RF TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

PuduBot

ISSUED TO
SHENZHEN PUDU TECHNOLOGY CO., LTD.

Room 501, Building A, Block 1, Phase 1, Shenzhen International Inno Valley, Dashi 1st Road, Nanshan District, Shenzhen, China

Tested by: Ye Hongji
Date Sep. 13, 2021

Approved by: Liao Jianming
(Technical Director)
Date Sep. 13, 2021

Report No.:	BL-SZ2140589-601
EUT Name:	PuduBot
Model Name:	PD1(refer section 2.4)
Brand Name:	PUDU
Test Standard:	47 CFR Part 15 Subpart C (refer section 3.1)
FCC ID:	2AV7T-PDI
Test conclusion:	Pass
Test Date:	May 01, 2021 ~ Aug. 30, 2021
Date of Issue:	Sep. 13, 2021

NOTE: This test report of test results only related to testing samples, which can be duplicated completely for the legal use with the approval of the applicant; it shall not be reproduced except in full, without the written approval of Shenzhen BALUN Technology Co., Ltd. Any objections should be raised within thirty days from the date of issue. To validate the report, please contact us.

Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong, P. R. China 518055
TEL: +86-755-66850100, FAX: +86-755-61824271
Email: qc@baluntek.com
www.baluntek.com

Revision History

Version	Issue Date	Revisions Content
Rev. 01	Sep. 13, 2021	Initial Issue

TABLE OF CONTENTS

1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

1.1 Identification of the Testing Laboratory

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

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, 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.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Laboratory Condition

Ambient Temperature	20℃ to 25℃
Ambient Relative Humidity	45% to 55%
Ambient Pressure	100 kPa to 102 kPa

1.4 Announce

(1) The test report reference to the report template version v5.7.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

(7) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	SHENZHEN PUDU TECHNOLOGY CO., LTD.
Address	Room 501, Building A, Block 1, Phase 1, Shenzhen International Inno Valley, Dashi 1st Road, Nanshan District, Shenzhen, China

2.2 Manufacturer Information

Manufacturer	SHENZHEN PUDU TECHNOLOGY CO., LTD.
Address	Room 501, Building A, Block 1, Phase 1, Shenzhen International Inno Valley, Dashi 1st Road, Nanshan District, Shenzhen, China

2.3 Factory Information

Factory	Guangdong Mingji Hi-Tech Electronics Co., Ltd
Address	Room 101, No.88, Pingshan Industrial Road, Tangxia Town, Dongguan, Guangdong, China

2.4 General Description for Equipment under Test (EUT)

EUT Name	PuduBot
Model Name Under Test	PD1
Series Model Name	PD2, PD6, PD8, PD9
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in tray structure.
Hardware Version	20.8.4
Software Version	4.12.0.38
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

	RGBD	Radar	Motor	Battery
Configurations	ASV0240U2HA, Nuwa-XB40	LDS-50C, A2M7, S1, EAI-G7 plus	ZHONGLING, YATENG, MagX 5.5	7S5P, 7S6P
Note: Only the data of the worst configuration RGBD: ASV0240U2HA + Radar: LDS-50C + Motor: YATENG + Battery: 7S5P shown in the report.				

2.5 Technical Information

Network and Wireless connectivity	Bluetooth (BR+EDR+BLE) WIFI 802.11a, 802.11b, 802.11g, 802.11n and 802.11ac U-NII-1/2A/2C/3

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	AP Module	Copper tube Antenna
	ESP Module	
Antenna Gain	AP Module	1.88 dBi (In test items related to antenna gain, the final results reflect this figure. This value is provided by the applicant.)
	ESP Module	
Antenna Impedance		50Ω
Antenna System (MIMO Smart Antenna)		N/A
Note: This report reflects the test data of two EUT modules, one is AP module and the other is ESP module.		

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	-	-

2.6 Additional Instructions

AP Module

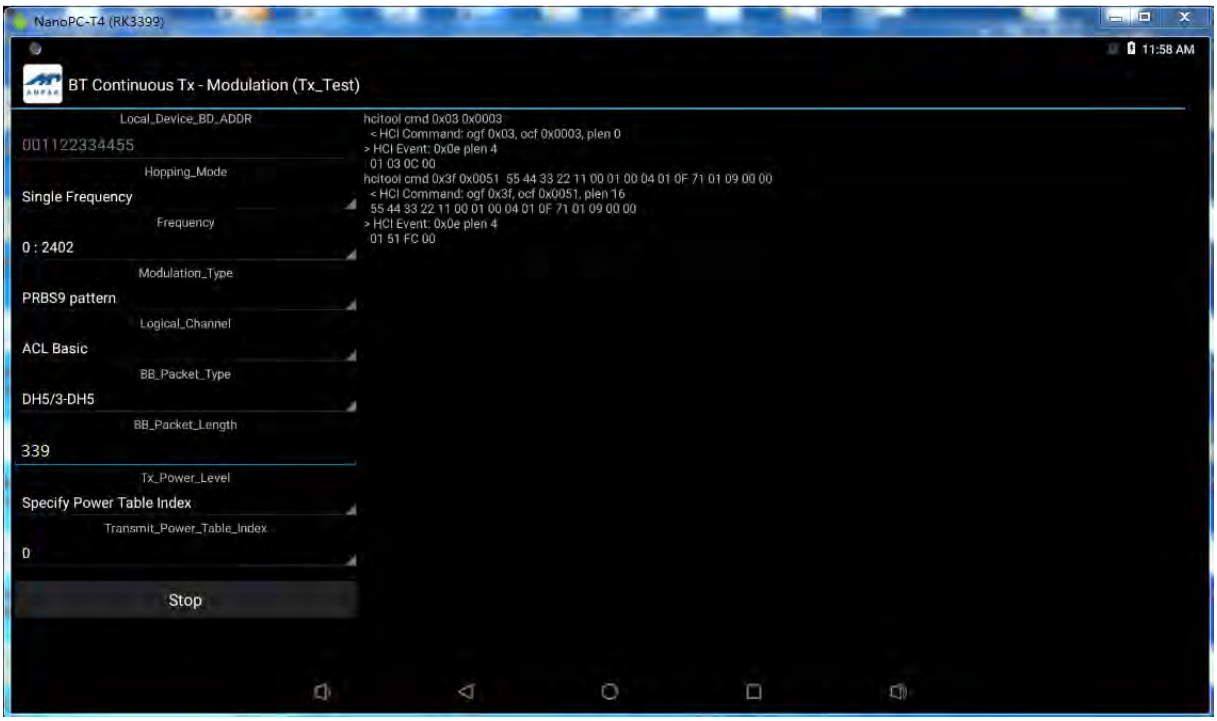
EUT Software Settings:

Mode	☒ Special software is used. The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Power level setup in software			
Test Software Version	RF Tool		
Support Units (Software installation media)	Description	Manufacturer	Model
	Notebook	Lenovo	X220
Mode	Channel	Frequency (MHz)	Soft Set
DH5	CH0	2402	Power parameter Settings is 0
	CH39	2441	
	CH78	2480	
2DH5	CH0	2402	
	CH39	2441	
	CH78	2480	
3DH5	CH0	2402	
	CH39	2441	
	CH78	2480	

Run Software:



ESP Module

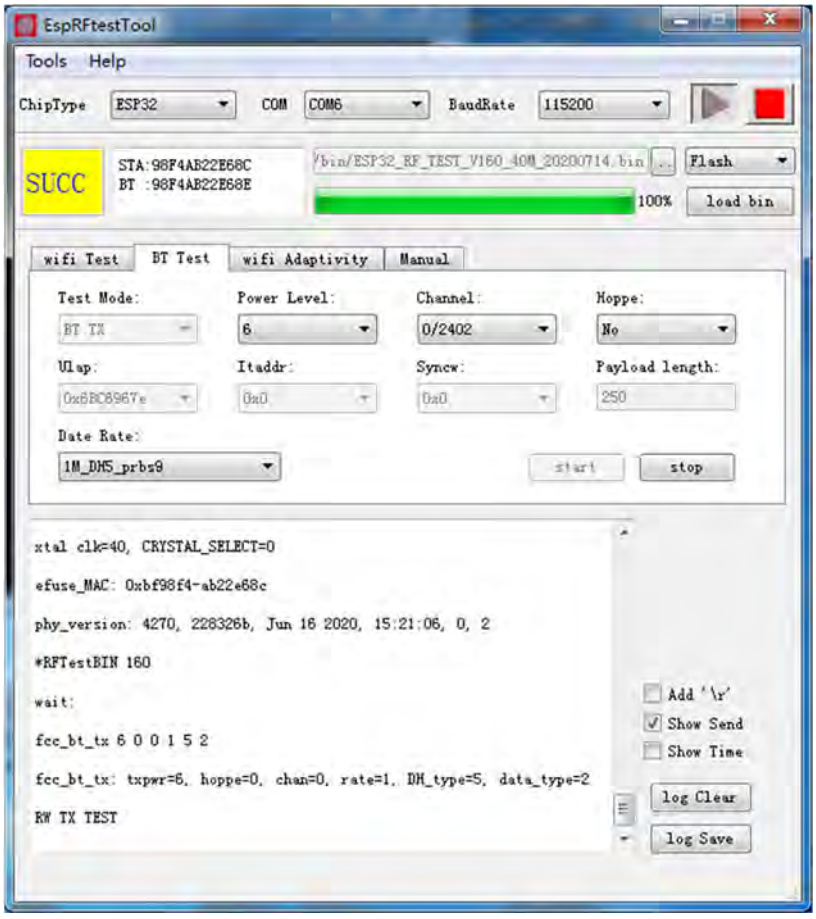
EUT Software Settings:

Mode	☒ Special software is used. The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Power level setup in software			
Test Software Version	EspRFtestTool		
Support Units (Software installation media)	Description	Manufacturer	Model
	Notebook	Lenovo	X220
Mode	Channel	Frequency (MHz)	Soft Set
DH5	CH0	2402	Power parameter Settings is 6
	CH39	2441	
	CH78	2480	
2DH5	CH0	2402	
	CH39	2441	
	CH78	2480	
3DH5	CH0	2402	
	CH39	2441	
	CH78	2480	

Run Software:



3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 15, Subpart C	Miscellaneous Wireless Communications Services
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
3	KDB 558074 D01 15.247 Meas Guidance v05r02	Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules

3.2 Verdict

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

Note [1]: Please refer to section 5.1

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	45% to 55%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22℃ to +25℃
Working Voltage of the EUT	NV (Normal Voltage)	26 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-40	101544	2021.04.01	2022.03.31
Bluetooth Signaling Unit	ROHDE&SCHWARZ	CMW500	142028	2020.06.08	2021.06.07
Bluetooth Signaling Unit	ROHDE&SCHWARZ	CMW500	142028	2021.06.01	2022.05.31
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2020.06.09	2021.06.08
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2021.06.01	2022.05.31
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2020.06.09	2021.06.08
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2021.06.01	2022.05.31
LISN	SCHWARZBECK	NSLK 8127	8127-687	2020.06.09	2021.06.08
LISN	SCHWARZBECK	NSLK 8127	8127-687	2021.06.01	2022.05.31
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2019.10.29	2021.10.28
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2019.07.02	2022.07.01
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1917	2019.07.02	2022.07.01
Test Antenna-Horn (18-40 GHz)	A-INFO	LB-180400KF	J211060273	2021.01.05	2023.01.04
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2022.02.20
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60*7.35m	N/A	2019.08.08	2022.08.07
Shielded Enclosure	ChangNing	CN-130701	130703	--	--

4.3 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.

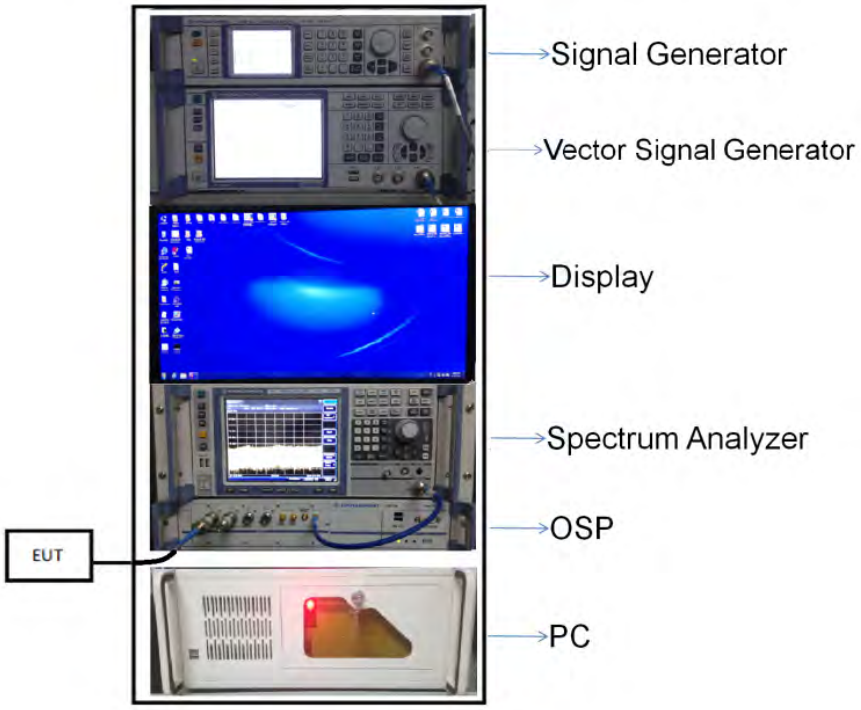
Parameters	Uncertainty
Occupied Channel Bandwidth	2.8%
RF output power, conducted	1.28 dB
Power Spectral Density, conducted	1.30 dB
Unwanted Emissions, conducted	1.84 dB
All emissions, radiated	5.36 dB
Temperature	0.82°C
Humidity	4.1%

4.4 Description of Test Setup

4.4.1 For Antenna Port Test

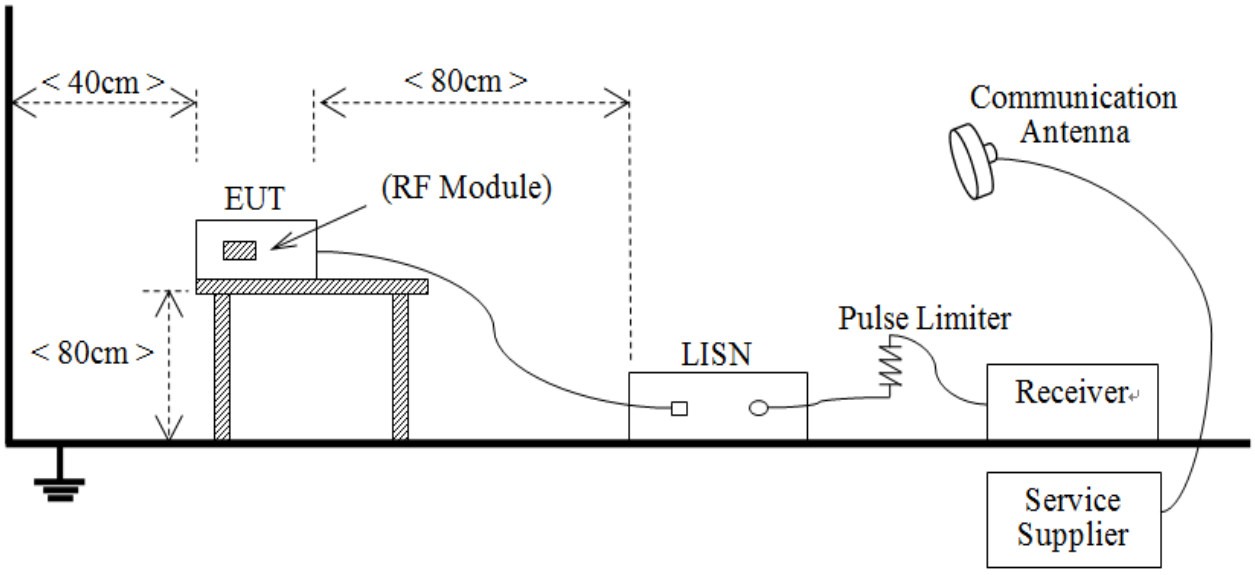
Conducted value (dBm) = Measurement value (dBm) + cable loss (dB)

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



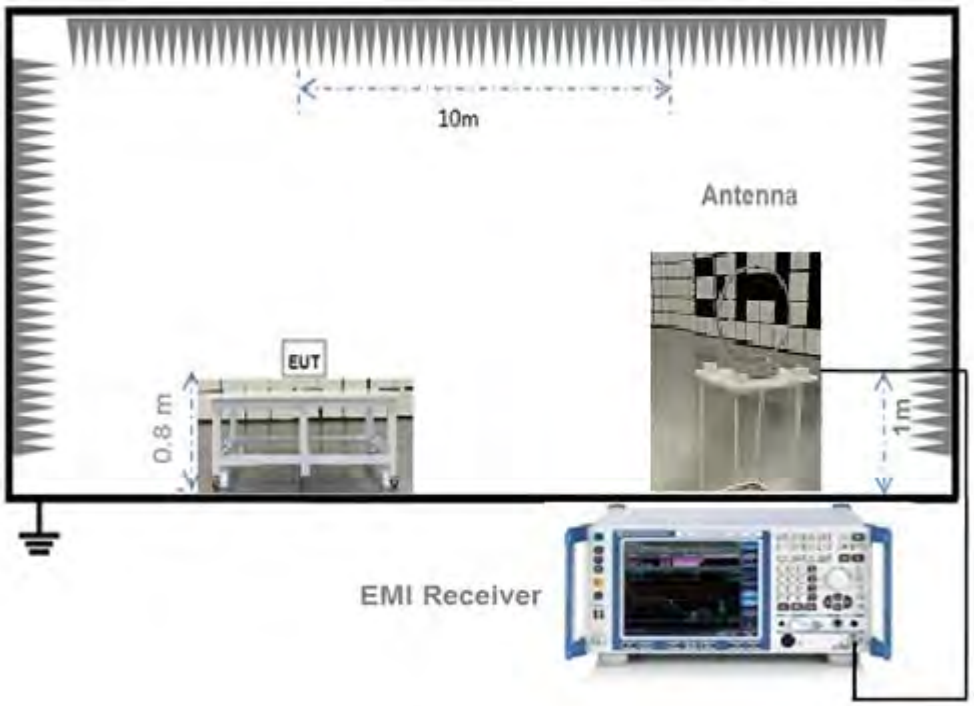
(Diagram 1)

4.4.2 For AC Power Supply Port Test



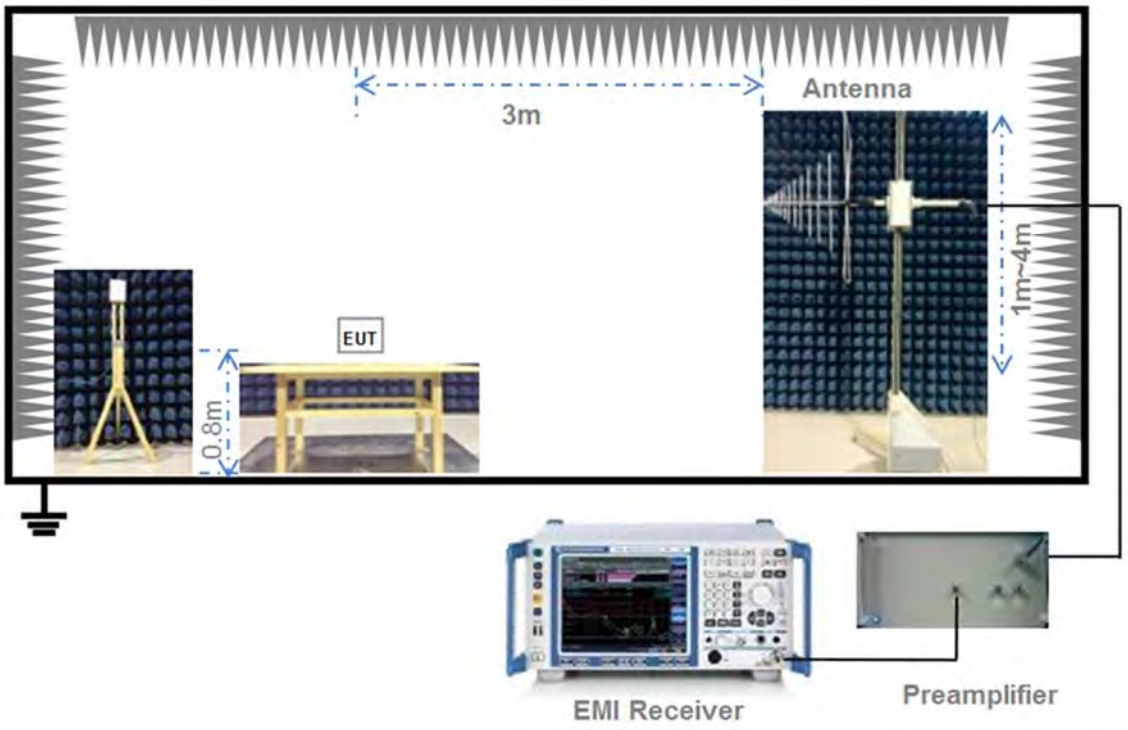
(Diagram 2)

4.4.3 For Radiated Test (Below 30 MHz)



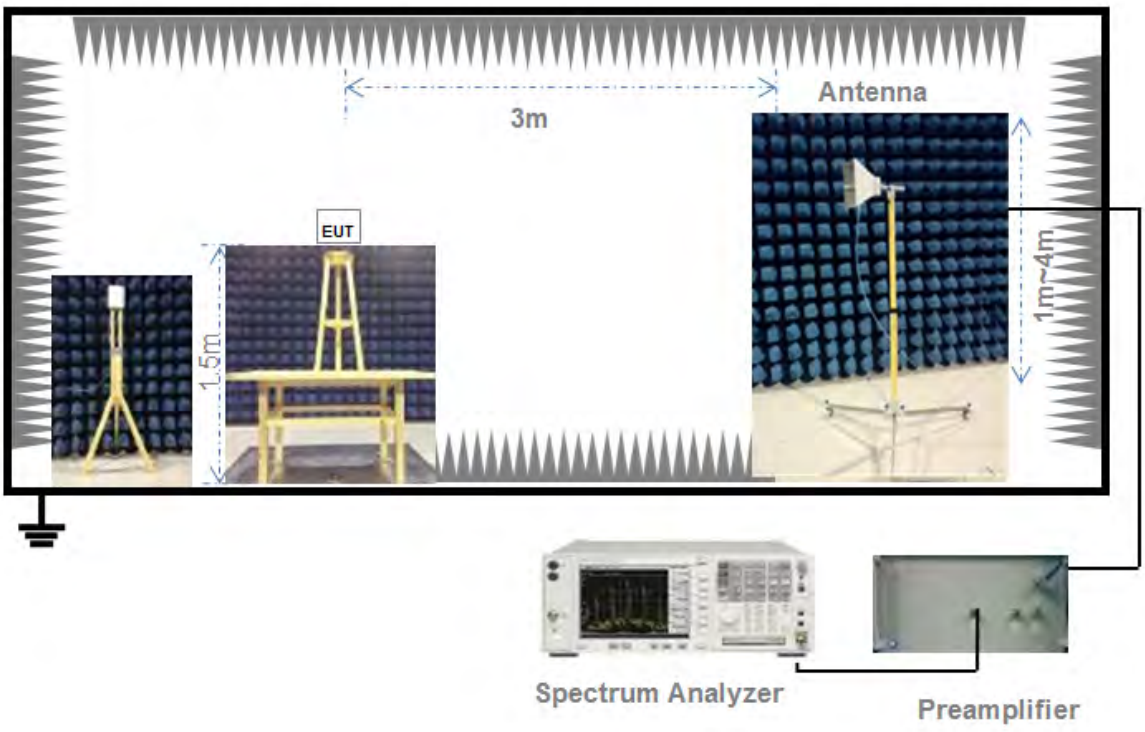
(Diagram 3)

4.4.4 For Radiated Test (30 MHz-1 GHz)



(Diagram 4)

4.4.5 For Radiated Test (Above 1 GHz)



(Diagram 5)

4.5 Measurement Results Explanation Example

4.5.1 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)

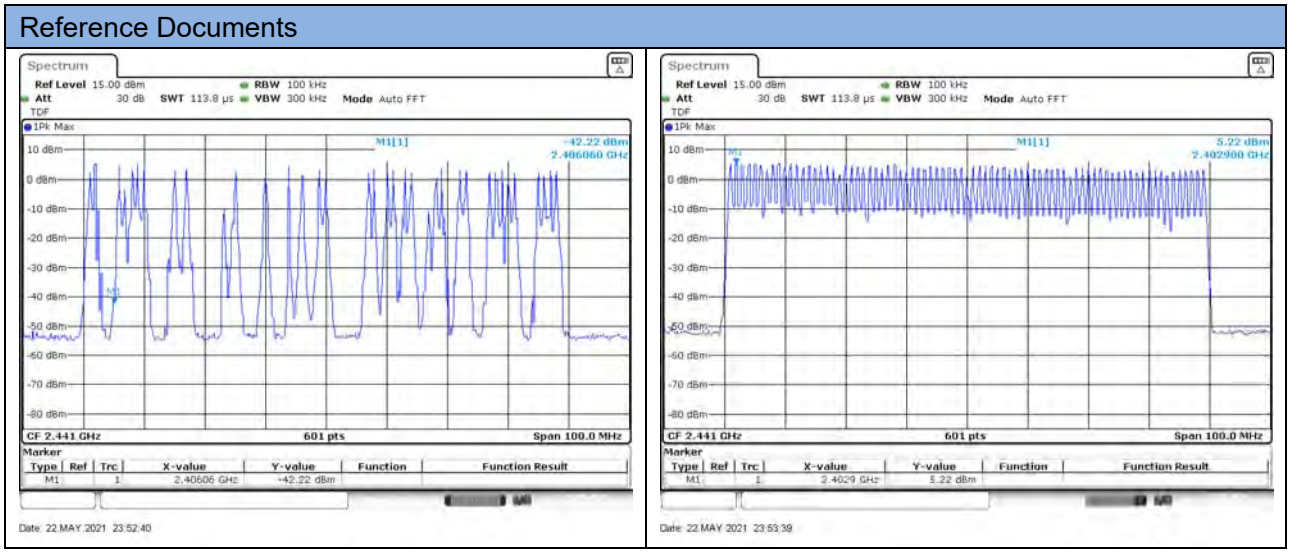
Describe how the hopping sequence is generated. Provide an example of the hopping sequence channels, to demonstrate that the sequence meets the requirement specified in the definition of an FHSS system. Per the definition in Section 2.1(c), the hop set shall appear as random in the near term, shall appear 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

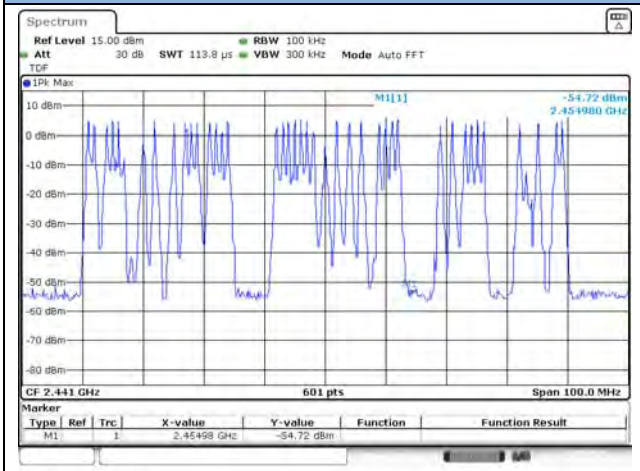
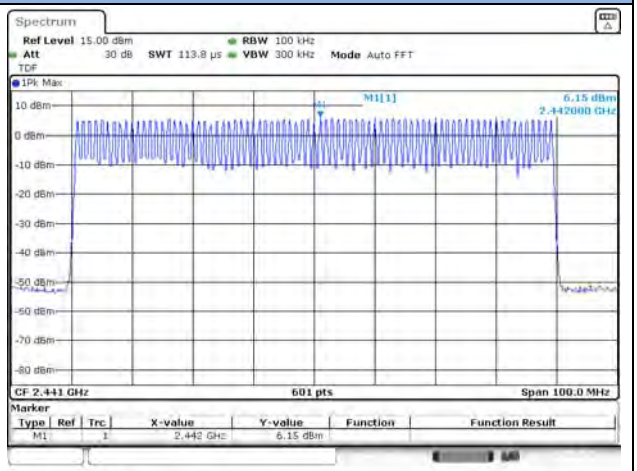
1. According to the preset procedure of the whole network, all the stations in the automatic control network synchronously change the frequency multiple times within one second, and temporarily stay on each frequency hopping channel. Periodic synchronization signaling is sent from the primary station, 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.

AP Module

Reference Documents



ESP Module

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 4.4.1 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

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 4.4.1 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, 5.1 (a)

Measurement of the 20dB bandwidth of the modulated signal.

5.5.2 Test Setup

See section 4.4.1 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 4.4.1 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 4.4.1 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 ≤ 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 4.4.1 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 4.4.2 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 4.4.3 to 4.4.5 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 4.4.3 to 4.4.5 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

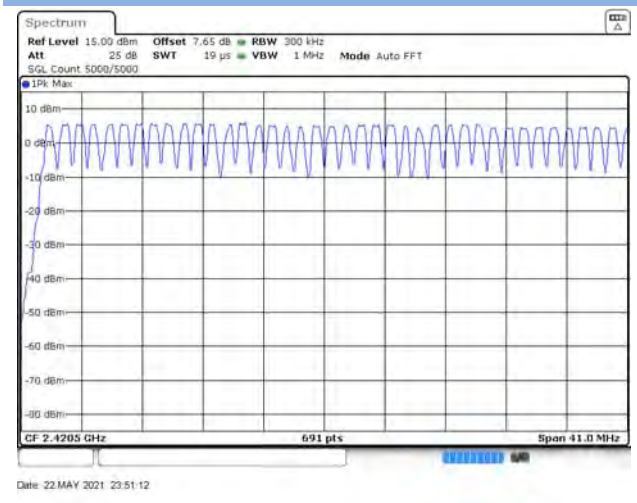
AP Module

Test Data

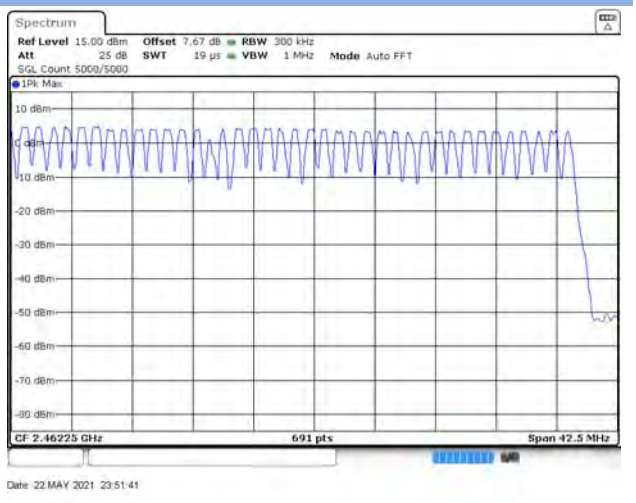
Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Verdict
GFSK	2400 - 2483.5	79	15	Pass
8-DPSK	2400 - 2483.5	79	15	Pass

Test plots

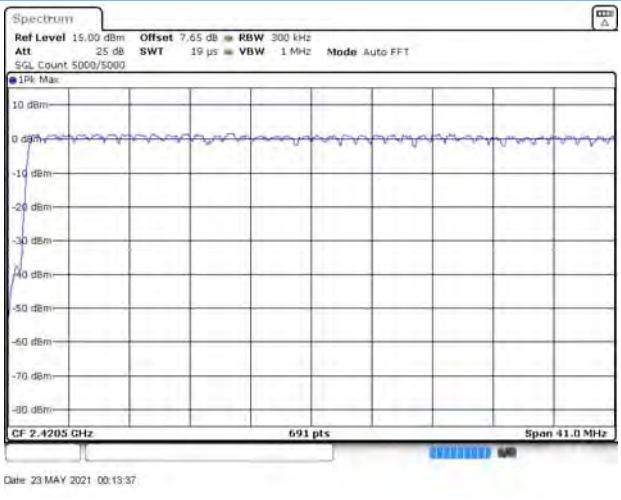
GFSK 2.4 GHz ~ 2.4415 GHz



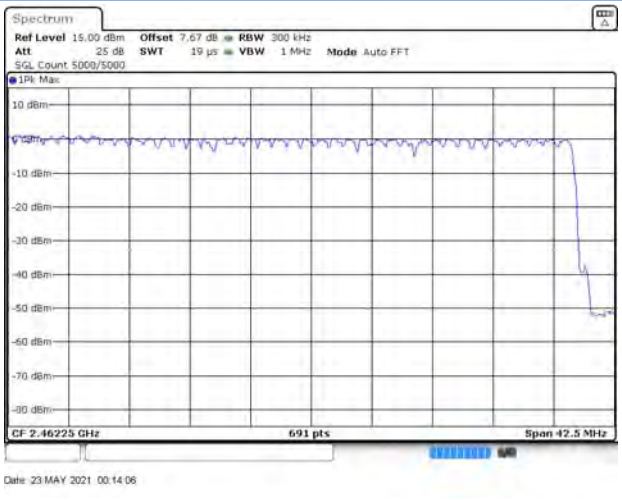
GFSK 2.4415 GHz ~ 2.4835 GHz



8-DPSK 2.4 GHz ~ 2.4415 GHz



8-DPSK 2.4415 GHz ~ 2.4835 GHz



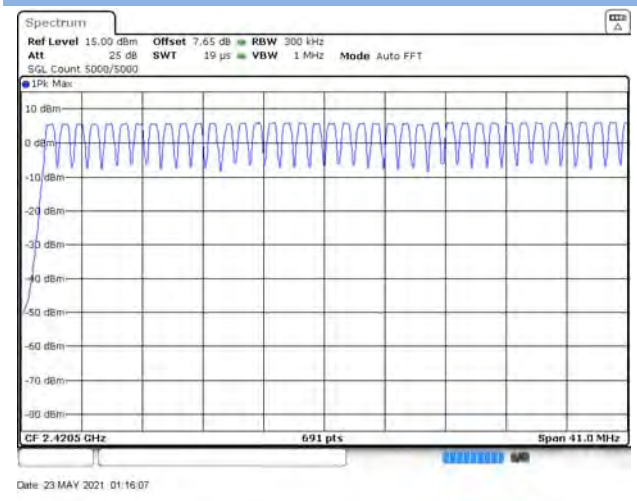
ESP Module

Test Data

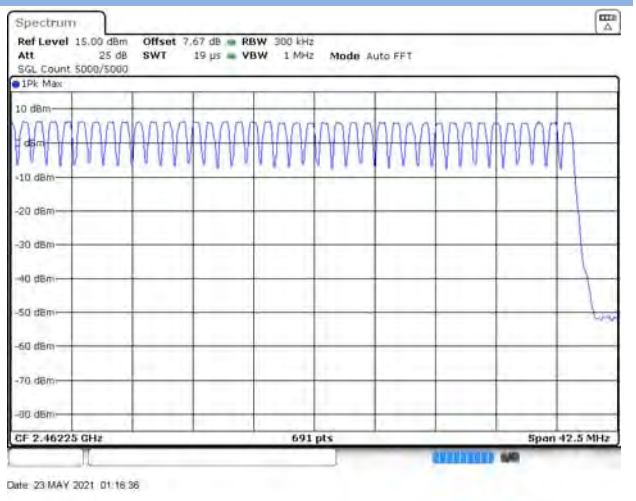
Test Mode	Frequency Block (MHz)	Measured Channel Numbers	Min. Limit	Verdict
GFSK	2400 - 2483.5	79	15	Pass
8-DPSK	2400 - 2483.5	79	15	Pass

Test plots

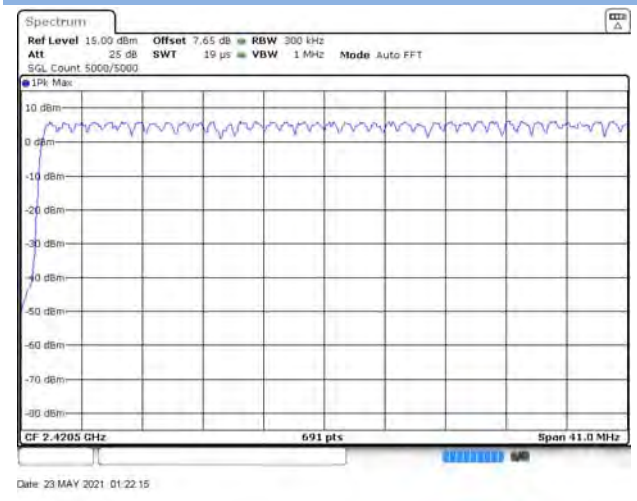
GFSK 2.4 GHz ~ 2.4415 GHz



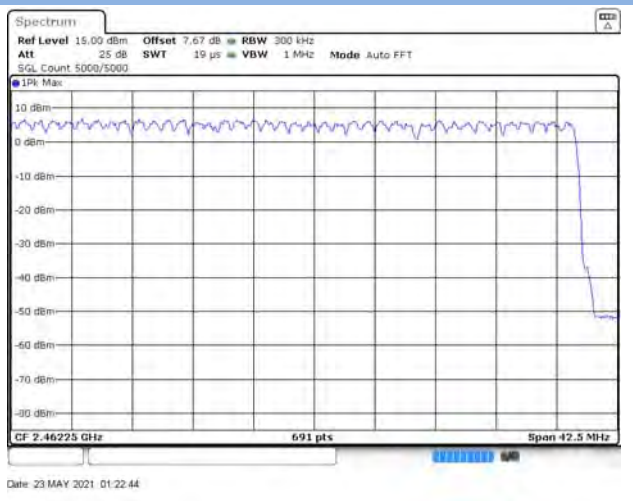
GFSK 2.4415 GHz ~ 2.4835 GHz



8-DPSK 2.4 GHz ~ 2.4415 GHz



8-DPSK 2.4415 GHz ~ 2.4835 GHz



A.2 Peak Output Power

AP Module

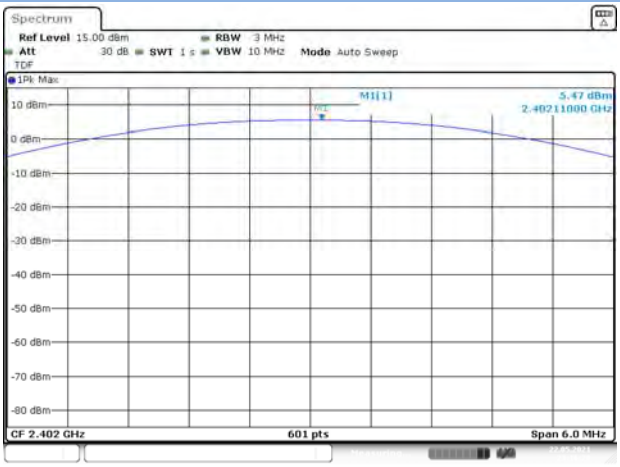
Peak Power Test Data

Channel	Measured Output Peak Power		Limit		Verdict
	GFSK		dBm	mW	
	dBm	mW			
Low	5.47	3.52	21	125	Pass
Middle	4.86	3.06			Pass
High	3.42	2.20			Pass

