

# TEST REPORT

Product Name: Bluetooth headset  
FCC ID: 2AQ2F-X13  
Trademark: N/A  
Model Number: X13, CT03, CT02, CT01, HT01, CT05, CT06, CT08, HT02, HT03  
Prepared For: Shenzhen Haiguoda Technology Co., Ltd.  
Address: 3/F, Building 5, Longbi Industrial Zone, Bantian, Longgang District, Shenzhen, China  
Manufacturer: Dongguan Dayu Technology Co., Ltd  
Address: Room 101, No. 2, Shaling Market Road, Fenggang Town, Dongguan City, Guangdong Province, China  
Prepared By: Shenzhen CTB Testing Technology Co., Ltd.  
Address: 1&2/F., Building A, No.26, Xinhe Road, Xinqiao, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China  
Sample Received Date: Nov. 23, 2022  
Sample tested Date: Nov. 23, 2022 to Nov. 26, 2022  
Issue Date: Nov. 26, 2022  
Report No.: CTB221126028RFX  
Test Standards: FCC Part15.247  
ANSI C63.10:2013  
Test Results: PASS  
Remark: This is Bluetooth radio test report.

Compiled by:

Chen Zheng

Reviewed by:

Arron Liu

Approved by:

Bin Mei / Director

Note: If there is any objection to the inspection results in this report, please submit a written report to the company within 15 days from the date of receiving the report. The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen CTB Testing Technology Co., Ltd. this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client. "\*" indicates the testing items were fulfilled by subcontracted lab. "#" indicates the items are not in CNAS accreditation scope.

**TABLE OF CONTENT**

Test Report Declaration	Page
<b>1. VERSION</b> .....	4
<b>2. TEST SUMMARY</b> .....	5
<b>3. MEASUREMENT UNCERTAINTY</b> .....	6
<b>4. PRODUCT INFORMATION AND TEST SETUP</b> .....	7
4.1 Product Information .....	7
4.2 Test Setup Configuration .....	7
4.3 Support Equipment .....	7
4.4 Channel List .....	8
4.5 Test Mode .....	8
4.6 Test Environment .....	8
<b>5. TEST FACILITY AND TEST INSTRUMENT USED</b> .....	9
5.1 Test Facility .....	9
5.2 Test Instrument Used .....	9
<b>6. AC POWER LINE CONDUCTED EMISSION</b> .....	12
6.1 Block Diagram Of Test Setup .....	12
6.2 Limit .....	12
6.3 Test procedure .....	12
6.4 Test Result .....	14
<b>7. RADIATED SPURIOUS EMISSION</b> .....	16
7.1 Block Diagram Of Test Setup .....	16
7.2 Limit .....	16
7.3 Test procedure .....	17
7.4 Test Result .....	18
<b>8. BAND EDGE AND RF CONDUCTED SPURIOUS EMISSIONS</b> .....	34
8.1 Block Diagram Of Test Setup .....	34
8.2 Limit .....	34
8.3 Test procedure .....	34
8.4 Test Result .....	35
<b>9. CONDUCTED PEAK OUTPUT POWER</b> .....	42
9.1 Block Diagram Of Test Setup .....	42
9.2 Limit .....	42
9.3 Test procedure .....	42
9.4 Test Result .....	43
<b>10. 20DB OCCUPIED BANDWIDTH</b> .....	47
10.1 Block Diagram Of Test Setup .....	47
10.2 Limit .....	47
10.3 Test procedure .....	47
10.4 Test Result .....	47
<b>11. CARRIER FREQUENCIES SEPARATION</b> .....	51
11.1 Block Diagram Of Test Setup .....	51
11.2 Limit .....	51
11.3 Test procedure .....	51
11.4 Test Result .....	51
<b>12. HOPPING CHANNEL NUMBER</b> .....	55
12.1 Block Diagram Of Test Setup .....	55
12.2 Limit .....	55
12.3 Test procedure .....	55
12.4 Test Result .....	55

<b>13. DWELL TIME</b> .....	57
13.1 Block Diagram Of Test Setup .....	57
13.2 Limit .....	57
13.3 Test procedure .....	57
13.4 Test Result .....	58
<b>14. PSEUDORANDOM FREQUENCY</b> .....	62
14.1 Limit .....	62
14.2 Test procedure .....	62
14.3 Test Result .....	63
<b>15. ANTENNA REQUIREMENT</b> .....	64
<b>16. EUT TEST SETUP PHOTOGRAPHS</b> .....	65

(Note: N/A means not applicable)



1. VERSION

Report No.	Issue Date	Description	Approved
CTB221126028RFX	Nov. 26, 2022	Original	Valid

## 2. TEST SUMMARY

The Product has been tested according to the following specifications:

Test Item	Test Requirement	Test method	Result
<b>AC Power Line Conducted Emission</b>	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	PASS
<b>Radiated Spurious emissions</b>	47 CFR Part 15 Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS
<b>Band edge and RF Conducted Spurious Emissions</b>	47 CFR Part 15 Subpart C Section 15.247(d)/15.205(a)	ANSI C63.10-2013	PASS
<b>Conducted Peak Output Power</b>	47 CFR Part 15 Subpart C Section 15.247 (b)(1)	ANSI C63.10-2013	PASS
<b>20dB Occupied Bandwidth</b>	47 CFR Part 15 Subpart C Section 15.247 (a)(1)	ANSI C63.10-2013	PASS
<b>Carrier Frequencies Separation</b>	47 CFR Part 15 Subpart C Section 15.247 (a)(1)	ANSI C63.10-2013	PASS
<b>Hopping Channel Number</b>	47 CFR Part 15 Subpart C Section 15.247 (b)	ANSI C63.10-2013	PASS
<b>Dwell Time</b>	47 CFR Part 15 Subpart C Section 15.247 (a)(1)	ANSI C63.10-2013	PASS
<b>Pseudorandom Frequency Hopping Sequence</b>	47 CFR Part 15 Subpart C Section 15.247(a)&TCB Exclusion List (7 July 2002)	ANSI C63.10-2013	PASS
<b>Antenna Requirement</b>	47 CFR Part 15 Subpart C Section 15.203/15.247 (b)	/	PASS
<b>RF Exposure Evaluation</b>	47 CFR Part 15 Subpart C Section 15.247 (i)/1.1310/2.1093	KDB447498D01v06	PASS

Remark:

Test according to ANSI C63.10-2013.

### 3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Item	Uncertainty
Occupancy bandwidth	54.3kHz
Conducted output power Above 1G	0.9dB
Conducted output power below 1G	0.9dB
Power Spectral Density , Conduction	0.9dB
Conduction spurious emissions	2.0dB
Out of band emission	2.0dB
3m chamber Radiated spurious emission(9KHz-30MHz)	4.8dB
3m chamber Radiated spurious emission(30MHz-1GHz)	4.6dB
3m chamber Radiated spurious emission(1GHz-18GHz)	5.1dB
3m chamber Radiated spurious emission(18GHz-40GHz)	3.4dB
humidity uncertainty	5.5%
Temperature uncertainty	0.63°C
frequency	1×10 <sup>-7</sup>
Conducted Emission (150KHz-30MHz)	3.2 dB
Radiated Emission(30MHz ~ 1000MHz)	4.8 dB
Radiated Emission(1GHz ~6GHz)	4.9 dB

#### 4. PRODUCT INFORMATION AND TEST SETUP

##### 4.1 Product Information

Model(s): X13, CT03, CT02, CT01, HT01, CT05, CT06, CT08, HT02, HT03

Model Description: All the model are the same circuit and RF module, only for model name. Test sample model: X13

Bluetooth Version: Bluetooth 5.3

Hardware Version: V1.0

Software Version: V1.0

Operation Frequency: Bluetooth: 2402-2480MHz

Max. RF output power: Bluetooth: 2.696dBm

Type of Modulation: Bluetooth: GFSK,  $\pi/4$  DQPSK, 8DPSK

Antenna installation: Bluetooth: Chip antenna

Antenna Gain: Bluetooth: 1.8dBi

Ratings: DC 5V charging from adapter  
DC 3.7V from battery

##### 4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

##### 4.3 Support Equipment

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
1	Adapter	JIYIN	JY-05100C	/	/

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

#### 4.4 Channel List

CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)
0	2402	1	2403	2	2404	3	2405
4	2406	5	2407	6	2408	7	2409
8	2410	9	2411	10	2412	11	2413
12	2414	13	2415	14	2416	15	2417
16	2418	17	2419	18	2420	19	2421
20	2422	21	2423	22	2424	23	2425
24	2426	25	2427	26	2428	27	2429
28	2430	29	2431	30	2432	31	2433
32	2434	33	2435	34	2436	35	2437
36	2438	37	2439	38	2440	39	2441
40	2442	41	2443	42	2444	43	2445
44	2446	45	2447	46	2448	47	2449
48	2450	49	2451	50	2452	51	2453
52	2454	53	2455	54	2456	55	2457
56	2458	57	2459	58	2460	59	2461
60	2462	61	2463	62	2464	63	2465
64	2466	65	2467	66	2468	67	2469
68	2470	69	2471	70	2472	71	2473
72	2474	73	2475	74	2476	75	2477
76	2478	77	2479	78	2480	79	/

#### 4.5 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Low channel	Middle channel	High channel
Transmitting (GFSK, $\pi/4$ DQPSK, 8DPSK)	2402MHz	2441MHz	2480MHz
Receiving (GFSK, $\pi/4$ DQPSK, 8DPSK)	2402MHz	2441MHz	2480MHz

#### 4.6 Test Environment

Humidity(%):	54
Atmospheric Pressure(kPa):	101
Normal Voltage(DC):	3.7V
Normal Temperature( $^{\circ}$ C)	23
Low Temperature( $^{\circ}$ C)	0
High Temperature( $^{\circ}$ C)	40



## 5. TEST FACILITY AND TEST INSTRUMENT USED

### 5.1 Test Facility

All measurement facilities used to collect the measurement data are located at 1&2F., Building A, No. 26, Xinh Road, Xinqiao, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

### 5.2 Test Instrument Used

Item	Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	2023.07.19
2	Power Sensor	Agilent	U2021XA	MY56120032	2023.07.19
3	Power Sensor	Agilent	U2021XA	MY56120034	2023.07.19
4	Communication test set	R&S	CMW500	108058	2023.07.19
5	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	2023.07.19
6	Signal Generator	Agilent	N5181A	MY50140365	2023.07.19
7	Vector signal generator	Agilent	N5182A	MY47420195	2023.07.19
8	Communication test set	Agilent	E5515C	MY50102567	2023.07.19
9	2.4 GHz Filter	Shenxiang	MSF2400-2483.5MS-1154	20181015001	2023.07.19
10	5 GHz Filter	Shenxiang	MSF5150-5850 MS-1155	20181015001	2023.07.19
11	Filter	Xingbo	XBLBQ-DZA120	190821-1-1	2023.07.19
12	BT&WI-FI Automatic test software	Microwave	MTS8000	Ver. 2.0.0.0	/
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	2023.10.30
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	2023.07.19
15	234G Automatic test software	Microwave	MTS8200	Ver. 2.0.0.0	/
16	966 chamber	C.R.T.	966	/	2024.08.11
17	Receiver	R&S	ESPI	100362	2023.07.19
18	Amplifier	HP	8447E	2945A02747	2023.07.19
19	Amplifier	Agilent	8449B	3008A01838	2023.07.19

20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	2023.07.22
21	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA9120D	01911	2023.07.22
22	EMI test software	Fala	EZ-EMC	FA-03A2 RE	/
23	Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-224	2023.07.23
24	loop antenna	ZHINAN	ZN30900A	GTS534	/
25	40G Horn antenna	A/H/System	SAS-574	588	2024.10.30
26	Amplifier	AEROFLEX	Aeroflex	097	2024.10.30

Continuous disturbance					
No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	ROHDE&SCHWARZ	ESH3-Z5	100318	2023.07.19
2	Pulse limiter	ROHDE&SCHWARZ	ESH3Z2	357881052	2023.07.19
3	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100428/003	2023.07.19
4	Coaxial cable	ZDECL	Z302S-NJ-SMAJ-12M	18091905	2023.07.19
5	ISN	Schwarzbeck	NTFM8158	183	2023.07.19
6	Communication test set	Agilent	E5515C	MY50102567	2023.07.19
7	Communication test set	R&S	CMW500	108058	2023.07.19
8	EZ-EMC	Frad	EMC-con3A1.1	/	/

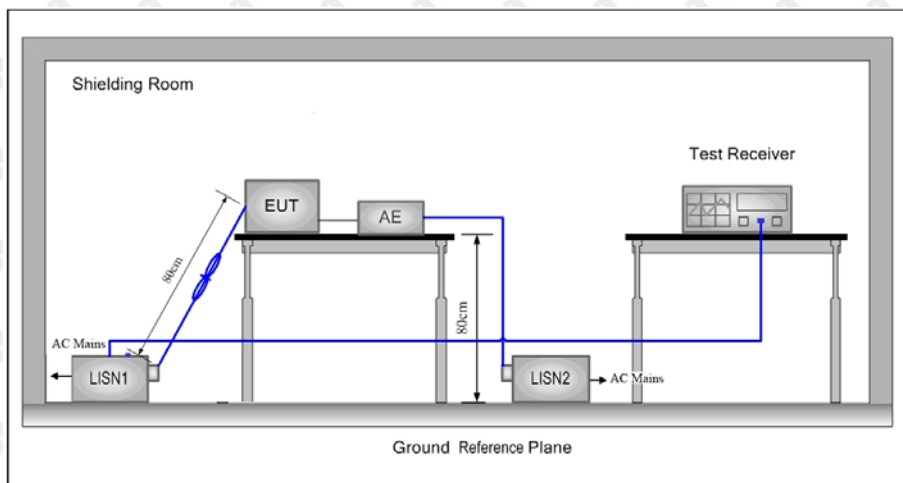
Radiated emission					
No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120 D	01911	2023.07.22
2	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	2023.07.22
3	Amplifier	Agilent	8449B	3008A01838	2023.07.19
4	Amplifier	HP	8447E	2945A02747	2023.07.19
5	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100428/003	2023.07.19
6	Coaxial cable	ETS	RFC-SNS-100-NMS-80 NI	/	2023.07.19
7	Coaxial cable	ETS	RFC-SNS-100-NMS-20 NI	/	2023.07.19
8	Coaxial cable	ETS	RFC-SNS-100-SMS-20 NI	/	2023.07.19
9	Coaxial cable	ETS	RFC-NNS-100-NMS-300 NI	/	2023.07.19
10	Communication test set	Agilent	E5515C	MY50102567	2023.07.19
11	Communication test set	R&S	CMW500	108058	2023.07.19



12	EZ-EMC	Frad	EMC-con3A1.1	/	/
----	--------	------	--------------	---	---

## 6. AC POWER LINE CONDUCTED EMISSION

### 6.1 Block Diagram Of Test Setup



### 6.2 Limit

**Table 4 – AC power-line conducted emissions limits**

Frequency (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 <sup>Note 1</sup>	56 to 46 <sup>Note 1</sup>
0.5 - 5	56	46
5 - 30	60	50

