FCC C2PC Test Report

FCC ID	:	**SQGBT800**
Equipment	:	**BTv4.0 Dual Mode USB HCI Module (Please refer to section 1.1.1 for more details)**
Model No.	:	**BT800 (Please refer to section 1.1.1 for more details)**
Brand Name	:	**Laird Technologies**
Applicant	:	**Laird Technologies**
Address	:	**11160 Thompson Ave. / Lenexa, Kansas / 66219 / USA**
Standard	:	**47 CFR FCC Part 15.247**
Received Date	:	**Sep. 03, 2014**
Tested Date	:	**Sep. 10 ~ Sep. 11, 2014**

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Approved & Reviewed by:

Gary Chang / Manager

Testing Laboratory 2732

Table of Contents

1 GENERAL DESCRIPTION 5

1.1 Information 5
1.2 Local Support Equipment List 8
1.3 Test Setup Chart 8
1.4 The Equipment List 9
1.5 Test Standards 11
1.6 Measurement Uncertainty 11

2 TEST CONFIGURATION 12

2.1 Testing Condition 12
2.2 The Worst Test Modes and Channel Details 12

3 TRANSMITTER TEST RESULTS 13

3.1 AC Power Line Conducted Emissions 13
3.2 Unwanted Emissions into Restricted Frequency Bands 16
3.3 Conducted Output Power 32

4 TEST LABORATORY INFORMATION 34

Release Record

Report No.	Version	Description	Issued Date
FR490301AD	Rev. 01	Initial issue	Sep. 19, 2014

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.152MHz 59.81 (Margin -6.06dB) - QP	Pass
15.247(d) 15.209	Radiated Emissions & Band Edge	[dBuV/m at 3m]: 71.71MHz 35.91 (Margin -4.09dB) - PK	Pass
15.247(b)(1)	Conducted Output Power	Power [dBm]: BR: 8.16 EDR: 7.05	Pass
15.247(a)(1)(iii)	Number of Hopping Channels	Note	Note
15.247(a)(1)	Hopping Channel Separation	Note	Note
15.247(a)(1)(iii)	Dwell Time	Note	Note
15.203	Antenna Requirement	Meet the requirement of limit	Pass

Note: This C2PC is adding new antenna that will not impact original test result thus this item is not re-evaluated.

1 General Description

1.1 Information

This report is prepared for FCC class II change.

This report is issued as a duplicate report to original ICC report no. FR362601AD. The modification is adding external antenna and model name for this change. In this report, conducted power, AC power line conducted emission and radiated emission tests had been re-tested and only its data was recorded in the following sections.

1.1.1 Product Details

The following models are provided to this EUT. (Additional model was marked in boldface.)

Model Name	Description	Difference
BT800	BTv4.0 Dual Mode USB HCI Module	---
BT810	BTv4.0 Dual Mode USB HCI Module (BG carrier board)	BT800 module mounted onto a PCB carrier board to change footprint – no other differences.
BT820	BTv4.0 Dual Mode USB Dongle	BT800 module mounted onto a carrier board with USB connector.
BT800-ST	BTv4.0 Dual Mode USB HCI Module – External Antenna variant	BT800 module mounted onto a PCB carrier board with external chip antenna.

1.1.2 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	**Bluetooth Mode**	**Ch. Frequency (MHz)**	**Channel Number**	**Data Rate**
2400-2483.5	BR V2.1	2402-2480	0-78 [79]	1 Mbps
2400-2483.5	EDR V2.1	2402-2480	0-78 [79]	2 Mbps
2400-2483.5	EDR V2.1	2402-2480	0-78 [79]	3 Mbps
Note 1: RF output power specifies that Maximum Peak Conducted Output Power. Note 2: Bluetooth BR uses a GFSK. Note 3: Bluetooth EDR uses a combination of π/4-DQPSK and 8DPSK.				

1.1.3 Antenna Details

Ant. No.	Brand	Model	Type	Connector	Antenna Gain (dBi)	Remark
1	ACX	AT3216-B2R7HAA_3216	chip	N/A	0.5	For BT800, BT810 & BT820
2	ACX	AT3216-B2R7HAA	chip	UFL	0.5	For BT800-ST

1.1.4 EUT Operational Condition

Power Supply Type	5Vdc from host.

1.1.5 Accessories

N/A

1.1.6 Channel List

Frequency band (MHz)				2400~2483.5			
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

1.1.7 Test Tool

Test tool	Blue Tool V2.5

1.1.8 Power Setting

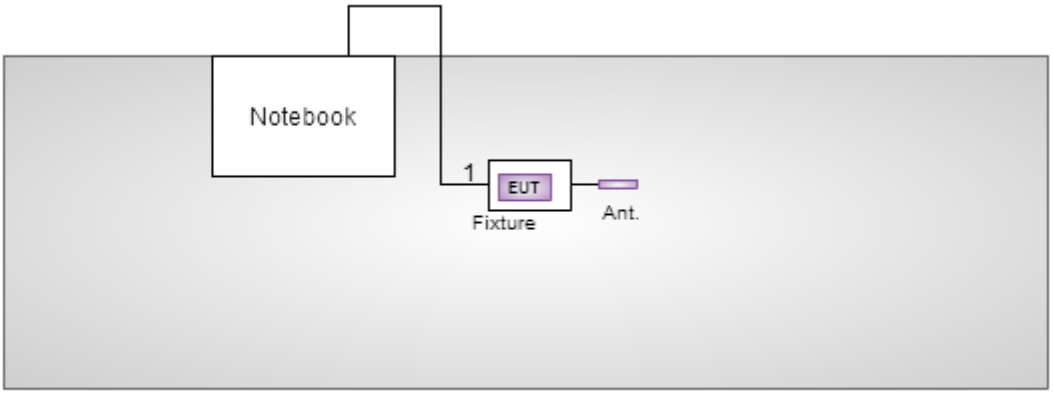
Modulation Mode	Test Frequency (MHz)		
	2402	**2440**	**2480**
GFSK/1Mbps	255,63	255,63	255,63
8DPSK/3Mbps	255,63	255,63	255,63

1.2 Local Support Equipment List

Support Equipment List						
No.	**Equipment**	**Brand**	**Model**	**S/N**	**FCC ID**	**Length (m)**
1	Notebook	DELL	E6430	---	DoC	USB, 1.2m shielded w/o core

1.3 Test Setup Chart

Test Setup Diagram



1. USB, 1.2m shielded w/o core

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
EMC Receiver	R&S	ESCS 30	100169	Oct. 15, 2013	Oct. 14, 2014
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 23, 2013	Nov. 22, 2014
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127-666	Dec. 04, 2013	Dec. 03, 2014
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Apr. 23, 2014	Apr. 22, 2015
50 ohm terminal (Support Unit)	NA	50	04	Apr. 18, 2014	Apr. 17, 2015
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101498	Jan. 25, 2014	Jan. 24, 2015
Receiver	R&S	ESR3	101658	Jan. 10, 2014	Jan. 09, 2015
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jan. 02, 2014	Jan. 01, 2015
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Feb. 13, 2014	Feb. 12, 2015
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Dec. 27, 2013	Dec. 26, 2014
Preamplifier	Burgeon	BPA-530	SN:100219	Nov. 28, 2013	Nov. 27, 2014
Preamplifier	Agilent	83017A	MY39501308	Dec. 16, 2013	Dec. 15, 2014
Preamplifier	WM	TF-130N-R1	923365	Oct. 23, 2013	Oct. 22, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 16, 2013	Dec. 15, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 16, 2013	Dec. 15, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 16, 2013	Dec. 15, 2014
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 16, 2013	Dec. 15, 2014
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 16, 2013	Dec. 15, 2014
Note: Calibration Interval of instruments listed above is one year.					

