

# **FCC Test Report**

FCC ID : R3USCBT26

**Product Description: Wireless Gaming Headset with Bluetooth** 

Model No. : SCBT26

Brand Name : EPOS

Applicant : DSEA A/S

Address : Kongebakken 9, DK-2765 Smoerum,

**Denmark** 

Factory : Charter Media (Dongguan) Co., Ltd.

Address : Dabandi Industrial Zone, Daning District,

**Humen Town. Dongguan City, Guangdong** 

523930, P.R.C

Standard : 47 CFR FCC Part 15.247

Received Date : Jan. 26, 2021

Tested Date : Feb. 04 ~ Feb. 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 Cherly Assistant Manager

Garv Chang / Manager

TAF

Testing Laboratory

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## **Release Record**

Report No.	Version	Description	Issued Date
FR112602AD	Rev. 01	Initial issue	Apr. 20, 2021
FR112602AD	Rev. 02	Adding FCC ID of USB dongle (Page 6)	May 07, 2021

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## **Summary of Test Results**

FCC Rules	Test Items	Measured	Result	
15.207	Conducted Emissions	[dBuV]: 0.796MHz 36.19 (Margin -9.81dB) - AV	Pass	
15.247(d)	Radiated Emissions	[dBuV/m at 3m]: 2483.50MHz	Pass	
15.209	Radiated Effilssions	42.25(Margin -11.75dB) - AV	F 455	
15.247(d)	Band Edge	Meet the requirement of limit	Pass	
15.247(b)(1)	Conducted Output Power	Power [dBm]: 11.42	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.

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## 1 General Description

### 1.1 Information

### 1.1.1 Specification of the Equipment under Test (EUT)

RF General Information								
Frequency Range (MHz)  Bluetooth Ch. Frequency Channel Number Data Ra								
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.

#### 1.1.2 Antenna Details

Ant. No.	Туре	Connector	Gain (dBi)	Remarks
1	IFA	No	3	

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

Power Supply Type	5Vdc from host 3.7dc from battery
-------------------	--------------------------------------

Note 2: Bluetooth BR uses a GFSK.

Note 3: Bluetooth EDR uses a combination of  $\pi/4$ -DQPSK and 8DPSK.



### 1.1.4 Accessories

	Accessories					
No.	Equipment	Description				
1	Battery	Brand: Sennheiser Model: AHB732038TPCT Power Rating: 3.7Vdc, 530mA				
2	USB cable	Brand: EPOS Model: EPUL2001 Line: 2m shielded without core				
3	Audio Cable	Brand: EPOS Model: EPAL2001 Line: 1.5m non-shielded without core				
4	USB dongle	Brand: EPOS Model: BTD 800 USB Product name : GSA H3PRO FCC ID: R3UBTD800				

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### 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		

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## 1.1.6 Test Tool and Duty Cycle

Test Tool	BlueTest3(Qualcomm Host Tools), Version: 3.2.2.144 Bluetooth Simulator: R&S, CMW270				
Modulation Mode	Duty Cycle Of Test Signal (%) Duty Factor (dB)				
DH5	77.99%	1.08			
2DH5	78.85%	1.03			
3DH5	78.16%	1.07			

### 1.1.7 Power Index of Test Tool

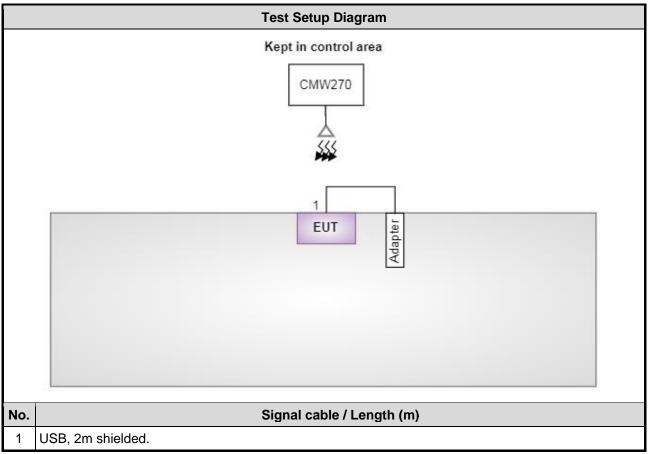
Modulation Mode	Test Frequency (MHz)			
Wodulation Wode	2402	2441	2480	
GFSK/1Mbps	default	default	default	
π/4-DQPSK /2Mbps	default	default	default	
8DPSK/3Mbps	default	default	default	



## 1.2 Local Support Equipment List

	Support Equipment List								
No.	No. Equipment Brand Model FCC ID Remarks								
1	Adapter	Samsung	ETA-U90JWS						
2	Notebook	DELL	Latitude E5470	DoC					
3	Wireless connectivity tester	ROHDE&SCHW ARZ	CMW270						

## 1.3 Test Setup Chart



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

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## 1.4 The Equipment List

Test Item	Conducted Emission	Conducted Emission						
Test Site	Conduction room 1 / (0	Conduction room 1 / (CO01-WS)						
Tested Date	Feb. 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. 12, 2020	Mar. 11, 2021			
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 21, 2020	Oct. 20, 2021			
Measurement Software								
Wireless connectivity tester	TROHDE&SCHWARZT CMW270 T 100856 T Nov 02 2020 T Nov 01 2021							
Note: Calibration Inte	Note: Calibration Interval of instruments listed above is one year.							

Test Item	Radiated Emission				
Test Site	966 chamber3 / (03Cl	H03-WS)			
Tested Date	Feb. 04 ~ Feb. 09, 20	21			
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101498	Dec. 04, 2020	Dec. 03, 2021
Receiver	R&S	ESR3	101657	Feb. 14, 2020	Feb. 13, 2021
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Apr. 29, 2020	Apr. 28, 2021
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Dec. 22, 2020	Dec. 21, 2021
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 06, 2020	Nov. 05, 2021
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 17, 2020	Nov. 16, 2021
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 06, 2020	Oct. 05, 2021
Preamplifier	EMC	EMC02325	980187	Aug. 05, 2020	Aug. 04, 2021
Preamplifier	Agilent	83017A	MY39501309	Sep. 02, 2020	Sep. 01, 2021
Preamplifier	EMC	EMC184045B	980192	Jul. 21, 2020	Jul. 20, 2021
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/ <b>4</b>	Sep. 26, 2020	Sep. 25, 2021
RF cable-8M	EMC	EMC104-SM-SM-80 00	181107	Sep. 26, 2020	Sep. 25, 2021
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Sep. 26, 2020	Sep. 25, 2021
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800 -001	Sep. 26, 2020	Sep. 25, 2021
LF cable-3M	EMC	EMC8D-NM-NM-300 0	131103	Sep. 26, 2020	Sep. 25, 2021
LF cable-13M	EMC	EMC8D-NM-NM-130 00	131104	Sep. 26, 2020	Sep. 25, 2021
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Wireless connectivity tester	ROHDE&SCHWAR Z	CMW270	100856	Nov. 02, 2020	Nov. 01, 2021
Note: Calibration Inter	val of instruments liste	d above is one year.			

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(TH01-WS)				
, 11101-VV3 <i>)</i>				
Feb. 17, 2021				
Brand	Model No.	Serial No.	Calibration Date	Calibration Until
R&S	FSV40	101063	Apr. 30, 2020	Apr. 29, 2021
Anritsu	ML2495A	1241002	Nov. 04, 2020	Nov. 03, 2021
Anritsu	MA2411B	1207366	Nov. 04, 2020	Nov. 03, 2021
GW INSTEK	GPC-6030D	GES855395	Nov. 09, 2020	Nov. 08, 2021
APC	AFC-500W	F312060012	Dec. 04, 2020	Dec. 03, 2021
	SENSE-15247_DTS	V5.10.7	NA	NA
ROHDE&SCHWARZ	CMW270	100856	Nov. 02, 2020	Nov. 01, 2021
R	Brand R&S Anritsu Anritsu GW INSTEK APC	Brand         Model No.           R&S         FSV40           Anritsu         ML2495A           Anritsu         MA2411B           GW INSTEK         GPC-6030D           APC         AFC-500W            SENSE-15247_DTS	Brand         Model No.         Serial No.           R&S         FSV40         101063           Anritsu         ML2495A         1241002           Anritsu         MA2411B         1207366           GW INSTEK         GPC-6030D         GES855395           APC         AFC-500W         F312060012            SENSE-15247_DTS         V5.10.7           ROHDE&SCHWARZ         CMW270         100856	Brand         Model No.         Serial No.         Calibration Date           R&S         FSV40         101063         Apr. 30, 2020           Anritsu         ML2495A         1241002         Nov. 04, 2020           Anritsu         MA2411B         1207366         Nov. 04, 2020           GW INSTEK         GPC-6030D         GES855395         Nov. 09, 2020           APC         AFC-500W         F312060012         Dec. 04, 2020            SENSE-15247_DTS         V5.10.7         NA           ROHDE&SCHWARZ         CMW270         100856         Nov. 02, 2020

### 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

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#### **Measurement Uncertainty** 1.8

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	±4.32 dB
Radiated emission > 1GHz	±4.9 dB
Time	±0.1%



## 2 Test Configuration

## 2.1 Testing Facility

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

FCC Designation No.: TW0009FCC site registration No.: 207696

➤ ISED#: 10807A

➤ CAB identifier: TW2732

### 2.2 The Worst Test Modes and Channel Details

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

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

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### 3 Transmitter Test Results

#### 3.1 Conducted Emissions

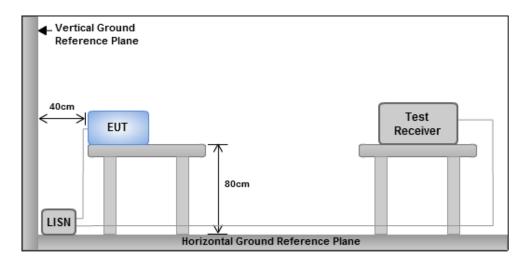
#### 3.1.1 Limit of Conducted Emissions

	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 logarith	nm 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



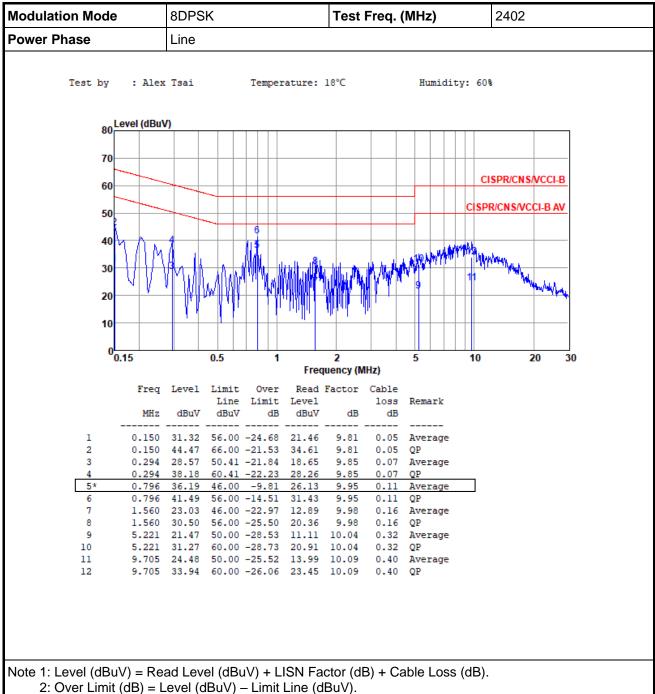
Note: 1. Support units were connected to second LISN.

Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

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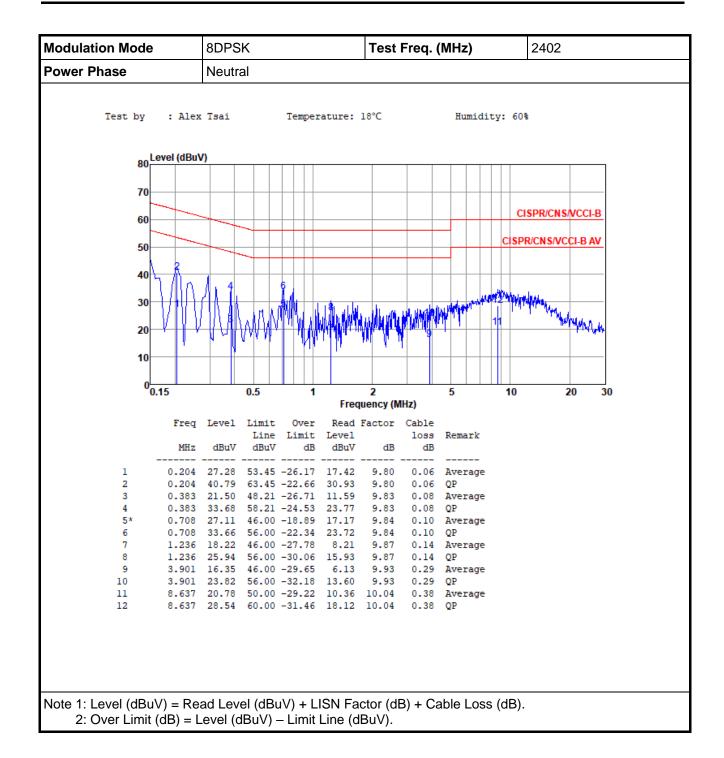
#### 3.1.4 **Test Result of Conducted Emissions**



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### 3.2 Unwanted Emissions into Restricted Frequency Bands

### 3.2.1 Limit of Unwanted Emissions into Restricted Frequency Bands

	Restricted Band	<b>Emissions Limit</b>	
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

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.

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#### 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:

3.

- 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

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:

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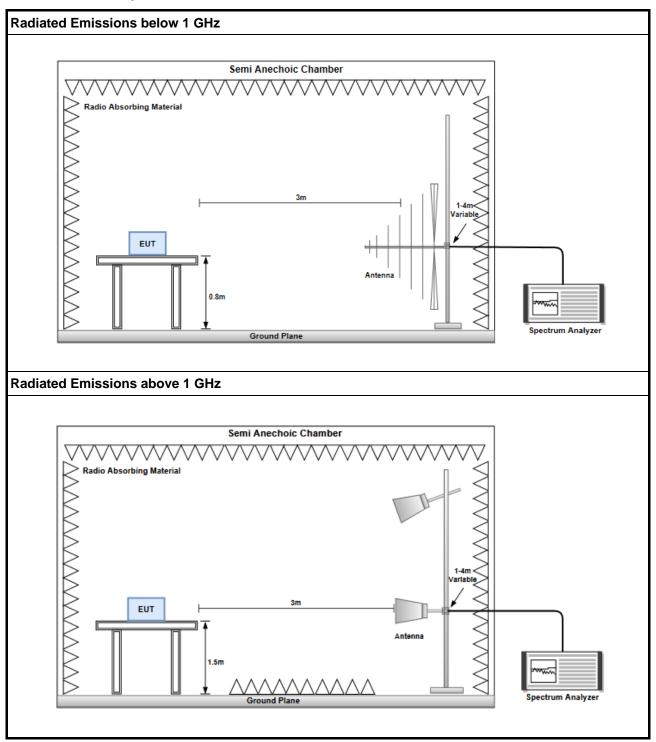
20log (Duty cycle) = 20log 
$$\frac{1s / 1600 * 5}{100 \text{ ms}}$$
 = -30.1dB

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

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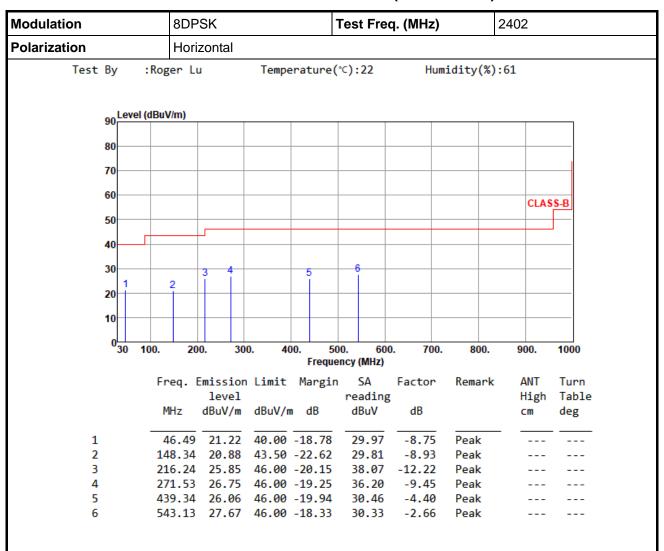
### 3.2.3 Test Setup



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



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).

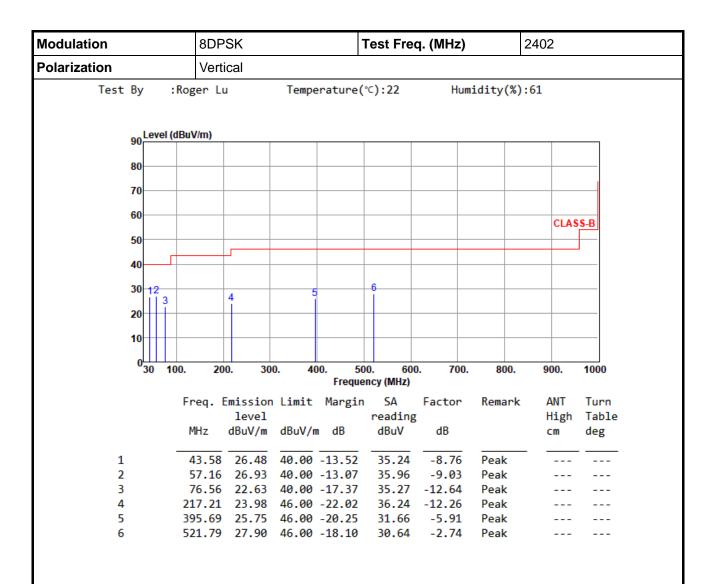
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

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

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

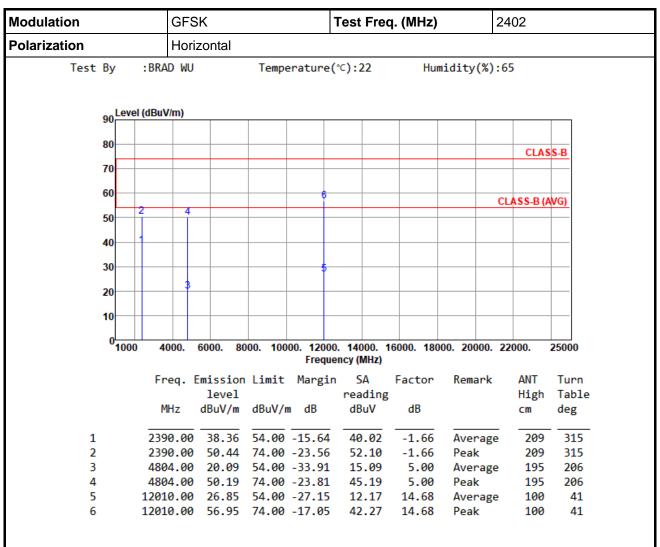
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

