

Verification of Conformity

On the basis of the evaluations undertaken, the sample(s) of the below product have been found to comply with the requirements of the referenced specifications at the time the tests were carried out.

Applicant Name & Address	: Chilicon Power, LLC; 1563 Calle Patricia Pacific Palisades, CA 90272
Product(s) Tested	: Grid Support Interactive Inverter
Ratings and principal characteristics	: See Page 2
Model(s)	: CP-720-60/72/96-208/240-MC4
Brand name	: Chilicon Power
Firmware version	: 3441
Relevant Standard(s)/Specification(s)	: UL 1741 Supplement SA – Grid Support Utility Interactive Inverters and Converters, Sept. 7, 2016 with the source requirements document (SRD) – Electric Rule No.21 Generating Facility Interconnections
Verification Issuing Office Name & Address	: Intertek, 3933 US Route 11, Cortland, NY 13045, USA
Date of Test(s)	: 07/05/2017 to 02/15/2019
Verification/Report Number(s)	: 102862126CRT-008a

NOTE: This verification is part of the full test report(s) and should be read in conjunction with it. Product covered by this report is in compliance with the requirement of NEC 690.12.

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Signature

Name: Ang Zhu
Position: Team Lead
Date: August 19, 2019

Ratings:



4008984



Intertek

Chilicon Power CP-720-60/72/96-208/240-MC4

Designed in California
Manufactured in California

Enclosure NEMA-6
Max. Ambient Op. Temp: 65C
FCC Part 15 Class B
Conforms to UL1741, IEEE1547
Certified to CSA Std C22.2 No. 107.1
& CSA T.I.L. I-35
UL1741SA Rule-21

Grid Support Interactive Inverter

Input Operating Voltage: 47 - 82V
Max DC Input Current: 13.5A
Rated Output Power: 720 VA
Max. Cont. Output Current: 3A (240V)
AC Output Voltage (min/nom/max): 211V 240V 264V
Max. Cont. Output Current: 3.43A (208V)
AC Output Voltage (min/nom/max): 183V 208V 229V
Operating Freq. Hz (min/non/max): 59.3 60 60.5
Output Power Factor: -0.6 to 0.6 (1.0 Default)
Max Units Per Branch: 7 (208V) or 8 (240V)

Manufacturer's Stated Accuracy

Chilicon states the following accuracies according to the requirements of UL1741 SA.

Manufacturer's Stated Accuracy

Description	Value
Manufacturer's stated AC voltage accuracy (%Vac)	2%
Manufacturer's stated DC voltage accuracy (%Vdc)	2%
Manufacturer's stated AC current accuracy (%Aac)	2%
Manufacturer's stated frequency measurement accuracy (Hz or %Hz)	0.05Hz
Manufacturer's stated output power accuracy (W or %W)	5W
Manufacturer's stated reactive power accuracy (% or Var)	50Var
Manufacturer's stated power factor accuracy	0.02
Manufacturer's stated time accuracy (sec)	0.4sec

Test Summary

Chilicon completed the following tests according to UL1741 SA.

Grid Support Function Tested	Source Requirement Document(s)	Test Standard(s) and Section(s)	Completion Date
LOW/HIGH VOLTAGE RIDE-THROUGH	Electric Rule No. 21 Table Hh.1	UL 1741 SA 9	4/9/18
LOW/HIGH FREQUENCY RIDE-THROUGH	Electric Rule No. 21 Table Hh.2	UL 1741 SA10	3/30/18
DYNAMIC VOLT/VAR OPERATIONS	Electric Rule No. 21 Hh.2J	UL 1741 SA 13	4/12/18
RAMP RATES	Electric Rule No. 21 Hh.2k	UL 1741 SA 11	4/9/18
RECONNECT BY "SOFT START"	Electric Rule No. 21 Hh.2k	UL 1741 SA 11	3/30/18
ANTI-ISLANDING PROTECTION - WITH GRID SUPPORT FUNCTIONS ENABLED	Electric Rule No. 21 Hh.1a	UL 1741 SA 8	5/1/18
SPECIFIED POWER FACTOR	Electric Rule No. 21 Hh.2i	UL 1741 SA 12	4/5/18
Frequency-Watt	Electric Rule No. 21 Hh.2l	UL 1741 SA 14	2/5/19
Volt-Watt	Electric Rule No. 21 Hh.2m	UL 1741 SA 15	2/7/19

Grid Support Function Parameters

Chilicon used the following parameters during the testing of the grid support functions according to UL1741 SA.

