FCC Part 15C
Measurement and Test Report

For

Shenzhen Daiku technology Co., LTD

FCC ID:2BCKX-DK68

FCC Rule(s):	FCC Part 15.247	
Product Description:	Smart Watch	
Tested Model:	DK68	
Report No.:	BSL240404175010RF	
Tested Date:	May 18~29，2024	
Issued Date:	May 29, 2024	
Tested By:	Cindy Zheng / Engineer	Cindy zheng
Reviewed By:	Haley Wen / EMC Manager	Haley wen
Approved & Authorized By:	Mike Mo / PSQ Manager	

Prepared By:

BSL Testing Co.,LTD.
1/F, Building B, Xinshidai GR Park, Shiyan Street,
Bao'an District, Shenzhen, ShiyanStreet, Bao'an District,
Shenzhen,Guangdong,518052,People’s Republic of China
Tel: 400-882-9628 Fax: 86- 755-26508703

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Applicant:	Shenzhen Daiku technology Co., LTD
Address of applicant:	605-606, Building E, Longjing Science Park, 339 Bulong Road, Longgang District, Shenzhen
Manufacturer:	Shenzhen Daiku technology Co., LTD
Address of manufacturer:	605-606, Building E, Longjing Science Park, 339 Bulong Road, Longgang District, Shenzhen
Product Name:	Smart Watch
Model No.:	DK68
Test Model No:	DK68
Quantity of tested samples	1
Serial No.:	N/A
Operation Frequency:	2402MHz~2480MHz
Channel numbers:	79
Channel separation:	1MHz
Modulation type:	GFSK,Pi/4 QPSK,8DPSK
Antenna Type:	Cable Antenna
Antenna gain:	1.49dBi
Power supply:	DC 3.7V by battery

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

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test.

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	Lenovo B490	BSTSZEMC-77

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

1.2 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows: During the test, pre-scan F18m, F18, DK68, and found the F18m model which it is worse case model.

Test Mode List			
Test Mode	Description	Channel	Frequency (MHz)
1	GFSK,	CH1	2402
		CH40	2441
		CH79	2480
2	Pi/4 QPSK	CH1	2402
		CH40	2441
		CH79	2480
3	8DPSK	CH1	2402
		CH40	2441
		CH79	2480

1.3 Test Standards

The following report accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices, and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.5 Test Facility

BSL Testing Co.,LTD.
1/F, Building B, Xinshidai GR Park, Shiyan Street, Bao'an District, Shenzhen, ShiyanStreet, Bao'an District, Shenzhen,Guangdong,518052,People’s Republic of China

FCC Test Firm Registration Number: 562200
Designation Number: CN1338

Tel: 400-882-9628
Fax: 86-755-26508703

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Power Spectral Density	Conducted	±1.8dB
Conducted Spurious Emission	Conducted	±2.17dB
Conducted Emissions	Conducted	±2.88dB
Transmitter Spurious Emissions	Radiated	±5.1dB

1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
Communication Tester	Rohde & Schwarz	CMW500	100358	2023-10-27	2024-10-26
Spectrum Analyzer	R&S	FSP40	100550	2023-10-27	2024-10-26
Test Receiver	R&S	ESCI7	US47140102	2023-10-27	2024-10-26
Signal Generator	HP	83630B	3844A01028	2023-10-27	2024-10-26
Test Receiver	R&S	ESPI-3	100180	2023-10-27	2024-10-26
Amplifier	Agilent	8449B	4035A00116	2023-10-27	2024-10-26
Amplifier	HP	8447E	2945A02770	2023-10-27	2024-10-26
Signal Generator	IFR	2023A	202307/242	2023-10-27	2024-10-26
Broadband Antenna	SCHAFFNER	2774	2774	2023-10-27	2024-10-26
Biconical and log periodic antennas	ELECTRO-METRICS	EM-6917B-1	171	2023-10-27	2024-10-26
Horn Antenna	R&S	HF906	100253	2023-10-27	2024-10-26
Horn Antenna	EM	EM-6961	6462	2023-10-27	2024-10-26
LISN	R&S	ESH3-Z5	100196	2023-10-27	2024-10-26
LISN	COM-POWER	LI-115	02027	2023-10-27	2024-10-26
3m Semi-Anechoic Chamber	Chengyu Electron	9 (L)*6 (W)* 6 (H)	BSL086	2023-10-27	2024-10-26
Horn Antenna	A-INFOMW	LB-180400KF	BSL088	2023-10-27	2024-10-26
20dB Attenuator	ICPROBING	IATS1	BSL1003	2023-10-27	2024-10-26
POWER DIVIDER	Mini-circuits	PD-2SF-0010	N/A	2023-10-27	2024-10-26
POWER DIVIDER	Mini-circuits	PD-2SF-0010	N/A	2023-10-27	2024-10-26
Loop Antenna	Schwarz beck	FMZB 1516	9773	2023-10-27	2024-10-26
Antenna Tower	SKET	BK-4AT-BS	N/A	N/A	N/A

3. RF Exposure

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the RF Exposure Report.

4. Antenna Requirement

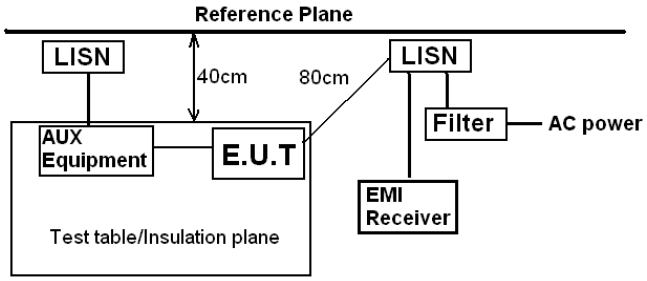
4.1 Standard Applicable

According to FCC Part 15.203, 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 shall be considered sufficient to comply with the provisions of this section.

4.2 Evaluation Information

This product has a PCB antenna(1.49dBi), fulfill the requirement of this section.

5. Conducted Emissions

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.207</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>150KHz to 30MHz</td></tr>
<tr><td>Class / Severity:</td><td>Class B</td></tr>
<tr><td>Receiver setup:</td><td>RBW=9KHz, VBW=30KHz, Sweep time=auto</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
* Decreases with the logarithm of the frequency.
</td></tr>
<tr><td>Test setup:</td><td>


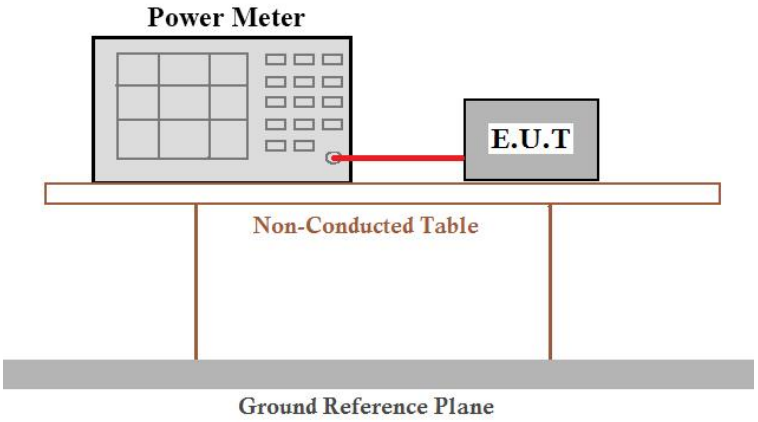
Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m
</td></tr>
<tr><td>Test procedure:</td><td>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).
3. Both sides of A.C. line are checked for maximum conducted interference. 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.</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 1.7 for details</td></tr>
<tr><td>Test mode:</td><td>Refer to section 1.2 for details</td></tr>
<tr><td>Test results:</td><td>Pass</td></tr>
</table>

The equipment is battery powered, so do not test this item

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss

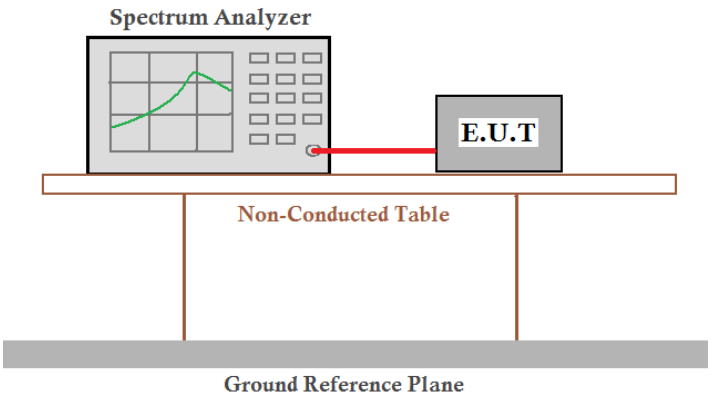
6. Conducted Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2013
Limit:	30dBm(for GFSK),20.97dBm(for EDR)
Test setup:	
Test Instruments:	Refer to section 1.7 for details
Test mode:	Refer to section 1.2 for details
Test results:	Pass

Measurement Data:

Mode	Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
GFSK	Lowest	1.1	30.00	Pass
	Middle	0.54		
	Highest	0.3		
Pi/4QPSK	Lowest	1.03	20.97	Pass
	Middle	0.59		
	Highest	-0.4		
8DPSK	Lowest	-1.25	20.97	Pass
	Middle	-0.66		
	Highest	-0.32		

6. 20dB Emission Bandwidth

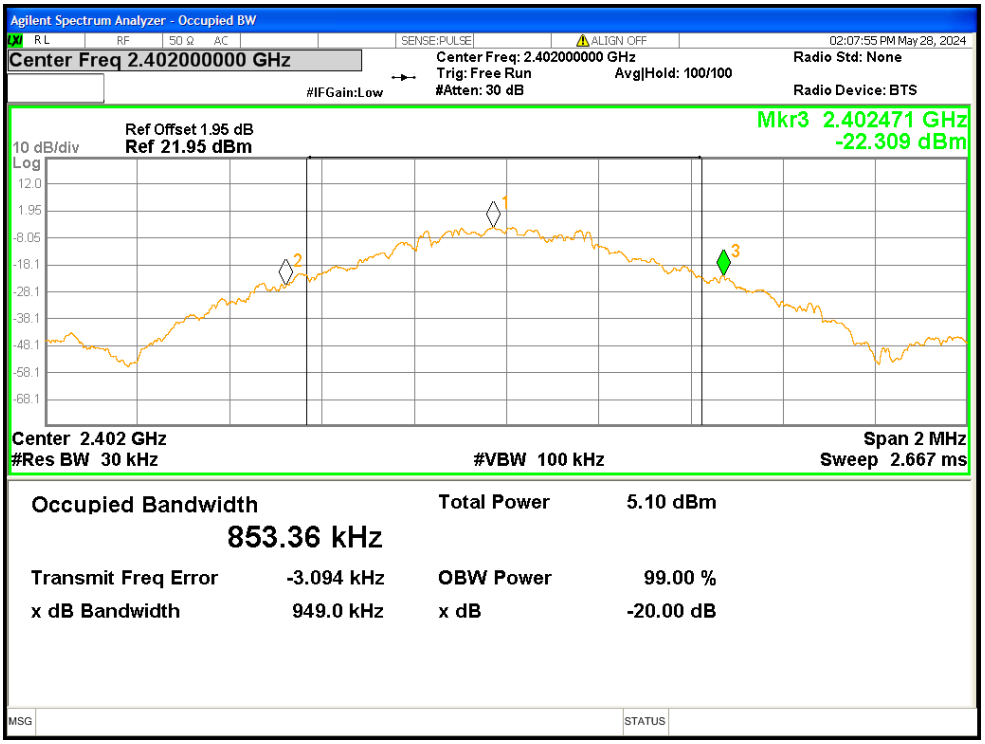
Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.10:2013
Limit:	N/A
Test setup:	
Test Instruments:	Refer to section 1.7 for details
Test mode:	Refer to section 1.2 for details
Test results:	Pass

Measurement Data:

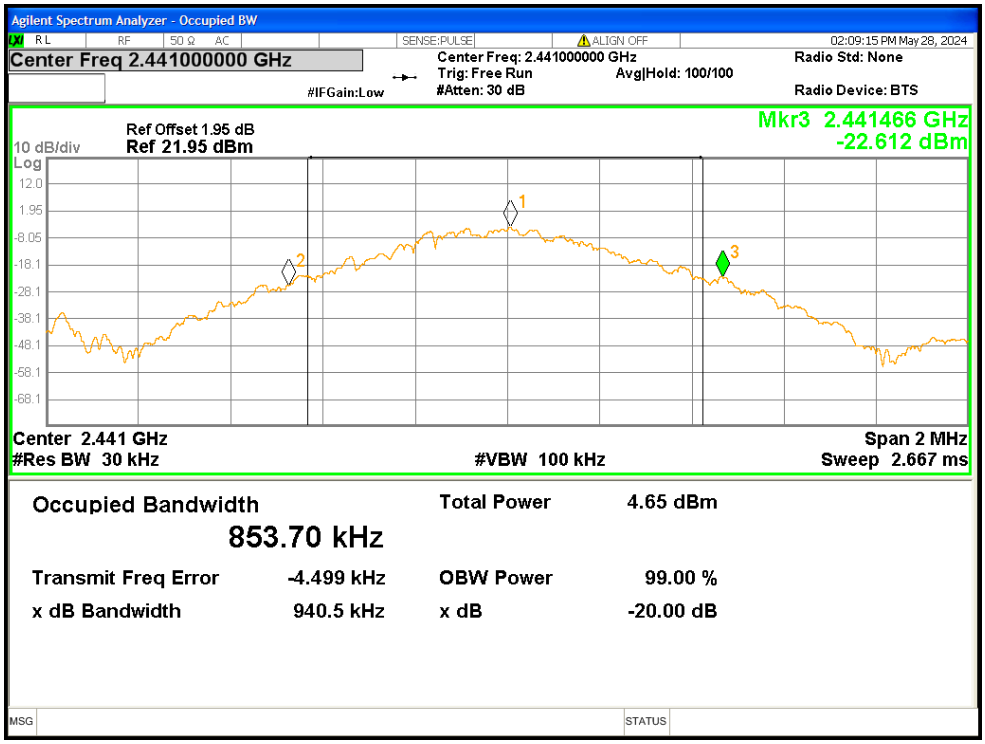
Mode	Test channel	20dB Emission Bandwidth (MHz)	Result
GFSK	Lowest	0.949	Pass
	Middle	0.94	
	Highest	0.95	
Pi/4QPSK	Lowest	1.282	Pass
	Middle	1.316	
	Highest	1.316	
8DPSK	Lowest	1.304	Pass
	Middle	1.28	
	Highest	1.316	

