









<b>Possible test case verdicts:</b>	
- test case does not apply to the test object.....:	N(/A, Not applicable)
- test object does meet the requirement .....	P (Pass)
- test object does not meet the requirement .....	F (Fail)
<b>Testing</b> .....	
Date of receipt of test item .....	May 9, 2016
Date (s) of performance of tests .....	May 9, 2016
<b>General remarks:</b>	
<p>"(see Attachment #)" refers to additional information appended to the report.          "(see appended table)" refers to a table appended to the report.          The tests results presented in this report relate only to the object tested.          This report shall not be reproduced except in full without the written approval of the testing laboratory.          List of test equipment must be kept on file and available for review.          Additional test data and/or information provided in the attachments to this report.          Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p>	
<b>General product information:</b>	
<ol style="list-style-type: none"> <li>Between the charger and the PV input there has to be a 150VDC/60A circuit breaker. Between the charger and battery there has to be a 60VDC/140A breaker.</li> <li>The charger is enclosed in the metal enclosure designed. It is manufactured to be mounted on a wall and its degree of protection is IP21.</li> <li>Battery is not provided by manufacturer and is not checked in this report. A battery is only used as tool for test.</li> <li>All models have the same construction, circuit diagram, and PCB layout. Only model name and output control software to control/power are different. Unless otherwise stated, all tests were performed on model FlinInfini Lite 2kW-24V</li> </ol>	
<b>Copy of marking plate:</b>	
<ol style="list-style-type: none"> <li>Rating labels for all model:</li> </ol>	





<b>Model No. : FlinInfini Lite 1kW-12V<sup>+</sup></b>	
<b>Serial No. :</b>  96111612100001	
<b>PV INPUT</b>	Nominal operating voltage 30Vdc.
	$V_{max}$ PV 145Vdc.
	PV input voltage range 15-145Vdc.
	$I_{sc}$ PV 80A.
	MPPT voltage range 15 ~ 115Vdc.
<b>GRID/AC OUTPUT</b>	Nominal operating voltage 230 V <sub>ac</sub> .
	Nominal output current 4.3A.
	Nominal operating frequency 50Hz/60Hz.
	Maximum power 1000W.
	Power factor range 0.9 lead-0.9lag.
<b>AC INPUT</b>	Nominal operating voltage 230V <sub>ac</sub> .
	Maximum input current 10A.
	Nominal operating frequency 50Hz/60Hz.
<b>BATTERY</b>	Battery voltage range 10.2 ~ 15.0Vdc.
	Maximum battery current 140A.

Ambient temperature: -10~+55°C.

Enclosure: IP21.

Safety class I







5min

WARNING: FIRE HAZARD...

SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.





CAUTION: THE DC AND AC BREAKER MUST HAVE BEEN TURNED OFF BEFORE SERVICING.





<b>Model No.:</b> FlinInfini Lite 2kW-24V <sup>+</sup>	
<b>Serial No.:</b>  96111512100001	
<b>PV INPUT</b>	Nominal operating voltage 60Vdc
	V <sub>max</sub> PV 145Vdc
	PV input voltage range 30-145Vdc
	I <sub>sc</sub> PV 80A
	MPPT voltage range 30 ~ 115Vdc
<b>GRID/AC OUTPUT</b>	Nominal operating voltage 230 V <sub>ac</sub>
	Nominal output current 8.7A
	Nominal operating frequency 50Hz/60Hz
	Maximum power 2000W
	Power factor range 0.9 lead-0.9lag
<b>AC INPUT</b>	Nominal operating voltage 230V <sub>ac</sub>
	Maximum input current 20A
	Nominal operating frequency 50Hz/60Hz
<b>BATTERY</b>	Battery voltage range 20.4~30Vdc
	Maximum battery current 140A

Ambient temperature: -10~+55°C

Enclosure: IP21

Safety class I

5min

**WARNING: FIRE HAZARD**

SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY

CAUTION: THE DC AND AC BREAKER MUST HAVE BEEN TURNED OFF BEFORE SERVICING

IEC 61727			
Clause	Requirement – Test	Result - Remark	Verdict
4	Utility compatibility		P
4.1	Voltage, current and frequency	(see appended table)	P
4.2	Normal voltage operating range		P
4.3	Flicker	(see appended table)	P
	The operation of the PV system should not cause voltage flicker in excess of limits stated in the relevant sections of IEC 61000-3-3 for systems less than 16 A or IEC 61000-3-5 for systems with current of 16 A and above		P
4.4	DC injection	(see appended table)	P
	The PV system shall not inject DC current greater than 1 % of the rated inverter output current, into the utility AC interface under any operating condition.		P
4.5	Normal frequency operating range	(see appended table)	P
	The PV system shall operate in synchronism with the utility system, and within the frequency trip limits defined in 5.2.2.		P
4.6	Harmonics and waveform distortion	(see appended table)	P
	Total harmonic current distortion shall be less than 5 % at rated inverter output. Each individual harmonic shall be limited to the percentages listed in Table 1		P
	Table 1 – Current distortion limits		
	Odd harmonics	Distortion limit	
	3 <sup>rd</sup> through 9 <sup>rd</sup>	Less than 4,0 %	
	11 <sup>rd</sup> through 15 <sup>rd</sup>	Less than 2,0 %	
	17 <sup>rd</sup> through 21 <sup>rd</sup>	Less than 1,5 %	
	23 <sup>rd</sup> through 33 <sup>rd</sup>	Less than 0,6 %	
	Even harmonics	Distortion limit	
	2 <sup>rd</sup> through 8 <sup>rd</sup>	Less than 1,0 %	
	10 <sup>rd</sup> through 32 <sup>rd</sup>	Less than 0,5 %	
4.7	Power factor	(see appended table)	P
	The PV system shall have a lagging power Factor greater than 0.9 when the output is Greater than 50% of the rated inverter		P
	Output power		P
5	Personnel safety and equipment protection		P

IEC 61727															
Clause	Requirement – Test	Result - Remark	Verdict												
5.1	Loss of utility voltage		P												
	To prevent islanding ,a utility connected PV system shall cease to energize the utility System from a de-energized Distribution line irrespective of connected loads or other generators within specified Time limits	See clause 5.3	P												
	A utility distribution line can become de-energized for several reasons. For example a substation breaker opening due to fault conditions or the distribution line switched out during maintenance	AC relay is used	P												
	If inventers (single or multiple) have DC SELV Input and have accumulated power below 1 KW then no mechanical disconnect (relay) is required		P												
5.2	Over/under voltage and frequency		P												
5.2.1	Over/under voltage	See appended table	P												
	<p>When the interface voltage deviates Outside the conditions specified in Table 2, the photovoltaic system shall cease to energize the utility distribution system. This applies to any phase of a multiphase system</p> <p>Table 2 – Response to abnormal voltages</p> <table border="1"> <thead> <tr> <th>Voltage (at point of utility connection)</th> <th>Maximum trip time*</th> </tr> </thead> <tbody> <tr> <td><math>V &lt; 0,5 \times V \text{ nominal}</math></td> <td>0,1 s</td> </tr> <tr> <td><math>50 \% \leq V &lt; 85 \%</math></td> <td>2,0 s</td> </tr> <tr> <td><math>85 \% \leq V \leq 110 \%</math></td> <td>Continuous operation</td> </tr> <tr> <td><math>110 \% &lt; V &lt; 135 \%</math></td> <td>2,0 s</td> </tr> <tr> <td><math>135 \% \leq V</math></td> <td>0,05 s</td> </tr> </tbody> </table> <p>* Trip time refers to the time between the abnormal condition occurring and the inverter ceasing to energize the utility line. The PV system control circuits shall actually remain connected to the utility to allow sensing of utility electrical conditions for use by the “reconnect” feature.</p>	Voltage (at point of utility connection)	Maximum trip time*	$V < 0,5 \times V \text{ nominal}$	0,1 s	$50 \% \leq V < 85 \%$	2,0 s	$85 \% \leq V \leq 110 \%$	Continuous operation	$110 \% < V < 135 \%$	2,0 s	$135 \% \leq V$	0,05 s		P
Voltage (at point of utility connection)	Maximum trip time*														
$V < 0,5 \times V \text{ nominal}$	0,1 s														
$50 \% \leq V < 85 \%$	2,0 s														
$85 \% \leq V \leq 110 \%$	Continuous operation														
$110 \% < V < 135 \%$	2,0 s														
$135 \% \leq V$	0,05 s														
5. 2. 2	Over/under frequency	See appended table	P												
	When the utility frequency deviates outside the		P												

IEC 61727			
Clause	Requirement – Test	Result - Remark	Verdict
	specified conditions the photovoltaic system shall cease to energize the utility line. The unit does not have to cease to energize if the frequency returns to the normal utility continuous operation condition within the specified trip time.		
	When the utility frequency is outside the range of $\pm 1$ Hz, the system shall cease to energize the utility line within 0,2 s. The purpose of the allowed range and time delay is to allow continued operation for short-term disturbances and to avoid excessive nuisance tripping in weak-utility system conditions.		P
5.3	Islanding protection	See appended table	P
	The PV system must cease to energize the utility line within 2 s of loss of utility.	The test is performed in accordance with IEC62116	P
5.4	Response to utility recovery		P
	Following an out-of-range utility condition that has caused the photovoltaic system to cease energizing, the photovoltaic system shall not energize the utility line for 20 s to 5 min after the utility service voltage and frequency have recovered to within the specified ranges.	30S	P
5.5	Earthing		P
	The utility interface equipment shall be earthed/grounded in accordance with IEC 60364-7-712.	Protective bonding conductors are installed and they are parallel to and in close contacts with DC cables and AC cables	P
5.6	Short circuit protection		P
	The photovoltaic system shall have short-circuit Protection in accordance with IEC 60634-7-712		P
5.7	Isolation and switching		P
	A method of isolation and switching shall be provided in accordance with IEC 60634-7-712		P

IEC 61727			
Clause	Requirement – Test	Result - Remark	Verdict

Table 4.1a Voltage					P
	Measure(V)	Rated(V)	deviation	limit	Verdict
Model:FlinInfini Lite 1kW-12V					
L	229.753	230	0.107%	+7%,-7%	P
Model:FlinInfini Lite 2kW-24V					
L	229.647	230	0.153%	+7%,-7%	P
Remark: This measured is signal phase voltage and at 100% load					

TABLE 4.1 b Frequency					P
	Measured	Rate	deviation	limit	Verdict
L	49.996Hz	50Hz	-0.004Hz	± 0.5Hz	P

