

QUALIFIED GRID SUPPORT UTILITY INTERACTIVE INVERTERS AND CONTROLLERS MEETING MANDATORY FUNCTIONS SPECIFIED IN RULE 14H/IEEE1547-2018

Last Updated: 05/15/2024

The following list of certified advanced inverters has been approved by the Companies for use with all interconnection programs under Rule 14H, except for Customer Self-Supply (Rule 22), Net Energy Metering Plus (Rule 27), and Smart Renewable Energy Non-Export (Rule 32). The equipment manufacturers represent that the designated models with associated firmware have been formally certified to Underwriters Laboratories Standard 1741 ("UL 1741") 3rd Edition, per the Companies' interconnection requirements.

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Alpha ESS Suzhou Co., LTD	Hawaii SRD V2.0	SMILE-SP7.6-INV	000019 or higher
Inverter	Alpha ESS Suzhou Co., LTD	Hawaii SRD V2.0	SMILE-SP9.6-INV	000019 or higher
Inverter	Alpha ESS Suzhou Co., LTD	Hawaii SRD V2.0	SMILE-SPB7.6-INV	000019 or higher
Inverter	Alpha ESS Suzhou Co., LTD	Hawaii SRD V2.0	SMILE-SPB9.6-INV	000019 or higher
Inverter	Altenergy Power Systems	Hawaii SRD V2.0	DS3	V5 or higher
Inverter	Altenergy Power Systems	Hawaii SRD V2.0	DS3-H	V5 or higher
Inverter	Altenergy Power Systems	Hawaii SRD V2.0	DS3-L	V5 or higher
Inverter	Altenergy Power Systems	Hawaii SRD V2.0	DS3-S	V5 or higher
Inverter	Altenergy Power Systems	Hawaii SRD V2.0	ELS-3K	V1.2.3.2 or higher
Inverter	Altenergy Power Systems	Hawaii SRD V2.0	ELS-5K	V1.2.3.2 or higher
Inverter	Altenergy Power Systems	Hawaii SRD V2.0	QT2 (208 Vp-p)	V3 or Higher
Inverter	Altenergy Power Systems	Hawaii SRD V2.0	QT2 (480 Vp-p)	V3 or Higher
Inverter	Altenergy Power Systems	Hawaii SRD V2.0	QT2-208	V3 or Higher
Inverter	Altenergy Power Systems	Hawaii SRD V2.0	QT2-480	V3 or Higher
Inverter	Anker Innovations Limited	Hawaii SRD V2.0	MI80	V5 Checksum BC061063 or higher
Inverter	Anker Innovations Limited	Hawaii SRD V2.0	MI80H	V5 Checksum BC061063 or higher
Inverter	Anker Innovations Limited	Hawaii SRD V2.0	MI80L	V5 Checksum BC061063 or higher
Inverter	Anker Innovations Limited	Hawaii SRD V2.0	MI80S	V5 Checksum BC061063 or higher
Inverter	Chint Power Systems	Hawaii SRD V2.0	CPS ECB200KTL-US-800	DSP firmware: V1.02.00 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Chint Power Systems	Hawaii SRD V2.0	CPS SCA25KTL-DO-R/US-480	DSP Ver 04.00 and higher
Inverter	Chint Power Systems	Hawaii SRD V2.0	CPS SCA25KTL-DO/US-208	DSP Ver 04.00 and higher
Inverter	Chint Power Systems	Hawaii SRD V2.0	CPS SCA36KTL-DO/US-480	DSP firmware: V1.18.00 or higher
Inverter	Chint Power Systems	Hawaii SRD V2.0	CPS SCA50KTL-DO/US-480	DSP Ver 17.00 and higher
Inverter	Chint Power Systems	Hawaii SRD V2.0	CPS SCA60KTL-DO/US-480	DSP Ver 17.00 and higher
Inverter	Chint Power Systems	Hawaii SRD V2.0	CPS SCH100KTL-DO/US-480	DSP Ver 12.00 and higher
Inverter	Chint Power Systems	Hawaii SRD V2.0	CPS SCH100KTL-DO/US-600	DSP Ver 12.00 and higher
Inverter	Chint Power Systems	Hawaii SRD V2.0	CPS SCH125KTL-DO/US-600	DSP Ver 12.00 and higher
Inverter	Chint Power Systems	Hawaii SRD V2.0	CPS SCH275KTL-DO/US-800	DSP Ver 01.00 and higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E10-TL-US (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E10-TL-US (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E10-TL-US(AC) (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E10-TL-US(AC) (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E10_BDI (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E10_BDI (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E4-TL-US (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E4-TL-US (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E4-TL-US(AC) (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E4-TL-US(AC) (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E4_BDI (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E4_BDI (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E6-TL-US (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E6-TL-US (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E6-TL-US(AC) (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E6-TL-US(AC) (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E6_BDI (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E6_BDI (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E8 Plus-TL-US (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E8 Plus-TL-US (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E8 Plus-TL-US(AC) (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E8 Plus-TL-US(AC) (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E8-TL-US (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E8-TL-US (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E8-TL-US(AC) (208Vp-p)	1.6.2 or higher

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Inverter	Delta Electronics	Hawaii SRD V2.0	E8-TL-US(AC) (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E8 BDI (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	E8 BDI (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	M10-4-TL-US (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	M10-4-TL-US (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	M10-TL-US (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	M10-TL-US (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	M4-TL-US (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	M4-TL-US (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	M5-TL-US (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	M5-TL-US (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	M6-TL-US (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	M6-TL-US (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	M8-TL-US (208Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	M8-TL-US (240Vp-p)	1.6.2 or higher
Inverter	Delta Electronics	Hawaii SRD V2.0	PCS125HV	2.0.0.1.0 or higher
Inverter	Duracell Power Center	Hawaii SRD V2.0	D-1500M4 (208Vp-p)	V01.00.00 or higher
Inverter	Duracell Power Center	Hawaii SRD V2.0	D-1500M4 (240Vp-p)	V01.00.00 or higher
Inverter	Duracell Power Center	Hawaii SRD V2.0	D-350M1 (208Vp-p)	V01.00.00 or higher
Inverter	Duracell Power Center	Hawaii SRD V2.0	D-350M1 (240Vp-p)	V01.00.00 or higher
Inverter	Duracell Power Center	Hawaii SRD V2.0	D-700M2 (208Vp-p)	V01.00.00 or higher
Inverter	Duracell Power Center	Hawaii SRD V2.0	D-700M2 (240Vp-p)	V01.00.00 or higher
Inverter	Enphase Energy	Hawaii SRD V2.0	ENCHARGE-10-1P-NA	V1.24.02, V1.27.01, V1.31.1, V3.24.01 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	ENCHARGE-10T-1P-NA	V1.24.02, V1.27.01, V1.31.1, V3.24.01 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	ENCHARGE-3-1P-NA	V1.24.02, V1.27.01, V1.31.1, V3.24.01 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	ENCHARGE-3T-1P-NA	V1.24.02, V1.27.01, V1.31.1, V3.24.01 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ7-60	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ7A (208 Vac)	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ7A (240 Vac)	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ7AS-66(240Vp-p)	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ7HS (208Vac)	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ7HS (240Vac)	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ7HS-66 (208Vp-p)	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ7HS-66 (240Vp-p)	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ7PD-72-2-US	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ7PD-84-2-US	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ7PLUS-72	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ7X-96	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ7XS-96	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8-60	V2.19.01, V2.22.02, V2.23.01, V2.27.02, V2.38.02, V2.38.03, V2.39.01, V2.42.02, V2.45.02, V2.45.04 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8A-72	V2.19.01, V2.22.02, V2.23.01, V2.27.02, V2.38.02, V2.38.03, V2.39.01, V2.42.02, V2.45.02, V2.45.04 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8AC-72-M-US (208Vp-p)	V2.45.02 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8AC-72-M-US (240 Vp-p)	V2.45.02 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8D-BAT	V4.31.01 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8D-BAT-240	V4.31.01 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8H-208-72	V2.19.01, V2.22.02, V2.23.01, V2.27.02, V2.38.02, V2.38.03, V2.39.01, V2.42.02, V2.45.02, V2.45.04 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8H-240-72	V2.19.01, V2.22.02, V2.23.01, V2.27.02, V2.38.02, V2.38.03, V2.39.01, V2.42.02, V2.45.02, V2.45.04 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8H-3P-72	V2.57.03 or higher
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8HC-72-M-US (208Vp-p)	V2.45.02 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8HC-72-M-US (240 Vp-p)	V2.45.02 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8M-72	V2.19.01, V2.22.02, V2.23.01, V2.27.02, V2.38.02, V2.38.03, V2.39.01, V2.42.02, V2.45.02, V2.45.04 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8MC-72-M-US (208Vp-p)	V2.45.02 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8MC-72-M-US (240 Vp-p)	V2.45.02 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8P-3P-72	V2.57.03 or higher
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8P-72-2-US	V7.04.01 or higher
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8PLUS-72	V2.19.01, V2.22.02, V2.23.01, V2.27.02, V2.38.02, V2.38.03, V2.39.01, V2.42.02, V2.45.02, V2.45.04 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8X-80 (208Vp-p)	V2.61.01 or higher
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8X-80 (240Vp-p)	V2.61.01 or higher
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8X-BAT-US	V1.24.02, V1.27.01, V1.31.1, V3.24.01 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQ8X-BAT-US-NB	V1.24.02, V1.27.01, V1.31.1, V3.24.01 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Enphase Energy	Hawaii SRD V2.0	IQBATTERY-5P-1P-NA	V4.31.01 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
Inverter	Fortress Power	Hawaii SRD V2.0	Avalon HV PC114	A2 or higher
Inverter	Fortress Power	Hawaii SRD V2.0	Avalon HV PC76	A2 or higher
Inverter	Fortress Power	Hawaii SRD V2.0	FP-ENVY-12K (208 Vp-p)	fA1.0 or higher
Inverter	Fortress Power	Hawaii SRD V2.0	FP-ENVY-12K (240 Vp-p)	fA1.0 or higher
Inverter	Fortress Power	Hawaii SRD V2.0	FP: eSpireMiniHV	fA1.0 or higher
Inverter	Fox ESS	Hawaii SRD V2.0	H1-11.4-US	V1.02 or higher Slave MCU (U1022)
Inverter	Fox ESS	Hawaii SRD V2.0	H1-3.8-US	V1.08 or higher Master MCU(U1000)
Inverter	Fox ESS	Hawaii SRD V2.0	H1-5.7-US	V1.08 or higher Master MCU(U1000)
Inverter	Fox ESS	Hawaii SRD V2.0	H1-7.6-US	V1.02 or higher Slave MCU (U1022)
Inverter	Fox ESS	Hawaii SRD V2.0	H1-9.6-US	V1.02 or higher Slave MCU (U1022)
Inverter	FranklinWH Technologies Co., Ltd	Hawaii SRD V2.0	aPower X, with aGate X (208Vp-p)	V10R00B00 or higher
Inverter	FranklinWH Technologies Co., Ltd	Hawaii SRD V2.0	aPower X, with aGate X (240 Vp-p)	V10R00B00 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Generac	Hawaii SRD V2.0	XVT076A03	V13845 checksum dce259439976a7ea17 60bc416551b6b3 with Grid Profile HECO SRD V2.0
Inverter	Ginlong Technologies	Hawaii SRD V2.0	S6-EH1P10K-H-US	Master DSP: A2 or higher, Checksum: D7CA3D39 Slave DSP: A2 or higher, Checksum: 7CAF9930
Inverter	Ginlong Technologies	Hawaii SRD V2.0	S6-EH1P11.4K-H-US	Master DSP: A2 or higher, Checksum: D7CA3D39 Slave DSP: A2 or higher, Checksum: 7CAF9930
Inverter	Ginlong Technologies	Hawaii SRD V2.0	S6-EH1P3.8K-H-US	Master DSP: A2 or higher, Checksum: D7CA3D39 Slave DSP: A2 or higher, Checksum: 7CAF9930
Inverter	Ginlong Technologies	Hawaii SRD V2.0	S6-EH1P5K-H-US	Master DSP: A2 or higher, Checksum: D7CA3D39 Slave DSP: A2 or higher, Checksum: 7CAF9930
Inverter	Ginlong Technologies	Hawaii SRD V2.0	S6-EH1P7.6K-H-US	Master DSP: A2 or higher, Checksum: D7CA3D39 Slave DSP: A2 or higher, Checksum: 7CAF9930
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC11.4-1U-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC5.0-1U-US10	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC5.0-1U-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC6.0-1U-US10	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC6.0-1U-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC7.0-1U-US10	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC7.6-1U-US10	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC7.6-1U-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC8.6-1U-US10	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC9.6-1U-US10	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC9.6-1U-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH11.4-1U-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH5.0-1U-US10	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH5.0-1U-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH6.0-1U-US10	000019 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH6.0-1U-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH7.0-1U-US10	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH7.6-1U-US10	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH7.6-1U-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH8.6-1U-US10	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH9.6-1U-US10	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH9.6-1U-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP11.4-1-US30 (208Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP11.4-1-US30 (240Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP5.0-1-US30 (208Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP5.0-1-US30 (240Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP6.0-1-US30 (208Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP6.0-1-US30 (240Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP7.6-1-US30 (208Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP7.6-1-US30 (240Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP7.7-1-US30 (208Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP7.7-1-US30 (240Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP9.6-1-US30 (208Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP9.6-1-US30 (240Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW11K4-ES-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW11K4-MS-US30 (208Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW11K4-MS-US30 (240Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW11K4-SBP-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000-ES-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000-MS-US30 (208Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000-MS-US30 (240Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000-SBP-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000A-BP	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000A-ES	000019 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000A-MS	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000H-ES	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW50K-SMT-US	00.00.01 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000-ES-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000-MS-US30 (208Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000-MS-US30 (240Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000-SBP-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000A-BP	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000A-ES	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000A-MS	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000H-ES	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW60K-SMT-US	00.00.01 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7000A-BP	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7000A-ES	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7000A-MS	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7000H-ES	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600-ES-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600-MS-US30 (208Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600-MS-US30 (240Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600-SBP-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600A-BP	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600A-ES	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600A-MS	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600H-ES	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7700-MS-US30 (208Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7700-MS-US30 (240Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW8600A-BP	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW8600A-ES	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW8600A-MS	000019 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW8600H-ES	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600-ES-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600-MS-US30 (208Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600-MS-US30 (240Vp-p)	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600-SBP-US20	000000 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600A-BP	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600A-ES	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600A-MS	000019 or higher
Inverter	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600H-ES	000019 or higher
Inverter	Green Solutions Inc.	Hawaii SRD V2.0	H12K-US (208Vp-p)	fA1.0 or higher
Inverter	Green Solutions Inc.	Hawaii SRD V2.0	H12K-US (240Vp-p)	fA1.0 or higher
Inverter	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT A3.8SX	Master DSP V1.05 (Slave DSP V1.03) or higher
Inverter	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT A5.0SX	Master DSP V1.05 (Slave DSP V1.03) or higher
Inverter	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT A6.0SX	Master DSP V1.05 (Slave DSP V1.03) or higher
Inverter	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT A7.6SX	Master DSP V1.05 (Slave DSP V1.03) or higher
Inverter	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT H3.8SX	Master DSP V1.05 (Slave DSP V1.03, AFCI V1.03) or higher
Inverter	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT H5.0SX	Master DSP V1.05 (Slave DSP V1.03, AFCI V1.03) or higher
Inverter	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT H6.0SX	Master DSP V1.05 (Slave DSP V1.03, AFCI V1.03) or higher
Inverter	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT H7.6SX	Master DSP V1.05 (Slave DSP V1.03, AFCI V1.03) or higher
Inverter	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT HOME HUB 200SX	Master DSP V1.05 (Slave DSP V1.03) or higher
Inverter	Holu Hou Energy LLC	Hawaii SRD V2.0	HH5000H-HI	000019 or higher
Inverter	Holu Hou Energy LLC	Hawaii SRD V2.0	HH6000H-HI	000019 or higher
Inverter	Holu Hou Energy LLC	Hawaii SRD V2.0	HH7000H-HI	000019 or higher
Inverter	Holu Hou Energy LLC	Hawaii SRD V2.0	HH7600H-HI	000019 or higher
Inverter	Holu Hou Energy LLC	Hawaii SRD V2.0	HH8600H-HI	000019 or higher
Inverter	Holu Hou Energy LLC	Hawaii SRD V2.0	HH9600H-HI	000019 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1000 (208Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_208V

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1000 (240Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_240V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1000N (208Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_208V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1000N (240Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_240V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1000NT (208Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_208V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1000NT (240Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_240V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1000T (208Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_208V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1000T (240Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_240V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1200 (208Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_208V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1200 (240Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_240V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1200N (208Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_208V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1200N (240Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_240V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1200NT (208Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_208V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1200NT (240Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_240V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1200T (208Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_208V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1200T (240Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_240V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1500 (208Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_208V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1500 (240Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_240V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1500N (208Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_208V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1500N (240Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_240V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1500NT (208Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_208V

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1500NT (240Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_240V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1500T (208Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_208V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1500T (240Vp-p)	V01.00.00 or higher, US_HECO SRD V2.0_240V
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-300NT (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-300NT (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-350NT (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-350NT (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-400NT (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-400NT (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-600NT (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-600NT (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-700NT (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-700NT (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-800NT (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-800NT (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-1000-2T (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-1000-2T (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-1000-2T-NA (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-1000-2T-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-1600-4T-NA (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-1600-4T-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-1800-4T-NA (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-1800-4T-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-2000-4T-NA (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-2000-4T-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-300-1T (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-300-1T (240Vp-p)	V01.00.00 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-350-1A-NA (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-350-1A-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-350-1T (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-350-1T (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-350-1T-NA (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-350-1T-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-400-1A-NA (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-400-1A-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-400-1T (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-400-1T (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-400-1T-NA (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-400-1T-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-450-1A-NA (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-450-1A-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-450-1T (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-450-1T (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-450-1T-NA (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-450-1T-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-500-1A-NA (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-500-1A-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-500-1T (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-500-1T (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-500-1T-NA (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-500-1T-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-600-2T (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-600-2T (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-700-2T (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-700-2T (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-700-2T-NA (208Vp-p)	V01.00.00 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-700-2T-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-800-2T (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-800-2T (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-800-2T-NA (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-800-2T-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-900-2T (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-900-2T (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-900-2T-NA (208Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-900-2T-NA (240Vp-p)	V01.00.00 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMT-1600-4T-208 (208Vp-p)	V01.00.03 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMT-1600-4T-208-NA (208Vp-p)	V01.00.03 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMT-1800-4T-208 (208Vp-p)	V01.00.03 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMT-1800-4T-208-NA (208Vp-p)	V01.00.03 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMT-2000-4T-208 (208Vp-p)	V01.00.03 or higher
Inverter	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMT-2000-4T-208-NA (208Vp-p)	V01.00.03 or higher
Inverter	LG Electronics	Hawaii SRD V2.0	RA768K00A10	LG P1 01.00.01.00 R85 53.32 or higher
Inverter	LG Electronics	Hawaii SRD V2.0	RBA008K0A00	V1.1.1712 or higher
Inverter	LG Energy Solution	Hawaii SRD V2.0	SHB-G1	000000 or higher
Inverter	Lion Energy	Hawaii SRD V2.0	50170168	V1.0.06(DSP), V1.03.06(ARM) or higher
Inverter	Northern Electric & Power Co.	Hawaii SRD V2.0	BDM-550	9200 or Higher
Inverter	Northern Electric & Power Co.	Hawaii SRD V2.0	BDM-650	9200 or Higher
Inverter	Northern Electric & Power Co.	Hawaii SRD V2.0	BDM-800 (208 Vp-p)	9200 or Higher
Inverter	Northern Electric & Power Co.	Hawaii SRD V2.0	BDM-800 (240 Vp-p)	9200 or Higher
Inverter	Panasonic Corporation of North America	Hawaii SRD V2.0	EVAC-I3	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
Inverter	Panasonic Corporation of North America	Hawaii SRD V2.0	EVAC-I5	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Panasonic Corporation of North America	Hawaii SRD V2.0	EVAC-I6	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
Inverter	Panasonic Corporation of North America	Hawaii SRD V2.0	EVAC-I7	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
Inverter	Panasonic Corporation of North America	Hawaii SRD V2.0	EVHB-I3	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
Inverter	Panasonic Corporation of North America	Hawaii SRD V2.0	EVHB-I5	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
Inverter	Panasonic Corporation of North America	Hawaii SRD V2.0	EVHB-I6	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
Inverter	Panasonic Corporation of North America	Hawaii SRD V2.0	EVHB-I7	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
Inverter	SAJ Electric	Hawaii SRD V2.0	H2-10K-S4-US (208 Vp-p)	Master DSP: V1.002 or higher Checksum: 0x F4E69621 Slave DSP: V1.001 or higher Checksum: 0x1A983BE13
Inverter	SAJ Electric	Hawaii SRD V2.0	H2-10K-S4-US (240 Vp-p)	Master DSP: V1.002 or higher Checksum: 0x F4E69621 Slave DSP: V1.001 or higher Checksum: 0x1A983BE12
Inverter	SAJ Electric	Hawaii SRD V2.0	H2-12K-S4-US (208 Vp-p)	Master DSP: V1.002 or higher Checksum: 0x F4E69621 Slave DSP: V1.001 or higher Checksum: 0x1A983BE15
Inverter	SAJ Electric	Hawaii SRD V2.0	H2-12K-S4-US (240 Vp-p)	Master DSP: V1.002 or higher Checksum: 0x F4E69621 Slave DSP: V1.001 or higher Checksum: 0x1A983BE14
Inverter	SAJ Electric	Hawaii SRD V2.0	H2-5K-S3-US (208 Vp-p)	Master DSP: V1.002 or higher Checksum: 0x F4E69621 Slave DSP: V1.001 or higher Checksum: 0x1A983BE7

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	SAJ Electric	Hawaii SRD V2.0	H2-5K-S3-US (240 Vp-p)	Master DSP: V1.002 or higher Checksum: 0x F4E69621 Slave DSP: V1.001 or higher Checksum: 0x1A983BE6
Inverter	SAJ Electric	Hawaii SRD V2.0	H2-7.6K-S3-US (208 Vp-p)	Master DSP: V1.002 or higher Checksum: 0x F4E69621 Slave DSP: V1.001 or higher Checksum: 0x1A983BE9
Inverter	SAJ Electric	Hawaii SRD V2.0	H2-7.6K-S3-US (240 Vp-p)	Master DSP: V1.002 or higher Checksum: 0x F4E69621 Slave DSP: V1.001 or higher Checksum: 0x1A983BE8
Inverter	SAJ Electric	Hawaii SRD V2.0	H2-8.6K-S4-US (208 Vp-p)	Master DSP: V1.002 or higher Checksum: 0x F4E69621 Slave DSP: V1.001 or higher Checksum: 0x1A983BE11
Inverter	SAJ Electric	Hawaii SRD V2.0	H2-8.6K-S4-US (240 Vp-p)	Master DSP: V1.002 or higher Checksum: 0x F4E69621 Slave DSP: V1.001 or higher Checksum: 0x1A983BE10
Inverter	SAJ Electric	Hawaii SRD V2.0	SBU-200	Master DSP: V1.002 or higher
Inverter	Schneider Electric	Hawaii SRD V2.0	HY8K1NA1	V42 or higher
Inverter	Schneider Electric	Hawaii SRD V2.0	XW Pro 6848 NA (120 Vp-p)	V2.04BN17 or higher
Inverter	Schneider Electric	Hawaii SRD V2.0	XW Pro 6848 NA (240 Vp-p)	V2.04BN17 or higher
Inverter	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-5-10-G-1	V2.0
Inverter	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-5-10-W-1	V2.0
Inverter	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-6-13-G-1	V2.0
Inverter	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-6-13-W-1	V2.0
Inverter	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-7-16-G-1	V2.0
Inverter	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-7-16-W-1	V2.0
Inverter	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-7-20-G-1	V2.0
Inverter	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-7-20-W-1	V2.0

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 10000TL-XA-US	UE 1.0 or higher
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 10000TL-XH-US	UE 1.0 or higher
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 11400TL-XA-US	UE 1.0 or higher
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 11400TL-XH-US	UE 1.0 or higher
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 3000TL-XA-US	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 3000TL-XH-US	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 3800TL-XA-US	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 3800TL-XH-US	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 3800TL-XH-US(S)	UE 1.0 or higher
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 5000TL-XA-US	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 5000TL-XH-US	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 6000TL-XA-US	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 6000TL-XH-US	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 7600TL-XA-US	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 7600TL-XH-US	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 7600TL-XH-US(S)	UE 1.0 or higher
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 8200TL-XA-US	UE 1.0 or higher
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 8200TL-XH-US	UE 1.0 or higher
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 9000TL-XA-US	UE 1.0 or higher
Inverter	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 9000TL-XH-US	UE 1.0 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Shenzhen Lux Power Technology Co.,LTD	Hawaii SRD V2.0	LXP-LB-US 12K (208 Vp-p)	fA1.0 or higher
Inverter	Shenzhen Lux Power Technology Co.,LTD	Hawaii SRD V2.0	LXP-LB-US 12K (240 Vp-p)	fA1.0 or higher
Inverter	Sicon S.r.l. - SOCOMEC	Hawaii SRD V2.0	SUN-HES-L-480+1xSUN-HES-MOD50	V1.3.6 or higher
Inverter	Sicon S.r.l. - SOCOMEC	Hawaii SRD V2.0	SUN-HES-L-480+2xSUN-HES-MOD50	V1.3.6 or higher
Inverter	Sicon S.r.l. - SOCOMEC	Hawaii SRD V2.0	SUN-HES-L-480+3xSUN-HES-MOD50	V1.3.6 or higher
Inverter	Sicon S.r.l. - SOCOMEC	Hawaii SRD V2.0	SUN-HES-L-480+4xSUN-HES-MOD50	V1.3.6 or higher
Inverter	Sicon S.r.l. - SOCOMEC	Hawaii SRD V2.0	SUN-HES-L-480+5xSUN-HES-MOD50	V1.3.6 or higher
Inverter	Sicon S.r.l. - SOCOMEC	Hawaii SRD V2.0	SUN-HES-L-480+6xSUN-HES-MOD50	V1.3.6 or higher
Inverter	SINEXCEL INC	Hawaii SRD V2.0	PWS1-500K-NA-1M1	1400 or Higher
Inverter	SINEXCEL INC	Hawaii SRD V2.0	PWS1-500K-NA-1M4	1400 or Higher
Inverter	SINEXCEL INC	Hawaii SRD V2.0	PWS1-500K-NA-1M8	1400 or Higher
Inverter	SINEXCEL INC	Hawaii SRD V2.0	PWS1-500K-NA-8M1	1400 or Higher
Inverter	SINEXCEL INC	Hawaii SRD V2.0	PWS1-500K-NA-8M4	1400 or Higher
Inverter	SINEXCEL INC	Hawaii SRD V2.0	PWS1-500K-NA-8M8	1400 or Higher
Inverter	SINEXCEL INC	Hawaii SRD V2.0	PWS2-30P-NA	v1.0 or higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	SBSE3.8-US-50 (208Vp-p)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	SBSE3.8-US-50 (240Vp-p)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	SBSE4.8-US-50 (208Vp-p)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	SBSE4.8-US-50 (240Vp-p)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	SBSE5.8-US-50 (208Vp-p)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	SBSE5.8-US-50 (240Vp-p)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	SBSE7.7-US-50 (208Vp-p)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	SMA America, LLC	Hawaii SRD V2.0	SBSE7.7-US-50 (240Vp-p)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	SHP 125-US-21	3.15.22 or higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	SHP 150-US-21	3.15.22 or higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	SHP 165-US-21	3.15.22 or higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	SHP 172-US-21	3.15.22 or higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	SHP FLEX-US-21	3.15.22 or higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	STP 20-US-50	2.16.3.R or Higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	STP 25-US-50	2.16.3.R or Higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	STP 30-US-50	2.16.3.R or Higher
Inverter	SMA America, LLC	Hawaii SRD V2.0	STP 33-US-41	01.05.03.R and up
Inverter	SMA America, LLC	Hawaii SRD V2.0	STP 50-US-40	01.05.03.R and up
Inverter	SMA America, LLC	Hawaii SRD V2.0	STP 50-US-41	01.05.03.R and up
Inverter	SMA America, LLC	Hawaii SRD V2.0	STP 62-US-41	01.05.03.R and up
Inverter	Sol-Ark	Hawaii SRD V2.0	30K-3P-208V	MCU: Ver1057 or later and COMM: 101F - XXXX or later
Inverter	Sol-Ark	Hawaii SRD V2.0	60K-3P-480V	MCU: Ver1057 or later
Inverter	Sol-Ark	Hawaii SRD V2.0	Limitless 15K-LV (208Vp-p)	v7214 and higher
Inverter	Sol-Ark	Hawaii SRD V2.0	Limitless 15K-LV (240Vp-p)	v7214 and higher
Inverter	Sol-Ark	Hawaii SRD V2.0	Sol-Ark 12K-P (208Vp-p)	MCU xx22 or Higher
Inverter	Sol-Ark	Hawaii SRD V2.0	Sol-Ark 12K-P (240Vp-p)	MCU xx22 or Higher
Inverter	Sol-Ark	Hawaii SRD V2.0	Sol-Ark 5K-48-ST (208Vp-p)	MCU xx22 or Higher
Inverter	Sol-Ark	Hawaii SRD V2.0	Sol-Ark 5K-48-ST (240Vp-p)	MCU xx22 or Higher
Inverter	Sol-Ark	Hawaii SRD V2.0	Sol-Ark 8K-48-ST (208Vp-p)	MCU xx22 or Higher
Inverter	Sol-Ark	Hawaii SRD V2.0	Sol-Ark 8K-48-ST (240Vp-p)	MCU xx22 or Higher
Inverter	SolarEdge	Hawaii SRD V2.0	SE10000H-US (208Vp-p)	V2.100.1204, Checksum 0xFC5866C9 or higher
Inverter	SolarEdge	Hawaii SRD V2.0	SE10000H-US (240Vp-p)	V2.100.1204, Checksum 0xFC5866C9 or higher
Inverter	SolarEdge	Hawaii SRD V2.0	SE100KUS	2.20.710 or higher w/ Country Code Profile US/Hawaii
Inverter	SolarEdge	Hawaii SRD V2.0	SE10KUS	2.20.710 or higher w/ Country Code Profile US/Hawaii
Inverter	SolarEdge	Hawaii SRD V2.0	SE11400H-US (208Vp-p)	V2.100.1204, Checksum 0xFC5866C9 or higher
Inverter	SolarEdge	Hawaii SRD V2.0	SE11400H-US (240Vp-p)	V2.100.1204, Checksum 0xFC5866C9 or higher
Inverter	SolarEdge	Hawaii SRD V2.0	SE120KUS	2.20.710 or higher w/ Country Code Profile US/Hawaii

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	SolarEdge	Hawaii SRD V2.0	SE14.4KUS	2.20.710 or higher w/ Country Code Profile US/Hawaii
Inverter	SolarEdge	Hawaii SRD V2.0	SE17.3KUS	2.20.710 or higher w/ Country Code Profile US/Hawaii
Inverter	SolarEdge	Hawaii SRD V2.0	SE3000H-US	V2.100.1204, Checksum 0xFC5866C9 or higher
Inverter	SolarEdge	Hawaii SRD V2.0	SE30KUS	2.20.710 or higher w/ Country Code Profile US/Hawaii
Inverter	SolarEdge	Hawaii SRD V2.0	SE33.3KUS	2.20.710 or higher w/ Country Code Profile US/Hawaii
Inverter	SolarEdge	Hawaii SRD V2.0	SE3800H-US (208Vp- p)	V2.100.1204, Checksum 0xFC5866C9 or higher
Inverter	SolarEdge	Hawaii SRD V2.0	SE3800H-US (240Vp- p)	V2.100.1204 or higher, Checksum 0xFC5866C9 or higher
Inverter	SolarEdge	Hawaii SRD V2.0	SE40KUS	2.20.710 or higher w/ Country Code Profile US/Hawaii
Inverter	SolarEdge	Hawaii SRD V2.0	SE43.2KUS	2.20.710 or higher w/ Country Code Profile US/Hawaii
Inverter	SolarEdge	Hawaii SRD V2.0	SE5000H-US (208Vp- p)	V2.100.1204, Checksum 0xFC5866C9 or higher
Inverter	SolarEdge	Hawaii SRD V2.0	SE5000H-US (240Vp- p)	V2.100.1204, Checksum 0xFC5866C9 or higher
Inverter	SolarEdge	Hawaii SRD V2.0	SE50KUS	2.20.710 or higher w/ Country Code Profile US/Hawaii
Inverter	SolarEdge	Hawaii SRD V2.0	SE5700H-US (208Vp- p)	V2.100.1204, Checksum 0xFC5866C9 or higher
Inverter	SolarEdge	Hawaii SRD V2.0	SE5700H-US (240Vp- p)	V2.100.1204, Checksum 0xFC5866C9 or higher
Inverter	SolarEdge	Hawaii SRD V2.0	SE6000H-US (208Vp- p)	V2.100.1204, Checksum 0xFC5866C9 or higher
Inverter	SolarEdge	Hawaii SRD V2.0	SE6000H-US (240Vp- p)	V2.100.1204, Checksum 0xFC5866C9 or higher
Inverter	SolarEdge	Hawaii SRD V2.0	SE66.6KUS	2.20.710 or higher w/ Country Code Profile US/Hawaii
Inverter	SolarEdge	Hawaii SRD V2.0	SE7600H-US	2.100.1204 or higher w/ Country Code Profile US/Hawaii V2.100.1204, Checksum 0xFC5866C9
Inverter	SolarEdge	Hawaii SRD V2.0	SE80KUS	2.20.710 or higher w/ Country Code Profile US/Hawaii

