RF Test Report

Report No.: AGC01813161203EE10

PRODUCT DESIGNATION	:	3G Dual-SIM Smartphone
BRAND NAME	:	vonino
MODEL NAME	:	Volt S
CLIENT	:	Vonino ELectronics LTD
DATE OF ISSUE	:	Dec. 30, 2016
STANDARD(S)	:	EN 300 328 V1.9.1 (2015-02)
REPORT VERSION	:	V1.0

*A*ttestation of *G*lobal *C*ompliance (Shenzhen) Co., Ltd

REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Dec. 30, 2016	Valid	Original Report

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1. TEST RESULT CERTIFICATION

Applicant Name	Vonino ELectronics LTD
Address	Miramar Tower 10F- No.1010, 132 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong
Manufacturer Name	Gui zhou Fortuneship Technology Co., Ltd
Address	No. 4 Plant, High-tech Industrial Park, Xinpu Economic Development Zone) Jingkai Road, Xinpu Jingkai District, Xinpu New District, Zunyi City, Guizhou Province, P. R. China
Product Designation	3G Dual-SIM Smartphone
Brand Name	vonino
Test Model	Volt S
Date of test	Dec. 15, 2016 to Dec. 22, 2016
Deviation	None
Condition of Test Sample	Normal
Report Template	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 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.

2. TECHNICAL INFORMATION

2.1 EUT DESCRIPTION

Operating Frequency Range(s)	2402MHz~2480MHz
Modulation	GFSK
Bluetooth Version	V 4.0
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.)	-5.25dBm
Hardware Version	ZH066-MB-V3.0
Software Version	N/A
Antenna designation	PIFA antenna
Antenna gain	1.0dBi
Nominal voltages	DC 3.8V by battery
The extreme operating conditions	Operating temperature range: -20°C~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 V1.9.1.
7. Please refer to Appendix Ⅰ for the photographs of the EUT. For more details, please refer to the User's manual of the EUT.

2.2 SUPPORT EQUIPMENT

Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	PC	Dell	INSPIRON	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
5	Middle channel RX
6	High channel RX

Note: 1. The EUT has been operated in GFSK modulation.
2. All the test modes can be supply by Built-in Li-ion battery, only the result of the worst case was recorded in the report if no any records.
3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

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

TEST ITEMS AND THE RESULTS ARE AS BELLOW:

№	Basic Standard	Test Type	The worst case operational mode	Result
1	ETSI EN 300 328 4.3.2.2	RF Output Power	Mode 1、2、3	Pass
2	ETSI EN 300 328 4.3.2.3	Power Spectral Density	Mode 1、2、3	Pass
3	ETSI EN 300 328 4.3.2.4	Duty Cycle, Tx-sequence, Tx-gap	N/A	N/A
4	ETSI EN 300 328 4.3.2.5	Medium Utilisation (MU) factor	N/A	N/A
5	ETSI EN 300 328 4.3.2.6	Adaptivity (adaptive equipment using modulations other than FHSS)	N/A	N/A
6	ETSI EN 300 328 4.3.2.7	Occupied Channel Bandwidth	Mode 1、3	Pass
7	ETSI EN 300 328 4.3.2.8	Transmitter unwanted emissions in the out-of-band domain	Mode 1、3	Pass
8	ETSI EN 300 328 4.3.2.9	Transmitter unwanted emissions in the spurious domain	Mode 1、3	Pass
9	ETSI EN 300 328 4.3.2.10	Receiver spurious emissions	Mode 4、6	Pass
10	ETSI EN 300 328 4.3.2.11	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 3, 4, 5, 10 are not applicable.

3 DETAILS OF TEST

3.1 IDENTIFICATION OF THE RESPONSIBLE TESTING LOCATION

Company Name:	Attestation of Global Compliance (Shenzhen) Co., Ltd.
Address 1:	2/F., Building 2, No.1-No.4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District, Shenzhen, Guangdong, China
Address 2:	B112-B113, Building 12, Baoan Building Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen, Guangdong, P.R.China

3.2 LIST OF TEST EQUIPMENTS

Description	Manufacturer	Model No.	S/N	Calibration Date	Calibration Due.
SIGNAL ANALYZER	Agilent	N9020A	MY49100060	Oct.10, 2016	Oct.09,2017
SIGNAL GENERATOR	Agilent	N5182A	MY50140530	Oct.10, 2016	Oct.09,2017
SIGNAL GENERATOR	Agilent	E8257D	MY45141029	Oct.10, 2016	Oct.09,2017
USB Wideband Power Sensor	Agilent	U2021XA	MY54110007	Oct.10, 2016	Oct.09,2017
USB Wideband Power Sensor	Agilent	U2021XA	MY54110009	Oct.10, 2016	Oct.09,2017
USB Wideband Power Sensor	Agilent	U2021XA	MY54110014	Oct.10, 2016	Oct.09,2017
USB Wideband Power Sensor	Agilent	U2021XA	MY54110012	Oct.10, 2016	Oct.09,2017
USB Simultaneous Sampling Multifunction DAQ	Agilent	U2531A	MY5211038	Oct.10, 2016	Oct.09,2017
2.4 GHz Filter	Micro-Tronics	BRM50702	017	Mar.01,2016	Feb.28,2017
VECTOR ANALYZER	Agilent	E4440A	MY44303916	July 02, 2016	July 01,2017
Trilog-Broadband Antenna	SCHWARZBEK	VULB 9168	VULB 9168-492	Mar.01, 2016	Feb.28,2017
Trilog-Broadband Antenna	SCHWARZBEK	VULB 9168	VULB 9168-494	Mar.12,2016	Mar.11,2017
Amplifier	EM	EM30180	060552	Feb.29,2016	Feb.28,2017
Horn Antenna	EM	EM-AH-10180	67	Mar.01,2016	Feb.28,2017

3.3 ENVIRONMENTAL CONDITIONS

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

- Temperature: 15-35ºC
- 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, Uc=±1 x 10^{-5}
- Uncertainty of total RF power, conducted, Uc = ±1.5dB
- Uncertainty of RF power density, conducted, Uc = ±3dB
- Uncertainty of spurious emissions, conducted, Uc = ±3dB
- Uncertainty of all emissions, radiated, Uc = ±6dB
- Uncertainty of Temperature: ±1° C
- Uncertainty of Humidity: ±5 %
- Uncertainty of DC and low frequency voltages: ±3 %

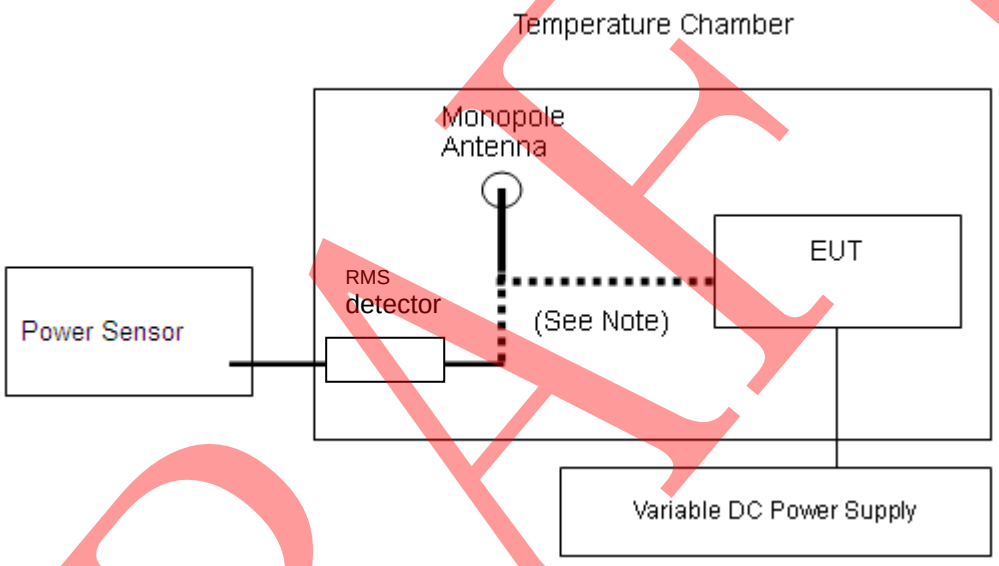
4. ETSI EN 300 328 REQUIREMENTS

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. 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

Operation Mode:	TX	Test Date:	Dec. 19, 2016
Temperature:	23.6°C	Tested by:	Dota
Humidity:	54.2 % 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	-5.45	-5.58	-5.57
Middle Channel TX	-5.96	-5.68	-5.91
High Channel TX	**-5.25**	-5.53	-5.52
Limit	20dBm		

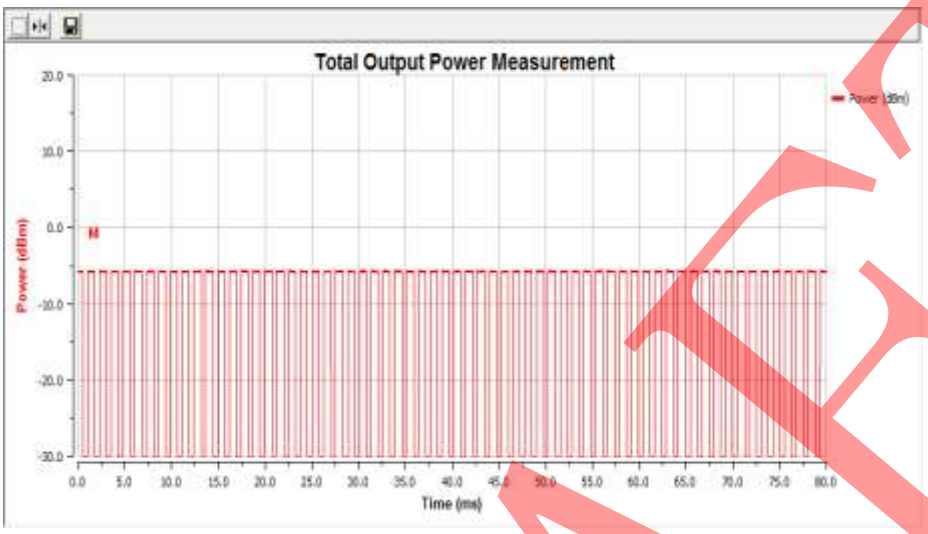
Note: Result=Reading+ Ant. Gain
The reading value included cable loss.

