FCC Test Report

FCC ID	:	**ACQ-VIP7802**
Equipment	:	**WiFi Set Top Box**
Model No.	:	**VIP7802**
Brand Name	:	**ARRIS**
Applicant	:	**ARRIS Group, Inc.**
Address	:	**101 Tournament Drive, Horsham, Pennsylvania, United States 19044**
Standard	:	**47 CFR FCC Part 15.247**
Received Date	:	**Feb. 03, 2021**
Tested Date	:	**Feb. 19 ~ Mar. 29, 2021**

We, International Certification Corporation, 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.

Reviewed by: **Approved by:**

Along Chen / Assistant Manager **Gary Chang / Manager**

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
FR120304AD	Rev. 01	Initial issue	May 04, 2021

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.582MHz 34.84 (Margin -11.16dB) - AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 60.04MHz 35.61 (Margin -4.39dB) - PK	Pass
15.247(d)	Band Edge	Meet the requirement of limit	Pass
15.247(b)(1)	Conducted Output Power	Power [dBm]: 6.45	Pass
15.247(a)(1)(iii)	Number of Hopping Channels	Meet the requirement of limit	Pass
15.247(a)(1)	Hopping Channel Separation	Meet the requirement of limit	Pass
15.247(a)(1)(iii)	Dwell Time	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Information

1.1.1 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	2402-2480	0-78 [79]	1 Mbps
2400-2483.5	EDR	2402-2480	0-78 [79]	2 Mbps
2400-2483.5	EDR	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.				

1.1.2 Antenna Details

Ant. No.	Type	Connector	Gain (dBi)	Remarks
1	PIFA	N/A	1.5	---

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	5Vdc from adapter

1.1.4 Accessories

Accessories		
No.	**Equipment**	**Description**
1	Adapter	Brand: NeBit Model: NBS12F050200VU Power Rating: I/P: 100-240Vac, 50/60Hz, 0.3A O/P: 5Vdc, 2A Power Line: 0.75m non-shielded without core
2	Remote control	Brand: Bell Model: 2855-001
3	HDMI	1.83m shielded without core
4	SD card	Brand: SanDisk Model: SDSDQEC-008G Capacity: 8GB

1.1.5 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	---	---

1.1.6 Test Tool and Duty Cycle

Test Tool	Tera Term, Version: V4.66 Bluetooth simulator: R&S, CMW270	
Modulation Mode	**Duty Cycle Of Test Signal (%)**	**Duty Factor (dB)**
DH5	78.14%	1.07
2DH5	78.14%	1.07
3DH5	78.60%	1.05

1.1.7 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)		
	2402	**2441**	**2480**
GFSK/1Mbps	Default	Default	Default
π/4-DQPSK /2Mbps	Default	Default	Default
8DPSK/3Mbps	Default	Default	Default

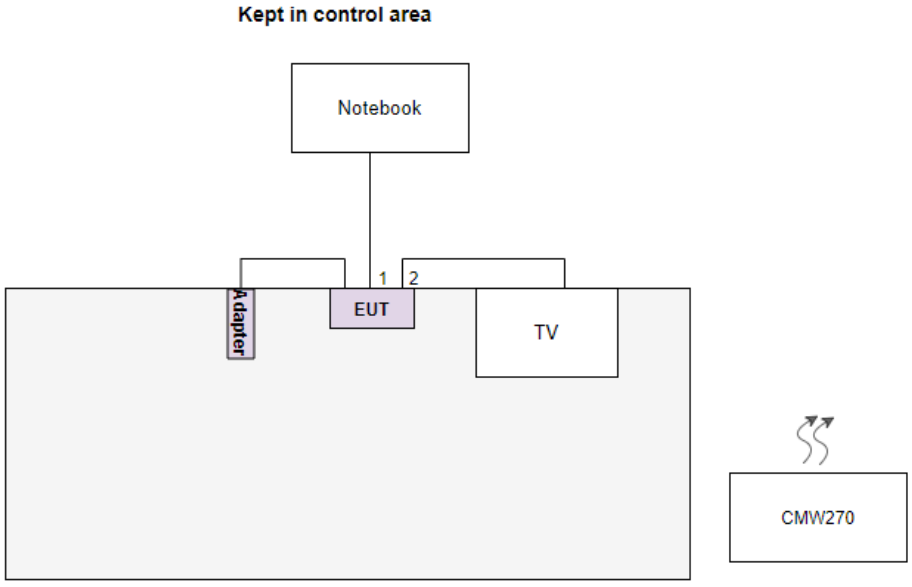
1.2 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Remarks**
1	Notebook	DELL	Latitude E5470	DoC	---
2	RJ45	ICC	RJ45-10m	---	---
3	TV	CHIMEI	TL-24LF500D	---	---
4	Fixture	ARRIS	240684-125 REV:1	---	Provided by applicant.
5	RS232	---	---	---	Provided by applicant.
6	USB cable	---	---	---	Provided by applicant.
7	Notebook	DELL	Latitude E5470	DoC	---

Note: The fixture (No.4), RS232 (No.5), USB cable (No.6) and notebook (No.7) are disconnected from EUT and removed from test table when EUT is set to transmit continuously.

1.3 Test Setup Chart

Test Setup Diagram



No.	Signal cable / Length (m)
1	RJ45, 10m non-shielded.
2	HDMI, 1.7m shielded

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Test Date	Mar. 08, 2021				
Instrument	**Brand**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101658	Feb. 08, 2021	Feb. 07, 2022
LISN	R&S	ENV216	100003	Dec. 15, 2020	Dec. 14, 2021
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127-666	Dec. 29, 2020	Dec. 28, 2021
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 21, 2020	Oct. 20, 2021
50 ohm terminal (Support Unit)	NA	50	04	Jun. 05, 2020	Jun. 04, 2021
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber3 / (03CH03-WS)				
Test Date	Feb. 19 ~ Mar. 05, 2021				
Instrument	**Brand**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101658	Feb. 08, 2021	Feb. 07, 2022
Spectrum Analyzer	R&S	FSV40	101498	Dec. 04, 2020	Dec. 03, 2021
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 17, 2020	Nov. 16, 2021
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Apr. 29, 2020	Apr. 28, 2021
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Dec. 22, 2020	Dec. 21, 2021
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 06, 2020	Nov. 05, 2021
Preamplifier	EMC	EMC02325	980187	Aug. 05, 2020	Aug. 04, 2021
Preamplifier	Agilent	83017A	MY39501309	Sep. 02, 2020	Sep. 01, 2021
Preamplifier	EMC	EMC184045B	980192	Jul. 21, 2020	Jul. 20, 2021
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 06, 2020	Oct. 05, 2021
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800 -001	Sep. 26, 2020	Sep. 25, 2021
LF cable-3M	EMC	EMC8D-NM-NM-300 0	131103	Sep. 26, 2020	Sep. 25, 2021
LF cable-13M	EMC	EMC8D-NM-NM-130 00	131104	Sep. 26, 2020	Sep. 25, 2021
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Sep. 26, 2020	Sep. 25, 2021
RF cable-8M	EMC	EMC104-SM-SM-80 00	181107	Sep. 26, 2020	Sep. 25, 2021
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Wireless connectivity tester	R&S	CMW270	100856	Nov. 02, 2020	Nov. 01, 2021
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Test Date	Mar. 29, 2021				
Instrument	**Brand**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101063	Apr. 30, 2020	Apr. 29, 2021
Power Meter	Anritsu	ML2495A	1241002	Nov. 04, 2020	Nov. 03, 2021
Power Sensor	Anritsu	MA2411B	1207366	Nov. 04, 2020	Nov. 03, 2021
Measurement Software	-	SENSE-15247_FS	V5.10.7.11	NA	NA
Wireless connectivity tester	R&S	CMW270	100856	Nov. 02, 2020	Nov. 01, 2021
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

47 CFR FCC Part 15.247
ANSI C63.10-2013

1.6 Reference Guidance

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

1.7 Deviation from Test Standard and Measurement Procedure

None

1.8 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

Measurement Uncertainty	
Parameters	**Uncertainty**
Bandwidth	±34.130 Hz
Conducted power	±0.808 dB
Power density	±0.583 dB
Conducted emission	±2.715 dB
AC conducted emission	±2.92 dB
Radiated emission ≤ 1GHz	±3.96 dB
Radiated emission > 1GHz	±4.51 dB
Time	±0.1%

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	CO01-WS, TH01-WS
Address of Test Site	No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)
Test Site	03CH03-WS
Address of Test Site	No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 333, Taiwan (R.O.C.)

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- ISED#: 10807A
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data Rate (Mbps)	Test Configuration
Conducted Emissions Radiated Emissions ≤ 1GHz	GFSK	2402	1Mbps	---
Radiated Emissions > 1GHz	GFSK 8DPSK	2402, 2441, 2480 2402, 2441, 2480	1Mbps 3Mbps	---
Conducted Output Power	GFSK π/4 DQPSK 8DPSK	2402, 2441, 2480 2402, 2441, 2480 2402, 2441, 2480	1Mbps 2Mbps 3Mbps	---
Number of Hopping Channels	GFSK π/4 DQPSK 8DPSK	2402~2480 2402~2480 2402~2480	1Mbps 2Mbps 3Mbps	---
Hopping Channel Separation 20dB and Occupied bandwidth	GFSK π/4 DQPSK 8DPSK	2402, 2441, 2480 2402, 2441, 2480 2402, 2441, 2480	1Mbps 2Mbps 3Mbps	---
Dwell Time	GFSK π/4 DQPSK 8DPSK	2402 2402 2402	1Mbps 2Mbps 3Mbps	---

3 Transmitter Test Results

3.1 Conducted Emissions

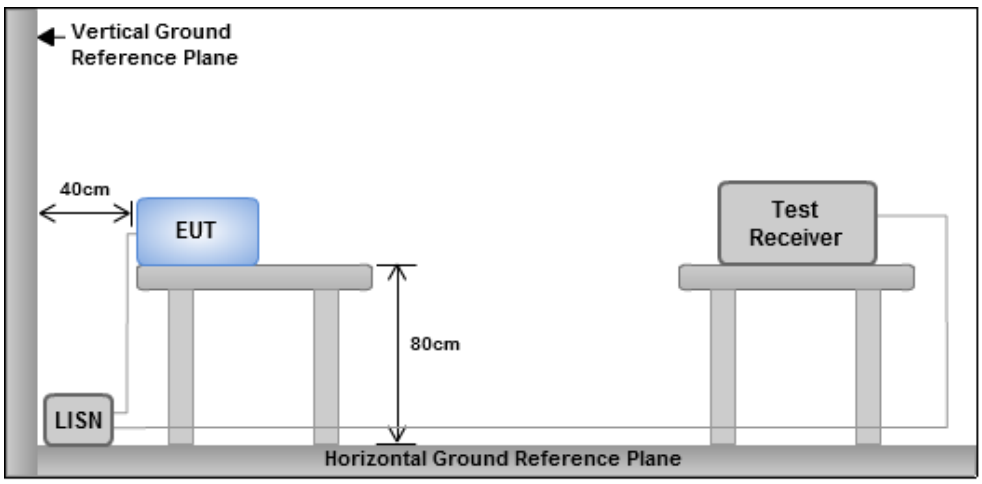
3.1.1 Limit of Conducted Emissions

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



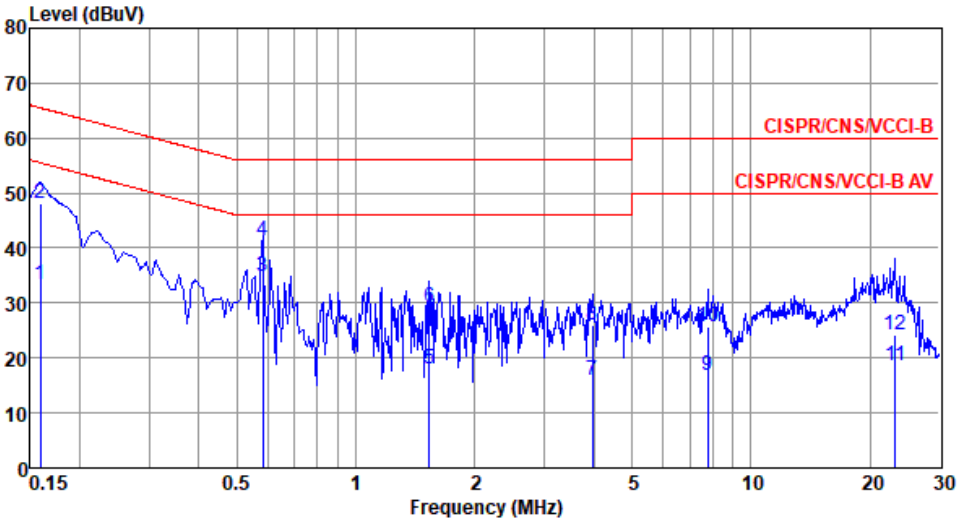
Note: 1. Support units were connected to second LISN.

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)	2402
Power Phase	Line		

Test by : Alex Tsai Temperature: 23°C Humidity: 63%

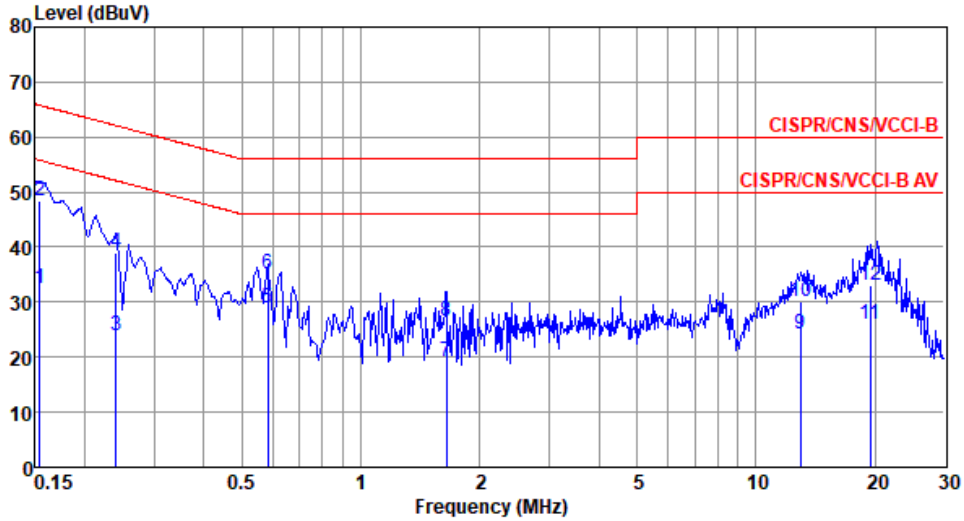


	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.159	33.48	55.52	-22.04	23.62	9.81	0.05	Average
2	0.159	47.98	65.52	-17.54	38.12	9.81	0.05	QP
3*	0.582	34.84	46.00	-11.16	24.82	9.92	0.10	Average
4	0.582	41.36	56.00	-14.64	31.34	9.92	0.10	QP
5	1.535	17.96	46.00	-28.04	7.82	9.98	0.16	Average
6	1.535	29.18	56.00	-26.82	19.04	9.98	0.16	QP
7	3.964	15.98	46.00	-30.02	5.67	10.02	0.29	Average
8	3.964	25.89	56.00	-30.11	15.58	10.02	0.29	QP
9	7.769	16.83	50.00	-33.17	6.39	10.07	0.37	Average
10	7.769	25.67	60.00	-34.33	15.23	10.07	0.37	QP
11	23.140	18.69	50.00	-31.31	7.66	10.34	0.69	Average
12	23.140	24.09	60.00	-35.91	13.06	10.34	0.69	QP

