

4345892.50V1.0

EMC Test report for Plug-in adaptor

Models PM1Wab-ccc

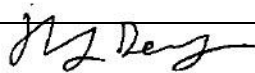
(a=nil or B, indicate color of product;
b=nil or U2, indicate USB output provided;
c=A to Z, or nil, indicate different outlet style)

Guangzhou, date of issue: 2018-07-06

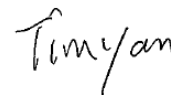
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Reviewed : Tim Yan



Pages : 28 pages

Annex : NIL

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1 TEST DESCRIPTION

The conclusion and results stated in this test report are based on a non-recurrent examination of sample(s) provided by the applicant.

This report is based on report 4322705.50. In this update,

1, adding two new models PM1WB-SP and PM1WB-GR, they are have same electronic circuit as models PM1W-SP and PM1W-GR but with different colour of enclosure.

2, adding new standard EN 55032: 2012+AC: 2013 to take place standard EN 55022.

3, standard EN 55024 was updated to version A1: 2015.

4, changing the name principle into PM1Wab-ccc. Refer to section 1.1 for details.

After technical review, model PM1WU2-GR was chosen to repeat mains conducted disturbance voltage test and radiated emission test for compliance verification.

1.1 Model description

The apparatus as supplied for the test is plug-in adaptor which intended for residential use, the product contains electronic control circuit and with earth connection.

Base on client's declaration, all models are with similar electronic circuitry but with different outlet types.

PM1Wab-ccc

a=nil or B, indicate color of product;

b=nil or U2, indicate USB output provided;

c=A to Z, or nil, indicate different outlet style.

Hence, model PM1WU2-GR was chosen for full test, and the corresponding data are representative of the other models as well.



Figure 1 model PM1WU2-GR

The operating modes during test are on (one port with load and two ports with load) and off mode.

1.2 Environment

The requirements and standards apply to equipment intended for use in:

√	Residential (domestic) environment
√	Commercial and light-industrial environment
	Industrial environment
	Medical environment

1.3 Classification

For the equipment under test the following classification is applicable.

	EN 55032 Class A	All other equipment doesn't belongs to Class B.
√	EN 55032 Class B	Equipment intended to offer adequate protection to broadcast services within the residential environment.

2 SUMMARY

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

2.1 Applied standards

Standard	Year	Title
EN 55032	2012	Electromagnetic compatibility of multimedia equipment – Emission requirements
AC	2013	
EN 55024	2010	Information technology equipment - Immunity characteristics - Limits and methods of measurement
A1	2015	
EN 61000-3-2	2014	Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
EN 61000-3-3	2013	Electromagnetic compatibility (EMC) -- Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

2.2 Overview of results

	Result
Emission tests	
Mains conducted disturbance voltage	PASS
Radiated Emission	PASS
Harmonic current emission	PASS
Limitation of voltage fluctuations (flicker)	PASS

	Result
Immunity tests	
Electrostatic Discharges (ESD)	PASS
Radiated EM Field	PASS
Electrical fast transient (EFT) / Burst transients	PASS
Surge transients	PASS
Conducted RF disturbances	PASS
Power supply voltage interruptions & dips	PASS

3 GENERAL INFORMATION

3.1 Product Information

Equipment under test	Plug-in adaptor
Trade mark	APC by Schneider Electric
Tested Type	PM1WU2-GR
Represented type(s)	PM1Wab-ccc a=nil or B, indicate color of product; b=nil or U2, indicate USB output provided; c=A to Z, or nil, indicate different outlet style.
Input	250 Vac, 50 Hz, Max. 10 A for models PM1Wab-IT; 250 Vac, 50 Hz, Max. 13 A for models PM1Wab-UK; The other models: Max. 16A
Output	5 Vdc, 2,4 A for models PM1WaU2-ccc
The highest frequency of the internal sources	Less than 108 MHz

3.2 Customer Information

Applicant	American Power Conversion Holdings Inc.
Address	3F, No. 205, sec. 3, Beixin Rd., Xindian Dist., New Taipei City, Taiwan

