



Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Telephone: +86-755-26648640

Fax: +86-755-26648637

Website: www.cqa-cert.com

Report Template Version: V04

Revision Issue Date: 2018-07-06

EMC Test Report

Report No.: CQASZ20190400303E-01

Applicant:

Address of Applicant:

Manufacturer:

Address of Manufacturer:

Factory:

Address of Factory:

Equipment Under Test (EUT):

EUT Name: Smart Bracelet

All Model No.:

Test Model No.:

Trade mark: N/A

Standards: EN 55032 : 2015

EN 55035 : 2017

Draft EN 301 489-1 V2.2.1 (2019-03)

Draft EN 301 489-17 V3.2.0 (2017-03)

Date of Test: 2019-04-30 to 2019-05-08

Date of Issue: 2019-05-08

Test Result : Pass*

Tested By: Martin Lee
(Martin Lee)

Reviewed By: Aaron Ma
(Aaron Ma)

Approved By: Jack Ai
(Jack Ai)



* In the configuration tested, the EUT complied with the standards specified above.

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20190400303E-01	Rev.01	Initial report	2019-05-08

2 Test Summary

Emission Part				
Item	Standard	Method	Requirement	Result
Radiated Emissions (30MHz-1GHz)	ETSI EN 301 489-1 V2.2.1	EN 55032:2015	Class B	Pass
Radiated Emissions (above 1GHz)	ETSI EN 301 489-1 V2.2.1	EN 55032:2015	Class B	Pass

Immunity Part				
Item	Standard	Method	Requirement	Result
Electrostatic Discharge	ETSI EN 301 489-1 V2.2.0 & EN 55035 : 2017	EN 61000-4-2:2009	4kV Contact Discharge 8kV Air Discharge	Pass
Radiated Immunity (80MHz-6GHz)	ETSI EN 301 489-1 V2.2.0 & EN 55035 : 2017	EN 61000-4-3:2006 +A1:2008+A2:2010	3V/m, 80%, 1kHz Amp. Mod.	Pass

3 Contents

	Page
1 COVER PAGE.....	1
1 VERSION.....	2
2 TEST SUMMARY	3
3 CONTENTS	4
4 GENERAL INFORMATION.....	5
4.1 CLIENT INFORMATION	5
4.2 GENERAL DESCRIPTION OF EUT	5
4.3 GENERAL DESCRIPTION OF BLE	5
4.4 DETAILS OF EUT	6
4.5 DESCRIPTION OF SUPPORT UNITS	6
4.6 MEASUREMENT UNCERTAINTY	6
4.7 TEST LOCATION.....	7
4.8 DEVIATION FROM STANDARDS	7
4.9 ABNORMALITIES FROM STANDARD CONDITIONS.....	7
4.10 MONITORING OF EUT FOR ALL IMMUNITY TEST	7
5 EQUIPMENT LIST.....	8
6 EMISSION TEST RESULTS	9
6.1 RADIATED EMISSIONS (30MHz-1GHz).....	9
6.1.1 E.U.T. Operation.....	9
6.1.2 Test Setup Diagram.....	9
6.1.3 Measurement Data	10
6.2 RADIATED EMISSIONS (ABOVE 1GHz).....	12
6.2.1 E.U.T. Operation.....	12
6.2.2 Test Setup Diagram.....	12
6.2.3 Measurement Data	13
7 IMMUNITY TEST RESULTS	14
7.1 PERFORMANCE CRITERIA DESCRIPTION IN ETSI EN 301 489-1 V2.2.1	14
7.2 PERFORMANCE CRITERIA DESCRIPTION IN ETSI EN 301 489-17 V3.1.1	14
7.3 EXCLUSION BANDS	16
7.4 ELECTROSTATIC DISCHARGE.....	17
7.4.1 Test Setup Diagram.....	17
7.4.2 E.U.T. Operation.....	17
7.4.3 Test Results:.....	17
7.5 RADIATED IMMUNITY (80MHz-6GHz)	19
7.5.1 Test Setup Diagram.....	19
7.5.2 E.U.T. Operation.....	19
7.5.3 Test Results:.....	20
8 PHOTOGRAPHS.....	21
8.1 RADIATED EMISSIONS TEST SETUP	21
8.2 ELECTROSTATIC DISCHARGE TEST SETUP	21
8.3 EUT CONSTRUCTIONAL DETAILS.....	22

