

# RF Test Report

Report No.: AGC00552181219EE11

**PRODUCT DESIGNATION** : Smart Phone  
**BRAND NAME** : CUBOT  
**MODEL NAME** : X19  
**APPLICANT** : Shenzhen Huafurui Technology Co., Ltd.  
**DATE OF ISSUE** : Jan. 07, 2019  
**STANDARD(S)** : EN 300 328 V2.1.1 (2016-11)  
**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	/	Jan. 07, 2019	Valid	Initial release

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## 1. TEST RESULT CERTIFICATION

<b>Applicant</b>	Shenzhen Huafurui Technology Co., Ltd.
<b>Address</b>	Unit 1401 &1402, 14/F, Jin qi zhi gu mansion (No. 4 building of Chong wen Garden), Crossing of the Liu xian street and Tang ling road, Tao yuan street, Nan shan district, Shenzhen,P.R. China
<b>Manufacturer</b>	Shenzhen Huafurui Technology Co., Ltd.
<b>Address</b>	Unit 1401 &1402, 14/F, Jin qi zhi gu mansion (No. 4 building of Chong wen Garden), Crossing of the Liu xian street and Tang ling road, Tao yuan street, Nan shan district, Shenzhen,P.R. China
<b>Factory Name</b>	Shenzhen Huafurui Technology Co., Ltd.
<b>Address</b>	Unit 1401 &1402, 14/F, Jin qi zhi gu mansion (No. 4 building of Chong wen Garden), Crossing of the Liu xian street and Tang ling road, Tao yuan street, Nan shan district, Shenzhen,P.R. China
<b>Product Designation</b>	Smart Phone
<b>Brand Name</b>	CUBOT
<b>Test Model</b>	X19
<b>Date of test</b>	Dec. 25, 2018 to Jan. 07, 2019
<b>Deviation</b>	None
<b>Condition of Test Sample</b>	Normal
<b>Report Template</b>	AGCRT-EC-BLE/RF

We (AGC), Attestation of Global Compliance (Shenzhen) Co., Ltd. for compliance with the requirements set forth in the European Standard ETSI EN 300 328 V2.1.1. 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.

The test results of this report relate only to the tested sample identified in this report.

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Tested By

*Donjon Huang*

Donjon Huang(Huang  
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Jan. 07, 2019

Reviewed By

*Bart Xie*

Bart Xie(Xie Xiaobin)

Jan. 07, 2019

Approved By

*Forrest Lei*

Forrest Lei(Lei Yonggang)  
Authorized Officer

Jan. 07, 2019

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## 2. TECHNICAL INFORMATION

### 2.1 EUT DESCRIPTION

Operating Frequency Range(s)	2402MHz~2480MHz
Modulation	GFSK
Bluetooth Version	V 5.0(BLE)
Adaptive / non-adaptive equipment	Adaptive Equipment
The number of Hopping Frequencies	40 Channels (37 adaptive automatic frequency hopping data channel, 3 advertising channel)
The maximum RF Output Power (e.i.r.p.)	-0.96dBm
Hardware Version	Q593_MB_V1.0
Software Version	CUBOT_X19_9021C_V01_20181211
Antenna designation	PIFA antenna
Antenna gain	1.0dBi
Nominal voltages	DC 3.8V by battery
Extreme Temperature	Low Temperature (TL) = -20°C Normal Temperature(TN) = 25 °C High Temperature (TH) = +55°C

#### Note:

1. The above information was declared by the applicant.
2. The equipment submitted are representative production models.
3. The EUT can not operated unmodulated.
4. The EUT provides Bluetooth wireless interface operating at 2.4G ISM band (2402MHZ-2480MHZ).
5. Only the Bluetooth was tested according the standard requirement.
6. The EUT is a multi-radio equipment and hand-portable station according to ETSI EN 300 328 V2.1.1.
7. Please refer to the photographs of the EUT. For more details, please refer to the User's manual of the EUT.

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## 2.2 OBJECTIVE

Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU for the FHSS function of the EUT.

## 2.3 TEST STANDARDS AND RESULTS

The EUT has been tested according to ETSI EN 300 328 V2.1.1 (2016-11).

ETSI EN 300 328 V2.1.1 (2016-11)	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques;
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## 2.4. TEST ITEMS AND THE RESULTS

No.	Basic Standard	Test Type	Result
1	ETSI EN 300 328 4.3.2.2	RF Output Power	Pass
2	ETSI EN 300 328 4.3.2.3	Power Spectral Density	Pass
3	ETSI EN 300 328 4.3.2.4	Duty Cycle, Tx-sequence, Tx-gap	N/A
4	ETSI EN 300 328 4.3.2.4	Medium Utilisation(MU) factor	N/A
5	ETSI EN 300 328 4.3.2.6	Adaptivity	N/A
6	ETSI EN 300 328 4.3.2.7	Occupied Channel Bandwidth	Pass
7	ETSI EN 300 328 4.3.2.8	Transmitter unwanted emissions in the out-of-band domain	Pass
8	ETSI EN 300 328 4.3.2.9	Transmitter unwanted emissions in the spurious domain	Pass
9	ETSI EN 300 328 4.3.2.10	Receiver spurious emissions	Pass
10	ETSI EN 300 328 4.3.2.11	Receiver Blocking	Pass

### Note:

1. N/A- Not Applicable.
2. The latest versions of basic standards are applied.

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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.
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

#### 3.2 LIST OF EQUIPMENTS USED

Description	Manufacturer	Model No.	Calibration Date	Calibration Due.
SIGNAL ANALYZER	Agilent	N9020A	Sep. 20, 2018	Sep. 19, 2019
SIGNAL GENERATOR	Agilent	N5182A	Sep. 20, 2018	Sep. 19, 2019
SIGNAL GENERATOR	Agilent	E8257D	Sep. 20, 2018	Sep. 19, 2019
USB Wideband Power Sensor	Agilent	U2021XA	Sep. 20, 2018	Sep. 19, 2019
USB Wideband Power Sensor	Agilent	U2021XA	Sep. 20, 2018	Sep. 19, 2019
USB Wideband Power Sensor	Agilent	U2021XA	Sep. 20, 2018	Sep. 19, 2019
USB Wideband Power Sensor	Agilent	U2021XA	Sep. 20, 2018	Sep. 19, 2019
USB Simultaneous Sampling Multifunction DAQ	Agilent	U2531A	Sep. 20, 2018	Sep. 19, 2019
2.4 GHz Filter	Micro-Tronics	BRM50702	Mar. 01, 2018	Feb. 28, 2019
VECTOR ANALYZER	Agilent	E4440A	Jun. 12, 2018	Jun. 11, 2019
Trilog-Broadband Antenna	SCHWARZBEK	VULB 9168	Mar. 01, 2018	Feb. 28, 2020
Trilog-Broadband Antenna	SCHWARZBEK	VULB 9168	Mar. 01, 2018	Feb. 28, 2020
Amplifier	EM	EM30180	Mar. 01, 2018	Feb. 28, 2019
ANTENNA	A.H.	SAS-521-4	Mar. 01, 2018	Feb. 28, 2020
ANTENNA	Schwarzbeck	9168	Mar. 01, 2018	Feb. 28, 2020
HORN ANTENNA	E.M.	EM-AH-10180	Mar. 01, 2018	Feb. 28, 2020
HORN ANTENNA	ETS	3117	Mar. 01, 2018	Feb. 28, 2020
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	Mar. 01, 2018	Feb. 28, 2020

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Horn Ant (18G-40GHz)	ETS	QWH_SL_18_40_K_SG	Mar. 01, 2018	Feb. 28, 2020
UNIVERSAL RADIO COMMUNICAION TESTER	R&S	CMW500	July 13, 2018	July 12, 2019
Adjustable attenuator	warison	WATT-6SR1211(1dB, 10dB)	June 12, 2018	June 11, 2019
Attenuator	Weinachel Corp	58-30-33(30dB)	June 12, 2018	June 11, 2019
Power divider	Mini-Circults	SF781901412	July 13, 2018	July 12, 2019
Directional Coupler	Werlatone	C5571-10	June 12, 2018	June 11, 2019

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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

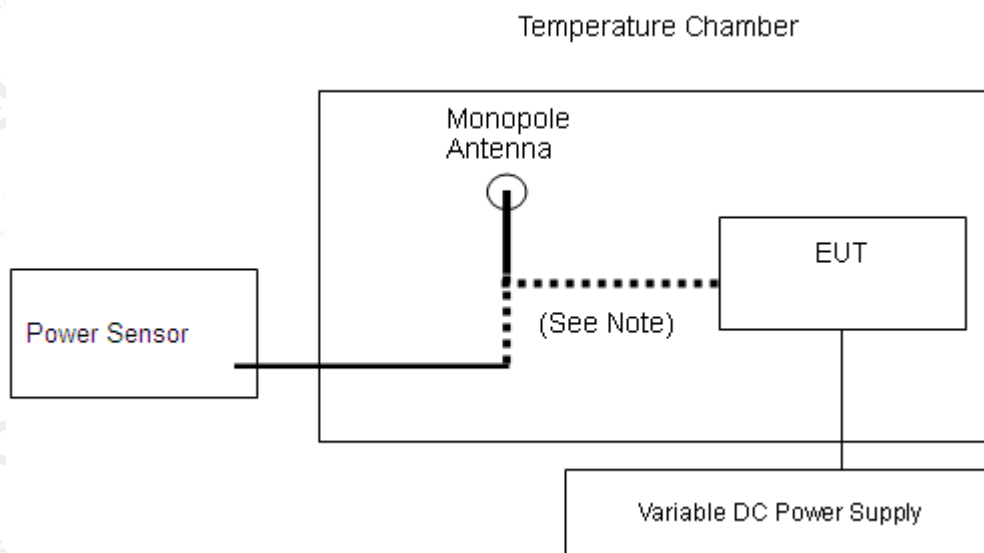
#### EN 300 328 Clause 4.3.2.2

For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.

