

# FCC Test Report

**FCC ID** : R3USCBT11  
**Equipment** : Bluetooth headset  
**Model No.** : SCBT11  
**Brand Name** : SENNHEISER  
**Applicant** : Sennheiser Communications A/S  
**Address** : Industriparken 27, Ballerup 2750, Denmark  
**Standard** : 47 CFR FCC Part 15.247  
**Received Date** : Nov. 01, 2018  
**Tested Date** : Nov. 06 ~ Nov. 12, 2018

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

Reviewed by:

  
Along Chen / Assistant Manager

Approved by:

  
Gary Chang / Manager



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## Release Record

Report No.	Version	Description	Issued Date
FR8N0101	Rev. 01	Initial issue	Jan. 17, 2019
ER8N0101	Rev. 02	Revised applicant	Jan. 25, 2019

## Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 2.346MHz 30.09 (Margin -15.91dB) - AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 43.68MHz 38.70 (Margin -1.30dB) - QP	Pass
15.247(d)	Band Edge	Meet the requirement of limit	Pass
15.247(b)(1)	Conducted Output Power	Power [dBm]: 9.23	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 values of gain for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of the gain.

# 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 V5.0	2402-2480	0-78 [79]	1 Mbps
2400-2483.5	EDR V5.0	2402-2480	0-78 [79]	2 Mbps
2400-2483.5	EDR V5.0	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 $\pi/4$ -DQPSK and 8DPSK.				

### 1.1.2 Antenna Details

Ant. No.	Type	Connector	Gain (dBi)	Remark
1	Inverted-F	No	3.8	---

### 1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	5Vdc, 470 mA from host 3.7Vdc, 335 mAh from battery
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### 1.1.4 Accessories

Accessories		
No.	Equipment	Description
1	Battery	Brand: Synergy Model: AHB552826TPC Rating: 3.7Vdc, 335 mAh
2	USB cable	1.5m micro-USB cable, shielded without core

### 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	BlueTest3 V2.5, CBT
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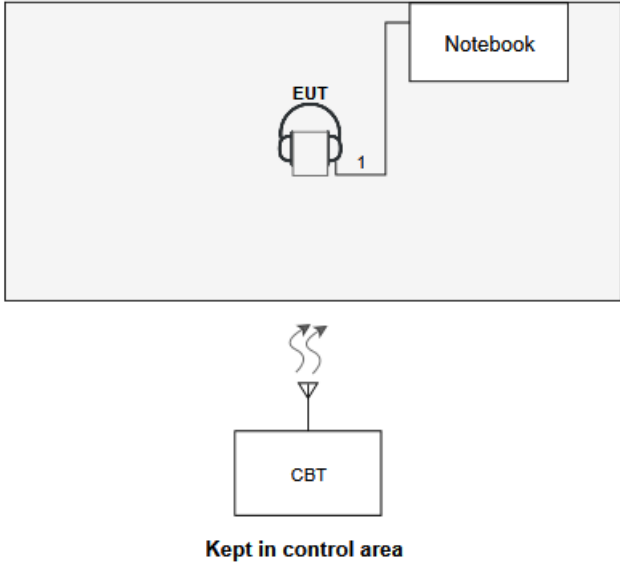
### 1.1.7 Power Setting

Modulation Mode	Test Frequency (MHz)		
	2402	2441	2480
GFSK/1Mbps	Default	Default	Default
$\pi/4$ -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 E6430	DoC	---

## 1.3 Test Setup Chart

Test Setup Diagram	
 <p>The diagram illustrates the test setup. A Notebook is connected to an EUT (Equipment Under Test) via a cable labeled '1'. The EUT is connected to a CBT (Control Board Test) via a signal cable. The CBT is labeled 'Kept in control area'.</p>	
No.	Signal cable / Length (m)
1	1.5m micro-USB cable, shielded.

## 1.4 The Equipment List

<b>Test Item</b>	Conducted Emission				
<b>Test Site</b>	Conduction room 1 / (CO01-WS)				
<b>Instrument</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Calibration Date</b>	<b>Calibration Until</b>
Receiver	R&S	ESR3	101657	Jan. 05, 2018	Jan. 04, 2019
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 13, 2017	Nov. 12, 2018
RF Cable-CON	EMC	EMCCFD300-BM-BM-6000	50821	Dec. 18, 2017	Dec. 17, 2018
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

<b>Test Item</b>	Radiated Emission				
<b>Test Site</b>	966 chamber1 / (03CH01-WS)				
<b>Instrument</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Calibration Date</b>	<b>Calibration Until</b>
Spectrum Analyzer	R&S	FSV40	101498	Dec. 04, 2017	Dec. 03, 2018
Receiver	R&S	ESR3	101658	Nov. 20, 2017	Nov. 19, 2018
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 18, 2018	Jul. 17, 2019
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 20, 2017	Dec. 19, 2018
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 23, 2017	Nov. 22, 2018
Loop Antenna	TESEQ	HLA 6120	31244	Mar. 09, 2018	Mar. 08, 2019
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 07, 2017	Dec. 06, 2018
Preamplifier	EMC	EMC02325	980225	Jul. 20, 2018	Jul. 19, 2019
Preamplifier	Agilent	83017A	MY39501308	Oct. 04, 2018	Oct. 03, 2019
Preamplifier	EMC	EMC184045B	980192	Aug. 09, 2018	Aug. 08, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16140/4	May. 09, 2018	May. 08, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 07, 2017	Dec. 06, 2018
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 07, 2017	Dec. 06, 2018
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	16052	Dec. 07, 2017	Dec. 06, 2018
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 07, 2017	Dec. 06, 2018
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 07, 2017	Dec. 06, 2018
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					



<b>Test Item</b>	RF Conducted				
<b>Test Site</b>	(TH01-WS)				
<b>Instrument</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Calibration Date</b>	<b>Calibration Until</b>
Spectrum Analyzer	R&S	FSV40	101063	Apr. 16, 2018	Apr. 15, 2019
Power Meter	Anritsu	ML2495A	1241002	Oct. 09, 2018	Oct. 08, 2019
Power Sensor	Anritsu	MA2411B	1207366	Oct. 09, 2018	Oct. 08, 2019
Bluetooth Tester	R&S	CBT	100959	Sep. 24, 2018	Sep. 23, 2019
DC POWER SOURCE	GW INSTEK	GPC-6030D	EM892433	Oct. 25, 2018	Oct. 24, 2019
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

## 1.5 Test Standards

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

47 CFR FCC Part 15.247

ANSI C63.10-2013

FCC KDB 558074 D01 15.247 Meas Guidance v05

## 1.6 Deviation from Test Standard and Measurement Procedure

None

## 1.7 Measurement Uncertainty

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

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	±34.134 Hz
Conducted power	±0.808 dB
Power density	±0.463 dB
Conducted emission	±2.670 dB
AC conducted emission	±2.90 dB
Radiated emission ≤ 1GHz	±3.66 dB
Radiated emission > 1GHz	±5.63 dB

## 2 Test Configuration

### 2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	25°C / 58%	Alex Tsai
Radiated Emissions	03CH01-WS	24°C / 60%	Akun Chung
RF Conducted	TH01-WS	23°C / 64%	Felix Sung

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- IC site registration No.: 10807A-1

### 2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data Rate (Mbps)	Test Configuration
Conducted Emissions	GFSK	2480	1Mbps	---
Radiated Emissions ≤ 1GHz	GFSK	2480	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	2441 2441 2441	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 **Y-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  $\Omega$  LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V/60Hz

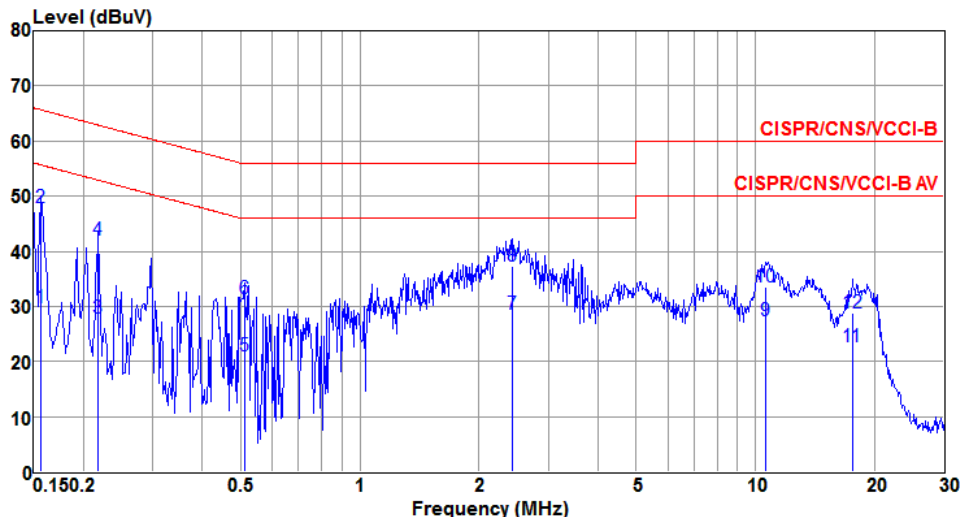
##### 3.1.3 Test Setup



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

### 3.1.4 Test Result of Conducted Emissions

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

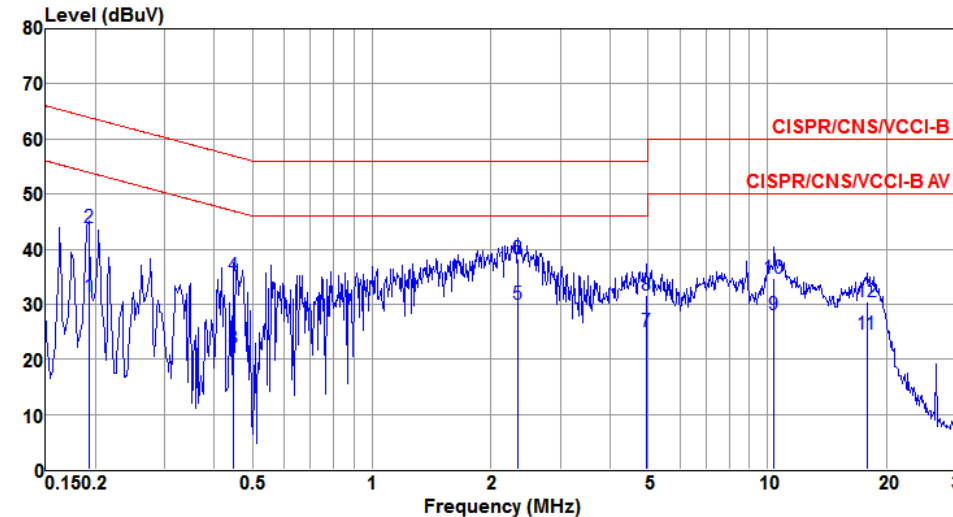
  


	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.156	29.71	55.69	-25.98	29.67	0.03	0.01	Average
2	0.156	47.95	65.69	-17.74	47.91	0.03	0.01	QP
3	0.219	27.87	52.88	-25.01	27.81	0.03	0.03	Average
4	0.219	42.03	62.88	-20.85	41.97	0.03	0.03	QP
5	0.510	21.05	46.00	-24.95	21.00	0.03	0.02	Average
6	0.510	31.39	56.00	-24.61	31.34	0.03	0.02	QP
7*	2.435	28.54	46.00	-17.46	28.35	0.06	0.13	Average
8	2.435	37.22	56.00	-18.78	37.03	0.06	0.13	QP
9	10.620	27.30	50.00	-22.70	26.80	0.18	0.32	Average
10	10.620	33.44	60.00	-26.56	32.94	0.18	0.32	QP
11	17.568	22.68	50.00	-27.32	22.10	0.25	0.33	Average
12	17.568	28.86	60.00	-31.14	28.28	0.25	0.33	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)	2480
Power Phase	Neutral		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.192	31.31	53.93	-22.62	31.25	0.03	0.03	Average
2	0.192	43.97	63.93	-19.96	43.91	0.03	0.03	QP
3	0.447	22.02	46.93	-24.91	21.97	0.03	0.02	Average
4	0.447	35.20	56.93	-21.73	35.15	0.03	0.02	QP
5*	2.346	30.09	46.00	-15.91	29.90	0.06	0.13	Average
6	2.346	38.26	56.00	-17.74	38.07	0.06	0.13	QP
7	4.952	25.01	46.00	-20.99	24.67	0.10	0.24	Average
8	4.952	31.65	56.00	-24.35	31.31	0.10	0.24	QP
9	10.397	27.98	50.00	-22.02	27.50	0.16	0.32	Average
10	10.397	34.69	60.00	-25.31	34.21	0.16	0.32	QP
11	17.849	24.61	50.00	-25.39	24.05	0.23	0.33	Average
12	17.849	30.42	60.00	-29.58	29.86	0.23	0.33	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  
RBW=1MHz, VBW=1/T and Peak detector

