
EMC Test Report

Report No.: AGC09377170502EE01

PRODUCT DESIGNATION : Tablet PC
BRAND NAME : Vonino
MODEL NAME : Navo S
CLIENT : Vonino Electronics (HK) Limited
DATE OF ISSUE : May. 10, 2017
STANDARD(S) : EN 301 489-1 V1.9.2: 2011-09
: EN 301 489-17 V2.2.1: 2012-09
REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	May. 10, 2017	Valid	Re-certification Report

Note: The report of the model (Navo S) is based on the original report- No. AGC06327160802EE01, which was named after (K701X), with some changed basic information and the adapter input current. The Tablet PC shut down the function of Bluetooth by software. All the test data is refer to the original report.

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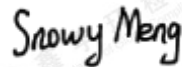
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1. TEST REPORT CERTIFICATION

Applicant	Vonino Electronics (HK) Limited
Address	#1109, 11/F, Kowloon Center 33 Ashley Road , Tsim Sha Tsui, Kowloon, Hong Kong
Manufacturer	Vonino Electronics (HK) Limited
Address	#1109, 11/F, Kowloon Center 33 Ashley Road , Tsim Sha Tsui, Kowloon, Hong Kong
Product Designation	Tablet PC
Brand Name	Vonino
Test Model	Navo S
Date of test	Aug.09,2016 to Aug.17,2016
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-EC-2.5G4/EMC

We, Attestation of Global Compliance (Shenzhen) Co., Ltd., hereby certify that the submitted samples of the above item, as detailed in chapter 2.1 of this report, has been tested in our facility. The test record, data evaluation and test configuration represented herein are true and accurate accounts of measurements of the sample's EMC characteristics under the conditions herein specified.

Tested By



Snowy Meng(Meng Linying)

Aug.17,2016

Reviewed By



Bart Xie(Xie Xiaobin)

May. 10, 2017

Approved By



 Solger Zhang(Zhang Hongyi)
 Authorized Officer

May. 10, 2017

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2. GENERAL INFORMATION

2.1. DESCRIPTION OF EUT

Details of technical specification refer to the description in follows:

EUT 1-Tablet PC	
Brand Name	Vonino
Test Model	Navo S
Hardware Version	YK86VS-3126-816-V1.0
Software Version	vonino_v1.1.0_20170328
Radio parts supported	<input checked="" type="checkbox"/> GPS <input type="checkbox"/> BLUETOOTH <input checked="" type="checkbox"/> WIFI <input type="checkbox"/> NFC
EUT 2-AC/DC Adapter	
Brand Name	Vonino
Test Model	VNA-0000001
Manufacturer Name	Shenzhen Eagletron Electronic Co., Ltd.
Manufacturer Address	Building C9, Meihuamei Industrial, Zhenmei Community, Guangming New District, Shenzhen, China
Rated Input	AC100V-240V, 50/60Hz, 0.3 A
Rated Output	DC5.0V,2.0A
EUT 3-Li-ion Battery	
Brand Name	KONROW
Test Model	357095
Manufacturer Name	Shenzhen Shirui Battery Co., Ltd.
Manufacturer Address	No.25, Shuiwei Road, Xinweizi, Xinmu Village, Pinghu, Longgang, Shenzhen, P.R.China
Capacitance	2800mAh
Rated Voltage	DC3.7V
Charging Voltage	DC4.2V

Note:

1. The EUT consists of **hand Tablet PC, li-ion battery, USB cable, charger and earphone.**
2. Please refer to Appendix I for the photographs of the EUT. For a more detailed features description about the EUT, please refer to User's Manual.

2.2. OBJECTIVE

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

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2.3. TEST STANDARDS AND RESULTS

The EUT has been tested according to ETSI EN 301 489-1 V1.9.2: 2011-09; ETSI EN 301 489-17 V2.2.1: 2012-09.

ETSI EN 301 489-1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electro Magnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
ETSI EN 301 489-17	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment Part 17: Specific conditions for Broadband Data Transmission Systems

2.4. TEST ITEMS AND THE RESULTS

No.	Basic Standard	Test Type	Result
EMISSION (EN 301 489-1 §7.1)			
1	EN 55022	Radiated emission	PASS
2	EN 55022	Conducted emission, DC ports	N/A
3	EN 55022	Conducted emission, AC ports	PASS
4	EN 55022	Conducted emission, Telecom ports	N/A
5	EN 61000-3-2	Harmonic current emissions	N/A
6	EN 61000-3-3	Voltage fluctuations & flicker	PASS
IMMUNITY (EN 301 489-1 §7.2)			
7	EN 61000-4-2	Electrostatic discharge immunity	PASS
8	EN 61000-4-3	Radiated RF electromagnetic field immunity	PASS
9	EN 61000-4-4	Electrical fast transient/burst immunity	PASS
10	ISO 7637-1, -2	Transients and surges, DC ports	N/A
11	EN 61000-4-5	Surge immunity, AC ports, Telecom ports	PASS
12	EN 61000-4-6	Immunity to conducted disturbances induced by RF fields	PASS
13	EN 61000-4-11	Voltage dips and short interruptions immunity	PASS

Note: 1. N/A- Not Applicable.
 2. The latest versions of basic standards are applied.

2.5. ENVIRONMENTAL CONDITIONS

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

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

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3. TEST MODE DESCRIPTION

MODE 1 IDLE MODE	Specification: MS + Battery + Charger + Earphone
MODE 2 WIFI MODE	Specification: MS + Battery + Charger + Earphone
Note: EMI and EMS contain the above test modes. All the modes had been tested but only the worst data recorded in the report.	

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, $U_c = \pm 2.75\text{dB}$
- Uncertainty of Radiated Emission, $U_c = \pm 3.2\text{dB}$

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5. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location-1	2/F., Building 2, No.1-No.4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District, Shenzhen, Guangdong, China
Location-2	B112-B113, Building 12, Baoan Building Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen, Guangdong, P.R.China
Note: The test items RS&CS were tested in the Laboratory of Location 2. Others were tested in the Laboratory of Location 1.	

LIST OF EQUIPMENTS USED OF AGC

Description	Manufacturer	Model No.	S/N	Calibration Date	Calibration Due.
Universal Radio Communication Tester	R&S	CMU200	120237	Feb.29,2016	Feb.28,2017
Wireless Communication Test Set	AGILENT	8960	GB46200384	July 18,2016	July 17,2017
VECTOR ANALYZER	AGILENT	E4440A	MY44303916	July 02,2016	July 01,2017
EMI Test Receiver	R&S	ESCI	100694	July 02,2016	July 01,2017
LISN	R&S	ESH2-Z5	100086	Sep.05,2015	Sep.04,2016
WIDEBAND REQUENCY ANTENNA	SCHWARZBECK	VULB9168	VULB9168-494	Mar.12,2016	Mar.11,2017
Horn Antenna	EM	EM-AH-10180	67	Mar.01,2016	Feb.28,2017
ESD Generator	EM	DITO	P1527160053	Jan.19,2016	Jan.18,2017
Electrical Fast Transient Burst Generator	LIONCEL	EFT-404B	EFT04401011	July 02,2016	July 01,2017
Lightning Surge Generator	LIONCEL	LSG-506A	LSG056001010	July 02,2016	July 01,2017
Voltage Dip Immunity Test Generator	LIONCEL	VDS-1120D	VSD11200901	Feb.29,2016	Feb.28,2017
Harmonic Emission Flicker Test System	LAPLACE	AC2000A	377951	Feb.29,2016	Feb.28,2017
Signal Generator	AGILENT	N5182A	MY50140530	Oct.16, 2015	Oct.15,2016
Amplifier	EM	EM30180	060552	Feb.29,2016	Feb.28,2017

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TEST EQUIPMENT OFCS & RS IMMUNITY TEST

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Biconilog Antenna	EMCO	3142C	00060447	Mar.01,2016	Feb.28,2017
Power Probe	R&S	URV5-Z4	100124	July 03,2016	July 02,2017
Power Meter	R&S	NRVD	8323781027	July 04,2016	July 03,2017
Power Amplifier	KALMUS	7100LC	04-02/17-06-001	July.01,2016	June.31,2017
RF Amplifier	Milmega	AS0104-55_55	1004793	July.01,2016	June.31,2017
Power Amplifier	AR	75A250	18464	July.01,2016	June.31,2017
CDN	Schaffner	M016	21264	Sept.05,2015	Sept.04,2016
6dB attenuator	JFW	50FHC-006-50	5N-20	Feb.29,2016	Feb.28,2017
Electromagnetic Injection Clamp	Luthi	EM101	35773	Sep.01,2015	Aug.31,2016
Signal Generator	R&S	SML01	104228	June 30,2016	May 31,2017
Directional Coupler	Werlatone	C5571-10	99463	July.01,2016	June.31,2017
Directional Coupler	Werlatone	C6026-10	99482	July.01,2016	June.31,2017
Audio Power Amplifier	B&K	2716-C-001	2647129	July.01,2016	June.31,2017
Conditioning Amplifier	B&K	2690-OS2	2654235	July.01,2016	June.31,2017
Microphone	B&K	4192	26488641	July.01,2016	June.31,2017
Probe Microphone	B&K	4182	2647123	July.01,2016	June.31,2017
Sound Calibrator	B&K	4231	2656617	July.01,2016	June.31,2017
Mouth Simulator	B&K	4227	2659578	July.01,2016	June.31,2017
Telephone Test Head	B&K	4206B	2663112	July.01,2016	June.31,2017
Audio Analyzer	R&S	UPV	101196	July 18,2016	July 17,2017
Wireless Communication Test Set	AGILENT	8960	GB42361316	Mar.01,2016	Feb.28,2017