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

Modulation Mode	GFSK	Test Freq. (MHz)	2402
Power Phase	Neutral		

Test by : Alex Tsai Temperature: 23°C Humidity: 63%



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.154	32.43	55.78	-23.35	22.59	9.79	0.05	Average
2	0.154	48.53	65.78	-17.25	38.69	9.79	0.05	QP
3	0.240	23.78	52.08	-28.30	13.90	9.81	0.07	Average
4	0.240	38.84	62.08	-23.24	28.96	9.81	0.07	QP
5*	0.582	28.92	46.00	-17.08	18.98	9.84	0.10	Average
6	0.582	35.12	56.00	-20.88	25.18	9.84	0.10	QP
7	1.645	19.33	46.00	-26.67	9.27	9.90	0.16	Average
8	1.645	26.67	56.00	-29.33	16.61	9.90	0.16	QP
9	12.988	24.12	50.00	-25.88	13.47	10.12	0.53	Average
10	12.988	30.23	60.00	-29.77	19.58	10.12	0.53	QP
11	19.428	26.12	50.00	-23.88	15.16	10.30	0.66	Average
12	19.428	32.93	60.00	-27.07	21.97	10.30	0.66	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (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 test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
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:

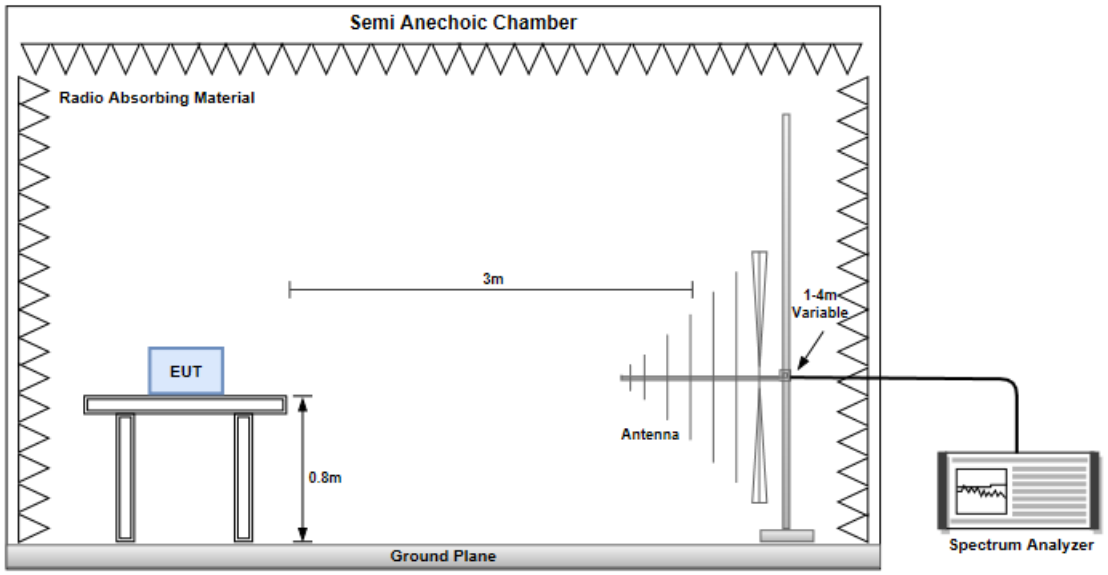
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. Radiated emission above 1GHz / Peak value
   RBW=1MHz, VBW=3MHz and Peak detector
3. Radiated emission above 1GHz / Average value for harmonics
   The average value is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula for DH5 packet type which has worst duty factor:

$$20\log(\text{Duty cycle}) = 20\log\frac{1\text{s} / 1600 * 5}{100\text{ ms}} = -30.1\text{dB}$$

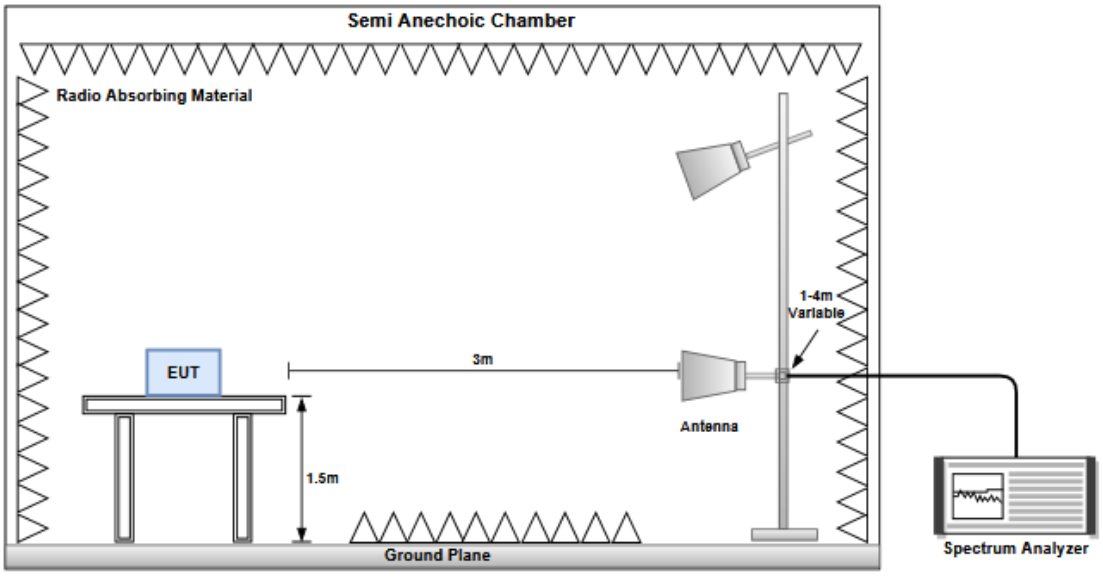
4. Radiated emission above 1GHz / Average value for other emissions
   RBW=1MHz, VBW=1/T and Peak detector

3.2.3 Test Setup

Radiated Emissions below 1 GHz



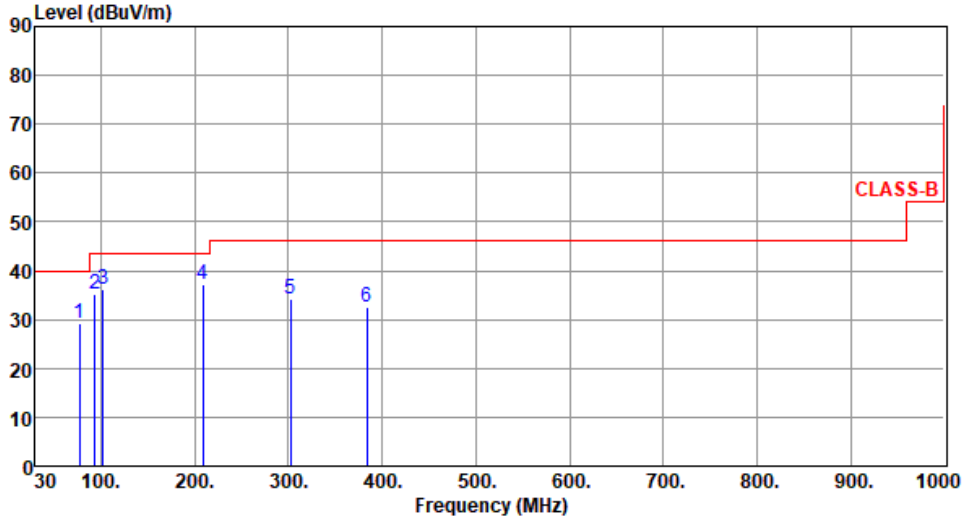
Radiated Emissions above 1 GHz



3.2.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	GFSK	Test Freq. (MHz)	2402
Polarization	Horizontal		

Test By :Roger Lu Temperature(℃):23 Humidity(%):65

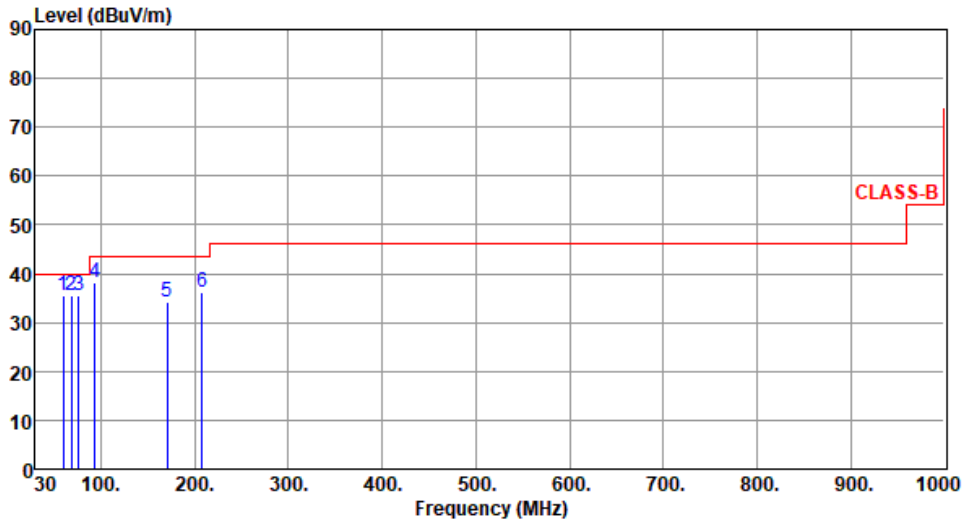


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	77.46	29.31	40.00	-10.69	42.22	-12.91	Peak	---	---
2	93.42	35.26	43.50	-8.24	49.91	-14.65	Peak	---	---
3	101.95	36.28	43.50	-7.22	49.62	-13.34	Peak	---	---
4	208.54	37.12	43.50	-6.38	49.31	-12.19	QP	125	246
5	302.15	34.19	46.00	-11.81	42.74	-8.55	Peak	---	---
6	383.45	32.61	46.00	-13.39	38.81	-6.20	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)	2402
Polarization	Vertical		

Test By :Roger Lu Temperature(℃):23 Humidity(%):65



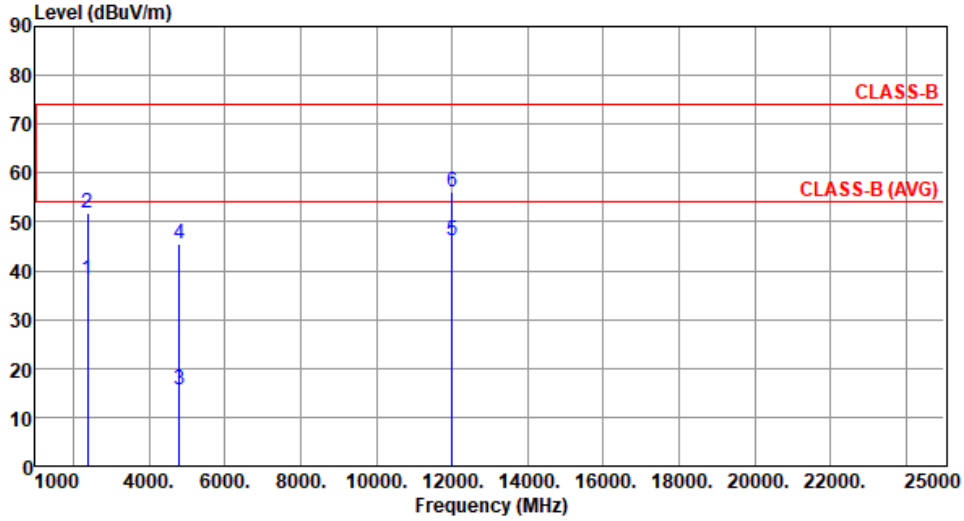
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	60.04	35.61	40.00	-4.39	44.81	-9.20	Peak	---	---
2	68.12	35.44	40.00	-4.56	45.94	-10.50	Peak	---	---
3	76.51	35.39	40.00	-4.61	48.00	-12.61	Peak	---	---
4	93.28	38.16	43.50	-5.34	52.81	-14.65	Peak	---	---
5	170.92	34.21	43.50	-9.29	43.49	-9.28	Peak	---	---
6	207.65	36.12	43.50	-7.38	48.32	-12.20	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		

Test By :BRAD WU Temperature(℃):24 Humidity(%):63

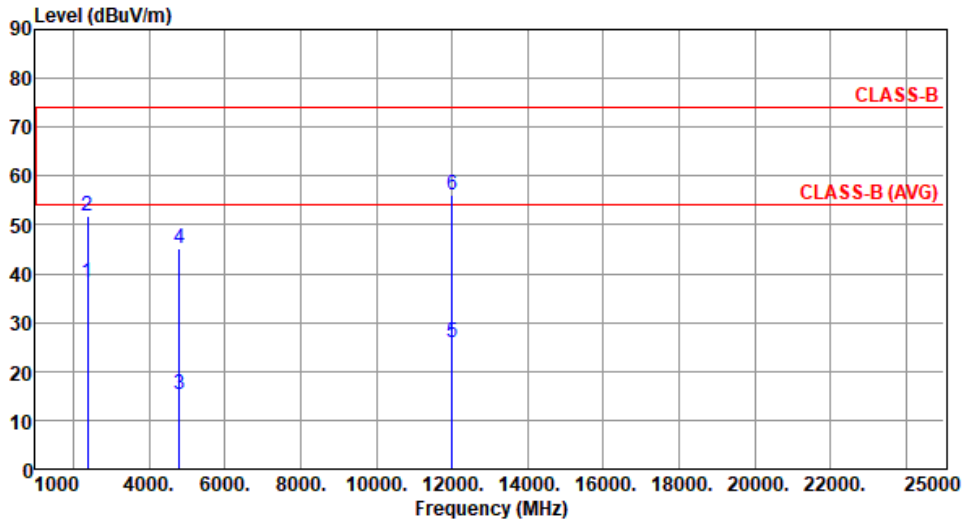


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.26	54.00	-15.74	39.92	-1.66	Average	242	176
2	2390.00	51.96	74.00	-22.04	53.62	-1.66	Peak	242	176
3	4804.00	15.52	54.00	-38.48	10.52	5.00	Average	100	58
4	4804.00	45.62	74.00	-28.38	40.62	5.00	Peak	100	58
5	12010.00	46.18	54.00	-7.82	31.50	14.68	Average	100	44
6	12010.00	56.28	74.00	-17.72	41.60	14.68	Peak	100	44

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		

Test By :BRAD WU Temperature(℃):24 Humidity(%):63

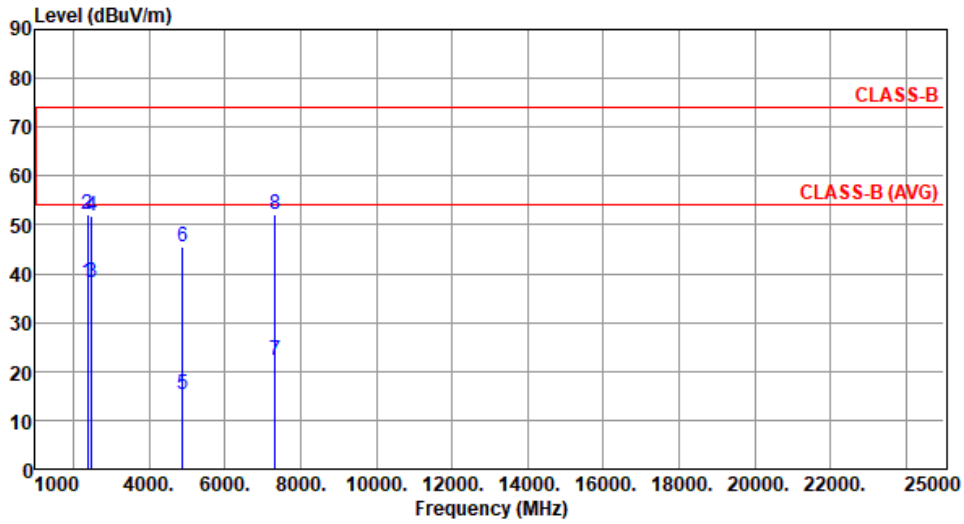


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.14	54.00	-15.86	39.80	-1.66	Average	103	156
2	2390.00	51.82	74.00	-22.18	53.48	-1.66	Peak	103	156
3	4804.00	15.18	54.00	-38.82	10.18	5.00	Average	100	33
4	4804.00	45.28	74.00	-28.72	40.28	5.00	Peak	100	33
5	12010.00	26.05	54.00	-27.95	11.37	14.68	Average	100	29
6	12010.00	56.15	74.00	-17.85	41.47	14.68	Peak	100	29

