

Test Report

Product name: 2T2R Wi-Fi + Bluetooth Module

Trademark: n.a.

Model no......: T7663B2

Series Model(s).: n.a.

FCC ID.....: 2ANM3T7663B2

IC: 23165-T7663B2

HVIN: T7663B2

Report No: C241224099-RF01

Test Standards: CFR47 FCC Part 15: Subpart C Section 15.247
CFR47 FCC Part 15: Subpart C Section 15.207
CFR47 FCC Part 15: Subpart C Section 15.209
RSS-247 Issue 3
RSS-Gen Issue 5

Applicant: Shenzhen Chuangwei-RGB Electronics Co., Ltd.

Address of applicant: 13F-16F, Unit A, Skyworth Building, Shennan Road,
Nanshan District, Shenzhen, Guangdong, China.

Manufacturer.....: Shenzhen Chuangwei-RGB Electronics Co., Ltd.

Manufacturer Address.....: 13F-16F, Unit A, Skyworth Building, Shennan Road,
Nanshan District, Shenzhen, Guangdong, China.

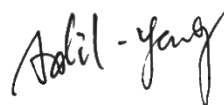
Date of Test Date.....: Dec 24, 2024 to Jan 14, 2025

Date of issue.: Apr 15, 2025

Test result.....: Compliance

Prepared By

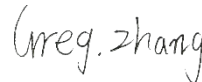
:



Adil Yang/Engineer

Reviewed By

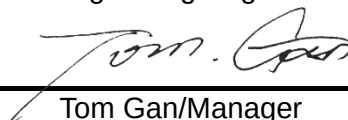
:



Greg Zhang/Engineer

Approved By

:



Tom Gan/Manager

The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of testing engineers, reviewer and approver. Any objections must be raised to CSIC within 15 days since the date when the report is received. It will not be taken into consideration beyond this limit.

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	Apr.15, 2025	Initial Issue	ALL	Adil Yang

Table of Contents

	Page
1. TEST SUMMARY	4
1.1. TEST DESCRIPTION	4
1.2. TEST FACILITY	5
1.3. MEASUREMENT UNCERTAINTY	5
2. GENERAL INFORMATION	6
2.1. GENERAL DESCRIPTION OF EUT	6
2.2. DESCRIPTION OF TEST MODES AND TEST FREQUENCY	7
2.3. MEASUREMENT INSTRUMENTS LIST	9
2.4. DESCRIPTION OF THE TEST MODES	11
2.5. TEST SOFTWARE AND POWER LEVEL	11
2.6. BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	12
2.7. DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS	12
2.8. ENVIRONMENTAL CONDITIONS FOR TESTING	12
3. EMC TEST	13
3.1. RADIATED SPURIOUS EMISSION MEASUREMENT	13
3.2. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT	26
3.3. ANTENNA REQUIREMENT	28
4. TEST PHOTOS	29
5. EUT PHOTOS	30

1. TEST SUMMARY

1.1. TEST DESCRIPTION

Test procedures according to the technical standards:

Item	Clause	Result	Note
Conducted Emission on AC Mains	Part 15.207(a) RSS-Gen 8.8	PASS*	
Maximum Conducted Output Power	Part 15.247(b)(3) RSS-247 5.4(d)	PASS*	Note 5
Radiated Spurious Emission	Part 15.247(c) Part 15.205 RSS-247 3.3	PASS	
Conducted Spurious Emissions Measured in 100 kHz Bandwidth	Part 15.247(d) RSS-247 5.5	PASS*	
Carrier Frequency Separation	Part 15.247(a)(1) RSS-247 5.1(b)	PASS*	
Number of Hopping Frequency	Part 15.247(a)(1)(iii) RSS-247 5.1(d)	PASS*	
Time of Occupancy	Part 15.247(a)(1)(iii) RSS-247 5.1(d)	PASS*	
20dB Bandwidth	Part 15.247(a)(1) RSS-247 5.1	PASS*	
99% Bandwidth	RSS-Gen 6.7	PASS*	
Antenna Requirement	Part 15.247(b)(4) Part 15.203	PASS	

Note:

- 1) "PASS*", The manufacturer added an optional antenna. We have retested the Radiated Spurious Emissions item. The other test terms were not affected, thus, the other test data were continued to be referenced. details refer to the original test report C240918049-RF01 published by Shenzhen Central Standard International Center Co., Ltd. on Nov 21,2024.
- 2) All tests are according to ANSI C63.10-2013.
- 3) The statements of test result on the above are decided by the request of test standard only; the measurement uncertainties are not factored into this compliance determination.
- 4) The information of measurement uncertainty is available upon the customer's request.
- 5) Update the EIRP values based on the new antenna specifications.

1.2. TEST FACILITY

Shenzhen Central Standard International Center Co., Ltd. (CSIC)

Room 201, Building 1, Mogen Fashion Industrial Park, No. 10, Shilongzai Road, Xinshi Community, Dalang Street, Longhua District, Shenzhen.

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

CNAS Registration No.: L11671

FCC Registration No.: 0031378433 Designation Number: CN1317

IC CAB identifier: CN0051

A2LA Lab Cert. No.: 6426.01

1.3. MEASUREMENT UNCERTAINTY

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Below is the best measurement capability for Shenzhen Central Standard International Center Co., Ltd.

