TEST REPORT

Applicant:	Libre Wireless Technologies, Inc.
Address:	27136 Burbank, Foothill Ranch, CA, 92610
Equipment Type:	High Performance Wireless Media Module
Model Name:	LS10A (refer to section 2.3)
Brand Name:	Libre Wireless
FCC ID:	2ADBM-LS10A
ISED Number:	20276-LS10A
Test Standard:	47 CFR Part 15 Subpart C RSS-Gen Issue 5 RSS-247 Issue 4 (refer to section 3.1)
Sample Arrival Date:	May 09, 2026
Test Date:	May 16, 2026 - May 24, 2026
Date of Issue:	Jul. 01, 2026

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Li Renyu

Checked by: Li Canming

Approved by: Tolan Tu

(Testing Director)

Revision History

Version	Issue Date	Revisions
Rev. 01	Jun. 12, 2026	Initial Issue
Rev. 02	Jul. 01, 2026	Add "HVIN Number" in Chapter 2.3

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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	Libre Wireless Technologies, Inc.
Address	27136 Burbank, Foothill Ranch, CA, 92610

2.2 Manufacturer Information

Manufacturer	Libre Wireless Technologies, Inc.
Address	27136 Burbank, Foothill Ranch, CA, 92610

2.3 General Description for Equipment under Test (EUT)

EUT Name	High Performance Wireless Media Module
Model Name Under Test	LS10A
Series Model Name	LS10A-EX-44G-B, LS10A-NX-44G-B, LS10A-EN-44G-B, LS10A-NN-44G-B
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in model name and whether there is Ethernet. (this information provided by the applicant)
HVIN Number	LS10A-EX-44G-B, LS10A-NX-44G-B
Serial Number	20260302LS10A
Hardware Version	VC1.0
Software Version	3887
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

Antenna Information:

Antenna Manufacturer	Model	Antenna Type	Antenna Gain
AUDEN COMMUNICATIONS & MULTIMEDIA TECHNO (KUNSHAN) CO., LTD	LSANT-1C-180	PCB	3.5 dBi
Suzhou Point Positive Electronic Technology Co., Ltd	RC1WFI0886A	Rod	2.6651 dBi
AUDEN COMMUNICATIONS & MULTIMEDIA TECHNO (KUNSHAN) CO., LTD	AUK01966B-2.4&5.8G	FPC	3.0 dBi
Note: Antenna model AUK01966B-2.4&5.8G and RC1WFI0886A are alternative antennas, the max gain antenna is chosen for all test.			

2.4 Technical Information

Network and Wireless connectivity	Bluetooth (BR+EDR+BLE) WIFI 802.11a, 802.11b, 802.11g, 802.11n, 802.11ac and 802.11ax

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

Modulation Technology	FHSS
Modulation Type	GFSK, π/4-DQPSK, 8DPSK
Product Type	☒ Mobile ☐ Portable ☐ Fix Location
Transfer Rate	DH5: 1 Mbps 2DH5: 2 Mbps 3DH5: 3 Mbps
Frequency Range	The frequency range used is 2400 MHz to 2483.5 MHz.
Number of Channel	79 (at intervals of 1 MHz)
Tested Channel	0 (2402 MHz), 39 (2441 MHz), 78 (2480 MHz)
Antenna Type	PCB Antenna
Antenna Gain	3.5 dBi
Antenna Impedance	50 Ω
Antenna System (MIMO Smart Antenna)	N/A

All channel was listed on the following table:

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

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 Test Verdict

No.	Description	FCC Part No.	ISED Part No.	Channel	Test Result	Verdict	Remark
1	Antenna Requirement	15.203	RSS-Gen, 6.8	N/A	--	Pass	Note [1]
2	Number of Hopping Frequencies	15.247(a)	RSS-247, 6.2.3.1 (b)	Hopping Mode	ANNEX A.1	Pass	Note [2]
3	Peak Output Power and E.I.R.P	15.247(b)	RSS-247, 6.2.3.2	Low/Middle/ High	ANNEX A.2	Pass	--
4	Occupied Bandwidth	15.247(a)	RSS-247, 6.2.1 (a)	Low/Middle/ High	ANNEX A.3	Pass	--
5	Carrier Frequency Separation	15.247(a)	RSS-247, 6.2.3.1 (a)	Hopping Mode	ANNEX A.4	Pass	Note [2]
6	Time of Occupancy (Dwell time)	15.247(a)	RSS-247, 6.2.3.1 (b)	Hopping Mode	ANNEX A.5	Pass	Note [2]
7	Conducted Spurious Emission & Authorized-band band-edge	15.247(d)	RSS-247, 6.6	Hopping Mode; Low/Middle/ High	ANNEX A.6	Pass	Note [2]
8	Conducted Emission	15.207	RSS-GEN, 8.8	Low/Middle/ High	ANNEX A.7	Pass	Note [2]
9	Radiated Spurious Emission	15.209 15.247(d)	RSS-247, 6.6	Low/Middle/ High	ANNEX A.8	Pass	Note [2]
10	Band Edge(Restricted-band band-edge)	15.209 15.247(d)	RSS-247, 6.6	Low/High	ANNEX A.9	Pass	Note [2]
11	Receiver Spurious Emissions	--	RSS-Gen, 7.3	--	--	N/A	Note [3]

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

Note [2]: π/4-DQPSK is the EDR 2M rate mode, 8DPSK is the EDR 3M rate mode. The consistency of test results in π/4-DQPSK and 8DPSK is very high. So we chose 8DPSK as a typical representative to appear on the report. Another we will show all the modes on the RF output power test item.

Note [3]: 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.

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

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

Relative Humidity	43% to 67%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+18.9℃ to +27.5℃
Working Voltage of the EUT	NV (Normal Voltage)	12V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	KEYSIGHT	N9020A	MY54420186	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	3117	00108482	2025.10.19	2028.10.18
Test Antenna-Loop	Schwarzbeck	FMZB 1513-60	00015	2026.05.12	2027.05.11
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.

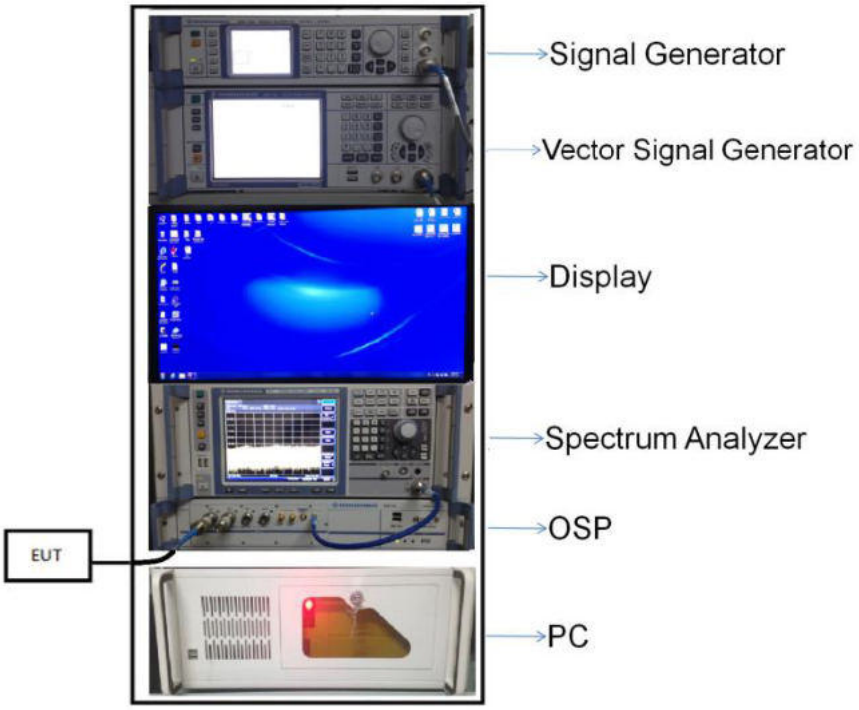
Parameters	Uncertainty
Occupied Channel Bandwidth	2.8%
RF output power, conducted	1.28 dB
Power Spectral Density, conducted	1.30 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.36 dB
Temperature	0.8°C
Humidity	4%

4.5 Description of Test Setup

4.5.1 For Antenna Port Test

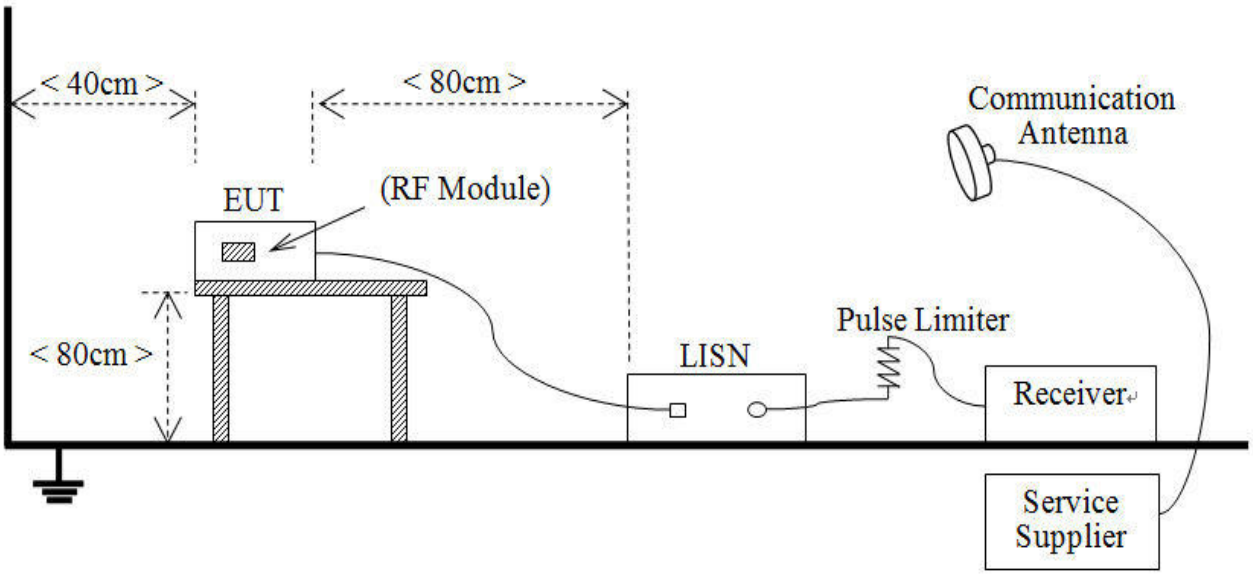
Conducted value (dBm) = Measurement value (dBm) + cable loss (dB)

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



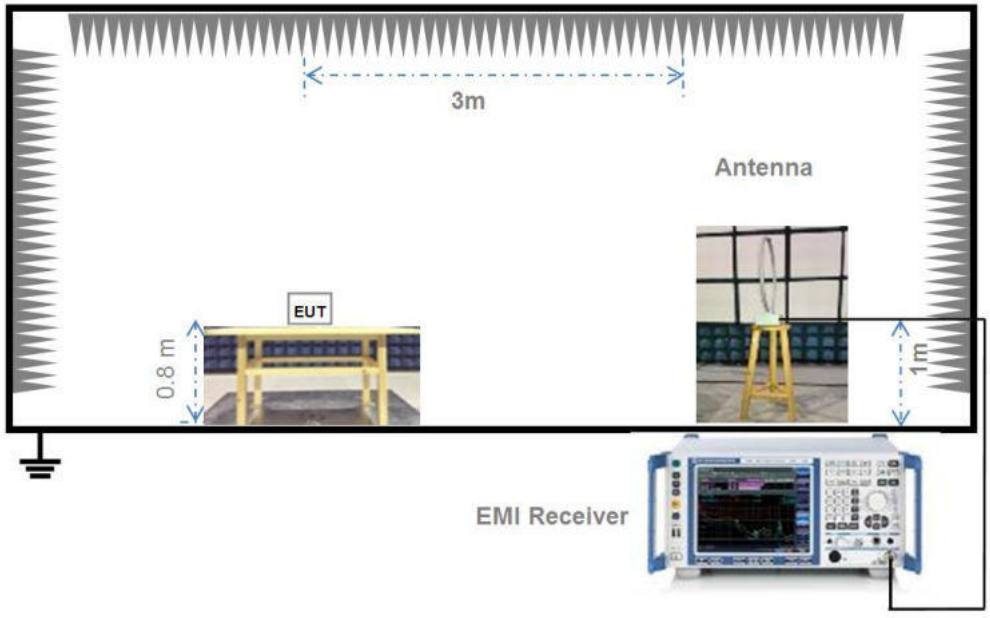
(Diagram 1)

4.5.2 For AC Power Supply Port Test



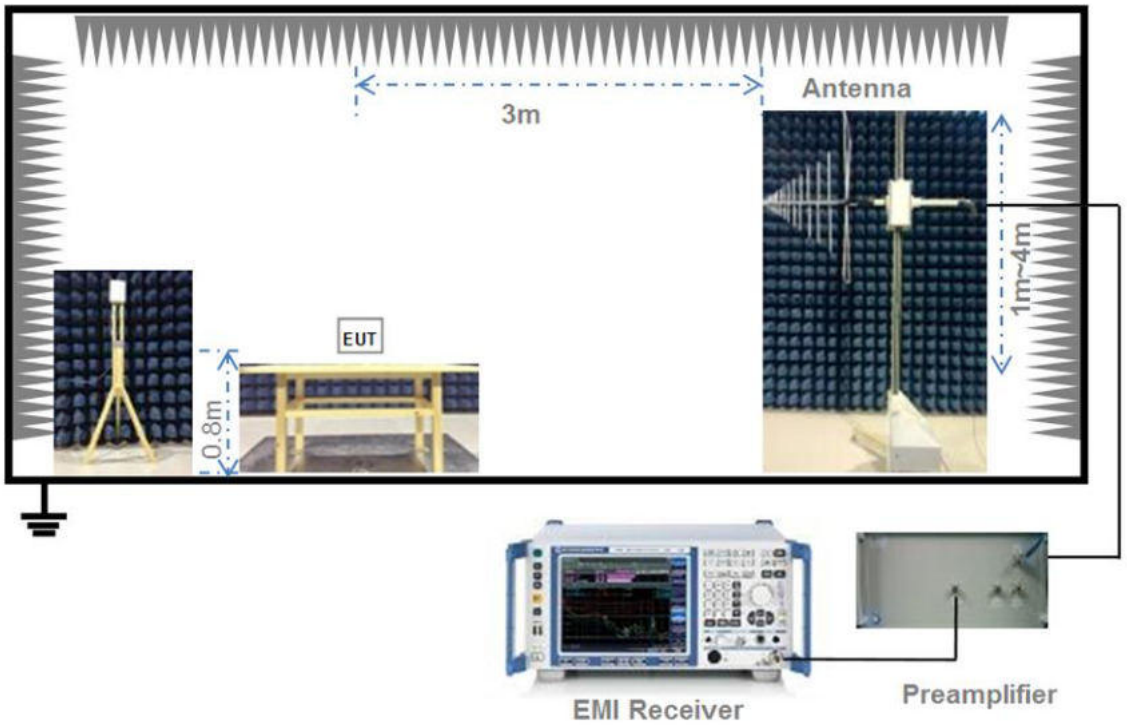
(Diagram 2)

4.5.3 For Radiated Test (Below 30 MHz)



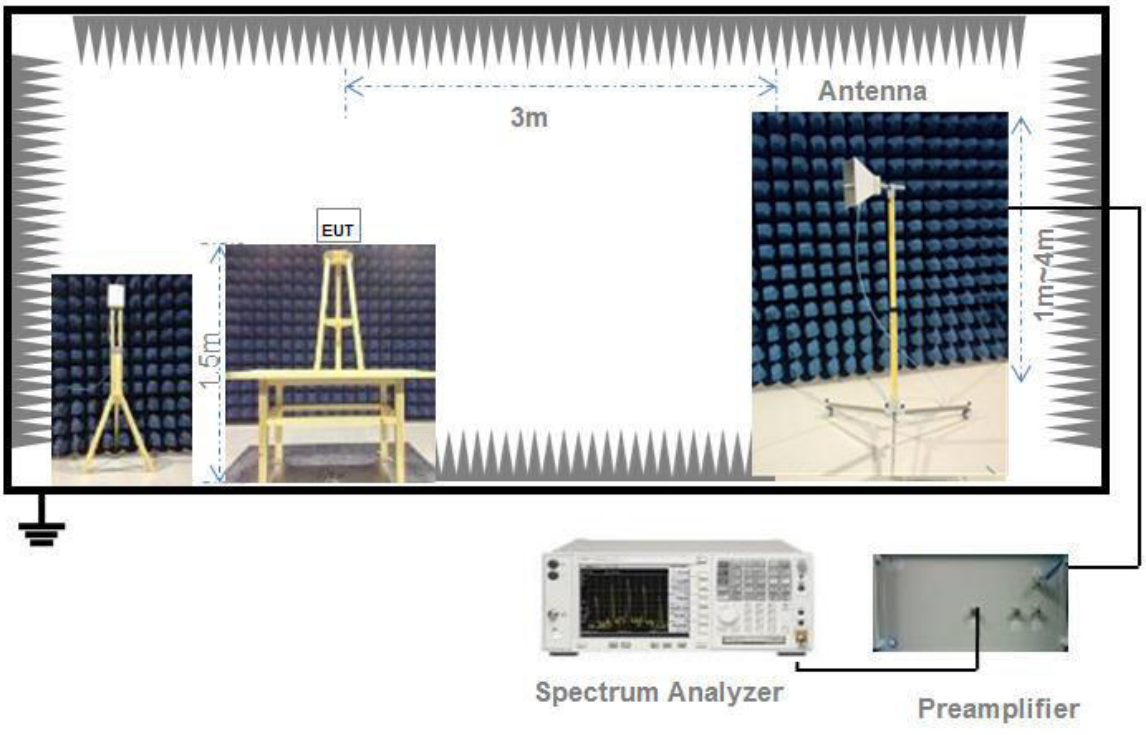
(Diagram 3)

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.

5 TEST ITEMS

5.1 Antenna Requirements

5.1.1 Relevant Standards

FCC §15.203 & 15.247(b); RSS-Gen, 6.8

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 Frequency Hopping Systems

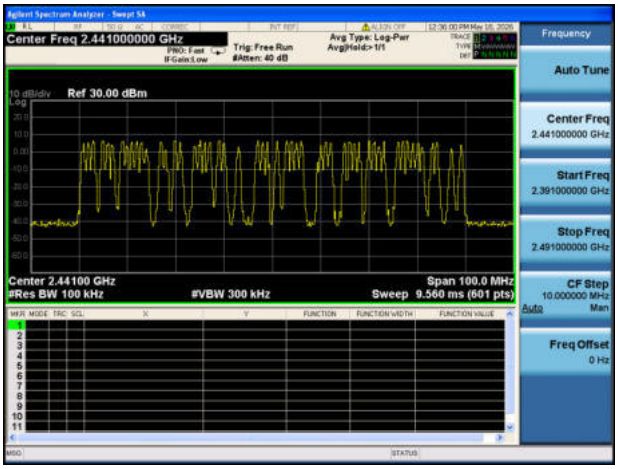
5.2.1 Relevant Standards

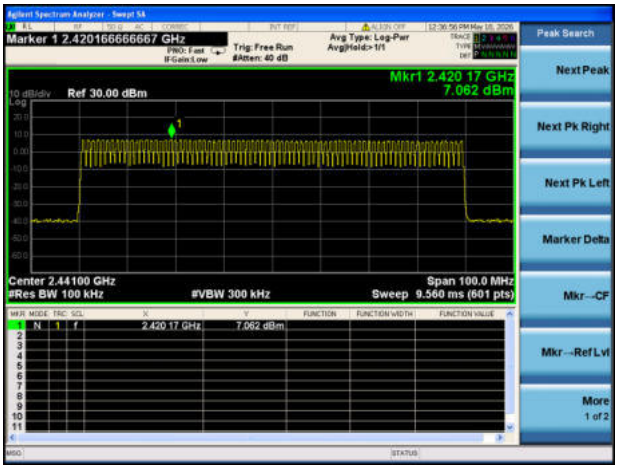
FCC §15.247(a) (1) (i) (ii) (iii) (iv); FCC §15.247(g); FCC §15.247(h);
Describe how the hopping sequence is generated. Provide an example of the hopping sequence channels, to demonstrate that the sequence meets the requirement specified in the definition of an FHSS system. Per the definition in Section 2.1(c), the hop set shall appear as random in the near term, shall appear as evenly distributed in the long term, and sequential hops shall be randomly distributed in both direction and magnitude of change.
Describe how each individual EUT meets the requirement that each of its hopping channels is used equally on average (e.g., that each new transmission event begins on the next channel in the hopping sequence after the final channel used in the previous transmission event).
Describe how the associated receiver(s) complies with the requirement that the input bandwidth (either RF or IF) matches the bandwidth of the transmitted signal.
Describe how the associated receiver(s) has the ability to shift frequencies in synchronization with the transmitted signals.
For short burst systems, describe how the EUT complies with the requirement that it be designed to be capable of operating as a true frequency hopping system. Specifically, the device shall comply with the equal frequency use and pseudorandom hopping sequence requirement when transmitting in short bursts, and shall be designed to comply when presented with continuous data (or information) stream.
Describe how the EUT complies with the requirement that it not have the ability to be coordinated with other FHSS systems in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

5.2.2 Description of the systems

1. According to the preset procedure of the whole network, all the stations in the automatic control network synchronously change the frequency multiple times within one second, and temporarily stay on each frequency hopping channel. Periodic synchronization signaling is sent from the primary station, instructing all slaves to simultaneously change the operating frequency, then the hopping sequence is generated.
2. The hop set shall appear as random in the near term, shall appear as evenly distributed in the long term, and sequential hops shall be randomly distributed in both direction and magnitude of change.

Reference Documents





3. Channels are classified into two categories, used and unused, where used channels are part of the hopping sequence and unused channels are replaced in the hopping sequence by used channels in a pseudo-random way. Make each individual EUT meets the requirement that each of its hopping channels is used equally on average.
4. The input bandwith and transmitted bandwith are both 1MHz, the associated receiver(s) complies with the requirement that the input bandwidth matches the bandwidth of the transmitted signal.
5. Connected devices communicate on the same physical channel by synchronizing with a common clock and hopping sequence.
6. EUT isn't short burst systems.
7. EUT can't have the ability to be coordinated with other FHSS systems in an effort.

5.3 Number of Hopping Frequencies

5.3.1 Limit

FCC §15.247(a) (1) (iii); RSS-247, 6.2.3.1(b)

Frequency hopping systems operating in the 2400 MHz to 2483.5 MHz bands shall use at least 15 hopping frequencies.

