TEST REPORT

Applicant:	Shenzhen Hollyland Technology Co., Ltd
Address:	8F, Building 5D, Skyworth Innovation Valley, Tangtou Road, Shiyan Street, Baoan District, Shenzhen, 518055 China
Equipment Type:	Wireless Microphone
Model Name:	M33T1
Brand Name:	HOLLYLAND
FCC ID:	2ADZC-6303T
ISED Number:	29803-6303T
Test Standard:	47 CFR Part 15 Subpart C RSS-Gen Issue 5 RSS-247 Issue 4 (refer to section 3.1)
Sample Arrival Date:	Mar. 11, 2026
Test Date:	Mar. 26, 2026 - May 23, 2026
Date of Issue:	May 29, 2026

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Li Renyu

Checked by: Li Ganming

Approved by: Tolan Tu

(Testing Director)

Revision History

Version	Issue Date	Revisions
Rev. 01	May 29, 2026	Initial Issue

TABLE OF CONTENTS

1 GENERAL INFORMATION 4

1.1 Test Laboratory 4

1.2 Test Location 4

2 PRODUCT INFORMATION 5

2.1 Applicant Information 5

2.2 Manufacturer Information 5

2.3 General Description for Equipment under Test (EUT) 5

2.4 Technical Information 6

3 SUMMARY OF TEST RESULTS 8

3.1 Test Standards 8

3.2 Verdict 9

4 GENERAL TEST CONFIGURATIONS 10

4.1 Test Environments 10

4.2 Test Equipment List 10

4.3 Test Software List 10

4.4 Measurement Uncertainty 11

4.5 Description of Test Setup 11

4.6 Measurement Results Explanation Example 14

5 TEST ITEMS 15

5.1 Antenna Requirements 15

5.2 Output Power and E.I.R.P 16

5.3 Occupied Bandwidth 18

5.4 Conducted Spurious Emission 19

5.5 Band Edge (Authorized-band band-edge) 21

5.6 Conducted Emission 23
5.7 Radiated Spurious Emission 24
5.8 Band Edge (Restricted-band band-edge) 29
5.9 Power Spectral density (PSD) 30
ANNEX A TEST RESULT 31
A.1 Output Power and E.I.R.P 31
A.2 Occupied Bandwidth 32
A.3 Conducted Spurious Emissions 36
A.4 Band Edge (Authorized-band band-edge) 41
A.5 Conducted Emissions 44
A.6 Radiated Spurious Emission 45
A.7 Band Edge (Restricted-band band-edge) 59
A.8 Power Spectral Density (PSD) 63
ANNEX B TEST SETUP PHOTOS 66
ANNEX C EUT EXTERNAL PHOTOS 66
ANNEX D EUT INTERNAL PHOTOS 66

1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	601, Building 2, Intelligent Connected Vehicle Industrial Park, No.55, Xiangshan Road, Luotian Community, Yanluo Sub-district, Bao'an District, Shenzhen
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☐ Building 2, Intelligent Connected Vehicle Industrial Park, No.55, Xiangshan Road, Luotian Community, Yanluo Sub-district, Bao'an District, Shenzhen, Guangdong
	☑ 1/F., Building B, Ganghongji High-Tech Intelligent Industrial Park, No.1008, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The CAB identifier number is CN0030.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Shenzhen Hollyland Technology Co., Ltd
Address	8F, Building 5D, Skyworth Innovation Valley, Tangtou Road, Shiyan Street, Baoan District, Shenzhen, 518055 China

2.2 Manufacturer Information

Manufacturer	Shenzhen Hollyland Technology Co., Ltd
Address	8F, Building 5D, Skyworth Innovation Valley, Tangtou Road, Shiyan Street, Baoan District, Shenzhen, 518055 China

2.3 General Description for Equipment under Test (EUT)

EUT Name	Wireless Microphone
Model Name Under Test	M33T1
Series Model Name	N/A
Description of Model name differentiation	N/A
Serial Number	20260526
Hardware Version	A6303_TX_V28
Software Version	V1.0.3.16
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.4 Technical Information

Network and Wireless connectivity	Bluetooth (BR+EDR) 2.4G ISM Band

The requirement for the following technical information of the EUT was tested in this report:

Modulation Technology	DTS
Modulation Type	GFSK
Product Type	☐ Mobile ☒ Portable ☐ Fix Location
Transfer Rate	2 Mbps, 4 Mbps
Frequency Range	The frequency range used is 2400 MHz to 2483.5 MHz.
Number of Channel	40 (at intervals of 2 MHz)
Tested Channel	2 Mbps: 1 (2402 MHz), 20 (2440 MHz), 40 (2480 MHz) 4 Mbps: 1 (2405 MHz), 10 (2441 MHz), 19 (2477 MHz)
Antenna Type	PIFA Antenna
Antenna Gain	-0.78 dBi
Adaptive or Non-Adaptive	Adaptive
The Max RF Output power	14.73 dBm
Antenna System (MIMO Smart Antenna)	N/A

All channel was listed on the following table:

2M:

Channel Number	Freq. (MHz)	Channel Number	Freq. (MHz)	Channel Number	Freq. (MHz)	Channel Number	Freq. (MHz)
1	**2402**	11	2422	21	2442	31	2462
2	2404	12	2424	22	2444	32	2464
3	2406	13	2426	23	2446	33	2466
4	2408	14	2428	24	2448	34	2468
5	2410	15	2430	25	2450	35	2470
6	2412	16	2432	26	2452	36	2472
7	2414	17	2434	27	2454	37	2474
8	2416	18	2436	28	2456	38	2476
9	2418	19	2438	29	2458	39	2478
10	2420	**20**	**2440**	30	2460	**40**	**2480**

4M:

Channel Number	Freq. (MHz)	Channel Number	Freq. (MHz)	Channel Number	Freq. (MHz)	Channel Number	Freq. (MHz)
1	**2405**	6	2425	11	2445	16	2465
2	2409	7	2429	12	2449	17	2469
3	2413	8	2433	13	2453	18	2473
4	2417	9	2437	14	2457	**19**	**2477**
5	2421	**10**	**2441**	15	2461	/	/

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C	Intentional radiators of radio frequency equipment
2	RSS-Gen Issue 5	General Requirements for Compliance of Radio Apparatus
3	RSS-247 Issue 4	Digital Transmission Systems,Frequency Hopping Systems and LicenceExempt Local Area Network Devices in 902-928 MHz, 2400-2483.5 MHz, 5150-5350 MHz, and 5470-5895 MHz bands
4	ANSI C63.10-2020 + Cor. 1-2023 + C63.10a-2024 + Errata to C63.10a-2024	American National Standard for Procedures for Compliance Testing of Unlicensed Wireless Devices
5	KDB 558074 D01 15.247 Meas Guidance v05r02	Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules

3.2 Verdict

No.	Description	FCC Part No.	ISED Part No.	Channel	Test Result	Verdict
1	Antenna Requirement	15.203	RSS-247, 6.5 (c)	N/A	--	Pass[Note1]
2	Output Power and E.I.R.P	15.247(b)	RSS-247, 6.3.2	Low/Middle/ High	ANNEX A.1	Pass
3	Occupied Bandwidth	15.247(a)	RSS-GEN, 6.7; RSS-247, 6.3.1(a)	Low/Middle/ High	ANNEX A.2	Pass
4	Conducted Spurious Emission	15.247(d)	RSS-247, 6.6	Low/Middle/ High	ANNEX A.3	Pass
5	Band Edge(Authorized-band band-edge)	15.247(d)	RSS-247, 6.6	Low/ High	ANNEX A.4	Pass
6	Conducted Emission	15.207	RSS-GEN, 8.8	Low/Middle/ High	ANNEX A.5	N/A[Note3]
7	Radiated Spurious Emission	15.209 15.247(d)	RSS-247, 6.6	Low/Middle/ High	ANNEX A.6	Pass
8	Band Edge(Restricted-band band-edge)	15.209 15.247(d)	RSS-247, 6.6	Low/Middle/ High	ANNEX A.7	Pass
9	Power spectral density (PSD)	15.247(e)	RSS-247, 6.3.1(b)	Low/Middle/ High	ANNEX A.8	Pass
10	Receiver Spurious Emissions	--	RSS-Gen, 7.3	--	N/A	N/A[Note2]

Note [1]: The EUT has a permanently and irreplaceable attached antenna, which complies with the requirement FCC 15.203.

Note [2]: Only radio communication receivers operating in stand-alone mode within the band 30-960 MHz, as well as scanner receivers, are subject to Industry Canada requirements, so this test is not applicable.

Note [3]: The EUT only powered by battery, so the Conducted Emission test is not applicable.

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

Relative Humidity	38% to 70%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+19.2℃ to +27.9℃
Working Voltage of the EUT	NV (Normal Voltage)	3.87 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	KEYSIGHT	N9020A	MY54420186	2025.05.21	2026.05.20
				2026.05.11	2027.05.10
Spectrum Analyzer	KEYSIGHT	N9020A	MY56060127	2025.12.25	2026.12.24
Power meter	R&S	NRP8S	101498	2025.07.07	2026.07.06
Test Antenna-Horn	A-INFO	LB-180400KF	J211060273	2024.06.15	2027.06.14
Test Antenna-Bi-Log	Schwarzbeck	VULB 9163	01414	2023.11.03	2026.11.02
Test Antenna-Horn	Schwarzbeck	BBHA 9120D	02459	2023.10.26	2026.10.25
Test Antenna-Loop	Schwarzbeck	FMZB 1519	1519-037	2024.01.23	2027.01.22
Anechoic Chamber	YIHENG	C8-966	N/A	2024.05.12	2027.05.11
EMI Receiver	Keysight	N9038A	MY55330121	2025.12.26	2026.12.25
Filtering unit	balun	SU319F	LW-SZ19D0001F01	N/A	N/A
Switching unit	BALUN	SU319	LW-SZ19D0001S01	N/A	N/A
EMI Receiver	keysight	N9038B	MY61380132	2025.12.26	2026.12.25
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK8127	01009	2025.07.15	2026.07.14
Shielded Enclosure	YiHeng Electronic Co., Ltd	4.3m*2.9m*2.4m	235	2024.11.05	2027.11.04

4.3 Test Software List

Description	Manufacturer	Software Version	Serial No.	Applicable test Setup
BL410R	BALUN	V3.0.1.528	N/A	The section 4.5.1
BL410E	BALUN	V22.930	N/A	The section 4.5.2&4.5.3&4.5.4&4.5.5

4.4 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT 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.

Parameters	Uncertainty
Occupied Channel Bandwidth	2.8%
RF output power, conducted	1.28 dB
Power Spectral Density, conducted	1.30 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.36 dB
Temperature	0.8°C
Humidity	4%

4.5 Description of Test Setup

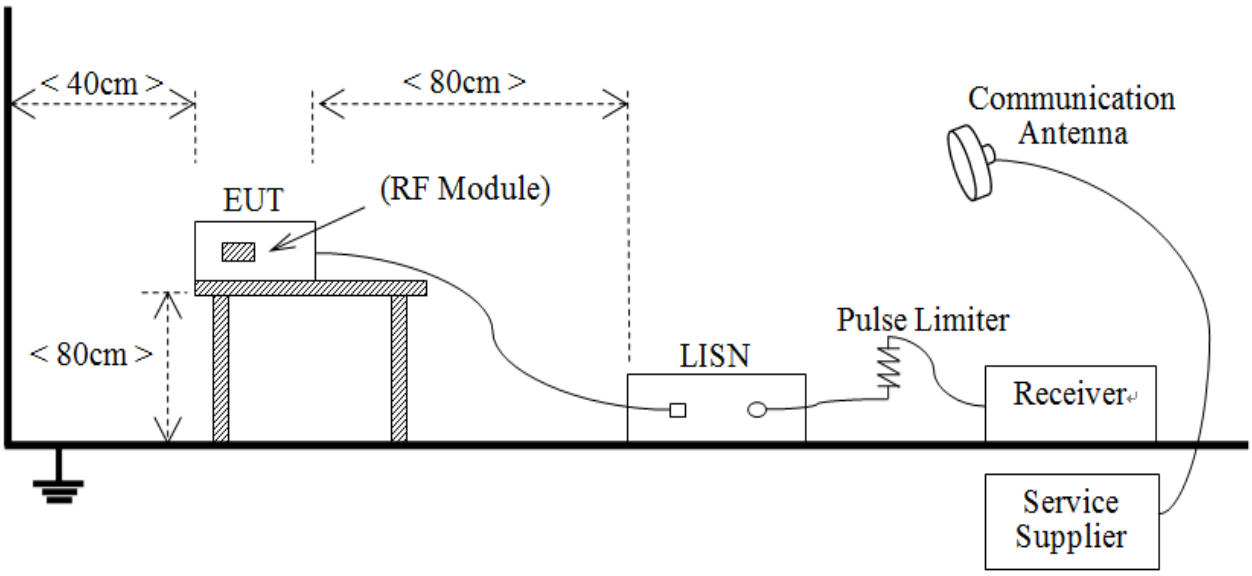
4.5.1. For Antenna Port Test

Conducted value (dBm) = Measurement value (dBm) + cable loss (dB)

For example: the measurement value is 10 dBm and the cable 0.5dBm used, then the final result of EUT:
Conducted value (dBm) = 10 dBm + 0.5 dB = 10.5 dBm

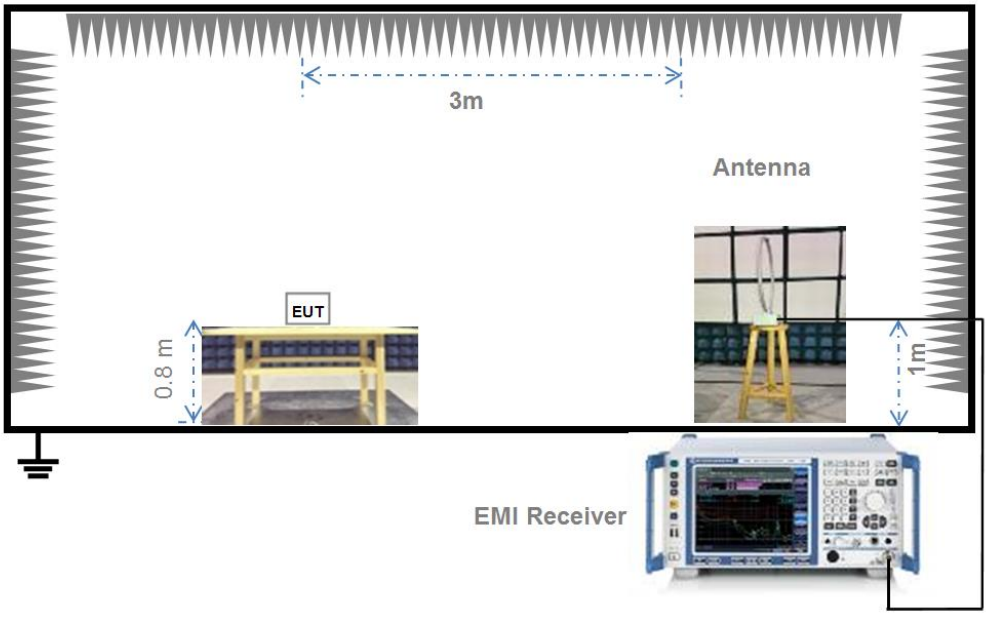
(Diagram 1)

4.5.2. For AC Power Supply Port Test



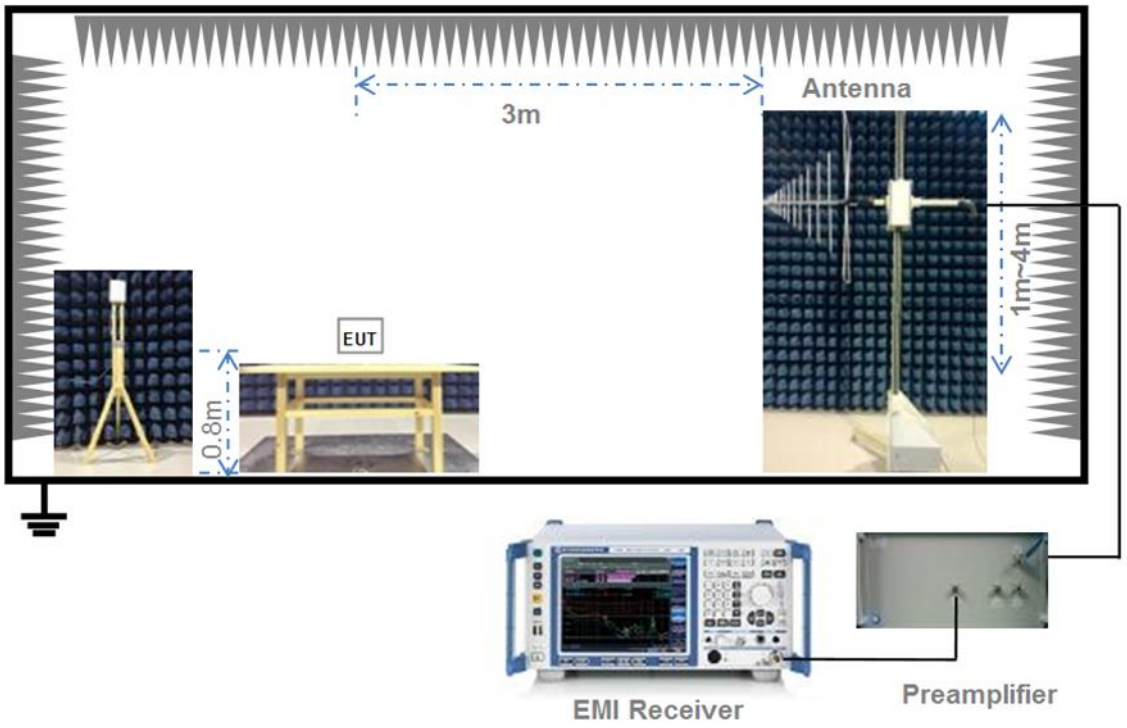
(Diagram 2)

