RF Test Report

Report No.: AGC00552190801EE11

PRODUCT DESIGNATION	:	Smart Phone
BRAND NAME	:	CUBOT
MODEL NAME	:	R15 PRO
APPLICANT	:	Shenzhen Huafurui Technology Co., Ltd.
DATE OF ISSUE	:	Aug. 22, 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	/	Aug. 22, 2019	Valid	Initial release

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1. TEST RESULT CERTIFICATION

Applicant	Shenzhen Huafurui Technology Co., Ltd.
Address	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
Manufacturer	Shenzhen Huafurui Technology Co., Ltd.
Address	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
Factory Name	Shenzhen Huafurui Technology Co., Ltd.
Address	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
Product Designation	Smart Phone
Brand Name	CUBOT
Test Model	R15 PRO
Date of test	Aug. 06, 2019~Aug. 22, 2019
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 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.

Prepared By	Donjon Huang (Project Engineer)	Aug. 22, 2019
Reviewed By	Max Zhang (Reviewer)	Aug. 22, 2019
Approved By	Forrest Lei Authorized Officer	Aug. 22, 2019

2. TECHNICAL INFORMATION

2.1 EUT DESCRIPTION

Operating Frequency Range(s)	2402MHz~2480MHz
Bluetooth Version	V4.2
Modulation	☐ Basic Rate(GFSK) ☐ EDR (PI/4-DQPSK) ☐ EDR(8-DPSK) ☒ BLE(GFSK)
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.)	-6.39dBm
Hardware Version	V625_MB_V2.0
Software Version	CUBOT_R15_PRO_9031C-1_V01_20190730
Antenna designation	PIFA antenna
Antenna gain	0dBi
Nominal voltages	DC 3.8V by battery
Extreme Temperature	Low Temperature (TL) = -10°C High Temperature (TH) = +40°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.
8. The maximum temperature of 40 is not a standard requirement and is measured according to the maximum service temperature stated by the manufacturer.

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;

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.

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.	S/N	Calibration Date	Calibration Due.
SIGNAL ANALYZER	Agilent	N9020A	MY52090123	Sep. 21, 2018	Sep. 20, 2019
SIGNAL GENERATOR	Agilent	N5182A	MY50140530	Sep. 21, 2018	Sep. 20, 2019
SIGNAL GENERATOR	Agilent	E8257D	MY45141029	Sep. 21, 2018	Sep. 20, 2019
USB Wideband Power Sensor	Agilent	U2021XA	MY54110007	Sep. 21, 2018	Sep. 20, 2019
USB Wideband Power Sensor	Agilent	U2021XA	MY54110009	Sep. 21, 2018	Sep. 20, 2019
USB Wideband Power Sensor	Agilent	U2021XA	MY54110014	Sep. 21, 2018	Sep. 20, 2019
USB Wideband Power Sensor	Agilent	U2021XA	MY54110012	Sep. 21, 2018	Sep. 20, 2019
USB Simultaneous Sampling Multifunction DAQ	Agilent	U2531A	MY5211038	Sep. 21, 2018	Sep. 20, 2019
2.4 GHz Filter	Micro-Tronics	BRM50702	017	Feb. 27, 2019	Feb. 26, 2020
VECTOR ANALYZER	Agilent	E4440A	MY44303916	June 12, 2019	June 11,2020
Trilog-Broadband Antenna	SCHWARZBEK	VULB 9168	VULB 9168-492	Mar. 01, 2018	Feb. 28, 2020
Trilog-Broadband Antenna	SCHWARZBEK	VULB 9168	VULB 9168-494	Mar. 01, 2018	Feb. 28, 2020
Amplifier	EM	EM30180	060552	June 12, 2019	June 11,2020
Horn Antenna	EM	EM-AH-10180	67	Mar. 01, 2018	Feb. 28, 2020
HORN ANTENNA	ETS	3117	00034609	Mar. 01, 2018	Feb. 28, 2020
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	#768	Mar. 01, 2018	Feb. 28, 2020
Horn Ant (18G-40GHz)	ETS	QWH_SL_18_40_K_SG	N/A	Mar. 01, 2018	Feb. 28, 2020

UNIVERSAL RADIO COMMUNICATION TESTER	R&S	CMW500	120909	July.13, 2018	July.12, 2019
Adjustable attenuator	warison	WATT-6SR1211（1dB, 10dB）	N/A	June 12, 2019	June 11,2020
Attenuator	Weinachel Corp	58-30-33（30dB）	N/A	June 12, 2019	June 11,2020
Power divider	Mini-Circults	SF781901412	ZFRSX-183-S+	July.11, 2019	July.10, 2020
Directional Coupler	Werlatone	C5571-10	99463	June 12, 2019	June 11,2020

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 %

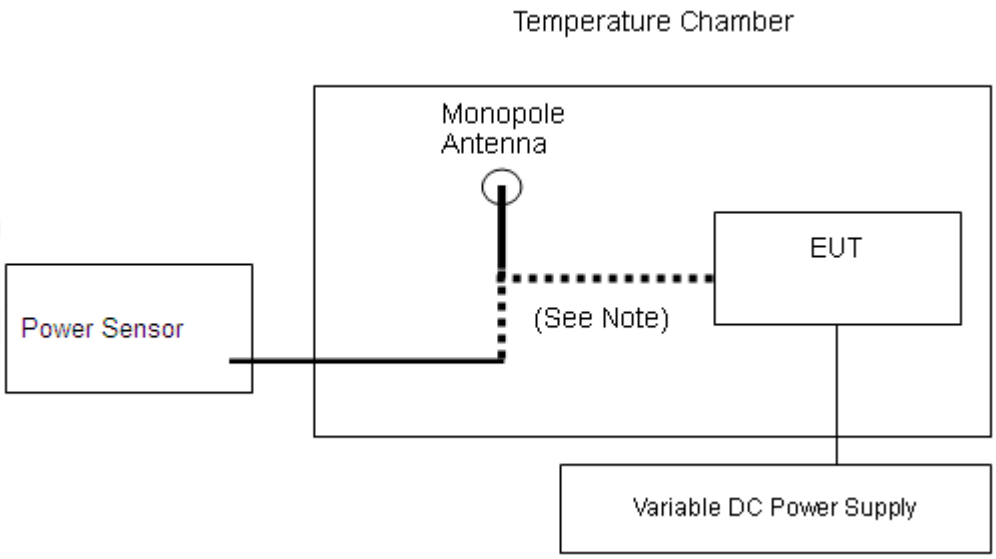
4. ETSI EN 300 328 REQUIREMENTS

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) 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.

