



# TEST REPORT

Product Name: Smart Phone  
FCC ID: 2ANMU-WP19PRO  
Trademark: **OUKITEL**  
Model Number: WP19 Pro  
Prepared For: SHENZHEN YUNJI INTELLIGENT TECHNOLOGY CO.,LTD  
Address: A2 2F BUILDING ENET NEW INDUSTRIAL PARK, DAFU INDUSTRIAL ZONE, GUANLAN, LONGHUA SHENZHEN, 518XXX China  
Manufacturer: SHENZHEN YUNJI INTELLIGENT TECHNOLOGY CO.,LTD  
Address: A2 2F BUILDING ENET NEW INDUSTRIAL PARK, DAFU INDUSTRIAL ZONE, GUANLAN, LONGHUA SHENZHEN, 518XXX 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: Oct. 18, 2023  
Sample tested Date: Oct. 18, 2023 to Nov. 02, 2023  
Issue Date: Nov. 02, 2023  
Report No.: CTB231031028RFX  
Test Standards: FCC Part15.247  
ANSI C63.10:2013  
Test Results: PASS  
Remark: This is Bluetooth radio test report.

Compiled by:

Reviewed by:

Approved by:

Zhou kui

Arron Liu



Zhou Kui

Arron Liu

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**

	Page
Test Report Declaration	
<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> .....	11
6.1 Block Diagram Of Test Setup .....	11
6.2 Limit .....	11
6.3 Test procedure .....	11
6.4 Test Result .....	13
<b>7. RADIATED SPURIOUS EMISSION</b> .....	15
7.1 Block Diagram Of Test Setup .....	15
7.2 Limit .....	15
7.3 Test procedure .....	16
7.4 Test Result .....	17
<b>8. BAND EDGE AND RF CONDUCTED SPURIOUS EMISSIONS</b> .....	26
8.1 Block Diagram Of Test Setup .....	26
8.2 Limit .....	26
8.3 Test procedure .....	26
8.4 Test Result .....	27
<b>9. CONDUCTED PEAK OUTPUT POWER</b> .....	34
9.1 Block Diagram Of Test Setup .....	34
9.2 Limit .....	34
9.3 Test procedure .....	34
9.4 Test Result .....	35
<b>10. 20DB OCCUPIED BANDWIDTH</b> .....	39
10.1 Block Diagram Of Test Setup .....	39
10.2 Limit .....	39
10.3 Test procedure .....	39
10.4 Test Result .....	39
<b>11. CARRIER FREQUENCIES SEPARATION</b> .....	43
11.1 Block Diagram Of Test Setup .....	43
11.2 Limit .....	43
11.3 Test procedure .....	43
11.4 Test Result .....	43
<b>12. HOPPING CHANNEL NUMBER</b> .....	47
12.1 Block Diagram Of Test Setup .....	47
12.2 Limit .....	47
12.3 Test procedure .....	47
12.4 Test Result .....	47

<b>13. DWELL TIME</b> .....	49
13.1 Block Diagram Of Test Setup .....	49
13.2 Limit .....	49
13.3 Test procedure .....	49
13.4 Test Result .....	50
<b>14. PSEUDORANDOM FREQUENCY</b> .....	54
14.1 Limit .....	54
14.2 Test procedure .....	54
14.3 Test Result .....	55
<b>15. ANTENNA REQUIREMENT</b> .....	56
<b>16. EUT TEST SETUP PHOTOGRAPHS</b> .....	57

*(Note: N/A means not applicable)*

**1. VERSION**

Report No.	Issue Date	Description	Approved
CTB231031028RFX	Nov. 02, 2023	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): WP19 Pro  
 Model Description: N/A  
 Bluetooth Version: Bluetooth 5.0  
 Hardware Version: LG985\_MB\_V4.0  
 Software Version: OUKITEL\_WP19 Pro\_EEA\_V03\_20231030

Operation Frequency: Bluetooth: 2402-2480MHz  
 Max. RF output power: Bluetooth: 4.667dBm  
 Type of Modulation: Bluetooth: GFSK,  $\pi/4$  DQPSK, 8DPSK  
 Antenna installation: Bluetooth: FPC antenna  
 Antenna Gain: Bluetooth: 0.44dBi  
 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	2024.07.05
2	Power Sensor	Agilent	U2021XA	MY56120032	2024.07.05
3	Power Sensor	Agilent	U2021XA	MY56120034	2024.07.05
4	Communication test set	R&S	CMW500	108058	2024.07.05
5	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	2024.07.05
6	Signal Generator	Agilent	N5181A	MY50140365	2024.07.05
7	Vector signal generator	Agilent	N5182A	MY47420195	2024.07.05
8	Communication test set	Agilent	E5515C	MY50102567	2024.07.06
9	2.4 GHz Filter	Shenxiang	MSF2400-2483.5MS-1154	20181015001	2024.07.05
10	5 GHz Filter	Shenxiang	MSF5150-5850 MS-1155	20181015001	2024.07.06
11	Filter	Xingbo	XBLBQ-DZA120	190821-1-1	2024.07.06
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	2024.07.05
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	2024.07.05
18	Amplifier	HP	8447E	2945A02747	2024.07.05
19	Amplifier	Agilent	8449B	3008A01838	2024.07.05
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	2024.07.08

21	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA9120D	01911	2024.07.08
22	EMI test software	Fala	EZ-EMC	FA-03A2 RE	/
23	Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-224	2024.07.08
24	loop antenna	ZHINAN	ZN30900A	GTS534	/
25	40G Horn antenna	A/H/System	SAS-574	588	2023.10.30
26	Amplifier	AEROFLEX	Aeroflex	097	2023.10.30

**Continuous disturbance**

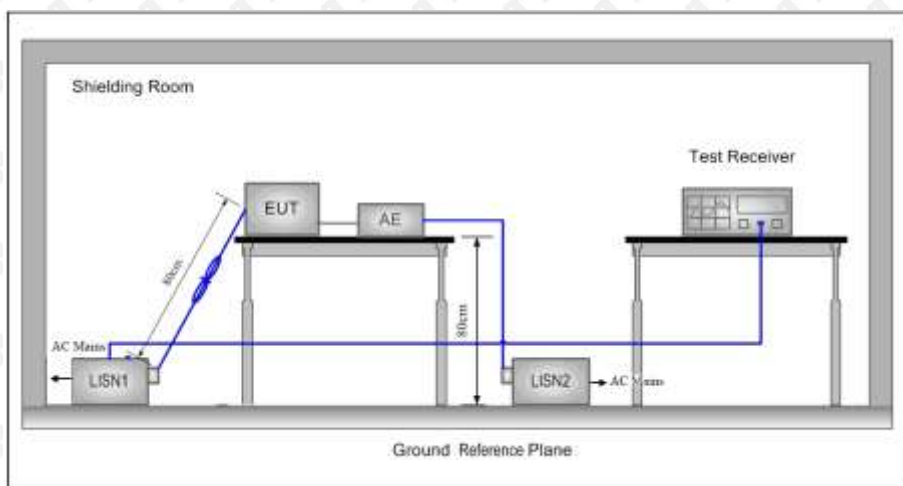
No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	ROHDE&SCHWARZ	ESH3-Z5	100318	2024.07.05
2	Pulse limiter	ROHDE&SCHWARZ	ESH3Z2	357881052	2024.07.05
3	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100428/003	2024.07.05
4	Coaxial cable	ZDECL	Z302S-NJ-SMA J-12M	18091905	2024.07.05
5	ISN	Schwarzbeck	NTFM8158	183	2024.07.05
6	Communication test set	Agilent	E5515C	MY50102567	2024.07.05
7	Communication test set	R&S	CMW500	108058	2024.07.05
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	2024.07.08
2	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	2024.07.08
3	Amplifier	Agilent	8449B	3008A01838	2024.07.05
4	Amplifier	HP	8447E	2945A02747	2024.07.05
5	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100428/003	2024.07.05
6	Coaxial cable	ETS	RFC-SNS-100-NMS-80 NI	/	2024.07.05
7	Coaxial cable	ETS	RFC-SNS-100-NMS-20 NI	/	2024.07.05
8	Coaxial cable	ETS	RFC-SNS-100-SMS-20 NI	/	2024.07.05
9	Coaxial cable	ETS	RFC-NNS-100-NMS-300 NI	/	2024.07.05
10	Communication test set	Agilent	E5515C	MY50102567	2024.07.05
11	Communication test set	R&S	CMW500	108058	2024.07.05
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

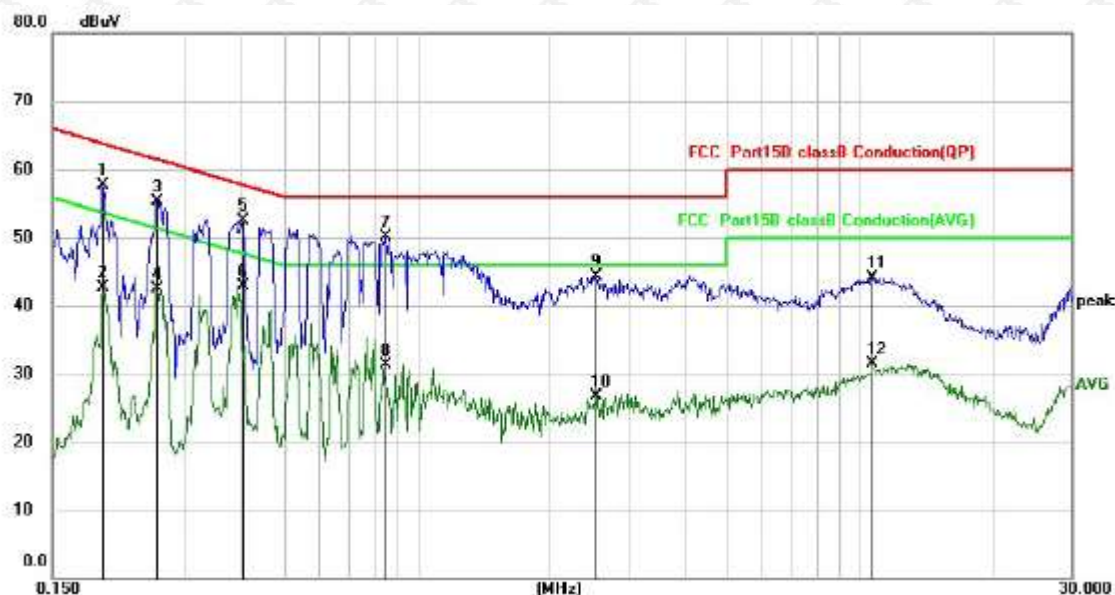
- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50 $\Omega$ /50 $\mu$ H + 5 $\Omega$  linear impedance. The power cables of all other units of the 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)

