

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

General description of the products	Grid-connected PV Inverter
Certification mark to be applied.....	(US, Canada)
Manufacturer (name and address).....	EAST Group Co., Ltd. No.6 Northern Industry Road, Songshan Lake Sci.& Tech. industrial zone, Dongguan City, Guangdong province, China
Factory (name and address).....	As above
Electrical Data (Input).....	90-600Vdc, Max. 11A
Electrical Data (output)	See following pages.
Software/Firmware to be tested within the inverter/converter.....	MDSP: V014, MCU: V014
Grid Tied.....	Yes
Voltage and Frequency Accuracy.....	Voltage tolerance < 1%Vn, Frequency tolerance <0.1%Fn
Built-in DC side GFDI (ground fault detector/interrupter).....	No
Built-in DC side Arc-fault Detector/Interrupter.....	No
Contains RCMD (Residual Current Monitor Device).....	No
Islanding detection means, active way.....	Yes
Built in isolating transformer.....	No
External Isolating Transformer required	No
Installation mode	Wall mounted
Rated ambient temperature range.....	Operation: 0-40C
Enclosure index / type	IP 65
Mass of equipment (lbs/kg)	See following pages
Overall size (L x W x H).....	See following pages

Product Description

The equipment is single phase utility-interactive type PV inverter which will be installed and connected to the grid network after installation.

It contains filters for smoothing the output voltage and for EMC, switching and control circuits. Electronic circuits has be mounted on a number of PCBs interconnected by appropriate connectors and wires. Power board including electronics components has be mounted on the heat sink to earthing by metal screw and spring washer.

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There are included a RS485 and two RJ45 communication ports which are connected to the monitors to monitor the status of the inverter by proprietary software.

The PV input combine with 1 or 2 string MPPT tracer and PV input terminals. AC output direct connected to grid and the protective earthing are provided by dedicated earthing terminals. Grid is protected combination with a two series of relays as redundant build for ensure the inverter can independent disconnected from grid while a relay was fault.

During fault condition defined in this standard, after the DSP receives the abnormal signal from the relevant protective detection circuit, the relays will operate to disconnect the PV inverter line and neutral from grid automatically.

The master DSP and slaver DSP has capacity independent disconnected from grid, when any grid fault had happened.

operation conditions.

Block Diagram:

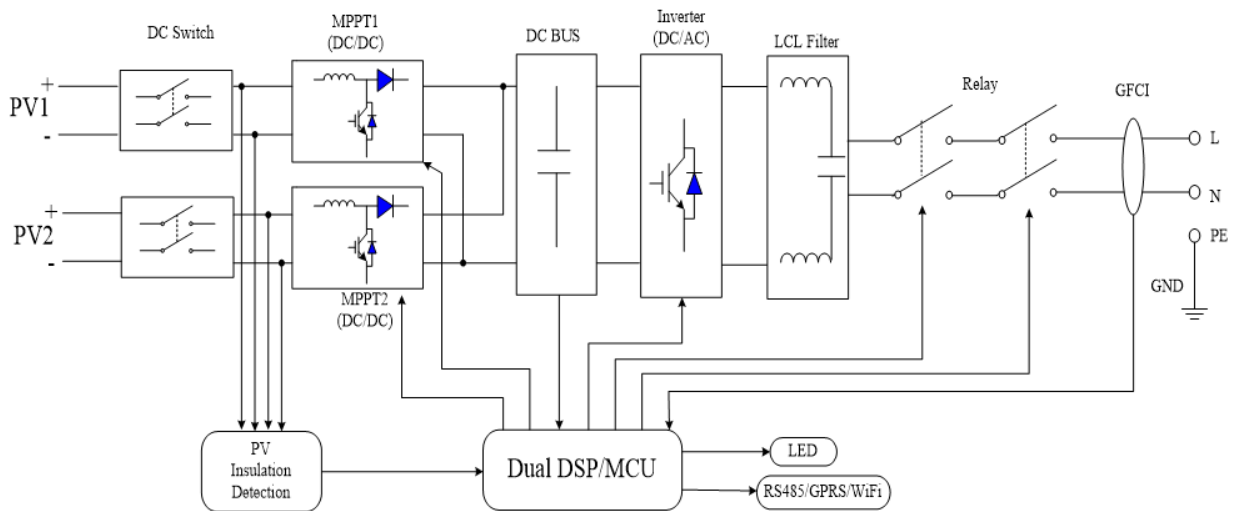


Figure 1. Block diagram

Model Difference:

The models EA2KSI, EA2.5KSI, EA3KSI are identical to hardware and software, except the output power are different has be adjusted by software.

The Models EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI and EA7KSI are same as the hardware and software, except the output power are different has be adjusted by software and internal cooling fan within EA6KSI.

The model EA7KSI is same as EA6KSI, except the components are different at below table 1.

The models EA2KSI, EA2.5KSI, EA3KSI and models EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI,

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EA7KSI are same as software and hardware, excepted the component are different with below table 1:

Model Components	EA2KSI, EA2.5KSI, EA3KSI	EA3KSI-D, EA3.68KSI, EA4KSI EA4.6KSI, EA5KSI, EA6KSI	EA7KSI
Max. input current	11A	11Ax2	
Output current sensor	HLSR 20-P/LEM	HLSR 32-P/LEM	
MPPT string	1	2	
Boost induct	580uH(11A)*1	580uH(11A)*2	
BUS capacitor	1200uF(315V)*4	1200uF(315V)*6	1500uF(315V)*6
IGBT/MOSFET	IKW40N65H5*5, IKW40N120H3*2	IKW40N65H5*6, IKW40N120H3*2	IKW50N65H5*6, NGTB50N120FL2WG* 2
Power board size	262mm*216mm	322mm*231.5mm	
Overall size (WxDxH) [mm]	308x116.5x353	370x126.5x420	

Model list:

MODEL LIST 1		EA2KSI	EA2.5KSI	EA3KSI	EA3KSI-D	EA7KSI
INPUT(PV)	V _{MAX} PV [Vdc]	600				
	I _{SC} PV [A]	12			2x12	
	MPP Voltage Range V _{MPP} [Vdc]	90-550				
	Max. PV Input Current [A]	11			11x2	
	MPP Full Power Voltage Range [Vdc]	200-480	250-480	300-480	150-480	350-480
	Input PV Operating Voltage Range [Vdc]	90-600				
	Start PV Voltage [Vdc]	120				
	Backfeed Current [A]	0				
	Overvoltage Category (OVC)	OVC II				
GRID CONNECTI	Rated Output Voltage U _r [Vac]	220/240				
	Normal Operating Voltage Range U _n [Vac]	180-280				
	Rated Output Frequency F _{NETZ}	60				