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

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = The frequency band of operation

RBW = To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize

5.3.4 Test Result

Please refer to ANNEX A.1.

5.4 Peak Output Power and E.I.R.P

5.4.1 Test Limit

FCC § 15.247(b)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

RSS-247, 6.2.3.2

The following transmitter output power and e.i.r.p. requirements shall apply:

a. if the hopset uses 75 or more hopping channels, the maximum peak conducted output power shall not exceed 1.0 W.

b. if the hopset uses less than 75 hopping channels the maximum peak conducted output power shall not exceed 0.125 W.

c. the e.i.r.p. shall not exceed 4 W, except as provided in sections 6.5 a) and b).

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 Module operates at hopping-off test mode. The lowest, middle and highest channels are selected to perform testing to verify the conducted RF output peak power of the Module.

Use the following spectrum analyzer settings:

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

RBW > the 20 dB bandwidth of the emission being measured

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize.

5.4.4 Test Result

Please refer to ANNEX A.2.

5.5 Occupied Bandwidth

5.5.1 Limit

FCC §15.247(a); RSS-247, 6.2.1 (a)

Measurement of the 20dB bandwidth of the modulated signal.

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

20dB bandwidth

use the following spectrum analyzer settings:

Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel

RBW = in the range of 1% to 5% of the OBW

VBW ≥ 3*RBW

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate, Allow the trace to stabilize.

99% bandwidth

use the following spectrum analyzer settings:

Span = approximately 1.5 to 5 times the 99% bandwidth, centered on a hopping channel

RBW = in the range of 1% to 5% of the OBW

VBW ≥ 3*RBW

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate, Allow the trace to stabilize.

Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

5.5.4 Test Result

Please refer to ANNEX A.3.

5.6 Carrier Frequency Separation

5.6.1 Limit

FCC §15.247(a); RSS-247, 6.2.3.1(a)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 2/3 of the 20 dB bandwidth of the hopping channel, whichever is greater.

5.6.2 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.

5.6.3 Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span

Video (or Average) Bandwidth (VBW) ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

5.6.4 Test Result

Please refer to ANNEX A.4.

5.7 Time of Occupancy (Dwell time)

5.7.1 Limit

FCC §15.247(a); RSS-247, 6.2.3.1(b)

Frequency hopping systems in the 2400 MHz - 2483.5 MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

5.7.2 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.

5.7.3 Test Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
Span: Zero span, centered on a hopping channel
RBW shall be $\leqslant$ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel
Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel
Detector function: Peak
Trace: Max hold

Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.

The average time of occupancy on any channel within the Period can be calculated with formulas:
For GFSK and 8DPSK:
For DH1 package type
{Total of Dwell} = {Pulse Time} * (1600 / 2) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}
For DH3 package type
{Total of Dwell} = {Pulse Time} * (1600 / 4) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}
For DH5 package type
{Total of Dwell} = {Pulse Time} * (1600 / 6) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}
For AFH Mode:
For DH1 package type
{Total of Dwell} = {Pulse Time} * (800 / 2) / {Number of Hopping Frequency} * {Period}

{Period} = 0.4 s * {Number of Hopping Frequency}
For DH3 package type
{Total of Dwell} = {Pulse Time} * (800 / 4) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}
For DH5 package type
{Total of Dwell} = {Pulse Time} * (800 / 6) / {Number of Hopping Frequency} * {Period}
{Period} = 0.4 s * {Number of Hopping Frequency}

The lowest, middle and highest channels are selected to perform testing to record the dwell time of each occupation measured in this channel, which is called Pulse Time here.

5.7.4 Test Result

Please refer to ANNEX A.5.

5.8 Conducted Spurious Emission & Authorized-band band-edge

5.8.1 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.

5.8.2 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.

5.8.3 Test Procedure

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.
RBW = 100 kHz
VBW = 300 kHz
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize

5.8.4 Test Result

Please refer to ANNEX A.6.

5.9 Conducted Emission

5.9.1 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

5.9.2 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.

5.9.3 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.

5.9.4 Test Result

Please refer to ANNEX A.7.

5.10 Radiated Spurious Emission

5.10.1 Limit

FCC §15.209&15.247(d); 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).

5.10.2 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.

5.10.3 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 Table 1.

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).

Table 1—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 30 MHz 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

5.10.4 Test Result

Please refer to ANNEX A.8.

5.11 Band Edge (Restricted-band band-edge)

5.11.1 Limit

FCC §15.209&15.247(d)

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).

5.11.2 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.

5.11.3 Test Procedure

The following procedures may be used to determine the average field strength or power of an unwanted emission that is within 2 MHz of the authorized band-edge. Use the procedure described in 11.12.3.2.2 when using an average detector and the EUT can be configured to transmit continuously (i.e., $D \geq 98\%$). Use the procedure described in 11.12.3.2.3 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%). Use the procedure described in 11.12.3.2.4 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%).
If the EUT can be configured or modified to transmit continuously (D ≥ 98%), measured using the following method (with EUT transmitting continuously):

Use the following spectrum analyzer settings:

Set instrument center frequency to the frequency of the emission to be measured (must be within

2 MHz of the authorized band-edge).

RBW = 100 kHz.

VBW ≥ [3 × RBW].

Detector = Power averaging (rms), if [span / (# of points in sweep)] ≤ (RBW / 2).

Averaging type = power (i.e., rms):

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

Some instruments require linear display mode to use linear voltage averaging. Log or dB

averaging shall not be used.

Sweep time = auto.

Perform a trace average of at least 100 traces.

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.

If continuous transmission of the EUT (D ≥ 98%) cannot be achieved and the duty cycle is constant (duty cycle variations are less ±2%), then the following procedure may be used to measure the average power of unwanted emissions within 2 MHz of the authorized band-edge:

RBW = 100 kHz.

VBW ≥ [3 × RBW].

Detector = Power averaging (rms), if [span / (# of points in sweep)] ≤ (RBW / 2).

Averaging type = power (i.e., rms):

Detector = Power averaging (rms), if [span / (# of points in sweep)] ≤ (RBW / 2). Satisfying this condition might 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.

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 to use linear voltage averaging. Log or dB averaging shall not be used.

Sweep time = auto.

Perform a trace average of at least 100 traces.

Compute the power by integrating the spectrum over 1 MHz using the instrument's band-power measurement function with band limits set equal to the emission frequency (femission) ± 0.5 MHz. If the spectrum analyzer 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.

A correction factor shall be added to the measurement results prior to comparing with the emission limit to compute the emission level that would have been measured had the test been performed at 100% 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 / D)], where D is the duty cycle.

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

3) If a specific emission is demonstrated to be continuous (D ≥ 98%) rather than turning ON and

OFF with the transmit cycle, then no duty cycle correction is required for that emission.

Reduction of the measured emission amplitude levels to account for operational duty cycle is not permitted. Determining compliance is based on emission levels occurring during transmission—it is not based on an average across ON and OFF times of the transmitter.

5.11.4 Test Result

Please refer to ANNEX A.9.

ANNEX A TEST RESULT

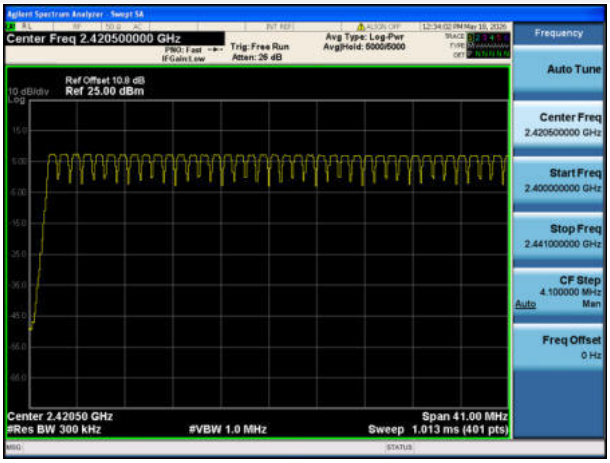
A.1 Number of Hopping Frequency

Test Data

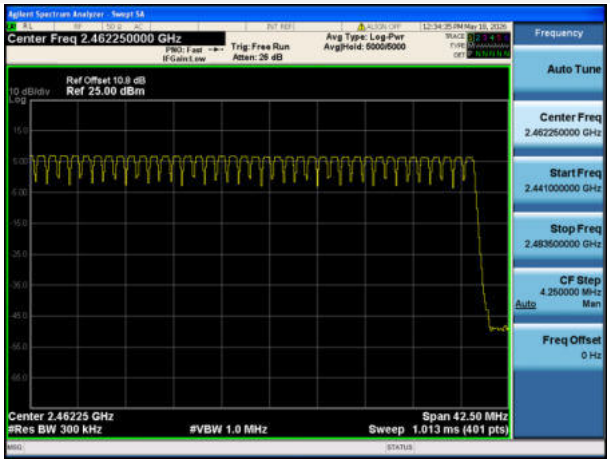
Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Verdict
GFSK	2400 - 2483.5	79	15	Pass
8DPSK	2400 - 2483.5	79	15	Pass

Test Plots

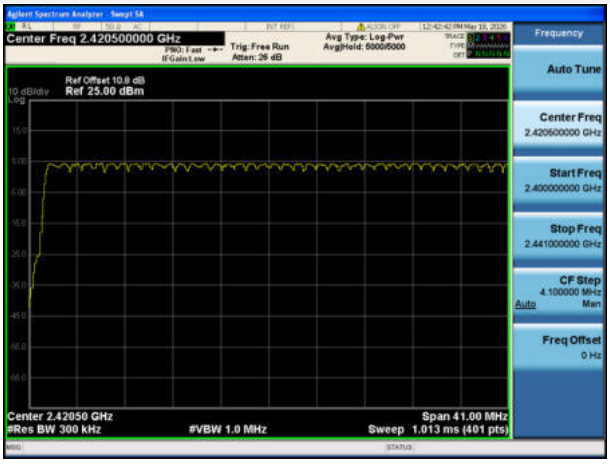
GFSK 2.4 GHz ~ 2.4415 GHz



GFSK 2.4415 GHz ~ 2.4835 GHz



8DPSK 2.4 GHz ~ 2.4415 GHz



8DPSK 2.4415 GHz ~ 2.4835 GHz

A.2 Peak Output Power and E.I.R.P

Peak Power Test Data

Channel	Measured Output Peak Power						Limit		Verdict
	GFSK		π/4-DQPSK		8DPSK		dBm	mW	
	dBm	mW	dBm	mW	dBm	mW			
Low	7.54	5.68	6.43	4.39	6.76	4.74	21	125	Pass
Middle	7.01	5.03	6.27	4.24	6.58	4.55			Pass
High	6.40	4.37	6.19	4.16	6.45	4.42			Pass

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

Channel	E.I.R.P						Limit		Verdict
	GFSK		π/4-DQPSK		8DPSK		dBm	mW	
	dBm	mW	dBm	mW	dBm	mW			
Low	11.04	12.71	9.93	9.84	10.26	10.61	36	4000	Pass
Middle	10.51	11.26	9.77	9.49	10.08	10.19			Pass
High	9.90	9.77	9.69	9.31	9.95	9.89			Pass

Test Plots

GFSK LOW CHANNEL

GFSK MIDDLE CHANNEL

GFSK HIGH CHANNEL

π/4-DQPSK LOW CHANNEL

π/4-DQPSK MIDDLE CHANNEL

π/4-DQPSK HIGH CHANNEL

8DPSK LOW CHANNEL

8DPSK MIDDLE CHANNEL

8DPSK HIGH CHANNEL

A.3 20 dB and 99% bandwidth

Test Data

GFSK		
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	0.960000	0.865310
Middle	0.960000	0.868180
High	0.960000	0.864370
π/4-DQPSK		
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	1.342500	1.175600
Middle	1.335200	1.177100
High	1.342500	1.175800
8DPSK		
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	1.297400	1.179400
Middle	1.297400	1.179800
High	1.297400	1.183800

Test Plots

20 dB Bandwidth

GFSK LOW CHANNEL

GFSK MIDDLE CHANNEL

GFSK HIGH CHANNEL

π/4-DQPSK LOW CHANNEL

π/4-DQPSK MIDDLE CHANNEL

π/4-DQPSK HIGH CHANNEL

8DPSK LOW CHANNEL

8DPSK MIDDLE CHANNEL

8DPSK HIGH CHANNEL

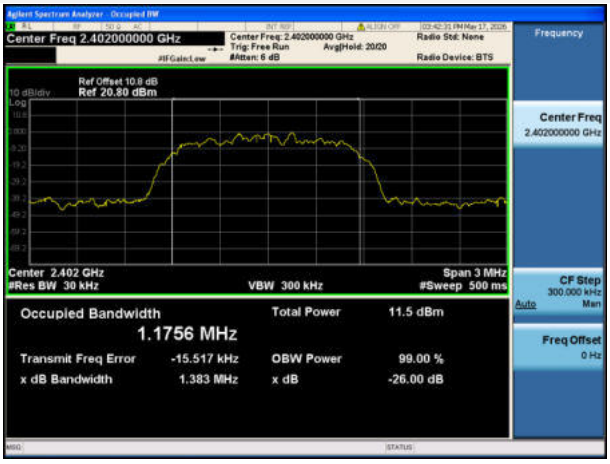
99% Bandwidth

GFSK LOW CHANNEL

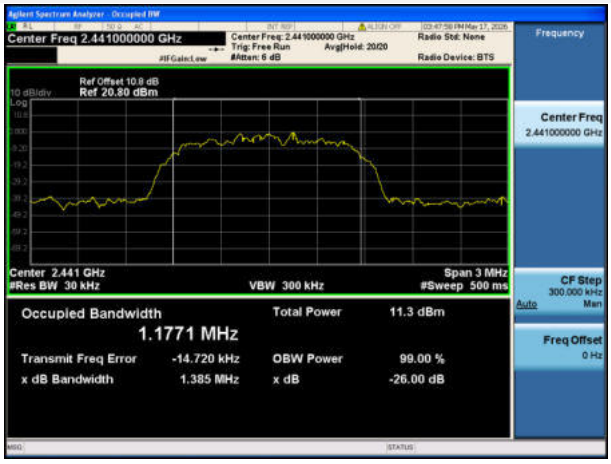
GFSK MIDDLE CHANNEL

GFSK HIGH CHANNEL

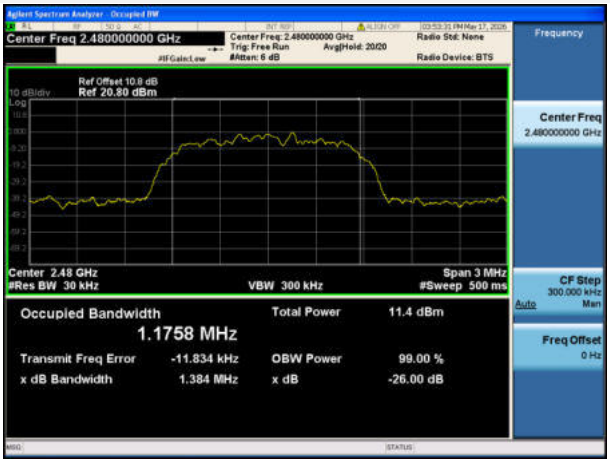
π/4-DQPSK LOW CHANNEL



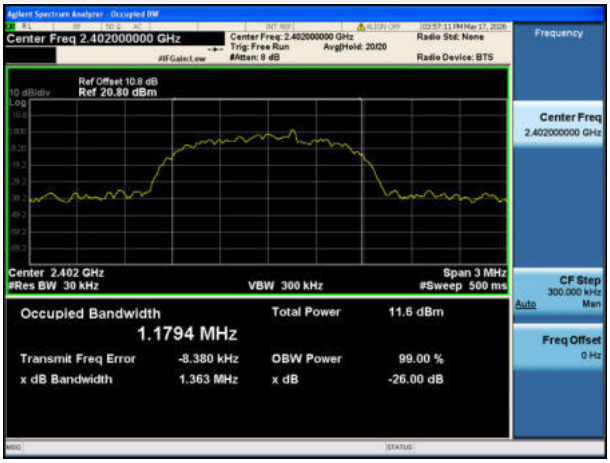
π/4-DQPSK MIDDLE CHANNEL



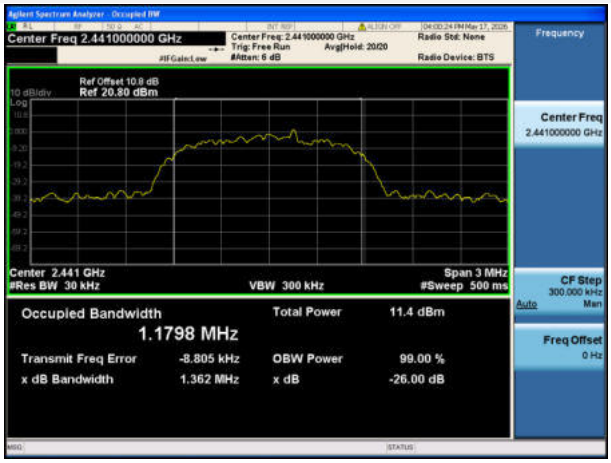
π/4-DQPSK HIGH CHANNEL



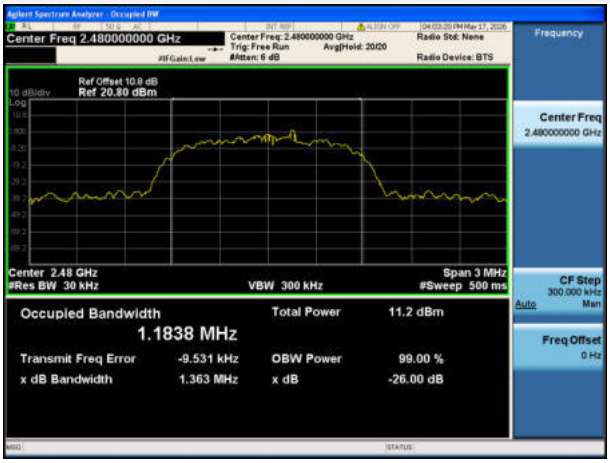
8DPSK LOW CHANNEL



8DPSK MIDDLE CHANNEL



8DPSK HIGH CHANNEL



A.4 Hopping Frequency Separation

Test Data

Mode	Frequency separation (MHz)	2/3 of the 20 dB Bandwidth (MHz)	Verdict
GFSK	1.000	0.640	Pass
8DPSK	1.015	0.865	Pass

Test Plots

GFSK

8DPSK

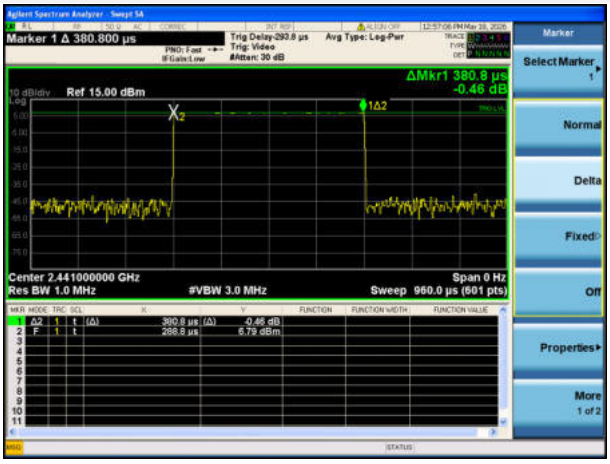
A.5 Average Time of Occupancy

Test Data

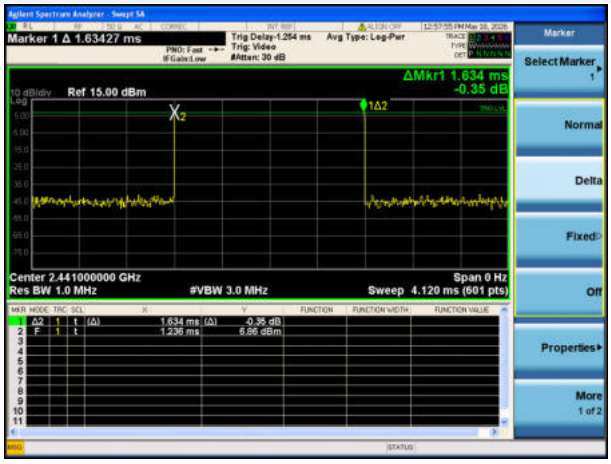
GFSK				
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.38080	121.856	0.4	Pass
DH 3	1.63400	261.440	0.4	Pass
DH 5	2.88800	308.053	0.4	Pass
8DPSK				
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
3DH 1	0.38240	122.368	0.4	Pass
3DH 3	1.63400	261.440	0.4	Pass
3DH 5	2.88800	308.053	0.4	Pass
AFH Mode				
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.38000	60.800	0.4	Pass
DH 3	1.64100	131.280	0.4	Pass
DH 5	2.88800	154.027	0.4	Pass

