

TEST REPORT

Applicant : Shenzhen Ai-Thinker Technology Co., Ltd

Address : 410,Block C, Huafeng Smart Innovation Port.Gushu 2nd Road,
Gushu Community, Xixiang Street, Baoan District, Shenzhen, China

Manufacturer : Shenzhen Ai-Thinker Technology Co., Ltd

Address : 410,Block C, Huafeng Smart Innovation Port.Gushu 2nd Road,
Gushu Community, Xixiang Street, Baoan District, Shenzhen, China

Product Name : Wi-Fi + BT Module

Model Number : Ai-M64L-12F

Trademark :   安信可科技
Ai-Thinker

FCC ID : 2ATPO-AIM64L

Test Date : Aug. 11, 2026 to Sep. 02, 2026

Date of Report : Sep. 02, 2026

Test Result : This device described above has been tested by NTT, and the test results show that the equipment under test (EUT) is in compliance with the Standard requirements. And it is applicable only to the tested sample identified in the report.

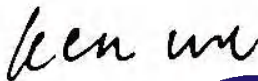
Test Procedure Used:

Standards : FCC CFR Title 47 Part 15 Subpart C Section 15.247
ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024
KDB 558074 D01 15.247 Meas Guidance v05r02

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Revision History of This Test Report

[illegible]

1. General Information

1.1. Description of Device (EUT)

EUT Name : Wi-Fi + BT Module
Model No. : Ai-M64L-12F
Model Difference : N/A
Power supply : DC 3.3V PC power supply
Operation frequency : 2402-2480MHz
Modulation : GFSK
Antenna Type : PCB antenna, Maximum Gain is 1.82dBi
Intend use environment : Residential, commercial and light industrial environment

1.2. Channel List

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	14	2430	28	2458
01	2404	15	2432	29	2460
02	2406	16	2434	30	2462
03	2408	17	2436	31	2464
04	2410	18	2438	32	2466
05	2412	19	2440	33	2468
06	2414	20	2442	34	2470
07	2416	21	2444	35	2472
08	2418	22	2446	36	2474
09	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

1.3.Summary of test result

RF PART		
Test Items	Test Requirement	Result
Antenna requirement	FCC part 15.203/15.247 (b)(4)	PASS
AC Power Line Conducted Emission	FCC part 15.207	PASS
Conducted Peak Output Power	FCC part 15.247 (b)(3)	PASS
Channel Bandwidth& 99% OCB	FCC part 15.247 (a)(2)	PASS
Power Spectral Density	FCC part 15.247 (e)	PASS
Band Edge	FCC part 15.247(d)	PASS
Spurious Emission	FCC part 15.205/15.209	PASS
Remark: N/A is an abbreviation for Not Applicable. Measurement Uncertainty is not taken into account for conformity statement		

1.4.Special Accessories and Auxiliary Equipment

Description	Manufacturer	Model No.	Hardware Version	Software Version
Laptop	DELL	Vostro 5490	/	/
Cable	/	/	/	/
Serial port board	/	/	/	/

1.5.Test mode

The special RF test software was used to control EUT work in Continuous BLE TX mode, and select test channel, wireless mode.

Test mode	Low channel	Middle channel	High channel
GFSK	2402MHz	2440MHz	2480MHz

Note: Only the worst Data Record in the report

1.6. Test configuration

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

Test Software	bouffalo_mfg_tool
Power level setup	Default

1.7.Block Diagram

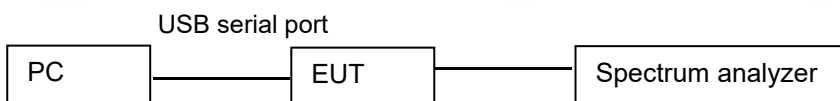
Conducted Emission



Radiated Emission



RF Conducted Test



1.8.Test Conditions

Category	Normal Conditions	Extreme Conditions
Temperature range	15-35°C	N/A
Humidity range	20-75%	N/A
Pressure range	86-106kPa	N/A
Power supply	DC 3.3V	N/A

Note: N/A is an abbreviation for Not Applicable.

1.9.Measurement Uncertainty (95% confidence levels, k=2)

Parameter	Uncertainty
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10 ⁻⁶
Bandwidth	± 1.5 x 10 ⁻⁶
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(9KHz~30MHz)	±4.51dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB

Remark:When making a conformity declaration based on test results for regulations/standards or specifications,the default is to use Clause 4.2.1of ILAC-G8:09/2019 and the guidelines on decision rules and conformity declaration in IEC Guide 115:2023.

1.10.Test Facility

Site Description		
Name of Firm	:	Shenzhen NTT Testing Technology Co.,Ltd.
Site Location	:	1B, Building 2, Factory Building & 103, Building 3, Factory Building, Dayang Industrial Park No.4, Industrial Avenue, Tangwei Community, Fuhai Sub-district, Bao 'an District, Shenzhen City, China
FCC Designation Number	:	CN3446
FCC Test Firm Registration Number	:	129414

1.11.Test Equipment

Conducted Test Site

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
944 Shielded Room	HSRCE944	/	HTEC	2025/4/30	2028/4/29
EMI Test Receiver	ESPI	/	RS	2025/9/8	2026/9/7
LISN	NNLK 8129	00603	Schwarzbeck	2025/9/8	2026/9/7
LISN	NNHV 8123-400	00694	Schwarzbeck	2025/9/8	2026/9/7
LISN	NNHV 8123-400	00680	Schwarzbeck	2025/9/8	2026/9/7
Cable	RG223-1500MM	NA	RG	2025/9/8	2026/9/7

Radiated Test Site(Below 1G and Above 1G)&RF Test Site

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
966 Shielded Room	966 Room	/	EMToni	2025/7/24	2028/7/23
EMI Test Receiver	ESCI	101018	RS	2025/9/8	2026/9/7
Amplifi (30MHz-1GHz)	BBV 9718D	00042	SCHWARZBECK	2025/9/8	2026/9/7
Bilog Antenna (30MHz-1GHz)	VULB9168	1858	SCHWARZBECK	2025/9/9	2026/9/8
Horn antenna (1GHz-18GHz)	BBHA 9120 D	02622	SCHWARZBECK	2025/9/9	2026/9/8
Pream plifier (1GHz-18GHz)	BBV 9718D	0024	SCHWARZBECK	2025/9/8	2026/9/7
Spectrum Analyze (10Hz-40GHz)	FSV 40	100952	Rohde & Schwarz	2025/9/8	2026/9/7
Pream plifier (18GHz-40GHz)	BBV 9721	0056	SCHWARZBECK	2025/9/8	2026/9/7
Double Ridge Guide Horn Antenna (18GHz-40GHz)	SAS-574	588	A.H.System	2025/9/8	2026/9/7
Loop Antenna (9KHz-30MHz)	FMZB1519B	014	SCHWARZBECK	2025/9/8	2026/9/7
Amplifier (9KHz-30MHz)	CVP 9222 C	00109	SCHWARZBECK	2025/9/8	2026/9/7
MXG Signal Analyzer	N9020A	MY505102 02	Agilent	2025/9/8	2026/9/7

MXG Vector Signal Generator	N5182A	MY501400 20	Agilent	2025/9/8	2026/9/7
MXG Analog Signal Generator	N5181A	MY474209 19	Agilent	2025/9/8	2026/9/7
Power Sensor	TR1029-2	512364	Techoy	2025/9/8	2026/9/7
RF Swith	TR1029-1	512364	Techoy	2025/9/8	2026/9/7
Cable	DA800- 4000MM	NA	DA	2025/9/8	2026/9/7
Cable	DA800- 11000MM	NA	DA	2025/9/8	2026/9/7

Test software

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ-EMC	Ver.EMC-CON 3A1.1+
2	EMC radiation test system	FALA	EZ-EMC	Ver.FA-03A2 RE+
3	RF test system	TACHOY	RFTest	V1.0.0
4	RF communication test system	TACHOY	RFTest	V1.0.0

