

<b>TEST REPORT</b> <b>ETSI EN 301 489-1 V2.2.3 (2019-11)</b> <b>ETSI EN 301 489-17 V3.2.4 (2020-09)</b>	
<b>Report Reference No.</b> .....	<b>E01A23050809E00201</b>
Compiled by ( position+printed name+signature)...	Test Engineer Sunshine Huang
Supervised by ( position+printed name+signature)...	Test Engineer Duke Liu
Approved by ( position+printed name+signature)...	Manager Tiger Xu
Date of issue .....	June 30, 2023
<b>Representative Laboratory Name</b> ..	<b>Dong Guan Anci Electronic Technology Co., Ltd.</b>
Address.....	1-2 Floor, Building A, No.11, Headquarters 2 Road, Songshan, Lake Hi-tech Industrial Development Zone, Dongguan City, Guangdong Pr., China.
<b>Applicant's name</b> .....	<b>Shenzhen Hope Microelectronics Co., Ltd.</b>
Address.....	30th floor of 8th Building, C Zone, Vanke Cloud City, Xili Sub-district, Nanshan, Shenzhen, GD, P.R. China
<b>Test specification</b> .....	
Standard .....	<b>ETSI EN 301 489-1 V2.2.3 (2019-11)/ETSI EN 301 489-17 V3.2.4 (2020-09) /EN 55032:2015+A11:2020/EN 55035: 2017+A11: 2020</b>
TRF Originator .....	GTG
<b>Dong Guan Anci Electronic Technology Co., Ltd. All rights reserved.</b> This publication may be reproduced in whole or in part for non-commercial purposes as long as the Dong Guan Anci Electronic Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Dong Guan Anci Electronic Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.	
<b>Test item description</b> .....	Bluetooth Module
Trade Mark .....	HOPERF
Model No.: .....	HM-BT2102
Series Model:.....	HM-BT2101, HM-BT2103, HM-BT2104
Difference Description .....	All the same except for the model name.
Hardware version .....	V1.0
Software version .....	V1.0
Input Rating .....	DC 1.71V-3.8V
Result.....	PASS



**TEST REPORT**

<b>Test Report No. :</b>	<b>E01A23050809E00201</b>	May 13, 2023
		Date of issue

Equipment under Test : Bluetooth Module

Model No. : HM-BT2102

Series Model: : HM-BT2101, HM-BT2103, HM-BT2104

**Applicant** : **Shenzhen Hope Microelectronics Co., Ltd**

Address : 30th floor of 8th Building, C Zone, Vanke Cloud City, Xili Sub-district, Nanshan, Shenzhen, GD, P.R. China

**Manufacturer** : **Shenzhen Hope Microelectronics Co., Ltd**

Address : 30th floor of 8th Building, C Zone, Vanke Cloud City, Xili Sub-district, Nanshan, Shenzhen, GD, P.R. China

<b>Test Result</b>	<b>PASS</b>
--------------------	-------------

The test report merely corresponds to the test sample.  
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

## Contents

<b><u>1.</u></b>	<b><u>TEST STANDARDS .....</u></b>	<b><u>3</u></b>
<b><u>2.</u></b>	<b><u>SUMMARY .....</u></b>	<b><u>4</u></b>
2.1.	General Remarks	4
2.2.	Product Description	4
2.3.	EUT operation mode	5
2.4.	EUT configuration	5
2.5.	Modifications	5
<b><u>3.</u></b>	<b><u>TEST ENVIRONMENT .....</u></b>	<b><u>6</u></b>
3.1.	Address of the test laboratory	6
3.2.	Test Facility	6
3.3.	Environmental conditions	6
3.4.	Test Description	7
3.5.	Statement of the measurement uncertainty	8
3.6.	Equipments Used during the Test	9
	For Power Line Conducted Emission	9
	For Radiated Emission Measurement	9
	For Electrostatic Discharge Test	9
	For Radio-frequency, Electromagnetic Field Immunity	9
<b><u>4.</u></b>	<b><u>TEST CONDITIONS AND RESULTS.....</u></b>	<b><u>10</u></b>
4.1.	<b>EMISSION</b>	<b>10</b>
4.1.1.	Radiated Emission.....	10
4.1.2.	Conducted Emission.....	14
4.2.	<b>IMMUNITY</b>	<b>17</b>
4.2.1.	Performance criteria .....	17
4.2.2.	Electrostatic Discharge .....	20
4.2.3.	RF Electromagnetic Field .....	22
<b><u>5.</u></b>	<b><u>EXTERNAL AND INTERNAL PHOTOS OF THE EUT .....</u></b>	<b><u>23</u></b>

## 1. TEST STANDARDS

The tests were performed according to following standards:

[ETSI EN 301 489-1 V2.2.3 \(2019-11\)](#)—ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU

[ETSI EN 301 489-17 V3.2.4 \(2020-09\)](#)—ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

## 2. SUMMARY

### 2.1. General Remarks

Date of receipt of test sample	:	June 10, 2023
Testing commenced on	:	June 10, 2023
Testing concluded on	:	June 20, 2023

### 2.2. Product Description

Product Name:	Bluetooth Module
Trade Mark:	HOPERF
Model No.	HM-BT2102
Series Model:	HM-BT2101, HM-BT2103, HM-BT2104
Power supply:	DC 1.71V-3.8V
<b>Bluetooth 5.1</b>	
Version:	Bluetooth Ver.5.1 BLE
Modulation:	GFSK
Operation frequency:	2402MHz~2480MHz
Channel number:	40
Channel separation:	2MHz

### 2.3. EUT operation mode

Test mode	BLE	PC
1	■	■

Note:

1. ■ is operation mode.
2. Pre-scan above all test mode, found below test mode which it was worse case mode.

Test item	Test mode (Worse case mode)
Conducted emission	Mode 1
Radiated emission	Mode 1
EMS	Mode 1

### 2.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer  
 ● - supplied by the lab

●	PC	M/N:	T430
		Manufacturer:	Lenovo

### 2.5. Modifications

No modifications were implemented to meet testing criteria.

### **3. TEST ENVIRONMENT**

#### **3.1. Address of the test laboratory**

**Dong Guan Anci Electronic Technology Co., Ltd.**

1-2 Floor, Building A, No.11, Headquarters 2 Road, Songshan, Lake Hi-tech Industrial Development Zone, Dongguan City, Guangdong Pr., China.

#### **3.2. Test Facility**

The test facility is recognized, certified, or accredited by the following organizations:

##### **FCC-Registration No.: 991798**

Accredited by A2LA, 2018.03.15

The Certificate Number is 4422.01.

##### **CNAS-Lab Code: L6214**

Dong Guan Anci Electronic Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories. The Certificate Registration Number is L6214.

#### **3.3. Environmental conditions**

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

Normal Temperature:	25°C
Relative Humidity	55 %
Air Pressure	989 hPa

### 3.4. Test Description

Emission Measurement		
Radiated Emission	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09)	PASS
Conducted Emission( AC Mains)	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09)	PASS
Immunity Measurement		
Electrostatic Discharge	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09)	PASS
RF Electromagnetic Field	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09)	PASS
Fast Transients Common Mode	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09)	N/A
RF Common Mode 0,15 MHz to 80 MHz	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09)	N/A
Voltage Dips and Interruptions	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09)	N/A
Surges	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09)	N/A

Remark: The measurement uncertainty is not included in the test result.



