FCC Test Report

FCC ID	:	**2AMMKIMGM6**
Equipment	:	**M6 Wireless Conference Box**
Model No.	:	**iMage_M6_01**
Brand Name	:	**iMage**
Applicant	:	**iMageTech Co.,Ltd**
Address	:	**5F.,No.16,Ln.15,Sec.6,Minquan,Taipei City 114, Taiwan**
Standard	:	**47 CFR FCC Part 15.247**
Received Date	:	**Aug. 20, 2021**
Tested Date	:	**Sep. 08 ~ Sep. 22, 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

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 10
1.6 Reference Guidance 10
1.7 Deviation from Test Standard and Measurement Procedure 10
1.8 Measurement Uncertainty 10

2 TEST CONFIGURATION 11

2.1 Testing Facility 11
2.2 The Worst Test Modes and Channel Details 11

3 TRANSMITTER TEST RESULTS 12

3.1 Conducted Emissions 12
3.2 Unwanted Emissions into Restricted Frequency Bands 15
3.3 Unwanted Emissions into Non-Restricted Frequency Bands 32
3.4 Conducted Output Power 40
3.5 Number of Hopping Frequency 43
3.6 20dB and Occupied Bandwidth 47
3.7 Channel Separation 54
3.8 Number of Dwell Time 61

4 TEST LABORATORY INFORMATION 67

Release Record

Report No.	Version	Description	Issued Date
FR0N1602-01AD	Rev. 01	Initial issue	Nov. 05, 2021

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.466MHz 26.54 (Margin -20.04dB) - AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 30.00MHz 29.69 (Margin -10.31dB) - PK	Pass
15.247(d)	Band Edge	Meet the requirement of limit	Pass
15.247(b)(1)	Conducted Output Power	Power [dBm]: 6.02	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.	Brand	Model	Type	Connector	Gain (dBi)
1	ANTENOVA	A5839H/A5887H	chip	Build-in	2.1

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	AC Adapter	Brand: UNIFIVE Model: UBX305-0510 Power Rating: I/P: 100-240Vac, 50/60Hz, 0.15A O/P: 5Vdc, 1A
2	USB Cable	1.8m non-shielded with one core
3	Audio Cable x2 (TRS 3.5mm)	1.48m non-shielded with one core
4	Wireless Speakerphone	Brand: iMage Model: A6
5	Core	Brand: iMage Model: CU0530B-LF

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	BlueSuite,Version:2.6.7 Simulator, Brand: R&S / Model: CMW270	
Modulation Mode	**Duty Cycle Of Test Signal (%)**	**Duty Factor (dB)**
DH5	78.38%	1.06
2DH5	78.76%	1.04
3DH5	79.15%	1.02

1.1.7 Power Index of Test Tool

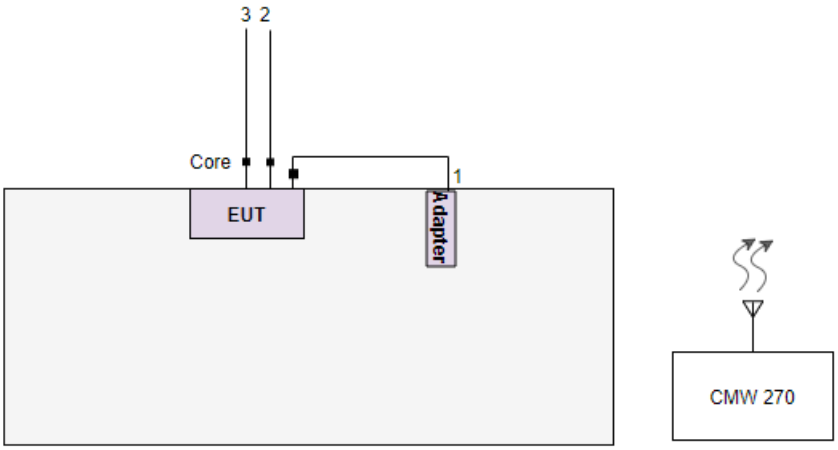
Modulation Mode	Test Frequency (MHz)		
	2402	**2441**	**2480**
GFSK/1Mbps	default	default	default
π/4-DQPSK/2Mbps	default	default	default
8DPSK/3Mbps	default	default	default

1.2 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Remarks**
1	Notebook	DELL	Latitude E5470	3J5JVF2	---

1.3 Test Setup Chart

Test Setup Diagram



No.	Signal cable / Length (m)
1	USB, 1.8m non-shielded with one core
2	Audio, 1.48m non-shielded with one core
3	Audio, 1.48m non-shielded with one core

Note: The notebook is disconnected from EUT and removed from test table when EUT is set to transmit continuously.

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Sep. 22, 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	101579	Mar. 17, 2021	Mar. 16, 2022
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	May 25, 2021	May 24, 2022
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 chamber1 / (03CH01-WS)				
Tested Date	Sep. 08 ~ Sep. 10, 2021				
Instrument	**Brand**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Wireless connectivity tester	R&S	CMW270	100856	Nov .02, 2020	Nov. 01, 2021
Receiver	R&S	ESR3	101657	Mar. 12, 2021	Mar. 11, 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	VULB9168-522	Jun. 30, 2021	Jun. 29, 2022
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 11, 2020	Dec. 10, 2021
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170508	Dec. 31, 2020	Dec. 30, 2021
Preamplifier	EMC	EMC02325	980225	Jun. 29, 2021	Jun. 28, 2022
Preamplifier	Agilent	83017A	MY39501308	Sep. 26, 2020	Sep. 25, 2021
Preamplifier	EMC	EMC184045B	980192	Jul. 14, 2021	Jul. 13, 2022
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 06, 2020	Oct. 05, 2021
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 06, 2020	Oct. 05, 2021
LF cable 11M	EMC	EMCCFD400-NW-NW-11000	200801	Oct. 06, 2020	Oct. 05, 2021
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	160502	Oct. 06, 2020	Oct. 05, 2021
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Oct. 06, 2020	Oct. 05, 2021
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Oct. 06, 2020	Oct. 05, 2021
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Tested Date	Sep. 13, 2021				
Instrument	**Brand**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Wireless connectivity tester	R&S	CMW270	100856	Nov .02, 2020	Nov. 01, 2021
Spectrum Analyzer	R&S	FSV40	101498	Dec. 04, 2020	Dec. 03, 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	Sporton	SENSE-15247_FS	V5.10.7.11	NA	NA
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	±3.41 dB
Radiated emission > 1GHz	±4.59 dB
Time	±0.1%

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	CO01-WS, 03CH01-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.)

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- 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	2441	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	---

NOTE:

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

3 Transmitter Test Results

3.1 Conducted Emissions

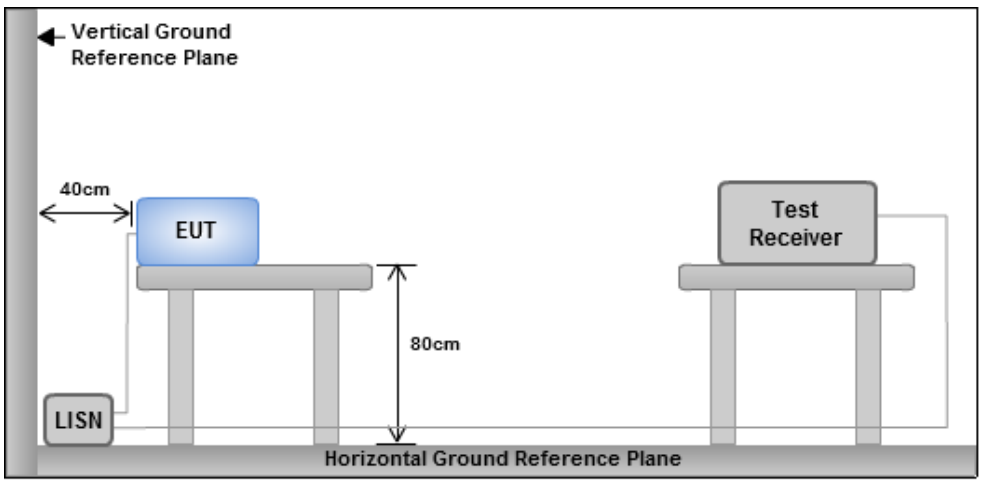
3.1.1 Limit of Conducted Emissions

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



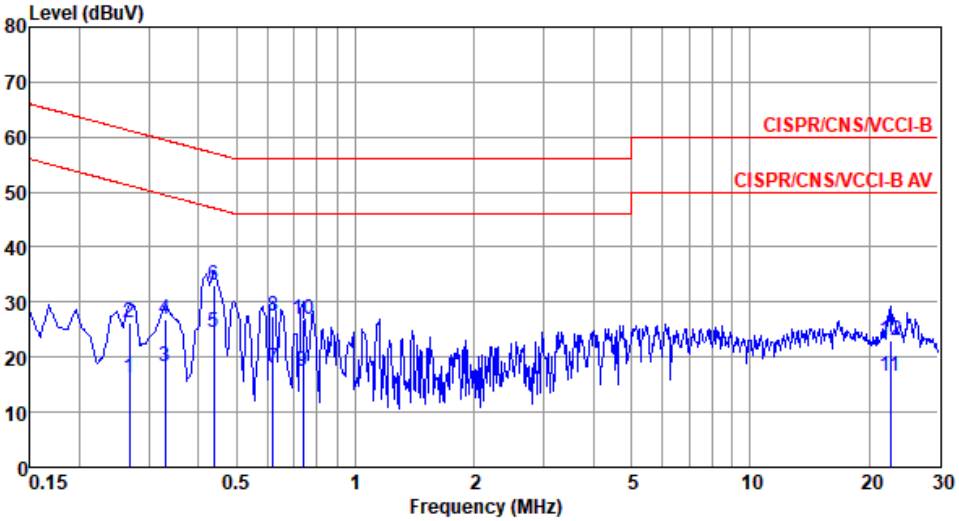
Note: 1. Support units were connected to second LISN.

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)	2441
Power Phase	Line		

Test by : Joe Liao Temperature: 22°C Humidity: 61%

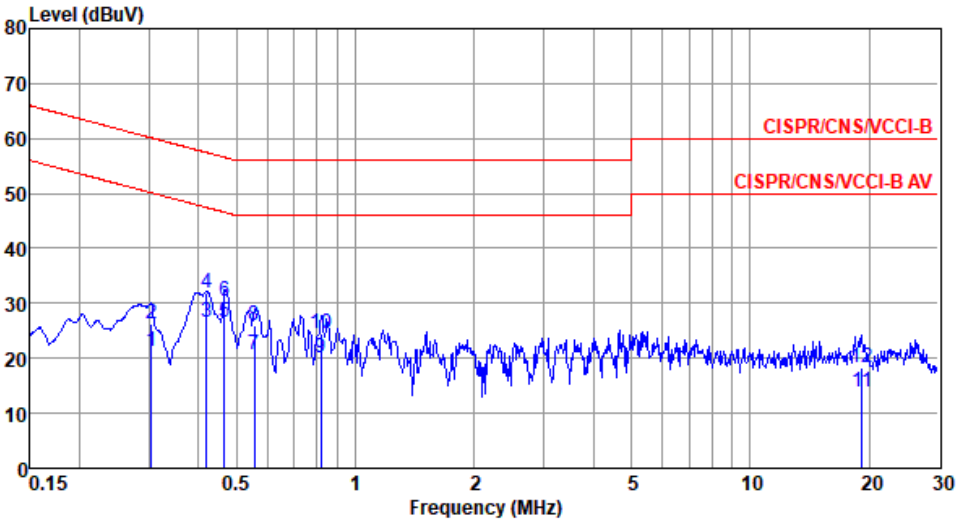


	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.267	16.14	51.20	-35.06	6.21	9.86	0.07	Average
2	0.267	26.28	61.20	-34.92	16.35	9.86	0.07	QP
3	0.330	18.32	49.44	-31.12	8.37	9.88	0.07	Average
4	0.330	26.76	59.44	-32.68	16.81	9.88	0.07	QP
5*	0.437	24.54	47.11	-22.57	14.56	9.90	0.08	Average
6	0.437	33.19	57.11	-23.92	23.21	9.90	0.08	QP
7	0.617	18.08	46.00	-27.92	8.04	9.94	0.10	Average
8	0.617	27.57	56.00	-28.43	17.53	9.94	0.10	QP
9	0.735	17.56	46.00	-28.44	7.49	9.96	0.11	Average
10	0.735	26.90	56.00	-29.10	16.83	9.96	0.11	QP
11	22.655	16.49	50.00	-33.51	5.47	10.33	0.69	Average
12	22.655	23.06	60.00	-36.94	12.04	10.33	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)	2441
Power Phase	Neutral		

Test by : Joe Liao Temperature: 22°C Humidity: 61%



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.303	21.12	50.15	-29.03	11.21	9.84	0.07	Average
2	0.303	26.26	60.15	-33.89	16.35	9.84	0.07	QP
3	0.419	26.66	47.46	-20.80	16.73	9.85	0.08	Average
4	0.419	31.85	57.46	-25.61	21.92	9.85	0.08	QP
5*	0.466	26.54	46.58	-20.04	16.59	9.86	0.09	Average
6	0.466	30.34	56.58	-26.24	20.39	9.86	0.09	QP
7	0.555	20.63	46.00	-25.37	10.68	9.86	0.09	Average
8	0.555	26.00	56.00	-30.00	16.05	9.86	0.09	QP
9	0.817	19.99	46.00	-26.01	10.01	9.87	0.11	Average
10	0.817	24.64	56.00	-31.36	14.66	9.87	0.11	QP
11	19.224	13.78	50.00	-36.22	2.81	10.31	0.66	Average
12	19.224	18.42	60.00	-41.58	7.45	10.31	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:

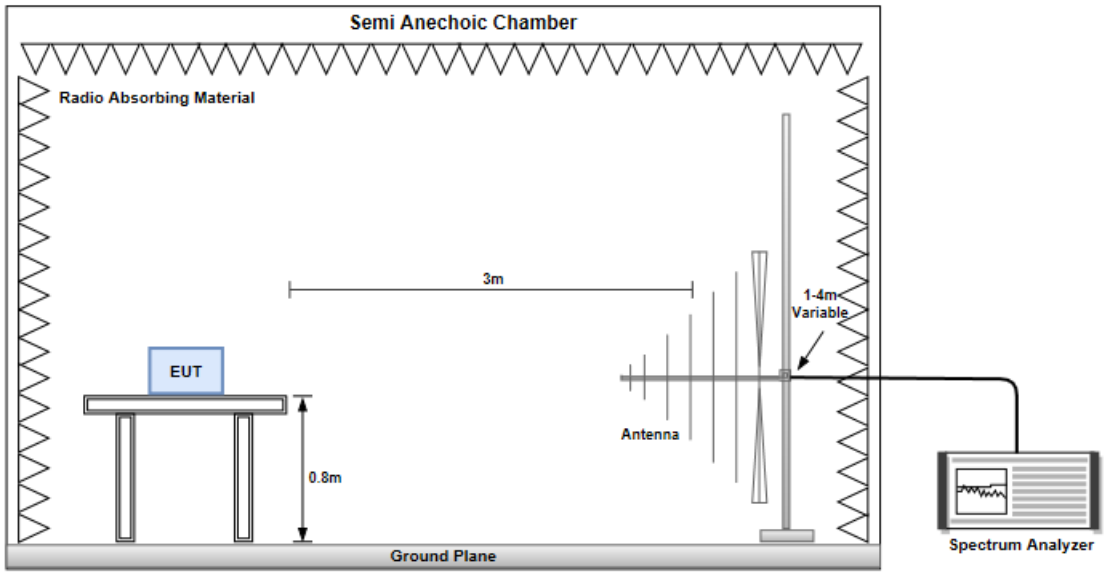
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. Radiated emission above 1GHz / Peak value
   RBW=1MHz, VBW=3MHz and Peak detector
3. Radiated emission above 1GHz / Average value for harmonics
   The average value is: Average = Peak value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