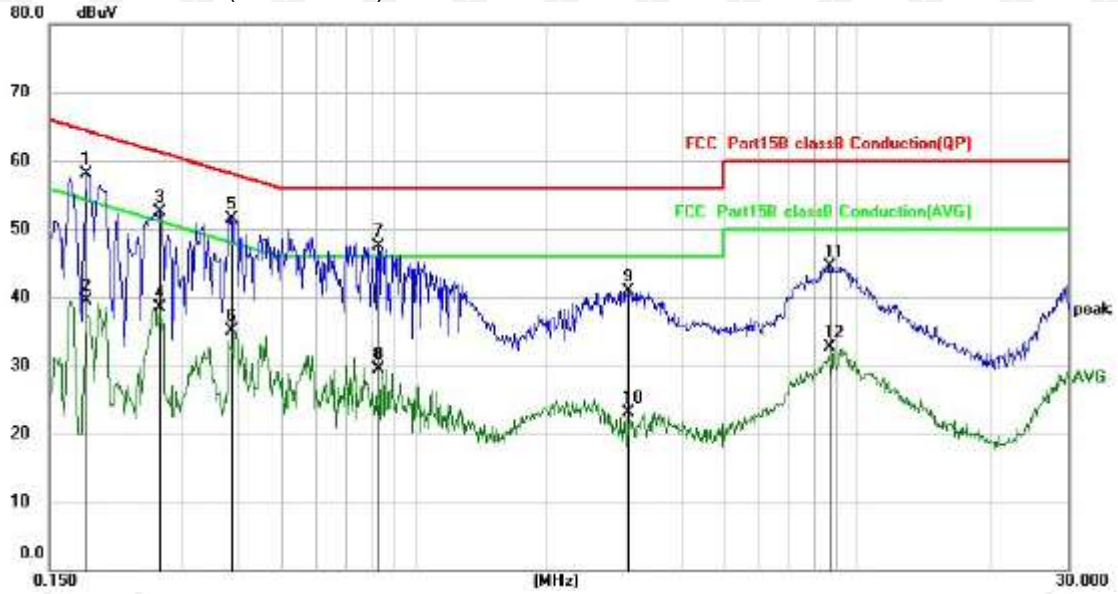


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.1945	47.74	9.95	57.69	63.84	-6.15	QP
2		0.1945	32.72	9.95	42.67	53.84	-11.17	AVG
3		0.2580	45.36	9.96	55.32	61.50	-6.18	QP
4		0.2580	32.47	9.96	42.43	51.50	-9.07	AVG
5		0.4020	42.53	9.98	52.51	57.81	-5.30	QP
6	*	0.4020	32.84	9.98	42.82	47.81	-4.99	AVG
7		0.8459	40.14	10.01	50.15	56.00	-5.85	QP
8		0.8459	21.36	10.01	31.37	46.00	-14.63	AVG
9		2.5379	34.08	10.14	44.22	56.00	-11.78	QP
10		2.5379	16.55	10.14	26.69	46.00	-19.31	AVG
11		10.6100	33.58	10.60	44.18	60.00	-15.82	QP
12		10.6100	20.88	10.60	31.48	50.00	-18.52	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	*	0.1824	48.07	9.95	58.02	64.38	-6.36	QP
2		0.1824	29.57	9.95	39.52	54.38	-14.86	AVG
3		0.2660	42.60	9.96	52.56	61.24	-8.68	QP
4		0.2660	28.50	9.96	38.46	51.24	-12.78	AVG
5		0.3860	41.48	9.97	51.45	58.15	-6.70	QP
6		0.3860	25.07	9.97	35.04	48.15	-13.11	AVG
7		0.8300	37.41	10.02	47.43	56.00	-8.57	QP
8		0.8300	19.55	10.02	29.57	46.00	-16.43	AVG
9		3.0459	30.66	10.19	40.85	56.00	-15.15	QP
10		3.0459	12.96	10.19	23.15	46.00	-22.85	AVG
11		8.6617	33.89	10.55	44.44	60.00	-15.56	QP
12		8.6617	22.11	10.55	32.66	50.00	-17.34	AVG

Remark:

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

## 7. RADIATED SPURIOUS EMISSION

### 7.1 Block Diagram Of Test Setup

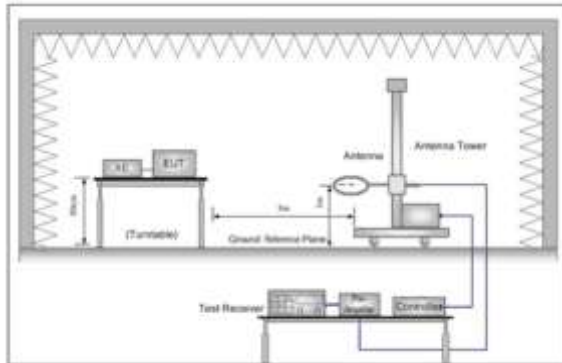


Figure 1. Below 30MHz

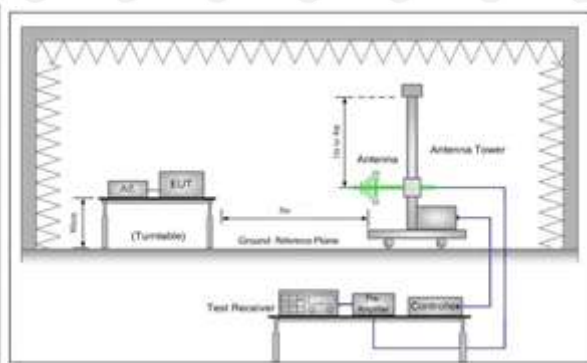


Figure 2. 30MHz to 1GHz

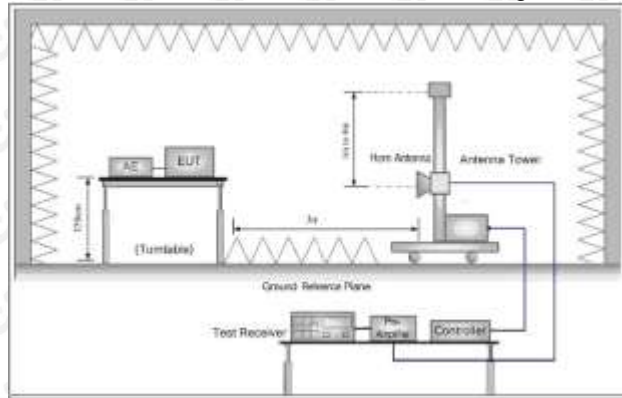


Figure 3. Above 1GHz

### 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		54.4515	30.18	-6.68	23.50	40.00	-16.50	QP
2		80.0805	34.12	-9.09	25.03	40.00	-14.97	QP
3		164.3300	32.76	-3.90	28.86	43.50	-14.64	QP
4		259.2336	31.33	-6.50	24.83	46.00	-21.17	QP
5		438.6553	35.54	-1.30	34.24	46.00	-11.76	QP
6	*	908.0729	28.58	6.95	35.53	46.00	-10.47	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		53.5052	30.92	-6.67	24.25	40.00	-15.75	QP
2		74.0052	35.72	-8.46	27.26	40.00	-12.74	QP
3		146.6303	33.79	-3.58	30.21	43.50	-13.29	QP
4		199.2855	32.11	-7.48	24.63	43.50	-18.87	QP
5		416.1791	28.34	-1.80	26.54	46.00	-19.46	QP
6	*	768.7481	29.23	5.84	35.07	46.00	-10.93	QP

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

## Above 1 GHz Test Results:

 CH Low (2402MHz)  
 Horizontal:

Frequency (MHz)	Reading Result (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
4804	57.30	-3.65	53.65	74.00	-20.35	peak
4804	50.76	-3.65	47.11	54.00	-6.89	AVG
7206	59.44	-0.95	58.49	74.00	-15.51	peak
7206	40.54	-0.95	39.59	54.00	-14.41	AVG

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

Vertical:

Frequency (MHz)	Reading Result (dB $\mu$ V)	Factor (dB)	Emission Level (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)	Detector Type
4804	58.87	-3.65	55.22	74.00	-18.78	peak
4804	50.32	-3.65	46.67	54.00	-7.33	AVG
7206	61.58	-0.95	60.63	74.00	-13.37	peak
7206	41.07	-0.95	40.12	54.00	-13.88	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	59.71	-3.54	56.17	74.00	-17.83	peak
4882.00	47.95	-3.54	44.41	54.00	-9.59	AVG
7323.00	57.92	-0.81	57.11	74.00	-16.89	peak
7323.00	43.01	-0.81	42.20	54.00	-11.80	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	57.84	-3.54	54.30	74.00	-19.70	peak
4882.00	48.87	-3.54	45.33	54.00	-8.67	AVG
7323.00	57.69	-0.81	56.88	74.00	-17.12	peak
7323.00	42.58	-0.81	41.77	54.00	-12.23	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	56.65	-3.43	53.22	74.00	-20.78	peak
4960	48.06	-3.44	44.62	54.00	-9.38	AVG
7440	60.98	-0.77	60.21	74.00	-13.79	peak
7440	42.58	-0.77	41.81	54.00	-12.19	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	57.61	-3.43	54.18	74.00	-19.82	peak
4960	47.85	-3.44	44.41	54.00	-9.59	AVG
7440	61.33	-0.77	60.56	74.00	-13.44	peak
7440	40.43	-0.77	39.66	54.00	-14.34	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	57.47	-5.81	51.66	74.00	-22.34	peak
2310.00	/	-5.81	/	54.00	/	AVG
2390.00	56.19	-5.84	50.35	74.00	-23.65	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	55.86	-5.81	50.05	74.00	-23.95	peak
2310.00	/	-5.81	/	54.00	/	AVG
2390.00	55.29	-5.84	49.45	74.00	-24.55	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	54.76	-5.81	48.95	74.00	-25.05	peak
2483.50	/	-5.81	/	54.00	/	AVG
2500.00	54.40	-6.06	48.34	74.00	-25.66	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	57.23	-5.81	51.42	74.00	-22.58	peak
2483.50	/	-5.81	/	54.00	/	AVG
2500.00	54.83	-6.06	48.77	74.00	-25.23	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	54.36	-5.81	48.55	74.00	-25.45	peak
2310.00	/	-5.81	/	54.00	/	AVG
2390.00	55.33	-5.84	49.49	74.00	-24.51	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	54.65	-5.81	48.84	74.00	-25.16	peak
2310.00	/	-5.81	/	54.00	/	AVG
2390.00	52.94	-5.84	47.10	74.00	-26.90	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	55.62	-5.81	49.81	74.00	-24.19	peak
2483.50	/	-5.81	/	54.00	/	AVG
2500.00	57.06	-6.06	51.00	74.00	-23.00	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	55.72	-5.81	49.91	74.00	-24.09	peak
2483.50	/	-5.81	/	54.00	/	AVG
2500.00	54.93	-6.06	48.87	74.00	-25.13	peak
2500.00	/	-6.06	/	54.00	/	AVG