Channel	Measured Output Peak Power				Limit		Verdict
	π/4-DQPSK		8-DPSK		dBm	mW	
	dBm	mW	dBm	mW			
Low	3.74	2.37	4.35	2.72	21	125	Pass
Middle	3.31	2.14	3.94	2.48			Pass
High	2.48	1.77	2.92	1.96			Pass

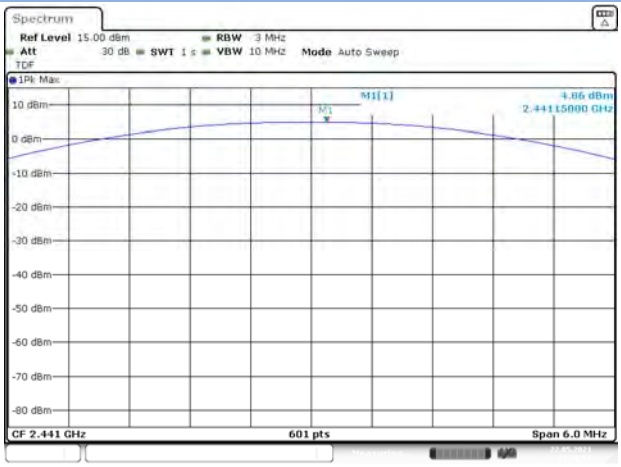
Test plots

GFSK LOW CHANNEL



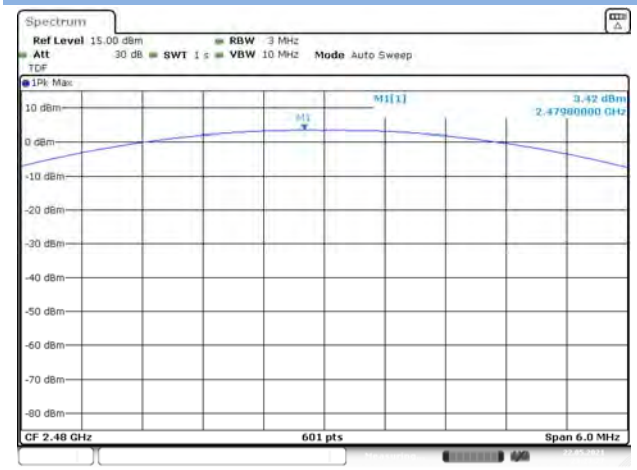
Date: 22.MAY.2021 23:16:29

GFSK MIDDLE CHANNEL



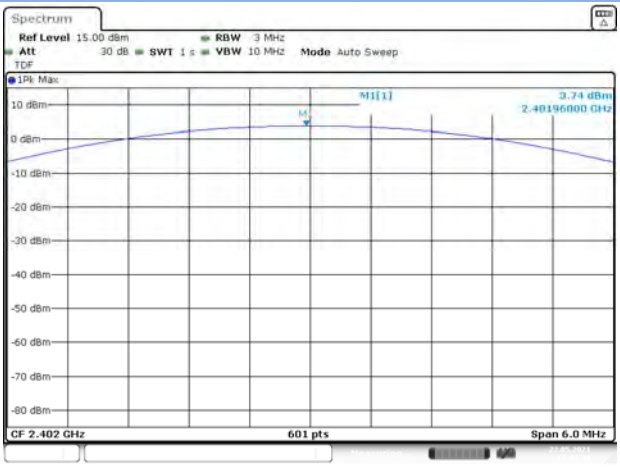
Date: 22.MAY.2021 23:20:51

GFSK HIGH CHANNEL



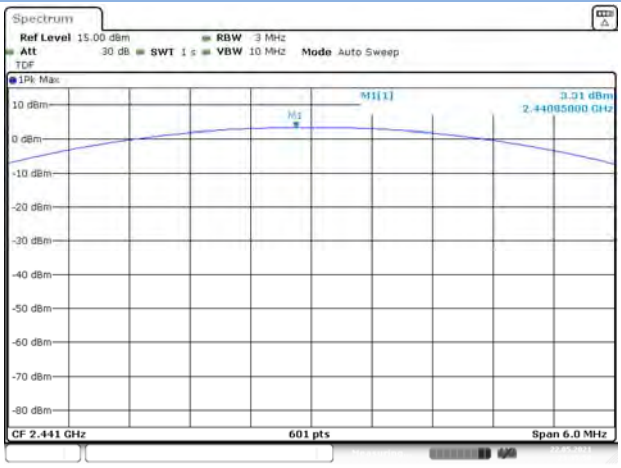
Date: 22.MAY.2021 23:23:28

π/4-DQPSK LOW CHANNEL



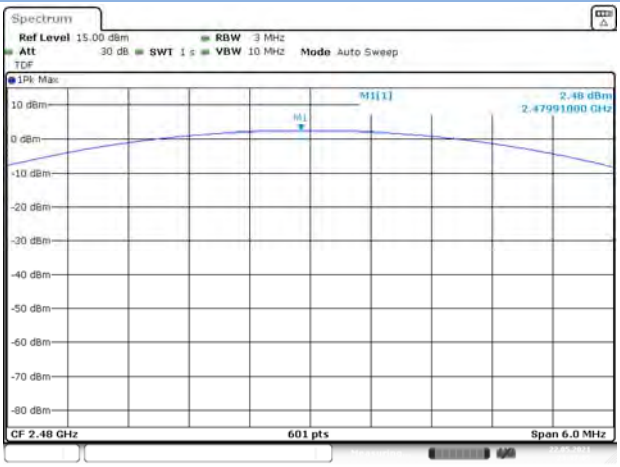
Date: 22.MAY.2021 23:32:18

π/4-DQPSK MIDDLE CHANNEL



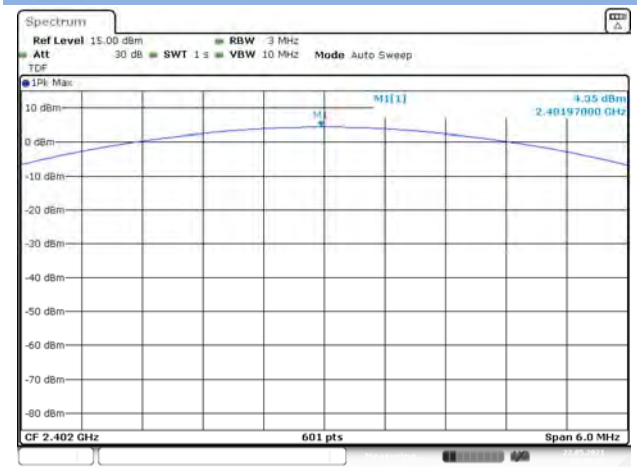
Date: 22.MAY.2021 23:35:59

π/4-DQPSK HIGH CHANNEL



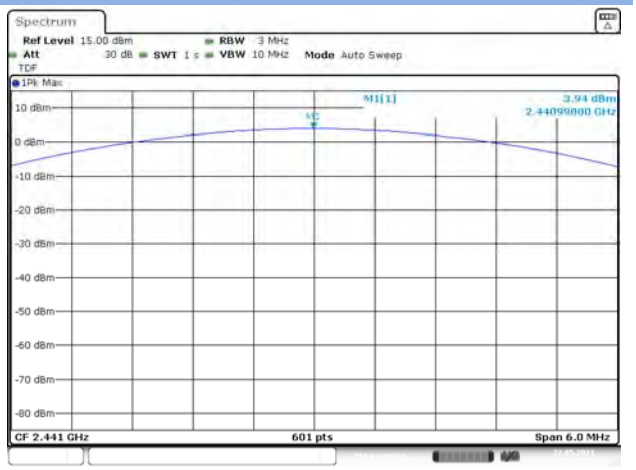
Date: 22.MAY.2021 23:37:05

8-DPSK LOW CHANNEL



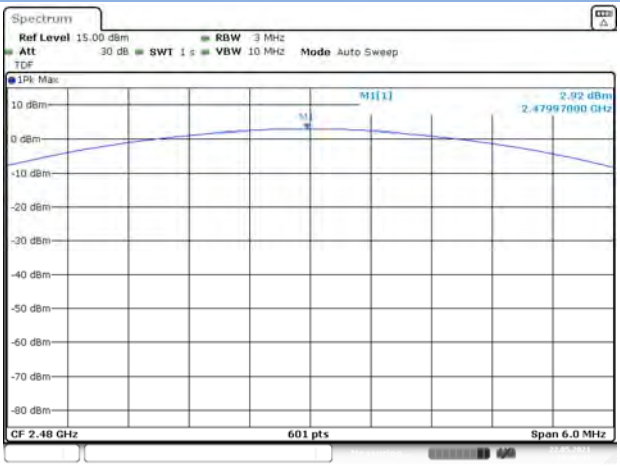
Date: 22.MAY.2021 23:39:33

8-DPSK MIDDLE CHANNEL



Date: 22.MAY.2021 23:45:23

8-DPSK HIGH CHANNEL



Date: 22.MAY.2021 23:46:43

ESP Module

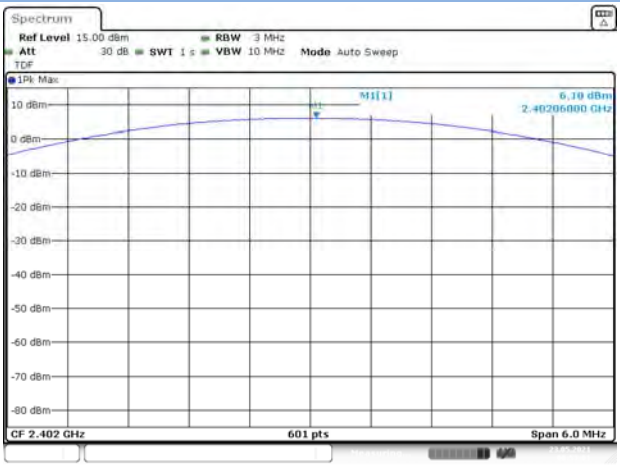
Peak Power Test Data

Channel	Measured Output Peak Power		Limit		Verdict
	GFSK		dBm	mW	
	dBm	mW			
Low	6.10	4.07	21	125	Pass
Middle	6.69	4.67			Pass
High	6.21	4.18			Pass

Channel	Measured Output Peak Power				Limit		Verdict
	π/4-DQPSK		8-DPSK		dBm	mW	
	dBm	mW	dBm	mW			
Low	8.11	6.47	8.52	7.11	21	125	Pass
Middle	8.65	7.33	9.04	8.02			Pass
High	8.35	6.84	8.75	7.50			Pass

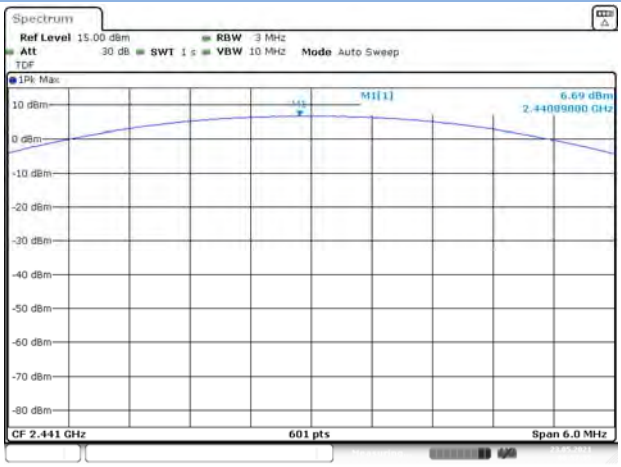
Test plots

GFSK LOW CHANNEL



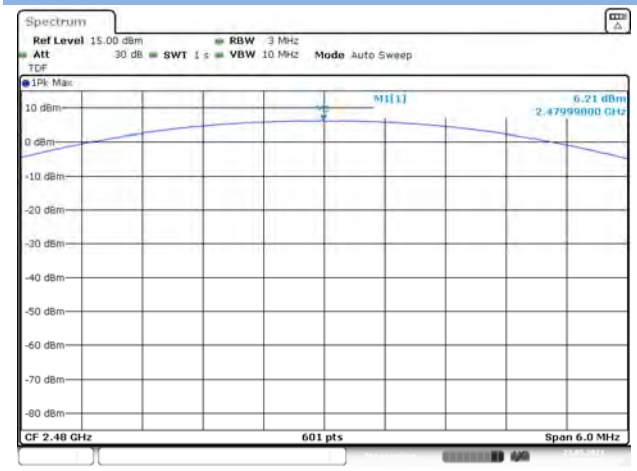
Date: 23.MAY.2021 00:53:02

GFSK MIDDLE CHANNEL



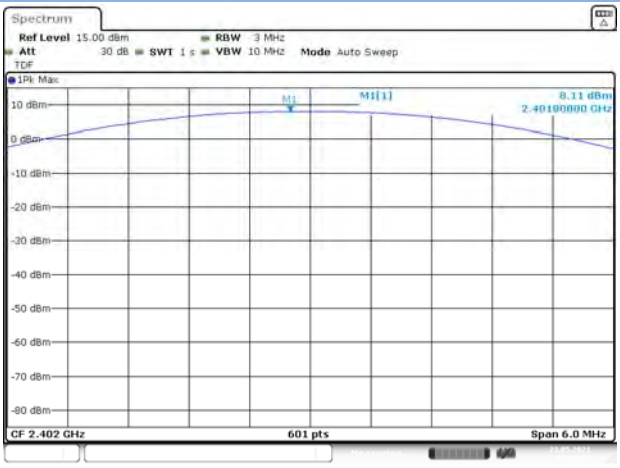
Date: 23.MAY.2021 00:57:36

GFSK HIGH CHANNEL



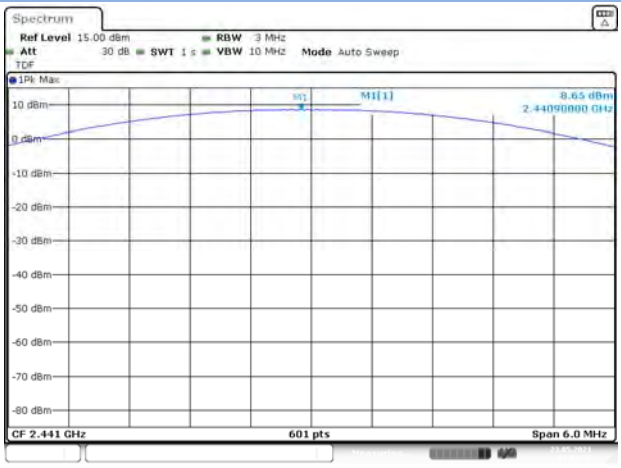
Date: 23.MAY.2021 01:00:13

π/4-DQPSK LOW CHANNEL



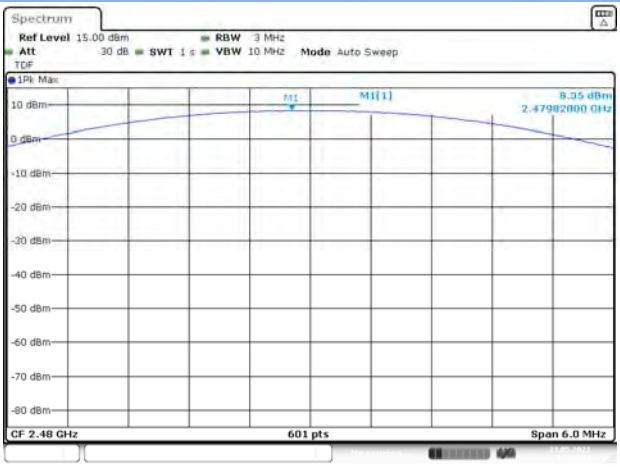
Date: 23.MAY.2021 01:03:23

π/4-DQPSK MIDDLE CHANNEL



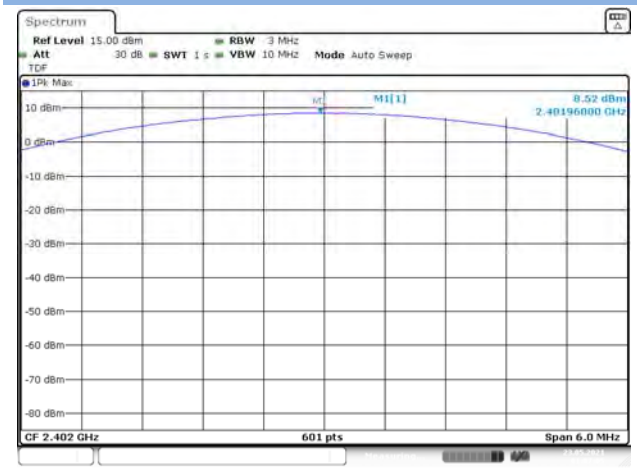
Date: 23.MAY.2021 01:04:26

π/4-DQPSK HIGH CHANNEL



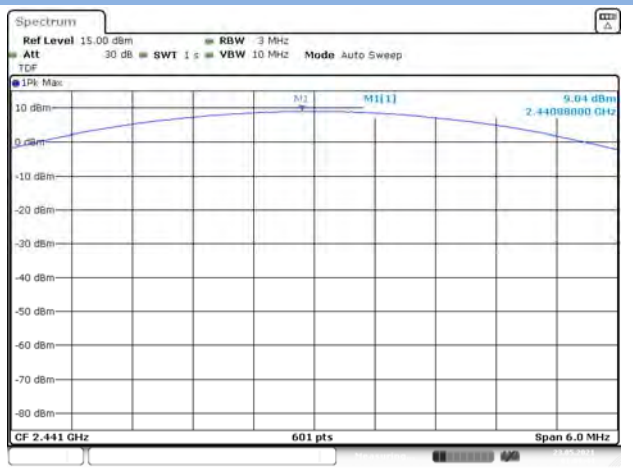
Date: 23.MAY.2021 01:05:44

8-DPSK LOW CHANNEL



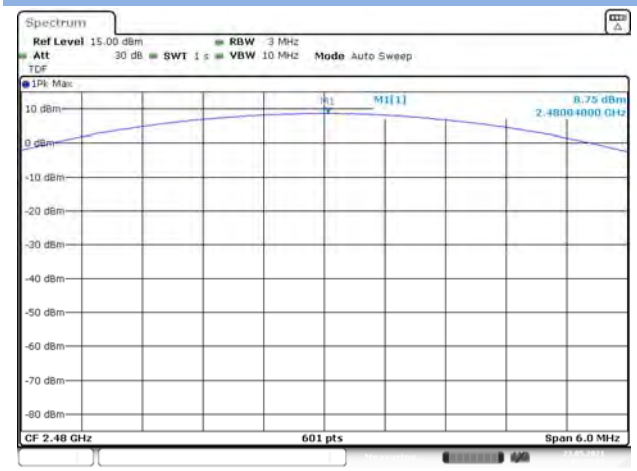
Date: 23.MAY.2021 01:07:05

8-DPSK MIDDLE CHANNEL



Date: 23.MAY.2021 01:09:45

8-DPSK HIGH CHANNEL



Date: 23.MAY.2021 01:12:13

A.3 20 dB and 99% bandwidth

AP Module

Test Data

GFSK		
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	0.973877	0.907381
Middle	0.978271	0.911722
High	0.973877	0.911722
π/4-DQPSK		
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	1.360840	1.206946
Middle	1.360840	1.202605
High	1.360840	1.202605
8-DPSK		
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	1.330322	1.206946
Middle	1.330322	1.202605
High	1.330566	1.202605

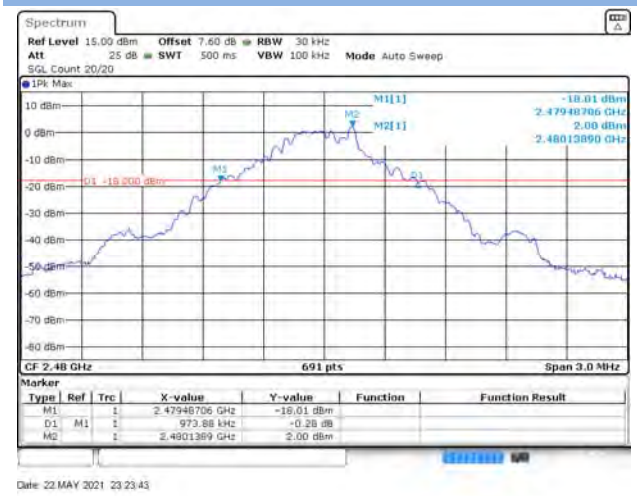
Test plots

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

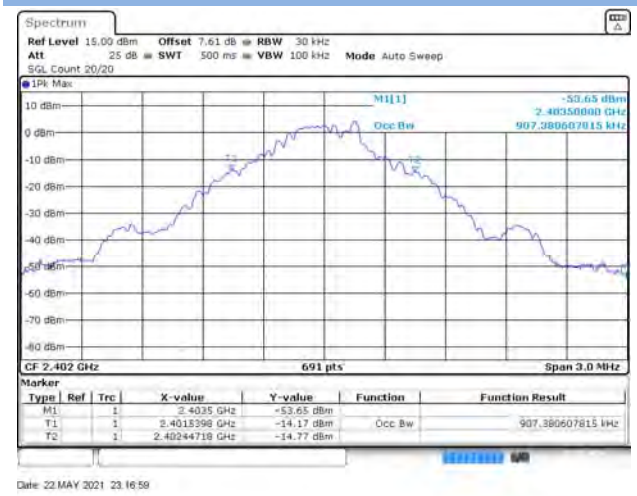
8-DPSK LOW CHANNEL

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

ESP Module

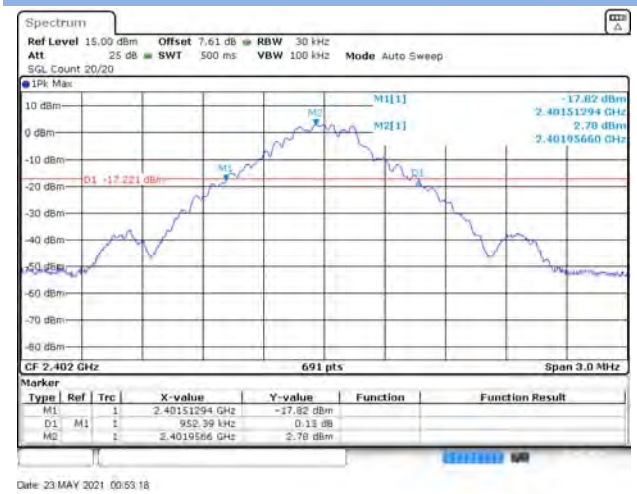
Test Data

GFSK		
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	0.952393	0.829233
Middle	0.952148	0.842258
High	0.947998	0.833575
π/4-DQPSK		
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	1.326172	1.176556
Middle	1.326172	1.189580
High	1.326172	1.185239
8-DPSK		
Channel	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	1.312988	1.180897
Middle	1.312988	1.189580
High	1.312988	1.185239

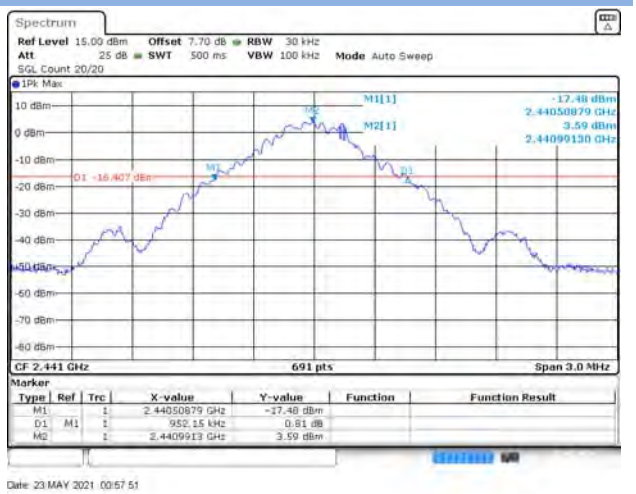
Test plots

20 dB Bandwidth

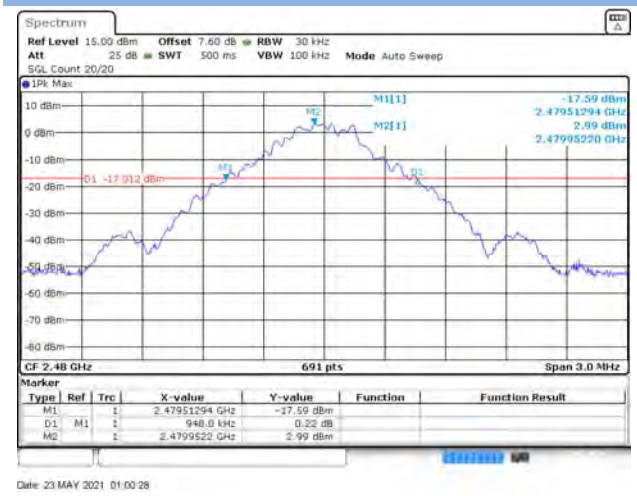
GFSK LOW CHANNEL



GFSK MIDDLE CHANNEL



GFSK HIGH CHANNEL



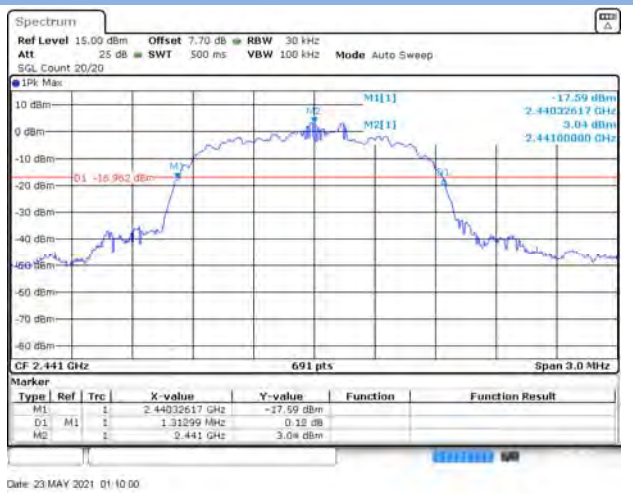
π/4-DQPSK LOW CHANNEL

π/4-DQPSK MIDDLE CHANNEL

π/4-DQPSK HIGH CHANNEL

8-DPSK LOW CHANNEL

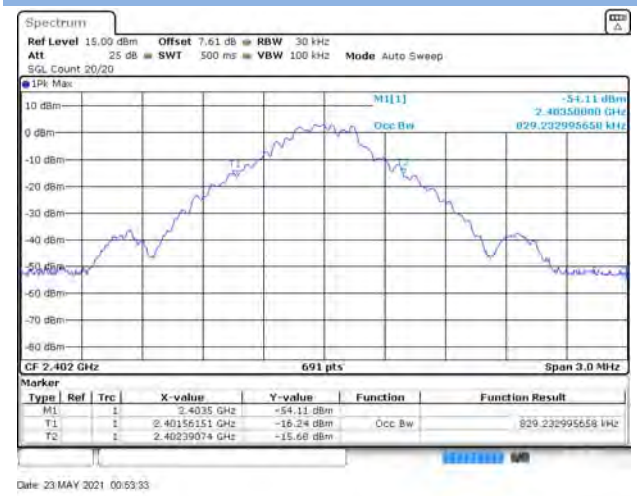
8-DPSK MIDDLE CHANNEL



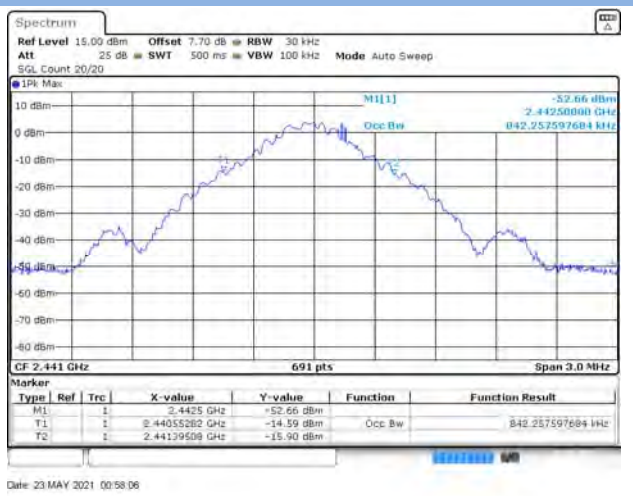
8-DPSK HIGH CHANNEL

99% Bandwidth

GFSK LOW CHANNEL



GFSK MIDDLE CHANNEL

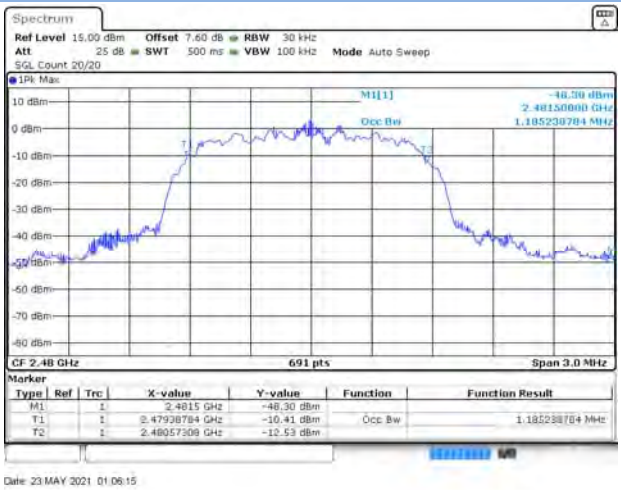


GFSK HIGH CHANNEL

π/4-DQPSK LOW CHANNEL

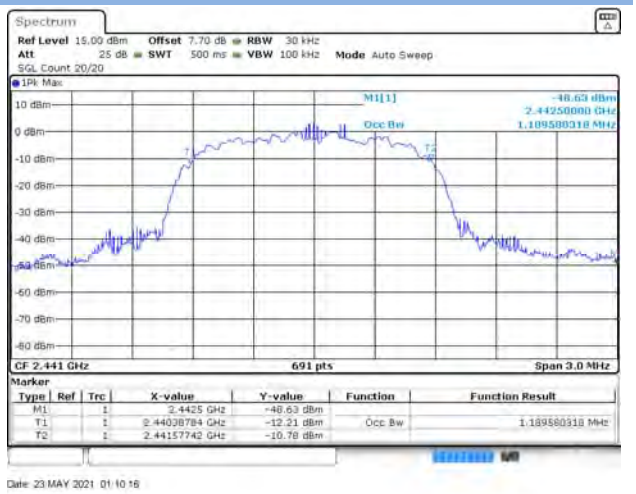
π/4-DQPSK MIDDLE CHANNEL

π/4-DQPSK HIGH CHANNEL



8-DPSK LOW CHANNEL

8-DPSK MIDDLE CHANNEL



8-DPSK HIGH CHANNEL

A.4 Hopping Frequency Separation

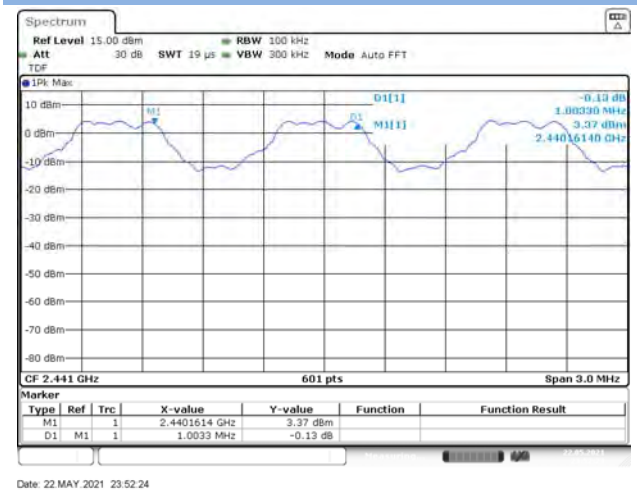
AP Module

Test Data

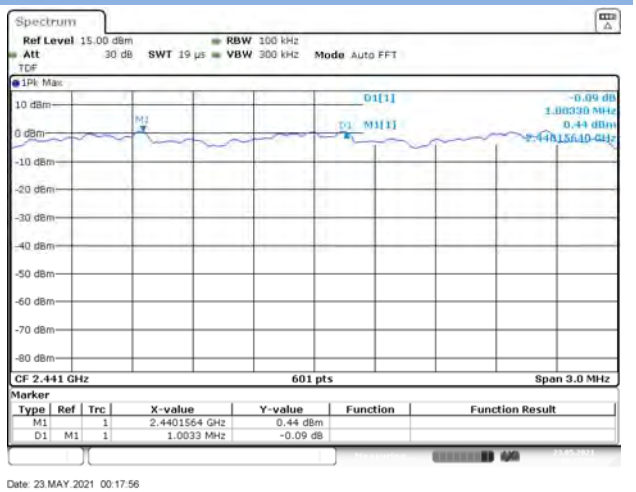
Mode	Frequency separation (MHz)	2/3 of the 20 dB Bandwidth (MHz)	Verdict
GFSK	1.0033	0.652181	Pass
8-DPSK	1.0033	0.887044	Pass

Test Plots

GFSK



8-DPSK



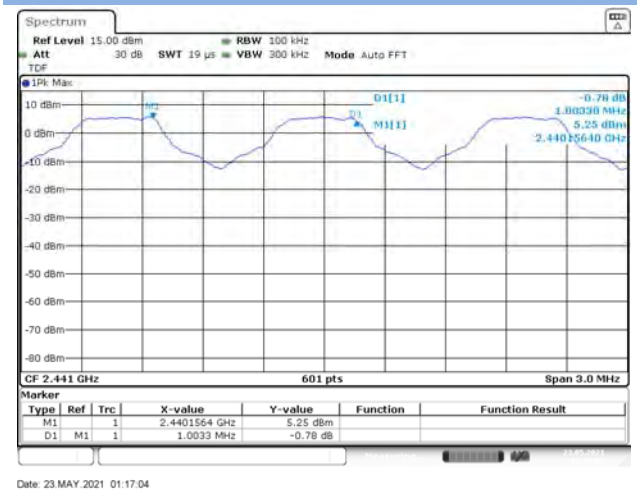
ESP Module

Test Data

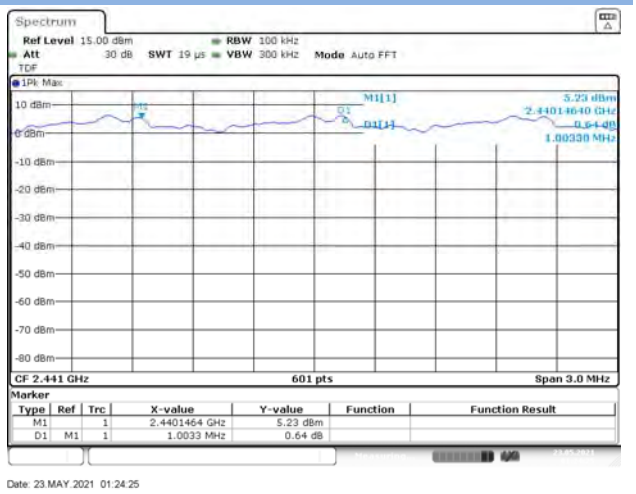
Mode	Frequency separation (MHz)	2/3 of the 20 dB Bandwidth (MHz)	Verdict
GFSK	1.0033	0.634929	Pass
8-DPSK	1.0033	0.875325	Pass

