

Certificate of Test

March 2017

MG Electronics

Product Name : Switching Power Supply
Model Number : HK-AD-150T050-WW6 (WW=EU for EU Plug , GB for UK Plug) , both models are identical, except for plug type.
Test Report Number : 1702057E-01
Date of Test : March 06, 2017 - March 07, 2017

This product was tested according to the standards as below at the laboratory of Global EMC Standard Tech. Corp..

Standards:

EN 55014-1:2006+A1:2009+A2:2011
EN 55014-2: 2015, IEC 61000-4 Series
EN 61000-3-2: 2014 & EN 61000-3-3: 2013
AS/NZS CISPR 14.1: 2013

[http : //www.gestek.com.tw](http://www.gestek.com.tw)



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Issue Date: March 22, 2017



Declaration of Conformity

We, Manufacturer/Importer
(full address)

declare that the product
(description of the apparatus, system, installation to which it refers)

EUT: Switching Power Supply

Model Number: HK-AD-150T050-WW6 (WW=EU for EU Plug , GB for UK Plug) , both models are identical, except for plug type.

is in conformity with
(reference to the specification under which conformity is declared)
in accordance with 2014/30/EU-EMC Directive

- | | | | |
|--|--|--|---|
| <input type="checkbox"/> CISPR 11 | Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) high frequency equipment | <input checked="" type="checkbox"/> EN 61000-3-2 | Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase) |
| <input type="checkbox"/> EN 55013 | Limits and methods of measurement of radio disturbance characteristics of broadcast receivers and associated equipment | <input checked="" type="checkbox"/> EN 61000-3-3 | 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 |
| <input type="checkbox"/> EN 55022 | Limits and methods of measurement of radio disturbance characteristics of information technology equipment | <input type="checkbox"/> EN 55024 | Information Technology equipment-Immunity characteristics-Limits and methods of measurement |
| <input checked="" type="checkbox"/> EN 55014-1 | Limits and methods of measurement of radio disturbance characteristics of household electrical appliances, portable tools and similar electrical apparatus | <input type="checkbox"/> EN 61000-6-1 | Generic standards-Immunity for residential, commercial and light-industrial environments |
| <input type="checkbox"/> EN 61000-6-3 | Generic standards-Emission standard for residential, commercial and light-industrial environments | <input type="checkbox"/> EN 61000-6-2 | Generic standards-Immunity for industrial environments |
| <input type="checkbox"/> EN 61000-6-4 | Generic standards-Emission standard for industrial environments | <input checked="" type="checkbox"/> EN 55014-2 | Immunity requirements for household appliances tools and similar apparatus |
| <input type="checkbox"/> EN 55015 | Limits and methods of measurement of radio disturbance characteristics of fluorescent lamps and luminaires | <input type="checkbox"/> EN 50091- 2 | EMC requirements for uninterruptible power systems (UPS) |
| | | <input type="checkbox"/> EN 55020 | Immunity from radio interference of broadcast receivers and associated equipment |
| | | <input type="checkbox"/> EN 61204-3 | Low voltage power supplies, d.c. output - Part 3: Electromagnetic compatibility. (EMC) |
| <input type="checkbox"/> DIN VDE 0855 | Cabled distribution systems; Equipment for receiving and/or distribution from | | |
| <input type="checkbox"/> part 10 | sound and television signals | | |
| <input type="checkbox"/> part 12 | | | |
| <input checked="" type="checkbox"/> CE marking | | | |



(EC conformity marking)

The manufacturer also declares the conformity of above mentioned product with the actual required safety standards in accordance with LVD 2014/35/EU

- | | | | |
|-----------------------------------|---|-------------------------------------|---|
| <input type="checkbox"/> EN 60065 | Safety requirements for mains operated electronic and related apparatus for household and similar general use | <input type="checkbox"/> EN 60950 | Safety for information technology equipment including electrical business equipment |
| <input type="checkbox"/> EN 60335 | Safety of household and similar electrical appliances | <input type="checkbox"/> EN 50091-1 | General and Safety requirements for uninterruptible power systems (UPS) |

Manufacturer/Importer

Signature: _____

Date: _____

Name: _____

(Stamp)



EMC Test Report For:

MG Electronics

EUT: Switching Power Supply

Model Number: HK-AD-150T050-WW6 (WW=EU for EU Plug, GB for UK Plug), both models are identical, except for plug type.

Prepared for:

**MG Electronics
32 Ranick Road, Hauppauge, N.Y. 11788**

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Fax: 886-2-2603-5325**

Test results given in this report only relate to the specimen(s) tested, measured.

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The client should not use it to claim product endorsement by TAF or any government agencies.

All data in this report are traceable to national standard or international standard.

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1. CERTIFICATION

Applicant : MG Electronics

EUT Description : Switching Power Supply

Model Number : HK-AD-150T050-WW6 (WW=EU for EU Plug , GB for UK Plug) ,
both models are identical, except for plug type.

Serial Number : N/A

STANDARDS OF TEST METHOD:

EN 55014-1:2006+A1:2009+A2:2011 AND

EN 61000-3-2: 2014 & EN 61000-3-3: 2013

EN 55014-2: 2015 AND IEC 61000-4 SERIES REGULATIONS

AS/NZS CISPR 14.1: 2013

GENERAL REMARKS:

The tests were performed according to the technical requirement of EUT.

- ☒ Power test Emission Measurement (EN 55014-1)
- ☒ Electro-magnetic Conducted Emission Interference Measurement (EN 55014-1)
- ☒ Electro-magnetic Radiated Emission Interference Measurement (EN 55014-1)
- ☒ Harmonic Current Emissions (EN 61000-3-2)
- ☒ Voltage Fluctuation and Flicker Measurement (EN 61000-3-3)
- ☒ ESD Immunity Test (IEC 61000-4-2)
- ☒ RF Field strength Susceptibility Test (IEC 61000-4-3)
- ☒ Electrical Fast Transient/Burst Immunity Test (IEC 61000-4-4)
- ☒ Surge Immunity Test (IEC 61000-4-5)
- ☒ Conducted disturbance Susceptibility Test (IEC 61000-4-6)
- ☒ Voltage Dips/Short Interruptions Test (IEC 61000-4-11)

☒ AS/NZS CISPR 14.1 Electromagnetic Compatibility – Requirements for household appliances, electric tools and similar apparatus –
Part 1: Emissions :2013

Sample Received Data : February 24, 2017

Date of Test : March 06, 2017 - March 07, 2017

Issue Date : March 22, 2017

In order to ensure the quality and accuracy of this document, the contents have been thoroughly reviewed by the following qualified personnel from Global EMC Standard Tech. Corp Lab.

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Approved By:

Tony Tsai

Tony Tsai / Director

2. SUMMARY OF TEST RESULTS

STANDARD	TEST ITEM	TEST RESULT	REMARKS
EN 55014-1 (AS/NZS CISPR 14.1)	Conducted emission (Mode 1)	PASS	The worst emission frequency is <u>0.4418</u> MHz. And minimum passing margin is <u>-10.91</u> dB. The measurement uncertainty is 4.40 dB.
	Power Test emission (Mode 1)	PASS	The worst emission frequency is <u>33.1875</u> MHz. And minimum passing margin is <u>-17.40</u> dB. The measurement uncertainty is 4.45 dB.
	Radiated emission (Mode 1)	PASS	The worst emission frequency is <u>47.2400</u> MHz at <u>Vertical</u> . And minimum passing margin is <u>- 6.21</u> dB. Height of antenna is <u>100</u> cm. Angle of turntable is <u>124°</u> . The measurement uncertainty is 4.30 dB.
EN 61000-3-2: 2014	Harmonic Current Emissions	PASS	The measurement uncertainty is 8.94 mA
EN 61000-3-3: 2013	Voltage Fluctuation and Flicker Measurement	PASS	The Value of Pst shall not be greater than 1.0 The measurement uncertainty is <u>0.02</u> %
EN 55014-2 IEC 61000-4-2:2008	Electrostatic Discharge(ESD)	PASS	Contact discharge up to <u>±4kV</u> . Air discharge up to <u>±8kV</u> .
EN 55014-2 IEC 61000-4-3:2006+A1: 2007+A2:2010	RF field strength Susceptibility	PASS	80-1000MHz (1kHz sinewave with 80% Amplitude Modulation: 3V/m)
EN 55014-2 IEC 61000-4-4: 2012	Electrical Fast Transients/Burst	PASS	±0.5kV, ±1kV(AC Input);
EN 55014-2 IEC 61000-4-5: 2014	Surge	PASS	±0.5kV, ±1kV(AC Input)
EN 55014-2 IEC 61000-4-6:2013	Conducted Disturbance Susceptibility	PASS	0.15-80MHz (1kHz sinewave with 80% Amplitude Modulation: 3V)
EN 55014-2 IEC 61000-4-11: 2004	Voltage Dips	PASS	100% reduction, 10ms at 50Hz 100% reduction, 8.33ms at 60Hz 60% reduction, 200 ms at 50/60Hz 30% reduction, 500 ms at 50/60Hz

2.1 UNCERTAINTY DESCRIPTION

According to CISPR 16-4-2,
The measure level is compliance with the limit if

$$L_m < L_{lim} \text{ and } L_m + U(L_m) < L_{lim} + U_{cispr} = L_{eff}$$

Where,
 U_{cispr} = Uncertainty value specified in Table 1 of CISPR 16-4-2

Measurement		U_{cispr}
Conducted disturbance (mains port)	(150 kHz – 30 MHz)	3.6 dB
Radiated disturbance (OATS or ATS)	(30 MHz – 1000 MHz)	5.2 dB
Disturbance Power	(30 MHz – 300 MHz)	4.5 dB

L_m = Measure value
 L_{lim} = Emission limit level
 $U(L_m)$ = Uncertainty value of test laboratory
 L_{eff} = Effective emission limit level

The above stated condition will be taking as a criterion for pass/fail determination.

3. GENERAL INFORMATION

3.1 PRODUCT DESCRIPTION

Product Name : Switching Power Supply
Model Number : HK-AD-150T050-WW6 (WW=EU for EU Plug , GB for UK Plug) , both models are identical, except for plug type.
Serial Number : N/A
Applicant : MG Electronics
Address : 32 Ranick Road, Hauppauge, N.Y. 11788
Manufacturer : MG Electronics
Address : 32 Ranick Road, Hauppauge, N.Y. 11788
Power Supply : AC Input : 200-240Vac, 50/60Hz, 0.35A
DC Output : 15Vdc, 0.5A, 7.5VA

3.2 TEST MODES & EUT COMPONENTS DESCRIPTION

EUT: Switching Power Supply, M/N: HK-AD-150T050-WW6 (WW=EU for EU Plug , GB for UK Plug) , both models are identical, except for plug type.

Test Mode	Mode 1 –(Worst Case)
-----------	----------------------

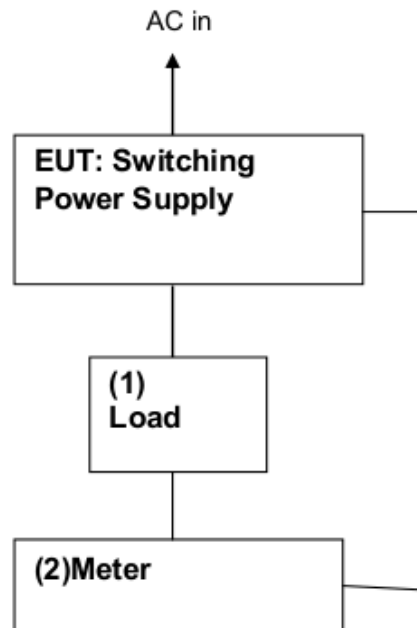
Note:

1. According to pre-scan data, we determine the data (Mode 1) shown in this test report, which reflects the worst-case data for each operation mode.
2. The EUT has serial model numbers for the requirement of marketing.

3.3 CONFIGURATION OF THE SYSTEM UNDER TEST

Item	Device	No.	Configuration
1	Load	-----	Full Load: 30Ω
2	Meter	-----	1A

3.4 BLOCK DIAGRAM OF CONNECTIONS BETWEEN EUT AND SIMULATORS



3.5 LAB AMBIENT

Items	Range Requirement
Temperature (°C)	10-40
Humidity (%RH)	10-90
Barometric pressure (mbar)	860-1060

3.6 TEST FACILITY ACCREDITATION

Global EMC Standard Tech. Corp. is accredited in respect of laboratory and the accreditation criteria is ISO/IEC 17025: 2005.

Site Description : Registration on VCCI effective through July 13, 2018.
VCCI Member No.708

Recognized by the Council of Taiwan Accreditation Foundation
As an accredited laboratory and registration No.:1082.
Registration on TAF effective through September 18, 2018.

Aug. 10, 1995 /Aug. 25, 1998 File on FCC Engineering Laboratory
Federal Communications Commission
Designation Number: TW1031, TW1032

Name of firm : Global EMC Standard Tech. Corp.

Site location : No.3, Baodoucuokeng, Linkou Dist., New Taipei City 244, Taiwan (R.O.C.)



4. CONDUCTED EMISSION MEASUREMENT

4.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	Test Receiver	RS	ESCS30	100393	2017.04.12
2	L.I.S.N.(EUT)	RS	ENV216	100108	2017.04.19
3	RF CABLE	GTK	N/A	GTK-E-A154-01	2018.01.07
4	Software	EZ-EMC	FARAD	2A1.1(USB)	N/A

Note: 1. All equipment is calibrated and will be valid only for a period of 1 year.

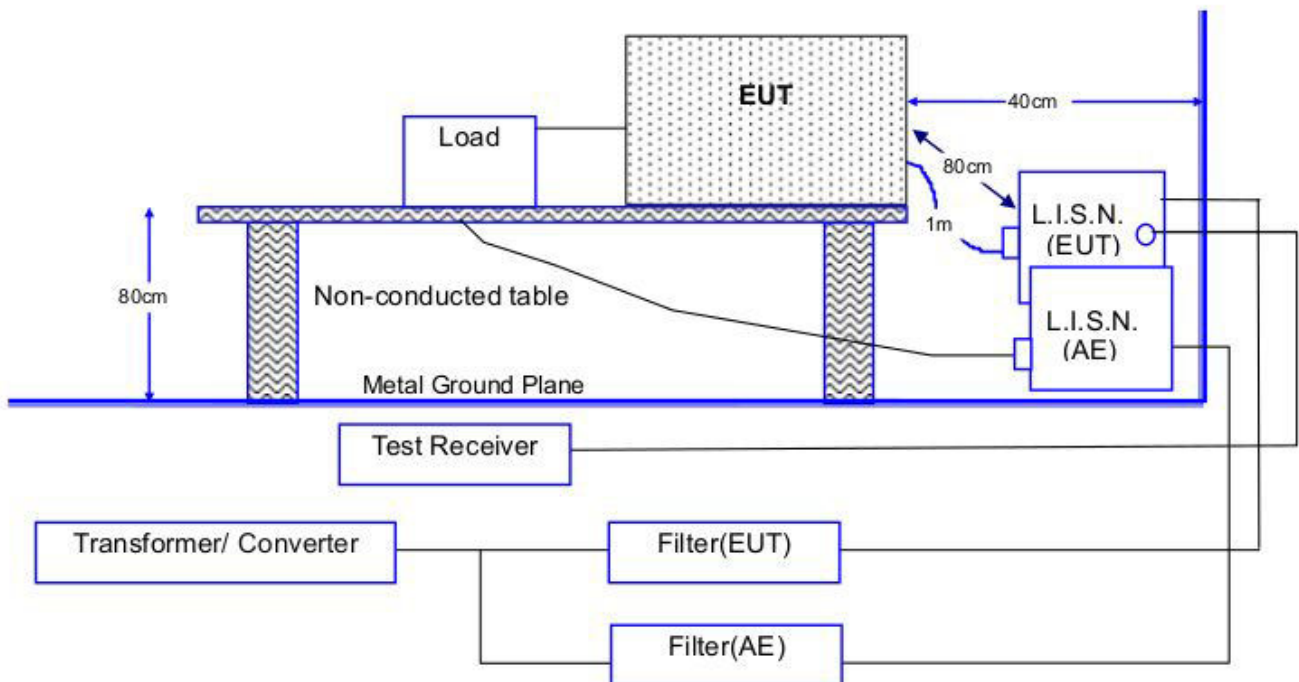
2. The test was performed at GTK Shielded Room B5.

4.2 TEST METHOD

According to EN 55014-1:2006+A1:2009+A2:2011

4.3 BLOCK DIAGRAM OF TEST SETUP

4.3.1 TEST SETUP FOR EMISSION MEASUREMENT AT MAINS TERMINAL



Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.

4.4 CONDUCTED EMISSION LIMITS

Frequency Range	At mains terminals	
1	2	3
MHz	dB(uV) Quasi-peak	dB(uV) Average
0.15 to 0.50	Decreasing linearly with the logarithm of the frequency from: 65 to 56 59 to 46	
0.50 to 5.0	56	46
5.0 to 30	60	50

Remarks: In the Above Table, the tighter limit applies at the band edges.

4.5 EUT CONFIGURATION ON MEASUREMENT

The equipment, which is listed at 4.1, is installed on Conducted Emission Test to meet the Commission requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

The device under test, installed in a representative system as described in section 4.3, was placed on a non-conductive table whose total height equaled 80 cm. The EUT was powered through one L.I.S.N. whose the signal output was terminated to the receiver. The other peripherals were powered from another L.I.S.N. whose the signal output was terminated by 50 Ohms terminator.

4.6 CONDUCTED EMISSION DATA

The measurement range of conducted emission, which is from **0.15 MHz to 30 MHz**, was investigated. The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range for all the test modes. Then the worst modes were reported the following data pages.

The final measurement equal to Receiver reading plus a Correction factor when AMN insertion loss bigger than 0.5dB, the receiver added the correction factor to the reading level automatically.

4.7 OPERATING CONDITIONS OF THE EUT

The exercise program used during conducted emission measurement was designed to exercise the EUT in a manner similar to a typical use. The exercise sequence is listed as below:

1. Setup the EUT and simulators as shown on 3.4.
2. Turn on the power of all equipments.
3. Active signal generator display image output on EUT
4. Repeat above steps.

4.8 CONDUCTED EMISSION MEASUREMENT RESULTS

Date of Test	March 06, 2017	Temperature	20 °C
EUT	Switching Power Supply	Humidity	60 %
Test Mode	Mode 1	Display Pattern	N/A
Test Power Supply	AC 207V/50Hz		

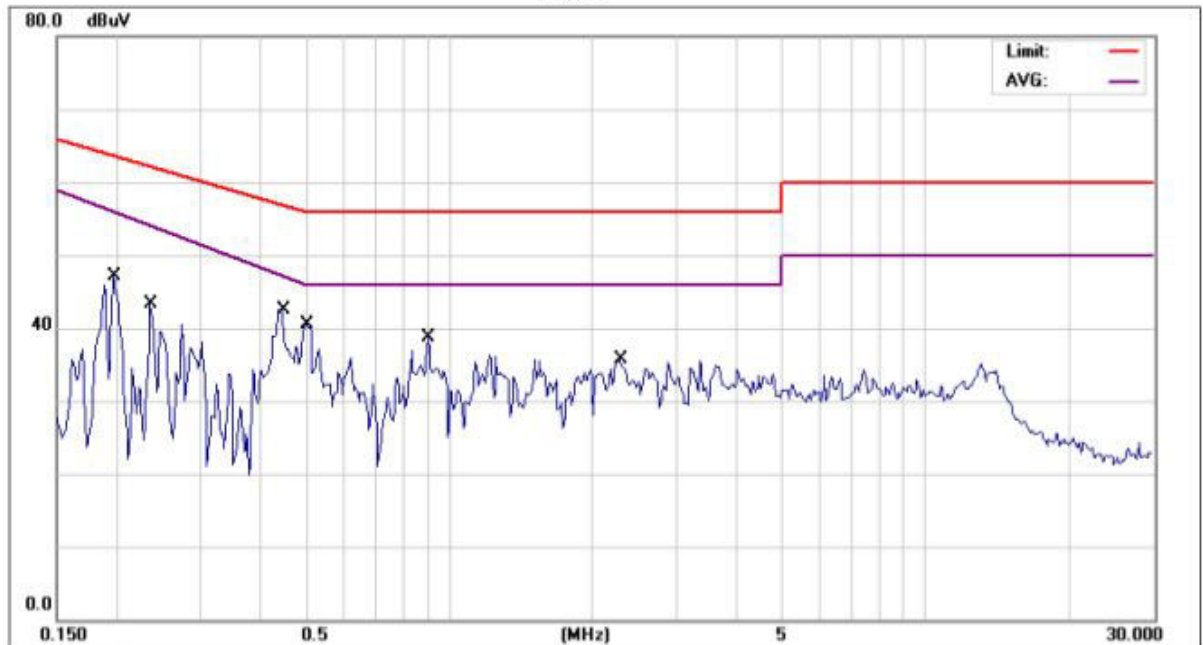
Line

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.1969	37.66	9.69	47.35	63.74	-16.39	QP
2	0.1969	29.58	9.69	39.27	56.06	-16.79	AVG
3	0.2361	30.31	9.69	40.00	62.23	-22.23	QP
4	0.2361	19.56	9.69	29.25	54.10	-24.85	AVG
5	0.4418	32.60	9.69	42.29	57.03	-14.74	QP
6	★0.4418	26.74	9.69	36.43	47.34	-10.91	AVG
7	0.5031	29.39	9.69	39.08	56.00	-16.92	QP
8	0.5031	22.81	9.69	32.50	46.00	-13.50	AVG
9	0.9063	25.44	9.71	35.15	56.00	-20.85	QP
10	0.9063	19.50	9.71	29.21	46.00	-16.79	AVG
11	2.2780	24.23	9.75	33.98	56.00	-22.02	QP
12	2.2780	17.16	9.75	26.91	46.00	-19.09	AVG

Remarks :

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = L.I.S.N. insertion loss + cable loss
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.40 dB.