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

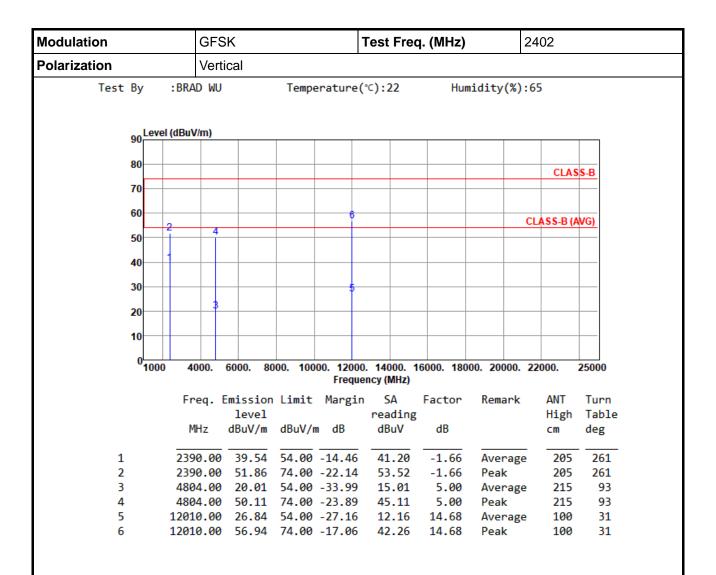


Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

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

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





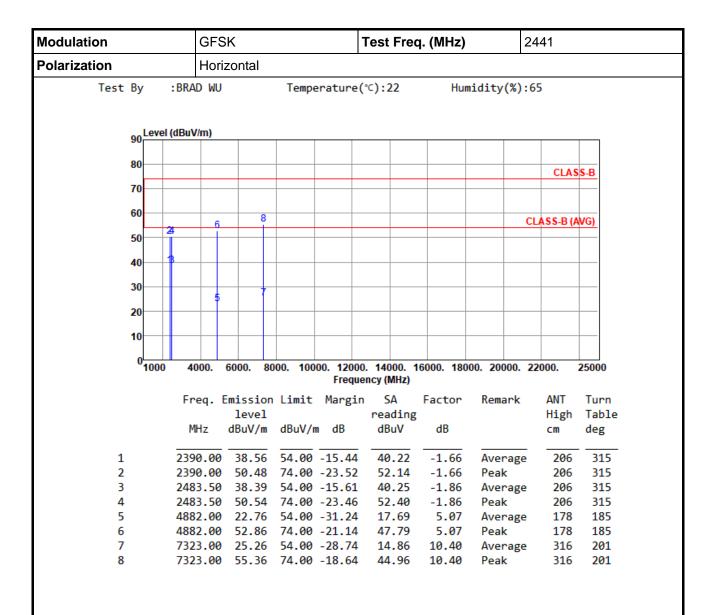
\*Factor includes antenna factor, cable loss and amplifier gain

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

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

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

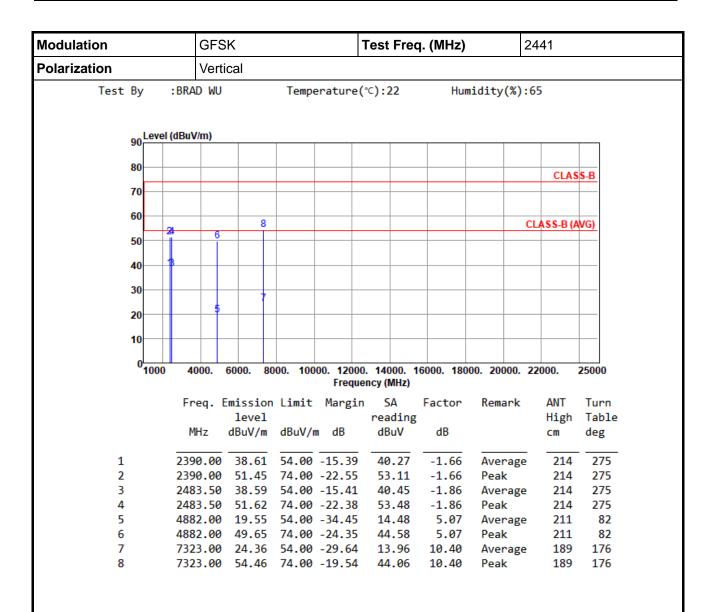
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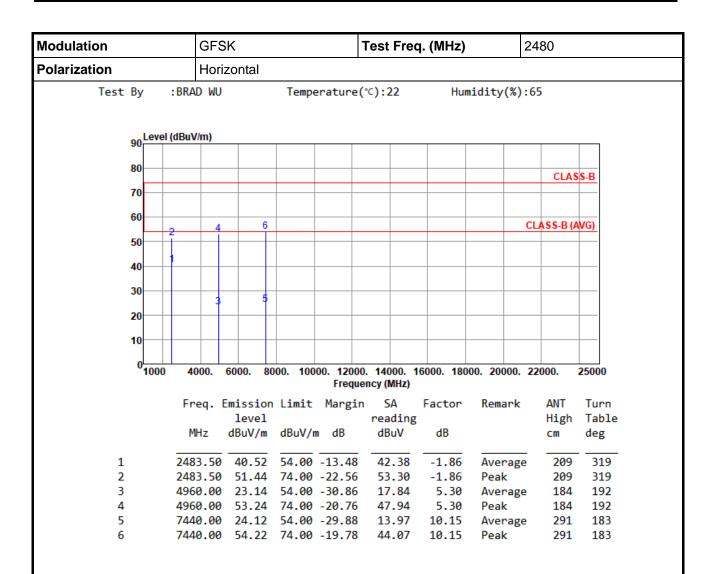




\*Factor includes antenna factor, cable loss and amplifier gain

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



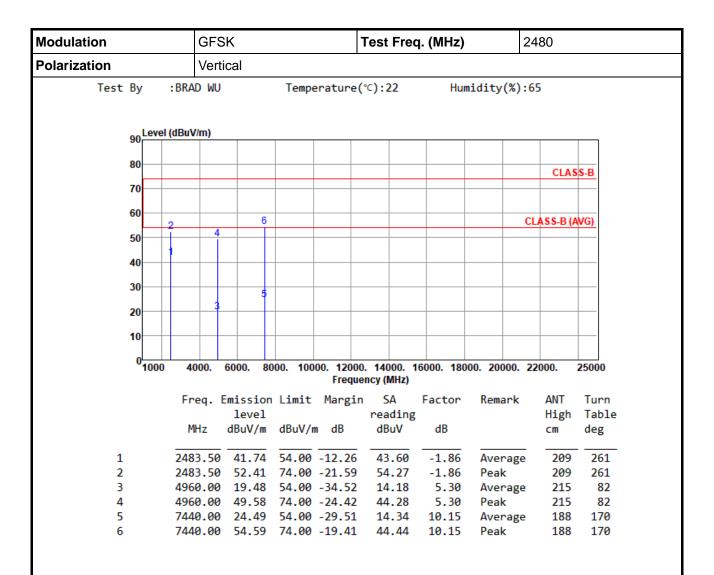


\*Factor includes antenna factor, cable loss and amplifier gain

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

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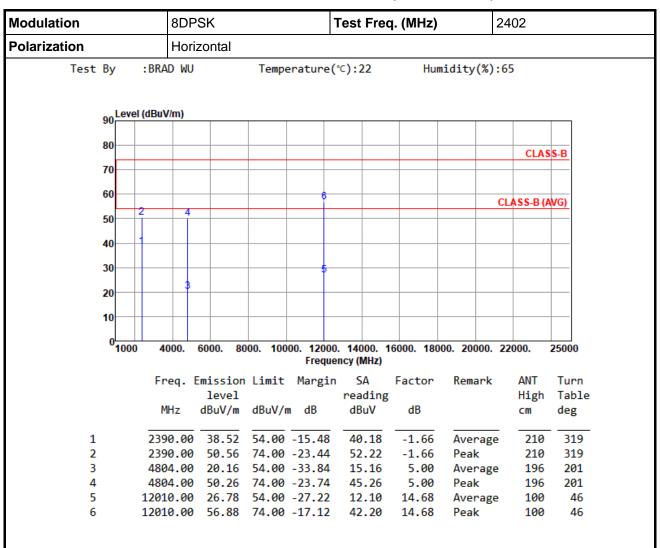


\*Factor includes antenna factor, cable loss and amplifier gain

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



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



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

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\*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		Verti	Vertical								
Test By	:BRA	D WU		Tempe	erature(	(°⊂):22		Hun	nidity(%)	:65	
gn_Le	vel (dBu\	//m)									
80										CLAS	S-B
70											
60											
00	2	4								CLASS-B (A	WG)
50		ΗŤ									
40	1										
30					- 5						
20		- 3									
10											
<sup>0</sup> 10	000 4	000.	6000. 80	00. 100				000. 180	00. 20000.	22000.	25000
						ency (MH					
	Fr	eq. E	mission level	Limit	Margir			actor	Remark		Turn
	N	1Hz	dBuV/m	dBuV/r	n dB	readi dBuV		dB		High cm	Table deg
		1112	ubuv/iii	ubuv/i	ıı ub	ubuv		ub		CIII	ueg
1	239	0.00	39.59	54.00	-14.41	41.2	25	-1.66	Averag	e 208	266
2		0.00			-21.94	53.7		-1.66	Peak	208	266
3		4.00			-33.74	15.2		5.00	Average		99
4					-23.64	45.3		5.00	Peak	216	99
5 6		0.00	26.88 56.98		-27.12	12.2 42.3		14.68 14.68	Average Peak	e 100 100	54 54
U	1201	0.00	30.30	74.00	-17.02	42.3	0	14.00	reak	100	54

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).

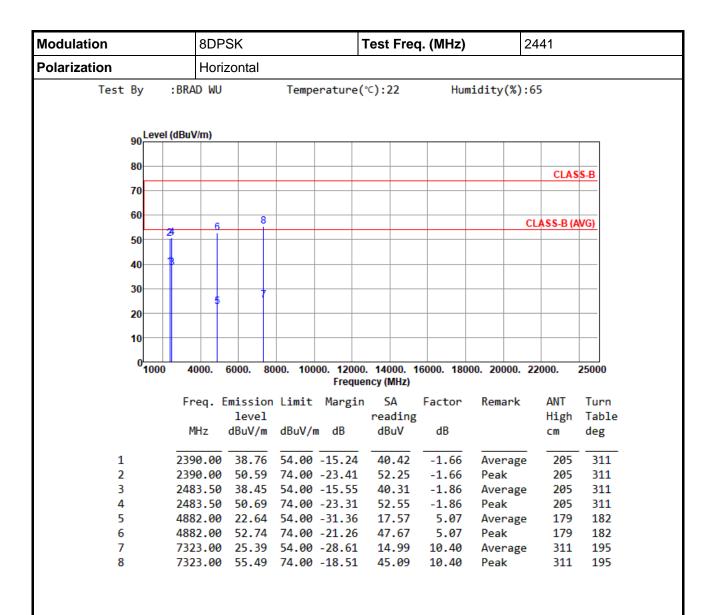
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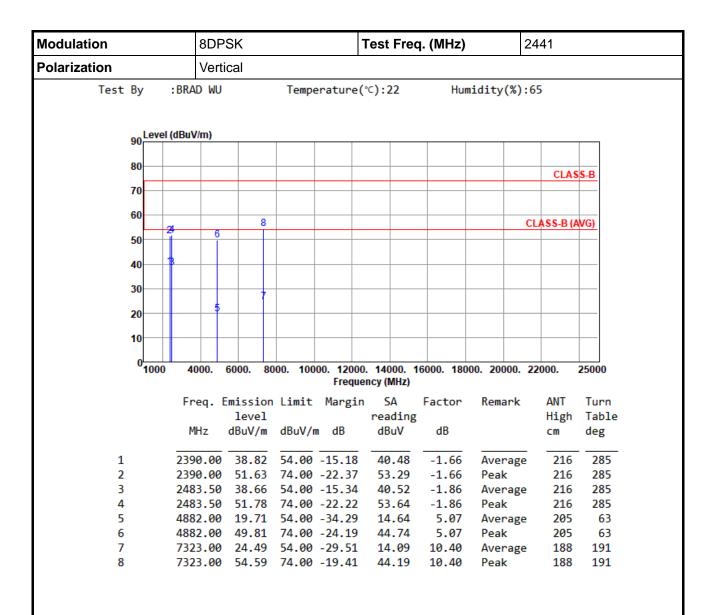
\*Factor includes antenna factor, cable loss and amplifier gain