Test Plots

GFSK



8-DPSK



A.5 Average Time of Occupancy

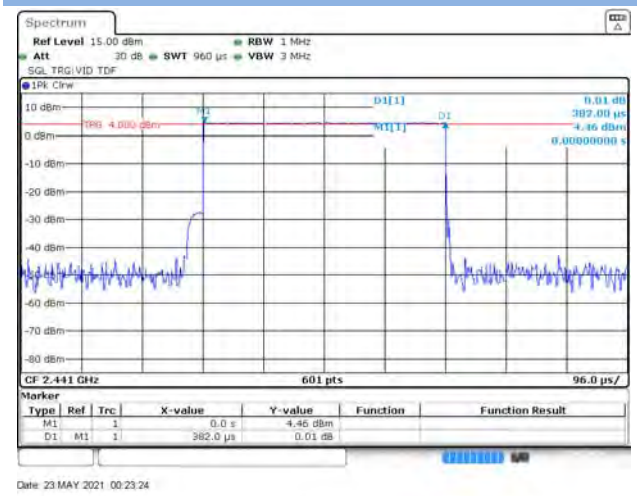
AP Module

Test Data

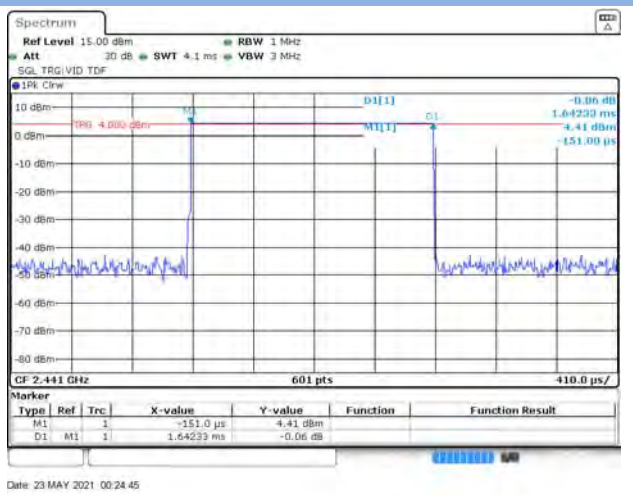
GFSK				
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.38200	122.240	0.4	Pass
DH 3	1.64233	262.773	0.4	Pass
DH 5	2.88430	307.659	0.4	Pass
8-DPSK				
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.38800	124.160	0.4	Pass
DH 3	1.63867	262.187	0.4	Pass
DH 5	2.89280	308.565	0.4	Pass
AFH Mode				
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.38180	61.088	0.4	Pass
DH 3	1.63867	131.094	0.4	Pass
DH 5	2.88620	153.931	0.4	Pass

Test Plots

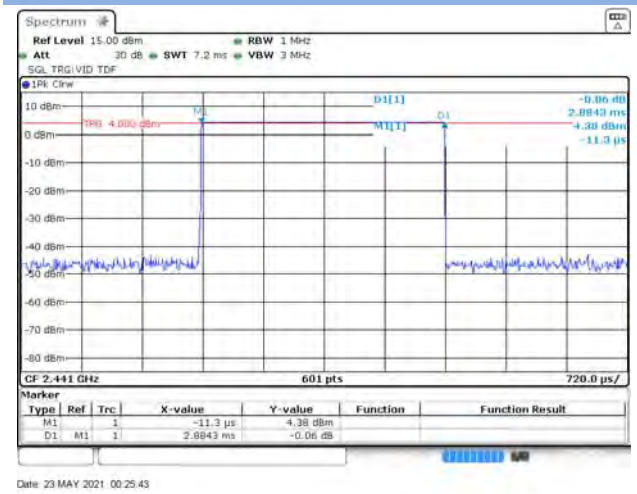
GFSK DH1



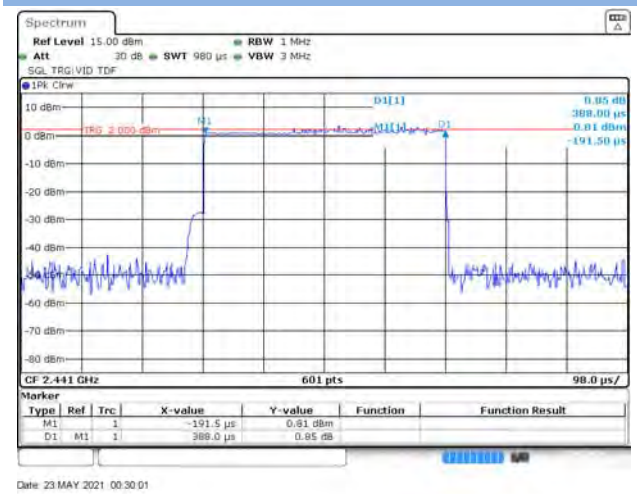
GFSK DH3



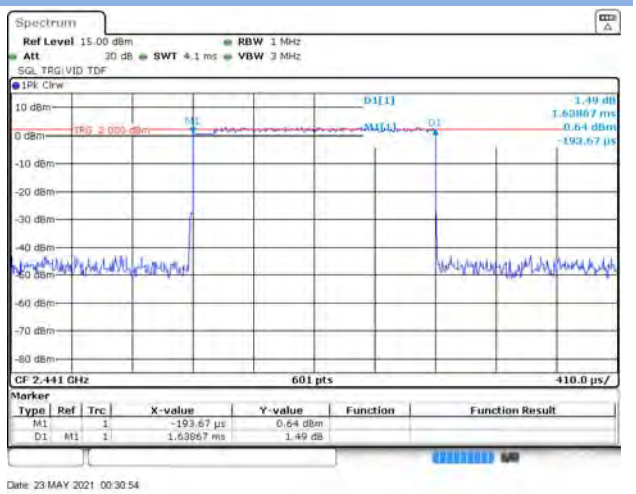
GFSK DH5



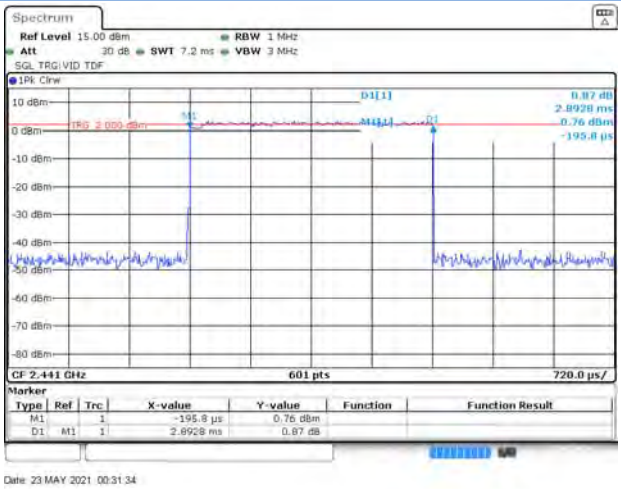
8-DPSK DH1



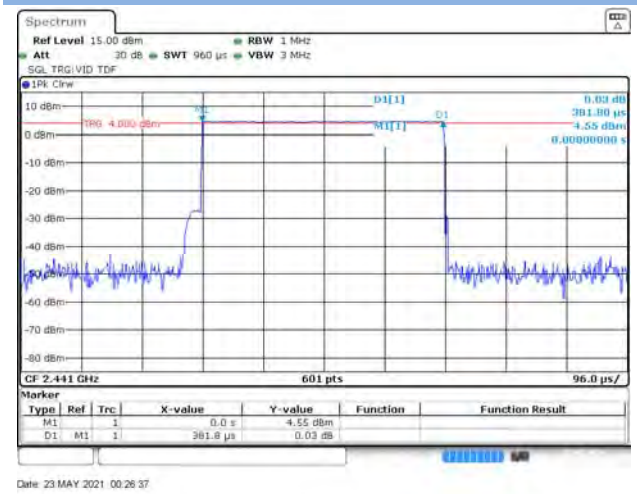
8-DPSK DH3



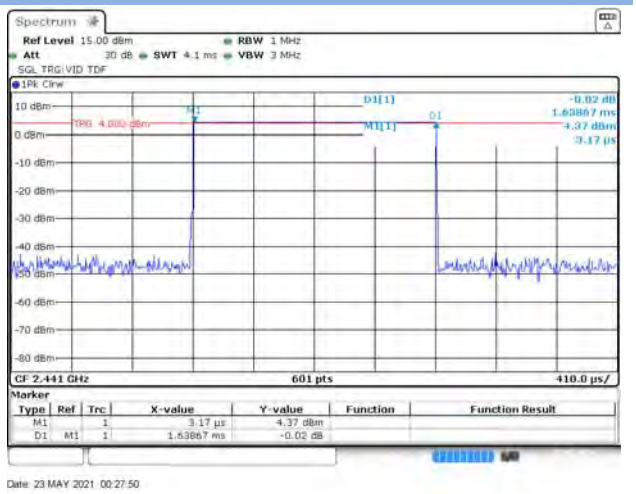
8-DPSK DH5



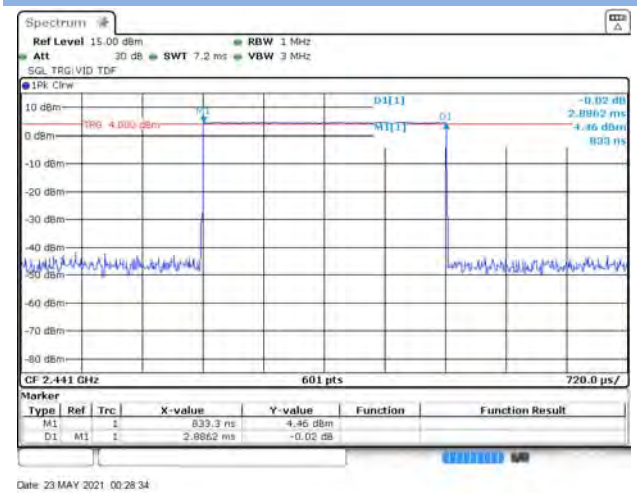
AFH Mode DH1



AFH Mode DH3



AFH Mode DH5



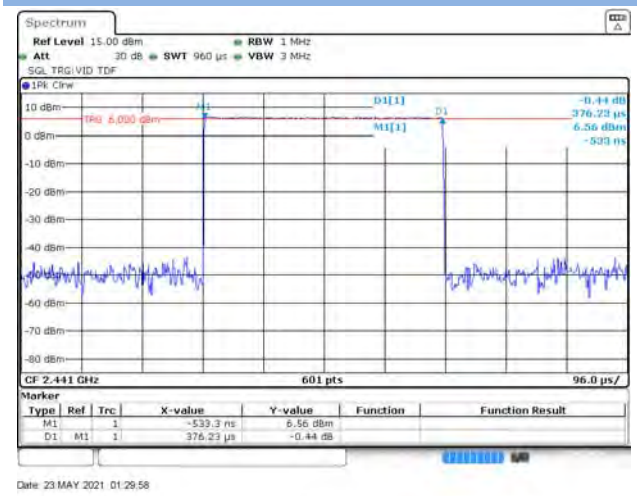
ESP Module

Test Data

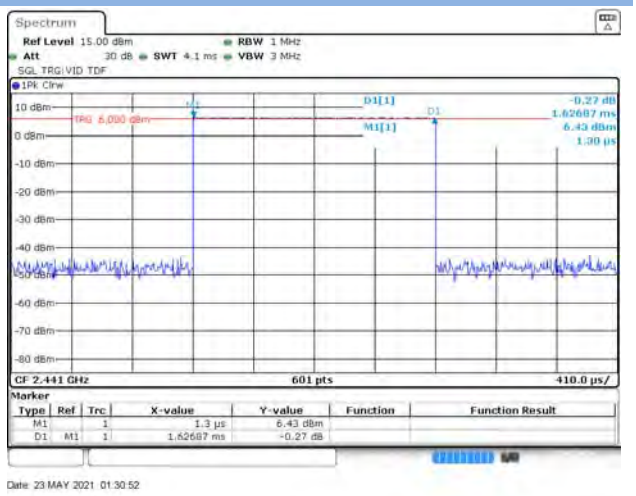
GFSK				
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.37623	120.394	0.4	Pass
DH 3	1.62687	260.299	0.4	Pass
DH 5	2.87630	306.805	0.4	Pass
8-DPSK				
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.38923	124.554	0.4	Pass
DH 3	1.63780	262.048	0.4	Pass
DH 5	2.87450	306.613	0.4	Pass
AFH Mode				
DH Packet	Pulse Width (ms)	Total of Dwell (ms)	Limit (sec)	Verdict
DH 1	0.37403	59.845	0.4	Pass
DH 3	1.63033	130.426	0.4	Pass
DH 5	2.86500	152.800	0.4	Pass

Test Plots

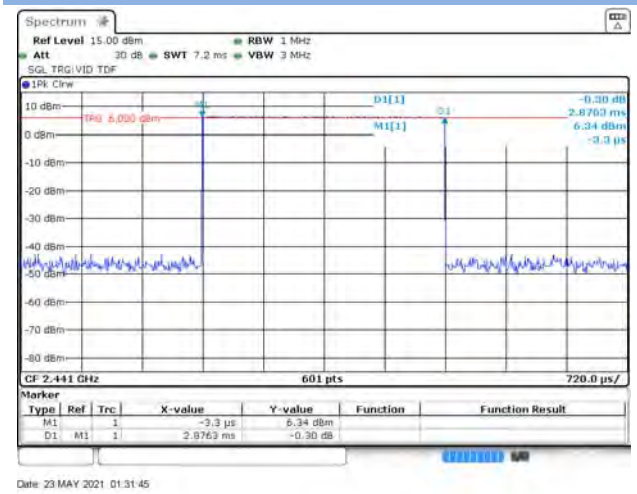
GFSK DH1



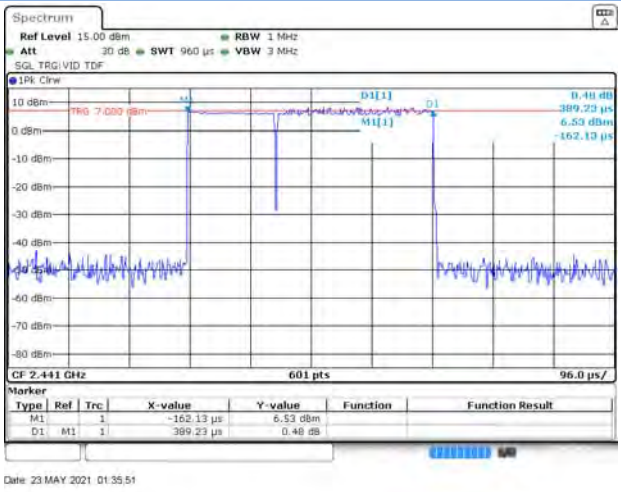
GFSK DH3



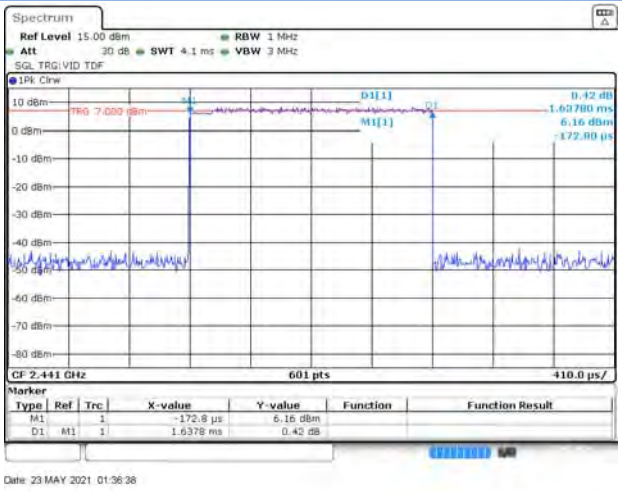
GFSK DH5



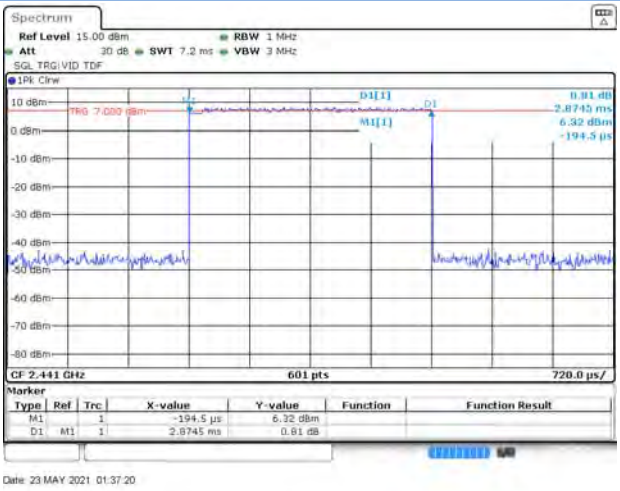
8-DPSK DH1



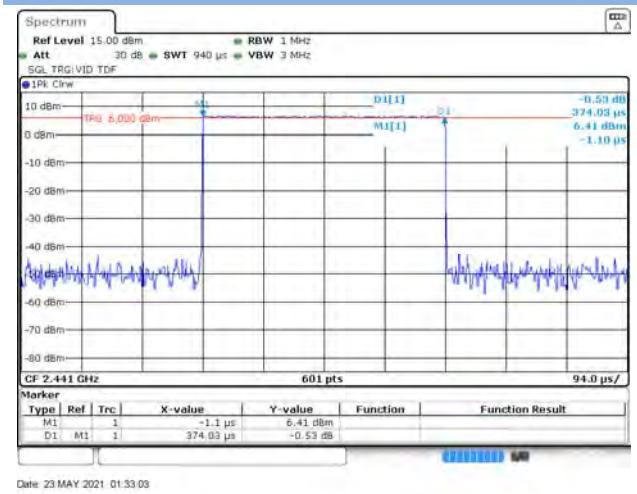
8-DPSK DH3



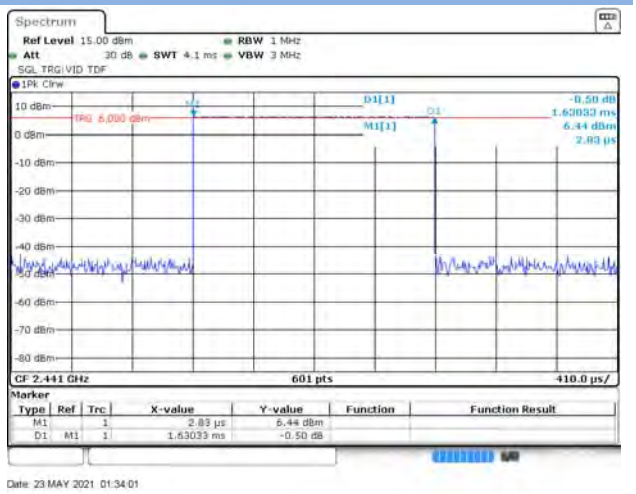
8-DPSK DH5



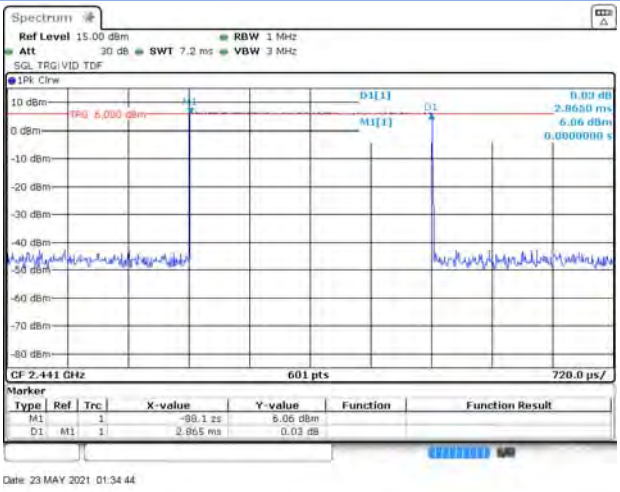
AFH Mode DH1



AFH Mode DH3



AFH Mode DH5



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

AP Module

Test Data

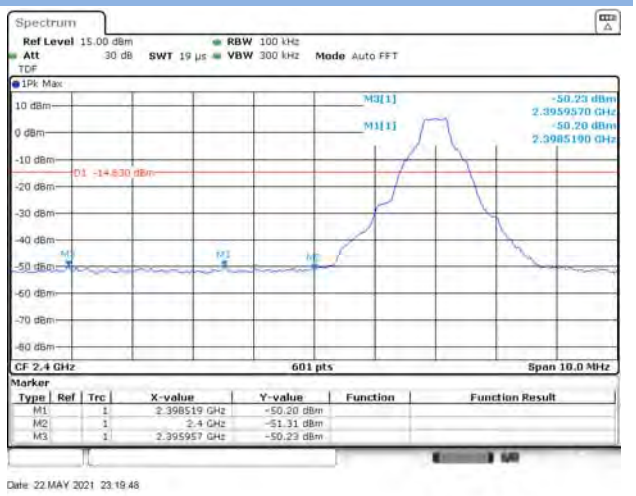
GFSK				
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-39.70	5.37	-14.63	Pass
Middle	-39.74	4.77	-15.23	Pass
High	-39.00	3.26	-16.74	Pass
8-DPSK				
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-39.81	1.41	-18.59	Pass
Middle	-38.54	1.04	-18.96	Pass
High	-39.16	0.03	-19.97	Pass

Hopping Mode				
Mode	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
GFSK	-39.12	5.44	-14.56	Pass
8-DPSK	-39.72	1.06	-18.94	Pass

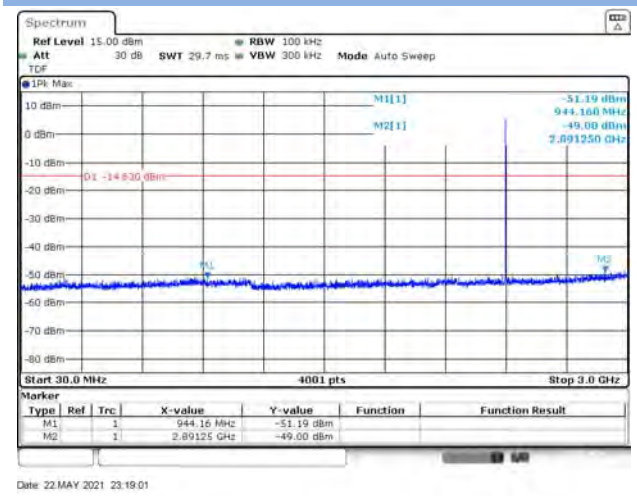
Test Plots

GFSK LOW CHANNEL, CARRIER LEVEL

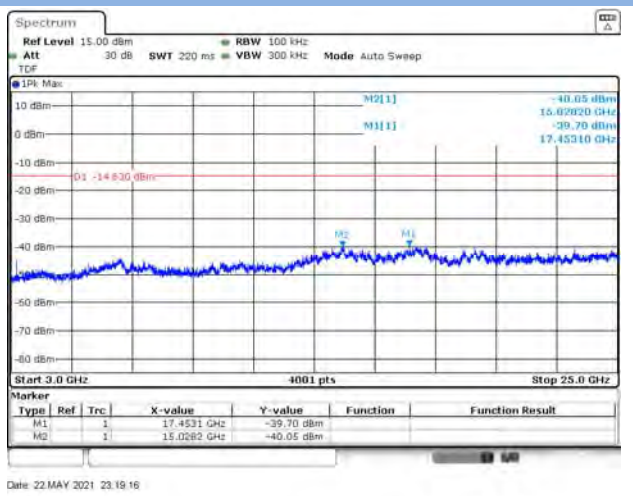
GFSK LOW CHANNEL, BAND EDGE



GFSK LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

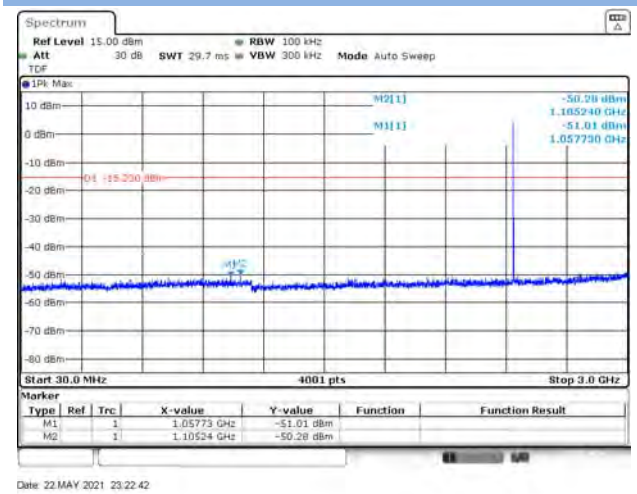


GFSK LOW CHANNEL, SPURIOUS 3 GHz ~ 25 GHz

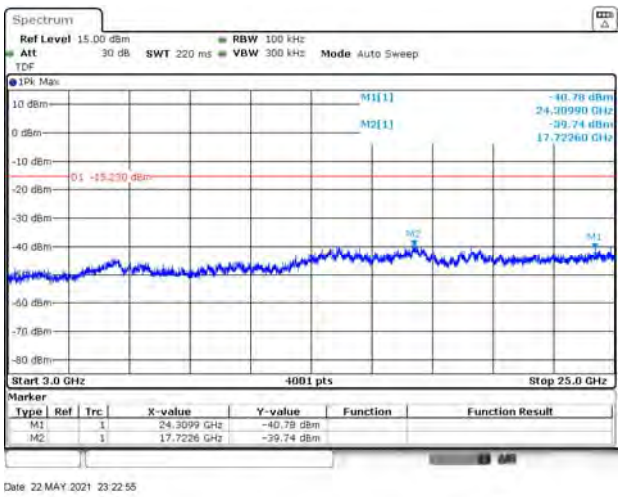


GFSK MIDDLE CHANNEL, CARRIER LEVEL

GFSK MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

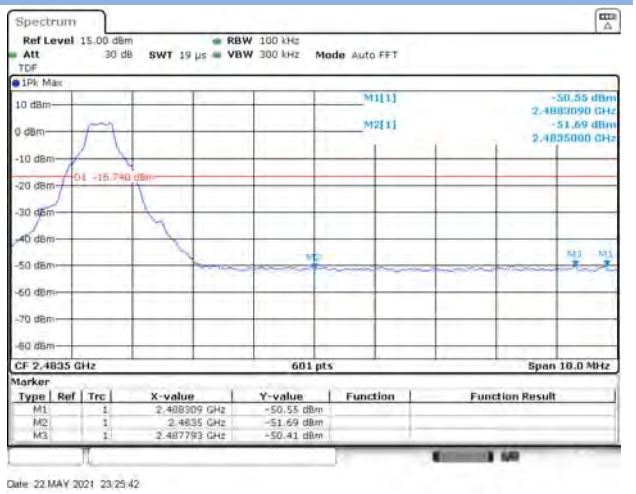


GFSK MIDDLE CHANNEL, SPURIOUS 3 GHz ~ 25 GHz

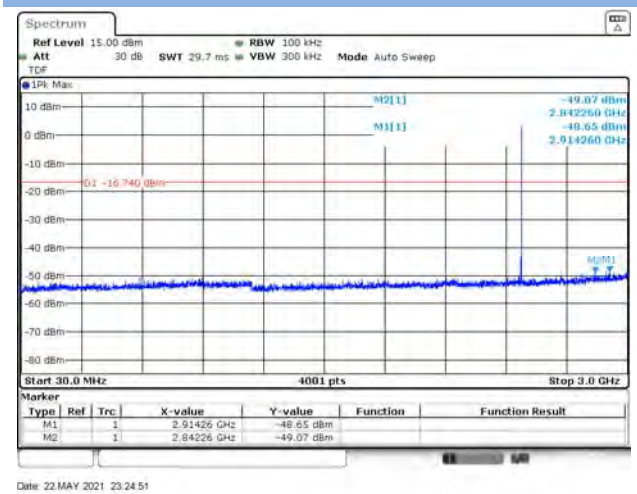


GFSK HIGH CHANNEL, CARRIER LEVEL

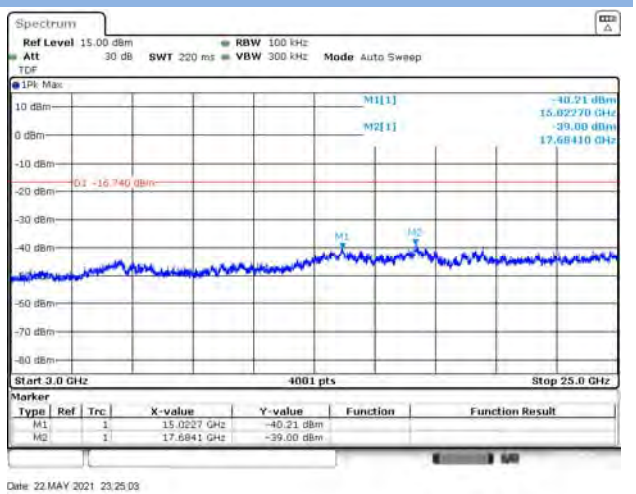
GFSK HIGH CHANNEL, BAND EDGE



GFSK HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

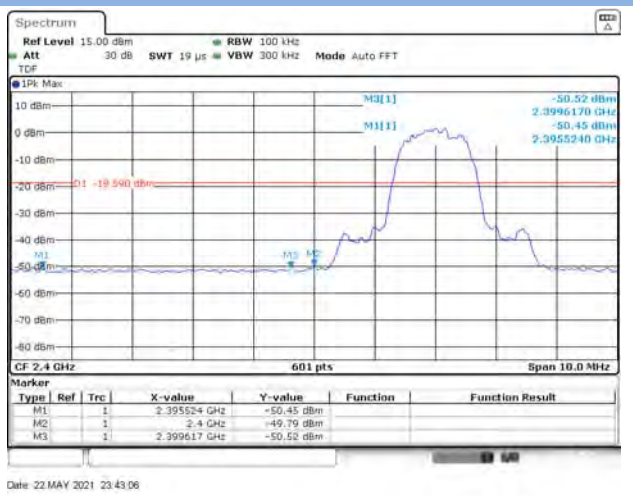


GFSK HIGH CHANNEL, SPURIOUS 3 GHz ~ 25 GHz

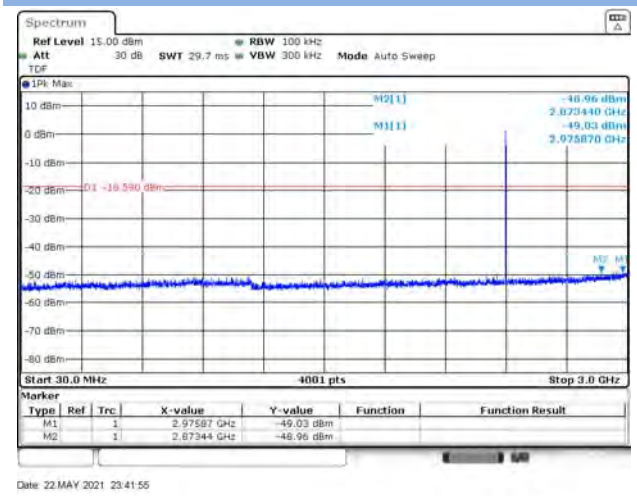


8-DPSK LOW CHANNEL, CARRIER LEVEL

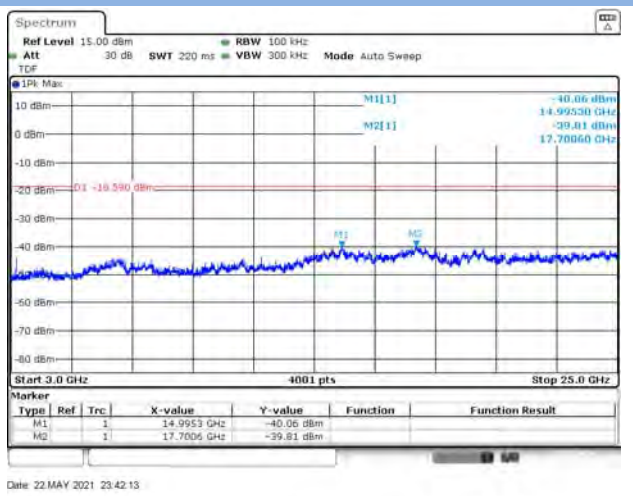
8-DPSK LOW CHANNEL, BAND EDGE



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

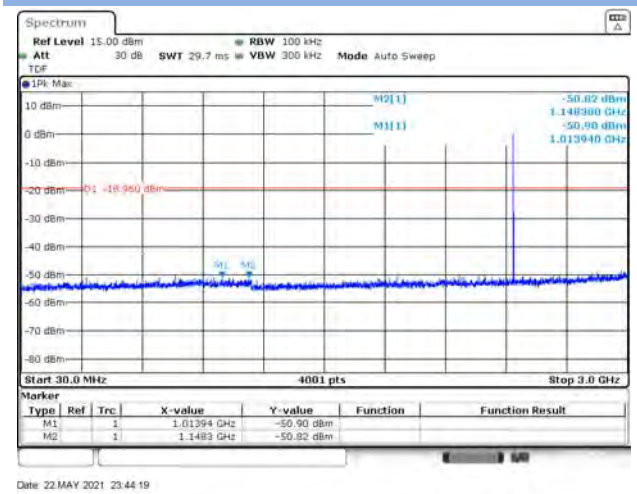


8-DPSK LOW CHANNEL, SPURIOUS 3 GHz ~ 25 GHz

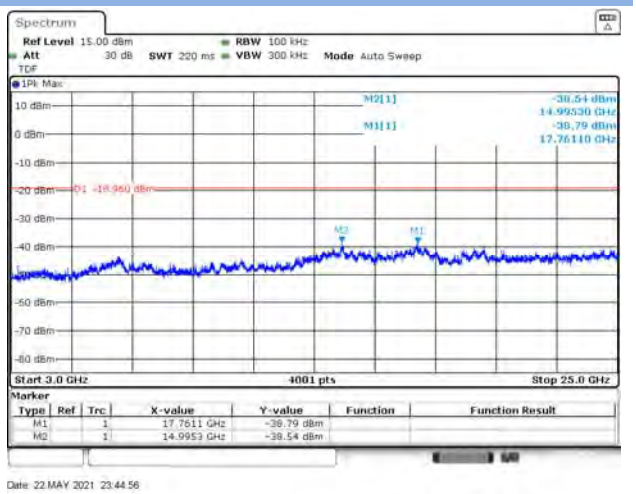


8-DPSK MIDDLE CHANNEL, CARRIER LEVEL

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

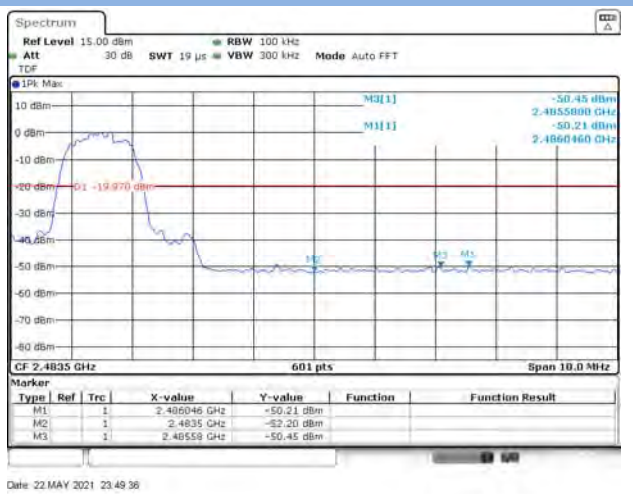


8-DPSK MIDDLE CHANNEL, SPURIOUS 3 GHz ~ 25 GHz

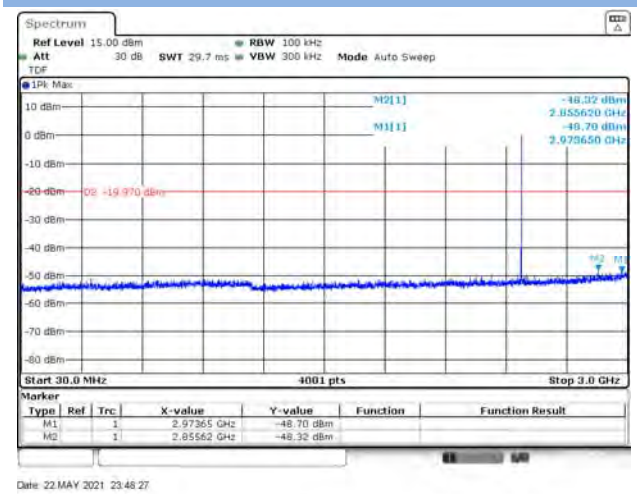


8-DPSK HIGH CHANNEL, CARRIER LEVEL

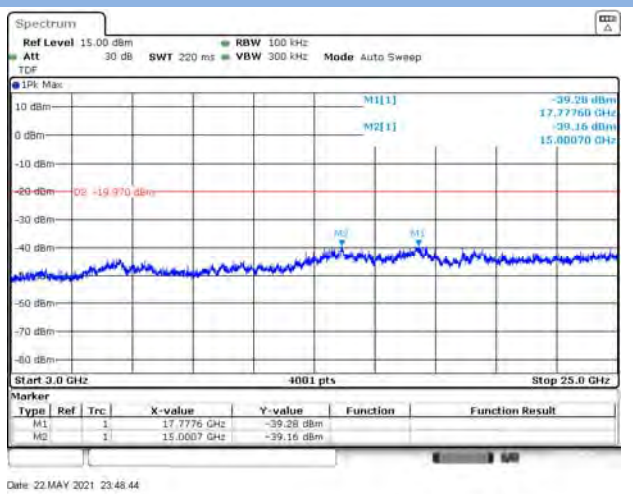
8-DPSK HIGH CHANNEL, BAND EDGE



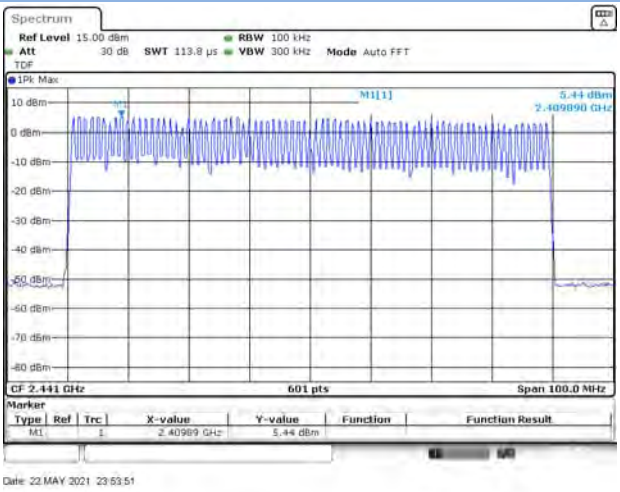
8-DPSK HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



