

# EMC Test Report

Report No.: AGC00552180502EE01

**PRODUCT DESIGNATION** : Smart Phone  
**BRAND NAME** : CUBOT  
**MODEL NAME** : P20  
**MANUFACTURER** : Shenzhen Huafurui Technology Co., Ltd.  
**DATE OF ISSUE** : Jun. 04, 2018  
**STANDARD(S)** : EN 301 489-1 V2.2.0: 2017-03(draft)  
EN 301 489-17 V3.2.0: 2017-03(draft)  
EN 301 489-19 V2.1.0: 2017-03(draft)  
EN 301 489-52 V1.1.0: 2016-11(draft)  
**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	/	Jun. 04, 2018	Valid	Initial release

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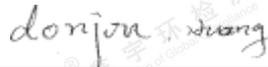
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**1. TEST REPORT CERTIFICATION**

<b>Manufacturer</b>	Shenzhen Huafurui Technology Co., Ltd.
<b>Address</b>	Unit 1401 &1402, 14/F, Jin qi zhi gu mansion (No. 4 building of Chong wen Garden), Crossing of the Liu xian street and Tang ling road, Tao yuan street, Nan shan district, Shenzhen, P.R. China
<b>Factory Name</b>	Shenzhen Huafurui Technology Co., Ltd.
<b>Address</b>	Unit 1401 &1402, 14/F, Jin qi zhi gu mansion (No. 4 building of Chong wen Garden), Crossing of the Liu xian street and Tang ling road, Tao yuan street, Nan shan district, Shenzhen, P.R. China
<b>Product Designation</b>	Smart Phone
<b>Brand Name</b>	CUBOT
<b>Test Model</b>	P20
<b>Date of test</b>	May 18, 2018 to May 30, 2018
<b>Deviation</b>	None
<b>Test Result</b>	<b>Pass</b>
<b>Report Template</b>	AGCRT-EC-3G2/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



Donjon Huang(Huang Dongyang)

May 30, 2018

Reviewed By



Bart Xie(Xie Xiaobin)

Jun. 04, 2018

Approved By



 Forrest Lei(Lei Yonggang)  
 Authorized Officer

Jun. 04, 2018

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## 2. GENERAL INFORMATION

### 2.1. DESCRIPTION OF EUT

Details of technical specification refer to the description in follows:

EUT 1-Smart Phone	
Brand Name	CUBOT
Test Model	P20
Hardware Version	HCT-S590MB-A2
Software Version	CUBOT_P20_8023C_V02_20180504
GPRS Class	Class 12
Radio parts supported	<input checked="" type="checkbox"/> GSM <input checked="" type="checkbox"/> UMTS <input checked="" type="checkbox"/> LTE <input checked="" type="checkbox"/> GPS <input checked="" type="checkbox"/> BLUETOOTH <input checked="" type="checkbox"/> WIFI <input type="checkbox"/> NFC
EUT 2-AC/DC Adapter	
Brand Name	CUBOT
Test Model	P20
Manufacturer Name	Shenzhen Hua Jin Electronics Co., Ltd
Manufacturer Address	Block E, Xinzhong Qiao Industrial Park, Baolong Six Road, Baolong Industrial City, Longgang District, Shenzhen
Rated Input	AC100-240V, 50/60Hz, 0.3A
Rated Output	DC5.0V,2000mA
EUT 3-Li-ion Battery	
Brand Name	CUBOT
Test Model	P20
Manufacturer Name	Zhongshan Tianmao Battery CO., Ltd
Manufacturer Address	NO.208, Qian Jin One Road, The Third Industrial Zone, Tanzhou Town, Zhongshan City, China
Capacitance	4000mAh
Rated Voltage	DC3.8V
Charging Voltage	DC4.35V

#### Note:

1. The EUT consists of **hand telephone set, li-ion battery, USB cable, charger.**
2. The Phone has dual-SIM card slots, but only one of the card can be transmitting when the two cards are inserting the phone together. Anyone of the SIM Card socket was tested.
3. 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.
4. The **earphone** is provided by AGC Lab.

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## 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 EN 301 489-1 V2.2.0: 2017-03; ETSI EN 301 489-19 V2.1.0: 2017-03; ETSI EN 301 489-17 V3.2.0: 2017-03; ETSI EN 301 489 -52 V1.1.0 :2016-11.

<b>ETSI EN 301 489-1</b>	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU
<b>ETSI EN 301 489-17</b>	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
<b>ETSI EN 301 489-19</b>	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 19: Specific conditions for Receive Only Mobile Earth Stations (ROMES) operating in the 1,5 GHz band providing data communications and GNSS receivers operating in the RNSS band (ROGNSS) providing positioning, navigation, and timing data; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
<b>ETSI EN 301 489-52</b>	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication Mobile and portable (UE) radio and ancillary equipment; Harmonised Standard covering the essential requirements of article 3.1b of Directive 2014/53/EU

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**2.4. TEST ITEMS AND THE RESULTS**

No.	Basic Standard	Test Type	Result
<b>EMISSION (EN 301 489-1 §7.1)</b>			
1	EN 55032	Radiated emission	PASS
2	EN 55032	Conducted emission, DC ports	N/A
3	EN 55032	Conducted emission, AC ports	PASS
4	EN 55032	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
<b>IMMUNITY (EN 301 489-1 §7.2)</b>			
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

<b>MODE 1 OPERATING MODE</b>	Specification A: GSM 900 Specification: MS + Battery + Charger+ Earphone Specification B: DCS 1800 Specification: MS + Battery + Charger+ Earphone Specification C: UMTS2100 Specification: MS + Battery + Charger+ Earphone Specification D: UMTS900 Specification: MS + Battery + Charger+ Earphone Specification E: GPRS 900 Specification: MS + Battery + Charger+ Earphone Specification F: GPRS 1800 Specification: MS + Battery + Charger+ Earphone Specification G: EGPRS 900 Specification: MS + Battery + Charger+ Earphone Specification H: EGPRS 1800 Specification: MS + Battery + Charger+ Earphone Specification I: HSPA2100 Specification: MS + Battery + Charger+ Earphone Specification J: HSPA900 Specification: MS + Battery + Charger+ Earphone Specification K: LTE band 1 Specification: MS + Battery + Charger+ Earphone Specification L: LTE band 3 Specification: MS + Battery + Charger+ Earphone Specification M: LTE band 7 Specification: MS + Battery + Charger+ Earphone Specification N: LTE band 8 Specification: MS + Battery + Charger+ Earphone Specification O: LTE band 20 Specification: MS + Battery + Charger+ Earphone
<b>MODE 2 IDLE MODE</b>	Specification: MS + Battery + Charger + Earphone
<b>MODE 3 BLUETOOTH MODE</b>	Specification: MS + Battery + Charger + Earphone
<b>MODE 4 WIFI MODE</b>	Specification: MS + Battery + Charger + Earphone
<b>MODE 5 GPS MODE</b>	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.	

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#### 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,  $U_c = \pm 3.2\text{dB}$
- Uncertainty of Radiated Emission below 1GHz,  $U_c = \pm 3.9\text{dB}$
- Uncertainty of Radiated Emission above 1GHz,  $U_c = \pm 4.8\text{dB}$

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**5. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION**

<b>Test Site</b>	Attestation of Global Compliance (Shenzhen) Co., Ltd
<b>Location</b>	B112-B113, Building 12, Baoan Building Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen, Guangdong, P.R.China

**LIST OF EQUIPMENTS USED OF AGC**

Description	Manufacturer	Model No.	S/N	Calibration Date	Calibration Due.
Universal Radio Communication Tester	R&S	CMU200	120237	Mar. 01, 2018	Feb. 28, 2019
Wireless Communication Test Set	AGILENT	8960	GB42361316	Mar. 01, 2018	Feb. 28, 2019
Wireless communication test	R&S	CMW500	120909	July 13,2017	July 12, 2018
Signal Analyzer	Agilent	N9010A	MY52090123	Sep.21,2017	Sep.20,2018
EMI Test Receiver	R&S	ESHS-30	828765	July 15,2017	July 14,2018
AMN	R&S	ESH2-Z5	100086	Aug.21,2017	Aug.20,2018
WIDEBAND REQUENCY ANTENNA	SCHWARZBECK	VULB9168	D69250	Mar. 01, 2018	Feb. 28, 2020
Double-Ridged Waveguide Horn Antenna	ETS LINDGREN	3117	00034609	Mar. 01, 2018	Feb. 28, 2020
ESD Simulator	Schaffner	NSG 438	782	Sep.21,2017	Sep.20,2018
Electrical Fast Transient Burst Generator	EM Test	EFT 200	0503-03	Aug.23,2017	Aug.22,2018
Lightning Surge Generator	Schaffner	Modula 6150	34437	Aug.21,2017	Aug.20,2018
Voltage Dip Immunity Test Generator	EM Test	VDS 200	1199-06	Aug.23,2017	Aug.22,2018
Signal Conditioning Unit	Schaffner	CCN1000-1	72431	Aug.21,2017	Aug.20,2018
AC Source	Schaffner	NSG1007	56825	Aug.21,2017	Aug.20,2018
Signal Generator	AGILENT	N5171B	MY53050474	Sep.21,2017	Sep.20,2018

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**TEST EQUIPMENT OF RS&CS IMMUNITY TEST**

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Signal Generator	AGILENT	E8257D	MY45141029	Sep.21,2017	Sep.20,2018
Biconilog Antenna	EMCO	3142C	00060447	Mar. 01, 2018	Feb. 28, 2020
Power Probe	R&S	URV5-Z4	100124	Mar. 01, 2018	Feb. 28, 2019
Power Meter	R&S	NRVD	8323781027	June 20, 2017	June 19,2018
Power Amplifier	KALMUS	7100LC	04-02/17-06-001	June 20, 2017	June 19,2018
RF Amplifier	Milmega	AS0104-55_55	1004793	June 20, 2017	June 19,2018
Power Amplifier	RF Light	NTWPAS-2560100	2016051406	May. 13, 2018	May. 12, 2019
Directional Coupler	Werlatone	C5571-10	99463	June 20, 2017	June 19,2018
Directional Coupler	Werlatone	C6026-10	99482	June 20, 2017	June 19,2018
Power Amplifier	AR	75A250	18464	June 20, 2017	June 19,2018
CDN	Schaffner	M016	21264	Aug.21,2017	Aug.20,2018
6dB attenuator	JWF	50FHC-006-50	5N-20	Mar. 01, 2018	Feb. 28, 2019
Electromagnetic Injection Clamp	Luthi	EM101	35773	Aug.21,2017	Aug.20,2018
Audio Power Amplifier	B&K	2716-C-001	2647129	June 29, 2017	June 28,2018
Conditioning Amplifier	B&K	2690-OS2	2654235	June 29, 2017	June 28,2018
Microphone	B&K	4192	26488641	June 29, 2017	June 28,2018
Probe Microphone	B&K	4182	2647123	June 29, 2017	June 28,2018
Sound Calibrator	B&K	4231	2656617	June 29, 2017	June 28,2018
Mouth Simulator	B&K	4227	2659578	June 29, 2017	June 28,2018
Telephone Test Head	B&K	4206B	2663112	June 29, 2017	June 28,2018
Audio Analyzer	R&S	UPV	101196	July 16,2017	July 15,2018
Wireless communication test	R&S	CMW500	120909	July 13, 2017	July 12, 2018
Wireless Communication Test Set	AGILENT	8960	GB42361316	Mar. 01, 2018	Feb. 28, 2019
Horn antenna	ETS	3117	00034609	Mar. 01, 2018	Feb. 28, 2020
1 KHZ standard audio source	B&K	4231	26741065	May. 13, 2018	May. 12, 2019
Filter Bank Notch	MICRO-TRONICS	010	/	Mar. 01, 2018	Feb. 28, 2019