TABLE 4.3:flicker		
Interval(10min)	Pst	Limits
1	0.13	1
2	0.13	
3	0.12	
4	0.12	
5	0.13	
6	0.12	
7	0.12	
8	0.13	
9	0.12	
10	0.12	
11	0.12	
12	0.13	
Plt		Limits
0.12		0.65

TABLE 4.4 DC current injection					
Mains frequency Isolation transformer	Max output Current (A)	Required limit (mA)	Adc (mA)		
			10% output Power	50% output Power	100% output Power
Model:FlinInfini Lite 1kW-12V					
No	6.14	61.4	L:21.3	L:22.0	L: 22.0
Model:FlinInfini Lite 2kW-24V					
No	12.28	122.8	L:30.0	L:16.0	L: 21.0

TABLE 4.6 Harmonic							
Model:FlinInfini Lite 1kW-12V							
ODD HARMONIC CURRENT (L1)				EVEN HARMONIC CURRENT (L1)			
Order	Limits	Measurements(%)	Verdict	Order	Limits	Measurements(%)	Verdict
3rd	4.00%	1.512	P	2nd	1.00%	0.392	P
5th	4.00%	1.681	P	4th	1.00%	0.386	P
7th	4.00%	1.275	P	6th	1.00%	0.368	P
9th	4.00%	1.024	P	8th	1.00%	0.594	P
11th	2.00%	1.536	P	10th	0.50%	0.452	P
13th	2.00%	1.372	P	12th	0.50%	0.432	P
15th	2.00%	0.341	P	14th	0.50%	0.348	P
17th	1.50%	1.007	P	16th	0.50%	0.406	P
19th	1.50%	0.825	P	18th	0.50%	0.285	P
21st	1.50%	0.331	P	20th	0.50%	0.275	P



IEC 61727							
Clause	Requirement – Test			Result - Remark			Verdict
23rd	0.60%	0.360	P	22nd	0.50%	0.238	P
25th	0.60%	0.305	P	24th	0.50%	0.316	P
27th	0.60%	0.199	P	26th	0.50%	0.127	P
29th	0.60%	0.193	P	28th	0.50%	0.246	P
31st	0.60%	0.118	P	30th	0.50%	0.398	P
33rd	0.60%	0.165	P	32nd	0.50%	0.200	P
Total harmonic distortion (to the 33rd harmonic)							
LIMITS				MEASUREMENTS			Verdict
5%				4.210			P
Model:FlinInfini Lite 2kW-24V							
ODD HARMONIC CURRENT (L1)				EVEN HARMONIC CURRENT (L1)			
Order	Limits	Measurements(%)	Verdict	Order	Limits	Measurements(%)	Verdict
3rd	4.00%	0.595	P	2nd	1.00%	0.487	P
5th	4.00%	0.477	P	4th	1.00%	0.240	P
7th	4.00%	1.198	P	6th	1.00%	0.157	P
9th	4.00%	0.749	P	8th	1.00%	0.721	P
11th	2.00%	0.731	P	10th	0.50%	0.432	P
13th	2.00%	1.172	P	12th	0.50%	0.373	P
15th	2.00%	0.257	P	14th	0.50%	0.302	P
17th	1.50%	0.917	P	16th	0.50%	0.275	P
19th	1.50%	0.560	P	18th	0.50%	0.245	P
21st	1.50%	0.117	P	20th	0.50%	0.086	P
23rd	0.60%	0.438	P	22nd	0.50%	0.229	P
25th	0.60%	0.204	P	24th	0.50%	0.228	P
27th	0.60%	0.102	P	26th	0.50%	0.079	P
29th	0.60%	0.334	P	28th	0.50%	0.220	P
31st	0.60%	0.136	P	30th	0.50%	0.317	P
33rd	0.60%	0.051	P	32nd	0.50%	0.139	P
Total harmonic distortion (to the 33rd harmonic)							
LIMITS				MEASUREMENTS			Verdict
5%				2.927			P
5%				3.253			P

Table 4.7: power factor				P
Load%	measured	limit		Verdict
Model:FlinInfini Lite 1kW-12V				
50%	L:0.9819	>0.9		P
100%	L:0.9924	>0.9		P
Model:FlinInfini Lite 2kW-24V				
50%	L:0.9806	>0.9		P
100%	L:0.9920	>0.9		P
Remark:				

Table 5.2: Under/over Voltage			P
Voltage (V)	Time (ms)	Limit (s)	Reconnection time (s)
114V (U<0.5 x Unominal)	86.25ms	0.1s	30
194V (0.5 x U nominal <U < 0.85 x Unominal)	96.25ms	2.0s	30
195V (U = 0.85 x Unominal)	Continuous operation	Continuous operation	30

IEC 61727			
Clause	Requirement – Test	Result - Remark	Verdict
	297V (U = 1.1 x Unominal)	Continuous operation	30
	253V (1.1 x Unominal <U < 0.85 x Unominal)	97.0ms	30
	310V (1.35 x Unominal <U)	34.50ms	30
Remark:			

Table 5.2: Under/over frequency					P
Frequency (Hz)	Time (ms)			limit	Reconnection time (s)
	20%load	50%load	100%load		
51Hz	83.25ms	81.0ms	95.25ms	0.2s	30
49Hz	86.50ms	76.50ms	84.75ms	0.2s	30
Remark:					

IEC 62116			
Clause	Requirement – Test	Result - Remark	Verdict

Table 5.3: Islanding protection								P
Test No.	PEUT (%EUT rating )	Reactive Power (%QL)	PAC(% nominal)	QAC (% of nominal)	Cut off time (ms)	PEUT (kW)	VDC	Remark
1	100	100	0	0	230.2	2.01	107	Test A BL
2	66	66	0	0	303.3	1.33	73	Test B BL
3	33	33	0	0	213.8	0.67	38	Test C BL
4	100	100	-5	-5	81.39	2.01	107	Test A IB
5	100	100	-5	0	175.28	2.01	107	Test A IB
6	100	100	-5	+5	93.13	2.01	107	Test A IB
7	100	100	0	-5	108.47	2.01	107	Test A IB
8	100	100	0	+5	109.12	2.01	107	Test A IB
9	100	100	+5	-5	103.11	2.01	107	Test A IB
10	100	100	+5	0	165.73	2.01	107	Test A IB
11	100	100	+5	+5	94.21	2.01	107	Test A IB
12	66	66	0	-5	201.8	1.33	73	Test B IB
13	66	66	0	-4	215.3	1.33	73	Test B IB
14	66	66	0	-3	271.6	1.33	73	Test B IB
15	66	66	0	-2	271.4	1.33	73	Test B IB
16	66	66	0	-1	283.1	1.33	73	Test B IB
17	66	66	0	+1	261.4	1.33	73	Test B IB
18	66	66	0	+2	234.2	1.33	73	Test B IB
19	66	66	0	+3	242.3	1.33	73	Test B IB
20	66	66	0	+4	191.5	1.33	73	Test B IB
21	66	66	0	+5	151.6	0.67	73	Test B IB
22	33	33	0	-5	134.8	0.67	38	Test C IB
23	33	33	0	-4	147.3	0.67	38	Test C IB
24	33	33	0	-3	151.3	0.67	38	Test C IB
25	33	33	0	-2	201.9	0.67	38	Test C IB
26	33	33	0	-1	210.7	0.67	38	Test C IB
27	33	33	0	+1	203.5	0.67	38	Test C IB
28	33	33	0	+2	175.8	0.67	38	Test C IB
29	33	33	0	+3	176.2	0.67	38	Test C IB
30	33	33	0	+4	161.4	0.67	38	Test C IB
31	33	33	0	+5	143.2	0.67	38	Test C IB
Remark:this test is performed in accordance with IEC62116								

Pictures



Fig. 1 -- Over view I(FlinInfini Lite 1kW-12V)



Fig. 2 -- Over view II(FlinInfini Lite 1kW-12V)

Pictures



Fig. 3 -- Over view III(FlinInfini Lite 1kW-12V)



Fig. 4 -- Over view IV(FlinInfini Lite 1kW-12V)



Pictures



Fig. 5 -- Input/output port view(FlinInfini Lite 1kW-12V)

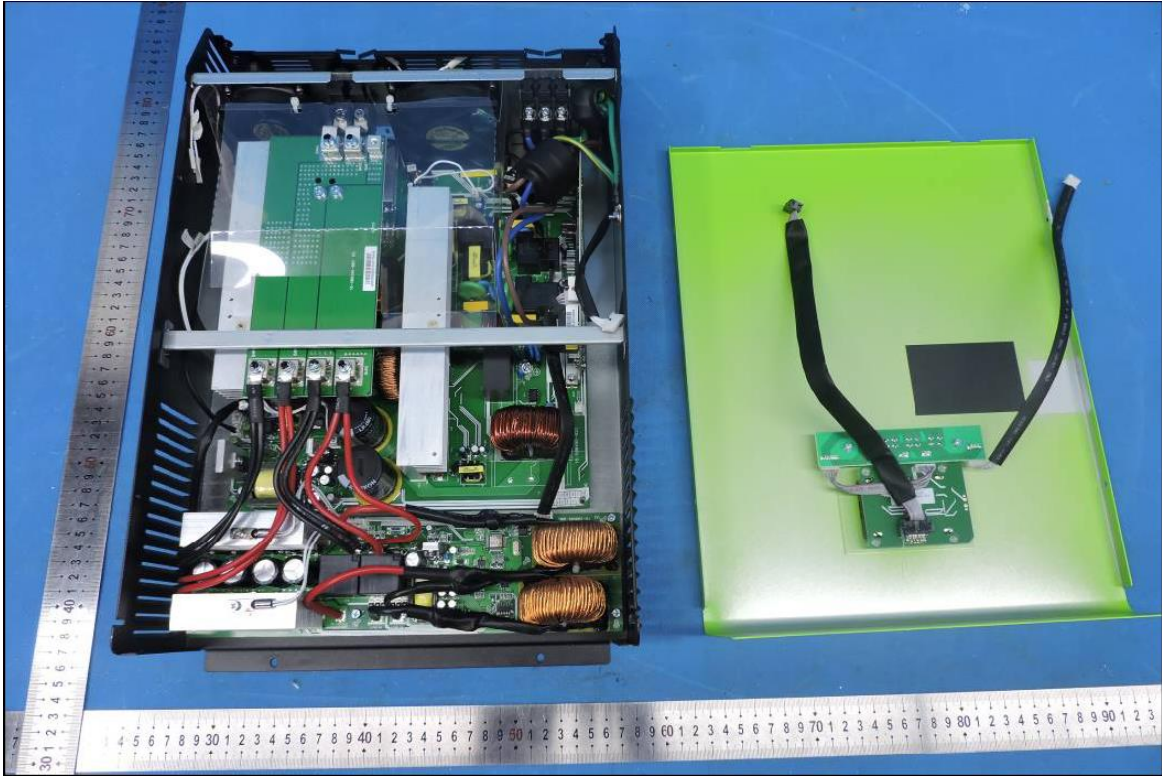


Fig. 6 -- Inside view I(FlinInfini Lite 1kW-12V)