Test Plots

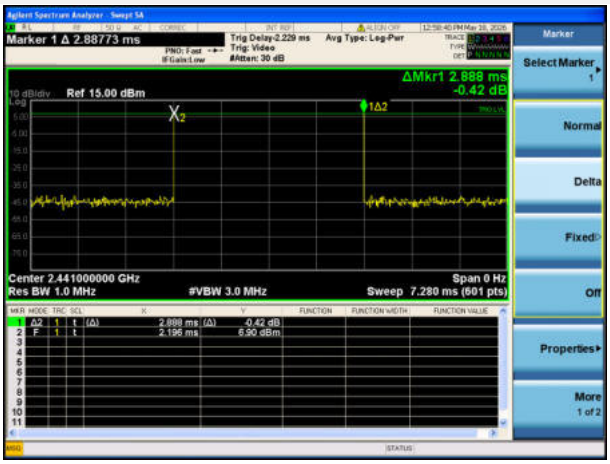
GFSK DH1



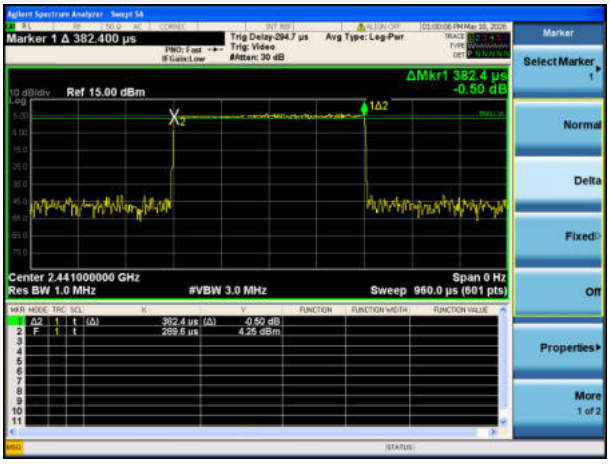
GFSK DH3



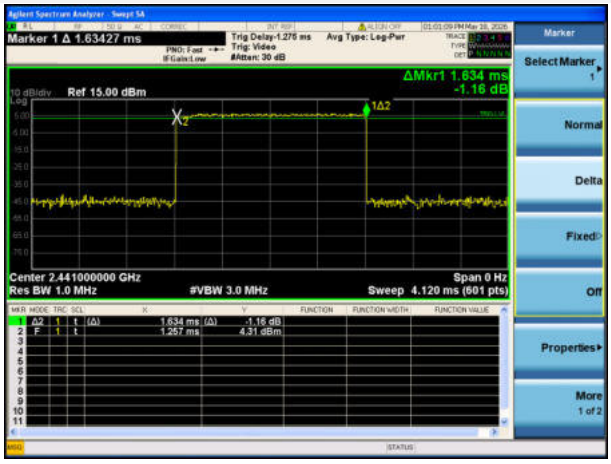
GFSK DH5



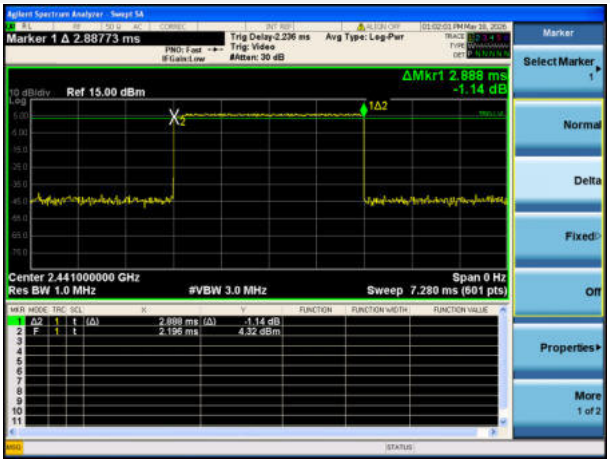
8DPSK 3DH1



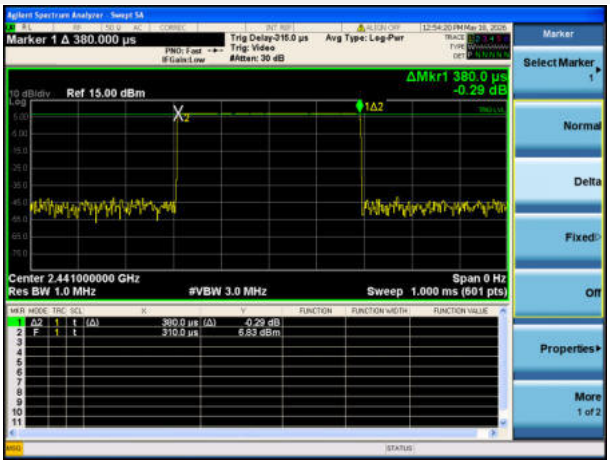
8DPSK 3DH3



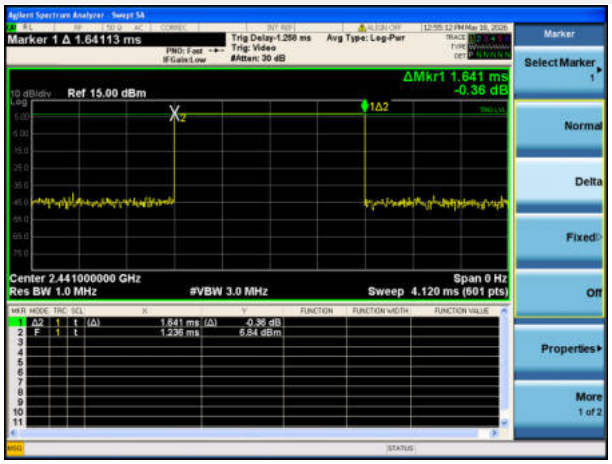
8DPSK 3DH5



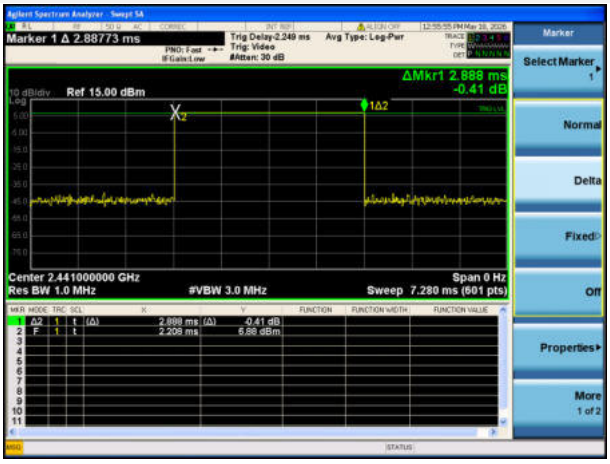
AFH Mode DH1



AFH Mode DH3



AFH Mode DH5



A.6 Conducted Spurious Emissions & Authorized-band band-edge

Test Data

GFSK				
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-36.37	7.36	-12.64	Pass
Middle	-36.52	6.88	-13.12	Pass
High	-36.56	6.25	-13.75	Pass
8DPSK				
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-36.61	4.12	-15.88	Pass
Middle	-36.25	4.20	-15.80	Pass
High	-36.36	4.07	-15.93	Pass

Hopping Mode				
Mode	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
GFSK	-26.81	7.06	-12.94	Pass
8DPSK	-26.45	4.27	-15.73	Pass

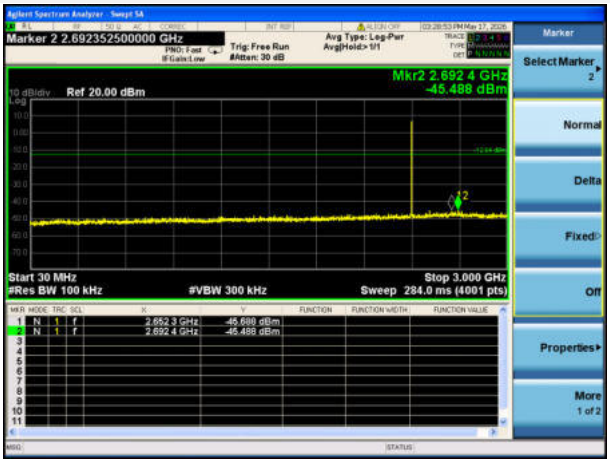
Test Plots

GFSK LOW CHANNEL, CARRIER LEVEL

GFSK LOW CHANNEL, BAND EDGE

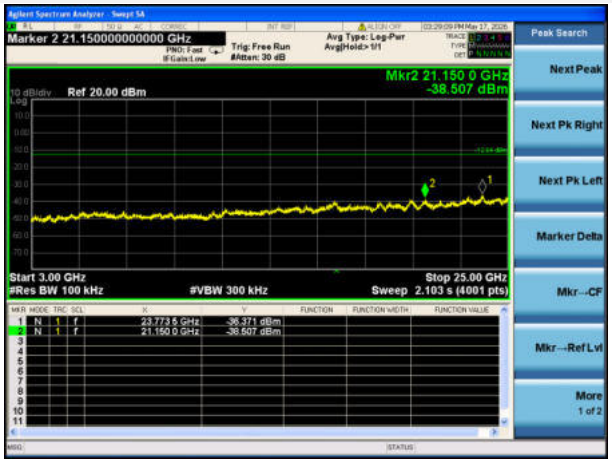
GFSK LOW CHANNEL, SPURIOUS

30 MHz ~ 3 GHz



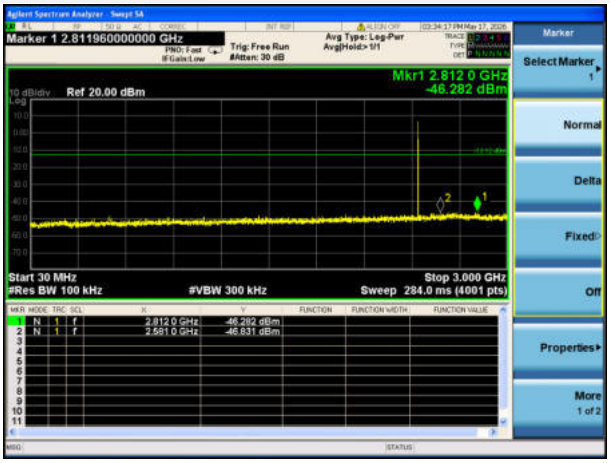
GFSK LOW CHANNEL, SPURIOUS

3 GHz ~ 25 GHz

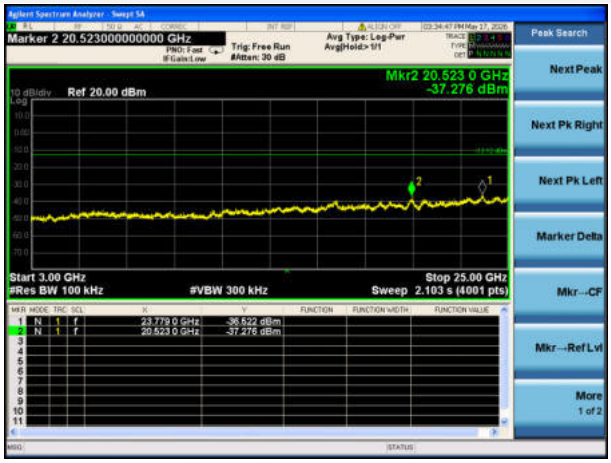


GFSK MIDDLE CHANNEL, CARRIER LEVEL

GFSK MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



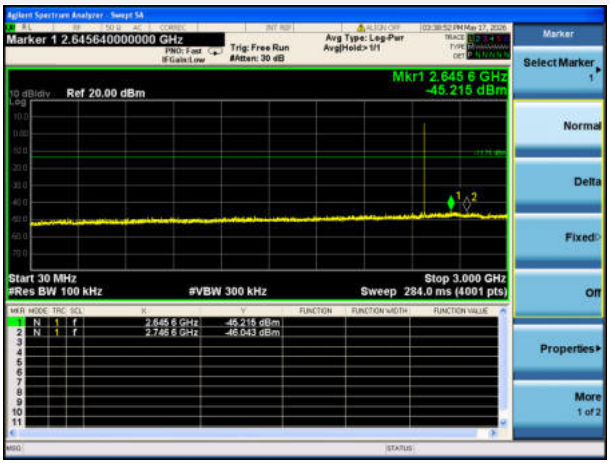
GFSK MIDDLE CHANNEL, SPURIOUS
3 GHz ~ 25 GHz



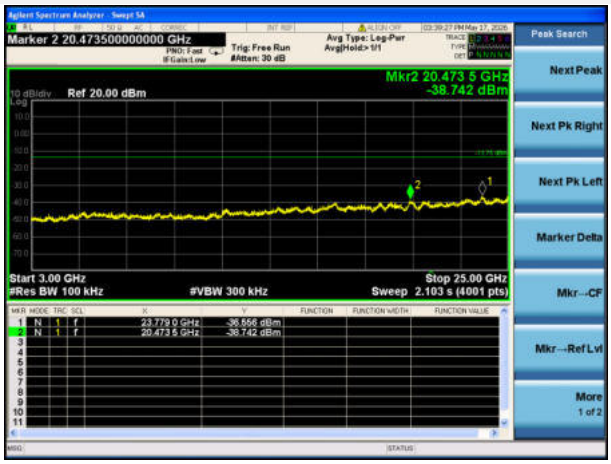
GFSK HIGH CHANNEL, CARRIER LEVEL

GFSK HIGH CHANNEL, BAND EDGE

GFSK HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



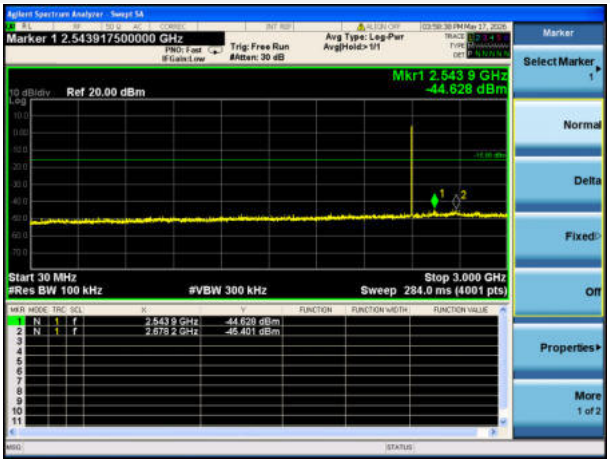
GFSK HIGH CHANNEL, SPURIOUS
3 GHz ~ 25 GHz



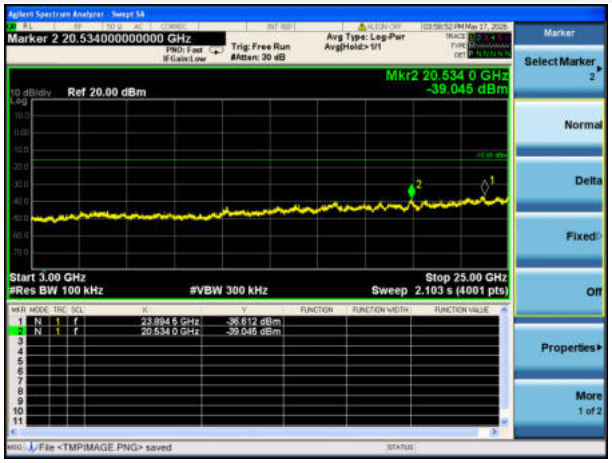
8DPSK LOW CHANNEL, CARRIER LEVEL

8DPSK LOW CHANNEL, BAND EDGE

8DPSK LOW CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

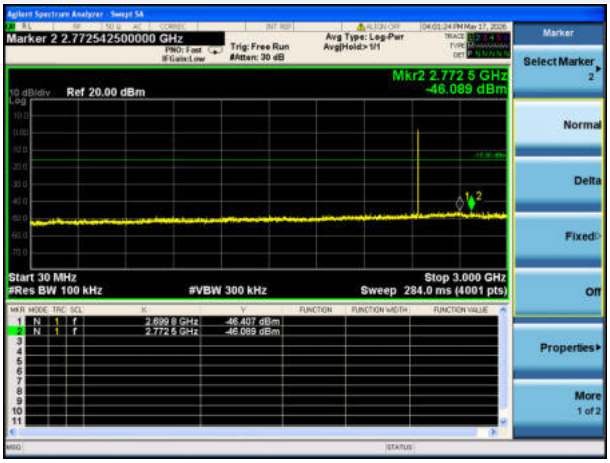


8DPSK LOW CHANNEL, SPURIOUS
3 GHz ~ 25 GHz

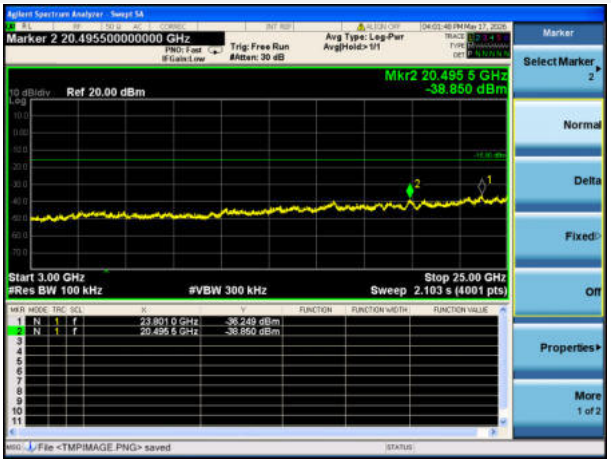


8DPSK MIDDLE CHANNEL, CARRIER LEVEL

8DPSK MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



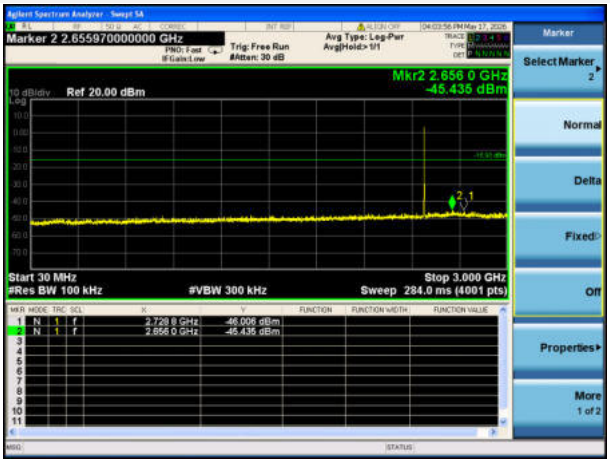
8DPSK MIDDLE CHANNEL, SPURIOUS
3 GHz ~ 25 GHz



8DPSK HIGH CHANNEL, CARRIER LEVEL

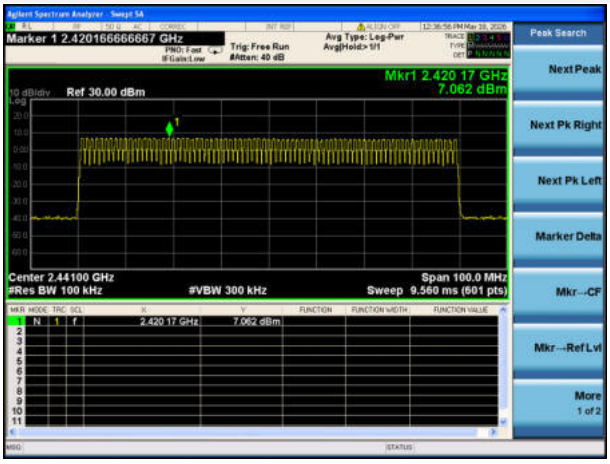
8DPSK HIGH CHANNEL, BAND EDGE

8DPSK HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



8DPSK HIGH CHANNEL, SPURIOUS
3 GHz ~ 25 GHz

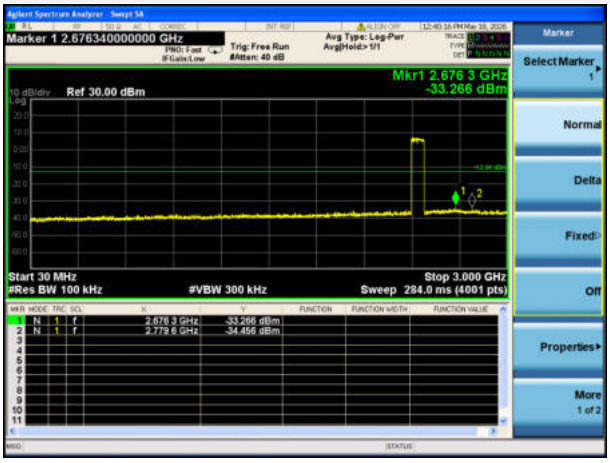
GFSK HOPPING, CARRIER LEVEL



GFSK HOPPING BAND EDGE (LOW)

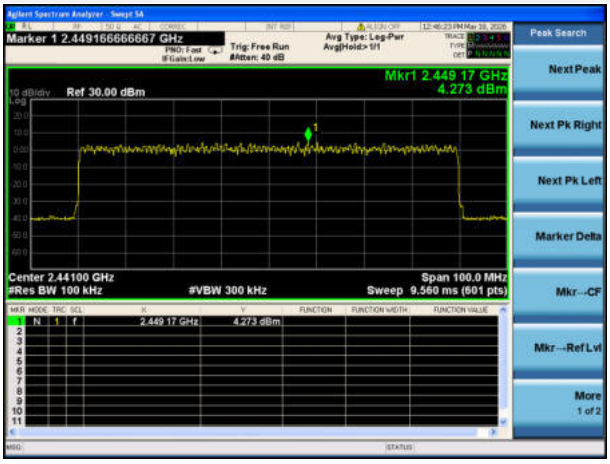
GFSK HOPPING BAND EDGE (HIGH)

GFSK Hopping Mode, SPURIOUS
30 MHz ~ 3 GHz



GFSK Hopping Mode, SPURIOUS
3GHz ~ 25 GHz

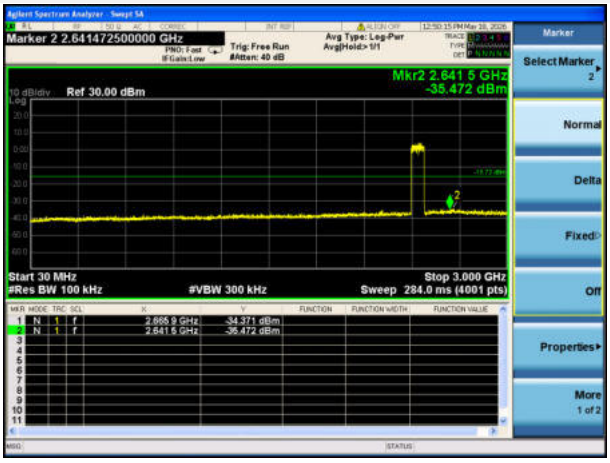
8DPSK HOPPING, CARRIER LEVEL



8DPSK Hopping BAND EDGE (LOW)

8DPSK Hopping BAND EDGE (HIGH)

8DPSK Hopping Mode, SPURIOUS
30 MHz ~ 3 GHz



8DPSK Hopping Mode, SPURIOUS
3GHz ~ 25 GHz

A.7 Conducted Emissions

Note [1]: The EUT is working in the Normal link mode. All modes have been tested and normal link mode is worst.

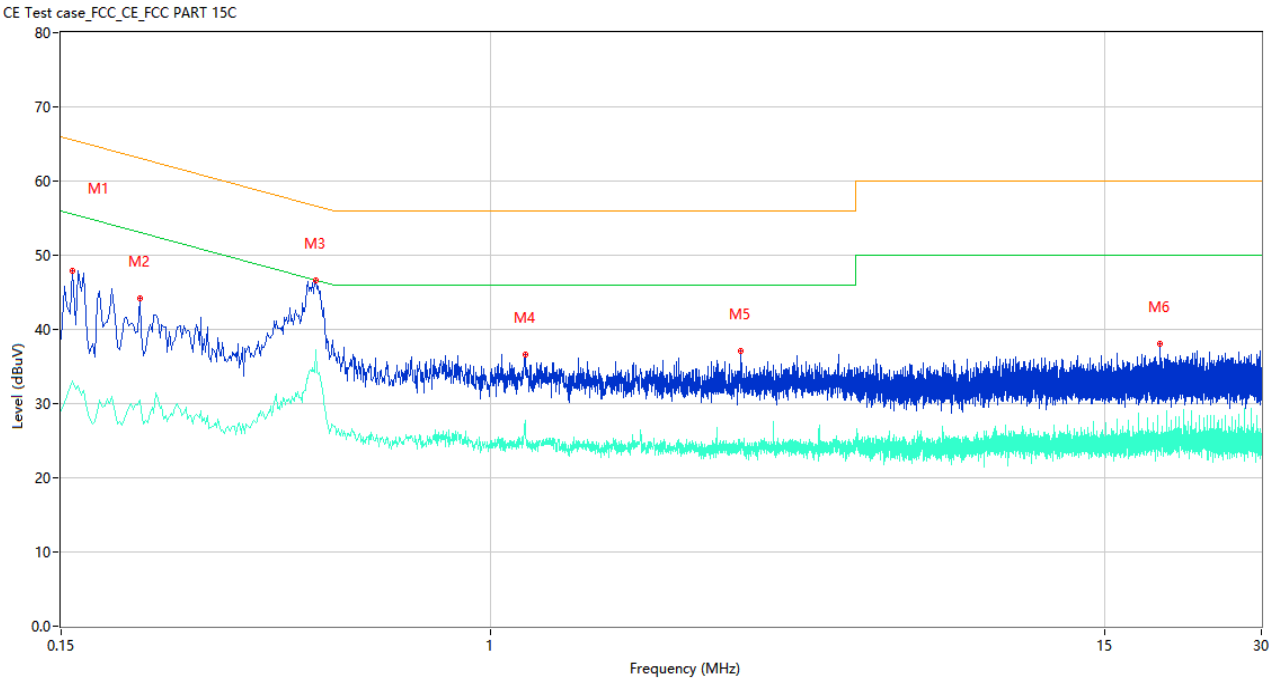
Note [2]: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 60 Hz and 240 VAC, 50 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration (120 VAC, 60 Hz) shown here.