4.5.3. For Radiated Test (Below 30 MHz)



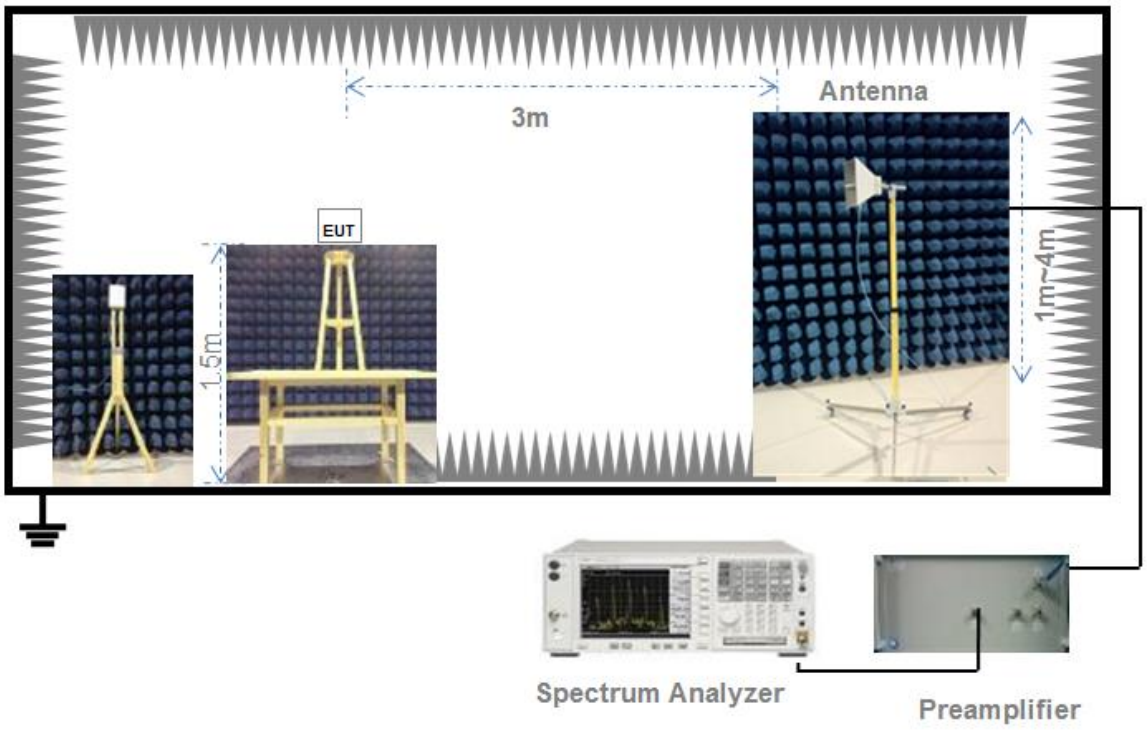
(Diagram 3)

4.5.4. For Radiated Test (30 MHz-1 GHz)



(Diagram 4)

4.5.5. For Radiated Test (Above 1 GHz)



(Diagram 5)

4.6 Measurement Results Explanation Example

4.6.1 For conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.
The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Offset = RF cable loss + attenuator factor.

4.6.2 For radiated band edges and spurious emission test:

$$E = EIRP - 20\log D + 104.8$$

where:

E = electric field strength in dBμV/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1. Relevant Standards

FCC §15.203 & 15.247(b); RSS-247, 6.5 (c)
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. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. 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 FCC rule.

5.1.2. Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

Protected Method	Description
The antenna is embedded in the product.	An embedded-in antenna design is used.

Reference Documents	Item
Photo	Please refer to the EUT Photo documents.

5.1.3. Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

5.2 Output Power and E.I.R.P

5.2.1. Test Limit

FCC § 15.247(b)

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements.

RSS-247, 6.3.2

For DTS operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W, and the e.i.r.p. shall not exceed 4 W, except as provided in section 6.5 a) and b).

5.2.2. Test Setup

See section 4.5.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.2.3. Test Procedure

a) Maximum peak conducted output power

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

Set the RBW ≥ DTS bandwidth.

Set VBW ≥ 3 x RBW.

Set span ≥ 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.

b) Measurements of duty cycle

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal.

Set the center frequency of the instrument to the center frequency of the transmission.

Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.

Set VBW ≥ RBW. Set detector = peak or average.

The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)

5.2.4. Test Result

Please refer to ANNEX A.1.

5.3 Occupied Bandwidth

5.3.1. Limit

FCC §15.247(a); RSS-247, 6.3.1(a); RSS-GEN, 6.7

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW. The 6 dB bandwidth must be greater than 500 kHz.

5.3.2. Test Setup

See section 4.5.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.3.3. Test Procedure

Use the following spectrum analyzer settings:

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

Set the video bandwidth (VBW) ≥ 3 RBW.

Detector = Peak.

Trace mode = max hold.

Sweep = auto couple.

Allow the trace to stabilize.

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.

5.3.4. Test Result

Please refer to ANNEX A.2.

5.4 Conducted Spurious Emission

5.4.1. Limit

FCC §15.247(d); RSS-247, 6.6

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.

5.4.2. Test Setup

See section 4.5.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.4.3. Test Procedure

The DTS rules specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

a) If the maximum peak conducted output power procedure was used to demonstrate compliance as described in 9.1, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).

b) If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).

c) In either case, attenuation to levels below the 15.209 general radiated emissions limits is not required.

The following procedures shall be used to demonstrate compliance to these limits. Note that these procedures can be used in either an antenna-port conducted or radiated test set-up. Radiated tests must conform to the test site requirements and utilize maximization procedures defined herein.

Reference level measurement:

Establish a reference level by using the following procedure:

Set instrument center frequency to DTS channel center frequency.

Set the span to ≥ 1.5 times the DTS bandwidth.

Set the RBW = 100 kHz.

Set the VBW ≥ 3 x RBW.

Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum PSD level.

Emission level measurement:

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

Set the RBW = 100 kHz.

Set the VBW ≥ 3 x RBW.

Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

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.

5.4.4. Test Result

Please refer to ANNEX A.3.

5.5 Band Edge (Authorized-band band-edge)

5.5.1. Limit

FCC §15.247(d); RSS-247, 6.6

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.

5.5.2. Test Setup

See section 4.5.1 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.5.3. Test Procedure

The following procedures may be used to determine the peak or average field strength or power of an unwanted emission that is within 2 MHz of the authorized band edge. If a peak detector is utilized, use the procedure described in 13.2.1. Use the procedure described in 13.2.2 when using an average detector and the EUT can be configured to transmit continuously (i.e., duty cycle ≥ 98%). Use the procedure described in 13.2.3 when using an average detector and the EUT cannot be configured to transmit continuously but the duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent). Use the procedure described in 13.2.4 when using an average detector for those cases where the EUT cannot be configured to transmit continuously and the duty cycle is not constant (duty cycle variations equal or exceed 2 percent).

When using a peak detector to measure unwanted emissions at or near the band edge (within 2 MHz of the authorized band), the following integration procedure can be used.

Set instrument center frequency to the frequency of the emission to be measured (must be within 2 MHz of the authorized band edge).

Set span to 2 MHz

RBW = 100 kHz.

VBW ≥ 3 x RBW.

Detector = peak.

Sweep time = auto.

Trace mode = max hold.

Allow sweep to continue until the trace stabilizes (required measurement time may increase for low duty cycle applications)

Compute the power by integrating the spectrum over 1 MHz using the analyzer’s band power measurement function with band limits set equal to the emission frequency (femission) ± 0.5 MHz. If the instrument does not have a band power function, then sum the amplitude levels (in power units) at 100 kHz intervals extending across the 1 MHz spectrum defined by femission ± 0.5 MHz.

5.5.4. Test Result

Please refer to ANNEX A.4.

5.6 Conducted Emission

5.6.1. Limit

FCC §15.207; RSS-GEN, 8.8

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

5.6.2. Test Setup

See section 4.5.2 for test setup description for the AC power supply port. The photo of test setup please refer to ANNEX B.

5.6.3. Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.
Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

5.6.4. Test Result

Please refer to ANNEX A.5.

5.7 Radiated Spurious Emission

5.7.1. Limit

FCC §15.209&15.247(d); RSS-GEN, 8.9; RSS-247, 6.6

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Note:

1. Field Strength (dBμV/m) = 20*log[Field Strength (μV/m)].
2. In the emission tables above, the tighter limit applies at the band edges.
3. For Above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
4. For above 1000 MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

5.7.2. Test Setup

See section 4.5.3 to 4.5.5 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.7.3. Test Procedure

Since the emission limits are specified in terms of radiated field strength levels, measurements performed to demonstrate compliance have traditionally relied on a radiated test configuration. Radiated measurements remain the principal method for demonstrating compliance to the specified limits; however antenna-port conducted measurements are also now acceptable to demonstrate compliance (see below for details). When radiated measurements are utilized, test site requirements and procedures for maximizing and measuring radiated emissions that are described in ANSI C63.10 shall be followed.

Antenna-port conducted measurements may also be used as an alternative to radiated measurements

for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

General Procedure for conducted measurements in restricted bands:

a) Measure the conducted output power (in dBm) using the detector specified (see guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).

b) Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see guidance on determining the applicable antenna gain)

c) Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies ≤ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz).

d) For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).

e) Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:

$E = EIRP - 20\log D + 104.8$

where:

E = electric field strength in dBμV/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

f) Compare the resultant electric field strength level to the applicable limit.

g) Perform radiated spurious emission test.

Quasi-Peak measurement procedure

The specifications for measurements using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Frequency Interference (CISPR) of the International Electrotechnical Commission.

As an alternative to CISPR quasi-peak measurement, compliance can be demonstrated to the applicable emission limits using a peak detector.

Peak power measurement procedure:

Peak emission levels are measured by setting the instrument as follows:

a) RBW = as specified in Ta1.

b) VBW ≥ 3 x RBW.

c) Detector = Peak.

d) Sweep time = auto.

e) Trace mode = max hold.

f) Allow sweeps to continue until the trace stabilizes. (Note that the required measurement time may be longer for low duty cycle applications).

Ta1—RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

Trace averaging across on and off times of the EUT transmissions followed by duty cycle correction:

If continuous transmission of the EUT (i.e., duty cycle ≥ 98 percent) cannot be achieved and the duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent), then the following procedure shall be used:

a) The EUT shall be configured to operate at the maximum achievable duty cycle.

b) Measure the duty cycle, x, of the transmitter output signal as described in section 6.0.

c) RBW = 1 MHz (unless otherwise specified).

d) VBW ≥ 3 x RBW.

e) Detector = RMS, if span/(# of points in sweep) ≤ (RBW/2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.

f) Averaging type = power (i.e., RMS).

1) As an alternative, the detector and averaging type may be set for linear voltage averaging.

2) Some instruments require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.

g) Sweep time = auto.

h) Perform a trace average of at least 100 traces.

i) A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:

1) If power averaging (RMS) mode was used in step f), then the applicable correction factor is 10 log(1/x), where x is the duty cycle.

2) If linear voltage averaging mode was used in step f), then the applicable correction factor is 20 log(1/x), where x is the duty cycle.

3) If a specific emission is demonstrated to be continuous (≥ 98 percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

NOTE: Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.

Determining the applicable transmit antenna gain:

A conducted power measurement will determine the maximum output power associated with a restricted band emission; however, in order to determine the associated EIRP level, the gain of the transmitting antenna (in dBi) must be added to the measured output power (in dBm).

Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.

See KDB 662911 for guidance on calculating the additional array gain term when determining the effective antenna gain for a EUT with multiple outputs occupying the same or overlapping frequency ranges in the same band.

Radiated spurious emission test:

An additional consideration when performing conducted measurements of restricted band emissions is that unwanted emissions radiating from the EUT cabinet, control circuits, power leads, or intermediate circuit elements will likely go undetected in a conducted measurement configuration. To address this concern, a radiated test shall be performed to ensure that emissions emanating from the EUT cabinet (rather than the antenna port) also comply with the applicable limits.

For these cabinet radiated spurious emission measurements the EUT transmit antenna may be replaced with a termination matching the nominal impedance of the antenna. Procedures for performing radiated measurements are specified in ANSI C63.10. All detected emissions shall comply with the applicable limits.

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the

Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

5.7.4. Test Result

Please refer to ANNEX A.6.

5.8 Band Edge (Restricted-band band-edge)

5.8.1. Limit

FCC §15.209&15.247(d); RSS-GEN, 8.10; RSS-247, 6.6

Radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

5.8.2. Test Setup

See section 4.5.3 to 4.5.5 for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.8.3. Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.

The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported, Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

For transmitters operating above 1 GHz repeat the measurement with an average detector.

5.8.4. Test Result

Please refer to ANNEX A.7.

5.9 Power Spectral density (PSD)

5.9.1. Limit

FCC §15.247(e); RSS-247, 6.3.1 (b)

The same method of determining the conducted output power shall be used to determine the power spectral density. If a peak output power is measured, then a peak power spectral density measurement is required. If an average output power is measured, then an average power spectral density measurement should be used.

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of Section 5.4(4), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

5.9.2. Test Setup

See section 4.5.1 (Diagram 1) for test setup description for the antenna port. The photo of test setup please refer to ANNEX B.

5.9.3. Test Procedure

Set analyzer center frequency to DTS channel center frequency.

Set the span to 1.5 times the DTS bandwidth.

Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.

Set the VBW ≥ 3 RBW.

Detector = peak.

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.9.4. Test Result

Please refer to ANNEX A.8.

ANNEX A TEST RESULT

A.1 Output Power and E.I.R.P

Peak Power Test Data

Channel	Measured Output Peak Power		Limit		Verdict
	GFSK (2Mbps)		dBm	mW	
	dBm	mW			
Low Channel	14.73	29.72	30	1000	Pass
Middle Channel	14.71	29.59			Pass
High Channel	14.69	29.47			Pass

Channel	Measured Output Peak Power		Limit		Verdict
	GFSK (4Mbps)		dBm	mW	
	dBm	mW			
Low Channel	12.42	17.44	30	1000	Pass
Middle Channel	12.37	17.26			Pass
High Channel	12.36	17.20			Pass

E.I.R.P Test Data (For ISED)

Channel	E.I.R.P		Limit		Verdict
	GFSK (2Mbps)		dBm	mW	
	dBm	mW			
Low Channel	13.95	24.83	36	4000	Pass
Middle Channel	13.93	24.72			Pass
High Channel	13.91	24.60			Pass

Channel	E.I.R.P		Limit		Verdict
	GFSK (4Mbps)		dBm	mW	
	dBm	mW			
Low Channel	11.64	14.59	36	4000	Pass
Middle Channel	11.59	14.42			Pass
High Channel	11.58	14.39			Pass

A.2 Occupied Bandwidth

Test Data

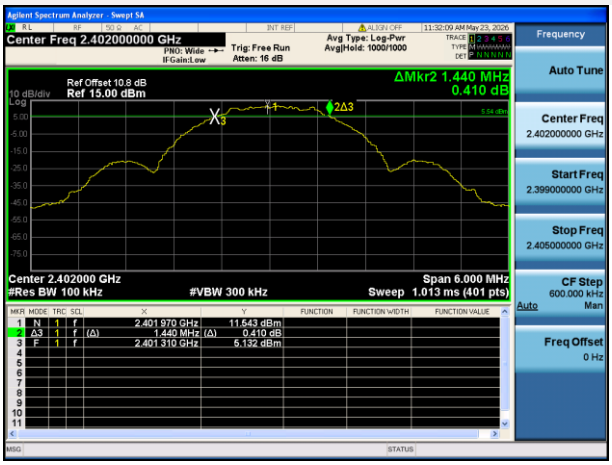
Test Mode	GFSK (2Mbps)		
Channel	6 dB Bandwidth (kHz)	99% Bandwidth (kHz)	6 dB Bandwidth Limits (kHz)
Low Channel	1440.000	2037.600	≥500
Middle Channel	1440.000	2013.600	≥500
High Channel	1410.000	2040.700	≥500

Test Mode	GFSK (4Mbps)		
Channel	6 dB Bandwidth (kHz)	99% Bandwidth (kHz)	6 dB Bandwidth Limits (kHz)
Low Channel	2790.000	4248.300	≥500
Middle Channel	2790.000	4132.800	≥500
High Channel	3000.000	4095.000	≥500