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

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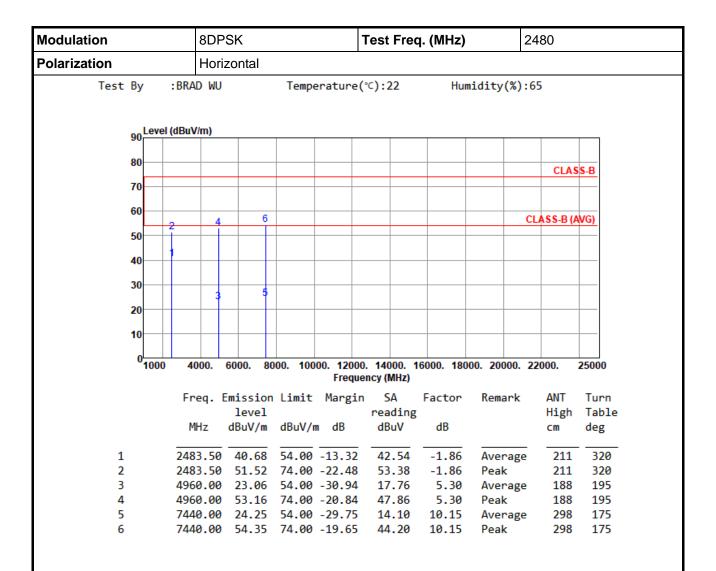




\*Factor includes antenna factor, cable loss and amplifier gain

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





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

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

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Modulation		8DPS	K			Test Fr	eq. (MH	z)	2480		
Polarization		Vertic	Vertical								
Test By	:BRA	D WU		Tempe	erature	(℃):22	ı	Humidity(%	3):65		
90 Lev	vel (dBu\	//m)									
80											
70									CLA	SS-B	
60	2		6						CLASS-B (	AVG)	
50		4									
40	1										
30											
			5								
20											
10											
0 100	00 40	000. 60	000. 8	2000 100	00 1200	14000	16000	18000. 20000	22000	25000	
100	00 4					ency (MHz		10000. 20000	. 22000.	25000	
	Fr			n Limit	Margi		Facto	or Remar		Turn	
			level		ID.	readin			High		
	M	lHz d	iBuv/m	dBuV/r	п ав	dBuV	dB		CM	deg	
1		3.50			-11.75	44.11					
2		3.50			-20.44	55.42			211		
3 4				54.00 74.00				,	ge 216 216		
5				54.00							
6				74.00				,	185		

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).

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### 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

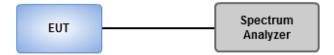
#### Reference level measurement

- 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

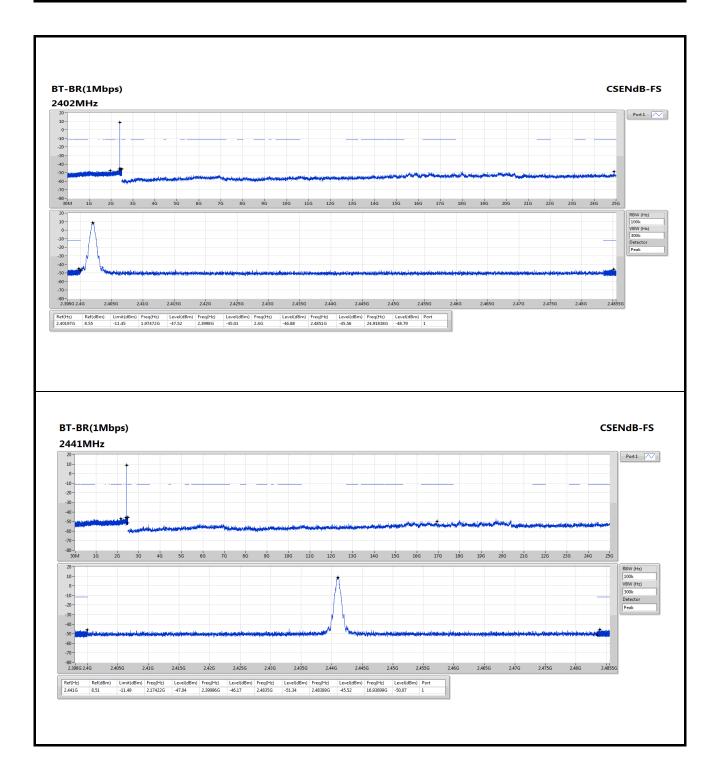
#### 3.3.3 Test Setup



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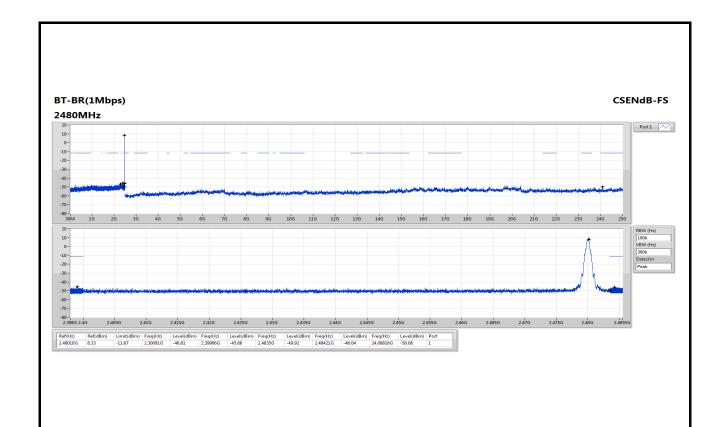
### 3.3.4 Unwanted Emissions into Non-Restricted Frequency Bands

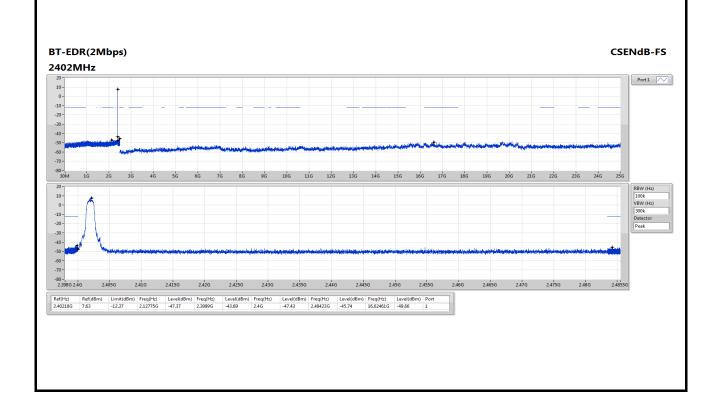


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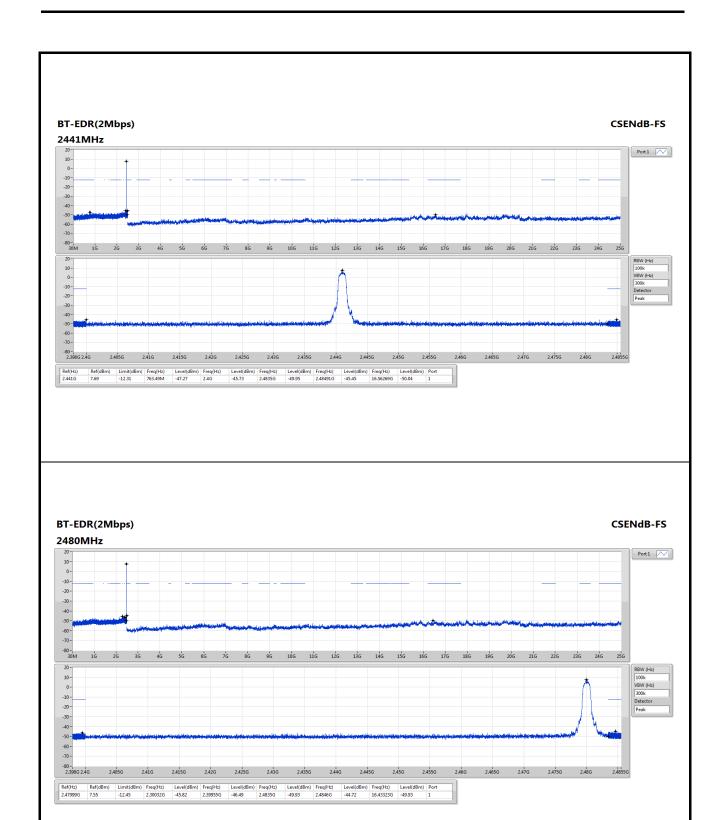
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The previous version of the test report has been cancelled and replaced by new version.