Note [3]: Results (dBuV) = Original reading level of Spectrum Analyzer (dBuV) + Factor (dB)

Test Data and Plots

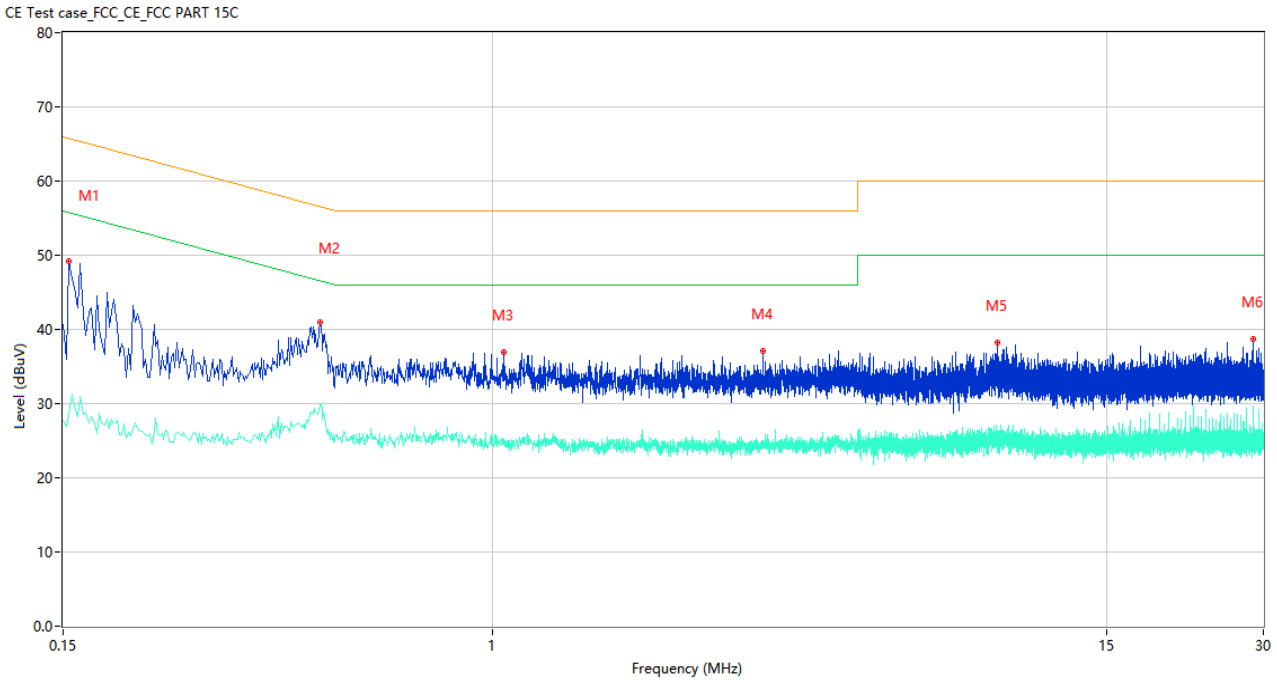
PCB Antenna

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.158	47.89	9.86	65.57	17.68	Peak	L	Pass
1**	0.158	33.14	9.86	55.57	22.43	AV	L	Pass
2	0.212	44.23	9.83	63.13	18.90	Peak	L	Pass
2**	0.212	30.52	9.83	53.13	22.61	AV	L	Pass
3	0.462	46.66	10.08	56.66	10.00	Peak	L	Pass
3**	0.462	37.28	10.08	46.66	9.38	AV	L	Pass
4	1.164	36.54	10.31	56.00	19.46	Peak	L	Pass
4**	1.164	27.72	10.31	46.00	18.28	AV	L	Pass
5	3.016	37.16	10.26	56.00	18.84	Peak	L	Pass
5**	3.016	24.54	10.26	46.00	21.46	AV	L	Pass
6	19.180	38.01	10.98	60.00	21.99	Peak	L	Pass
6**	19.180	25.55	10.98	50.00	24.45	AV	L	Pass

PHASE N

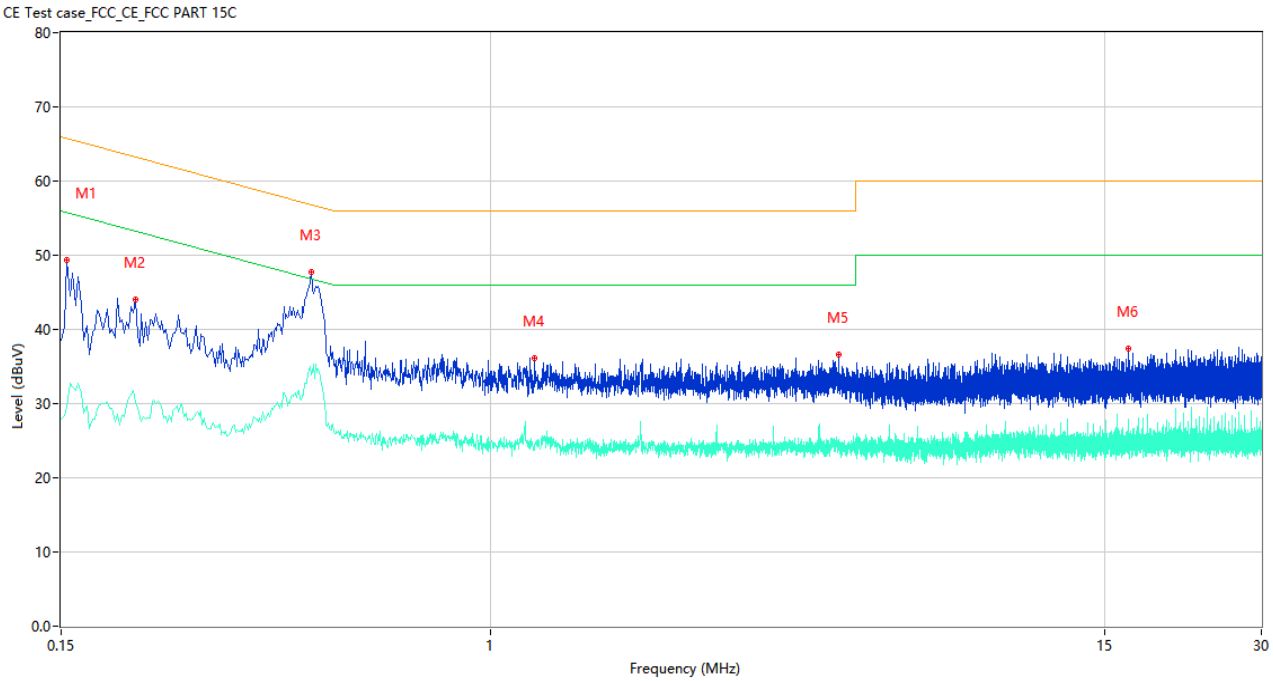


No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.154	49.25	9.86	65.78	16.53	Peak	N	Pass
1**	0.154	28.52	9.86	55.78	27.26	AV	N	Pass
2	0.466	40.90	10.07	56.58	15.68	Peak	N	Pass
2**	0.466	29.78	10.07	46.58	16.80	AV	N	Pass
3	1.048	36.99	10.23	56.00	19.01	Peak	N	Pass
3**	1.048	24.55	10.23	46.00	21.45	AV	N	Pass
4	3.296	37.11	10.38	56.00	18.89	Peak	N	Pass
4**	3.296	25.05	10.38	46.00	20.95	AV	N	Pass
5	9.252	38.29	10.41	60.00	21.71	Peak	N	Pass
5**	9.252	26.30	10.41	50.00	23.70	AV	N	Pass
6	28.642	38.69	11.27	60.00	21.31	Peak	N	Pass
6**	28.642	29.65	11.27	50.00	20.35	AV	N	Pass

Test Data and Plots

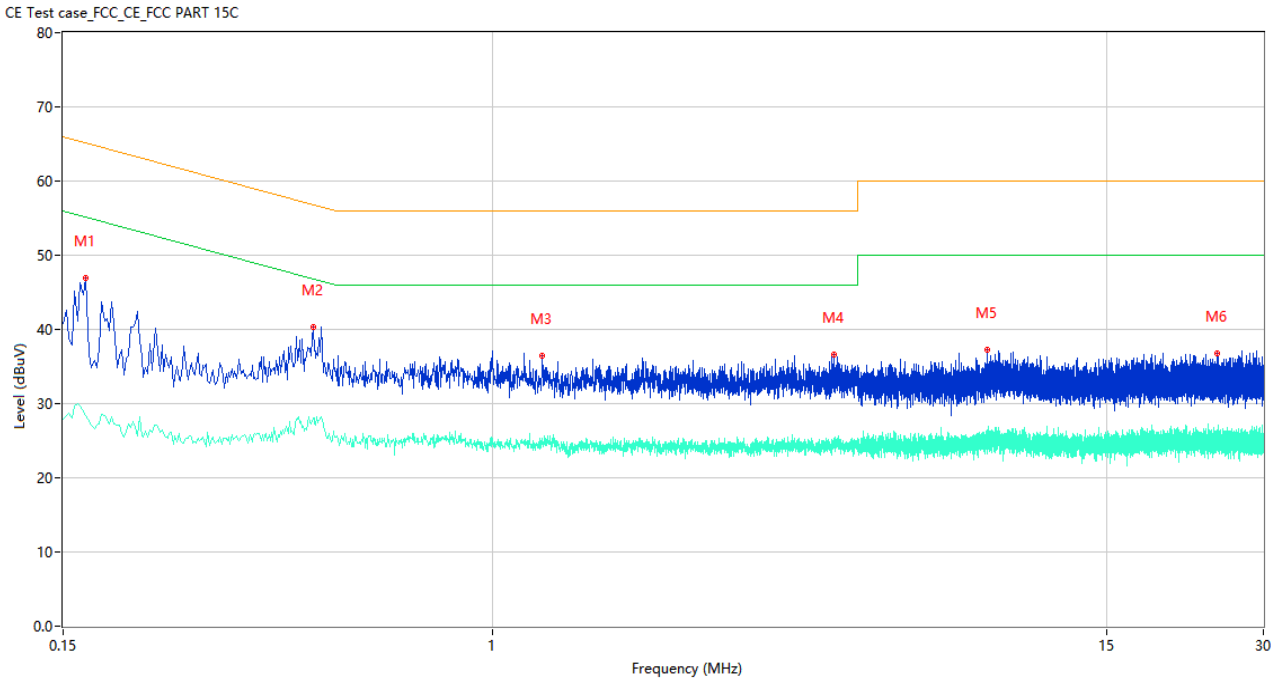
Rod Antenna

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.154	49.33	9.86	65.78	16.45	Peak	L	Pass
1**	0.154	29.51	9.86	55.78	26.27	AV	L	Pass
2	0.208	43.98	9.83	63.28	19.30	Peak	L	Pass
2**	0.208	30.16	9.83	53.28	23.12	AV	L	Pass
3	0.452	47.68	10.09	56.84	9.16	Peak	L	Pass
3**	0.452	33.81	10.09	46.84	13.03	AV	L	Pass
4	1.214	36.15	10.12	56.00	19.85	Peak	L	Pass
4**	1.214	24.48	10.12	46.00	21.52	AV	L	Pass
5	4.636	36.55	10.35	56.00	19.45	Peak	L	Pass
5**	4.636	24.31	10.35	46.00	21.69	AV	L	Pass
6	16.712	37.46	10.87	60.00	22.54	Peak	L	Pass
6**	16.712	24.86	10.87	50.00	25.14	AV	L	Pass

PHASE N

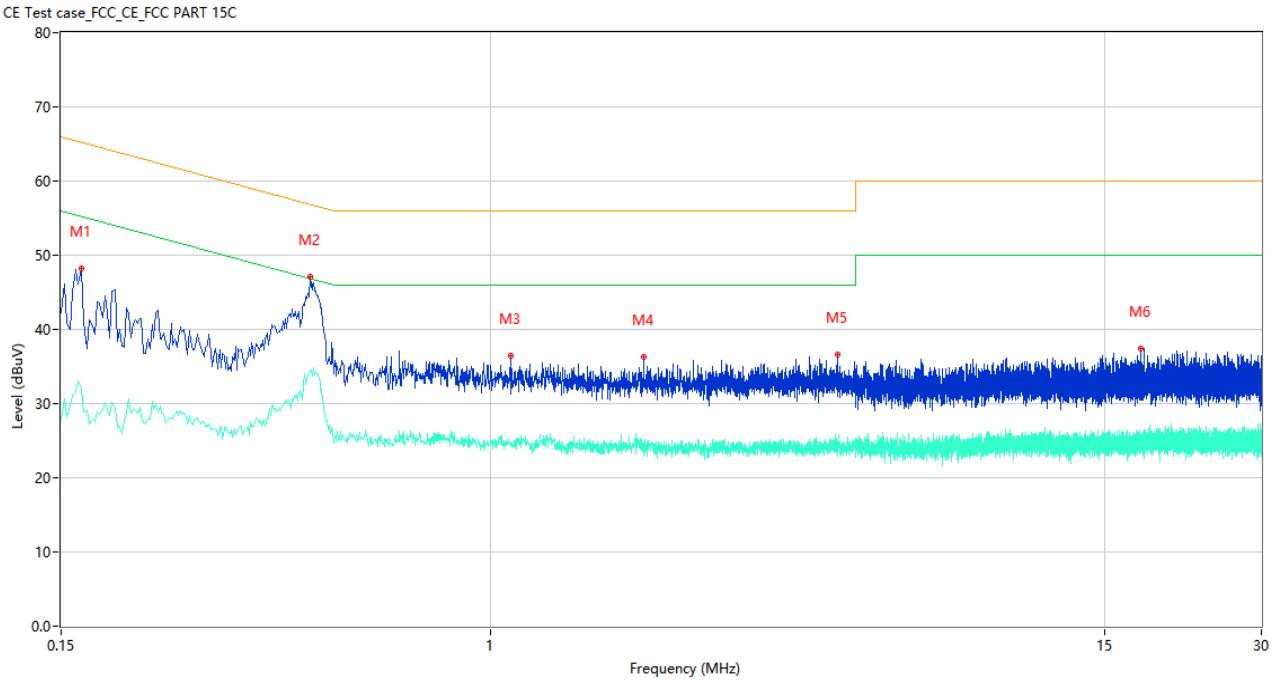


No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.166	46.95	9.85	65.16	18.21	Peak	N	Pass
1**	0.166	28.34	9.85	55.16	26.82	AV	N	Pass
2	0.452	40.30	10.09	56.84	16.54	Peak	N	Pass
2**	0.452	28.00	10.09	46.84	18.84	AV	N	Pass
3	1.244	36.51	10.45	56.00	19.49	Peak	N	Pass
3**	1.244	25.30	10.45	46.00	20.70	AV	N	Pass
4	4.518	36.61	10.47	56.00	19.39	Peak	N	Pass
4**	4.518	24.72	10.47	46.00	21.28	AV	N	Pass
5	8.886	37.25	10.32	60.00	22.75	Peak	N	Pass
5**	8.886	25.96	10.32	50.00	24.04	AV	N	Pass
6	24.464	36.78	11.09	60.00	23.22	Peak	N	Pass
6**	24.464	25.46	11.09	50.00	24.54	AV	N	Pass

Test Data and Plots

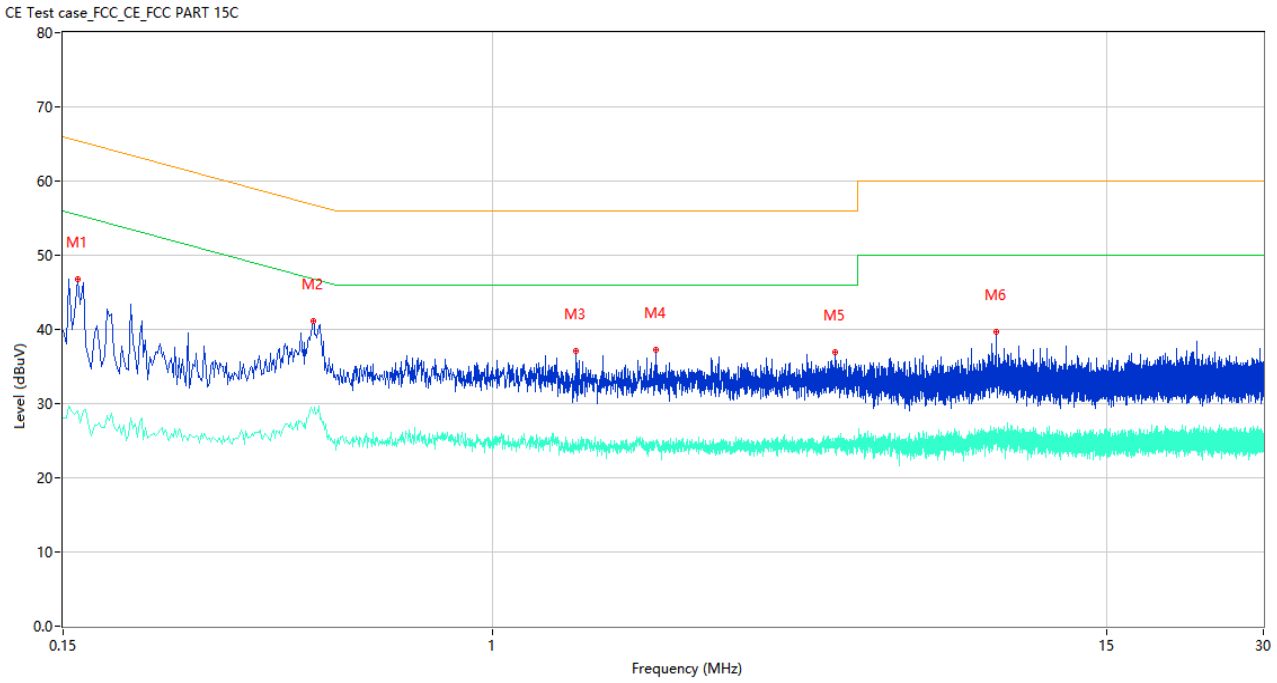
FPC Antenna

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.164	48.25	9.85	65.26	17.01	Peak	L	Pass
1**	0.164	31.95	9.85	55.26	23.31	AV	L	Pass
2	0.450	47.09	10.09	56.88	9.79	Peak	L	Pass
2**	0.450	34.44	10.09	46.88	12.44	AV	L	Pass
3	1.090	36.41	10.08	56.00	19.59	Peak	L	Pass
3**	1.090	24.84	10.08	46.00	21.16	AV	L	Pass
4	1.966	36.34	10.23	56.00	19.66	Peak	L	Pass
4**	1.966	24.72	10.23	46.00	21.28	AV	L	Pass
5	4.622	36.62	10.44	56.00	19.38	Peak	L	Pass
5**	4.622	23.88	10.44	46.00	22.12	AV	L	Pass
6	17.642	37.45	11.07	60.00	22.55	Peak	L	Pass
6**	17.642	24.60	11.07	50.00	25.40	AV	L	Pass

PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.160	46.71	9.85	65.46	18.75	Peak	N	Pass
1**	0.160	29.05	9.85	55.46	26.41	AV	N	Pass
2	0.452	41.05	10.09	56.84	15.79	Peak	N	Pass
2**	0.452	28.72	10.09	46.84	18.12	AV	N	Pass
3	1.446	37.10	10.10	56.00	18.90	Peak	N	Pass
3**	1.446	24.76	10.10	46.00	21.24	AV	N	Pass
4	2.050	37.25	10.51	56.00	18.75	Peak	N	Pass
4**	2.050	24.85	10.51	46.00	21.15	AV	N	Pass
5	4.536	36.89	10.45	56.00	19.11	Peak	N	Pass
5**	4.536	25.31	10.45	46.00	20.69	AV	N	Pass
6	9.224	39.68	10.53	60.00	20.32	Peak	N	Pass
6**	9.224	25.76	10.53	50.00	24.24	AV	N	Pass

A.8 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 EUT is working in the Normal link mode below 1 GHz. All modes have been tested and DH5-Hopping mode is the worst.