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1(880-915MHz)					
Filter Bank Notch 2(1710-1785MHz)	MICRO-TRONICS	009	/	Mar. 01, 2018	Feb. 28, 2019
Filter Bank Notch 3(1920-1980MHz)	MICRO-TRONICS	008	/	Mar. 01, 2018	Feb. 28, 2019
TEST SOFTWARE	FR	EZ-EMC	Ver.RA-03A	--	--
CHAMBER	ETS	---	---	Mar. 01, 2018	Feb. 28, 2020

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## 6. EMISSION TEST

### 6.1. MAINS TERMINAL DISTURBANCE VOLTAGE MEASUREMENT

#### 6.1.1 LIMITS OF MAINS TERMINAL DISTURBANCE VOLTAGE AND TABLE A OF EN55032

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:**

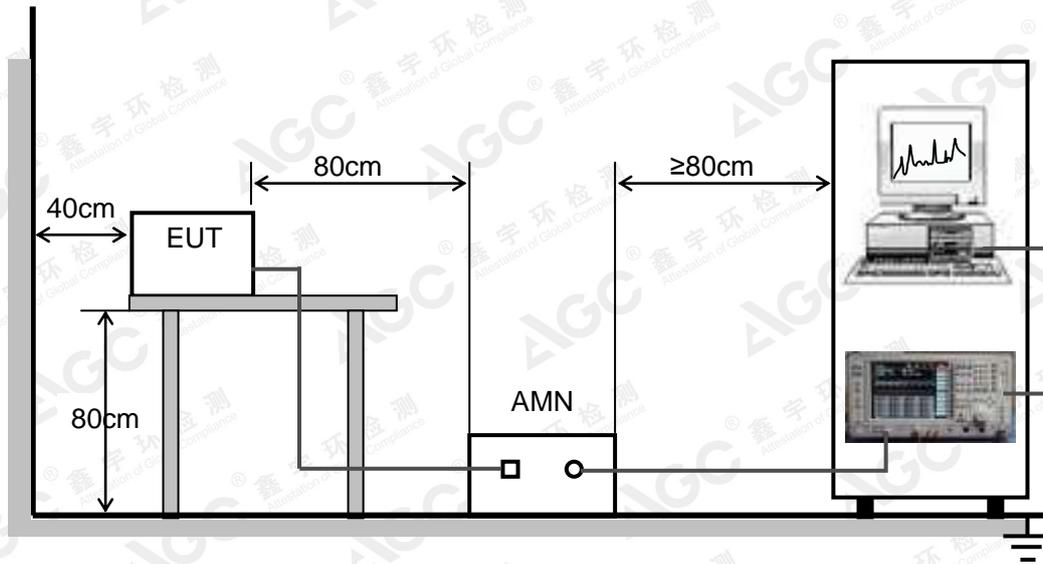
1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

#### 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 (AMN). 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.

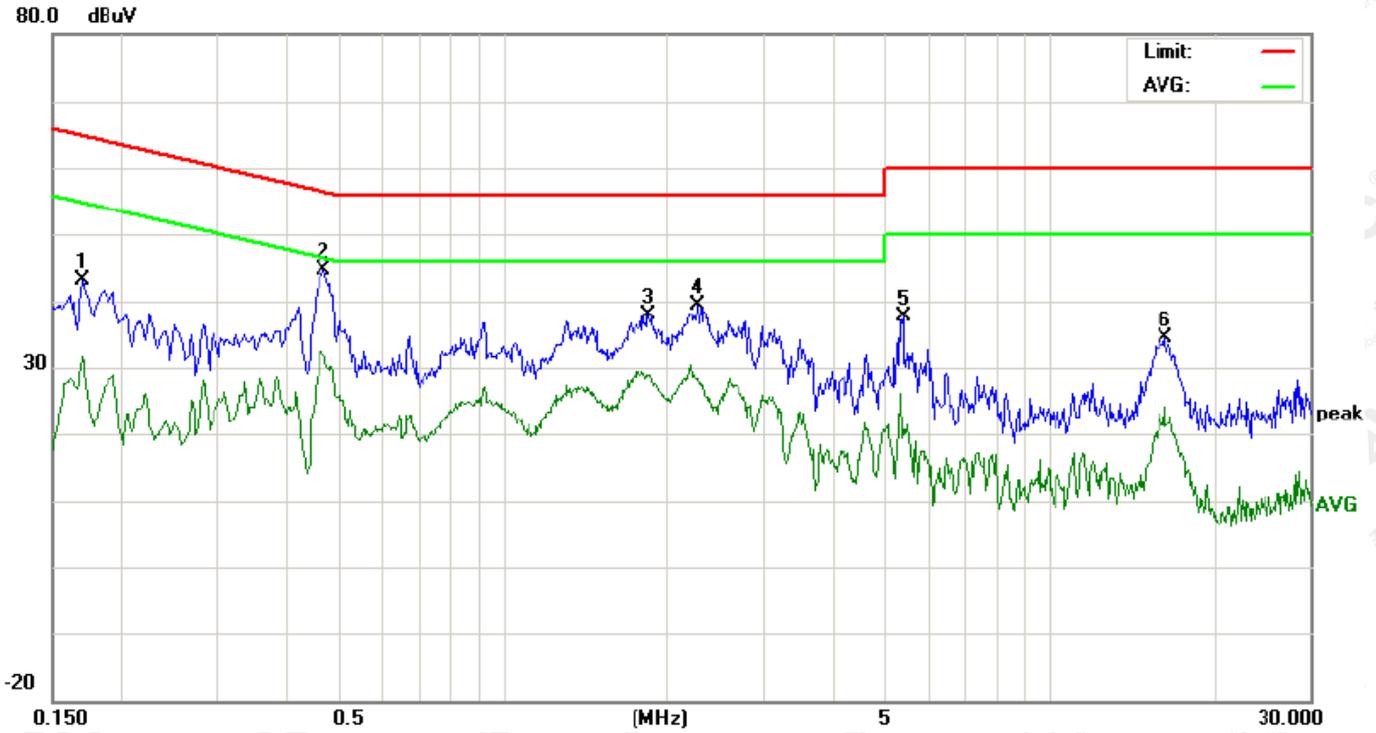
### 6.1.4 TEST RESULT

All test modes were carried out for all operation modes

The worst test data (Specification A of mode 1) was showed as the follow:

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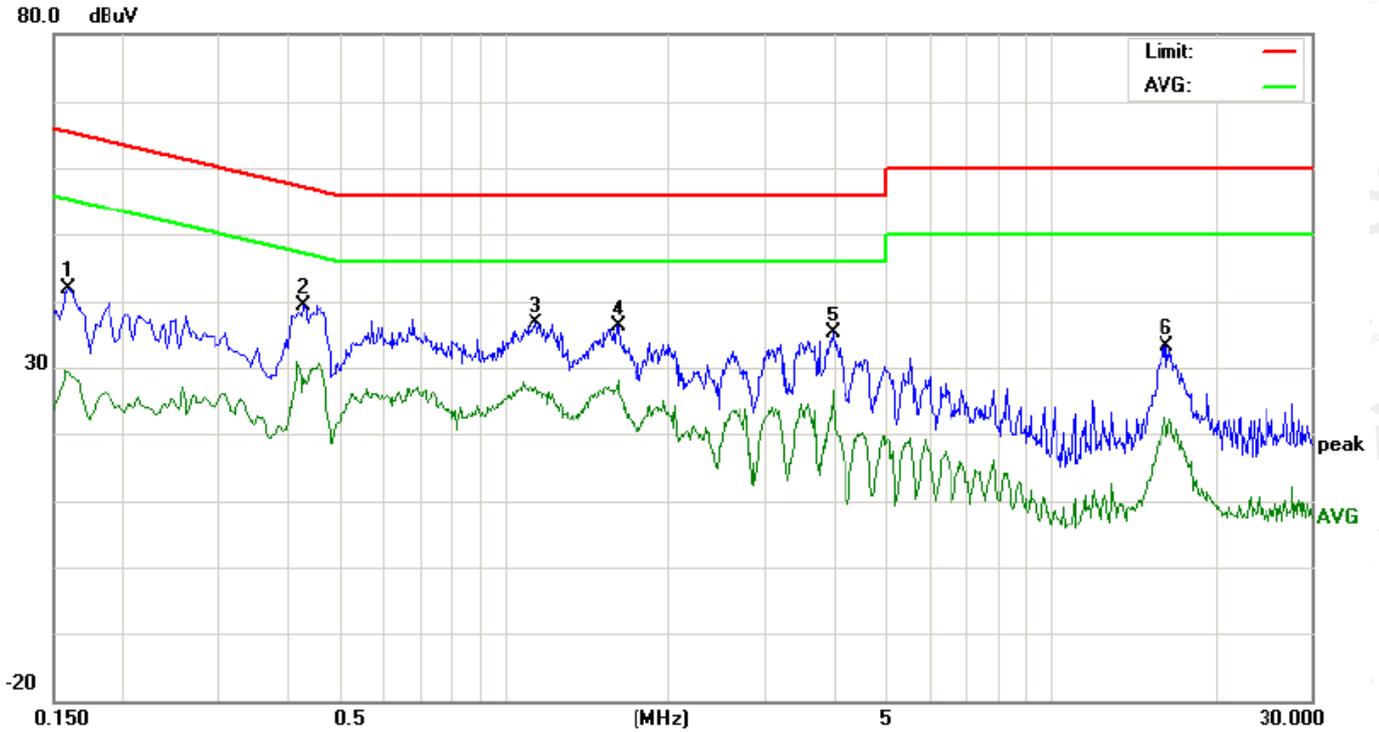
LINE CONDUCTED EMISSION TEST-L



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor (dB)	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1700	33.06		21.41	10.18	43.24		31.59	64.96	54.96	-21.72	-23.37	P	
2	0.4700	34.33		21.49	10.38	44.71		31.87	56.51	46.51	-11.80	-14.64	P	
3	1.8500	27.68		18.68	10.27	37.95		28.95	56.00	46.00	-18.05	-17.05	P	
4	2.2740	29.12		18.12	10.33	39.45		28.45	56.00	46.00	-16.55	-17.55	P	
5	5.4179	27.38		9.80	10.25	37.63		20.05	60.00	50.00	-22.37	-29.95	P	
6	16.2779	24.34		14.01	10.12	34.46		24.13	60.00	50.00	-25.54	-25.87	P	

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LINE CONDUCTED EMISSION TEST-N



No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor (dB)	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1590	31.67		19.13	10.17	41.84		29.30	65.51	55.51	-23.67	-26.21	P	
2	0.4300	29.12		17.97	10.35	39.47		28.32	57.25	47.25	-17.78	-18.93	P	
3	1.1460	26.27		16.73	10.37	36.64		27.10	56.00	46.00	-19.36	-18.90	P	
4	1.6180	25.84		17.80	10.34	36.18		28.14	56.00	46.00	-19.82	-17.86	P	
5	3.9900	24.77		16.08	10.43	35.20		26.51	56.00	46.00	-20.80	-19.49	P	
6	16.3339	23.10		9.52	10.12	33.22		19.64	60.00	50.00	-26.78	-30.36	P	

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## 6.2. RADIATED DISTURBANCE MEASUREMENT

### 6.2.1. LIMITS OF RADIATED DISTURBANCES

Radiated Emission at Frequencies up to 1GHz

For Class B Equipment SAC/OATS

EN 55032 Table clause	Frequency range (MHz)	Distance (m)	Detector type	Limits (dBuV/m)
A4.1	30 - 230	10	Quasi Peak	30
	230 - 1000			37
A4.2	30 - 230	3	Quasi Peak	40
	230 - 1000			47

Radiated Emission at Frequencies above 1GHz

For Class B Equipment FSOATS

EN 55032 Table clause	Frequency range (MHz)	Distance (m)	Detector type	Limits (dBuV/m)
A5.1	1000 - 3000	3	Average	50
	3000 - 6000			54
A5.2	1000 - 3000		Peak	70
	3000 - 6000			74