Manufacturer/Factory	Dongguan Quan Sheng Electric Co., Ltd.
Address	2nd Industrial Zone, Ju-Tang, Housha Road, Houjie Town, 523963 Dongguan, Guangdong, China

3.3 Test data

Location	DEKRA Testing and Certification (Shanghai) Ltd. Guangzhou Branch
Address	Building A3, No.3 Qiyun Road, Science City, Guangzhou Hi-Tech Industrial Development Zone, Guangzhou, P.R. China
Location	Guangzhou Electrical Safety Testing Institute (CEST)
Address	No.6, Haichengdong Street, Xingangdong Road, Haizhu District, Guangzhou, 510330, P. R. China
Date	2015-05-13 to 2015-07-02; 2018-05-24 to 2018-06-07
Supervised by	Harry Deng

3.4 Environmental conditions

Tests have been performed in a controlled laboratory environment, where the environmental conditions are maintained within the applicable ranges.

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%

3.5 Overview of measurement uncertainty

Measurement	Uncertainty
Mains disturbance voltage (150 kHz – 30 MHz)	2,82 dB
Radiated EM field emission (30 MHz– 300 MHz)	4,72 dB
Radiated EM field emission (300 MHz– 1000 MHz)	4,88 dB

3.6 Equipment list

Location: DEKRA Testing and Certification (Shanghai) Ltd. Guangzhou Branch

Item	Instrumentation	Manufacturer	Model No.	Serial No.	Dekra No.	Cal. Interval
1	EMI Receiver	R&S	ESCI	101206	G/L858	2018/11/02
2	LISN	R&S	ENV216	101336	G/L859	2018/11/02
3	Shielding Room	Changzhou Feite	/	/	G/L861	2018/07/05
4	EMI receiver	R&S	ESCI	101205	G/L857	2018/11/02
5	Antenna (30MHz-3GHz)	SCHWARZBECK	VULB9163	506	G/L864	2018/10/30
6	Chamber	ETS	/	/	G/L856	2018/07/05
7	ESD Generator	TESEQ	NSG435	6513	G/L867	2018/11/05
8	Signal Generator	TESEQ	NSG3040	1821	G/L868	2018/09/07
9	STEPTRANSFORMER	TESEQ	INA6501	/	G/L868	2018/09/07
10	Signal Generator	TESEQ	NSG4070	31446	G/L870	2019/01/01
11	CDN	TESEQ	M016	31564	G/L870	2019/01/01
12	EM-Koppelzange	TESEQ	KEMZ801	31493	G/L870	2019/01/01
13	6dB	TESEQ	ATN6075	30789	G/L870	2019/01/01

4 EMISSION TEST RESULTS

4.1 Mains conducted disturbance voltage

Requirements

Standard	EN 55032 (Class B)			
Frequency [MHz]	Limits			
	QP [dB(μV)]		AV [dB(μV)]	
0,15 – 0,50	66	–	56 *)	56 – 46 *)
0,50 – 5	56		46	
5 – 30	60		50	