Loop Antenna	R&S	HFH2-Z2	100330	Nov. 15, 2012	Nov. 14, 2014
Note: Calibration Interval of instruments listed above is two year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Feb. 17, 2014	Feb. 16, 2015
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Dec. 11, 2013	Dec. 10, 2014
Power Meter	Anritsu	ML2495A	1241002	Oct. 24, 2013	Oct. 23, 2014
Power Sensor	Anritsu	MA2411B	1207366	Oct. 24, 2013	Oct. 23, 2014
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247
FCC Public notice DA 00-705
ANSI C63.10-2009

1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty	
Parameters	**Uncertainty**
Bandwidth	±34.134 Hz
Conducted power	±0.808 dB
Frequency error	±34.134 Hz
Temperature	±0.6 ^{o}C
Conducted emission	±2.670 dB
AC conducted emission	±2.92 dB
Radiated emission ≤ 1GHz	±3.26 dB
Radiated emission > 1GHz	±4.94 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	22°C / 62%	Skys Huang
Radiated Emissions	03CH01-WS	22°C / 68%	Anderson Hung
RF Conducted	TH01-WS	22°C / 63%	Felix Sung

- FCC site registration No.: 657002
- IC site registration No.: 10807A-2

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data rate (Mbps)	Test Configuration
AC Power Line Conducted Emissions	GFSK	2480	1Mbps	---
Radiated Emissions (below 1GHz)	GFSK	2480	1Mbps	---
Radiated Emissions (above 1GHz)	GFSK 8DPSK	2402, 2441, 2480 2402, 2441, 2480	1Mbps 3Mbps	---
Conducted Output Power	GFSK 8DPSK	2402, 2441, 2480 2402, 2441, 2480	1Mbps 3Mbps	---

NOTE:

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Z-plane** results were found as the worst case and were shown in this report.

3 Transmitter Test Results

3.1 AC Power Line Conducted Emissions

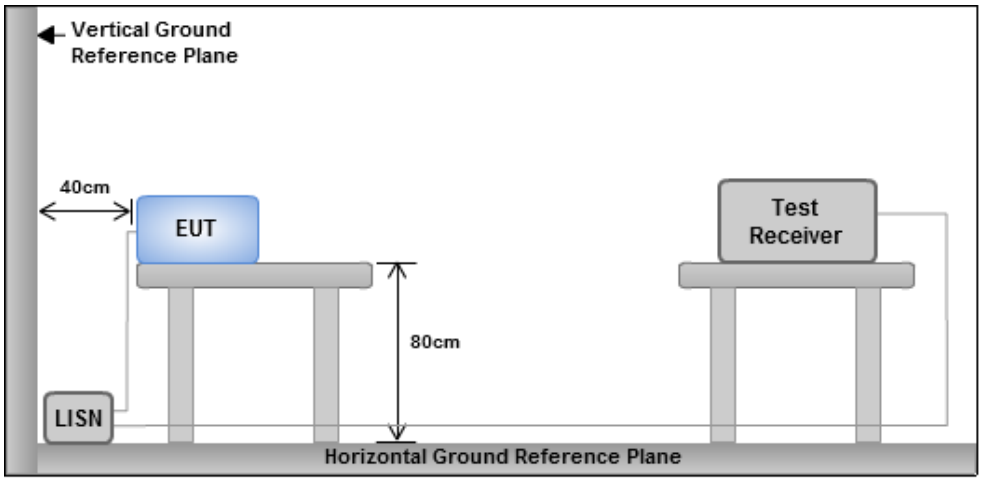
3.1.1 Limit of AC Power Line Conducted Emissions

Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

3.1.2 Test Procedures

1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V/60Hz

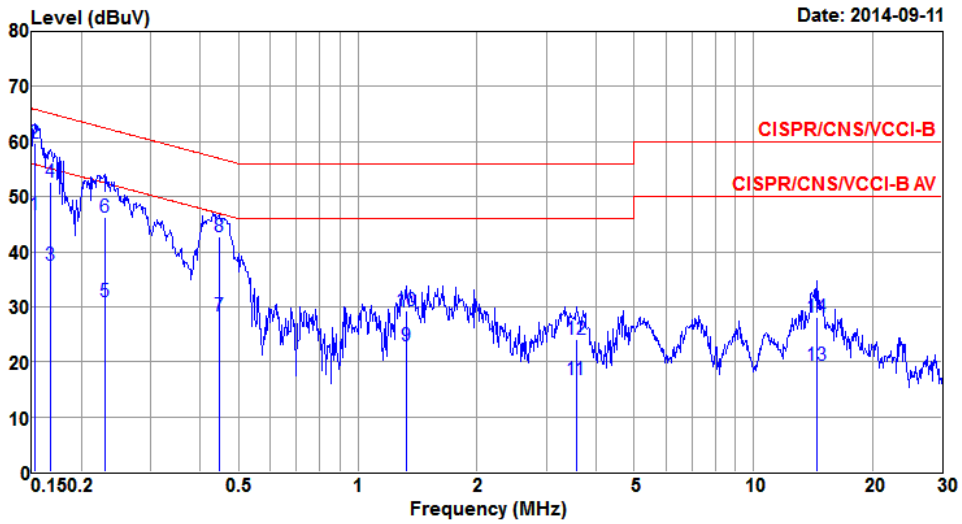
3.1.3 Test Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.1.4 Test Result of Conducted Emissions

