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Report No.: 1611RSU00203
Report Version: V02
Issue Date: 12-11-2016

MEASUREMENT REPORT

EMC Test Report

Applicant:	Compex Systems Pte Ltd
Address:	No:9 Harrison Road, Harrison Industrial Building, #05-01, Singapore 369651
Product:	WIRELESS ACCESS POINT
Model No.:	WPJ558HV, WPJ558LV, WPJ558LV-A, WPJ557LV-A, WPJ557HV-A, MMJ558LV, MMJ558LV-A MMJ558HV, MMJ558HV-A, MMN558LV, MMN558LV-A, MMN558HV, MMN558HV-A, MMS558LV, MMS558LV-A, MMS558HV, MMS558HV-A, MMZ558LV, MMZ558LV-A, MMZ558HV, MMZ558HV-A
Brand Name:	COMPEX
Standards:	ETSI EN 301 489 - 1 V1.9.2: 2011 ETSI EN 301 489 - 17 V2.2.1: 2012
Result:	Complies
Test Date:	November 01 ~ December 11, 2016

Reviewed By Manager : Robin Wu
(Robin Wu)

Approved By CEO : Marlin Chen
(Marlin Chen)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

Revision History

Report No.	Version	Description	Issue Date	Note
1611RSU00203	Rev. 01	Initial report	11-27-2016	Invalid
1611RSU00203	Rev. 02	Revised the radiated emission data	12-11-2016	Valid

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1. General Information

1.1. Applicant

Compex Systems Pte Ltd

No:9 Harrison Road, Harrison Industrial Building, #05-01, Singapore 369651

1.2. Manufacturer

Compex Systems Pte Ltd

No:9 Harrison Road, Harrison Industrial Building, #05-01, Singapore 369651

1.3. Testing Facility

Test Site

MRT Technology (Suzhou) Co., Ltd

Test Site Location

D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC registered (MRT Reg. No. 809388) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-4179, G-814, C-4664, T-2206) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.**

1.4. Feature of Equipment under Test

Product Name:	WIRELESS ACCESS POINT
Model No.:	WPJ558HV, WPJ558LV, WPJ558LV-A, WPJ557LV-A, WPJ557HV-A, MMJ558LV, MMJ558LV-A MMJ558HV, MMJ558HV-A, MMN558LV, MMN558LV-A, MMN558HV, MMN558HV-A, MMS558LV, MMS558LV-A, MMS558HV, MMS558HV-A, MMZ558LV, MMZ558LV-A, MMZ558HV, MMZ558HV-A
Brand Name:	COMPEX
Wi-Fi Specification:	802.11b/g/n
Frequency Range:	For 802.11b/g/n-HT20: 2412 ~ 2472 MHz For 802.11n-HT40: 2422 ~ 2462 MHz

Note: Difference between all models is for different marketing requirement.

1.5. Standards Applicable for Testing

The EUT complies with the requirements of EN 301 489-1 V1.9.2 & EN 301 489-17 V2.2.1.

EMI Test:

EN 55022 2010/AC: 2011 (Conducted Emission)

EN 55022 2010/AC: 2011 (Radiated Emission)

EN 61000-3-2: 2014 (Harmonic)

EN 61000-3-3: 2013 (Flicker)

EMS Test:

EN 61000-4-2: 2009 (ESD)

EN 61000-4-3: 2006+A1:2008+A2:2010 (RS)

EN 61000-4-4: 2012 (EFT)

EN 61000-4-5: 2014 (Surge)

EN 61000-4-6: 2014 (CS)

EN 61000-4-11: 2004 (Dips)

1.6. Performance Criteria

General Requirements (ETSI EN 301489-1):

The performance criteria are used to take a decision on whether radio equipment passes or fails immunity tests.

For the purpose of the present document four categories of performance criteria apply:

- performance criteria for continuous phenomena applied to transmitters;
- performance criteria for transient phenomena applied to transmitters;
- performance criteria for continuous phenomena applied to receivers;
- performance criteria for transient phenomena applied to receivers.

Normally, the performance criteria depend on the type of radio equipment. Thus, the present document only contains general performance criteria commonly used for the assessment of radio equipment. More specific and product-related performance criteria for a dedicated type of radio equipment may be found in the part of EN 301 489 series dealing with the particular type of radio equipment.

Performance criteria for continuous phenomena applied to transmitters and receivers

If no further details are given in the relevant part of EN 301 489 series dealing with the particular type of radio equipment, the following general performance criteria for continuous phenomena shall apply.

During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criteria for transient phenomena applied to transmitters and receivers
If no further details are given in the relevant part of EN 301 489 series dealing with the particular type of radio equipment, the following general performance criteria for transient phenomena shall apply.

After the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer, when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criteria for equipment which does not provide a continuous communication link
For radio equipment which does not provide a continuous communication link, the performance criteria described in clauses (1) and (2) are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The related specifications set out in clause 5.3 of EN 301 489-1 V1.9.2 (2010-09) have also to be taken into account.
The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in clauses (1) and (2).

Performance criteria for ancillary equipment tested on a stand-alone basis
If ancillary equipment is intended to be tested on a stand-alone basis, the performance criteria described in clauses (1) and (2) are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The related specifications set out in clause 5.3 of EN 301 489-1 V1.9.2 (2010-09) have also to be taken into account.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in clauses (1) and (2).

Special Performance Requirements (ETSI EN 301489-17):

The performance criteria are:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following clauses.

Performance criteria for Continuous phenomena applied to Transmitters (CT)

The performance criteria A shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Transient phenomena applied to Transmitters (TT)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5000 ms duration, for which performance criteria C shall apply.

Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Continuous phenomena applied to Receivers (CR)

The performance criteria A shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Transient phenomena applied to Receivers (TR)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5000 ms duration for which performance criteria C shall apply.

Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

EN 301 489 -17 Performance criteria		
Criteria	During Test	After test
A	Shall operate as intended May show degradation of performance (see note 1) Shall be no loss of function Shall be no unintentional transmissions	Shall operate as intended Shall be no degradation of performance (see note 2) Shall be no loss of function Shall be no loss of stored data or user programmable functions
B	May show loss of function (one or more) May show degradation of performance (see note 1) No unintentional transmission	Functions shall be self-recoverable Shall operate as intended after recovering Shall be no degradation of performance (see note 2) Shall be no loss of stored data or user programmable functions
C	May be loss of function (one or more)	Functions shall be recoverable by the operator Shall operate as intended after recovering Shall be no degradation of performance (see note 2)

Note 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.

If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

Note 2: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

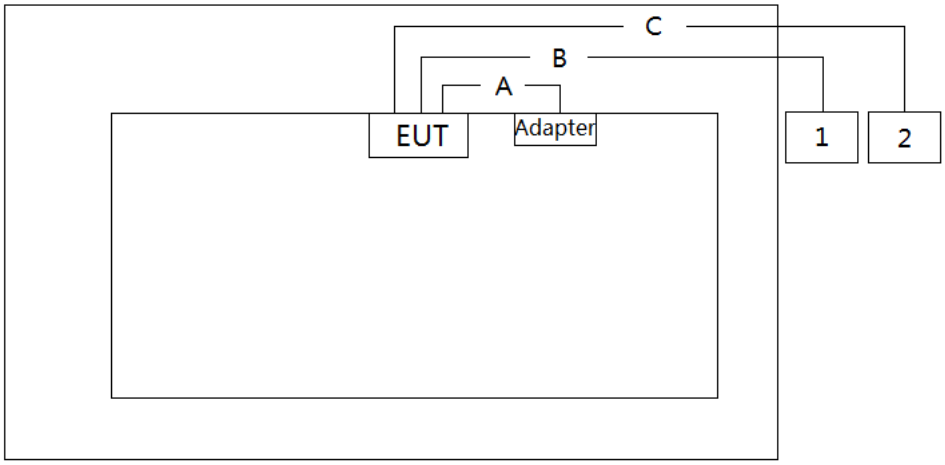
2. Test Configuration of Equipment under Test

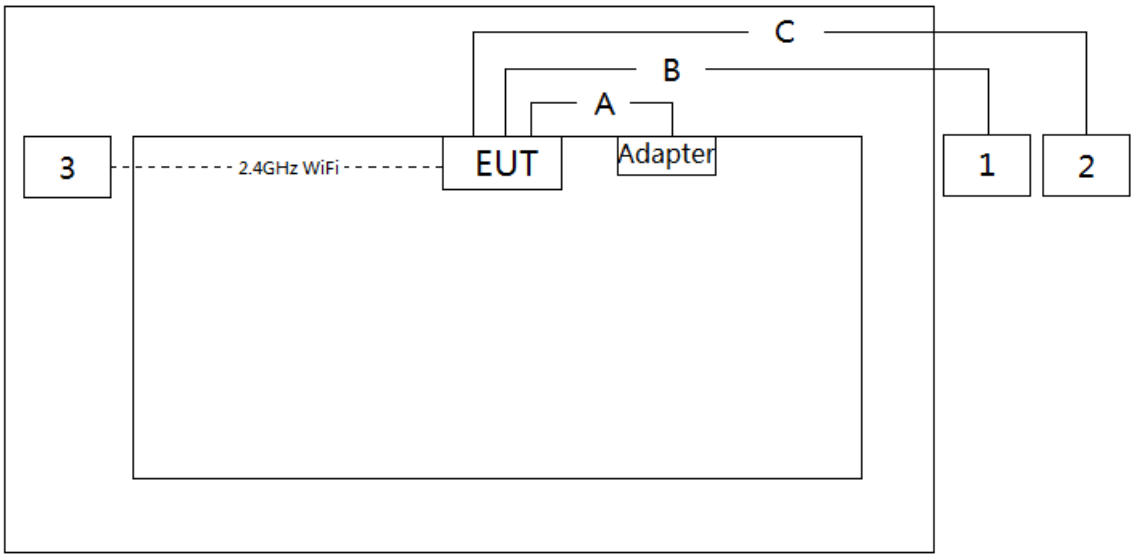
2.1. Test Mode

Pre Test Mode	
EMI Mode	Mode 1: Communicate with PC by “ping” function through LAN cable. Mode 2: Communicate with PC by “ping” function through LAN cable and Wi-Fi.
EMS Mode	Mode 1: Communicate with PC by “ping” function through LAN cable. Mode 2: Communicate with PC by “ping” function through LAN cable and Wi-Fi.
Final Test Mode	
EMI Mode	Mode 2: Communicate with PC by “ping” function through LAN cable and Wi-Fi.
EMS Mode	Mode 1: Communicate with PC by “ping” function through LAN cable. Mode 2: Communicate with PC by “ping” function through LAN cable and Wi-Fi.

2.2. Configuration of Tested System

Connection Diagram (Mode 1)



Connection Diagram (Mode 2)


Signal Cable Type		Signal Cable Description
A	Power Cable	Non-shielding, 1.5m
B	LAN Cable	Non-shielding, >10m
C	LAN Cable	Non-shielding, >10m

2.3. Test System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook	Lenovo	E430c	N/A	Non-Shielded, 1.8m
2	Notebook	Lenovo	X230i	N/A	Non-Shielded, 1.8m
3	Notebook	Lenovo	X201	N/A	Non-Shielded, 1.8m

2.4. Test Software

1	Setup the EUT and simulators as shown on above.
2	Power on and make the EUT communicate with PC by “ping” function through LAN cable and Wi-Fi.
3	Start to test.

3. Test Summary

Clause	Test Item	Test Standard	Result (Pass/Fail)	Remark
Emission Measurements				
EN 301489-1 Clause 8.4	Conducted Emission	EN 55022	Pass	--
EN 301489-1 Clause 8.2	Radiated Emission	EN 55022	Pass	--
EN 301489-1 Clause 8.5	Harmonic Current Emissions	EN 61000-3-2	Pass	--
EN 301489-1 Clause 8.6	Voltage Fluctuations and Flicker	EN 61000-3-3	Pass	--
Immunity Measurements				
EN 301489-1 Clause 9.3	Electrostatic Discharge	EN 61000-4-2	Pass	--
EN 301489-1 Clause 9.2	Radio-Frequency Electromagnetic Field	EN 61000-4-3	Pass	--
EN 301489-1 Clause 9.4	Electrical Fast Transients	EN 61000-4-4	Pass	--
EN 301489-1 Clause 9.8	Surges	EN 61000-4-5	Pass	--
EN 301489-1 Clause 9.5	Radio-Frequency Common Mode	EN 61000-4-6	Pass	--
EN 301489-1 Clause 9.7	Voltage Dips and Interruptions	EN 61000-4-11	Pass	--

4. Conducted Emission

4.1. Limit of Conducted Emission

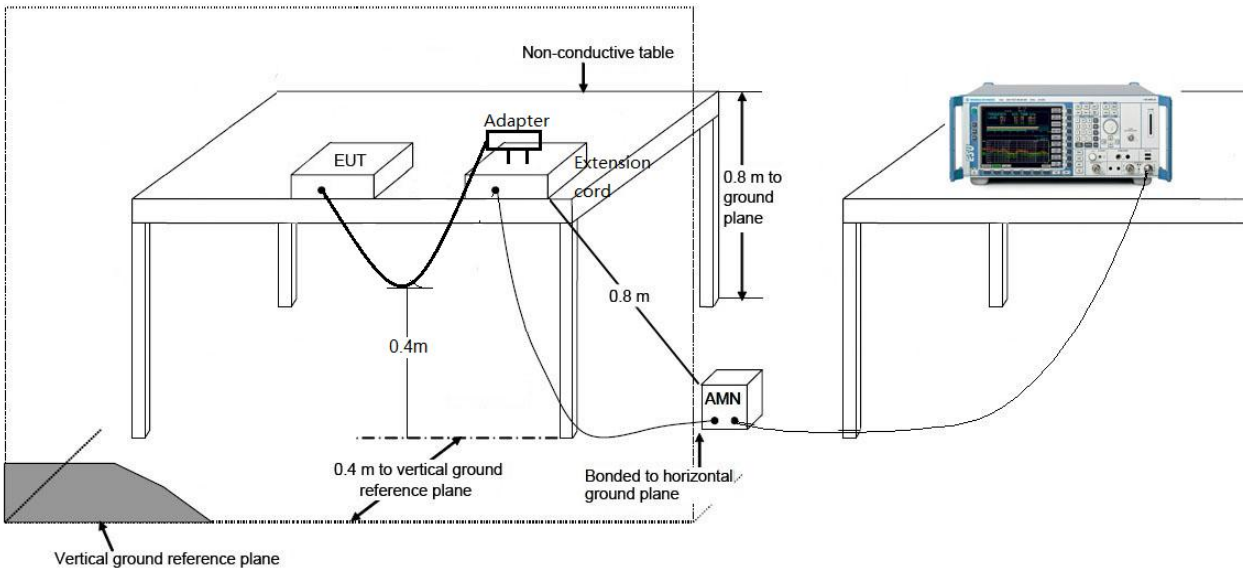
Limits of conducted emission for AC mains power input/output ports		
Frequency range MHz	Limits dB(μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Limits of conducted emission for telecommunication ports				
Frequency range MHz	Voltage Limits dB(μV)		Current limits dB(μA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.50	84 to 74	74 to 64	40 to 30	30 to 20
0.50 to 30	74	64	30	20

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

4.2. Test Setup



4.3. Test Procedure

The receiver or associated equipment under measurement and the artificial mains network are disposed as shown in 3.2. Measurements shall be carried out using a selective voltmeter having a quasi-peak detector for broadband measurements and an average detector for arrow-band measurements in accordance with CISPR 16-1.

The mains lead shall be arranged to follow the shortest possible path between the receiver and artificial mains network on the ground. The mains lead in excess of 0,8 m separating the equipment under test from the artificial mains network shall be folded back and forth parallel to the lead so as to form a bundle with a length of 0,3 m to 0,4 m.