Test Items	Measurement Uncertainty	Notes
RF output power, conducted	$\pm 1.04\text{dB}$	(1)
Unwanted Emissions, conducted	$\pm 1.38\text{dB}$	(1)
All emissions, radiated 9KHz-30MHz	$\pm 4.44\text{dB}$	(1)
All emissions, radiated 30-1GHz	$\pm 4.56\text{dB}$	(1)
All emissions, radiated 1G-6GHz	$\pm 4.84\text{dB}$	(1)
All emissions, radiated >6G	$\pm 4.84\text{dB}$	(1)
Conducted Emission (9KHz-150KHz)	$\pm 3.22\text{dB}$	(1)
Conducted Emission (150KHz-30MHz)	$\pm 3.24\text{dB}$	(1)

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

2. GENERAL INFORMATION

2.1. GENERAL DESCRIPTION OF EUT

EUT(Product Specifications)	
Product Name:	2T2R Wi-Fi + Bluetooth Module
Model:	T7663B2
Series Model(s):	n.a.
Power supply:	DC 3.3V
Hardware version:	VER 00.03
Software version:	7E7. 09.19
Technical Specification of Bluetooth	
Operating Frequency	2402 - 2480 MHz
Type of Modulation	GFSK, $\pi/4$ DQPSK, 8DPSK
Channel Number	79 channels
Channel Separation	1MHz
Bluetooth Version	Bluetooth 5.1
Antenna Type	PCB Antenna
Max. Antenna Gain	4.30 dBi.

Note:

1. For a more detailed features description, please refer to the manufacture's specifications or the user's manual.
2. Full tests were applied to the sample C241224099-Y01/01 only in this document.

2.2. DESCRIPTION OF TEST MODES AND TEST FREQUENCY

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting mode for testing.

Operation Frequency List for Bluetooth:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
00	2402.00	20	2422.00
01	2403.00	21	2423.00
02	2404.00	22	2424.00
03	2405.00	23	2425.00
04	2406.00	24	2426.00
05	2407.00	25	2427.00
06	2408.00	26	2428.00
07	2409.00	27	2429.00
08	2410.00	28	2430.00
09	2411.00	29	2431.00
10	2412.00	30	2432.00
11	2413.00	31	2433.00
12	2414.00	32	2434.00
13	2415.00	33	2435.00
14	2416.00	34	2436.00
15	2417.00	35	2437.00
16	2418.00	36	2438.00
17	2419.00	37	2439.00
18	2420.00	38	2440.00
19	2421.00	39	2441.00
40	2442.00	60	2462.00
41	2443.00	61	2463.00
42	2444.00	62	2464.00
43	2445.00	63	2465.00
44	2446.00	64	2466.00
45	2447.00	65	2467.00
46	2448.00	66	2468.00
47	2449.00	67	2469.00
48	2450.00	68	2470.00
49	2451.00	69	2471.00
50	2452.00	70	2472.00
51	2453.00	71	2473.00
52	2454.00	72	2474.00
53	2455.00	73	2475.00

54	2456.00	74	2476.00
55	2457.00	75	2477.00
56	2458.00	76	2478.00
57	2459.00	77	2479.00
58	2460.00	78	2480.00
59	2461.00	--	--

GFSK, $\pi/4$ DQPSK, 8DPSK		
Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH00	2402
middle	CH39	2441
highest	CH78	2480

2.3. MEASUREMENT INSTRUMENTS LIST

RF Connected Test					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY50200391	May. 26, 2025
2	Power sensor	KEYSIGHT	U2021XA	MY55080015	May. 26, 2025
3	Power sensor	KEYSIGHT	U2021XA	MY54250016	May. 26, 2025
4	Power sensor	KEYSIGHT	U2021XA	MY54250020	May. 26, 2025
5	Power sensor	KEYSIGHT	U2021XA	MY54210030	May. 26, 2025
6	Vector Signal Generator	Agilent	N5182A	MY50140130	May. 26, 2025
7	Signal generator	Agilent	SML03	100925	May. 26, 2025
8	Power sensor Box	MWRFTest	N/A	N/A	N/A
9	RF Switch Box	MWRFTest	MW100-RFCB	N/A	N/A
10	MTS 8310	MWRFTest	V: 2.0.0.0		

Radiation Test equipment					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI TEST RECEIVER	R&S	ESIB26	100342	May. 26, 2025
2	Amplifier	EMCO	EM330	980204	May. 26, 2025
3	Amplifier	MW	DPA8-1000-18000-1012	8220837	Mar. 06, 2025
4	Amplifier	SKET	LNPA_1840-50	SK201801801	Mar. 05, 2025
5	Loop Antenna	SCHNARZBECK	FMZB1519B	00023	Nov. 12, 2025
6	Bilog Antenna	Sunol Sciences	JB1	n.a.	Jul. 01, 2025
7	Horn Antenna	COMMW	ZAB-1-18G-50	20171109	Jul. 01, 2025
8	Horn Antenna	COM-MW	ZLB7-18-40G-777	3231081	Mar. 26, 2025
9	3M Chamber	Maor	9*6*6	--	Mar. 01, 2026
10	EZ-EMC	Farad	V3.1		

Mains Terminal Disturbance Voltage Test equipment					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESRP3	101936	May. 26, 2025
2	LISN	R&S	ENV216	100002	May. 26, 2025
3	LISN	MEB	NNB 42	--	May. 26, 2025
4	Shelding Room	Maor	8*4*3	--	Mar. 01, 2025
8	EZ-EMC	Fara	V3.1		

Note:

- 1) The cable loss has calculated in test result which connection between each test instruments.