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6. EMISSION TEST

6.1. MAINS TERMINAL DISTURBANCE VOLTAGE MEASUREMENT

6.1.1 LIMITS OF MAINS TERMINAL DISTURBANCE VOLTAGE

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

Note:

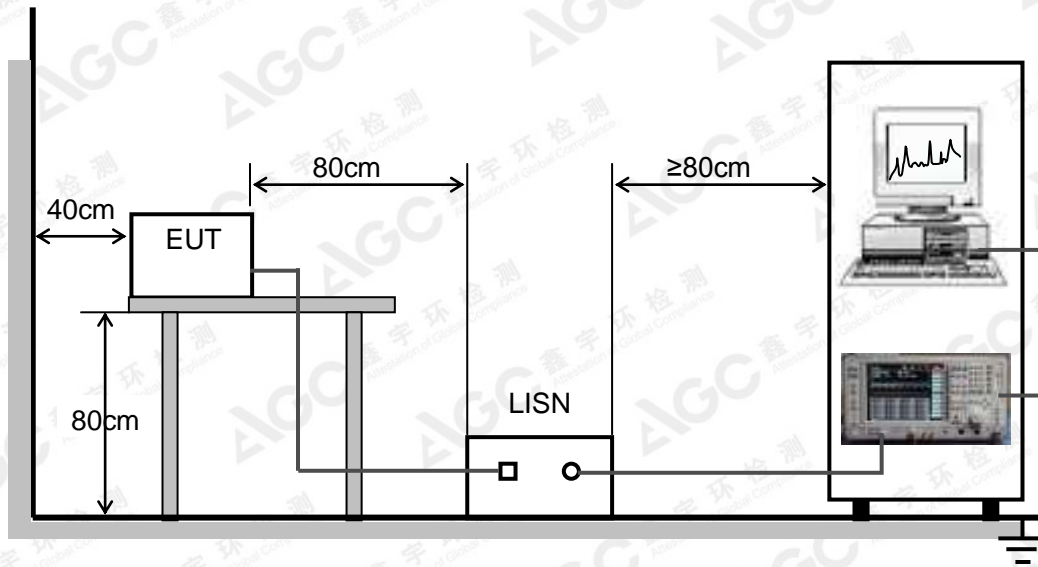
1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

6.1.2 TEST PROCEDURE

1. 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.
2. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
3. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 20dB under the prescribed limits are not reported.

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6.1.3 TEST SETUP



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

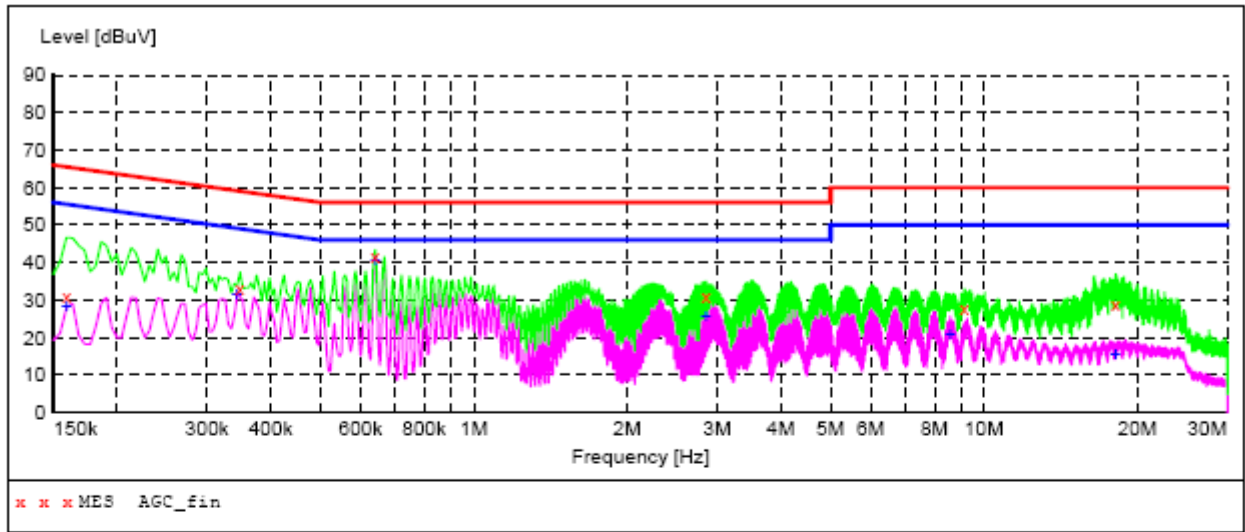
6.1.4 TEST RESULT

All test modes were carried out for all operation modes
The worst test data (WIFI Model) was showed as the follow:

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LINE CONDUCTED EMISSION TEST-L



MEASUREMENT RESULT: "AGC_fin"

2016/8/12 11:10

Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBuV	dB	dBuV	dB				
0.159000	31.00	10.3	66	34.5	QP	L1	FLO	ON
0.348000	33.10	10.3	59	25.9	QP	L1	FLO	ON
0.640500	41.40	10.3	56	14.6	QP	L1	FLO	ON
2.854500	31.00	10.5	56	25.0	QP	L1	FLO	ON
9.159000	27.70	10.7	60	32.3	QP	L1	FLO	ON
18.123000	28.80	11.8	60	31.2	QP	L1	FLO	ON

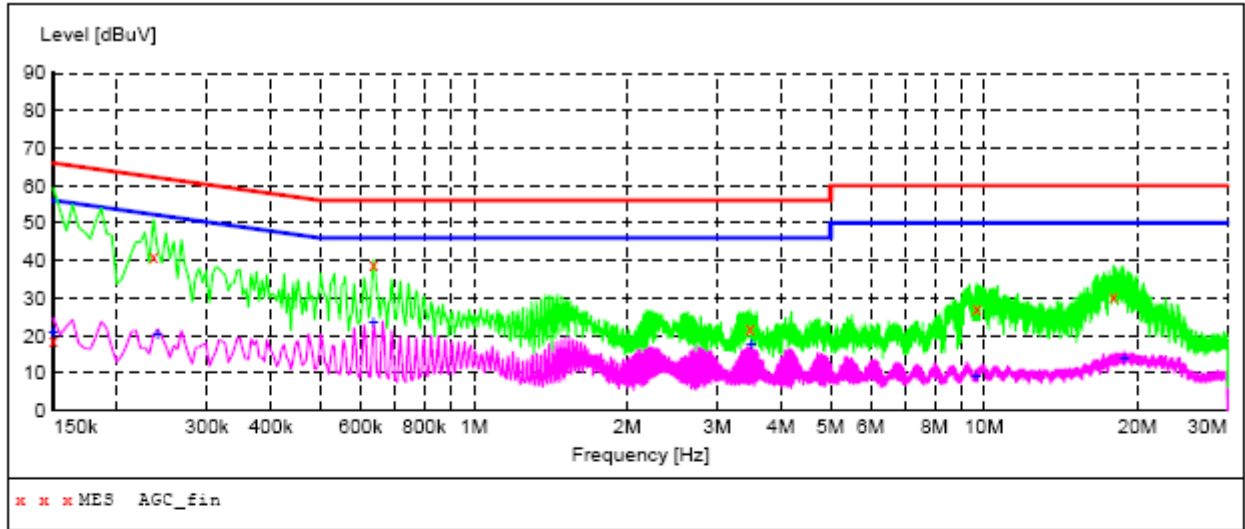
MEASUREMENT RESULT: "AGC_fin2"

2016/8/12 11:10

Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBuV	dB	dBuV	dB				
0.159000	28.20	10.3	56	27.3	AV	L1	FLO	ON
0.343500	31.40	10.3	49	17.7	AV	L1	FLO	ON
0.640500	40.80	10.3	46	5.2	AV	L1	FLO	ON
2.854500	25.60	10.5	46	20.4	AV	L1	FLO	ON
8.583000	21.00	10.7	50	29.0	AV	L1	FLO	ON
18.123000	15.30	11.8	50	34.7	AV	L1	FLO	ON

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LINE CONDUCTED EMISSION TEST-N