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

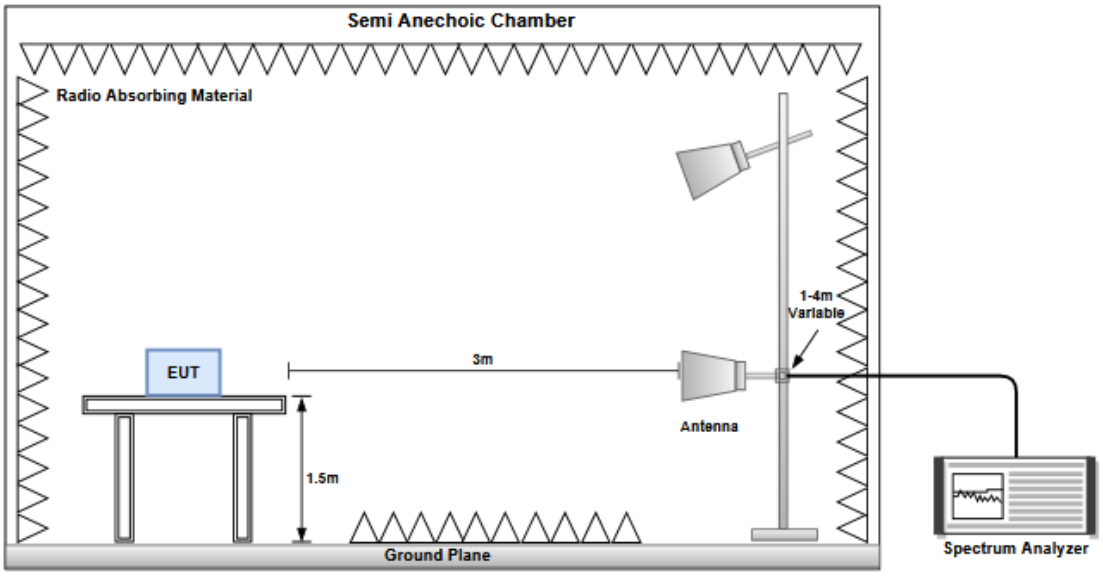
4. Radiated emission above 1GHz / Average value for other emissions
   RBW=1MHz, VBW=1/T and Peak detector

3.2.3 Test Setup

Radiated Emissions below 1 GHz



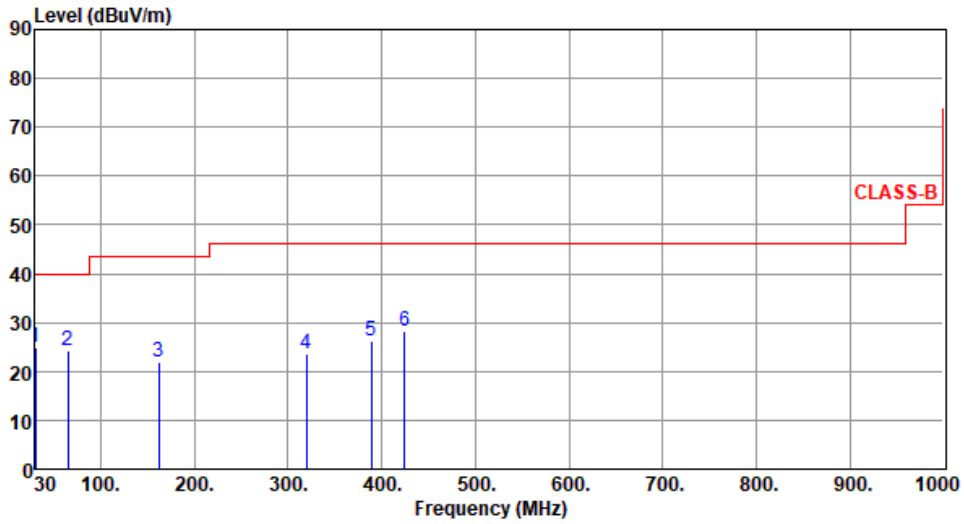
Radiated Emissions above 1 GHz



3.2.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	GFSK	Test Freq. (MHz)	2441
Polarization	Horizontal		

Test By :Akun Chung Temperature(℃):26 Humidity(%):66

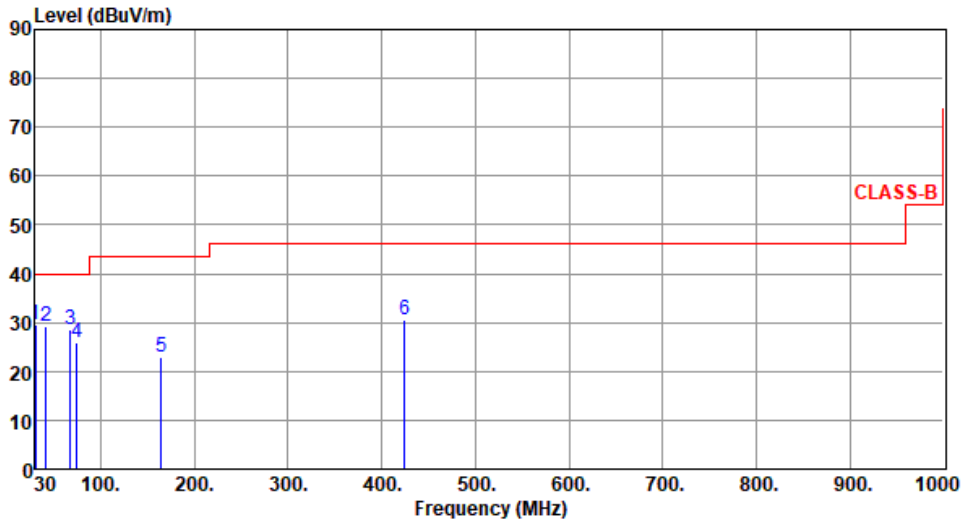


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	30.00	25.06	40.00	-14.94	35.07	-10.01	Peak	---	---
2	64.92	24.29	40.00	-15.71	34.17	-9.88	Peak	---	---
3	161.92	22.01	43.50	-21.49	30.76	-8.75	Peak	---	---
4	320.03	23.48	46.00	-22.52	31.05	-7.57	Peak	---	---
5	388.90	26.26	46.00	-19.74	32.38	-6.12	Peak	---	---
6	424.79	28.38	46.00	-17.62	33.46	-5.08	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
*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)	2441
Polarization	Vertical		

Test By :Akun Chung Temperature(℃):26 Humidity(%):66



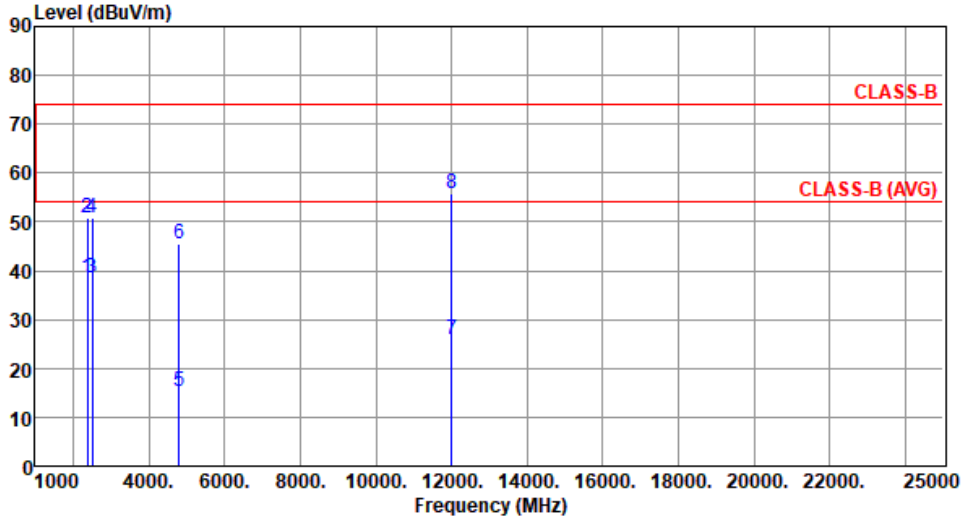
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	30.00	29.69	40.00	-10.31	39.70	-10.01	Peak	---	---
2	41.64	29.30	40.00	-10.70	37.88	-8.58	Peak	---	---
3	67.83	28.63	40.00	-11.37	38.84	-10.21	Peak	---	---
4	74.62	25.91	40.00	-14.09	38.04	-12.13	Peak	---	---
5	164.83	22.81	43.50	-20.69	31.72	-8.91	Peak	---	---
6	424.79	30.42	46.00	-15.58	35.50	-5.08	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
*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 :Roger Lu Temperature(℃):24 Humidity(%):63

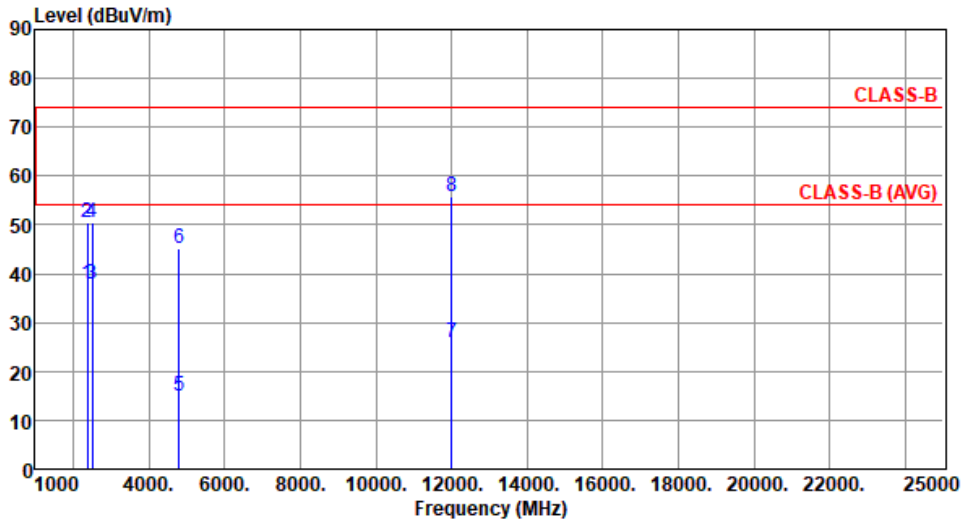


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	38.36	54.00	-15.64	41.15	-2.79	Average	100	344
2	2390.00	50.80	74.00	-23.20	53.59	-2.79	Peak	100	344
3	2498.00	38.60	54.00	-15.40	41.35	-2.75	Average	100	344
4	2498.00	50.72	74.00	-23.28	53.47	-2.75	Peak	100	344
5	4804.00	15.26	54.00	-38.74	11.76	3.50	Average	100	242
6	4804.00	45.36	74.00	-28.64	41.86	3.50	Peak	100	242
7	12010.00	25.85	54.00	-28.15	11.58	14.27	Average	100	60
8	12010.00	55.95	74.00	-18.05	41.68	14.27	Peak	100	60

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
*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 :Roger Lu Temperature(℃):24 Humidity(%):63

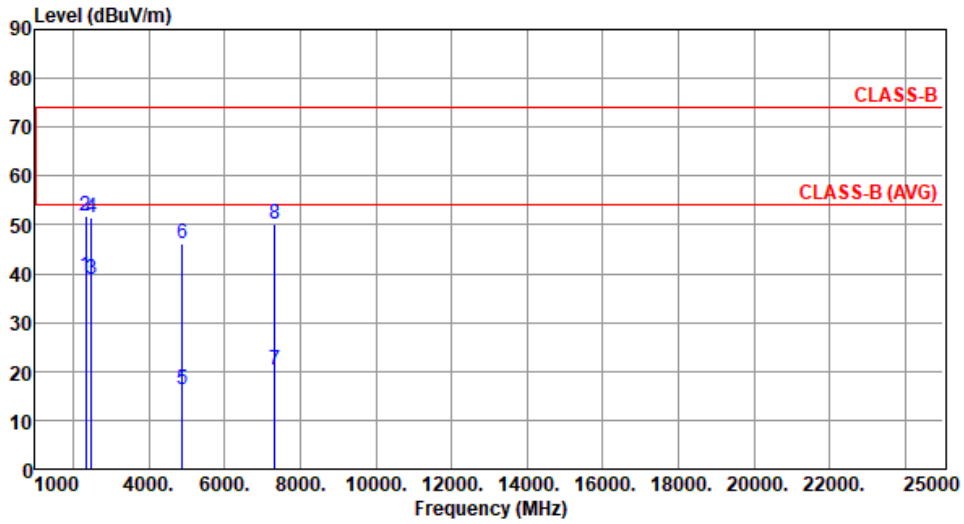


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	37.80	54.00	-16.20	40.59	-2.79	Average	382	261
2	2390.00	50.47	74.00	-23.53	53.26	-2.79	Peak	382	261
3	2498.00	37.94	54.00	-16.06	40.69	-2.75	Average	382	261
4	2498.00	50.45	74.00	-23.55	53.20	-2.75	Peak	382	261
5	4804.00	14.99	54.00	-39.01	11.49	3.50	Average	100	321
6	4804.00	45.09	74.00	-28.91	41.59	3.50	Peak	100	321
7	12010.00	25.76	54.00	-28.24	11.49	14.27	Average	100	30
8	12010.00	55.86	74.00	-18.14	41.59	14.27	Peak	100	30

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
*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 :Roger Lu Temperature(℃):24 Humidity(%):63

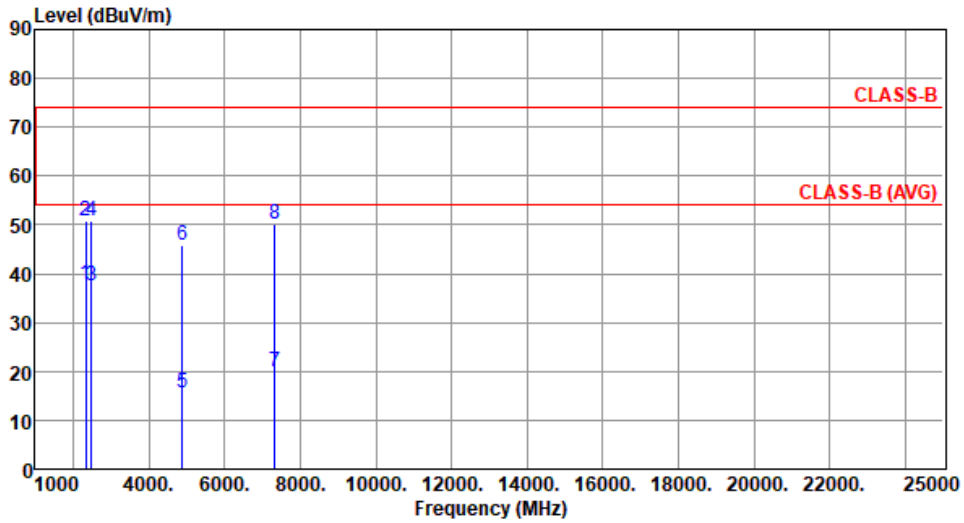


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2337.00	39.50	54.00	-14.50	42.22	-2.72	Average	100	322
2	2337.00	51.96	74.00	-22.04	54.68	-2.72	Peak	100	322
3	2493.00	38.81	54.00	-15.19	41.55	-2.74	Average	100	322
4	2493.00	51.52	74.00	-22.48	54.26	-2.74	Peak	100	322
5	4882.00	16.22	54.00	-37.78	12.75	3.47	Average	100	241
6	4882.00	46.32	74.00	-27.68	42.85	3.47	Peak	100	241
7	7323.00	20.18	54.00	-33.82	11.15	9.03	Average	100	340
8	7323.00	50.28	74.00	-23.72	41.25	9.03	Peak	100	340