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	SolaX Power Network Technology	Hawaii SRD V2.0	A1-AC-3.8K-G2	Master DSP V1.05(Slave DSP V1.03) or higher
Inverter	SolaX Power Network Technology	Hawaii SRD V2.0	A1-AC-5.0K-G2	Master DSP V1.05(Slave DSP V1.03) or higher
Inverter	SolaX Power Network Technology	Hawaii SRD V2.0	A1-AC-6.0K-G2	"Master DSP V1.05(Slave DSP V1.03) or higher"
Inverter	SolaX Power Network Technology	Hawaii SRD V2.0	A1-AC-7.6K-G2	Master DSP V1.05(Slave DSP V1.03) or higher
Inverter	SolaX Power Network Technology	Hawaii SRD V2.0	A1-HYB-3.8K-G2	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
Inverter	SolaX Power Network Technology	Hawaii SRD V2.0	A1-HYB-5.0K-G2	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
Inverter	SolaX Power Network Technology	Hawaii SRD V2.0	A1-HYB-6.0K-G2	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
Inverter	SolaX Power Network Technology	Hawaii SRD V2.0	A1-HYB-7.6K-G2	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
Inverter	Solectria Renewables, LLC (Yaskawa-Solectria Solar)	Hawaii SRD V2.0	PVI 25TL-208	DSP V01.04.00 or higher
Inverter	Solectria Renewables, LLC (Yaskawa-Solectria Solar)	Hawaii SRD V2.0	PVI 50TL-480	DSP V01.17.00 or higher
Inverter	Solectria Renewables, LLC (Yaskawa-Solectria Solar)	Hawaii SRD V2.0	PVI 60TL-480	DSP V01.17.00 or higher
Inverter	Solectria Renewables, LLC (Yaskawa-Solectria Solar)	Hawaii SRD V2.0	PVI-36TL-480-V2	DSP V19.0 or higher
Inverter	Solectria Renewables, LLC (Yaskawa-Solectria Solar)	Hawaii SRD V2.0	PVI25TL-480-R	DSP V00.05.00 or higher
Inverter	SunPower	Hawaii SRD V2.0	SPWR-A4 (240Vp-p)	Version 20.0 or higher with grid profile HECO_IEEE_1547-2018
Inverter	SunPower	Hawaii SRD V2.0	SPWR-A5 (208Vp-p)	Version 20.0 or higher with grid profile HECO_IEEE_1547-2018
Inverter	SunPower	Hawaii SRD V2.0	SPWR-A5 (240Vp-p)	Version 20.0 or higher with grid profile HECO_IEEE_1547-2018
Inverter	SunPower	Hawaii SRD V2.0	SV-BASE-13-12-0	V2.04BN17 or higher
Inverter	SunPower	Hawaii SRD V2.0	SV-BASE-13-12-A	V2.04BN17 or higher
Inverter	SunPower	Hawaii SRD V2.0	SV-BASE-13-12-B	V2.04BN17 or higher
Inverter	SunPower	Hawaii SRD V2.0	SV-BASE-13-C	V2.04BN17 or higher
Inverter	SunPower	Hawaii SRD V2.0	SV-BASE-19.5-C	V2.04BN17 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Syl Battery	Hawaii SRD V2.0	SU1147U125HV	2.0.0.1.0 or higher
Inverter	Syl Battery	Hawaii SRD V2.0	SU1147U375HV	2.0.0.1.0 or higher
Inverter	Syl Battery	Hawaii SRD V2.0	SU1147U500HV	2.0.0.1.0 or higher
Inverter	Syl Battery	Hawaii SRD V2.0	SU287U125HV	2.0.0.1.0 or higher
Inverter	Syl Battery	Hawaii SRD V2.0	SU573U125HV	2.0.0.1.0 or higher
Inverter	Syl Battery	Hawaii SRD V2.0	SU573U250HV	2.0.0.1.0 or higher
Inverter	Syl Battery	Hawaii SRD V2.0	SU860125HV	2.0.0.1.0 or higher
Inverter	Syl Battery	Hawaii SRD V2.0	SU860U375HV	2.0.0.1.0 or higher
Inverter	Syl Battery	Hawaii SRD V2.0	SU86U250HV	2.0.0.1.0 or higher
Inverter	Tesla	Hawaii SRD V2.0	Powerwall 3 1707000-XX-Y	c5773b136a9ef9be9057302a67258482 and dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
Inverter	Tesla	Hawaii SRD V2.0	Tesla AC Powerwall 2 (240 V) 2012170-xx-y	1.7.0 and higher 3700B98CF516D8D8421D23891E9AD8D5 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
Inverter	Tesla	Hawaii SRD V2.0	Tesla AC Powerwall 2 (240 V) 3012170-xx-y	1.7.0 and higher 3700B98CF516D8D8421D23891E9AD8D5 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
Inverter	Tesla	Hawaii SRD V2.0	Tesla Megapack2 1748844-XX-Y	9IWD23njXAz+y3gW4k5ZNZ2Us+MSb5f+I5KNQtp7Yq0=
Inverter	Tesla	Hawaii SRD V2.0	Tesla Megapack2XL 1848844-XX-Y	9IWD23njXAz+y3gW4k5ZNZ2Us+MSb5f+I5KNQtp7Yq0=
Inverter	Tesla	Hawaii SRD V2.0	Tesla Powerwall+ 1850000-XX-Y	1217B43E9B859EAB26ECB10B5FBECC64 & 3700B98CF516D8D8421D23891E9AD8D5 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
Inverter	Tesla	Hawaii SRD V2.0	Tesla PV Inverter 1534000-XX-Y	1217B43E9B859EAB26ECB10B5FBECC64 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
Inverter	Tesla	Hawaii SRD V2.0	Tesla PV Inverter 1538000-XX-Y (240Vp-p, 3.8kW)	1217B43E9B859EAB26ECB10B5FBECC64 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
Inverter	Tesla	Hawaii SRD V2.0	Tesla PV Inverter 1538000-XX-Y (240Vp-p, 5.7kW)	1217B43E9B859EAB26ECB10B5FBECC64 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
Inverter	Tesla	Hawaii SRD V2.0	Tesla PV Inverter 1538000-XX-Y (240Vp-p, 5kW)	1217B43E9B859EAB26ECB10B5FBECC64 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
Inverter	Tesla	Hawaii SRD V2.0	Tesla PV Inverter 1538000-XX-Y (240Vp-p, 7.6kW)	1217B43E9B859EAB26 ECB10B5FBECC64 & dcq8OiBXbQWYnK9Uh CAjvl02/py2MZymmw AQYOn8jSc=
Inverter	Tigo Energy	Hawaii SRD V2.0	TSI-10.0K-US	UE1.0
Inverter	Tigo Energy	Hawaii SRD V2.0	TSI-11.4K-US	UE1.0
Inverter	Tigo Energy	Hawaii SRD V2.0	TSI-3.0K-US	UE1.0 (checksum:8CB43554C CBB5D85F0581EA268 A5C28)
Inverter	Tigo Energy	Hawaii SRD V2.0	TSI-3.8K-US	UE1.0 (checksum:8CB43554C CBB5D85F0581EA268 A5C28)
Inverter	Tigo Energy	Hawaii SRD V2.0	TSI-5.0K-US	UE1.0 (checksum:8CB43554C CBB5D85F0581EA268 A5C28)
Inverter	Tigo Energy	Hawaii SRD V2.0	TSI-6.0K-US	UE1.0 (checksum:8CB43554C CBB5D85F0581EA268 A5C28)
Inverter	Tigo Energy	Hawaii SRD V2.0	TSI-7.6K-US	UE1.0 (checksum:8CB43554C CBB5D85F0581EA268 A5C28)
Inverter	Tigo Energy	Hawaii SRD V2.0	TSI-8.2K-US	UE1.0
Inverter	Tigo Energy	Hawaii SRD V2.0	TSI-9.0K-US	UE1.0
Inverter	Yotta Energy	Hawaii SRD V2.0	DPI-208	V3 or Higher
Inverter	Yotta Energy	Hawaii SRD V2.0	DPI-480	V3 or Higher

QUALIFIED GRID SUPPORT UTILITY INTERACTIVE INVERTERS AND CONTROLLERS AND EQUIPMENT FOR CUSTOMER SELF-SUPPLY AND NEM PLUS SYSTEMS

Last Updated: 05/15/2024

The following list of certified advanced inverters with associated equipment has been approved by the Companies for use with the Customer Self-Supply (Rule 22), NEM Plus (Rule 27), and Smart Renewable Energy Non-Export (Rule 32) programs. The equipment manufacturers represent that the designated models with associated firmware have been formally certified to Underwriters Laboratories Standard 1741 ("UL 1741") 3rd Edition, per the Companies interconnection requirements.

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Alpha ESS Suzhou Co., LTD	Hawaii SRD V2.0	SMILE-SP7.6-INV w/ Meter (AGF-AE-D/200 2CT)	000019 or higher
CSS System	Alpha ESS Suzhou Co., LTD	Hawaii SRD V2.0	SMILE-SP9.6-INV w/ Meter (AGF-AE-D/200 2CT)	000019 or higher
CSS System	Alpha ESS Suzhou Co., LTD	Hawaii SRD V2.0	SMILE-SPB7.6-INV w/ Meter (AGF-AE-D/200 2CT)	000019 or higher
CSS System	Alpha ESS Suzhou Co., LTD	Hawaii SRD V2.0	SMILE-SPB9.6-INV w/ Meter (AGF-AE-D/200 2CT)	000019 or higher
CSS System	Altenergy Power Systems	Hawaii SRD V2.0	DS3 w/ ECU-C, CT or ECU-R, Meter CT	V5 or higher
CSS System	Altenergy Power Systems	Hawaii SRD V2.0	DS3-H w/ ECU-C, CT or ECU-R, Meter CT	V5 or higher
CSS System	Altenergy Power Systems	Hawaii SRD V2.0	DS3-L w/ ECU-C, CT or ECU-R, Meter CT	V5 or higher
CSS System	Altenergy Power Systems	Hawaii SRD V2.0	DS3-S w/ ECU-C, CT or ECU-R, Meter CT	V5 or higher
CSS System	Altenergy Power Systems	Hawaii SRD V2.0	ELS-3K w/ CT or Meter	V1.2.3.2 or higher
CSS System	Altenergy Power Systems	Hawaii SRD V2.0	ELS-5K w/ CT or Meter	V1.2.3.2 or higher
CSS System	Altenergy Power Systems	Hawaii SRD V2.0	QT2 (208 Vp-p) w/ ECU-C, CT or ECU-R, Meter CT	V3 or Higher
CSS System	Altenergy Power Systems	Hawaii SRD V2.0	QT2 (480 Vp-p) w/ ECU-C, CT or ECU-R, Meter CT	V3 or Higher
CSS System	Altenergy Power Systems	Hawaii SRD V2.0	QT2-208 w/ ECU-C, CT or ECU-R, Meter CT	V3 or Higher
CSS System	Altenergy Power Systems	Hawaii SRD V2.0	QT2-480 w/ ECU-C, CT or ECU-R, Meter CT	V3 or Higher
CSS System	Anker Innovations Limited	Hawaii SRD V2.0	MI80 w/ ECU Zibee Dongle, Meter or CT	V5 Checksum BC061063 or higher
CSS System	Anker Innovations Limited	Hawaii SRD V2.0	MI80H w/ ECU Zibee Dongle, Meter or CT	V5 Checksum BC061063 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Anker Innovations Limited	Hawaii SRD V2.0	MI80L w/ ECU Zibee Dongle, Meter or CT	V5 Checksum BC061063 or higher
CSS System	Anker Innovations Limited	Hawaii SRD V2.0	MI80S w/ ECU Zibee Dongle, Meter or CT	V5 Checksum BC061063 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E10-TL-US (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E10-TL-US (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E10-TL-US(AC) (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E10-TL-US(AC) (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E10_BDI (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E10_BDI (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E4-TL-US (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E4-TL-US (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E4-TL-US(AC) (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E4-TL-US(AC) (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E4_BDI (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E4_BDI (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E6-TL-US (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E6-TL-US (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E6-TL-US(AC) (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E6-TL-US(AC) (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E6_BDI (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E6_BDI (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E8 Plus-TL-US (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E8 Plus-TL-US (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E8 Plus-TL-US(AC) (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E8 Plus-TL-US(AC) (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E8-TL-US (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E8-TL-US (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E8-TL-US(AC) (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E8-TL-US(AC) (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E8_BDI (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	E8_BDI (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	M10-4-TL-US (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	M10-4-TL-US (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	M10-TL-US (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	M10-TL-US (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	M4-TL-US (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	M4-TL-US (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	M5-TL-US (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	M5-TL-US (240Vp-p)	1.6.2 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Delta Electronics	Hawaii SRD V2.0	M6-TL-US (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	M6-TL-US (240Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	M8-TL-US (208Vp-p)	1.6.2 or higher
CSS System	Delta Electronics	Hawaii SRD V2.0	M8-TL-US (240Vp-p)	1.6.2 or higher
CSS System	Duracell Power Center	Hawaii SRD V2.0	D-1500M4 (208Vp-p) w/ PC-PRO-C or PC-PRO-WIFI and Three-phase electric meter	V01.00.00 or higher
CSS System	Duracell Power Center	Hawaii SRD V2.0	D-1500M4 (240Vp-p) w/ PC-PRO-C or PC-PRO-WIFI and Three-phase electric meter	V01.00.00 or higher
CSS System	Duracell Power Center	Hawaii SRD V2.0	D-350M1 (208Vp-p) w/ PC-PRO-C or PC-PRO-WIFI and Three-phase electric meter	V01.00.00 or higher
CSS System	Duracell Power Center	Hawaii SRD V2.0	D-350M1 (240Vp-p) w/ PC-PRO-C or PC-PRO-WIFI and Three-phase electric meter	V01.00.00 or higher
CSS System	Duracell Power Center	Hawaii SRD V2.0	D-700M2 (208Vp-p) w/ PC-PRO-C or PC-PRO-WIFI and Three-phase electric meter	V01.00.00 or higher
CSS System	Duracell Power Center	Hawaii SRD V2.0	D-700M2 (240Vp-p) w/ PC-PRO-C or PC-PRO-WIFI and Three-phase electric meter	V01.00.00 or higher
CSS System	Enphase Energy	Hawaii SRD V2.0	ENCHARGE-10-1P-NA w/ Envoy Communication Gateway, AC Combiner Envoy	V1.24.02, V1.27.01, V1.31.1, V3.24.01 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	ENCHARGE-10T-1P-NA w/ Envoy Communication Gateway, AC Combiner Envoy	V1.24.02, V1.27.01, V1.31.1, V3.24.01 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	ENCHARGE-3-1P-NA w/ Envoy Communication Gateway, AC Combiner Envoy	V1.24.02, V1.27.01, V1.31.1, V3.24.01 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	ENCHARGE-3T-1P-NA w/ Envoy Communication Gateway, AC Combiner Envoy	V1.24.02, V1.27.01, V1.31.1, V3.24.01 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ7-60 w/ Envoy, AC Combiner Box	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ7A (208 Vac) w/ Envoy, AC Combiner Box	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ7A (240 Vac) w/ Envoy, AC Combiner Box	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ7AS-66(240Vp-p) w/ Production and Consumption CTs PVS6	Version 20.0 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ7HS (208Vac) w/ Envoy, AC Combiner Box	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ7HS (240Vac) w/ Envoy, AC Combiner Box	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ7HS-66 (208Vp-p) w/ Production and Consumption CTs PVS6	Version 20.0 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ7HS-66 (240Vp-p) w/ Production and Consumption CTs PVS6	Version 20.0 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ7PD-72-2-US w/ Envoy, AC Combiner Box	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ7PD-84-2-US w/ Envoy, AC Combiner Box	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ7PLUS-72 w/ Envoy, AC Combiner Box	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ7X-96 w/ Envoy, AC Combiner Box	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ7XS-96 w/ Envoy, AC Combiner Box	v02.12.00, v02.14.02, v04.14.05, v04.17.01, v04.18.02, v04.20.03, v04.26.09, v04.27.04, V04.28.07, V04.30.22, V04.40.01 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8-60 w/ Envoy, AC Combiner Box	V2.19.01, V2.22.02, V2.23.01, V2.27.02, V2.38.02, V2.38.03, V2.39.01, V2.42.02, V2.45.02, V2.45.04 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8A-72 w/ Envoy, AC Combiner Box	V2.19.01, V2.22.02, V2.23.01, V2.27.02, V2.38.02, V2.38.03, V2.39.01, V2.42.02, V2.45.02, V2.45.04 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8AC-72-M-US (208Vp-p) w/ Energy IQ Envoy, AC Combiner box	V2.45.02 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8AC-72-M-US (240 Vp-p) w/ Energy IQ Envoy, AC Combiner box	V2.45.02 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8H-208-72 w/ Envoy, AC Combiner Box	V2.19.01, V2.22.02, V2.23.01, V2.27.02, V2.38.02, V2.38.03, V2.39.01, V2.42.02, V2.45.02, V2.45.04 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8H-240-72 w/ Envoy, AC Combiner Box	V2.19.01, V2.22.02, V2.23.01, V2.27.02, V2.38.02, V2.38.03, V2.39.01, V2.42.02, V2.45.02, V2.45.04 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8H-3P-72 w/ Energy IQ Envoy, AC Combiner box	V2.57.03 or higher
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8HC-72-M-US (208Vp-p) w/ Energy IQ Envoy, AC Combiner box	V2.45.02 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8HC-72-M-US (240 Vp-p) w/ Energy IQ Envoy, AC Combiner box	V2.45.02 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8M-72 w/ Envoy, AC Combiner Box	V2.19.01, V2.22.02, V2.23.01, V2.27.02, V2.38.02, V2.38.03, V2.39.01, V2.42.02, V2.45.02, V2.45.04 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8MC-72-M-US (208Vp-p) w/ Energy IQ Envoy, AC Combiner box	V2.45.02 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8MC-72-M-US (240 Vp-p) w/ Energy IQ Envoy, AC Combiner box	V2.45.02 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8P-3P-72 w/ Energy IQ Envoy, AC Combiner box	V2.57.03 or higher
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8P-72-2-US w/ Energy IQ Gateway, AC Combiner box	V7.04.01 or higher
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8PLUS-72 w/ Envoy, AC Combiner Box	V2.19.01, V2.22.02, V2.23.01, V2.27.02, V2.38.02, V2.38.03, V2.39.01, V2.42.02, V2.45.02, V2.45.04 or higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8X-80 (208Vp-p) w/ Energy IQ Envoy, AC Combiner box	V2.61.01 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Enphase Energy	Hawaii SRD V2.0	IQ8X-80 (240Vp-p) w/ Energy IQ Envoy, AC Combiner box	V2.61.01 or higher
CSS System	Enphase Energy	Hawaii SRD V2.0	IQBATTERY-5P-1P-NA w/ Envoy Communication Gateway, AC Combiner Envoy, IQ Combiner 5/5C	V4.31.01 or Higher and with Grid profiles HEI SRD V2.0 CGS and HEI SRD V2.0 CSS
CSS System	Fortress Power	Hawaii SRD V2.0	FP-ENVY-12K (208 Vp-p) w/ eFlex 5.4 and eVault Max	fA1.0 or higher
CSS System	Fortress Power	Hawaii SRD V2.0	FP-ENVY-12K (240 Vp-p) w/ eFlex 5.4 and eVault Max	fA1.0 or higher
CSS System	FranklinWH Technologies Co., Ltd	Hawaii SRD V2.0	aPower X, with aGate X (208Vp-p)	V10R00B00 or higher
CSS System	FranklinWH Technologies Co., Ltd	Hawaii SRD V2.0	aPower X, with aGate X (240 Vp-p)	V10R00B00 or higher
CSS System	Generac	Hawaii SRD V2.0	XVT076A03 w/ LEM CT, CASR-50-NP, LEM S A CT, HLSR20P and Neurio Echun, 011.0021B.F	V13845 checksum dce259439976a7ea1760bc416551b6b3 with Grid Profile HECO SRD V2.0
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC11.4-1U-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC5.0-1U-US10	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC5.0-1U-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC6.0-1U-US10	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC6.0-1U-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC7.0-1U-US10	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC7.6-1U-US10	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC7.6-1U-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC8.6-1U-US10	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC9.6-1U-US10	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEC9.6-1U-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH11.4-1U-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH5.0-1U-US10	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH5.0-1U-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH6.0-1U-US10	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH6.0-1U-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH7.0-1U-US10	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH7.6-1U-US10	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH7.6-1U-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH8.6-1U-US10	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH9.6-1U-US10	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEH9.6-1U-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP11.4-1-US30 (208Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP11.4-1-US30 (240Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP5.0-1-US30 (208Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP5.0-1-US30 (240Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP6.0-1-US30 (208Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP6.0-1-US30 (240Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP7.6-1-US30 (208Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP7.6-1-US30 (240Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP7.7-1-US30 (208Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP7.7-1-US30 (240Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP9.6-1-US30 (208Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GEP9.6-1-US30 (240Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW11K4-ES-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW11K4-MS-US30 (208Vp-p) w/ Meter	000000 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW11K4-MS-US30 (240Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW11K4-SBP-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000-ES-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000-MS-US30 (208Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000-MS-US30 (240Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000-SBP-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000A-BP	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000A-ES	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000A-MS	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW5000H-ES	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW50K-SMT-US w/ Meter	00.00.01 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000-ES-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000-MS-US30 (208Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000-MS-US30 (240Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000-SBP-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000A-BP	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000A-ES	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000A-MS	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW6000H-ES	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW60K-SMT-US w/ Meter	00.00.01 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7000A-BP	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7000A-ES	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7000A-MS	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7000H-ES	000019 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600-ES-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600-MS-US30 (208Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600-MS-US30 (240Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600-SBP-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600A-BP	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600A-ES	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600A-MS	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7600H-ES	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7700-MS-US30 (208Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW7700-MS-US30 (240Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW8600A-BP	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW8600A-ES	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW8600A-MS	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW8600H-ES	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600-ES-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600-MS-US30 (208Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600-MS-US30 (240Vp-p) w/ Meter	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600-SBP-US20 w/ Meter or Goodwe Automatic backup device	000000 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600A-BP	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600A-ES	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600A-MS	000019 or higher
CSS System	GoodWe Technologies Co.,Ltd.	Hawaii SRD V2.0	GW9600H-ES	000019 or higher
CSS System	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT A3.8SX w/ Q.HOME HUB 200SX	Master DSP V1.05 (Slave DSP V1.03) or higher
CSS System	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT A5.0SX w/ Q.HOME HUB 200SX	Master DSP V1.05 (Slave DSP V1.03) or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT A6.0SX w/ Q.HOME HUB 200SX	Master DSP V1.05 (Slave DSP V1.03) or higher
CSS System	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT A7.6SX w/ Q.HOME HUB 200SX	Master DSP V1.05 (Slave DSP V1.03) or higher
CSS System	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT H3.8SX w/ Q.HOME HUB 200SX	Master DSP V1.05 (Slave DSP V1.03, AFCI V1.03) or higher
CSS System	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT H5.0SX w/ Q.HOME HUB 200SX	Master DSP V1.05 (Slave DSP V1.03, AFCI V1.03) or higher
CSS System	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT H6.0SX w/ Q.HOME HUB 200SX	Master DSP V1.05 (Slave DSP V1.03, AFCI V1.03) or higher
CSS System	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT H7.6SX w/ Q.HOME HUB 200SX	Master DSP V1.05 (Slave DSP V1.03, AFCI V1.03) or higher
CSS System	Hanwha Q CELLS America Inc	Hawaii SRD V2.0	Q.VOLT HOME HUB 200SX	Master DSP V1.05 (Slave DSP V1.03) or higher
CSS System	Holu Hou Energy LLC	Hawaii SRD V2.0	HH5000H-HI w/ MEC, Meter, and Current Transformer	000013 or greater
CSS System	Holu Hou Energy LLC	Hawaii SRD V2.0	HH6000H-HI w/ MEC, Meter, and Current Transformer	000013 or greater
CSS System	Holu Hou Energy LLC	Hawaii SRD V2.0	HH7000H-HI w/ MEC, Meter, and Current Transformer	000013 or greater
CSS System	Holu Hou Energy LLC	Hawaii SRD V2.0	HH7600H-HI w/ MEC, Meter, and Current Transformer	000013 or greater
CSS System	Holu Hou Energy LLC	Hawaii SRD V2.0	HH8600H-HI w/ MEC, Meter, and Current Transformer	000013 or greater
CSS System	Holu Hou Energy LLC	Hawaii SRD V2.0	HH9600H-HI w/ MEC, Meter, and Current Transformer	000013 or greater
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1200NT (208Vp- p) w/ DTU Pro and three-phase Electric meter	V01.00.00 or higher, US_HECO SRD V2.0_208V
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1200NT (240Vp- p) w/ DTU Pro and split-phase Electric meter	V01.00.00 or higher, US_HECO SRD V2.0_240V
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1500NT (208Vp- p) w/ DTU Pro and three-phase Electric meter	V01.00.00 or higher, US_HECO SRD V2.0_208V
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-1500NT (240Vp- p) w/ DTU Pro and split-phase Electric meter	V01.00.00 or higher, US_HECO SRD V2.0_240V
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-300NT (208Vp-p) w/ DTU-Pro and Three-phase electric meter	V01.00.00 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-300NT (240Vp-p) w/ DTU-Pro and Split-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-350NT (208Vp-p) w/ DTU-Pro and Three-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-350NT (240Vp-p) w/ DTU-Pro and Split-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-400NT (208Vp-p) w/ DTU-Pro and Three-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-400NT (240Vp-p) w/ DTU-Pro and Split-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-600NT (208Vp-p) w/ DTU-Pro and Three Phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-600NT (240Vp-p) w/ DTU-Pro and Split Phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-700NT (208Vp-p) w/ DTU-Pro and Three Phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-700NT (240Vp-p) w/ DTU-Pro and Split Phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-800NT (208Vp-p) w/ DTU-Pro and Three Phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HM-800NT (240Vp-p) w/ DTU-Pro and Split Phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-1000-2T-NA (208Vp-p) w/ DTU-Pro-S, Three-phase Electric Meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-1000-2T-NA (240Vp-p) w/ DTU-Pro-S, Split-phase meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-1600-4T-NA (208Vp-p) w/ DTU-Pro-S, Three-phase Electric Meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-1600-4T-NA (240Vp-p) w/ DTU-Pro-S, Split-phase Electric Meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-1800-4T-NA (208Vp-p) w/ DTU-Pro-S, Three-phase Electric Meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-1800-4T-NA (240Vp-p) w/ DTU-Pro-S, Split-phase Electric Meter	V01.00.00 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-2000-4T-NA (208Vp-p) w/ DTU-Pro-S, Three-phase Electric Meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-2000-4T-NA (240Vp-p) w/ DTU-Pro-S, Split-phase Electric Meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-350-1A-NA (208Vp-p) w/ DTU-Pro-S and Three-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-350-1A-NA (240Vp-p) w/ DTU-Pro-S and Split-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-350-1T-NA (208Vp-p) w/ DTU-Pro-S and Three-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-350-1T-NA (240Vp-p) w/ DTU-Pro-S and Split-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-400-1A-NA (208Vp-p) w/ DTU-Pro-S and Three-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-400-1A-NA (240Vp-p) w/ DTU-Pro-S and Split-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-400-1T-NA (208Vp-p) w/ DTU-Pro-S and Three-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-400-1T-NA (240Vp-p) w/ DTU-Pro-S and Split-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-450-1A-NA (208Vp-p) w/ DTU-Pro-S and Three-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-450-1A-NA (240Vp-p) w/ DTU-Pro-S and Split-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-450-1T-NA (208Vp-p) w/ DTU-Pro-S and Three-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-450-1T-NA (240Vp-p) w/ DTU-Pro-S and Split-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-500-1A-NA (208Vp-p) w/ DTU-Pro-S and Three-phase electric meter	V01.00.00 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-500-1A-NA (240Vp-p) w/ DTU-Pro-S and Split-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-500-1T-NA (208Vp-p) w/ DTU-Pro-S and Three-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-500-1T-NA (240Vp-p) w/ DTU-Pro-S and Split-phase electric meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-700-2T-NA (208Vp-p) w/ DTU-Pro-S, Three-phase Electric Meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-700-2T-NA (240Vp-p) w/ DTU-Pro-S, Split-phase meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-800-2T-NA (208Vp-p) w/ DTU-Pro-S, Three-phase Electric Meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-800-2T-NA (240Vp-p) w/ DTU-Pro-S, Split-phase meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-900-2T-NA (208Vp-p) w/ DTU-Pro-S, Three-phase Electric Meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMS-900-2T-NA (240Vp-p) w/ DTU-Pro-S, Split-phase meter	V01.00.00 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMT-1600-4T-208 (208Vp-p) w/ DTU-Pro-S and Three Phase Meter	V01.00.03 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMT-1800-4T-208 (208Vp-p) w/ DTU-Pro-S and Three Phase Meter	V01.00.03 or higher
CSS System	Hoymiles Power Electronics Inc.	Hawaii SRD V2.0	HMT-2000-4T-208 (208Vp-p) w/ DTU-Pro-S and Three Phase Meter	V01.00.03 or higher
CSS System	LG Electronics	Hawaii SRD V2.0	RBA008K0A00 w/ Home 8 (RA768K16A11) and Smart Energy Box (REA200AP0)	V1.1.1712 or higher
CSS System	Northern Electric & Power Co.	Hawaii SRD V2.0	BDM-550 w/ BDM-NZ-SP-100 or BDM-NZ-SP-200	9200 or Higher
CSS System	Northern Electric & Power Co.	Hawaii SRD V2.0	BDM-650 w/ BDM-NZ-SP-100 or BDM-NZ-SP-200	9200 or Higher
CSS System	Northern Electric & Power Co.	Hawaii SRD V2.0	BDM-800 (208 Vp-p) w/ BDM-NZ-SP-100 or BDM-NZ-SP-200	9200 or Higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Northern Electric & Power Co.	Hawaii SRD V2.0	BDM-800 (240 Vp-p) w/ BDM-NZ-SP-100 or BDM-NZ-SP-200	9200 or Higher
CSS System	Panasonic Corporation of North America	Hawaii SRD V2.0	EVAC-I3 w/ EV-SB	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
CSS System	Panasonic Corporation of North America	Hawaii SRD V2.0	EVAC-I5 w/ EV-SB	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
CSS System	Panasonic Corporation of North America	Hawaii SRD V2.0	EVAC-I6 w/ EV-SB	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
CSS System	Panasonic Corporation of North America	Hawaii SRD V2.0	EVAC-I7 w/ EV-SB	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
CSS System	Panasonic Corporation of North America	Hawaii SRD V2.0	EVHB-I3 w/ EV-SB	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
CSS System	Panasonic Corporation of North America	Hawaii SRD V2.0	EVHB-I5 w/ EV-SB	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
CSS System	Panasonic Corporation of North America	Hawaii SRD V2.0	EVHB-I6 w/ EV-SB	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
CSS System	Panasonic Corporation of North America	Hawaii SRD V2.0	EVHB-I7 w/ EV-SB	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
CSS System	Schneider Electric	Hawaii SRD V2.0	XW Pro 6848 NA (120 Vp-p), w/ Conext Gateway, InsightFacility, InsightHome	V2.04BN17 or higher
CSS System	Schneider Electric	Hawaii SRD V2.0	XW Pro 6848 NA (240 Vp-p), w/ Conext Gateway, InsightFacility, InsightHome	V2.04BN17 or higher
CSS System	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-5-10-G-1 w/ Internal Li-ion battery packs, smart gateway	V2.0
CSS System	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-5-10-W-1 w/ Internal Li-ion battery packs, smart gateway	V2.0

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-6-13-G-1 w/ Internal Li-ion battery packs, smart gateway	V2.0
CSS System	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-6-13-W-1 w/ Internal Li-ion battery packs, smart gateway	V2.0
CSS System	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-7-16-G-1 w/ Internal Li-ion battery packs, smart gateway	V2.0
CSS System	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-7-16-W-1 w/ Internal Li-ion battery packs, smart gateway	V2.0
CSS System	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-7-20-G-1 w/ Internal Li-ion battery packs, smart gateway	V2.0
CSS System	Shenzhen Eternalplanet Energy Pingshan Ltd.	Hawaii SRD V2.0	EP CUBE NA-7-20-W-1 w/ Internal Li-ion battery packs, smart gateway	V2.0
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 1000TL-XA-US w/ Smart Meter AGF-AE-D or SU-US-200	UE 1.0 or higher
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 1000TL-XH-US w/ Smart Meter AGF-AE-D or SU-US-200	UE 1.0 or higher
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 11400TL-XA-US w/ Smart Meter AGF-AE-D or SU-US-200	UE 1.0 or higher
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 11400TL-XH-US w/ Smart Meter AGF-AE-D or SU-US-200	UE 1.0 or higher
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 3000TL-XA-US w/ Smart Meter AGF-AE-D or SU-US-200	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 3000TL-XH-US w/ Smart Meter AGF-AE-D or SU-US-200	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 3800TL-XA-US w/ Smart Meter AGF-AE-D or SU-US-200	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 3800TL-XH-US w/ Smart Meter AGF-AE-D or SU-US-200	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 3800TL-XH-US(S) w/ Smart Meter AGF-AE-D or SU-US-200	UE 1.0 or higher
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 5000TL-XA-US w/ Smart Meter AGF-AE-D or SU-US-200	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 5000TL-XH-US w/ Smart Meter AGF-AE-D or SU-US-200	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 6000TL-XA-US w/ Smart Meter AGF-AE-D or SU-US-200	UE1.0(checksum:8CB43554CCBB5D85F0581EA268A5C28)