### 3.2.3 Test Setup

#### Radiated Emissions below 1 GHz

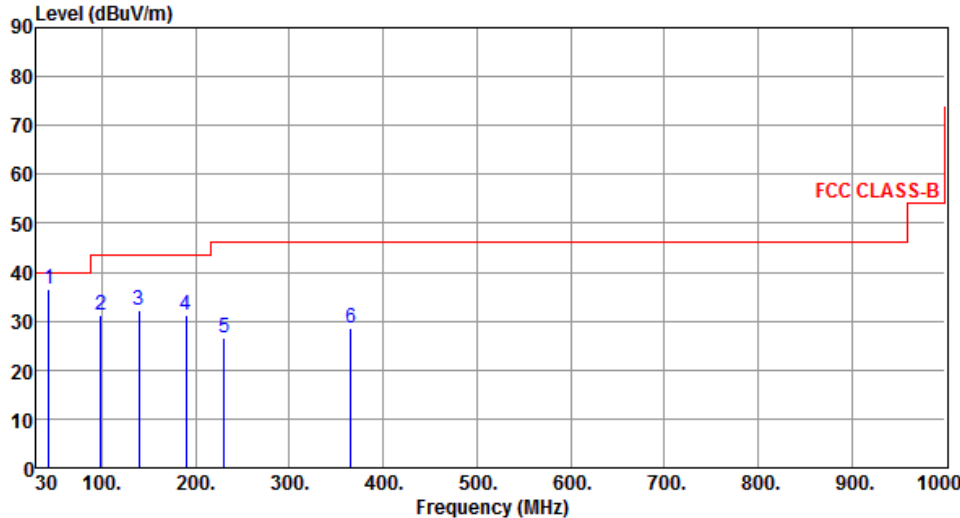


#### Radiated Emissions above 1 GHz



### 3.2.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	GFSK	Test Freq. (MHz)	2480
Polarization	Horizontal		

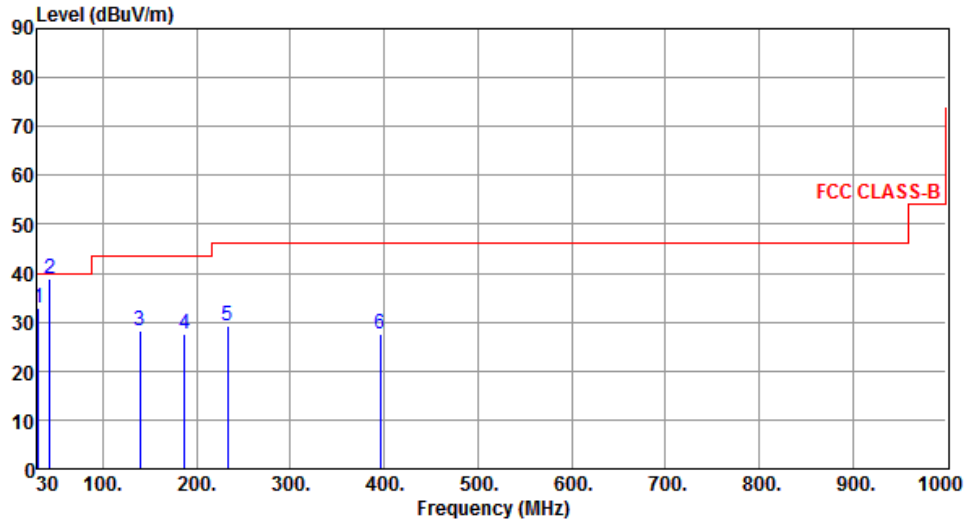
The graph displays the radiated unwanted emissions for a transmitter. The y-axis represents the Level in dBuV/m, ranging from 0 to 90. The x-axis represents the Frequency in MHz, ranging from 30 to 1000. A red line indicates the FCC CLASS-B limit, which is 40 dBuV/m from 30 to 100 MHz, 45 dBuV/m from 100 to 1000 MHz, and 55 dBuV/m at 1000 MHz. Six measured peaks are labeled with blue numbers 1 through 6, corresponding to the data in the table below.

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	43.58	36.53	40.00	-3.47	44.55	-8.02	Peak	---	---
2	98.87	31.28	43.50	-12.22	44.62	-13.34	Peak	---	---
3	139.61	32.21	43.50	-11.29	40.97	-8.76	Peak	---	---
4	190.05	31.27	43.50	-12.23	41.76	-10.49	Peak	---	---
5	230.79	26.44	46.00	-19.56	36.79	-10.35	Peak	---	---
6	365.62	28.58	46.00	-17.42	34.68	-6.10	Peak	---	---

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



Modulation	GFSK	Test Freq. (MHz)	2480
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	30.97	32.80	40.00	-7.20	41.85	-9.05	Peak	---	---
2	43.68	38.70	40.00	-1.30	46.73	-8.03	QP	100	310
3	139.61	28.23	43.50	-15.27	36.99	-8.76	Peak	---	---
4	187.14	27.65	43.50	-15.85	37.85	-10.20	Peak	---	---
5	232.73	29.14	46.00	-16.86	39.33	-10.19	Peak	---	---
6	395.69	27.42	46.00	-18.58	32.84	-5.42	Peak	---	---

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

\*Factor includes antenna factor , cable loss and amplifier gain

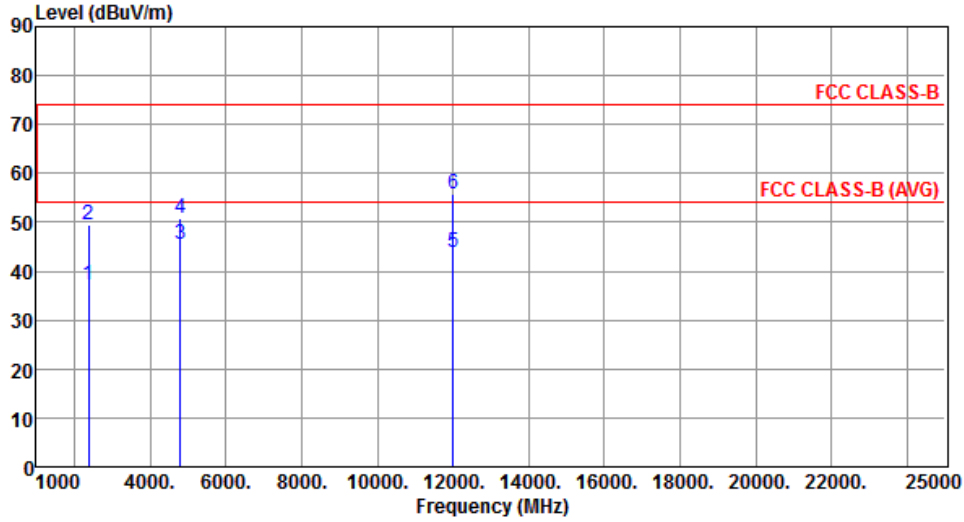
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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					
<div><div><div>Level (dBuV/m)</div><div><div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div>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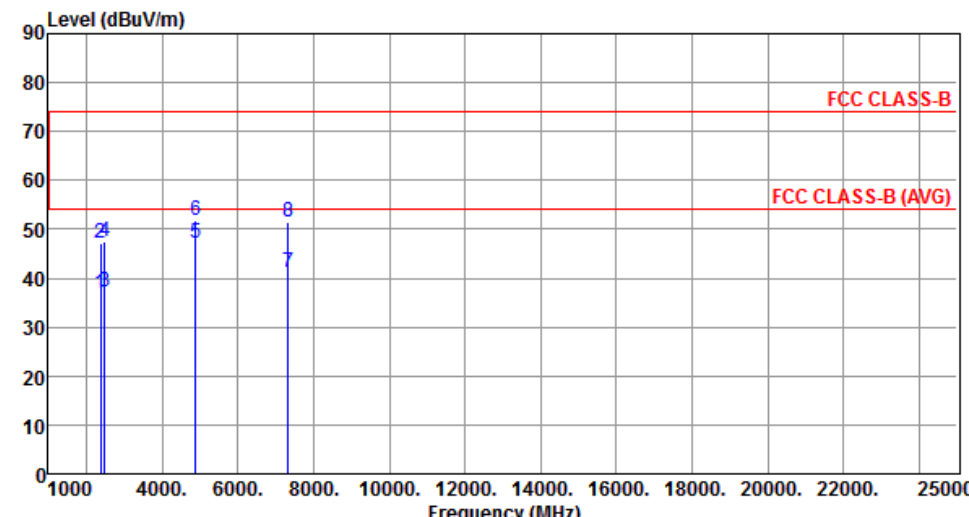
Modulation	GFSK	Test Freq. (MHz)	2402
Polarization	Vertical		

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.04	54.00	-16.96	40.41	-3.37	Average	106	121
2	2390.00	49.51	74.00	-24.49	52.88	-3.37	Peak	106	121
3	4804.00	45.64	54.00	-8.36	41.75	3.89	Average	100	263
4	4804.00	50.96	74.00	-23.04	47.07	3.89	Peak	100	263
5	12010.00	43.71	54.00	-10.29	30.33	13.38	Average	100	335
6	12010.00	55.90	74.00	-18.10	42.52	13.38	Peak	100	335

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

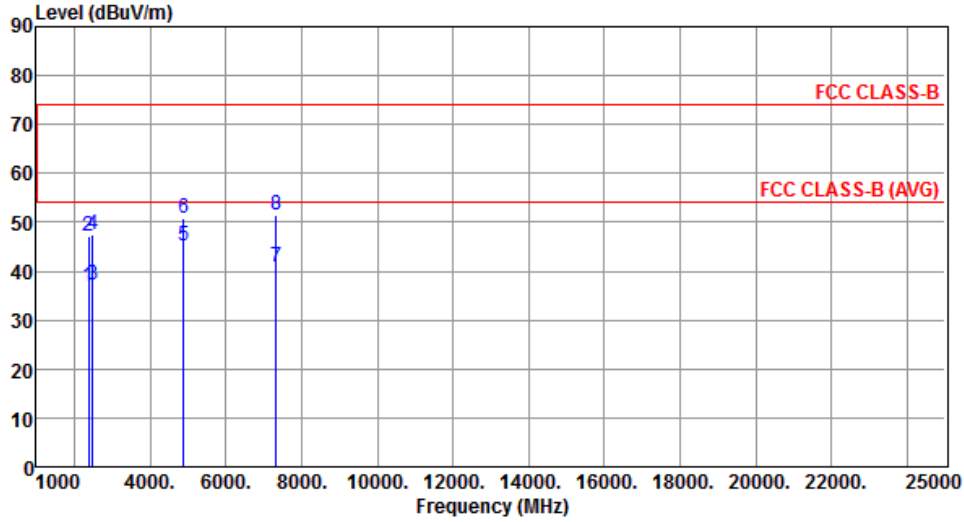
Modulation	GFSK	Test Freq. (MHz)	2441
Polarization	Horizontal		

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	36.98	54.00	-17.02	40.35	-3.37	Average	217	75
2	2390.00	47.04	74.00	-26.96	50.41	-3.37	Peak	217	75
3	2483.50	37.36	54.00	-16.64	40.32	-2.96	Average	217	75
4	2483.50	47.62	74.00	-26.38	50.58	-2.96	Peak	217	75
5	4882.00	47.07	54.00	-6.93	42.94	4.13	Average	202	265
6	4882.00	51.94	74.00	-22.06	47.81	4.13	Peak	202	265
7	7323.00	41.15	54.00	-12.85	32.50	8.65	Average	100	83
8	7323.00	51.47	74.00	-22.53	42.82	8.65	Peak	100	83

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

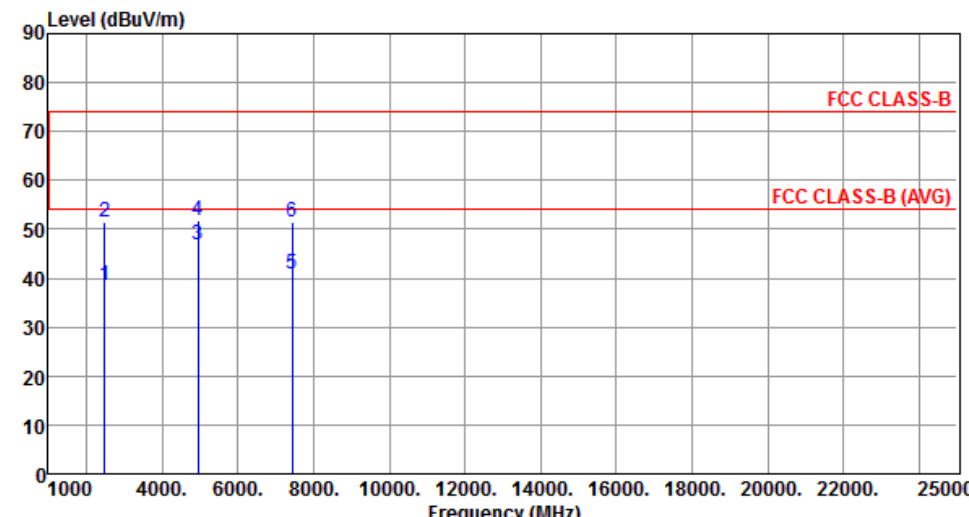
Modulation	GFSK	Test Freq. (MHz)	2441
Polarization	Vertical		

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	36.71	54.00	-17.29	40.08	-3.37	Average	100	223
2	2390.00	47.28	74.00	-26.72	50.65	-3.37	Peak	100	223
3	2483.50	37.32	54.00	-16.68	40.28	-2.96	Average	100	223
4	2483.50	47.42	74.00	-26.58	50.38	-2.96	Peak	100	223
5	4882.00	45.03	54.00	-8.97	40.90	4.13	Average	100	271
6	4882.00	50.83	74.00	-23.17	46.70	4.13	Peak	100	271
7	7323.00	41.00	54.00	-13.00	32.35	8.65	Average	100	275
8	7323.00	51.64	74.00	-22.36	42.99	8.65	Peak	100	275