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

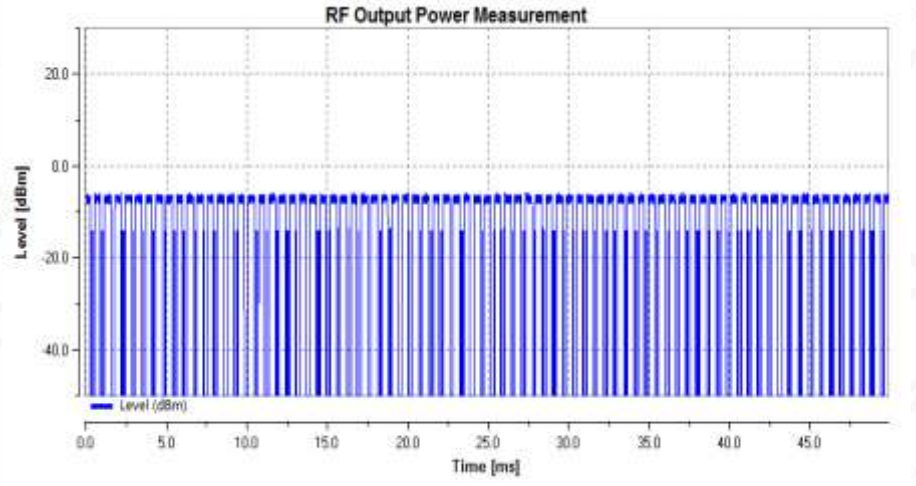
TEST RESULTS

Operation Mode:	TX	Test Date:	Aug. 19, 2019
Temperature:	24.1°C	Tested by:	Donjon
Humidity:	52.9% RH		
Number of Burst		= 10	
Measurement Time		= 45.53ms	

TEST CONDITIONS	RF OUTPUT POWER (dBm)		
	Temp (25)°C	Temp (-10)°C	Temp (40)°C
CHANNEL	DC 3.8V	DC 3.8V	DC 3.8V
Low Channel TX	-6.94	-7.05	-7.23
Middle Channel TX	-6.96	-7.11	-7.26
High Channel TX	**-6.39**	-6.42	-6.57
Limit	20dBm		

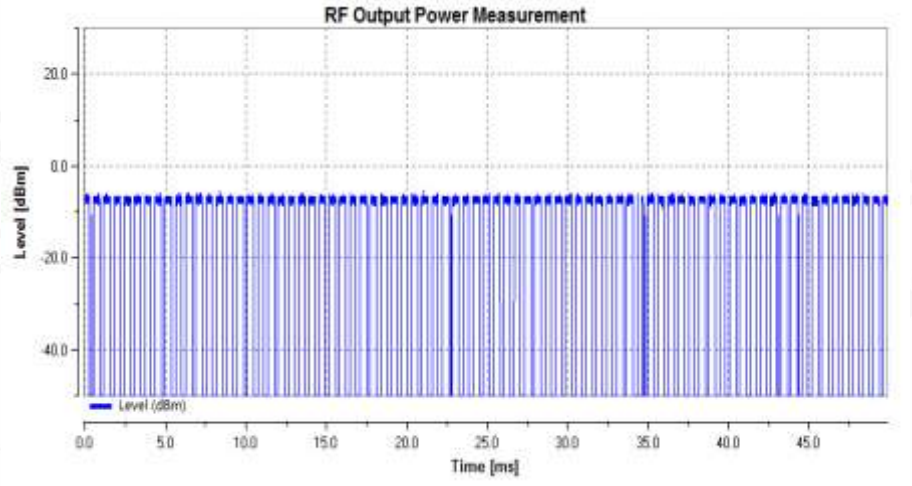
1*BLE:CH Low-2402: (Temp - Normal)

Channel	Voltage	Conducted Power (dBm)	EIRP (dBm)
CH Low-2402	Normal	-6.94	-6.94



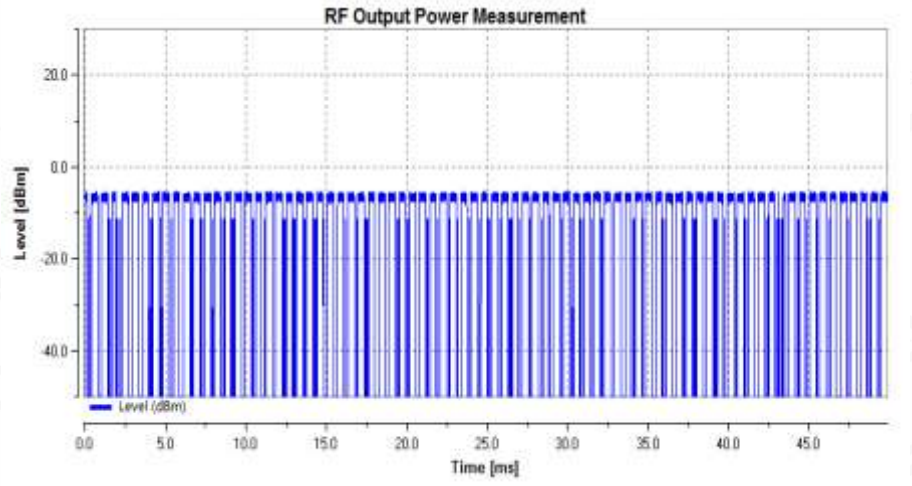
2*BLE:CH Mid-2440: (Temp - Normal)

Channel	Voltage	Conducted Power (dBm)	EIRP (dBm)
CH Mid-2440	Normal	-6.96	-6.96



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

Channel	Voltage	Conducted Power (dBm)	EIRP (dBm)
CH High-2480	Normal	-6.39	-6.39



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

Conclusion: PASS

4.2. POWER SPECTRAL DENSITY
EN 300 328 Clause 4.3.2.3

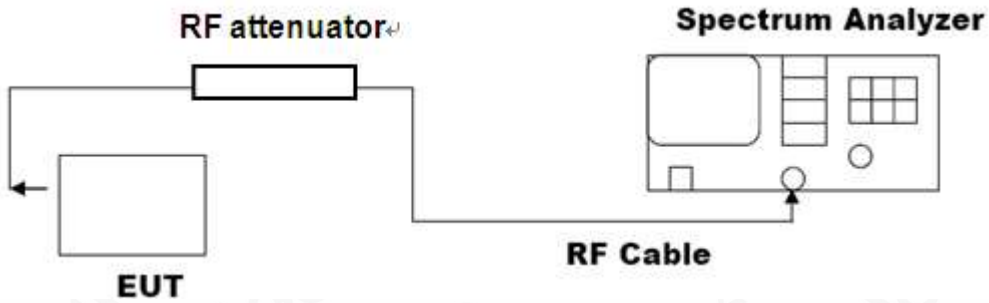
4.2.1 LIMIT

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.