MEASUREMENT RESULT: "AGC_fin"

2016/8/12 11:19

Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBuV	dB	dBuV	dB				
0.150000	18.40	10.3	66	47.6	QP	N	FLO	ON
0.235500	40.90	10.3	62	21.4	QP	N	FLO	ON
0.636000	39.10	10.3	56	16.9	QP	N	FLO	ON
3.475500	21.90	10.5	56	34.1	QP	N	FLO	ON
9.676500	27.00	10.8	60	33.0	QP	N	FLO	ON
17.956500	30.30	11.7	60	29.7	QP	N	FLO	ON

MEASUREMENT RESULT: "AGC_fin2"

2016/8/12 11:19

Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBuV	dB	dBuV	dB				
0.150000	20.90	10.3	56	35.1	AV	N	FLO	ON
0.240000	20.50	10.3	52	31.6	AV	N	FLO	ON
0.636000	23.30	10.3	46	22.7	AV	N	FLO	ON
3.502500	17.80	10.5	46	28.2	AV	N	FLO	ON
9.676500	9.00	10.8	50	41.0	AV	N	FLO	ON
18.847500	13.80	11.9	50	36.2	AV	N	FLO	ON

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6.2. RADIATED DISTURBANCE MEASUREMENT

6.2.1. LIMITS OF RADIATED DISTURBANCES

Limits for radiated disturbance 30M to1 GHz at a measurement distance of 3 m

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

Limits for radiated disturbance above 1 GHz at a measurement distance of 3 m

Frequency range (MHz)	Limits (dBuV/m), Class B ITE	
	Peak	Average
1000-3000MHz	70	50
3000-6000MHz	74	54

6.2.2. TEST CONDITION:

The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes.

If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz.

If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz the measurement shall only be made up to 2 GHz.

If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz.

If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.

Notes:

1. The lower limit shall apply at the transition frequency.
2. Additional provisions may be required for cases where interference occurs.

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6.2.3. TEST PROCEDURE

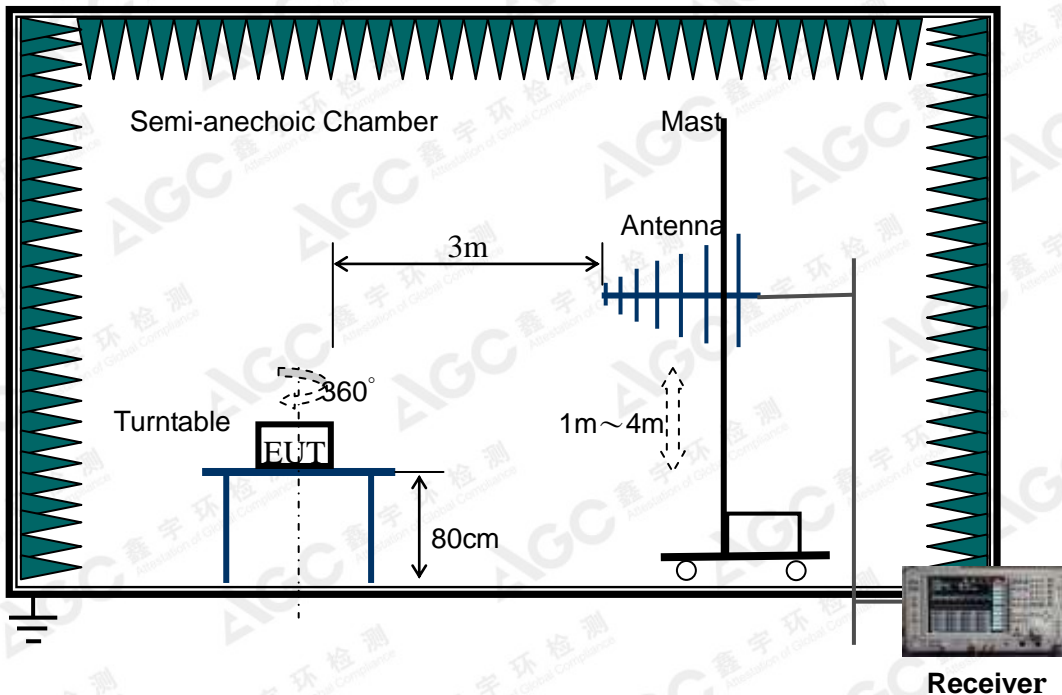
- (1). The EUT was placed on the top of an insulating table 0.8 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- (2). The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- (3). 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.
- (4). 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.
- (5). 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 3dB 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 3dB margin would be retested one by one using the quasi-peak method.
- (6). For emissions above 1G, the Horn Antenna is used. and its height is varied from 1 to 4 meter above the ground and the ratable table was turned from 0 degrees to 360 degrees to find the maximum reading. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- (7). The EUT was arranged according to Clause 8 of CISPR 16-1-4. Use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
- (8). For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

Note: Refer to the clause 8.2 in EN 301 489-1, enclosure of ancillary equipment measured on a stand-alone basis. Ancillary equipment can also be measured in combination with the radio equipment under test. When the ancillary equipment is measured in combination with the radio equipment, radiated emissions from the transmitter/transceiver shall be ignored, but recorded in the test report.

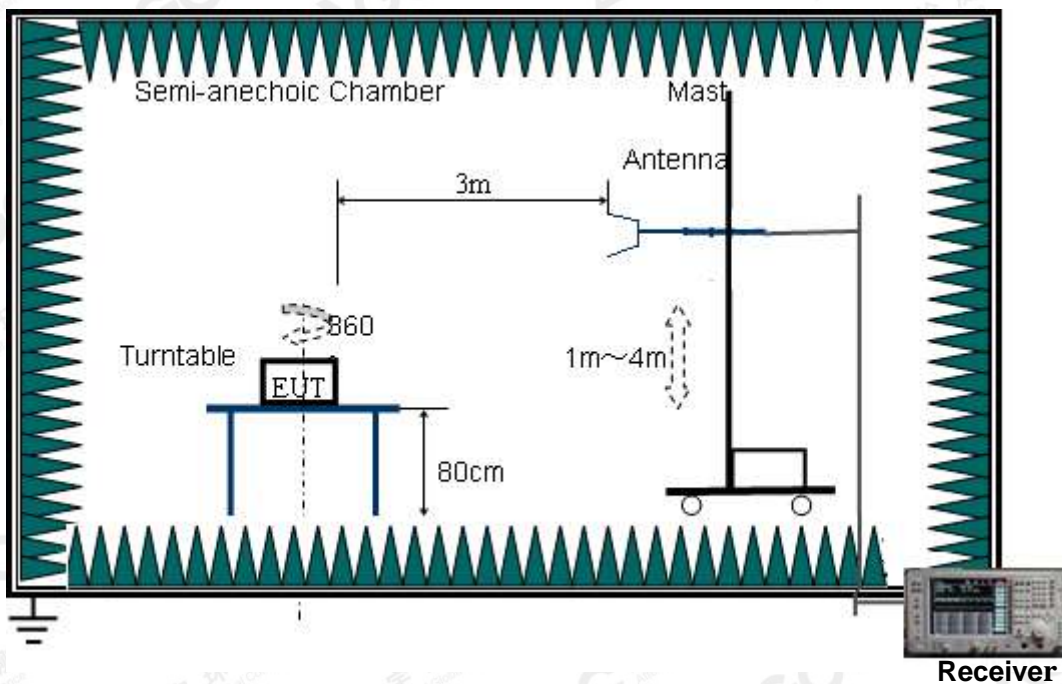
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6.2.4. BLOCK DIAGRAM OF TEST SETUP

