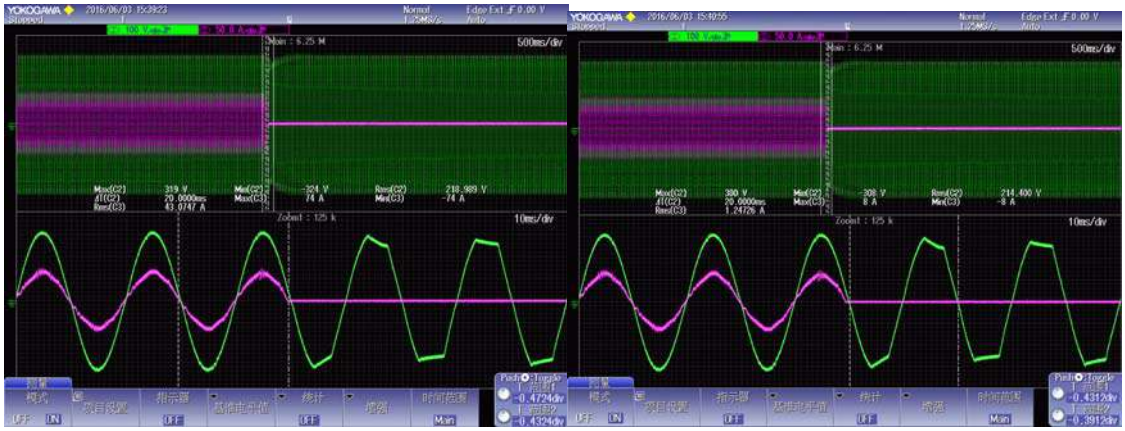
IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

6.4.2.11.1	**TABLE: - Change of operating mode – Normal to stored energy mode - AC input failure test**	P

Description of test conditions / test construction:

1) UPS initially operating at full linear load in normal mode, the input supply shall be interrupted, then UPS transfers to battery mode.
2) Check the system when the utility failure normal operation. Measure the transient output voltage deviation.

Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C
240V/60 Hz	Normal to Battery	218.9	/	/	214.4	/	/	2.0%	/	/



Channel 2 - Output Voltage

Channel 3 - Input Current

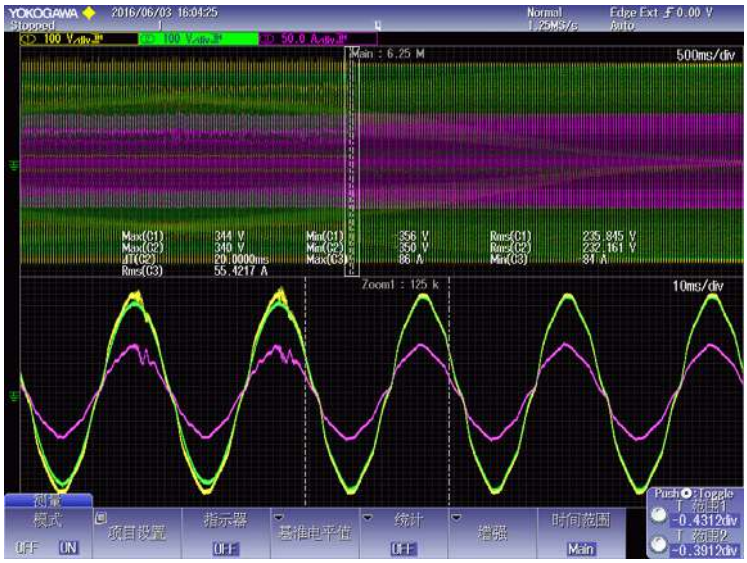
IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

6.4.2.11.3	**TABLE: - Change of operating mode – Normal to bypass mode - Overload test**	P

Description of test conditions / test construction:

1) UPS has a bypass mode of operation which is automatic in operation under conditions of output overload.
2) The input and output voltage waveforms shall be observed during transitions normal to bypass mode.

Measured graph: Load transfer from inverter to mains



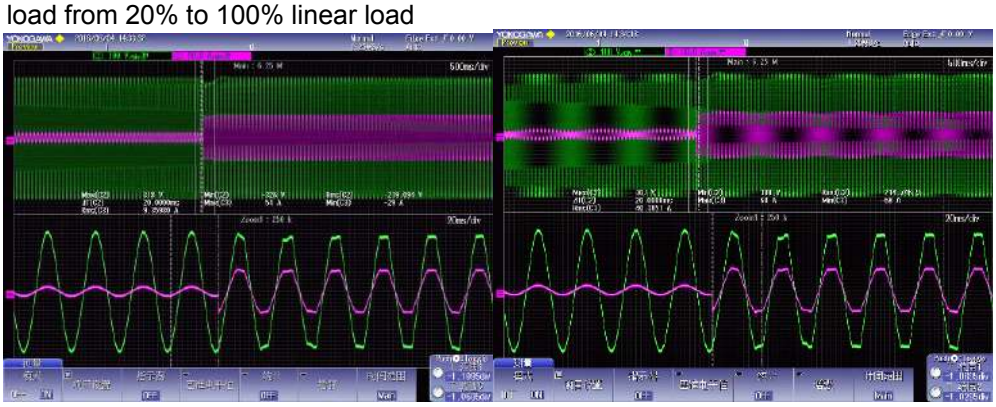
Channel 1 - Input Voltage
Channel 2 - Output Voltage
Channel 3 - Input Current

IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

6.4.2.11.4	**TABLE: - Step load –Normal mode**	P

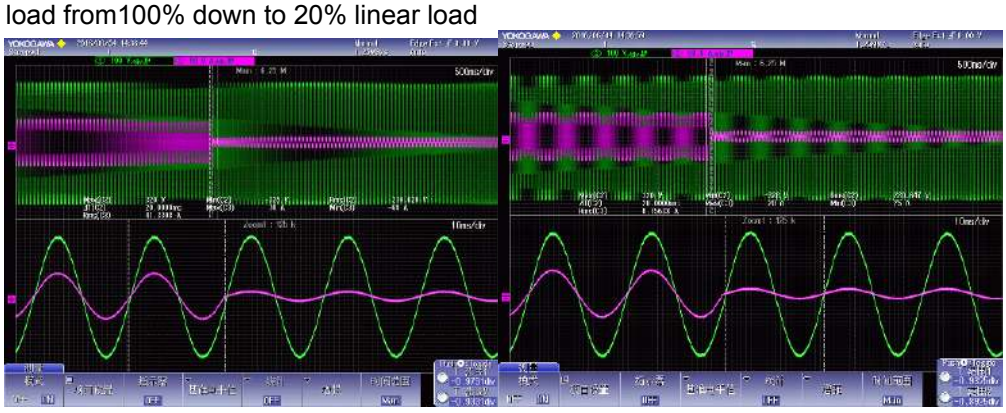
Description of test conditions / test construction:
1) Impact linear load as defined 20% => 100 %=> 20% nominal load with 230V/50Hz in normal mode.
2) Check the transient response

Measured graph:
1) Step load from 20% to 100% linear load



Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C
230V/50 Hz	20% to 100% load	219.0	/	/	214.7	/	/	2.0%	/	/

2) Step load from100% down to 20% linear load



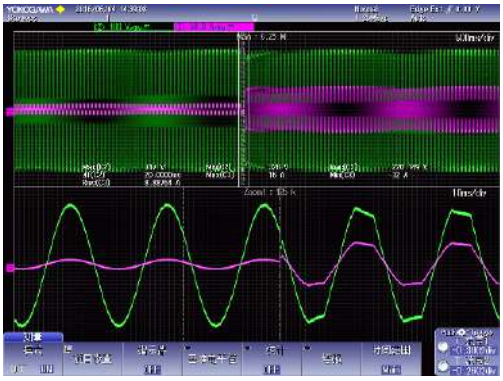
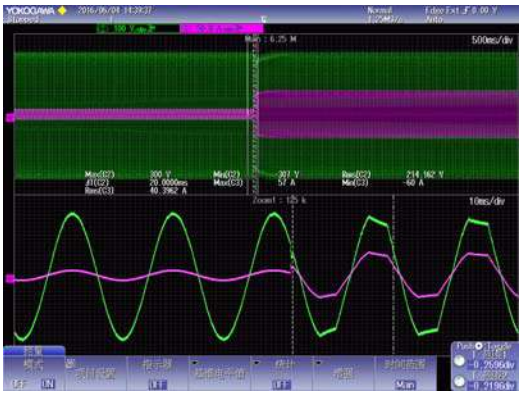
Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C
230V/50 Hz	100% to 20% load	219.6	/	/	220.6	/	/	2.0%	/	/