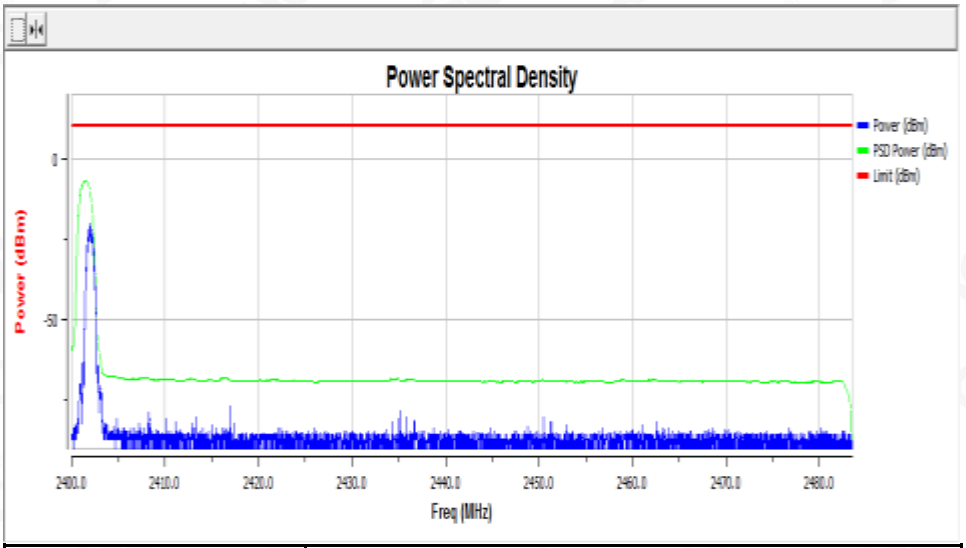
4.2.3 TEST CONFIGURATION



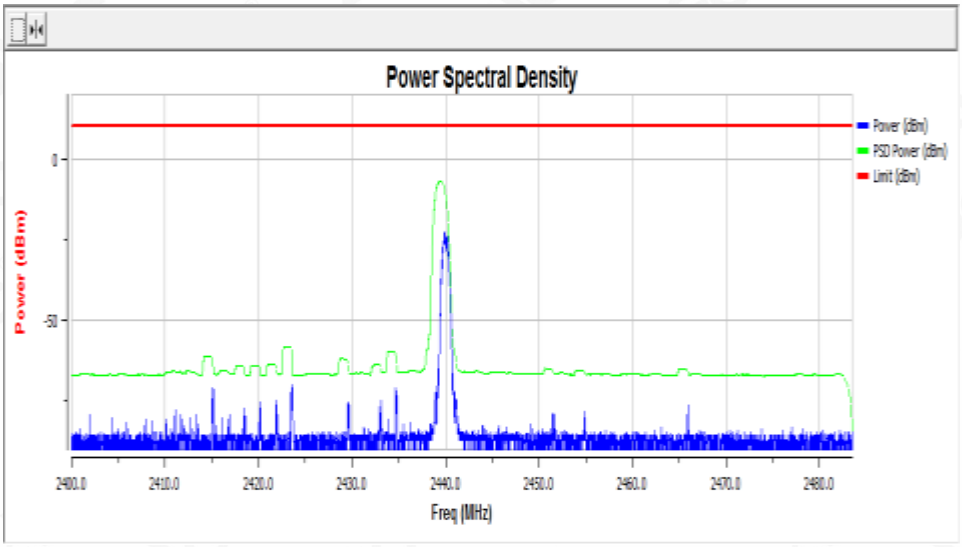
TEST RESULTS

PEAK POWER DENSITY			
Channel Tested	**Power Density (dBm/MHz)**	**Test Limit (dBm/MHz)**	**Pass / Fail**
Low Channel TX	-6.96	10	Pass
Middle Channel TX	-6.98	10	Pass
High Channel TX	-6.41	10	Pass

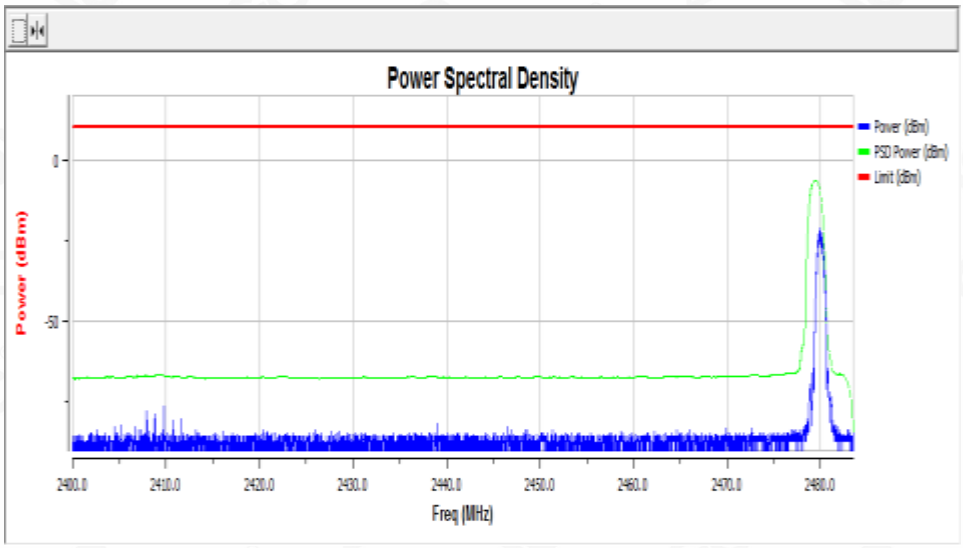
Channel	Max Power Spectral Density Level (dBm)
CH Low-2402	-6.96



Channel	Max Power Spectral Density Level (dBm)
CH Mid-2440	-6.98



Channel	Max Power Spectral Density Level (dBm)
CH High-2480	-6.41



4.3 OCCUPIED CHANNEL BANDWIDTH

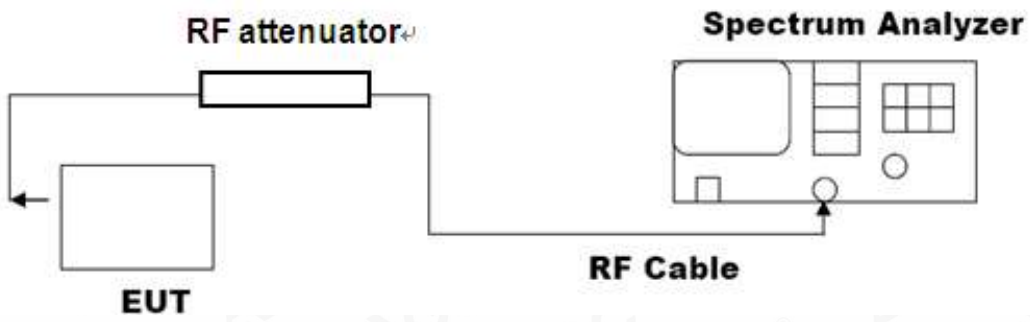
4.3.1 LIMIT

The Occupied Channel Bandwidth shall fall completely within the band 2400MHz to 2483.5MHz.

4.3.2 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×RBW
Span: 2×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.

4.3.3 TEST CONFIGURATION



TEST RESULT

TEST ITEM	OCCUPIED CHANNEL BANDWIDTH
TEST MODE	GFSK MODULATION

MEASUREMENT RESULT		
Test Data (MHz)		**Criteria**
Low Channel	0.939	PASS
High Channel	0.939	PASS

4.4 TRANSMITTER UNWANTED EMISSIONS IN THE OUT OF BAND DOMAIN

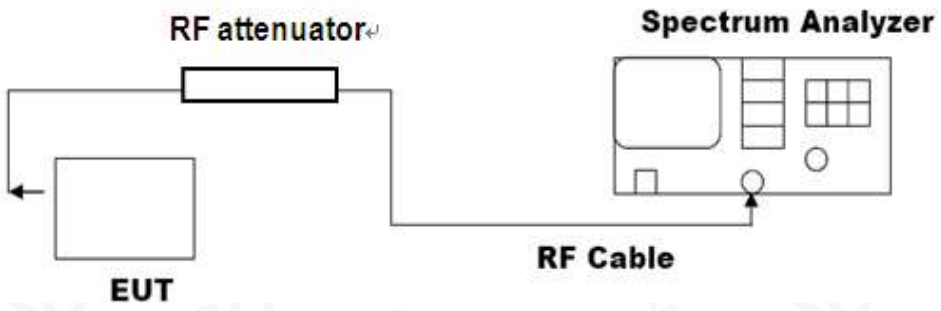
4.4.1 LIMIT

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask.

4.4.2 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.