### 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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### 6.2.2. TEST PROCEDURE

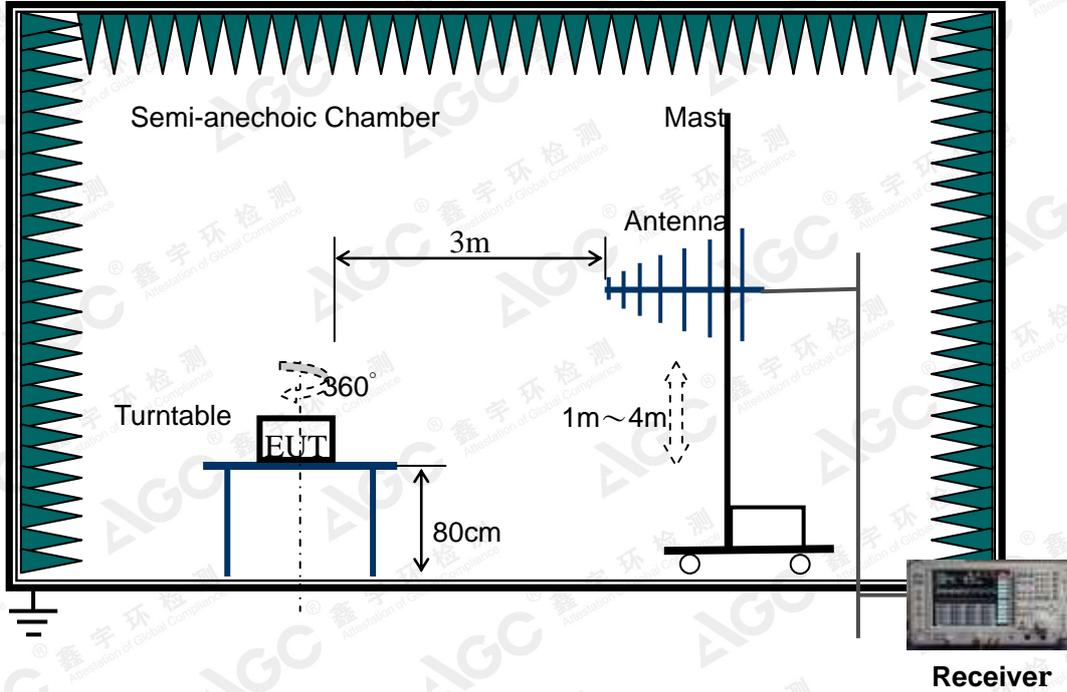
- (1). The EUT was placed on the top of an insulating table 0.8 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- (2). The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on 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 rotatable 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 3 dB 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 3 dB 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 rotatable 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.

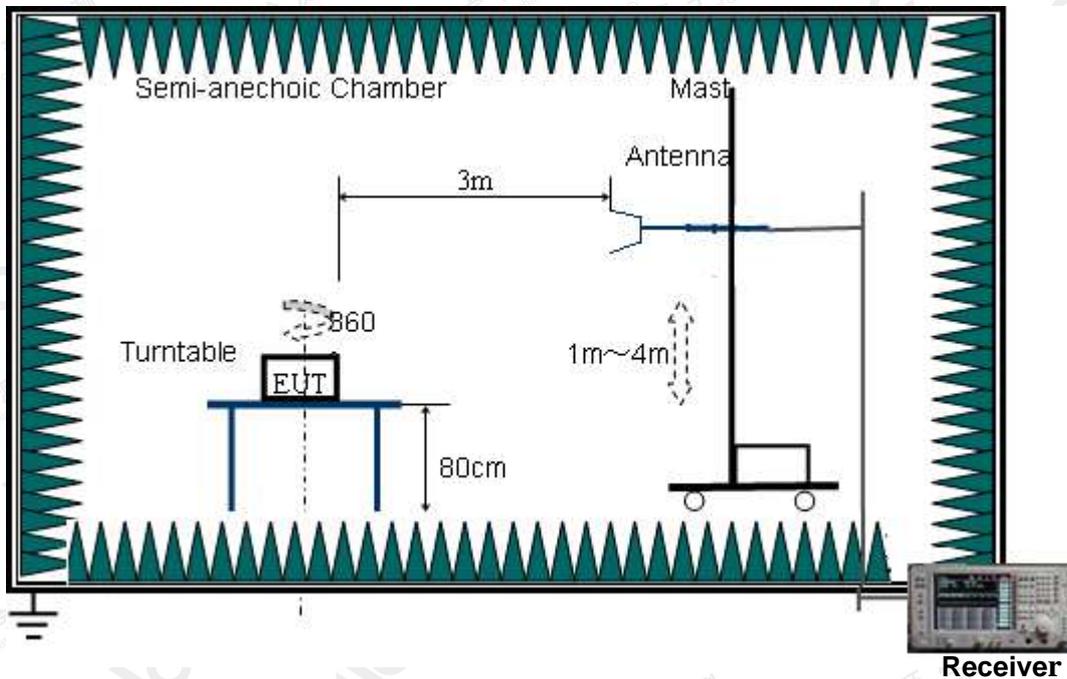
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**6.2.3. BLOCK DIAGRAM OF TEST SETUP**

**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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**6.2.4 TEST RESULT**

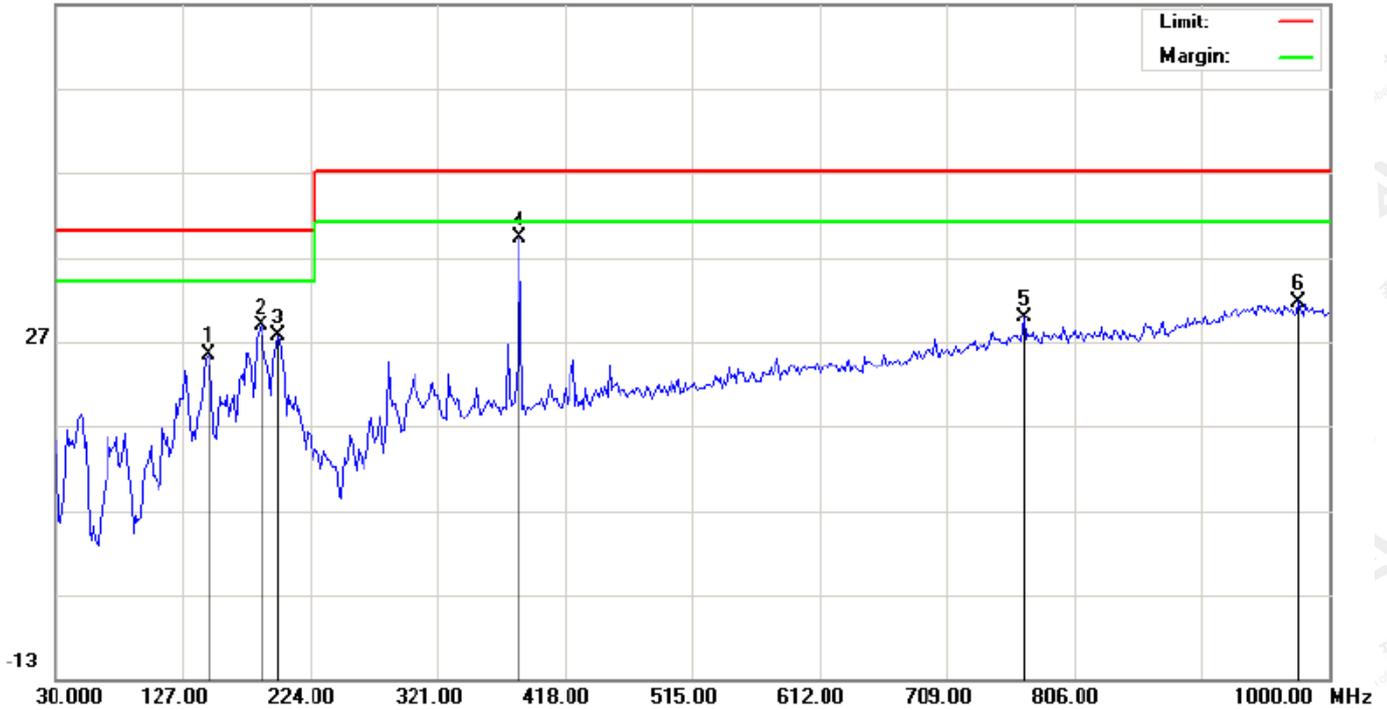
All test modes were carried out for all operation modes

The worst test data (Specification A GSM 900 of mode 1) was showed as the follow:

Note: The filter has been used in this test.

**RADIATED EMISSION BELOW 1GHZ- HORIZONTAL**

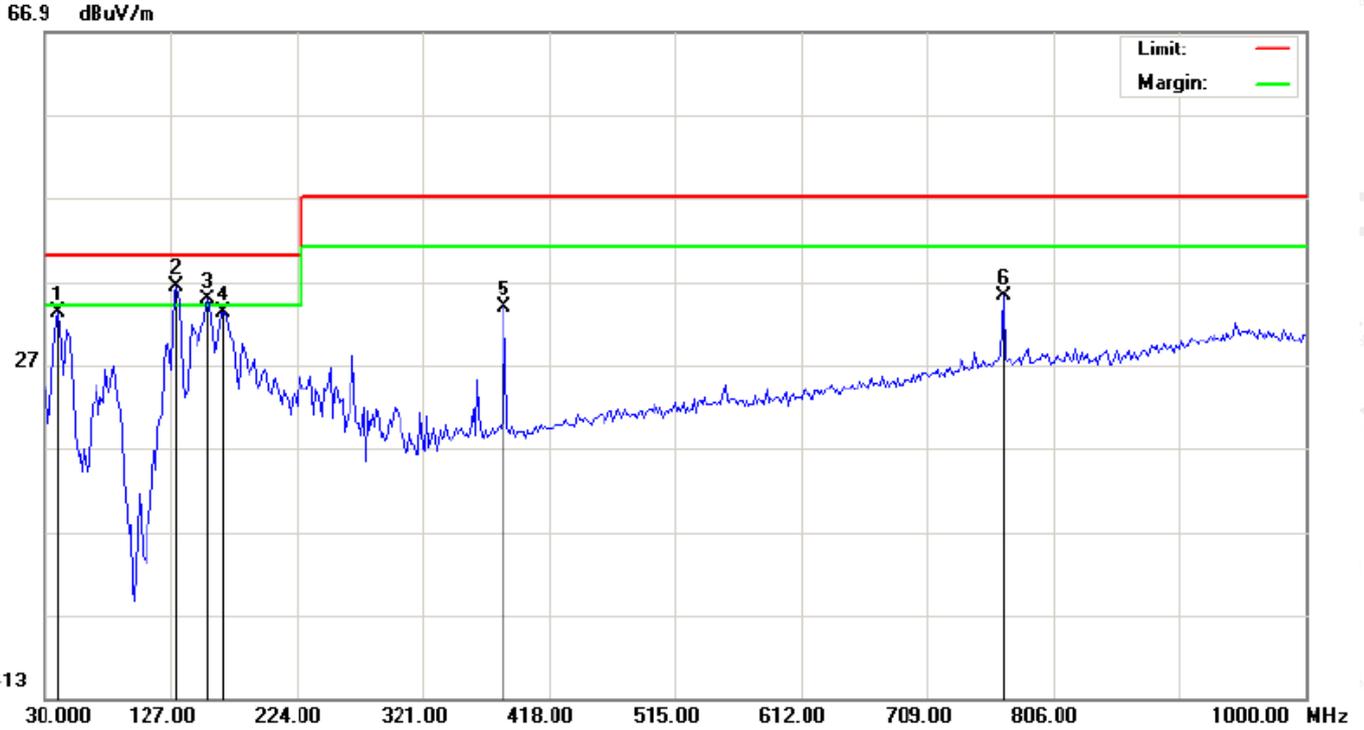
66.9 dBuV/m



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		146.4000	11.78	13.64	25.42	40.00	-14.58	peak			
2		186.8166	17.33	11.39	28.72	40.00	-11.28	peak			
3		199.7500	15.68	11.99	27.67	40.00	-12.33	peak			
4	*	384.0500	20.29	18.96	39.25	47.00	-7.75	peak			
5		767.2000	2.92	26.87	29.79	47.00	-17.21	peak			
6		977.3667	1.96	29.74	31.70	47.00	-15.30	peak			

