

# TEST REPORT



Applicant	Particle Industries, Inc
Address	126 Post St, 4th floor, San Francisco, CA 94108 USA

Manufacturer or Supplier	Particle Industries, Inc	
Address	126 Post St, 4th floor, San Francisco, CA 94108 USA	
Product	Boron 2G/3G	
Brand Name	Particle	
Model	BRN310	
Additional Model & Model Difference	BRN314; see items 2.1	
Date of tests	Sep. 03, 2018 ~ Nov. 08, 2018	

The submitted sample of the above equipment has been tested according to the requirements of the following standards:

- EN 55032:2015+A11:2020, Class B
- EN 55035:2017
- EN 301 489-1 V2.2.3 (2019-11)
- EN 301 489-3 V2.1.1 (2019-03)
- EN 301 489-17 V3.2.4 (2020-09)
- Draft EN 301 489-52 V1.1.2 (2020-12)

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

<p>Tested by Breeze Jiang Senior Project Engineer / EMC Department</p>	<p>Approved by Glyn He Assistant Manager / EMC Department</p>
	

Date: Dec. 28, 2020

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**BUREAU  
VERITAS**

**Test Report No.: CE2012WDG0026**

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**BUREAU  
VERITAS**

Test Report No.: CE2012WDG0026

## RELEASE CONTROL RECORD

Issue No.	Description	Date Issued
CE180831N010	Original release	Dec. 10, 2018
CE2012WDG0026	Based on the original report CE180831N010 updated standard, changed the brand name and added the additional model, but it doesn't need to be retested.	Dec. 28, 2020



### 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

<b>EMISSION</b>			
Standard	Test Item	Result	Remarks
EN 55032:2015 + A11:2020, Class B	Conducted emission from the AC mains power port	PASS	Minimum passing Class B margin is -31.31 dB at 0.80559 MHz
	Radiated emission 30MHz-1000MHz	PASS	Minimum passing Class B margin is -6.50 dB at 40.1855 MHz
	Radiated emission 1GHz -6GHz	PASS	Minimum passing Class B margin is -15.10 dB at 5046.120 MHz

<b>IMMUNITY (EN 55035:2017)</b>			
Standard	Test Type	Result	Remarks
IEC 61000-4-2: 2008 ED. 2.0	Electrostatic discharge immunity test	PASS	Electrostatic Discharge – ESD: 8kV Air discharge, 4kV Contact discharge, Performance Criterion A
IEC 61000-4-3: 2010 ED. 3.2	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Meets the requirements of Performance Criterion A

<b>IMMUNITY (EN 301 489-1 V2.2.3, EN 301 489-3 V2.1.1, EN 301489-17 V3.2.4, Draft EN 301 489-52 V1.1.2)</b>			
Standard	Test Type	Result	Remarks
EN 61000-4-2:2009	Electrostatic discharge immunity test	PASS	Electrostatic Discharge – ESD: 8kV Air discharge, 4kV Contact discharge, Performance Criterion A
EN 61000-4-3:2006 A1:2008 + A2:2010	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-6000 MHz, 3V/m, 80% AM (1kHz), Performance Criterion A



### **1.1 MEASUREMENT UNCERTAINTY**

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

<b>MEASUREMENT</b>	<b>FREQUENCY</b>	<b>UNCERTAINTY</b>
Mains Terminal Disturbance Voltage Test	0.15MHz ~ 30MHz	+ /-2.70 dB
Radiated Disturbance Test	30MHz ~ 1000MHz	+/- 3.83 dB
	1GHz ~ 6GHz	+/- 4.66 dB



## 2 GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Boron 2G/3G
<b>BRAND</b>	Particle
<b>TEST MODEL</b>	BRN310
<b>ADDITIONAL MODEL</b>	BRN314
<b>POWER SUPPLY</b>	Li+ PIN /Battery connector: DC 3.7V from Li-ion Battery or VUSB PIN /USB connector :DC 5V from USB Host Unit
<b>CABLE SUPPLIED</b>	N/A
<b>THE HIGHEST OPERATING FREQUENCY</b>	2.48GHz

**Note:**

1. For the test results, the EUT had been tested with all conditions. But only the worst case was showed in test report.
2. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
3. Please refer to the EUT photo document (Reference No.: 2012WDG0026) for detailed product photo.
4. The EUT is wireless module, it no any accessories, the test standard and items were specified by applicant.
5. Additional model BRN314 is identical with the test model BRN310 except the model name for trading purpose.



## 2.2 DESCRIPTION OF TEST MODES

The EUT were tested under the following modes, the final worst mode was marked in boldface and recorded in this report.

### ◆ FOR CONDUCTED EMISSION TEST:

Test Mode	Test Standard	Test Voltage
<b>2.4G Wireless Normal Working</b>	<b>EN55032, EN301489</b>	<b>DC5V from Adapter</b>
NFC Normal Working		
GPRS 1800 Link		
WCDMA Band 8 Link		

### ◆ FOR RADIATED EMISSIONS TEST(Below 1GHz):

Test Mode	Test Standard	Test Voltage
2.4G Wireless Normal Working	<b>EN55032, EN301489</b>	DC 3.7V from Battery
NFC Normal Working		
GPRS 1800 Link		
WCDMA Band 8 Link		
<b>2.4G Wireless Normal Working</b>		<b>DC5V from Adapter</b>
GPRS 900 Link		
GPRS 1800 Link		
WCDMA Band 1 Link		
WCDMA Band 8 Link		

### ◆ FOR RADIATED EMISSIONS TEST(Above 1GHz):

Test Mode	Test Standard	Test Voltage
<b>2.4G Wireless Normal Working</b>	<b>EN55032, EN301489</b>	<b>DC5V from Adapter</b>
GPRS 1800 Link		
WCDMA Band 8 Link		

### ◆ FOR ESD IMMUNITY TEST

Test Mode	Test Standard	Test Voltage
<b>2.4G Wireless Normal Working</b>	<b>EN301489, EN55035</b>	<b>DC 3.7V from Battery or DC5V from Adapter</b>
<b>NFC Normal Working</b>		
<b>GPRS 900 Link</b>		
<b>GPRS 1800 Link</b>		
<b>WCDMA Band 1 Link</b>		
<b>WCDMA Band 8 Link</b>		





◆ **FOR RS IMMUNITY TEST**

Test Mode	Test Standard	Test Voltage
<b>GPRS 900 Link</b>	<b>EN301489, EN55035</b>	<b>DC 3.7V from Battery or DC5V from Adapter</b>
GPRS 1800 Link		
<b>WCDMA Band 1 Link</b>		
WCDMA Band 8 Link		

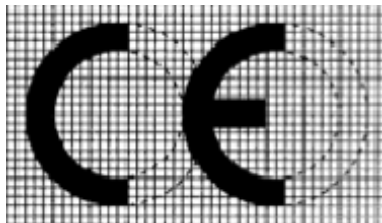
**2.3 TEST PROGRAM USED AND OPERATION DESCRIPTIONS**

- a. Turn on the power supply of the EUT.
- b. EUT was operated according to the type description in manufacturer’s specifications or the User’s Manual.

**2.4 MISCELLANEOUS**

➤ **Affix CE marking**

The marking must be placed visibly and legibly on the product or, if not possible due to the nature of the product, be affixed to the packaging and the accompanying document. The CE marking shall consist of the initials 'CE' taking the following form:



The various components of the CE marking must have the same vertical dimension, and may not be smaller than 5 mm. If the CE marking is reduced or enlarged, the proportions given in the graduated drawing above must be respected.

When the product is subject to other Directives covering other aspects and which also provide for the ‘CE’ marking, the accompanying documents must indicate that the product also conforms to those other Directives.

However, when one or more of those Directives allow the manufacturer, during a transitional period, to choose which arrangements to apply, the ‘CE’ marking has to indicate conformity only with the Directives applied by the manufacturer. In this case, the particularities of the Directives applied, as published in the Official Journal of the European Union, must be given in the documents, notices or instructions required by the Directives and accompanying such products.



## 2.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to the specifications of the manufacturers, the EUT must comply with the requirements of the following standards:

**EN 55032:2015+A11:2020, Class B**

**EN 55035:2017**

IEC 61000-4-2:2008 ED. 2.0

IEC 61000-4-3:2010 ED. 3.2

**EN 301 489-1 V2.2.3 (2019-11)**

**EN 301 489-3 V2.1.1 (2019-03)**

**EN 301 489-17 V3.2.4 (2020-09)**

**Draft EN 301 489-52 V1.1.2 (2020-12)**

EN 61000-4-2:2009

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

All applicable tests have been performed and recorded as per the above standards. The EUT haven't any components susceptible to magnetic fields, so don't test power-frequency magnetic field item.



## 2.6 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Adapter	N/A	DC 5V 1.5A	N/A	N/A
2	iPhone 6s	Apple	ML7F2CH/A	C6KQKXLAGRY8	N/A
3	Li-ion Battery	N/A	DC3.7V	N/A	N/A
4	Notebook PC	DELL	Inspiron 14-3442	4Q3WB12	N/A
5	Mobile Phone	Apple	MQA52CH/A	F2LW4YY9JCLF	N/A

NO.	DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	USB Line: Unshielded detachable 0.6m.
2, 3	N/A
4	AC Line: Unshielded detachable 1.0m, DC Line: Unshielded non-detachable 1.5m.
5	N/A



### 3 CONDUCTED EMISSION FROM THE AC MAINS POWER PORT

#### 3.1 LIMITS

Frequency (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

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

#### 3.2 TEST INSTRUMENT

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR7	101494	Apr. 05,18	Apr. 04,19
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	Mar. 03,18	Mar. 02,19
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100317	Apr. 05,18	Apr. 04,19
Voltage probe	SCHWARZBECK	TK 9421	TK 9421-176	Jan. 17,18	Jan. 16,19
Test software	ADT	ADT_Cond V7.3.7	N/A	N/A	N/A

- NOTE:** 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.  
 2. The test was performed at Shielded Room 553.