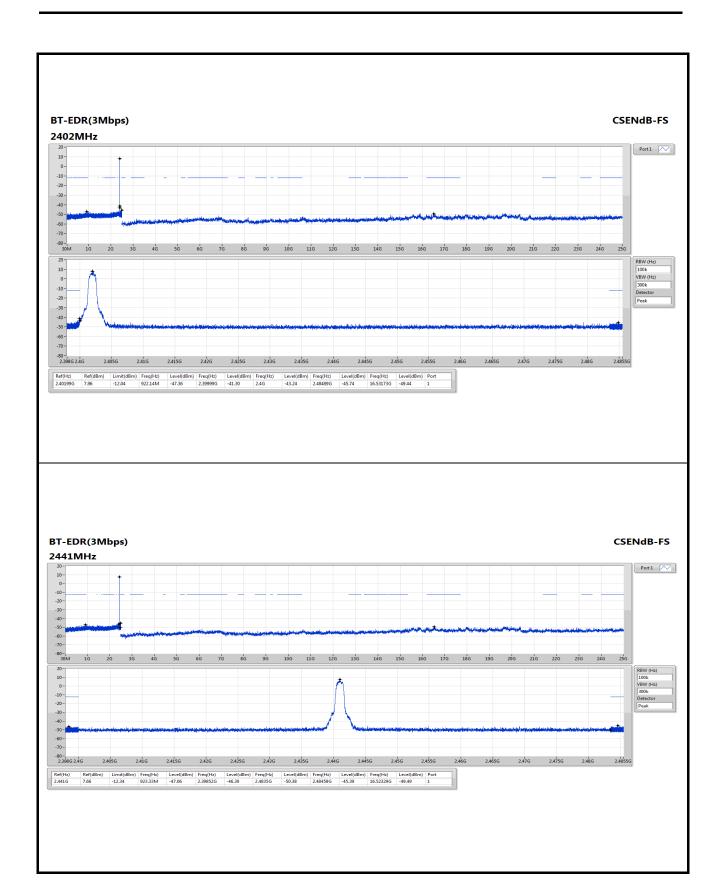




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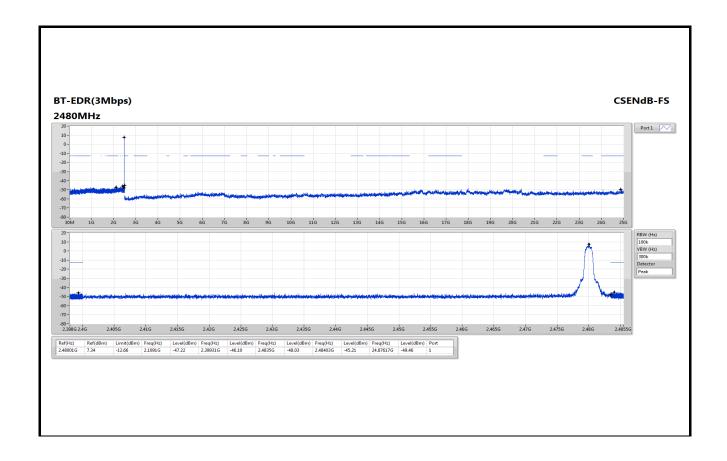




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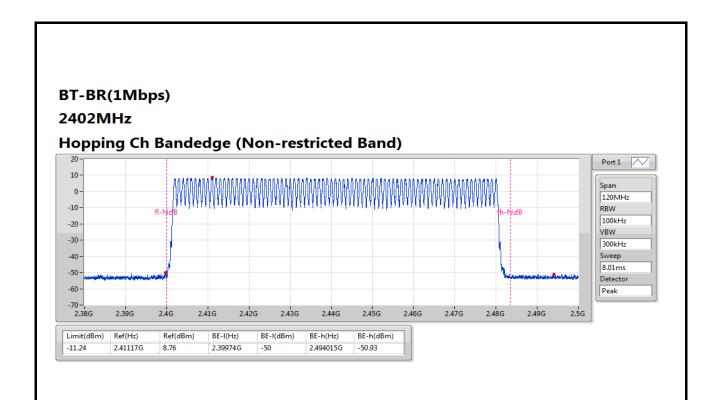
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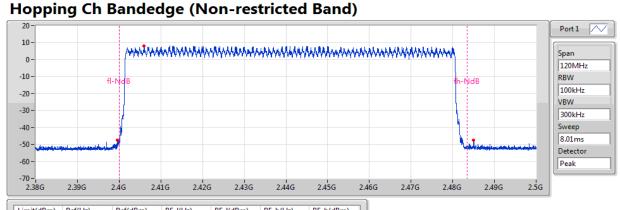


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# BT-EDR(2Mbps) 2402MHz Hopping Ch Bandedge (

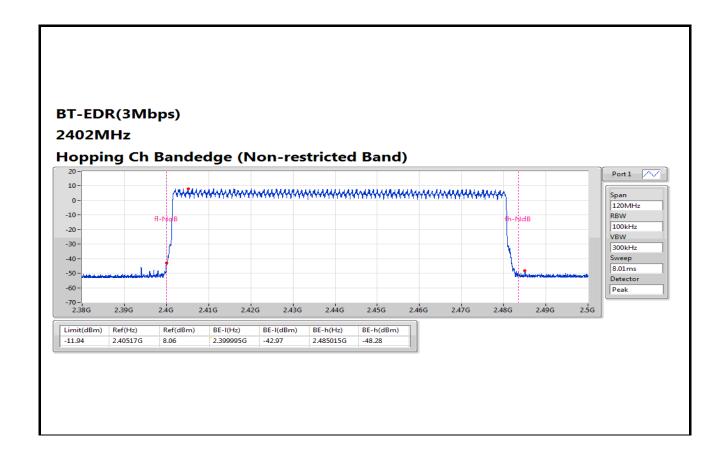


l	2.38G	2.39G	2.4G	2.41G	2.42G	2.43G	2.44G	2.45G	
ĺ	Limit(dBm)	Ref(Hz)	Ref(dBm)	BE-I	(Hz) BI	E-I(dBm)	BE-h(Hz)	BE-h(dBm)	
	-12.01	2.405995G	7.99			7.35	2.48503G	-47.35	1

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# 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

- 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



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# 3.4.4 Test Result of Conducted Output Power

Ambient Condition	22°C / 64%	Tested By	Brad Wu
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#### **Summary of Peak Conducted Output Power**

Mode	Power	Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	9.43	0.00877
BT-EDR(2Mbps)	10.95	0.01245
BT-EDR(3Mbps)	11.42	0.01387

#### Result

Mode	Result	Gain	Power	Power Limit
		(dBi)	(dBm)	(dBm)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	3.00	9.43	21.00
2441MHz	Pass	3.00	9.25	21.00
2480MHz	Pass	3.00	9.02	21.00
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	3.00	10.95	21.00
2441MHz	Pass	3.00	10.78	21.00
2480MHz	Pass	3.00	10.54	21.00
BT-EDR(3Mbps)	-	-	-	-
2402MHz	Pass	3.00	11.42	21.00
2441MHz	Pass	3.00	11.27	21.00
2480MHz	Pass	3.00	11.05	21.00

DG = Directional Gain; Port X = Port X output power

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## **Summary of Conducted (Average) Output Power**

Mode	Power	Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	9.36	0.00863
BT-EDR(2Mbps)	8.41	0.00693
BT-EDR(3Mbps)	8.41	0.00693

#### Result

Mode	Result	Gain	Power	Power Limit
		(dBi)	(dBm)	(dBm)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	3.00	9.36	-
2441MHz	Pass	3.00	9.19	-
2480MHz	Pass	3.00	8.95	-
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	3.00	8.41	-
2441MHz	Pass	3.00	8.23	-
2480MHz	Pass	3.00	7.99	-
BT-EDR(3Mbps)	-	-	-	-
2402MHz	Pass	3.00	8.41	-
2441MHz	Pass	3.00	8.23	-
2480MHz	Pass	3.00	7.99	-

Note: Average power is for reference only.

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# 3.5 Number of Hopping Frequency

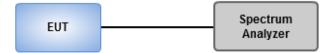
## 3.5.1 Limit of Number of Hopping Frequency

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



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# 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

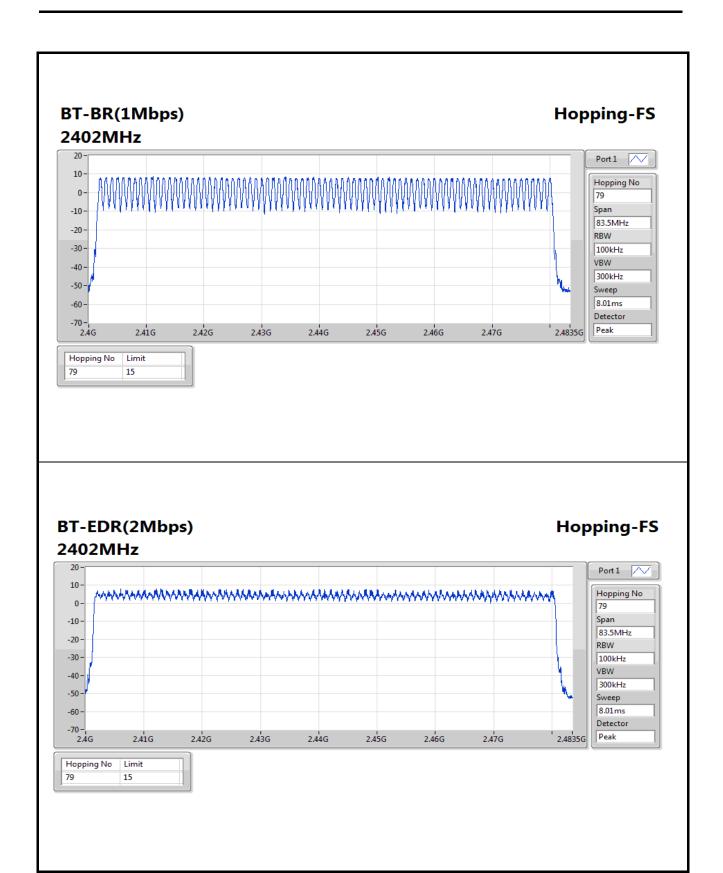
#### Result

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

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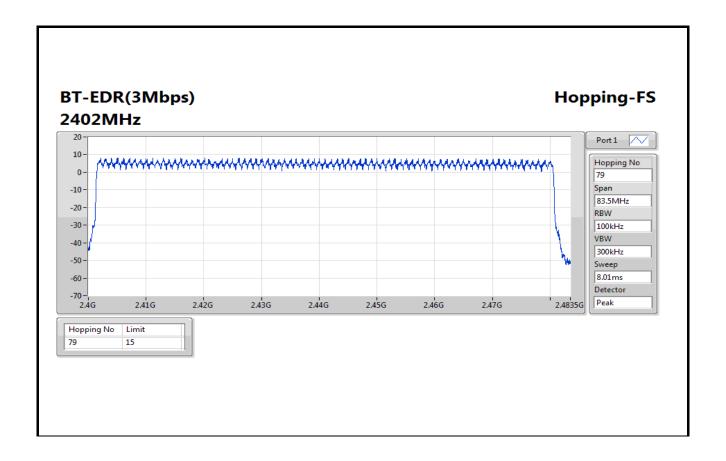


