Shenzhen Asia Test Technology Co., Ltd.

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FCC RADIO TEST REPORT
FCC ID: X6HBS057RQ

Product： BLUETOOTH HEADSET

Trade Name： N/A

Model Name： BS057RQ

Serial Model： MAGsmart Metallic, BS058F

Prepared for

Alpha Comm Enterprises, Inc.

1500 Lakes Parkway, Suite B Lawrenceville Georgia USA.

Prepared by

Shenzhen Asia Test Technology Co.,Ltd.

7 / F, Xinwei Building, Gushu Village, Xixiang Town, Baoan District, Shenzhen, China

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TEST RESULT CERTIFICATION

Applicant's name ..... Alpha Comm Enterprises, Inc.

Address ..... 1500 Lakes Parkway, Suite B Lawrenceville Georgia USA.

Manufacture's Name..... GuangZhou U&I Electronic Technology Co.,Ltd

Address ..... 3rd Floor, Building G, FengSheng Industrial Zone, ShiBei Industrial Road, HuiJiang, Da Shi Street, PanYu District, Guangzhou, China

Product description

Product name ..... BLUETOOTH HEADSET

Model and/or type reference BS057RQ

Additional Model ..... MAGsmart Metallic, BS058F

Standards ..... FCC Part15.247

Test procedure ..... ANSI C63.10

This device described above has been tested by ATT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test .....

Date (s) of performance of tests ..... Jan. 22 2015 ~Jan. 30 2015

Date of Issue..... Jan. 30 2015

Test Result..... **Pass**

Tested by:	Reviewed by:	Approved by:
Eric Wang	Jerry You	Jack yu
Project Leader	Laboratory Supervisor	Technical Director

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

Test Item	FCC Part No.	Requirements	Verdict
20dB Emission Bandwidth (EBW)	15.247(a)(1)	No limit.	PASS
Carrier Frequency Separation	15.247(a)(1)	≥MAX{25kHz,IIF{output power ≤125mW,2/3*20dB EBW, 20dB EBW}}.	PASS
Number of Hopping Channel	15.247(a)(1)(iii)	≥15channels.	PASS
Time of Occupancy (Dwell Time)	15.247(a)(1)(iii)	<0.4swithinaperiod of (0.4s*hopping number).	PASS
Maximum Peak Conducted Output Power	15.247(b)(1)	< 1W if using ≥75 Non-overlapping channels.	PASS
Band edge spurious emission	15.247(d)	< -20 dBc/100kHzif total peak power ≤ power limit.	PASS
Conducted RF Spurious Emission	15.247(d)	< -20 dBc/100kHzif total peak power ≤ power limit.	PASS
Radiated Emissions in the Restricted Bands	15.247(d) 15.209	FCC Part 15.209fieldstrength limit;	PASS
AC Power Line Conducted Emissions	15.207	FCC Part 15.207 conducted limit;	PASS

1.1 TEST FACILITY

Shenzhen Asia Test Technology Co.,Ltd.
7 / F, Xinwei Building, Gushu Village, Xixiang Town, Baoan District, Shenzhen, China
FCC Registration No.: 348715; IC Registration No.: 12198A

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

1.3 TEST ENVIRONMENT CONDITION

Ambient Temperature: 19.5to 25°C
Ambient Relative Humidity: 40 to 55 %
Atmospheric Pressure: Not applicable

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	BLUETOOTH HEADSET
Model Name	BS057RQ
Serial Model	MAGsmart Metallic, BS058F
Model Difference	All models are identical except model name.
Frequency Range	2402 ~ 2480 MHz
BT versions	V3.0
Modulation Type	GFSK
Antenna Type	Internal
Antenna Gain	2 dBi
Ratings	5.0Vdc (for charge) 3.7Vdc (Li-ion battery)
Adapter	N/A
Battery	DC 3.7V

Channel List

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

3 EUT CONFIGURATIONS

3.1 GENERAL CONFIGURATIONS

Configuration	Description
Test Antenna Ports	Until otherwise specified, All TX tests are performed at all TX antenna ports of the EUT.
Multiple RF Sources	Other than the tested RF source of the EUT, other RF source(s) are disabled or shutdown during measurements.

Note: The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%. Measurements are performed according to the Public Notice-DA 00-705.

3.2 CUSTOMIZED CONFIGURATIONS

#EUT Conf.	Signal Description	Operating Frequency
TM1_DH5_Hop	GFSK modulation, package type DH5, hopping on.	---
TM1_DH5_Ch0	GFSK modulation, package type DH5, hopping off.	Ch No. 00 /2402MHz
TM1_DH5_Ch39	GFSK modulation, package type DH5, hopping off.	Ch No. 39/ 2441MHz
TM1_DH5_Ch78	GFSK modulation, package type DH5, hopping off.	Ch No. 78/ 2480MHz

3.3 TEST ENVIRONMENTS

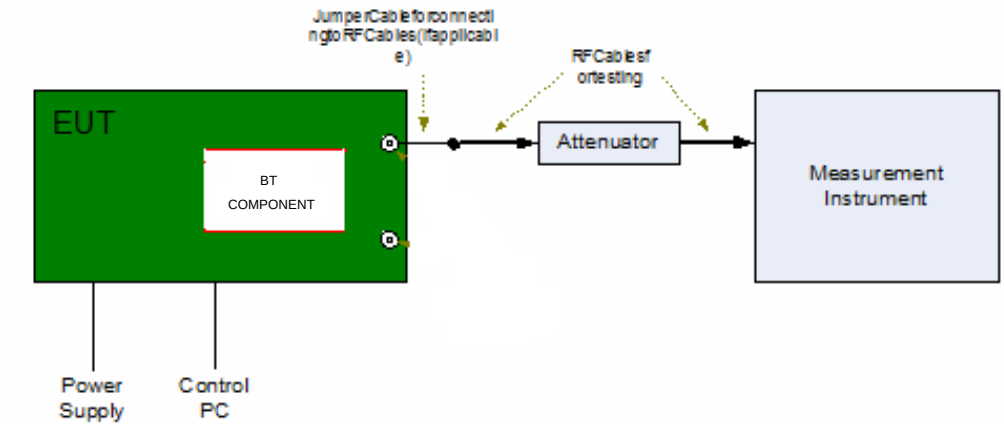
NOTE: The values used in the test report maybe stringent than the declared.

Environment Parameter	Selected Values During Tests		
NTNV	Temperature	Voltage	Relative Humidity
	Ambient	3.7VDC	Ambient

3.4 TEST SETUPS

3.4.1 POWER LINE CONDUCTED EMISSION LIMITS

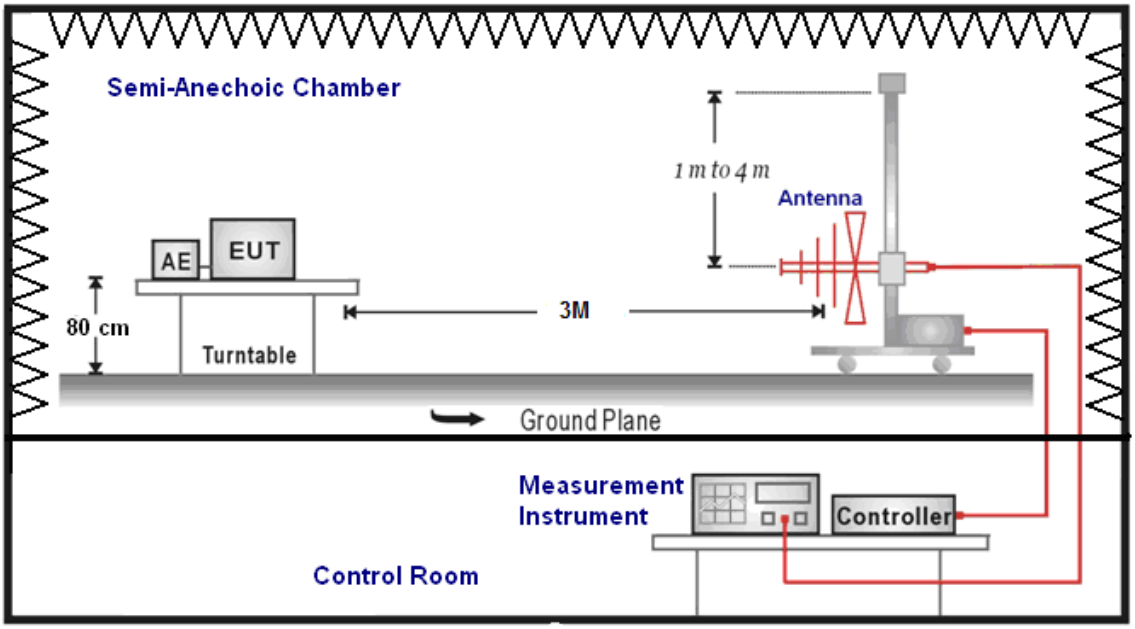
The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



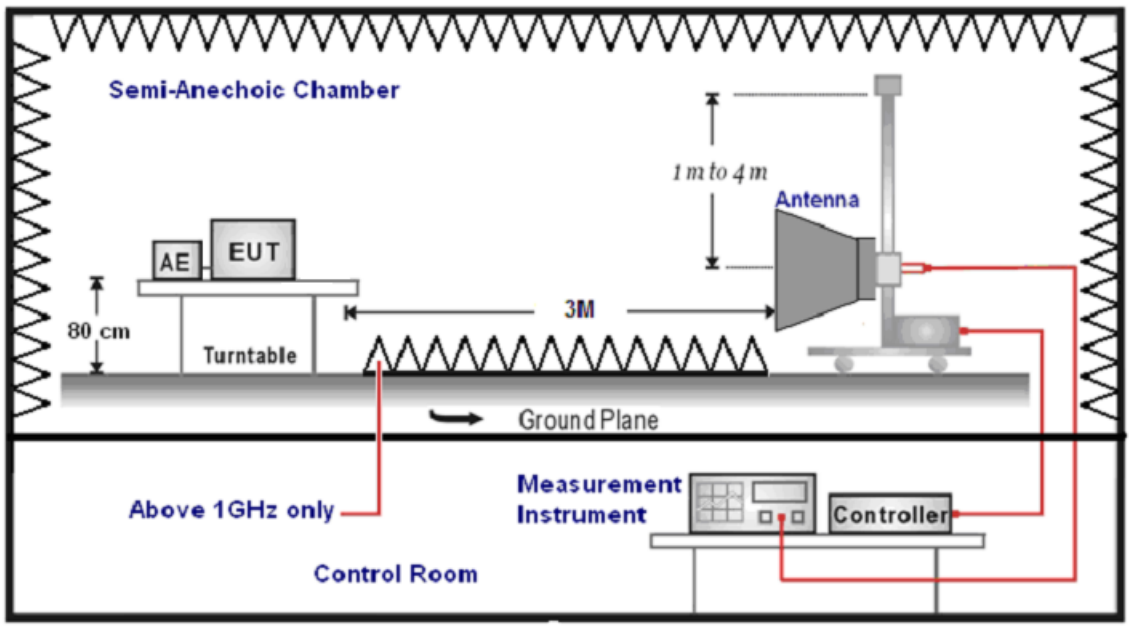
3.4.2 Test Setup 2

The test sites anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSIC63.4. The test distance is 3m.The setup is according to ANSI C63.4 and CAN/CSA-CEI/IEC CISPR 22.