4 General Information

4.1 Client Information

Applicant:	
Address of Applicant:	
Manufacturer:	
Address of Manufacturer:	
Factory:	
Address of Factory:	

4.2 General Description of EUT

Product Name:	Smart Bracelet
All Model No.:	
Test Model No.:	G20
Trade Mark:	N/A
Software version:	56
Hardware version:	RH122V03
Bluetooth Version:	V4.0
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	Portable production
Test Software of EUT:	RTL8762C_RFTTestTool_v1.0.1.1 (manufacturer declare)
Power Supply:	lithium battery:DC3.7V, Charge by USB

4.3 General Description of BLE

Frequency Range:	2402MHz to 2480MHz
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK
Transfer Rate:	1Mbps
Number of Channels:	40
Antenna Type:	PCB antenna
Antenna Gain:	0dBi

Note:

All model: G18, G20, G20Plus, G21, G22, G26, G28, G29, G30, G30Pro, G100, G100Plus

Only the model G20 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

4.4 Details of EUT

Charging+BT mode:	Keep the EUT exchange data with other BT device.
Idle mode:	Keep the EUT in standby mode.

4.5 Description of Support Units

Description	Manufacturer	Model No.	Remark
Phone	Iphone	iphone5s	Provide by lab
Adapter	Samsung	EP-TA50CBC	Provide by lab

4.6 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Conduction emission	3.74dB (9kHz to 150kHz)
		3.34dB (150kHz to 30MHz)
2	Radiated emission	5.12dB (30MHz-1GHz)
		4.60dB (1GHz-6GHz)
3	Radiated Immunity	1.61dB
4	Conducted Immunity	0.92dB
5	ESD	5 %
6	EFT (Electrical Fast Transients)	5 %
7	Surge Immunity	4 %
8	Voltage Dips and Interruptions	4 %
9	Temperature test	1°C
10	Humidity test	3%
11	DC power test	0.5 %

4.7 Test Location

Other than radiated immunity, all tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Radiated immunity test is performed at:

Shenzhen Academy of Metrology and Quality Inspection

NETC Building, No. 4 Tongfa Rd., Xili, Nanshan, Shenzhen, China

4.8 Deviation from Standards

None

4.9 Abnormalities from Standard Conditions

None

4.10 Monitoring of EUT for All Immunity Test

Visual: monitor the LCD display of EUT

Audio: monitor the sound of EUT

5 Equipment List

Radiated Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Loop antenna	SCHWARZBECK	FMZB 1516	CQA-060	2018/10/28	2020/10/27
Horn Antenna	R&S	BBHA 9170	CQA-088	2018/9/26	2020/9/25
Horn Antenna	R&S	HF906	CQA-012	2018/9/26	2019/9/25
Bilog Antenna	R&S	HL562	CQA-011	2018/9/26	2019/9/25
EMI Test Receiver	R&S	ESR7	CQA-005	2018/10/28	2019/10/27
Spectrum analyzer	R&S	FSU26	CQA-038	2018/10/28	2019/10/27
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2018/9/26	2019/9/25
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2018/11/2	2019/11/1
Coaxial cable (1GHz~40GHz)	CQA	N/A	C019	2018/9/26	2019/9/25
Coaxial cable (9KHz~1GHz)	CQA	N/A	C020	2018/9/26	2019/9/25

Electrostatic Discharge					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
ESD Simulator	EM TEST	DITO	CQA-001	2018/9/26	2019/9/25

SMQ:

Radiated Immunity (80MHz-6GHz)					
Equipment	Manufacturer	Model No	Inventory No.	Cal Date	Cal Due Date
Signal Generator	R&S	SMB100A	SB12827	2018/6/18	2019/6/17
Voltage Probe	R&S	URV5-Z2	SB3437/02	2019/2/27	2020/2/26
Power Amplifier	AR	250W1000A	SB7933	2019/1/19	2020/1/20
Antenna	AR	AT1080	SB3171	2018/10/10	2019/10/09
Power Amplifier	MILMEGA	AS0860-75/45	SB7934	2019/4/3	2020/4/2
Horn Antenna	AR	AT4002A	SB3937	2019/4/3	2020/4/2
Audio mouth	BK	BK-4227	SB3442/06	2019/3/30	2020/3/29
Audio Box	BK	ACO-B0X	SB3442/07	2019/3/30	2020/3/29
Audio analyzer	R&S	UPL	SB3439	2018/12/3	2019/12/2
Anechoic Chamber	Albatross	--	SB12827	2018/10/17	2019/10/16