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	[Hz]					
	Normal Operating Frequency Range Fn [Hz]	55 - 65				
	Rated Output Power P _E [W]	2000	2500	3000	3000	7000
	Max. Output Current I _{max} [A]	9.1/8.3	11.4/10.4	13.6/12.5	13.6/12.5	31.8/29.2
	Power Factor cosφ [λ]	0.8 cap-0.8ind adjustable (default: 1)				
	Efficiency max. η _{max} [%]	97.8				
	Night Power Consumption [W]	< 0.5				
	THD [V / I] (100% full power)	< 3%				
	Acoustic Noise [dB]	< 40				
	Overvoltage Category (OVC)	OVC III				
SYSTEM	Type of inverter	Non-transformer				
	Firmware [DSP/MCU]	MDSP: V014, MCU: V014				
	Separated by	Transformerless				
	MPPT strings	1		2		
	MPPT tracking	1		2		
	Protective Class	1				
	Enclosure Protection (IP)	IP65				
	Operating Temperature Range [°C]	-25-60 (> 45 °C derating)				
	Pollution degree (PD)	PD3 for outside, PD2 for inside				
	Altitude [m]	4000 (> 2000 derating power)				
	Weight [kg]	< 9			< 11.5	
	Size (WxDxH) [mm]	308x116.5x353			370x126.5x420	
Note:						

MODEL LIST 2		EA3.68KSI	EA4KSI	EA4.6KSI	EA5KSI	EA6KSI
INPUT(PV)	V _{MAX} PV [Vdc]	600				
	I _{SC} PV [A]	2x12				
	MPP Voltage Range V _{MPP} [Vdc]	90-550				
	Max. PV Input Current [A]	11x2				

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	MPP Full Power Voltage Range [Vdc]	200-480	230-480	250-480	300-480	
	Input PV Operating Voltage Range [Vdc]	90-600				
	Start PV Voltage [Vdc]	120				
	Backfeed Current [A]	0				
	Overvoltage Category (OVC)	OVC II				
GRID CONNECTION	Rated Output Voltage U_r [Vac]	220/240				
	Normal Operating Voltage Range U_n [Vac]	180-280				
	Rated Output Frequency F_{NETZ} [Hz]	60				
	Normal Operating Frequency Range F_n [Hz]	55 - 65				
	Rated Output Power P_E [W]	3680	4000	4600	5000	6000
	Max. Output Current I_{max} [A]	16.7/15.3	18.2/16.7	20.9/19.2	22.7/20.8	27.3/25
	Power Factor $\cos\phi$ [λ]	0.8 cap-0.8ind adjustable (default: 1)				
	Efficiency max. η_{max} [%]	97.8				
	Night Power Consumption [W]	< 0.5				
	THD [V / I] (100% full power)	< 3%				
	Acoustic Noise [dB]	< 40				
	Overvoltage Category (OVC)	OVC III				
SYSTEM	Type of inverter	Non-transformer				
	Firmware [DSP/MCU]	MDSP: V014, MCU: V014				
	Separated by	Transformerless				
	MPPT strings	2				
	MPPT tracking	2				
	Protective Class	1				
	Enclosure Protection (IP)	IP65				
	Operating Temperature Range [°C]	-25-60				
	Pollution degree (PD)	PD3 for outside, PD2 for inside				

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	Altitude [m]	4000 (> 2000 derating power)
	Weight [kg]	< 11.5
	Size (WxDxH) [mm]	370x126.5x420
Note:		

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Test Item:

Clause	Description	Applicable?	Remarks / Comments
42	Maximum – Voltage Measurements	Yes	--
43	Temperature – (at max. ambient)	Yes	--
44	Dielectric Voltage-Withstand Test	Yes	--
45.2	Output ratings	Yes	--
45.3	Input Range	Yes	--
45.4	Harmonic distortion	No	--
47.2	Abnormal Tests – Output overload test	Yes	--
47.3	Abnormal Tests – Short-circuit test	Yes	--
47.4	Abnormal Tests – DC input miswiring test	Yes	--
47.5	Abnormal Tests – Ventilation test (including liquid cooling system per Clause 67.1 and 67.2 of UL 508C)	No	--
47.6	Abnormal Tests – Component Short- and open- circuit	Yes	--
47.7	Abnormal Tests – Load transfer test	Yes	--
47.8	Utility Compatibility – Loss of Control Circuit	Yes	--
48	Grounding Impedance Test	Yes	--
49	Overcurrent Protection Calibration Test	Yes	--
50	Strain Relief Test	No	--
51	Reduced Spacing on Printed Wiring Boards Tests	No	--
52	Bonding Conductor Test	No	--
53	Voltage Surge Test	No	--
54	Calibration Test	No	
55	Overvoltage Test	No	
56	Current Withstand Test	No	

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57	Capacitor Voltage Determination Test	Yes	--
58	Stability	No	--
59	Static Load	Yes	--
60	Compression Test	No	--
61	Rain Test and Sprinkler Tests	No	--

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Test Equipment List:

No.	Equipment Description	Serial No.	Calibration Date	Calibration Due
1	Power analyze	PA6000H	2019-12-13	2020-12-12
2	Programmable AC source	61512	2019-12-13	2020-12-12
3	Data log	34970A	2019-12-05	2020-12-04
4	Oscilloscope	DLM2024	2019-10-29	2020-10-28
5	Voltage probe	DP6150A	2019-12-05	2020-12-04
6	Temperature chamber	YGDSJ800-40	2019-12-05	2020-12-04
7	Programmable DC source	6215H-1000S	2019-12-13	2020-12-12
8	Safety tester	CS9933X	2019-10-29	2020-10-28
9	Current sensor probe	L1000S	2019-12-09	2020-12-08

NOTE: (1) All test/measurement equipment shall be calibrated before use (before the due date).

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42: Maximum-Voltage Measurements

Testing date: 2020-07-06

Method:

- Connect the unit in normal rating conditions of Input and Output (max. voltage);
- Circuit voltages between live parts and live parts to grounding were monitored by oscilloscope or multimeter;
- The voltage monitored with switching devices need to be in their least favorable position so as to draw the most voltage drop.

Results: Pass

The measured values are to be used for:

- a) Calculation of the dielectric voltage-withstand test potentials, and
- b) Determination of the min. spacings.