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

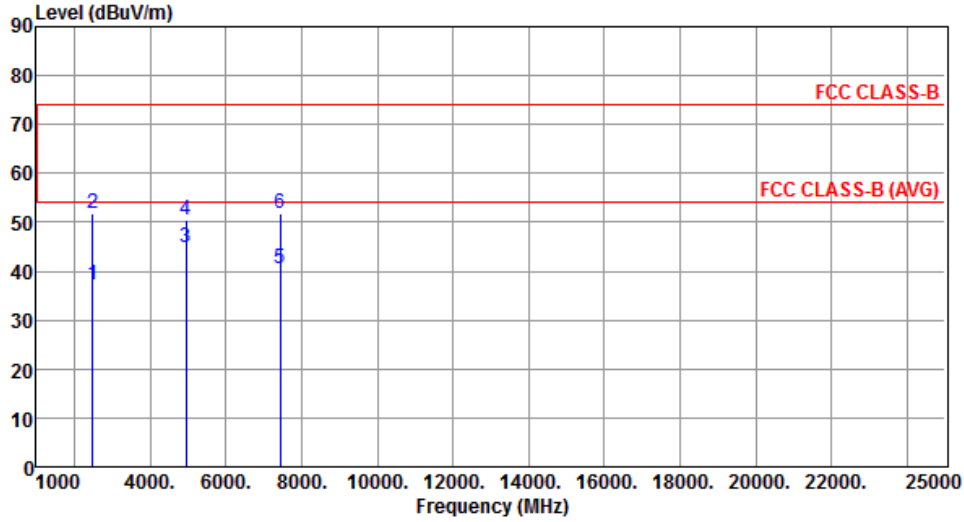
Modulation	GFSK	Test Freq. (MHz)	2480
Polarization	Horizontal		

	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	38.37	54.00	-15.63	41.33	-2.96	Average	101	49
2	2483.50	51.62	74.00	-22.38	54.58	-2.96	Peak	101	49
3	4960.00	46.88	54.00	-7.12	42.51	4.37	Average	195	234
4	4960.00	51.81	74.00	-22.19	47.44	4.37	Peak	195	234
5	7440.00	40.81	54.00	-13.19	31.99	8.82	Average	100	85
6	7440.00	51.51	74.00	-22.49	42.69	8.82	Peak	100	85

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

Modulation	GFSK	Test Freq. (MHz)	2480
Polarization	Vertical		

	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	37.18	54.00	-16.82	40.14	-2.96	Average	100	58
2	2483.50	51.84	74.00	-22.16	54.80	-2.96	Peak	100	58
3	4960.00	44.67	54.00	-9.33	40.30	4.37	Average	100	269
4	4960.00	50.63	74.00	-23.37	46.26	4.37	Peak	100	269
5	7440.00	40.36	54.00	-13.64	31.54	8.82	Average	100	278
6	7440.00	51.85	74.00	-22.15	43.03	8.82	Peak	100	278

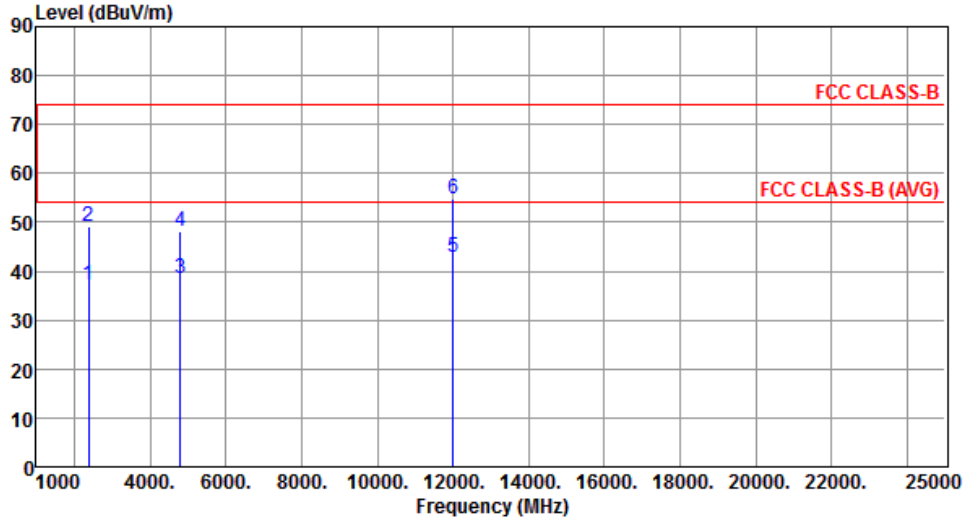
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor\* (dB)  
 \*Factor includes antenna factor , cable loss and amplifier gain  
 Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

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

Modulation	8DPSK	Test Freq. (MHz)	2402
Polarization	Horizontal		
<div><div><div>Level (dBuV/m)</div><div><div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div>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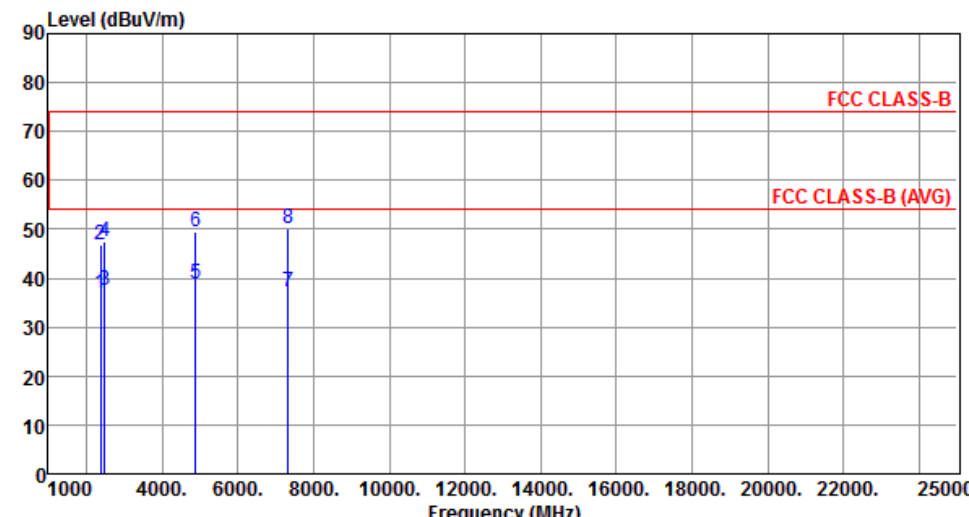
Modulation	8DPSK	Test Freq. (MHz)	2402
Polarization	Vertical		

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.17	54.00	-16.83	40.54	-3.37	Average	101	123
2	2390.00	49.07	74.00	-24.93	52.44	-3.37	Peak	101	123
3	4804.00	38.57	54.00	-15.43	34.68	3.89	Average	100	261
4	4804.00	48.05	74.00	-25.95	44.16	3.89	Peak	100	261
5	12010.00	42.89	54.00	-11.11	29.51	13.38	Average	100	333
6	12010.00	54.77	74.00	-19.23	41.39	13.38	Peak	100	333

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

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

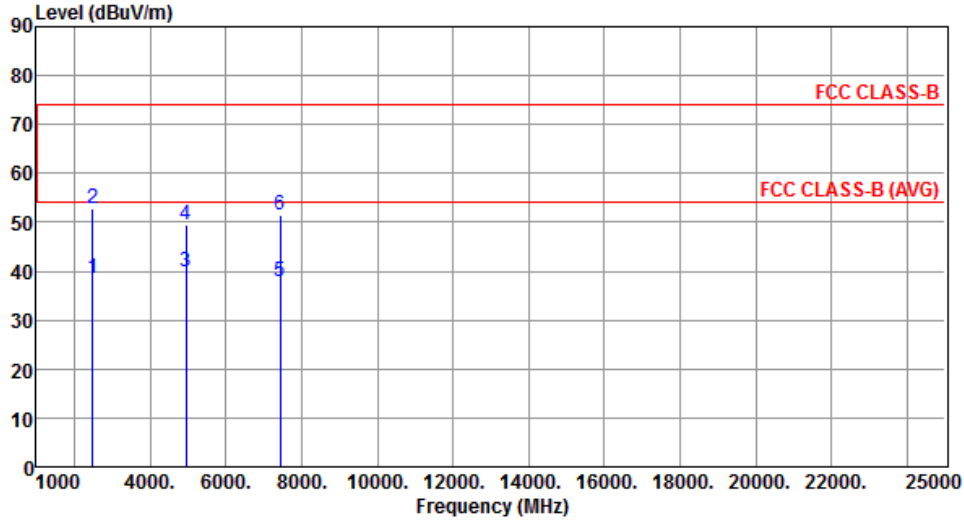
  


	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	36.94	54.00	-17.06	40.31	-3.37	Average	169	89
2	2390.00	46.77	74.00	-27.23	50.14	-3.37	Peak	169	89
3	2483.50	37.37	54.00	-16.63	40.33	-2.96	Average	169	89
4	2483.50	47.38	74.00	-26.62	50.34	-2.96	Peak	169	89
5	4882.00	38.75	54.00	-15.25	34.62	4.13	Average	198	239
6	4882.00	49.64	74.00	-24.36	45.51	4.13	Peak	198	239
7	7323.00	37.32	54.00	-16.68	28.67	8.65	Average	100	82
8	7323.00	50.24	74.00	-23.76	41.59	8.65	Peak	100	82

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		
<div><div><div>Level (dBuV/m)</div><div><div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div>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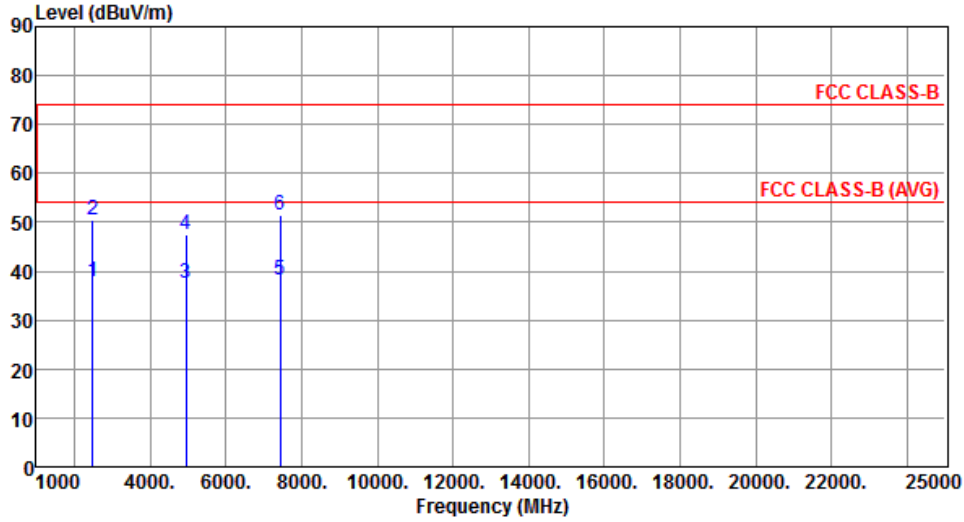
Modulation	8DPSK	Test Freq. (MHz)	2480
Polarization	Horizontal		

	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	38.63	54.00	-15.37	41.59	-2.96	Average	100	50
2	2483.50	52.65	74.00	-21.35	55.61	-2.96	Peak	100	50
3	4960.00	39.71	54.00	-14.29	35.34	4.37	Average	188	233
4	4960.00	49.48	74.00	-24.52	45.11	4.37	Peak	188	233
5	7440.00	37.77	54.00	-16.23	28.95	8.82	Average	100	90
6	7440.00	51.32	74.00	-22.68	42.50	8.82	Peak	100	90

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

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

	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	37.80	54.00	-16.20	40.76	-2.96	Average	105	59
2	2483.50	50.54	74.00	-23.46	53.50	-2.96	Peak	105	59
3	4960.00	37.61	54.00	-16.39	33.24	4.37	Average	100	271
4	4960.00	47.54	74.00	-26.46	43.17	4.37	Peak	100	271
5	7440.00	38.18	54.00	-15.82	29.36	8.82	Average	100	280
6	7440.00	51.51	74.00	-22.49	42.69	8.82	Peak	100	280