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		

Test By :BRAD WU Temperature(℃):24 Humidity(%):63

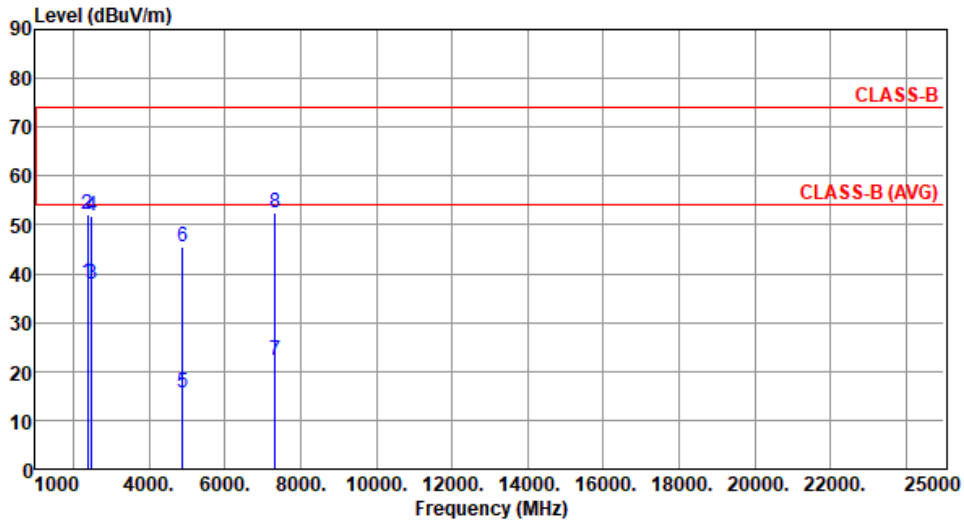


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.15	54.00	-15.85	39.81	-1.66	Average	239	179
2	2390.00	52.21	74.00	-21.79	53.87	-1.66	Peak	239	179
3	2483.50	38.04	54.00	-15.96	39.90	-1.86	Average	239	179
4	2483.50	51.88	74.00	-22.12	53.74	-1.86	Peak	239	179
5	4882.00	15.27	54.00	-38.73	10.20	5.07	Average	100	51
6	4882.00	45.37	74.00	-28.63	40.30	5.07	Peak	100	51
7	7323.00	22.12	54.00	-31.88	11.72	10.40	Average	100	65
8	7323.00	52.22	74.00	-21.78	41.82	10.40	Peak	100	65

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		

Test By :BRAD WU Temperature(℃):24 Humidity(%):63

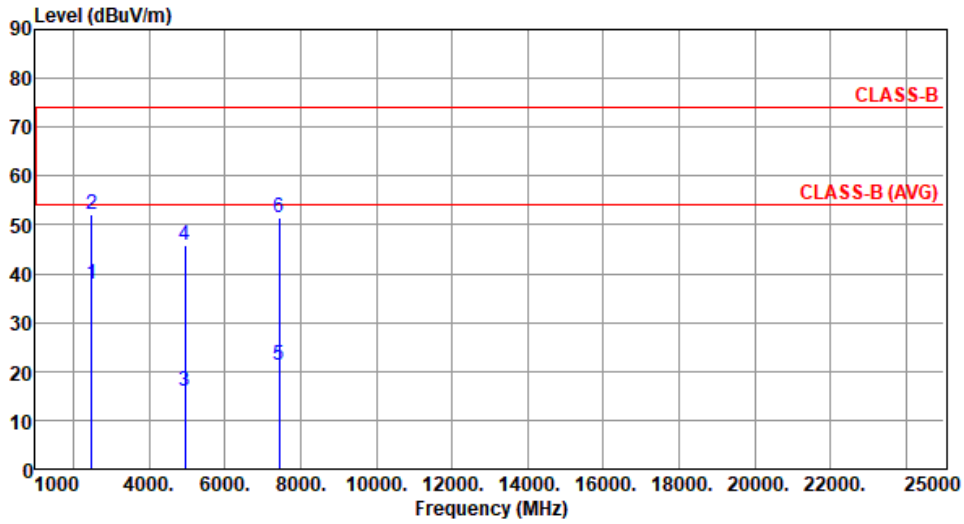


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.10	54.00	-15.90	39.76	-1.66	Average	101	152
2	2390.00	52.17	74.00	-21.83	53.83	-1.66	Peak	101	152
3	2483.50	37.95	54.00	-16.05	39.81	-1.86	Average	101	152
4	2483.50	51.73	74.00	-22.27	53.59	-1.86	Peak	101	152
5	4882.00	15.54	54.00	-38.46	10.47	5.07	Average	100	26
6	4882.00	45.64	74.00	-28.36	40.57	5.07	Peak	100	26
7	7323.00	22.22	54.00	-31.78	11.82	10.40	Average	100	19
8	7323.00	52.32	74.00	-21.68	41.92	10.40	Peak	100	19

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		

Test By :BRAD WU Temperature(℃):24 Humidity(%):63

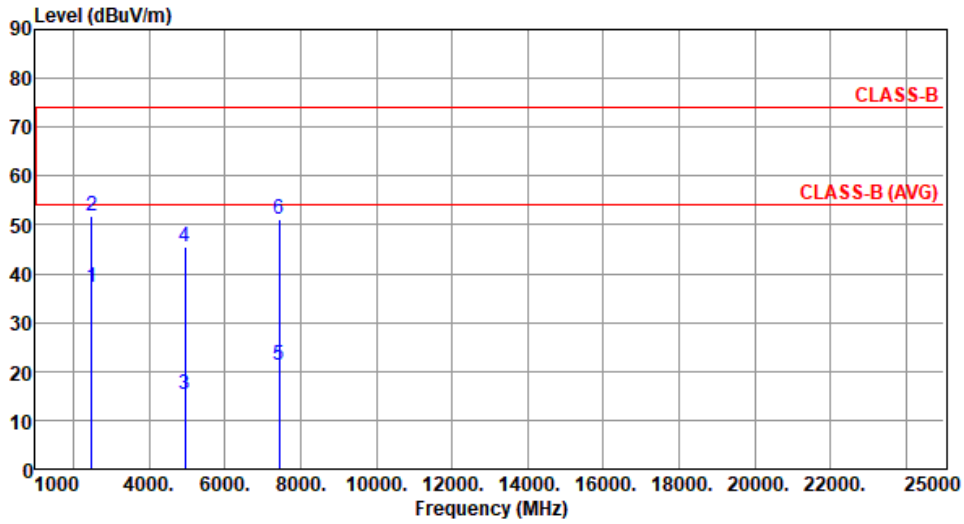


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	37.85	54.00	-16.15	39.71	-1.86	Average	266	175
2	2483.50	52.14	74.00	-21.86	54.00	-1.86	Peak	266	175
3	4960.00	15.78	54.00	-38.22	10.48	5.30	Average	101	24
4	4960.00	45.88	74.00	-28.12	40.58	5.30	Peak	101	24
5	7440.00	21.36	54.00	-32.64	11.21	10.15	Average	100	41
6	7440.00	51.46	74.00	-22.54	41.31	10.15	Peak	100	41

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		

Test By :BRAD WU Temperature(℃):24 Humidity(%):63



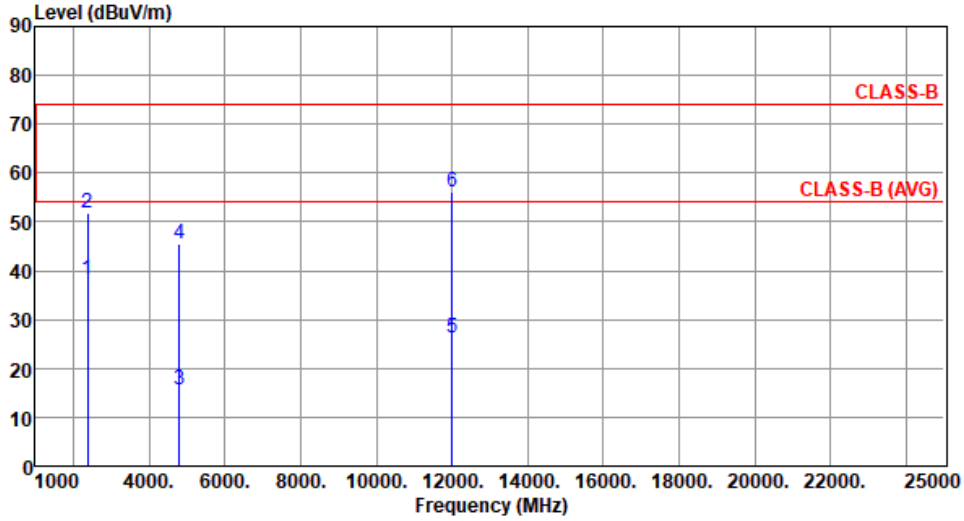
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	37.12	54.00	-16.88	38.98	-1.86	Average	103	142
2	2483.50	51.75	74.00	-22.25	53.61	-1.86	Peak	103	142
3	4960.00	15.44	54.00	-38.56	10.14	5.30	Average	100	61
4	4960.00	45.54	74.00	-28.46	40.24	5.30	Peak	100	61
5	7440.00	21.18	54.00	-32.82	11.03	10.15	Average	100	31
6	7440.00	51.28	74.00	-22.72	41.13	10.15	Peak	100	31

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		

Test By :BRAD WU Temperature(℃):24 Humidity(%):63

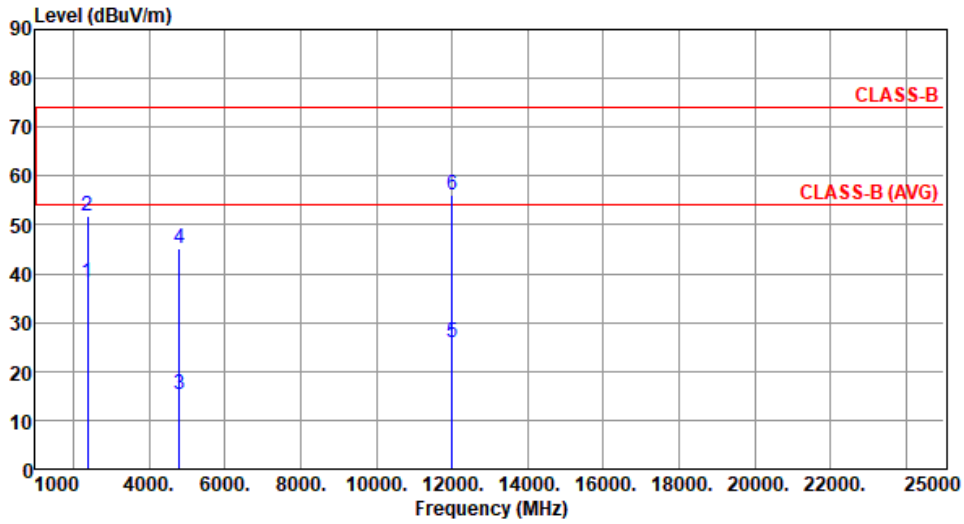


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.21	54.00	-15.79	39.87	-1.66	Average	243	178
2	2390.00	51.94	74.00	-22.06	53.60	-1.66	Peak	243	178
3	4804.00	15.48	54.00	-38.52	10.48	5.00	Average	101	62
4	4804.00	45.58	74.00	-28.42	40.58	5.00	Peak	101	62
5	12010.00	26.12	54.00	-27.88	11.44	14.68	Average	100	26
6	12010.00	56.22	74.00	-17.78	41.54	14.68	Peak	100	26

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		

Test By :BRAD WU Temperature(℃):24 Humidity(%):63

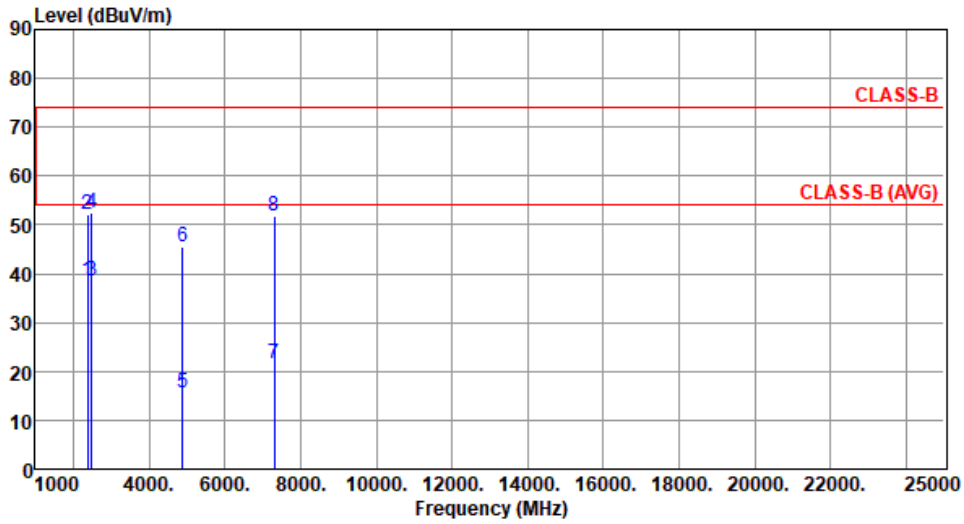


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.19	54.00	-15.81	39.85	-1.66	Average	105	151
2	2390.00	51.86	74.00	-22.14	53.52	-1.66	Peak	105	151
3	4804.00	15.23	54.00	-38.77	10.23	5.00	Average	100	47
4	4804.00	45.33	74.00	-28.67	40.33	5.00	Peak	100	47
5	12010.00	26.02	54.00	-27.98	11.34	14.68	Average	100	29
6	12010.00	56.12	74.00	-17.88	41.44	14.68	Peak	100	29

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		

Test By :BRAD WU Temperature(℃):24 Humidity(%):63

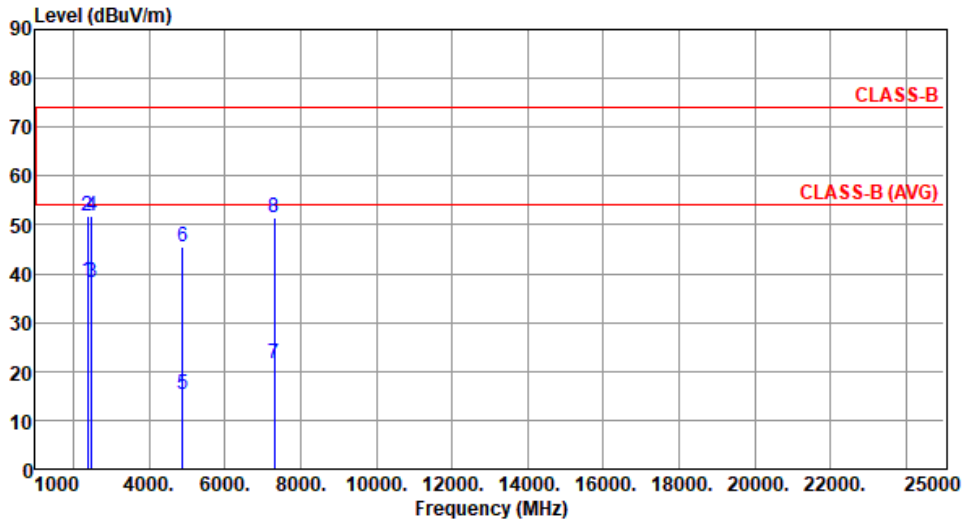


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.51	54.00	-15.49	40.17	-1.66	Average	239	180
2	2390.00	51.98	74.00	-22.02	53.64	-1.66	Peak	239	180
3	2483.50	38.41	54.00	-15.59	40.27	-1.86	Average	239	180
4	2483.50	52.42	74.00	-21.58	54.28	-1.86	Peak	239	180
5	4880.00	15.46	54.00	-38.54	10.39	5.07	Average	104	18
6	4880.00	45.56	74.00	-28.44	40.49	5.07	Peak	104	18
7	7320.00	21.69	54.00	-32.31	11.29	10.40	Average	100	45
8	7320.00	51.79	74.00	-22.21	41.39	10.40	Peak	100	45