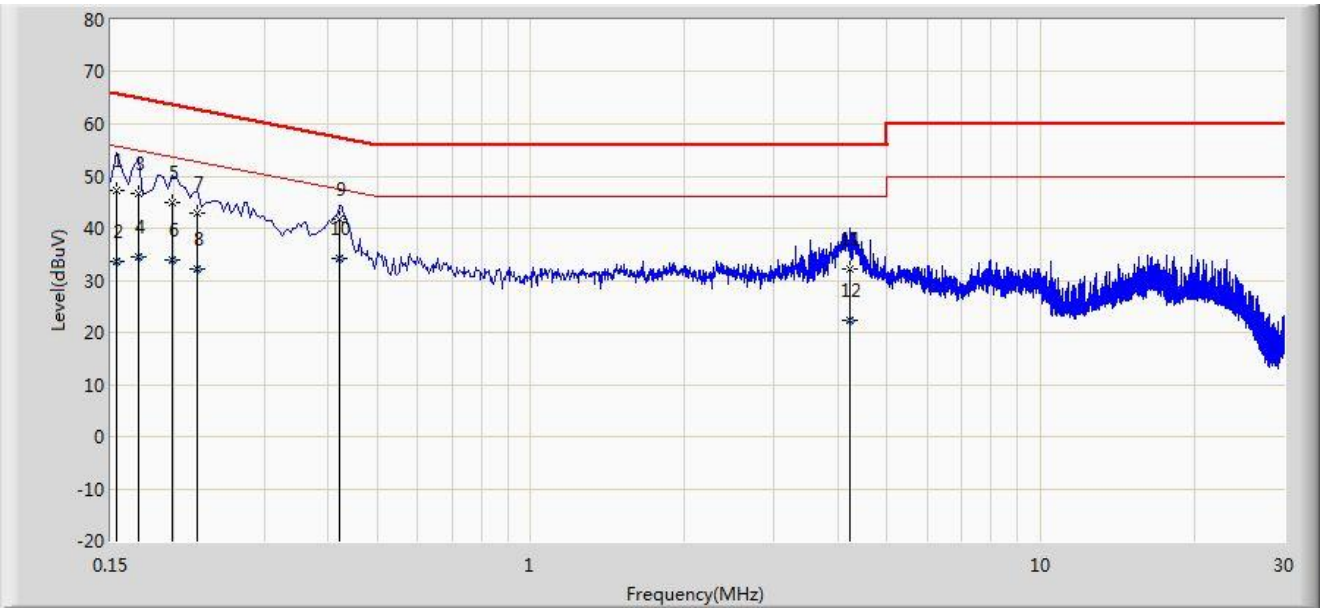
Earthing of the equipment under test if provided with a safety earth connection, shall be made to the earth terminal provided on the artificial mains network with the shortest possible lead.

If the equipment under test has a coaxial RF input connector, tests shall be performed with and without an earth connection made to the outer conductor screen of the coaxial RF input connector. When these tests are being carried out, no other earth connections shall be made to any additional earth terminal whatever.

If the equipment under test has no coaxial RF input connector and if it has an earth terminal, tests shall be performed with this terminal earthed.

4.4. Test Result

Site: SR2	Time: 2016/11/13 - 16:16
Limit: EN55022_CE_Mains_Class B	Engineer: Milo Li
Probe: ENV216_101683_Filter Off	Polarity: Line
EUT: WIRELESS ACCESS POINT	Power: AC 230V/50Hz
Test Mode 2: DC Power Port	

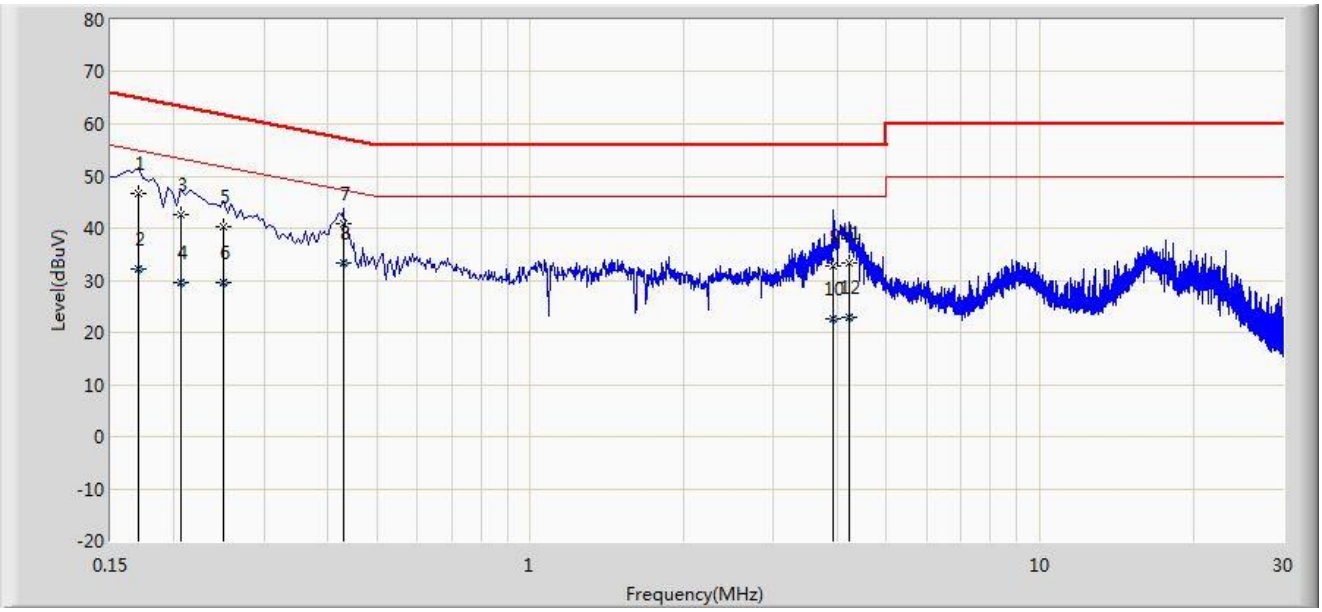


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.154	47.320	37.611	-18.461	65.781	9.709	QP
2			0.154	33.764	24.054	-22.017	55.781	9.709	AV
3			0.170	46.550	36.849	-18.411	64.960	9.701	QP
4			0.170	34.465	24.763	-20.496	54.960	9.701	AV
5			0.198	44.877	35.189	-18.817	63.694	9.688	QP
6			0.198	33.814	24.126	-19.880	53.694	9.688	AV
7			0.222	42.964	33.281	-19.780	62.744	9.683	QP
8			0.222	32.288	22.605	-20.455	52.744	9.683	AV
9			0.422	41.639	31.953	-15.770	57.409	9.686	QP
10		*	0.422	34.079	24.393	-13.330	47.409	9.686	AV
11			4.218	32.140	22.229	-23.860	56.000	9.911	QP
12			4.218	22.209	12.298	-23.791	46.000	9.911	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB).

Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

Site: SR2	Time: 2016/11/13 - 16:21
Limit: EN55022_CE_Mains_Class B	Engineer: Milo Li
Probe: ENV216_101683_Filter Off	Polarity: Neutral
EUT: WIRELESS ACCESS POINT	Power: AC 230V/50Hz
Test Mode 2: DC Power Port	

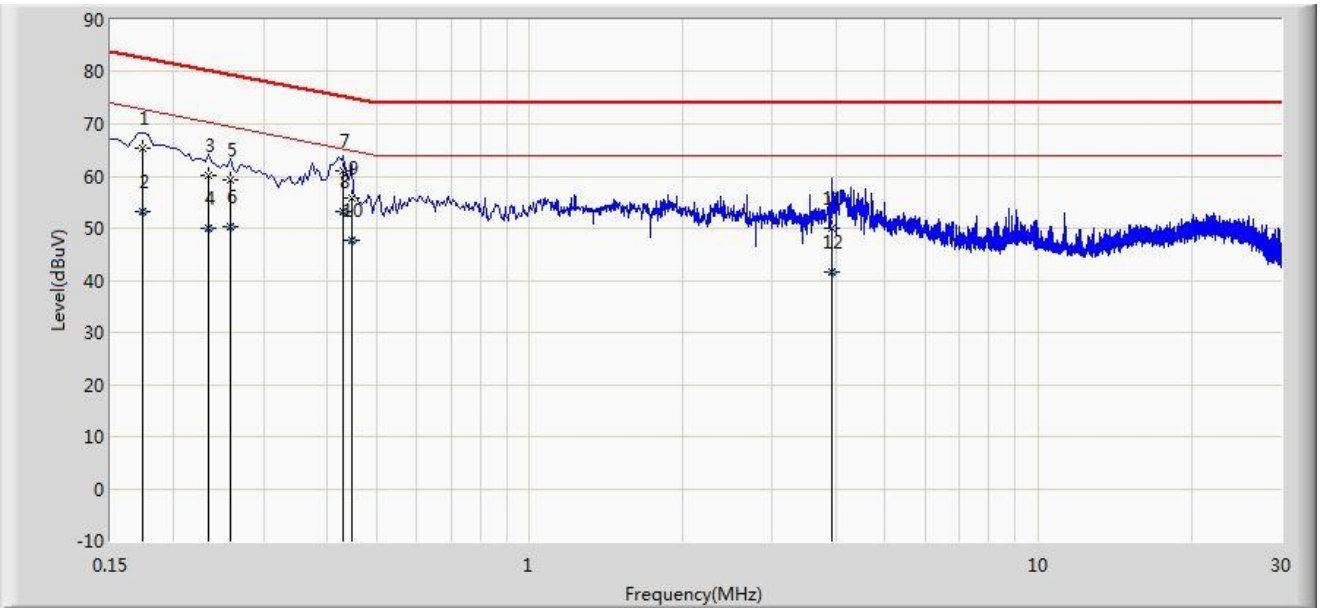


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.170	46.702	36.980	-18.259	64.960	9.721	QP
2			0.170	32.150	22.429	-22.810	54.960	9.721	AV
3			0.206	42.590	32.958	-20.776	63.365	9.632	QP
4			0.206	29.540	19.908	-23.825	53.365	9.632	AV
5			0.250	40.311	30.688	-21.447	61.757	9.622	QP
6			0.250	29.421	19.799	-22.336	51.757	9.622	AV
7			0.430	41.013	31.359	-16.240	57.253	9.654	QP
8		*	0.430	33.442	23.788	-13.811	47.253	9.654	AV
9			3.938	32.766	22.875	-23.234	56.000	9.891	QP
10			3.938	22.485	12.594	-23.515	46.000	9.891	AV
11			4.234	33.226	23.301	-22.774	56.000	9.925	QP
12			4.234	22.809	12.884	-23.191	46.000	9.925	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB).

Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

Site: SR2	Time: 2016/11/13 - 16:26
Limit: EN55022_CE_ISN(Voltage)_Class B	Engineer: Milo Li
Probe: TESEQ-ISN-T800-Cat 5_24811	Polarity:
EUT: WIRELESS ACCESS POINT	Power: AC 230V/50Hz
Test Mode 2: LAN Port 10Mbps	

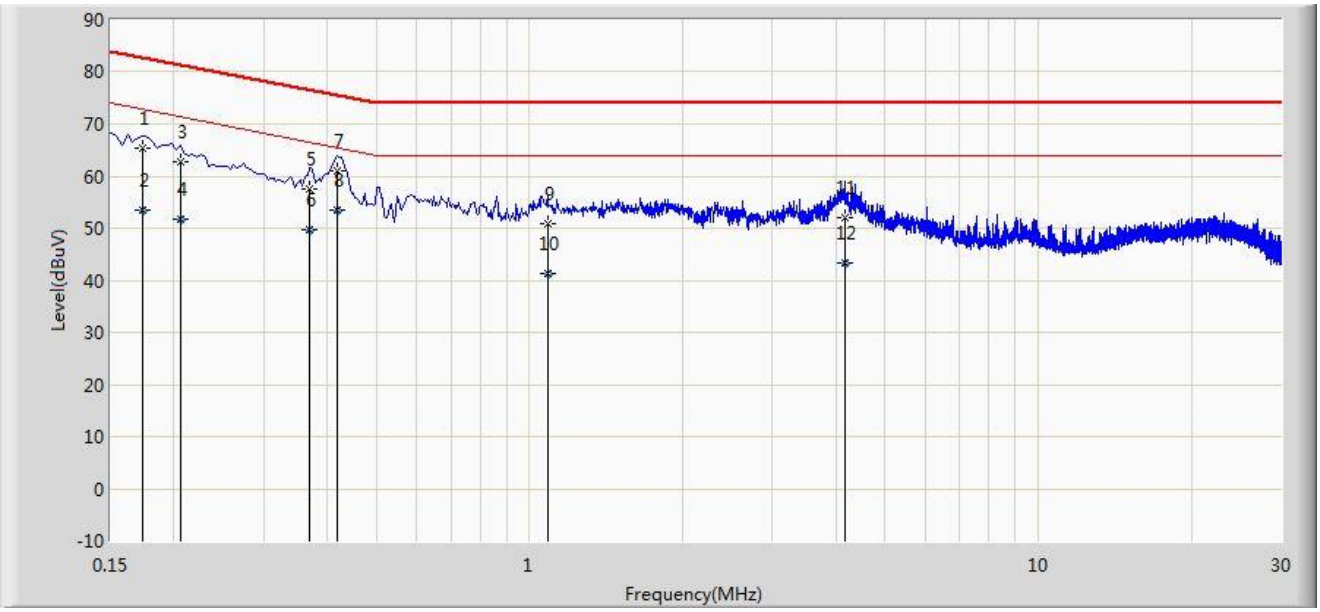


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.174	65.387	55.311	-17.380	82.767	10.076	QP
2			0.174	53.142	43.066	-19.625	72.767	10.076	AV
3			0.234	60.253	50.292	-20.054	80.307	9.962	QP
4			0.234	50.121	40.160	-20.185	70.307	9.962	AV
5			0.258	59.236	49.321	-20.259	79.496	9.915	QP
6			0.258	50.315	40.400	-19.181	69.496	9.915	AV
7			0.430	60.979	51.201	-14.274	75.253	9.778	QP
8		*	0.430	53.239	43.461	-12.014	65.253	9.778	AV
9			0.446	55.832	46.061	-19.118	74.949	9.770	QP
10			0.446	47.687	37.917	-17.262	64.949	9.770	AV
11			3.938	49.858	40.112	-24.142	74.000	9.746	QP
12			3.938	41.672	31.926	-22.328	64.000	9.746	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB).

Factor (dB) = Cable Loss (dB) + ISN Factor (dB).

Site: SR2	Time: 2016/11/13 - 16:34
Limit: EN55022_CE_ISN(Voltage)_Class B	Engineer: Milo Li
Probe: TESEQ-ISN-T800-Cat 5_24811	Polarity:
EUT: WIRELESS ACCESS POINT	Power: AC 230V/50Hz
Test Mode 2: LAN Port 100Mbps	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.174	65.439	55.363	-17.328	82.767	10.076	QP
2			0.174	53.586	43.510	-19.181	72.767	10.076	AV
3			0.206	62.642	52.627	-18.723	81.365	10.015	QP
4			0.206	51.625	41.610	-19.740	71.365	10.015	AV
5			0.370	57.545	47.742	-18.956	76.501	9.803	QP
6			0.370	49.732	39.928	-16.769	66.501	9.803	AV
7			0.418	61.007	51.224	-14.481	75.488	9.783	QP
8		*	0.418	53.504	43.721	-11.984	65.488	9.783	AV
9			1.086	50.838	41.175	-23.162	74.000	9.664	QP
10			1.086	41.439	31.776	-22.561	64.000	9.664	AV
11			4.170	51.920	42.155	-22.080	74.000	9.765	QP
12			4.170	43.265	33.499	-20.735	64.000	9.765	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB).

Factor (dB) = Cable Loss (dB) + ISN Factor (dB).