The maximal emission value is acquired by adjusting the antenna height, polarization and turntable azimuth. Normally, the height range of antenna is 1m to 4m, the azimuth range of turntable is 0° to 360°,and the receive antenna has two polarizations Vertical (V) and Horizontal (H).



(Below1 GHz)

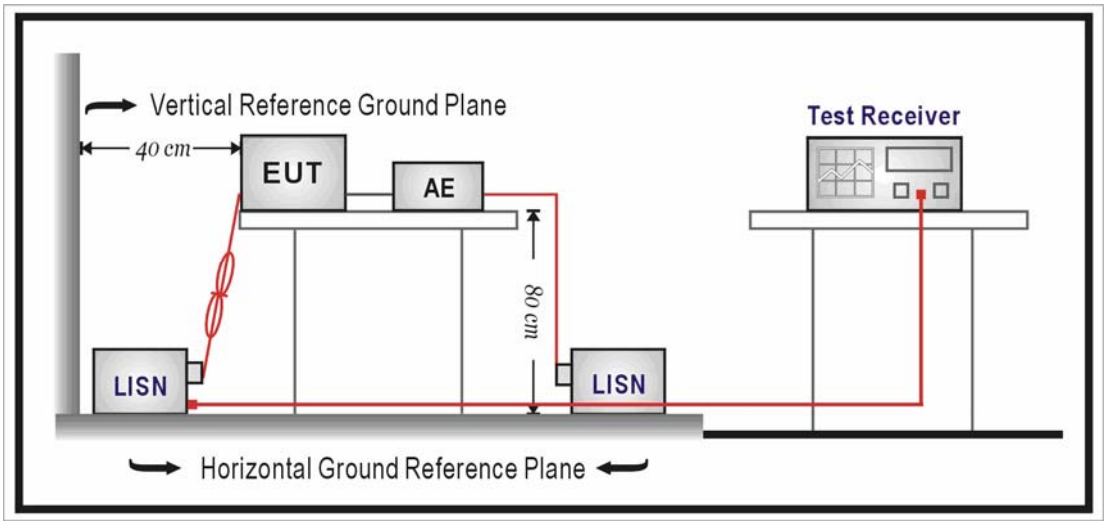


(Above 1GHz)

3.4.3 Test Setup 3

The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than0.1 m.



3.5 TEST CONDITIONS

Test Case	Test Conditions	
	Configuration	Description
20dB Emission Bandwidth (EBW)	Meas. Method	ANSI C63.10:2009
	Test Environment	NTNV
	Test Setup	Test Setup1
	EUT Conf.	TM1_DH5_Ch00,TM1_DH5_Ch39,TM1_DH5_Ch78 TM4_DH5_Ch00,TM4_DH5_Ch19,TM4_DH5_Ch39.
Carrier Frequency Separation	Meas. Method	ANSI C63.10:2009
	Test Environment	NTNV
	Test Setup	Test Setup1
	EUT Conf.	TM1_DH5_Hop
Number of Hopping Channel	Meas. Method	ANSI C63.10:2009
	Test Environment	NTNV
	Test Setup	Test Setup1
	EUT Conf.	TM1_DH5_Hop
Time of Occupancy (Dwell Time)	Meas. Method	ANSI C63.10:2009
	Test Environment	NTNV
	Test Setup	Test Setup1
	EUT Conf.	TM1_DH5_Ch39
Maximum Peak Conducted Output Power	Meas. Method	ANSI C63.10:2009
	Test Environment	NTNV
	Test Setup	Test Setup1
	EUT Conf.	TM1_DH3_Ch00,TM1_DH3_Ch39,TM1_DH3_Ch78 TM4_DH3_Ch00,TM4_DH3_Ch19,TM4_DH3_Ch39.
Bandedge spurious emission (Conducted)	Meas. Method	ANSI C63.10:2009
	Test Environment	NTNV
	Test Setup	Test Setup1
	EUT Conf.	TM1_DH3_Ch00,TM1_DH3_Ch78 TM4_DH3_Ch00,TM4_DH3_Ch39.
Conducted RF Spurious Emission	Meas. Method	ANSI C63.10:2009
	Test Environment	NTNV
	Test Setup	Test Setup1
	EUT Conf.	TM1_DH5_Ch00, TM1_DH5_Ch39, TM1_DH5_Ch78, TM2_2DH5_Ch00, TM4_DH5_Ch00,TM4_DH5_Ch19,TM4_DH5_Ch39.
Radiated Emissions in the Restricted Bands	Meas. Method	ANSI C63.10:2009 30 MHz to 1 GHz: Pre: RBW=100kHz; VBW=300kHz; Det. =

		Peak. Final: RBW=120kHz; Det. = CISPR Quasi-Peak. 1 GHz to 26.5GHz: Average: RBW=1 MHz; VBW= 10Hz; Det. = Peak; Sweep-time= Auto; Trace = Single. Peak: RBW=1 MHz; VBW= 3 MHz; Det. = Peak; Sweep-time= Auto; Trace≥ MaxHold * 100.
	Test Environment	NTNV
	Test Setup	Test Setup2
	EUT Conf.	30 MHz-1GHz TM1_DH5_Ch00 (Worst Conf.).
		1-18 GHz: TM1_DH5_Ch00, TM1_DH5_Ch39, TM1_DH5_Ch78, (Worst Conf.).

Test Case	Test Conditions	
	Configuration	Description
AC Power Line Conducted Emissions	Measurement Method	AC mains conducted.
	Test Environment	NTNV
	Test Setup	TestSetup3
	EUT Configuration	TM1_DH5_Ch39. (Worst Conf.).

Note: For Radiated Emissions, By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Z axis” position was the worst, then the final test was executed the worst condition and test data were recorded in this report.

3.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2014.07.06	2015.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2014.06.07	2015.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2014.07.06	2015.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2014.06.07	2015.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2014.06.07	2015.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2014.07.06	2015.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2014.07.06	2015.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2014.12.22	2015.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2014.06.08	2015.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2014.07.06	2015.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2014.07.06	2015.07.05	1 year
12	Test Receiver	R&S	FSU	550062	2014.06.07	2015.06.06	1 year
13	Cable 30-1000MHz	R&S	ATT-R01	201309R001	2014.06.08	2015.06.07	1 year
14	Cable 1-26.5GHz	R&S	ATT-R02	201309R048	2014.06.08	2015.06.07	1 year

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2014.06.06	2015.06.05	1 year
2	LISN	R&S	ENV216	101313	2014.08.24	2015.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2014.08.24	2015.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2014.06.07	2015.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2014.06.07	2015.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2014.06.08	2015.06.07	1 year
7	Cable 0.009-30MHz	R&S	ATT-C01	201309C006	2014.06.08	2015.06.07	1 year

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2009.
2. Support equipment, if needed, was placed as per ANSI C63.10-2009
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2009
4. The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

TEST RESULTS

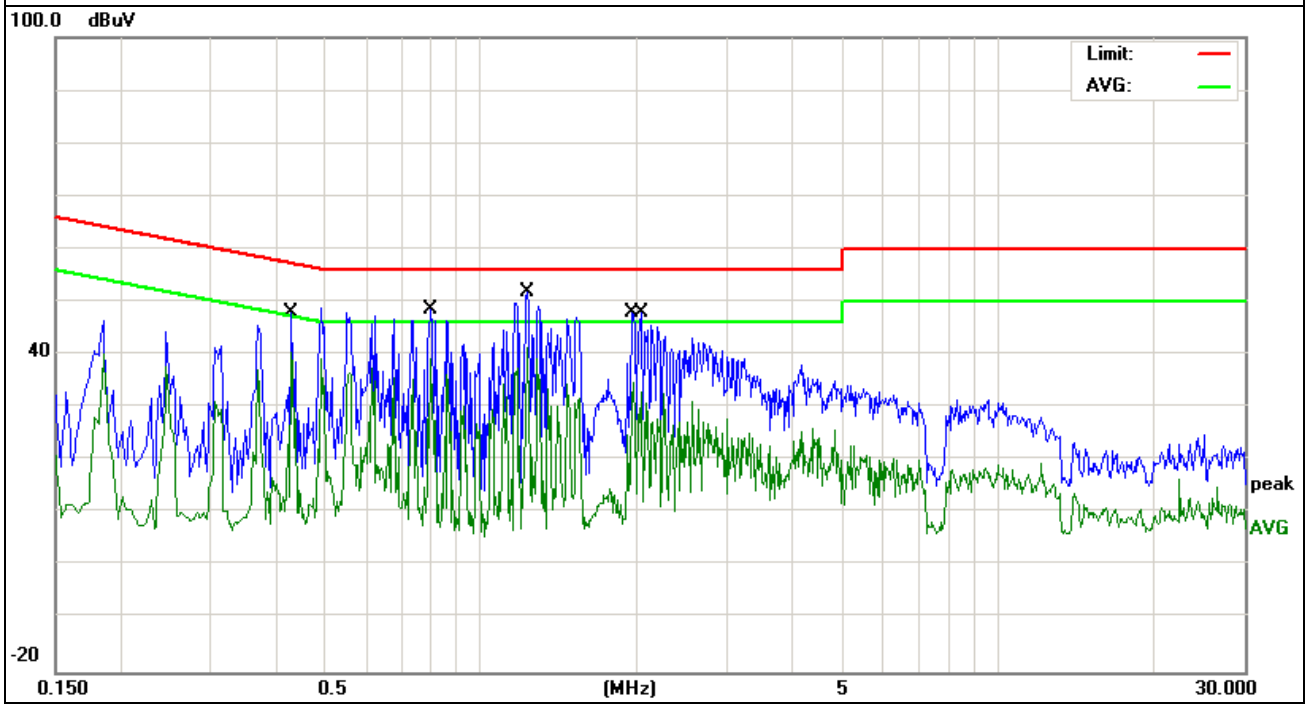
Note: We tested Conducted Emission of GFSK mode from 0.15 KHz to 30MHz (DH1, DH3 and DH5) and all channels (low, middle and high), recorded the worst case data at GFSK DH5 middle channel.