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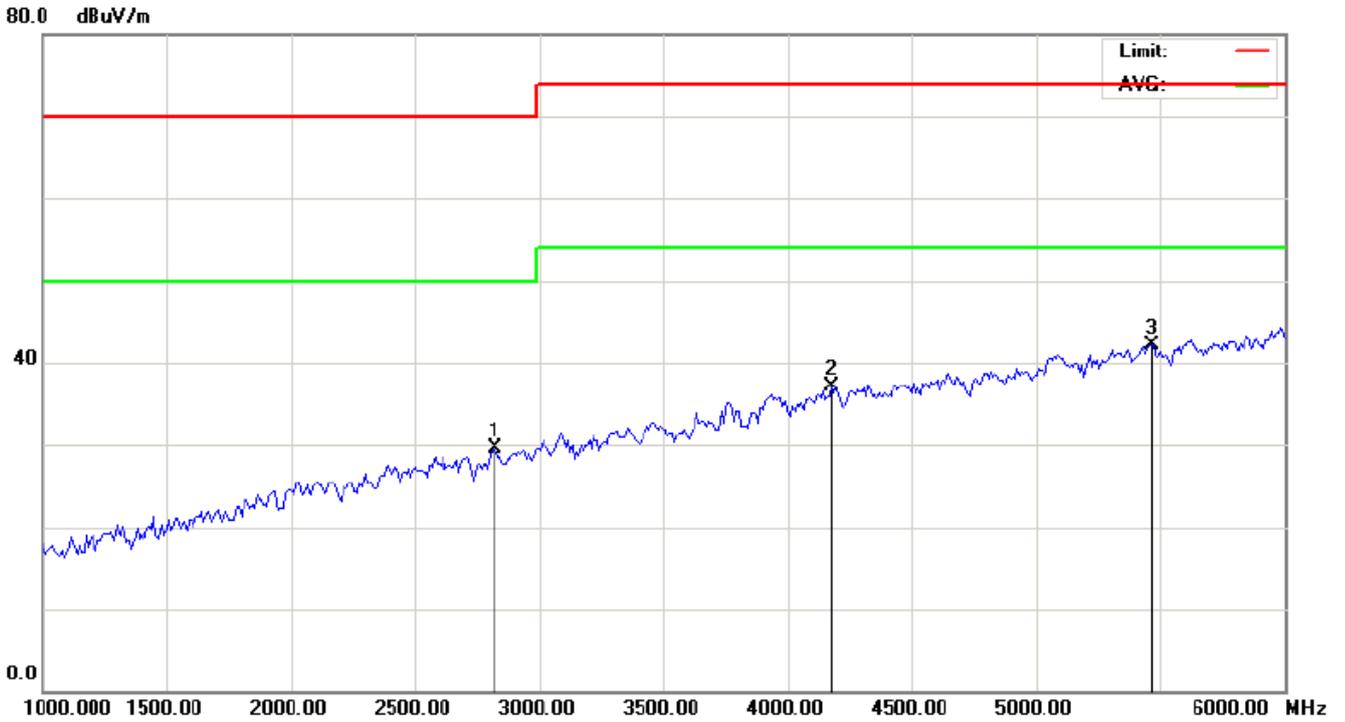
RADIATED EMISSION BELOW 1GHZ- VERTICAL



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		41.3166	24.42	8.81	33.23	40.00	-6.77	peak			
2	*	131.8499	24.56	11.80	36.36	40.00	-3.64	peak			
3	!	156.0999	19.57	15.30	34.87	40.00	-5.13	peak			
4		167.4166	18.33	14.86	33.19	40.00	-6.81	peak			
5		384.0500	14.87	18.96	33.83	47.00	-13.17	peak			
6		767.2000	8.25	26.87	35.12	47.00	-11.88	peak			

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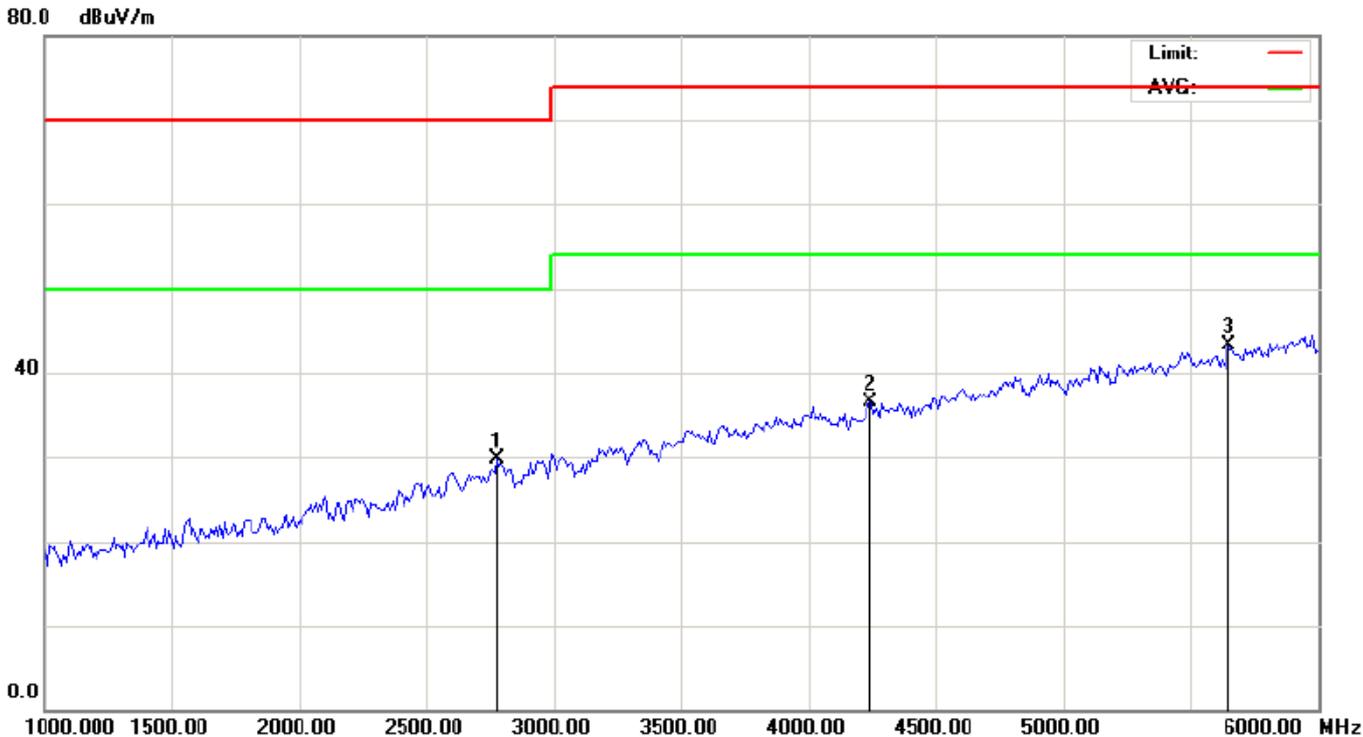
RADIATED EMISSION ABOVE 1GHZ – HORIZONTAL



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		2825.000	13.40	16.07	29.47	70.00	-40.53	peak			
2		4175.000	20.55	16.48	37.03	74.00	-36.97	peak			
3	*	5466.667	26.27	15.82	42.09	74.00	-31.91	peak			

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RADIATED EMISSION ABOVE 1GHZ - VERTICAL



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		2775.000	13.64	16.01	29.65	70.00	-40.35	peak			
2		4241.667	20.36	16.20	36.56	74.00	-37.44	peak			
3	*	5650.000	27.44	15.86	43.30	74.00	-30.70	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  $\leq 16$  A per phase, and intended to be connected to public low-voltage distribution systems.

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

**Note:**

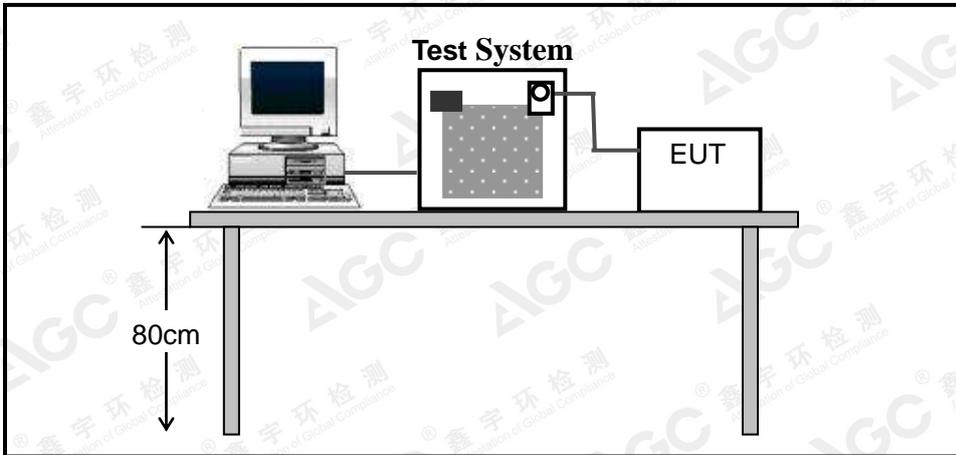
1. According to section 5 of EN61000-3-2, the EUT is Class A equipment.
2. The above limits are for all applications having an active input power >75W. No limits apply for equipment with an active input power up to and including 75W.

#### 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  $\leq 16$  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 GSM 900 as follow:

Test Parameter	Measurement Value	Limit	Remarks
$P_{st}$	0.013	1.0	Pass
$P_{lt}$	0.012	0.65	Pass
$T_{dt}(s)$	0.05	0.2	Pass
$d_{max}(\%)$	0.05%	4%	Pass
$d_c(\%)$	0.12%	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
<b>A</b>	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>B</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
<b>C</b>	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 AND TR TO EUT

### 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. PERFORMANCE CRITERIA FOR (GSM/ WCDMA/LTE)**

<b>CLAUSE 6 of EN301 489 –52</b>	
<b>Criteria</b>	<b>Performance criteria</b>
<b>CT/CR</b>	<p>During and 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. At the conclusion of the test, the EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained. In addition to confirming the above performance during a call, the test shall also be performed in idle mode, and the transmitter shall not unintentionally operate.</p> <p>The EUT shall operate as its intended operating condition during and after the test.</p> <p>The EUT (transmitter) uplink speech output level shall be at least 35dB less than the previously recorded reference.</p> <p>The EUT (receiver) shall show the RXQUAL of the GSM downlink does not exceed the value of three, and the BER of the WCDMA shall no greater than 0.1%, and measure during each individual exposure in the test sequence.</p> <p>The EUT (receiver) downlink speech output level shall be at least 35dB less than the previously recorded reference.</p> <p>The EUT shall show no loss of user control functions or stored data and the communication link shall be maintained during and after the test.</p> <p>The EUT shall show no unintentional responses when it is in idle condition.</p>
<b>TT/TR</b>	<p>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. At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link. At the conclusion of the total test comprising the series of individual exposures, the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the communication link shall have been maintained. In addition to confirming the above performance during a call, the test shall also be performed in idle mode, and the transmitter shall not unintentionally operate.</p>

**Note:**

For data transmission, the EUT was assessed in the following methods:

For WCDMA testing, the BER (as referred in TS 134 109 [9]) is used, it shall not exceed 0.1% during the test sequence.

For LTE testing, the throughput (as referred in TS 134 109 [9]) is used, it shall not exceed 0.1% during the test sequence.