2.4. DESCRIPTION OF THE TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Worst Mode	Description	Data Rate
Mode 1	TX BDR CH00	1 Mbps
Mode 2	TX BDR CH39	1 Mbps
Mode 3	TX BDR CH78	1 Mbps
Mode 4	TX EDR CH00	2 Mbps
Mode 5	TX EDR CH39	2 Mbps
Mode 6	TX EDR CH78	2 Mbps
Mode 7	TX EDR CH00	3 Mbps
Mode 8	TX EDR CH39	3 Mbps
Mode 9	TX EDR CH78	3 Mbps

Note:

- 1) The measurements are performed at the high, middle, low available channels.
- 2) All the bit rate of transmitter have been tested and found the lowest rate is found to be the worst case and recorded.
- 3) This test was performed with EUT in X, Y, Z position and worst case was found when EUT in X position.
- 4) For radiated emission above 1 GHz test, 1GHz-25GHz have been pre-tested and in this report only recorded the worst case. The remaining spurious points are all below the limit value of 20dB.

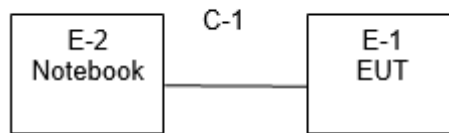
2.5. TEST SOFTWARE AND POWER LEVEL

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

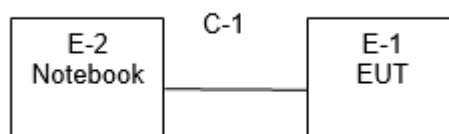
RF Function	Type	Mode Or Modulation type	Ant Gain(dBi)	Power Class	Software For Testing
Bluetooth	BT	GFSK	4.30	7	WCN Combo Tool V.W1942
		$\pi/4$ DQPSK		7	
		8DPSK		7	

2.6. BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

a. Radiated Spurious Emission Test



b. Conducted Emission Test



2.7. DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Necessary accessories					
Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
N/A	N/A	N/A	N/A	N/A	N/A

Support units					
Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-2	Notebook	DELL	Vostro 3400	N/A	N/A
E-3	Router	GL iNet	GL-MT3000	N/A	N/A
C-1	USB Cable	N/A	100cm	N/A	N/A

Note:

- 1) The support equipment was authorized by Declaration of Confirmation.
- 2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- 3) The Router FCC ID: 2AFIW-MT3000; IC ID: 23019-MT3000.

2.8. ENVIRONMENTAL CONDITIONS FOR TESTING

Test Item	Temperature (°C)	Relative Humidity (%)	Test Voltage	Tested by
Radiated Spurious Emission	24.3	52.0	DC 3.3V	Adil Yang

3. EMC TEST

3.1. Radiated Spurious Emission Measurement

Limit

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205 (a)&209(a) and RSS-247 3.3 limit in the table and according to ANSI C63.10-2013 and RSS-Gen below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (1GHz-25 GHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- 1) The limit for radiated test was performed according to FCC PART 15C.
- 2) The tighter limit applies at the band edges.
- 3) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RESTRICTED FREQUENCY BANDS

For FCC:

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

For IC:

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	13.36-13.41	960-1427	9.0-9.2
0.495-0.505	16.42-16.423	1435-1626.5	9.3-9.5
2.1735-2.1905	16.69475-16.69525	1645.5-1646.5	10.6-12.7
3.020-3.026	16.80425-16.80475	1660-1710	13.25-13.4
4.125-4.128	25.5-25.67	1718.8-1722.2	14.47-14.5
4.17725-4.17775	37.5-38.25	2200-2300	15.35-16.2
4.20725-4.20775	73-74.6	2310-2390	17.7-21.4
5.677-5.683	74.8-75.2	2483.5-2500	22.01-23.12
6.215-6.218	108-138	2655-2900	23.6-24.0
6.26775-6.26825	149.9-150.05	3260-3267	31.2-31.8
6.31175-6.31225	156.52475-156.52525	3332-3339	36.43-36.5
8.291-8.294	156.7-156.9	3345.8-3358	Above 38.6
8.362-8.366	162.0125-167.17	3500-4400	--
8.37625-8.38675	167.72-173.2	4500-5150	--
8.41425-8.41475	240-285	5350-5460	--
12.29-12.293	322-335.4	7250-7750	--
12.51975-12.52025	399.9-410	8025-8500	--
12.57675-12.57725	608-614	--	--

For Radiated Emission	
Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP/AVG
Start Frequency	9 KHz/150KHz(Peak/QP/AVG)
Stop Frequency	150KHz/30MHz(Peak/QP/AVG)
RB / VB (emission in restricted band)	200Hz (From 9kHz to 0.15MHz)/
	9KHz (From 0.15MHz to 30MHz);
	200Hz (From 9kHz to 0.15MHz)/
	9KHz (From 0.15MHz to 30MHz)
Attenuation	Auto
Detector	Peak/QP
Start Frequency	30 MHz(Peak/QP)
Stop Frequency	1000 MHz (Peak/QP)
RB / VB (emission in restricted band)	120 kHz / 300kHz
Attenuation	Auto
Detector	Peak/AVG
Start Frequency	1000 MHz(Peak/AVG)
Stop Frequency	10th carrier hamonic(Peak/AVG)
RB / VB (emission in restricted band)	1 MHz / 3 MHz(Peak)
	1 MHz/1/T MHz(AVG)

For Restricted band	
Spectrum Parameter	Setting
Detector	Peak/AVG
Start/Stop Frequency	Lower Band Edge: 2310 to 2410 MHz
	Upper Band Edge: 2476 to 2500 MHz
RB / VB	1 MHz / 3 MHz(Peak)
	1 MHz/1/T MHz(AVG)
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for Peak & AVG
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for Peak & AVG
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

Test Procedure

- The measuring distance of 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- The EUT was placed on the top of a rotating table 0.8 meters (above 1GHz is 1.5 m) above the ground at a 3-meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment shall be 0.8 m (above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then QuasiPeak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement is performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