Line



- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).
 3. The scan curve indicates peak detector measurement.

Date of Test	March 06, 2017	Temperature	20 °C
EUT	Switching Power Supply	Humidity	60 %
Test Mode	Mode 1	Display Pattern	N/A
Test Power Supply	AC 207V/50Hz		

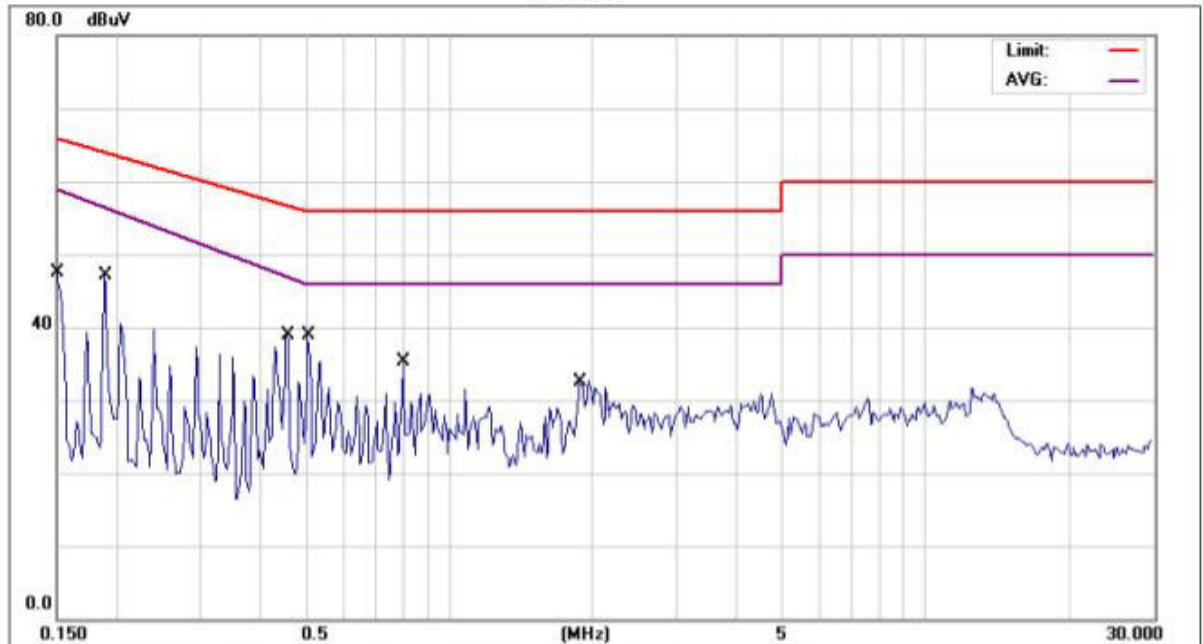
Neutral

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.1508	35.41	9.63	45.04	65.96	-20.92	QP
2	0.1508	21.52	9.63	31.15	58.94	-27.79	AVG
3	★0.1884	33.85	9.63	43.48	64.11	-20.63	QP
4	0.1884	18.04	9.63	27.67	56.54	-28.87	AVG
5	0.4568	24.65	9.63	34.28	56.75	-22.47	QP
6	0.4568	11.81	9.63	21.44	46.98	-25.54	AVG
7	0.5034	24.37	9.63	34.00	56.00	-22.00	QP
8	0.5034	13.88	9.63	23.51	46.00	-22.49	AVG
9	0.8019	20.09	9.64	29.73	56.00	-26.27	QP
10	0.8019	9.49	9.64	19.13	46.00	-26.87	AVG
11	1.8964	19.37	9.67	29.04	56.00	-26.96	QP
12	1.8964	8.68	9.67	18.35	46.00	-27.65	AVG

Remarks :

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = L.I.S.N. insertion loss + cable loss
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.40 dB.

Neutral



- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).
 3. The scan curve indicates peak detector measurement.

Date of Test	March 06, 2017	Temperature	20 °C
EUT	Switching Power Supply	Humidity	60 %
Test Mode	Mode 1	Display Pattern	N/A
Test Power Supply	AC 253V/50Hz		

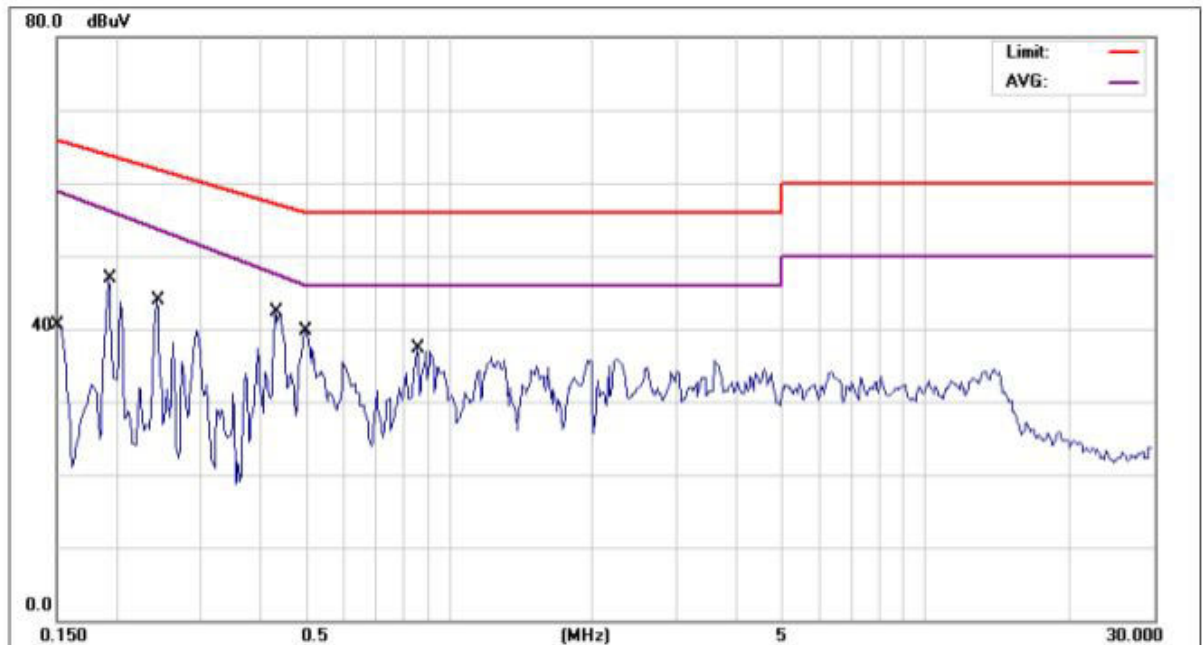
Line

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.1514	34.39	9.69	44.08	65.92	-21.84	QP
2	0.1514	24.51	9.69	34.20	58.90	-24.70	AVG
3	0.1932	36.20	9.69	45.89	63.90	-18.01	QP
4	0.1932	28.31	9.69	38.00	56.27	-18.27	AVG
5	0.2433	31.20	9.69	40.89	61.98	-21.09	QP
6	0.2433	23.05	9.69	32.74	53.78	-21.04	AVG
7	0.4318	30.42	9.69	40.11	57.22	-17.11	QP
8	0.4318	24.04	9.69	33.73	47.58	-13.85	AVG
9	0.4996	29.44	9.69	39.13	56.01	-16.88	QP
10	★0.4996	23.65	9.69	33.34	46.01	-12.67	AVG
11	0.8590	23.72	9.71	33.43	56.00	-22.57	QP
12	0.8590	17.11	9.71	26.82	46.00	-19.18	AVG

Remarks :

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = L.I.S.N. insertion loss + cable loss
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.40 dB.

Line



- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).
 3. The scan curve indicates peak detector measurement.

Date of Test	March 06, 2017	Temperature	20 °C
EUT	Switching Power Supply	Humidity	60 %
Test Mode	Mode 1	Display Pattern	N/A
Test Power Supply	AC 253V/50Hz		

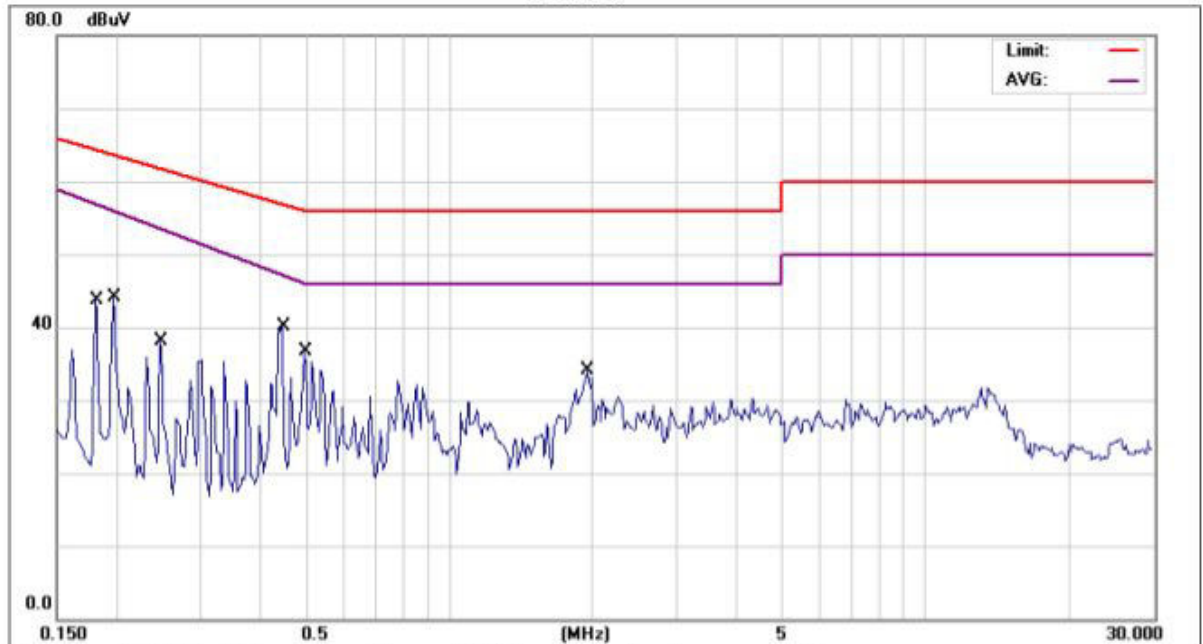
Neutral

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.1806	28.72	9.63	38.35	64.46	-26.11	QP
2	0.1806	12.00	9.63	21.63	57.00	-35.37	AVG
3	0.1964	34.71	9.63	44.34	63.76	-19.42	QP
4	0.1964	20.87	9.63	30.50	56.09	-25.59	AVG
5	0.2474	27.40	9.63	37.03	61.84	-24.81	QP
6	0.2474	15.79	9.63	25.42	53.60	-28.18	AVG
7	★0.4456	29.03	9.63	38.66	56.96	-18.30	QP
8	0.4456	17.72	9.63	27.35	47.24	-19.89	AVG
9	0.4959	24.56	9.63	34.19	56.07	-21.88	QP
10	0.4959	15.09	9.63	24.72	46.09	-21.37	AVG
11	1.9566	21.10	9.67	30.77	56.00	-25.23	QP
12	1.9566	11.04	9.67	20.71	46.00	-25.29	AVG

Remarks :

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = L.I.S.N. insertion loss + cable loss
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.40 dB.

Neutral



- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).
 3. The scan curve indicates peak detector measurement.

Date of Test	March 06, 2017	Temperature	20 °C
EUT	Switching Power Supply	Humidity	60 %
Test Mode	Mode 1	Display Pattern	N/A
Test Power Supply	AC 207V/50Hz		

Line

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.1600	26.51	9.69	36.20	65.46	-29.26	QP
2	0.1600	15.86	9.69	25.55	58.30	-32.75	AVG
3	0.2400	29.30	9.69	38.99	62.10	-23.11	QP
4	0.2400	21.16	9.69	30.85	53.93	-23.08	AVG
5	0.5500	23.91	9.70	33.61	56.00	-22.39	QP
6	★0.5500	18.03	9.70	27.73	46.00	-18.27	AVG
7	1.0000	21.90	9.72	31.62	56.00	-24.38	QP
8	1.0000	14.67	9.72	24.39	46.00	-21.61	AVG
9	1.4000	16.14	9.73	25.87	56.00	-30.13	QP
10	1.4000	9.47	9.73	19.20	46.00	-26.80	AVG
11	2.0000	23.97	9.74	33.71	56.00	-22.29	QP
12	2.0000	15.57	9.74	25.31	46.00	-20.69	AVG
13	3.5000	19.23	9.77	29.00	56.00	-27.00	QP
14	3.5000	12.80	9.77	22.57	46.00	-23.43	AVG
15	6.0000	20.13	9.81	29.94	60.00	-30.06	QP
16	6.0000	13.99	9.81	23.80	50.00	-26.20	AVG
17	10.0000	18.64	9.83	28.47	60.00	-31.53	QP
18	10.0000	12.77	9.83	22.60	50.00	-27.40	AVG
19	22.0000	4.63	9.94	14.57	60.00	-45.43	QP
20	22.0000	-0.60	9.94	9.34	50.00	-40.66	AVG
21	30.0000	1.87	9.87	11.74	60.00	-48.26	QP
22	30.0000	-3.03	9.87	6.84	50.00	-43.16	AVG

Remarks :

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ±0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = L.I.S.N. insertion loss + cable loss
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.40 dB.

Date of Test	March 06, 2017	Temperature	20 °C
EUT	Switching Power Supply	Humidity	60 %
Test Mode	Mode 1	Display Pattern	N/A
Test Power Supply	AC 207V/50Hz		

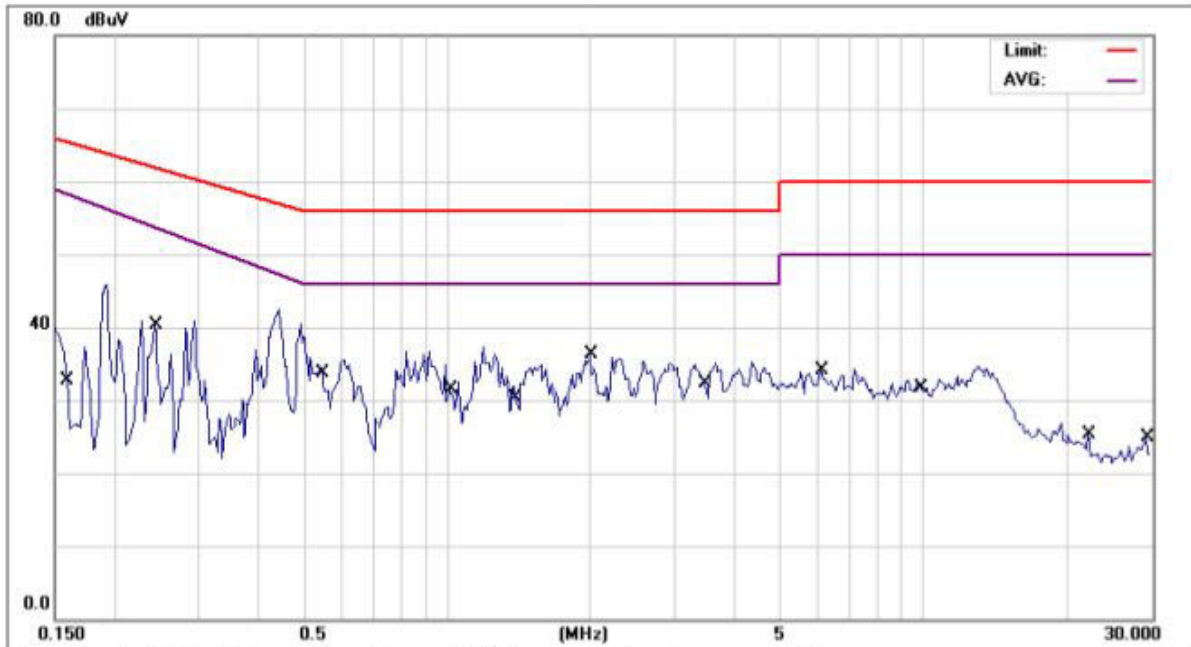
Neutral

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.1600	24.13	9.63	33.76	65.46	-31.70	QP
2	0.1600	9.18	9.63	18.81	58.30	-39.49	AVG
3	0.2400	25.70	9.63	35.33	62.10	-26.77	QP
4	0.2400	14.28	9.63	23.91	53.93	-30.02	AVG
5	★0.5500	21.59	9.63	31.22	56.00	-24.78	QP
6	0.5500	10.74	9.63	20.37	46.00	-25.63	AVG
7	1.0000	11.33	9.65	20.98	56.00	-35.02	QP
8	1.0000	5.56	9.65	15.21	46.00	-30.79	AVG
9	1.4000	8.90	9.66	18.56	56.00	-37.44	QP
10	1.4000	2.19	9.66	11.85	46.00	-34.15	AVG
11	2.0000	20.28	9.67	29.95	56.00	-26.05	QP
12	2.0000	11.03	9.67	20.70	46.00	-25.30	AVG
13	3.5000	14.96	9.71	24.67	56.00	-31.33	QP
14	3.5000	6.99	9.71	16.70	46.00	-29.30	AVG
15	6.0000	13.51	9.76	23.27	60.00	-36.73	QP
16	6.0000	5.71	9.76	15.47	50.00	-34.53	AVG
17	10.0000	14.23	9.79	24.02	60.00	-35.98	QP
18	10.0000	6.81	9.79	16.60	50.00	-33.40	AVG
19	22.0000	1.39	10.08	11.47	60.00	-48.53	QP
20	22.0000	-3.34	10.08	6.74	50.00	-43.26	AVG
21	30.0000	3.39	10.16	13.55	60.00	-46.45	QP
22	30.0000	-1.78	10.16	8.38	50.00	-41.62	AVG

Remarks :

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ±0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = L.I.S.N. insertion loss + cable loss
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.40 dB.