### 3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“and is documented in the Dong Guan Anci Electronic Technology Co., Ltd. acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Dong Guan Anci Electronic Technology Co., Ltd. for Products Quality is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.24 dB	(1)
Radiated Emission	1~18GHz	5.16 dB	(1)
Conducted Disturbance	0.15~30MHz	3.39 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

### 3.6. Equipments Used during the Test

#### For Power Line Conducted Emission

Item	Equipment Type	Manufacturer	Model No.	Serial Number	Calibrated until
1.	L.I.S.N	SCHWARZBECK	NSLK 8127	8127-669	2024-05-09
2.	10 db attenuator	JFW	50FP-010-H4	4360846-427-1	2024-05-09
3.	RF Cable	N/A	N/A	2#	2024-05-09
4.	EMI Test Receiver	ROHDE&SCHWARZ	ESCI	101358	2024-05-09
5.	Shielded Room	chengyu	8m*4m*3m	N/A	2024-05-09
6.	Test Software	Farad	EZ-EMC Ver:ANCI-8A1	N/A	N/A

#### For Radiated Emission Measurement

Item	Equipment Type	Manufacturer	Model No.	Serial Number	Calibrated until
1.	EMI Test Receiver	Rohde & Schwarz	ESPI	100502	2023-11-19
2.	EMI Test Receiver	Rohde & Schwarz	FSV40	102257	2023-11-19
3.	Pre-Amplifier	HP	8447D	2727A0617 2	2024-05-09
4.	Pre-Amplifier	A-INFO	LA1018N4009	J101313052 4001	2024-05-09
5.	Bilog Antenna	Schwarzbeck	VULB9163	VULB9163- 588	2024-05-09
6.	Horn Antenna	A-INFO	LB-10180-SF	J203109061 2123	2024-05-09
7.	Cable	N/A	N/A	6#	2024-05-09
8.	Cable	N/A	N/A	1-1#	2024-05-09
9.	Cable	N/A	N/A	1-2#	2024-05-09
10.	Cable	N/A	N/A	7#	2024-05-09
11.	3m Semi-anechoic Chamber	chengyu	9m*6m*6m	N/A	2024-05-09
12.	Test Software	Farad	EZ-EMC Ver:ANCI-3A1	N/A	N/A

#### For Electrostatic Discharge Test

Item	Equipment Type	Manufacturer	Model No.	Serial Number	Calibrated until
1	ESD Simulator	Prima	ESD61002B	PR13012530	2024-05-09

#### For Radio-frequency, Electromagnetic Field Immunity

Item	Equipment Type	Manufacturer	Model No.	Serial Number	Calibrated until
1	Signal Generator	Agilent	N517113-50B	MY53050160	2023-10-11
2	Amplifier	A&R	150W1000M3	313157	2023-09-20
3	Amplifier	A&R	50SIG6M2	0342835	2023-09-20
4	Log-periodic Antenna	SCHWARZBECK	STLP 9128E	9128E-012	2023-09-20
5	Microwave log-periodic antenna	SCHWARZBECK	STLP 9149	9149.222	2023-09-20
6	Isotropic Field Probe	A&R	FL700	0342652	2023-10-11
7	Audio Analyzer	Rohde&Schwarz	UPL	SB3439	2023-10-11

The calibration interval is one year.

## 4. TEST CONDITIONS AND RESULTS

### 4.1. EMISSION

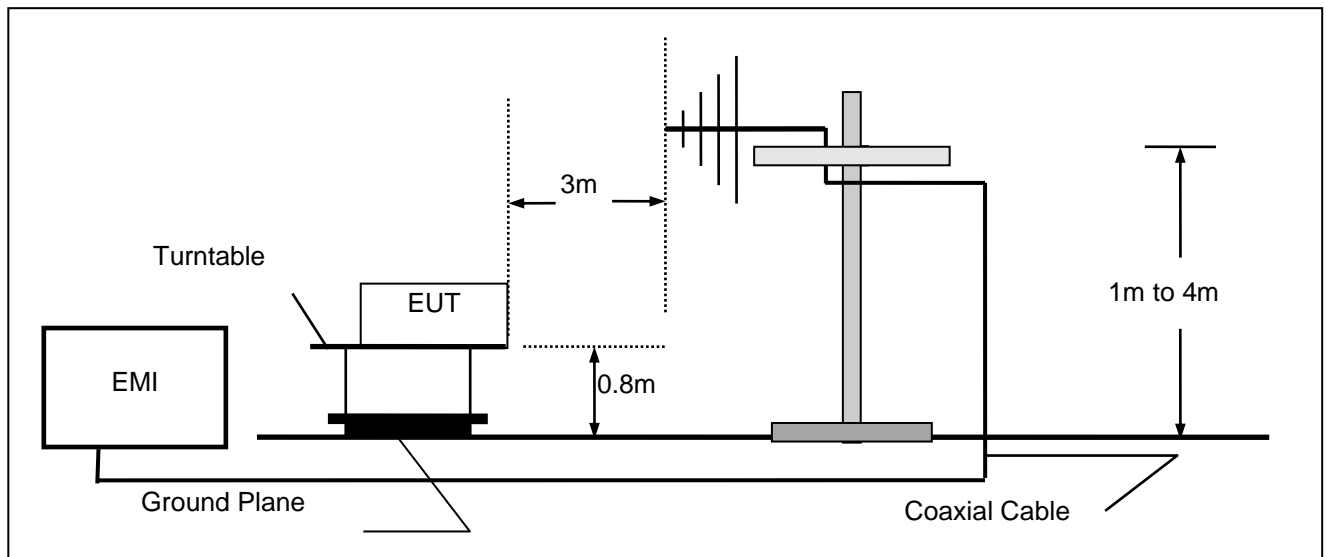
#### 4.1.1. Radiated Emission

##### LIMIT

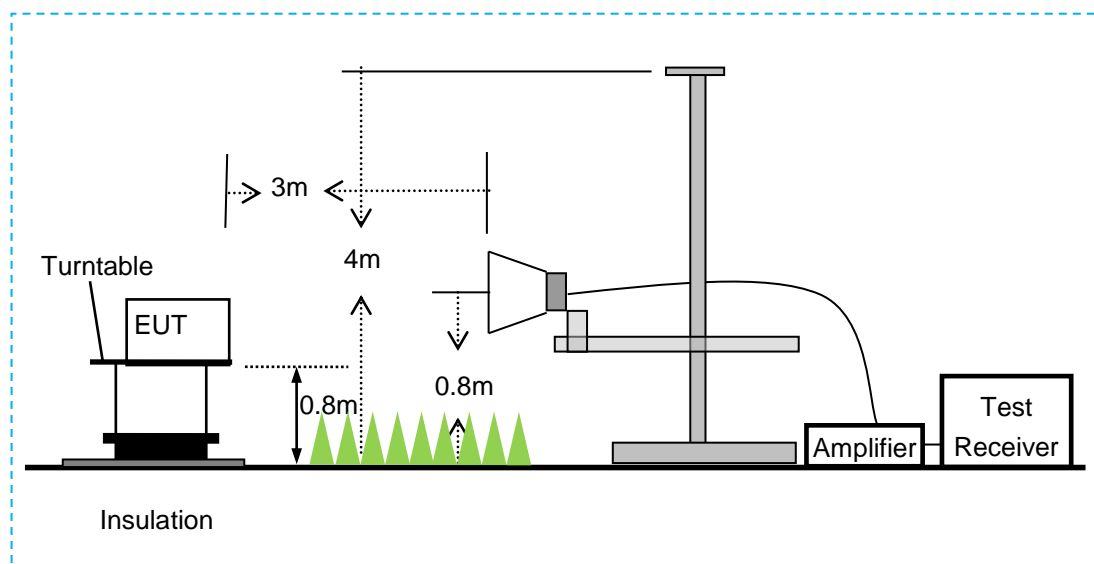
Please refer to ETSI EN301489-1 Clause 8.2.3, Table 4