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
*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 :Roger Lu Temperature(℃):24 Humidity(%):63

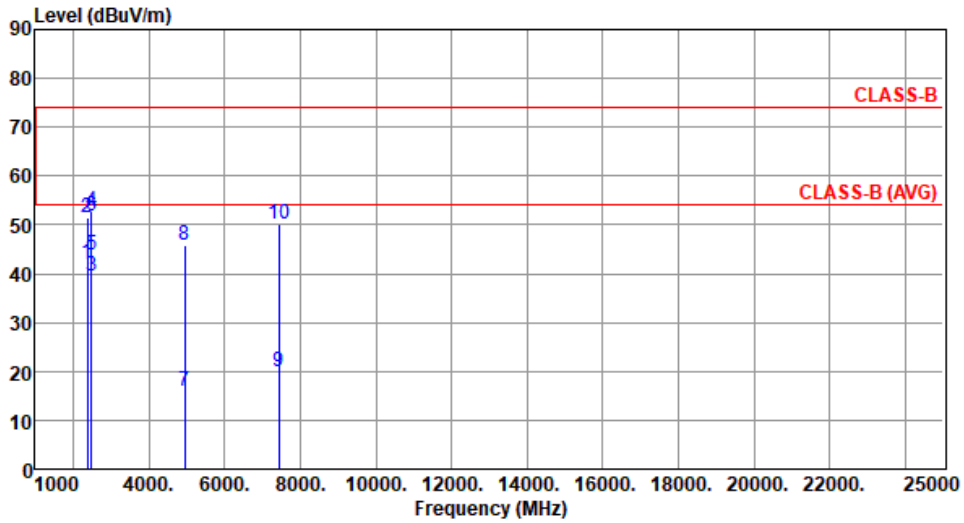


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2337.00	37.86	54.00	-16.14	40.58	-2.72	Average	389	264
2	2337.00	50.75	74.00	-23.25	53.47	-2.72	Peak	389	264
3	2493.00	37.60	54.00	-16.40	40.34	-2.74	Average	389	264
4	2493.00	50.70	74.00	-23.30	53.44	-2.74	Peak	389	264
5	4882.00	15.62	54.00	-38.38	12.15	3.47	Average	100	320
6	4882.00	45.72	74.00	-28.28	42.25	3.47	Peak	100	320
7	7323.00	20.07	54.00	-33.93	11.04	9.03	Average	100	200
8	7323.00	50.17	74.00	-23.83	41.14	9.03	Peak	100	200

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
*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 :Roger Lu Temperature(℃):24 Humidity(%):63

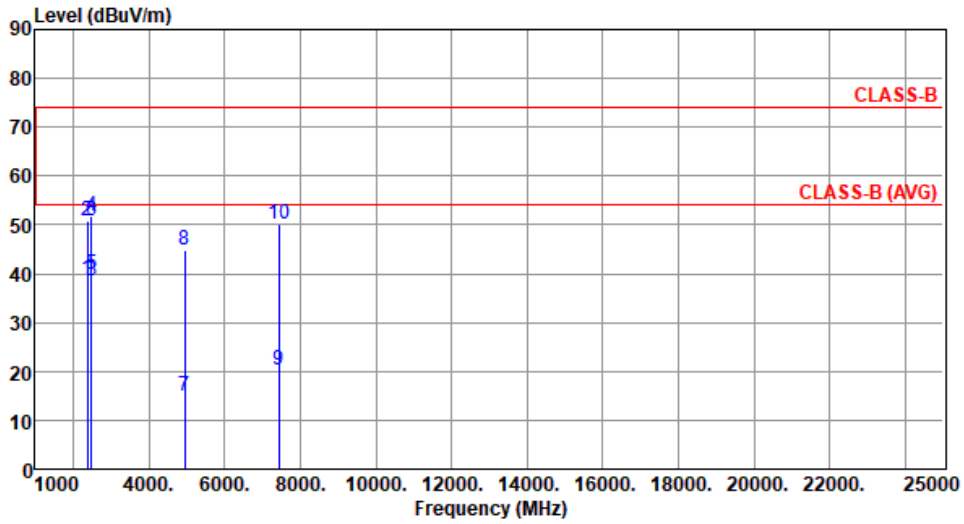


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2376.00	42.28	54.00	-11.72	45.06	-2.78	Average	100	307
2	2376.00	51.40	74.00	-22.60	54.18	-2.78	Peak	100	307
3	2483.50	39.54	54.00	-14.46	42.28	-2.74	Average	100	307
4	2483.50	52.95	74.00	-21.05	55.69	-2.74	Peak	100	307
5	2496.00	43.90	54.00	-10.10	46.64	-2.74	Average	100	307
6	2496.00	51.94	74.00	-22.06	54.68	-2.74	Peak	100	307
7	4960.00	15.83	54.00	-38.17	12.15	3.68	Average	100	245
8	4960.00	45.93	74.00	-28.07	42.25	3.68	Peak	100	245
9	7440.00	19.90	54.00	-34.10	10.92	8.98	Average	100	345
10	7440.00	50.00	74.00	-24.00	41.02	8.98	Peak	100	345

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
*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 :Roger Lu Temperature(℃):24 Humidity(%):63



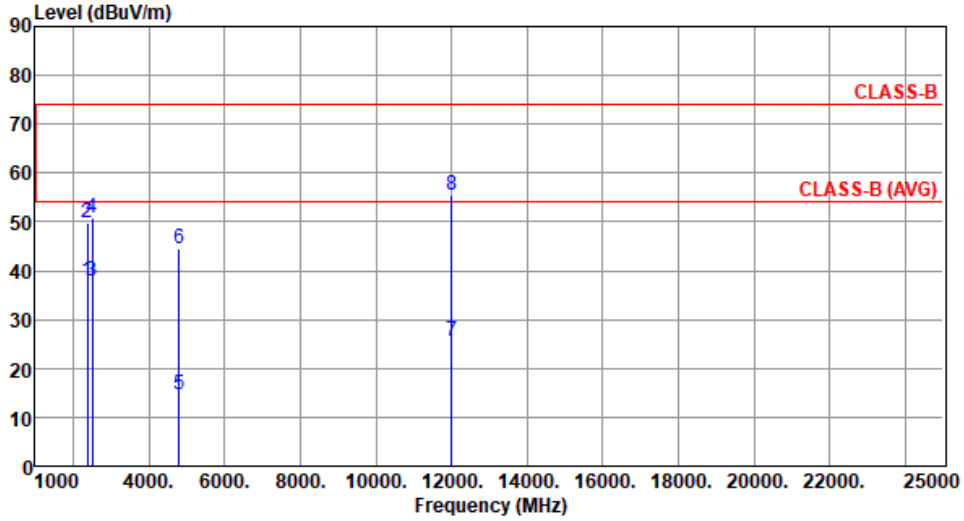
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2376.00	38.80	54.00	-15.20	41.58	-2.78	Average	386	258
2	2376.00	50.81	74.00	-23.19	53.59	-2.78	Peak	386	258
3	2483.50	38.52	54.00	-15.48	41.26	-2.74	Average	386	258
4	2483.50	51.94	74.00	-22.06	54.68	-2.74	Peak	386	258
5	2496.00	39.72	54.00	-14.28	42.46	-2.74	Average	386	258
6	2496.00	50.82	74.00	-23.18	53.56	-2.74	Peak	386	258
7	4960.00	14.89	54.00	-39.11	11.21	3.68	Average	100	325
8	4960.00	44.99	74.00	-29.01	41.31	3.68	Peak	100	325
9	7440.00	20.13	54.00	-33.87	11.15	8.98	Average	100	195
10	7440.00	50.23	74.00	-23.77	41.25	8.98	Peak	100	195

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
*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 :Roger Lu Temperature(℃):24 Humidity(%):63

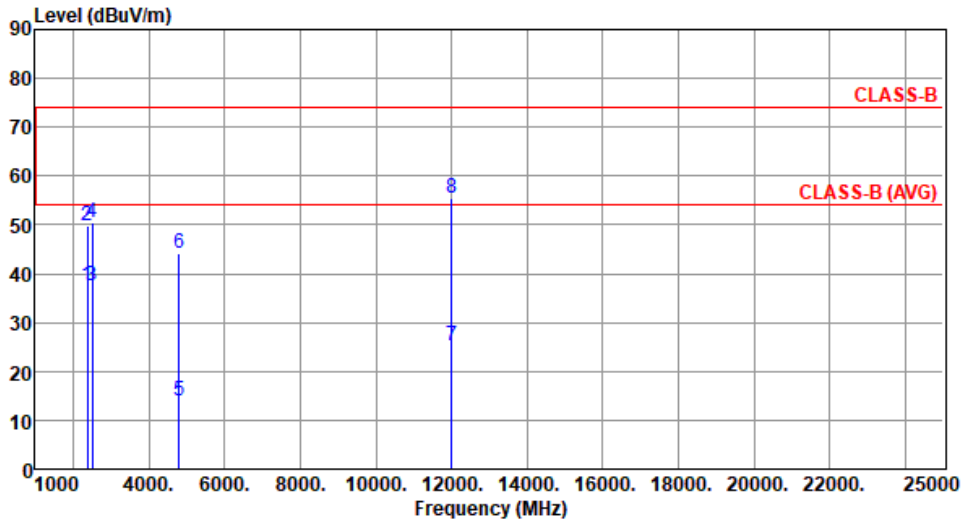


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	37.79	54.00	-16.21	40.58	-2.79	Average	100	306
2	2390.00	49.80	74.00	-24.20	52.59	-2.79	Peak	100	306
3	2498.00	37.91	54.00	-16.09	40.66	-2.75	Average	100	306
4	2498.00	50.71	74.00	-23.29	53.46	-2.75	Peak	100	306
5	4804.00	14.52	54.00	-39.48	11.02	3.50	Average	100	245
6	4804.00	44.62	74.00	-29.38	41.12	3.50	Peak	100	245
7	12010.00	25.42	54.00	-28.58	11.15	14.27	Average	100	55
8	12010.00	55.52	74.00	-18.48	41.25	14.27	Peak	100	55

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
*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 :Roger Lu Temperature(℃):24 Humidity(%):63

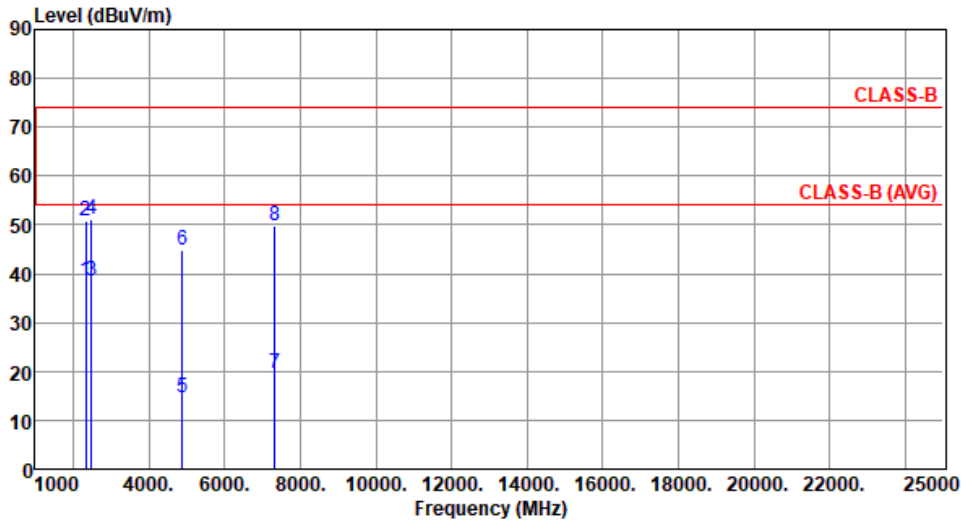


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	37.46	54.00	-16.54	40.25	-2.79	Average	384	261
2	2390.00	49.67	74.00	-24.33	52.46	-2.79	Peak	384	261
3	2498.00	37.68	54.00	-16.32	40.43	-2.75	Average	384	261
4	2498.00	50.55	74.00	-23.45	53.30	-2.75	Peak	384	261
5	4804.00	13.94	54.00	-40.06	10.44	3.50	Average	100	322
6	4804.00	44.04	74.00	-29.96	40.54	3.50	Peak	100	322
7	12010.00	25.29	54.00	-28.71	11.02	14.27	Average	100	80
8	12010.00	55.39	74.00	-18.61	41.12	14.27	Peak	100	80

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
*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 :Roger Lu Temperature(℃):24 Humidity(%):63

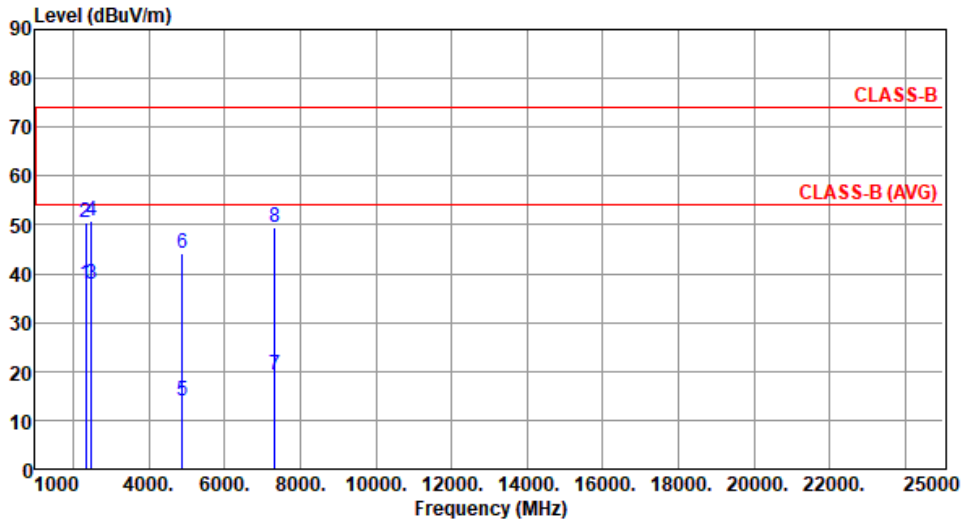


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2337.00	38.39	54.00	-15.61	41.11	-2.72	Average	100	338
2	2337.00	50.72	74.00	-23.28	53.44	-2.72	Peak	100	338
3	2493.00	38.38	54.00	-15.62	41.12	-2.74	Average	100	338
4	2493.00	51.15	74.00	-22.85	53.89	-2.74	Peak	100	338
5	4882.00	14.61	54.00	-39.39	11.14	3.47	Average	100	243
6	4882.00	44.71	74.00	-29.29	41.24	3.47	Peak	100	243
7	7323.00	19.60	54.00	-34.40	10.57	9.03	Average	100	60
8	7323.00	49.70	74.00	-24.30	40.67	9.03	Peak	100	60

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
*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 :Roger Lu Temperature(℃):24 Humidity(%):63

