EMC TEST REPORT

Report No.: SET2016-05452

Product: AC Adaptor

Model No. : KPL-xy (x = 048, 066; y = F), KPL-xy-VI (x = 040, 048, 050, 060, 065, 066; y = F, G, V, H, I, W, J, K, L, N, Q, R, M, S), 2ACLxxxYzzzzz (xxx = 050, 060, 065; Y =K, M, R, S, U; z = 0-9, A-Z, "-" or blank)

Brand name : CWT NETGEAR D-Link®

Applicant: CHANNEL WELL TECHNOLOGY CO., LTD.

Issued by: CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

Lab Location: Electronic Testing Building, No. 43 Shahe Road, Xili Jiedao, Nan shan District, 518055 Shenzhen, Guangdong, China

Tel: 86 755 26627338 **Fax:** 86 755 26627238

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Query No. :490S08AS

Test Report

Product	AC Adaptor
Model No.	KPL-xy (x = 048, 066; y = F), KPL-xy-VI (x = 040, 048, 050, 060, 065, 066; y = F, G, V, H, I, W, J, K, L, N, Q, R, M, S), 2ACLxxxYzzzzz (xxx = 050, 060, 065; Y =K, M, R, S, U; z = 0-9, A-Z, "-" or blank)
Applicant.....	CHANNEL WELL TECHNOLOGY CO., LTD.
Applicant Address	No.222, Sec. 2, Nankan Rd., Lujhu Township, Taoyuan Hsien,
Manufacturer	CHANNEL WELL TECHNOLOGY CO., LTD.
Manufacturer Address...	No.222, Sec. 2, Nankan Rd., Lujhu Township, Taoyuan Hsien,
Test Standards	EN 55022:2010 Information technology equipment — Radio disturbance characteristics — Limits and methods of measurement EN 55024:2010 Information technology equipment — Immunity characteristics — Limits and methods of measurement 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
Test Result.....	Pass
Tested by	Xu Wei wei — Jun. 08. 2016
Reviewed by	Lu-Tongzhou — Jun.08. 2016
Approved by.....	Wu Lian — Jun. 08. 2016

Southern Electronic Product Testing (Shenzhen) Co., Ltd. CCIC-SET

Table of Contents

1 General Information

1.1 Description of EUT

Product: AC Adaptor

Model No.: KPL-xy (x = 048, 066; y = F), KPL-xy-VI (x = 040, 048, 050, 060, 065, 066; y = F, G, V, H, I, W, J, K, L, N, Q, R, M, S), 2ACLxxxYzzzzz (xxx = 050, 060, 065; Y =K, M, R, S, U; z = 0-9, A-Z, "-" or blank)

Rating: AC input: please refer to model list table for details;
DC output: please refer to model list table for details

NOTE:

1. The product being tested in this report is a AC Adaptor. The power supply unit is fully enclosed with a standard off the shelf designing. The power supply is for building-in application for ITE equipment. For a more detailed description of the EUT, please refer to the user manual.

2.

KPL-xy:

x represents the output wattage; x = 048, 066

y represents the output voltage; y = F

KPL-xy-VI:

x represents the output wattage; x = 040, 048, 050, 060, 065, 066

y represents the output voltage; y = F, G, V, H, I, W, J, K, L, N, Q, R, M, S

x= O/P Wattage (W)	y= O/P Wattage	DC Output Voltage (V)	AC Input Voltage (VAC)	AC Input Current (A)	AC Input Frequency (Hz)
66	F	12	100	1.7	50/60
40, 50, 60	G	13	100	1.7	50/60
40, 50, 60	V	14	100	1.7	50/60
40, 50, 60	H	15	100	1.7	50/60
40, 50, 60	I	16	100	1.7	50/60
40, 50, 60	W	17	100	1.7	50/60

40, 50, 65	J	18	100	1.7	50/60
40, 50, 60, 65	K	19	100	1.7	50/60
40, 50, 65	L	20	100	1.7	50/60
40, 50, 65	N	21	100	1.7	50/60
40, 50, 65	Q	22	100	1.7	50/60
40, 50, 65	R	23	100	1.7	50/60
40, 50, 60, 65	M	24	100	1.7	50/60
50, 60, 65	S	48	100	1.7	50/60

O/P Voltage (y=)	O/P Voltage (V)	DC Output Voltage @ O/P Wattage 40W	DC Output Voltage @ O/P Wattage 48W	DC Output Voltage @ O/P Wattage 50W	DC Output Voltage @ O/P Wattage 60W	DC Output Voltage @ O/P Wattage 65W	DC Output Voltage @ O/P Wattage 66W
F	12	3.33	4.00	4.17	5.00	5.42	5.50
G	13	3.08	---	3.85	4.62	---	---
V	14	2.86	---	3.57	4.29	---	---
H	15	2.67	---	3.33	4.00	---	---
I	16	2.50	---	3.13	3.75	---	---
W	17	2.35	---	2.94	3.53	---	---
J	18	2.22	---	2.78	---	3.61	---
K	19	2.11	---	2.63	3.16	3.42	---
L	20	2.00	---	2.50	---	3.25	---
N	21	1.90	---	2.38	---	3.10	---
Q	22	1.82	---	2.27	---	2.95	---
R	23	1.74	---	2.17	---	2.83	---
M	24	1.67	---	2.08	2.50	2.71	---
S	48	---	---	1.04	1.25	1.35	---

3. According to the rating table above, all the applied EMC tests were performed on the model KPL-066F-VI (1#, Max. current and Max. power) and KPL-065S-VI (2#, Max. voltage). The test results represented other models.

4. 2ACLxxxYzzzzz

xxx represents the output wattage. xxx = 050, 060, 065
Y represents the output voltage. Y =K, M, R, S, U
z represents the different customer. z = 0-9, A-Z, "-" or blank

xxx = O/P Wattage (W)	Y = O/P Voltage	DC Output Voltage (V)	AC Input Voltage (VAC)	AC Input Current (A)	AC Input Frequency (Hz)
060	K	19	100-240	1.7	50/60
060	M	24	100-240	1.7	50/60
060, 065	R	48	100-240	1.7	50/60
060, 065	S	54	100-240	1.7	50/60
050, 060, 065	U	56	100-240	1.7	50/60

O/P Voltage (Y =)	O/P Voltage (V)	DC Output Current @ O/P Wattage 36W	DC Output Current @ O/P Wattage 48W	DC Output Current @ O/P Wattage 50W	DC Output Current @ O/P Wattage 60W	DC Output Current @ O/P Wattage 65W	DC Output Current @ O/P Wattage 66W
K	19	---	---	---	3.16	---	---
M	24	---	---	---	2.50	---	---
R	48	---	---	---	1.25	1.35	---
S	54	---	---	---	1.10	1.20	---
U	56	---	---	0.90	1.07	1.16	---

5. According to the rating table above, all the applied EMC tests were performed on the model 2ACL060K (3#, Max. current) and 2ACL065U (4#, Max. wattage and Max. voltage), The test results represented other models.

1.2 Objective

Perform ElectroMagnetic Interference (EMI) and ElectroMagnetic Susceptibility (EMS) tests for CE Marking.

1.3 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15-35ºC
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

1.4 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in Measurement” (GUM) published by ISO.

- Uncertainty of Conducted Emission, Uc = ±3.6dB
- Uncertainty of Radiated Emission, Uc = ±4.7dB

1.5 Test Standards and Results

The EUT has been tested according to the following specifications:

EMISSION		
Standard	**Test Type**	**Result**
EN55022:2010	Mains terminal disturbance voltage	PASS
	Radiated disturbance	PASS
EN61000-3-2: 2014	Harmonic current emissions	PASS
EN61000-3-3: 2013	Voltage fluctuation & flicker	PASS
IMMUNITY (EN 55024:2010)		
Basic Standard	**Test Type**	**Result**
IEC 61000-4-2:2008	Electrostatic discharge immunity	PASS
IEC 61000-4-3: 2010	Radiated, radio frequency electromagnetic field immunity	PASS
IEC 61000-4-4: 2012	Electrical fast transient/burst immunity	PASS
IEC 61000-4-5: 2014	Surge immunity	PASS
IEC 61000-4-6:2013	Immunity to conducted disturbances induced by RF fields	PASS
IEC 61000-4-8: 2009	Power frequency magnetic field immunity	PASS
IEC 61000-4-11: 2004	Voltage dips and short interruptions immunity	PASS

1.6 List of Equipments Used

Description	Manufacturer	Model No.	Cal. Date	Cal. Due Date	Serial No.
Test Receiver	KEYSIGHT	N9038A	Nov.06, 2015	Nov.06, 2016	A141202036
LISN	ROHDE&SCHWARZ	ENV216	Mar.27, 2016	Mar.27, 2017	A140701846
Shielding room	NANBO TECH	RF-1 9×4.5×3 (m)	Oct. 26, 2015	Oct. 26, 2018	A9901141
Test Receiver	ROHDE&SCHWARZ	ESIB7	Sep.10, 2015	Sep.9,	A0501375

				2016	
Broadband Ant.	ETC	MCTD2786	Feb. 25, 2015	Feb.25, 2018	A150402239
Anechoic Chamber	Albatross	9X6X6M	Oct. 9, 2014	Oct. 9, 2017	A0412372
Test Receiver	ROHDE&SCHWARZ	ESIB26	Jun. 2. 2015	Jun. 1. 2016	A0304218
Horn antenna	ROHDE&SCHWARZ	HF906	Jun. 28, 2013	Jun. 28, 2016	A0304225
Anechoic Chamber	Albatross	SAC-5MAC(EMC12.8*6.8*6.4m)	Mar. 23, 2016	Mar. 23, 2018	A0304210
Power Frequency Magnetic Field Generator	HAEFELY	MAG 100.1	Jun.1, 2015	Jun.1, 2016	A0103109
ESD Test System	EM TEST	ESD30N	Sep.22, 2015	Sep.22, 2016	A130301203
Surge electrical fast transient comprehensive simulator	EM TEST	UCS500N7.7	Nov. 06, 2015	Nov. 06, 2016	A130201094
100A three-phase coupling network	EM TEST	CNI503B9.3	Nov. 06, 2015	Nov. 06, 2016	A130201095
Power Frequency Test System	CI	15003Ix-400-CTS（500LIX）	Aug. 5, 2015	Aug. 5, 2016	A0801521
CDN	ROHDE&SCHWARZ	M3	Jun.10, 2015	Jun.10, 2016	---
Signal Generator	ROHDE&SCHWARZ	SML02	Jun.10, 2015	Jun.10, 2016	A0304261
Power Amplifier	Amplifier Research	AR 150W1000	Jun.10, 2015	Jun.10, 2016	A0304247
Power Amplifier	Amplifier Research	AR 75A250M	Jun.10, 2015	Jun.10, 2016	A0304255

NOTE: Equipments above have been calibrated and are in the period of validation.

2Emission Test

2.1 EUT Setup and Operation

The EUT was powered by 230VAC.

The EUT was connected to resistance loads and operating at rated output.

2.2 Mains Terminal Disturbance Voltage Measurement

2.2.1 Limits of Mains Terminal Disturbance Voltage

Frequency range (MHz)	Limits (dBμV), Class B ITE	
	Quasi-peak	Average
0.15 - 0.50	66～56	56～46
0.50 – 5	56	46
5-30	60	50

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

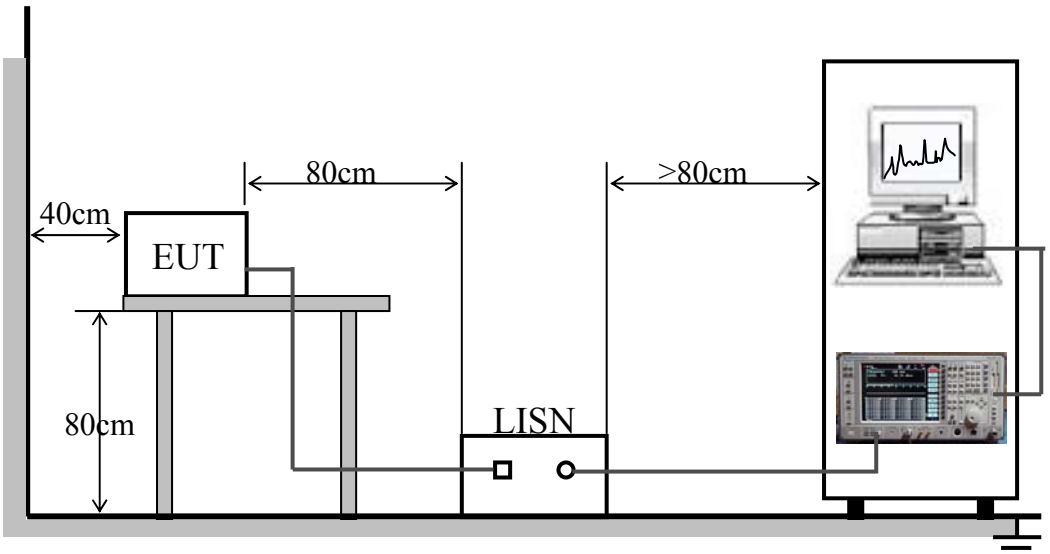
2.2.2 Test Procedure

a. The EUT was placed 0.4 meters from the conducting wall of shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). The LISN provide 50Ω/50μH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits are not reported.