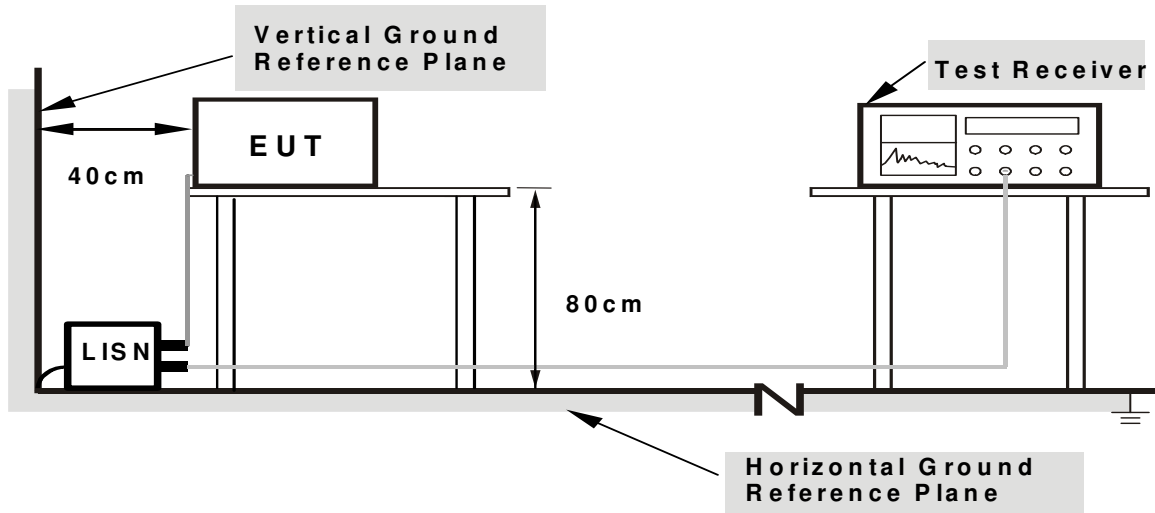
#### 3.3 TEST ARRANGEMENT

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.



### 3.4 TEST SETUP



- Note: 1. Support units were connected to second LISN.  
2. Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

### 3.5 SUPPLEMENTARY INFORMATION

N/A

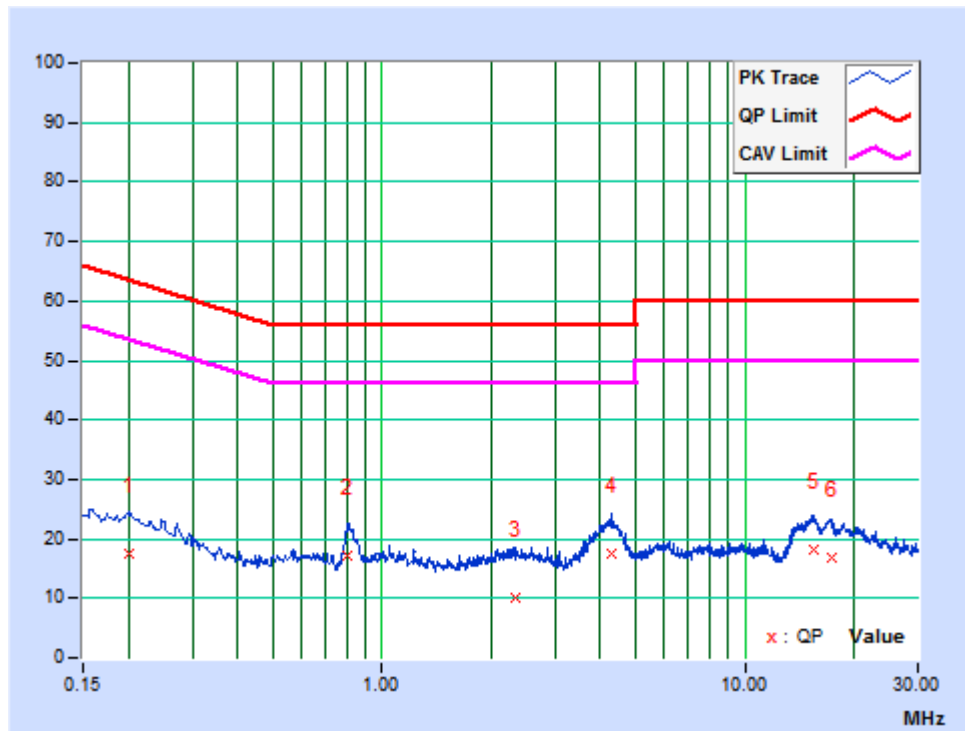


### 3.6 TEST RESULTS

<b>TEST MODE</b>	2.4G Wireless Normal Working	<b>6DB BANDWIDTH</b>	9 kHz
<b>TEST VOLTAGE</b>	DC 5V from Adapter	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	22deg. C, 50% RH	<b>TESTED BY</b>	Dragon

No.	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.20142	10.29	7.12	-1.28	17.41	9.01	63.55	53.55	-46.14	-44.54
2	<b>0.80559</b>	<b>10.46</b>	<b>6.85</b>	<b>4.23</b>	<b>17.31</b>	<b>14.69</b>	<b>56.00</b>	<b>46.00</b>	<b>-38.69</b>	<b>-31.31</b>
3	2.34825	10.07	-0.05	-3.42	10.02	6.65	56.00	46.00	-45.98	-39.35
4	4.28550	9.94	7.65	0.77	17.59	10.71	56.00	46.00	-38.41	-35.29
5	15.4140	9.81	8.38	6.54	18.19	16.35	60.00	50.00	-41.81	-33.65
6	17.2635	9.96	7.03	4.92	16.99	14.88	60.00	50.00	-43.01	-35.12

**REMARKS:** The emission levels of other frequencies were very low against the limit.

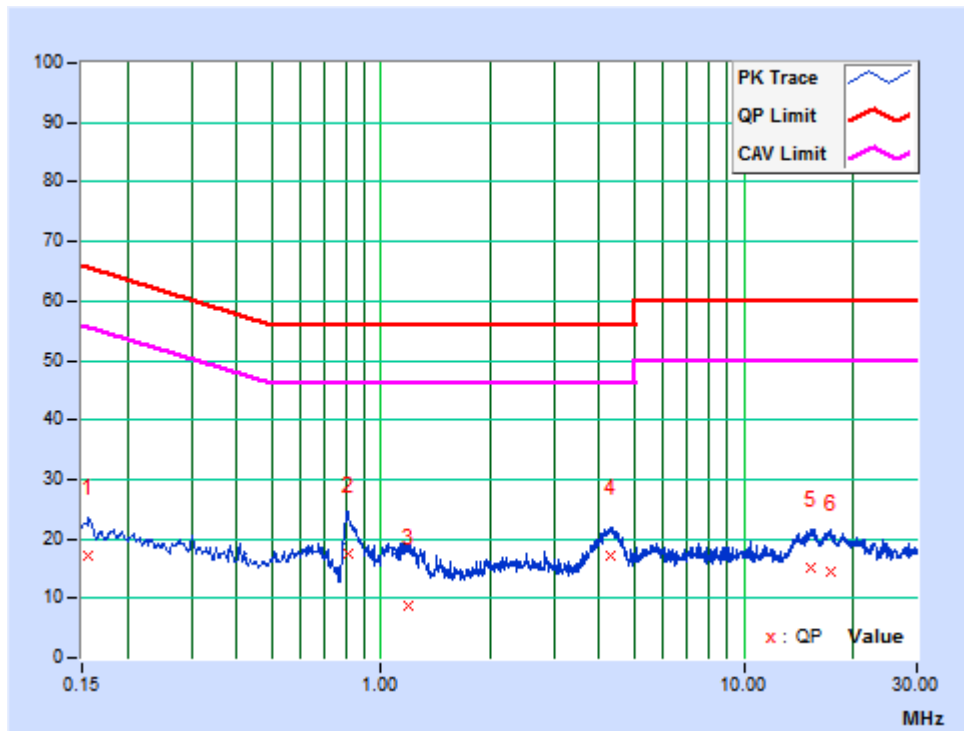




<b>TEST MODE</b>	2.4G Wireless Normal Working	<b>6DB BANDWIDTH</b>	9 kHz
<b>TEST VOLTAGE</b>	DC 5V from Adapter	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	22deg. C, 50% RH	<b>TESTED BY</b>	Dragon

No.	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15674	9.88	7.45	-0.97	17.33	8.91	65.63	55.63	-48.31	-46.73
2	0.81375	9.97	7.69	0.08	17.66	10.05	56.00	46.00	-38.34	-35.95
3	1.18275	9.66	-0.82	-4.74	8.84	4.92	56.00	46.00	-47.16	-41.08
4	4.28775	9.71	7.47	-0.41	17.18	9.30	56.00	46.00	-38.82	-36.70
5	15.2925	9.78	5.25	2.61	15.03	12.39	60.00	50.00	-44.97	-37.61
6	17.2815	9.90	4.62	1.64	14.52	11.54	60.00	50.00	-45.48	-38.46

**REMARKS:** The emission levels of other frequencies were very low against the limit.





## 4 RADIATED EMISSION MEASUREMENT

### 4.1 LIMITS OF RADIATED EMISSION MEASUREMENT

#### FOR FREQUENCY BELOW 1000 MHz

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 10m)
	Quasi-Peak dBuV/m	Quasi-Peak dBuV/m
30 – 230	40	30
230 – 1000	47	37

FREQUENCY (MHz)	Class A (at 3m)	Class B (at 3m)
	Quasi-Peak dBuV/m	Quasi-Peak dBuV/m
30 – 230	50	40
230 – 1000	57	47

#### For FM receivers

Distance (m)	Source	Frequency Range (MHz)	Limits dB (uV/m)	
			Quasi-peak	
10	Local oscillator	≤1000	Fundamental	50
		30 to 300	Harmonics	42
	Other	300 to 1000	Harmonics	46
		30 to 230		30
3	Local oscillator	≤1000	Fundamental	60
		30 to 300	Harmonics	52
	Other	300 to 1000	Harmonics	56
		30 to 230		40
		230 to 1000		47





### **FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)**

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	Up to 5 times of the highest frequency or 6 GHz, whichever is less

#### **FOR FREQUENCY ABOVE 1000 MHz**

FREQUENCY (GHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
1 to 3	76	56	70	50
3 to 6	80	60	74	54

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
  3. All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.