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

Channel	Voltage	Conducted Power (dBm)	EIRP (dBm)
CH Low-2402	Normal	-4.45	-5.45

2*BLE:CH Mid-2442: (Temp - Low)

Channel	Voltage	Conducted Power (dBm)	EIRP (dBm)
CH Mid-2442	Normal	-4.68	-5.68



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

Channel	Voltage	Conducted Power (dBm)	EIRP (dBm)
CH High-2480	Normal	-4.25	-5.25

4.2. POWER SPECTRAL DENSITY

EN 300 328 Clause 4.3.2.3

For wide band modulations other than the FHSS, The maximum E.I.R.P Power density is limited to 10mW Per MHz

TEST PROCEDURE

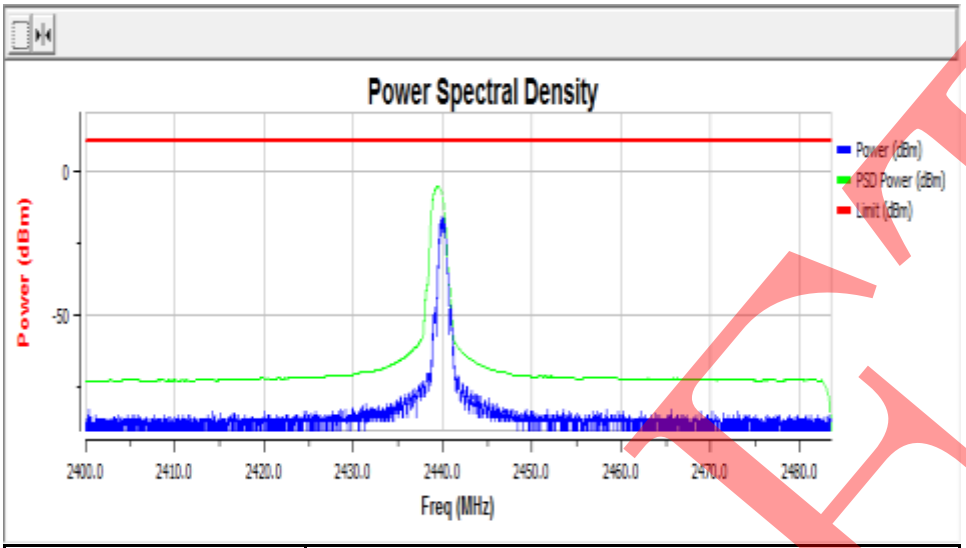
1. Please refer to ETSI EN 300 328 (V1.9.1) clause 5.3.3.1 for the test conditions.
2. Please refer to ETSI EN 300 328 (V1.9.1) clause 5.3.3.2 for the measurement method.
3 The equipment setting as following
Start Frequency: 2 400 MHz
• Stop Frequency: 2 483,5 MHz
• Resolution BW: 10 kHz
• Video BW: 30 kHz
• Sweep Points: >8350
Detector: RMS
• Trace Mode: Max Hold
• Sweep time: 10s

TEST RESULTS

PEAK POWER DENSITY			
Channel Tested	**Power Density (dBm/MHz)**	**Test Limit (dBm/MHz)**	**Pass / Fail**
Low Channel TX	-5.55	10	Pass
Middle Channel TX	-5.64	10	Pass
High Channel TX	-5.25	10	Pass

Channel	Max Power Spectral Density Level (dBm/MHz)
CH Low-2402	-5.55

Channel	Max Power Spectral Density Level (dBm/MHz)
CH Mid-2442	-5.64



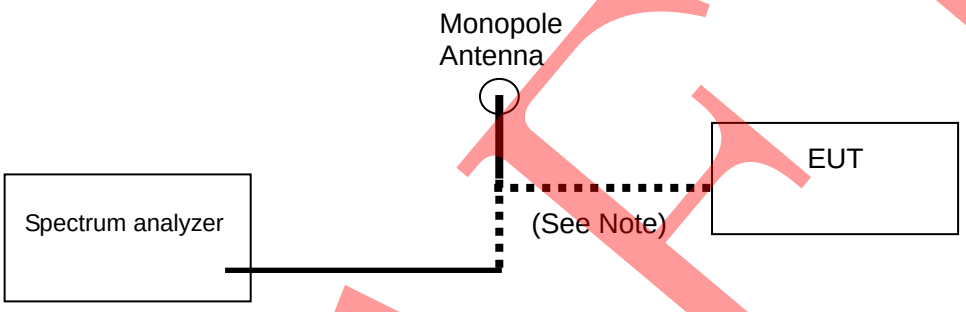
Channel	Max Power Spectral Density Level (dBm/MHz)
CH High-2480	-5.25

4.3. DUTY CYCLE, TX-SEQUENCE, TX-GAP

ETSI EN 300 328 SUBCLAUSE 4.3.2.4

The Duty Cycle shall be equal to or less than the maximum value declared by the supplier.
The maximum Tx-sequence Time and the minimum Tx-gap Time shall be according to the formula below:
Maximum Tx-Sequence Time = Minimum Tx-gap Time = M
where M is in the range of 3,5 ms to 10 ms.

TEST CONFIGURATION



TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V1.9.1) clause 5.3.4.1 for the test conditions.
2. Please refer to ETSI EN 300 328 (V1.9.1) clause 5.3.4.2 the measurement method.

TEST RESULT

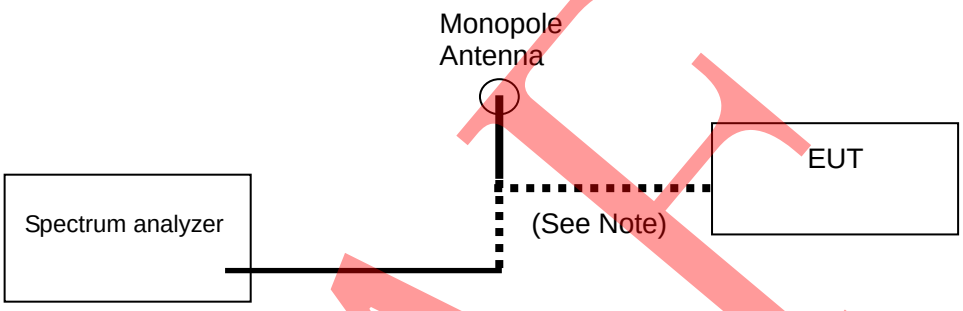
N/A

4.4. MEDIUM UTILISATION (MU) FACTOR

ETSI EN 300 328 SUBCLAUSE 4.3.2.5

The Medium Utilisation (MU) factor is a measure to quantify the amount of resources (Power and Time) used by non-adaptive equipment. The Medium Utilisation factor is defined by the formula:
MU = (P/100 mW) × DC
where: MU is Medium Utilisation factor in %.
P is the RF output power as defined in clause 4.3.2.2.2expressed in mW.
DC is the Duty Cycle as defined in clause 4.3.2.4.2 expressed in %.
NOTE: The equipment may have dynamic behaviour with regard to duty cycle and corresponding power level.

TEST CONFIGURATION



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 the measurement method.

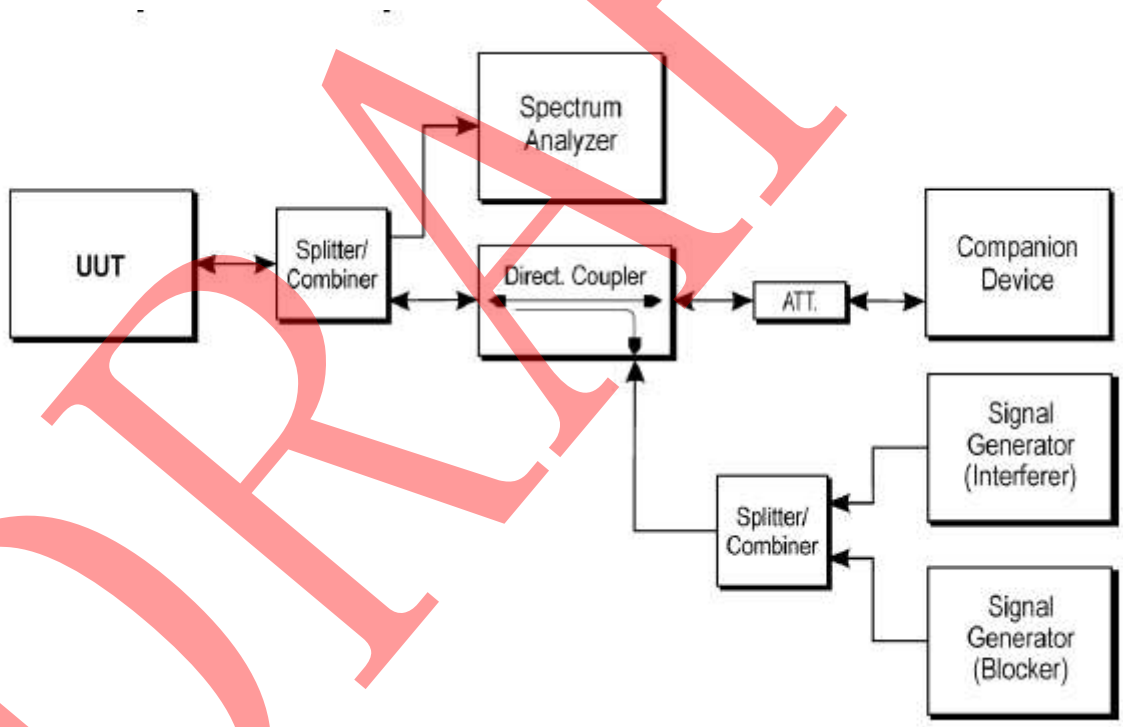
TEST RESULT
N/A

4.5. ADAPTIVITY (CHANNEL ACCESS MECHANISM)

ETSI EN 300 328 SUBCLAUSE 4.3.2.6

This requirement does not apply to non-adaptive equipment or adaptive equipment operating in a non-adaptive mode providing the equipment complies with the requirements and/or restrictions applicable to non-adaptive equipment.
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 modulations other than FHSS is allowed to operate in a non-adaptive mode providing it complies with the requirements applicable to non-adaptive equipment.
An adaptive equipment using modulations other than FHSS is equipment that uses a mechanism by which it can adapt to its radio environment by identifying other transmissions present within its Occupied Channel Bandwidth.
Adaptive equipment using modulations other than FHSS shall implement either of the Detect and Avoid mechanisms provided in clause 4.3.2.6.2 or clause 4.3.2.6.3.
Adaptive equipment is allowed to switch dynamically between different adaptive modes.

TEST CONFIGURATION



TEST PROCEDURE
1. Please refer to ETSI EN 300 328 (V1.9.1) clause 5.3.7.1 for the test conditions.
2. Please refer to ETSI EN 300 328 (V1.9.1) clause 5.3.7.2 the measurement method.