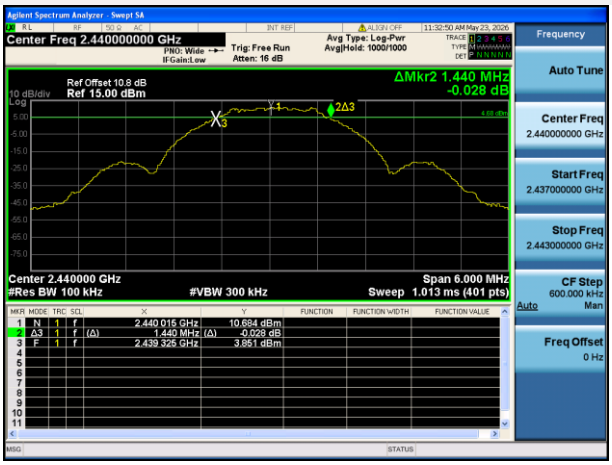
Test Plots

6 dB Bandwidth

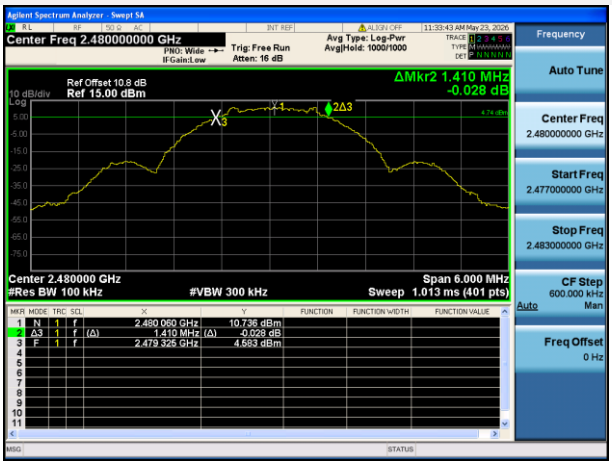
GFSK (2Mbps) LOW CHANNEL



GFSK (2Mbps) MIDDLE CHANNEL



GFSK (2Mbps) HIGH CHANNEL



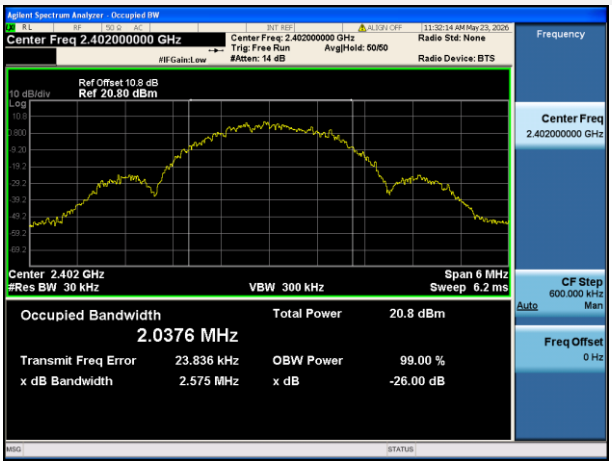
GFSK (4Mbps) LOW CHANNEL

GFSK (4Mbps) MIDDLE CHANNEL

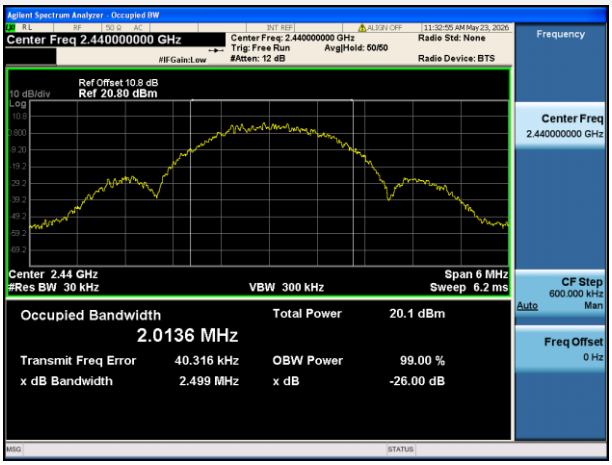
GFSK (4Mbps) HIGH CHANNEL

99% Bandwidth

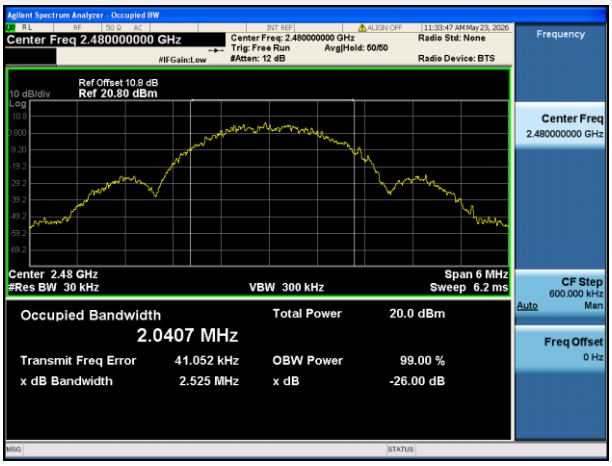
GFSK (2Mbps) LOW CHANNEL



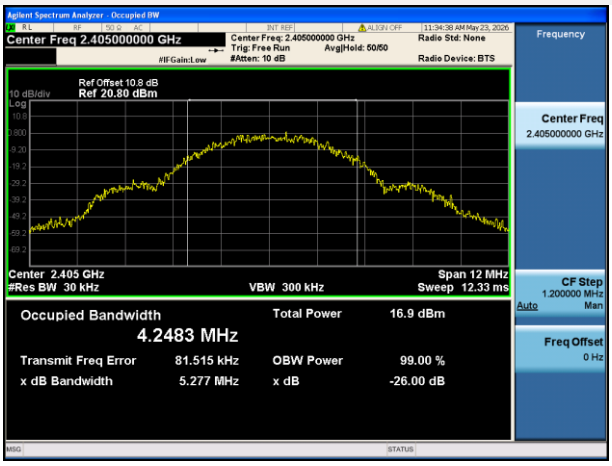
GFSK (2Mbps) MIDDLE CHANNEL



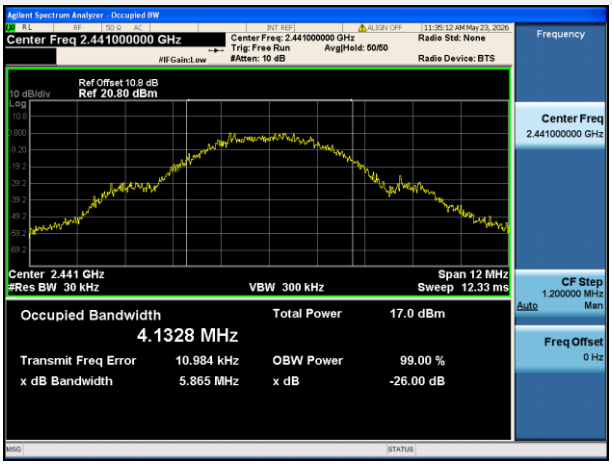
GFSK (2Mbps) HIGH CHANNEL



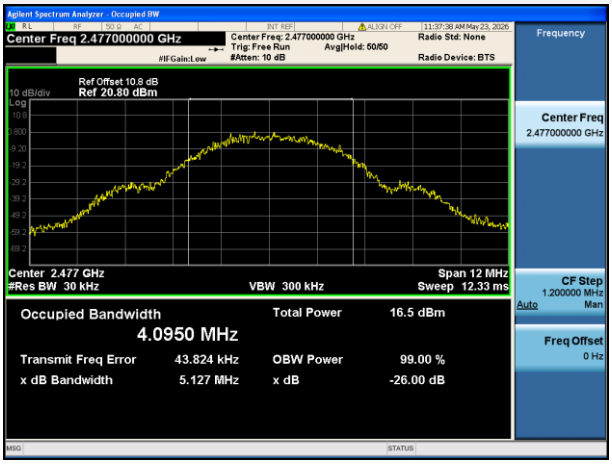
GFSK (4Mbps) LOW CHANNEL



GFSK (4Mbps) MIDDLE CHANNEL



GFSK (4Mbps) HIGH CHANNEL



A.3 Conducted Spurious Emissions

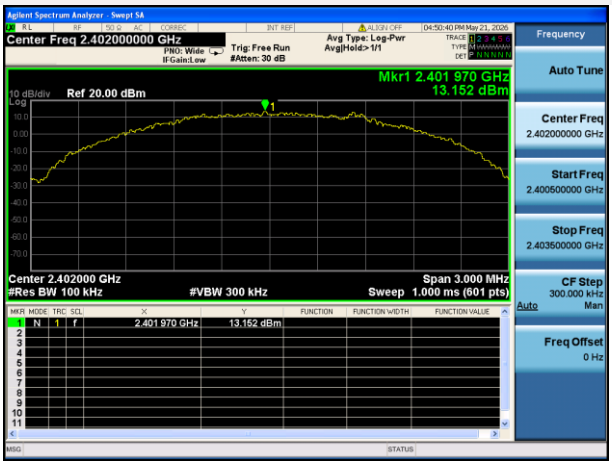
Test Data

GFSK (2Mbps)				
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-39.41	13.15	-6.85	Pass
Middle Channel	-36.61	13.16	-6.84	Pass
High Channel	-35.79	13.05	-6.95	Pass

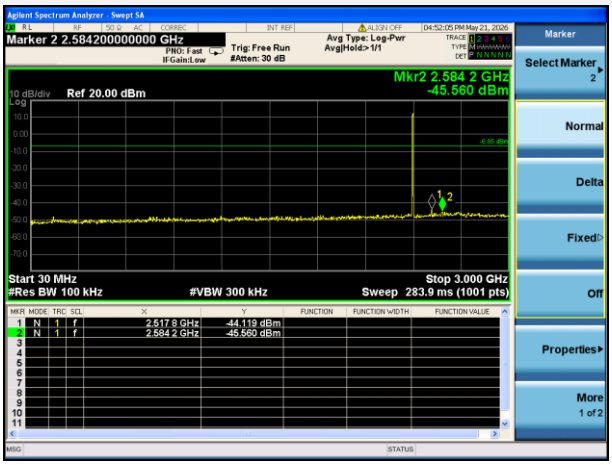
GFSK (4Mbps)				
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-38.12	8.02	-11.98	Pass
Middle Channel	-37.03	7.43	-12.58	Pass
High Channel	-35.13	7.07	-12.93	Pass

Test Plots

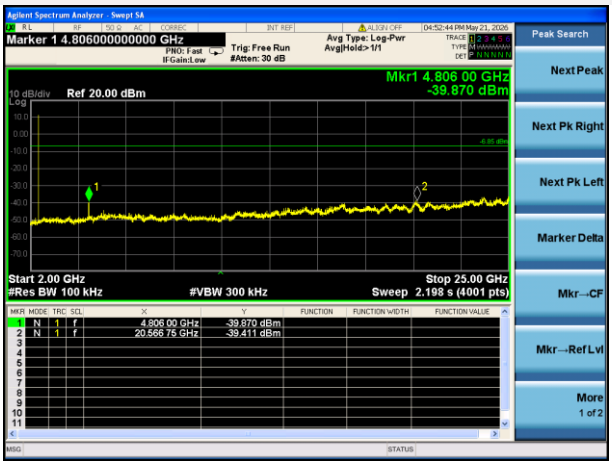
GFSK (2Mbps) LOW CHANNEL, CARRIER LEVEL



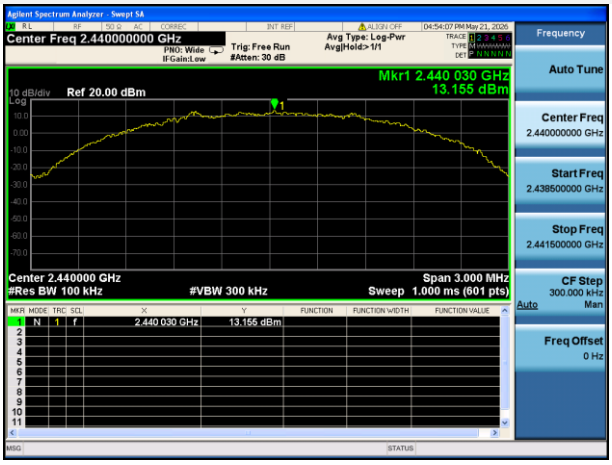
GFSK (2Mbps) LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



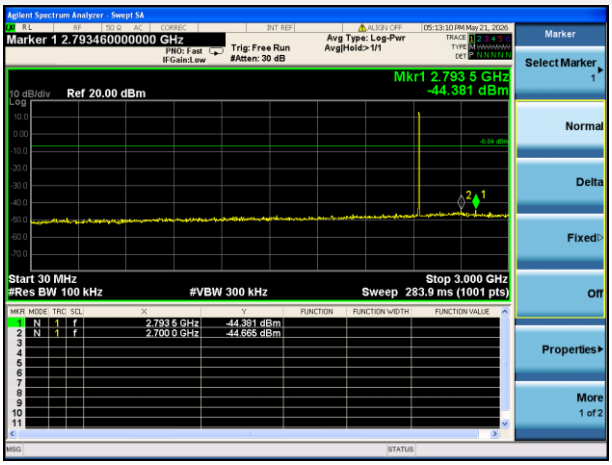
GFSK (2Mbps) LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



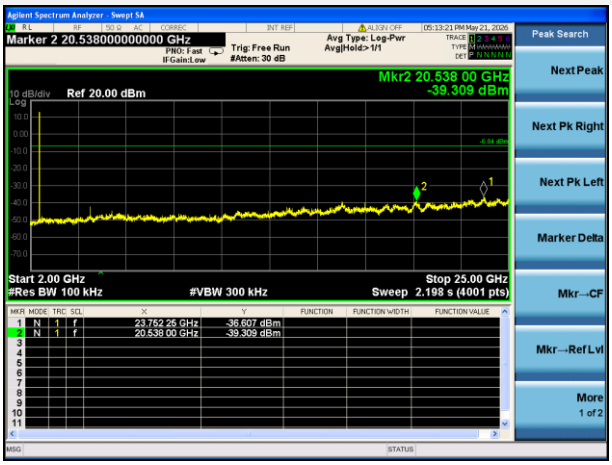
GFSK (2Mbps) MIDDLE CHANNEL, CARRIER LEVEL



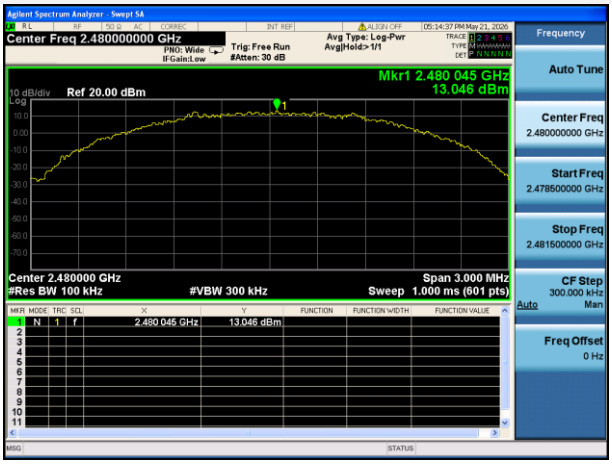
GFSK (2Mbps) MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



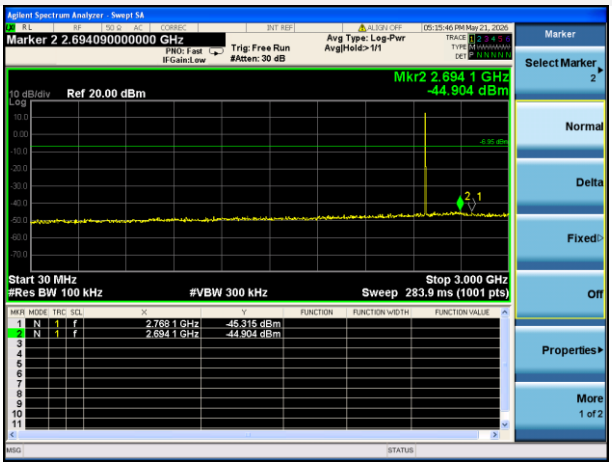
GFSK (2Mbps) MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



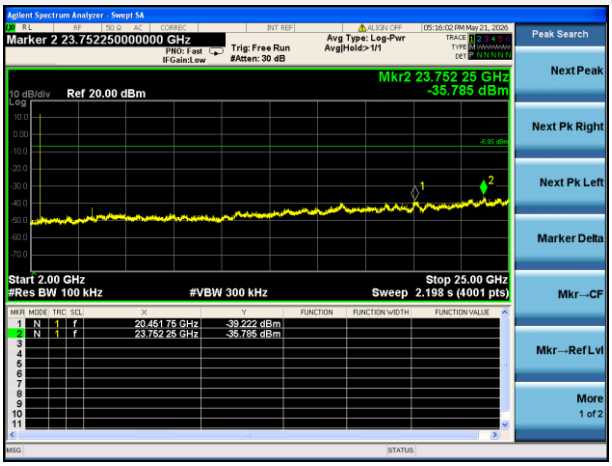
GFSK (2Mbps) HIGH CHANNEL, CARRIER LEVEL