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		

Test By :BRAD WU Temperature(℃):24 Humidity(%):63

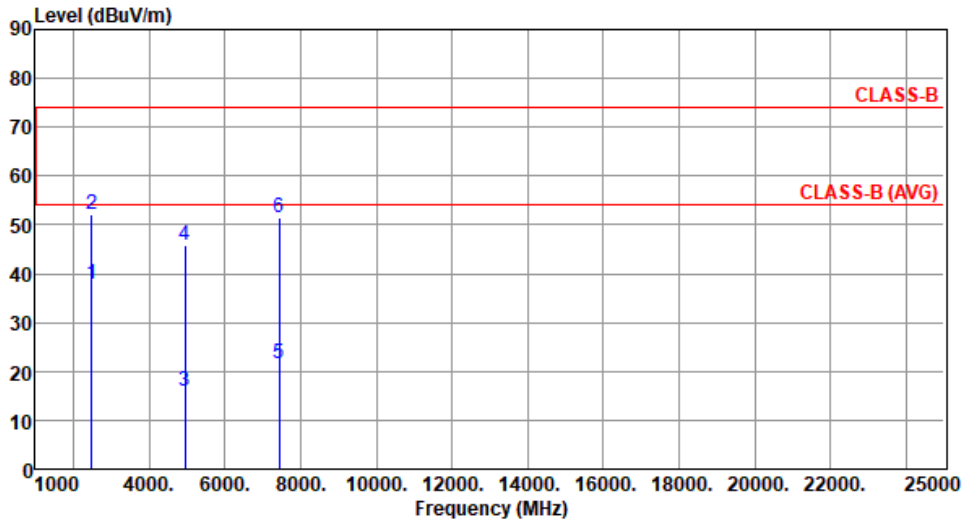


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.46	54.00	-15.54	40.12	-1.66	Average	101	152
2	2390.00	51.95	74.00	-22.05	53.61	-1.66	Peak	101	152
3	2483.50	38.29	54.00	-15.71	40.15	-1.86	Average	101	152
4	2483.50	51.74	74.00	-22.26	53.60	-1.86	Peak	101	152
5	4880.00	15.26	54.00	-38.74	10.19	5.07	Average	100	55
6	4880.00	45.36	74.00	-28.64	40.29	5.07	Peak	100	55
7	7320.00	21.44	54.00	-32.56	11.04	10.40	Average	100	23
8	7320.00	51.54	74.00	-22.46	41.14	10.40	Peak	100	23

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		

Test By :BRAD WU Temperature(℃):24 Humidity(%):63

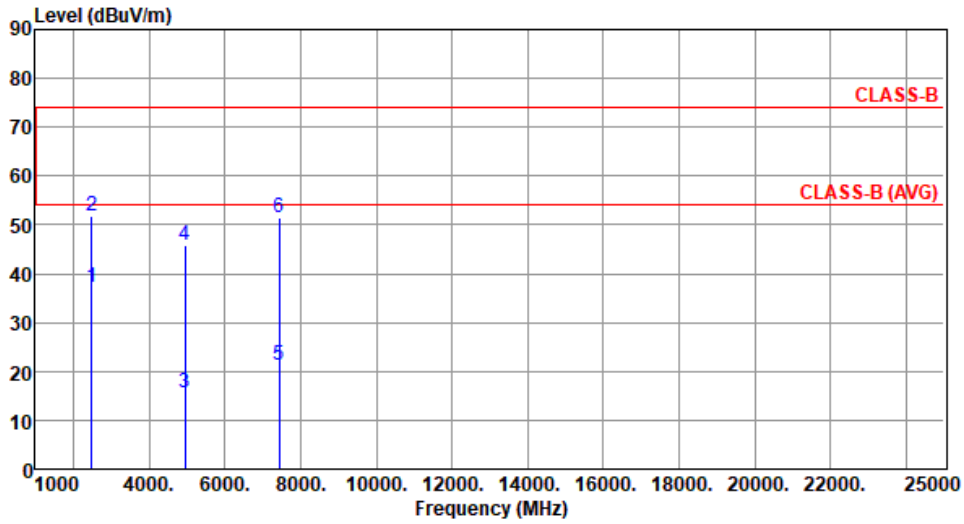


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	37.99	54.00	-16.01	39.85	-1.86	Average	265	176
2	2483.50	52.16	74.00	-21.84	54.02	-1.86	Peak	265	176
3	4960.00	15.82	54.00	-38.18	10.52	5.30	Average	100	26
4	4960.00	45.92	74.00	-28.08	40.62	5.30	Peak	100	26
5	7440.00	21.44	54.00	-32.56	11.29	10.15	Average	100	39
6	7440.00	51.54	74.00	-22.46	41.39	10.15	Peak	100	39

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		

Test By :BRAD WU Temperature(℃):24 Humidity(%):63



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	37.24	54.00	-16.76	39.10	-1.86	Average	102	149
2	2483.50	51.86	74.00	-22.14	53.72	-1.86	Peak	102	149
3	4960.00	15.58	54.00	-38.42	10.28	5.30	Average	100	41
4	4960.00	45.68	74.00	-28.32	40.38	5.30	Peak	100	41
5	7440.00	21.25	54.00	-32.75	11.10	10.15	Average	100	24
6	7440.00	51.35	74.00	-22.65	41.20	10.15	Peak	100	24

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 Unwanted Emissions into Non-Restricted Frequency Bands

3.3.1 Limit of Unwanted Emissions into Non-Restricted Frequency Bands

Peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz.

3.3.2 Test Procedures

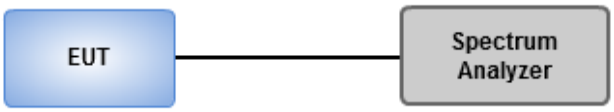
Reference level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Use the peak marker function to determine the maximum PSD level

Emission level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 25GHz
4. Use the peak marker function to determine the maximum amplitude level

3.3.3 Test Setup

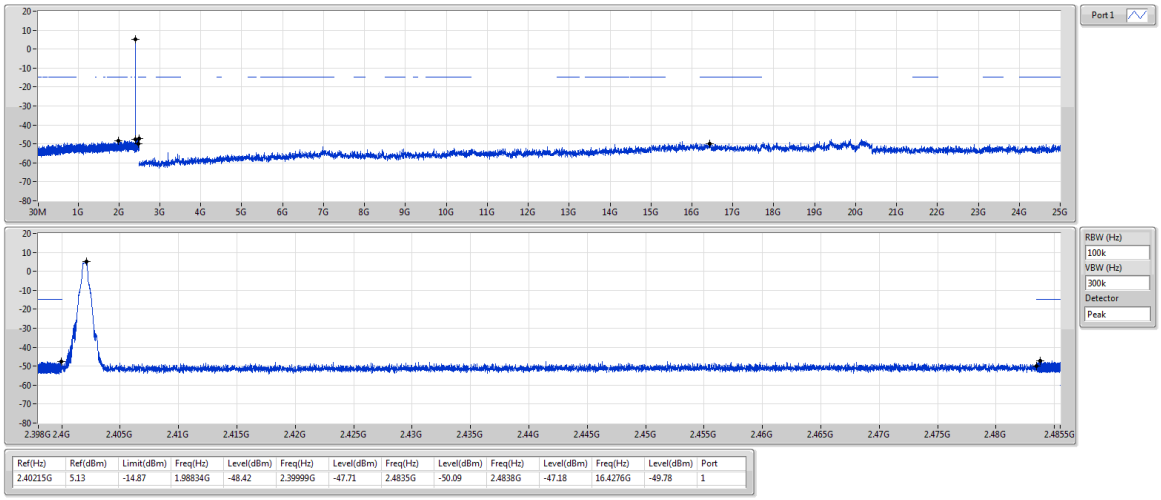


3.3.4 Unwanted Emissions into Non-Restricted Frequency Bands

Ambient Condition	25°C / 66%	Tested By	Aska Huang

BT-BR(1Mbps) **CSENdB-FS**

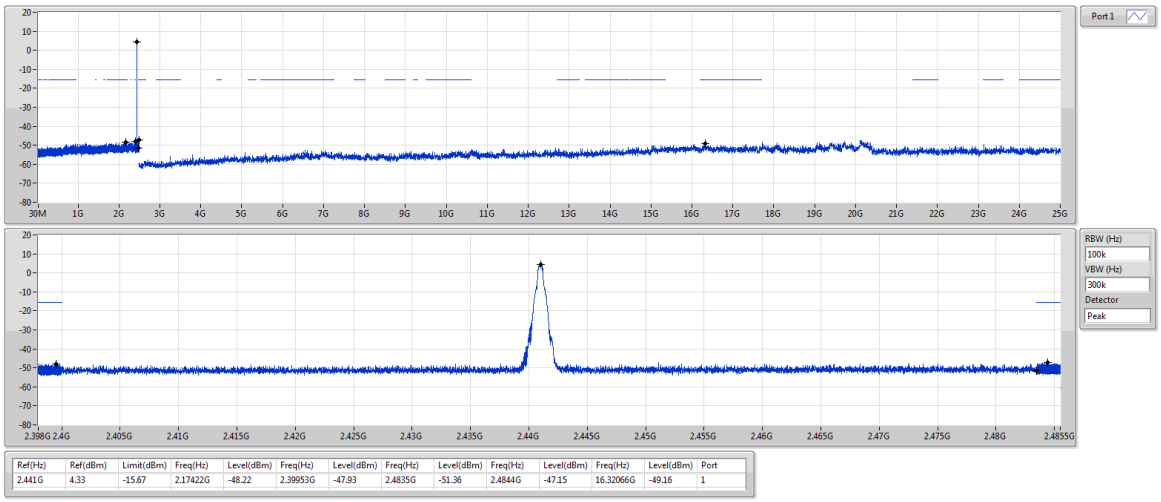
2402MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40215G	5.13	-14.87	1.98834G	-48.42	2.39999G	-47.71	2.4835G	-50.09	2.4838G	-47.18	16.4276G	-49.78	1

BT-BR(1Mbps) **CSENdB-FS**

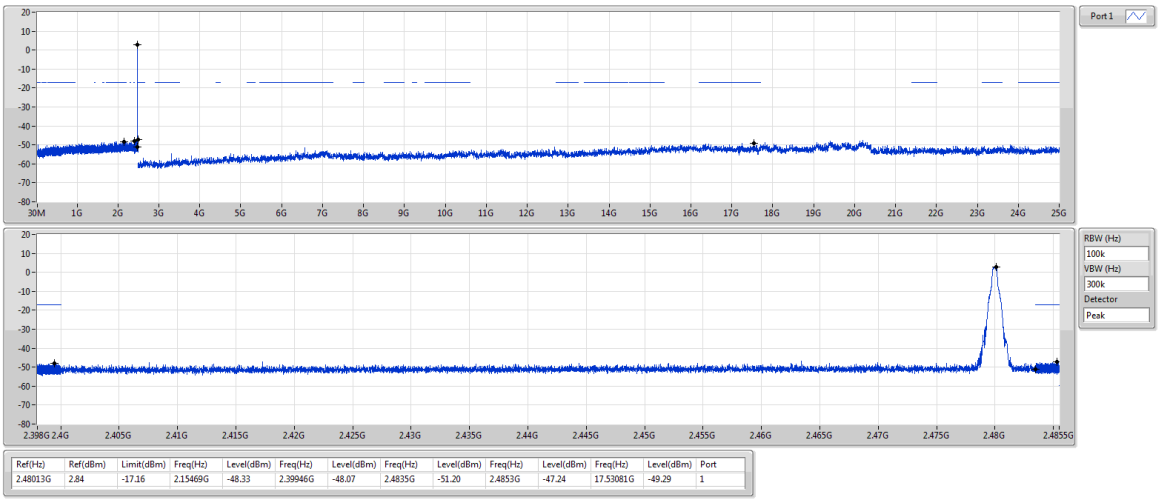
2441MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.441G	4.33	-15.67	2.17422G	-48.22	2.39953G	-47.93	2.4835G	-51.36	2.4844G	-47.15	16.32066G	-49.16	1

BT-BR(1Mbps) **CSENdB-FS**

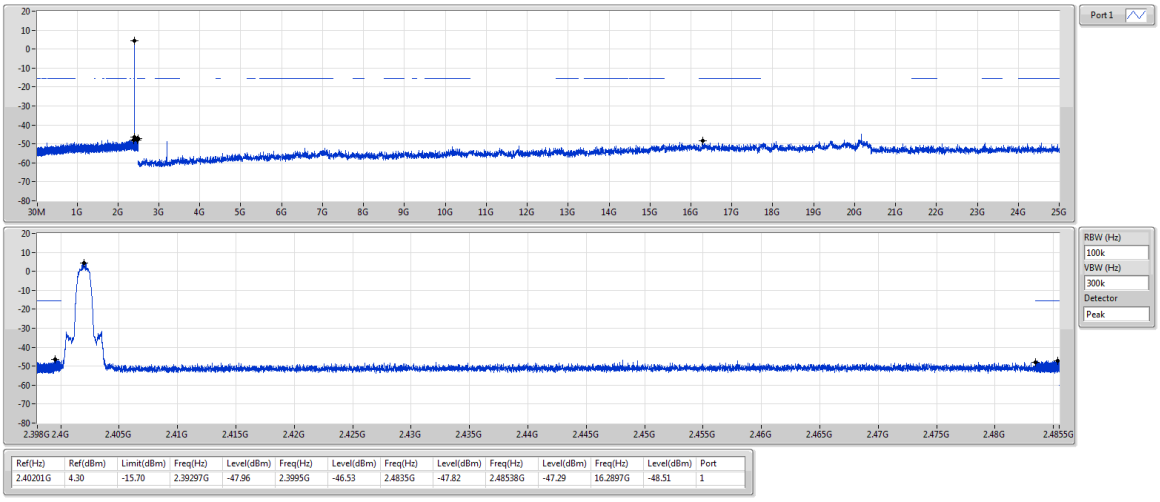
2480MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.48013G	2.84	-17.16	2.15469G	-48.33	2.39946G	-48.07	2.4835G	-51.20	2.4853G	-47.24	17.53081G	-49.29	1

