
EMC Test Report

Report No.: AGC00552200501EE01A

PRODUCT DESIGNATION : Smart Phone

BRAND NAME : HAFURY

MODEL NAME : M20

APPLICANT : Shenzhen Huafurui Technology Co., Ltd.

DATE OF ISSUE : Jul. 22, 2020

STANDARD(S) : EN 301 489-1 V2.2.3: 2019-11
EN 301 489-17 V3.2.2: 2019-12 (draft)
EN 301 489-19 V2.1.1: 2019-04
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	/	Jul. 22, 2020	Valid	Re-certification

Note: The original test report Ref. No.(AGC00552200501EE01) (dated 2020-06-08), was modified on 2020-07-22 to include the following changes for:

- Updated brand name and model name;
- Updated battery brand name and model name;
- Changed software version. (It changes due to the change of the product model, does not affect the test result

For the above described changes, no further testing necessary.



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1. TEST REPORT CERTIFICATION

Applicant	Shenzhen Huafurui Technology Co., Ltd.
Address	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
Manufacturer	Shenzhen Huafurui Technology Co., Ltd.
Address	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
Factory Name	Shenzhen Huafurui Technology Co., Ltd.
Address	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
Product Designation	Smart Phone
Brand Name	HAFURY
Test Model	M20
Date of test	May 25, 2020~Jun. 08, 2020
Deviation	None
Test Result	Pass
Report Template	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. The test results of this report relate only to the tested sample identified in this report.

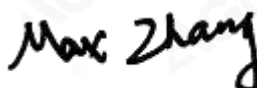
Prepared By



Calvin Liu
(Project Engineer)

Jun. 08, 2020

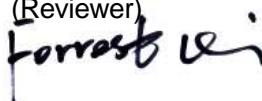
Reviewed By



Max Zhang
(Reviewer)

Jul. 22, 2020

Approved By



Forrest Lei
Authorized Officer

Jul. 22, 2020



2. GENERAL INFORMATION

2.1. DESCRIPTION OF EUT

Details of technical specification refer to the description in follows:

EUT 1–Smart Phone	
Brand Name	HAFURY
Test Model	M20
Hardware Version	TE647_MAIN_PCN_V1.0
Software Version	HAFURY_M20_A041CH_V03_20200713
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 <input checked="" type="checkbox"/> EGPRS
EUT 2–AC/DC Adapter	
Brand Name	CUBOT • HAFURY
Test Model	TPA-97050100VU
Manufacturer Name	Shenzhen Tianyin Electronics Co.,Ltd
Manufacturer Address	2-6 FL, Bldg 9, SanZhuli Industrial Park, Shuitian Community Shiyan Subdistrict, Bao'an District Shenzhen, Guangdong , China
Rated Input	AC100-240V, 50/60Hz, 0.15A
Rated Output	DC5.0V,1000mA
EUT 3–Li-ion Battery	
Brand Name	HAFURY
Test Model	M20
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	3100mAh
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 A 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.



2.2. OBJECTIVE

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



2.3. TEST STANDARDS AND RESULTS

The EUT has been tested according to ETSI EN 301 489-1 V2.2.3: 2019-11; ETSI EN 301 489-19 V2.1.1 2019-04; ETSI EN 301 489-17 V3.2.2: 2019-12; ETSI EN 301 489 -52 V1.1.0 :2016-11.

ETSI EN 301 489-1	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility.
ETSI EN 301 489-17	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility
ETSI EN 301 489-19	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
ETSI EN 301 489-52	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



2.4. TEST ITEMS AND THE RESULTS

No.	Basic Standard	Test Type	Result
EMISSION (EN 301 489-1 §7.1)			
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
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



3. TEST MODE DESCRIPTION

MODE 1 OPERATING MODE	Specification A: GSM 900 Specification: MS + Battery + Charger + Earphone Specification B: DCS 1800 Specification: MS + Battery + Charger + Earphone Specification C: UMTS 2100 Specification: MS + Battery + Charger + Earphone Specification D: UMTS 900 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: HSPA 2100 Specification: MS + Battery + Charger + Earphone Specification J: HSPA 900 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
MODE 2 IDLE MODE	Specification: MS + Battery + Charger + Earphone
MODE 3 BLUETOOTH MODE	Specification: MS + Battery + Charger + Earphone
MODE 4 WIFI MODE	Specification: MS + Battery + Charger + Earphone
MODE 5 GPS MODE	Specification: MS + Battery + Charger + Earphone
MODE 6 OPERATING MODE	Specification A: GSM 900 Specification: MS + Battery + Charger + Earphone Specification B: DCS 1800



	<p>Specification: MS + Battery + Earphone Specification C: UMTS 2100 Specification: MS + Battery + Earphone Specification D: UMTS 900 Specification: MS + Battery + Earphone Specification E: GPRS 900 Specification: MS + Battery + Earphone Specification F: GPRS 1800 Specification: MS + Battery + Earphone Specification G: EGPRS 900 Specification: MS + Battery + Earphone Specification H: EGPRS 1800 Specification: MS + Battery + Earphone Specification I: HSPA 2100 Specification: MS + Battery + Earphone Specification J: HSPA 900 Specification: MS + Battery + Earphone Specification K: LTE band 1 Specification: MS + Battery + Earphone Specification L: LTE band 3 Specification: MS + Battery + Earphone Specification M: LTE band 7 Specification: MS + Battery + Earphone Specification N: LTE band 8 Specification: MS + Battery + Earphone Specification O: LTE band 20 Specification: MS + Battery + Earphone</p>
MODE 7 IDLE MODE	Specification: MS + Battery + Earphone
MODE 8 BLUETOOTH MODE	Specification: MS + Battery + Earphone
MODE 9 WIFI MODE	Specification: MS + Battery + Earphone
MODE 10 GPS MODE	Specification: MS + Battery + Earphone
<p>Note: EMI and EMS contain the above test modes. All the modes had been tested but only the worst data recorded in the report.</p>	



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, $U_c = \pm 4.8\text{dB}$



5. IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao 'an District, Shenzhen, Guangdong, 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	July 12, 2020	July 11, 2021
Wireless communication test	R&S	CMW500	120909	July 11, 2019	July 10, 2020
Signal Analyzer	Agilent	N9010A	MY52090123	Sep. 09, 2019	Sep. 08, 2020
EMI Test Receiver	R&S	ESHS-30	828765	July 11, 2019	July 10, 2020
AMN	R&S	ESH2-Z5	100086	Aug. 26, 2019	Aug. 25, 2020
WIDEBAND REQUENCY ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep. 20, 2019	Sep. 19, 2020
Double-Ridged Waveguide Horn Antenna	ETS LINDGREN	3117	00034609	May 17, 2019	May 16, 2021
ESD Simulator	Schaffner	NSG 438	782	Sep. 09, 2019	Sep. 08, 2020
Electrical Fast Transient Burst Generator	EM Test	EFT 200	0503-03	Aug. 26, 2019	Aug. 25, 2020
Lightning Surge Generator	Schaffner	Modula 6150	34437	Aug. 26, 2019	Aug. 25, 2020
Voltage Dip Immunity Test Generator	EM Test	VDS 200	1199-06	Aug. 26, 2019	Aug. 25, 2020
Signal Conditioning Unit	Schaffner	CCN1000-1	72431	Aug. 26, 2019	Aug. 25, 2020
AC Source	Schaffner	NSG1007	56825	Aug. 26, 2019	Aug. 25, 2020
Signal Generator	AGILENT	N5171B	MY53050474	Sep. 09, 2019	Sep. 08, 2020