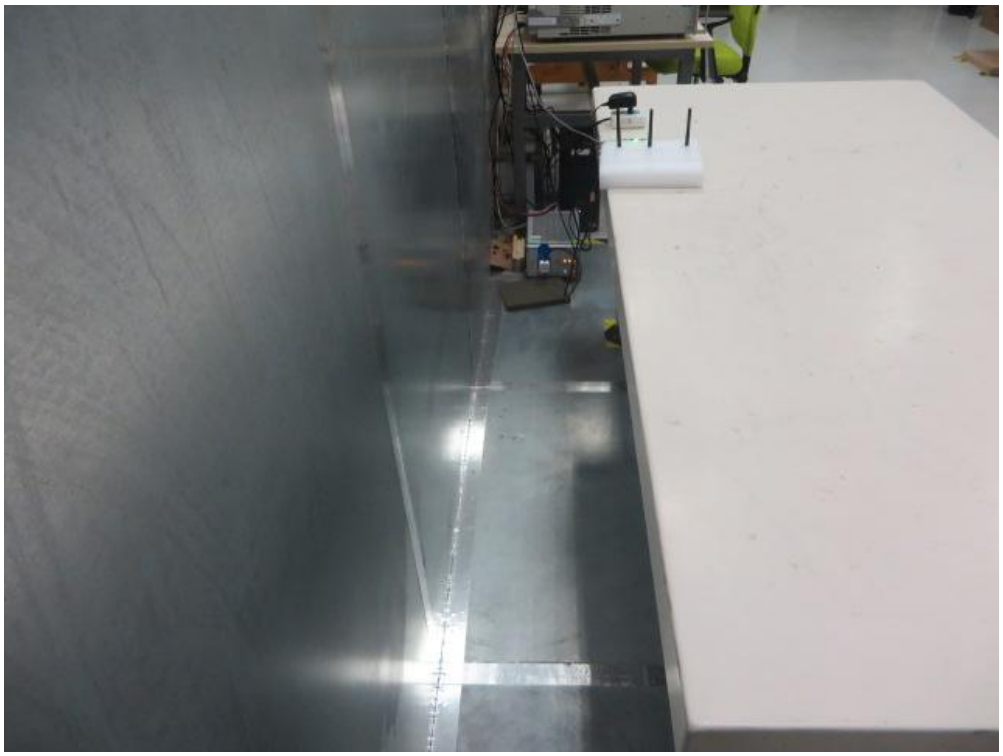
4.5. Test Photograph

Test Mode: Mode 2

Description: Front View Conducted Emission Test Setup for Power Port

Test Mode: Mode 2

Description: Back View Conducted Emission Test Setup for Power Port



Test Mode: Mode 2

Description: Front View Conducted Emission Test Setup for LAN Port

Test Mode: Mode 2

Description: Back View Conducted Emission Test Setup for LAN Port

5. Radiated Emission

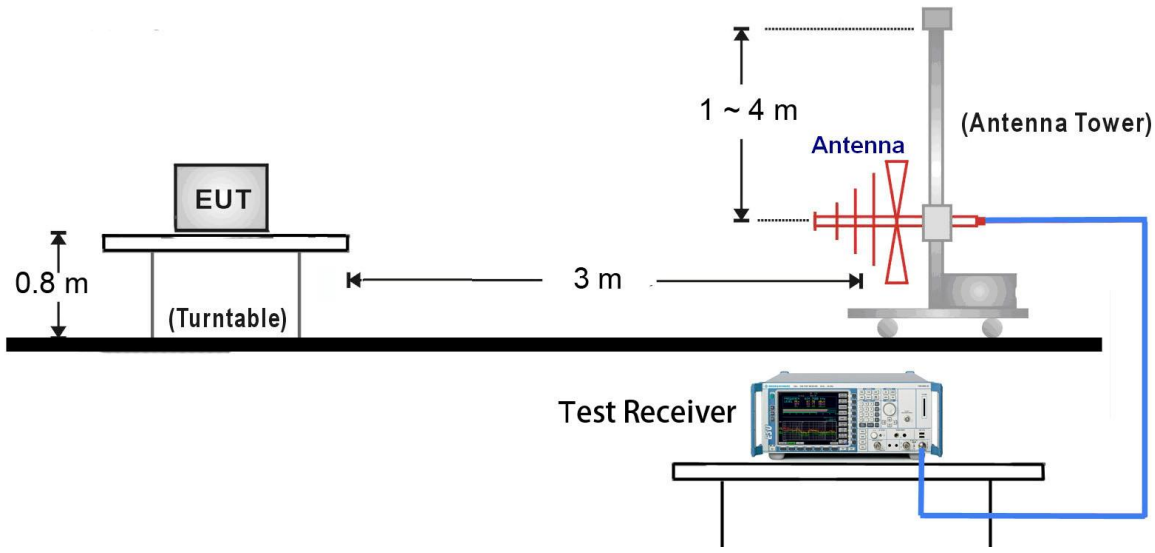
5.1. Limit of Radiated Emission

Frequency range MHz	Quasi-peak limits dB(μV/m)
30 to 230	40
230 to 1000	47
Note 1: The lower limit shall apply at the transition frequency. Note 2: Additional provisions may be required for cases where interference occurs.	

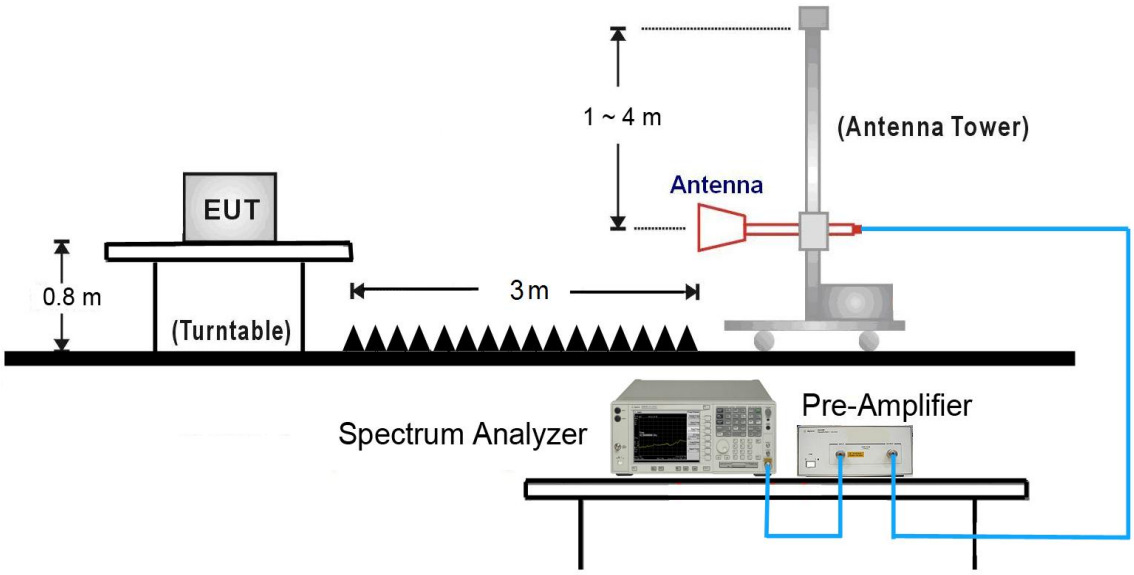
Frequency range GHz	Average limit dB(μV/m)	Peak limit dB(μV/m)
1 to 3	50	70
3 to 6	54	74
Note: The lower limit applies at the transition frequency.		

5.2. Test Setup

30 ~ 1000 MHz



1000 ~ 6000 MHz



5.3. Test Procedure

Starting with the front of the receiver under test facing the measuring antenna, the measuring antenna is adjusted for horizontal polarization measurement and its height varied between 1 m and 4 m until the maximum reading is obtained.

The receiver under test is then rotated about its centre until the maximum meter reading is obtained, after which the measuring antenna height is again varied between 1 m and 4 m and the maximum reading noted.

The procedure is repeated for vertical polarization of the measuring antenna.

The highest value found, following this procedure, is defined as the radiation figure of the receiver.

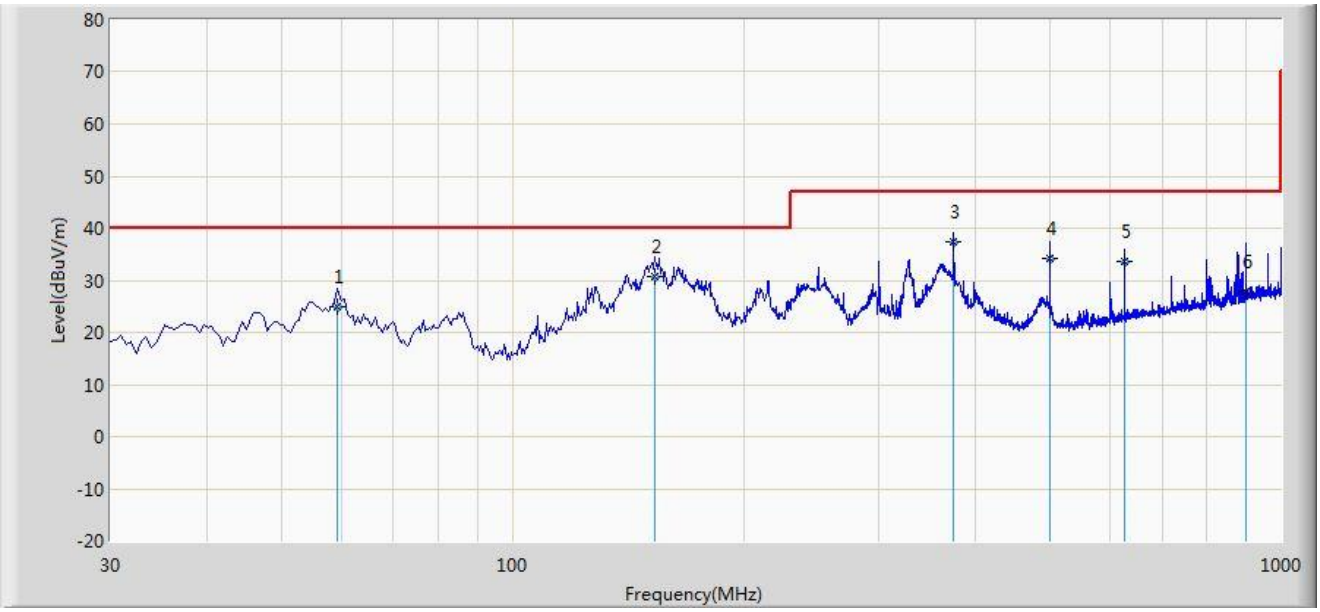
If at certain frequencies the ambient signal field strength is high at the position of the receiving antenna, one of the following methods may be used to show compliance of the equipment under test.

a) For small frequency bands with high ambient signals, the disturbance value may be interpolated from the adjacent values. The interpolated value shall lie on the curve describing a continuous function of the disturbance values adjacent to the ambient noise.

b) Another possibility is to use the method described in annex C of CISPR 11.

5.4. Test Result

Site: AC2	Time: 2016/11/11 - 20:54
Limit: EN55022_RE(3m)_Class B	Engineer: Milo Li
Probe: VULB 9168 _20-2000MHz	Polarity: Horizontal
EUT: WIRELESS ACCESS POINT	Power: AC 230V/50Hz
Test Mode 2	

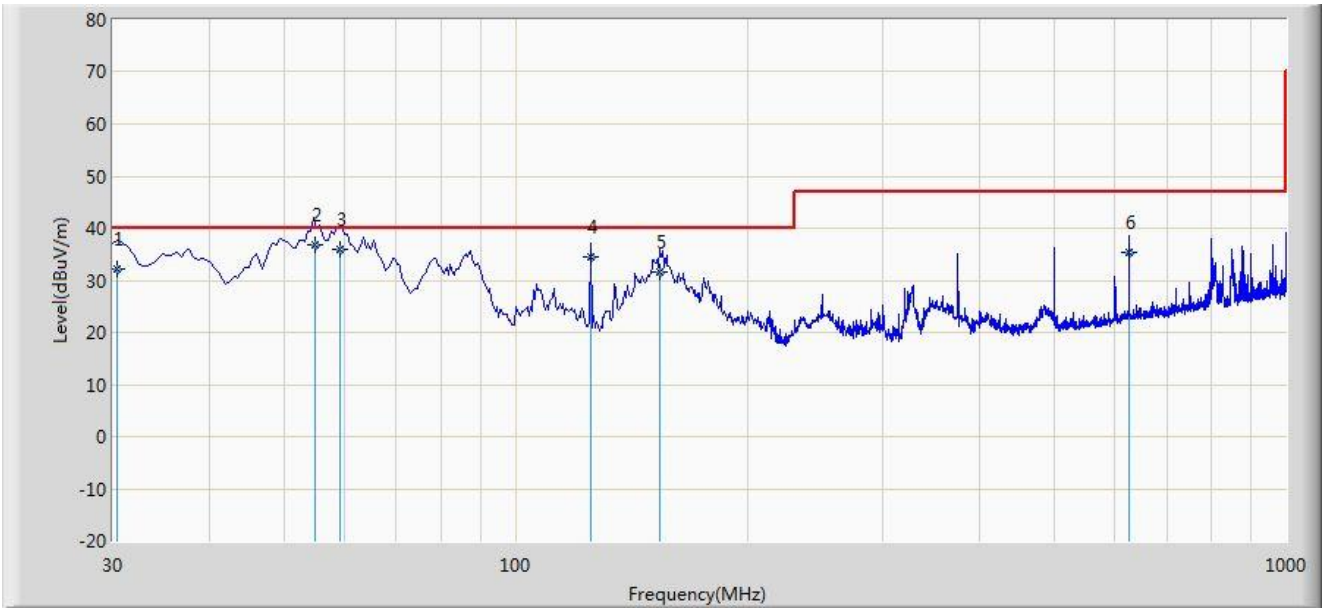


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			59.100	24.912	11.420	-15.088	40.000	13.492	QP
2		*	153.240	30.857	15.620	-9.143	40.000	15.237	QP
3			374.960	37.507	21.500	-9.493	47.000	16.007	QP
4			500.200	34.229	15.740	-12.771	47.000	18.489	QP
5			625.050	33.565	12.560	-13.435	47.000	21.006	QP
6			900.140	27.952	3.620	-19.048	47.000	24.332	QP

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC2	Time: 2016/11/11 - 21:00
Limit: EN55022_RE(3m)_Class B	Engineer: Milo Li
Probe: VULB 9168 _20-2000MHz	Polarity: Vertical
EUT: WIRELESS ACCESS POINT	Power: AC 230V/50Hz
Test Mode 2	