2. Conducted emission at the mains terminals test

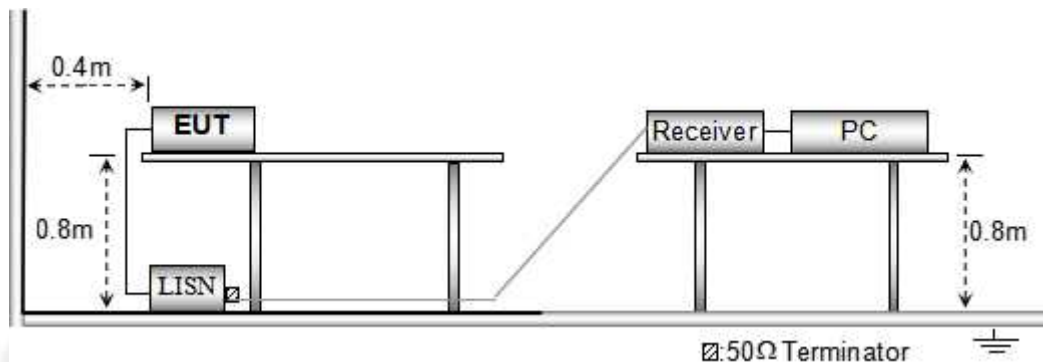
2.1.Limit

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

2.2.Test Setup

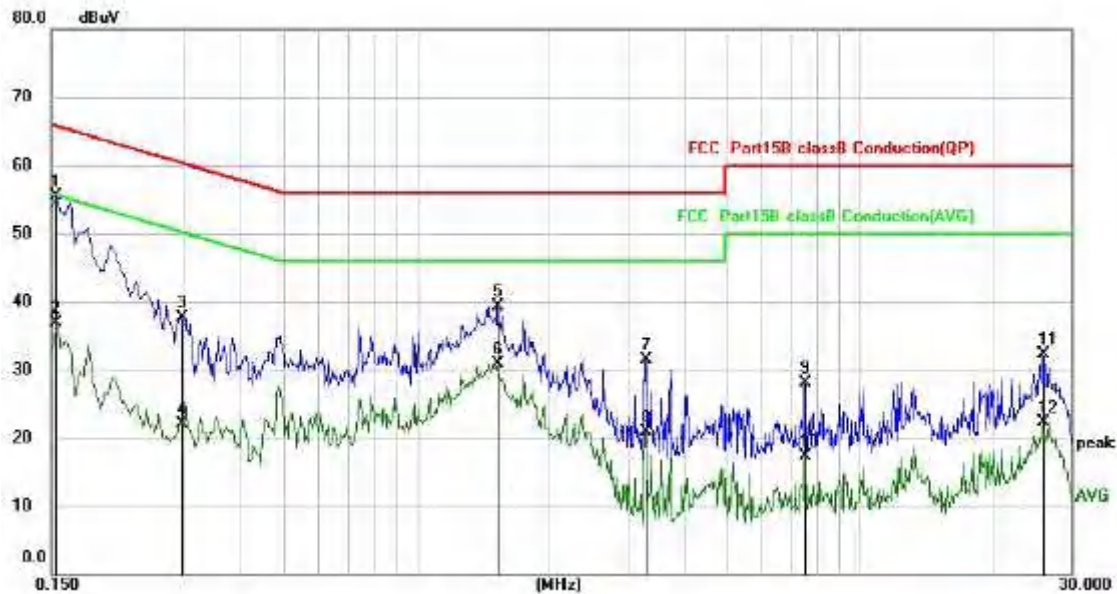


2.3.Test Procedure

1. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
2. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
3. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
4. LISN at least 80 cm from nearest part of EUT chassis.
5. For the actual test configuration, please refer to the related Item - EUT Test Photos.

2.4.Test Result

Conducted Emission At The Mains Terminals Test Data			
Temperature:	25.1℃	Relative Humidity:	56%
Pressure:	1008hPa	Phase :	Line
Test Voltage :	DC 3.3V PC power supply AC 120V/60Hz	Test Mode:	GFSK(CH00)

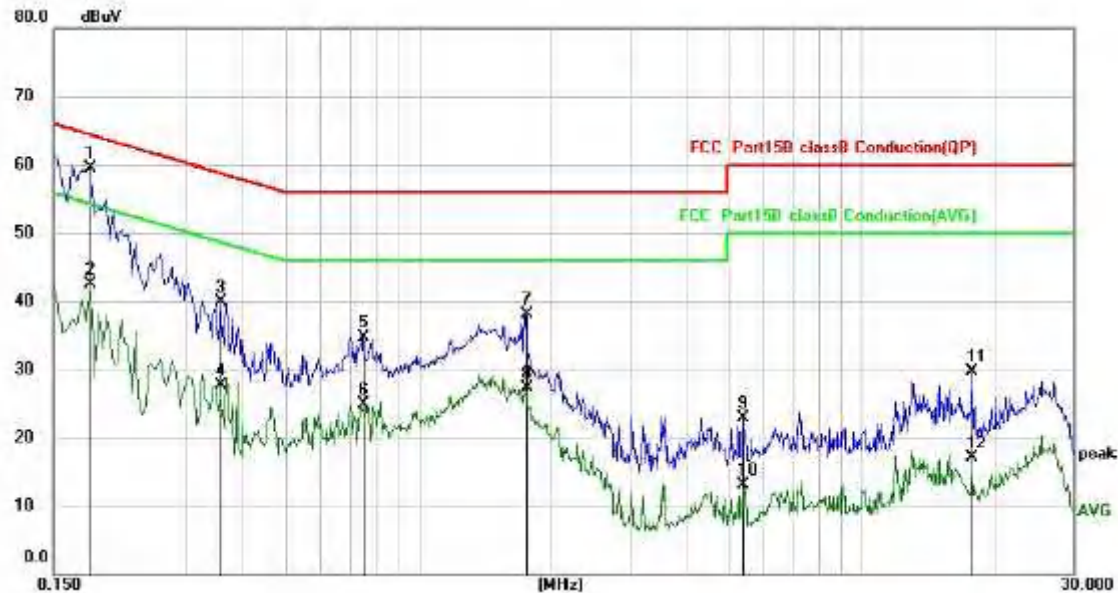


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1	*	0.1539	44.72	10.87	55.59	65.79	-10.20	QP
2		0.1539	25.97	10.87	36.84	55.79	-18.95	AVG
3		0.2940	27.06	10.67	37.73	60.41	-22.68	QP
4		0.2940	11.43	10.67	22.10	50.41	-28.31	AVG
5		1.5260	28.92	10.47	39.39	56.00	-16.61	QP
6		1.5260	20.39	10.47	30.86	46.00	-15.14	AVG
7		3.2820	20.94	10.49	31.43	56.00	-24.57	QP
8		3.2820	10.40	10.49	20.89	46.00	-25.11	AVG
9		7.5220	17.60	10.55	28.15	60.00	-31.85	QP
10		7.5220	6.83	10.55	17.38	50.00	-32.62	AVG
11		25.7540	21.04	11.31	32.35	60.00	-27.65	QP
12		25.7540	11.02	11.31	22.33	50.00	-27.67	AVG

Note:

1. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
2. Margin = Reading level + Correct Factor - Limit
3. All the modes have tested and recorded the worst mode(GFSK-CH00) in the report

Conducted Emission At The Mains Terminals Test Data			
Temperature:	25.1°C	Relative Humidity:	56%
Pressure:	1008hPa	Phase :	Neutral
Test Voltage :	DC 3.3V PC power supply AC 120V/60Hz	Test Mode:	GFSK(CH00)



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1	*	0.1819	48.77	10.80	59.57	64.40	-4.83	QP
2		0.1819	31.63	10.80	42.43	54.40	-11.97	AVG
3		0.3580	29.28	10.61	39.89	58.77	-18.88	QP
4		0.3580	17.02	10.61	27.63	48.77	-21.14	AVG
5		0.7500	24.31	10.46	34.77	56.00	-21.23	QP
6		0.7500	14.52	10.46	24.98	46.00	-21.02	AVG
7		1.7460	27.66	10.47	38.13	56.00	-17.87	QP
8		1.7460	16.81	10.47	27.28	46.00	-18.72	AVG
9		5.4060	12.38	10.52	22.90	60.00	-37.10	QP
10		5.4060	2.57	10.52	13.09	50.00	-36.91	AVG
11		17.7180	18.84	10.82	29.66	60.00	-30.34	QP
12		17.7180	6.38	10.82	17.20	50.00	-32.80	AVG

Note:

1. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
2. Margin = Reading level + Correct Factor - Limit
3. All the modes have tested and recorded the worst mode(GFSK-CH00) in the report

3. Radiated Spurious Emissions

3.1.Limit

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247
 Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;
 ANSI C63.10-2020 + Cor. 1-2023 + C63.10a-2024 + Errata to C63.10a-2024
 Test Result: PASS
 Measurement Distance: 3m

Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

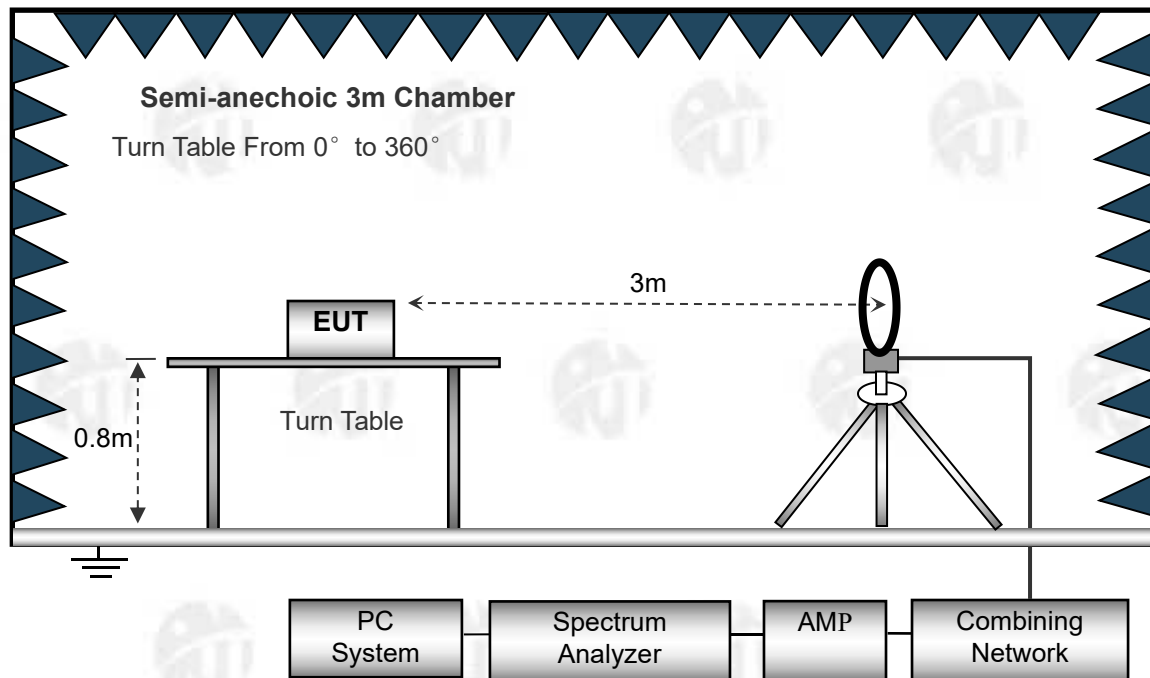
Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	20log(2400/F(kHz)) + 80
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	20log(24000/F(kHz)) + 40
1.705 ~ 30	30	30	100 * 30	20log(30) + 40
30 ~ 88	100	3	100	20log(100)
88 ~ 216	150	3	150	20log(150)
216 ~ 960	200	3	200	20log(200)
Above 960	500	3	500	20log(500)