The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. See clause 5.3.1 m). For non-adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be equal to or less than the value declared by the supplier.

This limit shall apply for any combination of power level and intended antenna assembly.

#### Test Configuration



#### **Remarks:**

EUT was direct connected to test equipment through coupling device.

#### TEST PROCEDURE

- 1) Use a fast power sensor and set the samples speed 1MS/s or faster.
- 2) Connect one power sensor to each transmit port, Trigger the power sensors so that they start sampling at the same time. For each instant in time, sum the power of the individual samples of all ports and store them. Use these stored samples in all following steps.
- 3) Find the start and stop times of each burst in the stored measurement samples.
- 4) Between the start and stop times of each individual burst calculate the RMS power over the burst. Save these Pburst values, as well as the start and stop times for each burst.
- 5) The highest of all Pburst values (Value "A" in dBm) will be used for maximum e.i.r.p calculations.
- 6) The cable loss and attenuator factor shall be considered to the value "A".
- 6) Add the (stated) antenna assembly gain "G" in dBi of the individual antenna. If applicable, add the additional beamforming gain "Y" in dB.

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7) The RF output power (P) shall be calculated using the formula:  $P=A+G+Y$

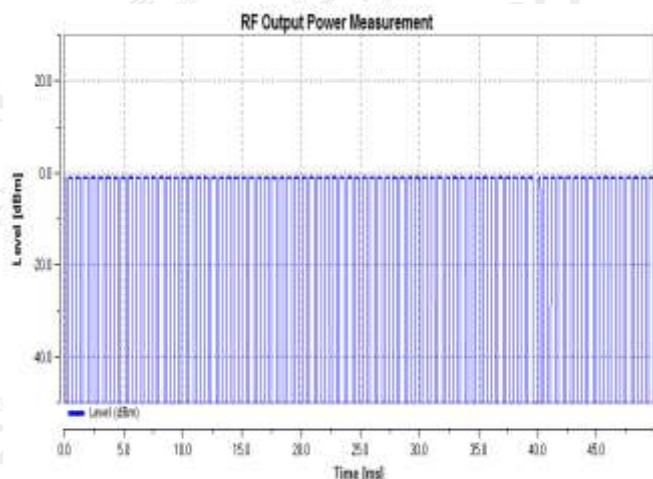
### TEST RESULTS

Operation Mode: TX Test Date: Jan. 05, 2019  
Temperature: 24.5°C Tested by: Donjon  
Humidity: 53.5% RH  
Number of Burst = 10  
Measurement Time = 45.53ms

TEST CONDITIONS	RF OUTPUT POWER (dBm)		
	Temp (25)°C	Temp (-20)°C	Temp (55)°C
CHANNEL	DC 3.8V	DC 3.8V	DC 3.8V
Low Channel TX	-0.96	-0.99	-1.03
Middle Channel TX	-1.07	-1.14	-1.17
High Channel TX	-1.95	-2.05	-2.12
Limit	20dBm		

### 1\*BLE:CH Low-2402: ( Temp - Normal )

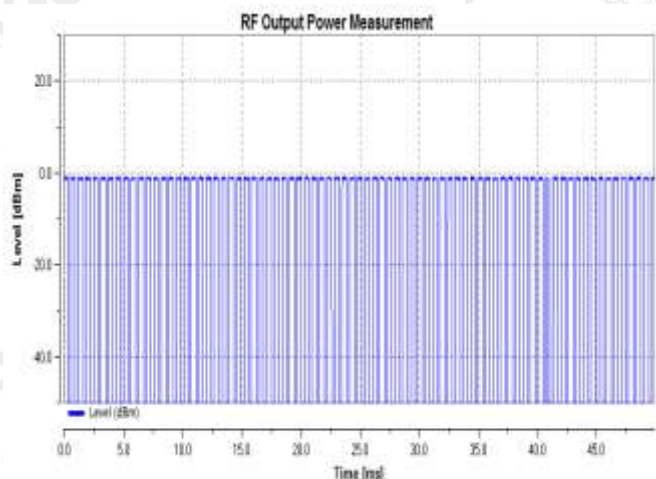
Channel	Voltage	Conducted Power (dBm)	EIRP (dBm)
CH Low-2402	Normal	-0.96	-0.96



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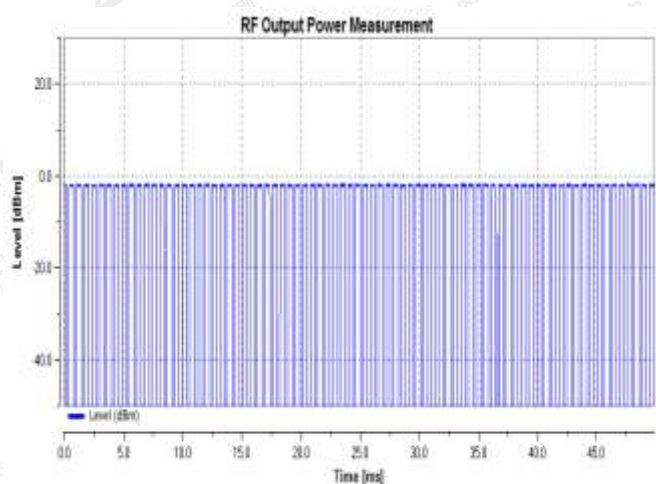
## 2\*BLE:CH Mid-2440: ( Temp - Normal )

Channel	Voltage	Conducted Power (dBm)	EIRP (dBm)
CH Mid-2440	Normal	-1.07	-1.07



## 3\*BLE:CH High-2480: ( Temp - Normal )

Channel	Voltage	Conducted Power (dBm)	EIRP (dBm)
CH High-2480	Normal	-1.95	-1.95



**Note:** Result=Reading+ Ant. Gain  
The reading value included cable loss.

**Conclusion: PASS**

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## 4.2. POWER SPECTRAL DENSITY

### EN 300 328 Clause 4.3.2.3

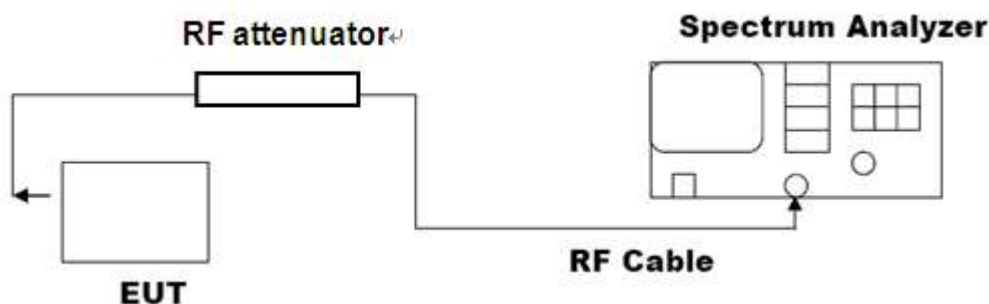
#### 4.2.1 LIMIT

For non-adaptive equipment using wide band modulations other than FHSS, The maximum Power spectral density is limited to 10mW Per MHz

#### 4.2.2 TEST PROCEDURE

- 1) Set the frequency from 2400MHz to 2483.5MHz, use 10kHz RBW and 30kHz VBW for pre-scan. The number of sweep points shall be more than 8350. Wait for the trace to be completed and save the (trace) data set to a file.
- 2) Add up the values for amplitude (power) for all the samples in the file.
- 3) Normalize the individual values for amplitude so that the sum is equal to the RF Output Power(e.i.r.p) measured in 5.1.
- 4) Starting from the first sample in the file (lowest frequency), add up the power of the following samples representing a 1MHz segment and record the results for power and position (i.e. sample #1 to #100). This is the Power Spectral Density (e.i.r.p) for the first 1MHz segment which shall be recorded.
- 5) Shift the start point of the samples added up in step 5 by 1 sample and repeat the procedure in step 4(i.e. sample #2 to #101).
- 6) Repeat step 5 until the end of the data set and record the radiated power spectral Density values for each of the 1MHz segments.
- 7) The cable loss and attenuator factor shall be considered to the test result.
- 8) The highest value shall be recorded in the test report.