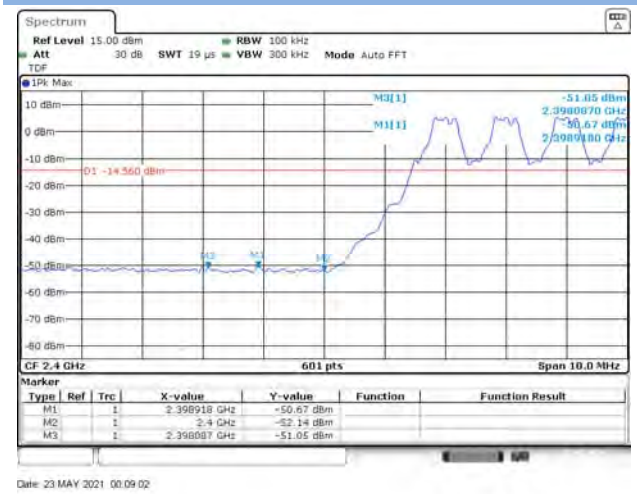
8-DPSK HIGH CHANNEL, SPURIOUS 3 GHz ~ 25 GHz



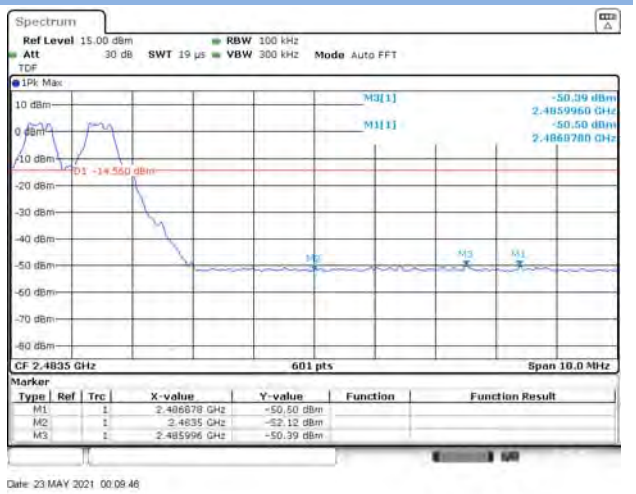
GFSK HOPPING, CARRIER LEVEL



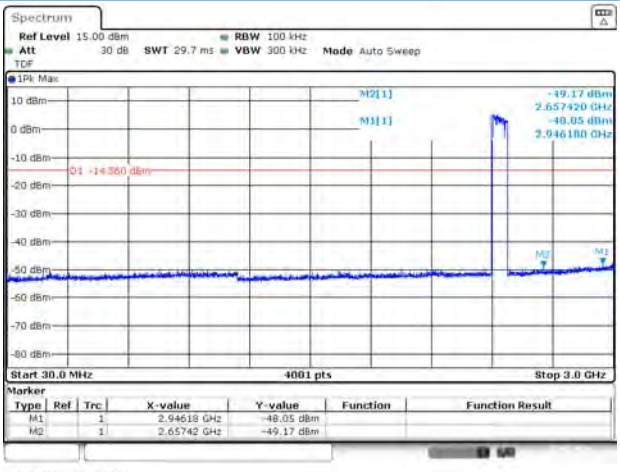
GFSK HOPPING BAND EDGE (LOW)



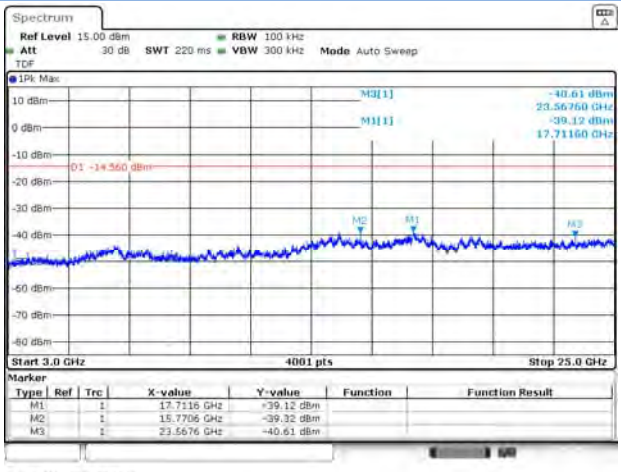
GFSK HOPPING BAND EDGE (HIGH)



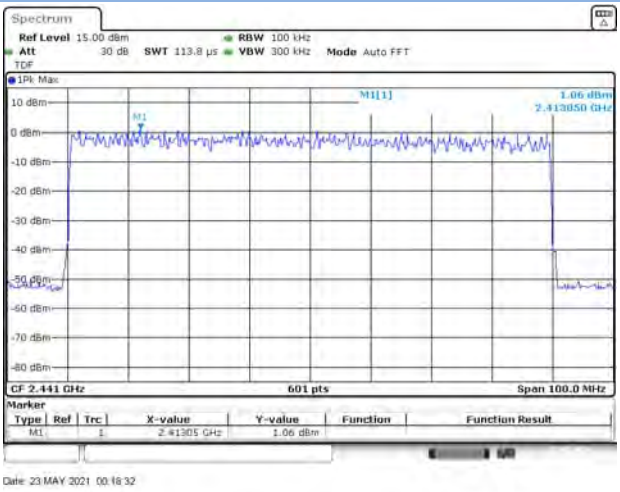
GFSK Hopping Mode, SPURIOUS 30 MHz ~ 3 GHz



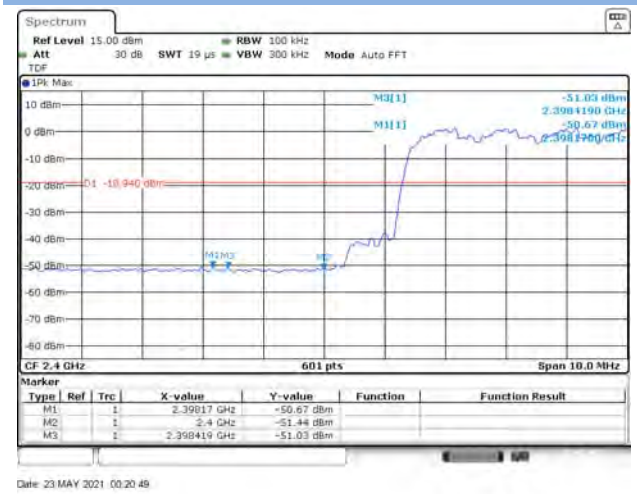
GFSK Hopping Mode, SPURIOUS 30 3GHz ~ 25 GHz



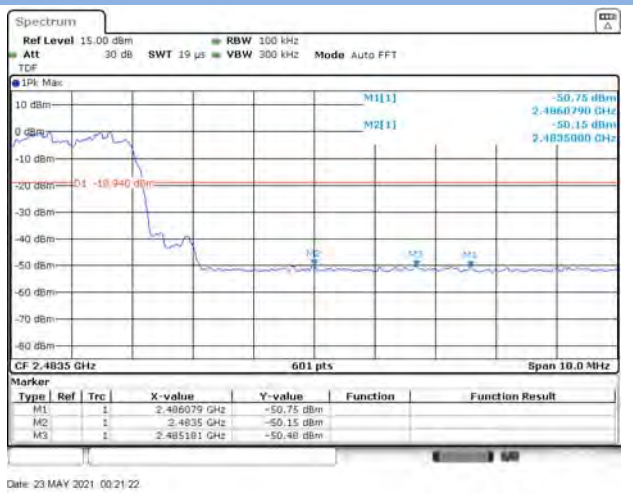
8-DPSK HOPPING, CARRIER LEVEL



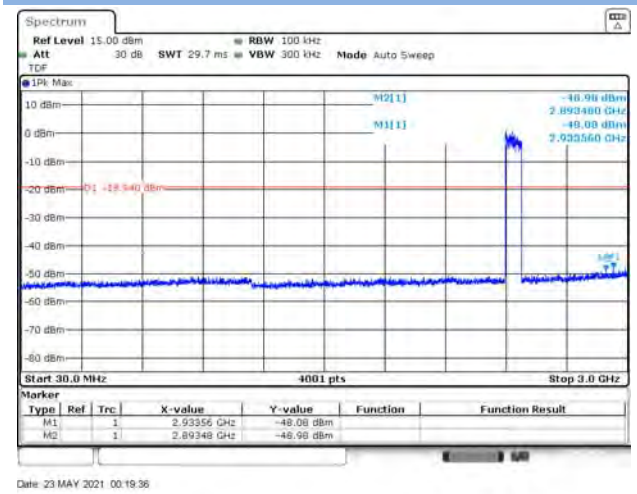
8-DPSK Hopping BAND EDGE (LOW)



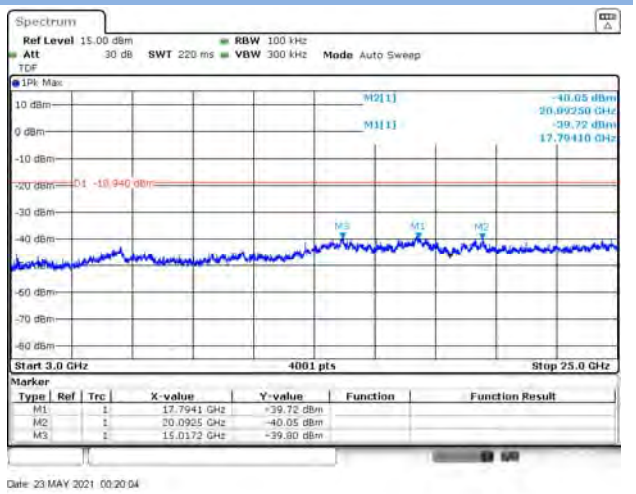
8-DPSK Hopping BAND EDGE (HIGH)



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



8-DPSK Hopping Mode, SPURIOUS 30 3GHz ~ 25 GHz



ESP Module

Test Data

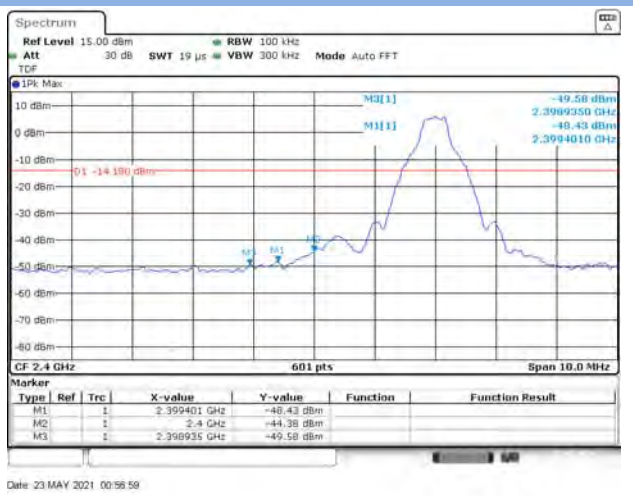
GFSK				
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-38.87	5.82	-14.18	Pass
Middle	-38.72	6.48	-13.52	Pass
High	-39.55	5.97	-14.03	Pass
8-DPSK				
Channel	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
Low	-38.29	5.72	-14.28	Pass
Middle	-38.79	6.27	-13.73	Pass
High	-38.95	5.97	-14.03	Pass

Hopping Mode				
Mode	Measured Max. Out of Band Emission (dBm)	Limit (dBm)		Verdict
		Carrier Level	Calculated 20 dBc Limit	
GFSK	-39.03	6.15	-13.85	Pass
8-DPSK	-38.88	6.24	-13.76	Pass

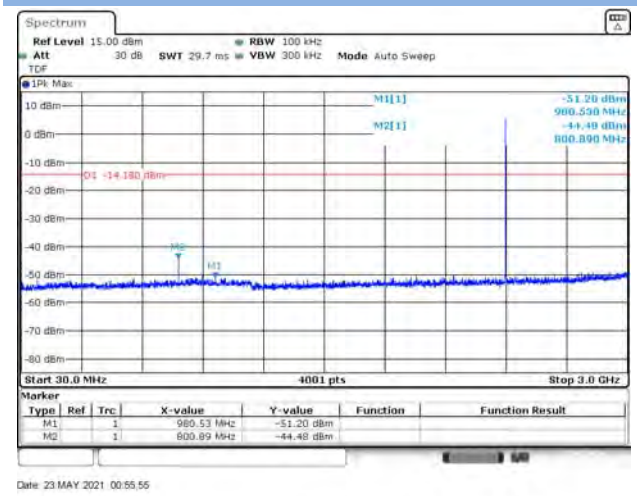
Test Plots

GFSK LOW CHANNEL, CARRIER LEVEL

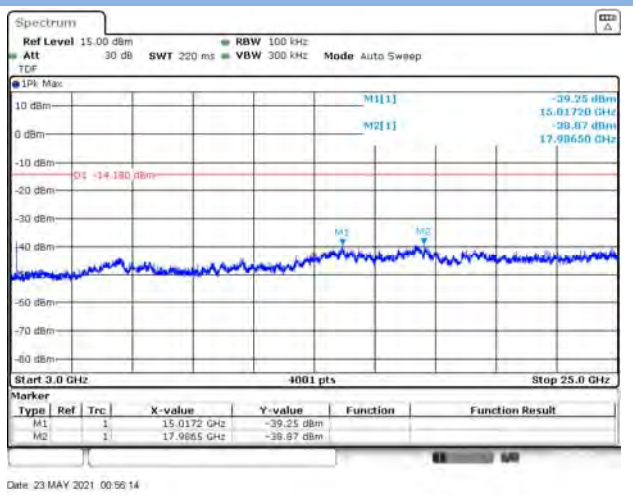
GFSK LOW CHANNEL, BAND EDGE



GFSK LOW CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

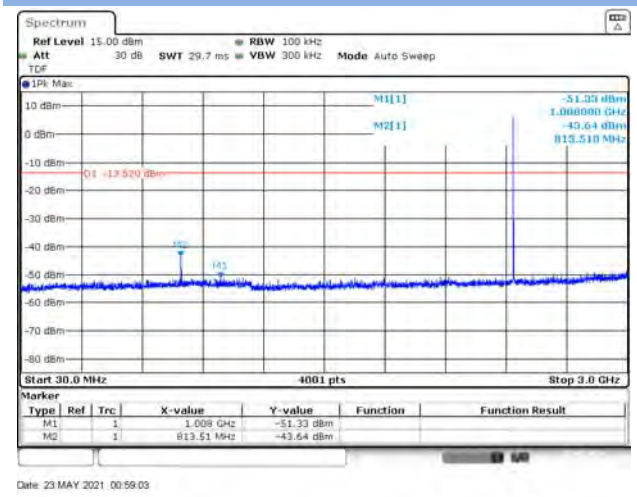


GFSK LOW CHANNEL, SPURIOUS 3 GHz ~ 25 GHz

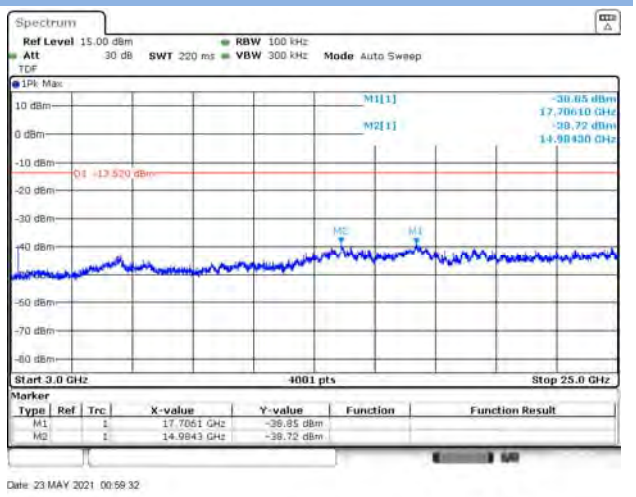


GFSK MIDDLE CHANNEL, CARRIER LEVEL

GFSK MIDDLE CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

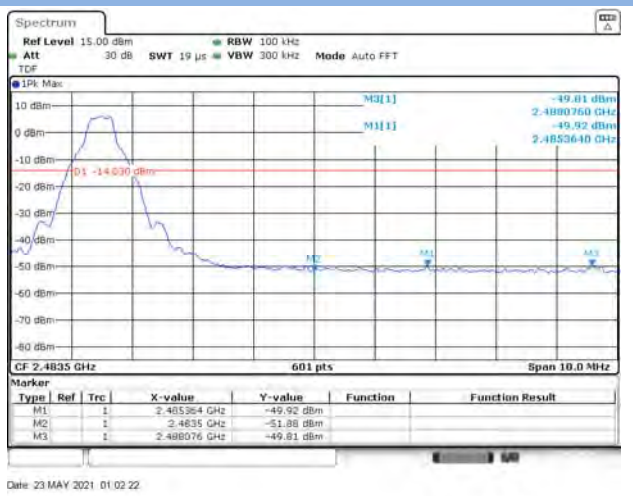


GFSK MIDDLE CHANNEL, SPURIOUS 3 GHz ~ 25 GHz

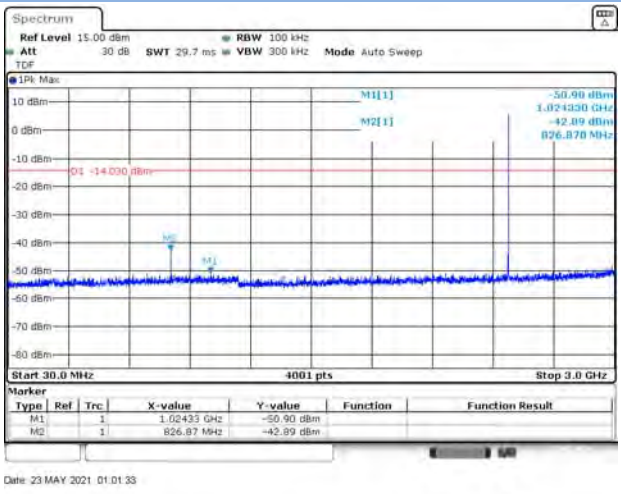


GFSK HIGH CHANNEL, CARRIER LEVEL

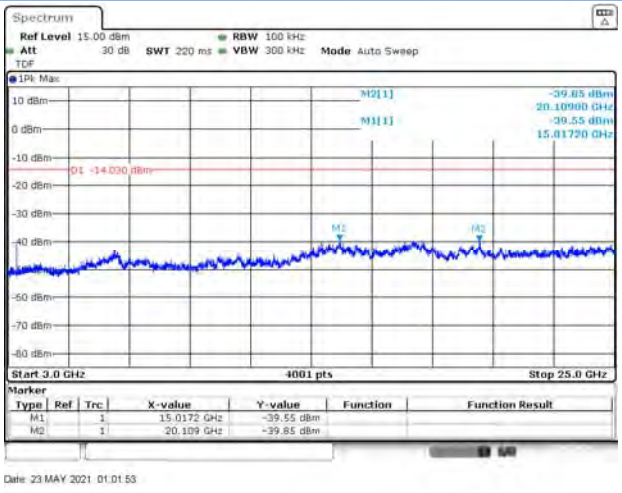
GFSK HIGH CHANNEL, BAND EDGE



GFSK HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz

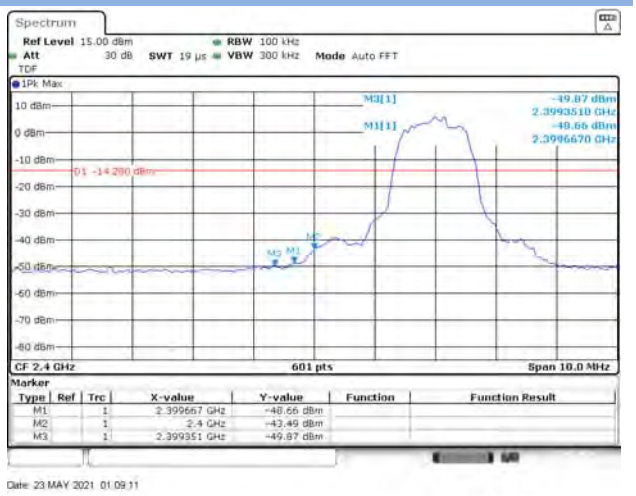


GFSK HIGH CHANNEL, SPURIOUS 3 GHz ~ 25 GHz

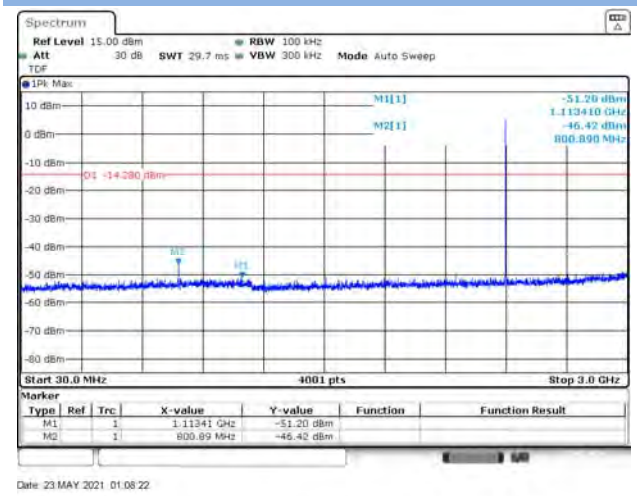


8-DPSK LOW CHANNEL, CARRIER LEVEL

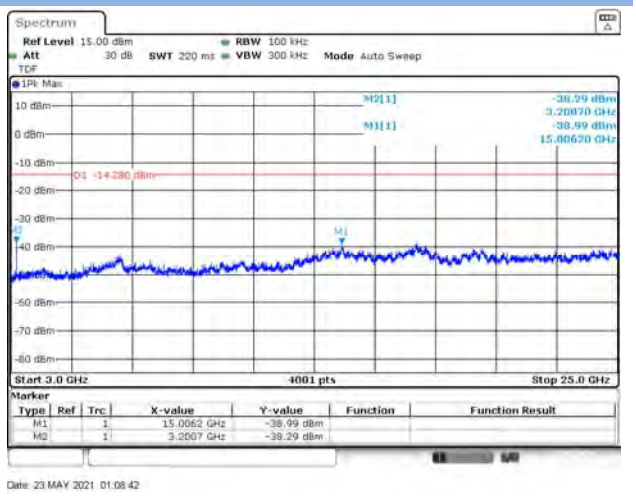
8-DPSK LOW CHANNEL, BAND EDGE



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

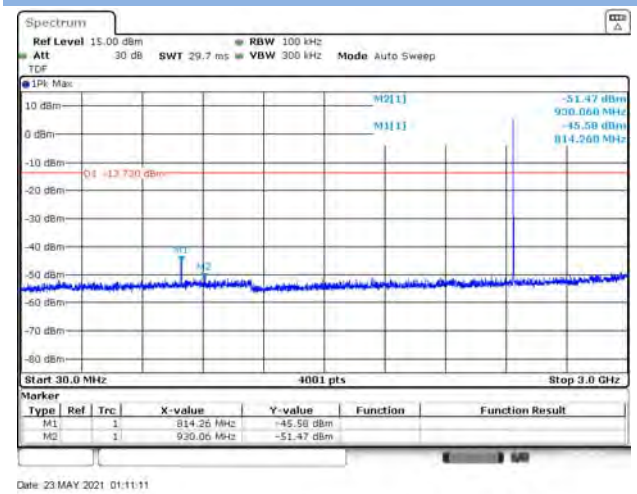


8-DPSK LOW CHANNEL, SPURIOUS 3 GHz ~ 25 GHz

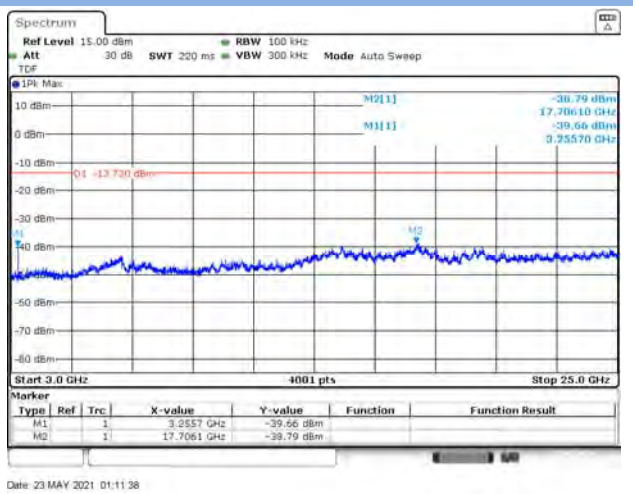


8-DPSK MIDDLE CHANNEL, CARRIER LEVEL

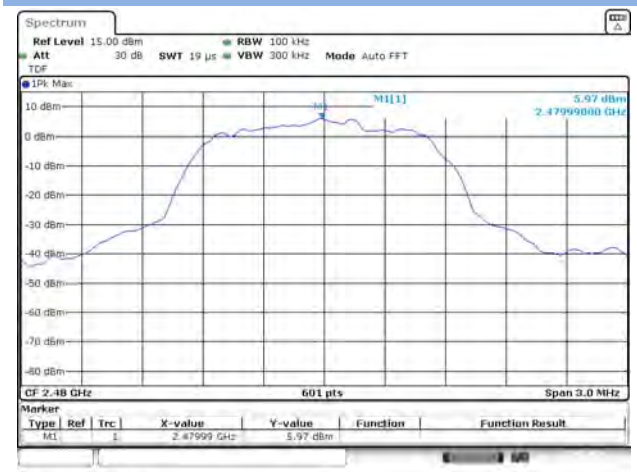
8-DPSK MIDDLE CHANNEL, SPURIOUS 30 MHz ~ ~ 3 GHz



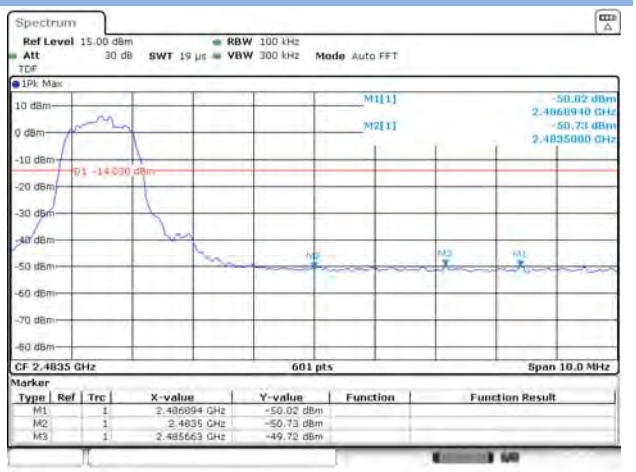
8-DPSK MIDDLE CHANNEL, SPURIOUS 3 GHz ~ 25 GHz



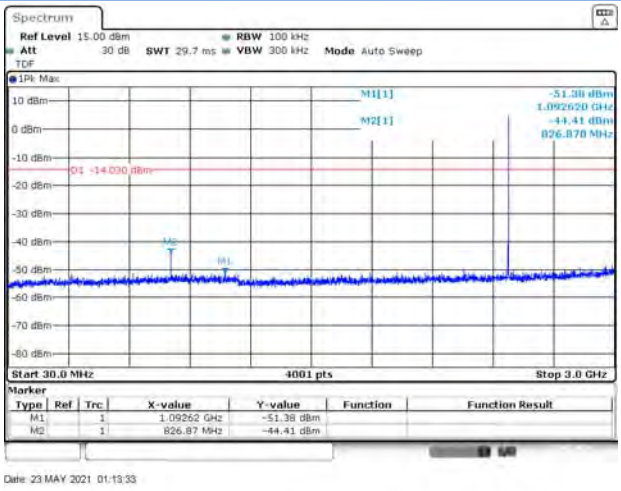
8-DPSK HIGH CHANNEL, CARRIER LEVEL



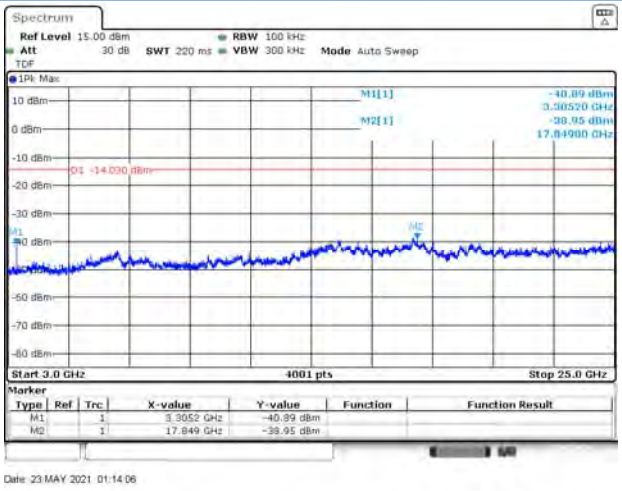
8-DPSK HIGH CHANNEL, BAND EDGE



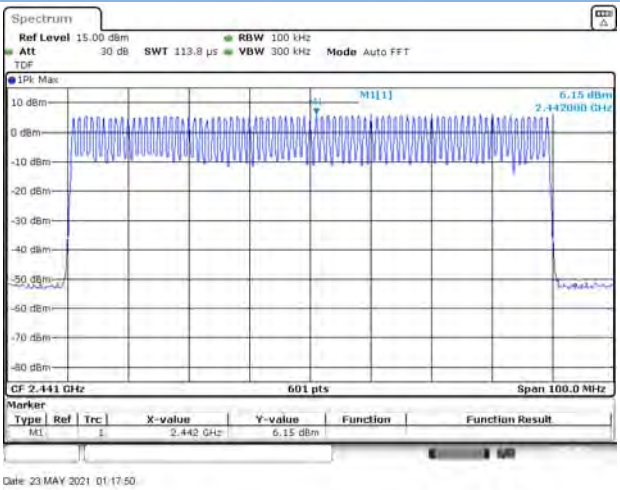
8-DPSK HIGH CHANNEL, SPURIOUS 30 MHz ~ 3 GHz



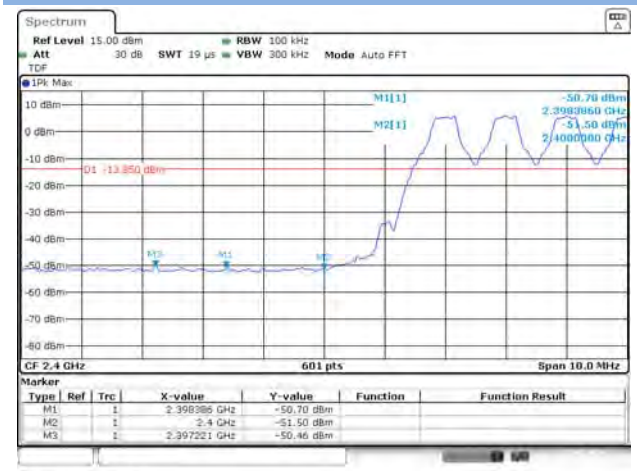
8-DPSK HIGH CHANNEL, SPURIOUS 3 GHz ~ 25 GHz



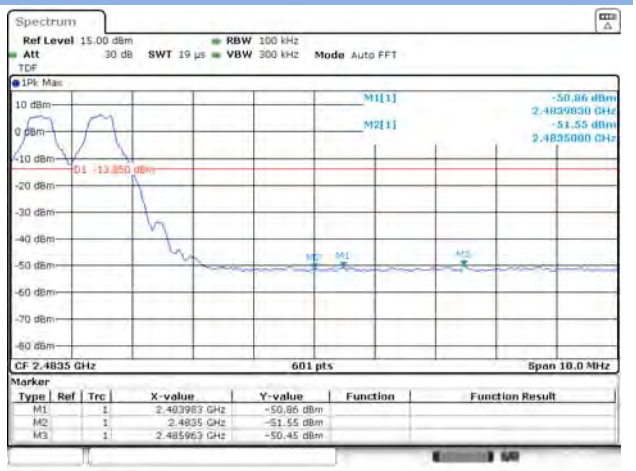
GFSK HOPPING, CARRIER LEVEL



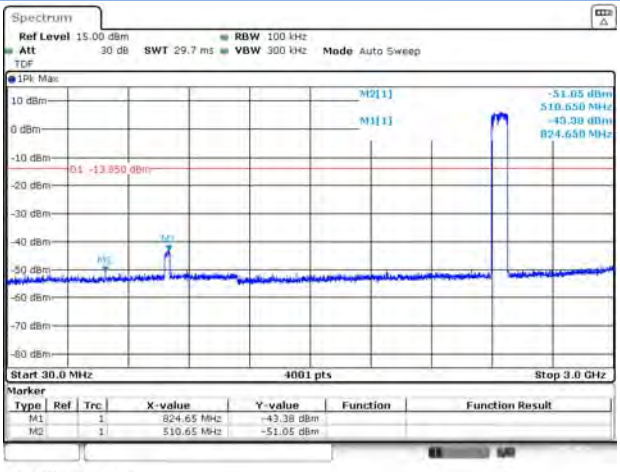
GFSK HOPPING BAND EDGE (LOW)



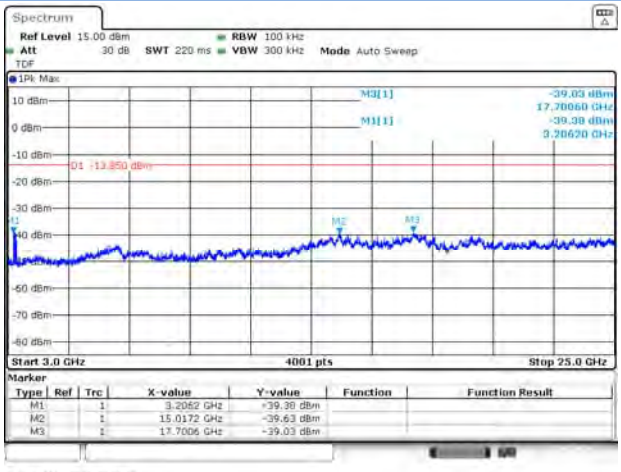
GFSK HOPPING BAND EDGE (HIGH)



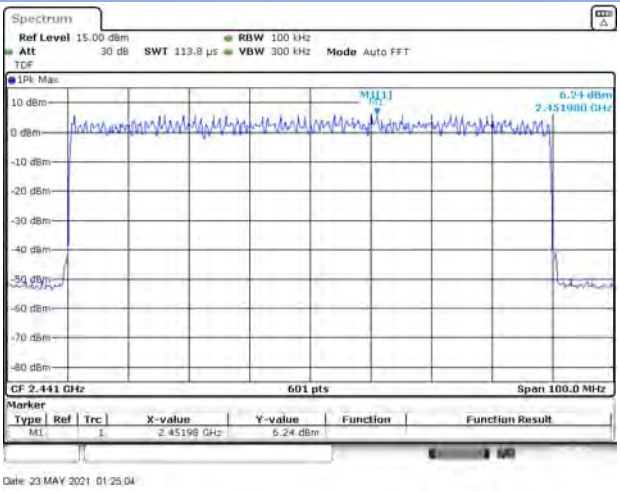
GFSK Hopping Mode, SPURIOUS 30 MHz ~ 3 GHz



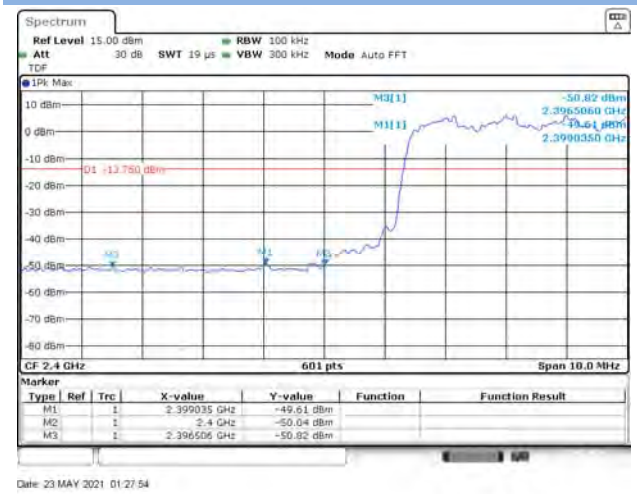
GFSK Hopping Mode, SPURIOUS 30 3GHz ~ 25 GHz



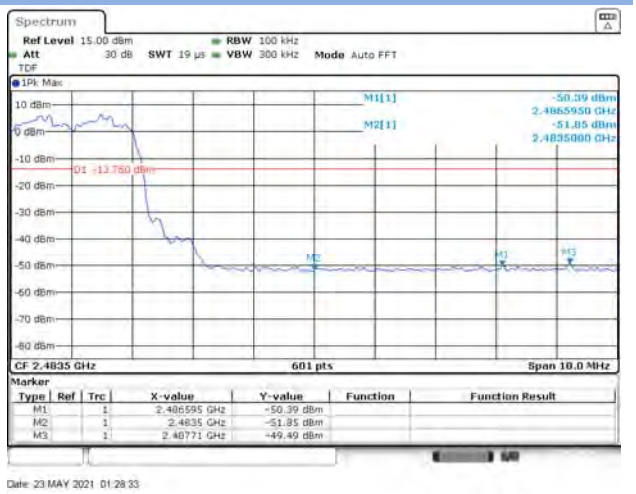
8-DPSK HOPPING, CARRIER LEVEL



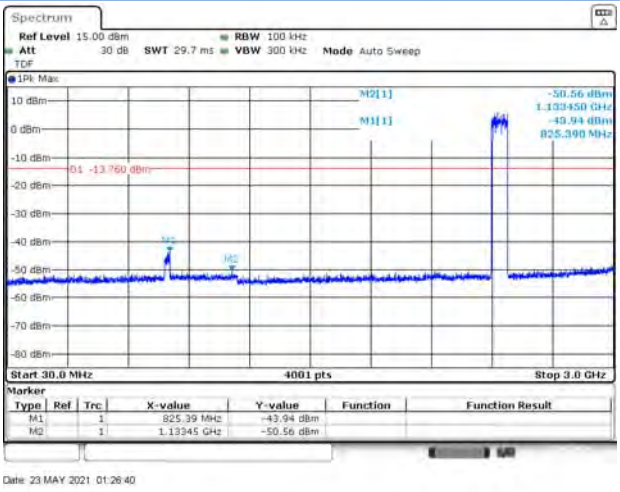
8-DPSK Hopping BAND EDGE (LOW)