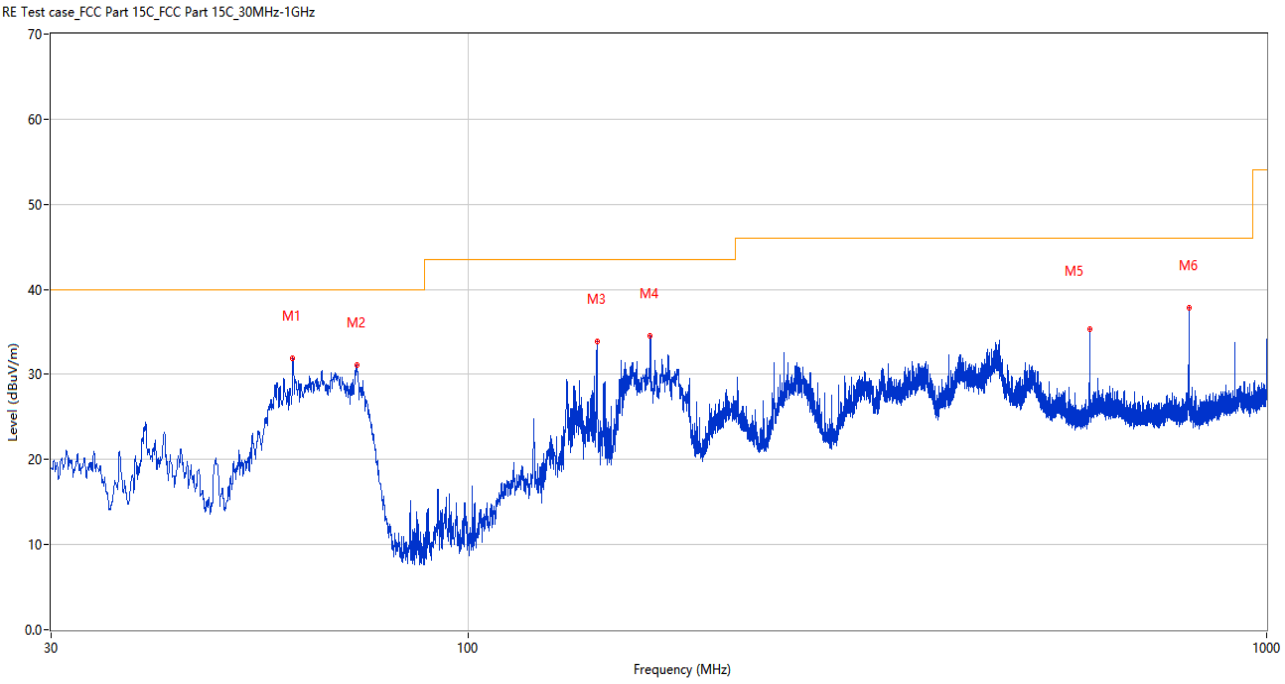
Note [4]: Results (dBuV/m) = Original reading level of Spectrum Analyzer (dBuV/m) + Factor (dB)

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.

Test Data and Plots

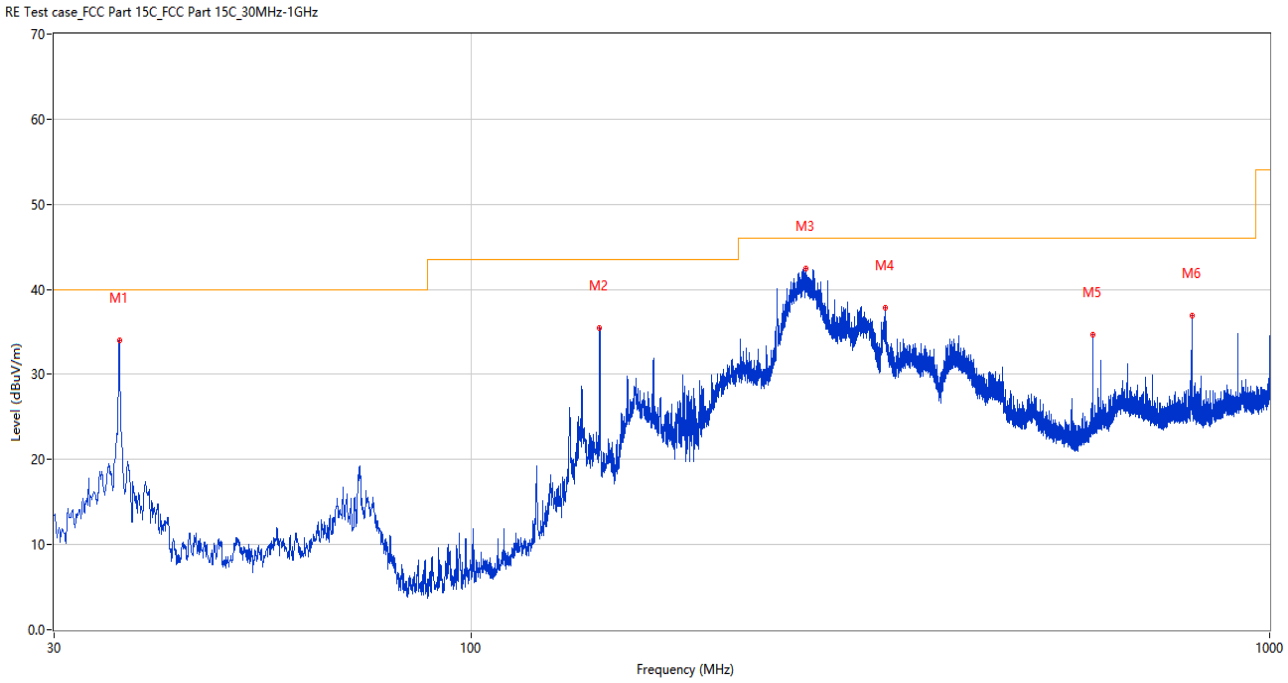
PCB Antenna

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	60.264	31.86	-29.39	40.0	8.14	Peak	267.40	100	Vertical	Pass
2	72.535	31.18	-31.47	40.0	8.82	Peak	198.60	100	Vertical	Pass
3	144.945	33.89	-28.20	43.5	9.61	Peak	101.00	100	Vertical	Pass
4	169.001	34.58	-28.25	43.5	8.92	Peak	211.10	100	Vertical	Pass
5	599.972	35.37	-17.27	46.0	10.63	Peak	281.00	100	Vertical	Pass
6	799.986	37.79	-13.24	46.0	8.21	Peak	198.60	100	Vertical	Pass

30 MHz to 1 GHz, ANT V

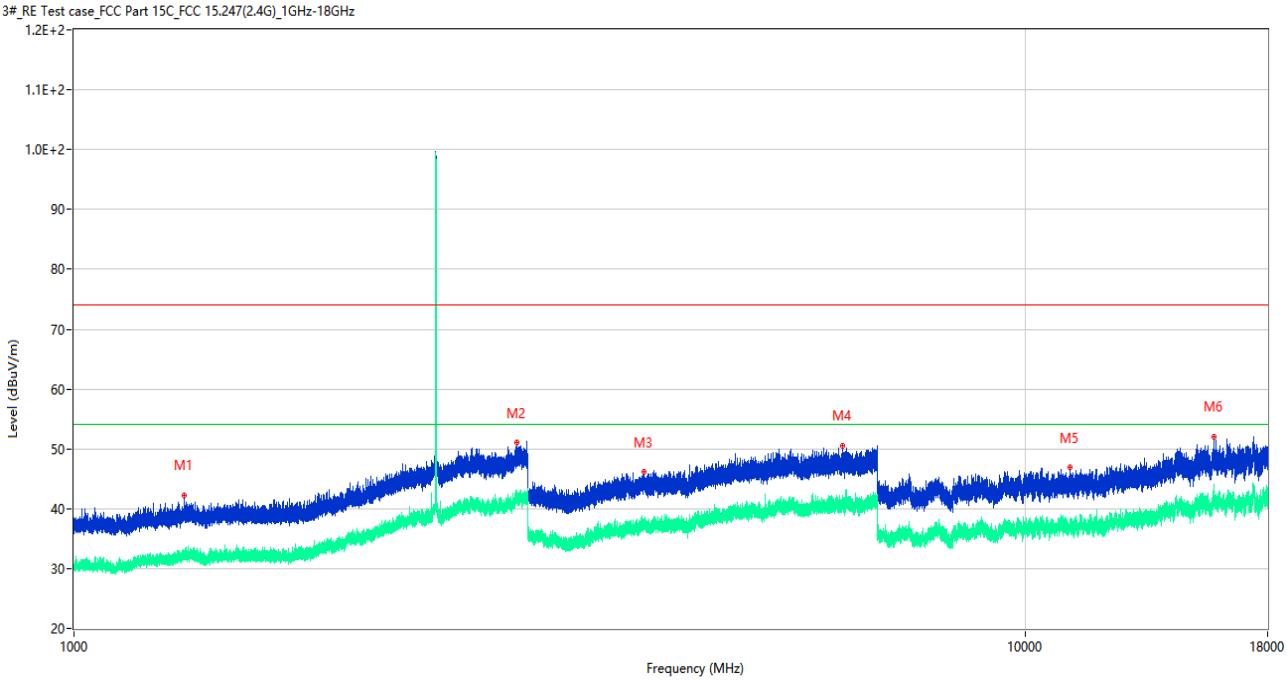


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	36.208	34.02	-30.22	40.0	5.98	Peak	245.50	100	Horizontal	Pass
2	144.800	35.47	-28.22	43.5	8.03	Peak	332.70	200	Horizontal	Pass
3	262.169	42.43	-28.10	46.0	3.57	Peak	167.20	100	Horizontal	Pass
4	330.215	37.79	-25.12	46.0	8.21	Peak	193.40	100	Horizontal	Pass
5	600.020	34.67	-17.26	46.0	11.33	Peak	218.40	100	Horizontal	Pass
6	799.986	36.91	-13.24	46.0	9.09	Peak	265.20	100	Horizontal	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 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	1304.572	42.40	74.0	31.60	Peak	137.00	400	Horizontal	Pass
1**	1304.572	31.98	54.0	22.02	AV	137.00	400	Horizontal	Pass
2	2925.024	51.29	74.0	22.71	Peak	341.00	300	Horizontal	Pass
2**	2925.024	41.68	54.0	12.33	AV	341.00	300	Horizontal	Pass
3	3975.365	46.16	74.0	27.84	Peak	180.00	200	Horizontal	Pass
3**	3975.365	37.99	54.0	16.01	AV	180.00	200	Horizontal	Pass
4	6432.231	50.73	74.0	23.27	Peak	63.00	100	Horizontal	Pass
4**	6432.231	41.33	54.0	12.68	AV	63.00	100	Horizontal	Pass
5	11143.506	47.17	74.0	26.84	Peak	333.00	300	Horizontal	Pass
5**	11143.506	37.34	54.0	16.66	AV	333.00	300	Horizontal	Pass
6	15794.865	52.29	74.0	21.71	Peak	238.00	400	Horizontal	Pass
6**	15794.865	42.23	54.0	11.77	AV	238.00	400	Horizontal	Pass

GFSK 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	1163.155	49.59	74.0	24.41	Peak	126.00	200	Vertical	Pass
1**	1163.155	34.01	54.0	19.99	AV	126.00	200	Vertical	Pass
2	1340.022	44.20	74.0	29.80	Peak	246.00	200	Vertical	Pass
2**	1340.022	40.82	54.0	13.19	AV	246.00	200	Vertical	Pass
3	4919.586	50.89	74.0	23.11	Peak	203.00	200	Vertical	Pass
3**	4919.586	39.91	54.0	14.09	AV	203.00	200	Vertical	Pass
4	7933.104	54.11	74.0	19.89	Peak	271.00	100	Vertical	Pass
4**	7933.104	41.42	54.0	12.58	AV	271.00	100	Vertical	Pass
5	12490.529	55.56	74.0	18.44	Peak	39.00	200	Vertical	Pass
5**	12490.529	41.27	54.0	12.73	AV	39.00	200	Vertical	Pass
6	17106.057	53.87	74.0	20.13	Peak	44.00	100	Vertical	Pass
6**	17106.057	41.72	54.0	12.29	AV	44.00	100	Vertical	Pass

GFSK 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	1300.633	41.87	74.0	32.13	Peak	3.00	200	Horizontal	Pass
1**	1300.633	31.60	54.0	22.40	AV	3.00	200	Horizontal	Pass
2	2924.581	50.42	74.0	23.58	Peak	154.00	200	Horizontal	Pass
2**	2924.581	41.05	54.0	12.96	AV	154.00	200	Horizontal	Pass
3	3978.219	45.81	74.0	28.19	Peak	325.00	200	Horizontal	Pass
3**	3978.219	37.82	54.0	16.18	AV	325.00	200	Horizontal	Pass
4	6431.192	49.83	74.0	24.17	Peak	42.00	300	Horizontal	Pass
4**	6431.192	40.55	54.0	13.46	AV	42.00	300	Horizontal	Pass
5	11147.426	46.78	74.0	27.23	Peak	293.00	300	Horizontal	Pass
5**	11147.426	36.67	54.0	17.33	AV	293.00	300	Horizontal	Pass
6	15796.936	51.65	74.0	22.35	Peak	192.00	300	Horizontal	Pass
6**	15796.936	41.82	54.0	12.18	AV	192.00	300	Horizontal	Pass

GFSK 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	1162.850	48.67	74.0	25.33	Peak	266.00	200	Vertical	Pass
1**	1162.850	33.01	54.0	20.99	AV	266.00	200	Vertical	Pass
2	1335.988	43.94	74.0	30.06	Peak	283.00	300	Vertical	Pass
2**	1335.988	40.30	54.0	13.71	AV	283.00	300	Vertical	Pass
3	4917.745	50.44	74.0	23.56	Peak	268.00	200	Vertical	Pass
3**	4917.745	39.60	54.0	14.40	AV	268.00	200	Vertical	Pass
4	7932.611	53.68	74.0	20.32	Peak	352.00	100	Vertical	Pass
4**	7932.611	41.25	54.0	12.75	AV	352.00	100	Vertical	Pass
5	12488.752	55.23	74.0	18.77	Peak	360.00	400	Vertical	Pass
5**	12488.752	41.63	54.0	12.37	AV	360.00	400	Vertical	Pass
6	17103.822	53.84	74.0	20.16	Peak	54.00	400	Vertical	Pass
6**	17103.822	41.06	54.0	12.95	AV	54.00	400	Vertical	Pass

GFSK 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	1300.418	42.15	74.0	31.85	Peak	221.00	200	Horizontal	Pass
1**	1300.418	30.99	54.0	23.01	AV	221.00	200	Horizontal	Pass
2	2920.522	50.79	74.0	23.21	Peak	109.00	200	Horizontal	Pass
2**	2920.522	41.61	54.0	12.40	AV	109.00	200	Horizontal	Pass
3	3977.894	45.71	74.0	28.29	Peak	136.00	200	Horizontal	Pass
3**	3977.894	37.35	54.0	16.65	AV	136.00	200	Horizontal	Pass
4	6427.020	50.60	74.0	23.40	Peak	31.00	100	Horizontal	Pass
4**	6427.020	40.90	54.0	13.11	AV	31.00	100	Horizontal	Pass
5	11147.510	46.94	74.0	27.07	Peak	295.00	300	Horizontal	Pass
5**	11147.510	37.26	54.0	16.74	AV	295.00	300	Horizontal	Pass
6	15792.850	51.64	74.0	22.36	Peak	69.00	200	Horizontal	Pass
6**	15792.850	41.74	54.0	12.26	AV	69.00	200	Horizontal	Pass

GFSK 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	1164.752	49.24	74.0	24.76	Peak	349.00	400	Vertical	Pass
1**	1164.752	33.24	54.0	20.76	AV	349.00	400	Vertical	Pass
2	1342.065	43.66	74.0	30.34	Peak	71.00	100	Vertical	Pass
2**	1342.065	40.56	54.0	13.45	AV	71.00	100	Vertical	Pass
3	4918.304	50.84	74.0	23.16	Peak	223.00	200	Vertical	Pass
3**	4918.304	39.22	54.0	14.78	AV	223.00	200	Vertical	Pass
4	7929.657	53.53	74.0	20.47	Peak	115.00	100	Vertical	Pass
4**	7929.657	41.63	54.0	12.37	AV	115.00	100	Vertical	Pass
5	12496.093	55.14	74.0	18.86	Peak	4.00	100	Vertical	Pass
5**	12496.093	41.93	54.0	12.07	AV	4.00	100	Vertical	Pass
6	17102.844	53.05	74.0	20.95	Peak	348.00	300	Vertical	Pass
6**	17102.844	41.23	54.0	12.78	AV	348.00	300	Vertical	Pass

8DPSK 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	1289.360	41.48	74.0	32.52	Peak	200.00	300	Horizontal	Pass
1**	1289.360	31.86	54.0	22.14	AV	200.00	300	Horizontal	Pass
2	2772.478	51.01	74.0	22.99	Peak	315.00	200	Horizontal	Pass
2**	2772.478	41.51	54.0	12.50	AV	315.00	200	Horizontal	Pass
3	5163.811	46.03	74.0	27.97	Peak	174.00	200	Horizontal	Pass
3**	5163.811	37.30	54.0	16.70	AV	174.00	200	Horizontal	Pass
4	6803.594	50.15	74.0	23.85	Peak	168.00	400	Horizontal	Pass
4**	6803.594	40.36	54.0	13.65	AV	168.00	400	Horizontal	Pass
5	13467.698	46.87	74.0	27.14	Peak	106.00	100	Horizontal	Pass
5**	13467.698	36.67	54.0	17.33	AV	106.00	100	Horizontal	Pass
6	17466.224	51.37	74.0	22.63	Peak	261.00	400	Horizontal	Pass
6**	17466.224	41.77	54.0	12.23	AV	261.00	400	Horizontal	Pass

8DPSK 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	1280.286	48.95	74.0	25.05	Peak	317.00	200	Vertical	Pass
1**	1280.286	33.89	54.0	20.11	AV	317.00	200	Vertical	Pass
2	2770.168	44.14	74.0	29.86	Peak	207.00	300	Vertical	Pass
2**	2770.168	40.34	54.0	13.67	AV	207.00	300	Vertical	Pass
3	5168.304	50.28	74.0	23.72	Peak	15.00	200	Vertical	Pass
3**	5168.304	39.03	54.0	14.97	AV	15.00	200	Vertical	Pass
4	6801.459	53.43	74.0	20.57	Peak	248.00	400	Vertical	Pass
4**	6801.459	41.27	54.0	12.73	AV	248.00	400	Vertical	Pass
5	13467.524	54.79	74.0	19.21	Peak	241.00	200	Vertical	Pass
5**	13467.524	4133	54.0	12.67	AV	241.00	200	Vertical	Pass
6	17462.217	53.01	74.0	20.99	Peak	250.00	300	Vertical	Pass
6**	17462.217	41.79	54.0	12.22	AV	250.00	300	Vertical	Pass

8DPSK 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	1283.424	41.35	74.0	32.65	Peak	67.00	200	Horizontal	Pass
1**	1283.424	30.70	54.0	23.30	AV	67.00	200	Horizontal	Pass
2	2773.163	49.72	74.0	24.28	Peak	147.00	300	Horizontal	Pass
2**	2773.163	40.68	54.0	13.33	AV	147.00	300	Horizontal	Pass
3	5165.764	45.78	74.0	28.22	Peak	72.00	200	Horizontal	Pass
3**	5165.764	36.82	54.0	17.18	AV	72.00	200	Horizontal	Pass
4	6803.988	49.56	74.0	24.44	Peak	40.00	100	Horizontal	Pass
4**	6803.988	39.62	54.0	14.39	AV	40.00	100	Horizontal	Pass
5	13466.088	46.46	74.0	27.55	Peak	264.00	300	Horizontal	Pass
5**	13466.088	36.12	54.0	17.88	AV	264.00	300	Horizontal	Pass
6	17470.794	51.47	74.0	22.53	Peak	209.00	400	Horizontal	Pass
6**	17470.794	41.57	54.0	12.43	AV	209.00	400	Horizontal	Pass

8DPSK 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	1286.312	48.05	74.0	25.95	Peak	60.00	200	Vertical	Pass
1**	1286.312	32.84	54.0	21.16	AV	60.00	200	Vertical	Pass
2	2774.257	43.36	74.0	30.64	Peak	335.00	200	Vertical	Pass
2**	2774.257	39.78	54.0	14.23	AV	335.00	200	Vertical	Pass
3	5166.330	49.74	74.0	24.26	Peak	124.00	200	Vertical	Pass
3**	5166.330	38.96	54.0	15.04	AV	124.00	200	Vertical	Pass
4	6803.824	53.54	74.0	20.46	Peak	101.00	200	Vertical	Pass
4**	6803.824	41.89	54.0	12.11	AV	101.00	200	Vertical	Pass
5	13467.867	54.83	74.0	19.17	Peak	288.00	300	Vertical	Pass
5**	13467.867	41.65	54.0	12.35	AV	288.00	300	Vertical	Pass
6	17465.817	53.30	74.0	20.70	Peak	246.00	300	Vertical	Pass
6**	17465.817	41.48	54.0	12.53	AV	246.00	300	Vertical	Pass

8DPSK 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	1285.581	41.78	74.0	32.22	Peak	39.00	100	Horizontal	Pass
1**	1285.581	30.82	54.0	23.18	AV	39.00	100	Horizontal	Pass
2	2770.223	50.34	74.0	23.66	Peak	336.00	300	Horizontal	Pass
2**	2770.223	41.56	54.0	12.45	AV	336.00	300	Horizontal	Pass
3	5166.732	45.64	74.0	28.36	Peak	97.00	200	Horizontal	Pass
3**	5166.732	36.82	54.0	17.18	AV	97.00	200	Horizontal	Pass
4	6809.603	50.12	74.0	23.88	Peak	333.00	200	Horizontal	Pass
4**	6809.603	40.05	54.0	13.96	AV	333.00	200	Horizontal	Pass
5	13469.155	46.84	74.0	27.17	Peak	356.00	300	Horizontal	Pass
5**	13469.155	36.87	54.0	17.13	AV	356.00	300	Horizontal	Pass
6	17466.045	50.93	74.0	23.07	Peak	230.00	400	Horizontal	Pass
6**	17466.045	41.67	54.0	12.33	AV	230.00	400	Horizontal	Pass