Radiated Disturbance 30M to1 GHz



Radiated Disturbance above 1 GHz



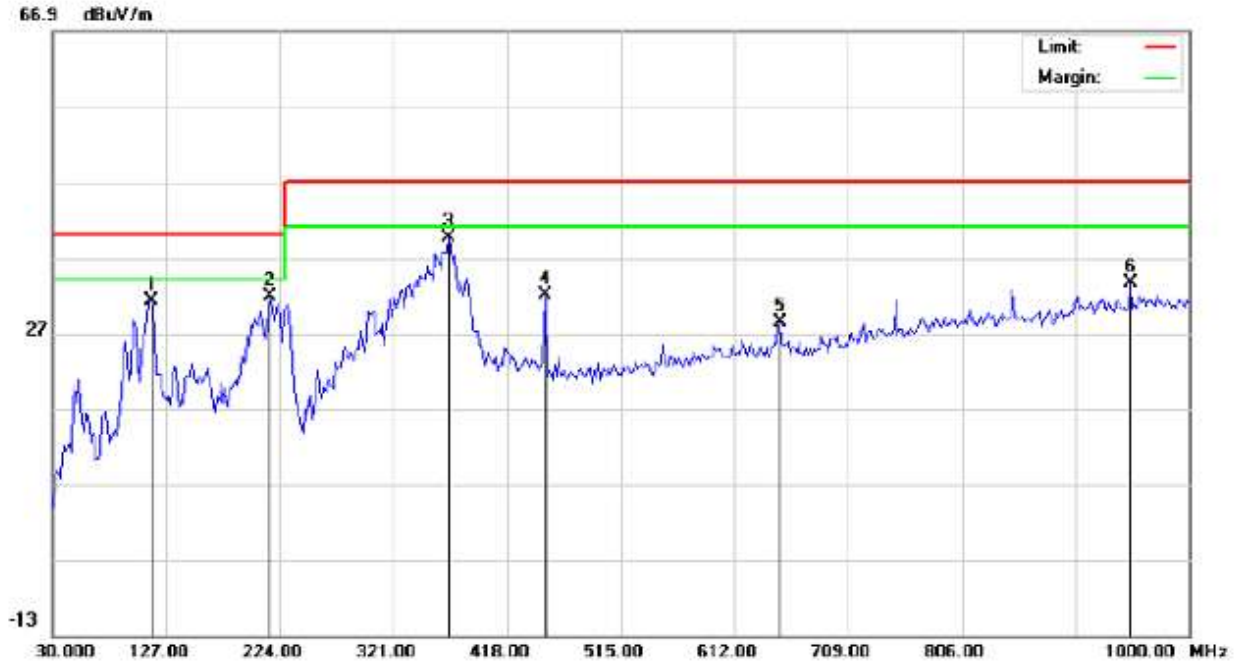
For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

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6.2.5 TEST RESULT

All test modes were carried out for all operation modes
The worst test data (WIFI Model) was showed as the follow:

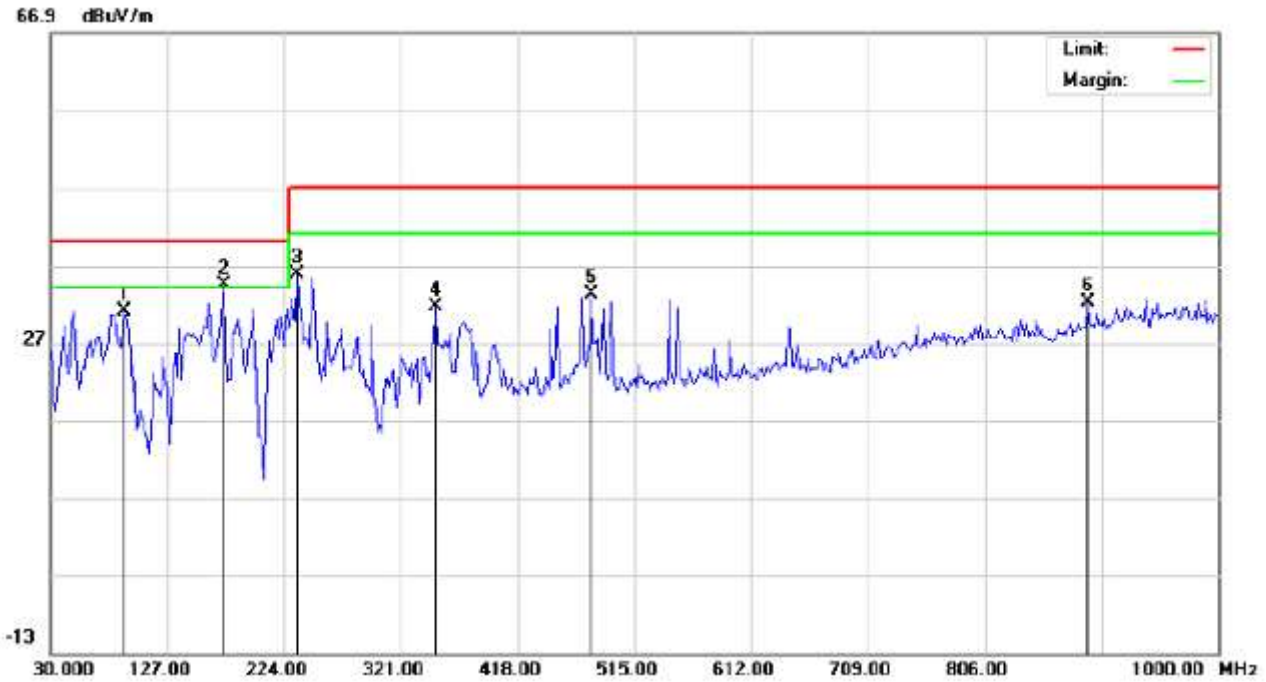
RADIATED EMISSION BELOW 1GHZ- HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		114.0667	24.05	7.23	31.28	40.00	-8.72	peak			
2		215.9167	21.35	10.38	31.73	40.00	-8.27	peak			
3	*	367.8833	20.66	18.86	39.52	47.00	-7.48	peak			
4		450.3333	11.36	20.59	31.95	47.00	-15.05	peak			
5		650.8000	4.52	23.87	28.39	47.00	-18.61	peak			
6		949.8833	3.61	30.00	33.61	47.00	-13.39	peak			

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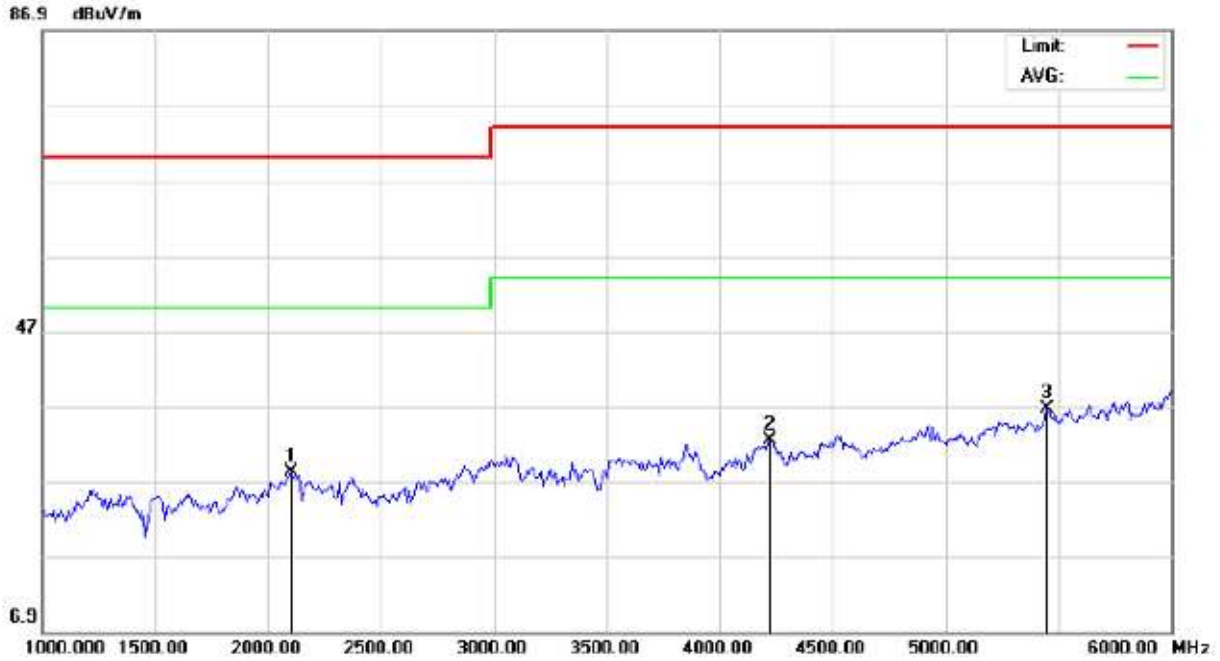
RADIATED EMISSION BELOW 1GHZ- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna	Table	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		Height	Degree	
									cm	degree	
1		91.4333	26.89	4.16	31.05	40.00	-8.95	peak			
2	*	173.8833	19.95	14.46	34.41	40.00	-5.59	peak			
3		235.3167	23.29	12.46	35.75	47.00	-11.25	peak			
4		350.1000	12.81	18.74	31.55	47.00	-15.45	peak			
5		479.4333	12.37	20.91	33.28	47.00	-13.72	peak			
6		891.6833	3.90	28.39	32.29	47.00	-14.71	peak			