**Note:** All test modes have been tested during the test.

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**7.2.4 GENERAL PERFORMANCE CRITERIA TO BT/ 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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## 7.2.5 PERFORMANCE CRITERIA FOR TT AND TR TO BT/ WIFI

### PERFORMANCE FOR TT TO BT/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 BT/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.

## 7.2.6 PERFORMANCE CRITERIA FOR CT AND CR TO BT/ WIFI

### PERFORMANCE FOR CT TO BT/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 BT/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

<b>Basic Standard</b>	EN 61000-4-2
<b>Discharge Impedance</b>	330Ω / 150 pF
<b>Discharge Voltage</b>	Air Discharge –8 kV , Contact Discharge – 4 kV
<b>Polarity</b>	Positive / Negative
<b>Number of Discharge</b>	Minimum 20 times at each test point
<b>Discharge Mode</b>	Single discharge
<b>Discharge Period</b>	1-second minimum
<b>Test Conditions</b>	Temperature/ Humidity:22.4°C/56.3%

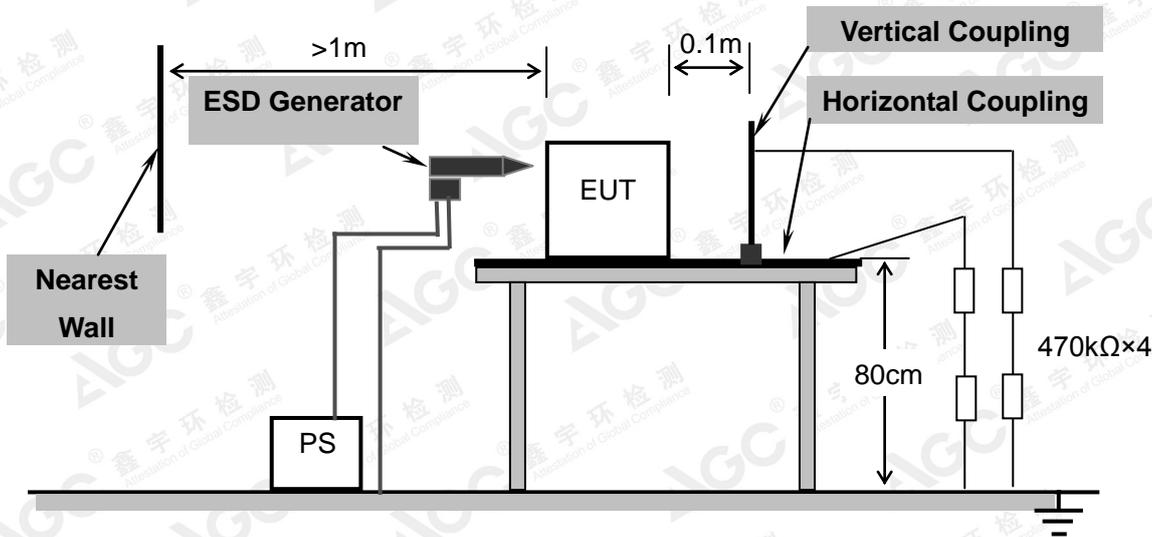
#### 7.3.2. TEST PROCEDURE

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 301 489-52 V1.1.0 MS (MODE 1\_GSM/GPRS/EGPRS 900&DCS/GPRS/EGPRS 1800) 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
Stethoscope	±2, ±4 , ±8	Air	TT, TR	Pass
Camera	±2, ±4 , ±8	Air	TT, TR	Pass
Screen	±2, ±4 , ±8	Air	TT, TR	Pass
Flashlight	±2, ±4 , ±8	Air	TT, TR	Pass
Interface of Earphone to MS	±2,±4	Contact	TT, TR	Pass
Interface of Adapter/ USB to MS	±2,±4	Contact	TT, TR	Pass
Interface of USB to Adapter	±2,±4	Contact	TT, TR	Pass
Fingerprint	±2,±4	Contact	TT, TR	Pass

**EN 301 489-52 V1.1.0 UMTS (MODE 1\_WCDMA/HSPA2100& WCDMA/HSPA900) 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
Stethoscope	±2, ±4 , ±8	Air	TT, TR	Pass
Camera	±2, ±4 , ±8	Air	TT, TR	Pass
Screen	±2, ±4 , ±8	Air	TT, TR	Pass
Flashlight	±2, ±4 , ±8	Air	TT, TR	Pass
Interface of Earphone to MS	±2,±4	Contact	TT, TR	Pass
Interface of Adapter/ USB to MS	±2,±4	Contact	TT, TR	Pass
Interface of USB to Adapter	±2,±4	Contact	TT, TR	Pass
Fingerprint	±2,±4	Contact	TT, TR	Pass

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**EN 301 489-52 V1.1.0 LTE (MODE 1\_LTE 2100/LTE 1800/LTE 2600/LTE 900/LTE 800) 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
Stethoscope	±2, ±4 , ±8	Air	TT, TR	Pass
Camera	±2, ±4 , ±8	Air	TT, TR	Pass
Screen	±2, ±4 , ±8	Air	TT, TR	Pass
Flashlight	±2, ±4 , ±8	Air	TT, TR	Pass
Interface of Earphone to MS	±2,±4	Contact	TT, TR	Pass
Interface of Adapter/ USB to MS	±2,±4	Contact	TT, TR	Pass
Interface of USB to Adapter	±2,±4	Contact	TT, TR	Pass
Fingerprint	±2,±4	Contact	TT, TR	Pass

**IDEL (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
Stethoscope	±2, ±4 , ±8	Air	TT, TR	Pass
Camera	±2, ±4 , ±8	Air	TT, TR	Pass
Screen	±2, ±4 , ±8	Air	TT, TR	Pass
Flashlight	±2, ±4 , ±8	Air	TT, TR	Pass
Interface of Earphone to MS	±2,±4	Contact	TT, TR	Pass
Interface of Adapter/ USB to MS	±2,±4	Contact	TT, TR	Pass
Interface of USB to Adapter	±2,±4	Contact	TT, TR	Pass
Fingerprint	±2,±4	Contact	TT, TR	Pass

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**EN 301 489-17 V3.2.0 BT (MODE 3) 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
Stethoscope	±2, ±4 , ±8	Air	TT, TR	Pass
Camera	±2, ±4 , ±8	Air	TT, TR	Pass
Screen	±2, ±4 , ±8	Air	TT, TR	Pass
Flashlight	±2, ±4 , ±8	Air	TT, TR	Pass
Interface of Earphone to MS	±2,±4	Contact	TT, TR	Pass
Interface of Adapter/ USB to MS	±2,±4	Contact	TT, TR	Pass
Interface of USB to Adapter	±2,±4	Contact	TT, TR	Pass
Fingerprint	±2,±4	Contact	TT, TR	Pass

**EN 301 489-17 V3.2.0 WIFI (MODE 4) 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
Stethoscope	±2, ±4 , ±8	Air	TT, TR	Pass
Camera	±2, ±4 , ±8	Air	TT, TR	Pass
Screen	±2, ±4 , ±8	Air	TT, TR	Pass
Flashlight	±2, ±4 , ±8	Air	TT, TR	Pass
Interface of Earphone to MS	±2,±4	Contact	TT, TR	Pass
Interface of Adapter/ USB to MS	±2,±4	Contact	TT, TR	Pass
Interface of USB to Adapter	±2,±4	Contact	TT, TR	Pass
Fingerprint	±2,±4	Contact	TT, TR	Pass

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**EN 301 489-19 V2.1.0 GPS (MODE 5) TEST RESULTS**

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

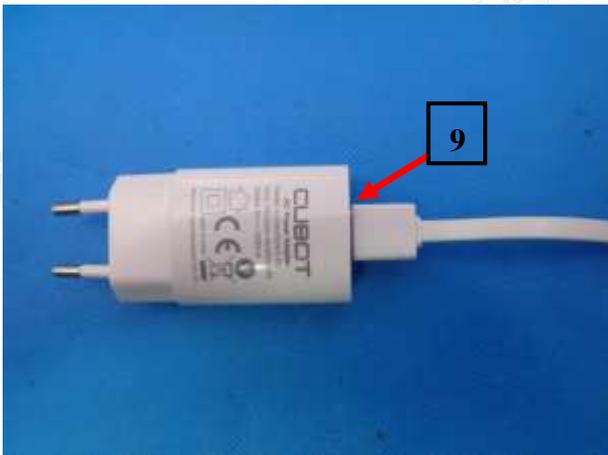
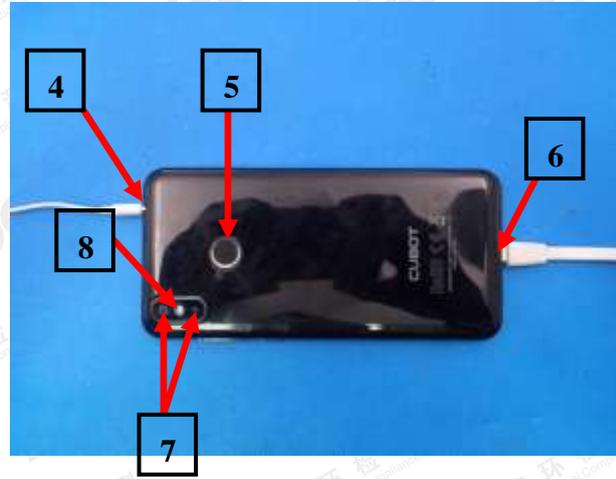
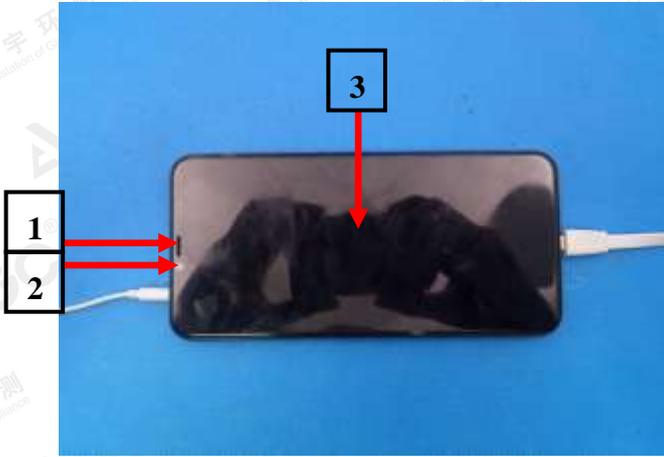
Note: There was not any intentional transmission discovered in standby mode

**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 points are 1~3 and 7~8. The contact discharge points are 4~6 and 9.