**Note 1:** The level decreases linearly with the logarithm of the frequency.

\* Decreasing linearly with the logarithm of the frequency

### 6.3 Test procedure

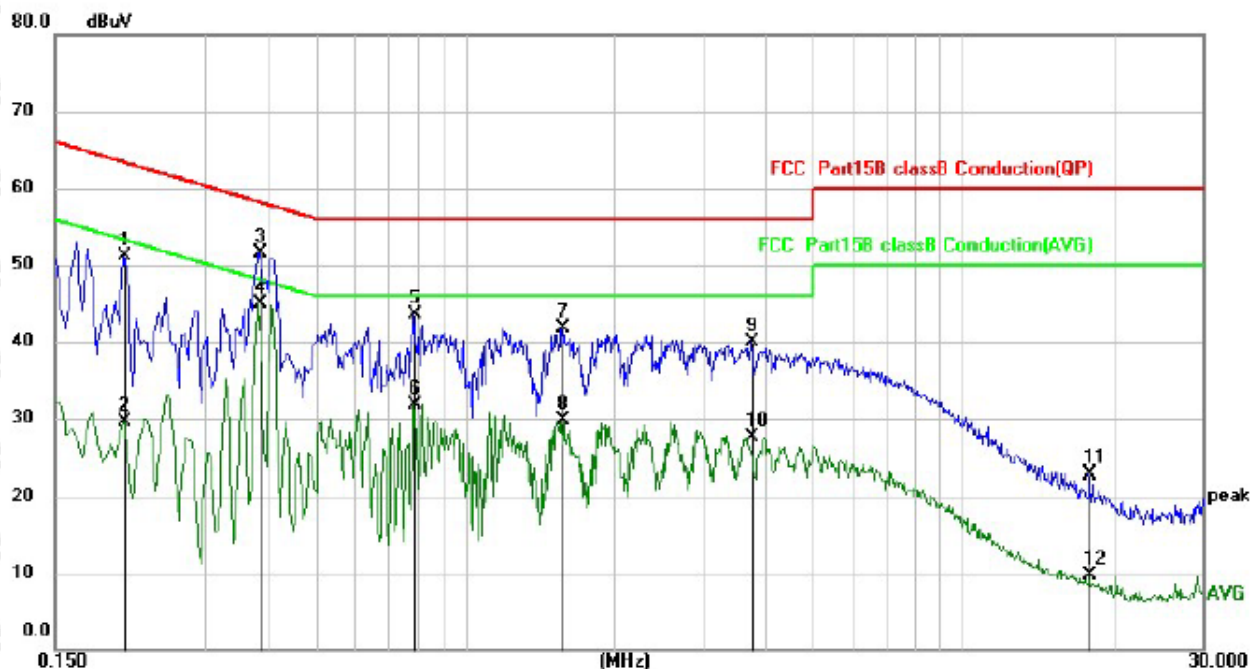
- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50 $\Omega$ /50 $\mu$ H + 5 $\Omega$  linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane.

This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.
- 6) All modes were tested at AC 120V and 240V, only the worst result of AC 120V 60Hz was reported.
- 7) If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.

6.4 Test Result

L: Worst case-GFSK(low channel)

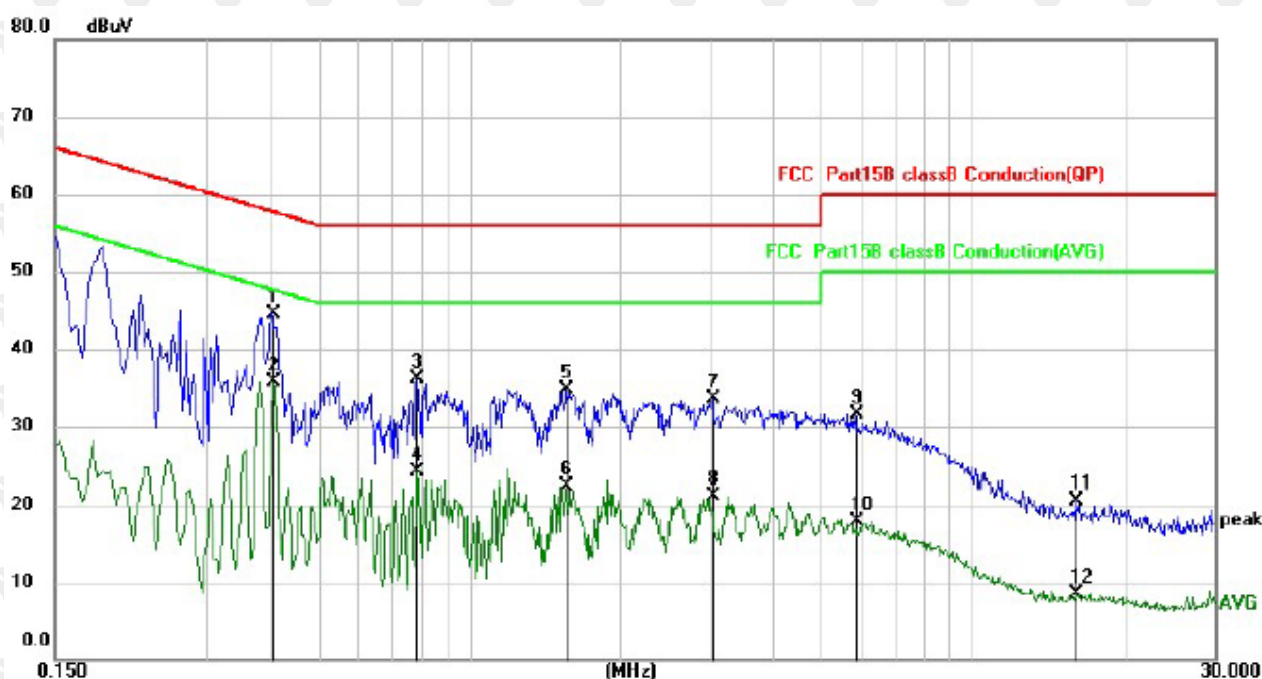


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.2060	41.12	10.00	51.12	63.37	-12.25	QP
2		0.2060	19.58	10.00	29.58	53.37	-23.79	AVG
3		0.3860	41.50	9.98	51.48	58.15	-6.67	QP
4	*	0.3860	34.88	9.98	44.86	48.15	-3.29	AVG
5		0.7900	33.44	9.98	43.42	56.00	-12.58	QP
6		0.7900	21.69	9.98	31.67	46.00	-14.33	AVG
7		1.5660	31.67	10.01	41.68	56.00	-14.32	QP
8		1.5660	19.69	10.01	29.70	46.00	-16.30	AVG
9		3.7460	29.83	10.11	39.94	56.00	-16.06	QP
10		3.7460	17.44	10.11	27.55	46.00	-18.45	AVG
11		17.8060	12.17	10.52	22.69	60.00	-37.31	QP
12		17.8060	-0.82	10.52	9.70	50.00	-40.30	AVG

Remark:

Factor = Cable loss + LISN factor, Margin = Measurement – Limit

N: Worst case-GFSK(low channel)



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.4060	34.62	9.98	44.60	57.73	-13.13	QP
2	*	0.4060	25.75	9.98	35.73	47.73	-12.00	AVG
3		0.7860	26.17	9.98	36.15	56.00	-19.85	QP
4		0.7860	14.18	9.98	24.16	46.00	-21.84	AVG
5		1.5580	24.60	10.01	34.61	56.00	-21.39	QP
6		1.5580	12.29	10.01	22.30	46.00	-23.70	AVG
7		3.0420	23.37	10.08	33.45	56.00	-22.55	QP
8		3.0420	11.05	10.08	21.13	46.00	-24.87	AVG
9		5.8500	21.39	10.20	31.59	60.00	-28.41	QP
10		5.8500	7.65	10.20	17.85	50.00	-32.15	AVG
11		15.9460	9.99	10.48	20.47	60.00	-39.53	QP
12		15.9460	-1.89	10.48	8.59	50.00	-41.41	AVG

Remark:

Factor = Cable loss + LISN factor, Margin = Measurement – Limit

## 7. RADIATED SPURIOUS EMISSION

### 7.1 Block Diagram Of Test Setup

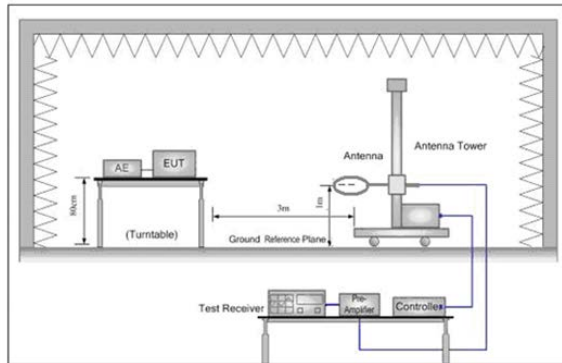


Figure 1. Below 30MHz

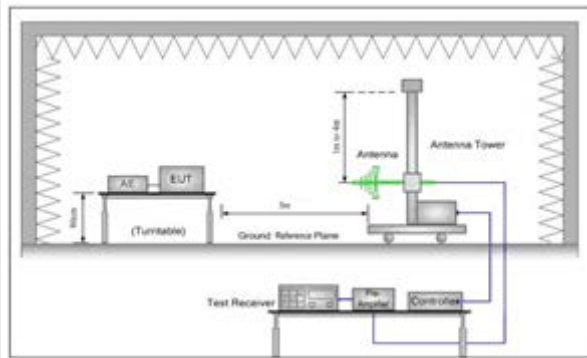


Figure 2. 30MHz to 1GHz

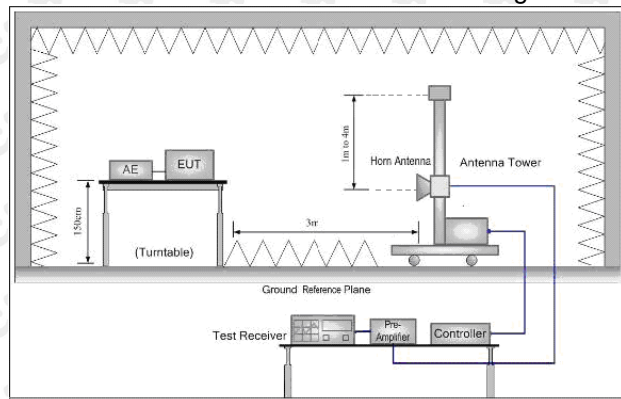


Figure 3. Above 1GHz

### 7.2 Limit

Spurious Emissions:

Frequency	Field strength (microvolt/meter)	Limit (dB $\mu$ V/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.



7.3 Test procedure

**Below 1GHz test procedure as below:**

- a.The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b.The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c.The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d.For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e.The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f.If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

**Above 1GHz test procedure as below:**

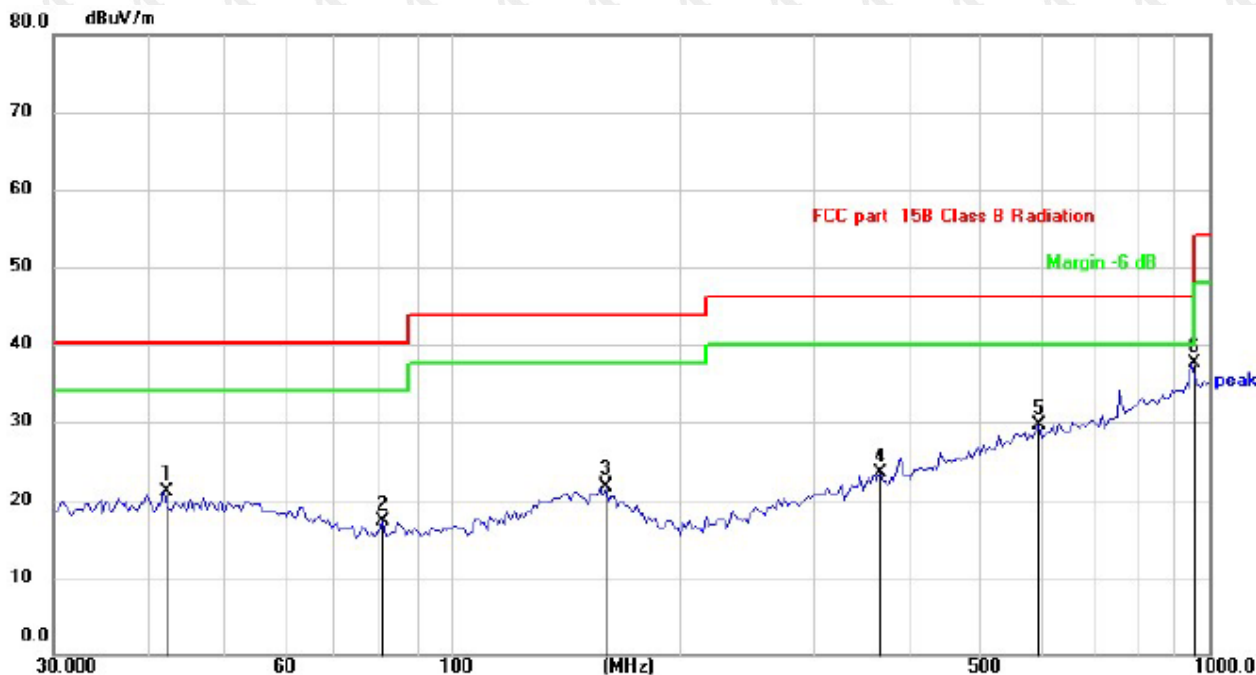
- g.Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter( Above 18GHz the distance is 1 meter and table is 1.5 meter).
- h.Test the EUT in the lowest channel ,the middle channel ,the Highest channel
- i.Repeat above procedures until all frequencies measured was complete.
- j. Full battery is used during test

Receiver set:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30KHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30KHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120 kHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