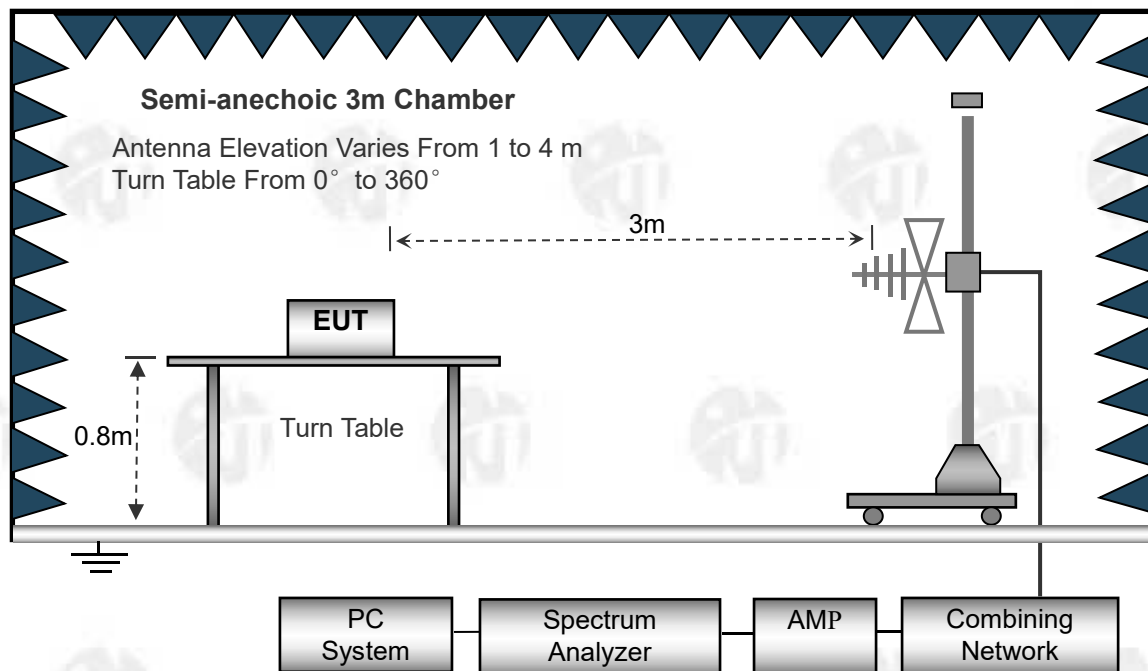
3.2.Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

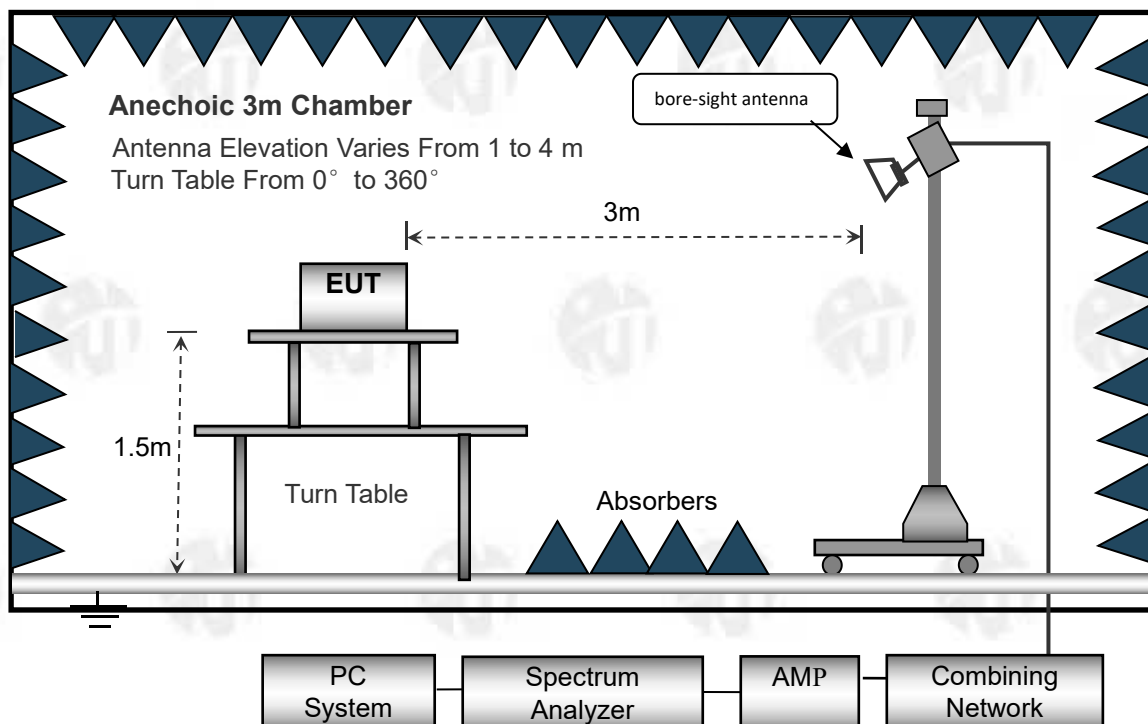
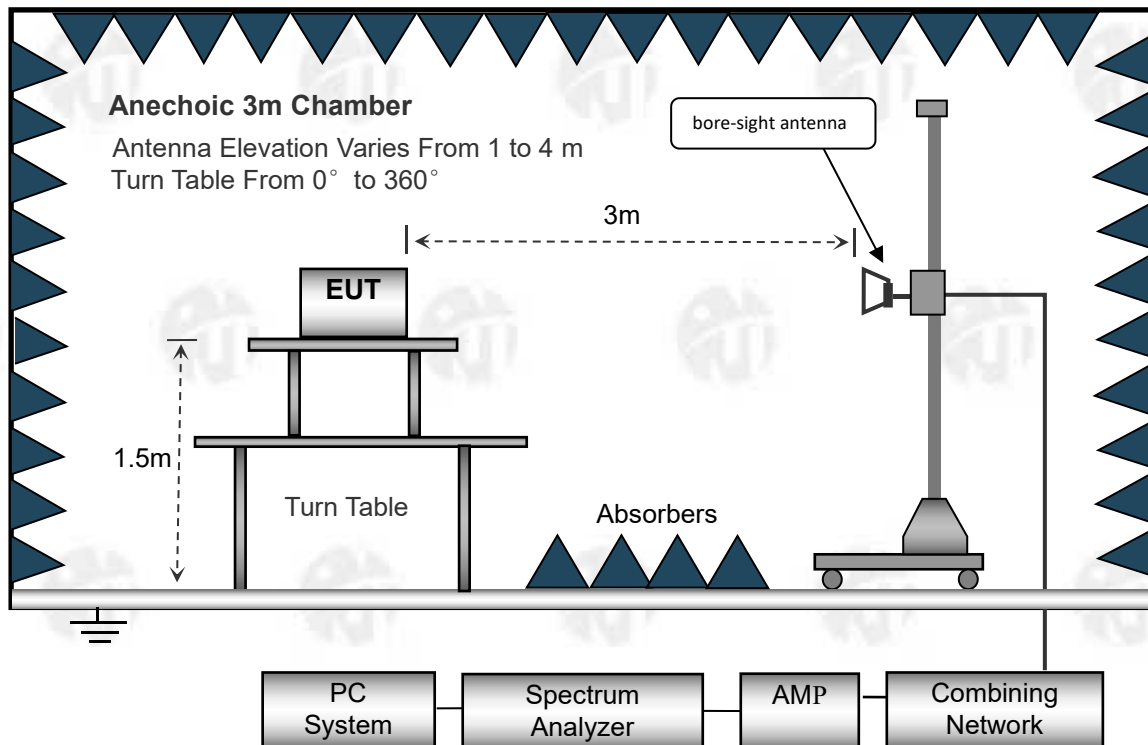
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



3.3.Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in Z axis,so the worst data were shown as follow.
8. A 2.4GHz high - pass filter is used during radiated emissions above 1GHz measurement.

3.4.Test Result

Test Frequency: 9KHz~30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency : 30MHz ~ 1GHz

Radiation Emission Test Data			
Temperature:	25.1℃	Relative Humidity:	56%
Pressure:	1008hPa	Phase :	Horizontal
Test Voltage :	DC 3.3V PC power supply	Test Mode:	GFSK(CH00)



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		42.2281	27.36	-5.89	21.47	40.00	-18.53	QP
2		63.2023	27.05	-4.80	22.25	40.00	-17.75	QP
3		141.5777	27.39	-5.10	22.29	43.50	-21.21	QP
4		233.3487	35.80	-6.79	29.01	46.00	-16.99	QP
5		300.8943	35.39	-3.29	32.10	46.00	-13.90	QP
6 *		401.8385	36.52	-1.81	34.71	46.00	-11.29	QP

Note:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Reading + Factor

Margin=Emission Level-Limit

2. All the modes have tested and recorded the worst mode(GFSK-CH00) in the report

Radiation Emission Test Data			
Temperature:	25.1°C	Relative Humidity:	56%
Pressure:	1008hPa	Phase :	Vertical
Test Voltage :	DC 3.3V PC power supply	Test Mode:	GFSK(CH00)



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		43.3534	27.76	-5.81	21.95	40.00	-18.05	QP
2		68.3908	27.28	-5.20	22.08	40.00	-17.92	QP
3		147.9214	30.08	-4.69	25.39	43.50	-18.11	QP
4		233.3487	31.49	-6.79	24.70	46.00	-21.30	QP
5		427.2695	33.84	-1.61	32.23	46.00	-13.77	QP
6	*	601.4265	29.78	3.86	33.64	46.00	-12.36	QP