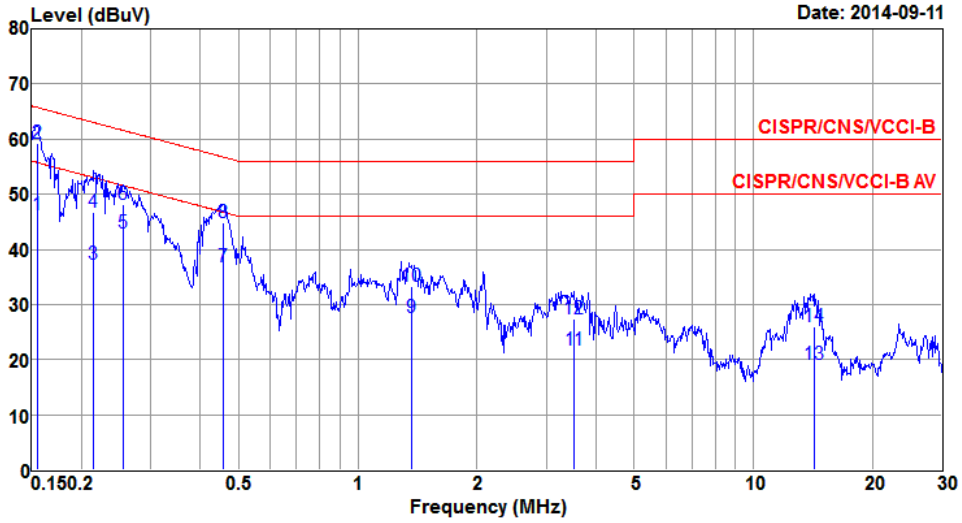
Modulation Mode	GFSK	Test Freq. (MHz)	2480
Power Phase	Line		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.152	46.62	55.87	-9.25	46.20	0.40	0.02	Average
2*	0.152	59.81	65.87	-6.06	59.39	0.40	0.02	QP
3	0.168	37.52	55.08	-17.56	37.10	0.40	0.02	Average
4	0.168	52.58	65.08	-12.50	52.16	0.40	0.02	QP
5	0.229	30.84	52.48	-21.64	30.44	0.39	0.01	Average
6	0.229	46.24	62.48	-16.24	45.84	0.39	0.01	QP
7	0.447	28.33	46.93	-18.60	27.90	0.39	0.04	Average
8	0.447	42.79	56.93	-14.14	42.36	0.39	0.04	QP
9	1.324	22.81	46.00	-23.19	22.26	0.42	0.13	Average
10	1.324	29.18	56.00	-26.82	28.63	0.42	0.13	QP
11	3.565	16.72	46.00	-29.28	16.14	0.45	0.13	Average
12	3.565	24.10	56.00	-31.90	23.52	0.45	0.13	QP
13	14.517	19.28	50.00	-30.72	18.42	0.55	0.31	Average
14	14.517	28.16	60.00	-31.84	27.30	0.55	0.31	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dBuV) = Limit Line (dBuV) – Level (dBuV).

Modulation Mode	GFSK	Test Freq. (MHz)	2480
Power Phase	Neutral		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.155	46.15	55.74	-9.59	45.65	0.48	0.02	Average
2*	0.155	59.31	65.74	-6.43	58.81	0.48	0.02	QP
3	0.215	37.32	53.01	-15.69	36.83	0.48	0.01	Average
4	0.215	46.85	63.01	-16.16	46.36	0.48	0.01	QP
5	0.255	43.05	51.60	-8.55	42.56	0.48	0.01	Average
6	0.255	48.08	61.60	-13.52	47.59	0.48	0.01	QP
7	0.456	36.79	46.76	-9.97	36.27	0.47	0.05	Average
8	0.456	44.87	56.76	-11.89	44.35	0.47	0.05	QP
9	1.367	27.70	46.00	-18.30	27.09	0.49	0.12	Average
10	1.367	33.29	56.00	-22.71	32.68	0.49	0.12	QP
11	3.528	21.72	46.00	-24.28	21.07	0.52	0.13	Average
12	3.528	27.31	56.00	-28.69	26.66	0.52	0.13	QP
13	14.288	19.19	50.00	-30.81	18.33	0.56	0.30	Average
14	14.288	26.05	60.00	-33.95	25.19	0.56	0.30	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dBuV) = Limit Line (dBuV) – Level (dBuV).

3.2 Unwanted Emissions into Restricted Frequency Bands

3.2.1 Limit of Unwanted Emissions into Restricted Frequency Bands

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit
Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.2.2 Test Procedures

1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at a height of 0.8 m test table above the ground plane.
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

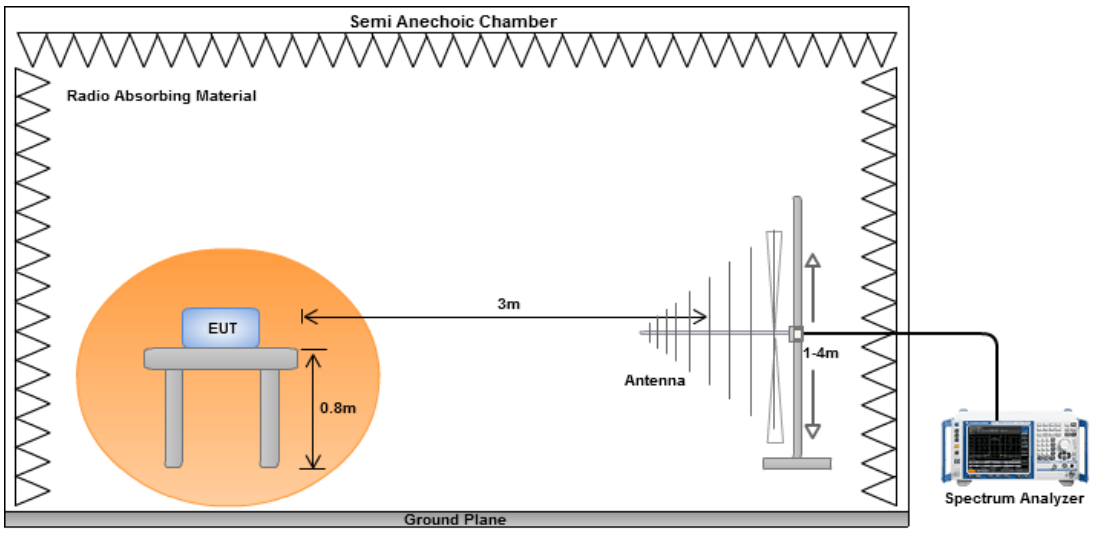
Note:

1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=10Hz and Peak detector is for average measured value of radiated emission above 1GHz

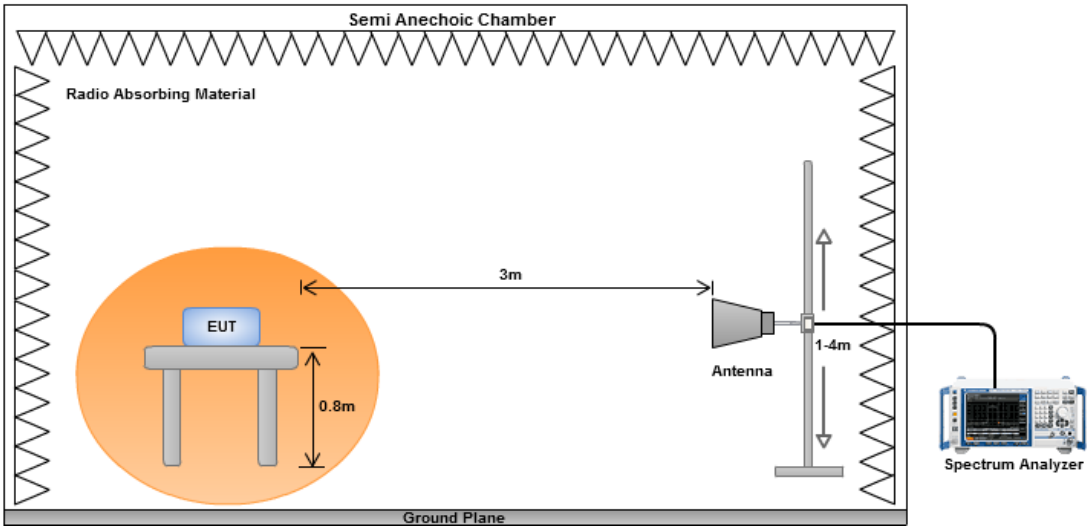
   DH5 packet is the worst case since DH5 has more TX slots than other packet types.
4. Hopping randomly between 79 channels is 1600 times per second (0.625 ms time slot).The duty factor is 20 * log (0.625 * 5 / 100) = -30.1 dB . Average value = Peak reading + duty factor