4.1.1 TEST RESULTS

EUT：	BLUETOOTH HEADSET	Model Name ：	BS057RQ
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5V from adapter AC 120V/60Hz	Test Mode：	BT LINK

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.4299	30.01	10.41	40.42	47.25	-6.83	AVG
0.798	38.24	10.41	48.65	56	-7.35	QP
1.2259	30.86	10.41	41.27	46	-4.73	AVG
*1.234	41.49	10.41	51.9	56	-4.1	QP
1.9739	24.33	10.42	34.75	46	-11.25	AVG
2.042	37.43	10.42	47.85	56	-8.15	QP

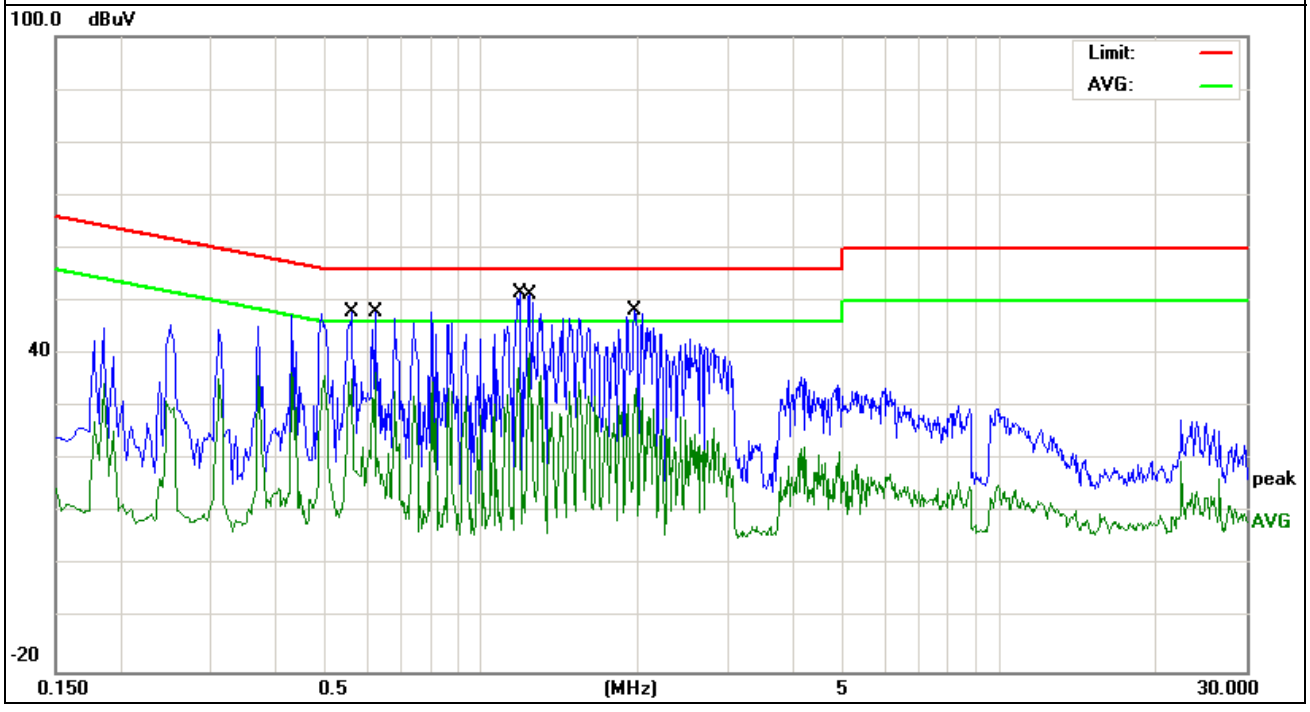
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. '*' means the worst case



EUT：	BLUETOOTH HEADSET	Model Name ：	BS057RQ
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5V from adapter AC 120V/60Hz	Test Mode：	BT LINK

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.562	37.66	10.4	48.06	56	-7.94	QP
0.622	26.18	10.41	36.59	46	-9.41	AVG
*1.186	41.16	10.41	51.57	56	-4.43	QP
1.242	29.86	10.41	40.27	46	-5.73	AVG
1.97	37.73	10.42	48.15	56	-7.85	QP
1.986	23.04	10.42	33.46	46	-12.54	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. '*' means the worst case



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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

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).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.2.2 TEST PROCEDURE

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. 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 Quasi Peak detector mode re-measured.
e. 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 performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

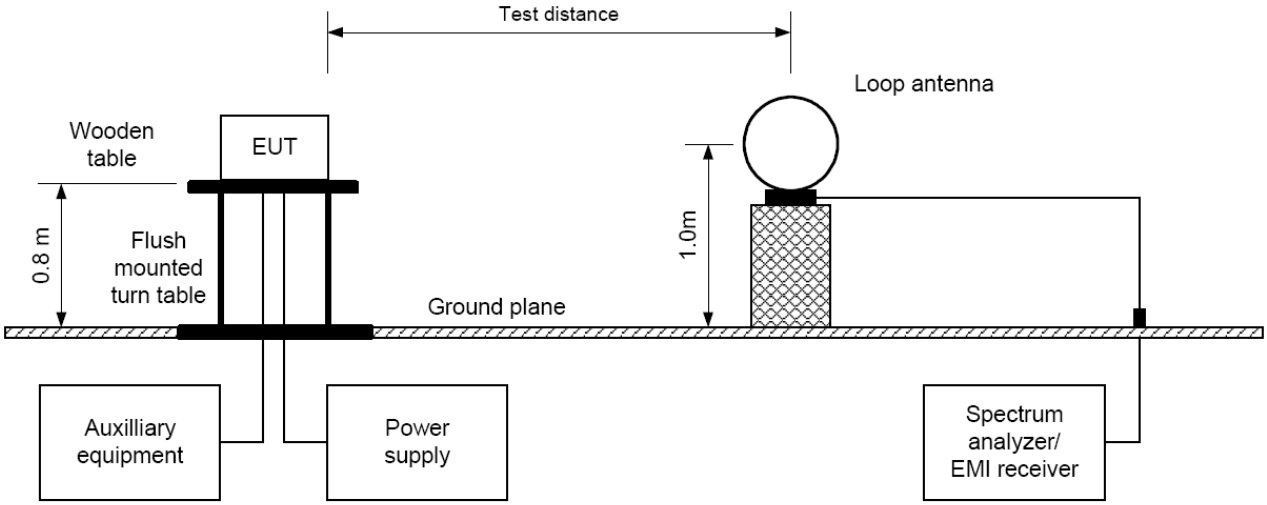
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

4.2.3 DEVIATION FROM TEST STANDARD

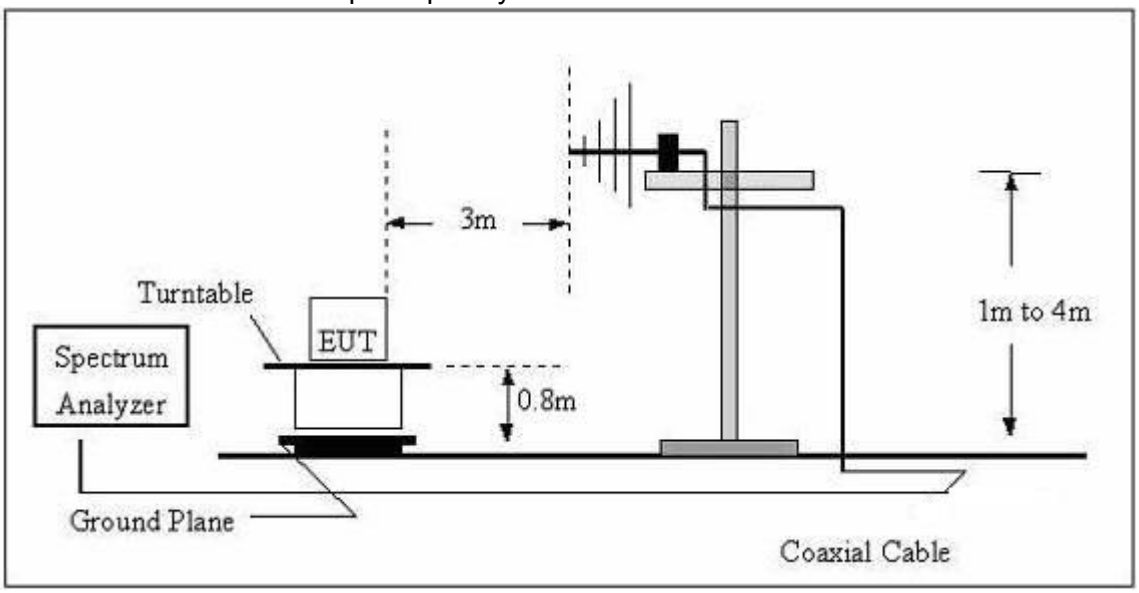
No deviation

4.2.4 TEST SETUP

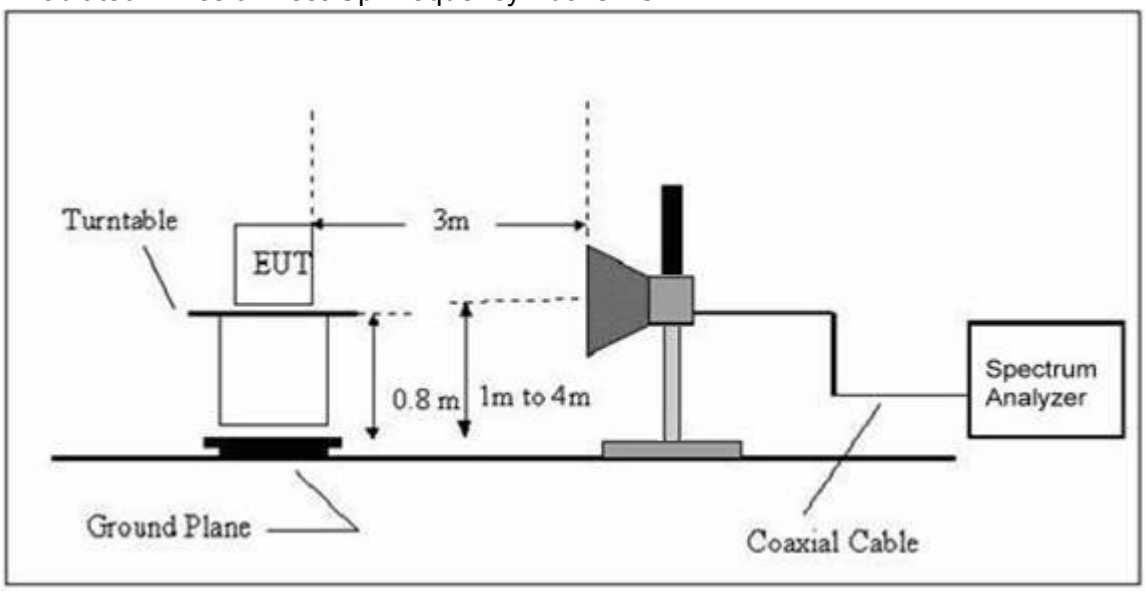
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

4.2.6 TEST RESULTS (BELOW 30 MHZ)

EUT：	BLUETOOTH HEADSET	Model Name ：	BS057RQ
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	TX	Polarization :	---