#### 4.2.3 TEST CONFIGURATION



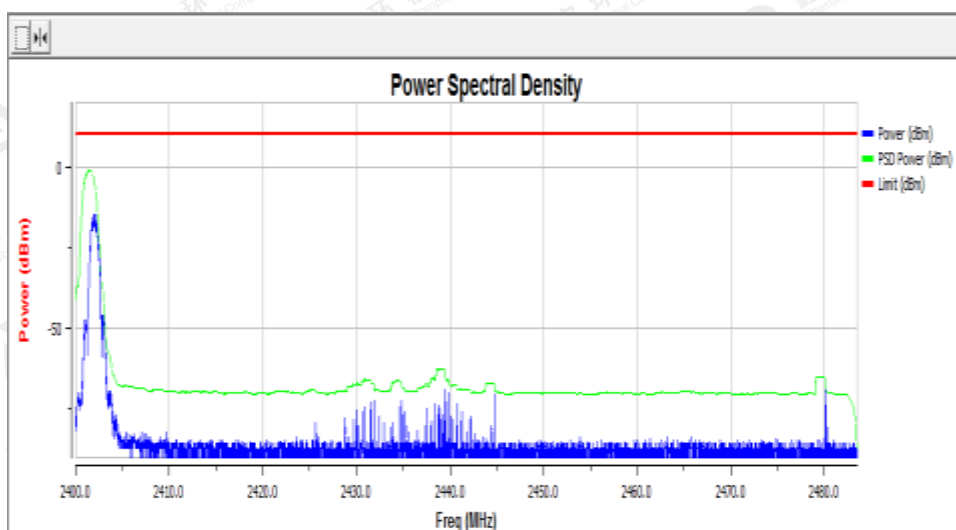
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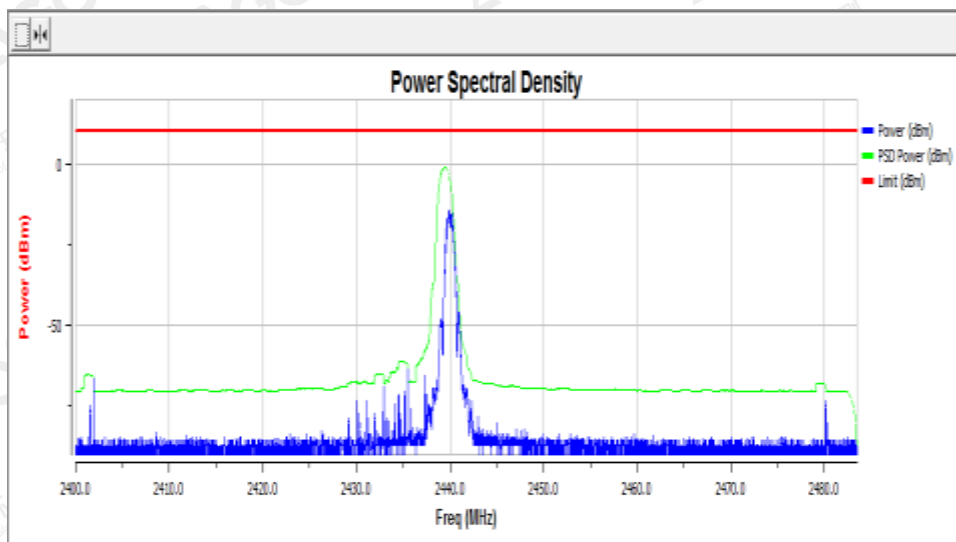
## TEST RESULTS

PEAK POWER DENSITY			
Channel Tested	Power Density (dBm/MHz)	Test Limit (dBm/MHz)	Pass / Fail
Low Channel TX	-1.03	10	Pass
Middle Channel TX	-1.13	10	Pass
High Channel TX	-2.01	10	Pass

Channel	Max Power Spectral Density Level (dBm)
CH Low-2402	-1.03

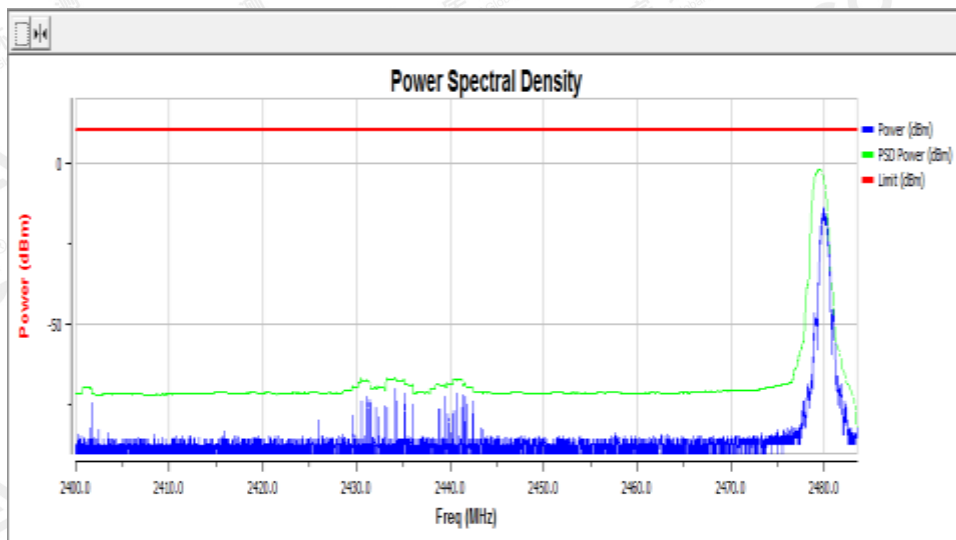


Channel	Max Power Spectral Density Level (dBm)
CH Mid-2440	-1.13



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Channel	Max Power Spectral Density Level (dBm)
CH High-2480	-2.01



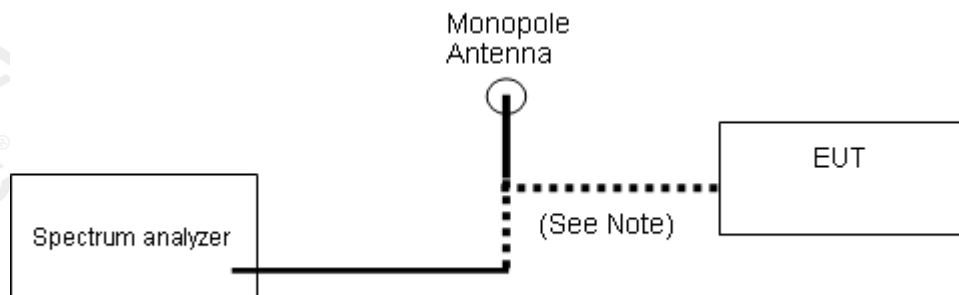
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### 4.3 OCCUPIED CHANNEL BANDWIDTH

#### EN300328 4.3.2.7 OCCUPIED CHANNEL BANDWIDTH

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

#### CONFIGURATION



#### TEST PROCEDURE

1) The spectrum analyser shall be used the following settings:

Centre Frequency: The centre frequency of the channel under test

Resolution BW: ~1% of the span without going below 1%

Video BW:  $3 \times \text{RBW}$

Span:  $2 \times \text{OBW}$

Detector: RMS

Trace mode: Max Hold

2) Wait until the trace is completed, find the peak value of the trace and place the analyser marker on this peak.

3) Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

#### TEST RESULT

TEST ITEM	OCCUPIED CHANNEL BANDWIDTH
TEST MODE	GFSK MODULATION

MEASUREMENT RESULT		
Test Data (MHz)		Criteria
Low Channel	1.052	PASS
High Channel	1.048	PASS

