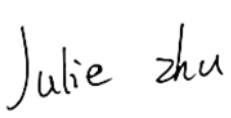
TEST REPORT

Applicant:	Libre Wireless Technologies, Inc.
Address:	17835 Newhope Street, Ste A, Fountain Valley, CA 92708, US
Equipment Type:	High Performance Wireless Media Module
Model Name:	LS8 (refer to section 2.3)
Brand Name:	LIBRE
FCC ID:	2ADBM-LS8
ISED Number:	20276-LS8
Test Standard:	47 CFR Part 15 Subpart C RSS-Gen Issue 5 RSS-247 Issue 3 (refer to section 3.1)
Sample Arrival Date:	Sep. 09, 2024
Test Date:	Sep. 19, 2024 - Oct. 13, 2024
Date of Issue:	Nov. 04, 2024

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

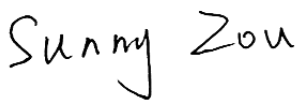
Tested by: Julie Zhu



Checked by: Ye Hongji

Approved by: Sunny Zou

(Technical Director)



Revision History

Version	Issue Date	Revisions
Rev. 01	Nov. 04, 2024	Initial Issue

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1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☑ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☐ 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China
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 recognition numbers of test site are 11524A.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Libre Wireless Technologies, Inc.
Address	17835 Newhope Street, Ste A, Fountain Valley, CA 92708, US

2.2 Manufacturer Information

Manufacturer	Libre Wireless Technologies, Inc.
Address	17835 Newhope Street, Ste A, Fountain Valley, CA 92708, US

2.3 General Description for Equipment under Test (EUT)

EUT Name	High Performance Wireless Media Module
Model Name Under Test	LS8
Series Model Name	LS8-NFK-22G-S, LS8-NFK-24G-S, LS8-NFK-44G-S, LS8-NFK-22G-R, LS8-NFK-24G-R, LS8-NFK-44G-R, LS8-NFK-11G-R, LS8-NFK-12G-R, LS8-NFK-21G-R, LS8-NFK-42G-R
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in model name and memory, the R series WIFI only has one IPEX port. (this information provided by the applicant)
Serial Number	20240902LS8
Hardware Version	MP1.0
Software Version	8118
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 and 802.11ac

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

Modulation Technology	FHSS
Modulation Type	GFSK, π/4-DQPSK, 8-DPSK
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	50Ω
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 3	Digital Transmission Systems (DTSs), Frequency Hopping Systems(FHSs) and Licence-Exemp Local Area Network (LE-LAN) Devices
4	ANSI C63.10-2013	American National Standard for Testing 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-247, 5.4 (f)	N/A	--	Pass	Note [1]
2	Number of Hopping Frequencies	15.247(a)	RSS-247, 5.1 (d)	Hopping Mode	ANNEX A.1	Pass	Note [2]
3	Peak Output Power and E.I.R.P	15.247(b)	RSS-247, 5.4 (b)	Low/Middle/ High	ANNEX A.2	Pass	--
4	Occupied Bandwidth	15.247(a)	RSS-247, 5.1 (a)	Low/Middle/ High	ANNEX A.3	Pass	--
5	Carrier Frequency Separation	15.247(a)	RSS-247, 5.1 (b)	Hopping Mode	ANNEX A.4	Pass	Note [2]
6	Time of Occupancy (Dwell time)	15.247(a)	RSS-247, 5.1 (d)	Hopping Mode	ANNEX A.5	Pass	Note [2]
7	Conducted Spurious Emission & Authorized-band band-edge	15.247(d)	RSS-247, 5.5	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, 5.5	Low/Middle/ High	ANNEX A.8	Pass	Note [2]
10	Band Edge(Restricted-band band-edge)	15.209 15.247(d)	RSS-247, 5.5	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, 8-DPSK is the EDR 3M rate mode. The consistency of test results in π/4-DQPSK and 8-DPSK is very high. So we chose 8-DPSK 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	42% to 68%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+20.3℃ to +24.8℃
Working Voltage of the EUT	NV (Normal Voltage)	5 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	KEYSIGHT	N9020A	MY50330200	2024.05.08	2025.05.07
Spectrum Analyzer	KEYSIGHT	N9020A	MY46471071	2024.07.04	2025.07.03
Spectrum Analyzer	KEYSIGHT	N9020A	MY50531259	2024.08.01	2025.07.31
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	02460	2024.05.16	2027.05.15
Test Antenna-Horn	A-INFO	LB-180400KF	J211060273	2024.06.15	2027.06.14
Anechoic Chamber	RAINFORD	9m*6m*6m	140	2024.07.28	2027.07.27
Amplifier	COM-MV	LSCX_LNA1-12G-01	7210214	2024.08.01	2025.07.31
Amplifier	COM-MV	XKu_LNA7-18G-01	7210209	2024.08.01	2025.07.31
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2024.08.01	2025.07.31
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9168	9168-01162	2023.08.04	2026.08.03
Test Antenna-Loop	SCHWARZBECK	FMZB 1519	1519-037	2024.01.23	2025.01.22
Amplifier	COM-MV	ZT30-1000M	B2018054558	2023.12.05	2024.12.04
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60*7.35m	130	2024.07.13	2027.07.12
EMI Receiver	KEYSIGHT	N9010B	MY57110309	2024.08.01	2025.07.31
LISN	SCHWARZBECK	NSLK 8127	8127-687	2024.05.09	2025.05.08
Shielded Enclosure	YiHeng Electronic Co., Ltd	3.5m*3.1m*2.8m	112	2022.02.19	2025.02.18

4.3 Test Software List

Description	Manufacturer	Software Version	Serial No.	Applicable test Setup
BL410R	BALUN	V2.1.1.488	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.

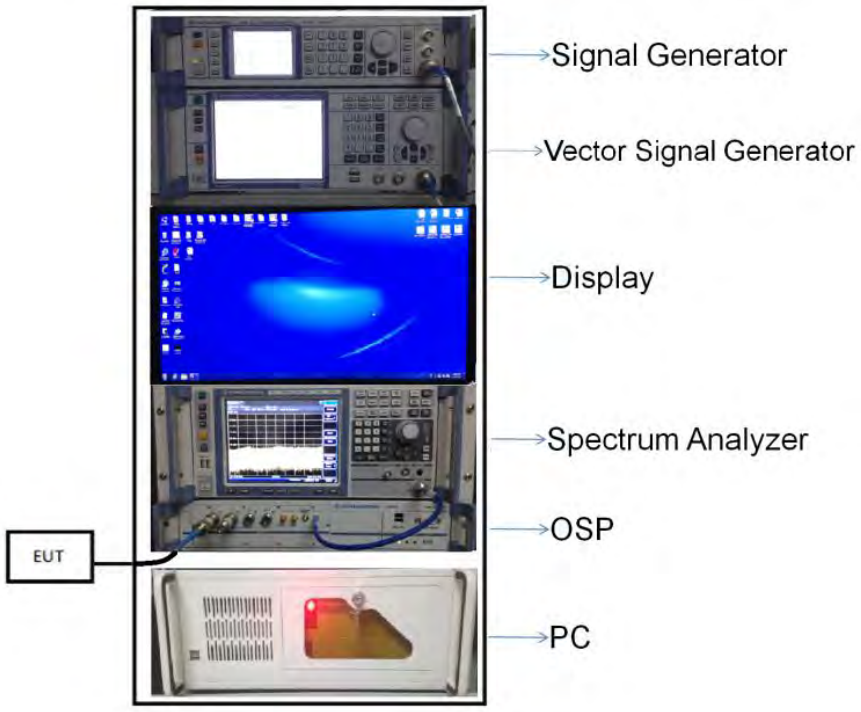
Parameters	Uncertainty
Occupied Channel Bandwidth	2.8%
RF output power, conducted	1.28 dB
Power Spectral Density, conducted	1.30 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.36 dB
Temperature	0.8℃
Humidity	4%

4.5 Description of Test Setup

4.5.1 For Antenna Port Test

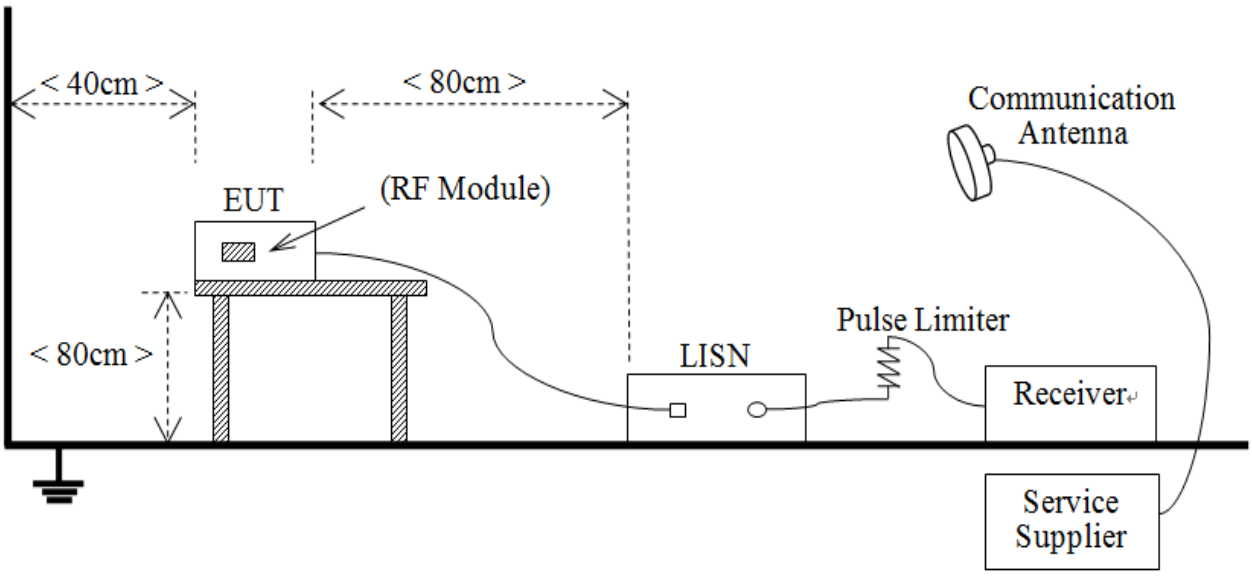
Conducted value (dBm) = Measurement value (dBm) + cable loss (dB)

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



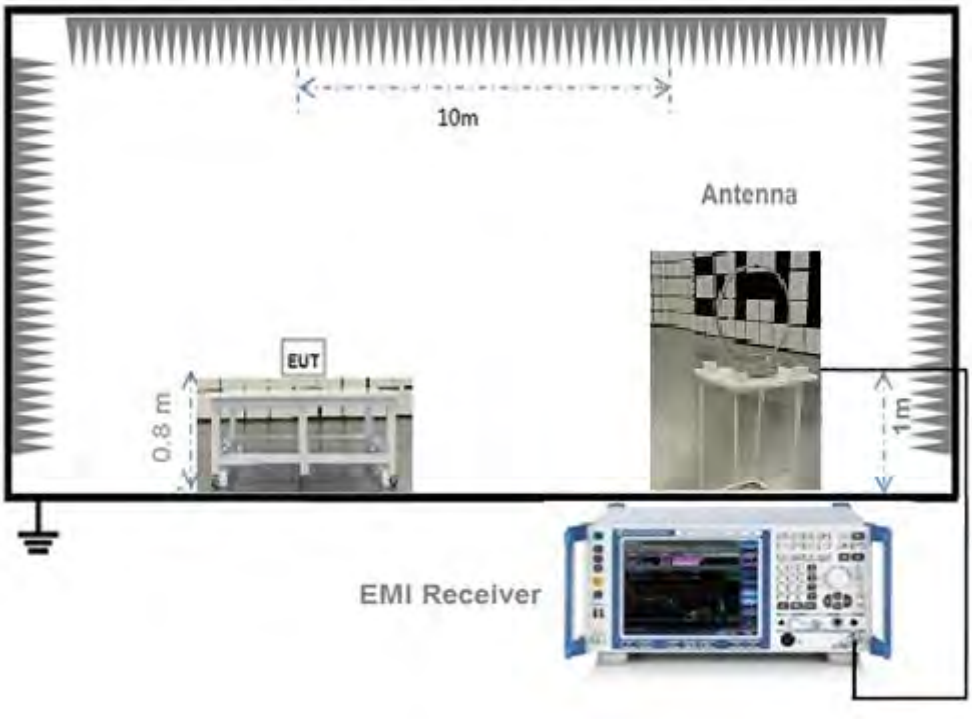
(Diagram 1)

4.5.2 For AC Power Supply Port Test



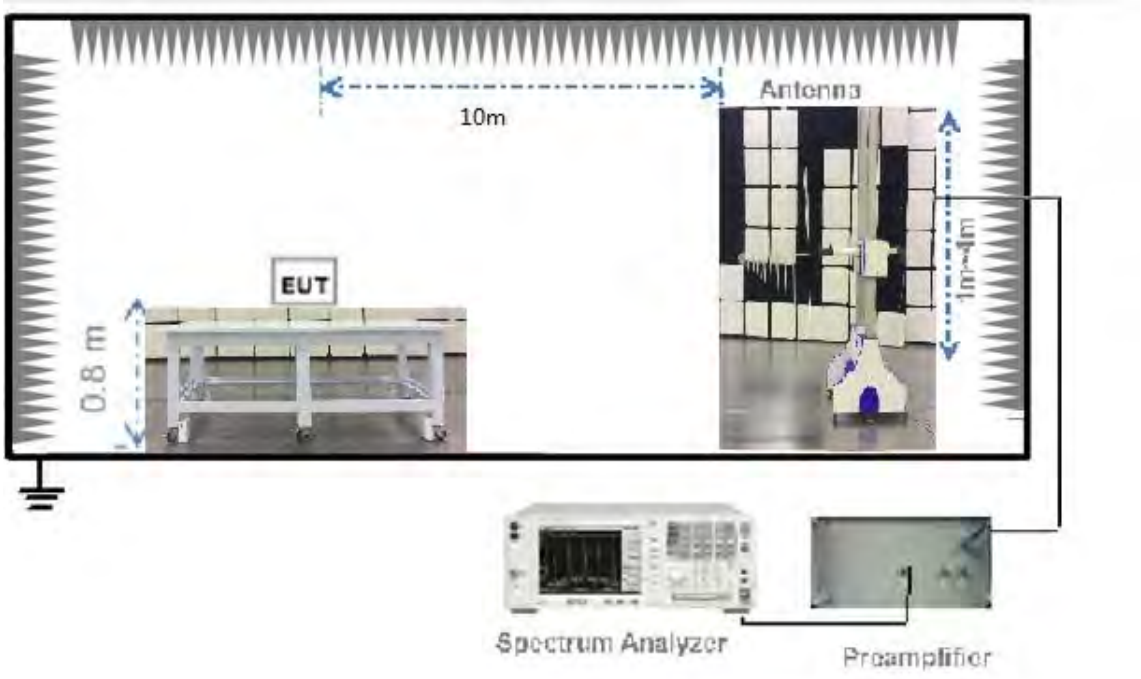
(Diagram 2)