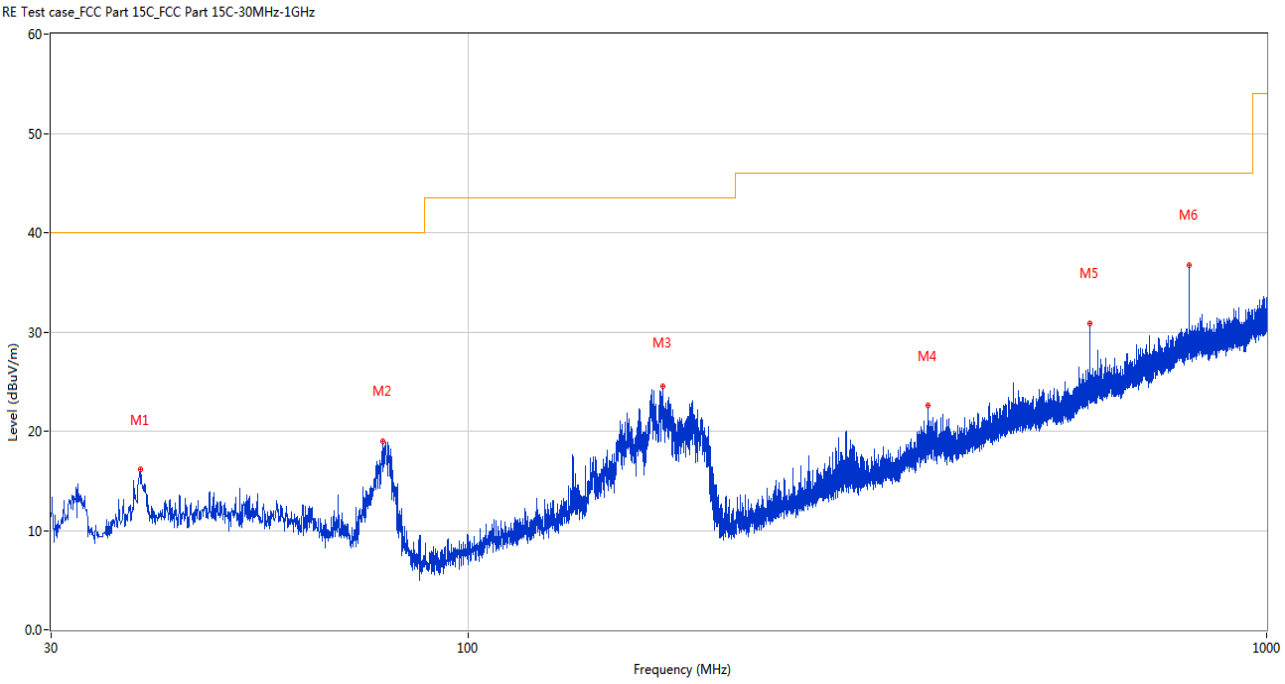
8DPSK HIGH CHANNEL 1 GHz to 18 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1282.910	48.87	74.0	25.13	Peak	352.00	200	Vertical	Pass
1**	1282.910	32.81	54.0	21.19	AV	352.00	200	Vertical	Pass
2	2772.588	42.66	74.0	31.34	Peak	187.00	200	Vertical	Pass
2**	2772.588	40.35	54.0	13.66	AV	187.00	200	Vertical	Pass
3	5166.572	50.07	74.0	23.93	Peak	221.00	200	Vertical	Pass
3**	5166.572	38.24	54.0	15.76	AV	221.00	200	Vertical	Pass
4	6802.992	53.30	74.0	20.70	Peak	211.00	200	Vertical	Pass
4**	6802.992	41.83	54.0	12.17	AV	211.00	200	Vertical	Pass
5	13463.787	54.15	74.0	19.85	Peak	43.00	200	Vertical	Pass
5**	13463.787	41.33	54.0	12.67	AV	43.00	200	Vertical	Pass
6	17460.548	52.95	74.0	21.05	Peak	328.00	100	Vertical	Pass
6**	17460.548	41.26	54.0	12.75	AV	328.00	100	Vertical	Pass

Test Data and Plots

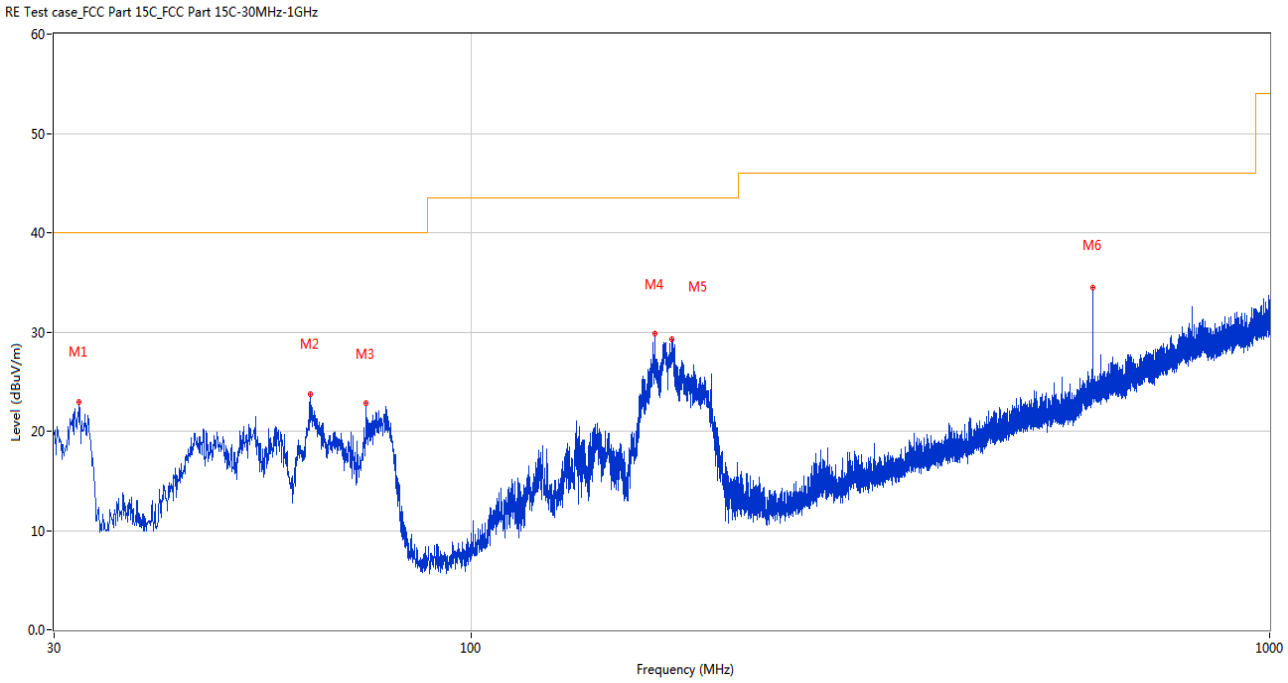
Rod Antenna

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	38.876	16.15	-25.64	40.0	23.85	Peak	278.00	100	Horizontal	Pass
2	78.160	19.01	-28.39	40.0	20.99	Peak	178.00	200	Horizontal	Pass
3	174.967	24.47	-24.63	43.5	19.03	Peak	291.00	200	Horizontal	Pass
4	376.290	22.57	-19.73	46.0	23.43	Peak	193.00	200	Horizontal	Pass
5	600.020	30.89	-13.10	46.0	15.11	Peak	139.00	200	Horizontal	Pass
6	799.986	36.76	-9.11	46.0	9.24	Peak	222.00	100	Horizontal	Pass

30 MHz to 1 GHz, ANT V

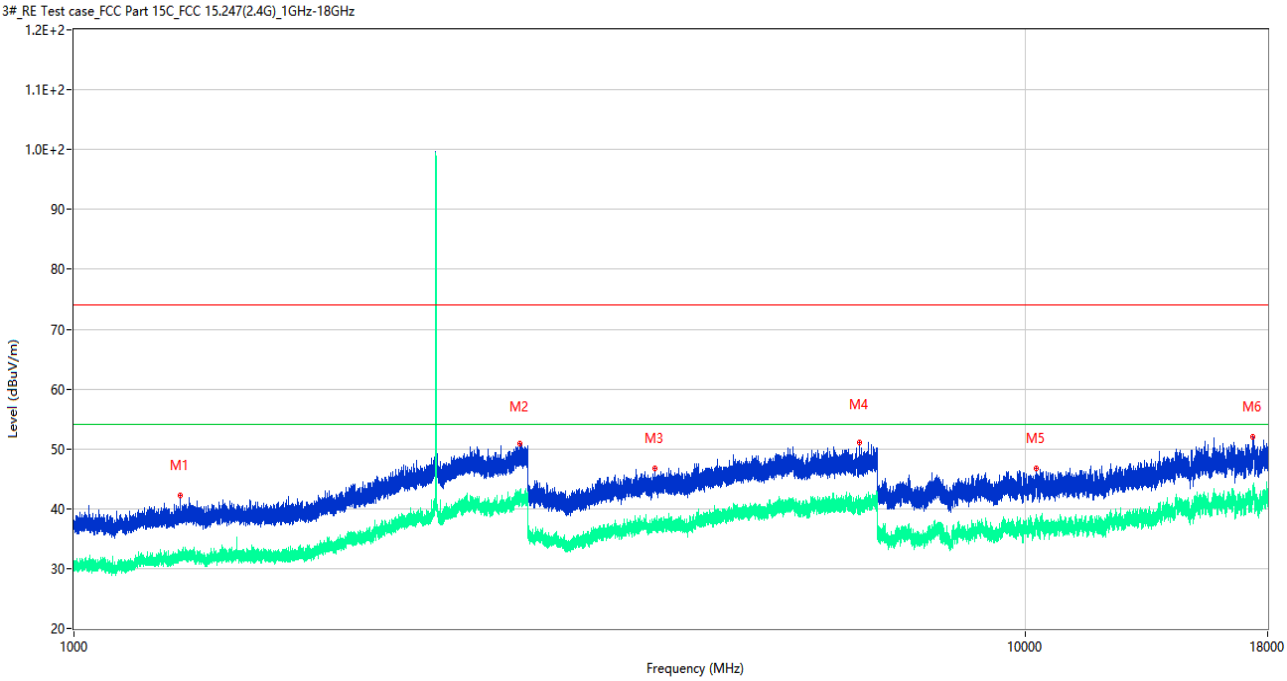


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	32.231	22.97	-26.73	40.0	17.03	Peak	189.00	100	Vertical	Pass
2	62.786	23.77	-25.94	40.0	16.23	Peak	56.00	100	Vertical	Pass
3	73.699	22.81	-27.48	40.0	17.19	Peak	112.00	100	Vertical	Pass
4	169.826	29.78	-24.35	43.5	13.72	Peak	212.00	100	Vertical	Pass
5	178.458	29.26	-25.11	43.5	14.24	Peak	360.00	100	Vertical	Pass
6	600.020	34.44	-13.10	46.0	11.56	Peak	344.00	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 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	1294.359	42.46	74.0	31.54	Peak	56.00	100	Horizontal	Pass
1**	1294.359	32.13	54.0	21.87	AV	56.00	100	Horizontal	Pass
2	2942.731	50.99	74.0	23.01	Peak	208.00	400	Horizontal	Pass
2**	2942.731	42.03	54.0	11.97	AV	208.00	400	Horizontal	Pass
3	4090.460	46.88	74.0	27.12	Peak	27.00	200	Horizontal	Pass
3**	4090.460	38.16	54.0	15.84	AV	27.00	200	Horizontal	Pass
4	6697.247	51.37	74.0	22.64	Peak	303.00	300	Horizontal	Pass
4**	6697.247	40.78	54.0	13.22	AV	303.00	300	Horizontal	Pass
5	10264.784	46.93	74.0	27.07	Peak	184.00	300	Horizontal	Pass
5**	10264.784	37.55	54.0	16.45	AV	184.00	300	Horizontal	Pass
6	17380.472	52.30	74.0	21.70	Peak	120.00	100	Horizontal	Pass
6**	17380.472	43.02	54.0	10.98	AV	120.00	100	Horizontal	Pass

GFSK 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	1162.310	49.63	74.0	24.37	Peak	122.00	100	Vertical	Pass
1**	1162.310	37.70	54.0	16.30	AV	122.00	100	Vertical	Pass
2	1335.575	46.46	74.0	27.54	Peak	217.00	100	Vertical	Pass
2**	1335.575	37.02	54.0	16.99	AV	217.00	100	Vertical	Pass
3	4919.507	49.29	74.0	24.71	Peak	235.00	200	Vertical	Pass
3**	4919.507	41.44	54.0	12.56	AV	235.00	200	Vertical	Pass
4	7931.538	55.66	74.0	18.34	Peak	11.00	100	Vertical	Pass
4**	7931.538	42.18	54.0	11.82	AV	11.00	100	Vertical	Pass
5	12495.536	52.99	74.0	21.01	Peak	189.00	300	Vertical	Pass
5**	12495.536	42.72	54.0	11.28	AV	189.00	300	Vertical	Pass
6	17105.562	55.62	74.0	18.38	Peak	292.00	100	Vertical	Pass
6**	17105.562	42.52	54.0	11.49	AV	292.00	100	Vertical	Pass

GFSK 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	1294.483	41.79	74.0	32.21	Peak	269.00	400	Horizontal	Pass
1**	1294.483	31.41	54.0	22.59	AV	269.00	400	Horizontal	Pass
2	2945.953	49.99	74.0	24.01	Peak	90.00	100	Horizontal	Pass
2**	2945.953	41.11	54.0	12.89	AV	90.00	100	Horizontal	Pass
3	4084.240	46.30	74.0	27.70	Peak	149.00	200	Horizontal	Pass
3**	4084.240	38.03	54.0	15.97	AV	149.00	200	Horizontal	Pass
4	6697.531	51.00	74.0	23.01	Peak	33.00	200	Horizontal	Pass
4**	6697.531	40.65	54.0	13.35	AV	33.00	200	Horizontal	Pass
5	10268.002	46.69	74.0	27.31	Peak	230.00	100	Horizontal	Pass
5**	10268.002	36.66	54.0	17.34	AV	230.00	100	Horizontal	Pass
6	17377.125	51.77	74.0	22.23	Peak	93.00	100	Horizontal	Pass
6**	17377.125	42.38	54.0	11.62	AV	93.00	100	Horizontal	Pass

GFSK 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	1160.149	49.11	74.0	24.89	Peak	348.00	400	Vertical	Pass
1**	1160.149	37.32	54.0	16.68	AV	348.00	400	Vertical	Pass
2	1335.545	46.28	74.0	27.72	Peak	186.00	200	Vertical	Pass
2**	1335.545	36.21	54.0	17.80	AV	186.00	200	Vertical	Pass
3	4924.207	49.28	74.0	24.72	Peak	236.00	200	Vertical	Pass
3**	4924.207	41.21	54.0	12.79	AV	236.00	200	Vertical	Pass
4	7932.858	54.97	74.0	19.03	Peak	147.00	300	Vertical	Pass
4**	7932.858	41.81	54.0	12.19	AV	147.00	300	Vertical	Pass
5	12490.376	52.01	74.0	21.99	Peak	355.00	100	Vertical	Pass
5**	12490.376	41.13	54.0	12.87	AV	355.00	100	Vertical	Pass
6	17104.430	54.77	74.0	19.23	Peak	299.00	100	Vertical	Pass
6**	17104.430	41.77	54.0	12.24	AV	299.00	100	Vertical	Pass

GFSK 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	1294.491	42.16	74.0	31.84	Peak	116.00	300	Horizontal	Pass
1**	1294.491	31.31	54.0	22.69	AV	116.00	300	Horizontal	Pass
2	2946.674	50.57	74.0	23.43	Peak	65.00	200	Horizontal	Pass
2**	2946.674	41.62	54.0	12.38	AV	65.00	200	Horizontal	Pass
3	4084.439	46.70	74.0	27.30	Peak	7.00	200	Horizontal	Pass
3**	4084.439	37.95	54.0	16.05	AV	7.00	200	Horizontal	Pass
4	6700.499	50.86	74.0	23.15	Peak	262.00	100	Horizontal	Pass
4**	6700.499	40.25	54.0	13.75	AV	262.00	100	Horizontal	Pass
5	10267.507	46.01	74.0	27.99	Peak	152.00	100	Horizontal	Pass
5**	10267.507	36.95	54.0	17.05	AV	152.00	100	Horizontal	Pass
6	17380.494	52.06	74.0	21.94	Peak	42.00	100	Horizontal	Pass
6**	17380.494	42.30	54.0	11.70	AV	42.00	100	Horizontal	Pass

GFSK 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	1161.633	48.91	74.0	25.09	Peak	152.00	300	Vertical	Pass
1**	1161.633	37.26	54.0	16.74	AV	152.00	300	Vertical	Pass
2	1336.837	46.10	74.0	27.90	Peak	106.00	400	Vertical	Pass
2**	1336.837	36.67	54.0	17.34	AV	106.00	400	Vertical	Pass
3	4919.402	48.40	74.0	25.60	Peak	335.00	200	Vertical	Pass
3**	4919.402	40.95	54.0	13.05	AV	335.00	200	Vertical	Pass
4	7931.938	54.71	74.0	19.29	Peak	4.00	100	Vertical	Pass
4**	7931.938	41.28	54.0	12.72	AV	4.00	100	Vertical	Pass
5	12489.488	52.86	74.0	21.14	Peak	59.00	100	Vertical	Pass
5**	12489.488	42.33	54.0	11.67	AV	59.00	100	Vertical	Pass
6	17107.461	55.24	74.0	18.76	Peak	194.00	400	Vertical	Pass
6**	17107.461	42.11	54.0	11.90	AV	194.00	400	Vertical	Pass

8DPSK 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	1283.645	41.78	74.0	32.22	Peak	124.00	100	Horizontal	Pass
1**	1283.645	31.96	54.0	22.04	AV	124.00	100	Horizontal	Pass
2	2771.750	50.92	74.0	23.08	Peak	285.00	300	Horizontal	Pass
2**	2771.750	41.82	54.0	12.18	AV	285.00	300	Horizontal	Pass
3	5165.307	46.85	74.0	27.15	Peak	74.00	200	Horizontal	Pass
3**	5165.307	38.05	54.0	15.95	AV	74.00	200	Horizontal	Pass
4	6804.175	50.78	74.0	23.23	Peak	176.00	400	Horizontal	Pass
4**	6804.175	40.20	54.0	13.80	AV	176.00	400	Horizontal	Pass
5	13469.218	46.61	74.0	27.39	Peak	95.00	100	Horizontal	Pass
5**	13469.218	37.30	54.0	16.70	AV	95.00	100	Horizontal	Pass
6	17469.309	51.61	74.0	22.39	Peak	110.00	300	Horizontal	Pass
6**	17469.309	42.24	54.0	11.76	AV	110.00	300	Horizontal	Pass

8DPSK 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	1283.224	48.91	74.0	25.09	Peak	319.00	300	Vertical	Pass
1**	1283.224	37.36	54.0	16.64	AV	319.00	300	Vertical	Pass
2	2773.337	45.87	74.0	28.13	Peak	34.00	300	Vertical	Pass
2**	2773.337	36.57	54.0	17.44	AV	34.00	300	Vertical	Pass
3	5162.693	49.05	74.0	24.95	Peak	120.00	200	Vertical	Pass
3**	5162.693	41.16	54.0	12.84	AV	120.00	200	Vertical	Pass
4	6801.502	55.44	74.0	18.56	Peak	38.00	400	Vertical	Pass
4**	6801.502	41.56	54.0	12.44	AV	38.00	400	Vertical	Pass
5	13470.191	52.47	74.0	21.53	Peak	80.00	200	Vertical	Pass
5**	13470.191	42.69	54.0	11.31	AV	80.00	200	Vertical	Pass
6	17460.769	54.78	74.0	19.22	Peak	11.00	200	Vertical	Pass
6**	17460.769	41.60	54.0	12.41	AV	11.00	200	Vertical	Pass

8DPSK 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	1289.335	41.30	74.0	32.70	Peak	145.00	300	Horizontal	Pass
1**	1289.335	30.66	54.0	23.34	AV	145.00	300	Horizontal	Pass
2	2772.163	49.19	74.0	24.81	Peak	240.00	400	Horizontal	Pass
2**	2772.163	40.69	54.0	13.31	AV	240.00	400	Horizontal	Pass
3	5164.629	45.75	74.0	28.25	Peak	281.00	200	Horizontal	Pass
3**	5164.629	37.32	54.0	16.68	AV	281.00	200	Horizontal	Pass
4	6802.409	50.17	74.0	23.84	Peak	221.00	100	Horizontal	Pass
4**	6802.409	40.32	54.0	13.68	AV	221.00	100	Horizontal	Pass
5	13470.874	45.84	74.0	28.16	Peak	137.00	400	Horizontal	Pass
5**	13470.874	36.13	54.0	17.87	AV	137.00	400	Horizontal	Pass
6	17468.551	51.43	74.0	22.57	Peak	56.00	200	Horizontal	Pass
6**	17468.551	41.85	54.0	12.15	AV	56.00	200	Horizontal	Pass

8DPSK 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	1281.562	48.50	74.0	25.50	Peak	241.00	400	Vertical	Pass
1**	1281.562	36.59	54.0	17.41	AV	241.00	400	Vertical	Pass
2	2771.979	45.76	74.0	28.24	Peak	89.00	100	Vertical	Pass
2**	2771.979	36.20	54.0	17.81	AV	89.00	100	Vertical	Pass
3	5164.775	49.04	74.0	24.96	Peak	171.00	200	Vertical	Pass
3**	5164.775	40.65	54.0	13.35	AV	171.00	200	Vertical	Pass
4	6808.154	54.63	74.0	19.37	Peak	21.00	200	Vertical	Pass
4**	6808.154	41.01	54.0	12.99	AV	21.00	200	Vertical	Pass
5	13471.644	51.02	74.0	22.98	Peak	47.00	400	Vertical	Pass
5**	13471.644	42.73	54.0	11.27	AV	47.00	400	Vertical	Pass
6	17466.352	54.44	74.0	19.56	Peak	26.00	300	Vertical	Pass
6**	17466.352	41.76	54.0	12.25	AV	26.00	300	Vertical	Pass

8DPSK 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	1287.123	41.95	74.0	32.05	Peak	260.00	300	Horizontal	Pass
1**	1287.123	31.18	54.0	22.82	AV	260.00	300	Horizontal	Pass
2	2768.236	50.45	74.0	23.55	Peak	28.00	300	Horizontal	Pass
2**	2768.236	40.69	54.0	13.31	AV	28.00	300	Horizontal	Pass
3	5163.662	45.83	74.0	28.17	Peak	311.00	200	Horizontal	Pass
3**	5163.662	37.81	54.0	16.19	AV	311.00	200	Horizontal	Pass
4	6805.953	50.30	74.0	23.71	Peak	143.00	100	Horizontal	Pass
4**	6805.953	39.26	54.0	14.74	AV	143.00	100	Horizontal	Pass
5	13466.795	45.04	74.0	28.96	Peak	224.00	300	Horizontal	Pass
5**	13466.795	36.15	54.0	17.85	AV	224.00	300	Horizontal	Pass
6	17464.613	51.19	74.0	22.81	Peak	35.00	100	Horizontal	Pass
6**	17464.613	41.53	54.0	12.47	AV	35.00	100	Horizontal	Pass