##### TEST CONFIGURATION

- a) Radiated emission test set-up, frequency below 1000MHz:



- b) Radiated emission test set-up, frequency above 1000MHz



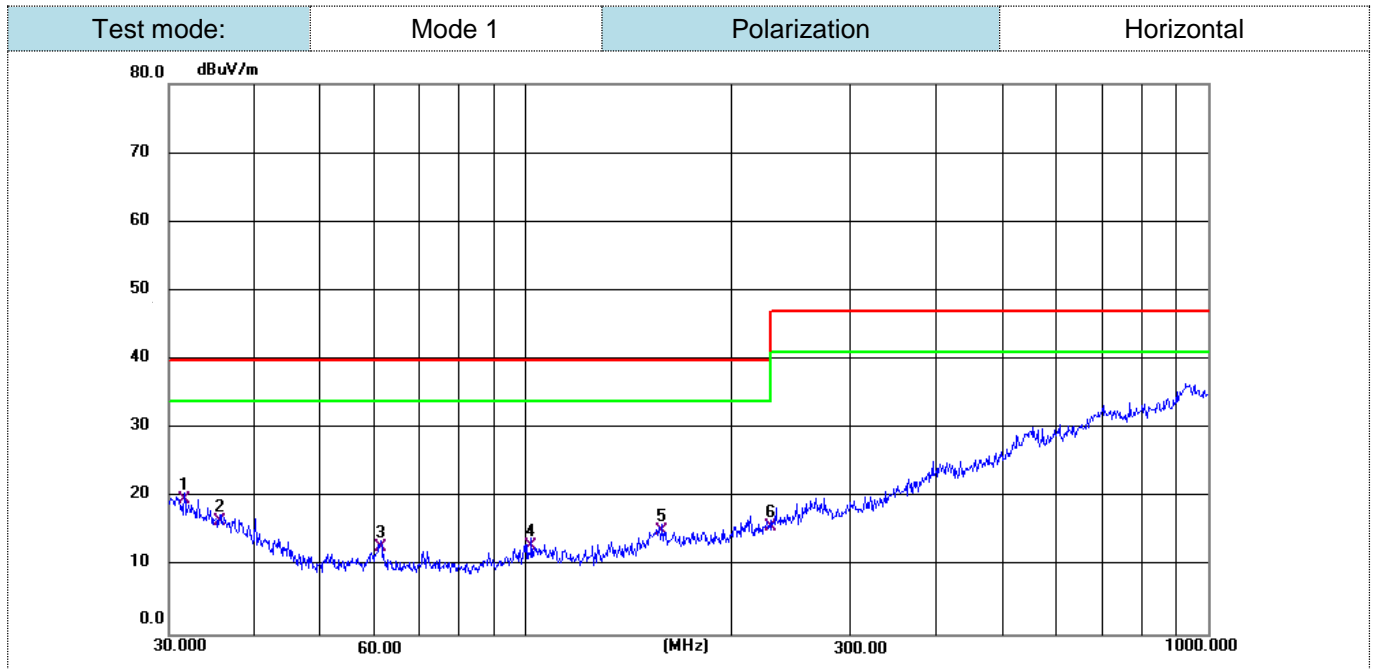
##### TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 8.2.3 for the measurement methods

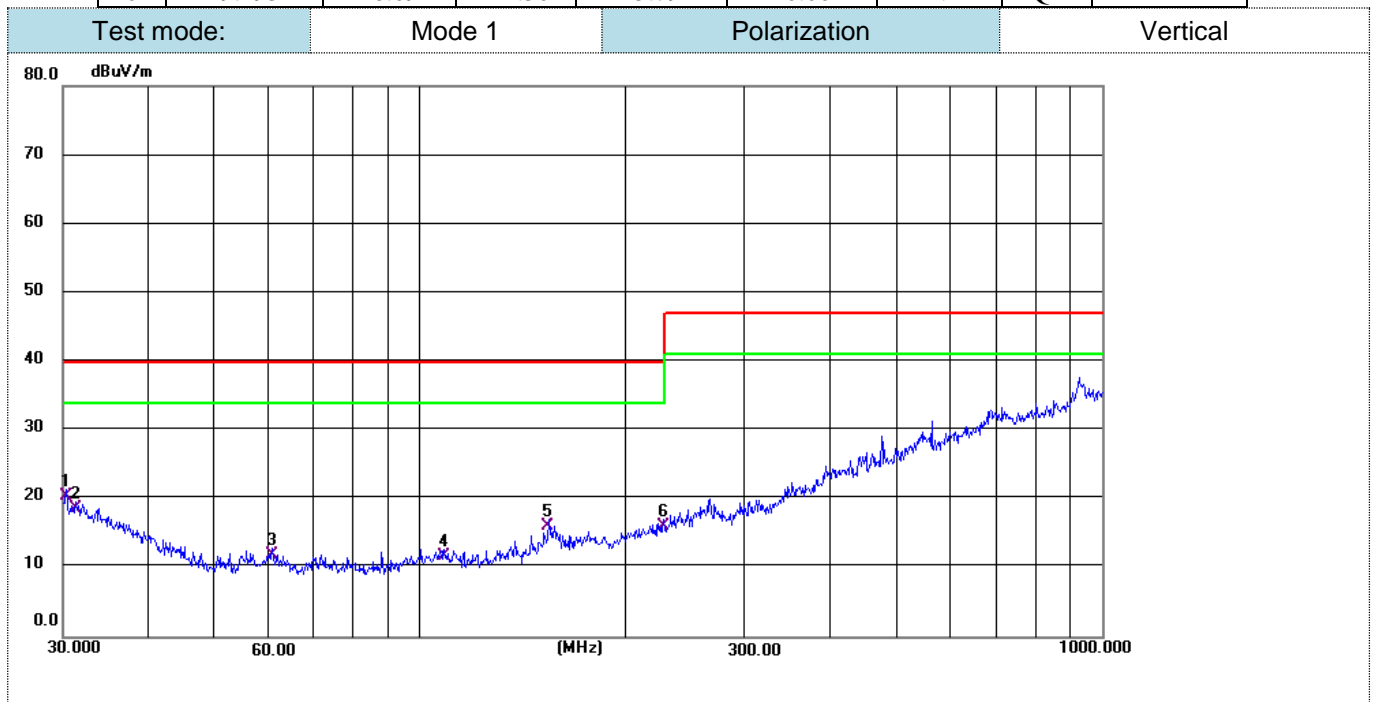
##### TEST RESULTS

**Passed**

Please refer to the below test data:

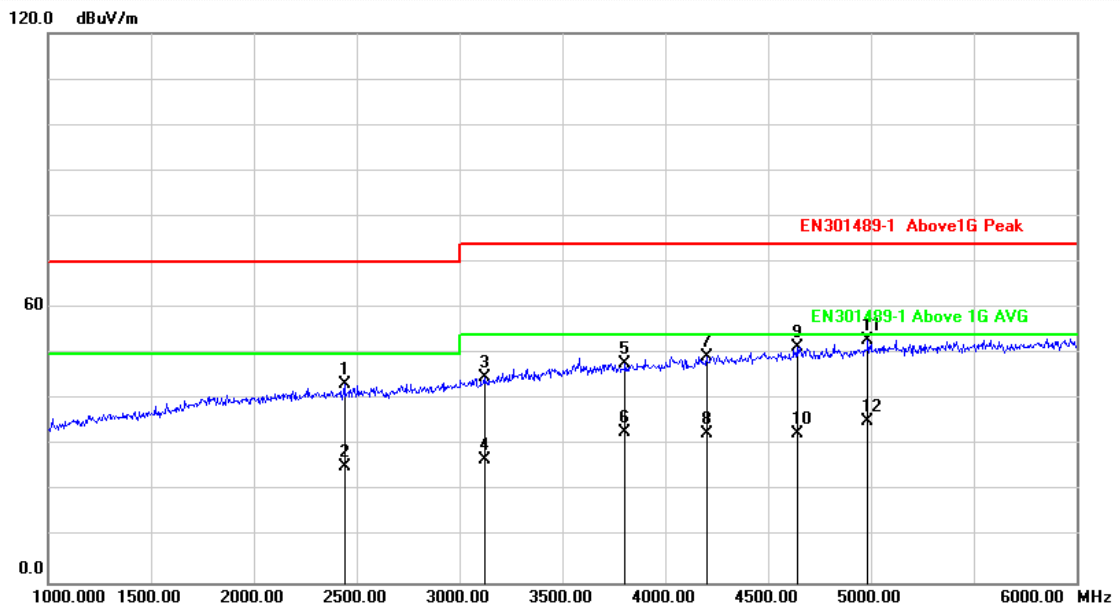


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Remark
1	31.6202	28.21	-8.57	19.64	40.00	-20.36	QP	
2	35.7490	27.38	-10.78	16.60	40.00	-23.40	QP	
3	61.3463	29.95	-17.24	12.71	40.00	-27.29	QP	
4	102.0014	28.76	-15.70	13.06	40.00	-26.94	QP	
5	158.6677	28.39	-13.32	15.07	40.00	-24.93	QP	
6	229.2931	28.09	-12.30	15.79	40.00	-24.21	QP	

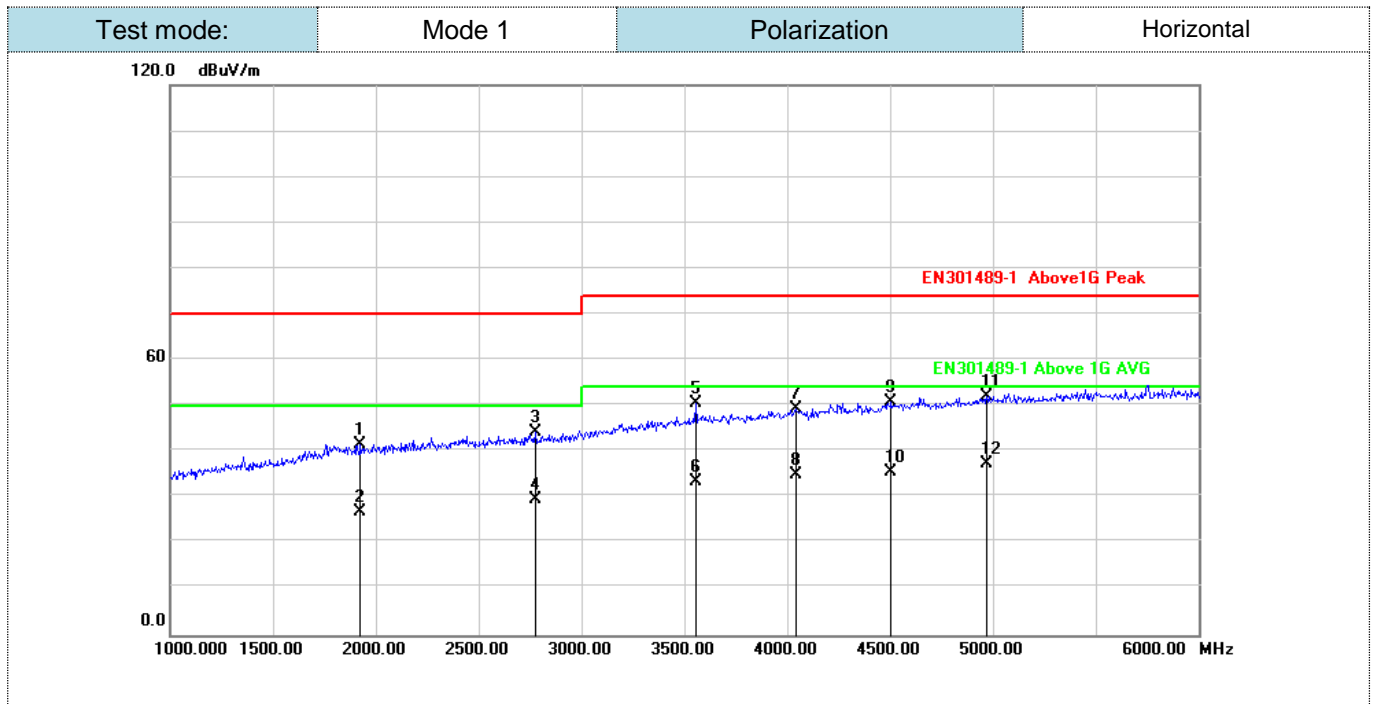


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Remark
1	30.3173	28.35	-7.90	20.45	40.00	-19.55	QP	
2	31.2893	27.16	-8.42	18.74	40.00	-21.26	QP	
3	60.7044	29.07	-17.14	11.93	40.00	-28.07	QP	
4	108.6470	27.36	-15.64	11.72	40.00	-28.28	QP	
5	154.8204	29.27	-13.11	16.16	40.00	-23.84	QP	
6	227.6906	28.48	-12.43	16.05	40.00	-23.95	QP	

Test mode:	Mode 1	Polarization	Vertical
------------	--------	--------------	----------



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Remark
1	2440.000	47.61	-4.35	43.26	70.00	-26.74	peak	
2	2440.000	29.65	-4.35	25.30	50.00	-24.70	AVG	
3	3120.000	45.90	-0.96	44.94	74.00	-29.06	peak	
4	3120.000	27.81	-0.96	26.85	54.00	-27.15	AVG	
5	3805.000	45.87	2.03	47.90	74.00	-26.10	peak	
6	3805.000	30.86	2.03	32.89	54.00	-21.11	AVG	
7	4200.000	46.36	3.05	49.41	74.00	-24.59	peak	
8	4200.000	29.40	3.05	32.45	54.00	-21.55	AVG	
9	4640.000	46.99	4.41	51.40	74.00	-22.60	peak	
10	4640.000	28.04	4.41	32.45	54.00	-21.55	AVG	
11	4985.000	47.63	5.45	53.08	74.00	-20.92	peak	
12	4985.000	29.65	5.45	35.10	54.00	-18.90	AVG	