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# 3.6 20dB and Occupied Bandwidth

#### 3.6.1 Test Procedures

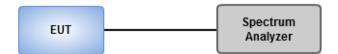
#### 20dB Bandwidth

- 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**

- 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



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## 3.6.3 Test result of 20dB and Occupied Bandwidth

Ambient Condition	22°C / 64%	Tested By	Brad Wu

**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)	938.406k	879.161k	879KF1D	934.783k	879.161k
BT-EDR(2Mbps)	1.337M	1.205M	1M21G1D	1.322M	1.198M
BT-EDR(3Mbps)	1.333M	1.212M	1M21G1D	1.312M	1.198M

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

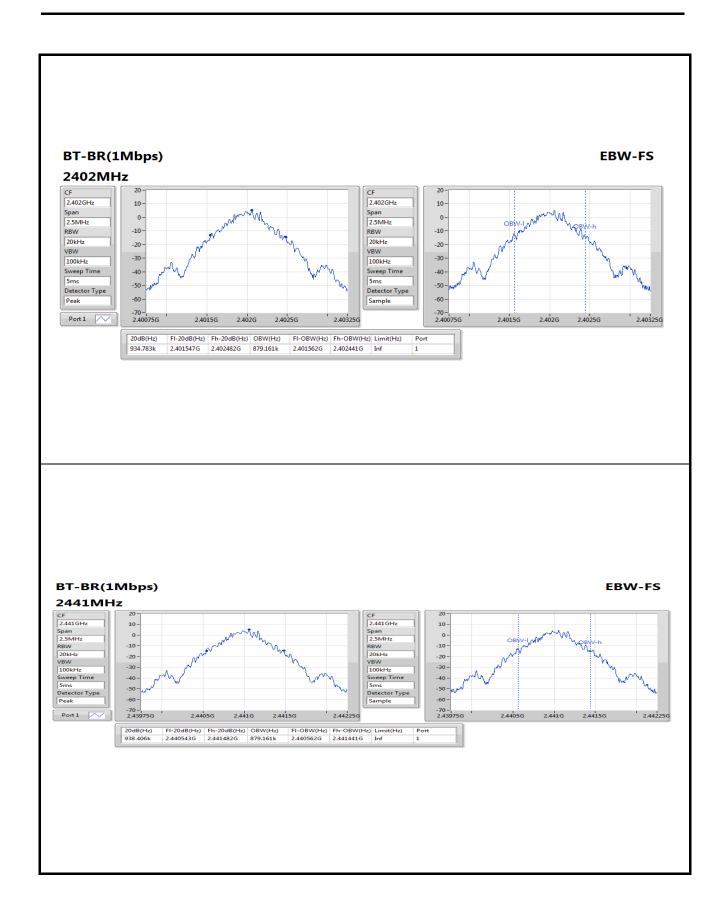
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-BR(1Mbps)	-	-	-	-
2402MHz	Pass	Inf	934.783k	879.161k
2441MHz	Pass	Inf	938.406k	879.161k
2480MHz	Pass	Inf	934.783k	879.161k
BT-EDR(2Mbps)	-	-	-	-
2402MHz	Pass	Inf	1.322M	1.205M
2441MHz	Pass	Inf	1.33M	1.198M
2480MHz	Pass	Inf	1.337M	1.198M
BT-EDR(3Mbps)	-	-	-	-
2402MHz	Pass	Inf	1.315M	1.205M
2441MHz	Pass	Inf	1.312M	1.212M
2480MHz	Pass	Inf	1.333M	1.198M

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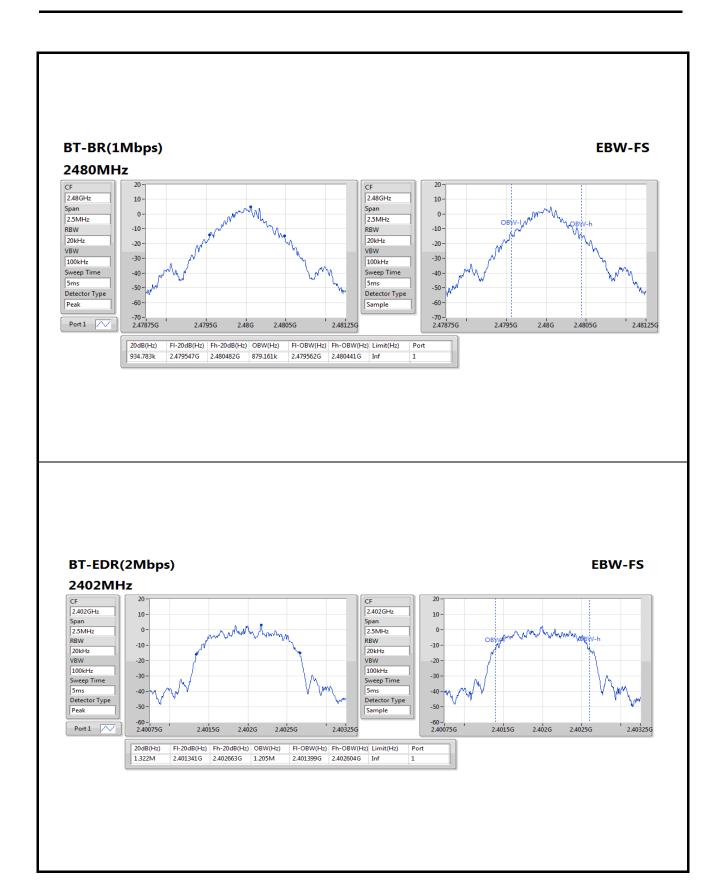
Port X-N dB = Port X 20dB down bandwidth; Port X-OBW = Port X 99% occupied bandwidth

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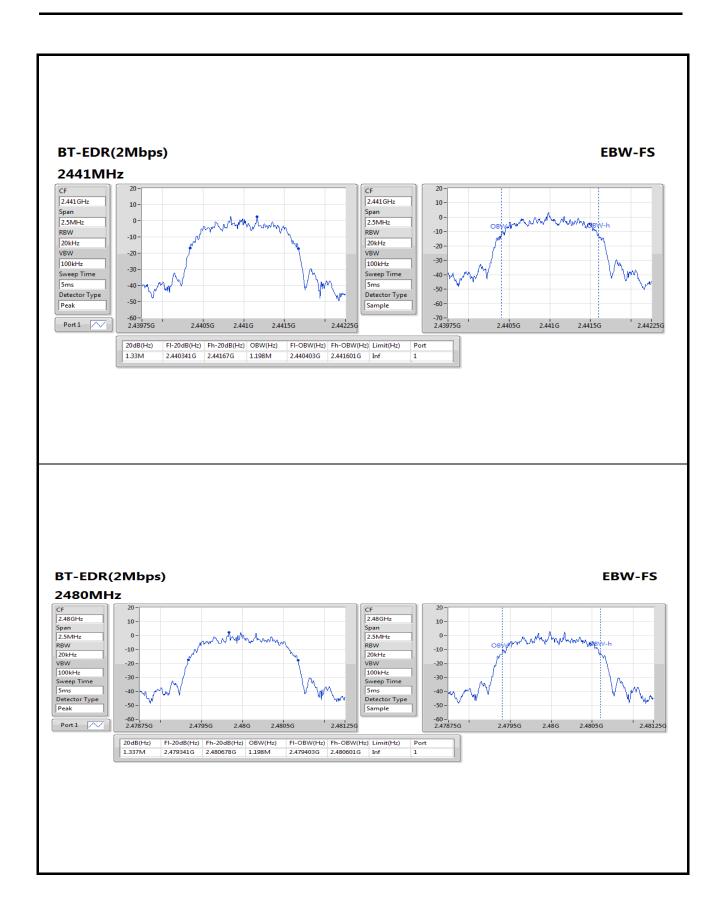




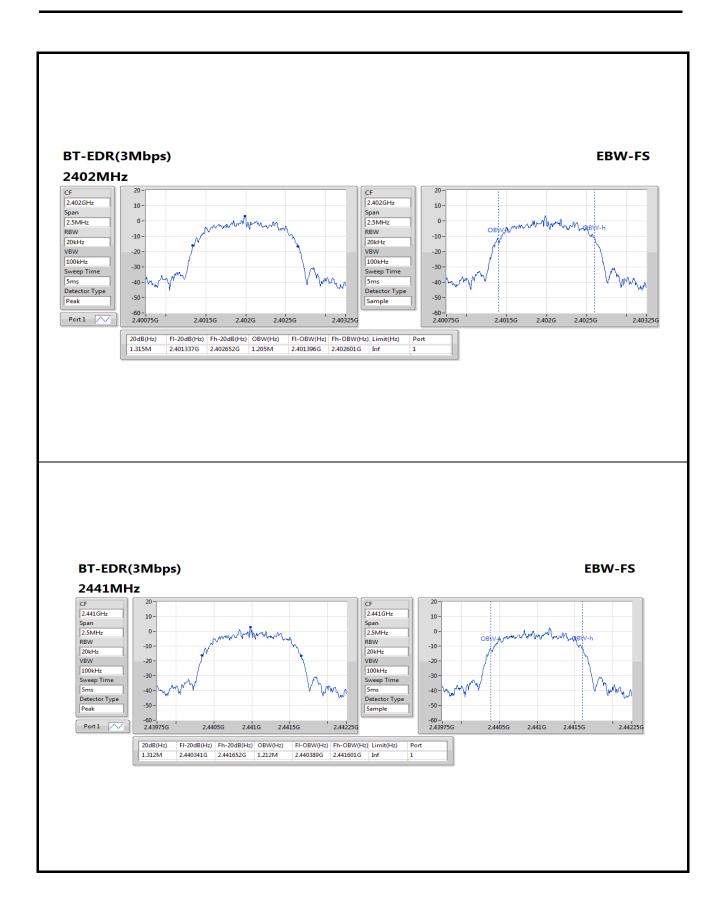










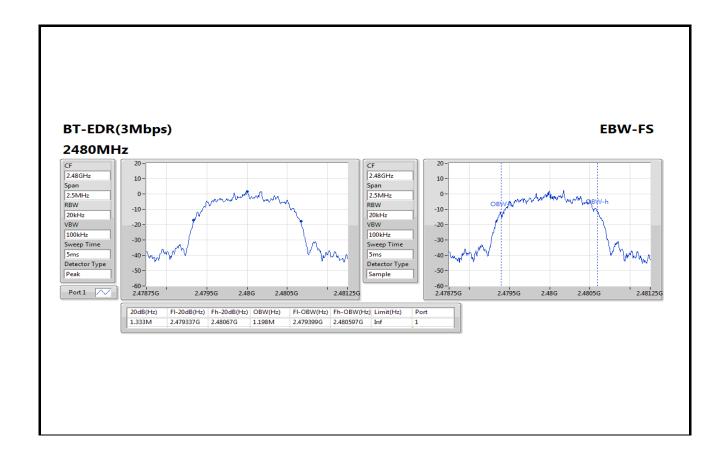


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# 3.7 Channel Separation

#### 3.7.1 Limit of Channel Separation

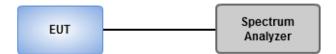
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum
of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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