3.2.3 Test Setup

Radiated Emissions below 1 GHz

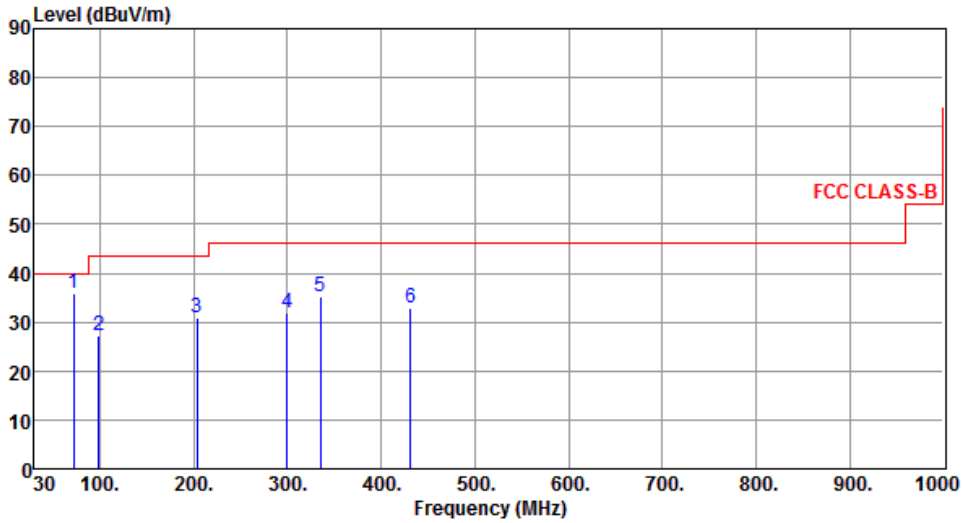


Radiated Emissions above 1 GHz



3.2.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

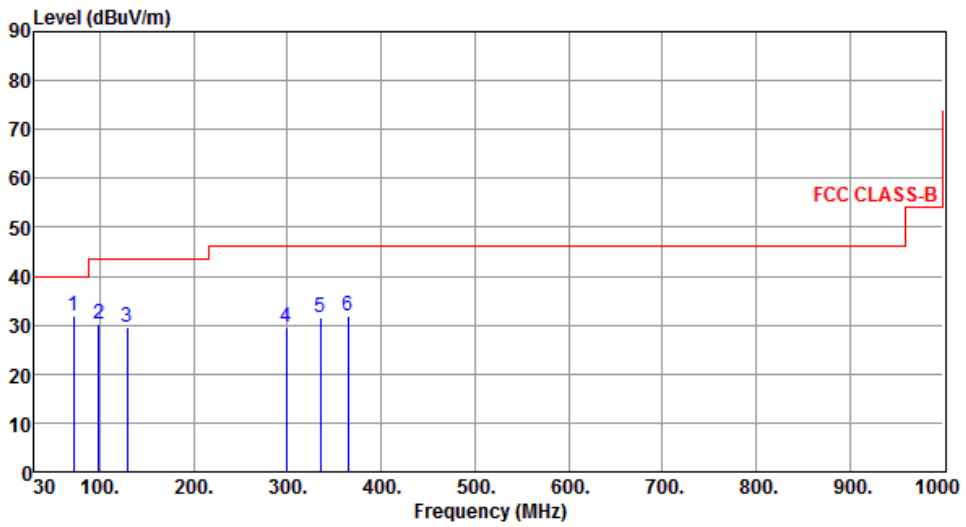
Modulation	GFSK	Test Freq. (MHz)	2480
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	71.71	35.91	40.00	-4.09	55.70	-19.79	Peak	---	---
2	98.87	27.13	43.50	-16.37	49.09	-21.96	Peak	---	---
3	203.63	30.97	43.50	-12.53	50.63	-19.66	Peak	---	---
4	299.66	31.83	46.00	-14.17	47.99	-16.16	Peak	---	---
5	335.55	35.13	46.00	-10.87	50.51	-15.38	Peak	---	---
6	431.58	32.89	46.00	-13.11	45.83	-12.94	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	GFSK	Test Freq. (MHz)	2480
Polarization	Vertical		

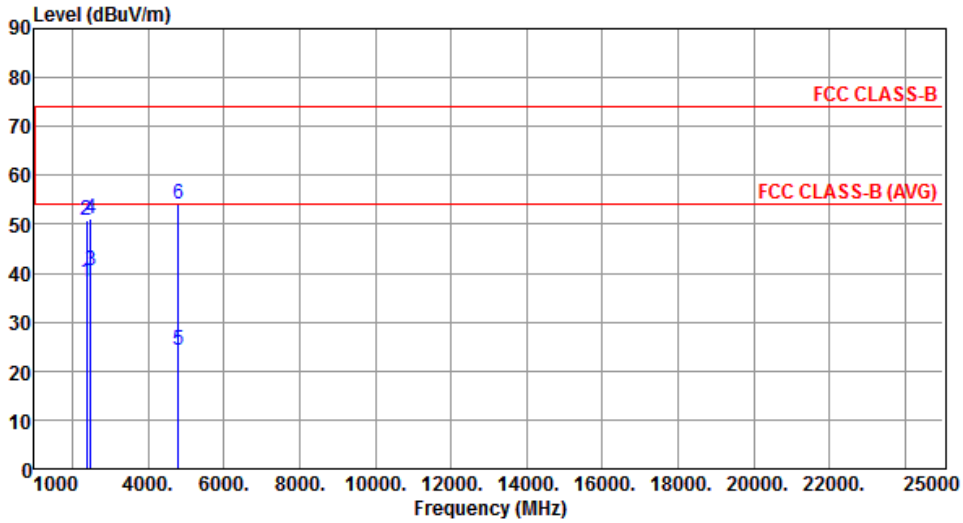


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	71.71	31.85	40.00	-8.15	51.64	-19.79	Peak	---	---
2	98.87	30.21	43.50	-13.29	52.17	-21.96	Peak	---	---
3	128.94	29.58	43.50	-13.92	47.96	-18.38	Peak	---	---
4	298.69	29.60	46.00	-16.40	45.79	-16.19	Peak	---	---
5	335.55	31.41	46.00	-14.59	46.79	-15.38	Peak	---	---
6	364.65	31.87	46.00	-14.13	46.52	-14.65	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