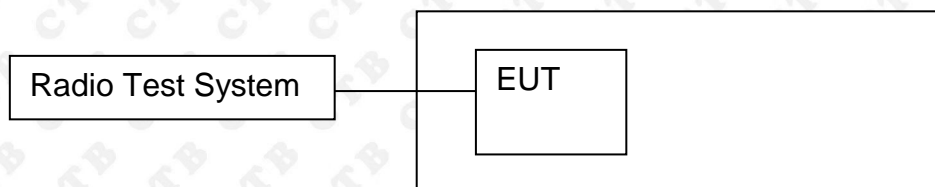
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Emission level = Reading Result + Factor, Margin = Emission level - Limits

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

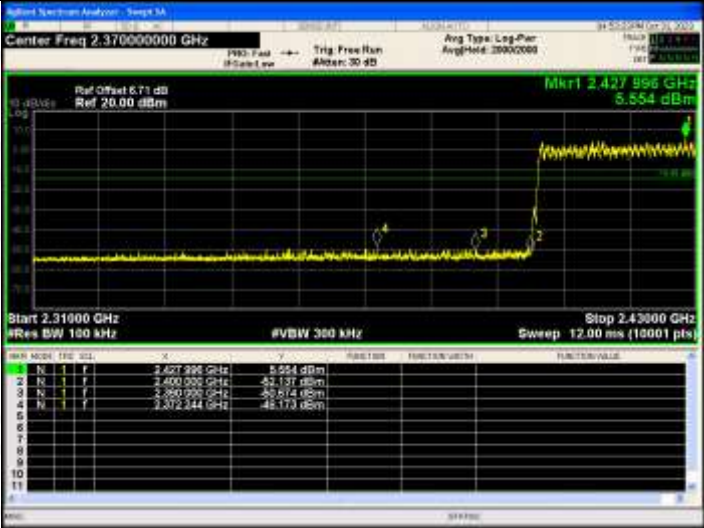

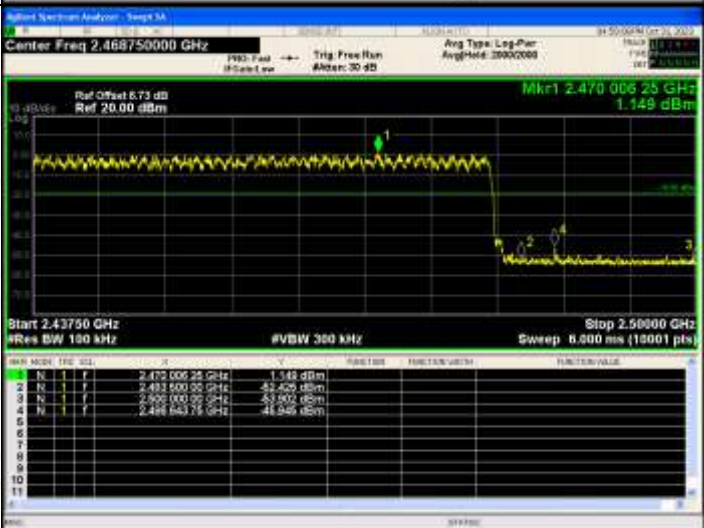
8.4 Test Result

BAND EDGE Graphs

<p>GFSK/LCH/ No Hop</p>	<p>Center Freq 2.36000000 GHz</p> <p>Ref Offset 6.71 dB Ref 20.00 dBm</p> <p>Mkr1 2.40215 GHz 3.052 dBm</p> <p>Start 2.31000 GHz #RBW 300 kHz Stop 2.41000 GHz #Res BW 100 kHz Sweep 10.00 ms (10001 pts)</p> <table border="1"> <thead> <tr> <th>CH</th> <th>MODE</th> <th>FREQ</th> <th>SCAL</th> <th>Y</th> <th>UNIT</th> <th>FILT</th> <th>RES</th> <th>AVG</th> <th>MARKER</th> </tr> </thead> <tbody> <tr><td>1</td><td>N</td><td>2.40215</td><td>GHz</td><td>3.052</td><td>dBm</td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td>N</td><td>2.40200</td><td>GHz</td><td>-58.270</td><td>dBm</td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td>N</td><td>2.39313</td><td>GHz</td><td>-54.999</td><td>dBm</td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td>N</td><td>2.33816</td><td>GHz</td><td>-61.900</td><td>dBm</td><td></td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	CH	MODE	FREQ	SCAL	Y	UNIT	FILT	RES	AVG	MARKER	1	N	2.40215	GHz	3.052	dBm					2	N	2.40200	GHz	-58.270	dBm					3	N	2.39313	GHz	-54.999	dBm					4	N	2.33816	GHz	-61.900	dBm					5										6										7										8										9										10										11									
CH	MODE	FREQ	SCAL	Y	UNIT	FILT	RES	AVG	MARKER																																																																																																																
1	N	2.40215	GHz	3.052	dBm																																																																																																																				
2	N	2.40200	GHz	-58.270	dBm																																																																																																																				
3	N	2.39313	GHz	-54.999	dBm																																																																																																																				
4	N	2.33816	GHz	-61.900	dBm																																																																																																																				
5																																																																																																																									
6																																																																																																																									
7																																																																																																																									
8																																																																																																																									
9																																																																																																																									
10																																																																																																																									
11																																																																																																																									
<p>GFSK/LCH/ Hop</p>	<p>Center Freq 2.37000000 GHz</p> <p>Ref Offset 6.71 dB Ref 20.00 dBm</p> <p>Mkr1 2.422848 GHz 3.728 dBm</p> <p>Start 2.31000 GHz #RBW 300 kHz Stop 2.43000 GHz #Res BW 100 kHz Sweep 12.00 ms (10001 pts)</p> <table border="1"> <thead> <tr> <th>CH</th> <th>MODE</th> <th>FREQ</th> <th>SCAL</th> <th>Y</th> <th>UNIT</th> <th>FILT</th> <th>RES</th> <th>AVG</th> <th>MARKER</th> </tr> </thead> <tbody> <tr><td>1</td><td>N</td><td>2.422848</td><td>GHz</td><td>3.728</td><td>dBm</td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td>N</td><td>2.400000</td><td>GHz</td><td>-53.498</td><td>dBm</td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td>N</td><td>2.360000</td><td>GHz</td><td>-53.183</td><td>dBm</td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td>N</td><td>2.371194</td><td>GHz</td><td>-58.299</td><td>dBm</td><td></td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	CH	MODE	FREQ	SCAL	Y	UNIT	FILT	RES	AVG	MARKER	1	N	2.422848	GHz	3.728	dBm					2	N	2.400000	GHz	-53.498	dBm					3	N	2.360000	GHz	-53.183	dBm					4	N	2.371194	GHz	-58.299	dBm					5										6										7										8										9										10										11									
CH	MODE	FREQ	SCAL	Y	UNIT	FILT	RES	AVG	MARKER																																																																																																																
1	N	2.422848	GHz	3.728	dBm																																																																																																																				
2	N	2.400000	GHz	-53.498	dBm																																																																																																																				
3	N	2.360000	GHz	-53.183	dBm																																																																																																																				
4	N	2.371194	GHz	-58.299	dBm																																																																																																																				
5																																																																																																																									
6																																																																																																																									
7																																																																																																																									
8																																																																																																																									
9																																																																																																																									
10																																																																																																																									
11																																																																																																																									
<p>GFSK/HCH/ No Hop</p>	<p>Center Freq 2.48900000 GHz</p> <p>Ref Offset 6.73 dB Ref 20.00 dBm</p> <p>Mkr1 2.480156 GHz 3.252 dBm</p> <p>Start 2.47300 GHz #RBW 100 kHz Stop 2.50300 GHz #Res BW 100 kHz Sweep 10.00 ms (10001 pts)</p> <table border="1"> <thead> <tr> <th>CH</th> <th>MODE</th> <th>FREQ</th> <th>SCAL</th> <th>Y</th> <th>UNIT</th> <th>FILT</th> <th>RES</th> <th>AVG</th> <th>MARKER</th> </tr> </thead> <tbody> <tr><td>1</td><td>N</td><td>2.480156</td><td>GHz</td><td>3.252</td><td>dBm</td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td>N</td><td>2.483500</td><td>GHz</td><td>-58.294</td><td>dBm</td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td>N</td><td>2.480000</td><td>GHz</td><td>-58.268</td><td>dBm</td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td>N</td><td>2.483008</td><td>GHz</td><td>-58.112</td><td>dBm</td><td></td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	CH	MODE	FREQ	SCAL	Y	UNIT	FILT	RES	AVG	MARKER	1	N	2.480156	GHz	3.252	dBm					2	N	2.483500	GHz	-58.294	dBm					3	N	2.480000	GHz	-58.268	dBm					4	N	2.483008	GHz	-58.112	dBm					5										6										7										8										9										10										11									
CH	MODE	FREQ	SCAL	Y	UNIT	FILT	RES	AVG	MARKER																																																																																																																
1	N	2.480156	GHz	3.252	dBm																																																																																																																				
2	N	2.483500	GHz	-58.294	dBm																																																																																																																				
3	N	2.480000	GHz	-58.268	dBm																																																																																																																				
4	N	2.483008	GHz	-58.112	dBm																																																																																																																				
5																																																																																																																									
6																																																																																																																									
7																																																																																																																									
8																																																																																																																									
9																																																																																																																									
10																																																																																																																									
11																																																																																																																									