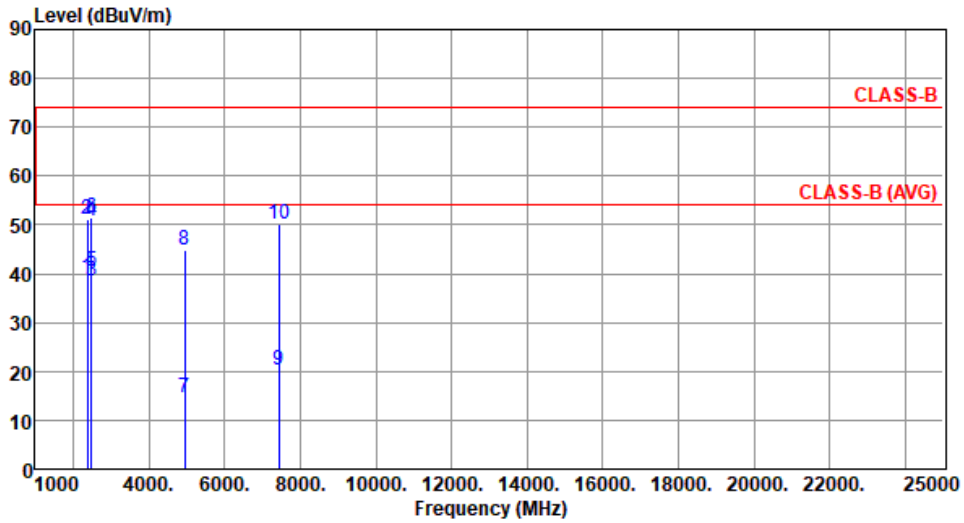


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2337.00	37.83	54.00	-16.17	40.55	-2.72	Average	386	257
2	2337.00	50.43	74.00	-23.57	53.15	-2.72	Peak	386	257
3	2493.00	37.90	54.00	-16.10	40.64	-2.74	Average	386	257
4	2493.00	50.71	74.00	-23.29	53.45	-2.74	Peak	386	257
5	4882.00	13.92	54.00	-40.08	10.45	3.47	Average	100	325
6	4882.00	44.02	74.00	-29.98	40.55	3.47	Peak	100	325
7	7323.00	19.37	54.00	-34.63	10.34	9.03	Average	100	40
8	7323.00	49.47	74.00	-24.53	40.44	9.03	Peak	100	40

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
*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 :Roger Lu Temperature(℃):24 Humidity(%):63

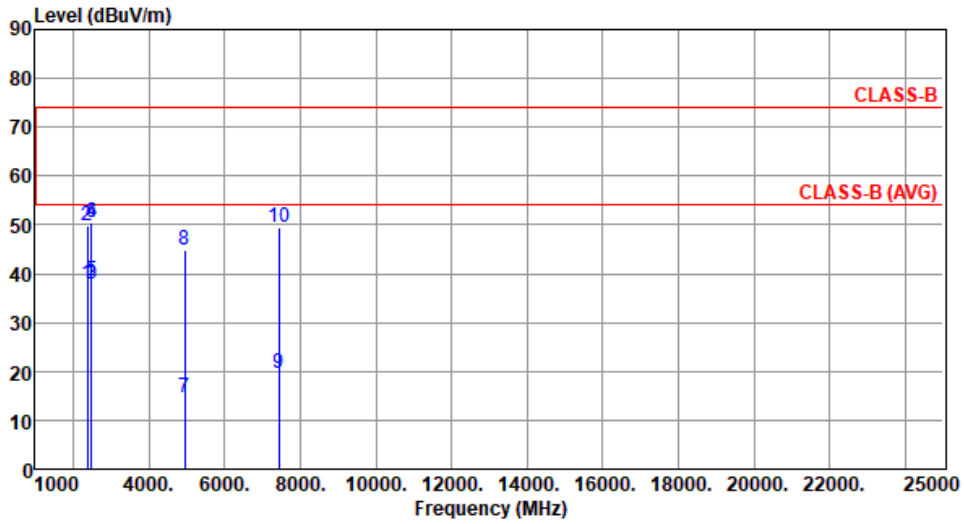


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2376.00	39.29	54.00	-14.71	42.07	-2.78	Average	100	308
2	2376.00	51.01	74.00	-22.99	53.79	-2.78	Peak	100	308
3	2483.50	38.46	54.00	-15.54	41.20	-2.74	Average	100	308
4	2483.50	50.75	74.00	-23.25	53.49	-2.74	Peak	100	308
5	2496.00	40.42	54.00	-13.58	43.16	-2.74	Average	100	308
6	2496.00	51.64	74.00	-22.36	54.38	-2.74	Peak	100	308
7	4960.00	14.73	54.00	-39.27	11.05	3.68	Average	100	242
8	4960.00	44.83	74.00	-29.17	41.15	3.68	Peak	100	242
9	7440.00	20.14	54.00	-33.86	11.16	8.98	Average	100	30
10	7440.00	50.24	74.00	-23.76	41.26	8.98	Peak	100	30

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
*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 :Roger Lu Temperature(℃):24 Humidity(%):63



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2376.00	37.81	54.00	-16.19	40.59	-2.78	Average	383	259
2	2376.00	49.81	74.00	-24.19	52.59	-2.78	Peak	383	259
3	2483.50	37.85	54.00	-16.15	40.59	-2.74	Average	383	259
4	2483.50	50.52	74.00	-23.48	53.26	-2.74	Peak	383	259
5	2496.00	38.60	54.00	-15.40	41.34	-2.74	Average	383	259
6	2496.00	50.37	74.00	-23.63	53.11	-2.74	Peak	383	259
7	4960.00	14.60	54.00	-39.40	10.92	3.68	Average	100	321
8	4960.00	44.70	74.00	-29.30	41.02	3.68	Peak	100	321
9	7440.00	19.55	54.00	-34.45	10.57	8.98	Average	100	60
10	7440.00	49.65	74.00	-24.35	40.67	8.98	Peak	100	60

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)
*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

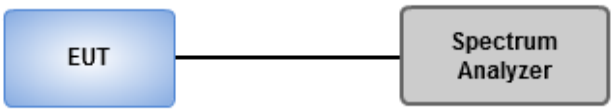
Reference level measurement

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

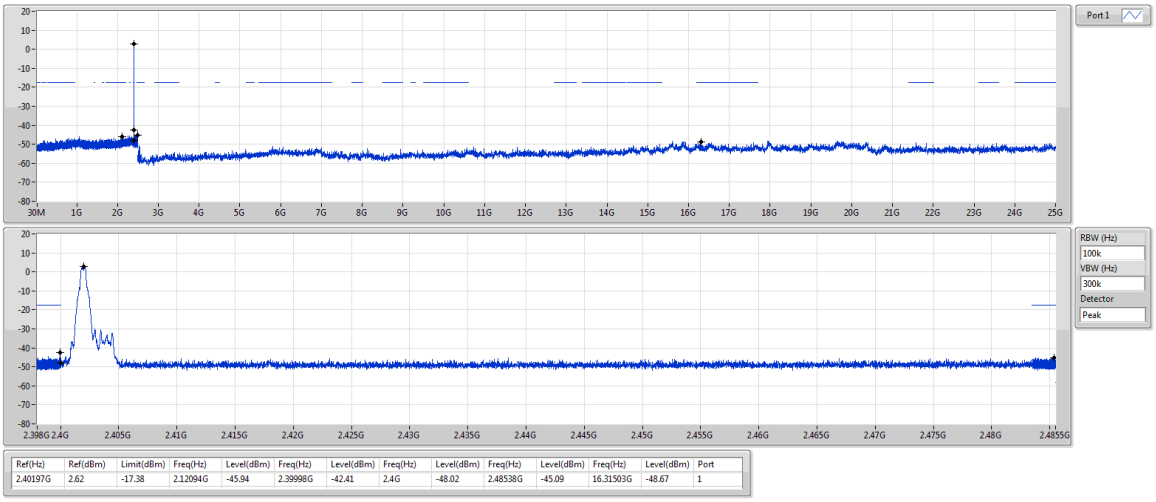


3.3.4 Unwanted Emissions into Non-Restricted Frequency Bands

Ambient Condition	23°C / 67%	Tested By	Aska Huang

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

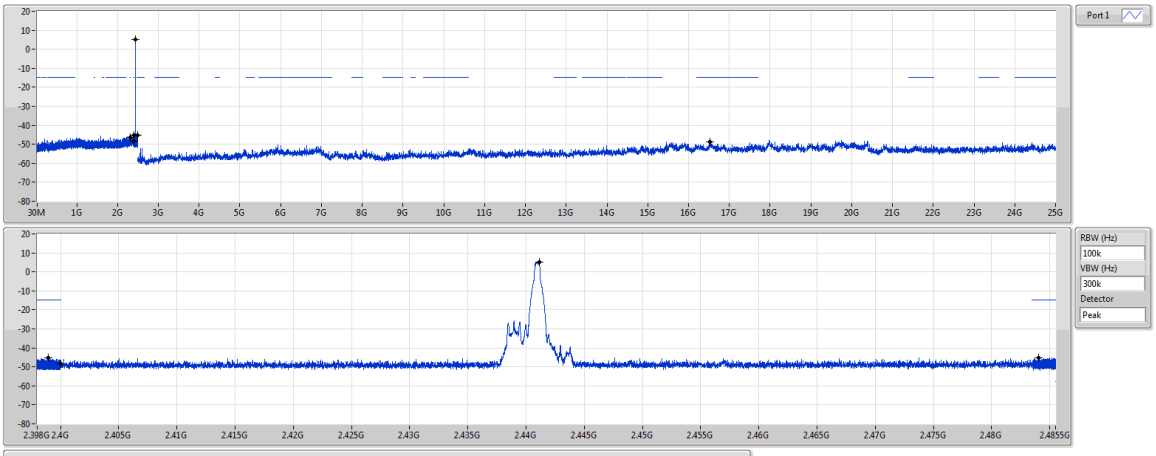
2402MHz



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
2.40197G	2.62	-17.38	2.12094G	-45.94	2.39998G	-42.41	2.4G	-48.02	2.48538G	-45.09	16.31503G	-48.67	1

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

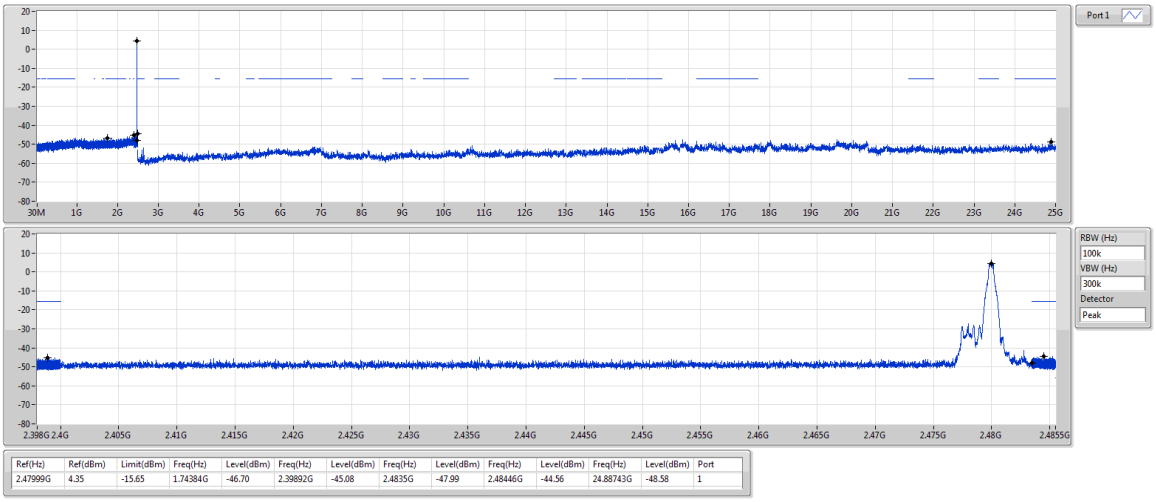
2441MHz



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
2.44112G	5.20	-14.80	2.30683G	-46.33	2.39894G	-45.09	2.4G	-48.51	2.48407G	-45.32	16.51766G	-48.60	1

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

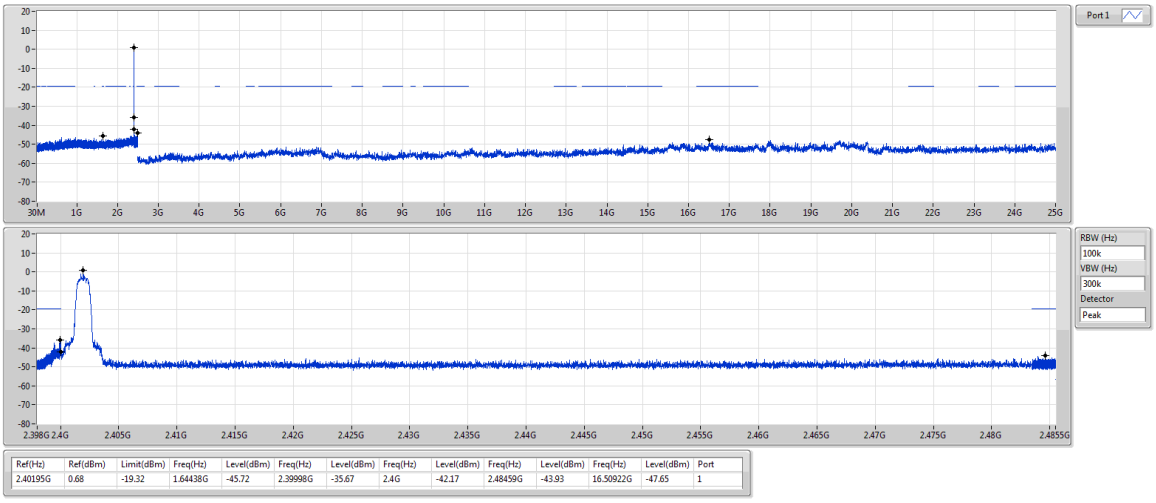
2480MHz



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
2.47999G	4.35	-15.65	1.74384G	-46.70	2.39892G	-45.08	2.4835G	-47.99	2.48446G	-44.56	24.88743G	-48.58	1

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

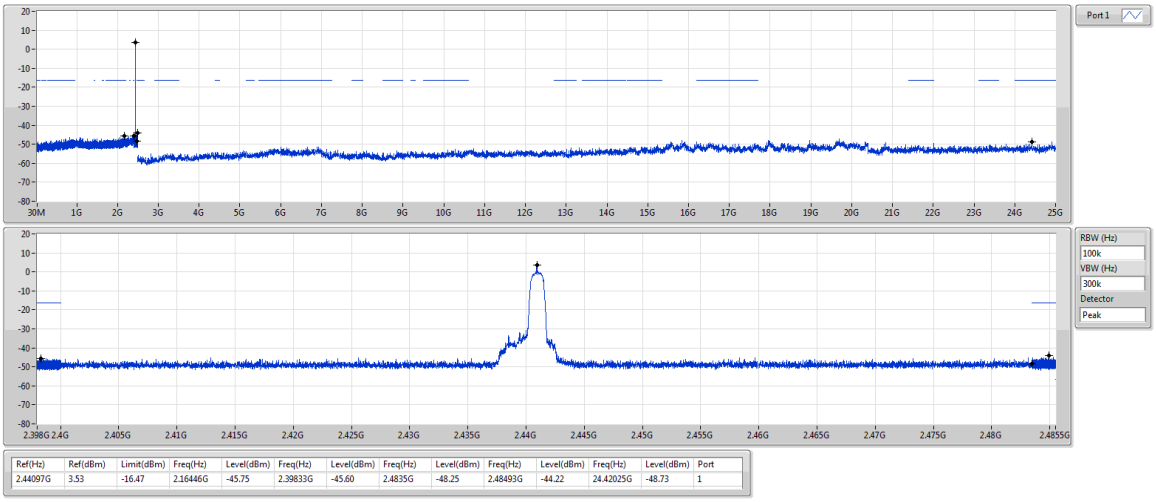
2402MHz



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
2.40195G	0.68	-19.32	1.64438G	-45.72	2.39998G	-35.67	2.4G	-42.17	2.48459G	-43.93	16.50922G	-47.65	1