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

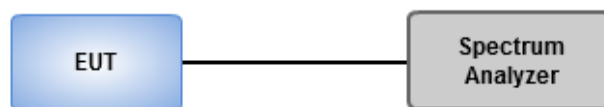
##### Reference level measurement

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

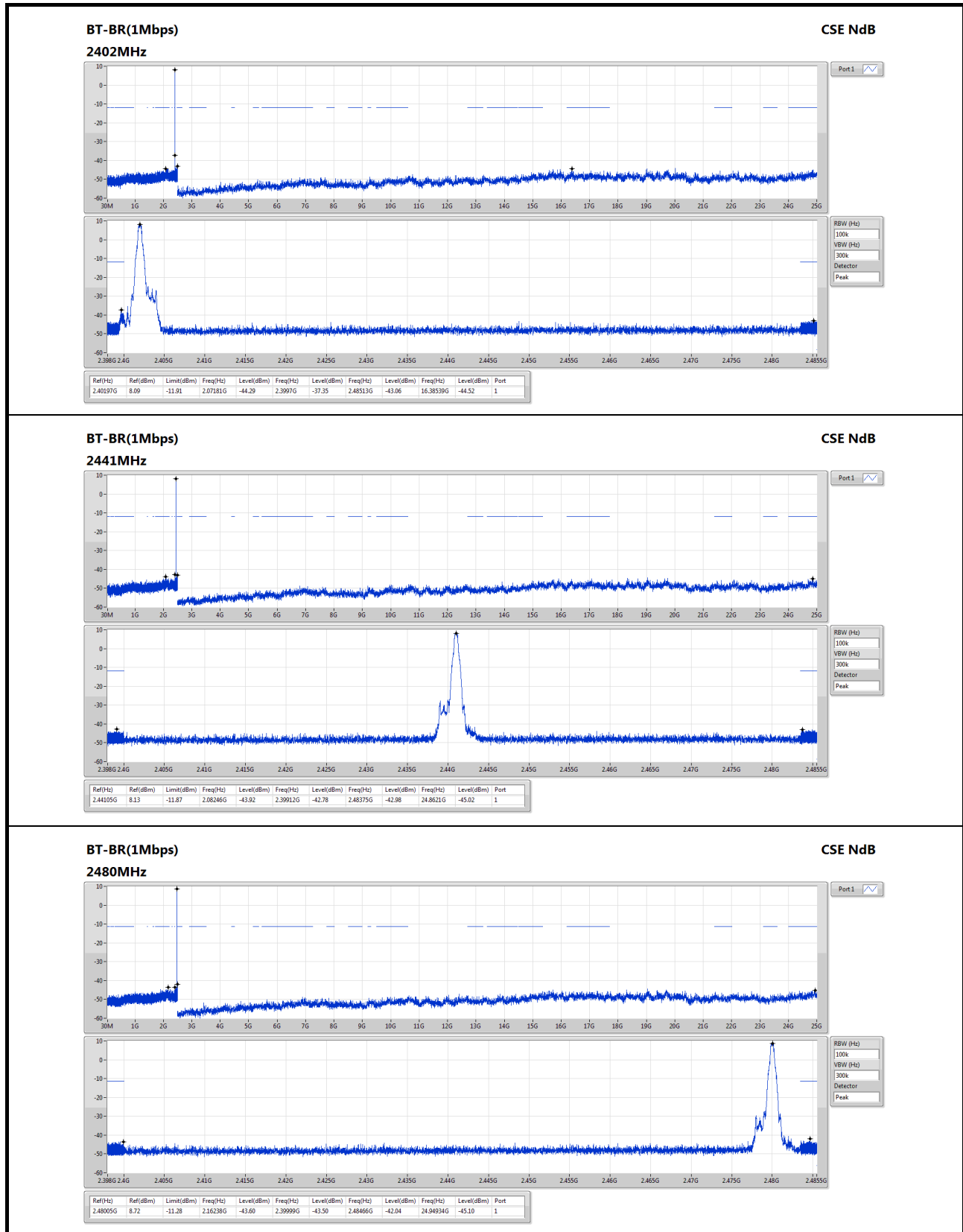
##### Emission level measurement

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



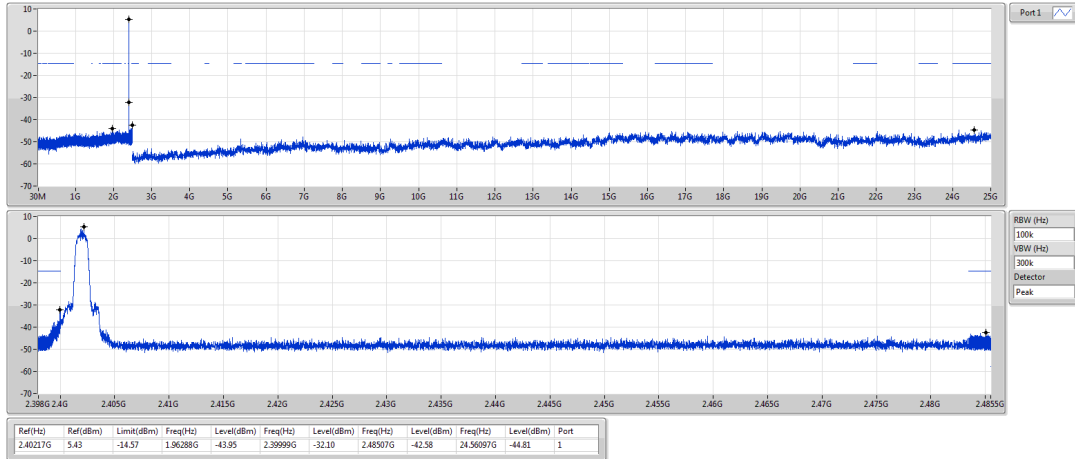
### 3.3.4 Unwanted Emissions into Non-Restricted Frequency Bands



### BT-EDR(2Mbps)

CSE NdB

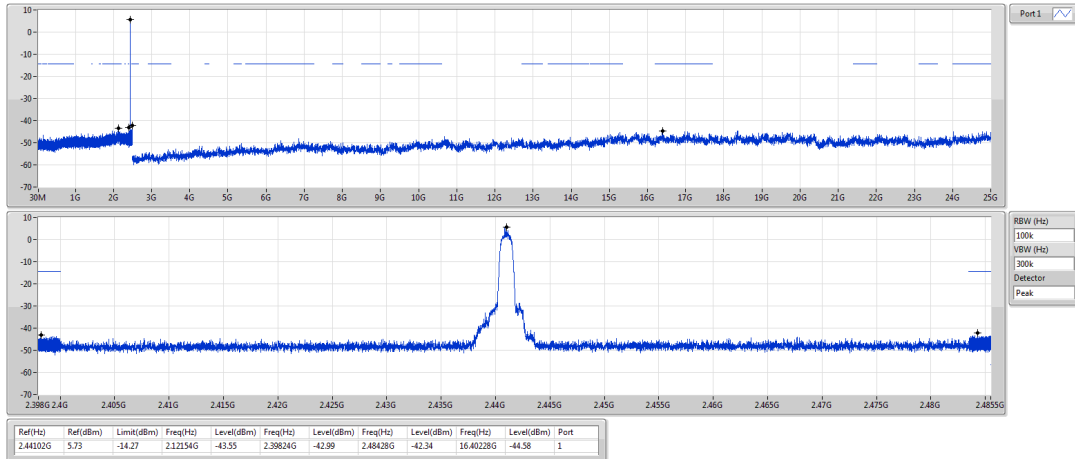
2402MHz



### BT-EDR(2Mbps)

CSE NdB

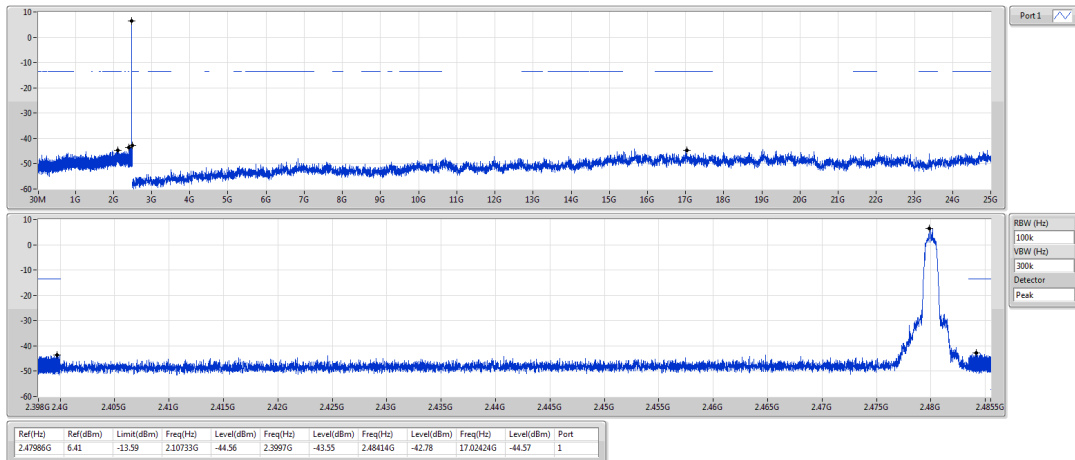
2441MHz



### BT-EDR(2Mbps)

CSE NdB

2480MHz

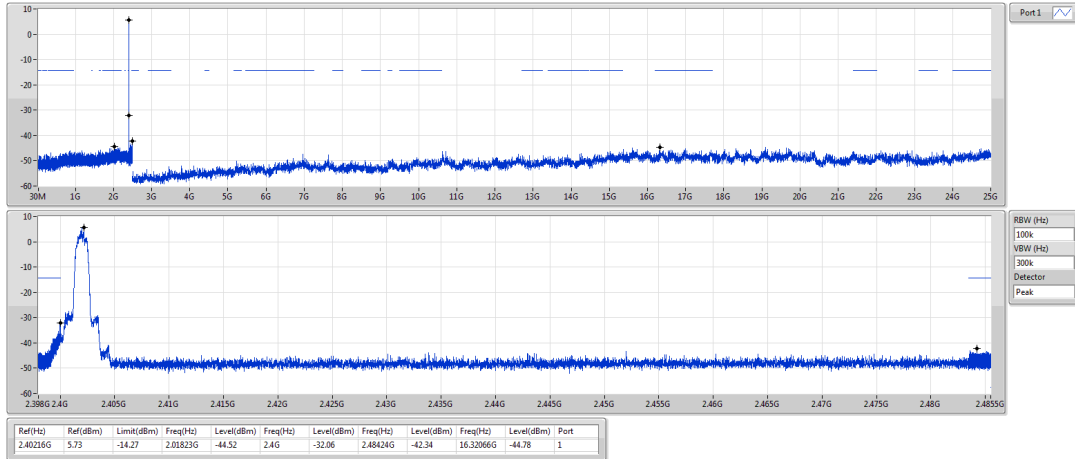




### BT-EDR(3Mbps)

CSE NdB

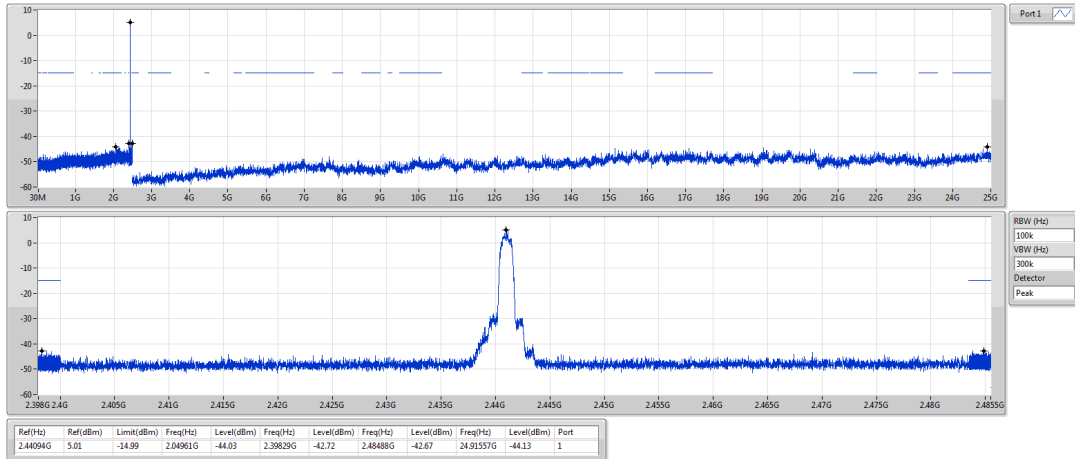
2402MHz



### BT-EDR(3Mbps)

CSE NdB

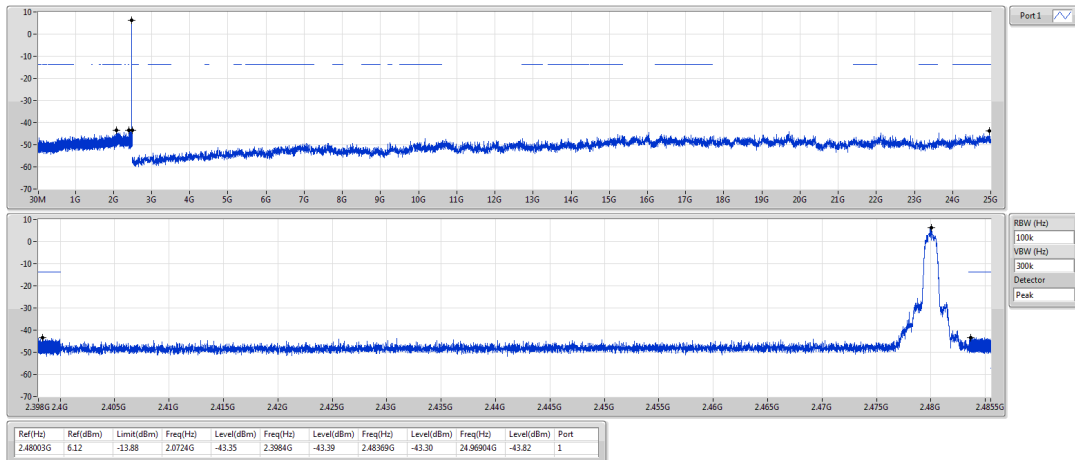
2441MHz



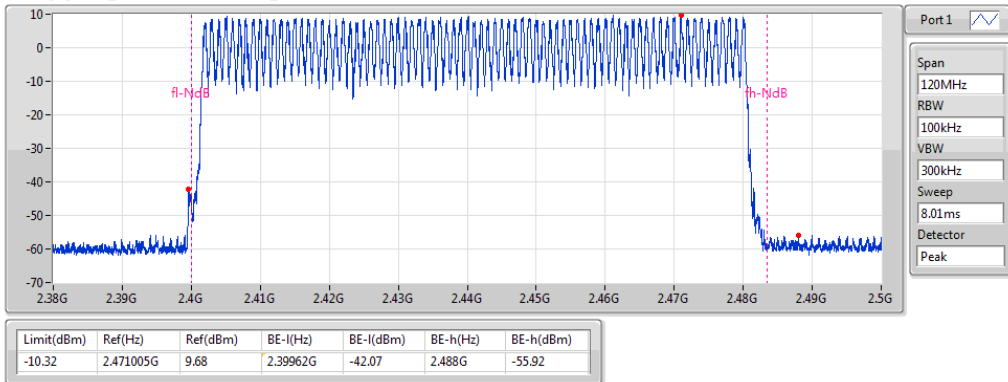
### BT-EDR(3Mbps)