### 4.2 TEST INSTRUMENTS

#### FREQUENCY RANGE BELOW 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU26	100005	Aug. 24,18	Aug. 23,19
EMI Test Receiver	Rohde&Schwarz	ESR7	101564	Jan. 18,18	Jan. 17,19
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-555	Nov. 10, 18	Nov. 09, 19
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-554	Nov. 10, 18	Nov. 09, 19
Preamplifier	EMCI	EMC1135	980378	Mar. 19,18	Mar. 18,19
Preamplifier	EMCI	EMC1135	980423	Mar. 19,18	Mar. 18,19
10m Semi-anechoic Chamber	CHANGLING	21.4m*12.1m* 8.8m	NSEMC006	Feb. 10,18	Feb. 09,19
Test Software	ADT	ADT_Radiated _V8.7.07	N/A	N/A	N/A

- NOTES:** 1. The test was performed in 10m Chamber.  
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

#### FREQUENCY RANGE ABOVE 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Horn Antenna	ETS-Lindgren	3117	00085519	Dec. 10, 17	Dec. 09, 18
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170242	May 05,18	May 04,19
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101003	Apr. 21,18	Apr. 20,19
Broadband Preamplifier (1~18GHz)	SCHWARZBECK	BBV9718	266	Apr. 18,18	Apr. 18,19
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 09,18	Nov. 08,19
Test Software	ADT	ADT_Radiated _V8.7.07	N/A	N/A	N/A

- NOTES:** 1. The test was performed in 10m Chamber.  
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.



### 4.3 TEST PROCEDURE

#### <Frequency Range below 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.

#### NOTE:

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
3. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier);
4. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier).
5. Margin value = Emission level – Limit value.



**<Frequency Range above 1GHz>**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna can be varied from one meter-to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

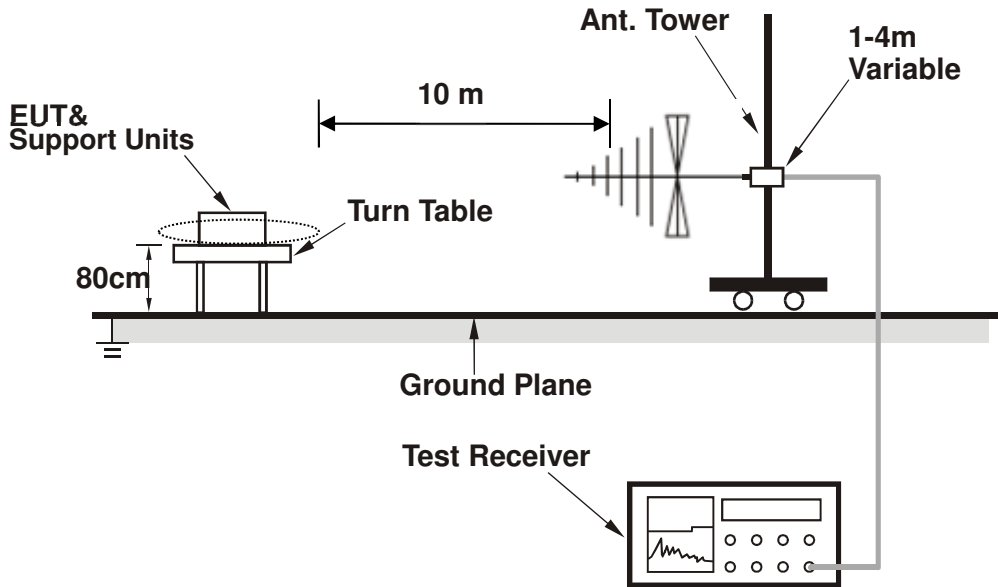
**NOTE:**

1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.
3. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
4. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier);
5. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier).
6. Margin value = Emission level – Limit value.

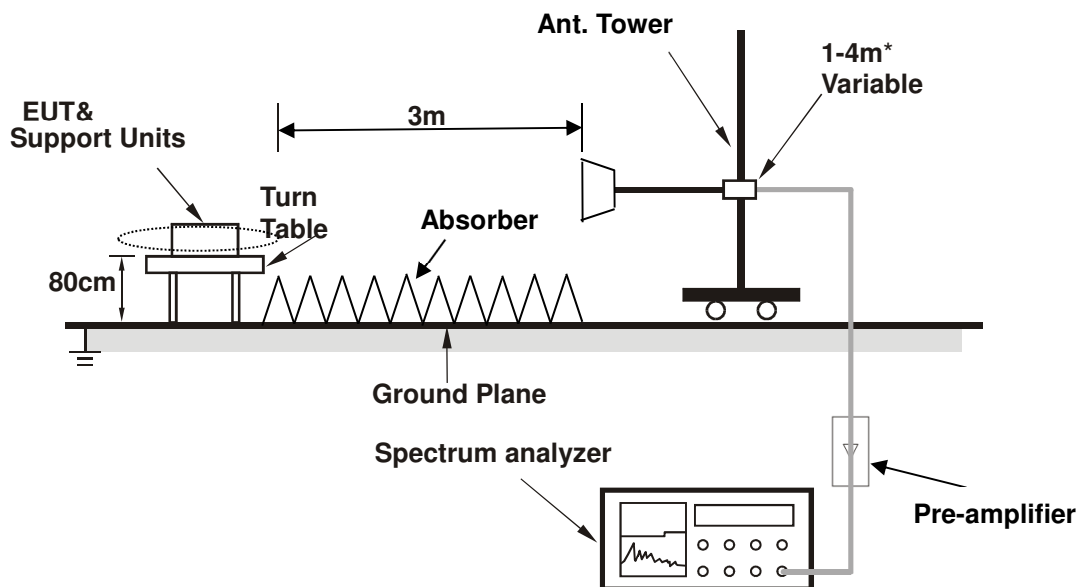


### 4.4 TEST SETUP

#### <Frequency Range below 1GHz>



#### <Frequency Range above 1GHz>



\* : depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3

### 4.5 SUPPLEMENTARY INFORMATION

The more stringent measurement method of paragraph 8.3.2 in ANSI C63.4:2014 was applied for the test.

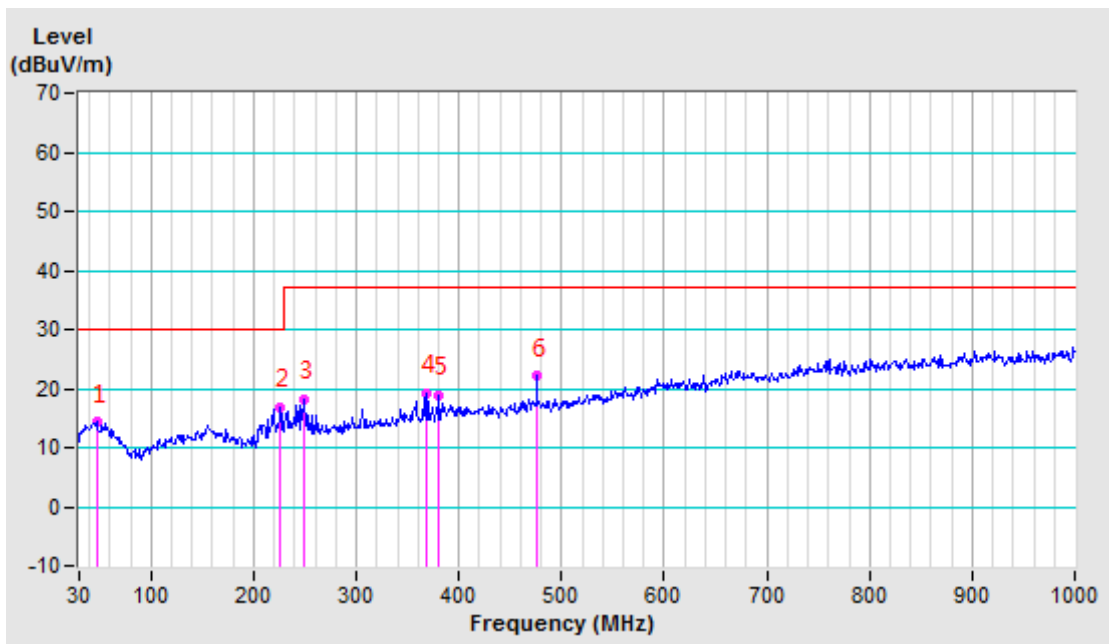


### 4.6 TEST RESULTS (BELOW 1GHz)

<b>TEST MODE</b>	2.4G Wireless Normal Working	<b>FREQUENCY RANGE</b>	30-1000MHz
<b>TEST VOLTAGE</b>	DC 5V from Adapter	<b>DETECTOR FUNCTION &amp; RESOLUTION BANDWIDTH</b>	Quasi-Peak, 120kHz
<b>ENVIRONMENTAL CONDITIONS</b>	21.0deg. C, 59.0% RH	<b>TESTED BY:</b> Luke	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 10 M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	45.5200	-17.32	32.61	15.29	30	-14.71	400	70
2	156.5850	-16.82	31.44	14.62	30	-15.38	400	43
3	333.8525	-14.74	30.36	15.62	37	-21.38	200	96
4	423.9413	-12.71	30.79	18.08	37	-18.92	400	197
5	497.1762	-11.68	30.65	18.97	37	-18.03	400	259
6	573.6850	-9.32	31.67	22.35	37	-14.65	400	43