Pictures

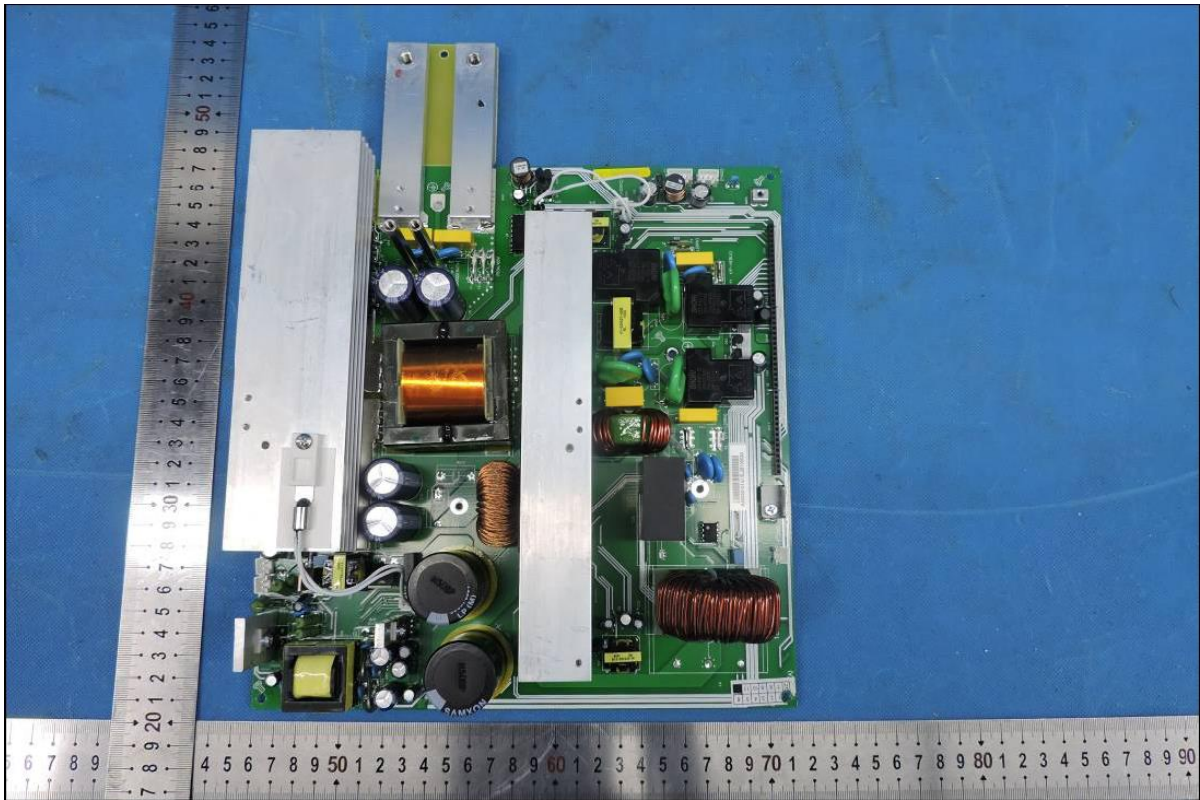


Fig. 7 --PCB of main board components view(FlinInfini Lite 1kW-12V)

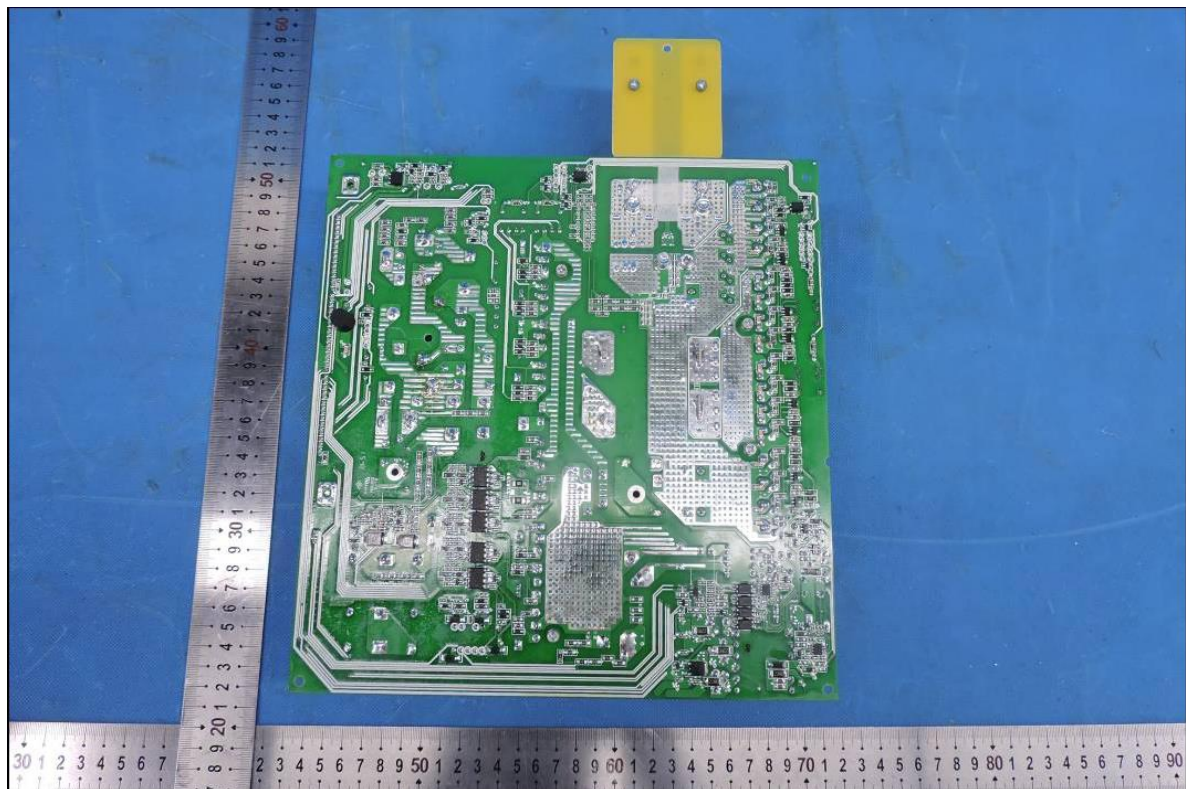


Fig. 8 -- PCB of main board trace view(FlinInfini Lite 1kW-12V)



Pictures

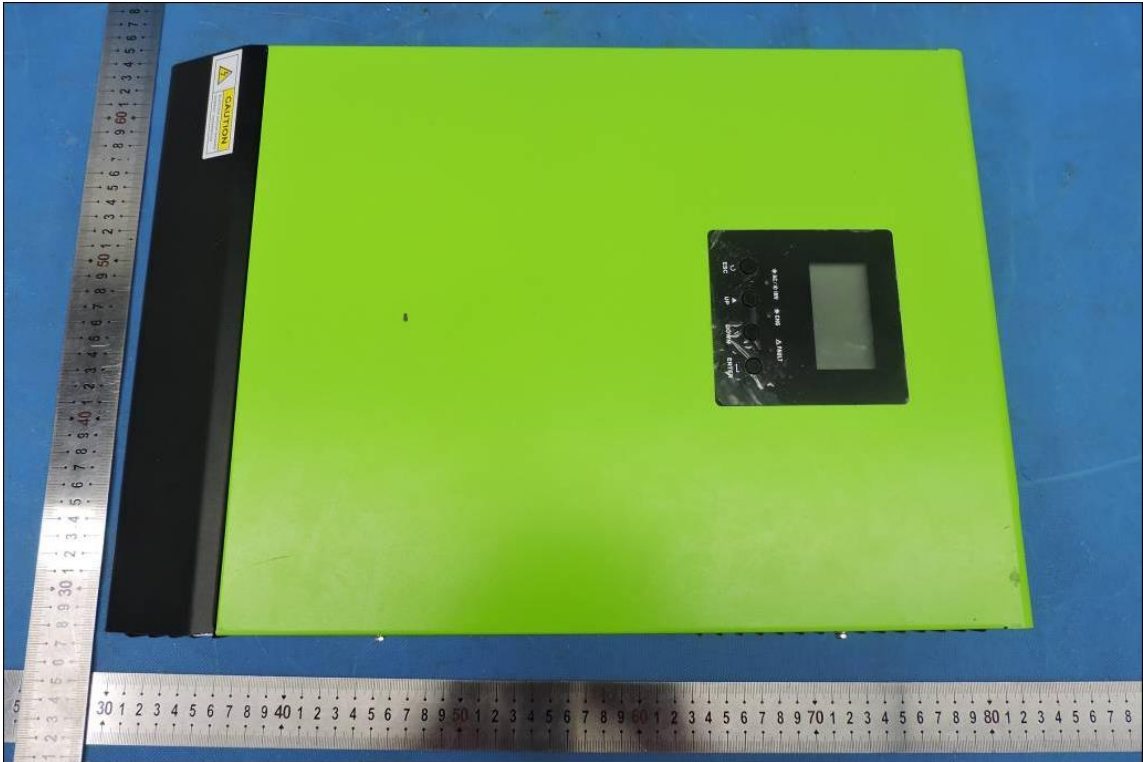


Fig. 9 --Over view I(FlinInfini Lite 2kW-24V)