Test plot as follows:

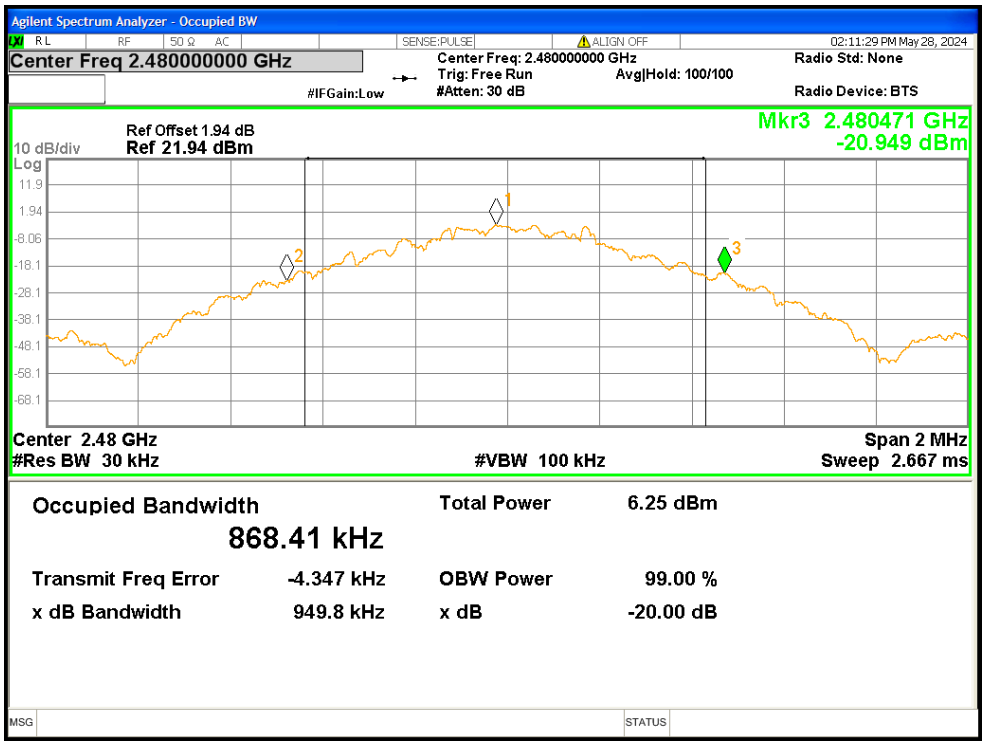
Test mode:	GFSK mode



Lowest channel

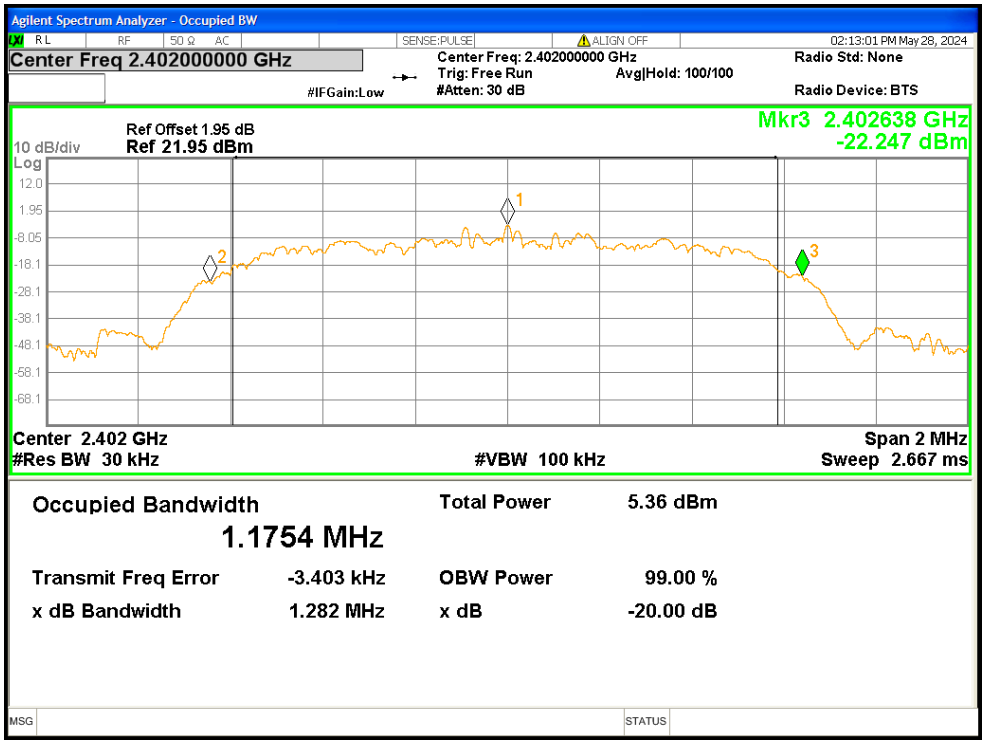


Middle channel

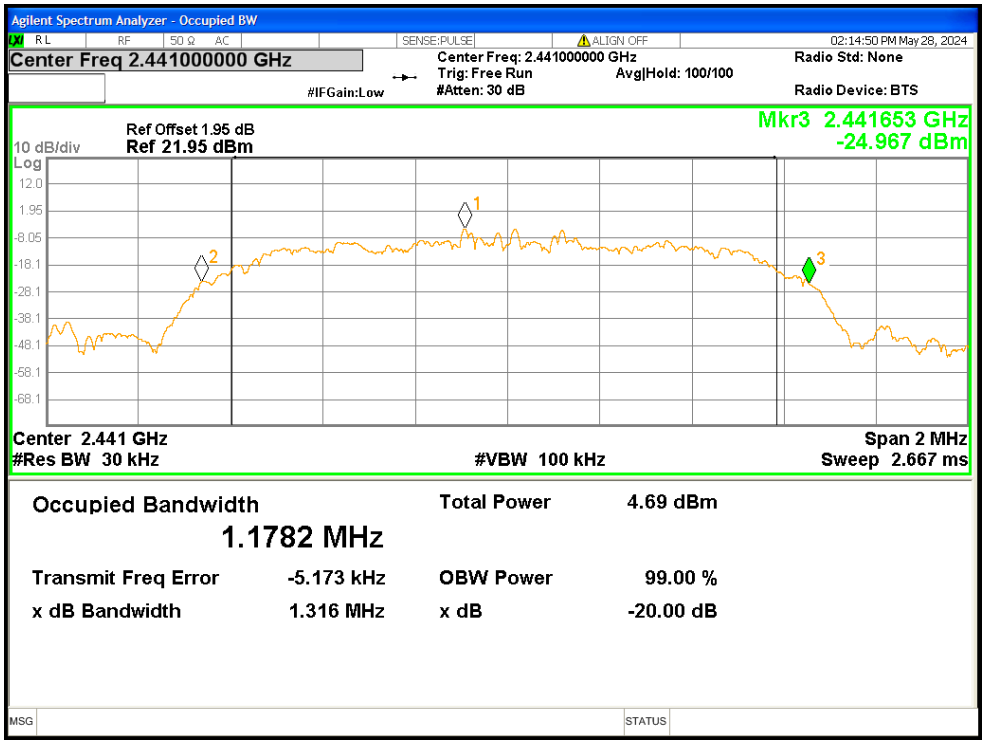


Highest channel

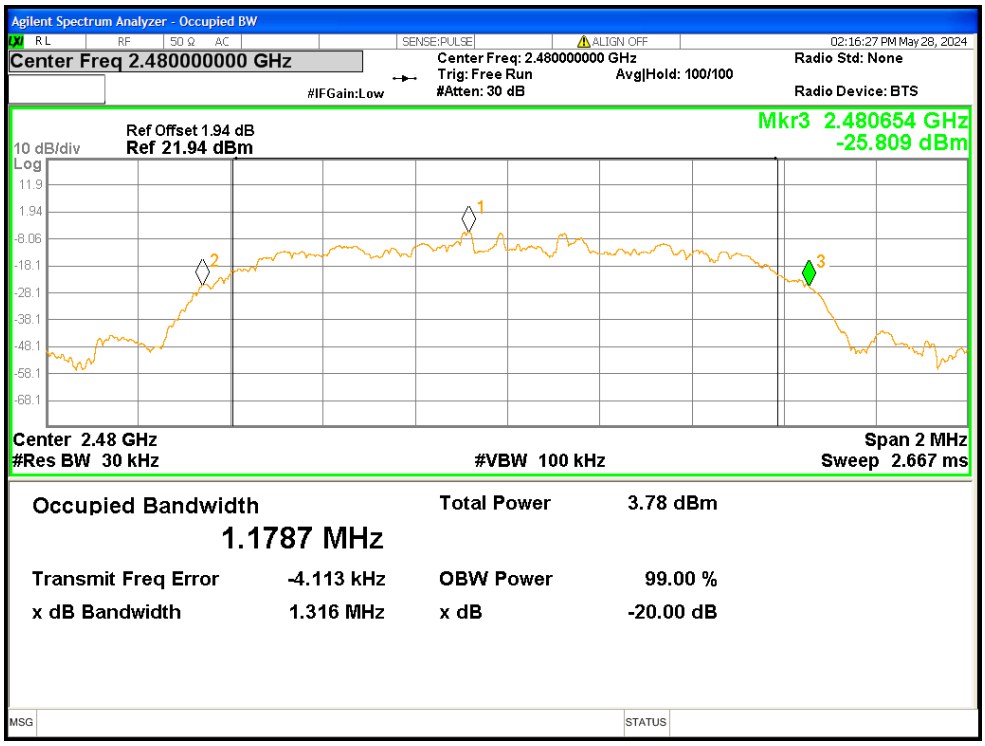
Test mode:	Pi/4QPSK mode



Lowest channel

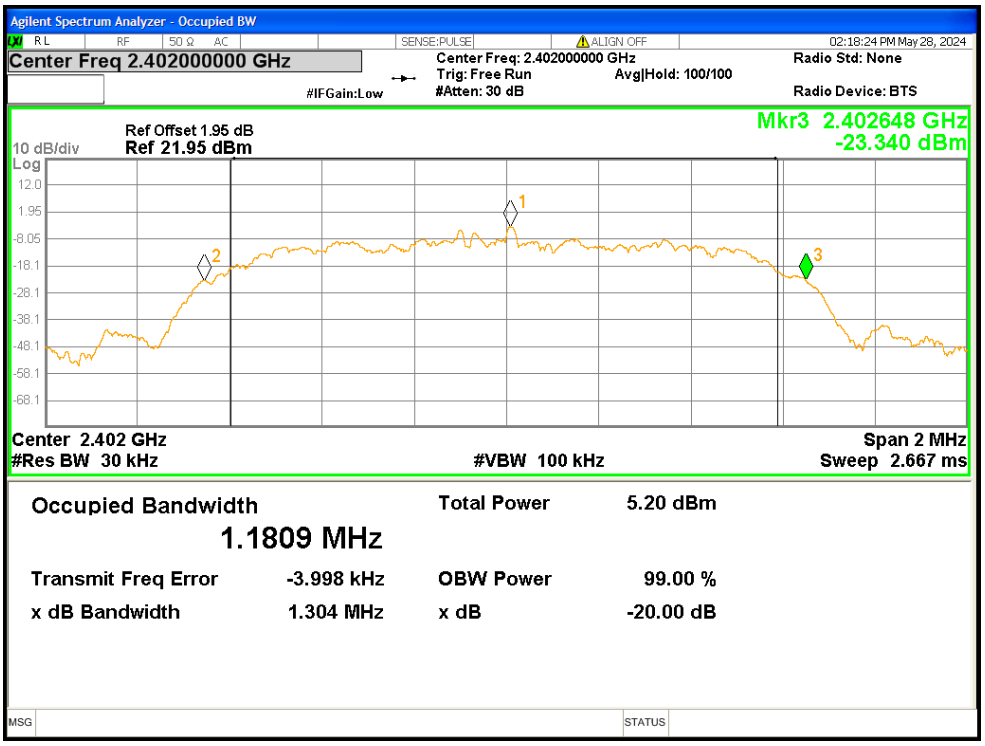


Middle channel

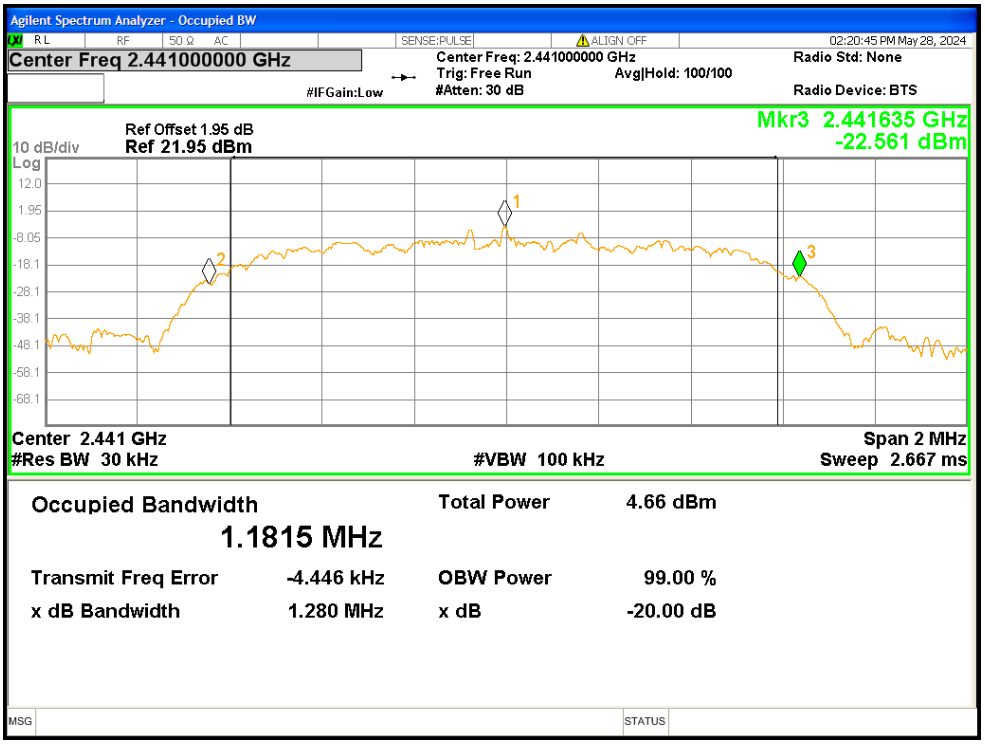


Highest channel

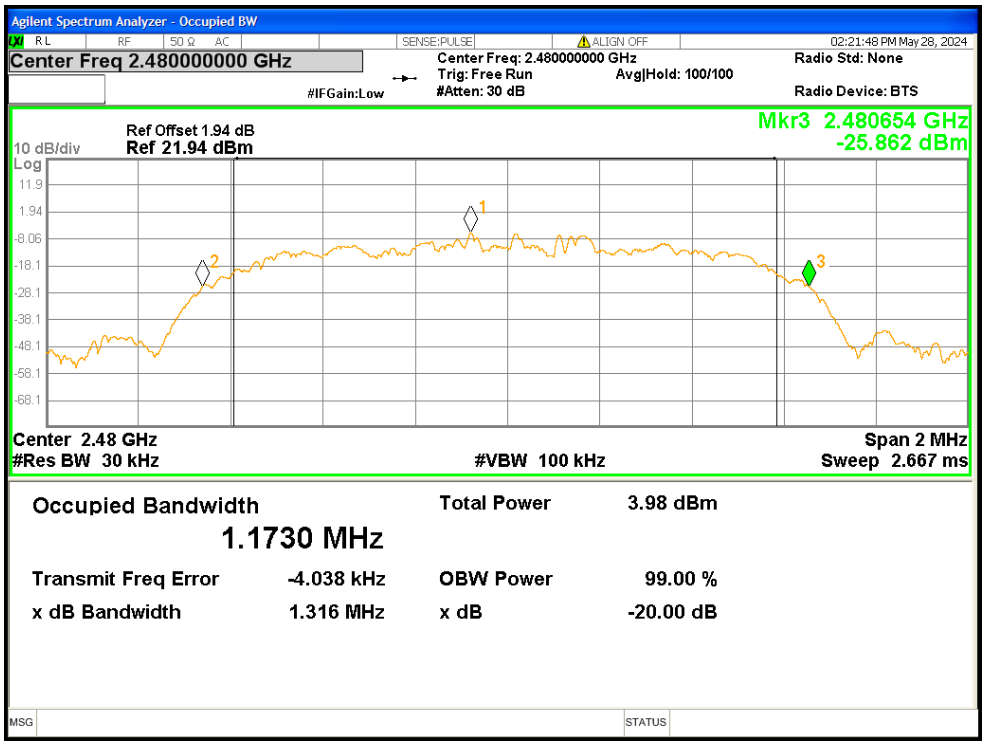
Test mode:	8DPSK mode



Lowest channel

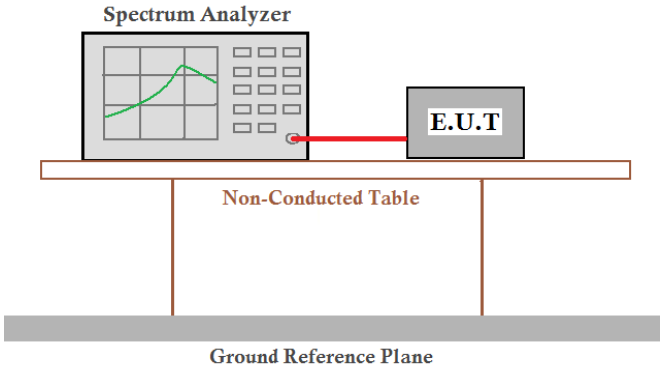


Middle channel



Highest channel

7. Carrier Frequencies Separation

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=20KHz, VBW=62KHz, detector=Peak
Limit:	0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)
Test setup:	
Test Instruments:	Refer to section 1.7 for details
Test mode:	Refer to section 1.2 for details
Test results:	Pass

Measurement Data:

Mode	Test channel	Carrier Frequencies Separation (MHz)	Limit (MHz)	Result
GFSK	Lowest	1.084	0.627	Pass
	Middle	1.02	0.627	Pass
	Highest	0.984	0.627	Pass