*) Limits decreasing linearly with the logarithm of the frequency

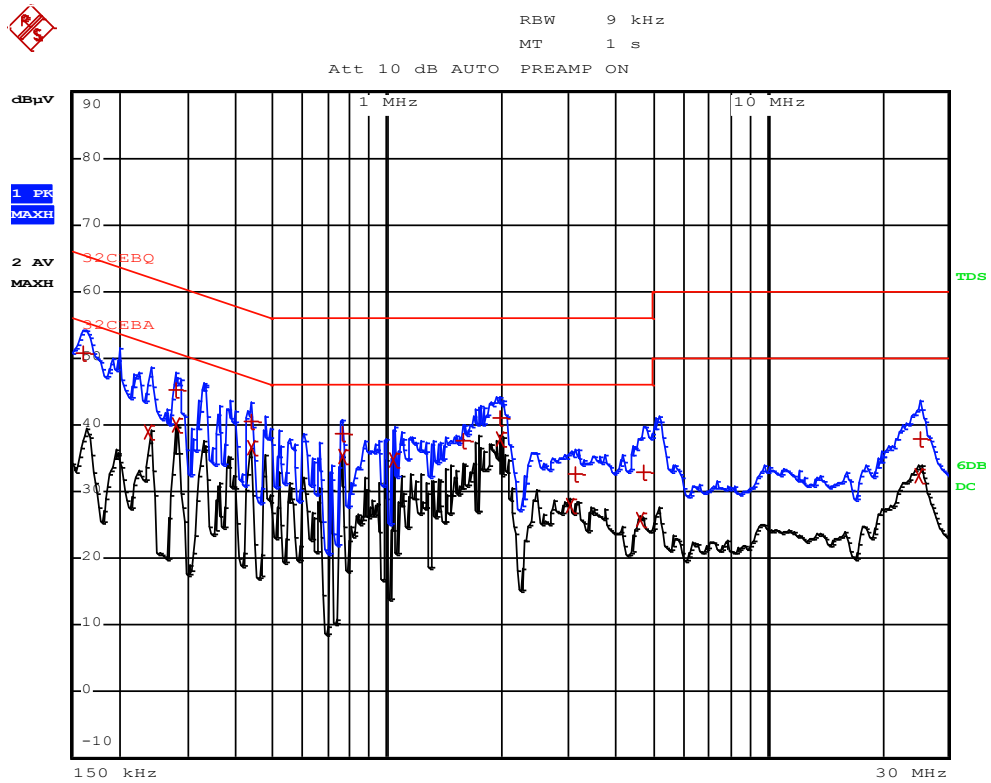
Environment condition

Ambient temperature	21,5 °C
Relative Humidity air	42,3 %

Model	PM1WU2-GR
Port	AC mains
Test method	LISN
Operation Mode	One USB port with load
Test Voltage	250 Vac, 50 Hz