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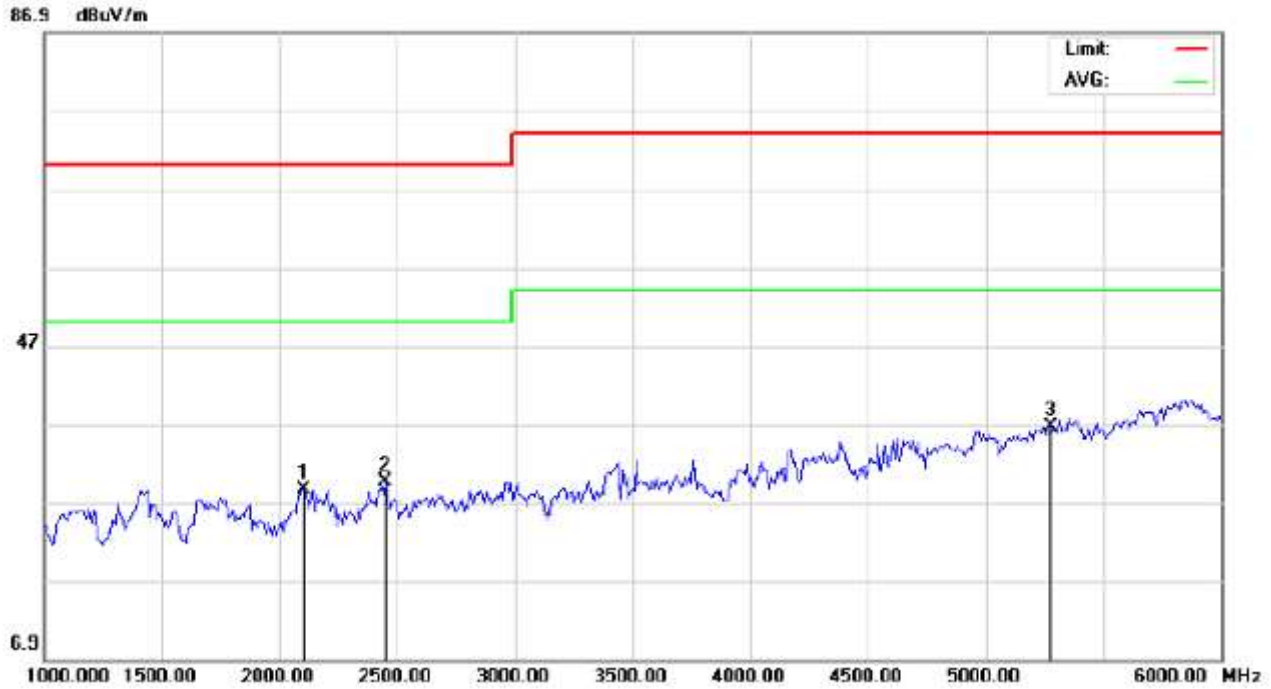
RADIATED EMISSION ABOVE 1GHZ – HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna	Table	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		Height	Degree	
1		2100.000	38.12	-10.01	28.11	70.00	-41.89	peak	cm	degree	
2		4225.000	36.35	-4.04	32.31	74.00	-41.69	peak			
3	*	5450.000	38.38	-1.81	36.57	74.00	-37.43	peak			

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RADIATED EMISSION ABOVE 1GHZ – VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna	Table	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		Height	Degree	
									cm	degree	
1		2100.000	38.62	-10.01	28.61	70.00	-41.39	peak			
2		2450.000	39.19	-9.62	29.57	70.00	-40.43	peak			
3	*	5275.000	38.34	-1.81	36.53	74.00	-37.47	peak			

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6.3. HARMONIC CURRENT MEASUREMENT

6.3.1 LIMITS OF HARMONIC CURRENT

Harmonic current emissions evaluate the potential for the EUT to cause distortion on the AC power lines. It is applicable to electrical and electronic equipment having an input current ≤ 16 A per phase, and intended to be connected to public low-voltage distribution systems.

Limits for Class D Equipment	
Harmonics Order n	Max. permissible harmonic current (A)
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
$15 \leq n \leq 39$	$0.15 \times 15/n$
Even harmonics	
2	1.08
4	0.43
6	0.30
$8 \leq n \leq 40$	$0.23 \times 8/n$

Note:

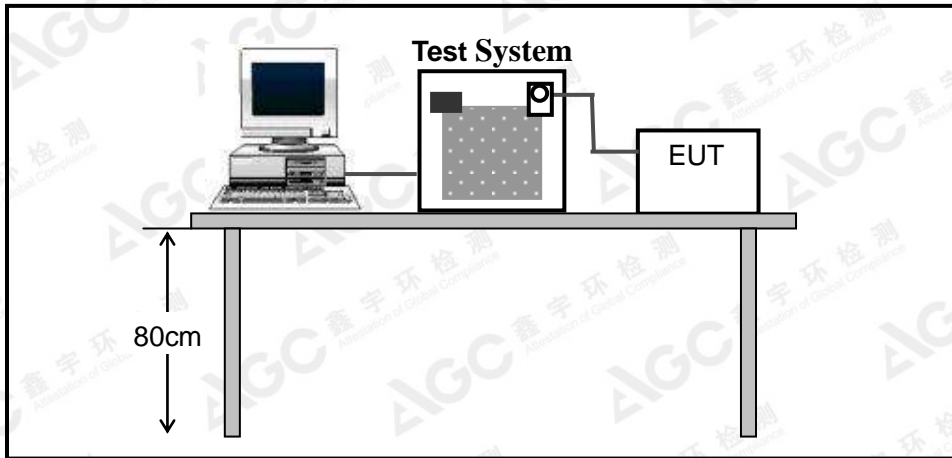
1. According to section 5 of EN61000-3-2, the EUT is Class D equipment.
2. The above limits are for all applications having an active input power > 75W. No limits apply for equipment with an active input power up to and including 75W.

6.3.2 TEST PROCEDURE

1. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
2. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.

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6.3.3 TEST SETUP



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

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6.3.4 TEST RESULT

Note:

1. The active input power of the EUT is **less than 75W**.
2. No limits apply for equipment with an active input power up to and including 75W.

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6.4. VOLTAGE FLUCTUATIONS AND FLICK MEASUREMENT

6.4.1. LIMITS OF VOLTAGE FLUCTUATIONS AND FLICK

The objective of voltage changes, voltage fluctuations and flicker in public low voltage supply systems during equipment with rated current ≤ 16 A per phase, ensures that home appliances and certain other electrical equipment do not adversely affect lighting equipment when connected to the same power system.

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}	0.2	T_{dt} means maximum time that d_t exceeds 3%
$d_{max}(\%)$	4%	d_{max} means maximum relative voltage change.
$d_c(\%)$	3%	d_c means relative steady-state voltage change.

6.4.2. TEST PROCEDURE

- 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
- 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.

6.4.3. TEST SETUP

Same as 3.4.3

6.4.4. TEST RESULT

Test Specification

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

All test modes were carried out for all operation modes

Only the test result of the worst case WIFI Model as follow:

Test Parameter	Measurement Value	Limit	Remarks
P_{st}	0.011	1.0	Pass
P_{lt}	0.007	0.65	Pass
$T_{dt(s)}$	0.005	0.2	Pass
$d_{max}(\%)$	0.19%	4%	Pass
$d_c(\%)$	0.28%	3%	Pass

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7. IMMUNITY TEST

7.1. EUT SETUP AND OPERATING CONDITIONS

The battery was in full voltage and the charger was connected to the EUT to keep the voltage constant during the tests. During the measurement the environmental conditions were within the listed ranges:

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

7.2. GENERAL PERFORMANCE CRITERIA

7.2.1. GENERAL PERFORMANCE CRITERIA

The EUT tested system was configured as the statements of 2.2 Unless otherwise a special operating condition is specified in the follows during the testing.

Criteria	During the test	After the 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 transmissions	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 any 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.

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7.2.2. PERFORMANCE CRITERIA FOR TT, TR, CT AND CR

PERFORMANCE FOR TT

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 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 FOR TR

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 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.

PERFORMANCE FOR 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 FOR 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.

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7.2.3 GENERAL PERFORMANCE CRITERIA TO WIFI

Criteria	During the test	After the 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 transmissions	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 any 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.

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7.2.4 PERFORMANCE CRITERIA FOR TT AND TR TO WIFI

PERFORMANCE FOR TT TO WIFI

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 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 FOR TR TO WIFI

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 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.

7.2.5 PERFORMANCE CRITERIA FOR CT AND CR TO WIFI

PERFORMANCE FOR CT TO WIFI

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 FOR CR TO WIFI

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.