Pi/4QPSK	Lowest	0.896	0.855	Pass
	Middle	0.99	0.855	Pass
	Highest	0.988	0.855	Pass
8DPSK	Lowest	1.096	0.853	Pass
	Middle	0.982	0.853	Pass
	Highest	0.89	0.853	Pass

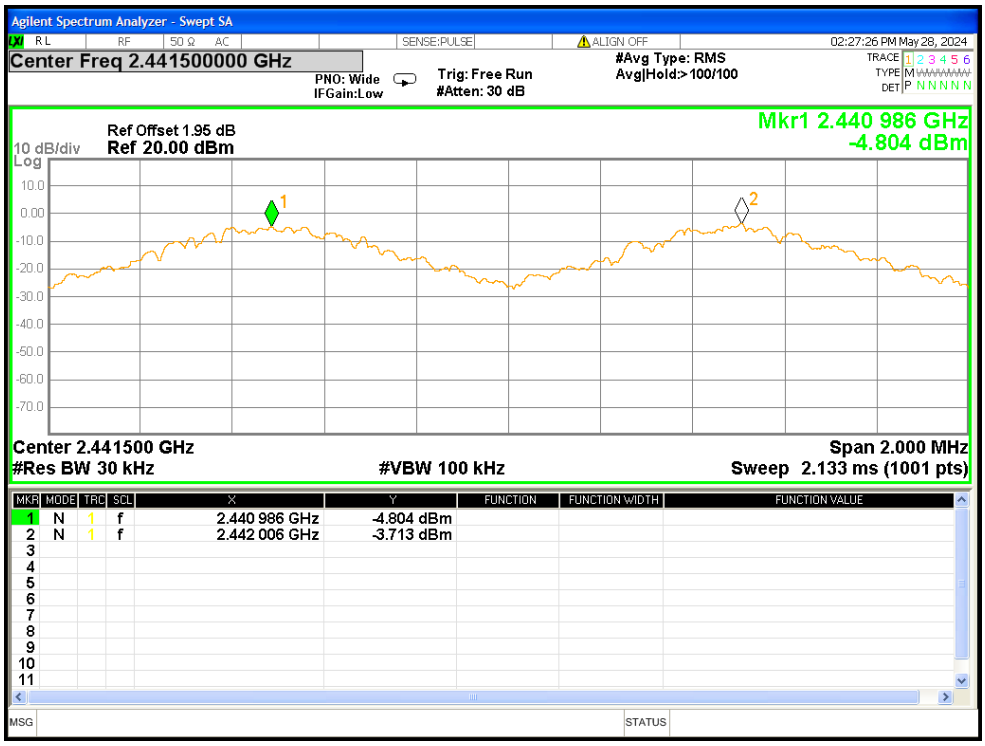
Note: According to section 7.4

Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
GFSK	940.00	627
Pi/4QPSK	1282.00	855
8DSK	1280.00	853

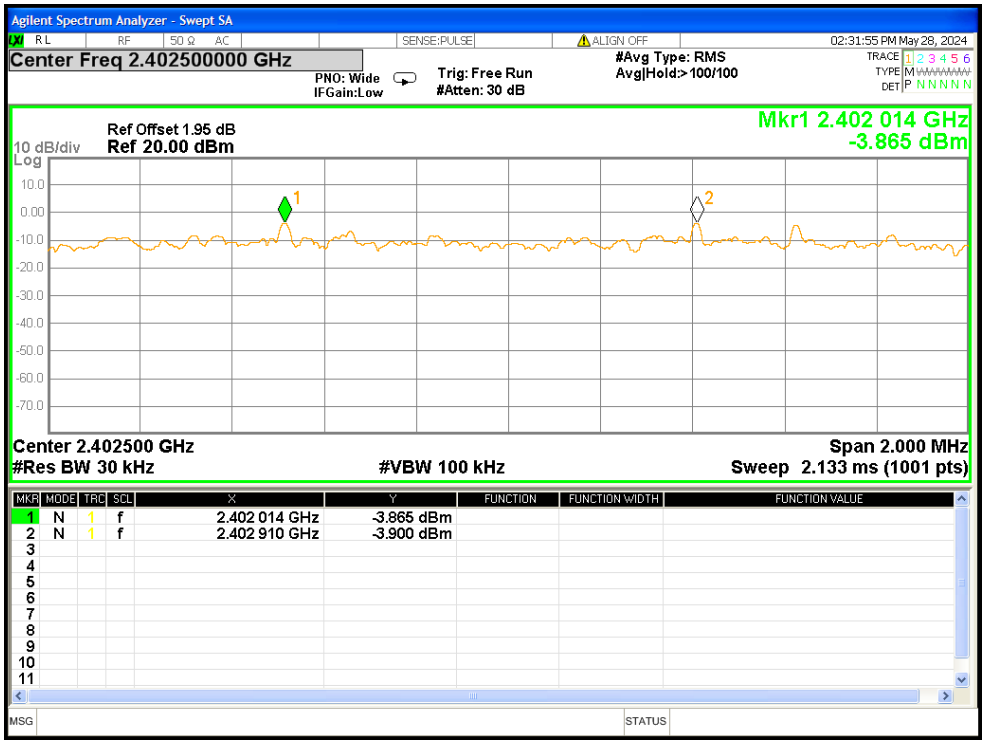
Test plot as follows:

Only show the worst case

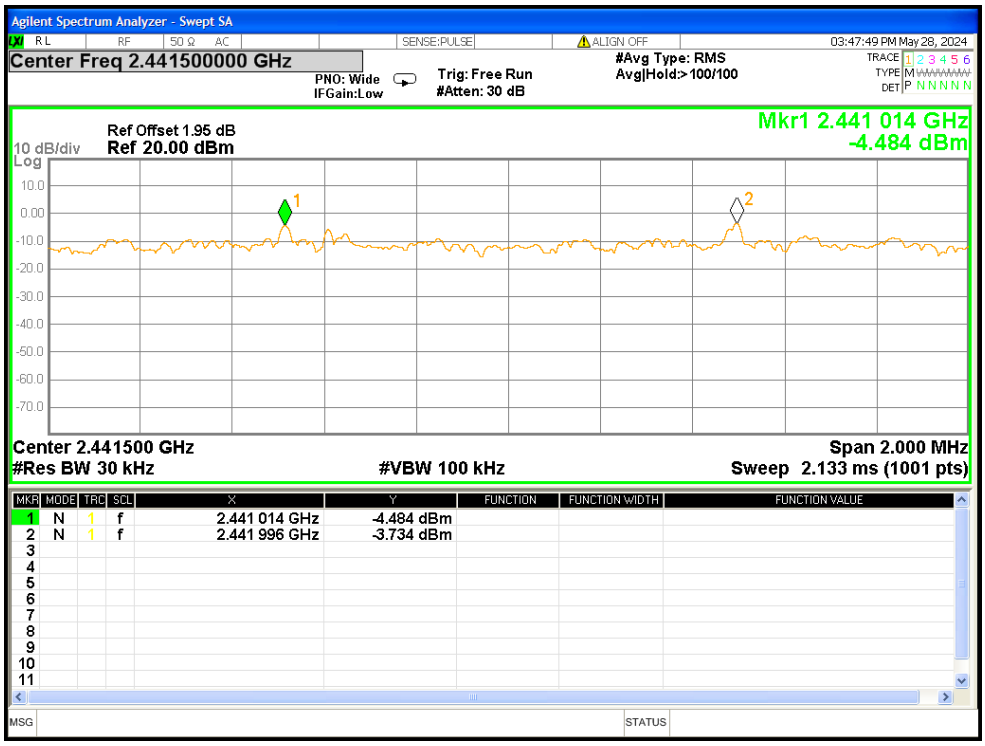
GFSK



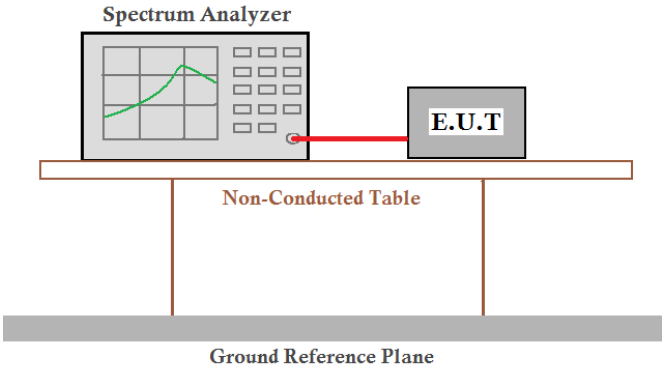
Pi/4QPSK



8DPSK


Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN OFF
03:47:49 PM May 28, 2024
Center Freq 2.441500000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Ref Offset 1.95 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 2.441 014 GHz
-4.484 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 2.441500 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 2.000 MHz
Sweep 2.133 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.441 014 GHz -4.484 dBm
2 N 1 f 2.441 996 GHz -3.734 dBm
3
4
5
6
7
8
9
10
11
MSG
STATUS