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 6000TL-XH-US w/ Smart Meter AGF-AE-D or SU-US-200	UE1.0 (checksum:8CB43554C CBB5D85F0581EA268 A5C28)
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 7600TL-XA-US w/ Smart Meter AGF-AE-D or SU-US-200	UE1.0 (checksum:8CB43554C CBB5D85F0581EA268 A5C28)
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 7600TL-XH-US w/ Smart Meter AGF-AE-D or SU-US-200	UE1.0 (checksum:8CB43554C CBB5D85F0581EA268 A5C28)
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 7600TL-XH-US(S) w/ Smart Meter AGF-AE-D or SU-US-200	UE 1.0 or higher
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 8200TL-XA-US w/ Smart Meter AGF-AE-D or SU-US-200	UE 1.0 or higher
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 8200TL-XH-US w/ Smart Meter AGF-AE-D or SU-US-200	UE 1.0 or higher
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 9000TL-XA-US w/ Smart Meter AGF-AE-D or SU-US-200	UE 1.0 or higher
CSS System	Shenzhen GroWatt New Energy Technolgy Co Ltd	Hawaii SRD V2.0	MIN 9000TL-XH-US w/ Smart Meter AGF-AE-D or SU-US-200	UE 1.0 or higher
CSS System	SMA America, LLC	Hawaii SRD V2.0	SBSE3.8-US-50 (208Vp-p) w/ SMA Energy Meter-US (EMETER-US-50)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
CSS System	SMA America, LLC	Hawaii SRD V2.0	SBSE3.8-US-50 (240Vp-p) w/ SMA Energy Meter-US (EMETER-US-50)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
CSS System	SMA America, LLC	Hawaii SRD V2.0	SBSE4.8-US-50 (208Vp-p) w/ SMA Energy Meter-US (EMETER-US-50)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
CSS System	SMA America, LLC	Hawaii SRD V2.0	SBSE4.8-US-50 (240Vp-p) w/ SMA Energy Meter-US (EMETER-US-50)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
CSS System	SMA America, LLC	Hawaii SRD V2.0	SBSE5.8-US-50 (208Vp-p) w/ SMA Energy Meter-US (EMETER-US-50)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
CSS System	SMA America, LLC	Hawaii SRD V2.0	SBSE5.8-US-50 (240Vp-p) w/ SMA Energy Meter-US (EMETER-US-50)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
CSS System	SMA America, LLC	Hawaii SRD V2.0	SBSE7.7-US-50 (208Vp-p) w/ SMA Energy Meter-US (EMETER-US-50)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
CSS System	SMA America, LLC	Hawaii SRD V2.0	SBSE7.7-US-50 (240Vp-p) w/ SMA Energy Meter-US (EMETER-US-50)	CONT Application: 2.24.4.R, CONT Bootloader: 2.24.3.R or higher
CSS System	SMA America, LLC	Hawaii SRD V2.0	STP 20-US-50 w/ SMA Data Manager and Energy Meter	3.02.05.R or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	SMA America, LLC	Hawaii SRD V2.0	STP 25-US-50 w/ SMA Data Manager and Energy Meter	3.02.05.R or higher
CSS System	SMA America, LLC	Hawaii SRD V2.0	STP 30-US-50 w/ SMA Data Manager and Energy Meter	3.02.05.R or higher
CSS System	SMA America, LLC	Hawaii SRD V2.0	STP 33-US-41Data Manager and Energy Meter	01.05.03.R and up
CSS System	SMA America, LLC	Hawaii SRD V2.0	STP 50-US-40 w/ Data Manager and Energy Meter	01.05.03.R and up
CSS System	SMA America, LLC	Hawaii SRD V2.0	STP 50-US-41 w/ Data Manager and Energy Meter	01.05.03.R and up
CSS System	SMA America, LLC	Hawaii SRD V2.0	STP 62-US-41 w/ Data Manager and Energy Meter	01.05.03.R and up
CSS System	Sol-Ark	Hawaii SRD V2.0	30K-3P-208V w/ No Additional Equipment	MCU: Ver1057 or later and COMM: 101F - XXXX or later
CSS System	Sol-Ark	Hawaii SRD V2.0	60K-3P-480V w/ 3 x 2 CT sensors (Model: CTK 160702)	MCU: Ver1057 or later
CSS System	Sol-Ark	Hawaii SRD V2.0	Limitless 15K-LV (208Vp-p) w/ No additional Equipment	v7214 and higher
CSS System	Sol-Ark	Hawaii SRD V2.0	Limitless 15K-LV (240Vp-p) w/ No Additional Equipment	v7214 and higher
CSS System	Sol-Ark	Hawaii SRD V2.0	Sol-Ark 12K-P (208Vp-p) w/ No Additional Equipment	MCU xx22 or Higher
CSS System	Sol-Ark	Hawaii SRD V2.0	Sol-Ark 12K-P (240Vp-p) w/ No Additional Equipment	MCU xx22 or Higher
CSS System	Sol-Ark	Hawaii SRD V2.0	Sol-Ark 8K-48-ST (208Vp-p) w/ No Additional Equipment	MCU xx22 or Higher
CSS System	Sol-Ark	Hawaii SRD V2.0	Sol-Ark 8K-48-ST (240Vp-p) w/ No Additional Equipment	MCU xx22 or Higher
CSS System	SolarEdge	Hawaii SRD V2.0	SE10000H-US (208Vp-p) w/ Export/Import Meter	V2.100.1204, Checksum 0xFC5866C9 or higher
CSS System	SolarEdge	Hawaii SRD V2.0	SE10000H-US (240Vp-p) w/ Export/Import Meter	V2.100.1204, Checksum 0xFC5866C9 or higher
CSS System	SolarEdge	Hawaii SRD V2.0	SE100KUS w/ Export/Import Meter	2.20.710 or higher w/ Country Code Profile US/Hawaii
CSS System	SolarEdge	Hawaii SRD V2.0	SE10KUS w/ Export/Import Meter	2.20.710 or higher w/ Country Code Profile US/Hawaii
CSS System	SolarEdge	Hawaii SRD V2.0	SE11400H-US (208Vp-p) w/ Export/Import Meter	V2.100.1204, Checksum 0xFC5866C9 or higher
CSS System	SolarEdge	Hawaii SRD V2.0	SE11400H-US (240Vp-p) w/ Export/Import Meter	V2.100.1204, Checksum 0xFC5866C9 or higher

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	SolarEdge	Hawaii SRD V2.0	SE120KUS w/ Export/Import Meter	2.20.710 or higher w/ Country Code Profile US/Hawaii
CSS System	SolarEdge	Hawaii SRD V2.0	SE14.4KUS w/ Export/Import Meter	2.20.710 or higher w/ Country Code Profile US/Hawaii
CSS System	SolarEdge	Hawaii SRD V2.0	SE17.3KUS w/ Export/Import Meter	2.20.710 or higher w/ Country Code Profile US/Hawaii
CSS System	SolarEdge	Hawaii SRD V2.0	SE3000H-US w/ Export/Import Meter	V2.100.1204, Checksum 0xFC5866C9 or higher
CSS System	SolarEdge	Hawaii SRD V2.0	SE30KUS w/ Export/Import Meter	2.20.710 or higher w/ Country Code Profile US/Hawaii
CSS System	SolarEdge	Hawaii SRD V2.0	SE33.3KUS w/ Export/Import Meter	2.20.710 or higher w/ Country Code Profile US/Hawaii
CSS System	SolarEdge	Hawaii SRD V2.0	SE3800H-US (240Vp- p) w/ Export/Import Meter	V2.100.1204 or higher, Checksum 0xFC5866C9 or higher
CSS System	SolarEdge	Hawaii SRD V2.0	SE40KUS w/ Export/Import Meter	2.20.710 or higher w/ Country Code Profile US/Hawaii
CSS System	SolarEdge	Hawaii SRD V2.0	SE43.2KUS w/ Export/Import Meter	2.20.710 or higher w/ Country Code Profile US/Hawaii
CSS System	SolarEdge	Hawaii SRD V2.0	SE5000H-US (208Vp- p) w/ Export/Import Meter	V2.100.1204, Checksum 0xFC5866C9 or higher
CSS System	SolarEdge	Hawaii SRD V2.0	SE5000H-US (240Vp- p) w/ Export/Import Meter	V2.100.1204, Checksum 0xFC5866C9 or higher
CSS System	SolarEdge	Hawaii SRD V2.0	SE50KUS w/ Export/Import Meter	2.20.710 or higher w/ Country Code Profile US/Hawaii
CSS System	SolarEdge	Hawaii SRD V2.0	SE5700H-US (208Vp- p) w/ Export/Import Meter	V2.100.1204, Checksum 0xFC5866C9 or higher
CSS System	SolarEdge	Hawaii SRD V2.0	SE5700H-US (240Vp- p) w/ Export/Import Meter	V2.100.1204, Checksum 0xFC5866C9 or higher
CSS System	SolarEdge	Hawaii SRD V2.0	SE6000H-US (208Vp- p) w/ Export/Import Meter	V2.100.1204, Checksum 0xFC5866C9 or higher
CSS System	SolarEdge	Hawaii SRD V2.0	SE6000H-US (240Vp- p) w/ Export/Import Meter	V2.100.1204, Checksum 0xFC5866C9 or higher
CSS System	SolarEdge	Hawaii SRD V2.0	SE66.6KUS w/ Export/Import Meter	2.20.710 or higher w/ Country Code Profile US/Hawaii
CSS System	SolarEdge	Hawaii SRD V2.0	SE7600H-US w/ Export/Import Meter	2.100.1204 or higher w/ Country Code Profile US/Hawaii , Checksum 0xFC5866C9 or higher
CSS System	SolarEdge	Hawaii SRD V2.0	SE80KUS w/ Export/Import Meter	2.20.710 or higher w/ Country Code Profile US/Hawaii

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	SolaX Power Network Technology	Hawaii SRD V2.0	A1-AC-3.8K-G2 w/ A1-BI-200-G2	Master DSP V1.05(Slave DSP V1.03) or higher
CSS System	SolaX Power Network Technology	Hawaii SRD V2.0	A1-AC-5.0K-G2 w/ A1-BI-200-G2	Master DSP V1.05(Slave DSP V1.03) or higher
CSS System	SolaX Power Network Technology	Hawaii SRD V2.0	A1-AC-6.0K-G2 w/ A1-BI-200-G2	Master DSP V1.05(Slave DSP V1.03) or higher
CSS System	SolaX Power Network Technology	Hawaii SRD V2.0	A1-AC-7.6K-G2 w/ A1-BI-200-G2	Master DSP V1.05(Slave DSP V1.03) or higher
CSS System	SolaX Power Network Technology	Hawaii SRD V2.0	A1-HYB-3.8K-G2 w/ A1-BI-200-G2	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
CSS System	SolaX Power Network Technology	Hawaii SRD V2.0	A1-HYB-5.0K-G2 w/ A1-BI-200-G2	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
CSS System	SolaX Power Network Technology	Hawaii SRD V2.0	A1-HYB-6.0K-G2 w/ A1-BI-200-G2	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
CSS System	SolaX Power Network Technology	Hawaii SRD V2.0	A1-HYB-7.6K-G2 w/ A1-BI-200-G2	Master DSP V1.05(Slave DSP V1.03,AFCI V1.03) or higher
CSS System	SunPower	Hawaii SRD V2.0	SPWR-A4 (240Vp-p) w/ Production and Consumption CTs PVS6	Version 20.0 or higher with grid profile HECO_IEEE_1547-2018 v01.1
CSS System	SunPower	Hawaii SRD V2.0	SPWR-A5 (208Vp-p) w/ Production and Consumption CTs PVS6	Version 20.0 or higher with grid profile HECO_IEEE_1547-2018 v01.1
CSS System	SunPower	Hawaii SRD V2.0	SPWR-A5 (240Vp-p) w/ Production and Consumption CTs PVS6	Version 20.0 or higher with grid profile HECO_IEEE_1547-2018 v01.1
CSS System	Tesla	Hawaii SRD V2.0	Powerwall 3 1707000-XX-Y w/ Gateway2 (1232100-xx-y) or Backup Switch (1624171) or Gateway3 (184100-xx-y)	c5773b136a9ef9be9057302a67258482 and dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
CSS System	Tesla	Hawaii SRD V2.0	Tesla AC Powerwall 2 2012170-xx-y w/ Gateway2 (1232100-xx-y) or Backup Switch (1624171-xx-y)	1.7.0 and higher 3700B98CF516D8D8421D23891E9AD8D5 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
CSS System	Tesla	Hawaii SRD V2.0	Tesla AC Powerwall 2 3012170-xx-y w/ Gateway2 (1232100-xx-y) or Backup Switch (1624171-xx-y)	1.7.0 and higher 3700B98CF516D8D8421D23891E9AD8D5 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
CSS System	Tesla	Hawaii SRD V2.0	Tesla Megapack2 1748844-XX-Y w/ Site Controller Model: 1471208-XX-Y	9IWD23njXAz+y3gW4k5ZNZ2Us+MSb5f+I5KNQtp7Yq0=

Technology Type	Manufacturer	HI SRD Certification	Model	Firmware Version
CSS System	Tesla	Hawaii SRD V2.0	Tesla Megapack2XL 1848844-XX-Y w/ Site Controller Model: 1471208-XX-Y	9lWD23njXAz+y3gW4k5ZNZ2Us+MSb5f+I5KNQtp7Yq0=
CSS System	Tesla	Hawaii SRD V2.0	Tesla Powerwall+ 1850000-XX-Y w/ Gateway2 (1232100-xx-y) or Backup Switch (1624171) or Gateway3 (184100-xx-y)	1217B43E9B859EAB26ECB10B5FBECC64 & 3700B98CF516D8D8421D23891E9AD8D5 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
CSS System	Tesla	Hawaii SRD V2.0	Tesla PV Inverter 1534000-XX-Y w/ Gateway2 (1232100-xx-y) or Backup Switch (1624171-xx-y)	1217B43E9B859EAB26ECB10B5FBECC64 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
CSS System	Tesla	Hawaii SRD V2.0	Tesla PV Inverter 1538000-XX-Y (240Vp-p, 3.8kW) w/ Gateway2 (1232100-xx-y) or Backup Switch (1624171-xx-y)	1217B43E9B859EAB26ECB10B5FBECC64 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
CSS System	Tesla	Hawaii SRD V2.0	Tesla PV Inverter 1538000-XX-Y (240Vp-p, 5.7kW) w/ Gateway2 (1232100-xx-y) or Backup Switch (1624171-xx-y)	1217B43E9B859EAB26ECB10B5FBECC64 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
CSS System	Tesla	Hawaii SRD V2.0	Tesla PV Inverter 1538000-XX-Y (240Vp-p, 5kW) w/ Gateway2 (1232100-xx-y) or Backup Switch (1624171-xx-y)	1217B43E9B859EAB26ECB10B5FBECC64 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
CSS System	Tesla	Hawaii SRD V2.0	Tesla PV Inverter 1538000-XX-Y (240Vp-p, 7.6kW) w/ Gateway2 (1232100-xx-y) or Backup Switch (1624171-xx-y)	1217B43E9B859EAB26ECB10B5FBECC64 & dcq8OiBXbQWYnK9UhCAjvl02/py2MZymmwAQYOn8jSc=
CSS System	Yotta Energy	Hawaii SRD V2.0	DPI-208 w/ ECU-C, CT or ECU R, Meter, CT	V3 or Higher
CSS System	Yotta Energy	Hawaii SRD V2.0	DPI-480 w/ ECU-C, CT or ECU R, Meter, CT	V3 or Higher



Manufacturer Certification Statement

Effective Date: August 26, 2024

This Manufacturer Certification Statement is provided to the taxpayer by Sol-Ark, LLC in connection with the qualification of Sol-Ark residential solar electric property equipment under Section 25D of the Internal Revenue Code of 1986, as amended. No other use of this Certification Statement is permitted or intended.

Based on information available to Sol-Ark as of the date of this Certification Statement, including published Treasury Department regulations and IRS Notices, Sol-Ark certifies that the following Sol-Ark manufactured products should qualify as solar electrical property expenditures that use solar energy to generate electricity for use in a dwelling unit that is used as a residence by the taxpayer under Section 25D of the Internal Revenue Code, assuming that the taxpayer otherwise complies with all other requirements under Section 25D and other applicable laws and regulations:

- Sol-Ark 8k-2P-N; 8K; 8K-2p; SA-8K-2P; SA-8K-2P; 8K OD; 8K Outdoor; 8K-2P-W/Kit
- Sol-Ark 12k-2P-N; 12K-2P; SA-12K-2P; 12K OD; 12K Outdoor; 12K-2P-W/Kit
- Sol-Ark 15k-2P-N; 15K; 15K-2P; SA-15K-2P; 15K OD; 15K Outdoor; 15K-2P-W/Kit
- Sol-Ark 30k-3P-208V; 30k-3P-208V; 30k-3P-208V W/Kit; 30K-3P; SA-30K; Sol-Ark 30K
- Sol-Ark 60k-3P-480V; 60k-3P-480V; 60k-3P-208V W/Kit; 60K; 60K-3P; SA-60K; Sol-Ark 60K
- Sol-Ark L3 HV; L3-HV-40KWH; L3-HV-40KWH W/Kit; HV-40; Indoor 8-stack batteries; IP20 Indoor batteries
- Sol-Ark L3 HV; L3-HV-60KWH; L3-HV-60KWH W/Kit; HV-60; Indoor 12-stack batteries
- Sol-Ark L3 HVR; L3-HVR-60KWH; L3-HVR-60KWH W/Kit WO Transformer; HVR-60Outdoor 12-stack batteries; IP55 Outdoor batteries
- 8K EMP; Sol-Ark 8K-2P EMP; SA-8K-2P Emp, 8K EMP OD; 8K EMP Outdoor
- 8K-2P-L; 8K-2P Indoor; 8K; 8K Indoor; Sol-Ark 8K Indoor
- 12K EMP; Sol-Ark 12K-2P EMP; SA-12K-2P Emp, 12K EMP OD; 12K EMP Outdoor
- 15K EMP; Sol-Ark 15K-2P EMP; SA-15K-2P Emp, 15K EMP OD; 15K EMP Outdoor
- 12K-2P Indoor Green; 12K-2P Indoor Blue; 12K-2P Indoor Blue 63V; 12K-3P-L
- 5K-1P, 5K-1P W/Kit; 5K; 5K-2P; 5K-2P W/Kit; 5K; Sol-Ark 5K-2P; 5K OD; 5K Outdoor; SA-5K-2P
- 9K-2P; 9K-2P W/Kit; 9K; 9K-2P; SA-9K; Sol-Ark 9K

After-market equipment changes, other unauthorized modifications to Sol-Ark equipment, or taxpayer non-compliance with applicable laws and regulations, may affect the qualification of Sol-Ark manufactured products under Section 25D, and Sol-Ark makes no representation regarding the effects that any such changes, modifications, or non-compliance may have on the availability or use of tax credits.

This Certification Statement is intended solely to permit the taxpayer to seek potential tax credits under Section 25D and is not intended for any other purpose. The ability of any taxpayer to obtain or make use of tax credits may depend on a taxpayer's individual circumstances, compliance with applicable laws and regulations, changing tax laws, rules and regulations and other factors, and there is no assurance that tax credits may be available to the individual taxpayer. Sol-Ark does not offer or provide tax advice, and the taxpayer should not rely on Sol-Ark, or any Sol-Ark employee or representative, for tax planning advice. Taxpayers are urged to consult with their own tax professionals and advisors for tax planning matters and for further information on the use and applicability of any tax credits that may be available for solar equipment, including Sol-Ark manufactured products. Sol-Ark assumes no obligation to update or revise this Certification Statement, or to inform any taxpayers of changes in applicable laws or regulations, at any time on or after the Effective Date.

Under penalties of perjury, I declare that I have examined this certification statement, and to the best of my knowledge and belief, the facts presented are true, correct, and complete.

SOL-ARK, LLC

805 Central Expressway South, Allen, Texas 75013

AUTHORIZED SIGNATORY:

By: John Martinson

Name: John Martinson

Title: COO

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Test Package History

Created By	Reviewed By	Original Version	Original Date	Revision
Xingxin Tian		1.0	2022.07.02	

Note/注: Definition of Power Sign Convention/功率方向定义:

Grid port: Positive values of power indicate current flow towards the grid/流向电网为正

EUT Output port: Positive values of power indicate current flow towards AC side/DC流向AC为正

Generation port: Positive values of power indicate current flow towards AC side/发电为正

PV port: Positive values of power indicate generation/发电为正

ESS port: Positive values of power indicate discharging/放电为正

Load port: Positive values of power indicate current flow towards load/流向负载为正

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V, [REDACTED]	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

General description of the products	The PCEs 60K-3P-480V, [REDACTED] under test (EUT) are Grid Support Utility Interactive Hybrid Inverters which utilize the advanced power electronics conversion components such as MOSFET, IGBT, IPM to convert the variable DC power generated from the photovoltaic (PV) arrays and batteries to the stable utility AC power which can be fed into the commercial electrical grid. The PCEs under test are three phase grid-connected bi-directional inverters, direct current from PV arrays and alternating current from AC grid also can be converted for charging the batteries.
Model and/or type reference..... :	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V
Certification mark to be applied.....:	cTUVus
Manufacturer (name and address).....:	Portable Solar LLC (dba Sol-Ark) 1100 Professional Dr, Plano, Texas, 75074, United States of America
Factory (name and address).....:	[REDACTED]
Battery DC Port.....:	See model list
Solar DC Port	See model list
Electrical Data (AC)	See model list
AC continuous current	See model list
Voltage and Frequency Accuracy.....:	See model list
Installation mode..... :	Wall mounted
Rated ambient temperature range ... :	-40°C to +60°C (>45°C derating)
Enclosure index / type	TYPE 3R
Mass of equipment (lbs/kg)	80
Overall size (W x H x D)..... :	527mm*894mm*294mm
Firmware Version..... :	1020
Unit Serial Number..... :	NA
Date(s) of performance of tests..... :	2022.12.14-2023.04.20
Place(s) of performance of tests	TÜV Rheinland (Shanghai) Co., Ltd. No.177, Lane 777 West Guangzhong Road, Jing'an District, Shanghai, China

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Test Item Summary:

Clause	Description	Applicable	Remarks / Comments
UL 1741 CRD	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems (PCS)		
203.5	Step Change in Load Test	Y	Tested on 60K-3P-480V
203.6	Step Change in Generation Test	Y	Tested on 60K-3P-480V
204	Optional Tests	Y	Tested on 60K-3P-480V
205	Abnormal Tests	Y	See UL 1741 report.
NOTE:			

Test Result Summary: See page 27 in this test package.

Date: 11/10/2021

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

201 General Requirements

201.5 Scope of EUT - The EUT referenced in all tests may consist of:

- A single integrated device which includes all of the PCS functionality in a single device; or
- A system with multiple devices operating together; or
- A separate PCS controller intended for use with external devices.

In following tests, the EUT is hybrid inverter with integrated PCS functionality intended for use with external current sensors.

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

202 EUT Construction and Configuration

202.4 Where specific devices are required for proper functionality of the PCS, those devices (e.g. external current sensors) shall be specified in the manufacturer's instructions. Other examples of devices required for proper functionality include power converters or inverters, PCS controllers, and controllable AC or DC loads. When specified by the manufacturer, the PCS may optionally be evaluated with a larger number of devices.

In following tests, the EUT is tested with external current sensor of model CTSA035-300A/150mA

202.10 During all tests, power and current levels, including associated tolerances, are specified as a percentage or the EUT nameplate ratings. Where multiple EUT sources are present the power and current levels shall be calculated using the sum of the nameplate ratings of the individual applicable devices.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203 Normal Operating Tests

203.1 Normal Operating Tests record and characterize the performance of the PCS during normal operation. These tests monitor currents flowing in PCS controlled conductors in response to step changes in load with generation held constant and in response to step changes in generation with load held constant.

203.2 For testing any required overcurrent devices shall be installed as required in the PCS instructions for the end application. During all tests in Section 203 the EUT shall not result in the opening of any overcurrent protective device. Ratings of overcurrent protective devices used during the testing shall be as specified in the manufacturer's instructions.

203.3 No specific pass / fail criteria currently exist for the temporal response of the PCS. Until standardized temporal requirements are developed, the maximum open loop response shall be less than or equal to 30 seconds. Faster PCS response times are allowed and may be required to meet specific utility requirements.

203.4 The Normal Operation Tests shall use the test setup shown in Figure 203.1 for AC coupled systems or Figure 203.2 for DC coupled systems. For hybrid systems which are capable of combined AC and DC coupled systems the EUT shall be evaluated both as an AC coupled system and as a DC coupled system.

In following tests, DC coupled system used.

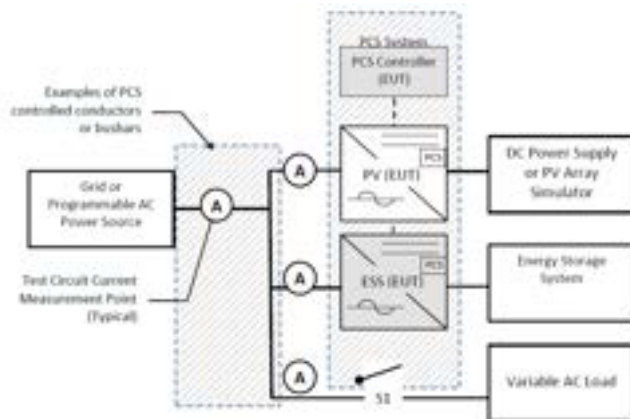


Figure 203.1 – Test Circuit AC Coupled System

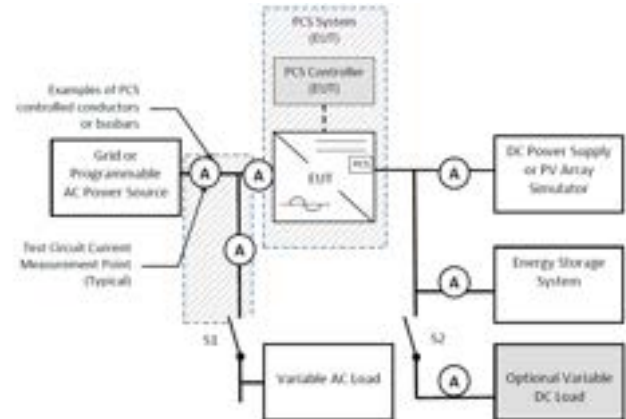


Figure 203.2 – Test Circuit Setup DC Coupled System

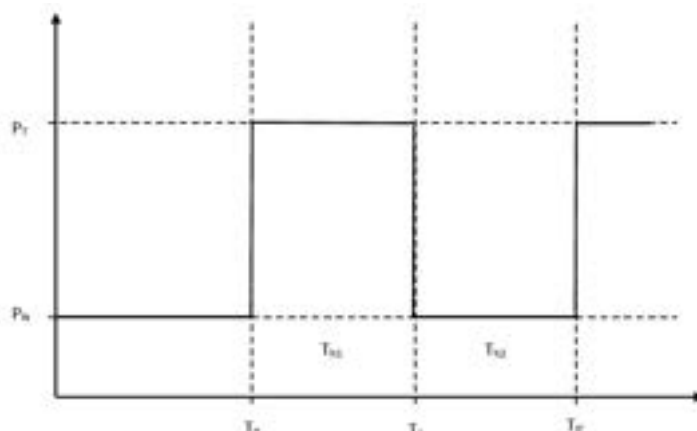


Figure 203.3 – Step Change Test Signal (step function)

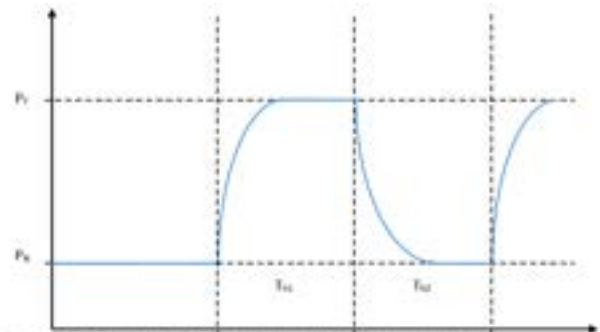


Figure 203.4 - Example EUT response (current) at the measurement point

Where:
 P_N = Nominal Condition
 P_T = Test Condition

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203. 5 Step Change in Load Test

Testing date: See page 2.

203.5.1 This procedure uses the step change test signal (step function) defined in Figure 203.3. These tests shall be performed at the terminals of the EUT and/or at an external reference point where the current is controlled. Signal injection test methods may be used for evaluation of Supplemental PCS but shall not be permitted for evaluation of Branch Circuit PCS.

203.5.2 The step change in test loads records the behavior of the PCS to variations in parallel connected loads when operating at constant generation levels. The test may be performed at any convenient voltage and frequency within the continuous operating region. The EUT(s) shall be connected in accordance with the relevant test circuit in Figure 203.1 or 203.2, and in accordance with the manufacturer's instructions.

Test Method:

- Set the EUT operating parameters to nominal.
- Record the state and settings of any grid support functions of the EUT(s)
- Set EUT output current level to rated current, **100%** +/- 5%
- Close Switch S1 and adjust the variable load to draw EUT power output at **100%** +/- 2%.
Record the value of the current flowing to the grid or programmable ac power supply
- Open Switch S1 and wait for the grid current to reach a new steady state value at EUT rated current. Record the currents flowing in all test circuit current sensors.
- Close Switch S1 and wait for the grid current to reach a new steady state value at EUT rated current. Record the currents flowing in all test circuit current sensors. Repeat steps e) and f) two times for **a total of three samples**. The timing of the step transitions used in steps e) and f), shown as Th1 and Th2 in Figure 203.3, shall be selected to achieve steady state conditions in all current sensors.
- Repeat steps d) through f) with **load** tuned to **66%** +/- 5% and **33%** +/- 5% of EUT output current.
- Repeat steps d) through g) with the **EUT output limit** set to:
 - 50%** +/- 5% and **0%** + 5%/-0% of nameplate current rating, and;
 - Optionally, at the maximum negative range of current supported by the system¹.
- For three phase units repeat steps c) through h) opening switch S1 on **only one phase** and again **with two phases simultaneously**.
- For single phase units connected line to line, repeat steps c) through h) opening switch S1 on only one line.

¹ Apparent current may be limited to negative values if the system is to be evaluated for capability to maintain a load bias rather than a zero-current setting.

Criteria:

No specific pass / fail criteria currently exist for the temporal response of the PCS. Until standardized temporal requirements are developed, the maximum open loop response shall be less than or equal to 30 seconds. Faster PCS response times are allowed and may be required to meet specific utility requirements.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Results:

Open loop response time (s)	
Maximum	0.2
Average	0.1

(1) For single phase unit connected line to neutral, or for three phase unit (open S1 on three phases simultaneously)

203.5 Step Change in Load Test																
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) ($<30s$)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
1	100%	100%	d	276.8	71.8	59528.0	276.4	71.7	59445.9	277.1	3.2	88.9	600.2	105.5	63310.8	--
			e	277.3	71.7	56565.6	277.2	0.9	3.2	277.9	71.7	59705.7	600.2	105.5	63326.3	0.1
			f	276.4	71.9	59535.2	276.4	71.7	59481.3	277.1	3.2	63.2	600.2	105.5	63304.4	0.1
			e	277.3	71.6	59520.7	277.3	0.9	3.2	277.9	71.6	59661.3	600.2	105.4	63289.0	0.1
			f	276.4	71.8	59500.5	276.4	71.7	59470.3	277.1	3.2	40.5	600.2	105.5	63297.2	0.2
			e	277.3	71.6	59521.9	277.3	0.9	3.2	277.9	71.6	59659.3	600.2	105.5	63301.0	0.1
			f	276.4	71.9	59530.5	276.4	71.7	59477.1	277.1	3.2	61.9	600.2	105.5	63325.6	0.2
2		66%	d	276.8	71.8	59559.5	276.8	47.5	39472.0	277.5	24.4	20146.7	600.3	105.6	63362.9	--
			e	277.4	71.6	59549.1	277.4	0.9	3.4	278.0	71.6	59686.7	600.3	105.5	63345.1	0.2
			f	276.8	71.8	59573.6	276.8	47.2	39219.4	277.5	24.8	20414.8	600.3	105.6	63369.3	0.1
			e	277.4	71.7	59565.4	277.4	0.9	3.3	278.0	71.7	59705.5	600.3	105.6	63376.2	0.1
			f	276.8	71.8	59541.7	276.8	47.2	39219.7	277.5	24.7	20380.2	600.2	105.5	63331.4	0.1
			e	277.4	71.6	59530.0	277.3	0.9	3.1	278.0	71.6	59670.0	600.3	105.4	63290.6	0.2
			f	276.8	71.8	59566.5	276.8	47.3	39242.3	277.5	24.7	20382.3	600.3	105.5	63351.6	0.2
3		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) ($<30s$)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
4	50%	100%	d	275.9	36.0	29794.1	275.9	72.6	60058.2	276.5	36.6	-30336.6	600.2	52.1	31289.4	--
			e	276.8	35.9	29806.5	276.7	0.9	3.7	277.4	35.9	29873.4	600.2	52.1	31283.9	0.2
			f	275.9	36.0	29769.5	275.9	71.8	59400.1	276.6	35.8	-29702.8	600.2	52.1	31240.8	0.1
			e	276.8	35.9	29777.2	276.7	0.9	3.4	277.4	35.9	29844.6	600.1	52.0	31219.7	0.2
			f	275.9	36.0	29790.0	275.9	71.8	59430.3	276.6	35.8	-29711.7	600.2	52.1	31268.6	0.1
			e	276.8	35.9	29794.6	276.8	0.9	3.9	277.4	35.9	29860.6	600.2	52.1	31274.9	0.1
			f	275.9	36.0	29802.7	275.9	71.9	59474.5	276.6	35.9	-2941.7	600.2	52.1	31288.4	0.1
5		66%	d	276.1	36.0	29760.5	276.1	47.6	39456.5	276.8	11.8	-9722.7	600.2	52.1	31243.2	--
			e	276.7	35.9	29766.5	276.7	0.9	3.2	277.4	35.9	29834.5	600.2	52.1	31249.4	0.2
			f	276.1	36.0	29756.0	276.1	47.3	39199.3	276.8	11.5	-9468.6	600.2	52.1	31253.4	0.2
			e	276.7	35.9	29764.9	276.7	0.9	3.7	277.4	35.9	29832.3	600.2	52.1	31265.2	0.1
			f	276.1	36.0	29776.0	276.1	47.4	39215.1	276.8	11.5	-9464.5	600.2	52.1	31295.0	0.1
			e	276.7	35.9	29777.9	276.7	1.1	3.5	277.4	35.9	29844.7	600.2	52.1	31296.5	0.2
			f	276.1	36.0	29759.0	276.1	47.4	39221.4	276.8	11.5	-9485.9	600.2	52.1	31267.8	0.1
6		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
7	100%	d	275.4	0.5	121.8	275.4	72.8	60129.5	276.1	72.6	-60144.6	600.1	0	53.1	--	
		e	276.4	0.5	116.0	276.3	1.0	3.6	277.0	0.6	110.1	600.0	0	52.5	0.2	
		f	275.4	0.5	121.0	275.4	71.9	59431.8	276.1	71.8	-59445.6	600.0	0	44.2	0.2	
		e	276.3	0.5	115.7	276.3	1.0	3.6	277.0	0.6	109.8	600.1	0	41.6	0.1	
		f	275.4	0.5	122.1	275.4	71.9	59414.9	276.1	71.7	-59427.3	600.1	0	50.0	0.1	
		e	276.4	0.5	115.5	277.0	1.0	3.3	277.0	0.6	109.8	600.1	0	50.9	0.1	
		f	275.5	0.5	121.6	275.4	71.9	59419.2	276.1	71.7	-59433.1	600.1	0	57.5	0.2	
8	66%	d	275.7	0.8	461.6	275.7	47.9	39582.4	276.4	47.3	-39211.8	600.0	0	250.7	--	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test

Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
9			e	276.3	0.7	437.9	276.3	1.0	3.4	277.0	0.78	432.9	600.0	0	299.1	0.2
			f	275.7	0.7	393.0	275.7	47.5	39239.5	276.4	47.0	-38936.8	600.1	0	187.6	0.1
			e	276.3	0.6	360.8	276.3	1.0	3.3	277.0	0.7	355.9	600.1	0	145.0	0.2
			f	275.7	0.6	325.9	276.4	47.0	39224.7	275.7	47.4	-38989.3	600.1	0	126.3	0.1
			e	276.3	0.5	244.9	276.3	1.0	3.3	277.0	0.6	239.1	600.1	0	244.9	0.1
			f	275.7	0.5	145.6	275.7	47.4	39220.8	276.4	47.2	-39165.3	600.1	0	41.6	0.2
		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--

Remark:

(1) 33% load test condition is omitted, which has performed on model of 30k.