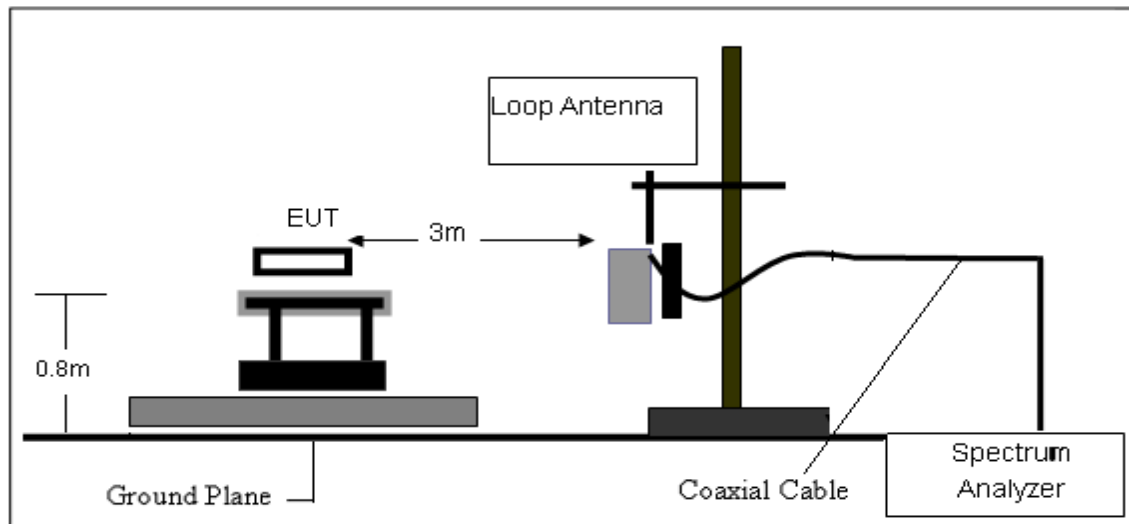
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axes. The worst-case emissions were reported.

DEVIATION FROM TEST STANDARD

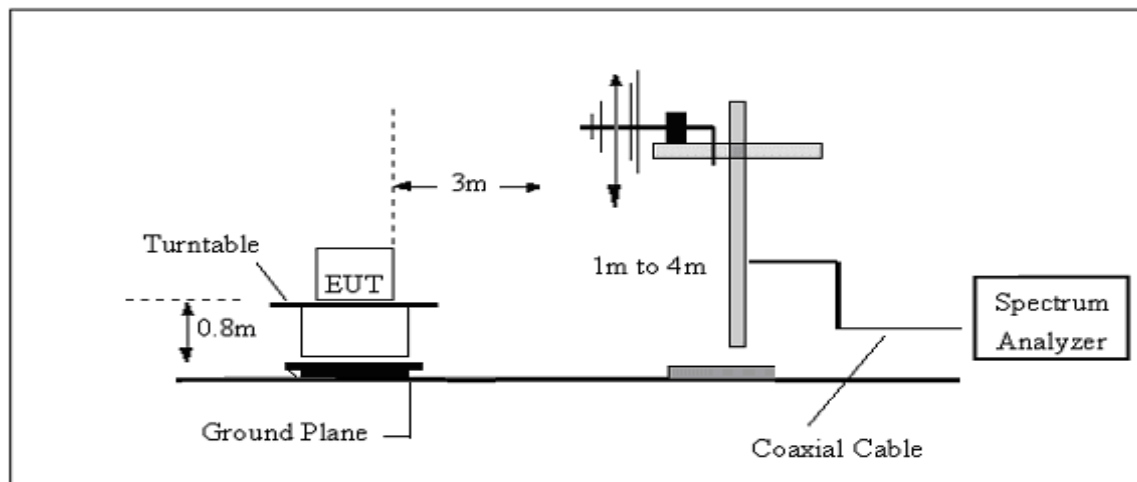
No deviation.

Test Setup

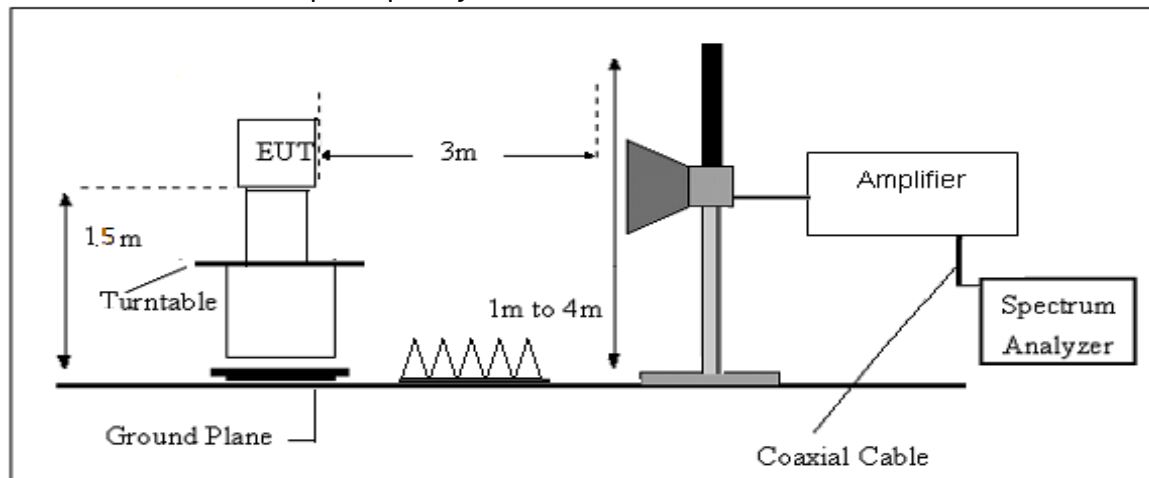
1. Radiated Emission Test-Up Frequency Below 30MHz



2. Radiated Emission Test-Up Frequency 30MHz~1GHz



3. Radiated Emission Test-Up Frequency Above 1GHz



EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.5 Unless otherwise a special operating condition is specified in the follows during the testing.