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#### 4.4 TRANSMITTER UNWANTED EMISSIONS IN THE OUT OF BAND DOMAIN

ETSI EN300328 SUBCLAUSE 4.3.2.8

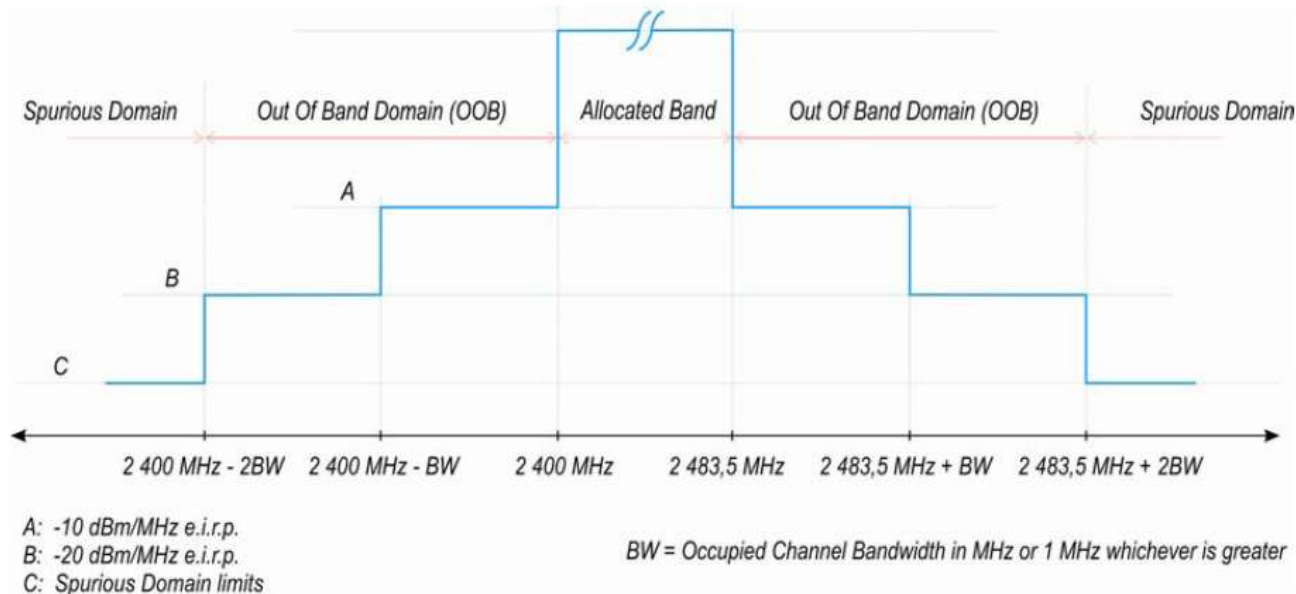
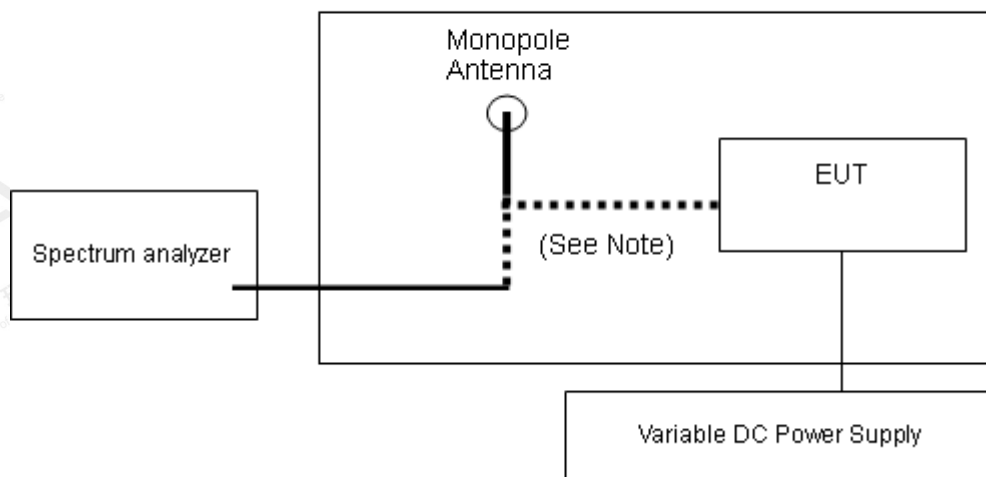


Figure 1: Transmit mask

#### TEST CONFIGURATION

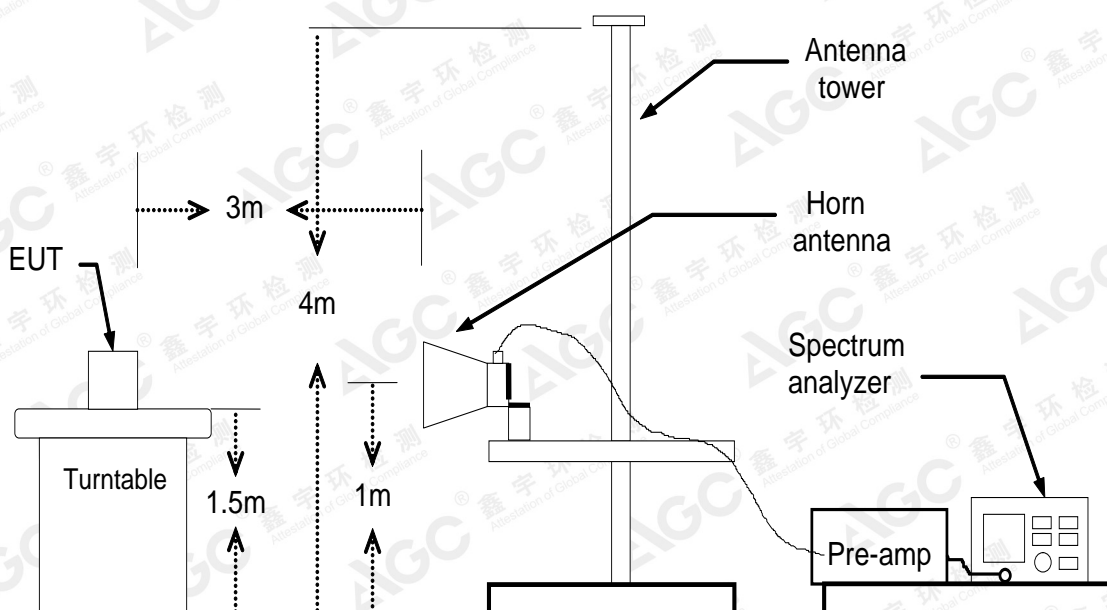
Temperature Chamber



For have temporary antenna connector product

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For have no temporary antenna product

## TEST PROCEDURE

- 1) The spectrum analyser shall be used the following settings:

Centre Frequency: 2484MHz

Resolution BW: 1MHz; Video BW: 3MHz; Span: 0Hz; Detector: RMS

Trace mode: Max Hold; Sweep Points: 5000

- 2) (segment 2 483.5 MHz to 2 483.5 MHz + BW)

Adjust the trigger level to select the transmissions with the highest power level.

Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483.5 MHz to 2 483.5 MHz + BW.

- 3) Segment 2 483.5 MHz + BW to 2 483.5 MHz + 2BW

Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483.5 MHz + BW to 2 483.5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW – 0.5 MHz.

- 4) Segment 2 400 MHz - BW to 2 400 MHz

Change the centre frequency of the analyser to 2 399.5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0.5 MHz.

- 5) Segment 2 400 MHz - 2BW to 2 400 MHz - BW

Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0.5 MHz.

- 6) The cable loss and attenuator factor shall be considered to the test result.

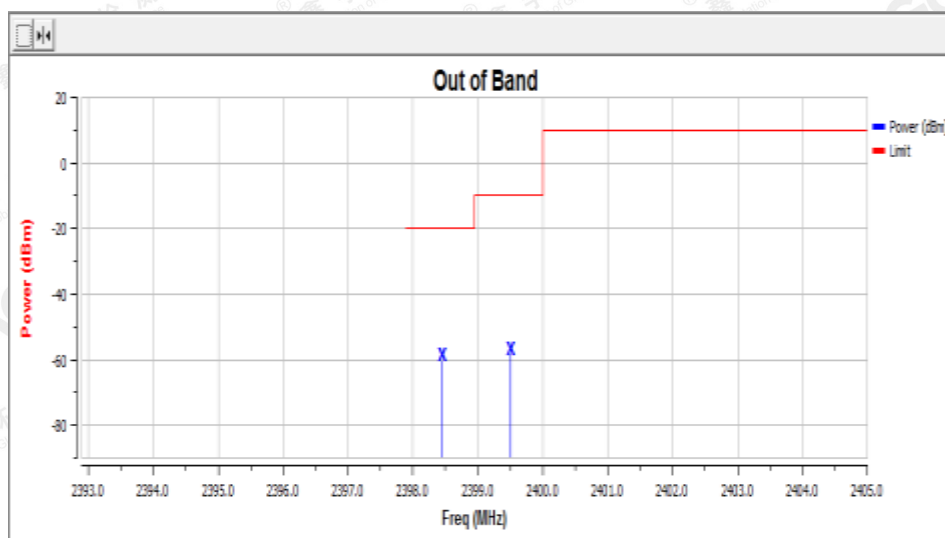
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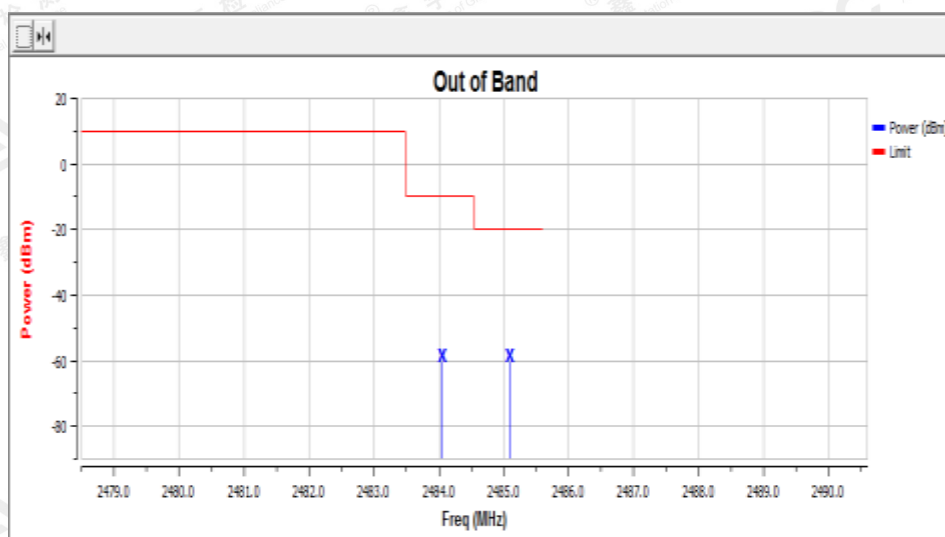
## TEST RESULT

### NORMAL TEMPERATURE

Channel	Antenna	Frequency	Level	Limit
CH Low-2402	Antenna 1	2399.5	-58.42	-10
CH Low-2402	Antenna 1	2398.448	-60.57	-20



Channel	Antenna	Frequency	Level	Limit
CH High-2480	Antenna 1	2484.048	-60.48	-10
CH High-2480	Antenna 1	2485.096	-60.53	-20



**Note:** The modulation used during test is GFSK at high channel and this is the worst case.  
**Conclusion: PASS**

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#### 4.5 TRANSMITTER SPURIOUS EMISSIONS

Spurious emissions are emissions outside the frequency range(s) of the equipment as defined in Clause 4.3.2.9.