7.4 Test Result

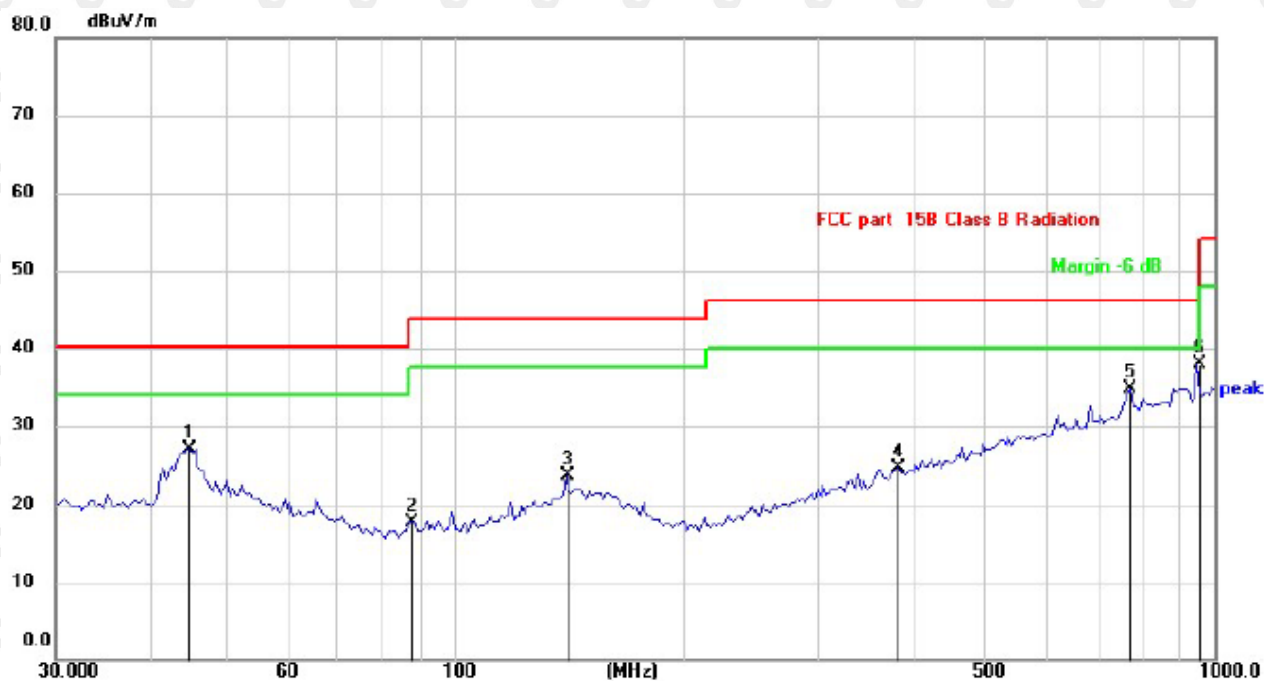
Below 1GHz Test Results:  
 Antenna polarity: H  
 Worst case-GFSK(low channel)



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		41.8596	27.61	-6.50	21.11	40.00	-18.89	QP
2		81.4970	27.80	-10.46	17.34	40.00	-22.66	QP
3		160.0648	27.12	-5.48	21.64	43.50	-21.86	QP
4		368.1116	26.89	-3.54	23.35	46.00	-22.65	QP
5		596.1772	27.14	2.36	29.50	46.00	-16.50	QP
6	*	948.7610	29.87	7.63	37.50	46.00	-8.50	QP

Remark: Factor = Cable lose + Antenna factor - Pre-amplifier; Margin = Measurement- Limit

Antenna polarity: V  
Worst case-GFSK(low channel)



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		44.9006	33.48	-6.54	26.94	40.00	-13.06	QP
2		87.4177	28.01	-10.28	17.73	40.00	-22.27	QP
3		140.3421	28.95	-5.51	23.44	43.50	-20.06	QP
4		384.6055	27.49	-3.08	24.41	46.00	-21.59	QP
5		775.5169	29.37	5.31	34.68	46.00	-11.32	QP
6	*	948.7610	30.28	7.63	37.91	46.00	-8.09	QP

Remark: Factor = Cable lose + Antenna factor - Pre-amplifier; Margin = Measurement - Limit

Right:  
Above 1 GHz Test Results:

CH Low (2402MHz)  
Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4804	59.09	-3.65	55.44	74.00	-18.56	peak
4804	48.72	-3.65	45.07	54.00	-8.93	AVG
7206	61.63	-0.95	60.68	74.00	-13.32	peak
7206	41.48	-0.95	40.53	54.00	-13.47	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4804	58.16	-3.65	54.51	74.00	-19.49	peak
4804	49.20	-3.65	45.55	54.00	-8.45	AVG
7206	60.61	-0.95	59.66	74.00	-14.34	peak
7206	42.85	-0.95	41.90	54.00	-12.10	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

CH Middle (2441MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4882.00	59.75	-3.54	56.21	74.00	-17.79	peak
4882.00	48.09	-3.54	44.55	54.00	-9.45	AVG
7323.00	57.16	-0.81	56.35	74.00	-17.65	peak
7323.00	43.84	-0.81	43.03	54.00	-10.97	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4882.00	57.81	-3.54	54.27	74.00	-19.73	peak
4882.00	48.56	-3.54	45.02	54.00	-8.98	AVG
7323.00	56.57	-0.81	55.76	74.00	-18.24	peak
7323.00	41.60	-0.81	40.79	54.00	-13.21	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

CH High (2480MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4960	57.38	-3.43	53.95	74.00	-20.05	peak
4960	47.23	-3.44	43.79	54.00	-10.21	AVG
7440	58.81	-0.77	58.04	74.00	-15.96	peak
7440	40.32	-0.77	39.55	54.00	-14.45	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4960	58.26	-3.43	54.83	74.00	-19.17	peak
4960	47.49	-3.44	44.05	54.00	-9.95	AVG
7440	59.40	-0.77	58.63	74.00	-15.37	peak
7440	42.35	-0.77	41.58	54.00	-12.42	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

The test range is 9K ~10 times the main wave, and other spurious below the limit of 20dB will not be reflected in the report

**Restricted bands around fundamental frequency (Radiated)**

hopping

Operation Mode: TX CH Low (2402MHz)

Horizontal (Worst case-GFSK)

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2310.00	57.84	-5.81	52.03	74.00	-21.97	peak
2310.00	/	-5.81	/	54.00	/	AVG
2390.00	56.12	-5.84	50.28	74.00	-23.72	peak
2390.00	/	-5.84	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2310.00	57.35	-5.81	51.54	74.00	-22.46	peak
2310.00	/	-5.81	/	54.00	/	AVG
2390.00	56.90	-5.84	51.06	74.00	-22.94	peak
2390.00	/	-5.84	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

When the peak value is smaller than the AVG limit, AVG is not reflected.

Operation Mode: TX CH High (2480MHz)  
Horizontal (Worst case-GFSK)

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2483.50	55.05	-5.81	49.24	74.00	-24.76	peak
2483.50	/	-5.81	/	54.00	/	AVG
2500.00	54.37	-6.06	48.31	74.00	-25.69	peak
2500.00	/	-6.06	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2483.50	56.72	-5.81	50.91	74.00	-23.09	peak
2483.50	/	-5.81	/	54.00	/	AVG
2500.00	53.57	-6.06	47.51	74.00	-26.49	peak
2500.00	/	-6.06	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.

When the peak value is smaller than the AVG limit, AVG is not reflected.



NO hopping

Operation Mode: TX CH Low (2402MHz)

Horizontal (Worst case-GFSK)

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2310.00	54.18	-5.81	48.37	74.00	-25.63	peak
2310.00	/	-5.81	/	54.00	/	AVG
2390.00	54.12	-5.84	48.28	74.00	-25.72	peak
2390.00	/	-5.84	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2310.00	55.89	-5.81	50.08	74.00	-23.92	peak
2310.00	/	-5.81	/	54.00	/	AVG
2390.00	53.63	-5.84	47.79	74.00	-26.21	peak
2390.00	/	-5.84	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

When the peak value is smaller than the AVG limit, AVG is not reflected.

Operation Mode: TX CH High (2480MHz)  
Horizontal (Worst case-GFSK)

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2483.50	57.96	-5.81	52.15	74.00	-21.85	peak
2483.50	/	-5.81	/	54.00	/	AVG
2500.00	56.58	-6.06	50.52	74.00	-23.48	peak
2500.00	/	-6.06	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2483.50	55.76	-5.81	49.95	74.00	-24.05	peak
2483.50	/	-5.81	/	54.00	/	AVG
2500.00	53.85	-6.06	47.79	74.00	-26.21	peak
2500.00	/	-6.06	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.

When the peak value is smaller than the AVG limit, AVG is not reflected.

Left:

Above 1 GHz Test Results:

CH Low (2402MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4804	56.56	-3.65	52.91	74.00	-21.09	peak
4804	49.15	-3.65	45.50	54.00	-8.50	AVG
7206	59.36	-0.95	58.41	74.00	-15.59	peak
7206	41.30	-0.95	40.35	54.00	-13.65	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4804	56.82	-3.65	53.17	74.00	-20.83	peak
4804	49.23	-3.65	45.58	54.00	-8.42	AVG
7206	61.35	-0.95	60.40	74.00	-13.60	peak
7206	41.39	-0.95	40.44	54.00	-13.56	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

CH Middle (2441MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4882.00	60.04	-3.54	56.50	74.00	-17.50	peak
4882.00	49.42	-3.54	45.88	54.00	-8.12	AVG
7323.00	56.71	-0.81	55.90	74.00	-18.10	peak
7323.00	44.41	-0.81	43.60	54.00	-10.40	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4882.00	58.63	-3.54	55.09	74.00	-18.91	peak
4882.00	48.34	-3.54	44.80	54.00	-9.20	AVG
7323.00	57.60	-0.81	56.79	74.00	-17.21	peak
7323.00	42.47	-0.81	41.66	54.00	-12.34	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

CH High (2480MHz)

Horizontal:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4960	57.20	-3.43	53.77	74.00	-20.23	peak
4960	49.05	-3.44	45.61	54.00	-8.39	AVG
7440	60.41	-0.77	59.64	74.00	-14.36	peak
7440	39.75	-0.77	38.98	54.00	-15.02	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency	Reading Result	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4960	58.96	-3.43	55.53	74.00	-18.47	peak
4960	47.53	-3.44	44.09	54.00	-9.91	AVG
7440	61.41	-0.77	60.64	74.00	-13.36	peak
7440	39.76	-0.77	38.99	54.00	-15.01	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

The test range is 9K ~10 times the main wave, and other spurious below the limit of 20dB will not be reflected in the report

**Restricted bands around fundamental frequency (Radiated)**

hopping

Operation Mode: TX CH Low (2402MHz)

Horizontal (Worst case-GFSK)

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2310.00	56.66	-5.81	50.85	74.00	-23.15	peak
2310.00	/	-5.81	/	54.00	/	AVG
2390.00	55.90	-5.84	50.06	74.00	-23.94	peak
2390.00	/	-5.84	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2310.00	55.89	-5.81	50.08	74.00	-23.92	peak
2310.00	/	-5.81	/	54.00	/	AVG
2390.00	56.12	-5.84	50.28	74.00	-23.72	peak
2390.00	/	-5.84	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

When the peak value is smaller than the AVG limit, AVG is not reflected.

Operation Mode: TX CH High (2480MHz)  
Horizontal (Worst case-GFSK)

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2483.50	54.49	-5.81	48.68	74.00	-25.32	peak
2483.50	/	-5.81	/	54.00	/	AVG
2500.00	53.95	-6.06	47.89	74.00	-26.11	peak
2500.00	/	-6.06	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2483.50	57.08	-5.81	51.27	74.00	-22.73	peak
2483.50	/	-5.81	/	54.00	/	AVG
2500.00	54.55	-6.06	48.49	74.00	-25.51	peak
2500.00	/	-6.06	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.

When the peak value is smaller than the AVG limit, AVG is not reflected.

NO hopping

Operation Mode: TX CH Low (2402MHz)

Horizontal (Worst case-GFSK)

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2310.00	55.78	-5.81	49.97	74.00	-24.03	peak
2310.00	/	-5.81	/	54.00	/	AVG
2390.00	55.69	-5.84	49.85	74.00	-24.15	peak
2390.00	/	-5.84	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2310.00	56.07	-5.81	50.26	74.00	-23.74	peak
2310.00	/	-5.81	/	54.00	/	AVG
2390.00	53.58	-5.84	47.74	74.00	-26.26	peak
2390.00	/	-5.84	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

When the peak value is smaller than the AVG limit, AVG is not reflected.



Operation Mode: TX CH High (2480MHz)  
Horizontal (Worst case-GFSK)

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2483.50	57.83	-5.81	52.02	74.00	-21.98	peak
2483.50	/	-5.81	/	54.00	/	AVG
2500.00	57.01	-6.06	50.95	74.00	-23.05	peak
2500.00	/	-6.06	/	54.00	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Vertical:

Frequency (MHz)	Meter Reading (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
2483.50	55.00	-5.81	49.19	74.00	-24.81	peak
2483.50	/	-5.81	/	54.00	/	AVG
2500.00	53.67	-6.06	47.61	74.00	-26.39	peak
2500.00	/	-6.06	/	54.00	/	AVG

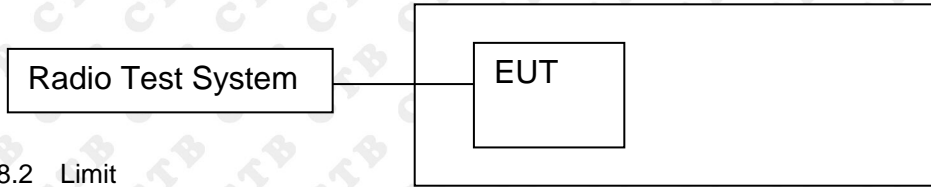
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit.

When the peak value is smaller than the AVG limit, AVG is not reflected.