**REMARKS:** The emission levels of other frequencies were very low against the limit.

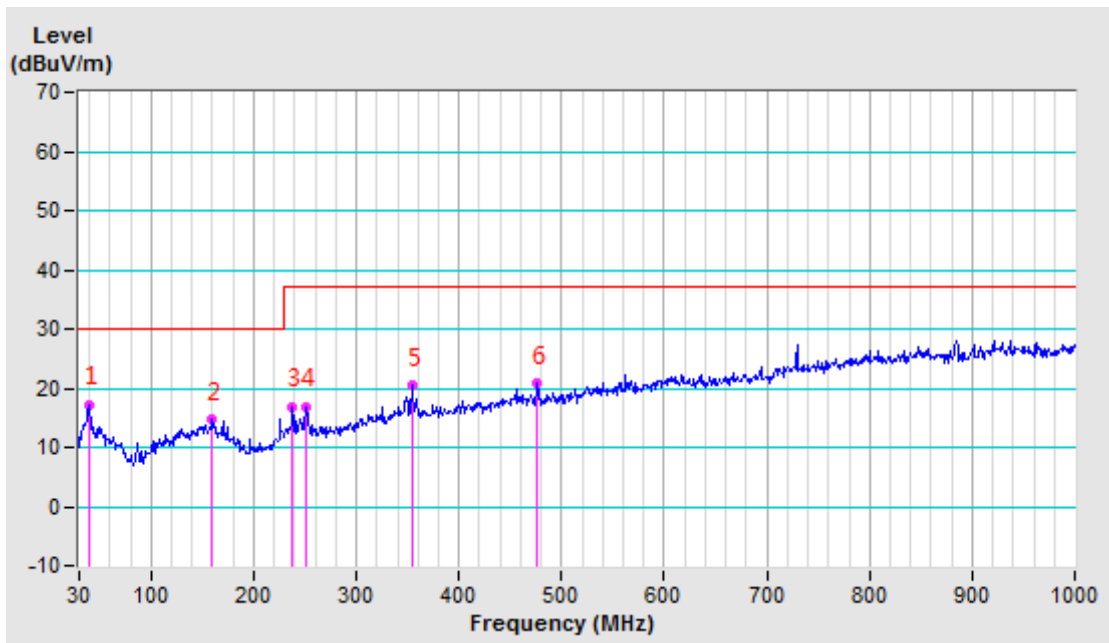




<b>TEST MODE</b>	2.4G Wireless Normal Working	<b>FREQUENCY RANGE</b>	30-1000MHz
<b>TEST VOLTAGE</b>	DC 5V from Adapter	<b>DETECTOR FUNCTION &amp; RESOLUTION BANDWIDTH</b>	Quasi-Peak, 120kHz
<b>ENVIRONMENTAL CONDITIONS</b>	21.0deg. C, 59.0% RH	<b>TESTED BY:</b> Luke	

<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 10 M</b>								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	40.1855	-17.77	41.27	23.50	30.00	-6.50	100	359
2	144.1262	-16.48	31.84	15.36	30.00	-14.64	100	272
3	302.5836	-14.52	29.80	15.28	37.00	-21.72	100	287
4	387.9964	-12.56	30.27	17.71	37.00	-19.29	100	193
5	488.9784	-10.35	30.02	19.67	37.00	-17.33	100	237
6	571.9661	-8.45	30.89	22.44	37.00	-14.56	100	289

**REMARKS:** The emission levels of other frequencies were very low against the limit.





### 4.7 TEST RESULTS (ABOVE 1GHz)

<b>TEST MODE</b>	2.4G Wireless Normal Working		
<b>TEST VOLTAGE</b>	DC 5V from Adapter	<b>FREQUENCY RANGE</b>	1-6 GHz
<b>ENVIRONMENTAL CONDITIONS</b>	21.0deg. C, 59.0% RH	<b>TESTED BY:</b> Daniel	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	1567.650PK	-1.64	55.94	54.30	70.00	-15.70	100	107
2	1567.650 AV	-1.64	36.24	34.60	50.00	-15.40	100	107
3	3054.620PK	3.01	54.59	57.60	74.00	-16.40	100	12
4	3054.620 AV	3.01	35.09	38.10	54.00	-15.90	100	12
5	3976.640PK	5.21	52.59	57.80	74.00	-16.20	100	109
6	3976.640 AV	5.21	33.29	38.50	54.00	-15.50	100	109
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	1679.650PK	-0.65	54.85	54.20	70.00	-15.80	100	52
2	1679.650AV	-0.65	35.05	34.40	50.00	-15.60	100	52
3	3487.690PK	5.17	52.43	57.60	74.00	-16.40	100	56
4	3487.690 AV	5.17	33.23	38.40	54.00	-15.60	100	56
5	5046.120PK	6.98	50.92	57.90	74.00	-16.10	100	307
6	5046.120AV	6.98	31.92	38.90	54.00	-15.10	100	307

- REMARKS:**
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
  2. Negative sign (-) in the margin column signify levels below the limit.
  3. Frequency range scanned: 1GHz to 6GHz.
  4. Only emissions significantly above equipment noise floor are reported.





## 5 IMMUNITY TEST

### 5.1 GENERAL DESCRIPTION

#### 5.1.1 GENERAL DESCRIPTION OF EN 55035

<b>Product Standard</b>	<b>EN 55035:2017</b>	
<b>Basic Standard, specification requirement, and Performance Criteria:</b>	IEC 61000-4-2	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-1000 MHz, 3V/m, 80% AM (1kHz), 1800 MHz,3V/m, 80% AM (1kHz), 2600 MHz,3V/m, 80% AM (1kHz), 3500 MHz,3V/m, 80% AM (1kHz), 5000 MHz,3V/m, 80% AM (1kHz) Performance Criterion A

<b>Product Standard</b>	<b>EN 301 489-1 V2.2.3 (2019-11)</b> <b>EN 301 489-3 V2.1.1 (2019-03)</b> <b>EN 301 489-17 V3.2.4 (2020-09)</b> <b>Draft EN 301 489-52 V1.1.2 (2020-12)</b>	
<b>Basic Standard, Specification, and Performance Criterion required</b>	EN 61000-4-2	Electrostatic Discharge – ESD: 2, 4, 8 kV air discharge, 4 kV contact discharge, Performance Criterion B
	EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80 ~ 6000 MHz, 3 V/m, 80% AM (1 kHz), Performance Criterion A



### 5.1.2 PERFORMANCE CRITERIA

According to Clause 8.2, 8.3, 8.4 of EN 55035:2017 standard, the following describes the general performance criteria.

<b>CRITERION A</b>	The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
	For audio output device: The measured acoustic interference ratio and/or the measured electrical interference during the test shall be -20dB or better(see note1)
<b>CRITERION B</b>	<p>During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.</p> <p>After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.</p> <p>If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.</p>
<b>CRITERION C</b>	<p>Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer’s instructions. A reboot or re-start operation is allowed.</p> <p>Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

**Note 1:** This performance criterion only using for Continuous induced RF disturbances and Continuous RF electromagnetic field disturbances item.



Modified test levels for performance criterion A for the broadcast reception function:

Performance criteria	Test Item	Group 1	Group 2
A	RS	The disturbance level is reduced to 1V/m for in-band frequencies	No test requirements apply
A	CS	The disturbance level is reduced to 1V/m for in-band frequencies	

Note: 1. In-band is defined as the entire tuneable operating range of the selected broadcast reception function.  
 2. The tuned channel  $\pm 0,5$  MHz (lower edge frequency – 0,5 MHz up to the upper edge frequency + 0,5 MHz of the tuned channel) is excluded from testing.  
 3. Group 1: Equipment in which the desired RF broadcast signal enters the equipment through a coaxial broadcast receiver tuner port. These coaxial ports are intended to be connected via a coaxial cable to an antenna or a cable distribution system.  
 4. Group 2: Broadcast reception equipment which is not included in Group 1.

**For EN 301 489-3**

The phenomena allowed during and after test in each criterion are clearly stated in the following table.

Performance criteria		
Criteria	During test	After test
A	Operate as intended No loss of function No unintentional responses	Operate as intended No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May show loss of function No unintentional responses	Operate as intended Loss of function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions



**FOR EN301489-17**

The performance criteria		
Performance criteria A for immunity tests with phenomena of a continuous nature	continuous phenomena	1. Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test. 2. Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test
Performance criteria B for immunity tests with phenomena of a transient nature	Transient phenomena	1. Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as a result of the application of the test 2. Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as a result of the application of the test
Performance criteria C for immunity tests with power interruptions exceeding a certain time	Transient phenomena	Voltage dips greater than or equal to 100 ms and voltage interruptions of 5000 ms duration, for which performance criteria C shall apply

The phenomena allowed during and after test in each criterion are clearly stated in the following table.

Performance criteria		
Criteria	During test	After test
A	Shall operate as intended. (see note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of stored data.
B	May show loss of function	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.
<p><b>NOTE:</b> Operate as intended during the test allows a level of degradation in accordance with a and b.</p> <p>(a) For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.</p> <p>(b) For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.</p>		



**For EN 301 489-52**

**EN 301 489-52, GSM and DCS**

The equipment shall meet the performance criteria specified in this clause.

Portable equipment intended for use whilst powered by the main battery of a vehicle shall additionally fulfill the applicable requirements set out in EN 301 489-1, clauses 7.1 and 7.2 for mobile equipment.