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

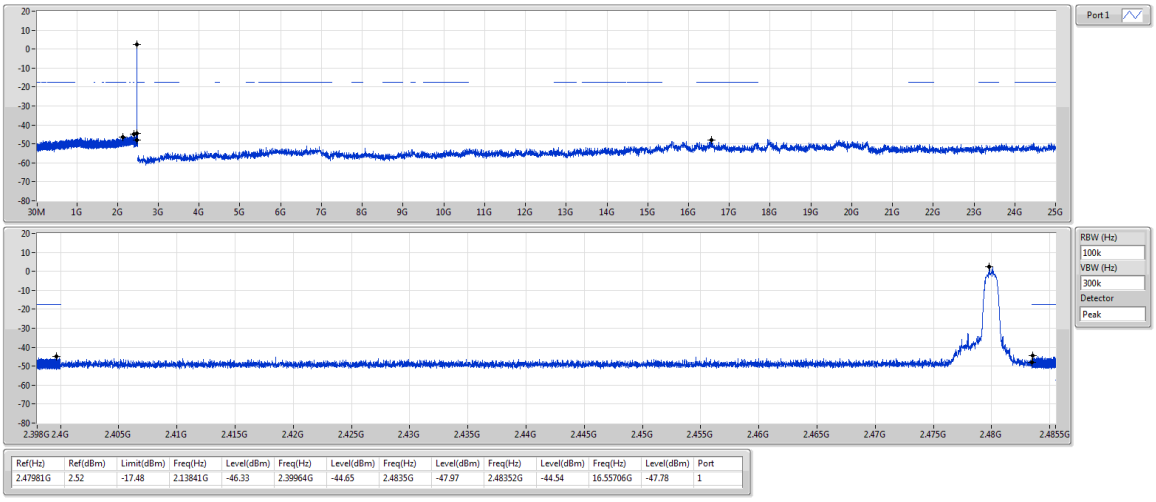
2441MHz



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
2.44097G	3.53	-16.47	2.16446G	-45.75	2.39833G	-45.60	2.4835G	-48.25	2.48493G	-44.22	24.42025G	-48.73	1

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

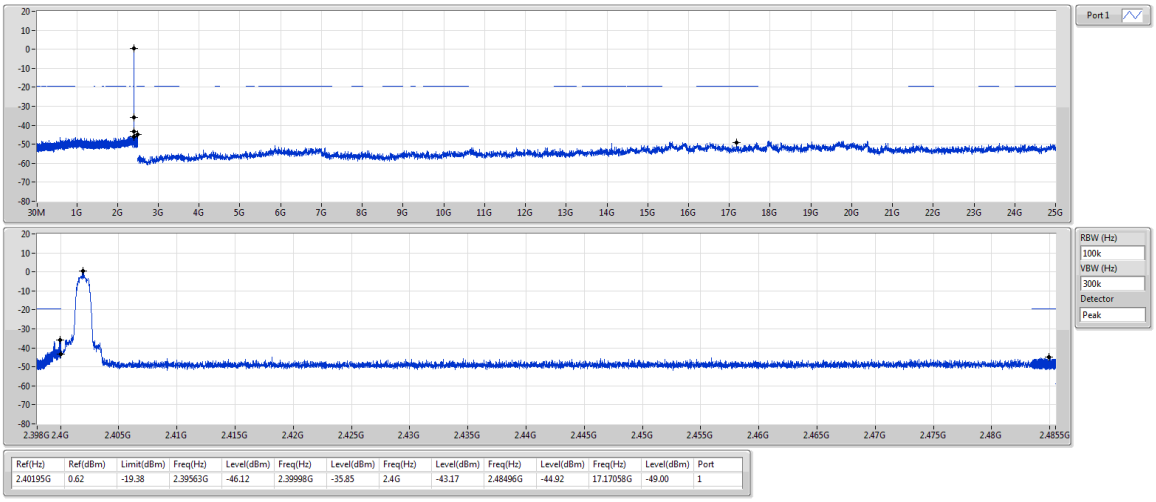
2480MHz



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
2.47981G	2.52	-17.48	2.13841G	-46.33	2.39964G	-44.65	2.4835G	-47.97	2.48352G	-44.54	16.55706G	-47.78	1

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

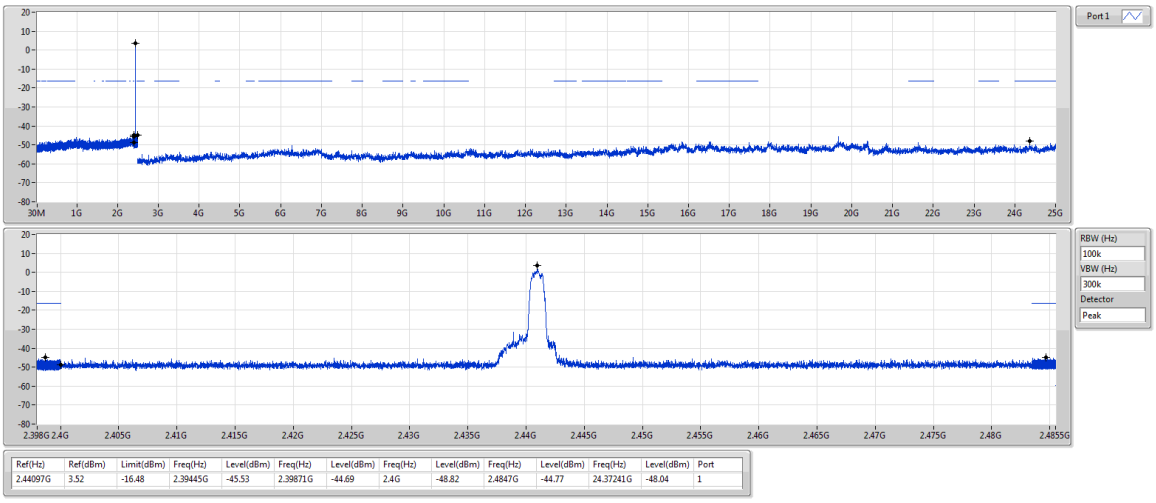
2402MHz



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
2.40195G	0.62	-19.38	2.39563G	-46.12	2.39998G	-35.85	2.4G	-43.17	2.48496G	-44.92	17.17058G	-49.00	1

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

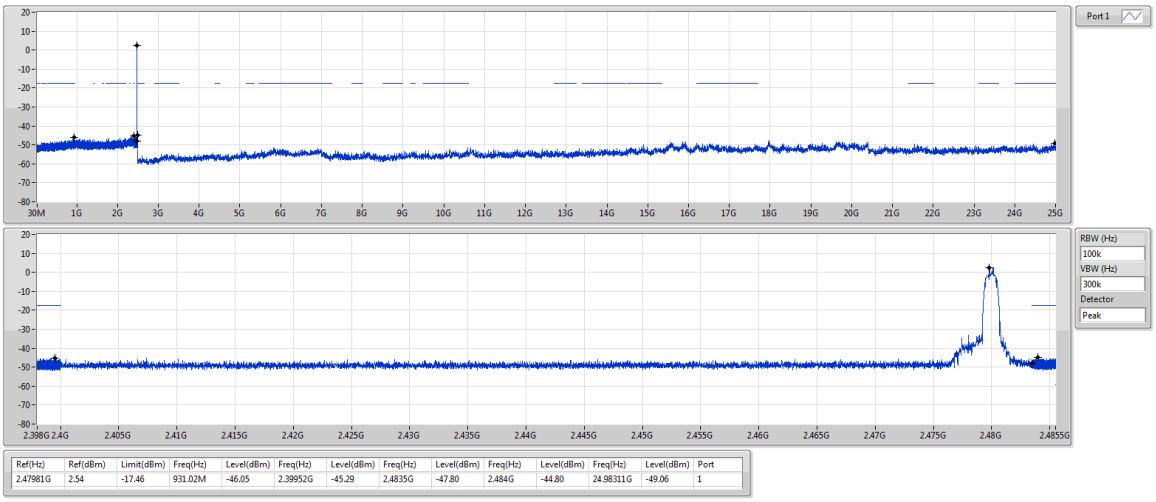
2441MHz



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
2.44097G	3.52	-16.48	2.39445G	-45.53	2.39871G	-44.69	2.4G	-48.82	2.4847G	-44.77	24.37241G	-48.04	1

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

2480MHz

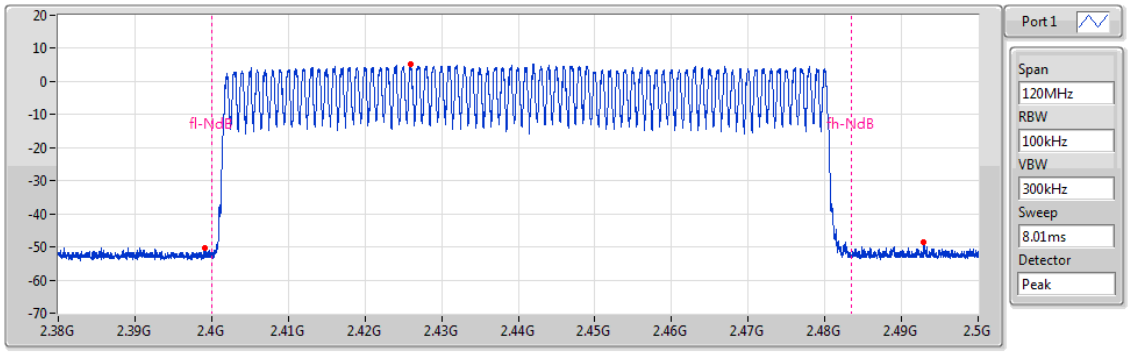


Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.47981G	2.54	-17.46	931.02M	-46.05	2.39952G	-45.29	2.4835G	-47.80	2.484G	-44.80	24.98311G	-49.06	1

BT-BR(1Mbps)

2402MHz

Hopping Ch Bandedge (Non-restricted Band)

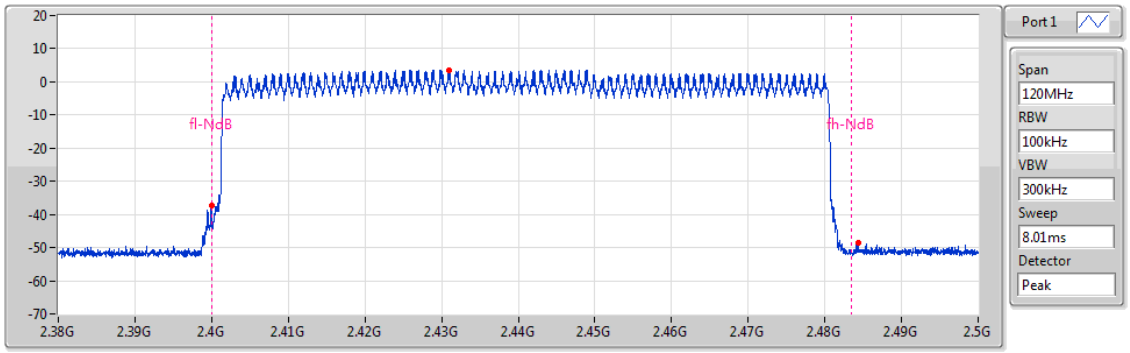


Limit(dBm)	Ref(Hz)	Ref(dBm)	BE-l(Hz)	BE-l(dBm)	BE-h(Hz)	BE-h(dBm)
-14.82	2.425975G	5.18	2.39917G	-50.38	2.492935G	-48.64

BT-EDR(2Mbps)

2402MHz

Hopping Ch Bandedge (Non-restricted Band)

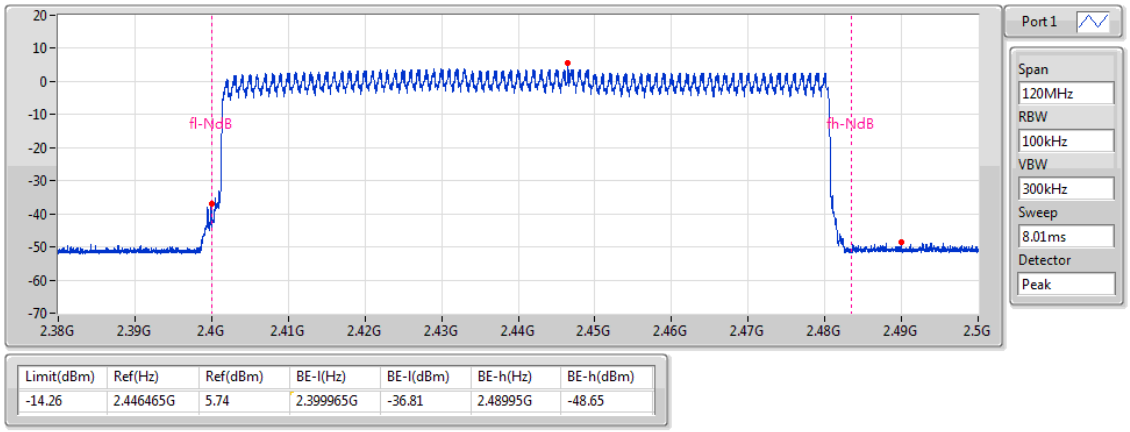


Limit(dBm)	Ref(Hz)	Ref(dBm)	BE-l(Hz)	BE-l(dBm)	BE-h(Hz)	BE-h(dBm)
-16.35	2.43097G	3.65	2.399965G	-37.34	2.484385G	-48.66

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)
-14.26	2.446465G	5.74	2.399965G	-36.81	2.48995G	-48.65

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	23°C / 67%	Tested By	Aska Huang

Summary of Peak Conducted Output Power

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	6.02	0.00400
BT-EDR(2Mbps)	5.21	0.00332
BT-EDR(3Mbps)	5.55	0.00359

Result

Mode	Result	Antenna Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	2.10	3.56	21.00
2441MHz	Pass	2.10	6.02	21.00
2480MHz	Pass	2.10	5.49	21.00
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	2.10	2.59	21.00
2441MHz	Pass	2.10	5.21	21.00
2480MHz	Pass	2.10	4.45	21.00
BT-EDR(3Mbps)	-	-	-	-
2402MHz	Pass	2.10	2.99	21.00
2441MHz	Pass	2.10	5.55	21.00
2480MHz	Pass	2.10	4.92	21.00

Summary of Conducted (Average) Output Power

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	5.63	0.00366
BT-EDR(2Mbps)	2.61	0.00182
BT-EDR(3Mbps)	2.71	0.00187

Result

Mode	Result	Antenna Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	2.10	3.07	-
2441MHz	Pass	2.10	5.63	-
2480MHz	Pass	2.10	5.00	-
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	2.10	-0.05	-
2441MHz	Pass	2.10	2.61	-
2480MHz	Pass	2.10	1.83	-
BT-EDR(3Mbps)	-	-	-	-
2402MHz	Pass	2.10	0.10	-
2441MHz	Pass	2.10	2.71	-
2480MHz	Pass	2.10	1.86	-

Note: Average power is for reference only.