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7.3. ELECTROSTATIC DISCHARGE IMMUNITY TEST

7.3.1. TEST SPECIFICATION

Basic Standard	EN 61000-4-2
Discharge Impedance	330Ω / 150 pF
Discharge Voltage	Air Discharge –8 kV , Contact Discharge – 4 kV
Polarity	Positive / Negative
Number of Discharge	Minimum 20 times at each test point
Discharge Mode	Single discharge
Discharge Period	1-second minimum
Test Conditions	Temperature/ Humidity:23.5°C/54.1%

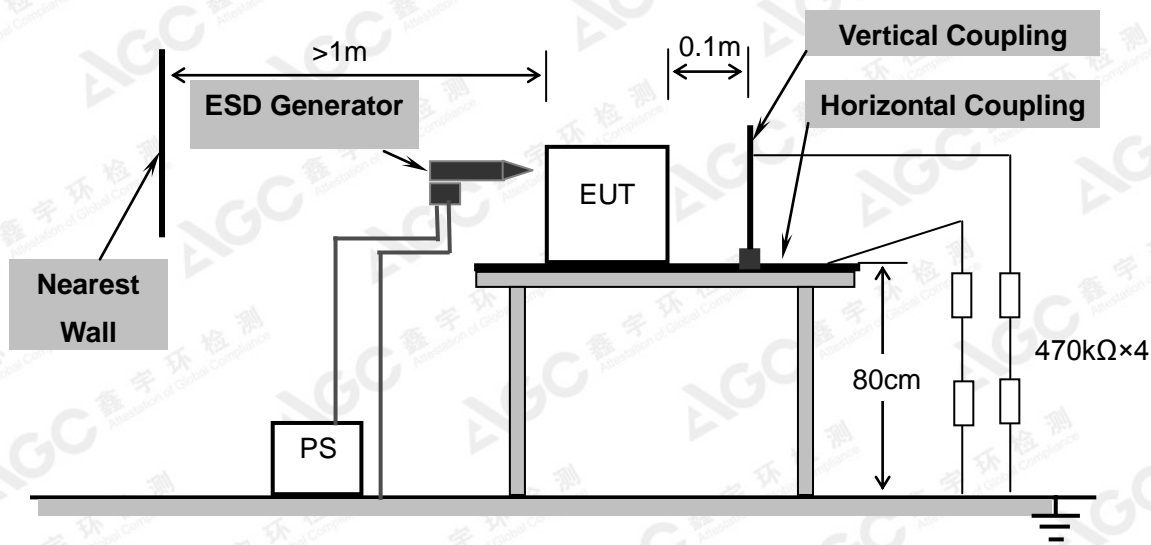
7.3.2. TEST PROCEDURE

The test procedure was in accordance with EN 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 ten 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 ten 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.

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7.3.3. TEST SETUP



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

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7.3.4. TEST RESULT
EN 301 489-17 V2.2.1 WIFI (MODE 2) TEST RESULT

Test Points	Discharge Level (kV)	Discharge Mode	Observation	Conclusion
HCP	±2,±4	Indirect	TT, TR	Pass
VCP	±2,±4	Indirect	TT, TR	Pass
Interface of Earphone to MS	±2,±4	Contact	TT, TR	Pass
Interface of USB to Adapter	±2,±4	Contact	TT, TR	Pass
Interface of Adapter/USB to MS	±2,±4	Contact	TT, TR	Pass
Speaker	±2, ±4, ±8	Air	TT, TR	Pass

Note: There was not any unintentional transmission discovered in standby mode

Phenomenon: no function loss during the test.

PERFORMANCE CRITERIA	
Criteria requested	<input type="checkbox"/> A / <input checked="" type="checkbox"/> B / <input type="checkbox"/> C
Criteria meet	<input checked="" type="checkbox"/> A / <input type="checkbox"/> B / <input type="checkbox"/> C

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Discharge points:



Note: The air discharge point is 3. The contact discharge point are 1, 2 and 4.

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7.4. RADIATED, RADIO FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY TEST

7.4.1 TEST SPECIFICATION

Basic Standard	EN 61000-4-3
Frequency Range	80 MHz – 1000MHz, 1400MHz-2700MHz
Field Strength	3V/m
Modulation	1 kHz 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
Test Conditions	Temperature/ Humidity:23.6°C/52.8%

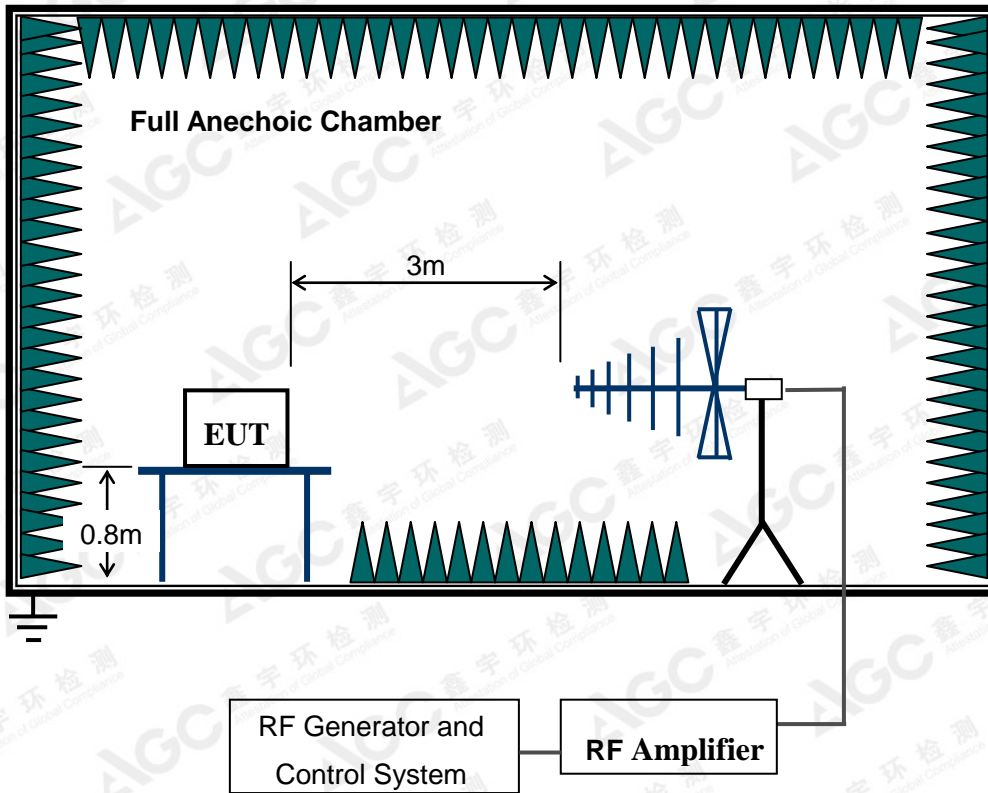
7.4.2 TEST PROCEDURE

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

- The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- The test signal was 80% amplitude modulated with a 1 kHz sine wave.
- The frequency range was swept from 80 MHz to 1000MHz and 1400MHz to 2700MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers. 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.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- The field strength level was 3V/m.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

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7.4.3 TEST SETUP



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

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7.4.4 TEST RESULT
EN 301 489-17 V2.2.1 WIFI (MODE 2) TEST RESULT

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Conclusion	Side
Operating Mode	Vertical	80-1000, 1400-2700	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-1000, 1400-2700	3	CT,CR	Pass	Right, Left, Front, Rear
Standby Mode	Vertical	80-1000, 1400-2700	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-1000, 1400-2700	3	CT,CR	Pass	Right, Left, Front, Rear

Note: There was not any unintentional transmission discovered in standby mode

Phenomenon: no function loss during the test.

PERFORMANCE CRITERIA	
Criteria requested	<input checked="" type="checkbox"/> A / <input type="checkbox"/> B / <input type="checkbox"/> C
Criteria meet	<input checked="" type="checkbox"/> A / <input type="checkbox"/> B / <input type="checkbox"/> C

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7.5. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

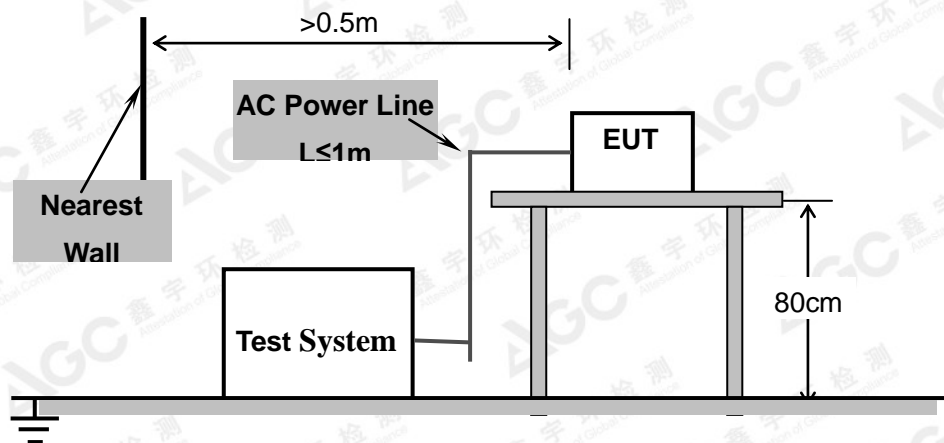
7.5.1 TEST SPECIFICATION

Basic Standard	EN 61000-4-4
Test Voltage	a.c. power port – 1 kV; communication port 0.5kV
Polarity	Positive/Negative
Impulse Frequency	5kHz
Impulse wave shape	5/50ns
Burst Duration	15ms
Burst Period	300ms
Test Duration	Not less than 1 min.
Test Conditions	Temperature/ Humidity:24.1°C/52.5%

7.5.2 TEST PROCEDURE

- The EUT was tested with 1000 volt discharges to the AC power input leads.
- Both positive and negative polarity discharges were applied.
- 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.
- The duration time of each test sequential was 1 minute.
- The transient/burst waveform was in accordance with EN 61000-4-4, 5/50ns.
- Test communication port according EN 61000-4-4 with clamp

7.5.3 TEST SETUP



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

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7.5.4 TEST RESULT
EN 301 489-17 V2.2.1 WIFI (MODE 2) TEST RESULT

Test Point	Polarity	Test Level (kV)	Observation	Conclusion
a.c. port, L	+/-	1	TT,TR	Pass
a.c. port, N	+/-	1	TT,TR	Pass
a.c. port, L-N	+/-	1	TT,TR	Pass

Note: There was not any unintentional transmission discovered in standby mode

Phenomenon: no function loss during the test.