4.5.3 For Radiated Test (Below 30 MHz)



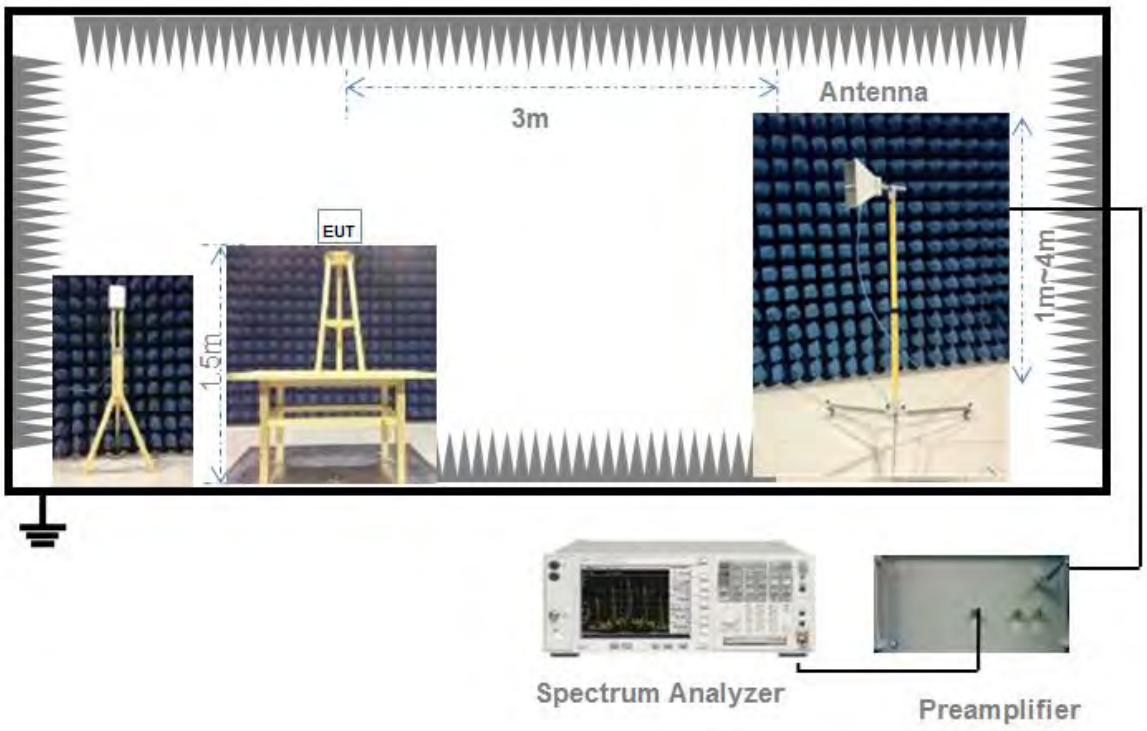
(Diagram 3)

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-247, 5.4 (f)

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.

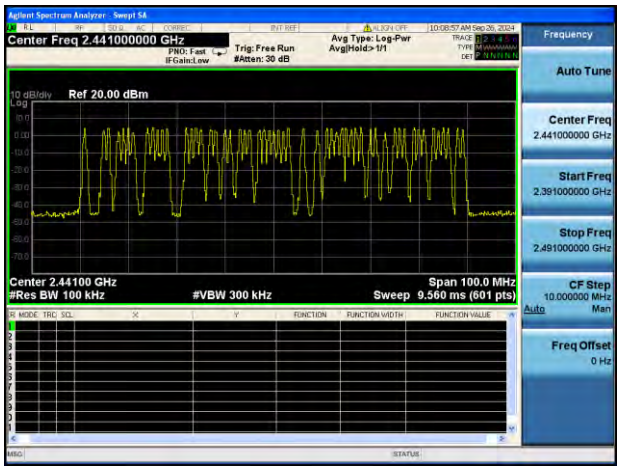
For short burst systems, describe how the EUT complies with the requirement that it be designed to be capable of operating as a true frequency hopping system. Specifically, the device shall comply with the equal frequency use and pseudorandom hopping sequence requirement when transmitting in short bursts, and shall be designed to comply when presented with continuous data (or information) stream.

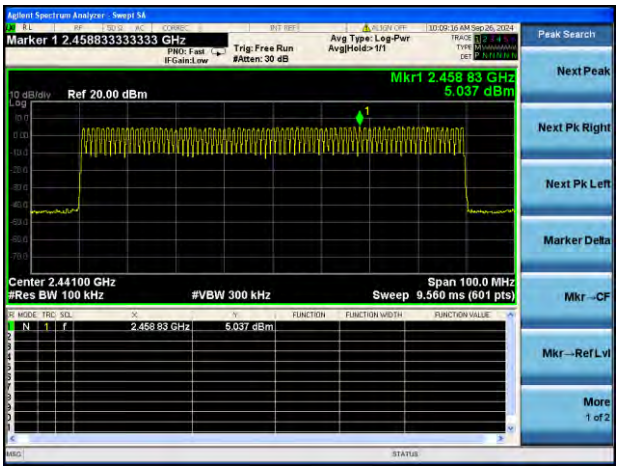
Describe how the EUT complies with the requirement that it not have the ability to be coordinated with other FHSS systems in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

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, 5.1 (d)

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, 5.4 (b)

For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W and the e.i.r.p. shall not exceed 4 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W and the e.i.r.p. shall not exceed 0.5 W if the hopset uses less than 75 hopping channels (see Section 5.4(5) for exceptions).

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.

EIRP= conducted RF output peak power +Antenna Gain.

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, 5.1 (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

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 ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

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

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, 5.1 (b)

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, 5.1 (d)

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 8-DPSK:
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, 5.5

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, 5.5

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

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

The power of the EUT transmitting frequency should be ignored.

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

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported, Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

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

The power of the EUT transmitting frequency should be ignored.

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

Use the following spectrum analyzer settings:

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

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

5.11.4 Test Result

Please refer to ANNEX A.9.

ANNEX A TEST RESULT

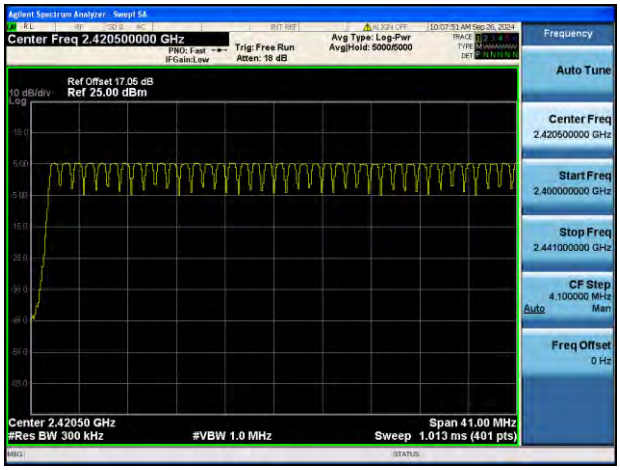
A.1 Number of Hopping Frequency

Test Data

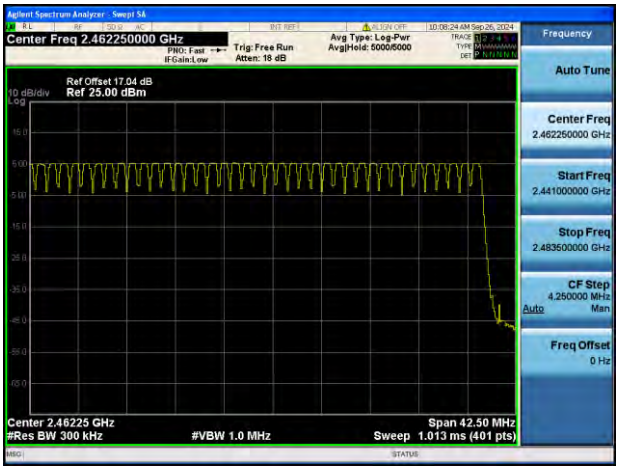
Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Verdict
GFSK	2400 - 2483.5	79	15	Pass
8-DPSK	2400 - 2483.5	79	15	Pass

Test Plots

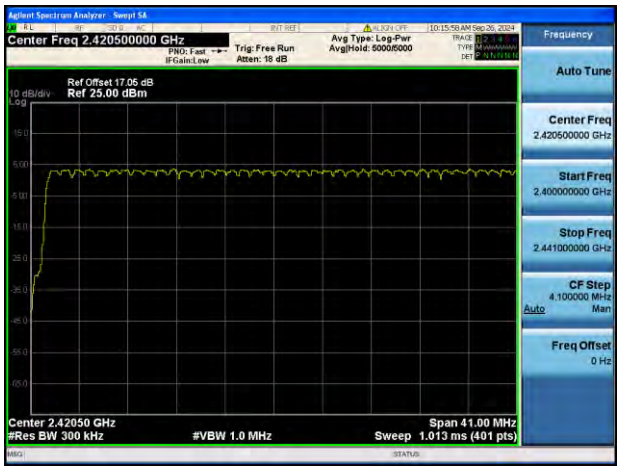
GFSK 2.4 GHz ~ 2.4415 GHz



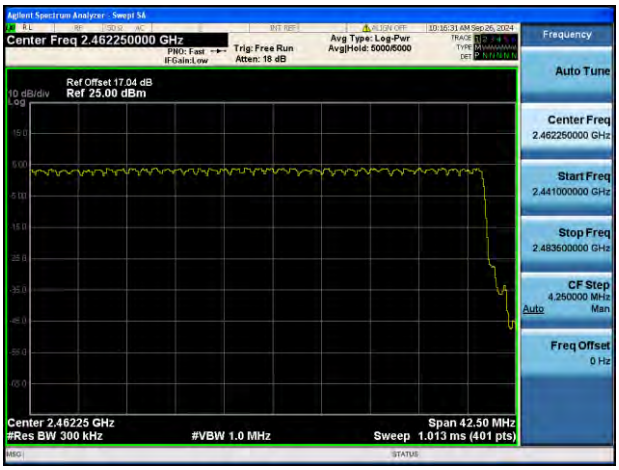
GFSK 2.4415 GHz ~ 2.4835 GHz



8-DPSK 2.4 GHz ~ 2.4415 GHz



8-DPSK 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		8-DPSK		dBm	mW	
	dBm	mW	dBm	mW	dBm	mW			
Low	5.50	3.55	6.04	4.02	4.80	3.02	21	125	Pass
Middle	5.20	3.31	5.72	3.73	6.58	4.54			Pass
High	5.12	3.25	5.72	3.73	6.45	4.41			Pass

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

Channel	E.I.R.P						Limit		Verdict
	GFSK		π/4-DQPSK		8-DPSK		dBm	mW	
	dBm	mW	dBm	mW	dBm	mW			
Low	9.00	7.94	9.54	8.99	8.30	6.76	36	4000	Pass
Middle	8.70	7.41	9.22	8.35	10.08	10.17			Pass
High	8.62	7.27	9.22	8.36	9.95	9.88			Pass

Test Plots

GFSK LOW CHANNEL

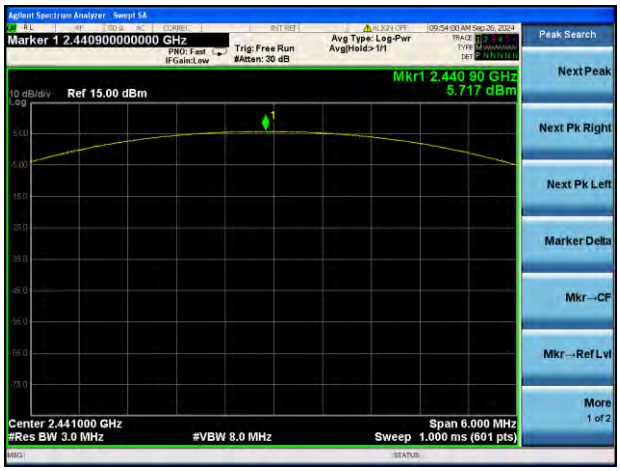
GFSK MIDDLE CHANNEL

GFSK HIGH CHANNEL

π/4-DQPSK LOW CHANNEL

π/4-DQPSK MIDDLE CHANNEL

π/4-DQPSK HIGH CHANNEL



8-DPSK LOW CHANNEL

8-DPSK MIDDLE CHANNEL

8-DPSK HIGH CHANNEL

A.3 20 dB and 99% bandwidth

Test Data

GFSK		
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	0.952400	0.865960
Middle	0.952400	0.867480
High	0.952400	0.867940
π/4-DQPSK		
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	1.342500	1.185500
Middle	1.342500	1.188800
High	1.342500	1.208800
8-DPSK		
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	1.312500	1.182900
Middle	1.312500	1.186100
High	1.312500	1.190200

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

8-DPSK LOW CHANNEL

8-DPSK MIDDLE CHANNEL

8-DPSK HIGH CHANNEL

99% Bandwidth

GFSK LOW CHANNEL

GFSK MIDDLE CHANNEL

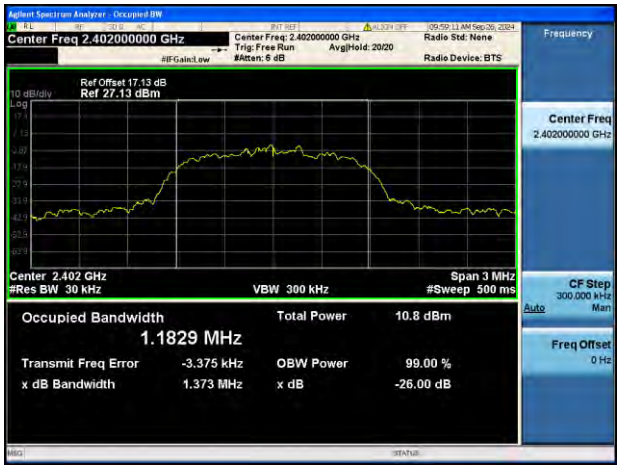
GFSK HIGH CHANNEL

π/4-DQPSK LOW CHANNEL

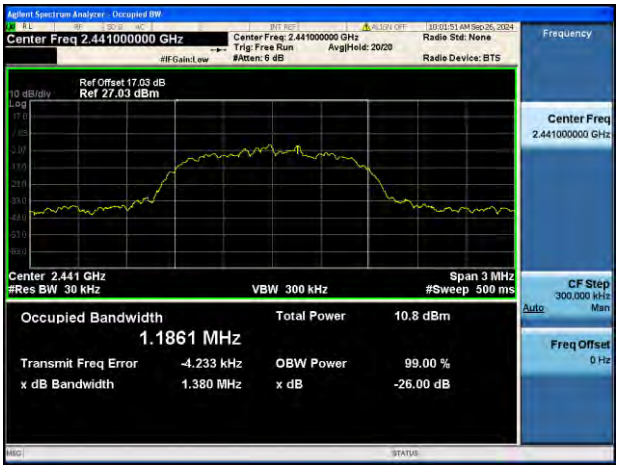
π/4-DQPSK MIDDLE CHANNEL

π/4-DQPSK HIGH CHANNEL

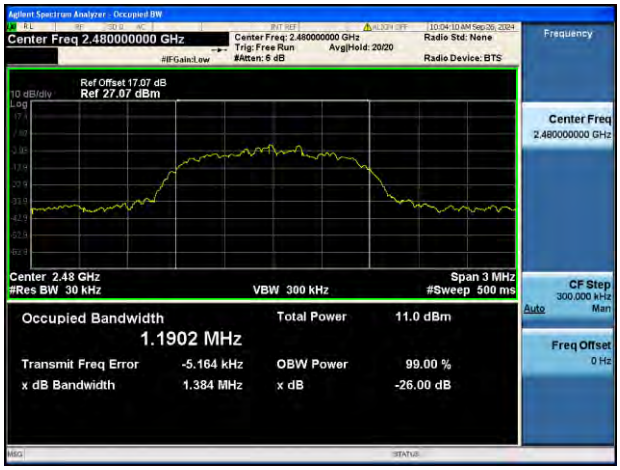
8-DPSK LOW CHANNEL



8-DPSK MIDDLE CHANNEL



8-DPSK HIGH CHANNEL



A.4 Hopping Frequency Separation

Test Data

Mode	Frequency separation (MHz)	2/3 of the 20 dB Bandwidth (MHz)	Verdict
GFSK	1.005	0.635	Pass
8-DPSK	2.027	0.875	Pass