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# 3.7.4 Test result of Channel Separation

Ambient Condition	22°C / 64%	Tested By	Brad Wu
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Summary

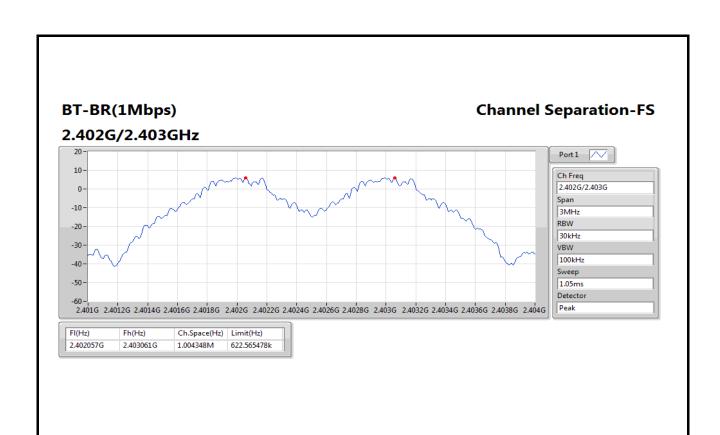
Mode	Max-Space (Hz)	Min-Space (Hz)
2.4-2.4835GHz	-	-
BT-BR(1Mbps)	1.004348M	1M
BT-EDR(2Mbps)	1.004348M	1M
BT-EDR(3Mbps)	1.004348M	1.004348M

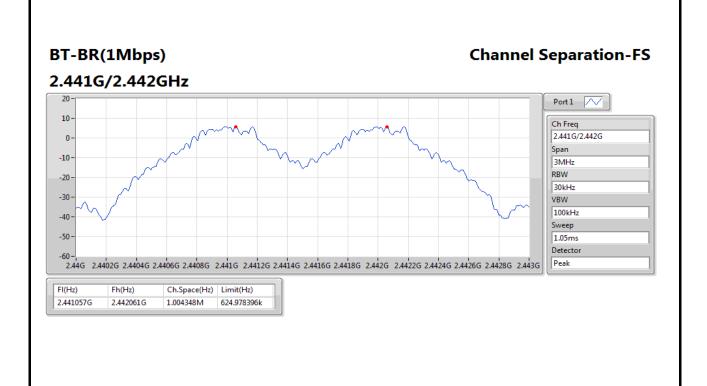
#### Result

Mode	Result	FI	Fh	Ch.Space	Limit
		(Hz)	(Hz)	(Hz)	(Hz)
BT-BR(1Mbps)	-	-	-	-	-
2402MHz	Pass	2.402057G	2.403061G	1.004348M	622.565478k
2441MHz	Pass	2.441057G	2.442061G	1.004348M	624.978396k
2480MHz	Pass	2.479061G	2.480061G	1M	622.565478k
BT-EDR(2Mbps)	-	-	-	-	-
2402MHz	Pass	2.401991G	2.402996G	1.004348M	880.452k
2441MHz	Pass	2.440991G	2.441996G	1.004348M	885.78k
2480MHz	Pass	2.478991G	2.479991G	1M	890.442k
BT-EDR(3Mbps)	-	-	-	-	-
2402MHz	Pass	2.401991G	2.402996G	1.004348M	875.79k
2441MHz	Pass	2.440991G	2.441996G	1.004348M	873.792k
2480MHz	Pass	2.478991G	2.479996G	1.004348M	887.778k

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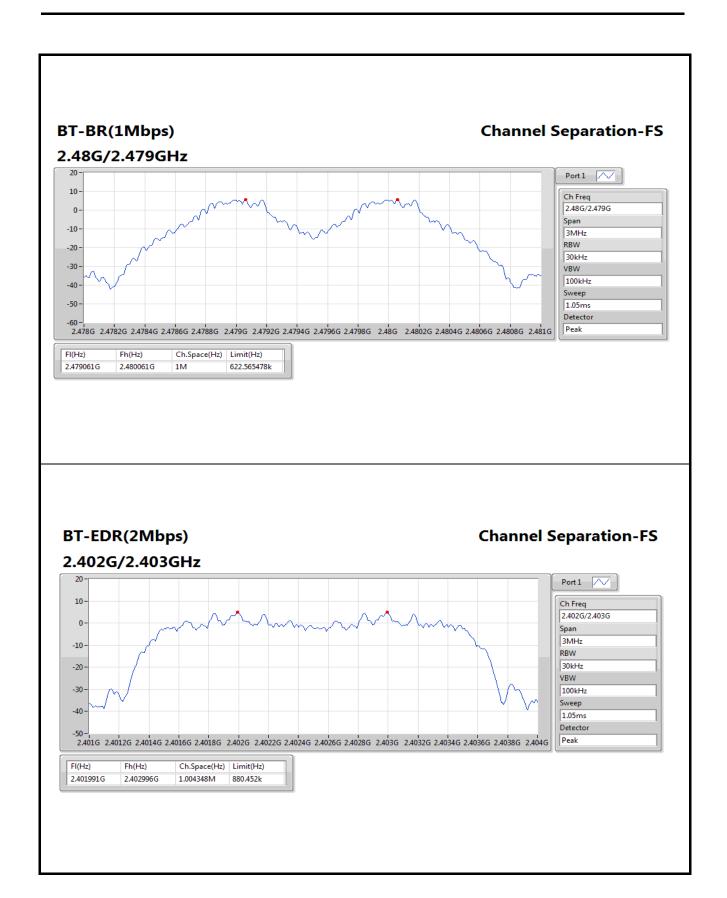


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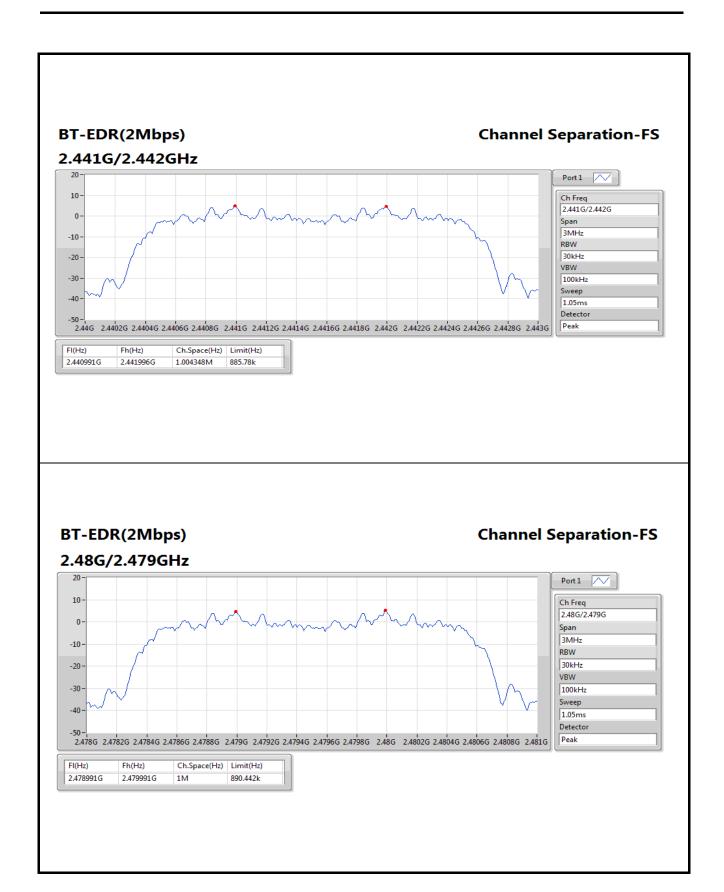




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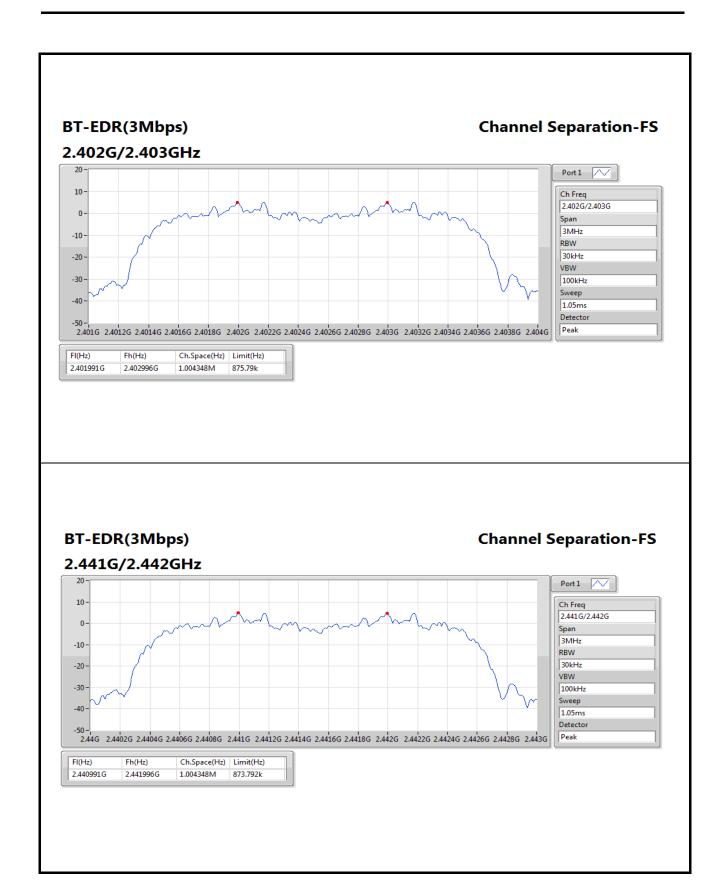