6.4.2.11.5	**TABLE: - Step load – Stored energy mode**	P

IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

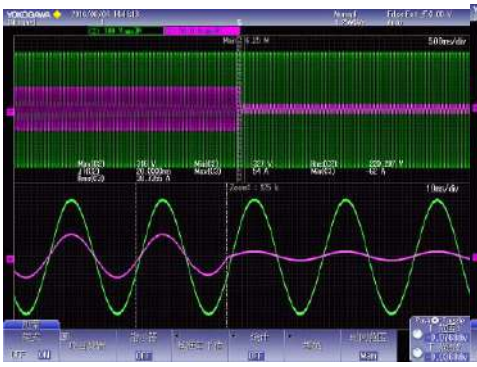
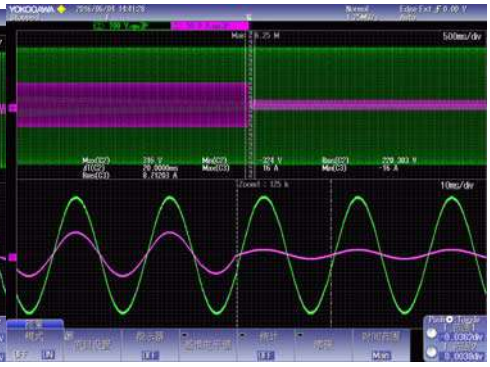
Description of test conditions / test construction:
1) Impact linear load as defined 20% => 100 %=> 20% nominal load with 230V/50Hz in battery mode.
2) Check the transient response

Measured graph:
1) Step load from 20% to 100% linear load

Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C
230V/50 Hz	20% to 100% load	220.1	/	/	214.1	/	/	2.7%	/	/

2) Step load from100% down to 20% linear load

Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C
230V/50 Hz	100% to 20% load	220.2	/	/	220.3	/	/	0.1%	/	/

6.4.3.1	**TABLE: - Output – Non-linear load: Normal mode – Full load - Harmonic components measurement**	P

IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

Description of test conditions / test construction:
UPS runs in normal mode, applying 100 % non-linear load to the UPS output, then measure output voltage and its fundamental and harmonic components.

Load (%)	Harmonic No.	Phase 1 (dB)	Phase 2 (dB)	Phase 3 (dB)	-
100	3	2.9	/	/	-
100	5	2.9	/	/	-
100	7	2.9	/	/	-
100	9	2.9	/	/	-
THD	Distortion at phase 1	Distortion at phase 2	Distortion at phase 3	Expected value due to the specification of the manufacturer	-
see formula to THD below	2.9%	/	/	⩽5%	-

$$THD = 100 \bullet \sqrt{\left(10^{\frac{3°}{20}}\right)^2 + \left(10^{\frac{5°}{20}}\right)^2 + \left(10^{\frac{7°}{20}}\right)^2 + \left(10^{\frac{9°}{20}}\right)^2}$$

IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

6.4.3.2	**TABLE: - Output – Non-linear load: Stored energy mode – Full load - Harmonic components measurement**				P
Description of test conditions / test construction: UPS runs in battery mode, applying 100 % non-linear load to the UPS output, then measure output voltage and its fundamental and harmonic components.					
Load (%)	Harmonic No.	Phase 1 (dB)	Phase 2 (dB)	Phase 3 (dB)	-
100	3	3.0	/	/	-
100	5	3.0	/	/	-
100	7	3.0	/	/	-
100	9	2.9	/	/	-
THD	Distortion at phase 1	Distortion at phase 2	Distortion at phase 3	Expected value due to the specification of the manufacturer	-
see formula to THD below	3.0%	/	/	⩽5%	-

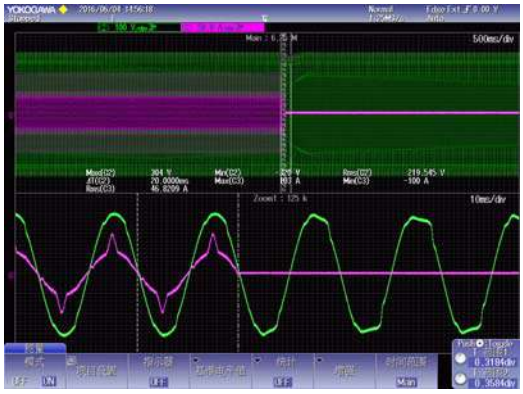
$$THD = 100 \bullet \sqrt{\left(10^{\frac{3^\circ}{20}}\right)^2 + \left(10^{\frac{5^\circ}{20}}\right)^2 + \left(10^{\frac{7^\circ}{20}}\right)^2 + \left(10^{\frac{9^\circ}{20}}\right)^2}$$

IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

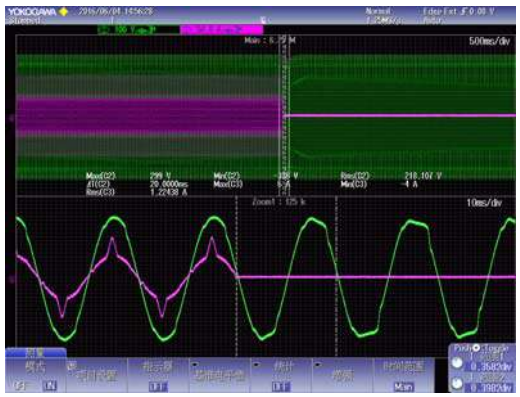
6.4.3.3.1 **6.4.3.3.2**	**TABLE: - Reference non-linear load – Normal to stored energy mode** **- AC input failure test** **- Reference non-linear load – Stored energy to normal mode**	P

Measured graph:

Before waveform



After waveform



Channel 2 - Output Voltage
Channel 3 - Output Current

Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C
230V/ 50Hz	Normal to Battery	219.5	/	/	218.1	/	/	0.6%	/	/

IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

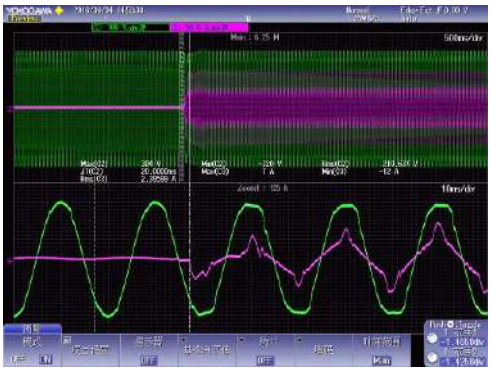
6.4.3.3.2	**TABLE: - Reference non-linear load – Stored energy to normal mode**	

Description of test conditions / test construction:

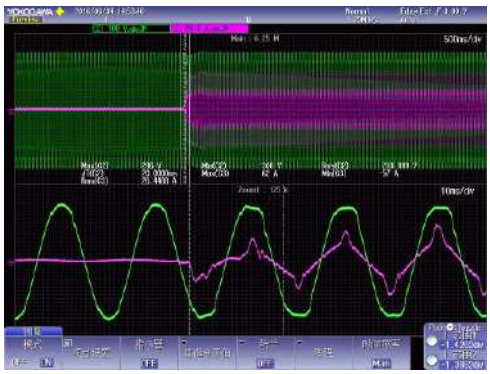
1) UPS initially operating at full non-linear load in battery mode, the input supply shall be recovery, then UPS transfers to normal mode,
2) Check the system when the utility response normal operation. Measure the transient output voltage deviation.