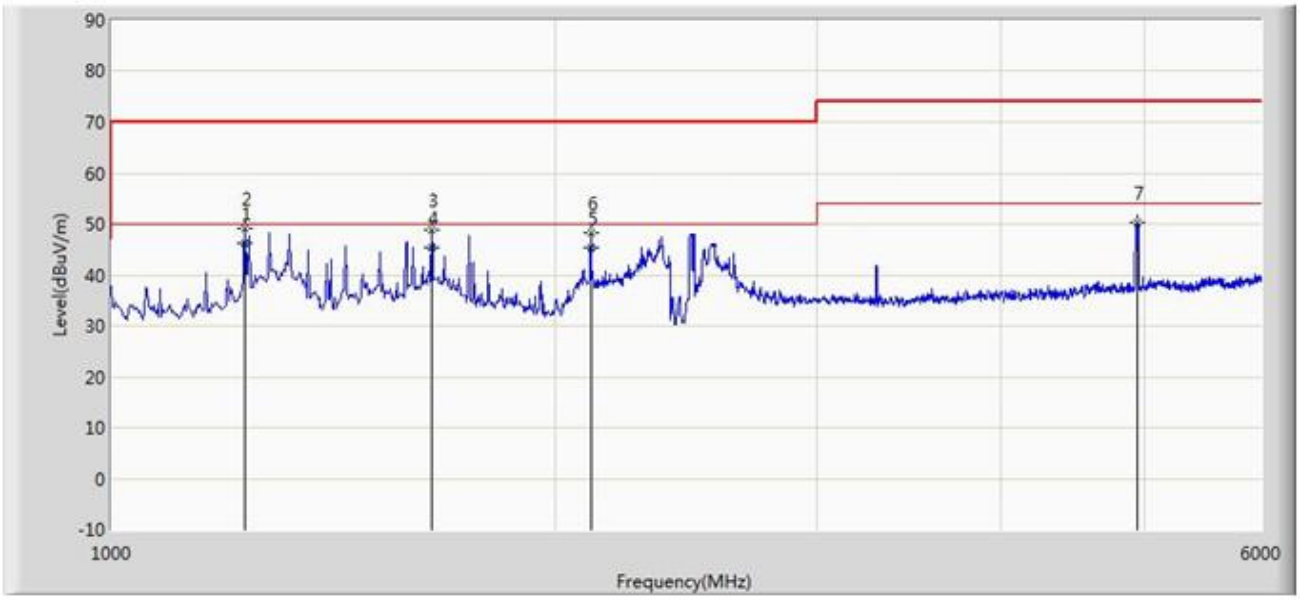


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			30.420	32.259	18.530	-7.741	40.000	13.730	QP
2		*	54.850	36.946	23.150	-3.054	40.000	13.796	QP
3			59.230	36.004	22.520	-3.996	40.000	13.484	QP
4			125.040	34.353	20.870	-5.647	40.000	13.483	QP
5			153.730	31.656	16.420	-8.344	40.000	15.236	QP
6			625.140	35.237	14.230	-11.763	47.000	21.007	QP

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC2	Time: 2016/12/11 - 18:17
Limit: EN55022_RE(3m)_Class B	Engineer: Milo Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: WIRELESS ACCESS POINT	Power: AC 230V/50Hz
Test Mode 2	



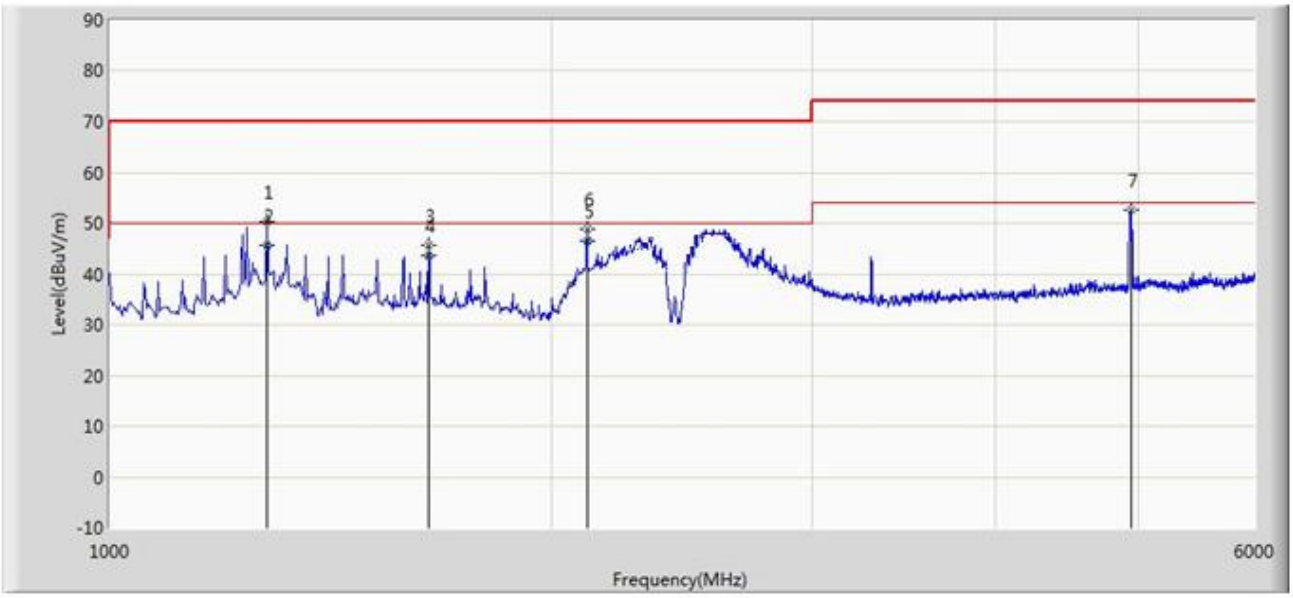
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	1232.000	46.178	52.110	-3.822	50.000	-5.932	AV
2			1232.500	49.214	55.147	-20.786	70.000	-5.933	PK
3			1647.500	48.822	55.021	-21.178	70.000	-6.199	PK
4			1648.000	45.368	51.570	-4.632	50.000	-6.202	AV
5			2112.000	45.455	48.820	-4.545	50.000	-3.365	AV
6			2112.500	48.300	51.662	-21.700	70.000	-3.362	PK
7			4945.000	50.219	47.514	-23.781	74.000	2.706	PK

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Note 2: The frequency (point 7) is the second harmonic of the fundamental frequency 2.4GHz and it was assessed by the RF rule EN 300 328.

Site: AC2	Time: 2016/12/11 - 18:20
Limit: EN55022_RE(3m)_Class B	Engineer: Milo Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: WIRELESS ACCESS POINT	Power: AC 230V/50Hz
Test Mode 2	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			1280.000	50.227	55.713	-19.773	70.000	-5.486	PK
2			1280.000	45.594	51.080	-4.406	50.000	-5.486	AV
3			1647.500	45.786	51.985	-24.214	70.000	-6.199	PK
4			1648.000	43.548	49.750	-6.452	50.000	-6.202	AV
5		*	2112.000	46.545	49.910	-3.455	50.000	-3.365	AV
6			2112.500	48.703	52.065	-21.297	70.000	-3.362	PK
7			4947.500	52.637	49.937	-21.363	74.000	2.701	PK

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

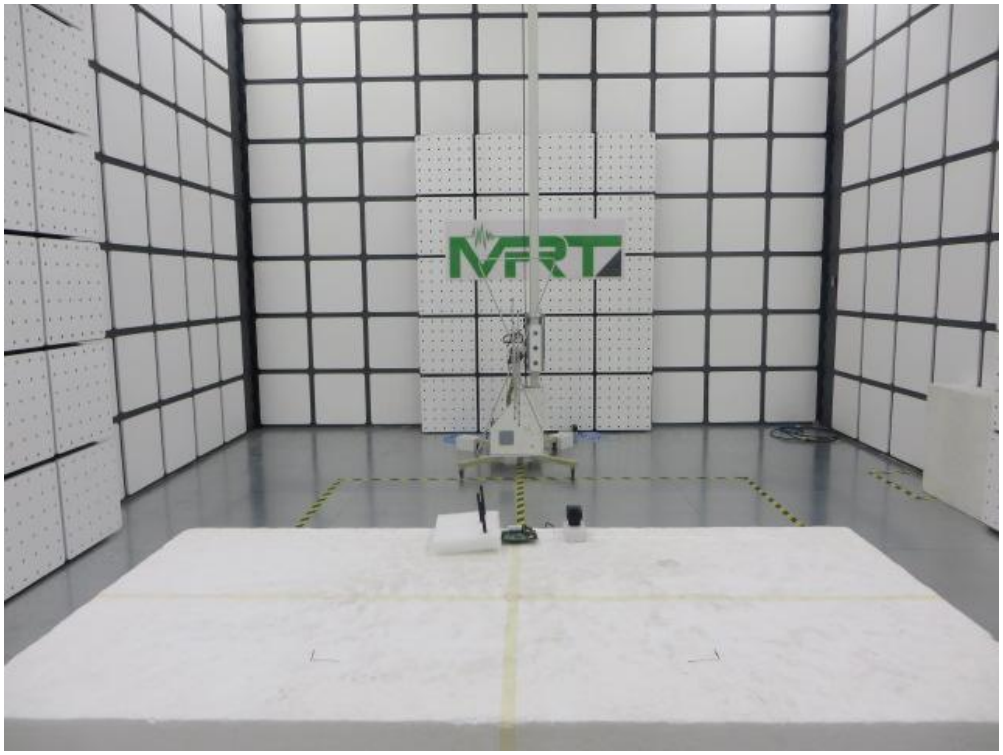
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB).

Note 2: The frequency (point 7) is the second harmonic of the fundamental frequency 2.4GHz and it was assessed by the RF rule EN 300 328.

5.5. Test Photograph

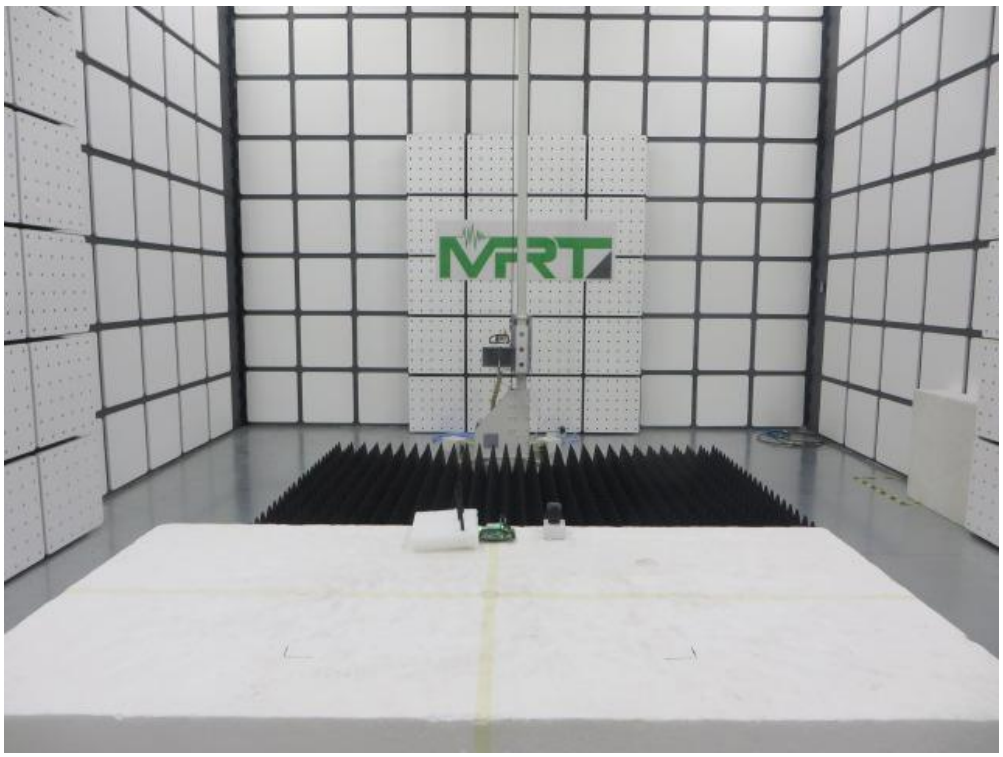
Test Mode: Mode 2

Description: Radiated Emission Test Setup (30MHz ~ 1GHz)



Test Mode: Mode 2

Description: Radiated Emission Test Setup (1GHz ~ 6GHz)



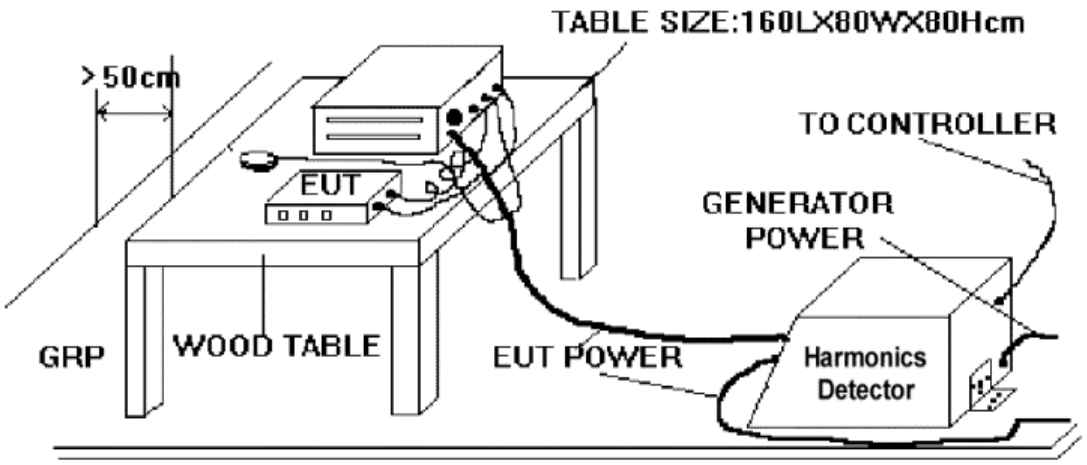
6. Harmonic Current Emissions

6.1. Limit of Harmonic Current Emissions

Limits of Class A Harmonics Currents

Harmonics Order n	Maximum Permissible harmonic current A	Harmonics Order n	Maximum Permissible harmonic current A
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 ≤ n ≤ 40	0.23 * 8/n
11	0.33	--	--
13	0.21	--	--
15 ≤ n ≤ 39	0.15 * 15/n	--	--

6.2. Test Setup



6.3. Test Procedure

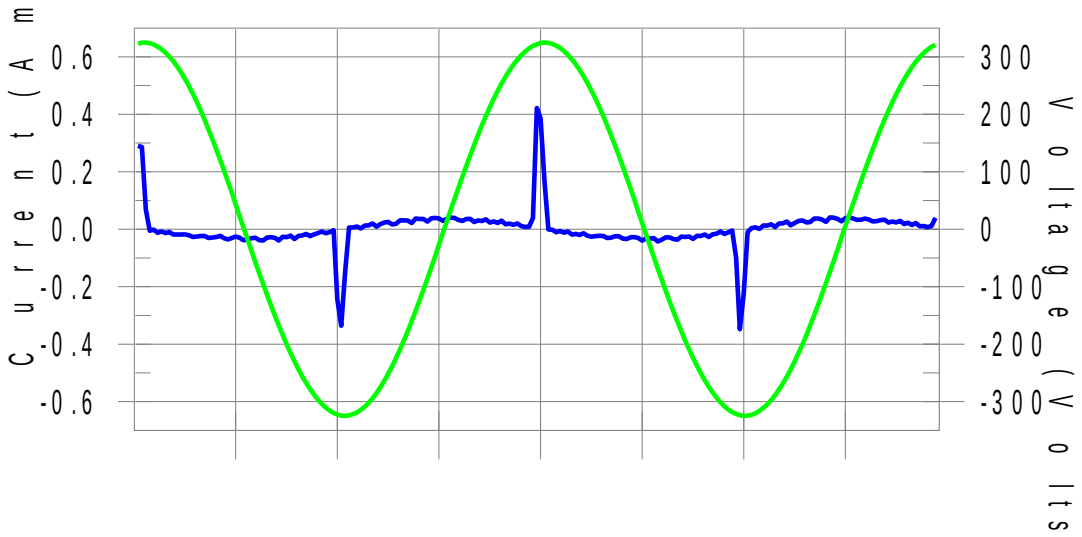
The EUT is supplied in series with power analyzer from a power source having the same normal voltage and frequency as the rated supply voltage and the equipment under test. And the rated voltage at the supply voltage of EUT of 0.98 times and 1.02 times shall be performed.