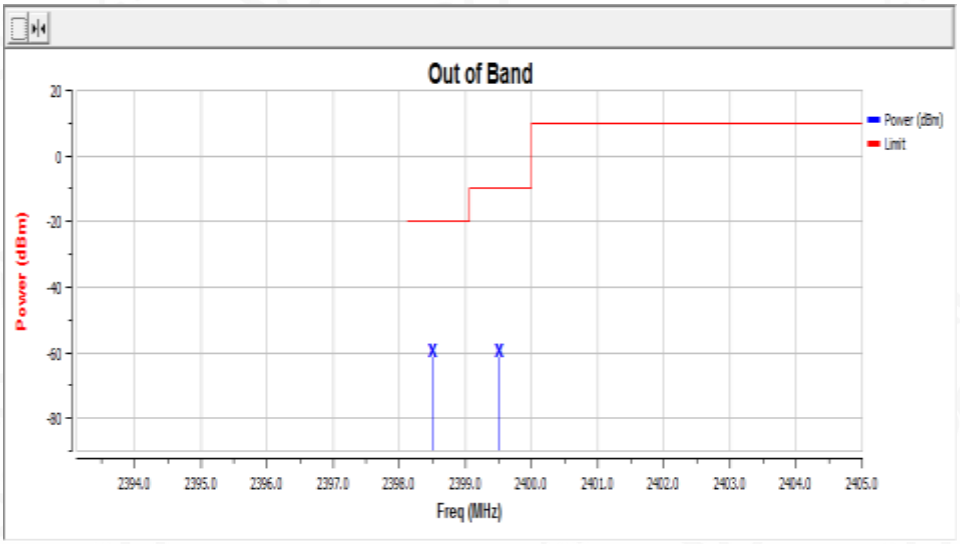
4.4.3 TEST CONFIGURATION



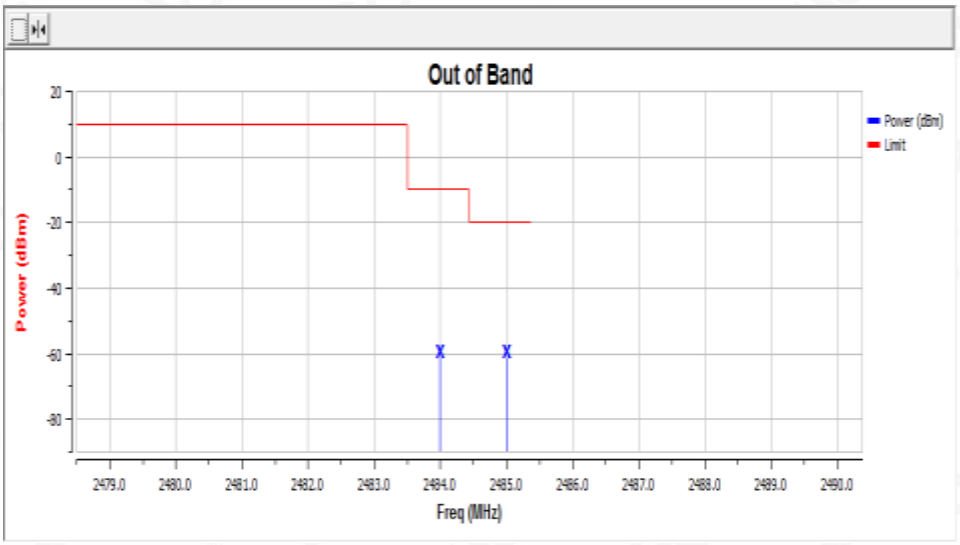
TEST RESULT

NORMAL TEMPERATURE

Channel	Antenna	Frequency	Level	Limit
CH Low-2402	Antenna 1	2399.5	-61.47	-10
CH Low-2402	Antenna 1	2398.5	-61.49	-20



Channel	Antenna	Frequency	Level	Limit
CH High-2480	Antenna 1	2484	-61.41	-10
CH High-2480	Antenna 1	2485	-61.5	-20



Note: All the modes had been tested, but only the worst data recorded in the report.
Conclusion: PASS

4.5 TRANSMITTER SPURIOUS EMISSIONS

4.5.1 LIMIT

Frequency range	Maximum power, e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

4.5.2 TEST PROCEDURE

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

2)Spectrum analyzersettings:

Resolution bandwidth: 100 kHz

Video bandwidth: 300 kHz

Detector mode: Peak

Sweep Points: ≥19 400

Trace Mode: Max Hold

3)Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using RMS detector and compared to the limits.

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

5) Resolution bandwidth: 1 MHz

Video bandwidth: 3 MHz

Detector mode: Peak

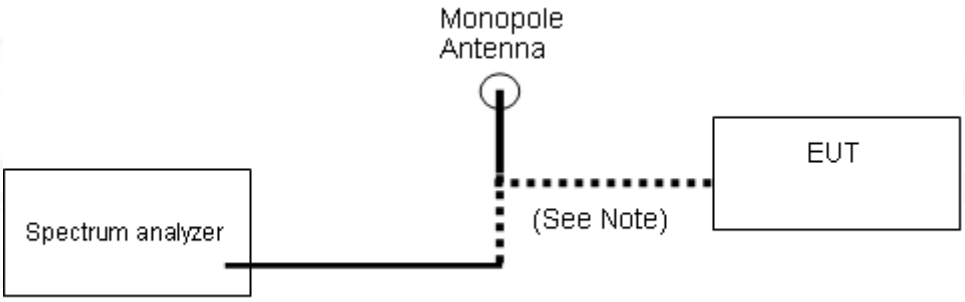
Trace Mode: Max Hold

Sweep Points: ≥23 500

6) Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using RMS detector and compared to the limits.

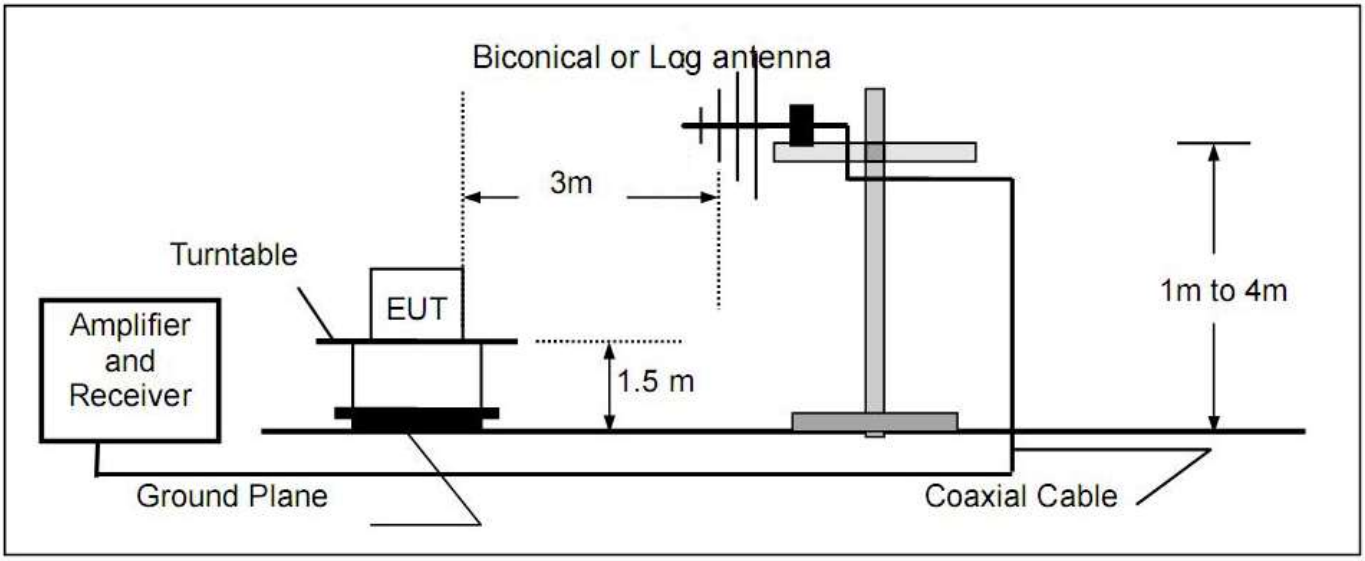
7) For radiated method, the applicable measurement procedures as described in the EN 300 328 V2.1.1 annex C.2 and C.4 are used.