Results

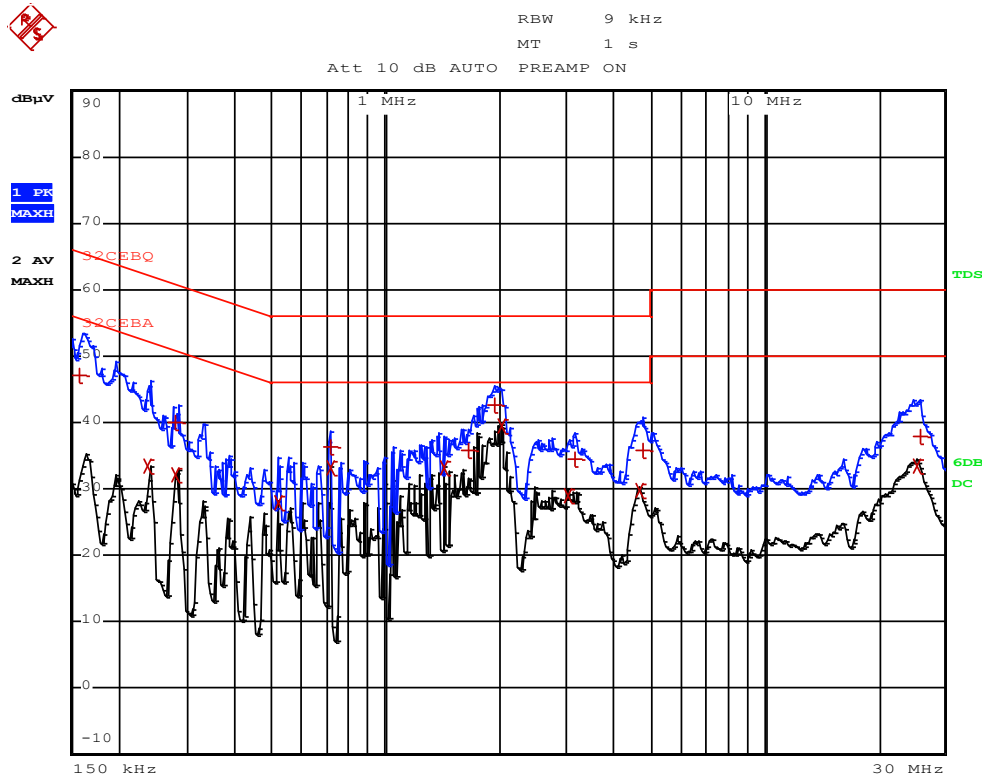
Live



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	32CEBQ		
Trace2:	32CEBA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	1.99 MHz	37.80	-8.19
2 Average	438 kHz	36.54	-10.55
2 Average	762 kHz	35.29	-10.71
2 Average	278 kHz	39.92	-10.95
2 Average	1.042 MHz	34.76	-11.23
2 Average	238 kHz	39.03	-13.12

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Natural



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	32CEBQ		
Trace2:	32CEBA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	2.038 MHz	39.46	-6.53
2 Average	714 kHz	33.21	-12.78
2 Average	1.43 MHz	33.12	-12.87
1 Quasi Peak	1.954 MHz	42.51	-13.48
2 Average	4.67 MHz	29.78	-16.21
2 Average	25.37 MHz	33.36	-16.63

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

See chapter 6 for a photo of the test setup.

Conclusion:

PASS

4.2 Radiated EM Field emission

Requirements

Standard	EN 55032 (Class B)
Measuring distance	3 meters

Frequency [MHz]	Limits - QP [dB(μ V/m)]
30 – 230	40
230 – 1000	47

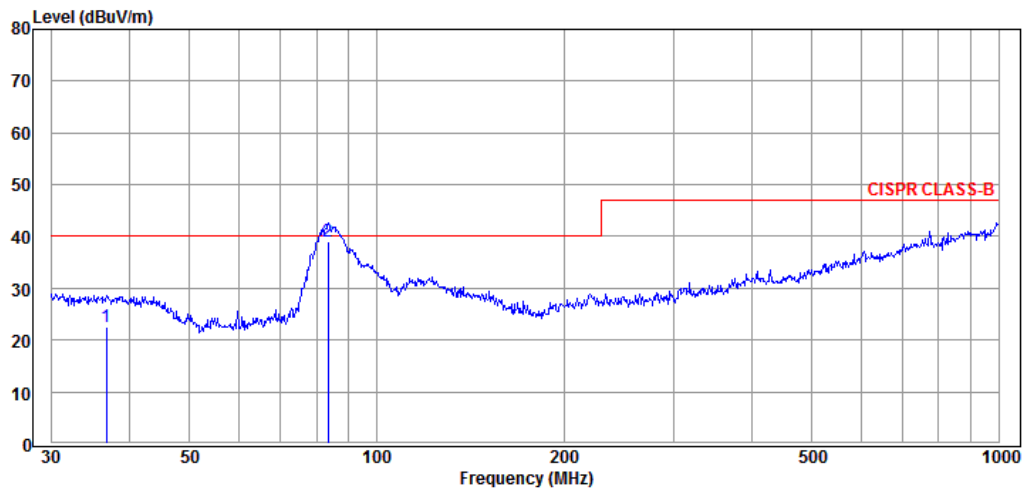
ITU frequency bands as stated in EN 55011 are excluded from the mentioned limits.

Environment condition

Ambient temperature	22,6 °C
Relative Humidity air	40,9 %

Model	PM1WU2-GR
Operation Mode	Two USB ports with load
Test voltage	250 Vac, 50 Hz