Test Plots

GFSK

8-DPSK

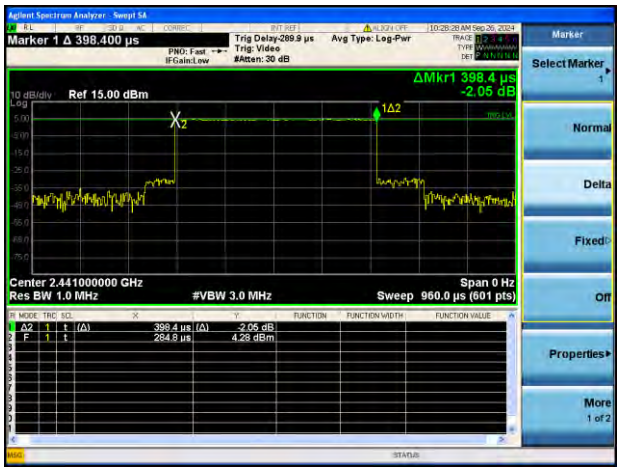
A.5 Average Time of Occupancy

Test Data

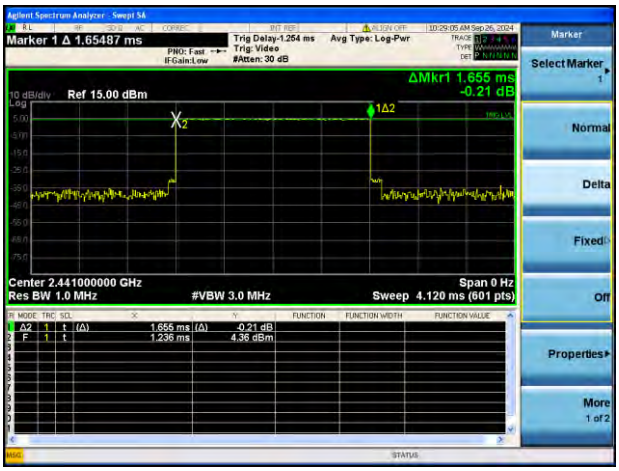
GFSK				
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.39840	127.488	0.4	Pass
DH 3	1.65500	264.800	0.4	Pass
DH 5	2.91200	310.613	0.4	Pass
8-DPSK				
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
3DH 1	0.38720	123.904	0.4	Pass
3DH 3	1.63400	261.440	0.4	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	0.39830	63.728	0.4	Pass
DH 3	1.65500	132.400	0.4	Pass
DH 5	2.90000	154.667	0.4	Pass

Test Plots

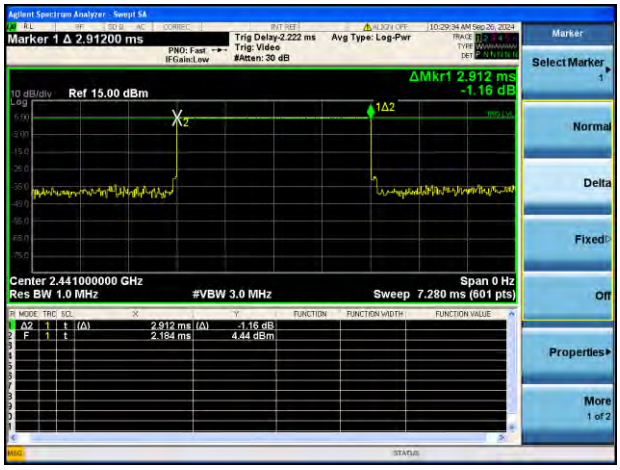
GFSK DH1



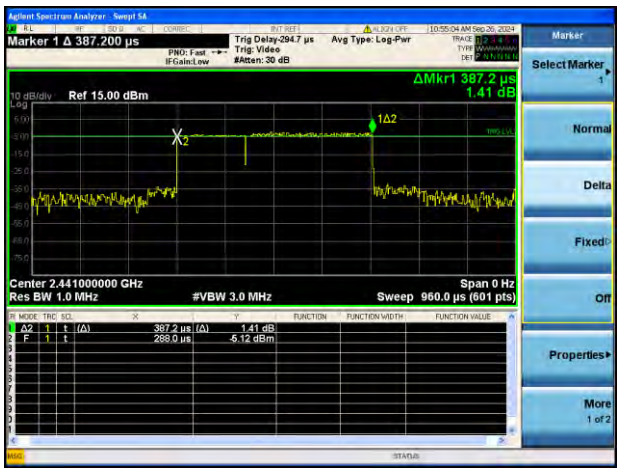
GFSK DH3



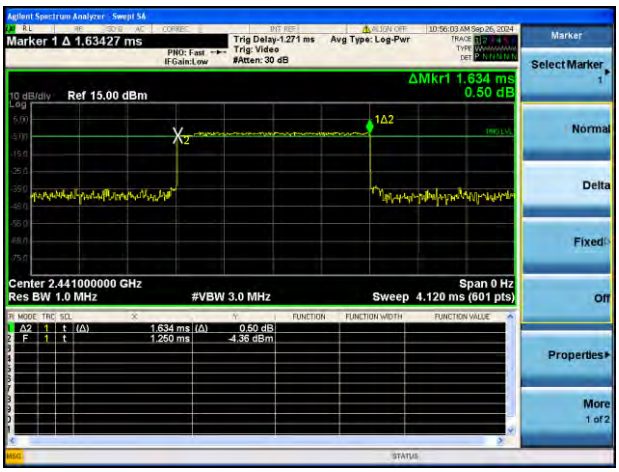
GFSK DH5



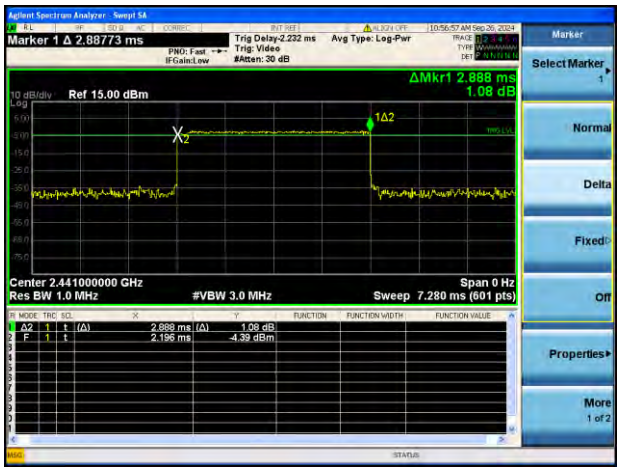
8-DPSK 3DH1



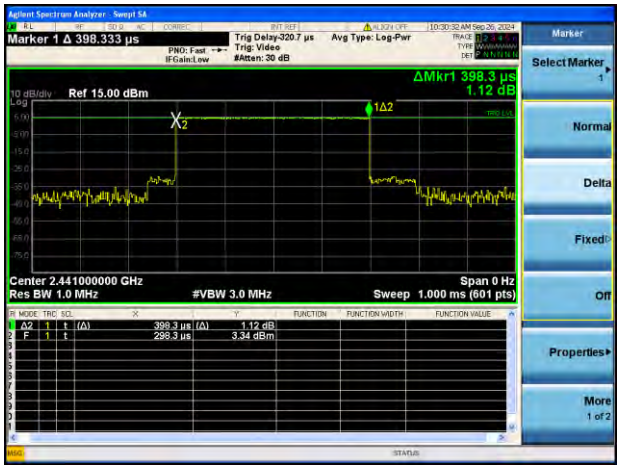
8-DPSK 3DH3



8-DPSK 3DH5

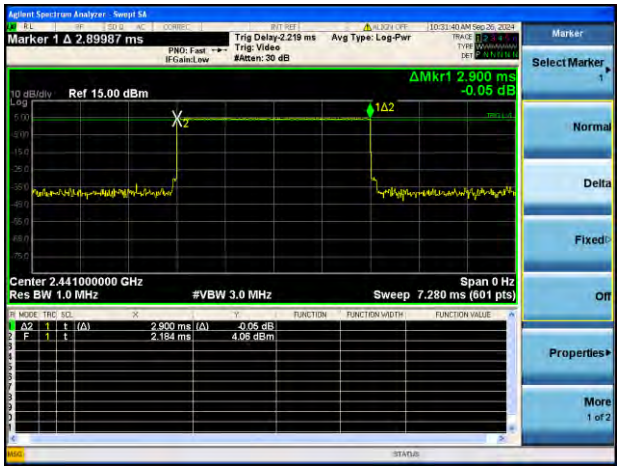


AFH Mode DH1



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	-29.67	4.76	-15.24	Pass
Middle	-29.31	4.48	-15.52	Pass
High	-29.49	4.44	-15.56	Pass
8-DPSK				
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-28.85	3.16	-16.84	Pass
Middle	-29.67	3.22	-16.78	Pass
High	-29.22	3.52	-16.48	Pass

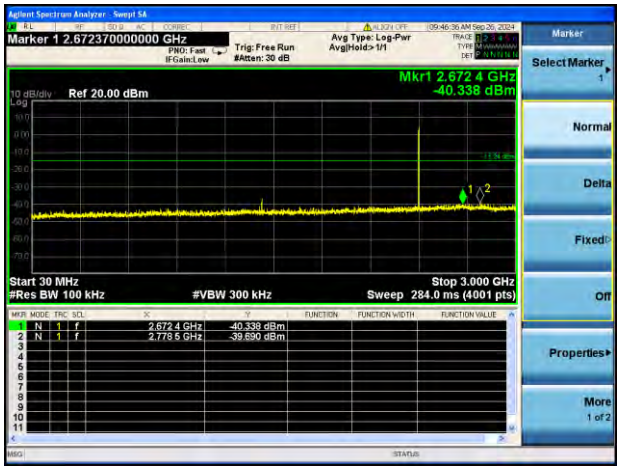
Hopping Mode				
Mode	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
GFSK	-29.81	5.04	-14.96	Pass
8-DPSK	-28.95	3.30	-16.70	Pass

Test Plots

GFSK LOW CHANNEL, CARRIER LEVEL

GFSK LOW CHANNEL, BAND EDGE

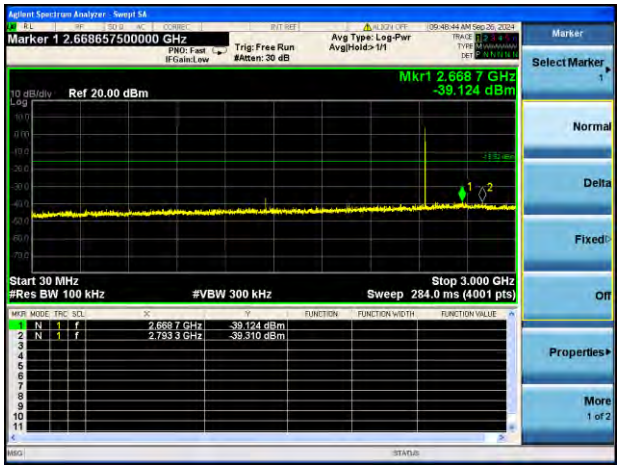
GFSK LOW CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