4.5.3 TEST CONFIGURATION

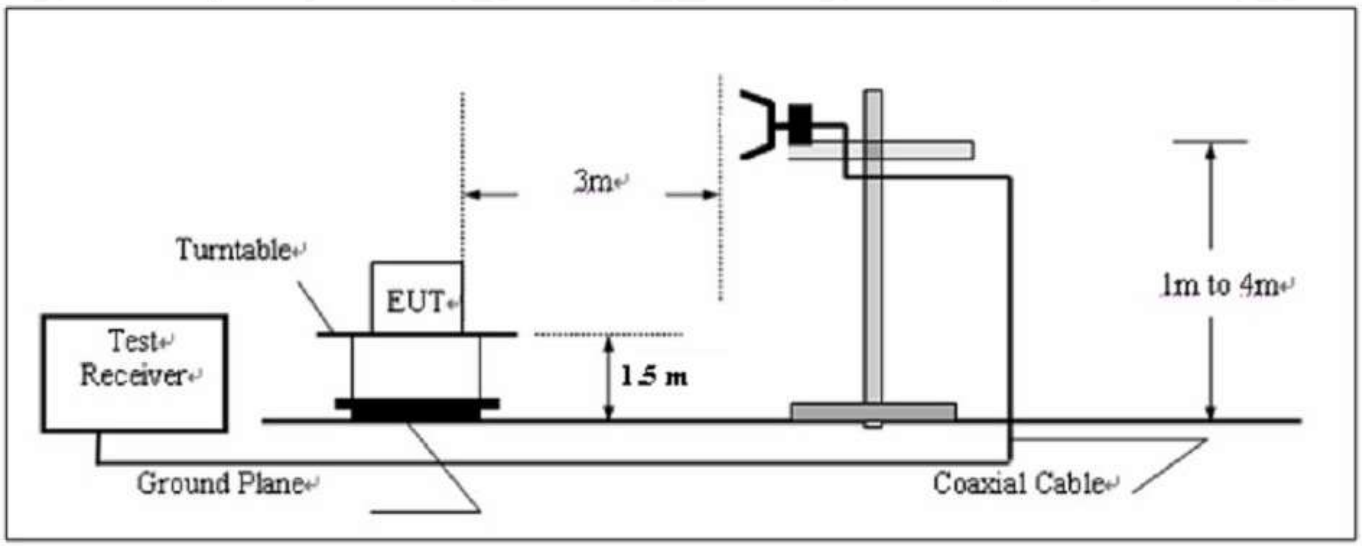


Conducted Method

Below 1GHz



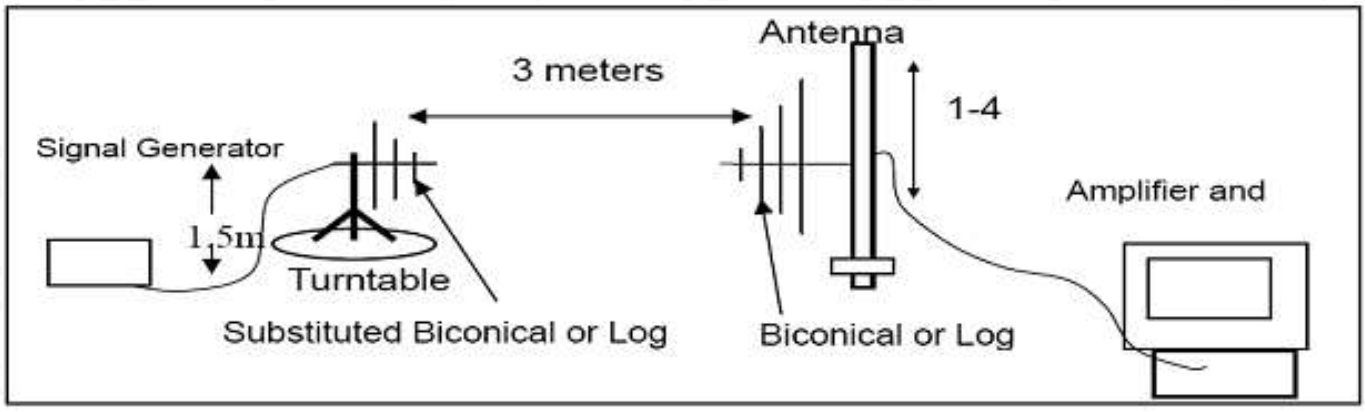
Above 1GHz



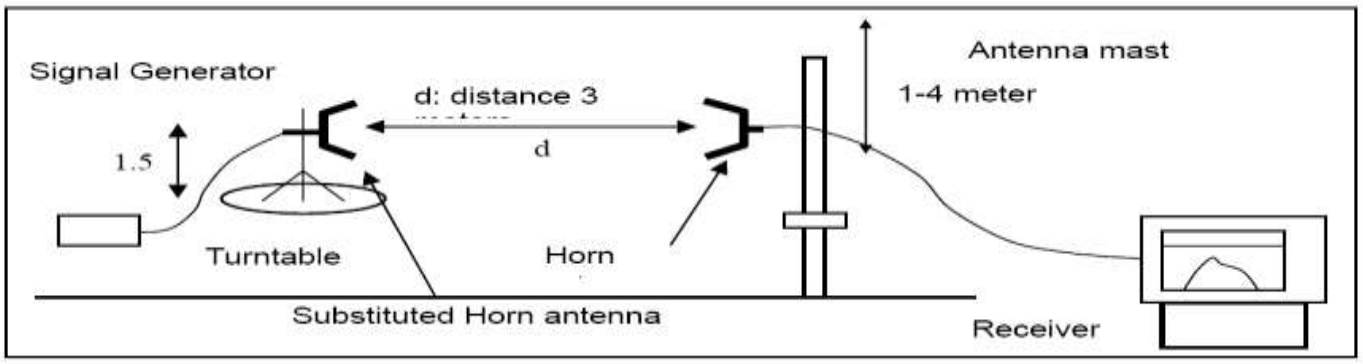
Radiated Method

SUBSTITUTION METHOD: (RADIATED EMISSIONS)