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

NOTE:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =20 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

4.2.7 TEST RESULTS (BETWEEN 30M – 1000 MHZ)

EUT：	BLUETOOTH HEADSET	Model Name ：	BS057RQ
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Test Mode：	TX 2402
Test Voltage ：	DC 3.7V		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
V	57.48	21.65	10.22	31.87	40	-8.13	QP
V	133.39	24.56	10.73	35.29	40	-4.71	QP
V	241.39	17.68	12.55	30.23	47	-16.77	QP
V	337.25	16.55	15.73	32.28	47	-14.72	QP
V	421.37	15.36	16.14	31.5	46	-14.5	QP
V	488.63	17.94	16.75	34.69	46	-11.31	QP
H	66.73	20.33	9.35	29.68	40	-10.32	QP
H	157.37	22.19	9.76	31.95	40	-8.05	QP
H	198.36	21.27	10.62	31.89	46	-14.11	QP
H	400.26	20.65	11.73	32.38	46	-13.62	QP
H	478.81	22.18	12.84	35.02	46	-10.98	QP
H	553.27	20.33	14.94	35.27	47	-11.73	QP

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit

4.2.8 TEST RESULTS (ABOVE 1000 MHZ)

Remark:

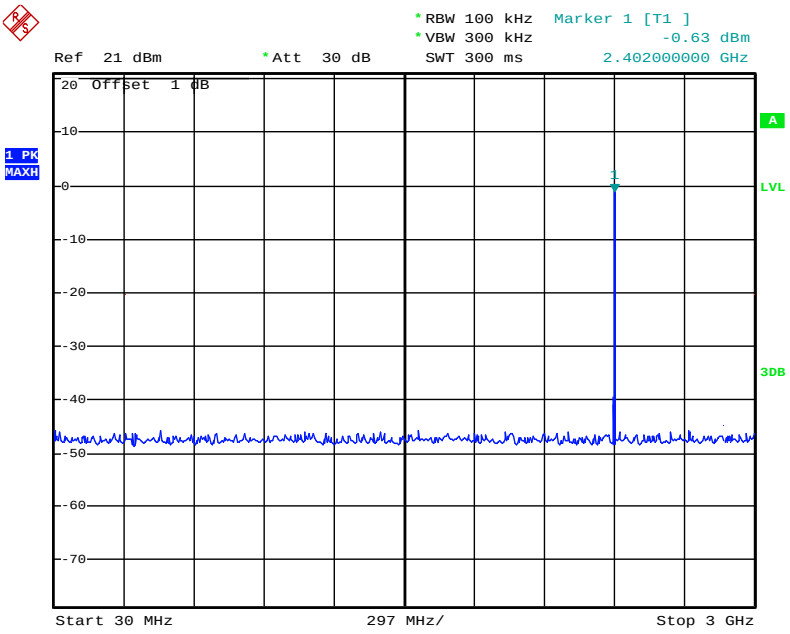
1. The radiated measurement are performed the each channel (low/mid/high) at all Packet type (DH1, DH3 and DH5) also for GFSK modulation type , recorded worst case at GFSK_DH5_Low channel (Channel 00), GFSK_DH5_Middle channel (Channel 39), GFSK_DH5_High channel (Channel 78).
2. ULTRA-BROADBAND ANTENNA for the radiation emission test below 1G.
3. HORN ANTENNA for the radiation emission test above 1G.
4. We tested both battery powered and powered by adapter charging mode at three orientate ones, recorded worst case at powered by adapter charging mode.
5. "---" means not recorded as emission levels lower than limit.

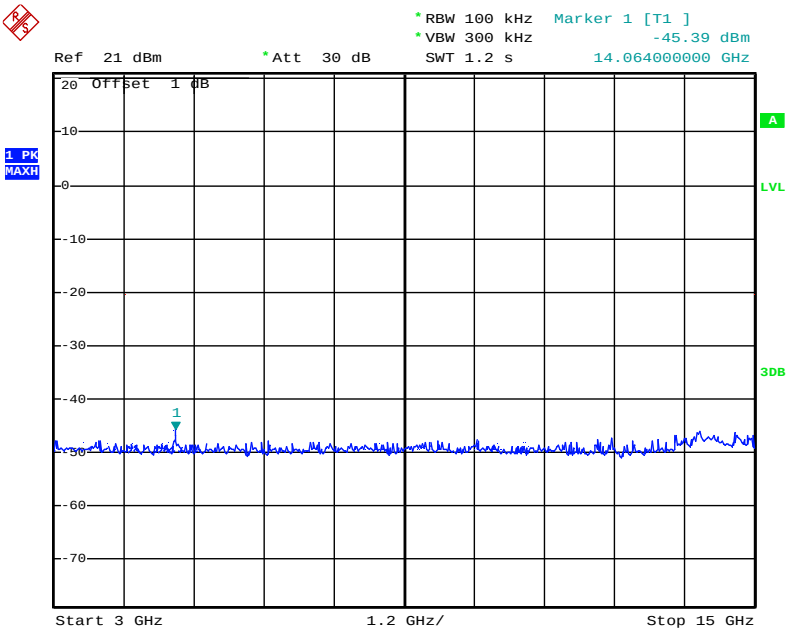
Low Channel (2402 MHz)-Above 1G							
Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type	Polar (H/V)
4803.98	53.63	-3.26	50.37	74	-23.63	Pk	Vertical
4803.98	40.84	-3.26	37.58	54	-16.42	Av	Vertical
7206.14	51.37	-2.31	49.06	74	-24.94	Pk	Vertical
7206.14	38.39	-2.31	36.08	54	-17.92	Av	Vertical
4804.33	51.29	-3.18	48.11	74	-25.89	Pk	Horizontal
4804.33	42.92	-3.18	39.74	54	-14.26	Av	Horizontal
7206.19	46.82	-2.28	44.54	74	-29.46	Pk	Horizontal
7206.19	35.53	-2.28	33.25	54	-20.75	Av	Horizontal
Mid Channel (2441 MHz)-Above 1G							
4882.43	52.56	-3.55	49.01	74	-24.99	Pk	Vertical
4882.43	41.36	-3.55	37.81	54	-16.19	Av	Vertical
7324.15	50.36	-0.76	49.6	74	-24.4	Pk	Vertical
7324.15	39.28	-0.76	38.52	54	-15.48	Av	Vertical
4882.76	49.74	-3.82	45.92	74	-28.08	Pk	Horizontal
4882.76	36.83	-3.82	33.01	54	-20.99	Av	Horizontal
7324.23	47.66	-0.91	46.75	74	-27.25	Pk	Horizontal
7324.23	34.28	-0.91	33.37	54	-20.63	Av	Horizontal
High Channel (2480MHz)- Above 1G							
4960.25	53.73	-3.67	50.06	74	-23.94	Pk	Vertical
4960.25	40.47	-3.67	36.8	54	-17.2	Av	Vertical
7440.16	51.37	-0.73	50.64	74	-23.36	Pk	Vertical
7440.16	37.84	-0.73	37.11	54	-16.89	Av	Vertical
4960.44	49.68	-3.47	46.21	74	-27.79	Pk	Horizontal
4960.44	35.66	-3.47	32.19	54	-21.81	Av	Horizontal
7440.78	47.86	-0.54	47.32	74	-26.68	Pk	Horizontal
7440.78	33.74	-0.54	33.2	54	-20.8	Av	Horizontal

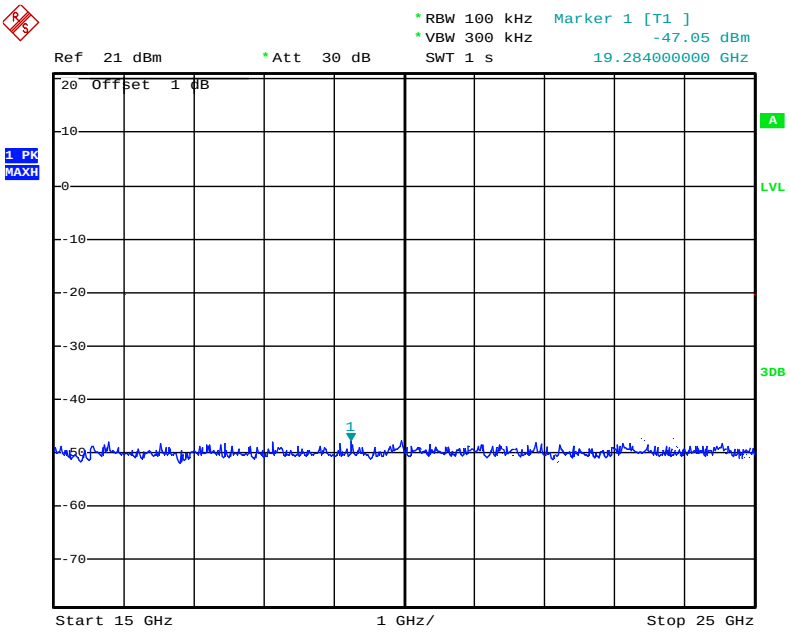
Conducted Spurious Emissions at Antenna Port:

1Mbps

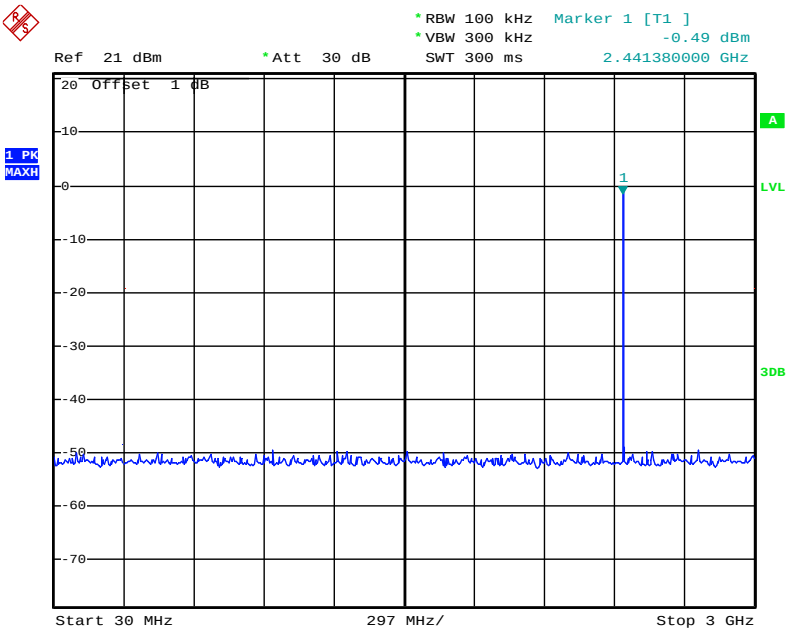
CH00

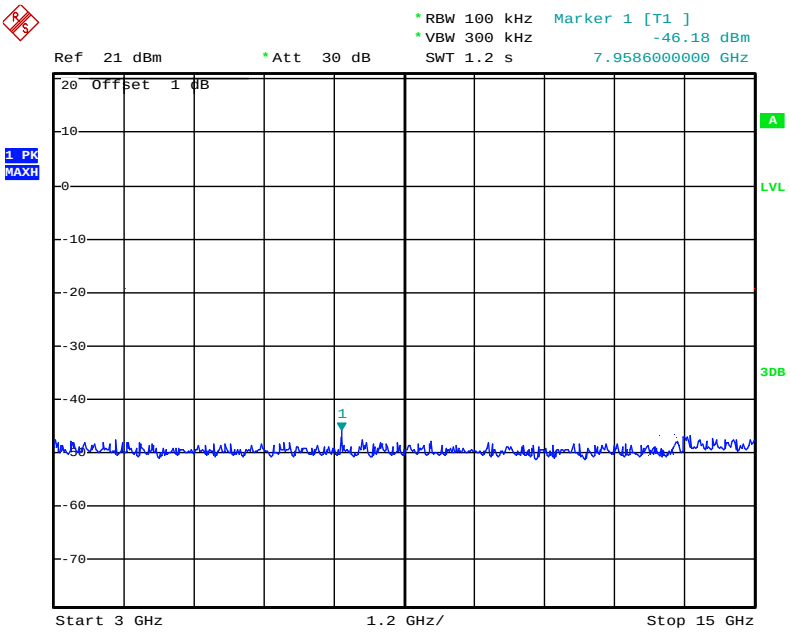


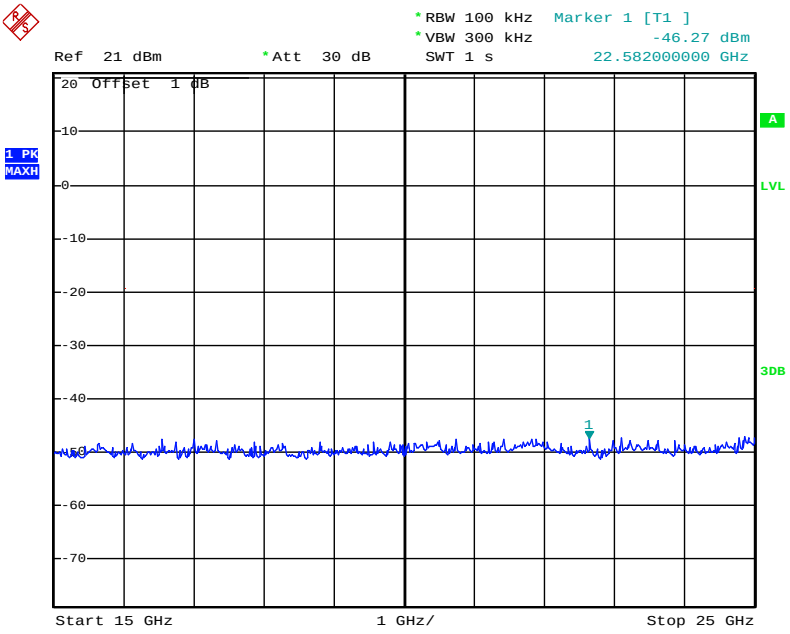




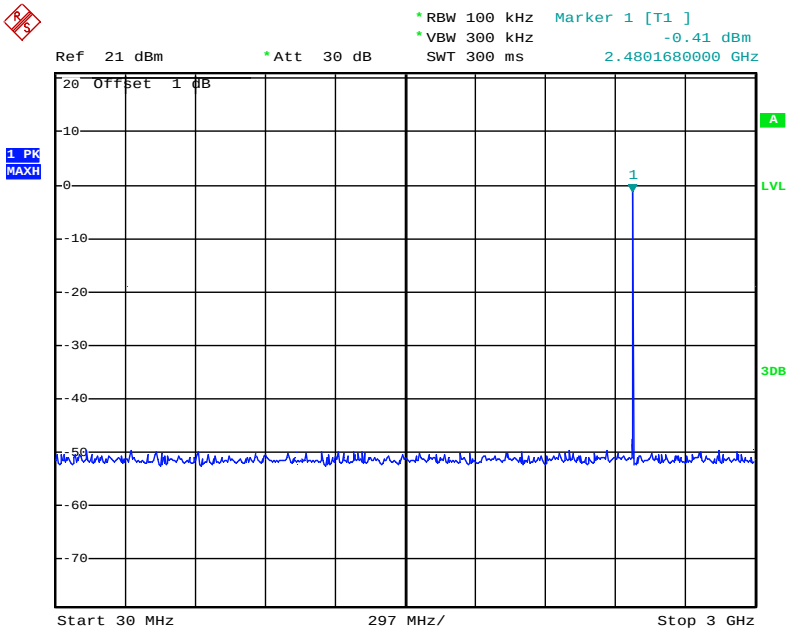
CH39

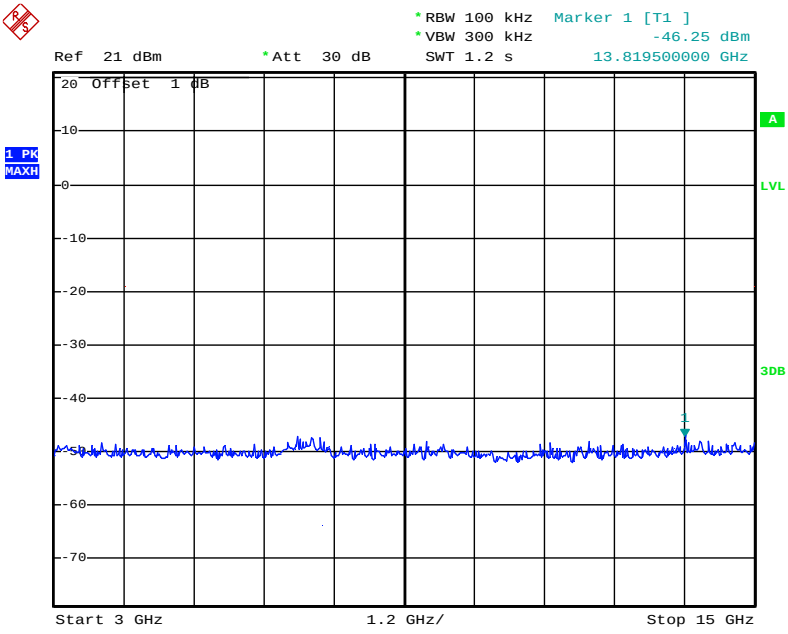


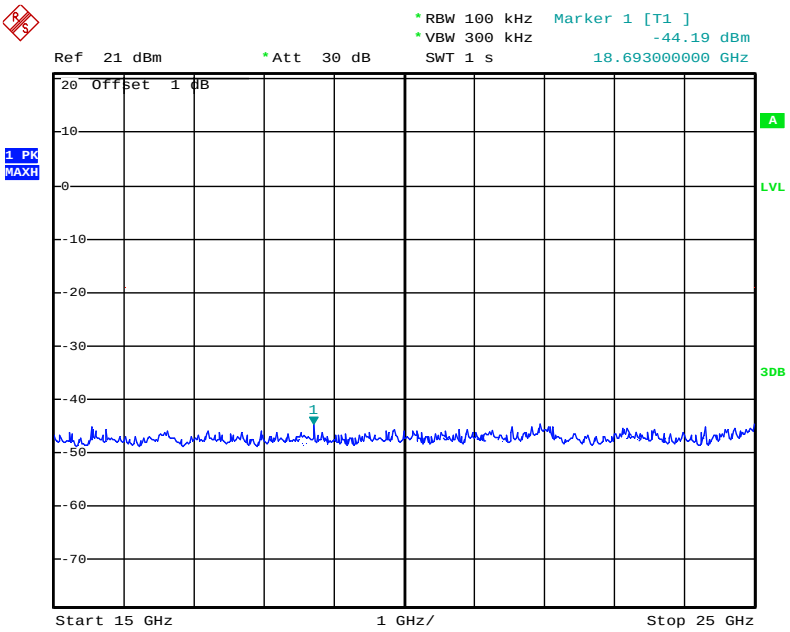




CH78







5. NUMBER OF HOPPING CHANNEL

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	RBW =100kHz
VB	VBW ≥ RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

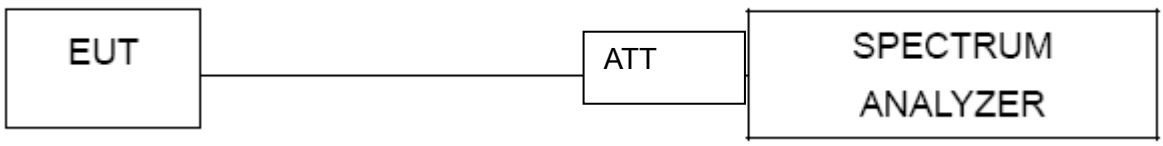
5.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100kHz, VBW=300kHz, Sweep time = Auto.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



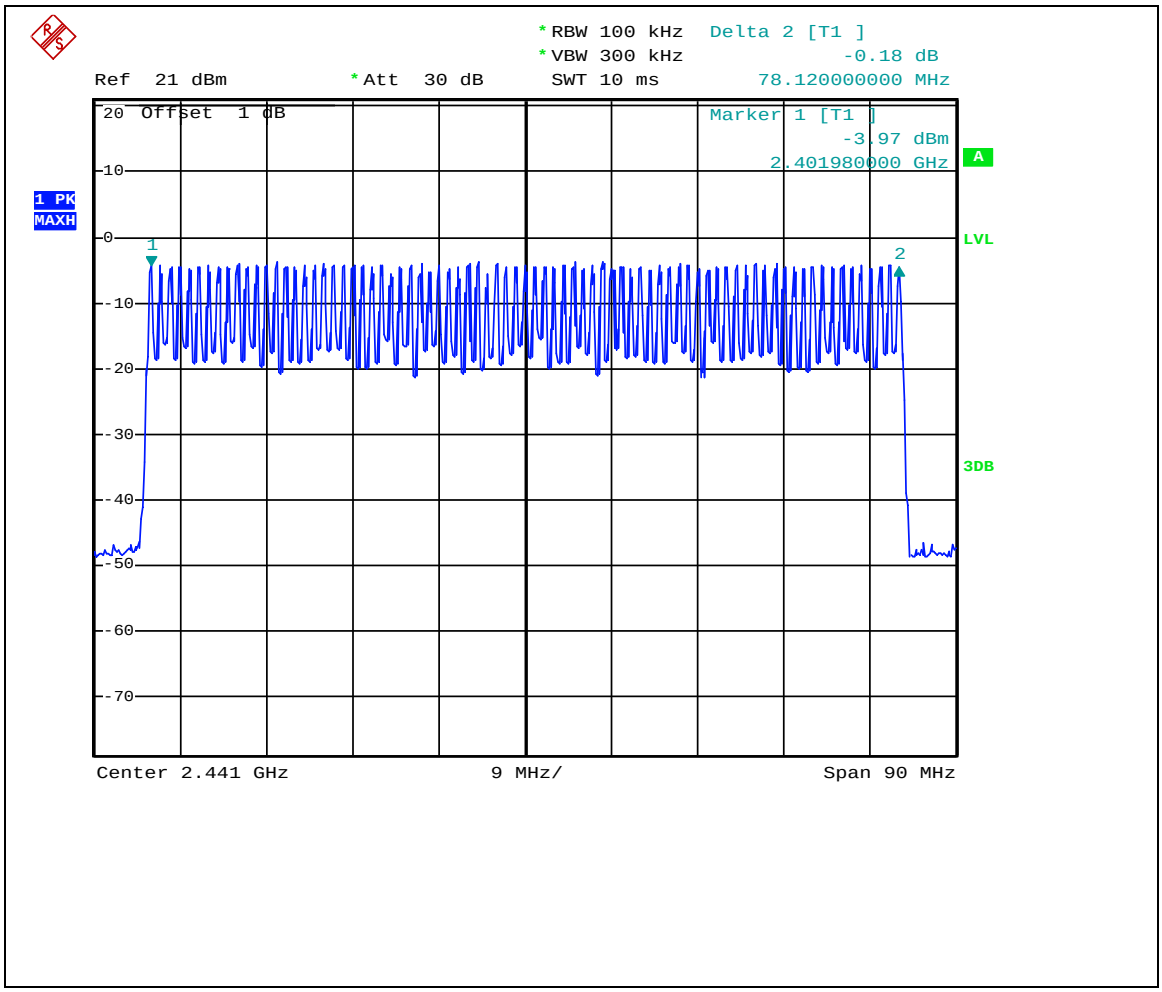
5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