FROM	To	Vp-p	Vrms
Input DC	Grounding	350V	302.70V
Input DC "+"	Input DC "-"	140V	555.81V
AC Filter Capacitor	Grounding	420V	130.25V
Output L1	Grounding	400V	129.96V
Output L1	Output N	710V	242.93
T1 P1	P3	840V	159.04V
T1 P4	P6	167V	27.85V
T1 P8	P9	136V	19.53V
T1 P10	P12	143V	23.32V
T1 P13	P14	220V	35.50V
T1 P15	P16	212V	35.47V
T1 P17	P18	219V	35.32V

Note: Working voltage to ground cannot be less than the system voltage or the AC voltage as applicable

Equipment used: See equipment list.

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43: Temperature Test (max. ambient)

Testing date: 2020-07-10

Test Method:

- Set the input voltage and current to the rated values;
- Set the output AC line to the rated voltage and rated current/power;
- Change the loads type to meet the rated power factor (if other than 1.0);
- The testing is going to be performed in a chamber with the max. rated ambient temperature (if more than 40C);
- For a unit marked for operation at a higher ambient at reduced output power, the test is to also be performed at the specified higher ambient and the associated reduced output power.

Maximum allowed temperatures are defined in table 43.2.

Results: Pass

(see table of following page - temperature data sheet)

Equipment used: See equipment list.

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Temperature Data Sheet:

Measuring Location	TC. #	350Vdc, 45degree	350Vdc, 60degree	480Vdc, 45degree	480Vdc, 60degree	Overload	Mam. Allowed Temperature
Ambient	1	45.9	60.1	45.9	60.4	29.5	--
PV input terminal	2	53.2	65.7	51.4	65.5	54.5	85
AC output terminal	3	54.5	66.5	53.3	67.1	46.8	85
DC breaker holder	4	53.4	66.2	51.8	66.0	52.4	80
DC breaker body	5	62.9	73.9	59.7	73.1	65.4	75
Heat-sink	6	68.1	78.9	62.9	76.5	69.7	90
Top panel	7	56.5	68.9	55.5	69.6	60.0	70
Screen	8	53.2	64.8	51.7	65.7	52.5	80
Cover	9	56.3	68.4	54.2	68.0	57.3	70
PV wire	10	65.6	75.4	61.3	74.4	72.2	105
Comm. Coil H5	11	64.6	75.2	59.6	72.6	65.7	110
PV filter capacitor	12	63.9	74.7	59.7	72.9	66.2	105
Current sensor (CT1)	13	67.2	77.9	61.8	74.6	70.6	85
BUS capacitor	14	69.2	78.8	64.3	76.3	73.2	105
BUS induce lead wire	15	68.1	78.2	62.7	76.1	72.2	105
BUS induce coil	16	74.2	82.9	64.7	74.2	72.8	110
Inverter induce 1 lead wire	17	70.5	80.3	66.9	80.1	78.9	110
Inverter induce 2 lead wire	18	69.6	79.3	67.2	80.0	78.2	110
Inverter induce 1 coil	19	92.2	97.8	92.5	104.3	122.0	110
Inverter induce 2 coil	20	91.1	96.8	91.5	103.2	119.8	110
Current sensor (CT3)	21	74.8	83.8	71.5	84.4	85.9	85
Capacitor C100	22	69.6	79.4	67.2	80.5	82.0	105
Relay enclosure	23	84.9	91.4	79.0	90.8	104.4	110
Relay around	24	72.1	81.4	67.0	80.0	77.6	85
AC filter capacitor	25	76.1	84.0	71.5	84.0	85.7	110
AC comm. induce	26	90.5	95.0	84.5	95.5	108.6	110
Capacitor C10	27	79.5	86.7	74.8	86.9	92.0	105
AC output wire	28	72.7	81.4	69.0	81.7	81.0	105
Transformer Coil	29	73.3	83.4	69.2	82.0	79.1	110
Transformer bobbin	30	75.9	85.9	72.4	84.9	81.7	110
Transformer core	31	75.8	85.9	71.8	84.9	81.7	110
DSP U8	32	79.3	89.5	74.8	88.2	84.4	105
DSP U9	33	73.3	83.2	69.1	82.2	79.0	105
Opto-coupler U28	34	69.6	79.6	65.9	79.0	75.3	85
PCB near Q1	35	84.2	91.1	77.4	90.3	98.9	130
PCB near Q3	36	88.6	96.1	88.9	100.9	115.0	130
PCB near Q7	37	75.3	85.1	61.6	75.0	71.8	130

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44: Dielectric-voltage Withstand Test

Testing date: 2020-07-08

Test Method:

- **As soon as** the temperature test is completed, the dielectric-voltage withstand test is run while the unit is still in hot condition to verify the isolation designs;
- Before applying the hi-voltage to the testing points, verify that the disconnect switch and other components, such as surge protectors, which are need to be opened are disconnected;
- **Circuit breaker, Contactor, and Switches need to be bridged before the tests.**
- Set the Hi-Pot tester to the calculated value and verify that this potential is held for one minute.

The unit shall withstand for 1 minute without breakdown.

Results: Pass

Test Location	Applied Voltage	Pass / Fail
Input circuits – Frame/Enclosure (grounding)	2614Vdc	Pass
Output circuits – Frame/Enclosure (grounding)	1480Vac	Pass
Input circuits – output circuits	2614Vdc	Pass
Control circuits – Frame/Enclosure (grounding)	2614Vdc	Pass
Input circuit – communication port	2614Vdc	Pass
<p>Note: U is the measured max. working voltage from clause 42</p>		

Equipment used: See equipment list.

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45.2: Output Ratings

Testing date: 2020-07-10

Test Method:

- Stand alone and/or Utility interactive tests per UL 1741 clause 45.2.1 and 45.2.3);
- The tests shall be conducted at the nominal and the maximum ambient. If the power level is de-rated at higher temperatures, this shall be reflected in the test results too.