TEST EQUIPMENT OF RS&CS IMMUNITY TEST

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Signal Generator	AGILENT	E8257D	MY45141029	Sep. 09, 2019	Sep. 08, 2020
Biconilog Antenna	EMCO	3142C	00060447	May 17, 2019	May 16, 2021
Power Probe	R&S	URV5-Z4	100124	May 22, 2020	May 21, 2022
Power Meter	R&S	NRVD	8323781027	May 22, 2020	May 21, 2022
Power Amplifier	KALMUS	7100LC	04-02/17-06-001	June 12, 2019	June 11, 2020
RF Amplifier	Milmega	AS0104-55_55	1004793	June 12, 2019	June 11, 2020
Power Amplifier	RF Light	NTWPAS-2560100	2016051406	Sep. 09, 2019	Sep. 08, 2020
Directional Coupler	Werlatone	C5571-10	99463	June 12, 2019	June 11, 2020
Directional Coupler	Werlatone	C6026-10	99482	June 12, 2019	June 11, 2020
Power Amplifier	AR	75A250	18464	June 12, 2019	June 11, 2020
CDN	Schaffner	M016	21264	Aug. 26, 2019	Aug. 25, 2020
6dB attenuator	JWF	50FHC-006-50	5N-20	June 12, 2019	June 11, 2020
Electromagnetic Injection Clamp	Luthi	EM101	35773	Aug. 26, 2019	Aug. 25, 2020
Audio Power Amplifier	B&K	2716-C-001	2647129	June 25, 2019	June 24, 2020
Conditioning Amplifier	B&K	2690-OS2	2654235	June 25, 2019	June 24, 2020
Microphone	B&K	4192	26488641	June 25, 2019	June 24, 2020
Probe Microphone	B&K	4182	2647123	June 25, 2019	June 24, 2020
Sound Calibrator	B&K	4231	2656617	June 25, 2019	June 24, 2020
Mouth Simulator	B&K	4227	2659578	June 25, 2019	June 24, 2020
Telephone Test Head	B&K	4206B	2663112	June 25, 2019	June 24, 2020
Audio Analyzer	R&S	UPV	101196	July 11, 2019	July 10, 2020
Wireless communication test	R&S	CMW500	120909	July 11, 2019	July 10, 2020
Horn antenna	ETS	3117	00034609	May 17, 2019	May 16, 2021
1 KHZ standard audio source	B&K	4231	26741065	May 22, 2020	May 21, 2021
Filter Bank Notch 1(880-915MHz)	MICRO-TRONICS	010	/	Feb. 25, 2020	Feb. 24, 2021



Filter Bank Notch 2(1710-1785MHz)	MICRO-TRONICS	009	/	Feb. 25, 2020	Feb. 24, 2021
Filter Bank Notch 3(1920-1980MHz)	MICRO-TRONICS	008	/	Feb. 25, 2020	Feb. 24, 2021
TEST SOFTWARE	FR	EZ-EMC	Ver.RA-03A	--	--
CHAMBER	ETS	---	---	Feb. 25, 2020	Feb. 24, 2021



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:

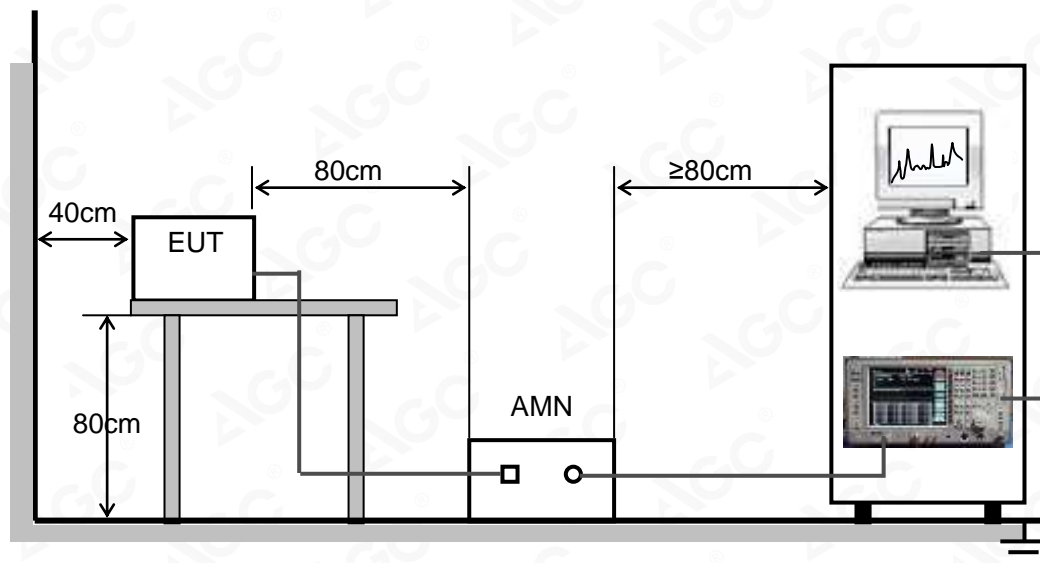
1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

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.



6.1.3 TEST SETUP



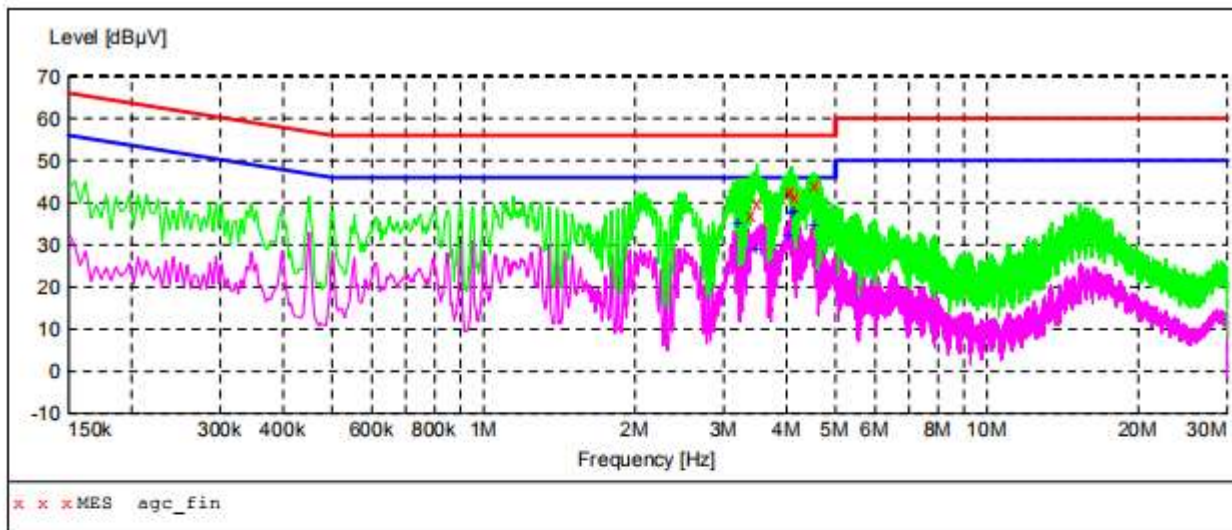
For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

6.1.4 TEST RESULT

All test modes were carried out for all operation modes

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

LINE CONDUCTED EMISSION TEST-L



MEASUREMENT RESULT: "agc_fin"

2020/5/25 11:08

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
3.398000	37.00	10.4	56	19.0	QP	L1	GND
3.494000	40.00	10.4	56	16.0	QP	L1	GND
4.038000	42.20	10.4	56	13.8	QP	L1	GND
4.086000	42.80	10.4	56	13.2	QP	L1	GND
4.154000	41.40	10.4	56	14.6	QP	L1	GND
4.546000	44.10	10.4	56	11.9	QP	L1	GND

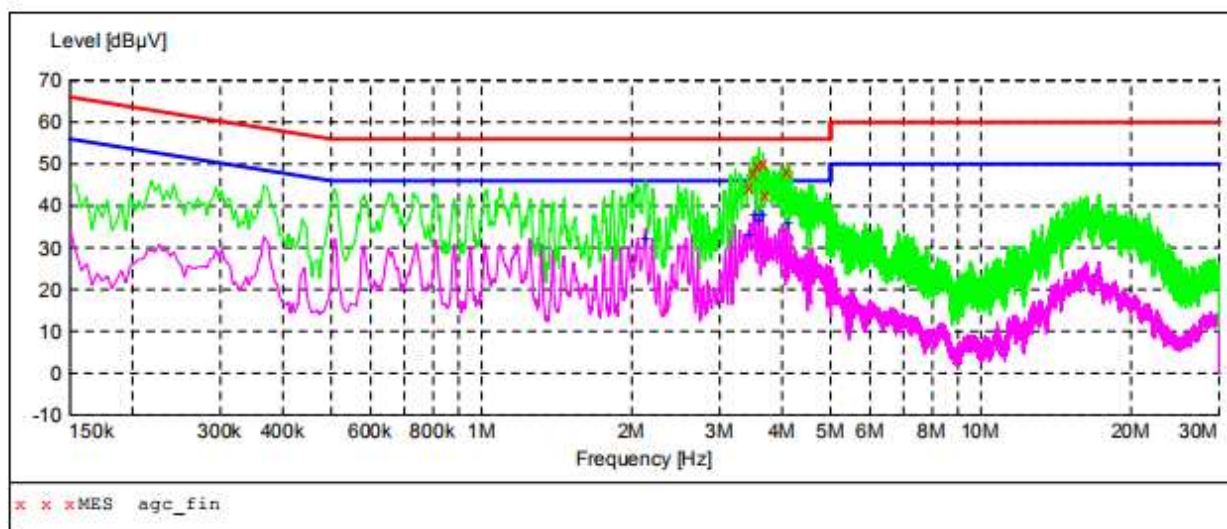
MEASUREMENT RESULT: "agc_fin2"