GFSK (2Mbps) HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

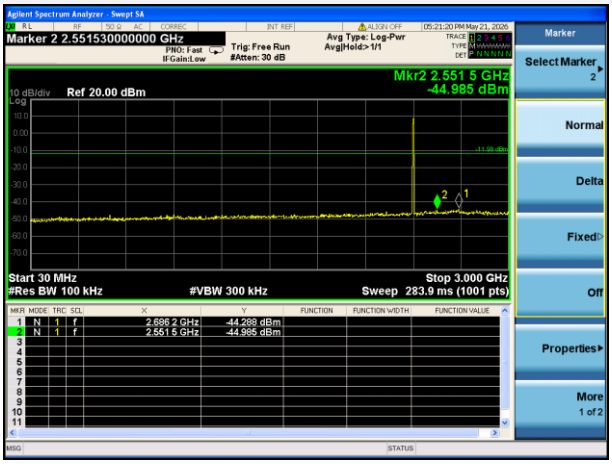


GFSK (2Mbps) HIGH CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

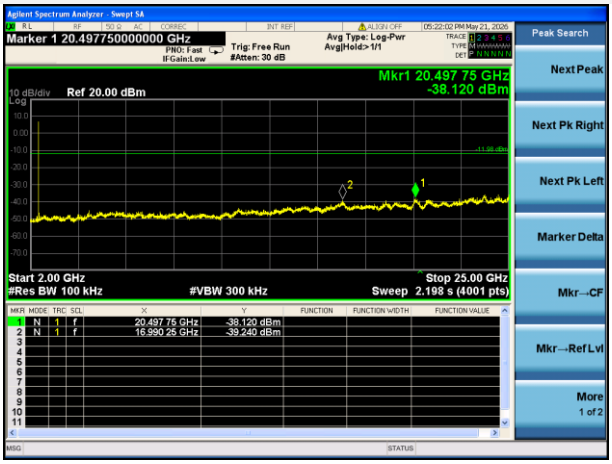


GFSK (4Mbps) LOW CHANNEL, CARRIER LEVEL

GFSK (4Mbps) LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

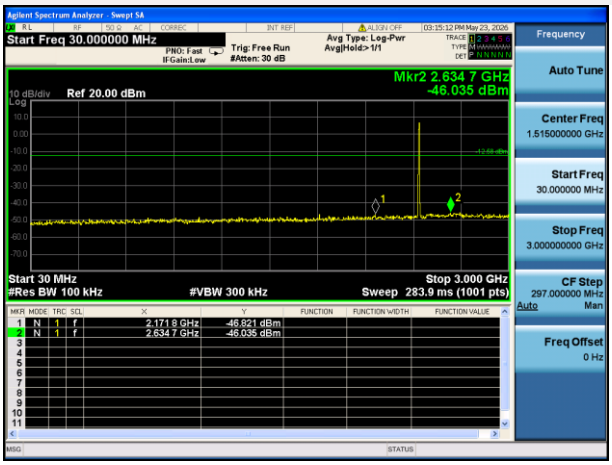


GFSK (4Mbps) LOW CHANNEL, SPURIOUS 2 GHz ~ 25 GHz

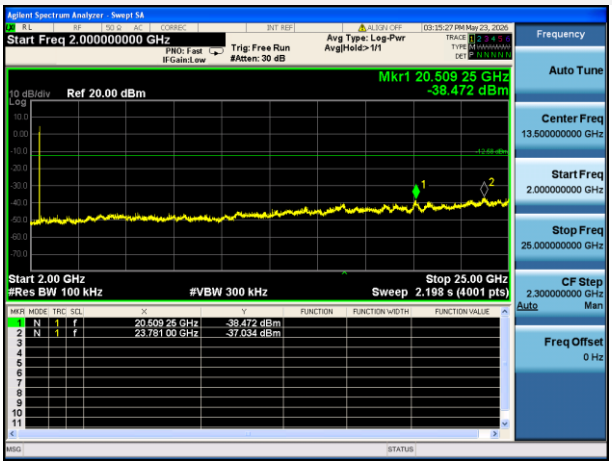


GFSK (4Mbps) MIDDLE CHANNEL, CARRIER LEVEL

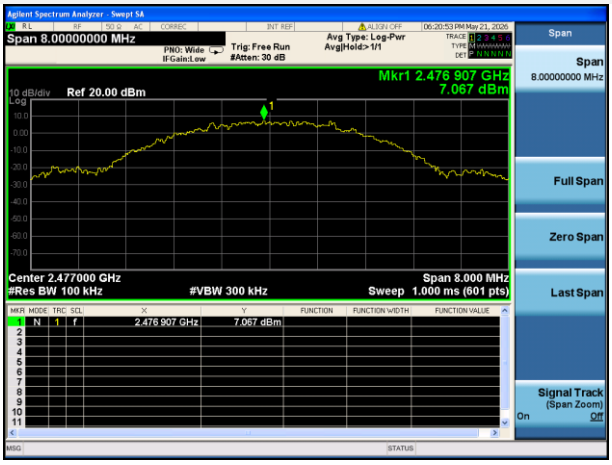
GFSK (4Mbps) MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



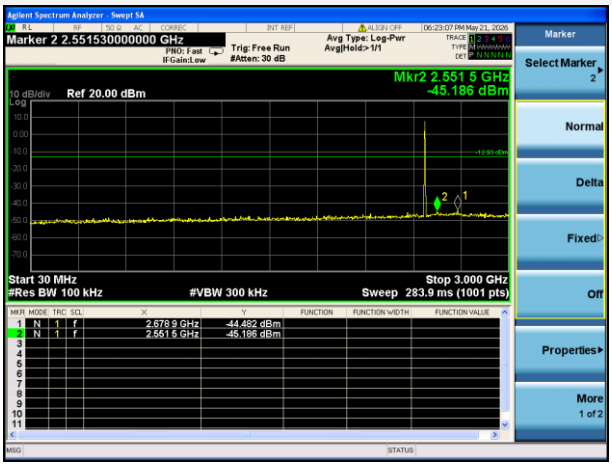
GFSK (4Mbps) MIDDLE CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



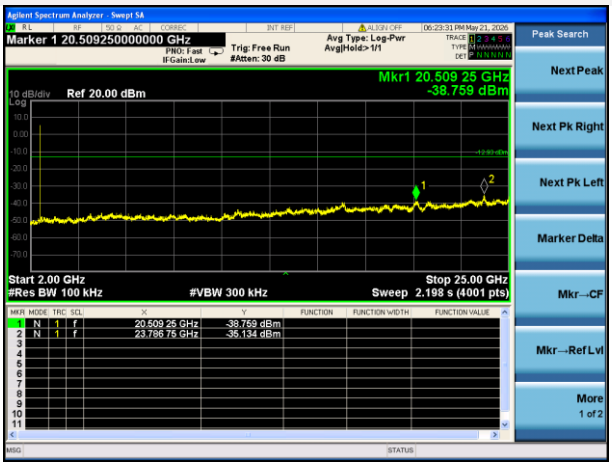
GFSK (4Mbps) HIGH CHANNEL, CARRIER LEVEL



GFSK (4Mbps) HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



GFSK (4Mbps) HIGH CHANNEL, SPURIOUS 2 GHz ~ 25 GHz



A.4 Band Edge (Authorized-band band-edge)

Note: The lowest and highest channels are tested to verify the band edge emissions. Please refer to the following the plots for emissions values.

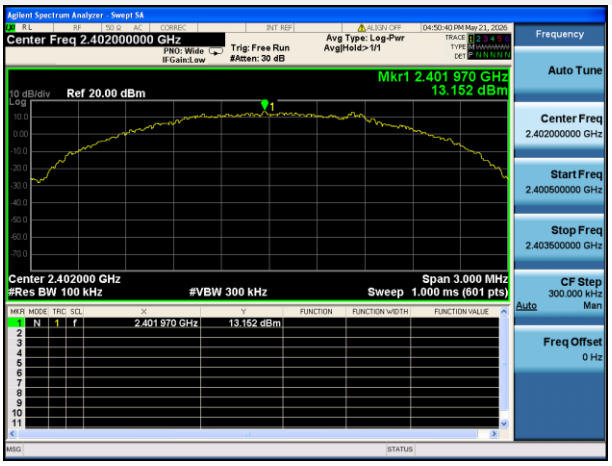
Test Data

GFSK (2Mbps)				
Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-20.09	13.15	-6.85	Pass
High Channel	-45.60	13.05	-6.95	Pass

GFSK (4Mbps)				
Channel	Measured Max. Band Edge Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low Channel	-38.03	8.02	-11.98	Pass
High Channel	-46.80	7.07	-12.93	Pass

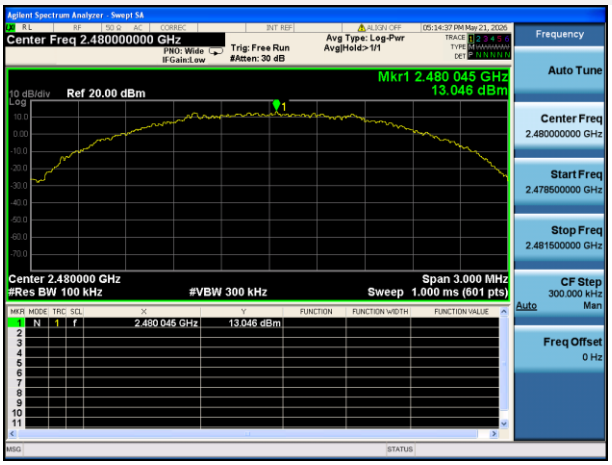
Test Plots

GFSK (2Mbps) LOW CHANNEL, CARRIER LEVEL

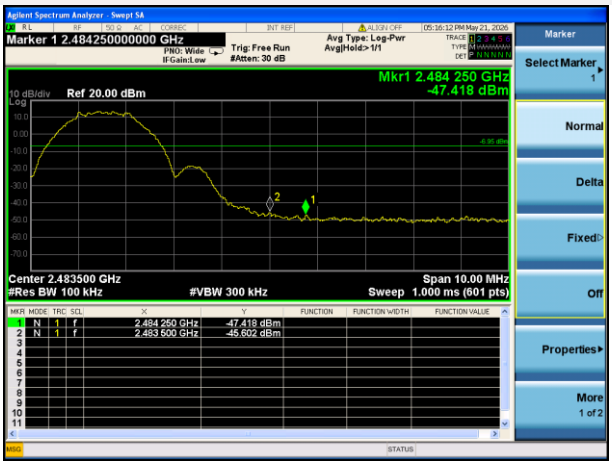


GFSK (2Mbps) LOW CHANNEL, BAND EDGE

GFSK (2Mbps) HIGH CHANNEL, CARRIER LEVEL



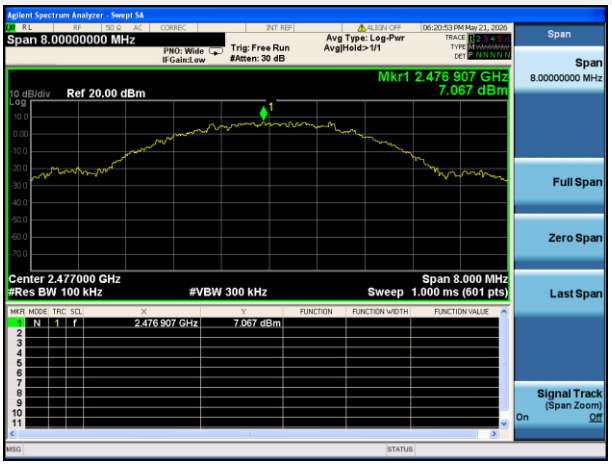
GFSK (2Mbps) HIGH CHANNEL, BAND EDGE



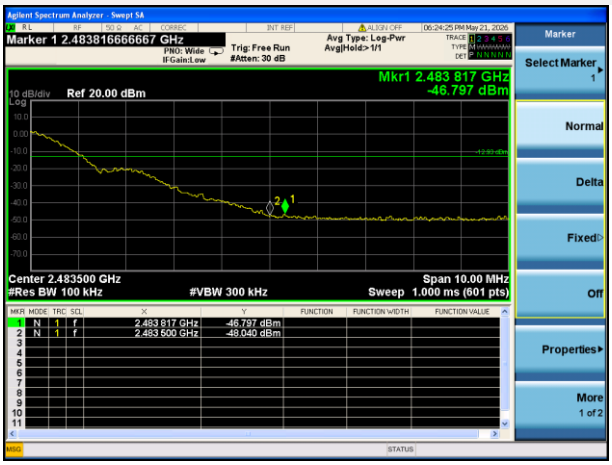
GFSK (4Mbps) LOW CHANNEL, CARRIER LEVEL

GFSK (4Mbps) LOW CHANNEL, BAND EDGE

GFSK (4Mbps) HIGH CHANNEL, CARRIER LEVEL



GFSK (4Mbps) HIGH CHANNEL, BAND EDGE



A.5 Conducted Emissions

Note: Not applicable.

A.6 Radiated Spurious Emission

Note [1]: The symbol of "--" in the table which means not application.

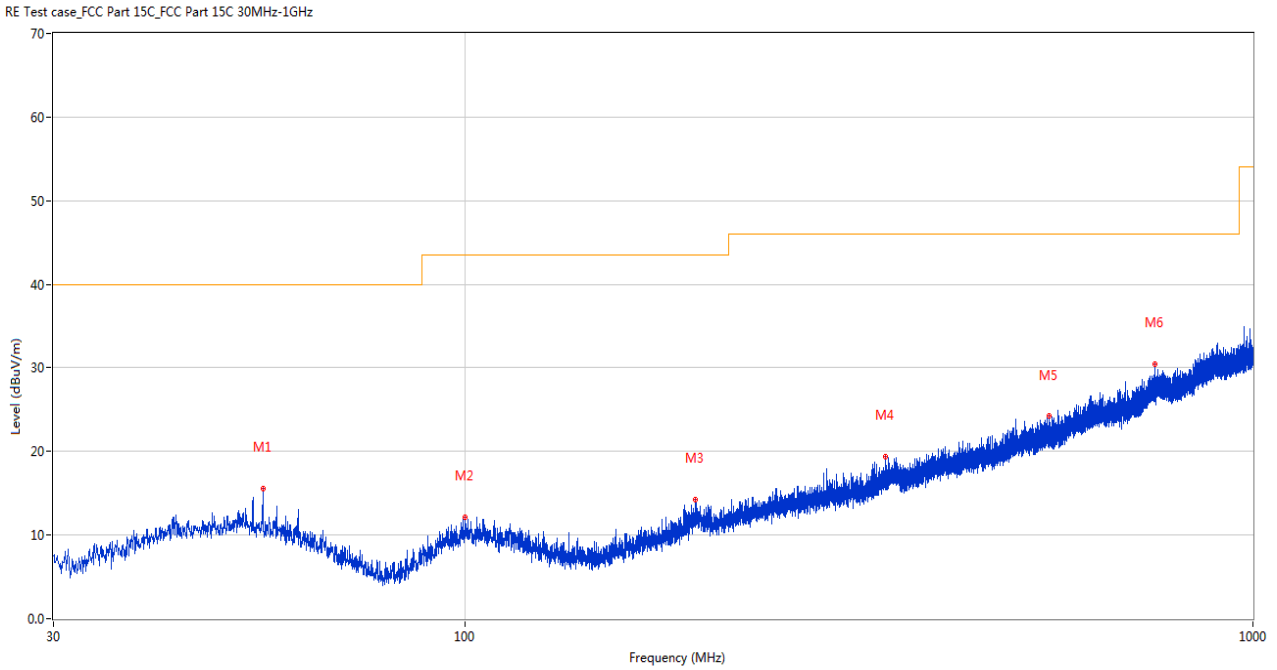
Note [2]: For the test data above 1 GHz, according the ANSI C63.10-2020, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note [3]: The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

Note [4]: Results (dBuV/m) = Original reading level of Spectrum Analyzer (dBuV/m) + Factor (dB)

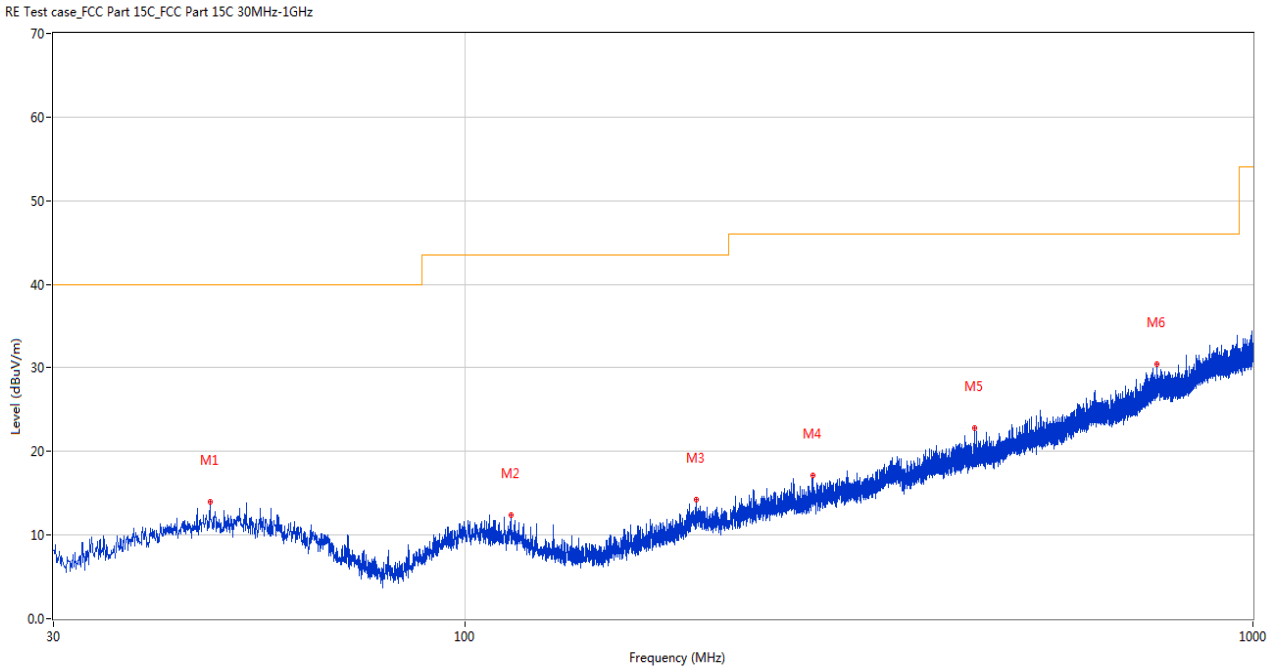
Test Data and Plots

30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	55.317	15.50	-24.56	40.0	24.50	Peak	296.20	100	Horizontal	Pass
2	99.985	12.10	-25.66	43.5	31.40	Peak	327.10	100	Horizontal	Pass
3	196.064	14.25	-24.20	43.5	29.25	Peak	151.90	100	Horizontal	Pass
4	341.418	19.33	-19.69	46.0	26.67	Peak	214.40	100	Horizontal	Pass
5	551.278	24.19	-14.37	46.0	21.81	Peak	107.50	100	Horizontal	Pass
6	750.710	30.44	-8.91	46.0	15.56	Peak	179.00	100	Horizontal	Pass