(1) Stand-alone: The output voltage of the unit shall not exceed the rated voltage by +/- 10%

(2) Utility-interactive: the unit shall be capable of operating at rated output current +/- 10% (limited to this +/-10% too)

Results: Pass

Model: EA2KSI

Percent of Output Load	Input Voltage(V)	Output Current(A)	Input Voltage (V)	Output Current(A)
90%	90.22	10.57	216.11	4.11
90%	119.69	10.82	215.75	5.62
90%	199.59	10.39	216.42	9.07
90%	359.81	5.73	216.14	9.39
90%	479.43	4.23	216.13	9.31
90%	548.48	2.17	216.12	5.37
90%	599.57	0.04	215.25	0.40
100%	89.61	10.91	239.44	3.99
100%	119.69	10.91	239.63	5.13
100%	199.64	10.43	240.35	8.18
100%	360.52	5.63	239.91	8.31
100%	479.42	4.23	239.98	8.44
100%	549.58	2.56	239.66	5.46
100%	599.55	0.04	239.19	0.40
110%	89.61	10.91	263.26	3.69
110%	119.70	11.02	263.55	4.74
110%	199.84	10.44	263.75	7.46
110%	360.52	5.61	263.82	7.54
110%	479.38	4.23	263.84	7.72

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<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

110%	549.55	2.51	263.35	4.89
110%	599.57	0.04	263.15	0.40

Model: EA2.5KSI

Percent of Output Load	Input Voltage(V)	Output Current(A)	Input Voltage (V)	Output Current(A)
90%	90.25	9.94	216.11	3.93
90%	120.23	10.81	216.22	5.73
90%	251.53	9.92	216.61	11.14
90%	363.69	6.86	216.62	11.25
90%	484.76	5.14	216.62	11.21
90%	550.97	3.91	216.32	8.35
90%	599.52	0.04	215.19	0.40
100%	90.21	10.02	240.06	3.51
100%	119.64	10.97	239.61	5.17
100%	249.64	10.33	240.46	10.23
100%	360.48	7.14	240.16	10.49
100%	479.39	5.32	240.16	10.51
100%	549.46	3.95	239.98	8.74
100%	599.53	0.04	239.16	0.40
110%	89.56	10.92	263.26	3.69
110%	119.65	10.91	263.42	4.69
110%	249.51	10.39	263.89	9.32
110%	360.52	7.15	263.95	9.57
110%	479.49	5.34	264.01	9.64
110%	549.52	3.88	263.83	7.82
110%	599.56	0.04	263.14	0.40

Model: EA3KSI

Percent of Output Load	Input Voltage(V)	Output Current(A)	Input Voltage (V)	Output Current(A)
90%	90.17	10.58	216.07	4.11
90%	119.65	10.89	215.53	5.66

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

90%	300.22	10.30	216.70	13.69
90%	359.74	8.38	216.34	13.64
90%	479.39	6.34	216.36	13.79
90%	549.93	3.98	216.33	8.51
90%	599.51	0.04	215.06	0.40
100%	89.69	10.96	239.29	3.95
100%	119.70	10.85	239.51	5.10
100%	298.25	10.26	240.22	12.28
100%	357.96	8.37	240.24	12.17
100%	479.46	6.29	240.09	12.39
100%	549.96	3.91	240.30	7.56
100%	599.53	0.04	238.96	0.45
110%	89.63	10.96	263.30	3.65
110%	119.65	10.99	263.65	4.72
110%	300.26	10.42	264.02	11.36
110%	360.56	8.49	264.35	11.52
110%	479.48	6.41	264.35	11.52
110%	549.98	3.84	263.73	6.79
110%	599.45	0.01	263.14	0.40

Model: EA3KSI-D

Percent of Output Load	Input Voltage(V)	Output Current(A)	Input Voltage (V)	Output Current(A)
100%	89.47	21.75	239.92	7.66
100%	119.40	21.88	240.18	10.24
100%	149.77	20..35	240.67	12.09
100%	360.35	8.45	240.40	12.36
100%	479.41	6.34	240.40	12.46
100%	549.55	3.72	239.93	7.66
100%	599.59	0.05	239.24	0.45
90%	89.49	21.75	216.08	8.48
90%	119.40	21.89	216.36	11.35

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

90%	149.41	20.00	216.51	12.92
90%	360.56	8.02	216.52	13.14
90%	480.54	6.05	216.53	8.47
90%	550.57	3.73	216.08	8.47
90%	599.62	0.05	215.30	0.41
110%	89.49	21.75	263.81	7.00
110%	119.41	21.88	264.04	9.33
110%	147.55	20.46	264.18	10.74
110%	360.33	8.52	264.23	11.26
110%	479.45	6.28	264.23	11.28
110%	549.58	3.65	263.79	6.90
110%	599.60	0.05	263.18	0.49

Model: EA3.68KSI

Percent of Output Load	Input Voltage(V)	Output Current(A)	Input Voltage (V)	Output Current(A)
90%	92.34	21.28	216.42	8.57
90%	121.63	21.31	216.60	11.36
90%	199.33	18.55	216.96	16.34
90%	362.71	10.19	216.96	16.59
90%	482.67	7.66	216.94	16.57
90%	550.52	4.85	216.57	10.84
90%	599.96	0.03	215.78	0.40
100%	92.37	21.27	240.31	7.71
100%	121.75	21.29	240.50	10.24
100%	199.62	18.50	240.75	14.75
100%	360.31	10.24	240.71	14.92
100%	482.28	7.65	240.75	14.97
100%	550.55	4, 97	240.46	9.67
100%	599.95	0.03	239.78	0.40
110%	92.40	21.26	263.75	7.03
110%	121.90	21.26	263.92	9.33
110%	199.47	18.56	264.70	13.43

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

110%	358.63	10.31	264.21	13.58
110%	482.17	7.67	264.20	13.69
110%	550.58	4.73	263.87	8.71
110%	600.94	0.04	263.75	0.40

Model: EA4KSI

Percent of Output Load	Input Voltage(V)	Output Current(A)	Input Voltage (V)	Output Current(A)
90%	91.32	21.85	216.33	8.66
90%	120.16	21.60	216.54	11.36
90%	199.25	20.28	217.03	17.85
90%	361.38	11.27	217.05	18.27
90%	480.63	8.41	217.03	18.10
90%	553.29	5.81	216.60	12.94
90%	601.02	0.01	215.69	0.40
100%	91.37	21.84	240.26	7.80
100%	122.43	21.22	240.44	10.24
100%	201.63	20.19	240.83	16.12
100%	364.49	11.09	240.84	16.30
100%	481.96	8.39	240.86	16.37
100%	551.59	5.65	240.47	11.33
100%	601.31	0.01	239.69	0.40
110%	92.49	21.24	263.23	7.04
110%	122.04	21.24	264.38	9.32
110%	199.47	20.56	264.30	14.89
110%	363.84	11.25	264.32	15.08
110%	482.25	8.39	264.31	14.99
110%	550.21	5.60	263.95	10.24
110%	599.94	0.01	263.67	0.40