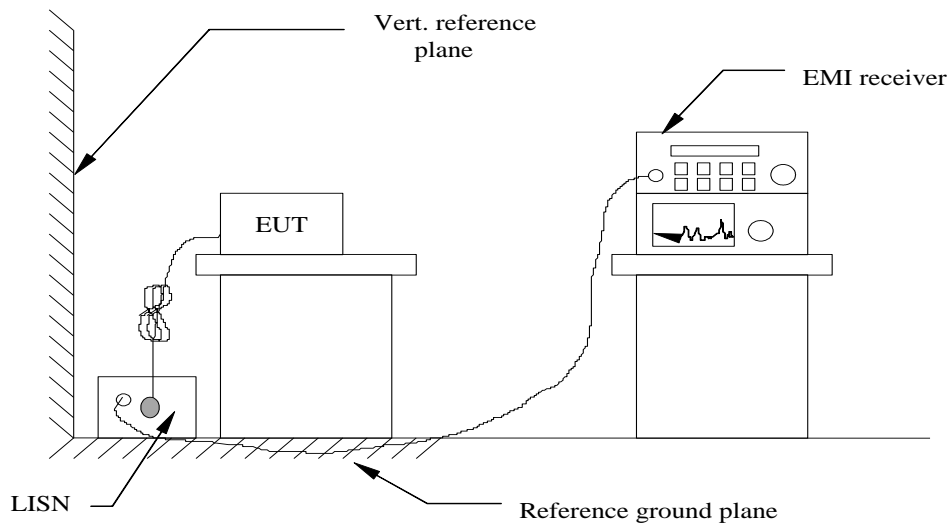
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Remark
1	1925.000	48.30	-6.73	41.57	70.00	-28.43	peak	
2	1925.000	33.58	-6.73	26.85	50.00	-23.15	AVG	
3	2775.000	47.16	-2.79	44.37	70.00	-25.63	peak	
4	2775.000	32.37	-2.79	29.58	50.00	-20.42	AVG	
5	3555.000	49.10	1.49	50.59	74.00	-23.41	peak	
6	3555.000	32.07	1.49	33.56	54.00	-20.44	AVG	
7	4045.000	46.87	2.58	49.45	74.00	-24.55	peak	
8	4045.000	32.33	2.58	34.91	54.00	-19.09	AVG	
9	4505.000	46.73	3.98	50.71	74.00	-23.29	peak	
10	4505.000	31.63	3.98	35.61	54.00	-18.39	AVG	
11	4970.000	46.63	5.41	52.04	74.00	-21.96	peak	
12	4970.000	32.08	5.41	37.49	54.00	-16.51	AVG	

### 4.1.2. Conducted Emission

#### LIMIT

Please refer to ETSI EN301489-1 Clause 8.4.3, Table 8, Table A.10, A.12

#### TEST CONFIGURATION



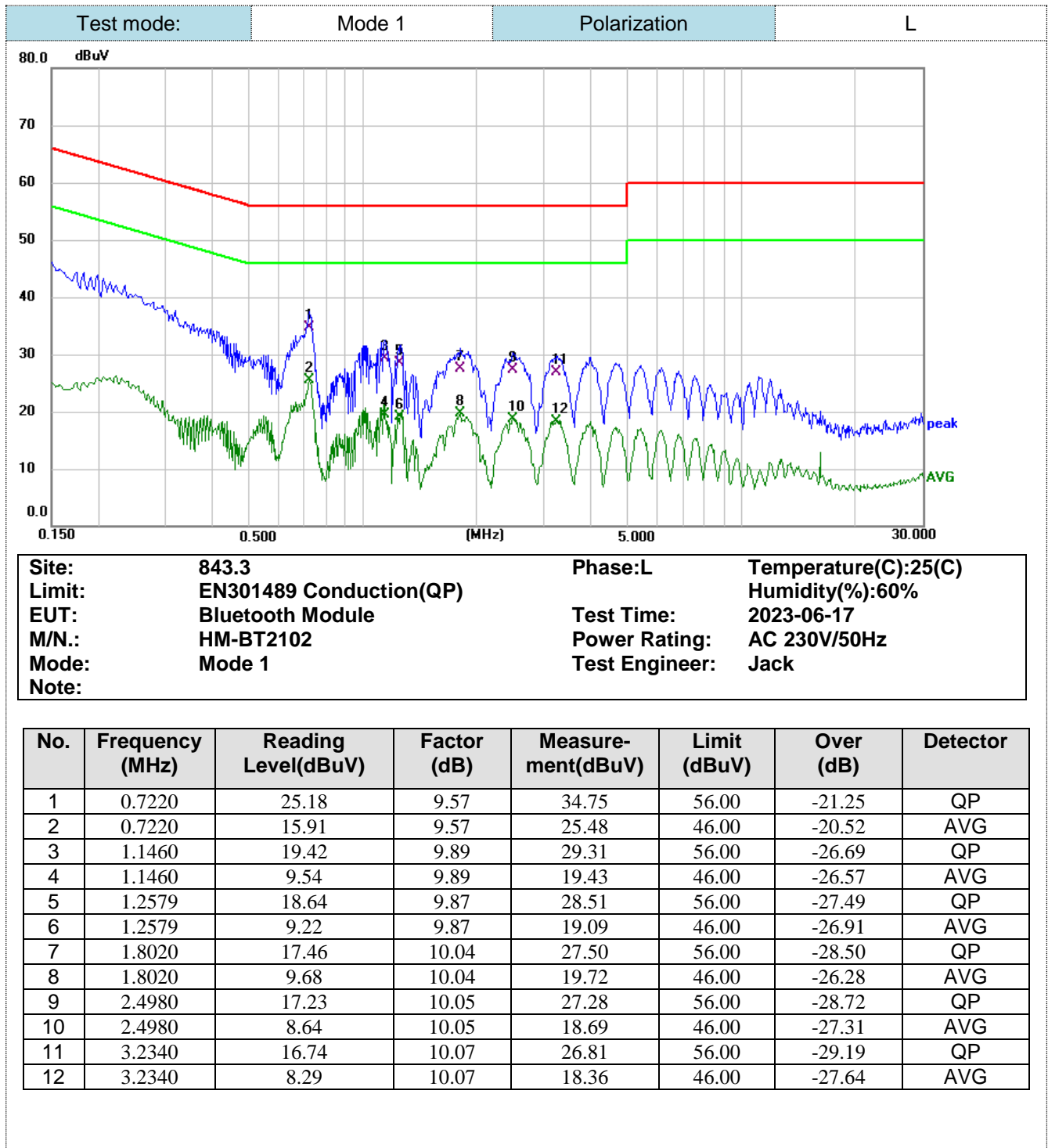
#### TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 8.4.3 for the measurement methods.