6 Emission Test Results

6.1 Radiated Emissions (30MHz-1GHz)

Test Requirement:	ETSI EN 301 489-1 V2.2.1
Test Method:	EN 55032:2015
Frequency Range:	30MHz to 1GHz
Measurement Distance:	3m
Limit:	
30MHz-230MHz	40 dB(μ V/m) quasi-peak
230MHz-1GHz	47 dB(μ V/m) quasi-peak
Detector:	Peak for pre-scan (120kHz resolution bandwidth) 30M to 1000MHz

6.1.1 E.U.T. Operation

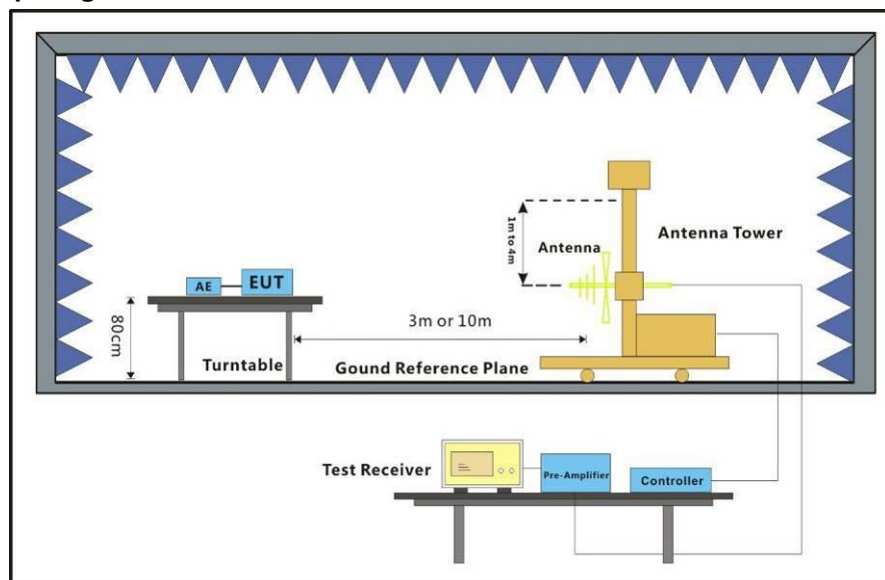
Operating Environment:

Temperature: 24 °C Humidity: 54 % RH Atmospheric Pressure: 1015 mbar

Pretest these Charging+BT mode
mode to find the
worst case: Idle mode

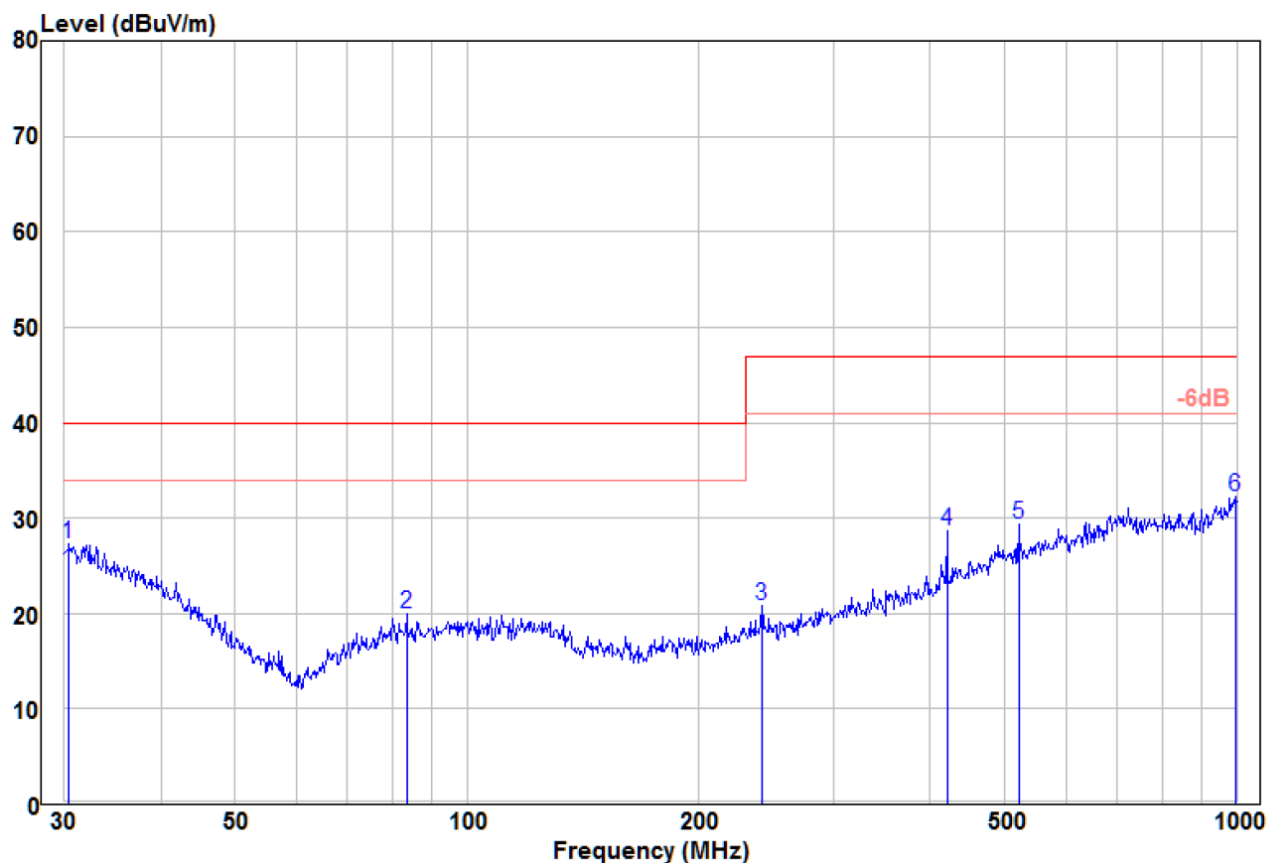
The worst case Charging+BT mode
for final test:

6.1.2 Test Setup Diagram



6.1.3 Measurement Data

Polarization:Horizontal



		Read			Limit	Over		
	Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1 pp	30.42	-0.83	28.16	27.33	40.00	-12.67		HORIZONTAL
2	83.52	0.18	19.77	19.95	40.00	-20.05		HORIZONTAL
3	241.68	1.12	19.71	20.83	47.00	-26.17		HORIZONTAL
4	420.58	3.87	24.73	28.60	47.00	-18.40		HORIZONTAL
5	520.89	1.96	27.45	29.41	47.00	-17.59		HORIZONTAL
6	996.50	-0.80	32.99	32.19	47.00	-14.81		HORIZONTAL

Remark:

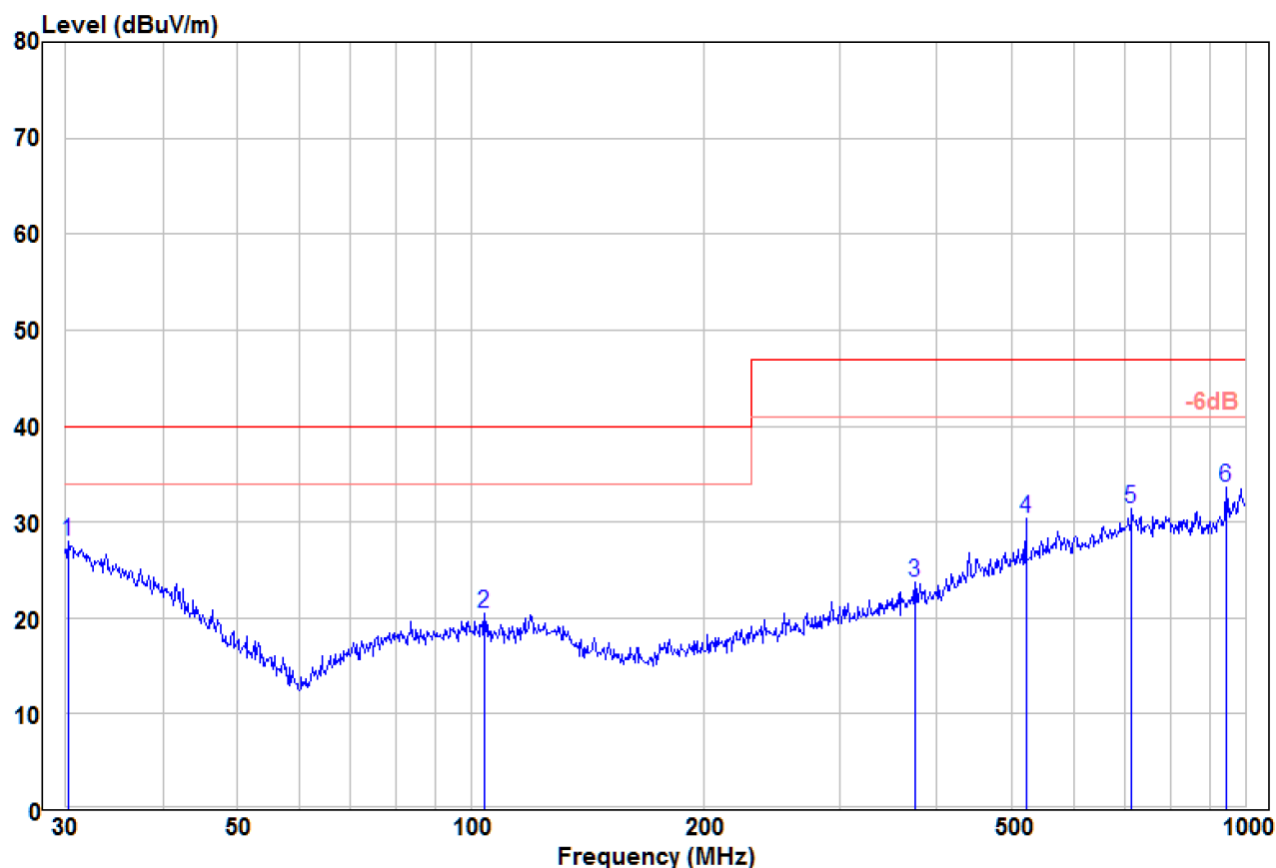
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