Model: EA4.6KSI

Percent of Output Load	Input Voltage(V)	Output Current(A)	Input Voltage (V)	Output Current(A)
90%	90.80	21.78	216.33	8.57

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

90%	120.09	21.61	216.55	11.34
90%	229.16	20.46	217.26	20.69
90%	360.96	13.01	217.34	20.90
90%	480.03	9.78	217.34	20.90
90%	553.27	7.21	216.81	15.74
90%	601.02	0.01	215.68	0.40
100%	91.82	21.73	240.23	7.80
100%	120.37	21.58	240.38	10.25
100%	229.37	20.47	241.03	18.70
100%	363.57	12.91	241.05	18.86
100%	479.04	9.80	241.06	18.94
100%	551.19	8.15	240.84	15.97
100%	600.31	0.01	239.68	0.40
110%	92.47	21.24	263.21	7.04
110%	122.05	21.23	264.38	9.32
110%	231.00	20.64	264.97	17.28
110%	361.18	13.00	264.96	17.23
110%	481.71	9.64	264.95	17.13
110%	549.60	6.94	264.63	12.54
110%	600.48	0.01	263.69	0.40

Model: EA5KSI

Percent of Output Load	Input Voltage(V)	Output Current(A)	Input Voltage (V)	Output Current(A)
90%	91.98	21.67	216.34	8.65
90%	120.09	21.62	216.55	11.35
90%	249.75	20.38	217.33	22.49
90%	361.82	13.97	217.37	22.51
90%	478.69	10.64	217.37	22.67
90%	549.03	8.33	217.03	18.11
90%	600.85	0.01	215.71	0.40
100%	92.23	21.69	240.26	7.79
100%	120.37	21.62	240.42	10.24

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Biflee</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

100%	249.54	20.42	241.15	20.31
100%	362.95	14.04	241.15	20.45
100%	480.57	10.61	241.18	20.53
100%	552.52	8.01	240.81	15.84
100%	600.31	0.01	239.67	0.40
110%	92.79	21.12	263.20	7.03
110%	122.05	21.23	264.40	9.32
110%	249.16	20.48	265.12	18.53
110%	362.95	14.04	265.13	18.68
110%	481.69	9.70	265.04	17.23
110%	549.20	7.84	264.76	14.08
110%	599.94	0.03	263.71	0.40

Model: EA6KSI

Percent of Output Load	Input Voltage(V)	Output Current(A)	Input Voltage (V)	Output Current(A)
90%	90.96	21.75	216.35	8.57
90%	119.95	21.64	216.54	11.35
90%	301.23	20.35	217.76	26.94
90%	367.31	16.59	217.73	27.00
90%	480.01	12.81	217.80	27.16
90%	548.27	10.86	217.43	22.91
90%	600.83	0.01	215.72	0.41
100%	91.84	21.80	240.26	7.80
100%	120.38	21.63	240.42	10.25
100%	300.31	20.48	241.54	24.47
100%	364.36	16.87	241.52	24.55
100%	478.97	12.85	241.54	24.67
100%	551.10	10.31	241.21	20.13
100%	600.30	0.01	239.67	0.46
110%	93.17	21.26	263.21	7.11
110%	122.81	21.08	264.36	9.32

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

110%	297.55	19.27	265.19	20.86
110%	366.32	15.43	265.18	20.66
110%	479.36	10.45	265.03	18.43
110%	548.10	10.09	264.99	17.94
110%	599.96	0.04	263.68	0.51

Model: EA7KSI

Percent of Output Load	Input Voltage(V)	Output Current(A)	Input Voltage (V)	Output Current(A)
90%	92.73	21.47	216.74	8.63
90%	120.77	21.49	216.93	11.35
90%	352.89	20.04	218.29	31.36
90%	361.76	19.57	218.31	31.38
90%	482.59	14.66	218.32	31.32
90%	551.30	12.09	218.17	28.29
90%	600.33	0.04	216.12	0.04
100%	93.16	21.34	240.68	7.78
100%	121.17	21.41	240.86	10.23
100%	352.92	20.05	242.12	28.24
100%	363.24	19.48	242.15	28.27
100%	482.31	14.67	242.13	28.42
100%	551.76	11.97	241.95	25.27
100%	600.31	0.04	240.13	0.04
110%	93.23	21.34	264.65	7.10
110%	121.73	21.32	264.81	9.33
110%	352.40	20.08	266.07	25.80
110%	363.07	19.49	266.02	25.83
110%	482.61	14.66	266.07	26.00
110%	551.88	11.87	265.78	22.80
110%	600.31	0.04	264.15	0.04

Equipment used: See equipment list.

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

45.3: Input Range

Testing date: 2020-07-11

Test Method:

- Grid tied and/or stand-alone inverter/converter input range measurement per UL 1741 clause 45.3;
- Inverter/converter was loaded to its rated load with the minimum and maximum input voltage supplied;
- The load for a [stand-alone inverter or converter](#) is to include both resistance and inductance with a power factor of 0.5

Results: Pass

See cl. 45.2: Output Ratings table.

Equipment used: See equipment list.

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

47 - Abnormal Tests

Test Method:

The unit is to be placed on a softwood surface covered with white tissue paper. A single layer of cheese cloth was draped loosely over the entire enclosure.

The input and output circuits are to be connected as in normal working condition, Fusing and protective devices for the unit shall be connected in accordance with the instructions provided with the unit and in accordance with the marking on the unit.

Each test is to be continued until ultimate results and there is no further change as a result of the test condition. When an automatically reset protector functions during a test, the test is to be continued for 7 hours

During and after the tests, the product shall be monitored without any of the following:

- (a) - Emission of flame, molten metal, glowing or flaming particles through any opening.
- (b) - Charring, glowing or flaming of the supporting surface
- (c) - Ignition of the enclosure
- (d) - Creation of any opening in the enclosure that results in accessibility of live parts
- (e) - Opening of the 3 amp fuse monitor

Following each test (except after the dc input miswiring test), the unit shall comply with Dielectric Voltage-Withstand Test between:

- (1) AC power circuits to DC power circuit, except for non-isolated units;
- (2) AC and DC power circuits to accessible dead metal parts;
- (3) After the short-circuit test (only), Primary to Secondary windings of isolating transformer;

Note: More than one abnormal test is able to be conducted on a unit, and the dielectric voltage-withstand test is able to be conducted after completion of all abnormal tests.

Detailed tests are listed in the following pages.