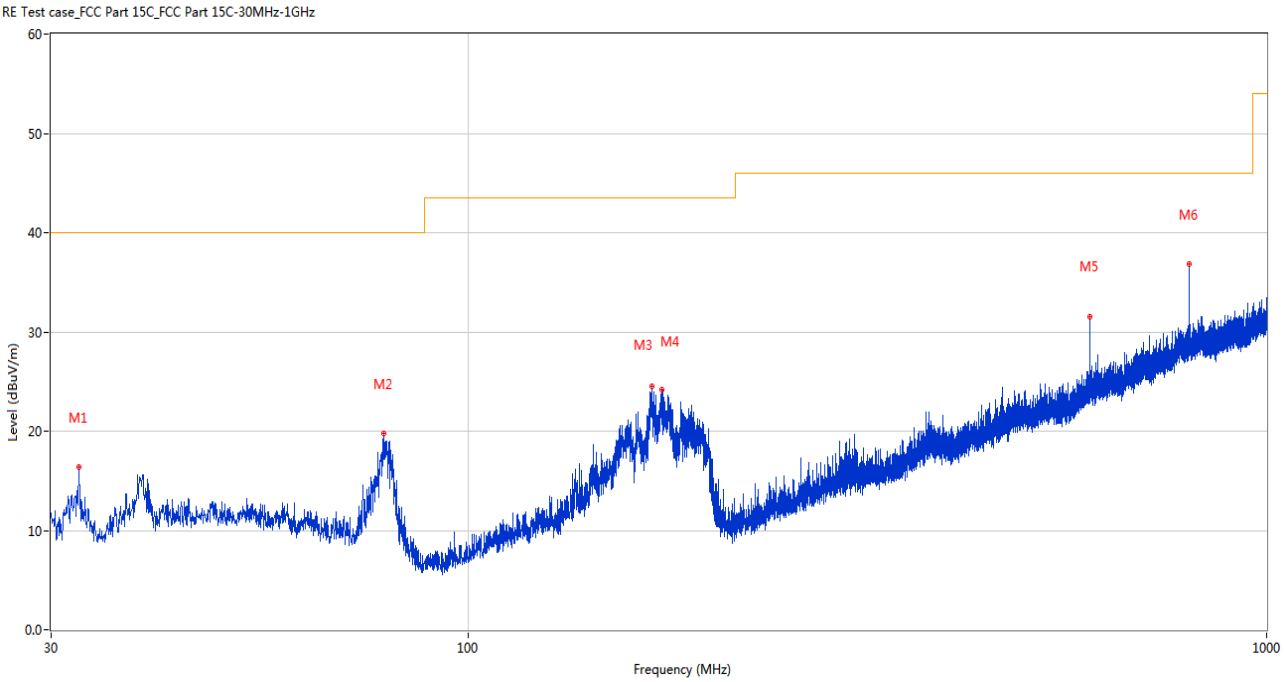
8DPSK HIGH CHANNEL 1 GHz to 18 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1283.184	48.42	74.0	25.58	Peak	201.00	300	Vertical	Pass
1**	1283.184	36.51	54.0	17.49	AV	201.00	300	Vertical	Pass
2	2768.460	45.45	74.0	28.55	Peak	38.00	200	Vertical	Pass
2**	2768.460	35.72	54.0	18.29	AV	38.00	200	Vertical	Pass
3	5161.837	47.59	74.0	26.41	Peak	225.00	200	Vertical	Pass
3**	5161.837	40.82	54.0	13.18	AV	225.00	200	Vertical	Pass
4	6804.945	54.47	74.0	19.53	Peak	139.00	200	Vertical	Pass
4**	6804.945	40.76	54.0	13.24	AV	139.00	200	Vertical	Pass
5	13468.157	52.12	74.0	21.88	Peak	260.00	200	Vertical	Pass
5**	13468.157	42.72	54.0	11.28	AV	260.00	200	Vertical	Pass
6	17465.402	54.85	74.0	19.15	Peak	317.00	400	Vertical	Pass
6**	17465.402	41.58	54.0	12.43	AV	317.00	400	Vertical	Pass

Test Data and Plots

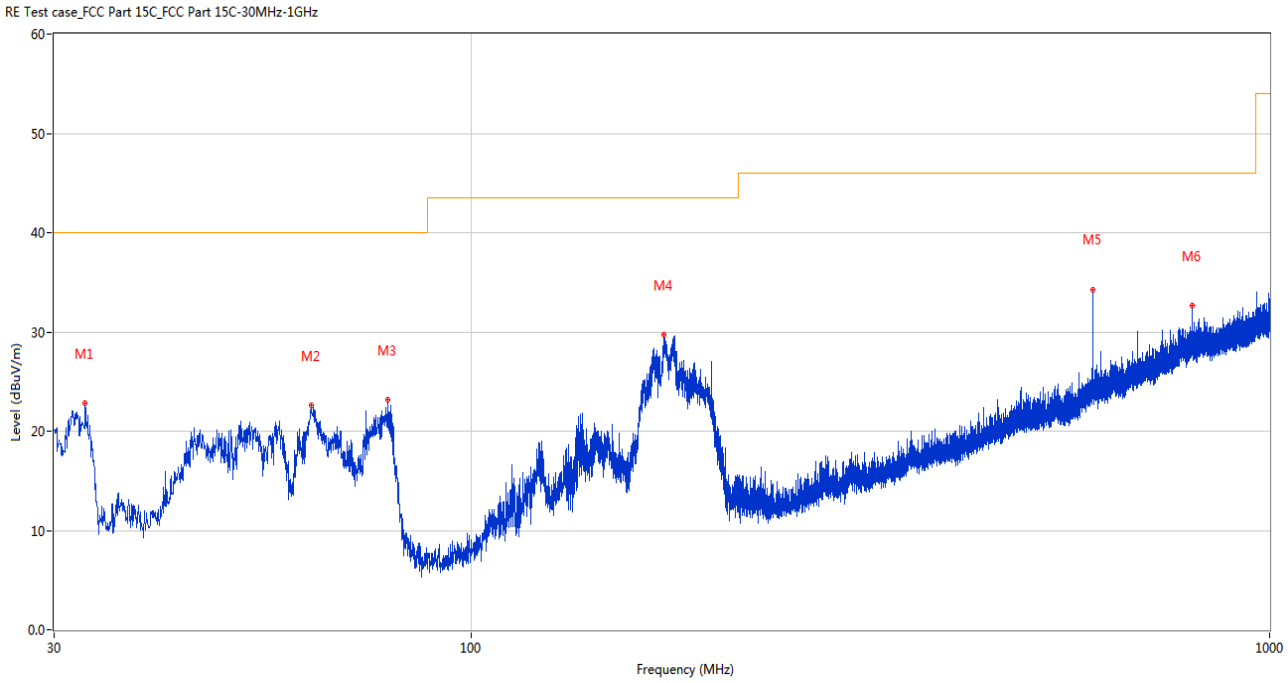
FPC Antenna

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	32.522	16.39	-26.70	40.0	23.61	Peak	223.00	100	Horizontal	Pass
2	78.403	19.77	-28.45	40.0	20.23	Peak	354.00	200	Horizontal	Pass
3	169.777	24.47	-24.34	43.5	19.03	Peak	275.00	100	Horizontal	Pass
4	174.627	24.18	-24.60	43.5	19.32	Peak	291.00	100	Horizontal	Pass
5	600.020	31.58	-13.10	46.0	14.42	Peak	345.00	200	Horizontal	Pass
6	799.937	36.79	-9.11	46.0	9.21	Peak	232.00	100	Horizontal	Pass

30 MHz to 1 GHz, ANT V

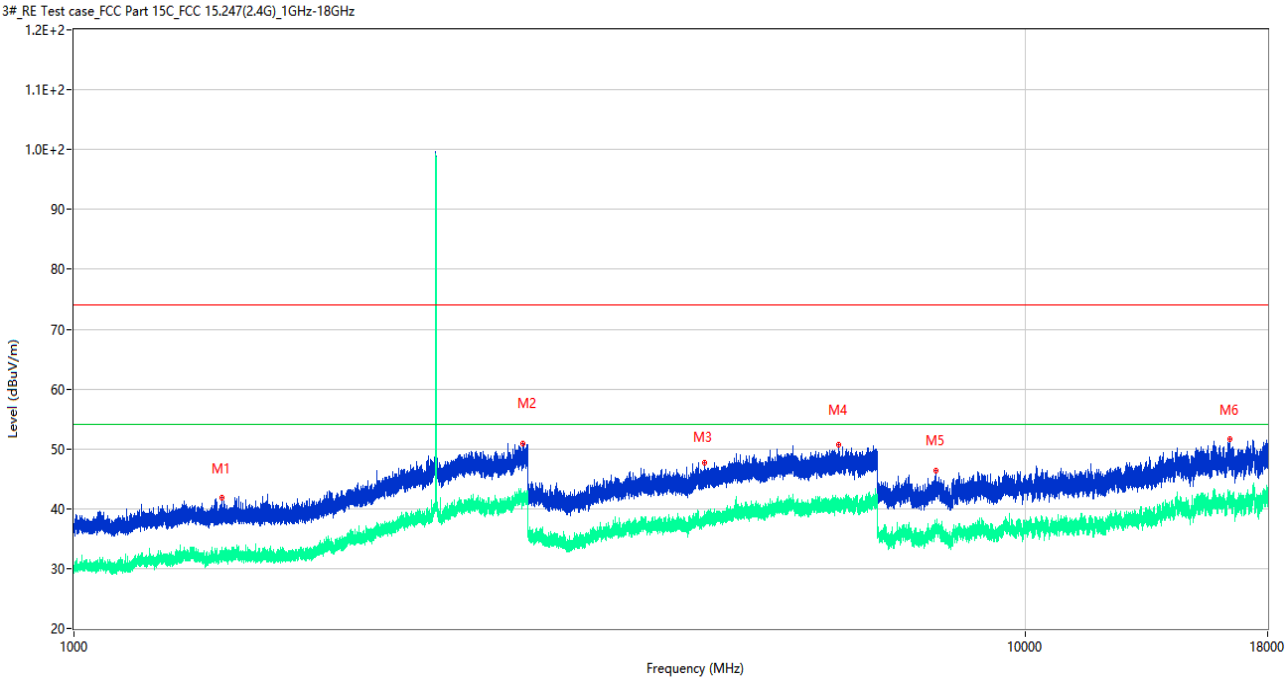


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	32.813	22.85	-26.67	40.0	17.15	Peak	48.00	100	Vertical	Pass
2	62.980	22.58	-25.98	40.0	17.42	Peak	90.00	100	Vertical	Pass
3	78.500	23.13	-28.47	40.0	16.87	Peak	123.00	100	Vertical	Pass
4	174.385	29.74	-24.59	43.5	13.76	Peak	354.00	100	Vertical	Pass
5	600.020	34.29	-13.10	46.0	11.71	Peak	338.00	100	Vertical	Pass
6	799.986	32.62	-9.11	46.0	13.38	Peak	300.00	200	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 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	1430.434	42.05	74.0	31.95	Peak	51.00	300	Horizontal	Pass
1**	1430.434	31.87	54.0	22.13	AV	51.00	300	Horizontal	Pass
2	2964.292	51.00	74.0	23.01	Peak	337.00	200	Horizontal	Pass
2**	2964.292	41.41	54.0	12.59	AV	337.00	200	Horizontal	Pass
3	4604.727	47.72	74.0	26.29	Peak	223.00	200	Horizontal	Pass
3**	4604.727	38.59	54.0	15.41	AV	223.00	200	Horizontal	Pass
4	6370.362	50.70	74.0	23.30	Peak	179.00	100	Horizontal	Pass
4**	6370.362	40.49	54.0	13.51	AV	179.00	100	Horizontal	Pass
5	8059.317	46.48	74.0	27.52	Peak	133.00	400	Horizontal	Pass
5**	8059.317	36.90	54.0	17.10	AV	133.00	400	Horizontal	Pass
6	16423.786	51.82	74.0	22.18	Peak	350.00	100	Horizontal	Pass
6**	16423.786	41.55	54.0	12.45	AV	350.00	100	Horizontal	Pass

GFSK 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	1165.566	49.73	74.0	24.27	Peak	41.00	100	Vertical	Pass
1**	1165.566	35.57	54.0	18.43	AV	41.00	100	Vertical	Pass
2	1343.290	47.20	74.0	26.80	Peak	29.00	400	Vertical	Pass
2**	1343.290	35.95	54.0	18.06	AV	29.00	400	Vertical	Pass
3	4919.819	49.93	74.0	24.07	Peak	79.00	200	Vertical	Pass
3**	4919.819	37.10	54.0	16.90	AV	79.00	200	Vertical	Pass
4	7931.896	55.14	74.0	18.86	Peak	259.00	400	Vertical	Pass
4**	7931.896	41.14	54.0	12.86	AV	259.00	400	Vertical	Pass
5	12494.145	54.40	74.0	19.60	Peak	284.00	400	Vertical	Pass
5**	12494.145	40.96	54.0	13.04	AV	284.00	400	Vertical	Pass
6	17107.785	54.75	74.0	19.25	Peak	231.00	100	Vertical	Pass
6**	17107.785	40.99	54.0	13.02	AV	231.00	100	Vertical	Pass

GFSK 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	1430.219	41.40	74.0	32.60	Peak	134.00	400	Horizontal	Pass
1**	1430.219	30.89	54.0	23.11	AV	134.00	400	Horizontal	Pass
2	2967.874	50.48	74.0	23.53	Peak	291.00	200	Horizontal	Pass
2**	2967.874	40.45	54.0	13.55	AV	291.00	200	Horizontal	Pass
3	4606.694	47.19	74.0	26.82	Peak	188.00	200	Horizontal	Pass
3**	4606.694	38.43	54.0	15.57	AV	188.00	200	Horizontal	Pass
4	6373.690	50.47	74.0	23.53	Peak	33.00	400	Horizontal	Pass
4**	6373.690	39.62	54.0	14.38	AV	33.00	400	Horizontal	Pass
5	8061.490	46.34	74.0	27.66	Peak	78.00	400	Horizontal	Pass
5**	8061.490	36.54	54.0	17.46	AV	78.00	400	Horizontal	Pass
6	16418.150	51.76	74.0	22.24	Peak	203.00	200	Horizontal	Pass
6**	16418.150	41.06	54.0	12.94	AV	203.00	200	Horizontal	Pass

GFSK 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	1160.713	48.97	74.0	25.03	Peak	107.00	300	Vertical	Pass
1**	1160.713	35.05	54.0	18.95	AV	107.00	300	Vertical	Pass
2	1342.568	46.75	74.0	27.25	Peak	22.00	400	Vertical	Pass
2**	1342.568	35.74	54.0	18.27	AV	22.00	400	Vertical	Pass
3	4917.951	49.18	74.0	24.82	Peak	273.00	200	Vertical	Pass
3**	4917.951	36.74	54.0	17.26	AV	273.00	200	Vertical	Pass
4	7931.146	54.70	74.0	19.30	Peak	54.00	200	Vertical	Pass
4**	7931.146	41.19	54.0	12.81	AV	54.00	200	Vertical	Pass
5	12495.593	54.34	74.0	19.66	Peak	145.00	100	Vertical	Pass
5**	12495.593	40.51	54.0	13.49	AV	145.00	100	Vertical	Pass
6	17106.894	54.67	74.0	19.33	Peak	125.00	300	Vertical	Pass
6**	17106.894	41.18	54.0	12.83	AV	125.00	300	Vertical	Pass

GFSK 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	1428.446	41.56	74.0	32.44	Peak	254.00	300	Horizontal	Pass
1**	1428.446	31.36	54.0	22.64	AV	254.00	300	Horizontal	Pass
2	2969.159	50.31	74.0	23.70	Peak	133.00	100	Horizontal	Pass
2**	2969.159	41.28	54.0	12.72	AV	133.00	100	Horizontal	Pass
3	4601.942	47.31	74.0	26.70	Peak	275.00	200	Horizontal	Pass
3**	4601.942	38.07	54.0	15.93	AV	275.00	200	Horizontal	Pass
4	6374.081	50.20	74.0	23.80	Peak	192.00	200	Horizontal	Pass
4**	6374.081	40.30	54.0	13.70	AV	192.00	200	Horizontal	Pass
5	8060.123	45.51	74.0	28.49	Peak	17.00	200	Horizontal	Pass
5**	8060.123	36.62	54.0	17.38	AV	17.00	200	Horizontal	Pass
6	16417.449	51.40	74.0	22.60	Peak	238.00	400	Horizontal	Pass
6**	16417.449	41.26	54.0	12.74	AV	238.00	400	Horizontal	Pass

GFSK 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	1165.643	49.71	74.0	24.29	Peak	243.00	400	Vertical	Pass
1**	1165.643	35.38	54.0	18.62	AV	243.00	400	Vertical	Pass
2	1339.645	47.06	74.0	26.94	Peak	212.00	300	Vertical	Pass
2**	1339.645	34.97	54.0	19.04	AV	212.00	300	Vertical	Pass
3	4918.746	48.93	74.0	25.07	Peak	200.00	200	Vertical	Pass
3**	4918.746	36.50	54.0	17.50	AV	200.00	200	Vertical	Pass
4	7933.225	54.97	74.0	19.03	Peak	190.00	300	Vertical	Pass
4**	7933.225	41.08	54.0	12.92	AV	190.00	300	Vertical	Pass
5	12493.369	53.41	74.0	20.59	Peak	324.00	400	Vertical	Pass
5**	12493.369	41.46	54.0	12.54	AV	324.00	400	Vertical	Pass
6	17103.923	54.52	74.0	19.48	Peak	173.00	100	Vertical	Pass
6**	17103.923	40.65	54.0	13.36	AV	173.00	100	Vertical	Pass

8DPSK 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	1284.588	41.39	74.0	32.61	Peak	70.00	300	Horizontal	Pass
1**	1284.588	31.55	54.0	22.45	AV	70.00	300	Horizontal	Pass
2	2772.634	50.63	74.0	23.38	Peak	153.00	400	Horizontal	Pass
2**	2772.634	41.03	54.0	12.97	AV	153.00	400	Horizontal	Pass
3	5170.030	47.32	74.0	26.69	Peak	236.00	200	Horizontal	Pass
3**	5170.030	37.61	54.0	16.39	AV	236.00	200	Horizontal	Pass
4	6804.049	50.39	74.0	23.61	Peak	218.00	100	Horizontal	Pass
4**	6804.049	39.63	54.0	14.37	AV	218.00	100	Horizontal	Pass
5	13464.100	46.10	74.0	27.90	Peak	156.00	300	Horizontal	Pass
5**	13464.100	36.61	54.0	17.39	AV	156.00	300	Horizontal	Pass
6	17466.052	51.04	74.0	22.96	Peak	180.00	100	Horizontal	Pass
6**	17466.052	41.13	54.0	12.87	AV	180.00	100	Horizontal	Pass

8DPSK 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	1282.907	49.11	74.0	24.89	Peak	165.00	200	Vertical	Pass
1**	1282.907	35.29	54.0	18.71	AV	165.00	200	Vertical	Pass
2	2774.139	47.17	74.0	26.83	Peak	26.00	300	Vertical	Pass
2**	2774.139	35.50	54.0	18.51	AV	26.00	300	Vertical	Pass
3	5162.715	49.06	74.0	24.94	Peak	203.00	200	Vertical	Pass
3**	5162.715	36.57	54.0	17.43	AV	203.00	200	Vertical	Pass
4	6806.766	54.28	74.0	19.72	Peak	39.00	200	Vertical	Pass
4**	6806.766	40.89	54.0	13.11	AV	39.00	200	Vertical	Pass
5	13464.220	53.97	74.0	20.03	Peak	254.00	400	Vertical	Pass
5**	13464.220	40.72	54.0	13.28	AV	254.00	400	Vertical	Pass
6	17462.416	54.39	74.0	19.61	Peak	61.00	100	Vertical	Pass
6**	17462.416	41.07	54.0	12.94	AV	61.00	100	Vertical	Pass

8DPSK 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	1284.017	41.26	74.0	32.74	Peak	319.00	300	Horizontal	Pass
1**	1284.017	30.84	54.0	23.16	AV	319.00	300	Horizontal	Pass
2	2773.089	50.33	74.0	23.68	Peak	169.00	200	Horizontal	Pass
2**	2773.089	39.79	54.0	14.21	AV	169.00	200	Horizontal	Pass
3	5171.208	46.76	74.0	27.25	Peak	27.00	200	Horizontal	Pass
3**	5171.208	37.78	54.0	16.22	AV	27.00	200	Horizontal	Pass
4	6803.731	49.80	74.0	24.20	Peak	6.00	300	Horizontal	Pass
4**	6803.731	39.20	54.0	14.80	AV	6.00	300	Horizontal	Pass
5	13469.468	46.08	74.0	27.92	Peak	215.00	100	Horizontal	Pass
5**	13469.468	35.72	54.0	18.28	AV	215.00	100	Horizontal	Pass
6	17464.494	50.77	74.0	23.23	Peak	73.00	200	Horizontal	Pass
6**	17464.494	40.14	54.0	13.86	AV	73.00	200	Horizontal	Pass

8DPSK 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	1285.573	48.07	74.0	25.93	Peak	30.00	400	Vertical	Pass
1**	1285.573	34.62	54.0	19.38	AV	30.00	400	Vertical	Pass
2	2770.372	46.64	74.0	27.36	Peak	174.00	100	Vertical	Pass
2**	2770.372	35.42	54.0	18.59	AV	174.00	100	Vertical	Pass
3	5163.216	49.07	74.0	24.93	Peak	321.00	200	Vertical	Pass
3**	5163.216	36.64	54.0	17.36	AV	321.00	200	Vertical	Pass
4	6801.895	53.80	74.0	20.20	Peak	144.00	300	Vertical	Pass
4**	6801.895	41.46	54.0	12.54	AV	144.00	300	Vertical	Pass
5	13468.220	53.89	74.0	20.11	Peak	236.00	300	Vertical	Pass
5**	13468.220	40.56	54.0	13.44	AV	236.00	300	Vertical	Pass
6	17464.096	54.50	74.0	19.50	Peak	91.00	200	Vertical	Pass
6**	17464.096	41.40	54.0	12.61	AV	91.00	200	Vertical	Pass

8DPSK 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	1289.597	41.44	74.0	32.56	Peak	147.00	400	Horizontal	Pass
1**	1289.597	31.11	54.0	22.89	AV	147.00	400	Horizontal	Pass
2	2768.158	49.98	74.0	24.03	Peak	136.00	100	Horizontal	Pass
2**	2768.158	40.73	54.0	13.27	AV	136.00	100	Horizontal	Pass
3	5168.532	46.78	74.0	27.23	Peak	208.00	200	Horizontal	Pass
3**	5168.532	37.75	54.0	16.25	AV	208.00	200	Horizontal	Pass
4	6805.440	50.11	74.0	23.89	Peak	325.00	300	Horizontal	Pass
4**	6805.440	40.26	54.0	13.74	AV	325.00	300	Horizontal	Pass
5	13468.657	44.80	74.0	29.20	Peak	175.00	100	Horizontal	Pass
5**	13468.657	36.48	54.0	17.52	AV	175.00	100	Horizontal	Pass
6	17470.542	50.77	74.0	23.23	Peak	317.00	200	Horizontal	Pass
6**	17470.542	40.34	54.0	13.66	AV	317.00	200	Horizontal	Pass

8DPSK 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	1282.815	48.96	74.0	25.04	Peak	118.00	300	Vertical	Pass
1**	1282.815	34.66	54.0	19.34	AV	118.00	300	Vertical	Pass
2	2767.693	46.37	74.0	27.63	Peak	123.00	400	Vertical	Pass
2**	2767.693	34.69	54.0	19.32	AV	123.00	400	Vertical	Pass
3	5166.480	48.71	74.0	25.29	Peak	3.00	200	Vertical	Pass
3**	5166.480	35.69	54.0	18.31	AV	3.00	200	Vertical	Pass
4	6806.101	54.90	74.0	19.10	Peak	313.00	200	Vertical	Pass
4**	6806.101	40.82	54.0	13.18	AV	313.00	200	Vertical	Pass
5	13465.170	53.17	74.0	20.83	Peak	312.00	400	Vertical	Pass
5**	13465.170	40.51	54.0	13.49	AV	312.00	400	Vertical	Pass
6	17464.850	53.95	74.0	20.05	Peak	100.00	300	Vertical	Pass
6**	17464.850	40.57	54.0	13.44	AV	100.00	300	Vertical	Pass

A.9 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.