30 MHz to 1 GHz, ANT V

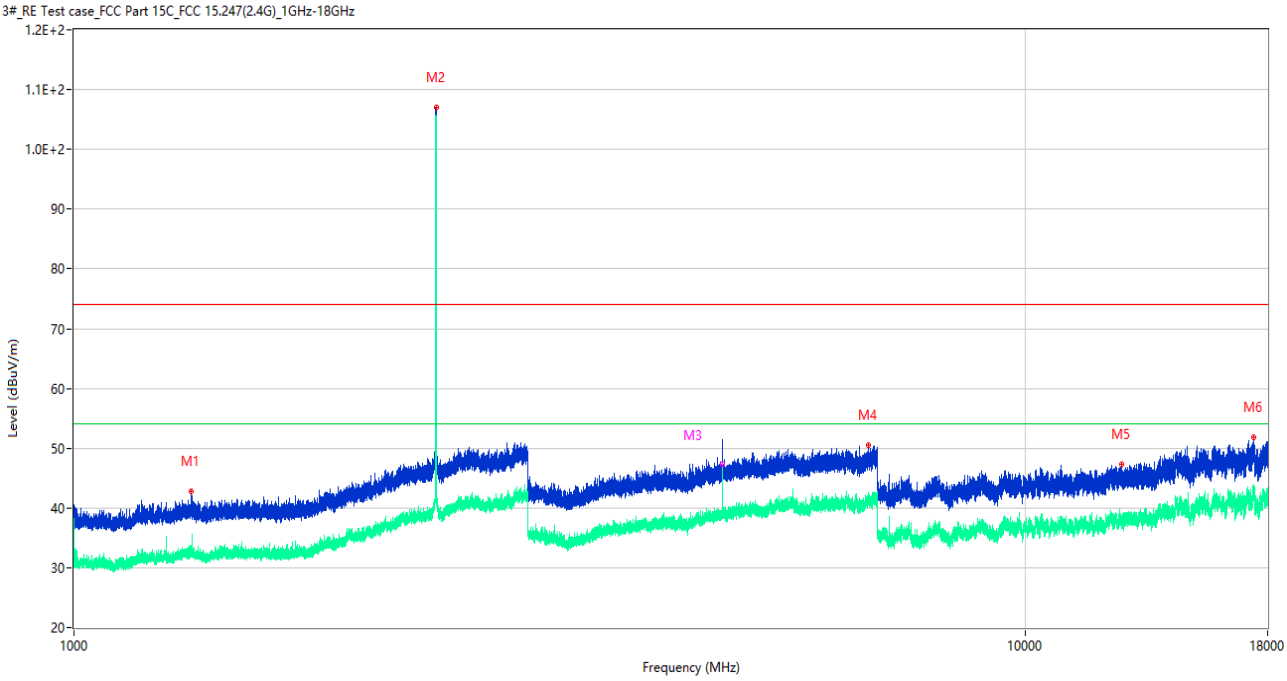


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	47.411	13.94	-24.15	40.0	26.06	Peak	14.10	100	Vertical	Pass
2	114.196	12.43	-26.14	43.5	31.07	Peak	150.60	100	Vertical	Pass
3	196.404	14.20	-24.16	43.5	29.30	Peak	142.30	100	Vertical	Pass
4	276.477	17.17	-22.11	46.0	28.83	Peak	360.00	100	Vertical	Pass
5	443.414	22.85	-17.37	46.0	23.15	Peak	104.90	100	Vertical	Pass
6	756.190	30.46	-8.69	46.0	15.54	Peak	168.00	100	Vertical	Pass

Note [1]: The marked spikes near 2400 MHz with circle should be ignored because they are Fundamental signal.

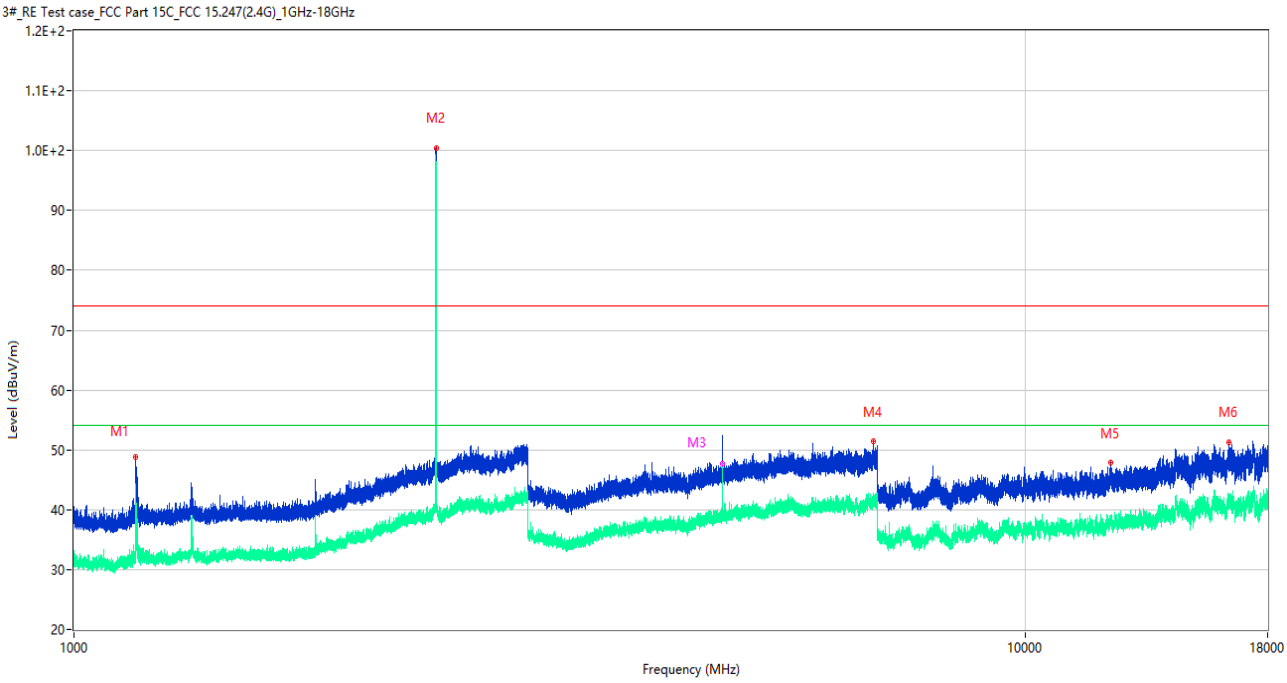
Note [2]: The spurious from 18GHz-25GHz is noise only, do not show on the report.

GFSK (2Mbps) LOW CHANNEL 1 GHz to 18 GHz, ANT H



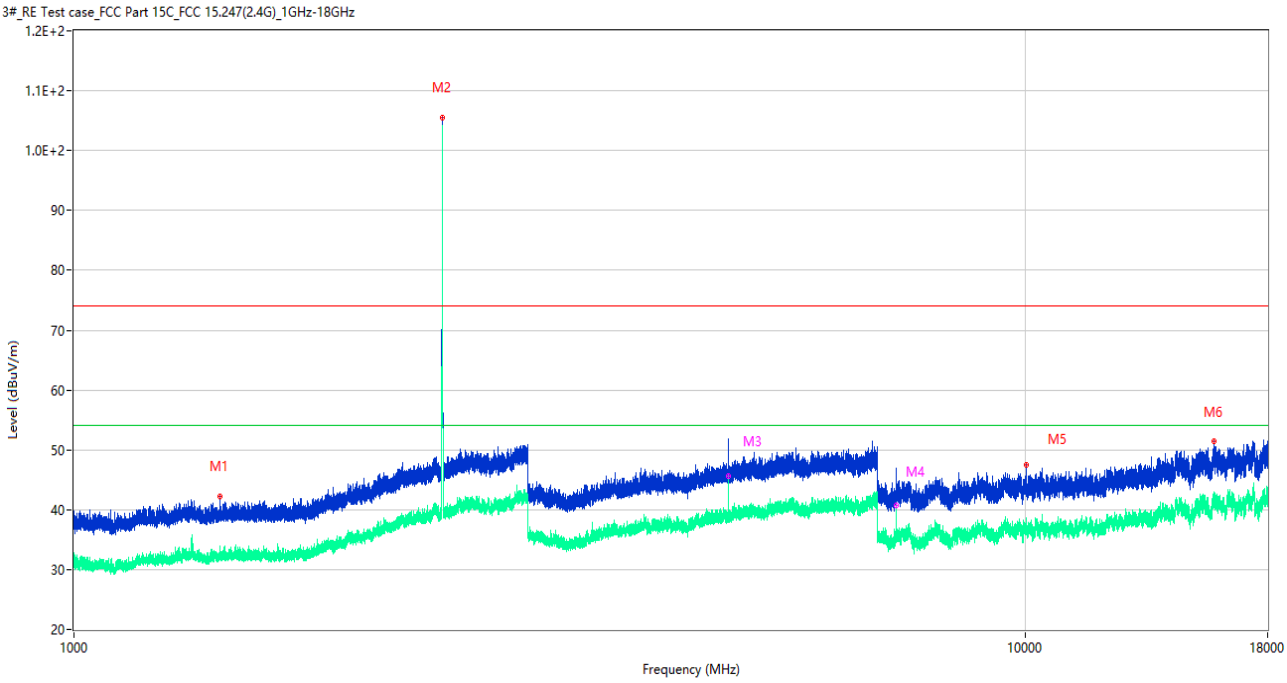
No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1329.200	42.87	74.0	31.13	Peak	128.00	400	Horizontal	Pass
1**	1329.200	32.69	54.0	21.31	AV	128.00	400	Horizontal	Pass
2	2402.500	107.01	74.0	-33.01	Peak	60.00	100	Horizontal	N/A
2**	2402.500	105.46	54.0	-51.46	AV	60.00	100	Horizontal	N/A
3	4803.400	50.23	74.0	23.77	Peak	217.00	150	Horizontal	Pass
3**	4803.400	47.26	54.0	6.74	AV	217.00	150	Horizontal	Pass
4	6843.200	50.52	74.0	23.48	Peak	58.00	100	Horizontal	Pass
4**	6843.200	41.18	54.0	12.82	AV	58.00	100	Horizontal	Pass
5	12625.225	47.34	74.0	26.66	Peak	351.00	400	Horizontal	Pass
5**	12625.225	37.49	54.0	16.51	AV	351.00	400	Horizontal	Pass
6	17389.949	51.88	74.0	22.12	Peak	302.00	150	Horizontal	Pass
6**	17389.949	42.61	54.0	11.39	AV	302.00	150	Horizontal	Pass

GFSK (2Mbps) LOW CHANNEL 1 GHz to 18 GHz, ANT V



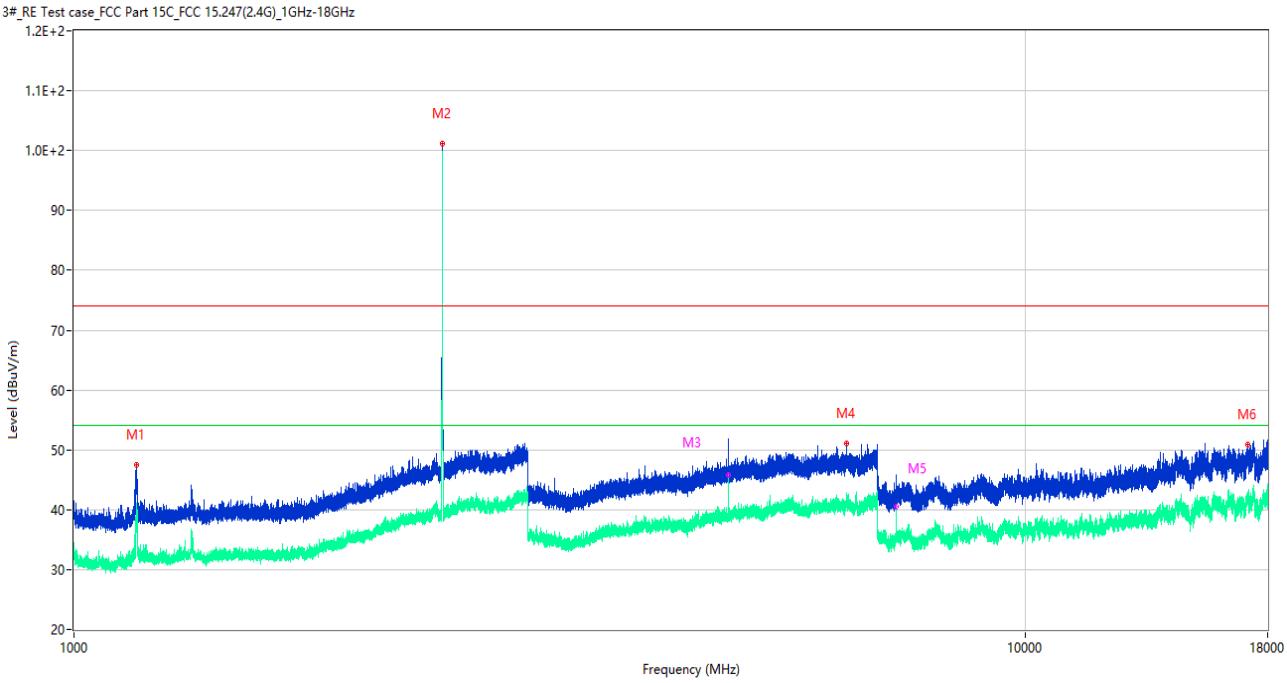
No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1162.000	48.87	74.0	25.13	Peak	21.00	200	Vertical	Pass
1**	1162.000	33.80	54.0	20.20	AV	21.00	200	Vertical	Pass
2	2402.500	100.50	74.0	-26.50	Peak	83.00	100	Vertical	N/A
2**	2402.500	98.03	54.0	-44.03	AV	83.00	100	Vertical	N/A
3	4805.200	51.99	74.0	22.01	Peak	114.00	150	Vertical	Pass
3**	4805.200	47.72	54.0	6.28	AV	114.00	150	Vertical	Pass
4	6921.400	51.39	74.0	22.61	Peak	170.00	300	Vertical	Pass
4**	6921.400	40.55	54.0	13.45	AV	170.00	300	Vertical	Pass
5	12296.325	47.80	74.0	26.20	Peak	360.00	100	Vertical	Pass
5**	12296.325	38.37	54.0	15.63	AV	360.00	100	Vertical	Pass
6	16383.000	51.35	74.0	22.65	Peak	305.00	300	Vertical	Pass
6**	16383.000	41.02	54.0	12.98	AV	305.00	300	Vertical	Pass