Portable or mobile equipment powered by the AC mains shall additionally fulfill the applicable requirements of EN 301 489-1, clauses 7.1 and 7.2 for radio and ancillary equipment for fixed use.

The establishment and maintenance of a communications link, the assessment of RXQUAL, and the assessment of the audio breakthrough by monitoring the speech output signal level, are used as performance criteria to ensure that all primary functions of the transmitter and receiver are evaluated during the immunity tests. In addition, the test shall also be performed in idle mode to ensure the transmitter does not unintentionally operate.

The maintenance of a communications link shall be assessed using an indicator which may be part of the test system or the EUT.

If an equipment is of a specialized nature, such that the performance criteria described in the following clauses are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in the following clauses.



The phenomena allowed during and after test are stated in the following table.

Special conditions for EN301489-52	
Criteria	During / After Test
CT	<p>A communication link shall be established at the start of the test, and maintained during the test, see clauses 4.2.3 and 4.2.4.</p> <p>During the test, the uplink speech output level shall be at least 35 dB less than the previously recorded reference levels, when measured through an audio band pass filter of width 200 Hz, centred on 1 kHz.</p> <p>Note: When there is a high level background noise present the filter bandwidth can be reduced down to a minimum of 40 Hz.</p> <p>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>
TT	<p>A communications link shall be established at the start of the test, see clauses 4.2 to 4.2.4.</p> <p>At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link.</p> <p>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.</p> <p>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>
CR	<p>A communications link shall be established at the start of the test, clauses 4.2 to 4.2.6.</p> <p>During the test, the RXQUAL of the downlink shall not exceed the value of three, measured during each individual exposure in the test sequence.</p> <p>During the test, the downlink speech output level shall be at least 35 dB less than the previously recorded reference levels, when measured through an audio band pass filter of width 200 Hz, centred on 1 kHz.</p> <p>Note: When there is a high level background noise present the filter bandwidth can be reduced down to a minimum of 40 Hz.</p> <p>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.</p>
TR	<p>A communications link shall be established at the start of the test, clauses 4.2 to 4.2.6.</p> <p>At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link.</p> <p>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.</p>
Ancillary equipment tested on a stand alone bases	The provision of EN 301 489-1, clause 6.4 shall apply.



**EN 301 489-52, UTRA, Mobile and Portable UE**

The equipment shall meet the performance criteria specified in this clause.

The maintenance of a communications link shall be assessed by using an indicator, which may be part of the test system or the equipment under test.

If an equipment is of a specialized nature, that the performance criteria described in the following clauses are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after testing, as required by the present document.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in the following clauses.

In addition, the test shall also be performed in idle mode to ensure the transmitter does not unintentionally operate.

The requirements apply to all types of UTRA for the UE.

Special conditions for EN301489-52	
Criteria	During / After Test
CT/CR	<p>A communication link shall be established at the start of the test, and maintained during the test. In the speech mode, the performance criteria shall be that the Up Link and Down Link 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 (annex B).            Note: When there is a high level of background audio noise present, the filter bandwidth can be reduced down to a minimum of 40 Hz.</p> <p>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.</p> <p>In addition to confirming the above performance in traffic mode, the test shall be performed in idle mode, and the transmitter shall not unintentionally operate.</p> <ul style="list-style-type: none"> <li>• UTRA</li> </ul> <p>In the data transfer mode, the performance criteria can be one of the following:</p> <ul style="list-style-type: none"> <li>- if the BER (as referred in TS 134 109) is used, it shall not exceed 0,001 during the test sequence;</li> <li>- if the BLER (as referred in TS 134 109) is used, it shall not exceed 0,01 during the test sequence.</li> </ul> <p>The BLER calculation shall be based on evaluating the CRC on each transport block.</p>
TT/TR	<p>A communications link shall be established at the start of the test.</p> <p>At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link.</p> <p>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.</p> <p>In addition to confirming the above performance in traffic mode, the test shall also be performed in idle mode, and the transmitter shall not unintentionally operate.</p>

**5.1.3 EUT OPERATING CONDITION**

Same as item 2.3



## 5.2 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD) (EN55035, EN301489)

### 5.2.1 TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-2
<b>Discharge Impedance:</b>	330 ohm / 150 pF
<b>Discharge Voltage:</b>	Contact Discharge : 4 kV (Direct & Indirect) Air Discharge: 8kV (Direct)
<b>Polarity:</b>	Positive / Negative
<b>Number of Discharge:</b>	20 times at each test point
<b>Discharge Mode:</b>	Single Discharge
<b>Discharge Period:</b>	1-second

### 5.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
ESD Generator	TESEQ	NSG 437	279	Mar. 07,18	Mar. 06,19
Test Software	TESEQ	V03.03	N/A	N/A	N/A
ESD Generator	EM TEST	Dito	V1211112265	Jan. 16,18	Jan. 15,19
Test Software	EM TEST	V 2.31	N/A	N/A	N/A

- NOTE:**
1. The test was performed in ESD Room.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.





### **5.2.3 TEST PROCEDURE**

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

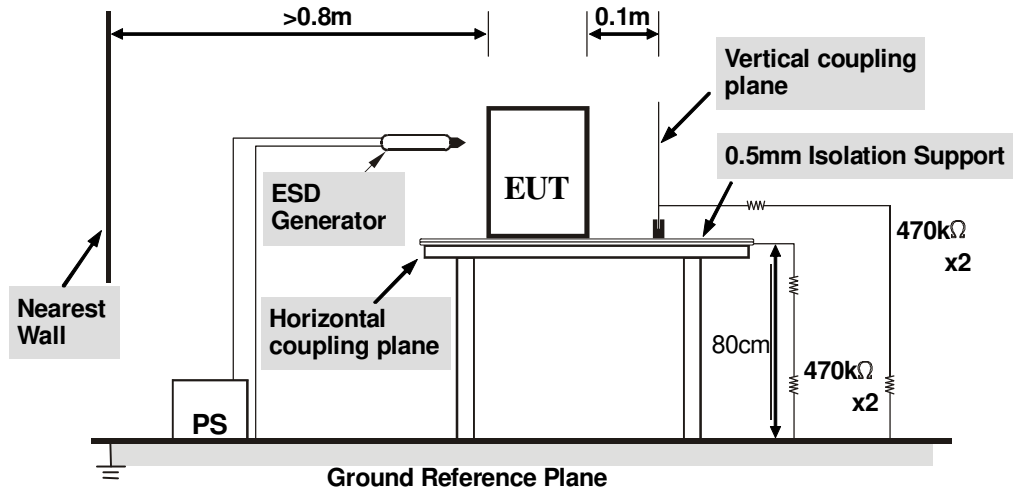
- a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- c. The time interval between two successive single discharges was at least 1 second.
- d. The discharge return cable of the generator shall be kept at a distance of at least 0.2 m from the EUT whilst the discharge is being applied and should not be held by the operator
- 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 complete.
- 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 horizontally 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 x 0.5m) was placed vertically to and 0.1 meters from the EUT.



### 5.2.4 DEVIATION FROM TEST STANDARD

No deviation.

### 5.2.5 TEST SETUP



#### NOTE:

##### TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940k $\Omega$  total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 0.8-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

##### FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.



### 5.2.6 TEST RESULTS

<b>TEST VOLTAGE</b>	See section 2.2	<b>ENVIRONMENTAL CONDITIONS</b>	23.7deg. C, 45.8% RH, 101.3kPa
<b>TESTED BY</b>	Hu		

Indirect Discharge Application				
Discharge Level (kV)	Polarity	Test Point	Test Result of HCP	Test Result of VCP
4	+ /-	HCP	A	N/A
4	+ /-	VCP	N/A	A

**NOTE:** A: There was no change compared with initial operation during the test.



### 5.3 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS) (EN55035)

#### 5.3.1 TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-3
<b>Frequency Range:</b>	80-1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz
<b>Field Strength:</b>	3 V/m
<b>Modulation:</b>	1kHz Sine Wave, 80%, AM Modulation
<b>Frequency Step:</b>	1 % of fundamental
<b>Polarity of Antenna:</b>	Horizontal and Vertical
<b>Antenna Height:</b>	1.5m
<b>Dwell Time:</b>	at least 3 seconds

#### 5.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal Generator	Agilent	N5181A	MY50142530	Oct. 13,18	Oct. 12,19
Bilog Antenna	Teseq	CBL 6111D	27089	Jul. 19,18	Jul. 18,19
Antenna Log-Periodic	AR	ATR80M6G	0337307	N/A	N/A
Antenna Log-Periodic	AR	ATS700M11G	0336821	N/A	N/A
Switch Controller	AR	SC1000	0337343	N/A	N/A
RF Power Meter	ESE	4242	13984	Nov. 04,18	Nov. 03,19
Power Sensor	ESE	51011EMC	35716	Nov. 04,18	Nov. 03,19
Power Sensor	ESE	51011EMC	35715	Nov. 04,18	Nov. 03,19
E-Field probe	Narda	NBM-520	2403/01B	Mar. 08,18	Mar. 07,19
Power Amplifier	TESEQ	CBA 1G-150	T44029	N/A	N/A
Power Amplifier	TESEQ	CBA 3G-100	T44030	N/A	N/A
Power Amplifier	TESEQ	CBA 6G-050	1041204	N/A	N/A
Dual Directional Coupler	TESEQ	C5982	95208	Nov. 04,18	Nov. 03,19
Dual Directional Coupler	TESEQ	C6187	95175	Nov. 04,18	Nov. 03,19
Dual Directional Coupler	TESEQ	CPH-274F	M251304-01	Nov. 04,18	Nov. 03,19
Test Software	ADT	BVADT_RS_V 7.6.4-DG	N/A	N/A	N/A
Audio analyzer	Rohde&Schwarz	UPV	101397	Oct. 13,18	Oct. 12,19
EAR SIMULATOR	B&K	4192	2764719	Oct. 13,18	Oct. 12,19
Sound Calibrator	B&K	Type 4231	2463874	Oct. 13,18	Oct. 12,19
Conditioning Amplifier	Rohde&Schwarz	2690A0S2	2437856	Oct. 13,18	Oct. 12,19

- NOTE:**
1. The test was performed in RS chamber.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.