Measured graph:

Before waveform



After waveform



Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C
230V/ 50Hz	Battery to Normal	219.6	/	/	218.9	/	/	0.3%	/	/

Channel 2 - Output Voltage
Channel 3 - Output Current

6.4.3.3.3.a	**TABLE: - Reference non-linear load steps – Normal mode ≤ 4.0 kVA rating**	N/A

Description of test conditions / test construction:

Measured graph:

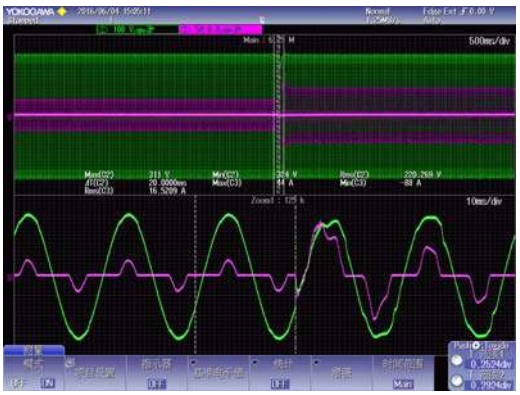
6.4.3.3.3.b	**TABLE: - Reference non-linear load steps – Normal mode > 4.0 kVA rating**	

IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

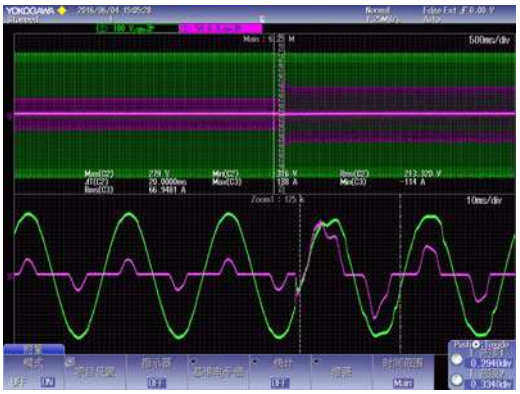
Description of test conditions / test construction:
1) Impact linear load as defined 33 %=> 66%=100 %=> 66 %=> 33% non-linear load with 230V/50Hz in normal mode.
2) Check the transient response.

Measured graph:
1) Step load from 33% up to 66% non-linear load

Before waveform



After waveform



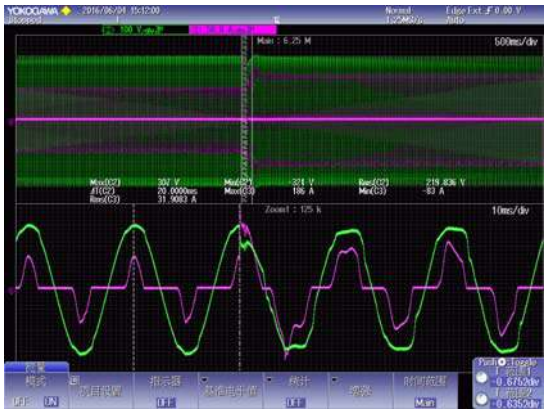
Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C
230V/50Hz	33%=> 66% load	220.2	/	/	213.3	/	/	3.1%	/	/

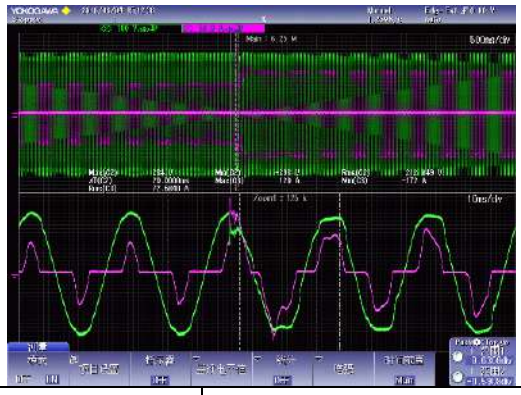
2) Step load from 66% up to 100% non-linear load

Before waveform

IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

After waveform



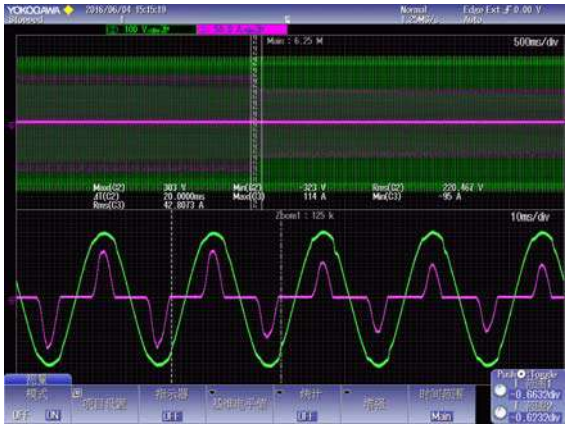


Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C
230V/50Hz	66%=100% load	219.8	/	/	212.2	/	/	3.5%	/	/

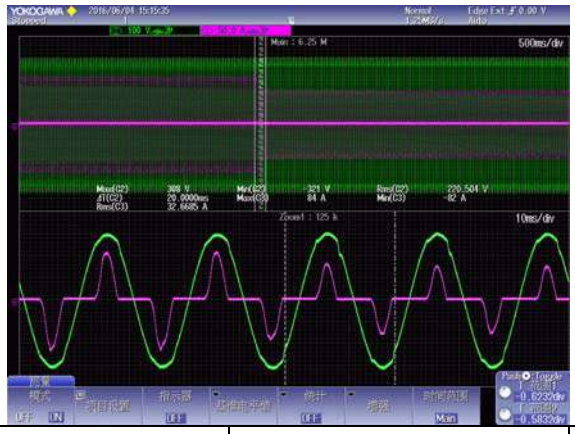
IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

3) Step load from100% down to 66% non-linear load

Before waveform



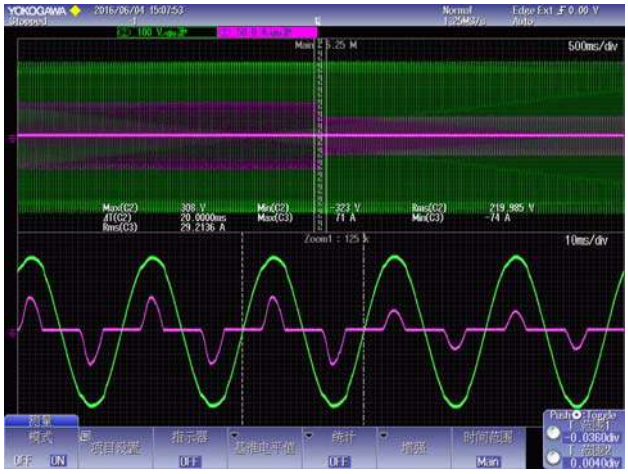
After waveform



Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C
230V/50Hz	100%=66% load	220.4	/	/	220.5	/	/	0.1%	/	/

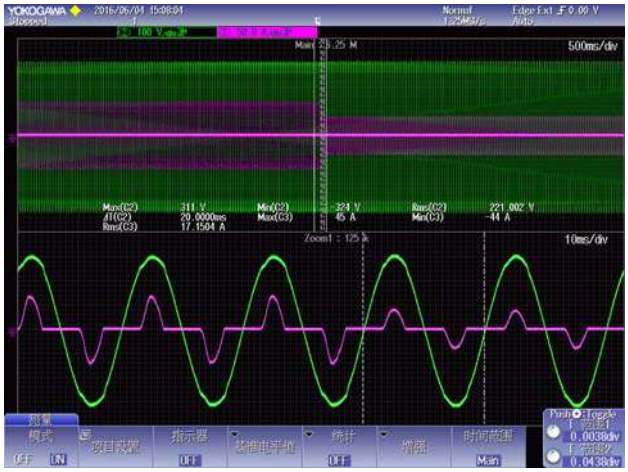
4) Step load from 66% down to 33% non-linear load

Before waveform



IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

After waveform



Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C
230V/ 50Hz	66%=33 % load	219.9			221.0			0.5%		

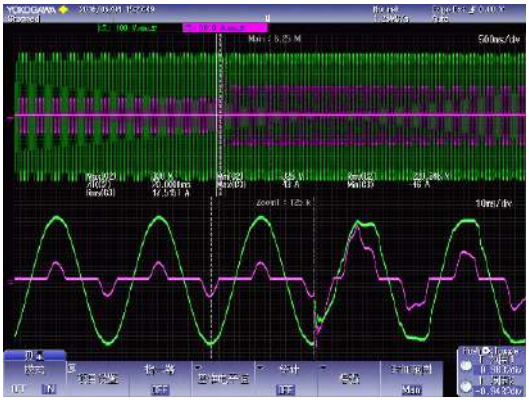
Channel 2 - Output Voltage
Channel 3 - Output Current