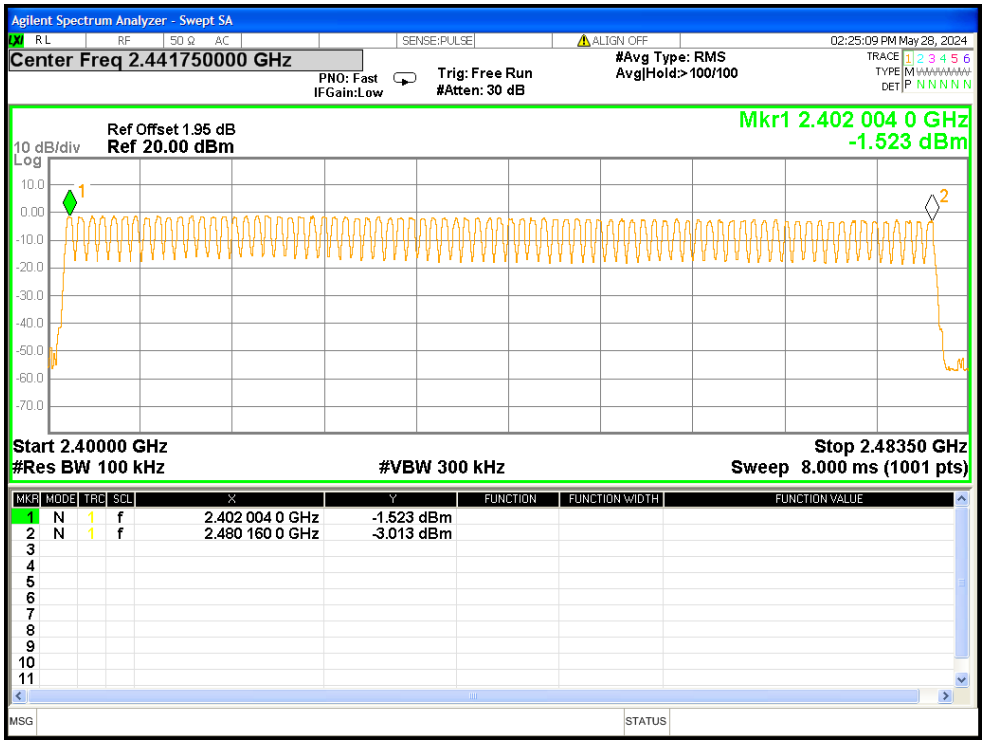
8. Hopping Channel Number

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	
Test Instruments:	Refer to section 1.7 for details
Test mode:	Refer to section 1.2 for details
Test results:	Pass

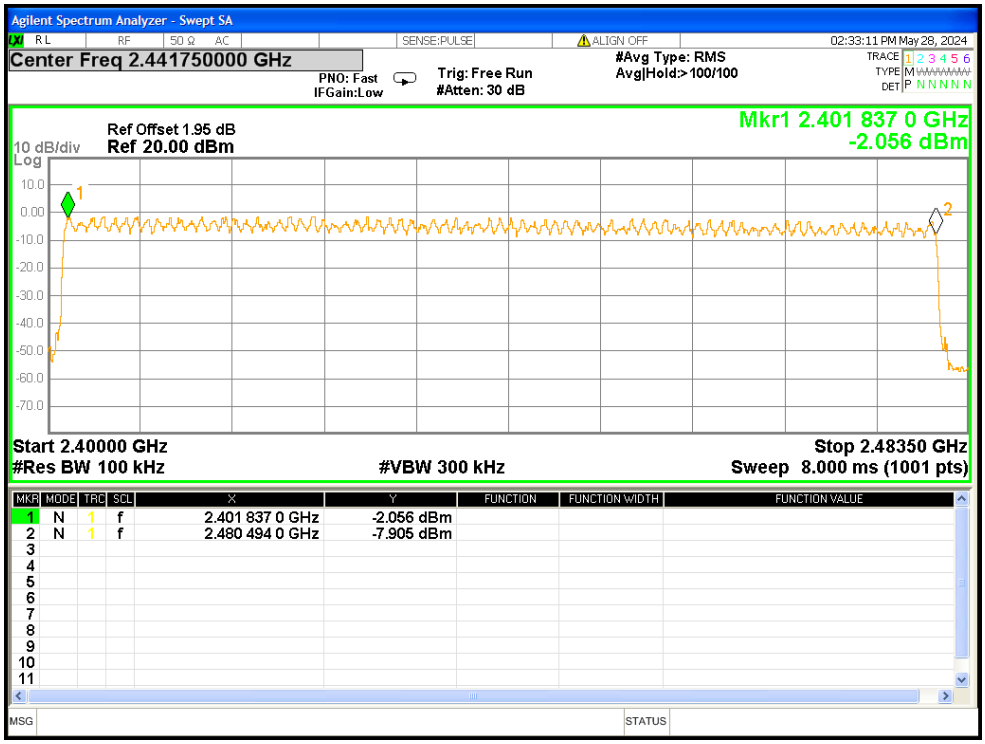
Measurement Data:

Mode	Hopping channel numbers	Limit	Result
GFSK	79	15	Pass
Pi/4QPSK	79	15	Pass
8DPSK	79	15	Pass

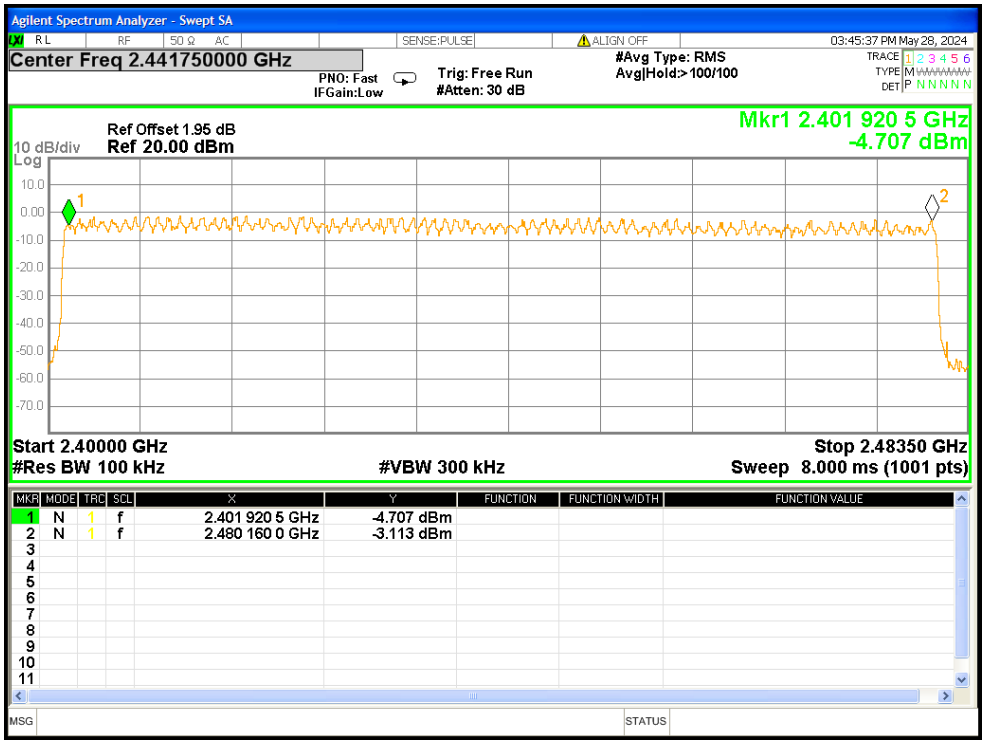
GFSK



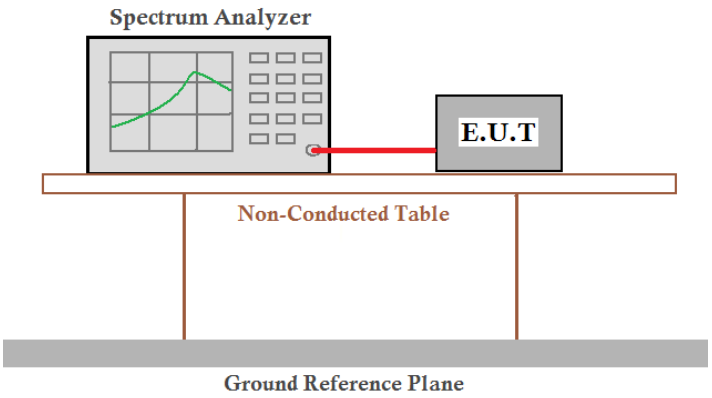
Pi/4QPSK



8DPSK


Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN OFF
03:45:37 PM May 28, 2024
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Ref Offset 1.95 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 2.401 920 5 GHz
-4.707 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1
2
Start 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 8.000 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.401 920 5 GHz -4.707 dBm
2 N 1 f 2.480 160 0 GHz -3.113 dBm
3
4
5
6
7
8
9
10
11
MSG
STATUS

9. Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=1MHz, VBW=1MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second
Test setup:	
Test Instruments:	Refer to section 1.7 for details
Test mode:	Refer to section 1.2 for details
Test results:	Pass

Measurement Data:

Mode	Frequency (MHz)	Burst Type	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Verdict
GFSK	2441	DH1	2.905	296.31	400	PASS
		DH3	2.905	305.025		
		DH5	2.905	305.025		
π/4-DQPSK	2441	DH1	2.913	291.3	400	PASS
		DH3	2.91	349.2		
		DH5	2.91	331.74		
8DPSK	2441	DH1	2.891	289.1	400	PASS
		DH3	2.911	264.901		
		DH5	2.909	328.717		

The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 s

Test channel: 2402MHz/2441MHz/2480MHz as blow

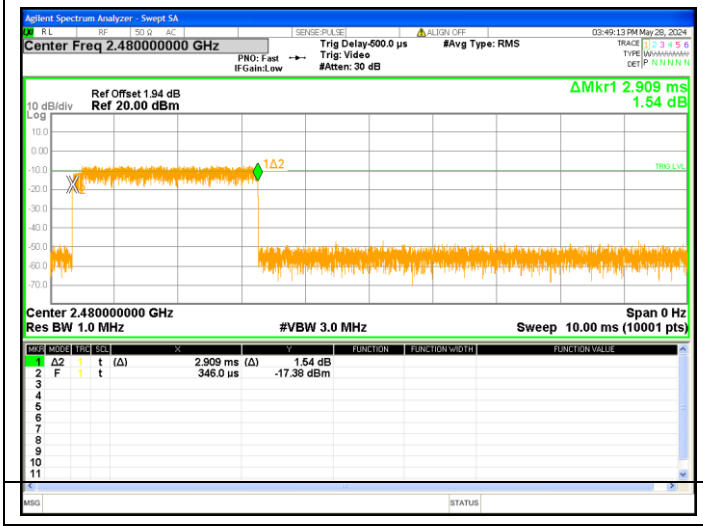
DH1 time slot= Pulse time (ms)*(1600/ (2*79))*31.6

DH3 time slot= Pulse time (ms)*(1600/ (4*79))*31.6

DH5 time slot= Pulse time (ms)*(1600/ (6*79))*31.6

Test plot as follows:

Dwell time	
GFSK	*π/4-DQPSK*
	
	
	

Dwell time	
8DPSK	
	
	
	

10. Pseudorandom Frequency Hopping Sequence

Test Requirement:	FCC Part15 C Section 15.247 (a)(1) requirement:

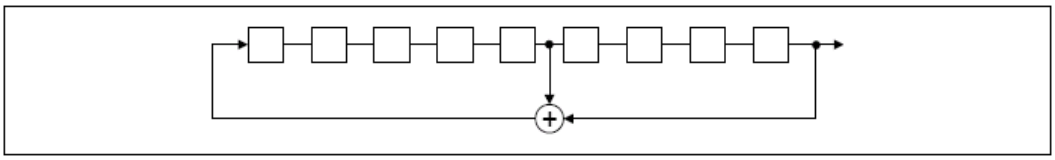
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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.