2.2.3 Test Setup



For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

2.2.4 Test Result

1#

NO.	Freq. (MHz)	Limit Value (dBμV)		Emission Level (dBμV)	
		QP	AV	QP	AV
1	0.5325	56	46	44.92	NOTE 2
2	0.7530	56	46	44.76	NOTE 2
3	0.9510	56	46	43.93	NOTE 2
4	0.7305	56	46	45.82	NOTE 2
5	1.1670	56	46	45.22	NOTE 2
6	1.6485	56	46	45.47	NOTE 2

2#

NO.	Freq. (MHz)	Limit Value (dBμV)		Emission Level (dBμV)	
		QP	AV	QP	AV
1	0.1590	65.5	55.5	56.11	33.77
2	0.1950	63.8	53.8	53.03	NOTE 2
3	0.2175	62.9	52.9	51.37	NOTE 2
4	0.1680	65.1	55.1	52.99	NOTE 2
5	0.1905	64	54	50.38	NOTE 2
6	0.2085	63.3	53.3	49.67	NOTE 2

3#

NO.	Freq. (MHz)	Limit Value (dBμV)		Emission Level (dBμV)	
		QP	AV	QP	AV
1	0.1950	63.8	53.8	54.22	36.75
2	0.2490	61.8	51.8	47.52	NOTE 2
3	1.5090	56	46	40.24	NOTE 2
4	0.1860	64.2	54.2	52.05	NOTE 2
5	0.2130	63.1	53.1	51.34	NOTE 2
6	1.0410	56	46	41.18	NOTE 2

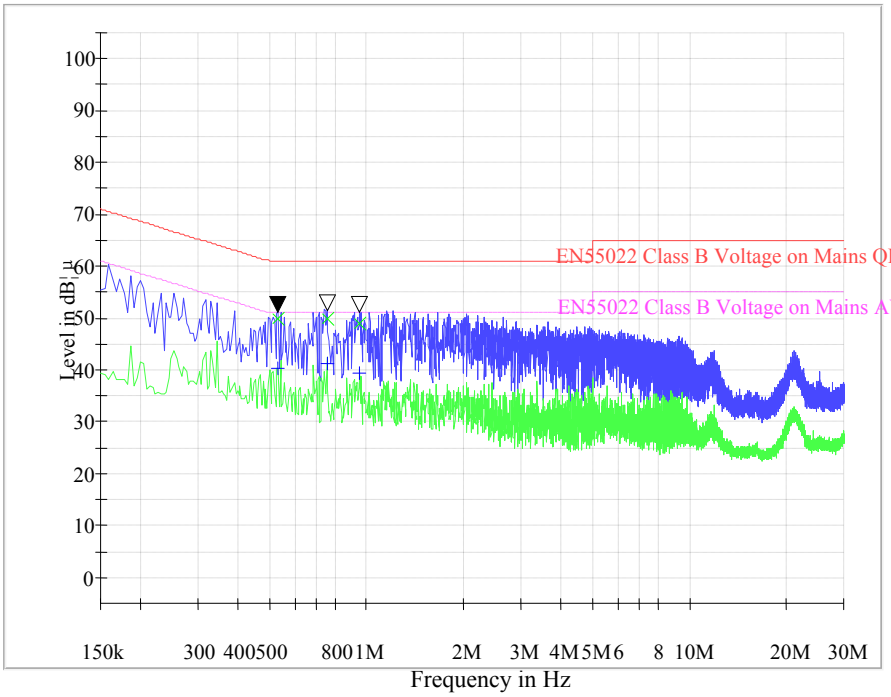
4#

NO.	Freq. (MHz)	Limit Value (dBμV)		Emission Level (dBμV)	
		QP	AV	QP	AV
1	0.2040	64.2	54.2	51.37	NOTE 2
2	0.3210	56	46	46.61	31.77
3	0.5550	56	46	44.24	NOTE 2
4	0.2040	63.4	53.4	51.29	NOTE 2
5	0.3210	59.7	49.7	47.47	NOTE 2
6	0.5550	56	46	45.93	NOTE 2

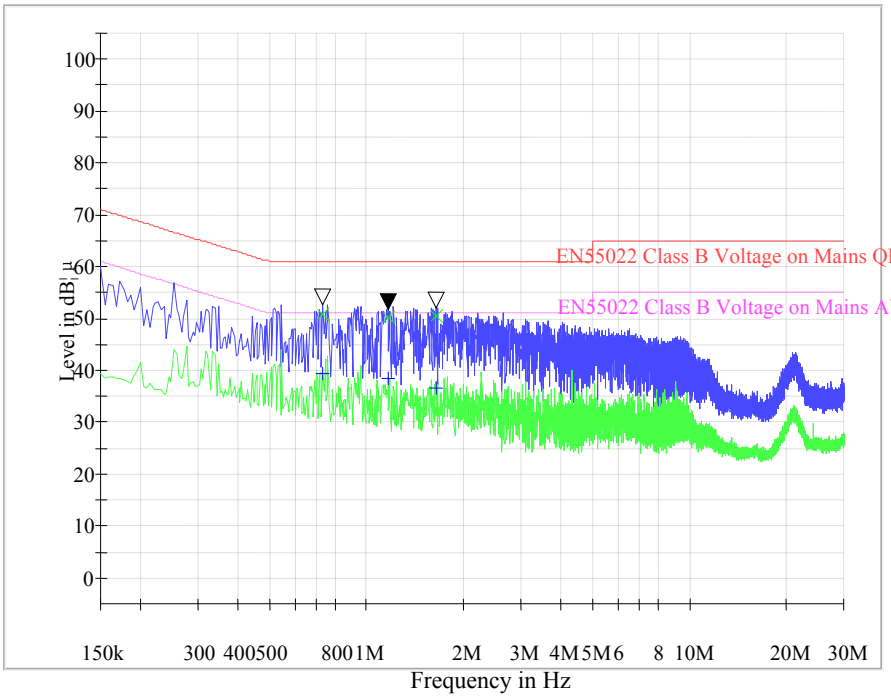
NOTE:

1. QP and AV are abbreviations of the quasi-peak and average individually.
2. If the emission levels measured with QP detector are lower than AV limits, there is unnecessary to measure with AV detector.
3. The emission levels recorded above are the larger ones of both L phase and N phase.

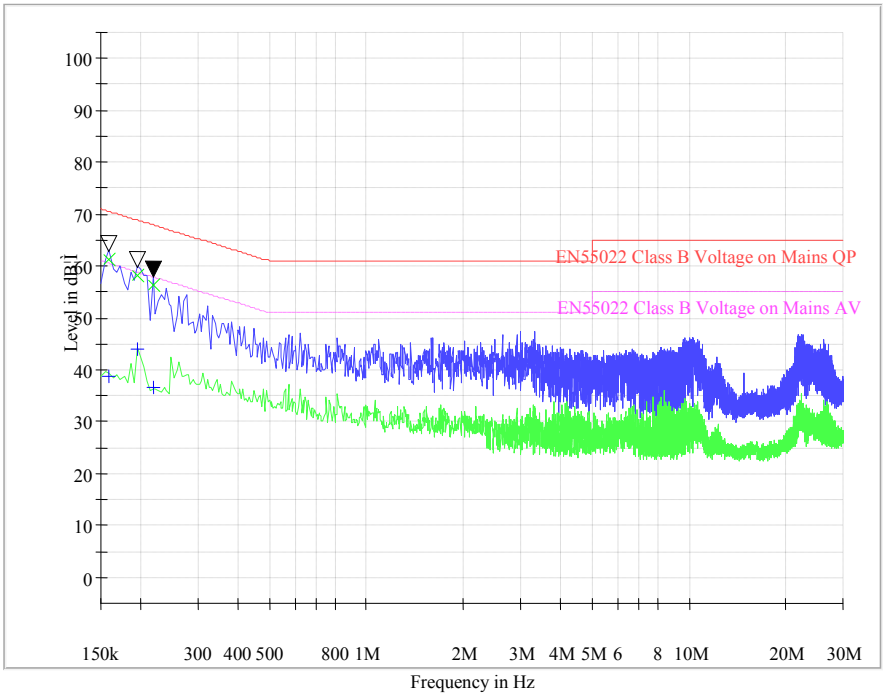
1. Mains terminal disturbance voltage, L phase 1#



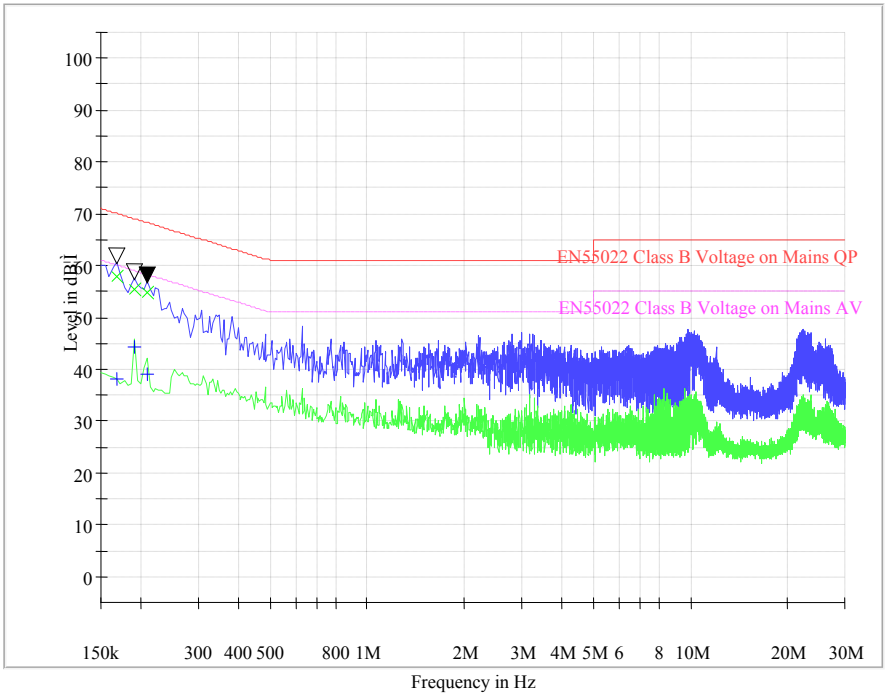
2. Mains terminal disturbance voltage, N phase 1#



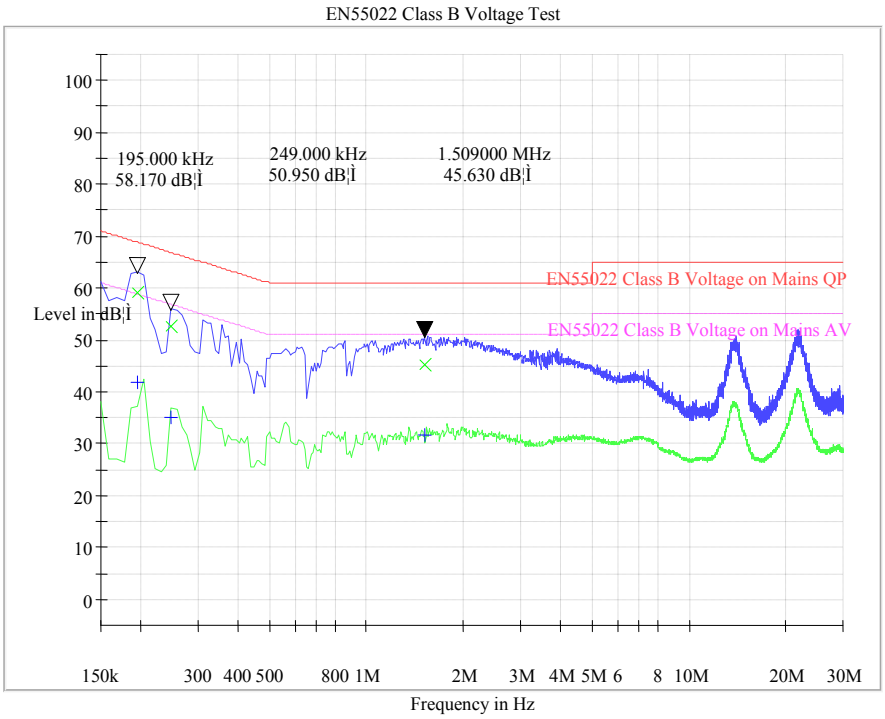
3. Mains terminal disturbance voltage, L phase 2#



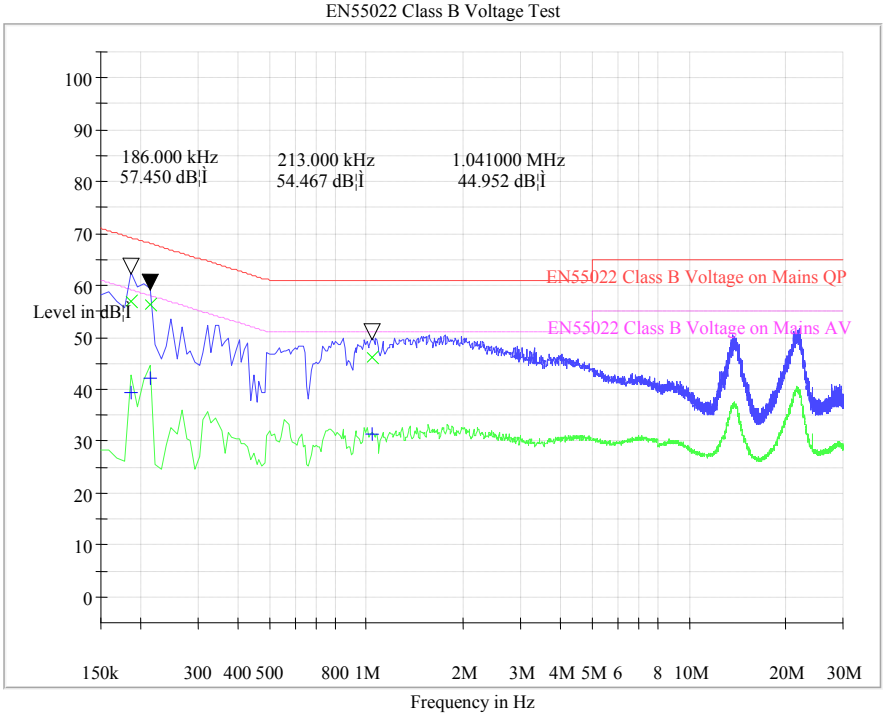
4. Mains terminal disturbance voltage, N phase 2#