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

47.2 - Output Overload Test

Testing date: 2020-08-07

Test Method:

After thermal stabilization is reached during the conditions described in Temperature, section 43, do the following:

(1) Utility-interactive inverter:

The input is to be connected to a source that delivers a min. of 2 times the rated input current. The utility voltage is to be adjusted to provide for the max. output current (by just a little above the low line trip limit).

The unit is to remain in the loaded condition until it shuts down, reaches thermal stabilization or has been operated for seven hours, whichever occurs first.

Record the temperature data and the input and output currents and voltage, etc.

(2) Stand-alone inverter:

Increase the load in increment of 10% of the maximum output ratings of the unit and held for ½ hour at each increment until: (a) There is no further change as a result of the test condition; or (b) The unit shut down

Record the temperature data and the input and output currents and voltage, etc.

Note: IF during the tests, any Firmware or Software is controlling the temperature limits of the inverter, this function should be disabled for these tests.

Results: Pass

Test Condition	Temperature	Input Current (A)	Output Current (A)	Output Voltage (V)	Comments
Utility Interactive	(see test data)	19.8	35.7	190.9	Max. output current
<p>Note: Keep recording the temperature data sheet as that of the test of clause 43, and take it as a kind of reference</p>					

Equipment used: See equipment list.

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

47.3 - Short Circuit Test

Testing date: 2020-08-06

Test Method:

- The dc battery circuit and the ac output circuit of a unit are to be shorted separately. The shorting is to be from line to neutral (when applicable) and from line to line.
- When shorting the unit, the source (input or output/utility) is to be disconnected by a relay or similar device.
- The maximum inverter output fault current (**peak and RMS**) and short circuit current **duration** are to be measured by scope immediately after the short is applied.
- The short-circuit test is to be performed for 4 times, so that the short occurs in different portions of the line cycle.
- For a unit with a 3-phase output, the test is to be performed with shorts applied from phase to phase and from phase to neutral or ground.
- For a unit intended for use with external isolation transformers, the short is to be applied before and after the external transformer.
- The location of the applied short in the test circuit shall not direct the output short-circuit test current through the 3-ampere ground fuse, which need to be verified after each short applied.

Note: The AC output Short-circuit tests performed only on the grid connected case even if it also works in stand-alone, but during the test, the unit should be tested as if it is working at stand-alone condition: the grid is disconnected and the inverter is not shut down at the moment of shorting-circuit.

Results: Pass

(1) AC output circuit – Shorting:

Tested between:	Measured Current (A, p-p)				Comments	Results
	1	2	3	4		
L1 – N/G	383	338	422	385	The inverter has be shut down during testing, without damaged after testing.	P
(Scope image)	50#	51#	52#	53#		
The max. output fault current = 422Ap-p / 74.1Arms; Duration = 11.5mS						

Equipment used: See equipment list.

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

47.4 – DC Input Miswiring Test

Testing date: 2020-08-05

Test Method:

The dc input of the unit is to be connected as below before energizing the inverter:

Positive to Negative / Negative to Positive

When a simulated input source is used for the test, the source is to be adjusted to maximum rated input voltage and the current is to be limited to 1.5 times the rated input current

Results: Pass

Test Condition	Input Voltage (V)	Input Current (A)	Output Current (A)	Output Voltage (V)	Comments
DC Input Miswiring	550	25	0	0	Pass

Equipment used: See equipment list.

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Biflee</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

47.6 - Component Short- and Open-Circuit

Testing date: 2020-08-09

Test Method:

Based on the analysis of the electrical and the electronic circuits, capacitors, diodes, solid-state devices and similar component are to be short- and open-circuited, while the inverter/converter was energized.

In addition, utility-interactive inverters, the max. backfeed current that flows from the simulated utility source into the input source as a result of a faulted component shall be measured and not exceed the marked max. input source backfeed current.

Record the temperature data (if necessary) and **the power level** before and during the tests.

Results: Pass

Components	Fault Applied	Input power and Output Power (W)	Result when the applied fault removed, etc.
BUS Voltage monitoring	R252 O-C	7.2kW/7kW	PV inverter shut down and disconnected from grid. Error message "BUS fault", "BUS LV". No damaged, no hazard.
Grid voltage monitoring	R278 O-C	7.2kW/7kW	PV inverter shut down and disconnected from grid. Error message "Relay fault". No damaged, no hazard.
	R275 O-C	7.2kW/7kW	PV inverter shut down and disconnected from grid. Error message "Relay fault". No damaged, no hazard.
	R271 O-C	7.2kW/7kW	PV inverter shut down and disconnected from grid. Error message "Salve MCU fault". No damaged, no hazard.
	R274 O-C	7.2kW/7kW	PV inverter shut down and disconnected from grid. Error message "Salve MCU fault". No damaged, no hazard.
	R287 O-C	7.2kW/7kW	PV inverter shut down and disconnected from grid. Error message "Grid OV fault". No damaged, no hazard.
	R293 O-C	7.2kW/7kW	PV inverter shut down and disconnected from grid. Error message "Grid LV fault". No damaged, no hazard.
Grid current monitoring	R308 O-C	7.2kW/7kW	PV inverter shut down and disconnected from grid. Error message " DC component fault". No damaged, no hazard.
Residual current monitoring	R311 O-C	7.2kW/7kW	PV inverter shut down and disconnected from grid. Error message " RCMU current fault". No damaged, no hazard.

Client:	EAST Group Co., Ltd.	Tested by:	Billy Chen	<i>Billy Chen</i>	
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Model No:	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	Standard:	UL 1741 : 2018		

Aux. power supply	C73 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. No damaged, no hazard.
	C277 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Q1, Q2, Q6 damaged. No hazard.
	C148 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. The IGBT damaged. No hazard.
Slave DSP	CY4 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Error message " Slave MCU gird frequency fault". No damaged, no hazard.
Main DSP	C120 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. The IGBT damaged. No hazard.
	CY3 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. No damaged. No hazard.
Aux. power supply	C500 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Error message "DC component fault". R135 damaged. No hazard.
	C590 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Error message "DC component fault". R157 damaged. No hazard.
	C594 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Error message " BUS OV". R159 damaged. No hazard.
	C44 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. No damaged. No hazard.
	C517 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. No damaged. No hazard.
	Q500 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. D503, R526, D501 damaged. No hazard.
IGBT circuits	Q1 D-S S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Q1, Q5, Q6 damaged, No hazard.
	Q1 G-D S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Q1, Q5, Q6 damaged, No hazard.
BOOST circuit	Q7 D-S S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Inverter has damaged, No hazard.
BUS capacitor	C82 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Error message "Inverter OC". No damaged. No hazard.
	C87 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Q2, Q5 damaged, No hazard.
Relay	K S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Error message "Relay fault". No damaged, no hazard.
	K2 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Error message "Relay fault". No damaged, no hazard.
Grid voltage Voltage	R50 O-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Error message "Grid fault".