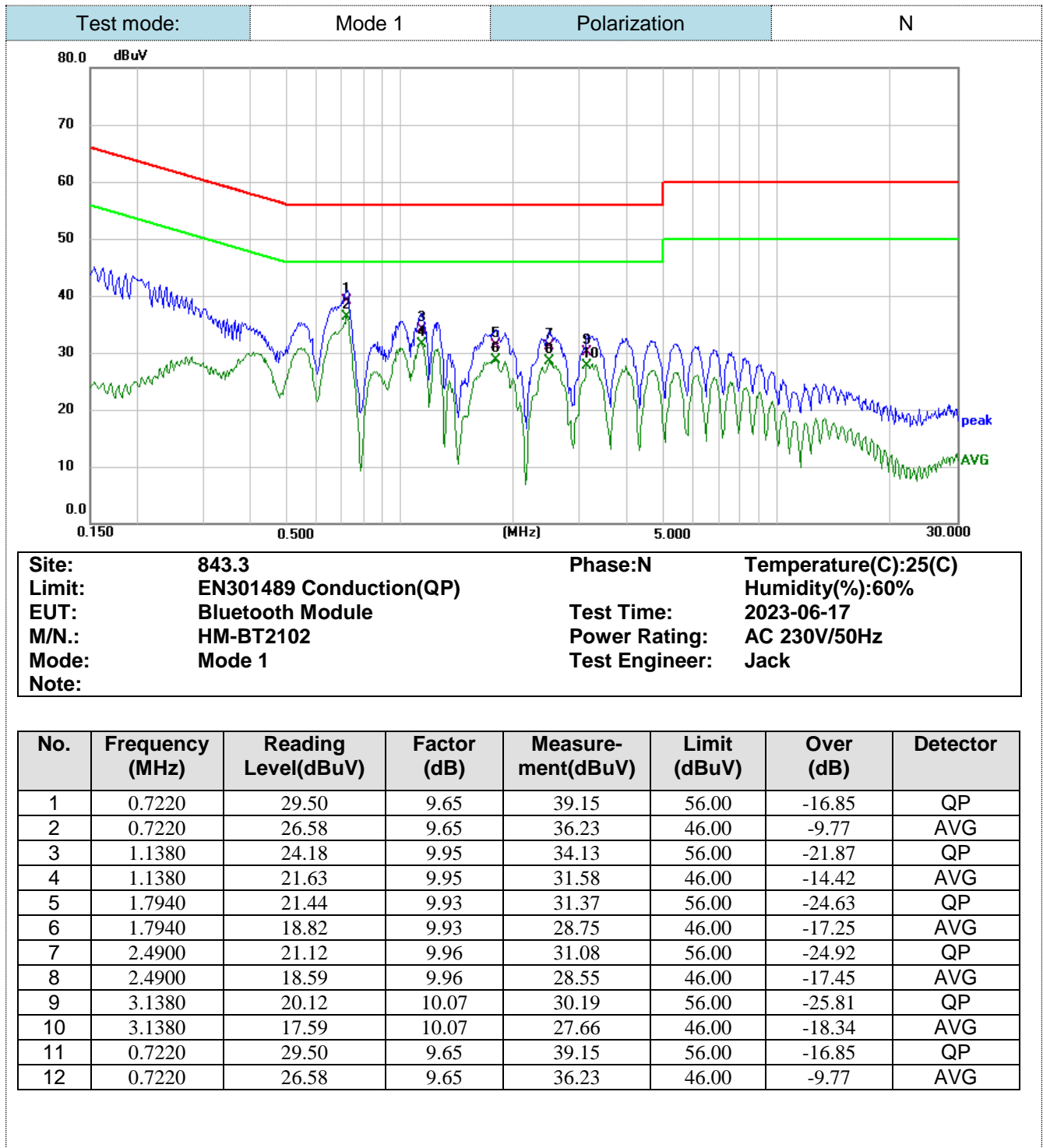
#### TEST RESULTS

**Passed**

Please refer to the below test data:







## 4.2. IMMUNITY

### 4.2.1. Performance criteria

#### ■ ETSI EN301489-1

##### General performance criteria

- 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.

Criteria	During test	After 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 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.

#### 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.

#### 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.

#### **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.

#### **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.

### **■ ETSI EN301489-17**

#### **General performance criteria**

- 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.

<b>Criteria</b>	<b>During test</b>	<b>After test</b>
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 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.
-----------

**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.

**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.

**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.

**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.

**■ Performance Criterion of EN301489**

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.

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.

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.

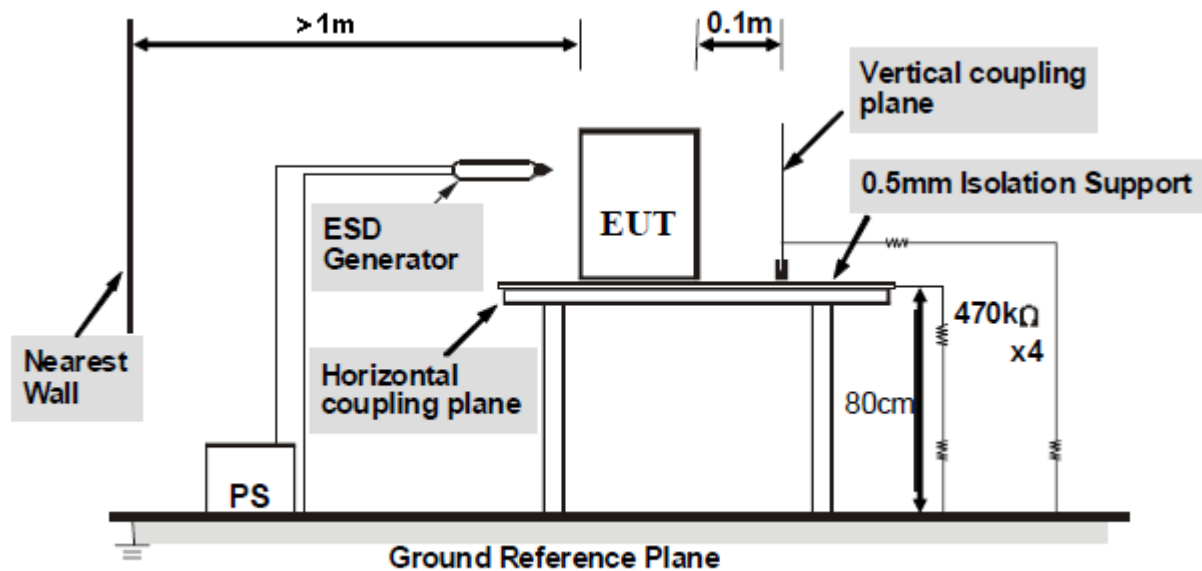
## 4.2.2. Electrostatic Discharge

### LIMIT

### SEVERITY LEVELS OF ELECTROSTATIC DISCHARGE

Test level: Contact Discharge at  $\pm 2\text{KV}$ ,  $\pm 4\text{KV}$  Air Discharge at  $\pm 2\text{KV}$ ,  $\pm 4\text{KV}$ ,  $\pm 8\text{KV}$

### TEST CONFIGURATION



### TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.3.2 , and EN 61000-4-2 for the measurement methods.

#### **Contact Discharge:**

The ESD generator is held perpendicular to the surface to which the discharge is applied and the tip of the discharge electrode touch the surface of EUT. Then turn the discharge switch. The generator is then re-triggered for a new single discharge and repeated at least 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

#### **Air Discharge:**

Air discharge is used where contact discharge can't be applied. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated at least 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

#### **Indirect discharge for horizontal coupling plane:**

At least 10 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT.