EUT Pseudorandom Frequency Hopping Sequence

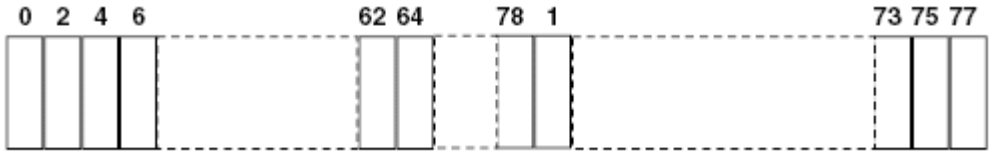
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized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



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

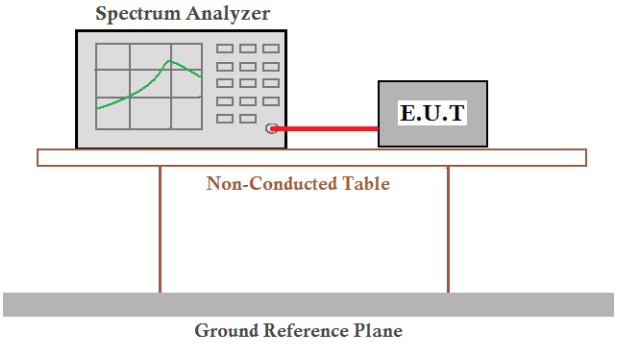


Each frequency used equally on the average by each transmitter.

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.

11. Band Edge

Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100kHz, VBW=300kHz, Detector=Peak
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test setup:	
Test Instruments:	Refer to section 1.7 for details
Test mode:	Refer to section 1.2 for details
Test results:	Pass

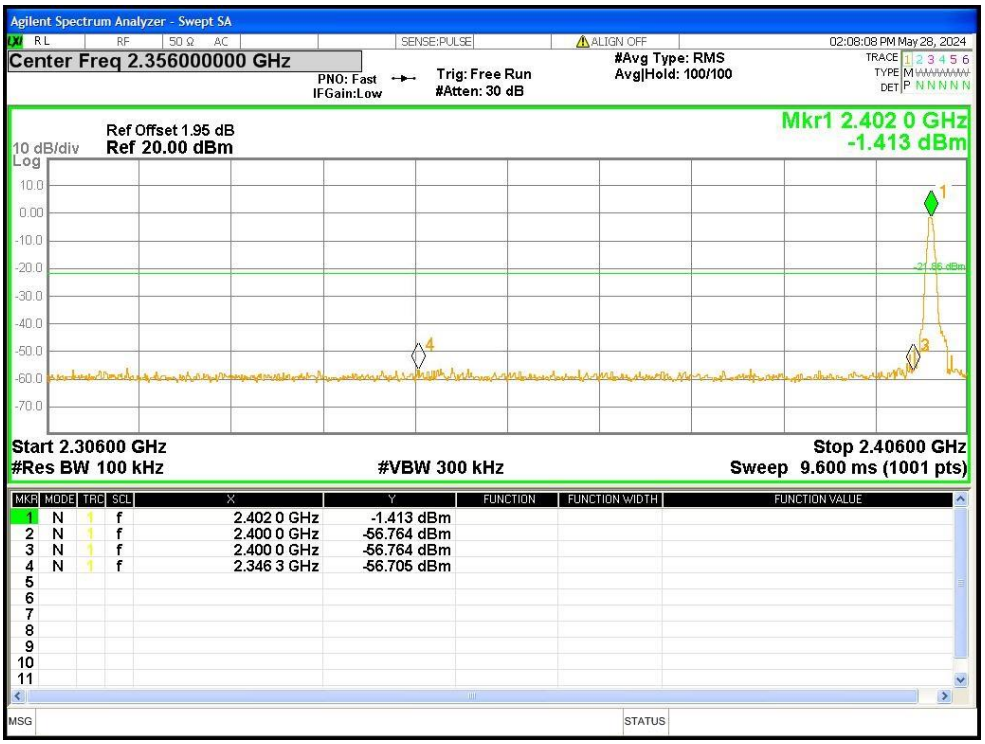
Marker-Delta Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205			
Test Method:	ANSI C63.10:2013 section 6.10.6			
Test Frequency Range:	All restriction band have been tested.			
Limit:	Frequency	Limit (dBuV/m @3m)	Remark	
	Above 1GHz	54.00	Average Value	
		74.00	Peak Value	

Test plot as follows:

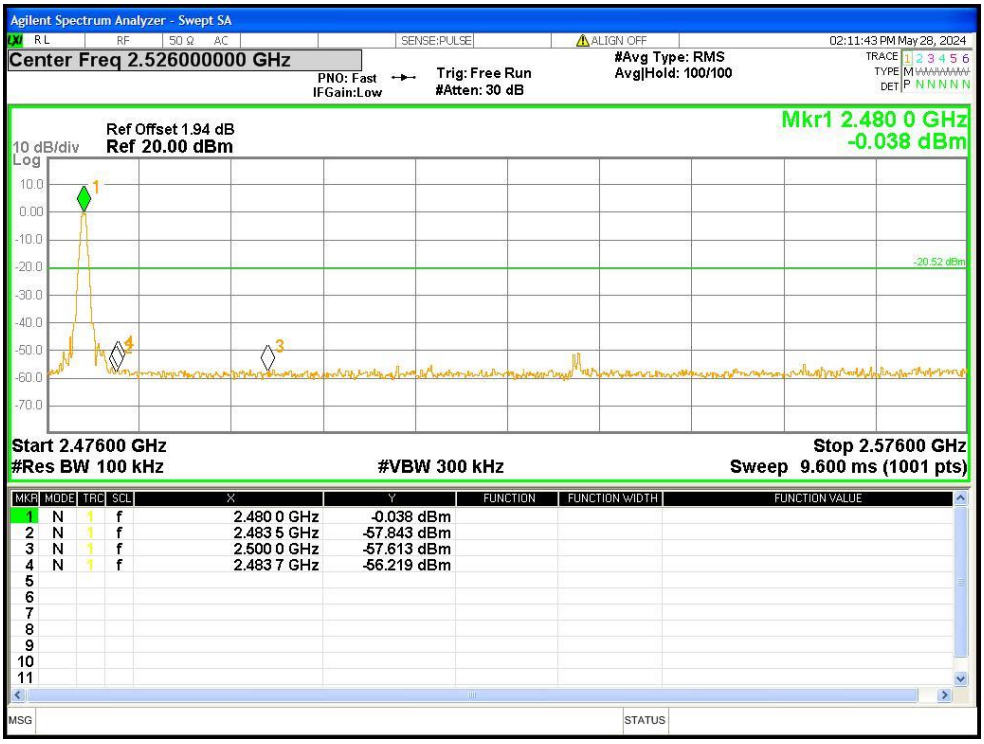
GFSK Mode:

Test channel: Lowest channel



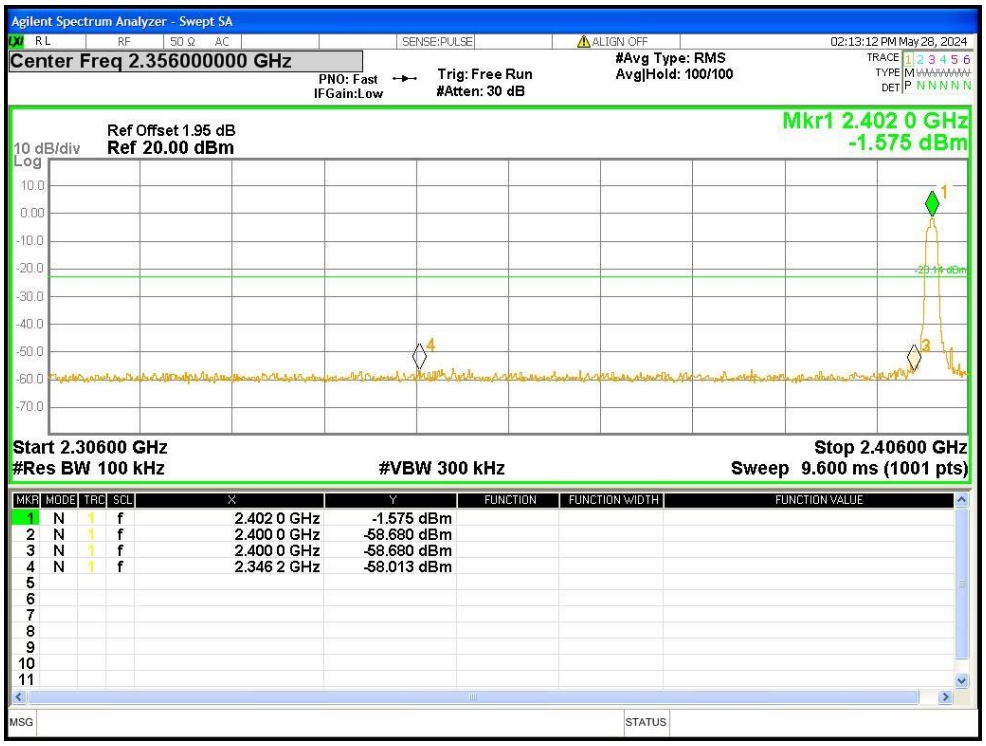
Test channel:

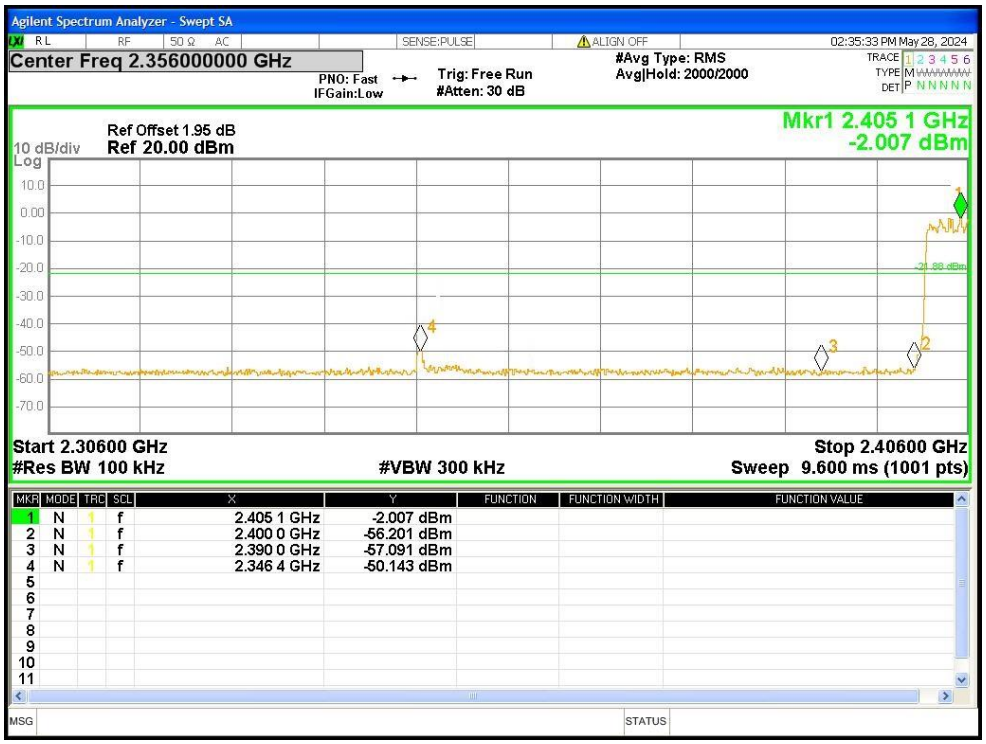
Highest channel



Pi/4QPSK Mode:

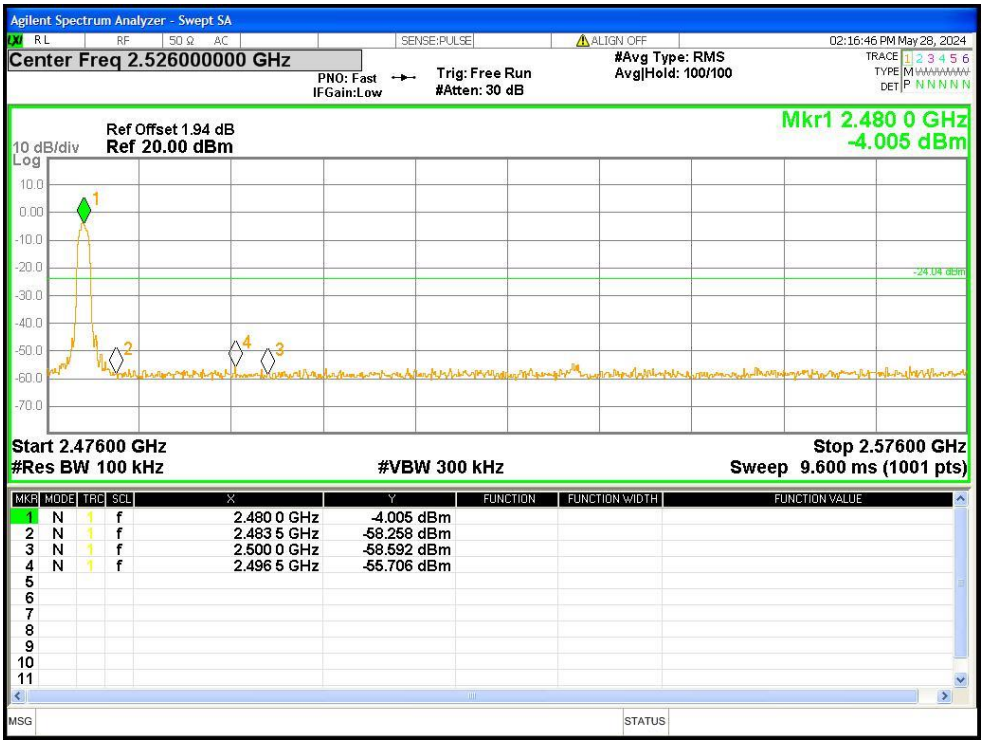
Test channel: Lowest channel





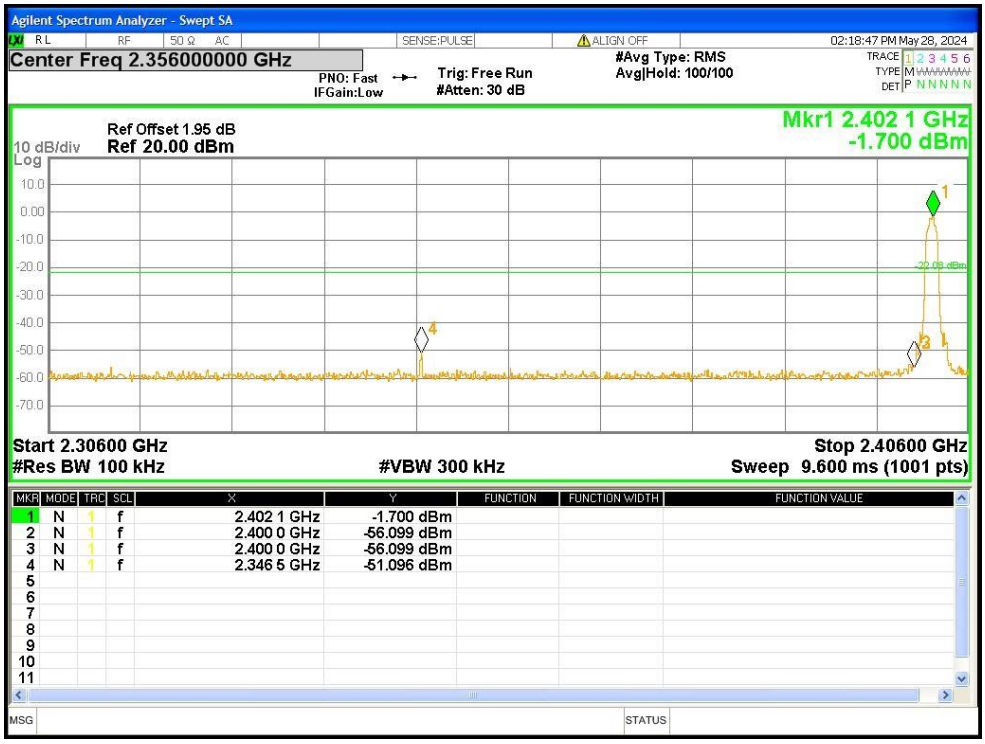
Test channel:

Highest channel



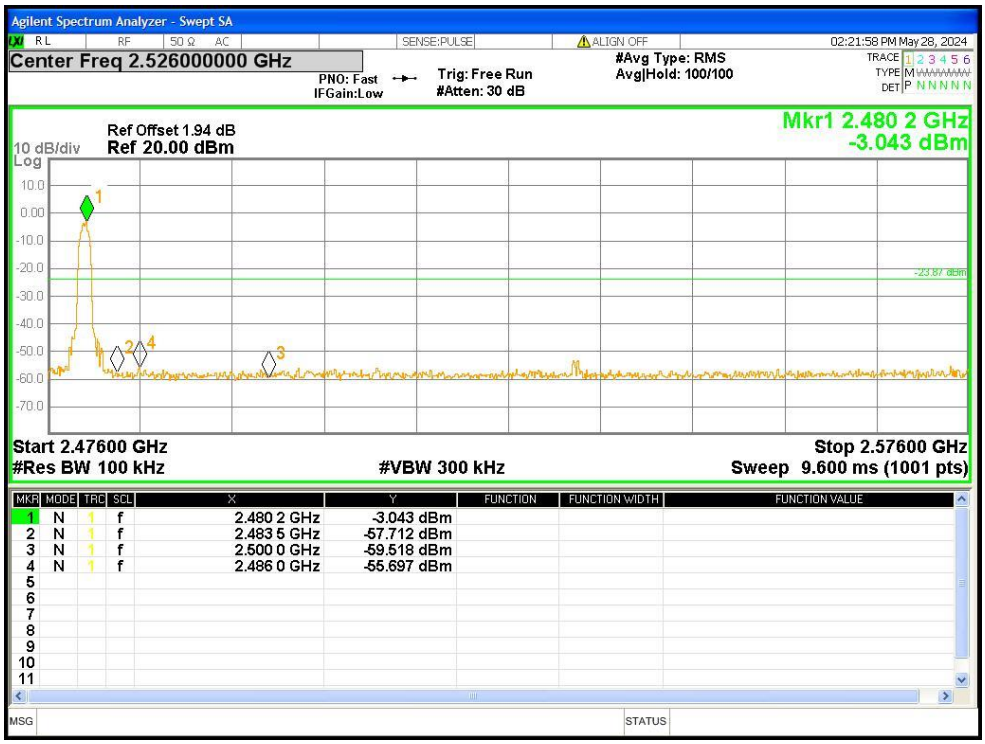
8DPSK Mode:

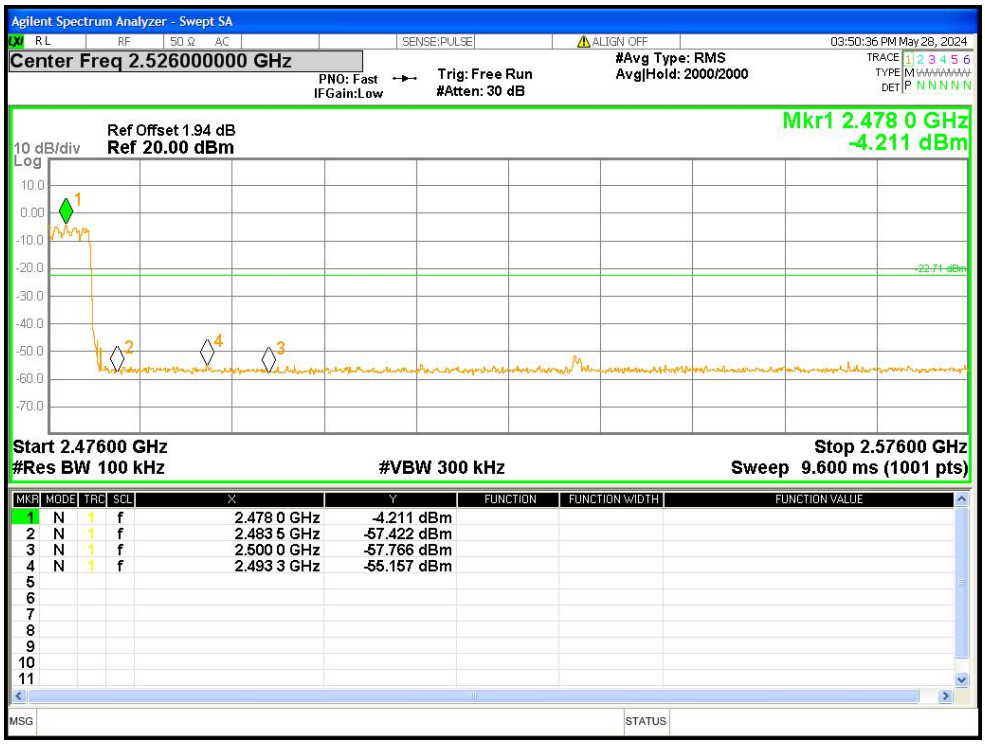
Test channel: Lowest channel



Test channel:

Highest channel

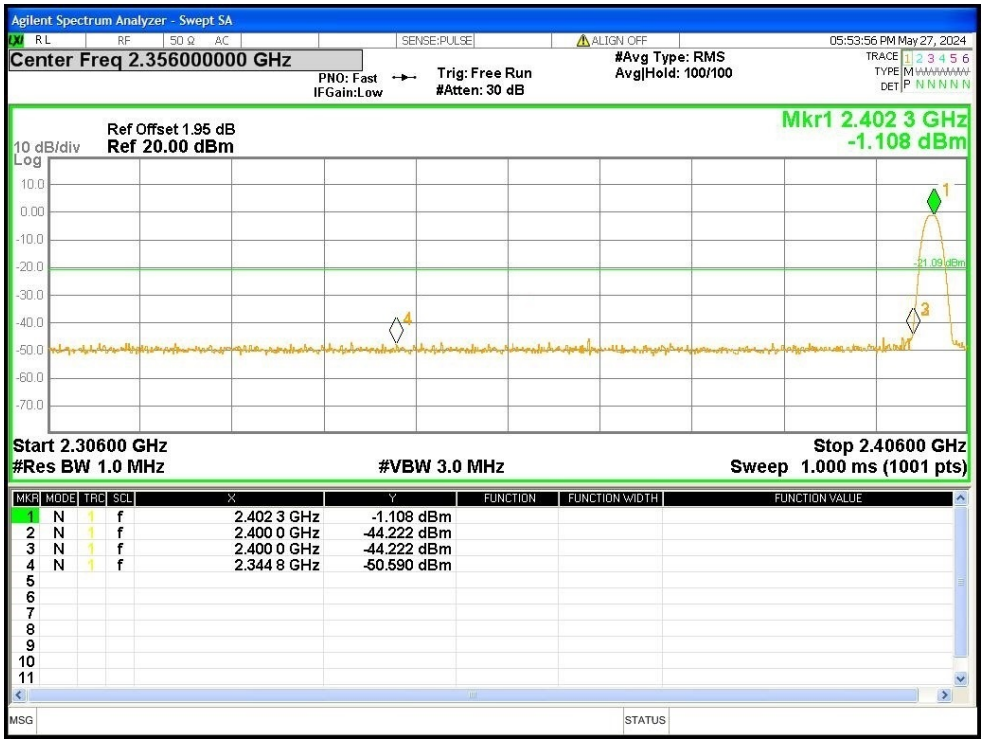


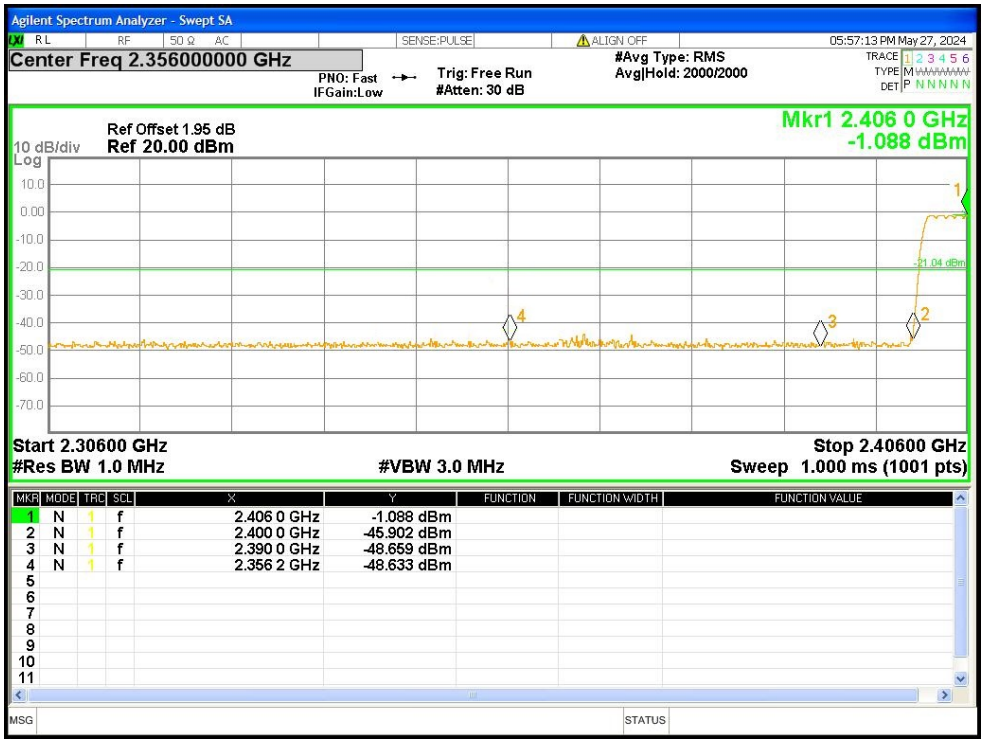


Bandedge (Conducted)

Lowest Channel:

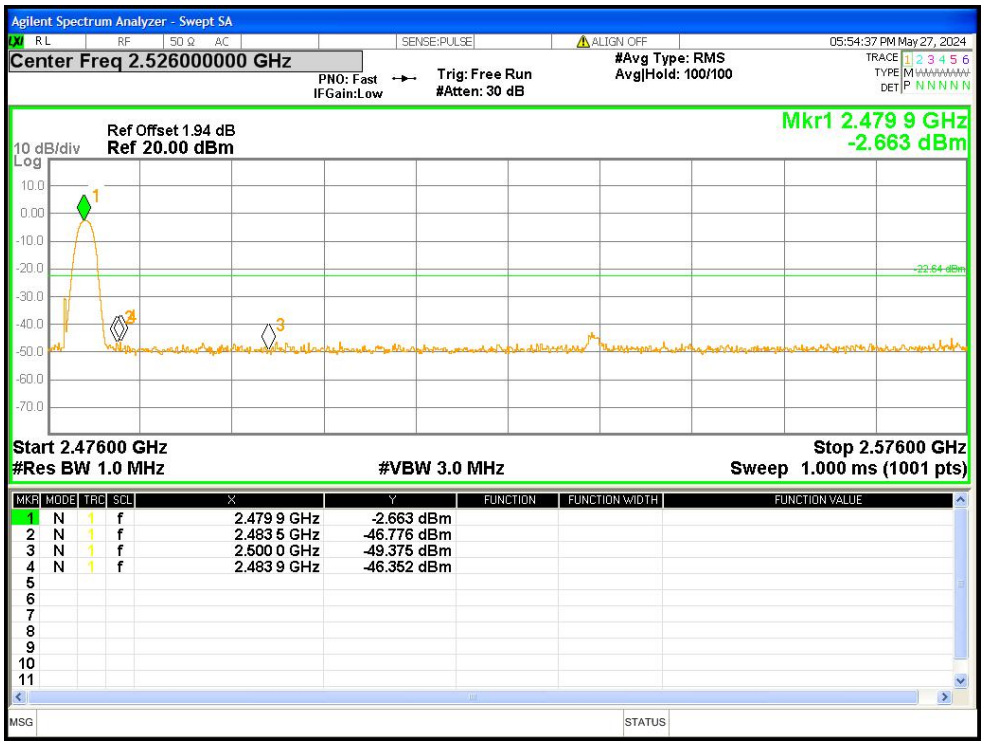
GFSK Mode

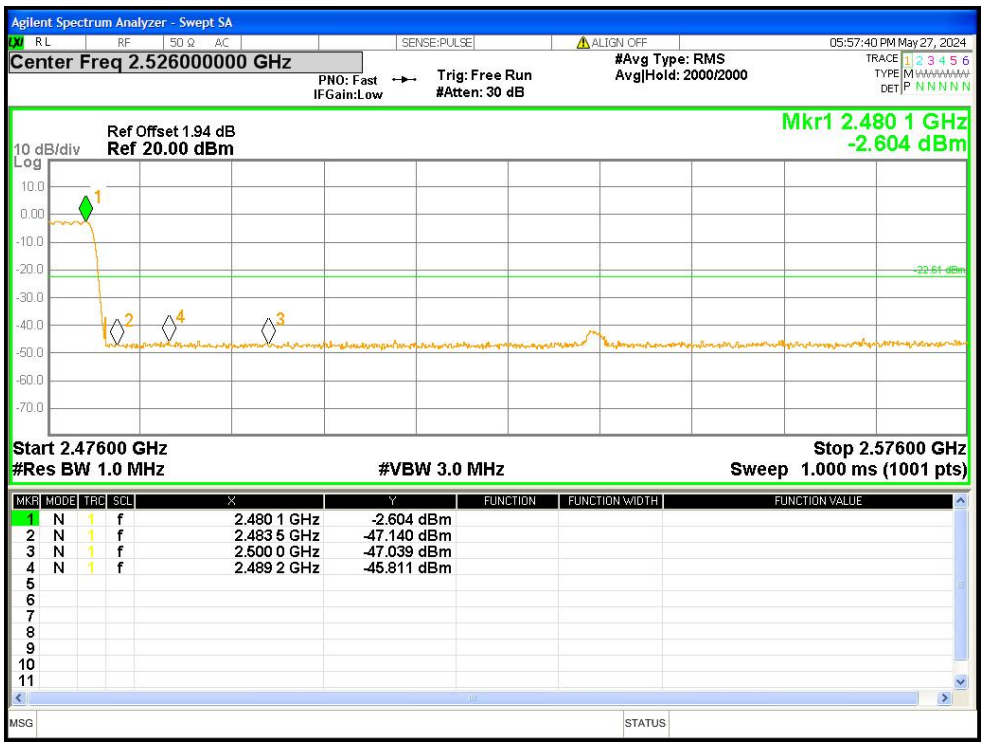




High Channel:

GFSK Mode





Channel	Mode	Detector	Frequency(MHz)	Level(dBm)	Delta(dB)
Low	Hop off	Peak	2402.30	-1.10	--
			2400.00	-44.22	**43.12**
			2344.80	-50.59	49.49
	Hop on		2406.00	-1.08	--
			2400.00	-45.90	44.82
			2390.00	-48.65	47.57
			2356.20	-48.63	47.55
High	Hop off		2479.90	-2.66	--
			2483.50	-46.77	44.11
			2483.90	-46.35	43.69
			2500.00	-49.37	46.71
	Hop on		2480.10	-2.60	--
			2483.50	-47.14	44.54
			2489.20	-45.81	**43.21**
			2500.00	-47.03	44.43

Test channel:	Lowest

Peak value:

Frequency (MHz)	Fundamental (dBuV/m)	Delta (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2400.00	89.48	43.12	46.36	74.00	-27.64	Vertical
2400.00	88.67	43.12	45.55	74.00	-28.45	Horizontal

Test channel:	Highest

Peak value:

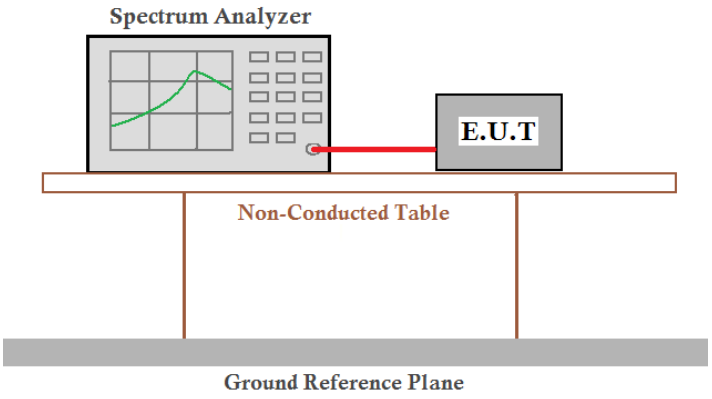
Frequency (MHz)	Fundamental (dBuV/m)	Delta (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	87.27	43.21	44.06	74.00	-29.94	Vertical
2483.50	86.72	43.21	43.51	74.00	-30.49	Horizontal

Remark:

1. *Final Level = Filed Strength of Fundamental – Delta*
2. *During the test, pre-scan the GFSK, Pi/4QPSK, 8DPSK modulation, and found the GFSK modulation which it is worse case.*
3. *The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.*

12. Spurious Emission

Conducted Emission Method

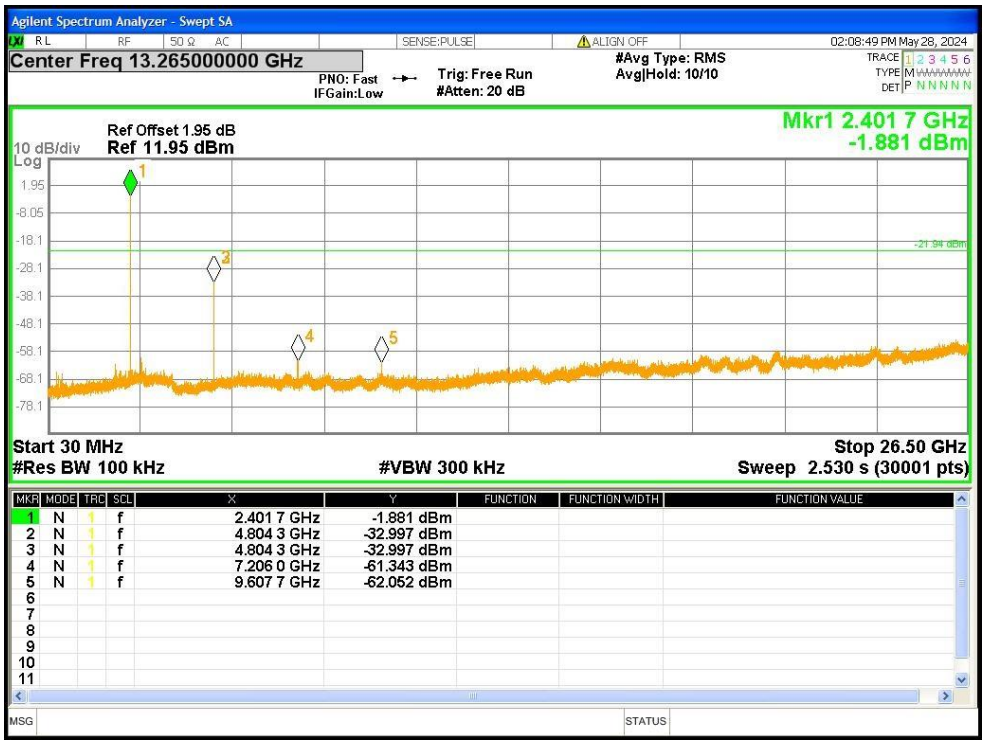
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below 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.
Test setup:	
Test Instruments:	Refer to section 1.7 for details
Test mode:	Refer to section 1.2 for details
Test results:	Pass

Remark:

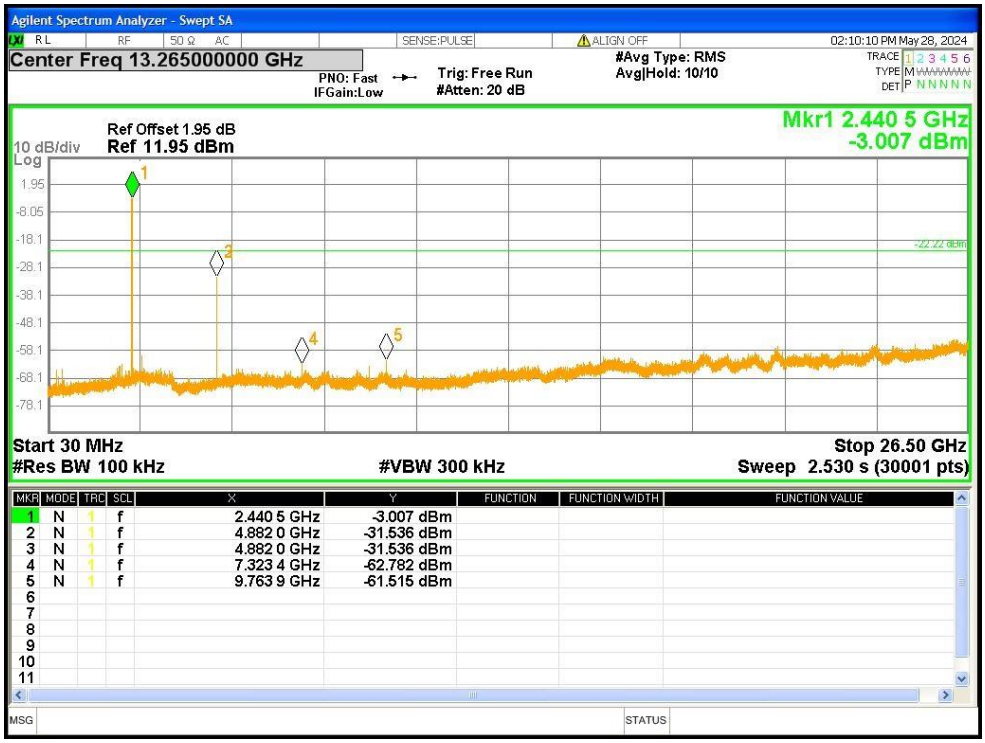
During the test, pre-scan the GFSK, Pi/4QPSK, 8DPSK modulation, and found the GFSK modulation which it is worse case.

Not recorded emission from 9 KHz to 30 MHz as emission level at least 20dBc lower than emission limit.