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

#### TEST PROCEDURE

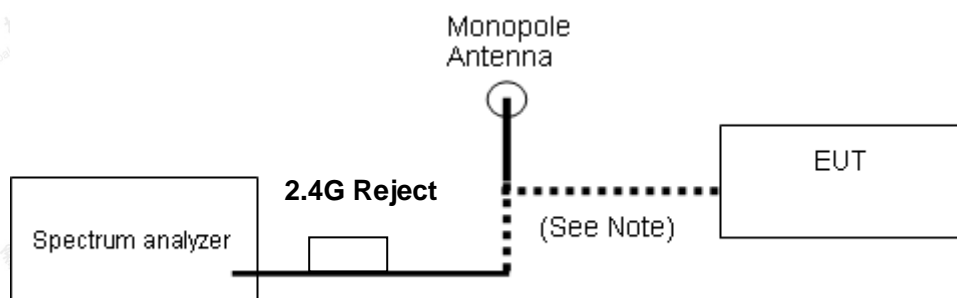
Refer to chapter 5.4.9.2 of ETSI EN 300 328 V2.1.1

#### Measurement

Measurement	
<input checked="" type="checkbox"/> Conducted measurement	<input checked="" type="checkbox"/> Radiated measurement

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## TEST CONFIGURATION

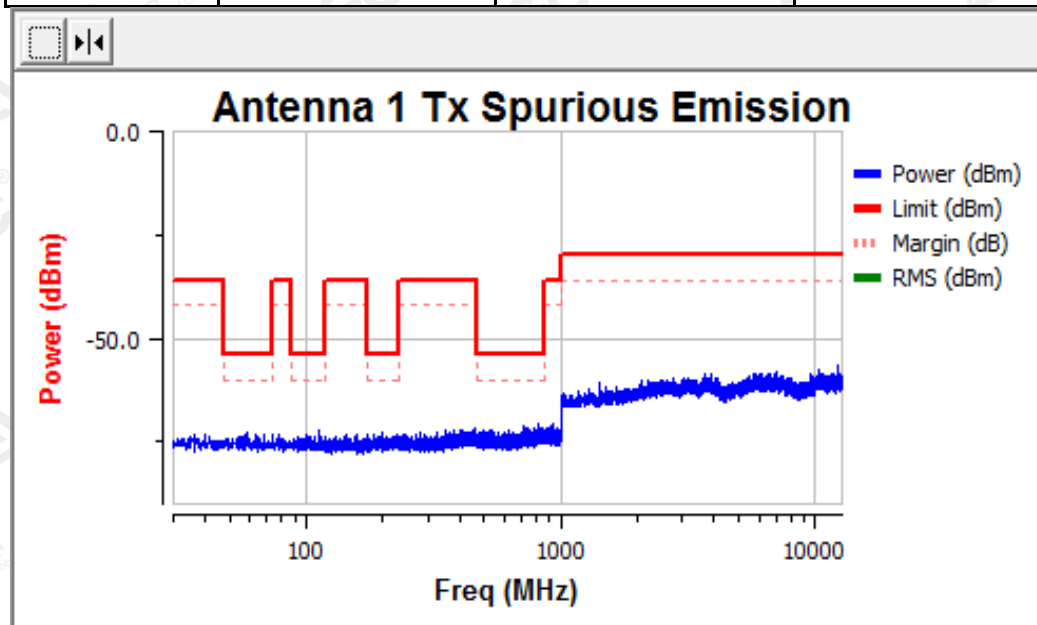


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**CONDUCTED RESULTS: (Low channel)**

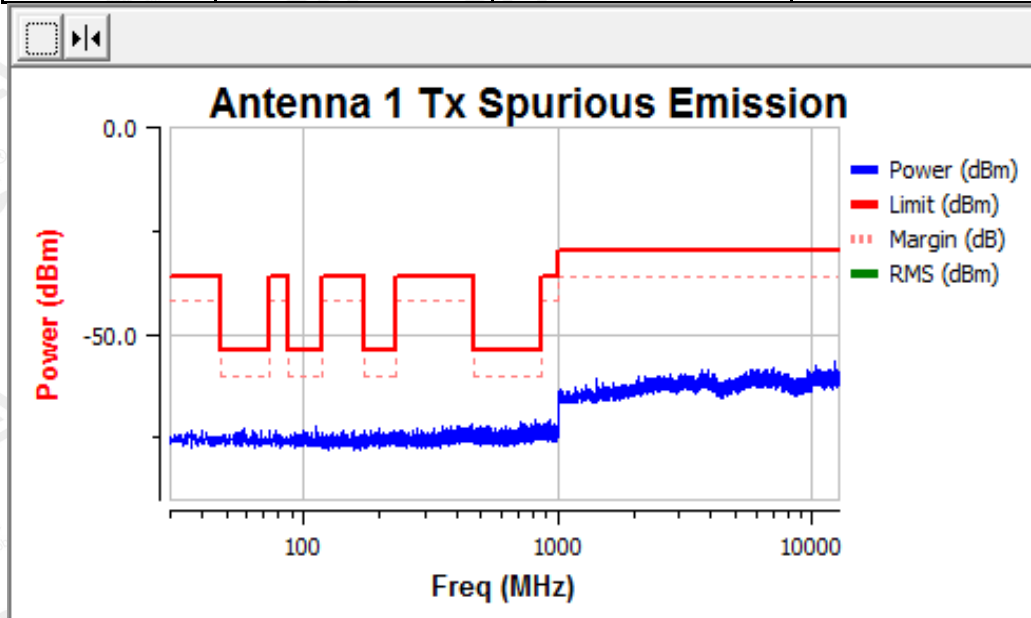
Freq	RMS Level (dBm)	Limit (dBm)	Over Limit (dB)	Status
714.935	-70.88	-54.00	-16.88	Pass
12159.000	-57.76	-30.00	-27.76	Pass



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(High channel)

Freq	RMS Level (dBm)	Limit (dBm)	Over Limit (dB)	Status
793.741	-70.86	-54.00	-16.86	Pass
12372.000	-57.41	-30.00	-27.41	Pass



- Note: 1. All the modes had been test but only the worst data record in the report.  
2. The 2.4G fundamental frequency is filtered out.  
3. The effective radiated power has been considered in this test.

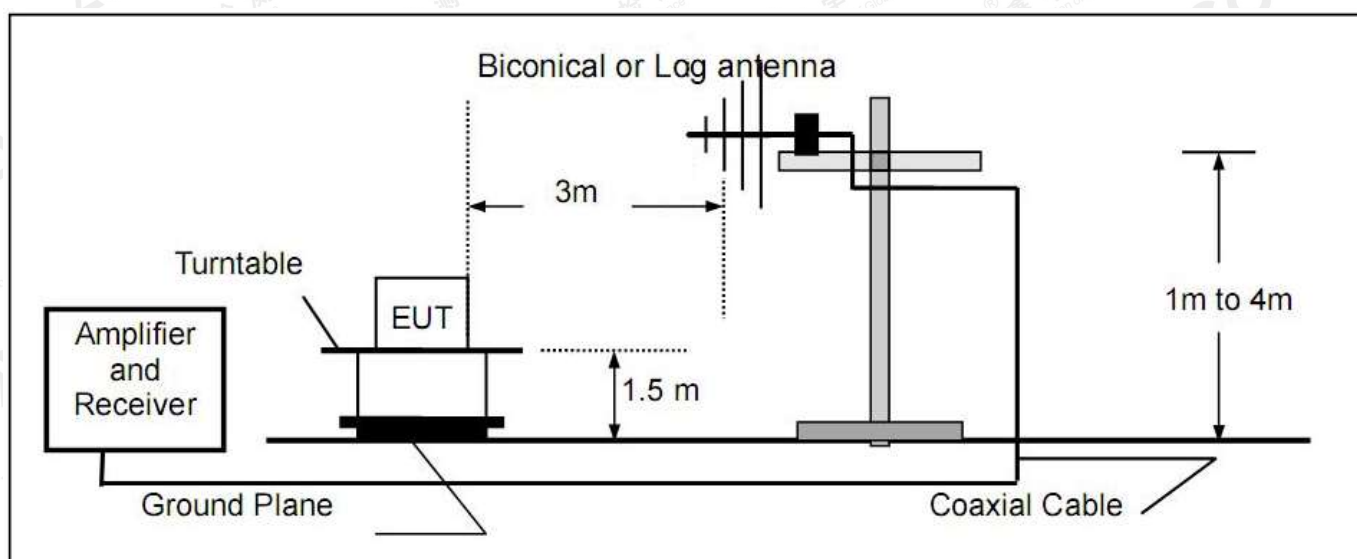
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## RADIATED MEASUREMENT