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TEST RESULT

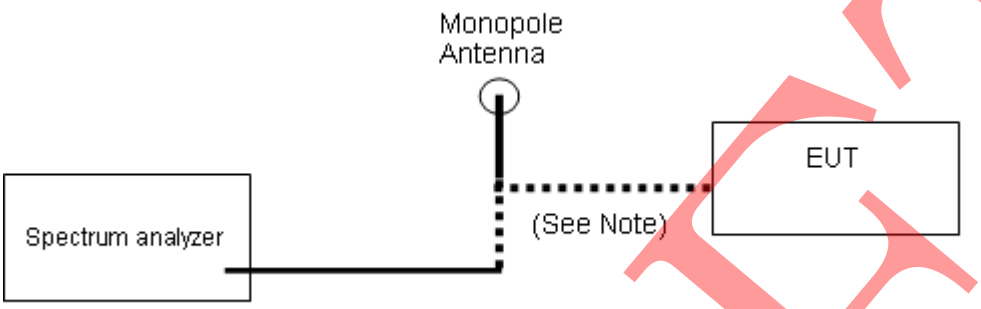
N/A

4.6. OCCUPIED CHANNEL BANDWIDTH

ETSI EN 300328 SUBCLAUSE 4.3.2.7

The Occupied Channel Bandwidth shall fall completely within the band given in clause 1.
In addition, for non-adaptive systems using wide band modulations other than FHSS and with e.i.r.p greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.

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: The centre frequency of the channel under test
   - Resolution BW: ~ 1 % of the span without going below 1 %
   - Video BW: 3 × RBW
   - Frequency Span for frequency hopping equipment: Lowest frequency separation that is used within the hopping sequence
   - Frequency Span for other types of equipment: 2 × Nominal Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel)
   - Detector Mode: RMS
   - Trace Mode: Max Hold
   - Sweep time: 1 s

TEST RESULT

TEST ITEM	OCCUPIED CHANNEL BANDWIDTH
TEST MODE	GFSK MODULATION

MEASUREMENT RESULT		
Test Data (MHz)		**Criteria**
Low Channel	1.03	PASS
High Channel	1.03	PASS


Sweep Time 1.00 s
Center Freq: 2.402000000 GHz
Trig: Free Run
Avg|Hold: 10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Mkr1 2.40149 GHz
-29.091 dBm
Ref 20.00 dBm
Center 2.402 GHz
#Res BW 20 kHz
#VBW 62 kHz
Span 2 MHz
#Sweep 1 s
Occupied Bandwidth
1.0300 MHz
Total Power
-2.51 dBm
Transmit Freq Error
4.910 kHz
OBW Power
99.00 %
x dB Bandwidth
1.170 MHz
x dB
-20.00 dB
SweepControl
Sweep Time
1.00 s
Auto
Man
Sweep Setup
Pause
Gate
[Off, LO]
Points
5001


Sweep Time 1.00 s
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Mkr1 2.48052 GHz
-27.438 dBm
Ref 20.00 dBm
Center 2.48 GHz
#Res BW 20 kHz
#VBW 62 kHz
Span 2 MHz
#Sweep 1 s
Occupied Bandwidth
1.0297 MHz
Total Power
-1.70 dBm
Transmit Freq Error
4.624 kHz
OBW Power
99.00 %
x dB Bandwidth
1.170 MHz
x dB
-20.00 dB
SweepControl
Sweep Time
1.00 s
Auto
Man
Sweep Setup
Pause
Gate
[Off, LO]
Points
5001

4.7. TRANSMITTER UNWANTED EMISSIONS IN THE OUT OF BAND DOMAIN

ETSI EN300328 SUBCLAUSE 4.3.2.8

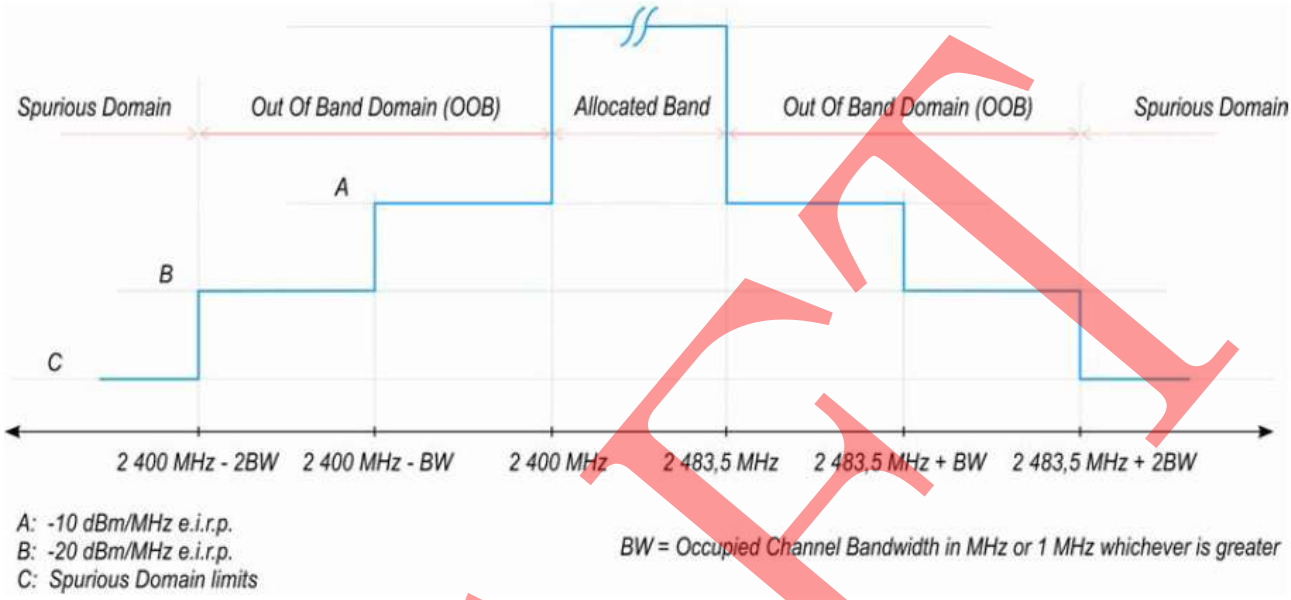
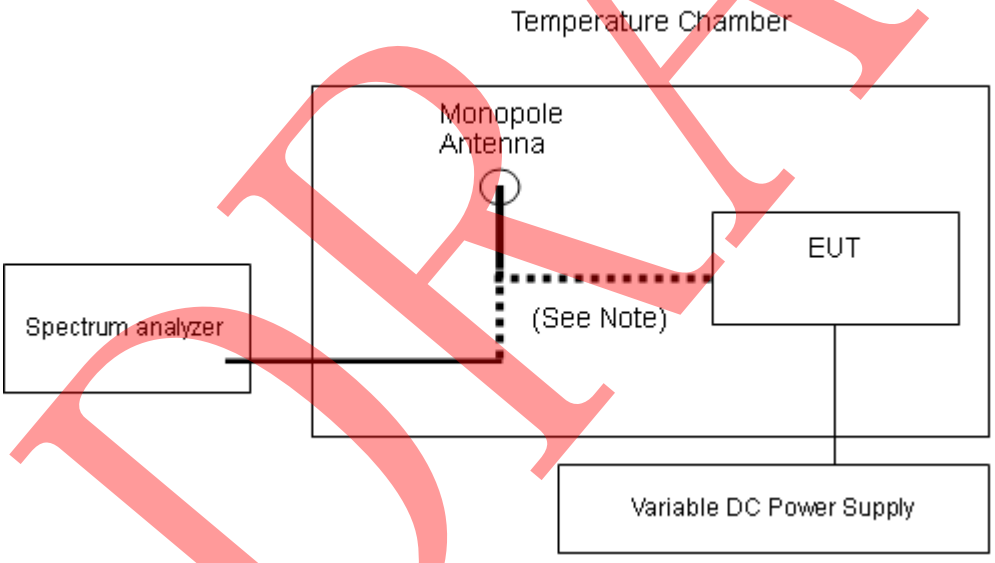
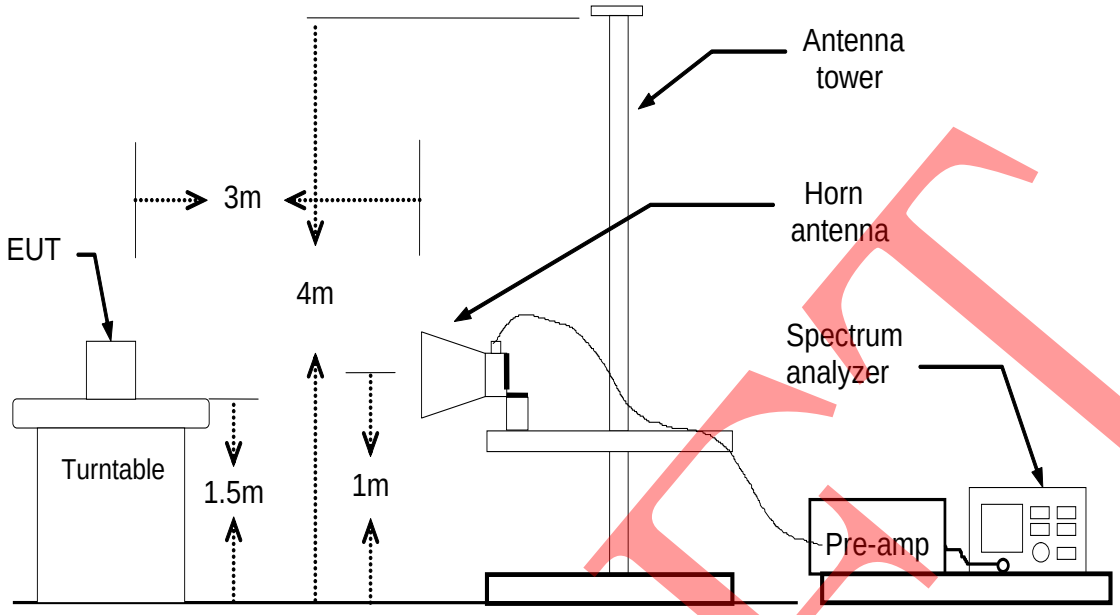


Figure 1: Transmit mask

TEST CONFIGURATION



For have temporary antenna connector product



For have no temporary antenna product

TEST PROCEDURE

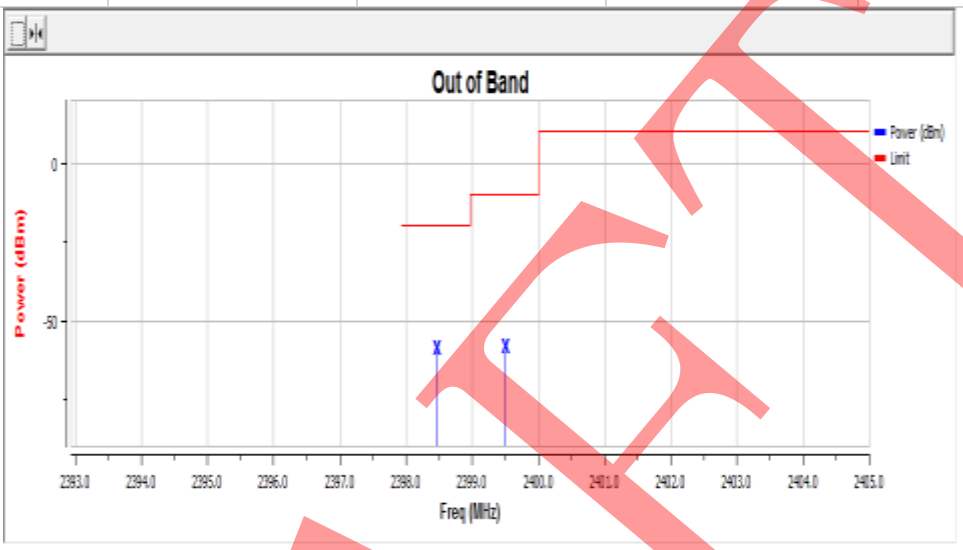
1. Please refer to ETSI EN 300 328 (V1.9.1) clause 5.3.9.1 for the test conditions.
2. Please refer to ETSI EN 300 328 (V1.9.1) clause 5.3.9.2.1 the measurement method.