3.5 Number of Hopping Frequency

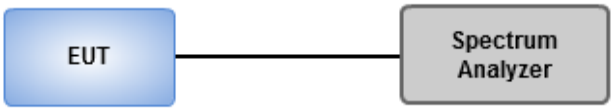
3.5.1 Limit of Number of Hopping Frequency

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	23°C / 67%	Tested By	Aska Huang

Summary

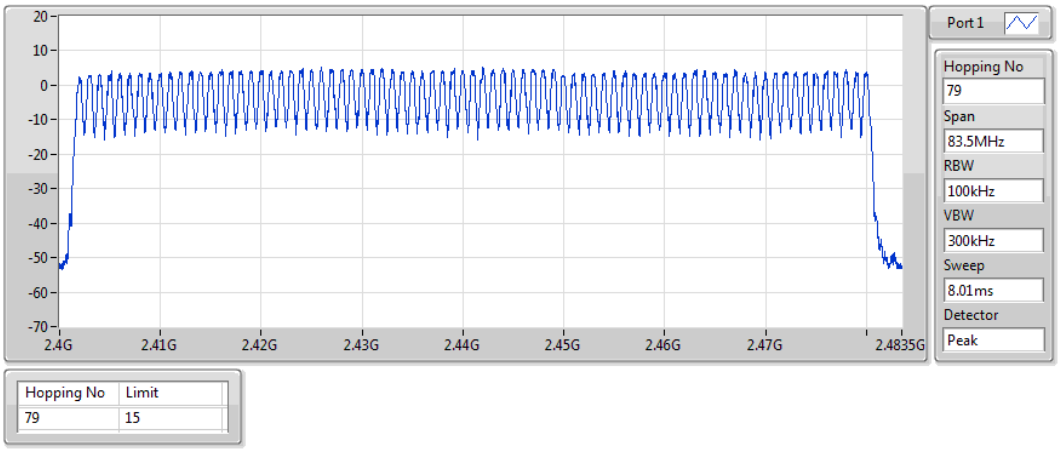
Mode	Max-Hop No
2.4-2.4835GHz	-
BT-BR(1Mbps)	79
BT-EDR(2Mbps)	79
BT-EDR(3Mbps)	79

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**

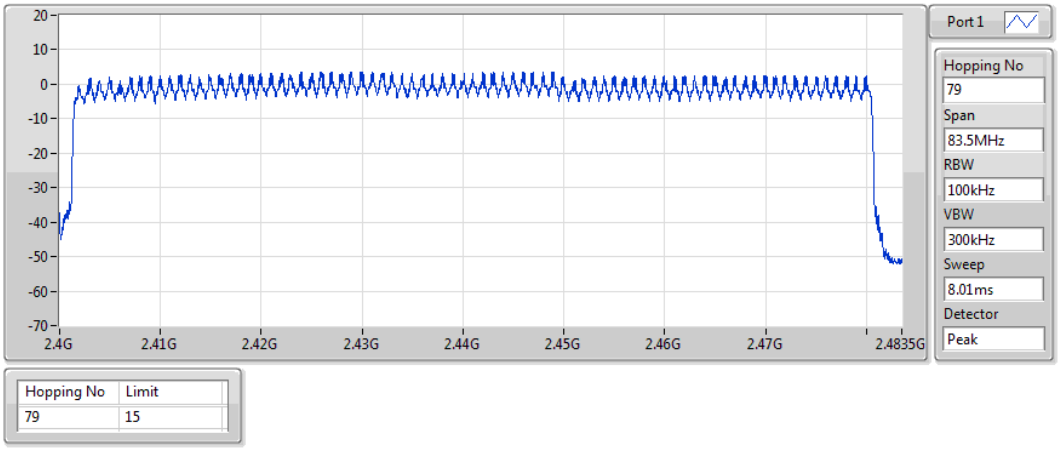
2402MHz



Hopping No	Limit
79	15

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

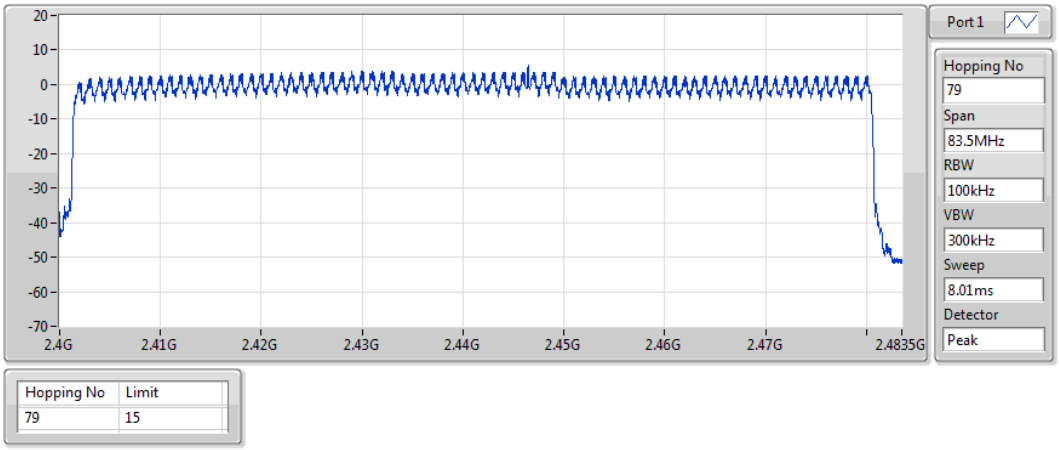
2402MHz



Hopping No	Limit
79	15

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

2402MHz



Hopping No	Limit
79	15

3.6 20dB and Occupied Bandwidth

3.6.1 Test Procedures

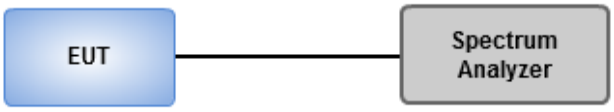
20dB Bandwidth

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	23°C / 67%	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)	934.783k	871.925k	872KF1D	931.159k	868.307k
BT-EDR(2Mbps)	1.312M	1.179M	1M18G1D	1.239M	1.176M
BT-EDR(3Mbps)	1.257M	1.19M	1M19G1D	1.254M	1.187M

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

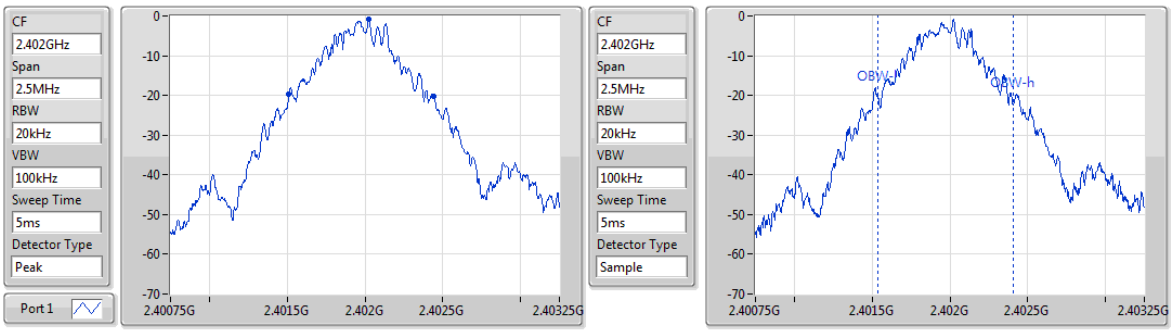
Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	Inf	934.783k	871.925k
2441MHz	Pass	Inf	934.783k	868.307k
2480MHz	Pass	Inf	931.159k	868.307k
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	Inf	1.239M	1.176M
2441MHz	Pass	Inf	1.312M	1.176M
2480MHz	Pass	Inf	1.261M	1.179M
BT-EDR(3Mbps)	-	-	-	-
2402MHz	Pass	Inf	1.257M	1.187M
2441MHz	Pass	Inf	1.254M	1.19M
2480MHz	Pass	Inf	1.254M	1.187M

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

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

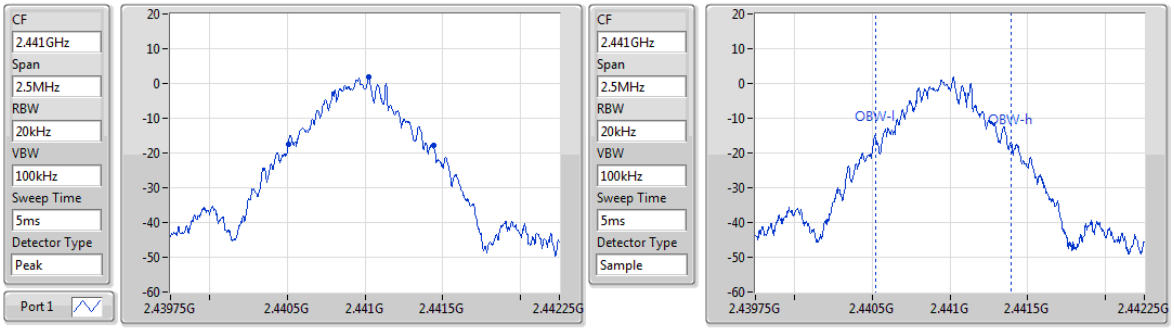
2402MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
934.783k	2.401511G	2.402446G	871.925k	2.401537G	2.402409G	Inf	1

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

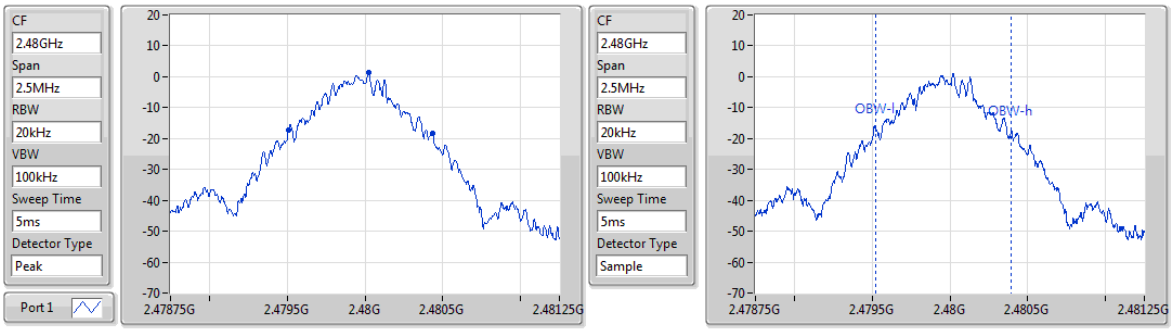
2441MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
934.783k	2.440507G	2.441442G	868.307k	2.440522G	2.441391G	Inf	1

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

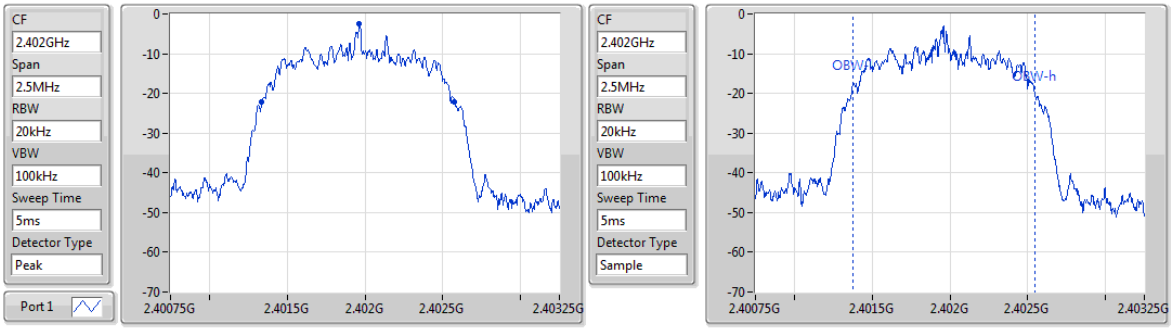
2480MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
931.159k	2.479507G	2.480438G	868.307k	2.479522G	2.480391G	Inf	1

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

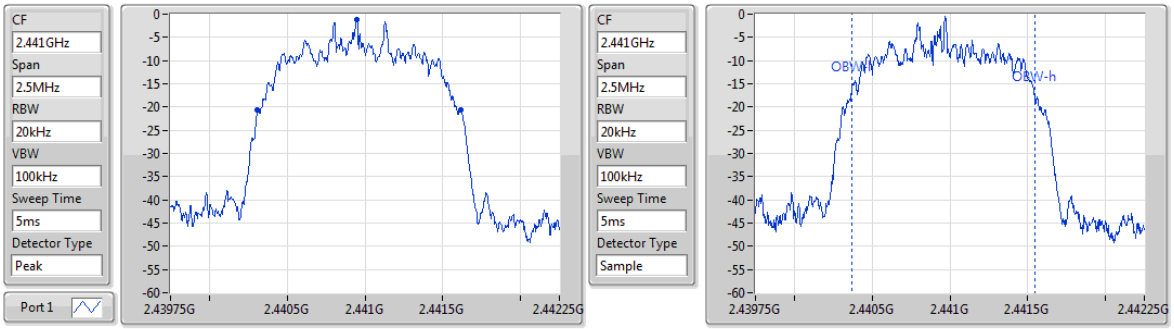
2402MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.239M	2.401337G	2.402576G	1.176M	2.401374G	2.40255G	Inf	1

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

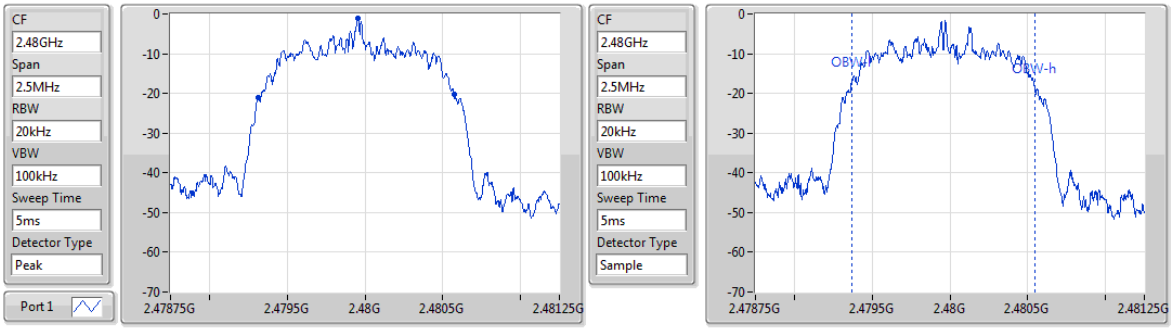
2441MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.312M	2.440308G	2.44162G	1.176M	2.44037G	2.441546G	Inf	1