2020/5/25 11:08

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
3.194000	35.30	10.4	46	10.7	AV	L1	GND
3.494000	29.10	10.4	46	16.9	AV	L1	GND
4.042000	32.50	10.4	46	13.5	AV	L1	GND
4.094000	37.40	10.4	46	8.6	AV	L1	GND
4.146000	38.20	10.4	46	7.8	AV	L1	GND
4.546000	34.80	10.4	46	11.2	AV	L1	GND



LINE CONDUCTED EMISSION TEST-N



MEASUREMENT RESULT: "agc_fin"

2020/5/25 10:46

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
3.442000	44.50	10.4	56	11.5	QP	N	GND
3.518000	47.90	10.4	56	8.1	QP	N	GND
3.594000	49.90	10.4	56	6.1	QP	N	GND
3.666000	50.30	10.4	56	5.7	QP	N	GND
3.706000	42.60	10.4	56	13.4	QP	N	GND
4.106000	48.40	10.4	56	7.6	QP	N	GND

MEASUREMENT RESULT: "agc_fin2"

2020/5/25 10:46

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
2.134000	32.20	10.3	46	13.8	AV	N	GND
3.442000	33.10	10.4	46	12.9	AV	N	GND
3.522000	37.90	10.4	46	8.1	AV	N	GND
3.586000	36.30	10.4	46	9.7	AV	N	GND
3.662000	37.70	10.4	46	8.3	AV	N	GND
4.106000	35.90	10.4	46	10.1	AV	N	GND



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.



6.2.2. TEST PROCEDURE

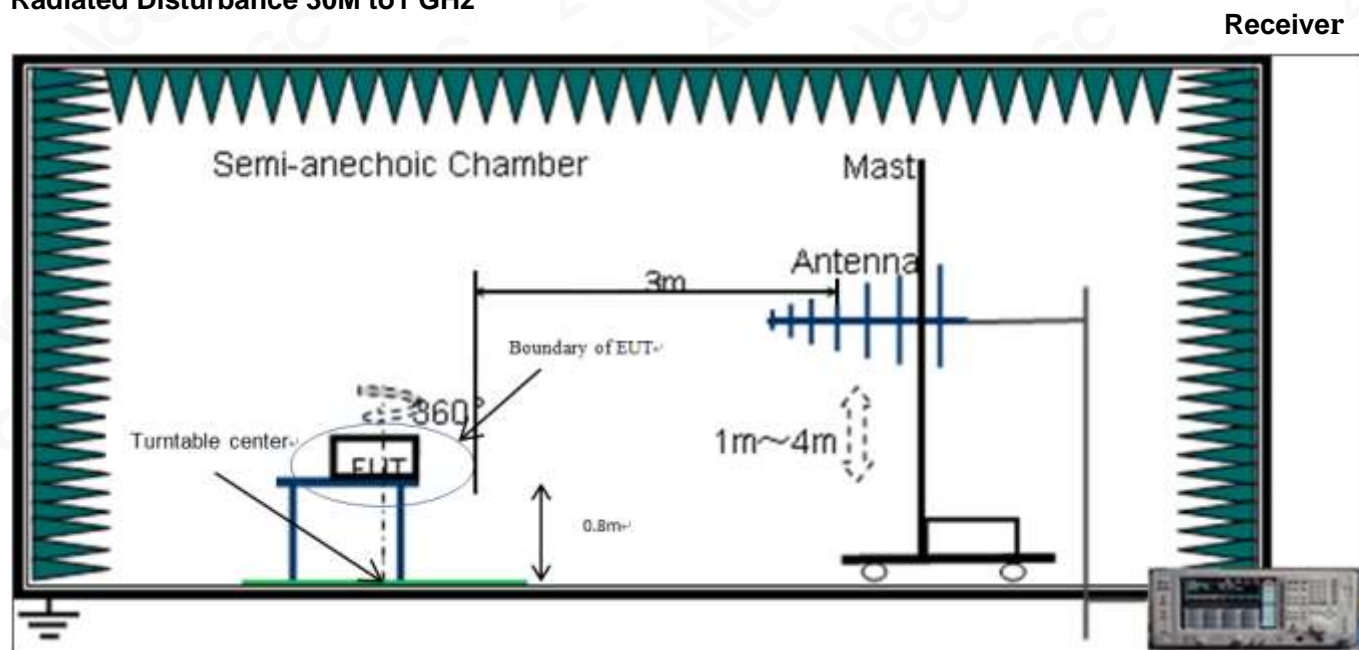
- (1). The EUT was placed on the top of an insulating table 0.8 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- (2). The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on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

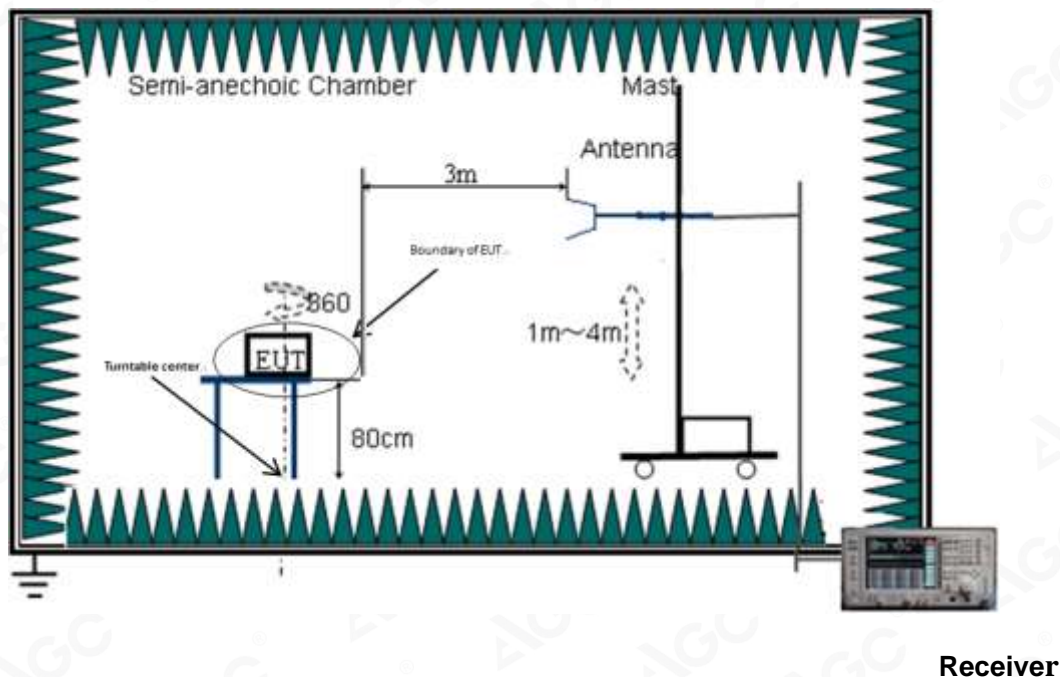


6.2.3. BLOCK DIAGRAM OF TEST SETUP

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.