GFSK (2Mbps) MIDDLE CHANNEL 1 GHz to 18 GHz, ANT H



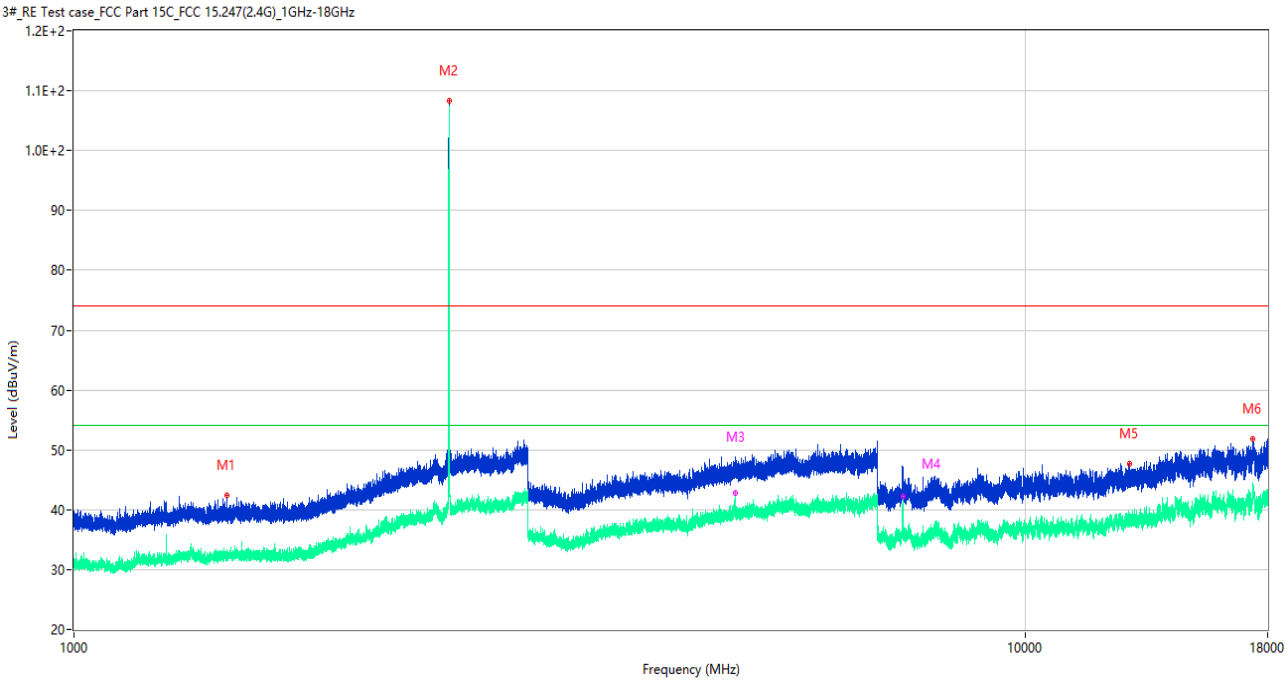
No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1423.400	42.26	74.0	31.74	Peak	201.00	200	Horizontal	Pass
1**	1423.400	32.29	54.0	21.71	AV	201.00	200	Horizontal	Pass
2	2439.500	105.55	74.0	-31.55	Peak	42.00	100	Horizontal	N/A
2**	2439.500	102.75	54.0	-48.75	AV	42.00	100	Horizontal	N/A
3	4879.600	49.37	74.0	24.63	Peak	250.00	150	Horizontal	Pass
3**	4879.600	45.68	54.0	8.32	AV	250.00	150	Horizontal	Pass
4	7319.125	45.33	74.0	28.67	Peak	352.00	150	Horizontal	Pass
4**	7319.125	40.81	54.0	13.19	AV	352.00	150	Horizontal	Pass
5	10029.100	47.42	74.0	26.58	Peak	229.00	200	Horizontal	Pass
5**	10029.100	36.87	54.0	17.13	AV	229.00	200	Horizontal	Pass
6	15803.924	51.42	74.0	22.58	Peak	188.00	300	Horizontal	Pass
6**	15803.924	42.59	54.0	11.41	AV	188.00	300	Horizontal	Pass

GFSK (2Mbps) MIDDLE CHANNEL 1 GHz to 18 GHz, ANT V



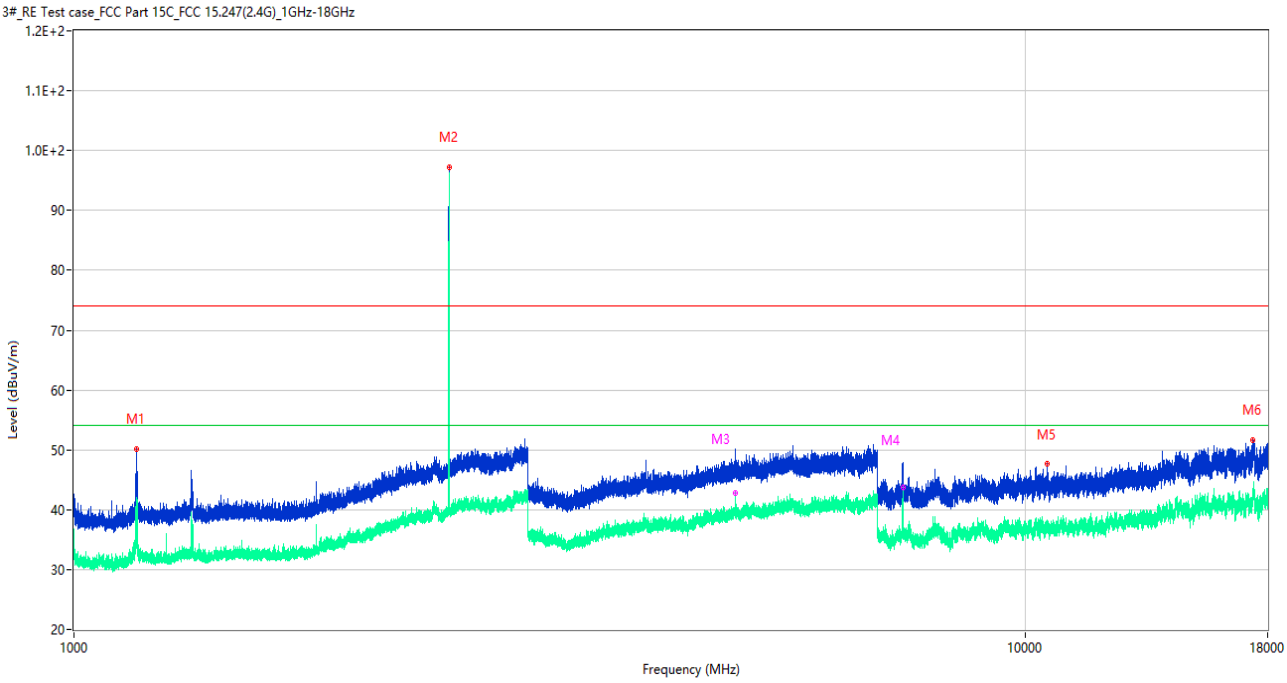
No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1163.000	47.50	74.0	26.50	Peak	0.00	100	Vertical	Pass
1**	1163.000	36.38	54.0	17.62	AV	0.00	100	Vertical	Pass
2	2439.500	101.20	74.0	-27.20	Peak	80.00	200	Vertical	N/A
2**	2439.500	99.29	54.0	-45.29	AV	80.00	200	Vertical	N/A
3	4879.400	50.17	74.0	23.83	Peak	0.00	150	Vertical	Pass
3**	4879.400	45.71	54.0	8.29	AV	0.00	150	Vertical	Pass
4	6489.200	51.11	74.0	22.89	Peak	0.00	100	Vertical	Pass
4**	6489.200	41.73	54.0	12.27	AV	0.00	100	Vertical	Pass
5	7318.837	44.00	74.0	30.00	Peak	32.00	150	Vertical	Pass
5**	7318.837	40.48	54.0	13.52	AV	32.00	150	Vertical	Pass
6	17140.574	50.92	74.0	23.08	Peak	360.00	300	Vertical	Pass
6**	17140.574	42.02	54.0	11.98	AV	360.00	300	Vertical	Pass

GFSK (2Mbps) HIGH CHANNEL 1 GHz to 18 GHz, ANT H



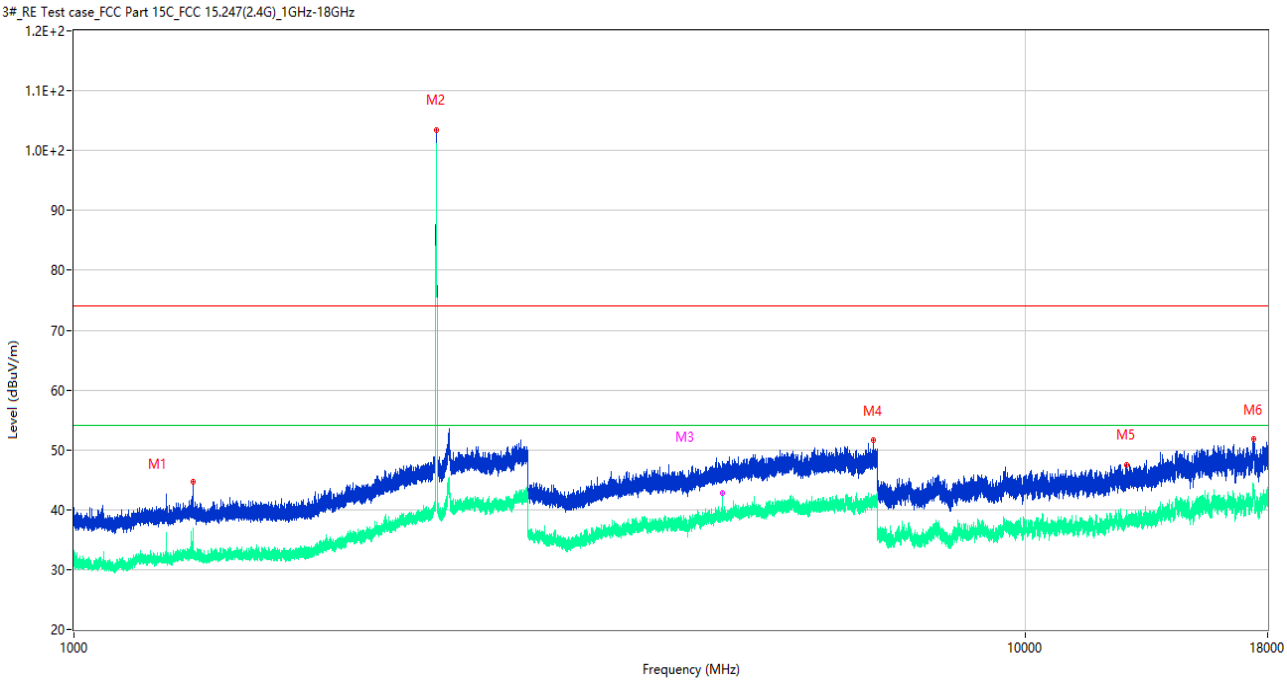
No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1448.700	42.48	74.0	31.52	Peak	105.00	300	Horizontal	Pass
1**	1448.700	31.87	54.0	22.13	AV	105.00	300	Horizontal	Pass
2	2480.500	108.41	74.0	-34.41	Peak	63.00	200	Horizontal	N/A
2**	2480.500	107.32	54.0	-53.32	AV	63.00	200	Horizontal	N/A
3	4961.000	48.49	74.0	25.51	Peak	90.00	150	Horizontal	Pass
3**	4961.000	42.75	54.0	11.25	AV	90.00	150	Horizontal	Pass
4	7441.888	46.57	74.0	27.43	Peak	102.00	150	Horizontal	Pass
4**	7441.888	42.20	54.0	11.80	AV	102.00	150	Horizontal	Pass
5	12891.750	47.74	74.0	26.26	Peak	343.00	100	Horizontal	Pass
5**	12891.750	38.33	54.0	15.67	AV	343.00	100	Horizontal	Pass
6	17352.675	51.89	74.0	22.11	Peak	304.00	300	Horizontal	Pass
6**	17352.675	41.16	54.0	12.84	AV	304.00	300	Horizontal	Pass

GFSK (2Mbps) HIGH CHANNEL 1 GHz to 18 GHz, ANT V



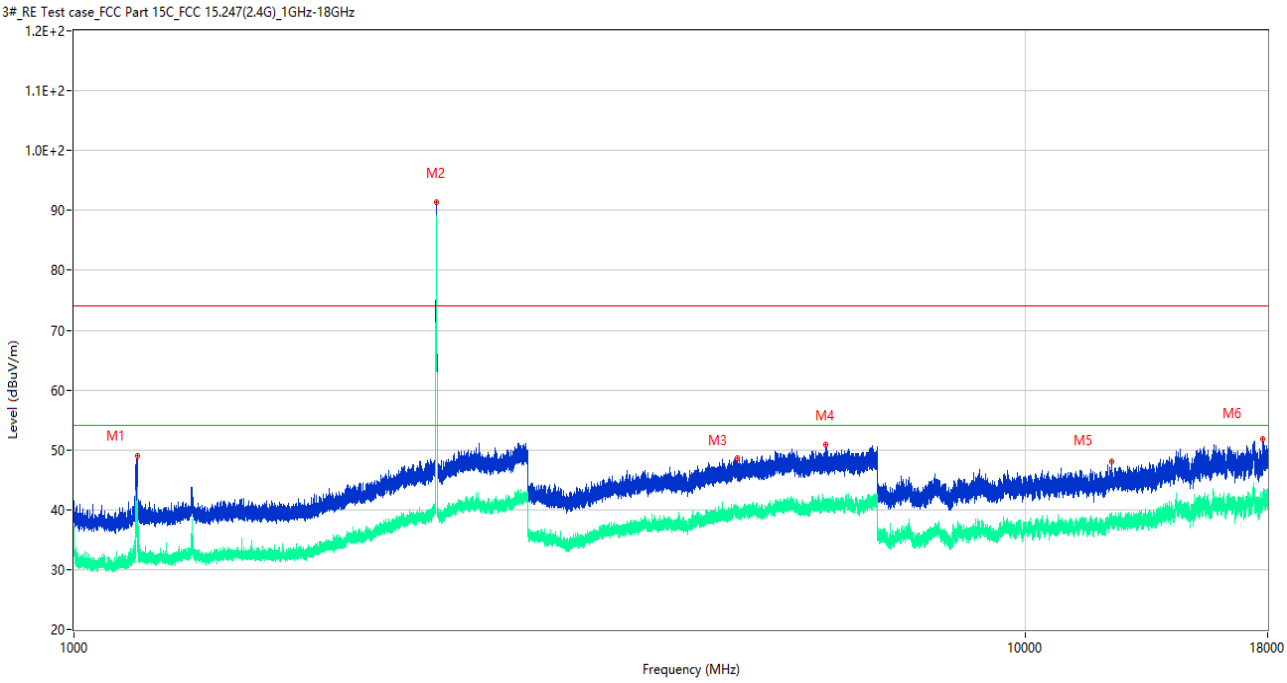
No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1163.900	50.16	74.0	23.84	Peak	20.00	400	Vertical	Pass
1**	1163.900	38.25	54.0	15.75	AV	20.00	400	Vertical	Pass
2	2480.500	97.21	74.0	-23.21	Peak	264.00	150	Vertical	N/A
2**	2480.500	95.78	54.0	-41.78	AV	264.00	150	Vertical	N/A
3	4960.600	48.69	74.0	25.31	Peak	64.00	150	Vertical	Pass
3**	4960.600	42.81	54.0	11.19	AV	64.00	150	Vertical	Pass
4	7441.888	46.85	74.0	27.15	Peak	316.00	150	Vertical	Pass
4**	7441.888	43.78	54.0	10.22	AV	316.00	150	Vertical	Pass
5	10543.438	47.59	74.0	26.41	Peak	35.00	300	Vertical	Pass
5**	10543.438	37.02	54.0	16.98	AV	35.00	300	Vertical	Pass
6	17381.550	51.68	74.0	22.32	Peak	343.00	200	Vertical	Pass
6**	17381.550	41.83	54.0	12.17	AV	343.00	200	Vertical	Pass

GFSK (4Mbps) LOW CHANNEL 1 GHz to 18 GHz, ANT H



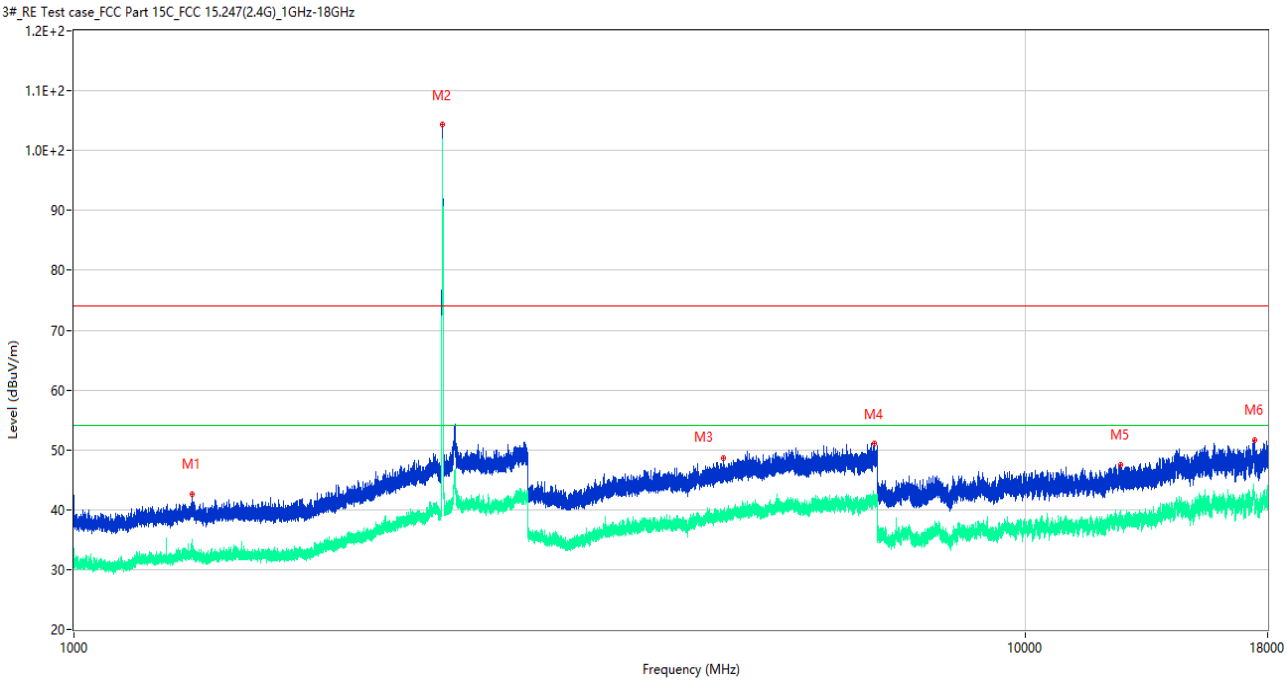
No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1333.500	44.76	74.0	29.24	Peak	125.00	400	Horizontal	Pass
1**	1333.500	36.88	54.0	17.12	AV	125.00	400	Horizontal	Pass
2	2406.000	103.45	74.0	-29.45	Peak	59.00	100	Horizontal	N/A
2**	2406.000	101.06	54.0	-47.06	AV	59.00	100	Horizontal	N/A
3	4808.400	46.43	74.0	27.57	Peak	360.00	150	Horizontal	Pass
3**	4808.400	42.73	54.0	11.27	AV	360.00	150	Horizontal	Pass
4	6934.800	51.57	74.0	22.43	Peak	261.00	300	Horizontal	Pass
4**	6934.800	42.29	54.0	11.71	AV	261.00	300	Horizontal	Pass
5	12778.875	47.52	74.0	26.48	Peak	221.00	300	Horizontal	Pass
5**	12778.875	38.71	54.0	15.29	AV	221.00	300	Horizontal	Pass
6	17415.938	51.79	74.0	22.21	Peak	221.00	200	Horizontal	Pass
6**	17415.938	41.93	54.0	12.07	AV	221.00	200	Horizontal	Pass