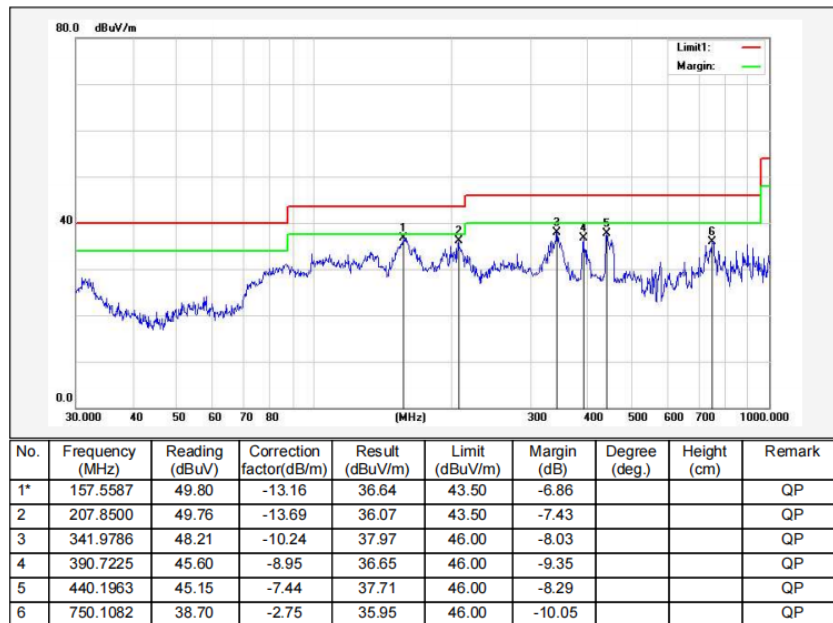
Test Result

Below 1G:

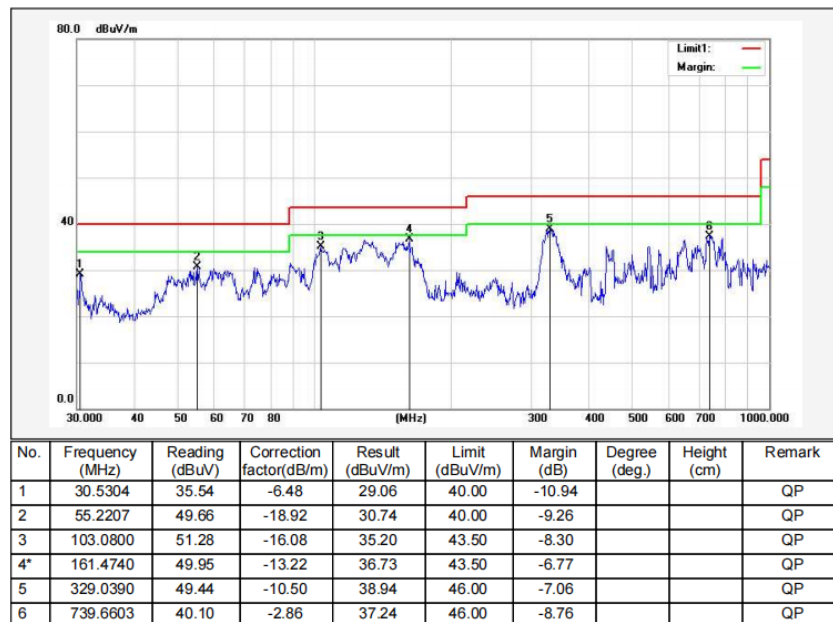
Note: All modes have been tested, and the report only reflects the worst mode.

Test Mode : working Test Voltage : DC 3.3V

Horizontal



Vertical



Correction Factor = antenna factor + cable loss – amplifier gain;

Reading = Reading Amplitude in the instrument;

Result = Correction Factor + Reading;

Margin = Result – Limit.

Above 1GHz:
GFSK - Low (worst mode) Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3176	63.93	-19.14	44.79	77.35	-32.56	peak
2	6950	56.63	-8.79	47.84	77.35	-29.51	peak
3	7562	56.59	-7.22	49.37	74	-24.63	peak
4	10350	55.59	-4.13	51.46	77.35	-25.89	peak
5	11302	53.99	-2.14	51.85	74	-22.15	peak
6	12424	55.03	-1.81	53.22	74	-20.78	peak

GFSK - Low (worst mode) Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2938	70.28	-19.89	50.39	77.35	-26.96	peak
2	3992	61.47	-15.01	46.46	74	-27.54	peak
3	7426	55.37	-7.09	48.28	74	-25.72	peak
4	8344	56.01	-7.2	48.81	74	-25.19	peak
5	10554	53.84	-2.97	50.87	77.35	-26.48	peak
6	11404	53.84	-1.87	51.97	74	-22.03	peak

GFSK - Middle (worst mode) Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3142	64.7	-19.25	45.45	77.35	-31.9	peak
2	5998	57.67	-10.12	47.55	77.35	-29.8	peak
3	7562	56.26	-7.22	49.04	74	-24.96	peak
4	8344	55.98	-7.2	48.78	74	-25.22	peak
5	11404	53.97	-1.87	52.1	74	-21.9	peak
6	12458	54.52	-1.59	52.93	74	-21.07	peak