6.4.3.3.4	**TABLE: - Reference non-linear load steps – Stored energy mode ≤ 4.0 kVA rating**	N/A
Description of test conditions / test construction: test repeated according to sub-clause 6.4.3.3.3.a		
Measured graph: N/A		

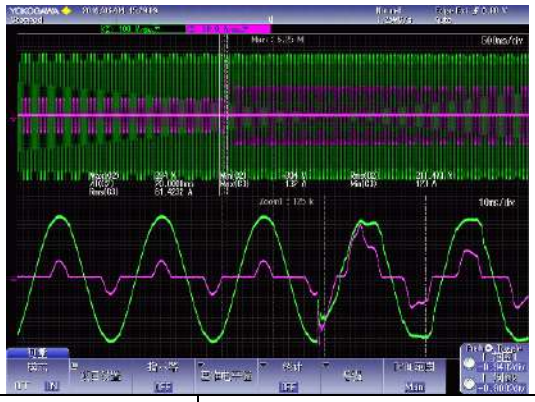
6.4.3.3.4	**TABLE: - Reference non-linear load steps – Stored energy mode > 4.0 kVA rating**	
Description of test conditions / test construction: test repeated according to sub-clause 6.4.3.3.3.b 1) Impact linear load as defined 33 %=> 66%=100 %=> 66 %=> 33% non-linear load with 230V/50Hz in battery mode. 2) Check the transient response		
Measured graph: 1) Step load from 33% up to 66% non-linear load		

IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

Before waveform



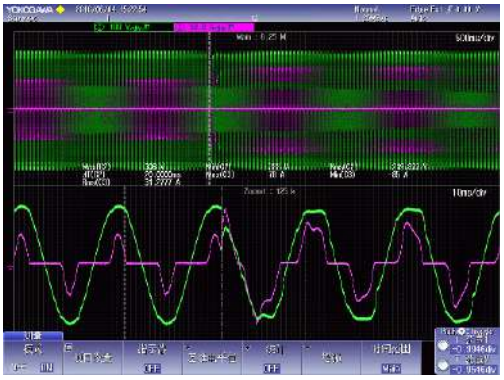
After waveform



Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C
230V/50Hz	33%=66% load	220.3	/	/	211.4	/	/	4.1%	/	/

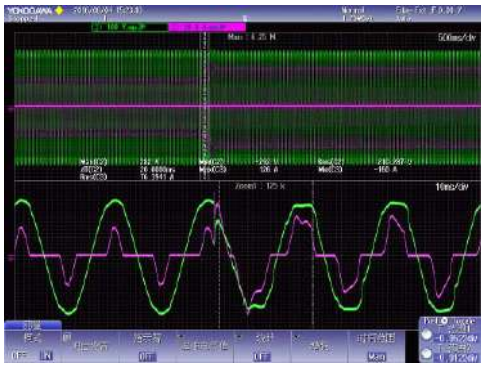
2)Step load from 66% up to 100% non-linear load

Before waveform



After waveform

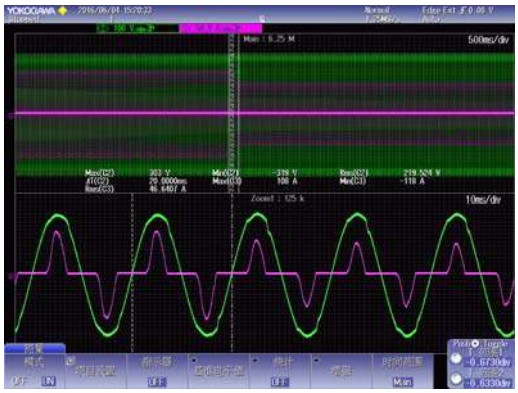
IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict



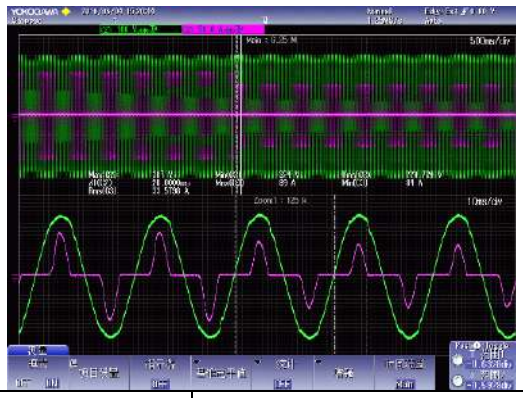
Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C
230V/50Hz	66%=100% load	219.8	/	/	210.2	/	/	4.4%	/	/

3) Step load from100% down to 66% non-linear load

Before waveform



After waveform



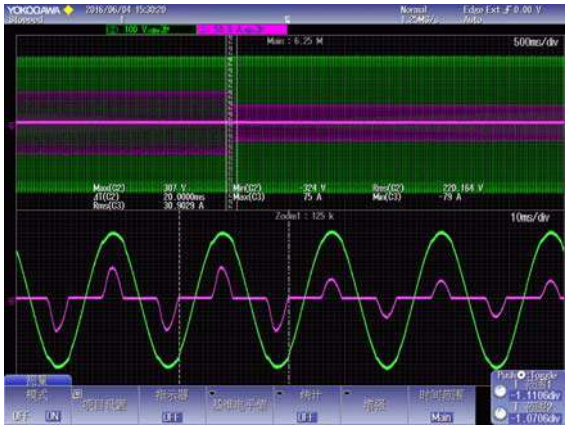
Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C

IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

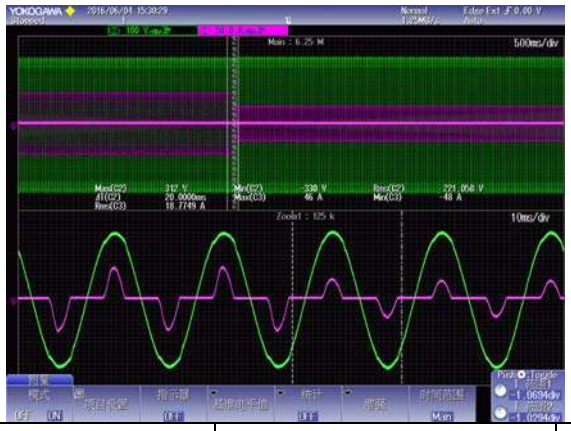
230V/50Hz	100%=66% load	219.6	/	/	220.7	/	/	0.5%	/	/	

4) Step load from 66% downto 33% non-linear load

Before waveform



After waveform



Power Type	Response procedure	Before			After			deviation < 5%		
		A	B	C	A	B	C	deviation Phase A	deviation Phase B	deviation Phase C
230V/50Hz	100%=66% load	220.1	/	/	221.0	/	/	0.4%	/	/

Channel 2 - Output Voltage

Channel 3 - Output Current

IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

4.5	TABLE: List of critical components				P
Object/part no.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity [1.]
DC fan	YATE LOON ELECTRONICS CO., LTD.	D12BH-12D	12V,0.30A	UL507	UL E189702
FUSE	ZHEJIANG MINGRONG ELECTRICAL PROTECTION CO.,LTD.	RS15	500V,32A	IEC/EN60127	VDE
RELAY	SONGCHUAN	832A-1C-F-C 735-2C-C	12VDC,30A,250 V 12VDC,2C,25A,250VAC	UL508 & 873	UL E88991 VDE 6615
Primary wire	FENG CHING METAL CORP	2UEW	130oC	UL 1446	UL
PCB	various	FR-1 FR-4	130℃，V-0	UL95	UL
Front panel	CHIMEI	PA765A	Thickness＞ 2.54mm	UL94	UL
X2 Cap	XIAMEN FARATRONIC CO.,LTD. SHENZHEN SURONG CAPACITORS CO.,LTD.	MPX/MKP	2.2uF,275V 3.3uF,280V	IEC/EN60384	VDE
Y Cap	FENGHUA ADVANCED TECHNOLOGY HOLDING CO.,LTD.	CT7	Y2,0.01uF,250V Y2,4700pF,250V	IEC/EN60384	VDE
Battery	LEOCH BATTERY CO., LTD.	DJW12-7.0 DJW12-9.0	192V,7AH 192V,9AH	UL1989	UL MH26866
Whole unit					
Breaker	KUOYUH W L ENTERPRISE CO LTD	88	8A/250VAC	UL1077	UL E155159(S)
ON MAIN board					
Fuses	LITTELFUSE	0216008	F8AL, 250V	EN60127-1 EN 60127-2	VDE: 40013834
PCB	BAOYUEJIA ELECTRONICS CO., LTD	BY-2	V-0, 130°C, min. 1.5mm	UL74 UL 796	UL: E230225

IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

Mains Transformer	JEPULS TECHNOLOGY(SHENZHEN) CO.,LTD ALT- SHENZHEN FERROCOIL ELECTRONICS TECHNOLOGY CO.,LTD ALT- ShenZhenJiaMei Rui ELECTRONICS CO.,LTD		Class B	IEC 62040	Test with appliance
ON I/P_EMI board					
X-Capacitors	Xiamen Faratronic Co., Ltd	MKP62	X2, 275VAC, 2.2uF, 100°C	IEC 60384-14	VDE: 40000358
Y-Capacitors	GUANGDONG FENGHUA BANGKE ELECTRONIC CO. ,LTD	CT7-Y2	Y2, 4700pF, 250V, 85oC	IEC 60384-14	VDE: 40013869
MOV/Surge suppressor,/MCB ifused	Nanjing Kemin Electronics Co., Ltd	HEL 20D561K	AC350/DC460	IEC 61051-1 IEC 61051-2	VDE: 40008621

Supplementary information:

An asterisk indicates a mark that assures the agreed level of surveillance.

IEC 62040-3			
Clause	Requirement + Test	Result - Remark	Verdict

Pictures

Fig. 1 –Overview I

Fig. 2 –Overview II

Pictures

Fig. 3 –internal view

Fig. 4 – internal view

Pictures