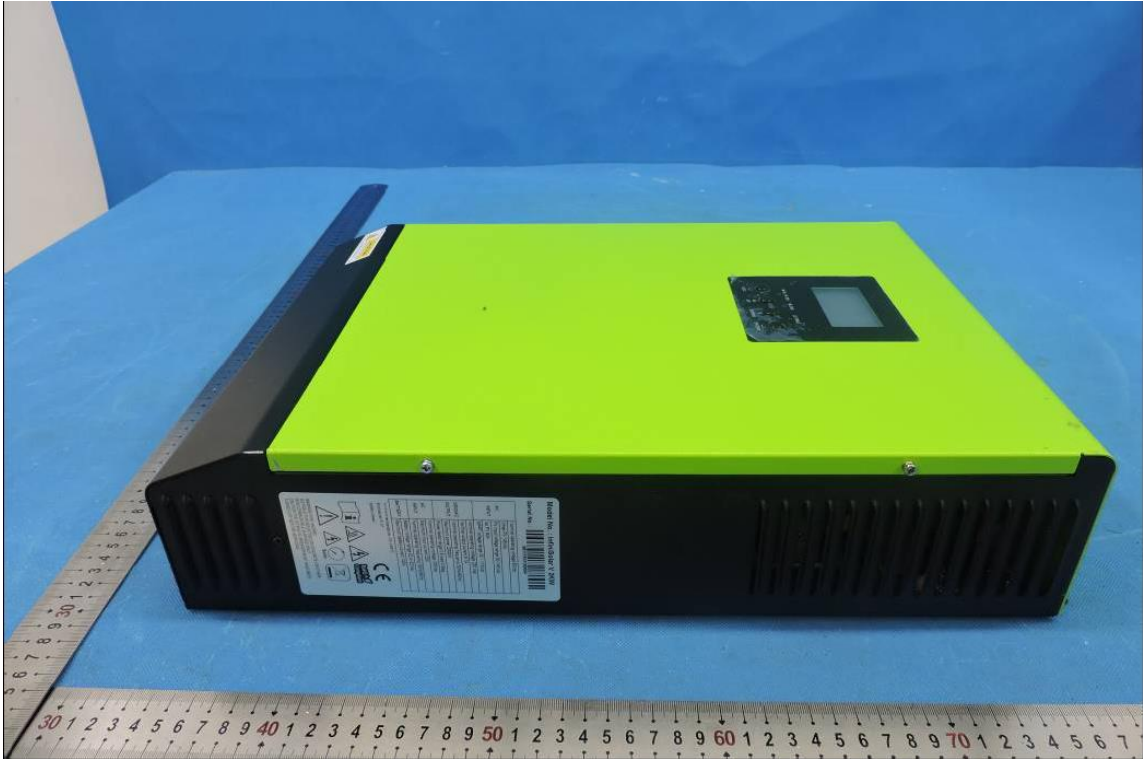


Fig. 10 --Over view II(FlinInfini Lite 2kW-24V)



Pictures

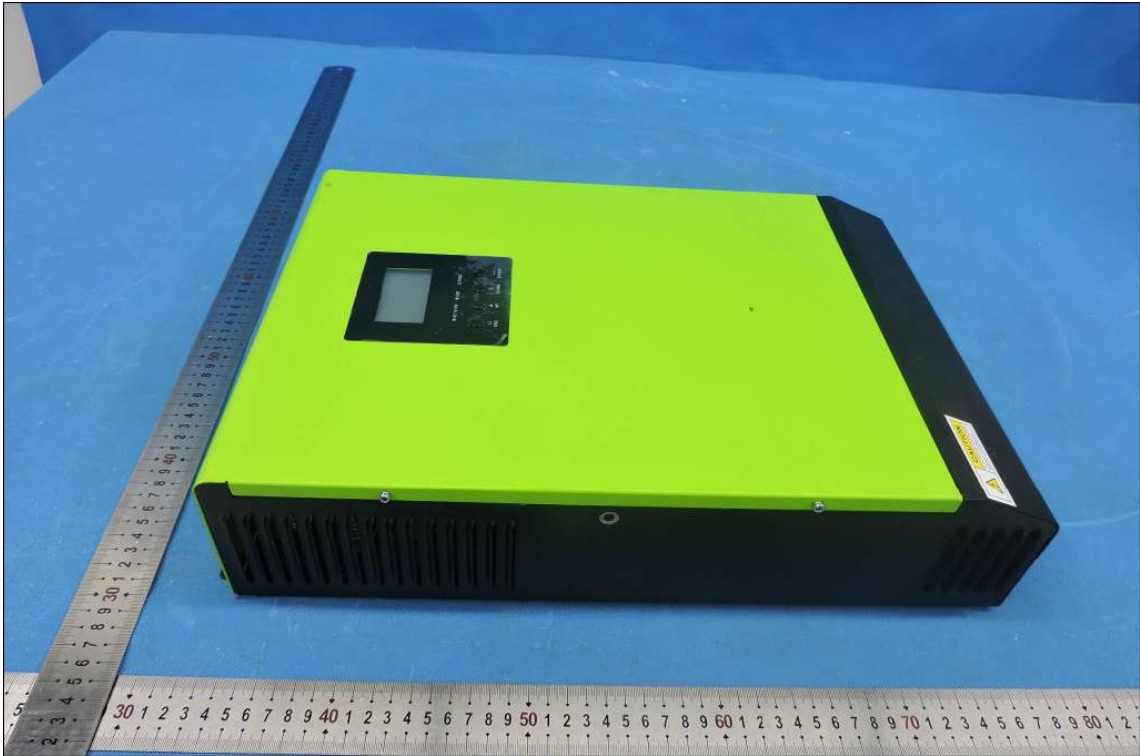


Fig. 11 --Over view III(FlinInfini Lite 2kW-24V)



Fig. 12 --Input/output port view (FlinInfini Lite 2kW-24V)

Pictures



Fig. 13 --Over view I (FlinInfini Lite 2kW-24V)

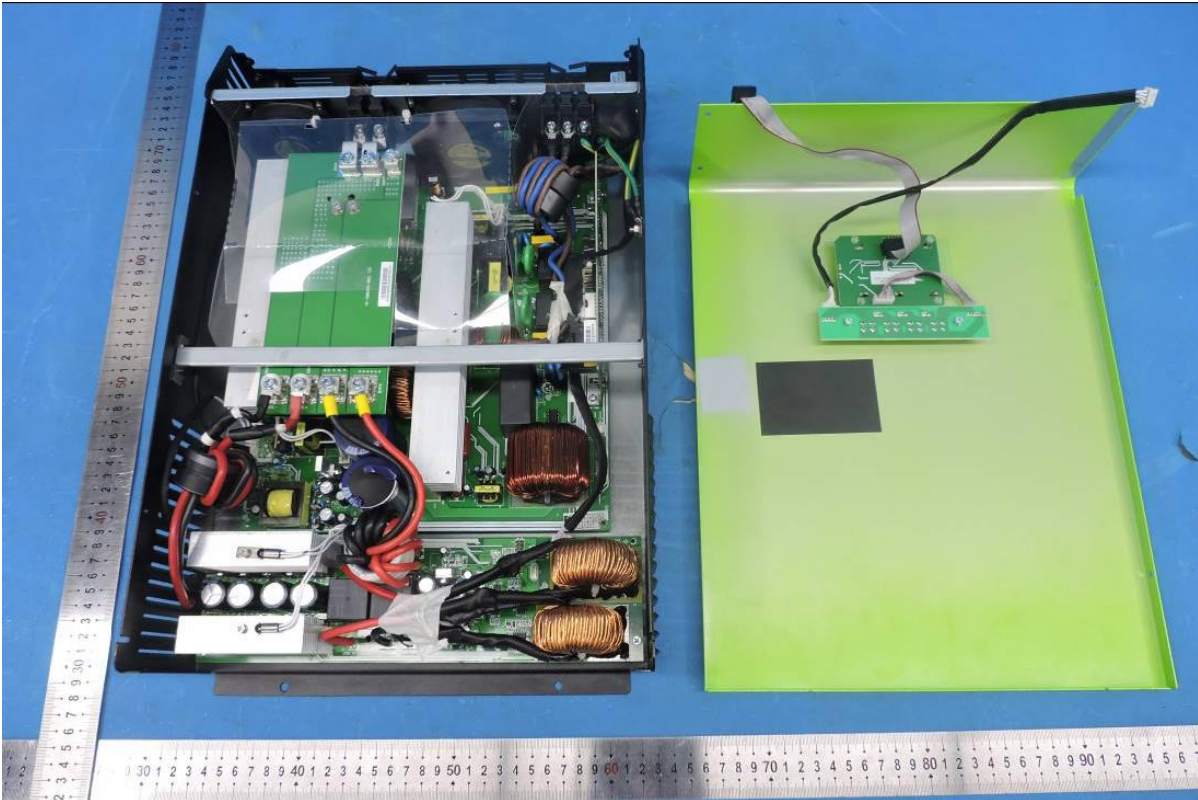


Fig. 14 --Inside view I (FlinInfini Lite 2kW-24V)



Pictures

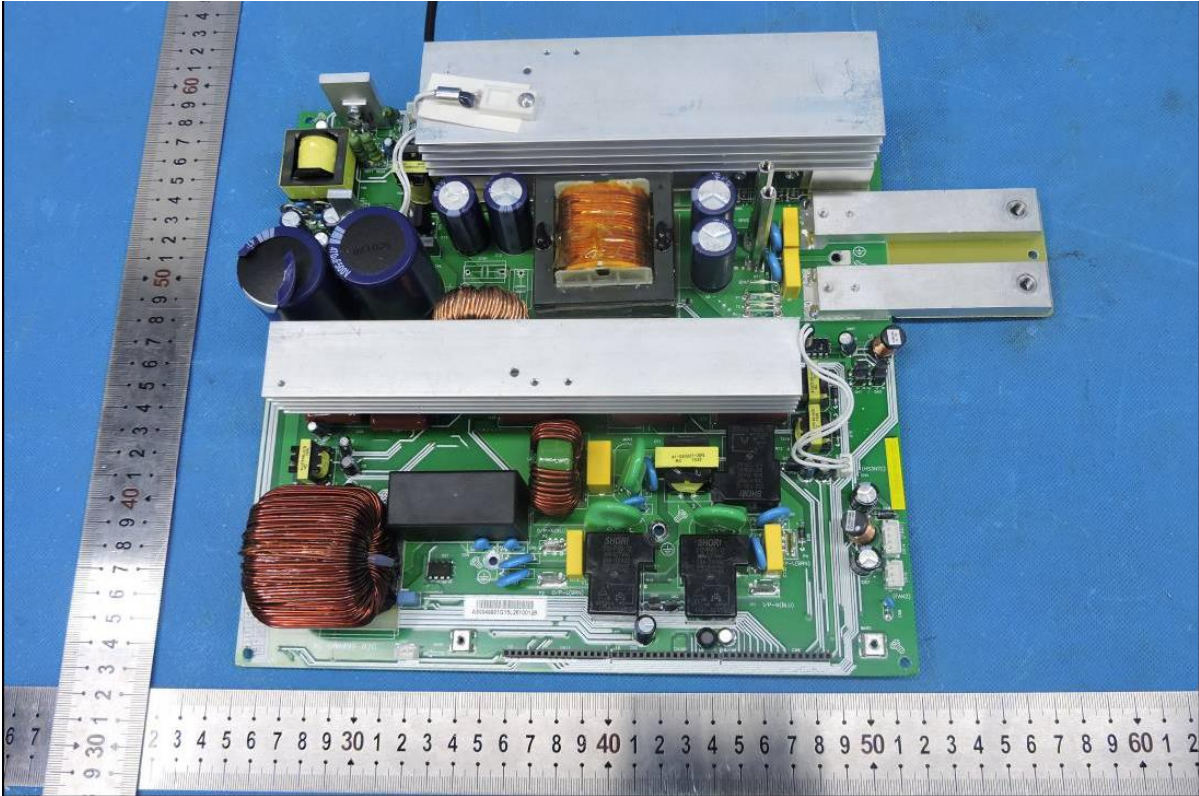


Fig. 15 --PCB of main board components view (FlinInfini Lite 2kW-24V)