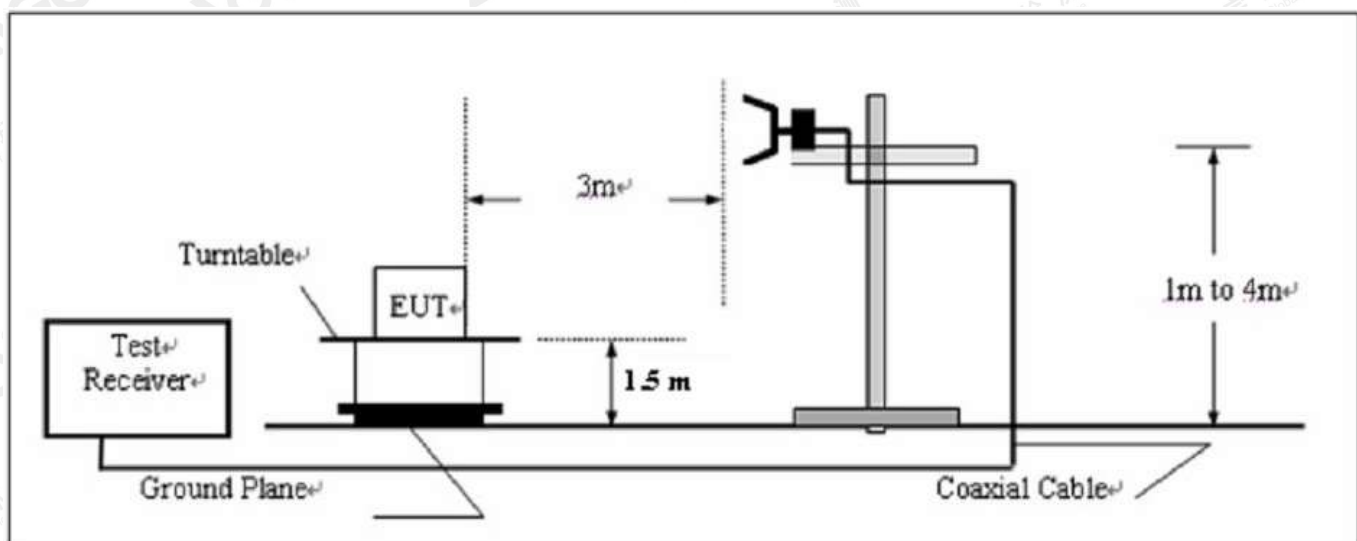
### TEST SETUP

1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. The measurements were performed when normal hopping was disabled. In this case measurements were performed when operating at the lowest and the highest hopping frequency.
3. The equipment was configured to operate under its worst case situation with respect to output power.
4. The test setup has been constructed as the normal use condition. Controlling software (Button Function) has been activated to set the EUT on specific status.

#### Below 1GHz



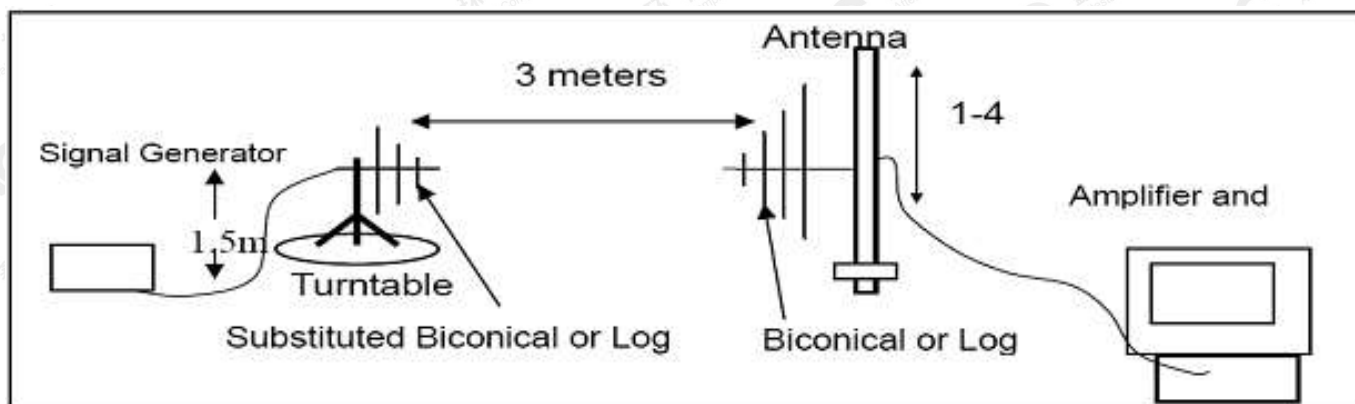
#### Above 1GHz



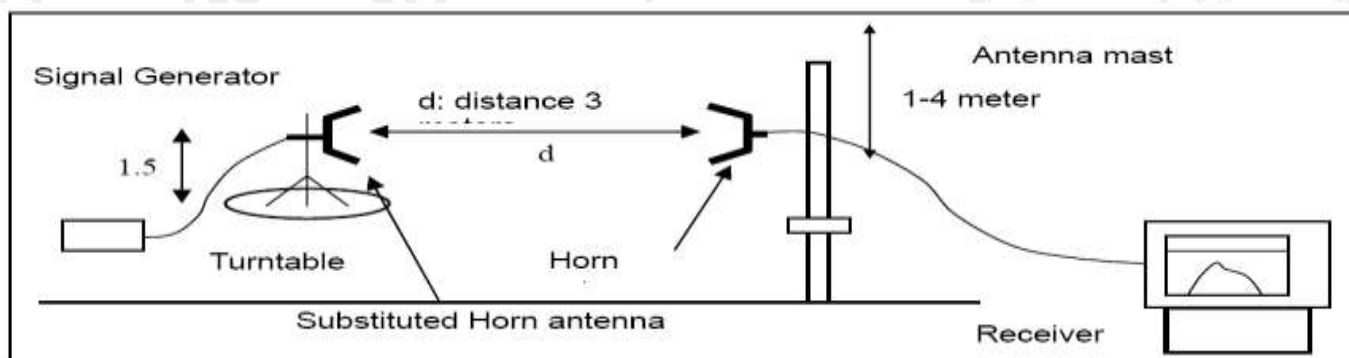
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**SUBSTITUTION METHOD: (RADIATED EMISSIONS)**  
**RADIATED BELOW 1GHZ**



**RADIATED ABOVE 1 GHZ**



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**TEST RESULTS for Radiated Method**
**Transmitter Operating Mode (Worst case: 1Mbps)**

SPURIOUS EMISSION FREQUENCY RANGE		30MHz ~ 1GHz		OPERATING CHANNEL	Low
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)	
44.77	H	-63.63	-36	-27.63	
56.87	H	-69.09	-54	-15.09	
168.35	H	-63.23	-36	-27.23	
273.13	H	-70	-36	-34	
563.42	H	-73.11	-54	-19.11	
930.51	H	-65.24	-36	-29.24	
62.14	V	-68.3	-54	-14.3	
189.81	V	-69.12	-54	-15.12	
166.28	V	-65.59	-36	-29.59	
207.04	V	-67.92	-54	-13.92	
321.33	V	-73.85	-36	-37.85	
946.28	V	-65.58	-36	-29.58	
30MHz ~ 1GHz	H	--	-36	>10	
30MHz ~ 1GHz	V	--	-36	>10	
30MHz ~ 1GHz	H	--	-54	>10	
30MHz ~ 1GHz	V	--	-54	>10	

**NOTE:** 1.The emission behavior belongs to narrowband spurious emission.

2. 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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SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING CHANNEL		High
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
42.79	H	-64.28	-36	-28.28
56.05	H	-70.13	-54	-16.13
159.65	H	-64.32	-36	-28.32
289.5	H	-70.76	-36	-34.76
573.5	H	-72.96	-54	-18.96
993.41	H	-66.03	-36	-30.03
52.26	V	-68.91	-54	-14.91
204.37	V	-68.79	-54	-14.79
150.75	V	-64.41	-36	-28.41
218.63	V	-67.35	-54	-13.35
231.93	V	-73.94	-36	-37.94
923.76	V	-63.04	-36	-27.04
30MHz ~ 1GHz	H	--	-36	>10
30MHz ~ 1GHz	V	--	-36	>10
30MHz ~ 1GHz	H	--	-54	>10
30MHz ~ 1GHz	V	--	-54	>10

**NOTE:** 1. The emission behavior belongs to narrowband spurious emission.

2. 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.