GFSK LOW CHANNEL, SPURIOUS
3 GHz ~ 25 GHz

GFSK MIDDLE CHANNEL, CARRIER LEVEL

GFSK MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

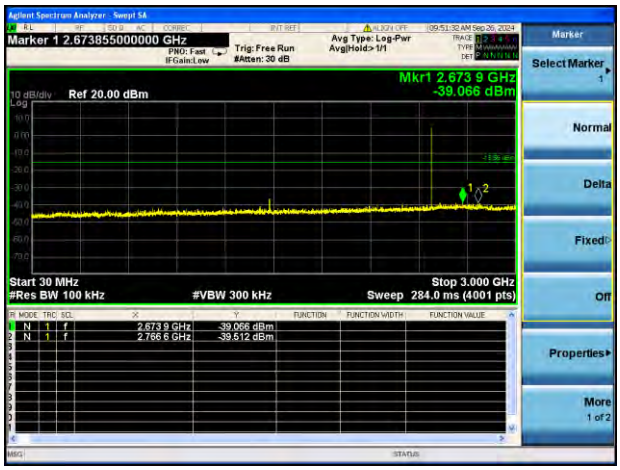


GFSK MIDDLE CHANNEL, SPURIOUS
3 GHz ~ 25 GHz

GFSK HIGH CHANNEL, CARRIER LEVEL

GFSK HIGH CHANNEL, BAND EDGE

GFSK HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

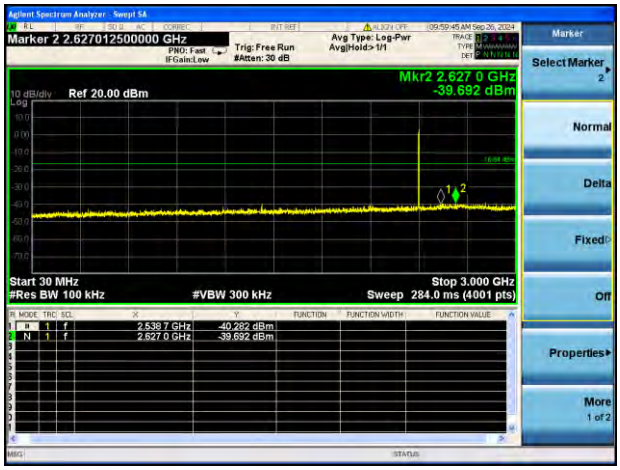


GFSK HIGH CHANNEL, SPURIOUS
3 GHz ~ 25 GHz

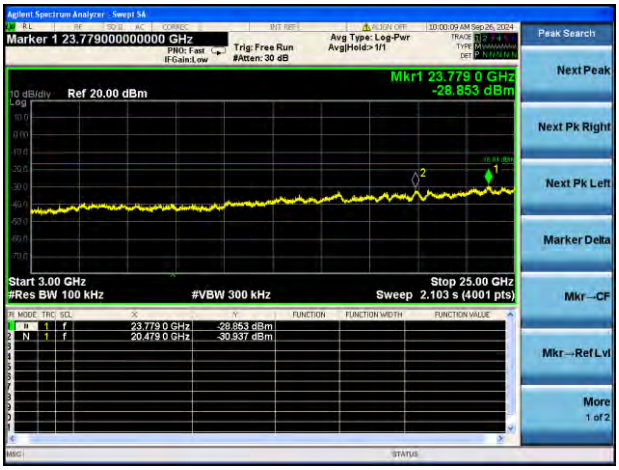
8-DPSK LOW CHANNEL, CARRIER LEVEL

8-DPSK LOW CHANNEL, BAND EDGE

8-DPSK LOW CHANNEL, SPURIOUS
30 MHz ~ 3 GHz

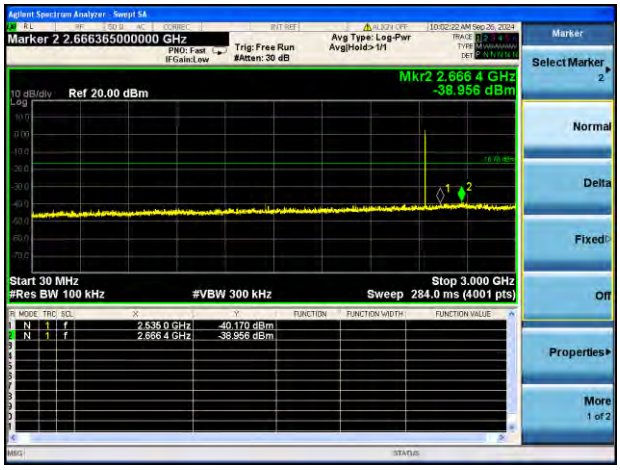


8-DPSK LOW CHANNEL, SPURIOUS
3 GHz ~ 25 GHz

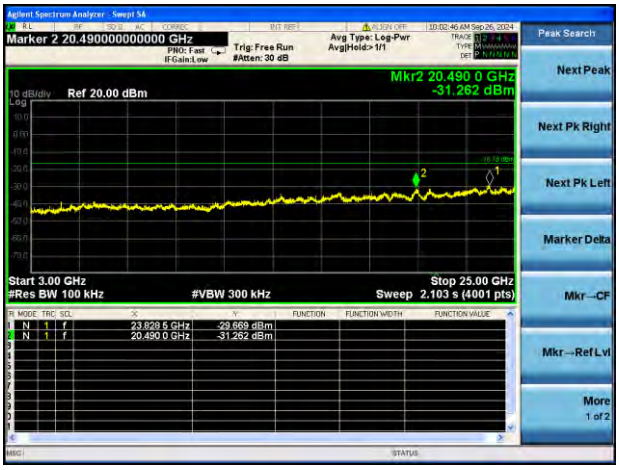


8-DPSK MIDDLE CHANNEL, CARRIER LEVEL

8-DPSK MIDDLE CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



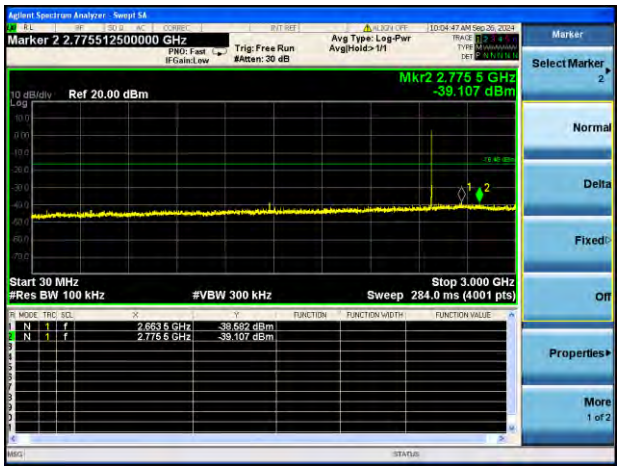
8-DPSK MIDDLE CHANNEL, SPURIOUS
3 GHz ~ 25 GHz



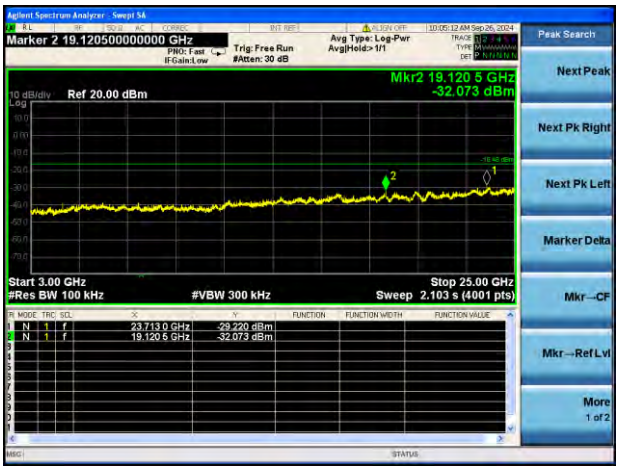
8-DPSK HIGH CHANNEL, CARRIER LEVEL

8-DPSK HIGH CHANNEL, BAND EDGE

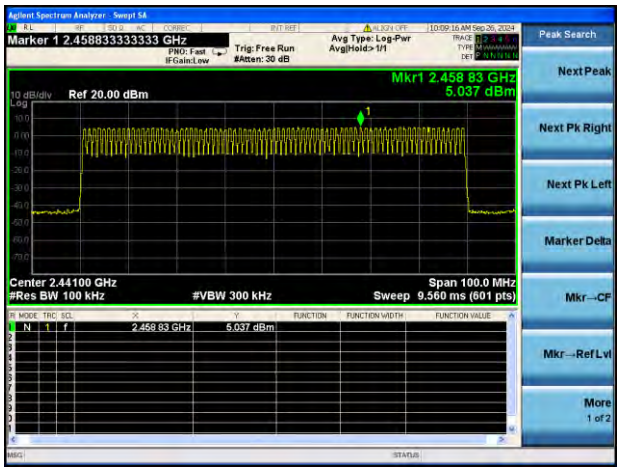
8-DPSK HIGH CHANNEL, SPURIOUS
30 MHz ~ 3 GHz



8-DPSK HIGH CHANNEL, SPURIOUS
3 GHz ~ 25 GHz



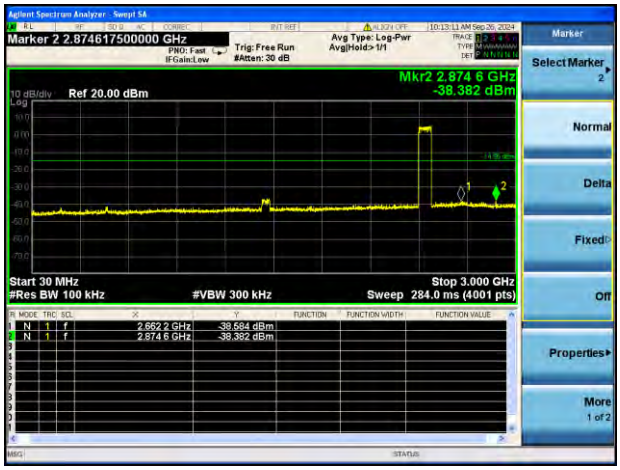
GFSK HOPPING, CARRIER LEVEL



GFSK HOPPING BAND EDGE (LOW)

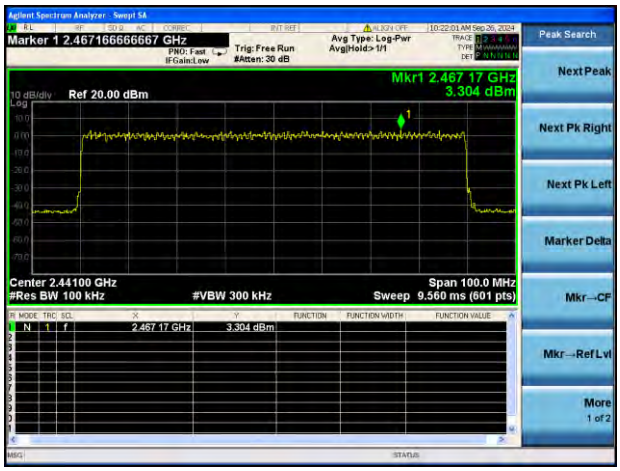
GFSK HOPPING BAND EDGE (HIGH)

GFSK Hopping Mode, SPURIOUS 30 MHz ~ 3 GHz



GFSK Hopping Mode, SPURIOUS 3GHz ~ 25 GHz

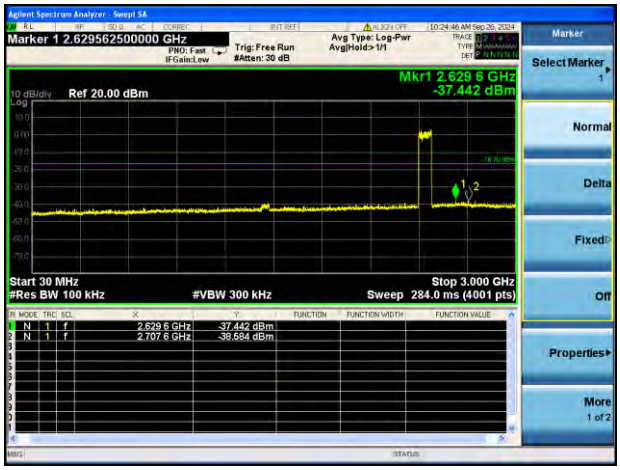
8-DPSK HOPPING, CARRIER LEVEL



8-DPSK Hopping BAND EDGE (LOW)

8-DPSK Hopping BAND EDGE (HIGH)

8-DPSK Hopping Mode, SPURIOUS 30 MHz ~ 3 GHz



8-DPSK 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.

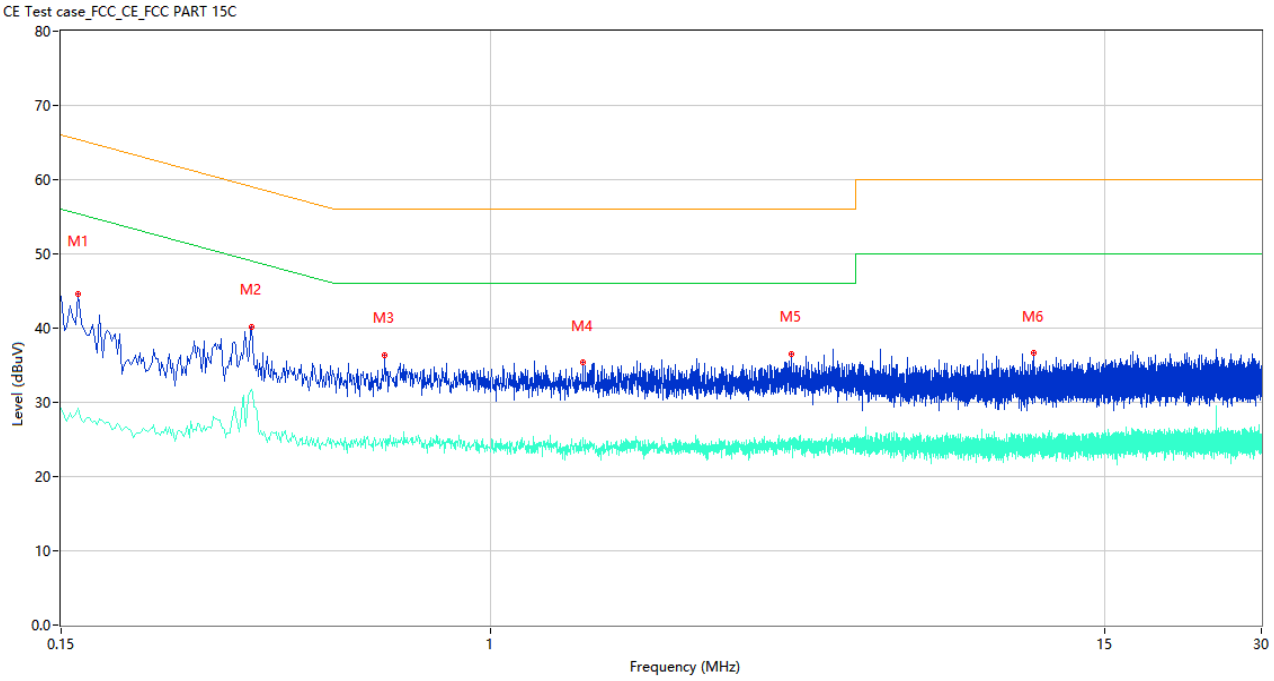
Note [2]: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 60 Hz and 240 VAC, 50 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst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