3.2.5 Transmitter Radiated Unwanted Emissions (Above 1GHz) for GFSK

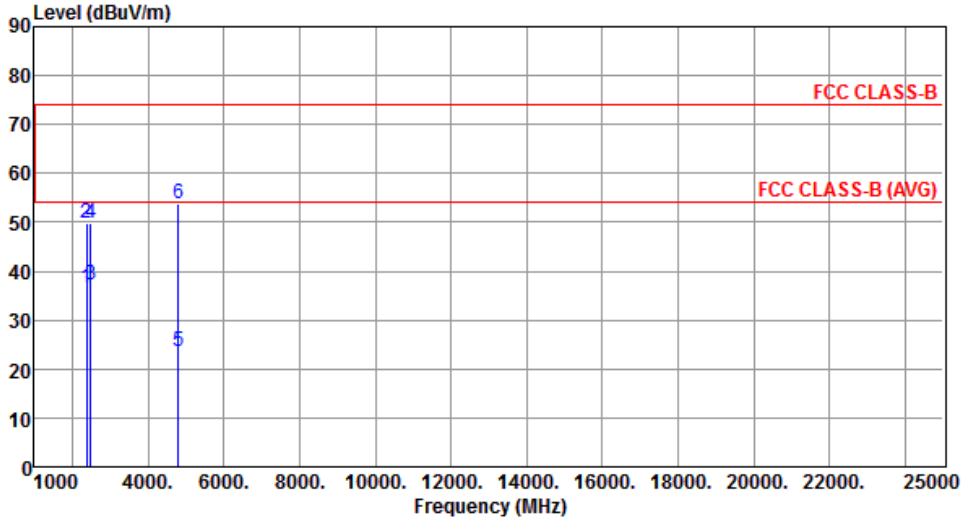
Modulation	GFSK	**Test Freq. (MHz)**	2402
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.34	54.00	-15.66	42.02	-3.68	Average	---	---
2	2390.00	50.65	74.00	-23.35	54.33	-3.68	Peak	---	---
3	2497.00	40.61	54.00	-13.39	43.85	-3.24	Average	---	---
4	2497.00	51.21	74.00	-22.79	54.45	-3.24	Peak	---	---
5	4804.00	24.13	54.00	-29.87	19.17	4.96	Average	---	---
6	4804.00	54.23	74.00	-19.77	49.27	4.96	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

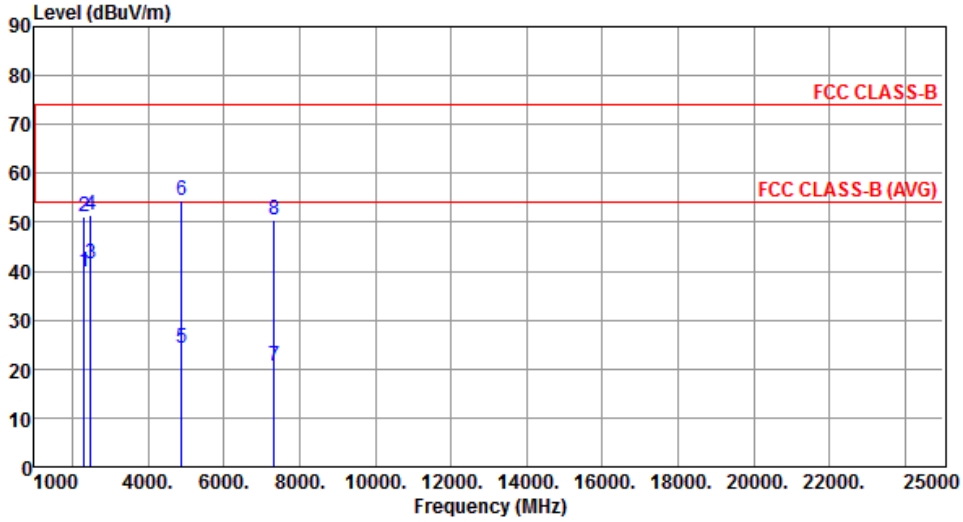
Modulation	GFSK	Test Freq. (MHz)	2402
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	36.42	54.00	-17.58	40.10	-3.68	Average	---	---
2	2390.00	49.91	74.00	-24.09	53.59	-3.68	Peak	---	---
3	2497.00	37.15	54.00	-16.85	40.39	-3.24	Average	---	---
4	2497.00	49.96	74.00	-24.04	53.20	-3.24	Peak	---	---
5	4804.00	23.66	54.00	-30.34	18.70	4.96	Average	---	---
6	4804.00	53.76	74.00	-20.24	48.80	4.96	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

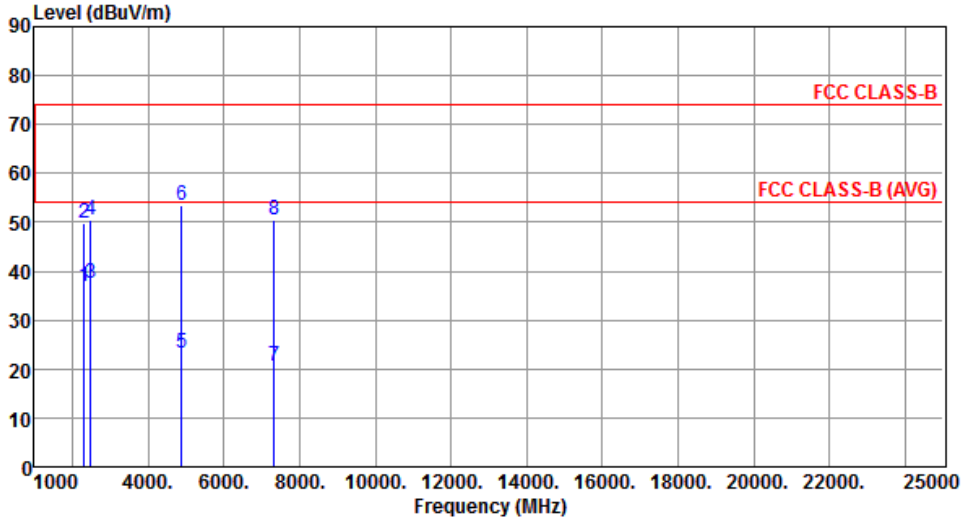
Modulation	GFSK	Test Freq. (MHz)	2441
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2323.00	39.73	54.00	-14.27	43.67	-3.94	Average	---	---
2	2323.00	51.09	74.00	-22.91	55.03	-3.94	Peak	---	---
3	2492.00	41.48	54.00	-12.52	44.74	-3.26	Average	---	---
4	2492.00	51.37	74.00	-22.63	54.63	-3.26	Peak	---	---
5	4882.00	24.27	54.00	-29.73	19.15	5.12	Average	---	---
6	4882.00	54.37	74.00	-19.63	49.25	5.12	Peak	---	---
7	7323.00	20.53	54.00	-33.47	11.19	9.34	Average	---	---
8	7323.00	50.63	74.00	-23.37	41.29	9.34	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

