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# Health Test Report

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Report No.: AGC07060160503EH02

**TEST NAME** : 1999/5/EC R&TTE Directive Art.3.1(a)  
**PRODUCT DESIGNATION** : Bluetooth speaker  
**BRAND NAME** : N/A  
**MODEL NAME** : See page 4  
**CLIENT** :  
**DATE OF ISSUE** : Aug.11, 2016  
**STANDARD(S)** : EN 62479:2010  
**REPORT VERSION** : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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**Report Revise Record**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug.11, 2016	Valid	Original Report

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**1. TEST REPORT CERTIFICATION**

<b>Applicant</b>	
<b>Address</b>	
<b>Manufacturer</b>	
<b>Address</b>	
<b>Product Designation</b>	Bluetooth speaker
<b>Brand Name</b>	N/A
<b>Test Model</b>	MO8644
<b>Series Model</b>	
<b>Difference description</b>	All the same except for the model name
<b>Deviation</b>	None
<b>Condition of Test Sample</b>	Normal

We, Attestation of Global Compliance (Shenzhen) Co., Ltd. has tested the product mentioned above in compliance with the requirements set forth in the European Standard EN 62479. The results of testing in this report apply to the product/system which was tested only.

Tested By \_\_\_\_\_ *Strive Liang*  
 Strive Liang(Liang Faqiang) Aug.11, 2016

Reviewed By \_\_\_\_\_ *Forrest Lei*  
 Forrest Lei(Lei Yonggang) Aug.11, 2016

Approved By \_\_\_\_\_ *Solger Zhang*  
 Solger Zhang(Zhang Hongyi) Aug.11, 2016  
 Authorized Officer

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## 2. GENERAL INFORMATION

### 2.1. DESCRIPTION OF EUT

the following data is based on the information by the applicant.

<b>Operating Frequency</b>	2.402 GHz~2.480GHz
<b>Bluetooth Version</b>	V2.1+EDR
<b>Modulation</b>	GFSK ,π /4-DQPSK, 8DPSK
<b>Hardware Version</b>	2.1
<b>Software Version</b>	V1.0
<b>Antenna Type</b>	PCB Antenna
<b>Number of channels</b>	79
<b>Antenna Gain</b>	2dBi
<b>Power Supply</b>	DC 3.7V

**Note:**

1. The EUT provides Bluetooth wireless interface operating at 2.4G ISM band (2402MHZ-2480MHZ). The EUT use Frequency Hopping Spread Spectrum (FHSS) modulation.
2. Please refer to the User's manual of the EUT.

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### 3. TEST RESULT

The maximum output power for BR/EDR is **-3.09dBm (0.49mW less than 20mW)**. Please refer to ETSI EN 300 328 (V1.9.1) Test report ( AGC07060160503EE04) for the result of Maximum Transmit Power, which deemed to comply with the basic restrictions without testing.

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# RF Test Report

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Report No.: AGC07060160503EE04

**TEST NAME** : 1999/5/EC R&TTE Directive Art.3.2  
**PRODUCT DESIGNATION** : Bluetooth speaker  
**BRAND NAME** : N/A  
**MODEL NAME** : See page 4  
**CLIENT** :  
**DATE OF ISSUE** : Aug.11, 2016  
**STANDARD(S)** : EN 300 328 V1.9.1 2015-02  
**REPORT VERSION** : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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**Report Revise Record**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug.11, 2016	Valid	Original Report

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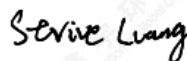


**1. TEST RESULT CERTIFICATION**

<b>Applicant</b>	
<b>Address</b>	
<b>Manufacturer</b>	
<b>Address</b>	
<b>Product Designation</b>	Bluetooth speaker
<b>Brand Name</b>	N/A
<b>Test Model</b>	MO8644
<b>Series Model</b>	SP10S(White), SP10S(Black), SP10S(Red), SP10S(Blue), SP10S(Yellow), SP10S(Green)
<b>Difference description</b>	All the same except for the model name
<b>Date of test</b>	Aug.05, 2016 to Aug.10, 2016

We (AGC), Attestation of Global Compliance (Shenzhen) Co., Ltd has tested the product mentioned above in compliance with the requirements set forth in the European Standard ETSI EN 300 328 V1.9.1. The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By \_\_\_\_\_



Strive Liang(Liang Faqiang) Aug.11, 2016

Reviewed By \_\_\_\_\_



Forrest Lei(Lei Yonggang) Aug.11, 2016

Approved By \_\_\_\_\_



 Solger Zhang(Zhang Hongyi)  
 Authorized Officer Aug.11, 2016

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## 2. TECHNICAL INFORMATION

### 2.1 EUT DESCRIPTION

Modulation type	FHSS
Bluetooth Version	V2.1+EDR
Modulation	GFSK , $\pi$ /4-DQPSK, 8DPSK
Hardware Version	2.1
Software Version	V1.0
Adaptive / non-adaptive equipment	Adaptive Equipment
The number of Hopping Frequencies	79
The maximum RF Output Power (e.i.r.p.)	-3.09dBm
The different transmit operating modes	Operating mode 1: Single Antenna Equipment Equipment with only 1 antenna
Operating Frequency Range(s)	2402MHz~2480MHz
Occupied Channel Bandwidth(s)	1.087MHz
Dwell Time	320.4ms(max)
Type of Equipment	Stand-alone
Antenna designation	PCB Antenna
Antenna gain	2dBi
Nominal voltages	DC 3.7V
The extreme operating conditions	Operating temperature range: -10°C~45°C

#### Note:

1. The above information was declared by the applicant.
2. The equipment submitted are representative production models.
3. The EUT provides Bluetooth wireless interface operating at 2.4G ISM band (2402MHZ-2480MHZ). The EUT use Frequency Hopping Spread Spectrum (FHSS) modulation.
4. Only the Bluetooth was tested according the standard requirement.
5. The EUT is an adaptive equipment and hand-portable station according to ETSI EN 300 328 v1.9.1.
6. Please refer to Appendix I for the photographs of the EUT. For more details, please refer to the User's manual of the EUT.

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**2.2 SUPPORT EQUIPMENT**

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	Dell	INSPIRON	N/A	A.E

**2.3 DESCRIPTION OF TEST MODES**

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX
4	Low channel (RX Mode)
5	Middle channel (RX Mode)
6	High channel (RX Mode)
7	Normal hopping

**Note:**

1. All the transmit mode would tested with each modulation (GFSK,  $\pi/4$ -DQPSK, 8-DPSK).
2. All modes have been tested and the worst mode test data recording in the test report, if no any other data.

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**A) OBJECTIVE**

Perform Radio Spectrum tests for CE Marking according to the provisions of article 3.2 of the R&TTE Directive (1999/5/EC) for the Bluetooth function of the EUT.

**B) TEST STANDARDS AND RESULTS**

The EUT has been tested according to ETSI EN 300 328 V1.9.1 (2015-02).

ETSI EN 300 328 V1.9.1 (2015-02)	Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive
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**TEST ITEMS AND THE RESULTS ARE AS BELOW:**

No	Basic Standard	Test Type	The worst case operational mode	Result
1	ETSI EN 300 328 4.3.1.2	RF Output Power	Mode 7	Pass
2	ETSI EN 300 328 4.3.1.3	Duty Cycle,Tx-sequence,Tx-gap	N/A	N/A
3	ETSI EN 300 328 4.3.1.4	Accumulated Transmit time, Frequency Occupation and hopping sequence	Mode 1/2/3/7	Pass
4	ETSI EN 300 328 4.3.1.5	Hopping Frequency Separation	Mode 7	Pass
5	ETSI EN 300 328 4.3.1.6	Medium Utilisation	N/A	N/A
6	ETSI EN 300 328 4.3.1.7	Adaptivity (Adaptive Frequency Hopping)	N/A	N/A
7	ETSI EN 300 328 4.3.1.8	Occupied Channel Bandwidth	Mode 1/3	Pass
8	ETSI EN 300 328 4.3.1.9	Transmitter unwanted emission in the out of band domain	Mode 1/3	Pass
9	ETSI EN 300 328 4.3.1.10	Transmitter unwanted emission in the Spurious domain	Mode 1/3	Pass
10	ETSI EN 300 328 4.3.1.11	Receiver Spurious emissions	Mode 4/6	Pass
11	ETSI EN 300 328 4.3.1.12	Receiver Blocking	N/A	N/A
12	ETSI EN 300328 4.3.1.13	Geo-location capability	N/A	N/A

**Note:**

1. N/A means it's not applicable to this item.
2. Owing to the maximum declared RF Output power (e.i.r.p.) less than 10 dBm, so the item 2, 5, 6, 11 are not applicable.

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### 3. DETAILS OF TEST

#### 3.1 IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

Company Name:	Attestation of Global Compliance (Shenzhen) Co., Ltd.
Address:	2/F., Building 2, No.1-No.4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District, Shenzhen, Guangdong, China

#### 3.2 LIST OF TEST EQUIPMENTS

Description	Manufacturer	Model No.	S/N	Calibration Date	Calibration Due.
Signal Analyzer	Agilent	N9020A	MY49100060	Nov.09, 2015	Nov.08,2016
Signal Generator	Agilent	N5182A	MY50140530	Oct.16, 2015	Oct.15,2016
Signal Generator	Agilent	E8257D	MY45141029	Oct.16, 2015	Oct.15,2016
USB Wideband Power Sensor	Agilent	U2021XA	MY54110007	Oct.16, 2015	Oct.15, 2016
USB Wideband Power Sensor	Agilent	U2021XA	MY54110009	Oct.16, 2015	Oct.15, 2016
USB Wideband Power Sensor	Agilent	U2021XA	MY54110014	Oct.16, 2015	Oct.15, 2016
USB Wideband Power Sensor	Agilent	U2021XA	MY54110012	Oct.16, 2015	Oct.15, 2016
USB Simultaneous Sampling Multifunction DAQ	Agilent	U2531A	MY5211038	Oct.16, 2015	Oct.15, 2016
2.4 GHz Filter	Micro-Tronics	BRM50702	017	Mar. 01, 2016	Feb.28, 2017
Spectrum Analyzer	Agilent	E4440A	US41421290	July 23, 2016	July 22, 2017
Wideband Frequency Antenna	SCHWARZBECK	VULB9168	VULB9168-494	Mar.12, 2016	Mar.11, 2017
Horn Antenna	EM	EM-AH-10180	67	Mar.01, 2016	Feb.28, 2017
Amplifier	EM	EM30180	060552	Feb.29, 2016	Feb.28, 2017

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### 3.3 ENVIRONMENTAL CONDITIONS

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

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

### 3.4 MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in Measurement” (GUM) published by ISO.

- Uncertainty of Radio Frequency,  $U_c = \pm 1 \times 10^{-5}$
- Uncertainty of total RF power, conducted,  $U_c = \pm 1.5\text{dB}$
- Uncertainty of RF power density, conducted,  $U_c = \pm 3\text{dB}$
- Uncertainty of spurious emissions, conducted,  $U_c = \pm 3\text{dB}$
- Uncertainty of all emissions, radiated,  $U_c = \pm 6\text{dB}$
- Uncertainty of Temperature:  $\pm 1^\circ \text{C}$
- Uncertainty of Humidity:  $\pm 5\%$
- Uncertainty of DC and low frequency voltages:  $\pm 3\%$

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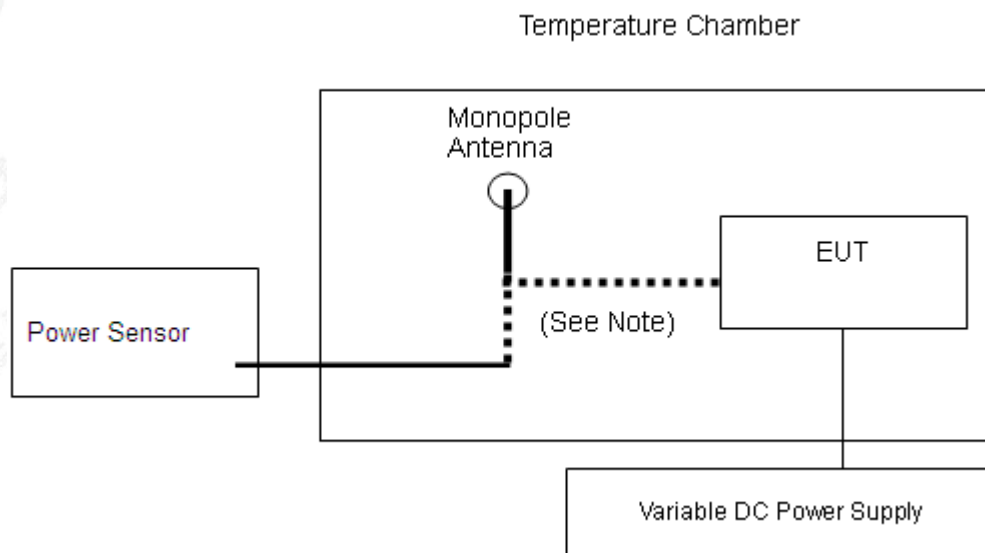
#### 4. ETSI EN 300 328 REQUIREMENTS

##### 4.1 RF OUTPUT POWER

###### EN 300 328 Clause 4.3.1.2

The maximum RF output power for adaptive Frequency Hopping equipment shall be equal to or less than 20 dBm. The maximum RF output power for non-adaptive Frequency Hopping equipment shall be declared by the supplier. See clause 5.3.1 m). The maximum RF output power for this equipment shall be equal to or less than the value declared by the supplier. This declared value shall be equal to or less than 20 dBm.

##### Test Configuration



##### **Remarks:**

EUT was direct connected to test equipment through coupling device.

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**TEST PROCEDURE**

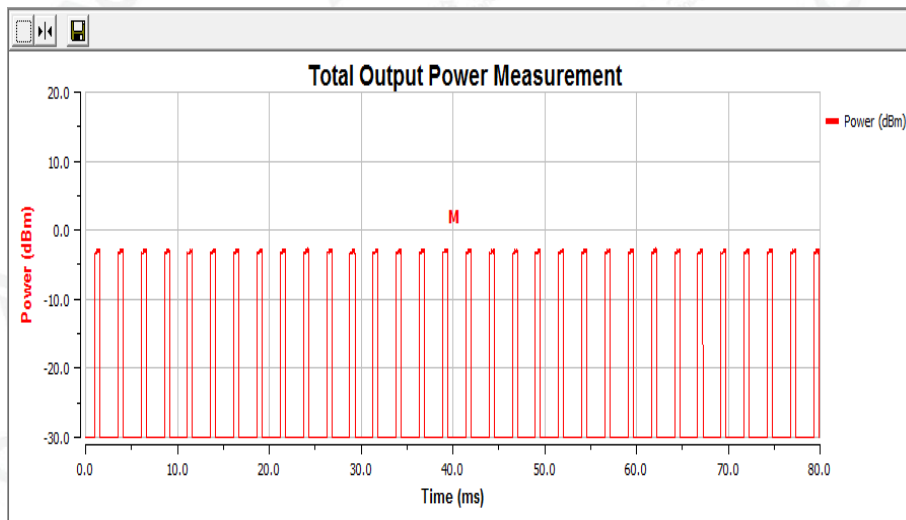
1. Please refer to ETSI EN 300 328 (V1.9.1) clause 5.3.2.1 for the test conditions.
2. Please refer to ETSI EN 300 328 (V1.9.1) clause 5.3.2.2.1 for the measurement method.

**TEST RESULTS**

Temperature:	25°C	Tested by:	Strive
Humidity:	55 % RH	Detector:	RMS
Number of Burst		>=	10
Measurement Time		=	45.48ms

TEST CONDITIONS	GFSK MODULATION RF OUTPUT POWER (dBm)		
	Temp (25)°C	Temp (-20)°C	Temp (55)°C
Result	DC 3.7V	DC 3.7V	DC 3.7V
Normal Hopping	-3.09	-3.10	-3.12
Limit	20dBm		

**NORMAL TEMPERATURE NORMAL VOLTAGE**

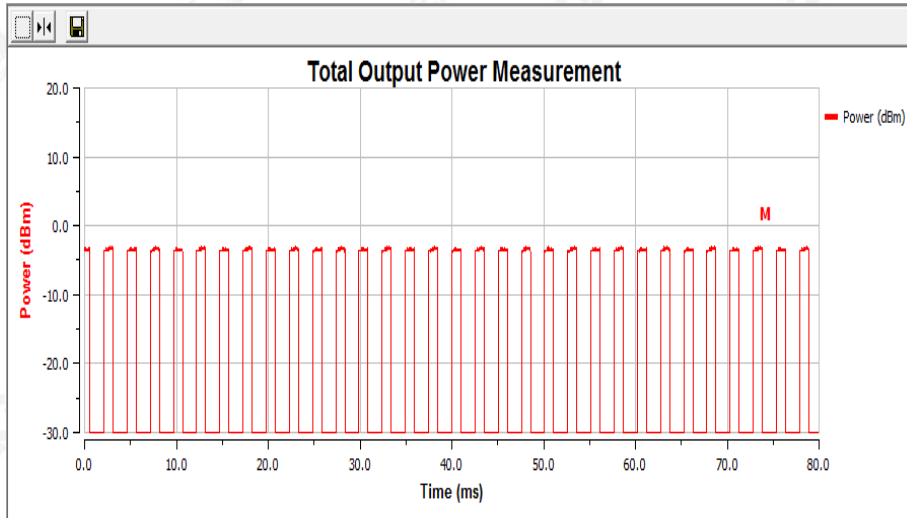


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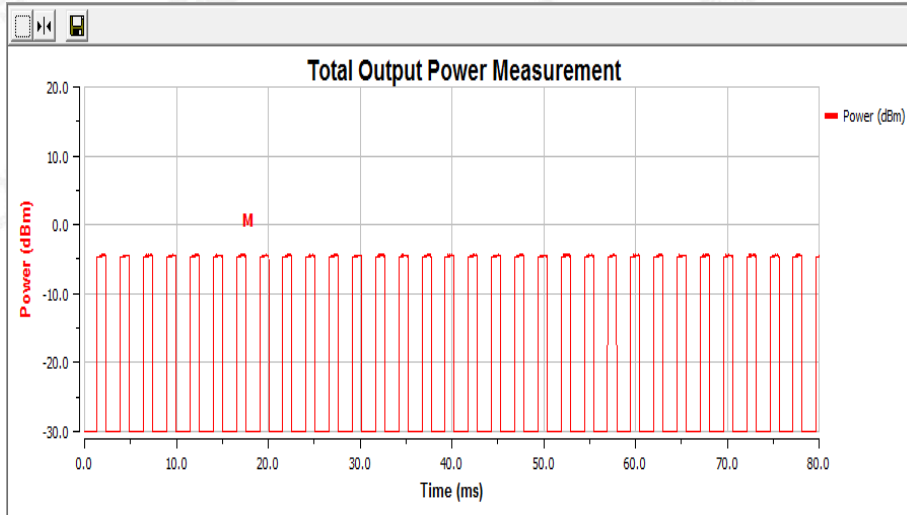