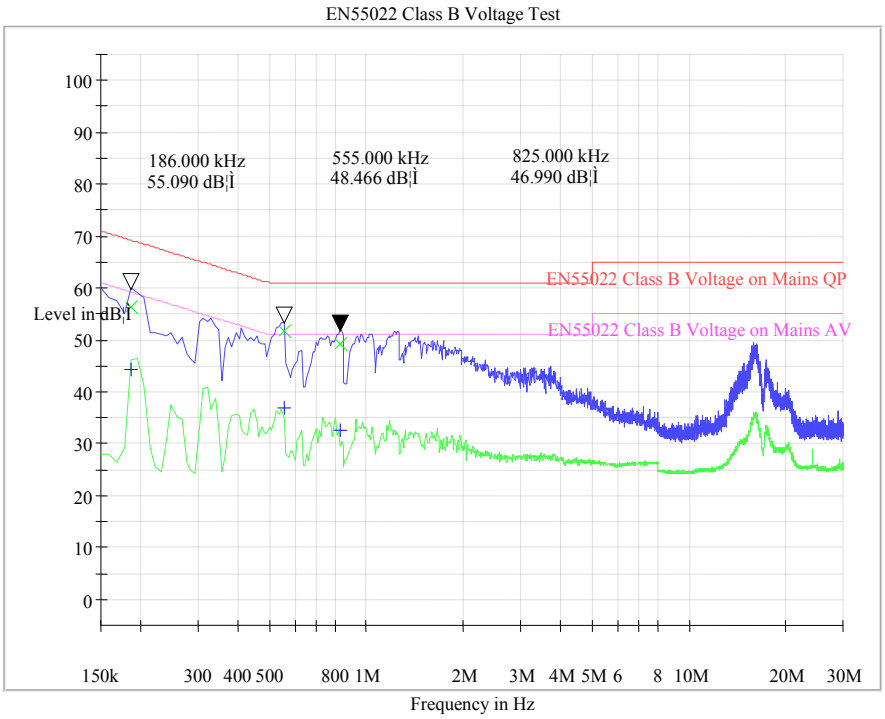
5. Mains terminal disturbance voltage, L phase 3#



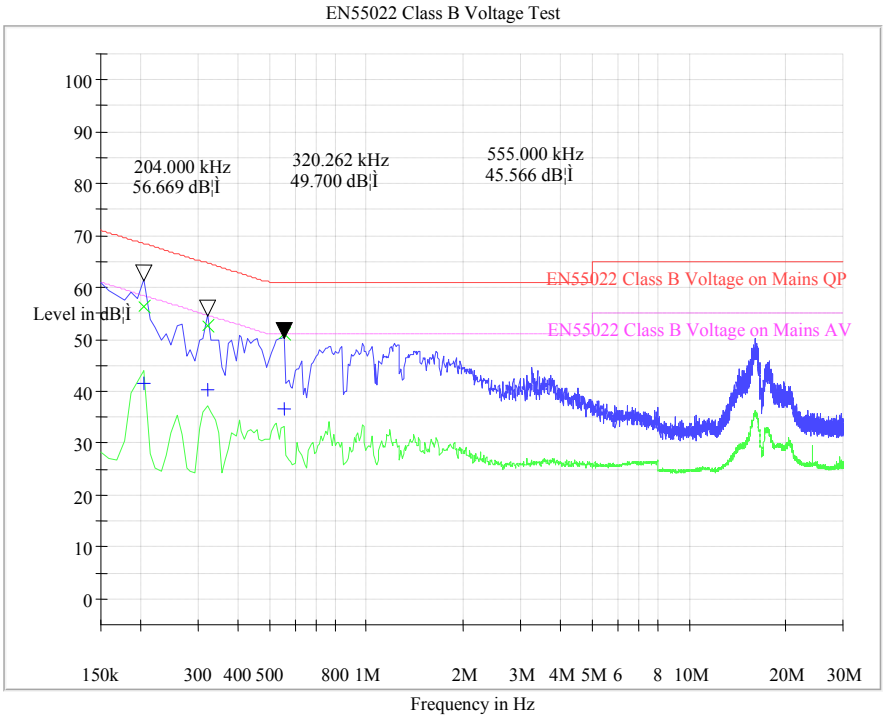
6. Mains terminal disturbance voltage, N phase 3#



7. Mains terminal disturbance voltage, L phase 4#



8. Mains terminal disturbance voltage, N phase 4#



2.3 Radiated Disturbance Measurement

2.3.1 Limits of Radiated Disturbance

Frequency range (MHz)	Quasi peak limits(dBμV/m), for Class B ITE, at 3m measurement distance
30 – 230	40
230 - 1000	47

Notes:

(1) The lower limit shall apply at the transition frequency.

(2) Additional provisions may be required for cases where interference occurs.

2.3.2 Test Procedure

a. The EUT was placed on the top of an insulating table 0.8 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

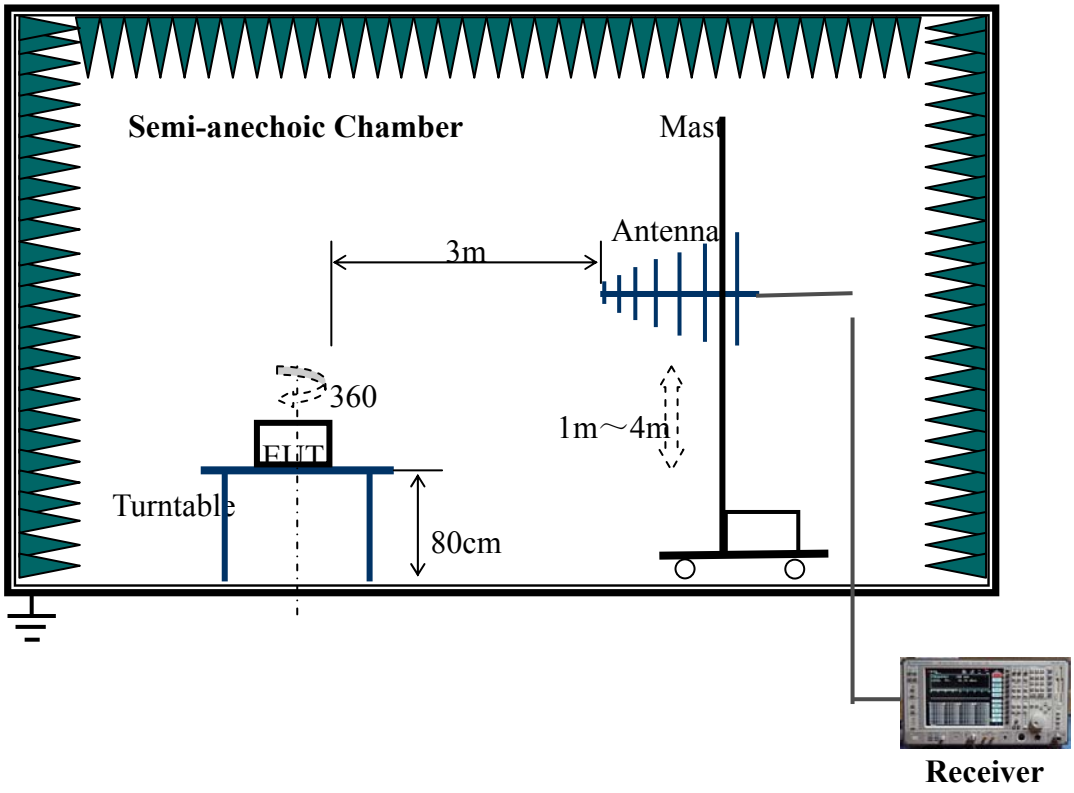
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna is a broadband antenna, and its height is varied from 1 to 4 meter above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to the heights from 1 to 4 meters and the ratable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detector Function and Specified Bandwidth with Maximum Hold Mode. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emission that did not have 10dB margin would be retested one by one using the quasi-peak method.

2.3.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

2.3.4 Test Result

1#

No.	Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	QP Limits (dBμV/m)	Emission Level (dBμV/m)
1	30-230	H/V	100-400	0-360	40	<30
2	230-1000	H/V	100-400	0-360	47	<40

2#

No.	Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	QP Limits (dBμV/m)	Emission Level (dBμV/m)
1	30-230	H	100-400	0-360	40	<30
	230-1000	H	100-400	0-360	47	<40
2	30.25	V	140	270	40	32.86

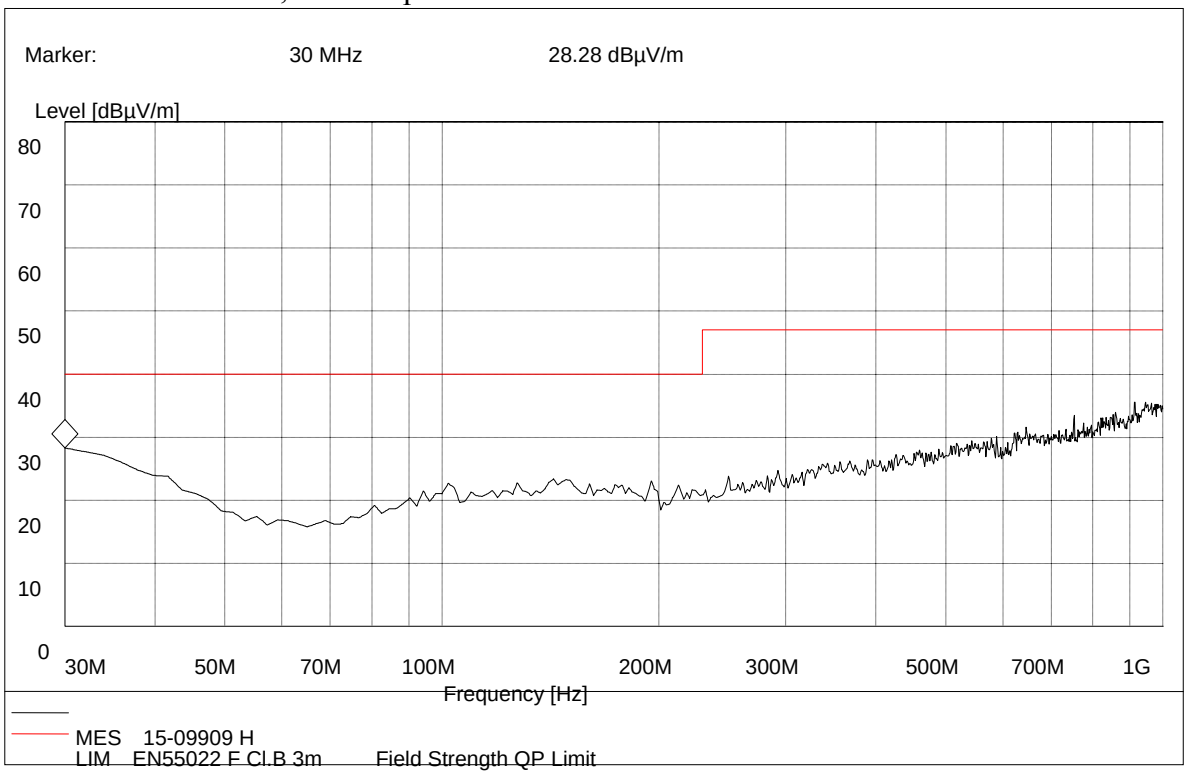
3#

No.	Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	QP Limits (dBμV/m)	Emission Level (dBμV/m)
1	30-230	H/V	100-400	0-360	40	<30
2	230-1000	H/V	100-400	0-360	47	<40