RADIATED BELOW 1GHZ

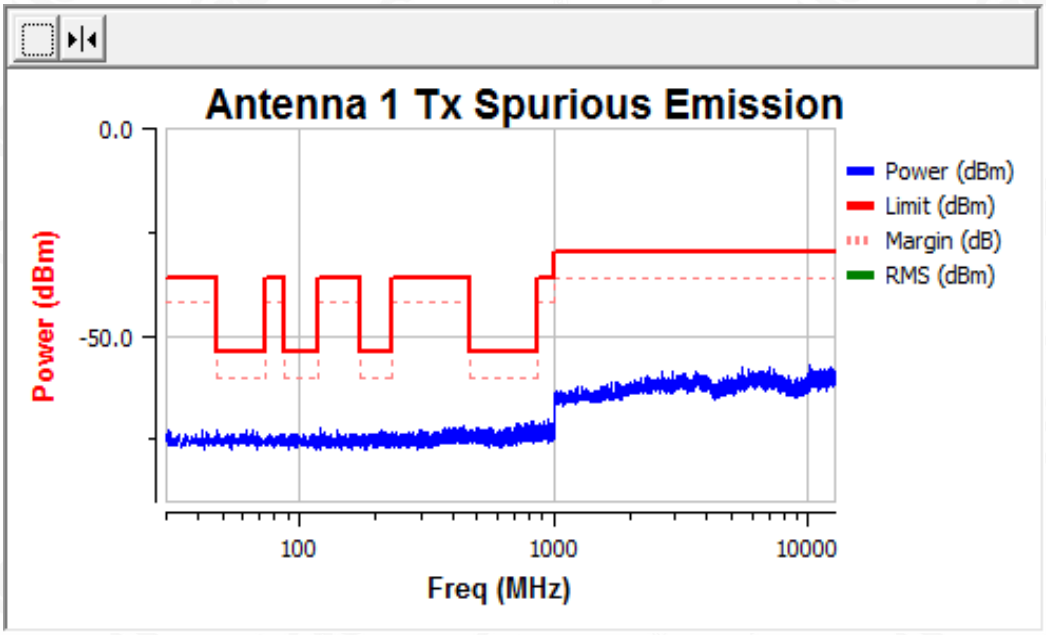


RADIATED ABOVE 1 GHZ



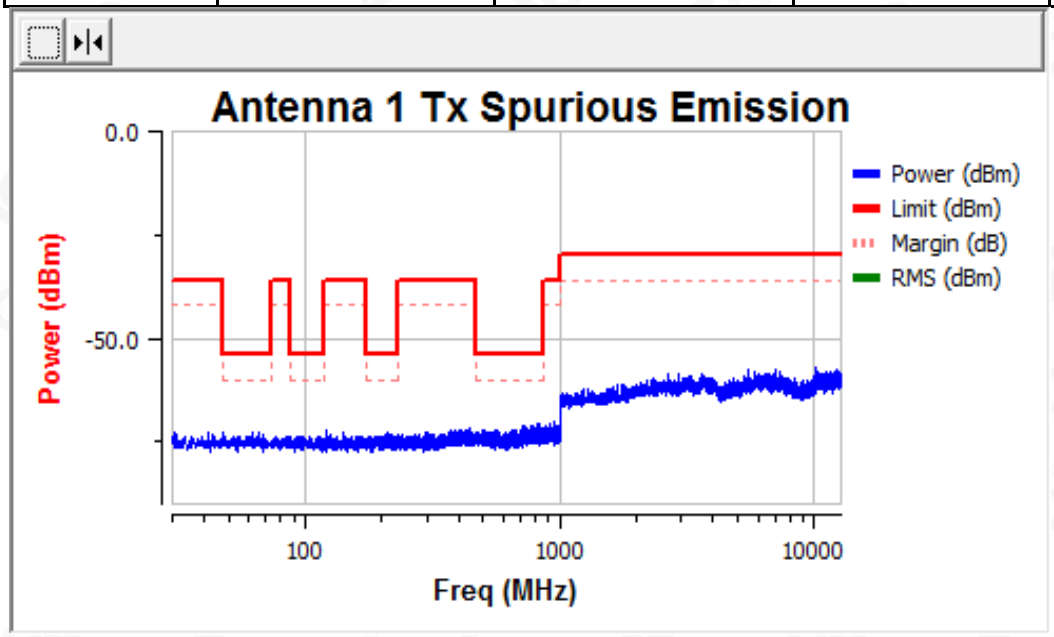
CONDUCTED RESULTS: (Low channel)

Freq	RMS Level (dBm)	Limit (dBm)	Over Limit (dB)	Status
827.404	-70.34	-54.00	-16.34	Pass
10179.000	-56.53	-30.00	-26.53	Pass



(High channel)

Freq	RMS Level (dBm)	Limit (dBm)	Over Limit (dB)	Status
775.742	-70.68	-54.00	-16.68	Pass
11622.000	-57.26	-30.00	-27.26	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.

RADIATED MEASUREMENT

(Worst Case: 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/m)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
84.51	30.41	V	-60.87	0.48	0.54	-60.81	-36.00	24.81
130.29	30.47	V	-61.16	0.49	0.10	-61.55	-36.00	25.55
239.97	31.58	V	-66.36	0.52	6.60	-60.28	-36.00	24.28
326.48	30.86	V	-66.07	0.53	6.10	-60.50	-36.00	24.50
334.29	31.19	V	-64.37	0.53	5.94	-58.96	-36.00	22.96
827.48	31.93	V	-65.25	0.66	6.45	-59.46	-54.00	5.46
Other(30-1000)	--	V	--	--	--	--	-36.00/-54.00	--
83.80	31.94	H	-58.65	0.48	0.38	-58.75	-36.00	22.75
131.67	31.08	H	-60.27	0.49	0.08	-60.68	-36.00	24.68
243.20	29.70	H	-68.01	0.52	6.78	-61.75	-36.00	25.75
326.20	31.32	H	-64.42	0.53	6.10	-58.85	-36.00	22.85
735.32	30.73	H	-65.85	0.59	6.60	-59.84	-54.00	5.84
828.03	31.33	H	-65.12	0.66	6.40	-59.38	-54.00	5.38
Other(30-1000)	--	H	--	--	--	--	-36.00/-54.00	--

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)
4804.56	45.93	V	-48.37	2.64	9.30	-41.70	-30.00	11.70
7328.67	30.99	V	-57.79	3.11	11.45	-49.46	-30.00	19.46
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
Other(1000-12750)	--	V	--	--	--	--	-30.00	--
4804.10	41.36	H	-49.19	2.64	9.30	-42.52	-30.00	12.52
7246.95	30.34	H	-58.07	3.13	11.34	-49.87	-30.00	19.87
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
Other(1000-12750)	--	H	--	--	--	--	-30.00	--

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

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.

(Worst Case: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/m)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
92.75	30.59	V	-60.11	0.48	1.56	-59.03	-54.00	5.03
145.56	30.75	V	-62.09	0.49	0.30	-62.28	-36.00	26.28
242.89	31.13	V	-66.36	0.52	6.72	-60.16	-36.00	24.16
343.96	30.25	V	-67.40	0.53	5.64	-62.29	-36.00	26.29
386.10	30.84	V	-67.57	0.54	6.44	-61.67	-36.00	25.67
864.43	31.83	V	-65.94	0.68	5.72	-60.90	-36.00	24.90
Other(30-1000)	--	V	--	--	--	--	-36.00/-54.00	--
92.99	32.22	H	-61.17	0.48	1.56	-60.09	-54.00	6.09
146.14	30.74	H	-59.25	0.49	0.38	-59.36	-36.00	23.36
252.83	29.80	H	-65.57	0.52	7.18	-58.91	-36.00	22.91
336.23	30.98	H	-65.03	0.53	5.86	-59.70	-36.00	23.70
647.82	30.87	H	-65.20	0.59	7.17	-58.62	-54.00	4.62
720.41	30.78	H	-64.51	0.58	6.30	-58.79	-54.00	4.79
Other(30-1000)	--	H	--	--	--	--	-36.00/-54.00	--

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)
4960.19	45.83	V	-49.05	2.75	9.62	-42.18	-30.00	12.18
7328.42	31.32	V	-66.33	3.11	11.45	-57.99	-30.00	27.99
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
Other(1000-12750)	--	V	--	--	--	--	-30.00	--
4960.48	41.56	H	-47.83	2.75	9.62	-40.96	-30.00	10.96
7246.79	30.57	H	-69.72	3.13	11.34	-61.51	-30.00	31.51
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
Other(1000-12750)	--	H	--	--	--	--	-30.00	--

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

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

4.6 RECEIVER SPURIOUS EMISSIONS

4.6.1 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

4.6.2 TEST PROCEDURE

1)The emissions over the range 30 MHz to 1 000 MHz shall be identified.
2)Spectrum analyzersettings:
Resolution bandwidth: 100 kHz
Video bandwidth: 300 kHz
Detector mode: Peak
Sweep Points: ⩾19 400
Trace Mode: Max Hold
3)Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using RMS detector and compared to the limits given in 5.7.1.
4) The emissions over the range 1 GHz to 12.75 GHz shall be identified.
5) Resolution bandwidth: 1 MHz
Video bandwidth: 3 MHz
Detector mode: Peak
Trace Mode: Max Hold
Sweep Points: ⩾23200
6) Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using RMS detector and compared to the limits given in 5.7.1.
7) For radiated method, the applicable measurement procedures as described in the EN 300 328 V2.1.1 annex C.2 and C.4 are used.