(2) Only for three phase unit, open switch S1 on only one phase

203.5 Step Change in Load Test

Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
1	100%	100%	d	276.4	71.9	59582.4	276.4	72.4	60064.4	277.1	3.3	-474.9	600.2	105.6	63378.7	--
			e	276.7	71.8	59526.8	276.7	49.0	40065.2	277.4	25.9	19600.5	600.2	105.5	63327.4	0.2
			f	276.4	71.9	56566.5	276.4	72.8	60326.7	277.1	3.3	-756.6	600.2	105.6	63359.7	0.2
			e	276.7	71.8	59520.2	276.7	49.0	40050.8	277.4	25.9	19608	600.2	105.5	63294.9	0.1
			f	276.4	71.9	59546.5	276.4	72.7	60314.6	277.1	3.4	-764.3	600.2	105.5	63324.8	0.1
			e	276.7	71.8	59531.3	276.7	49.0	40044.3	277.4	25.9	19624.6	600.2	105.5	63297.7	0.1
			f	276.4	71.8	59515.2	276.4	72.7	60309.4	277.1	3.4	-790.5	600.2	105.4	63279.3	0.1
2		66%	d	276.7	71.8	59536.9	276.6	47.5	39383.9	277.3	24.5	20208.6	600.0	105.2	63115.4	--
			e	276.8	71.8	59584.7	276.8	32.4	26408.2	277.5	40.0	33317.1	600.0	105.3	63180.6	0.2

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test

203.5 Step Change in Load Test																
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) ($<30s$)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
3			f	276.6	71.8	59552.5	276.6	47.7	39544.1	277.3	24.3	20066.5	600.1	105.3	63154.8	0.2
			e	276.8	71.8	59585.0	276.8	32.3	26388.7	277.5	40.1	33338.3	600.1	105.3	63190.1	0.1
			f	276.7	71.9	59582.3	276.6	47.7	39550.5	277.3	24.4	20087.4	600.1	105.3	63192.3	0.1
			e	276.8	71.9	59616.6	276.8	32.3	26385.3	277.5	40.1	33373.9	600.1	105.4	63232.6	0.2
			f	276.7	71.8	59547.0	276.6	47.6	39531.7	277.3	24.4	20070.6	600.1	105.3	63169.1	0.1
		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
4	50%	100%	d	276.0	36.0	29798.8	276.0	72.6	60137.1	276.7	36.7	-30409.3	600.3	52.1	31292.9	--
			e	276.3	36.0	29813.1	276.2	49.1	40121.5	276.9	36.6	-10241.7	600.3	52.2	31304.9	0.2
			f	276.0	36.1	29827.4	276.0	72.9	60360.5	276.7	36.9	-30605.0	600.3	51.2	31325.8	0.1
			e	276.3	36.1	29839.7	276.3	49.1	40082.2	276.9	36.5	-10175.5	600.3	52.2	31355.5	0.2
			f	276.0	36.1	29833.1	276.0	72.9	60330.8	276.7	36.9	-30568.9	600.3	52.2	31347.8	0.1
			e	276.3	36.0	29830.1	276.3	49.1	40062.4	276.9	36.5	-10165.0	600.2	52.2	31333.1	0.2
			f	276.0	36.1	29819.8	276.0	72.8	60315.0	276.7	36.9	-30566.0	600.2	52.2	31331.5	0.2
		66%	d	276.3	36.0	29809.7	276.3	47.7	39489.9	277.0	11.8	-9705.6	600.4	52.1	31265.9	--
			e	276.5	36.0	29789.1	276.5	32.3	26401.0	276.2	20.0	3256.2	600.4	52.0	31232.1	0.2
			f	276.3	36.0	29812.4	276.3	47.8	39605.2	277.0	11.9	-9818.4	600.4	52.1	31264.1	0.1
			e	276.5	36.0	29812.4	276.5	32.5	26387.3	277.2	20.0	3292.3	600.3	52.1	31262.3	0.1
			f	276.3	36.0	29819.6	276.3	47.8	39600.7	277.0	11.9	-9808.0	600.3	52.1	31286.9	0.1
33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--		
	e	--	--	--	--	--	--	--	--	--	--	--	--	--		
	f	--	--	--	--	--	--	--	--	--	--	--	--	--		
6		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test

Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) ($<30s$)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
7	0%	100%	d	275.4	0.5	289.0	275.4	72.7	60066.7	276.1	72.3	-59914.9	600.1	0	-117.9	--
			e	275.7	0.7	198.3	275.7	49.1	40051.8	276.4	48.7	-39860.0	600.1	0	-130.4	0.2
			f	275.4	0.5	128.9	275.4	73.0	60286.5	276.1	72.8	-60294.9	600.1	0	-135.5	0.1
			e	275.7	0.7	125.9	275.7	49.1	40018.1	276.4	48.7	-39898.5	600.1	0	-140.0	0.2
			f	275.4	0.5	126.4	275.4	73.0	60276.6	276.1	72.8	-60287.6	600.1	0	-154.6	0.1
			e	275.7	0.7	126.4	275.7	49.1	40005.9	276.4	48.7	-39886.4	600.1	0	-154.5	0.2
			f	275.4	0.5	127.1	275.4	73.0	60627.6	276.1	72.8	-60278.4	600.1	0	-157.0	0.1
8		66%	d	275.9	0.7	472.0	275.8	47.9	39607.7	276.5	47.3	-39227.9	600.1	0	176.1	--
			e	276.0	0.8	447.1	276.0	32.6	26464.9	276.7	32.0	-26023.5	600.1	0	147.5	0.2
			f	275.8	0.7	422.2	275.8	48.0	39690.4	276.5	47.4	-39359.6	600.1	0	124.9	0.1
			e	276.0	0.7	390.4	276.0	32.5	26426.7	276.7	32.0	-26041.7	600.1	0	108.3	0.1
			f	275.8	0.6	361.9	275.8	47.9	39662.5	276.5	47.5	-39391.8	600.1	0	88.2	0.2
			e	276.0	0.7	312.5	276.0	32.5	26405.0	276.7	32.0	-26097.7	600.1	0	26.7	0.2
			f	275.8	0.5	217.3	275.8	47.9	39645.1	276.5	47.6	-39519.3	600.1	0	-9.4	0.1
9		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--

Remark:

(1) 33% load test condition is omitted, which has performed on model of 30k.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(3) Only for three phase unit, open switch S1 on two phases simultaneously

203.5 Step Change in Load Test																
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (≤ 30 s)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
1	100%	100%	d	276.4	71.9	59559.0	276.4	72.5	60174.9	277.1	3.3	-612.2	600.2	105.2	63191.7	--
			e	277.1	71.8	59570.8	277.1	24.7	19612.4	277.8	48.5	40091.4	600.0	105.3	63174.4	0.2
			f	276.4	71.9	59526.9	276.4	73.4	60840.6	277.1	3.6	-1275.6	600.2	105.3	63181.0	0.1
			e	277.1	71.8	59583.6	277.1	24.7	19606.1	277.8	48.5	40109.5	600.2	105.3	63170.7	0.1
			f	276.4	71.9	59598.7	276.4	73.4	60851.3	277.1	3.6	-1250.8	600.3	105.4	63250.7	0.2
			e	277.1	71.8	59585.3	277.1	24.7	19609.2	277.8	48.5	40110.2	600.2	105.3	63188.9	0.2
			f	276.4	71.9	59596.9	276.4	73.4	60840.2	277.1	3.6	-1240.1	600.2	105.4	63235.3	0.1
2		66%	d	276.7	71.8	59509.1	276.7	47.9	39769.8	277.4	24.0	19798.3	600.1	105.0	63013.4	--
			e	277.2	71.7	59540.9	277.1	16.7	13110.0	277.8	55.9	46568.3	600.1	105.0	63026.6	0.2
			f	276.7	71.8	59550.8	276.7	47.9	39769.3	277.4	24.1	19840.0	600.1	105.1	63049.6	0.2
			e	277.2	71.7	59559.4	277.1	16.7	13101.0	277.8	55.9	46597.1	600.1	105.1	63041.9	0.1
			f	276.7	71.8	59575.7	276.7	47.9	39767.3	277.4	24.1	19864.7	600.1	105.1	63081.1	0.2
			e	277.1	71.7	59550.2	277.1	16.7	13097.4	277.8	55.9	46588.7	600.1	105.1	63084.3	0.2
			f	276.7	71.8	59539.4	276.7	47.9	39764.2	277.4	24.1	19830.1	600.1	105.1	63063.2	0.1
3		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
4	50%	100%	d	275.9	36.0	29782.2	275.9	72.6	60130.6	276.6	36.7	-30419.8	600.3	51.8	31061.7	--
			e	276.7	35.9	29779.2	276.6	24.7	19637.1	277.3	35.8	10205.9	600.3	51.8	31063.2	0.2
			f	276.0	36.0	29796.4	275.9	73.5	60814.5	276.6	37.5	-31093.5	600.3	51.8	31077.3	0.1
			e	276.6	35.9	39773.7	276.6	24.7	19620.0	277.3	35.8	10217.7	600.3	51.7	31048.1	0.1
			f	276.0	36.0	29774.1	275.9	73.4	60782.6	276.6	37.5	-31082.8	600.3	51.7	31041.4	0.2
			e	276.6	35.9	29778.6	276.6	24.7	19610.3	277.3	35.7	10232.8	600.2	51.7	31045.1	0.1

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test

203.5 Step Change in Load Test																	
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) ($\leq 30s$)	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			f	276.0	36.0	29790.9	276.0	73.4	60777.1	276.6	37.5	-31059.6	600.3	51.7	31050.8	0.1	
5		66%	d	277.1	36.7	29785.3	276.3	47.5	39390.8	277.0	11.7	-9630.7	600.2	51.7	31014.4	--	
			e	276.7	35.9	30995.5	276.7	16.7	13087.7	277.4	27.8	16745.2	600.2	51.7	30995.5	0.2	
			f	276.3	36.0	29791.1	276.3	48.0	39753.2	277.0	12.1	-9987.0	600.2	51.7	31023.6	0.1	
			e	276.7	35.9	29763.8	276.7	16.7	13083.2	277.4	27.8	16746.4	600.2	51.6	30973.1	0.1	
			f	276.3	36.0	29803.1	276.3	48.0	39769.2	276.9	12.1	-9993.2	600.2	51.7	31031.8	0.1	
			e	276.7	35.9	29785.4	276.7	16.7	13080.3	277.4	27.8	16767.9	600.2	51.7	31006.4	0.1	
			f	276.3	36.0	29806.5	276.3	48.0	39795.4	277.0	12.2	-10015.4	600.2	51.7	31048.3	0.1	
6		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	
7	0%	100%	d	275.5	0.6	347.1	275.4	72.9	60214.8	276.1	72.4	-60004.7	600.1	0	-121.7	--	
			e	276.2	0.7	2775	276.1	24.7	19716.9	276.8	24.3	-19447.7	600.1	0	-157.3	0.2	
			f	275.5	0.5	180.0	275.4	73.6	60807.8	276.1	73.4	-60766.3	600.1	0	-170.6	0.1	
			e	276.2	0.6	122.9	276.1	24.7	19674.2	276.8	24.3	-19559.6	600.1	0	-174.4	0.2	
			f	275.5	0.5	126.9	275.4	73.5	60765.4	276.1	73.4	-60776.1	600.1	0	-167.4	0.1	
			e	276.2	0.6	122.8	276.1	24.7	19649.6	276.9	24.3	-19535.2	600.1	0	-171.0	0.2	
			f	275.5	0.5	127.1	275.4	73.5	60739.5	276.1	73.3	-60749.7	600.1	0	-170.2	0.2	
		8	66%	d	275.8	0.7	429.6	275.8	47.8	39572.8	276.5	47.3	-39234.3	600.0	0	-30.1	--
				e	276.2	0.7	390.7	276.2	16.7	13156.5	276.9	16.3	-12773.4	600.0	0	-69.5	0.2
				f	275.8	0.6	360.2	275.8	48.1	39824.7	276.5	47.7	-39556.3	600.0	0	-92.6	0.2
				e	276.2	0.6	307.7	276.2	16.7	13125.1	276.9	16.3	-12824.2	600.0	0	-118.0	0.1
				f	275.8	0.5	211.0	275.8	48.1	39793.1	276.5	47.8	-39673.9	600.0	0	-161.4	0.1
				e	276.2	0.5	126.3	276.2	16.6	13105.1	276.9	16.3	-12986.8	600.0	0	-171.9	0.2
				f	275.8	0.4	123.6	276.5	48.1	39791.6	276.5	47.9	-39759.4	600.0	0	-174.5	0.1

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test

Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
9		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--

Remark:

(1) 33% load test condition is omitted, which has performed on model of 30k.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test

Testing date: See page 2.

203.6.1 This procedure uses the step change test signal (step function) defined in Figure 203.3. These tests shall be performed at the terminals of the EUT or an external reference point where the current is controlled. Signal injection test methods may be used.

203.6.2 The step change in generation test records the behavior of the PCS to variations in generation levels when connected in parallel with constant loads. For a PCS which includes an ESS device the step change in generation tests do not apply to the ESS source. The step change in generation test shall be applied only for variable input power sources, e.g. PV or Wind.

203.6.3 The test may be performed at any convenient near nominal voltage and frequency within the continuous operating region. Connect the EUT(s) in accordance with the relevant test circuit in Figure 203.1 or 203.2 and following the manufacturers supplied instructions

Test Method:

- Set or verify that the EUT operating parameters are set to nominal.
- Record the state and settings of any grid support functions of the EUT(s)
- Set **EUT output** current level to rated current, **100%** +/- 5%
- Close Switch S1 and tune the variable **load** to **33%** +/- 2% of EUT nameplate active current output rating. Record the apparent currents flowing in all test circuit current sensors.
- Reduce the current of the DC source to a level which results in an EUT active output current **between 5% and 10%** of EUT's nameplate current rating. Record the currents flowing in all test circuit current sensors.
- Increase the DC source to **full** power and record the value of the current flowing to the grid or programmable ac power supply.
- Repeat steps e) and f) two times for a total of **three** samples.
- Repeat steps e) through g) with the reduced value of the dc source set to a level which results in an EUT active output current **between 33% and 66%** of EUT nameplate rating. Record the currents flowing in all test circuit current sensors.
- Repeat e) through h) with the EUT output current level set to **66%** +/-5% and **33%** +/-5% of EUT nameplate rating. Record the currents flowing in all test circuit current sensors. The timing of the step transitions used in steps e) through h) shown as Th1 and Th2 in Figure 203.3, shall be selected to achieve steady state conditions in all current sensors.

Criteria:

No specific pass / fail criteria currently exist for the temporal response of the PCS. Until standardized temporal requirements are developed, the maximum open loop response shall be less than or equal to 30 seconds. Faster PCS response times are allowed and may be required to meet specific utility requirements.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Results:

Open loop response time (s)	
Maximum	0.3
Average	0.2

203.6 Step Change in Generation Test																
Load level: 33%																
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
1	100%	5%-10%	d	277	72.2	59954.1	277.0	24.0	19797.2	277.1	48.4	40207.9	600.1	104.3	62595.9	--
			e	277.1	3.6	3004.2	277.1	24.0	19801.2	277.1	20.2	-16784.2	600.3	5.3	3193.5	0.2
			f	277.0	72.2	599455.1	277.0	24.0	19797.3	277.1	48.4	40201.5	600.1	104.3	62594.2	0.3
			e	277.1	3.6	3004.2	277.1	24.0	19802.8	277.1	20.2	-16784.5	600.3	5.3	3193.6	0.2
			f	277.0	72.2	59932.7	277.0	24.0	19798.4	277.1	48.4	40190.2	600.2	104.2	62547.7	0.1
			e	277.1	3.6	3005.3	277.1	24.0	19802.6	277.1	20.2	-16791.1	600.3	5.3	3196.9	0.1
			f	277.0	72.2	59929.2	277.0	24.0	19798.9	277.1	48.4	40187.8	600.2	104.2	62553.4	0.1
2		33%-66%	d	277.0	72.2	59968.7	277.0	24.0	19792.6	277.1	48.4	40190.3	600.2	104.2	62568.7	--
			e	277.0	47.9	39730.9	277.1	24.1	19817.9	277.1	23.8	19754.9	600.4	68.6	41216.2	0.2
			f	277.0	72.2	59946.9	277.0	24.0	19792.6	277.1	48.4	40203.1	600.2	104.2	62562.0	0.1
			e	277.0	47.9	39758.1	277.1	24.1	19833.4	277.1	23.8	19769.4	600.4	68.7	41253.6	0.2
			f	277.0	72.2	59923.9	277.0	24.0	19794.1	277.1	48.4	40183.8	600.2	104.2	62563.4	0.1
			e	277.0	47.9	39757.1	277.1	24.1	19840.4	277.1	23.8	19767.3	600.4	68.7	41227.6	0.1
			f	277.0	72.2	59963.3	277.0	24.0	19794.6	277.1	48.5	40214.2	600.2	104.3	62601.4	0.2
3	66%	5%-10%	d	277.1	47.9	39772.2	277.2	23.9	19812.5	277.2	23.8	19780.1	600.3	68.6	41199.1	--
			e	277.0	3.6	3003.9	277.1	24.0	19801.0	277.1	20.2	-16782.0	600.3	5.3	3191.7	0.2
			f	277.1	47.9	39773.3	277.2	23.9	19814.7	277.1	23.8	19780.7	600.3	68.7	41210.3	0.1
			e	277.1	3.6	3004.4	277.1	24.0	19800.4	277.1	20.2	-16786.1	600.3	5.3	3192.1	0.1
			f	277.1	47.9	39752.0	277.2	23.9	19812.1	277.2	23.8	19768.3	600.3	68.6	41187.0	0.2
			e	277.1	3.6	3003.6	277.1	24.0	19800.6	277.1	20.2	-16780.5	600.3	5.3	3192.8	0.2
			f	277.1	47.9	39750.3	277.2	23.9	19820.0	277.2	23.7	19717.0	600.3	68.6	41197.8	0.2
4		33%-66%	d	277.1	47.9	39785.1	277.2	23.9	19814.4	277.2	23.8	19787.6	600.3	68.7	41221.9	--
			e	277.1	23.8	19787.9	277.1	23.9	19810.2	277.2	0.0	11.6	600.2	34.4	20655.9	0.2

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																
Load level: 33%																
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
			f	277.1	47.9	39753.2	277.2	23.9	19813.8	277.2	23.8	19769.3	600.3	68.6	41179.9	0.2
			e	277.1	23.8	19787.8	277.1	23.9	19810.2	277.2	0.0	23.9	600.2	34.4	20657.8	0.1
			f	277.1	47.9	39778.5	277.2	23.9	19813.7	277.2	23.8	19783.9	600.3	68.7	41223.5	0.1
			e	277.1	23.8	19779.7	277.1	23.9	19810.0	277.2	0.0	11.6	600.2	34.4	20653.0	0.2
			f	277.1	47.9	39759.5	277.2	23.9	19814.9	277.2	23.8	19773.1	600.3	68.6	41203.2	0.3
5	33%	5%-10%	d	277.1	23.8	19780.8	277.1	23.9	19810.1	277.2	0.0	11.6	600.3	34.4	20635.6	--
			e	277.0	3.6	3004.3	277.1	24.0	19800.1	277.1	20.2	-16784.9	600.3	5.3	3190.3	0.2
			f	277.1	23.8	19780.6	277.1	23.9	19810.0	277.2	0.0	11.6	600.3	34.4	20636.7	0.3
			e	277.0	3.6	3006.3	277.1	24.0	19800.1	277.1	20.2	-16799.3	600.2	5.3	3194.9	0.2
			f	277.1	23.8	19773.6	277.1	23.9	19810.1	277.2	0.0	11.5	600.3	34.4	20629.8	0.2
			e	277.0	3.6	3005.2	277.1	24.0	19800.3	277.2	20.2	-16791.1	600.3	5.3	3193.3	0.1
			f	277.1	23.8	19787.9	277.1	23.9	19810.0	277.2	0.0	11.6	600.3	34.4	20643.9	0.1
6		33%-66% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--
(1) 33% load test condition is omitted, which has performed on model of 30k.																

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

204 Optional test

204.1 A PCS may optionally be evaluated to control current exchange with the Area EPS at an external reference point of applicability such as the point of common coupling. The PCS may limit current flow from sources to the Area EPS (exporting) or limit current flow from the Area EPS to loads (importing). During these optional tests the current measured at any external reference point shall not cause the PCS to exceed any current limits as defined in Section 201.9. A PCS shall be considered in compliance if the current conducted to any optional external reference point(s) does not result in a steady state current on any PCS controlled conductor greater than the limits set in tests 203.5 and 203.6. The following optional tests shall be conducted as applicable for functionality and system configurations specified by the manufacturer.

Note: These requirements do not presently evaluate the ability of a PCS to comply with the Prioritization of DER Responses contained in IEEE Standard 1547, 2018. Following publication of IEEE P1547.1 these requirements will be revised to align with the 1547.1 testing protocols that are expected to include requirements for active and reactive power control functions for the PCS controlled conductors except where the active or reactive power control function could cause a PCS controlled current to exceed the limits of protected conductors or bus bars.

Date:

11/10/2021

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

204. 1. 1 Export limiting from all sources

Testing date: N/A

Test Method:

204.1.1 Where the PCS uses external current sensors to limit currents at an external reference point, such as at the point of common coupling, repeat the test sequence in 203.5 and 203.6 at the following conditions:

- Install the external current sensors in accordance with the instructions supplied by the manufacturer.
- Perform test 203.5 and 203.6 and measure current flows, including current flow to the external reference point such as the Area EPS or programmable ac power source. The timing of the step transitions shown as Th1 and Th2 in Figure 203.3, shall be selected to achieve steady state conditions in all current sensors, including the external current sensor at the external reference point.
- Repeat step b) above with external current limit set to 50% (+/- 5%) and 0% (+/- 5%) of EUT nameplate rating. If the manufacturer also elects to support a minimum import function, repeat tests 203.5 and 203.6 at the minimum import setting which results in maximum current flow from the Area EPS or programmable ac power source (i.e. at the maximum setting of minimum import limit - Example: -50% or -100% of EUT nameplate rating).

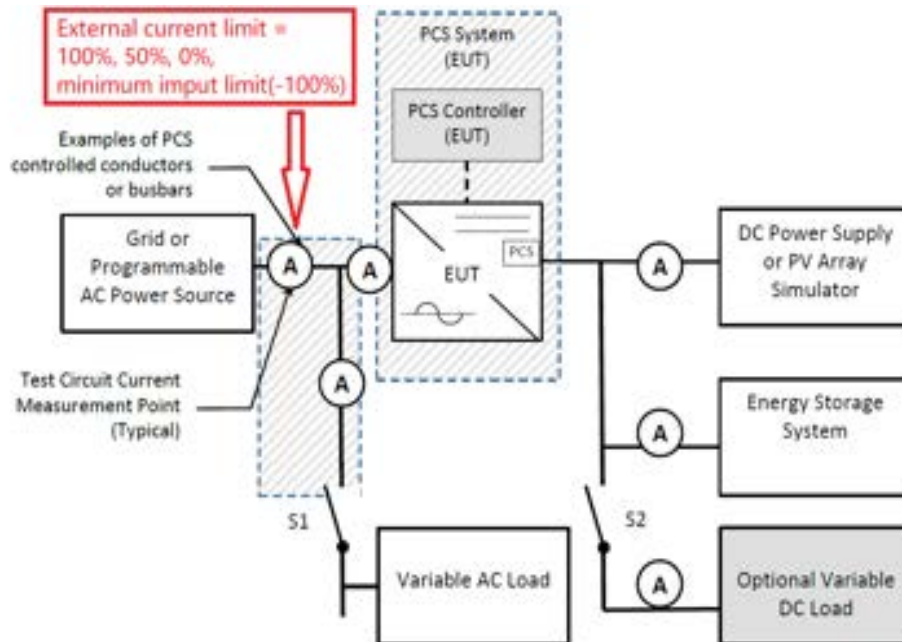


Figure 203.2 – Test Circuit Setup DC Coupled System

Criteria:

204.1.2 An EUT shall be considered in compliance if the current conducted to any optional external reference point(s) does not result in a steady state current on any PCS controlled conductor greater than the limits set in tests 203.5 and 203.6.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Results: NA (This function is not claimed by the manufacturer.)

(1) external current limit set to 100% (+/- 5%)

(a) 203.5

Open loop response time (s)	
Maximum	
Average	

203.5 Step Change in Load Test																
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) ($<30s$)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
1	100%	100%	d													--
			e													
			f													
			e													
			f													
			e													
2		66%	f													
			d													--
			e													
			f													
			e													
			f													
3		33%	d													--
			e													
			f													
			e													
			f													

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																	
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e														
			f														
4	50%	100%	d													--	
			e														
			f														
			e														
			f														
			e														
			f														
			e														
5		66%	d													--	
			e														
			f														
			e														
			f														
			e														
6		33%	d													--	
			e														
			f														
			e														
			f														
			e														
7		0%	100%	d													--
				e													
				f													
				e													
				f													
				e													

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																	
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<30s)	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
		66%	f														
8			d														--
			e														
			f														
			e														
			f														
			e														
			f														
9	33%	d														--	
		e															
		f															
		e															
		f															
		e															
		f															

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(b) 203.6

Open loop response time (s)	
Maximum	
Average	

203.6 Step Change in Generation Test																
Load level: 33%																
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<u><30s</u>)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
1	100%	5%-10%	d													--
			e													
			f													
			e													
			f													
			e													
2		33%- <u>66%</u>	f													
			d												--	
			e													
			f													
			e													
			f													
3	66%	5%-10%	d												--	
			e													
			f													
			e													
			f													
			e													
4		33%- <u>66%</u>	d												--	
			e													

Date: 11/10/2021

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																
Load level: 33%																
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			Generation port			Tr (s) (<u><30s</u>)
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	
			f													
			e													
			f													
			e													
			f													
5	33%	5%-10%	d													--
			e													
			f													
			e													
			f													
			e													
6		33%- <u>66%</u>	d													--
			e													
			f													
			e													
			f													
			e													

(2) external current limit set to 50% (+/- 5%)

(3) external current limit set to 0% (+/- 5%)

(4) external current limit set to -100% (+/- 5%)

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

204.2 ESS Operating Modes

204.2.1 General - Some utility requirements restrict current exchanges between the Area EPS and the energy storage sub-system (ESS). This section includes the requirements for ESS that perform PCS functionality. For example: It may be permissible to export active power from the ESS to the Area EPS but the ESS may not be allowed to import active power from the Area EPS.

204.2.2 ESS is rated to perform PCS control active power exchanges between the Area EPS and the energy storage sub-system (ESS), the manufacturer shall specify which optional functions and ESS operating modes are supported by the PCS. Each supported mode shall be evaluated using the relevant tests described in this Section.

204.2.3 The following terminology shall be used in the test report to identify operating modes which limit the steady state active power flows between the ESS and the Area EPS supported by the PCS.

- a) Unrestricted Mode – The ESS may import active power from Area EPS while charging and may export active power to the Area EPS while discharging.
- b) Export Only Mode – The ESS may export active power to the Area EPS during discharging but shall not import active power from the Area EPS for ESS charging purposes.
- c) Import Only Mode – The ESS may import active power from the Area EPS for charging purposes but shall not export active power from the ESS to the Area EPS.
- d) No Exchange Mode – The ESS shall not exchange active power with the Area EPS for charging or discharging purposes.

Test Result Summary:

ESS Operating Mode	If support?	If only support zero export?	If only support zero charge?	If tested?	Test clause	Maximum open loop response time (s)	Average open loop response time (s)
Unrestricted Mode	Yes	Yes	Yes	Yes	203.5, 203.6	0.3	0.2
Export Only Mode	Yes	Yes	Yes	Yes	204.5	0.3	0.2
Import Only Mode	Yes	Yes	Yes	Yes	204.4	0.3	0.2
No Exchange Mode	Yes	Yes	Yes	Yes	204.4, 204.5	0.3	0.2
Remark(s): See detail test datas in the following test items.							

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

204.4 Export limiting from Energy Storage Systems

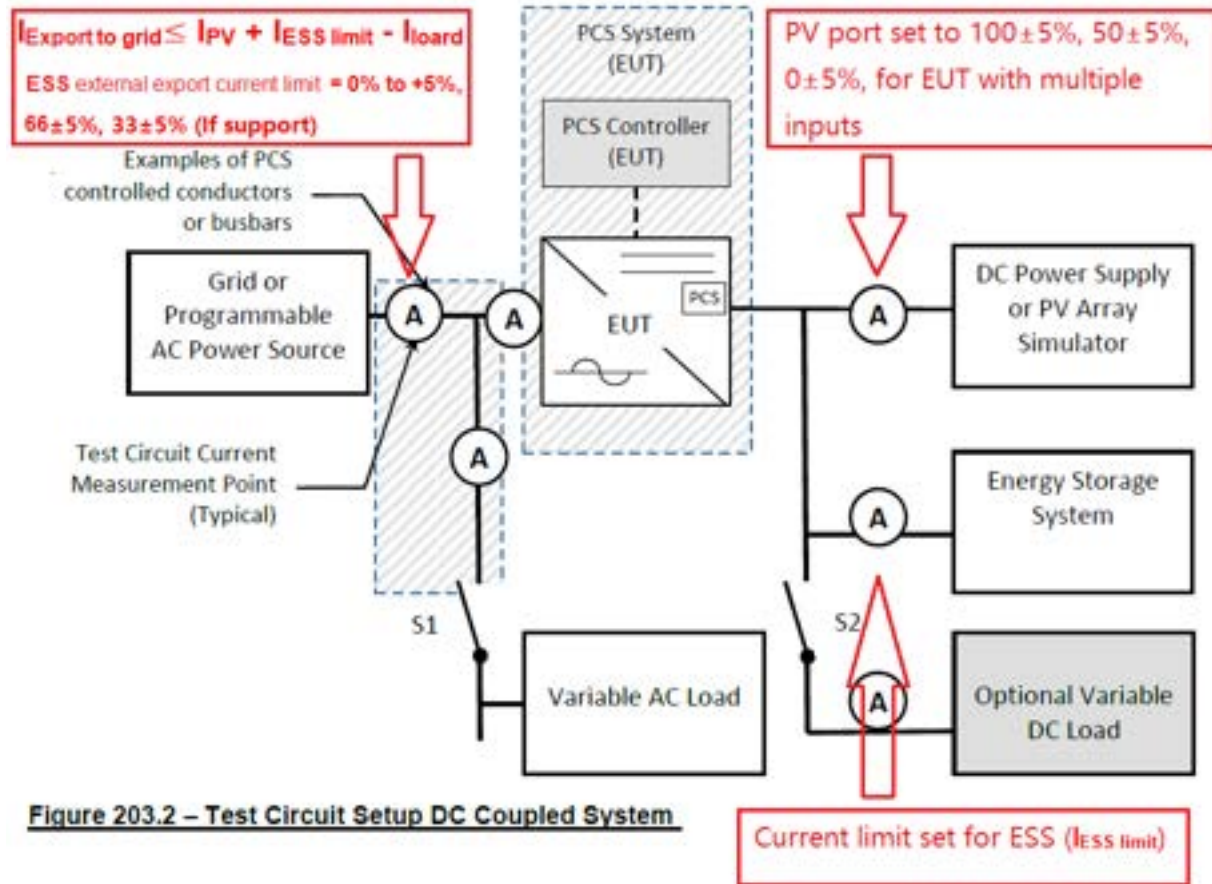
Testing date: See page 2.

Test Method:

204.4.1 Where the PCS includes ability to limit current flow from an ESS to the external reference point such as the point of common coupling to the Area EPS (i.e. ESS grid export limiting). Repeat the test sequence in 203.5 and 203.6 at the following conditions:

- a) Install any external current sensors, if applicable, in accordance with the instructions supplied by the manufacturer.
- b) For EUT's with multiple inputs, such as PV and ESS, set or verify the other, non ESS, inputs are set to 100% +/-5% of their nameplate ratings.
- c) Set or verify that the ESS external export current limit is set to 0% to +5% of EUT nameplate rating.
- d) Run test 203.5 and 203.6 and record current flows including current flow to the Area EPS or programmable ac power source and the output of the ESS. The timing of the step transitions shown as Th1 and Th2 in Figure 203.3, shall be selected to achieve steady state conditions in all current sensors, including the external current sensor at the external reference point and at the output of the ESS.
- e) Where the PCS only supports zero export from the ESS steps f) and g) may be omitted.
- f) Repeat steps c) through e) above with external current limit set to 66% +/- 5% and 33% +/- 5% of EUT nameplate rating.
- g) For EUT's with multiple inputs, such as PV and ESS, repeat steps c) through g) with the other, non ESS, inputs set to 50% +/- 5% and 0% to +5% of their nameplate ratings

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V, 50K-3P-480V, 40K-3P-480V, 30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		



Criteria:

204.4.2 The EUT shall be considered in compliance if the steady state export current at the external reference point does not exceed the current from generation sources other than the ESS plus the current limit set for the ESS minus any local load.