6.4. Test Result

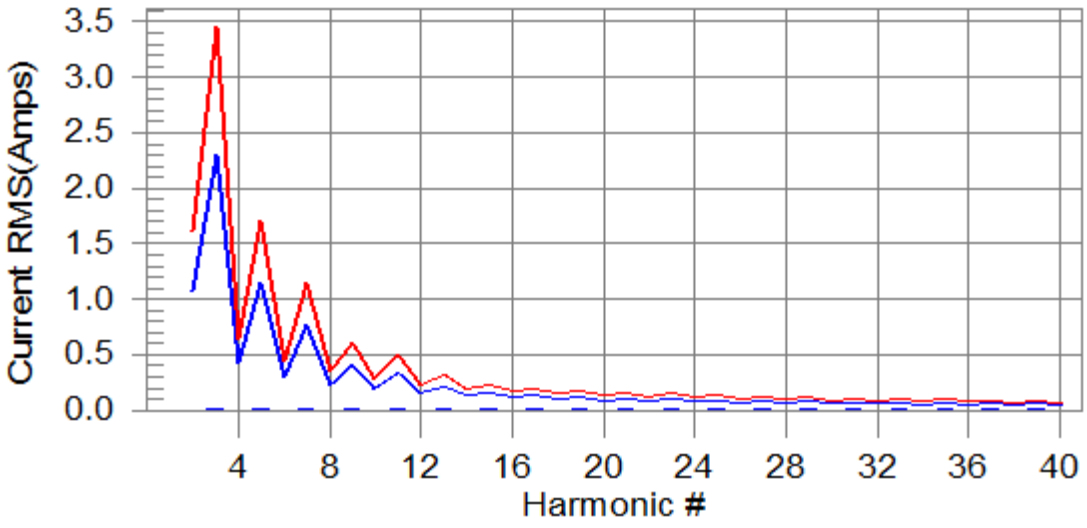
EUT	WIRELESS ACCESS POINT	Temperature	21°C
Test Engineer	Milo Li	Relative Humidity	52%
Test Mode	Mode 2	Date of Test	2016/11/15

Test Result: Pass **Source qualification: Normal**

Current & voltage waveforms



Harmonics and Class A limit line **European Limits**



Test result: Pass **Worst harmonic was #21 with 11.6% of the limit.**

Test Result: Pass **Source qualification: Normal**

THC(A): 0.057 **I-THD(%): 181.5** **POHC(A): 0.025** **POHC Limit(A): 0.251**

Highest parameter values during test:

V_RMS (Volts):	**229.81**	**Frequency(Hz):**	**50.00**
I_Peak (Amps):	**0.467**	**I_RMS (Amps):**	**0.076**
I_Fund (Amps):	**0.033**	**Crest Factor:**	**7.065**
Power (Watts):	**4.6**	**Power Factor:**	**0.313**

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	N/A	0.001	1.620	N/A	Pass
3	0.019	2.300	0.8	0.020	3.450	0.6	Pass
4	0.001	0.430	N/A	0.001	0.645	N/A	Pass
5	0.019	1.140	1.7	0.020	1.710	1.1	Pass
6	0.000	0.300	N/A	0.001	0.450	N/A	Pass
7	0.019	0.770	2.4	0.019	1.155	1.7	Pass
8	0.000	0.230	N/A	0.000	0.345	N/A	Pass
9	0.018	0.400	4.5	0.019	0.600	3.1	Pass
10	0.000	0.184	N/A	0.000	0.276	N/A	Pass
11	0.017	0.330	5.2	0.018	0.495	3.6	Pass
12	0.000	0.153	N/A	0.000	0.230	N/A	Pass
13	0.016	0.210	7.8	0.017	0.315	5.4	Pass
14	0.000	0.131	N/A	0.000	0.197	N/A	Pass
15	0.016	0.150	10.4	0.016	0.225	7.1	Pass
16	0.000	0.115	N/A	0.000	0.173	N/A	Pass
17	0.015	0.132	11.1	0.015	0.198	7.6	Pass
18	0.000	0.102	N/A	0.000	0.153	N/A	Pass
19	0.014	0.118	11.4	0.014	0.178	7.8	Pass
20	0.000	0.092	N/A	0.000	0.138	N/A	Pass
21	0.012	0.107	11.6	0.013	0.161	7.9	Pass
22	0.000	0.084	N/A	0.000	0.125	N/A	Pass
23	0.011	0.098	11.6	0.012	0.147	7.9	Pass
24	0.000	0.077	N/A	0.000	0.115	N/A	Pass
25	0.010	0.090	11.4	0.010	0.135	7.7	Pass
26	0.000	0.071	N/A	0.000	0.107	N/A	Pass
27	0.009	0.083	10.9	0.009	0.125	7.3	Pass
28	0.000	0.066	N/A	0.000	0.099	N/A	Pass
29	0.008	0.078	10.3	0.008	0.116	6.9	Pass
30	0.000	0.061	N/A	0.000	0.092	N/A	Pass
31	0.007	0.073	9.5	0.007	0.109	6.4	Pass
32	0.000	0.058	N/A	0.000	0.086	N/A	Pass
33	0.006	0.068	8.7	0.006	0.102	5.9	Pass
34	0.000	0.054	N/A	0.000	0.081	N/A	Pass
35	0.005	0.064	N/A	0.005	0.096	N/A	Pass
36	0.000	0.051	N/A	0.000	0.077	N/A	Pass
37	0.004	0.061	N/A	0.004	0.091	N/A	Pass
38	0.000	0.048	N/A	0.000	0.073	N/A	Pass
39	0.003	0.058	N/A	0.003	0.087	N/A	Pass
40	0.000	0.046	N/A	0.000	0.069	N/A	Pass

6.5. Test Photograph

Test Mode: Mode 2

Description: Voltage Fluctuation and Flicker Test Setup

7. Voltage Fluctuations and Flicker

7.1. Limit of Voltage Fluctuations and Flicker

The following limits apply:

- the value of P_{st} shall not be greater than 1.0;
- the value of P_{lt} shall not be greater than 0.65;
- the value of d(t) during a voltage change shall not exceed 3.3% for more than 500ms;
- the relative steady-state voltage change, d_c, shall not exceed 3.3%;
- the maximum relative voltage change, d_{max}, shall not exceed;

a) 4% without additional conditions;
b) 6% for equipment which is:

- switched manually, or
- switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

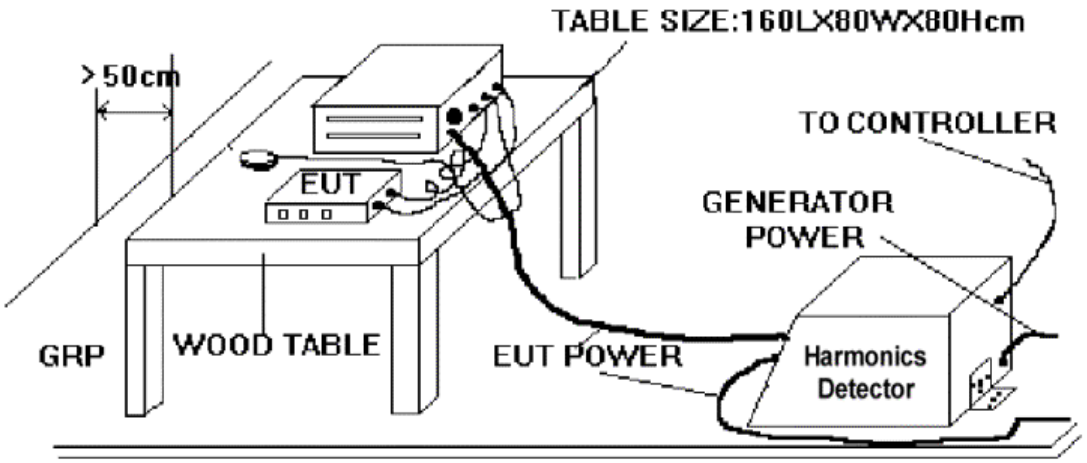
NOTE: The cycling frequency will be further limited by the P_{st} and P_{lt} limit.
For example: a d_{max} of 6% producing a rectangular voltage change characteristic twice per hour will give a P_{lt} of about 0.65.

c) 7% for equipment which is:

- attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
- switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

P_{st} and P_{1t} requirements shall not be applied to voltage changes caused by manual switching.

7.2. Test Setup



7.3. Test Procedure

The EUT is supplied in series with power analyzer from a power source having the same normal voltage and frequency as the rated supply voltage and the equipment under test. And the rated voltage at the supply voltage of EUT of 0.98 times and 1.02 times shall be performed.

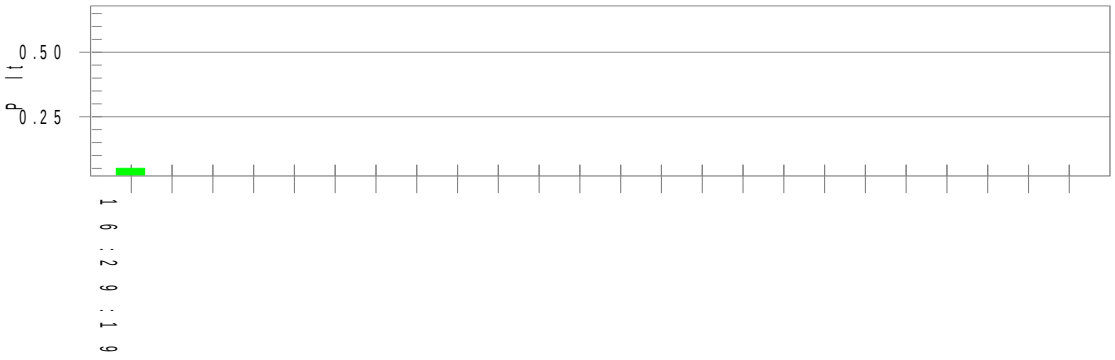
7.4. Test Result

EUT	WIRELESS ACCESS POINT	Temperature	21°C
Test Engineer	Milo Li	Relative Humidity	52%
Test Mode	Mode 2	Date of Test	2016/11/15

Test Result: Pass **Status: Test Completed**

Pst$_j$ and limit line **European Limits**

Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt):	**229.79**			
Highest dt (%):	**0.00**	**Test limit (%):**	**N/A**	**N/A**
T-max (mS):	**0**	**Test limit (mS):**	**500.0**	**Pass**
Highest dc (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Highest dmax (%):	**-0.04**	**Test limit (%):**	**4.00**	**Pass**
Highest Pst (10 min. period):	**0.115**	**Test limit:**	**1.000**	**Pass**
Highest Plt (2 hr. period):	**0.050**	**Test limit:**	**0.650**	**Pass**

7.5. Test Photograph

Test Mode: Mode 2

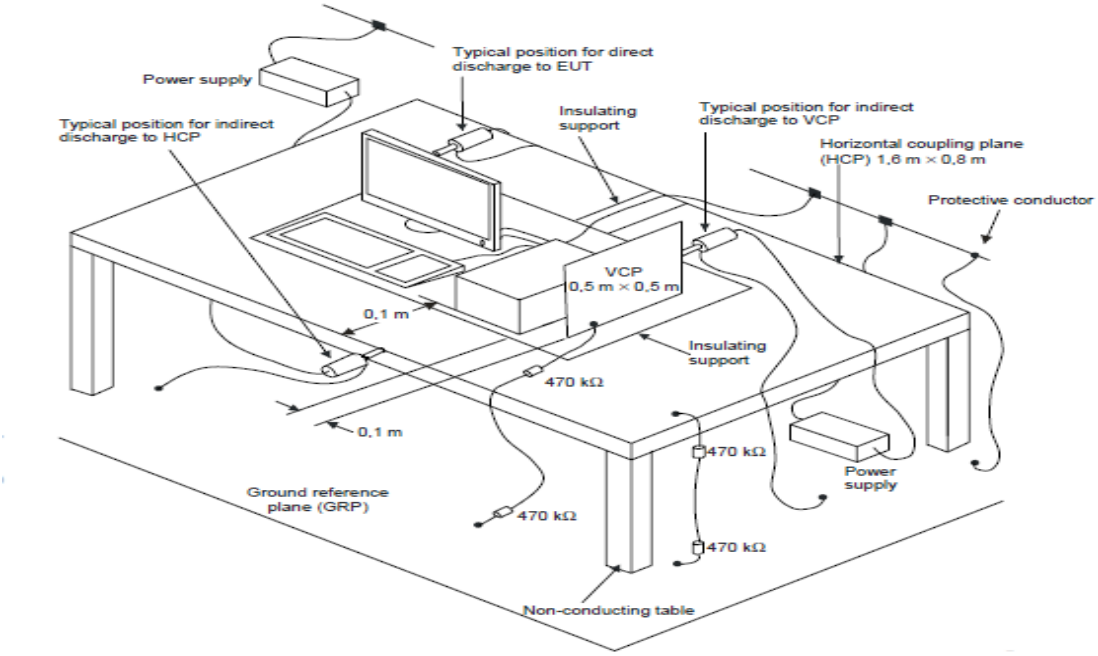
Description: Voltage Fluctuation and Flicker Test Setup

8. Electrostatic Discharge

8.1. Limit of Electrostatic Discharge

Environmental phenomenon	Test specification	Units	Performance criterion
Enclosure port			
Electrostatic discharge	±4 (Contact discharge) ±8 (Air discharge)	kV (Charge voltage) kV (Charge voltage)	A(TT, TR)

8.2. Test Setup



8.3. Test Procedure

Direct Application of Discharges to the EUT:

Contact discharge was applied only to conductive surfaces of the EUT.

Air discharges were applied only to non-conductive surfaces of the EUT.

During the test, it was performed with single discharges. For the single discharge time between successive single discharges will be keep longer 1 second. It was at least twenty-five single discharges with positive and negative at the same selected point.

The selected point, which was performed with electrostatic discharge, was marked on the red label of the EUT.

Indirect Application of Discharges to the EUT:

Vertical Coupling Plane (VCP):

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge. It was at least twenty-five single discharges with positive and negative at the same selected point.

Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge. It was at least twenty-five single discharges with positive and negative at the same selected point.

8.4. Test Result

EUT	WIRELESS ACCESS POINT	Temperature	22°C
Test Engineer	Polly Zong	Relative Humidity	53%
Test Mode	Mode 1	Date of Test	2016/12/10

Indirect Application		Test Result	
Test Location	Test Level	Horizontal Coupling	Vertical Coupling
Front, Rear Left, Right	±4kV	Pass	Pass

Note: There is no any degradation of performance and function, and the test result is A.

EUT	WIRELESS ACCESS POINT	Temperature	22°C
Test Engineer	Polly Zong	Relative Humidity	53%
Test Mode	Mode 2	Date of Test	2016/11/16

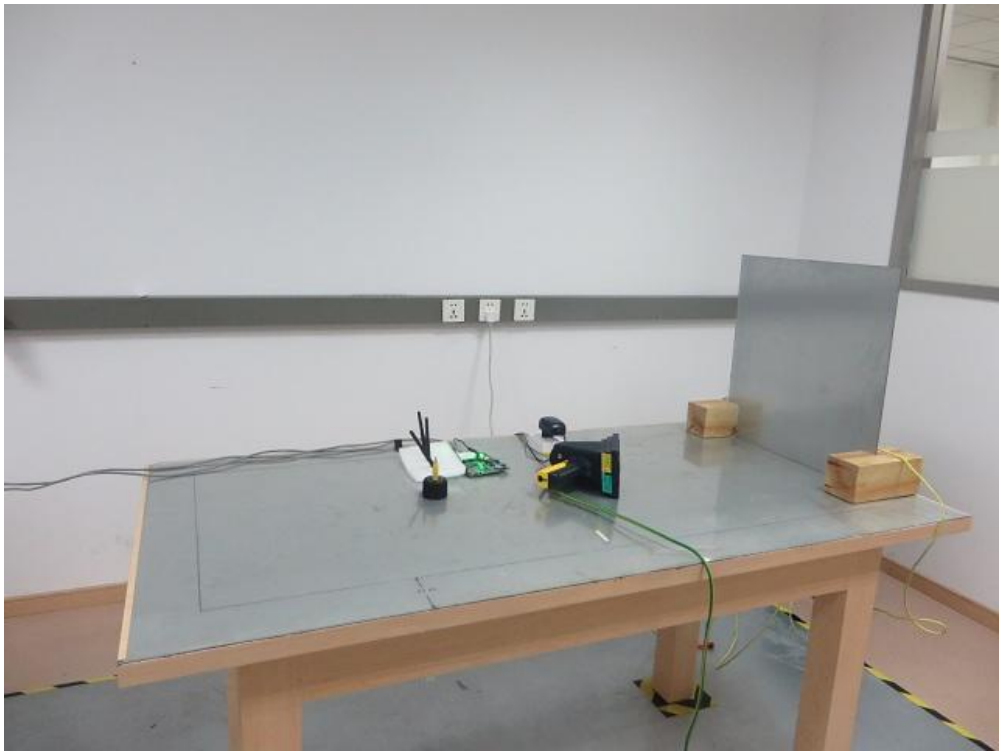
Indirect Application		Test Result	
Test Location	Test Level	Horizontal Coupling	Vertical Coupling
Front, Rear Left, Right	±4kV	Pass	Pass

Note: The EUT performance complied with performance criteria for TT & TR to MS Function and there is no any degradation of performance and function.