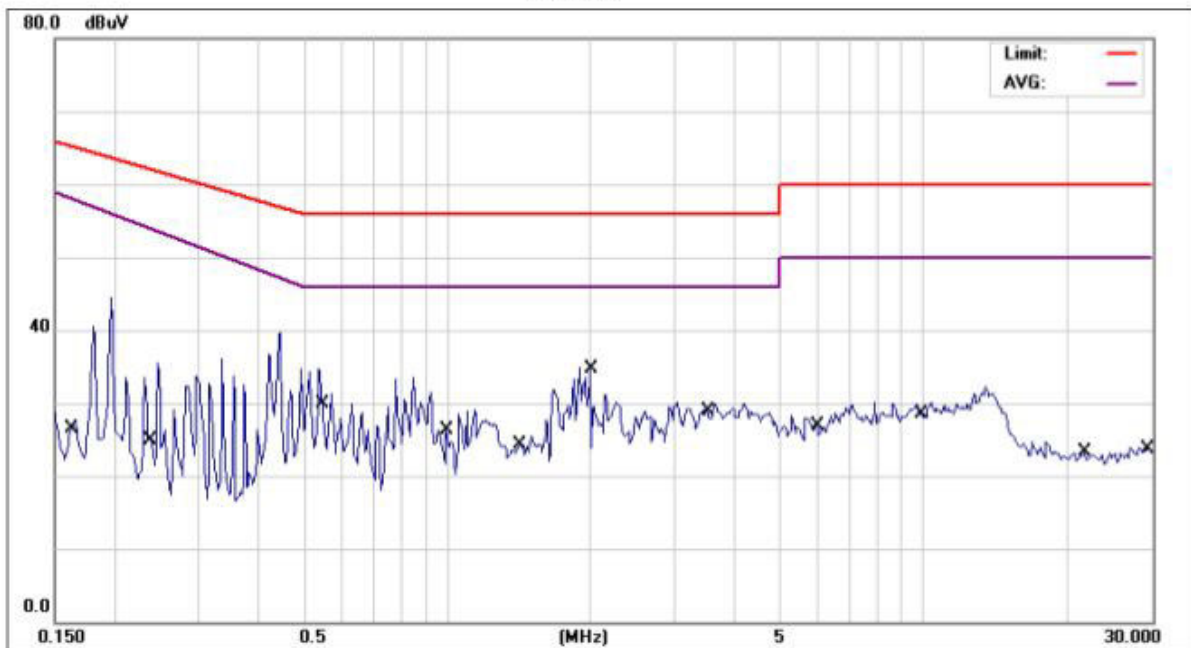
Line



Remark:

1. The Limit (The red line of the graph indicates the quasi-peak measurements).
2. The AVG (The purple line of the graph indicates the average measurements).
3. The scan curve indicates peak detector measurement.

Neutral



Remark:

1. The Limit (The red line of the graph indicates the quasi-peak measurements).
2. The AVG (The purple line of the graph indicates the average measurements).
3. The scan curve indicates peak detector measurement.

Date of Test	March 06, 2017	Temperature	20 °C
EUT	Switching Power Supply	Humidity	60 %
Test Mode	Mode 1	Display Pattern	N/A
Test Power Supply	AC 253V/50Hz		

Line

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.1600	27.29	9.69	36.98	65.46	-28.48	QP
2	0.1600	16.19	9.69	25.88	58.30	-32.42	AVG
3	0.2400	29.62	9.69	39.31	62.10	-22.79	QP
4	0.2400	21.22	9.69	30.91	53.93	-23.02	AVG
5	0.5500	23.59	9.70	33.29	56.00	-22.71	QP
6	★0.5500	17.90	9.70	27.60	46.00	-18.40	AVG
7	1.0000	21.66	9.72	31.38	56.00	-24.62	QP
8	1.0000	14.61	9.72	24.33	46.00	-21.67	AVG
9	1.4000	16.34	9.73	26.07	56.00	-29.93	QP
10	1.4000	9.70	9.73	19.43	46.00	-26.57	AVG
11	2.0000	23.99	9.74	33.73	56.00	-22.27	QP
12	2.0000	15.40	9.74	25.14	46.00	-20.86	AVG
13	3.5000	19.25	9.77	29.02	56.00	-26.98	QP
14	3.5000	12.72	9.77	22.49	46.00	-23.51	AVG
15	6.0000	20.13	9.81	29.94	60.00	-30.06	QP
16	6.0000	13.85	9.81	23.66	50.00	-26.34	AVG
17	10.0000	18.52	9.83	28.35	60.00	-31.65	QP
18	10.0000	12.77	9.83	22.60	50.00	-27.40	AVG
19	22.0000	4.83	9.94	14.77	60.00	-45.23	QP
20	22.0000	-0.60	9.94	9.34	50.00	-40.66	AVG
21	30.0000	1.89	9.87	11.76	60.00	-48.24	QP
22	30.0000	-2.98	9.87	6.89	50.00	-43.11	AVG

Remarks :

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ±0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = L.I.S.N. insertion loss + cable loss
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.40 dB.

Date of Test	March 06, 2017	Temperature	20 °C
EUT	Switching Power Supply	Humidity	60 %
Test Mode	Mode 1	Display Pattern	N/A
Test Power Supply	AC 253V/50Hz		

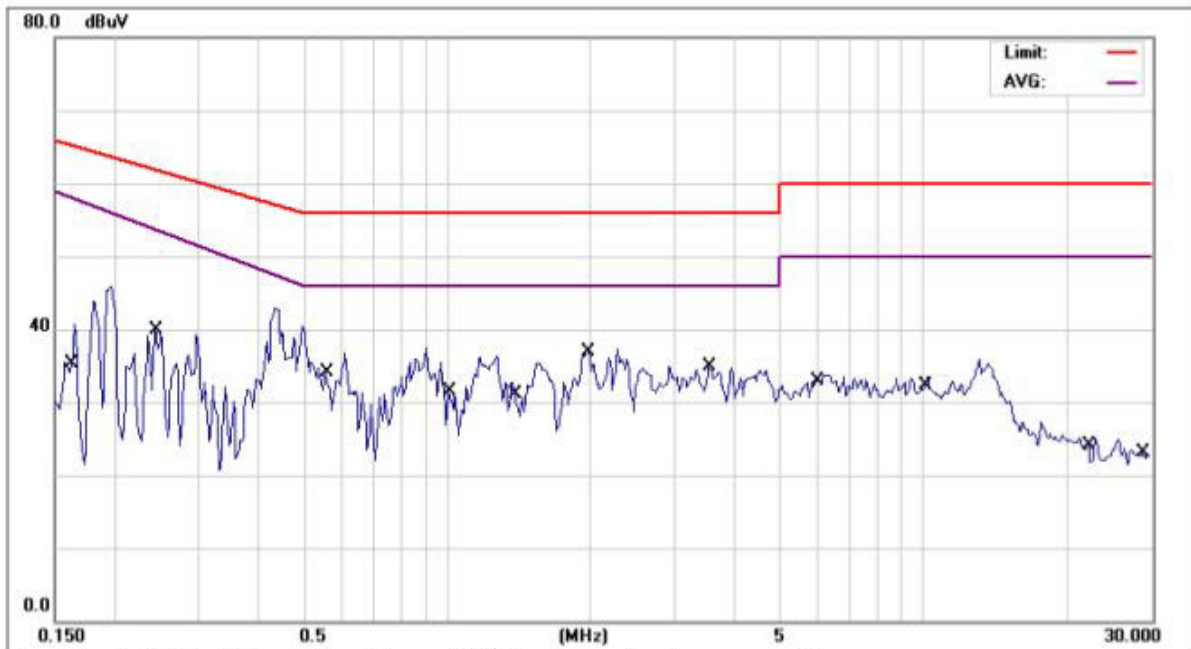
Neutral

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.1600	24.95	9.63	34.58	65.46	-30.88	QP
2	0.1600	10.08	9.63	19.71	58.30	-38.59	AVG
3	0.2400	26.08	9.63	35.71	62.10	-26.39	QP
4	0.2400	14.63	9.63	24.26	53.93	-29.67	AVG
5	★0.5500	21.65	9.63	31.28	56.00	-24.72	QP
6	0.5500	10.99	9.63	20.62	46.00	-25.38	AVG
7	1.0000	11.01	9.65	20.66	56.00	-35.34	QP
8	1.0000	5.08	9.65	14.73	46.00	-31.27	AVG
9	1.4000	10.09	9.66	19.75	56.00	-36.25	QP
10	1.4000	2.84	9.66	12.50	46.00	-33.50	AVG
11	2.0000	20.24	9.67	29.91	56.00	-26.09	QP
12	2.0000	10.69	9.67	20.36	46.00	-25.64	AVG
13	3.5000	14.98	9.71	24.69	56.00	-31.31	QP
14	3.5000	6.84	9.71	16.55	46.00	-29.45	AVG
15	6.0000	13.29	9.76	23.05	60.00	-36.95	QP
16	6.0000	5.30	9.76	15.06	50.00	-34.94	AVG
17	10.0000	14.45	9.79	24.24	60.00	-35.76	QP
18	10.0000	6.96	9.79	16.75	50.00	-33.25	AVG
19	22.0000	1.56	10.08	11.64	60.00	-48.36	QP
20	22.0000	-3.29	10.08	6.79	50.00	-43.21	AVG
21	30.0000	3.29	10.16	13.45	60.00	-46.55	QP
22	30.0000	-1.78	10.16	8.38	50.00	-41.62	AVG

Remarks :

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ±0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = L.I.S.N. insertion loss + cable loss
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.40 dB.

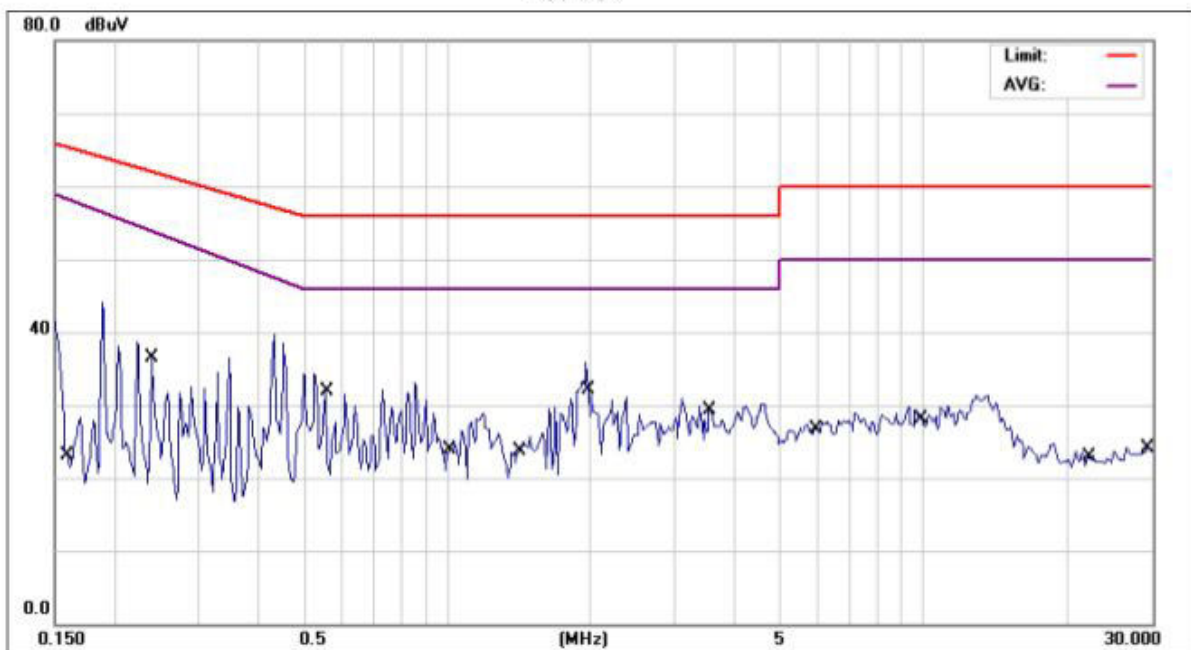
Line



Remark:

1. The Limit (The red line of the graph indicates the quasi-peak measurements).
2. The AVG (The purple line of the graph indicates the average measurements).
3. The scan curve indicates peak detector measurement.

Neutral



Remark:

1. The Limit (The red line of the graph indicates the quasi-peak measurements).
2. The AVG (The purple line of the graph indicates the average measurements).
3. The scan curve indicates peak detector measurement.

5. POWER TEST EMISSION MEASUREMENT

5.1 TEST EQUIPMENT

The following test equipment is used during the radiated emission tests:

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	Test Receiver	RS	ESCS30	849650/023	2017.08.15
2	Absorbing Clamp	SCHWARZBECK	MDS21	02822	2017.03.14
3	Cable	GTK	N/A	GTK-E-A358-01	2017.10.11
4	Software	EZ-EMC	FARAD	2A1.1(USB)	N/A

Note: 1. All equipment is calibrated and will be valid only for a period of 1 year.

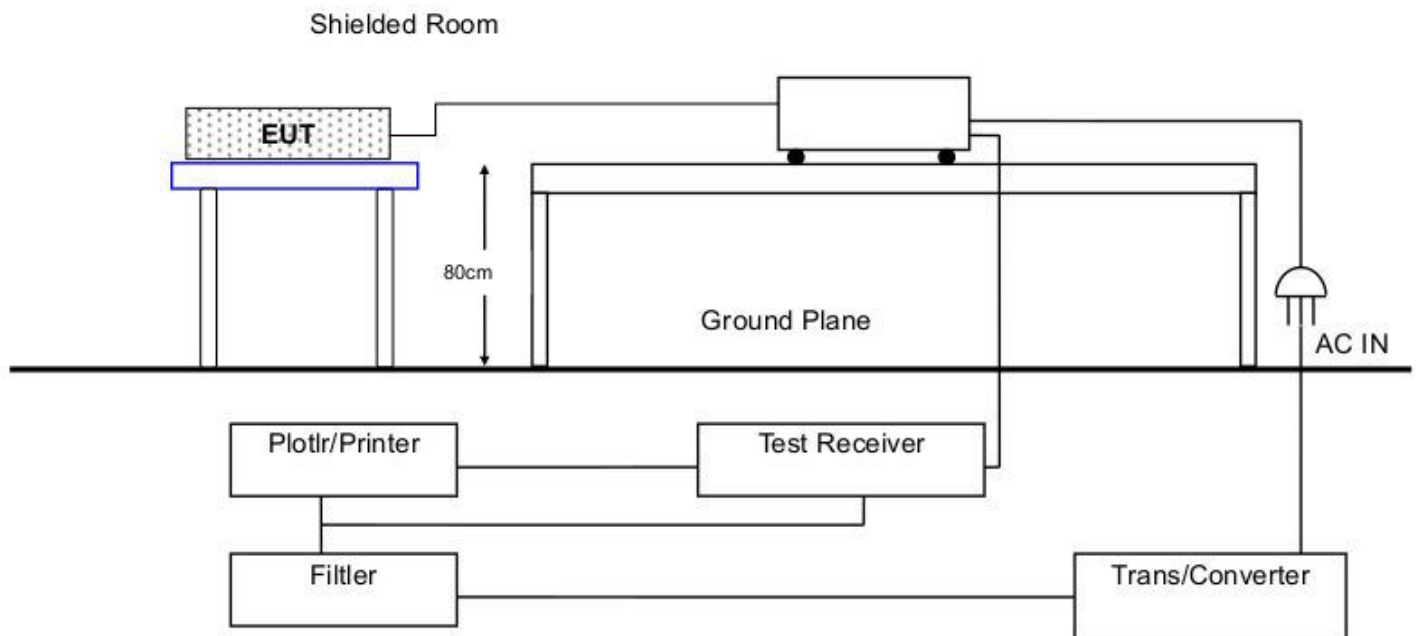
2. The test was performed at GTK Shielded Room A9.

5.2 TEST METHOD

According to EN 55014-1:2006+A1:2009+A2:2011

5.3 BLOCK DIAGRAM OF TEST SETUP

5.3.1 TEST SETUP FOR EMISSION MEASUREMENT POWER TEST



5.4 POWER TEST EMISSION LIMIT

	Household and similar appliances	
1	2	3
Frequency range		
(MHz)	dB (pW) Quasi-Peak	dB (pW) Average
30 to 300	45 to 55	35 to 45

5.5 EUT CONFIGURATION

The equipment which is listed 5.3 are installed on Power Test Emission Test to meet the Commission requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

5.6 OPERATING CONDITION OF THE EUT

Same as conducted emission measurement, which is listed in 4.7

5.7 RADIATED POWER TEST DATA

The measurement range of radiated power test which is from **30 MHz to 300 MHz** was investigated. The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range for all the test modes. Then the worst modes were reported the following data pages.

5.8 POWER TEST EMISSIONS MEASUREMENT RESULTS

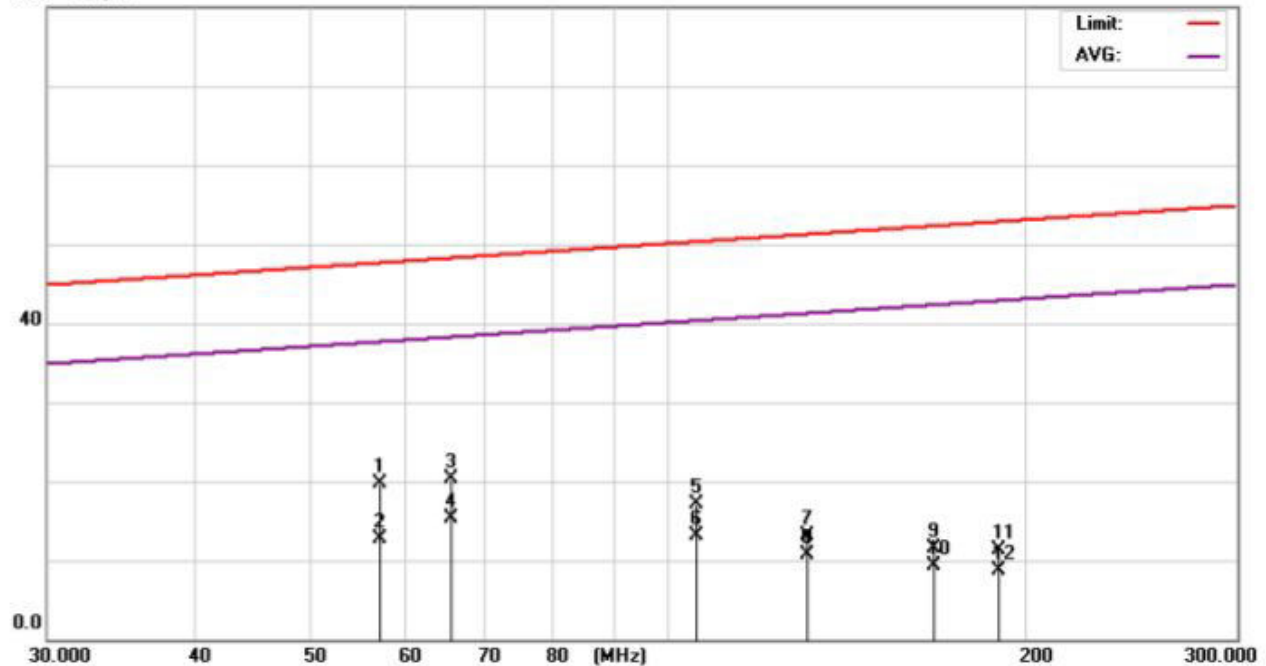
Date of Test	March 07, 2017	Temperature	20 deg/C
EUT	Switching Power Supply	Humidity	60 %RH
Working Cond.	Mode 1 (Mains)	Display Pattern	N/A
Test Power Supply	AC 207V/50Hz	Frequency Range	30-300MHz

No.	Frequency MHz	Reading Level dBuV	Factor dB	Measurement dBpW	Limit dBpW	Over Limit dB	Detector
1	57.2500	1.53	18.26	19.79	47.81	-28.02	QP
2	57.2500	-5.47	18.26	12.79	37.81	-25.02	AVG
3	65.5625	3.03	17.31	20.34	48.40	-28.06	QP
4	★65.5625	-1.94	17.31	15.37	38.40	-23.03	AVG
5	105.5625	-0.22	17.25	17.03	50.46	-33.43	QP
6	105.5625	-4.24	17.25	13.01	40.46	-27.45	AVG
7	131.0625	-3.33	16.43	13.10	51.40	-38.30	QP
8	131.0625	-5.74	16.43	10.69	41.40	-30.71	AVG
9	167.2500	-3.89	15.41	11.52	52.46	-40.94	QP
10	167.2500	-6.14	15.41	9.27	42.46	-33.19	AVG
11	189.7500	-3.75	15.14	11.39	53.01	-41.62	QP
12	189.7500	-6.35	15.14	8.79	43.01	-34.22	AVG

Remarks:

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = clamp insertion loss + cable loss.
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.45 dB.