204.4.3 For DC coupled systems the AC output current of the EUT shall be considered to be proportional to the relative DC current flows from each source divided by the sum of the DC current from all sources.

ie. $I_{\text{Export to grid}} \leq I_{\text{PV}} + I_{\text{ESS limit}} - I_{\text{load}}$ (Clause 204.4.2)

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Results:

(1) ESS external export current limit = 0% to +5%, PV inputs = 100% ± 5%

Open loop response time (s)	
Maximum	0.3
Average	0.2

(a) For single phase unit connected line to neutral, or for three phase unit (open S1 on three phases simultaneously)

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	276.3	71.9	59585.0	276.3	72.6	60161.1	277.0	3.3	-567.5	600.1	105.5	63311.5	600.3	0.0	10.3	--	Non-exchange
			e	277.2	71.7	59585.5	277.2	1.2	3.9	277.9	71.7	59725.9	600.1	105.5	63306.7	600.3	0.0	10.3	0.1	
			f	276.4	71.9	59565.0	276.3	71.8	59497.0	277.0	3.2	77.8	600.1	105.5	63296.2	600.2	0.0	10.3	0.2	
			e	277.2	71.7	59591.4	277.2	1.2	3.7	277.9	71.7	59731.4	600.2	105.5	63292.1	600.3	0.0	10.3	0.3	
			f	276.4	71.9	59543.3	276.3	71.8	59485.3	277.0	3.2	69.3	600.2	105.4	63240.5	600.3	0.0	10.3	0.2	
			e	277.2	71.7	59590.7	277.2	1.2	3.6	277.9	71.7	59732.2	600.2	105.4	63286.0	600.3	0.0	10.3	0.2	
			f	276.4	71.9	59574.3	276.3	71.8	59491.0	277.0	3.2	91.8	600.2	105.4	63266.7	600.3	0.0	10.3	0.1	
2		66%	d	276.7	71.8	59560.2	276.7	47.6	39509.8	277.4	24.4	20106.8	600.1	105.1	63081.2	600.2	0.0	10.3	--	
			e	277.3	71.7	59573.7	277.2	1.2	3.7	277.9	71.7	59713.3	600.1	105.2	63107.3	600.3	0.0	10.3	0.2	
			f	276.7	71.8	59557.8	276.7	47.3	39227.8	277.4	24.8	20388.0	600.1	105.1	63074.1	600.2	0.0	10.3	0.1	
			e	277.3	71.7	59583.7	277.2	1.2	3.6	277.9	71.7	59724.0	600.1	105.1	63096.6	600.2	0.0	10.3	0.1	
			f	276.7	71.8	59557.3	276.7	47.3	39217.6	277.4	24.7	20395.6	600.1	105.2	63100.4	600.3	0.0	10.3	0.1	
			e	277.3	71.7	59580.1	277.2	1.2	3.5	277.9	71.7	59719.0	600.1	105.2	63145.3	600.2	0.0	10.3	0.2	
			f	276.7	71.8	59539.8	276.7	47.3	39237.9	277.4	24.7	20358.4	600.1	105.2	63130.1	600.3	0.0	10.3	0.1	
3		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Date: 11/10/2021

TEST PACKAGE

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
4	50%	100%	d	275.9	36.0	29780.0	275.9	72.6	60063.4	276.5	36.6	-30356.0	600.2	51.9	31159.1	600.2	0.0	5.2		
			e	276.8	35.9	29788.8	276.8	1.1	3.7	277.4	35.9	29855.1	600.2	51.9	31163.8	600.2	0.0	5.2	0.2	
			f	275.9	36.0	29790.5	275.9	71.8	59401.4	276.5	35.8	-29681.5	600.5	51.9	31145.3	600.2	0.0	5.2	0.3	
			e	276.8	35.9	29792.1	276.8	1.1	3.5	277.4	35.9	29859.4	600.3	51.9	31123.9	600.3	0.0	5.2	0.2	
			f	275.9	36.0	29752.5	275.9	71.8	59430.4	276.5	35.9	-29748.9	600.2	51.8	31104.9	600.3	0.0	5.2	0.3	
			e	276.8	35.9	29781.7	276.8	1.1	3.6	276.4	35.9	29849.2	600.2	51.9	31125.0	600.2	0.0	5.2	0.2	
			f	275.9	36.0	29776.4	275.9	71.9	59470.5	276.6	35.9	-29764.8	600.2	51.8	3115.5	600.2	0.0	5.2	0.2	
5		66%	d	276.2	36.0	29768.2	276.2	47.7	39477.7	276.9	11.8	-9734.6	600.2	51.8	31070.9	600.3	0.0	5.2		
			e	276.8	35.9	29777.4	276.8	1.1	3.9	277.5	35.9	29844.6	600.2	51.8	31057.2	600.2	0.0	5.2	0.2	
			f	276.2	36.0	29760.9	276.2	47.3	39194.9	276.9	11.5	-9458.1	600.2	51.7	31032.0	600.3	0.0	5.2	0.3	
			e	276.8	35.9	29783.4	276.8	1.1	3.6	277.5	35.9	29850.6	600.2	51.7	31052.9	600.3	0.0	5.2	0.2	
			f	276.2	36.0	29771.3	276.2	47.4	39236.6	276.9	11.5	-9490.0	600.2	51.7	31045.8	600.3	0.0	5.2	0.1	
			e	276.8	35.9	29790.4	276.8	1.1	3.3	277.5	35.9	29857.5	600.2	51.7	31037.2	600.3	0.0	5.2	0.2	
			f	276.2	36.0	29770.0	276.2	47.4	39231.8	276.9	11.6	-9486.1	600.2	51.7	31030.4	600.2	0.0	5.2	0.1	
6		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
7	0%	100%	d	275.4	0.7	474.7	275.4	72.8	60160.1	276.1	72.2	-59822.3	600.1	0.0	67.3	600.2	0.0	0.2	--	
			e	276.3	0.7	454.6	276.3	1.1	3.5	277.0	0.8	449.8	600.0	0.0	35.9	600.3	0.0	0.2	0.2	
			f	275.4	0.7	429.2	275.4	71.9	59421.3	276.1	71.4	-59127.3	600.1	0.0	12.4	600.3	0.0	0.2	0.3	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
8			e	276.3	0.6	394.9	276.3	1.0	3.1	277.0	0.7	389.8	600.1	0.0	12.6	600.3	0.0	0.1	0.2	
			f	275.4	0.6	366.7	275.4	71.9	59425.7	276.1	71.5	-59194.2	600.1	0.0	-6.6	600.3	0.0	0.6	0.3	
			e	276.3	0.6	317.0	276.3	1.0	3.4	277.0	0.6	311.8	600.1	0.0	-49.0	600.2	0.0	0.1	0.1	
			f	275.4	0.5	223.9	275.4	71.9	59422.7	276.1	71.6	-59334.7	600.1	0.0	-86.8	600.2	0.0	0.1		
		66%	d	275.8	0.7	459.1	275.7	47.8	39518.2	276.4	47.2	-39150.1	600.1	0.0	-6.6	600.2	0.0	0.2	--	
			e	276.4	0.7	433.7	276.3	0.7	3.1	277.0	0.7	428.7	600.1	0.0	-16.8	600.2	0.0	0.2	0.2	
			f	275.8	0.7	411.0	275.7	47.4	39202.7	276.4	46.9	-38881.8	600.1	0.0	-31.9	600.2	0.0	0.2	0.3	
			e	276.4	0.6	381.3	276.3	0.7	3.0	277.0	0.7	376.1	600.1	0.0	-48.4	600.3	0.0	0.1	0.2	
			f	275.8	0.6	333.6	275.7	47.4	39206.1	276.4	47.0	-38962.6	600.1	0.0	-73.6	600.2	0.0	0.1	0.1	
			e	276.4	0.5	243.6	276.3	0.7	3.4	277.0	0.6	238.2	600.1	0.0	-139.8	600.2	0.0	0.1	0.2	
			f	275.8	0.5	147.6	275.7	47.4	39205.5	276.4	47.2	-39147.9	600.1	0.0	-149.6	600.3	0.0	0.1	0.3	
9		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	

Remark:

(1) 33% load test condition is omitted, which has performed on model of 30k.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(2) Only for three phase unit, open switch S1 on only one phase

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	276.2	71.9	59518.9	276.2	72.5	60077.1	276.9	3.3	-552.9	600.1	105.2	63139.4	600.2	0.0	10.3		Non-exchange
			e	276.5	71.9	59526.6	276.5	49.0	40047.1	277.2	25.9	19615.9	600.1	105.3	63203.5	600.3	0.0	10.3	0.2	
			f	276.2	71.9	59539.1	276.2	72.8	60325.5	276.9	3.4	-781.9	600.1	105.4	63231.1	600.2	0.0	10.3	0.3	
			e	276.5	71.9	59533.3	276.5	49.0	40033.1	277.2	25.9	19635.9	600.1	105.3	63212.2	600.2	0.0	10.3	0.2	
			f	276.2	71.9	59542.1	276.2	72.8	60316.8	276.9	3.4	-769.9	600.1	105.4	63230.7	600.3	0.0	10.3	0.3	
			e	276.5	71.9	59525.3	276.5	49.0	40020.3	277.2	25.9	19640.9	600.1	105.4	63218.8	600.3	0.0	10.3	0.1	
			f	276.2	71.9	59547.1	276.2	72.8	60311.1	26.9	3.4	-759.8	600.1	105.4	63230.4	600.3	0.0	10.3	0.2	
2		66%	d	276.6	71.8	59549.0	276.6	47.6	39473.9	277.3	24.4	20130.5	600.3	105.2	63147.0	600.3	0.0	10.3	---	
			e	276.8	71.8	59551.9	276.8	32.5	26428.6	277.5	40.0	33260.1	600.3	105.3	63185.4	600.2	0.0	10.3	0.2	
			f	276.6	71.8	59528.3	276.6	47.8	39623.1	277.3	24.2	19956.7	600.2	105.2	63147.3	600.2	0.0	10.3	0.1	
			e	276.8	71.9	59610.2	276.8	32.5	26423.7	277.5	40.1	33327.6	600.3	105.3	63203.8	600.3	0.0	10.3	0.3	
			f	276.6	71.8	59563.7	276.6	47.8	39630.0	277.3	24.3	19959.3	600.3	105.2	63165.5	600.2	0.0	10.3	0.1	
			e	276.8	71.8	59587.5	276.8	32.5	26420.9	277.5	40.0	33302.4	600.3	105.3	63200.9	600.3	0.0	10.3	0.2	
			f	276.6	71.8	59544.4	276.6	47.8	39631.8	277.3	24.2	19963.8	600.3	105.2	63143.5	600.3	0.0	10.3	0.2	
3		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
4	50%	100%	d	275.8	36.0	29762.4	275.7	72.6	60074.1	276.4	36.7	-3038 5.5	600.2	51.9	31123.5	600.3	0.0	5.2	---	Non-exchange
			e	276.0	36.0	29740.5	276.0	49.1	40029.4	276.7	36.5	-1022 4.1	600.2	51.8	31078.3	600.2	0.0	5.2	0.2	
			f	275.8	36.0	29758.6	275.7	72.9	60329.4	276.4	37.0	-3064 4.3	600.3	51.8	31086.7	600.3	0.0	5.2	0.2	
			e	276.0	36.0	29754.1	276.0	49.1	40026.1	276.7	36.5	-1020 6.7	600.3	51.8	31088.8	600.2	0.0	5.2	0.1	
			f	275.8	36.0	29760.1	275.7	72.9	60320.7	276.4	37.0	-3063 3.4	600.3	51.8	31101.8	600.3	0.0	5.2	0.1	
			e	276.0	36.0	29764.8	276.0	49.1	40015.7	276.8	36.5	-1018 6.2	600.3	51.8	31087.7	600.2	0.0	5.2	0.3	
			f	275.8	36.0	29761.9	275.7	72.9	60312.7	276.4	37.0	-3062 1.3	600.3	51.8	31076.7	600.2	0.0	5.2	0.2	
5		66%	d	276.2	36.0	29776.7	276.2	47.4	39261.1	276.9	11.6	-9509. 4	600.4	51.8	31078.6	600.2	0.0	5.2	---	
			e	276.4	36.0	29765.0	276.3	32.6	26486.0	277.0	20.1	3344.5	600.4	51.8	31068.7	600.2	0.0	5.2	0.2	
			f	276.2	36.0	29773.4	276.2	47.9	39693.4	276.8	12.0	-9944. 9	600.3	51.8	31073.1	600.3	0.0	5.2	0.1	
			e	276.4	35.9	29749.1	276.3	32.5	2644.38	277.0	20.1	3370.4	600.3	51.7	31010.3	600.3	0.0	5.2	0.3	
			f	276.2	36.0	29778.1	276.2	47.9	39659.0	276.9	12.0	-9909. 3	600.3	51.7	31043.5	600.2	0.0	5.2	0.2	
			e	276.4	36.0	29767.9	276.3	32.5	26422.7	277.0	20.0	3411.5	600.3	51.7	31045.7	600.2	0.0	5.2	0.2	
			f	276.2	36.0	29767.8	276.2	47.9	39639.0	276.9	12.0	-9898. 2	600.3	51.7	31025.4	600.3	0.0	5.2	0.1	
6		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
7	0%	100%	d	275.3	0.7	459.0	275.3	72.8	60076.9	276.0	72.2	-5975 4.6	600.1	0.0	48.6	600.2	0.0	0.2	--	Non-exchange

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
			e	275.6	0.8	440.2	275.6	49.1	40042.1	276.2	48.6	-3960 8.8	600.1	0.0	41.8	600.3	0.0	0.2	0.2		
			f	275.3	0.7	409.9	275.3	73.1	60316.2	276.0	72.5	-6004 4.5	600.1	0.0	27.9	600.2	0.0	0.7	0.3		
			e	275.6	0.8	376.8	275.6	49.1	40032.6	276.3	48.6	-3966 2.9	600.1	0.0	3.8	600.3	0.0	0.2	0.3		
			f	275.3	0.6	360.2	275.3	73.0	60300.4	276.0	72.6	-6007 7.9	600.1	0.0	-19.5	600.3	0.0	0.1	0.2		
			e	275.6	0.7	298.8	275.6	49.1	40001.1	276.3	48.6	-3970 9.1	600.1	0.0	-43.2	600.2	0.0	0.1	0.2		
			f	275.3	0.5	201.8	275.3	73.0	60289.8	276.0	72.7	-6022 5.6	600.1	0.0	-85.1	600.2	0.0	0.1	0.1		
		8	66%	d	275.7	0.7	468.7	275.7	47.5	39241.5	276.4	46.9	-3886 3.9	600.2	0.0	-24.8	600.3	0.0	0.2		--
				e	275.9	0.8	452.3	275.9	32.6	26444.7	276.6	32.0	-2599 7.9	600.2	0.0	-27.7	600.3	0.0	0.2		0.2
				f	275.7	0.7	428.7	275.7	48.0	39675.5	276.4	47.5	-3933 8.4	600.1	0.0	-42.2	600.3	0.0	0.2		0.1
				e	275.8	0.7	397.4	275.9	32.5	26430.2	276.6	32.0	-2603 7.9	600.1	0.0	-64.8	600.2	0.0	0.1		0.1
				f	275.7	0.6	378.3	275.7	48.0	39656.9	276.4	47.5	-3937 0.9	600.1	0.0	-93.9	600.3	0.0	0.1		0.2
				e	275.9	0.6	318.1	275.9	32.6	26415.6	276.6	32.0	-2610 3.2	600.1	0.0	-123.2	600.2	0.0	0.1		0.1
9	33% ⁽¹⁾	f	275.7	0.5	229.0	275.7	48.0	39645.6	276.4	47.7	-3950 8.3	600.1	0.0	-160.7	600.3	0.0	0.1	0.2			
		d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
		e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
		f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
		e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
		f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
		e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
		f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			

Remark:
 (1) 33% load test condition is omitted, which has performed on model of 30k.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(c) Only for three phase unit, open switch S1 on two phases simultaneously

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	276.4	71.9	59549.0	276.4	72.5	60085.9	277.1	3.3	-534.7	600.3	105.1	63098.5	600.2	0.0	10.3	---	Non-exchange
			e	277.1	71.8	59585.2	277.0	24.9	19663.3	277.7	48.5	40051.6	600.3	105.2	63129.8	600.2	0.0	10.3	0.2	
			f	276.4	71.9	59567.5	276.4	73.4	60837.6	277.1	3.6	-1269.1	600.3	105.2	63135.3	600.2	0.0	10.3	0.3	
			e	277.1	71.8	59567.9	277.0	24.9	19646.5	277.7	48.5	40054.1	600.3	105.1	63096.7	600.3	0.0	10.3	0.2	
			f	276.4	71.9	59566.3	276.4	73.4	60816.5	277.1	3.6	-1247.5	600.3	105.1	63097.9	600.3	0.0	10.3	0.2	
			e	277.1	71.8	59592.2	277.0	24.9	19638.5	277.7	48.5	40082.1	600.3	105.2	63118.1	600.2	0.0	10.3	0.1	
			f	276.4	71.9	59561.9	276.4	73.4	60815.7	277.1	3.6	-1251.9	600.3	105.1	63094.9	600.3	0.0	10.3	0.2	
2		66%	d	276.8	71.8	59578.2	276.7	47.4	39355.6	277.4	24.6	20276.4	600.3	105.2	63147.3	600.3	0.0	10.3	---	
			e	277.2	71.7	59590.0	277.1	16.9	13087.6	277.9	56.0	46634.5	600.3	105.2	63133.0	600.2	0.0	10.3	0.3	
			f	276.8	71.8	59591.8	276.7	47.9	39723.6	277.4	24.2	19921.7	600.3	105.2	63141.0	600.3	0.0	10.3	0.3	
			e	277.2	71.7	59532.9	277.1	17.0	13086.3	277.8	55.9	46579.2	600.3	105.1	63062.4	600.2	0.0	10.3	0.2	
			f	276.8	71.8	59568.3	276.7	47.9	39744.1	277.4	24.1	19877.3	600.3	105.1	63101.0	600.3	0.0	10.3	0.2	
			e	277.2	71.7	59570.2	277.1	17.0	13086.0	277.8	55.9	46614.2	600.3	105.2	63108.6	600.3	0.0	10.3	0.3	
			f	276.8	71.9	59595.9	276.7	47.9	39751.7	277.4	24.1	19900.1	600.3	105.2	63138.8	600.3	0.0	10.3	0.2	
3		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
4	50%	100%	d	275.9	36.0	29775.2	275.9	72.6	60073.3	276.6	36.6	-30371.4	600.4	51.6	31004.7	600.2	0.0	5.2	---	Non-exchange
			e	276.6	35.9	29762.0	276.6	24.9	19647.8	277.2	35.7	10176.8	600.4	51.7	61006.3	600.3	0.0	5.1	0.2	
			f	275.9	36.0	29789.6	275.9	73.5	60805.8	276.6	37.5	-31090.3	600.4	51.7	31039.1	600.3	0.0	5.2	0.2	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	276.6	36.0	29776.9	276.6	24.9	19644.1	277.3	35.7	10191.9	600.4	51.7	31031.4	600.3	0.0	5.1	0.1	
f			275.9	36.0	29774.7	275.9	73.5	60808.5	276.6	37.5	-31108.6	600.4	51.7	31019.6	600.2	0.0	5.2	0.1		
e			276.6	35.9	29761.1	276.6	24.9	19639.1	277.3	35.7	10184.2	600.4	51.6	30986.9	600.2	0.0	5.2	0.3		
f			275.9	36.0	29770.3	275.9	73.5	60806.8	276.6	37.5	-31111.5	600.3	51.6	30982.5	600.3	0.0	5.2	0.2		
5		66%	d	276.3	36.0	29800.8	276.3	47.3	39220.5	277.0	11.5	-9446.7	600.4	51.7	31029.1	600.2	0.0	5.2	--	
			e	276.7	35.9	29786.2	276.7	17.0	13125.0	277.4	27.8	16722.5	600.3	51.7	31015.0	600.3	0.0	5.2	0.2	
			f	276.3	36.0	29803.9	276.3	48.1	39834.4	277.0	12.2	-10058.0	600.3	51.7	31029.6	600.2	0.0	5.2	0.2	
			e	276.7	35.9	29789.6	276.7	16.9	13103.3	277.4	27.8	16747.3	600.3	51.7	31027.2	600.2	0.0	5.2	0.1	
			f	276.3	36.0	29791.7	276.3	48.1	39832.1	277.0	12.2	-10068.2	600.3	51.7	31013.3	600.2	0.0	5.2	0.1	
			e	276.7	35.9	29776.9	276.7	16.9	136098.5	277.4	27.8	16739.0	600.3	51.6	30975.9	600.3	0.0	5.2	0.3	
6		33% ⁽¹⁾	f	276.3	36.0	29789.1	276.3	48.1	39825.0	277.0	12.2	-10063.9	600.3	51.7	31013.7	600.2	0.0	5.2	0.2	
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
7		0%	100%	d	275.5	0.7	470.1	275.4	71.8	59285.5	276.1	71.2	-58950.2	600.2	0.0	-73.4	600.2	0.0	0.2	
	e			276.1	0.8	450.4	276.1	24.9	19676.3	276.8	24.3	-19233.2	600.2	0.0	-94.1	600.2	0.0	0.2	0.1	
	f			275.4	0.7	425.8	275.4	73.6	60778.6	276.1	73.0	-60491.5	600.2	0.0	-98.1	600.2	0.0	0.2	0.1	
	e			276.1	0.8	406.4	276.1	24.9	19664.6	276.8	24.3	-19266.1	600.3	0.0	-113.5	600.3	0.0	0.1	0.1	
	f			275.4	0.6	379.4	275.4	73.6	60780.3	276.1	73.1	-60539.3	600.2	0.0	-131.3	600.3	0.0	0.1	0.2	
	e			276.1	0.7	307.4	276.1	24.9	19659.5	276.8	24.3	-19360.1	600.2	0.0	-173.1	600.2	0.0	0.1	0.1	
	f			275.4	0.5	218.5	275.4	73.5	60750.0	276.1	73.2	-60669.8	600.2	0.0	-197.7	600.2	0.0	0.1	0.1	
8	66%	d	275.8	0.7	468.9	275.8	47.4	39164.5	276.5	46.8	-38785.9	600.1	0.0	-64.1	600.3	0.0	0.2	--		
		e	276.3	0.7	450.1	276.2	16.9	13115.0	276.9	16.3	-12671.8	600.1	0.0	-67.5	600.3	0.0	0.2	0.2		
		f	275.8	0.7	431.4	275.8	48.1	39811.6	276.5	47.6	-39471.9	600.1	0.0	-107.9	600.3	0.0	0.2	0.2		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
9			e	276.3	0.7	411.6	276.2	16.9	13105.4	276.9	16.3	-12700.9	600.1	0.0	-129.8	600.2	0.0	0.1	0.3		
			f	275.8	0.6	388.8	275.8	48.1	39796.3	276.5	47.6	-39499.1	600.1	0.0	-142.6	600.2	0.0	0.1	0.3		
			e	276.3	0.6	314.8	276.2	16.9	13107.2	276.9	16.2	-12799.9	600.1	0.0	-188.4	600.3	0.0	0.1	0.1		
			f	275.8	0.5	224.7	275.8	48.1	39797.3	276.5	47.8	-39664.0	600.2	0.0	-211.2	600.3	0.0	0.1	0.2		
		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		

Remark:
(1) 33% load test condition is omitted, which has performed on model of 30k.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Open loop response time (s)	
Maximum	0.3
Average	0.2

203.6 Step Change in Generation Test																				
Load level: 33%																				
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	5%-10%	d	277.1	23.9	19838.0	277.0	23.9	19814.7	277.7	0.6	454.0	600.4	103.0	61813.2	600.7	63.6	-38204.8	--	Non-exchange
			e	277.1	23.9	19837.5	277.0	23.9	19813.8	277.7	0.5	454.0	600.4	8.2	4946.8	600.7	26.2	15765.0	0.2	
			f	277.1	23.9	19843.6	277.0	23.9	19814.6	277.7	0.5	454.2	600.3	103.0	61847.3	600.6	63.6	-38224.4	0.3	
			e	277.1	23.9	19832.9	277.0	23.9	19813.5	277.7	0.5	453.9	600.4	8.2	4945.9	600.7	26.2	15762.1	0.1	
			f	277.1	23.9	19847.0	277.0	23.9	19814.7	277.7	0.5	454.3	600.3	103.0	61860.2	600.6	63.7	-38236.9	0.2	
			e	277.1	23.9	19821.6	277.0	23.9	19813.4	277.7	0.5	453.5	600.4	8.2	4944.3	600.7	26.2	15755.6	0.3	
			f	277.1	23.9	19828.9	277.0	23.9	19814.5	277.7	0.5	453.7	600.3	102.9	61784.0	600.6	63.6	-38187.4	0.2	
2		33%-66%	d	277.1	23.9	19851.0	277.0	23.9	19813.5	277.7	0.5	454.5	600.3	103.1	61866.2	600.7	63.5	-38168.6	--	
			e	277.1	23.9	19841.6	277.1	23.9	19813.6	277.8	0.5	454.2	600.4	51.8	31077.5	600.7	16.1	-9685.9	0.2	
			f	277.1	23.9	19836.8	277.0	23.9	19813.6	277.7	0.5	454.0	600.4	102.9	61806.4	600.7	63.5	-38137.1	0.1	
			e	277.1	23.9	19835.2	277.1	23.9	19813.7	277.8	0.5	453.9	600.4	51.7	31059.24	600.7	16.1	-9680.06	0.2	
			f	277.1	239	19842.2	277.0	23.9	19812.9	277.7	0.5	454.2	600.4	102.9	61807.2	600.7	63.5	-38140.5	0.3	
			e	277.1	23.9	19827.0	277.1	23.9	19812.6	277.8	0.5	453.7	600.4	51.7	31049.3	600.7	16.1	-9676.2	0.2	
			f	277.1	23.9	19837.1	277.0	23.9	19813.4	277.7	0.5	454.0	600.4	102.9	61805.0	600.7	63.5	-38134.2	0.2	
3	66% ⁽¹⁾	5%-10%	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
4		33%-66%	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																				
Load level: 33%																				
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			e	---	---	---	---	---	---	---	---	---	---	---	---	---				
			f	---	---	---	---	---	---	---	---	---	---	---	---	---				
			e	---	---	---	---	---	---	---	---	---	---	---	---	---				
			f	---	---	---	---	---	---	---	---	---	---	---	---	---				
5	33% ⁽¹⁾	5%-10%	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---				
			f	---	---	---	---	---	---	---	---	---	---	---	---	---				
			e	---	---	---	---	---	---	---	---	---	---	---	---	---				
			f	---	---	---	---	---	---	---	---	---	---	---	---	---				
			e	---	---	---	---	---	---	---	---	---	---	---	---	---				
6		33%-66%	f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			d	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.																				

(2) ESS external export current limit = $66 \pm 5\%$ (If support), PV inputs = $100\% \pm 5\%$ - NA

(3) ESS external export current limit = $33 \pm 5\%$ (If support), PV inputs = $100\% \pm 5\%$ - NA

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(4) ESS external export current limit = 0% to +5%, PV inputs = 50% ± 5%

Open loop response time (s)	
Maximum	0.3
Average	0.2

(a) For single phase unit connected line to neutral, or for three phase unit (open S1 on three phases simultaneously)

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	276.3	72.8	60250.7	276.3	72.3	59908.7	277.0	0.1	-9.15	600.3	51.6	30970.5	600.6	51.5	30912.1	--	Import only
			e	277.2	36.2	-30097.7	277.2	1.1	1.8	277.9	36.2	-30167.6	600.3	51.5	30906.9	600.6	94.9	-56983.2	0.3	
			f	276.3	72.8	60260.0	276.3	72.3	59908.4	277.0	0.1	-8.9	600.3	51.6	30978.0	600.6	51.5	30919.5	0.2	
			e	277.2	36.2	-30109.5	277.2	1.1	1.2	277.9	36.2	-30179.7	600.4	51.5	30929.1	600.7	94.9	-57021.9	0.2	
			f	276.3	72.7	60230.0	276.3	72.3	59906.7	277.0	0.0	-9.5	600.3	51.6	30967.1	600.6	51.5	30906.2	0.2	
			e	277.2	36.2	-30100.9	277.2	1.1	1.8	277.9	36.2	-30171.3	600.3	51.5	30920.3	600.6	94.9	-57005.3	0.1	
			f	276.3	72.8	60245.8	276.3	72.3	59906.3	277.0	0.1	-9.2	600.3	51.6	30963.7	600.6	51.5	30902.9	0.1	
2		66%	d	276.7	47.7	39578.8	276.7	47.7	39536.5	277.4	0.3	277.7	600.3	51.4	30872.9	600.6	16.8	10102.3	--	
			e	277.3	36.2	-30077.9	277.3	1.2	1.3	278.0	36.2	-30148.7	600.3	51.4	30859.1	600.6	94.8	-56915.5	0.2	
			f	276.7	47.7	39569.0	276.7	47.6	39527.3	277.4	0.3	227.6	600.3	51.4	30858.3	600.6	16.8	10097.1	0.3	
			e	277.3	36.2	-30079.0	277.3	1.2	1.6	278.0	36.2	-30149.4	600.3	51.4	30870.1	600.7	94.8	-56933.4	0.1	
			f	276.7	47.7	39594.7	276.7	47.6	39521.5	277.4	0.3	228.1	600.3	51.4	30881.3	600.6	16.8	10105.7	0.2	
			e	277.3	36.2	-30094.4	277.3	1.2	1.0	278.0	36.2	-30164.2	600.3	51.4	30874.7	600.7	94.8	-56947.4	0.3	
			f	276.7	47.7	39586.8	276.7	47.6	39516.9	277.4	0.3	228.0	600.3	51.4	30872.6	600.6	16.8	10103.7	0.2	
3		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
	e		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			

TEST PACKAGE

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($\leq 30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
4	50%	100%	d	275.9	36.3	30058.2	275.9	72.4	59932.0	276.6	36.4	-30146.8	600.4	51.3	30788.9	600.7	0.1	51.3	--	Import only
			e	276.9	36.3	-30106.7	276.8	1.2	1.0	277.5	36.3	-30174.0	600.4	51.4	30855.5	600.7	94.8	-56948.9	0.2	
			f	275.9	36.4	30115.3	275.9	72.4	59921.1	276.6	36.3	-30079.4	600.3	51.4	30840.9	600.7	0.1	61.4	0.3	
			e	276.9	36.3	-30127.8	276.8	1.2	1.2	277.5	36.3	-30194.6	600.4	51.4	30855.9	600.7	94.8	-56960.1	0.2	
			f	276.0	36.4	30081.4	275.9	72.3	59911.1	276.6	36.3	-30097.7	600.3	51.3	30820.1	600.7	0.1	51.3	0.1	
			e	276.9	36.3	-30122.0	276.8	1.2	0.9	277.5	36.3	-30188.2	600.4	51.4	30879.8	600.7	94.9	-56982.2	0.3	
			f	276.0	36.4	30077.1	276.0	72.4	59905.4	276.6	36.3	-30098.2	600.3	51.4	30826.7	600.7	0.1	51.3	0.2	
5		66%	d	276.3	36.4	30127.1	276.3	47.7	39496.7	277.0	11.7	-9602.68	600.4	51.4	30880.7	600.7	0.1	51.4	--	
			e	276.9	36.3	-30110.8	276.8	1.1	1.4	277.5	36.3	-30177.4	600.3	51.4	30881.4	600.7	94.9	-56992.5	0.3	
			f	276.3	36.4	30096.5	276.3	47.7	39492.1	277.0	11.7	-9624.7	600.4	51.4	30854.7	600.7	0.1	51.4	0.2	
			e	276.9	36.3	-30135.4	276.8	1.1	1.0	277.5	36.3	-30202.7	600.3	51.5	30899.2	600.7	95.0	-57040.5	0.3	
			f	276.3	36.4	30119.8	276.3	47.7	39489.5	277.0	11.7	-9601.8	600.4	51.5	30893.8	600.7	0.0	51.4	0.3	
			e	276.9	36.3	-30112.4	276.8	1.1	0.8	277.5	36.3	-30178.6	600.4	51.4	30871.5	600.7	94.9	-56983.0	0.2	
			f	276.3	36.4	30106.1	276.3	47.7	39486.1	276.9	11.7	-9611.1	600.4	51.4	30854.0	600.7	0.1	51.4	0.1	
6		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
7	0%	100%	d	276.1	0.2	149.5	276.0	72.3	59848.9	276.7	73.2	-60702.3	600.4	51.3	30807.8	600.8	47.5	-28543.1	--	Import only
			e	277.0	0.2	149.7	276.9	1.2	1.0	277.6	0.0	6.8	600.4	51.3	30805.2	600.8	47.5	-28553.2	0.2	
			f	276.1	0.2	149.5	276.0	72.3	59846.7	276.7	73.2	-60725.5	600.4	51.3	30774.0	600.8	47.5	-28520.6	0.3	
			e	277.0	0.2	149.7	276.9	1.2	0.6	277.6	0.0	6.8	600.4	51.3	30777.5	600.8	47.5	-28526.2	0.1	
			f	276.1	0.2	149.4	276.0	72.3	59847.4	276.7	73.3	-60777.7	600.4	51.2	30742.4	600.8	47.4	-28489.7	0.3	
			e	276.0	0.2	149.7	276.9	1.2	0.7	277.6	0.0	6.8	600.4	51.3	30772.9	600.8	47.5	-28526.9	0.2	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (≤ 30 s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
8		66%	f	276.1	0.2	149.5	276.0	72.3	59848.3	276.7	73.2	-60707.5	600.5	51.3	30785.4	600.8	47.5	-28523.4	0.3	
			d	276.4	0.2	149.6	276.4	47.7	39505.5	277.1	47.6	-39103.1	600.4	81.3	30793.0	600.8	47.5	-28526.0	--	
			e	277.0	0.2	149.6	276.9	1.2	1.0	277.6	0.0	6.8	600.4	51.3	30779.3	600.7	47.5	-28518.2	0.2	
			f	276.4	0.2	149.6	276.4	47.7	39497.2	277.1	47.6	-39093.4	600.3	51.3	30771.4	600.7	47.5	-28513.2	0.2	
			e	276.9	0.2	149.6	276.9	1.2	0.8	277.6	0.0	6.8	600.4	51.3	30772.1	600.8	47.5	-28502.4	0.1	
			f	276.4	0.2	149.7	276.4	47.6	39491.1	277.1	49.4	-38943.6	600.4	51.4	30818.2	600.8	47.5	-28557.0	0.2	
			e	276.9	0.2	149.8	276.9	1.2	1.0	277.6	0.0	6.8	600.4	51.3	30768.3	600.7	47.5	-28509.5	0.3	
			f	276.4	0.2	149.7	276.4	47.6	39486.5	277.1	47.5	-39022.3	600.4	51.3	30775.2	600.8	47.5	-28516.3	0.3	
9		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.																				