- Centre Frequency: 2 484 MHz
- Span: 0 Hz
- Resolution BW: 1 MHz
- Filter mode: Channel filter
- Video BW: 3 MHz
- Detector Mode: RMS
- Trace Mode: Max Hold
- Sweep Mode: Continuous
- Sweep Points: Sweep Time [s] / (1 µs) or 5 000 whichever is greater
- Trigger Mode: Video trigger
- Sweep Time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power

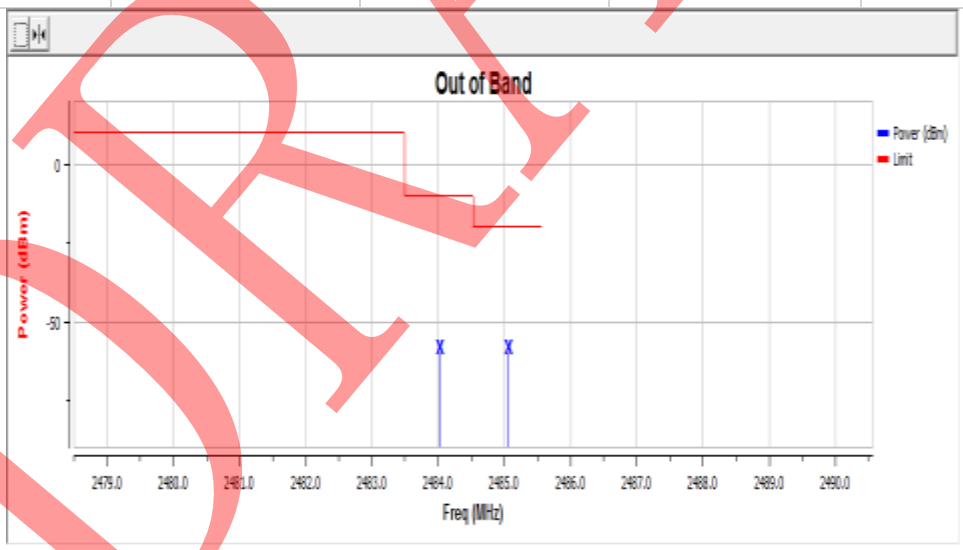
TEST RESULT

NORMAL TEMPERATURE

Channel	Antenna	Frequency	Level	Limit
CH Low-2402	Antenna 1	2399.5	-59.94	-10
CH Low-2402	Antenna 1	2398.47	-60.29	-20

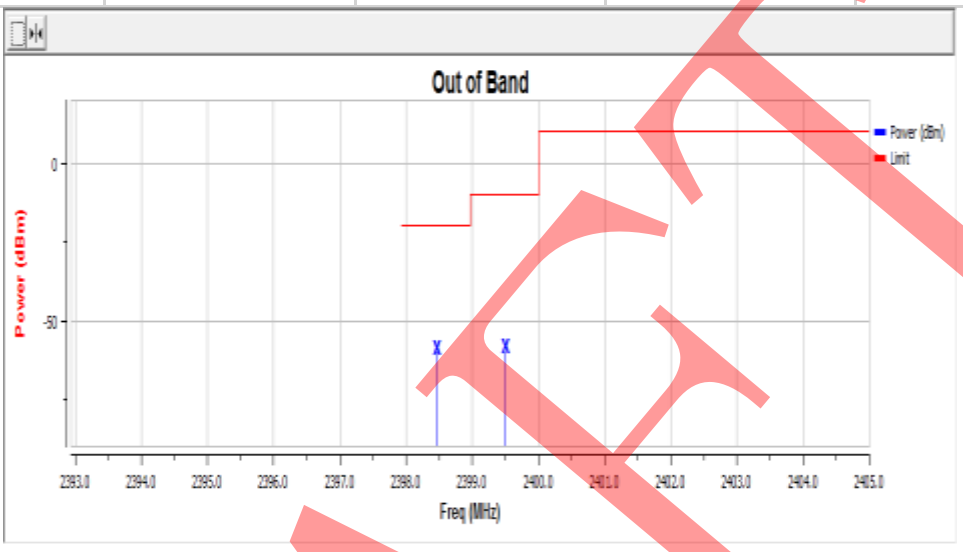


Channel	Antenna	Frequency	Level	Limit
CH High-2480	Antenna 1	2484.03	-60.19	-10
CH High-2480	Antenna 1	2485.06	-60.19	-20

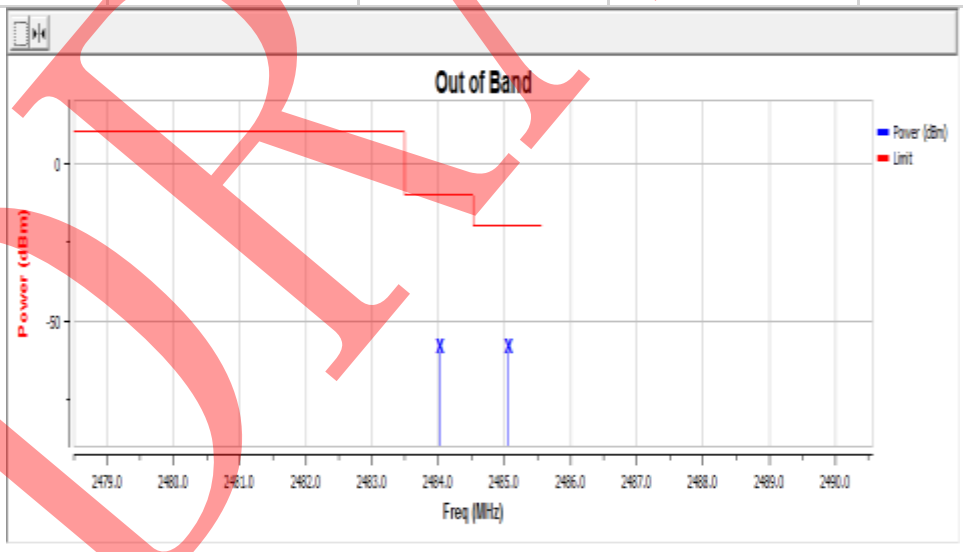


LOW TEMPERATURE

Channel	Antenna	Frequency	Level	Limit
CH Low-2402	Antenna 1	2399.5	-59.97	-10
CH Low-2402	Antenna 1	2398.47	-60.3	-20

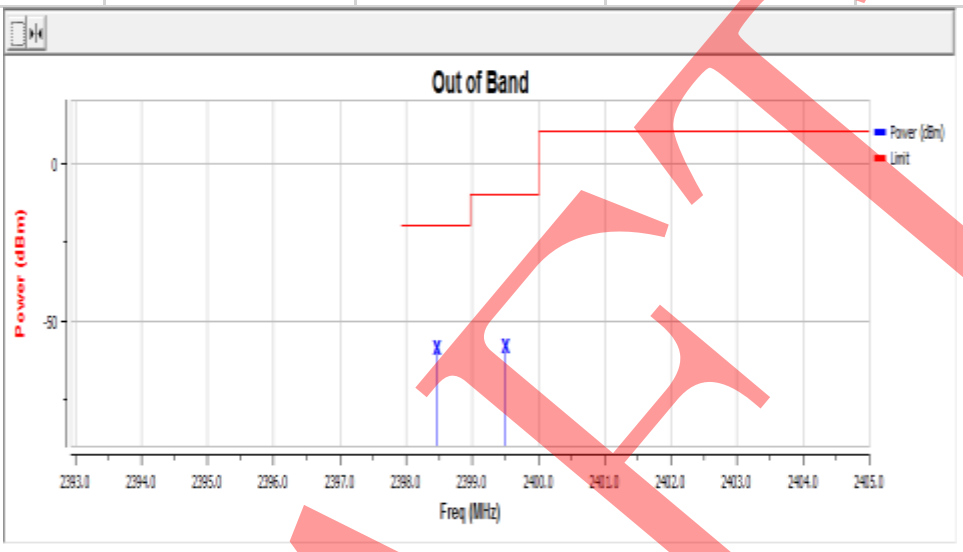


Channel	Antenna	Frequency	Level	Limit
CH High-2480	Antenna 1	2484.03	-60.1	-10
CH High-2480	Antenna 1	2485.06	-60.19	-20

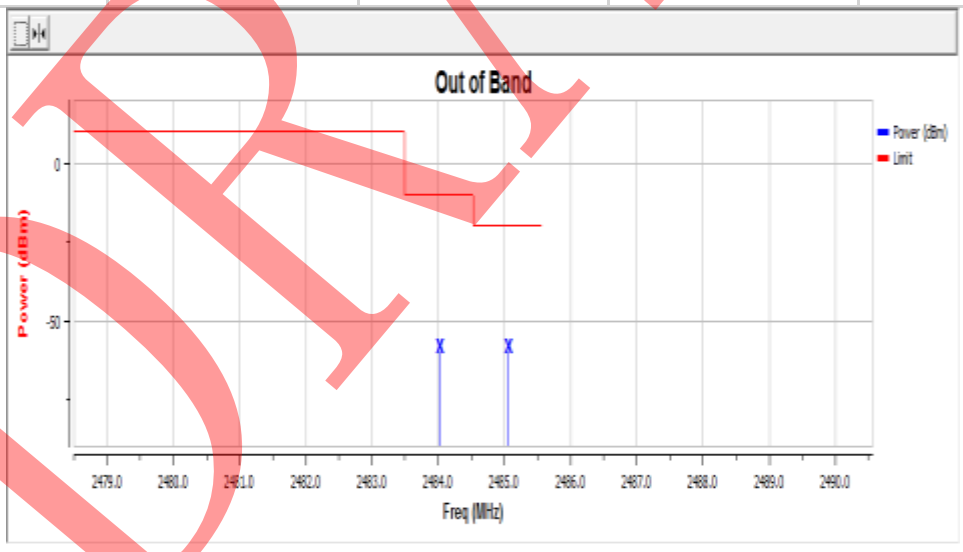


HIGH TEMPERATURE

Channel	Antenna	Frequency	Level	Limit
CH Low-2402	Antenna 1	2399.5	-59.89	-10
CH Low-2402	Antenna 1	2398.47	-60.3	-20



Channel	Antenna	Frequency	Level	Limit
CH High-2480	Antenna 1	2484.03	-60.12	-10
CH High-2480	Antenna 1	2485.06	-60.18	-20



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

4.8 TRANSMITTER SPURIOUS EMISSIONS

Spurious emissions are emissions outside the frequency range(s) of the equipment as defined

in Clause 4.3.1.10.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: Limit

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

Note: In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted) and to the emissions radiated by the cabinet. In case of integral antenna equipment (without temporary antenna connectors), these limits apply to emissions radiated by the equipment.