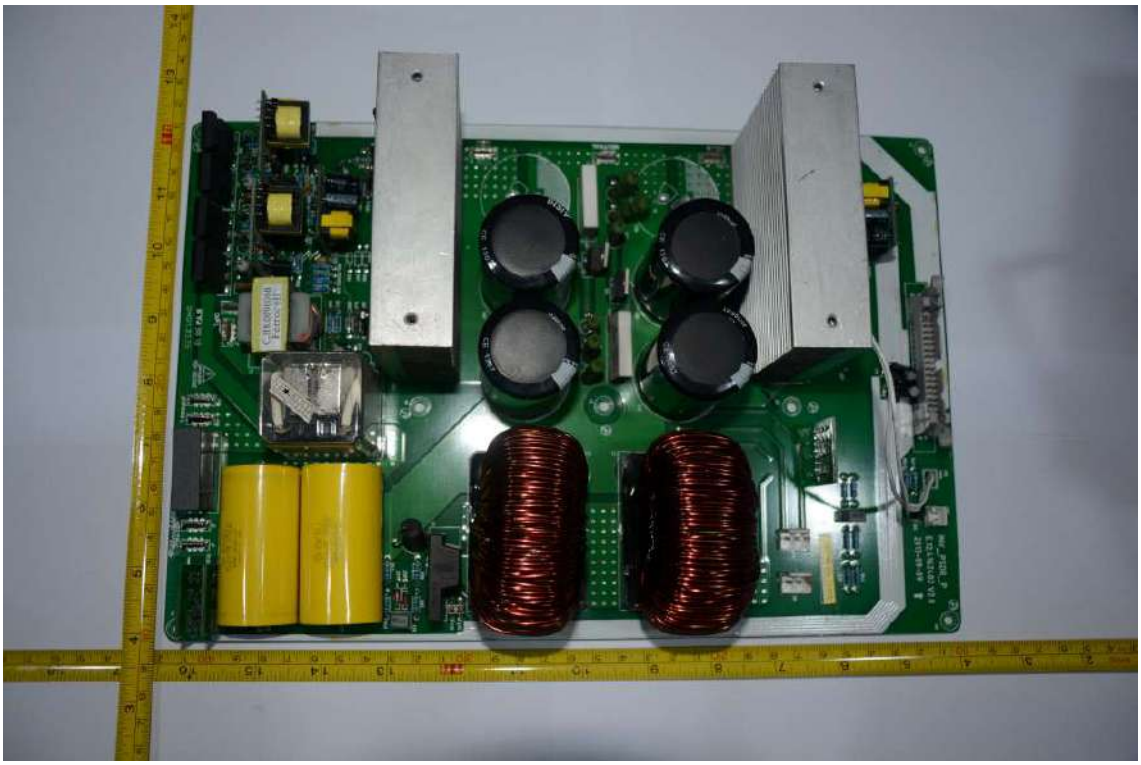


Fig. 5 – PCB components view

Fig. 6 – PCB trace view

Pictures

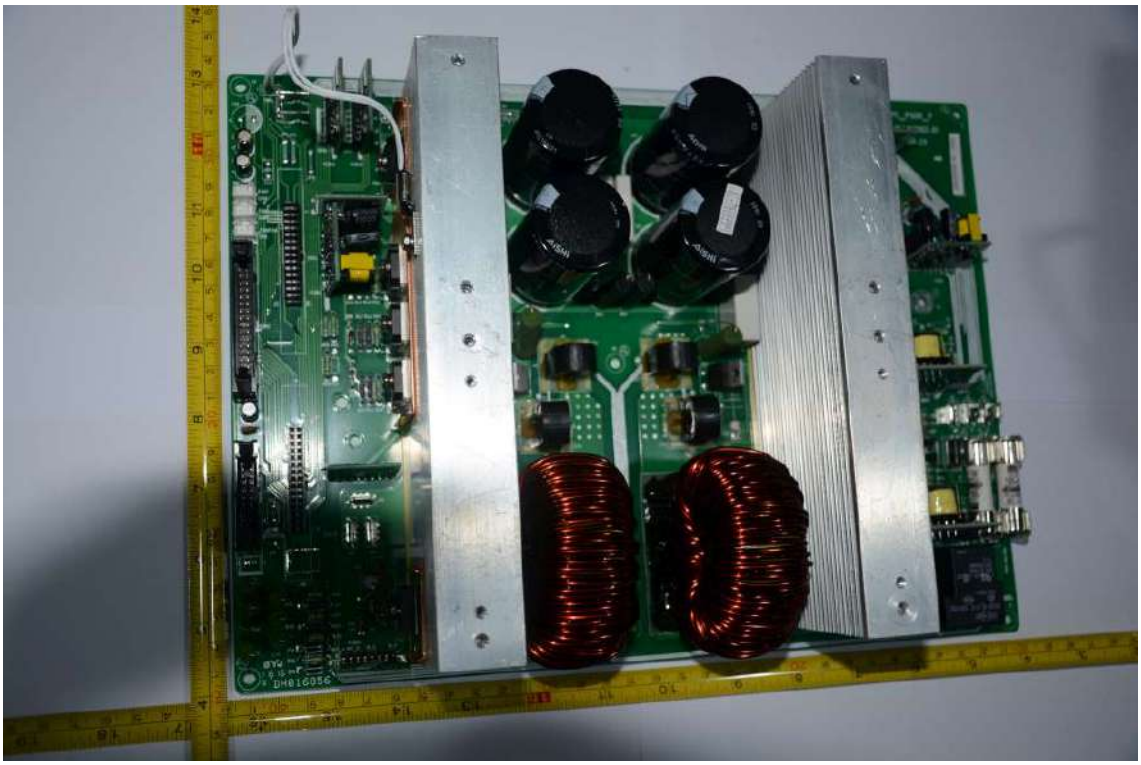


Fig. 7 – PCB components view

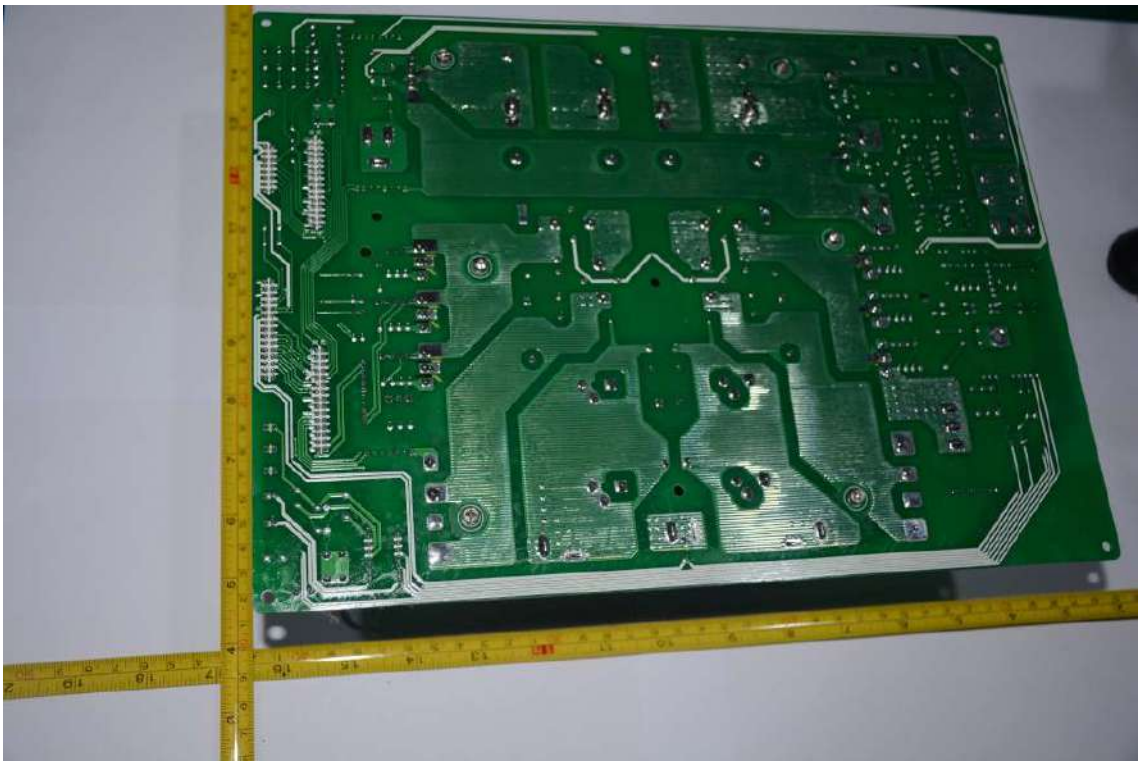


Fig. 8 – PCB trace view

Pictures

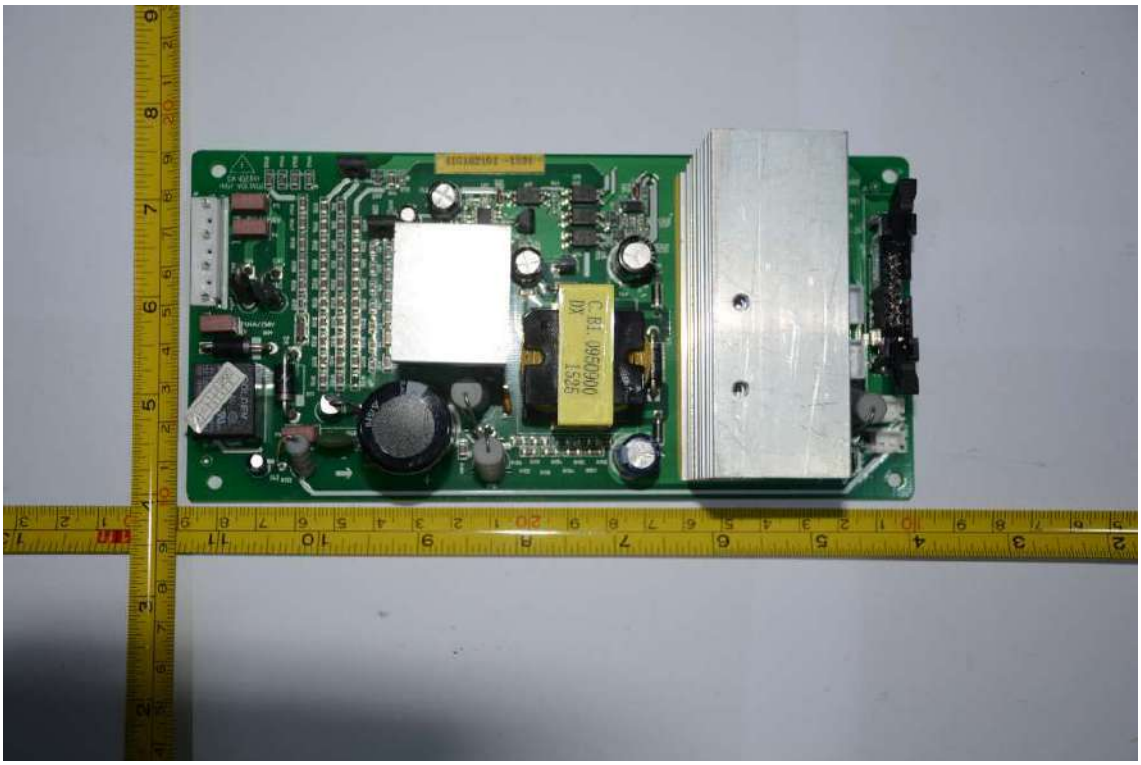


Fig. 9 – PCB components view

Fig. 10 – PCB trace view

Pictures

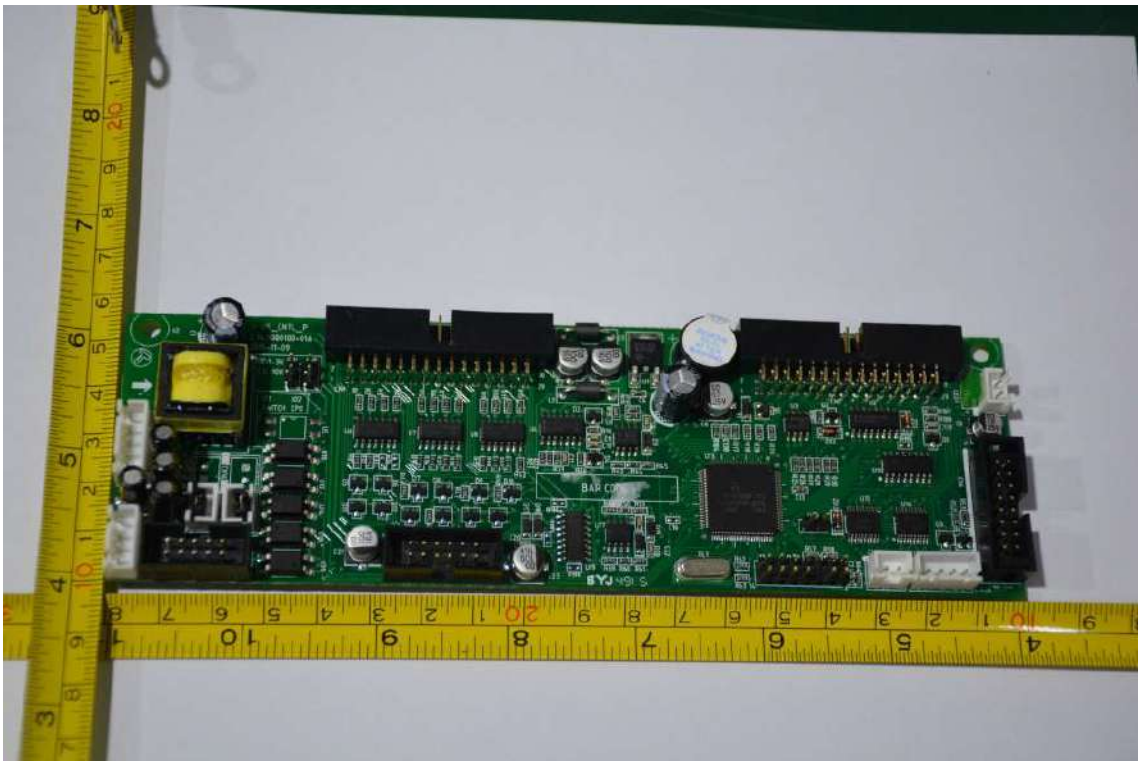


Fig. 11 – PCB components view

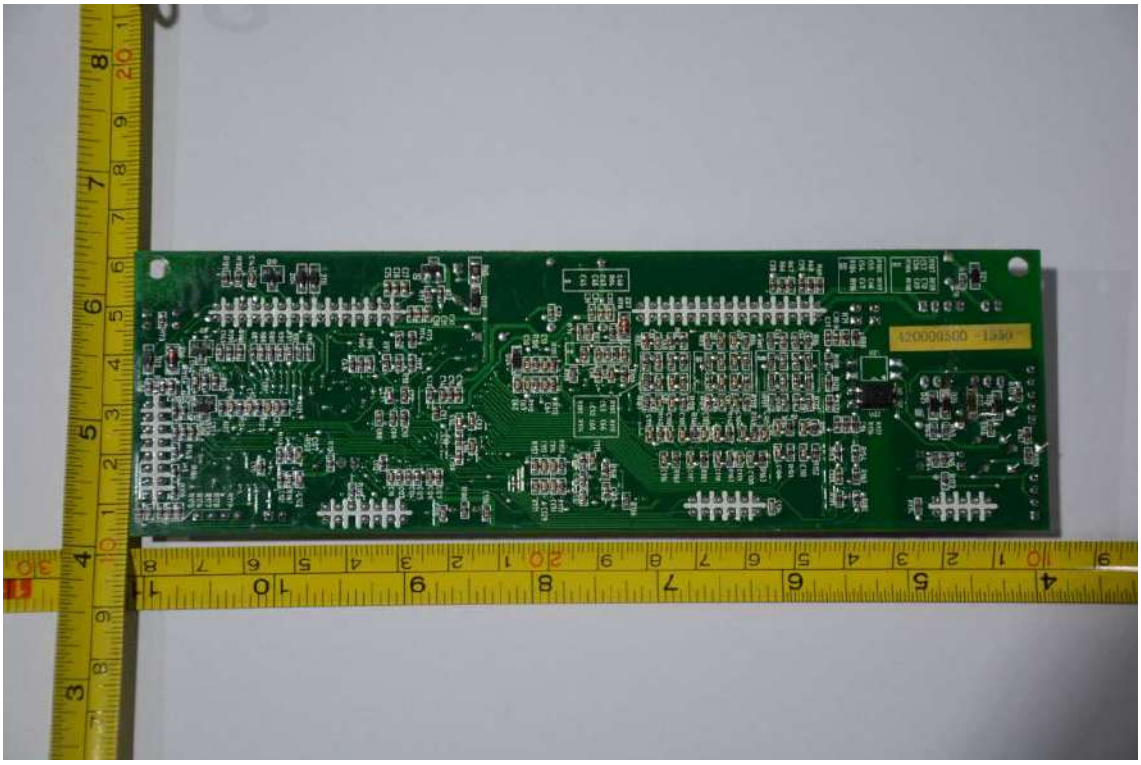