**LOW TEMPERATURE NORMAL VOLTAGE**



**HIGH TEMPERATURE NORMAL VOLTAGE**

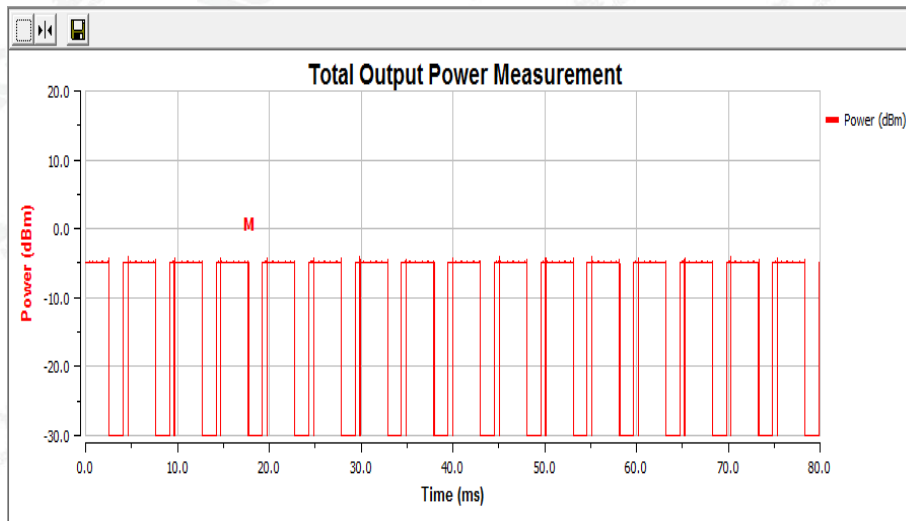


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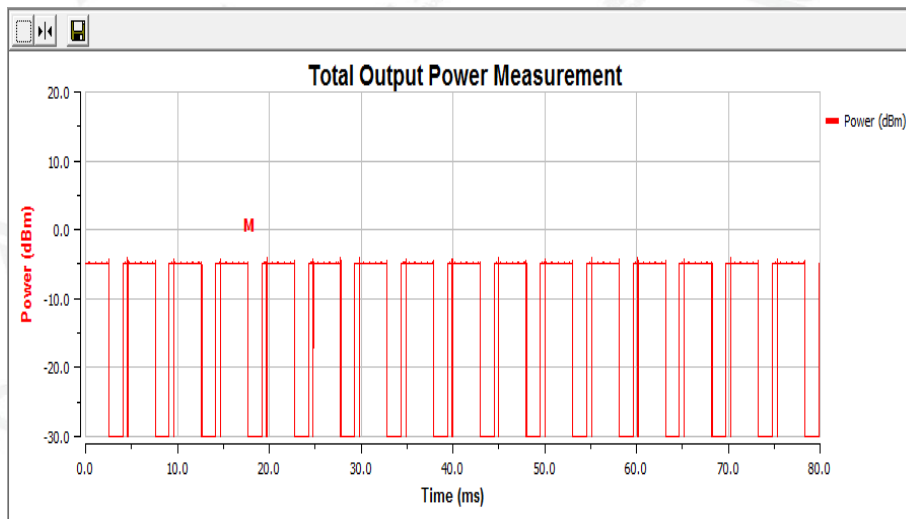


TEST CONDITIONS	Π /4-DQPSK MODULATION RF OUTPUT POWER (dBm)		
	Temp (25)°C	Temp (-20)°C	Temp (55)°C
Result	DC 3.7V	DC 3.7V	DC 3.7V
Normal Hopping	-4.39	-4.40	-4.40
Limit	20dBm		

**NORMAL TEMPERATURE NORMAL VOLTAGE**



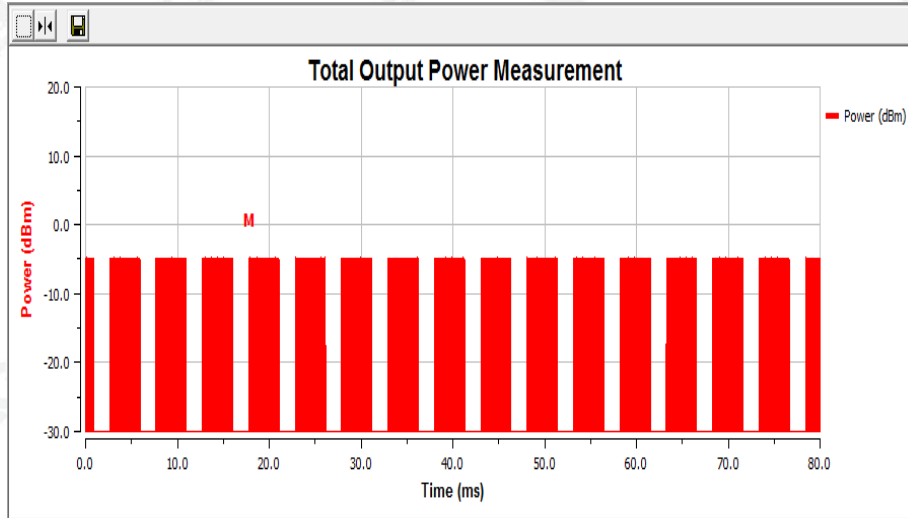
**LOW TEMPERATURE NORMAL VOLTAGE**



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**HIGH TEMPERATURE NORMAL VOLTAGE**



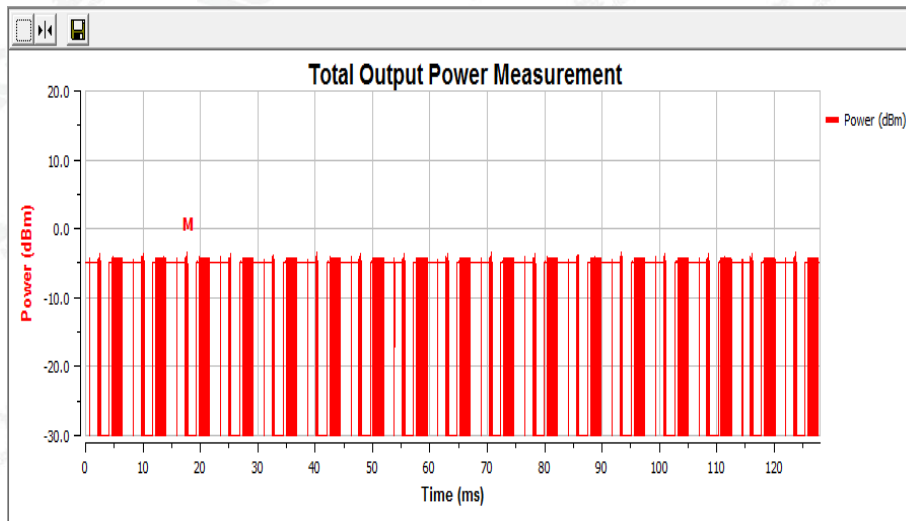
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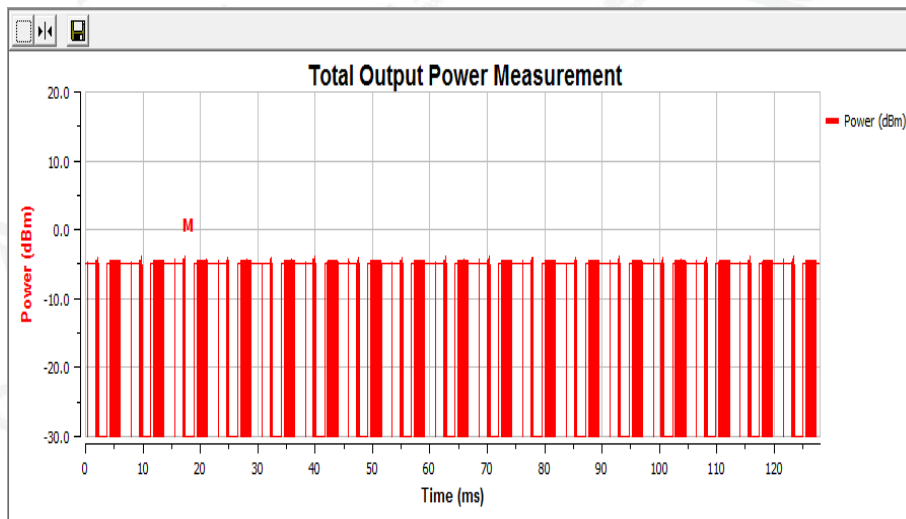


TEST CONDITIONS	8DPSK MODULATION RF OUTPUT POWER (dBm)		
	Temp (25)°C	Temp (-20)°C	Temp (55)°C
Result	DC 3.7V	DC 3.7V	DC 3.7V
Normal Hopping	-4.39	-4.53	-4.41
Limit	20dBm		

**NORMAL TEMPERATURE NORMAL VOLTAGE**



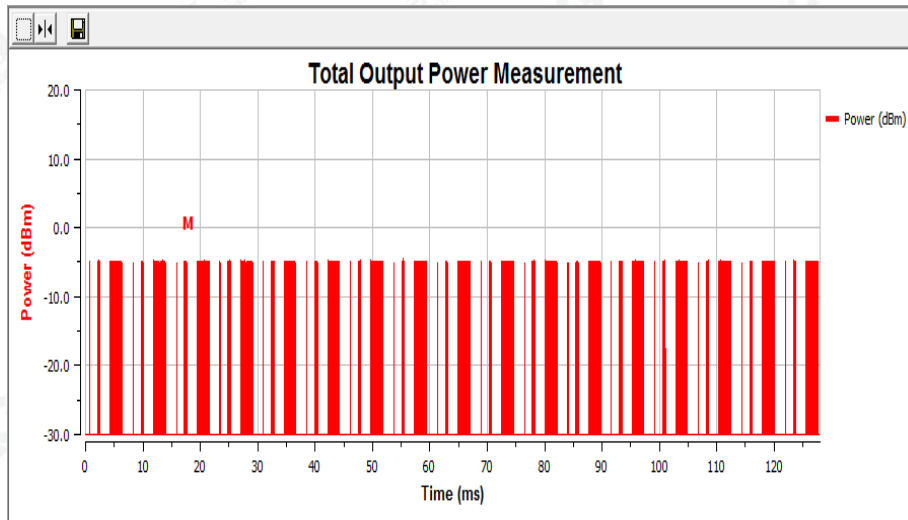
**LOW TEMPERATURE NORMAL VOLTAGE**



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**HIGH TEMPERATURE NORMAL VOLTAGE**



**Note:** Result=Reading+ Ant. Gain  
**Conclusion: PASS**

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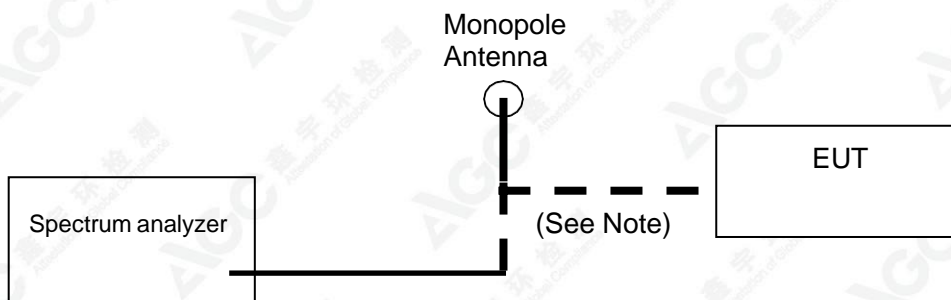
**4.2 ACCUMULATED TRANSMIT TIME, FREQUENCY OCCUPIATION AND HOPPING SEQUENCE**  
ETSI EN 300 328 SUBCLAUSE 4.3.1.4.3  
HOPPING SEQUENCE

ACCUMULATED TRANSMIT TIME	
CONDITION	LIMIT
<input type="checkbox"/> Non-adaptive frequency hopping systems	≤ 15 ms
<input checked="" type="checkbox"/> Adaptive frequency hopping systems	≤ 400 ms

FREQUENCY OCCUPATION TIME	
CONDITION	LIMIT
<input type="checkbox"/> Non-adaptive frequency hopping systems	Equal to one dwell time within a period not exceeding four times the product of the dwell time per hop and the number of hopping frequencies in use.
<input checked="" type="checkbox"/> Adaptive frequency hopping systems	

HOPPING SEQUENCE(S)	
CONDITION	LIMIT
<input type="checkbox"/> Non-adaptive frequency hopping systems	≥15 hopping frequencies or 15/minimum Hopping Frequency Separation in MHz , whichever is the greater.
<input checked="" type="checkbox"/> Adaptive frequency hopping systems	Operating frequency band ≥58.45MHz (Operating over a minimum of 70 % of the operating in the band 2,4 GHz to 2,4835 GHz) ≥15 hopping frequencies or 15/minimum Hopping Frequency Separation in MHz , whichever is the greater.

**TEST CONFIGURATION**



**TEST PROCEDURE**

Please refer to ETSI EN300328 V1.9.1 Section 5.3.4.2

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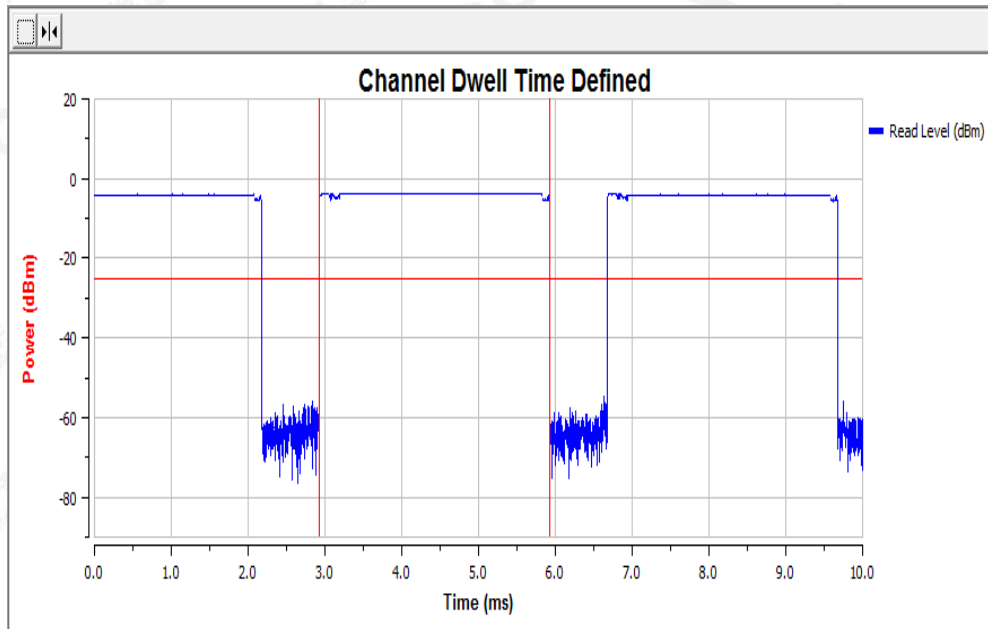


**TEST RESULT (Dwell Time)**

**Bluetooth 1Mbps (DH5) Test Result**

Channel	Pulse time(ms)	Dwell Time (ms)	Limit (ms)
Low	3.00	320.4	400
Middle	3.00	320.4	400
High	3.00	320.4	400

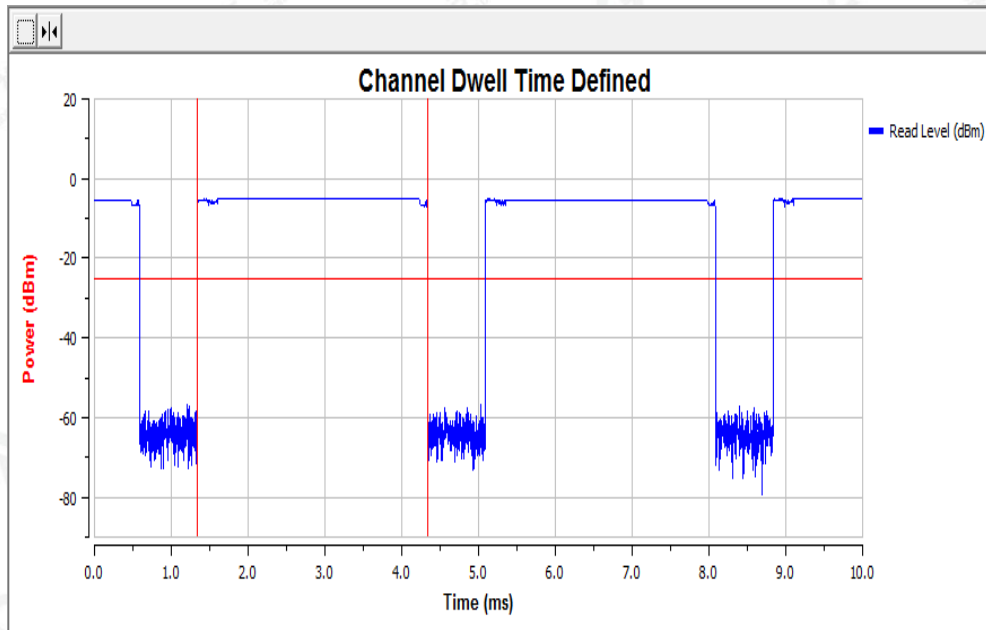
Low Channel



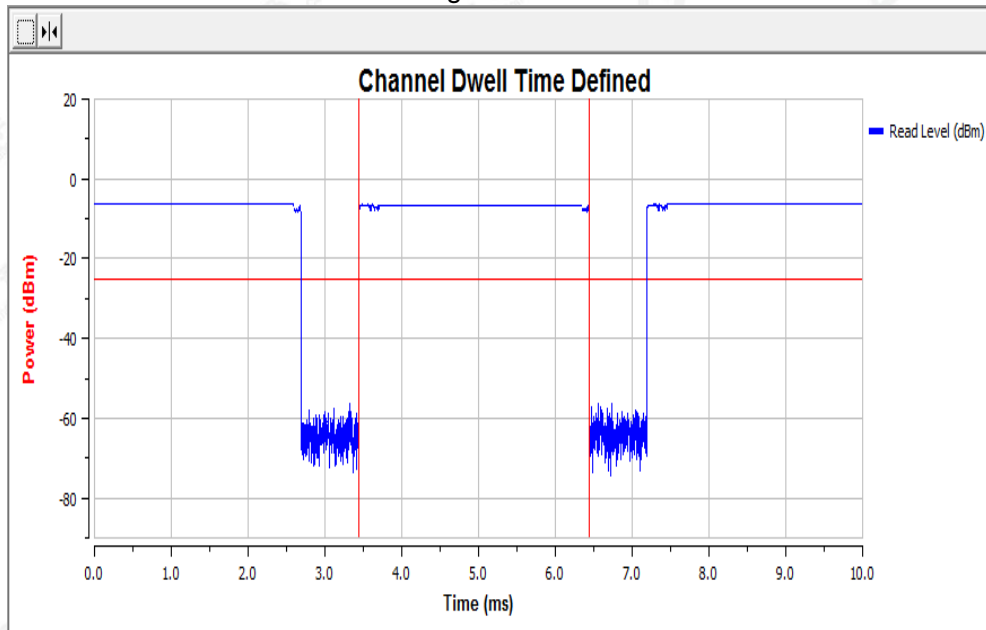
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Middle Channel



High Channel



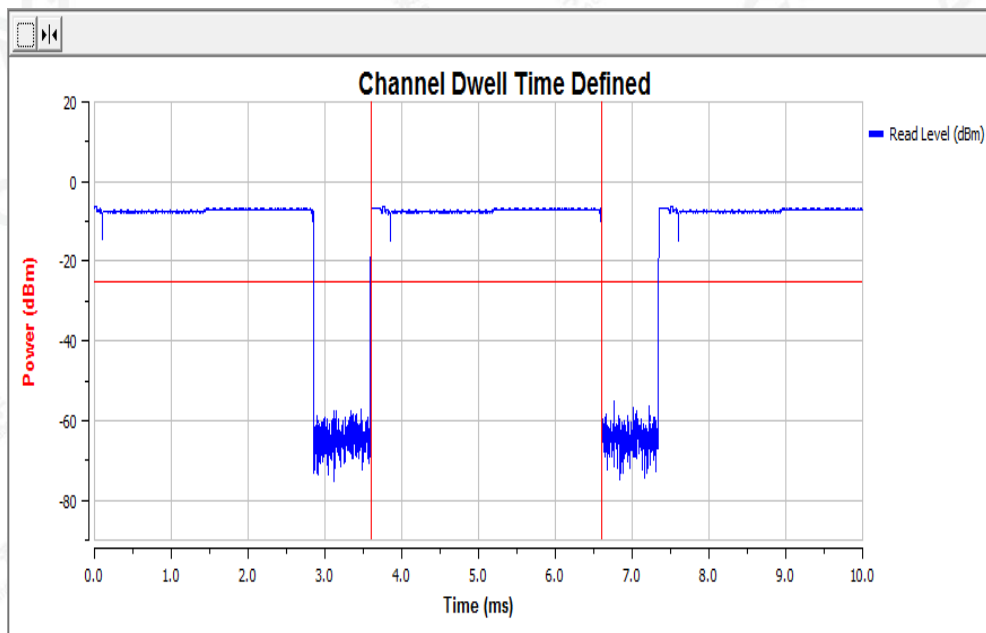
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Bluetooth 2Mbps(DH5) Test Result