SA9 Low/High Voltage Ride-Through

Operating Region	Voltage at Point of Interconnection (% of Nominal Voltage)	Operating Mode	Ride Through Until (s)	Default Maximum Trip Time (s)	Range of Adjustability Voltage Trip Magnitude (% of Nominal Voltage)	Range of Adjustability Clearing Time (s)
OV2	$V > 120$ [121]	Mandatory Operation	N/A	0.16	N/A	N/A
OV1	$120 \geq V > 110$ [117]	Momentary Cessation	12	13	110-120	1-13
CO	$110 \geq V > 100$ [107]	Continuous Operation	N/A	N/A	N/A	N/A
CO	$100 > V \geq 88$ [91]	Continuous Operation	N/A	N/A	N/A	N/A
UV1	$88 > V \geq 70$ [73]	Mandatory Operation	20	21	70-88	19-21
UV2	$70 > V \geq 50$ [53]	Mandatory Operation	10	11	50-88	10-11
UV3	$V < 50$	Momentary Cessation	1	2	N/A	0.5-2

SA10 Low High Frequency Ride-Through

Operating Region	Frequency at Point of Interconnection	Operating Mode	Ride Through Until (s)	Default Maximum Trip Time (s)	Range of Adjustability Frequency	Range of Adjustability Clearing Time (s)
OF2	$f > 62$ (F=64)	Permissive Operation	None	0.16	62-64	0.16
OF1	$f > 62$ (F=62.2)	Permissive Operation	None	0.16	62-64	0.16
High Frequency 1 (HF1)	$60.5 < f \leq 62$ [F=60.8]	Mandatory Operation	299	300	60.1-62	N/A
NOF	$F < 60.5$	Continuous Operation	Indefinite	N/A	N/A	N/A
NUF	$f \geq 58.5$	Continuous Operation	Indefinite	N/A	N/A	N/A
Low Frequency 1 (LF1)	$57 < f \leq 58.5$ [F=58]	Mandatory Operation	299	300	57-59.9	N/A
UF1	$F < 57$ (F=56)	Mandatory Operation	None	None	53-57	0.16
UF2	$F < 57$ (F=53)	Permissive Operation	None	None	53-57	0.16

SA11 Normal Ramp Parameters

Description	Value
Output current rating (Aac)	3/3.4
Minimum normal ramp-up rate (%I _{rated} / sec)	1
Maximum normal ramp-up rate (%I _{rated} / sec)	100
Output current range of function (%I _{rated})	0% to 100%
Ramp rate accuracy (%I _{rated} / sec)	NA

SA11 Soft-Start Ramp Parameters

Description	Value
Output current rating (Aac)	3/3.4
Minimum soft-start ramp-up rate (%I _{rated} / sec)	0.1
Maximum soft-start ramp-up rate (%I _{rated} / sec)	100
Output current range of function (%I _{rated})	0% to 100%
Ramp rate accuracy (%I _{rated} / sec)	NA

SA12 Specified Power Factor Parameters

Description	Value
Apparent power rating (VA)	720
Output power rating (W)	720
DC Input voltage range with SPF enabled (Vdc)	47 - 82V
Nominal AC voltage (Vac)	211V/ 240V/ 264V
AC voltage range with SPF enabled (Vac)	102-138
Manufacturer's stated AC voltage accuracy (%Vac)	2%
Manufacturer's stated DC voltage accuracy (%Vdc)	2%
Active power range of function (W)	50-740
Manufacturer's stated Power Factor accuracy	0.2
Power factor settling time (sec)	30
Minimum Inductive (under excited) Power Factor	-0.6
Minimum Capacitive (overexcited) Power Factor	0.6