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<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

monitoring			No damaged. No hazard.
	R120 O-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Error message "DC component fault". No damaged. No hazard.
	R116 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Error message "OV fault". No damaged. No hazard.
Grid voltage Voltage monitoring	R97 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Error message "Relay fault". No damaged. No hazard.
	R102 S-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Error message "Relay fault". No damaged. No hazard.
BUS Voltage monitoring	R80 O-C	7.2kW7kW	PV inverter shut down and disconnected from gird. Error message "BUS voltage fault". No damaged. No hazard.
<p>Note: Keep recording the temperature data sheet as that of the test of clause 43, and take it as a kind of reference</p>			

Equipment used: See equipment list.

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

47.7 – Load Transfer Test

Testing date: 2020-08-09

Test Method:

A bypass switch shall continue to operate normally after completion of the test described below:

- The bypass ac source is to be displaced 120 electrical degrees from the ac output of the inverter for a 3-phase supply or 180 electrical degrees for a single phase supply. The transfer switch is to be subjected to one operation of switching the load from the ac output of the inverter to a bypass ac source. The load is to be adjusted to draw maximum rated ac power.
- For an inverter employing a bypass switch having a control preventing switching between two ac sources out of synchronization, the test specified above is to be conducted under the condition of a component malfunction – see 47.6.1 – when such a condition results in an out-of-phase transfer between the two ac sources of supply.

Results: Pass

Fault Applied	Output Power (kW)	Result when the applied fault removed, etc.
180 degree displaced	3	The inverter has working normally without disconnected from grid.
180 degree displaced	6	The inverter has working normally without disconnected from grid.

Equipment used: See equipment list.

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

47.8 - Loss of Control Circuit (Utility-Interactive)

Testing date: 2020-07-05

Test Method:

A utility-interactive inverter or interconnection system equipment (ISE) shall cease the export of power to the EPS upon the loss of control circuit power.

The inverter, converter, or interconnection system equipment (ISE) is to be connected to its rated input supply and simulated utility source. A single fault is to be placed such that it disables the power to the control circuit.

Exception 1: When the control circuit is unable to be disabled under any single fault condition, this test is not required to be performed.

Exception 2: The unit may continue to export power if it continues to meet the requirements of IEEE 1547.1 tests with the single fault in place.

Results: Pass

See 47.6 - Component Short- and Open-Circuit table.

Equipment used: See equipment list.

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

48 – Grounding Impedance Test / 4.2.3 – Grounding and Bonding

Testing date: 2020-07-04

Test Method:
Test 1: Grounding Impedance per Clause 48 of UL 1741 and [Clause 4.23.2 of C22.2 No. 107.1](#)

The impedance at 60 hertz between the point of connection of the equipment-grounding means and any other metal part that is required to be grounded shall not be more than 0.1 ohm when measured as below:

- A current of 25 amperes derived from a 60-hertz source with a no-load voltage not exceeding 6 volts is passed between the grounding connection and the metal part in question
- [The impedance test current for the bonding circuit to a withdrawable chassis or plug-in subsidiary boards in power supplies provided with internal overcurrent protection may be reduced to two times the rating of the overcurrent device but not less than 10 A](#)

Test 2: [Impedance test per Clause 4.1 of C22.2 No. 0.4:](#)

The impedance test shall be conducted by passing a 60 Hz current from a part to be bonded to the bonding terminal means and measuring the potential drop between them at the end of the period.

The current used for the measurement shall have the following characteristics:

- for cord-connected equipment, twice the rating of the attachment plug cap, but not less than 40 A;
- for equipment for permanent connection to the supply, twice the rating of the fuse that is required by Part I of the CEC for the branch circuit to which the equipment is connected, up to 250 A; and
- 500 A for equipment for permanent connection to the supply when a branch circuit fused at over 250 A is required.

Fusing of branch circuit required for equipment (A)	0-30	31-60	61-100	101-200	201 and over
Time (min.)	2	4	6	8	10

The following additional requirements shall apply:

- For test currents up to 500 A, the measured potential drop shall not exceed 4 V;
- For equipment that requires branch circuit fusing over 250 A, the measured potential drop multiplied by the required fusing and divided by 250 shall not exceed 4 V; and
- There shall be no melting of any metal in the bond and no heating or burning that is likely to create a fire hazard.

Test 3: [Continuity test per Clause 4.2 of C22.2 No. 0.4:](#)

- Apply to the bonds a potential of not more than 30 V open circuit; and the passage of a current of at least 1 A through the bond in order to produce an indication of continuity.

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<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

Results: Pass

Test #	Applied Current (A) and Location	No-load Voltage (V)	Measured Value (Ω/V)	Limit
1	25A for 1min. between PE terminal and the enclosure.	< 6Vac, 60Hz	0.0043/0.107	0.1 Ω
	10A or 2 times of the rating of overcurrent devices, which is higher for 2min.	< 6Vac, 60Hz	0.0046/0.138	0.1 Ω
3	test for all bonding, > 1A	< 30Vac, 60Hz	Indication of continuity only	None

Equipment used: See equipment list.

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

52 – Bonding Conductor Test

Testing date:--

Test Method:

When a small conductor or strap, which does not comply with size requirement, is used, the bonding circuit, including the conductor, terminations and portions of the unit intended to be bonded, shall be subjected to the following tests: (using a separate bonding circuit for each test)

- The conductor is to carry currents equal to 135 and 200 percent of the rating or setting of the intended branch-circuit overcurrent-protective device for the times specified in table below, and

Rating or setting of branch-circuit overcurrent protective device, amperes	Test time, minutes	
	135 percent of current	200 percent of current
0 – 30	60	2
31 – 60	60	4
61 – 100	120	6
101 – 200	120	8

- Three specimens are to be subjected to a limited-short-circuit test using a test current as specified in the following table while connected in series with a nonrenewable fuse having a rating equal to the intended branch-circuit overcurrent-protective device.