8.5. Test Photograph

Test Mode: Mode 1 & 2

Description: Electrostatic Discharge Test Setup

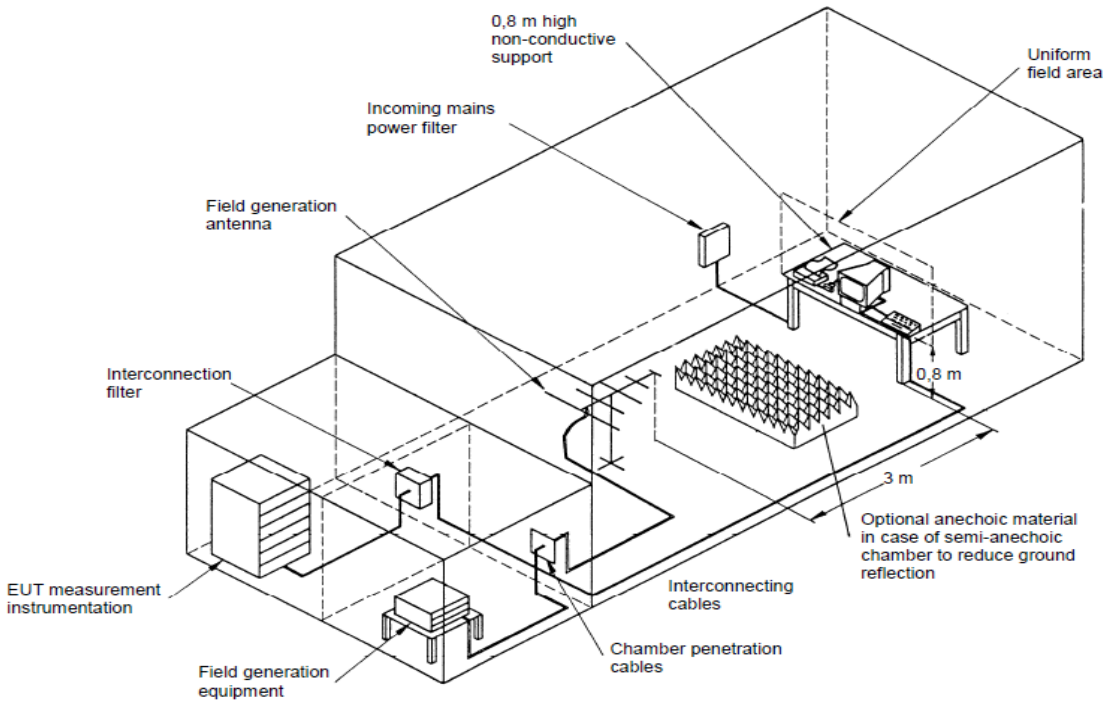


9. Radio-Frequency Electromagnetic Field

9.1. Limit of Radio-Frequency Electromagnetic Field

Environmental phenomenon	Test specification	Units	Performance criterion
Enclosure port			
Radio frequency electromagnetic field	80 - 1000, 1400 - 2700 3 80	MHz V/m (unmodulated, r.m.s) % AM (1kHz)	A(CT, CR)
Note 1: If the wanted signal is modulated at 1000Hz, then an audio signal of 400Hz shall be used. Note 2: The test shall be performed over the frequency range 80MHz to 1000MHz and 1400MHz to 2700MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers [see clause 4 of EN 301 489-1 V1.9.2 (2010-09)], as appropriate.			

9.2. Test Setup



9.3. Test Procedure

The EUT and load, which are placed on a table that is 0.8 meter above ground, are placed with one coincident with the calibration plane such that the distance from antenna to the EUT was 3 meters. Both horizontal and vertical polarization of the antenna and four sides of the EUT are set on measurement.

All the scanning conditions are as follows:

	Condition of Test	Remarks
1.	Field Strength	3V/m
2.	Radiated Signal	AM 80% Modulated with 1kHz
3.	Scanning Frequency	80MHz - 1000MHz, 1.4GHz - 2.7GHz
4	Dwell Time	3 Seconds
5.	Frequency Step Size Δf	1% and 10%

9.4. Test Result

EUT	WIRELESS ACCESS POINT	Temperature	22°C
Test Engineer	Lewis Huang	Relative Humidity	50%
Test Mode	Mode 1	Date of Test	2016/12/10

Frequency (MHz)	Polarity	Test Position	Field Strength (V/m)	Test Result
80 - 1000	Horizontal/Vertical	Front	3	Pass
		Rear		Pass
		Left		Pass
		Right		Pass
		Top		Pass
		Bottom		Pass
1400 - 2700	Horizontal/Vertical	Front	3	Pass
		Rear		Pass
		Left		Pass
		Right		Pass
		Top		Pass
		Bottom		Pass

Note: There is no any degradation of performance and function, and the test result is A.

EUT	WIRELESS ACCESS POINT	Temperature	22°C
Test Engineer	Lewis Huang	Relative Humidity	50%
Test Mode	Mode 2	Date of Test	2016/11/15

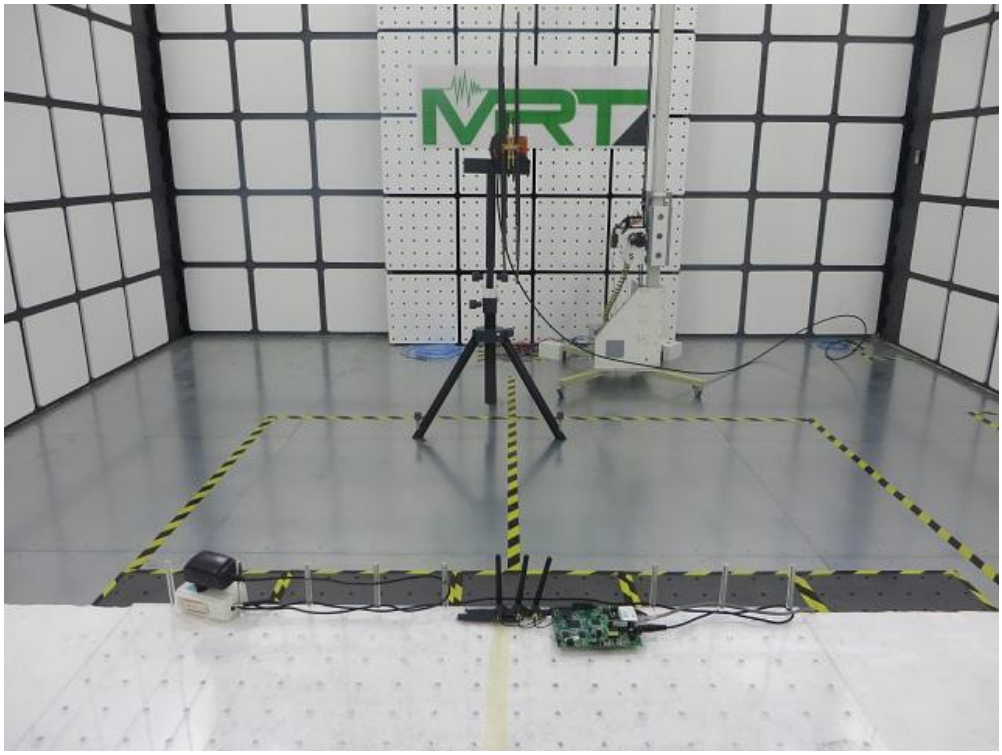
Frequency (MHz)	Polarity	Test Position	Field Strength (V/m)	Test Result
80 - 1000	Horizontal/Vertical	Front	3	Pass
		Rear		Pass
		Left		Pass
		Right		Pass
		Top		Pass
		Bottom		Pass
1400 - 2700	Horizontal/Vertical	Front	3	Pass
		Rear		Pass
		Left		Pass
		Right		Pass
		Top		Pass
		Bottom		Pass

Note: The EUT performance complied with performance criteria for CT & CR to MS Function and there is no any degradation of performance and function.

9.5. Test Photograph

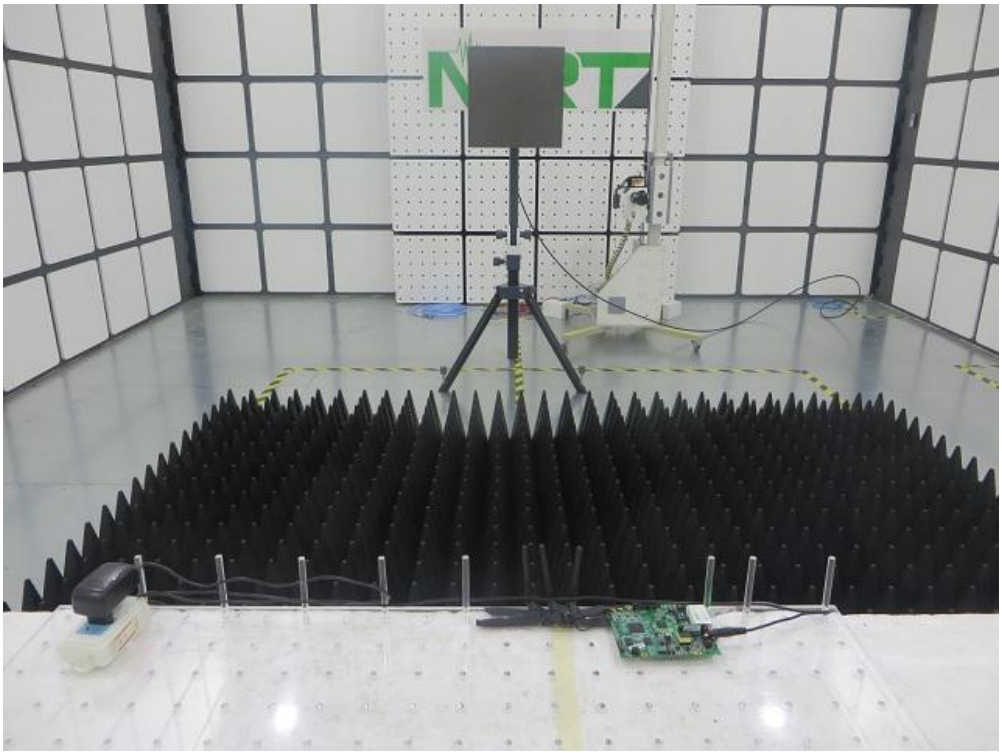
Test Mode: Mode 1 & 2

Description: Radio-Frequency Electromagnetic Field Test Setup (80-1000MHz)



Test Mode: Mode 1 & 2

Description: Radio-Frequency Electromagnetic Field Test Setup (1400-2700MHz)

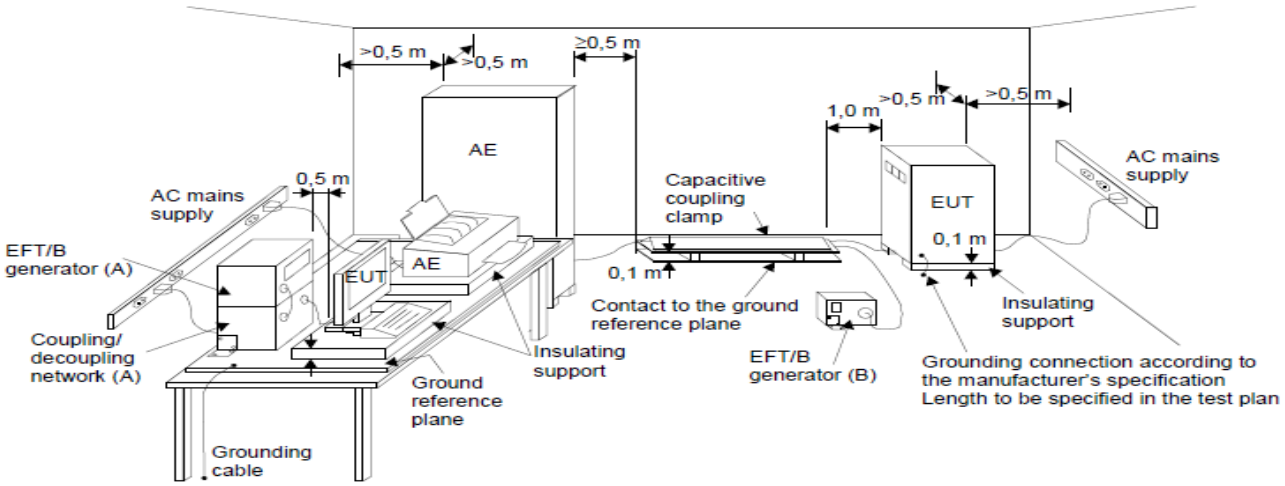


10. Electrical Fast Transients

10.1. Limit of Electrical Fast Transients

Environmental Phenomenon	Test Specification	Units	Performance Criterion
Input AC power ports			
Electrical fast transients	±1 5/50 5	kV (open circuit test voltage) Tr/Th (ns) Repetition frequency (kHz)	B(TT, TR)
Signal ports, telecommunication ports, and control ports (See Note)			
Fast transients common mode	±0.5 5/50 5	kV (peak) Tr/Th ns Repetition frequency (kHz)	B(TT, TR)
Note: This test shall be additionally performed on signal ports, telecommunication ports, control ports, and DC power ports, of radio equipment and associated ancillary equipment, if the cables may be longer than 3m.			

10.2. Test Setup



10.3. Test Procedure

The EUT is placed on a table that is 0.8 meter height. A ground reference plane is placed on the table, and uses a 0.1m insulation between the EUT and ground reference plane.

The minimum area of the ground reference plane is 1m*1m, and 0.65mm thick min, and projected beyond the EUT by at least 0.1m on all sides.

For input AC power ports:

The EUT is connected to the power mains through a coupling device that directly couples the EFT/B interference signal.

Each of the line conductors is impressed with burst noise for 1 minute.

The length of the power lines between the coupling device and the EUT is 0.5m.

For Signal Ports, Telecommunication Ports, and Control Ports:

The EFT interference signal is through a coupling clamp device couples to the signal of the EUT with burst noise for 1 minute.

The length of the signal lines between the coupling device and the EUT is 0.5m.

10.4. Test Result

EUT	WIRELESS ACCESS POINT	Temperature	20°C
Test Engineer	Polly Zong	Relative Humidity	48%
Test Mode	Mode 1	Date of Test	2016/12/10

Inject Line	Polarity	Test Level (kV)	Test Duration (second)	Inject Method	Observation	Result
L	+	1	60	Direct	Note	Pass
L	-	1	60	Direct	Note	Pass
N	+	1	60	Direct	Note	Pass
N	-	1	60	Direct	Note	Pass
L+N	+	1	60	Direct	Note	Pass
L+N	-	1	60	Direct	Note	Pass
LAN Port	+	0.5	60	Clamp	Note	Pass
LAN Port	-	0.5	60	Clamp	Note	Pass

Note: There is no any degradation of performance and function, and the test result is A.