Results
Horizontal

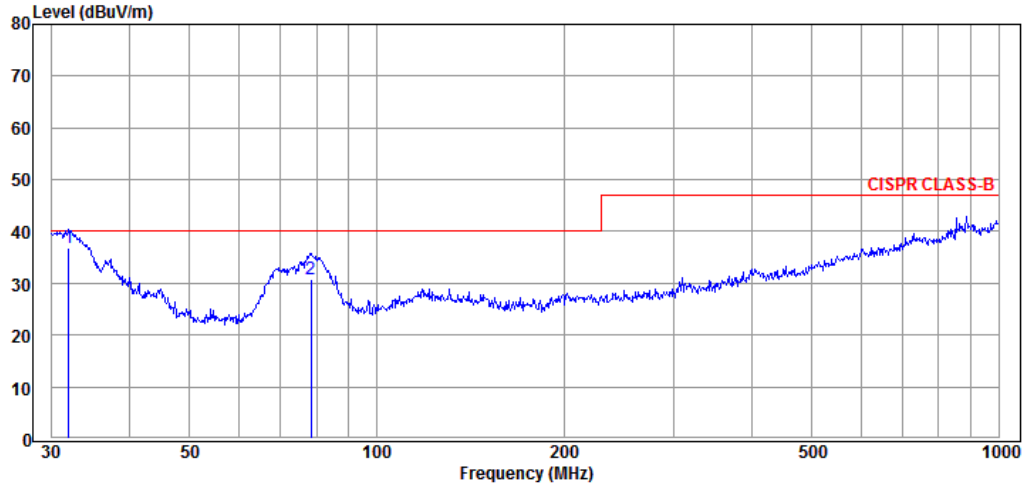


Freq (MHz)	Reading (dBuV)	C.F (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin=limit-result (dB)
36,77	7,87	14,80	22,67	40,00	17,33
83,52	30,39	8,53	38,92	40,00	1,08

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss

No other significant emissions were measured at the frequency range of interest employing the QP detectors.

Vertical



Freq (MHz)	Reading (dBuV)	C.F (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin=limit-result (dB)
31,96	22,61	14,27	36,88	40,00	3,12
78,41	22,87	7,91	30,78	40,00	9,22

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss

No other significant emissions were measured at the frequency range of interest employing the QP detectors.

See chapter 6 for a photo of the test setup.

Conclusion:

PASS

4.3 Harmonic currents

Requirements

Standard	EN 61000-3-2
Port	AC Mains supply

√	Class A	All apparatus not classified as Class B, C or D
	Class B	Portable tools
	Class C	Lighting equipment
	Class D	Personal computers, television receivers, refrigerators and freezers having one or more variable-speed to control compressor motor(s)

Results and limits

This product is not defined as lighting equipment, and rated power is less than 75W, therefore, no limit applies according to EN 61000-3-2.

Conclusion:

PASS

4.4 Voltage fluctuations (Flicker)

Requirements

Standard	EN 61000-3-3
Port	AC Mains supply

Equipment intended to be connected to 230/400 V, 50 Hz supply systems may not produce voltage fluctuations in the supply systems due to variation of the input current above the limits as stated below.

Results

√	Tests are not necessary because the EUT is unlikely to produce significant voltage fluctuations or flicker (clause 6.1)
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Conclusion:

PASS

5 IMMUNITY TEST RESULTS

5.1 Electrostatic discharge immunity

Electrostatic discharges (ESD) are the result of persons or objects that accumulate static electricity due to for instance walking on synthetic carpets. The ESD can influence the operation of equipment or damage its electronics, either by a direct discharge or indirectly by coupling or radiation. Both effects are simulated during the tests.

Requirements

Standard	EN 55024
Basic standard	EN 61000-4-2
Port	Enclosure
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed.
Air discharges	2, 4, 8 kV
Contact discharges	4 kV

Performed tests

Model	PM1WU2-GR						
Operation mode	Two USB ports with load						
Air discharges	√	2 kV	√	4 kV	√	8 kV	xx kV
Contact discharges		2 kV	√	4 kV		8 kV	xx kV
Via coupling planes	√	Horizontal			√	Vertical	
Polarity	√	Positive			√	Negative	
Set-up	√	Table-top				Floor standing	
Ambient temperature	20 °C						
Relative Humidity air	50 %						
Atmospheric pressure	101 kPa						

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or loss of data was observed.

Conclusion:

PASS

5.2 Radiated EM field immunity

During the test it is verified if the equipment under test has sufficient immunity against radiated electromagnetic fields. Walkie-talkies, radio transmitters, television transmitters, and telecommunication equipment including cellular telephones and other emitting devices, like industrial electromagnetic sources can generate these fields.