PERFORMANCE CRITERIA	
Criteria requested	<input type="checkbox"/> A / <input checked="" type="checkbox"/> B / <input type="checkbox"/> C
Criteria meet	<input checked="" type="checkbox"/> A / <input type="checkbox"/> B / <input type="checkbox"/> C

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7.6. SURGE IMMUNITY TEST

7.6.1 TEST SPECIFICATION

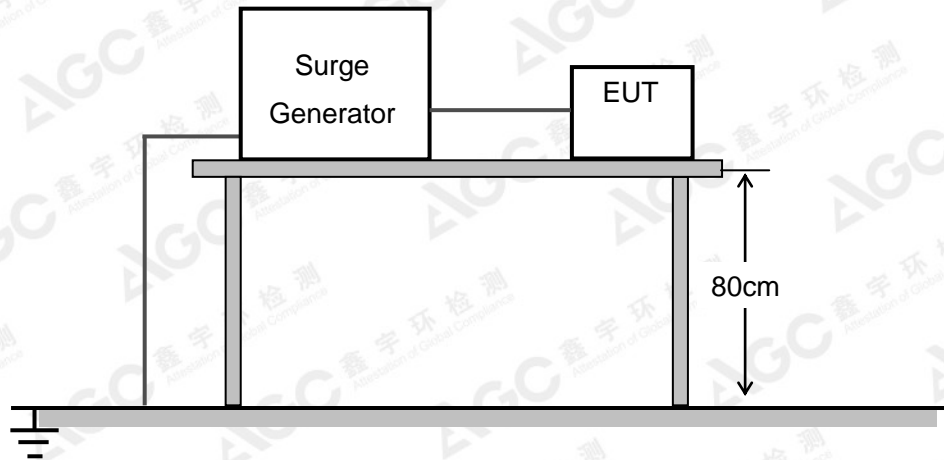
Basic Standard	EN 61000-4-5
Waveform	Voltage 1.2/50 μ s; Current 8/20 μ s
Test Voltage	a.c. power port, line to ground 2 kV, line to line 1.0 Kv communication port 1kV
Polarity	Positive/Negative
Phase Angle	0°, 90°, 180°, 270°
Repetition Rate	60sec
Times	5 time/each condition.
Test Conditions	Temperature/ Humidity:23.5°C/52.7%

7.6.2 TEST PROCEDURE

- 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 \times 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).
- 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).
- 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.
- Test communication Port according EN55024.

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7.6.3 TEST SETUP



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

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7.6.4 TEST RESULT
EN 301 489-17 V2.2.1 WIFI (MODE 2) TEST RESULT

Coupling Line	Polarity	Voltage (kV)	Observation	Conclusion
a.c. power, L-N	+/-	1.0	TT,TR	Pass
Note: There was not any unintentional transmission discovered in standby mode				

Phenomenon: no function loss during the test.

PERFORMANCE CRITERIA	
Criteria requested	<input type="checkbox"/> A / <input checked="" type="checkbox"/> B / <input type="checkbox"/> C
Criteria meet	<input checked="" type="checkbox"/> A / <input type="checkbox"/> B / <input type="checkbox"/> C

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7.7. IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS

7.7.1 TEST SPECIFICATION

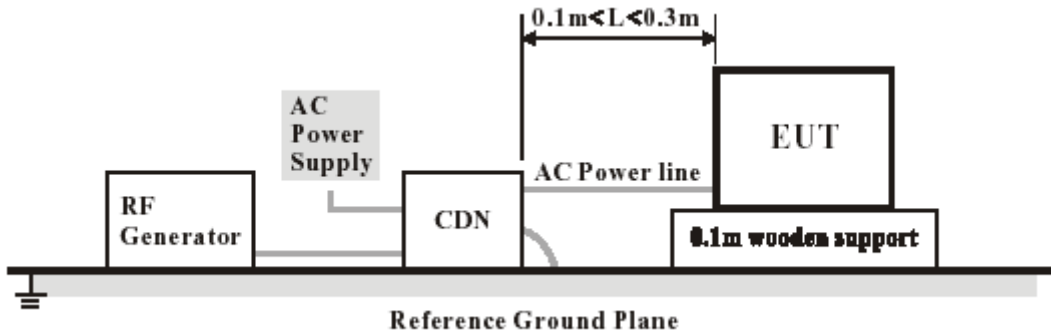
Basic Standard	EN 61000-4-6
Frequency Range	0.15 MHz – 80 MHz
Field Strength	3Vrms
Modulation	1 kHz Sine Wave, 80% AM
Frequency Step	1% of fundamental
Coupled Cable	a.c. power line, Communication Line
Coupling Device	CDN-M2 ,Clamp
Test Conditions	Temperature/ Humidity:23.7°C/53.5%

7.7.2 TEST PROCEDURE

- The EUT shall be tested within its intended operating and climatic conditions.
- 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.
- The test signal was 80% amplitude modulated with a 1 kHz sine wave
- 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 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.
- 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.
- Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.

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7.7.3 TEST SETUP



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

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7.7.4 TEST RESULT
EN 301 489-17 V2.2.1 WIFI (MODE 2) TEST RESULT

EUT Working Mode	Test Port	Frequency (MHz)	Field Strength (Vrms)	Observation	Conclusion
Operating Mode	a.c. port	0.15 – 80	3	CT,CR	Pass
Standby Mode	a.c. port	0.15 – 80	3	CT,CR	Pass

Note: There was not any unintentional transmission in Standby mode

PERFORMANCE CRITERIA	
Criteria requested	<input checked="" type="checkbox"/> A / <input type="checkbox"/> B / <input type="checkbox"/> C
Criteria meet	<input checked="" type="checkbox"/> A / <input type="checkbox"/> B / <input type="checkbox"/> C

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7.8. VOLTAGE DIPS AND SHORT INTERRUPTIONS IMMUNITY TEST

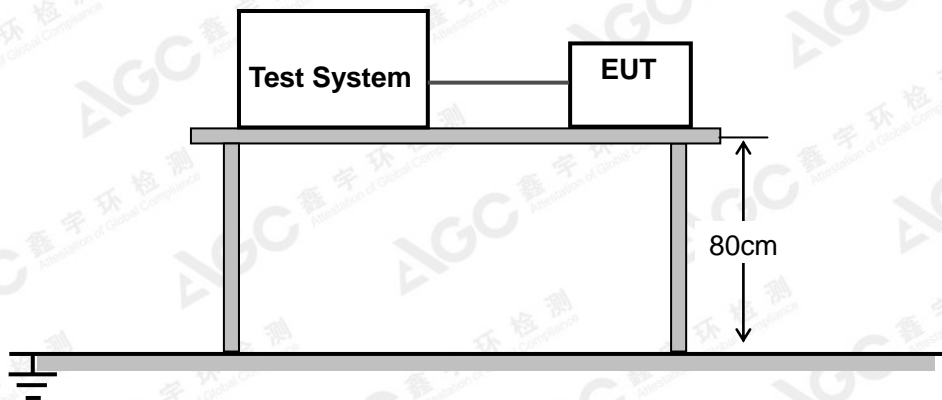
7.8.1 TEST SPECIFICATION

Basic Standard	EN 61000-4-11
Voltage Dips	100% reduction, 0.5 Cycle 100% reduction, 1.0 Cycle 30% reduction, 25 Cycles
Voltage Interruptions	100% reduction, 250 Cycles
Voltage Phase Angle	0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°
Test Conditions	Temperature/ Humidity:23.1°C/54.5%

7.8.2 TEST PROCEDURE

- 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.
- The EUT was tested for (1) 100% voltage dip of supplied voltage with duration of 0.5 cycles, (2)100% voltage dip of supplied voltage and duration 1.0 cycle. (3) 30% voltage dip of supplied voltage and duration 25 cycles. (4) 100% voltage interruption of supplied voltage with duration of 250 Cycles was followed,
- 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.