**8. BAND EDGE AND RF CONDUCTED SPURIOUS EMISSIONS**

8.1 Block Diagram Of Test Setup



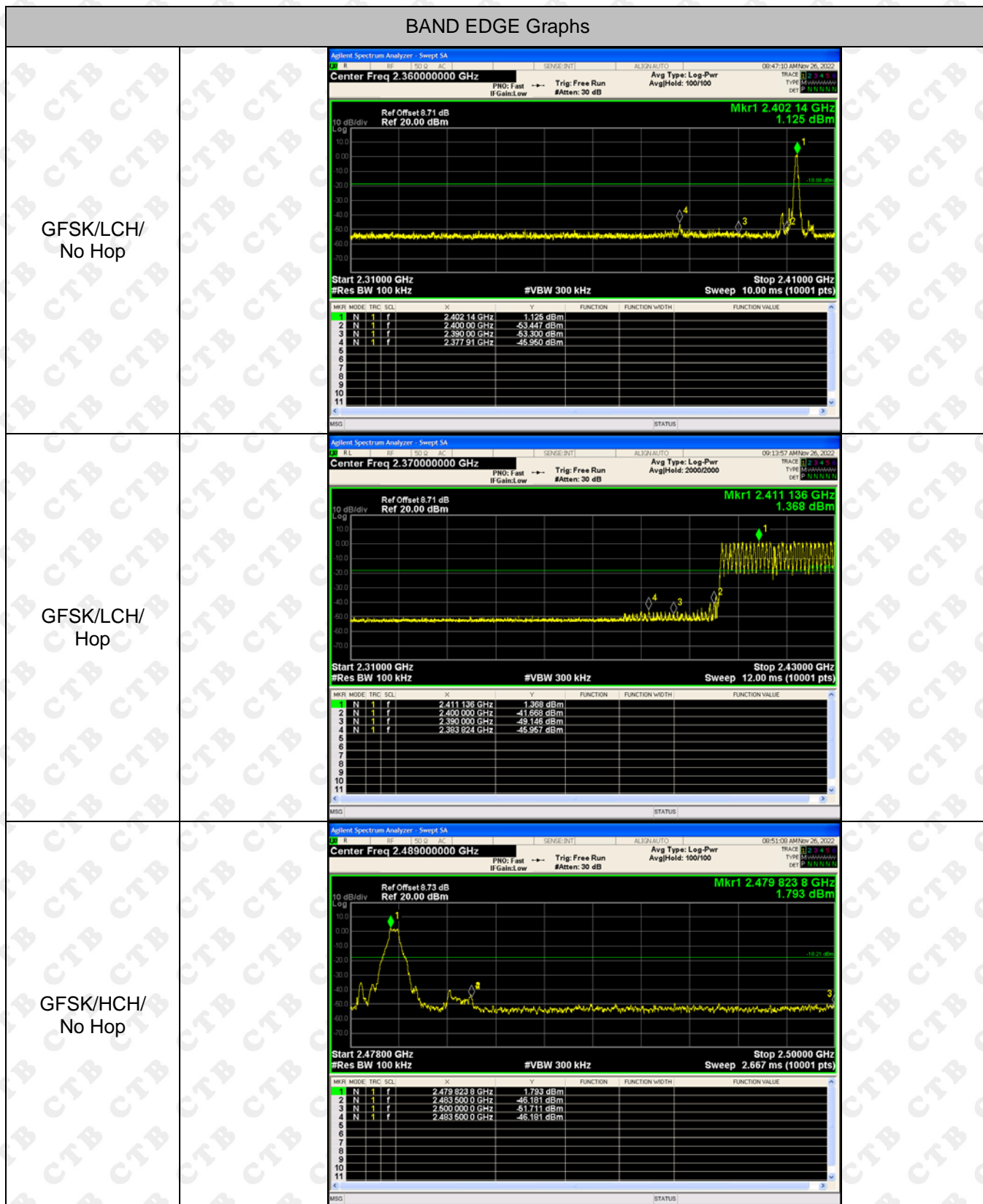
8.2 Limit

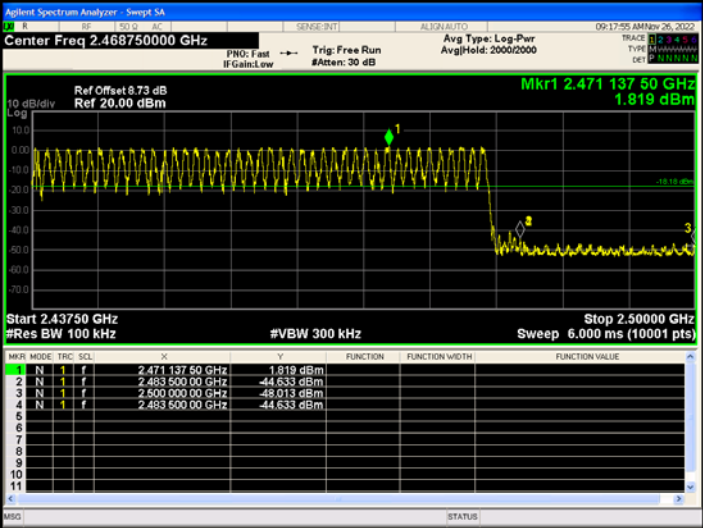
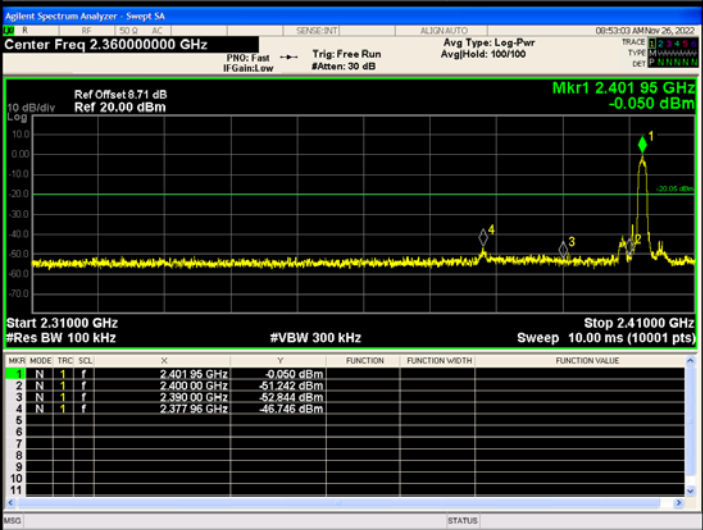
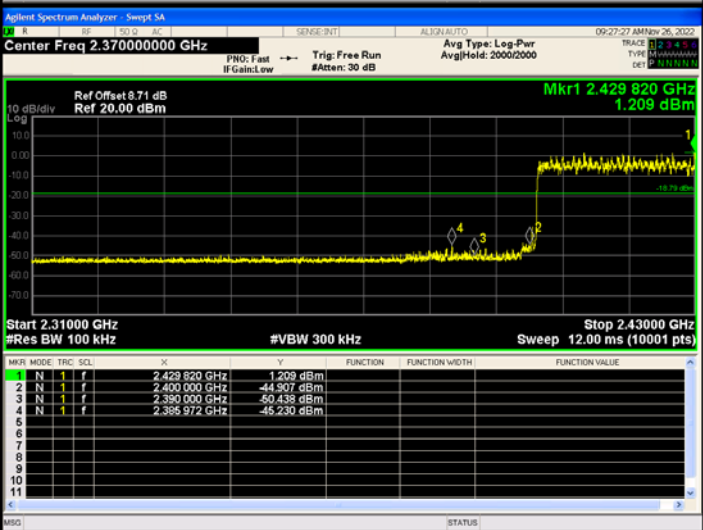
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

8.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer:  
 Below 30MHz:  
 RBW = 100kHz, VBW = 300kHz, Sweep = auto  
 Detector function = peak, Trace = max hold  
 Above 30MHz:  
 RBW = 100KHz, VBW = 300KHz, Sweep = auto  
 Detector function = peak, Trace = max hold

8.4 Test Result



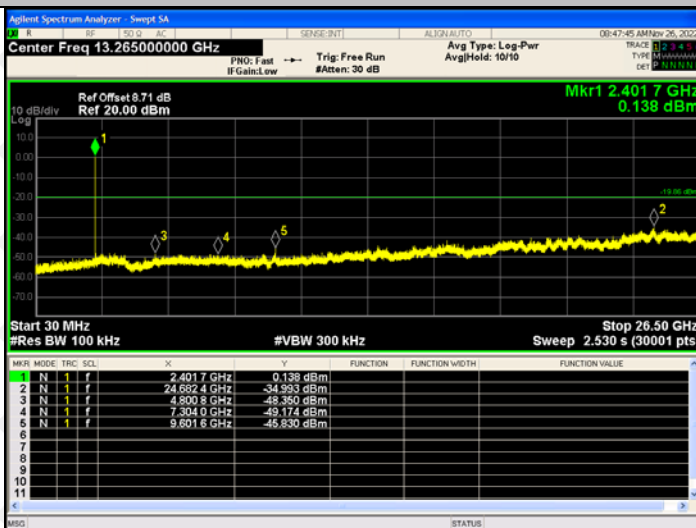
<p>GFSK/HCH/ Hop</p>	 <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.47113750 GHz</td> <td>1.819 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>2.48350000 GHz</td> <td>-44.633 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>2.49000000 GHz</td> <td>-49.013 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>2.49350000 GHz</td> <td>-44.633 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.47113750 GHz	1.819 dBm				2	N	1	f	2.48350000 GHz	-44.633 dBm				3	N	1	f	2.49000000 GHz	-49.013 dBm				4	N	1	f	2.49350000 GHz	-44.633 dBm			
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																						
1	N	1	f	2.47113750 GHz	1.819 dBm																																									
2	N	1	f	2.48350000 GHz	-44.633 dBm																																									
3	N	1	f	2.49000000 GHz	-49.013 dBm																																									
4	N	1	f	2.49350000 GHz	-44.633 dBm																																									
<p><math>\pi/4</math>DQPSK/LCH/ No Hop</p>	 <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.40195 GHz</td> <td>-0.050 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>2.40000 GHz</td> <td>-51.242 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>2.39900 GHz</td> <td>-52.544 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>2.37796 GHz</td> <td>-46.746 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.40195 GHz	-0.050 dBm				2	N	1	f	2.40000 GHz	-51.242 dBm				3	N	1	f	2.39900 GHz	-52.544 dBm				4	N	1	f	2.37796 GHz	-46.746 dBm			
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																						
1	N	1	f	2.40195 GHz	-0.050 dBm																																									
2	N	1	f	2.40000 GHz	-51.242 dBm																																									
3	N	1	f	2.39900 GHz	-52.544 dBm																																									
4	N	1	f	2.37796 GHz	-46.746 dBm																																									
<p><math>\pi/4</math>DQPSK/LCH/ Hop</p>	 <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.429820 GHz</td> <td>1.209 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>2.400000 GHz</td> <td>-44.907 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>2.390000 GHz</td> <td>-50.438 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>2.395972 GHz</td> <td>-45.230 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.429820 GHz	1.209 dBm				2	N	1	f	2.400000 GHz	-44.907 dBm				3	N	1	f	2.390000 GHz	-50.438 dBm				4	N	1	f	2.395972 GHz	-45.230 dBm			
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																						
1	N	1	f	2.429820 GHz	1.209 dBm																																									
2	N	1	f	2.400000 GHz	-44.907 dBm																																									
3	N	1	f	2.390000 GHz	-50.438 dBm																																									
4	N	1	f	2.395972 GHz	-45.230 dBm																																									

<p><math>\pi/4</math>DQPSK/HCH/ No Hop</p>	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.489000000 GHz</p> <p>Ref Offset 8.73 dB Ref 20.00 dBm</p> <p>Mkr1 2.479 821 6 GHz 1.721 dBm</p> <p>Start 2.47800 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.50000 GHz Sweep 2.667 ms (10001 pts)</p> <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.479 821 6 GHz</td> <td>1.721 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>2.483 500 0 GHz</td> <td>-50.637 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>2.500 000 0 GHz</td> <td>-52.142 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>2.494 742 0 GHz</td> <td>-49.226 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.479 821 6 GHz	1.721 dBm				2	N	1	f	2.483 500 0 GHz	-50.637 dBm				3	N	1	f	2.500 000 0 GHz	-52.142 dBm				4	N	1	f	2.494 742 0 GHz	-49.226 dBm				
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																							
1	N	1	f	2.479 821 6 GHz	1.721 dBm																																										
2	N	1	f	2.483 500 0 GHz	-50.637 dBm																																										
3	N	1	f	2.500 000 0 GHz	-52.142 dBm																																										
4	N	1	f	2.494 742 0 GHz	-49.226 dBm																																										
<p><math>\pi/4</math>DQPSK/HCH/ Hop</p>	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.468750000 GHz</p> <p>Ref Offset 8.73 dB Ref 20.00 dBm</p> <p>Mkr1 2.476 825 00 GHz 1.845 dBm</p> <p>Start 2.43750 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.50000 GHz Sweep 6.000 ms (10001 pts)</p> <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.476 825 00 GHz</td> <td>1.845 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>2.483 500 00 GHz</td> <td>-50.962 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>2.500 000 00 GHz</td> <td>-50.729 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>2.492 812 50 GHz</td> <td>-46.577 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.476 825 00 GHz	1.845 dBm				2	N	1	f	2.483 500 00 GHz	-50.962 dBm				3	N	1	f	2.500 000 00 GHz	-50.729 dBm				4	N	1	f	2.492 812 50 GHz	-46.577 dBm				
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																							
1	N	1	f	2.476 825 00 GHz	1.845 dBm																																										
2	N	1	f	2.483 500 00 GHz	-50.962 dBm																																										
3	N	1	f	2.500 000 00 GHz	-50.729 dBm																																										
4	N	1	f	2.492 812 50 GHz	-46.577 dBm																																										
<p>8DPSK/LCH/No Hop</p>	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.360000000 GHz</p> <p>Ref Offset 8.71 dB Ref 20.00 dBm</p> <p>Mkr1 2.401 82 GHz 0.644 dBm</p> <p>Start 2.31000 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.41000 GHz Sweep 10.00 ms (10001 pts)</p> <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.401 82 GHz</td> <td>0.644 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>2.400 00 GHz</td> <td>-52.082 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>2.390 00 GHz</td> <td>-54.884 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>2.384 28 GHz</td> <td>-49.000 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.401 82 GHz	0.644 dBm				2	N	1	f	2.400 00 GHz	-52.082 dBm				3	N	1	f	2.390 00 GHz	-54.884 dBm				4	N	1	f	2.384 28 GHz	-49.000 dBm				
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																							
1	N	1	f	2.401 82 GHz	0.644 dBm																																										
2	N	1	f	2.400 00 GHz	-52.082 dBm																																										
3	N	1	f	2.390 00 GHz	-54.884 dBm																																										
4	N	1	f	2.384 28 GHz	-49.000 dBm																																										