Requirements

Standard	EN 55024
Basic standard	EN 61000-4-3
Port	Enclosure
Performance criterion	A; Operation as intended
Frequency range	80 - 1000 MHz
Modulation	1 kHz – 80% AM
Field strength	3 V/m

Performed tests

Model	PM1WU2-GR
Operation mode	Two USB ports with load
Frequency range	80 - 1000 MHz
Tested Field strength	3 V/m
Dwell time	1 second
Test set-up	Full Anechoic Chamber

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or loss of data was observed.

Conclusion:

PASS

5.3 Electrical Fast Transient immunity

The EFT immunity test simulates disturbances by bursts of very short transients caused for example by switching off loads such as an AC motor or bouncing relay contacts. The transients are likely to disturb electronics but less likely to cause damage.

Requirements

Standard	EN 55024		
Basic standard	EN 61000-4-4		
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed.		
Pulse characteristics	5/50 ns		
Peak Voltage; Port	1 kV; AC input power port		
Repetition frequency	√	5 kHz	2,5 kHz

Performed tests

Model	PM1WU2-GR		
Operation mode	Two USB ports with load		
Tested Voltage; Port	1 kV; AC input power port		
Injection method	√	CDN	Capacitive clamp
Polarity	√	Positive	√ Negative
Set-up	√	Table-top	Floor standing

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or loss of data was observed.

Conclusion:

PASS

5.4 Surge transient immunity

The surge transient immunity test simulates the surges that are caused by overvoltages due to indirect (induced) lightning transients. The pulse is a slow transient with high-energy contents and due to its long duration may cause damage to an unprotected EUT.

Requirements

Standard	EN 55024
Basic standard	EN 61000-4-5
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed.
Pulse characteristics	1,2/50 μ s
Peak Voltage; Port	1 kV; AC input power port (line to line) 2 kV; AC input power port (line to earth)

Performed tests

Model	PM1WU2-GR				
Operation mode	Two USB ports with load				
Tested Voltage; Port	1 kV; AC input power port (line to line) 2 kV; AC input power port (line to earth)				
Polarity	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="text-align: center;">√</td> <td>Positive</td> <td style="text-align: center;">√</td> <td>Negative</td> </tr> </table>	√	Positive	√	Negative
√	Positive	√	Negative		

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or loss of data was observed.

Conclusion:

PASS

5.5 RF Conducted immunity

During this test the immunity of the equipment for induced or conducted electromagnetic fields is checked. Fields generated by radio and other transmitters cause RF voltages in long cables like the mains network. This test reproduces these induced disturbing voltages by injecting them to the EUT via the cabling.

Requirements

Standard	EN 55024
Basic standard	EN 61000-4-6
Performance criterion	A; Operation as intended
Frequency range	0,15 – 80 MHz
Modulation	1 kHz – 80% AM
Test level; Port	3 V; AC input output power port

Performed tests

Model	PM1WU2-GR		
Operation mode	Two USB ports with load		
Tested level; Port	3 V; AC input power port		
Frequency range	0,15 – 80 MHz		
Dwell time	3 seconds		
Injection method	√	CDN-M3	EM clamp

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or loss of data was observed.

Conclusion:

PASS

5.6 Power supply interruptions and dips

Requirements

Basic standard	EN 61000-4-11:
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed. C; Temporary, self-recoverable loss of function is allowed.

Standard	EN 55024	
AC input power port	C	$U_{NOM} - 30\%$ (25 periods)
	B	$U_{NOM} - 100\%$ (0,5 period)
	C	$U_{NOM} - 100\%$ (250 periods)

Performed tests

Model	PM1WU2-GR	
Operation mode	Two USB ports with load	
Tested voltage	AC input power port, 230 Vac	
AC input power port	C	$U_{NOM} - 30\%$ (25 periods)
	B	$U_{NOM} - 100\%$ (0,5 period)
	C	$U_{NOM} - 100\%$ (250 periods)

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or loss of data was observed.