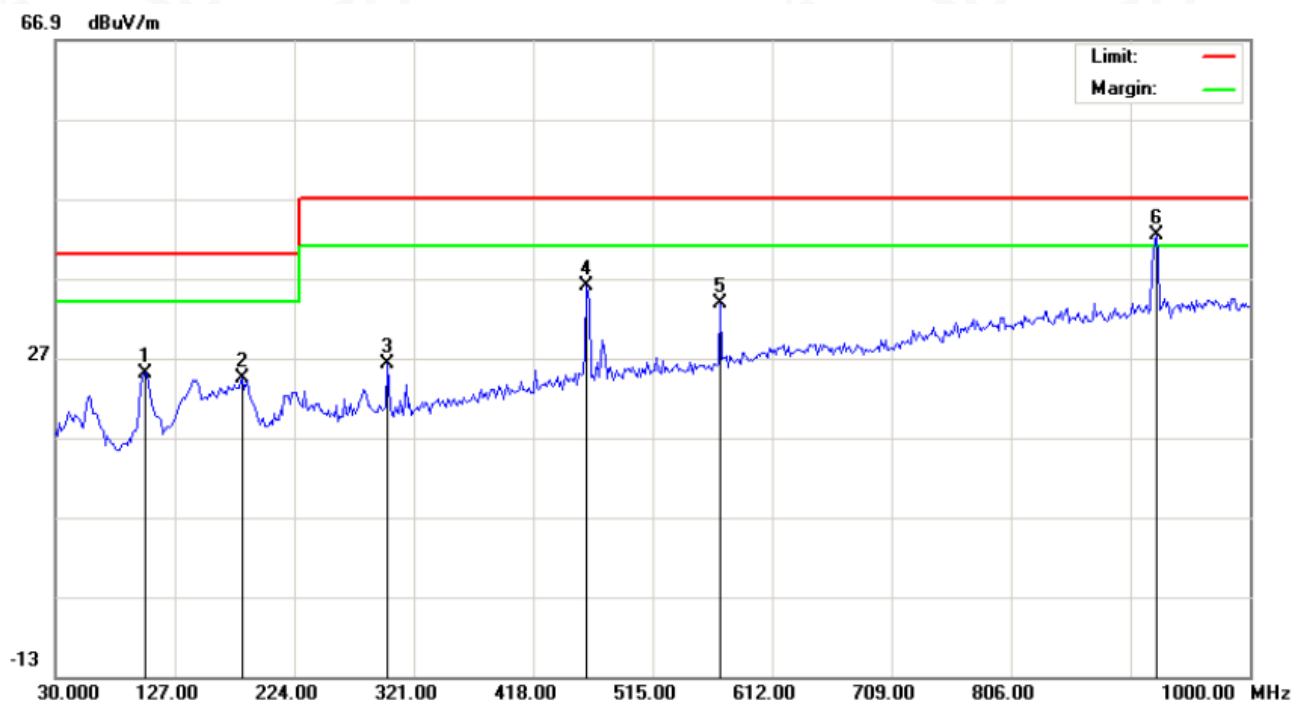
6.2.4 TEST RESULT

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:

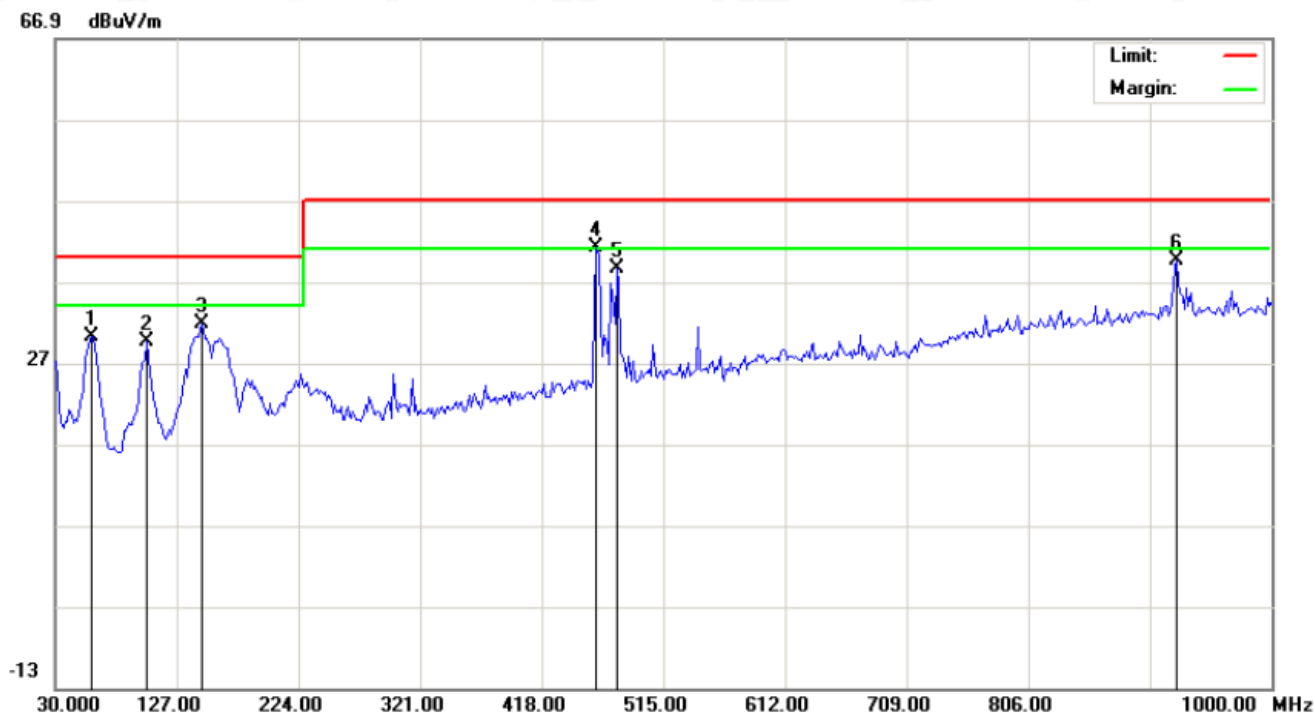
Note: The filter has been used in this test.

RADIATED EMISSION BELOW 1GHZ- HORIZONTAL



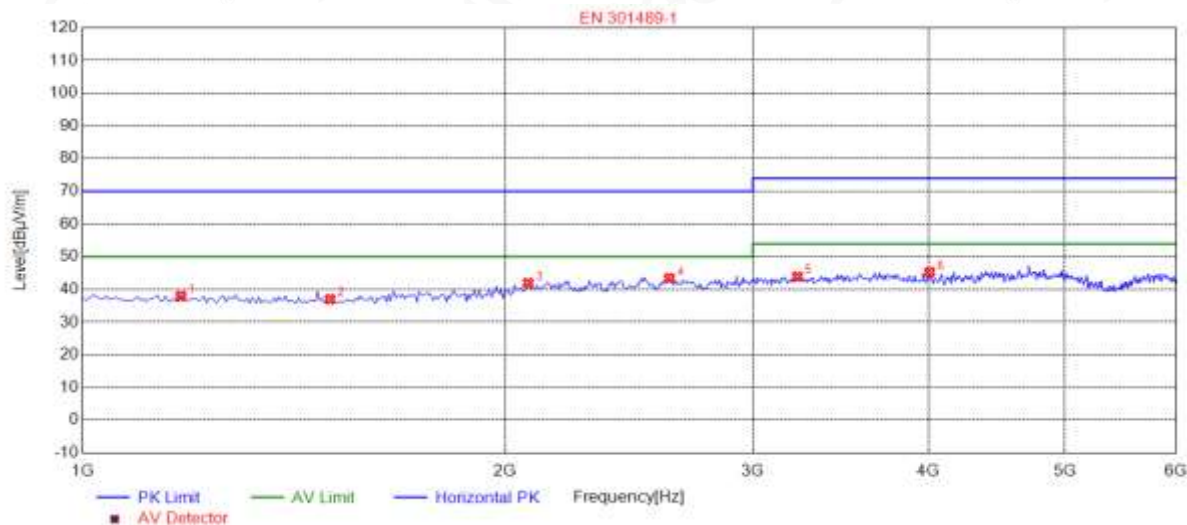
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		102.7500	8.72	16.28	25.00	40.00	-15.00	peak			
2		181.9667	7.46	17.02	24.48	40.00	-15.52	peak			
3		299.9833	6.68	19.47	26.15	47.00	-20.85	peak			
4		461.6500	11.87	24.22	36.09	47.00	-10.91	peak			
5		569.9667	7.38	26.36	33.74	47.00	-13.26	peak			
6	*	924.0167	10.41	31.91	42.32	47.00	-4.68	peak			

RADIATED EMISSION BELOW 1GHZ- VERTICAL



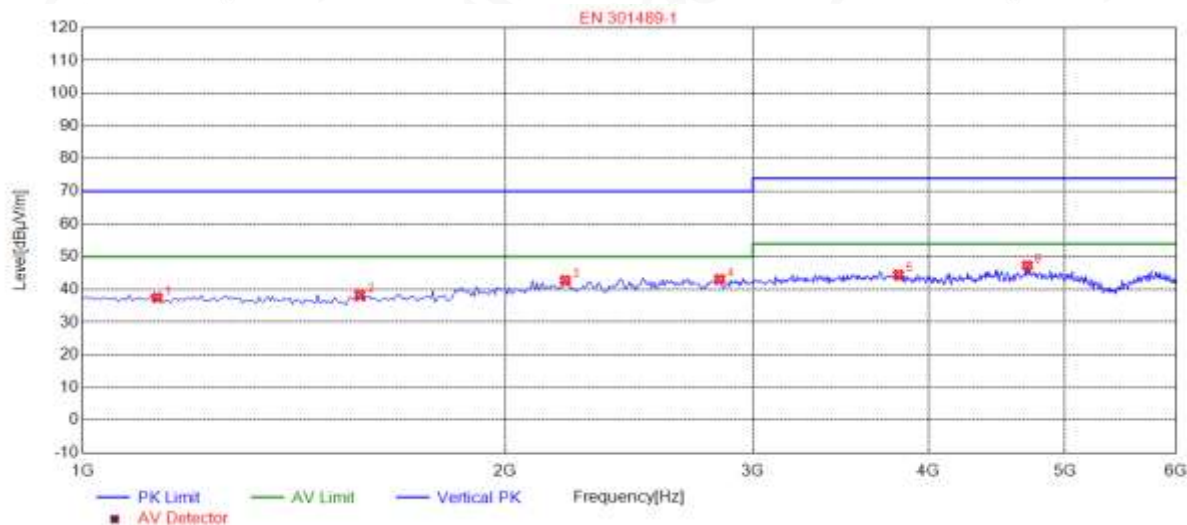
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		59.1000	11.23	18.95	30.18	40.00	-9.82	peak			
2		102.7500	13.31	16.28	29.59	40.00	-10.41	peak			
3		146.4000	12.51	19.22	31.73	40.00	-8.27	peak			
4	*	461.6500	16.99	24.22	41.21	47.00	-5.79	peak			
5		477.8167	14.06	24.54	38.60	47.00	-8.40	peak			
6		924.0167	7.71	31.91	39.62	47.00	-7.38	peak			