GFSK - Middle (worst mode) Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3958	63.09	-15.09	48	74	-26	peak
2	5998	56.89	-10.12	46.77	77.35	-30.58	peak
3	7426	55.75	-7.09	48.66	74	-25.34	peak
4	8208	55.8	-7.62	48.18	74	-25.82	peak
5	10486	54.88	-3.53	51.35	77.35	-26	peak
6	11404	55.84	-1.87	53.97	74	-20.03	peak

GFSK - High (worst mode) Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3958	59.06	-15.09	43.97	74	-30.03	peak
2	6168	57.15	-9.92	47.23	77.35	-30.12	peak
3	7392	55.66	-7.13	48.53	74	-25.47	peak
4	8208	56.04	-7.62	48.42	74	-25.58	peak
5	11404	54.75	-1.87	52.88	74	-21.12	peak
6	12424	55.21	-1.81	53.4	74	-20.6	peak

GFSK - High (worst mode) Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3992	61.35	-15.01	46.34	74	-27.66	peak
2	5998	56.95	-10.12	46.83	77.35	-30.52	peak
3	8242	56.49	-7.48	49.01	74	-24.99	peak
4	10078	55.2	-4.37	50.83	77.35	-26.52	peak
5	11404	53.73	-1.87	51.86	74	-22.14	peak
6	12458	55.16	-1.59	53.57	74	-20.43	peak

 $\pi/4$ DQPSK - Low (worst mode) Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3890	59.29	-15.36	43.93	74	-30.07	peak
2	6168	56.75	-9.92	46.83	77.35	-30.52	peak
3	7426	55.48	-7.09	48.39	74	-25.61	peak
4	10350	54.95	-4.13	50.82	77.35	-26.53	peak
5	11370	54.37	-1.94	52.43	74	-21.57	peak
6	12424	54.87	-1.81	53.06	74	-20.94	peak

 $\pi/4$ DQPSK - Low (worst mode) Vertical

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3992	60.6	-15.01	45.59	74	-28.41	peak
2	6134	56.92	-9.98	46.94	77.35	-30.41	peak
3	8174	56.57	-7.68	48.89	74	-25.11	peak
4	9908	55.77	-5.28	50.49	77.35	-26.86	peak
5	11404	54.01	-1.87	52.14	74	-21.86	peak
6	12424	55	-1.81	53.19	74	-20.81	peak

 $\pi/4$ DQPSK - Middle (worst mode) Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	6304	57	-9.91	47.09	77.35	-30.26	peak
2	8072	56	-7.75	48.25	74	-25.75	peak
3	10146	54.03	-4.02	50.01	77.35	-27.34	peak
4	11302	54.32	-2.14	52.18	74	-21.82	peak
5	12424	55.21	-1.81	53.4	74	-20.6	peak
6	15280	52.9	6.75	59.65	77.35	-17.7	peak

$\pi/4$ DQPSK - Middle (worst mode) Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3992	60.7	-15.01	45.69	74	-28.31	peak
2	7698	55.89	-7.74	48.15	74	-25.85	peak
3	8378	56.11	-7.1	49.01	74	-24.99	peak
4	11438	54.22	-2.04	52.18	74	-21.82	peak
5	12458	54.8	-1.59	53.21	74	-20.79	peak
6	13206	53.51	0.35	53.86	77.35	-23.49	peak

 $\pi/4$ DQPSK - High (worst mode) Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3550	61.98	-16.79	45.19	77.35	-32.16	peak
2	5998	56.88	-10.12	46.76	77.35	-30.59	peak
3	7460	55.46	-7.09	48.37	74	-25.63	peak
4	10350	54.71	-4.13	50.58	77.35	-26.77	peak
5	11404	54.91	-1.87	53.04	74	-20.96	peak
6	12458	55.57	-1.59	53.98	74	-20.02	peak

 $\pi/4$ DQPSK - High (worst mode) Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3992	61	-15.01	45.99	74	-28.01	peak
2	7562	55.7	-7.22	48.48	74	-25.52	peak
3	8820	56.21	-7.83	48.38	77.35	-28.97	peak
4	11778	54.43	-2.61	51.82	74	-22.18	peak
5	12730	54.26	-0.78	53.48	77.35	-23.87	peak
6	15246	52.93	6.7	59.63	77.35	-17.72	peak

8DPSK - Low (worst mode) Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3142	64.56	-19.25	45.31	77.35	-32.04	peak
2	5998	57.3	-10.12	47.18	77.35	-30.17	peak
3	6916	57.15	-8.8	48.35	77.35	-29	peak
4	8344	55.8	-7.2	48.6	74	-25.4	peak
5	11404	54.9	-1.87	53.03	74	-20.97	peak
6	12424	54.88	-1.81	53.07	74	-20.93	peak

8DPSK - Low (worst mode) Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	7562	56.08	-7.22	48.86	74	-25.14	peak
2	8378	55.58	-7.1	48.48	74	-25.52	peak
3	10316	54.87	-4.06	50.81	77.35	-26.54	peak
4	11404	54.22	-1.87	52.35	74	-21.65	peak
5	12458	54.42	-1.59	52.83	74	-21.17	peak
6	13716	53.97	1.55	55.52	77.35	-21.83	peak

8DPSK - Middle (worst mode) Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3142	65.76	-19.25	46.51	77.34	-30.83	peak
2	6100	57.65	-10.06	47.59	77.34	-29.75	peak
3	7426	55.89	-7.09	48.8	74	-25.2	peak
4	10554	54.55	-2.97	51.58	77.34	-25.76	peak
5	11438	54.23	-2.04	52.19	74	-21.81	peak
6	12458	55.27	-1.59	53.68	74	-20.32	peak