BT-EDR(2Mbps) **CSENdB-FS**

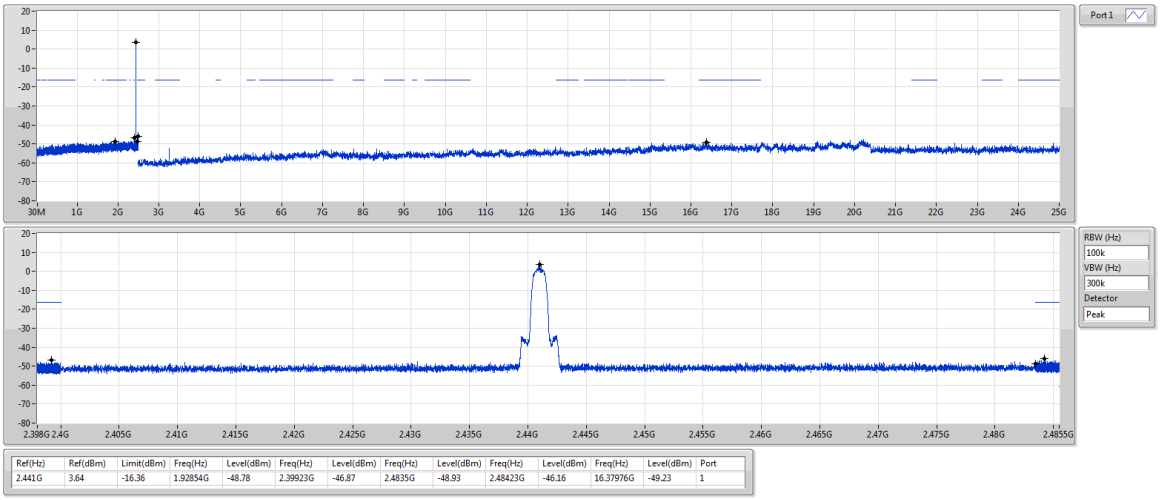
2402MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40201G	4.30	-15.70	2.39297G	-47.96	2.3995G	-46.53	2.4835G	-47.82	2.48538G	-47.29	16.2897G	-48.51	1

BT-EDR(2Mbps) **CSENdB-FS**

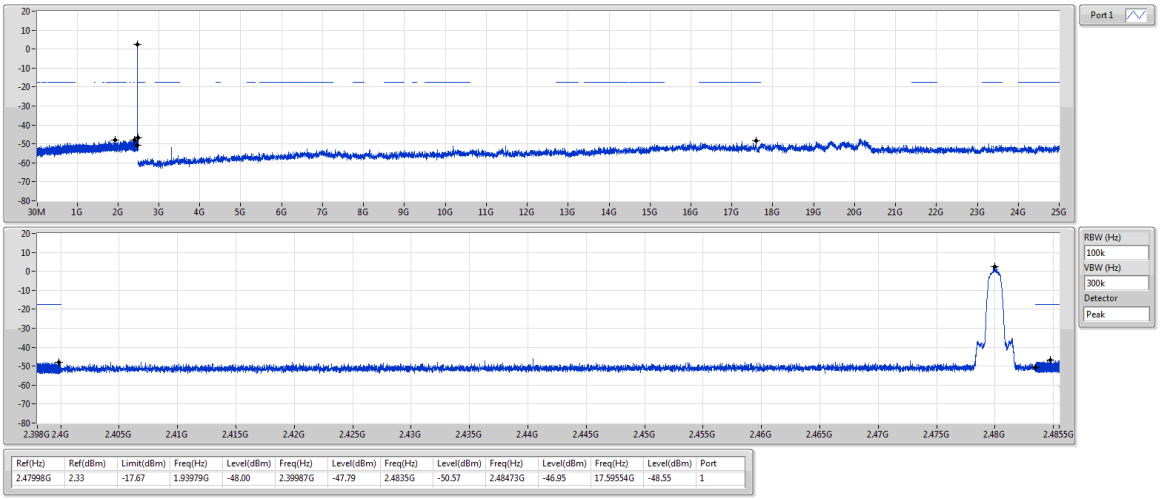
2441MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.441G	3.64	-16.36	1.92854G	-48.78	2.39923G	-46.87	2.4835G	-48.93	2.48423G	-46.16	16.37976G	-49.23	1

BT-EDR(2Mbps) **CSENdB-FS**

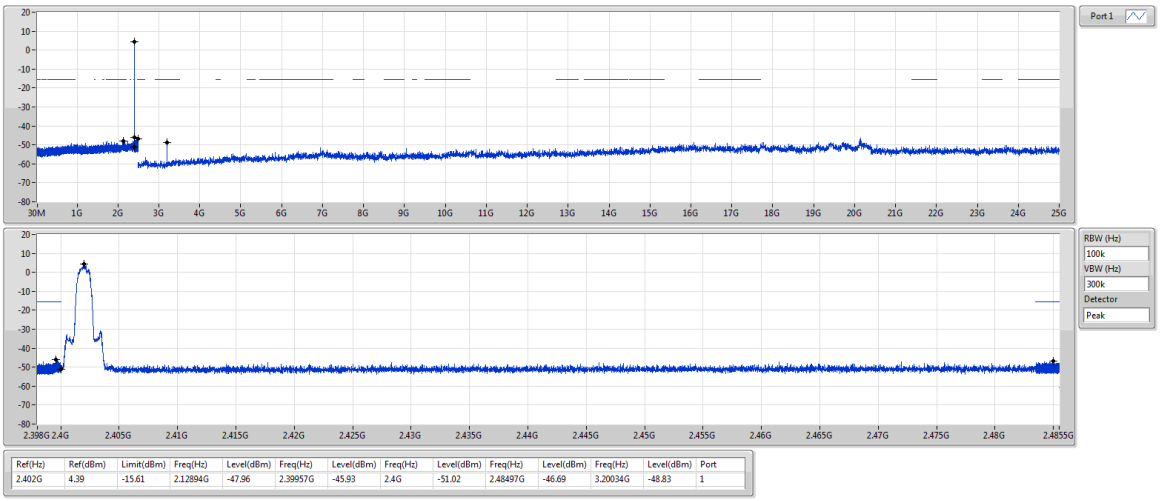
2480MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.47998G	2.33	-17.67	1.93979G	-48.00	2.39987G	-47.79	2.4835G	-50.57	2.48473G	-46.95	17.59554G	-48.55	1

BT-EDR(3Mbps) **CSENdB-FS**

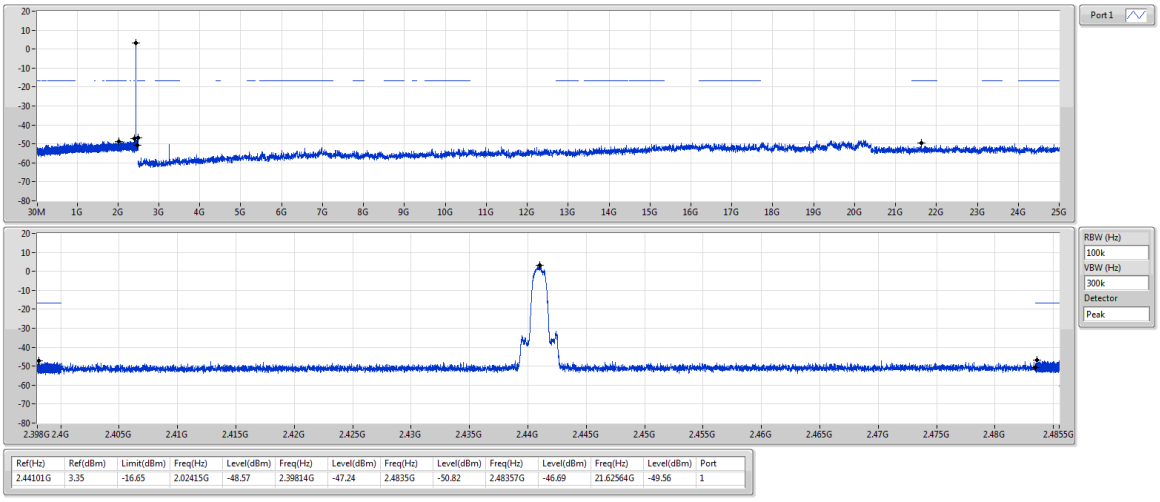
2402MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.402G	4.39	-15.61	2.12894G	-47.96	2.39957G	-45.93	2.4G	-51.02	2.48497G	-46.69	3.20034G	-48.83	1

BT-EDR(3Mbps) **CSENdB-FS**

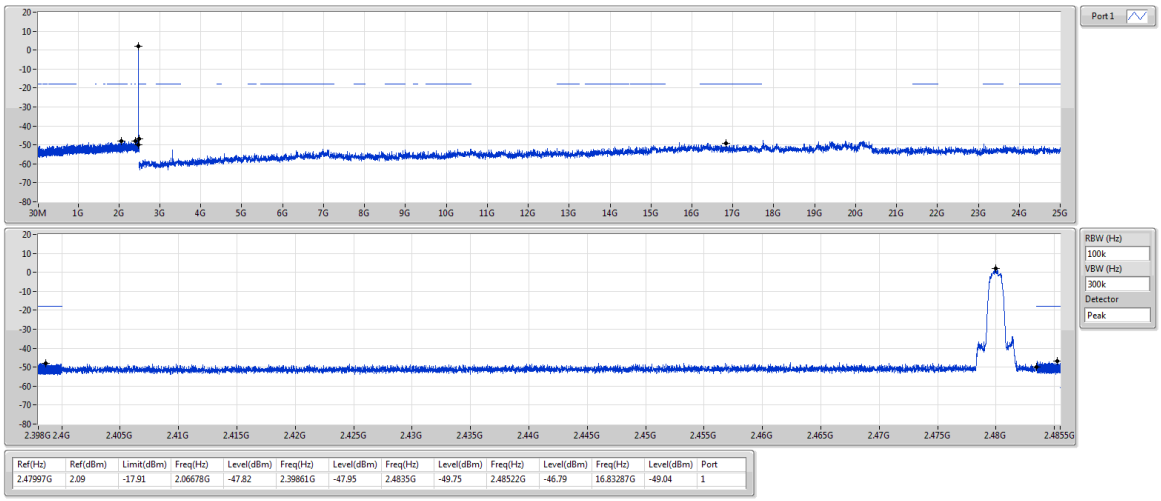
2441MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.44101G	3.35	-16.65	2.02415G	-48.57	2.39814G	-47.24	2.4835G	-50.82	2.48357G	-46.69	21.62564G	-49.56	1

BT-EDR(3Mbps) **CSENdB-FS**

2480MHz

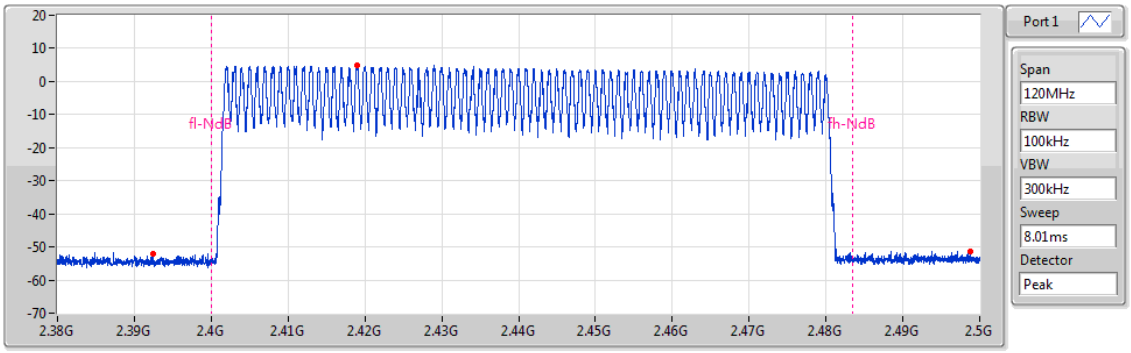


Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.47997G	2.09	-17.91	2.06678G	-47.82	2.39861G	-47.95	2.4835G	-49.75	2.48522G	-46.79	16.83287G	-49.04	1

BT-BR(1Mbps)

2402MHz

Hopping Ch Bandedge (Non-restricted Band)

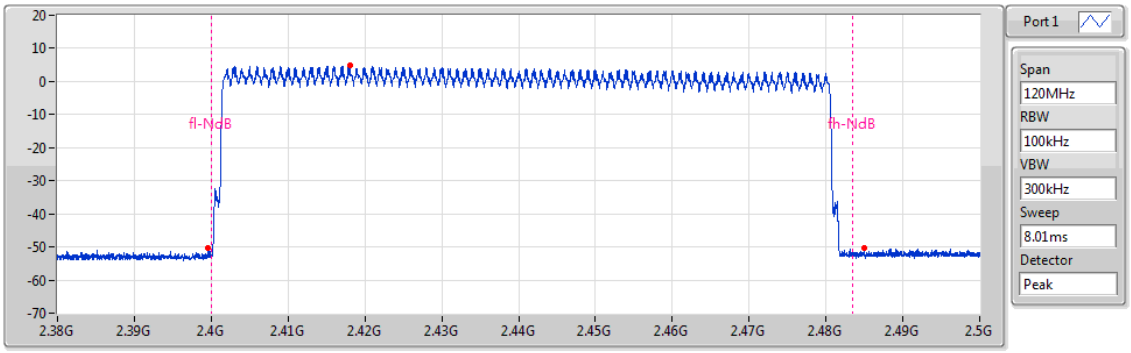


Limit(dBm)	Ref(Hz)	Ref(dBm)	BE-l(Hz)	BE-l(dBm)	BE-h(Hz)	BE-h(dBm)
-15.14	2.419015G	4.86	2.39242G	-51.9	2.498785G	-51.27

BT-EDR(2Mbps)

2402MHz

Hopping Ch Bandedge (Non-restricted Band)

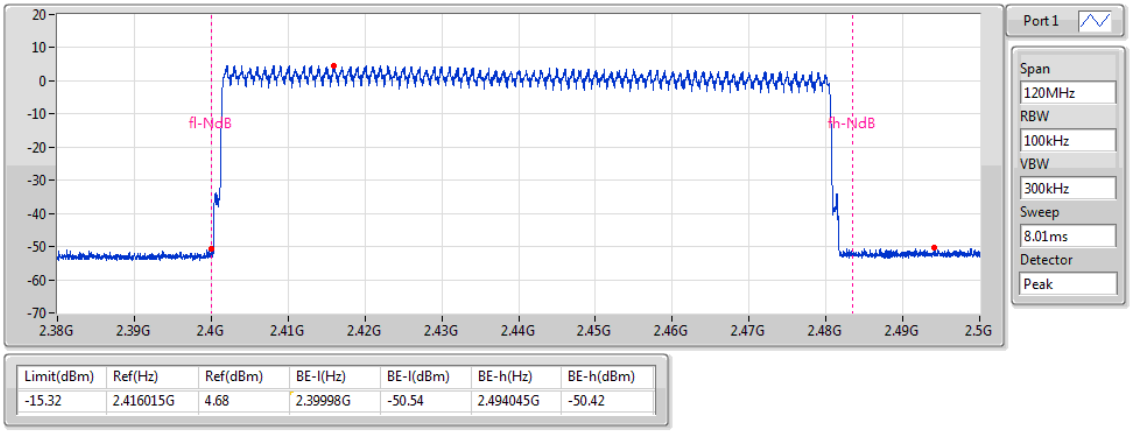


Limit(dBm)	Ref(Hz)	Ref(dBm)	BE-l(Hz)	BE-l(dBm)	BE-h(Hz)	BE-h(dBm)
-15.23	2.41801G	4.77	2.399635G	-50.39	2.484925G	-50.29

BT-EDR(3Mbps)

2402MHz

Hopping Ch Bandedge (Non-restricted Band)



Limit(dBm)	Ref(Hz)	Ref(dBm)	BE-l(Hz)	BE-l(dBm)	BE-h(Hz)	BE-h(dBm)
-15.32	2.416015G	4.68	2.39998G	-50.54	2.494045G	-50.42

3.4 Conducted Output Power

3.4.1 Limit of Conducted Output Power

☐ 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.