RADIATED EMISSION ABOVE 1GHZ – HORIZONTAL



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1175.1752	37.96	-16.81	70.00	32.04	100	189	Horizontal
2	1500.5005	37.02	-17.12	70.00	32.98	100	1	Horizontal
3	2076.0761	42.00	-11.50	70.00	28.00	100	73	Horizontal
4	2616.6166	43.46	-9.63	70.00	26.54	100	129	Horizontal
5	3227.2272	43.92	-8.54	74.00	30.08	100	360	Horizontal
6	4008.0080	45.28	-6.48	74.00	28.72	100	14	Horizontal

RADIATED EMISSION ABOVE 1GHZ - VERTICAL



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1130.1301	37.51	-16.77	70.00	32.49	100	27	Vertical
2	1575.5756	38.30	-16.33	70.00	31.70	100	352	Vertical
3	2206.2062	42.80	-10.95	70.00	27.20	100	282	Vertical
4	2841.8418	43.17	-9.45	70.00	26.83	100	112	Vertical
5	3807.8078	44.52	-6.92	74.00	29.48	100	222	Vertical
6	4703.7037	47.34	-5.00	74.00	26.66	100	186	Vertical

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 A 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:

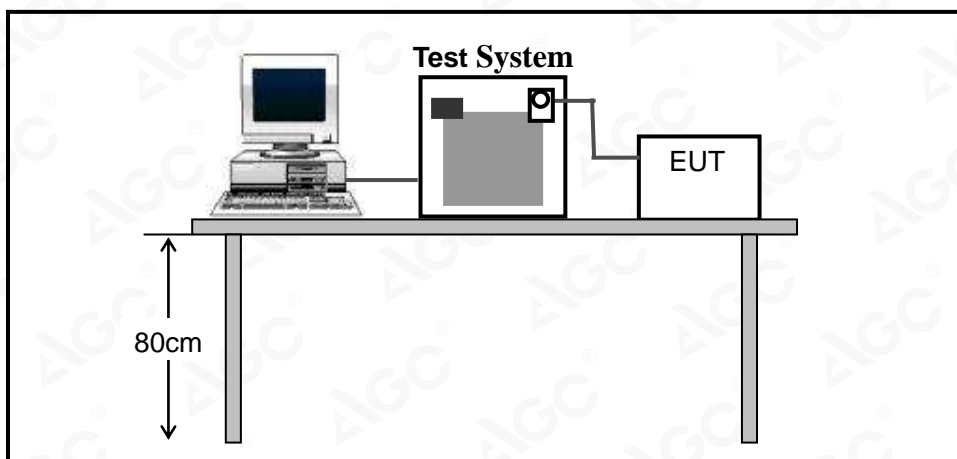
1. According to section 5 of EN61000-3-2, the EUT is Class A equipment.
2. The above limits are for all applications having an active input power > 75 W. No limits apply for equipment with an active input power up to and including 75W.

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.



6.3.3 TEST SETUP



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

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.



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 GSM 900 as follow:

Test Parameter	Measurement Value	Limit	Remarks
P_{st}	0.013	1.0	Pass
P_{lt}	0.007	0.65	Pass
$T_{dt(s)}$	0.02	0.2	Pass
$d_{max}(\%)$	0.05%	4%	Pass
$d_c(\%)$	0.19%	3%	Pass



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.

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.



7.2.3. PERFORMANCE CRITERIA FOR (GSM/ WCDMA/LTE)

CLAUSE 6 of EN301 489 – 52	
Criteria	Performance criteria
CT/CR	<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>
TT/TR	<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.



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.



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.



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:24.4°C/57.4%

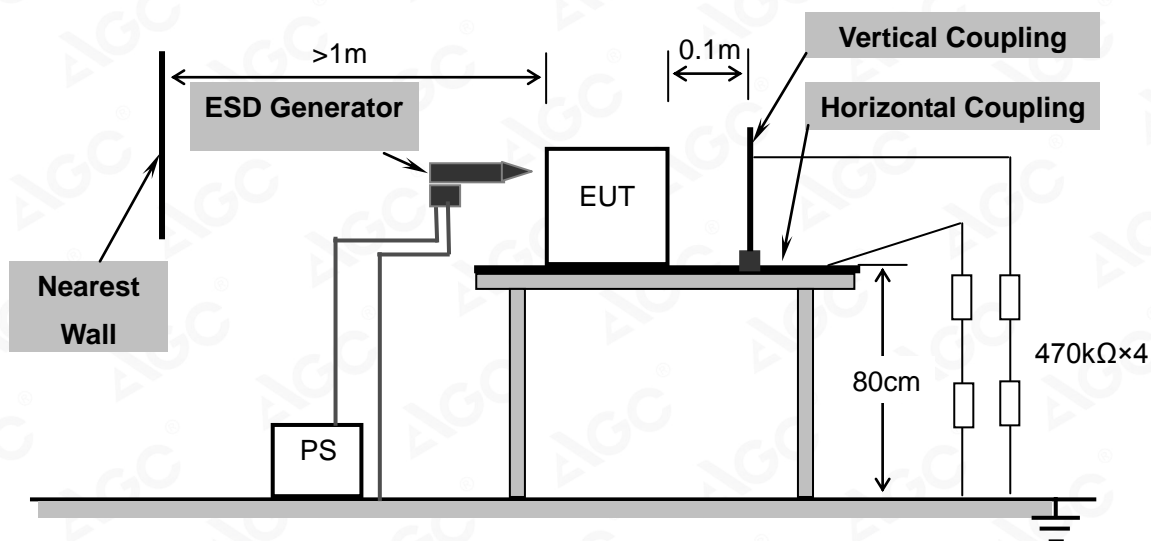
7.3.2. TEST PROCEDURE

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

- Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- The time interval between two successive single discharges was at least 1 second.
- 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.
- Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- 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.
- 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.
- 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.