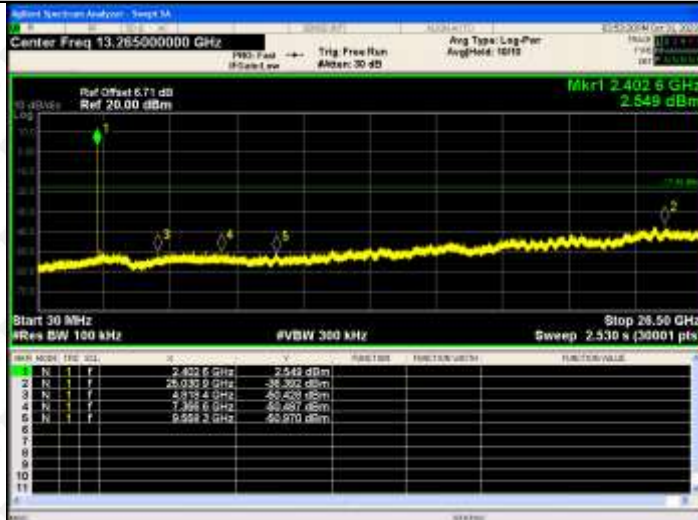
<p>GFSK/HCH/ Hop</p>		
<p><math>\pi/4</math>DQPSK/LCH/ No Hop</p>		
<p><math>\pi/4</math>DQPSK/LCH/ Hop</p>		

<p><math>\pi/4</math>DQPSK/HCH/ No Hop</p>	<p>Adjust Spectrum Analyzer - Sweep 3A Center Freq 2.489000000 GHz Ref Offset 8.73 dB Ref 20.00 dBm Mkr1 2.480 032 8 GHz 0.788 dBm Start 2.47300 GHz #VBW 300 kHz Stop 2.50000 GHz #Res BW 100 kHz Sweep 2.667 ms (10001 pts)</p> <table border="1"> <thead> <tr> <th>CHN</th> <th>MODE</th> <th>FREQ</th> <th>SECT</th> <th>Y</th> <th>RES</th> <th>UNIT</th> <th>MARKER</th> <th>MARKER VALUE</th> </tr> </thead> <tbody> <tr><td>1</td><td>N</td><td>F</td><td>F</td><td>2.480 032 8 GHz</td><td>0.788</td><td>dBm</td><td></td><td></td></tr> <tr><td>2</td><td>N</td><td>F</td><td>F</td><td>2.482 800 0 GHz</td><td>-52.898</td><td>dBm</td><td></td><td></td></tr> <tr><td>3</td><td>N</td><td>F</td><td>F</td><td>2.485 000 0 GHz</td><td>-56.104</td><td>dBm</td><td></td><td></td></tr> <tr><td>4</td><td>N</td><td>F</td><td>F</td><td>2.487 776 8 GHz</td><td>-52.206</td><td>dBm</td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	CHN	MODE	FREQ	SECT	Y	RES	UNIT	MARKER	MARKER VALUE	1	N	F	F	2.480 032 8 GHz	0.788	dBm			2	N	F	F	2.482 800 0 GHz	-52.898	dBm			3	N	F	F	2.485 000 0 GHz	-56.104	dBm			4	N	F	F	2.487 776 8 GHz	-52.206	dBm			5									6									7									8									9									10									11								
CHN	MODE	FREQ	SECT	Y	RES	UNIT	MARKER	MARKER VALUE																																																																																																					
1	N	F	F	2.480 032 8 GHz	0.788	dBm																																																																																																							
2	N	F	F	2.482 800 0 GHz	-52.898	dBm																																																																																																							
3	N	F	F	2.485 000 0 GHz	-56.104	dBm																																																																																																							
4	N	F	F	2.487 776 8 GHz	-52.206	dBm																																																																																																							
5																																																																																																													
6																																																																																																													
7																																																																																																													
8																																																																																																													
9																																																																																																													
10																																																																																																													
11																																																																																																													
<p><math>\pi/4</math>DQPSK/HCH/ Hop</p>	<p>Adjust Spectrum Analyzer - Sweep 3A Center Freq 2.468750000 GHz Ref Offset 8.73 dB Ref 20.00 dBm Mkr1 2.448 006 25 GHz 6.000 dBm Start 2.43750 GHz #VBW 300 kHz Stop 2.50000 GHz #Res BW 100 kHz Sweep 6.800 ms (10001 pts)</p> <table border="1"> <thead> <tr> <th>CHN</th> <th>MODE</th> <th>FREQ</th> <th>SECT</th> <th>Y</th> <th>RES</th> <th>UNIT</th> <th>MARKER</th> <th>MARKER VALUE</th> </tr> </thead> <tbody> <tr><td>1</td><td>N</td><td>F</td><td>F</td><td>2.448 006 25 GHz</td><td>6.000</td><td>dBm</td><td></td><td></td></tr> <tr><td>2</td><td>N</td><td>F</td><td>F</td><td>2.483 500 00 GHz</td><td>-52.528</td><td>dBm</td><td></td><td></td></tr> <tr><td>3</td><td>N</td><td>F</td><td>F</td><td>2.500 000 00 GHz</td><td>-51.653</td><td>dBm</td><td></td><td></td></tr> <tr><td>4</td><td>N</td><td>F</td><td>F</td><td>2.488 837 80 GHz</td><td>-45.748</td><td>dBm</td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	CHN	MODE	FREQ	SECT	Y	RES	UNIT	MARKER	MARKER VALUE	1	N	F	F	2.448 006 25 GHz	6.000	dBm			2	N	F	F	2.483 500 00 GHz	-52.528	dBm			3	N	F	F	2.500 000 00 GHz	-51.653	dBm			4	N	F	F	2.488 837 80 GHz	-45.748	dBm			5									6									7									8									9									10									11								
CHN	MODE	FREQ	SECT	Y	RES	UNIT	MARKER	MARKER VALUE																																																																																																					
1	N	F	F	2.448 006 25 GHz	6.000	dBm																																																																																																							
2	N	F	F	2.483 500 00 GHz	-52.528	dBm																																																																																																							
3	N	F	F	2.500 000 00 GHz	-51.653	dBm																																																																																																							
4	N	F	F	2.488 837 80 GHz	-45.748	dBm																																																																																																							
5																																																																																																													
6																																																																																																													
7																																																																																																													
8																																																																																																													
9																																																																																																													
10																																																																																																													
11																																																																																																													
<p>8DPSK/LCH/No Hop</p>	<p>Adjust Spectrum Analyzer - Sweep 3A Center Freq 2.380000000 GHz Ref Offset 8.73 dB Ref 20.00 dBm Mkr1 2.402 10 GHz 0.056 dBm Start 2.31000 GHz #VBW 300 kHz Stop 2.41000 GHz #Res BW 100 kHz Sweep 10.00 ms (10001 pts)</p> <table border="1"> <thead> <tr> <th>CHN</th> <th>MODE</th> <th>FREQ</th> <th>SECT</th> <th>Y</th> <th>RES</th> <th>UNIT</th> <th>MARKER</th> <th>MARKER VALUE</th> </tr> </thead> <tbody> <tr><td>1</td><td>N</td><td>F</td><td>F</td><td>2.402 10 GHz</td><td>0.056</td><td>dBm</td><td></td><td></td></tr> <tr><td>2</td><td>N</td><td>F</td><td>F</td><td>2.423 00 GHz</td><td>-51.956</td><td>dBm</td><td></td><td></td></tr> <tr><td>3</td><td>N</td><td>F</td><td>F</td><td>2.391 00 GHz</td><td>-51.458</td><td>dBm</td><td></td><td></td></tr> <tr><td>4</td><td>N</td><td>F</td><td>F</td><td>2.378 23 GHz</td><td>-52.133</td><td>dBm</td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	CHN	MODE	FREQ	SECT	Y	RES	UNIT	MARKER	MARKER VALUE	1	N	F	F	2.402 10 GHz	0.056	dBm			2	N	F	F	2.423 00 GHz	-51.956	dBm			3	N	F	F	2.391 00 GHz	-51.458	dBm			4	N	F	F	2.378 23 GHz	-52.133	dBm			5									6									7									8									9									10									11								
CHN	MODE	FREQ	SECT	Y	RES	UNIT	MARKER	MARKER VALUE																																																																																																					
1	N	F	F	2.402 10 GHz	0.056	dBm																																																																																																							
2	N	F	F	2.423 00 GHz	-51.956	dBm																																																																																																							
3	N	F	F	2.391 00 GHz	-51.458	dBm																																																																																																							
4	N	F	F	2.378 23 GHz	-52.133	dBm																																																																																																							
5																																																																																																													
6																																																																																																													
7																																																																																																													
8																																																																																																													
9																																																																																																													
10																																																																																																													
11																																																																																																													

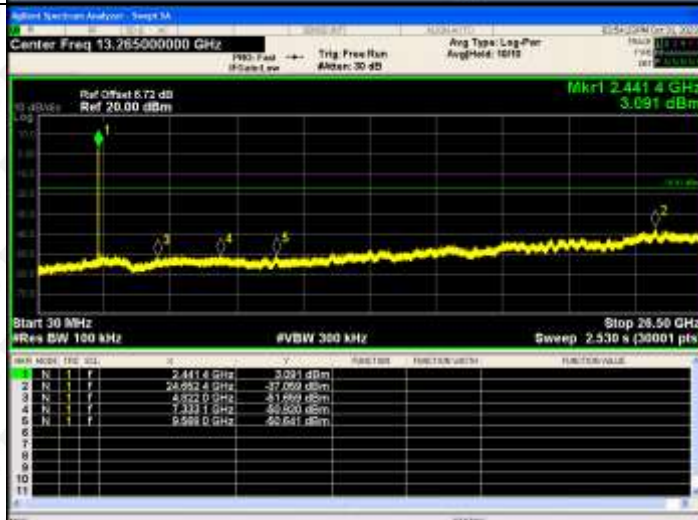
<p>8DPSK /LCH/Hop</p>	
<p>8DPSK /HCH/No Hop</p>	
<p>8DPSK /HCH/Hop</p>	