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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 – 6000MHz
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:23.1°C/56.3%

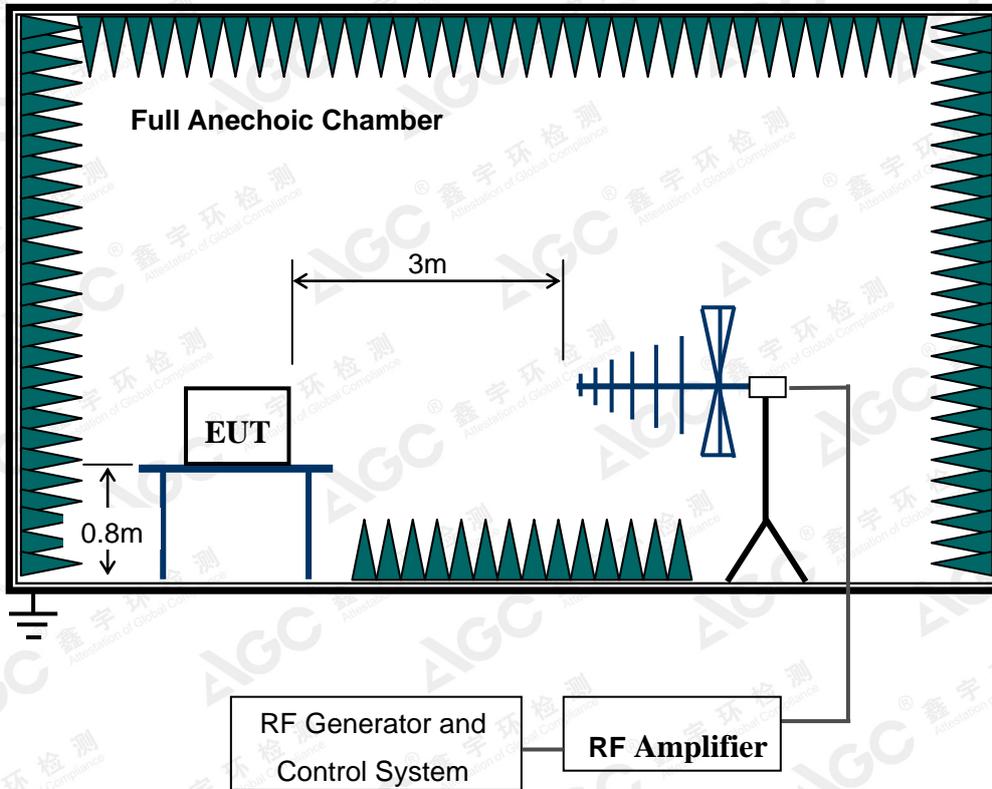
### 7.4.2 TEST PROCEDURE

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

- a. The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- b. The test signal was 80% amplitude modulated with a 1 kHz sine wave.
- c. The frequency range was swept from 80 MHz – 6000MHz to 2700MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers. The rate of sweep did not exceed  $1.5 \times 10^{-3}$  decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
- d. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- e. The field strength level was 3V/m.
- f. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.
- g. Downlink Mode: the audio source was adjusted to achieve a reference level equivalent to a SPL of 0 dBPa at 1 kHz at the input of the acoustic coupler for the downlink, the reading of the audio level meter was recorded as a reference level. During the test, the downlink speech output level was monitored, it was confirmed to be at least 35 dB less than the previously- recorded reference level.
- h. Uplink Mode: EUT is used for this calibration, the output of the audio source was adjusted to achieve a reference level equivalent to a SPL of -5 dBPa at 1kHz at the Mouth Reference Point (MRP), the reading of the audio level meter, which was connected to the output of the communication tester, was recorded as a reference level. During the test, the uplink speech output level was monitored, it was confirmed to be at least 35 dB less than the previously- recorded reference level.

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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 301 489-52 V1.1.0 MS (MODE 1) TEST RESULT**

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Conclusion
GSM/GPRS/EGPRS 900 MHz, Traffic	Vertical	80-6000	3	CT,CR	Pass
	Horizontal	80-6000	3	CT,CR	Pass
GSM/GPRS/EGPRS 900 MHz, Idle	Vertical	80-6000	3	CT,CR	Pass
	Horizontal	80-6000	3	CT,CR	Pass
DCS/GPRS/EGPRS 1800 MHz, Traffic	Vertical	80-6000	3	CT,CR	Pass
	Horizontal	80-6000	3	CT,CR	Pass
DCS/GPRS/EGPRS 1800 MHz, Idle	Vertical	80-6000	3	CT,CR	Pass
	Horizontal	80-6000	3	CT,CR	Pass

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

**EN 301 489-52 V1.1.0 UMTS (MODE 1) TEST RESULT**

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Conclusion	Side
UMTS/HSPA 2100 MHz, Traffic	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
UMTS/HSPA 2100 MHz, Idle	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
UMTS/HSPA 900 MHz, Traffic	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
UMTS/HSPA 900 MHz, Idle	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear

**Note:** In the data transfer mode, the BER (as referred in TS 134 109 [8]) is used, it shall not exceed 0,001 during the test sequence, in the speech mode, the performance criteria shall be that the uplink and downlink speech output levels shall be at least 35 dB less than the recorded reference levels, when measured through an audio band pass filter of width 200 Hz, centred on 1 kHz. in idle mode, the transmitter is not unintentionally operate.

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**EN 301 489-52 V1.1.0 LTE (MODE 1) TEST RESULT**

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Conclusion	Side
LTE 2100 MHz, Traffic	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
LTE 2100 MHz, Idle	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
LTE 1800 MHz, Traffic	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
LTE 1800 MHz, Idle	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
LTE 2600 MHz, Traffic	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
LTE 2600 MHz, Idle	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
LTE 900 MHz, Traffic	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
LTE 900 MHz, Idle	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
LTE 800MHz, Traffic	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
LTE 800 MHz, Idle	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear

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	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
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**Note:** In the data transfer mode, the performance criteria shall be that the throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channel as specified in annex C in TS 136 101 [13] with parameters specified in tables 7.3.1-1 and 7.3.1-2 in TS 136 101 [13] during the test sequence. LTE only support data service, not for audio breakthrough. LTE only support data service, not for audio breakthrough.

### IDEL (MODE 2) TEST RESULT

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Conclusion	Side
Operating Mode	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
Standby Mode	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear

### EN 301 489-17 V3.2.0 BT (MODE 3) TEST RESULT

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Conclusion	Side
Operating Mode	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
Standby Mode	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear

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**EN 301 489-17 V3.2.0 WIFI (MODE 4) TEST RESULT**

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Conclusion	Side
Operating Mode	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
Standby Mode	Vertical	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000	3	CT,CR	Pass	Right, Left, Front, Rear

**EN 301 489-19 V2.1.0 GPS (MODE 5) TEST RESULT**

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Conclusion	Side
Operating Mode	Vertical	80-6000 80 MHz; 104 MHz; 136 MHz; 165 MHz; 200 MHz; 260 MHz; 330 MHz; 430 MHz; 560 MHz; 715 MHz ± 1 MHz; 920 MHz ± 1 MHz	3	CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000 80 MHz; 104 MHz; 136 MHz; 165 MHz; 200 MHz; 260 MHz; 330 MHz; 430 MHz; 560 MHz; 715 MHz ± 1 MHz; 920 MHz ± 1 MHz	3	CR	Pass	Right, Left, Front, Rear

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Standby Mode	Vertical	80-6000 80 MHz; 104 MHz; 136 MHz; 165 MHz; 200 MHz; 260 MHz; 330 MHz; 430 MHz; 560 MHz; 715 MHz ± 1 MHz; 920 MHz ± 1 MHz	3	CR	Pass	Right, Left, Front, Rear
	Horizontal	80-6000 80 MHz; 104 MHz; 136 MHz; 165 MHz; 200 MHz; 260 MHz; 330 MHz; 430 MHz; 560 MHz; 715 MHz ± 1 MHz; 920 MHz ± 1 MHz	3	CR	Pass	Right, Left, Front, Rear

Note: For the spot frequency test of the immunity test with radiated RF electromagnetic fields (see ETSI EN 301 489-1 [1], clause 9.2) the EUT shall be assessed by monitoring the accuracy of the call received alert signal.

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**Special conditions for EMC immunity tests (Worst Test Report)**

EUT operating Mode		Polarity	Position (°)	Max. value(dB)	Frequency (MHz)
Call Mode GSM 900	Uplink	H	Front	-55.06	200.20
		V	Front	-58.16	532.21
	Downlink	H	Front	-56.73	420.01
		V	Front	-56.27	617.09

EUT operating Mode		Polarity	Position (°)	Max. value	Frequency (MHz)
Call Mode GSM 900	RX Quality	H	Front	0	80MHz-6000MHz
		V	Front	0	80MHz-6000MHz

EUT operating Mode		Polarity	Position (°)	Max. value(dB)	Frequency (MHz)
UMTS 2100 MHz	Uplink	H	Front	-42.42	577.10
		V	Front	-54.23	790.49
	Downlink	H	Front	-55.16	104.48
		V	Front	-52.64	794.34

EUT operating Mode		Polarity	Position (°)	Max. value	Frequency (MHz)
UMTS 2100 MHz	BER	H	Front	0.0007	80MHz-6000MHz
		V	Front	0.0005	80MHz-6000MHz

EUT operating Mode		Polarity	Position (°)	Max. value(%)	Throughput (%)
LTE 2600 MHz	Throughput	H	Front	97.5	95
		V	Front	98.1	95

**Note:**

Downlink SPL = 0 dBPa at 1KHz at the input of acoustic coupler

Uplink SPL = -5 dBPa at 1KHz at the Mouth Reference Point

During the test BLER / Throughput &gt; 95%

**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

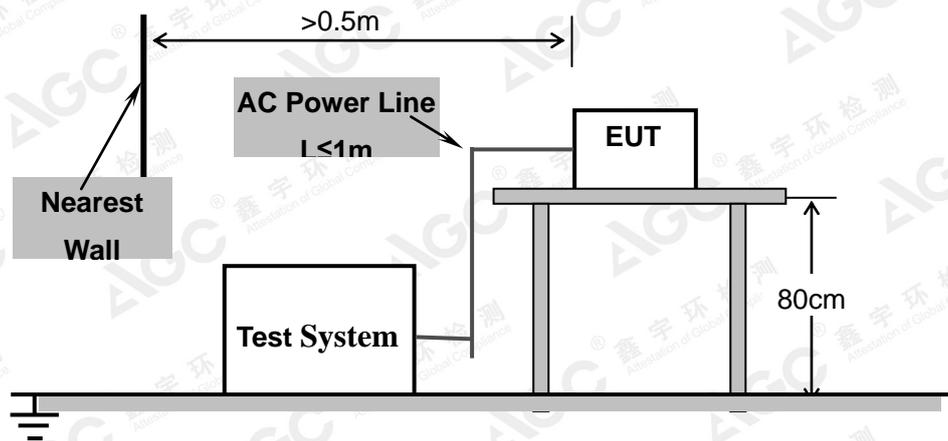
### 7.5.1 TEST SPECIFICATION

<b>Basic Standard</b>	EN 61000-4-4
<b>Test Voltage</b>	a.c. power port – 1 kV; communication port 0.5kV
<b>Polarity</b>	Positive/Negative
<b>Impulse Frequency</b>	5kHz
<b>Impulse wave shape</b>	5/50ns
<b>Burst Duration</b>	15ms
<b>Burst Period</b>	300ms
<b>Test Duration</b>	Not less than 1 min.
<b>Test Conditions</b>	Temperature/ Humidity:22.6°C/56.1%

### 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 301 489-52 V1.1.0 MS (MODE 1\_GSM/GPRS/EGPRS 900&DCS/GPRS/EGPRS 1800) 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

**EN 301 489-52 V1.1.0 UMTS (MODE 1\_WCDMA/HSPA2100& WCDMA/HSPA900) 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

**EN 301 489-52 V1.1.0 LTE (MODE 1\_LTE 2100/LTE 1800/LTE 2600/LTE 900/LTE 800) 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

**IDEL (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

**EN 301 489-17 V3.2.0 BT (MODE 3) 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

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**EN 301 489-17 V3.2.0 WIFI (MODE 4) 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