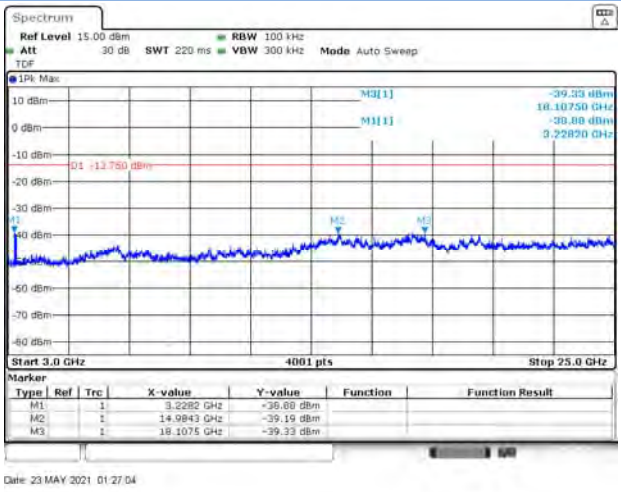
8-DPSK Hopping BAND EDGE (HIGH)



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



8-DPSK Hopping Mode, SPURIOUS 30 3GHz ~ 25 GHz



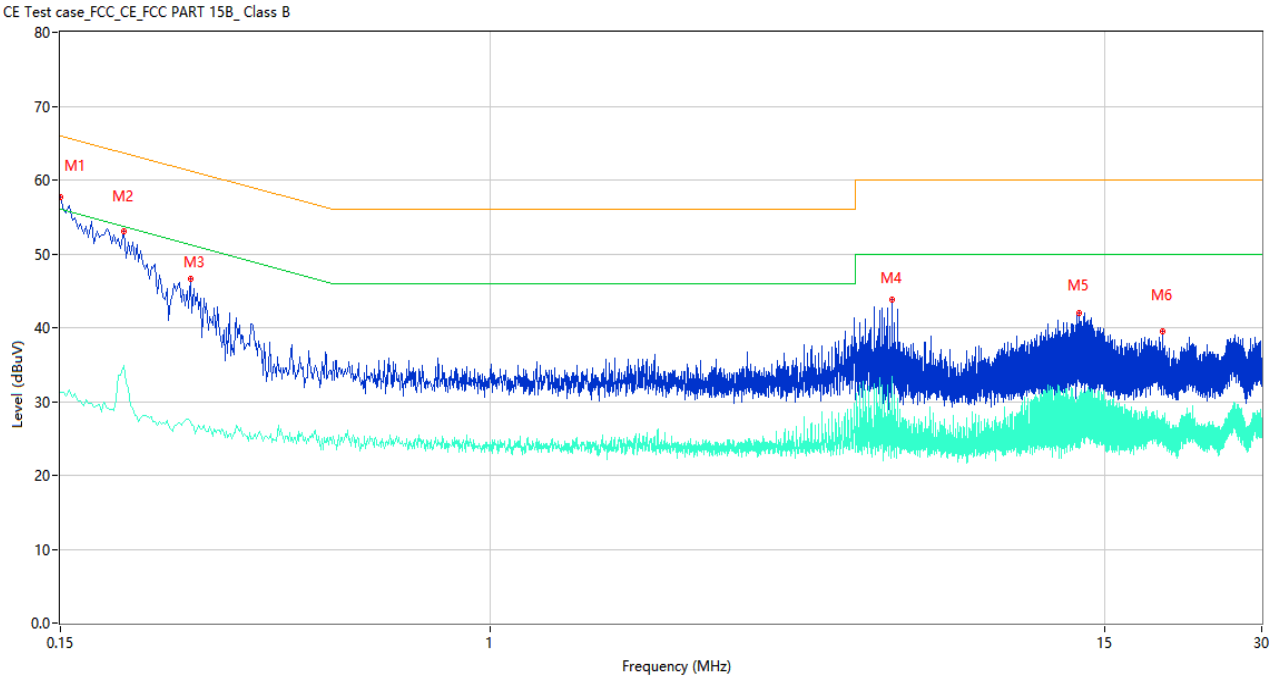
A.7 Conducted Emissions

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

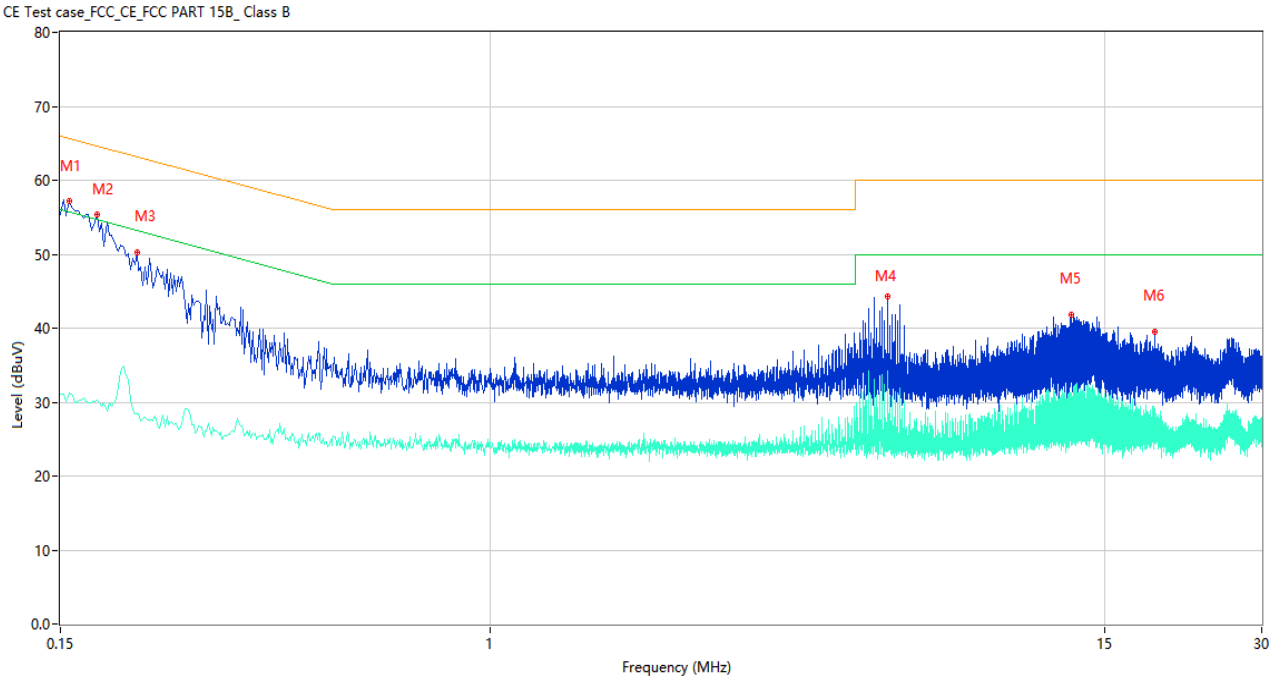
AP Module

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.150	57.71	10.41	66.00	-8.29	Peak	L	Pass
1**	0.150	31.25	10.41	56.00	-24.75	AV	L	Pass
2	0.198	53.13	10.38	63.69	-10.56	Peak	L	Pass
2**	0.198	34.85	10.38	53.69	-18.84	AV	L	Pass
3	0.266	46.56	10.34	61.24	-14.68	Peak	L	Pass
3**	0.266	27.35	10.34	51.24	-23.89	AV	L	Pass
4	5.882	43.74	10.32	60.00	-16.26	Peak	L	Pass
4**	5.882	25.38	10.32	50.00	-24.62	AV	L	Pass
5	13.394	41.99	10.39	60.00	-18.01	Peak	L	Pass
5**	13.394	28.78	10.39	50.00	-21.22	AV	L	Pass
6	19.410	39.50	10.53	60.00	-20.50	Peak	L	Pass
6**	19.410	26.65	10.53	50.00	-23.35	AV	L	Pass

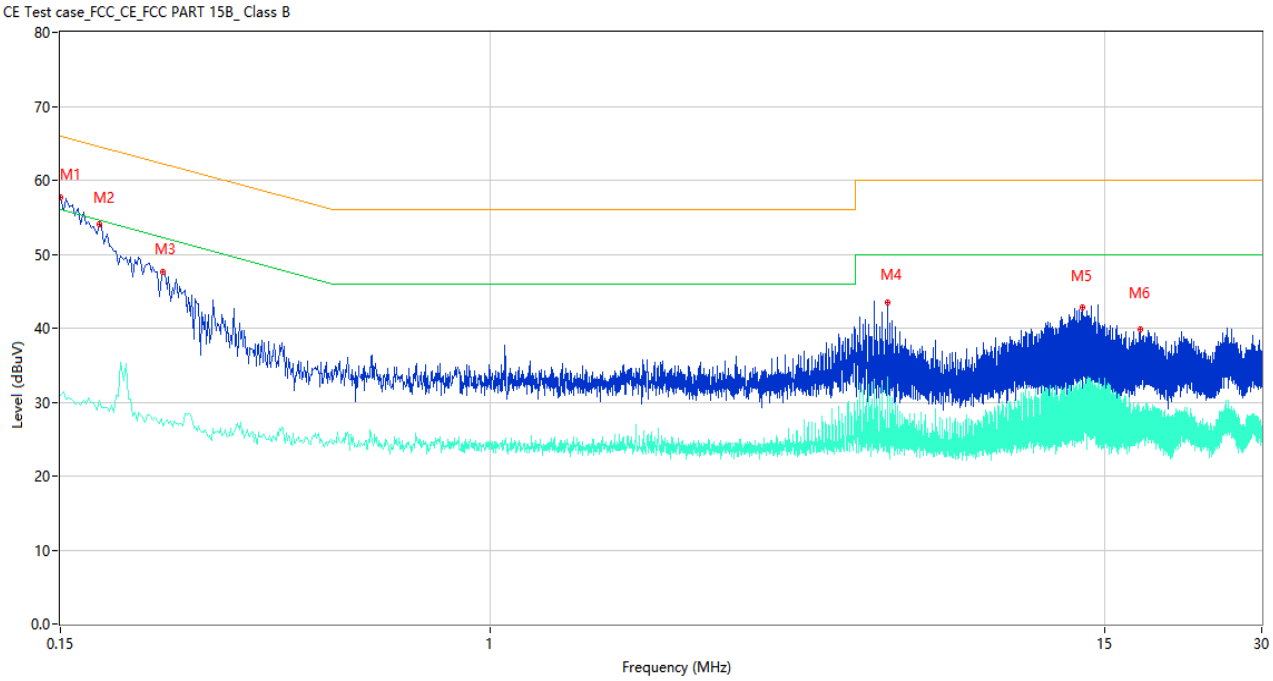
PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.156	57.26	10.41	65.67	-8.41	Peak	N	Pass
1**	0.156	31.24	10.41	55.67	-24.43	AV	N	Pass
2	0.176	55.36	10.39	64.67	-9.31	Peak	N	Pass
2**	0.176	30.19	10.39	54.67	-24.48	AV	N	Pass
3	0.210	50.24	10.38	63.21	-12.97	Peak	N	Pass
3**	0.210	28.37	10.38	53.21	-24.84	AV	N	Pass
4	5.754	44.28	10.32	60.00	-15.72	Peak	N	Pass
4**	5.754	34.13	10.32	50.00	-15.87	AV	N	Pass
5	12.950	41.85	10.39	60.00	-18.15	Peak	N	Pass
5**	12.950	31.29	10.39	50.00	-18.71	AV	N	Pass
6	18.768	39.50	10.52	60.00	-20.50	Peak	N	Pass
6**	18.768	29.17	10.52	50.00	-20.83	AV	N	Pass

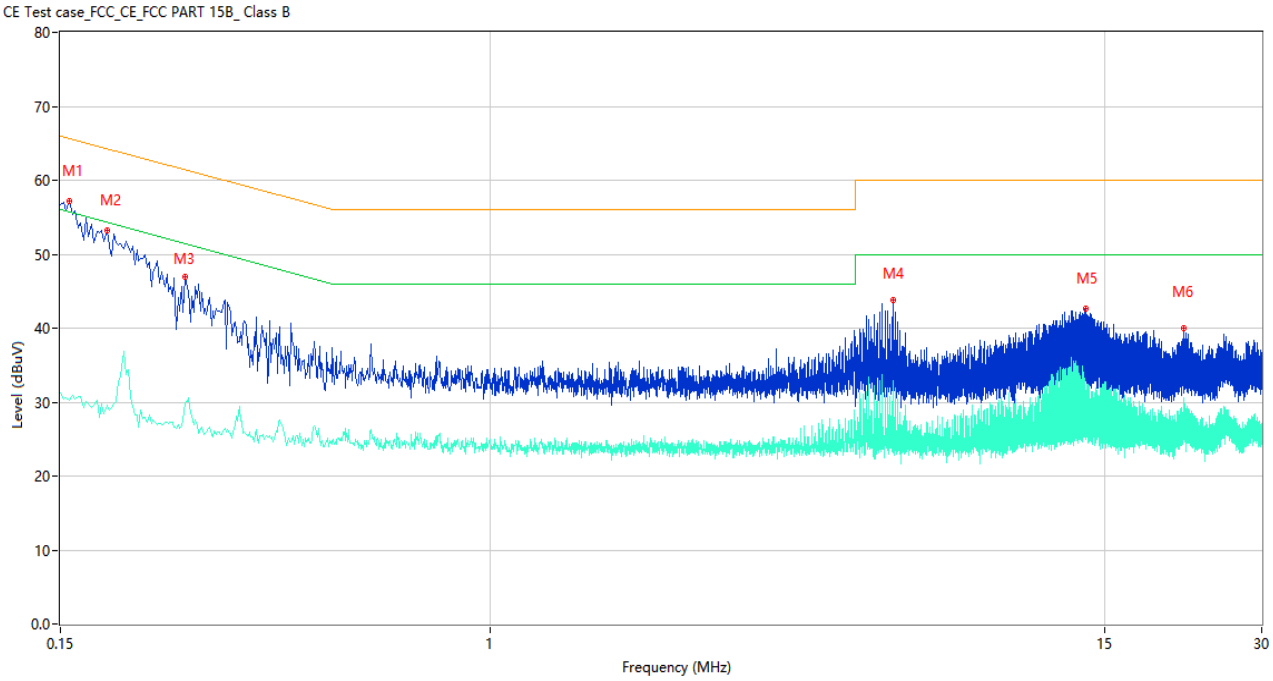
ESP Module

PHASE L



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.150	57.72	10.41	66.00	-8.28	Peak	L	Pass
1**	0.150	30.84	10.41	56.00	-25.16	AV	L	Pass
2	0.178	54.05	10.39	64.58	-10.53	Peak	L	Pass
2**	0.178	30.25	10.39	54.58	-24.33	AV	L	Pass
3	0.236	47.63	10.35	62.24	-14.61	Peak	L	Pass
3**	0.236	26.84	10.35	52.24	-25.40	AV	L	Pass
4	5.758	43.45	10.32	60.00	-16.55	Peak	L	Pass
4**	5.758	26.19	10.32	50.00	-23.81	AV	L	Pass
5	13.612	42.75	10.40	60.00	-17.25	Peak	L	Pass
5**	13.612	31.30	10.40	50.00	-18.70	AV	L	Pass
6	17.602	39.77	10.48	60.00	-20.23	Peak	L	Pass
6**	17.602	28.61	10.48	50.00	-21.39	AV	L	Pass

PHASE N



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.156	57.23	10.41	65.67	-8.44	Peak	N	Pass
1**	0.156	30.23	10.41	55.67	-25.44	AV	N	Pass
2	0.184	53.20	10.39	64.30	-11.10	Peak	N	Pass
2**	0.184	29.58	10.39	54.30	-24.72	AV	N	Pass
3	0.260	46.97	10.34	61.43	-14.46	Peak	N	Pass
3**	0.260	29.93	10.34	51.43	-21.50	AV	N	Pass
4	5.892	43.74	10.32	60.00	-16.26	Peak	N	Pass
4**	5.892	25.51	10.32	50.00	-24.49	AV	N	Pass
5	13.810	42.60	10.40	60.00	-17.40	Peak	N	Pass
5**	13.810	31.54	10.40	50.00	-18.46	AV	N	Pass
6	21.278	39.92	10.57	60.00	-20.08	Peak	N	Pass
6**	21.278	30.53	10.57	50.00	-19.47	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.

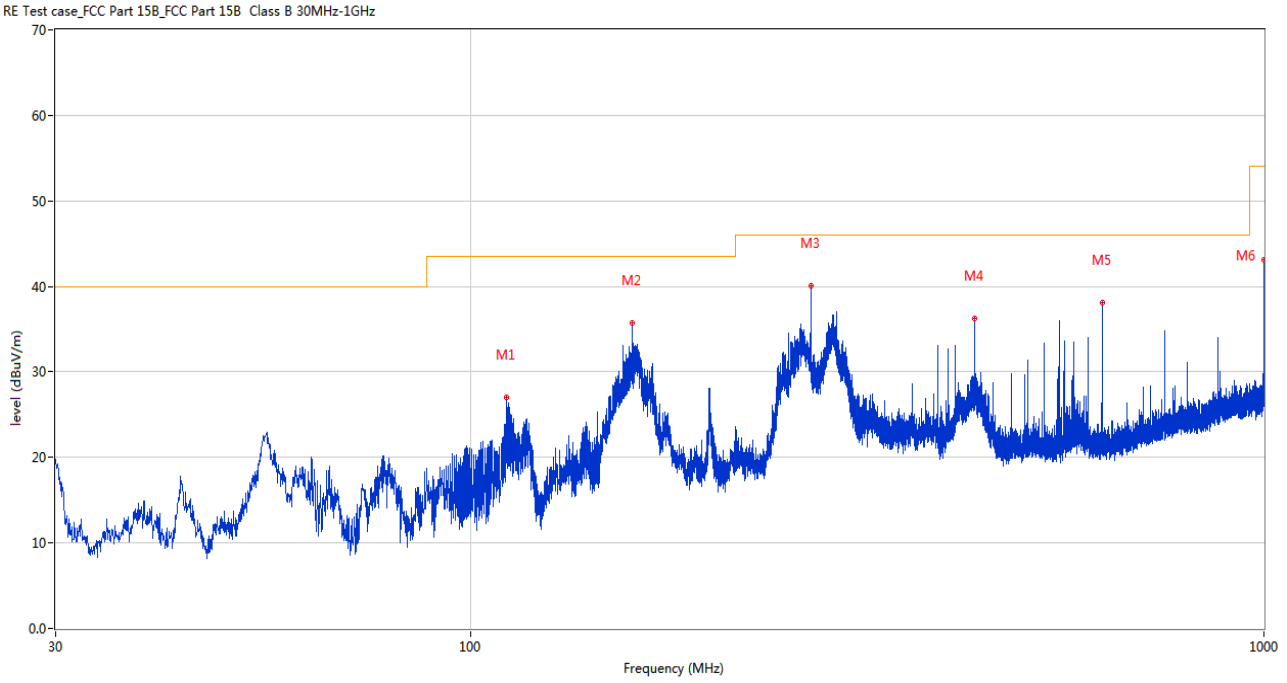
Note [4]: Results (dBuV/m) = Original reading level of Spectrum Analyzer (dBuV/m) + Factor (dB)

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

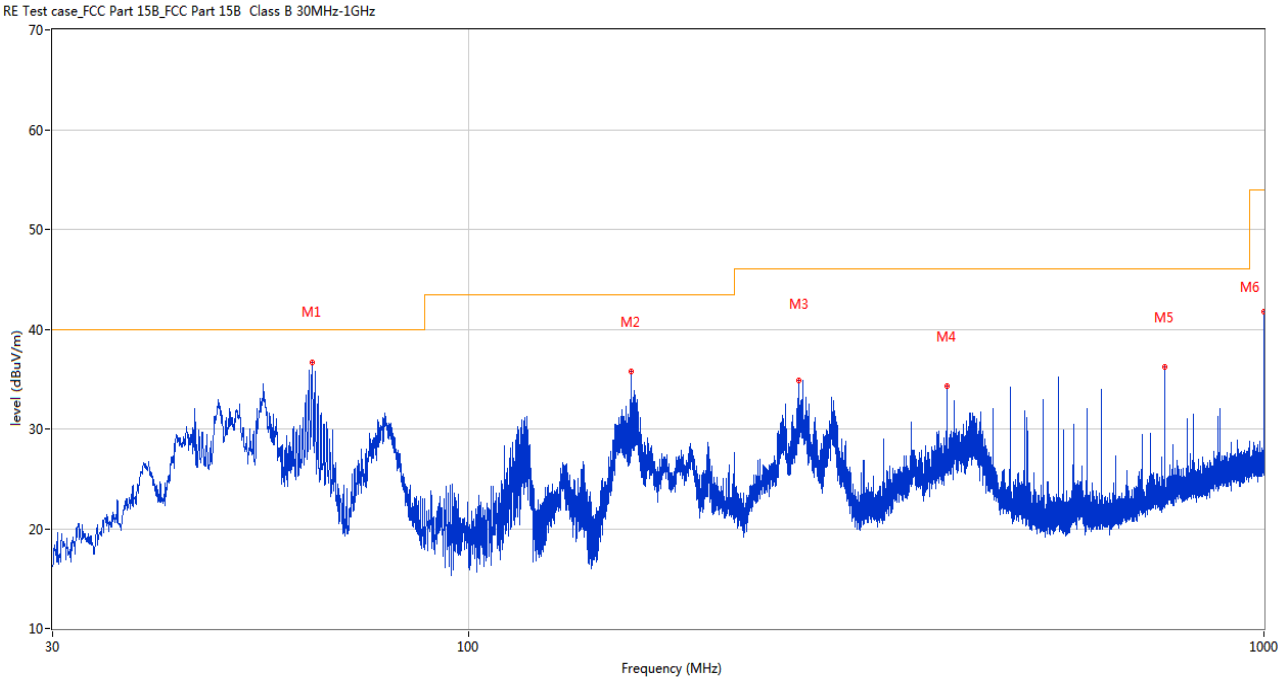
AP Module

30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	110.995	26.98	-28.24	43.5	-16.52	Peak	0.00	200	Horizontal	Pass
2	160.028	35.74	-24.54	43.5	-7.76	Peak	211.00	200	Horizontal	Pass
3	268.620	40.04	-25.66	46.0	-5.96	Peak	297.00	200	Horizontal	Pass
4	432.017	36.22	-20.43	46.0	-9.78	Peak	133.00	200	Horizontal	Pass
5	625.047	38.06	-15.59	46.0	-7.94	Peak	289.00	200	Horizontal	Pass
6	1000.000	43.16	-10.49	54.0	-10.84	Peak	168.00	200	Horizontal	Pass

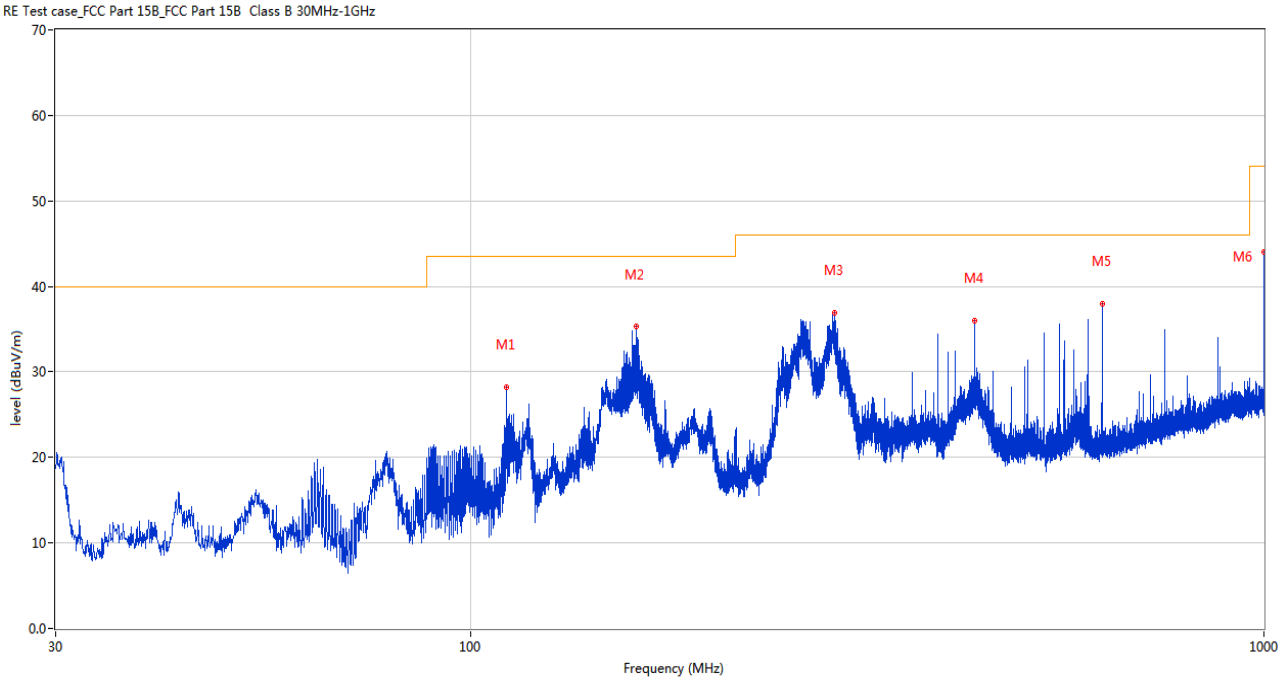
30 MHz to 1 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	63.611	36.71	-27.93	40.0	-3.29	Peak	202.00	100	Vertical	Pass
2	159.980	35.75	-24.54	43.5	-7.75	Peak	164.00	200	Vertical	Pass
3	260.278	34.85	-25.74	46.0	-11.15	Peak	117.00	200	Vertical	Pass
4	400.006	34.35	-21.51	46.0	-11.65	Peak	258.00	100	Vertical	Pass
5	750.080	36.17	-13.63	46.0	-9.83	Peak	93.00	100	Vertical	Pass
6	1000.000	41.77	-10.49	54.0	-12.23	Peak	96.00	200	Vertical	Pass

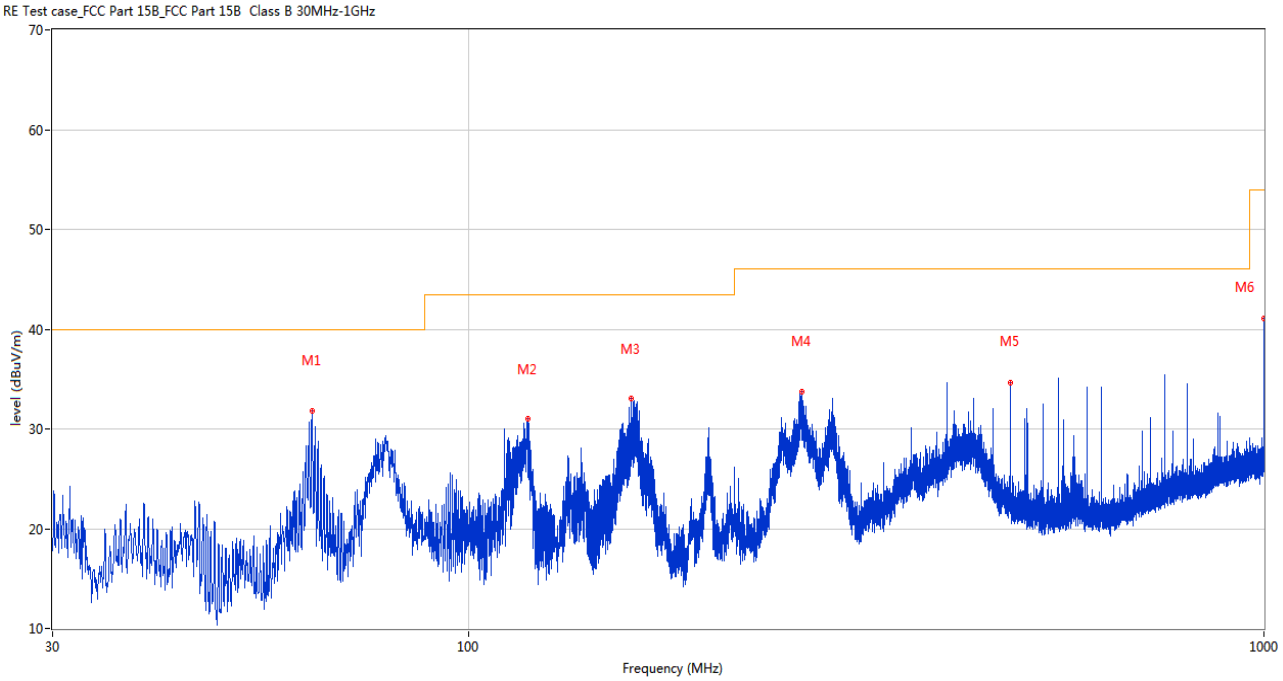
ESP Module

30 MHz to 1 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	110.947	28.19	-28.24	43.5	-15.31	Peak	191.00	200	Horizontal	Pass
2	161.726	35.29	-24.77	43.5	-8.21	Peak	91.00	100	Horizontal	Pass
3	287.971	36.86	-24.39	46.0	-9.14	Peak	49.00	100	Horizontal	Pass
4	432.017	35.97	-20.43	46.0	-10.03	Peak	137.00	200	Horizontal	Pass
5	625.047	37.91	-15.59	46.0	-8.09	Peak	290.00	100	Horizontal	Pass
6	1000.000	44.06	-10.49	54.0	-9.94	Peak	75.00	200	Horizontal	Pass

30 MHz to 1 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	63.611	31.85	-27.93	40.0	-8.15	Peak	210.00	100	Vertical	Pass
2	118.900	30.99	-27.27	43.5	-12.51	Peak	163.00	100	Vertical	Pass
3	159.980	33.03	-24.54	43.5	-10.47	Peak	188.00	200	Vertical	Pass
4	262.509	33.77	-25.63	46.0	-12.23	Peak	121.00	200	Vertical	Pass
5	480.031	34.59	-19.01	46.0	-11.41	Peak	95.00	100	Vertical	Pass
6	1000.000	41.13	-10.49	54.0	-12.87	Peak	102.00	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.

Test Data and Plots (1 GHz ~ 10th Harmonic)

AP Module

GFSK LOW CHANNEL 1 GHz to 18 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1500.200	41.60	-15.20	74.0	-32.40	Peak	214.00	150	Horizontal	Pass
1**	1500.200	35.44	-15.20	54.0	-18.56	AV	214.00	150	Horizontal	Pass
2	2401.800	95.93	-10.75	74.0	21.93	Peak	85.00	150	Horizontal	N/A
2**	2401.800	93.96	-10.75	54.0	39.96	AV	85.00	150	Horizontal	N/A
3	4976.400	48.27	-1.38	74.0	-25.73	Peak	119.00	150	Horizontal	Pass
3**	4976.400	39.17	-1.38	54.0	-14.83	AV	119.00	150	Horizontal	Pass
4	6942.800	52.47	4.25	74.0	-21.53	Peak	219.00	150	Horizontal	Pass
4**	6942.800	42.37	4.25	54.0	-11.63	AV	219.00	150	Horizontal	Pass
5	11527.550	49.77	19.51	74.0	-24.23	Peak	303.00	150	Horizontal	Pass
5**	11527.550	37.87	19.51	54.0	-16.13	AV	303.00	150	Horizontal	Pass
6	17322.750	56.54	24.27	74.0	-17.46	Peak	105.00	150	Horizontal	Pass
6**	17322.750	44.85	24.27	54.0	-9.15	AV	105.00	150	Horizontal	Pass

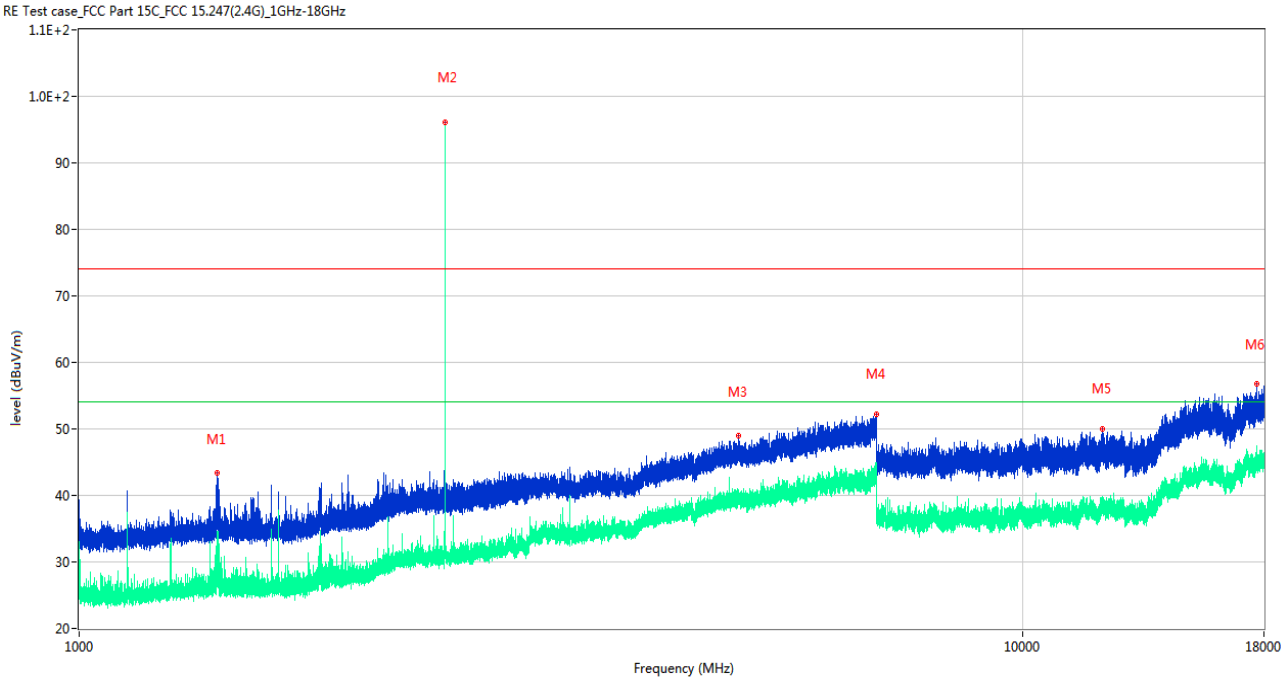
GFSK LOW CHANNEL 1 GHz to 18 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1800.000	42.50	-14.62	74.0	-31.50	Peak	28.00	150	Vertical	Pass
1**	1800.000	34.50	-14.62	54.0	-19.50	AV	28.00	150	Vertical	Pass
2	2402.100	95.52	-10.74	74.0	21.52	Peak	342.00	150	Vertical	N/A
2**	2402.100	94.90	-10.74	54.0	40.90	AV	342.00	150	Vertical	N/A
3	4828.800	48.23	-1.45	74.0	-25.77	Peak	263.00	150	Vertical	Pass
3**	4828.800	38.41	-1.45	54.0	-15.59	AV	263.00	150	Vertical	Pass
4	6930.000	52.78	4.25	74.0	-21.22	Peak	250.00	150	Vertical	Pass
4**	6930.000	42.57	4.25	54.0	-11.43	AV	250.00	150	Vertical	Pass
5	12104.563	50.19	19.45	74.0	-23.81	Peak	295.00	150	Vertical	Pass
5**	12104.563	38.76	19.45	54.0	-15.24	AV	295.00	150	Vertical	Pass
6	17731.199	56.12	24.03	74.0	-17.88	Peak	-3.00	150	Vertical	Pass
6**	17731.199	44.54	24.03	54.0	-9.46	AV	-3.00	150	Vertical	Pass