RF Conducted Spurious Emissions Graphs

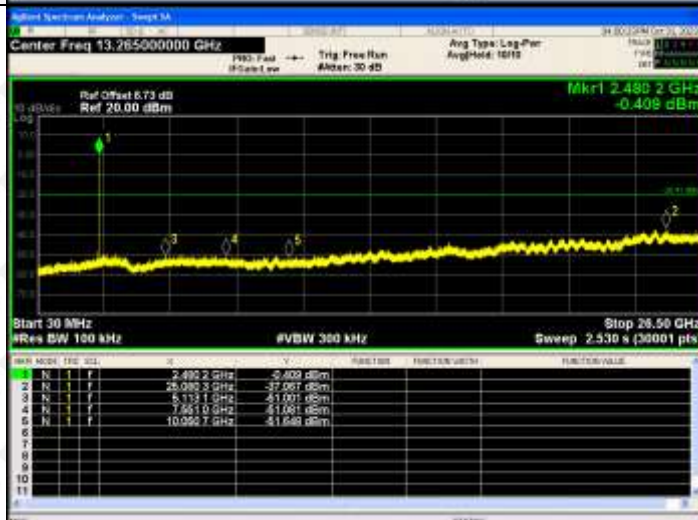
GFSK/LCH



GFSK/MCH

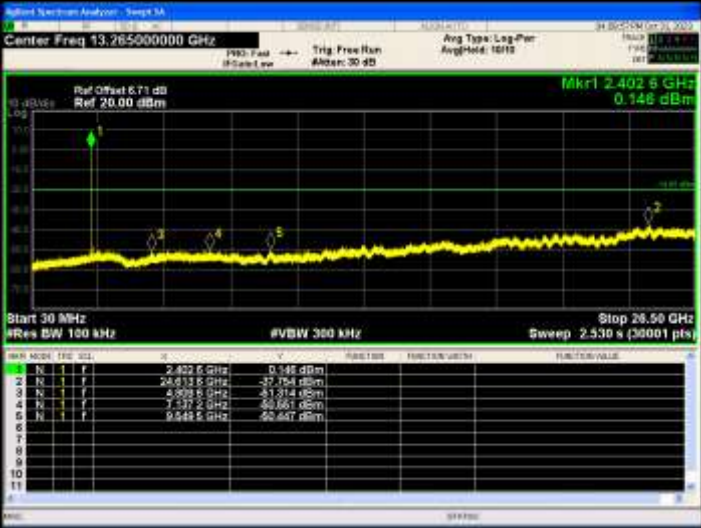
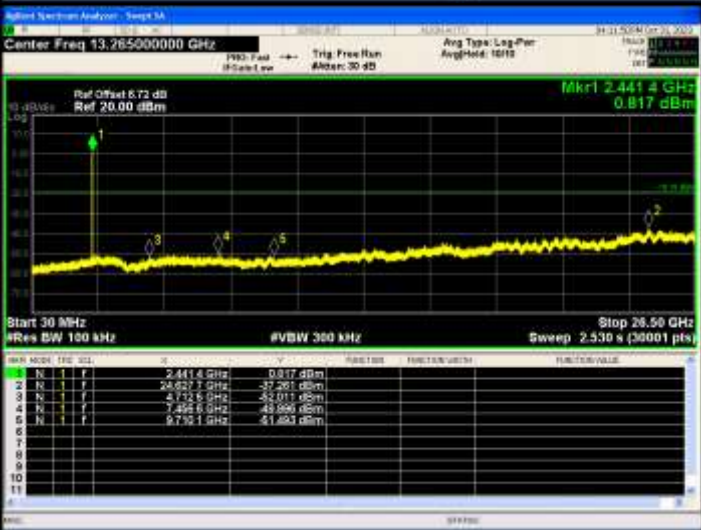
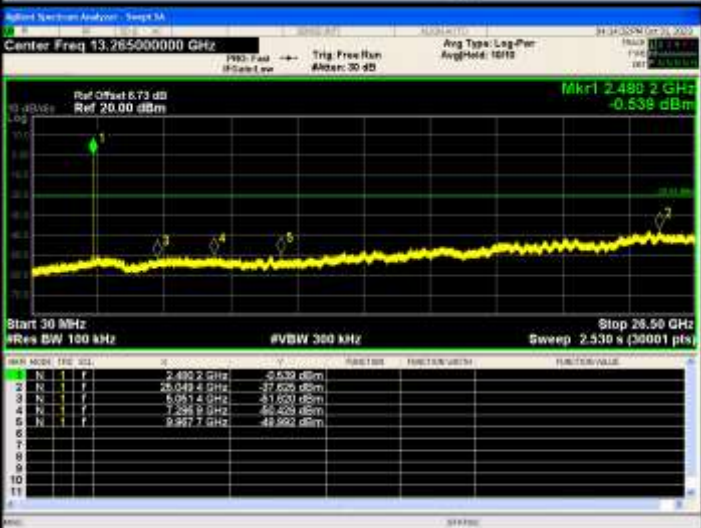


GFSK/HCH



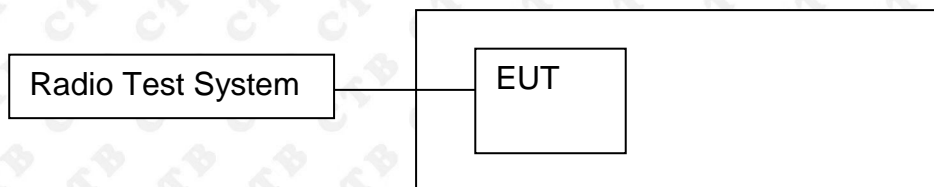
<p><math>\pi/4</math>DQPSK /LCH</p>		<table border="1"> <thead> <tr> <th>Chan</th> <th>Mod</th> <th>Freq</th> <th>Level</th> </tr> </thead> <tbody> <tr><td>1</td><td>N</td><td>2.4017 GHz</td><td>-1.415 dBm</td></tr> <tr><td>2</td><td>N</td><td>24.6347 GHz</td><td>-36.376 dBm</td></tr> <tr><td>3</td><td>N</td><td>6.9873 GHz</td><td>-31.844 dBm</td></tr> <tr><td>4</td><td>N</td><td>7.3302 GHz</td><td>-30.264 dBm</td></tr> <tr><td>5</td><td>N</td><td>9.9926 GHz</td><td>-49.360 dBm</td></tr> </tbody> </table>	Chan	Mod	Freq	Level	1	N	2.4017 GHz	-1.415 dBm	2	N	24.6347 GHz	-36.376 dBm	3	N	6.9873 GHz	-31.844 dBm	4	N	7.3302 GHz	-30.264 dBm	5	N	9.9926 GHz	-49.360 dBm	
Chan	Mod	Freq	Level																								
1	N	2.4017 GHz	-1.415 dBm																								
2	N	24.6347 GHz	-36.376 dBm																								
3	N	6.9873 GHz	-31.844 dBm																								
4	N	7.3302 GHz	-30.264 dBm																								
5	N	9.9926 GHz	-49.360 dBm																								
<p><math>\pi/4</math>DQPSK/MCH</p>		<table border="1"> <thead> <tr> <th>Chan</th> <th>Mod</th> <th>Freq</th> <th>Level</th> </tr> </thead> <tbody> <tr><td>1</td><td>N</td><td>2.4485 GHz</td><td>-0.750 dBm</td></tr> <tr><td>2</td><td>N</td><td>24.6350 GHz</td><td>-36.763 dBm</td></tr> <tr><td>3</td><td>N</td><td>6.9770 GHz</td><td>-31.748 dBm</td></tr> <tr><td>4</td><td>N</td><td>7.3321 GHz</td><td>-30.263 dBm</td></tr> <tr><td>5</td><td>N</td><td>9.9742 GHz</td><td>-50.235 dBm</td></tr> </tbody> </table>	Chan	Mod	Freq	Level	1	N	2.4485 GHz	-0.750 dBm	2	N	24.6350 GHz	-36.763 dBm	3	N	6.9770 GHz	-31.748 dBm	4	N	7.3321 GHz	-30.263 dBm	5	N	9.9742 GHz	-50.235 dBm	
Chan	Mod	Freq	Level																								
1	N	2.4485 GHz	-0.750 dBm																								
2	N	24.6350 GHz	-36.763 dBm																								
3	N	6.9770 GHz	-31.748 dBm																								
4	N	7.3321 GHz	-30.263 dBm																								
5	N	9.9742 GHz	-50.235 dBm																								
<p><math>\pi/4</math>DQPSK/HCH</p>		<table border="1"> <thead> <tr> <th>Chan</th> <th>Mod</th> <th>Freq</th> <th>Level</th> </tr> </thead> <tbody> <tr><td>1</td><td>N</td><td>2.4862 GHz</td><td>4.078 dBm</td></tr> <tr><td>2</td><td>N</td><td>24.6323 GHz</td><td>-36.632 dBm</td></tr> <tr><td>3</td><td>N</td><td>6.9343 GHz</td><td>-31.114 dBm</td></tr> <tr><td>4</td><td>N</td><td>7.3640 GHz</td><td>-30.619 dBm</td></tr> <tr><td>5</td><td>N</td><td>9.9986 GHz</td><td>-50.617 dBm</td></tr> </tbody> </table>	Chan	Mod	Freq	Level	1	N	2.4862 GHz	4.078 dBm	2	N	24.6323 GHz	-36.632 dBm	3	N	6.9343 GHz	-31.114 dBm	4	N	7.3640 GHz	-30.619 dBm	5	N	9.9986 GHz	-50.617 dBm	
Chan	Mod	Freq	Level																								
1	N	2.4862 GHz	4.078 dBm																								
2	N	24.6323 GHz	-36.632 dBm																								
3	N	6.9343 GHz	-31.114 dBm																								
4	N	7.3640 GHz	-30.619 dBm																								
5	N	9.9986 GHz	-50.617 dBm																								