EUT：	BLUETOOTH HEADSET	Model Name ：	BS057RQ
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	Hopping Mode		

Number of Hopping Channel	79



6. AVERAGE TIME OF OCCUPANCY

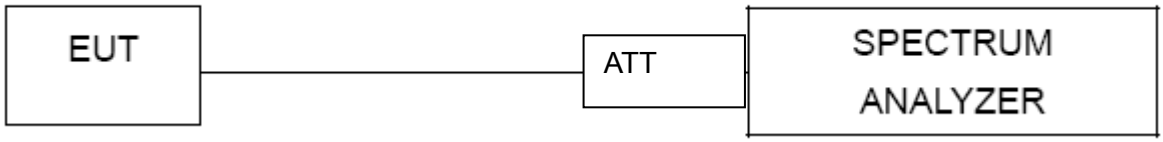
6.1 APPLIED PROCEDURES / LIMIT

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

6.1.1 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. Set center frequency of spectrum analyzer=operating frequency with RBW=1MHz and VBW=3MHz, Span=0Hz.

6.1.2 TEST SETUP

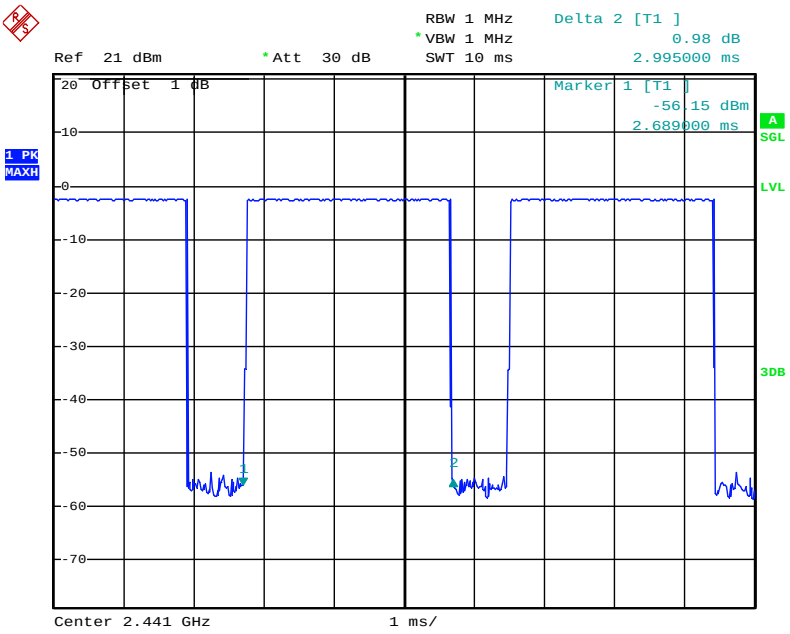


6.1.3 TEST RESULTS

The Dwell Time=Burst Width*Total Hops. The detailed calculations are showed as follows:
The duration for dwell time calculation:0.4[s]*hopping number=0.4[s]*79[ch]=31.6[s*ch];
The burst width [ms/hop/ch], which is directly measured, refers to the duration on one channel hop.
The hops per second for all channels: The selected EUT Conf uses a slot type of 5-Tx&1-Rx and a hopping rate of 1600 [ch*hop/s] for all channels. So the final hopping rate for all channels is 1600/6=266.67 [ch*hop/s]
The hops per second on one channel: 266.67 [ch*hops/s]/79 [ch]=3.38 [hop/s];
The total hops for all channels within the dwell time calculation duration: 3.38 [hop/s]*31.6[s*ch]=106.67 [hop*ch];
The dwell time for all channels hopping: 106.67 [hop*ch]*Burst Width [ms/hop/ch].

Remark: 1. We test Frequency Separation at all test channels, recorded worst case at middle channel.

GFSK Test Mode					
Mode	**Frequency (MHz)**	**Pulse Width (ms)**	**Dwell Time (S)**	**Limit (S)**	**Verdict**
DH5	2441	2.995	0.319	0.4	PASS
	Note: Dwell time=Pulse Time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second				



7. HOPPING CHANNEL SEPARATION MEASUREMENT

7.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100kHz
RB	300kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

7.1.1 TEST PROCEDURE

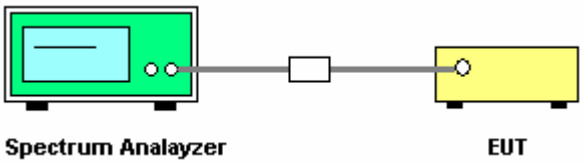
a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.

b. The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



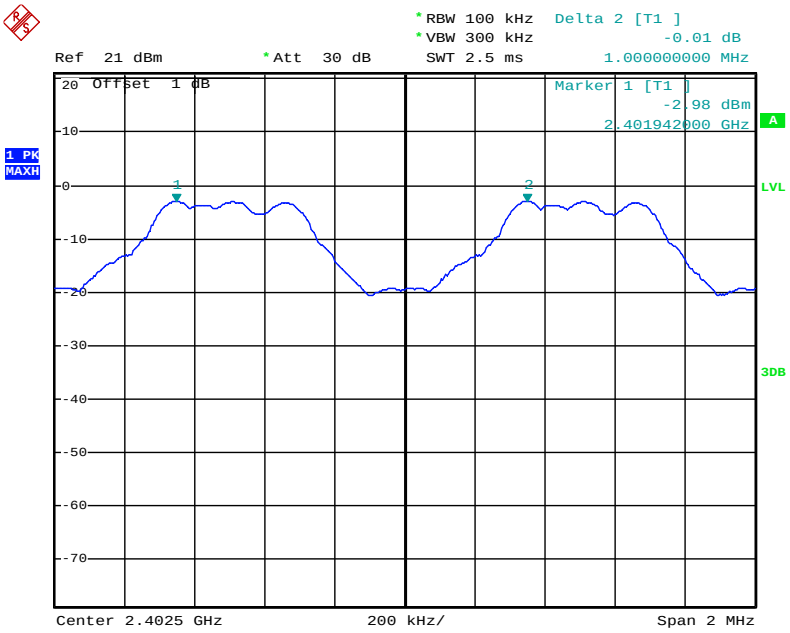
7.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

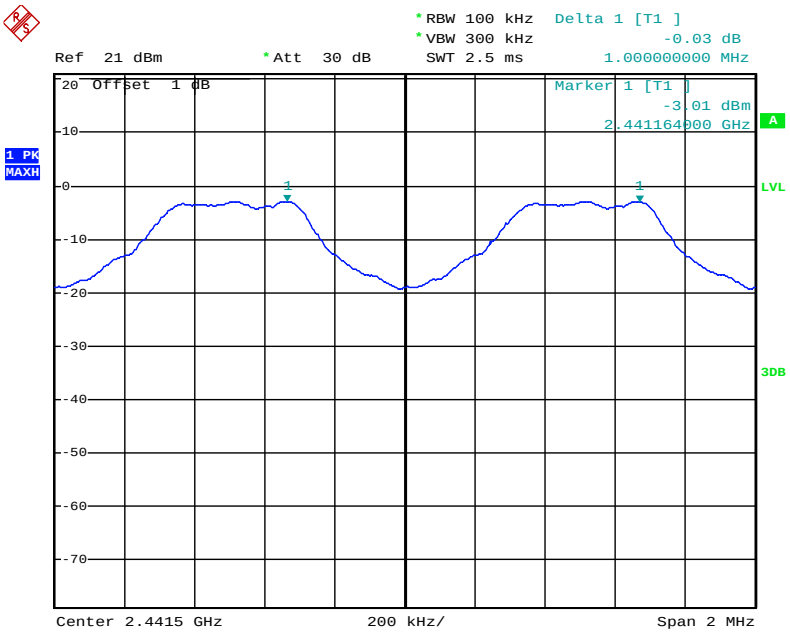
7.1.5 TEST RESULTS

GFSK Test Mode		
Frequency	**Ch. Separation (MHz)**	**Result**
2402 MHz	1.000	**Complies**
2441 MHz	1.000	**Complies**
2480 MHz	1.000	**Complies**

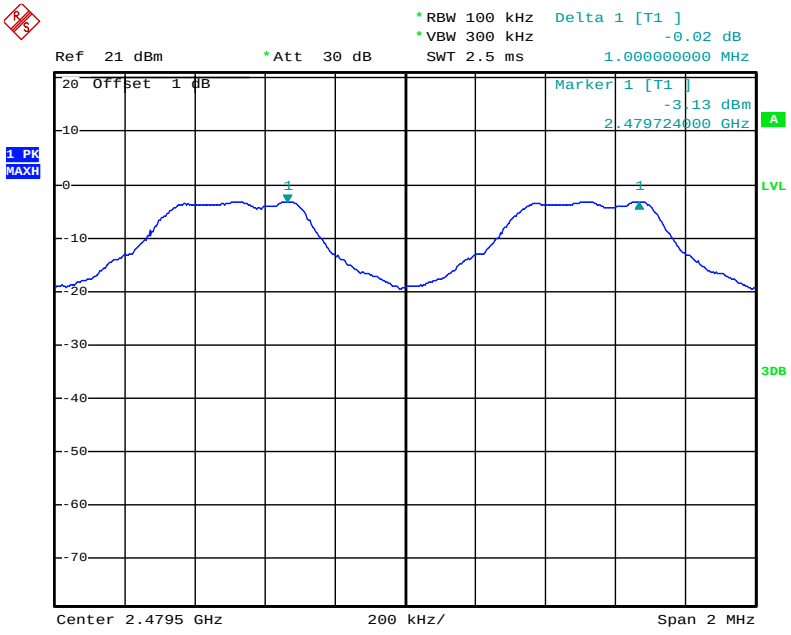
CH00 -1Mbps



CH39 -1Mbps



CH78 -1Mbps



8. BANDWIDTH TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)	Bandwidth	(20dB bandwidth)	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