**EN 301 489-19 V2.1.0 GPS (MODE 5) TEST RESULT**

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

**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

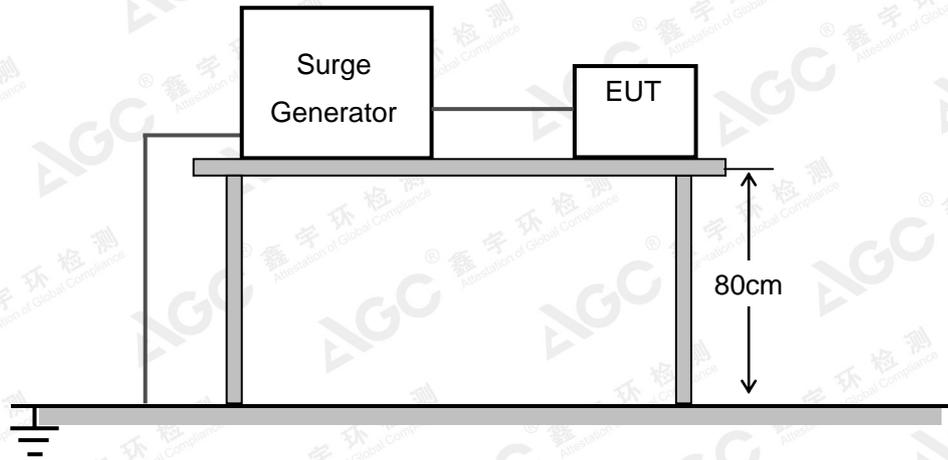
<b>Basic Standard</b>	EN 61000-4-5
<b>Waveform</b>	Voltage 1.2/50 $\mu$ s; Current 8/20 $\mu$ s
<b>Test Voltage</b>	a.c. power port, line to ground 2 kV, line to line 1.0 Kv communication port 1kV
<b>Polarity</b>	Positive/Negative
<b>Phase Angle</b>	0°, 90°, 180°, 270°
<b>Repetition Rate</b>	60sec
<b>Times</b>	5 time/each condition.
<b>Test Conditions</b>	Temperature/ Humidity:23.1°C/55.3%

### 7.6.2 TEST PROCEDURE

- a. The EUT and the auxiliary equipment were placed on a table of 0.8m heights above a metal ground reference plane. The size of ground plane is greater than 1m $\times$ 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).
- b. The EUT was connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise was applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).
- c. The surges were applied line to line and line(s) to earth. When testing line to earth the test voltage was applied successively between each of the lines and earth. Steps up to the test level specified increased the test voltage. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulses.
- d. 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 301 489-52 V1.1.0 MS (MODE 1\_GSM/GPRS/EGPRS 900&DCS/GPRS/EGPRS 1800) TEST RESULT**

Coupling Line	Polarity	Voltage (kV)	Observation	Conclusion
a.c. power, L-N	+/-	1.0	TT,TR	Pass

**EN 301 489-52 V1.1.0 UMTS (MODE 1\_WCDMA/HSPA2100& WCDMA/HSPA900) TEST RESULT**

Coupling Line	Polarity	Voltage (kV)	Observation	Conclusion
a.c. power, L-N	+/-	1.0	TT,TR	Pass

**EN 301 489-52 V1.1.0 LTE (MODE 1\_LTE 2100/LTE 1800/LTE 2600/LTE 900/LTE 800) TEST RESULT**

Coupling Line	Polarity	Voltage (kV)	Observation	Conclusion
a.c. power, L-N	+/-	1.0	TT,TR	Pass

**IDEL (MODE 2) TEST RESULT**

Coupling Line	Polarity	Voltage (kV)	Observation	Conclusion
a.c. power, L-N	+/-	1.0	TT,TR	Pass

**EN 301 489-17 V3.2.0 BT (MODE 3) TEST RESULT**

Coupling Line	Polarity	Voltage (kV)	Observation	Conclusion
a.c. power, L-N	+/-	1.0	TT,TR	Pass

**EN 301 489-17 V3.2.0 WIFI (MODE 4) TEST RESULT**

Coupling Line	Polarity	Voltage (kV)	Observation	Conclusion
a.c. power, L-N	+/-	1.0	TT,TR	Pass

**EN 301 489-19 V2.1.0 GPS (MODE 5) TEST RESULT**

Coupling Line	Polarity	Voltage (kV)	Observation	Conclusion
a.c. power, L-N	+/-	1.0	TR	Pass

**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

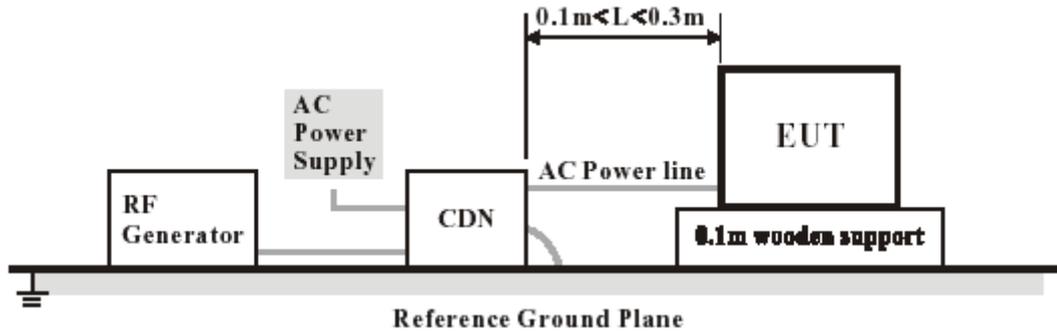
<b>Basic Standard</b>	EN 61000-4-6
<b>Frequency Range</b>	0.15 MHz – 80 MHz
<b>Field Strength</b>	3Vrms
<b>Modulation</b>	1 kHz Sine Wave, 80% AM
<b>Frequency Step</b>	1% of fundamental
<b>Coupled Cable</b>	a.c. power line, Communication Line
<b>Coupling Device</b>	CDN-M2 ,Clamp
<b>Test Conditions</b>	Temperature/ Humidity:22.5°C/55.7%

### 7.7.2 TEST PROCEDURE

- a. The EUT shall be tested within its intended operating and climatic conditions.
- b. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.
- c. The test signal was 80% amplitude modulated with a 1 kHz sine wave
- d. 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  $1.5 \times 10^{-3}$  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.
- e. 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.
- f. Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.
- g. Downlink Mode: the audio source was adjusted to achieve a reference level equivalent to a SPL of 0 dBPa at 1 kHz at the input of the acoustic coupler for the downlink, the reading of the audio level meter was recorded as a reference level. During the test, the downlink speech output level was monitored, it was confirmed to be at least 35 dB less than the previously- recorded reference level.
- h. Uplink Mode: EUT is used for this calibration, the output of the audio source was adjusted to achieve a reference level equivalent to a SPL of -5 dBPa at 1kHz at the Mouth Reference Point (MRP), the reading of the audio level meter, which was connected to the output of the communication tester, was recorded as a reference level. During the test, the uplink speech output level was monitored, it was confirmed to be at least 35 dB less than the previously- recorded reference level.

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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 301 489-52 V1.1.0 MS (MODE 1) TEST RESULT**

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (Vrms)	Observation	Conclusion
GSM/GPRS/EGPRS 900 MHz, Traffic	a.c. port	0.15-80	3	CT,CR	Pass
GSM/GPRS/EGPRS 900 MHz, Idle	a.c. port I	0.15-80	3	CT,CR	Pass
DCS/GPRS/EGPRS 1800 MHz, Traffic	a.c. port	0.15-80	3	CT,CR	Pass
DCS/GPRS/EGPRS 1800 MHz, Idle	a.c. port	0.15-80	3	CT,CR	Pass

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

**EN 301 489-52 V1.1.0 UMTS (MODE 1) TEST RESULT**

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (Vrms)	Observation	Conclusion
UMTS/HSPA 2100 MHz, Traffic	a.c. port	0.15-80	3	CT,CR	Pass
UMTS/HSPA 2100 MHz, Idle	a.c. port I	0.15-80	3	CT,CR	Pass
UMTS/HSPA 900 MHz, Traffic	a.c. port	0.15-80	3	CT,CR	Pass
UMTS/HSPA 900 MHz, Idle	a.c. port I	0.15-80	3	CT,CR	Pass

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

**Note:** In the data transfer mode, the BER (as referred in TS 134 109 [8]) is used, it shall not exceed 0,001 during the test sequence, in the speech mode, the performance criteria shall be that the uplink and downlink speech output levels shall be at least 35 dB less than the recorded reference levels, when measured through an audio band pass filter of width 200 Hz, centred on 1 kHz. in idle mode, the transmitter is not unintentionally operate.

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**EN 301 489-52 V1.1.0 LTE (MODE 1) TEST RESULT**

EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (Vrms)	Observation	Conclusion
LTE 2100 MHz, Traffic	a.c. port	0.15-80	3	CT,CR	Pass
LTE 2100 MHz, Idle	a.c. port I	0.15-80	3	CT,CR	Pass
LTE 1800 MHz, Traffic	a.c. port	0.15-80	3	CT,CR	Pass
LTE 1800 MHz, Idle	a.c. port I	0.15-80	3	CT,CR	Pass
LTE 2600 MHz, Traffic	a.c. port	0.15-80	3	CT,CR	Pass
LTE 2600 MHz, Idle	a.c. port I	0.15-80	3	CT,CR	Pass
LTE 900 MHz, Traffic	a.c. port	0.15-80	3	CT,CR	Pass
LTE 900 MHz, Idle	a.c. port I	0.15-80	3	CT,CR	Pass
LTE 800 MHz, Traffic	a.c. port	0.15-80	3	CT,CR	Pass
LTE 800 MHz, Idle	a.c. port I	0.15-80	3	CT,CR	Pass

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

**Note:** In the data transfer mode, the performance criteria shall be that the throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channel as specified in annex C in TS 136 101 [13] with parameters specified in tables 7.3.1-1 and 7.3.1-2 in TS 136 101 [13] during the test sequence. LTE only support data service, not for audio breakthrough.

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**IDEL (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

**EN 301 489-17 V3.2.0 BT (MODE 3) 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

**EN 301 489-17 V3.2.0 WIFI (MODE 4) 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

**EN 301 489-19 V2.1.0 GPS (MODE 5) TEST RESULT**

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

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**Special Conditions for EMC Immunity Tests (Worst Test Result)**

EUT operating Mode		Max. value(dB)	Frequency (MHz)
Call Mode GSM 900	Uplink	-59.00	4.09
		-53.35	31.87
	Downlink	-49.50	3.28
		-47.48	16.63

EUT operating Mode		Max. value	Frequency (MHz)
Call Mode GSM 900	RX Quality	0	0.15MHz-80.00 MHz
		0	0.15MHz-80.00 MHz

EUT operating Mode		Max. value(dB)	Frequency (MHz)
UMTS 2100 MHz	Uplink	-48.59	4.69
		-51.60	40.63
	Downlink	-55.51	7.70
		-45.82	17.07

EUT operating Mode		Max. value	Frequency (MHz)
UMTS 2100 MHz	BER	0.0006	0.15MHz-80.00 MHz
		0.0005	0.15MHz-80.00 MHz

EUT operating Mode		Max. value(%)	Throughput (%)
LTE 2600 MHz	BLER	97.9	95
		98.3	95

**Note:** Downlink SPL = 0 dBPa at 1KHz at the input of acoustic coupler  
 Uplink SPL = -5 dBPa at 1KHz at the Mouth Reference Point  
 During the test BLER / Throughput > 95%

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

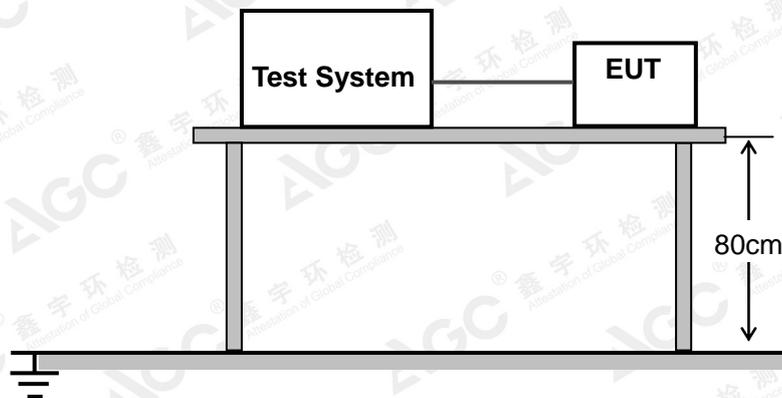
### 7.8.1 TEST SPECIFICATION

<b>Basic Standard</b>	EN 61000-4-11
<b>Voltage Dips</b>	100% reduction, 0.5 Cycle 100% reduction, 1.0 Cycle 30% reduction, 25 Cycles
<b>Voltage Interruptions</b>	100% reduction, 250 Cycles
<b>Voltage Phase Angle</b>	0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°
<b>Test Conditions</b>	Temperature/ Humidity:22.8°C/54.2%