Channel	Pulse time(ms)	Dwell Time (ms)	Limit (ms)
Low	3.00	320.4	400
Middle	3.00	320.4	400
High	3.00	320.4	400

Low Channel

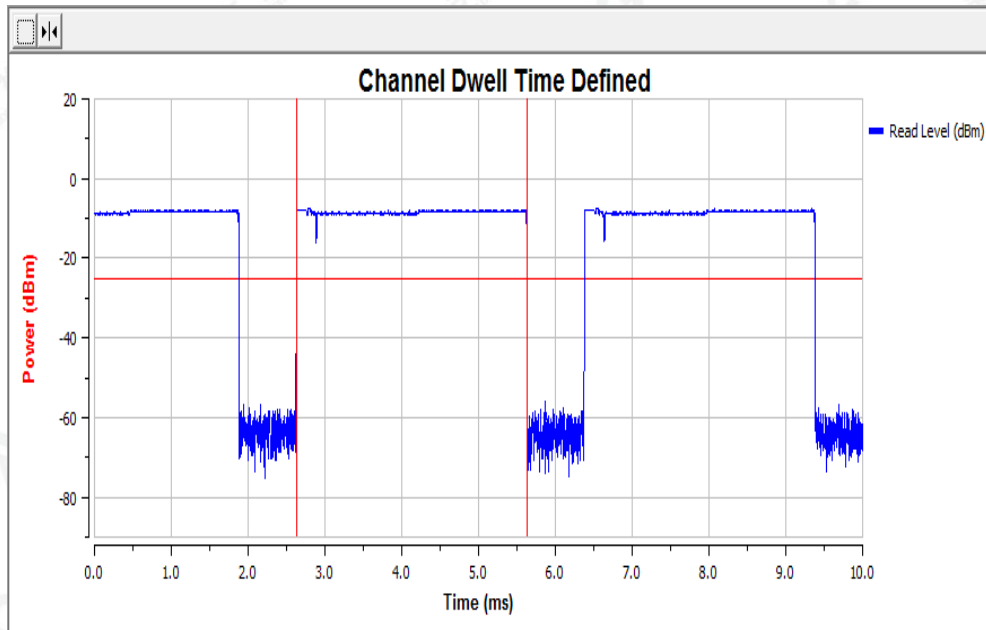


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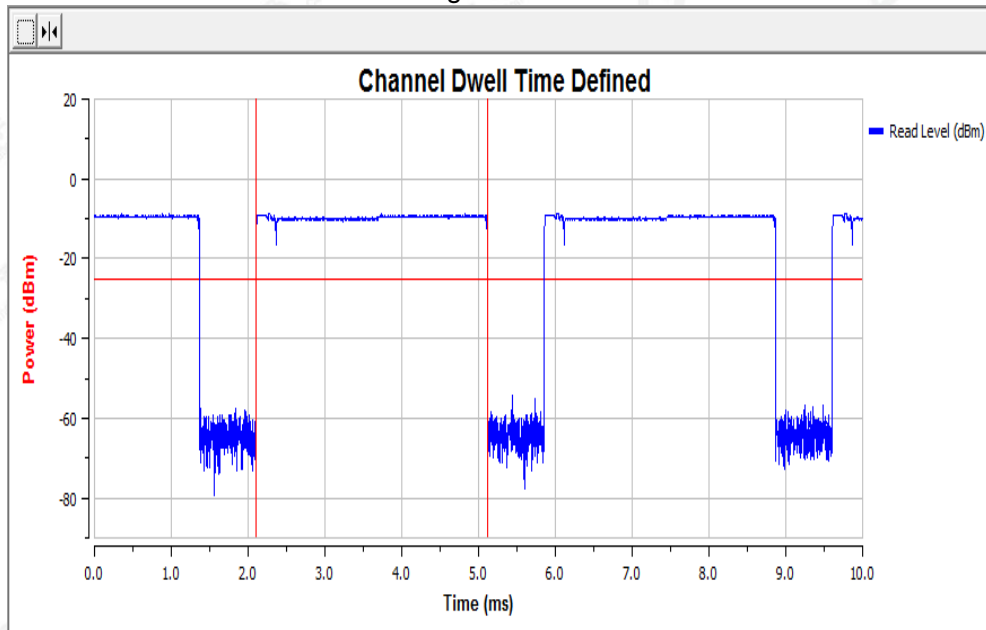




Middle Channel



High Channel



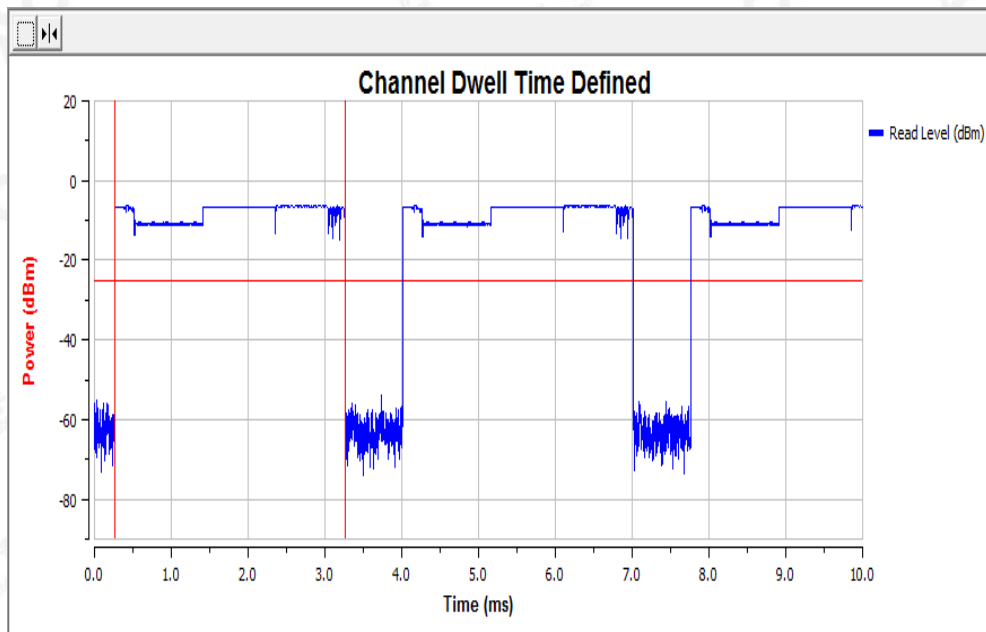
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Bluetooth 3Mbps(DH5) Test Result

Channel	Pulse Time(ms)	Dwell Time (ms)	Limit (ms)
Low	3.00	320.4	400
Middle	3.00	320.4	400
High	3.00	320.4	400

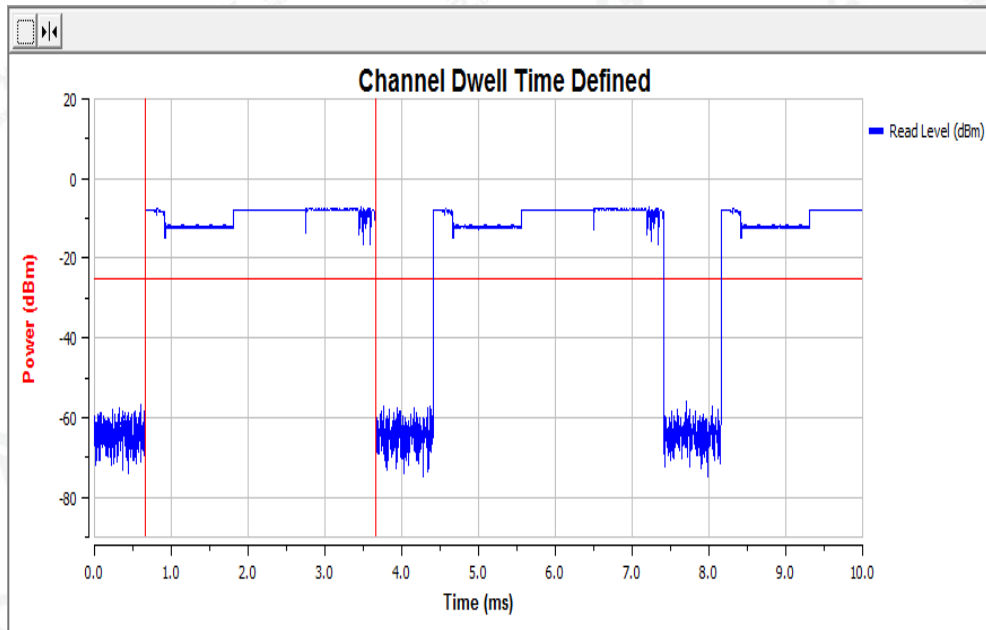
Low Channel



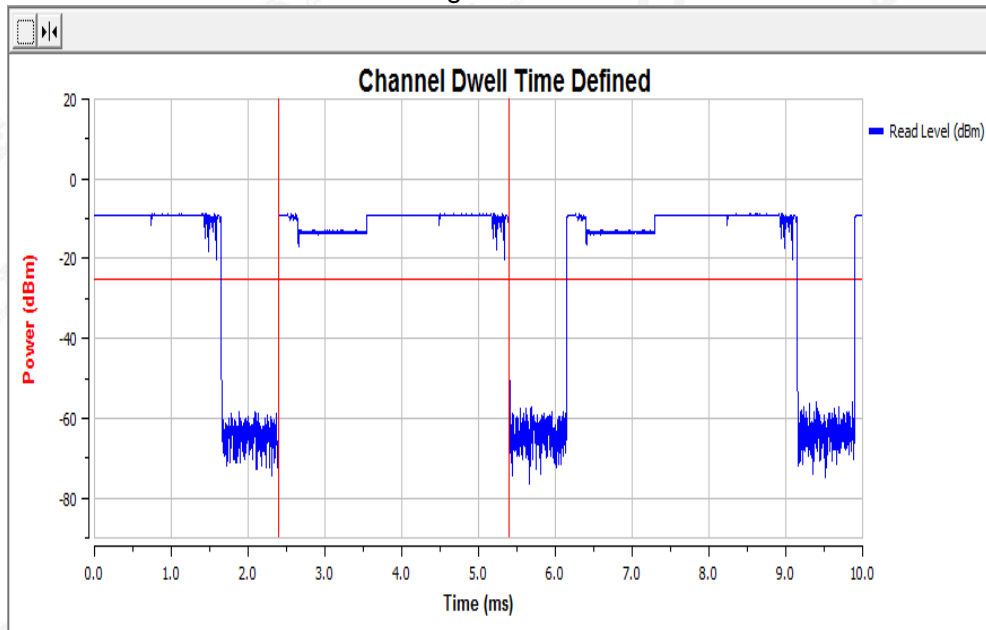
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by AGC, this document cannot be reproduced except in full with our prior written permission. The document is available on request and the brief information for its validation can be assessable and confirmed at <http://www.agc-cert.com>



Middle Channel



High Channel



Note: Dwell time=pulse time\*hopping numbers,  
Hopping numbers= $1000 / (0.625 * \text{time slot} + 0.625) * 31.6$   
Time slot(DH1,DH3,DH5)

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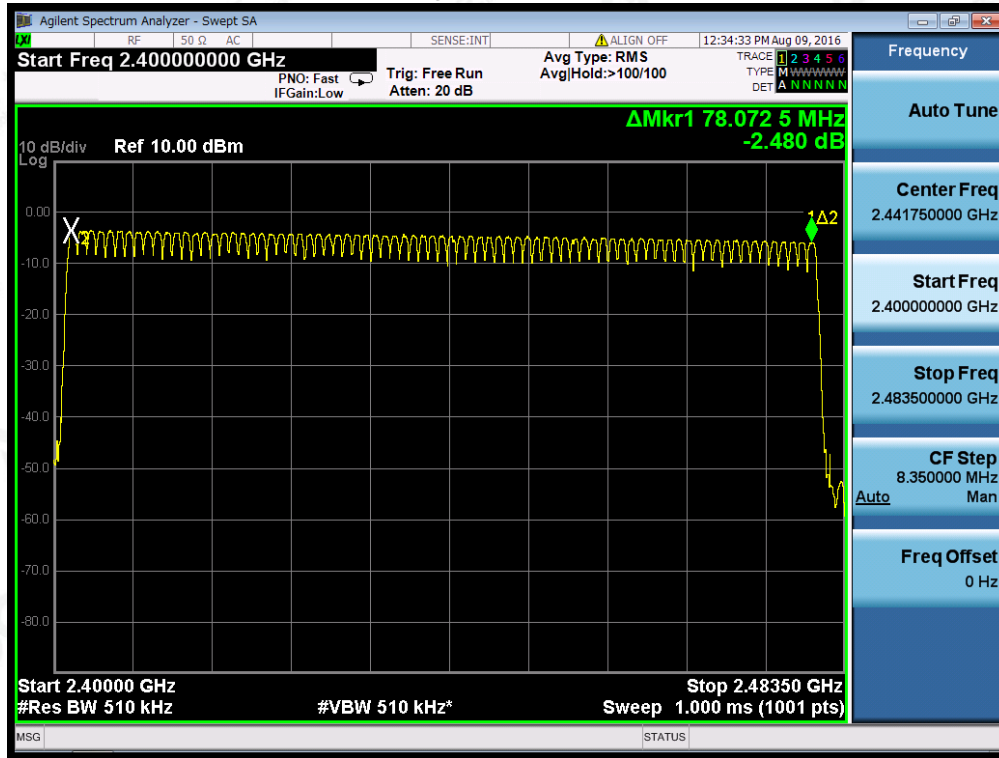
**TEST RESULT FOR HOPPING SEQUENCE**

Channel	Frequency (GHz)	Channel	Frequency (GHz)
01	2.40202	42	2.44302
02	2.40302	43	2.44402
03	2.40402	44	2.44502
04	2.40502	45	2.44602
05	2.40602	46	2.44702
06	2.40702	47	2.44802
07	2.40802	48	2.44902
08	2.40902	49	2.45002
09	2.41002	50	2.45102
10	2.41102	51	2.45202
11	2.41202	52	2.45302
12	2.41302	53	2.45402
13	2.41402	54	2.45502
14	2.41502	55	2.45602
15	2.41602	56	2.45702
16	2.41702	57	2.45802
17	2.41802	58	2.45902
18	2.41902	59	2.46002
19	2.42002	60	2.46102
20	2.42102	61	2.46202
21	2.42202	62	2.46302
22	2.42302	63	2.46402
23	2.42402	64	2.46502
24	2.42502	65	2.46602
25	2.42602	66	2.46702
26	2.42702	67	2.46802
27	2.42802	68	2.46902
28	2.42902	69	2.47002
29	2.43002	70	2.47102
30	2.43102	71	2.47202
31	2.43202	72	2.47302
32	2.43302	73	2.47402
33	2.43402	74	2.47502
34	2.43502	75	2.47602
35	2.43602	76	2.47702
36	2.43702	77	2.47802
37	2.43802	78	2.47902
38	2.43902	79	2.48002
39	2.44002		
40	2.44102		
41	2.44202		

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Hopping Channel Test Plot



Note: The test data has 79 channels.

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**TEST RESULT FOR OCCUPATION TIME**
**Bluetooth 1Mbps (DH5) Test Result**

Channel	Occupation Time (ms)	Limit
Low	1281.6	>400ms
Middle	1281.6	
High	1281.6	

**Bluetooth 2Mbps (DH5) Test Result**

Channel	Occupation Time (ms)	Limit
Low	1281.6	>400ms
Middle	1281.6	
High	1281.6	

**Bluetooth 3Mbps (DH5) Test Result**

Channel	Occupation Time (ms)	Limit
Low	1281.6	>400ms
Middle	1281.6	
High	1281.6	

Note: Occupation=pulse time\*hopping numbers\*4.

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**4.3 HOPPING FREQUENCY SEPARATION**  
ETSI EN 300 328 SUBCLAUSE 4.3.1.5

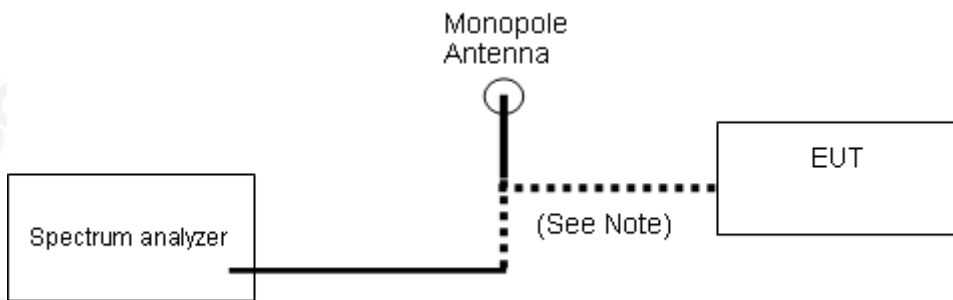
For Non-adaptive frequency hopping systems:

For non-adaptive Frequency Hopping equipment, the Hopping Frequency Separation shall be equal or greater than the Occupied Channel Bandwidth (see clause 4.3.1.8), with a minimum separation of 100 kHz.

For Adaptive frequency hopping systems:

The minimum Hopping Frequency Separation shall be 100 kHz.