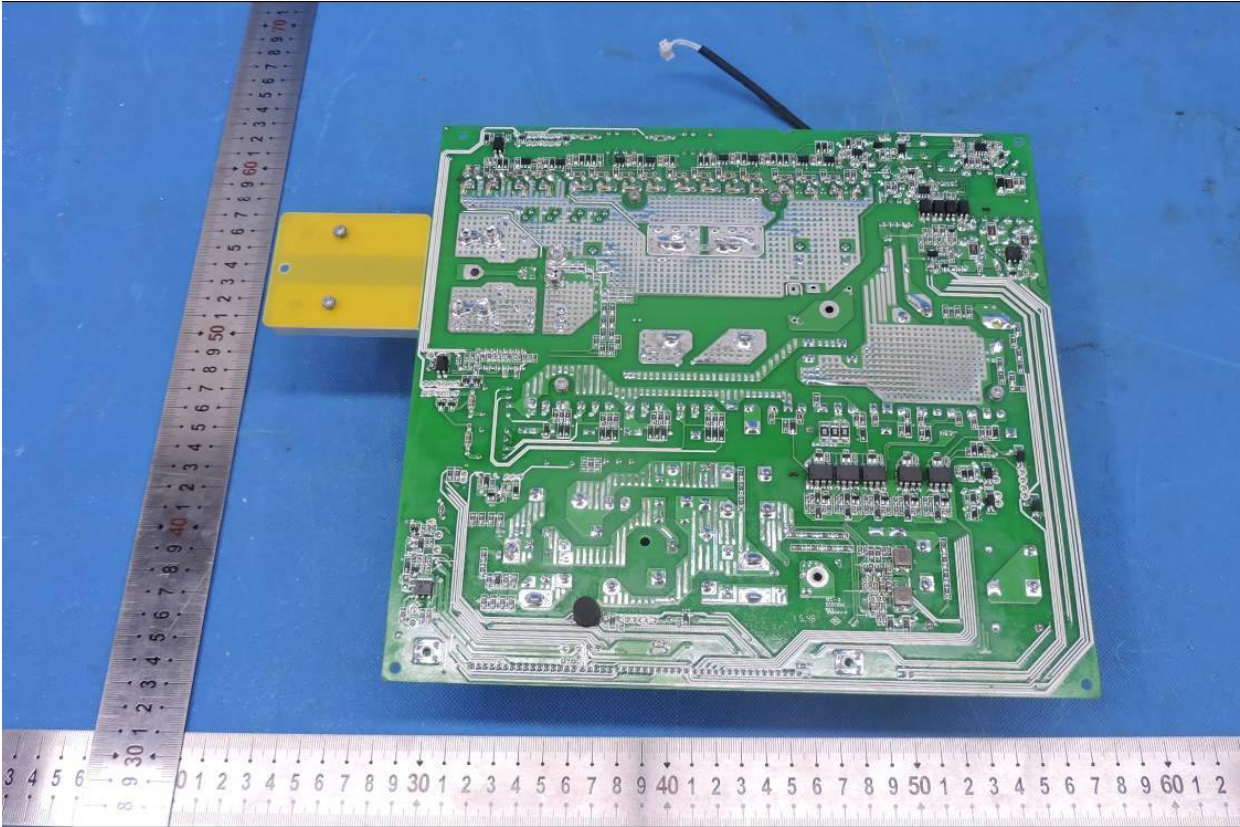


Fig. 16 --PCB of main board trace view (FlinInfini Lite 2kW-24V)



Pictures

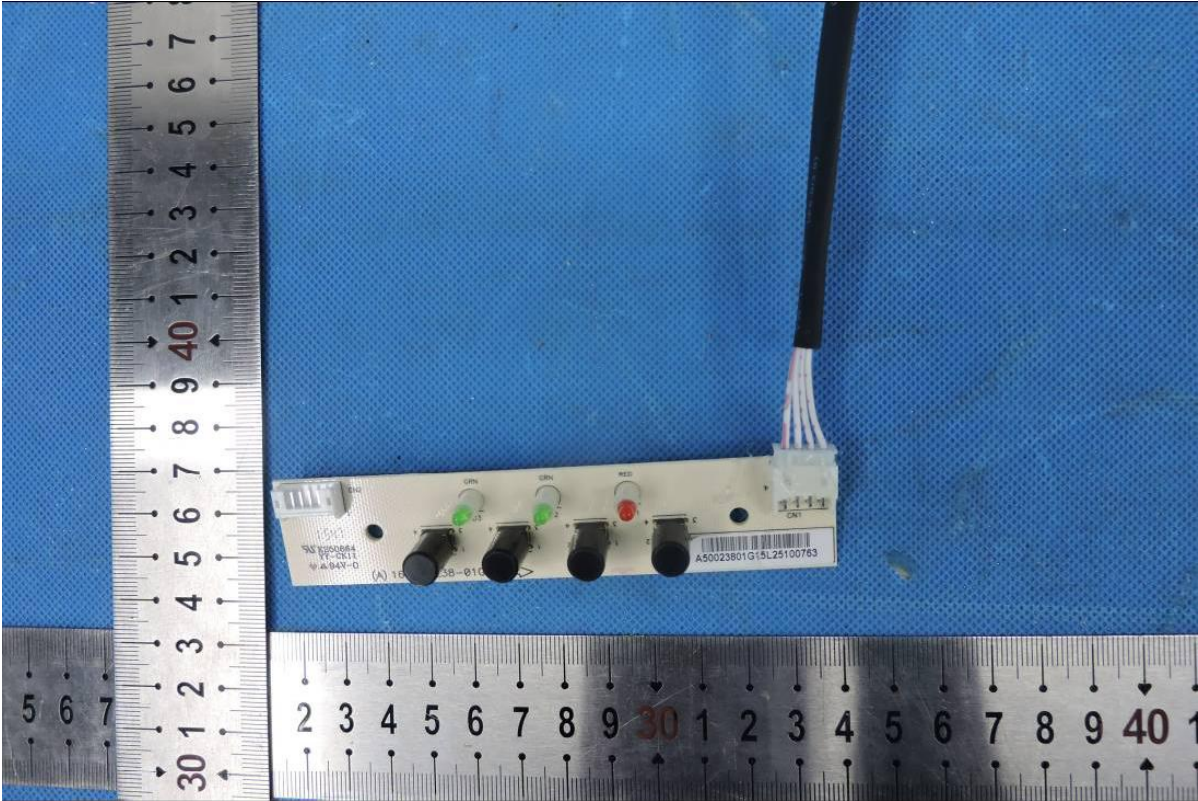


Fig. 17 --PCB of board trace view(FlinInfini Lite 1kW-12V &FlinInfini Lite 2kW-24V

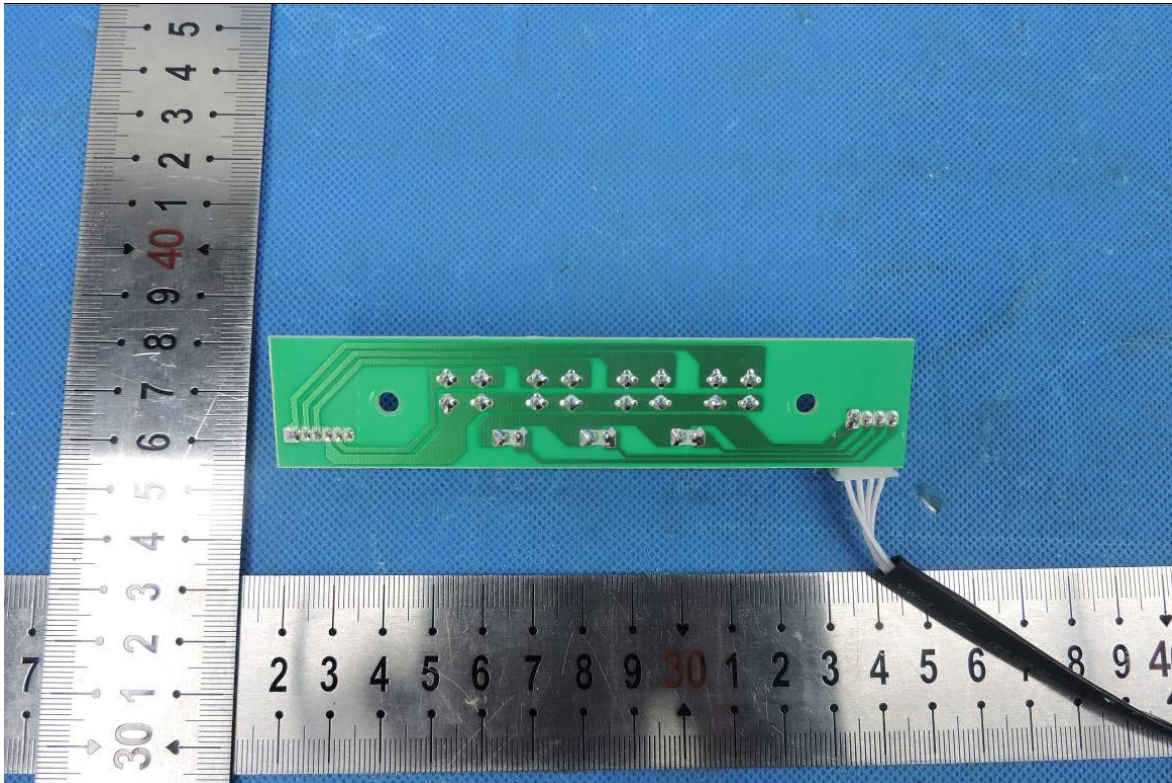


Fig. 18 --PCB of board trace view(FlinInfini Lite 1kW-12V &FlinInfini Lite 2kW-24V