<p>8DPSK /LCH</p>	 <table border="1" data-bbox="592 616 1295 772"> <thead> <tr> <th>Row</th> <th>Mode</th> <th>Freq</th> <th>Level</th> <th>Function</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>2.4026 GHz</td> <td>0.148 dBm</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>24.8138 GHz</td> <td>-37.154 dBm</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>6.8898 GHz</td> <td>-31.514 dBm</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>7.3378 GHz</td> <td>-30.861 dBm</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>N</td> <td>9.6485 GHz</td> <td>-30.647 dBm</td> <td></td> <td></td> </tr> </tbody> </table>	Row	Mode	Freq	Level	Function	Value	1	N	2.4026 GHz	0.148 dBm			2	N	24.8138 GHz	-37.154 dBm			3	N	6.8898 GHz	-31.514 dBm			4	N	7.3378 GHz	-30.861 dBm			5	N	9.6485 GHz	-30.647 dBm		
Row	Mode	Freq	Level	Function	Value																																
1	N	2.4026 GHz	0.148 dBm																																		
2	N	24.8138 GHz	-37.154 dBm																																		
3	N	6.8898 GHz	-31.514 dBm																																		
4	N	7.3378 GHz	-30.861 dBm																																		
5	N	9.6485 GHz	-30.647 dBm																																		
<p>8DPSK /MCH</p>	 <table border="1" data-bbox="592 1153 1295 1310"> <thead> <tr> <th>Row</th> <th>Mode</th> <th>Freq</th> <th>Level</th> <th>Function</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>2.4414 GHz</td> <td>0.817 dBm</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>24.8277 GHz</td> <td>-37.261 dBm</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>6.1735 GHz</td> <td>-35.011 dBm</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>7.4928 GHz</td> <td>-43.896 dBm</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>N</td> <td>9.7321 GHz</td> <td>-51.693 dBm</td> <td></td> <td></td> </tr> </tbody> </table>	Row	Mode	Freq	Level	Function	Value	1	N	2.4414 GHz	0.817 dBm			2	N	24.8277 GHz	-37.261 dBm			3	N	6.1735 GHz	-35.011 dBm			4	N	7.4928 GHz	-43.896 dBm			5	N	9.7321 GHz	-51.693 dBm		
Row	Mode	Freq	Level	Function	Value																																
1	N	2.4414 GHz	0.817 dBm																																		
2	N	24.8277 GHz	-37.261 dBm																																		
3	N	6.1735 GHz	-35.011 dBm																																		
4	N	7.4928 GHz	-43.896 dBm																																		
5	N	9.7321 GHz	-51.693 dBm																																		
<p>8DPSK /HCH</p>	 <table border="1" data-bbox="592 1668 1295 1825"> <thead> <tr> <th>Row</th> <th>Mode</th> <th>Freq</th> <th>Level</th> <th>Function</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>2.4862 GHz</td> <td>-0.538 dBm</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>25.0494 GHz</td> <td>-37.656 dBm</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>N</td> <td>6.9874 GHz</td> <td>-31.650 dBm</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>N</td> <td>7.5819 GHz</td> <td>-36.639 dBm</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>N</td> <td>9.9877 GHz</td> <td>-48.992 dBm</td> <td></td> <td></td> </tr> </tbody> </table>	Row	Mode	Freq	Level	Function	Value	1	N	2.4862 GHz	-0.538 dBm			2	N	25.0494 GHz	-37.656 dBm			3	N	6.9874 GHz	-31.650 dBm			4	N	7.5819 GHz	-36.639 dBm			5	N	9.9877 GHz	-48.992 dBm		
Row	Mode	Freq	Level	Function	Value																																
1	N	2.4862 GHz	-0.538 dBm																																		
2	N	25.0494 GHz	-37.656 dBm																																		
3	N	6.9874 GHz	-31.650 dBm																																		
4	N	7.5819 GHz	-36.639 dBm																																		
5	N	9.9877 GHz	-48.992 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
EDR mode (GFSK)	LCH	3.274	20.97	PASS
	MCH	3.724	20.97	PASS
	HCH	3.213	20.97	PASS
EDR mode ( $\pi/4$ DQPSK)	LCH	4.064	20.97	PASS
	MCH	4.54	20.97	PASS
	HCH	4.216	20.97	PASS
EDR mode (8DPSK)	LCH	4.287	20.97	PASS
	MCH	4.667	20.97	PASS
	HCH	4.365	20.97	PASS

Test Graph:

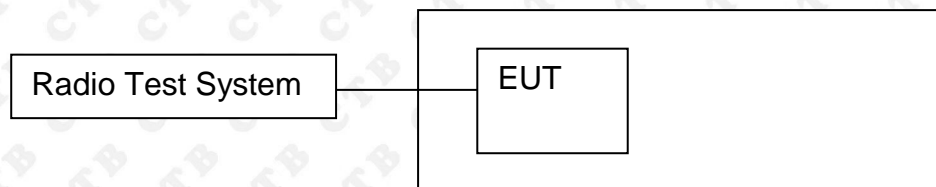
Graphs	
GFSK/LCH	
GFSK/MCH	
GFSK/HCH	

<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>Center Freq: 2.402000000 GHz          Ref Offset: 0.71 dB          Ref: 20.00 dBm          Mkr1: 2.40180 GHz          4.287 dBm          Center: 2.402000 GHz          #VBW: 6.0 MHz          Span: 10.00 MHz          #Res BW: 2.0 MHz          Sweep: 1.000 ms (1001 pts)</p>
<p>8DPSK /MCH</p>	 <p>Center Freq: 2.441000000 GHz          Ref Offset: 0.72 dB          Ref: 20.00 dBm          Mkr1: 2.44101 GHz          4.667 dBm          Center: 2.441000 GHz          #VBW: 6.0 MHz          Span: 10.00 MHz          #Res BW: 2.0 MHz          Sweep: 1.000 ms (1001 pts)</p>
<p>8DPSK /HCH</p>	 <p>Center Freq: 2.480000000 GHz          Ref Offset: 0.73 dB          Ref: 20.00 dBm          Mkr1: 2.47996 GHz          4.365 dBm          Center: 2.480000 GHz          #VBW: 6.0 MHz          Span: 10.00 MHz          #Res BW: 2.0 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	0.944	<b>PASS</b>
	Mid channel	0.941	<b>PASS</b>
	High channel	0.962	<b>PASS</b>
$\pi/4$ DQPSK	Low channel	1.486	<b>PASS</b>
	Mid channel	1.522	<b>PASS</b>
	High channel	1.507	<b>PASS</b>
8DPSK	Low channel	1.486	<b>PASS</b>
	Mid channel	1.492	<b>PASS</b>
	High channel	1.494	<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>Center Freq 2.40200000 GHz</p> <p>Center Freq 2.40200000 GHz</p> <p>Trig: Free Run</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>Ref Offset 5.71 dB</p> <p>Ref 26.71 dBm</p> <p>Mkr3 2.40245 GHz</p> <p>-19.204 dBm</p> <p>Center 2.402 GHz</p> <p>Res BW 30 kHz</p> <p>Span 3 MHz</p> <p>Sweep 3.2 ms</p> <p>#VBW 100 kHz</p> <p>Occupied Bandwidth 832.31 kHz</p> <p>Total Power 9.86 dBm</p> <p>Transmit Freq Error -12.294 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 944.3 kHz</p> <p>x dB -20.00 dB</p>
<p>GFSK Mid channel</p>	<p>Center Freq 2.44100000 GHz</p> <p>Center Freq 2.44100000 GHz</p> <p>Trig: Free Run</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>Ref Offset 5.72 dB</p> <p>Ref 26.72 dBm</p> <p>Mkr3 2.441458 GHz</p> <p>-18.637 dBm</p> <p>Center 2.441 GHz</p> <p>Res BW 30 kHz</p> <p>Span 3 MHz</p> <p>Sweep 3.2 ms</p> <p>#VBW 100 kHz</p> <p>Occupied Bandwidth 849.32 kHz</p> <p>Total Power 10.1 dBm</p> <p>Transmit Freq Error -12.696 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 940.7 kHz</p> <p>x dB -20.00 dB</p>
<p>GFSK High channel</p>	<p>Center Freq 2.48000000 GHz</p> <p>Center Freq 2.48000000 GHz</p> <p>Trig: Free Run</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>Ref Offset 5.73 dB</p> <p>Ref 26.73 dBm</p> <p>Mkr3 2.480462 GHz</p> <p>-20.328 dBm</p> <p>Center 2.48 GHz</p> <p>Res BW 30 kHz</p> <p>Span 3 MHz</p> <p>Sweep 3.2 ms</p> <p>#VBW 100 kHz</p> <p>Occupied Bandwidth 840.05 kHz</p> <p>Total Power 9.51 dBm</p> <p>Transmit Freq Error -19.142 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 962.3 kHz</p> <p>x dB -20.00 dB</p>

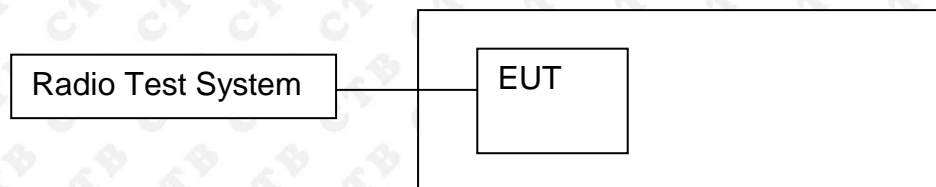


<p><math>\pi/4</math>-DQPSK Low channel</p>	 <p>Ref Offset: 5.71 dB Ref: 26.71 dBm</p> <p>Center Freq: 2.402000000 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms</p> <p>Occupied Bandwidth: 1.3592 MHz Total Power: 9.43 dBm Transmit Freq Error: -13.703 kHz x dB Bandwidth: 1.486 MHz OBW Power: 99.00 % x dB: -20.00 dB</p>
<p><math>\pi/4</math>-DQPSK Mid channel</p>	 <p>Ref Offset: 5.72 dB Ref: 26.72 dBm</p> <p>Center Freq: 2.441000000 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms</p> <p>Occupied Bandwidth: 1.3646 MHz Total Power: 9.87 dBm Transmit Freq Error: -17.001 kHz x dB Bandwidth: 1.522 MHz OBW Power: 99.00 % x dB: -20.00 dB</p>
<p><math>\pi/4</math>-DQPSK High channel</p>	 <p>Ref Offset: 5.73 dB Ref: 26.73 dBm</p> <p>Center Freq: 2.480000000 GHz #Res BW: 30 kHz #VBW: 100 kHz Span: 3 MHz Sweep: 3.2 ms</p> <p>Occupied Bandwidth: 1.3576 MHz Total Power: 9.72 dBm Transmit Freq Error: -17.309 kHz x dB Bandwidth: 1.507 MHz OBW Power: 99.00 % x dB: -20.00 dB</p>