#### **Indirect discharge for vertical coupling plane:**

At least 10 single discharges shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

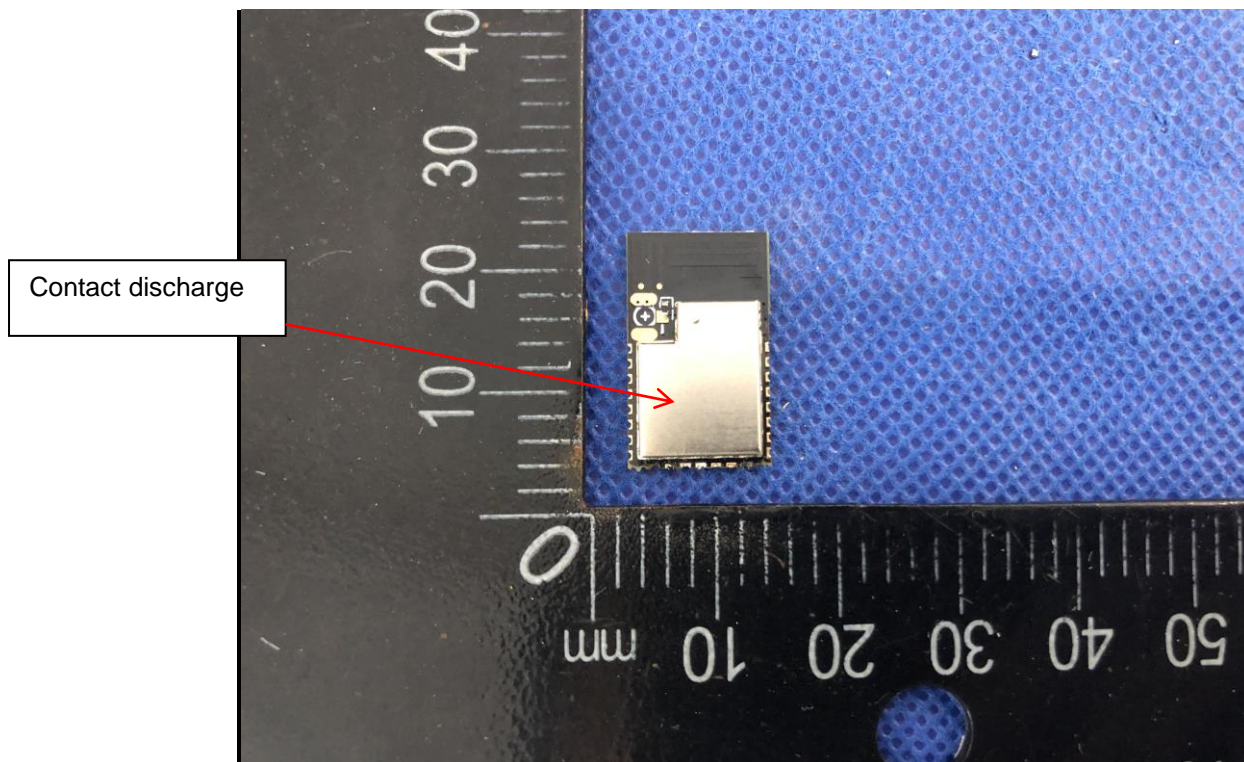
**TEST MODE**

Please reference to the section 2.3

**TEST RESULTS**

Direct discharge				
Type of discharge	Discharge voltage (KV)	Observations Performance	Criteria Level	Result
Contact discharge	±2	B (See remark)	B	Pass
	±4	B (See remark)	B	
Air discharge	±2	A	B	
	±4	B (See remark)	B	
	±8	B (See remark)	B	
Indirect discharge				
Type of discharge	Discharge voltage (KV)	Observations Performance	Criteria Level	Result
HCP (6 sides)	±2	A	B	Pass
	±4	A	B	
VCP (4 sides)	±2	A	B	
	±4	A	B	

Remark: The ancillary equipment's specification for an acceptable level of performance or degradation of performance during and/or after the ESD tests. In contact discharge and air discharge in BT modes, the sound quality of the product is obviously disturbed. When the test is completed, the prototype can recover itself.

**Description of Discharge Point**

### 4.2.3. RF Electromagnetic Field

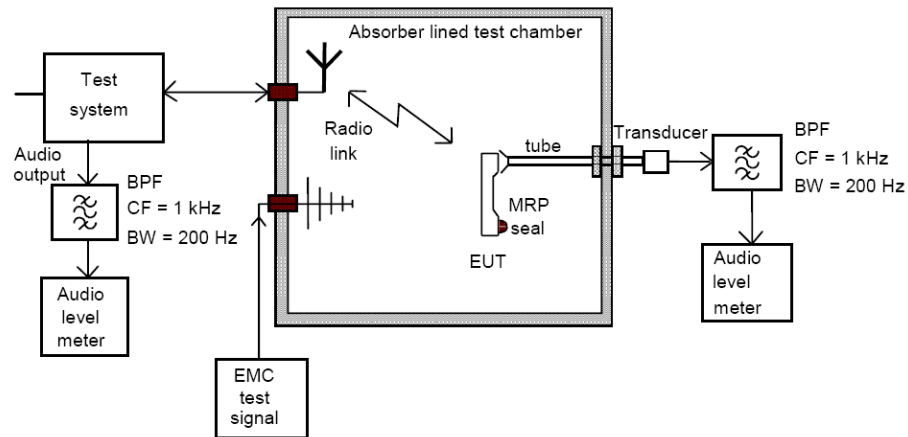
#### PERFORMANCE CRITERION

Criteria A

#### TEST LEVEL

3V/m (80%, 1kHz Amplitude Modulation)

#### TEST CONFIGURATION



#### TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.2.2 and EN 61000-4-3 for the measurement methods.

#### TEST MODE

Please reference to the section 2.3

#### TEST RESULTS

##### ● Idle mode

Test monitor: BCCH and CCCH

Frequency	Level	Modulation	Antenna Polarization	EUT Face	Observations (Performance Criterion)	Result
80MHz-6GHz	3 V/m	1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=3seconds	V	Front	A	Pass
			H		A	Pass
			V	Rear	A	Pass
			H		A	Pass
			V	Left	A	Pass
			H		A	Pass
			V	Right	A	Pass
			H		A	Pass
			V	Top	A	Pass
			H		A	Pass
			V	Bottom	A	Pass
			H		A	Pass