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(2) Only for three phase unit, open switch S1 on only one phase

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	276.4	72.7	60251.8	276.4	72.3	59953.5	277.0	0.0	-0.1	600.3	51.8	31104.9	600.3	51.5	31104.9	--	Import only
			e	227.2	36.2	-30091.0	277.2	48.5	40204.6	277.9	84.5	-70303.2	600.3	51.7	31057.5	600.3	95.1	-57058.9	0.1	
			f	276.4	72.7	60247.2	276.4	72.3	59944.9	277.0	0.0	-0.1	600.3	51.8	31097.7	600.3	51.5	30931.6	0.2	
			e	277.2	36.2	-30097	277.2	48.5	40204.5	277.9	84.5	-70315.3	600.3	51.8	31068.6	600.3	95.1	-57081.2	0.2	
			f	276.4	72.77	60221.6	276.4	72.3	59937.3	277.0	0.0	-0.1	600.3	51.8	31081.7	600.4	51.5	30914.9	0.2	
			e	277.2	36.2	-30090.3	277.2	48.5	40205.3	277.9	84.5	-70299.2	600.2	51.7	31059.7	600.3	95.1	-57065.9	0.1	
f		276.4	72.7	60221.9	276.4	72.3	59932.6	277.0	0.0	-0.1	600.3	51.8	31092.3	600.3	51.5	30925.0	0.1			
2		66%	d	277.0	47.7	39625.9	277.0	47.8	39638.8	277.0	0.0	11.6	600.4	51.7	31047.5	600.9	16.9	10141.9	--	
			e	277.2	36.2	-30092.8	277.2	31.9	26368.6	277.9	67.4	-56079.8	600.2	103.9	62341.5	600.3	95.1	-57079.2	0.2	
			f	277.0	47.7	39600.1	277.0	47.8	39637.9	277.0	0.0	11.6	600.3	51.7	31023.8	600.8	16.9	10135.7	0.1	
			e	277.2	36.2	-30092.7	277.2	31.9	26368.6	277.9	67.4	-56080.7	600.3	103.9	62337.4	600.3	95.1	-57065.9	0.1	
			f	277.0	47.7	39615.7	277.0	47.8	39638.9	277.0	0.0	11.6	600.3	51.7	31036.8	600.8	16.9	10138.5	0.2	
			e	277.2	36.2	-30086.9	277.2	31.8	26368.9	277.9	67.4	-56068.3	600.3	103.8	62322.8	600.3	95.0	-57051.3	0.2	
3		33% ⁽¹⁾	f	277.0	47.7	39600.1	277.0	47.8	39638.9	277.0	0.0	11.6	600.3	51.7	31023.8	600.8	16.9	10137.5	0.3	
			d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
	f		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
4	50%	100%	d	277.0	36.3	30110.5	277.0	36.2	60010.8	277.7	36.2	-30097.5	600.2	52.1	31248.0	600.1	0.0	10.3	--	Import only
			e	277.1	36.3	-30139.8	277.0	48.7	40241.6	277.7	84.3	-70111.1	600.2	52.0	31249.6	600.2	95.3	-57187.4	0.2	
			f	277.0	36.3	30133.2	277.0	72.9	60011.9	277.7	36.2	-30123.2	600.2	52.1	31266.2	600.2	0.0	10.3	0.2	
			e	277.1	36.3	-30145.0	277.1	48.7	40241.9	277.7	84.3	-70124.8	600.3	52.1	31260.9	600.2	95.3	-57212.4	0.2	
			f	277.0	36.3	30112.1	277.0	72.9	60009.6	277.7	36.2	-30099.0	600.2	52.0	31232.3	600.2	0.0	10.3	0.1	

TEST PACKAGE

Page 45 of 95

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
			e	277.1	36.3	-30128.5	277.1	48.7	40240.9	277.7	84.2	-70079.8	600.3	52.0	31239.6	600.3	95.3	-57173.4	0.2		
			f	277.0	36.3	30155.2	277.0	72.8	60011.5	277.7	36.2	-30146.2	600.2	52.1	31281.8	600.1	0.0	10.3	0.1		
5		66%	d	277.1	36.3	30111.4	277.1	48.1	39604.6	277.8	11.5	-9607.6	600.2	51.9	31189.9	600.2	0.0	10.3	--		
			e	277.1	36.3	-30111.6	277.1	31.9	26442.0	277.8	67.7	-56371.6	600.3	51.9	31198.1	600.3	95.1	-57110.4	0.2		
			f	277.1	36.2	30096.3	277.1	48.1	39605.3	277.8	11.5	-9601.7	600.2	51.9	31193.8	600.2	0.0	10.3	0.2		
			e	277.1	36.2	-30102	277.1	31.9	26442.3	277.8	67.7	-56348.7	600.2	51.9	31190.5	600.2	95.1	-57098.6	0.2		
			f	277.1	36.3	30111.3	277.1	48.1	39606.9	277.7	11.5	-9607.1	600.2	51.9	31207.2	600.2	0.0	10.3	0.3		
			e	277.1	36.2	-30099.2	277.1	31.9	26443.0	277.1	67.7	-56340.8	600.2	51.9	31182.1	600.2	95.1	-57077.1	0.2		
			f	277.1	36.2	30097.5	277.1	48.1	39605.9	277.8	11.5	-9602.2	600.2	51.9	31189.2	600.2	0.0	10.3	0.2		
			d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
e		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
6		33% ⁽¹⁾	f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
f		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---				
7	0%	100%	d	277.2	0.0	13.6	277.1	72.9	60058.3	277.8	72.3	-60180.5	600.2	52.0	31198.6	600.2	45.7	-27422.2	--		
			e	277.2	0.0	13.6	277.2	48.6	40274.5	277.9	48.4	-40278.6	600.2	51.9	31183.9	600.3	47.7	-28643.9	0.2		
			f	277.2	0.0	13.6	277.1	72.9	60059.9	277.8	72.3	-60184.2	600.2	51.9	31184.8	600.2	45.6	-27408.7	0.1		
			e	277.2	0.0	13.6	277.2	48.6	40274.7	277.9	48.4	-40273.2	600.3	51.9	31173.5	600.3	47.7	-28637.7	0.2		
			f	277.2	0.0	13.6	277.1	72.9	60061.4	277.8	72.3	-60194.7	600.2	52.0	31180.8	600.3	45.7	-27406.0	0.1		
			e	277.2	0.0	13.6	277.2	48.6	40274.8	277.9	48.4	-40270.8	600.3	52.0	31168.0	600.3	47.7	-28631.5	0.2		
			f	277.2	0.0	13.6	277.1	72.9	60059.5	277.8	72.3	-60209.5	600.3	52.0	31199.4	600.3	45.7	-27421.3	0.2		
		8	66%	d	277.2	0.0	13.6	277.2	47.9	39633.9	277.9	47.7	-39700.3	600.3	51.9	31168.5	600.3	47.7	-28634.6	--	
				e	277.2	0.0	13.6	277.27	31.9	26428.4	277.9	31.7	-26376.8	600.3	51.9	3157.6	600.3	48.0	-28833.5	0.1	
				f	277.2	0.0	13.6	277.2	47.9	39633.8	277.9	47.7	-39703.9	600.3	51.9	31170.9	600.3	47.7	-28635.7	0.1	
				e	277.2	0.0	13.6	277.2	31.9	26427.3	277.9	31.7	-26384.2	600.4	51.9	31159.2	600.4	48.0	-28835.5	0.2	
				f	277.2	0.0	13.6	277.2	47.9	39634.4	277.9	47.7	-39688.6	600.3	51.9	31167.9	600.3	47.7	-28632.2	0.2	

Date: 11/10/2021

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	277.2	0.0	13.6	277.2	31.9	26427.3	277.9	31.7	-26378.4	600.3	51.9	31148.7	600.3	48.0	-28824.6	0.1	
		f	277.2	0.0	13.6	277.2	47.9	39634.9	277.9	47.7	-39720.2	600.3	51.9	31189.4	600.3	47.7	-28652.1	0.1		
9		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
	e		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
	f		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
	e		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
	f		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
	e		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.																				

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(c) Only for three phase unit, open switch S1 on two phases simultaneously

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	277.0	72.5	60159.7	277.0	72.9	60067.0	277.7	0.0	11.6	600.2	52.0	31234.0	600.3	52.1	31289.9	--	Import only
			e	277.1	36.2	-30070.6	277.1	23.8	19810.2	277.7	59.6	-49713.9	600.2	51.9	31183.7	600.4	95.2	-57138.3	0.2	
			f	277.0	72.4	60119.2	277.0	72.9	60068.9	277.7	0.0	11.6	600.1	52.0	31215.3	600.3	52.1	31274.8	0.1	
			e	277.1	36.2	-30065.1	277.1	23.8	19809.7	277.7	59.7	-49704.4	600.2	51.9	31170.7	600.4	95.2	-57114.9	0.1	
			f	277.0	72.5	60159.2	277.0	72.9	60069.2	277.7	0.0	11.6	600.2	52.0	31234.0	600.3	52.1	31294.6	0.1	
			e	277.1	36.2	-30060.2	277.1	23.8	19810.5	277.7	59.7	-49594.4	600.3	51.9	31146.8	600.4	95.0	-57072.7	0.2	
f		277.0	72.4	60143.7	277.0	72.9	60071.1	277.7	0.0	11.6	600.2	52.0	31220.9	600.3	52.1	31280.8	0.2			
2		66%	d	277.1	27.7	39634.9	277.1	48.1	39604.4	277.8	0.0	11.6	600.2	51.9	31137.3	600.5	16.9	10121.1	--	
			e	277.1	36.2	-30041.3	277.1	15.9	13162.8	277.8	52.0	-43287.9	600.3	51.8	31123.9	600.5	95.0	-57038.6	0.2	
			f	277.1	47.7	39623.1	277.1	48.1	39605.4	277.8	0.0	11.8	600.2	51.9	31127.5	600.4	16.9	10120.3	0.1	
			e	277.1	36.1	-29987.6	277.1	15.8	13164.3	277.8	51.9	-43199.2	600.3	51.7	31052.2	600.5	94.8	-56904.3	0.2	
			f	277.1	47.7	39610.6	277.1	48.1	39605.3	277.8	0.0	11.6	600.3	51.8	31116.8	600.5	16.8	10116.1	0.1	
			e	277.1	36.2	-30038.7	277.1	15.8	13163.6	277.8	52.0	-43283.3	600.3	51.8	31119.2	600.5	95.0	-57025.9	0.1	
3		33%(1)	f	277.1	47.7	39635.2	277.1	48.1	39606.4	277.8	0.0	11.6	600.3	51.9	31138.8	600.5	16.9	10124.1	0.2	
			d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
	f		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
4	50%	100%	d	277.1	36.2	30031.3	277.1	73.0	60103.7	277.80	36.2	-30084.1	600.2	51.8	31107.3	600.5	0.0	10.3	--	Import only
			e	277.2	36.2	-30030.7	277.1	23.8	19807.8	277.8	59.8	-49747.7	600.3	51.8	31112.2	600.5	95.0	-57023.6	0.2	
			f	277.1	36.2	30031.6	277.1	73.0	60104.7	277.8	36.1	-30081.9	600.3	51.8	31106.7	600.5	0.0	10.3	0.2	
			e	277.2	36.2	-30038.9	277.1	23.8	19806.9	277.8	59.8	-49757.2	600.3	51.9	31123.1	600.5	95.0	-57047.4	0.1	
			f	277.1	36.2	30037.4	277.1	73.0	60105.2	277.8	36.2	-30089.8	600.2	51.8	31112.3	600.4	0.0	10.3	0.1	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
			e	277.2	36.2	-30032.5	277.1	23.8	19809.3	277.8	59.8	-49751.8	600.3	51.9	31116.6	600.5	95.0	-5731.0	0.3		
			f	277.1	36.2	30039.8	277.1	73.0	60104.7	277.8	36.2	-30091.1	600.2	51.8	31118.5	600.5	0.0	10.3	0.2		
5		66%	d	277.2	36.2	30043.7	277.2	48.1	39628.9	277.9	11.5	-9606.5	600.3	51.8	31105.8	600.6	0.0	10.3	--		
			e	277.2	36.2	-30057.0	277.2	15.8	13170.3	277.9	51.8	43170.3	600.3	51.8	31122.4	600.6	95.0	-57052.6	0.2		
			f	277.2	36.2	30053.7	277.2	48.1	39628.1	277.9	11.5	-9610.6	600.3	51.8	31114.0	600.6	0.0	10.3	0.1		
			e	277.2	36.1	-30029.5	277.2	15.8	13169.7	277.9	51.8	-43144.1	600.3	51.8	31083.7	600.6	94.9	-56981.6	0.2		
			f	277.2	36.2	30031.4	277.2	48.1	39627.9	277.9	11.5	-9602.6	600.3	51.8	31094.3	600.6	0.0	10.3	0.2		
			e	277.2	36.2	-30044.4	277.2	15.8	13170.6	277.9	51.9	-43172.3	600.3	51.8	31092.2	600.6	94.9	-57002.5	0.1		
			f	277.2	36.1	30022.1	277.2	48.1	39629.6	277.9	11.5	-9598.4	600.3	51.8	31079.6	600.6	0.0	10.3	0.1		
			d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---
6		33%(1)	e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
7	0%	100%	d	277.2	0.0	13.6	277.2	73.0	60140.3	277.9	72.3	-60189.0	600.3	51.8	31096.2	600.6	47.6	-28608.2	--	Import only	
			e	277.2	0.0	13.6	277.2	23.8	19818.4	277.9	23.8	-19790.1	600.3	51.8	31090.9	600.6	47.6	-28603.0	0.2		
			f	277.2	0.0	13.6	277.2	73.0	60142.0	277.9	72.3	-60188.3	600.3	51.8	31097.2	600.6	47.6	-28609.9	0.1		
			e	277.2	0.0	13.6	277.2	23.8	19818.5	277.9	23.9	-19793.7	600.3	51.8	31094.4	600.6	47.6	-28606.1	0.2		
			f	277.2	0.0	13.6	277.2	73.0	60142.4	277.9	72.3	-60196.1	600.3	51.8	31100.0	600.6	47.7	-28610.9	0.3		
			e	277.3	0.0	13.6	227.2	23.0	19817.4	277.9	23.8	-19796.2	600.3	51.8	31104.4	600.6	47.6	-28616.3	0.1		
			f	277.2	0.0	13.6	277.2	73.0	60141.17	277.9	72.3	-60179.2	600.3	51.8	31098.7	600.6	47.6	-28609.4	0.2		
		8	66%	d	277.2	0.0	13.6	277.2	48.1	39635.9	277.9	23.8	-39702.2	600.3	51.8	31087.5	600.6	47.6	-28598.5		--
				e	277.2	0.0	13.6	277.2	15.8	13170.3	277.9	15.9	-13195.1	600.3	51.8	31090.9	600.6	47.6	-28601.8		0.2
				f	277.2	0.0	13.6	277.2	48.1	39635.9	277.9	47.7	-39693.7	600.3	51.9	31095.3	600.6	47.6	-28605.5		0.2
			e	277.2	0.0	13.6	277.2	15.9	13171.4	277.9	15.9	-13194.7	600.3	51.8	31088.8	600.6	47.6	-28601.8	0.3		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
9			f	277.2	0.0	13.6	277.2	48.1	39635.3	277.9	47.7	-39691.3	600.3	51.8	31094.0	600.6	47.6	-28604.4	0.1	
			e	277.2	0.0	13.6	277.2	15.8	13170.8	277.9	15.9	-13195.9	600.3	51.8	31089.6	600.6	47.6	-28602.1	0.1	
			f	277.2	0.0	13.6	277.2	48.1	39635.4	277.9	47.7	-39686.8	600.3	51.8	31096.5	600.6	47.6	-28607.8	0.1	
		33%(1)	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
		f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Open loop response time (s)	
Maximum	0.3
Average	0.2

203.6 Step Change in Generation Test																				
Load level: 33%																				
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	5%-10%	d	276.9	36.2	-30067.9	276.9	24.1	19791.5	277.7	59.9	-49827.4	600.1	52.1	31252.8	600.2	95.4	-57226.0	--	Import only
			e	276.9	66.5	-55209.1	277.0	23.9	19799.8	277.0	90.4	-74984.8	600.1	8.2	4905.7	600.2	95.3	-57227.8	0.2	
			f	277.0	36.3	-30071.0	276.9	24.1	19792.1	277.7	59.9	-49837.2	600.1	52.0	31262.3	600.2	95.4	-57249.8	0.2	
			e	276.9	66.5	-55213.6	277.0	23.9	19799.2	277.0	90.4	-74992.6	600.1	8.2	4906.3	600.2	95.4	-57238.4	0.1	
			f	276.9	36.2	-30062.5	276.9	24.1	19791.9	277.7	59.9	-49819.1	600.1	52.1	31256.5	600.2	95.4	-57239.5	0.1	
			e	276.9	66.5	-55216.3	277.0	23.9	19799.6	277.0	90.4	-74996.6	600.1	8.2	4906.8	600.2	95.4	-57251.7	0.3	
			f	277.0	36.2	-30089.2	277.0	24.1	19791.9	277.7	59.9	-49870.1	600.1	52.1	31285.3	600.2	95.5	-57291.6	0.2	
2		33%-66%	d	277.1	36.2	-30044.2	277.1	24.1	19796.8	277.7	59.8	-49780.1	600.2	519.	31174.5	600.3	95.1	-57102.4	--	
			e	277.1	48.3	-40077.8	277.1	24.1	19800.2	277.8	72.3	-60148.5	600.2	34.5	20735.3	600.4	95.0	-57032.5	0.2	
			f	277.1	36.2	-30010.0	277.0	24.1	19797.0	277.7	59.8	-49769.7	600.2	51.9	31158.0	600.3	95.0	-57070.6	0.2	
			e	277.1	48.3	-40082.7	277.1	24.1	19800.3	277.8	72.3	-60158.0	600.2	34.6	20745.2	600.4	95.0	-57055.3	0.1	
			f	277.1	36.1	-30035.6	277.1	24.1	19797.8	277.7	59.8	-49761.5	600.2	51.9	31157.1	600.3	95.1	-27074.5	0.3	
			e	277.1	48.3	-40073.0	277.1	24.1	19800.2	277.8	72.3	-60142.0	600.2	34.6	20739.4	600.4	95.0	-57038.7	0.1	
			f	277.1	36.2	-30020.1	277.1	24.1	19797.7	277.7	59.8	-49730.3	600.2	51.9	31147.0	600.3	95.0	-57053.5	0.1	
3	66% ⁽¹⁾	5%-10%	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																				
Load level: 33%																				
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
4		33%-66%	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			f	---	---	---	---	---	---	---	---	---	---	---	---	---				
			e	---	---	---	---	---	---	---	---	---	---	---	---	---				
			f	---	---	---	---	---	---	---	---	---	---	---	---	---				
			e	---	---	---	---	---	---	---	---	---	---	---	---	---				
			f	---	---	---	---	---	---	---	---	---	---	---	---	---				
5	33% ⁽¹⁾	5%-10%	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			f	---	---	---	---	---	---	---	---	---	---	---	---	---				
			e	---	---	---	---	---	---	---	---	---	---	---	---	---				
			f	---	---	---	---	---	---	---	---	---	---	---	---	---				
			e	---	---	---	---	---	---	---	---	---	---	---	---	---				
			f	---	---	---	---	---	---	---	---	---	---	---	---	---				
6		33%-66%	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---			

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

(5) ESS external export current limit = $66 \pm 5\%$ (If support), PV inputs = $50\% \pm 5\%$ - NA

(6) ESS external export current limit = $33 \pm 5\%$ (If support), PV inputs = $50\% \pm 5\%$ - NA

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(7) ESS external export current limit = 0% to +5%, PV inputs = 0% + 5%

Open loop response time (s)	
Maximum	0.3
Average	0.2

(a) For single phase unit connected line to neutral, or for three phase unit (open S1 on three phases simultaneously)

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
0.1	100%	100%	d	277.1	72.5	60192.3	277.1	72.9	60036.9	277.8	0.0	11.6	600.2	0.0	5.1	600.4	95.0	57046.4	--	Import only
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.5	600.3	0.0	5.14	600.5	0.0	10.3	0.2	
			f	277.1	72.5	60194.6	277.0	72.9	60037.9	277.8	0.0	11.6	600.2	0.0	5.1	600.4	95.0	57051.3	0.2	
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.1	600.5	0.0	10.3	0.1	
			F	277.1	72.5	60218.2	277.1	72.9	60038.3	277.8	0.0	11.6	600.3	0.0	5.1	600.5	95.1	57090.7	0.3	
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.1	600.5	0.0	10.3	0.2	
			f	277.1	72.5	60177.2	277.1	72.9	60039.0	277.8	0.0	11.6	600.3	0.0	5.1	600.5	95.0	57064.0	0.2	
2		66%	d	277.1	47.7	39601.6	277.1	48.1	39614.1	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	39601.6	--	
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.1	600.5	0.0	10.3	0.3	
			f	277.1	47.7	39614.6	277.1	48.1	39614.7	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	38118.1	0.2	
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.1	600.6	0.0	10.3	0.1	
			f	277.1	47.7	39612.3	277.1	48.1	39614.4	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	38111.4	0.2	
			e	277.2	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.1	600.6	0.0	10.3	0.1	
			f	277.1	47.7	39620.2	277.1	48.1	39615.1	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	38109.3	0.1	
3		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (≤ 30 s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
4	50%	100%	d	277.2	36.2	30029.6	277.1	72.9	60062.2	277.8	36.1	-30077.1	600.3	0.0	5.1	600.6	51.9	31224.9	--	Import only
			e	277.2	0.0	13.6	277.2	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.2	600.6	0.0	10.3	0.2	
			f	277.2	36.2	30028.6	277.2	72.9	60063.1	277.8	36.1	-30074.6	600.4	0.0	5.1	600.6	52.0	31221.0	0.3	
			e	277.2	0.0	13.6	277.2	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.2	600.6	0.0	10.3	0.1	
			f	277.2	36.2	30040.1	277.2	72.9	60064.2	277.8	36.2	-30088.5	600.3	0.0	5.1	600.6	52.0	31230.2	0.3	
			e	277.2	0.0	13.6	277.2	0.0	1.8	277.9	0.0	11.6	600.3	0.0	5.1	600.6	0.0	10.3	0.2	
			f	277.2	36.2	30041.5	277.2	72.9	60064.1	277.8	36.2	-30090.3	600.3	0.0	5.1	600.6	51.9	31184.0	0.2	
5		66%	d	277.2	36.2	30030.1	277.2	48.2	39629.7	277.9	11.5	-9601.2	600.3	0.0	5.2	600.6	52.0	31255.3	--	
			e	277.2	0.0	13.6	277.2	0.0	1.8	277.9	0.0	11.6	600.3	0.0	5.2	600.6	0.0	10.3	0.2	
			f	277.2	36.2	30045.5	277.2	48.1	39630.5	277.9	11.5	-9607.2	600.3	0.0	5.2	600.5	52.1	31276.3	0.3	
			e	277.2	0.0	13.6	277.2	0.0	1.8	277.9	0.0	11.6	600.3	0.0	5.2	600.6	0.0	10.3	0.1	
			f	277.2	36.2	30040.5	277.2	48.1	39630.9	277.9	11.5	-9605.2	600.3	0.0	5.2	600.6	52.1	31265.0	0.2	
			e	277.2	0.0	13.6	277.2	0.0	1.8	277.9	0.0	11.6	600.3	0.0	5.2	600.6	0.0	10.3	0.3	
			f	277.2	36.1	30023.9	277.2	48.1	39630.4	277.9	11.5	-9598.8	600.3	0.0	5.2	600.6	52.0	31253.4	0.2	
6		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
	f		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
	e		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
	f		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
7	0%	100%	d	277.2	72.5	-60251.4	277.2	73.0	60132.8	277.9	144.7	-120434.3	600.4	0.0	5.2	600.6	95.2	-57153.6	--	Import only
			e	277.2	72.5	-60204.8	277.2	0.0	1.8	277.9	72.3	-60160.0	600.3	0.0	5.2	600.6	95.1	-57134.4	0.2	
			f	277.2	72.5	-60233.2	277.2	73.0	60133.0	277.9	144.6	-120390.3	600.3	0.0	5.1	600.6	95.1	-57118.1	0.1	
			e	277.2	72.5	-60245.9	277.2	0.0	1.8	277.9	72.3	-60206.4	600.3	0.0	5.2	600.6	95.2	-57176.4	0.2	
			f	277.2	72.5	-60218.3	277.2	73.1	60133.9	277.9	144.6	-120350.3	600.3	0.0	5.1	600.6	95.1	-57095.0	0.3	
			e	277.2	72.5	-60238.0	277.2	0.0	1.8	277.9	72.3	-60201.8	600.3	0.0	5.2	600.6	95.2	-57178.5	0.2	
			f	277.2	72.5	-60224.2	277.2	73.1	60134.3	277.9	144.6	-120360.0	600.3	0.0	5.1	600.6	95.1	-57114.3	0.1	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
8		66%	d	277.2	72.5	-60241.4	277.2	48.2	39638.1	277.9	119.6	-99564.3	600.3	0.0	5.2	600.6	95.1	-57129.6	--	
			e	277.2	72.5	-60219.5	277.2	0.0	1.8	277.9	72.3	-60185.2	600.4	0.0	5.1	600.6	95.1	-57117.7	0.2	
			f	277.2	72.5	-60237.6	277.2	48.2	39638.1	277.9	119.6	-99560.0	600.4	0.0	5.2	600.7	95.1	-57127.2	0.1	
			e	277.2	72.5	-60230.2	277.2	0.0	1.8	277.9	72.3	-60185.9	600.4	0.0	5.1	600.6	95.1	-57108.1	0.2	
			f	277.2	72.5	-60226.1	277.2	48.1	39639.2	277.9	119.6	-99535.4	600.4	0.0	5.1	600.6	95.1	-57098.5	0.3	
			e	277.2	72.5	-60249.1	277.2	0.0	1.8	277.9	72.3	-60209.1	600.4	0.0	5.2	600.7	95.2	-57155.0	0.2	
			f	277.2	72.5	-60244.7	277.2	48.1	39640.3	277.9	119.6	-99572.8	600.4	0.0	5.2	600.6	95.1	-57133.8	0.1	
9		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.																				

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(2) Only for three phase unit, open switch S1 on only one phase

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	277.2	72.4	60195.7	277.2	73.1	60148.7	277.9	0.0	11.6	600.4	0.0	5.2	600.6	103.9	62392.6	--	Import only
			e	277.3	48.4	40241.8	277.2	48.8	40297.4	277.9	0.0	11.6	600.4	0.0	5.2	600.7	69.6	41814.4	0.2	
			f	277.2	72.5	60235.7	277.2	73.1	60149.0	277.9	0.0	11.6	600.4	0.0	5.2	600.6	104.0	62450.8	0.3	
			e	277.3	48.4	40257.6	277.2	48.8	40296.3	277.9	0.0	11.6	600.4	0.0	5.2	600.6	69.6	41828.3	0.1	
			f	277.2	72.5	60215.9	277.2	73.1	60147.2	277.9	0.0	11.6	600.4	0.0	5.2	600.7	104.0	62436.5	0.3	
			e	277.3	48.4	40254.4	277.2	48.8	40295.6	277.9	0.0	11.6	600.4	0.0	5.2	600.7	69.6	41819.2	0.1	
			f	277.3	72.5	60245.5	277.2	73.1	60149.4	277.9	0.0	11.6	600.4	0.0	5.2	600.6	104.0	62470.1	0.2	
2		66%	d	277.3	47.6	39564.4	277.3	48.2	39656.6	278.0	0.0	11.6	600.3	0.0	5.2	600.6	63.6	38213.3	--	
			e	277.3	31.9	26518.1	277.3	31.8	26295.5	278.0	0.0	11.6	600.4	0.0	5.2	600.7	45.9	27592.6	0.2	
			f	277.3	47.6	39572.5	277.3	48.2	39656.7	278.0	0.0	11.6	600.3	0.0	5.2	600.6	63.6	38223.0	0.1	
			e	277.3	31.9	26487.1	277.3	31.8	26296.0	278.0	0.0	11.6	600.4	0.0	5.2	600.6	45.9	27549.7	0.1	
			f	277.3	47.6	39557.7	277.3	48.2	39656.3	278.0	0.0	11.6	600.4	0.0	5.2	600.6	63.6	38205.6	0.2	
			e	277.3	31.9	26506.9	277.3	31.8	26297.0	278.0	0.0	11.6	600.4	0.0	5.2	600.6	45.9	27575.0	0.3	
			f	277.3	47.6	39564.5	277.3	48.2	39657.1	278.0	0.0	11.6	600.4	0.0	5.2	600.6	63.6	38217.1	0.2	
3		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
4	50%	100%	d	277.3	36.1	30034.2	277.3	72.9	60029.0	278.0	36.1	-30074.4	600.4	0.0	5.2	600.7	52.1	31277.3	--	Import only
			e	277.3	36.2	30054.9	277.3	48.8	40310.4	278.0	12.2	-10187.9	600.4	0.0	5.2	600.6	52.1	31298.9	0.2	
			f	277.3	36.2	30049.8	277.3	72.9	60030.9	278.0	36.1	-30093.2	600.4	0.0	5.2	600.7	52.1	31289.2	0.3	
			e	277.3	36.2	30046.5	277.3	48.8	40312.8	278.0	12.2	-10184.5	600.4	0.0	5.2	600.7	52.1	31286.8	0.1	
			f	277.3	36.2	30053.5	277.3	72.9	60028.8	278.0	36.1	-30098.6	600.4	0.0	5.2	600.7	52.1	31292.7	0.1	

TEST PACKAGE

Page 56 of 95

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	277.3	36.1	30039.9	277.3	48.8	40312.3	278.0	12.2	-10182.1	600.3	0.0	5.2	600.6	52.1	31287.1	0.2	
			f	277.3	36.1	30042.2	277.3	72.9	60031.4	278.0	36.1	-30086.6	600.4	0.0	5.2	600.7	52.1	31283.7	0.3	
5			66%	d	277.3	36.2	30073.8	277.3	48.2	39664.6	278.0	11.5	-9616.0	600.4	0.0	5.2	600.7	52.2	31338.0	
		e		277.3	31.7	26376.3	277.3	31.9	26362.1	278.0	0.0	11.6	600.3	0.0	5.2	600.6	45.6	27391.9	0.2	
		f		277.3	36.1	30040.5	277.3	48.2	39667.5	278.0	11.5	-9603.3	600.4	0.0	5.2	600.7	52.1	31296.9	0.1	
		e		277.3	31.7	26383.1	277.3	31.9	26361.8	278.0	0.0	11.6	600.3	0.0	5.2	600.6	45.6	27401.6	0.2	
		f		277.3	36.2	30064.1	277.3	48.2	39666.7	278.0	11.5	-9611.6	600.4	0.0	5.2	600.7	52.1	31323.7	0.3	
		e		277.3	31.7	26379.4	277.3	31.9	26360.6	278.0	0.0	11.6	600.3	0.0	5.2	600.6	45.6	27397.2	0.2	
		f		277.3	36.2	30067.5	277.3	48.2	39667.1	278.0	11.5	-9613.4	600.4	0.0	5.2	600.7	52.1	31320.4	0.2	
6		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
7	0%	100%	d	277.3	72.5	-60240.7	277.3	72.9	60042.0	278.0	143.9	-119803.8	600.4	0.0	5.2	600.7	95.2	-57159.9	--	Import only
			e	277.3	72.5	-60282.7	277.3	48.7	40259.2	278.0	120.6	-100449.5	600.4	0.0	5.2	600.7	95.2	-57206.6	0.2	
			f	277.3	72.5	-60255.3	277.3	72.9	60042.4	278.0	143.9	-119847.2	600.4	0.0	5.2	600.7	95.2	-57170.2	0.2	
			e	277.3	72.5	-60231.2	277.3	48.7	40260.0	278.0	120.5	-100348.3	600.4	0.0	5.2	600.7	95.1	-57151.6	0.3	
			f	277.3	72.5	-60243.9	277.3	72.9	60042.5	278.0	143.9	-119809.7	600.4	0.0	5.2	600.7	95.2	-57155.3	0.1	
			e	277.3	72.5	-60256.8	277.3	48.7	40258.8	278.0	120.6	-100391.5	600.4	0.0	5.2	600.7	95.2	-57175.6	0.1	
			f	277.3	72.5	-60262.0	277.3	72.9	60044.0	278.0	143.9	-119857.8	600.4	0.0	5.2	600.7	95.2	-57184.0	0.1	
8		66%	d	277.3	72.5	-60279.5	277.3	48.2	39671.9	278.0	119.4	-99399.2	600.4	0.0	5.2	600.7	95.2	-57201.9	--	
			e	277.3	72.4	-60218.2	277.3	31.9	26363.7	278.0	103.5	-86201.9	600.4	0.0	5.1	600.7	95.1	-57113.9	0.2	
			f	277.3	72.5	-60295.3	277.3	48.1	39669.9	278.0	119.4	-99423.7	600.4	0.0	5.2	600.7	95.3	-57221.5	0.3	
			e	277.3	72.5	-60219.4	277.3	31.9	26364.6	278.0	103.5	-86202.0	600.4	0.0	5.1	600.7	95.1	-57115.7	0.2	
			f	277.3	72.5	-60255.2	277.3	48.1	39670.4	278.0	119.3	-99346.0	600.4	0.0	5.2	600.7	95.2	-57185.9	0.2	