3.4.2 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

3.4.3 Test Setup

3.4.4 Test Result of Conducted Output Power

Ambient Condition	25°C / 66%	Tested By	Aska Huang

Summary of Peak Conducted Output Power

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	5.29	0.00338
BT-EDR(2Mbps)	6.11	0.00408
BT-EDR(3Mbps)	6.45	0.00442

Result

Mode	Result	Antenna Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	1.50	5.29	21.00
2441MHz	Pass	1.50	4.62	21.00
2480MHz	Pass	1.50	3.42	21.00
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	1.50	6.11	21.00
2441MHz	Pass	1.50	5.31	21.00
2480MHz	Pass	1.50	4.25	21.00
BT-EDR(3Mbps)	-	-	-	-
2402MHz	Pass	1.50	6.45	21.00
2441MHz	Pass	1.50	5.67	21.00
2480MHz	Pass	1.50	4.67	21.00

Port X = Port X output power

Summary of Conducted (Average) Output Power

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	5.10	0.00324
BT-EDR(2Mbps)	3.84	0.00242
BT-EDR(3Mbps)	3.89	0.00245

Result

Mode	Result	Antenna Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	1.50	5.10	21.00
2441MHz	Pass	1.50	4.43	21.00
2480MHz	Pass	1.50	3.19	21.00
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	1.50	3.84	21.00
2441MHz	Pass	1.50	2.99	21.00
2480MHz	Pass	1.50	1.93	21.00
BT-EDR(3Mbps)	-	-	-	-
2402MHz	Pass	1.50	3.89	21.00
2441MHz	Pass	1.50	3.03	21.00
2480MHz	Pass	1.50	1.94	21.00

Note: Average power is for reference only.

3.5 Number of Hopping Frequency

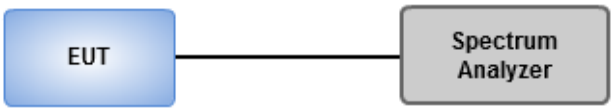
3.5.1 Limit of Number of Hopping Frequency

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

3.5.2 Test Procedures

1. Set RBW = 100kHz, VBW = 300kHz, Sweep time = Auto, Detector = Peak Trace max hold.
2 Allow trace to stabilize.

3.5.3 Test Setup



3.5.4 Test Result of Number of Hopping Frequency

Ambient Condition	25°C / 66%	Tested By	Aska Huang

Summary

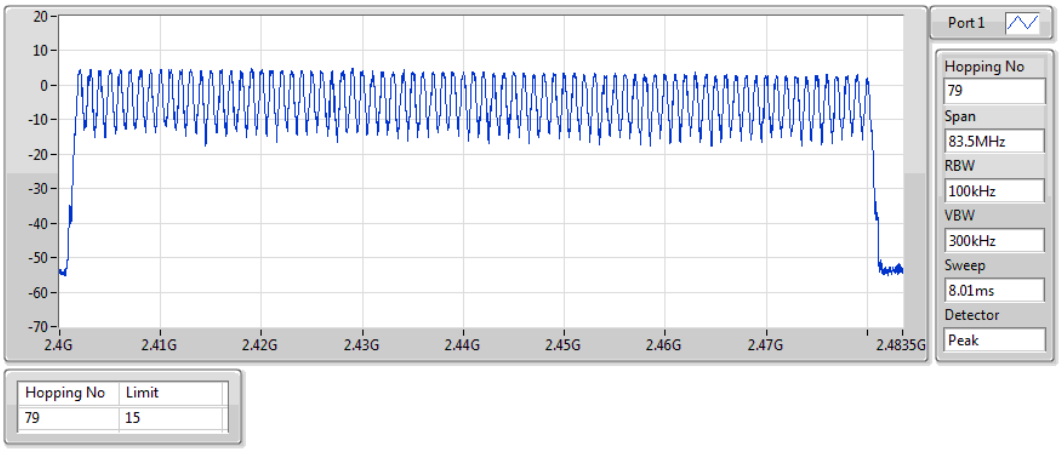
Mode	Max-Hop No
2.4-2.4835GHz	-
BT-BR(1Mbps)	79
BT-EDR(2Mbps)	79
BT-EDR(3Mbps)	79

Result

Mode	Result	Hopping No	Limit
BT-BR(1Mbps)	-	-	-
2402MHz	Pass	79	15
BT-EDR(2Mbps)	-	-	-
2402MHz	Pass	79	15
BT-EDR(3Mbps)	-	-	-
2402MHz	Pass	79	15

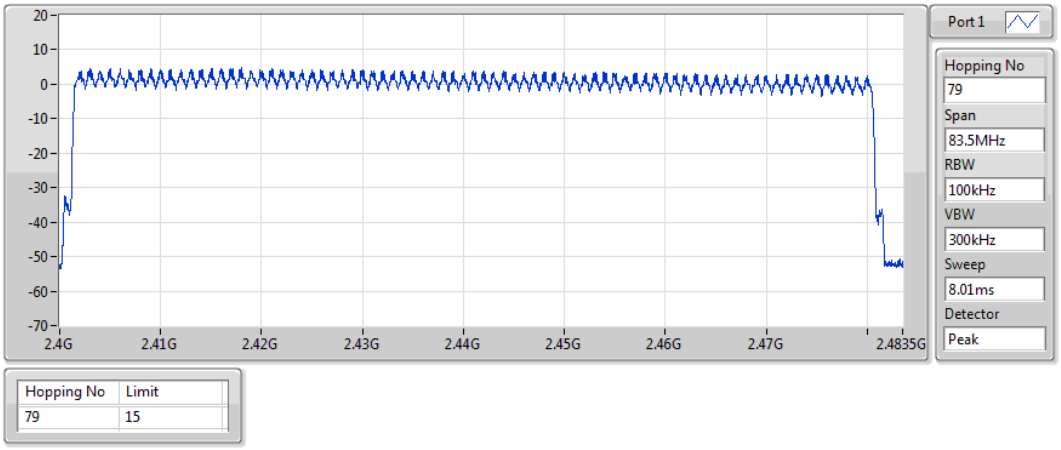
BT-BR(1Mbps) **Hopping-FS**

2402MHz



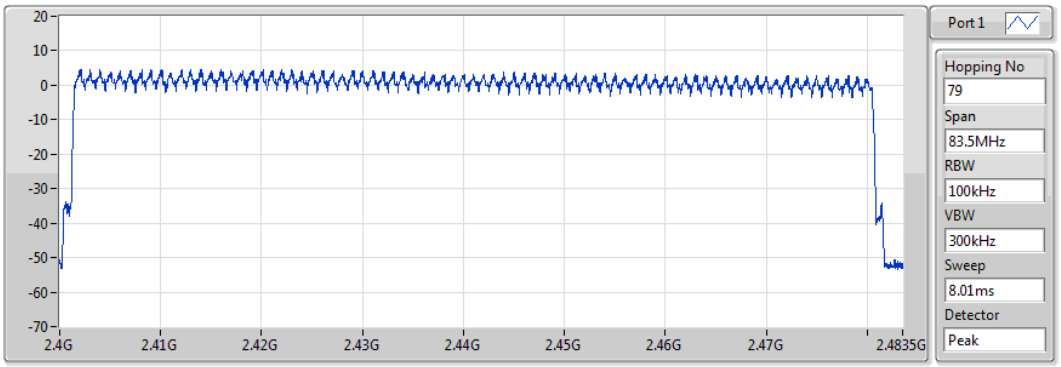
BT-EDR(2Mbps) **Hopping-FS**

2402MHz



BT-EDR(3Mbps) **Hopping-FS**

2402MHz



Hopping No	Limit
79	15

3.6 20dB and Occupied Bandwidth

3.6.1 Test Procedures

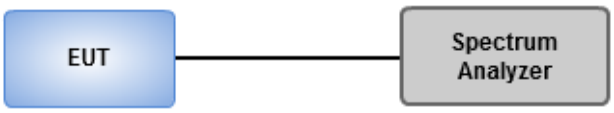
20dB Bandwidth

1. Set RBW=20kHz, VBW=100kHz, Sweep time = Auto, Detector=Peak , Trace max hold
2 Allow trace to stabilize
3 Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

Occupied Bandwidth

1. Set RBW=20kHz, VBW=100kHz , Sweep time = Auto, Detector=Sample , Trace max hold
2 Allow trace to stabilize
3. Use Occupied bandwidth function of spectrum analyzer to measuring 99% occupied bandwidth

3.6.2 Test Setup



3.6.3 Test result of 20dB and Occupied Bandwidth

Ambient Condition	25°C / 66%	Tested By	Aska Huang

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
BT-BR(1Mbps)	931.159k	882.779k	883KF1D	931.159k	868.307k
BT-EDR(2Mbps)	1.351M	1.205M	1M21G1D	1.337M	1.201M
BT-EDR(3Mbps)	1.341M	1.219M	1M22G1D	1.33M	1.19M

Max-N dB = Maximum 20dB down bandwidth; Max-OBW = Maximum 99% occupied bandwidth;
Min-N dB = Minimum 20dB down bandwidth; Min-OBW = Minimum 99% occupied bandwidth

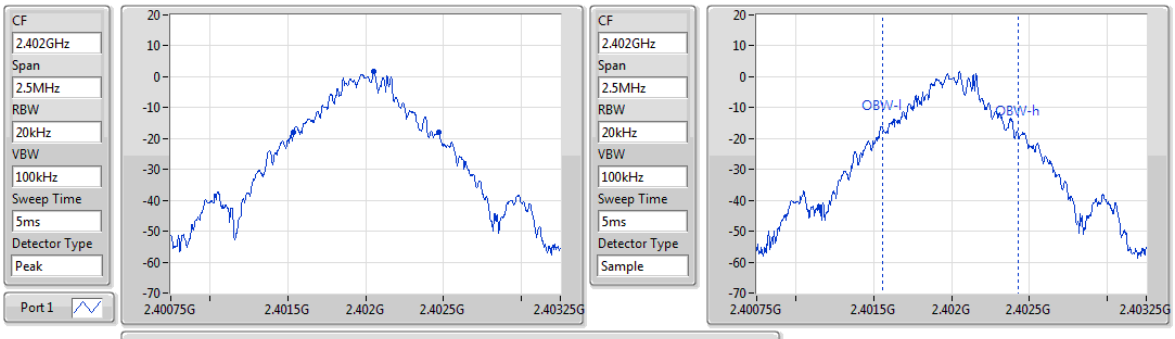
Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	Inf	931.159k	868.307k
2441MHz	Pass	Inf	931.159k	882.779k
2480MHz	Pass	Inf	931.159k	882.779k
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	Inf	1.351M	1.201M
2441MHz	Pass	Inf	1.337M	1.205M
2480MHz	Pass	Inf	1.348M	1.205M
BT-EDR(3Mbps)	-	-	-	-
2402MHz	Pass	Inf	1.341M	1.212M
2441MHz	Pass	Inf	1.33M	1.219M
2480MHz	Pass	Inf	1.333M	1.19M

Port X-N dB = Port X 20dB down bandwidth;
Port X-OBW = Port X 99% occupied bandwidth

BT-BR(1Mbps) **EBW-FS**

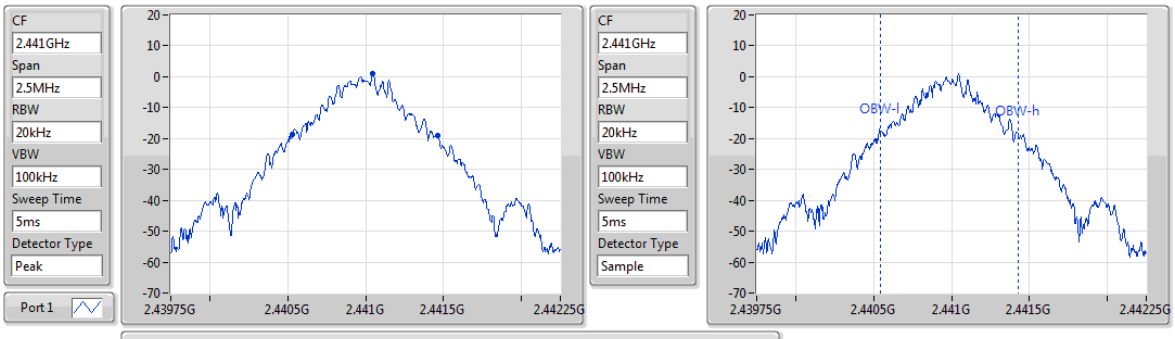
2402MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
931.159k	2.40154G	2.402471G	868.307k	2.401559G	2.402427G	Inf	1

BT-BR(1Mbps) **EBW-FS**

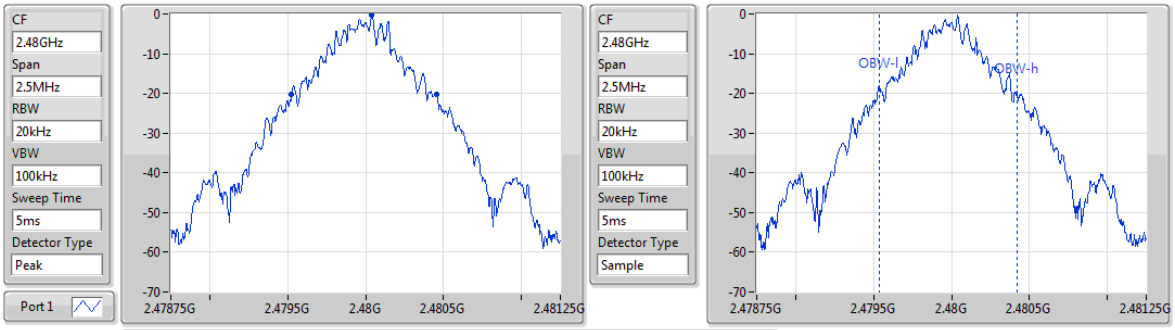
2441MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
931.159k	2.440533G	2.441464G	882.779k	2.440544G	2.441427G	Inf	1

BT-BR(1Mbps) **EBW-FS**

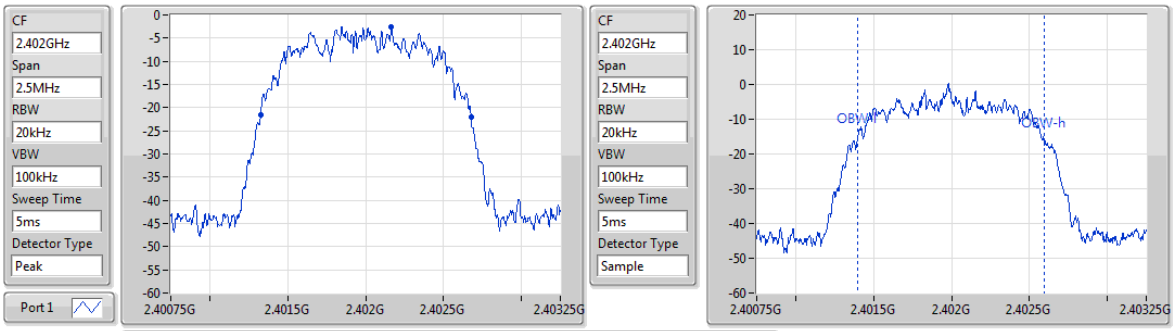
2480MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
931.159k	2.479525G	2.480457G	882.779k	2.479537G	2.48042G	Inf	1

BT-EDR(2Mbps) **EBW-FS**

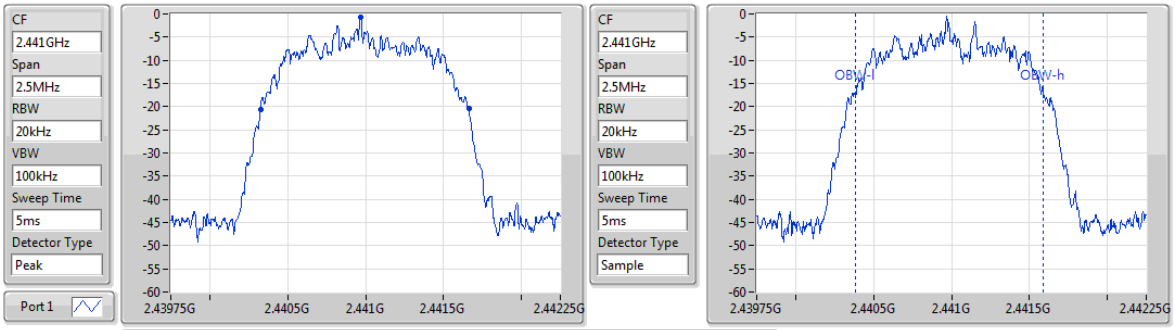
2402MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.351M	2.401326G	2.402678G	1.201M	2.401396G	2.402597G	Inf	1