80.0 dBpW



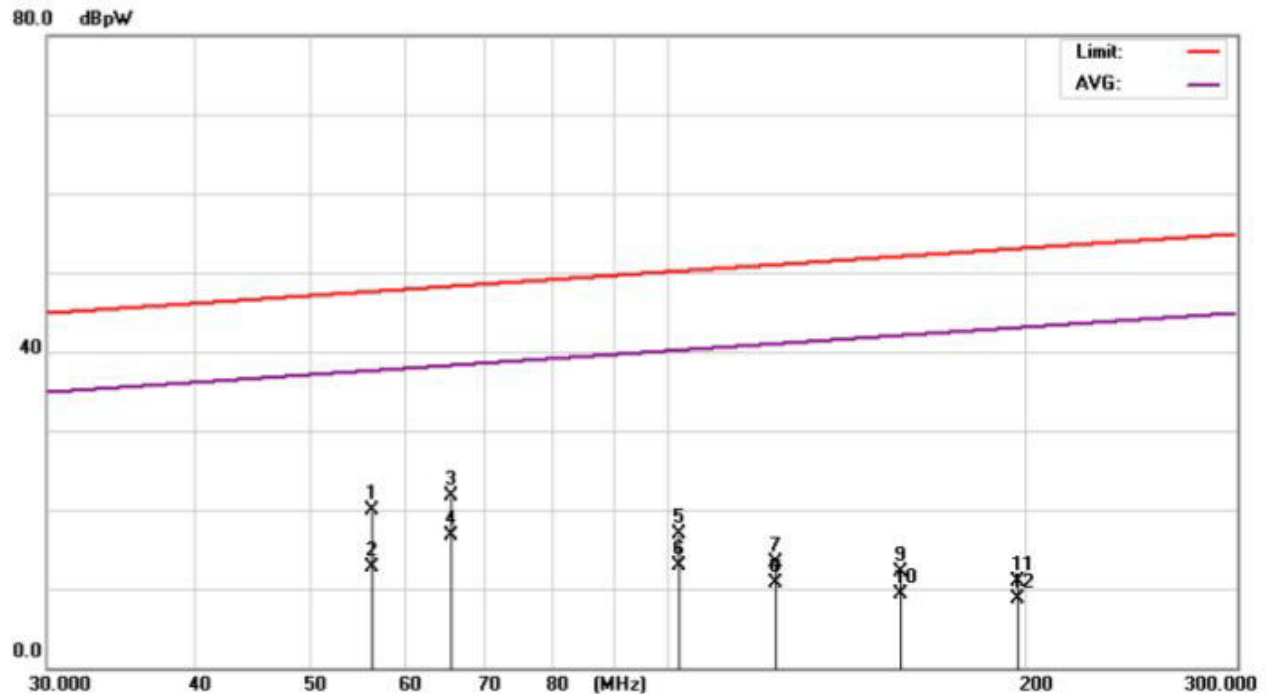
- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).

Date of Test	March 07, 2017	Temperature	20 deg/C
EUT	Switching Power Supply	Humidity	60 %RH
Working Cond.	Mode 1 (Mains)	Display Pattern	N/A
Test Power Supply	AC 253V/50Hz	Frequency Range	30-300MHz

No.	Frequency MHz	Reading Level dBuV	Factor dB	Measurement dBpW	Limit dBpW	Over Limit dB	Detector
1	56.3750	1.59	18.22	19.81	47.74	-27.93	QP
2	56.3750	-5.45	18.22	12.77	37.74	-24.97	AVG
3	65.5625	4.47	17.31	21.78	48.40	-26.62	QP
4	★65.5625	-0.68	17.31	16.63	38.40	-21.77	AVG
5	102.3125	-0.47	17.30	16.83	50.33	-33.50	QP
6	102.3125	-4.30	17.30	13.00	40.33	-27.33	AVG
7	123.3125	-3.46	16.84	13.38	51.14	-37.76	QP
8	123.3125	-6.04	16.84	10.80	41.14	-30.34	AVG
9	156.7500	-3.61	15.63	12.02	52.18	-40.16	QP
10	156.7500	-6.35	15.63	9.28	42.18	-32.90	AVG
11	196.9375	-4.32	15.13	10.81	53.17	-42.36	QP
12	196.9375	-6.45	15.13	8.68	43.17	-34.49	AVG

Remarks:

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = clamp insertion loss + cable loss.
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.45 dB.



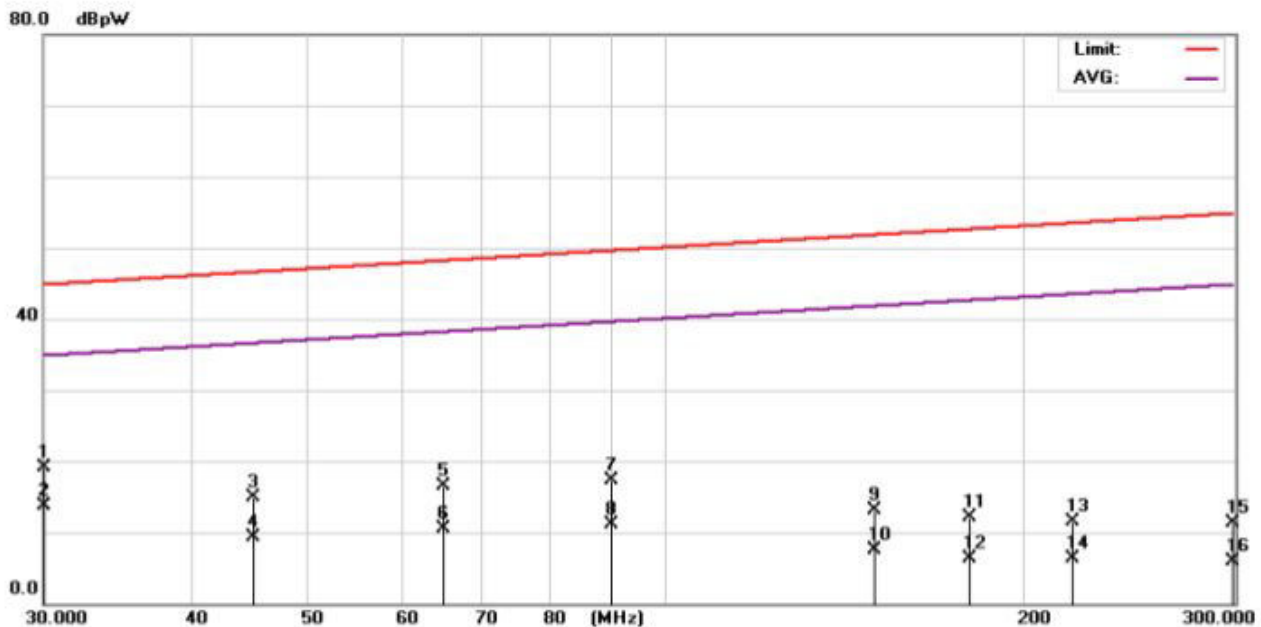
- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).

Date of Test	March 07, 2017	Temperature	20 deg/C
EUT	Switching Power Supply	Humidity	60 %RH
Working Cond.	Mode 1 (Mains)	Display Pattern	N/A
Test Power Supply	AC 207V/50Hz	Frequency Range	30-300MHz

No.	Frequency MHz	Reading Level dBuV	Factor dB	Measurement dBpW	Limit dBpW	Over Limit dB	Detector
1	30.0000	-1.29	20.45	19.16	45.00	-25.84	QP
2	★30.0000	-6.79	20.45	13.66	35.00	-21.34	AVG
3	45.0000	-3.50	18.33	14.83	46.76	-31.93	QP
4	45.0000	-9.03	18.33	9.30	36.76	-27.46	AVG
5	65.0000	-0.96	17.43	16.47	48.36	-31.89	QP
6	65.0000	-6.90	17.43	10.53	38.36	-27.83	AVG
7	90.0000	-0.06	17.36	17.30	49.77	-32.47	QP
8	90.0000	-6.23	17.36	11.13	39.77	-28.64	AVG
9	150.0000	-2.68	15.76	13.08	51.99	-38.91	QP
10	150.0000	-8.34	15.76	7.42	41.99	-34.57	AVG
11	180.0000	-3.07	15.15	12.08	52.78	-40.70	QP
12	180.0000	-8.75	15.15	6.40	42.78	-36.38	AVG
13	220.0000	-4.38	15.96	11.58	53.65	-42.07	QP
14	220.0000	-9.63	15.96	6.33	43.65	-37.32	AVG
15	300.0000	-4.05	15.34	11.29	55.00	-43.71	QP
16	300.0000	-9.42	15.34	5.92	45.00	-39.08	AVG

Remarks:

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = clamp insertion loss + cable loss.
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.45 dB.



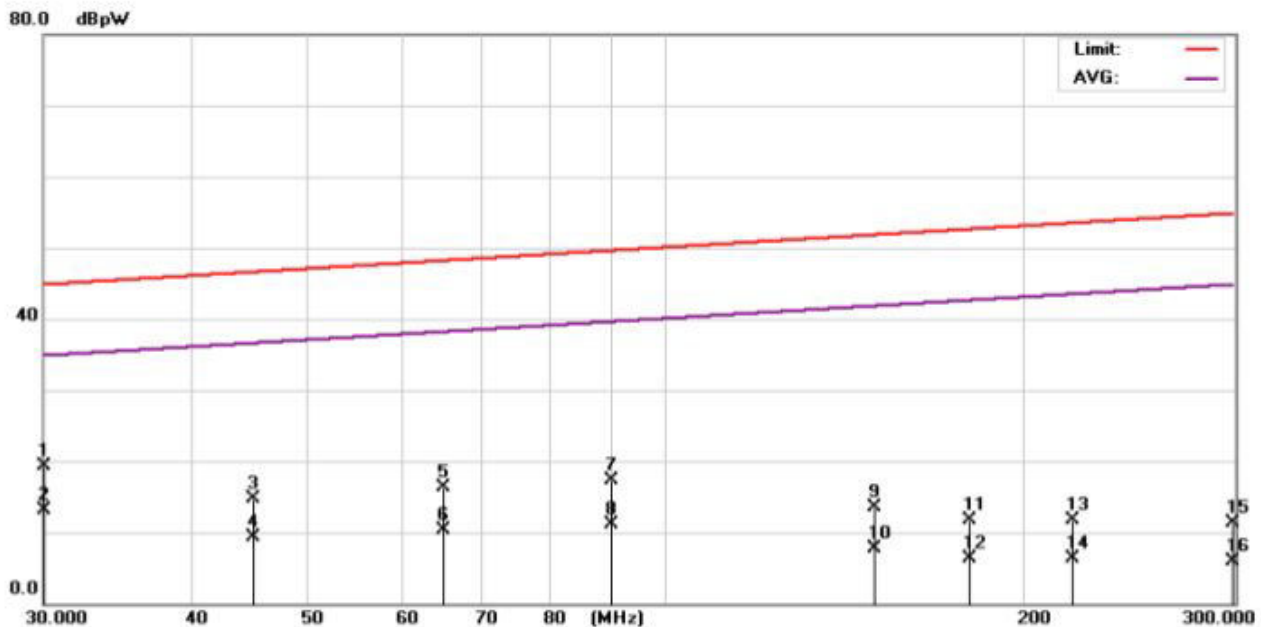
- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).

Date of Test	March 07, 2017	Temperature	20 deg/C
EUT	Switching Power Supply	Humidity	60 %RH
Working Cond.	Mode 1 (Mains)	Display Pattern	N/A
Test Power Supply	AC 253V/50Hz	Frequency Range	30-300MHz

No.	Frequency MHz	Reading Level dBuV	Factor dB	Measurement dBpW	Limit dBpW	Over Limit dB	Detector
1	30.0000	-1.23	20.45	19.22	45.00	-25.78	QP
2	★30.0000	-7.32	20.45	13.13	35.00	-21.87	AVG
3	45.0000	-3.56	18.33	14.77	46.76	-31.99	QP
4	45.0000	-9.03	18.33	9.30	36.76	-27.46	AVG
5	65.0000	-1.22	17.43	16.21	48.36	-32.15	QP
6	65.0000	-7.12	17.43	10.31	38.36	-28.05	AVG
7	90.0000	-0.06	17.36	17.30	49.77	-32.47	QP
8	90.0000	-6.23	17.36	11.13	39.77	-28.64	AVG
9	150.0000	-2.29	15.76	13.47	51.99	-38.52	QP
10	150.0000	-8.12	15.76	7.64	41.99	-34.35	AVG
11	180.0000	-3.40	15.15	11.75	52.78	-41.03	QP
12	180.0000	-8.89	15.15	6.26	42.78	-36.52	AVG
13	220.0000	-4.34	15.96	11.62	53.65	-42.03	QP
14	220.0000	-9.68	15.96	6.28	43.65	-37.37	AVG
15	300.0000	-4.01	15.34	11.33	55.00	-43.67	QP
16	300.0000	-9.47	15.34	5.87	45.00	-39.13	AVG

Remarks:

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = clamp insertion loss + cable loss.
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.45 dB.



- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).

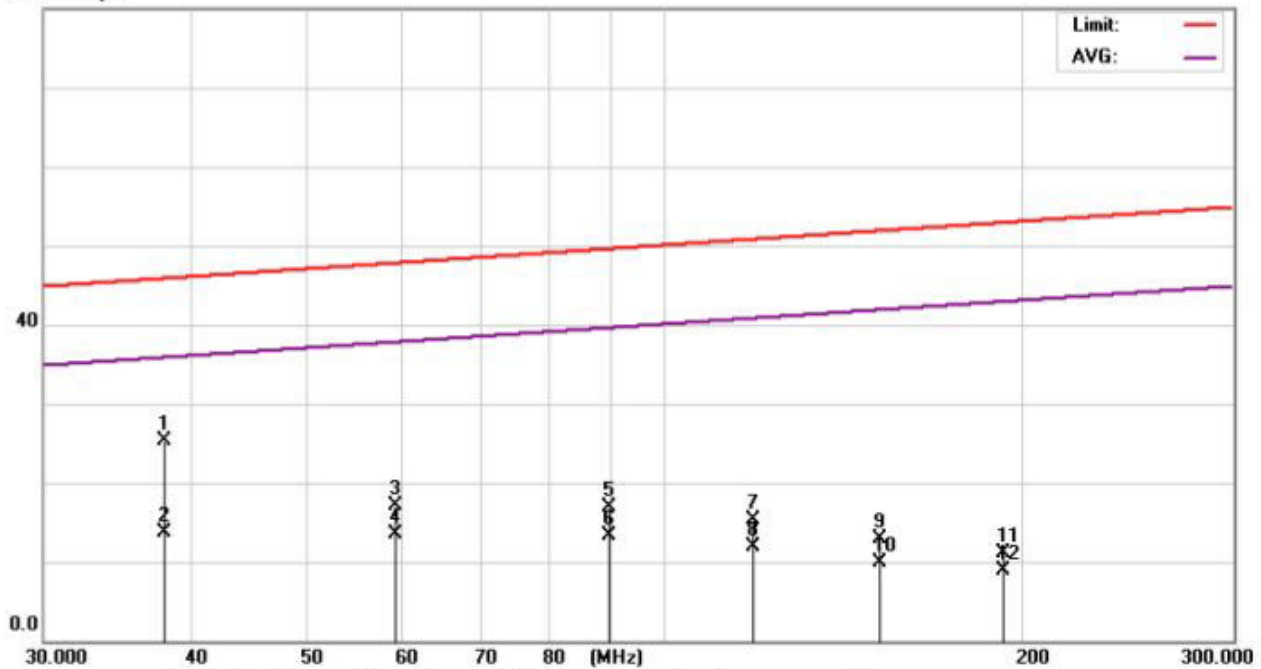
Date of Test	March 07, 2017	Temperature	20 deg/C
EUT	Switching Power Supply	Humidity	60 %RH
Working Cond.	Mode 1 (DC Cable)	Display Pattern	N/A
Test Power Supply	AC 207V/50Hz	Frequency Range	30-300MHz

No.	Frequency MHz	Reading Level dBuV	Factor dB	Measurement dBpW	Limit dBpW	Over Limit dB	Detector
1	★37.8750	6.29	19.06	25.35	46.01	-20.66	QP
2	37.8750	-5.43	19.06	13.63	36.01	-22.38	AVG
3	59.3125	-1.28	18.37	17.09	47.96	-30.87	QP
4	59.3125	-4.79	18.37	13.58	37.96	-24.38	AVG
5	89.8125	-0.50	17.35	16.85	49.76	-32.91	QP
6	89.8125	-4.07	17.35	13.28	39.76	-26.48	AVG
7	118.7500	-1.81	17.04	15.23	50.98	-35.75	QP
8	118.7500	-5.14	17.04	11.90	40.98	-29.08	AVG
9	151.9375	-2.81	15.72	12.91	52.05	-39.14	QP
10	151.9375	-5.75	15.72	9.97	42.05	-32.08	AVG
11	192.4375	-4.06	15.14	11.08	53.07	-41.99	QP
12	192.4375	-6.27	15.14	8.87	43.07	-34.20	AVG

Remarks:

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = clamp insertion loss + cable loss.
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.45 dB.

80.0 dBpW



- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).

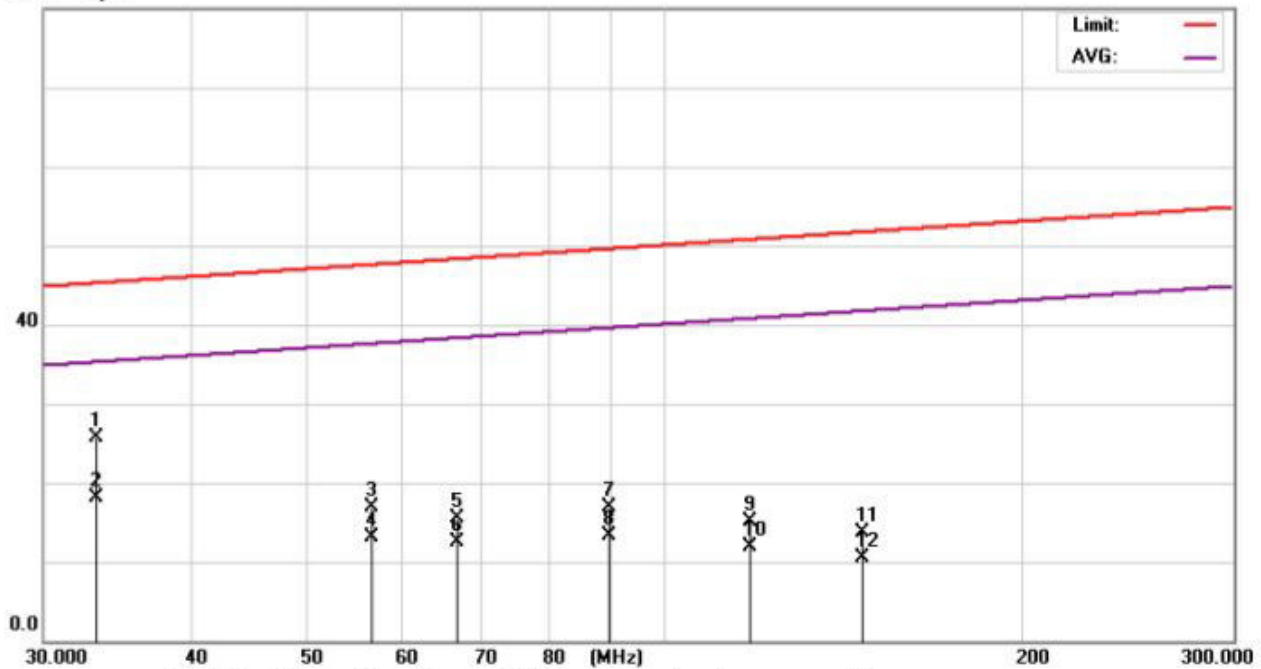
Date of Test	March 07, 2017	Temperature	20 deg/C
EUT	Switching Power Supply	Humidity	60 %RH
Working Cond.	Mode 1 (DC Cable)	Display Pattern	N/A
Test Power Supply	AC 253V/50Hz	Frequency Range	30-300MHz

No.	Frequency MHz	Reading Level dBuV	Factor dB	Measurement dBpW	Limit dBpW	Over Limit dB	Detector
1	33.1875	5.78	19.87	25.65	45.44	-19.79	QP
2	★33.1875	-1.83	19.87	18.04	35.44	-17.40	AVG
3	56.5625	-1.35	18.23	16.88	47.75	-30.87	QP
4	56.5625	-5.07	18.23	13.16	37.75	-24.59	AVG
5	66.8750	-1.49	17.06	15.57	48.48	-32.91	QP
6	66.8750	-4.63	17.06	12.43	38.48	-26.05	AVG
7	89.9375	-0.42	17.36	16.94	49.77	-32.83	QP
8	89.9375	-4.07	17.36	13.29	39.77	-26.48	AVG
9	117.8125	-1.92	17.06	15.14	50.94	-35.80	QP
10	117.8125	-5.18	17.06	11.88	40.94	-29.06	AVG
11	146.6875	-2.15	15.83	13.68	51.89	-38.21	QP
12	146.6875	-5.30	15.83	10.53	41.89	-31.36	AVG

Remarks:

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = clamp insertion loss + cable loss.
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.45 dB.