Level = Read Level + Factor,

Over Limit=Level-Limit Line.

Polarization:Vertical



	Freq	Read	Factor	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1 pp	30.21	-0.22	28.23	28.01	40.00	-11.99		VERTICAL
2	104.17	0.06	20.36	20.42	40.00	-19.58		VERTICAL
3	374.62	0.18	23.46	23.64	47.00	-23.36		VERTICAL
4	520.89	2.89	27.45	30.34	47.00	-16.66		VERTICAL
5	714.17	1.32	30.12	31.44	47.00	-15.56		VERTICAL
6	945.44	2.08	31.54	33.62	47.00	-13.38		VERTICAL

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

Level = Read Level + Factor,

Over Limit=Level-Limit Line.

6.2 Radiated Emissions (above 1GHz)

Test Requirement:	ETSI EN 301 489-1 V2.2.1
Test Method:	EN 55032:2015
Frequency Range:	Above 1GHz
Measurement Distance:	3m
Limit:	
1GHz-3GHz	70 dB(μ V/m) peak, 50 dB(μ V/m) average
3GHz-6GHz	74 dB(μ V/m) peak, 54dB(μ V/m) average
Detector:	Peak for pre-scan (1000kHz resolution bandwidth) 1000M to 6000MHz

6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 52 % RH Atmospheric Pressure: 1015 mbar

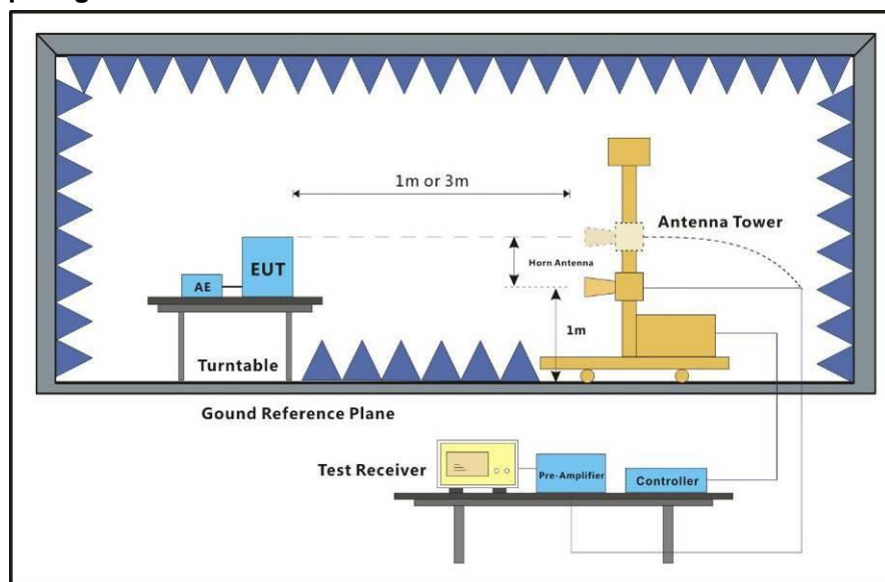
Pretest these Charging+BT mode

mode to find the Idle mode

worst case: Charging+BT mode

for final test:

6.2.2 Test Setup Diagram



6.2.3 Measurement Data

Note: The frequencies(2400~2483.5MHz) on which the transmitter part of the EUT is intended to operate shall be excluded from radiated emission measurements when performed in transmit mode of operation

Class B: Above 1GHz : at 3M							
Ant.Pol.	Frequency	Measurement (dBUV)		Limit 3m(dBUV/m)		Over(dB)	
	MHz	PK	AV	PK	AV	PK	AV
Horizontal	1455.57	51.28	36.89	70	50	-18.72	-13.11
	2550.53	51.54	37.23	70	50	-18.46	-12.77
	4486.34	59.97	38.60	74	54	-14.03	-15.40
Vertical	1643.95	51.16	37.12	70	50	-18.84	-12.88
	2341.19	53.91	35.72	70	50	-16.09	-14.28
	4752.94	55.18	39.32	74	54	-18.82	-14.68

7 Immunity Test Results

7.1 Performance Criteria Description in ETSI EN 301 489-1 V2.2.1

- Criterion A** 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. 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.
- Criterion B** After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena 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.
- During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.
- 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.
- Criterion C** 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.
- Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

7.2 Performance Criteria Description in ETSI EN 301 489-17 V3.1.1

6 Performance criteria

6.1 General performance criteria

The performance criteria are:

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

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

6.2 Performance table

Table 1: Performance criteria

Criteria	During test	After test
A	Shall operate as intended. (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 3). 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 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). 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 3).
NOTE 1: Operate as intended during the test allows a level of degradation 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: 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 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.		

6.3 Performance criteria for Continuous phenomena applied to Transmitters (CT)

The performance criteria A shall apply.

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

6.4 Performance criteria for Transient phenomena applied to Transmitters (TT)

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

6.5 Performance criteria for Continuous phenomena applied to Receivers (CR)

The performance criteria A shall apply.

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

6.6 Performance criteria for Transient phenomena applied to Receivers (TR)

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

7.3 Exclusion Bands

The exclusion band for immunity testing of equipment operating in the 2,4 GHz band shall be:

lower limit of exclusion band = lowest allocated band edge frequency -120 MHz

$$=2400\text{MHz}-120\text{MHz}=2280\text{MHz}$$

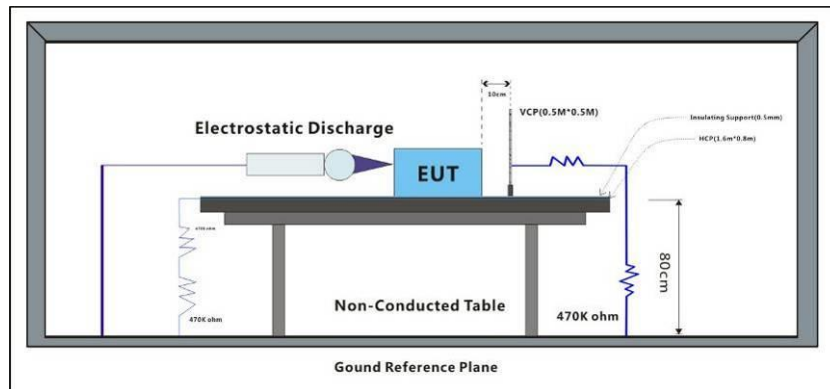
upper limit of exclusion band = highest allocated band edge frequency +120 MHz

$$=2483.5\text{MHz}+120\text{MHz}=2603.5\text{MHz}$$

7.4 Electrostatic Discharge

Test Requirement: ETSI EN 301 489-1 V2.2.1 & EN 55035 : 2017
 Test Method: EN 61000-4-2:2009
 Performance Criterion: B
 Discharge Impedance: 330Ω/150pF
 Number of Discharge: Minimum 10 times at each test point
 Discharge Mode: Single Discharge
 Discharge Period: 1 second minimum

7.4.1 Test Setup Diagram



7.4.2 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 53 % RH Atmospheric Pressure: 1005 mbar

Test mode: Charging+BT mode

Idle mode

7.4.3 Test Results:

Observations: Test Point:

1. All insulated enclosure and seams.
2. All accessible metal parts of the enclosure.
3. All side

Discharge type	Level (kV)	Polarity	Test Point	Result / Observations
Air Discharge	2,4,8	+	1	A
Air Discharge	2,4,8	-	1	A
Contact Discharge	4	+	2	A
Contact Discharge	4	-	2	A
Horizontal Coupling	4	+	3	A
Horizontal Coupling	4	-	3	A
Vertical Coupling	4	+	3	A
Vertical Coupling	4	-	3	A

Results:

A: No degradation in the performance of the EUT was observed.