EUT	WIRELESS ACCESS POINT	Temperature	20°C
Test Engineer	Polly Zong	Relative Humidity	48%
Test Mode	Mode 2	Date of Test	2016/11/14

Inject Line	Polarity	Test Level (kV)	Test Duration (second)	Inject Method	Observation	Result
L	+	1	60	Direct	Note	Pass
L	-	1	60	Direct	Note	Pass
N	+	1	60	Direct	Note	Pass
N	-	1	60	Direct	Note	Pass
L+N	+	1	60	Direct	Note	Pass
L+N	-	1	60	Direct	Note	Pass
LAN Port	+	0.5	60	Clamp	Note	Pass
LAN Port	-	0.5	60	Clamp	Note	Pass

Note: The EUT performance complied with performance criteria for TT&TR to MS Function and there is no any unintentional transmission.

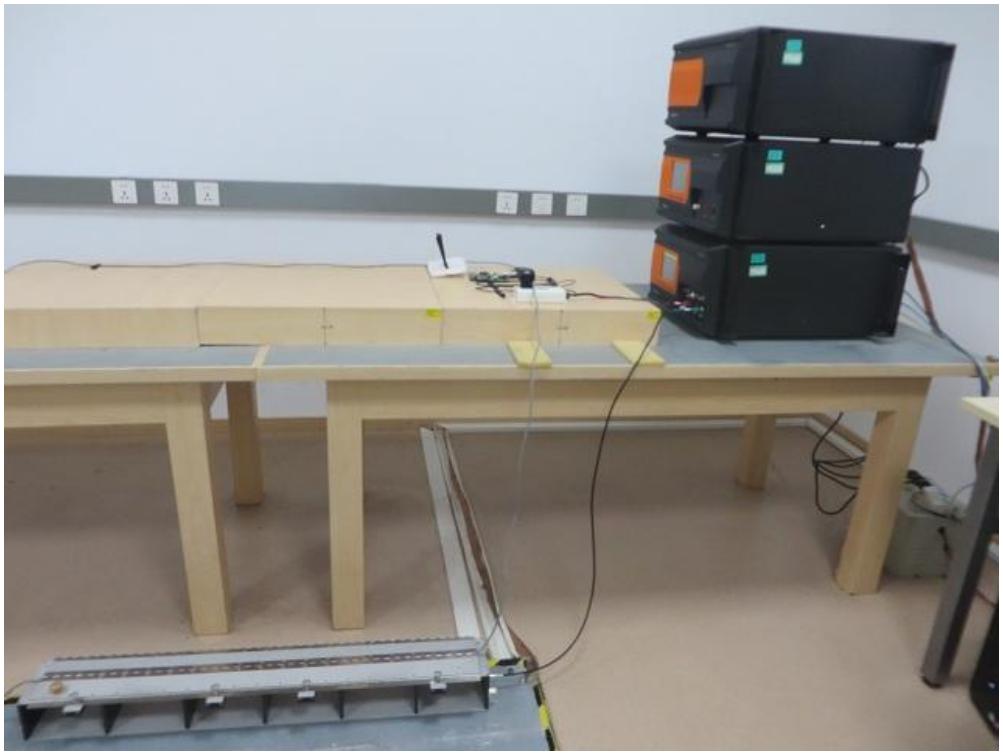
10.5. Test Photograph

Test Mode: Mode 1 & 2

Description: Electrical Fast Transients Test Setup for Power Port

Test Mode: Mode 1 & 2

Description: Electrical Fast Transients Test Setup for LAN Port

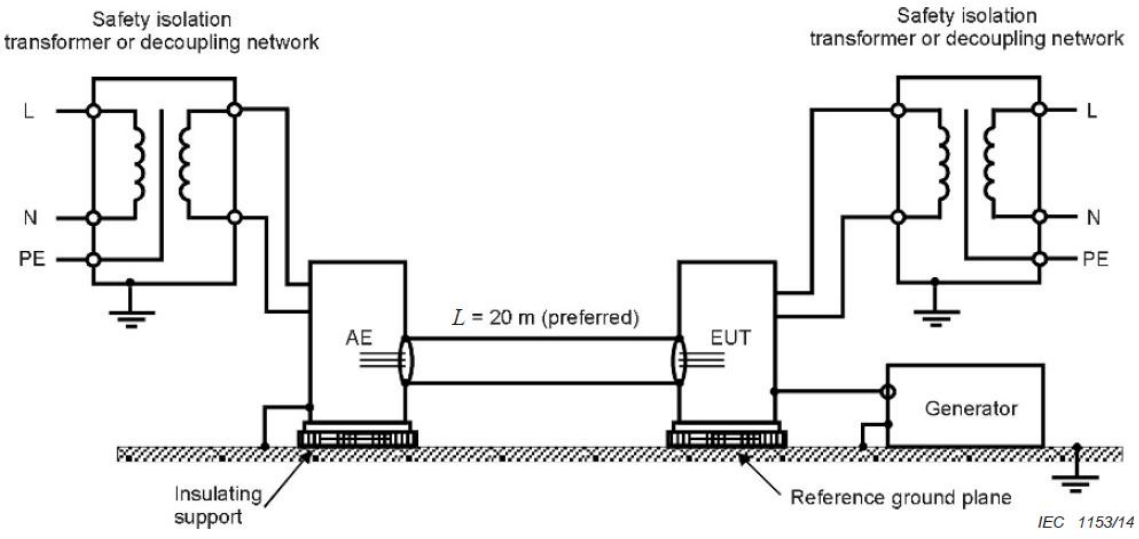


11. Surges

11.1. Limit of Surges

Environmental phenomenon	Test specification	Units	Performance criterion
Input AC power ports (See Note 1)			
Surges	1.2/50 (8/20) ±1 line to line ±2 line to earth	Tr/Th (us) kV (open circuit test voltage) kV (open circuit test voltage)	B(TT, TR)
Telecommunication ports directly connected to indoor cables (See Note 1 and 2)			
Surges	1.2/50 (8/20) 0.5 line to ground	Tr/Th us kV (peak)	B(TT, TR)
Note 1: Where normal functioning cannot be achieved because of the impact of the CDN on the EUT, no test shall be required. Note 2: The test level for telecommunication ports, intended to be connected to indoor cables (longer than 10m) shall be 0.5kV line to ground.			

11.2. Test Setup



11.3. Test Procedure

The EUT is placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m minimum and 0.65mm thick minimum and projected beyond the EUT by at least 0.1m on all sides. The length of power cord between the coupling device and the EUT shall be 2m or less.

For input AC Power Ports:

The EUT is connected to the power mains through a coupling device that directly couples the surge interference signal.

The surge noise shall be applied synchronized to the voltage phase at 0^0, 90^0, 180^0, 270^0 and the peak value of the AC voltage wave. (Positive and negative)

Each of Line to Earth and Line to Line is impressed with a sequence of five surge voltages with interval of 1 minute.

For Telecommunication Ports:

The signal line of EUT is connected to coupling and decoupling network that directly couples the surge interference signal.

Only Line to ground is impressed with a sequence of five surge voltages with interval of 1 minute.

11.4. Test Result

EUT	WIRELESS ACCESS POINT	Temperature	20°C
Test Engineer	Polly Zong	Relative Humidity	48%
Test Mode	Mode 1	Date of Test	2016/12/10

Inject Line	Polarity	Angle (degree)	Test Level (kV)	Test Interval (second)	Observation	Result
L+N	+	0	0.5 & 1	60	Note	Pass
L+N	-	0	0.5 & 1	60	Note	Pass
L+N	+	90	0.5 & 1	60	Note	Pass
L+N	-	90	0.5 & 1	60	Note	Pass
L+N	+	180	0.5 & 1	60	Note	Pass
L+N	-	180	0.5 & 1	60	Note	Pass
L+N	+	270	0.5 & 1	60	Note	Pass
L+N	-	270	0.5 & 1	60	Note	Pass
LAN Cable (Line to Ground)	+	N/A	0.5	60	Note	Pass
LAN Cable (Line to Ground)	-	N/A	0.5	60	Note	Pass

Note: There is no any degradation of performance and function, and the test result is A.

EUT	WIRELESS ACCESS POINT	Temperature	20°C
Test Engineer	Polly Zong	Relative Humidity	48%
Test Mode	Mode 2	Date of Test	2016/11/14

Inject Line	Polarity	Angle (degree)	Test Level (kV)	Test Interval (second)	Observation	Result
L+N	+	0	0.5 & 1	60	Note	Pass
L+N	-	0	0.5 & 1	60	Note	Pass
L+N	+	90	0.5 & 1	60	Note	Pass
L+N	-	90	0.5 & 1	60	Note	Pass
L+N	+	180	0.5 & 1	60	Note	Pass
L+N	-	180	0.5 & 1	60	Note	Pass
L+N	+	270	0.5 & 1	60	Note	Pass
L+N	-	270	0.5 & 1	60	Note	Pass
LAN Cable (Line to Ground)	+	N/A	0.5	60	Note	Pass
LAN Cable (Line to Ground)	-	N/A	0.5	60	Note	Pass

Note: The EUT performance complied with performance criteria for TT&TR to MS Function and there is no any unintentional transmission.

11.5. Test Photograph

Test Mode: Mode 1 & 2

Description: Surge Test Setup for Power Port

Test Mode: Mode 1 & 2

Description: Surge Test Setup for LAN Port

12. Radio-Frequency Common Mode

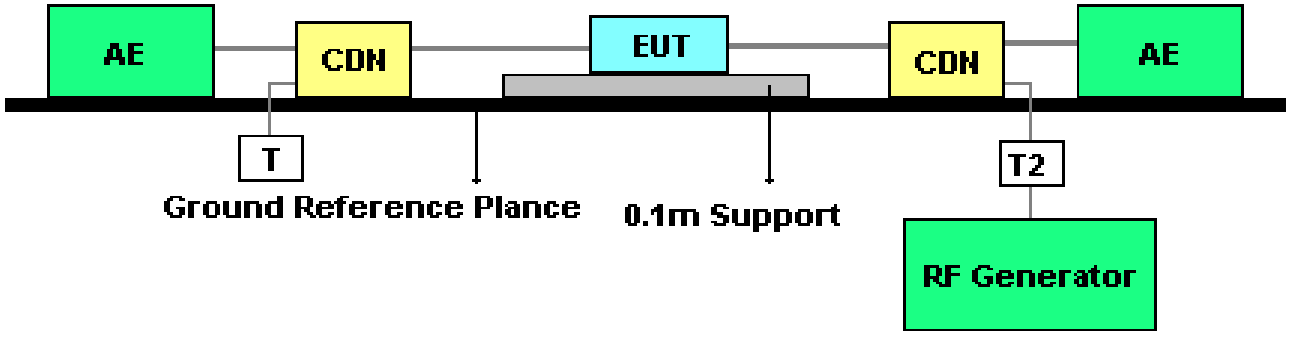
12.1. Limit of Radio-Frequency Common Mode

Environmental phenomenon	Test specification	Units	Performance criterion
Input AC power ports (See Note 1 and 2)			
Radio-frequency common mode	0.15 - 80 3 80 1 & 10	MHz V (unmodulated, r.m.s) % AM (1kHz) Frequency Step Size Δf %	A(CT, CR)
Signal ports, telecommunication ports, and control ports (See Note 1, 2 and 3)			
Radio frequency common mode	0.15 - 80 3 80 1 & 10	MHz V (unmodulated, r.m.s) % AM (1kHz) Frequency Step Size Δf %	A(CT, CR)
NOTE 1: If the wanted signal is modulated at 1000Hz, then an audio signal of 400Hz shall be used. NOTE 2: The test shall be performed over the frequency range 150kHz to 80MHz with the exception of the exclusion band for transmitters, and for receivers and duplex transceivers [see clause 4 of EN 301 489-1 V1.9.2 (2011-09)]. NOTE 3: This test shall be additionally performed on signal ports, telecommunication ports, control ports, and DC power ports, of radio equipment and associated ancillary equipment, if the cables may be longer than 3m.			

12.2. Test Setup

CDN Test Setup

T : 50 ohm
T2: Power attenuator(6dB)



12.3. Test Procedure

The EUT is placed on a table that is 0.8 meter height, and a ground reference plane on the table, EUT is placed upon table and use 0.1m insulation between the EUT and ground reference plane.

For input AC power ports:

The EUT is connected to the power mains through a coupling and decoupling networks for power supply lines. And directly couples the Disturbances signal into EUT.

For Signal Ports, Telecommunication Ports, and Control Ports:

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

	Condition of Test	Remarks
1.	Field Strength	3V
2.	Radiated Signal	AM 80% Modulated with 1kHz
3.	Scanning Frequency	0.15 - 80MHz
4	Dwell Time	3 Seconds
5.	Frequency Step Size Δf	1%, 10%

12.4. Test Result

EUT	WIRELESS ACCESS POINT	Temperature	20°C
Test Engineer	Polly Zong	Relative Humidity	48%
Test Mode	Mode 1	Date of Test	2016/12/10

Frequency (MHz)	Inject Voltage (V)	Inject Ports	Inject Method	Observation	Result
0.15 - 80	3	AC Mains	CDN	Note	Pass
0.15 - 80	3	LAN Port	CDN	Note	Pass

Note: There is no any degradation of performance and function, and the test result is A.

EUT	WIRELESS ACCESS POINT	Temperature	20°C
Test Engineer	Polly Zong	Relative Humidity	48%
Test Mode	Mode 2	Date of Test	2016/11/14

Frequency (MHz)	Inject Voltage (V)	Inject Ports	Inject Method	Observation	Result
0.15 - 80	3	AC Mains	CDN	Note	Pass
0.15 - 80	3	LAN Port	CDN	Note	Pass

Note: The EUT performance complied with performance criteria for CT&CR to MS Function and there is no any unintentional transmission.

12.5. Test Photograph

Test Mode: Mode 1 & 2

Description: Radio-frequency Common Mode Test Setup for Power Port

Test Mode: Mode 1 & 2

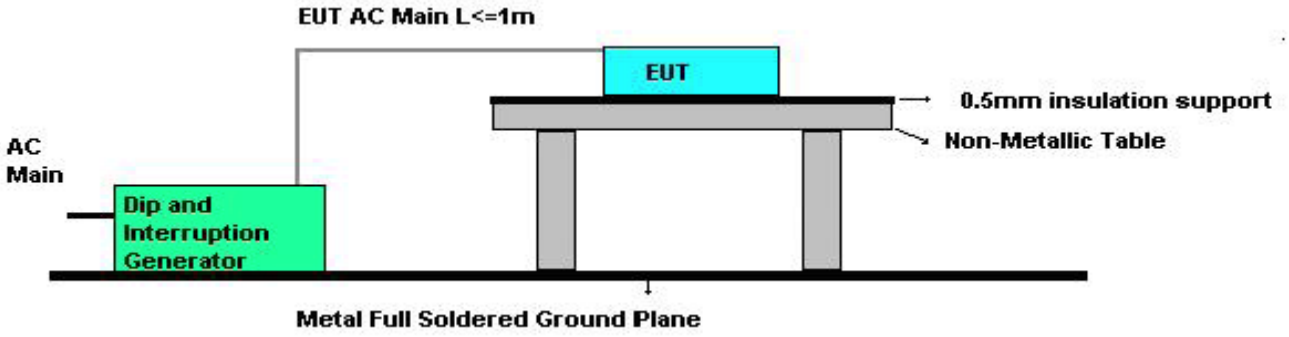
Description: Radio-frequency Common Mode Test Setup for LAN Port

13. Voltage Dips and Interruptions

13.1. Limit of Voltage Dips and Interruptions

Environmental phenomenon	Test specification	Units	Performance criterion
Input AC power ports			
Voltage dips	0 0.5	% residual cycle	B(TT, TR)
	0 1	% residual cycle	B(TT, TR)
	70 25	% residual cycle	C(TT, TR)
Voltage interruptions	0 250	% residual cycle	C(TT, TR)

13.2. Test Setup



13.3. Test Procedure

The EUT is placed on a table which is 0.8 meter above a metal ground plane measured 1m*1m minimum, and 0.65mm thick minimum, and projected beyond the EUT by at least 0.1m on all sides.
The power cord shall be used the shortest power cord as specified by the manufacturer.
For Voltage dips and interruptions test:
The selection of test voltage is based on the rated power range. If the operation range is large than 20% of lower power range, both end of specified voltage shall be tested. Otherwise, the typical voltage specification is selected as test voltage.
The EUT is connected to the power mains through a coupling device that directly couples to the voltage dips and interruption generator.