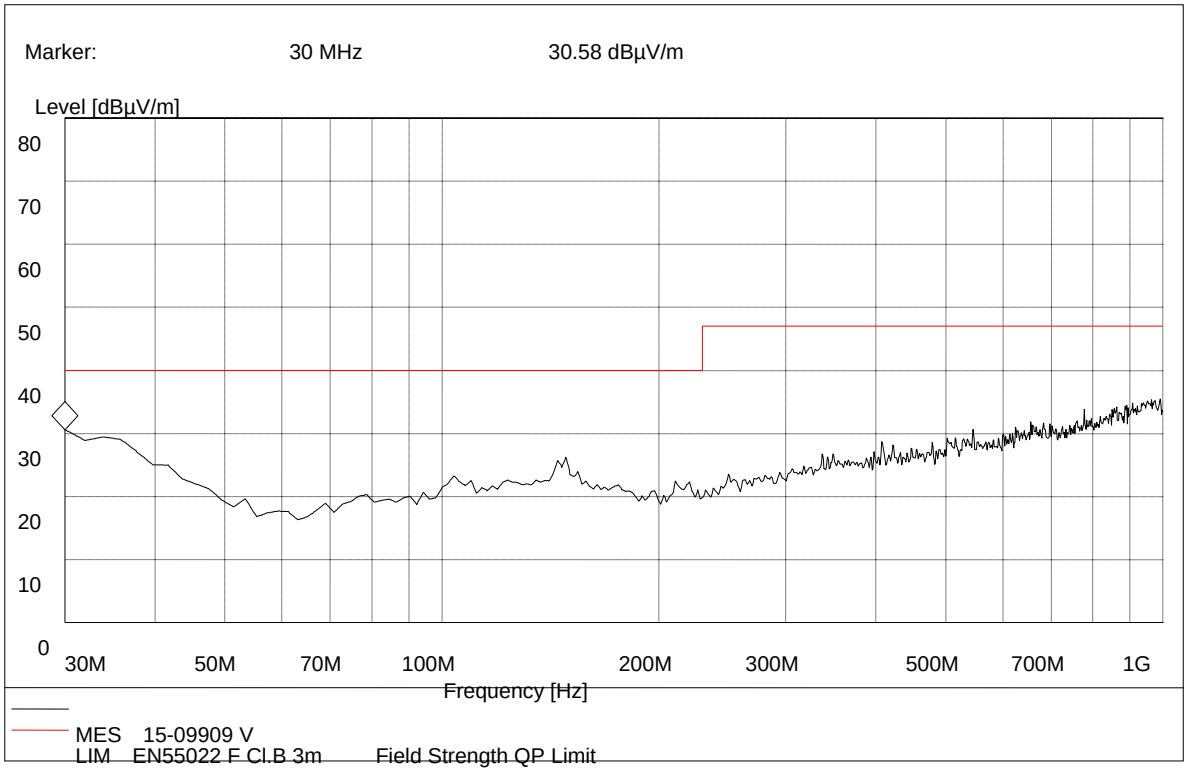
4#

No.	Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	QP Limits (dBμV/m)	Emission Level (dBμV/m)
1	30-230	H/V	100-400	0-360	40	<30
2	230-1000	H/V	100-400	0-360	47	<40

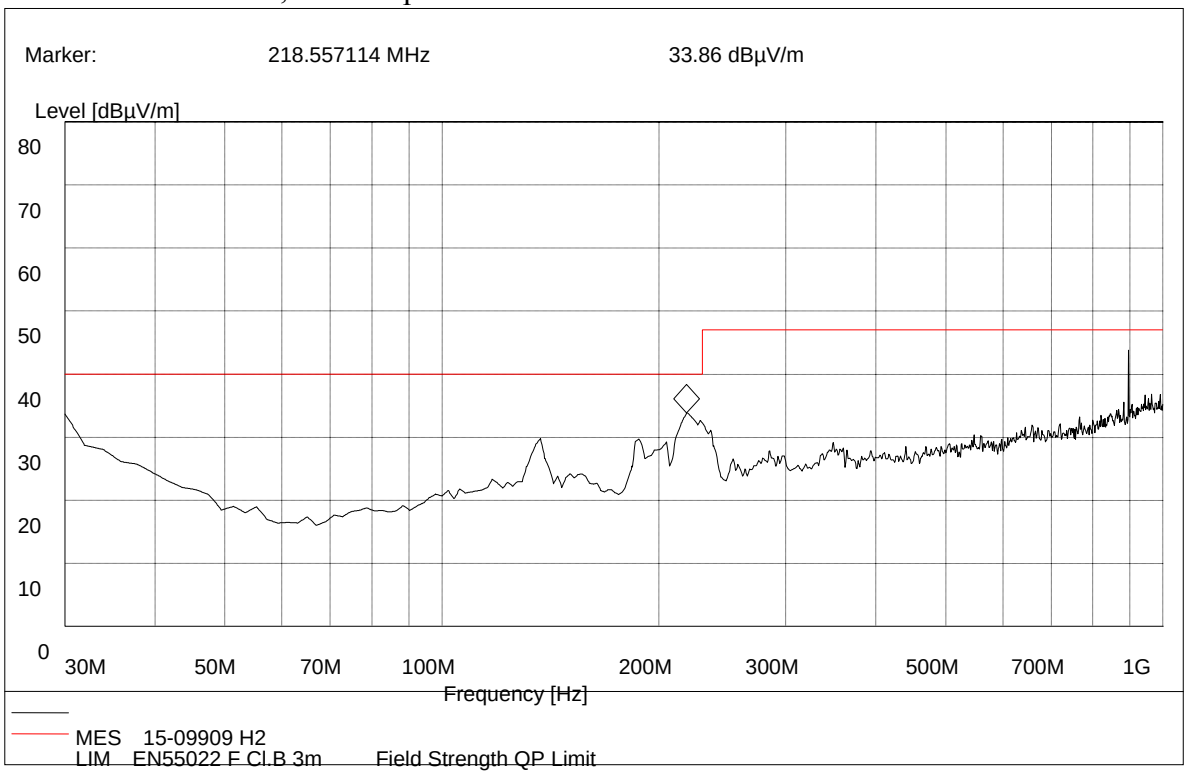
1. Radiation disturbances, antenna polarization: Horizontal 1#



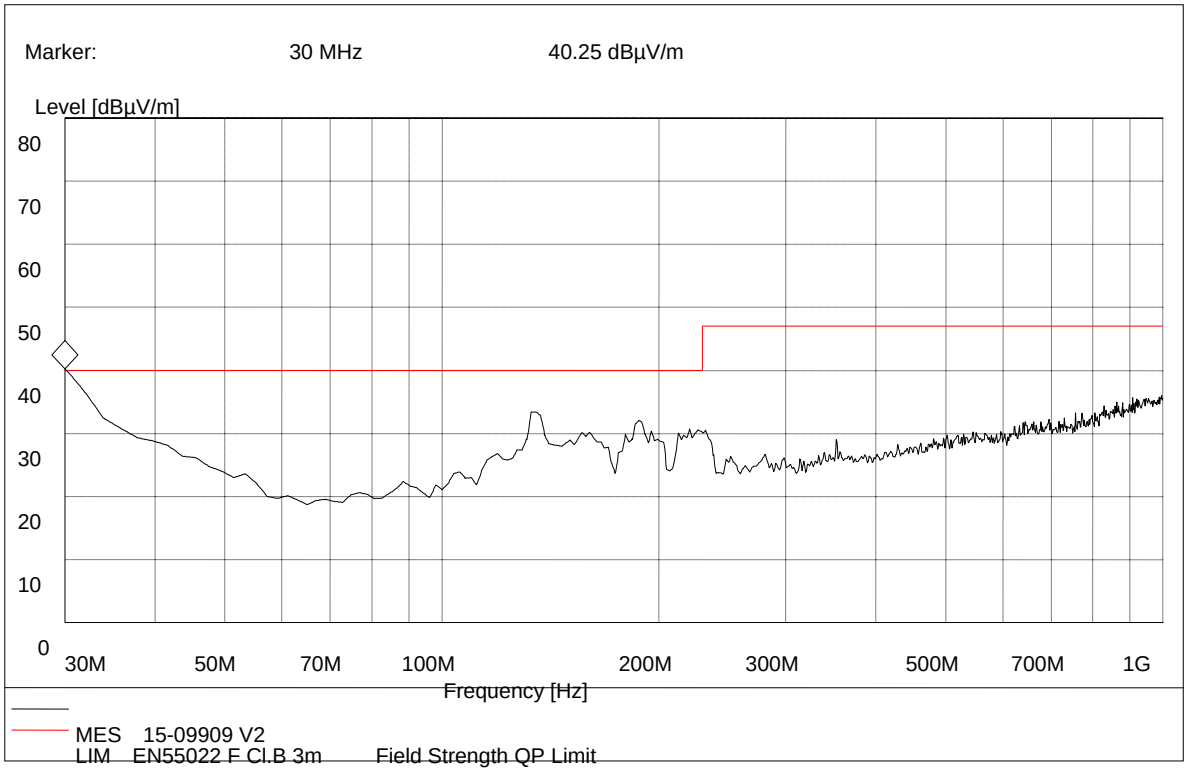
2. Radiation disturbances, antenna polarization: Vertical 1#



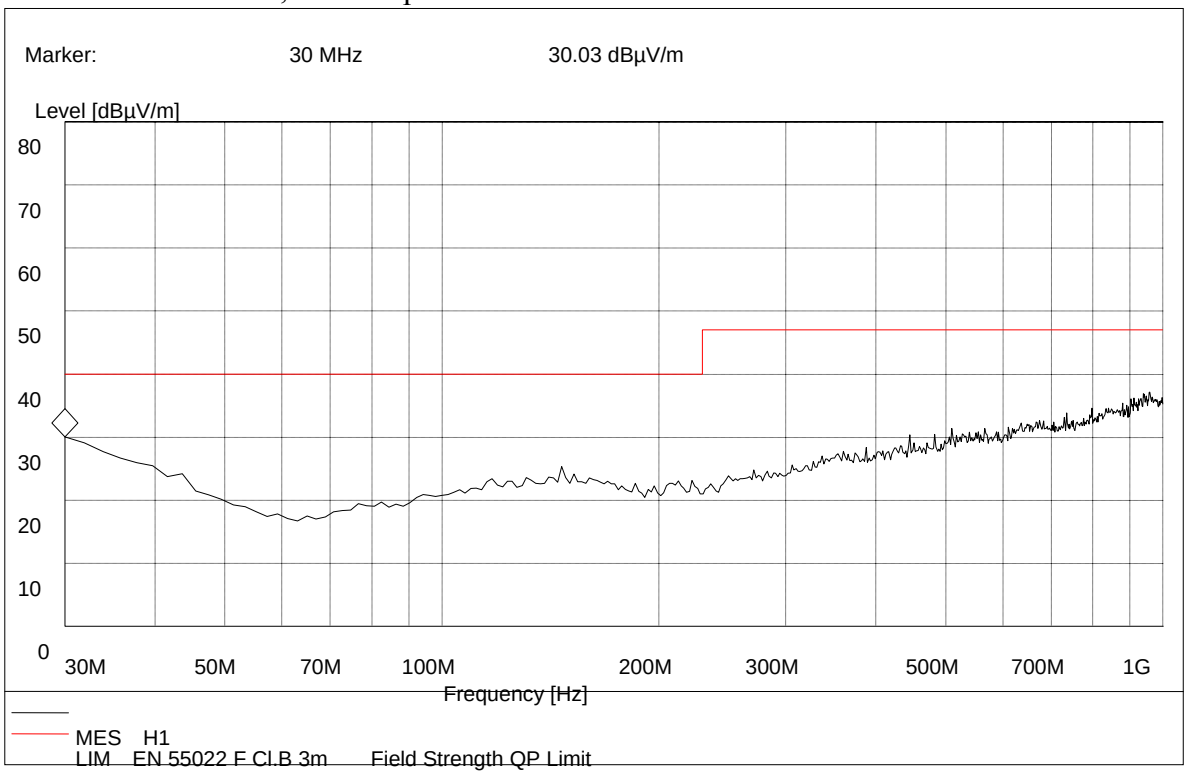
3. Radiation disturbances, antenna polarization: Horizontal 2#



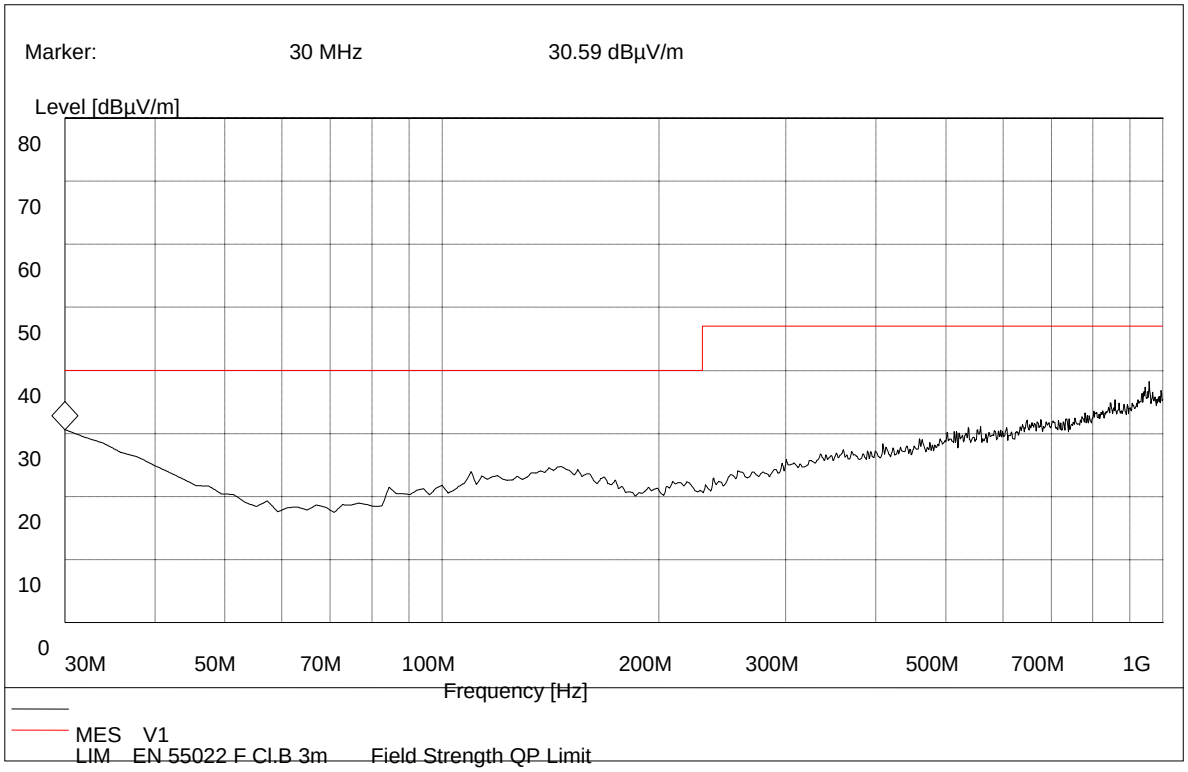
4. Radiation disturbances, antenna polarization: Vertical 2#