8DPSK - Middle (worst mode) Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	6882	56.65	-8.82	47.83	77.35	-29.52	peak
2	8174	56.44	-7.68	48.76	74	-25.24	peak
3	11404	53.9	-1.87	52.03	74	-21.97	peak
4	12730	53.65	-0.78	52.87	77.35	-24.48	peak
5	13716	53.21	1.55	54.76	77.35	-22.59	peak
6	15314	52.98	6.82	59.8	77.35	-17.55	peak

8DPSK - High (worst mode) Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3142	64.67	-19.25	45.42	77.35	-31.93	peak
2	5964	57.11	-10.23	46.88	77.35	-30.47	peak
3	7562	55.74	-7.22	48.52	74	-25.48	peak
4	8310	56.17	-7.28	48.89	74	-25.11	peak
5	11472	54.89	-2.21	52.68	74	-21.32	peak
6	12458	54.96	-1.59	53.37	74	-20.63	peak

8DPSK - High (worst mode) Vertical

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	6304	54.94	-9.91	45.03	77.35	-32.32	peak
2	7460	55.95	-7.09	48.86	74	-25.14	peak
3	9024	57.22	-8.12	49.1	74	-24.9	peak
4	11132	54.65	-2.48	52.17	74	-21.83	peak
5	12424	55.56	-1.81	53.75	74	-20.25	peak
6	14260	53.05	3.53	56.58	77.35	-20.77	peak

Node:

- Testing was carried out within frequency range 9kHz to the tenth harmonics. The measurement results below 30MHz and 18GHz - 26.5GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported..
- Radiated emissions measured in frequency above 1GHz were made with an instrument using peak/average detector mode.
- Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
- Result formula:
Correction Factor = antenna factor + cable loss – amplifier gain;
Reading = Reading Amplitude in the instrument;
Result = Correction Factor + Reading;
Margin (dB) = result in dBuV/m – limit in dBuV/m.

- 5、 According to section part 15.247(d), frequencies other than those required by part 15.205(a) are limited to the level of the intended emission (min. 97.35) minus 20dB

Restricted band Requirements							
GFSK - Low (worst mode)							
Horizontal							
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2374.03	65.58	-21.1	44.48	74	-29.52	peak
2	2374.03	57.35	-21.1	36.25	54	-17.75	AVG
3	2390	62.32	-21.03	41.29	74	-32.71	peak
4	2390	56	-21.03	34.97	54	-19.03	AVG
5	2402.15	127.57	-20.99	106.58	116.2	-9.62	peak
Vertical							
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2355.41	62.56	-21.17	41.39	74	-32.61	peak
2	2355.41	54.94	-21.17	33.77	54	-20.23	AVG
3	2390	62.05	-21.03	41.02	74	-32.98	peak
4	2390	56.01	-21.03	34.98	54	-19.02	AVG
5	2402.15	118.66	-20.99	97.67	116.2	-18.53	peak
GFSK - High (worst mode)							
Horizontal							
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2479.95	127.85	-20.91	106.94	116.2	-9.26	peak
2	2483.5	63.21	-20.91	42.3	74	-31.7	peak
3	2483.5	53.96	-20.91	33.05	54	-20.95	AVG
4	2487.4	68.12	-20.91	47.21	74	-26.79	peak
5	2487.4	56.78	-20.91	35.87	54	-18.13	AVG
Vertical							
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2480	120.48	-20.91	99.57	116.2	-16.63	peak
2	2483.5	62.74	-20.91	41.83	74	-32.17	peak
3	2483.5	53.53	-20.91	32.62	54	-21.38	AVG
4	2491.25	67.13	-20.92	46.21	74	-27.79	peak
5	2491.25	55.85	-20.92	34.93	54	-19.07	AVG

Correction Factor = antenna factor + cable loss – amplifier gain;

Reading = Reading Amplitude in the instrument;

Result = Correction Factor + Reading;

Margin = Result – Limit

$\pi/4$ DQPSK - Low (worst mode)							
Horizontal							
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2376.5	61.88	-21.08	40.8	74	-33.2	peak
2	2376.5	54.07	-21.08	32.99	54	-21.01	AVG
3	2390	61.34	-21.03	40.31	74	-33.69	peak
4	2390	55.04	-21.03	34.01	54	-19.99	AVG
5	2402.34	127.47	-20.99	106.48	116.2	-9.72	peak
Vertical							
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2369.66	62.12	-21.12	41	74	-33	peak
2	2369.66	53.9	-21.12	32.78	54	-21.22	AVG
3	2390	63.57	-21.03	42.54	74	-31.46	peak
4	2390	55.39	-21.03	34.36	54	-19.64	AVG
5	2402.34	118.34	-20.99	97.35	116.2	-18.85	peak
$\pi/4$ DQPSK - High (worst mode)							
Horizontal							
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2479.85	127.78	-20.91	106.87	116.2	-9.33	peak
2	2483.5	80.52	-20.91	59.61	74	-14.39	peak
3	2483.5	56.64	-20.91	35.73	54	-18.27	AVG
4	2499.6	73.74	-20.92	52.82	74	-21.18	peak
5	2499.6	54.93	-20.92	34.01	54	-19.99	AVG
Vertical							
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2479.85	120.31	-20.91	99.4	116.2	-16.8	peak
2	2483.5	66.24	-20.91	45.33	74	-28.67	peak
3	2483.5	54.57	-20.91	33.66	54	-20.34	AVG
4	2490.55	67.36	-20.92	46.44	74	-27.56	peak
5	2490.55	55.79	-20.92	34.87	54	-19.13	AVG

Correction Factor = antenna factor + cable loss – amplifier gain;

Reading = Reading Amplitude in the instrument;

Result = Correction Factor + Reading;