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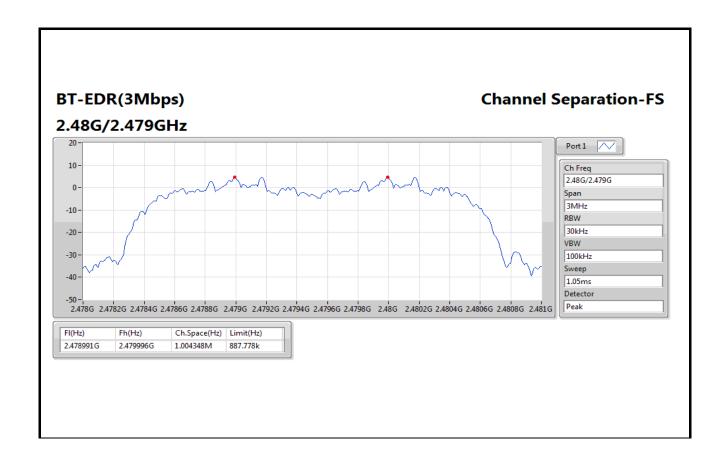


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#### 3.8 Number of Dwell Time

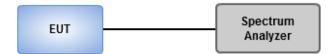
#### 3.8.1 Limit of Dwell time

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



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## 3.8.4 Test Result of Dwell Time

Ambient Condition	22°C / 64%	Tested By	Brad Wu
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**Summary** 

Mode	Max-Dwell		
	(s)		
2.4-2.4835GHz	-		
BT-BR(1Mbps)	310.98508m_DH5		
BT-EDR(2Mbps)	330.0462m_DH5		
BT-EDR(3Mbps)	330.15996m_DH5		
BT-BR-AFH(1Mbps)	312.606m_DH5-AFH		
BT-EDR-AFH(2Mbps)	301.73m_DH5-AFH		
BT-EDR-AFH(3Mbps)	290.225m_DH5-AFH		

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#### **Result/ Non AFH mode**

Mode	Result	Period	Dwell	Limit	Tx On	Number of
		(s)	(s)	(s)	(ms)	transmission in a 5 s
BT-BR(1Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	31.6	0.31099	0.4	2.89450	17
BT-EDR(2Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	31.6	0.33005	0.4	2.90125	18
BT-EDR(3Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	31.6	0.33016	0.4	2.90225	18

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.

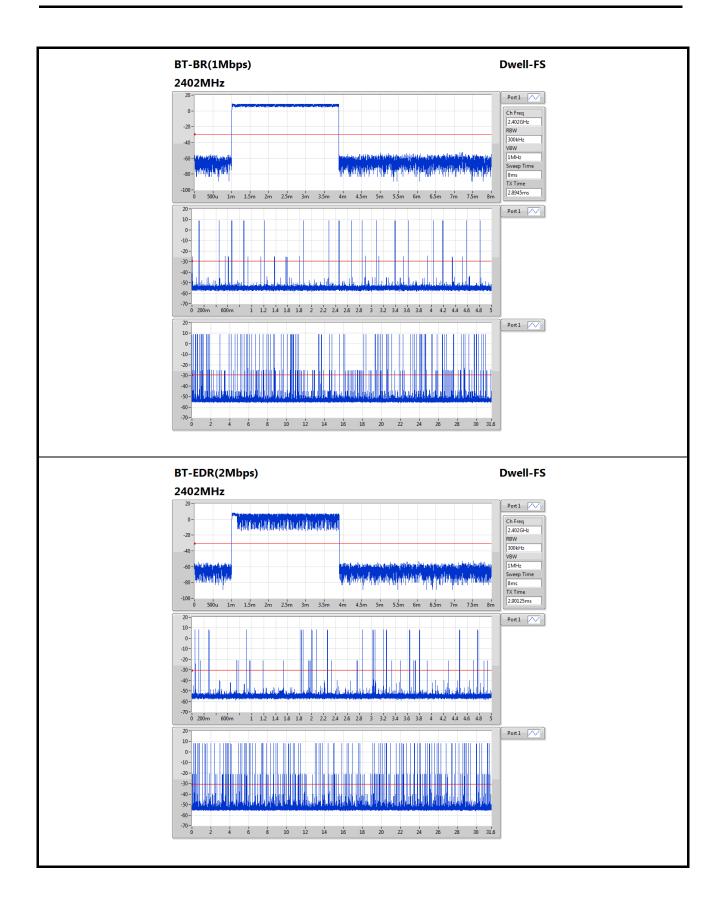
#### Result/ AFH mode

Mode	Result	Period	Dwell	Limit	Tx On	Number of
		(s)	(s)	(s)	(ms)	transmission
						in a 2 s
BT-BR-AFH(1Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	8	0.31261	0.4	2.89450	27
BT-EDR-AFH(2Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	8	0.30173	0.4	2.90125	26
BT-EDR-AFH(3Mbps)	-	-	-	-	-	-
2402MHz_DH5	PASS	8	0.29023	0.4	2.90225	25

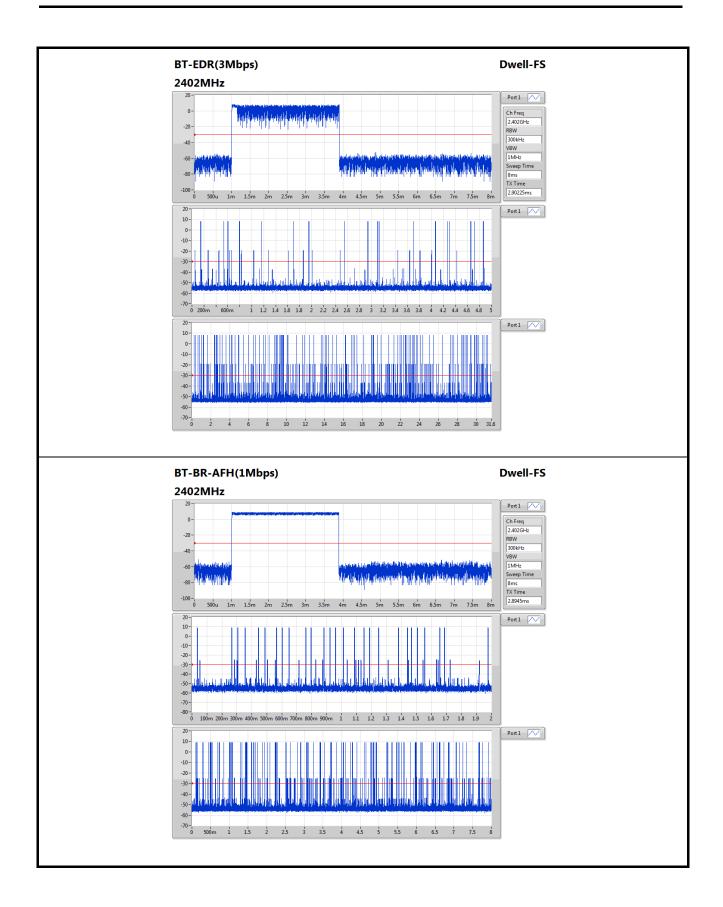
Note 1: Dwell time = Number of transmission in a 2 second x Tx On Time x 4

Note 2: DH5 was the worst mode.

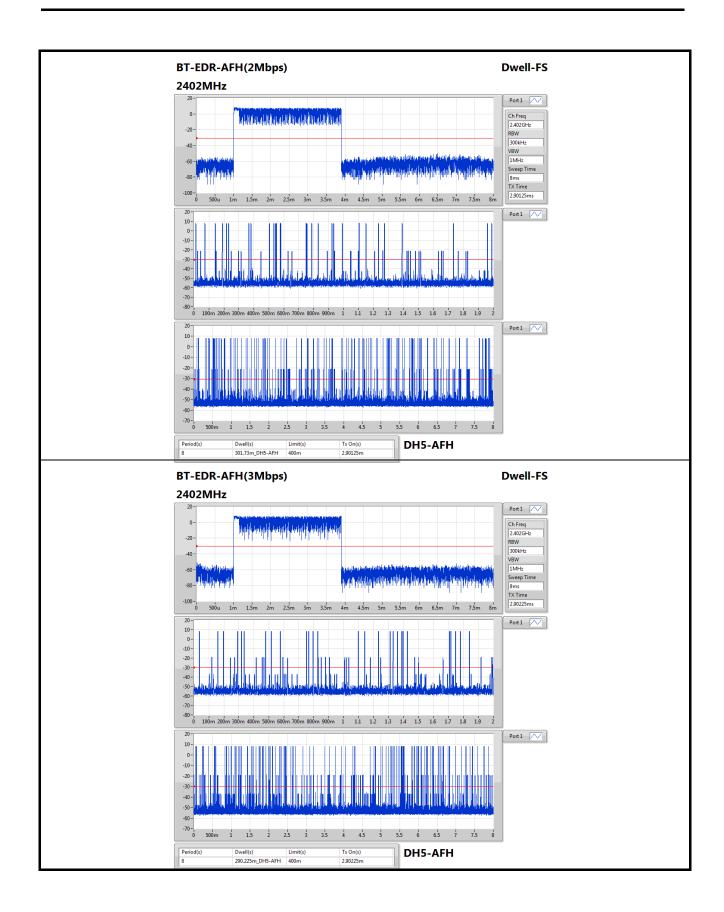














# 4 Test laboratory information

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 <a href="http://www.icertifi.com.tw">http://www.icertifi.com.tw</a>.

Linkou

Tel: 886-2-2601-1640

No.30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan

(R.O.C.)

Kwei Shan

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

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