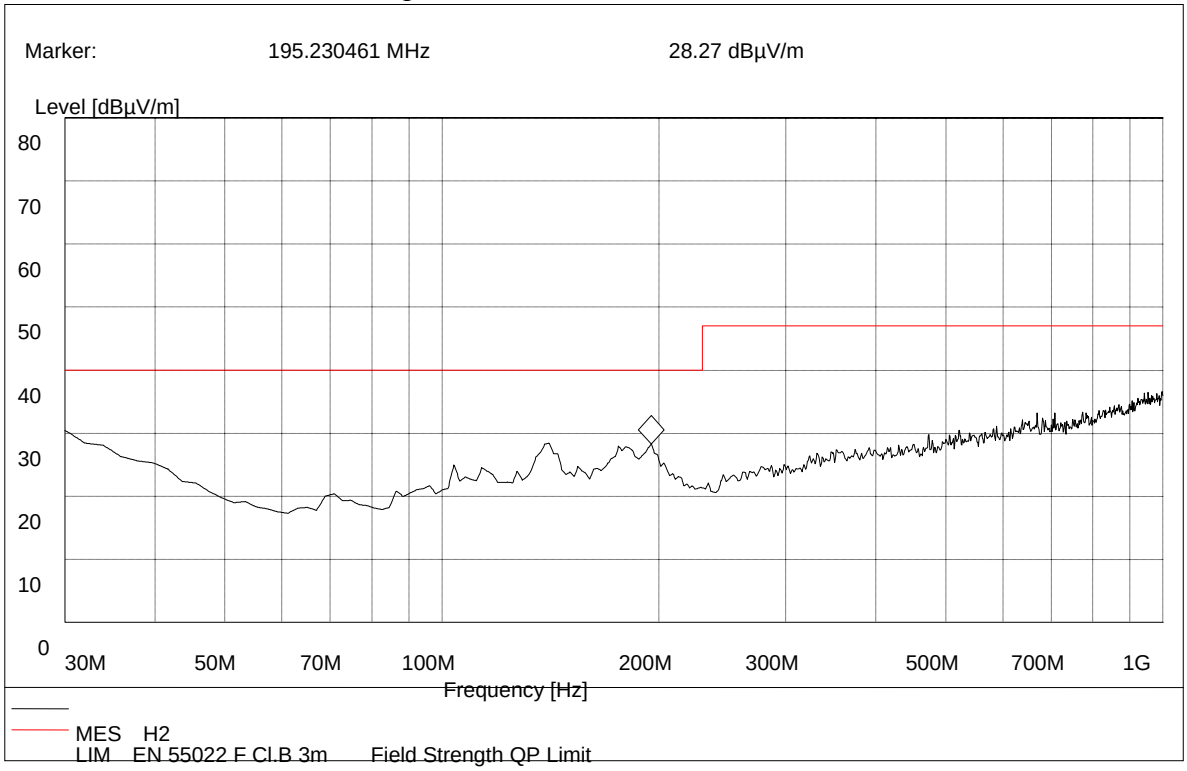
5. Radiation disturbances, antenna polarization: Horizontal 3#



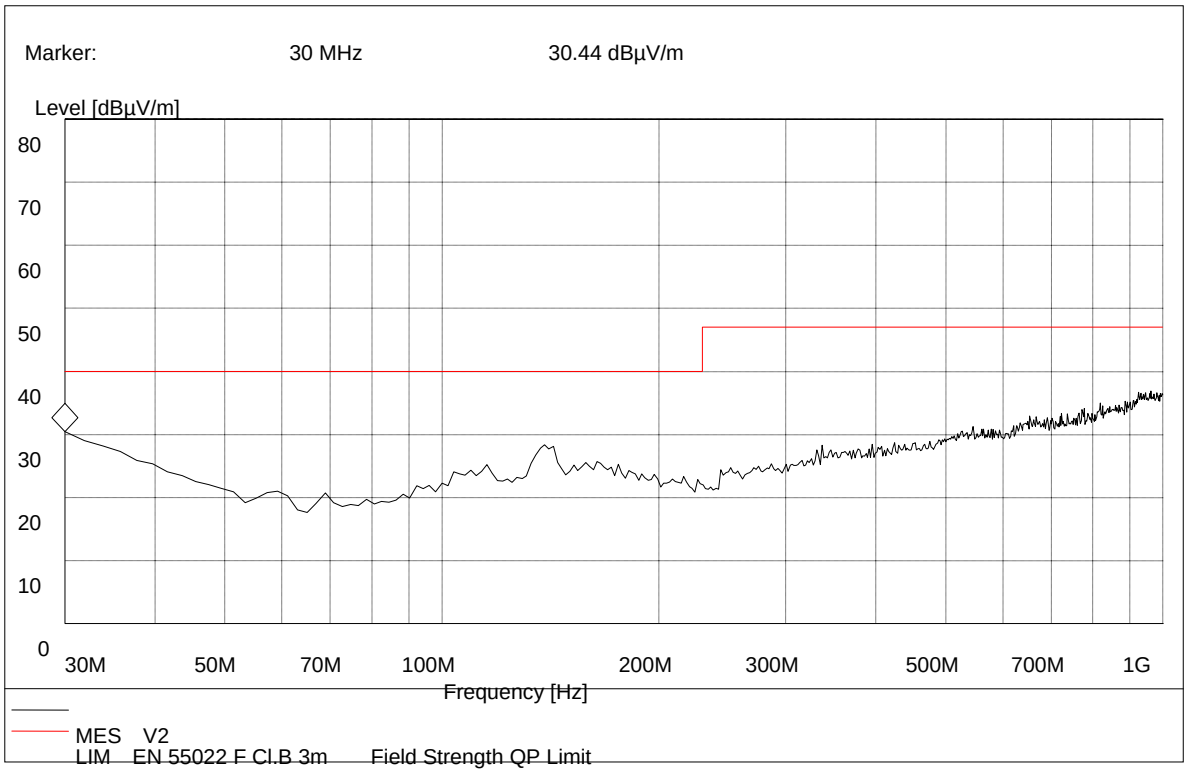
6. Radiation disturbances, antenna polarization: Vertical 3#



7. Radiation disturbances, antenna polarization: Horizontal 4#



8. Radiation disturbances, antenna polarization: Vertical 4#



2.4 Harmonic Current Measurement

The test should comply with the requirements of EN 61000-3-2. Because the EUT rated power is less than 75W, there is no need for Harmonics test to be performed according to EN 61000-3-2.For further details, please refer to Clause 7, Note 1 of EN 61000-3-2 which states:“For the following categories of equipment limits are not specified in this edition of the standard.”

2.5 Voltage Fluctuation and Flick Measurement

2.5.1 Limits of Voltage Fluctuation and Flick

Test Item	Limit	Note
P_{st}	1.0	P_{st} means Short-term flicker indicator
P_{lt}	0.65	P_{lt} means long-term flicker indicator
T_{dt}	0.5	T_{dt} means maximum time that d_t exceeds 3%
d_{max}(%)	4%	d_{max} means maximum relative voltage change.
d_c(%)	3.3%	d_c means relative steady-state voltage change.

2.5.2 Test Procedure

a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal conditions

b. During the flick measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

2.5.3 Test Result

Test Specification

Test Frequency:	50Hz	**Test Voltage:**	230Vac
Waveform:	Sine	**Test Time:**	10 minutes(P_{st}); 2 hours (P_{lt})

1#

Test Parameter	Measurement Value	Limit	Remarks
P_{st}	0.064	1.0	Pass
P_{lt}	0.028	0.65	Pass
$T_{dt(s)}$	0.00	0.5	Pass
d_{max}(%)	0.00%	4%	Pass
d_c(%)	0.00%	3.3%	Pass

2#

Test Parameter	Measurement Value	Limit	Remarks
P_{st}	0.064	1.0	Pass
P_{lt}	0.028	0.65	Pass
$T_{dt(s)}$	0.00	0.5	Pass
d_{max}(%)	0.00%	4%	Pass
d_c(%)	0.00%	3.3%	Pass

3#

Test Parameter	Measurement Value	Limit	Remarks
P_{st}	0.064	1.0	Pass
P_{lt}	0.028	0.65	Pass
$T_{dt(s)}$	0.00	0.5	Pass
d_{max}(%)	0.00%	4%	Pass
d_c(%)	0.00%	3.3%	Pass

4#

Test Parameter	Measurement Value	Limit	Remarks
P_{st}	0.064	1.0	Pass
P_{lt}	0.028	0.65	Pass
$T_{dt(s)}$	0.00	0.5	Pass
d_{max}(%)	0.00%	4%	Pass
d_c(%)	0.00%	3.3%	Pass

3 Immunity Test

3.1 EUT Setup and Operating Conditions

Same as 2.1

3.2 Performance Criteria

Criterion A	The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.
Criterion B	The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.
Criterion C	Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

3.3 Electrostatic Discharge Immunity Test

3.3.1 Test Specification

KPL:

Basic Standard:	IEC 61000-4-2
Discharge Impedance	330Ω / 150 pF
Discharge Voltage:	Air Discharge :8 kV Contact Discharge :4 kV
Polarity:	Positive / Negative
Discharge Mode:	Single discharge
Discharge Period:	1 second minimum

2ACL:

Basic Standard:	IEC 61000-4-2
Discharge Impedance	330Ω / 150 pF
Discharge Voltage:	Air Discharge :≥15 kV Contact Discharge : ≥8kV
Polarity:	Positive / Negative
Discharge Mode:	Single discharge
Discharge Period:	1 second minimum

3.3.2 Test Procedure

The discharges shall be applied in two ways:

a. Contact discharges to the conductive surfaces and coupling planes:

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. The remaining three contact test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.

b. Air discharges at slots and apertures and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled selected test point for each such area.

The basic test procedure was in accordance with IEC 61000-4-2:

a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.

b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

c. The time interval between two successive single discharges was at least 1 second.

d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.

e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

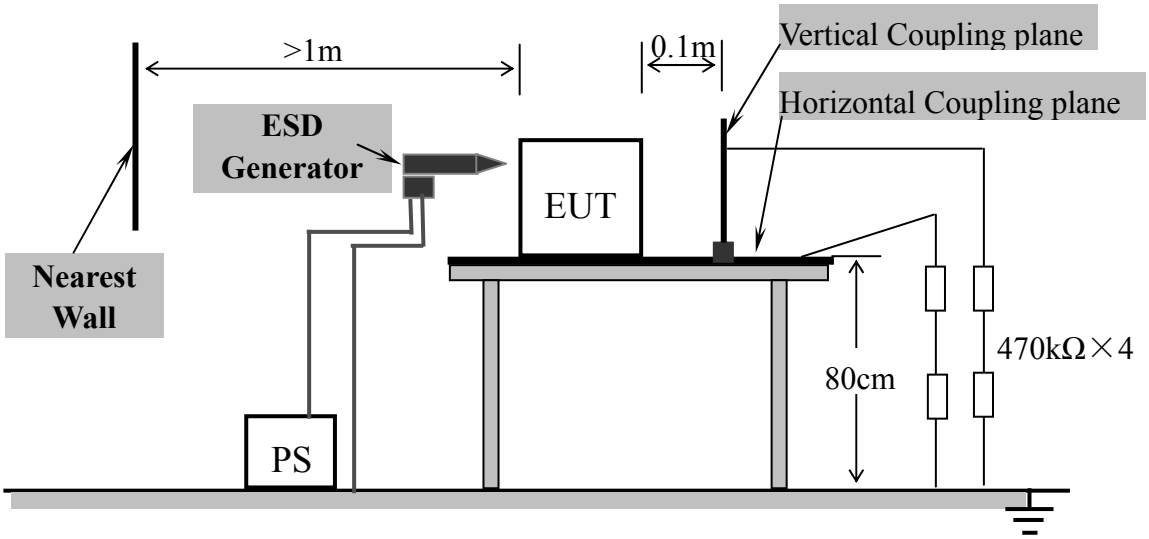
f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were completed.

g. At least 50 single discharges (in the most sensitive polarity) were applied to the Horizontal

Coupling Plane at points on each side of the EUT. The ESD generator was positioned vertically at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.

h. At least 50 single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m×0.5m) was placed vertically to and 0.1 meters from the EUT.

3.3.3 Test Setup



For the actual test configuration, please refer to Appendix II： Photographs of the Test Configuration.