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

Test Data and Plots

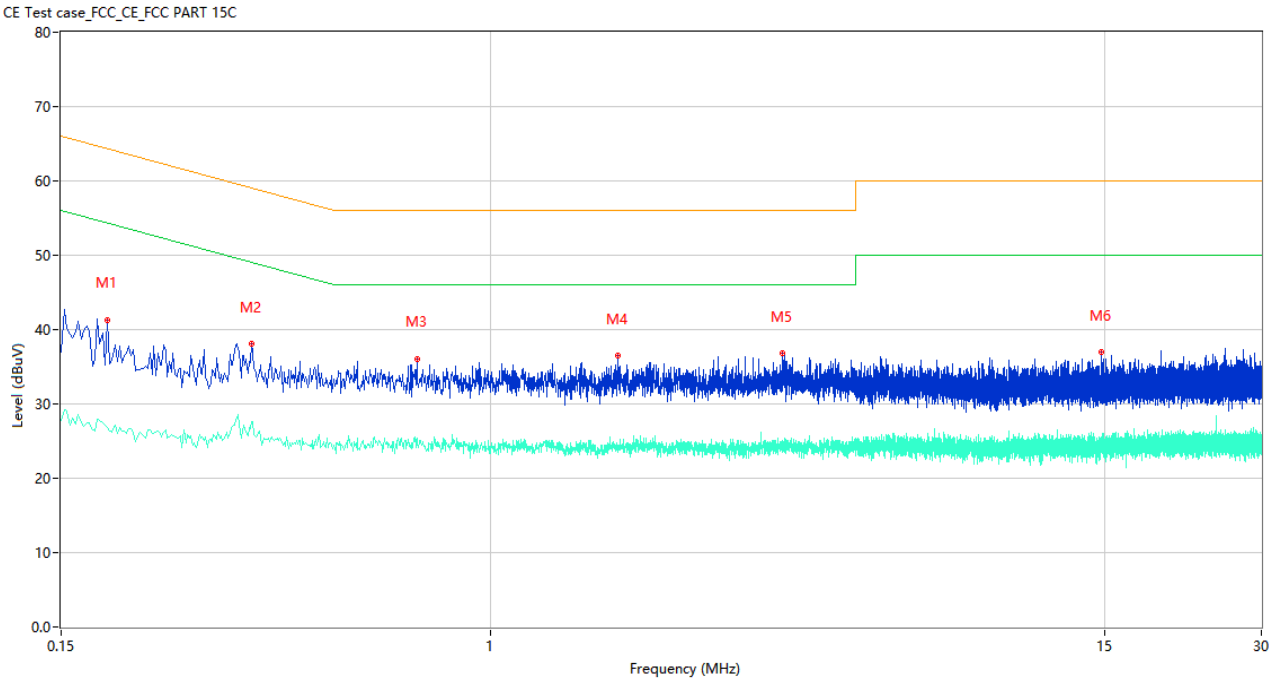
PCB Antenna

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.162	44.58	9.78	65.36	20.78	Peak	L	Pass
1**	0.162	29.22	9.78	55.36	26.14	AV	L	Pass
2	0.348	40.20	10.72	59.01	18.81	Peak	L	Pass
2**	0.348	31.72	10.72	49.01	17.29	AV	L	Pass
3	0.626	36.40	10.19	56.00	19.60	Peak	L	Pass
3**	0.626	24.60	10.19	46.00	21.40	AV	L	Pass
4	1.502	35.39	10.26	56.00	20.61	Peak	L	Pass
4**	1.502	25.32	10.26	46.00	20.68	AV	L	Pass
5	3.776	36.56	10.38	56.00	19.44	Peak	L	Pass
5**	3.776	24.86	10.38	46.00	21.14	AV	L	Pass
6	10.966	36.64	10.62	60.00	23.36	Peak	L	Pass
6**	10.966	24.40	10.62	50.00	25.60	AV	L	Pass

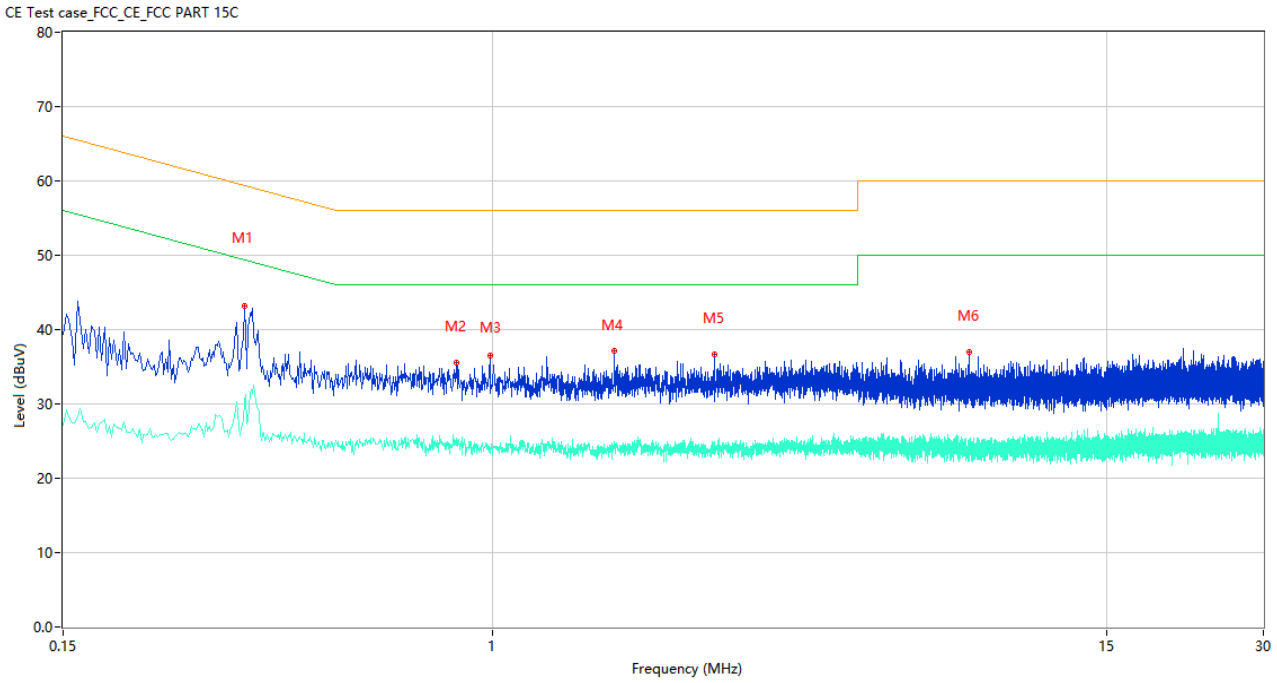
PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.184	41.31	9.78	64.30	22.99	Peak	N	Pass
1**	0.184	26.79	9.78	54.30	27.51	AV	N	Pass
2	0.348	38.05	10.72	59.01	20.96	Peak	N	Pass
2**	0.348	27.55	10.72	49.01	21.46	AV	N	Pass
3	0.722	36.09	10.44	56.00	19.91	Peak	N	Pass
3**	0.722	25.47	10.44	46.00	20.53	AV	N	Pass
4	1.754	36.46	10.15	56.00	19.54	Peak	N	Pass
4**	1.754	23.96	10.15	46.00	22.04	AV	N	Pass
5	3.614	36.81	10.38	56.00	19.19	Peak	N	Pass
5**	3.614	24.97	10.38	46.00	21.03	AV	N	Pass
6	14.778	36.96	10.62	60.00	23.04	Peak	N	Pass
6**	14.778	24.47	10.62	50.00	25.53	AV	N	Pass

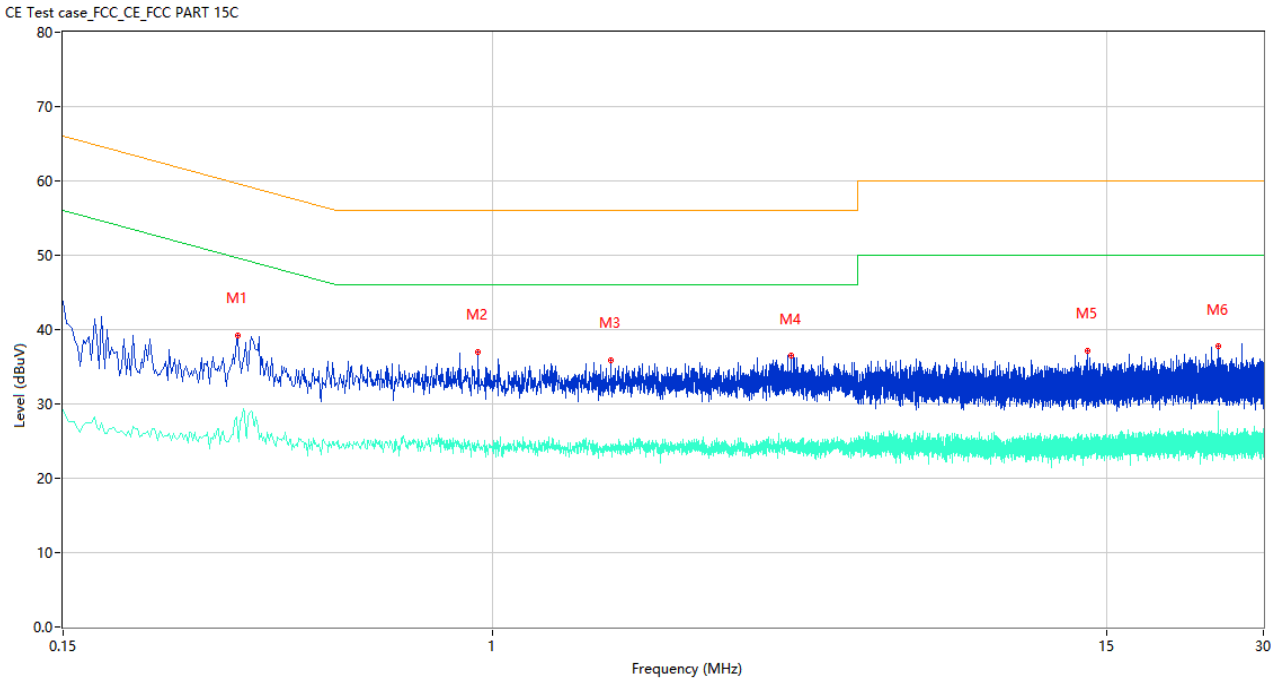
Rod Antenna

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.334	43.16	10.44	59.35	16.19	Peak	L	Pass
1**	0.334	30.56	10.44	49.35	18.79	AV	L	Pass
2	0.852	35.56	10.60	56.00	20.44	Peak	L	Pass
2**	0.852	24.66	10.60	46.00	21.34	AV	L	Pass
3	0.986	36.43	9.99	56.00	19.57	Peak	L	Pass
3**	0.986	23.71	9.99	46.00	22.29	AV	L	Pass
4	1.708	37.07	10.19	56.00	18.93	Peak	L	Pass
4**	1.708	24.13	10.19	46.00	21.87	AV	L	Pass
5	2.656	36.66	10.18	56.00	19.34	Peak	L	Pass
5**	2.656	23.18	10.18	46.00	22.82	AV	L	Pass
6	8.190	36.96	10.30	60.00	23.04	Peak	L	Pass
6**	8.190	24.57	10.30	50.00	25.43	AV	L	Pass

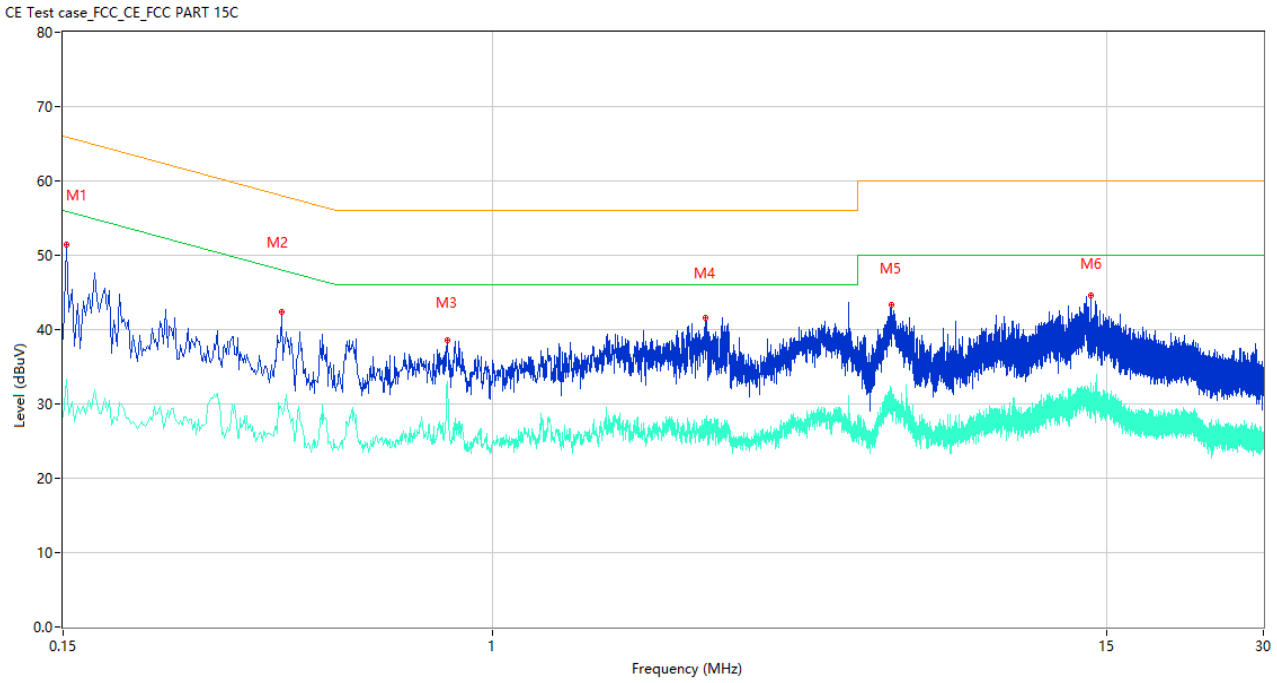
PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.324	39.26	10.24	59.60	20.34	Peak	N	Pass
1**	0.324	25.90	10.24	49.60	23.70	AV	N	Pass
2	0.938	37.06	10.09	56.00	18.94	Peak	N	Pass
2**	0.938	25.07	10.09	46.00	20.93	AV	N	Pass
3	1.684	35.94	10.12	56.00	20.06	Peak	N	Pass
3**	1.684	24.34	10.12	46.00	21.66	AV	N	Pass
4	3.736	36.45	10.42	56.00	19.55	Peak	N	Pass
4**	3.736	24.72	10.42	46.00	21.28	AV	N	Pass
5	13.798	37.16	10.66	60.00	22.84	Peak	N	Pass
5**	13.798	25.54	10.66	50.00	24.46	AV	N	Pass
6	24.572	37.76	10.82	60.00	22.24	Peak	N	Pass
6**	24.572	28.14	10.82	50.00	21.86	AV	N	Pass