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

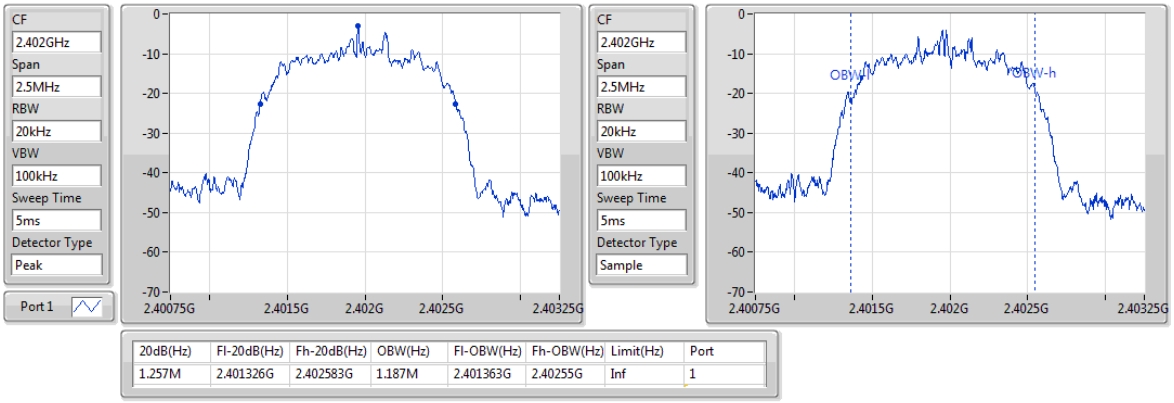
2480MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.261M	2.479312G	2.480572G	1.179M	2.479367G	2.480546G	Inf	1

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

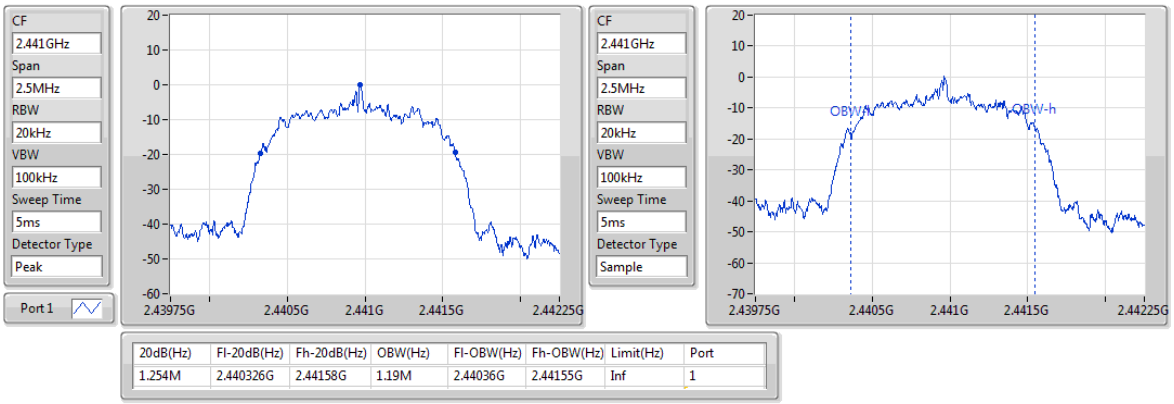
2402MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.257M	2.401326G	2.402583G	1.187M	2.401363G	2.40255G	Inf	1

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

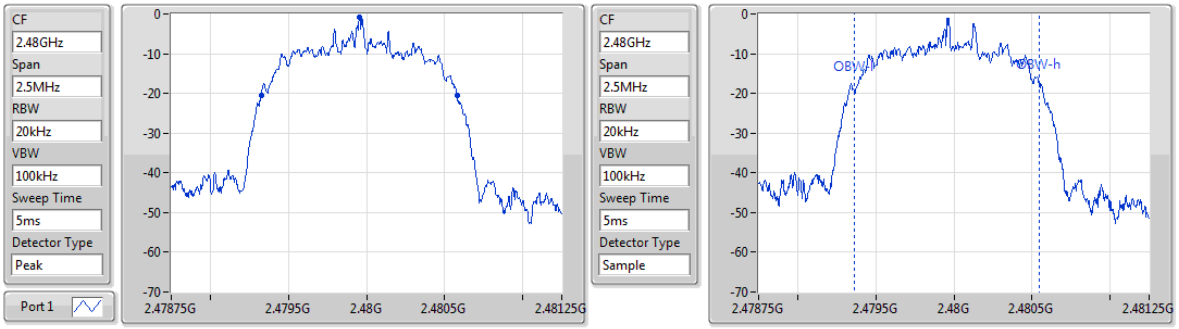
2441MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.254M	2.440326G	2.44158G	1.19M	2.44036G	2.44155G	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
1.254M	2.479326G	2.48058G	1.187M	2.47936G	2.480546G	Inf	1

3.7 Channel Separation

3.7.1 Limit of Channel Separation

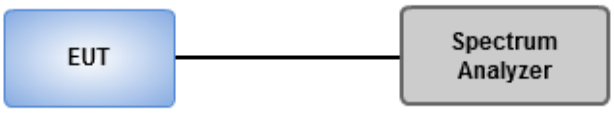
☐ Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

☒ 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	23°C / 67%	Tested By	Aska Huang

Summary

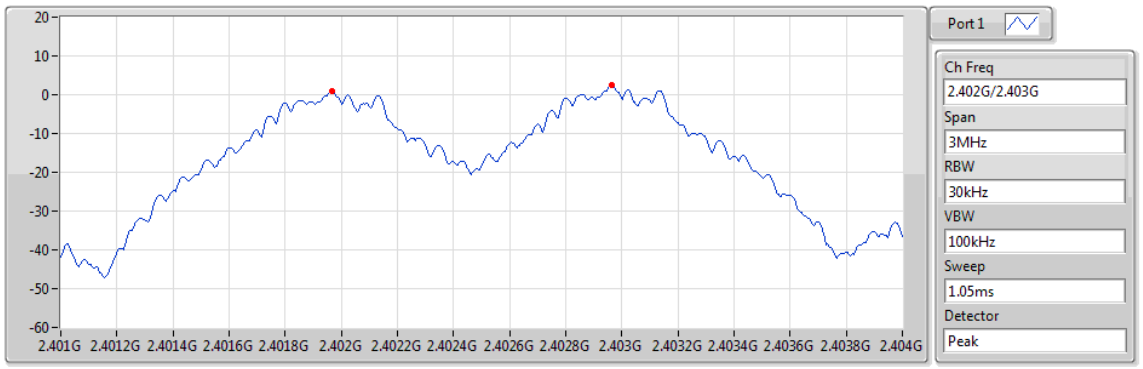
Mode	Max-Space (Hz)	Min-Space (Hz)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	1M	1M
BT-EDR(2Mbps)	1M	1M
BT-EDR(3Mbps)	1.004348M	1M

Result

Mode	Result	Fl (Hz)	Fh (Hz)	Ch.Space (Hz)	Limit (Hz)
BT-BR(1Mbps)	-	-	-	-	-
2402MHz	Pass	2.401965G	2.402965G	1M	622.565478k
2441MHz	Pass	2.440965G	2.441965G	1M	622.565478k
2480MHz	Pass	2.478965G	2.479965G	1M	620.151894k
BT-EDR(2Mbps)	-	-	-	-	-
2402MHz	Pass	2.401965G	2.402965G	1M	825.174k
2441MHz	Pass	2.440965G	2.441965G	1M	873.792k
2480MHz	Pass	2.478965G	2.479965G	1M	839.826k
BT-EDR(3Mbps)	-	-	-	-	-
2402MHz	Pass	2.401965G	2.40297G	1.004348M	837.162k
2441MHz	Pass	2.440965G	2.441965G	1M	835.164k
2480MHz	Pass	2.478961G	2.479965G	1.004348M	835.164k

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

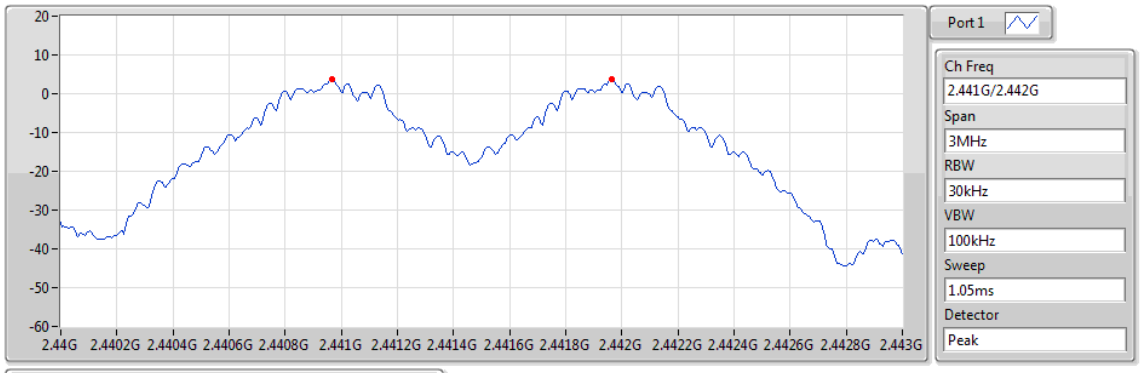
2.402G/2.403GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.401965G	2.402965G	1M	622.565478k

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

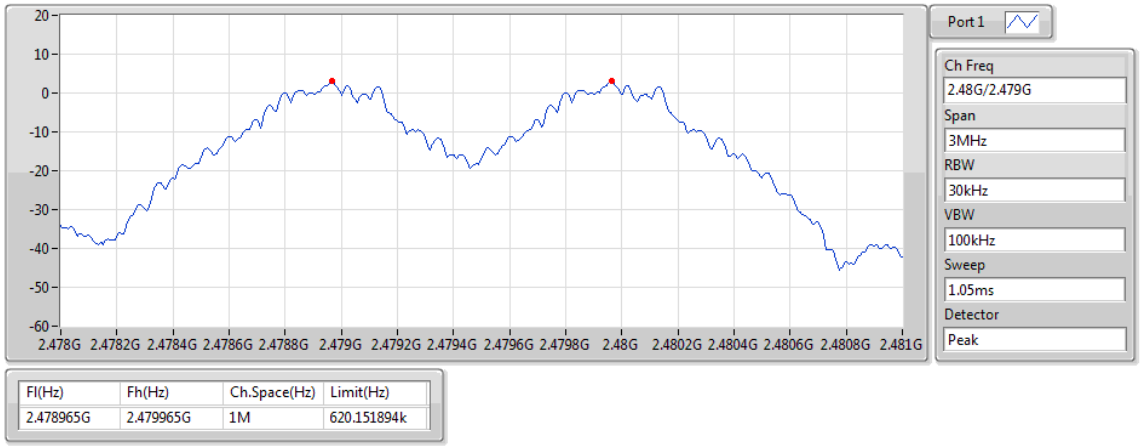
2.441G/2.442GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.440965G	2.441965G	1M	622.565478k

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

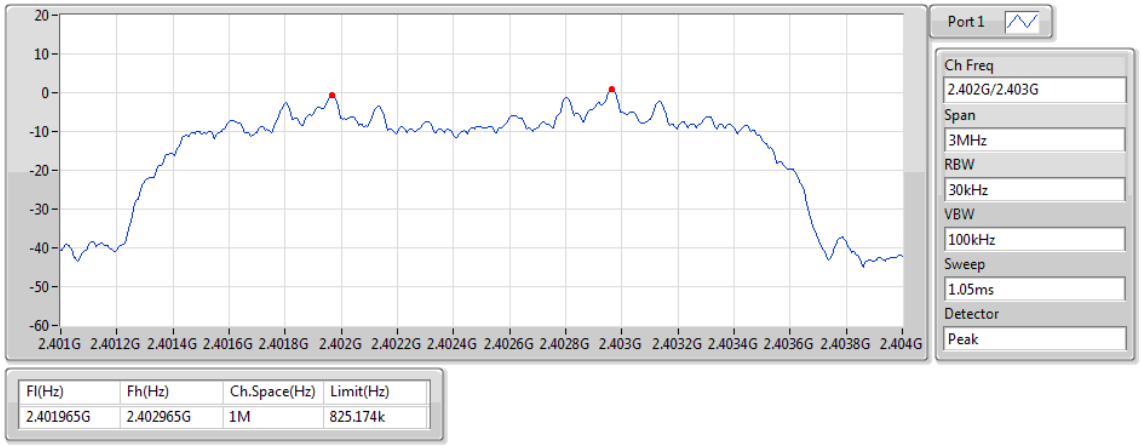
2.48G/2.479GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.478965G	2.479965G	1M	620.151894k

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

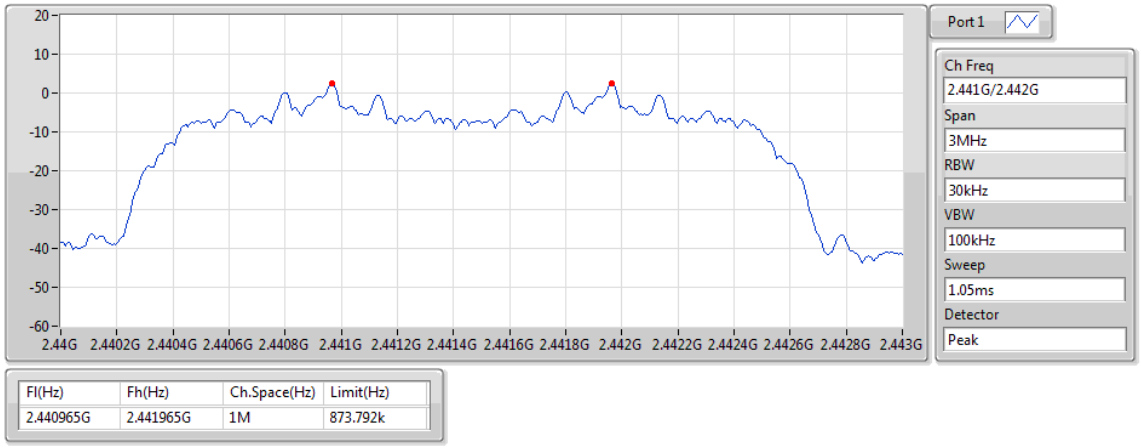
2.402G/2.403GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.401965G	2.402965G	1M	825.174k

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

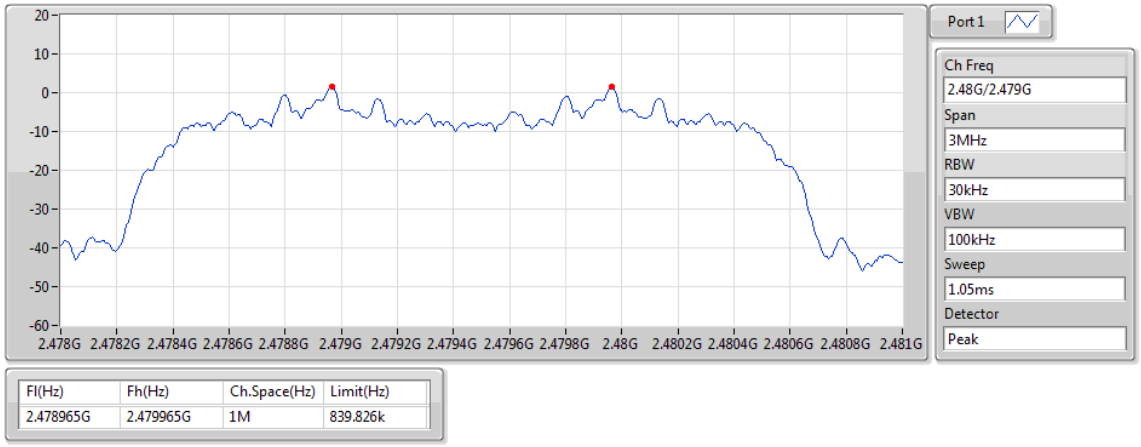
2.441G/2.442GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.440965G	2.441965G	1M	873.792k