TEST PROCEDURE

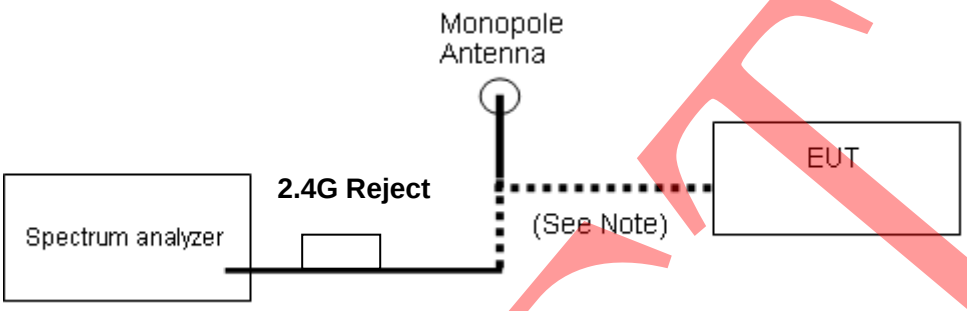
Refer to chapter 5.3.10.2 of ETSI EN 300 328 V1.9.1

Measurement

Measurement	
☒Conducted measurement	☒Radiated measurement

CONDUCTED MEASUREMENT

TEST CONFIGURATION



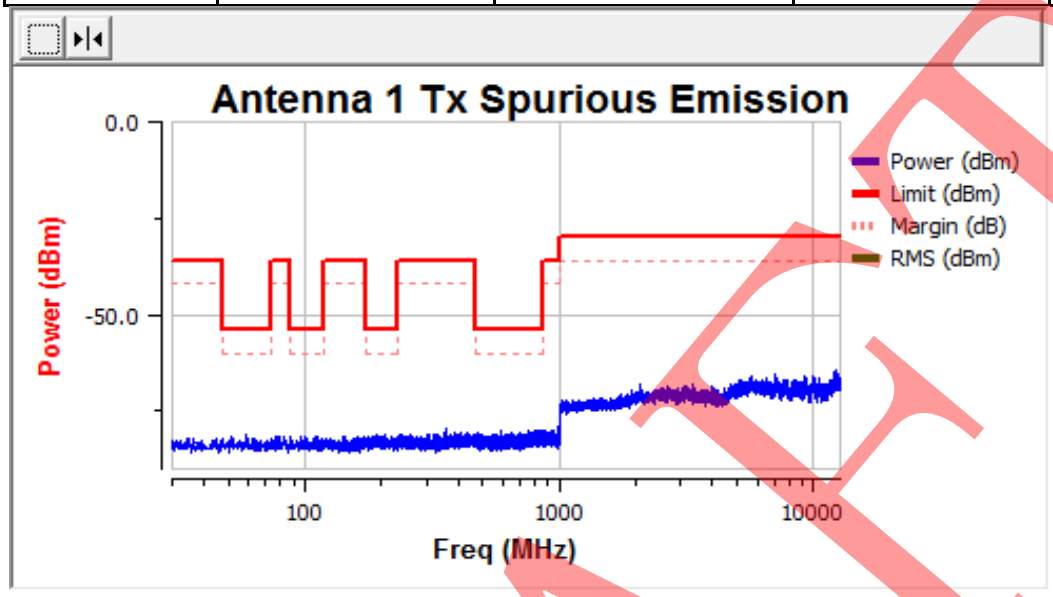
Conducted Method

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.

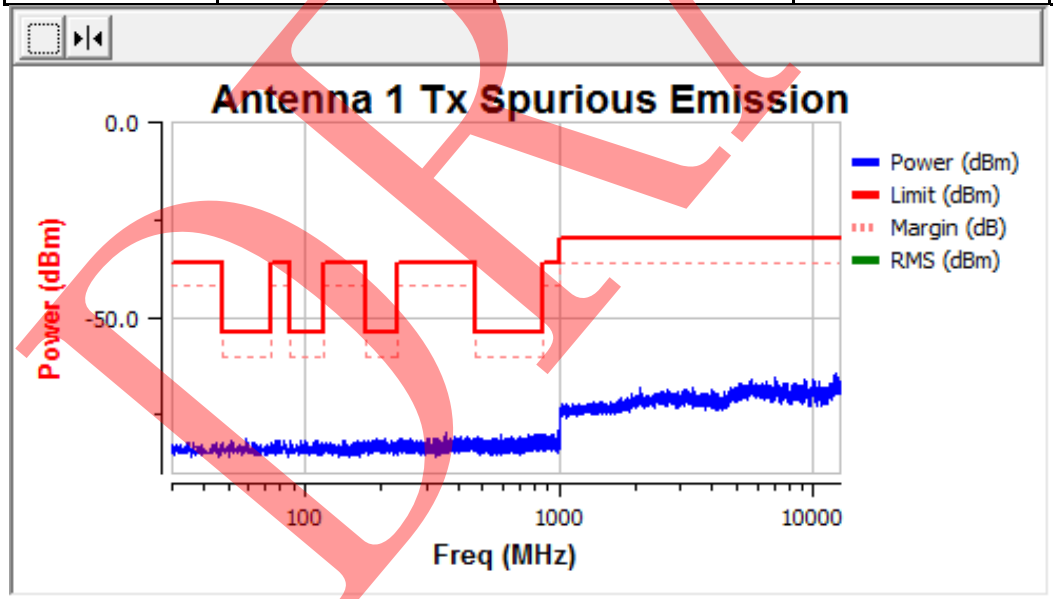
CONDUCTED RESULTS: (Low channel)

Freq	RMS Level (dBm)	Limit (dBm)	Over Limit (dB)	Status
841.901	-79.34	-54.00	-25.34	Pass
12231.000	-64.04	-30.00	-34.04	Pass



(High channel)

Freq	RMS Level (dBm)	Limit (dBm)	Over Limit (dB)	Status
826.723	-79.19	-54.00	-25.19	Pass
12239.000	-64.60	-30.00	-34.60	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.

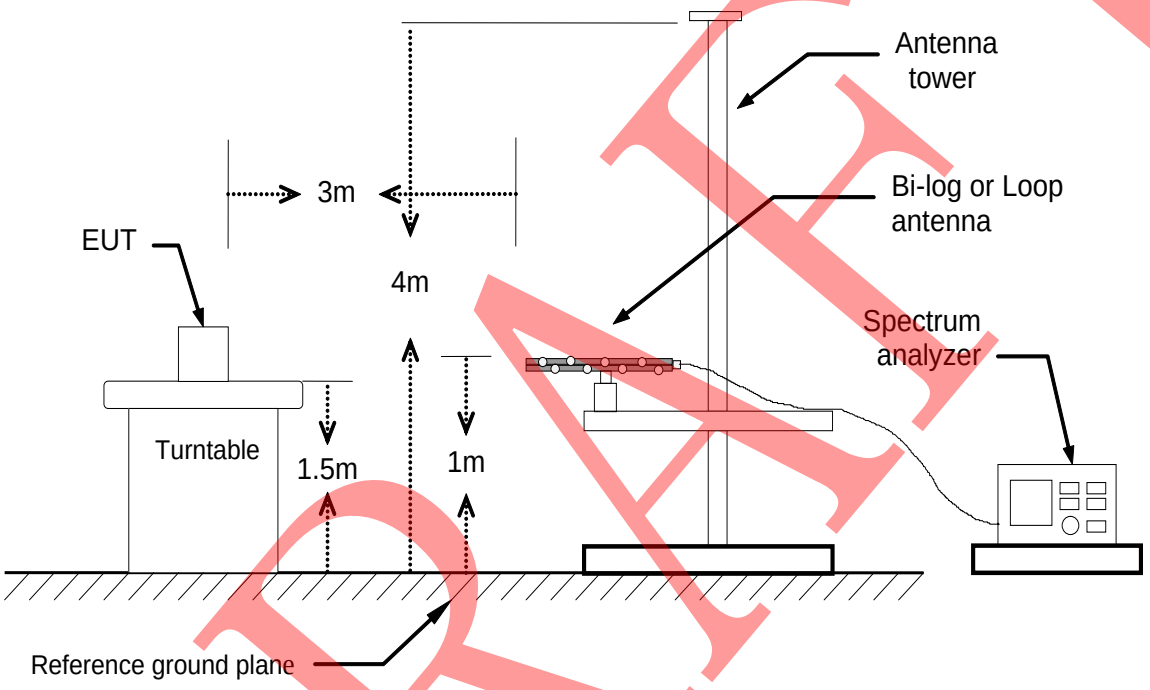
3. The effective radiated power has been considered in this test.