### 5.3.3 TEST PROCEDURE

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

- a. The testing was performed in a fully-anechoic chamber.
- b. The frequency range is swept from 80 MHz to 1000 MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz, with the signal 80% amplitude modulated with a 1kHz sine wave.
- c. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5s.
- d. The field strength levels were 3V/m.
- e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

For Broadcast reception function:

- f. **Group1:** Equipment in which the desired RF broadcast signal enters the equipment through a coaxial broadcast receiver tuner port. These coaxial ports are intended to be connected via a coaxial cable to an antenna or a cable distribution system.
- g. **Group 2:** Broadcast reception equipment which is not included in Group 1.
- h. AM/FM/DAB equipment with a coaxial broadcast receiver tuner port is classified as Group 2 equipment if the manufacturer declares that the equipment is not intended to be connected to a CATV or other cable distribution network.
- i. The broadcast reception function shall be tested in each reception mode for which the receiver is designed, for example analogue reception, DVB-T, DVB-T2, DVB-C, DVB-C2, DVB-S, DVB-S2. The receiver shall be tuned to one channel and provided with an appropriate wanted signal on that channel or other input typical of normal use.

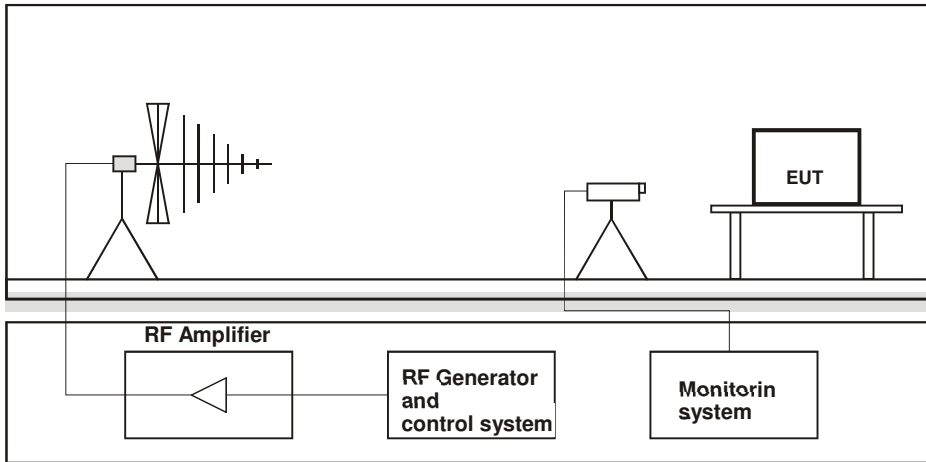
### 5.3.4 DEVIATION FROM TEST STANDARD

No deviation.

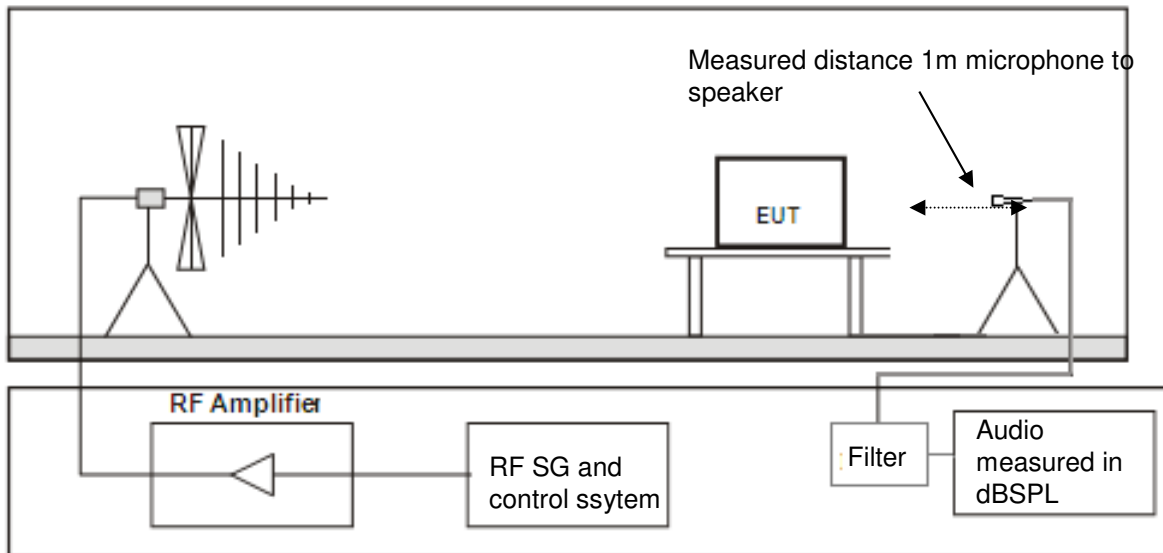


### 5.3.5 TEST SETUP

For Picture monitoring:

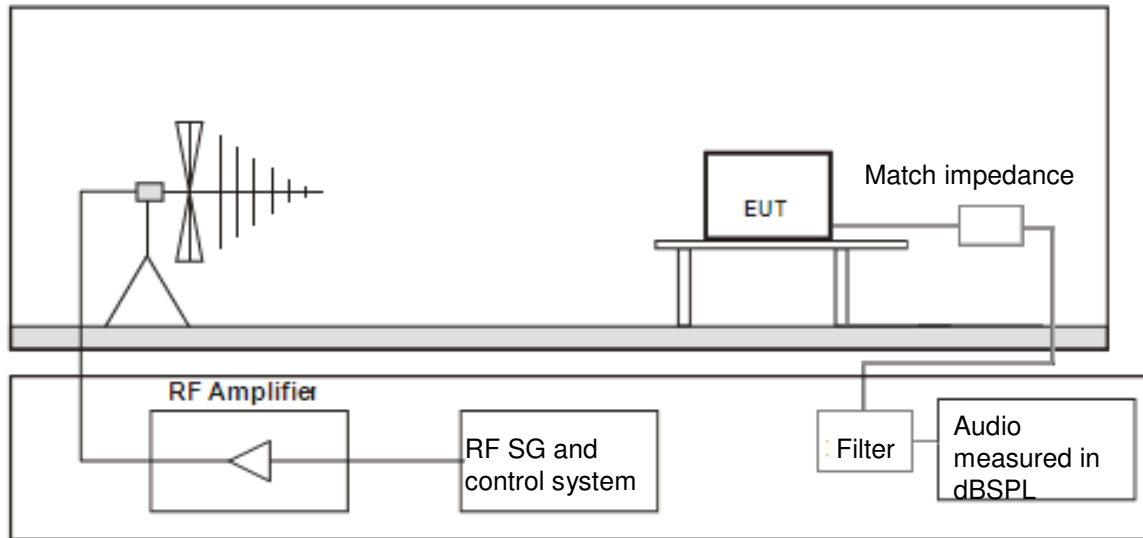


For Acoustic mode:





For Electrical mode:



**NOTE:**

1. The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.
2. Filter: 1kHz 3dB band pass filter.
3. The measurement distance: EUT to interference antenna was 3m.



### 5.3.6 TEST RESULTS

<b>TEST MODE</b>	See section 2.2	<b>TEST VOLTAGE</b>	See section 2.2
<b>ENVIRONMENTAL CONDITIONS</b>	25.2deg.C, 55.3% RH	<b>TESTED BY:</b> Andy	

Field Strength (V/m)	Test Frequency Note (MHz)	Polarization of antenna (Horizontal / Vertical)	Test Distance (m)	Test Result	Remark
3	80-1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz	H&V	3	A	Pass

**Note:** 1. In-band is defined as the entire tuneable operating range of the selected broadcast reception function.

2. The tuned channel  $\pm 0,5$  MHz (lower edge frequency – 0,5 MHz up to the upper edge frequency + 0,5 MHz of the tuned channel) is excluded from testing.

**NOTE:** A: There was no change compared with initial operation during the test





### 5.4 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS) (EN301489)

#### 5.4.1 TEST SPECIFICATION

**Basic Standard:** EN 61000-4-3  
**Frequency Range:** 80 MHz ~ 6000 MHz  
**Field Strength:** 3 V/m  
**Modulation:** 1 kHz Sine Wave, 80%, AM Modulation  
**Frequency Step:** 1% of preceding frequency value  
**Polarity of Antenna:** Horizontal and Vertical  
**Antenna Height:** 1.5 m  
**Dwell Time:** 3 seconds

#### 5.4.2 TEST INSTRUMENT

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal Generator	Agilent	N5181A	MY50142530	Oct. 20,18	Oct. 19,19
Antenna Log-Periodic	AR	ATR80M6G	0337307	N/A	N/A
Antenna Log-Periodic	AR	ATS700M11G	0336821	N/A	N/A
Switch Controller	AR	SC1000	0337343	N/A	N/A
RF Power Meter	ESE	4242	13984	Jan. 02,18	Jan. 01,19
Power Sensor	ESE	51011EMC	35716	Jan. 02,18	Jan. 01,19
Power Sensor	ESE	51011EMC	35715	Jan. 02,18	Jan. 01,19
E-Field probe	Narda	NBM-520	2403/01B	Sep. 28,18	Sep. 27,19
Power Amplifier	TESEQ	CBA 1G-150	T44029	N/A	N/A
Power Amplifier	TESEQ	CBA 3G-100	T44030	N/A	N/A
Power Amplifier	TESEQ	CBA 6G-050	1041204	N/A	N/A
Dual Directional Coupler	TESEQ	C5982	95208	Nov. 08,18	Nov. 07,19
Dual Directional Coupler	TESEQ	C6187	95175	Nov. 08,18	Nov. 07,19
Dual Directional Coupler	TESEQ	CPH-274F	M251304-01	Nov. 08,18	Nov. 07,19
Universal Radio Communication Tester	Rohde&Schwarz	CMU 200	123259	Apr.07, 18	Apr.06, 19
Conditioning Amplifier	Rohde&Schwarz	2690A0S2	2437856	Aug. 13,18	Aug.12,19
Test Software	ADT	BVADT_RS_V7.6.4-DG	N/A	N/A	N/A
Signal Generator	Agilent	N5181A	MY50142530	Oct. 20,18	Oct. 19,19

- NOTE:**
1. The test was performed in RS chamber.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.