SA13 Volt/VAR Parameters

Description	Value
Apparent power rating (VA)	720
Output power rating (W)	720
EUT Input voltage range with Q(V) function enabled (Vdc)	75-85
Nominal AC EPS voltage (V)	120 L-N & 120V L-L
AC EPS voltage range with function enabled (Vac)	102-138
Reactive Power Accuracy (Var)	50
Max rated reactive Power (capacitive, overexcited) (VAr)	-250
Max rated reactive Power (inductive, underexcited) (VAr)	250
Maximum slope (VAr/V)	62.5
Deadband Range (Vac)	207-209 L-L
Settling Time (sec)	30 secs

SA14 Frequency-Watt (FW)

Description	Value
Output power rating (W)	720
AC frequency range with function enabled (Hz) – [fmin, fmax]	60.036, 63.899
Manufacturer's stated AC frequency measurement accuracy (Hz or %Hz) – MSAHz	0.01 Hz
Manufacturer's stated P(f) accuracy (W or %W) – MSAP(f)	30W
Settling Time (s) – ts	10 seconds
M Adjustment range of the start of frequency droop (Hz) – [fstart_min, fstart_max]	60.036Hz, 61.524Hz
Maximum slope of frequency droop (%Prated/Hz) – KPower-Freq_Max	720W/(62.036 – 60.036)
Minimum slope of frequency droop (%Prated/Hz) - KPower-Freq_Min	720W/(63.899 – 61.524)
Slope of the active power response to changes in frequency - KPower_Freq	720W/(63.899 - 60.036)

SA15 Volt-Watt (VW)

Description	Value
Output Power Rating (W) – Prated	720
AC voltage range with function enabled (V) – [Vmin, Vmax]	Vmin = 230V Vmax = 276V (240V mode); Vmin = 200V Vmax = 239 (208V mode)
Nominal AC voltage (V) – Vnom	240V or 208V
AC voltage accuracy (V or %V) – MSAV	1.5%
Output Power accuracy (W or %W) – MSAwatts	30Watts
Accuracy of time – MSAt	10 seconds
Settling Time (s) – ts	20 seconds
Adjustment range of the start of active power reduction (V) – [Vstart_min, Vstart_max]	Vstart_min = 1.02*Vnom; Vstart_max = 1.06*Vnom
Adjustment range of the stop of the curtailment function (V) – [Vstop_min, Vstop_max]	Vstop_min = 1.06*Vnom; Vstop_max = 1.10*Vnom
Maximum slope of active power reduction (%Prated/V) – KPower-Volt_Max	10.4% / Volt (25% power reduction per 1% increase in voltage)
Minimum slope of active power reduction (%Prated/V) - KPower-Volt_Min	10.4% / Volt (25% power reduction per 1% increase in voltage)
Range of adjustment of a delay before return to normal operation (s) – [treturn_min, treturn_max]	No adjustable delay before return
Adjustment range of the rate of return to normal operation (%Prated/Sec) – [KPower_Rate_Min, KPower_Rate_Max]	No adjustment of rate of return to normal operation
Use of hysteresis in the Volt-Watt function	No hysteresis in Volt-Watt function
Slope of the active power response to changes in voltage - KPower_Volt	Slope of active power response equals 10.4% Power / Volt
Active power rate of return to normal operation - KPower_Rate	Rate of return to normal operation equals 10.4% Power / Volt

Reactive Power Priority (RPP)

Question #	Description	Direction for NRTL
1	Is the product capable of providing the required reactive power for the volt/var curve function at all active power levels without derating active power? (Y or N) (Active Power = 20 – 100%)	A "Yes" response meets the intent of the Resolution and Question #2 and #3 do not need to be answered
2	Was the volt/var curve tested with reactive power priority enabled? (Y or N)	A "Yes" response meets the requirements of the Resolution and Question #1 does not need to be answered
3	Was the volt/var curve tested with active power priority enabled? (Y, N, or N/A)	An "N/A" response indicates active power priority is not an option for the inverter. A "Yes" indicates that the inverter must be programmed with the correct profile in the final installation

Manufacturer	Inverter Model	Question #1 (Y/N)	Question #2 (Y/N)	Question #3 (Y/N)
Chilicon Power LLC	CP-720-60/72/96-208/240-MC4	Y	N	Y