80.0 dBpW



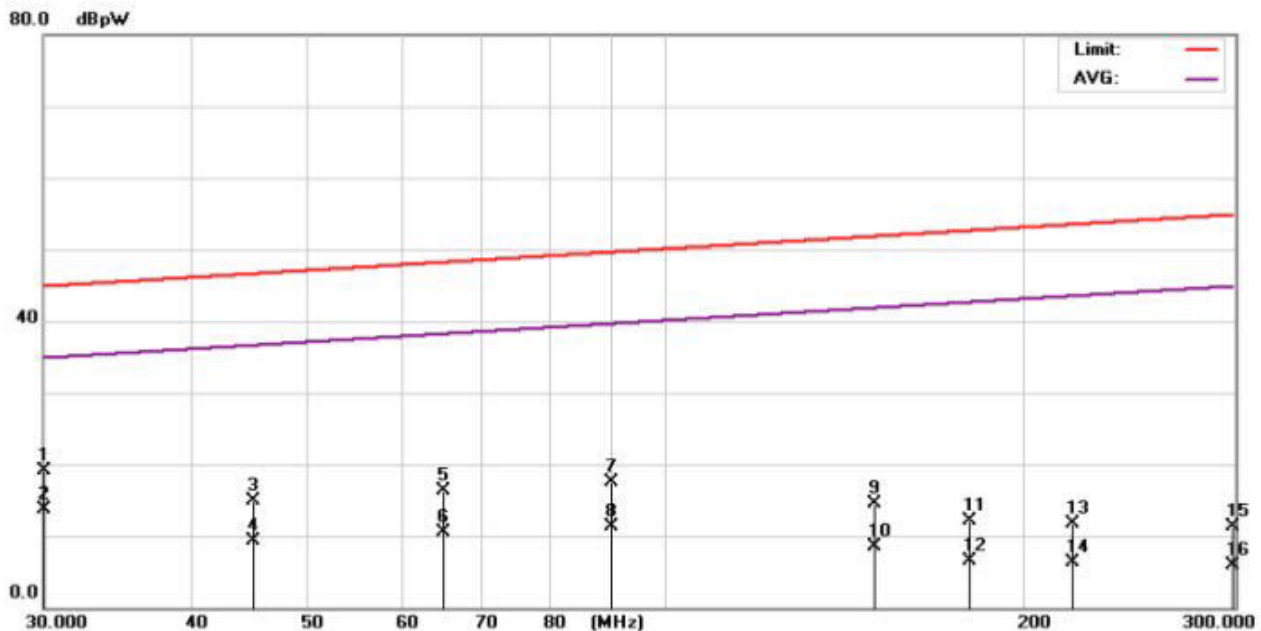
- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).

Date of Test	March 07, 2017	Temperature	20 deg/C
EUT	Switching Power Supply	Humidity	60 %RH
Working Cond.	Mode 1 (DC Cable)	Display Pattern	N/A
Test Power Supply	AC 207V/50Hz	Frequency Range	30-300MHz

No.	Frequency MHz	Reading Level dBuV	Factor dB	Measurement dBpW	Limit dBpW	Over Limit dB	Detector
1	30.0000	-1.33	20.45	19.12	45.00	-25.88	QP
2	★30.0000	-6.79	20.45	13.66	35.00	-21.34	AVG
3	45.0000	-3.50	18.33	14.83	46.76	-31.93	QP
4	45.0000	-8.94	18.33	9.39	36.76	-27.37	AVG
5	65.0000	-1.16	17.43	16.27	48.36	-32.09	QP
6	65.0000	-6.97	17.43	10.46	38.36	-27.90	AVG
7	90.0000	0.18	17.36	17.54	49.77	-32.23	QP
8	90.0000	-6.09	17.36	11.27	39.77	-28.50	AVG
9	150.0000	-1.26	15.76	14.50	51.99	-37.49	QP
10	150.0000	-7.23	15.76	8.53	41.99	-33.46	AVG
11	180.0000	-3.13	15.15	12.02	52.78	-40.76	QP
12	180.0000	-8.71	15.15	6.44	42.78	-36.34	AVG
13	220.0000	-4.34	15.96	11.62	53.65	-42.03	QP
14	220.0000	-9.68	15.96	6.28	43.65	-37.37	AVG
15	300.0000	-4.09	15.34	11.25	55.00	-43.75	QP
16	300.0000	-9.42	15.34	5.92	45.00	-39.08	AVG

Remarks:

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = clamp insertion loss + cable loss.
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.45 dB.



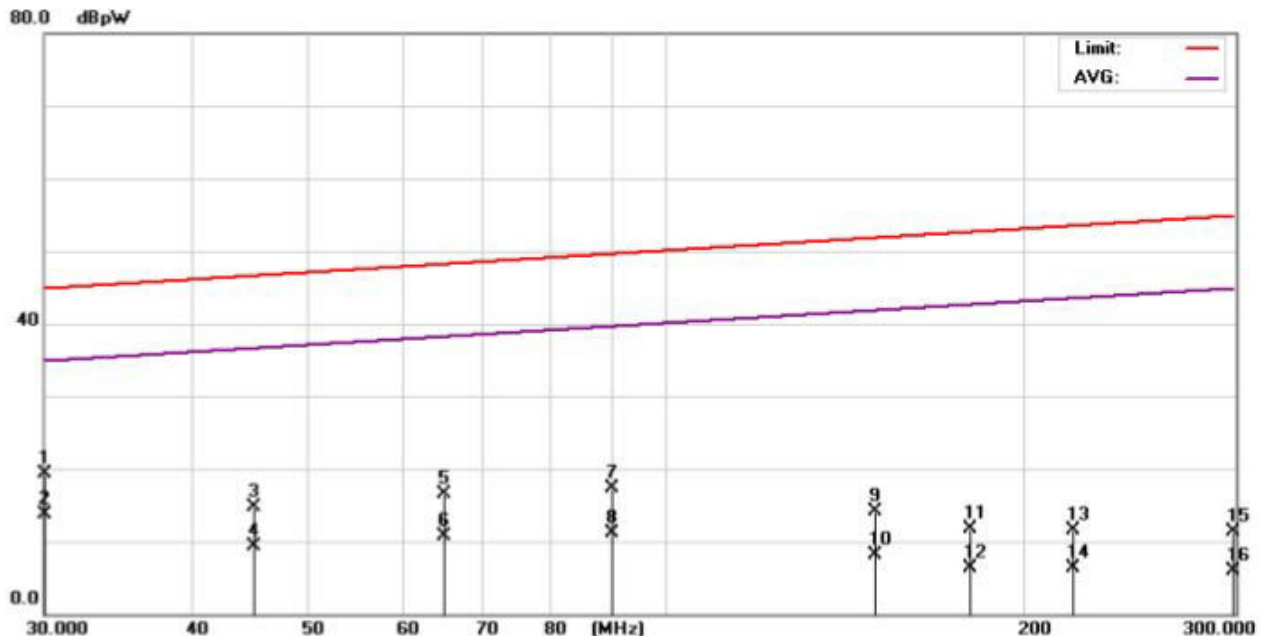
- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).

Date of Test	March 07, 2017	Temperature	20 deg/C
EUT	Switching Power Supply	Humidity	60 %RH
Working Cond.	Mode 1 (DC Cable)	Display Pattern	N/A
Test Power Supply	AC 253V/50Hz	Frequency Range	30-300MHz

No.	Frequency MHz	Reading Level dBuV	Factor dB	Measurement dBpW	Limit dBpW	Over Limit dB	Detector
1	30.0000	-1.19	20.45	19.26	45.00	-25.74	QP
2	★30.0000	-6.79	20.45	13.66	35.00	-21.34	AVG
3	45.0000	-3.60	18.33	14.73	46.76	-32.03	QP
4	45.0000	-9.03	18.33	9.30	36.76	-27.46	AVG
5	65.0000	-0.92	17.43	16.51	48.36	-31.85	QP
6	65.0000	-6.82	17.43	10.61	38.36	-27.75	AVG
7	90.0000	0.00	17.36	17.36	49.77	-32.41	QP
8	90.0000	-6.16	17.36	11.20	39.77	-28.57	AVG
9	150.0000	-1.68	15.76	14.08	51.99	-37.91	QP
10	150.0000	-7.63	15.76	8.13	41.99	-33.86	AVG
11	180.0000	-3.48	15.15	11.67	52.78	-41.11	QP
12	180.0000	-8.94	15.15	6.21	42.78	-36.57	AVG
13	220.0000	-4.38	15.96	11.58	53.65	-42.07	QP
14	220.0000	-9.58	15.96	6.38	43.65	-37.27	AVG
15	300.0000	-4.07	15.34	11.27	55.00	-43.73	QP
16	300.0000	-9.47	15.34	5.87	45.00	-39.13	AVG

Remarks:

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = clamp insertion loss + cable loss.
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 4.45 dB.



- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
 2. The AVG (The purple line of the graph indicates the average measurements).

6. RADIATED EMISSION MEASUREMENT

6.1 TEST EQUIPMENT

The following test equipment is used during the radiated emission tests:

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	TEST RECEIVER	RS	ESCS30	849650/023	2017.08.15
2	SPECTRUM	RS	FSL6	100517	2017.03.17
3	PRE-AMPLIFIER	EMV-Technik	PA303	GTK-E-A393-01	2017.06.29
4	BILOG ANTENNA	SCHWARZBECK	VULB 9168	9168-253	2017.04.25
5	CABLE	PEWC	CFD400-NL	GTK-E-A395-01	2017.06.29
6	Software	EZ-EMC	FARAD	2A1.1(USB)	N/A

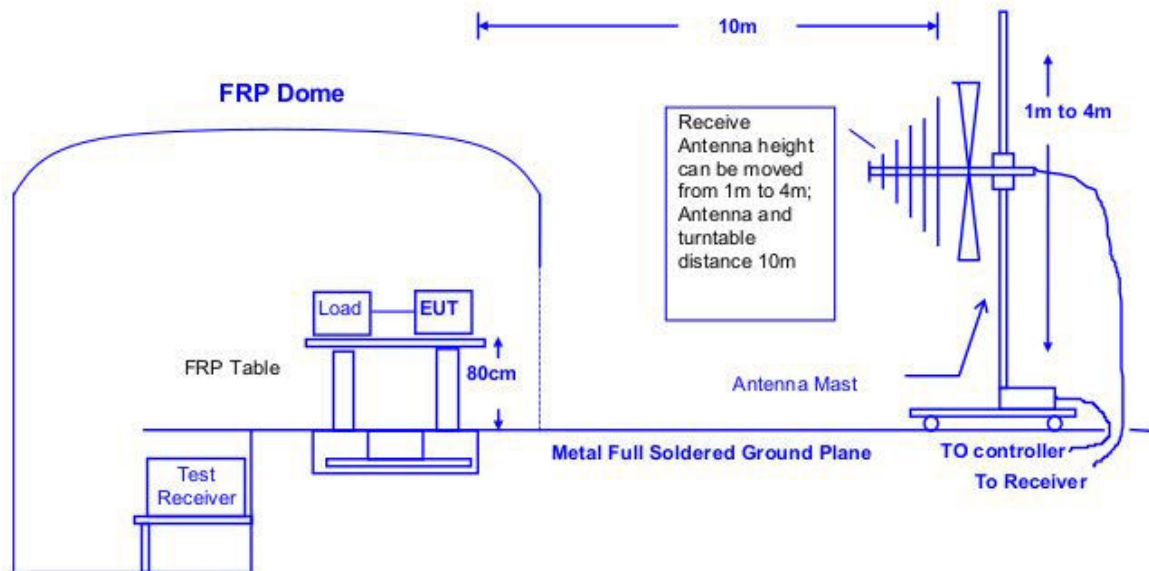
Note: 1. All equipment is calibrated and will be valid only for a period of 1 year.

2.The test was performed at GTK Open Site C2.

6.2 TEST METHOD

According to EN 55014-1:2006+A1:2009+A2:2011

6.3 BLOCK DIAGRAM OF TEST SETUP



Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.

6.4 RADIATED EMISSION LIMITS

Frequency	Distance	Field Strength
MHz	Meter	dB(μ V/m)
30 to 230	10	30
230 to 1000	10	37
The lower limit is applicable at the transition frequency.		

6.5 TEST CONFIGURATION

The equipment which is listed at 6.1 is installed at the Radiated Emission Test site to meet the Commission requirements and operated in a manner, which tends to maximize its emission characteristics in a normal application.

The EUT, installed in a representative system as described in section 6.3, was placed on a non-conductive table whose total height equaled 80 cm. This table can be rotated 360 degrees.

6.5.1 30 MHz to 1 GHz

The measurement antenna was mounted to a non-conductive mast capable of moving the antenna vertically. Antenna height was varied from 1 m to 4 m and the system under test was rotated from 0 degree through 360 degrees relative to the antenna position and polarization (Horizontal and Vertical). Also the I/O cable positions were investigated to find the maximum emission condition.

6.6 OPERATING CONDITION OF THE EUT

The exercise program used during conducted emission measurement was designed to exercise the EUT in a manner similar to a typical use. The exercise sequence is listed as below:

1. Setup the EUT and simulators as shown on 3.4.
2. Turn on the power of all equipments.
3. Start Test.

6.7 RADIATED POWER TEST DATA

The measurement range of radiated emission, which is from **30 MHz to 1 GHz**, was investigated. All readings are quasi-peak values with a resolution bandwidth of 120 kHz. The initial step in collecting radiated emission data is a spectrum analyzer peak scans of the measurement range for all the test modes and then use test receiver for final measurement and record at least the disturbance levels and the frequencies of the six highest disturbances. Then the worst modes were reported the following data pages.

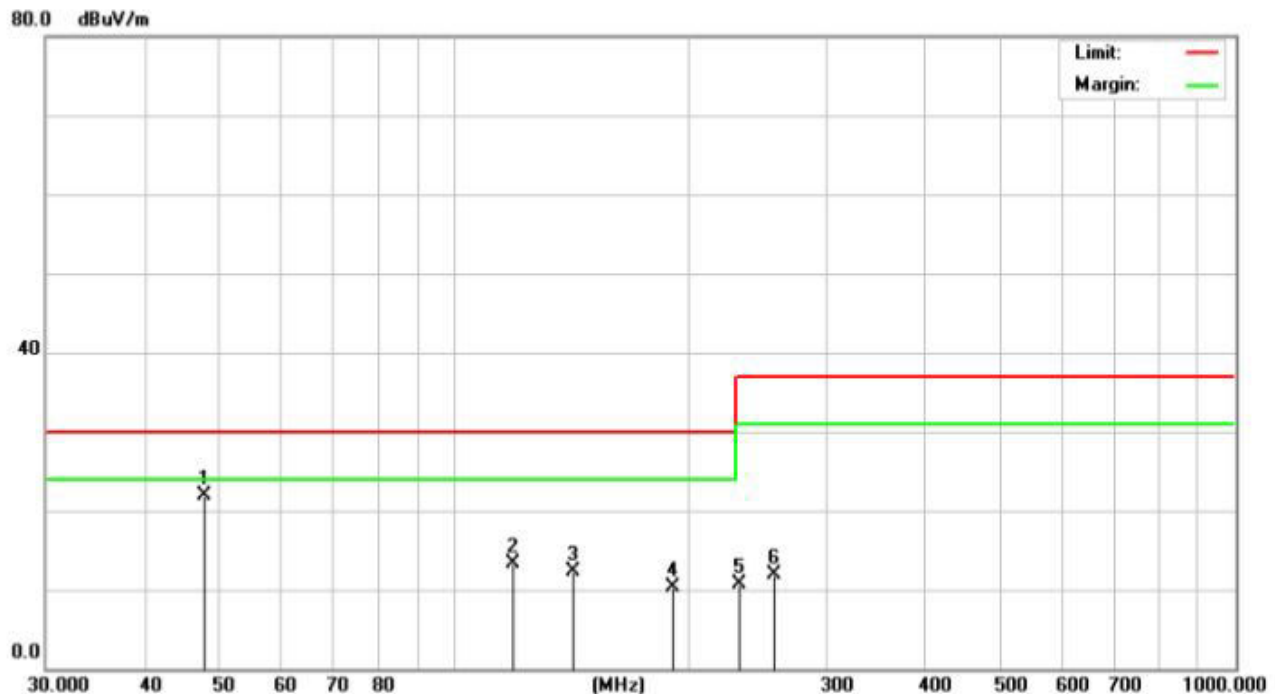
6.8 RADIATED EMISSIONS MEASUREMENT RESULTS

Date of Test	March 07, 2017	Temperature	20 deg/C
EUT	Switching Power Supply	Humidity	53 %RH
Working Cond.	Mode 1	Display Pattern	N/A
Antenna distance	10m at Horizontal	Test Frequency Range	30-1000MHz
Test Power Supply	AC 230V/50Hz		

No.	Frequency MHz	Reading Level dB μ V	Factor dB	Measurement dB μ V/m	Limit dB μ V/m	Over Limit dB	Detector
1	★47.7200	30.80	-8.80	22.00	30.00	-8.00	QP
2	119.2200	25.32	-12.04	13.28	30.00	-16.72	QP
3	141.6200	23.06	-10.82	12.24	30.00	-17.76	QP
4	190.9600	22.73	-12.38	10.35	30.00	-19.65	QP
5	231.6800	22.78	-12.04	10.74	37.00	-26.26	QP
6	258.0200	22.21	-10.38	11.83	37.00	-25.17	QP

Remarks:

1. All Readings below 1GHz are Quasi-Peak.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = antenna factor + cable loss – amplifier gain.
5. " ★ " means that this data is the worst case measurement level.
6. The antenna height could have ± 1 cm tolerance and the turn table degree could have $\pm 1^\circ$ tolerance.
7. The measurement uncertainty is 4.30 dB.



- Remark:
1. The Limit (The red line of the graph indicates the quasi -peak measurements).
 2. The Margin (The green line of the graph indicates the 6dB margin).

Date of Test	March 07, 2017	Temperature	20 deg/C
EUT	Switching Power Supply	Humidity	53 %RH
Working Cond.	Mode 1	Display Pattern	N/A
Antenna distance	10m at Vertical	Test Frequency Range	30-1000MHz
Test Power Supply	AC 230V/50Hz		

No.	Frequency MHz	Reading Level dB μ V	Factor dB	Measurement dB μ V/m	Limit dB μ V/m	Over Limit dB	Detector
1	★47.2400	32.60	-8.81	23.79	30.00	-6.21	QP
2	60.9500	31.27	-9.61	21.66	30.00	-8.34	QP
3	74.2800	34.59	-12.79	21.80	30.00	-8.20	QP
4	117.2900	32.13	-12.19	19.94	30.00	-10.06	QP
5	189.4200	25.67	-12.42	13.25	30.00	-16.75	QP
6	215.7100	23.29	-12.00	11.29	30.00	-18.71	QP

Remarks:

1. All Readings below 1GHz are Quasi-Peak.
2. Measurement = Reading + Factor (Could have ± 0.01 tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = antenna factor + cable loss – amplifier gain.
5. " ★ " means that this data is the worst case measurement level.
6. The antenna height could have ± 1 cm tolerance and the turn table degree could have $\pm 1^\circ$ tolerance.
7. The measurement uncertainty is 4.30 dB.