Conclusion:

PASS

6 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

The photograph shows the tested device.



Figure 2 Mains conducted disturbance voltage test setup

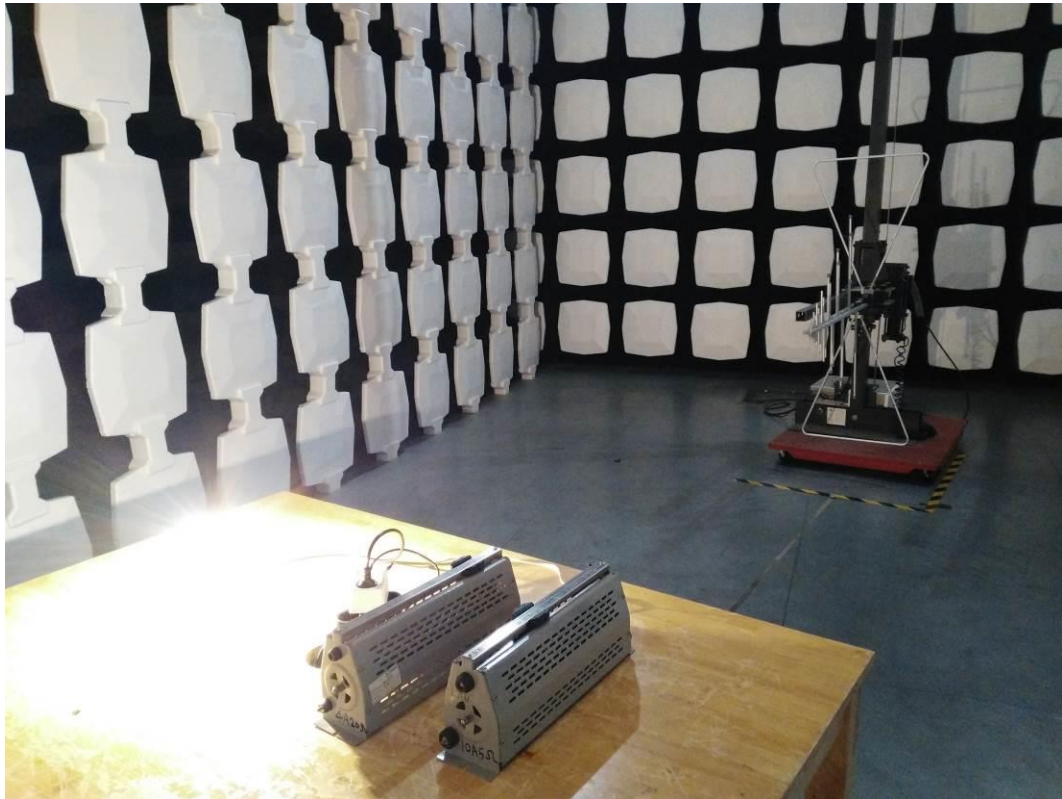