Note:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Reading + Factor

Margin=Emission Level-Limit

2. All the modes have tested and recorded the worst mode(GFSK-CH00) in the report

1GHz~25GHz

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2402MHz									
V	4804.00	52.40	34.12	5.03	32.39	55.70	74	-18.30	Pk
V	4804.00	39.53	34.12	5.03	32.39	42.83	54	-11.17	AV
V	7206.00	50.39	32.54	6.29	35.86	60.00	74	-14.00	Pk
V	7206.00	35.01	32.54	6.29	35.86	44.62	54	-9.38	AV
V	9608.00	47.86	32.98	7.55	38.4	60.83	74	-13.17	Pk
V	9608.00	32.67	32.98	7.55	38.4	45.64	54	-8.36	AV
V	12010.00	45.70	32.09	8.93	39	61.54	74	-12.46	Pk
V	12010.00	27.24	32.09	8.93	39	43.08	54	-10.92	AV
H	4804.00	49.71	34.12	5.03	32.39	53.01	74	-20.99	Pk
H	4804.00	39.77	34.12	5.03	32.39	43.07	54	-10.93	AV
H	7206.00	48.85	32.54	6.29	35.86	58.46	74	-15.54	Pk
H	7206.00	32.83	32.54	6.29	35.86	42.44	54	-11.56	AV
H	9608.00	48.34	32.98	7.55	38.4	61.31	74	-12.69	Pk
H	9608.00	29.80	32.98	7.55	38.4	42.77	54	-11.23	AV
H	12010.00	38.83	32.09	8.93	39	54.67	74	-19.33	Pk
H	12010.00	25.30	32.09	8.93	39	41.14	54	-12.86	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2440MHz									
V	4880.00	50.62	34.07	5.09	32.59	54.23	74	-19.77	Pk
V	4880.00	39.96	34.07	5.09	32.59	43.57	54	-10.43	AV
V	7320.00	45.69	32.63	6.34	35.96	55.36	74	-18.64	Pk
V	7320.00	35.75	32.63	6.34	35.96	45.42	54	-8.58	AV
V	9760.00	42.96	32.92	7.59	38.4	56.03	74	-17.97	Pk
V	9760.00	30.53	32.92	7.59	38.4	43.60	54	-10.40	AV
V	12200.00	41.26	31.96	8.88	39.04	57.22	74	-16.78	Pk
V	12200.00	28.90	31.96	8.88	39.04	44.86	54	-9.14	AV
H	4880.00	48.54	34.07	5.09	32.59	52.15	74	-21.85	Pk
H	4880.00	40.29	34.07	5.09	32.59	43.90	54	-10.10	AV
H	7320.00	47.17	32.63	6.34	35.96	56.84	74	-17.16	Pk
H	7320.00	33.99	32.63	6.34	35.96	43.66	54	-10.34	AV
H	9760.00	42.23	32.92	7.59	38.4	55.30	74	-18.70	Pk
H	9760.00	30.12	32.92	7.59	38.4	43.19	54	-10.81	AV
H	12200.00	40.67	31.96	8.88	39.04	56.63	74	-17.37	Pk
H	12200.00	29.78	31.96	8.88	39.04	45.74	54	-8.26	AV

Polar (H/V)	Frequency	Meter Reading	Pre-ampli fier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
High Channel:2480MHz									
V	4960.00	49.11	34.02	5.15	32.8	53.04	74	-20.96	Pk
V	4960.00	36.32	34.02	5.15	32.8	40.25	54	-13.75	AV
V	7440.00	43.81	32.71	6.4	36.05	53.55	74	-20.45	Pk
V	7440.00	36.16	32.71	6.4	36.05	45.90	54	-8.10	AV
V	9920.00	41.55	32.86	7.62	38.4	54.71	74	-19.29	Pk
V	9920.00	30.09	32.86	7.62	38.4	43.25	54	-10.75	AV
V	12400.00	37.86	31.82	8.84	39.08	53.96	74	-20.04	Pk
V	12400.00	28.21	31.82	8.84	39.08	44.31	54	-9.69	AV
H	4960.00	48.49	34.02	5.15	32.8	52.42	74	-21.58	Pk
H	4960.00	39.02	34.02	5.15	32.8	42.95	54	-11.05	AV
H	7440.00	44.19	32.71	6.4	36.05	53.93	74	-20.07	Pk
H	7440.00	30.90	32.71	6.4	36.05	40.64	54	-13.36	AV
H	9920.00	41.59	32.86	7.62	38.4	54.75	74	-19.25	Pk
H	9920.00	28.21	32.86	7.62	38.4	41.37	54	-12.63	AV
H	12400.00	41.38	31.82	8.84	39.08	57.48	74	-16.52	Pk
H	12400.00	28.94	31.82	8.84	39.08	45.04	54	-8.96	AV

Note: 1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
 Margin= Emission Level - Limit

2. If peak below the average limit, the average emission was no test.

3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

All the modes have tested and recorded the worst mode(GFSK) in the report.

The 1-25GHz range has been tested, and the report only records the worst performance of the 1-18G range.

Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz

	Polar (H/V)	Frequenc y (MHz)	Meter Reading (dBuV)	Pre- amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV /m)	Margi n (dB)	Detec tor Type
GFSK	Low Channel: 2402MHz									
	H	2390.00	59.79	35.17	3.48	27.49	55.59	74	-18.41	PK
	H	2390.00	50.60	35.17	3.48	27.49	46.40	54	-7.60	AV
	H	2400.00	60.11	35.16	3.49	27.52	55.96	74	-18.04	PK
	H	2400.00	49.77	35.16	3.49	27.52	45.62	54	-8.38	AV
	V	2390.00	57.87	35.17	3.48	27.49	53.67	74	-20.33	PK
	V	2390.00	49.85	35.17	3.48	27.49	45.65	54	-8.35	AV
	V	2400.00	60.91	35.16	3.49	27.52	56.76	74	-17.24	PK
	V	2400.00	49.39	35.16	3.49	27.52	45.24	54	-8.76	AV
	High Channel: 2480MHz									
	H	2483.50	57.78	35.11	3.56	27.75	53.98	74	-20.02	PK
	H	2483.50	49.13	35.11	3.56	27.75	45.33	54	-8.67	AV
	H	2500.00	61.32	35.1	3.57	27.8	57.59	74	-16.41	PK
	H	2500.00	49.62	35.1	3.57	27.8	45.89	54	-8.11	AV
	V	2483.50	57.79	35.11	3.56	27.75	53.99	74	-20.01	PK
	V	2483.50	49.82	35.11	3.56	27.75	46.02	54	-7.98	AV
	V	2500.00	59.83	35.1	3.57	27.8	56.10	74	-17.90	PK
	V	2500.00	50.17	35.1	3.57	27.8	46.44	54	-7.56	AV
Remark: 1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit										

4. Conducted Spurious Emissions

4.1.Limit

Test Requirement: FCC CFR47 Part 15 Section 15.247
Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;
ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024
Test Result: PASS

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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

4.2.Test Setup



4.3.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:
 - a) Set instrument center frequency to DTS channel center frequency.
 - b) Set the span to ≈ 1.5 times the DTS bandwidth.
 - c) Set the RBW = 100 kHz.
 - d) Set the VBW $\geq [3 \times \text{RBW}]$.
 - e) Detector = peak.
 - f) Sweep time = auto couple.
 - g) Trace mode = max hold.
 - h) Allow trace to fully stabilize.
 - i) Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

Establish an emission level by using the following procedure:

- a) Set the center frequency and span to encompass frequency range to be measured. Note that the frequency range might need to be divided into multiple frequency ranges to retain frequency resolution.

NOTE—the number of points can also be increased for large spans to retain frequency resolution

- b) Set the RBW = 100 kHz.
- c) Set the VBW $\geq [3 \times \text{RBW}]$.
- d) Detector = peak.
- e) Sweep time = No faster than coupled (auto) time.
- f) Trace mode = max-hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

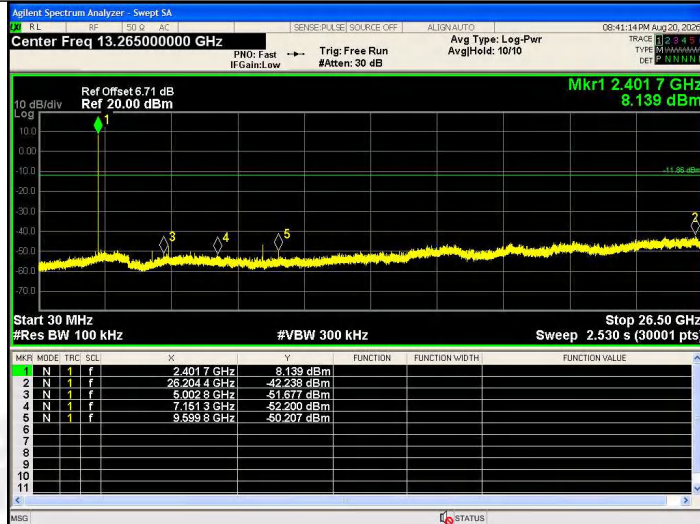
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.