### 5.4.3 TEST PROCEDURE

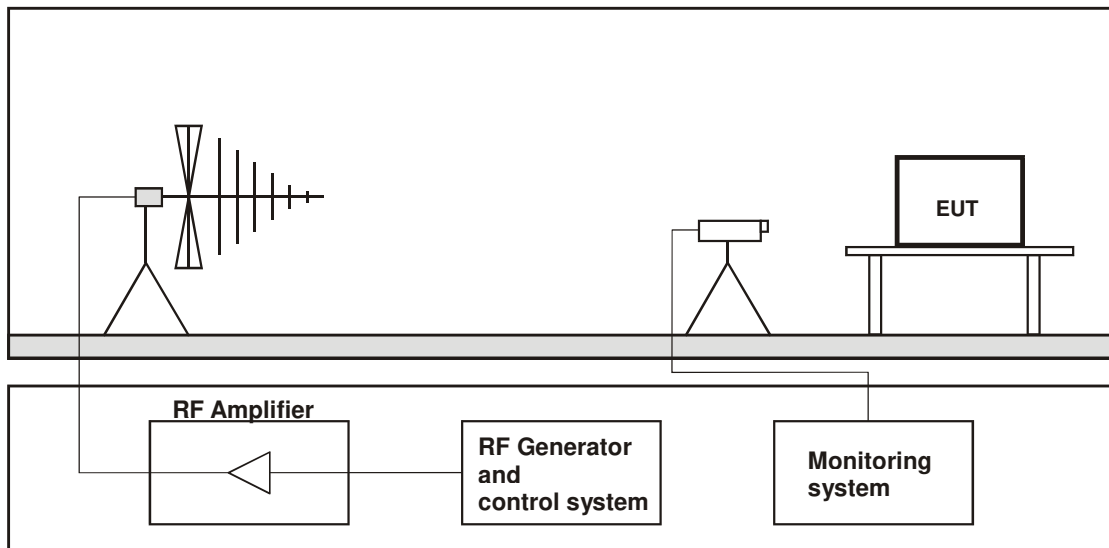
The test procedure was in accordance with EN 61000-4-3.

- a. The testing was performed in a fully-anechoic chamber.
- b. The frequency range is swept from 80 MHz to 6000 MHz with the signal 80% amplitude modulated with a 1 kHz sine wave.
- c. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0.5s.
- d. The field strength level was 3 V/m.
- e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

### 5.4.4 DEVIATION FROM TEST STANDARD

No deviation.

### 5.4.5 TEST SETUP



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

#### NOTE:

##### TABLETOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.



### 5.4.6 TEST RESULTS

<b>TEST MODE</b>	See section 2.2	<b>TEST VOLTAGE</b>	See section 2.2
<b>ENVIRONMENTAL CONDITIONS</b>	24.1deg., 55.1% RH	<b>TESTED BY:</b> Andy	

Field Strength (V/m)	Test Frequency Note <sup>#1</sup> (MHz)	Polarization of antenna (Horizontal / Vertical)	Test Distance (m)	Test Result	Remark
3	80 - 6000	H / V	3	A	Note 1

Note<sup>#1</sup>: Tested Israel SII Frequencies 89,100,107,144,163,196,244,315,434,460,600,825,845,880 MHz

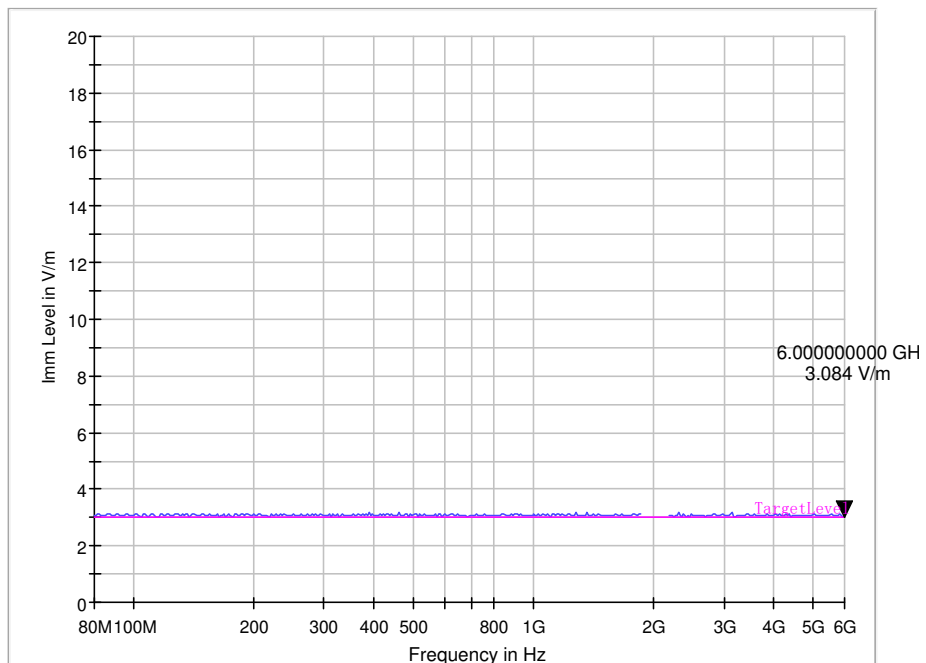
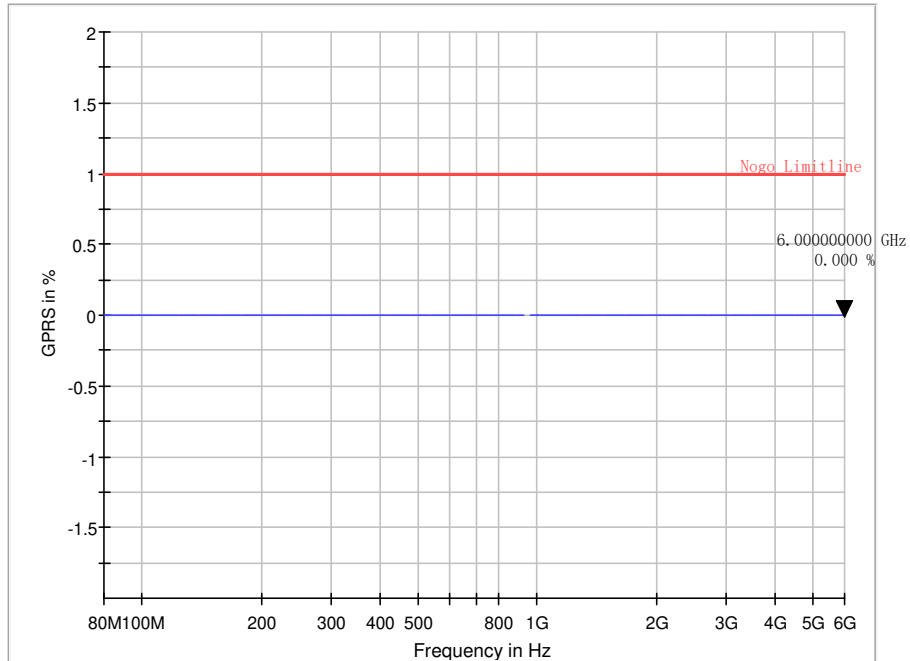
**Note :**

1. A: There was no change compared with initial operation during the test.
2. For throughput Measurement: During the test, the measured Throughput shall not found less than 95% of the maximum throughput of the reference measurement channel.



### 5.4.7 DATA TRANSFER MEASUREMENT RESULTS

Worst case of the test modes: GPRS 900  
Vertical (90 degree)