**CONFIGURATION**

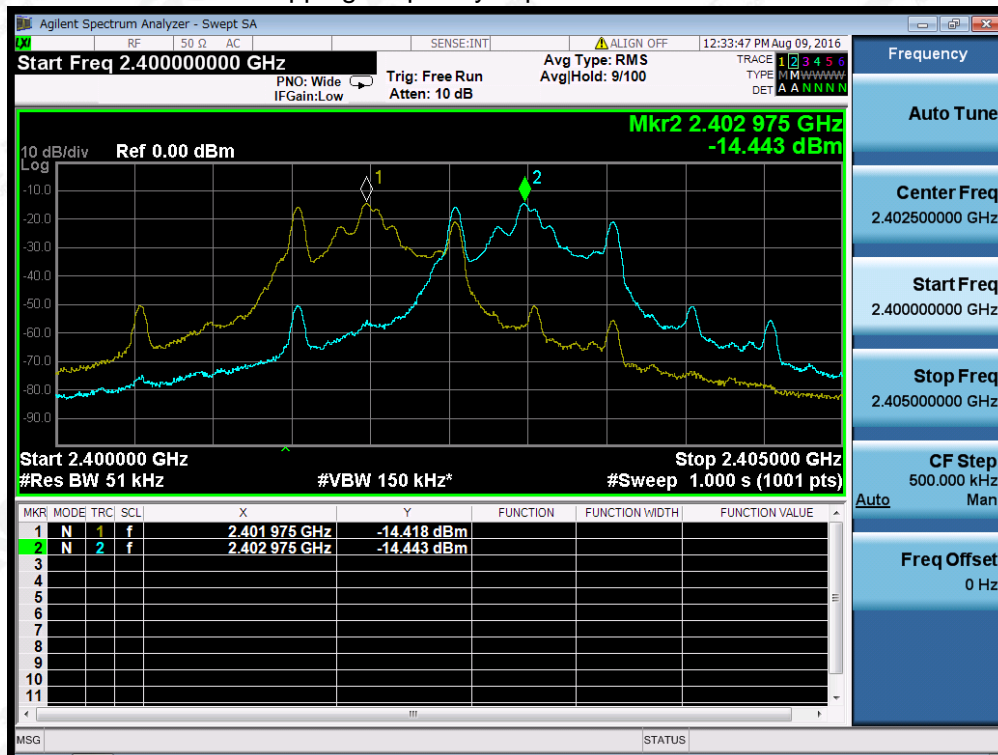


**TEST PROCEDURE**

Test Procedure please refer to clause 5.3.5.2.1

**TEST RESULT**

Hopping frequency separation Test Plot-1



Hopping Frequency Separation ( $F_{HS}$ ) =  $F_{2C} - F_{1C} = 1.000\text{MHz}$

**Note:** The modulation used during test is 8DPSK and this is the worst case.

**Conclusion: PASS**

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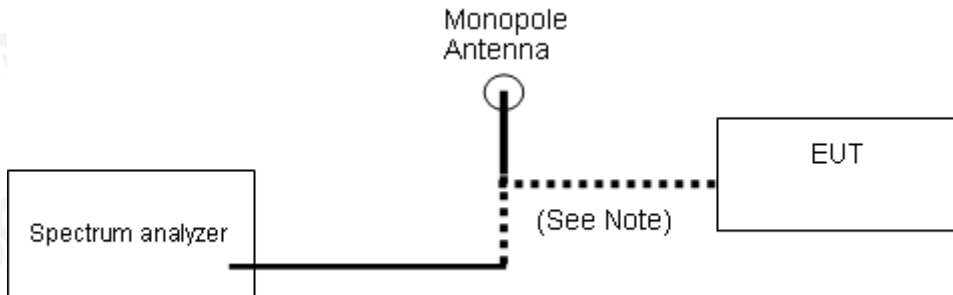


#### 4.4 OCCUPIED CHANNEL BANDWIDTH

##### EN300328 4.3.1.8 OCCUPIED CHANNEL BANDWIDTH

The Occupied Channel Bandwidth is the bandwidth that contains 99 % of the power of the signal.

##### CONFIGURATION



##### TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V1.9.1) clause 5.3.8.1 for the test conditions.
2. Please refer to ETSI EN 300 328 (V1.9.1) clause 5.3.8.2 the measurement method.
3. The Test equipment information as following
  - Centre frequency: 2402MHz,2480MHz
  - Resolution bandwidth: 20kHz
  - Video bandwidth: 62kHz
  - Detector mode :RMZ
  - Trace mode :Max Hold

##### TEST RESULT

<b>TEST ITEM</b>	OCCUPIED CHANNEL BANDWIDTH
<b>TEST MODE</b>	GFSK MOUDULATION

MEASUREMENT RESULT		
	Test Data (MHz)	Result
Low Channel	0.984	PASS
High Channel	0.985	PASS

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Low Channel



High Channel



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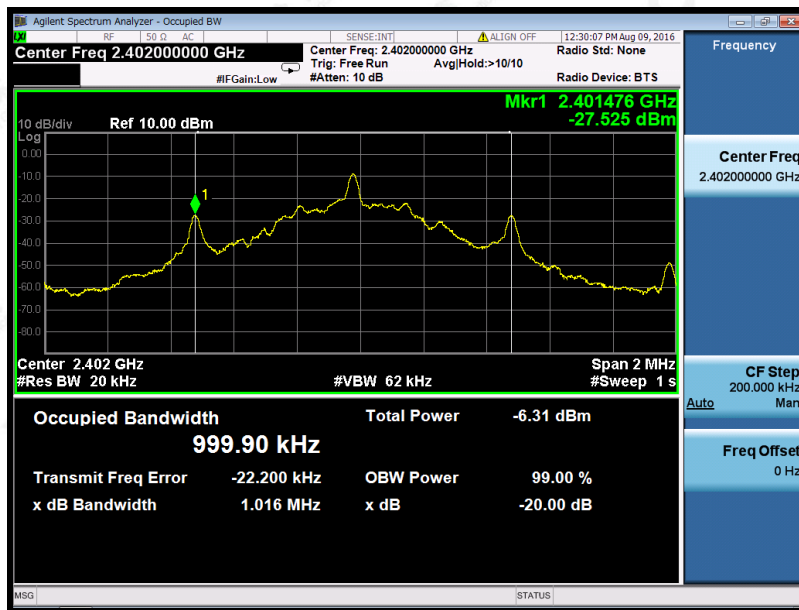




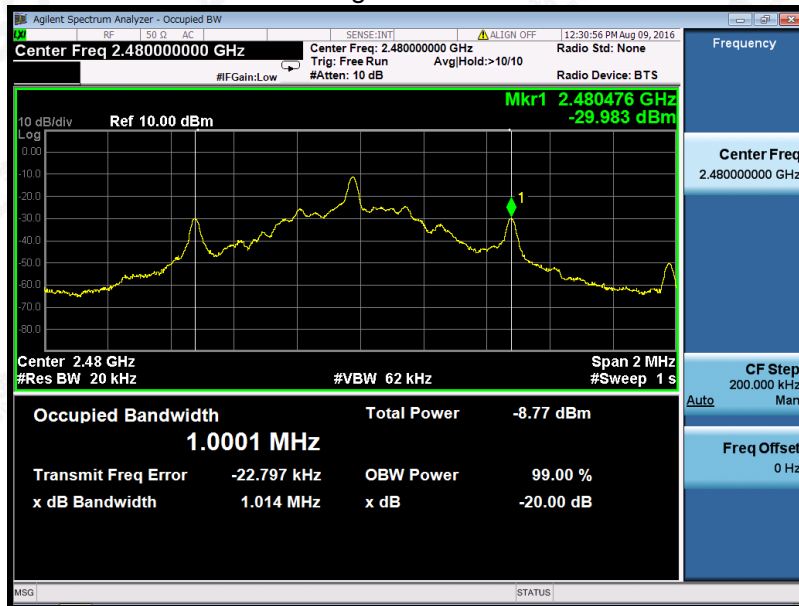
<b>TEST ITEM</b>	OCCUPIED CHANNEL BANDWIDTH
<b>TEST MODE</b>	Π /4-DQPSK MODULATION MOUDULATIO

MEASUREMENT RESULT		
Test Data (MHz)		Result
Low Channel	1.000	PASS
High Channel	1.000	PASS

Low Channel



High Channel



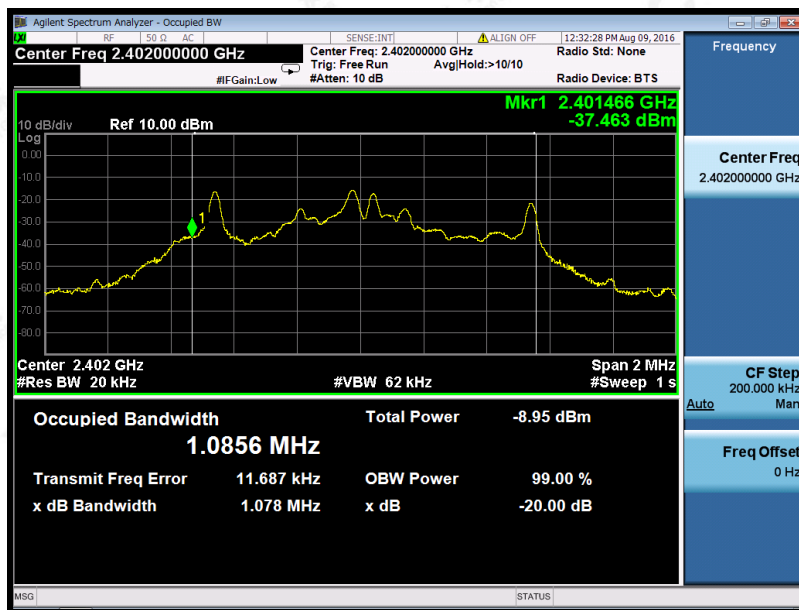
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by AGC, this document cannot be reproduced except in full with our prior written permission. The document is available on request and the brief information for its validation can be assessable and confirmed at <http://www.agc-cert.com>



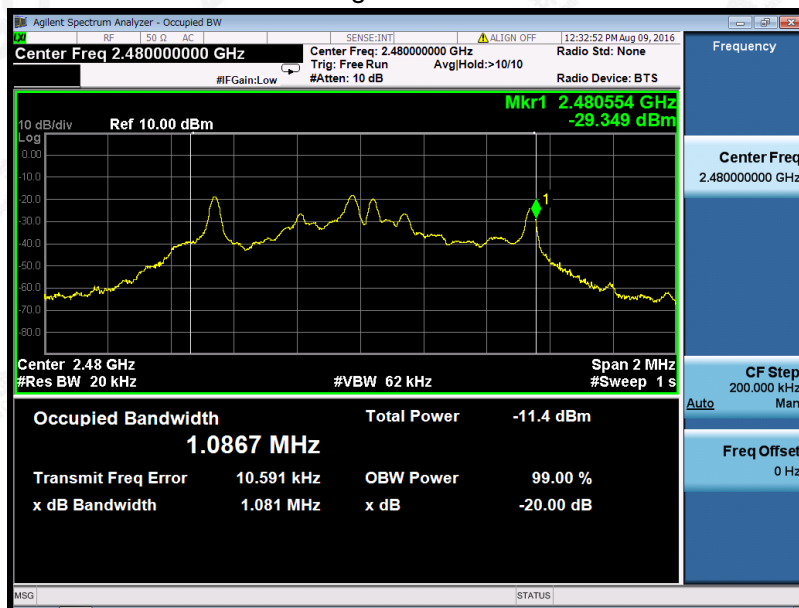
TEST ITEM	OCCUPIED CHANNEL BANDWIDTH
TEST MODE	8-DPSK MODULATION

MEASUREMENT RESULT		
Test Data (MHz)		Result
Low Channel	1.086	PASS
High Channel	1.087	PASS

Low Channel



High Channel

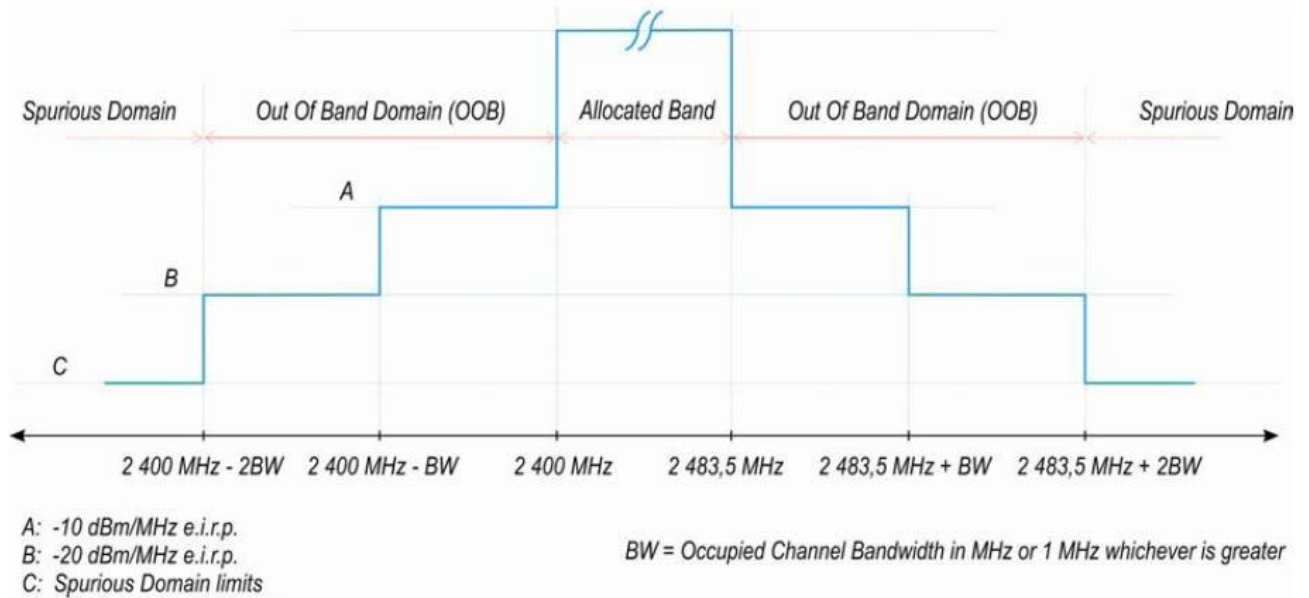


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**4.5 TRANSMITTER UNWANTED EMISSIONS IN THE OUT OF BAND DOMAIN**

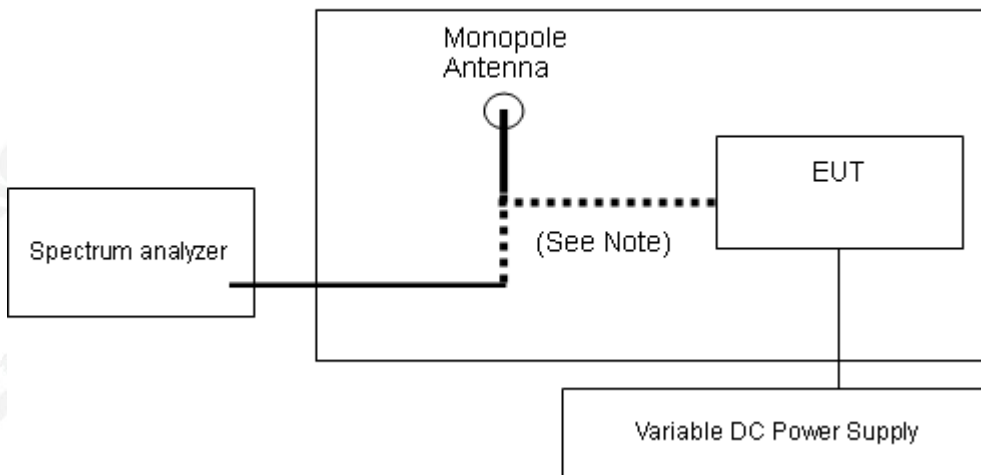
**EN300328 4.3.1.9 TRANSMITTER UNWANTED EMISSIONS IN THE OUT OF BAND DOMAIN**



**Figure 1: Transmit mask**

**TEST CONFIGURATION**

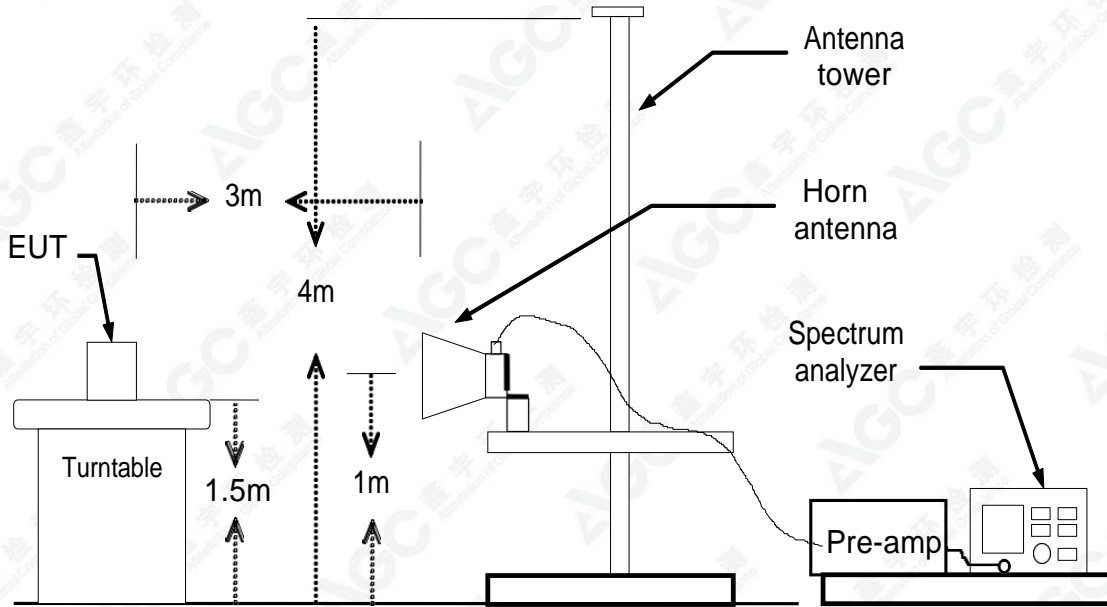
Temperature Chamber



For have temporary antenna connector product

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For have no temporary antenna product

**TEST PROCEDURE**

Test Procedure Please refer to Clause 5.3.9.2

**TEST RESULT**

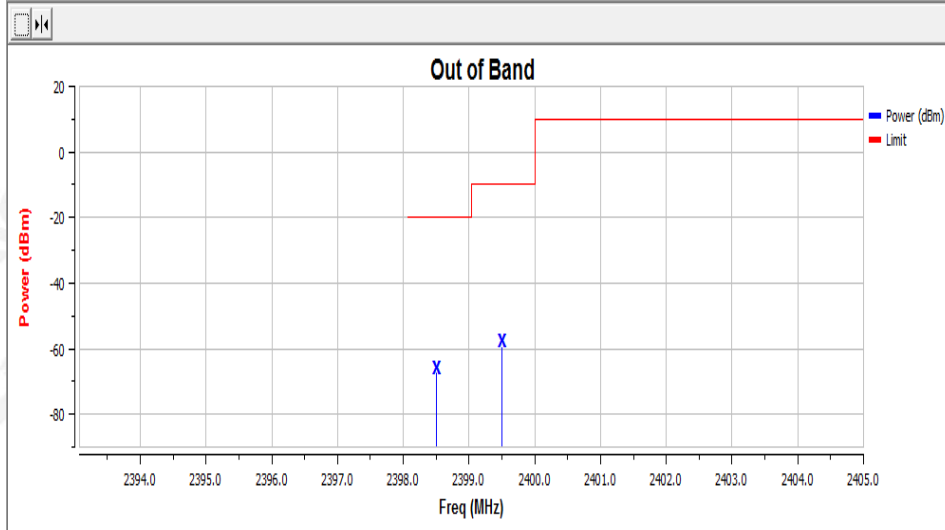
See the next page

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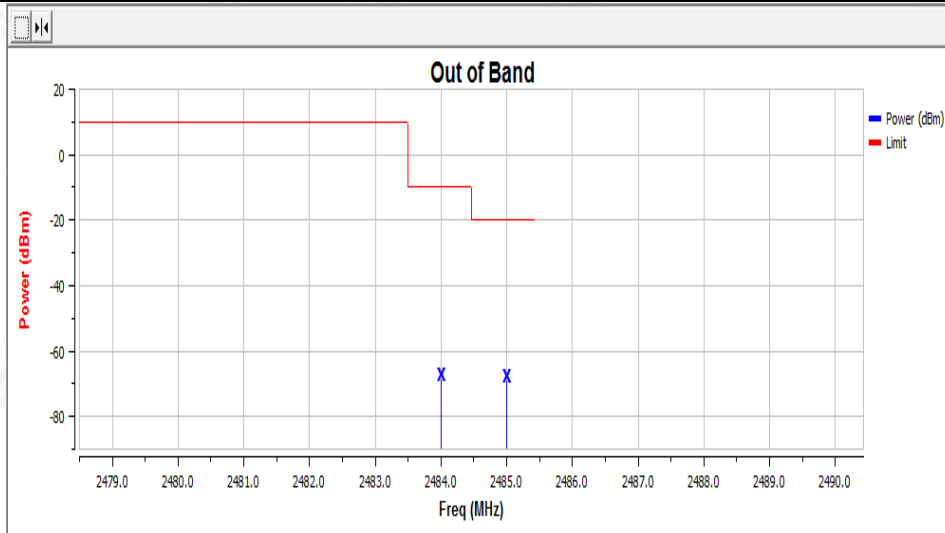