GFSK MIDDLE CHANNEL 1 GHz to 18 GHz, ANT H

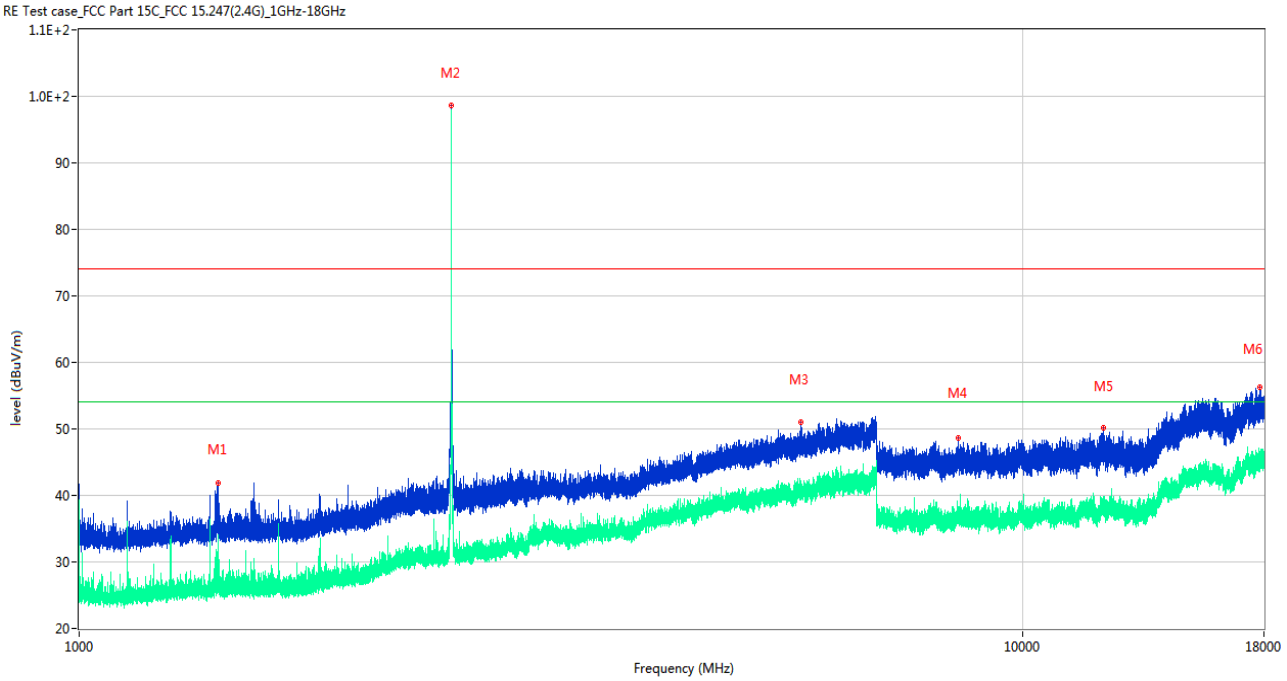
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1397.200	42.16	-14.92	74.0	-31.84	Peak	110.00	150	Horizontal	Pass
1**	1397.200	27.56	-14.92	54.0	-26.44	AV	110.00	150	Horizontal	Pass
2	2440.800	94.93	-10.52	74.0	20.93	Peak	130.00	150	Horizontal	N/A
2**	2440.800	92.65	-10.52	54.0	38.65	AV	130.00	150	Horizontal	N/A
3	4821.600	48.54	-1.48	74.0	-25.46	Peak	361.00	150	Horizontal	Pass
3**	4821.600	40.38	-1.48	54.0	-13.62	AV	361.00	150	Horizontal	Pass
4	6665.600	52.52	4.15	74.0	-21.48	Peak	317.00	150	Horizontal	Pass
4**	6665.600	41.28	4.15	54.0	-12.72	AV	317.00	150	Horizontal	Pass
5	11760.713	49.42	18.84	74.0	-24.58	Peak	360.00	150	Horizontal	Pass
5**	11760.713	38.01	18.84	54.0	-15.99	AV	360.00	150	Horizontal	Pass
6	17244.262	57.62	24.20	74.0	-16.38	Peak	360.00	150	Horizontal	Pass
6**	17244.262	44.48	24.20	54.0	-9.52	AV	360.00	150	Horizontal	Pass

GFSK MIDDLE CHANNEL 1 GHz to 18 GHz, ANT V



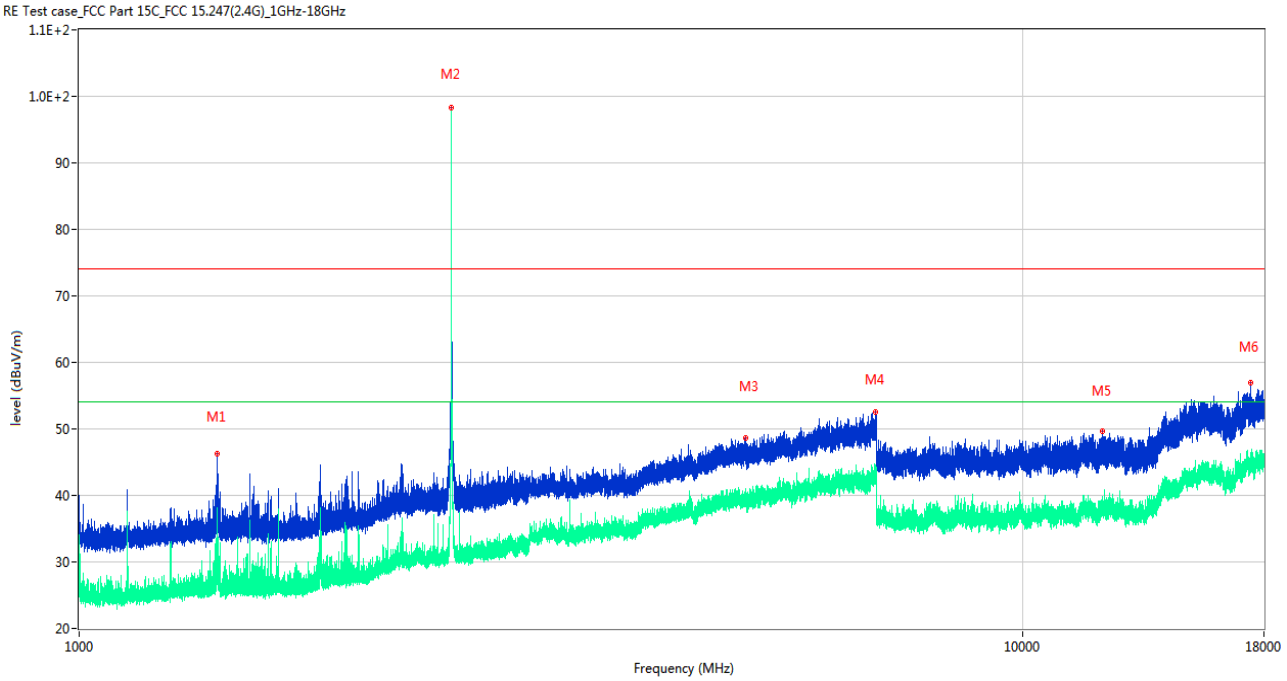
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1399.900	43.41	-14.90	74.0	-30.59	Peak	362.00	150	Vertical	Pass
1**	1399.900	29.48	-14.90	54.0	-24.52	AV	362.00	150	Vertical	Pass
2	2440.900	96.03	-10.52	74.0	22.03	Peak	333.00	150	Vertical	N/A
2**	2440.900	95.43	-10.52	54.0	41.43	AV	333.00	150	Vertical	N/A
3	4994.400	48.90	-1.04	74.0	-25.10	Peak	103.00	150	Vertical	Pass
3**	4994.400	39.38	-1.04	54.0	-14.62	AV	103.00	150	Vertical	Pass
4	6989.600	52.20	4.60	74.0	-21.80	Peak	323.00	150	Vertical	Pass
4**	6989.600	43.50	4.60	54.0	-10.50	AV	323.00	150	Vertical	Pass
5	12128.137	49.98	19.72	74.0	-24.02	Peak	360.00	150	Vertical	Pass
5**	12128.137	37.71	19.72	54.0	-16.29	AV	360.00	150	Vertical	Pass
6	17699.699	56.76	24.44	74.0	-17.24	Peak	109.00	150	Vertical	Pass
6**	17699.699	44.53	24.44	54.0	-9.47	AV	109.00	150	Vertical	Pass

GFSK HIGH CHANNEL 1 GHz to 18 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1402.200	41.89	-14.91	74.0	-32.11	Peak	272.00	150	Horizontal	Pass
1**	1402.200	28.02	-14.91	54.0	-25.98	AV	272.00	150	Horizontal	Pass
2	2480.200	98.56	-10.32	74.0	24.56	Peak	83.00	150	Horizontal	N/A
2**	2480.200	97.74	-10.32	54.0	43.74	AV	83.00	150	Horizontal	N/A
3	5823.000	51.09	0.86	74.0	-22.91	Peak	25.00	150	Horizontal	Pass
3**	5823.000	40.72	0.86	54.0	-13.28	AV	25.00	150	Horizontal	Pass
4	8540.137	48.58	18.22	74.0	-25.42	Peak	68.00	150	Horizontal	Pass
4**	8540.137	36.32	18.22	54.0	-17.68	AV	68.00	150	Horizontal	Pass
5	12164.362	50.13	20.09	74.0	-23.87	Peak	219.00	150	Horizontal	Pass
5**	12164.362	38.25	20.09	54.0	-15.75	AV	219.00	150	Horizontal	Pass
6	17811.788	56.30	23.89	74.0	-17.70	Peak	279.00	150	Horizontal	Pass
6**	17811.788	43.55	23.89	54.0	-10.45	AV	279.00	150	Horizontal	Pass

GFSK HIGH CHANNEL 1 GHz to 18 GHz, ANT V

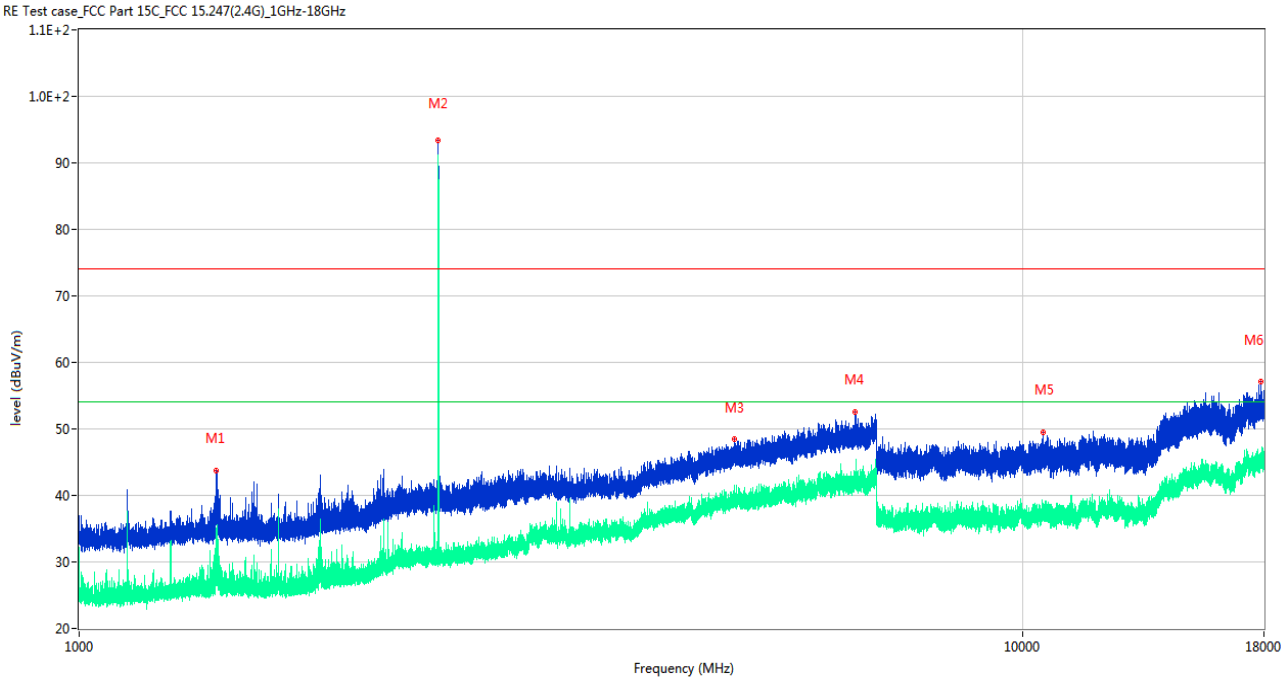


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1401.100	46.34	-14.90	74.0	-27.66	Peak	171.00	150	Vertical	Pass
1**	1401.100	30.42	-14.90	54.0	-23.58	AV	171.00	150	Vertical	Pass
2	2479.800	98.38	-10.36	74.0	24.38	Peak	105.00	150	Vertical	N/A
2**	2479.800	96.47	-10.36	54.0	42.47	AV	105.00	150	Vertical	N/A
3	5083.600	48.58	0.12	74.0	-25.42	Peak	76.00	150	Vertical	Pass
3**	5083.600	39.82	0.12	54.0	-14.18	AV	76.00	150	Vertical	Pass
4	6977.600	52.51	5.07	74.0	-21.49	Peak	102.00	150	Vertical	Pass
4**	6977.600	42.50	5.07	54.0	-11.50	AV	102.00	150	Vertical	Pass
5	12136.475	49.64	19.81	74.0	-24.36	Peak	150.00	150	Vertical	Pass
5**	12136.475	39.10	19.81	54.0	-14.90	AV	150.00	150	Vertical	Pass
6	17429.588	56.91	23.64	74.0	-17.09	Peak	226.00	150	Vertical	Pass
6**	17429.588	45.35	23.64	54.0	-8.65	AV	226.00	150	Vertical	Pass

8-DPSK LOW CHANNEL 1 GHz to 18 GHz, ANT H

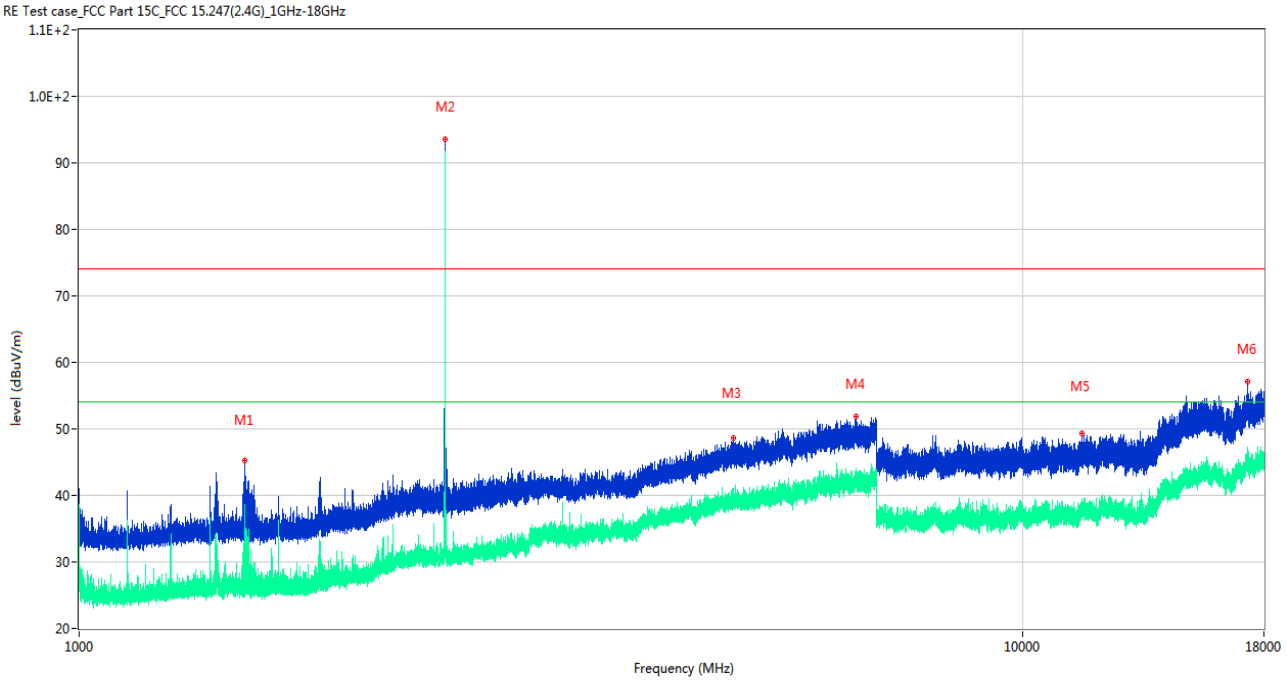
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1525.600	42.65	-15.00	74.0	-31.35	Peak	112.00	150	Horizontal	Pass
1**	1525.600	26.41	-15.00	54.0	-27.59	AV	112.00	150	Horizontal	Pass
2	2401.800	93.98	-10.75	74.0	19.98	Peak	74.00	150	Horizontal	N/A
2**	2401.800	90.76	-10.75	54.0	36.76	AV	74.00	150	Horizontal	N/A
3	4444.000	48.39	-2.17	74.0	-25.61	Peak	361.00	150	Horizontal	Pass
3**	4444.000	38.09	-2.17	54.0	-15.91	AV	361.00	150	Horizontal	Pass
4	6893.400	52.34	4.37	74.0	-21.66	Peak	-1.00	150	Horizontal	Pass
4**	6893.400	43.17	4.37	54.0	-10.83	AV	-1.00	150	Horizontal	Pass
5	12114.912	50.24	19.58	74.0	-23.76	Peak	316.00	150	Horizontal	Pass
5**	12114.912	39.78	19.58	54.0	-14.22	AV	316.00	150	Horizontal	Pass
6	17271.300	56.44	24.39	74.0	-17.56	Peak	187.00	150	Horizontal	Pass
6**	17271.300	45.15	24.39	54.0	-8.85	AV	187.00	150	Horizontal	Pass

8-DPSK LOW CHANNEL 1 GHz to 18 GHz, ANT V



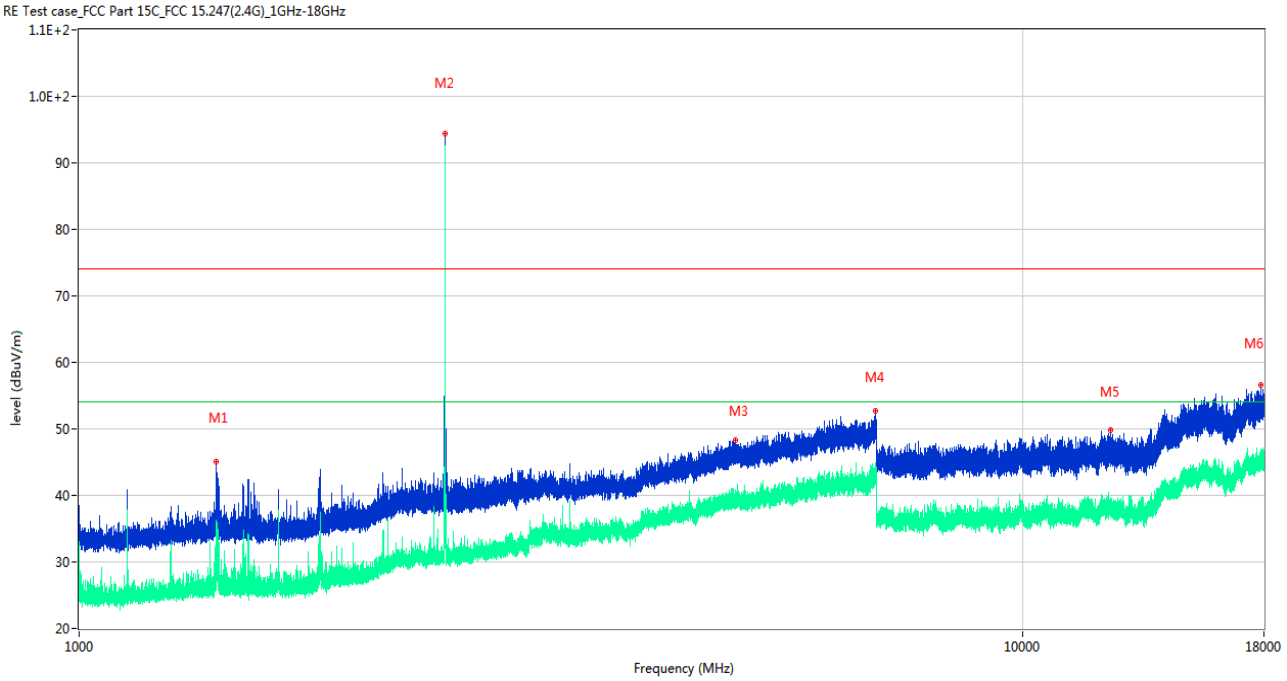
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1397.800	43.73	-14.91	74.0	-30.27	Peak	0.00	150	Vertical	Pass
1**	1397.800	32.65	-14.91	54.0	-21.35	AV	0.00	150	Vertical	Pass
2	2401.800	93.39	-10.75	74.0	19.39	Peak	342.00	150	Vertical	N/A
2**	2401.800	90.56	-10.75	54.0	36.56	AV	342.00	150	Vertical	N/A
3	4939.800	48.44	-1.36	74.0	-25.56	Peak	169.00	150	Vertical	Pass
3**	4939.800	39.14	-1.36	54.0	-14.86	AV	169.00	150	Vertical	Pass
4	6640.000	52.53	3.95	74.0	-21.47	Peak	245.00	150	Vertical	Pass
4**	6640.000	41.84	3.95	54.0	-12.16	AV	245.00	150	Vertical	Pass
5	10498.875	49.48	18.37	74.0	-24.52	Peak	0.00	150	Vertical	Pass
5**	10498.875	37.93	18.37	54.0	-16.07	AV	0.00	150	Vertical	Pass
6	17869.801	57.05	24.33	74.0	-16.95	Peak	325.00	150	Vertical	Pass
6**	17869.801	44.57	24.33	54.0	-9.43	AV	325.00	150	Vertical	Pass

8-DPSK MIDDLE CHANNEL 1 GHz to 18 GHz, ANT H



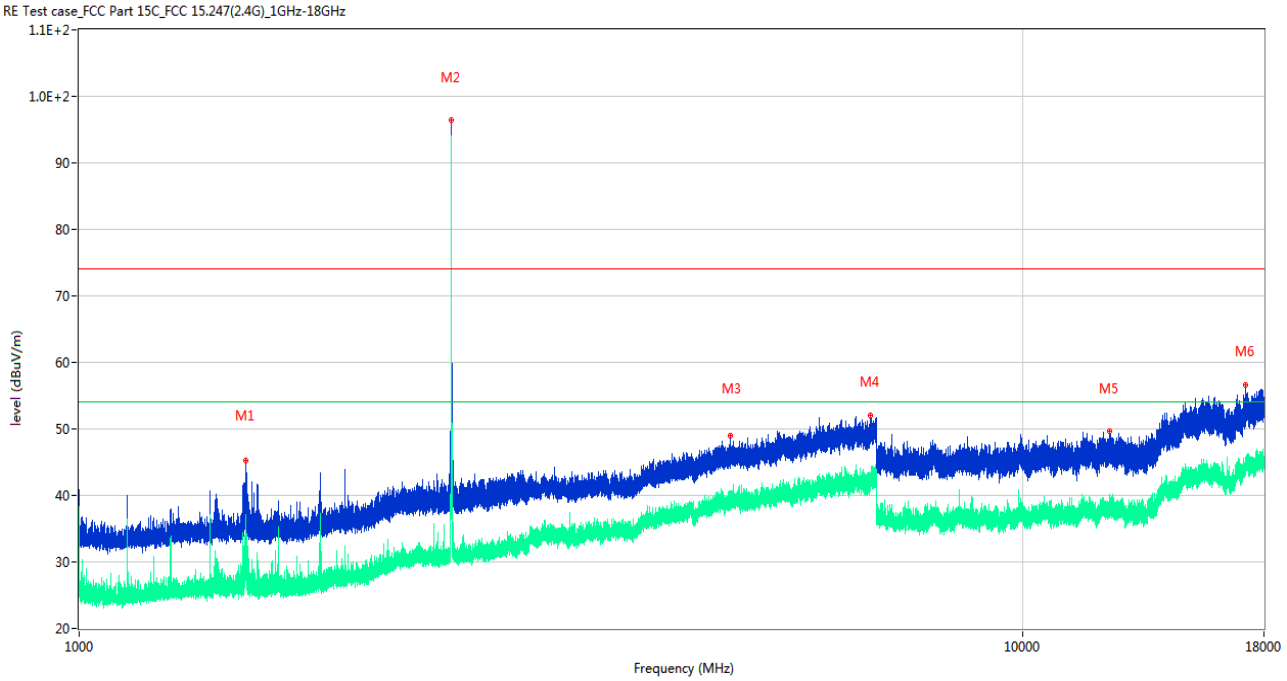
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1497.800	45.19	-15.12	74.0	-28.81	Peak	55.00	150	Horizontal	Pass
1**	1497.800	34.11	-15.12	54.0	-19.89	AV	55.00	150	Horizontal	Pass
2	2440.800	93.53	-10.52	74.0	19.53	Peak	132.00	150	Horizontal	N/A
2**	2440.800	89.85	-10.52	54.0	35.85	AV	132.00	150	Horizontal	N/A
3	4931.600	48.63	-1.11	74.0	-25.37	Peak	102.00	150	Horizontal	Pass
3**	4931.600	39.56	-1.11	54.0	-14.44	AV	102.00	150	Horizontal	Pass
4	6653.000	51.79	4.66	74.0	-22.21	Peak	-3.00	150	Horizontal	Pass
4**	6653.000	43.37	4.66	54.0	-10.63	AV	-3.00	150	Horizontal	Pass
5	11535.600	49.27	19.58	74.0	-24.73	Peak	360.00	150	Horizontal	Pass
5**	11535.600	37.42	19.58	54.0	-16.58	AV	360.00	150	Horizontal	Pass
6	17293.875	57.10	24.57	74.0	-16.90	Peak	48.00	150	Horizontal	Pass
6**	17293.875	43.53	24.57	54.0	-10.47	AV	48.00	150	Horizontal	Pass

8-DPSK MIDDLE CHANNEL 1 GHz to 18 GHz, ANT V



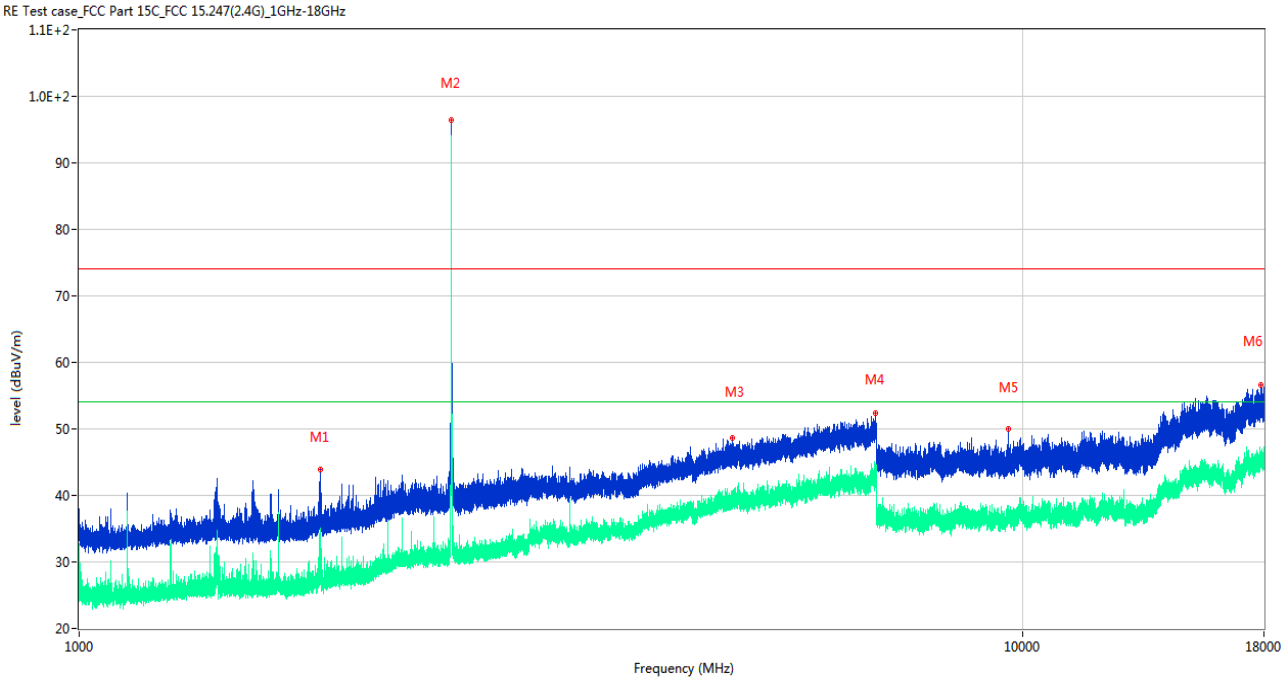
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1398.200	45.11	-14.90	74.0	-28.89	Peak	179.00	150	Vertical	Pass
1**	1398.200	36.35	-14.90	54.0	-17.65	AV	179.00	150	Vertical	Pass
2	2440.900	94.32	-10.52	74.0	20.32	Peak	334.00	150	Vertical	N/A
2**	2440.900	91.09	-10.52	54.0	37.09	AV	334.00	150	Vertical	N/A
3	4960.000	48.37	-1.74	74.0	-25.63	Peak	129.00	150	Vertical	Pass
3**	4960.000	38.13	-1.74	54.0	-15.87	AV	129.00	150	Vertical	Pass
4	6971.200	52.70	5.10	74.0	-21.30	Peak	259.00	150	Vertical	Pass
4**	6971.200	42.60	5.10	54.0	-11.40	AV	259.00	150	Vertical	Pass
5	12388.037	49.81	19.32	74.0	-24.19	Peak	363.00	150	Vertical	Pass
5**	12388.037	37.63	19.32	54.0	-16.37	AV	363.00	150	Vertical	Pass
6	17876.363	56.60	24.39	74.0	-17.40	Peak	51.00	150	Vertical	Pass
6**	17876.363	44.70	24.39	54.0	-9.30	AV	51.00	150	Vertical	Pass

8-DPSK HIGH CHANNEL 1 GHz to 18 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1503.000	45.28	-15.01	74.0	-28.72	Peak	44.00	150	Horizontal	Pass
1**	1503.000	34.06	-15.01	54.0	-19.94	AV	44.00	150	Horizontal	Pass
2	2479.800	96.43	-10.36	74.0	22.43	Peak	75.00	150	Horizontal	N/A
2**	2479.800	93.86	-10.36	54.0	39.86	AV	75.00	150	Horizontal	N/A
3	4902.800	48.93	-0.80	74.0	-25.07	Peak	167.00	150	Horizontal	Pass
3**	4902.800	39.10	-0.80	54.0	-14.90	AV	167.00	150	Horizontal	Pass
4	6897.000	52.11	4.50	74.0	-21.89	Peak	135.00	150	Horizontal	Pass
4**	6897.000	42.86	4.50	54.0	-11.14	AV	135.00	150	Horizontal	Pass
5	12363.025	49.74	19.60	74.0	-24.26	Peak	278.00	150	Horizontal	Pass
5**	12363.025	38.43	19.60	54.0	-15.57	AV	278.00	150	Horizontal	Pass
6	17230.875	56.56	24.09	74.0	-17.44	Peak	-1.00	150	Horizontal	Pass
6**	17230.875	44.77	24.09	54.0	-9.23	AV	-1.00	150	Horizontal	Pass

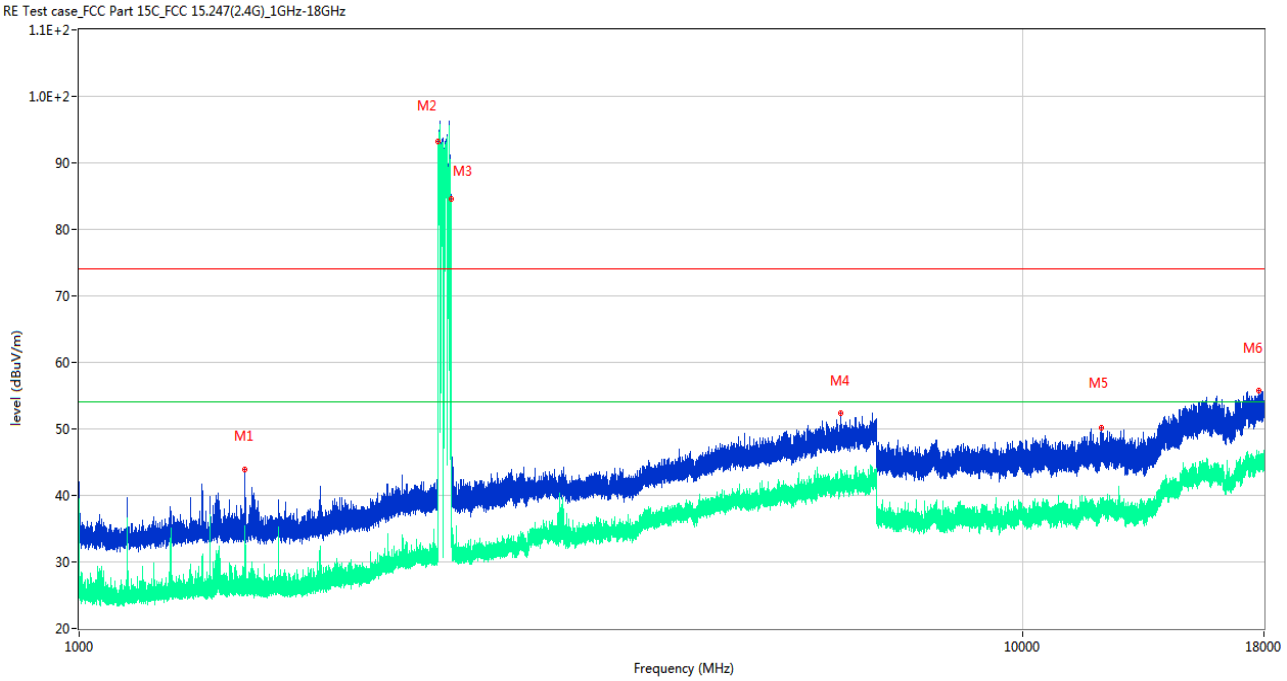
8-DPSK HIGH CHANNEL 1 GHz to 18 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1801.500	43.88	-14.79	74.0	-30.12	Peak	279.00	150	Vertical	Pass
1**	1801.500	34.16	-14.79	54.0	-19.84	AV	279.00	150	Vertical	Pass
2	2480.100	96.41	-10.33	74.0	22.41	Peak	109.00	150	Vertical	N/A
2**	2480.100	93.85	-10.33	54.0	39.85	AV	109.00	150	Vertical	N/A
3	4926.200	48.64	-1.10	74.0	-25.36	Peak	-3.00	150	Vertical	Pass
3**	4926.200	39.59	-1.10	54.0	-14.41	AV	-3.00	150	Vertical	Pass
4	6985.400	52.29	4.62	74.0	-21.71	Peak	177.00	150	Vertical	Pass
4**	6985.400	43.51	4.62	54.0	-10.49	AV	177.00	150	Vertical	Pass
5	9659.950	49.92	18.83	74.0	-24.08	Peak	0.00	150	Vertical	Pass
5**	9659.950	36.16	18.83	54.0	-17.84	AV	0.00	150	Vertical	Pass
6	17849.850	56.54	24.10	74.0	-17.46	Peak	-1.00	150	Vertical	Pass
6**	17849.850	44.54	24.10	54.0	-9.46	AV	-1.00	150	Vertical	Pass

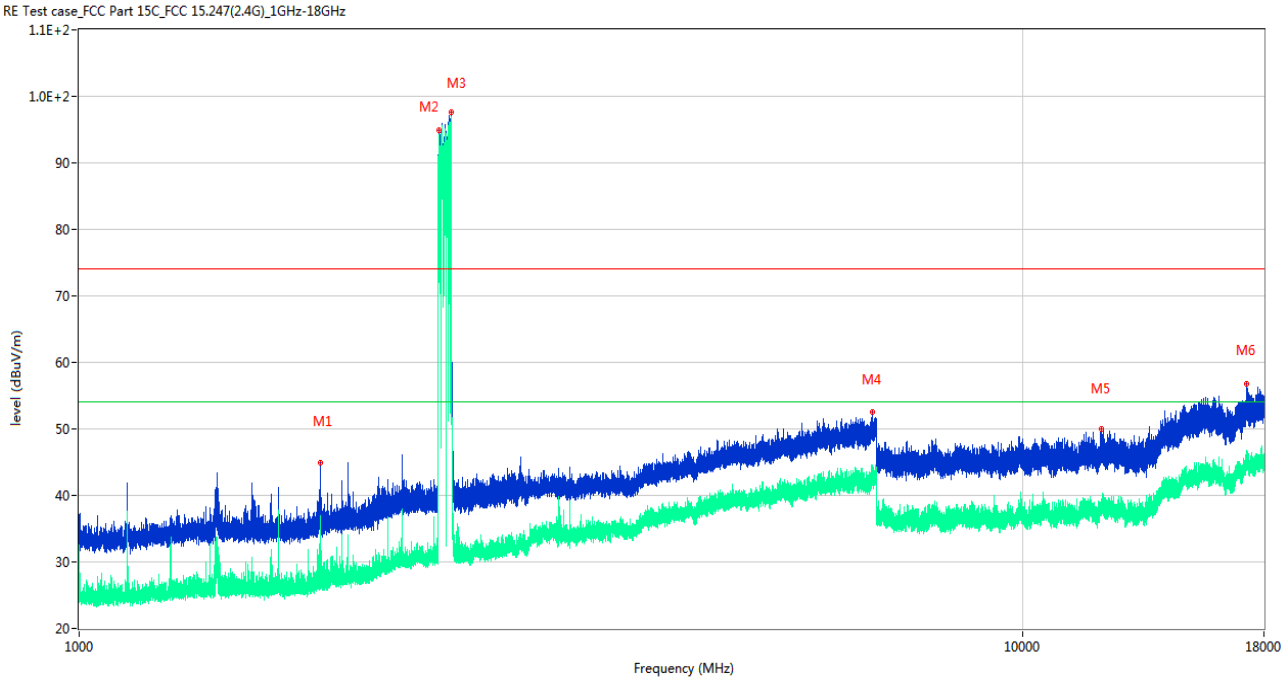
Hopping Mode:

GFSK MODE 1 GHz to 18 GHz, ANT H



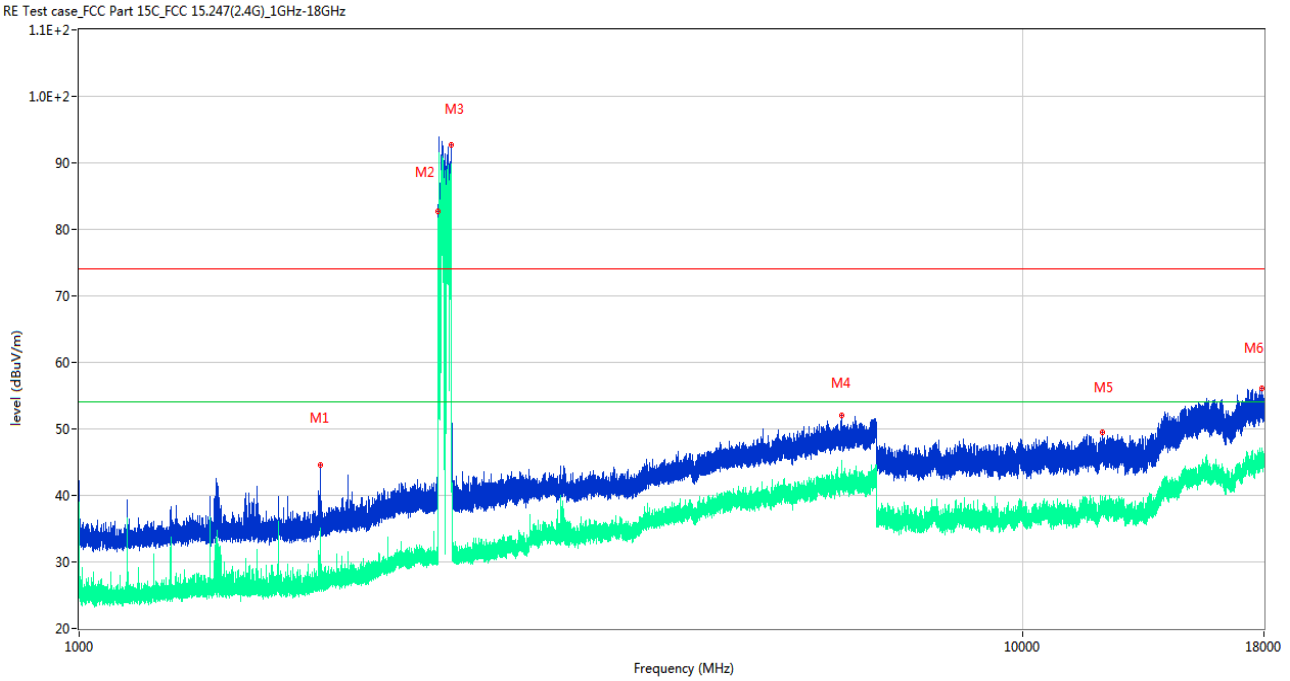
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1499.100	43.91	-15.17	74.0	-30.09	Peak	255.00	150	Horizontal	Pass
1**	1499.100	28.84	-15.17	54.0	-25.16	AV	255.00	150	Horizontal	Pass
2	2402.100	93.16	-10.74	74.0	19.16	Peak	61.00	150	Horizontal	N/A
2**	2402.100	92.71	-10.74	54.0	38.71	AV	61.00	150	Horizontal	N/A
3	2478.300	84.64	-10.44	74.0	10.64	Peak	201.00	150	Horizontal	N/A
3**	2478.300	81.66	-10.44	54.0	27.66	AV	201.00	150	Horizontal	N/A
4	6411.600	52.38	3.97	74.0	-21.62	Peak	335.00	150	Horizontal	Pass
4**	6411.600	42.11	3.97	54.0	-11.89	AV	335.00	150	Horizontal	Pass
5	12116.350	50.20	19.59	74.0	-23.80	Peak	360.00	150	Horizontal	Pass
5**	12116.350	38.26	19.59	54.0	-15.74	AV	360.00	150	Horizontal	Pass
6	17764.801	55.70	23.77	74.0	-18.30	Peak	108.00	150	Horizontal	Pass
6**	17764.801	45.21	23.77	54.0	-8.79	AV	108.00	150	Horizontal	Pass

GFSK MODE 1 GHz to 18 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1799.700	44.85	-14.63	74.0	-29.15	Peak	255.00	150	Vertical	Pass
1**	1799.700	32.83	-14.63	54.0	-21.17	AV	255.00	150	Vertical	Pass
2	2403.100	94.85	-10.69	74.0	20.85	Peak	345.00	150	Vertical	N/A
2**	2403.100	94.26	-10.69	54.0	40.26	AV	345.00	150	Vertical	N/A
3	2479.800	97.64	-10.36	74.0	23.64	Peak	335.00	150	Vertical	N/A
3**	2479.800	95.52	-10.36	54.0	41.52	AV	335.00	150	Vertical	N/A
4	6921.400	52.57	4.49	74.0	-21.43	Peak	191.00	150	Vertical	Pass
4**	6921.400	43.15	4.49	54.0	-10.85	AV	191.00	150	Vertical	Pass
5	12096.513	49.94	19.37	74.0	-24.06	Peak	360.00	150	Vertical	Pass
5**	12096.513	38.59	19.37	54.0	-15.41	AV	360.00	150	Vertical	Pass
6	17250.038	56.85	24.20	74.0	-17.15	Peak	55.00	150	Vertical	Pass
6**	17250.038	45.21	24.20	54.0	-8.79	AV	55.00	150	Vertical	Pass

8-DPSK MODE 1 GHz to 18 GHz, ANT H



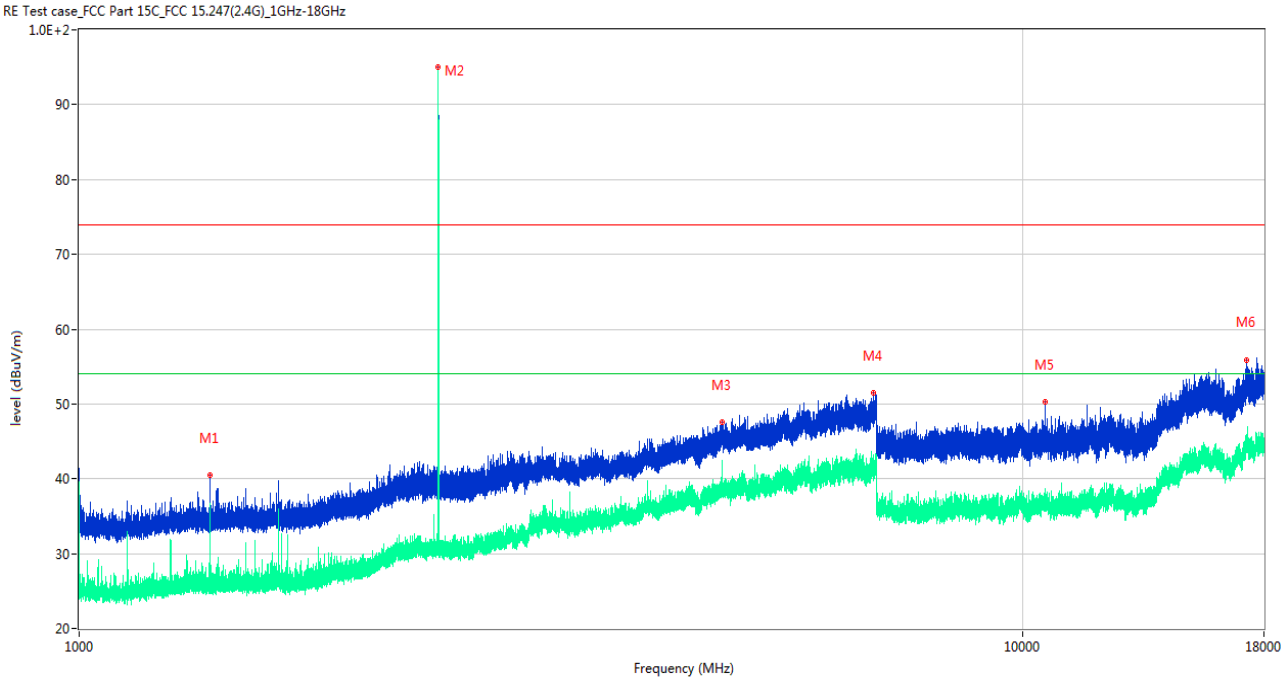
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1799.400	44.63	-14.65	74.0	-29.37	Peak	137.00	150	Horizontal	Pass
1**	1799.400	30.82	-14.65	54.0	-23.18	AV	137.00	150	Horizontal	Pass
2	2401.700	82.65	-10.75	74.0	8.65	Peak	362.00	150	Horizontal	N/A
2**	2401.700	79.88	-10.75	54.0	25.88	AV	362.00	150	Horizontal	N/A
3	2479.000	92.65	-10.40	74.0	18.65	Peak	67.00	150	Horizontal	N/A
3**	2479.000	89.89	-10.40	54.0	35.89	AV	67.00	150	Horizontal	N/A
4	6421.200	51.98	3.92	74.0	-22.02	Peak	21.00	150	Horizontal	Pass
4**	6421.200	43.40	3.92	54.0	-10.60	AV	21.00	150	Horizontal	Pass
5	12145.100	49.52	19.88	74.0	-24.48	Peak	363.00	150	Horizontal	Pass
5**	12145.100	37.47	19.88	54.0	-16.53	AV	363.00	150	Horizontal	Pass
6	17893.425	56.02	24.51	74.0	-17.98	Peak	47.00	150	Horizontal	Pass
6**	17893.425	44.73	24.51	54.0	-9.27	AV	47.00	150	Horizontal	Pass

8-DPSK MODE 1 GHz to 18 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1398.200	44.96	-14.90	74.0	-29.04	Peak	45.00	150	Vertical	Pass
1**	1398.200	33.62	-14.90	54.0	-20.38	AV	45.00	150	Vertical	Pass
2	2402.000	88.75	-10.74	74.0	14.75	Peak	282.00	150	Vertical	N/A
2**	2402.000	86.21	-10.74	54.0	32.21	AV	282.00	150	Vertical	N/A
3	2477.300	93.08	-10.47	74.0	19.08	Peak	343.00	150	Vertical	N/A
3**	2477.300	92.43	-10.47	54.0	38.43	AV	343.00	150	Vertical	N/A
4	6355.400	52.07	2.85	74.0	-21.93	Peak	-1.00	150	Vertical	Pass
4**	6355.400	41.53	2.85	54.0	-12.47	AV	-1.00	150	Vertical	Pass
5	12141.075	50.39	19.86	74.0	-23.61	Peak	77.00	150	Vertical	Pass
5**	12141.075	37.93	19.86	54.0	-16.07	AV	77.00	150	Vertical	Pass
6	17928.073	56.03	24.42	74.0	-17.97	Peak	-1.00	150	Vertical	Pass
6**	17928.073	45.57	24.42	54.0	-8.43	AV	-1.00	150	Vertical	Pass

ESP Module

GFSK LOW CHANNEL 1 GHz to 18 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1375.100	40.49	-15.02	74.0	-33.51	Peak	61.00	150	Horizontal	Pass
1**	1375.100	36.05	-15.02	54.0	-17.95	AV	61.00	150	Horizontal	Pass
2	2402.200	95.02	-10.73	74.0	21.02	Peak	80.00	150	Horizontal	N/A
2**	2402.200	94.40	-10.73	54.0	40.40	AV	80.00	150	Horizontal	N/A
3	4797.600	47.59	-1.63	74.0	-26.41	Peak	206.00	150	Horizontal	Pass
3**	4797.600	39.74	-1.63	54.0	-14.26	AV	206.00	150	Horizontal	Pass
4	6938.200	51.48	4.42	74.0	-22.52	Peak	313.00	150	Horizontal	Pass
4**	6938.200	40.40	4.42	54.0	-13.60	AV	313.00	150	Horizontal	Pass
5	10567.875	50.25	18.37	74.0	-23.75	Peak	158.00	150	Horizontal	Pass
5**	10567.875	36.76	18.37	54.0	-17.24	AV	158.00	150	Horizontal	Pass
6	17266.051	55.79	24.32	74.0	-18.21	Peak	36.00	150	Horizontal	Pass
6**	17266.051	44.87	24.32	54.0	-9.13	AV	36.00	150	Horizontal	Pass

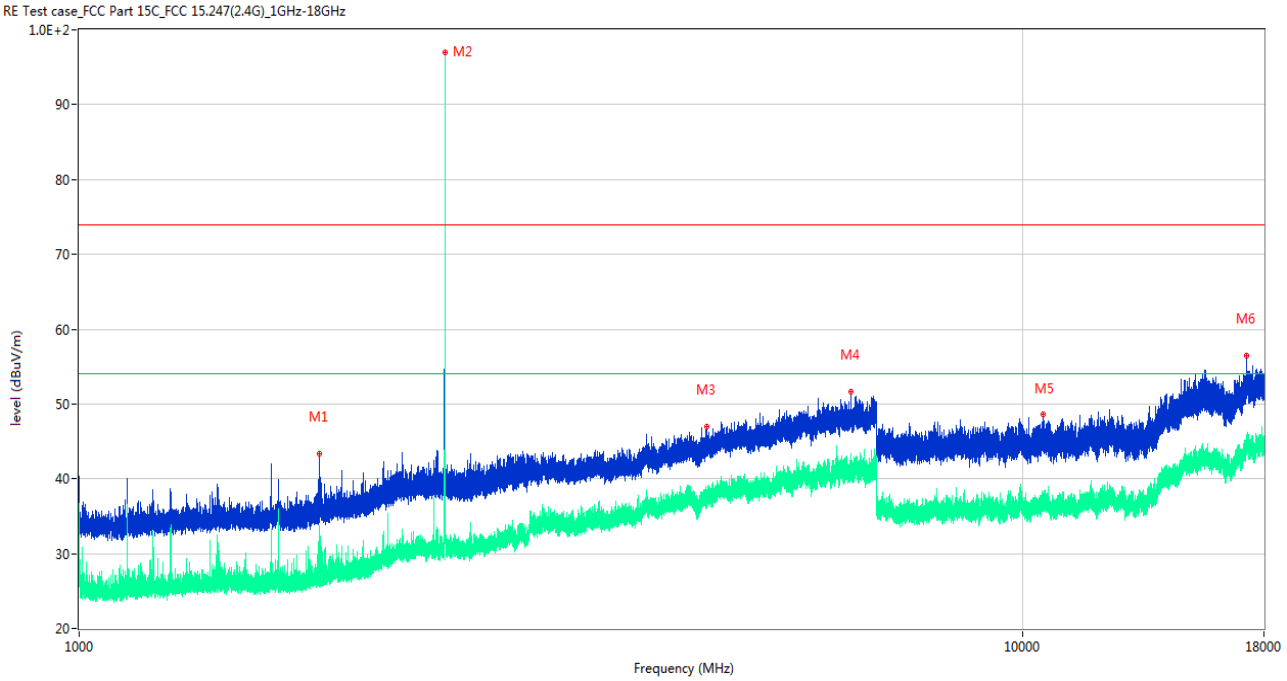
GFSK LOW CHANNEL 1 GHz to 18 GHz, ANT V

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1900.200	42.84	-13.87	74.0	-31.16	Peak	179.00	150	Vertical	Pass
1**	1900.200	31.19	-13.87	54.0	-22.81	AV	179.00	150	Vertical	Pass
2	2401.900	93.02	-10.74	74.0	19.02	Peak	330.00	150	Vertical	N/A
2**	2401.900	91.96	-10.74	54.0	37.96	AV	330.00	150	Vertical	N/A
3	4854.200	48.40	-1.31	74.0	-25.60	Peak	201.00	150	Vertical	Pass
3**	4854.200	38.34	-1.31	54.0	-15.66	AV	201.00	150	Vertical	Pass
4	6730.000	51.62	4.13	74.0	-22.38	Peak	328.00	150	Vertical	Pass
4**	6730.000	42.33	4.13	54.0	-11.67	AV	328.00	150	Vertical	Pass
5	9125.775	47.80	17.81	74.0	-26.20	Peak	141.00	150	Vertical	Pass
5**	9125.775	36.30	17.81	54.0	-17.70	AV	141.00	150	Vertical	Pass
6	15650.099	55.32	23.52	74.0	-18.68	Peak	300.00	150	Vertical	Pass
6**	15650.099	43.36	23.52	54.0	-10.64	AV	300.00	150	Vertical	Pass

GFSK MIDDLE CHANNEL 1 GHz to 18 GHz, ANT H

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1375.100	40.05	-15.02	74.0	-33.95	Peak	49.00	150	Horizontal	Pass
1**	1375.100	36.83	-15.02	54.0	-17.17	AV	49.00	150	Horizontal	Pass
2	2440.800	97.59	-10.52	74.0	23.59	Peak	74.00	150	Horizontal	N/A
2**	2440.800	96.09	-10.52	54.0	42.09	AV	74.00	150	Horizontal	N/A
3	4769.800	48.62	-2.20	74.0	-25.38	Peak	353.00	150	Horizontal	Pass
3**	4769.800	37.83	-2.20	54.0	-16.17	AV	353.00	150	Horizontal	Pass
4	6898.000	51.89	4.55	74.0	-22.11	Peak	353.00	150	Horizontal	Pass
4**	6898.000	41.92	4.55	54.0	-12.08	AV	353.00	150	Horizontal	Pass
5	8494.138	49.13	18.07	74.0	-24.87	Peak	174.00	150	Horizontal	Pass
5**	8494.138	36.34	18.07	54.0	-17.66	AV	174.00	150	Horizontal	Pass
6	15496.013	54.88	23.91	74.0	-19.12	Peak	266.00	150	Horizontal	Pass
6**	15496.013	42.44	23.91	54.0	-11.56	AV	266.00	150	Horizontal	Pass

GFSK MIDDLE CHANNEL 1 GHz to 18 GHz, ANT V

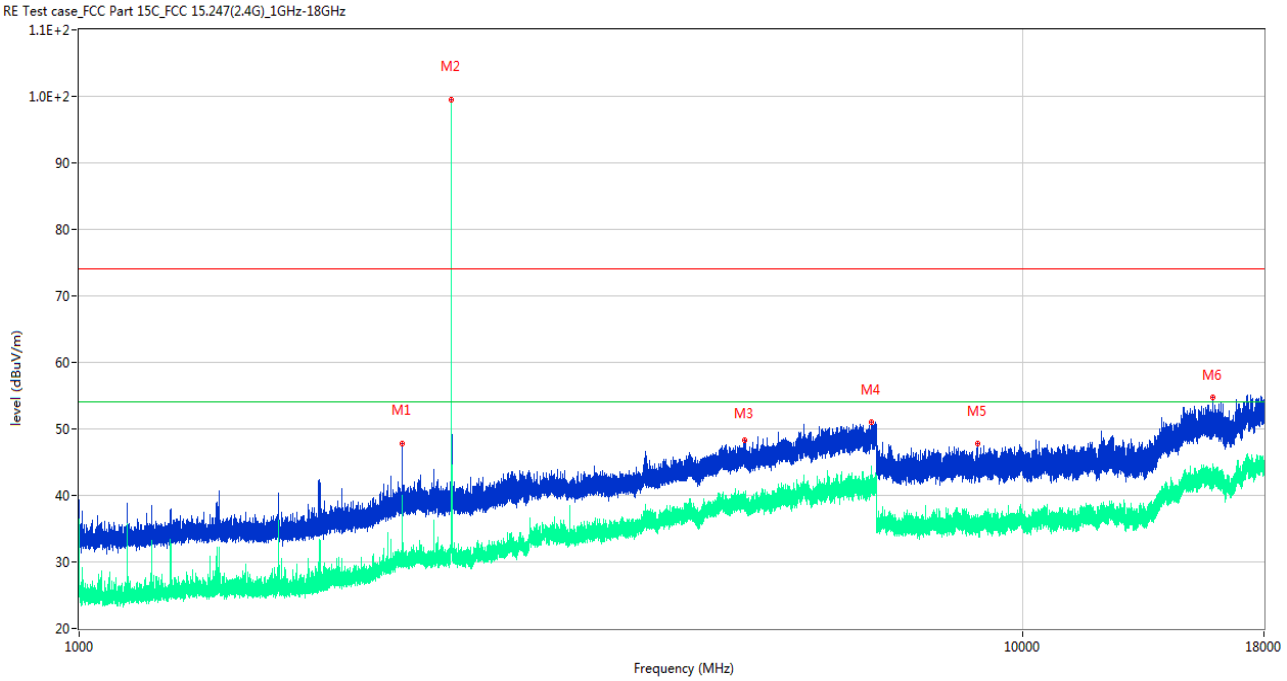


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1796.200	43.38	-14.71	74.0	-30.62	Peak	256.00	150	Vertical	Pass
1**	1796.200	27.84	-14.71	54.0	-26.16	AV	256.00	150	Vertical	Pass
2	2440.800	97.02	-10.52	74.0	23.02	Peak	72.00	150	Vertical	N/A
2**	2440.800	95.45	-10.52	54.0	41.45	AV	72.00	150	Vertical	N/A
3	4621.000	47.02	-2.56	74.0	-26.98	Peak	53.00	150	Vertical	Pass
3**	4621.000	38.58	-2.56	54.0	-15.42	AV	53.00	150	Vertical	Pass
4	6569.400	51.70	3.06	74.0	-22.30	Peak	27.00	150	Vertical	Pass
4**	6569.400	40.29	3.06	54.0	-13.71	AV	27.00	150	Vertical	Pass
5	10508.363	48.63	18.35	74.0	-25.37	Peak	165.00	150	Vertical	Pass
5**	10508.363	36.22	18.35	54.0	-17.78	AV	165.00	150	Vertical	Pass
6	17248.199	56.41	24.20	74.0	-17.59	Peak	289.00	150	Vertical	Pass
6**	17248.199	43.98	24.20	54.0	-10.02	AV	289.00	150	Vertical	Pass

GFSK HIGH CHANNEL 1 GHz to 18 GHz, ANT H

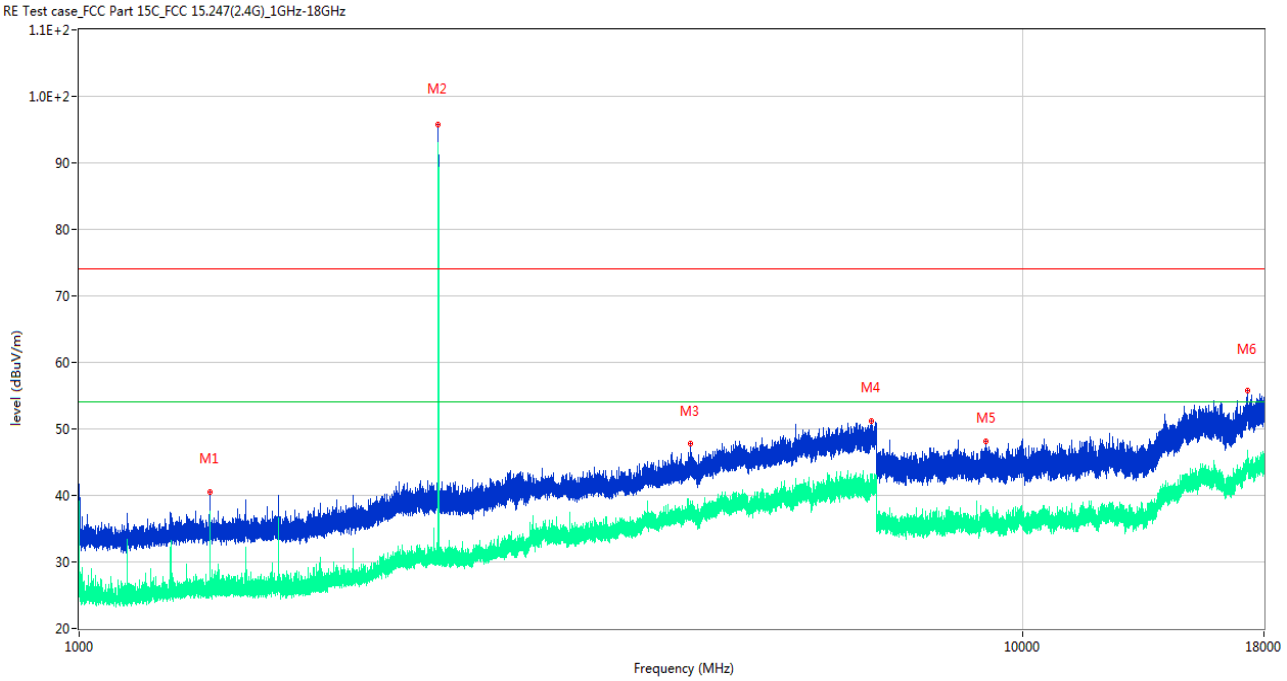
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1375.100	40.26	-15.02	74.0	-33.74	Peak	67.00	150	Horizontal	Pass
1**	1375.100	36.72	-15.02	54.0	-17.28	AV	67.00	150	Horizontal	Pass
2	2479.800	102.84	-10.36	74.0	28.84	Peak	74.00	150	Horizontal	N/A
2**	2479.800	100.77	-10.36	54.0	46.77	AV	74.00	150	Horizontal	N/A
3	4831.400	48.21	-1.38	74.0	-25.79	Peak	54.00	150	Horizontal	Pass
3**	4831.400	38.13	-1.38	54.0	-15.87	AV	54.00	150	Horizontal	Pass
4	6423.800	51.51	3.66	74.0	-22.49	Peak	294.00	150	Horizontal	Pass
4**	6423.800	40.85	3.66	54.0	-13.15	AV	294.00	150	Horizontal	Pass
5	9663.688	48.17	18.78	74.0	-25.83	Peak	129.00	150	Horizontal	Pass
5**	9663.688	35.81	18.78	54.0	-18.19	AV	129.00	150	Horizontal	Pass
6	17284.688	55.55	24.52	74.0	-18.45	Peak	34.00	150	Horizontal	Pass
6**	17284.688	43.84	24.52	54.0	-10.16	AV	34.00	150	Horizontal	Pass

GFSK HIGH CHANNEL 1 GHz to 18 GHz, ANT V



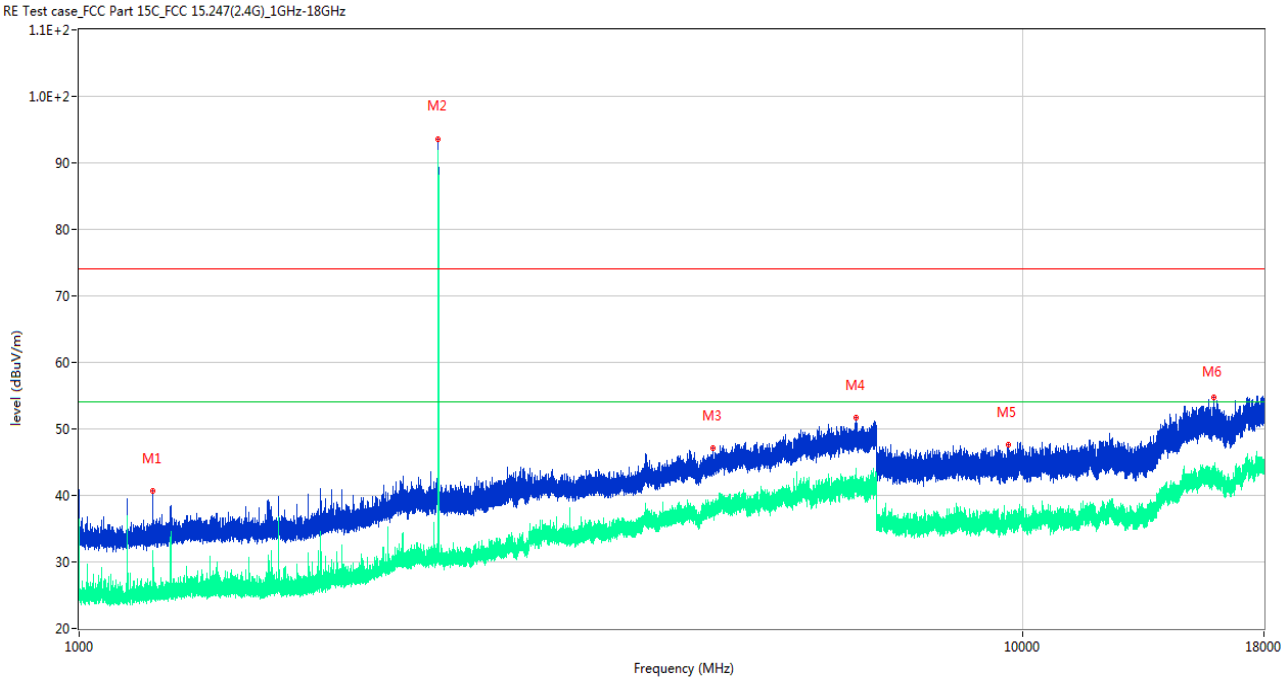
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2200.000	47.85	-10.85	74.0	-26.15	Peak	240.00	150	Vertical	Pass
1**	2200.000	33.31	-10.85	54.0	-20.69	AV	240.00	150	Vertical	Pass
2	2480.000	99.44	-10.35	74.0	25.44	Peak	69.00	150	Vertical	N/A
2**	2480.000	99.01	-10.35	54.0	45.01	AV	69.00	150	Vertical	N/A
3	5069.400	48.39	-0.35	74.0	-25.61	Peak	275.00	150	Vertical	Pass
3**	5069.400	39.00	-0.35	54.0	-15.00	AV	275.00	150	Vertical	Pass
4	6912.600	50.99	4.74	74.0	-23.01	Peak	330.00	150	Vertical	Pass
4**	6912.600	41.70	4.74	54.0	-12.30	AV	330.00	150	Vertical	Pass
5	8955.288	47.71	17.94	74.0	-26.29	Peak	360.00	150	Vertical	Pass
5**	8955.288	36.02	17.94	54.0	-17.98	AV	360.00	150	Vertical	Pass
6	15897.638	54.71	23.28	74.0	-19.29	Peak	38.00	150	Vertical	Pass
6**	15897.638	41.81	23.28	54.0	-12.19	AV	38.00	150	Vertical	Pass

8-DPSK LOW CHANNEL 1 GHz to 18 GHz, ANT H



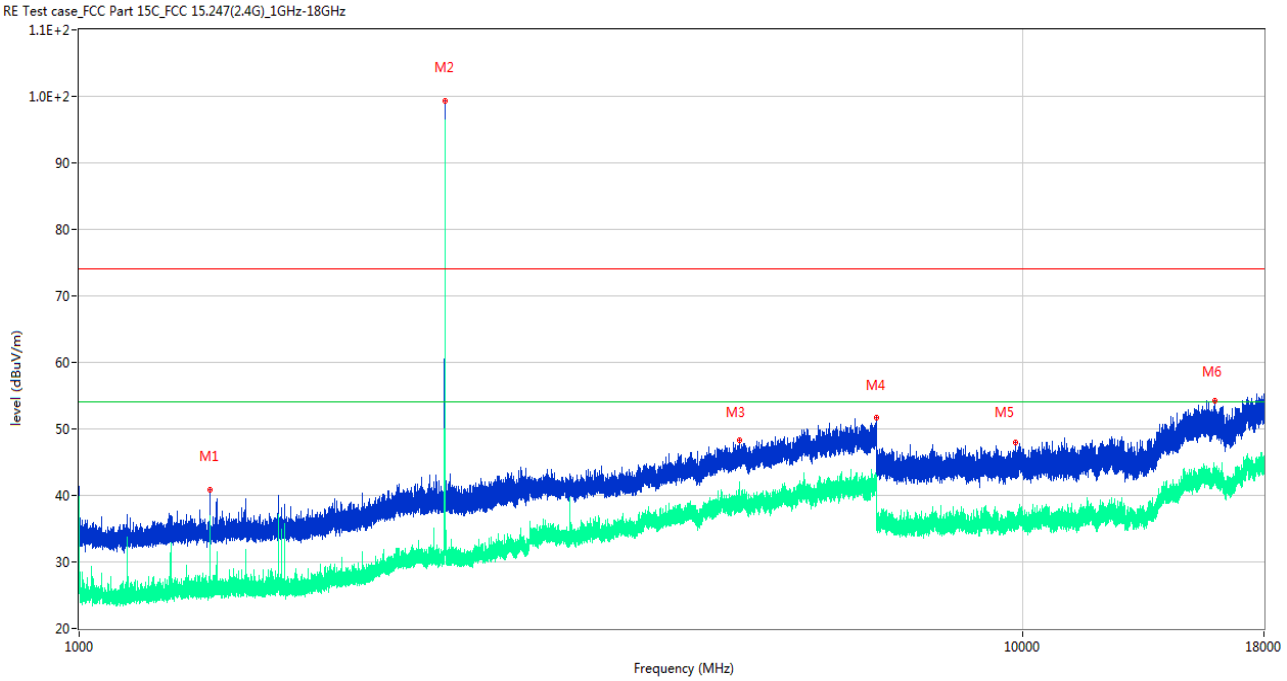
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1375.200	40.55	-15.02	74.0	-33.45	Peak	61.00	150	Horizontal	Pass
1**	1375.200	36.63	-15.02	54.0	-17.37	AV	61.00	150	Horizontal	Pass
2	2401.900	95.73	-10.74	74.0	21.73	Peak	75.00	150	Horizontal	N/A
2**	2401.900	92.84	-10.74	54.0	38.84	AV	75.00	150	Horizontal	N/A
3	4438.800	47.75	-2.13	74.0	-26.25	Peak	180.00	150	Horizontal	Pass
3**	4438.800	38.91	-2.13	54.0	-15.09	AV	180.00	150	Horizontal	Pass
4	6913.000	51.26	4.75	74.0	-22.74	Peak	105.00	150	Horizontal	Pass
4**	6913.000	41.95	4.75	54.0	-12.05	AV	105.00	150	Horizontal	Pass
5	9143.599	48.09	17.55	74.0	-25.91	Peak	-2.00	150	Horizontal	Pass
5**	9143.599	34.89	17.55	54.0	-19.11	AV	-2.00	150	Horizontal	Pass
6	17294.399	55.75	24.57	74.0	-18.25	Peak	224.00	150	Horizontal	Pass
6**	17294.399	44.79	24.57	54.0	-9.21	AV	224.00	150	Horizontal	Pass

8-DPSK LOW CHANNEL 1 GHz to 18 GHz, ANT V



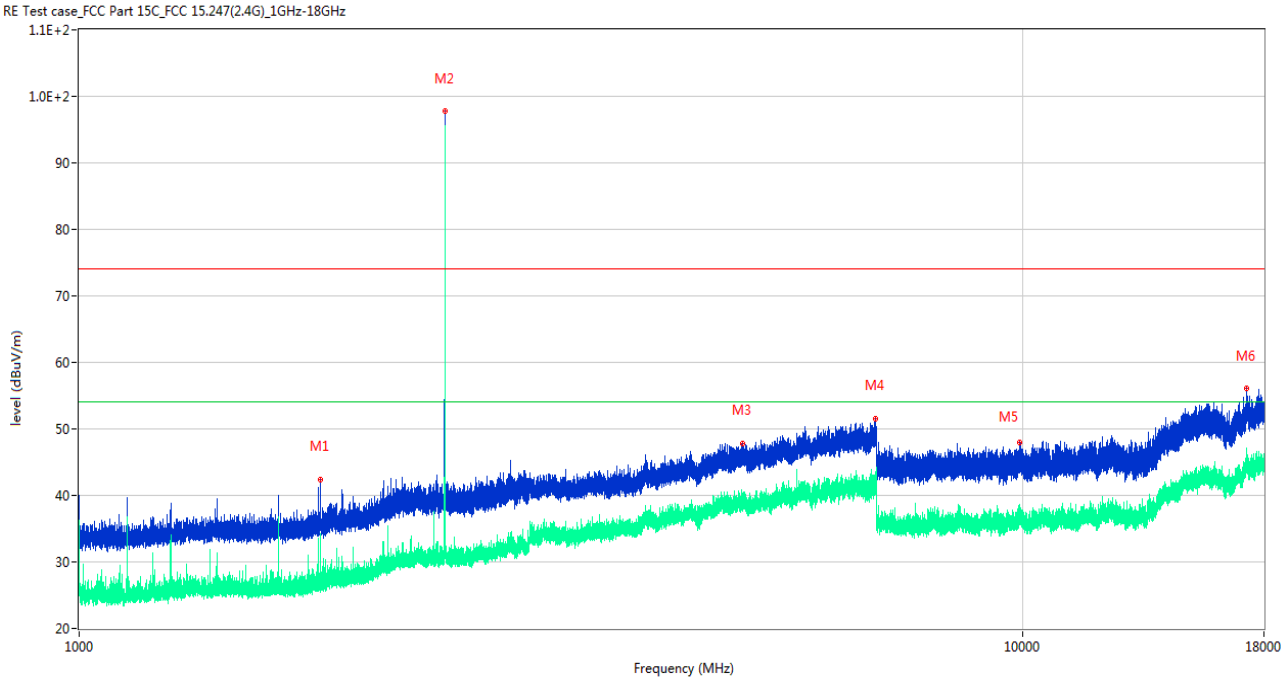
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1196.800	40.61	-14.97	74.0	-33.39	Peak	269.00	150	Vertical	Pass
1**	1196.800	26.45	-14.97	54.0	-27.55	AV	269.00	150	Vertical	Pass
2	2401.900	93.58	-10.74	74.0	19.58	Peak	333.00	150	Vertical	N/A
2**	2401.900	91.35	-10.74	54.0	37.35	AV	333.00	150	Vertical	N/A
3	4698.000	47.17	-2.37	74.0	-26.83	Peak	189.00	150	Vertical	Pass
3**	4698.000	38.55	-2.37	54.0	-15.45	AV	189.00	150	Vertical	Pass
4	6648.800	51.68	4.65	74.0	-22.32	Peak	124.00	150	Vertical	Pass
4**	6648.800	41.95	4.65	54.0	-12.05	AV	124.00	150	Vertical	Pass
5	9659.662	47.71	18.84	74.0	-26.29	Peak	362.00	150	Vertical	Pass
5**	9659.662	35.77	18.84	54.0	-18.23	AV	362.00	150	Vertical	Pass
6	15948.826	54.67	23.94	74.0	-19.33	Peak	-1.00	150	Vertical	Pass
6**	15948.826	42.43	23.94	54.0	-11.57	AV	-1.00	150	Vertical	Pass