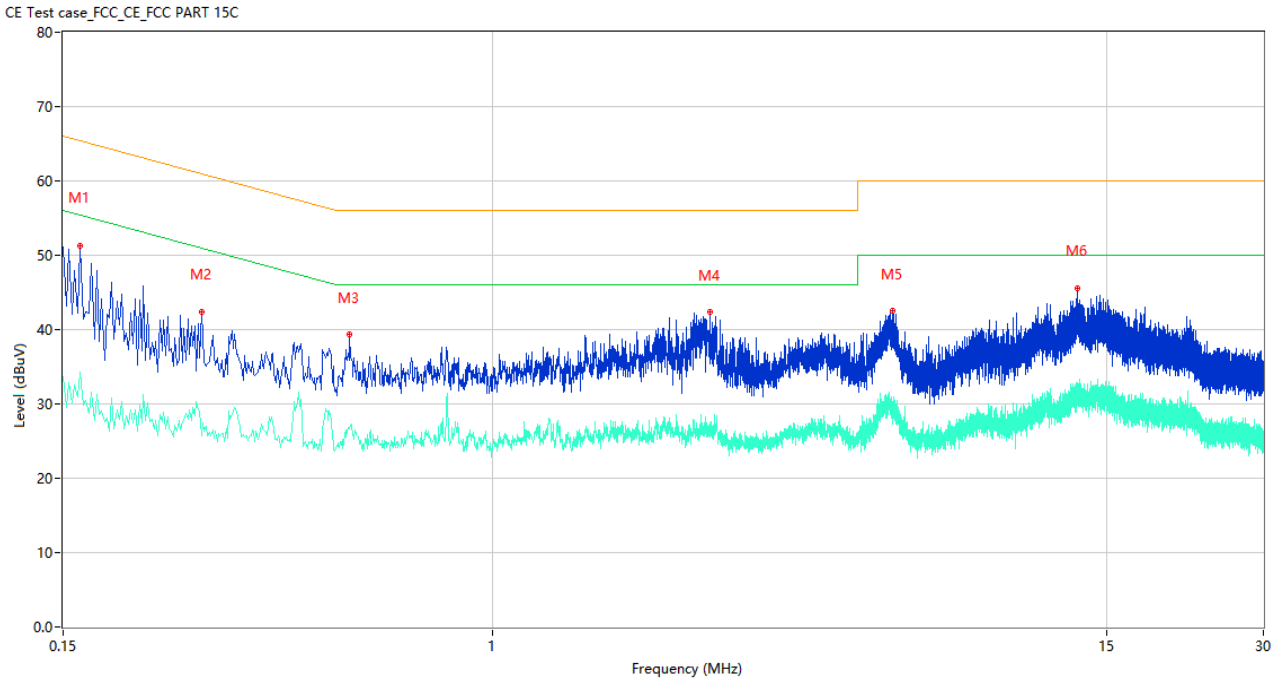
FPC Antenna

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.152	51.45	9.78	65.89	14.44	Peak	L	Pass
1**	0.152	33.33	9.78	55.89	22.56	AV	L	Pass
2	0.394	42.44	10.58	57.98	15.54	Peak	L	Pass
2**	0.394	29.36	10.58	47.98	18.62	AV	L	Pass
3	0.820	38.62	10.56	56.00	17.38	Peak	L	Pass
3**	0.820	32.10	10.56	46.00	13.90	AV	L	Pass
4	2.562	41.56	9.97	56.00	14.44	Peak	L	Pass
4**	2.562	27.90	9.97	46.00	18.10	AV	L	Pass
5	5.822	43.31	10.19	60.00	16.69	Peak	L	Pass
5**	5.822	31.27	10.19	50.00	18.73	AV	L	Pass
6	14.040	44.65	10.72	60.00	15.35	Peak	L	Pass
6**	14.040	32.83	10.72	50.00	17.17	AV	L	Pass

PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.162	51.21	9.78	65.36	14.15	Peak	N	Pass
1**	0.162	34.33	9.78	55.36	21.03	AV	N	Pass
2	0.276	42.42	9.76	60.94	18.52	Peak	N	Pass
2**	0.276	25.71	9.76	50.94	25.23	AV	N	Pass
3	0.532	39.34	10.01	56.00	16.66	Peak	N	Pass
3**	0.532	26.68	10.01	46.00	19.32	AV	N	Pass
4	2.612	42.31	9.84	56.00	13.69	Peak	N	Pass
4**	2.612	27.12	9.84	46.00	18.88	AV	N	Pass
5	5.852	42.50	10.24	60.00	17.50	Peak	N	Pass
5**	5.852	29.88	10.24	50.00	20.12	AV	N	Pass
6	13.208	45.60	10.77	60.00	14.40	Peak	N	Pass
6**	13.208	31.00	10.77	50.00	19.00	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 C63.10-2013, 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.

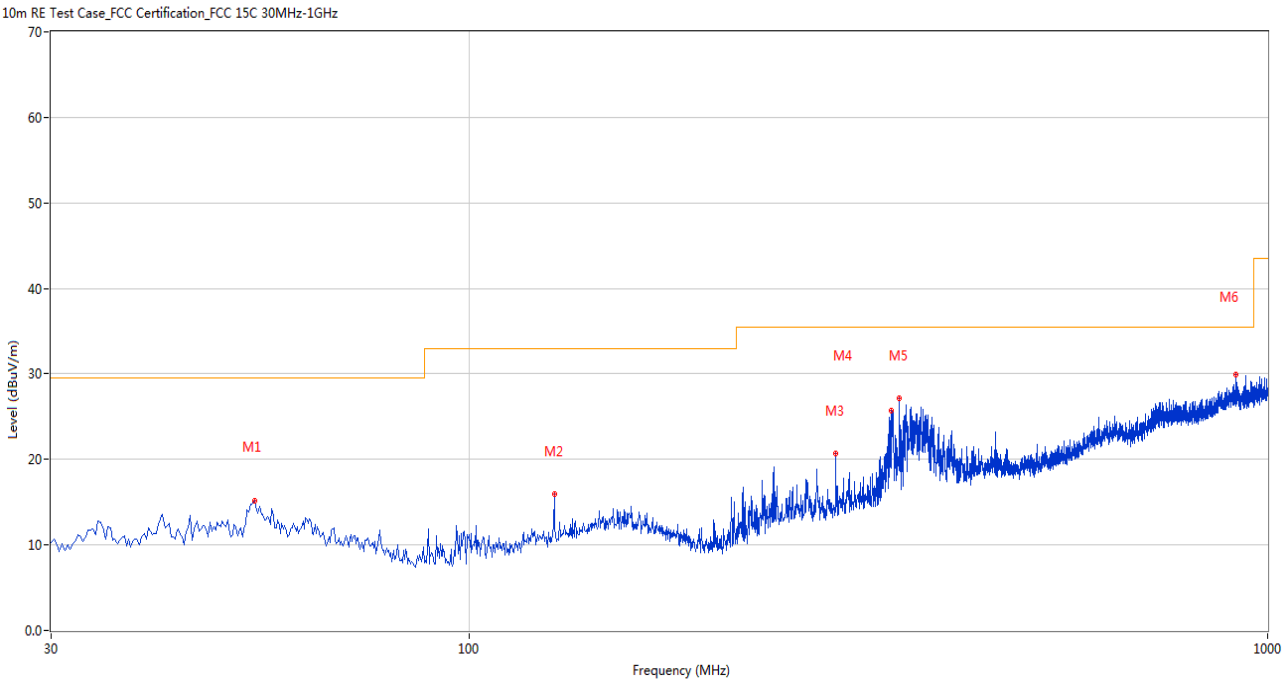
Note [4]: Results (dBuV/m) = Original reading level of Spectrum Analyzer (dBuV/m) + Factor (dB)

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

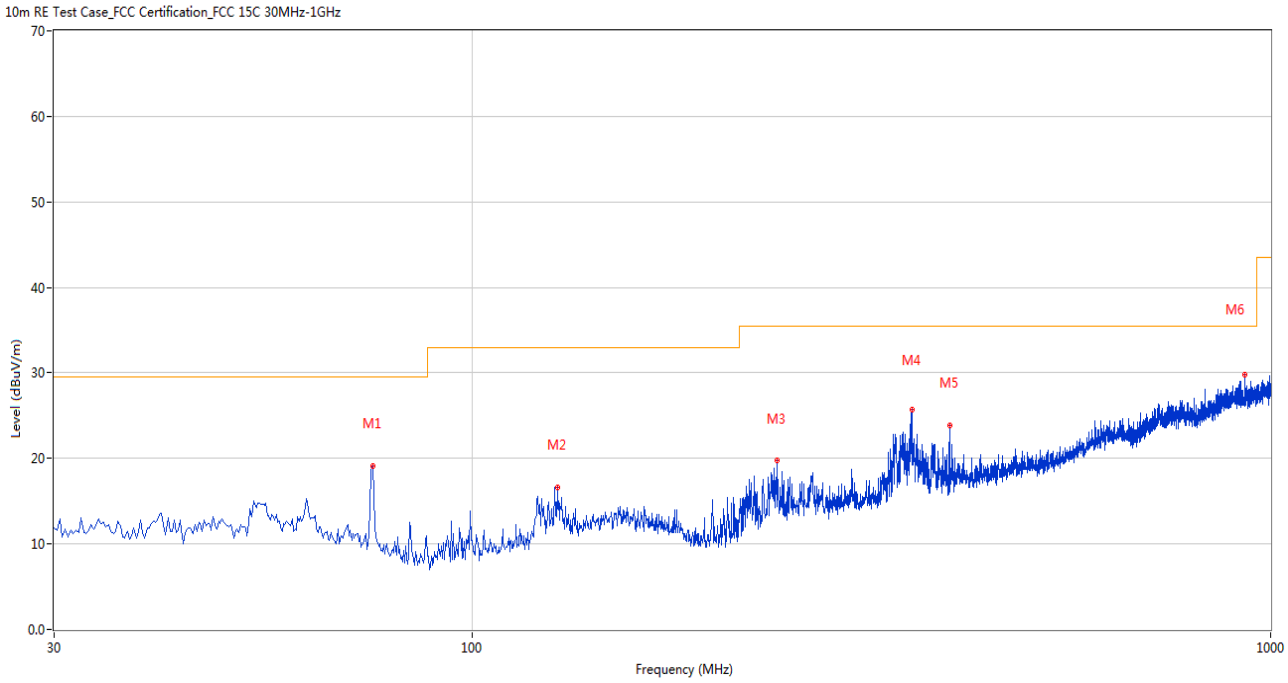
PCB Antenna

30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	54.002	15.17	-26.08	29.5	14.33	Peak	183.00	200	Horizontal	Pass
2	127.946	15.99	-27.27	33.0	17.01	Peak	282.00	100	Horizontal	Pass
3	287.956	20.75	-25.18	35.5	14.75	Peak	280.00	200	Horizontal	Pass
4	338.383	25.73	-23.66	35.5	9.77	Peak	50.00	200	Horizontal	Pass
5	345.899	27.16	-23.84	35.5	8.34	Peak	259.00	200	Horizontal	Pass
6	912.479	29.87	-10.61	35.5	5.63	Peak	140.00	200	Horizontal	Pass

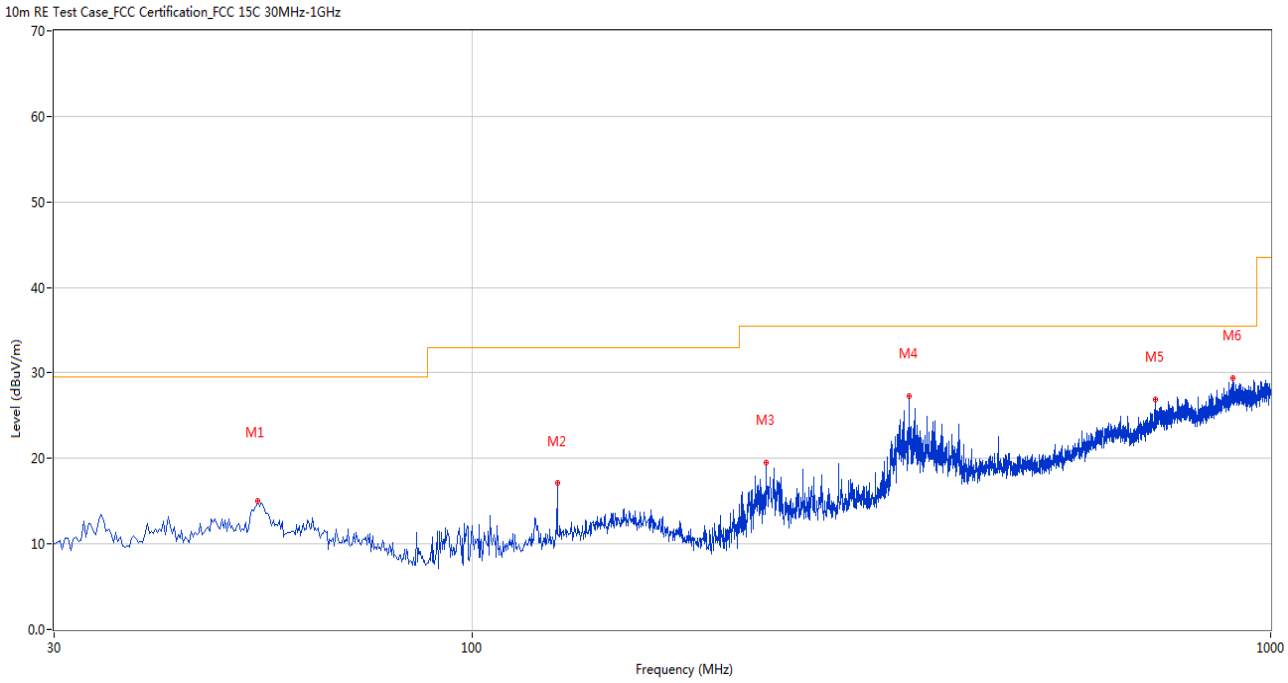
30 MHz to 1 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	75.094	19.12	-29.19	29.5	10.38	Peak	159.00	200	Vertical	Pass
2	127.946	16.62	-27.27	33.0	16.38	Peak	0.00	200	Vertical	Pass
3	241.407	19.71	-27.00	35.5	15.79	Peak	0.00	200	Vertical	Pass
4	355.354	25.70	-23.70	35.5	9.80	Peak	27.00	100	Vertical	Pass
5	396.568	23.89	-22.41	35.5	11.61	Peak	27.00	100	Vertical	Pass
6	928.723	29.84	-10.67	35.5	5.66	Peak	360.00	200	Vertical	Pass

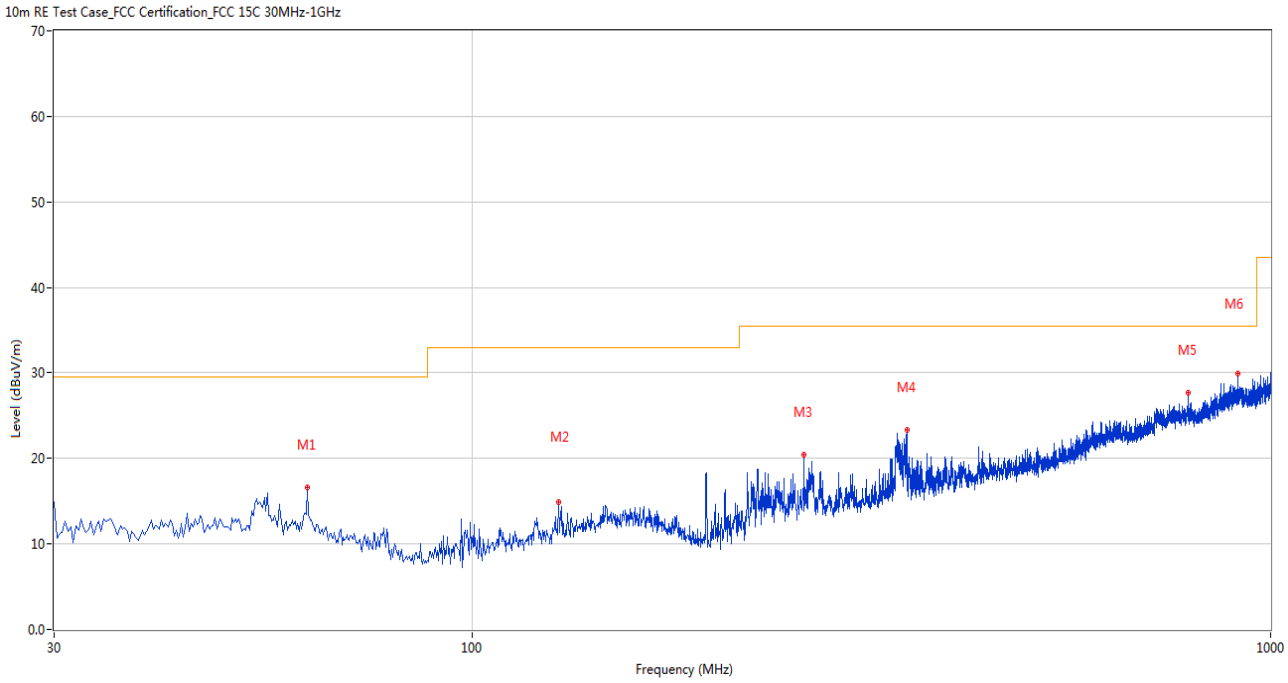
Rod Antenna

30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	54.002	14.97	-26.08	29.5	14.53	Peak	313.00	100	Horizontal	Pass
2	127.946	17.07	-27.27	33.0	15.93	Peak	260.00	100	Horizontal	Pass
3	233.649	19.51	-27.80	35.5	15.99	Peak	264.00	200	Horizontal	Pass
4	352.687	27.28	-23.83	35.5	8.22	Peak	258.00	200	Horizontal	Pass
5	717.073	26.94	-14.16	35.5	8.56	Peak	28.00	100	Horizontal	Pass
6	897.206	29.37	-10.52	35.5	6.13	Peak	217.00	100	Horizontal	Pass