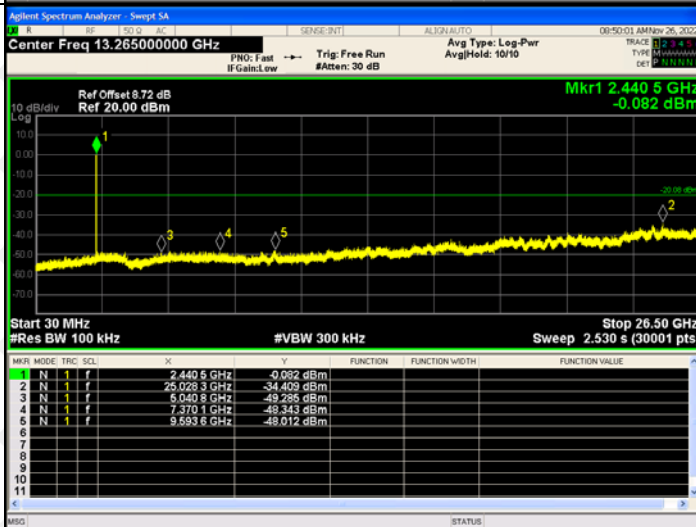
<p>8DPSK /LCH/Hop</p>	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.37000000 GHz</p> <p>Ref Offset 8.71 dB Ref 20.00 dBm</p> <p>Mkr1 2.408 820 GHz 1.238 dBm</p> <p>Start 2.31000 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.43000 GHz Sweep 12.00 ms (10001 pts)</p> <table border="1"> <thead> <tr> <th>MKR MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.408 820 GHz</td> <td></td> <td></td> <td>1.238 dBm</td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>2.400 000 GHz</td> <td></td> <td></td> <td>-44.626 dBm</td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>2.390 000 GHz</td> <td></td> <td></td> <td>-50.979 dBm</td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>2.387 964 GHz</td> <td></td> <td></td> <td>-45.292 dBm</td> </tr> </tbody> </table>	MKR MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.408 820 GHz			1.238 dBm	2	N	1	f	2.400 000 GHz			-44.626 dBm	3	N	1	f	2.390 000 GHz			-50.979 dBm	4	N	1	f	2.387 964 GHz			-45.292 dBm	
MKR MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																			
1	N	1	f	2.408 820 GHz			1.238 dBm																																			
2	N	1	f	2.400 000 GHz			-44.626 dBm																																			
3	N	1	f	2.390 000 GHz			-50.979 dBm																																			
4	N	1	f	2.387 964 GHz			-45.292 dBm																																			
<p>8DPSK /HCH/No Hop</p>	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.48900000 GHz</p> <p>Ref Offset 8.73 dB Ref 20.00 dBm</p> <p>Mkr1 2.479 832 6 GHz 1.353 dBm</p> <p>Start 2.47800 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.50000 GHz Sweep 2.667 ms (10001 pts)</p> <table border="1"> <thead> <tr> <th>MKR MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.479 832 6 GHz</td> <td></td> <td></td> <td>1.353 dBm</td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>2.483 500 0 GHz</td> <td></td> <td></td> <td>-46.726 dBm</td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>2.500 000 0 GHz</td> <td></td> <td></td> <td>-51.520 dBm</td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>2.483 500 0 GHz</td> <td></td> <td></td> <td>-46.726 dBm</td> </tr> </tbody> </table>	MKR MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.479 832 6 GHz			1.353 dBm	2	N	1	f	2.483 500 0 GHz			-46.726 dBm	3	N	1	f	2.500 000 0 GHz			-51.520 dBm	4	N	1	f	2.483 500 0 GHz			-46.726 dBm	
MKR MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																			
1	N	1	f	2.479 832 6 GHz			1.353 dBm																																			
2	N	1	f	2.483 500 0 GHz			-46.726 dBm																																			
3	N	1	f	2.500 000 0 GHz			-51.520 dBm																																			
4	N	1	f	2.483 500 0 GHz			-46.726 dBm																																			
<p>8DPSK /HCH/Hop</p>	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.46875000 GHz</p> <p>Ref Offset 8.73 dB Ref 20.00 dBm</p> <p>Mkr1 2.455 825 0 GHz 1.313 dBm</p> <p>Start 2.43750 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.50000 GHz Sweep 6.000 ms (10001 pts)</p> <table border="1"> <thead> <tr> <th>MKR MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.455 825 00 GHz</td> <td></td> <td></td> <td>1.313 dBm</td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>2.483 500 00 GHz</td> <td></td> <td></td> <td>-49.093 dBm</td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>2.500 000 00 GHz</td> <td></td> <td></td> <td>-51.974 dBm</td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>2.489 937 50 GHz</td> <td></td> <td></td> <td>-46.743 dBm</td> </tr> </tbody> </table>	MKR MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.455 825 00 GHz			1.313 dBm	2	N	1	f	2.483 500 00 GHz			-49.093 dBm	3	N	1	f	2.500 000 00 GHz			-51.974 dBm	4	N	1	f	2.489 937 50 GHz			-46.743 dBm	
MKR MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																			
1	N	1	f	2.455 825 00 GHz			1.313 dBm																																			
2	N	1	f	2.483 500 00 GHz			-49.093 dBm																																			
3	N	1	f	2.500 000 00 GHz			-51.974 dBm																																			
4	N	1	f	2.489 937 50 GHz			-46.743 dBm																																			

RF Conducted Spurious Emissions Graphs

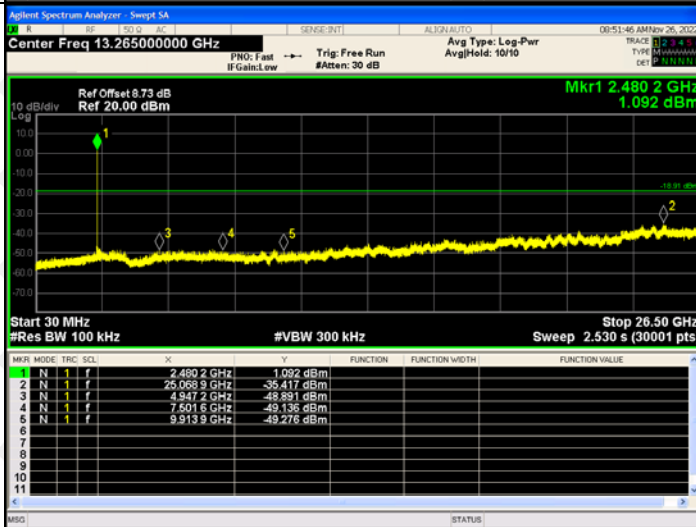
GFSK/LCH



GFSK/MCH

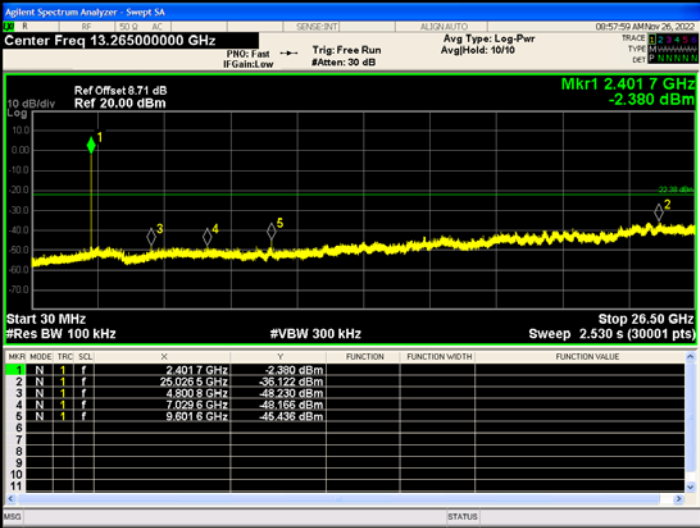
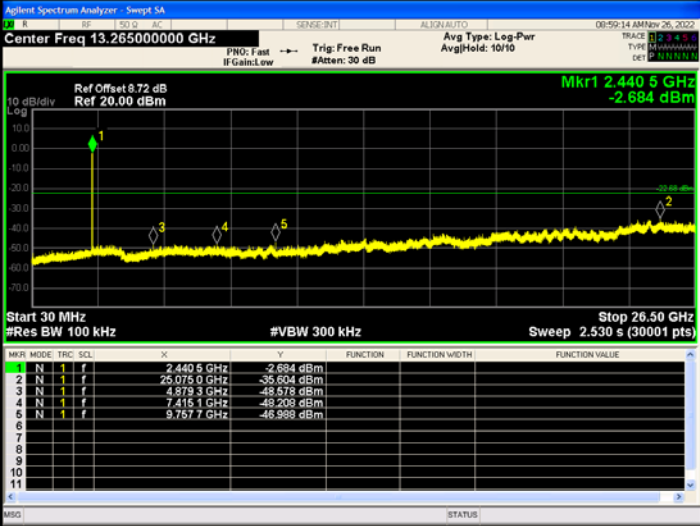
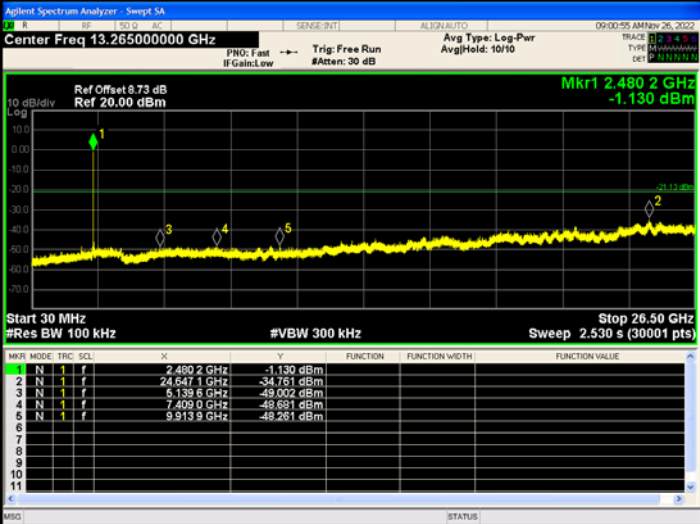


GFSK/HCH



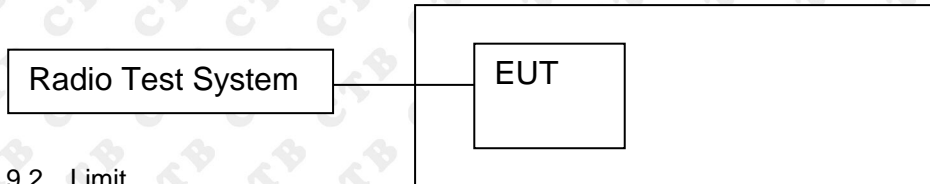




<p>8DPSK /LCH</p>	 <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SQL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.4017 GHz</td> <td>-2.380 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>25.0255 GHz</td> <td>-35.122 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>4.8008 GHz</td> <td>-45.220 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>7.0296 GHz</td> <td>-49.155 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>N</td> <td>1</td> <td>f</td> <td>9.6016 GHz</td> <td>-45.436 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SQL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.4017 GHz	-2.380 dBm				2	N	1	f	25.0255 GHz	-35.122 dBm				3	N	1	f	4.8008 GHz	-45.220 dBm				4	N	1	f	7.0296 GHz	-49.155 dBm				5	N	1	f	9.6016 GHz	-45.436 dBm			
MKR	MODE	TRC	SQL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																															
1	N	1	f	2.4017 GHz	-2.380 dBm																																																		
2	N	1	f	25.0255 GHz	-35.122 dBm																																																		
3	N	1	f	4.8008 GHz	-45.220 dBm																																																		
4	N	1	f	7.0296 GHz	-49.155 dBm																																																		
5	N	1	f	9.6016 GHz	-45.436 dBm																																																		
<p>8DPSK /MCH</p>	 <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SQL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.4405 GHz</td> <td>-2.684 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>25.0750 GHz</td> <td>-35.604 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>4.8793 GHz</td> <td>-43.978 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>7.4151 GHz</td> <td>-49.208 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>N</td> <td>1</td> <td>f</td> <td>9.7577 GHz</td> <td>-46.988 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SQL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.4405 GHz	-2.684 dBm				2	N	1	f	25.0750 GHz	-35.604 dBm				3	N	1	f	4.8793 GHz	-43.978 dBm				4	N	1	f	7.4151 GHz	-49.208 dBm				5	N	1	f	9.7577 GHz	-46.988 dBm			
MKR	MODE	TRC	SQL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																															
1	N	1	f	2.4405 GHz	-2.684 dBm																																																		
2	N	1	f	25.0750 GHz	-35.604 dBm																																																		
3	N	1	f	4.8793 GHz	-43.978 dBm																																																		
4	N	1	f	7.4151 GHz	-49.208 dBm																																																		
5	N	1	f	9.7577 GHz	-46.988 dBm																																																		
<p>8DPSK /HCH</p>	 <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SQL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>2.4802 GHz</td> <td>-1.130 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>24.6471 GHz</td> <td>-34.751 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>1</td> <td>f</td> <td>5.1398 GHz</td> <td>-49.002 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>1</td> <td>f</td> <td>7.4090 GHz</td> <td>-45.651 dBm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>N</td> <td>1</td> <td>f</td> <td>9.9139 GHz</td> <td>-48.281 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SQL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.4802 GHz	-1.130 dBm				2	N	1	f	24.6471 GHz	-34.751 dBm				3	N	1	f	5.1398 GHz	-49.002 dBm				4	N	1	f	7.4090 GHz	-45.651 dBm				5	N	1	f	9.9139 GHz	-48.281 dBm			
MKR	MODE	TRC	SQL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																															
1	N	1	f	2.4802 GHz	-1.130 dBm																																																		
2	N	1	f	24.6471 GHz	-34.751 dBm																																																		
3	N	1	f	5.1398 GHz	-49.002 dBm																																																		
4	N	1	f	7.4090 GHz	-45.651 dBm																																																		
5	N	1	f	9.9139 GHz	-48.281 dBm																																																		

## 9. COUDUCTED PEAK OUTPUT POWER

### 9.1 Block Diagram Of Test Setup



### 9.2 Limit

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: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

### 9.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 2MHz. VBW = 6MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, middle and highest channel individually. Record the max value.

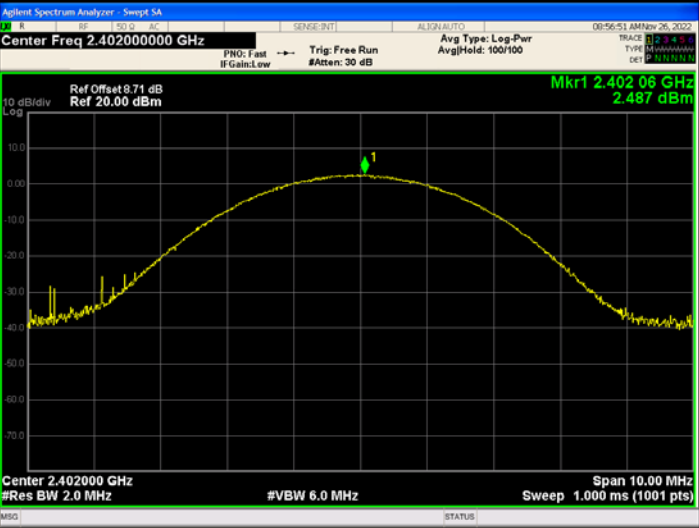
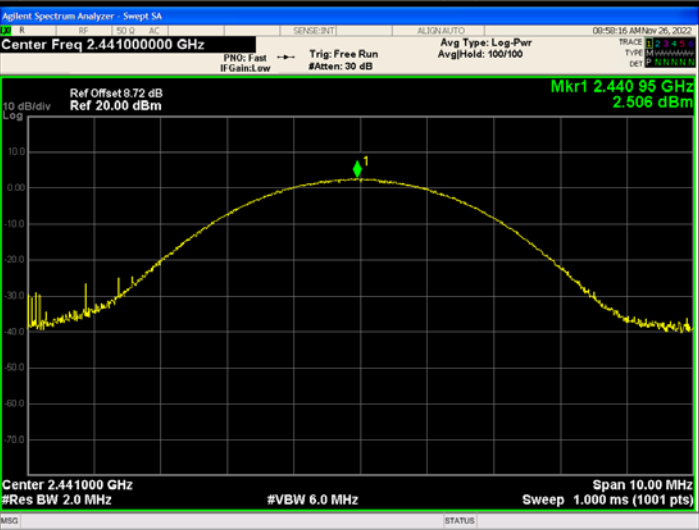
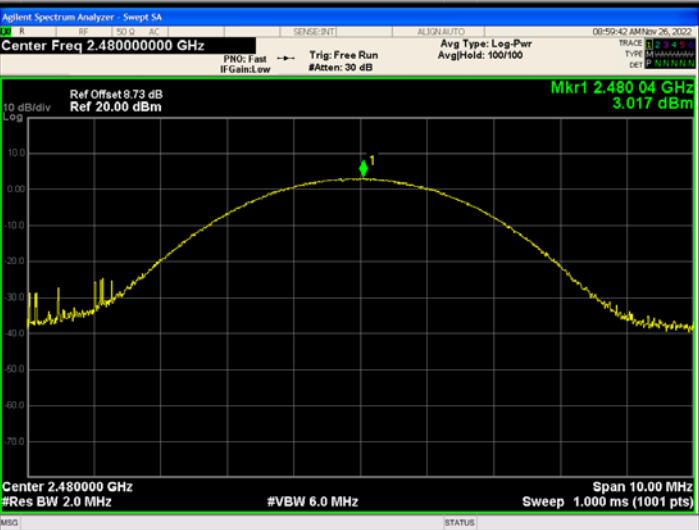
## 9.4 Test Result

Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
BDR mode (GFSK)	LCH	1.286	20.97	PASS
	MCH	1.283	20.97	PASS
	HCH	1.869	20.97	PASS
EDR mode ( $\pi/4$ DQPSK)	LCH	2.109	20.97	PASS
	MCH	2.118	20.97	PASS
	HCH	2.696	20.97	PASS
EDR mode (8DPSK)	LCH	2.487	20.97	PASS
	MCH	2.506	20.97	PASS
	HCH	3.017	20.97	PASS

Test Graph:

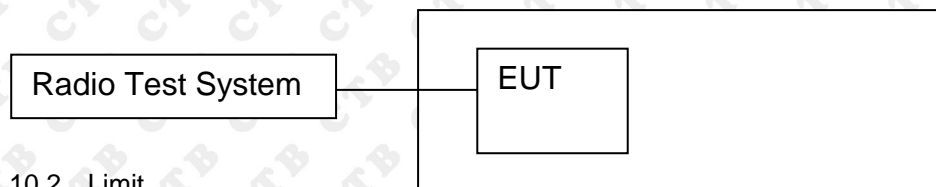
Graphs	
GFSK/LCH	<p>Agilent Spectrum Analyzer - Swept SA            Center Freq 2.40200000 GHz            Ref Offset: 8.71 dB, Ref 20.00 dBm            Mkr1 2.40181 GHz, 1.286 dBm            #Res BW 2.0 MHz, #VBW 6.0 MHz, Span 10.00 MHz, Sweep 1.000 ms (1001 pts)</p>
GFSK/MCH	<p>Agilent Spectrum Analyzer - Swept SA            Center Freq 2.44100000 GHz            Ref Offset: 8.72 dB, Ref 20.00 dBm            Mkr1 2.44083 GHz, 1.283 dBm            #Res BW 2.0 MHz, #VBW 6.0 MHz, Span 10.00 MHz, Sweep 1.000 ms (1001 pts)</p>
GFSK/HCH	<p>Agilent Spectrum Analyzer - Swept SA            Center Freq 2.48000000 GHz            Ref Offset: 8.73 dB, Ref 20.00 dBm            Mkr1 2.47980 GHz, 1.889 dBm            #Res BW 2.0 MHz, #VBW 6.0 MHz, Span 10.00 MHz, Sweep 1.000 ms (1001 pts)</p>

<p><math>\pi/4</math>DQPSK/LCH</p>		
<p><math>\pi/4</math>DQPSK/MCH</p>		
<p><math>\pi/4</math>DQPSK/HCH</p>		

<p>8DPSK/LCH</p>	 <p>Agilent Spectrum Analyzer - Sweep SA          Center Freq 2.40200000 GHz          Ref Offset 8.71 dB          Ref 20.00 dBm          Mkr1 2.40206 GHz          2.487 dBm          Center 2.402000 GHz          #Res BW 2.0 MHz          #VBW 6.0 MHz          Span 10.00 MHz          Sweep 1.000 ms (1001 pts)</p>
<p>8DPSK /MCH</p>	 <p>Agilent Spectrum Analyzer - Sweep SA          Center Freq 2.44100000 GHz          Ref Offset 8.72 dB          Ref 20.00 dBm          Mkr1 2.44095 GHz          2.506 dBm          Center 2.441000 GHz          #Res BW 2.0 MHz          #VBW 6.0 MHz          Span 10.00 MHz          Sweep 1.000 ms (1001 pts)</p>
<p>8DPSK /HCH</p>	 <p>Agilent Spectrum Analyzer - Sweep SA          Center Freq 2.48000000 GHz          Ref Offset 8.73 dB          Ref 20.00 dBm          Mkr1 2.48004 GHz          3.017 dBm          Center 2.480000 GHz          #Res BW 2.0 MHz          #VBW 6.0 MHz          Span 10.00 MHz          Sweep 1.000 ms (1001 pts)</p>

## 10. 20DB OCCUPIED BANDWIDTH

### 10.1 Block Diagram Of Test Setup



### 10.2 Limit

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mw.

### 10.3 Test procedure

1. Rem1. Set RBW = 30 kHz.
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### 10.4 Test Result

Test Mode	Frequency	20dB Bandwidth (MHz)	Result
GFSK	Low channel	0.869	<b>PASS</b>
	Mid channel	0.938	<b>PASS</b>
	High channel	0.877	<b>PASS</b>
$\pi/4$ DQPSK	Low channel	1.309	<b>PASS</b>
	Mid channel	1.288	<b>PASS</b>
	High channel	1.279	<b>PASS</b>
8DPSK	Low channel	1.3	<b>PASS</b>
	Mid channel	1.277	<b>PASS</b>
	High channel	1.292	<b>PASS</b>

Note: All modes of operation were Pre-scan and the worst-case emissions are reported.

Test Graph:

<p>GFSK Low channel</p>		<p>Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.402000000 GHz Center Freq: 2.402000000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS</p> <p>Ref Offset: 8.71 dB Ref: 28.71 dBm Mkr3: 2.402405 GHz -20.747 dBm</p> <p>Center: 2.402 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms</p> <p>Occupied Bandwidth: 813.79 kHz Total Power: 7.90 dBm</p> <p>Transmit Freq Error: -29.654 kHz OBW Power: 99.00 % x dB Bandwidth: 868.6 kHz x dB: -20.00 dB</p>
<p>GFSK Mid channel</p>		<p>Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.441000000 GHz Center Freq: 2.441000000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS</p> <p>Ref Offset: 8.72 dB Ref: 28.72 dBm Mkr3: 2.441438 GHz -22.479 dBm</p> <p>Center: 2.441 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms</p> <p>Occupied Bandwidth: 866.56 kHz Total Power: 6.52 dBm</p> <p>Transmit Freq Error: -31.391 kHz OBW Power: 99.00 % x dB Bandwidth: 938.4 kHz x dB: -20.00 dB</p>
<p>GFSK High channel</p>		<p>Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.480000000 GHz Center Freq: 2.480000000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS</p> <p>Ref Offset: 8.73 dB Ref: 28.73 dBm Mkr3: 2.480408 GHz -21.974 dBm</p> <p>Center: 2.48 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms</p> <p>Occupied Bandwidth: 824.53 kHz Total Power: 8.26 dBm</p> <p>Transmit Freq Error: -29.760 kHz OBW Power: 99.00 % x dB Bandwidth: 876.5 kHz x dB: -20.00 dB</p>

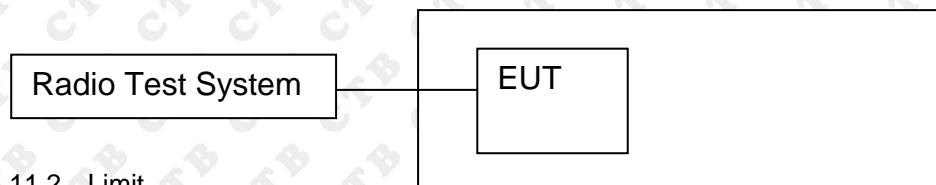


<p><math>\pi/4</math>-DQPSK Low channel</p>	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.402000000 GHz Center Freq: 2.402000000 GHz Trig: Free Run #IF Gain: Low #Atten: 30 dB Avg/Hold: 100/100 Radio Std: None Radio Device: BTS Ref Offset: 6.71 dB Ref: 28.71 dBm Mkr3: 2.402624 GHz -21.392 dBm Center: 2.402 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 1.1785 MHz Total Power: 7.42 dBm Transmit Freq Error: -30.403 kHz OBW Power: 99.00 % x dB Bandwidth: 1.309 MHz x dB: -20.00 dB</p>
<p><math>\pi/4</math>-DQPSK Mid channel</p>	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.441000000 GHz Center Freq: 2.441000000 GHz Trig: Free Run #IF Gain: Low #Atten: 30 dB Avg/Hold: 100/100 Radio Std: None Radio Device: BTS Ref Offset: 6.72 dB Ref: 28.72 dBm Mkr3: 2.441619 GHz -20.575 dBm Center: 2.441 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 1.1942 MHz Total Power: 7.16 dBm Transmit Freq Error: -25.230 kHz OBW Power: 99.00 % x dB Bandwidth: 1.288 MHz x dB: -20.00 dB</p>
<p><math>\pi/4</math>-DQPSK High channel</p>	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.480000000 GHz Center Freq: 2.480000000 GHz Trig: Free Run #IF Gain: Low #Atten: 30 dB Avg/Hold: 100/100 Radio Std: None Radio Device: BTS Ref Offset: 6.73 dB Ref: 28.73 dBm Mkr3: 2.480606 GHz -19.410 dBm Center: 2.48 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms Occupied Bandwidth: 1.1866 MHz Total Power: 7.48 dBm Transmit Freq Error: -33.777 kHz OBW Power: 99.00 % x dB Bandwidth: 1.279 MHz x dB: -20.00 dB</p>

<p>8DPSK Low channel</p>	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.402000000 GHz Center Freq: 2.402000000 GHz Trig: Free Run #Atten: 30 dB Avg/Hold: 100/100 Radio Std: None Radio Device: BTS</p> <p>10 dB/div Ref Offset 6.71 dB Ref 28.71 dBm Mkr3 2.402624 GHz -21.783 dBm</p> <p>Center 2.402 GHz #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 3.2 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>7.46 dBm</td> </tr> <tr> <td>1.1854 MHz</td> <td></td> <td></td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>-26.017 kHz</td> <td>x dB</td> <td>-20.00 dB</td> </tr> <tr> <td>x dB Bandwidth</td> <td></td> <td></td> </tr> <tr> <td>1.300 MHz</td> <td></td> <td></td> </tr> </table>	Occupied Bandwidth	Total Power	7.46 dBm	1.1854 MHz			Transmit Freq Error	OBW Power	99.00 %	-26.017 kHz	x dB	-20.00 dB	x dB Bandwidth			1.300 MHz		
Occupied Bandwidth	Total Power	7.46 dBm																	
1.1854 MHz																			
Transmit Freq Error	OBW Power	99.00 %																	
-26.017 kHz	x dB	-20.00 dB																	
x dB Bandwidth																			
1.300 MHz																			
<p>8DPSK Mid channel</p>	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.441000000 GHz Center Freq: 2.441000000 GHz Trig: Free Run #Atten: 30 dB Avg/Hold: 100/100 Radio Std: None Radio Device: BTS</p> <p>10 dB/div Ref Offset 6.72 dB Ref 28.72 dBm Mkr3 2.441604 GHz -22.275 dBm</p> <p>Center 2.441 GHz #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 3.2 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>7.24 dBm</td> </tr> <tr> <td>1.1938 MHz</td> <td></td> <td></td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>-34.559 kHz</td> <td>x dB</td> <td>-20.00 dB</td> </tr> <tr> <td>x dB Bandwidth</td> <td></td> <td></td> </tr> <tr> <td>1.277 MHz</td> <td></td> <td></td> </tr> </table>	Occupied Bandwidth	Total Power	7.24 dBm	1.1938 MHz			Transmit Freq Error	OBW Power	99.00 %	-34.559 kHz	x dB	-20.00 dB	x dB Bandwidth			1.277 MHz		
Occupied Bandwidth	Total Power	7.24 dBm																	
1.1938 MHz																			
Transmit Freq Error	OBW Power	99.00 %																	
-34.559 kHz	x dB	-20.00 dB																	
x dB Bandwidth																			
1.277 MHz																			
<p>8DPSK High channel</p>	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.480000000 GHz Center Freq: 2.480000000 GHz Trig: Free Run #Atten: 30 dB Avg/Hold: 100/100 Radio Std: None Radio Device: BTS</p> <p>10 dB/div Ref Offset 6.73 dB Ref 28.73 dBm Mkr3 2.480618 GHz -20.250 dBm</p> <p>Center 2.48 GHz #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 3.2 ms</p> <table border="1"> <tr> <td>Occupied Bandwidth</td> <td>Total Power</td> <td>8.35 dBm</td> </tr> <tr> <td>1.1794 MHz</td> <td></td> <td></td> </tr> <tr> <td>Transmit Freq Error</td> <td>OBW Power</td> <td>99.00 %</td> </tr> <tr> <td>-27.710 kHz</td> <td>x dB</td> <td>-20.00 dB</td> </tr> <tr> <td>x dB Bandwidth</td> <td></td> <td></td> </tr> <tr> <td>1.292 MHz</td> <td></td> <td></td> </tr> </table>	Occupied Bandwidth	Total Power	8.35 dBm	1.1794 MHz			Transmit Freq Error	OBW Power	99.00 %	-27.710 kHz	x dB	-20.00 dB	x dB Bandwidth			1.292 MHz		
Occupied Bandwidth	Total Power	8.35 dBm																	
1.1794 MHz																			
Transmit Freq Error	OBW Power	99.00 %																	
-27.710 kHz	x dB	-20.00 dB																	
x dB Bandwidth																			
1.292 MHz																			

## 11. CARRIER FREQUENCIES SEPARATION

### 11.1 Block Diagram Of Test Setup



### 11.2 Limit

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. Alternatively, 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, provided the systems operate with an output power no greater than 0.125W.