Date: 11/10/2021

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	277.3	72.5	-60275.5	277.3	31.9	26364.2	278.0	103.6	-86296.4	600.4	0.0	5.2	600.6	95.2	-57184.0	0.2	
		f	277.3	72.5	-60228.8	277.3	48.2	39669.8	278.0	119.2	-99294.7	600.4	0.0	5.2	600.7	95.1	-57140.2	0.1		
9		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

(c) Only for three phase unit, open switch S1 on two phases simultaneously

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	277.0	72.6	60249.6	277.0	73.0	60014.9	277.7	0.0	11.6	600.2	0.0	5.2	600.3	105.2	63126.0	--	Import only
			e	277.1	23.9	19809.6	277.1	23.8	19797.1	277.8	0.0	11.6	600.2	0.0	5.2	600.3	34.4	20623.2	0.2	
			f	277.0	72.6	60253.2	277.0	72.9	60016.6	277.7	0.0	11.6	600.2	0.0	5.2	600.2	105.1	63112.8	0.3	
			e	277.1	23.9	19813.3	277.1	23.8	19797.7	277.7	0.0	11.6	600.2	0.0	5.2	600.3	34.4	20621.4	0.2	
			f	277.0	72.6	60250.6	277.0	72.9	60017.0	277.7	0.0	11.6	600.1	0.0	5.2	600.2	105.2	63120.0	0.3	
			e	277.1	23.9	19810.6	277.1	23.8	19797.2	277.7	0.0	11.6	600.2	0.0	5.2	600.3	34.4	2620.2	0.2	
			f	277.0	72.6	60274.7	277.0	72.9	60017.9	277.7	0.0	11.6	600.2	0.0	5.2	600.2	105.2	63142.9	0.3	
2		66%	d	277.1	47.7	39601.6	277.1	48.1	39614.1	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	38105.0	--	
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.1	600.5	0.0	10.3	0.2	
			f	277.1	47.7	39614.6	277.1	48.1	39614.7	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	38118.1	0.3	
			e	277.1	0.0	13.6	277.1	0.0	11.6	277.8	0.0	11.6	600.3	0.0	5.1	600.6	0.0	10.3	0.2	
			f	277.1	47.7	39612.3	277.1	48.1	39614.4	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	38111.4	0.2	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	277.2	0.0	13.6	277.1	0.0	1.8	277.8	0.0	11.6	600.3	0.0	5.1	600.6	0.0	10.3	0.1	
			f	277.1	47.7	39620.2	27.1	48.1	39615.1	277.8	0.0	11.6	600.3	0.0	5.1	600.5	63.5	38109.3	0.1	
3		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
4		100%	d	277.1	36.2	30042.3	277.1	73.0	60109.5	277.8	36.2	-30095.5	600.3	0.0	5.2	600.4	52.0	31207.5	--	Import only
			e	277.2	23.8	19785.5	277.2	23.8	19807.7	277.8	0.0	11.6	600.2	0.0	5.2	600.4	34.7	20821.7	0.2	
			f	277.1	36.2	30054.5	277.1	73.0	60109.45	2777.8	36.2	-30108.4	600.2	0.0	5.2	600.4	52.0	31216.3	0.3	
			e	277.2	23.8	19796.6	277.2	23.8	19808.5	277.9	0.0	11.6	600.2	0.0	5.2	600.4	34.7	20840.0	0.2	
			f	277.1	36.2	30063.5	277.1	73.0	60109.8	277.8	36.2	-30120.1	600.2	0.0	5.2	600.3	52.0	31222.6	0.1	
			e	277.2	23.8	19793.4	277.2	23.8	19808.6	277.8	0.0	11.6	600.2	0.0	5.2	600.4	34.7	20834.4	0.2	
			f	277.1	36.2	30053.3	277.1	73.0	60109.9	277.8	36.2	-30107.8	600.2	0.0	5.2	600.4	52.0	31212.3	0.1	
5	50%	66%	d	277.2	36.2	30054.0	277.2	48.1	39626.1	277.9	11.5	-9611.3	600.2	0.0	5.2	600.4	52.0	31221.7	--	
			e	227.2	15.9	13191.6	277.2	15.9	13168.6	277.9	0.0	11.6	600.3	0.0	5.1	600.4	22.9	13750.2	0.2	
			f	277.2	36.2	30047.3	277.2	48.1	39626.0	277.9	11.5	-9609.0	600.2	0.0	5.2	600.4	52.0	31211.1	0.2	
			e	277.2	15.9	13189.9	277.2	15.9	13168.4	277.9	0.0	11.6	600.3	0.0	5.2	600.4	22.9	13755.1	0.1	
			f	277.2	36.2	30057.0	277.2	48.1	39626.5	277.9	11.5	-9611.1	600.3	0.0	5.1	600.4	52.0	31208.2	0.2	
			e	277.2	15.9	13195.1	277.2	15.9	13169.1	277.9	0.0	11.6	600.3	0.0	5.2	600.4	22.9	13763.1	0.1	
			f	277.2	36.2	30059.6	277.2	48.1	39627.2	277.9	11.5	-9613.0	600.3	0.0	5.1	600.4	51.9	31203.1	0.3	
6		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		

TEST PACKAGE

Page 59 of 95

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
7	0%	100%	d	277.2	72.5	-60264.4	277.2	73.0	60130.7	277.9	144.6	-120353.0	600.3	0.0	5.2	600.4	95.1	-57079.6	--	Import only
			e	277.2	72.4	-60108.5	277.2	23.8	19815.3	277.9	96.0	-79895.1	600.3	0.0	5.1	600.5	95.0	-57065.4	0.2	
			f	277.2	72.5	-60210.4	277.2	73.0	60130.7	277.9	144.4	-120224.4	600.3	0.0	5.1	600.4	95.0	-57017.6	0.3	
			e	277.2	72.3	-60097.1	277.2	23.8	19815.3	277.9	96.0	-79876.4	600.3	0.0	5.1	600.5	95.0	-57058.1	0.1	
			f	277.2	72.5	-60247.9	277.2	73.0	60131.6	277.9	144.5	-120313.5	600.2	0.0	5.1	600.4	95.0	-57059.5	0.2	
			e	277.2	72.4	-60124.1	277.2	23.8	19814.3	277.9	96.0	-79917.9	600.3	0.0	5.2	600.5	95.1	-57097.0	0.1	
			f	277.2	72.5	-60229.1	277.2	73.0	60133.6	277.9	144.5	-120269.4	600.3	0.0	5.1	600.4	95.0	-57061.2	0.1	
8		66%	d	277.2	72.3	-60104.3	277.2	48.1	39638.0	277.9	118.9	-98989.5	600.3	0.0	5.1	600.5	95.0	-57031.3	--	
			e	277.2	72.3	-60096.5	277.2	15.8	13170.6	277.9	88.3	-73511.8	600.3	0.0	5.1	600.5	95.0	-57046.8	0.2	
			f	277.2	72.3	-60104.3	277.2	48.1	39638.5	277.9	118.9	-98989.5	600.3	0.0	5.1	600.5	95.0	-57033.4	0.3	
			e	277.2	72.3	-60101.3	277.2	15.8	13171.8	277.9	88.3	-73509.5	600.3	0.0	5.1	600.5	95.0	-57046.4	0.2	
			f	277.2	72.3	-60088.4	277.2	48.1	39637.9	277.9	118.9	-98956.4	600.3	0.0	5.1	600.5	95.0	-57027.6	0.2	
			e	277.2	72.3	-60092.5	277.2	15.8	13172.2	277.9	88.3	-73497.8	600.3	0.0	5.1	600.5	95.0	-57039.9	0.2	
9		33% ⁽¹⁾	f	277.2	72.4	-60111.4	277.2	48.1	39639.7	277.9	118.9	-99007.7	600.3	0.0	5.1	600.5	95.0	-57045.1	0.1	
			d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
	e		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.																				

Date: 11/10/2021

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																				
Load level: 33%																				
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	5%-10%	d	277.2	23.9	19849.6	277.2	24.1	19820.9	277.9	0.0	11.6	600.3	0.0	5.1	600.5	34.6	20804.0	--	Import only
			e	277.2	23.9	19841.9	277.2	24.1	19822.9	277.9	0.0	11.6	600.3	8.2	4934.8	600.5	26.2	15738.9	0.2	
			f	277.2	23.9	19851.2	277.2	24.1	19821.6	277.9	0.0	11.6	600.3	0.0	5.1	600.5	34.6	20801.7	0.1	
			e	277.2	23.9	19839.7	277.2	24.1	19823.3	277.9	0.0	11.6	600.3	8.2	4934.7	600.5	26.2	15739.4	0.2	
			f	277.2	23.9	19839.5	277.2	24.1	19821.6	277.9	0.0	11.6	600.3	0.0	5.1	600.5	34.6	20785.7	0.3	
			e	277.2	23.9	19845.0	277.2	24.1	19823.0	277.9	0.0	11.6	600.3	8.2	4935.8	600.6	26.2	15743.7	0.1	
f		277.2	23.9	19862.4	277.2	24.1	19822.1	277.9	0.0	11.6	600.3	0.0	5.1	600.5	34.7	20815.2	0.3			
d		277.2	23.9	19858.5	277.2	24.1	19823.2	277.9	0.0	11.6	600.3	0.0	5.1	600.5	34.6	20805.2	--			
e		277.2	23.9	19848.2	277.2	24.1	19823.5	277.9	0.0	11.6	600.3	34.0	20426.3	600.5	0.0	10.3	0.2			
f		277.2	23.9	19851.1	277.2	24.1	19823.7	277.9	0.0	11.6	600.3	0.0	5.1	600.5	34.6	20788.2	0.3			
e		277.3	23.9	19841.3	277.2	24.1	19824.1	277.9	0.0	11.6	600.3	34.0	20411.6	600.5	0.0	10.3	0.2			
f		277.2	23.9	19846.6	277.2	24.1	19823.4	277.9	0.0	11.6	600.3	0.0	5.1	600.5	34.6	20790.9	0.1			
2	33%-66%	e	277.3	23.9	19842.0	277.2	24.1	19824.3	277.9	0.0	11.6	600.3	34.0	20414.8	600.6	0.0	10.3	0.3		
		f	277.2	23.9	19850.3	277.2	24.1	19823.7	277.9	0.0	11.6	600.4	0.0	5.1	600.5	34.6	20797.5	0.2		
		d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
3	66% ⁽¹⁾	5%-10%	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
4	33%-66%		d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																				
Load level: 33%																				
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
5	33% ⁽¹⁾	5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
6		33%-66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Note (1): Because the 33% and 66% load condition is not affected by the change in EUT output variation, the related test is not repeated.																				

(8) ESS external export current limit = $66 \pm 5\%$ (If support), PV inputs = 0% + 5% - NA

(9) ESS external export current limit = $33 \pm 5\%$ (If support), PV inputs = 0% + 5% - NA

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

204.5 Import limiting to Energy Storage Systems

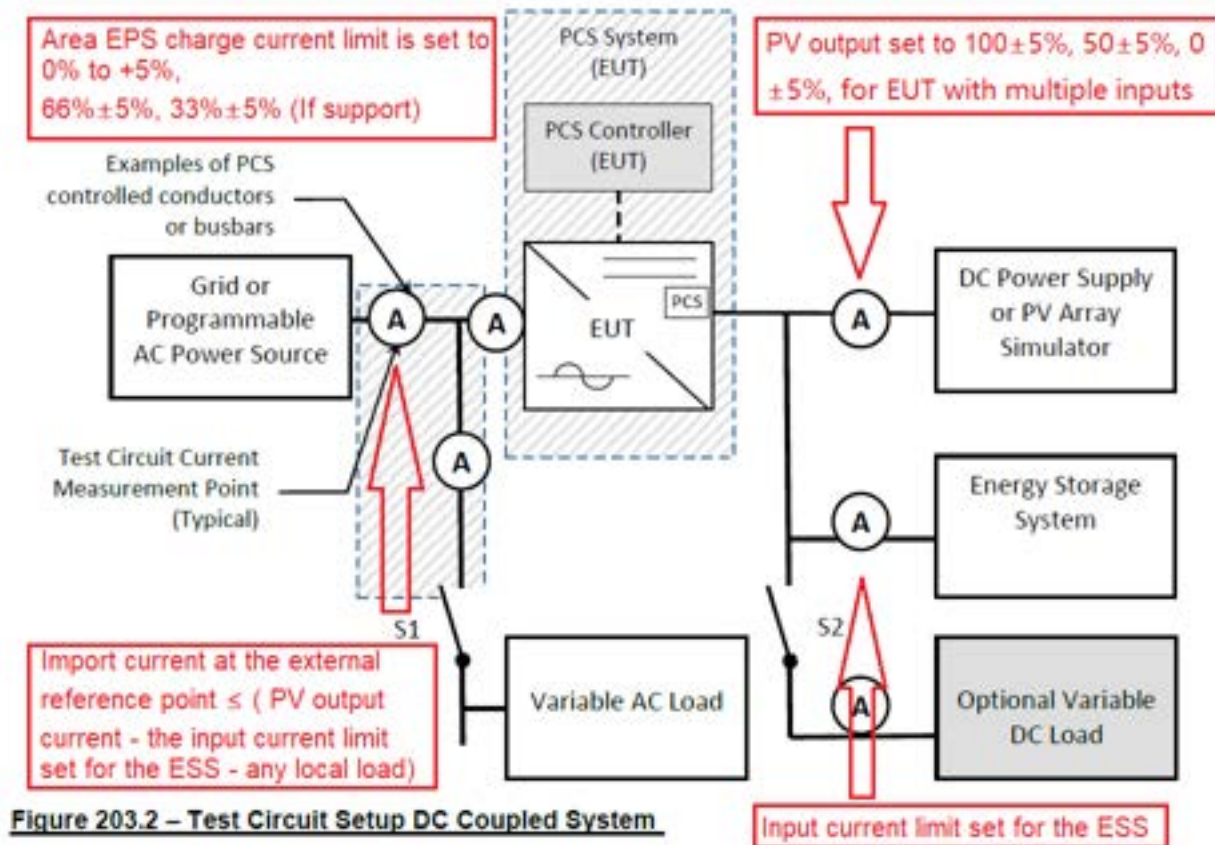
Testing date: See page 2.

Test Method:

204.5.1 Where the PCS includes ability to limit current flow from the Area EPS to an Energy Storage System (ESS), i.e. ESS grid charge limiting, repeat the test sequence in 203.5 and 203.6 at the following conditions:

- Install any external current sensors, if applicable, in accordance with the instructions supplied by the manufacturer.
- Set or verify that the ESS is at **the lowest state of charge** the ESS can support for the duration of the tests without causing damage or mis-operation. The lowest state of charge operating condition shall be specified by the manufacturer.
- Set or verify that the Area EPS charge current limit is set to 0% to +5% of EUT nameplate rating.
- For EUT's with multiple inputs, such as PV and ESS, set or verify the other, non ESS, inputs are set to 100% +/-5% of their nameplate ratings.
- Where the PCS only supports zero charging from the Area EPS steps f) and g) may be omitted.
- Run test 203.5 and 203.6 and record current flows including current flow from the Area EPS or programmable ac power source and the input of the ESS. The timing of the step transitions, Th1 and Th2, in Figure 203.3 shall be selected to achieve steady state conditions in all current sensors including the external current sensor at the external reference point and at the output of the ESS.
- Repeat steps b) through d) above with external charge current limit set to 66% (+/- 5%) and 33%(+/- 5%) of EUT nameplate rating.
- For EUT's with multiple inputs, such as PV and ESS, repeat steps c) through g) with the other, non ESS, inputs set to 50% +/- 5% and 0% +5% of their nameplate ratings

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		



Criteria:

204.5.2 For EUT's with multiple inputs, such as PV and ESS, the EUT shall be considered in compliance if the steady state import current at the external reference point does not exceed the sum of the PV output current minus the input current limit set for the ESS minus any local load. For DC coupled systems the EUT input current, shall be considered to be proportional to the sum of the relative current flows of each source.

ie. $I_{\text{from grid}} \leq I_{\text{PV}} - I_{\text{ESS limit}} - I_{\text{load}}$ (Clause 204.5.2)

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Results:

(1) ESS external charge current limit = 0% to +5%, PV inputs = 100% ± 5%

Open loop response time (s)	
Maximum	0.3
Average	0.1

(a) For single phase unit connected line to neutral, or for three phase unit (open S1 on three phases simultaneously)

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (≤ 30 s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	277.0	72.2	59947.6	277.0	72.7	60113.0	277.0	0.0	11.5	600.1	103.6	62160.6	600.6	0.0	10.3	--	Non-exchange
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.2	103.7	62255.7	600.7	95.1	-57104.0	0.1	
			f	277.0	72.3	59992.6	277.0	72.7	60127.0	277.0	0.0	11.6	600.1	103.7	62213.4	600.7	0.0	10.3	0.2	
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.2	103.8	62276.5	600.7	95.1	-57134.6	0.1	
			f	277.0	72.3	59977.2	277.0	72.7	60133.6	277.0	0.0	11.6	600.2	103.6	62201.9	600.7	0.0	10.3	0.3	
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.2	103.8	62293.3	600.7	95.2	-57161.4	0.1	
			f	277.0	72.3	59995.0	277.0	72.7	60136.7	277.0	0.0	11.6	600.1	103.7	62221.8	600.6	0.0	10.3	0.2	
2		66%	d	277.0	47.7	39604.9	277.0	47.9	39639.4	277.1	0.0	11.6	600.2	103.7	62249.4	600.7	32.3	-19379.4	--	
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62317.2	600.8	95.2	-57169.2	0.1	
			f	277.0	47.7	39593.4	277.0	47.9	39639.7	277.1	0.0	11.6	600.2	103.7	62234.0	600.7	32.2	-19370.5	0.2	
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62325.0	600.8	95.1	-57158.2	0.2	
			f	277.0	47.7	39628.3	277.0	47.9	39640.2	277.1	0.0	11.6	600.2	103.8	62296.2	600.7	32.3	-19395.0	0.3	
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62306.2	600.8	95.1	-57143.2	0.2	
			f	277.0	47.7	39631.4	277.0	47.9	39642.1	277.1	0.0	11.6	600.2	103.8	62304.5	600.8	32.3	-19401.4	0.1	
3		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		

Date: 11/10/2021

TEST PACKAGE

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
4	50%	100%	d	277.1	36.3	30100.6	277.1	72.5	60008.5	277.1	36.1	-29974.4	600.3	103.9	62342.8	600.8	47.4	-28506.7	--	Non-exchange	
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62322.7	600.8	95.2	-57204.4	0.1		
			f	277.1	36.2	30077.3	277.1	72.5	60009.1	277.1	36.1	-29946.7	600.3	103.8	62290.4	600.8	47.4	-28488.4	0.2		
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.3	103.9	62364.0	600.9	95.3	-57250.0	0.3		
			f	277.1	36.3	30104.2	277.1	72.5	60010.2	277.1	36.1	-29977.5	600.3	103.9	62342.3	600.8	47.4	-28499.1	0.2		
			e	277.1	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62323.8	600.9	95.2	-57199.6	0.1		
			f	277.1	36.2	30090.6	277.1	72.5	60010.0	277.1	36.1	-29961.2	600.3	103.8	62309.7	600.8	47.4	-28491.1	0.3		
d		277.1	36.2	30098.5	277.1	47.9	39651.3	277.1	11.6	-9604.5	600.4	103.8	62335.1	600.8	47.4	-28493.7	--				
e		277.1	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62316.8	600.9	95.1	-57164.6	0.2				
f		277.1	36.2	30085.4	277.1	47.9	39651.0	277.1	11.6	-9599.1	600.4	103.8	62306.5	600.8	47.4	-28471.7	0.2				
e		277.1	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62304.9	600.8	95.1	-57157.9	0.1				
f		277.1	36.2	30085.6	277.1	47.9	39652.1	277.1	11.6	-9599.1	600.4	103.8	62306.5	600.9	47.4	-28482.4	0.1				
e		277.1	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.3	103.8	62331.5	600.8	95.2	-57178.6	0.1				
f		277.1	36.2	30091.2	277.1	47.9	39653.1	277.1	11.6	-9601.6	600.4	103.8	62319.1	600.9	47.4	-28479.4	0.3				
6		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
	e		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
	f		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
7	0%	100%	d	276.9	0.0	13.6	277.0	72.6	60017.6	277.0	72.4	-60032.5	600.2	103.6	62154.0	600.5	95.3	-57213.6	--	Non-exchange	
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.3	103.5	62153.9	600.6	95.2	-57205.8	0.1		
			f	276.9	0.0	13.6	277.0	72.6	60017.0	277.0	72.4	-60050.0	600.2	103.6	62168.7	600.5	95.3	-57235.7	0.2		
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.4	103.5	62138.8	600.6	95.2	-57170.3	0.1		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
8			f	276.9	0.0	13.6	277.0	72.6	60017.8	277.0	72.4	-60031.5	600.3	103.6	62155.3	600.5	95.3	-57232.1	0.2	
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.3	103.5	62141.6	600.6	95.1	-57129.5	0.3	
			f	276.9	0.0	13.6	277.0	72.6	60019.0	277.0	72.4	-60046.3	600.2	103.6	62173.1	600.5	95.3	-57242.3	0.2	
		66%	d	277.0	0.0	13.6	277.0	47.9	39640.0	277.1	47.7	-39598.1	600.4	103.5	62136.1	600.7	95.1	-57108.6	--	
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.1	0.0	11.6	600.4	103.4	62107.8	600.8	95.0	-57087.8	0.2	
			f	277.0	0.0	13.6	277.0	47.9	39640.3	277.1	47.7	-39585.9	600.4	103.5	62122.5	600.7	95.1	-57109.9	0.1	
			e	277.0	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.4	103.5	62134.2	600.8	95.1	-57102.3	0.2	
			f	277.0	0.0	13.6	277.0	47.9	39640.4	277.1	47.7	-39574.1	600.4	103.4	62103.6	600.7	95.0	-57088.0	0.2	
			e	277.0	0.0	13.6	277.1	0.0	1.8	277.1	0.0	11.6	600.4	103.5	62123.6	600.8	95.0	-57089.4	0.1	
			f	277.0	0.0	13.6	277.0	47.9	39641.6	277.1	47.7	-39574.5	600.4	103.4	62104.8	600.7	95.1	-57104.0	0.2	
9		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(2) Only for three phase unit, open switch S1 on only one phase

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	277.1	72.3	60048.4	277.1	72.6	60057.9	277.1	0.0	11.6	600.2	103.7	62232.3	600.3	0.0	10.3	--	Non-exchange
			e	277.1	48.5	40247.6	277.1	48.5	40211.5	277.2	0.0	11.6	600.3	103.7	62257.4	600.3	31.3	-18808.1	0.2	
			f	277.1	72.3	60012.0	277.1	72.6	60059.9	277.1	0.0	11.6	600.3	103.6	62195.3	600.3	0.0	10.3	0.1	
			e	277.1	48.5	40248.1	277.1	48.5	40209.5	277.2	0.0	11.6	600.3	103.7	62257.8	600.4	31.3	-18811.2	0.2	
			f	277.1	72.3	60007.2	277.1	72.6	60059.4	277.1	0.0	11.6	600.3	103.6	62187.4	600.3	0.0	10.3	0.1	
			e	277.1	48.5	40246.0	277.1	48.5	40210.1	277.2	0.0	11.6	600.3	103.7	62254.5	600.4	31.3	-18808.9	0.2	
f		277.1	72.3	60026.5	277.1	72.6	60060.5	277.1	0.0	11.6	600.3	103.6	62218.3	600.3	0.0	10.3	0.1			
2		66%	d	277.1	47.7	39636.2	277.2	47.8	39599.8	277.2	0.0	11.6	600.2	103.7	62250.9	600.3	32.3	-19397.0	--	
			e	277.1	31.8	26445.7	277.2	31.9	26405.5	277.2	0.0	11.6	600.2	103.8	62301.6	600.1	53.3	-31965.6	0.2	
			f	277.1	47.7	39634.3	277.2	47.8	39600.0	277.2	0.0	11.6	600.2	103.7	62249.4	600.3	32.3	-19396.8	0.2	
			e	277.1	31.8	26430.7	277.2	31.9	26404.1	277.2	0.0	11.6	600.2	103.7	62265.8	600.1	53.2	-31941.0	0.1	
			f	277.1	47.7	39651.4	277.2	47.8	39599.6	277.2	0.0	11.6	600.2	103.8	62276.8	600.3	32.3	-19396.2	0.2	
			e	277.1	31.8	26430.3	277.2	31.9	26403.9	277.2	0.0	11.6	600.2	103.7	62266.2	600.1	53.2	-31944.2	0.1	
3		33% ⁽¹⁾	f	277.1	47.7	39643.9	277.2	47.8	39599.8	277.2	0.0	11.6	600.2	103.7	62262.5	600.3	32.3	-19398.0	0.2	
			d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
	f		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
4	50%	100%	d	277.0	36.1	29990.3	277.0	72.5	60027.4	277.1	36.2	-30013.4	600.2	103.7	62245.2	600.4	47.6	-28551.1	--	Non-exchange
			e	277.0	36.1	29995.5	277.0	48.6	40240.0	277.1	11.7	-9700.4	600.3	103.7	62254.5	600.5	47.6	-28559.1	0.2	
			f	277.0	36.1	29989.7	277.0	72.5	60028.8	277.1	36.2	-30010.7	600.3	103.7	62243.2	600.5	47.5	-28538.6	0.1	
			e	277.0	36.1	29975.9	277.0	48.6	40240.6	277.1	11.7	-9692.9	600.3	103.6	62214.8	600.5	47.5	-28542.9	0.2	
			f	277.0	36.1	29981.1	277.0	72.5	60028.0	277.1	36.1	-30000.9	600.3	103.7	62226.3	600.4	47.5	-28531.3	0.1	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	277.0	36.1	29975.9	277.0	48.6	40240.6	277.1	11.7	-9692.9	600.3	103.6	62214.8	600.5	47.5	-28542.9	0.2	
		f	277.0	36.1	29979.7	277.0	72.5	60028.1	277.1	36.1	-29999.0	600.3	103.7	62222.6	600.4	47.5	-28531.8	0.3		
5		66%	d	277.0	36.1	29985.3	277.1	47.9	39608.7	277.1	11.0	-9117.2	600.2	103.7	62224.2	600.5	47.5	-28550.6	--	
			e	277.0	31.8	26416.7	277.1	31.9	26432.9	277.1	0.0	11.6	600.3	103.7	62227.5	600.5	53.2	-31927.3	0.2	
			f	277.0	36.1	29989.7	277.1	47.9	39609.0	277.1	11.0	-9118.8	600.2	103.7	62236.7	600.5	47.6	-28552.4	0.3	
			e	277.0	31.8	26397.8	277.1	31.9	26435.0	277.1	0.0	11.6	600.3	103.6	62188.4	600.6	53.1	-31904.5	0.2	
			f	277.0	36.1	29985.2	277.1	47.9	39608.8	277.1	11.0	-9117.2	600.3	103.7	62228.9	600.5	47.6	-28553.7	0.1	
			e	277.0	31.8	26408.1	277.1	31.9	26434.2	277.1	0.0	11.6	600.3	103.6	62211.1	600.6	53.2	-31918.3	0.2	
			f	277.0	36.1	29977.3	277.1	47.9	39608.5	277.1	11.0	-9114.4	600.3	103.6	62213.8	600.5	47.5	-28544.1	0.1	
6		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
7	0%	100%	d	277.0	0.0	13.6	277.1	72.5	60045.6	277.1	72.3	-60004.9	600.3	103.7	62232.3	600.5	95.5	-57343.7	--	Non-exchange
			e	277.1	0.0	13.6	277.1	48.5	40203.7	277.1	48.4	-40189.2	600.3	103.6	62219.0	600.6	95.4	-57294.9	0.2	
			f	277.0	0.0	13.6	277.1	72.5	60047.5	277.1	72.3	-60006.1	600.3	103.7	62233.6	600.6	95.4	-57317.4	0.1	
			e	277.1	0.0	13.6	277.1	48.5	40204.6	277.1	48.4	-40166.7	600.3	103.6	62185.5	600.6	95.4	-57265.2	0.3	
			f	277.1	0.0	13.6	277.1	72.5	60048.6	277.1	72.3	-59986.0	600.3	103.6	62212.9	600.5	95.4	-57283.2	0.2	
			e	277.1	0.0	13.6	277.1	48.5	40206.4	277.1	48.4	-40173.3	600.3	103.6	62192.8	600.6	95.4	-57293.3	0.1	
			f	277.0	0.0	13.6	277.1	72.5	60047.2	277.1	72.3	-59977.0	600.3	103.6	62202.9	600.6	95.4	-57272.0	0.2	
8		66%	d	277.1	0.0	13.6	277.1	47.9	39617.6	277.1	47.7	-39605.9	600.4	103.6	62214.9	600.6	95.4	-57295.7	--	
			e	277.1	0.0	13.6	277.1	31.9	26418.5	277.1	31.8	-26421.9	600.4	103.6	62202.5	600.6	95.3	-57267.3	0.2	
			f	277.1	0.0	13.6	277.1	47.9	39617.8	277.1	47.7	-39607.6	600.3	103.6	62218.4	600.6	95.4	-57281.3	0.1	
			e	277.1	0.0	13.6	277.1	31.9	26418.2	277.1	31.8	-26417.2	600.4	103.6	62191.7	600.7	95.4	-57274.7	0.2	
			f	277.1	0.0	13.6	277.1	47.9	39618.6	277.1	47.7	-39613.7	600.3	103.7	62222.1	600.6	95.4	-57288.8	0.3	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (≤ 30 s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	277.1	0.0	13.6	277.1	31.9	26419.2	277.1	31.8	-26404.9	600.3	103.6	62168.0	600.6	95.3	-57225.4	0.2	
		f	277.1	0.0	13.6	277.1	47.9	39618.5	277.1	47.7	-39610.1	600.3	103.6	62215.2	600.6	95.4	-57295.0	0.1		
9		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

(c) Only for three phase unit, open switch S1 on two phases simultaneously

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	277.1	72.1	59907.4	277.1	72.5	60062.5	277.1	0.0	11.6	600.4	103.5	62162.0	600.7	0.0	10.3	--	Non-exchange
			e	277.1	23.9	19813.5	277.1	23.8	19809.8	277.2	0.0	11.6	600.4	103.5	62165.1	600.7	63.6	-38185.7	0.1	
			f	277.1	72.1	59907.4	277.1	72.5	60062.3	277.1	0.0	11.6	600.4	103.5	62147.0	600.7	0.0	10.3	0.2	
			e	277.1	23.8	19805.3	277.1	23.8	19809.9	277.2	0.0	11.6	600.4	103.5	62137.0	600.7	63.5	-38169.2	0.2	
			f	277.1	72.1	59913.0	277.1	72.5	60063.1	277.1	0.0	11.6	600.4	103.5	62162.4	600.7	0.0	10.3	0.1	
			e	277.1	23.9	19808.1	277.1	23.8	19810.1	277.2	0.0	11.6	600.4	103.5	62145.8	600.7	63.6	-38191.3	0.3	
			f	277.1	72.1	59908.5	277.1	72.5	60064.7	277.2	0.0	11.6	600.4	103.5	62159.4	600.7	0.0	10.3	0.2	
2		66%	d	277.1	47.7	39637.3	277.1	47.9	39629.4	277.2	0.0	11.6	600.4	103.6	62182.4	600.7	32.2	-19363.9	--	
			e	277.1	15.9	13217.4	277.1	15.9	13200.0	277.2	0.0	11.6	600.4	103.6	62212.8	600.7	74.1	-44485.4	0.1	
			f	277.1	47.7	39633.4	277.1	47.9	39628.8	277.2	0.0	11.6	600.4	103.6	62177.3	600.7	32.2	-19369.3	0.2	
			e	277.1	15.9	13213.3	277.1	15.9	13199.9	277.2	0.0	11.6	600.4	103.6	62198.5	600.7	74.1	-44485.5	0.3	
			f	277.1	47.7	39633.4	277.1	47.9	39630.4	277.2	0.0	11.6	600.4	103.6	62173.5	600.7	32.2	-19365.8	0.1	

TEST PACKAGE

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
			e	277.1	15.9	13210.6	277.1	15.9	13200.0	277.2	0.0	11.6	600.4	103.6	62181.3	600.7	74.1	-44483.7	0.2		
			f	277.1	47.7	39644.8	277.1	47.9	39629.3	277.2	0.0	11.6	600.4	103.6	62185.9	600.7	32.2	-19367.7	0.2		
3		33% ⁽¹⁾	d	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---
			e	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---
			f	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		---
4	50%	100%	d	277.1	36.3	30113.2	277.1	72.5	60029.6	277.1	36.2	-30044.5	600.3	103.6	62161.3	600.6	47.4	-28496.6	--	Non-exchange	
			e	277.1	23.9	19820.6	277.1	23.8	19799.3	277.1	0.0	11.6	600.3	103.6	62165.3	600.6	63.6	-38189.6	0.2		
			f	277.1	36.3	30106.8	277.1	72.5	60032.0	277.1	36.2	-30037.9	600.3	103.6	62154.4	600.6	47.4	-28478.3	0.2		
			e	277.1	23.9	19814.3	277.1	23.8	19798.8	277.1	0.0	11.6	600.3	103.5	62141.8	600.7	63.6	-38172.3	0.1		
			f	277.1	36.3	30107.0	277.1	72.5	60033.8	277.1	36.2	-30037.6	600.3	103.5	62158.8	600.6	47.4	-28493.4	0.2		
			e	277.1	23.9	19811.3	277.1	23.8	19799.4	277.1	0.0	11.6	600.3	103.5	62131.9	600.6	63.6	-38170.2	0.1		
			f	277.1	36.3	30106.5	277.1	72.5	60031.4	277.1	36.2	-30036.2	600.3	103.5	62155.8	600.7	47.4	-28498.9	0.2		
		66%	d	277.1	36.2	30094.6	277.1	47.9	39610.2	277.1	11.6	-9601.9	600.3	103.5	62144.5	600.6	47.4	-28495.1	--		
			e	277.1	15.9	13214.9	277.1	15.9	13189.2	277.2	0.0	11.6	600.4	103.6	62181.0	600.7	74.0	-44468.5	0.3		
			f	277.1	36.2	30089.3	277.1	47.9	39609.5	277.1	11.6	-9600.0	600.4	103.5	62136.9	600.7	47.4	-28479.8	0.2		
			e	277.1	15.9	13207.5	277.1	15.9	13189.7	277.2	0.0	11.6	600.4	103.5	62143.7	600.7	74.0	-44440.1	0.2		
			f	277.1	36.2	30099.8	277.1	47.9	39610.7	277.1	11.6	-9604.1	600.4	103.5	62158.1	600.7	47.4	-28487.2	0.1		
			e	277.1	15.9	13211.8	277.1	15.9	13189.5	277.2	0.0	11.6	600.4	103.6	62168.3	600.7	74.0	-44452.0	0.2		
			f	277.1	36.3	30102.8	277.1	47.9	39611.0	277.2	11.6	-9605.1	600.4	103.6	62170.1	600.7	47.5	-28507.1	0.3		
33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
	e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
	e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																						
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode		
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)				
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
7	0%	100%	d	277.1	0.0	13.6	277.1	72.6	60047.7	277.2	72.2	-59935.1	600.4	103.5	62168.0	600.7	95.2	-57209.4	--	Non-exchange		
			e	277.1	0.0	13.7	277.1	23.9	19828.2	277.1	23.9	-19818.0	600.2	103.8	62327.1	600.3	95.5	-57312.4	0.2			
			f	277.1	0.0	13.6	277.1	72.5	60048.4	277.2	72.2	-59941.7	600.4	103.6	62169.5	600.7	95.2	-57208.4	0.1			
			e	277.1	0.0	13.7	277.1	23.9	19824.5	277.1	23.9	-19825.9	600.2	103.9	62348.0	600.2	95.5	-57330.4	0.3			
			f	277.1	0.0	13.6	277.1	72.5	60047.0	277.2	72.2	-59921.7	600.4	103.5	62151.9	600.7	95.2	-57193.3	0.2			
			e	277.1	0.0	13.7	277.1	23.9	19824.4	277.1	23.9	-19824.8	600.2	103.9	62345.2	600.2	95.5	-57325.7	0.1			
			f	277.1	0.0	13.6	277.1	72.5	60048.4	277.2	72.1	-59901.0	600.4	103.5	62134.9	600.7	95.2	-57181.9	0.2			
8		66%	d	277.1	0.0	13.6	277.2	47.8	39587.1	277.2	47.8	-39687.0	600.4	103.5	62157.3	600.7	95.3	-57218.1	--		Non-exchange	
			e	277.1	0.0	13.6	277.2	15.9	13211.3	277.2	15.9	-13193.9	600.4	103.6	62180.5	600.7	95.3	-57228.8	0.2			
			f	277.1	0.0	13.6	277.2	47.8	39587.0	277.2	47.8	-39677.9	600.4	103.5	62148.4	600.7	95.2	-57200.8	0.2			
			e	277.1	0.0	13.6	277.2	15.9	13213.9	277.2	15.9	-13196.4	600.3	103.6	62190.7	600.6	95.3	-57229.8	0.2			
			f	277.1	0.0	13.6	277.2	47.8	39586.2	277.2	47.8	-39663.4	600.4	103.5	62128.5	600.7	95.2	-57161.3	0.1			
			e	277.1	0.0	13.6	277.2	15.9	13211.9	277.2	15.9	-13195.2	600.4	103.6	62181.9	600.6	95.3	-57220.9	0.1			
			f	277.1	0.0	13.6	277.2	47.8	39587.5	277.2	47.8	-39692.8	600.4	103.6	62172.6	600.7	95.2	-57210.3	0.3			
9		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			Non-exchange
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.																						

Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Open loop response time (s)	
Maximum	0.3
Average	0.2

203.6 Step Change in Generation Test																				
Load level: 33%																				
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	5%-10%	d	277.0	23.9	19800.0	277.0	24.0	19900.0	277.0	0.0	11.6	600.2	103.6	62168.1	600.4	63.6	-38194.4	--	Non-exchange
			e	277.0	0.0	13.6	277.0	23.9	19800.0	277.1	18.1	-15004.1	600.3	8.4	5015.5	600.5	0.0	10.3	0.2	
			f	277.0	23.9	19802.9	277.0	24.0	19900.0	277.0	0.0	11.6	600.3	103.6	62157.3	600.4	63.6	-38196.8	0.3	
			e	277.0	0.0	13.6	277.0	23.9	19800.0	277.1	18.1	-15009.4	600.3	8.4	5016.9	600.5	0.0	10.3	0.2	
			f	277.0	23.9	19800.0	277.0	24.0	19900.0	277.0	0.0	11.6	600.3	103.5	62141.1	600.4	63.6	-38181.0	0.2	
			e	277.0	0.0	13.6	277.0	23.9	19800.0	277.1	18.1	-15010.9	600.3	8.4	5017.6	600.5	0.0	10.3	0.1	
			f	277.0	23.9	19800.0	277.0	24.0	19900.0	277.0	0.0	11.6	600.2	103.6	62177.2	600.4	63.6	-38204.6	0.1	
2		33%-66%	d	276.9	23.9	19827.1	277.0	24.0	19876.6	277.0	0.0	11.6	600.2	103.6	62174.0	600.4	63.6	-38192.8	--	
			e	277.0	36.1	29986.3	277.1	23.9	19800.0	277.1	12.3	10194.8	600.3	52.2	31316.9	600.5	0.0	10.3	0.2	
			f	276.9	23.9	19822.2	277.0	24.0	19880.0	277.0	0.0	11.6	600.2	103.6	62158.3	600.4	63.6	-38194.1	0.2	
			e	277.0	36.1	29986.5	277.1	23.9	19800.0	277.1	12.3	10195.1	600.3	52.2	31318.4	600.5	0.0	10.3	0.1	
			f	276.9	23.9	19823.2	277.0	24.0	19880.0	277.0	0.0	11.6	600.2	103.6	62167.6	600.4	63.7	-38218.3	0.2	
			e	277.0	36.1	29990.4	277.1	23.9	19800.1	277.1	12.3	10196.6	600.3	52.2	31324.2	600.5	0.0	10.3	0.3	
			f	276.9	23.9	19818.9	277.0	24.0	19880.1	277.0	0.0	11.6	600.2	103.6	62158.1	600.4	63.6	-38198.4	0.2	
3	66% ⁽¹⁾	5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Non-exchange
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
4		33%-66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																				
Load level: 33%																				
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
5	33% ⁽¹⁾	5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Non-exchange	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
6		33%-66%	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.																				

(2) ESS external charge current limit = $66 \pm 5\%$ (If support), PV inputs = $100\% \pm 5\%$ - NA

(3) ESS external charge current limit = $33 \pm 5\%$ (If support), PV inputs = $100\% \pm 5\%$ - NA

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(4) ESS external charge current limit = 0% to +5%, PV inputs = 50% ± 5%

Open loop response time (s)	
Maximum	0.3
Average	0.1

(a) For single phase unit connected line to neutral, or for three phase unit (open S1 on three phases simultaneously)

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	276.9	0.0	13.6	276.9	72.5	60013.0	276.9	72.3	-59951.3	600.2	52.1	31292.5	600.4	47.5	-28500.4	--	Export only
			e	276.9	0.0	13.6	276.9	0.0	1.8	277.0	0.0	11.6	600.2	52.2	31303.6	600.5	47.5	-28525.3	0.2	
			f	276.9	0.0	13.6	276.9	72.5	60013.5	276.9	72.3	-59974.4	600.2	52.2	31304.5	600.4	47.5	-28520.4	0.1	
			e	276.9	0.0	13.6	276.9	0.0	1.8	277.0	0.0	11.6	600.2	52.2	31311.9	600.5	47.5	-28533.5	0.1	
			f	276.9	0.0	13.6	276.9	72.5	60016.6	277.0	72.3	-60004.2	600.2	52.2	31319.6	600.4	47.5	-28531.8	0.1	
			e	276.9	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.2	52.2	31308.1	600.5	47.5	-28530.3	0.2	
			f	276.9	0.0	13.6	276.9	72.5	60017.7	277.0	72.3	-59994.1	600.2	52.2	31312.0	600.4	47.5	-28529.5	0.3	
2		66%	d	276.9	0.0	13.6	277.0	47.9	39622.9	277.0	47.7	-39559.7	600.2	52.1	31279.4	600.5	47.5	-28511.7	--	
			e	276.9	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.3	52.1	31286.4	600.5	47.5	-28520.7	0.1	
			f	276.9	0.0	13.6	277.0	47.9	39625.1	277.0	47.7	-39561.4	600.3	52.1	31279.8	600.5	47.5	-28513.5	0.2	
			e	276.9	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.3	52.2	31304.3	600.5	47.5	-28537.5	0.2	
			f	276.9	0.0	13.6	277.0	47.9	39625.8	277.0	47.7	-39559.8	600.3	52.1	31276.8	600.5	47.5	-28517.7	0.2	
			e	276.9	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.3	52.1	31296.6	600.5	47.5	-28527.5	0.3	
			f	276.9	0.0	13.6	277.0	47.9	39627.2	277.0	47.7	-39580.1	600.3	52.1	31293.0	600.5	47.5	-28530.3	0.1	
3		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
4	50% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
f		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
5		66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
f		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
6		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
f		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
7		0% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	e			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	f			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	e			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--					

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
8		66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
f		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
9		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	e		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
Note (1): Because the 33% and 50% load condition is not affected by the change in EUT output variation, the related test is not repeated.																				

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(2) Only for three phase unit, open switch S1 on only one phase

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	277.1	0.0	13.6	277.2	72.5	60015.9	277.2	72.4	-60085.4	600.4	52.0	31236.5	600.9	47.3	-28424.5	--	Export only
			e	277.1	0.0	13.6	277.2	48.5	40210.3	277.2	48.4	-40215.4	600.5	52.0	31242.6	600.9	47.3	-28434.8	0.2	
			f	277.1	0.0	13.6	277.2	72.5	60015.9	277.2	72.4	-60083.2	600.5	52.0	31232.3	600.9	47.3	-28422.9	0.3	
			e	277.1	0.0	13.6	277.2	48.5	40210.6	277.2	48.4	-40204.3	600.4	52.0	31231.9	600.9	47.3	-28435.7	0.1	
			f	277.1	0.0	13.6	277.2	72.5	60017.4	277.2	72.4	-60083.4	600.5	52.0	31236.3	600.9	47.3	-28428.8	0.3	
			e	277.1	0.0	13.6	277.2	48.5	40210.0	277.2	48.4	-40196.9	600.4	52.0	31226.0	600.9	47.3	-28421.0	0.2	
			f	277.1	0.0	13.6	277.2	72.5	60014.3	277.2	72.4	-60079.7	600.4	52.0	31234.3	600.8	47.3	-28430.5	0.2	
2		66%	d	277.1	0.0	13.6	277.1	47.9	39645.7	277.1	47.7	-39607.2	600.3	52.1	31272.0	600.8	47.4	-28499.4	--	
			e	277.1	0.0	13.6	277.1	31.9	26408.5	277.1	31.8	-26416.4	600.4	52.1	31275.1	600.8	47.4	-28504.5	0.2	
			f	277.1	0.0	13.6	277.1	47.9	39655.7	277.1	47.7	-39602.1	600.3	52.1	31272.4	600.8	47.4	-28490.8	0.3	
			e	277.1	0.0	13.6	277.1	31.9	26409.7	277.1	31.8	-26402.0	600.4	52.1	31262.0	600.8	47.4	-28476.1	0.2	
			f	277.1	0.0	13.6	277.1	47.9	39661.0	277.1	47.7	-39594.8	600.4	52.1	31271.9	600.8	47.4	-28473.9	0.2	
			e	277.1	0.0	13.6	277.1	31.9	26410.0	277.1	31.8	-26403.7	600.4	52.1	31265.5	600.8	47.4	-28476.4	0.1	
			f	277.1	0.0	13.6	277.1	47.9	39664.4	277.1	47.7	-39585.4	600.4	52.1	31270.1	600.8	47.4	-28479.7	0.2	
3		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
4	50% ⁽¹⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																					
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode	
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
5		66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
6		33%	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
7	100%	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
8	66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
9			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
f		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
Note (1): Because the 33% and 50% load condition is not affected by the change in EUT output variation, the related test is not repeated.																				

(c) Only for three phase unit, open switch S1 on two phases simultaneously

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	277.0	0.0	13.6	277.0	72.5	60018.9	277.0	72.2	-59943.8	600.2	52.0	31213.3	600.4	47.4	-28439.8	--	Export only
			e	277.0	0.0	13.6	277.0	23.8	19811.2	277.1	23.9	-19836.4	600.2	52.1	31280.3	600.5	47.4	-28483.6	0.2	
			f	277.0	0.0	13.6	277.0	72.5	60008.3	277.0	72.3	-60002.9	600.1	52.1	31242.5	600.4	47.4	-28469.3	0.2	
			e	277.0	0.0	13.6	277.0	23.8	19810.5	277.1	23.9	-19819.7	600.3	52.1	31261.2	600.6	47.4	-28464.9	0.1	
			f	277.0	0.0	13.6	277.0	72.5	60001.6	277.0	72.3	-59981.7	600.1	52.0	31233.1	600.4	47.4	-28452.9	0.2	
			e	277.0	0.0	13.6	277.0	23.8	19810.2	277.1	23.9	-19828.3	600.3	52.1	31273.9	600.6	47.4	-28481.6	0.3	
			f	277.0	0.0	13.6	277.0	72.5	59995.8	277.0	72.3	-60016.7	600.1	52.1	31249.8	600.4	47.4	-28471.5	0.2	
2		66%	d	277.0	0.0	13.6	277.0	47.9	39612.9	277.1	47.8	-39676.7	600.3	52.1	31262.0	600.6	47.4	-28496.8	--	
			e	277.0	0.0	13.6	277.1	15.9	13203.2	277.1	15.9	-13181.8	600.3	52.1	31256.8	600.6	47.4	-28484.3	0.1	
			f	277.0	0.0	13.6	277.0	47.9	39631.9	277.1	47.8	-39687.2	600.3	52.1	31274.3	600.7	47.5	-28505.0	0.2	
			e	277.0	0.0	13.6	277.1	15.9	13206.2	277.1	15.9	-13185.0	600.3	52.1	31265.0	600.6	47.4	-28493.8	0.3	
			f	277.0	0.0	13.6	277.0	47.9	39641.5	277.1	47.8	-39707.4	600.3	52.1	31287.8	600.7	47.5	-28515.4	0.2	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	277.0	0.0	13.6	277.1	15.9	13208.8	277.1	15.9	-13189.4	600.3	52.1	31272.8	600.7	47.5	-28503.6	0.3	
		f	277.0	0.0	13.6	277.0	47.9	39647.9	277.1	47.8	-39706.0	600.3	52.1	31285.6	600.7	47.5	-28523.4	0.1		
3		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
f		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
4		50% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	e			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	f			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	e			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	f			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	e			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	f			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
5	66%		d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
6	33%		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
7	0%(2)	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
8		66%	e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
9		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Note (1): Because the 33% and 50% load condition is not affected by the change in EUT output variation, the related test is not repeated.																				

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

Open loop response time (s)	
Maximum	0.3
Average	0.2

203.6 Step Change in Generation Test																				
Load level: 33%																				
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	5%-10%	d	277.1	0.0	13.6	277.1	23.9	19809.5	277.1	23.8	-19768.1	600.4	52.0	31241.6	600.8	47.3	-28414.5	--	Export only
			e	277.1	0.0	13.6	277.1	23.9	19810.0	277.2	23.8	-19748.3	600.4	8.3	4998.5	600.8	7.6	-4545.3	0.2	
			f	277.1	0.0	13.6	277.1	23.9	19810.0	277.1	23.8	-19763.3	600.4	52.0	31236.7	600.8	47.3	-28415.8	0.3	
			e	277.1	0.0	13.6	277.1	23.9	19810.0	277.2	23.8	-19756.8	600.4	8.3	5000.5	600.8	7.6	-4547.8	0.2	
			f	277.1	0.0	13.6	277.1	23.9	19810.0	277.1	23.8	-19757.6	600.4	52.0	31228.1	600.8	47.3	-28406.9	0.3	
			e	277.1	0.0	13.6	277.1	23.9	19810.0	277.2	23.8	-19770.2	600.4	8.3	5003.6	600.8	7.6	-4549.1	0.2	
			f	277.1	0.0	13.6	277.1	23.9	19810.0	277.1	23.8	-19747.6	600.4	52.0	31212.9	600.7	47.3	-28403.0	0.1	
2		33%-66%	d	277.1	0.0	13.6	277.1	23.9	19791.0	277.2	23.9	-19802.5	600.4	52.0	31244.8	600.7	47.3	-28411.6	--	
			e	277.1	0.0	13.6	277.2	23.9	19795.4	277.2	23.9	-19803.9	600.4	34.2	20525.3	600.8	31.2	-18740.2	0.3	
			f	277.1	0.0	13.6	277.1	23.9	19791.5	277.2	23.8	-19787.7	600.4	52.0	31224.0	600.7	47.3	-28391.1	0.3	
			e	277.1	0.0	13.6	277.2	23.9	19795.2	277.2	23.8	-19792.9	600.5	34.2	20512.9	600.8	31.2	-18731.6	0.2	
			f	277.1	0.0	13.6	277.1	23.9	19790.9	277.2	23.8	-19786.2	600.4	52.0	31225.4	600.7	47.3	-28406.5	0.1	
			e	277.1	0.0	13.6	277.2	23.9	19795.4	277.2	23.8	-19797.1	600.5	34.2	20521.4	600.8	31.2	-18723.8	0.2	
			f	277.1	0.0	13.6	277.1	23.9	19792.0	277.2	23.9	-19807.7	600.4	52.1	31252.9	600.8	47.3	-28425.6	0.2	
3	66% ⁽¹⁾	5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
4		33%-66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																				
Load level: 33%																				
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
5	33% ⁽¹⁾	5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
		6	33%-66%	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
d				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
e				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
f				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
e				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
f				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Note (1): Because the 33% load condition is not affected by the change in EUT output variation, the related test is not repeated.																				

(5) ESS external charge current limit = $66 \pm 5\%$ (If support), PV inputs = $50\% \pm 5\%$ - NA

(6) ESS external charge current limit = $33 \pm 5\%$ (If support), PV inputs = $50\% \pm 5\%$ - NA

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(7) ESS external charge current limit = 0% to +5%, PV inputs = 0% + 5%

Open loop response time (s)	
Maximum	0.3
Average	0.2

(a) For single phase unit connected line to neutral, or for three phase unit (open S1 on three phases simultaneously)

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	276.6	0.0	13.6	276.7	72.5	60036.8	276.7	72.3	-59919.4	600.0	0.0	10.2	600.1	0.0	10.3	--	Export only
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.5	600.0	0.0	10.2	600.2	0.0	10.3	0.2	
			f	276.7	0.0	13.6	276.7	72.6	60064.4	276.7	72.3	-59900.4	600.0	0.0	10.2	600.2	0.0	10.3	0.3	
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.6	600.1	0.0	10.2	600.3	0.0	10.3	0.2	
			f	276.7	0.0	13.6	276.7	72.8	60081.5	276.7	72.3	-59904.2	600.0	0.0	10.2	600.2	0.0	10.3	0.2	
			e	277.0	0.0	13.6	277.0	0.0	1.8	277.0	0.0	11.5	600.1	0.0	10.2	600.3	0.0	10.3	0.3	
			f	276.7	0.0	13.6	276.7	72.9	60092.1	276.8	72.2	-59850.7	600.0	0.0	10.2	600.2	0.0	10.3	0.1	
2		66%	d	276.8	0.0	13.6	276.8	47.9	39612.6	276.8	47.8	-39609.1	600.2	0.0	10.2	600.4	0.0	10.3	--	
			e	276.7	0.0	13.6	276.8	0.0	1.8	276.8	0.0	11.6	600.2	0.0	10.2	600.3	0.0	10.3	0.2	
			f	276.8	0.0	13.6	276.8	47.9	39613.8	276.9	47.7	-39593.3	600.2	0.0	10.2	600.4	0.0	10.3	0.3	
			e	276.8	0.0	13.6	276.8	0.0	1.8	276.8	0.0	11.6	600.2	0.0	10.2	600.3	0.0	10.3	0.3	
			f	276.8	0.0	13.6	276.8	47.9	39615.5	276.9	47.8	-39599.8	600.2	0.0	10.2	600.4	0.0	10.3	0.3	
			e	276.8	0.0	13.6	276.8	0.0	1.8	276.8	0.0	11.6	600.2	0.0	10.2	600.3	0.0	10.3	0.2	
			f	276.8	0.0	13.6	276.8	47.9	39617.2	276.9	47.8	-39608.8	600.2	0.0	10.2	600.4	0.0	10.3	0.2	
3		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
4	50% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
f		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
5		66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
f		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
6		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
f		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				
7		0% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	e			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	f			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	e			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	f			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($\leq 30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
8		66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
9		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Note (1): Because the 33% and 50% load condition is not affected by the change in EUT output variation, the related test is not repeated.																				

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(2) Only for three phase unit, open switch S1 on only one phase

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	276.8	0.0	13.6	276.9	72.5	59971.5	276.9	72.2	-59909.6	600.2	0.0	10.2	600.5	0.0	10.3	--	Export only
			e	276.9	0.0	13.6	276.9	48.5	40206.0	276.9	48.5	-40212.3	600.3	0.0	10.2	600.5	0.0	10.3	0.2	
			f	276.9	0.0	13.6	276.9	72.5	59973.9	276.9	72.3	-59935.1	600.2	0.0	10.2	600.5	0.0	10.3	0.3	
			e	276.9	0.0	13.6	276.9	48.6	40207.6	276.9	48.5	-40216.3	600.3	0.0	10.2	600.6	0.0	10.3	0.2	
			f	276.9	0.0	13.6	276.9	72.5	59975.7	276.9	72.3	-59963.0	600.2	0.0	10.2	600.5	0.0	10.3	0.3	
			e	276.9	0.0	13.6	276.9	48.6	40207.8	276.9	48.5	-40228.9	600.3	0.0	10.2	600.6	0.0	10.3	0.2	
f		276.9	0.0	13.6	276.9	72.6	59975.6	276.9	72.3	-59936.9	600.3	0.0	10.2	600.5	0.0	10.3	0.1			
2		66%	d	276.9	0.0	13.6	276.9	47.9	39608.3	277.0	47.8	-39683.5	600.3	0.0	10.2	600.6	0.0	10.3	--	
			e	276.9	0.0	13.6	277.0	31.9	26400.0	277.0	31.8	-26400.3	600.3	0.0	10.2	600.5	0.0	10.3	0.2	
			f	276.9	0.0	13.6	276.9	47.9	39607.9	277.0	47.8	-39652.7	600.2	0.0	10.2	600.5	0.0	10.3	0.2	
			e	276.9	0.0	13.6	277.0	31.9	26400.1	277.0	31.8	-26402.7	600.2	0.0	10.2	600.5	0.0	10.3	0.3	
			f	276.9	0.0	13.6	276.9	47.9	39609.3	277.0	47.8	-39662.3	600.3	0.0	10.2	600.5	0.0	10.3	0.1	
			e	276.9	0.0	13.6	277.0	31.9	26400.2	277.0	31.8	-26401.1	600.3	0.0	10.2	600.6	0.0	10.3	0.1	
f		276.9	0.0	13.6	276.9	47.9	39610.5	277.0	47.8	-39664.5	600.3	0.0	10.2	600.5	0.0	10.3	0.2			
3		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	f		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	e		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
4	50% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
		66%	e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
5			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
6		d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
7	0% ⁽²⁾	100%	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only	
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		8	66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
				e	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
				f	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
9			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
f		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
Note (1): Because the 33% and 50% load condition is not affected by the change in EUT output variation, the related test is not repeated.																				

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

(c) Only for three phase unit, open switch S1 on two phases simultaneously

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) ($<30s$)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	100%	d	276.9	0.0	13.6	277.0	72.6	60011.7	277.0	72.3	-59986.6	600.3	0.0	10.2	600.6	0.0	10.3	--	Export only
			e	277.0	0.0	13.6	277.0	23.8	19799.3	277.0	23.8	-19784.6	600.3	0.0	10.2	600.7	0.0	10.3	0.2	
			f	277.0	0.0	13.6	277.0	72.7	60014.6	277.0	72.3	-59978.6	600.3	0.0	10.2	600.6	0.0	10.3	0.2	
			e	277.0	0.0	13.6	277.0	23.8	19799.5	277.0	23.8	-19780.0	600.4	0.0	10.2	600.7	0.0	10.3	0.3	
			f	277.0	0.0	13.6	277.0	72.8	60016.3	277.0	72.4	-60066.5	600.4	0.0	10.2	600.6	0.0	10.3	0.1	
			e	277.0	0.0	13.6	277.0	23.8	19800.0	277.0	23.8	-19779.8	600.4	0.0	10.2	600.7	0.0	10.3	0.1	
			f	277.0	0.0	13.6	277.0	72.6	60014.9	277.0	72.4	-60063.8	600.4	0.0	10.2	600.6	0.0	10.3	0.1	
2		66%	d	277.0	0.0	13.6	277.0	47.9	39631.0	277.1	47.8	-39646.5	600.4	0.0	10.2	600.7	0.0	10.3	--	
			e	277.0	0.0	13.6	277.0	15.9	13200.0	277.1	15.9	-13199.3	600.4	0.0	10.2	600.7	0.0	10.4	0.2	
			f	277.0	0.0	13.6	277.0	47.9	39631.7	277.1	47.8	-39669.7	600.4	0.0	10.2	600.7	0.0	10.3	0.3	
			e	277.0	0.0	13.6	277.0	15.9	13200.0	277.1	15.9	-13193.8	600.4	0.0	10.2	600.7	0.0	10.3	0.3	
			f	277.0	0.0	13.6	277.0	47.9	39631.4	277.1	47.8	-39655.6	600.4	0.0	10.2	600.7	0.0	10.3	0.1	
			e	277.0	0.0	13.6	277.0	15.9	13200.0	277.1	15.9	-13190.9	600.4	0.0	10.2	600.7	0.0	10.3	0.1	
			f	277.0	0.0	13.6	277.0	47.9	39633.3	277.1	47.8	-39666.3	600.4	0.0	10.2	600.7	0.0	10.3	0.1	
3		33% ⁽¹⁾	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
	e		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
	f		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
4	50% ⁽²⁾	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40 K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
5		66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
6		33%	f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
7	0%(2)	100%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
8		66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.5 Step Change in Load Test																				
Excel file	EUT output limit	Load level	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (≤ 30 s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
9			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
		33%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Note (1)(2): Because the 33% and 50% load condition is not affected by the change in EUT output variation, the related test is not repeated.																				

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																				
Load level: 33%																				
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
1	100%	5%-10%	d	276.9	0.0	13.6	277.0	24.0	19838.3	277.0	23.9	-19792.5	600.3	0.0	10.2	600.3	0.0	10.3	0.3	Export only
			e	277.1	0.0	13.6	277.1	23.9	19818.5	277.2	23.8	-19797.4	600.3	8.4	5017.3	600.4	7.6	-4566.7	0.2	
			f	277.0	0.0	13.6	277.0	24.0	19838.7	277.0	23.9	-19801.3	600.2	0.0	10.2	600.2	0.0	10.3	0.2	
			e	277.1	0.0	13.6	277.1	24.0	19828.5	277.2	23.8	-19789.5	600.4	8.4	5015.6	600.4	7.6	-4566.1	0.3	
			f	277.0	0.0	13.6	277.0	24.0	19838.8	277.0	23.9	-19795.6	600.2	0.0	10.2	600.2	0.0	10.3	0.1	
			e	277.1	0.0	13.6	277.1	24.0	19830.2	277.2	23.8	-19788.7	600.3	8.4	5015.4	600.4	7.6	-4564.3	0.1	
			f	277.0	0.0	13.6	277.0	24.0	19839.3	277.0	23.9	-19809.2	600.2	0.0	10.2	600.2	0.0	10.3	0.1	
2		33%-66%	d	277.0	0.0	13.6	277.0	24.0	19839.1	277.0	23.9	-19815.0	600.3	0.0	10.2	600.3	0.0	10.3	---	
			e	277.1	0.0	13.6	277.1	24.0	19830.0	277.2	23.8	-19769.6	600.3	52.0	31191.7	600.4	47.4	-28482.8	0.1	
			f	277.0	0.0	13.6	277.0	24.0	19839.0	277.0	23.9	-19812.7	600.2	0.0	10.2	600.2	0.0	10.3	0.1	
			e	277.1	0.0	13.6	277.1	24.0	19830.0	277.2	23.8	-19767.5	600.3	52.0	31188.2	600.4	47.4	-28472.6	0.1	
			f	277.0	0.0	13.6	277.0	24.0	19839.3	277.0	23.9	-19816.5	600.2	0.0	10.2	600.2	0.0	10.3	0.2	
			e	277.1	0.0	13.6	277.1	24.0	19830.0	277.2	23.8	-19765.5	600.3	52.0	31187.1	600.4	47.4	-28471.5	0.2	
			f	277.0	0.0	13.6	277.0	24.0	19838.4	277.0	23.9	-19817.5	600.2	0.0	10.2	600.2	0.0	10.3	0.2	
3	66% ⁽¹⁾	5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	Export only	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
4		33%-66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--

Client:	Portable Solar LLC (dba Sol-Ark)	Tested by:	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
File Number:	CN235DYA 001	Reviewed by:	Yue Yin	<i>Yue Yin</i>	2023.04.12
Model No:	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	Standard:	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

203.6 Step Change in Generation Test																				
Load level: 33%																				
Excel file	EUT output limit	Generation level (PV)	Step	EUT output port			Load port			Grid port			PV port			ESS port			Tr (s) (<30s)	ESS Operating Mode
				U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)	U (V)	I (A)	P (W)		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
5	33% ⁽¹⁾	5%-10%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
6		33%-66%	d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			e	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
			f	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Note (1): Because the 33% and 66% load condition is not affected by the change in EUT output variation, the related test is not repeated.

Note (1): Because the 33% and 66% load condition is not affected by the change in EUT output variation, the related test is not repeated.

(8) ESS external charge current limit = $66 \pm 5\%$ (If support), PV inputs = 0% + 5% - NA

(9) ESS external charge current limit = $33 \pm 5\%$ (If support), PV inputs = 0% + 5% - NA

<i>Client:</i>	Portable Solar LLC (dba Sol-Ark)	<i>Tested by:</i>	Xingxin Tian	<i>Xingxin Tian</i>	2023.04.12
<i>File Number:</i>	CN235DYA 001	<i>Reviewed by:</i>	Yue Yin	<i>Yue Yin</i>	2023.04.12
<i>Model No:</i>	60K-3P-480V,50K-3P-480V,40K-3P-480V,30K-3P-480V	<i>Standard:</i>	UL 1741 CRD issued on March 8, 2019, Subject: Power Control Systems(PCS)		

205 Abnormal tests

Testing date:

Test Method:

205.1 All Power Control Systems shall be tested as described in UL1741 Section 47 and comply with section 47.1.1 and 47.1.2 of UL 1741.

Criteria:

Passing criteria are specified in the "Criteria" column of Table 44.

Results: PASS

See UL 1741 test report for details.

----- End of report -----

Date : 11/29/2023

Portable Solar LLC (dba Sol-Ark)
805 Central Expy S
Allen, TX 75013
USA

Attn: Tom Brennan

Re. : CU US + Canada Certificate

Type of Equipment : (Grid Support Utility Interactive Hybrid Inverter)
Model Designation : See Certificate
Certificate No. : CU 50608067 0001
File No. : CN235DYA 001
Engineer/Contact : Xingxin Tian
Standard(s) : UL 1741:2021
CSA C22.2 No. 107.1-16

Dear Madame or Sir,

The above referenced technical equipment has been tested and was found to be in compliance with the listed test requirement(s). Enclosed, please find the TÜV Rheinland approval document No. CU 50608067 0001. It authorizes you to label the listed product(s) with the TÜV Rheinland Mark identified in the approval document. For compliance, the Test Mark must be on the approved unit.

Your product is subject to regular factory follow-up inspections as well as annual certificate and factory registration fees.

In using the TÜV Rheinland Mark you are obligated to comply with the TÜV Rheinland of North America Service Agreement.

If we can be of any further assistance to you, please do not hesitate to contact us.

Sincerely yours,
Certification Body


Weichun Li

Enclosure

证书的详细信息请登陆www.certipedia.com查询, 或拨打我司客服热线800 999 3668 / 400 883 1300咨询

Certificate



Certificate no.

CU 50608067 01

License Holder:

Portable Solar LLC (dba Sol-Ark)
805 Central Expy S
Allen, TX 75013
USA

Manufacturing Plant:



Test report no.: USA-Tianxin CN235DYA 001

Client Reference: TOM BRENNAN

Tested to: UL 1741:2021
CSA C22.2 No. 107.1-16

Certified Product: (Grid Support Utility Interactive Hybrid Inverter) **License Fee - Units**

Model Designation: 60K-3P-480V [REDACTED] 13

Trademark : Sol-Ark
Other data : See appendix
Special Remarks :
Also evaluated to
UL1741 3rd Edition Supplement SB for grid support functions,
and IEEE 1547-2018 and IEEE1547.1-2020: Normal Operating
Performance Category B; Abnormal Operating Performance III
to the following SRDs:
-Hawaiian Electric SRD V2.0.
Continued on page 02

Appendix: 1, 1-162

13

Licensed Test mark:



Date of Issue
(day/mo/yr)
29/11/2023

Certificate



Certificate no.

CU 50608067 02

License Holder:

Portable Solar LLC (dba Sol-Ark)
805 Central Expy S
Allen, TX 75013
USA

Manufacturing Plant:



Test report no.: USA-Tianxin CN235DYA 001

Client Reference: TOM BRENNAN

Tested to: UL 1741:2021
CSA C22.2 No. 107.1-16

Certified Product: (Grid Support Utility Interactive Hybrid Inverter) **License Fee - Units**

As page 01 continuation

UL 1741 3rd Edition Supplement SB for interoperability functions, and IEEE 1547-2018 and IEEE1547.1-2020: using IEEE 2030.5 protocol.
UL 1699B for photovoltaic DC arc-fault circuit interrupter protection integrated in inverter.
UL 1741 (2nd Edition, April 20, 2010) CRD,
Subject: Power Control Systems (PCS).
UL 1998 Software evaluation was performed for safety related functions.

Appendix: 1, 1-162

Licensed Test mark:



Date of Issue

(day/mo/yr)
29/11/2023