7.3.3. TEST SETUP



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

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

IDEL (MODE 2) TEST RESULT

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



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

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



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

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

EN 301 489-52 V1.1.0 MS(MODE 6 GSM/GPRS/EGPRS 900&DCS/GPRS/EGPRS 1800) TEST RESULT

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



EN 301 489-52 V1.1.0 UMTS (MODE 6_WCDMA/HSPA2100& WCDMA/HSPA900) TEST RESULT

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

EN 301 489-52 V1.1.0 LTE (MODE 6_LTE 2100/LTE 1800/LTE 2600/LTE 900/LTE 800) TEST RESULT

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



IDEL (MODE 7) TEST RESULT

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

EN 301 489-17 V3.2.0 BT (MODE 8) TEST RESULT

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



EN 301 489-17 V3.2.0 WIFI (MODE 9) TEST RESULT

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

EN 301 489-19 V2.1.0 GPS (MODE 10) TEST RESULTS

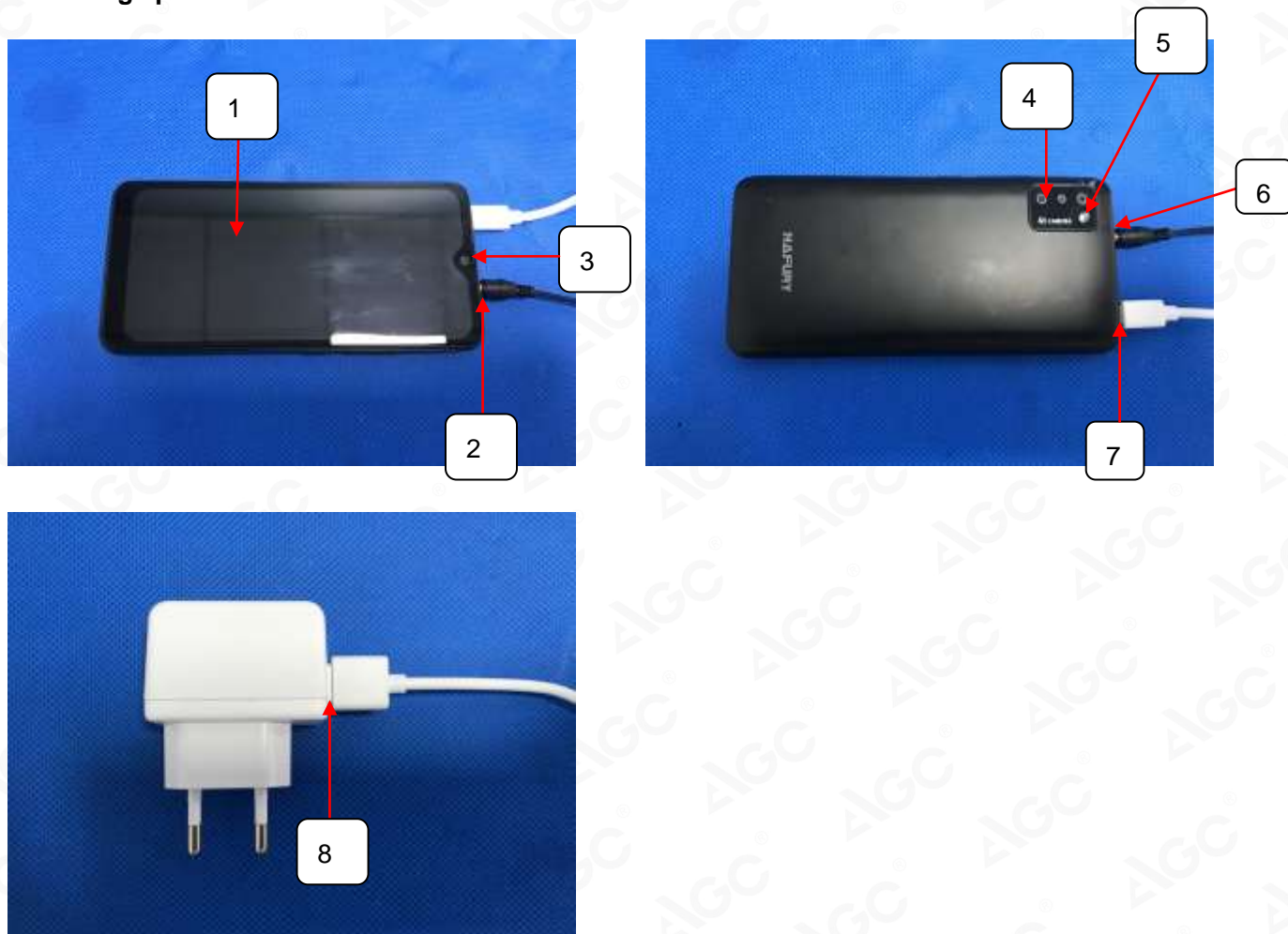
Test Points	Discharge Level (kV)	Discharge Mode	Observation	Conclusion
HCP	$\pm 2, \pm 4$	Indirect	TR	Pass
VCP	$\pm 2, \pm 4$	Indirect	TR	Pass
Camera	$\pm 2, \pm 4, \pm 8$	Air	TR	Pass
Screen	$\pm 2, \pm 4, \pm 8$	Air	TR	Pass
Flashlight	$\pm 2, \pm 4, \pm 8$	Air	TR	Pass
Stethoscope	$\pm 2, \pm 4, \pm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



Discharge points:



Note: The air discharge points are 1~5. The contact discharge points are 6~8.

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:20.4°C/58.5%

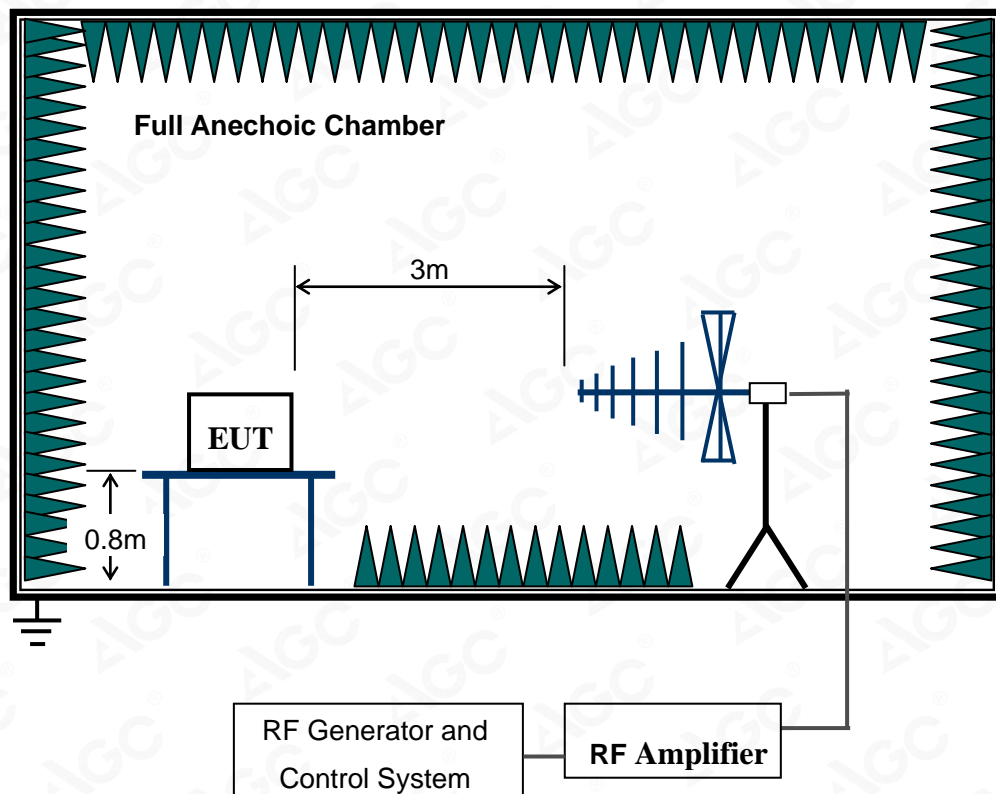
7.4.2 TEST PROCEDURE

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 – 6000MHz to 2700MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers. The rate of sweep did not exceed 1.5×10^{-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.
- 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.
- 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.



7.4.3 TEST SETUP



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

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

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.



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 800 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 800 MHz, Idle	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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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

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 \pm 1 MHz; 920 MHz \pm 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 \pm 1 MHz; 920 MHz \pm 1 MHz	3	CR	Pass	Right, Left, Front, Rear
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 \pm 1 MHz; 920 MHz \pm 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 \pm 1 MHz; 920 MHz \pm 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.



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	-57.10	266.68
		V	Front	-47.94	354.10
	Downlink	H	Front	-48.11	122.55
		V	Front	-57.50	629.95

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	-43.88	491.94
		V	Front	-44.84	726.75
	Downlink	H	Front	-57.17	339.91
		V	Front	-57.05	760.38

EUT operating Mode		Polarity	Position (°)	Max. value	Frequency (MHz)
UMTS 2100 MHz	BER	H	Front	0.0006	80MHz-6000MHz
		V	Front	0.0007	80MHz-6000MHz

EUT operating Mode		Polarity	Position (°)	Max. value(%)	Throughput (%)
LTE 2600 MHz	Throughput	H	Front	98.2	95
		V	Front	98.6	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%

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



7.5. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

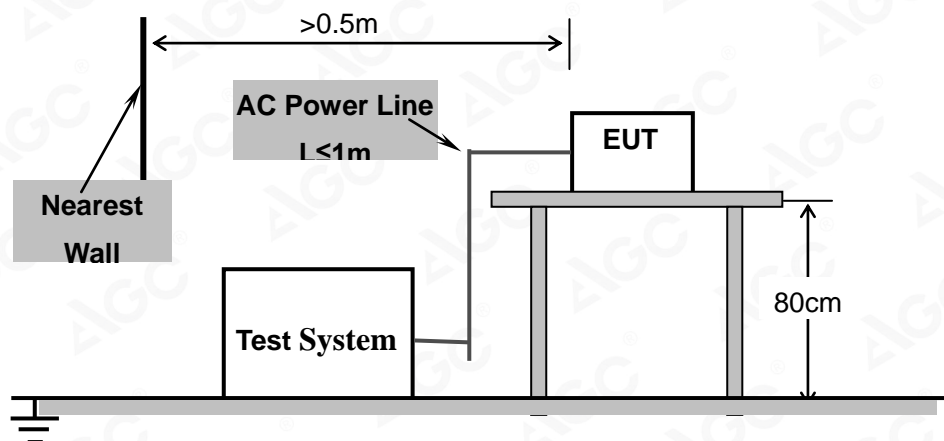
7.5.1 TEST SPECIFICATION

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:23.3°C/57%

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.