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



## 5. External and Internal Photos of the EUT

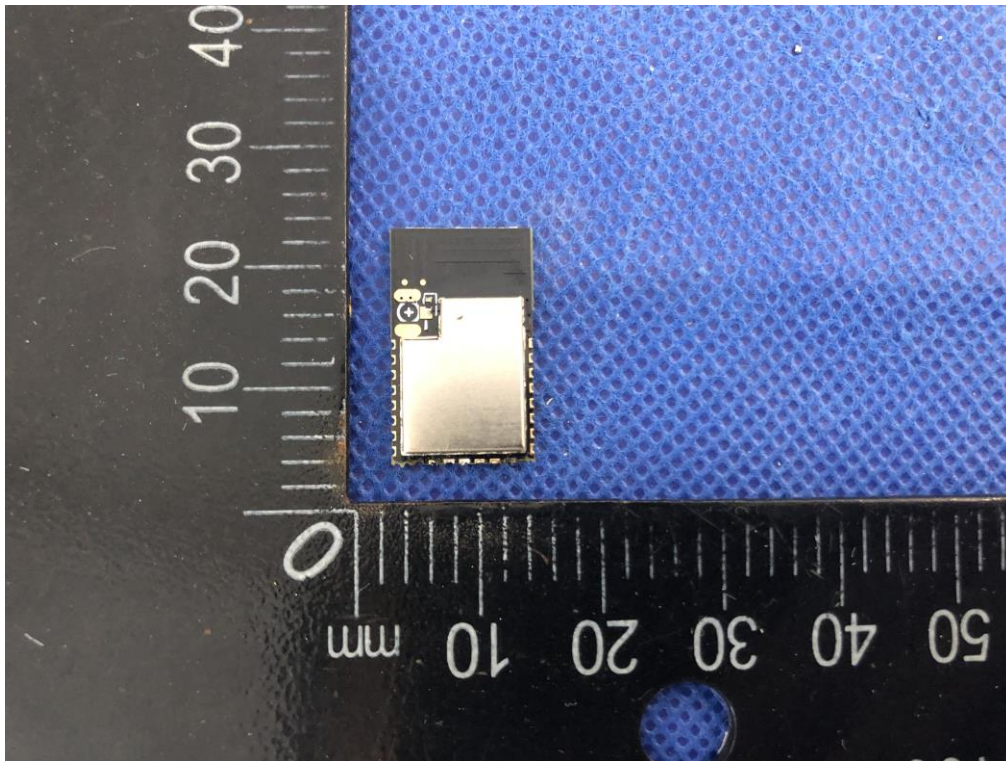


Figure 1. Overall view of unit

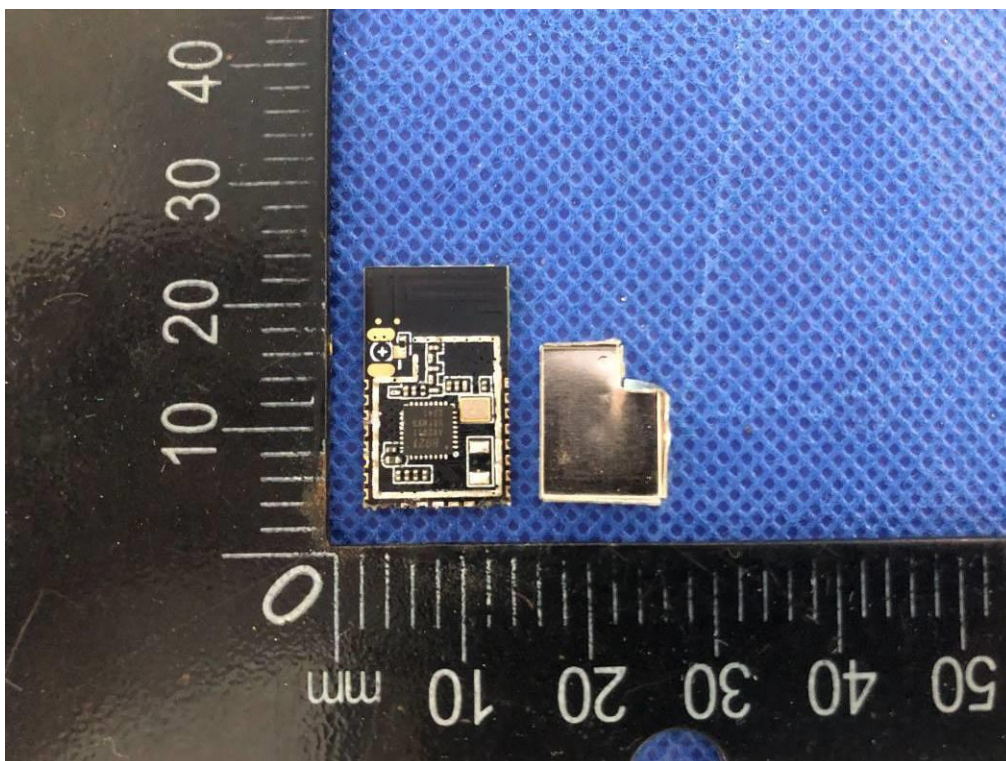


Figure 2. Internal view of unit



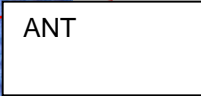


Figure 3. Top view of PCB

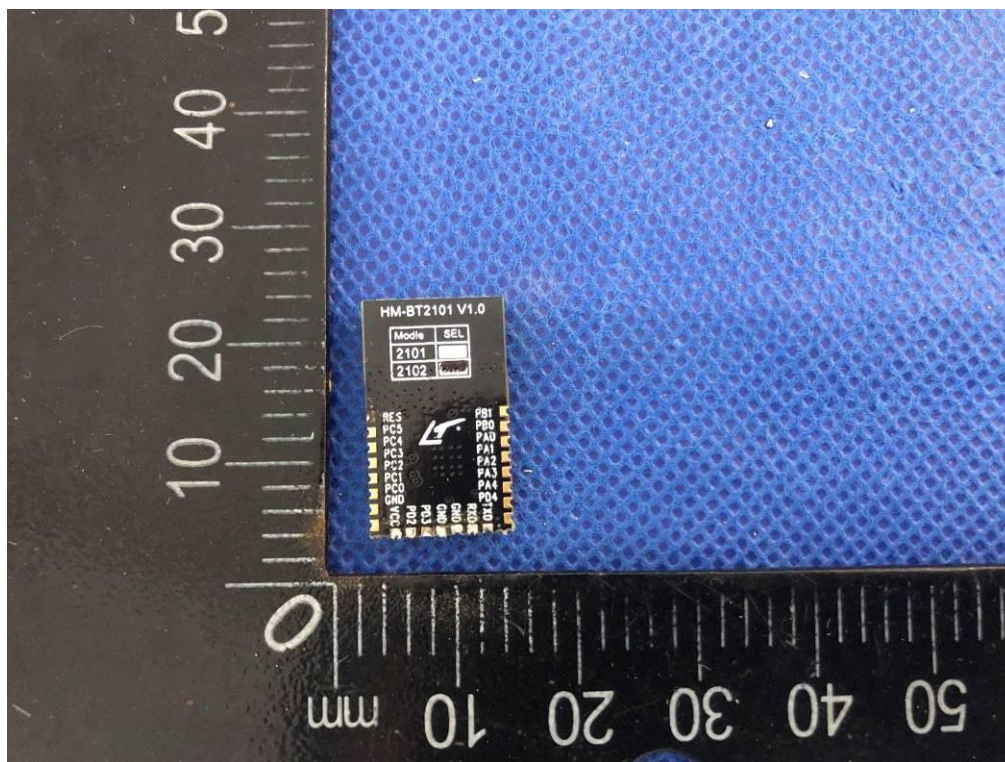


Figure 4. Bottom view of PCB

--- End of Report ---