**Standby Mode:**

NO.	Frequency	Measurement Bandwidth	Level	Limit	Margin
	MHz	KHz	dBm	dBm	dB
<b>Standby Mode ,Antenna Polarization: Vertical</b>					
1	30-1000	100	\	-54	>20
2	30-1000	100	\	-36	>20
<b>Standby Mode ,Antenna Polarization: Horizontal</b>					
1	30-1000	100	\	-54	>20
2	30-1000	100	\	-36	>20

**Conclusion: PASS**

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Above 1GHz (1GHz-12.75GHz)

NO.	Frequency	Measurement Bandwidth	Level	Limit	Margin
	MHz	KHz	dBm	dBm	dB
<b>TX:2402MHz ,Antenna Polarization: Vertical</b>					
1	4804	1000	-48.02	-30	>10
2	7206	1000	-49.75	-30	>10
3	9608	1000	\	-30	>40
4	12010	1000	\	-30	>40
5	Other(1000-12750)	1000	\	-30	>40
<b>TX:2402MHz ,Antenna Polarization: Horizontal</b>					
1	4804	1000	-57.59	-30	>10
2	7206	1000	-46.32	-30	>10
3	9608	1000	\	-30	>40
4	12010	1000	\	-30	>40
5	Other(1000-12750)	1000	\	-30	>40
<b>TX:2440MHz ,Antenna Polarization: Vertical</b>					
1	4882	1000	-56.12	-30	>10
2	7323	1000	-54.63	-30	>10
3	9764	1000	\	-30	>40
4	12205	1000	\	-30	>40
5	Other(1000-12750)	1000	\	-30	>40
<b>TX:2440MHz ,Antenna Polarization: Horizontal</b>					
1	4882	1000	-50.23	-30	>10
2	7323	1000	-55.19	-30	>10
3	9764	1000	\	-30	>40
4	12205	1000	\	-30	>40
5	Other(1000-12750)	1000	\	-30	>40
<b>TX:2480MHz ,Antenna Polarization: Vertical</b>					
1	4960	1000	-52.63	-30	>10
2	7440	1000	-50.67	-30	>10
3	9920	1000	\	-30	>40

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4	12400	1000	\	-30	>40
5	Other(1000-12750)	1000	\	-30	>40
<b>TX:2480MHz ,Antenna Polarization: Horizontal</b>					
1	4960	1000	-57.68	-30	>10
2	7440	1000	-59.59	-30	>10
3	9920	1000	\	-30	>40
4	12400	1000	\	-30	>40
5	Other(1000-12750)	1000	\	-30	>40
Measurement uncertainty:±3.2dB					

**Standby Mode:**

NO.	Frequency	Measurement Bandwidth	Level	Limit	Margin
	MHz	KHz	dBm	dBm	dB
<b>Standby Mode ,Antenna Polarization: Vertical</b>					
1	1000-12750	1000	\	-30	>20
<b>Standby Mode ,Antenna Polarization: Horizontal</b>					
1	1000-12750	1000	\	-30	>20

**Conclusion: PASS**

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#### 4.6 RECEIVER SPURIOUS EMISSIONS

ETSI EN300328 SUBCLAUSE 4.3.2.10

Receiver spurious emissions are emissions at any frequency when the equipment is in receive mode. The spurious emissions of the receiver shall not exceed the values given in table 5.

**Table 5: Spurious emission limits for receivers**

Frequency range	Maximum power, e.r.p.	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12,75 GHz	-47 dBm	1 MHz

#### Test Configuration

Same as section 4.5 in this test report

#### TEST PROCEDURE

Refer to chapter 5.4.10.2 of ETSI EN 300 328 V2.1.1

#### Measurement

Measurement	
<input checked="" type="checkbox"/> Conducted measurement	<input checked="" type="checkbox"/> Radiated measurement

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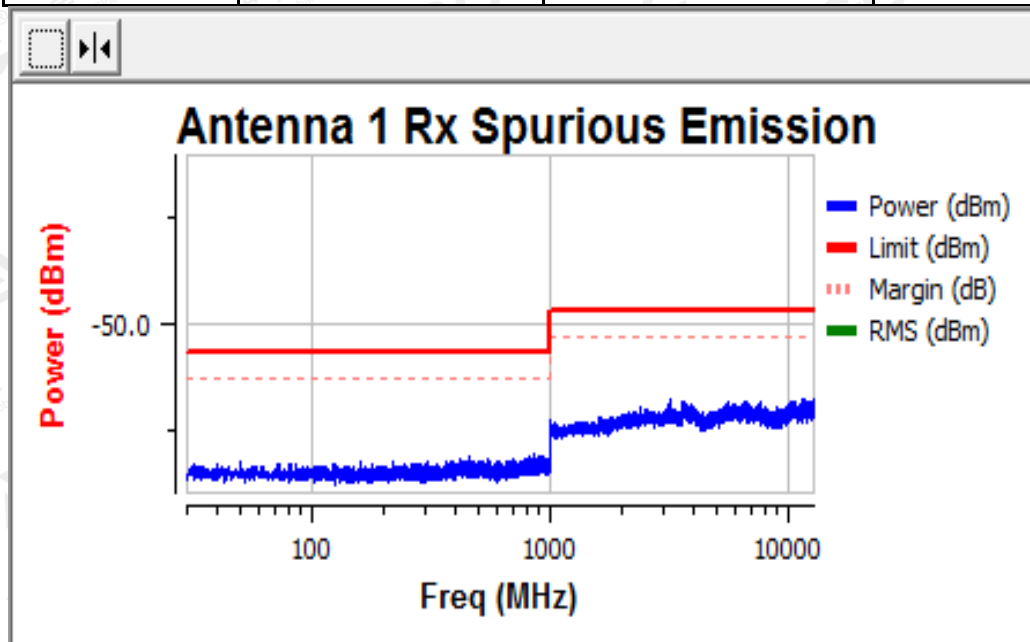


## CONDUCTED MEASUREMENT

### TEST RESULTS FOR CONDUCTED METHOD

RECEIVER MODE: (Low channel)

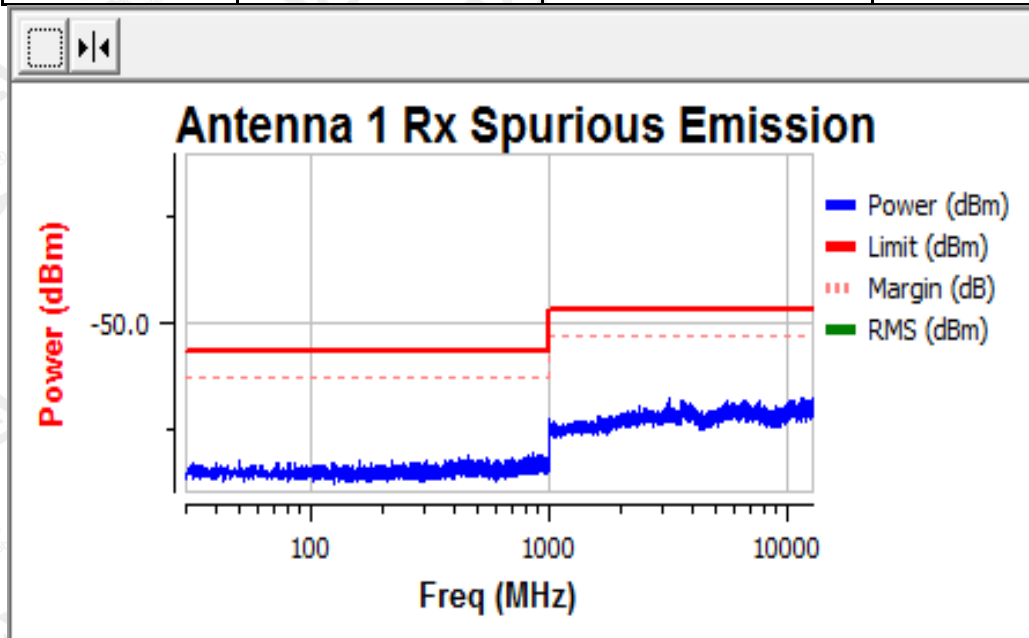
Freq	RMS Level (dBm)	Limit (dBm)	Over Limit (dB)	Status
825.945	-80.55	-57.00	-23.55	Pass
11591.000	-67.54	-47.00	-20.54	Pass



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(High channel)

Freq	RMS Level (dBm)	Limit (dBm)	Over Limit (dB)	Status
861.943	-80.29	-57.00	-23.29	Pass
12247.000	-66.56	-47.00	-19.56	Pass



Note: 1. All the modes had been test but only the worst data record in the report..  
2. The effective radiated power has been considered in this test.

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## RADIATED MEASUREMENT

### TEST SETUP

- 1 For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
- 2 Testing was performed when the equipment was in a receive-only mode.
- 3 The measurements were performed when normal hopping was disabled. In this case measurements were performed when operating at the lowest and the highest hopping frequency.
- 4 The test setup has been constructed as the normal use condition. Controlling software (Button Function) has been activated to set the EUT on specific status.