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



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



7.6. SURGE IMMUNITY TEST

7.6.1 TEST SPECIFICATION

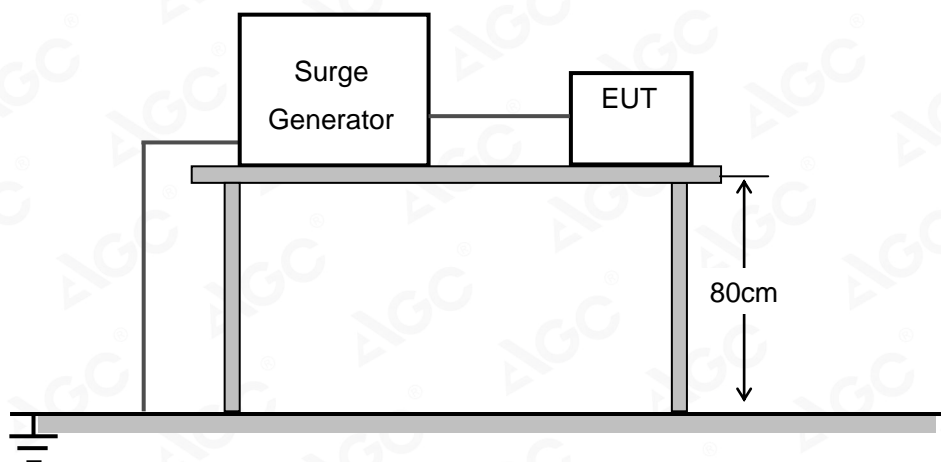
Basic Standard	EN 61000-4-5
Waveform	Voltage 1.2/50 μ s; Current 8/20 μ s
Test Voltage	a.c. power port, line to ground 2 kV, line to line 1.0 Kv communication port 1kV
Polarity	Positive/Negative
Phase Angle	0°, 90°, 180°, 270°
Repetition Rate	60sec
Times	5 time/each condition.
Test Conditions	Temperature/ Humidity:23.3°C/57%

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 1mx1m 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.



7.6.3 TEST SETUP



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

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



7.7. IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS

7.7.1 TEST SPECIFICATION

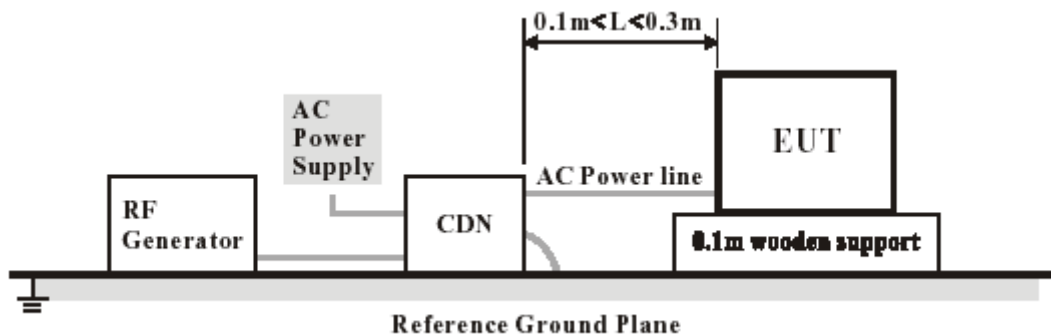
Basic Standard	EN 61000-4-6
Frequency Range	0.15 MHz – 80 MHz
Field Strength	3Vrms
Modulation	1 kHz Sine Wave, 80% AM
Frequency Step	1% of fundamental
Coupled Cable	a.c. power line, Communication Line
Coupling Device	CDN-M2 ,Clamp
Test Conditions	Temperature/ Humidity:23.6°C/56.9%

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.
- 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.
- 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.



7.7.3 TEST SETUP



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

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.



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: 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.



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



Special Conditions for EMC Immunity Tests (Worst Test Result)

EUT operating Mode		Max. value(dB)	Frequency (MHz)
Call Mode GSM 900	Uplink	-54.10	6.49
		-58.74	39.23
	Downlink	-59.46	8.98
		-51.91	17.37

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	-53.71	3.88
		-55.25	43.41
	Downlink	-54.94	7.59
		-53.59	59.25

EUT operating Mode		Max. value	Frequency (MHz)
UMTS 2100 MHz	BER	0.0006	0.15MHz-80.00 MHz
		0.0007	0.15MHz-80.00 MHz

EUT operating Mode		Max. value(%)	Throughput (%)
LTE 2600 MHz	BLER	98.5	95
		98.7	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



7.8. VOLTAGE DIPS AND SHORT INTERRUPTIONS IMMUNITY TEST

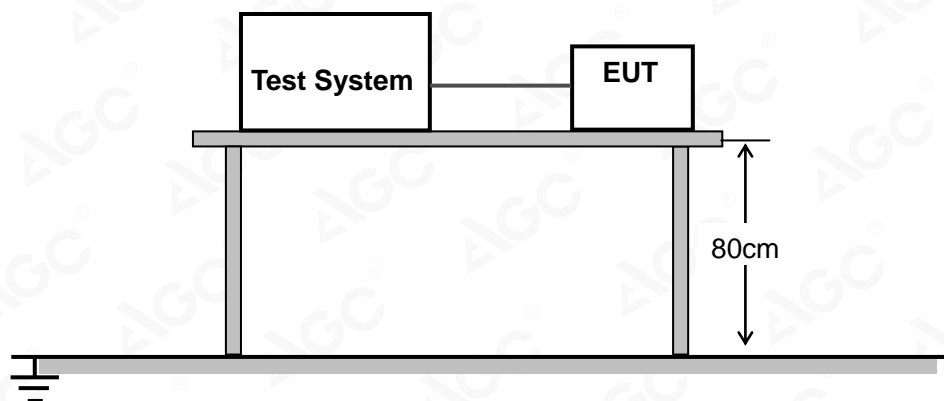
7.8.1 TEST SPECIFICATION

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:23.3°C/57%

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.