PERORMANCE CRITERIA	
Criteria requested	<input checked="" type="checkbox"/> TT / <input checked="" type="checkbox"/> TR
Criteria meet	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR
	<input type="checkbox"/> TT / <input type="checkbox"/> TR

7.5 Radiated Immunity (80MHz-6GHz)

Test Requirement: ETSI EN 301 489-1 V2.2.1 & EN 55035 : 2017
 Test Method: EN 61000-4-3:2006+A1:2008+A2:2010
 Performance Criterion: A
 Frequency Range: 80MHz to 6GHz
 Antenna Polarisation: Vertical and Horizontal
 Modulation: 1kHz, 80% Amp. Mod, 1% increment

7.5.1 Test Setup Diagram

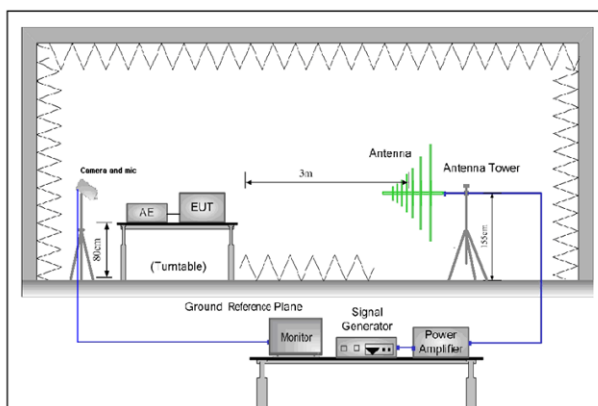


Figure 1. 80MHz to 1GHz

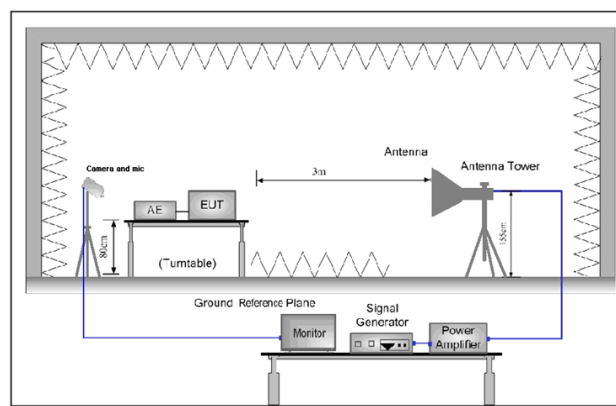


Figure 2. 1GHz to 6GHz

7.5.2 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 53 % RH Atmospheric Pressure: 1015 mbar
 Test mode: Charging+BT mode
 Idle mode

7.5.3 Test Results:

Frequency	Level (V/m)	EUT Face	Dwell time	Result / Observations
80MHz-1GHz	3	Front	2s	A
80MHz-1GHz	3	Back	2s	A
80MHz-1GHz	3	Left	2s	A
80MHz-1GHz	3	Right	2s	A
80MHz-1GHz	3	Top	2s	A
80MHz-1GHz	3	Underside	2s	A
1GHz -6GHz	3	Front	2s	A
1GHz -6GHz	3	Back	2s	A
1GHz -6GHz	3	Left	2s	A
1GHz -6GHz	3	Right	2s	A
1GHz -6GHz	3	Top	2s	A
1GHz -6GHz	3	Underside	2s	A

Results:

A: No degradation in the performance of the EUT was observed.

PERFORMANCE CRITERIA

Criteria requested	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR
Criteria meet	<input checked="" type="checkbox"/> CT / <input checked="" type="checkbox"/> CR

8 Photographs

8.1 Radiated Emissions Test Setup



8.2 Electrostatic Discharge Test Setup



8.3 EUT Constructional Details

Test Model No.: G20