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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)
75.67	30.11	V	-71	0.23	0.33	-70.9	-57	-13.9
181.38	30.79	V	-71.14	0.44	0.5	-71.08	-57	-14.08
426.58	30.74	V	-70.97	0.47	0.48	-70.96	-57	-13.96
736.99	31.81	V	-71.18	0.74	0.82	-71.1	-57	-14.1
515.48	30.48	V	-70.03	0.51	0.49	-70.05	-57	-13.05
570.1	31.28	V	-71.06	0.48	0.44	-71.1	-57	-14.1
76.16	30.68	H	-70.37	0.25	0.09	-70.53	-57	-13.53
184.38	30.74	H	-70.49	0.45	0.44	-70.5	-57	-13.5
736.28	31.01	H	-70.57	0.62	0.53	-70.66	-57	-13.66
426.39	29.88	H	-70.9	0.52	0.88	-70.54	-57	-13.54
512.47	31.61	H	-70.59	0.5	0.5	-70.59	-57	-13.59
572.24	31.32	H	-71.1	0.52	0.73	-70.89	-57	-13.89
30MHz ~ 1GHz	--	V	--	--	--	--	-57	>10
30MHz ~ 1GHz	--	H	--	--	--	--	-57	>10

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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**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)
75.96	30.11	V	-71	0.52	0.33	-71.19	-57	-14.19
181.67	30.79	V	-71.14	0.73	0.5	-71.37	-57	-14.37
426.87	30.74	V	-70.97	0.76	0.48	-71.25	-57	-14.25
737.28	31.81	V	-71.18	1.03	0.82	-71.39	-57	-14.39
515.77	30.48	V	-70.03	0.8	0.49	-70.34	-57	-13.34
570.39	31.28	V	-71.06	0.77	0.44	-71.39	-57	-14.39
76.45	30.68	H	-70.37	0.54	0.09	-70.82	-57	-13.82
184.67	30.74	H	-70.49	0.74	0.44	-70.79	-57	-13.79
736.57	31.01	H	-70.57	0.91	0.53	-70.95	-57	-13.95
426.68	29.88	H	-70.9	0.81	0.88	-70.83	-57	-13.83
512.76	31.61	H	-70.59	0.79	0.5	-70.88	-57	-13.88
572.53	31.32	H	-71.1	0.81	0.73	-71.18	-57	-14.18
30MHz ~ 1GHz	--	V	--	--	--	--	-57	>10
30MHz ~ 1GHz	--	H	--	--	--	--	-57	>10

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)
1954.68	39.77	V	-62.69	2.25	0.52	-64.42	-47	-17.42
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
2443.7	39.04	H	-62.62	2.45	0.71	-64.36	-47	-17.36
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
1GHz-12.75 GHz	--	V	--	--	--	--	-47	>10
1GHz-12.75 GHz	--	H	--	--	--	--	-47	>10

Note: 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.

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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)
1954.73	39.77	V	-62.69	2.25	2.54	-62.4	-47	-15.4
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
2443.75	39.04	H	-62.62	2.45	2.74	-62.33	-47	-15.33
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
1GHz-12.75 GHz	--	V	--	--	--	--	-47	>10
1GHz-12.75 GHz	--	H	--	--	--	--	-47	>10

Note: 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.

**Remarks:**

1. The emission behaviour belongs to narrowband spurious emission.
2. 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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#### 4.7 RECEIVER BLOCKING

Receiver blocking is a measure of the ability of the equipment to receive a wanted signal on its operating channel without exceeding a given degradation in the presence of an unwanted signal (blocking signal) on frequencies other than those of the operating band provided in table 1.

##### 4.7.1 LIMIT

The minimum performance criterion shall be a PER less than or equal to 10 %. The manufacturer may declare alternative performance criteria as long as that is appropriate for the intended use of the equipment

**Table 16: Receiver Blocking parameters receiver category 3 equipment**

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
$P_{\min} + 12$ dB	2 380 2 503,5	-57	CW
$P_{\min} + 12$ dB	2 300 2 583,5	-47	CW

NOTE 1:  $P_{\min}$  is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal.

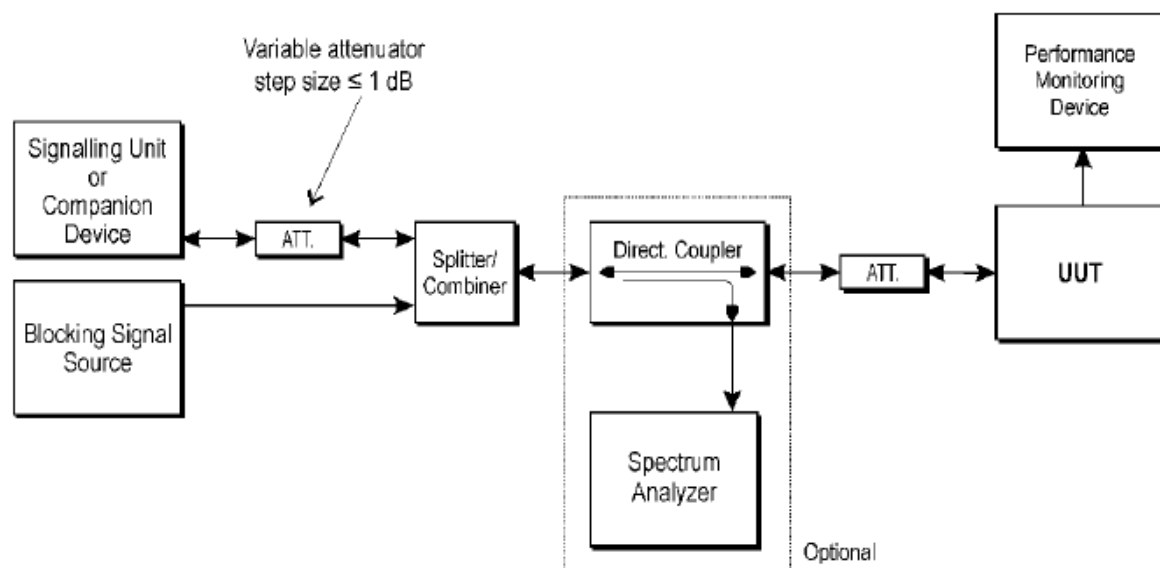
NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.

Note: Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p. shall be considered as receiver category 3 equipment.

##### 4.7.2 TEST PROCEDURE

Test Procedure please refer to clause 5.4.11.2

##### 4.7.3 TEST CONFIGURATION



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#### 4.7.4 TEST RESULTS

##### GFSK MODE(HOPPING CHANNEL)

Wanted Signal Power (MHz)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Test Result ( PER)	Limit ( PER)	Result
P <sub>-84</sub> +12dB	2380	-57	0.74%	10%	Pass
P <sub>-84</sub> +12dB	2503.5	-57	0.59%	10%	Pass
P <sub>-84</sub> +12dB	2300	-47	1.22%	10%	Pass
P <sub>-84</sub> +12dB	2583.5	-47	0.69%	10%	Pass

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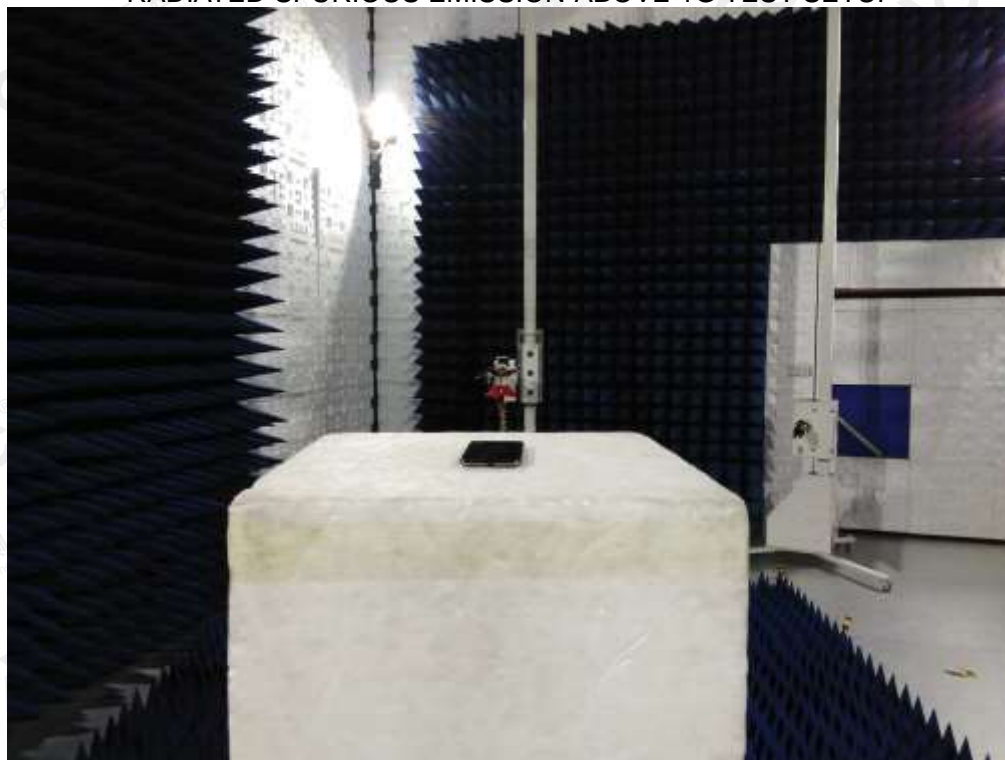


## APPENDIX A: PHOTOGRAPHS OF THE TEST SETUP

### RADIATED SPURIOUS EMISSION TEST SETUP



RADIATED SPURIOUS EMISSION-ABOVE 1G TEST SETUP



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### CONDUCTED TEST SETUP



Sample label



----END OF REPORT----

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