### 11.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz, Span = 2MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

### 11.4 Test Result

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit(2/3 of the 20dB bandwidth MHz)	Verdict
GFSK	LCH	1.000	0.579	PASS
GFSK	MCH	1.000	0.625	PASS
GFSK	HCH	1.002	0.585	PASS
$\pi/4$ DQPSK	LCH	1.002	0.873	PASS
$\pi/4$ DQPSK	MCH	1.000	0.859	PASS
$\pi/4$ DQPSK	HCH	1.000	0.853	PASS
8DPSK	LCH	1.002	0.867	PASS
8DPSK	MCH	1.000	0.851	PASS
8DPSK	HCH	1.002	0.861	PASS

Test Graph

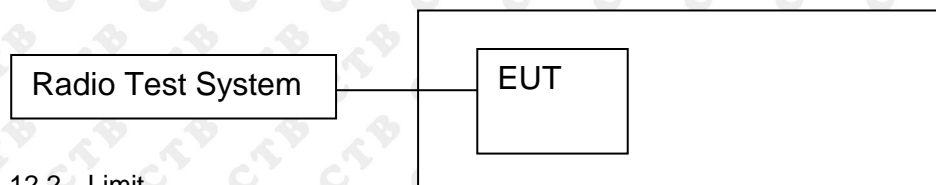
Graphs																												
GFSK/LCH	<table border="1"> <thead> <tr> <th>MNR</th> <th>MODE</th> <th>TRF</th> <th>SQL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>AZ</td> <td>1</td> <td>f</td> <td>(Δ)</td> <td>1.000 MHz (Δ)</td> <td></td> <td></td> <td>-0.141 dB</td> </tr> <tr> <td>2</td> <td>F</td> <td>1</td> <td>f</td> <td></td> <td>2.401 988 GHz</td> <td></td> <td></td> <td>0.486 dBm</td> </tr> </tbody> </table>	MNR	MODE	TRF	SQL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	AZ	1	f	(Δ)	1.000 MHz (Δ)			-0.141 dB	2	F	1	f		2.401 988 GHz			0.486 dBm
MNR	MODE	TRF	SQL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																				
1	AZ	1	f	(Δ)	1.000 MHz (Δ)			-0.141 dB																				
2	F	1	f		2.401 988 GHz			0.486 dBm																				
GFSK/MCH	<table border="1"> <thead> <tr> <th>MNR</th> <th>MODE</th> <th>TRF</th> <th>SQL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>AZ</td> <td>1</td> <td>f</td> <td>(Δ)</td> <td>1.000 MHz (Δ)</td> <td></td> <td></td> <td>-0.126 dB</td> </tr> <tr> <td>2</td> <td>F</td> <td>1</td> <td>f</td> <td></td> <td>2.440 982 GHz</td> <td></td> <td></td> <td>0.110 dBm</td> </tr> </tbody> </table>	MNR	MODE	TRF	SQL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	AZ	1	f	(Δ)	1.000 MHz (Δ)			-0.126 dB	2	F	1	f		2.440 982 GHz			0.110 dBm
MNR	MODE	TRF	SQL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																				
1	AZ	1	f	(Δ)	1.000 MHz (Δ)			-0.126 dB																				
2	F	1	f		2.440 982 GHz			0.110 dBm																				
GFSK/HCH	<table border="1"> <thead> <tr> <th>MNR</th> <th>MODE</th> <th>TRF</th> <th>SQL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>AZ</td> <td>1</td> <td>f</td> <td>(Δ)</td> <td>1.002 MHz (Δ)</td> <td></td> <td></td> <td>-0.462 dB</td> </tr> <tr> <td>2</td> <td>F</td> <td>1</td> <td>f</td> <td></td> <td>2.478 950 GHz</td> <td></td> <td></td> <td>1.408 dBm</td> </tr> </tbody> </table>	MNR	MODE	TRF	SQL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	AZ	1	f	(Δ)	1.002 MHz (Δ)			-0.462 dB	2	F	1	f		2.478 950 GHz			1.408 dBm
MNR	MODE	TRF	SQL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																				
1	AZ	1	f	(Δ)	1.002 MHz (Δ)			-0.462 dB																				
2	F	1	f		2.478 950 GHz			1.408 dBm																				

<p><math>\pi/4</math>DQPSK/LCH</p>	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Marker 1 <math>\Delta</math> 1.002000000 MHz</p> <p>Ref Offset: 8.71 dB Ref 20.00 dBm</p> <p>Center 2.402500 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>MNR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>\Delta</math>2</td> <td>1</td> <td>f</td> <td>(<math>\Delta</math>)</td> <td>1.002 MHz</td> <td>(<math>\Delta</math>)</td> <td></td> <td>-0.288 dBm</td> </tr> <tr> <td>2</td> <td>F</td> <td>1</td> <td>f</td> <td>(<math>\Delta</math>)</td> <td>2.401828 GHz</td> <td></td> <td></td> <td>0.940 dBm</td> </tr> </tbody> </table>	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	$\Delta$ 2	1	f	( $\Delta$ )	1.002 MHz	( $\Delta$ )		-0.288 dBm	2	F	1	f	( $\Delta$ )	2.401828 GHz			0.940 dBm	
MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	$\Delta$ 2	1	f	( $\Delta$ )	1.002 MHz	( $\Delta$ )		-0.288 dBm																					
2	F	1	f	( $\Delta$ )	2.401828 GHz			0.940 dBm																					
<p><math>\pi/4</math>DQPSK/MCH</p>	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Marker 1 <math>\Delta</math> 1.000000000 MHz</p> <p>Ref Offset: 8.72 dB Ref 20.00 dBm</p> <p>Center 2.441500 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>MNR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>\Delta</math>2</td> <td>1</td> <td>f</td> <td>(<math>\Delta</math>)</td> <td>1.000 MHz</td> <td>(<math>\Delta</math>)</td> <td></td> <td>-1.555 dB</td> </tr> <tr> <td>2</td> <td>F</td> <td>1</td> <td>f</td> <td>(<math>\Delta</math>)</td> <td>2.440956 GHz</td> <td></td> <td></td> <td>0.827 dBm</td> </tr> </tbody> </table>	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	$\Delta$ 2	1	f	( $\Delta$ )	1.000 MHz	( $\Delta$ )		-1.555 dB	2	F	1	f	( $\Delta$ )	2.440956 GHz			0.827 dBm	
MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	$\Delta$ 2	1	f	( $\Delta$ )	1.000 MHz	( $\Delta$ )		-1.555 dB																					
2	F	1	f	( $\Delta$ )	2.440956 GHz			0.827 dBm																					
<p><math>\pi/4</math>DQPSK/HCH</p>	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Marker 1 <math>\Delta</math> 1.000000000 MHz</p> <p>Ref Offset: 8.73 dB Ref 20.00 dBm</p> <p>Center 2.479500 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.000 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>MNR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>\Delta</math>2</td> <td>1</td> <td>f</td> <td>(<math>\Delta</math>)</td> <td>1.000 MHz</td> <td>(<math>\Delta</math>)</td> <td></td> <td>-1.305 dB</td> </tr> <tr> <td>2</td> <td>F</td> <td>1</td> <td>f</td> <td>(<math>\Delta</math>)</td> <td>2.478956 GHz</td> <td></td> <td></td> <td>1.061 dBm</td> </tr> </tbody> </table>	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	$\Delta$ 2	1	f	( $\Delta$ )	1.000 MHz	( $\Delta$ )		-1.305 dB	2	F	1	f	( $\Delta$ )	2.478956 GHz			1.061 dBm	
MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	$\Delta$ 2	1	f	( $\Delta$ )	1.000 MHz	( $\Delta$ )		-1.305 dB																					
2	F	1	f	( $\Delta$ )	2.478956 GHz			1.061 dBm																					

<p>8DPSK/LCH</p>	 <table border="1"> <thead> <tr> <th>MNR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>ΔZ</td> <td>1</td> <td>f (Δ)</td> <td>1.000 MHz (Δ)</td> <td>-0.872 dB</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>1</td> <td>f (Δ)</td> <td>2.401928 GHz</td> <td>-0.084 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	ΔZ	1	f (Δ)	1.000 MHz (Δ)	-0.872 dB				2	F	1	f (Δ)	2.401928 GHz	-0.084 dBm				
MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	ΔZ	1	f (Δ)	1.000 MHz (Δ)	-0.872 dB																								
2	F	1	f (Δ)	2.401928 GHz	-0.084 dBm																								
<p>8DPSK /MCH</p>	 <table border="1"> <thead> <tr> <th>MNR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>ΔZ</td> <td>1</td> <td>f (Δ)</td> <td>1.000 MHz (Δ)</td> <td>-0.602 dB</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>1</td> <td>f (Δ)</td> <td>2.440964 GHz</td> <td>0.338 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	ΔZ	1	f (Δ)	1.000 MHz (Δ)	-0.602 dB				2	F	1	f (Δ)	2.440964 GHz	0.338 dBm				
MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	ΔZ	1	f (Δ)	1.000 MHz (Δ)	-0.602 dB																								
2	F	1	f (Δ)	2.440964 GHz	0.338 dBm																								
<p>8DPSK /HCH</p>	 <table border="1"> <thead> <tr> <th>MNR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>ΔZ</td> <td>1</td> <td>f (Δ)</td> <td>1.002 MHz (Δ)</td> <td>-0.886 dB</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>1</td> <td>f (Δ)</td> <td>2.478922 GHz</td> <td>1.600 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	ΔZ	1	f (Δ)	1.002 MHz (Δ)	-0.886 dB				2	F	1	f (Δ)	2.478922 GHz	1.600 dBm				
MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	ΔZ	1	f (Δ)	1.002 MHz (Δ)	-0.886 dB																								
2	F	1	f (Δ)	2.478922 GHz	1.600 dBm																								

## 12. HOPPING CHANNEL NUMBER

### 12.1 Block Diagram Of Test Setup



### 12.2 Limit

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

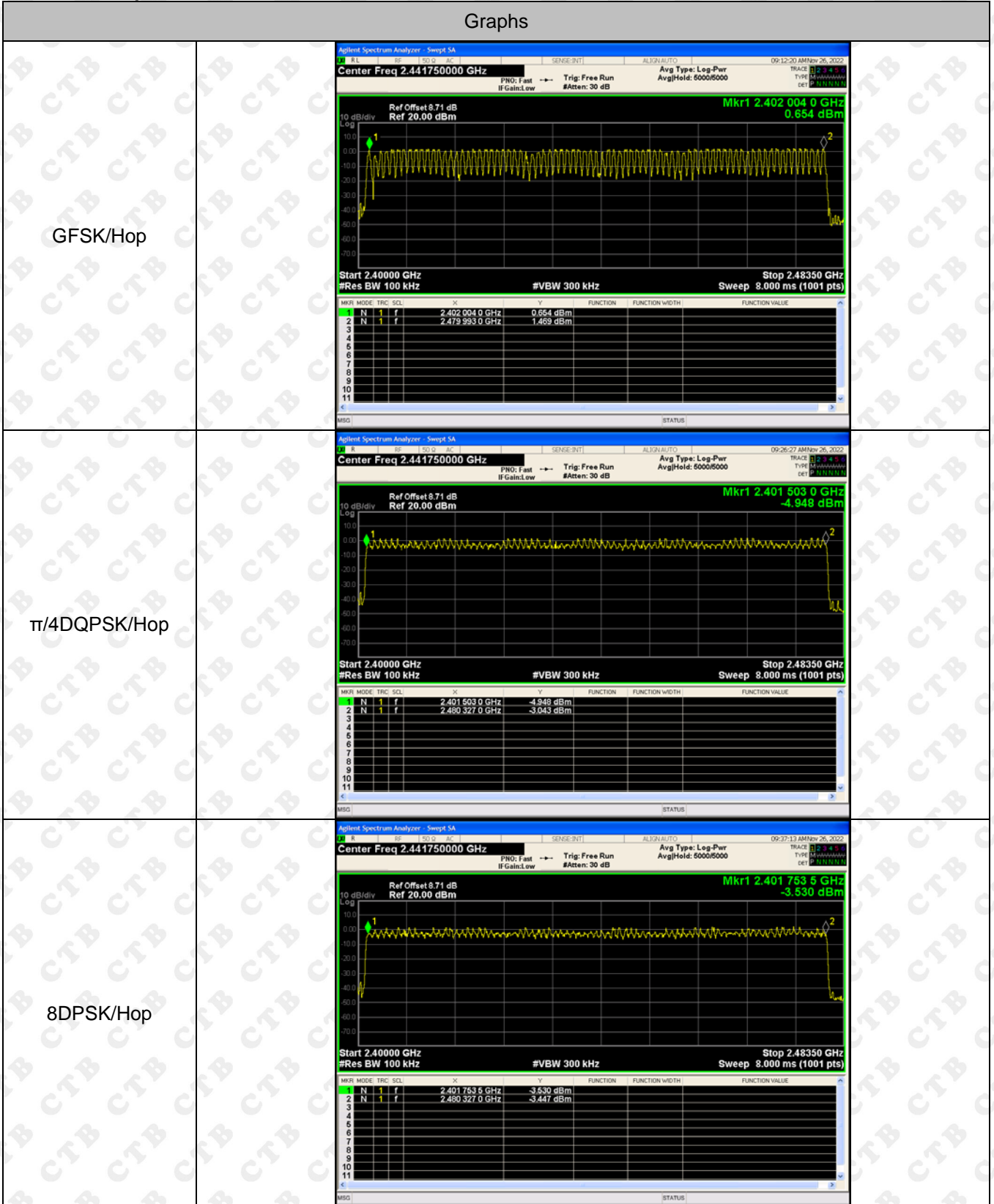
### 12.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;

### 12.4 Test Result

Mode	Channel.	Number of Hopping Channel	Verdict
GFSK	Hop	79	PASS
$\pi/4$ DQPSK	Hop	79	PASS
8DPSK	Hop	79	PASS

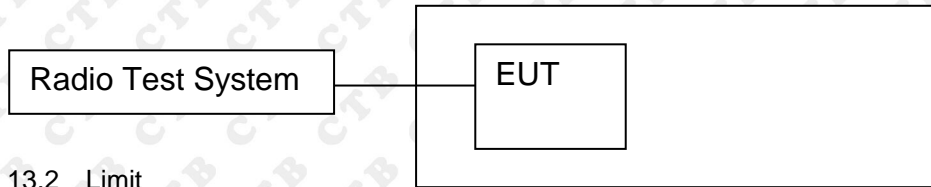
Test Graph





### 13. DWELL TIME

#### 13.1 Block Diagram Of Test Setup



#### 13.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

#### 13.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set spectrum analyzer span = 0. Centred on a hopping channel;
3. Set RBW = 1MHz and VBW = 3MHz. Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.
4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

13.4 Test Result

Worst case-GFSK:

Mode	Packet	Channel	Pulse Time (ms)	Total Dwell Time (ms)	Limit (ms)	Verdict
GFSK	DH1	LCH	0.376	120.32	400	PASS
	DH1	MCH	0.376	120.32	400	PASS
	DH1	HCH	0.376	120.32	400	PASS
	DH3	LCH	1.639	262.24	400	PASS
	DH3	MCH	1.638	262.08	400	PASS
	DH3	HCH	1.639	262.24	400	PASS
	DH5	LCH	2.888	308.053	400	PASS
	DH5	MCH	2.889	308.16	400	PASS
	DH5	HCH	2.888	308.053	400	PASS

Remark: DH5 Packet permit maximum 1600 / 79 / 6 hops per second in each channel (5 time slots RX, 1 time slot TX).

DH3 Packet permit maximum 1600 / 79 / 4 hops per second in each channel (3 time slots RX, 1 time slot TX).