**NORMAL TEMPERATURE NORMAL VOLTAGE**

Channel	Antenna	Freq(MHz)	Level	Limit
CH Low-2402	Antenna 1	2399.5	-59.53	-10
CH Low-2402	Antenna 1	2398.5	-67.77	-20



Channel	Antenna	Freq(MHz)	Level	Limit
CH High-2480	Antenna 1	2484	-69.06	-10
CH High-2480	Antenna 1	2485	-69.57	-20

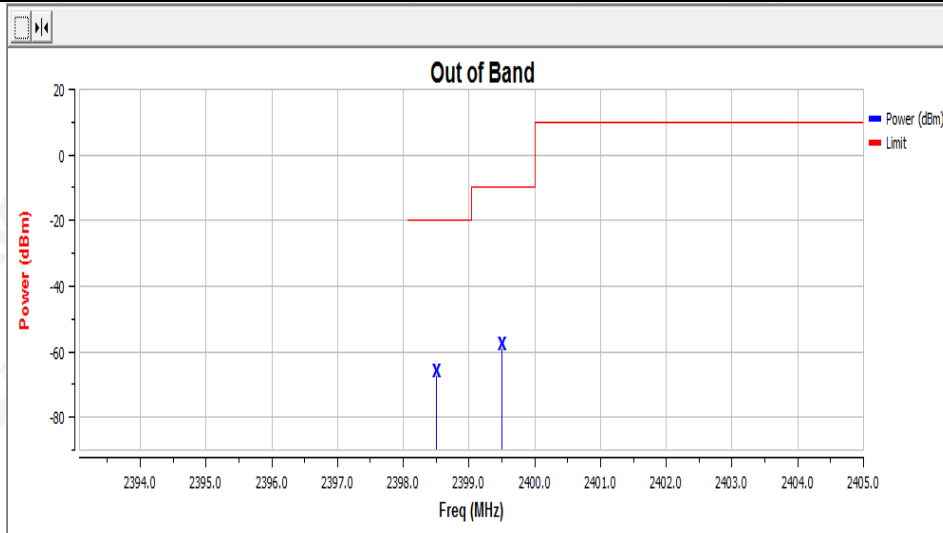


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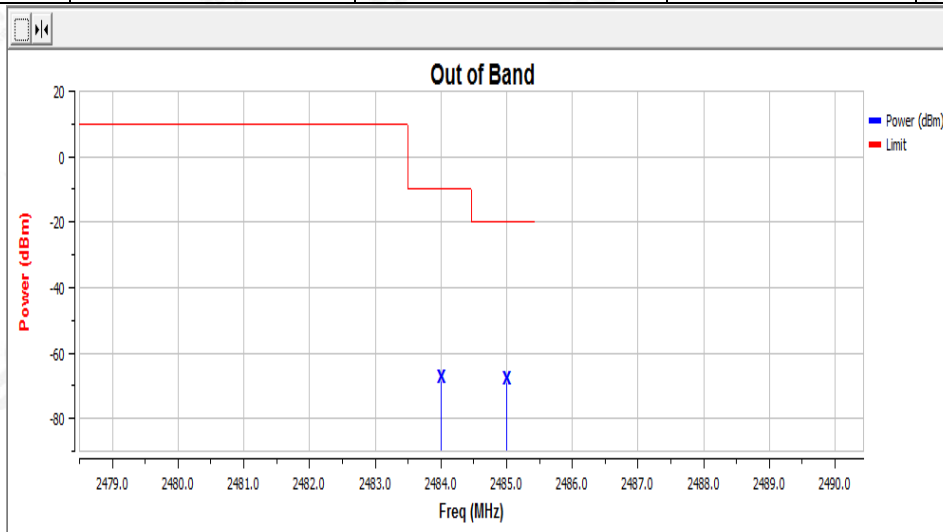


**LOW TEMPERATURE NORMAL VOLTAGE**

Channel	Antenna	Freq(MHz)	Level	Limit
CH Low-2402	Antenna 1	2399.5	-59.41	-10
CH Low-2402	Antenna 1	2398.5	-67.76	-20



Channel	Antenna	Freq(MHz)	Level	Limit
CH High-2480	Antenna 1	2484	-69.04	-10
CH High-2480	Antenna 1	2485	-69.56	-20



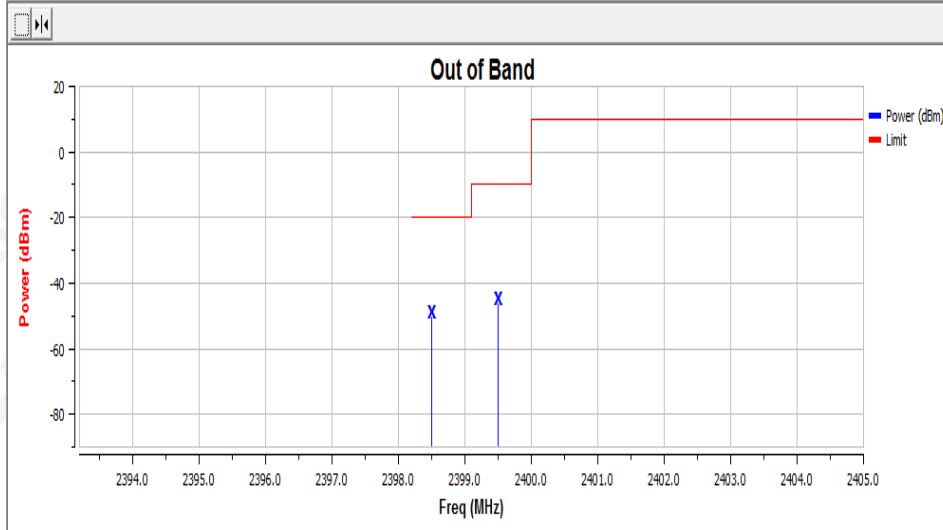
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by AGC, this document cannot be reproduced except in full with our prior written permission. The document is available on request and the brief information for its validation can be assessable and confirmed at <http://www.agc-cert.com>



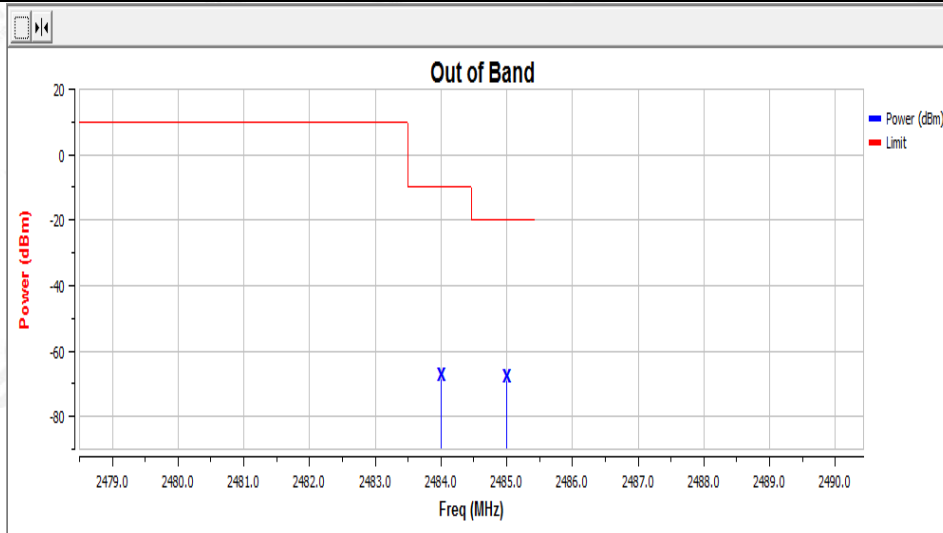


**HIGH TEMPERATURE NORMAL VOLTAGE**

Channel	Antenna	Freq(MHz)	Level	Limit
CH Low-2402	Antenna 1	2399.5	-59.43	-10
CH Low-2402	Antenna 1	2398.5	-67.71	-20



Channel	Antenna	Freq(MHz)	Level	Limit
CH High-2480	Antenna 1	2484	-69.08	-10
CH High-2480	Antenna 1	2485	-69.56	-20



**Note:** The modulation used during test is GFSK the worst case.  
**Conclusion: PASS**

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#### 4.6 TRANSMITTER SPURIOUS EMISSIONS

Spurious emissions are emissions outside the frequency range(s) of the equipment as defined in Clause 4.3.1.10.3.

Transmitter unwanted emissions in the spurious domain are emissions outside the allocated band and outside the out-of-band domain as indicated in figure 1 when the equipment is in Transmit mode.

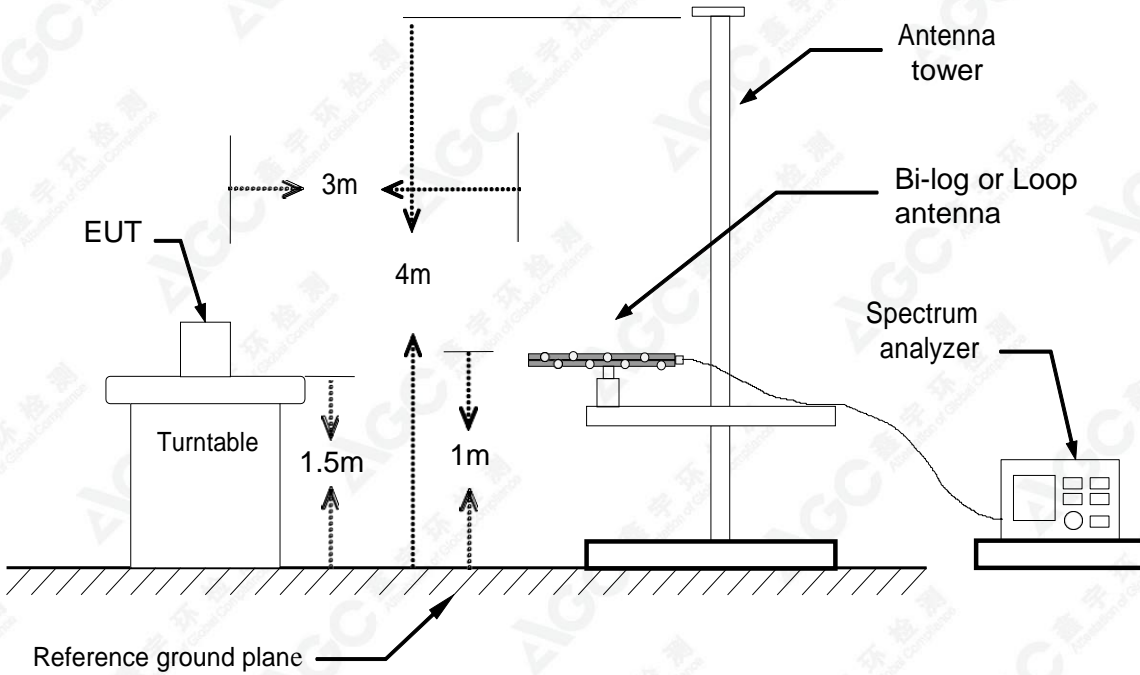
The spurious emissions of the transmitter shall not exceed the values in tables in the indicated bands:

Frequency Range	Maximum Power e.r.p(<=1GHz)/e.i.r.p(>1GHz)	Bandwidth
30MHZ to 47MHZ	-36dBm	100kHz
47MHZ to 74MHZ	-54dBm	100kHz
74MHZ to 87.5MHZ	-36dBm	100kHz
87.5MHZ to 118MHZ	-54dBm	100kHz
118MHZ to 174MHZ	-36dBm	100kHz
174 MHZ to 230MHZ	-54dBm	100kHz
230 MHZ to 470MHZ	-36dBm	100kHz
470 MHZ to 862MHZ	-54dBm	100kHz
862 MHZ to 1GHZ	-36dBm	100kHz
1 GHZ to 12.75GHZ	-30dBm	1MHz

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**Test Configuration**

**Below 1GHz**

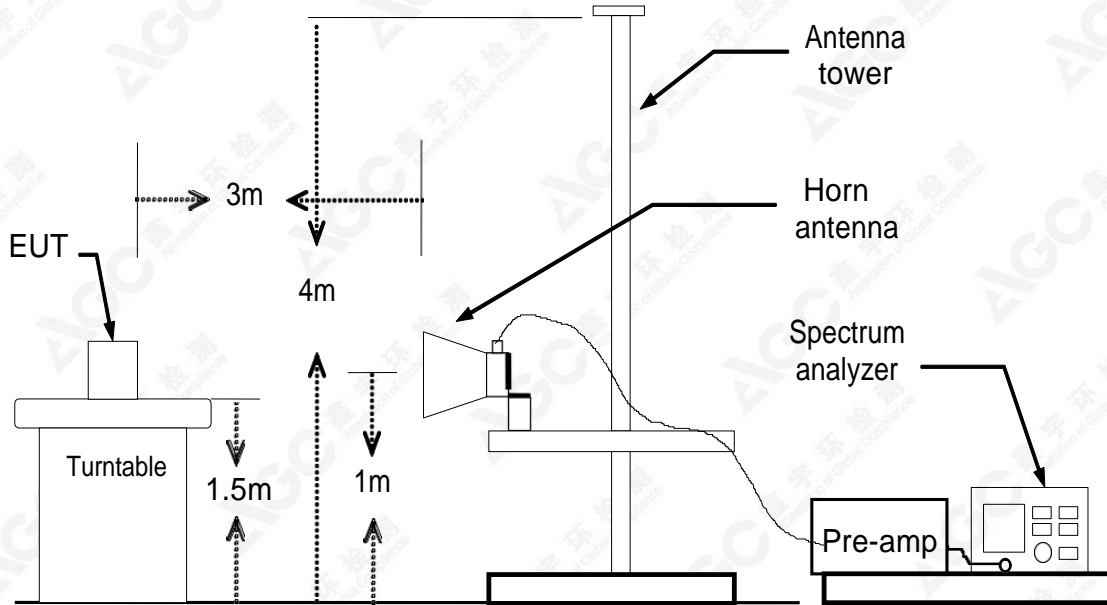


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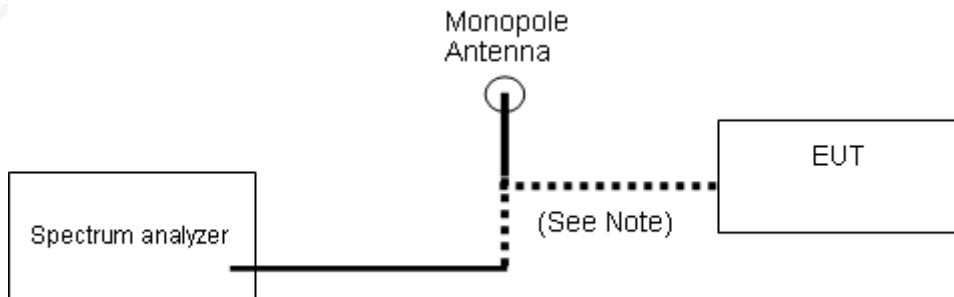




**Above 1GHz**



**Radiated Method**



**Conducted Method**

**TEST PROCEDURE**

1. Please refer to ETSI EN 300 328 (V1.9.1) clause 5.3.10.2.1 for the conducted method.
2. Please refer to ETSI EN 300 328 (V1.9.1) clause 5.3.10.2.2 for the radiated method.

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**TEST SETTING**

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyzer settings:

- Resolution bandwidth: 100 kHz
- Video bandwidth: 300 kHz
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points:  $\geq 19400$

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

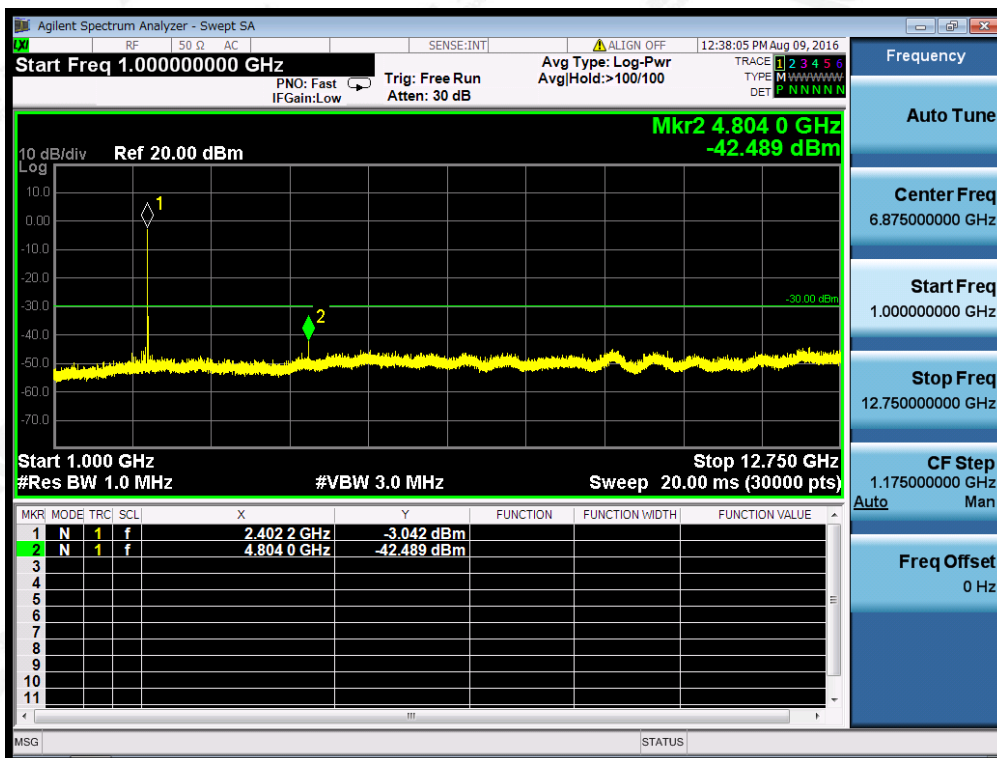
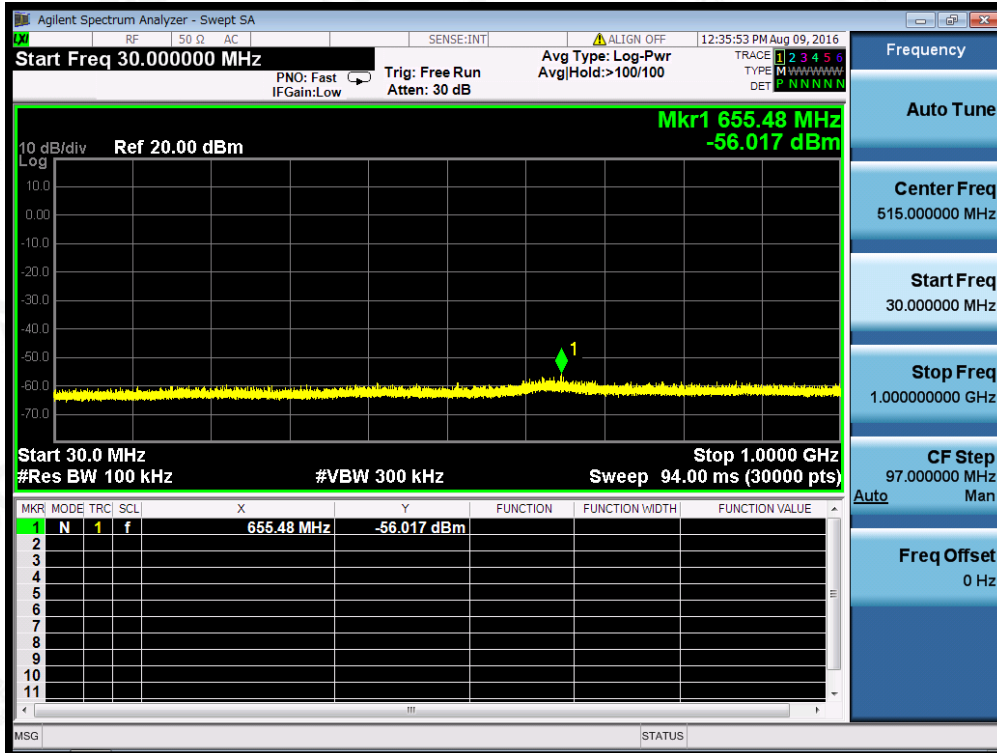
Spectrum analyzer settings:

- Resolution bandwidth: 1 MHz
- Video bandwidth: 3 MHz
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points:  $\geq 23500$

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**CONDUCTED RESULTS: (Worst Case: Low channel, 1Mbps)**

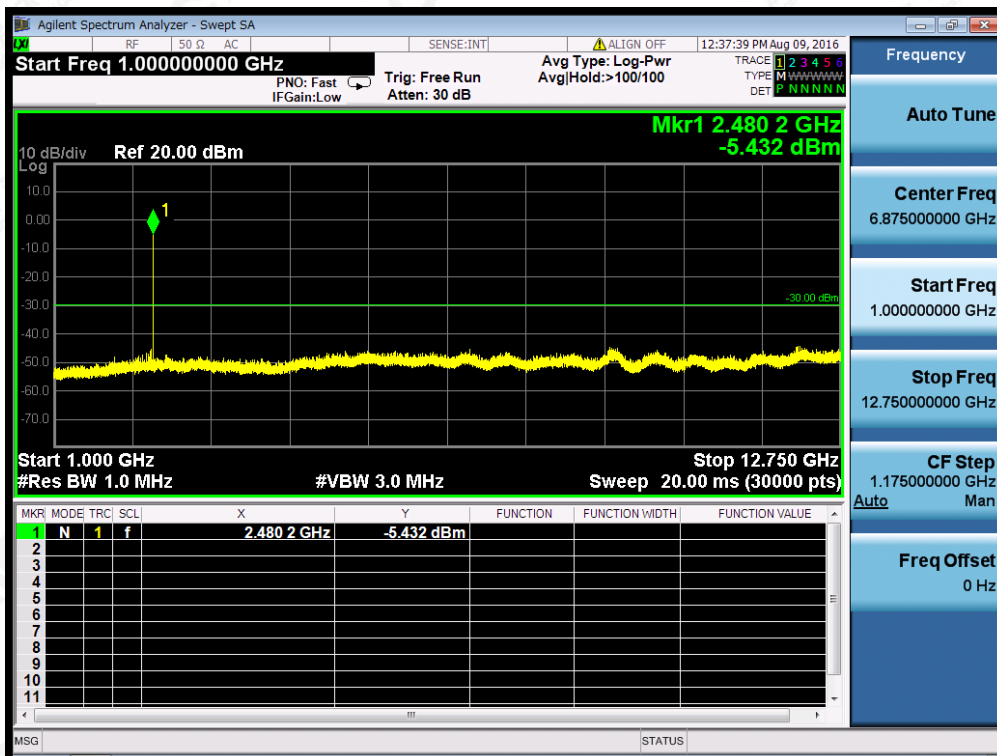
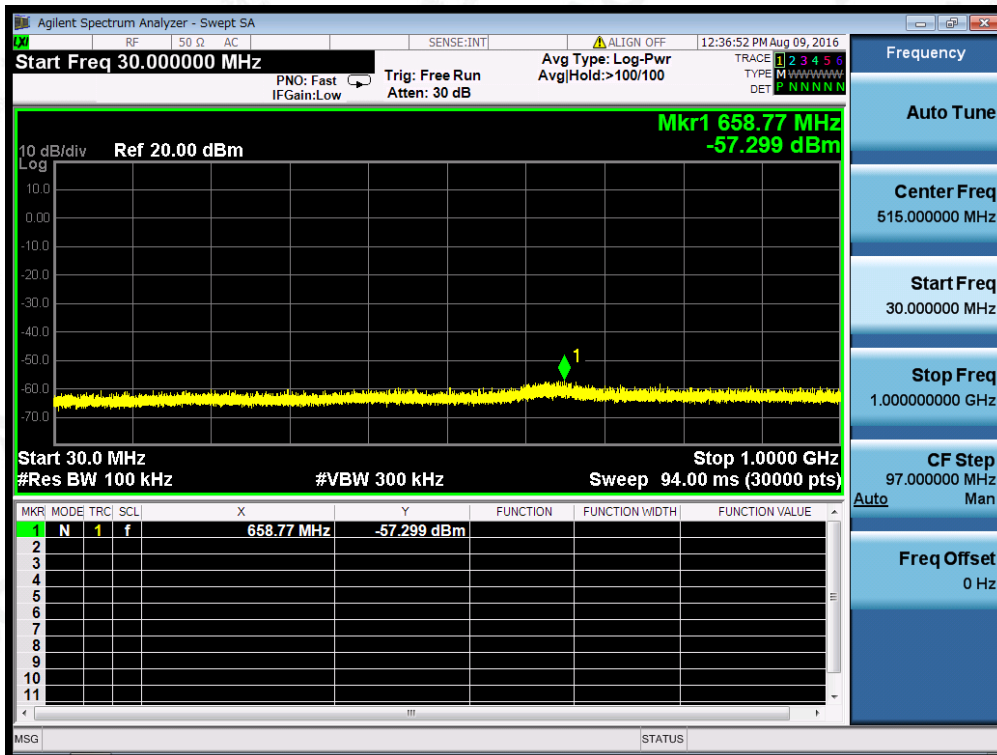


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(Worst Case: High channel, 1Mbps)



Note: All the modes have been tested but only the worst data recorded in the report.

**Conclusion: PASS**

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**TEST RESULTS FOR RADIATED METHOD (Worst case :1Mbps)**
**Low Channel: Transmitter Spurious Emission below 1GHz (30MHz-1GHz)**

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
97.02	33.5	V	-59.24	0.04	1.60	-57.68	-54.00	3.68
159.48	29.01	V	-63.92	0.06	1.10	-62.88	-36.00	26.88
286.3	31.65	V	-64.53	0.17	6.56	-58.14	-36.00	22.14
385.69	32.77	V	-65.10	0.29	6.45	-58.93	-36.00	22.93
466.8	30.14	V	-63.79	0.38	6.76	-57.41	-36.00	21.41
851.32	31.56	V	-64.65	0.67	6.88	-58.44	-54.00	4.44
96.34	29.78	H	-63.74	0.04	1.70	-62.08	-54.00	8.08
161.87	28.45	H	-62.16	0.06	1.28	-60.94	-36.00	24.94
270.58	26.89	H	-69.68	0.15	6.80	-63.03	-36.00	27.03
355.69	30.14	H	-66.95	0.25	6.15	-61.05	-36.00	25.05
600.35	26.03	H	-71.25	0.49	6.50	-65.25	-54.00	11.25
684.79	32.77	H	-62.53	0.55	6.44	-56.65	-54.00	2.65

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**High Channel: Transmitter Spurious Emission below 1GHz (30MHz-1GHz)**

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
96.58	30.45	V	-60.78	0.04	1.70	-59.12	-54.00	5.12
147.25	29.35	V	-61.07	0.05	0.46	-60.66	-36.00	24.66
264.3	30.57	V	-67.34	0.14	7.20	-60.28	-36.00	24.28
353.97	28.72	V	-65.45	0.25	5.89	-59.81	-36.00	23.81
464.02	29.88	V	-66.90	0.38	6.74	-60.53	-36.00	24.53
683.99	29.15	V	-68.28	0.55	6.43	-62.40	-54.00	8.40
97.3	31.75	H	-60.16	0.04	1.60	-58.60	-54.00	4.60
256.6	28.76	H	-67.94	0.14	7.28	-60.80	-36.00	24.80
365.65	29.88	H	-65.35	0.26	6.70	-58.91	-36.00	22.91
469.8	30.16	H	-68.45	0.38	6.79	-62.05	-36.00	26.05
596.78	29.45	H	-67.91	0.49	6.38	-62.02	-54.00	8.02
625.02	29.53	H	-70.05	0.51	7.10	-63.46	-54.00	9.46

Note: The margins of the other spectrum below 1GHz are not exceeding the minimum value of margin, and this part of the results without recording in the test report.

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**Low Channel: Transmitter Spurious Emission above 1GHz (1GHz-12.75GHz)**

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuV)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
2554.78	46.02	V	-56.15	1.58	7.94	-49.79	-30.00	19.79
4804.32	42.53	V	-47.00	2.64	9.30	-40.34	-30.00	10.34
7239.63	32.08	V	-57.61	3.13	11.32	-49.42	-30.00	19.42
7336.58	29.77	V	-70.55	3.11	11.46	-62.20	-30.00	32.20
7675.48	32.14	V	-68.39	3.04	11.53	-59.90	-30.00	29.90
7958.6	29.02	V	-70.23	2.98	11.25	-61.96	-30.00	31.96
2554.19	42.57	H	-57.84	1.58	7.94	-51.48	-30.00	21.48
4806.32	43.28	H	-47.39	2.64	9.30	-40.73	-30.00	10.73
7254.89	41.30	H	-54.74	3.13	11.35	-46.52	-30.00	16.52
7365.99	42.58	H	-55.88	3.10	11.50	-47.48	-30.00	17.48
7561.3	40.18	H	-58.82	3.06	11.64	-50.24	-30.00	20.24
7894.86	32.06	H	-69.05	2.99	11.31	-60.74	-30.00	30.74

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**High Channel: Transmitter Spurious Emission above 1GHz (1GHz-12.75GHz)**

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
2554.3	47.8	V	-55.94	1.58	7.94	-49.58	-30.00	19.58
4958.73	31.62	V	-47.29	2.74	9.60	-40.43	-30.00	10.43
7154.19	29.25	V	-65.33	3.15	11.21	-57.27	-30.00	27.27
7224.58	29.44	V	-59.61	3.13	11.31	-51.44	-30.00	21.44
7615.3	30.26	V	-69.02	3.05	11.59	-60.48	-30.00	30.48
7824.51	30.14	V	-68.71	3.01	11.38	-60.34	-30.00	30.34
2557.84	52.3	H	-55.60	1.58	7.94	-49.24	-30.00	19.24
4962.35	41.27	H	-46.11	2.75	9.62	-39.24	-30.00	9.24
7150.23	29.80	H	-68.96	3.15	11.21	-60.90	-30.00	30.90
7236.89	40.33	H	-58.42	3.13	11.32	-50.23	-30.00	20.23
7464.9	37.59	H	-59.84	3.08	11.64	-51.28	-30.00	21.28
7537.99	42.57	H	-58.57	3.07	11.67	-49.97	-30.00	19.97

Note:

1. The margins of the other spectrum above 1GHz are not exceeding the minimum value of margin, and this part of the results without recording in the test report.
2. The emission behaviour belongs to narrowband spurious emission.

**Conclusion: PASS**

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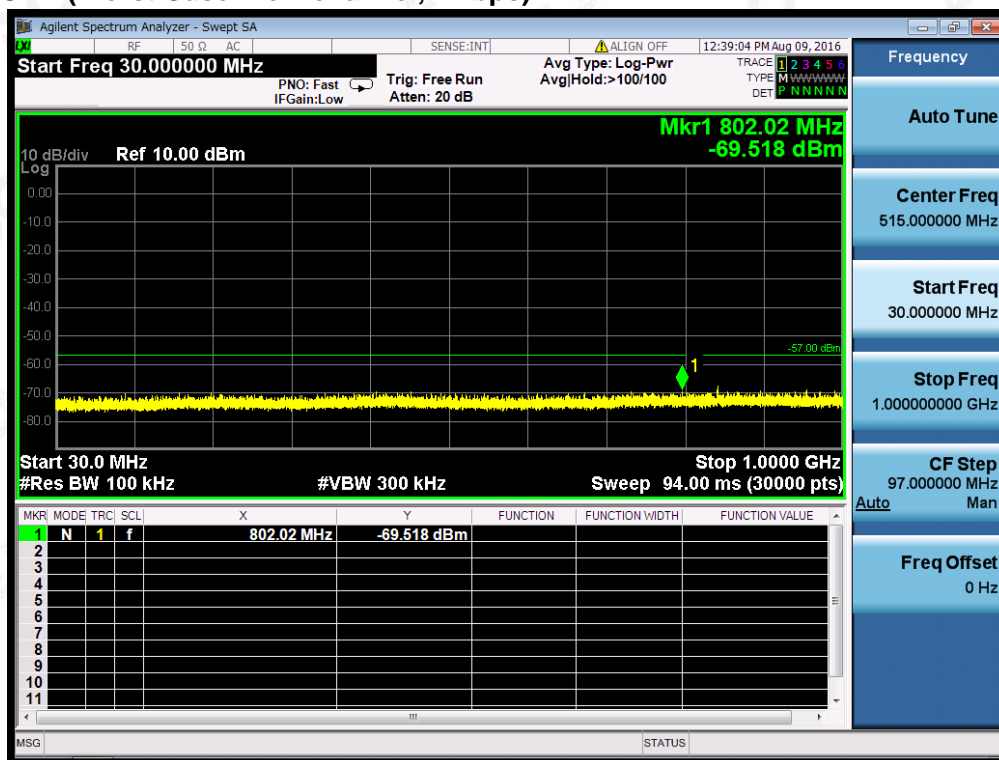
**4.7 RECEIVER SPURIOUS EMISSIONS**  
**TEST LIMIT**  
**SPURIOUS EMISSION LIMITS FOR RECEIVERS**

Frequency range	Maximum power	Measurement bandwidth
30MHz to 1GHz	-57dBm	100kHz
1GHz to 12.75GHz	-47dBm	1MHz

**TEST PROCEDURE**

Please see the section 5.3.11.2.1 for conducted method in EN300328 v1.9.1  
Please see the section 5.3.11.2.2 for radiated method in EN300328 v1.9.1

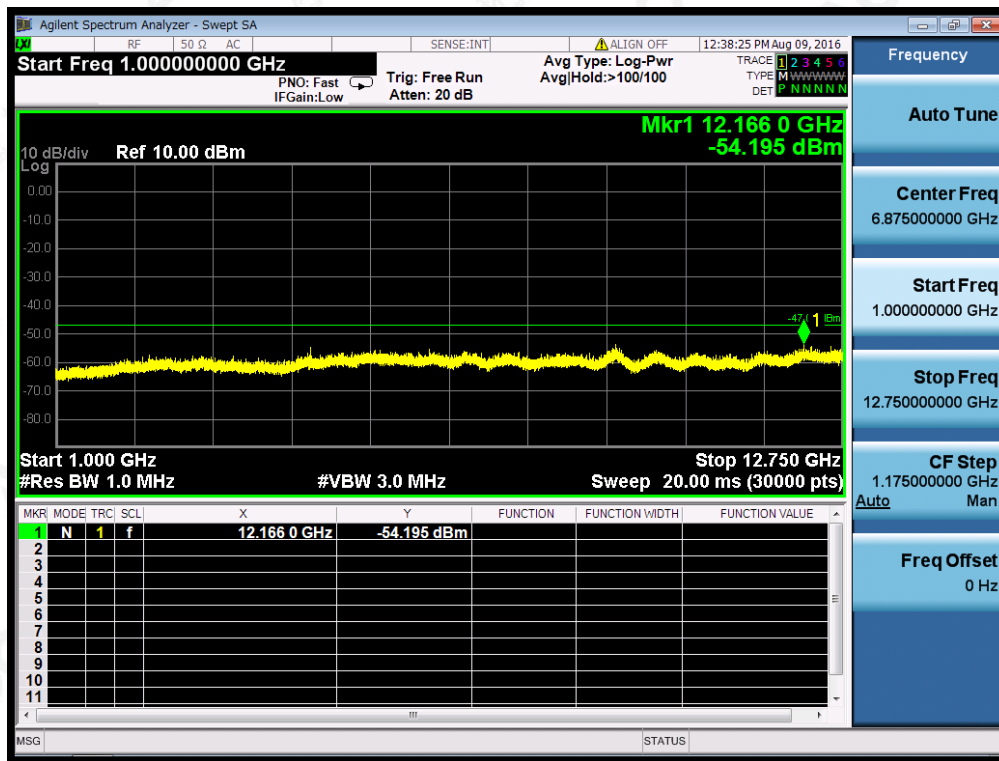
**TEST RESULTS FOR CONDUCTED METHOD**  
**RECEIVER MODE (Worst Case: Low channel, 1Mbps)**



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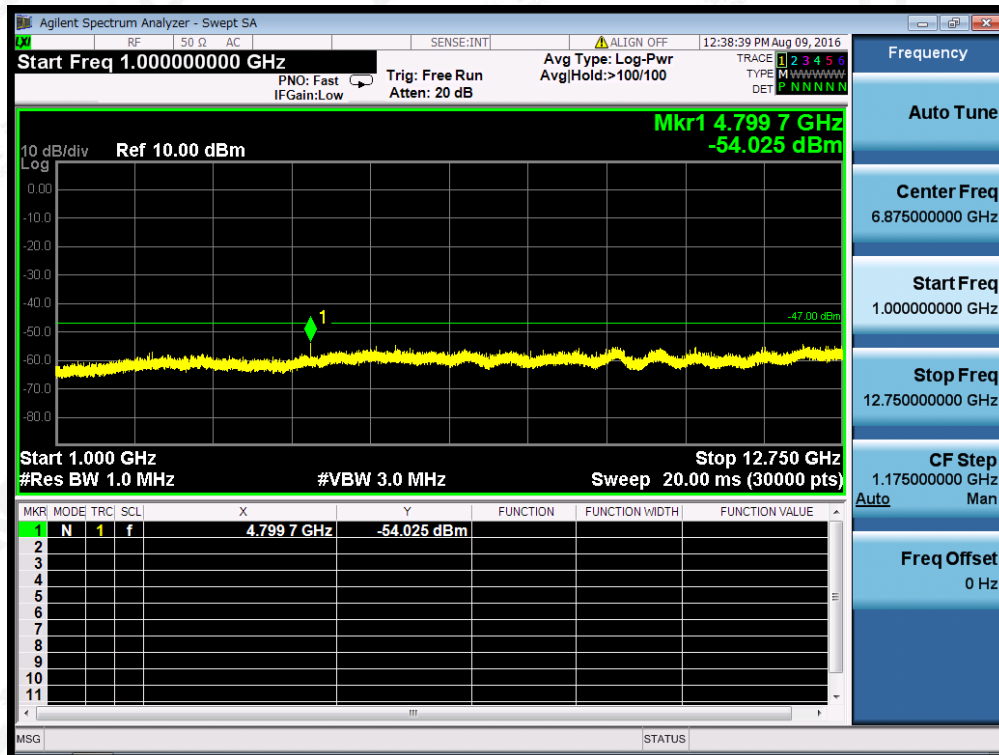
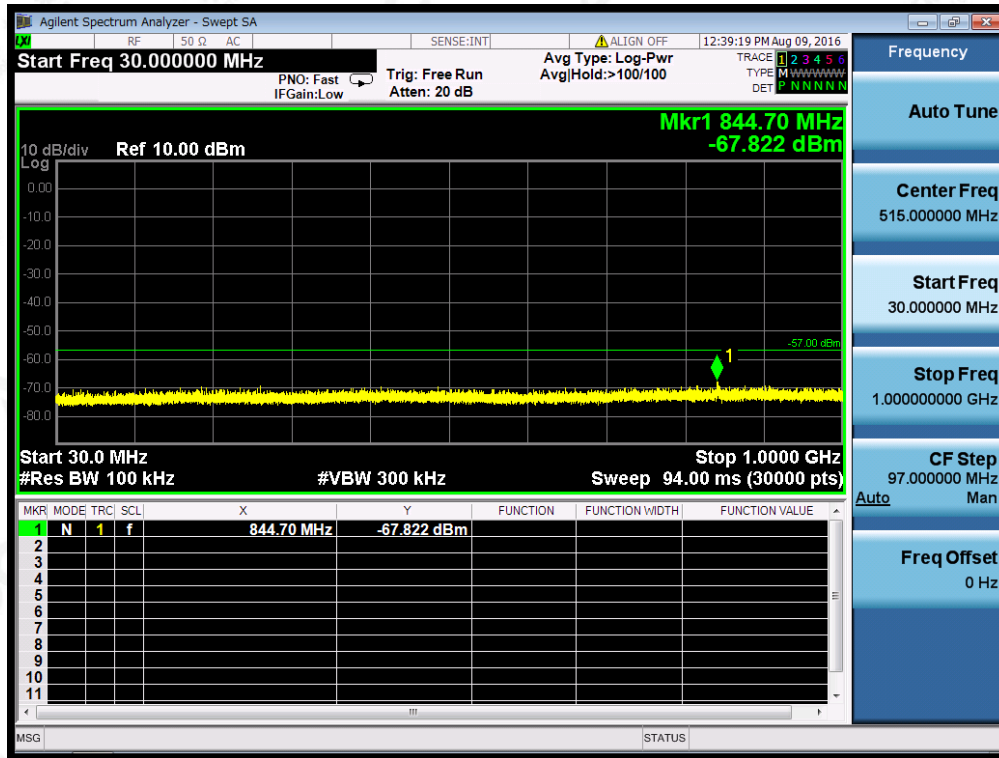




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(Worst Case: High channel, 1Mbps)



Note: All the modes have been tested but only the worst data recorded in the report.