CSE NdB

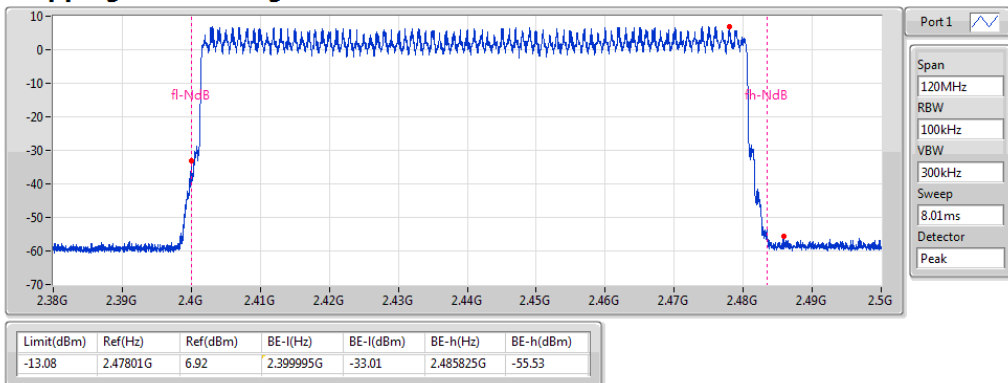
2480MHz



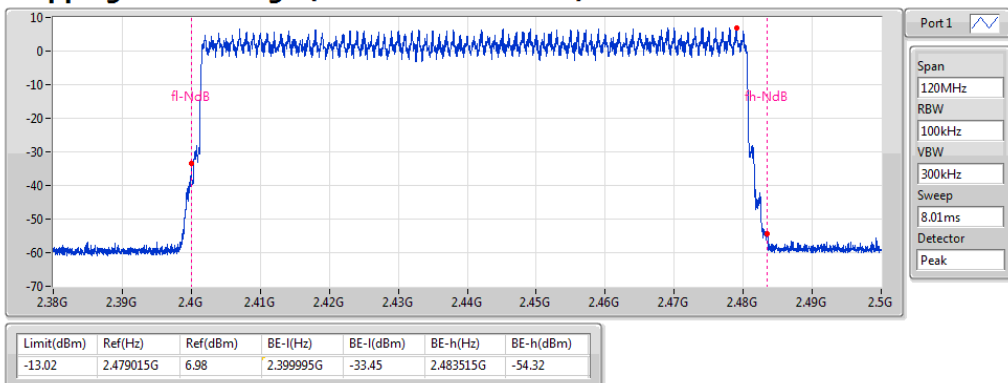
**BT-BR(1Mbps)**  
**2441MHz**  
**Hopping Ch Bandedge (Non-restricted Band)**



**BT-EDR(2Mbps)**  
**2441MHz**  
**Hopping Ch Bandedge (Non-restricted Band)**



**BT-EDR(3Mbps)**  
**2441MHz**  
**Hopping Ch Bandedge (Non-restricted Band)**



### 3.4 Conducted Output Power

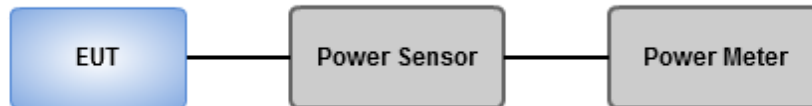
#### 3.4.1 Limit of Conducted Output Power

- ☐ 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 sensor 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

#### Summary of Peak Conducted Output Power

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	9.23	0.00838
BT-EDR(2Mbps)	7.50	0.00562
BT-EDR(3Mbps)	7.93	0.00621

#### Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	3.80	8.56	21.00
2441MHz	Pass	3.80	8.93	21.00
2480MHz	Pass	3.80	9.23	21.00
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	3.80	6.64	21.00
2441MHz	Pass	3.80	7.13	21.00
2480MHz	Pass	3.80	7.50	21.00
BT-EDR(3Mbps)	-	-	-	-
2402MHz	Pass	3.80	7.03	21.00
2441MHz	Pass	3.80	7.56	21.00
2480MHz	Pass	3.80	7.93	21.00

### Summary of Conducted (Average) Output Power

Mode	Power	Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	9.03	0.00800
BT-EDR(2Mbps)	5.35	0.00343
BT-EDR(3Mbps)	5.32	0.00340

### Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	3.80	8.31	21.00
2441MHz	Pass	3.80	8.71	21.00
2480MHz	Pass	3.80	9.03	21.00
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	3.80	4.34	21.00
2441MHz	Pass	3.80	4.89	21.00
2480MHz	Pass	3.80	5.35	21.00
BT-EDR(3Mbps)	-	-	-	-
2402MHz	Pass	3.80	4.34	21.00
2441MHz	Pass	3.80	4.88	21.00
2480MHz	Pass	3.80	5.32	21.00

Note: Average power is for reference only.

### 3.5 Number of Hopping Frequency

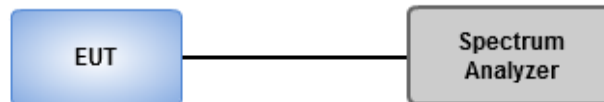
#### 3.5.1 Limit of Number of Hopping Frequency

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

#### Summary

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

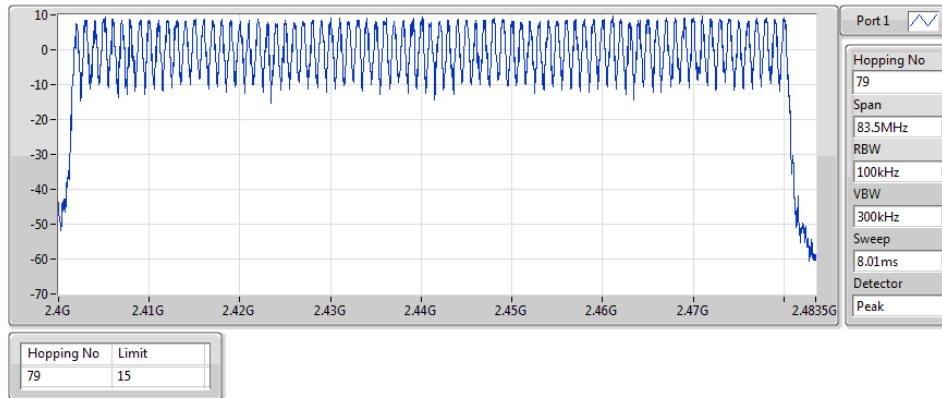
#### Result

Mode	Result	Hopping No	Limit
BT-BR(1Mbps)	-	-	-
2441MHz	Pass	79	15
BT-EDR(2Mbps)	-	-	-
2441MHz	Pass	79	15
BT-EDR(3Mbps)	-	-	-
2441MHz	Pass	79	15

### BT-BR(1Mbps)

2441MHz

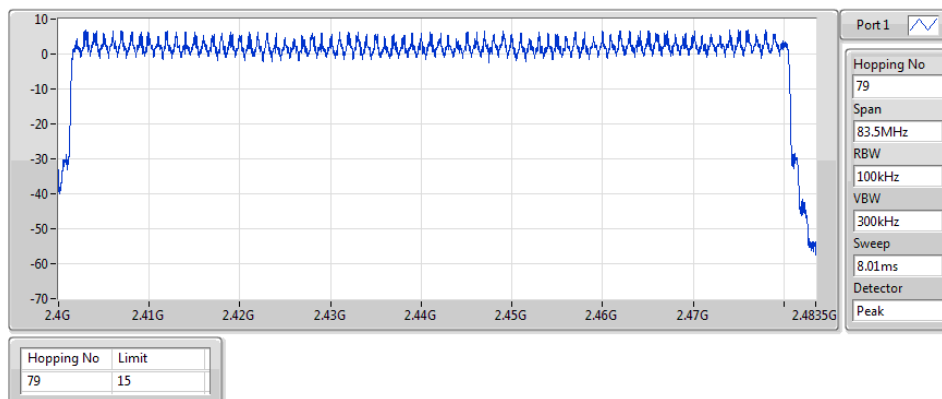
### Hopping Ch



### BT-EDR(2Mbps)

2441MHz

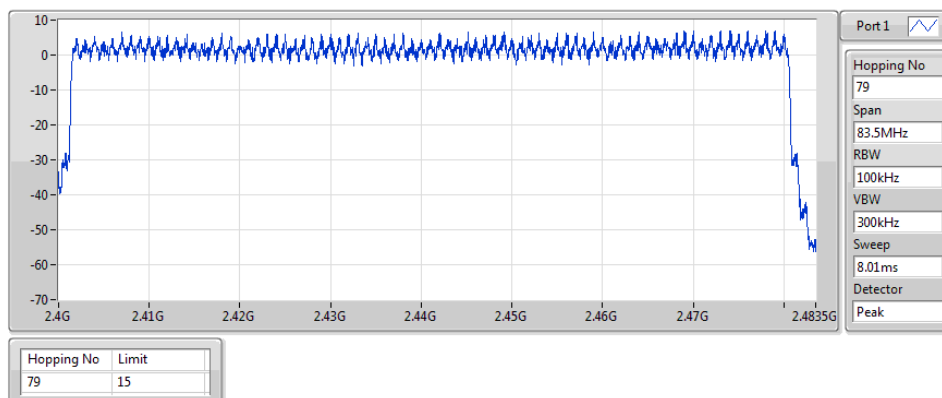
### Hopping Ch



### BT-EDR(3Mbps)

2441MHz

### Hopping Ch





## 3.6 20dB and Occupied Bandwidth

### 3.6.1 Test Procedures

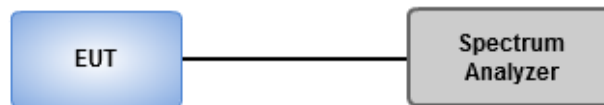
#### 20dB Bandwidth

1. Set RBW=10kHz VBW= 30kHz for BT BR mode, RBW=20kHz, VBW=100kHz for other modes, 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=10kHz VBW= 30kHz for BT BR mode, RBW=20kHz, VBW=100kHz for other modes, 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

#### 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)	923.913k	868.307k	868KF1D	920.29k	864.689k
BT-EDR(2Mbps)	1.322M	1.208M	1M21G1D	1.315M	1.165M
BT-EDR(3Mbps)	1.279M	1.198M	1M20G1D	1.257M	1.194M

**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

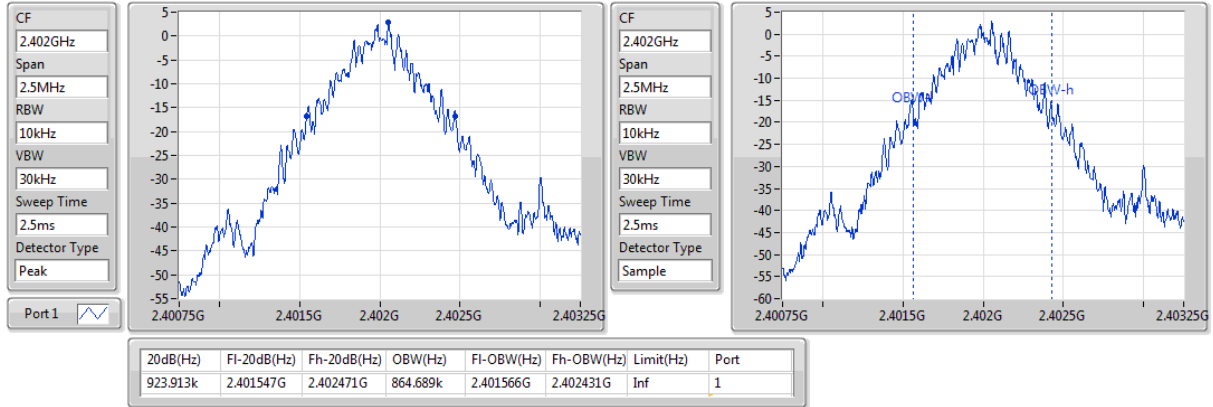
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	Inf	923.913k	864.689k
2441MHz	Pass	Inf	923.913k	868.307k
2480MHz	Pass	Inf	920.29k	864.689k
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	Inf	1.322M	1.176M
2441MHz	Pass	Inf	1.315M	1.208M
2480MHz	Pass	Inf	1.319M	1.165M
BT-EDR(3Mbps)	-	-	-	-
2402MHz	Pass	Inf	1.261M	1.198M
2441MHz	Pass	Inf	1.279M	1.198M
2480MHz	Pass	Inf	1.257M	1.194M