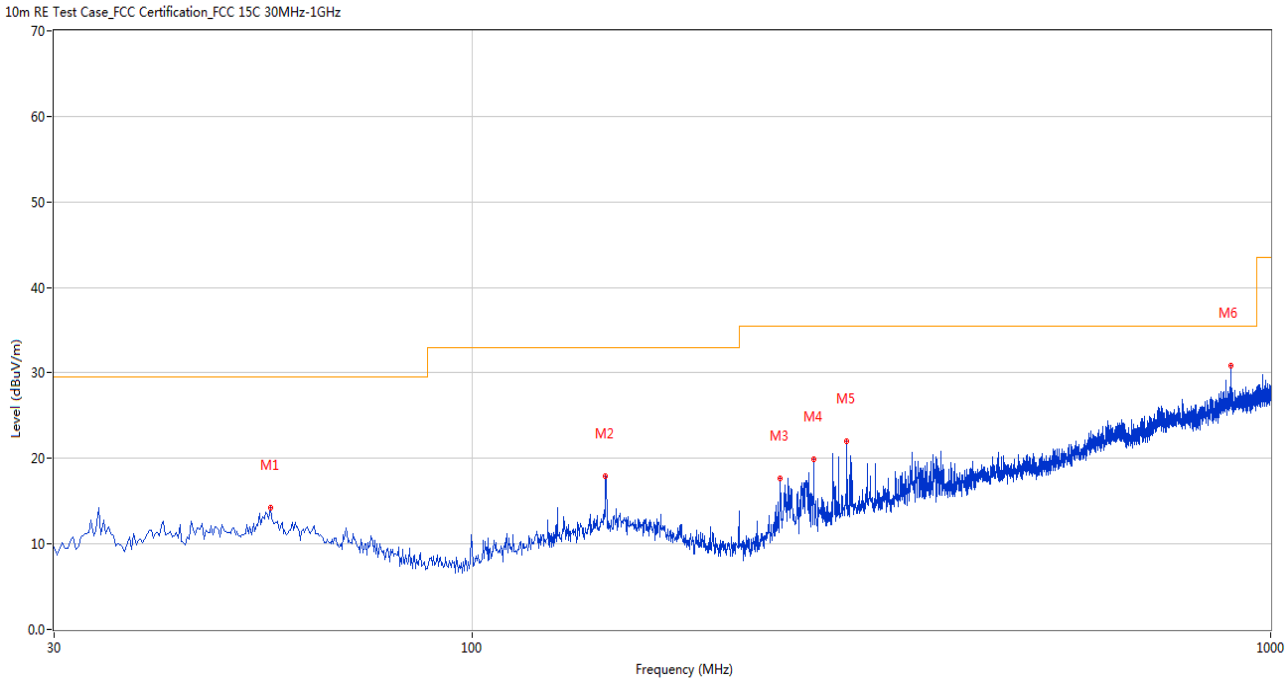
30 MHz to 1 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	62.244	16.57	-26.92	29.5	12.93	Peak	282.00	100	Vertical	Pass
2	128.430	14.89	-27.27	33.0	18.11	Peak	216.00	100	Vertical	Pass
3	260.317	20.39	-26.51	35.5	15.11	Peak	145.00	100	Vertical	Pass
4	350.262	23.37	-23.97	35.5	12.13	Peak	0.00	200	Vertical	Pass
5	788.593	27.72	-12.82	35.5	7.78	Peak	63.00	200	Vertical	Pass
6	909.328	29.97	-10.70	35.5	5.53	Peak	344.00	100	Vertical	Pass

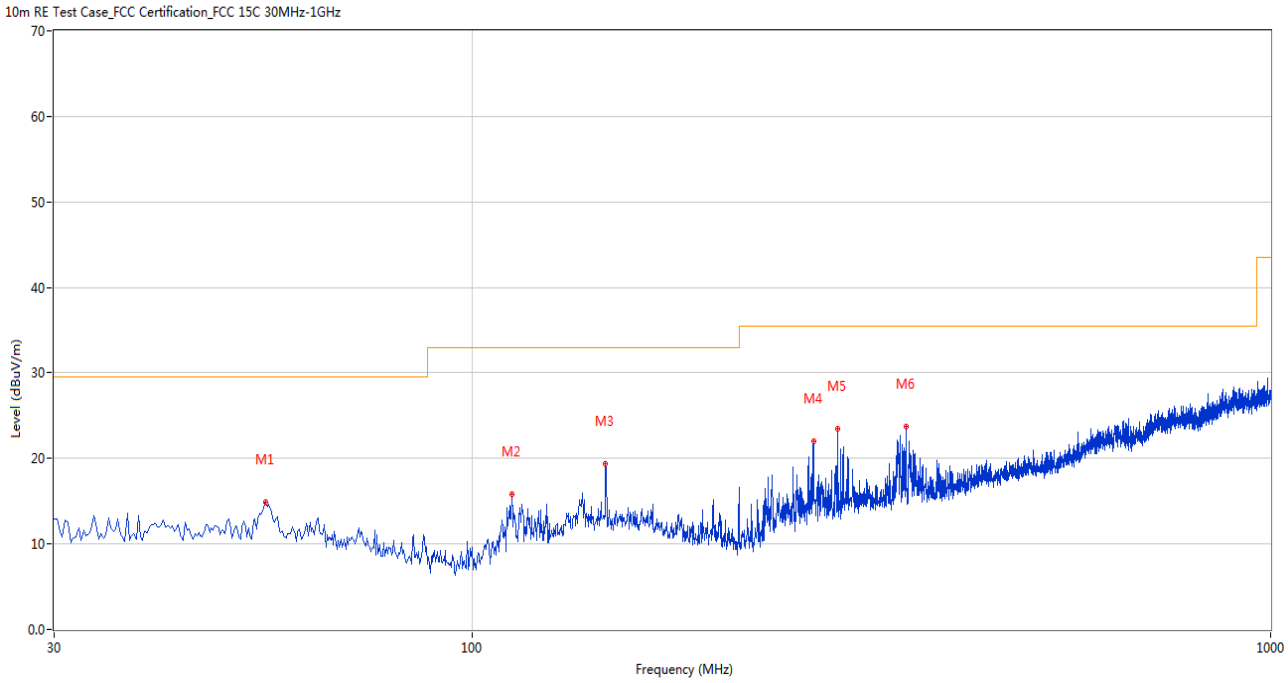
FPC Antenna

30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	55.941	14.24	-26.20	29.5	15.26	Peak	360.00	200	Horizontal	Pass
2	147.098	17.99	-25.56	33.0	15.01	Peak	360.00	200	Horizontal	Pass
3	243.347	17.65	-26.95	35.5	17.85	Peak	286.00	200	Horizontal	Pass
4	268.075	19.88	-25.87	35.5	15.62	Peak	264.00	200	Horizontal	Pass
5	294.744	22.03	-25.03	35.5	13.47	Peak	232.00	200	Horizontal	Pass
6	892.842	30.90	-10.56	35.5	4.60	Peak	47.00	100	Horizontal	Pass

30 MHz to 1 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	55.214	14.89	-26.15	29.5	14.61	Peak	360.00	200	Vertical	Pass
2	112.187	15.82	-28.85	33.0	17.18	Peak	253.00	200	Vertical	Pass
3	147.098	19.40	-25.56	33.0	13.60	Peak	85.00	100	Vertical	Pass
4	267.833	22.04	-25.92	35.5	13.46	Peak	0.00	100	Vertical	Pass
5	286.743	23.48	-25.22	35.5	12.02	Peak	47.00	100	Vertical	Pass
6	349.535	23.75	-23.84	35.5	11.75	Peak	340.00	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.

PCB Antenna

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	1282.223	43.43	74.0	30.57	Peak	325.00	200	Horizontal	Pass
1**	1282.223	30.68	54.0	23.32	AV	325.00	200	Horizontal	Pass
2	2767.660	52.51	74.0	21.49	Peak	102.00	200	Horizontal	Pass
2**	2767.660	42.97	54.0	11.03	AV	102.00	200	Horizontal	Pass
3	5171.274	54.81	74.0	19.19	Peak	55.00	200	Horizontal	Pass
3**	5171.274	43.93	54.0	10.07	AV	55.00	200	Horizontal	Pass
4	6806.494	55.61	74.0	18.39	Peak	39.00	100	Horizontal	Pass
4**	6806.494	44.59	54.0	9.41	AV	39.00	100	Horizontal	Pass
5	13464.397	53.45	74.0	20.55	Peak	25.00	100	Horizontal	Pass
5**	13464.397	43.73	54.0	10.27	AV	25.00	100	Horizontal	Pass
6	17469.305	54.14	74.0	19.86	Peak	355.00	400	Horizontal	Pass
6**	17469.305	49.28	54.0	4.72	AV	355.00	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	1159.858	48.47	74.0	25.53	Peak	331.00	300	Vertical	Pass
1**	1159.858	32.53	54.0	21.47	AV	331.00	300	Vertical	Pass
2	2769.091	48.69	74.0	25.31	Peak	118.00	400	Vertical	Pass
2**	2769.091	41.19	54.0	12.81	AV	118.00	400	Vertical	Pass
3	5042.077	51.18	74.0	22.82	Peak	3.00	200	Vertical	Pass
3**	5042.077	40.34	54.0	13.66	AV	3.00	200	Vertical	Pass
4	6978.865	54.62	74.0	19.38	Peak	251.00	400	Vertical	Pass
4**	6978.865	44.52	54.0	9.48	AV	251.00	400	Vertical	Pass
5	13343.234	57.81	74.0	16.19	Peak	317.00	200	Vertical	Pass
5**	13343.234	46.63	54.0	7.37	AV	317.00	200	Vertical	Pass
6	17434.220	58.68	74.0	15.32	Peak	215.00	100	Vertical	Pass
6**	17434.220	47.27	54.0	6.73	AV	215.00	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	1285.507	44.30	74.0	29.70	Peak	264.00	300	Horizontal	Pass
1**	1285.507	35.30	54.0	18.70	AV	264.00	300	Horizontal	Pass
2	2767.810	54.28	74.0	19.72	Peak	97.00	400	Horizontal	Pass
2**	2767.810	43.38	54.0	10.62	AV	97.00	400	Horizontal	Pass
3	5165.716	53.00	74.0	21.00	Peak	124.00	200	Horizontal	Pass
3**	5165.716	39.90	54.0	14.10	AV	124.00	200	Horizontal	Pass
4	6809.258	52.16	74.0	21.84	Peak	282.00	400	Horizontal	Pass
4**	6809.258	45.02	54.0	8.98	AV	282.00	400	Horizontal	Pass
5	13469.519	57.90	74.0	16.10	Peak	129.00	200	Horizontal	Pass
5**	13469.519	46.52	54.0	7.48	AV	129.00	200	Horizontal	Pass
6	17463.769	53.63	74.0	20.37	Peak	59.00	200	Horizontal	Pass
6**	17463.769	47.36	54.0	6.64	AV	59.00	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	1165.740	46.47	74.0	27.53	Peak	319.00	300	Vertical	Pass
1**	1165.740	32.34	54.0	21.66	AV	319.00	300	Vertical	Pass
2	2766.091	53.98	74.0	20.02	Peak	104.00	200	Vertical	Pass
2**	2766.091	43.80	54.0	10.20	AV	104.00	200	Vertical	Pass
3	5035.896	52.49	74.0	21.51	Peak	236.00	200	Vertical	Pass
3**	5035.896	44.15	54.0	9.85	AV	236.00	200	Vertical	Pass
4	6979.774	55.27	74.0	18.73	Peak	296.00	300	Vertical	Pass
4**	6979.774	46.95	54.0	7.05	AV	296.00	300	Vertical	Pass
5	13342.532	58.29	74.0	15.71	Peak	182.00	300	Vertical	Pass
5**	13342.532	46.75	54.0	7.25	AV	182.00	300	Vertical	Pass
6	17433.985	57.29	74.0	16.71	Peak	51.00	300	Vertical	Pass
6**	17433.985	48.70	54.0	5.30	AV	51.00	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	1282.163	44.47	74.0	29.53	Peak	122.00	200	Horizontal	Pass
1**	1282.163	30.10	54.0	23.90	AV	122.00	200	Horizontal	Pass
2	2767.275	50.37	74.0	23.63	Peak	351.00	400	Horizontal	Pass
2**	2767.275	45.68	54.0	8.32	AV	351.00	400	Horizontal	Pass
3	5170.410	51.75	74.0	22.25	Peak	60.00	200	Horizontal	Pass
3**	5170.410	42.51	54.0	11.49	AV	60.00	200	Horizontal	Pass
4	6808.749	56.34	74.0	17.66	Peak	70.00	200	Horizontal	Pass
4**	6808.749	43.87	54.0	10.13	AV	70.00	200	Horizontal	Pass
5	13471.081	53.12	74.0	20.88	Peak	269.00	400	Horizontal	Pass
5**	13471.081	46.87	54.0	7.13	AV	269.00	400	Horizontal	Pass
6	17468.619	58.30	74.0	15.70	Peak	188.00	300	Horizontal	Pass
6**	17468.619	44.58	54.0	9.42	AV	188.00	300	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	1158.807	47.43	74.0	26.57	Peak	89.00	200	Vertical	Pass
1**	1158.807	32.81	54.0	21.19	AV	89.00	200	Vertical	Pass
2	2765.315	50.66	74.0	23.34	Peak	163.00	300	Vertical	Pass
2**	2765.315	41.19	54.0	12.81	AV	163.00	300	Vertical	Pass
3	5037.661	53.61	74.0	20.39	Peak	123.00	200	Vertical	Pass
3**	5037.661	41.10	54.0	12.90	AV	123.00	200	Vertical	Pass
4	6973.557	57.76	74.0	16.24	Peak	269.00	300	Vertical	Pass
4**	6973.557	45.49	54.0	8.51	AV	269.00	300	Vertical	Pass
5	13346.760	58.13	74.0	15.87	Peak	198.00	200	Vertical	Pass
5**	13346.760	49.22	54.0	4.78	AV	198.00	200	Vertical	Pass
6	17438.461	57.66	74.0	16.34	Peak	187.00	200	Vertical	Pass
6**	17438.461	46.83	54.0	7.17	AV	187.00	200	Vertical	Pass