BT-EDR(2Mbps) **EBW-FS**

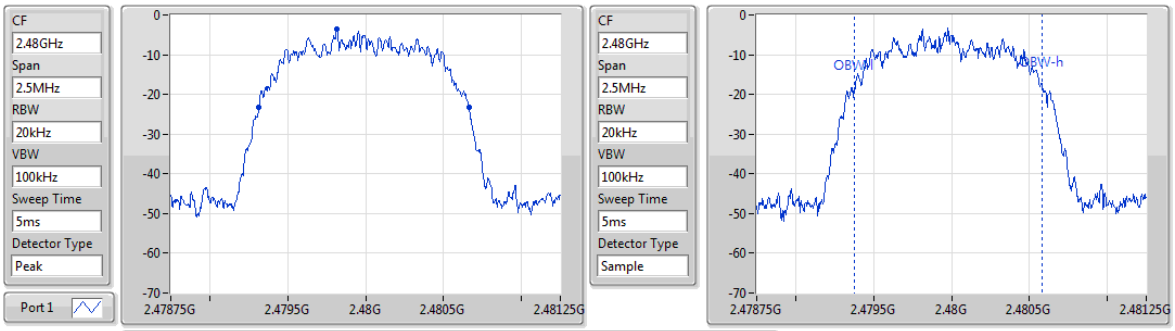
2441MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.337M	2.440326G	2.441663G	1.205M	2.440385G	2.44159G	Inf	1

BT-EDR(2Mbps) **EBW-FS**

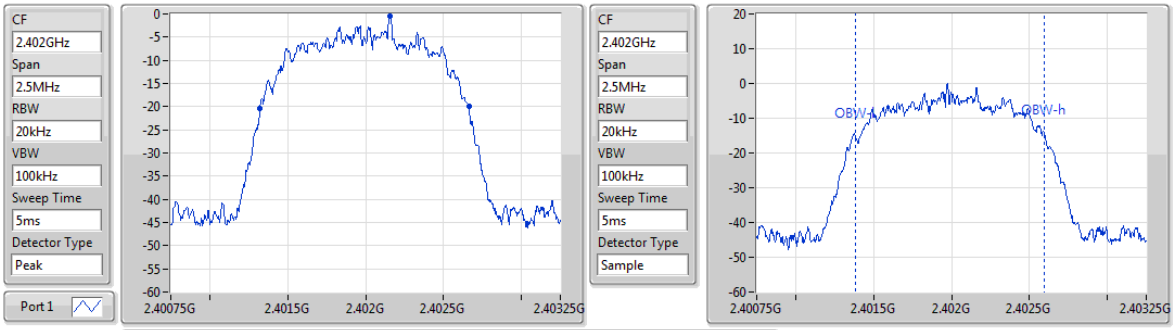
2480MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.348M	2.479315G	2.480663G	1.205M	2.479378G	2.480582G	Inf	1

BT-EDR(3Mbps) **EBW-FS**

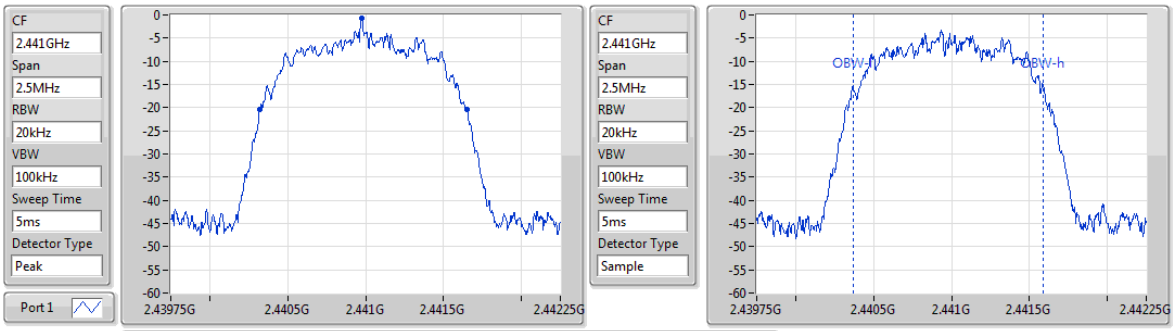
2402MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.341M	2.401322G	2.402663G	1.212M	2.401381G	2.402593G	Inf	1

BT-EDR(3Mbps) **EBW-FS**

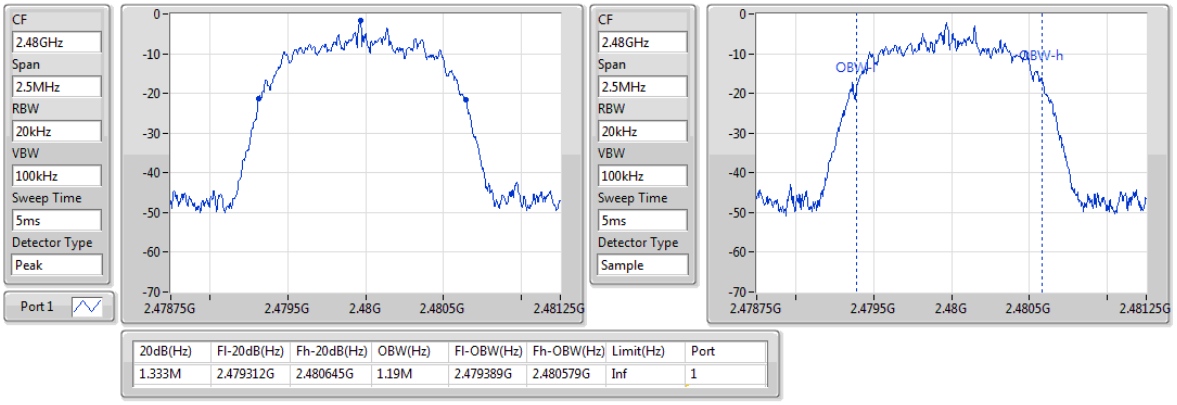
2441MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.33M	2.440319G	2.441649G	1.219M	2.44037G	2.44159G	Inf	1

BT-EDR(3Mbps) **EBW-FS**

2480MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.333M	2.479312G	2.480645G	1.19M	2.479389G	2.480579G	Inf	1

3.7 Channel Separation

3.7.1 Limit of Channel Separation

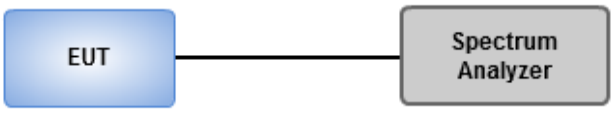
☐ Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

☒ 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.

3.7.2 Test Procedures

1. Set RBW=30kHz, VBW=100kHz,Sweep time = Auto, Detector=Peak Trace max hold
2. Allow trace to stabilize
3. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The EUT shall show compliance with the appropriate regulatory limit

3.7.3 Test Setup



3.7.4 Test result of Channel Separation

Ambient Condition	25°C / 66%	Tested By	Aska Huang

Summary

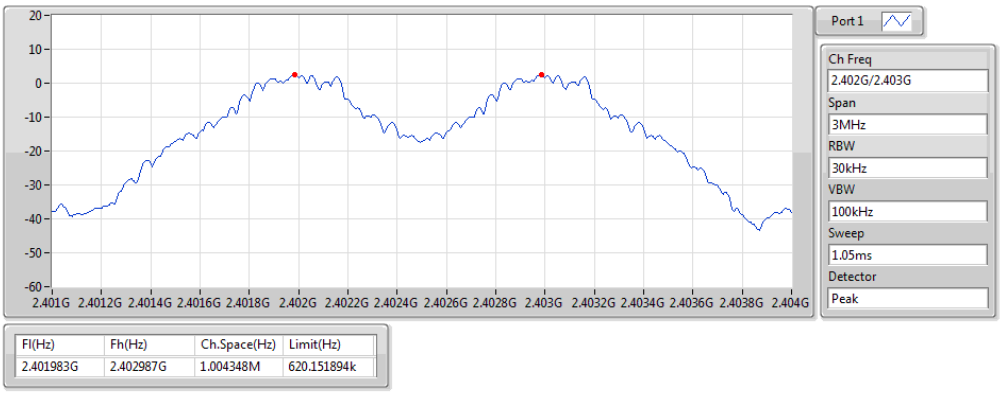
Mode	Max-Space (Hz)	Min-Space (Hz)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	1.004348M	1M
BT-EDR(2Mbps)	1.004348M	1M
BT-EDR(3Mbps)	1.004348M	1M

Result

Mode	Result	Fl (Hz)	Fh (Hz)	Ch.Space (Hz)	Limit (Hz)
BT-BR(1Mbps)	-	-	-	-	-
2402MHz	Pass	2.401983G	2.402987G	1.004348M	620.151894k
2441MHz	Pass	2.440978G	2.441978G	1M	620.151894k
2480MHz	Pass	2.47897G	2.479974G	1.004348M	620.151894k
BT-EDR(2Mbps)	-	-	-	-	-
2402MHz	Pass	2.401987G	2.402987G	1M	899.766k
2441MHz	Pass	2.440978G	2.441978G	1M	890.442k
2480MHz	Pass	2.47897G	2.479974G	1.004348M	897.768k
BT-EDR(3Mbps)	-	-	-	-	-
2402MHz	Pass	2.401987G	2.402987G	1M	893.106k
2441MHz	Pass	2.440978G	2.441978G	1M	885.78k
2480MHz	Pass	2.47897G	2.479974G	1.004348M	887.778k

BT-BR(1Mbps) **Channel Separation-FS**

2.402G/2.403GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.401983G	2.402987G	1.004348M	620.151894k

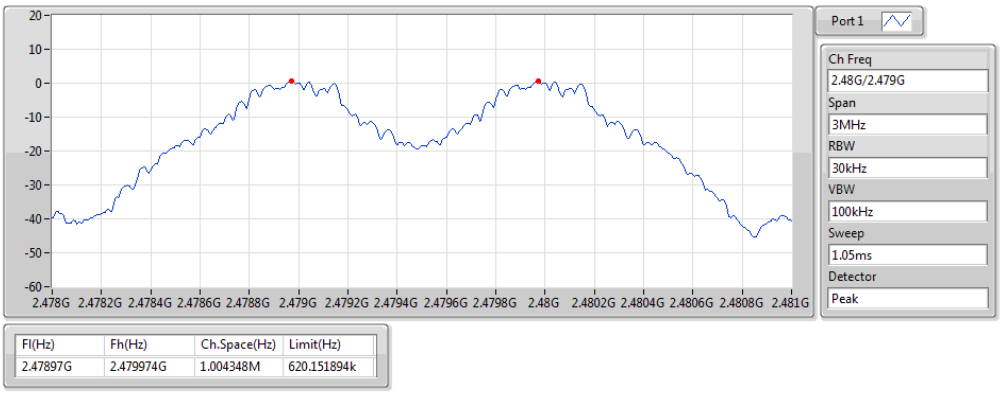
BT-BR(1Mbps) **Channel Separation-FS**

2.441G/2.442GHz

Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.440978G	2.441978G	1M	620.151894k

BT-BR(1Mbps) **Channel Separation-FS**

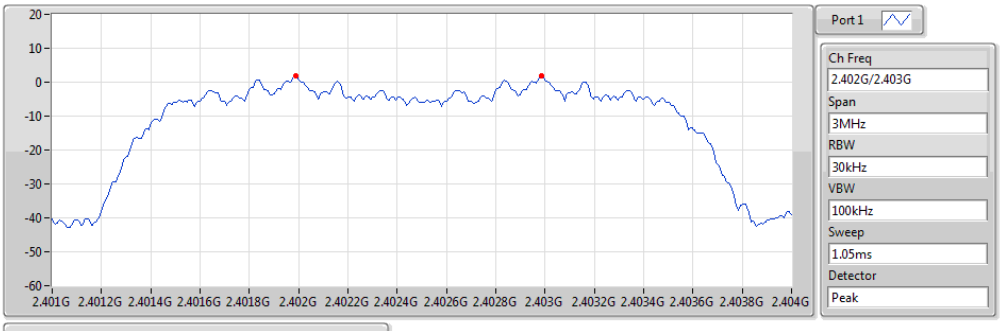
2.48G/2.479GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.47897G	2.479974G	1.004348M	620.151894k

BT-EDR(2Mbps) **Channel Separation-FS**

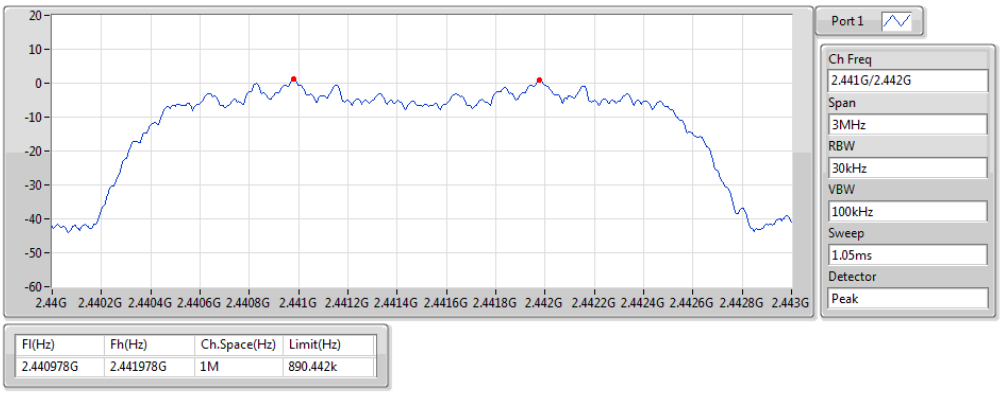
2.402G/2.403GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.401987G	2.402987G	1M	899.766k

BT-EDR(2Mbps) **Channel Separation-FS**

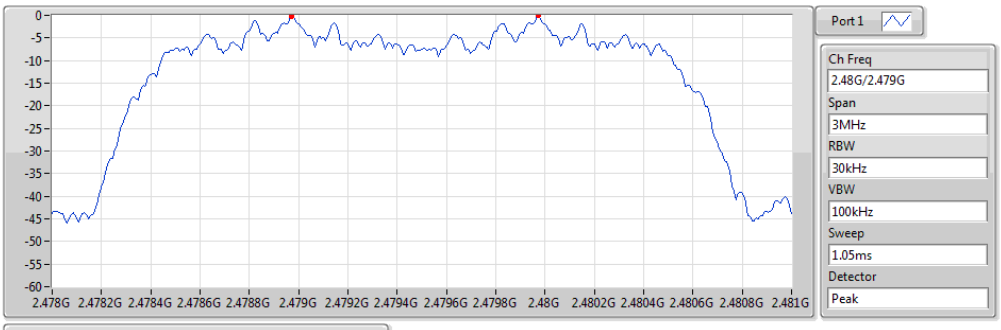
2.441G/2.442GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.440978G	2.441978G	1M	890.442k

BT-EDR(2Mbps) **Channel Separation-FS**

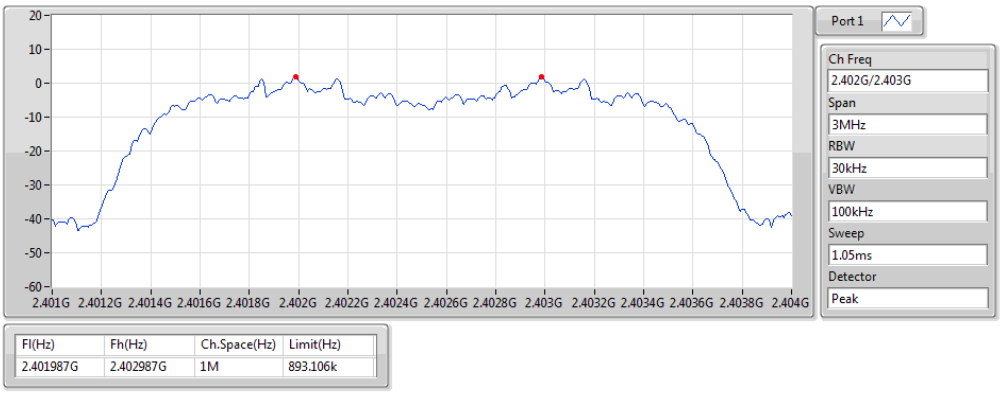
2.48G/2.479GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.47897G	2.479974G	1.004348M	897.768k