Fig. 12 – PCB trace view

Pictures

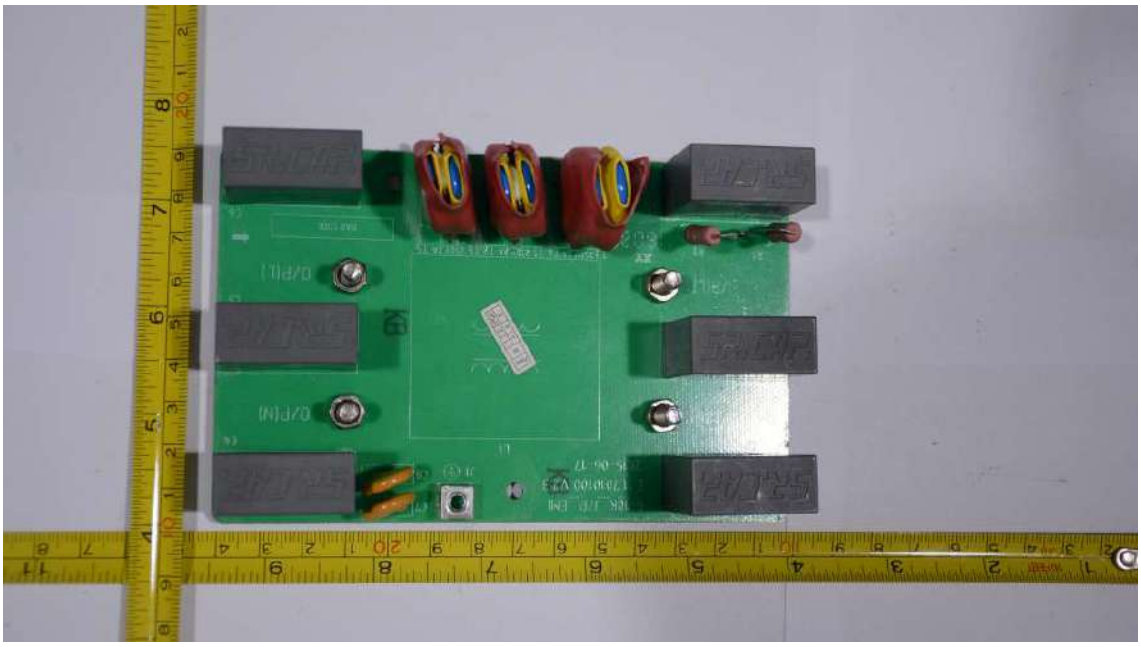


Fig. 13 – PCB components view

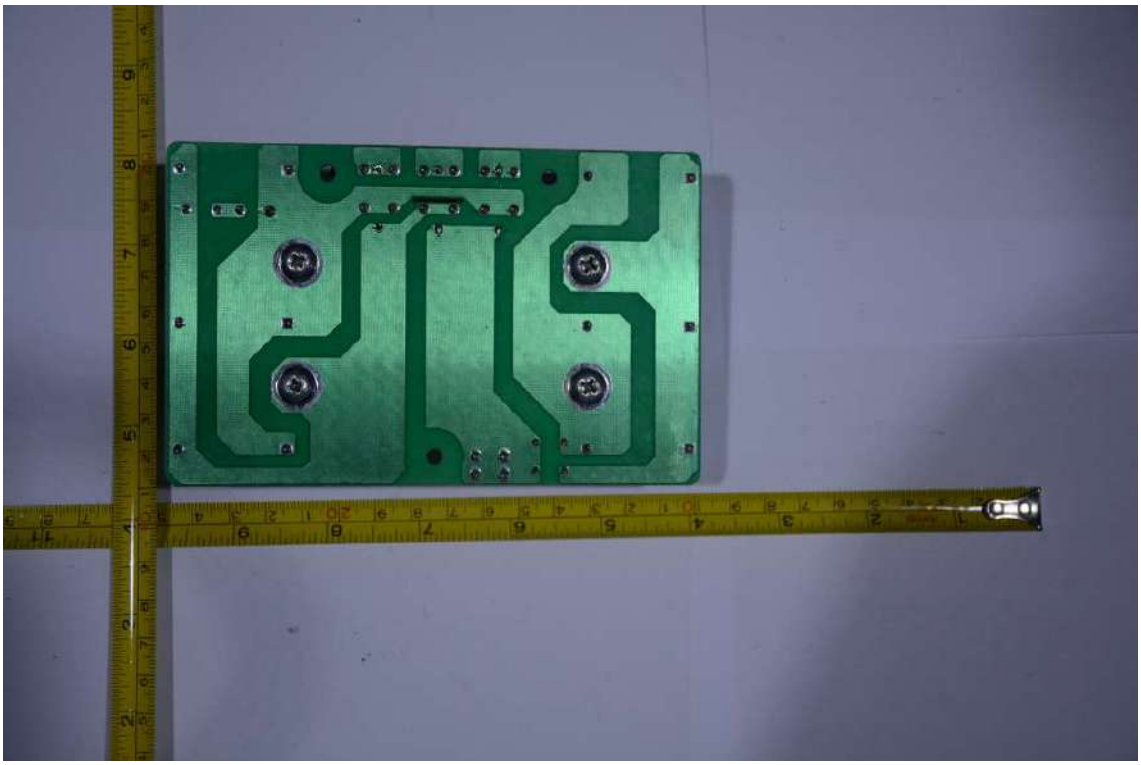


Fig. 14 – PCB trace view

Pictures

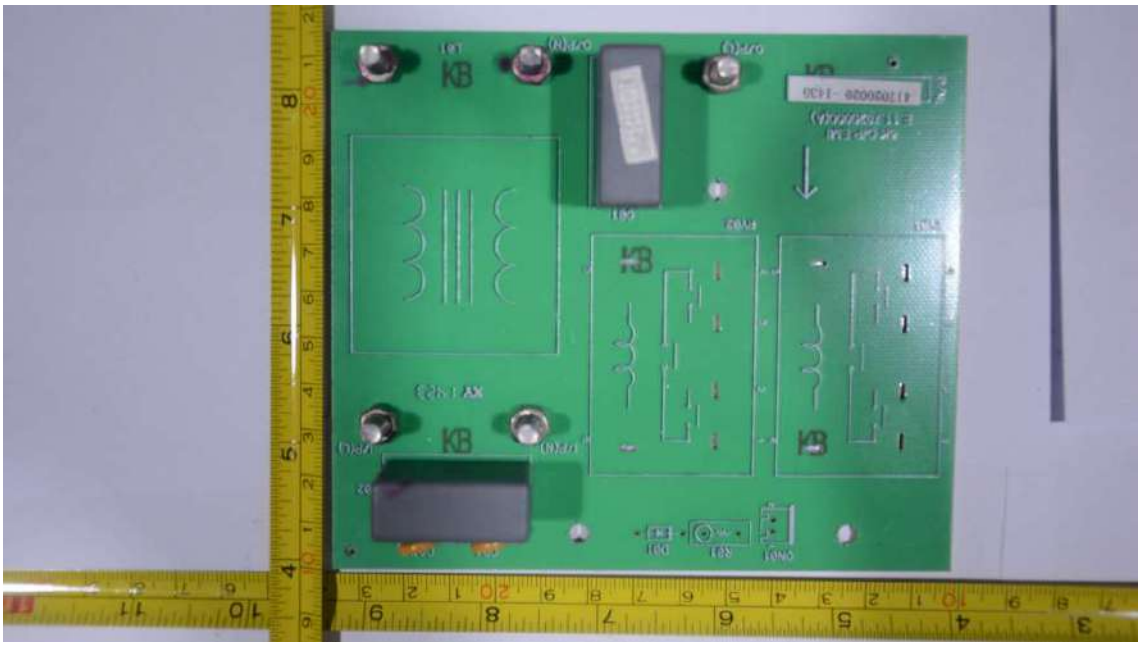


Fig. 15 – PCB component view

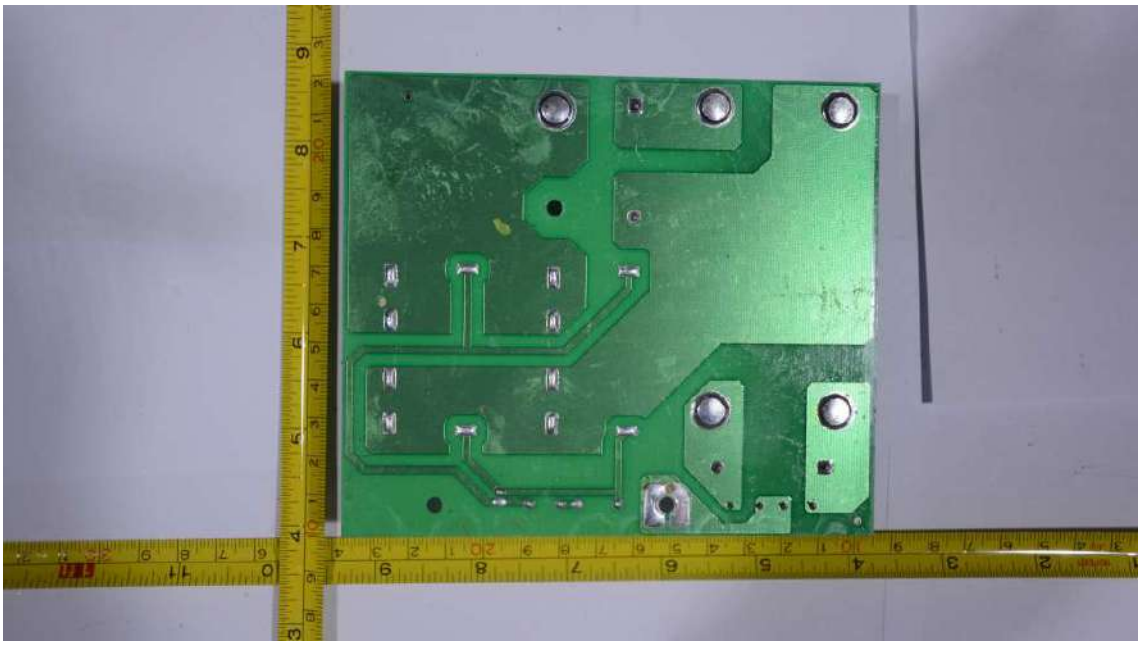


Fig. 16 – PCB trace view

Pictures

Fig. 17 – PCB components view

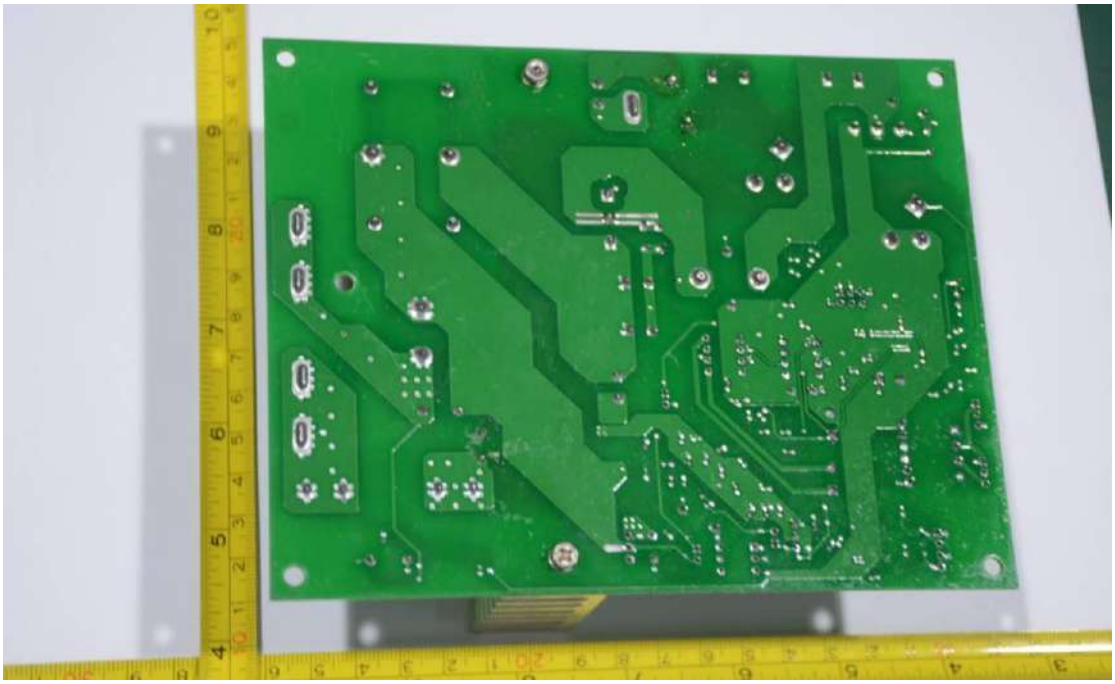


Fig. 18 – PCB trace view