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

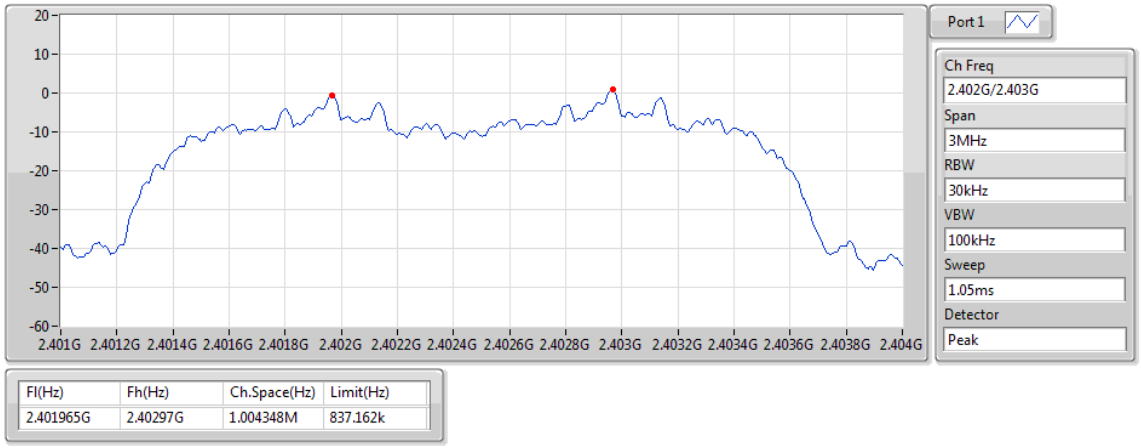
2.48G/2.479GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.478965G	2.479965G	1M	839.826k

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

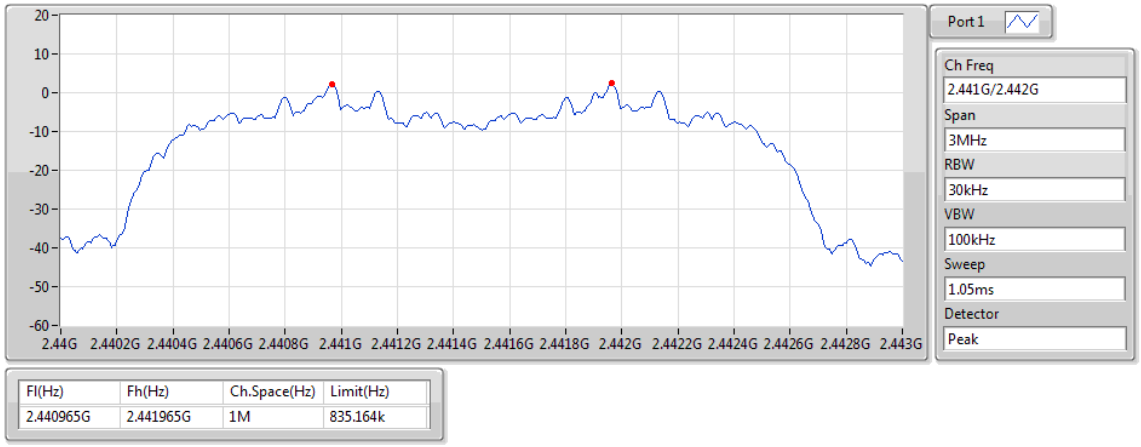
2.402G/2.403GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.401965G	2.40297G	1.004348M	837.162k

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

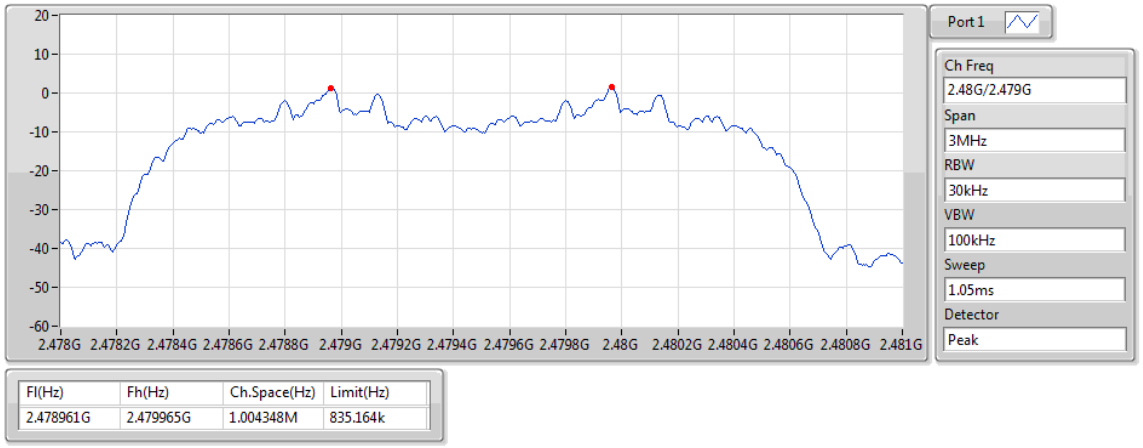
2.441G/2.442GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.440965G	2.441965G	1M	835.164k

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

2.48G/2.479GHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
2.478961G	2.479965G	1.004348M	835.164k

3.8 Number of Dwell Time

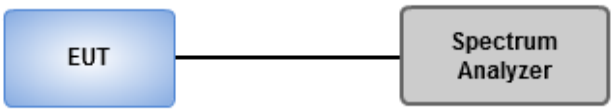
3.8.1 Limit of Dwell time

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	23°C / 67%	Tested By	Aska Huang

Summary

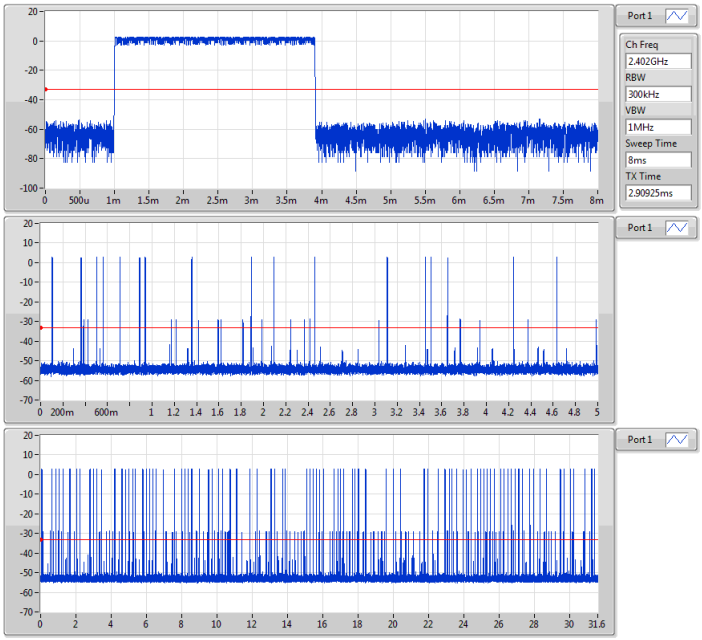
Mode	Max-Dwell (s)
2.4-2.4835GHz	-
BT-BR(1Mbps)	312.56982m_DH5
BT-EDR(2Mbps)	350.39344m_DH5
BT-EDR(3Mbps)	350.51352m_DH5
BT-BR-AFH(1Mbps)	302.588m_DH5-AFH
BT-EDR-AFH(2Mbps)	291.8m_DH5-AFH
BT-EDR-AFH(3Mbps)	315.252m_DH5-AFH

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	0.31257	0.4	2.90925	17
BT-EDR(2Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	31.6	0.35039	0.4	2.91800	19
BT-EDR(3Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	31.6	0.35051	0.4	2.91900	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	0.30259	0.4	2.90950	26
BT-EDR-AFH(2Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	8	0.29180	0.4	2.91800	25
BT-EDR-AFH(3Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	8	0.31525	0.4	2.91900	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.						

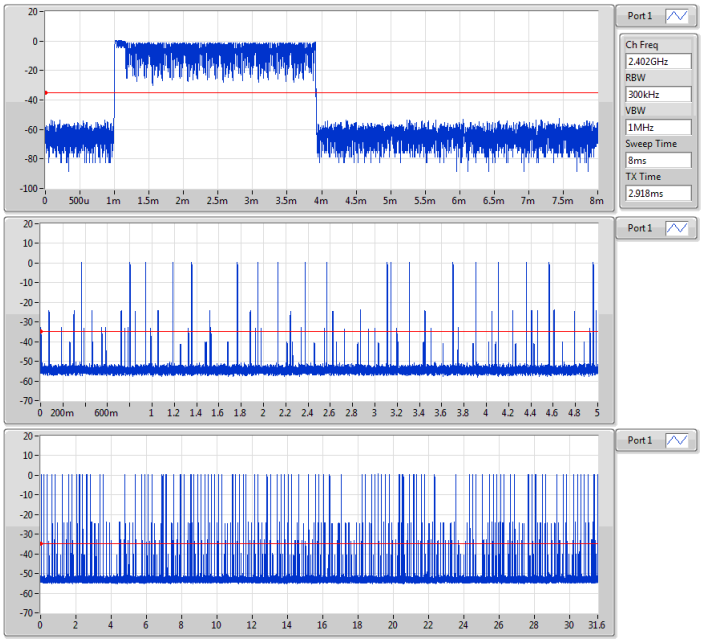
BT-BR(1Mbps) **Dwell-FS**

2402MHz



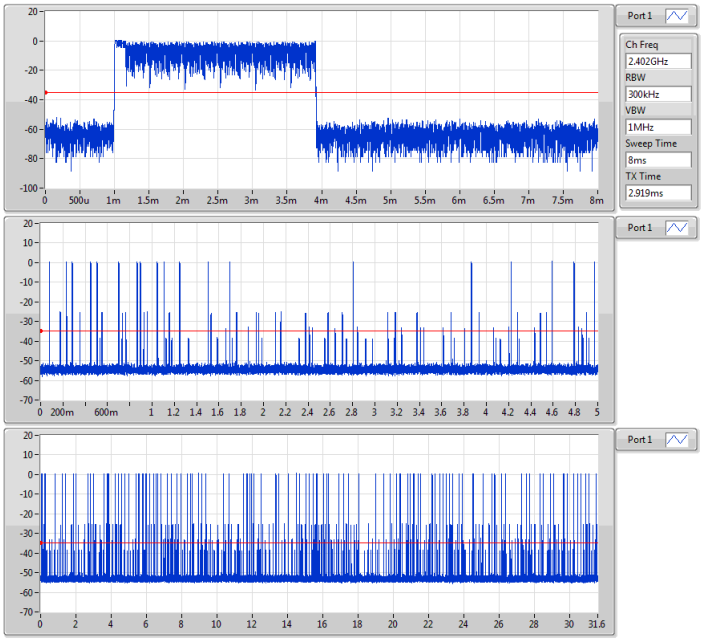
BT-EDR(2Mbps) **Dwell-FS**

2402MHz



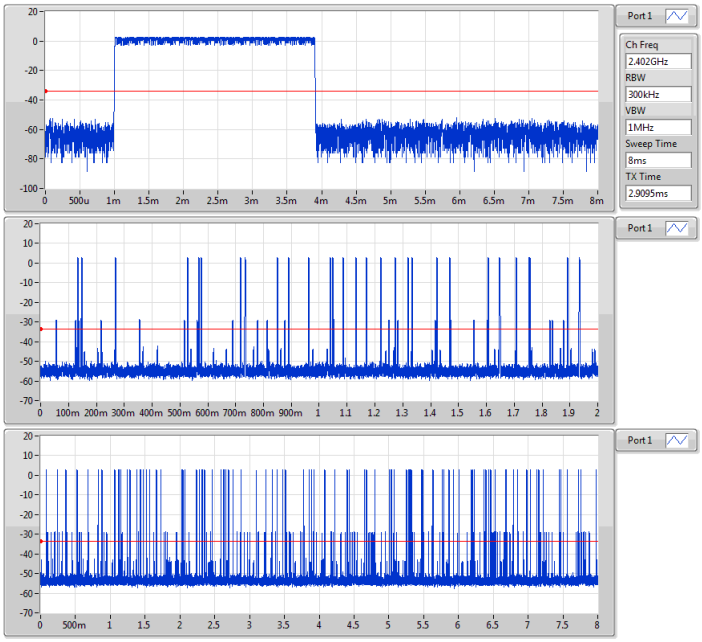
BT-EDR(3Mbps) **Dwell-FS**

2402MHz



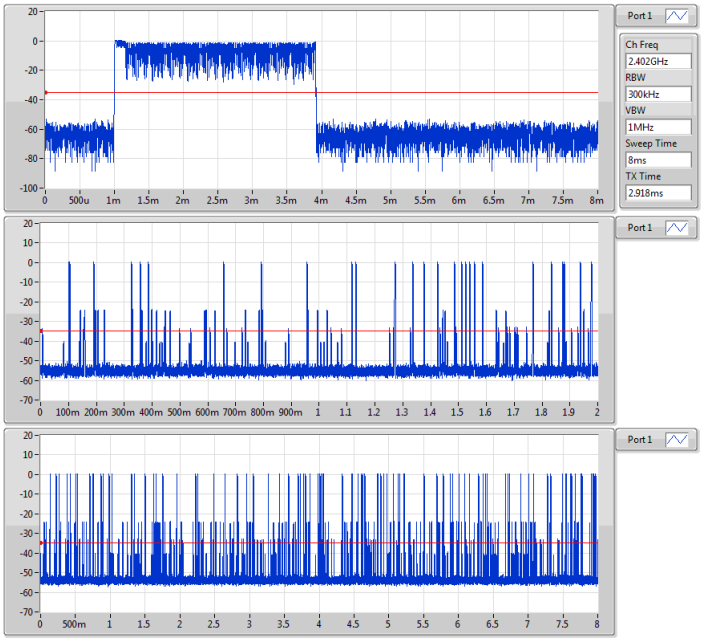
BT-BR-AFH(1Mbps) **Dwell-FS**

2402MHz



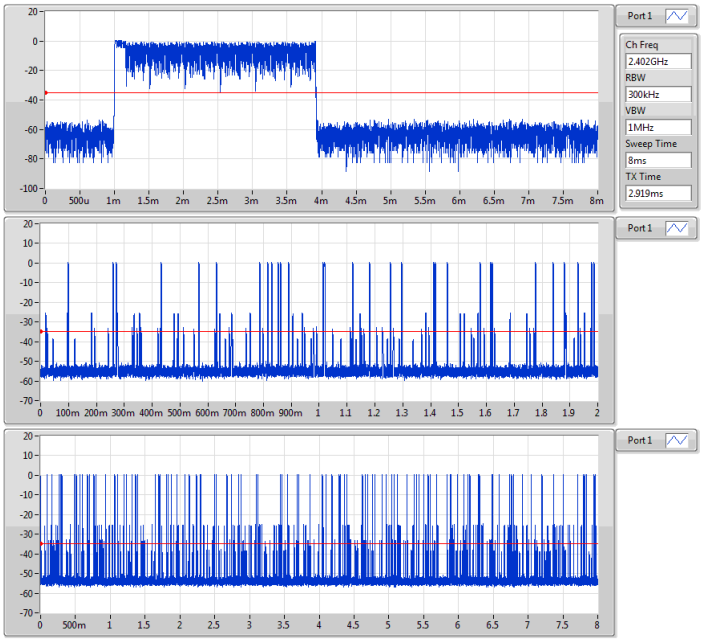
BT-EDR-AFH(2Mbps) **Dwell-FS**

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

Tel: 886-2-2601-1640

No.30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan (R.O.C.)

Kwei Shan

Tel: 886-3-271-8666

No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

No.2-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

Kwei Shan Site II

Tel: 886-3-271-8640

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: 886-3-318-0345
Email: ICC_Service@icertifi.com.tw

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