Margin = Result – Limit

8DPSK - Low (worst mode)							
Horizontal							
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2372.32	61.07	-21.11	39.96	74	-34.04	peak
2	2372.32	55.35	-21.11	34.24	54	-19.76	AVG
3	2390	59.22	-21.03	38.19	74	-35.81	peak
4	2390	53.8	-21.03	32.77	54	-21.23	AVG
5	2401.96	127.45	-20.99	106.46	116.2	-9.74	peak
Vertical							
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2359.21	62.63	-21.16	41.47	74	-32.53	peak
2	2359.21	56.55	-21.16	35.39	54	-18.61	AVG
3	2390	60.99	-21.03	39.96	74	-34.04	peak
4	2390	54.87	-21.03	33.84	54	-20.16	AVG
5	2401.96	118.51	-20.99	97.52	116.2	-18.68	peak
8DPSK - High (worst mode)							
Horizontal							
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2479.85	127.73	-20.91	106.82	116.2	-9.38	peak
2	2483.5	80.16	-20.91	59.25	74	-14.75	peak
3	2483.5	56.65	-20.91	35.74	54	-18.26	AVG
4	2488.85	73.01	-20.91	52.1	74	-21.9	peak
5	2488.85	55.9	-20.91	34.99	54	-19.01	AVG
Vertical							
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2480.15	120.39	-20.91	99.48	116.2	-16.72	peak
2	2483.5	70.48	-20.91	49.57	74	-24.43	peak
3	2483.5	53.54	-20.91	32.63	54	-21.37	AVG
4	2491.45	72.19	-20.92	51.27	74	-22.73	peak
5	2491.45	56.55	-20.92	35.63	54	-18.37	AVG

Correction Factor = antenna factor + cable loss – amplifier gain;

Reading = Reading Amplitude in the instrument;

Result = Correction Factor + Reading;

Margin = Result – Limit

3.2. Maximum Conducted Output Power Measurement

Limits

Section	Test Item	Limit	Frequency Range (MHz)
15.247 (b)(3)	Output Power	1 watt or 30dBm	2400-2483.5
RSS-247 5.4(d) RSS-Gen 6.12	EIRP	36dBm	2400-2483.5

Test Procedure

Some regulatory agencies permit the maximum conducted (average) output power to be measured as an alternative to the maximum peak conducted output power for determining compliance to the limit. When this option is exercised, the measured power is to be referenced to the OBW rather than to the DTS bandwidth (see 11.2 for definitions and 6.9.2 for measurement guidance).

When using a spectrum analyzer or EMI receiver to perform these measurements, it shall be capable of utilizing a number of measurement points in each sweep that is greater than or equal to twice the span / RBW, to set a bin-to-bin spacing of $\leq \text{RBW} / 2$ so that narrowband signals are not lost between frequency bins. If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see 11.6).

The intent is to test at 100% duty cycle; however, a small reduction in duty cycle (to no lower than 98%) is permitted, if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test laboratory to permit such continuous operation.

If continuous transmission (or at least 98% duty cycle) cannot be achieved because of hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level, with the transmit duration as long as possible, and the duty cycle as high as possible during which sweep triggering/signal gating techniques may be used to perform the measurement over the transmission duration.

Measurement using a power meter (PM):

1. Method AVGPM:

Method AVGPM is a measurement using an RF average power meter, as follows:

a) As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied:

- 1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
- 2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
- 3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

b) If the transmitter does not transmit continuously, measure the duty cycle, D, of the transmitter output signal as described in 11.6.

c) Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.

d) Adjust the measurement in dBm by adding $[10 \log (1 / D)]$, where D is the duty cycle.

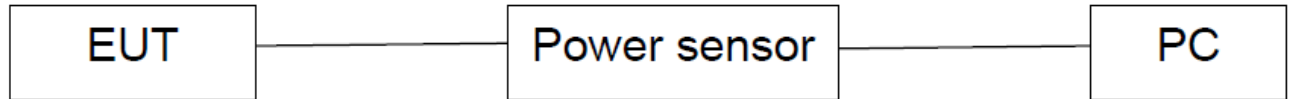
2. Method AVGPM-G:

Method AVGPM-G is a measurement using a gated RF average power meter.

Alternatively, measurements may be performed using a wideband gated RF power meter provided

that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

TEST SETUP



EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.5 Unless otherwise a special operating condition is specified in the follows during the testing.

Test Results

Pass

For ISCED:

Mode	Frequency [MHz]	Conducted Power	EIRP	Limit [dBm]
		dBm	dBm	
GFSK	2402	13.723	18.023	< 21
	2441	13.715	18.015	< 21
	2480	13.765	18.065	< 21
π/4 DQPSK	2402	13.556	17.856	< 21
	2441	13.461	17.761	< 21
	2480	13.673	17.973	< 21
8DPSK	2402	13.777	18.077	< 21
	2441	13.734	18.034	< 21
	2480	13.775	18.075	< 21

Note:

- 1) The cable loss is taken into account in results.
 - 2) Antenna gain(G) of Bluetooth: 4.30 dBi
- e.i.r.p.=P(Peak power)+ G, which is far below the 4 W

3.3. ANTENNA REQUIREMENT

According to the manufacturer declared, the EUT has PIFA Antenna and PCB Antenna, the directional gain of antenna is Bluetooth antenna Gain: 4.30 dBi;, and the antenna and other components are all on the same PCB and cannot be replaced. Therefore, the EUT is considered sufficient to comply with the provision.

EUT ANTENNA

The Bluetooth is PCB Antenna and wi-fi is PIFA Antenna. It complies with the standard requirement.



4. TEST PHOTOS

Please refer to Appendix C Test Setup.

5. EUT PHOTOS

External Photos Please refer to Appendix A and Internal Photos Please refer to Appendix B.

*****THE END*****