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

### BT-BR(1Mbps)

EBW

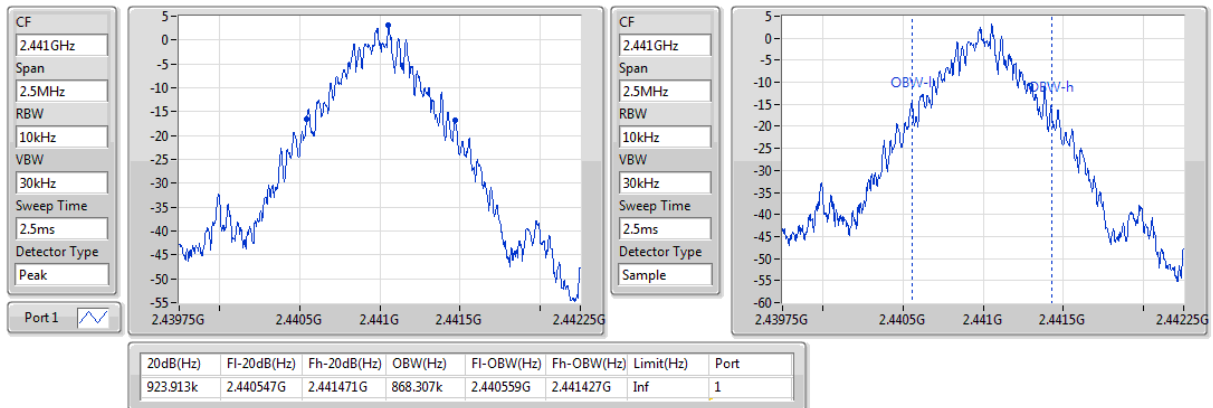
2402MHz



### BT-BR(1Mbps)

EBW

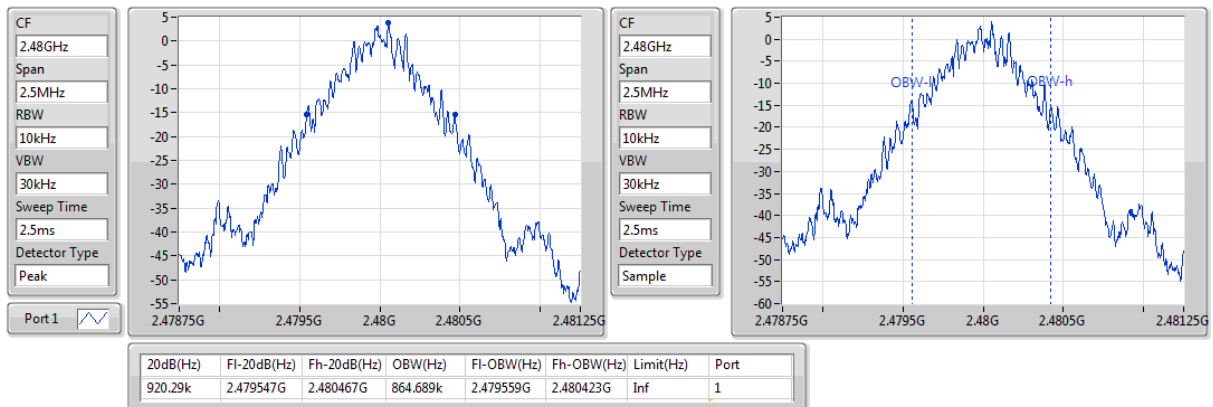
2441MHz



### BT-BR(1Mbps)

EBW

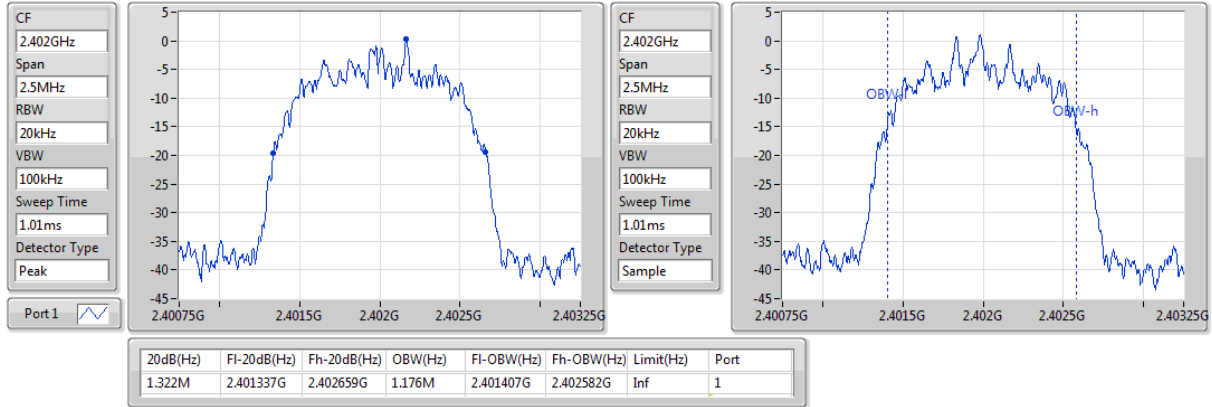
2480MHz



### BT-EDR(2Mbps)

EBW

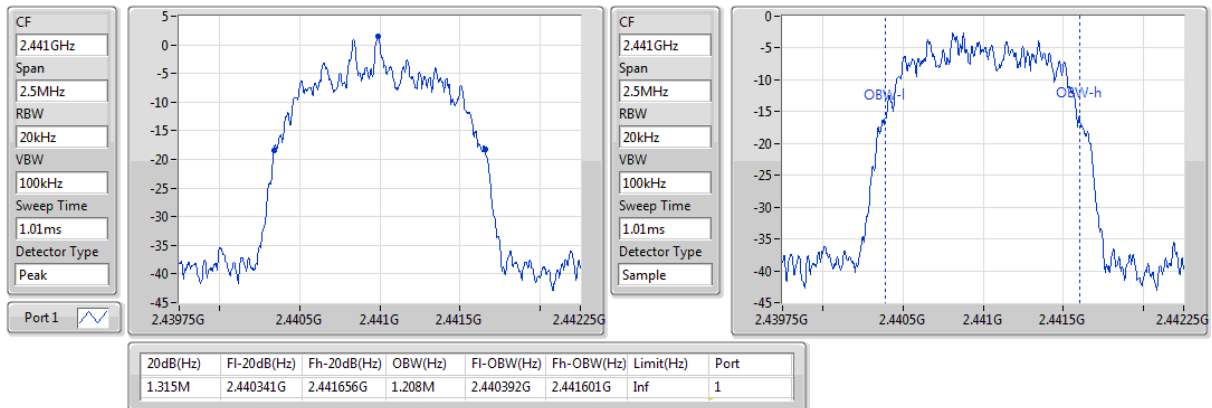
2402MHz



### BT-EDR(2Mbps)

EBW

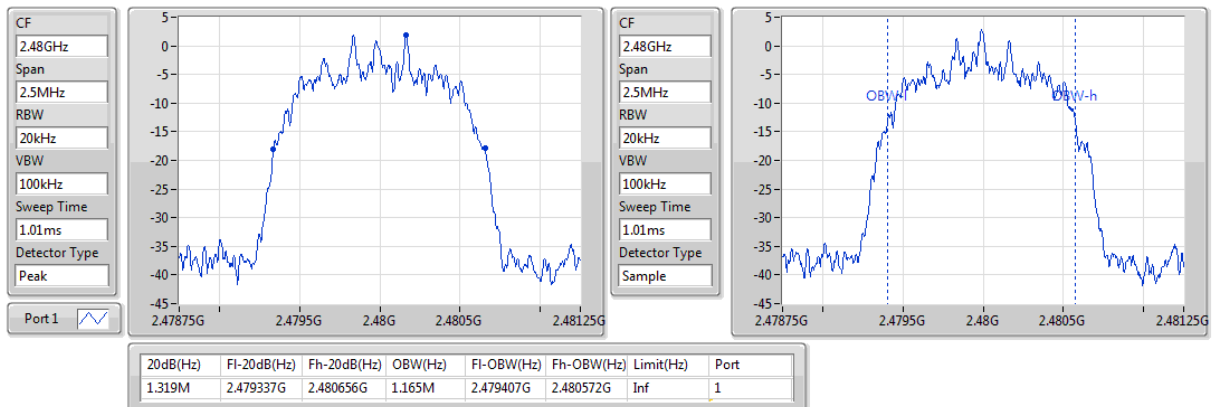
2441MHz



### BT-EDR(2Mbps)

EBW

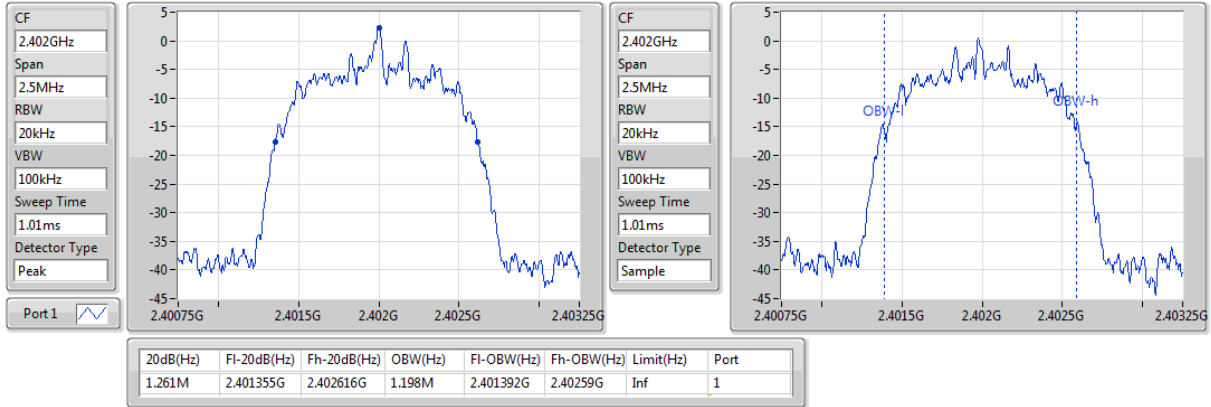
2480MHz



### BT-EDR(3Mbps)

EBW

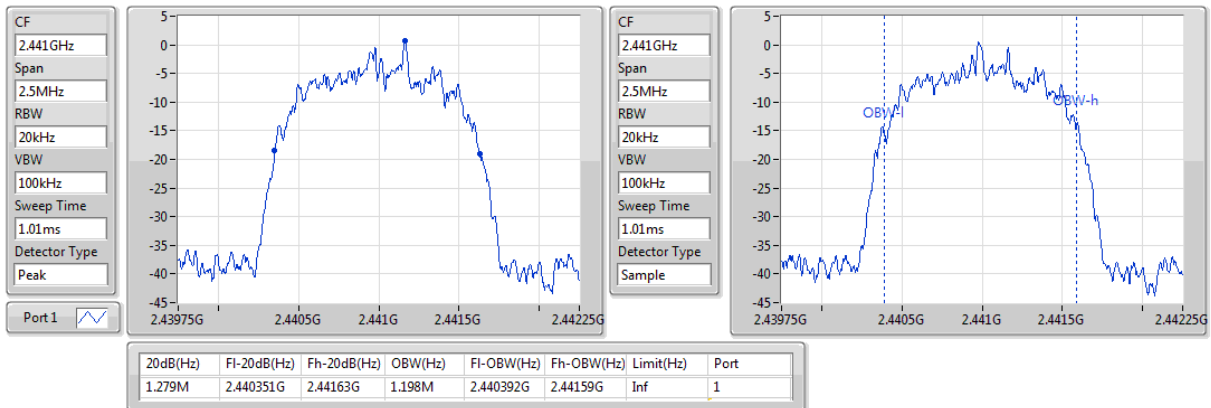
2402MHz



### BT-EDR(3Mbps)

EBW

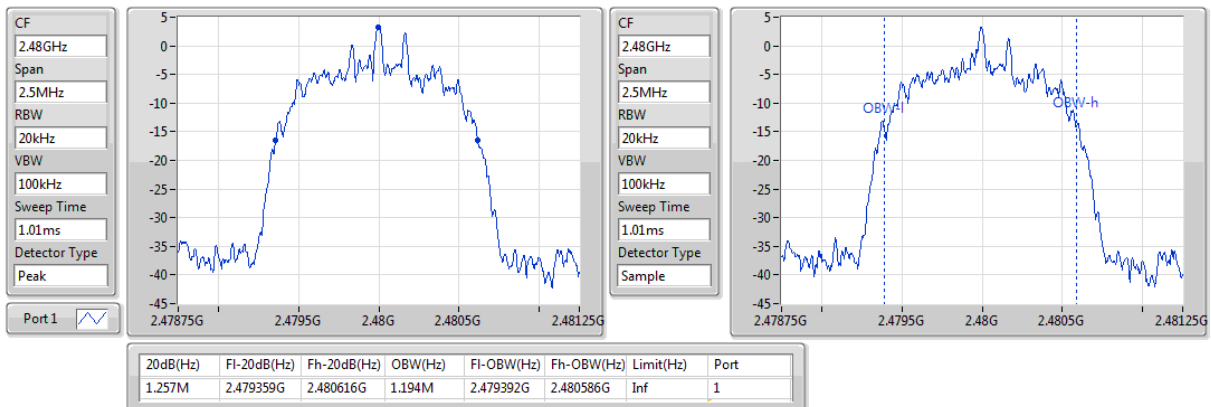
2441MHz



### BT-EDR(3Mbps)

EBW

2480MHz



### 3.7 Channel Separation

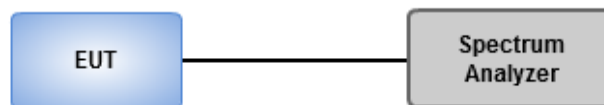
#### 3.7.1 Limit of Channel Separation

- ☐ 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

#### Summary

Mode	Max-Space (Hz)	Min-Space (Hz)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	1.004348M	1M
BT-EDR(2Mbps)	1.169565M	1M
BT-EDR(3Mbps)	1.008696M	1M

#### Result

Mode	Result	Fl (Hz)	Fh (Hz)	Ch.Space (Hz)	Limit (Hz)
BT-BR(1Mbps)	-	-	-	-	-
2402MHz	Pass	2.401996G	2.403G	1.004348M	615.326058k
2441MHz	Pass	2.441G	2.442G	1M	615.326058k
2480MHz	Pass	2.479G	2.48G	1M	612.91314k
BT-EDR(2Mbps)	-	-	-	-	-
2402MHz	Pass	2.401996G	2.403G	1.004348M	880.452k
2441MHz	Pass	2.44083G	2.442G	1.169565M	875.79k
2480MHz	Pass	2.479G	2.48G	1M	878.454k
BT-EDR(3Mbps)	-	-	-	-	-
2402MHz	Pass	2.402G	2.403009G	1.008696M	839.826k
2441MHz	Pass	2.441G	2.442G	1M	851.814k
2480MHz	Pass	2.479G	2.48G	1M	837.162k