**Conclusion: PASS**

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**TEST RESULTS FOR RADIATED METHOD (Worst case :1Mbps)**
**Low Channel: Receiver Spurious Emission below 1GHz (30MHz-1GHz)**

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
96.08	30.9	V	-72.01	0.04	1.70	-70.35	-57.00	13.35
158.74	28.74	V	-73.38	0.06	1.00	-72.44	-57.00	15.44
249.63	29.53	V	-78.42	0.13	7.06	-71.49	-57.00	14.49
270.36	27.13	V	-77.34	0.15	6.80	-70.69	-57.00	13.69
490.71	27.22	V	-76.85	0.41	7.10	-70.16	-57.00	13.16
865.02	30.29	V	-75.26	0.68	5.70	-70.24	-57.00	13.24
96.85	28.05	H	-74.02	0.04	1.70	-72.36	-57.00	15.36
198.75	27.33	H	-76.68	0.07	6.26	-70.49	-57.00	13.49
399.15	29.63	H	-77.14	0.30	6.58	-70.86	-57.00	13.86
459.01	27.15	H	-77.69	0.37	6.67	-71.39	-57.00	14.39
551.32	26.85	H	-81.14	0.46	6.72	-74.88	-57.00	17.88
663.58	28.35	H	-76.59	0.54	7.01	-70.12	-57.00	13.12

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**High Channel:** Receiver Spurious Emission below 1GHz (30MHz-1GHz)

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
97.25	29.8	V	-71.75	0.04	1.60	-70.19	-57.00	13.19
147.8	27.48	V	-70.76	0.05	0.46	-70.35	-57.00	13.35
263.19	29.31	V	-78.95	0.14	7.20	-71.89	-57.00	14.89
354.82	28.76	V	-77.23	0.25	6.02	-71.46	-57.00	14.46
452.7	29.44	V	-77.09	0.36	6.46	-70.99	-57.00	13.99
969.79	30.25	V	-75.71	0.75	5.98	-70.48	-57.00	13.48
97.84	30.09	H	-72.26	0.04	1.60	-70.70	-57.00	13.70
156.42	28.75	H	-73.08	0.06	0.80	-72.34	-57.00	15.34
370.29	27.99	H	-78.79	0.27	6.60	-72.46	-57.00	15.46
460.15	30.36	H	-76.69	0.37	6.70	-70.36	-57.00	13.36
540.39	29.18	H	-78.25	0.45	7.20	-71.50	-57.00	14.50
767.96	30.46	H	-78.17	0.62	6.81	-71.98	-57.00	14.98

Note: The margins of the other spectrum below 1GHz are not exceeding the minimum value of margin, and this part of the results without recording in the test report.

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**Low Channel: Receiver Spurious Emission above 1GHz (1GHz-12.75GHz)**

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuV)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
5924.78	29.65	V	-66.81	2.91	9.12	-60.59	-47.00	13.59
		V						
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
9558.7	30.21	H	-68.70	2.97	11.20	-60.47	-47.00	13.47
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--

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**High Channel: Receiver Spurious Emission above 1GHz (1GHz-12.75GHz)**

Frequency	Reading Level	Antenna	S.G.	Cable Loss	Ant.Gain	Emission Level	Limit	Margin
(MHz)	(dBuv)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
9465.3	29.45	V	-69.82	2.97	11.20	-61.59	-47.00	14.59
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
9771.48	27.55	H	-69.89	2.97	11.20	-61.66	-47.00	14.66
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--

**Note:**

1. The margins of the other spectrum above 1GHz are not exceeding the minimum value of margin, and this part of the results without recording in the test report.
2. The emission behaviour belongs to narrowband spurious emission.
3. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with "--" remark, if no specific emission from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

**Conclusion: PASS**

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#### 4.8. RECEIVER BLOCKING

ETSI EN300328 SUBCLAUSE 4.3.2.11

This requirement does not apply to non-adaptive equipment or adaptive equipment operating in a non-adaptive mode.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p. Adaptive equipment using wide band modulations other than FHSS, shall comply with the requirements defined in clause 4.3.2.6.2 (non-LBT based DAA) or clause 4.3.2.6.3 (LBT based DAA) in the presence of a blocking signal with characteristics as provided in table 6.

**Table 6: Receiver Blocking parameters**

Equipment Type (LBT / non-LBT)	Wanted signal mean power from companion device	Blocking signal frequency [MHz]	Blocking signal power [dBm]	Type of interfering signal
LBT	sufficient to maintain the link (see note 2)	2 395 or 2 488,5 (see note 1)	-35	CW
Non-LBT	-30 dBm			
NOTE 1: The highest blocking frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest blocking frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.3.7.1.				
NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.				

#### TEST PROCEDURE

1. Please refer to ETSI EN 300 328 clause 5.3.7.1 for the test conditions.
2. Please refer to ETSI EN 300 328 clause 5.3.7.2 for the measurement methods.

#### TEST RESULTS

N/A

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**APPENDIX A: PHOTOGRAPHS OF THE TEST SETUP**  
CONDUCTED SPURIOUS EMISSION TEST



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## APPENDIX B: PHOTOGRAPHS OF THE EUT

ALL VIEW OF EUT



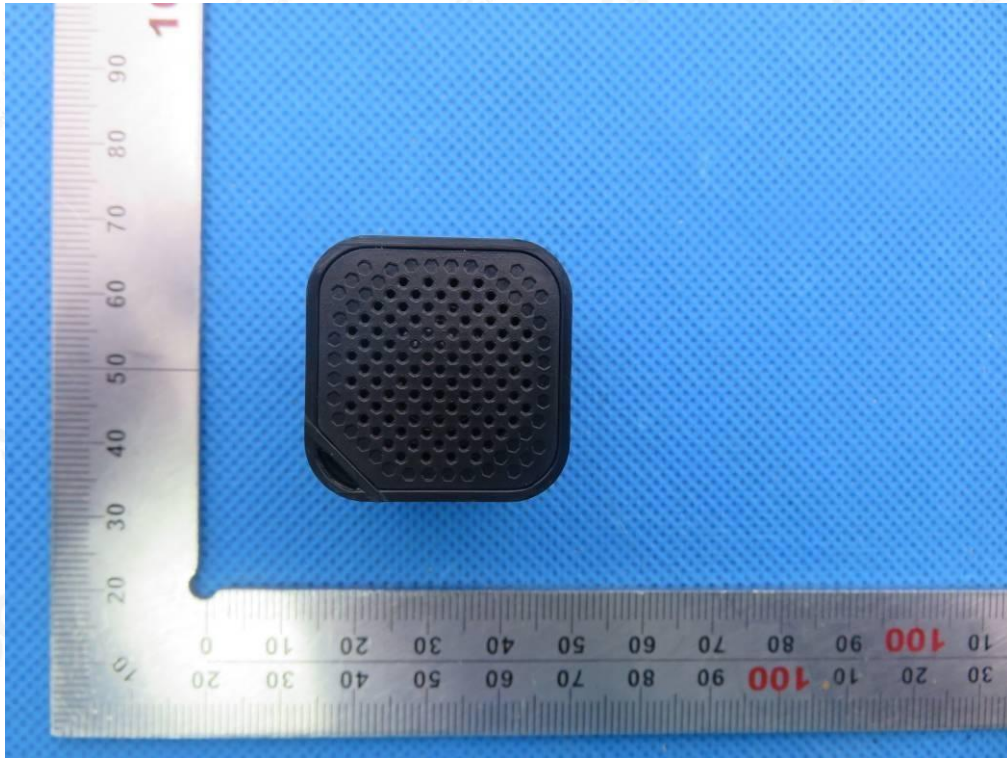
TOP VIEW OF EUT



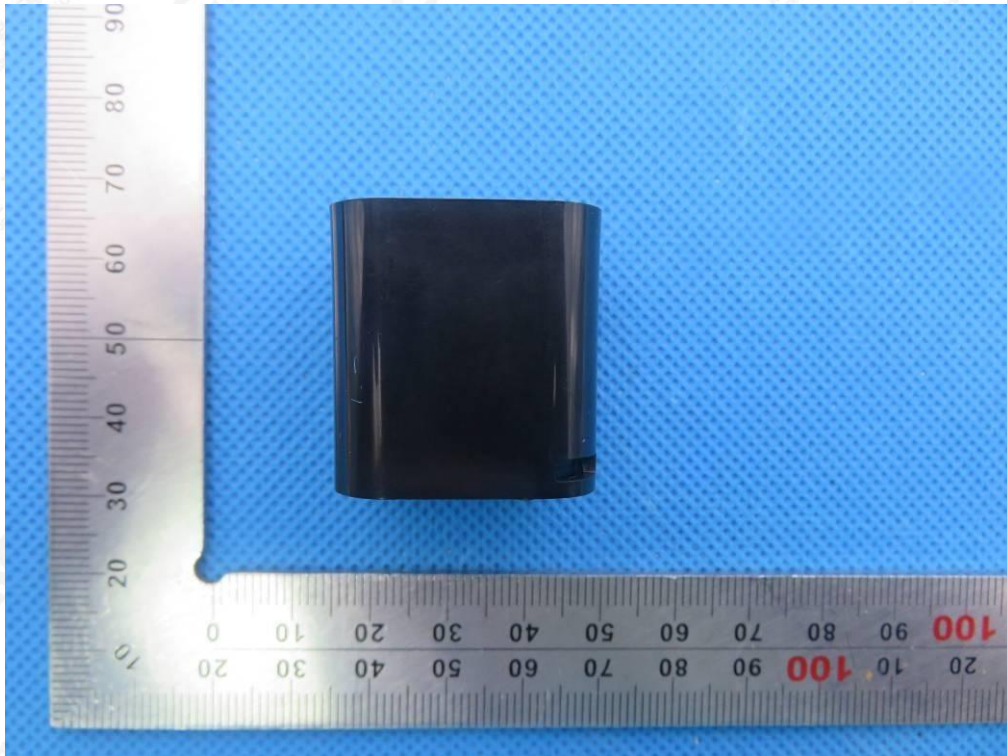
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BOTTOM VIEW OF EUT



FRONT VIEW OF EUT

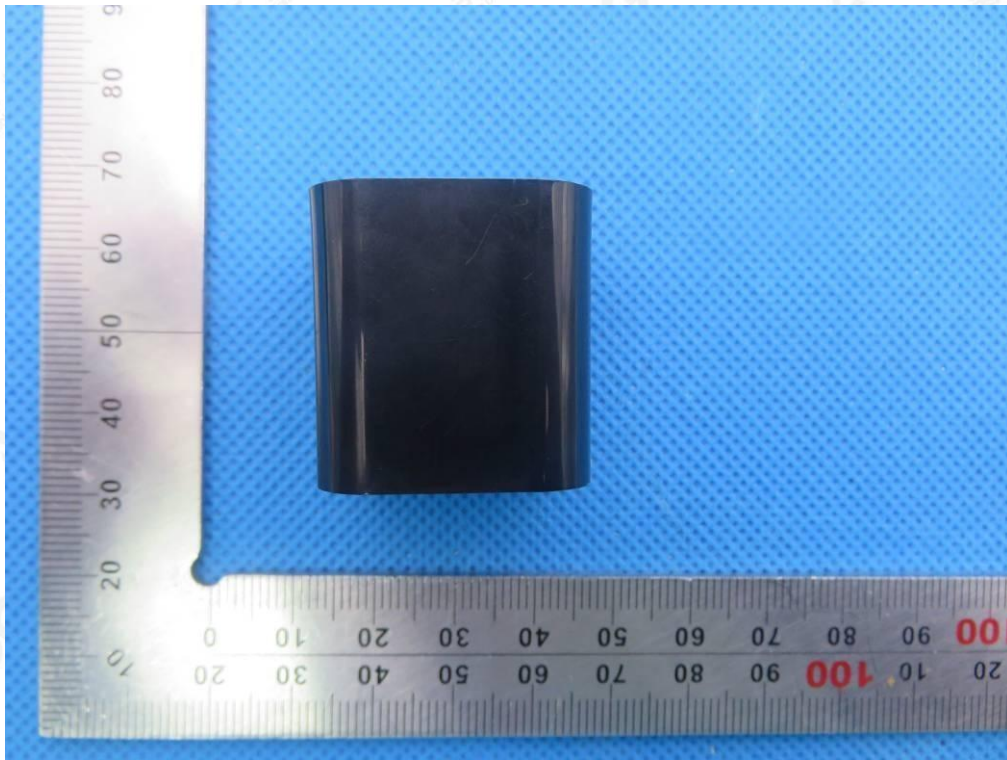


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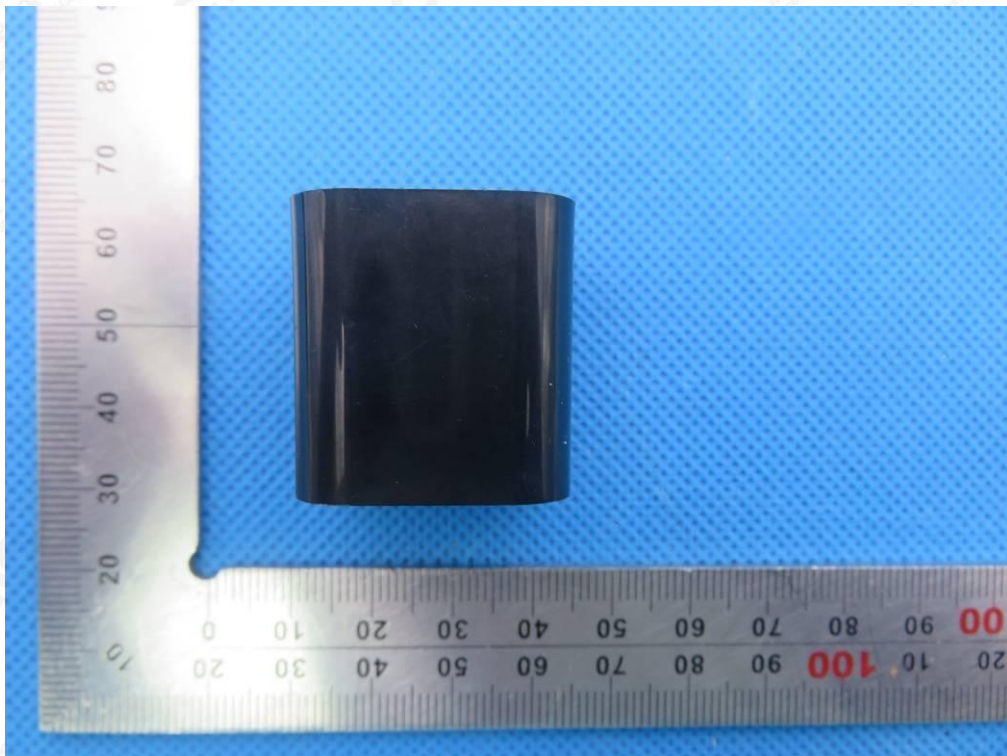




BACK VIEW OF EUT



LEFT VIEW OF EUT

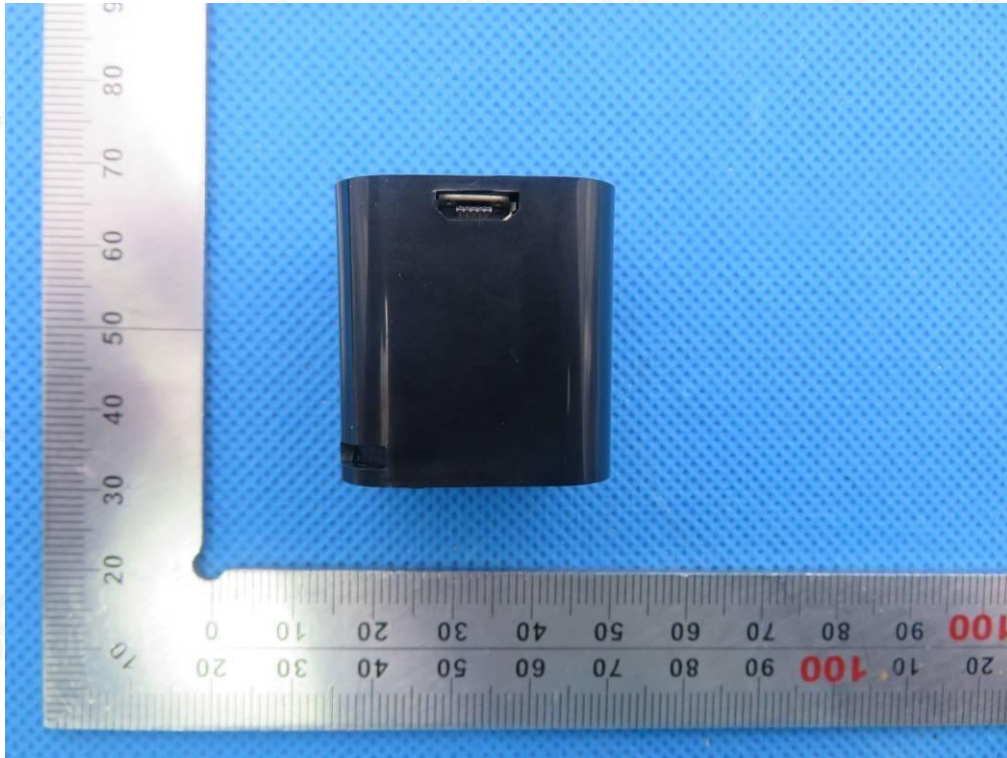


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RIGHT VIEW OF EUT



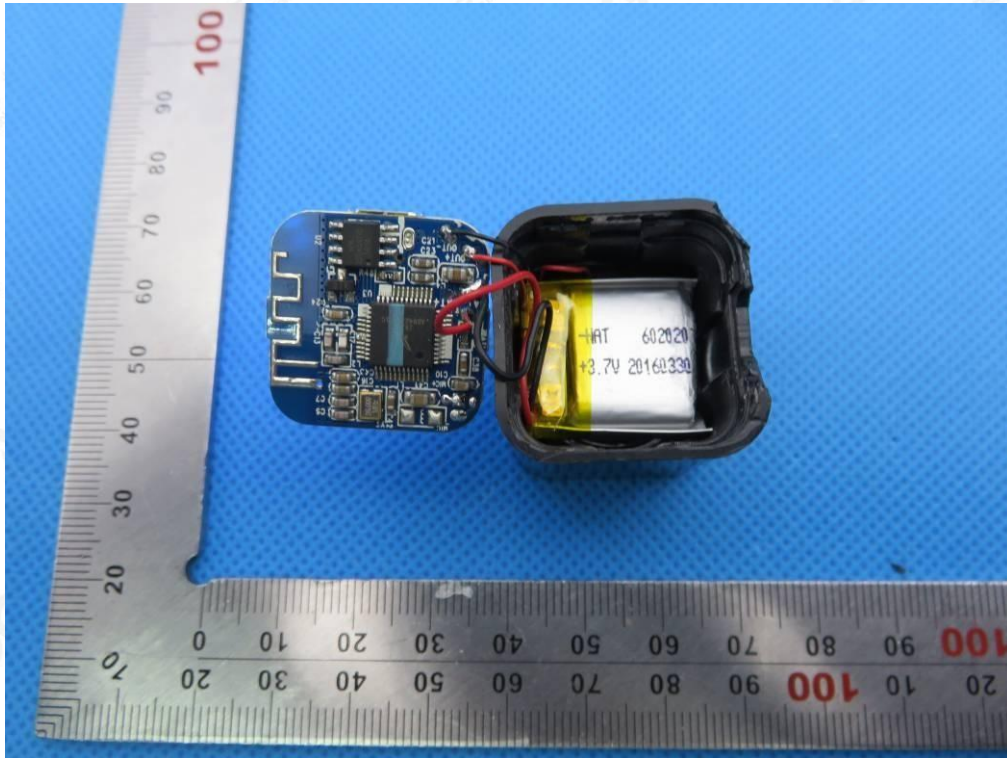
VIEW OF EUT (PORT)