7.8.3 TEST SETUP



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

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7.8.4 TEST RESULT
EN 301 489-17 V2.2.1 WIFI (MODE 2) TEST RESULT

Test item	Voltage Reduction	Duration (cycle)	Times	Interval (Sec)	Observation	Conclusion
Voltage dips	100%	0.5	3	10	TT,TR	Pass
	100%	1	3	10	TT,TR	Pass
	30%	25	3	10	TT,TR	Pass
Voltage interruptions	100%	250	3	10	TT,TR	Pass

Note: There was not any unintentional transmission in standby mode

Phenomenon: no function loss during the test.

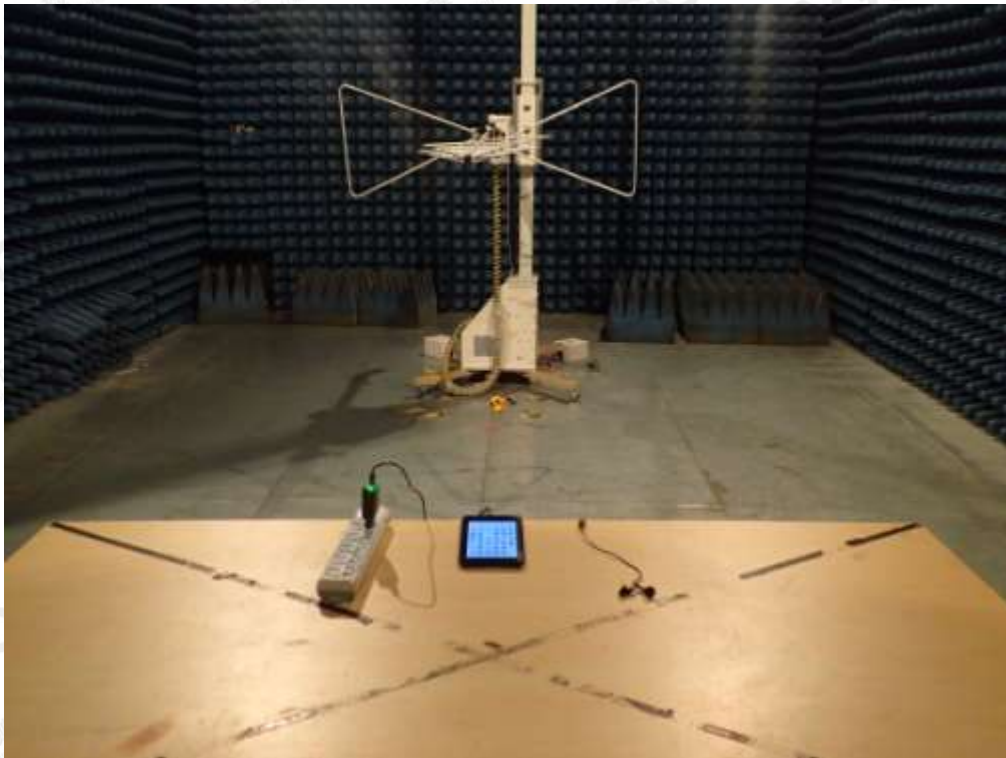
PERFORMANCE CRITERIA	
Criteria requested	<input type="checkbox"/> A / <input checked="" type="checkbox"/> B / <input type="checkbox"/> C
Criteria meet	<input checked="" type="checkbox"/> A / <input type="checkbox"/> B / <input type="checkbox"/> C

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APPENDIX A: PHOTOGRAPHS OF TEST SETUP
LINE CONDUCTED EMISSION TEST SETUP



RADIATED EMISSION TEST SETUP

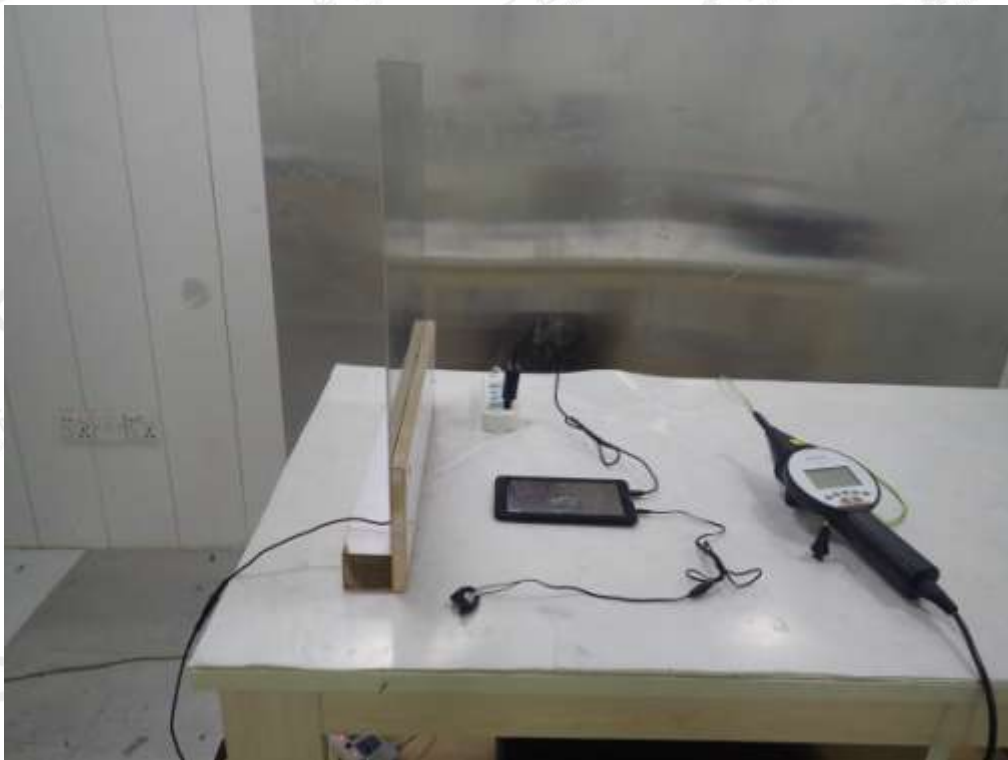


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EN 61000-3-3 FLICKER TEST SETUP



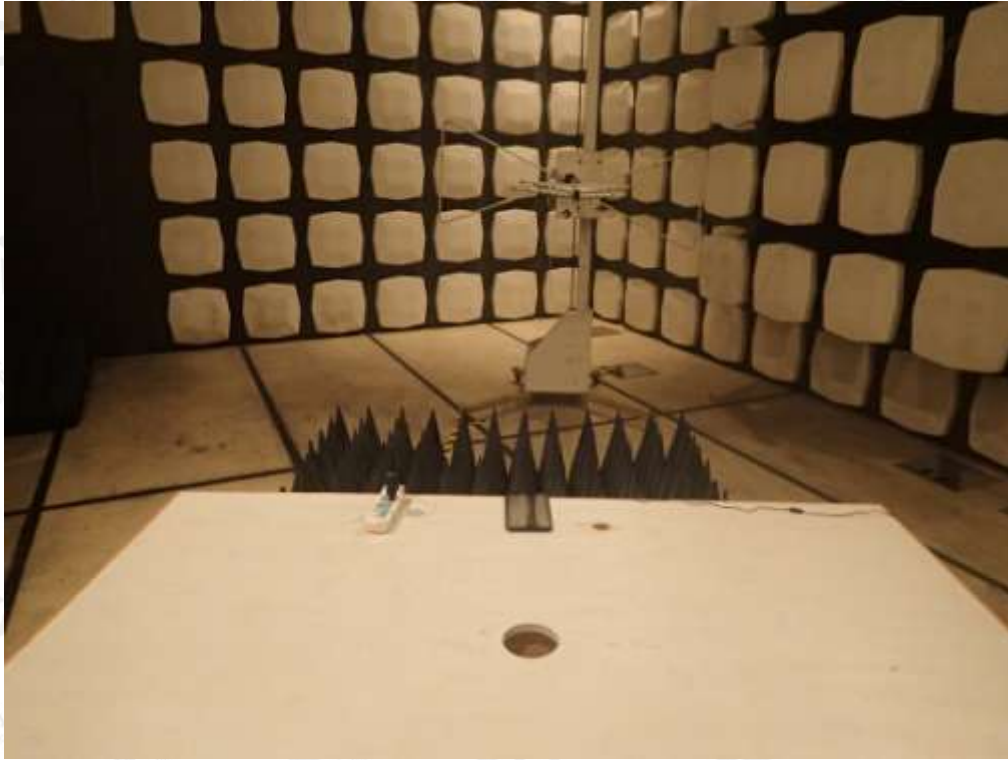
EN 61000-4-2 ESD TEST SETUP



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EN 61000-4-3 RS TEST SETUP



EN 61000-4-4 EFT TEST SETUP



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EN 61000-4-5 SURGE TEST SETUP



EN 61000-4-6 CS TEST SETUP



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EN 61000-4-11 DIPS TEST SETUP



----END OF REPORT----

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