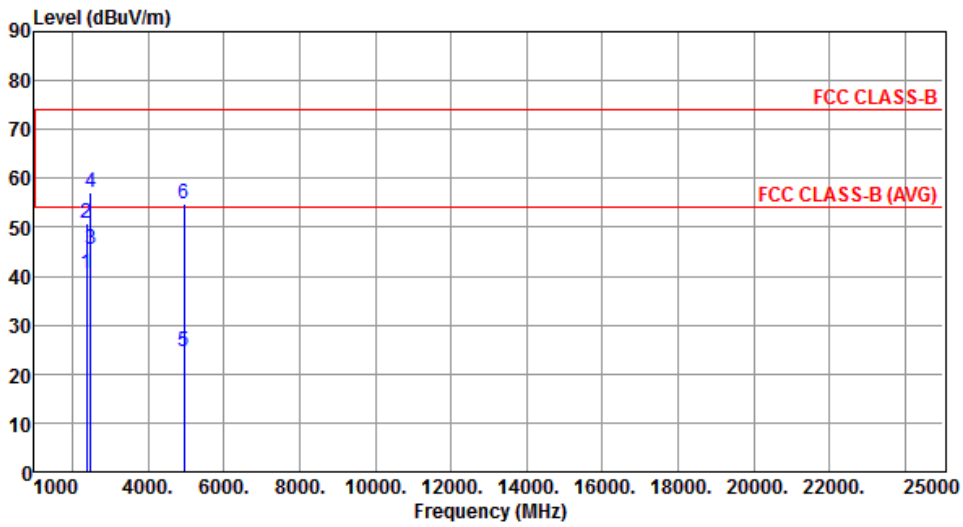
Modulation	GFSK	Test Freq. (MHz)	2441
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2323.00	36.75	54.00	-17.25	40.69	-3.94	Average	---	---
2	2323.00	49.68	74.00	-24.32	53.62	-3.94	Peak	---	---
3	2492.00	37.56	54.00	-16.44	40.82	-3.26	Average	---	---
4	2492.00	50.51	74.00	-23.49	53.77	-3.26	Peak	---	---
5	4882.00	23.25	54.00	-30.75	18.13	5.12	Average	---	---
6	4882.00	53.35	74.00	-20.65	48.23	5.12	Peak	---	---
7	7323.00	20.47	54.00	-33.53	11.13	9.34	Average	---	---
8	7323.00	50.57	74.00	-23.43	41.23	9.34	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

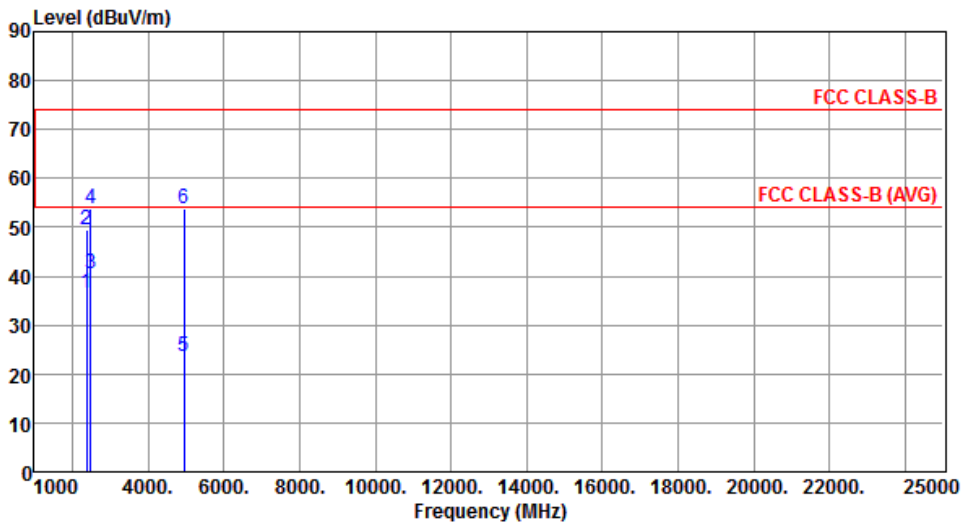
Modulation	GFSK	Test Freq. (MHz)	2480
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2375.00	40.35	54.00	-13.65	44.09	-3.74	Average	---	---
2	2375.00	50.83	74.00	-23.17	54.57	-3.74	Peak	---	---
3	2483.50	45.42	54.00	-8.58	48.72	-3.30	Average	---	---
4	2483.50	57.19	74.00	-16.81	60.49	-3.30	Peak	---	---
5	4960.00	24.71	54.00	-29.29	19.43	5.28	Average	---	---
6	4960.00	54.81	74.00	-19.19	49.53	5.28	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	GFSK	Test Freq. (MHz)	2480
Polarization	Vertical		

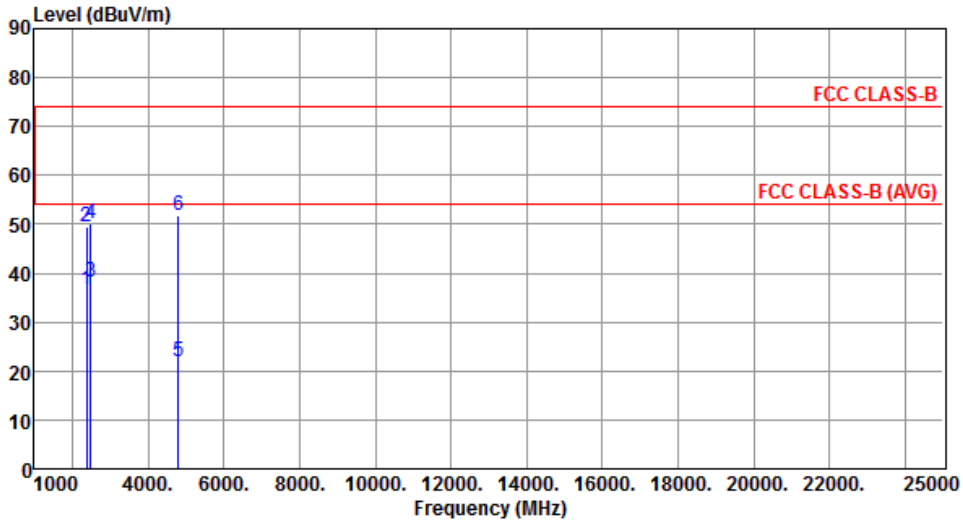


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2375.00	36.55	54.00	-17.45	40.29	-3.74	Average	---	---
2	2375.00	49.60	74.00	-24.40	53.34	-3.74	Peak	---	---
3	2483.50	40.55	54.00	-13.45	43.85	-3.30	Average	---	---
4	2483.50	53.77	74.00	-20.23	57.07	-3.30	Peak	---	---
5	4960.00	23.70	54.00	-30.30	18.42	5.28	Average	---	---
6	4960.00	53.80	74.00	-20.20	48.52	5.28	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.2.6 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 8DPSK