GFSK (4Mbps) LOW CHANNEL 1 GHz to 18 GHz, ANT V



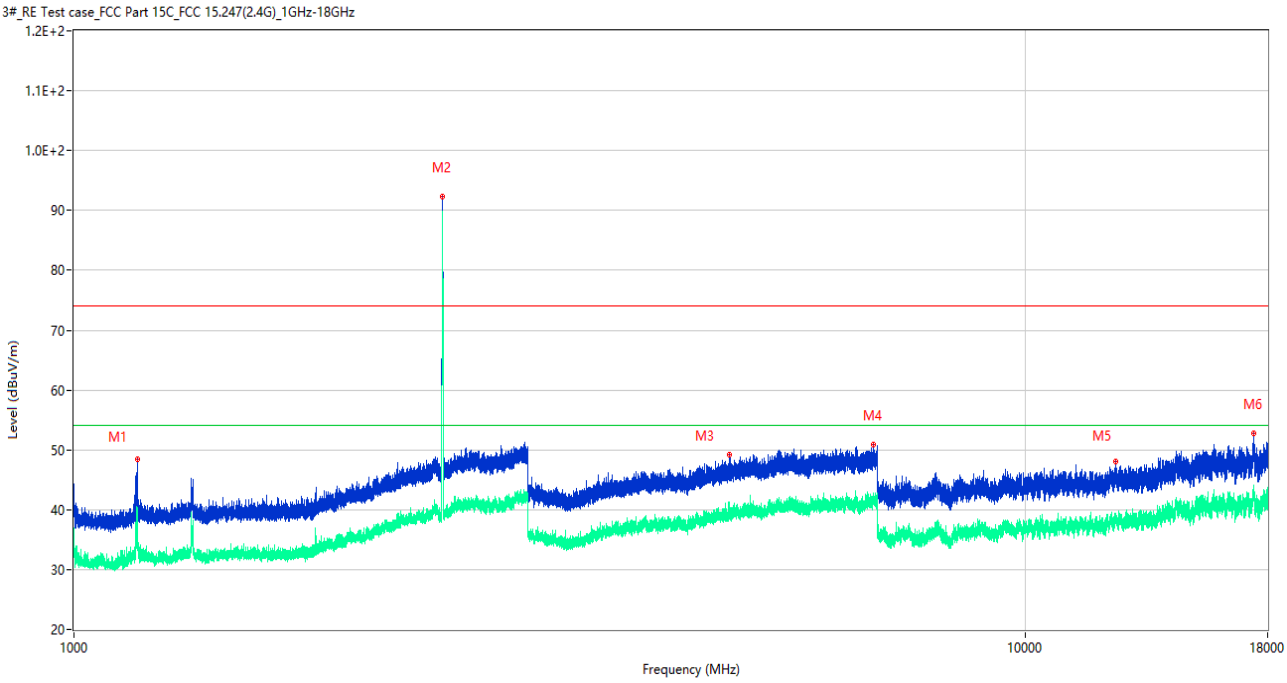
No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1166.100	49.04	74.0	24.96	Peak	25.00	300	Vertical	Pass
1**	1166.100	34.84	54.0	19.16	AV	25.00	300	Vertical	Pass
2	2405.900	91.36	74.0	-17.36	Peak	63.00	100	Vertical	N/A
2**	2405.900	87.69	54.0	-33.69	AV	63.00	100	Vertical	N/A
3	4988.800	48.60	74.0	25.40	Peak	200.00	100	Vertical	Pass
3**	4988.800	39.96	54.0	14.04	AV	200.00	100	Vertical	Pass
4	6175.200	50.84	74.0	23.16	Peak	119.00	400	Vertical	Pass
4**	6175.200	40.52	54.0	13.48	AV	119.00	400	Vertical	Pass
5	12340.312	48.03	74.0	25.97	Peak	14.00	100	Vertical	Pass
5**	12340.312	38.31	54.0	15.69	AV	14.00	100	Vertical	Pass
6	17802.600	51.82	74.0	22.18	Peak	226.00	150	Vertical	Pass
6**	17802.600	41.39	54.0	12.61	AV	226.00	150	Vertical	Pass

GFSK (4Mbps) MIDDLE CHANNEL 1 GHz to 18 GHz, ANT H



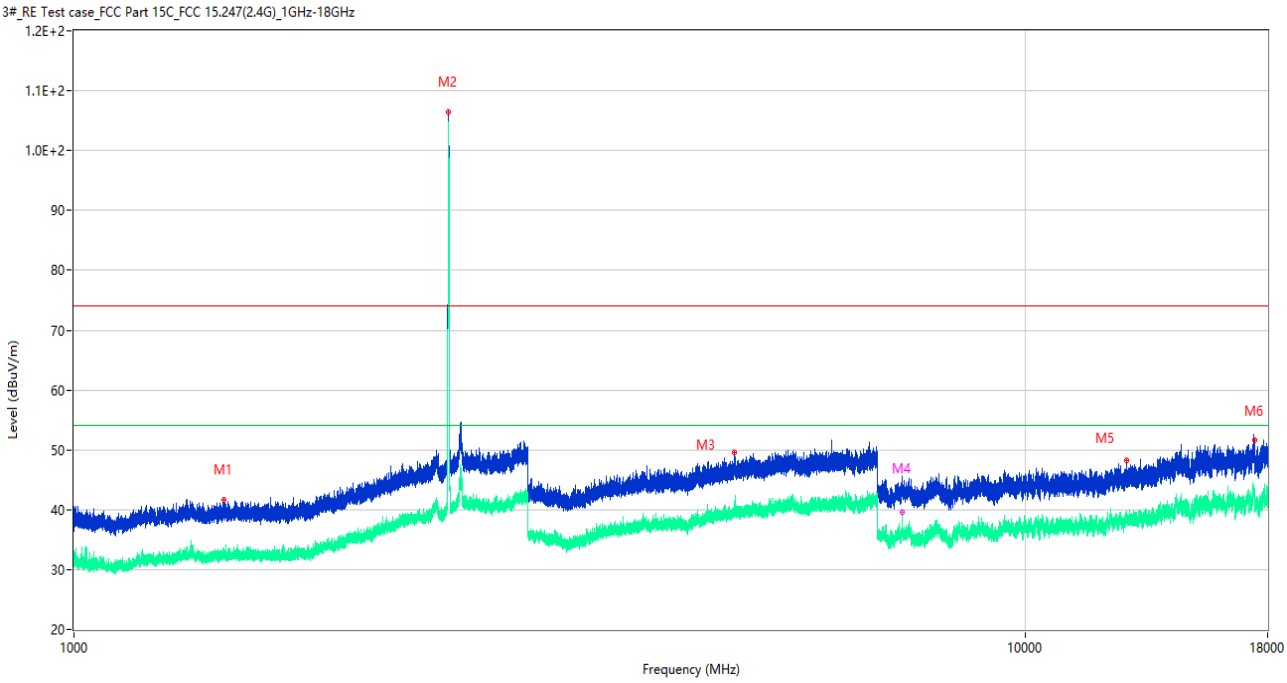
No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1330.300	42.63	74.0	31.37	Peak	140.00	100	Horizontal	Pass
1**	1330.300	34.97	54.0	19.03	AV	140.00	100	Horizontal	Pass
2	2440.000	104.28	74.0	-30.28	Peak	59.00	100	Horizontal	N/A
2**	2440.000	100.33	54.0	-46.33	AV	59.00	100	Horizontal	N/A
3	4823.600	48.60	74.0	25.40	Peak	0.00	200	Horizontal	Pass
3**	4823.600	39.19	54.0	14.81	AV	0.00	200	Horizontal	Pass
4	6944.000	51.06	74.0	22.94	Peak	216.00	300	Horizontal	Pass
4**	6944.000	41.00	54.0	13.00	AV	216.00	300	Horizontal	Pass
5	12599.063	47.55	74.0	26.45	Peak	282.00	100	Horizontal	Pass
5**	12599.063	38.63	54.0	15.37	AV	282.00	100	Horizontal	Pass
6	17430.901	51.73	74.0	22.27	Peak	218.00	400	Horizontal	Pass
6**	17430.901	42.58	54.0	11.42	AV	218.00	400	Horizontal	Pass

GFSK (4Mbps) MIDDLE CHANNEL 1 GHz to 18 GHz, ANT V



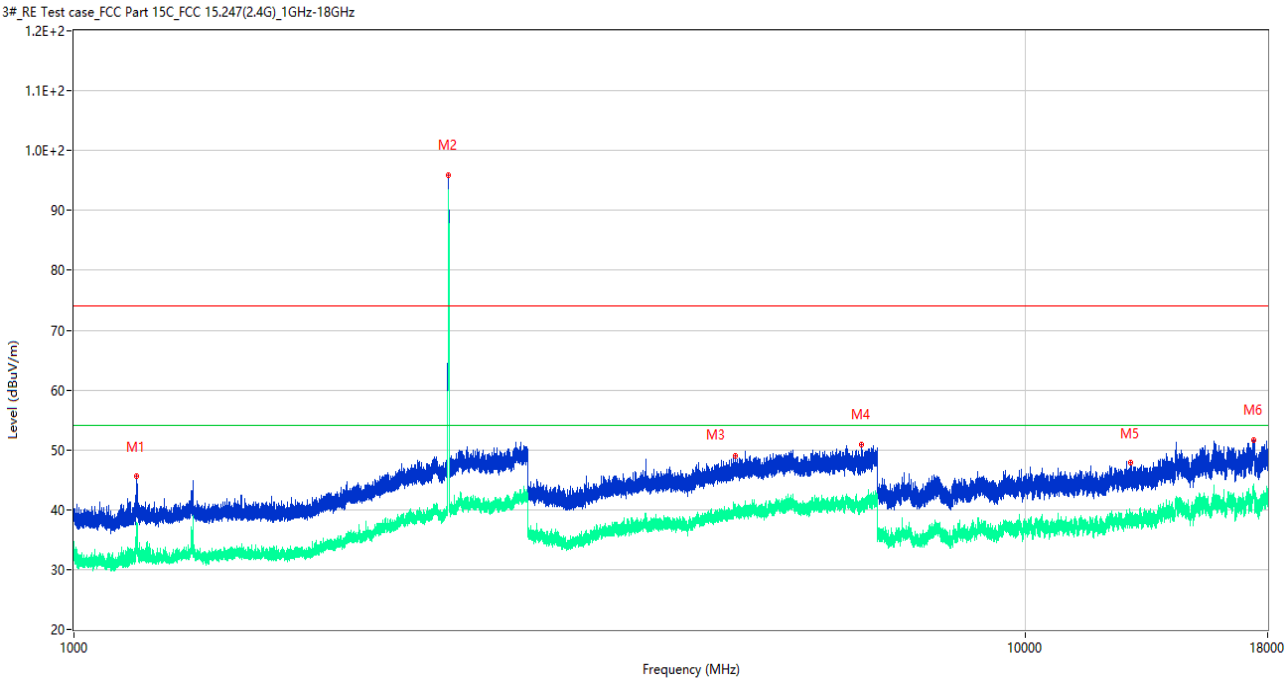
No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1165.500	48.40	74.0	25.60	Peak	0.00	400	Vertical	Pass
1**	1165.500	39.60	54.0	14.40	AV	0.00	400	Vertical	Pass
2	2440.000	92.27	74.0	-18.27	Peak	241.00	150	Vertical	N/A
2**	2440.000	86.74	54.0	-32.74	AV	241.00	150	Vertical	N/A
3	4883.800	49.24	74.0	24.76	Peak	360.00	150	Vertical	Pass
3**	4883.800	40.02	54.0	13.98	AV	360.00	150	Vertical	Pass
4	6931.000	50.80	74.0	23.20	Peak	282.00	400	Vertical	Pass
4**	6931.000	41.20	54.0	12.80	AV	282.00	400	Vertical	Pass
5	12461.350	48.10	74.0	25.90	Peak	330.00	400	Vertical	Pass
5**	12461.350	38.54	54.0	15.46	AV	330.00	400	Vertical	Pass
6	17390.737	52.86	74.0	21.14	Peak	268.00	150	Vertical	Pass
6**	17390.737	42.81	54.0	11.19	AV	268.00	150	Vertical	Pass

GFSK (4Mbps) HIGH CHANNEL 1 GHz to 18 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1438.700	41.71	74.0	32.29	Peak	360.00	200	Horizontal	Pass
1**	1438.700	32.79	54.0	21.21	AV	360.00	200	Horizontal	Pass
2	2478.000	106.53	74.0	-32.53	Peak	350.00	150	Horizontal	N/A
2**	2478.000	103.32	54.0	-49.32	AV	350.00	150	Horizontal	N/A
3	4951.800	49.47	74.0	24.53	Peak	294.00	100	Horizontal	Pass
3**	4951.800	41.02	54.0	12.98	AV	294.00	100	Horizontal	Pass
4	7431.250	44.09	74.0	29.91	Peak	328.00	150	Horizontal	Pass
4**	7431.250	39.65	54.0	14.35	AV	328.00	150	Horizontal	Pass
5	12800.663	48.32	74.0	25.68	Peak	172.00	400	Horizontal	Pass
5**	12800.663	38.61	54.0	15.39	AV	172.00	400	Horizontal	Pass
6	17428.802	51.56	74.0	22.44	Peak	287.00	200	Horizontal	Pass
6**	17428.802	43.40	54.0	10.60	AV	287.00	200	Horizontal	Pass

GFSK (4Mbps) HIGH CHANNEL 1 GHz to 18 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1163.500	45.55	74.0	28.45	Peak	204.00	100	Vertical	Pass
1**	1163.500	37.11	54.0	16.89	AV	204.00	100	Vertical	Pass
2	2476.000	95.99	74.0	-21.99	Peak	142.00	150	Vertical	N/A
2**	2476.000	90.94	54.0	-36.94	AV	142.00	150	Vertical	N/A
3	4955.600	48.93	74.0	25.07	Peak	47.00	100	Vertical	Pass
3**	4955.600	40.21	54.0	13.79	AV	47.00	100	Vertical	Pass
4	6728.400	50.90	74.0	23.10	Peak	0.00	400	Vertical	Pass
4**	6728.400	40.49	54.0	13.51	AV	0.00	400	Vertical	Pass
5	12929.025	47.81	74.0	26.19	Peak	325.00	400	Vertical	Pass
5**	12929.025	37.70	54.0	16.30	AV	325.00	400	Vertical	Pass
6	17395.988	51.72	74.0	22.28	Peak	325.00	300	Vertical	Pass
6**	17395.988	43.10	54.0	10.90	AV	325.00	300	Vertical	Pass

A.7 Band Edge (Restricted-band band-edge)

Note [1]: The lowest and highest channels are tested to verify the band edge emissions. Please refer to the following the plots for emissions values.

Note [2]: The test data all are tested in the vertical and horizontal antenna which the trace is max hold. So these plots have shown the worst case.