BT-EDR(3Mbps) **Channel Separation-FS**

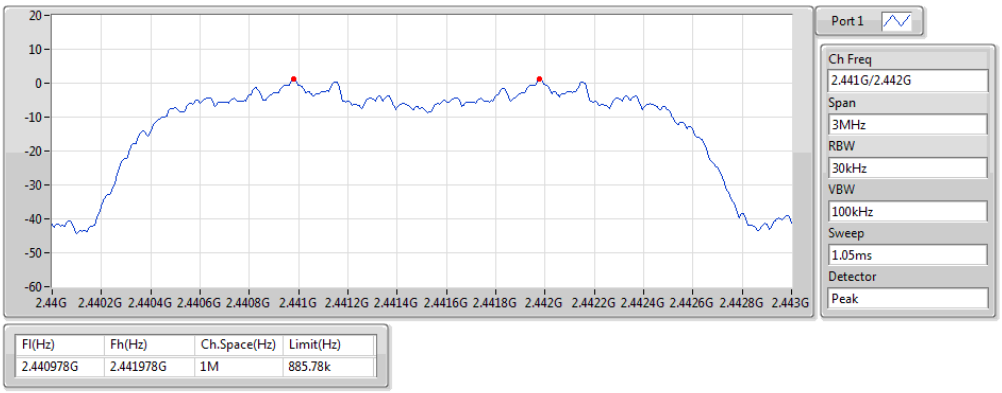
2.402G/2.403GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.401987G	2.402987G	1M	893.106k

BT-EDR(3Mbps) **Channel Separation-FS**

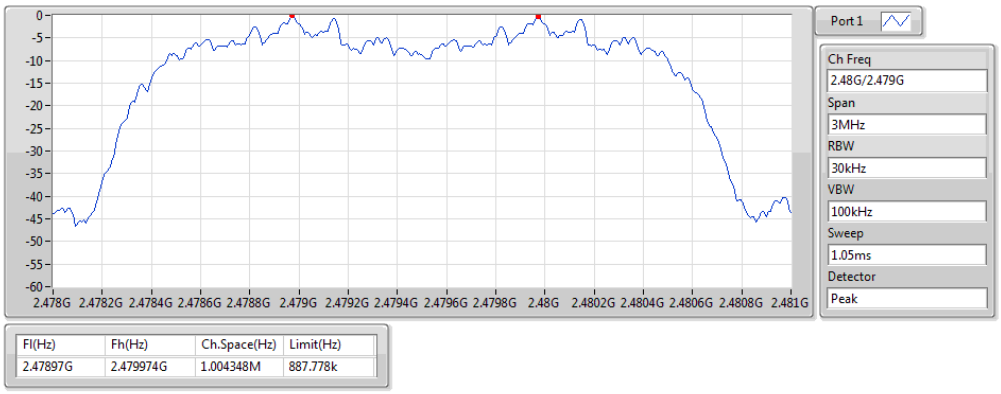
2.441G/2.442GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.440978G	2.441978G	1M	885.78k

BT-EDR(3Mbps) **Channel Separation-FS**

2.48G/2.479GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.47897G	2.479974G	1.004348M	887.778k

3.8 Number of Dwell Time

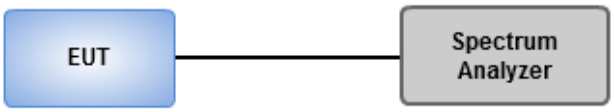
3.8.1 Limit of Dwell time

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.

3.8.2 Test Procedures

1. Set RBW=300 kHz, VBW=1 MHz, Sweep time=8 ms, Detector=Peak, Span=0 Hz,Trace max hold.
2 Enable gating and trigger function of spectrum analyzer to measure burst on time.
3. Set RBW=300 kHz, VBW=1 MHz, Sweep time=5 s / 2 s, Detector=Peak, Span=0 Hz,Trace max hold.
4. Enable gating and trigger function of spectrum analyzer to measure burst on number of transmission.
5 Set RBW=300 kHz, VBW=1 MHz, Sweep time=31.6 s / 8 s, Detector=Peak, Span=0 Hz,Trace max hold.
6 Enable gating and trigger function of spectrum analyzer to measure burst on number of transmission of entire time cycle.

3.8.3 Test Setup



3.8.4 Test Result of Dwell Time

Ambient Condition	25°C / 66%	Tested By	Aska Huang

Summary

Mode	Max-Dwell (s)
2.4-2.4835GHz	-
BT-BR(1Mbps)	328.79484m_DH5
BT-EDR(2Mbps)	329.07924m_DH5
BT-EDR(3Mbps)	347.66162m_DH5
BT-BR-AFH(1Mbps)	312.201m_DH5-AFH
BT-EDR-AFH(2Mbps)	300.846m_DH5-AFH
BT-EDR-AFH(3Mbps)	312.633m_DH5-AFH

Result/ Non AFH mode

Mode	Result	Period (s)	Dwell (s)	Limit (s)	Tx On (ms)	Number of transmission in a 5 s
BT-BR(1Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	31.6	0.32879	0.4	2.89025	18
BT-EDR(2Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	31.6	0.32908	0.4	2.89275	18
BT-EDR(3Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	31.6	0.34766	0.4	2.89525	19

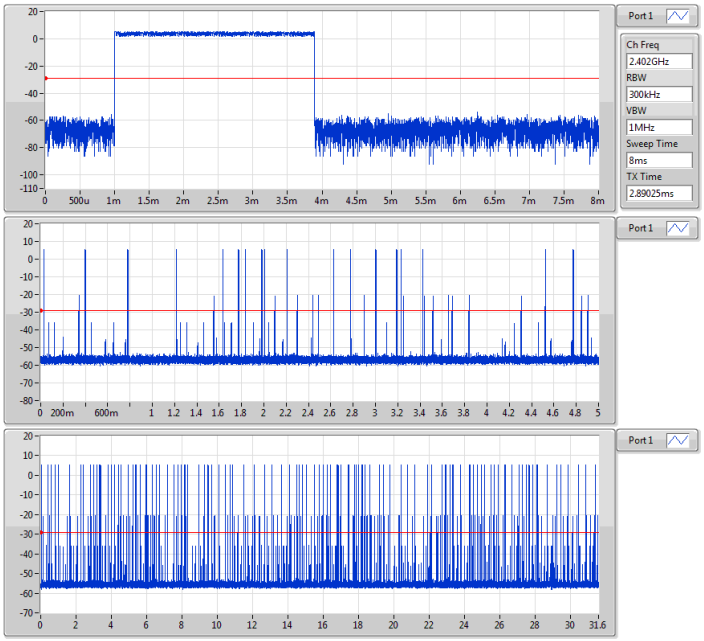
Note 1: Dwell time =Number of transmission in a 5 second x Tx On Time x 6.32

Note 2: DH5 was the worst mode.

Result/ AFH mode						
Mode	**Result**	**Period (s)**	**Dwell (s)**	**Limit (s)**	**Tx On (ms)**	**Number of transmission in a 2 s**
BT-BR-AFH(1Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	8	0.31220	0.4	2.89075	27
BT-EDR-AFH(2Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	8	0.30085	0.4	2.89275	26
BT-EDR-AFH(3Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	8	0.31263	0.4	2.89475	27
Note 1: Dwell time =Number of transmission in a 2 second x Tx On Time x 4 Note 2: DH5 was the worst mode.						

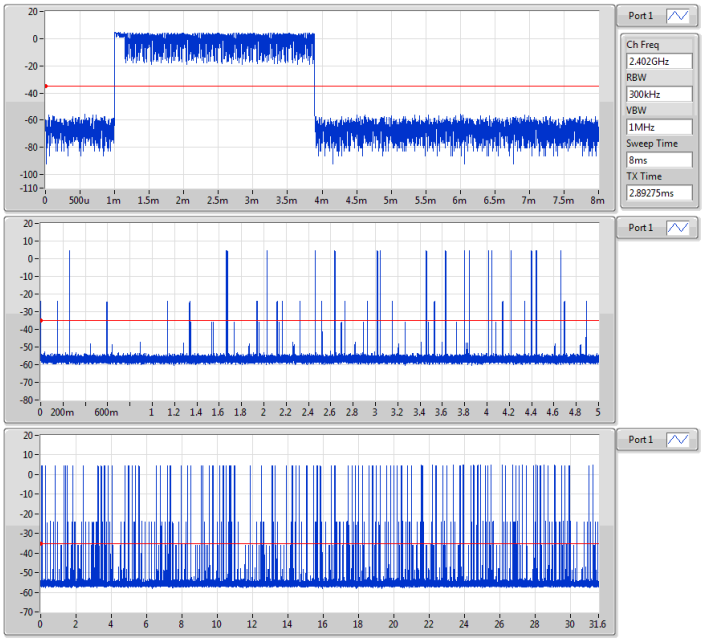
BT-BR(1Mbps) **Dwell-FS**

2402MHz



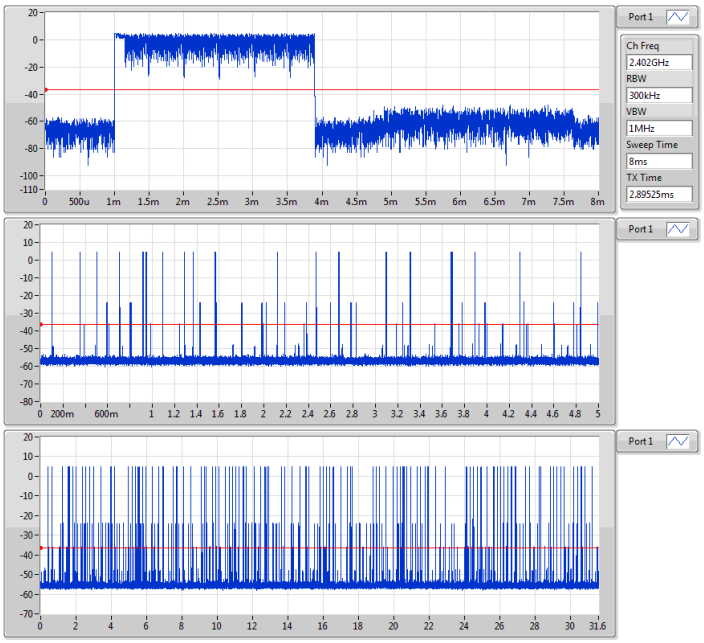
BT-EDR(2Mbps) **Dwell-FS**

2402MHz



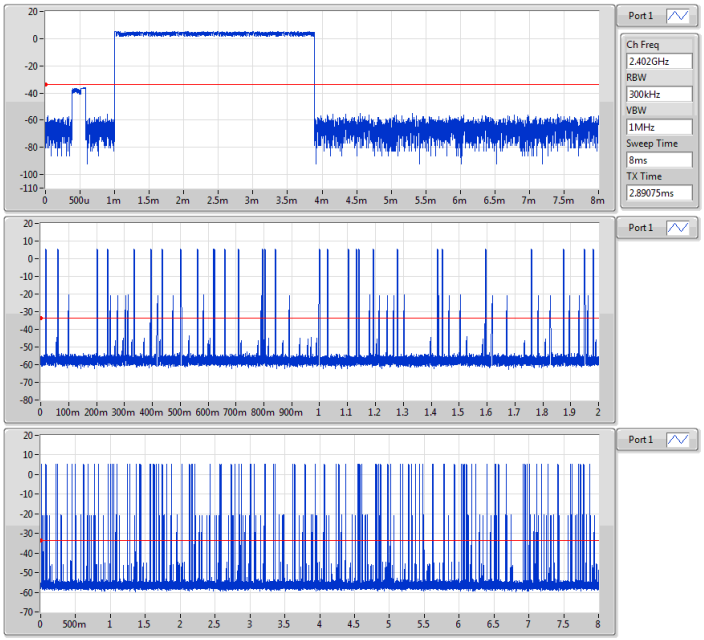
BT-EDR(3Mbps) **Dwell-FS**

2402MHz



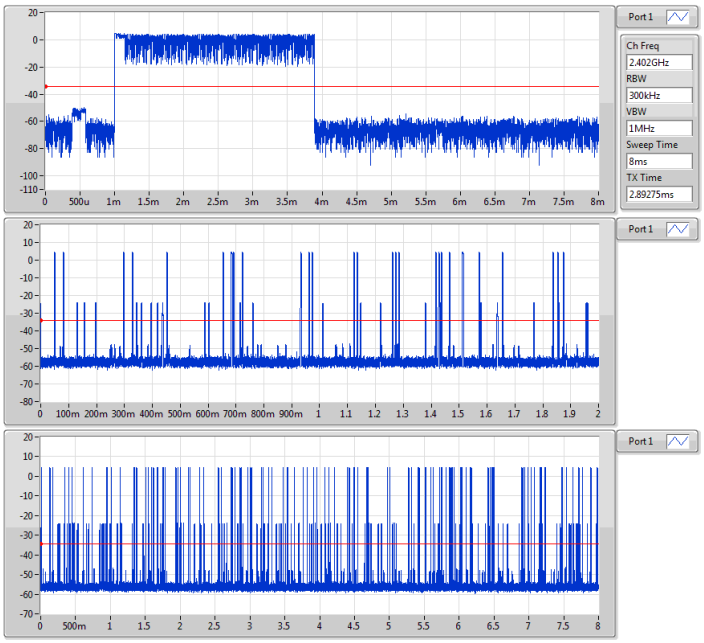
BT-BR-AFH(1Mbps) **Dwell-FS**

2402MHz



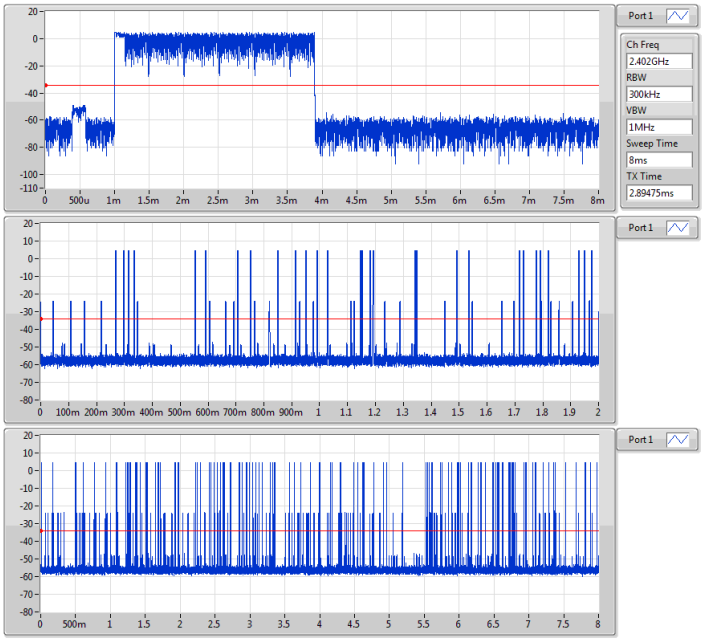
BT-EDR-AFH(2Mbps) **Dwell-FS**

2402MHz



BT-EDR-AFH(3Mbps) **Dwell-FS**

2402MHz



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 Corporation (EMC and Wireless Communication Laboratory), 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 District. 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 Dist., Tao Yuan City 33381, Taiwan (R.O.C.)	No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 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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