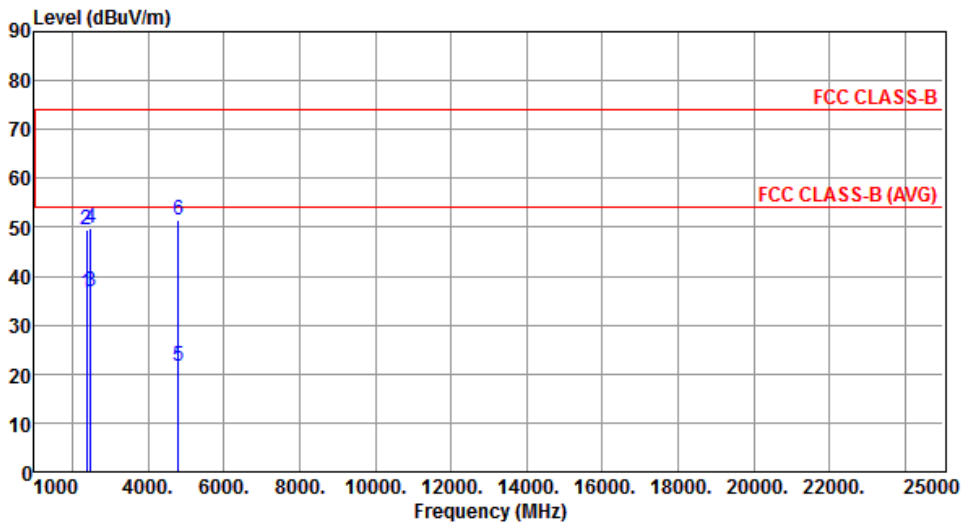
Modulation	8DPSK	**Test Freq. (MHz)**	2402
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	36.63	54.00	-17.37	40.31	-3.68	Average	---	---
2	2390.00	49.36	74.00	-24.64	53.04	-3.68	Peak	---	---
3	2497.00	38.27	54.00	-15.73	41.51	-3.24	Average	---	---
4	2497.00	50.30	74.00	-23.70	53.54	-3.24	Peak	---	---
5	4804.00	21.85	54.00	-32.15	16.89	4.96	Average	---	---
6	4804.00	51.95	74.00	-22.05	46.99	4.96	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

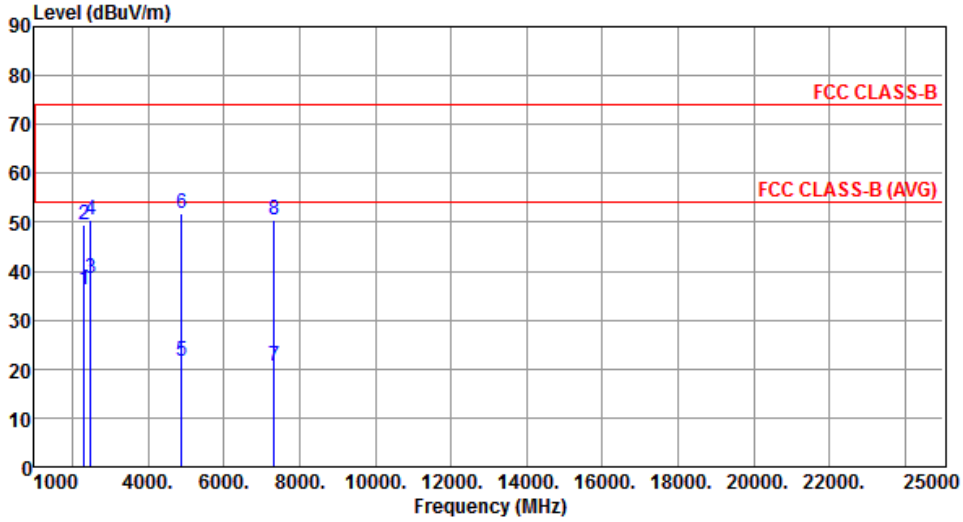
Modulation	8DPSK	Test Freq. (MHz)	2402
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	36.42	54.00	-17.58	40.10	-3.68	Average	---	---
2	2390.00	49.35	74.00	-24.65	53.03	-3.68	Peak	---	---
3	2497.00	36.92	54.00	-17.08	40.16	-3.24	Average	---	---
4	2497.00	49.92	74.00	-24.08	53.16	-3.24	Peak	---	---
5	4804.00	21.43	54.00	-32.57	16.47	4.96	Average	---	---
6	4804.00	51.53	74.00	-22.47	46.57	4.96	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

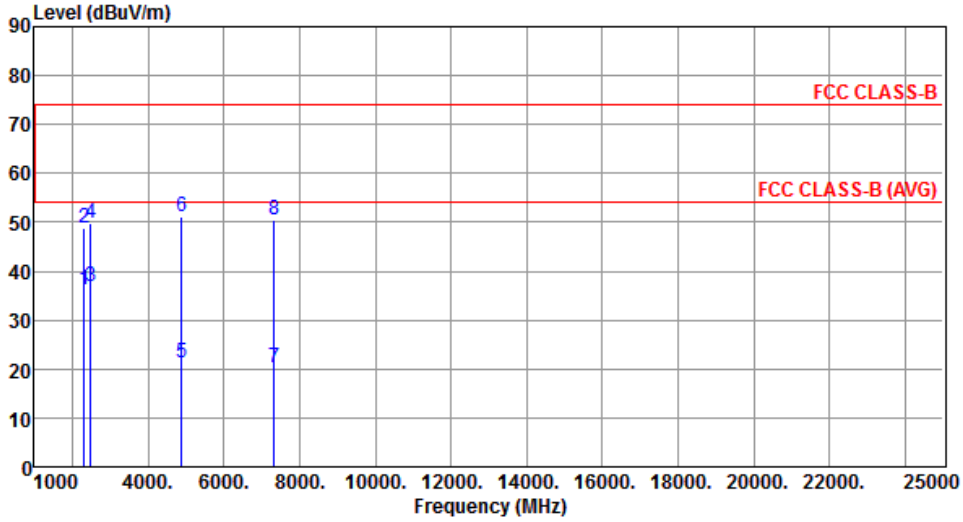
Modulation	8DPSK	Test Freq. (MHz)	2441
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2323.00	36.29	54.00	-17.71	40.23	-3.94	Average	---	---
2	2323.00	49.60	74.00	-24.40	53.54	-3.94	Peak	---	---
3	2492.00	38.59	54.00	-15.41	41.85	-3.26	Average	---	---
4	2492.00	50.46	74.00	-23.54	53.72	-3.26	Peak	---	---
5	4882.00	21.61	54.00	-32.39	16.49	5.12	Average	---	---
6	4882.00	51.71	74.00	-22.29	46.59	5.12	Peak	---	---
7	7323.00	20.51	54.00	-33.49	11.17	9.34	Average	---	---
8	7323.00	50.61	74.00	-23.39	41.27	9.34	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