DH1 Packet permit maximum 1600 / 79 / 2 hops per second in each channel (1 time slot RX, 1 time slot TX). So, the Dwell Time can be calculated as follows:

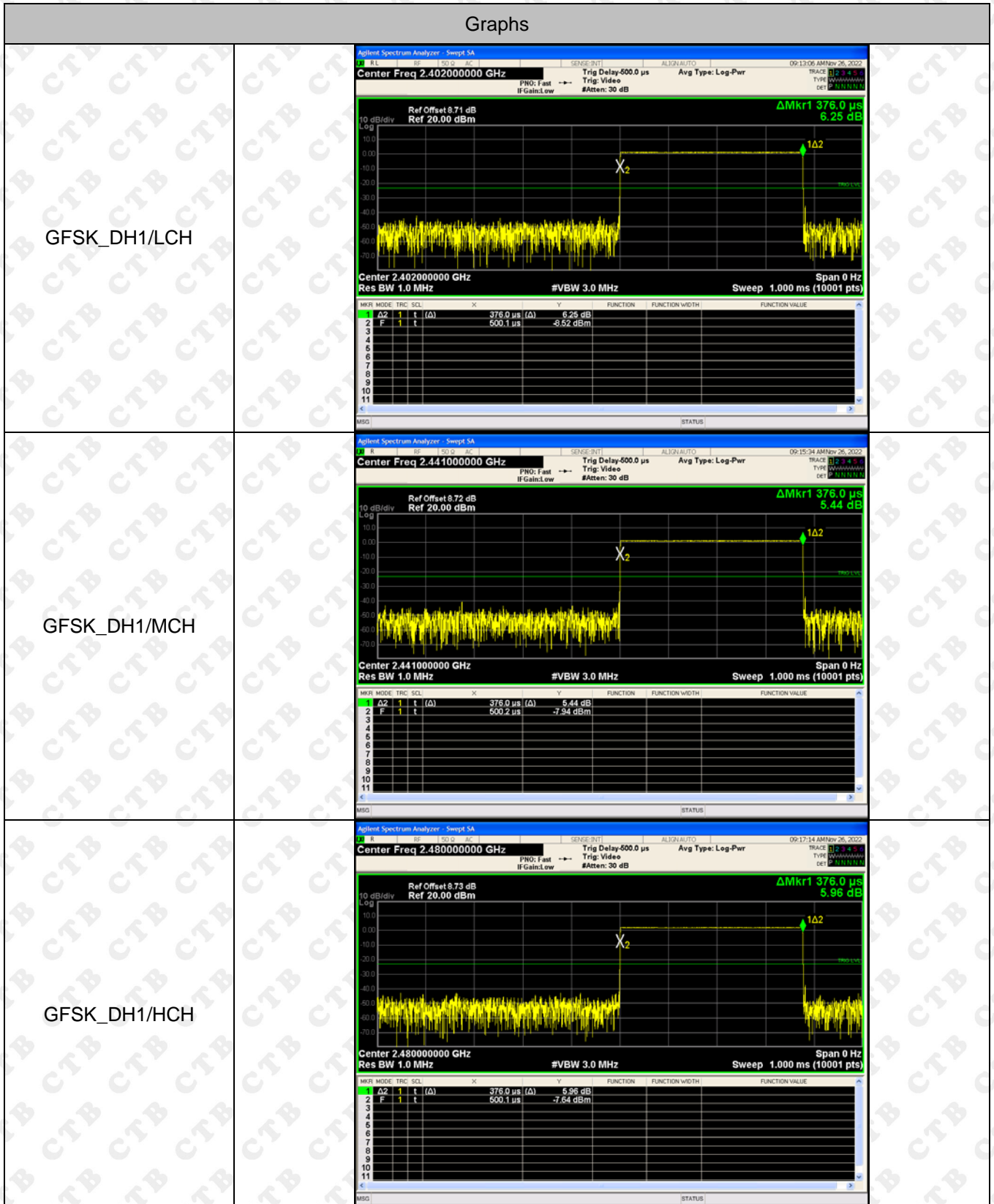
DH5:  $1600/79/6*0.4*79*(MkrDelta)/1000$

DH3:  $1600/79/4*0.4*79*(MkrDelta)/1000$

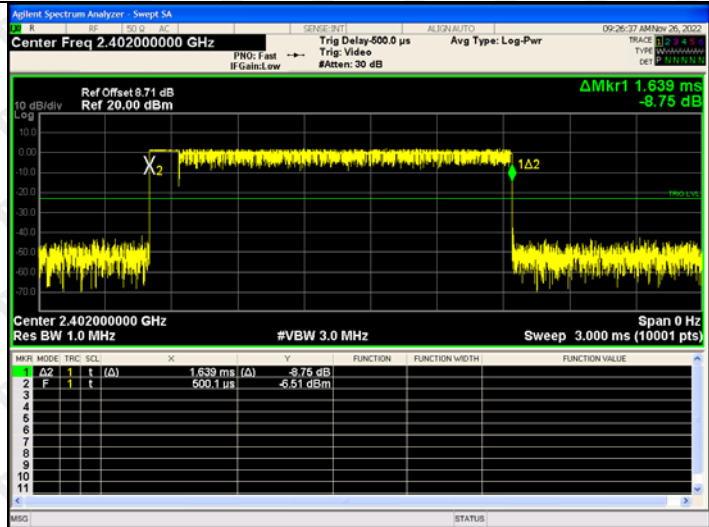
DH1:  $1600/79/2*0.4*79*(MkrDelta)/1000$

Remark: Mkr Delta is once pulse time.

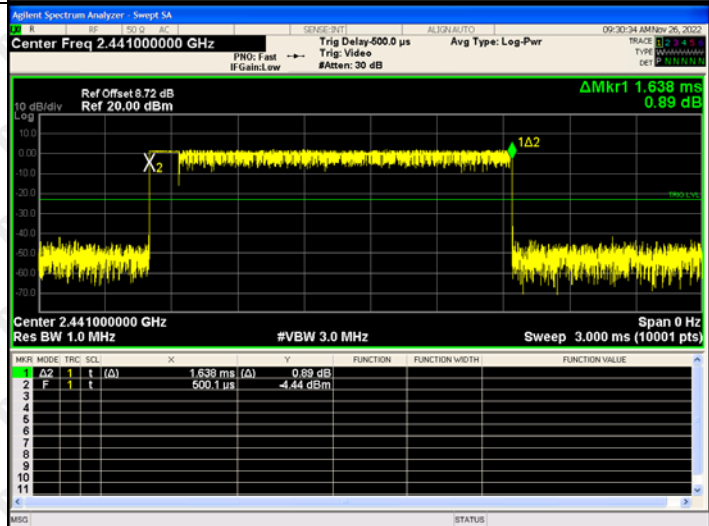
Test Graph



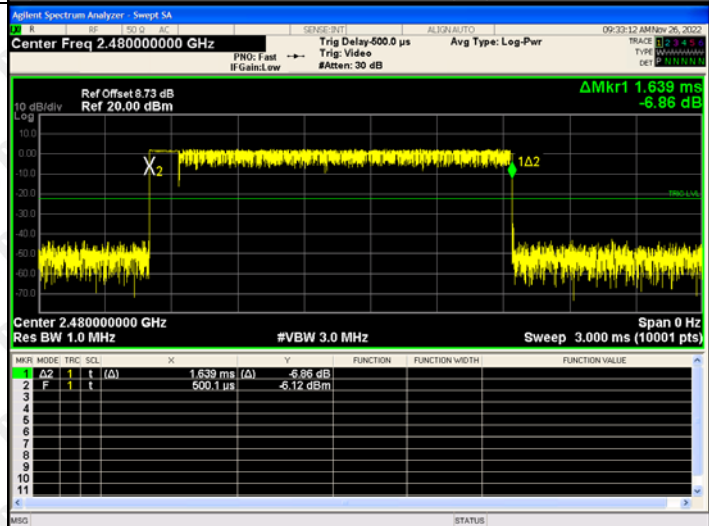
GFSK\_DH3/LCH



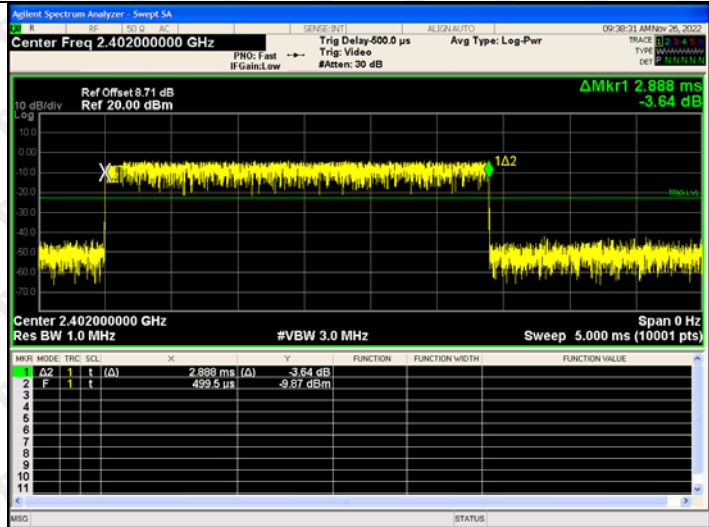
GFSK\_DH3/MCH



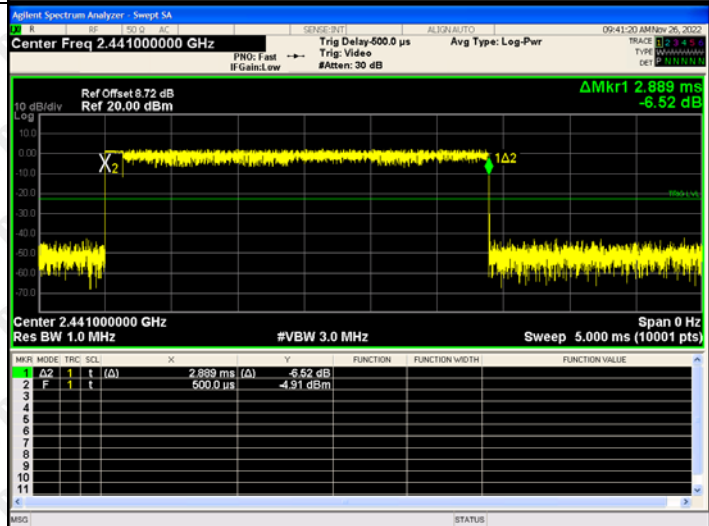
GFSK\_DH3/HCH



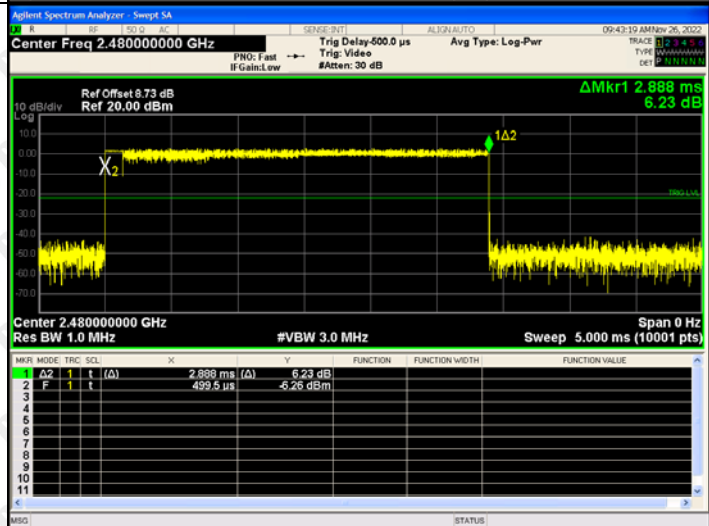
GFSK\_DH5/LCH



GFSK\_DH5/MCH



GFSK\_DH5/HCH



### 14. PSEUDORANDOM FREQUENCY

#### 14.1 Limit

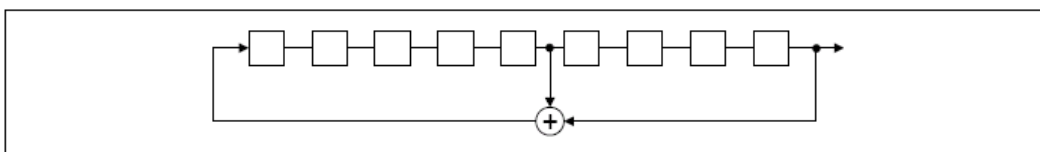
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively, 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, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

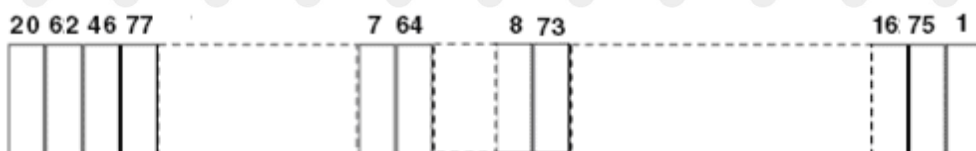
#### 14.2 Test procedure

The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence:  $2^9 - 1 = 511$  bits
- Longest sequence of zeros: 8 (non-inverted signal)



An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter. The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

### 14.3 Test Result

The device does not have the ability to be coordinated with other FHSS systems in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

## 15. ANTENNA REQUIREMENT

### 15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### 15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### EUT Antenna:

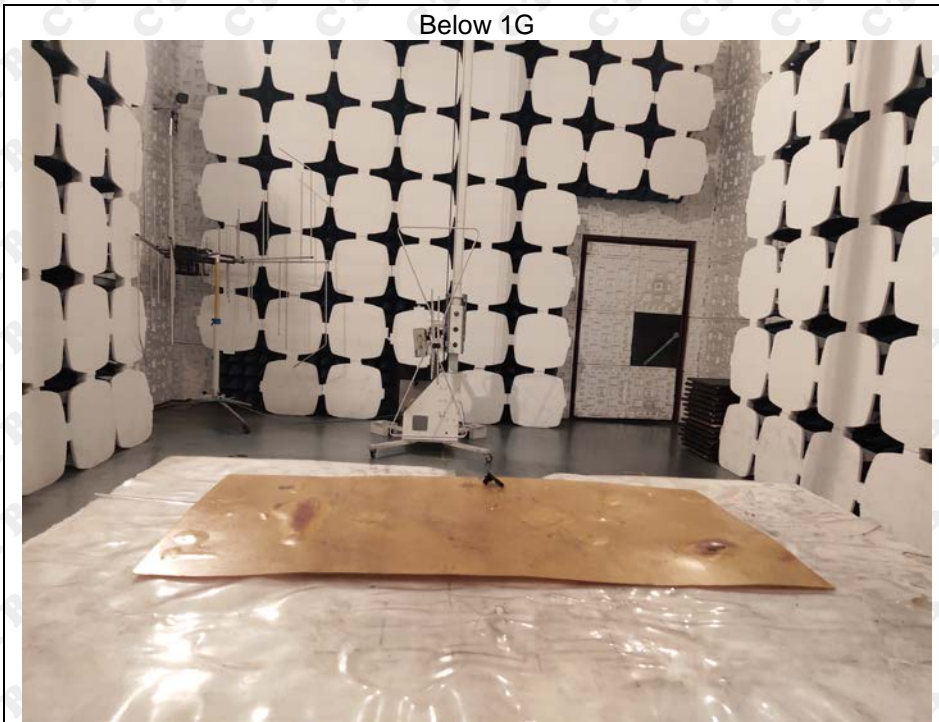
The antenna is Chip antenna. The best case gain of the antenna is 1.8dBi.



**16. EUT TEST SETUP PHOTOGRAPHS**

## Radiated Emission

Below 1G



Above 1G



## Conducted emissions



※※※※ END OF REPORT ※※※※