Rating of unit, volt-ampere		Volts	Capacity of test circuit, amperes
Single phase	3-Phase		
0 – 1176	0 – 832	0 – 250	200
0 – 1176	0 – 832	251 – 600	1000
1177 – 1920	833 – 1496	0 – 600	1000
1921 – 4080	1497 – 3990	0 – 250	2000
4081 – 9600	3991 – 9145	0 – 250	3500
9601 or more	9146 or more	0 – 250	5000
1921 or more	1497 or more	251 – 600	5000

The test circuit should have a power factor of 0.9 – 1.0 and the closed-circuit test voltage is the upper rated one. The open-circuit voltage is to be 100 – 105 percent of the closed-circuit voltage. The test is to be performed on each of the three specimens.

Exception: When a fuse smaller than that indicated in above is employed in the unit for protection of the circuit to which the bonding conductor is connected, the magnitude of the test current and size of fuse used during the test is to be based on the rating of the smaller fuse

After the bonding circuits are subjected to these tests, the circuits shall comply with Grounding Impedance Test

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<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

Results: --

Test Item	Testing Specification	Grounding Impedance (Ω)	Pass / Fail
Overcurrent test	Sample #1: 60A, 4min.	N/A	N/A
Bonding conductor short-circuit test	Sample #2: 600V, 1000A	N/A	N/A
	Sample #3: 600V, 1000A	N/A	N/A
	Sample #4: 600V, 1000A	N/A	N/A
Note: No bounding conductors.			

Equipment Used: --

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
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<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

57 - Capacitor Voltage Determination Test

Testing date: 2020-07-04

Test Method:

Verify the voltage stored on the capacitors is less than the required value, for instance, **60V for dry location and 30V for wet location** when the capacitance is more than 184.5uF, after 5min.

The unit is to be operated at a dc voltage equal to the peak value of the ac input sinewave for ac circuits, and at the maximum rated input for dc circuits, and then de-energized. **Any access covers are to be quickly removed** and immediately after removal, the residual voltage on any accessible capacitor is to be measured and the stored energy calculated by:

$$J = 5 \times 10^{-7} CV^2$$

Results: Pass

Enclosure Construction	Capacitor under Measurement (µF)	Voltage (V) and Discharge Time (S)	Stored Energy (J)
Screwed enclosure and locked doors	PV+-PV-	30V/0.43s	< 20J
	L-N	30V/0.295s	< 20J
	L-G	20V/0.152s	< 20J
	N-G	23V/0.268s	< 20J
	BUS+-BUS-	29V/267s	< 20J
	PV+- Ground	20V/58.2s	< 20J
	PV—Ground	30V/59.6s	< 20J
			(limit: 20J)

Equipment used: See equipment list.

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<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

59 – Static Load
 Testing date: 2020-07-01

Test Method:

When mounted as specified by the manufacturer, a unit intended to be fastened to a supporting structure shall be loaded as described in below with a force equal to three times the weight of the unit and not less than 89 N (20 lbf).

- The force is to be applied through the center of gravity of the unit, is to be increased gradually so as to reach the required value in 5 to 10 seconds, and is to be maintained at that value for 1 minute

As a result of the loading, there shall not be permanent deformation, breakage, dislocation, cracking, or other damage to the unit or its mounting hardware.

Exception: A unit intended for floor mounting or an AC module is not required to be subjected to this test.

Results: Pass

Part Under Test	Pull Force Applied (N)	Observation	Result
Whole unit	3 times of the unit mass	No damaged	Pass

Equipment Used: See equipment list.

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		



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<i>File Number:</i>	60418398 001	<i>Reviewed by:</i>	John Dai	<i>John Dai</i>	
<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

60 - Compression Test

Testing date:--

Test Method:

An enclosure that is thinner than that specified in Tables 5.1, 5.2, or 5.3 shall be constructed so that during the test described below, the resulting deflection does not result in spacings less than specified in Spacings, Section 24, or Alternate Spacings – Clearances and Creepage Distances, Section 25.

- A force of 445 N (100 pounds) is to be applied to the end, side, and walls of the enclosure. The enclosure is to rest on a smooth solid, horizontal surface. A vertical force is to be applied at any point through a rod having a 12.7 mm (1/2 inch) square flat steel face.

Results:--

Part Under Test	Pull Force Applied (N)	Measured Enclosure Deform (mm)	Damages (Y/N)
--	--	--	--

Equipment Used:--

<i>Client:</i>	EAST Group Co., Ltd.	<i>Tested by:</i>	Billy Chen	<i>Billy Chen</i>	
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<i>Model No:</i>	EA2KSI, EA2.5KSI, EA3KSI, EA3KSI-D, EA3.68KSI, EA4KSI, EA4.6KSI, EA5KSI, EA6KSI, EA7KSI	<i>Standard:</i>	UL 1741 : 2018		

61 – Rain and Sprinkler Test

Testing date: 2020-07-01

Test Method:

- Before a rain or sprinkler test is performed, the unit is to be fitted with the intended supply connection means as described in the unit's installation instructions.
- A unit intended for multiple mounting orientations shall be tested in all the intended orientations.
- The rain and sprinkler tests are to be performed in the operating sequence specified below:

Duration in hours	Unit	Water
1	On	Off
1/2	Off	On
1	On	On
1/2	Off	On

As a result of the rain and sprinkler tests, no water shall enter the unit.

Exception: When water enters ground-mounted or surface-mounted units and the water does not wet any wiring or other electrical parts that are not inherently waterproof, and when the unit is provided with drain holes in accordance with 5.9.14, the unit is in compliance with the rain and sprinkler tests.

(1) Rain test

The unit is to be set up as in a normal installation with conduit connections. The enclosure is to be positioned in the focal area of the spray heads so that the greatest possible quantity of water enters the enclosure. The water pressure is to be maintained at 34.5 kPa (5 psi) at each spray head.

A gasketed unit shall be tested after the temperature test or after operation for 1/2 hour, followed by removal and reinstallation of doors, access panels, frames, covers, or other removable parts serving to compress the gasket.

(2) Sprinkler test

An outdoor ground-mounted unit is to be turned about its vertical axis to each of four positions 90 degrees from each other, each for 30 minutes during the 2-hour portion of the test described in this test method section, with adjustable parts arranged for maximum vulnerability to the water spray. Wall-mounted units intended for mounting within 914 mm (3 feet) of the ground, are to be similarly tested in the most vulnerable normal mounting position.

The unit is to be positioned in front of a standard water spray head, to which the water pressure is maintained at a gage pressure of 138 kPa (20psi).

Results: Pass

Test Item	Water Inside (Y/N)	Exception applied (Y/N)	Result
Rain	N	N	Pass
Sprinkler	N	N	Pass

Equipment Used: See equipment list.