3.3.4 Test Result

1#

Test Points	Discharge Level (kV)	Discharge Mode	Observation	Comply with Criterion
Aperture of the cover	±8	Air	Note(1)	A
HCP	±4	Contact	Note(1)	A
VCP	±4	Contact	Note(1)	A
Metallic cover	±4	Contact	Note(1)	A

2#

Test Points	Discharge Level (kV)	Discharge Mode	Observation	Comply with Criterion
Aperture of the cover	±8	Air	Note(1)	A
HCP	±4	Contact	Note(1)	A
VCP	±4	Contact	Note(1)	A
Metallic cover	±4	Contact	Note(1)	A

3#

Test Points	Discharge Level (kV)	Discharge Mode	Observation	Comply with Criterion
Aperture of the cover	±15	Air	Note(1)	A
HCP	±8	Contact	Note(1)	A
VCP	±8	Contact	Note(1)	A
Metallic cover	±8	Contact	Note(1)	A

4#

Test Points	Discharge Level (kV)	Discharge Mode	Observation	Comply with Criterion
Aperture of the cover	±15	Air	Note(1)	A
HCP	±8	Contact	Note(1)	A
VCP	±8	Contact	Note(1)	A
Metallic cover	±8	Contact	Note(1)	A

NOTE:

(1). The EUT continued to operate as intended. No degradation of performance was observed.

3.4 Radiated, Radio Frequency Electromagnetic Field Immunity Test

3.4.1 Test Specification

Basic Standard:	IEC 61000-4-3
Frequency Range:	80 MHz – 1000MHz
Field Strength:	3V/m
Modulation:	1kHz sine wave, 80%, AM modulation
Frequency Step:	1% of fundamental
Polarity of Antenna	Horizontal and Vertical
Test Distance:	3m
Antenna Height:	1.5m
Dwell Time:	3 seconds

3.4.2 Test Procedure

The test procedure was in accordance with IEC 61000-4-3.

a. The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.

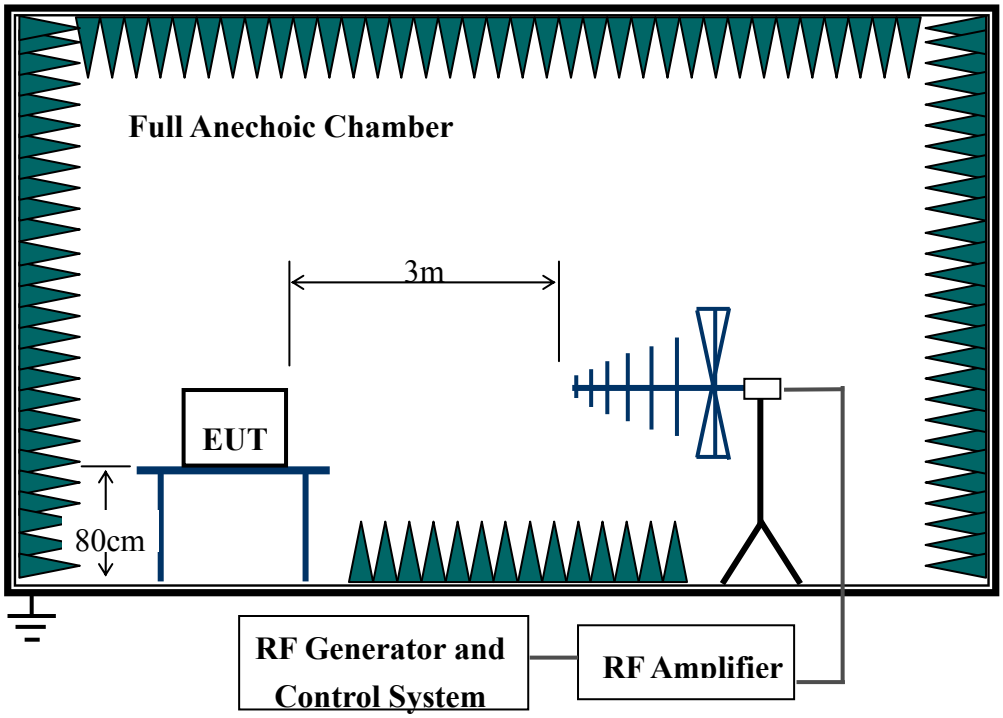
b. The frequency range is swept from 80 MHz to 1000MHz with the signal 80% amplitude modulated with a 1 kHz sine wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

c. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

d. The field strength level was 3V/m.

e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

3.4.3 Test Setup



For the actual test configuration, please refer to Appendix II： Photographs of the Test Configuration.

3.4.4 Test Result

1#

Frequency	Polarity	Azimuth	Field Strength (V/m)	Observation	Comply with Criterion
80-1000 MHz	V&H	0	3	Note(1)	A
80-1000 MHz	V&H	90	3	Note(1)	A
80-1000 MHz	V&H	180	3	Note(1)	A
80-1000 MHz	V&H	270	3	Note(1)	A

2#

Frequency	Polarity	Azimuth	Field Strength (V/m)	Observation	Comply with Criterion
80-1000 MHz	V&H	0	3	Note(1)	A
80-1000 MHz	V&H	90	3	Note(1)	A
80-1000 MHz	V&H	180	3	Note(1)	A
80-1000 MHz	V&H	270	3	Note(1)	A

3#

Frequency	Polarity	Azimuth	Field Strength (V/m)	Observation	Comply with Criterion
80-1000 MHz	V&H	0	3	Note(1)	A
80-1000 MHz	V&H	90	3	Note(1)	A
80-1000 MHz	V&H	180	3	Note(1)	A
80-1000 MHz	V&H	270	3	Note(1)	A

4#

Frequency	Polarity	Azimuth	Field Strength (V/m)	Observation	Comply with Criterion
80-1000 MHz	V&H	0	3	Note(1)	A
80-1000 MHz	V&H	90	3	Note(1)	A
80-1000 MHz	V&H	180	3	Note(1)	A
80-1000 MHz	V&H	270	3	Note(1)	A

NOTE:

(1). The EUT continued to operate as intended. No degradation of performance was observed.

3.5 Electrical Fast Transient/Burst Immunity Test

3.5.1 Test Specification

KPL:

Basic Standard:	IEC 61000-4-4
Test Voltage:	a.c. power port : 1 kV
Polarity:	Positive/Negative
Impulse Frequency:	5kHz
Impulse wave shape:	5/50ns
Burst Duration:	15ms
Burst Period:	300ms
Test Duration:	Not less than 1 min.

2ACL:

Basic Standard:	IEC 61000-4-4
Test Voltage:	a.c. power port : **differential mode**≥2 kV, **common mode**≥4 kV
Polarity:	Positive/Negative
Impulse Frequency:	5kHz
Impulse wave shape:	5/50ns
Burst Duration:	15ms
Burst Period:	300ms
Test Duration:	Not less than 1 min.

3.5.2 Test Procedure

a. The EUT was tested with 1000 volt discharges to the AC power input leads.

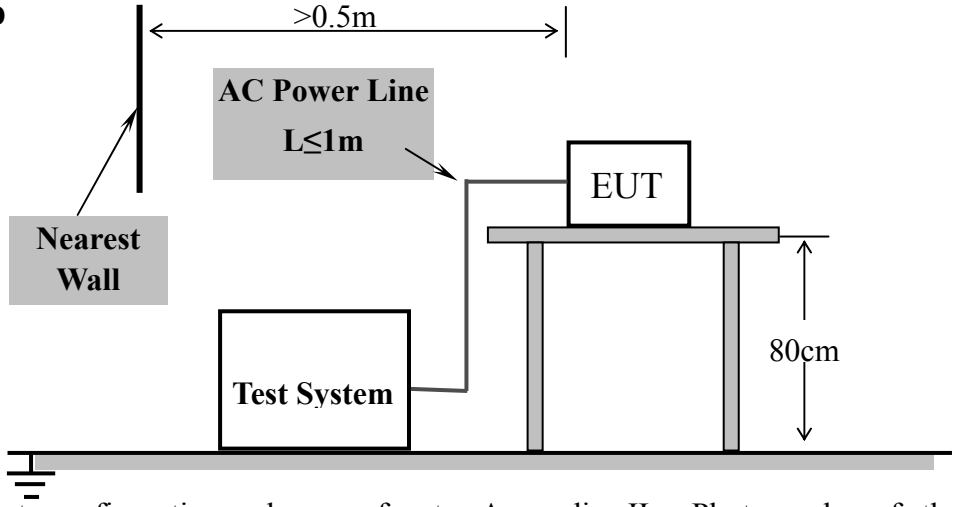
b. Both positive and negative polarity discharges were applied.

c. The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 1 meter.

d. The duration time of each test sequential was 1 minute.

e. The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.

3.5.3 Test Setup



For the actual test configuration, please refer to Appendix II： Photographs of the Test Configuration.

3.5.4 Test Result

1#

Test Point	Polarity	Test Level (kV)	Observation	Comply with Criterion
a.c. power, L	+/-	1	Note (1)	A
a.c. power, N	+/-	1	Note (1)	A
a.c. power, PE	+/-	1	Note (1)	A
a.c. power, L-N	+/-	1	Note (1)	A
a.c. power, L-PE	+/-	1	Note (1)	A
a.c. power, N-PE	+/-	1	Note (1)	A

2#

Test Point	Polarity	Test Level (kV)	Observation	Comply with Criterion
a.c. power, L	+/-	1	Note (1)	A
a.c. power, N	+/-	1	Note (1)	A
a.c. power, PE	+/-	1	Note (1)	A
a.c. power, L-N	+/-	1	Note (1)	A
a.c. power, L-PE	+/-	1	Note (1)	A
a.c. power, N-PE	+/-	1	Note (1)	A

3#

Test Point	Polarity	Test Level (kV)	Observation	Comply with Criterion
a.c. power, L	+/-	2	Note (1)	A
a.c. power, N	+/-	2	Note (1)	A
a.c. power, PE	+/-	2	Note (1)	A
a.c. power, L-N	+/-	2	Note (1)	A
a.c. power, L-PE	+/-	4	Note (1)	A
a.c. power, N-PE	+/-	4	Note (1)	A

4#

Test Point	Polarity	Test Level (kV)	Observation	Comply with Criterion
a.c. power, L	+/-	2	Note (1)	A
a.c. power, N	+/-	2	Note (1)	A
a.c. power, PE	+/-	2	Note (1)	A
a.c. power, L-N	+/-	2	Note (1)	A
a.c. power, L-PE	+/-	4	Note (1)	A
a.c. power, N-PE	+/-	4	Note (1)	A

NOTE:

(1). The EUT continued to operate as intended. No degradation of performance was observed.

3.6 Surge Immunity Test

3.6.1 Test Specification

Basic Standard:	IEC 61000-4-5
Waveform:	Voltage 1.2/50 μs; Current 8/20 μs
Test Voltage:	a.c. power port, line to line 2 kV　line to earth 4kV
Polarity:	Positive/Negative
Phase Angle:	0°， 90°， 180°, 270°
Repetition Rate:	60sec
Times:	5 times/each condition.

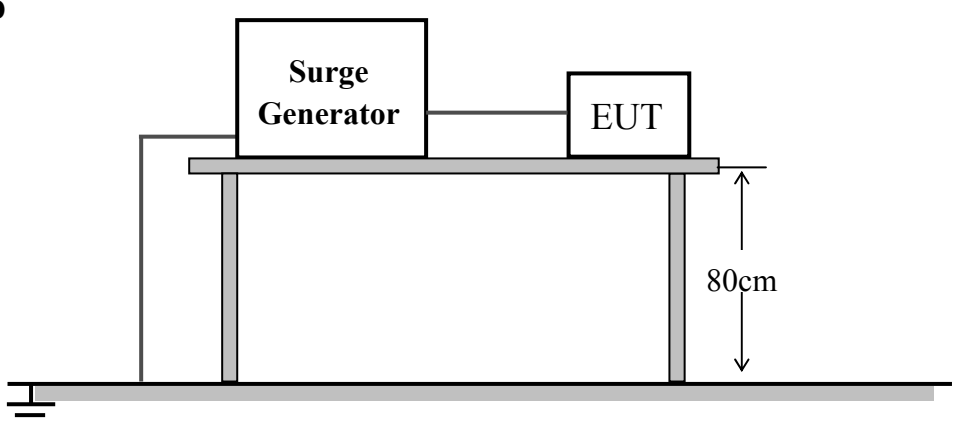
3.6.2 Test Procedure

a. The EUT and the auxiliary equipment were placed on a table of 0.8m heights above a metal ground reference plane. The size of ground plane is greater than 1m×1m and project beyond the EUT by at least 0.1m on all sides. The ground plane is connected to the protective earth. The length of power cord between the coupling device and the EUT was less than 2 meters (provided by the manufacturer).

b. The EUT was connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise was applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).

c. The surges were applied line to line and line(s) to earth. When testing line to earth the test voltage was applied successively between each of the lines and earth. Steps up to the test level specified increased the test voltage. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulses.

3.6.3 Test Setup



For the actual test configuration, please refer to Appendix II： Photographs of the Test

Configuration.

1.6.4 Test Result

1#

Coupling Line	Polarity	Voltage (kV)	Observation	Comply with Criterion
a.c. power, L-N	+/-	2	Note (1)	A
a.c. power, L-PE	+/-	4	Note (1)	A
a.c. power, N-PE	+/-	4	Note (1)	A

2#

Coupling Line	Polarity	Voltage (kV)	Observation	Comply with Criterion
a.c. power, L-N	+/-	2	Note (1)	A
a.c. power, L-PE	+/-	4	Note (1)	A
a.c. power, N-PE	+/-	4	Note (1)	A

3#

Coupling Line	Polarity	Voltage (kV)	Observation	Comply with Criterion
a.c. power, L-N	+/-	2	Note (1)	A
a.c. power, L-PE	+/-	4	Note (1)	A
a.c. power, N-PE	+/-	4	Note (1)	A

4#

Coupling Line	Polarity	Voltage (kV)	Observation	Comply with Criterion
a.c. power, L-N	+/-	2	Note (1)	A
a.c. power, L-PE	+/-	4	Note (1)	A
a.c. power, N-PE	+/-	4	Note (1)	A

NOTE:

(1). The EUT continued to operate as intended. No degradation of performance was observed.