RADIATED MEASUREMENT

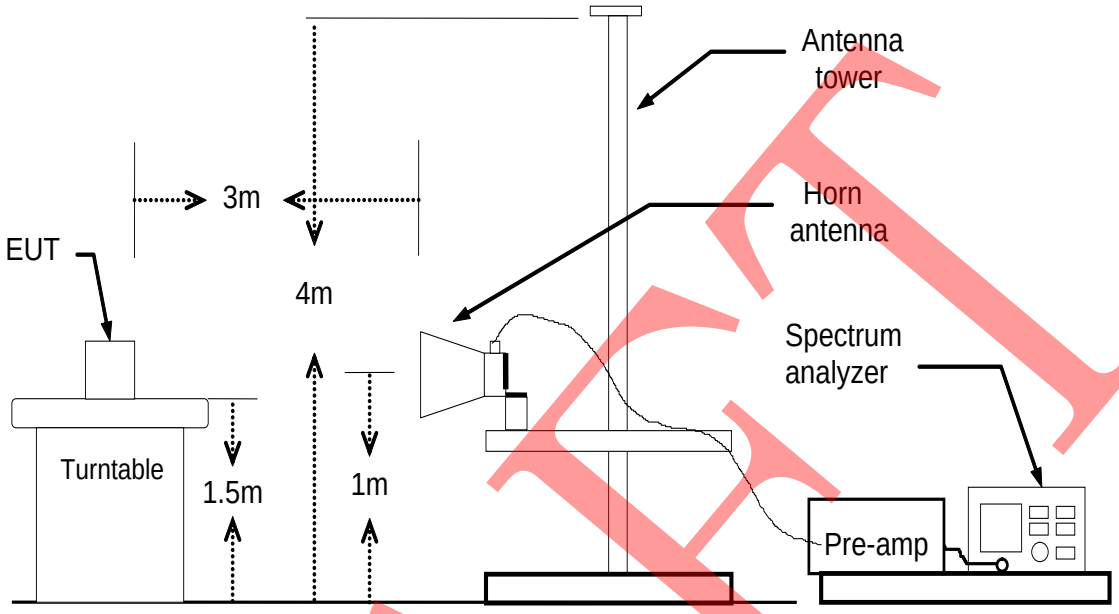
TEST SETUP

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



Radiated Method

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)**
41.04	H	-64.33	-36	-28.33
63.39	H	-69.77	-54	-15.77
132.88	H	-61.34	-36	-25.34
339.42	H	-70.11	-36	-34.11
603.53	H	-73.73	-54	-19.73
984.27	H	-66.09	-36	-30.09
61.86	V	-71.1	-54	-17.1
216.31	V	-66.57	-54	-12.57
125.57	V	-63.09	-36	-27.09
175.75	V	-66.91	-54	-12.91
341.79	V	-70.53	-36	-34.53
990.26	V	-62.3	-36	-26.3
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.

SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING CHANNEL	High

Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
45.31	H	-65.04	-36	-29.04
54.84	H	-71.02	-54	-17.02
165.6	H	-64.6	-36	-28.6
377.36	H	-69.63	-36	-33.63
749.67	H	-68.63	-54	-14.63
942.5	H	-62.28	-36	-26.28
56.05	V	-68.89	-54	-14.89
202.79	V	-69.52	-54	-15.52
139.03	V	-64.46	-36	-28.46
191.76	V	-67.66	-54	-13.66
367.14	V	-70.74	-36	-34.74
909.22	V	-62.26	-36	-26.26
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
Standby Mode ,Antenna Polarization: Vertical					
1	30-1000	100	\	-54	>20
2	30-1000	100	\	-36	>20
Standby Mode ,Antenna Polarization: Horizontal					
1	30-1000	100	\	-54	>20
2	30-1000	100	\	-36	>20

Conclusion: PASS

Above 1GHz (1GHz-12.75GHz)

NO.	Frequency	Measurement Bandwidth	Level	Limit	Margin
	MHz	KHz	dBm	dBm	dB
TX:2402MHz ,Antenna Polarization: Vertical					
1	4804	1000	-49.26	-30	>10
2	7206	1000	-51.75	-30	>10
3	9608	1000	\	-30	>40
4	12010	1000	\	-30	>40
5	Other(1000-12750)	1000	\	-30	>40
TX:2402MHz ,Antenna Polarization: Horizontal					
1	4804	1000	-51.38	-30	>10
2	7206	1000	-48.49	-30	>10
3	9608	1000	\	-30	>40
4	12010	1000	\	-30	>40
5	Other(1000-12750)	1000	\	-30	>40
TX:2441MHz ,Antenna Polarization: Vertical					
1	4882	1000	-56.50	-30	>10
2	7323	1000	-54.66	-30	>10
3	9764	1000	\	-30	>40
4	12205	1000	\	-30	>40
5	Other(1000-12750)	1000	\	-30	>40
TX:2441MHz ,Antenna Polarization: Horizontal					
1	4882	1000	-53.40	-30	>10
2	7323	1000	-55.18	-30	>10
3	9764	1000	\	-30	>40
4	12205	1000	\	-30	>40
5	Other(1000-12750)	1000	\	-30	>40
TX:2480MHz ,Antenna Polarization: Vertical					
1	4960	1000	-52.70	-30	>10
2	7440	1000	-50.89	-30	>10
3	9920	1000	\	-30	>40

4	12400	1000	\	-30	>40
5	Other(1000-12750)	1000	\	-30	>40
TX:2480MHz ,Antenna Polarization: Horizontal					
1	4960	1000	-57.12	-30	>10
2	7440	1000	-59.43	-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
Standby Mode ,Antenna Polarization: Vertical					
1	1000-12750	1000	\	-30	>20
Standby Mode ,Antenna Polarization: Horizontal					
1	1000-12750	1000	\	-30	>20

Conclusion: PASS

4.9 RECEIVER SPURIOUS EMISSIONS

The level of spurious emissions shall be measured as, either:
a) Their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation); or
b) Their effective radiated power when radiated by cabinet and antenna in case of integral antenna equipment with no temporary antenna connectors.
Testing shall be performed when the equipment is in a receive-only mode.

LIMIT

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

Note: In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted) and to the emissions radiated by the cabinet. In case of integral antenna equipment (without temporary antenna connectors), these limits apply to emissions radiated by the equipment.

TEST PROCEDURE

Refer to chapter 5.3.11.2 of ETSI EN 300 328 V1.9.1

Measurement

Measurement	
☒Conducted measurement	☒Radiated measurement

CONDUCTED MEASUREMENT

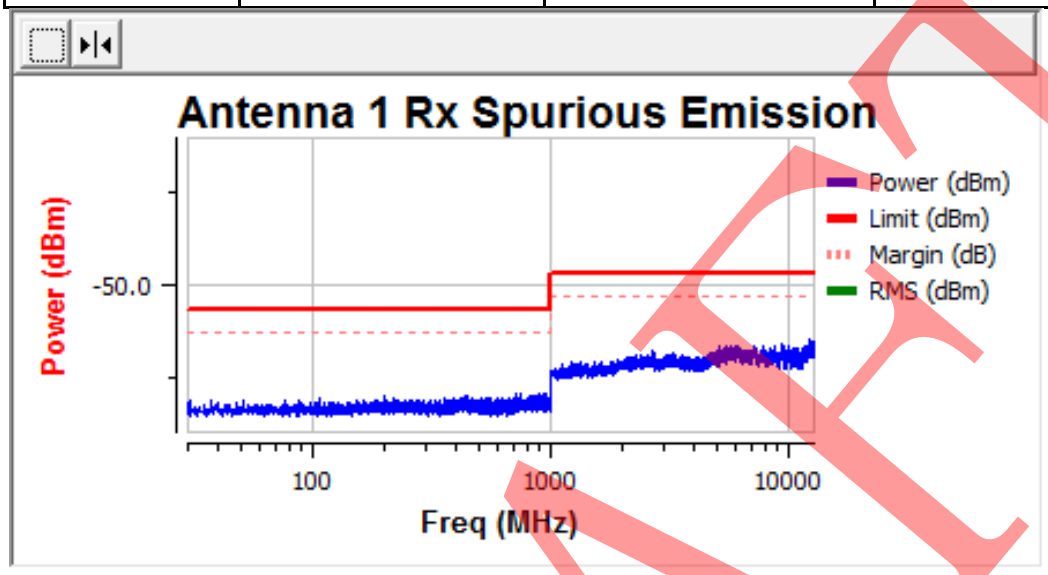
TEST CONFIGURATION

Conducted Method: Same as section 4.8 in this test report

TEST RESULTS FOR CONDUCTED METHOD

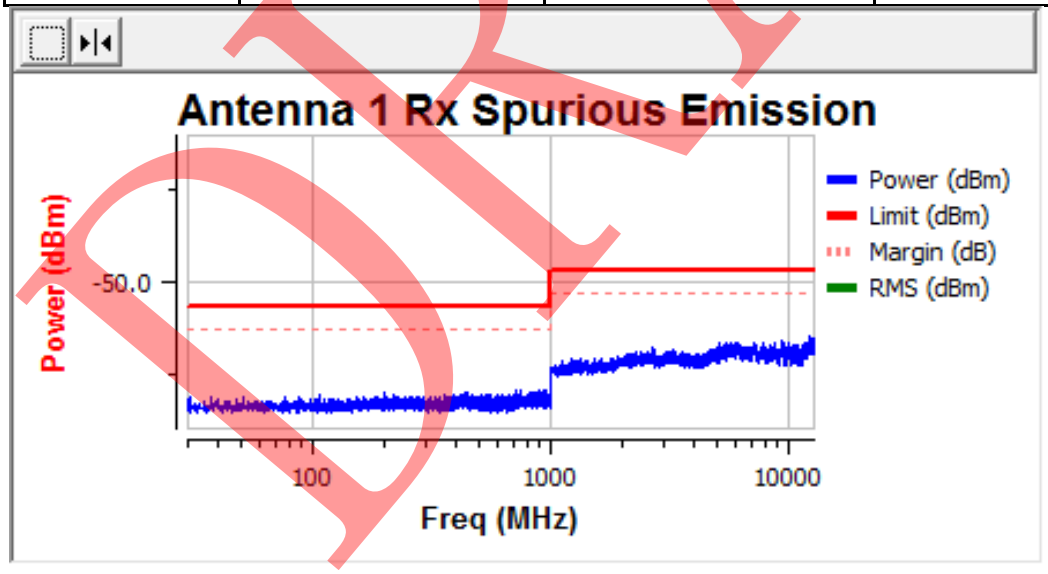
RECEIVER MODE: (Low channel)

Freq	RMS Level (dBm)	Limit (dBm)	Over Limit (dB)	Status
902.805	-78.95	-57.00	-21.95	Pass
12302.000	-64.46	-47.00	-17.46	Pass



(High channel)

Freq	RMS Level (dBm)	Limit (dBm)	Over Limit (dB)	Status
762.024	-78.50	-57.00	-21.50	Pass
12683.000	-64.33	-47.00	-17.33	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.

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.