Figure 3 Radiated emission test setup

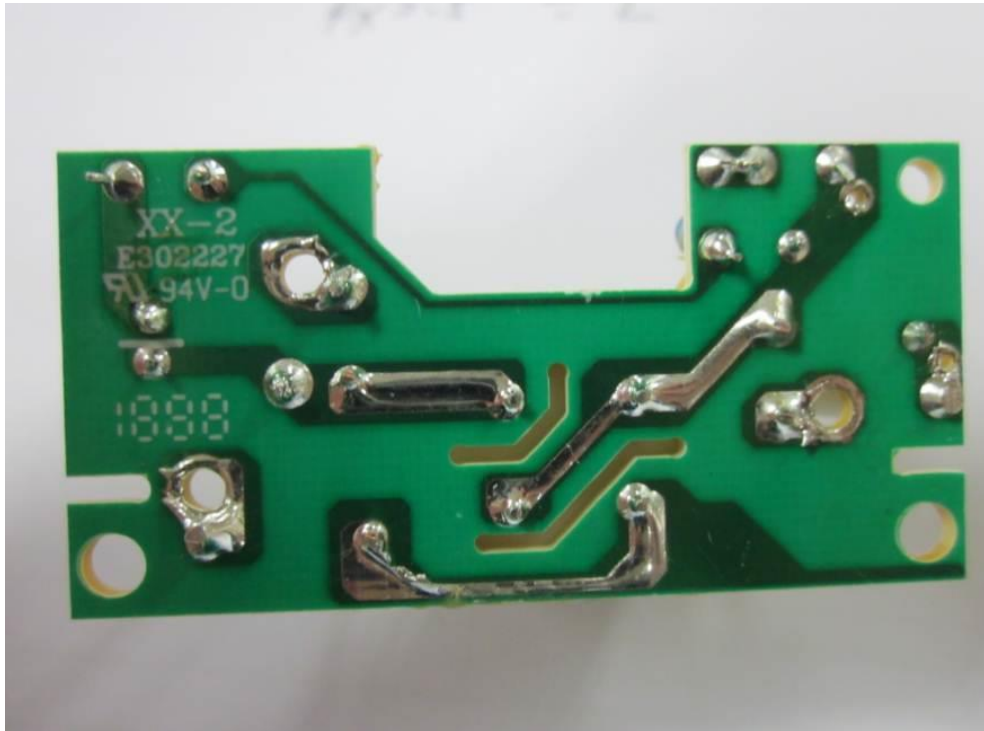
7 **PRODUCT INTERNAL VIEW**



Wiring



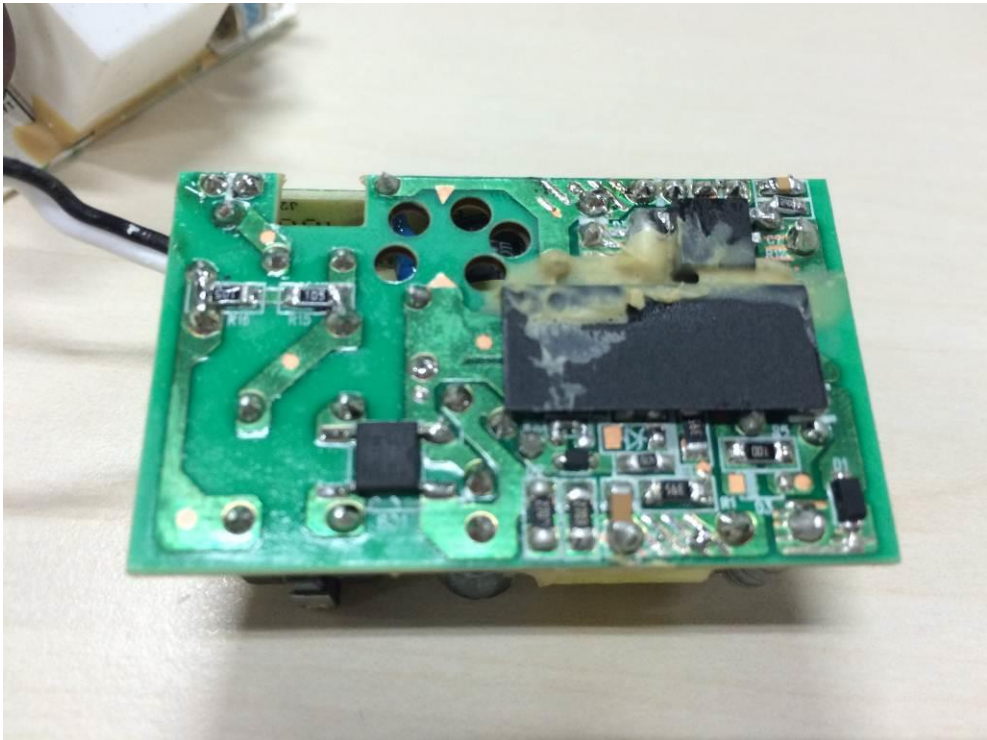
PCB



PCB



PCB



PCB

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