### 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 301 489-52 V1.1.0 MS (MODE 1\_GSM/GPRS/EGPRS 900&DCS/GPRS/EGPRS 1800) 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

**EN 301 489-52 V1.1.0 UMTS (MODE 1\_WCDMA/HSPA2100& WCDMA/HSPA900) 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

**EN 301 489-52 V1.1.0 LTE (MODE 1\_LTE 2100/LTE 1800/LTE 2600/LTE 900/LTE 800) 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

**IDEL (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

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**EN 301 489-17 V3.2.0 BT (MODE 3) 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

**EN 301 489-17 V3.2.0 WIFI (MODE 4) 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

**EN 301 489-19 V2.1.0 GPS (MODE 5) TEST RESULT**

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

**Phenomenon:** no function loss during the test.

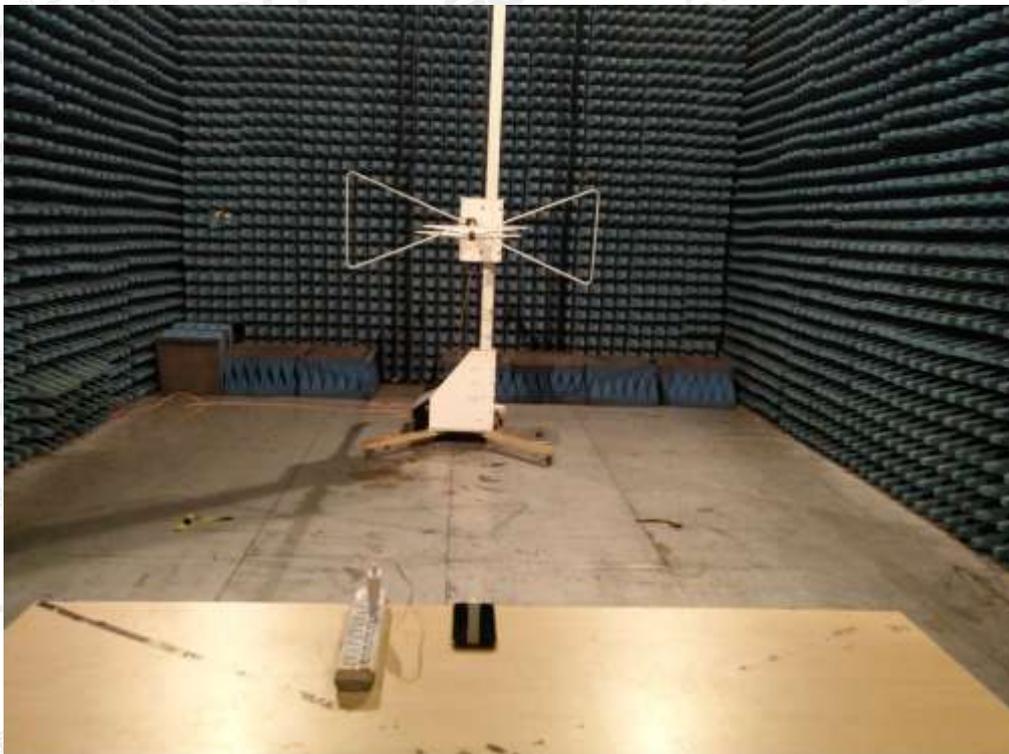
PERFORMANCE CRITERIA	
Criteria requested	<input type="checkbox"/> A / <input checked="" type="checkbox"/> B / <input type="checkbox"/> C
Criteria meet	<input checked="" type="checkbox"/> A / <input type="checkbox"/> B / <input type="checkbox"/> C

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



**RADIATED EMISSION TEST SETUP**



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RADIATED EMISSION-ABOVE 1G TEST SETUP



EN 61000- 3-3 FLICKER TEST SETUP

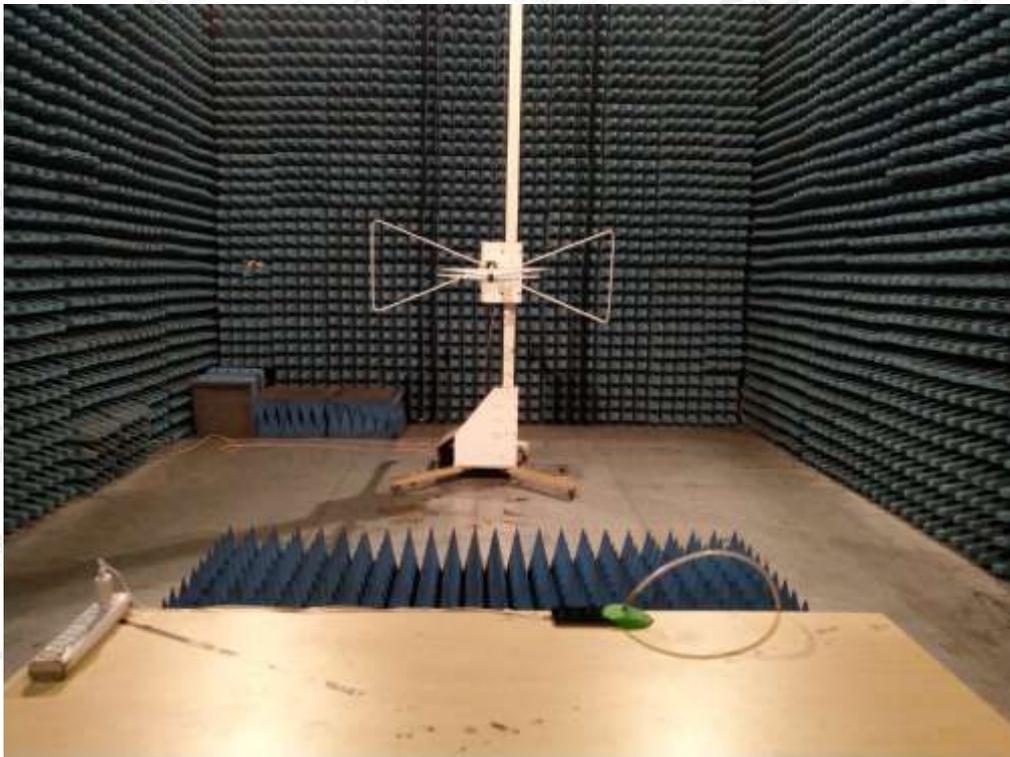


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EN 61000-4-2 ESD TEST SETUP

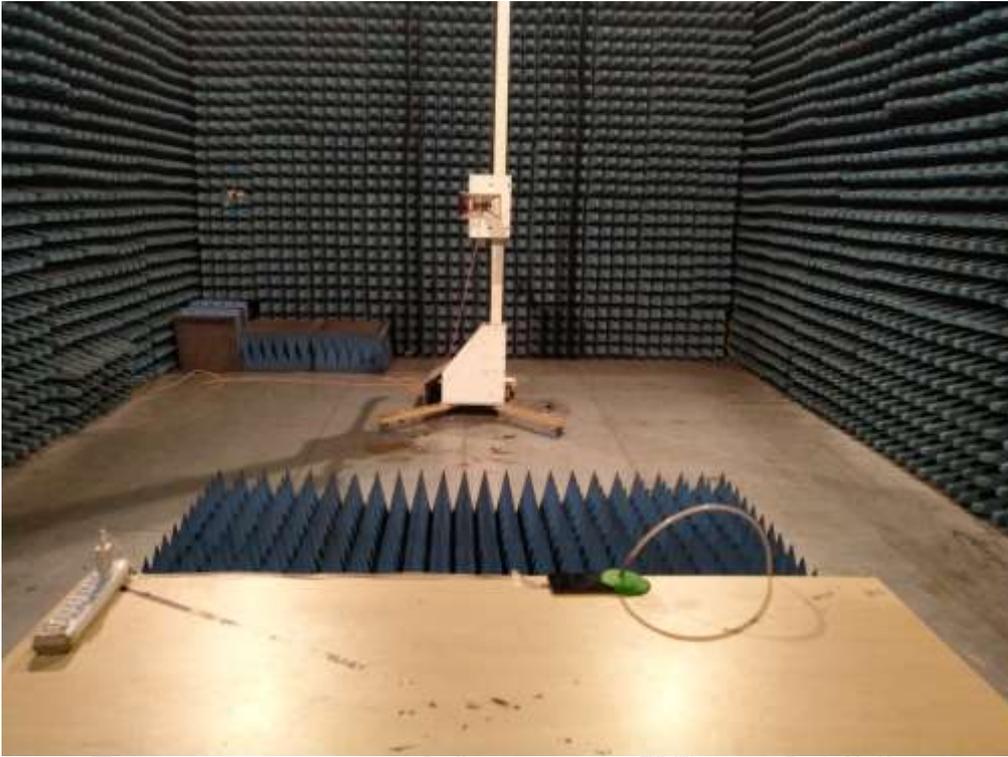


EN 61000-4-3 RS TEST SETUP



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EN 61000-4-3 RS-ABOVE 1G TEST SETUP

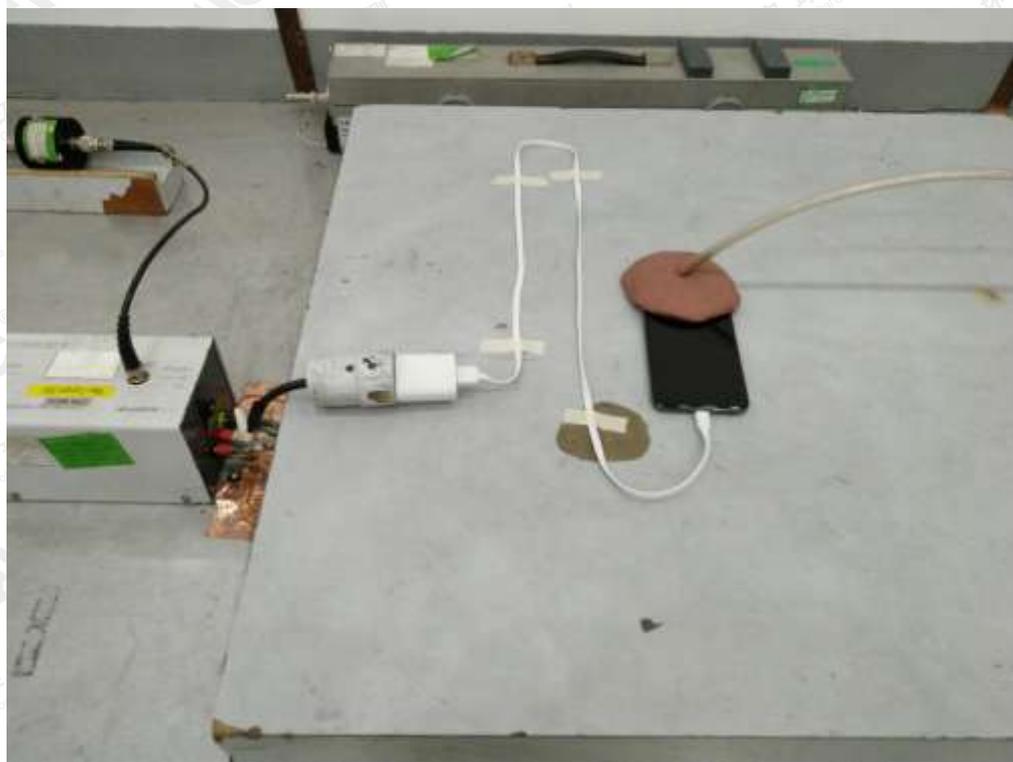


EFT SURGE and DIPS IMMUNITY TEST SETUP



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EN 61000-4-6 CS TEST SETUP



----END OF REPORT----

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