8-DPSK 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	1284.175	39.52	74.0	34.48	Peak	173.00	200	Horizontal	Pass
1**	1284.175	32.42	54.0	21.58	AV	173.00	200	Horizontal	Pass
2	2771.443	52.64	74.0	21.36	Peak	22.00	100	Horizontal	Pass
2**	2771.443	40.21	54.0	13.79	AV	22.00	100	Horizontal	Pass
3	5163.960	49.73	74.0	24.27	Peak	55.00	200	Horizontal	Pass
3**	5163.960	45.10	54.0	8.90	AV	55.00	200	Horizontal	Pass
4	6804.043	53.23	74.0	20.77	Peak	222.00	400	Horizontal	Pass
4**	6804.043	44.84	54.0	9.16	AV	222.00	400	Horizontal	Pass
5	13468.723	54.97	74.0	19.03	Peak	66.00	400	Horizontal	Pass
5**	13468.723	43.94	54.0	10.06	AV	66.00	400	Horizontal	Pass
6	17464.426	55.04	74.0	18.96	Peak	349.00	100	Horizontal	Pass
6**	17464.426	43.52	54.0	10.48	AV	349.00	100	Horizontal	Pass

8-DPSK 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	1287.373	44.07	74.0	29.93	Peak	61.00	400	Vertical	Pass
1**	1287.373	31.95	54.0	22.05	AV	61.00	400	Vertical	Pass
2	2768.881	56.65	74.0	17.35	Peak	219.00	100	Vertical	Pass
2**	2768.881	47.35	54.0	6.65	AV	219.00	100	Vertical	Pass
3	5160.657	57.65	74.0	16.35	Peak	62.00	200	Vertical	Pass
3**	5160.657	43.93	54.0	10.07	AV	62.00	200	Vertical	Pass
4	6806.721	50.04	74.0	23.96	Peak	89.00	100	Vertical	Pass
4**	6806.721	44.91	54.0	9.09	AV	89.00	100	Vertical	Pass
5	13467.717	51.94	74.0	22.06	Peak	347.00	200	Vertical	Pass
5**	13467.717	41.83	54.0	12.17	AV	347.00	200	Vertical	Pass
6	17463.315	58.04	74.0	15.96	Peak	295.00	300	Vertical	Pass
6**	17463.315	46.78	54.0	7.22	AV	295.00	300	Vertical	Pass

8-DPSK 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	1288.870	39.29	74.0	34.71	Peak	51.00	400	Horizontal	Pass
1**	1288.870	31.28	54.0	22.72	AV	51.00	400	Horizontal	Pass
2	2771.523	54.50	74.0	19.50	Peak	341.00	200	Horizontal	Pass
2**	2771.523	43.60	54.0	10.40	AV	341.00	200	Horizontal	Pass
3	5163.565	51.77	74.0	22.23	Peak	323.00	200	Horizontal	Pass
3**	5163.565	40.99	54.0	13.01	AV	323.00	200	Horizontal	Pass
4	6807.988	55.21	74.0	18.79	Peak	196.00	400	Horizontal	Pass
4**	6807.988	44.54	54.0	9.46	AV	196.00	400	Horizontal	Pass
5	13465.418	55.12	74.0	18.88	Peak	355.00	300	Horizontal	Pass
5**	13465.418	46.38	54.0	7.62	AV	355.00	300	Horizontal	Pass
6	17465.234	54.37	74.0	19.63	Peak	166.00	100	Horizontal	Pass
6**	17465.234	44.16	54.0	9.84	AV	166.00	100	Horizontal	Pass

8-DPSK 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	1287.247	45.70	74.0	28.30	Peak	333.00	400	Vertical	Pass
1**	1287.247	31.85	54.0	22.15	AV	333.00	400	Vertical	Pass
2	2767.735	54.09	74.0	19.91	Peak	47.00	100	Vertical	Pass
2**	2767.735	43.42	54.0	10.58	AV	47.00	100	Vertical	Pass
3	5163.527	55.06	74.0	18.94	Peak	269.00	200	Vertical	Pass
3**	5163.527	43.50	54.0	10.50	AV	269.00	200	Vertical	Pass
4	6801.442	51.00	74.0	23.00	Peak	197.00	100	Vertical	Pass
4**	6801.442	44.88	54.0	9.12	AV	197.00	100	Vertical	Pass
5	13466.109	51.52	74.0	22.48	Peak	198.00	200	Vertical	Pass
5**	13466.109	44.85	54.0	9.15	AV	198.00	200	Vertical	Pass
6	17464.257	59.90	74.0	14.10	Peak	189.00	300	Vertical	Pass
6**	17464.257	46.37	54.0	7.63	AV	189.00	300	Vertical	Pass

8-DPSK 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	1287.170	41.21	74.0	32.79	Peak	287.00	100	Horizontal	Pass
1**	1287.170	32.81	54.0	21.19	AV	287.00	100	Horizontal	Pass
2	2767.676	49.69	74.0	24.31	Peak	51.00	200	Horizontal	Pass
2**	2767.676	41.35	54.0	12.65	AV	51.00	200	Horizontal	Pass
3	5170.662	54.20	74.0	19.80	Peak	195.00	200	Horizontal	Pass
3**	5170.662	44.15	54.0	9.85	AV	195.00	200	Horizontal	Pass
4	6807.068	55.75	74.0	18.25	Peak	5.00	100	Horizontal	Pass
4**	6807.068	43.58	54.0	10.42	AV	5.00	100	Horizontal	Pass
5	13470.263	53.64	74.0	20.36	Peak	295.00	100	Horizontal	Pass
5**	13470.263	44.86	54.0	9.14	AV	295.00	100	Horizontal	Pass
6	17465.822	56.81	74.0	17.19	Peak	84.00	400	Horizontal	Pass
6**	17465.822	48.17	54.0	5.83	AV	84.00	400	Horizontal	Pass

8-DPSK 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	1285.483	45.05	74.0	28.95	Peak	214.00	400	Vertical	Pass
1**	1285.483	33.85	54.0	20.15	AV	214.00	400	Vertical	Pass
2	2768.444	55.77	74.0	18.23	Peak	149.00	400	Vertical	Pass
2**	2768.444	47.97	54.0	6.03	AV	149.00	400	Vertical	Pass
3	5167.468	56.98	74.0	17.02	Peak	336.00	200	Vertical	Pass
3**	5167.468	43.31	54.0	10.69	AV	336.00	200	Vertical	Pass
4	6802.194	52.60	74.0	21.40	Peak	193.00	100	Vertical	Pass
4**	6802.194	43.42	54.0	10.58	AV	193.00	100	Vertical	Pass
5	13464.866	55.96	74.0	18.04	Peak	132.00	200	Vertical	Pass
5**	13464.866	40.61	54.0	13.39	AV	132.00	200	Vertical	Pass
6	17465.593	56.99	74.0	17.01	Peak	223.00	100	Vertical	Pass
6**	17465.593	50.01	54.0	3.99	AV	223.00	100	Vertical	Pass

Rod Antenna

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	1287.169	41.88	74.0	32.12	Peak	133.00	300	Horizontal	Pass
1**	1287.169	33.91	54.0	20.09	AV	133.00	300	Horizontal	Pass
2	2771.908	52.66	74.0	21.34	Peak	308.00	300	Horizontal	Pass
2**	2771.908	45.41	54.0	8.59	AV	308.00	300	Horizontal	Pass
3	5165.727	53.06	74.0	20.94	Peak	239.00	200	Horizontal	Pass
3**	5165.727	40.37	54.0	13.63	AV	239.00	200	Horizontal	Pass
4	6803.803	51.91	74.0	22.09	Peak	155.00	300	Horizontal	Pass
4**	6803.803	47.72	54.0	6.28	AV	155.00	300	Horizontal	Pass
5	13463.388	57.67	74.0	16.33	Peak	309.00	300	Horizontal	Pass
5**	13463.388	47.11	54.0	6.89	AV	309.00	300	Horizontal	Pass
6	17466.971	56.07	74.0	17.93	Peak	72.00	100	Horizontal	Pass
6**	17466.971	46.85	54.0	7.15	AV	72.00	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	1162.736	46.25	74.0	27.75	Peak	215.00	300	Vertical	Pass
1**	1162.736	34.04	54.0	19.96	AV	215.00	300	Vertical	Pass
2	2767.577	50.98	74.0	23.02	Peak	197.00	400	Vertical	Pass
2**	2767.577	39.25	54.0	14.75	AV	197.00	400	Vertical	Pass
3	5043.019	52.71	74.0	21.29	Peak	164.00	200	Vertical	Pass
3**	5043.019	42.53	54.0	11.47	AV	164.00	200	Vertical	Pass
4	6976.925	54.50	74.0	19.50	Peak	65.00	200	Vertical	Pass
4**	6976.925	45.10	54.0	8.90	AV	65.00	200	Vertical	Pass
5	13343.521	57.36	74.0	16.64	Peak	87.00	400	Vertical	Pass
5**	13343.521	46.03	54.0	7.97	AV	87.00	400	Vertical	Pass
6	17439.701	57.93	74.0	16.07	Peak	123.00	400	Vertical	Pass
6**	17439.701	48.82	54.0	5.18	AV	123.00	400	Vertical	Pass

FPC Antenna

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	1282.223	43.43	74.0	30.57	Peak	325.00	200	Horizontal	Pass
1**	1282.223	30.68	54.0	23.32	AV	325.00	200	Horizontal	Pass
2	2767.660	52.51	74.0	21.49	Peak	102.00	200	Horizontal	Pass
2**	2767.660	42.97	54.0	11.03	AV	102.00	200	Horizontal	Pass
3	5171.274	54.81	74.0	19.19	Peak	55.00	200	Horizontal	Pass
3**	5171.274	43.93	54.0	10.07	AV	55.00	200	Horizontal	Pass
4	6806.494	55.61	74.0	18.39	Peak	39.00	100	Horizontal	Pass
4**	6806.494	44.59	54.0	9.41	AV	39.00	100	Horizontal	Pass
5	13464.397	53.45	74.0	20.55	Peak	25.00	100	Horizontal	Pass
5**	13464.397	43.73	54.0	10.27	AV	25.00	100	Horizontal	Pass
6	17469.305	54.14	74.0	19.86	Peak	355.00	400	Horizontal	Pass
6**	17469.305	49.28	54.0	4.72	AV	355.00	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	1159.858	48.47	74.0	25.53	Peak	331.00	300	Vertical	Pass
1**	1159.858	32.53	54.0	21.47	AV	331.00	300	Vertical	Pass
2	2769.091	48.69	74.0	25.31	Peak	118.00	400	Vertical	Pass
2**	2769.091	41.19	54.0	12.81	AV	118.00	400	Vertical	Pass
3	5042.077	51.18	74.0	22.82	Peak	3.00	200	Vertical	Pass
3**	5042.077	40.34	54.0	13.66	AV	3.00	200	Vertical	Pass
4	6978.865	54.62	74.0	19.38	Peak	251.00	400	Vertical	Pass
4**	6978.865	44.52	54.0	9.48	AV	251.00	400	Vertical	Pass
5	13343.234	57.81	74.0	16.19	Peak	317.00	200	Vertical	Pass
5**	13343.234	46.63	54.0	7.37	AV	317.00	200	Vertical	Pass
6	17434.220	58.68	74.0	15.32	Peak	215.00	100	Vertical	Pass
6**	17434.220	47.27	54.0	6.73	AV	215.00	100	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 C63.10-2013, 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.

Test Data

PCB Antenna

GFSK LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2362.256	55.67	74.0	18.33	Peak	339.00	100	Horizontal	Pass
1**	2362.256	44.03	54.0	9.97	AV	339.00	100	Horizontal	Pass
2	2390.000	54.29	74.0	19.71	Peak	146.00	100	Horizontal	Pass
2**	2390.000	48.06	54.0	5.94	AV	146.00	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	55.46	74.0	18.54	Peak	278.00	100	Horizontal	Pass
1**	2483.500	45.27	54.0	8.73	AV	278.00	100	Horizontal	Pass
2	2485.190	59.1	74.0	14.90	Peak	124.00	300	Horizontal	Pass
2**	2485.190	48.58	54.0	5.42	AV	124.00	300	Horizontal	Pass

8-DPSK LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2363.094	55.76	74.0	18.24	Peak	284.00	100	Horizontal	Pass
1**	2363.094	44.46	54.0	9.54	AV	284.00	100	Horizontal	Pass
2	2390.000	57.55	74.0	16.45	Peak	332.00	300	Horizontal	Pass
2**	2390.000	45.92	54.0	8.08	AV	332.00	300	Horizontal	Pass

8-DPSK HIGH CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2483.500	57.35	74.0	16.65	Peak	174.00	300	Horizontal	Pass
1**	2483.500	46.64	54.0	7.36	AV	174.00	300	Horizontal	Pass
2	2485.309	57.72	74.0	16.28	Peak	12.00	200	Horizontal	Pass
2**	2485.309	46.09	54.0	7.91	AV	12.00	200	Horizontal	Pass

Rod Antenna

GFSK LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2364.216	57.91	74.0	16.09	Peak	341.00	200	Horizontal	Pass
1**	2364.216	46.8	54.0	7.20	AV	341.00	200	Horizontal	Pass
2	2390.000	54.24	74.0	19.76	Peak	326.00	300	Horizontal	Pass
2**	2390.000	49.41	54.0	4.59	AV	326.00	300	Horizontal	Pass

FPC Antenna

GFSK LOW CHANNEL

No.	Frequency (MHz)	Results (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2362.101	56.07	74.0	17.93	Peak	347.00	200	Horizontal	Pass
1**	2362.101	46.59	54.0	7.41	AV	347.00	200	Horizontal	Pass
2	2390.000	55.83	74.0	18.17	Peak	216.00	100	Horizontal	Pass
2**	2390.000	49.47	54.0	4.53	AV	216.00	100	Horizontal	Pass

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ2490059-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ2490059-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ2490059-AI.PDF”.

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--END OF REPORT--