### BT-BR(1Mbps)

### Channel Separation

2.402G/2.403GHz



### BT-BR(1Mbps)

### Channel Separation

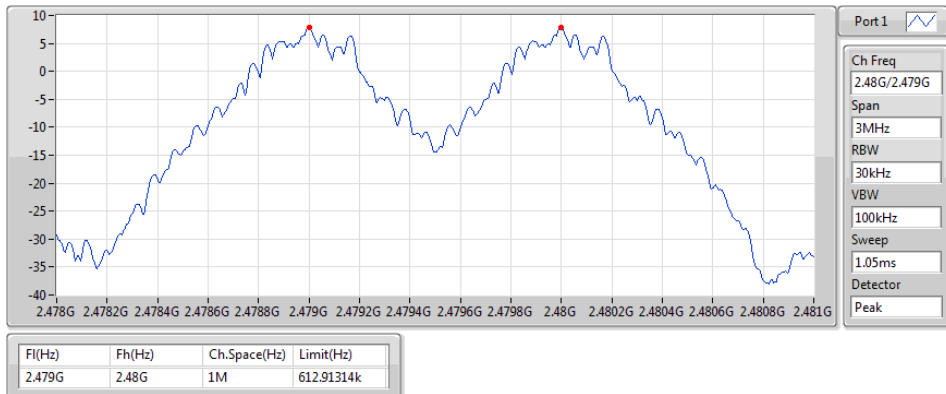
2.441G/2.442GHz



### BT-BR(1Mbps)

### Channel Separation

2.48G/2.479GHz

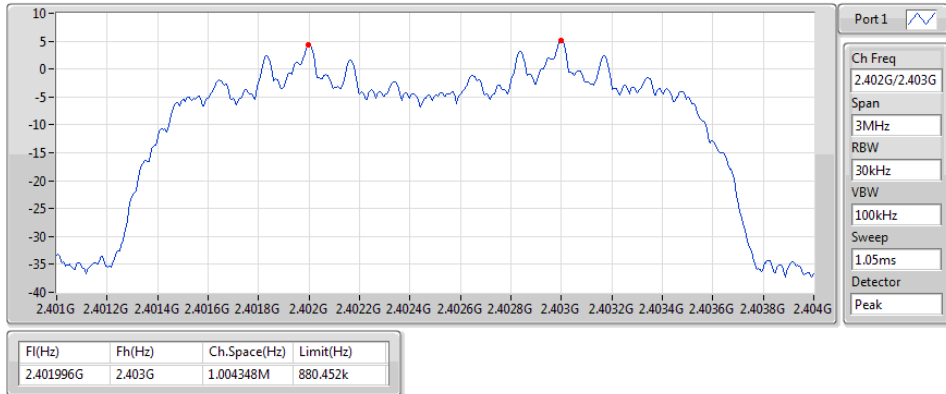




### BT-EDR(2Mbps)

### Channel Separation

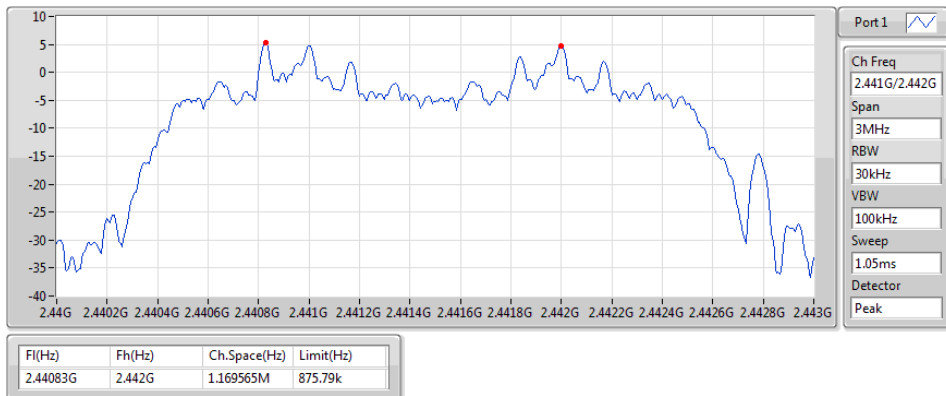
2.402G/2.403GHz



### BT-EDR(2Mbps)

### Channel Separation

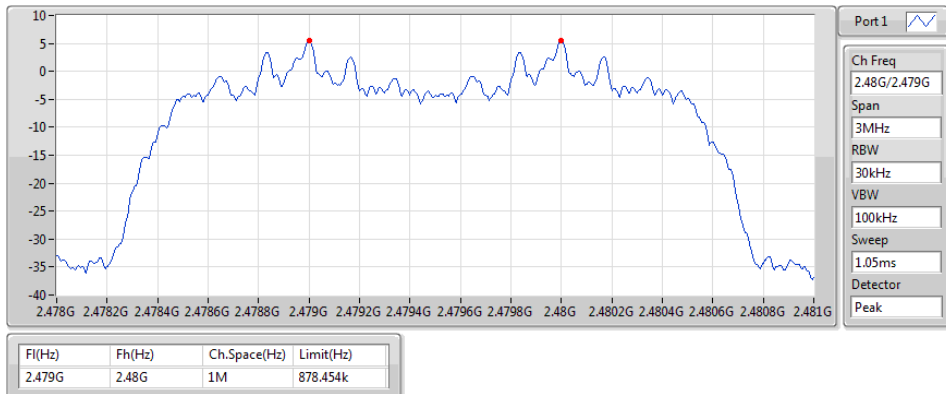
2.441G/2.442GHz



### BT-EDR(2Mbps)

### Channel Separation

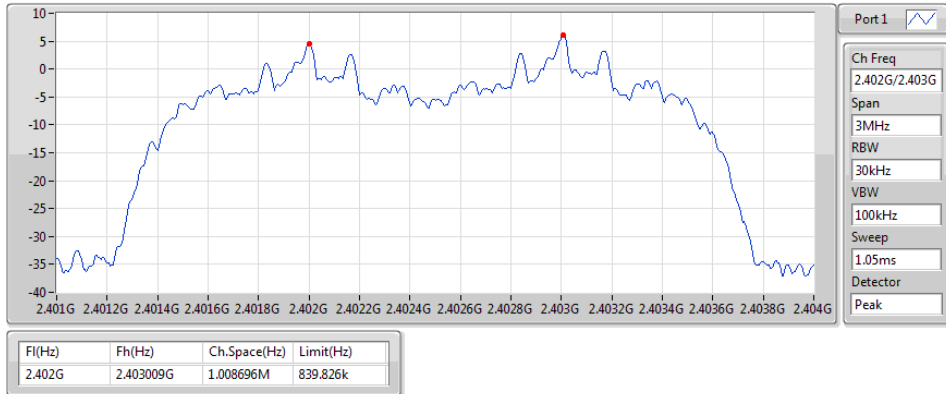
2.48G/2.479GHz



### BT-EDR(3Mbps)

### Channel Separation

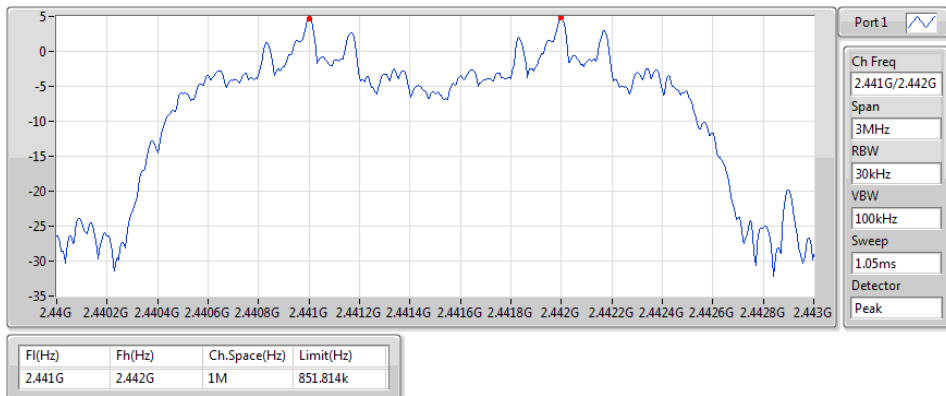
2.402G/2.403GHz



### BT-EDR(3Mbps)

### Channel Separation

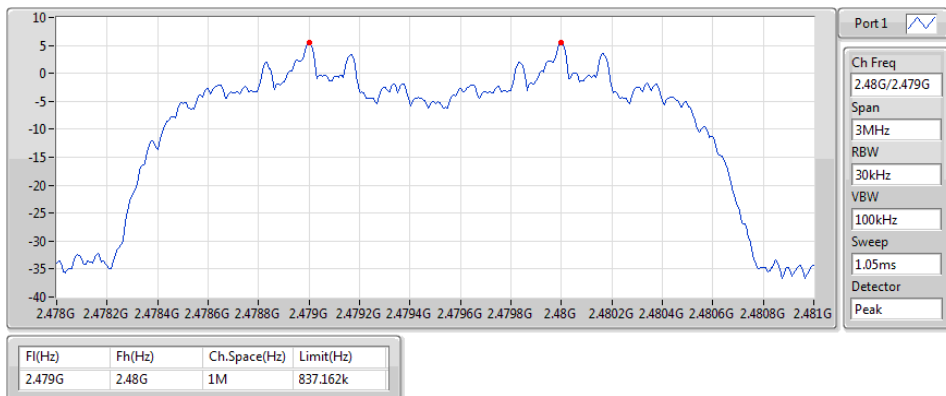
2.441G/2.442GHz



### BT-EDR(3Mbps)

### Channel Separation

2.48G/2.479GHz



## 3.8 Number of Dwell Time

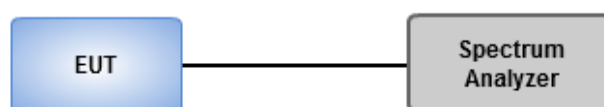
### 3.8.1 Limit of Dwell time

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=100kHz,VBW=300kHz,Sweep time = 500us(DH1),2ms(DH3),4ms(DH5), Detector=Peak, Span=0Hz,Trace max hold
2. Enable gating and trigger function of spectrum analyzer to measure burst on time.
3. The DH1 packet can cover a single time slot. A maximum length packet has duration of 1 time slots.  
Non AFH mode  
The hopping rate is 1600 hops/second so the maximum dwell time is 1/1600 seconds. DH1 Packet permit maximum  $1600 / 79 / 2 = 10.12$  hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $10.12 \times 31.6 = 320$  within 31.6 seconds.  
AFH mode  
The hopping rate is 800 hops/second so the maximum dwell time is 1/800 seconds. DH1 Packet permit maximum  $800 / 20 / 2 = 20$  hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $20 \times 8 = 160$  within 8 seconds.
4. The DH3 packet can cover up to 3 time slots. A maximum length packet has duration of 3 time slots.  
Non AFH mode  
The hopping rate is 1600 hops/second so the maximum dwell time is 3/1600 seconds. DH3 Packet permit maximum  $1600 / 79 / 4 = 5.06$  hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $5.06 \times 31.6 = 160$  within 31.6 seconds.  
AFH mode  
The hopping rate is 800hops/second so the maximum dwell time is 3/800 seconds. DH3 Packet permit maximum  $800 / 20 / 4 = 10$  hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $10 \times 8 = 80$  within 8 seconds.
5. The DH5 packet can cover up to 5 time slots. Operate DH5 at maximum dwell time and maximum duty cycle. A maximum length packet has duration of 5 time slots.  
Non AFH mode  
The hopping rate is 1600 hops/second so the maximum dwell time is 5/1600 seconds, or 3.125ms. DH5 Packet permit maximum  $1600 / 79 / 6 = 3.37$  hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $3.37 \times 31.6 = 106.6$  within 31.6 seconds  
AFH mode  
The hopping rate is 800 hops/second so the maximum dwell time is 5/800 seconds. DH5 Packet permit maximum  $800 / 20 / 6 = 6.667$  hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $6.667 \times 8 = 53.33$  within 8 seconds

### 3.8.3 Test Setup



### 3.8.4 Test Result of Dwell Time

#### Summary

Mode	Max-Dwell (s)
2.4-2.4835GHz	-
BT-BR(1Mbps)	312.075362m_DH5
BT-EDR(2Mbps)	313.62029m_DH5
BT-EDR(3Mbps)	312.075362m_DH5

#### Result / Non AFH mode

Mode	Result	Period (s)	Dwell (s)	Limit (s)	Tx On (s)
BT-BR(1Mbps)	-	-	-	-	-
2441MHz	Pass	31.6	312.075362m_DH5	400m	2.927536m
2441MHz	Pass	31.6	266.666667m_DH3	400m	1.666667m
2441MHz	Pass	31.6	134.492754m_DH1	400m	420.289855u
BT-EDR(2Mbps)	-	-	-	-	-
2441MHz	Pass	31.6	313.62029m_DH5	400m	2.942029m
2441MHz	Pass	31.6	268.985507m_DH3	400m	1.681159m
2441MHz	Pass	31.6	139.130435m_DH1	400m	434.782609u
BT-EDR(3Mbps)	-	-	-	-	-
2441MHz	Pass	31.6	312.075362m_DH5	400m	2.927536m
2441MHz	Pass	31.6	268.985507m_DH3	400m	1.681159m
2441MHz	Pass	31.6	134.492754m_DH1	400m	420.289855u