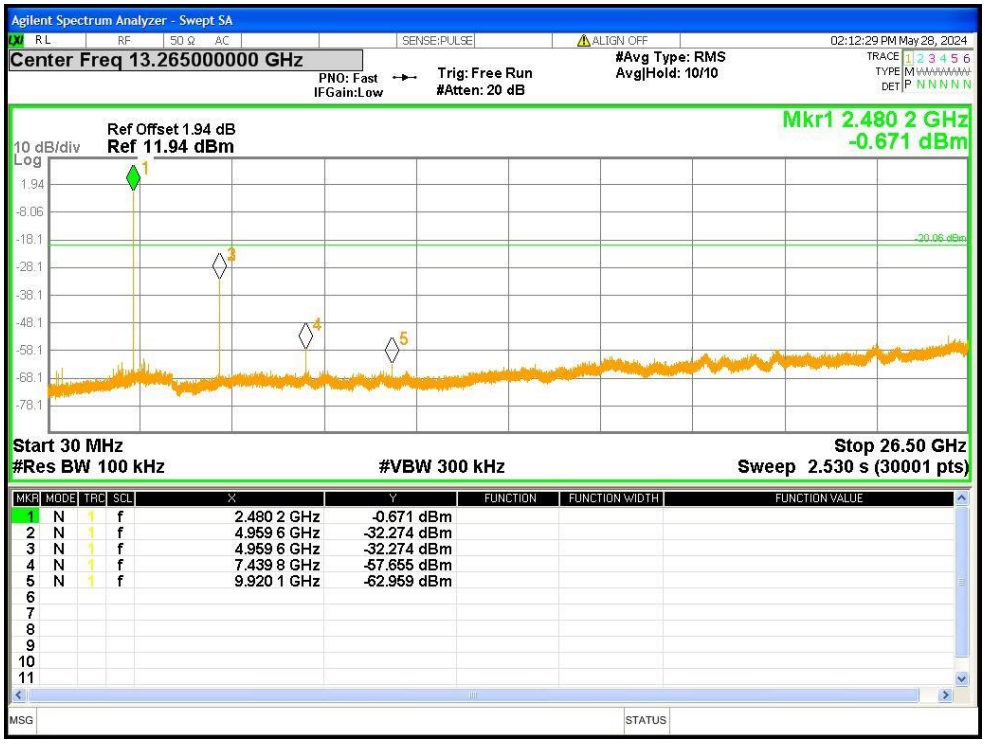
Test channel:	Lowest



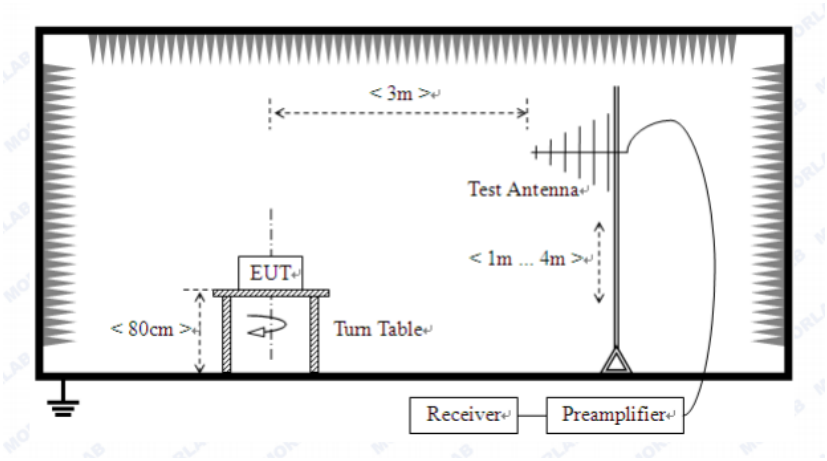
Test channel:	Middle



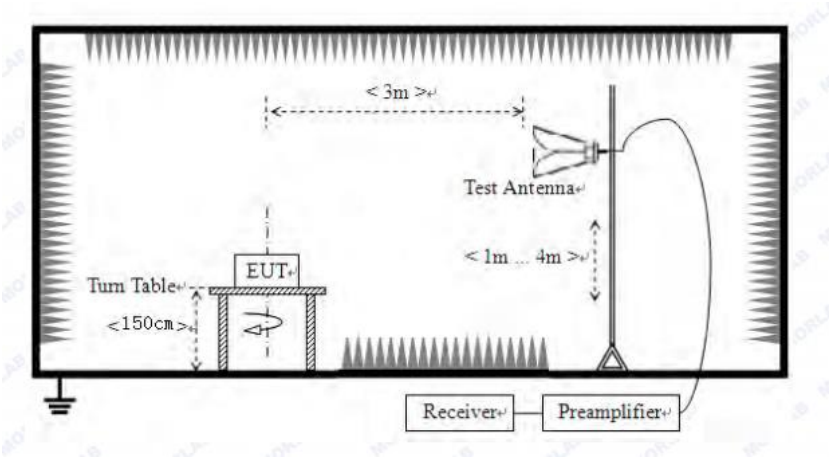
Test channel:	Highest



Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>30MHz to 25GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Average</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>74.0</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Test setup:</td><td>Below 1GHz
 

Above 1GHz</td></tr>
</table>

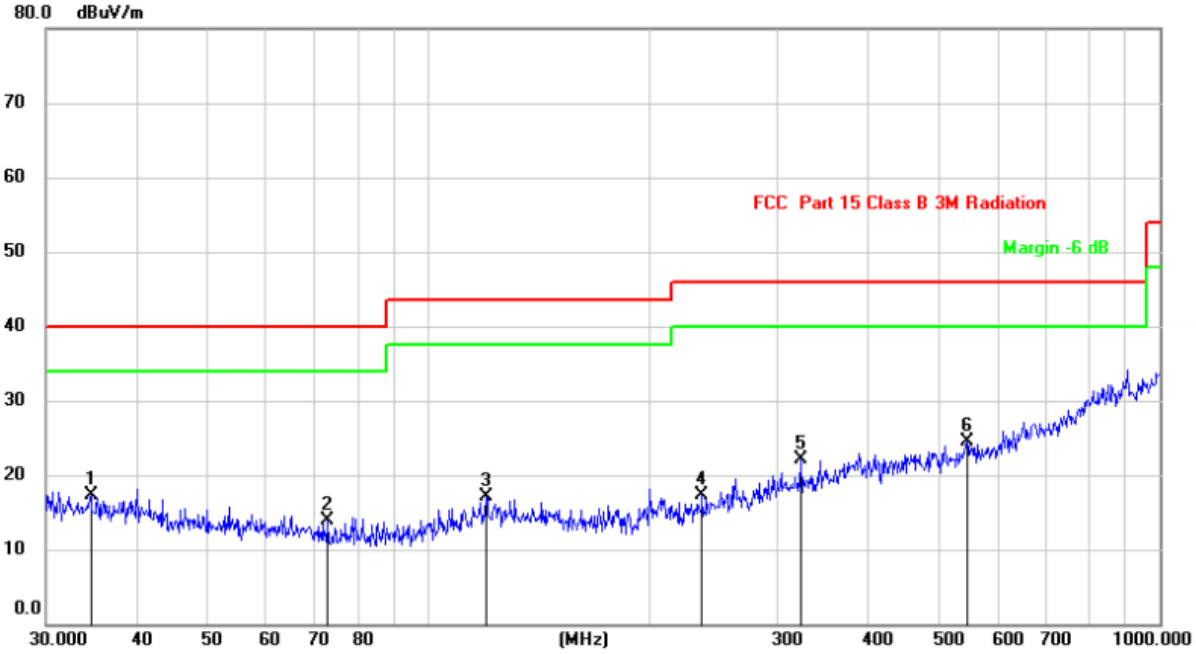
	
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8 meters below 1G and 1.5 meters above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. 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. 4. 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 and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. 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.
Test Instruments:	Refer to section 1.7 for details
Test mode:	Refer to section 1.2 for details
Test results:	Pass

Remark:

1. *During the test, pre-scan the GFSK, Pi/4QPSK, 8DPSK modulation, and found the GFSK modulation which it is worse case.*
2. *Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.*

Measurement data:

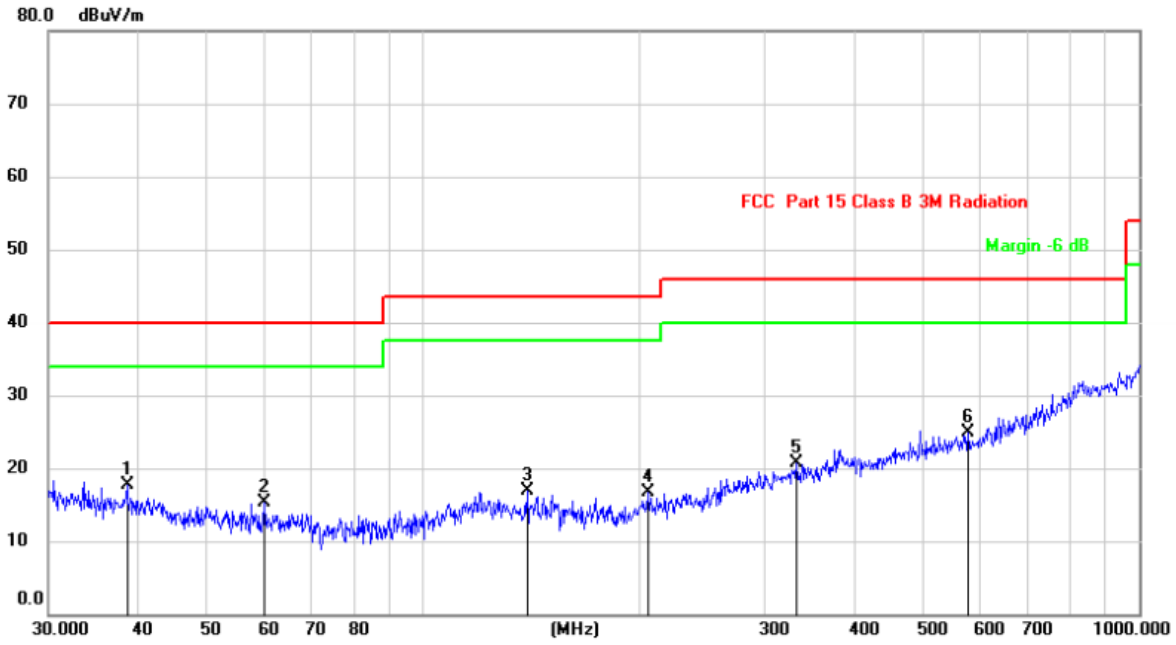
Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	Detector
1		34.5173	12.48	4.88	17.36	40.00	-22.64	QP
2		72.8466	12.87	1.08	13.95	40.00	-26.05	QP
3		119.8556	12.92	4.13	17.05	43.50	-26.45	QP
4		236.6447	13.14	4.16	17.30	46.00	-28.70	QP
5		323.3204	14.15	7.92	22.07	46.00	-23.93	QP
6	*	545.1826	12.96	11.62	24.58	46.00	-21.42	QP

*:Maximum data x:Over limit !:over margin

Horizontal:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	Detector
1		38.6160	13.24	4.45	17.69	40.00	-22.31	QP
2		60.0691	13.87	1.46	15.33	40.00	-24.67	QP
3		139.8508	13.55	3.29	16.84	43.50	-26.66	QP
4		206.3976	13.15	3.59	16.74	43.50	-26.76	QP
5		332.5187	12.77	7.99	20.76	46.00	-25.24	QP
6	*	576.6443	13.49	11.51	25.00	46.00	-21.00	QP

*:Maximum data x:Over limit !:over margin

Above 1GHz

Test channel:	Lowest

Peak value:

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2402	89.48	-	-	Vertical
4804	40.15	74.00	-33.85	Vertical
7206	37.27	74.00	-36.73	Vertical
9608	31.29	74.00	-42.71	Vertical
2402	88.67	-	-	Horizontal
4804	39.34	74.00	-34.66	Horizontal
7206	37.18	74.00	-36.82	Horizontal
9608	31.59	74.00	-42.41	Horizontal

Average value:

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2402	87.64	-	-	Vertical
4804	38.26	54.00	-15.74	Vertical
7206	35.19	54.00	-18.81	Vertical
9608	30.14	54.00	-23.86	Vertical
2402	86.73	-	-	Horizontal
4804	37.24	54.00	-16.76	Horizontal
7206	35.43	54.00	-18.57	Horizontal
9608	30.26	54.00	-23.74	Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *The emission from 9 kHz to 30MHz was pre tested and found the result was 20dB lower than the limit, and the permissible value has no need to be reported.*
4. *In frequency ranges 18 ~25GHz no any other harmonic emissions detected which are tested to compliance with the limit. No recording in the test report. No any other emissions level which are attenuated less than 20dB below the limit. No recording in the test report.*

Test channel:	Middle

Peak value:

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2442	87.93	-	-	Vertical
4882	39.57	74.00	-34.43	Vertical
7323	37.21	74.00	-36.79	Vertical
9764	31.27	74.00	-42.73	Vertical
2442	86.59	-	-	Horizontal
4882	39.41	74.00	-34.59	Horizontal
7323	37.47	74.00	-36.53	Horizontal
9764	31.36	74.00	-42.64	Horizontal

Average value:

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2442	86.26	-	-	Vertical
4882	37.16	54.00	-16.84	Vertical
7323	35.41	54.00	-18.59	Vertical
9764	30.47	54.00	-23.53	Vertical
2442	85.47	-	-	Horizontal
4882	37.17	54.00	-16.83	Horizontal
7323	35.28	54.00	-18.72	Horizontal
9764	30.73	54.00	-23.27	Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *The emission from 9 kHz to 30MHz was pre tested and found the result was 20dB lower than the limit, and the permissible value has no need to be reported.*
4. *In frequency ranges 18 ~25GHz no any other harmonic emissions detected which are tested to compliance with the limit. No recording in the test report. No any other emissions level which are attenuated less than 20dB below the limit. No recording in the test report.*

Test channel:	Highest

Peak value:

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2480	87.27	-	-	Vertical
4960	39.45	74.00	-34.55	Vertical
7440	36.91	74.00	-37.09	Vertical
9920	31.43	74.00	-42.57	Vertical
2480	86.72	-	-	Horizontal
4960	38.78	74.00	-35.22	Horizontal
7440	36.84	74.00	-37.16	Horizontal
9920	31.29	74.00	-42.71	Horizontal

Average value:

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2480	85.61	-	-	Vertical
4960	37.81	54.00	-16.19	Vertical
7440	35.47	54.00	-18.53	Vertical
9920	30.35	54.00	-23.65	Vertical
2480	85.10	-	-	Horizontal
4960	37.24	54.00	-16.76	Horizontal
7440	35.16	54.00	-18.84	Horizontal
9920	30.43	54.00	-23.57	Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *The emission from 9 kHz to 30MHz was pre tested and found the result was 20dB lower than the limit, and the permissible value has no need to be reported.*
4. *In frequency ranges 18 ~25GHz no any other harmonic emissions detected which are tested to compliance with the limit. No recording in the test report. No any other emissions level which are attenuated less than 20dB below the limit. No recording in the test report.*

------End------