- Remark:
1. The Limit (The red line of the graph indicates the quasi -peak measurements).
 2. The Margin (The green line of the graph indicates the 6dB margin).

7. HARMONIC CURRENT EMISSIONS, VOLTAGE FLUCTUATIONS AND FLICKER MEASUREMENT

7.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	EMC Emission Tester	EMC PARTNER	HAR1000-1P	HAR1000-1P 115V-0241	2017.07.19
2	AC Power Source	PACIFIC	345AMX/UPC32	270	N/A
3	Software	EMC PARTNER	HARCS	4.21	N/A

Note: 1. All equipment is calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Shielded Room B7.

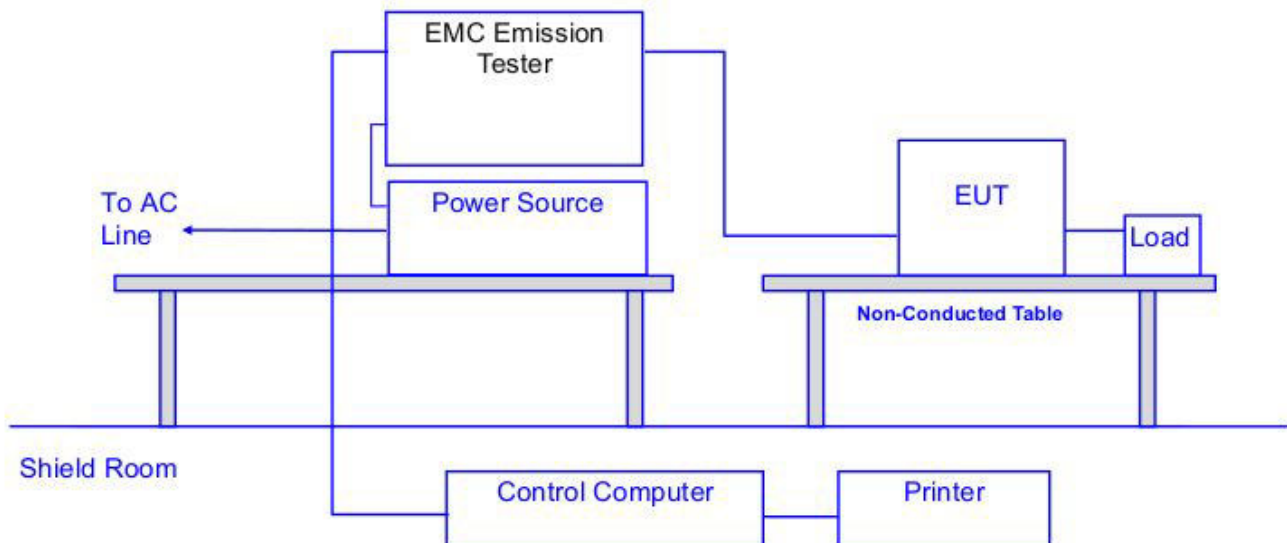
7.2 TEST METHOD

According to EN 61000-3-2: 2014 &
EN 61000-3-3: 2013.

7.3 BLOCK DIAGRAM OF TEST SETUP

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



7.4 LIMITS OF HARMONIC CURRENT EMISSIONS AND FLICKER MEASUREMENT

Power Line Harmonics:

☒ Class A

Harmonics Order	Maximum Permissible harmonic current (in amperes)	Harmonics Order	Maximum Permissible harmonic current (in amperes)
Odd harmonics		Even harmonics	
3	2.30	2	1.08
5	1.14	4	0.43
7	0.77	6	0.30
9	0.40	$8 \leq n \leq 40$	$0.23 * 8/n$
11	0.33		
13	0.21		
$15 \leq n \leq 39$	$0.15 * 15/n$		

Flicker:

Limits	
P_{st}	1.0
P_{lt}	0.65
$d(t)$	3.3%
Time(ms)>dt	500ms
d_c	3.3%
d_{max}	4%

7.5 OPERATING CONDITIONS OF THE EUT

1. Setup the EUT and Test Equipment as shown on 7.3.
2. Power on the EUT. Acting performance checking program to allow EUT executing its usual operation mode during test.

7.6 TEST PROCEDURE

7.6.1 Power Line Harmonics:

The EUT was supplied in series with power analyzer from a power source having the same nominal voltage and frequency as the rated supply voltage of the equipment under test.

7.6.2 Flicker:

The test voltage supplied the EUT shall be maintained within $230V \pm 2\%$.

The frequency shall be $50Hz \pm 0.5\%$.

The observation period T_p :

-for Pst $T_p = 10\text{min}$.

-for Plt $T_p = 2\text{h}$.

7.7 TEST RESULT

1. The measurement of the power harmonics and flicker, which test at the extremes of EUT's supply range was investigated, and the test results are reported on the following pages.
The measurement limits were met, and the EUT passed the test.
2. The Harmonic measurement uncertainty is 8.94 mA.
3. The Flicker measurement uncertainty is 0.02 %.

Current Test Result Summary (Run time)

Comply: EN 61000-3-2:2014 - IEC 61000-4-7 Ed.2.0

Date : 2017/3/6 PM 04:44:24 V4.21

Operator

Albert

Unit

Switching Power Supply

Serial Number

HK-AD-150T050-WW6

Remarks

Urms = 230.1V Freq = 50.000 Range: 1 A
Irms = 0.101A Ipk = 0.394A cf = 3.913
P = 11.24W S = 23.15VA pf = 0.486
THDi = 181 % THDu = 0.10 % Class A

Test - Time : 1min(100 %)

Test completed, Result: PASSED

Order	Freq. [Hz]	Iavg [A]	Irms [A]	I _{max} [A]	Limit [A]
2	100	0.0000	0.0004	0.0004	1.0800
3	150	0.0468	0.0468	0.0468	2.3000
4	200	0.0000	0.0004	0.0004	0.4300
5	250	0.0432	0.0432	0.0432	1.1400
6	300	0.0000	0.0004	0.0005	0.3000
7	350	0.0380	0.0380	0.0380	0.7700
8	400	0.0000	0.0005	0.0005	0.2300
9	450	0.0318	0.0318	0.0318	0.4000
10	500	0.0000	0.0005	0.0005	0.1840
11	550	0.0252	0.0252	0.0252	0.3300
12	600	0.0000	0.0005	0.0005	0.1533
13	650	0.0188	0.0189	0.0189	0.2100
14	700	0.0000	0.0004	0.0004	0.1314
15	750	0.0134	0.0134	0.0134	0.1500
16	800	0.0000	0.0004	0.0004	0.1150
17	850	0.0095	0.0095	0.0095	0.1324
18	900	0.0000	0.0004	0.0004	0.1022
19	950	0.0076	0.0076	0.0076	0.1184
20	1000	0.0000	0.0004	0.0004	0.0920
21	1050	0.0072	0.0073	0.0073	0.1071
22	1100	0.0000	0.0004	0.0004	0.0836
23	1150	0.0071	0.0072	0.0072	0.0978
24	1200	0.0000	0.0004	0.0004	0.0767
25	1250	0.0067	0.0068	0.0068	0.0900
26	1300	0.0000	0.0004	0.0004	0.0708
27	1350	0.0059	0.0059	0.0059	0.0833
28	1400	0.0000	0.0003	0.0004	0.0657
29	1450	0.0000	0.0048	0.0048	0.0776
30	1500	0.0000	0.0003	0.0003	0.0613
31	1550	0.0000	0.0038	0.0037	0.0726
32	1600	0.0000	0.0003	0.0003	0.0575
33	1650	0.0000	0.0031	0.0031	0.0682
34	1700	0.0000	0.0003	0.0003	0.0541
35	1750	0.0000	0.0029	0.0029	0.0643
36	1800	0.0000	0.0002	0.0003	0.0511
37	1850	0.0000	0.0030	0.0030	0.0608
38	1900	0.0000	0.0002	0.0003	0.0484
39	1950	0.0000	0.0029	0.0029	0.0577
40	2000	0.0000	0.0002	0.0003	0.0460

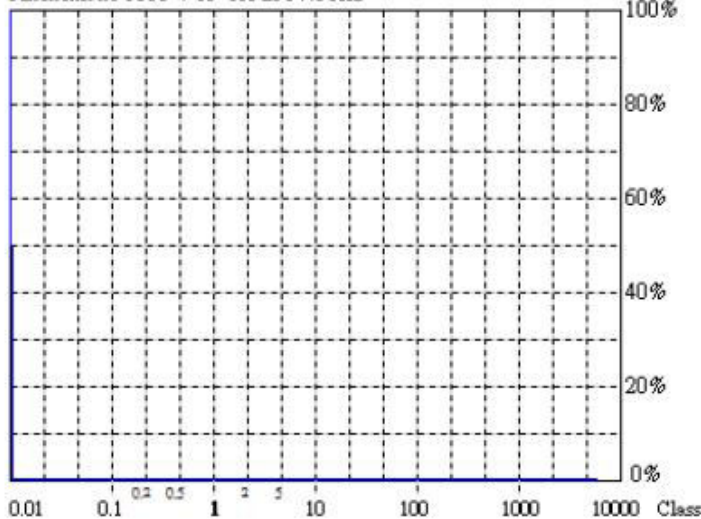
Order	Limits in Ampere			
	90%	100%	150%	200%
2	0.9720	1.0800	1.6200	2.1599
3	2.0701	2.3001	3.4502	4.6002
4	0.3870	0.4300	0.6450	0.8600
5	1.0260	1.1400	1.7100	2.2800
6	0.2700	0.3000	0.4500	0.6000
7	0.6930	0.7700	1.1550	1.5400
8	0.2070	0.2300	0.3450	0.4600
9	0.3600	0.4000	0.6000	0.8000
10	0.1656	0.1840	0.2760	0.3680
11	0.2970	0.3300	0.4950	0.6600
12	0.1380	0.1533	0.2300	0.3066
13	0.1890	0.2100	0.3150	0.4200
14	0.1183	0.1314	0.1971	0.2628
15	0.1350	0.1500	0.2250	0.3000
16	0.1035	0.1150	0.1725	0.2300
17	0.1191	0.1323	0.1985	0.2646
18	0.0920	0.1022	0.1534	0.2045
19	0.1066	0.1184	0.1776	0.2368
20	0.0828	0.0920	0.1380	0.1840
21 *	0.0964	0.1071	0.1607	0.2142
22	0.0753	0.0836	0.1254	0.1672
23 *	0.0881	0.0978	0.1468	0.1957
24	0.0690	0.0767	0.1150	0.1533
25 *	0.0810	0.0900	0.1350	0.1801
26	0.0637	0.0707	0.1061	0.1415
27 *	0.0750	0.0833	0.1250	0.1666
28	0.0592	0.0657	0.0986	0.1315
29 *	0.0698	0.0776	0.1164	0.1552
30	0.0552	0.0613	0.0920	0.1227
31 *	0.0653	0.0726	0.1089	0.1451
32	0.0517	0.0575	0.0862	0.1150
33 *	0.0614	0.0682	0.1023	0.1364
34	0.0487	0.0541	0.0812	0.1083
35 *	0.0578	0.0643	0.0964	0.1285
36	0.0460	0.0511	0.0766	0.1022
37 *	0.0547	0.0608	0.0912	0.1216
38	0.0436	0.0484	0.0726	0.0968
39 *	0.0519	0.0577	0.0865	0.1154
40	0.0414	0.0460	0.0690	0.0920

Flicker Test Summary per EN/IEC61000-3-3 (Run time)

Comply: EN 61000-3-3: 2013 - IEC 61000-4-15 Ed.2

Operator Albert
Unit Switching Power Supply
Serial Number HK-AD-150T050-WW6

Flickermeter 1000-4-15 for 230V/50Hz



Actual Flicker (Fli): 0.00
Short-term Flicker (Pst): 0.07
Limit (Pst): 1.00
Long-term Flicker (Plt): 0.07
Limit (Plt): 0.65
Maximum Relative Volt. Change (dmax): 0.00%
Limit (dmax): 4.00%
Relative Steady-state Voltage Change (dc): 0.00%
Limit (dc): 3.00%
Maximum Interval exceeding 3.30% (dt): 0.00ms
Limit (dt>Lim): 500ms

Flicker Emission - IEC 61000-3-3, EN 61000-3-3

Urms = 230.1 V P = 11.24 W
Irms = 0.102 A pf = 0.479

Switching Power Supply

Test completed, Result: PASSED

2017/3/6 PM 04:59:28

Range: 1 A
V-nom: 230 V
TestTime: 12 min (100%)

EMC-1000 EMC-Partner

Full Bar : Actual Values
Empty Bar : Maximum Values
Circles : Average Values
Blue : Current , Green : Voltage , Red : Failed

Urms = 230.1V Freq = 50.013 Range: 1 A
Irms = 0.102A Ipk = 0.413A cf = 4.048
P = 11.24W S = 23.48VA pf = 0.479

Test - Time : 12 x 1min = 12min (100 %)

LIN (Line Impedance Network) : L: 0.24ohm +j0.15ohm N: 0.16ohm +j0.10ohm

Limits : Plt : 0.65 Pst : 1.00
dmax : 4.00 % dc : 3.00 %
dtLim: 3.30 % dt>Lim: 500ms

Test completed, Result: PASSED

8. ESD IMMUNITY TEST

8.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	ESD SIMULATOR SYSTEM	NoiseKen	GT-30R	ESS1366788	2017.06.01

Note: 1. All equipment is calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Shielded Room B4.

8.2 TEST METHOD

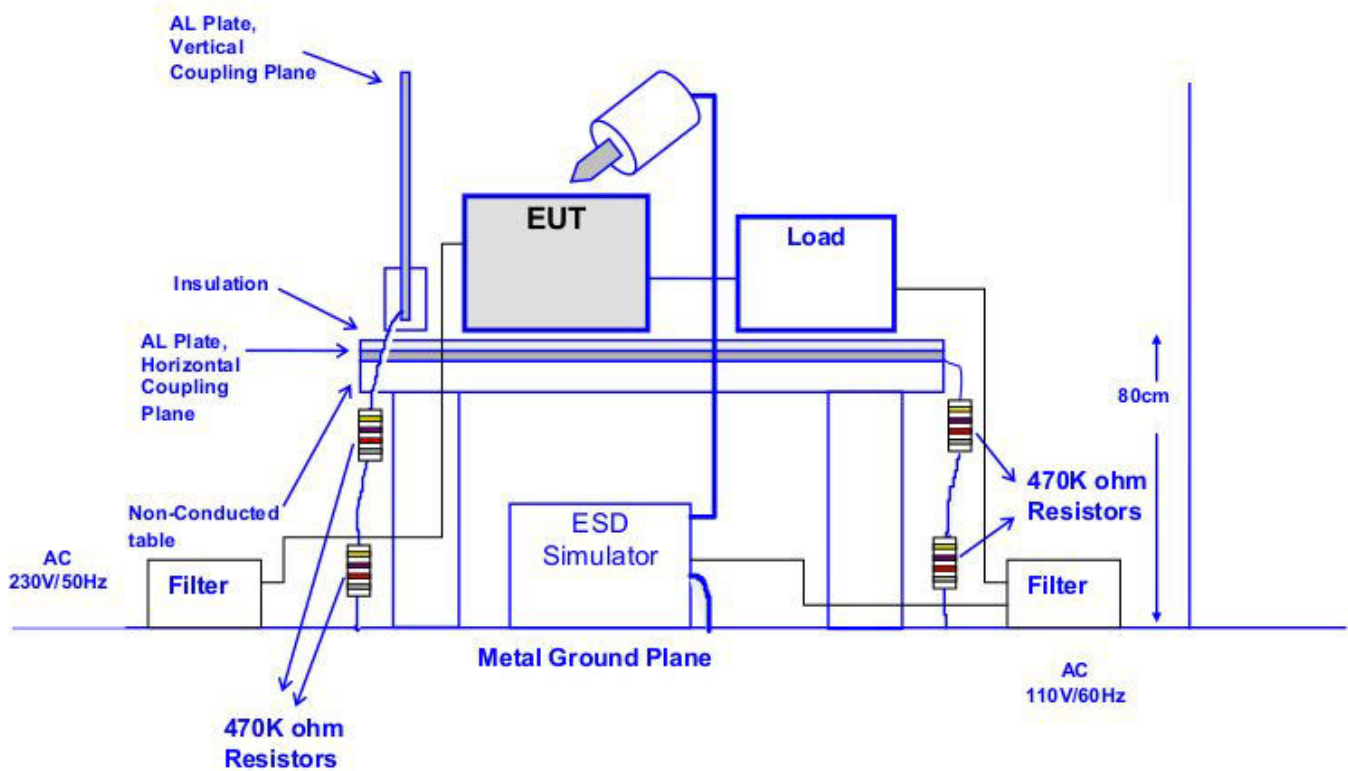
According to EN 55014-2: 2015

IEC 61000-4-2:2008

8.3 BLOCK DIAGRAM OF TEST SETUP

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



8.4 SEVERITY LEVELS

Required Performance Criteria : B
Level : $\pm 8\text{kV}$ and lower levels (Air Discharge)
 $\pm 4\text{kV}$ and lower levels (Contact Discharge)

8.5 OPERATING CONDITIONS OF THE EUT

1. Setup the EUT and Test Equipment as shown on 8.3.
2. Power on the EUT. Acting performance checking program to allow EUT executing its usual operation mode during test.

8.6 TEST PROCEDURE

Air Discharge: discharge at slots and apertures and insulating surfaces:

This test was performed on non-conductive surfaces in accordance with IEC 61000-4-2.

The selected test point shall be subjected to at least 10 positive & 10 negative discharges with >1 second interval.

Contact Discharge: discharge to the conductive surfaces and coupling planes:

Each one test point shall be subjected to at least 10 positive & 10 negative discharges with >1 second interval.

Horizontal Coupling Plane (HCP) under the EUT & Vertical Coupling Plane (VCP) beside the 4 sides of the EUT, with the sharp discharge electrode touching the coupling plane.

HCP discharge:

ESD was applied to the earth reference plane on each accessible side of the EUT.

VCP discharge:

Vertical Coupling Plane was positioned at a distance of 0.1m from the EUT.

8.7 TEST RESULT

Date of Test	March 07, 2017	Temperature	20 °C
Test Mode	Mode 1	Humidity	58 %
Test Power Supply	AC 230V/50Hz	Atmospheric Pressure	998 hPa (mbar)

Item	Each Point of Discharge	Voltage	Required Criteria	Complied to Criteria (A, B, C)	Result
Air Direct Discharge	10	☑-2kV, ☑-4kV, ☑-8kV	B	A	PASS
	10	☑+2kV, ☑+4kV, ☑+8kV	B	A	PASS
Indirect Discharge (HCP)	10	☑-2kV, ☑-4kV	B	A	PASS
	10	☑+2kV, ☑+4kV	B	A	PASS
Indirect Discharge (VCP) (Front)	10	☑-2kV, ☑-4kV	B	A	PASS
	10	☑+2kV, ☑+4kV	B	A	PASS
Indirect Discharge (VCP) (Left)	10	☑-2kV, ☑-4kV	B	A	PASS
	10	☑+2kV, ☑+4kV	B	A	PASS
Indirect Discharge (VCP) (Back)	10	☑-2kV, ☑-4kV	B	A	PASS
	10	☑+2kV, ☑+4kV	B	A	PASS
Indirect Discharge (VCP) (Right)	10	☑-2kV, ☑-4kV	B	A	PASS
	10	☑+2kV, ☑+4kV	B	A	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
 - ☐ Meet criteria B: Operate as intended after the test
 - ☐ Meet criteria C: Loss/Error of function
 - ☒ Additional Information
 - ☒ There was no observable degradation in performance.
 - ☒ No false alarms or other malfunctions were observed during or after the test.
- The acceptance criteria were met, and the EUT passed the test.
- ★The green tag means the air discharge point. (See the report page 61)
- ★The red tag means the contact point. (See the report page 61)

9.4 SEVERITY LEVELS

Required Performance Criteria : A
Level : 80~1000MHz(1kHz sinewave with 80% Amplitude modulation): 3V/m.