Pictures

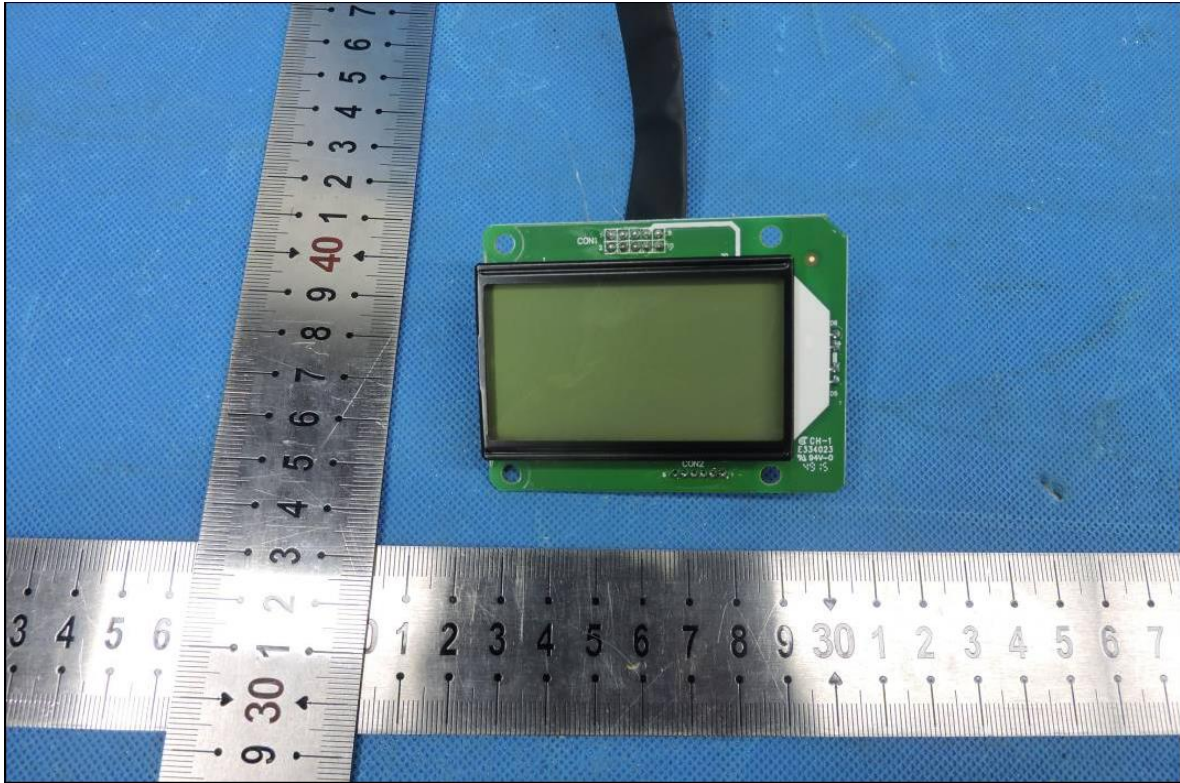


Fig. 19 --PCB of board components view(FlinInfini Lite 1kW-12V &FlinInfini Lite 2kW-24V

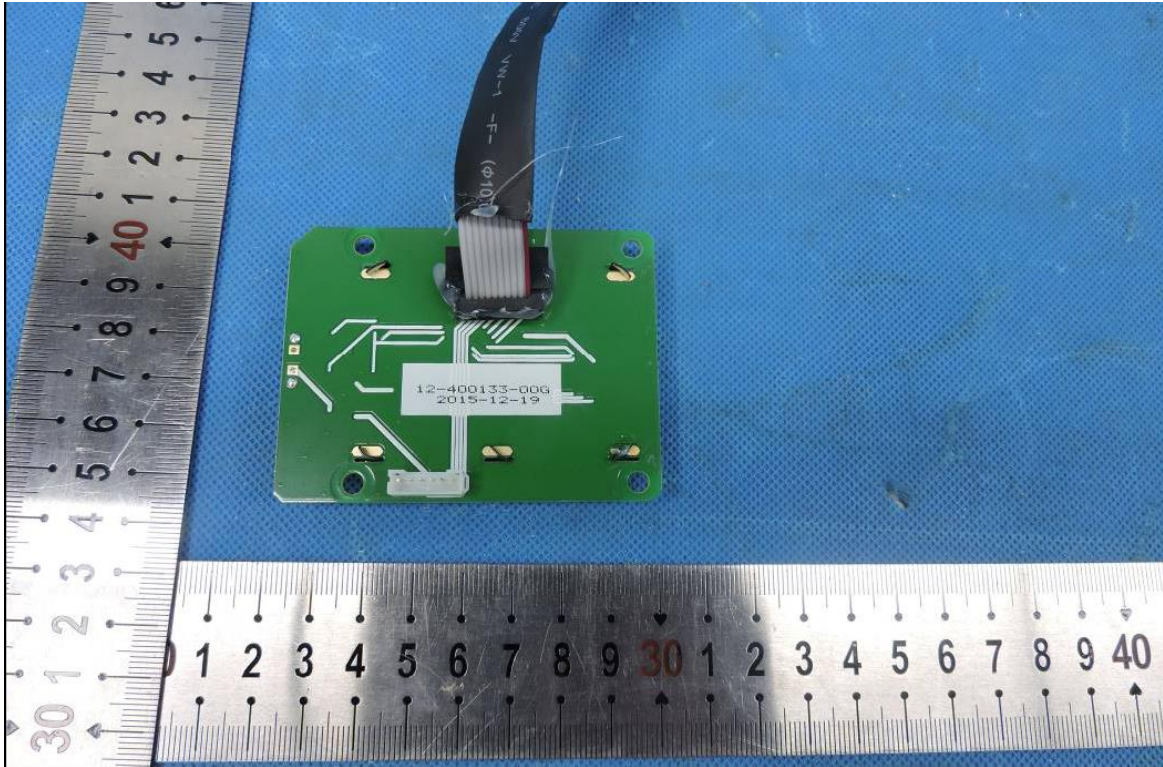


Fig. 20 --PCB of board trace view(FlinInfini Lite 1kW-12V &FlinInfini Lite 2kW-24V



Pictures

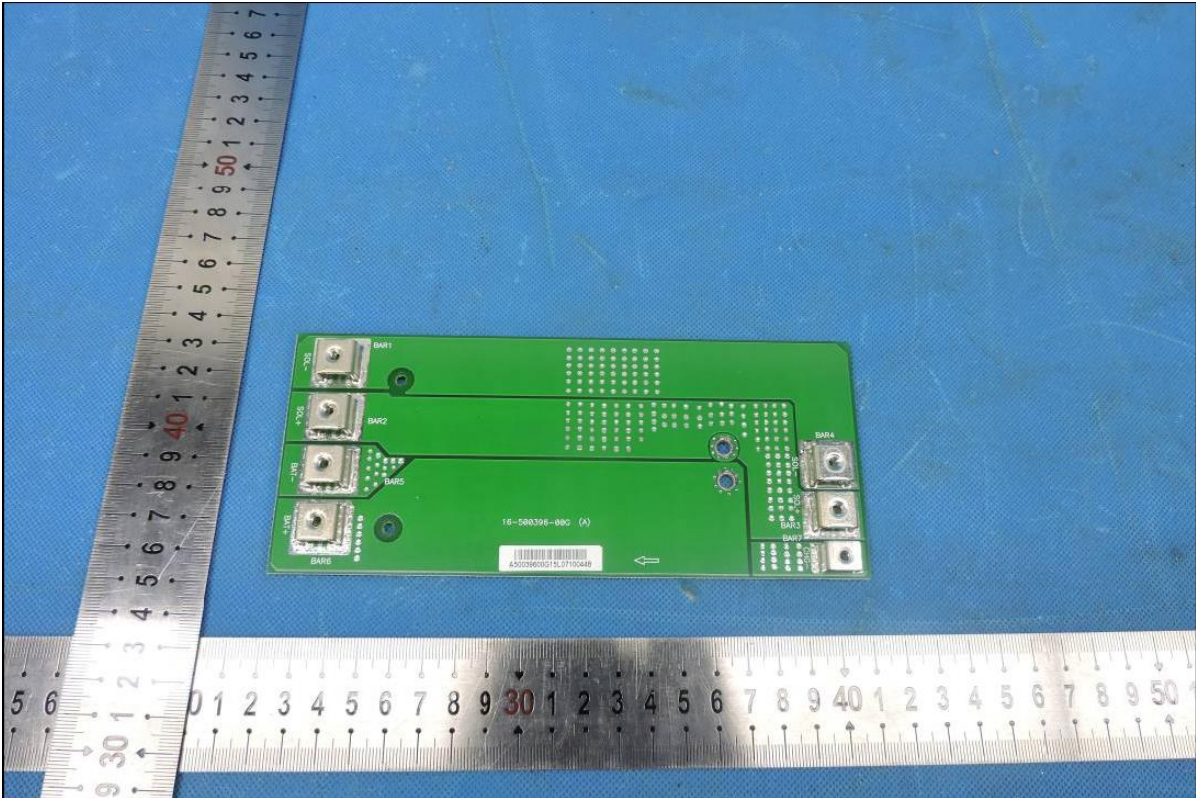


Fig. 21 --PCB of board components view(FlinInfini Lite 1kW-12V &FlinInfini Lite 2kW-24V