13.4. Test Result

EUT	WIRELESS ACCESS POINT	Temperature	20°C
Test Engineer	Polly Zong	Relative Humidity	48%
Test Mode	Mode 1	Date of Test	2016/12/10

Voltage % Residual	Test Duration (ms)	Observation	Result
0	10	Note 1	Pass
0	20	Note 1	Pass
70	500	Note 1	Pass
0	5000	Note 1, 2	Pass

Note 1: There is no any degradation of performance and function, and the test result is A.

EUT	WIRELESS ACCESS POINT	Temperature	20°C
Test Engineer	Polly Zong	Relative Humidity	48%
Test Mode	Mode 2	Date of Test	2016/11/14

Voltage % Residual	Test Duration (ms)	Observation	Result
0	10	Note 1	Pass
0	20	Note 1	Pass
70	500	Note 1	Pass
0	5000	Note 1, 2	Pass

Note 1: The EUT performance complied with performance criteria for TT&TR to MS Function.

Note 2: The power consumption of EUT has shut down during the test, but self-recoverable after the test.

13.5. Test Photograph

Test Mode: Mode 1 & 2

Description: Voltage Dips and Interruptions Test Setup

14. Uncertainty Measurement

Conducted Emission - SR2
The maximum measurement uncertainty is evaluated as: 9kHz~150kHz: ±3.84dB 150kHz~30MHz: ±3.46dB
Radiated Disturbance - AC2
The maximum measurement uncertainty is evaluated as: Horizontal: 30MHz~300MHz: ±4.07dB 300MHz~1GHz: ±3.63 dB Vertical: 30MHz~300MHz: ±4.18 dB 300MHz~1GHz: ±3.60 dB
Radiated Disturbance - AC2
The maximum measurement uncertainty is evaluated as: Horizontal: 1GHz~18GHz: ±4.16 dB Vertical: 1GHz~18GHz: ±4.76 dB
Harmonic Current Emissions - SR2
The maximum measurement uncertainty is evaluated as ±0.2%.
Voltage Fluctuation and Flicker - SR2
The maximum measurement uncertainty is evaluated as d_c and d_{max}: ±0.095%, P_{st} and P_{lt}: ±4%, $d_{(t)}$: ±1.5%.

15. List of Measuring Instrument

Conducted Emission - SR2

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	102030	1 year	2017/05/08
Two-Line V-Network	R&S	ENV216	101683	1 year	2017/06/21
Two-Line V-Network	R&S	ENV216	101684	1 year	2017/06/21
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2016/12/20
Shielding Anechoic Chamber	MIX-BEP	Chamber-SR2	N/A	1 year	2017/05/10

Radiated Disturbance - AC2

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
MXE EMI Receiver	Agilent	N9038A	MY51210182	1 year	2017/08/03
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MY52090106	1 year	2016/12/11
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2017/10/22
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	1457	1 year	2017/11/19
Digitial Thermometer & Hygrometer	Minggao	ETH529	N/A	1 year	2016/11/29
Anechoic Chamber	RIKEN	Chamber-AC2	N/A	1 year	2017/05/10

Harmonic Current Emissions - SR2

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Power Analyzer	California	PACS-1	1344A01096	1 year	2017/01/21
AC Power Source	California	3001iX	1344A01096	1 year	2017/01/21
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2016/12/19
Shielding Anechoic Chamber	Mikebang	Chamber-SR2	N/A	1 year	2017/05/10

Voltage Fluctuation and Flicker - SR2

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Power Analyzer	California	PACS-1	1344A01096	1 year	2017/01/21
AC Power Source	California	3001iX	1344A01096	1 year	2017/01/21
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2016/12/19
Shielding Anechoic Chamber	Mikebang	Chamber-SR2	N/A	1 year	2017/05/10

Electrostatic Discharge - TR2

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
ESD Simulator	Teseq GmbH	NSG 435	6753	1 year	2017/11/15
Barometer	BaoPing	DYM3	13061925	1 year	2017/11/15
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2016/12/19

Radio-Frequency Electromagnetic Field - AC2

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Signal Generator	Agilent	E4438C	MY49071305	1 year	2016/12/07
EPM Series Power Meter	Agilent	E4418B	GB40518318	1 year	2017/06/26
Power Sensor	Agilent	E9301H	MY41495633	1 year	2017/06/26
Power Amplifier	AR	150W1000M1	0344209	N/A	N/A
Power Amplifier	AR	40S1G4	0424706	N/A	N/A
High-Gain Horn Antenna	AR	ATH800M5GA	0343837	N/A	N/A
Log-Periodic Antenna	AR	ATR80M6G	0347701	N/A	N/A
Digitial Thermometer & Hygrometer	Minggao	ETH529	N/A	1 year	2016/11/29
Anechoic Chamber	RIKEN	Chamber-AC2	N/A	1 year	2017/05/10

Electrical Fast Transients - TR1

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Compact Immunity Test System	3cTest	CCS 600	ES0801302	1 year	2017/06/20
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2016/12/19

Surges - TR1

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Compact Immunity Test System	3cTest	CCS 600	ES0801302	1 year	2017/06/20
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2016/12/19

Radio-Frequency Common Mode - TR1

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Conducted Immunity Tester	Frankonia	CIT-10/75	126B1227/2012	1 year	2017/06/20
CDN	Frankonia	CDN M2+M3	A2210241/2013	1 year	2017/06/20
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2016/12/20

Voltage Dips and Interruptions - TR1

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Compact Immunity Test System	3cTest	CCS 600	ES0801302	1 year	2017/06/20
CDN	3cTest	VMT 2612S	ES0441301	1 year	2017/06/20
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2016/12/20

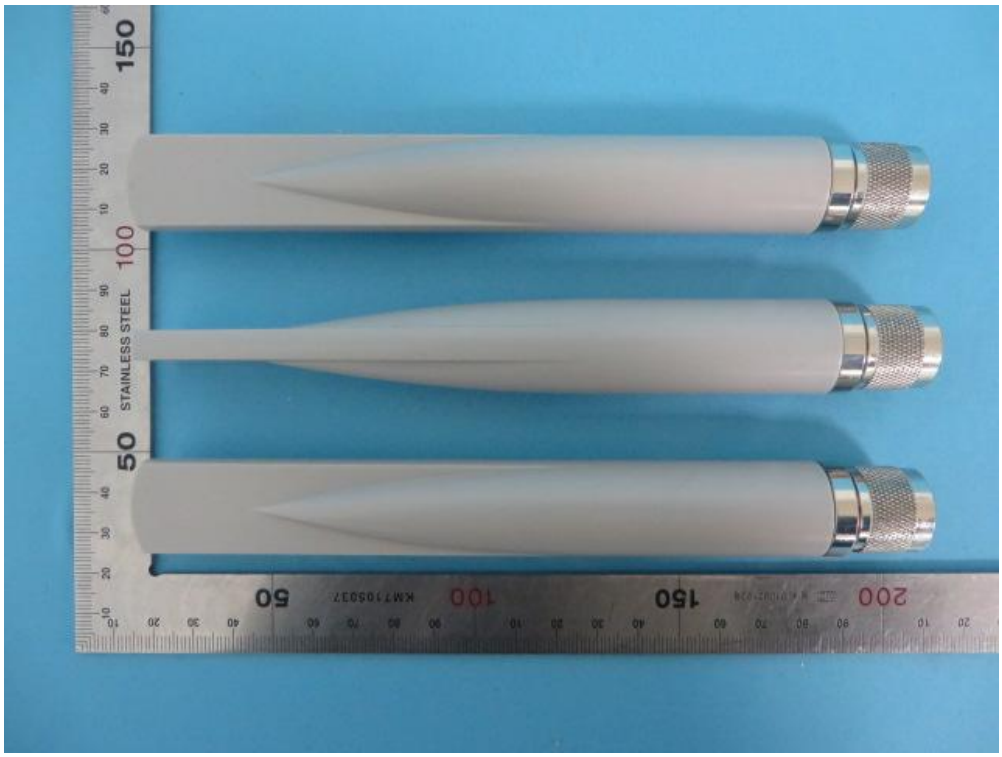
Software	**Version**	**Function**
e3	v 8.3.5	EMI Test Software
Compliance Test System	v 4.6.2	Harmonic & Flicker
JS32-RS	v 1.0.0.1	RS Test Software
EN61000-4-6	v 1.1.2	CS Test Software

16. Appendix - EUT Photograph

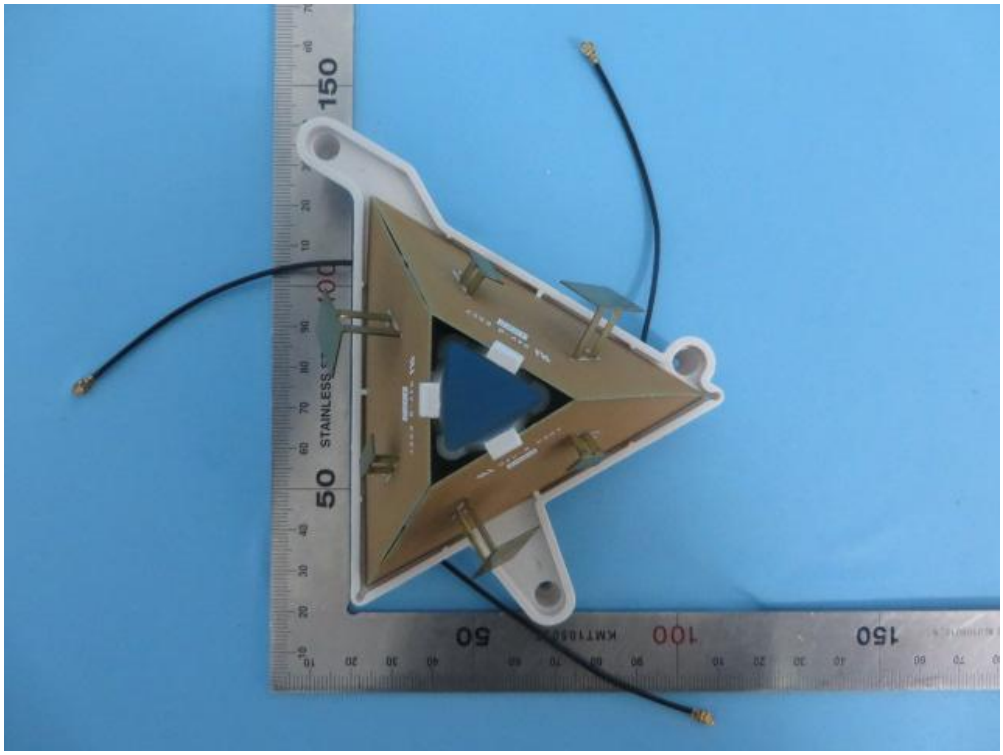
(1) EUT Photo

(2) EUT Photo

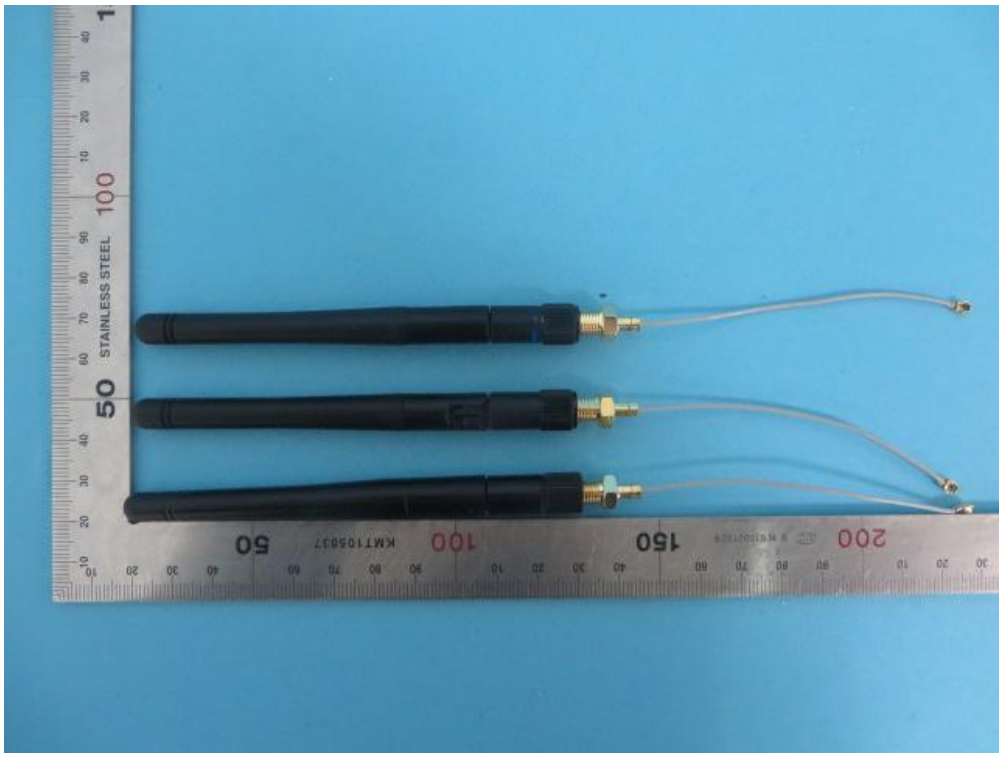
(3) EUT Photo (Panel Antenna, Gain = 4.5dBi)



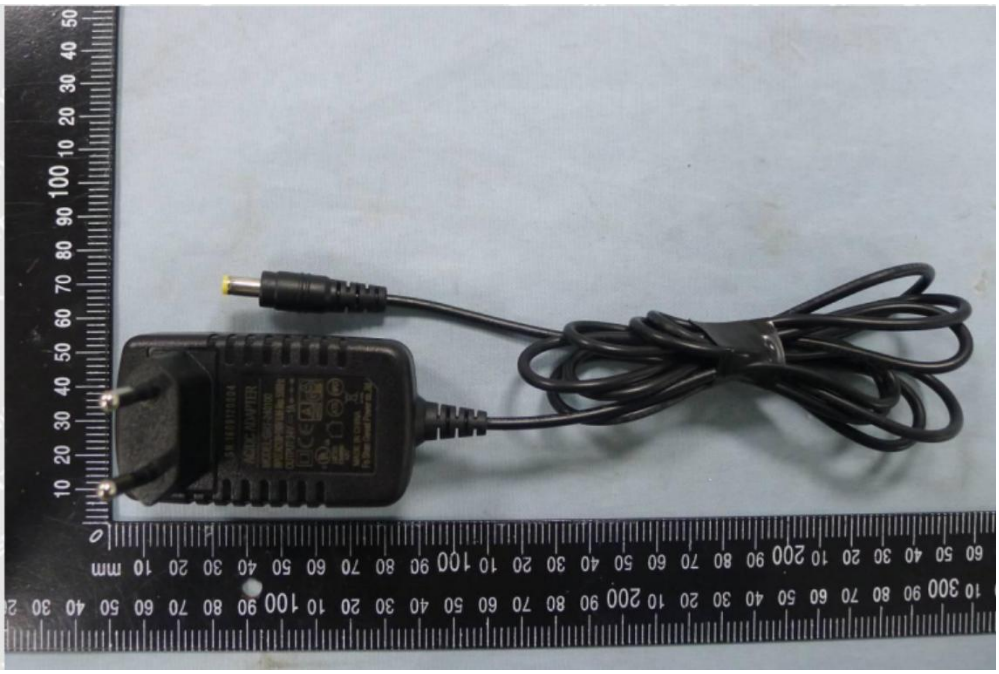
(4) EUT Photo (Panel Antenna, Gain = 4.0dBi)



(5) EUT Photo (Dipole Antenna, Gain = 2.0dBi)



(6) EUT Photo



The End