3.7 Immunity to Conducted Disturbances Induced by RF Fields

3.7.1 Test Specification

Basic Standard:	IEC 61000-4-6
Frequency Range:	0.15 MHz – 80 MHz
Field Strength:	3V
Modulation:	1 kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1% of fundamental
Coupled Cable:	a.c. power line
Coupling Device:	CDN-M3

3.7.2 Test Procedure

a. The EUT shall be tested within its intended operating and climatic conditions.

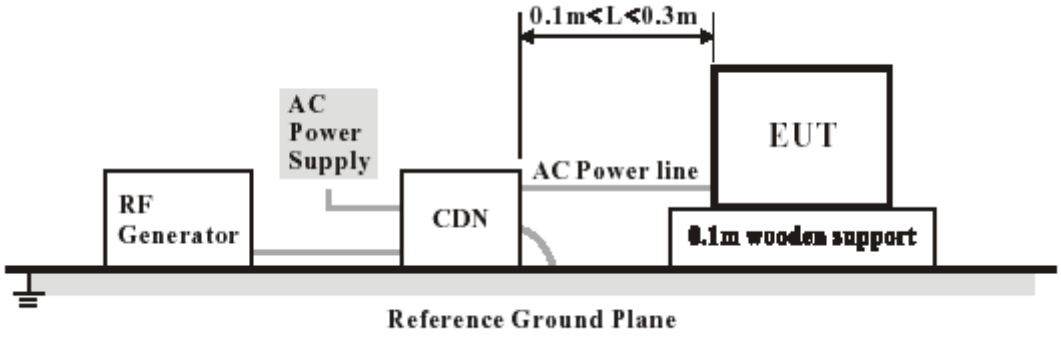
b. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

c. The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80% amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate shall not exceed 1.5×10^{-3} decades/s. The step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value where the frequency is swept incrementally.

d. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequencies and harmonics or frequencies of dominant interest, shall be analyzed separately.

e. Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.

3.7.3 Test Setup



For the actual test configuration, please refer to Appendix II： Photographs of the Test Configuration.

3.7.4 Test Result

1#

Test Point	Frequency	Field Strength (Vrms)	Observation	Comply with criterion
a.c. power line	0.15 – 80 MHz	3	Note(1)	A

2#

Test Point	Frequency	Field Strength (Vrms)	Observation	Comply with criterion
a.c. power line	0.15 – 80 MHz	3	Note(1)	A

3#

Test Point	Frequency	Field Strength (Vrms)	Observation	Comply with criterion
a.c. power line	0.15 – 80 MHz	3	Note(1)	A

4#

Test Point	Frequency	Field Strength (Vrms)	Observation	Comply with criterion
a.c. power line	0.15 – 80 MHz	3	Note(1)	A

NOTE:

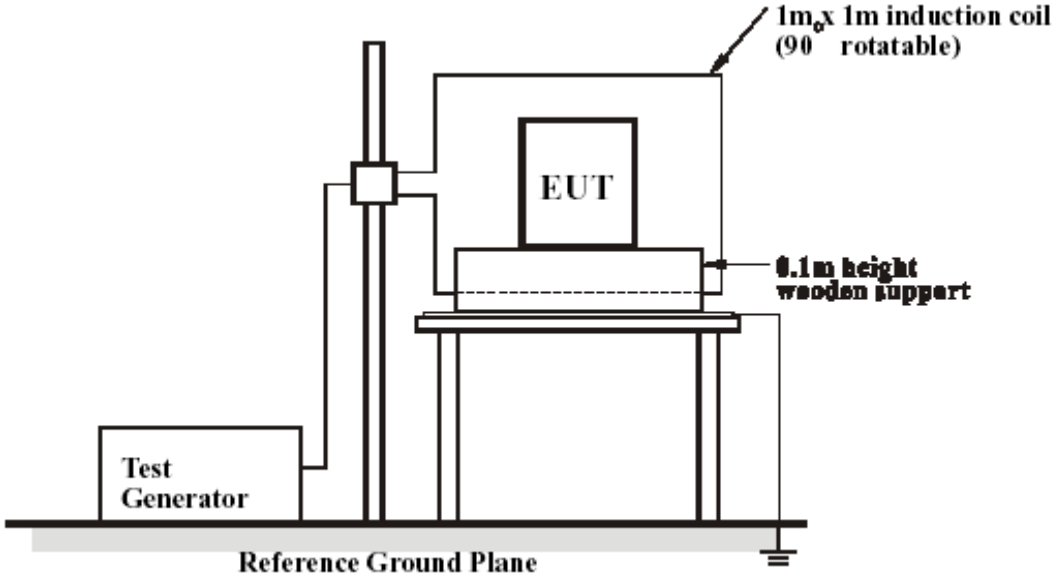
(1). The EUT continued to operate as intended. No degradation of performance was observed.

3.8 Power Frequency Magnetic Field Immunity Test

3.8.1 Test Specification

Basic Standard:	IEC 61000-4-8
Frequency Range:	50Hz
Field Strength:	1A/m
Observation Time:	5 minutes
Inductance Coil:	Rectangular type, 1m×1m
Performance Criterion:	Criterion A

3.8.2 Test Setup



The test procedure was in accordance with IEC 61000-4-8.

3.8.3 Test Result

1#

Direction	Field Strength(A/m)	Observation	Comply with Criterion
X	1	Note(1)	A
Y	1	Note(1)	A
Z	1	Note(1)	A

2#

Direction	Field Strength(A/m)	Observation	Comply with Criterion
X	1	Note(1)	A
Y	1	Note(1)	A
Z	1	Note(1)	A

3#

Direction	Field Strength(A/m)	Observation	Comply with Criterion
X	1	Note(1)	A
Y	1	Note(1)	A
Z	1	Note(1)	A

4#

Direction	Field Strength(A/m)	Observation	Comply with Criterion
X	1	Note(1)	A
Y	1	Note(1)	A
Z	1	Note(1)	A

NOTE:

(1). The EUT continued to operate as intended. No degradation of performance was observed.

3.9 Voltage Dips and Short Interruptions Immunity Test

3.9.1 Test Specification

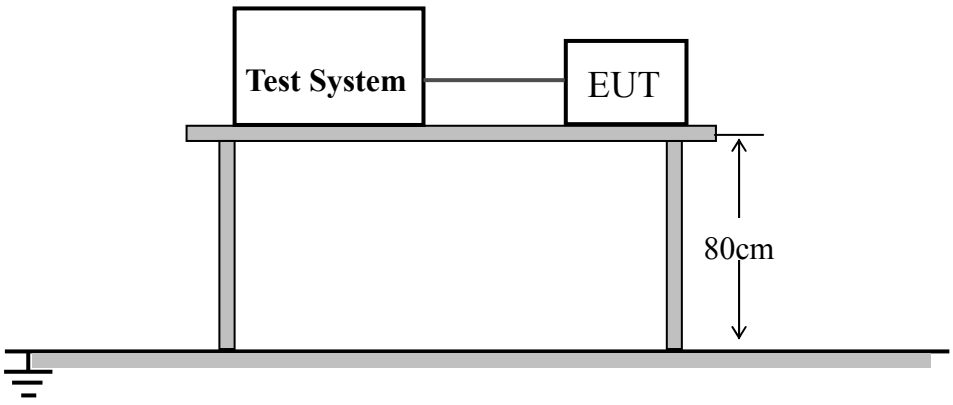
Basic Standard:	IEC 61000-4-11
Voltage Dips:	100% reduction, 1 period 30% reduction, 25 periods
Voltage Interruptions:	>95% reduction, 250 periods
Voltage Phase Angle:	0°

3.9.2 Test Procedure

a. The power cord was used as supplied by the manufacturer. The EUT was connected to the line output of the Voltage Dips and Interruption Generator.

b. Voltage reductions occur at 0 degree crossover point of the voltage waveform. The performance of the EUT was checked after the voltage dip or interruption.

3.9.3 Test Setup



For the actual test configuration, please refer to Appendix II： Photographs of the Test Configuration.

3.9.4 Test Result

1#

Test voltage: 240VAC

Test Mode	Voltage Reduction	Duration (ms)	Times	Interval (Sec)	Observation	Comply with Criterion
Voltage dips	100%	20	3	100	Note (1)	A
	30%	500	3	100	Note (1)	A
Voltage interruptions	100%	5000	3	100	Note (2)	C

Test voltage: 100VAC

Test Mode	Voltage Reduction	Duration (ms)	Times	Interval (Sec)	Observation	Comply with Criterion
Voltage dips	100%	20	3	100	Note (1)	A
	30%	500	3	100	Note (1)	A
Voltage interruptions	100%	5000	3	100	Note (2)	C

2#

Test voltage: 240VAC

Test Mode	Voltage Reduction	Duration (ms)	Times	Interval (Sec)	Observation	Comply with Criterion
Voltage dips	100%	20	3	100	Note (1)	A
	30%	500	3	100	Note (1)	A
Voltage interruptions	100%	5000	3	100	Note (2)	C

Test voltage: 100VAC

Test Mode	Voltage Reduction	Duration (ms)	Times	Interval (Sec)	Observation	Comply with Criterion
Voltage dips	100%	20	3	100	Note (1)	A
	30%	500	3	100	Note (1)	A
Voltage interruptions	100%	5000	3	100	Note (2)	C

3#

Test voltage: 240VAC

Test Mode	Voltage Reduction	Duration (ms)	Times	Interval (Sec)	Observation	Comply with Criterion
Voltage dips	100%	20	3	100	Note (1)	A
	30%	500	3	100	Note (1)	A
Voltage interruptions	100%	5000	3	100	Note (2)	C

Test voltage: 100VAC

Test Mode	Voltage Reduction	Duration (ms)	Times	Interval (Sec)	Observation	Comply with Criterion
Voltage dips	100%	20	3	100	Note (1)	A
	30%	500	3	100	Note (1)	A
Voltage interruptions	100%	5000	3	100	Note (2)	C

4#

Test voltage: 240VAC

Test Mode	Voltage Reduction	Duration (ms)	Times	Interval (Sec)	Observation	Comply with Criterion
Voltage dips	100%	20	3	100	Note (1)	A
	30%	500	3	100	Note (1)	A
Voltage interruptions	100%	5000	3	100	Note (2)	C

Test voltage: 100VAC

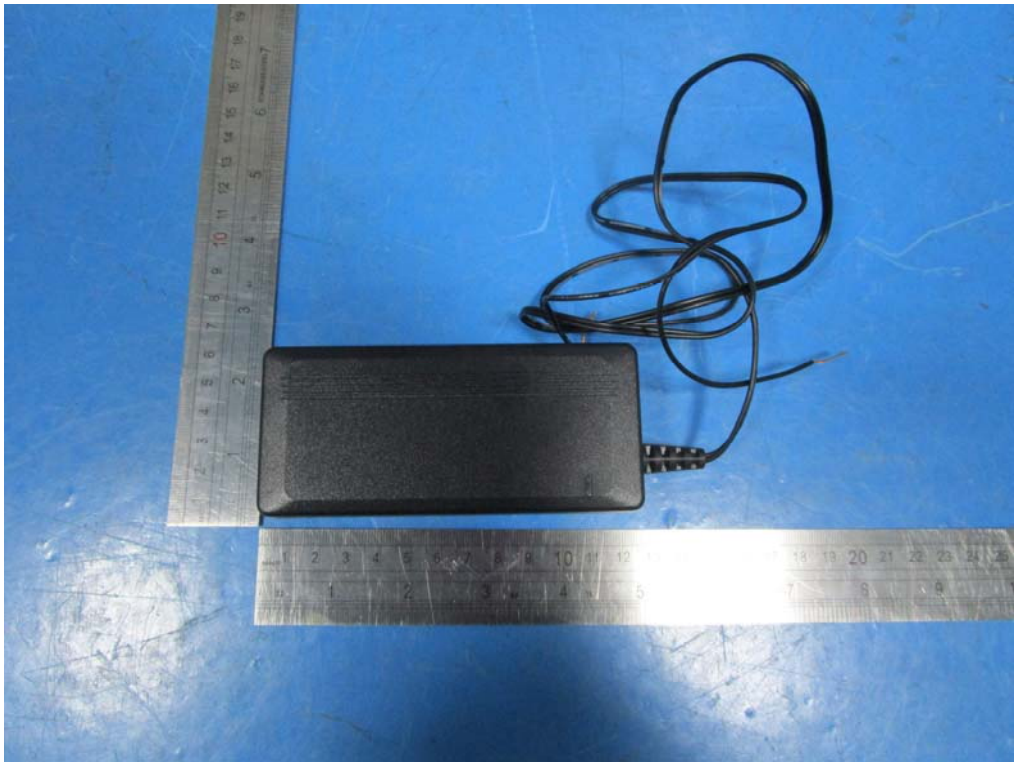
Test Mode	Voltage Reduction	Duration (ms)	Times	Interval (Sec)	Observation	Comply with Criterion
Voltage dips	100%	20	3	100	Note (1)	A
	30%	500	3	100	Note (1)	A
Voltage interruptions	100%	5000	3	100	Note (2)	C