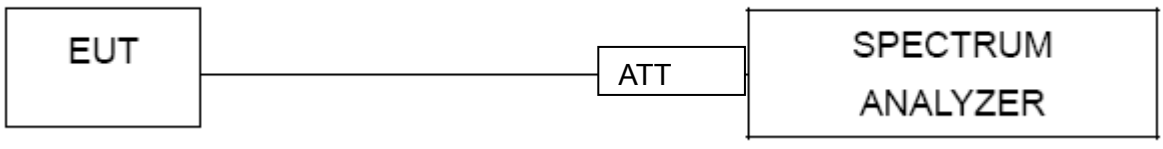
8.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 30KHz, VBW=100KHz, Sweep time = Auto.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



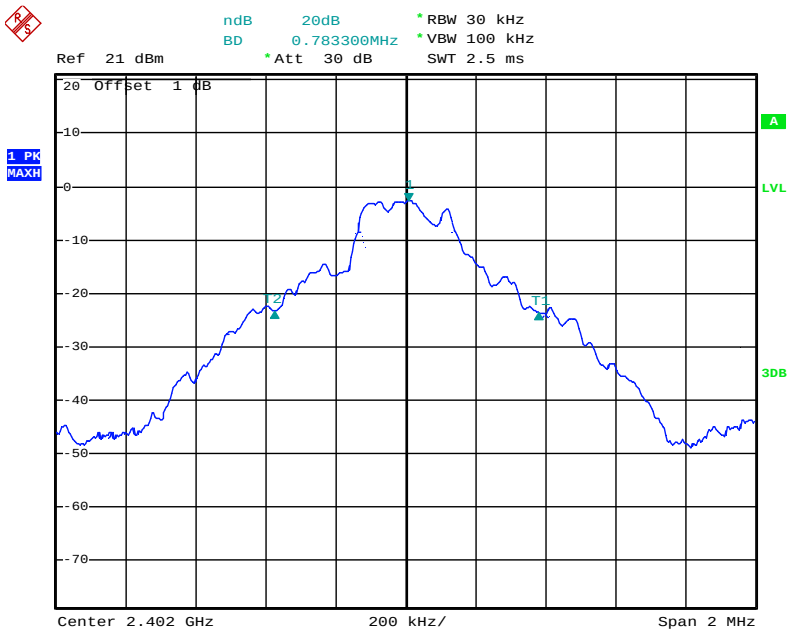
8.1.4 EUT OPERATION CONDITIONS

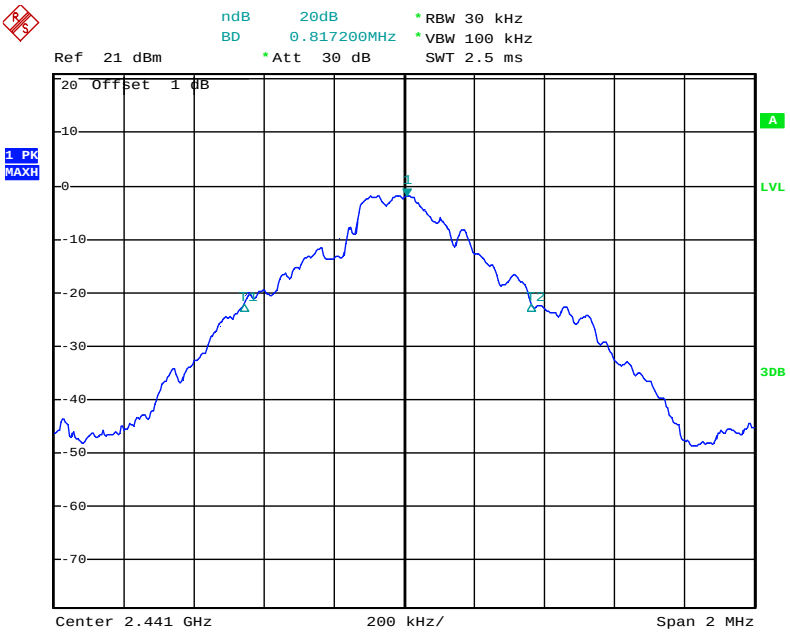
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

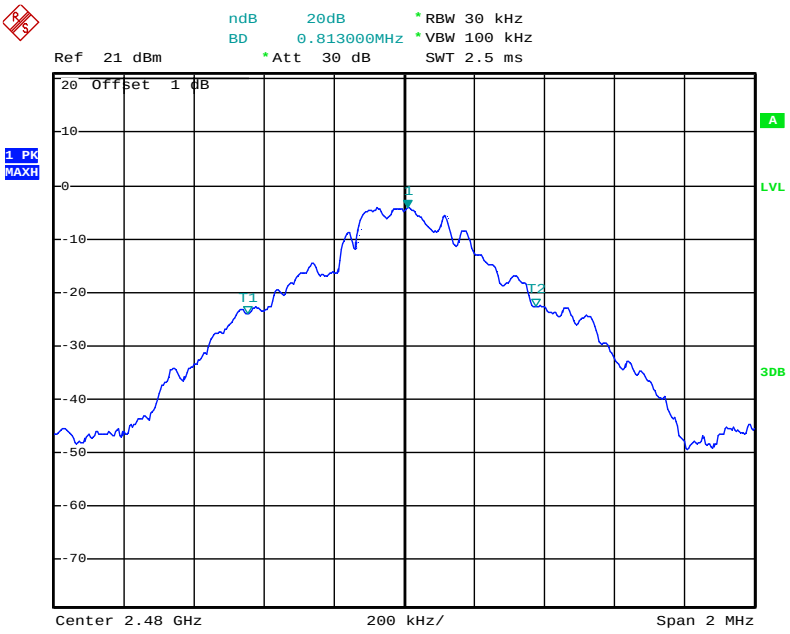
8.1.5 TEST RESULTS

EUT：	BLUETOOTH HEADSET	Model Name ：	BS057RQ
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	CH00 / CH39 /C78**(1Mbps)**		

Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	0.783	**PASS**
2441 MHz	0.817	**PASS**
2480 MHz	0.813	**PASS**







9. PEAK OUTPUT POWER TEST

9.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(i)	Peak Output Power	0.125 w or 1w	2400-2483.5	PASS

9.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

b. Spectrum Setting : RBW > the 20 dB bandwidth of the emission being measured

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

VBW ≥ RBW

Sweep = auto

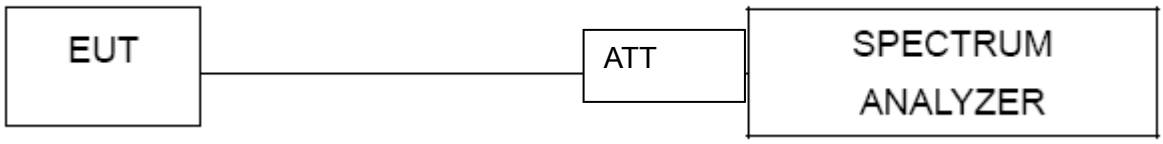
Detector function = peak

Trace = max hold

9.1.2 DEVIATION FROM STANDARD

No deviation.

9.1.3 TEST SETUP



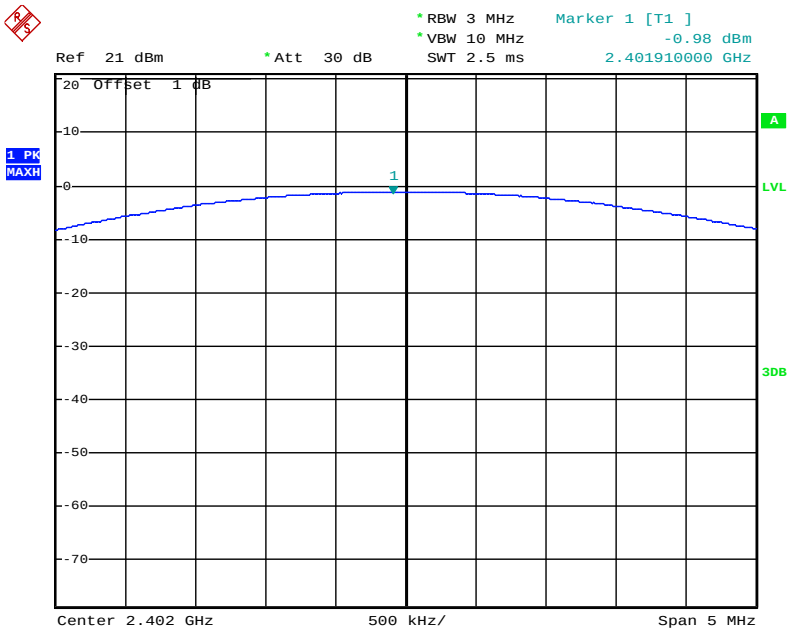
9.1.4 EUT OPERATION CONDITIONS

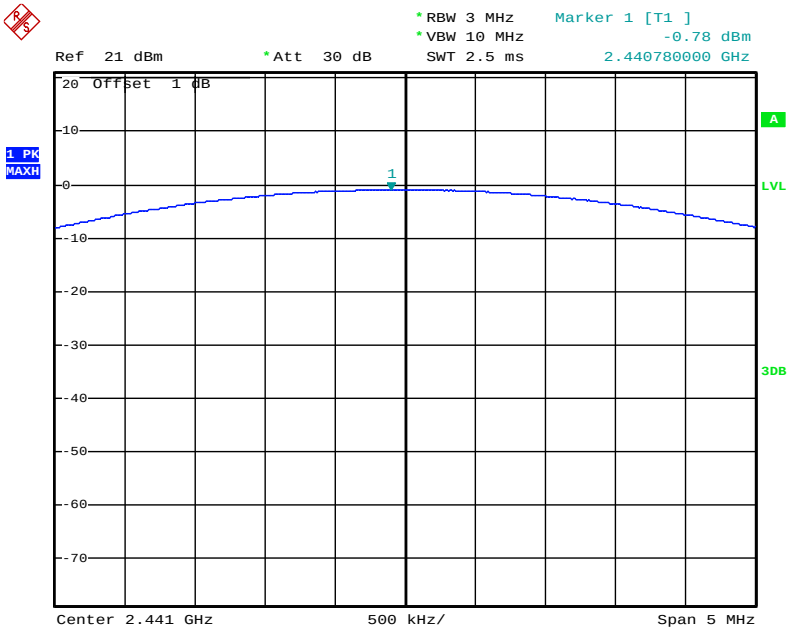
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