TEST CONFIGURATION

Radiated Method: Same as section 4.8 in this test report

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)
75.12	30.11	V	-71	0.1	0.33	-70.77	-57	-13.77
181.25	30.79	V	-71.14	0.18	0.5	-70.82	-57	-13.82
426.3	30.74	V	-70.97	0.26	0.48	-70.75	-57	-13.75
736.29	31.81	V	-71.18	0.51	0.82	-70.87	-57	-13.87
515.47	30.48	V	-70.03	0.38	0.49	-69.92	-57	-12.92
570.53	31.28	V	-71.06	0.43	0.44	-71.05	-57	-14.05
76.44	30.68	H	-70.37	0.14	0.09	-70.42	-57	-13.42
184.2	30.74	H	-70.49	0.22	0.44	-70.27	-57	-13.27
736.11	31.01	H	-70.57	0.5	0.53	-70.54	-57	-13.54
426.17	29.88	H	-70.9	0.25	0.88	-70.27	-57	-13.27
513.33	31.61	H	-70.59	0.35	0.5	-70.44	-57	-13.44
572.08	31.32	H	-71.1	0.46	0.73	-70.83	-57	-13.83
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.

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)
75.38	30.11	V	-71	0.11	0.33	-70.78	-57	-13.78
181.62	30.79	V	-71.14	0.19	0.5	-70.83	-57	-13.83
426.93	30.74	V	-70.97	0.29	0.48	-70.78	-57	-13.78
736.9	31.81	V	-71.18	0.57	0.82	-70.93	-57	-13.93
515.75	30.48	V	-70.03	0.39	0.49	-69.93	-57	-12.93
570.64	31.28	V	-71.06	0.44	0.44	-71.06	-57	-14.06
76.55	30.68	H	-70.37	0.15	0.09	-70.43	-57	-13.43
184.42	30.74	H	-70.49	0.23	0.44	-70.28	-57	-13.28
736.78	31.01	H	-70.57	0.55	0.53	-70.59	-57	-13.59
426.8	29.88	H	-70.9	0.28	0.88	-70.3	-57	-13.3
513.69	31.61	H	-70.59	0.36	0.5	-70.45	-57	-13.45
572.55	31.32	H	-71.1	0.47	0.73	-70.84	-57	-13.84
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.

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)
1954.14	39.77	V	-62.69	2.02	0.52	-64.19	-47	-17.19
--	--	V	--	--	--			
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
2443.2	39.04	H	-62.62	1.88	0.71	-63.79	-47	-16.79
--	--	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.

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)
1954.95	39.77	V	-62.69	2.11	0.52	-64.28	-47	-17.28
--	--	V	--	--	--			
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
2443.84	39.04	H	-62.62	1.98	0.71	-63.89	-47	-16.89
--	--	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.

4.10. 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 Frequency Hopping equipment shall comply with the requirements defined in clauses 4.3.1.7.2 (LBT based DAA) or 4.3.1.7.3 (non-LBT based DAA) in the presence of a blocking signal with characteristics as provided in table 3.

Table 3: 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)	-30	CW
Non-LBT	-30 dBm			
NOTE 1: The highest blocking frequency shall be used for testing the lowest operating hopping frequency, while the lowest blocking frequency shall be used for testing the highest hopping frequency. NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.				

TEST PROCEDURE

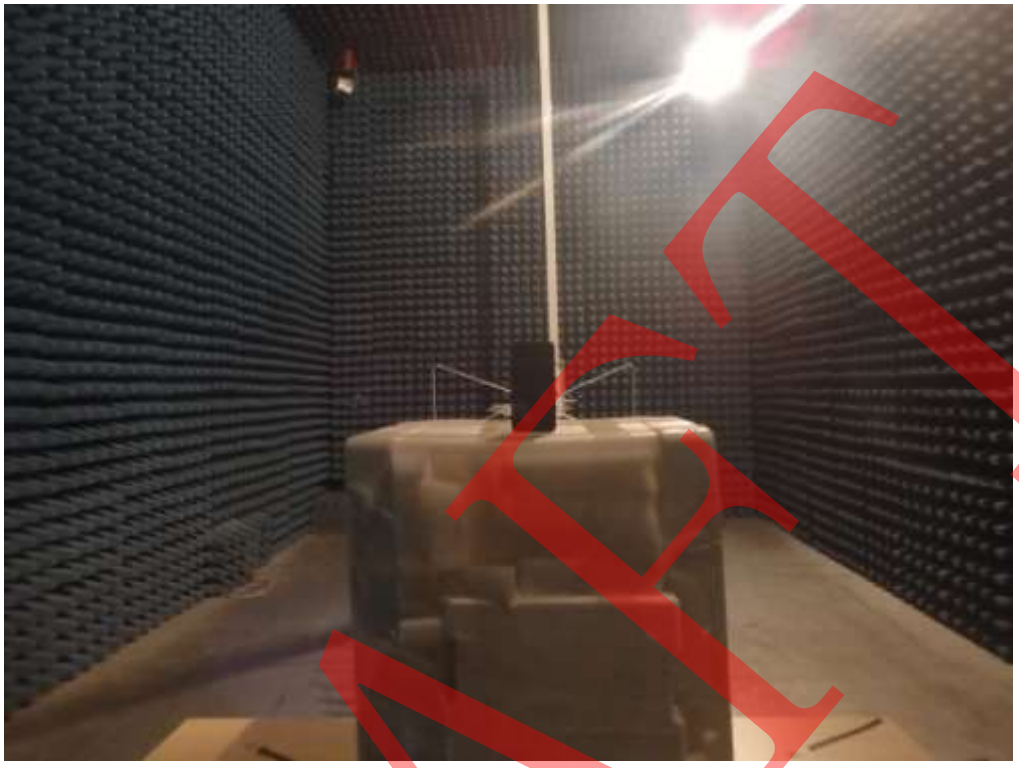
1. Please refer to ETSI EN 300 328 clause 5.3.7.1 for the test conditions.
2. Please refer to ETSI EN 300 328 clause 5.3.7.2 for the measurement methods.