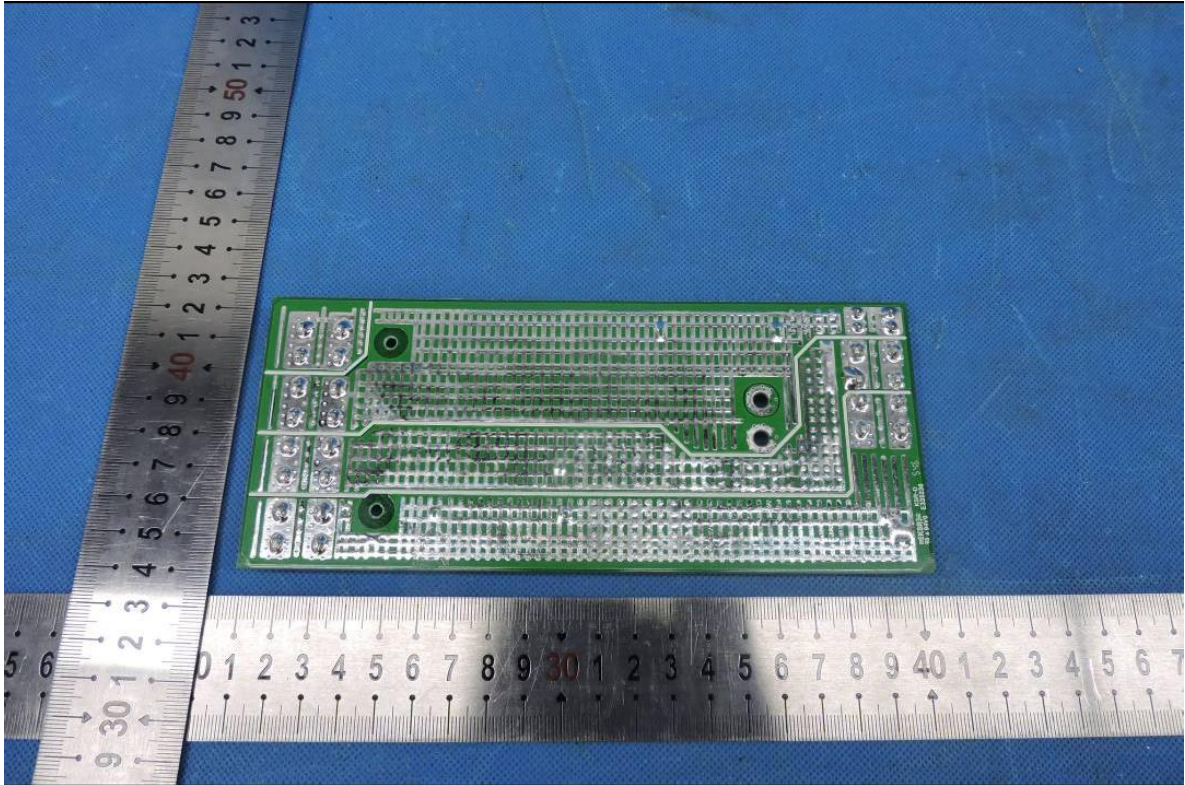


Fig. 22 --PCB of board trace view(FlinInfini Lite 1kW-12V &FlinInfini Lite 2kW-24V



Pictures

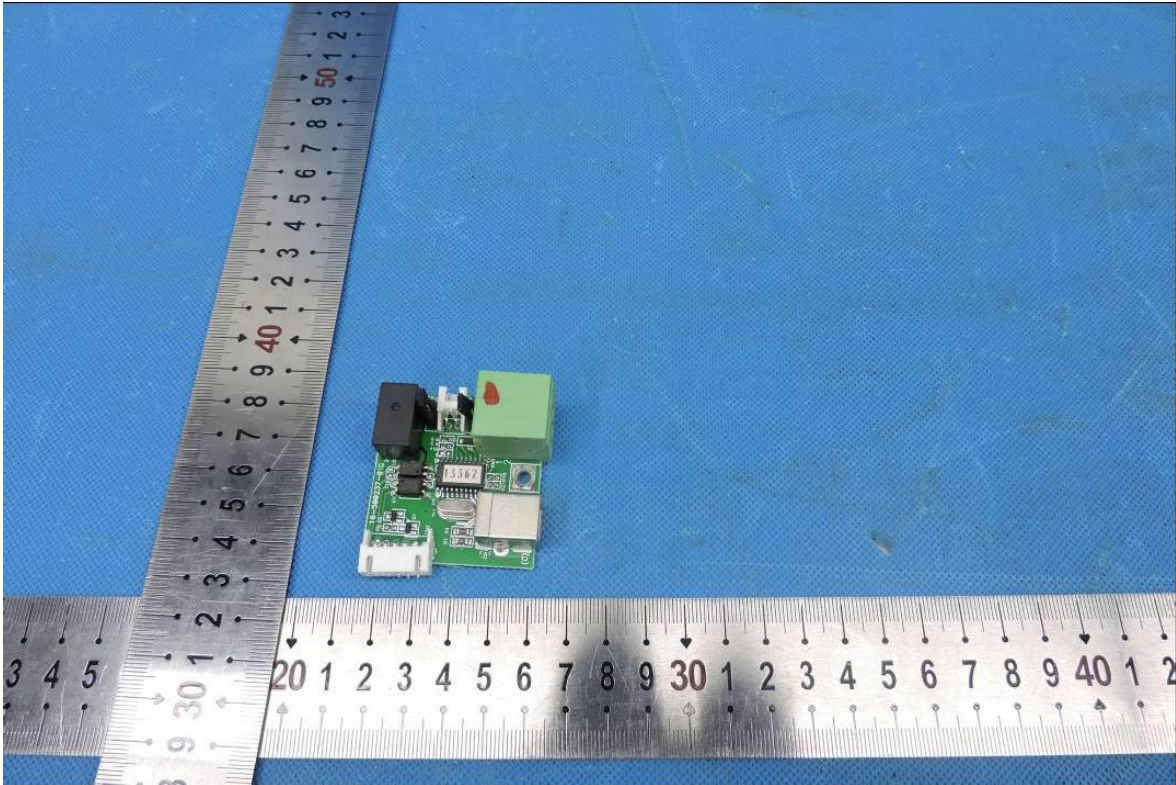


Fig. 23 --PCB of board components view(FlinInfini Lite 1kW-12V &FlinInfini Lite 2kW-24V

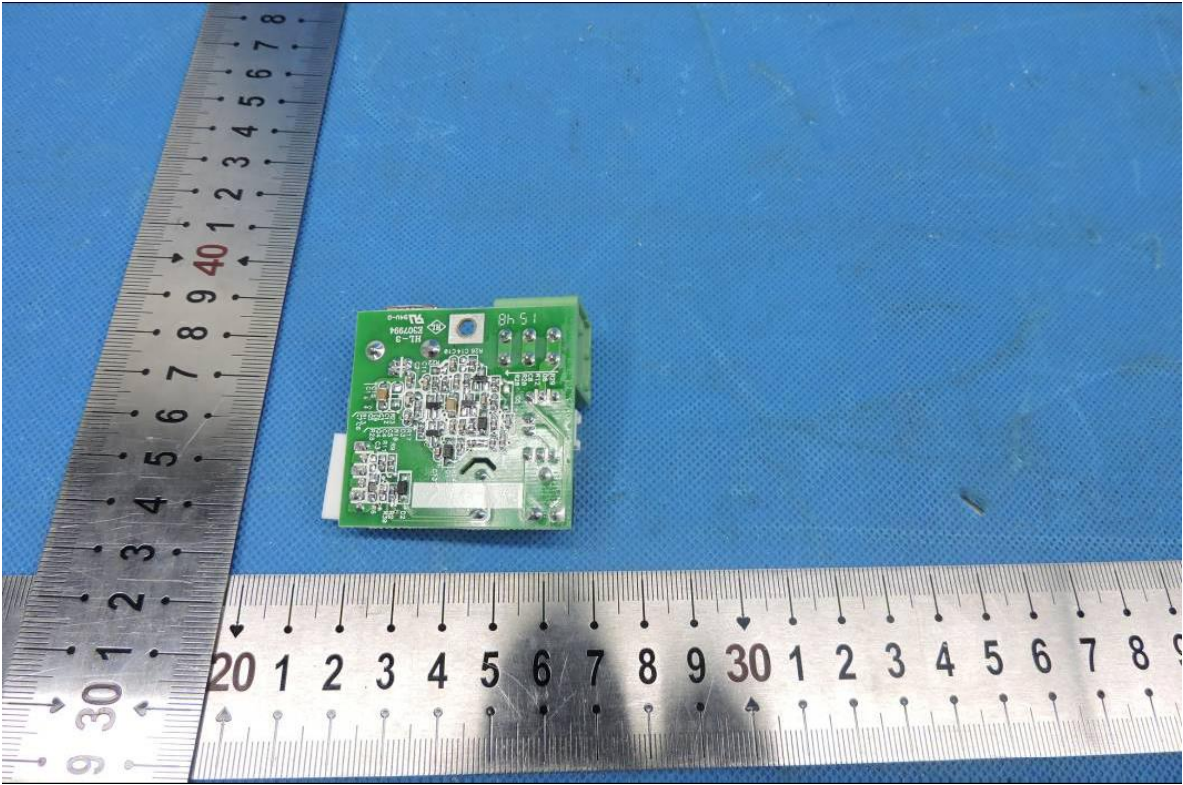


Fig. 24 --PCB of board trace view(FlinInfini Lite 1kW-12V &FlinInfini Lite 2kW-24V



Pictures

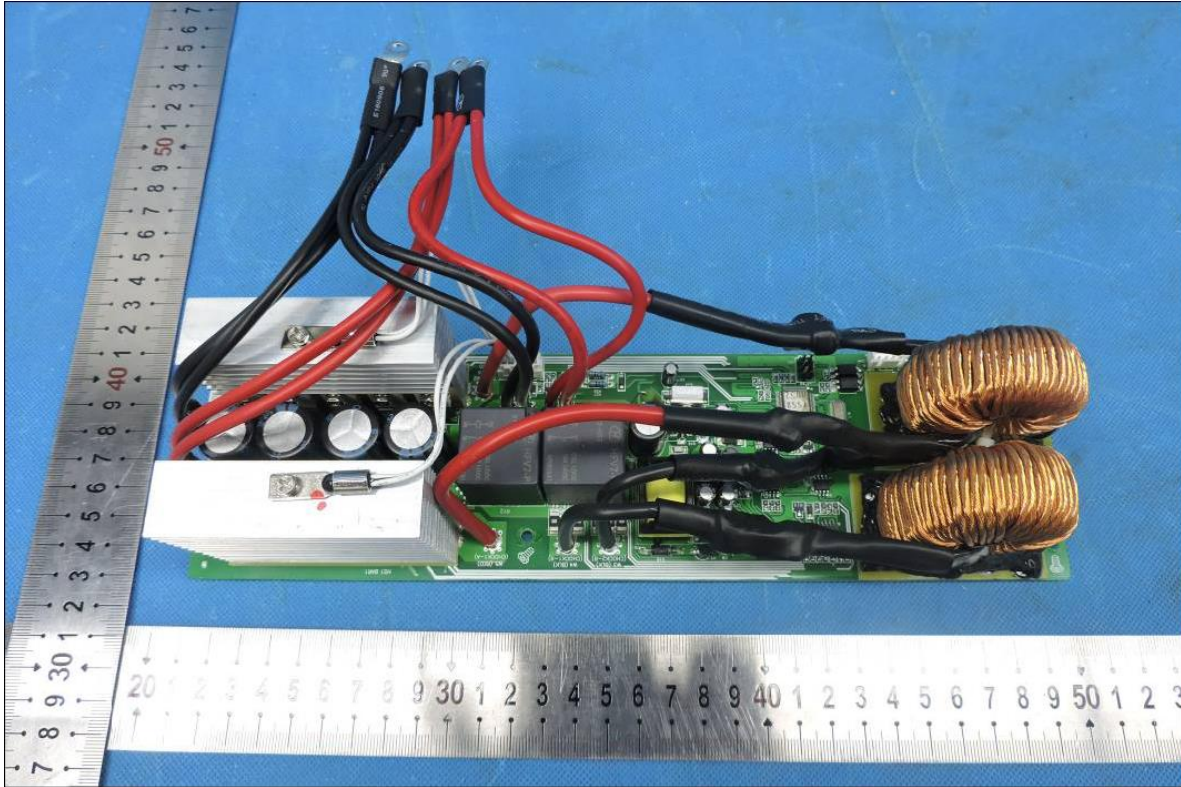


Fig. 25 --PCB of board components view(FlinInfini Lite 1kW-12V &FlinInfini Lite 2kW-24V