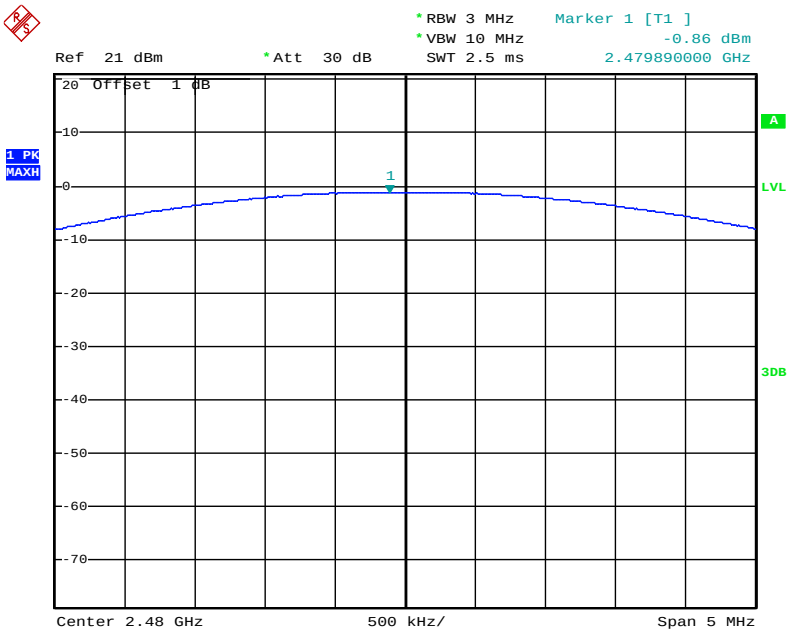
9.1.5 TEST RESULTS

Remark: We test maximum peak output power at difference Packet Type (DH1, DH3 and DH5), recorded worst case at DH3

1Mbps			
Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)
CH00	2402	-0.98	30
CH39	2441	-0.78	30
CH78	2480	-0.86	30
Note: The relevant measured result has the offset with cable loss already.			







10. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

APPLICABLE STANDARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

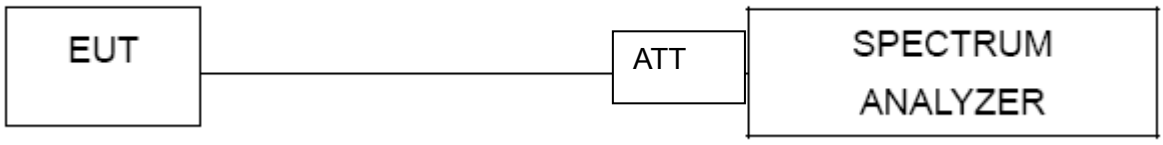
TEST PROCEDURE

a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
c) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
d) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
e) Repeat above procedures until all measured frequencies were complete.

10.1 DEVIATION FROM STANDARD

No deviation.

10.2 TEST SETUP



10.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

10.4 TEST RESULTS

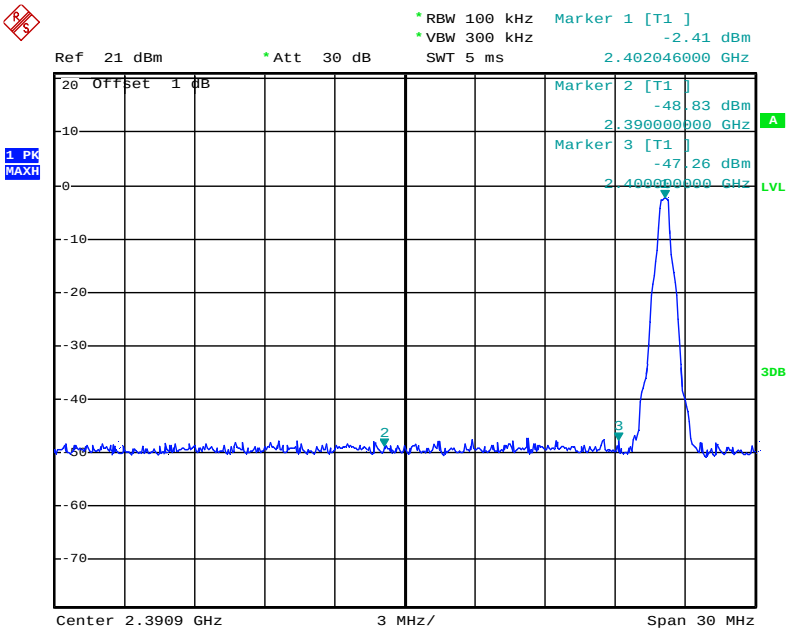
EUT：	BLUETOOTH HEADSET	Model Name ：	BS057RQ
Temperature：	24 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V

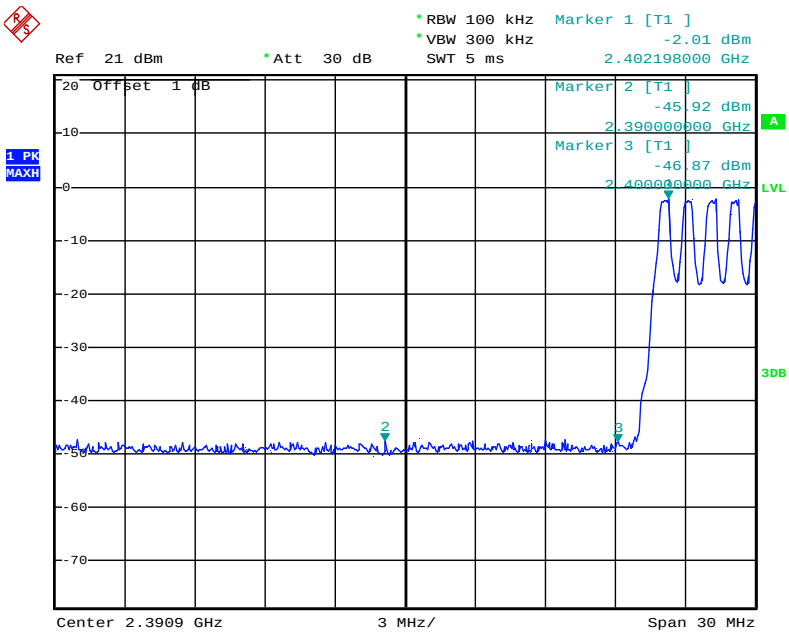
Frequency Band	Delta Peak to band emission (dBc)	＞Limit (dBc)	Result
1Mbps Non-hopping			
Left-band	46.42	20	Pass
Right-band	46.60	20	Pass
1Mbps hopping			
Left-band	43.91	20	Pass
Right-band	46.98	20	Pass

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
1Mbps Non-hopping							
2390	55.74	-13.06	42.68	54	-11.32	peak	Vertical
2390	52.16	-13.06	39.1	54	-14.9	peak	Horizontal
2483.5	50.84	-12.78	38.06	54	-15.94	peak	Vertical
2483.5	51.48	-12.78	38.7	54	-15.3	peak	Horizontal

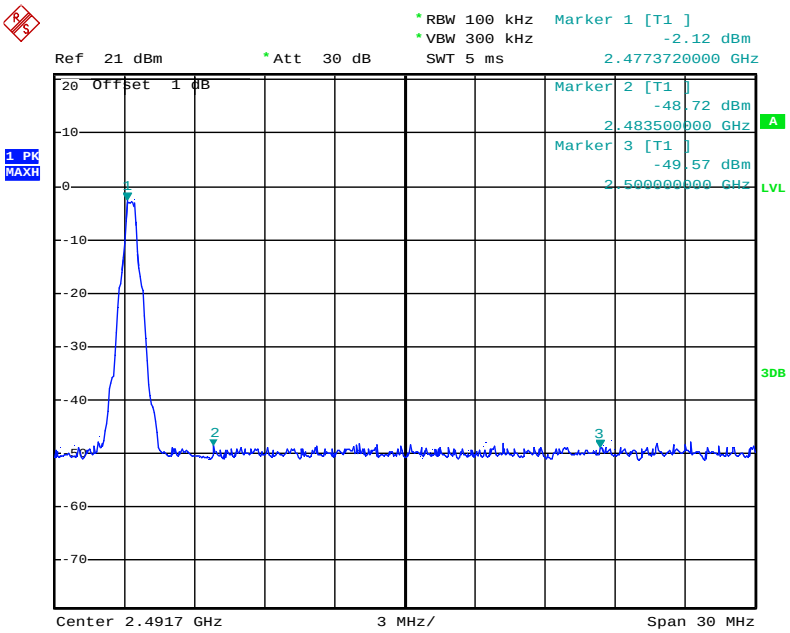
Note: Test method to see chapter 3.2 . When PK value is lower than the Average value limit, average didn't record.

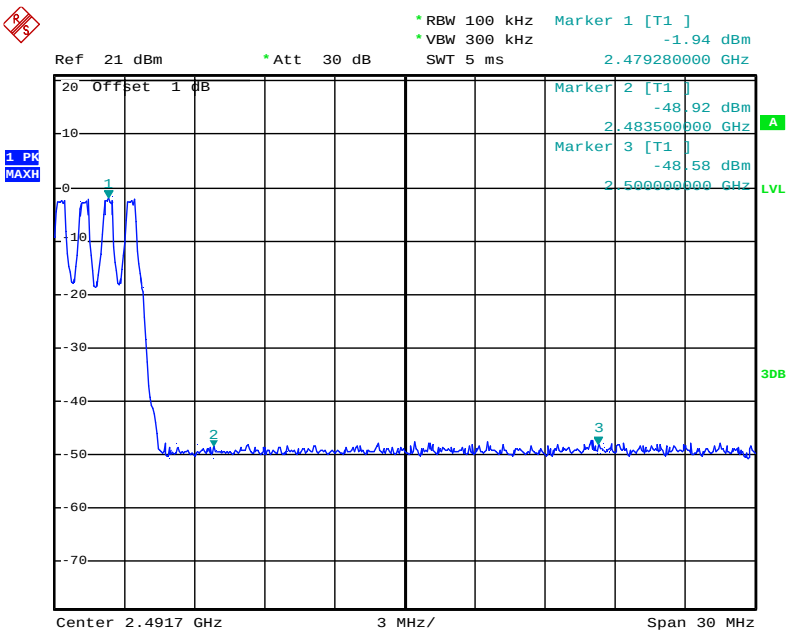
DH5: Band Edge, Left Side





DH5: Band Edge, Right Side





11. ANTENNA REQUIREMENT

11.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

11.2 EUT ANTENNA

The EUT antenna is PCB antenna. It comply with the standard requirement.