TEST RESULTS

N/A

APPENDIX A: PHOTOGRAPHS OF THE TEST SETUP

RADIATED SPURIOUS EMISSION TEST SETUP

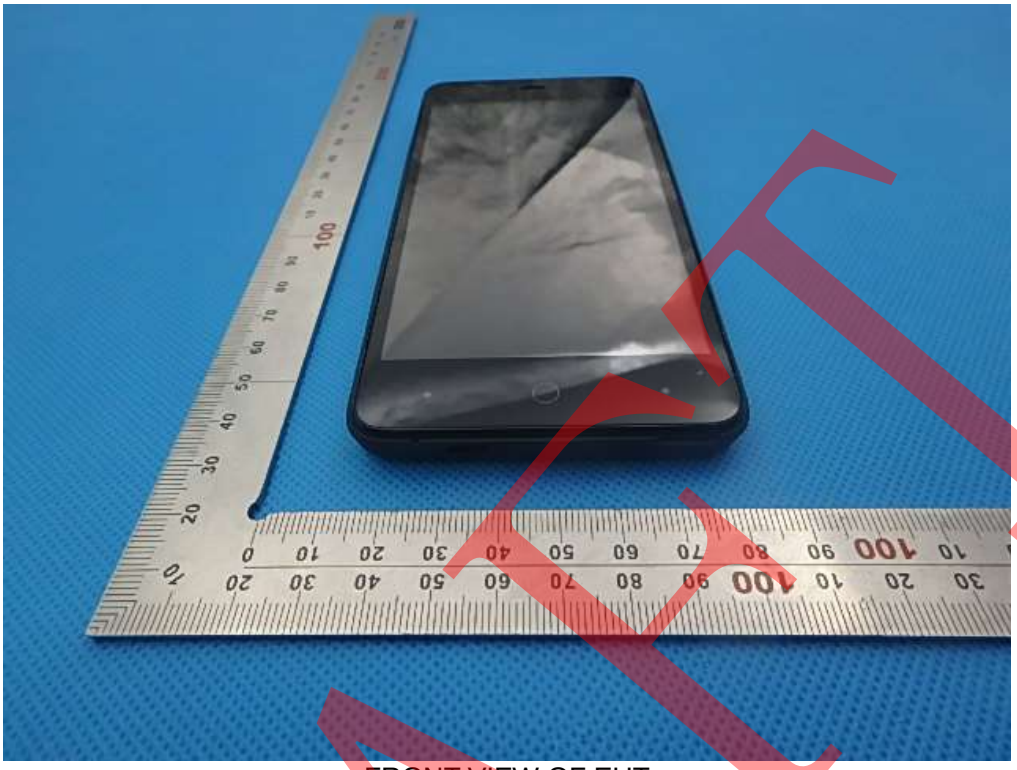


APPENDIX B: PHOTOGRAPHS OF EUT

All VIEW OF EUT

TOP VIEW OF EUT

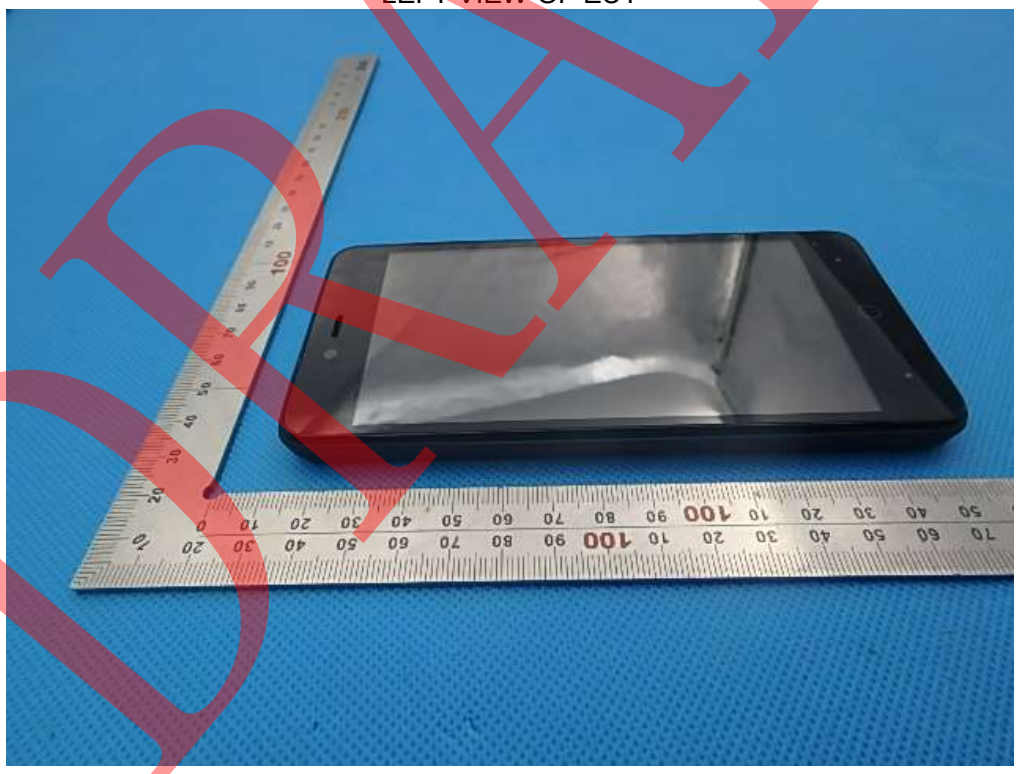
BOTTOM VIEW OF EUT



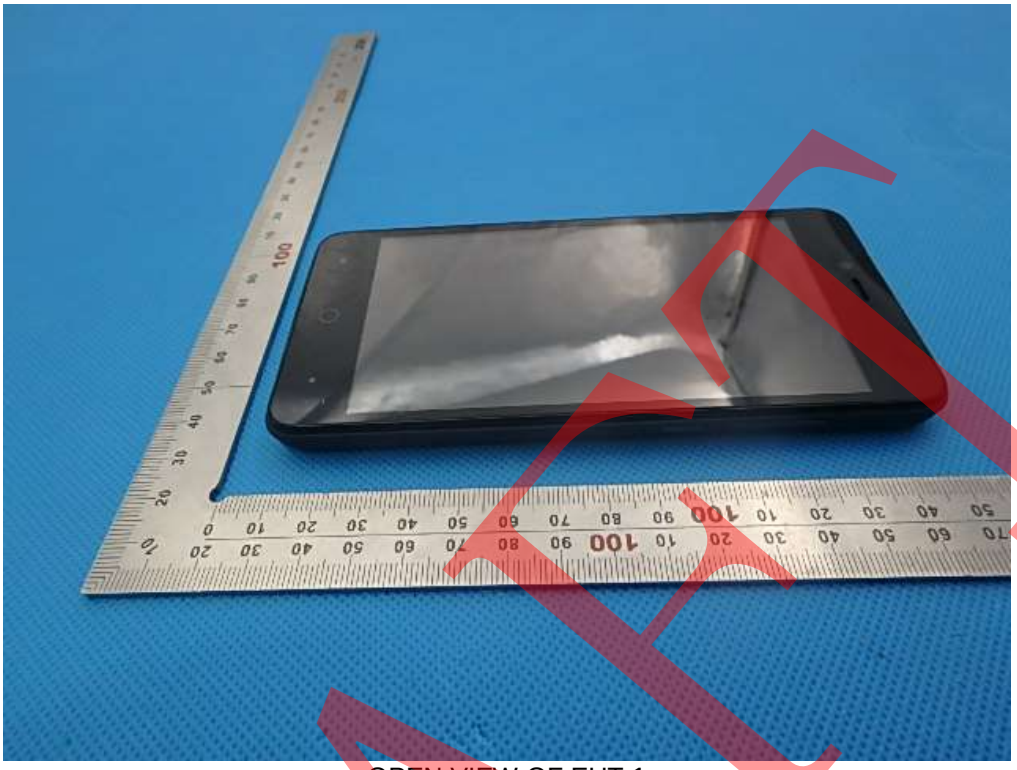
FRONT VIEW OF EUT

BACK VIEW OF EUT

LEFT VIEW OF EUT

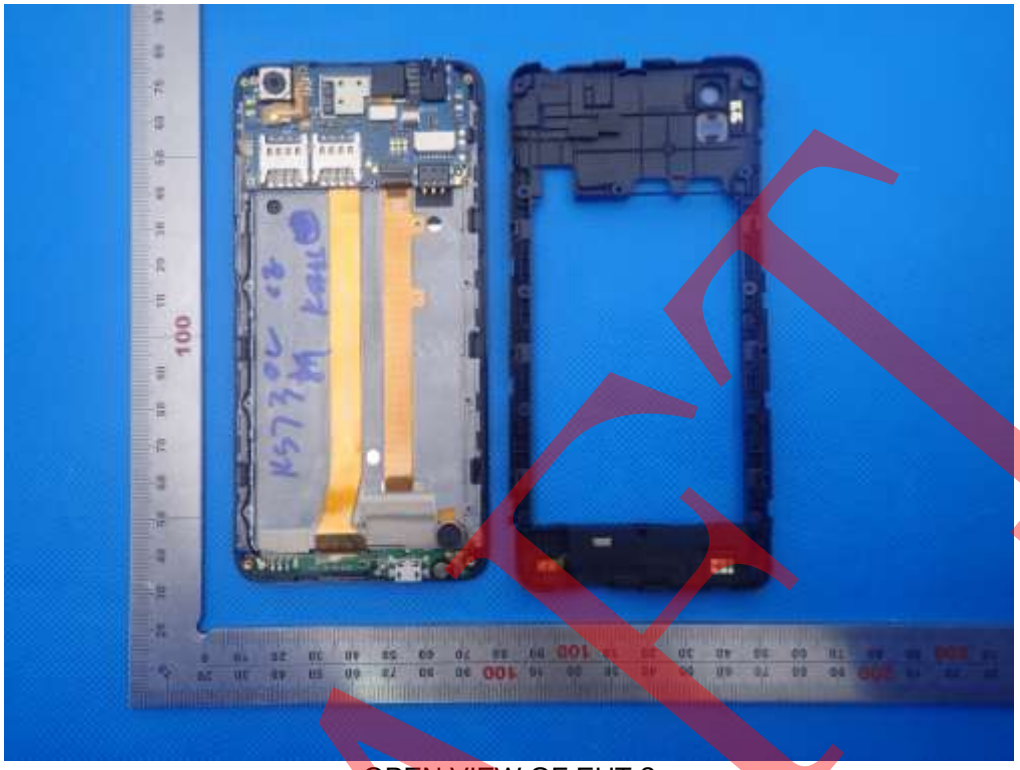


RIGHT VIEW OF EUT



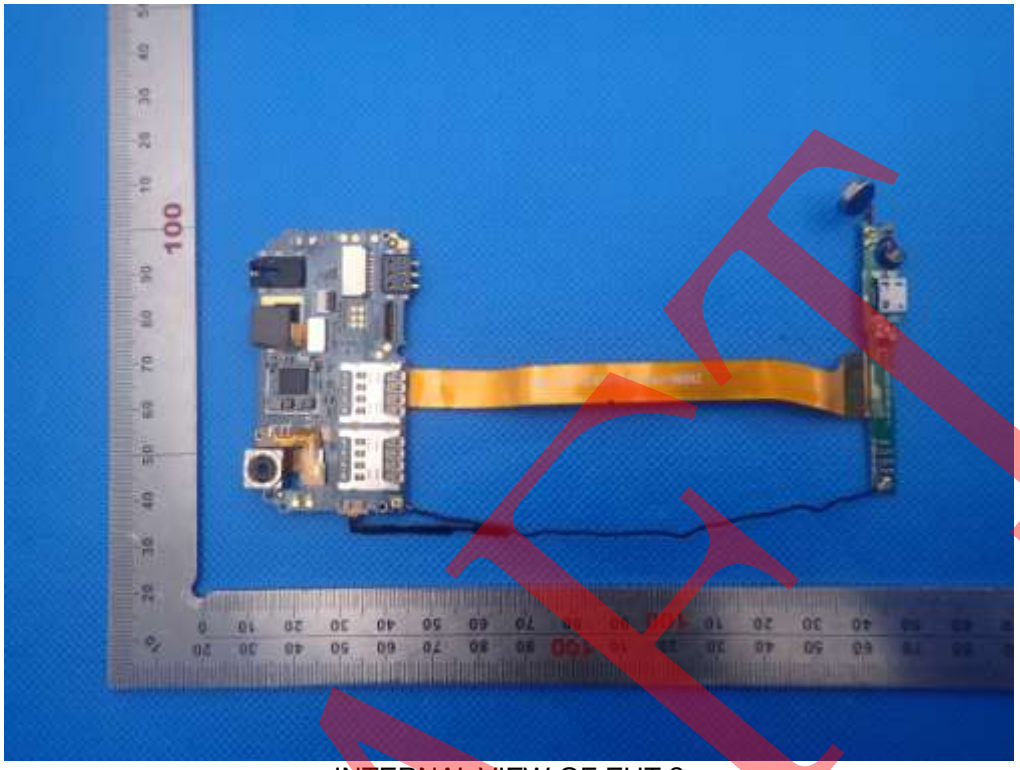
OPEN VIEW OF EUT-1

OPEN VIEW OF EUT-2

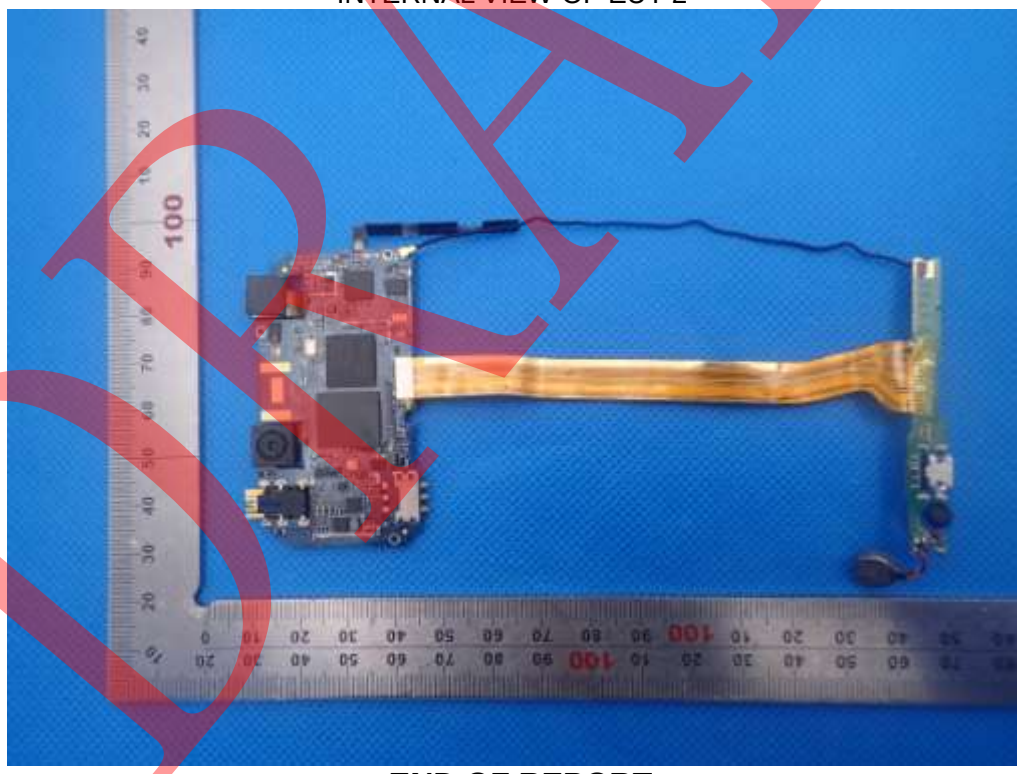


OPEN VIEW OF EUT-3

INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



----END OF REPORT----