4.6.3 TEST CONFIGURATION

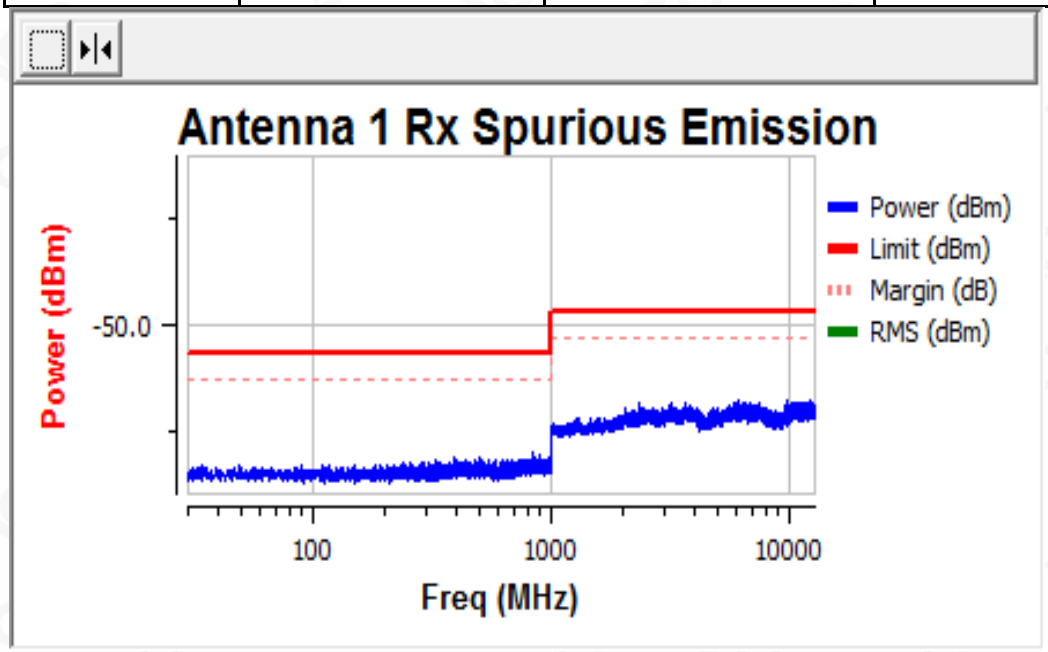
Refer to 4.5.3

CONDUCTED MEASUREMENT

TEST RESULTS FOR CONDUCTED METHOD

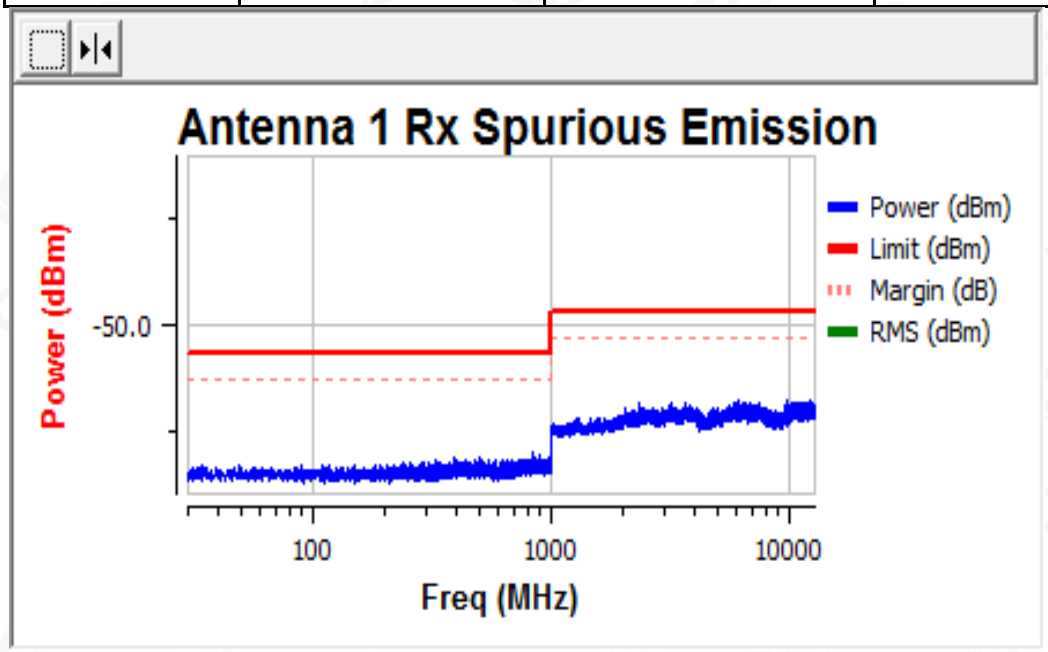
RECEIVER MODE: (Low channel)

Freq	RMS Level (dBm)	Limit (dBm)	Over Limit (dB)	Status
832.366	-79.62	-57.00	-22.62	Pass
10392.000	-67.62	-47.00	-20.62	Pass



(High channel)

Freq	RMS Level (dBm)	Limit (dBm)	Over Limit (dB)	Status
901.541	-80.46	-57.00	-23.46	Pass
10559.000	-66.91	-47.00	-19.91	Pass



Note: 1. All the modes had been test but only the worst data record in the report..

RADIATED MEASUREMENT
(Worst Case: 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/m)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
114.50	30.69	V	-72.32	0.48	1.40	-71.40	-57.00	14.40
176.98	31.61	V	-73.61	0.51	2.88	-71.24	-57.00	14.24
229.23	29.59	V	-77.91	0.52	6.84	-71.59	-57.00	14.59
496.74	30.68	V	-76.98	0.56	7.04	-70.50	-57.00	13.50
664.59	30.65	V	-76.87	0.59	6.98	-70.48	-57.00	13.48
879.70	30.49	V	-76.14	0.69	5.87	-70.97	-57.00	13.97
Other(30-1000)	--	V	--	--	--	--	-57.00	--
84.21	31.88	H	-70.92	0.48	0.54	-70.86	-57.00	13.86
110.20	30.55	H	-72.20	0.48	1.40	-71.28	-57.00	14.28
219.35	30.84	H	-77.42	0.52	7.38	-70.56	-57.00	13.56
485.34	30.74	H	-77.23	0.56	7.00	-70.79	-57.00	13.79
554.51	30.62	H	-79.90	0.57	6.78	-73.69	-57.00	16.69
635.05	31.21	H	-78.98	0.58	7.20	-72.36	-57.00	15.36
Other(30-1000)	--	H	--	--	--	--	-57.00	--

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)
4947.65	28.77	V	-70.01	2.74	9.58	-63.16	-47.00	16.16
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
Other(1000-12750)	--	V	--	--	--	--	-47.00	--
4953.05	29.74	H	-68.50	2.74	9.60	-61.65	-47.00	14.65
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
Other(1000-12750)	--	H	--	--	--	--	-47.00	--

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

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.