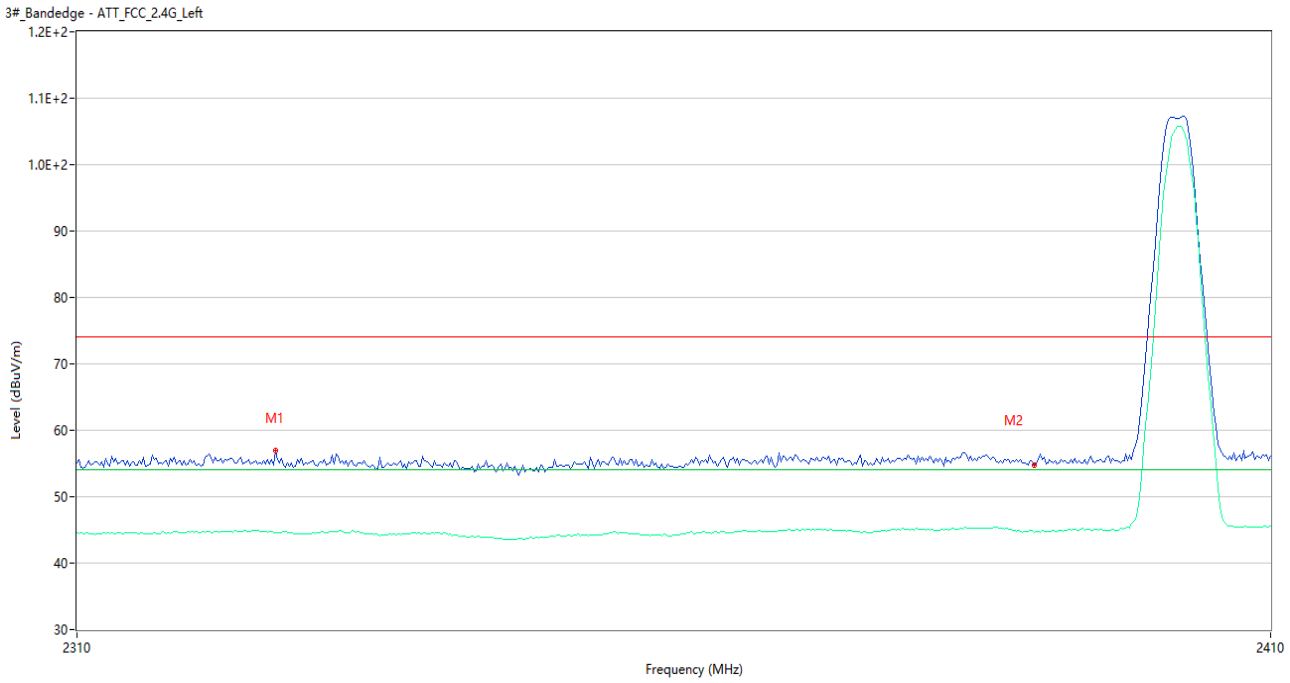
Note [3]: According the ANSI C63.10-2020, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note [4]: The Level (dBuV/m) has been corrected by factor.

Note [5]: Both horizontal and vertical directions were pre tested, only the worst configuration has been reported in this report.

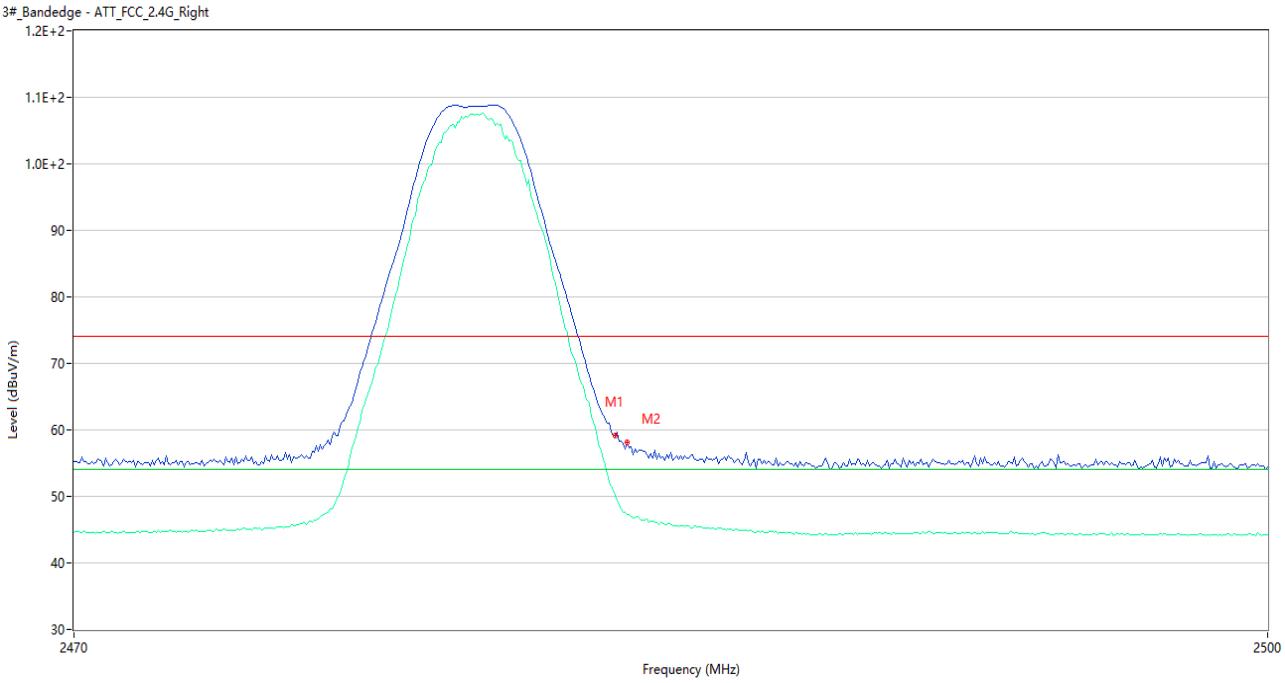
Test Data and Plots

GFSK (2Mbps) LOW CHANNEL



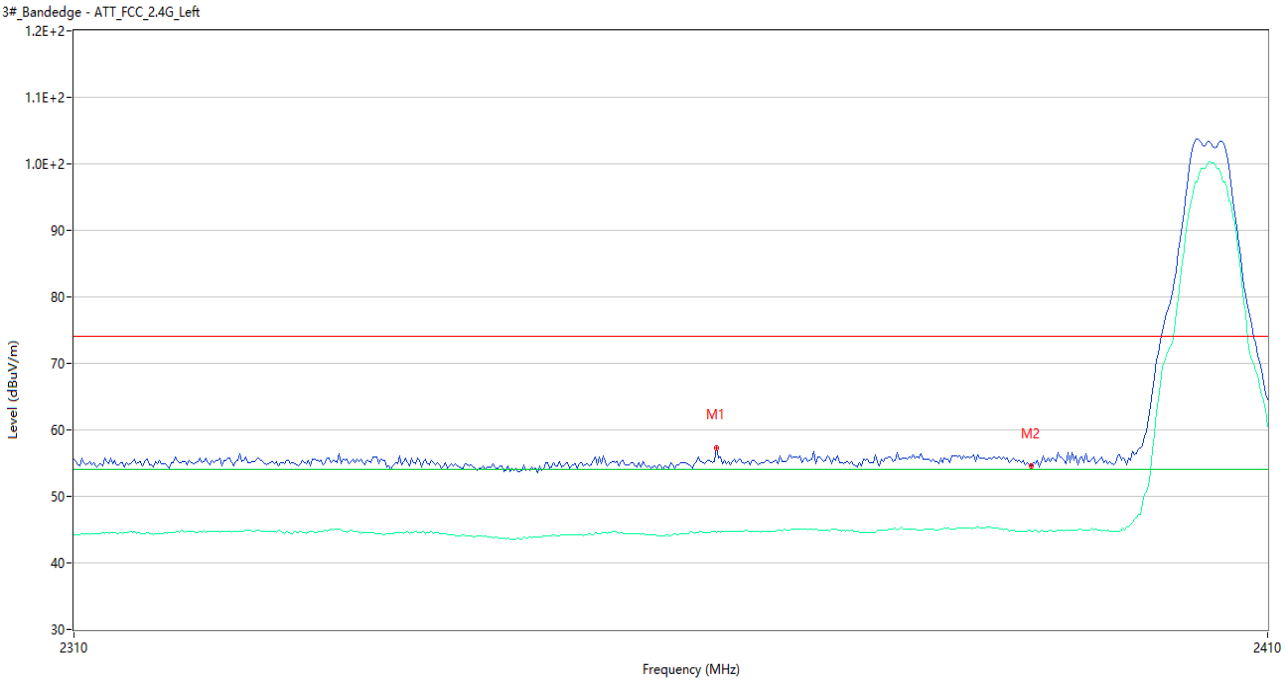
No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2326.333	56.89	74.0	17.11	Peak	222.00	200	Horizontal	Pass
1**	2326.333	44.58	54.0	9.42	AV	222.00	200	Horizontal	Pass
2	2389.833	54.73	74.0	19.27	Peak	329.00	150	Horizontal	Pass
2**	2389.833	44.61	54.0	9.39	AV	329.00	150	Horizontal	Pass

GFSK (2Mbps) HIGH CHANNEL



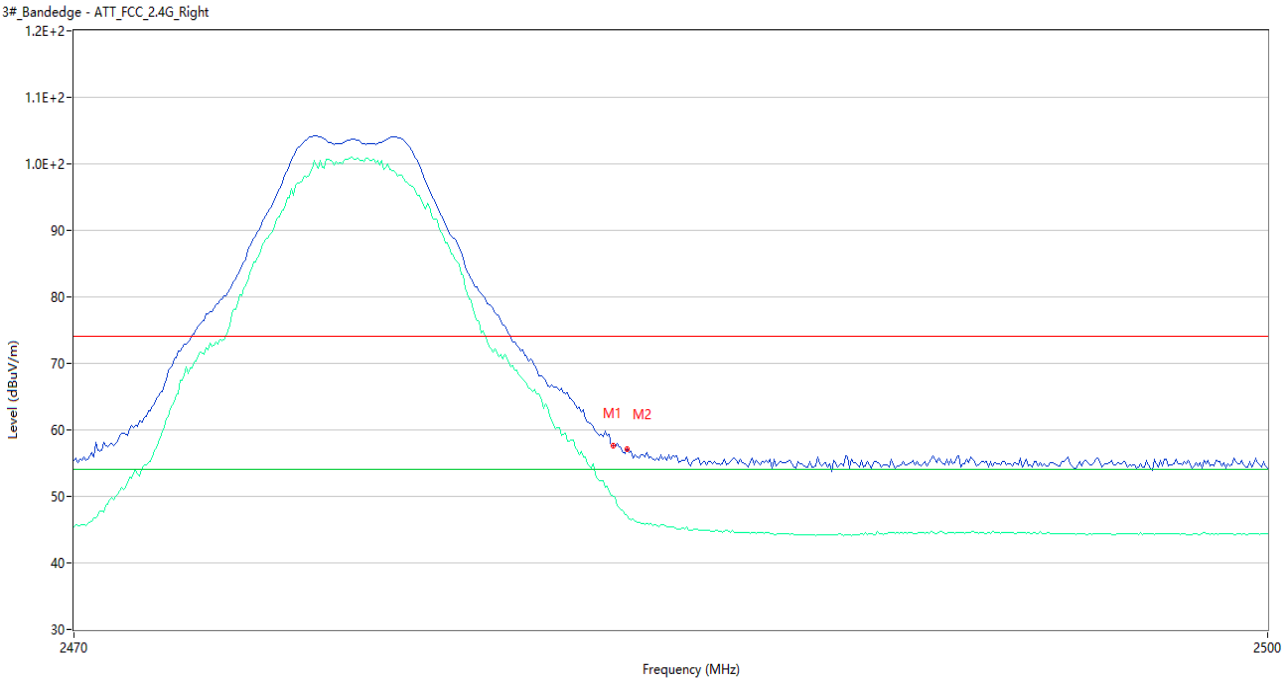
No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.550	59.18	74.0	14.82	Peak	34.00	100	Horizontal	Pass
1**	2483.550	50.24	54.0	3.76	AV	34.00	100	Horizontal	Pass
2	2483.850	58.20	74.0	15.80	Peak	73.00	150	Horizontal	Pass
2**	2483.850	47.30	54.0	6.70	AV	73.00	150	Horizontal	Pass

GFSK (4Mbps) LOW CHANNEL



No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2363.333	57.33	74.0	16.67	Peak	343.00	200	Horizontal	Pass
1**	2363.333	44.62	54.0	9.38	AV	343.00	200	Horizontal	Pass
2	2389.833	54.55	74.0	19.45	Peak	330.00	100	Horizontal	Pass
2**	2389.833	44.77	54.0	9.23	AV	330.00	100	Horizontal	Pass

GFSK (4Mbps) HIGH CHANNEL



No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	57.57	74.0	16.43	Peak	259.00	150	Horizontal	Pass
1**	2483.500	50.05	54.0	3.95	AV	259.00	150	Horizontal	Pass
2	2483.850	57.04	74.0	16.96	Peak	36.00	100	Horizontal	Pass
2**	2483.850	47.04	54.0	6.96	AV	36.00	100	Horizontal	Pass

A.8 Power Spectral Density (PSD)

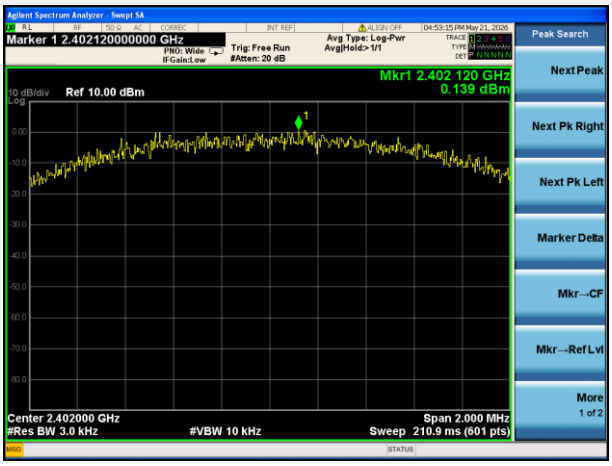
Test Data

GFSK (2Mbps)			
Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
Low Channel	0.14	8	Pass
Middle Channel	1.35	8	Pass
High Channel	1.10	8	Pass

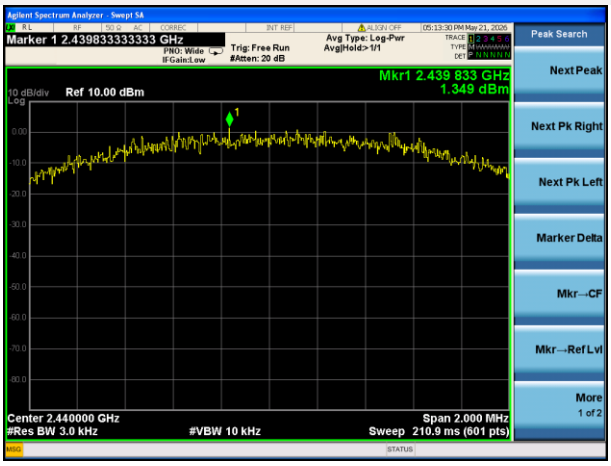
GFSK (4Mbps)			
Channel	Spectral power density (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
Low Channel	-6.27	8	Pass
Middle Channel	-6.09	8	Pass
High Channel	-6.16	8	Pass

Test Plots

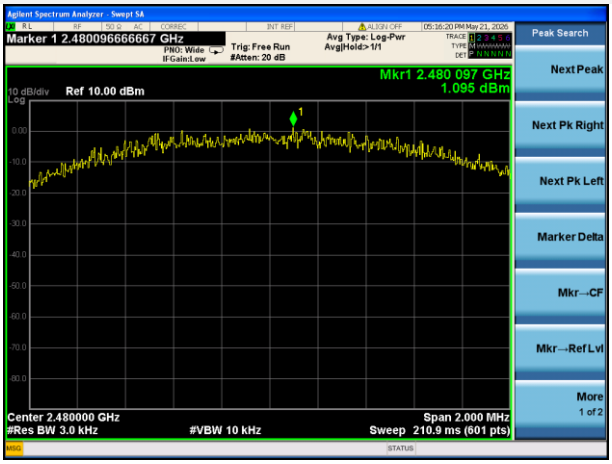
GFSK (2Mbps) LOW CHANNEL



GFSK (2Mbps) MIDDLE CHANNEL

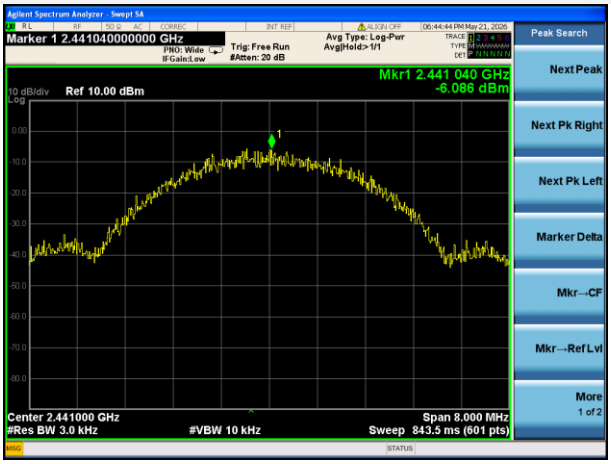


GFSK (2Mbps) HIGH CHANNEL

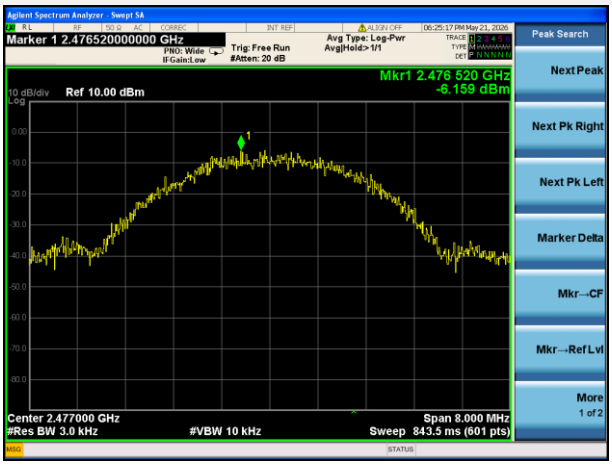


GFSK (4Mbps) LOW CHANNEL

GFSK (4Mbps) MIDDLE CHANNEL



GFSK (4Mbps) HIGH CHANNEL



ANNEX B TEST SETUP PHOTOS

Please refer the document “Ti-EE26030442-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “Ti-EE26030442-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “Ti-EE26030442-AI.PDF”.

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the “inspection and testing dedicated stamp” or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--