9.5 OPERATING CONDITIONS OF THE EUT

1. Setup the EUT and Test Equipment as shown on 9.3.
2. Power on the EUT. Acting performance checking program to allow EUT executing its usual operation mode during test.

9.6 TEST PROCEDURE

The EUT and load were placed on a table, which was 0.8 meters high. The field sensor was also placed on the same table to monitor field strength from transmitting antenna. EUT was set 3 meters away from the transmitting antenna. The transmitting antenna was fixed at 1 meter above ground. Both horizontal and vertical polarizations of the antenna were used during testing. In order to judge the EUT performance, a CCD camera was used to monitor the EUT screen.

All the scanning conditions are as follows:

Condition of Test	Remarks
Field Strength	3V/m
Radiated Signal	80MHz-1000MHz (1kHz sinewave with 80% Amplitude modulation)
Dwell Time	3 Seconds
Frequency step size	1 % of the present frequency

9.7 TEST RESULT

Date of Test	March 06, 2017	Temperature	20 °C
Test Mode	Mode 1	Humidity	58 %
Test Power Supply	AC 230V/50Hz		

Freq. Range (MHz)	Position (Angle)	Polarity (H or V)	Field Strength (V/m)	Performance Criteria Complied to	Results
<input type="checkbox"/> 26-80 MHz	0	H / V	3	A	PASS
<input checked="" type="checkbox"/> 80-1000 MHz	90	H / V	3	A	PASS
<input type="checkbox"/> 900 ± 5 MHz	180	H / V	3	A	PASS
	270	H / V	3	A	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
☐ Meet criteria B: Operate as intended after the test
☐ Meet criteria C: Loss/Error of function
☒ Additional Information
☒ There was no observable degradation in performance.
☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

10. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

10.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	COMPACT GENERATOR	EM TEST	UCS 500N5.1	P1310114655	2017.05.24
2	Software	EM TEST	ISMIEC	5.3.0	N/A

Note: 1. All equipment is calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Shielded Room B4.

10.2 TEST METHOD

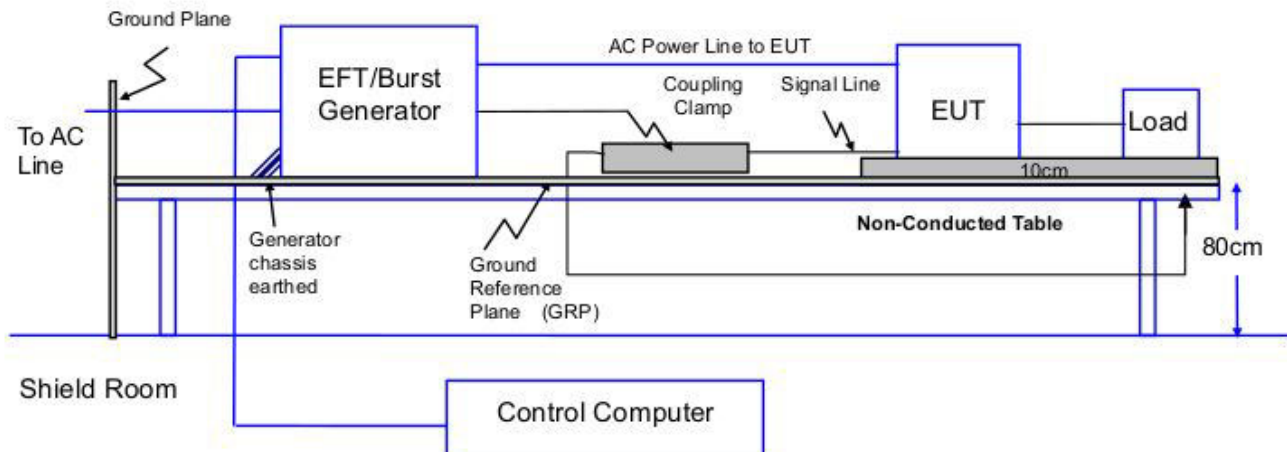
According to EN 55014-2: 2015

IEC 61000-4-4: 2012

10.3 BLOCK DIAGRAM OF TEST SETUP

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



10.4 SEVERITY LEVELS

Required Performance Criteria
Level

: B

: $\pm 0.5\text{kV}$ for Signal Lines and Control Lines

$\pm 0.5\text{kV}$, $\pm 1.0\text{kV}$ for Power Lines and protective earth terminal

10.5 OPERATING CONDITIONS OF THE EUT

1. Setup the EUT and Test Equipment as shown on 10.3.
2. Power on the EUT. Acting performance checking program to allow EUT executing its usual operation mode during test.

The EUT and its load were placed on a table which was 0.8 meters above a metal ground plane measuring 2m by 2m and 0.65mm thick min, and projecting beyond the EUT by at least 0.1m on all sides. More than 0.5 meters separated the EUT from the walls of the shielded room.

Prior to the start of the test, a functional test was performed on the EUT to ensure proper operation. The EUT was also monitored during the test for any degradation of performance.

For AC Power lines test:

The EUT is connected to the power mains through a coupling/decoupling network that directly injected the transient energy. Bursts of pulse trains were injected onto the power line, in both positive and negative polarities. The test level was 0.5kV and 1.0kV. The Line, Neutral, and protective earth conductors were impressed with burst noise for one minute.

For Signal Lines and Control Lines test:

The EFT interference signal was looped through a capacitive coupling clamp device to the signal and control lines of the EUT. The clamp meets the requirements of IEC 61000-4-4: 2012. The clamp was placed on the ground plane, and the data lines were placed inside the clamp. Bursts of pulse trains were injected onto the data lines, in both positive and negative polarities. The test level was 0.5kV run for one minute for each polarity on each cable.

After completion of the test, a functional test was performed on the EUT to ensure proper operation.

10.6 TEST RESULT

Date of Test	March 07, 2017	Temperature	20 °C
Test Mode	Mode 1	Humidity	58 %
Test Power Supply	AC 230V/50Hz		

Inject Place: Power Supply Line							
Inject Line	Polarity	Voltage kV	Inject time (minute)	Inject Method	Required Criteria	Complied to Criteria	Result
L+N	+	<input checked="" type="checkbox"/> 0.5	2	DIRECT	B	A	PASS
		<input checked="" type="checkbox"/> 1.0	2	DIRECT	B	A	PASS
L+N	-	<input checked="" type="checkbox"/> 0.5	2	DIRECT	B	A	PASS
		<input checked="" type="checkbox"/> 1.0	2	DIRECT	B	A	PASS

- ☒ Meet criteria A : Operate as intended during and after the test
 - ☐ Meet criteria B : Operate as intended after the test
 - ☐ Meet criteria C : Loss/Error of function
 - ☒ Additional Information
 - ☒ There was no observable degradation in performance.
 - ☒ No false alarms or other malfunctions were observed during or after the test.
- The acceptance criteria were met, and the EUT passed the test.

11. SURGE IMMUNITY TEST

11.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	COMPACT GENERATOR	EM TEST	UCS 500N5.1	P1310114655	2017.05.24
2	Software	EM TEST	ISMIEC	5.3.0	N/A

Note: 1. All equipment is calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Shielded Room B4.

11.2 TEST METHOD

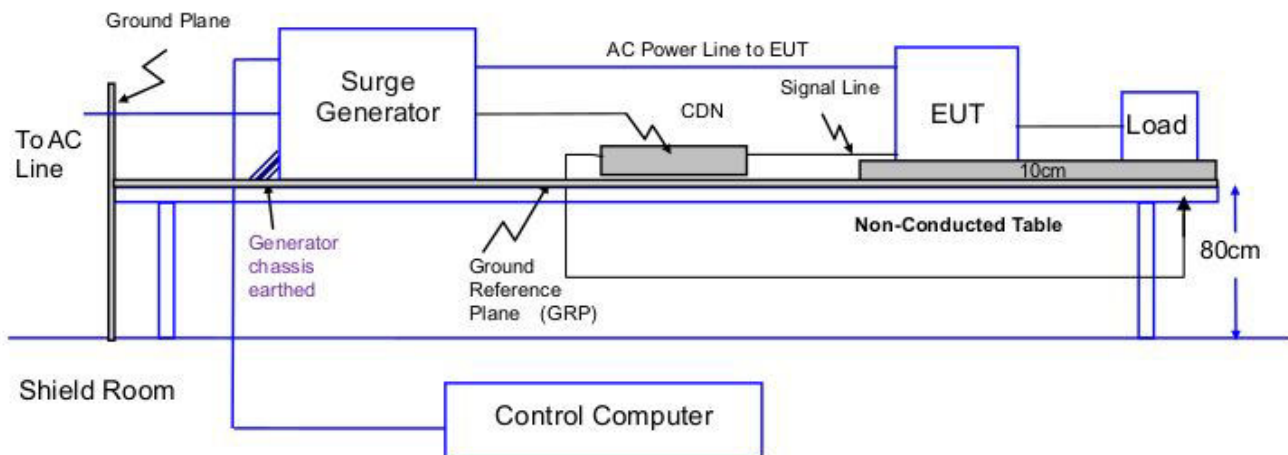
According to EN 55014-2: 2015

IEC 61000-4-5: 2014

11.3 BLOCK DIAGRAM OF TEST SETUP

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



11.4 SEVERITY LEVELS

Open Circuit Output Test Voltage +/- 10%	
Level	On power supply lines
1	0.5kV
2	1kV
3	2kV
4	4kV
X	Special

11.5 OPERATING CONDITIONS OF THE EUT

1. Setup the EUT and Test Equipment as shown on 11.3.
2. Power on the EUT. Acting performance checking program to allow EUT executing its usual operation mode during test.

11.6 TEST PROCEDURE

A "combination wave" as specified in IEC 61000-4-5: 2014 was applied to the EUT. The amplitude was gradually increased using control software. Surges were initiated line synced. The positive pulses are applied 90° relative to the phase angle of the a.c. line voltage to the equipment under test, and the negative pulses are applied 270° relative to the phase angle of the a.c. line voltage to the equipment under test. Tests with other (lower) voltages than those given in common mode $\pm 1\text{kV}$ and differential mode $\pm 2\text{kV}$ are not required. The Surges were applied at rate of one surge per minute. The EUT was monitored for any degradation of performance.

11.7 TEST RESULT

Date of Test	March 07, 2017	Temperature	20 °C
Test Mode	Mode 1	Humidity	58 %
Test Power Supply	AC 230V/50Hz		

AC Power line test								
Inject Line	Voltage kV	Repetition Rate (minute)	Phase Angle	Surge applied Method	Number of pulse	Required Criteria	Complied to Criteria	Result
L-N (Differential mode)	<input checked="" type="checkbox"/> +0.5	1	90°	CDN	5	B	A	PASS
	<input checked="" type="checkbox"/> +1.0	1	90°	CDN	5	B	A	PASS
	<input checked="" type="checkbox"/> -0.5	1	270°	CDN	5	B	A	PASS
	<input checked="" type="checkbox"/> -1.0	1	270°	CDN	5	B	A	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
☐ Meet criteria B: Operate as intended after the test
☐ Meet criteria C: Loss/Error of function
☒ Additional Information
☒ There was no observable degradation in performance.
☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

12. CONDUCTED DISTURBANCE SUSCEPTIBILITY TEST

12.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	Continuous Wave Simulator	EM TEST	CWS 500 A	1099-01	2017.03.15
2	Dual Directional Coupler	A & R	DC-2600	20193	N/A
3	VOLTMETER	BOONTON	9200C	361501AA	2017.11.15
4	Injection Clamp	LIITHI	EM101	35260	2017.04.13
5	ATTENUATOR	BNOS	AT50-6-250	521926	N/A
6	CDN(EUT)	LUTHI	CDN L-801 M2/M3	2627	2017.06.01
7	CDN (AE)	Knorr Bremse	M3	12184	N/A
8	SHIELDING ROOM	GTK	N/A	B6	2017.06.03
9	Software	EM TEST	ICD	2.20	N/A

Note: 1. All equipment is calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Shielded Room B6.

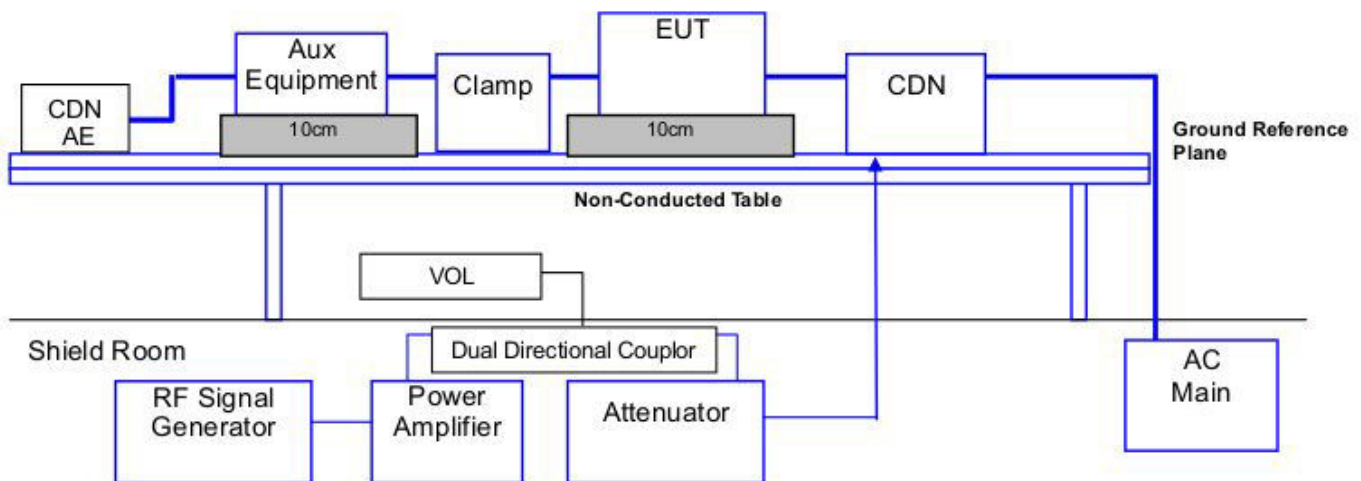
12.2 TEST METHOD

According to EN 55014-2: 2015
IEC 61000-4-6:2013

12.3 BLOCK DIAGRAM OF TEST SETUP

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



12.4 SEVERITY LEVELS

Test specification
Required Performance Criteria : A
Level : 1kHz sinewave with 80% Amplitude Modulation: 1, 3V
Frequency range : 0.15-80MHz

12.5 OPERATING CONDITIONS OF THE EUT

1. Setup the EUT and Test Equipment as shown on 12.3.
2. Power on the EUT. Acting performance checking program to allow EUT executing its usual operation mode during test.

12.6 TEST PROCEDURE

The EUT and load were placed on a table, which was 0.1 meters high from a Ground reference plane. Prior to the start of the test, a functional test was performed on the EUT to ensure proper operation. The EUT was also monitored during the test for any degradation of performance. Also, prior to the start of the test, clamp injection (RF current probe) calibration measurements were performed as described in IEC 61000-4-6:2013.

For AC Power line test & For Signal Lines and Control Lines test:

The disturbance signal is through a coupling and decoupling networks (CDN) or EM-clamp device couples to the signal and control lines of the EUT.

After completion of the test, a functional test was performed on the EUT to ensure proper operation.

All the scanning conditions are as follows:

Condition of Test	Remarks
Field Strength	3V
Radiated Signal	0.15-80MHz (1kHz sinewave with 80% Amplitude modulation)
Dwell Time	3 Seconds
Frequency step size	1% of the present frequency

12.7 TEST RESULT

Date of Test	March 07, 2017	Temperature	20 °C
Test Mode	Mode 1	Humidity	55 %
Test Power Supply	AC 230V/50Hz		

Frequency Range (MHz)	Inject Line	Field Strength	Inject Method	Required Criteria	Performance Criteria Complied To	Result
0.15~80	AC Line	3V	CDN	A	A	PASS
0.15~80	DC Line	1V	CDN	A	A	PASS

- ☒ Meet criteria A: Operate as intended during and after the test
- ☐ Meet criteria B: Operate as intended after the test
- ☐ Meet criteria C: Loss/Error of function
- ☒ Additional Information
 - ☒ There was no observable degradation in performance.
 - ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

13. VOLTAGE DIPS AND SHORT INTERRUPTIONS TEST

13.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	S/N or Version	Next Cal. Date
1	COMPACT GENERATOR	EM TEST	UCS 500N5.1	P1310114655	2017.05.24

Note: 1. All equipment is calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Shielded Room B6.

13.2 TEST METHOD

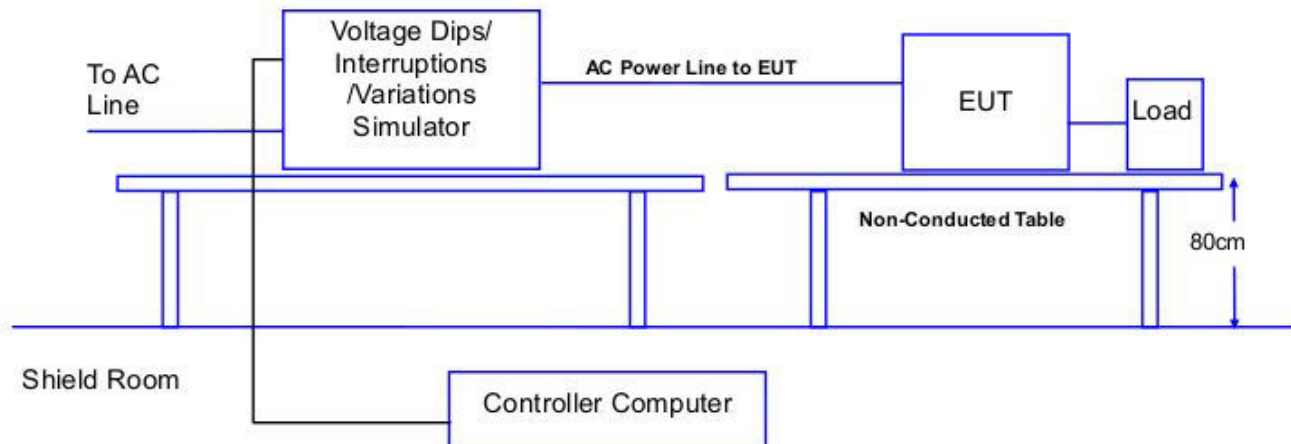
According to EN 55014-2: 2015

IEC 61000-4-11: 2004

13.3 BLOCK DIAGRAM OF TEST SETUP

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



13.4 SEVERITY LEVELS

For 50Hz

Voltage Dips and Interruption Reduction(%)	Test Duration	Required Performance Criteria
60	200ms	C
30	500ms	C
100	10ms	C

For 60Hz

Voltage Dips and Interruption Reduction(%)	Test Duration	Required Performance Criteria
60	200ms	C
30	500ms	C
100	8.33ms	C

13.5 OPERATING CONDITIONS OF THE EUT

1. Setup the EUT and Test Equipment as shown on 13.3.
2. Power on the EUT. Acting performance checking program to allow EUT executing its usual operation mode during test.

13.6 TEST PROCEDURE

The EUT and its load were placed on a table which was 0.8 meters height.

For AC Power line test (For 50Hz):

The EUT was connected to the power mains through a coupling device that directly couples to the Voltage Dips and Interruption Generator.

Voltage dips of 100% for 10ms and 30% for 500ms and 60% for 200ms were applied to the EUT three times with 10 sec intervals between dips.

For AC Power line test (For 60Hz):

The EUT was connected to the power mains through a coupling device that directly couples to the Voltage Dips and Interruption Generator.

Voltage dips of 100% for 8.33ms and 30% for 500ms and 60% for 200ms were applied to the EUT three times with 10 sec intervals between dips.