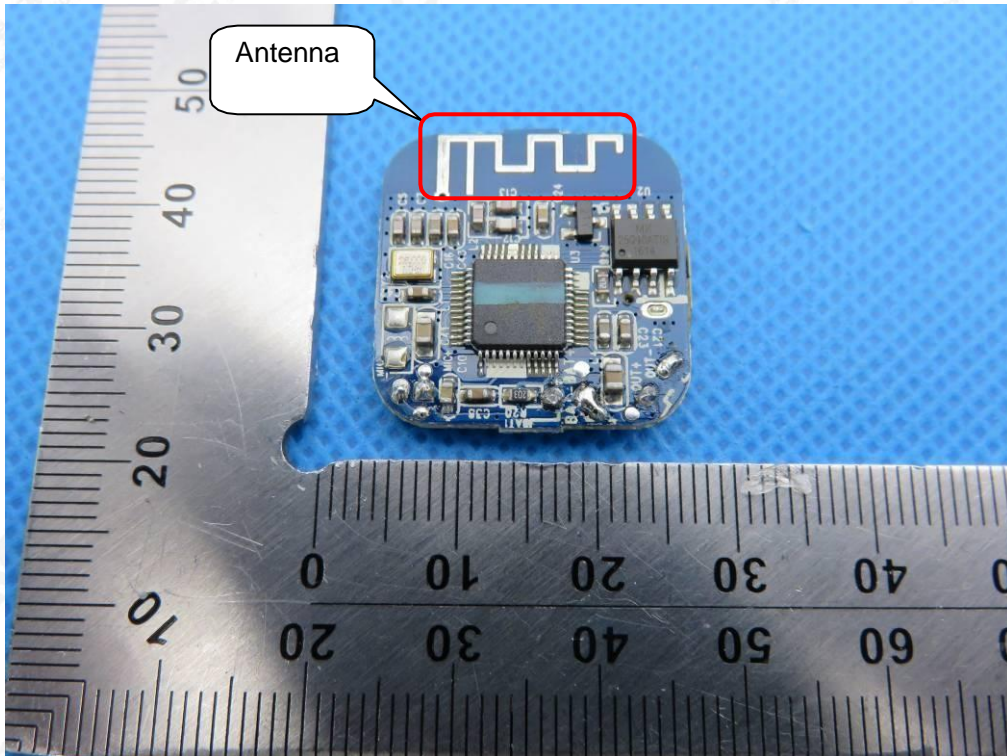
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by AGC, this document cannot be reproduced except in full with our prior written permission. The document is available on request and the brief information for its validation can be assessable and confirmed at <http://www.agc-cert.com>



OPEN VIEW OF EUT-1



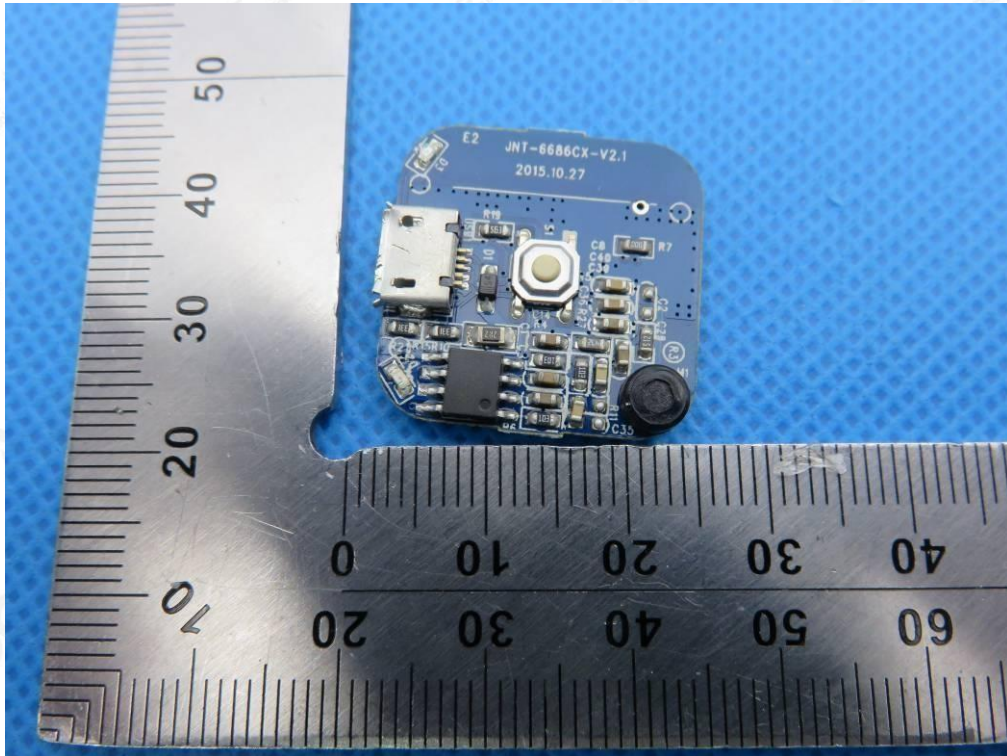
INTERNAL VIEW OF EUT-1



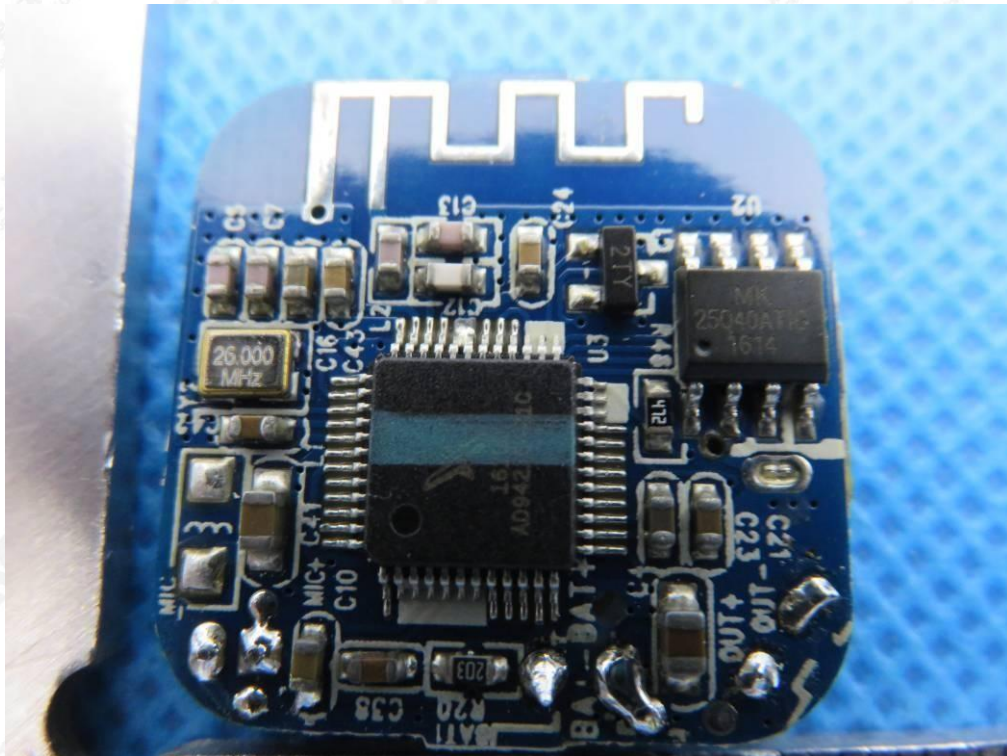
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by AGC, this document cannot be reproduced except in full with our prior written permission. The document is available on request and the brief information for its validation can be assessable and confirmed at <http://www.agc-cert.com>



INTERNAL VIEW OF EUT-2



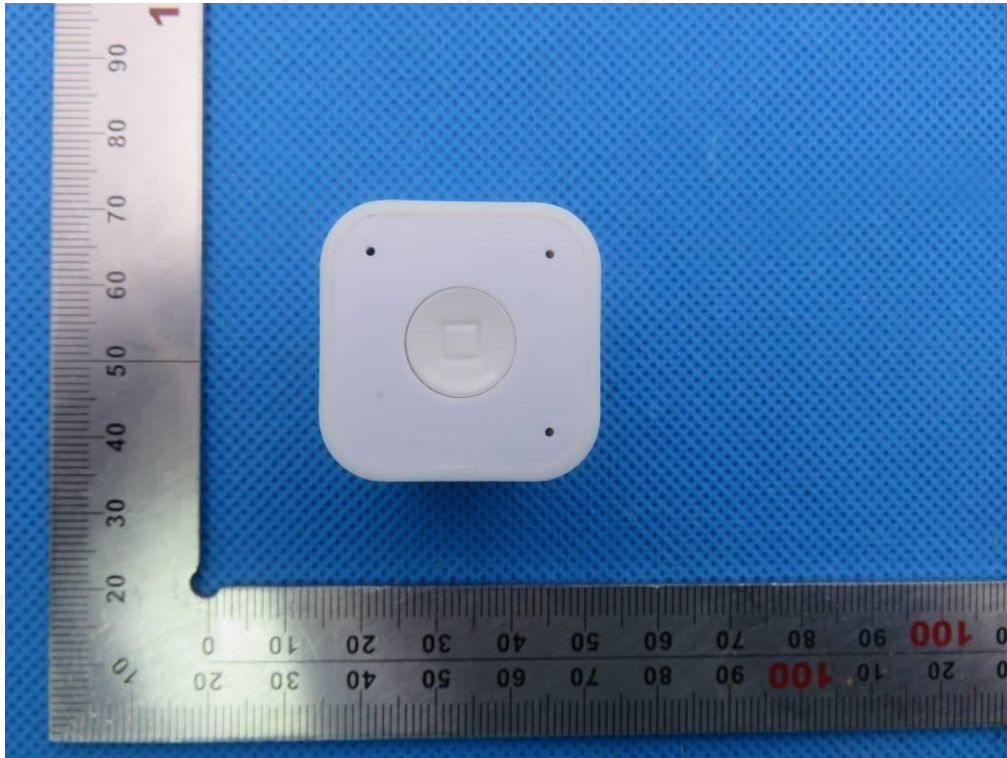
INTERNAL VIEW OF EUT-3



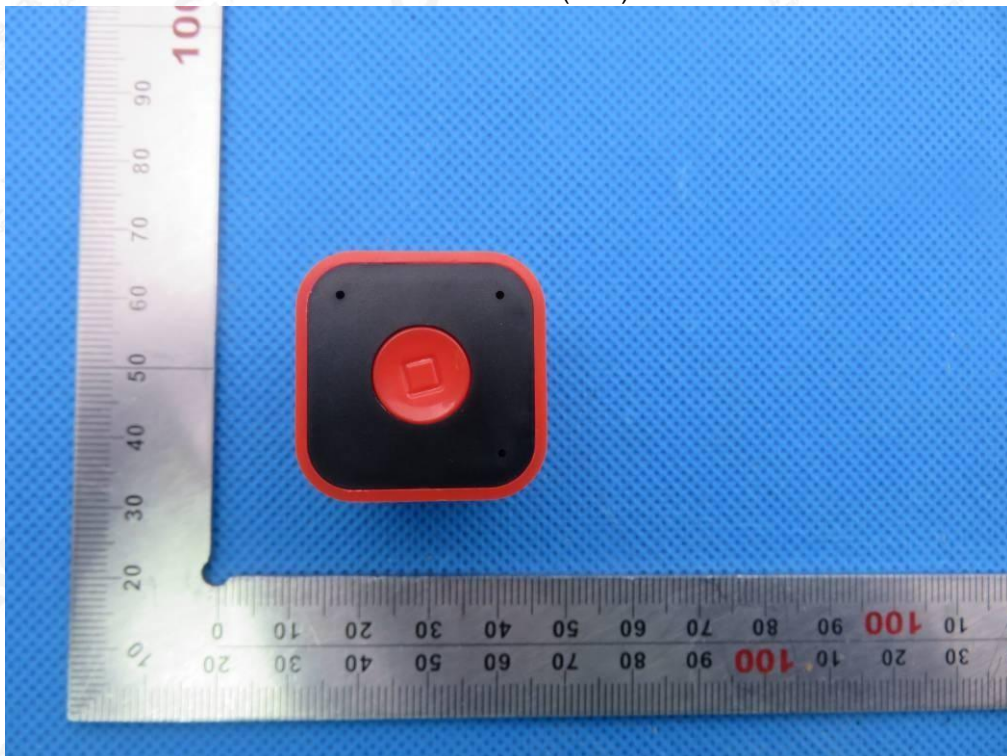
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Series Model (White)



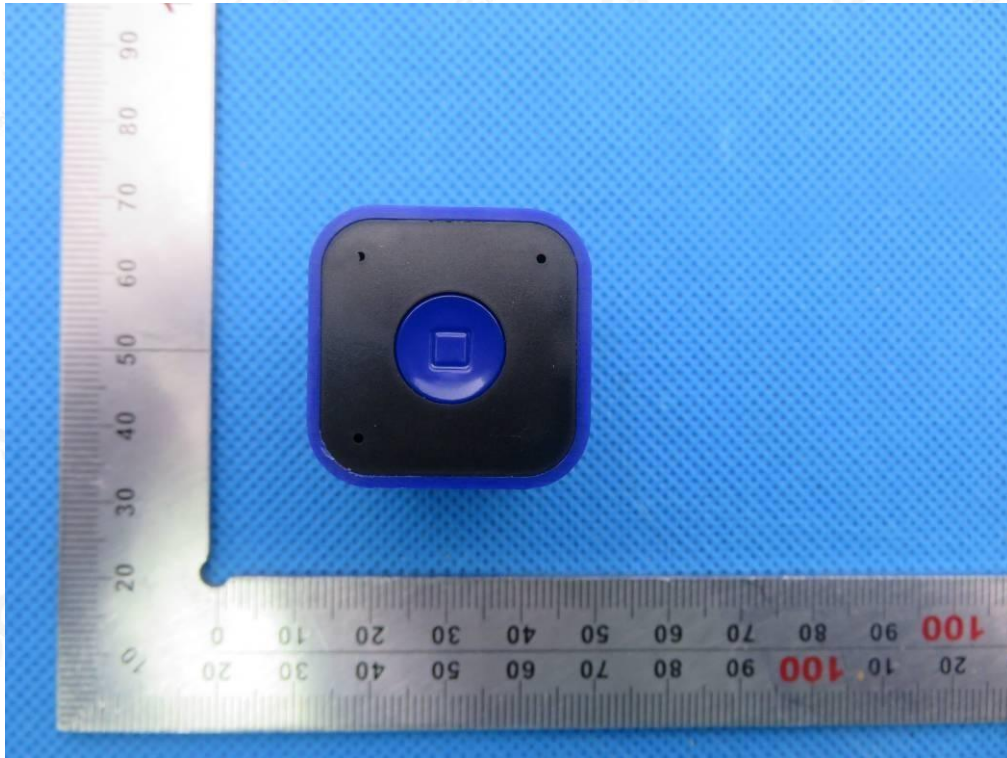
Series Model (Red)



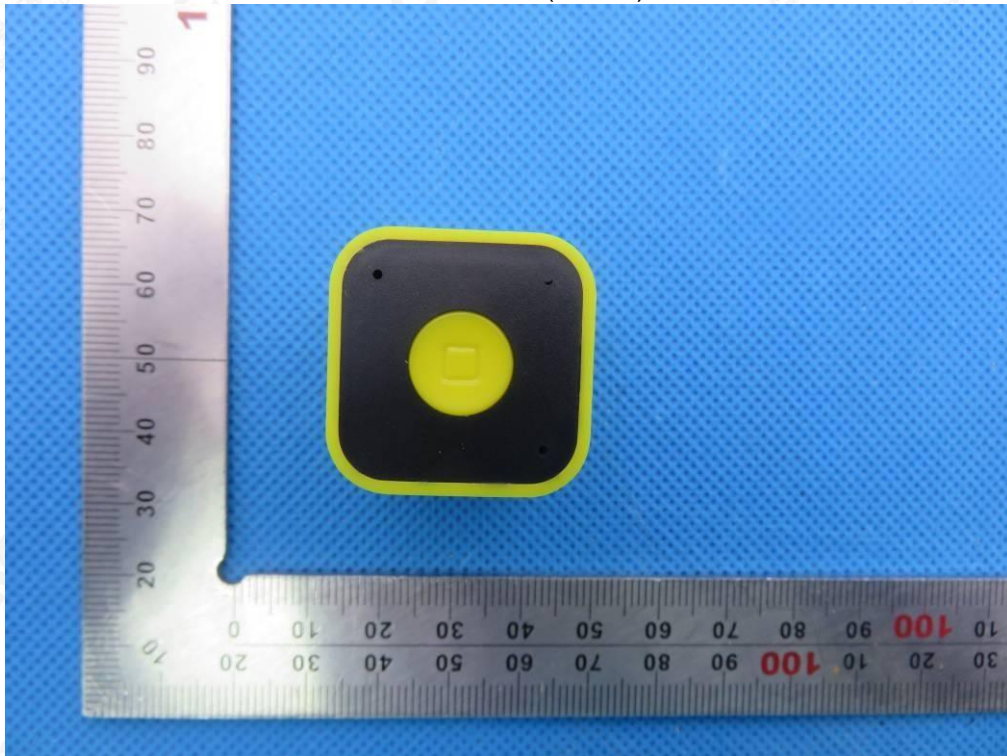
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Series Model (Blue)



Series Model (Yellow)



----END OF REPORT----

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