<p>8DPSK Low channel</p>	
<p>8DPSK Mid channel</p>	
<p>8DPSK High channel</p>	

## 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	0.994	0.629	PASS
GFSK	MCH	0.996	0.627	PASS
GFSK	HCH	1.002	0.641	PASS
$\pi/4$ DQPSK	LCH	0.998	0.991	PASS
$\pi/4$ DQPSK	MCH	1.000	1.015	PASS
$\pi/4$ DQPSK	HCH	1.000	1.005	PASS
8DPSK	LCH	1.004	0.991	PASS
8DPSK	MCH	0.996	0.995	PASS
8DPSK	HCH	1.004	0.996	PASS

Test Graph

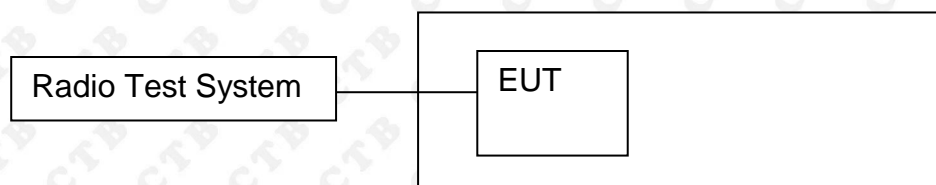
Graphs										
GFSK/LCH	<p>Marker 1 <math>\Delta</math> 994.000000 kHz</p> <p>Ref Offset 8.73 dB Ref 20.00 dBm</p> <p><math>\Delta</math>fkr1 894 kHz 0.398 dBm</p> <p>Center 2.402500 GHz #Res BW 20 kHz #VBW 62 kHz Span 2.000 MHz Sweep 4.800 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>Marker</th> <th>Freq</th> <th>Power</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>994 kHz</td> <td>0.398 dBm</td> </tr> <tr> <td>2</td> <td>3.401372 GHz</td> <td>-2.022 dBm</td> </tr> </tbody> </table>	Marker	Freq	Power	1	994 kHz	0.398 dBm	2	3.401372 GHz	-2.022 dBm
Marker	Freq	Power								
1	994 kHz	0.398 dBm								
2	3.401372 GHz	-2.022 dBm								
GFSK/MCH	<p>Marker 1 <math>\Delta</math> 996.000000 kHz</p> <p>Ref Offset 8.73 dB Ref 20.00 dBm</p> <p><math>\Delta</math>fkr1 896 kHz -0.207 dBm</p> <p>Center 2.441500 GHz #Res BW 20 kHz #VBW 62 kHz Span 2.000 MHz Sweep 4.800 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>Marker</th> <th>Freq</th> <th>Power</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>996 kHz</td> <td>-0.207 dBm</td> </tr> <tr> <td>2</td> <td>3.440372 GHz</td> <td>0.413 dBm</td> </tr> </tbody> </table>	Marker	Freq	Power	1	996 kHz	-0.207 dBm	2	3.440372 GHz	0.413 dBm
Marker	Freq	Power								
1	996 kHz	-0.207 dBm								
2	3.440372 GHz	0.413 dBm								
GFSK/HCH	<p>Marker 1 <math>\Delta</math> 1.002000000 MHz</p> <p>Ref Offset 8.73 dB Ref 20.00 dBm</p> <p><math>\Delta</math>fkr1 1.002 MHz -0.187 dBm</p> <p>Center 2.479500 GHz #Res BW 20 kHz #VBW 62 kHz Span 2.000 MHz Sweep 4.800 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>Marker</th> <th>Freq</th> <th>Power</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1.002 MHz</td> <td>-0.187 dBm</td> </tr> <tr> <td>2</td> <td>3.478372 GHz</td> <td>0.724 dBm</td> </tr> </tbody> </table>	Marker	Freq	Power	1	1.002 MHz	-0.187 dBm	2	3.478372 GHz	0.724 dBm
Marker	Freq	Power								
1	1.002 MHz	-0.187 dBm								
2	3.478372 GHz	0.724 dBm								

<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>Ref Offset 8.73 dB Ref 20.00 dBm</p> <p>Center 2.402500 GHz #Res BW 20 kHz #VBW 62 kHz Span 2.000 MHz Sweep 4.000 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>MARK</th> <th>FREQ</th> <th>DBM</th> <th>UNIT</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1.004 MHz</td> <td>0.052 dB</td> <td></td> </tr> <tr> <td>2</td> <td>2.401382 GHz</td> <td>-2.529 dBm</td> <td></td> </tr> </tbody> </table>	MARK	FREQ	DBM	UNIT	1	1.004 MHz	0.052 dB		2	2.401382 GHz	-2.529 dBm		
MARK	FREQ	DBM	UNIT												
1	1.004 MHz	0.052 dB													
2	2.401382 GHz	-2.529 dBm													
<p>8DPSK /MCH</p>		<p>Ref Offset 8.72 dB Ref 20.00 dBm</p> <p>Center 2.441500 GHz #Res BW 20 kHz #VBW 62 kHz Span 2.000 MHz Sweep 4.000 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>MARK</th> <th>FREQ</th> <th>DBM</th> <th>UNIT</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>996 kHz</td> <td>0.509 dB</td> <td></td> </tr> <tr> <td>2</td> <td>2.441152 GHz</td> <td>0.749 dBm</td> <td></td> </tr> </tbody> </table>	MARK	FREQ	DBM	UNIT	1	996 kHz	0.509 dB		2	2.441152 GHz	0.749 dBm		
MARK	FREQ	DBM	UNIT												
1	996 kHz	0.509 dB													
2	2.441152 GHz	0.749 dBm													
<p>8DPSK /HCH</p>		<p>Ref Offset 8.73 dB Ref 20.00 dBm</p> <p>Center 2.479500 GHz #Res BW 20 kHz #VBW 62 kHz Span 2.000 MHz Sweep 4.000 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>MARK</th> <th>FREQ</th> <th>DBM</th> <th>UNIT</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1.004 MHz</td> <td>-1.235 dB</td> <td></td> </tr> <tr> <td>2</td> <td>2.479028 GHz</td> <td>0.534 dBm</td> <td></td> </tr> </tbody> </table>	MARK	FREQ	DBM	UNIT	1	1.004 MHz	-1.235 dB		2	2.479028 GHz	0.534 dBm		
MARK	FREQ	DBM	UNIT												
1	1.004 MHz	-1.235 dB													
2	2.479028 GHz	0.534 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	Limit	Verdict
GFSK	Hop	79	$\geq 15$	PASS
$\pi/4$ DQPSK	Hop	79	$\geq 15$	PASS
8DPSK	Hop	79	$\geq 15$	PASS

Test Graph

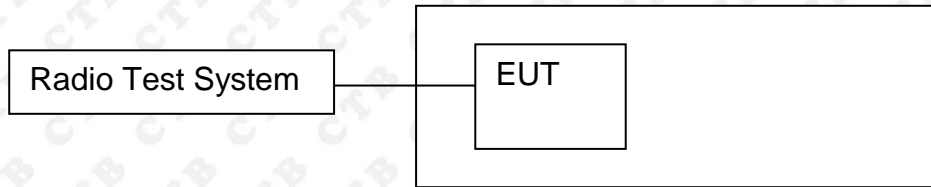
Graphs

<p>GFSK/Hop</p>	
<p><math>\pi/4</math>DQPSK/Hop</p>	
<p>8DPSK/Hop</p>	



### 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	0.381	121.92	400	PASS
	DH1	MCH	0.381	121.92	400	PASS
	DH1	HCH	0.38	121.6	400	PASS
	DH3	LCH	1.642	262.72	400	PASS
	DH3	MCH	1.641	262.56	400	PASS
	DH3	HCH	1.641	262.56	400	PASS
	DH5	LCH	2.892	308.48	400	PASS
	DH5	MCH	2.891	308.373	400	PASS
	DH5	HCH	2.892	308.48	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:  $1600/79/4*0.4*79*(MkrDelta)/1000$

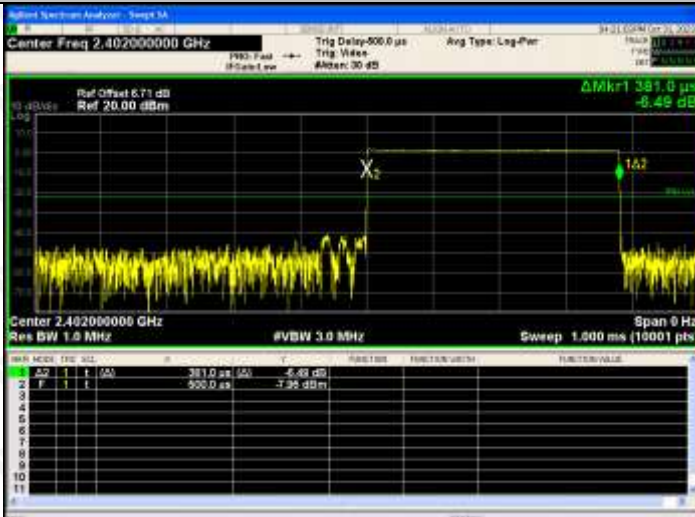
DH1:  $1600/79/2*0.4*79*(MkrDelta)/1000$

Remark: Mkr Delta is once pulse time.