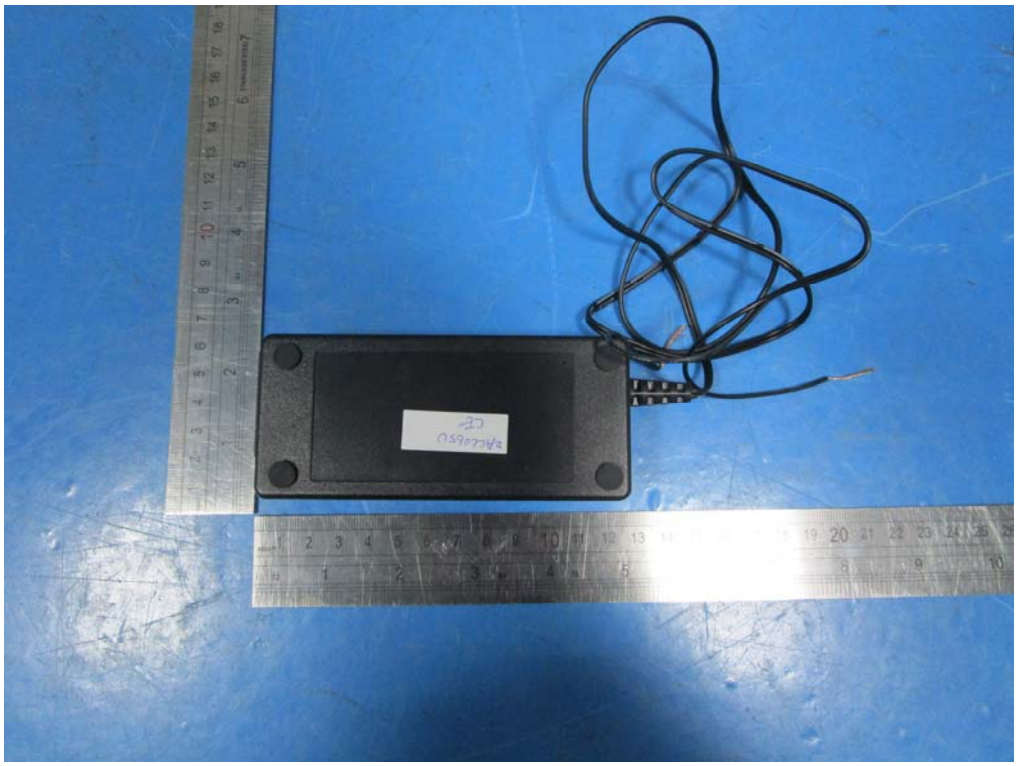
Note:

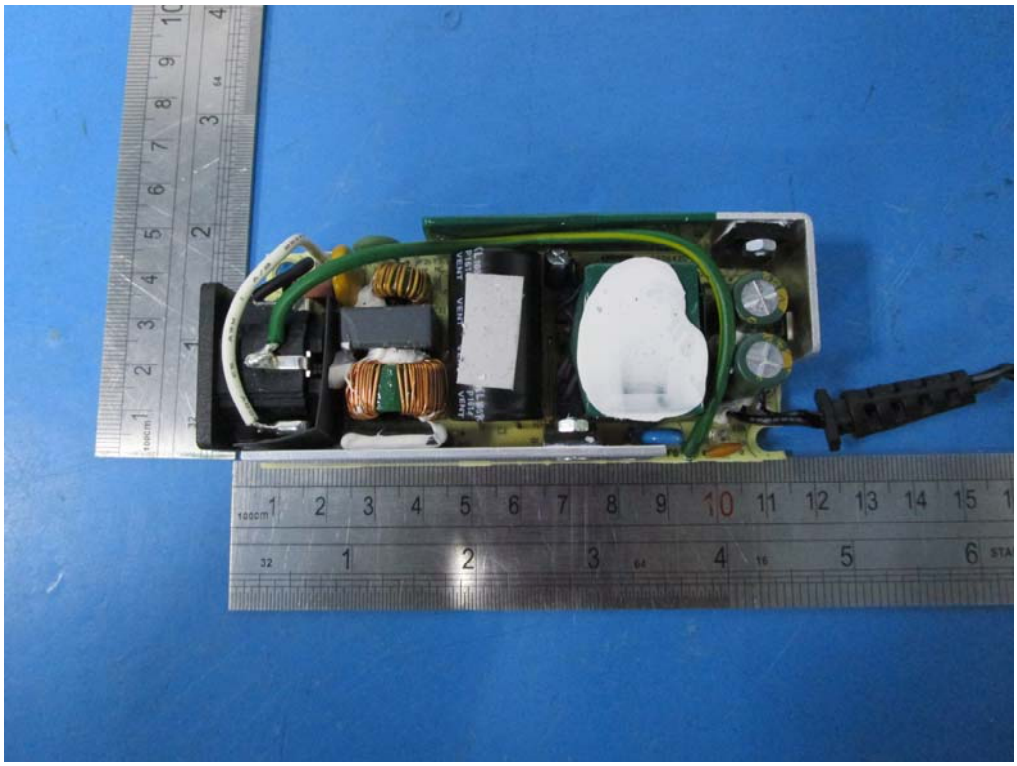
(1). The EUT continued to operate as intended. No degradation of performance was observed.

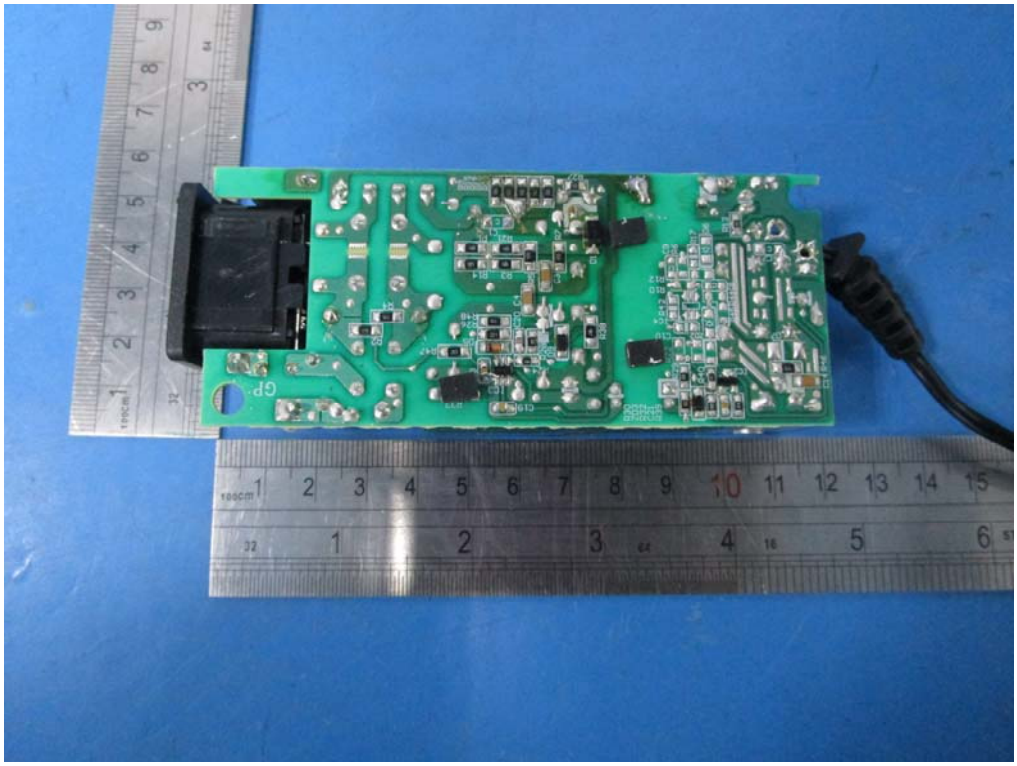
(2). Degradation of performance was observed during the voltage interruption test. After the test, the EUT output restored automatically

Appendix I: Photographs of the EUT



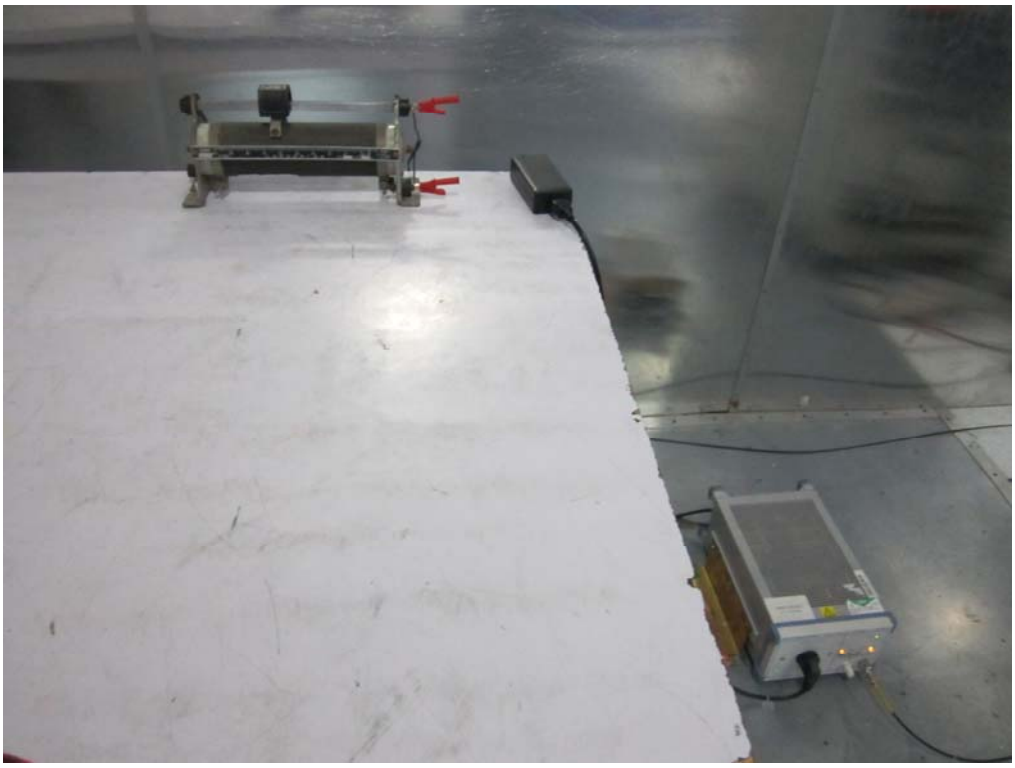






Appendix II：Photographs of EMC Test Configuration

1. Mains Terminal Disturbance Voltage Measurement

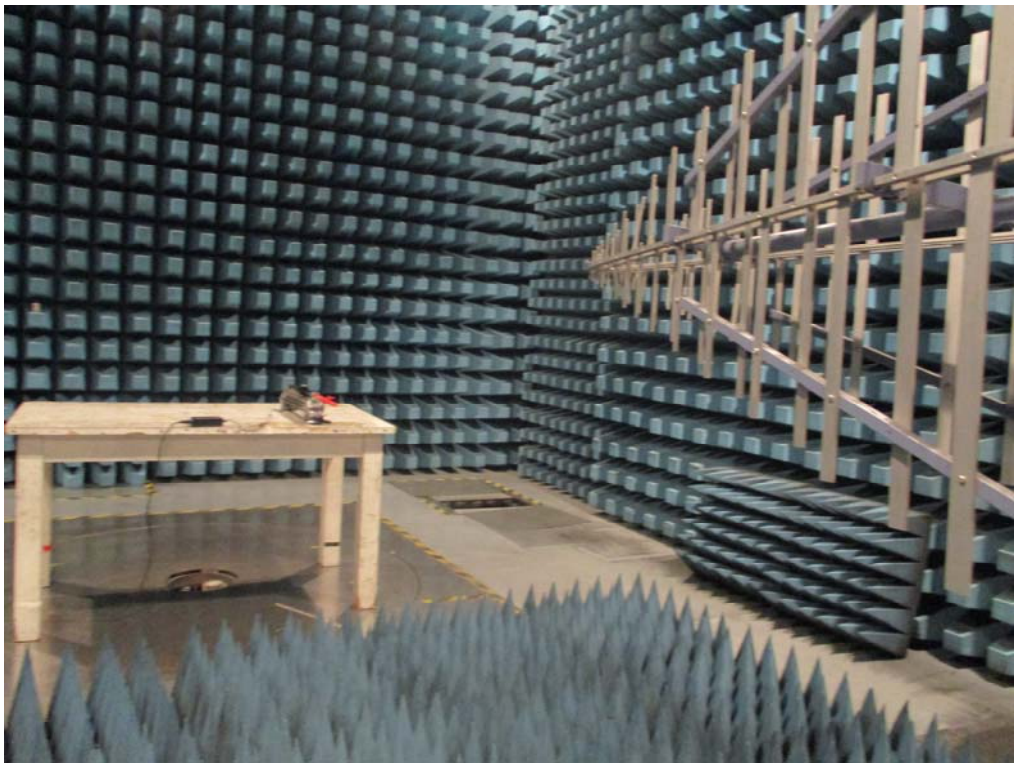


2.Radiated Field Strength Measurement

3. Harmonics Current Measurement and Voltage Fluctuation and Flick Measurement

4. Electrostatic Discharge Immunity Test

5. Radiated, Radio Frequency Electromagnetic Field Immunity Test



6. Electrical Fast Transient/Burst Immunity Test

7. Surge Immunity Test

8. Immunity to conducted disturbances induced by RF fields

9. Voltage Dips and Short Interruptions Immunity Test

10. Power Frequency Magnetic Field Immunity Test

End of Report