4.4. Test Result

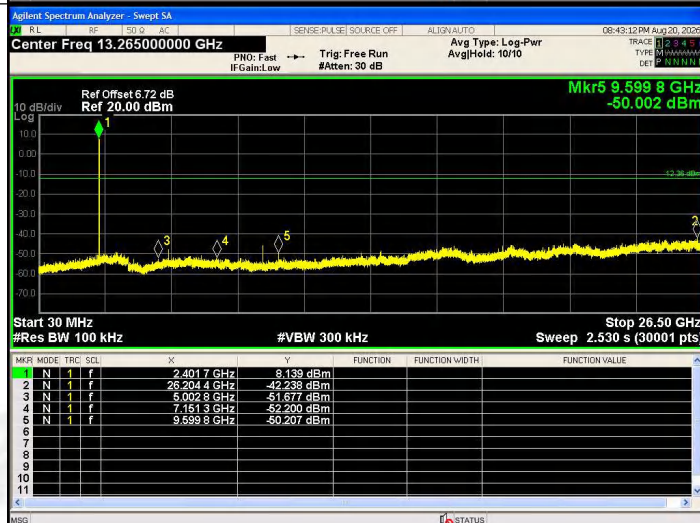
1M:

RF Conducted Spurious Emissions Graphs

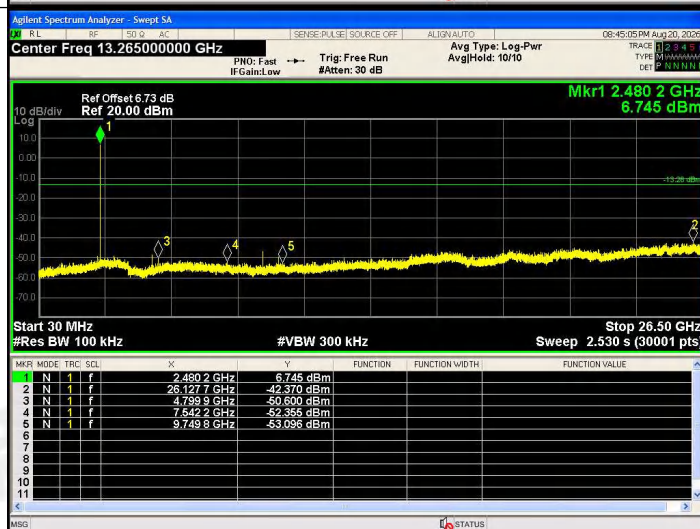
GFSK/LCH



GFSK/MCH



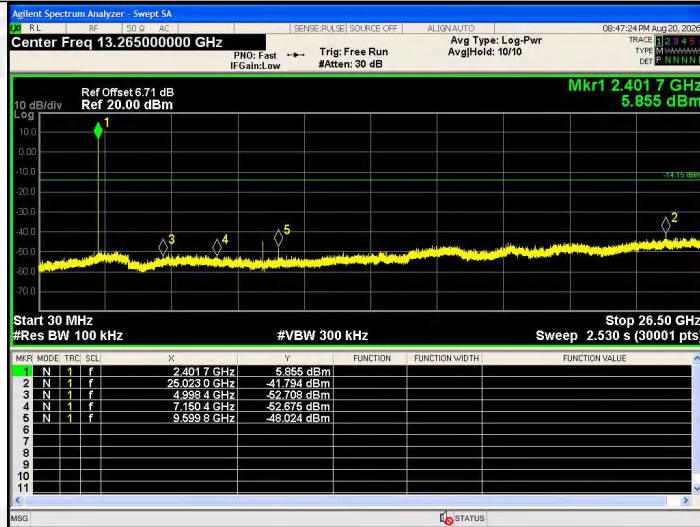
GFSK/HCH



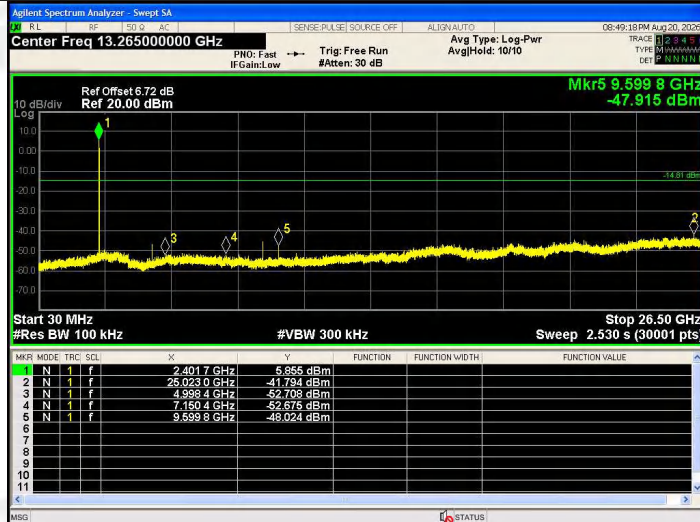
2M:

RF Conducted Spurious Emissions Graphs

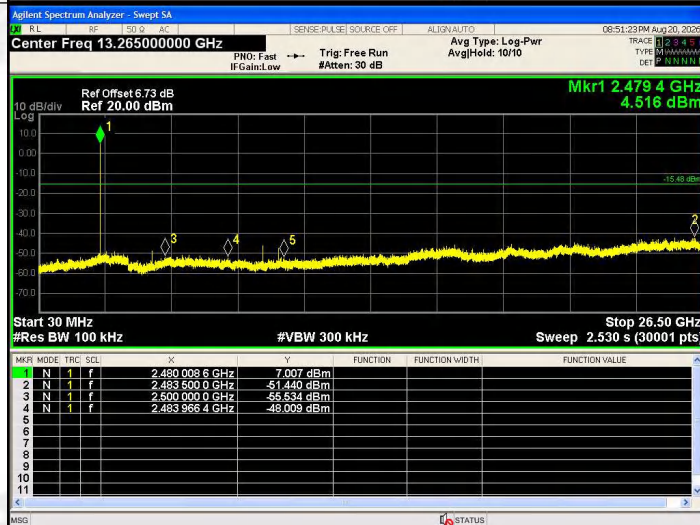
GFSK/LCH



GFSK/MCH



GFSK/HCH



5. Band Edge Measurement

5.1.Limit

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;

ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024

Test Limit: Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band 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)).

Test Mode: Transmitting

5.2.Test setup

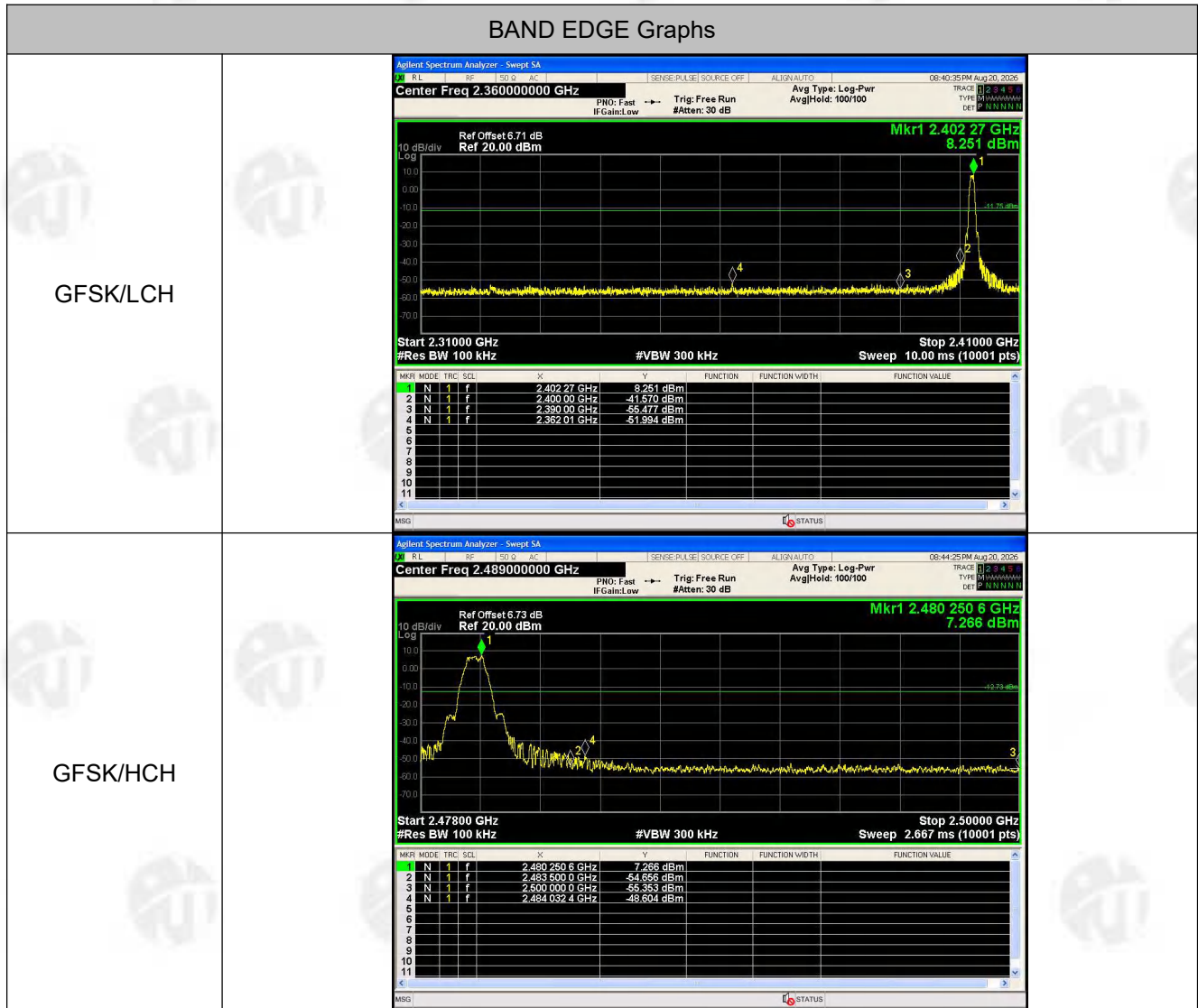


5.3.Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

5.4.Test Result

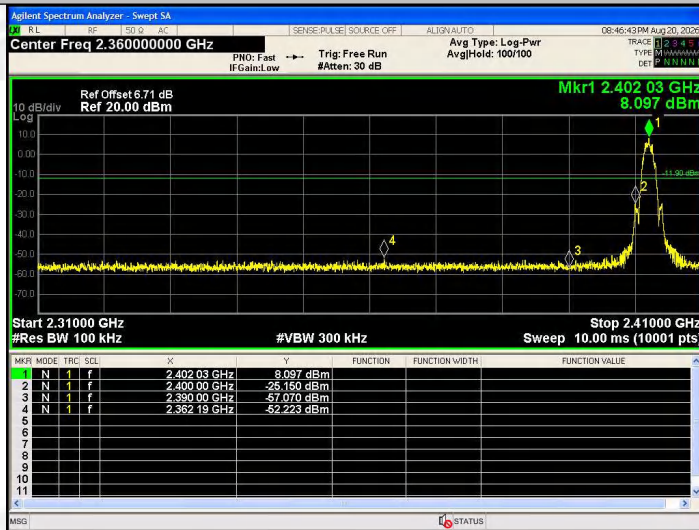
1M:



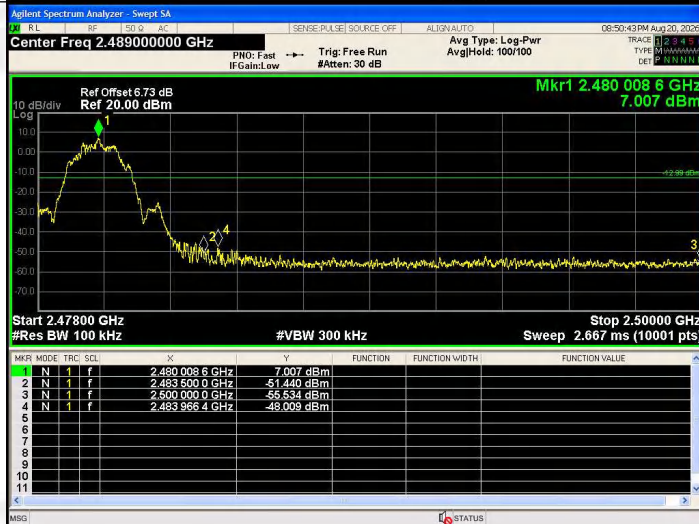
2M:

BAND EDGE Graphs

GFSK/LCH



GFSK/HCH



6. -6 dB Bandwidth and 99% Bandwidth Measurement

6.1.Limit

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019; ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024

6.2.Test Setup



6.3.Test Procedure

For 6dB Bandwidth Measurement

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., $RBW = 100\text{ kHz}$, $VBW > 3 \times RBW$, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be $\geq 6\text{ dB}$.

3. The steps for the first option are as follows:

a. Set RBW = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz.

b. Set the $VBW[3 \times RBW]$.

c. Detector = peak

d. Trace mode = max-hold.

e. Sweep = No faster than coupled (auto) time.

f. Allow the trace to stabilize.

g. Measure the maximum width of the emission by placing two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "-6 dB down amplitude". If a marker is below this "-6 dB down amplitude" value, then it shall be as close as possible to this value.

For 99% Bandwidth Measurement

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: $RBW = 1\%-5\% \text{ OBW}$, $VBW \geq 3RBW$

6.4.Test Result

1M:

Test Mode	Frequency	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
GFSK	Low channel	0.663	1.0271	PASS
	Mid channel	0.673	1.0274	PASS
	High channel	0.675	1.0249	PASS

2M:

Test Mode	Frequency	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
GFSK	Low channel	1.165	2.0430	PASS
	Mid channel	1.14	2.0487	PASS
	High channel	1.175	2.0417	PASS

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

1M:
Test Graph:
6dB

GFSK Low channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.402000000 GHz Ref Offset: 6.71 dB Ref: 26.71 dBm Occupied Bandwidth: 1.0266 MHz Total Power: 15.2 dBm Transmit Freq Error: 3.776 kHz x dB Bandwidth: 662.7 kHz
GFSK Mid channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.440000000 GHz Ref Offset: 6.72 dB Ref: 26.72 dBm Occupied Bandwidth: 1.0342 MHz Total Power: 15.1 dBm Transmit Freq Error: 4.922 kHz x dB Bandwidth: 673.2 kHz
GFSK High channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq: 2.480000000 GHz Ref Offset: 6.73 dB Ref: 26.73 dBm Occupied Bandwidth: 1.0302 MHz Total Power: 14.0 dBm Transmit Freq Error: 4.386 kHz x dB Bandwidth: 675.3 kHz

99%

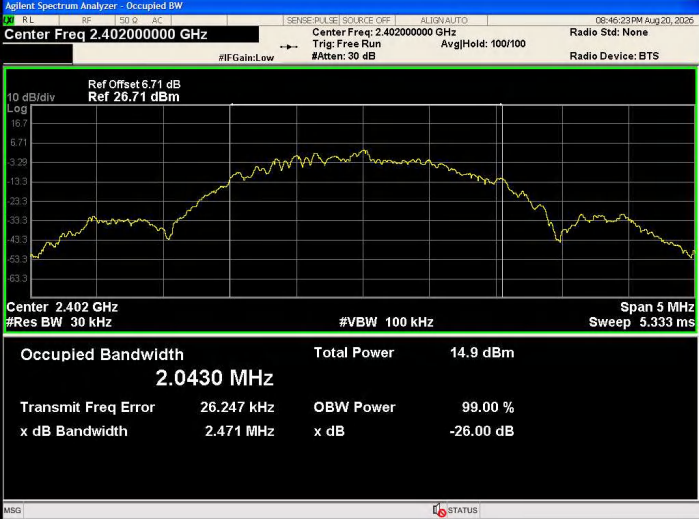
GFSK Low channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.402000000 GHz #IFGain:Low #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 3.2 ms Occupied Bandwidth 1.0271 MHz Total Power 15.2 dBm Transmit Freq Error 10.867 kHz OBW Power 99.00 % x dB Bandwidth 1.270 MHz x dB -26.00 dB
GFSK Mid channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.440000000 GHz #IFGain:Low #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 3.2 ms Occupied Bandwidth 1.0274 MHz Total Power 15.2 dBm Transmit Freq Error 6.034 kHz OBW Power 99.00 % x dB Bandwidth 1.269 MHz x dB -26.00 dB
GFSK High channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.480000000 GHz #IFGain:Low #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 3.2 ms Occupied Bandwidth 1.0249 MHz Total Power 14.1 dBm Transmit Freq Error 8.190 kHz OBW Power 99.00 % x dB Bandwidth 1.269 MHz x dB -26.00 dB

2M:

Test Graph:
6dB

GFSK Low channel	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.402000000 GHz Center Freq: 2.402000000 GHz Trig: Free Run #Atten: 30 dB Radio Std: None Radio Device: BTS Ref Offset: 6.71 dB Ref 26.71 dBm Mkr3 2.402604 GHz 1.0036 dBm Center 2.402 GHz #Res BW 100 kHz #VBW 300 kHz Span 5 MHz Sweep 1 ms Occupied Bandwidth 2.0418 MHz Total Power 15.5 dBm Transmit Freq Error 21.652 kHz OBW Power 99.00 % x dB Bandwidth 1.165 MHz x dB -6.00 dB
GFSK Mid channel	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.440000000 GHz Center Freq: 2.440000000 GHz Trig: Free Run #Atten: 30 dB Radio Std: None Radio Device: BTS Ref Offset: 6.72 dB Ref 26.72 dBm Mkr3 2.440581 GHz -1.9257 dBm Center 2.44 GHz #Res BW 100 kHz #VBW 300 kHz Span 5 MHz Sweep 1 ms Occupied Bandwidth 2.0241 MHz Total Power 15.4 dBm Transmit Freq Error 10.695 kHz OBW Power 99.00 % x dB Bandwidth 1.140 MHz x dB -6.00 dB
GFSK High channel	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.480000000 GHz Center Freq: 2.480000000 GHz Trig: Free Run #Atten: 30 dB Radio Std: None Radio Device: BTS Ref Offset: 6.73 dB Ref 26.73 dBm Mkr3 2.480601 GHz -0.79415 dBm Center 2.48 GHz #Res BW 100 kHz #VBW 300 kHz Span 5 MHz Sweep 1 ms Occupied Bandwidth 2.0544 MHz Total Power 14.3 dBm Transmit Freq Error 12.903 kHz OBW Power 99.00 % x dB Bandwidth 1.175 MHz x dB -6.00 dB

99%

GFSK Low channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.402000000 GHz Ref Offset 6.71 dB Ref 26.71 dBm Center 2.402 GHz #Res BW 30 kHz #VBW 100 kHz Span 5 MHz Sweep 5.333 ms Occupied Bandwidth 2.0430 MHz Total Power 14.9 dBm Transmit Freq Error 26.247 kHz OBW Power 99.00 % x dB Bandwidth 2.471 MHz x dB -26.00 dB
GFSK Mid channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.440000000 GHz Ref Offset 6.72 dB Ref 26.72 dBm Center 2.44 GHz #Res BW 30 kHz #VBW 100 kHz Span 5 MHz Sweep 5.333 ms Occupied Bandwidth 2.0487 MHz Total Power 14.7 dBm Transmit Freq Error 26.000 kHz OBW Power 99.00 % x dB Bandwidth 2.483 MHz x dB -26.00 dB
GFSK High channel	 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.480000000 GHz Ref Offset 6.73 dB Ref 26.73 dBm Center 2.48 GHz #Res BW 30 kHz #VBW 100 kHz Span 5 MHz Sweep 5.333 ms Occupied Bandwidth 2.0417 MHz Total Power 13.6 dBm Transmit Freq Error 24.843 kHz OBW Power 99.00 % x dB Bandwidth 2.465 MHz x dB -26.00 dB

7. Maximum Peak Output Power

7.1.Limit

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02April 2,2019;

ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

7.2.Test Setup



7.3.Test Procedure

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

- Set the RBW $\geq$ DTS bandwidth.
- Set VBW $\geq$ 3 x RBW.
- Set span $\geq$ 3 x RBW
- Sweep time = auto couple.
- Detector = peak.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use peak marker function to determine the peak amplitude level.