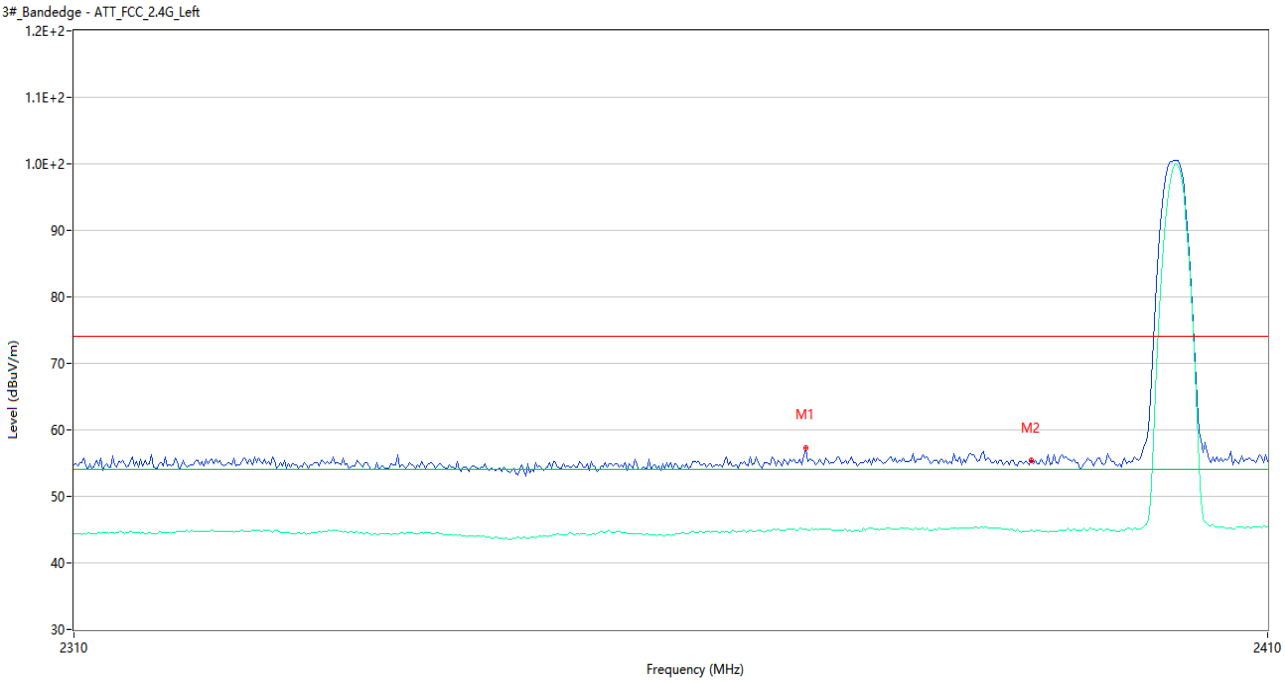
Note [4]: The Level (dBuV/m) has been corrected by factor.

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

Test Data and Plots

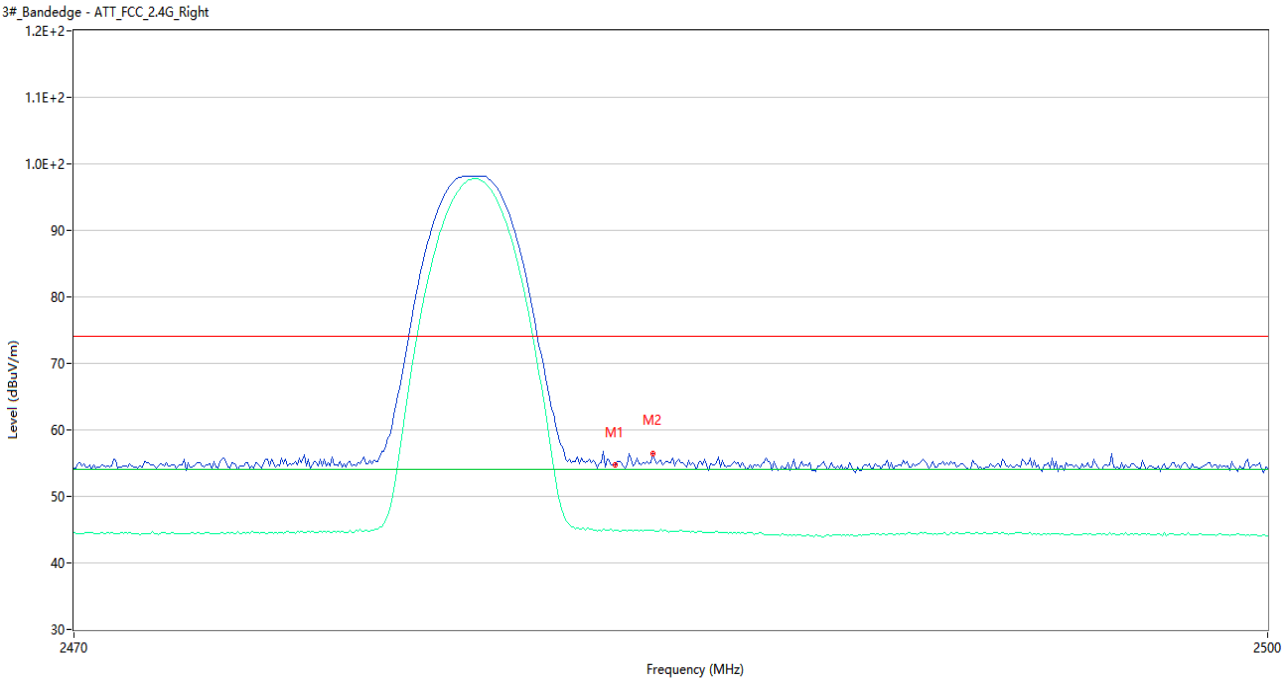
PCB Antenna

GFSK LOW CHANNEL



No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2368.117	57.60	74.0	16.41	Peak	137.00	200	Horizontal	Pass
1**	2368.117	45.15	54.0	8.85	AV	137.00	200	Horizontal	Pass
2	2390.000	55.42	74.0	18.58	Peak	343.00	300	Horizontal	Pass
2**	2390.000	44.99	54.0	9.01	AV	343.00	300	Horizontal	Pass

GFSK HIGH CHANNEL



No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	54.95	74.0	19.05	Peak	207.00	300	Horizontal	Pass
1**	2483.500	44.98	54.0	9.02	AV	207.00	300	Horizontal	Pass
2	2487.484	56.68	74.0	17.33	Peak	221.00	200	Horizontal	Pass
2**	2487.484	44.87	54.0	9.13	AV	221.00	200	Horizontal	Pass

8DPSK LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2325.289	55.62	74.0	18.38	Peak	301.00	100	Horizontal	Pass
1**	2325.289	43.75	54.0	10.25	AV	301.00	100	Horizontal	Pass
2	2390.000	53.93	74.0	20.08	Peak	193.00	100	Horizontal	Pass
2**	2390.000	42.92	54.0	11.08	AV	193.00	100	Horizontal	Pass

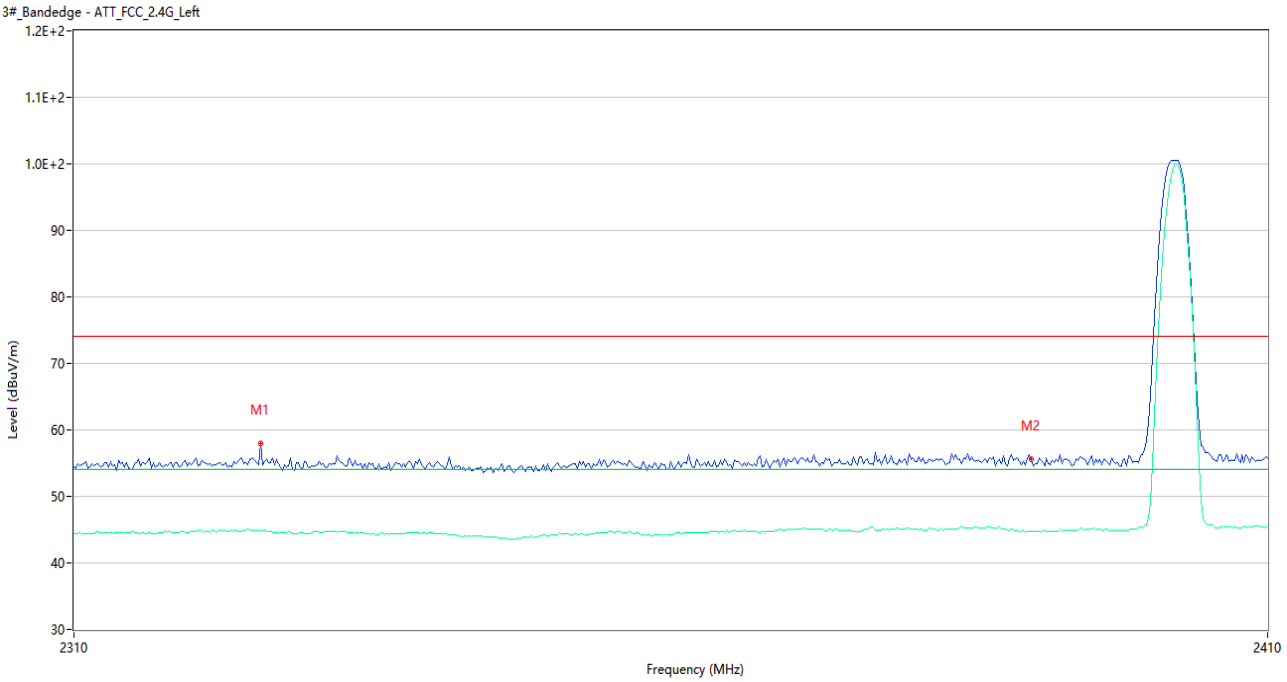
8DPSK HIGH CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	54.53	74.0	19.48	Peak	177.00	300	Horizontal	Pass
1**	2483.500	43.38	54.0	10.62	AV	177.00	300	Horizontal	Pass
2	2488.342	55.69	74.0	18.31	Peak	0.00	200	Horizontal	Pass
2**	2488.342	43.74	54.0	10.26	AV	0.00	200	Horizontal	Pass

Test Data and Plots

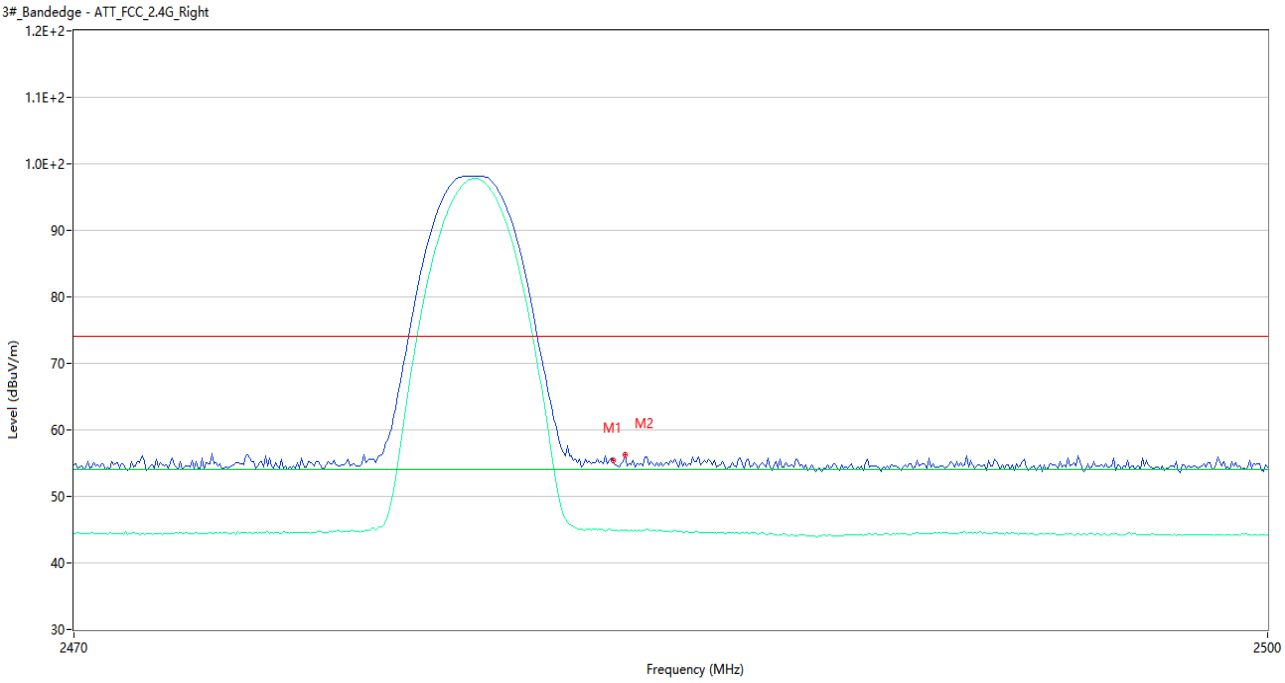
Rod Antenna

GFSK LOW CHANNEL



No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2323.874	58.14	74.0	15.86	Peak	128.00	200	Horizontal	Pass
1**	2323.874	44.95	54.0	9.05	AV	128.00	200	Horizontal	Pass
2	2390.000	55.78	74.0	18.22	Peak	170.00	100	Horizontal	Pass
2**	2390.000	44.93	54.0	9.08	AV	170.00	100	Horizontal	Pass

GFSK HIGH CHANNEL



No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	55.45	74.0	18.55	Peak	268.00	200	Horizontal	Pass
1**	2483.500	45.02	54.0	8.98	AV	268.00	200	Horizontal	Pass
2	2484.130	56.45	74.0	17.55	Peak	72.00	100	Horizontal	Pass
2**	2484.130	44.90	54.0	9.10	AV	72.00	100	Horizontal	Pass

8DPSK LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2325.591	55.38	74.0	18.62	Peak	198.00	300	Horizontal	Pass
1**	2325.591	43.67	54.0	10.33	AV	198.00	300	Horizontal	Pass
2	2390.000	54.02	74.0	19.98	Peak	92.00	100	Horizontal	Pass
2**	2390.000	43.14	54.0	10.86	AV	92.00	100	Horizontal	Pass

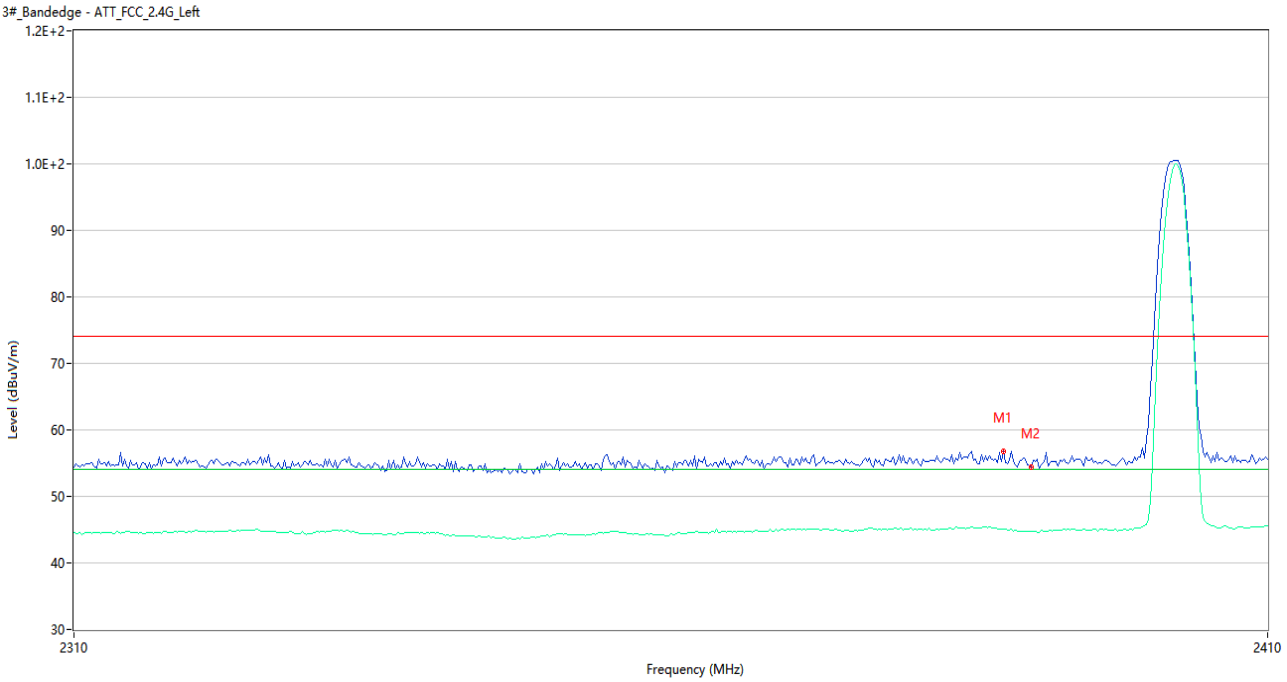
8DPSK HIGH CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	54.50	74.0	19.50	Peak	277.00	100	Horizontal	Pass
1**	2483.500	43.17	54.0	10.83	AV	277.00	100	Horizontal	Pass
2	2487.870	55.57	74.0	18.43	Peak	133.00	100	Horizontal	Pass
2**	2487.870	43.80	54.0	10.20	AV	133.00	100	Horizontal	Pass

Test Data and Plots

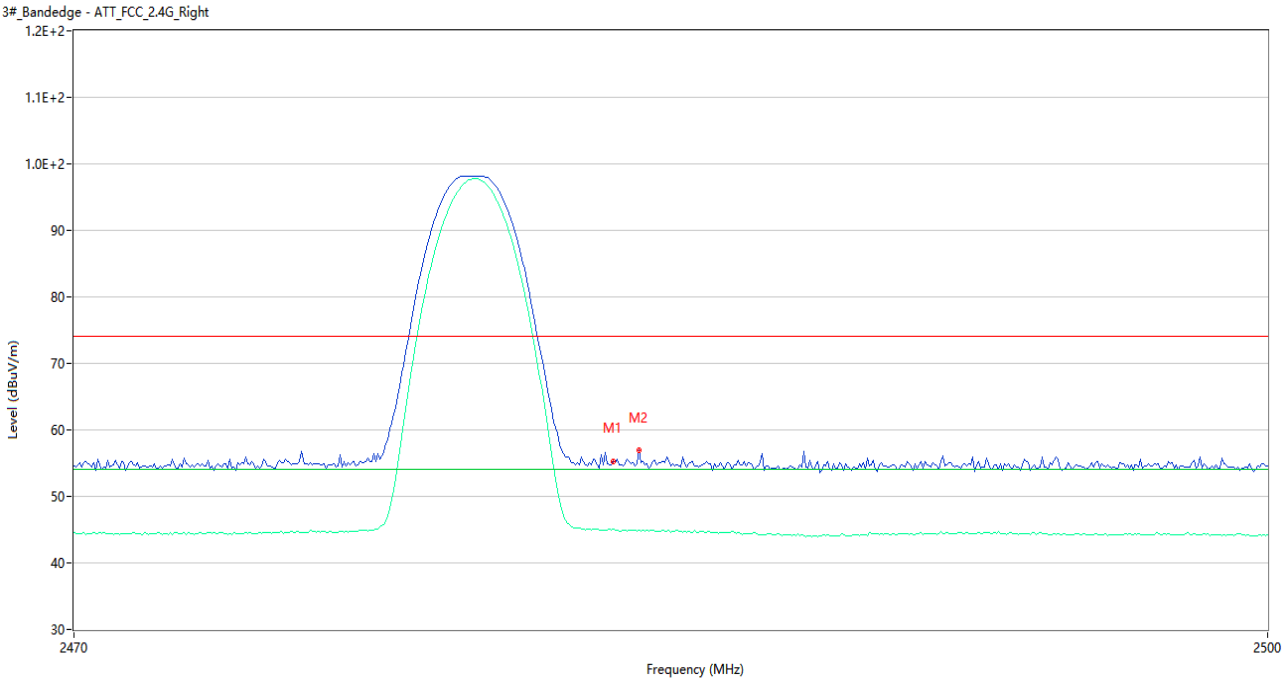
FPC Antenna

GFSK LOW CHANNEL



No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2385.677	56.92	74.0	17.08	Peak	209.00	100	Horizontal	Pass
1**	2385.677	45.23	54.0	8.77	AV	209.00	100	Horizontal	Pass
2	2390.000	54.55	74.0	19.45	Peak	68.00	300	Horizontal	Pass
2**	2390.000	45.01	54.0	8.99	AV	68.00	300	Horizontal	Pass

GFSK HIGH CHANNEL



No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	55.34	74.0	18.66	Peak	73.00	300	Horizontal	Pass
1**	2483.500	45.29	54.0	8.71	AV	73.00	300	Horizontal	Pass
2	2486.097	57.14	74.0	16.86	Peak	84.00	100	Horizontal	Pass
2**	2486.097	45.19	54.0	8.81	AV	84.00	100	Horizontal	Pass

8DPSK LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2327.713	55.40	74.0	18.60	Peak	90.00	300	Horizontal	Pass
1**	2327.713	43.84	54.0	10.16	AV	90.00	300	Horizontal	Pass
2	2390.000	53.84	74.0	20.16	Peak	348.00	100	Horizontal	Pass
2**	2390.000	42.98	54.0	11.02	AV	348.00	100	Horizontal	Pass

8DPSK HIGH CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	54.29	74.0	19.71	Peak	210.00	100	Horizontal	Pass
1**	2483.500	43.27	54.0	10.73	AV	210.00	100	Horizontal	Pass
2	2489.567	55.64	74.0	18.36	Peak	146.00	200	Horizontal	Pass
2**	2489.567	43.53	54.0	10.47	AV	146.00	200	Horizontal	Pass

ANNEX B TEST SETUP PHOTOS

Please refer the document “Ti-EE26040484-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “Ti-EE26040484-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “Ti-EE26040484-AI.PDF”.

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