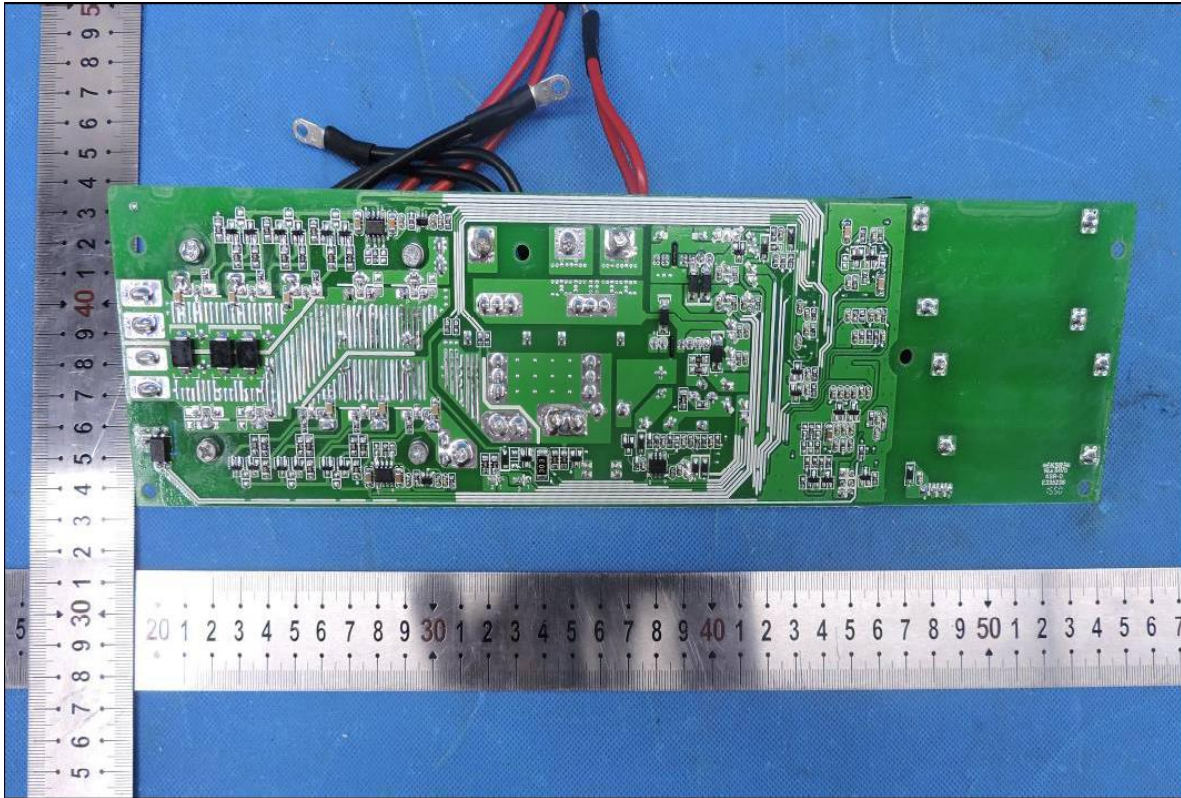


Fig. 26 -- PCB of board trace view(FlinInfini Lite 1kW-12V &FlinInfini Lite 2kW-24V



Pictures

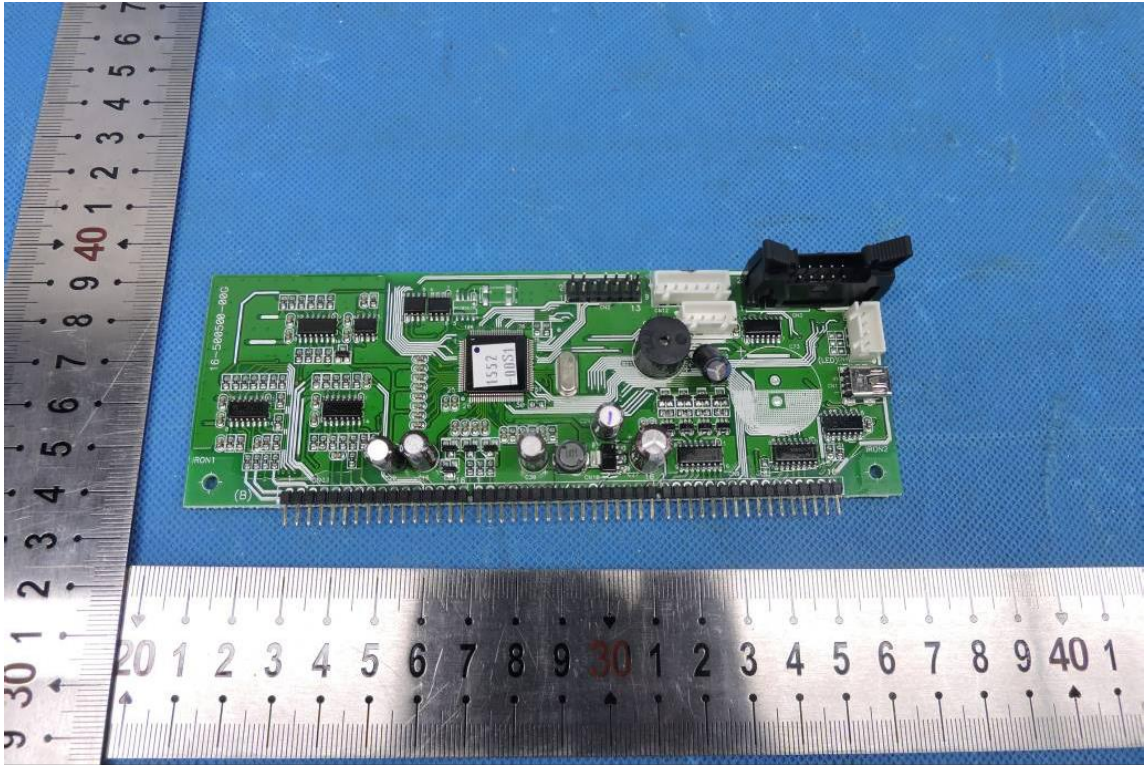


Fig. 27 --PCB of board components view(FlinInfini Lite 1kW-12V &FlinInfini Lite 2kW-24V

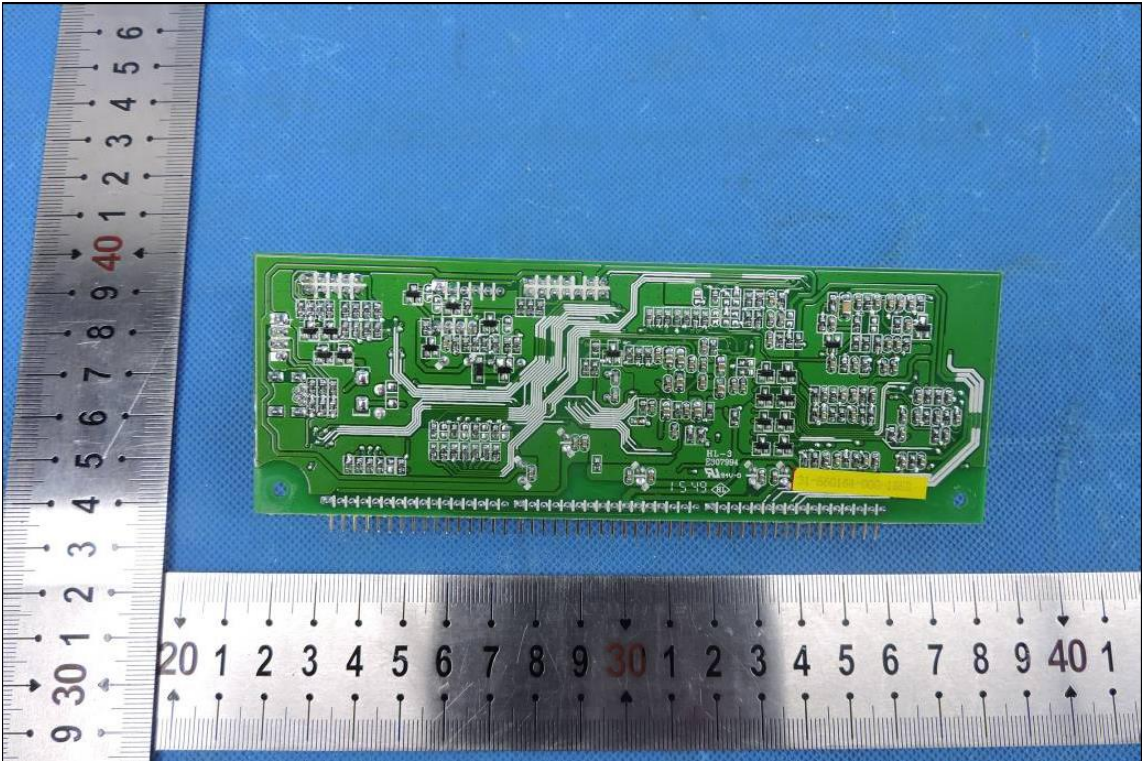


Fig. 28 --PCB of board trace view(FlinInfini Lite 1kW-12V &FlinInfini Lite 2kW-24V