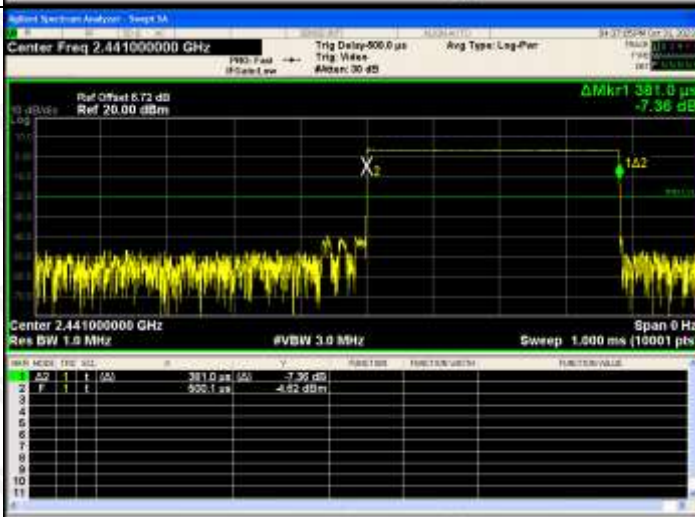
## Test Graph

### Graphs

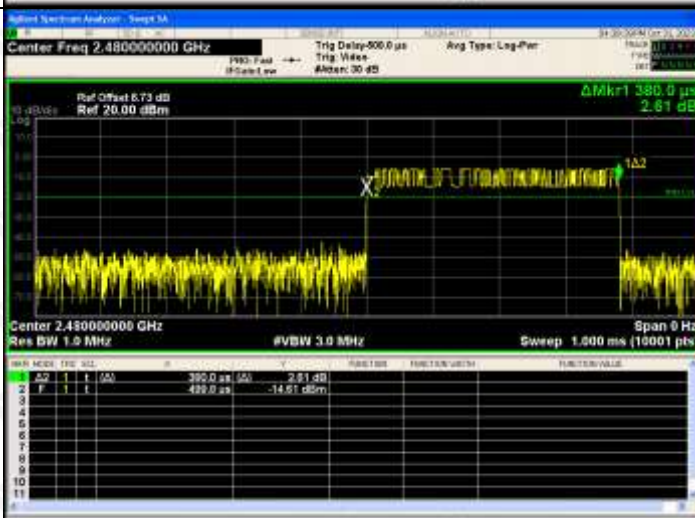
GFSK\_DH1/LCH

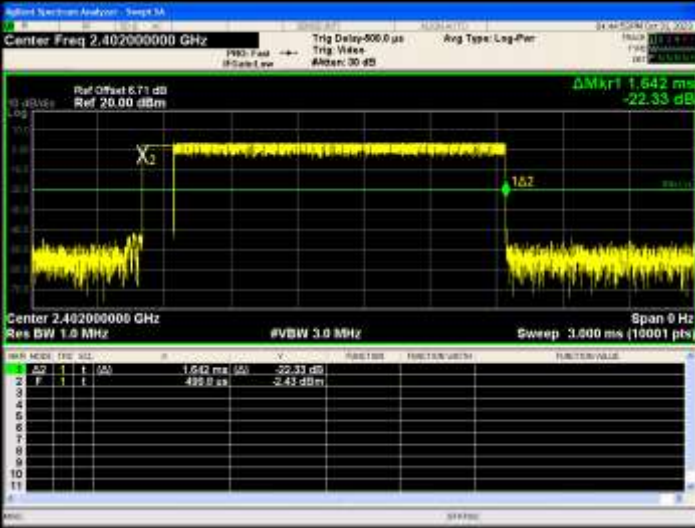
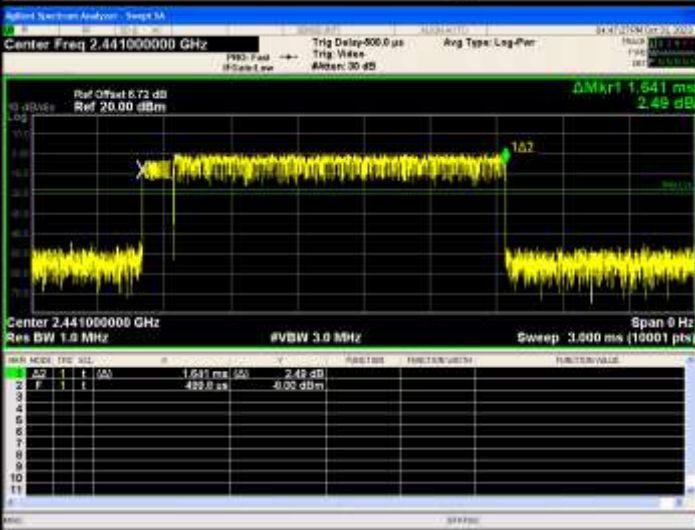


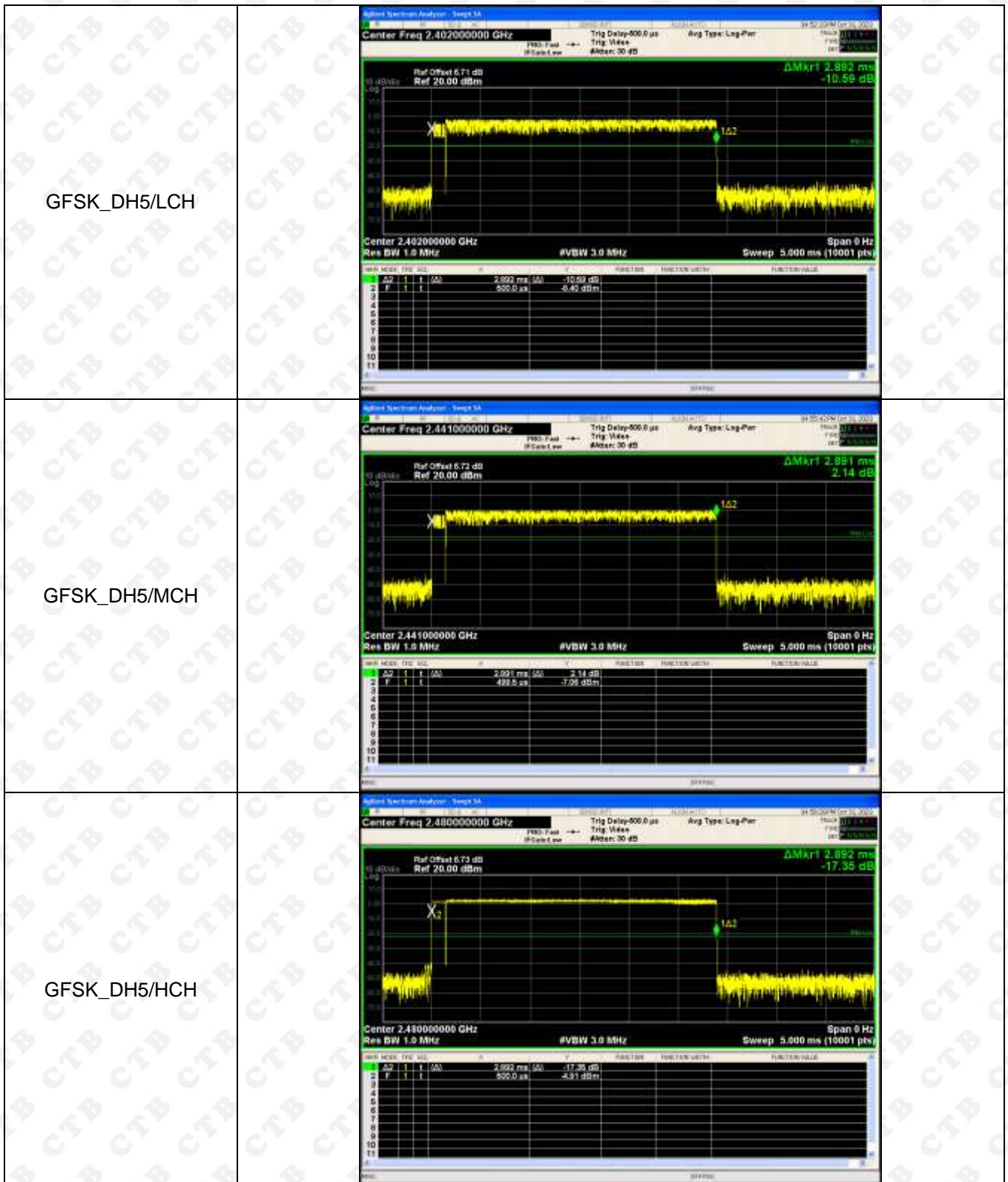
GFSK\_DH1/MCH



GFSK\_DH1/HCH



<p>GFSK_DH3/LCH</p>	
<p>GFSK_DH3/MCH</p>	
<p>GFSK_DH3/HCH</p>	



### 14. PSEUDORANDOM FREQUENCY

#### 14.1 Limit

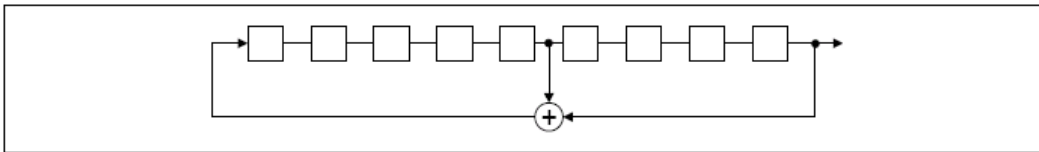
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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.

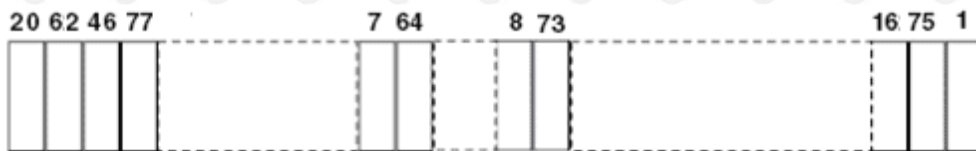
#### 14.2 Test procedure

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 FPC antenna. The best case gain of the antenna is 0.44dBi.



**16. EUT TEST SETUP PHOTOGRAPHS**

## Radiated Emission

Below 1G



Above 1G



## Conducted emissions



\*\*\*\*\* END OF REPORT \*\*\*\*\*