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

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

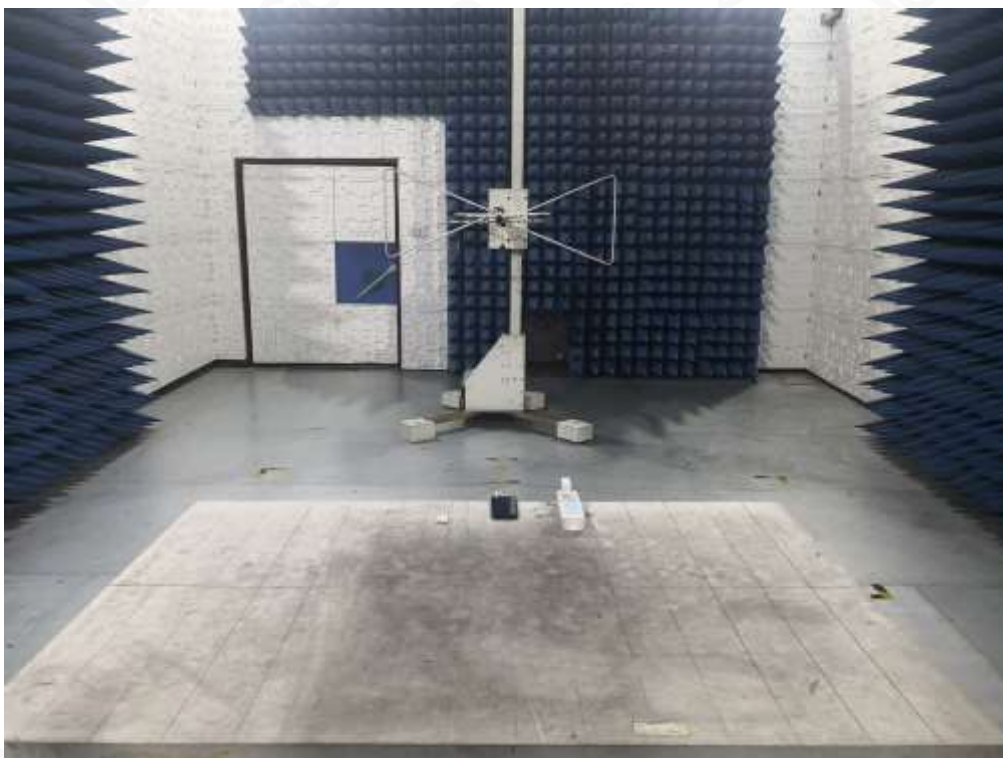


APPENDIX A: PHOTOGRAPHS OF TEST SETUP

LINE CONDUCTED EMISSION TEST SETUP



RADIATED EMISSION TEST SETUP



RADIATED EMISSION-ABOVE 1G TEST SETUP



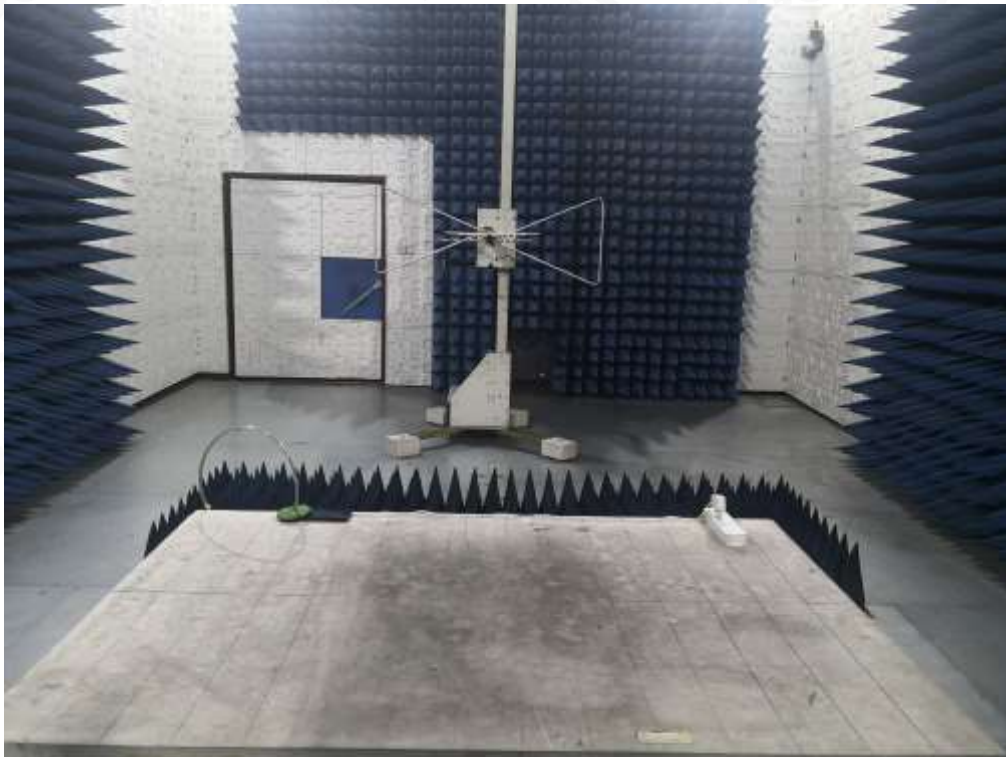
EN 61000- 3-3 FLICKER TEST SETUP



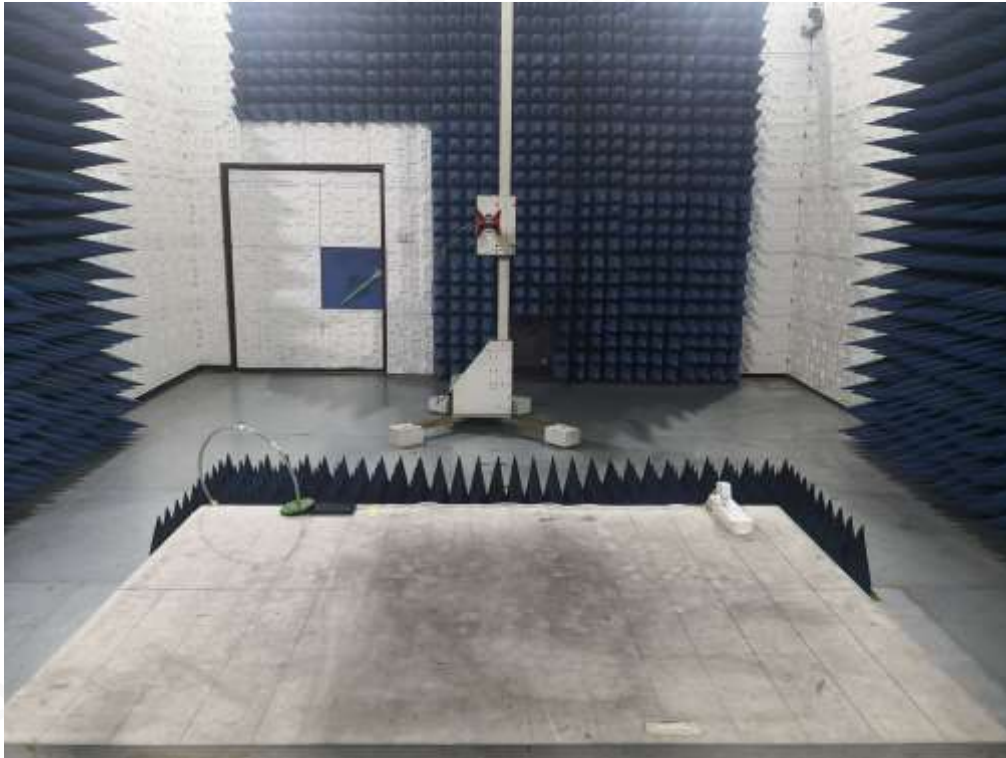
EN 61000-4-2 ESD TEST SETUP



EN 61000-4-3 RS TEST SETUP



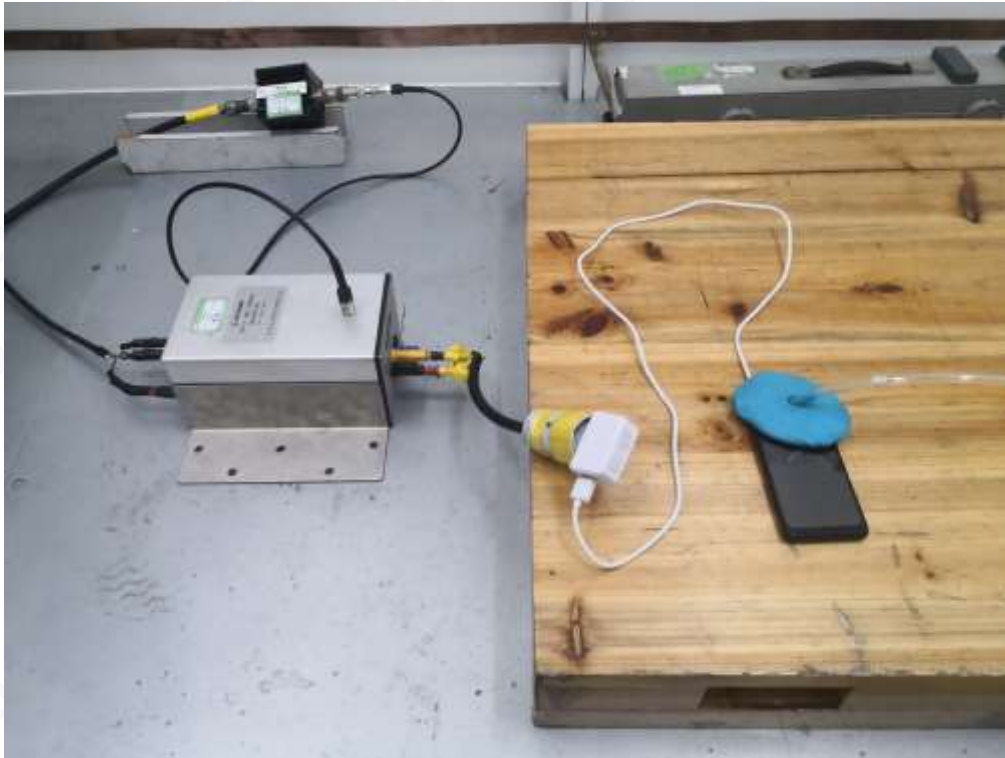
RS ABOVE 1G TEST SETUP



EFT SURGE and DIPS IMMUNITY TEST SETUP



EN 61000-4-6 CS TEST SETUP



----END OF REPORT----