7.4.Test Result

1M:

Mode	Channel.	Maximum Output Power [dBm]	Limit[dBm]	Verdict
GFSK	LCH	9.336	30	PASS
	MCH	9.245	30	PASS
	HCH	8.21	30	PASS

Duty Cycle

Mode	Channel.	Duty Cycle(%)	Correction Factor (dB)
GFSK	LCH	56.45	2.48
	MCH	58.06	2.36
	HCH	53.13	2.75

2M:

Mode	Channel.	Maximum Output Power [dBm]	Limit[dBm]	Verdict
GFSK	LCH	9.4	30	PASS
	MCH	9.279	30	PASS
	HCH	8.271	30	PASS

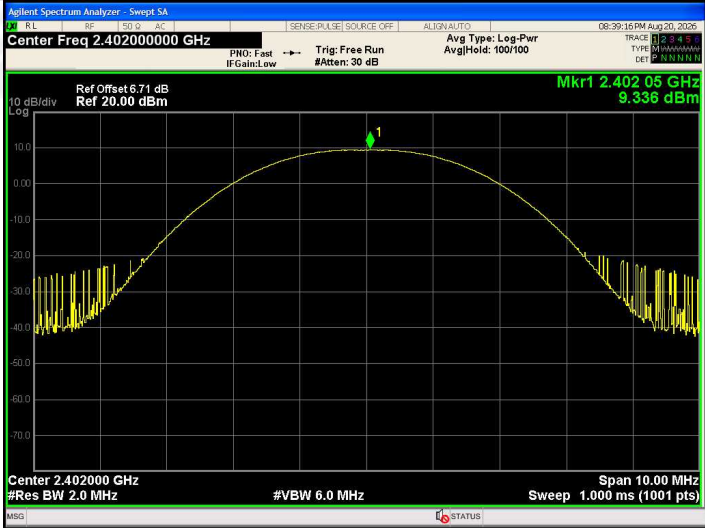
Duty Cycle

Mode	Channel.	Duty Cycle(%)	Correction Factor (dB)
GFSK	LCH	30.65	5.14
	MCH	30.16	5.21
	HCH	29.37	5.32

 Note: Duty Cycle Factor= $10 \log (1/x)$, x is Duty Cycle.

1M:

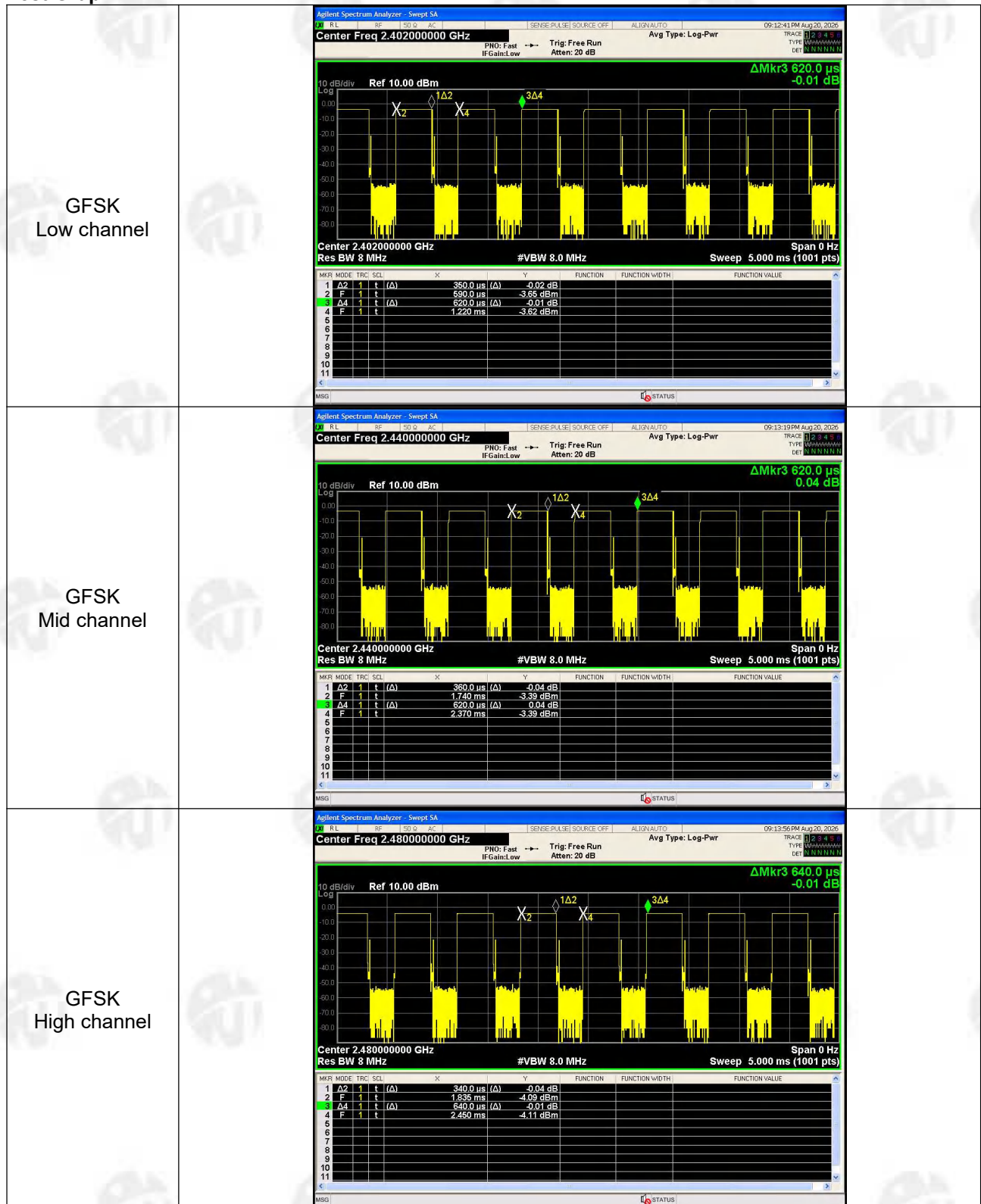
Test Graph:

GFSK Low channel	
GFSK Mid channel	
GFSK High channel	

Duty Cycle

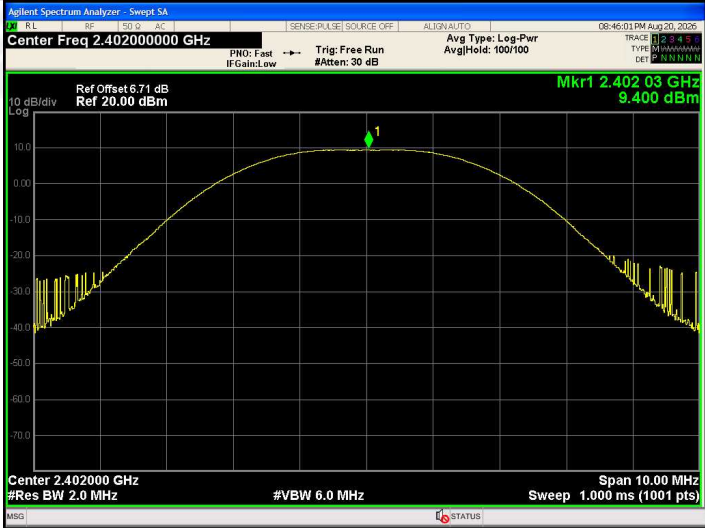
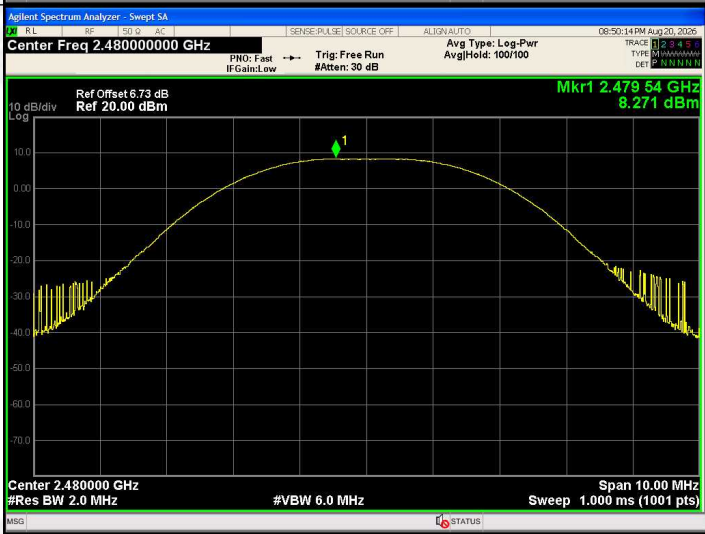
1M:

Test Graph:



2M:

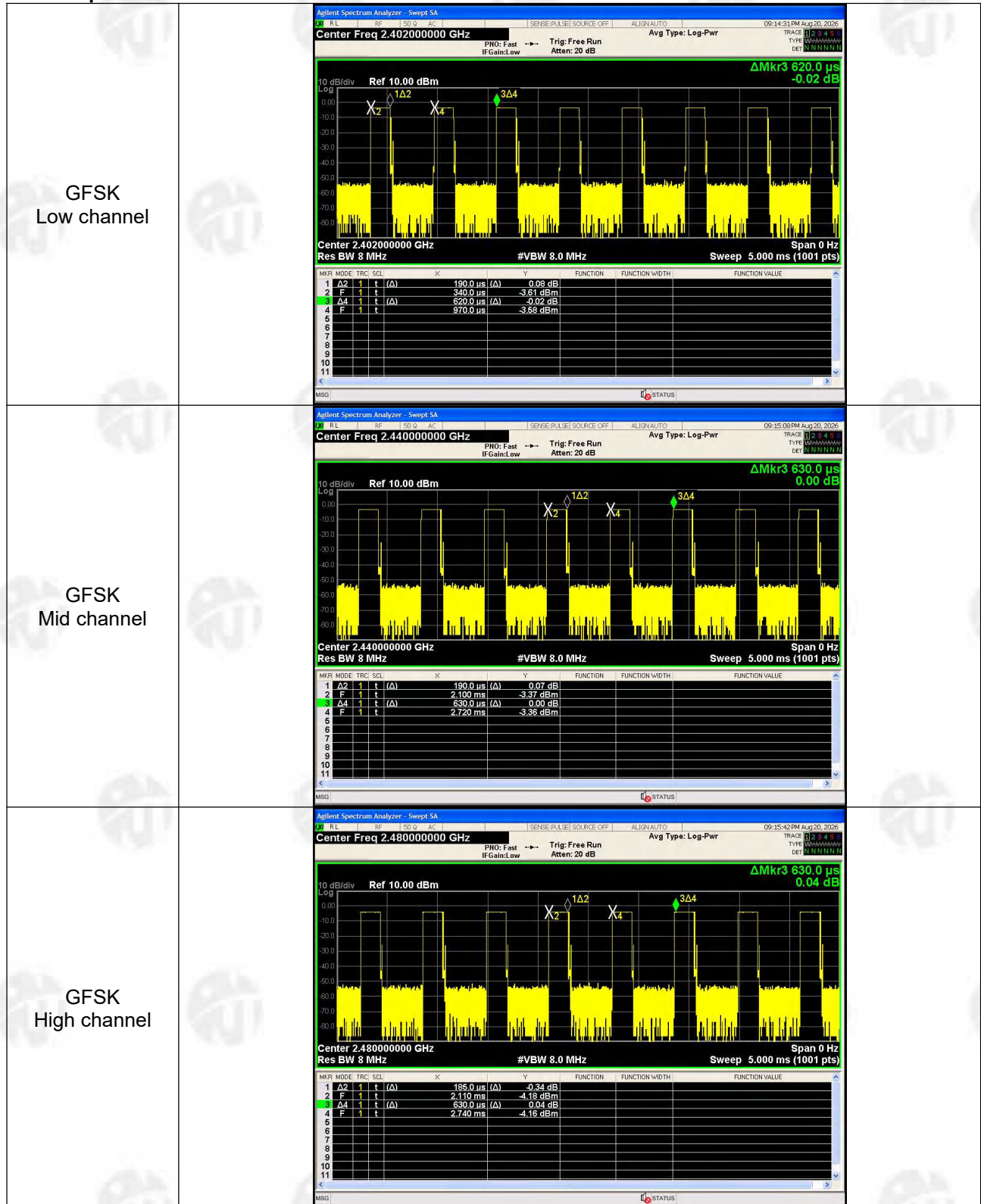
Test Graph:

GFSK Low channel	 Agilent Spectrum Analyzer - Swept SA Center Freq 2.40200000 GHz Ref Offset 6.71 dB Ref 20.00 dBm Mkr1 2.402 03 GHz 9.400 dBm Center 2.402000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1,000 ms (1001 pts)
GFSK Mid channel	 Agilent Spectrum Analyzer - Swept SA Center Freq 2.44000000 GHz Ref Offset 6.72 dB Ref 20.00 dBm Mkr1 2.439 50 GHz 9.279 dBm Center 2.440000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1,000 ms (1001 pts)
GFSK High channel	 Agilent Spectrum Analyzer - Swept SA Center Freq 2.48000000 GHz Ref Offset 6.73 dB Ref 20.00 dBm Mkr1 2.479 54 GHz 8.271 dBm Center 2.480000 GHz #Res BW 2.0 MHz #VBW 6.0 MHz Span 10.00 MHz Sweep 1,000 ms (1001 pts)

Duty Cycle

2M:

Test Graph:



8. Power Spectral density

8.1.Limit

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02April 2,2019; ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8dBm/3kHz	2400-2483.5	PASS

8.2.Test Setup



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: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). 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.

8.4.Test Result

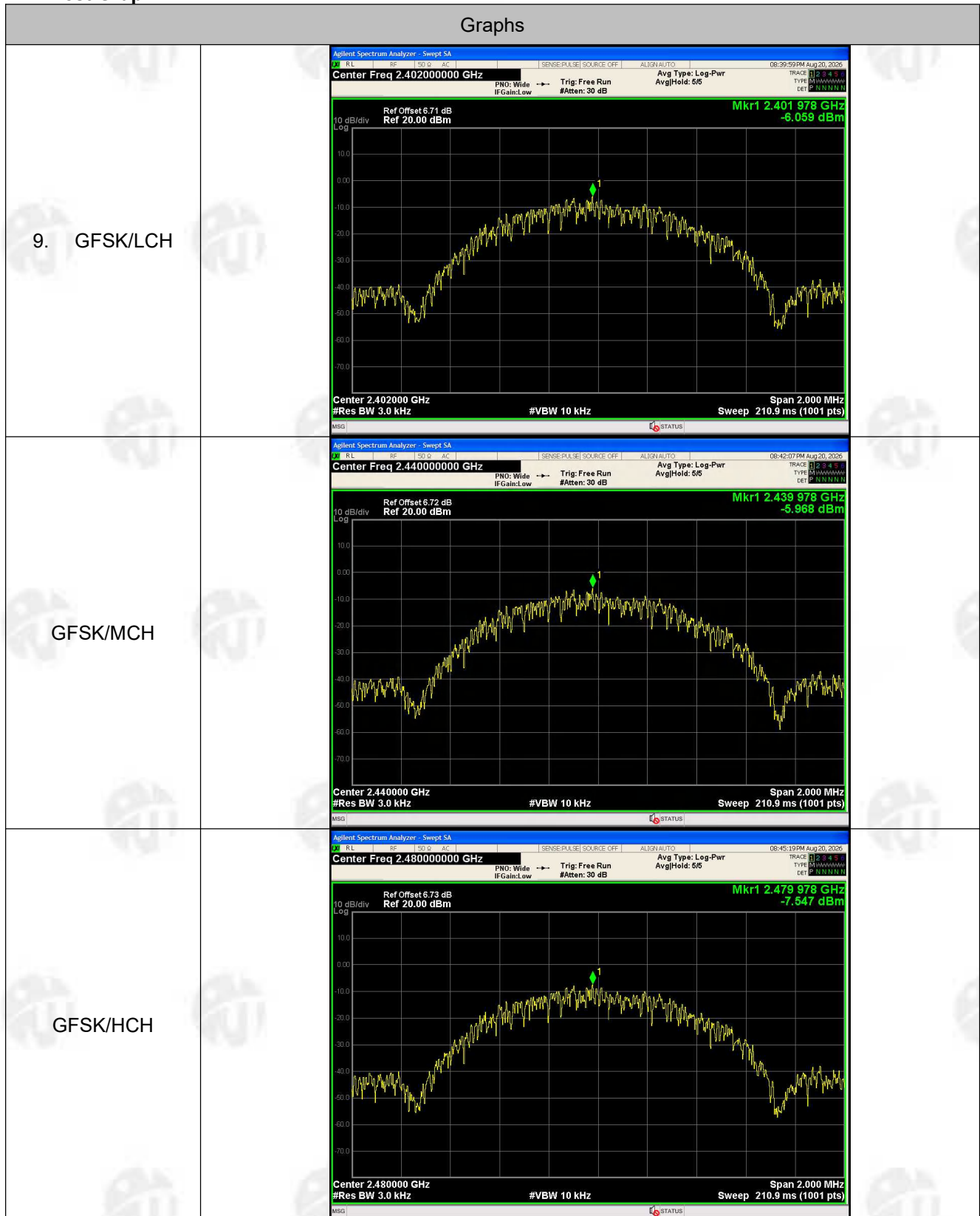
1M:

Mode	Channel.	Power Spectral Density (dBm/3KHz)	Limit(dBm/3KHz)	Verdict
GFSK	LCH	-6.059	8	PASS
GFSK	MCH	-5.968	8	PASS
GFSK	HCH	-7.547	8	PASS

2M:

Mode	Channel.	Power Spectral Density (dBm/3KHz)	Limit(dBm/3KHz)	Verdict
GFSK	LCH	-8.705	8	PASS
GFSK	MCH	-9.205	8	PASS
GFSK	HCH	-9.944	8	PASS

1M:
Test Graph



2M:
Test Graph

Graphs	
GFSK/LCH	Agilent Spectrum Analyzer - Swept SA Center Freq 2.402000000 GHz Ref Offset 6.71 dB Ref 20.00 dBm Mkr1 2.401955 GHz -8.705 dBm Span 5.000 MHz Sweep 527.2 ms (1001 pts)
GFSK/MCH	Agilent Spectrum Analyzer - Swept SA Center Freq 2.440000000 GHz Ref Offset 6.72 dB Ref 20.00 dBm Mkr1 2.439960 GHz -9.205 dBm Span 5.000 MHz Sweep 527.2 ms (1001 pts)
GFSK/HCH	Agilent Spectrum Analyzer - Swept SA Center Freq 2.480000000 GHz Ref Offset 6.73 dB Ref 20.00 dBm Mkr1 2.479955 GHz -9.944 dBm Span 5.000 MHz Sweep 527.2 ms (1001 pts)

10. Antenna Requirement

According to the FCC Part 15 Paragraph 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. This product has an integrated antenna fulfill the requirement of this section.

This product has a PCB antenna, and the maximum antenna gain is 1.82dBi, fulfill the requirement of this section.

11. TEST SETUP & EUT PHOTOGRAPH

Reference to EUT photo attachment for details.

----- End of Report -----