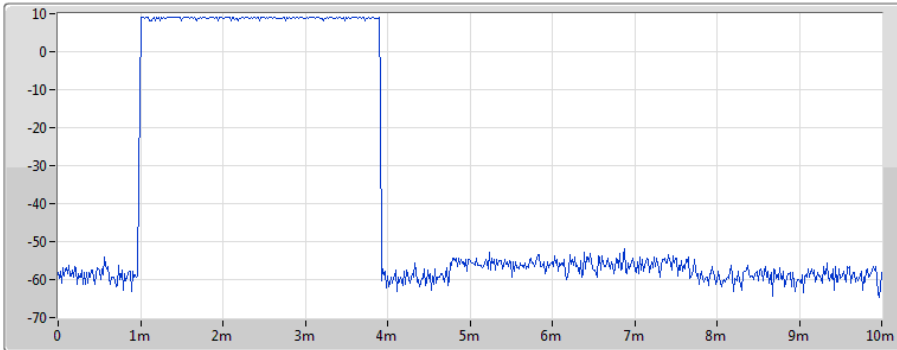
#### Result / AFH mode


Mode	Result	Period (s)	Dwell (s)	Limit (s)	Tx On (s)
BT-BR(1Mbps)	-	-	-	-	-
2441MHz_DH5	Pass	8	156.1352533m_DH5	400m	2.927536m
2441MHz_DH3	Pass	8	133.33336m_DH3	400m	1.666667m
2441MHz_DH1	Pass	8	67.2463768m_DH1	400m	420.289855u
BT-EDR(2Mbps)	-	-	-	-	-
2441MHz_DH5	Pass	8	156.9082133m_DH5	400m	2.942029m
2441MHz_DH3	Pass	8	134.49272m_DH3	400m	1.681159m
2441MHz_DH1	Pass	8	69.56521744m_DH1	400m	434.782609u
BT-EDR(3Mbps)	-	-	-	-	-
2441MHz_DH5	Pass	8	156.1352533m_DH5	400m	2.927536m
2441MHz_DH3	Pass	8	134.49272m_DH3	400m	1.681159m
2441MHz_DH1	Pass	8	67.2463768m_DH1	400m	420.289855u

### BT-BR(1Mbps)

Dwell

2441MHz



Port 1 

Ch Freq  
2.441GHz

RBW  
300kHz

VBW  
1MHz

Sweep Time  
10ms

TX Time  
2.927536ms

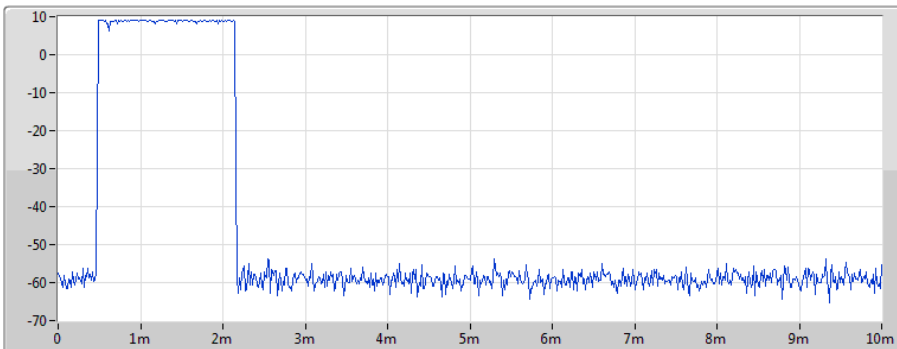
DH5


Period(s)	Dwell(s)	Limit(s)	Tx On(s)
31.6	312.075362m	400m	2.927536m

### BT-BR(1Mbps)

Dwell

2441MHz



Port 1 

Ch Freq  
2.441GHz

RBW  
300kHz

VBW  
1MHz

Sweep Time  
10ms

TX Time  
1.666667ms

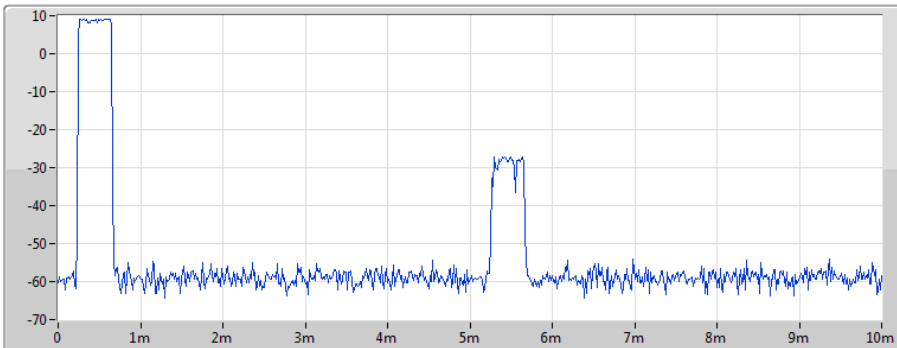
DH3


Period(s)	Dwell(s)	Limit(s)	Tx On(s)
31.6	266.666667m	400m	1.666667m

### BT-BR(1Mbps)

Dwell

2441MHz



Port 1 

Ch Freq  
2.441GHz

RBW  
300kHz

VBW  
1MHz

Sweep Time  
10ms

TX Time  
420.289855us

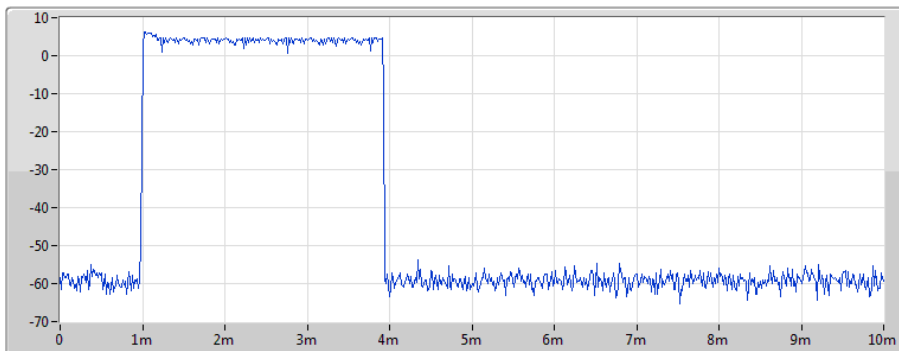
DH1


Period(s)	Dwell(s)	Limit(s)	Tx On(s)
31.6	134.492754m	400m	420.289855u

## BT-EDR(2Mbps)

Dwell

2441MHz



Port 1 

Ch Freq  
2.441GHz

RBW  
300kHz

VBW  
1MHz

Sweep Time  
10ms

TX Time  
2.942029ms

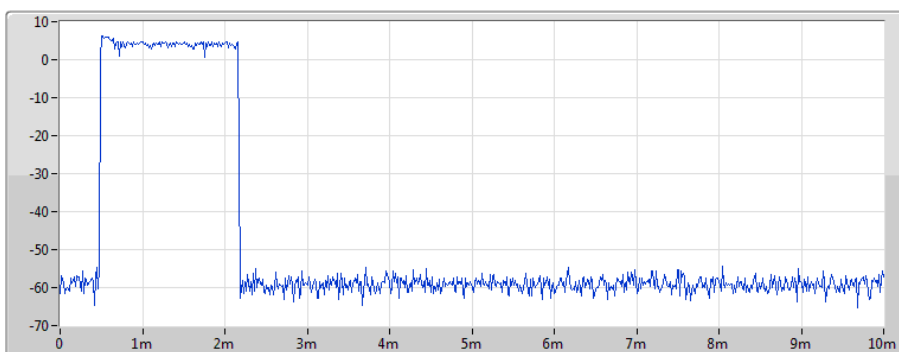
DH5


Period(s)	Dwell(s)	Limit(s)	Tx On(s)
31.6	313.62029m_DH	400m	2.942029m

## BT-EDR(2Mbps)

Dwell

2441MHz



Port 1 

Ch Freq  
2.441GHz

RBW  
300kHz

VBW  
1MHz

Sweep Time  
10ms

TX Time  
1.681159ms

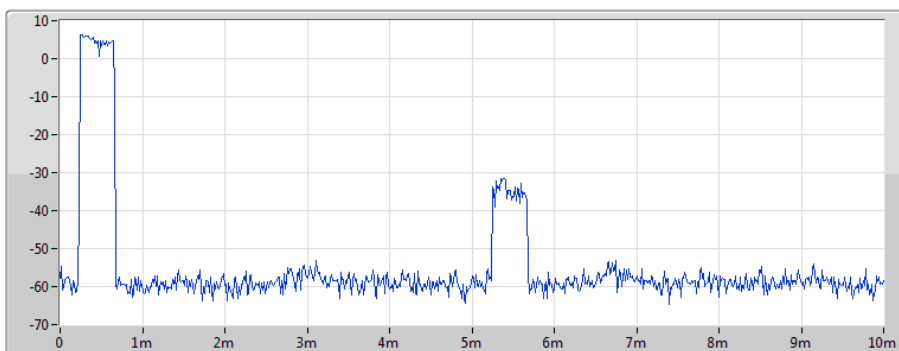
DH3


Period(s)	Dwell(s)	Limit(s)	Tx On(s)
31.6	268.985507m_D	400m	1.681159m

## BT-EDR(2Mbps)

Dwell

2441MHz



Port 1 

Ch Freq  
2.441GHz

RBW  
300kHz

VBW  
1MHz

Sweep Time  
10ms

TX Time  
434.782609us

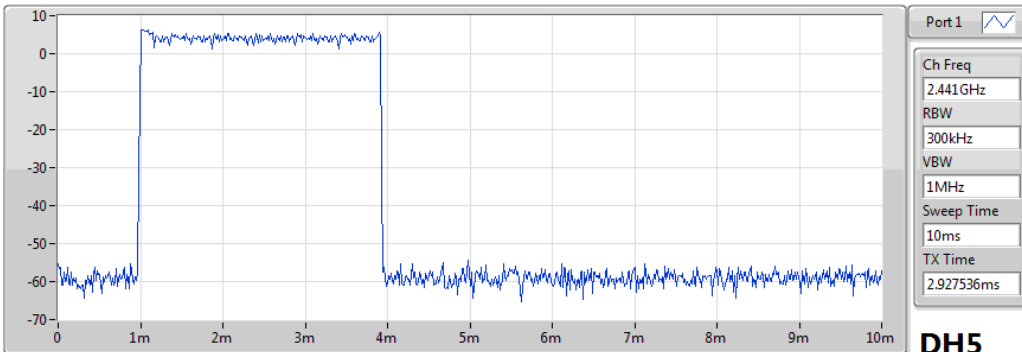
DH1

Period(s)	Dwell(s)	Limit(s)	Tx On(s)
31.6	139.130435m_D	400m	434.782609u

### BT-EDR(3Mbps)

Dwell

2441MHz



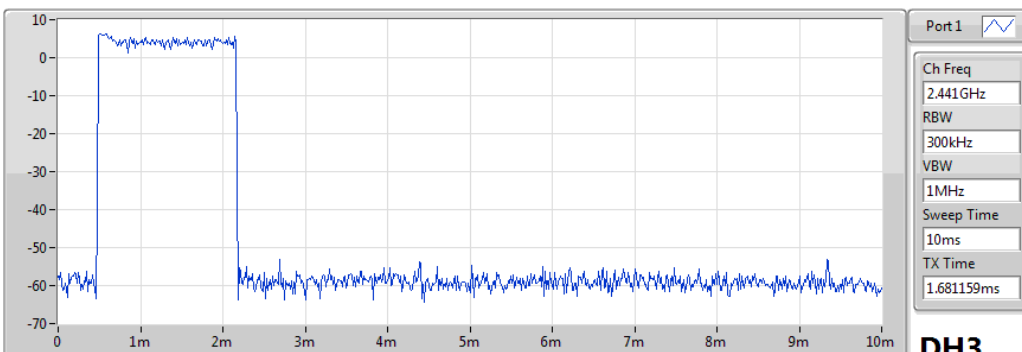
DH5

Period(s)	Dwell(s)	Limit(s)	Tx On(s)
31.6	312.075362m	400m	2.927536m

### BT-EDR(3Mbps)

Dwell

2441MHz



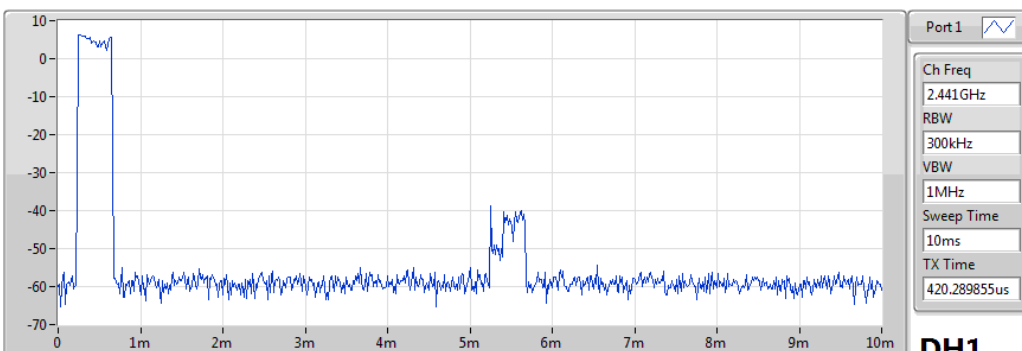
DH3

Period(s)	Dwell(s)	Limit(s)	Tx On(s)
31.6	268.985507m	400m	1.681159m

### BT-EDR(3Mbps)

Dwell

2441MHz



DH1

Period(s)	Dwell(s)	Limit(s)	Tx On(s)
31.6	134.492754m	400m	420.289855u



## 4 Test laboratory information

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

International Certification Corp (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 District, Tao Yuan City  
333, Taiwan, R.O.C.

### **Kwei Shan Site II**

Tel: 886-3-271-8640

No. 14-1, Lane 19, Wen San 3rd  
St., Kwei Shan District, 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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