13.7 TEST RESULT

Date of Test	March 07, 2017	Temperature	20 °C
Test Mode	Mode 1	Humidity	58 %
Test Power Supply	AC 200V/50Hz		

Item	Phase Angle	Reduction (%)	Test Duration (ms)	Required Criteria	Complied to Criteria	Result
Voltage Short Interruptions	<input checked="" type="checkbox"/> 0	100	10	C	B	PASS
Voltage Dips	<input checked="" type="checkbox"/> 0	30	500	C	B	PASS
	<input checked="" type="checkbox"/> 0	60	200	C	B	PASS

- ☐ Meet criteria A: Operate as intended during and after the test
- ☒ Meet criteria B: Operate as intended after the test
- ☐ Meet criteria C: Loss of function, provided the function is self-recoverable, or can be restored by the operation of the controls
- ☒ Additional Information
- ☐ There was no observable degradation in performance.
- ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

Date of Test	March 07, 2017	Temperature	20 °C
Test Mode	Mode 1	Humidity	58 %
Test Power Supply	AC 200V/60Hz		

Item	Phase Angle	Reduction (%)	Test Duration (ms)	Required Criteria	Complied to Criteria	Result
Voltage Short Interruptions	<input checked="" type="checkbox"/> 0	100	8.33	C	B	PASS
Voltage Dips	<input checked="" type="checkbox"/> 0	30	500	C	B	PASS
	<input checked="" type="checkbox"/> 0	60	200	C	B	PASS

- ☐ Meet criteria A: Operate as intended during and after the test
- ☒ Meet criteria B: Operate as intended after the test
- ☐ Meet criteria C: Loss of function, provided the function is self-recoverable, or can be restored by the operation of the controls
- ☒ Additional Information
- ☐ There was no observable degradation in performance.
- ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

Date of Test	March 07, 2017	Temperature	20 °C
Test Mode	Mode 1	Humidity	58 %
Test Power Supply	AC 240V/50Hz		

Item	Phase Angle	Reduction (%)	Test Duration (ms)	Required Criteria	Complied to Criteria	Result
Voltage Short Interruptions	<input checked="" type="checkbox"/> 0	100	10	C	B	PASS
Voltage Dips	<input checked="" type="checkbox"/> 0	30	500	C	B	PASS
	<input checked="" type="checkbox"/> 0	60	200	C	B	PASS

- ☐ Meet criteria A: Operate as intended during and after the test
- ☒ Meet criteria B: Operate as intended after the test
- ☐ Meet criteria C: Loss of function, provided the function is self-recoverable, or can be restored by the operation of the controls
- ☒ Additional Information
- ☐ There was no observable degradation in performance.
- ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

Date of Test	March 07, 2017	Temperature	20 °C
Test Mode	Mode 1	Humidity	58 %
Test Power Supply	AC 240V/60Hz		

Item	Phase Angle	Reduction (%)	Test Duration (ms)	Required Criteria	Complied to Criteria	Result
Voltage Short Interruptions	<input checked="" type="checkbox"/> 0	100	8.33	C	B	PASS
Voltage Dips	<input checked="" type="checkbox"/> 0	30	500	C	B	PASS
	<input checked="" type="checkbox"/> 0	60	200	C	B	PASS

- ☐ Meet criteria A: Operate as intended during and after the test
- ☒ Meet criteria B: Operate as intended after the test
- ☐ Meet criteria C: Loss of function, provided the function is self-recoverable, or can be restored by the operation of the controls
- ☒ Additional Information
- ☐ There was no observable degradation in performance.
- ☒ No false alarms or other malfunctions were observed during or after the test. The acceptance criteria were met, and the EUT passed the test.

14. PHOTOGRAPHS FOR TEST

14.1 TEST PHOTOGRAPHS FOR CONDUCTION TEST



14.2 TEST PHOTOGRAPHS FOR POWER TEST



14.3 TEST PHOTOGRAPHS FOR RADIATED TEST



14.4 TEST PHOTOGRAPHS FOR HARMONIC/FLICKER



14.5 TEST PHOTOGRAPHS FOR ESD



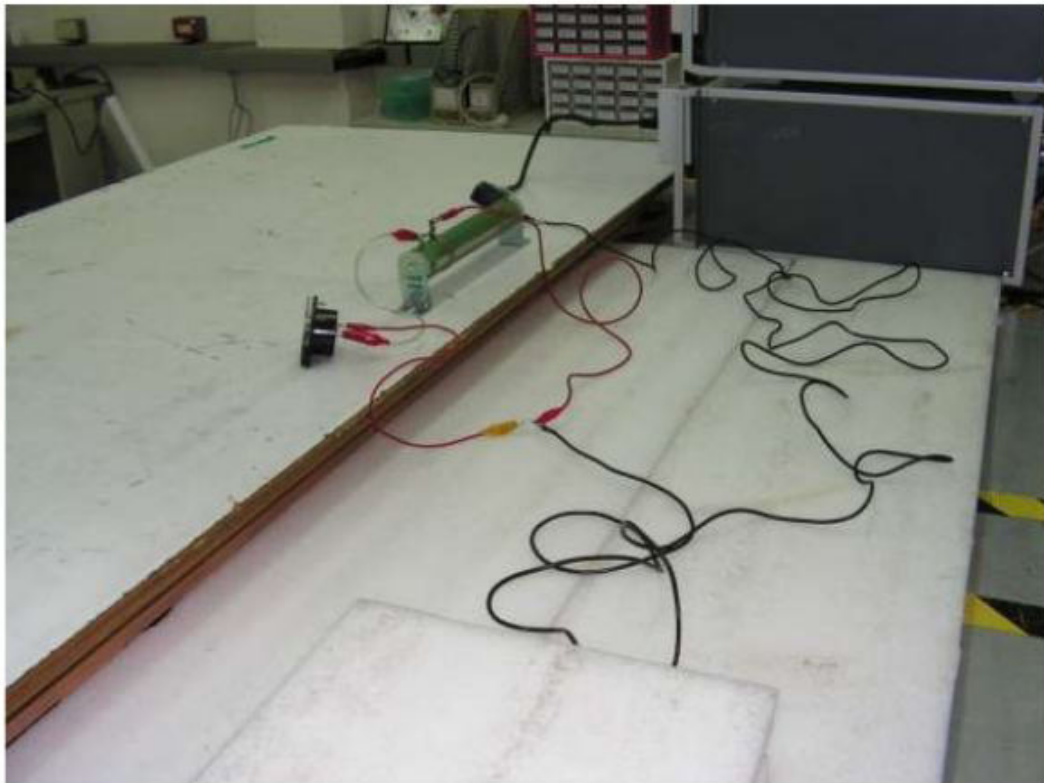
14.6 TEST PHOTOGRAPHS FOR ESD TEST POINTS



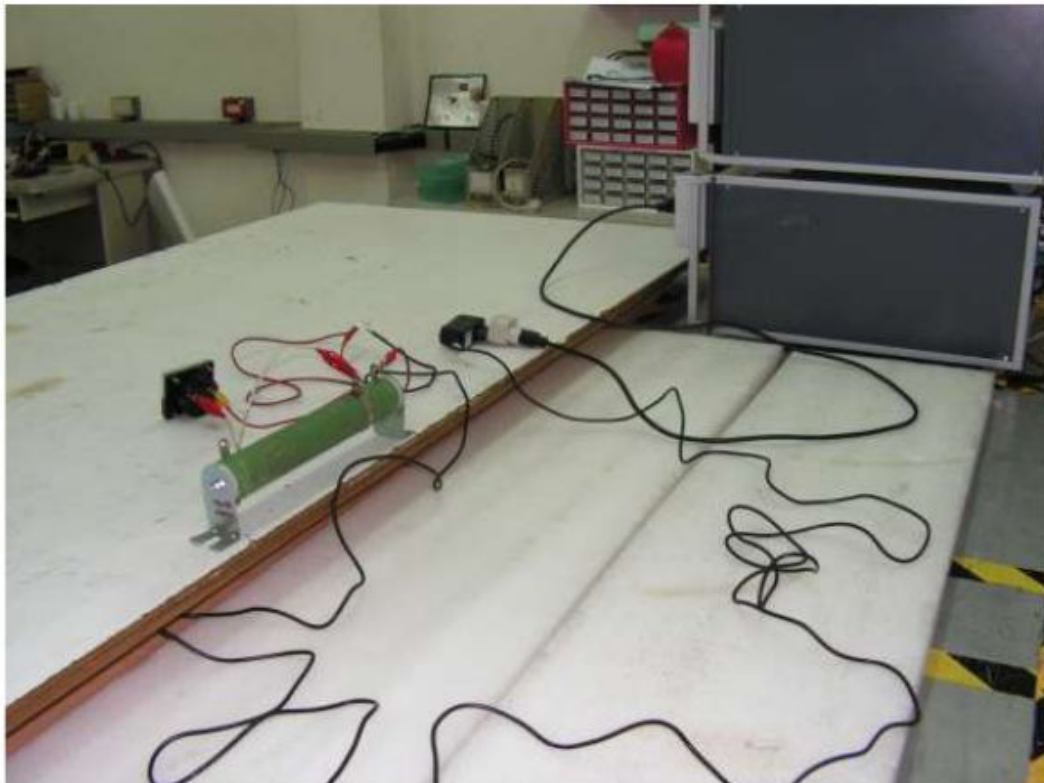
14.7 TEST PHOTOGRAPHS FOR RS



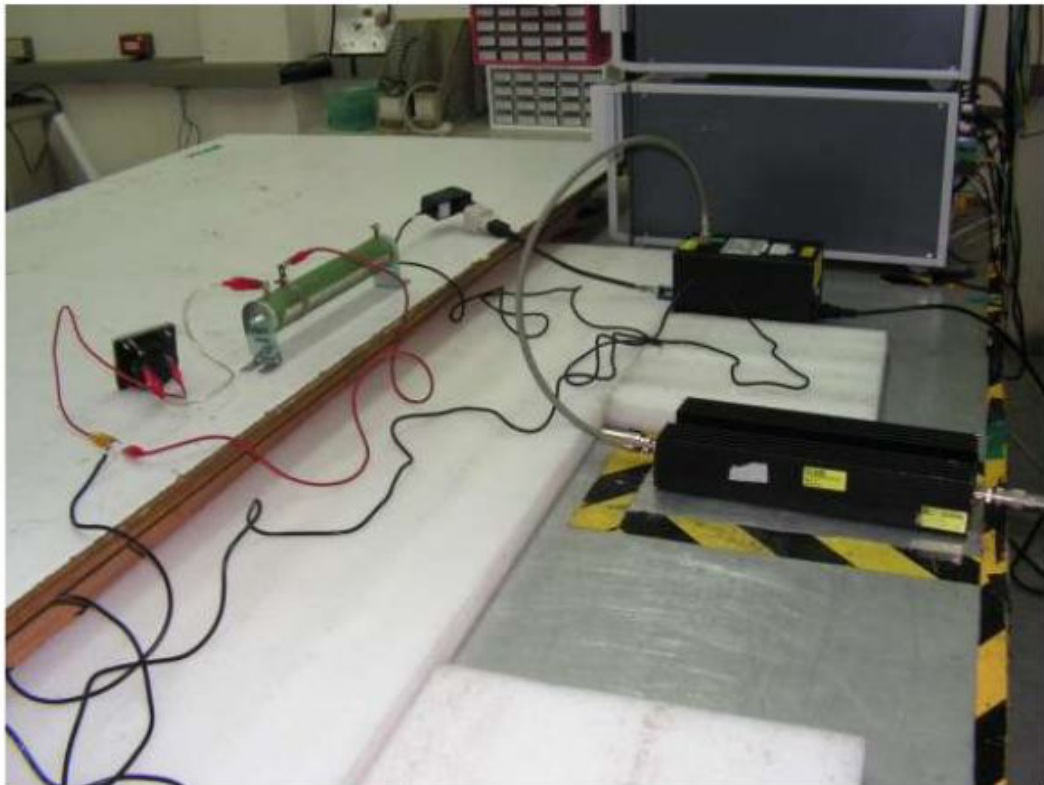
14.8 TEST PHOTOGRAPHS FOR EFT



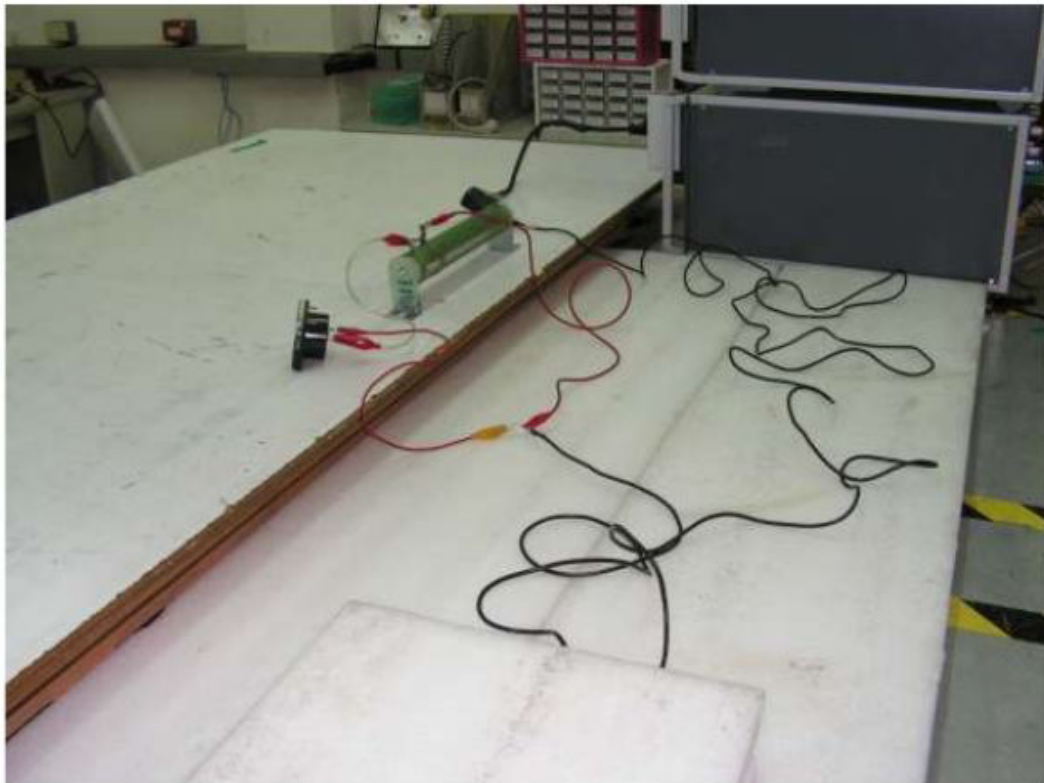
14.9 TEST PHOTOGRAPHS FOR SURGE



14.10 TEST PHOTOGRAPHS FOR CS



14.11 TEST PHOTOGRAPHS FOR DIPS



15. PHOTOGRAPHS FOR PRODUCT

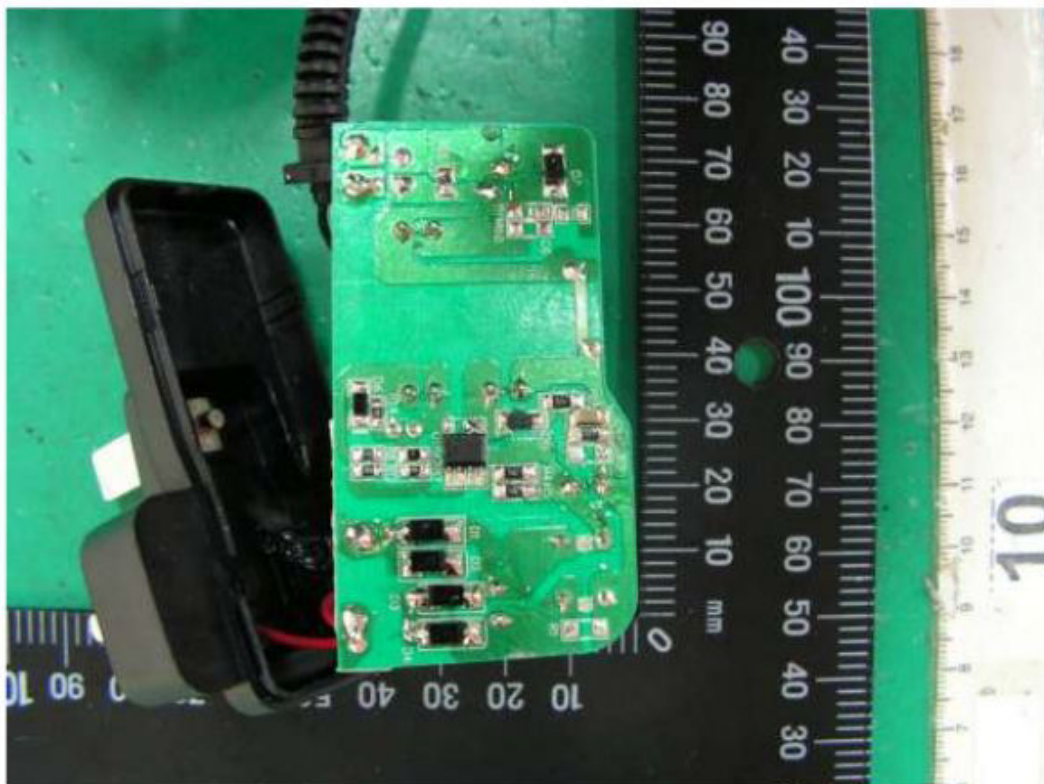
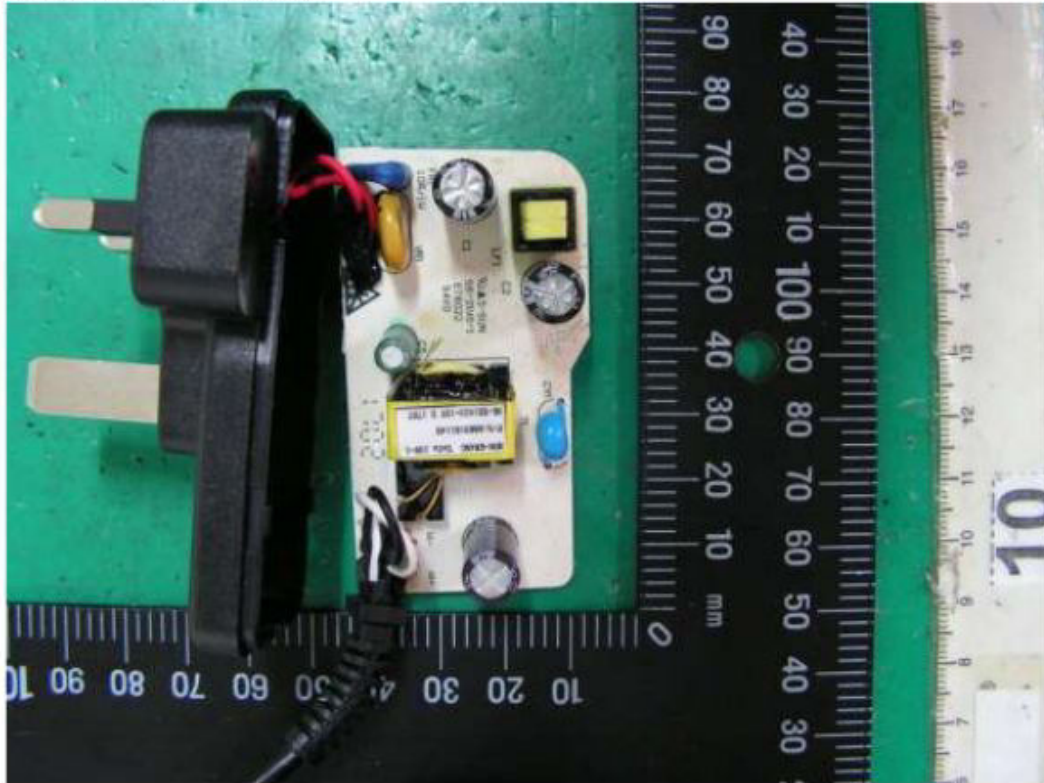
1. Front View of Switching Power Supply. (EUT)
2. Back View of Switching Power Supply. (EUT)



3. Front View of Switching Power Supply. (EUT)
4. Back View of Switching Power Supply. (EUT)



5. Component Side of Motherboard.
6. Solder Side of Motherboard.



16. EMI/EMS REDUCTION METHOD DURING COMPLIANCE TESTING

No modification was made during testing.