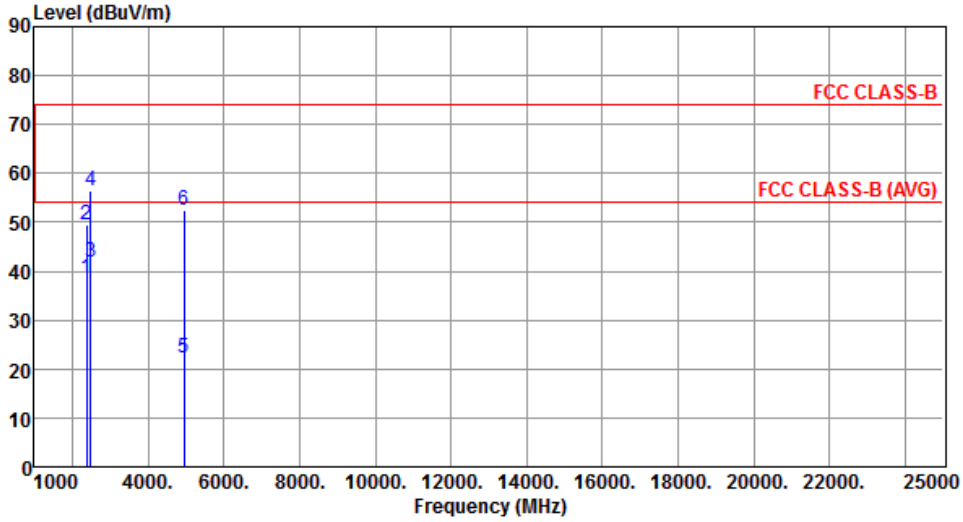
Modulation	8DPSK	Test Freq. (MHz)	2441
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2323.00	36.18	54.00	-17.82	40.12	-3.94	Average	---	---
2	2323.00	48.71	74.00	-25.29	52.65	-3.94	Peak	---	---
3	2492.00	36.86	54.00	-17.14	40.12	-3.26	Average	---	---
4	2492.00	49.89	74.00	-24.11	53.15	-3.26	Peak	---	---
5	4882.00	21.19	54.00	-32.81	16.07	5.12	Average	---	---
6	4882.00	51.29	74.00	-22.71	46.17	5.12	Peak	---	---
7	7323.00	20.42	54.00	-33.58	11.08	9.34	Average	---	---
8	7323.00	50.52	74.00	-23.48	41.18	9.34	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

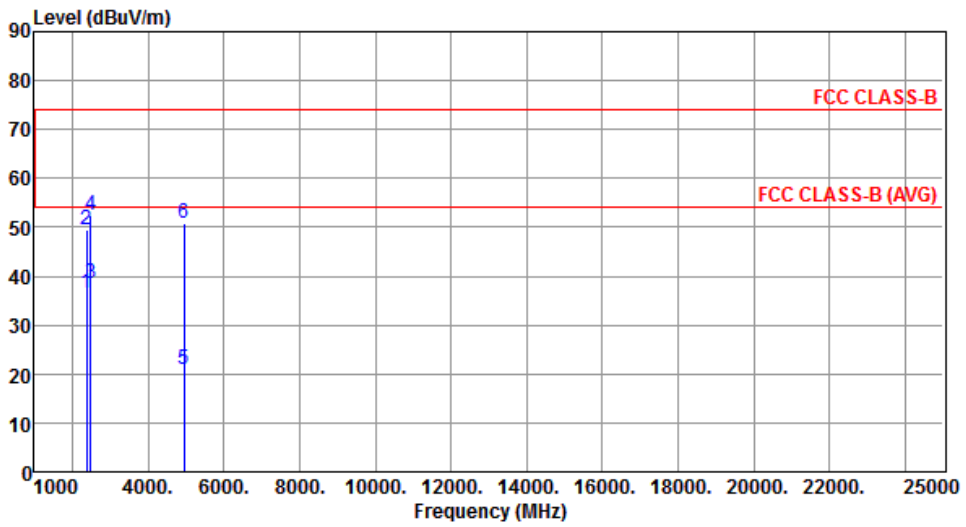
Modulation	8DPSK	Test Freq. (MHz)	2480
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2375.00	38.49	54.00	-15.51	42.23	-3.74	Average	---	---
2	2375.00	49.64	74.00	-24.36	53.38	-3.74	Peak	---	---
3	2483.50	41.94	54.00	-12.06	45.24	-3.30	Average	---	---
4	2483.50	56.35	74.00	-17.65	59.65	-3.30	Peak	---	---
5	4960.00	22.34	54.00	-31.66	17.06	5.28	Average	---	---
6	4960.00	52.44	74.00	-21.56	47.16	5.28	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	8DPSK	Test Freq. (MHz)	2480
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2375.00	36.47	54.00	-17.53	40.21	-3.74	Average	---	---
2	2375.00	49.46	74.00	-24.54	53.20	-3.74	Peak	---	---
3	2483.50	38.46	54.00	-15.54	41.76	-3.30	Average	---	---
4	2483.50	52.42	74.00	-21.58	55.72	-3.30	Peak	---	---
5	4960.00	20.80	54.00	-33.20	15.52	5.28	Average	---	---
6	4960.00	50.90	74.00	-23.10	45.62	5.28	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.3 Conducted Output Power

3.3.1 Limit of Unwanted Emissions into Non-Restricted Frequency Bands

☐ 1 Watt
For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band.

☐ 0.125 Watt
For all other frequency hopping systems in the 2400–2483.5 MHz band.

☒ 0.125 Watt
For Frequency hopping systems operating in the 2400–2483.5 MHz band have hopping channel carrier frequencies that are separated by two-thirds of the 20 dB bandwidth of the hopping channel.

3.3.2 Test Procedures

1. A wideband power meter is used for power measurement. Bandwidth of power senor and meter is 50MHz
2. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power

3.3.3 Test Setup

3.3.4 Test Result of Conducted Output Power

Modulation Mode	Freq. (MHz)	Output Power (mW)	Output Power (dBm)	Limit (mW)
GFSK	2402	4.29	6.32	125
GFSK	2441	6.04	7.81	125
GFSK	2480	6.55	8.16	125
8DPSK	2402	3.24	5.10	125
8DPSK	2441	4.73	6.75	125
8DPSK	2480	5.07	7.05	125

Modulation Mode	Freq. (MHz)	AV Output Power (mW)	AV Output Power (dBm)
GFSK	2402	4.14	6.17
GFSK	2441	5.70	7.56
GFSK	2480	6.18	7.91
8DPSK	2402	1.88	2.75
8DPSK	2441	2.76	4.41
8DPSK	2480	3.13	4.96

Note: Average power is for reference only

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp, it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan Hsiang. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information

Tel: 886-3-271-8666
Fax: 886-3-318-0155
Email: ICC_Service@icertifi.com.tw

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