(Worst Case: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/m)	Polarization	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
114.50	30.69	V	-72.32	0.48	1.40	-71.40	-57.00	14.40
176.98	31.61	V	-73.61	0.51	2.88	-71.24	-57.00	14.24
229.23	29.59	V	-77.91	0.52	6.84	-71.59	-57.00	14.59
496.74	30.68	V	-76.98	0.56	7.04	-70.50	-57.00	13.50
664.59	30.65	V	-76.87	0.59	6.98	-70.48	-57.00	13.48
879.70	30.49	V	-76.14	0.69	5.87	-70.97	-57.00	13.97
Other(30-1000)	--	V	--	--	--	--	-57.00	--
84.21	31.88	H	-70.92	0.48	0.54	-70.86	-57.00	13.86
110.20	30.55	H	-72.20	0.48	1.40	-71.28	-57.00	14.28
219.35	30.84	H	-77.42	0.52	7.38	-70.56	-57.00	13.56
485.34	30.74	H	-77.23	0.56	7.00	-70.79	-57.00	13.79
554.51	30.62	H	-79.90	0.57	6.78	-73.69	-57.00	16.69
635.05	31.21	H	-78.98	0.58	7.20	-72.36	-57.00	15.36
Other(30-1000)	--	H	--	--	--	--	-57.00	--

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)
4947.65	28.77	V	-70.01	2.74	9.58	-63.16	-47.00	16.16
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
--	--	V	--	--	--	--	--	--
Other(1000-12750)	--	V	--	--	--	--	-47.00	--
4953.05	29.74	H	-68.50	2.74	9.60	-61.65	-47.00	14.65
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
--	--	H	--	--	--	--	--	--
Other(1000-12750)	--	H	--	--	--	--	-47.00	--

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

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

4.7 RECEIVER BLOCKING

4.7.1 LIMIT

Receiver Blocking parameters for Receiver Category 3 equipment

Table 8: 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 4.3.1.12.3 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.

4.7.2 TEST PROCEDURE

1)The UUT shall be set to the lowest operating channel.

2)The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

3)With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in the Test Set-up. The attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria is still met. The resulting level for the wanted signal at the input of the UUT is Pmin.

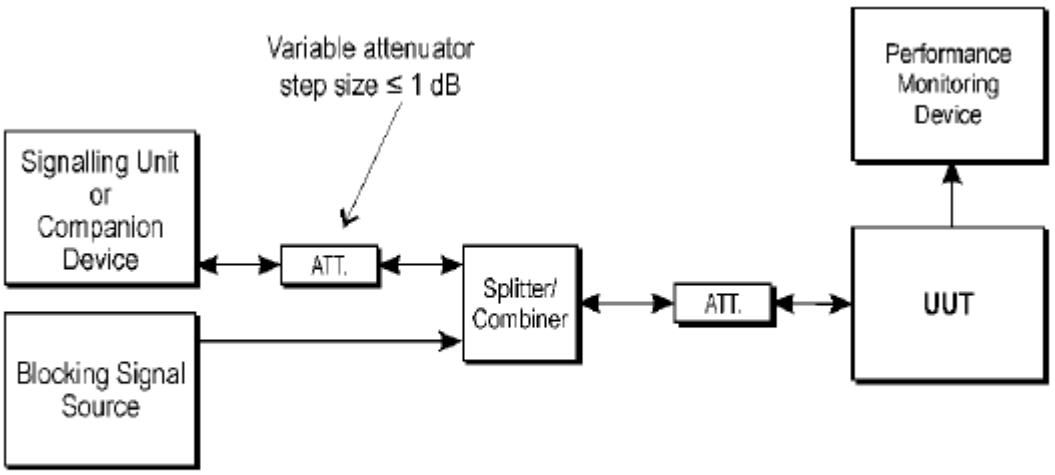
This signal level (Pmin) is increased by the value provided in the table corresponding to the receiver category and type of equipment.

4) The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment. It shall be verified and recorded in the test report that the performance criteria is met.

5) Repeat step 4 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

6)Repeat step 2 to step 5 with the UUT operating at the highest operating channel.

4.7.3 TEST CONFIGURATION



Test Set-up for receiver blocking

4.7.4TEST RESULT

GFSK mode

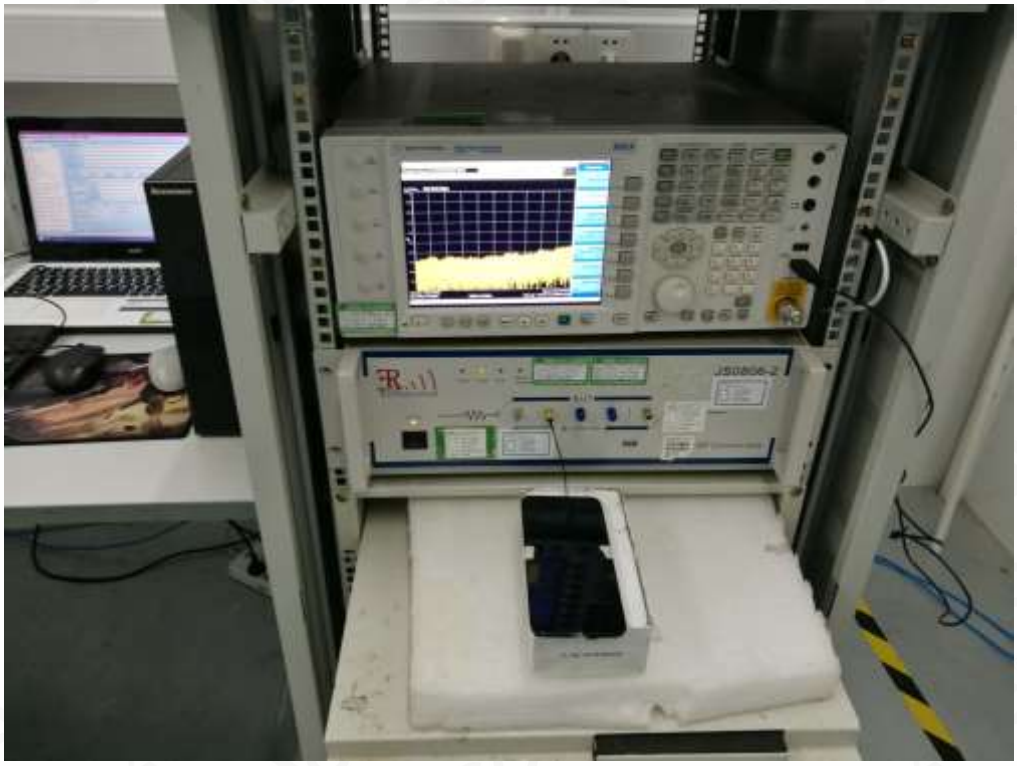
Wanted Signal Power (dBm)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Test Result (PER)	Limit (PER)	Result
$P_{(-82.3)}$+12dB	2380	-57	0.23%	10%	Pass
$P_{(-82.3)}$+12dB	2503.5	-57	0.65%	10%	Pass
$P_{(-82.3)}$+12dB	2300	-47	0.00%	10%	Pass
$P_{(-82.3)}$+12dB	2583.5	-47	1.05%	10%	Pass

APPENDIX A: PHOTOGRAPHS OF THE TEST SETUP

RADIATED SPURIOUS EMISSION TEST SETUP

RADIATED SPURIOUS EMISSION-ABOVE 1G TEST SETUP

CONDUCTED TEST SETUP



----END OF REPORT----