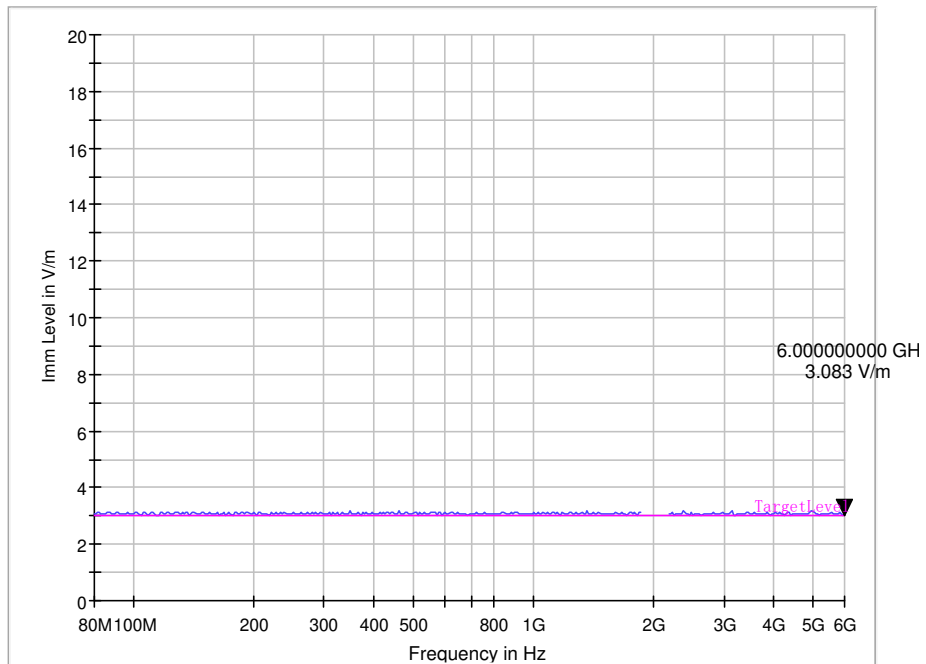
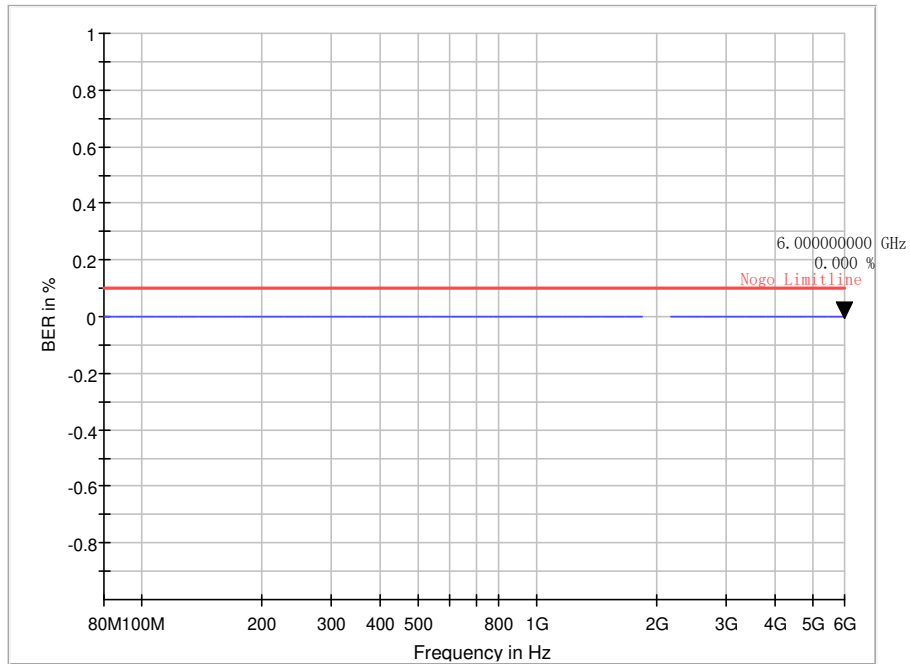




**BUREAU  
VERITAS**

**Test Report No.: CE2012WDG0026**

**Worst case of the test modes: WCDMA Band 1 Link  
Vertical (90 degree)**





## 6 PHOTOGRAPHS OF THE TEST CONFIGURATION

### CONDUCTED EMISSION TEST

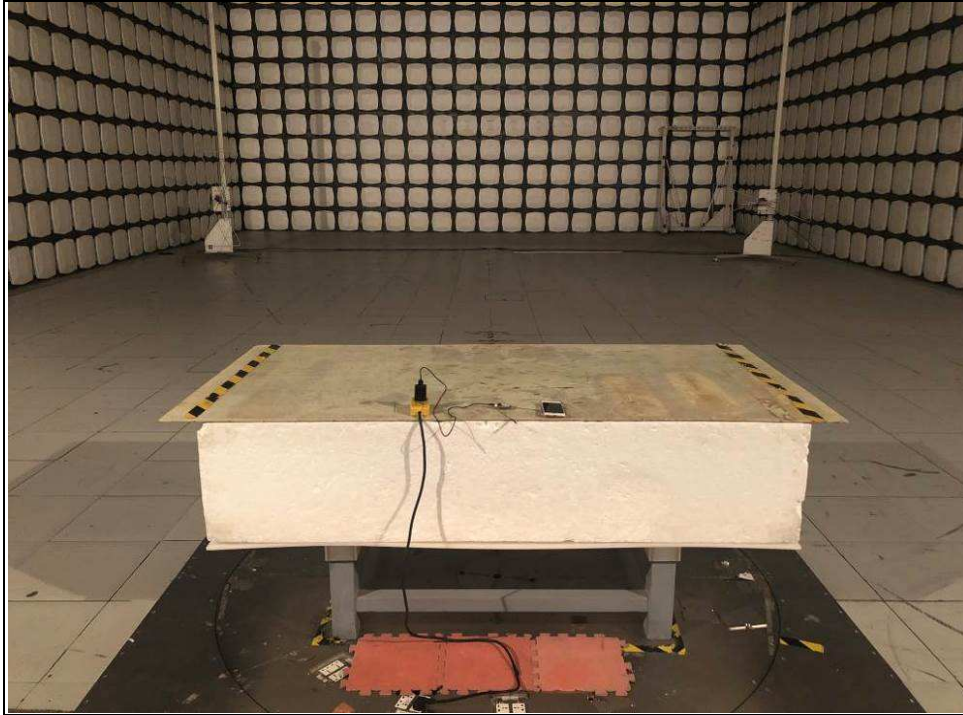




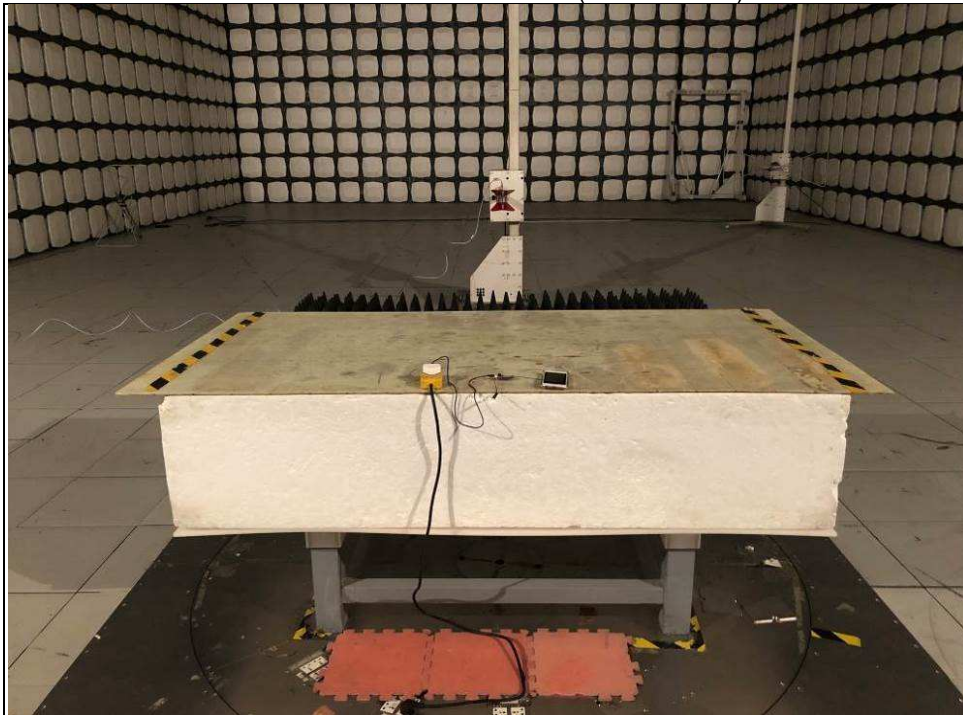
**BUREAU  
VERITAS**

**Test Report No.: CE2012WDG0026**

**RADIATED EMISSION TEST (30MHz-1GHz)**



**RADIATED EMISSION TEST (Above 1GHz)**

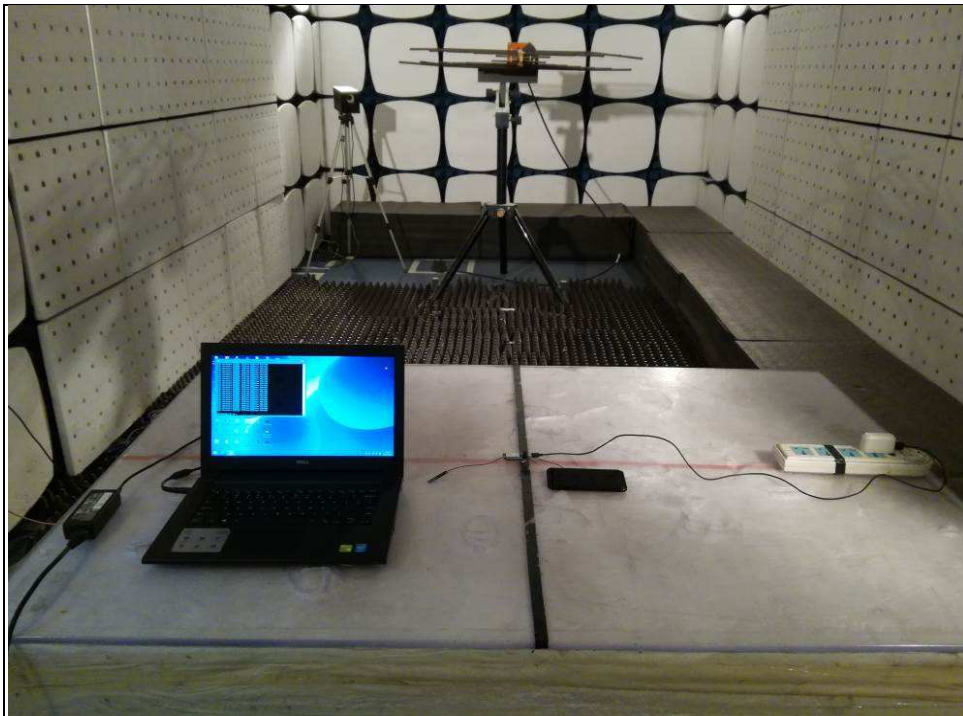




ESD TEST



RS TEST







## **7 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications were made to the EUT by the lab during the test.

**---END---**