8-DPSK MIDDLE CHANNEL 1 GHz to 18 GHz, ANT H



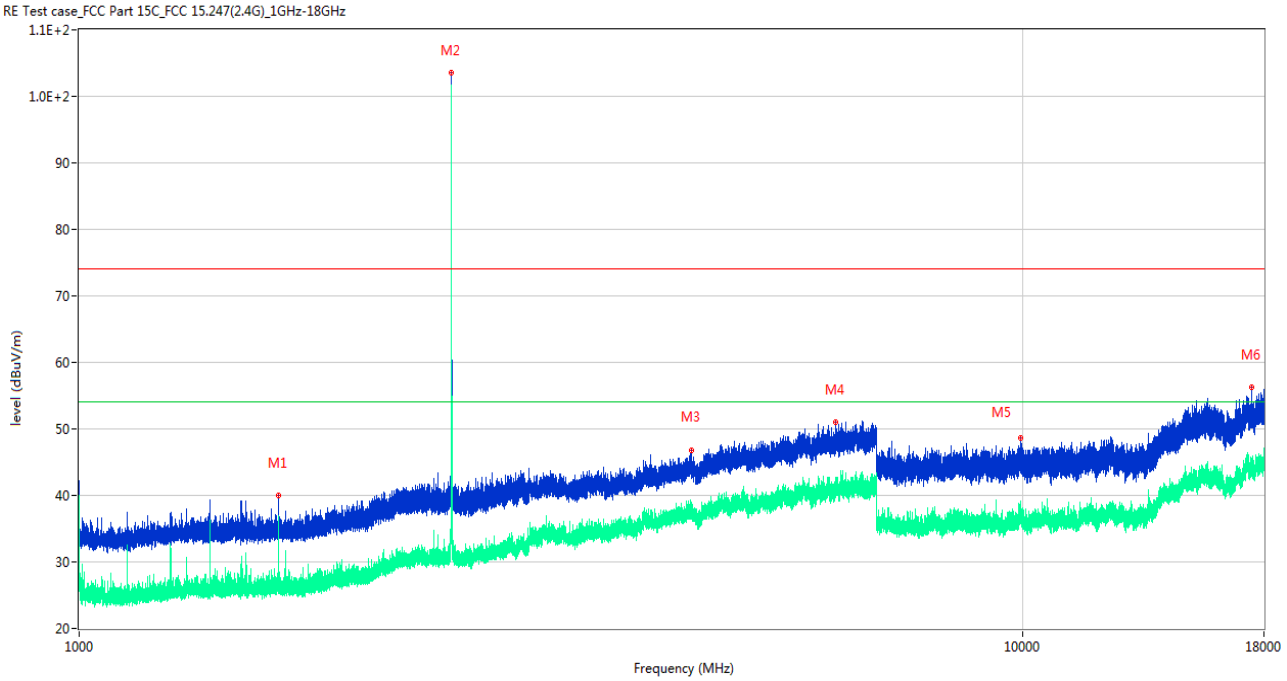
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1375.000	40.85	-15.02	74.0	-33.15	Peak	67.00	150	Horizontal	Pass
1**	1375.000	36.38	-15.02	54.0	-17.62	AV	67.00	150	Horizontal	Pass
2	2441.000	99.27	-10.52	74.0	25.27	Peak	74.00	150	Horizontal	N/A
2**	2441.000	96.16	-10.52	54.0	42.16	AV	74.00	150	Horizontal	N/A
3	5010.800	48.23	-0.64	74.0	-25.77	Peak	360.00	150	Horizontal	Pass
3**	5010.800	38.61	-0.64	54.0	-15.39	AV	360.00	150	Horizontal	Pass
4	6996.800	51.66	4.06	74.0	-22.34	Peak	212.00	150	Horizontal	Pass
4**	6996.800	40.91	4.06	54.0	-13.09	AV	212.00	150	Horizontal	Pass
5	9812.612	47.90	17.50	74.0	-26.10	Peak	221.00	150	Horizontal	Pass
5**	9812.612	35.99	17.50	54.0	-18.01	AV	221.00	150	Horizontal	Pass
6	15965.887	54.26	23.99	74.0	-19.74	Peak	223.00	150	Horizontal	Pass
6**	15965.887	43.57	23.99	54.0	-10.43	AV	223.00	150	Horizontal	Pass

8-DPSK MIDDLE CHANNEL 1 GHz to 18 GHz, ANT V



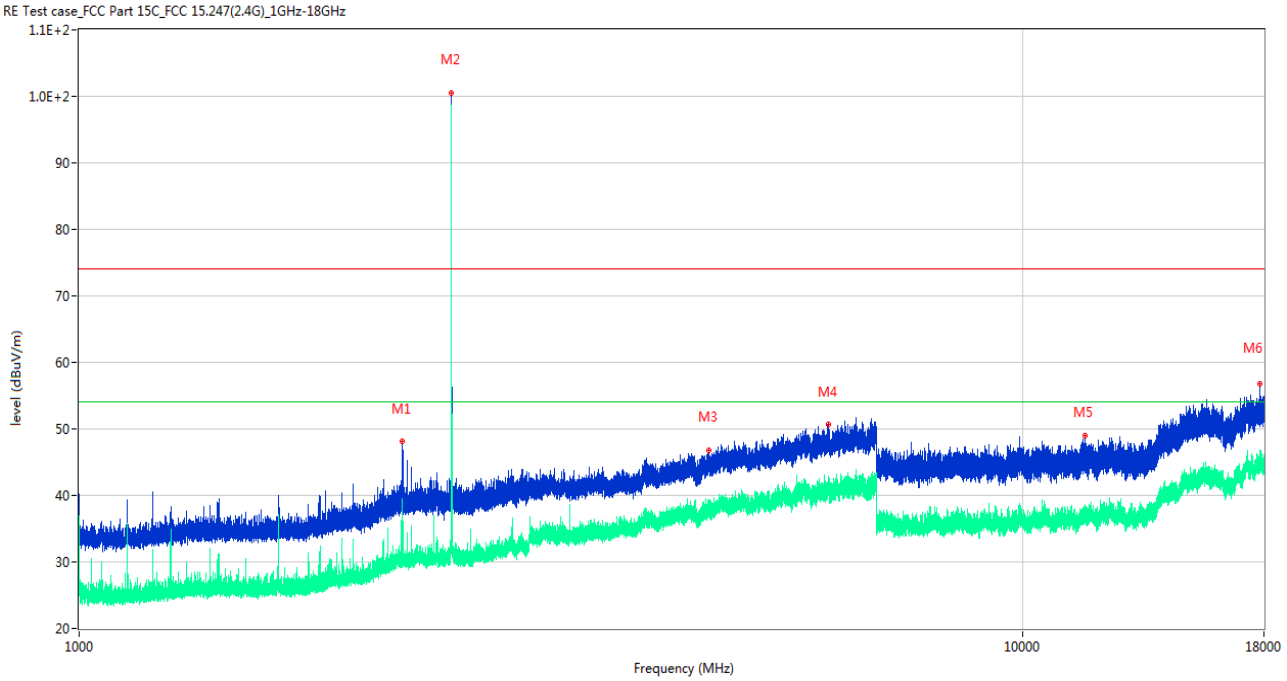
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1802.700	42.41	-14.87	74.0	-31.59	Peak	348.00	150	Vertical	Pass
1**	1802.700	31.51	-14.87	54.0	-22.49	AV	348.00	150	Vertical	Pass
2	2441.000	97.72	-10.52	74.0	23.72	Peak	77.00	150	Vertical	N/A
2**	2441.000	95.51	-10.52	54.0	41.51	AV	77.00	150	Vertical	N/A
3	5051.600	47.77	-0.94	74.0	-26.23	Peak	212.00	150	Vertical	Pass
3**	5051.600	39.08	-0.94	54.0	-14.92	AV	212.00	150	Vertical	Pass
4	6973.800	51.50	5.15	74.0	-22.50	Peak	101.00	150	Vertical	Pass
4**	6973.800	41.60	5.15	54.0	-12.40	AV	101.00	150	Vertical	Pass
5	9922.150	47.99	17.78	74.0	-26.01	Peak	32.00	150	Vertical	Pass
5**	9922.150	36.36	17.78	54.0	-17.64	AV	32.00	150	Vertical	Pass
6	17267.886	56.17	24.34	74.0	-17.83	Peak	128.00	150	Vertical	Pass
6**	17267.886	44.62	24.34	54.0	-9.38	AV	128.00	150	Vertical	Pass

8-DPSK HIGH CHANNEL 1 GHz to 18 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1624.900	39.92	-14.84	74.0	-34.08	Peak	84.00	150	Horizontal	Pass
1**	1624.900	34.48	-14.84	54.0	-19.52	AV	84.00	150	Horizontal	Pass
2	2479.700	103.55	-10.37	74.0	29.55	Peak	84.00	150	Horizontal	N/A
2**	2479.700	99.81	-10.37	54.0	45.81	AV	84.00	150	Horizontal	N/A
3	4449.400	46.78	-2.41	74.0	-27.22	Peak	246.00	150	Horizontal	Pass
3**	4449.400	38.99	-2.41	54.0	-15.01	AV	246.00	150	Horizontal	Pass
4	6334.400	51.01	3.02	74.0	-22.99	Peak	360.00	150	Horizontal	Pass
4**	6334.400	42.71	3.02	54.0	-11.29	AV	360.00	150	Horizontal	Pass
5	9939.687	48.58	17.85	74.0	-25.42	Peak	278.00	150	Horizontal	Pass
5**	9939.687	36.09	17.85	54.0	-17.91	AV	278.00	150	Horizontal	Pass
6	17473.425	56.20	23.87	74.0	-17.80	Peak	-3.00	150	Horizontal	Pass
6**	17473.425	44.55	23.87	54.0	-9.45	AV	-3.00	150	Horizontal	Pass

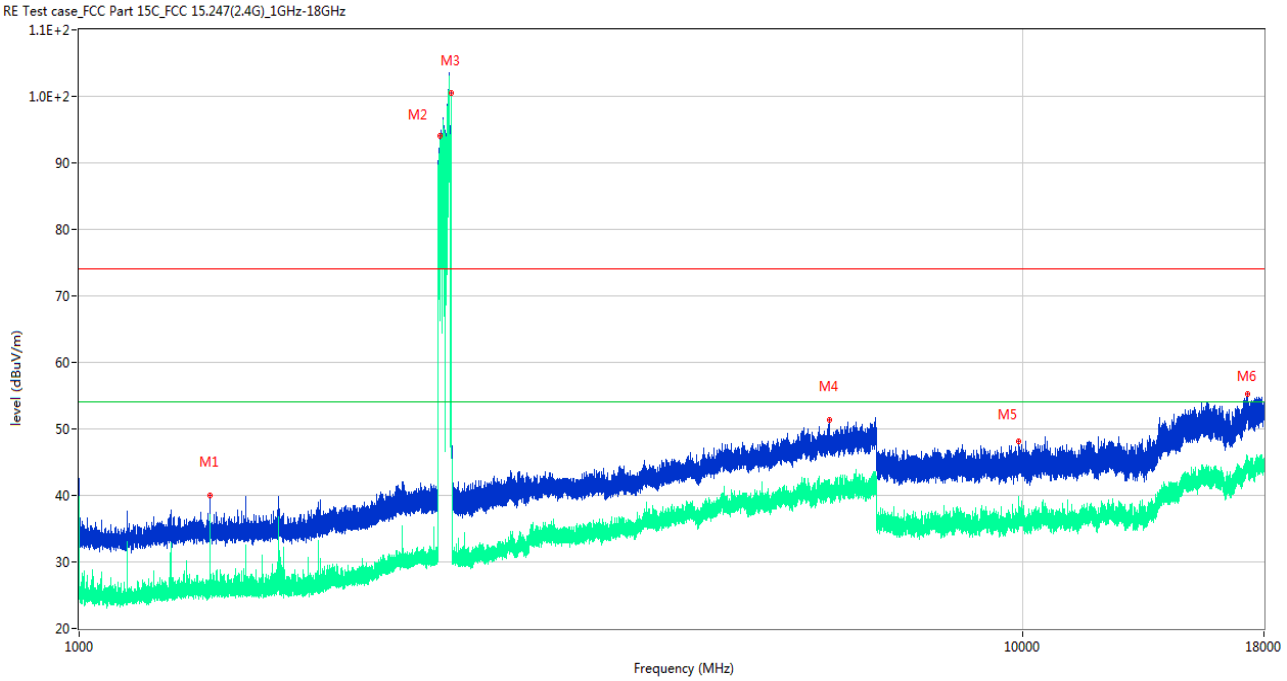
8-DPSK HIGH CHANNEL 1 GHz to 18 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2199.700	48.06	-10.88	74.0	-25.94	Peak	273.00	150	Vertical	Pass
1**	2199.700	29.95	-10.88	54.0	-24.05	AV	273.00	150	Vertical	Pass
2	2480.000	100.56	-10.35	74.0	26.56	Peak	79.00	150	Vertical	N/A
2**	2480.000	98.12	-10.35	54.0	44.12	AV	79.00	150	Vertical	N/A
3	4644.600	46.81	-1.81	74.0	-27.19	Peak	207.00	150	Vertical	Pass
3**	4644.600	37.29	-1.81	54.0	-16.71	AV	207.00	150	Vertical	Pass
4	6222.800	50.65	3.31	74.0	-23.35	Peak	266.00	150	Vertical	Pass
4**	6222.800	41.20	3.31	54.0	-12.80	AV	266.00	150	Vertical	Pass
5	11623.862	48.98	20.26	74.0	-25.02	Peak	70.00	150	Vertical	Pass
5**	11623.862	36.53	20.26	54.0	-17.47	AV	70.00	150	Vertical	Pass
6	17842.500	56.78	24.08	74.0	-17.22	Peak	51.00	150	Vertical	Pass
6**	17842.500	44.29	24.08	54.0	-9.71	AV	51.00	150	Vertical	Pass

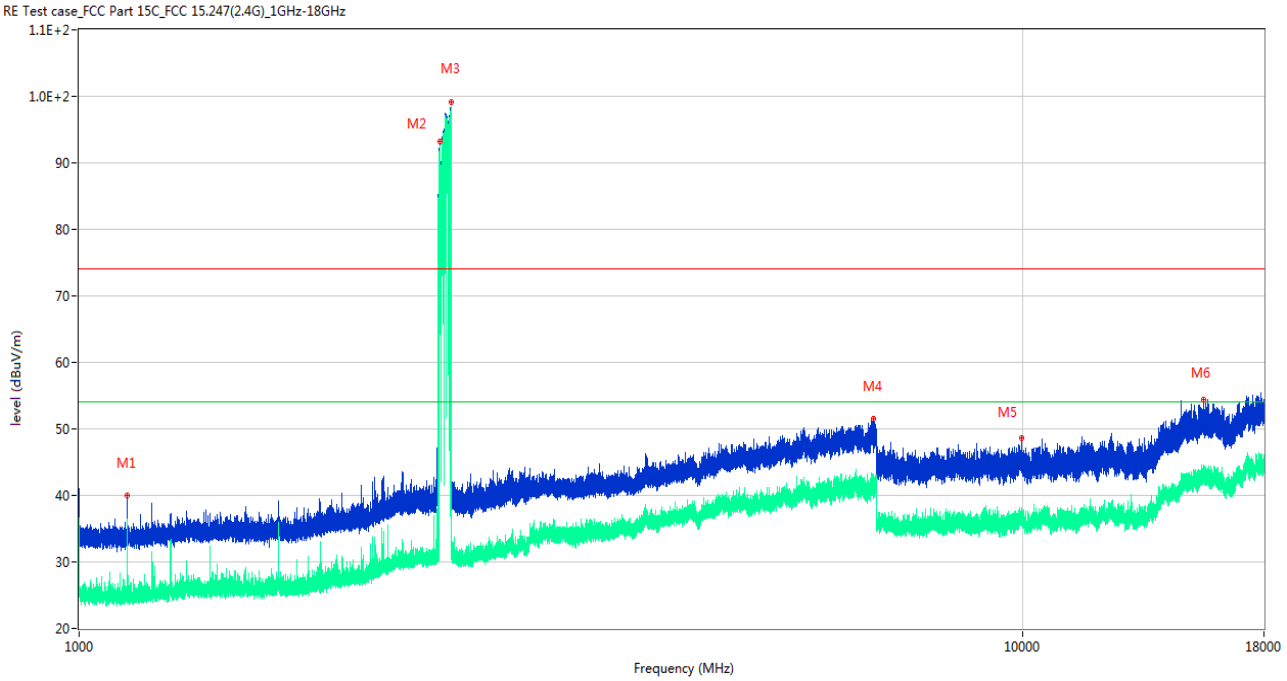
Hopping Mode:

GFSK MODE 1 GHz to 18 GHz, ANT H



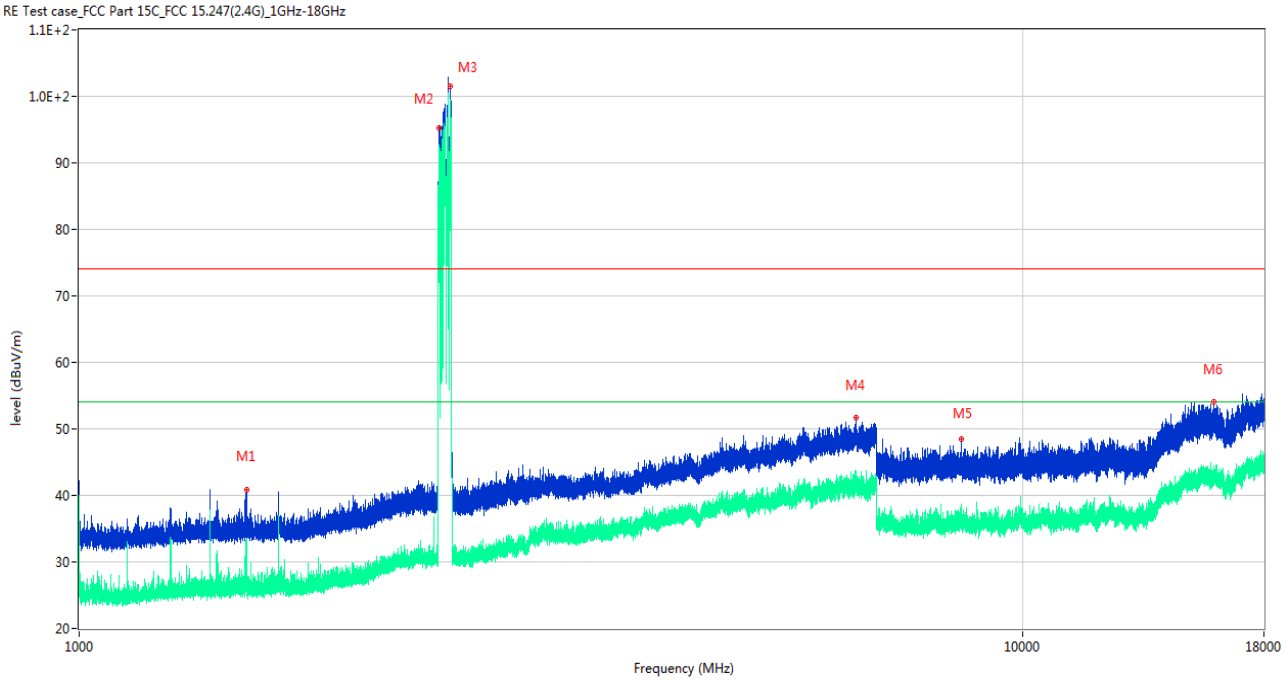
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1375.000	40.03	-15.02	74.0	-33.97	Peak	60.00	150	Horizontal	Pass
1**	1375.000	36.05	-15.02	54.0	-17.95	AV	60.00	150	Horizontal	Pass
2	2413.800	94.02	-10.09	74.0	20.02	Peak	67.00	150	Horizontal	N/A
2**	2413.800	92.49	-10.09	54.0	38.49	AV	67.00	150	Horizontal	N/A
3	2479.900	100.50	-10.36	74.0	26.50	Peak	51.00	150	Horizontal	N/A
3**	2479.900	98.99	-10.36	54.0	44.99	AV	51.00	150	Horizontal	N/A
4	6232.800	51.31	3.62	74.0	-22.69	Peak	80.00	150	Horizontal	Pass
4**	6232.800	40.62	3.62	54.0	-13.38	AV	80.00	150	Horizontal	Pass
5	9889.950	48.13	17.68	74.0	-25.87	Peak	329.00	150	Horizontal	Pass
5**	9889.950	37.11	17.68	54.0	-16.89	AV	329.00	150	Horizontal	Pass
6	17290.988	55.24	24.55	74.0	-18.76	Peak	226.00	150	Horizontal	Pass
6**	17290.988	44.53	24.55	54.0	-9.47	AV	226.00	150	Horizontal	Pass

GFSK MODE 1 GHz to 18 GHz, ANT V



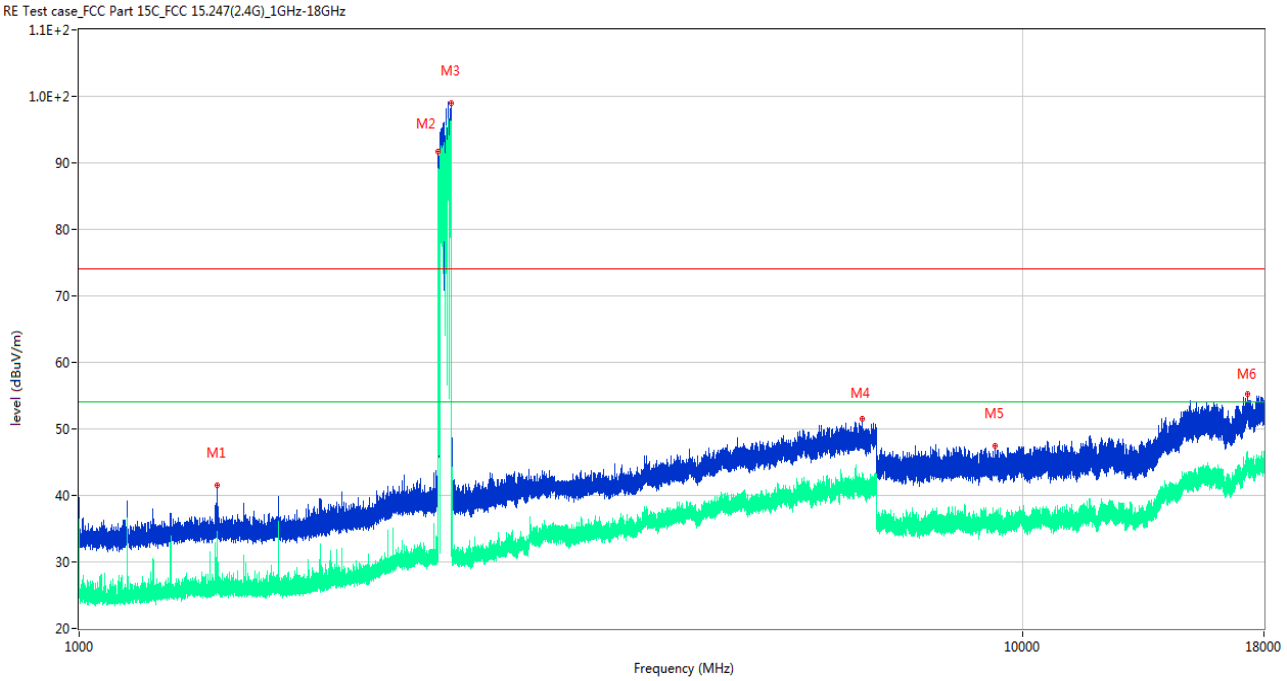
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1125.100	39.99	-15.34	74.0	-34.01	Peak	295.00	150	Vertical	Pass
1**	1125.100	36.38	-15.34	54.0	-17.62	AV	295.00	150	Vertical	Pass
2	2411.800	93.21	-10.33	74.0	19.21	Peak	88.00	150	Vertical	N/A
2**	2411.800	91.25	-10.33	54.0	37.25	AV	88.00	150	Vertical	N/A
3	2475.800	99.21	-10.49	74.0	25.21	Peak	107.00	150	Vertical	N/A
3**	2475.800	96.72	-10.49	54.0	42.72	AV	107.00	150	Vertical	N/A
4	6951.400	51.46	4.32	74.0	-22.54	Peak	230.00	150	Vertical	Pass
4**	6951.400	40.88	4.32	54.0	-13.12	AV	230.00	150	Vertical	Pass
5	9959.525	48.65	17.80	74.0	-25.35	Peak	34.00	150	Vertical	Pass
5**	9959.525	37.18	17.80	54.0	-16.82	AV	34.00	150	Vertical	Pass
6	15528.300	54.42	23.74	74.0	-19.58	Peak	-1.00	150	Vertical	Pass
6**	15528.300	44.11	23.74	54.0	-9.89	AV	-1.00	150	Vertical	Pass

8-DPSK MODE 1 GHz to 18 GHz, ANT H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1504.000	40.92	-15.05	74.0	-33.08	Peak	43.00	150	Horizontal	Pass
1**	1504.000	31.54	-15.05	54.0	-22.46	AV	43.00	150	Horizontal	Pass
2	2406.000	95.26	-10.76	74.0	21.26	Peak	92.00	150	Horizontal	N/A
2**	2406.000	92.80	-10.76	54.0	38.80	AV	92.00	150	Horizontal	N/A
3	2473.900	101.55	-10.60	74.0	27.55	Peak	71.00	150	Horizontal	N/A
3**	2473.900	97.99	-10.60	54.0	43.99	AV	71.00	150	Horizontal	N/A
4	6647.000	51.61	4.43	74.0	-22.39	Peak	254.00	150	Horizontal	Pass
4**	6647.000	41.50	4.43	54.0	-12.50	AV	254.00	150	Horizontal	Pass
5	8603.675	48.51	18.25	74.0	-25.49	Peak	303.00	150	Horizontal	Pass
5**	8603.675	35.20	18.25	54.0	-18.80	AV	303.00	150	Horizontal	Pass
6	15937.275	54.01	23.87	74.0	-19.99	Peak	-3.00	150	Horizontal	Pass
6**	15937.275	43.22	23.87	54.0	-10.78	AV	-3.00	150	Horizontal	Pass

8-DPSK MODE 1 GHz to 18 GHz, ANT V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1401.000	41.49	-14.90	74.0	-32.51	Peak	44.00	150	Vertical	Pass
1**	1401.000	32.52	-14.90	54.0	-21.48	AV	44.00	150	Vertical	Pass
2	2401.900	91.64	-10.74	74.0	17.64	Peak	64.00	150	Vertical	N/A
2**	2401.900	88.67	-10.74	54.0	34.67	AV	64.00	150	Vertical	N/A
3	2476.100	98.93	-10.48	74.0	24.93	Peak	74.00	150	Vertical	N/A
3**	2476.100	95.11	-10.48	54.0	41.11	AV	74.00	150	Vertical	N/A
4	6757.400	51.45	4.27	74.0	-22.55	Peak	323.00	150	Vertical	Pass
4**	6757.400	41.65	4.27	54.0	-12.35	AV	323.00	150	Vertical	Pass
5	9351.175	47.39	17.12	74.0	-26.61	Peak	69.00	150	Vertical	Pass
5**	9351.175	34.93	17.12	54.0	-19.07	AV	69.00	150	Vertical	Pass
6	17294.399	55.21	24.57	74.0	-18.79	Peak	-1.00	150	Vertical	Pass
6**	17294.399	44.86	24.57	54.0	-9.14	AV	-1.00	150	Vertical	Pass

A.9 Band Edge (Restricted-band band-edge)

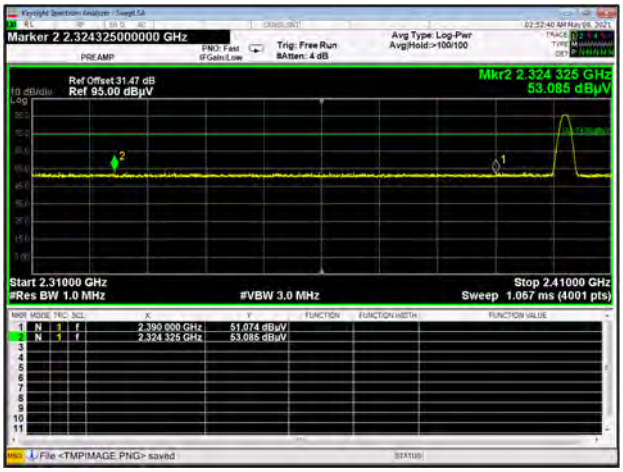
Note [1]: The lowest and highest channels are tested to verify the band edge emissions. Please refer to the following the plots for emissions values.
Note [2]: The test data all are tested in the vertical and horizontal antenna which the trace is max hold. So these plots have shown the worst case.
Note [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.

AP Module
Test Data

Test Mode	Test Channel	Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Margin (dB)	Remark	Verdict
GFSK	Low	2390.00	53.085	31.47	74	20.915	PEAK	Pass
		2390.00	N/A	N/A	54	N/A	AVERAGE	Pass
GFSK	HIGH	2483.50	56.896	31.40	74	17.104	PEAK	Pass
		2483.50	44.609	31.40	54	9.391	AVERAGE	Pass
8-DPSK	Low	2390.00	52.997	31.47	74	21.003	PEAK	Pass
		2390.00	N/A	N/A	54	N/A	AVERAGE	Pass
8-DPSK	HIGH	2483.50	54.311	31.40	74	19.689	PEAK	Pass
		2483.50	43.459	31.40	54	10.541	AVERAGE	Pass
GFSK(Hopping)	Low	2390.00	53.634	31.47	74	20.366	PEAK	Pass
		2390.00	N/A	N/A	54	N/A	AVERAGE	Pass
GFSK(Hopping)	HIGH	2483.50	53.437	31.40	74	20.563	PEAK	Pass
		2483.50	N/A	N/A	54	N/A	AVERAGE	Pass
8-DPSK (Hopping)	Low	2390.00	52.955	31.47	74	21.045	PEAK	Pass
		2390.00	N/A	N/A	54	N/A	AVERAGE	Pass
8-DPSK (Hopping)	HIGH	2483.50	52.839	31.40	74	21.161	PEAK	Pass
		2483.50	N/A	N/A	54	N/A	AVERAGE	Pass

Test Plots

GFSK LOW CHANNEL, PEAK

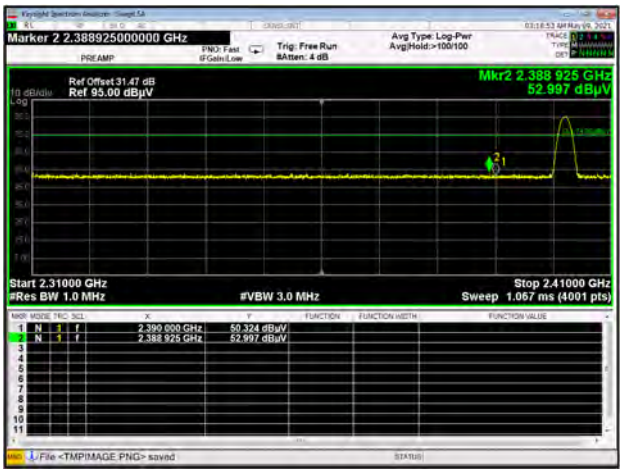


GFSK HIGH CHANNEL, PEAK

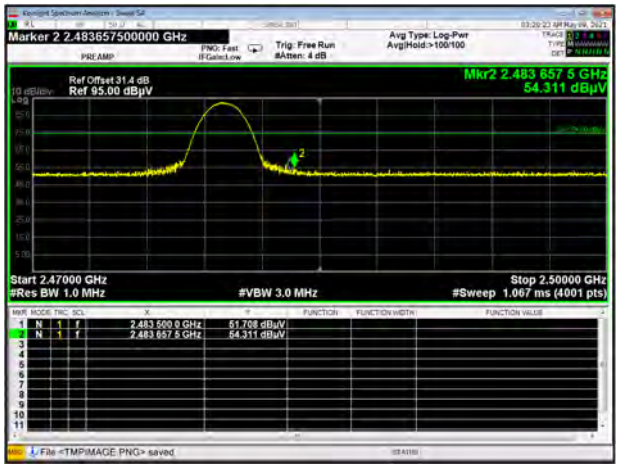
GFSK HIGH CHANNEL, AV

GFSK HIGH CHANNEL, AV

8-DPSK LOW CHANNEL, PEAK



8-DPSK HIGH CHANNEL, PEAK



8-DPSK HIGH CHANNEL, AV

Hopping Mode:

GFSK LOW FREQUENCY BAND, PEAK

GFSK HIGH FREQUENCY BAND, PEAK

8-DPSK LOW FREQUENCY BAND, PEAK

8-DPSK HIGH FREQUENCY BAND, PEAK

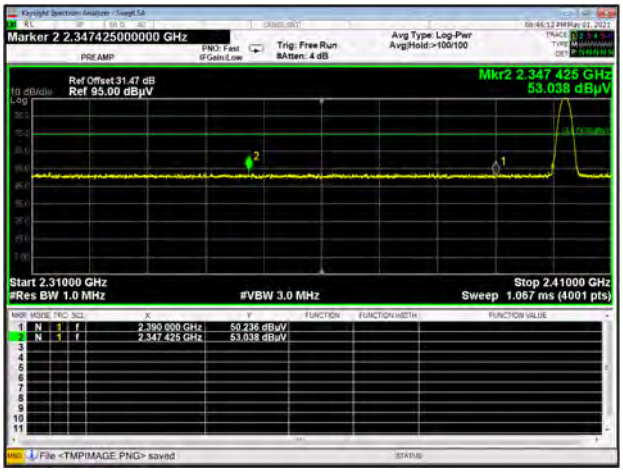
ESP Module

Test Data

Test Mode	Test Channel	Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Margin (dB)	Remark	Verdict
GFSK	Low	2390.00	53.038	31.47	74	20.962	PEAK	Pass
		2390.00	N/A	N/A	54	N/A	AVERAGE	Pass
GFSK	HIGH	2483.50	53.151	31.40	74	20.849	PEAK	Pass
		2483.50	N/A	N/A	54	N/A	AVERAGE	Pass
8-DPSK	Low	2390.00	53.379	31.47	74	20.621	PEAK	Pass
		2390.00	N/A	N/A	54	N/A	AVERAGE	Pass
8-DPSK	HIGH	2483.50	53.847	31.40	74	20.153	PEAK	Pass
		2483.50	N/A	N/A	54	N/A	AVERAGE	Pass
GFSK(Hopping)	Low	2390.00	53.115	31.47	74	20.885	PEAK	Pass
		2390.00	N/A	N/A	54	N/A	AVERAGE	Pass
GFSK(Hopping)	HIGH	2483.50	53.082	31.40	74	20.918	PEAK	Pass
		2483.50	N/A	N/A	54	N/A	AVERAGE	Pass
8-DPSK (Hopping)	Low	2390.00	52.831	31.47	74	21.169	PEAK	Pass
		2390.00	N/A	N/A	54	N/A	AVERAGE	Pass
8-DPSK (Hopping)	HIGH	2483.50	52.605	31.40	74	21.395	PEAK	Pass
		2483.50	N/A	N/A	54	N/A	AVERAGE	Pass

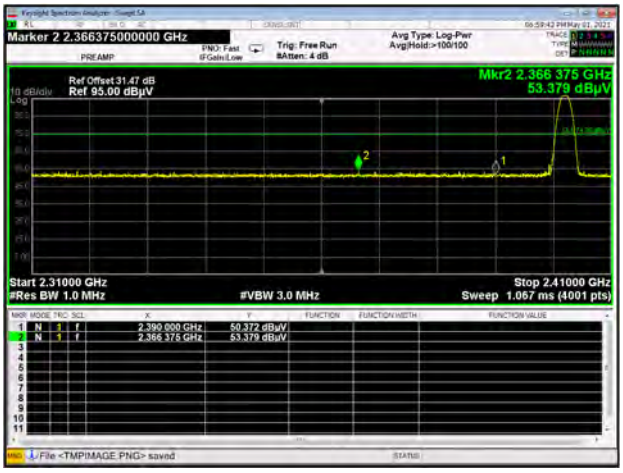
Test Plots

GFSK LOW CHANNEL, PEAK



GFSK HIGH CHANNEL, PEAK

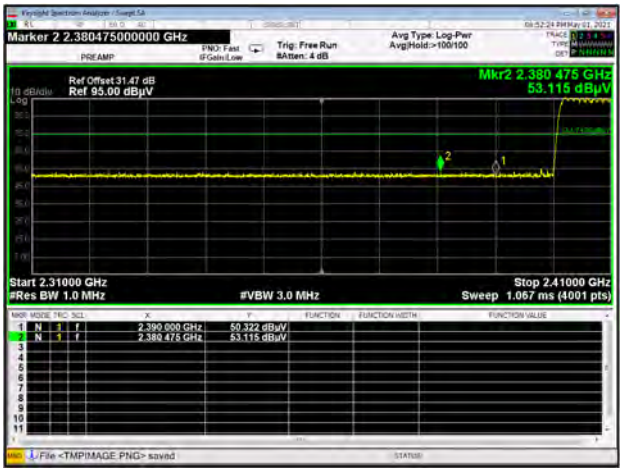
8-DPSK LOW CHANNEL, PEAK



8-DPSK HIGH CHANNEL, PEAK

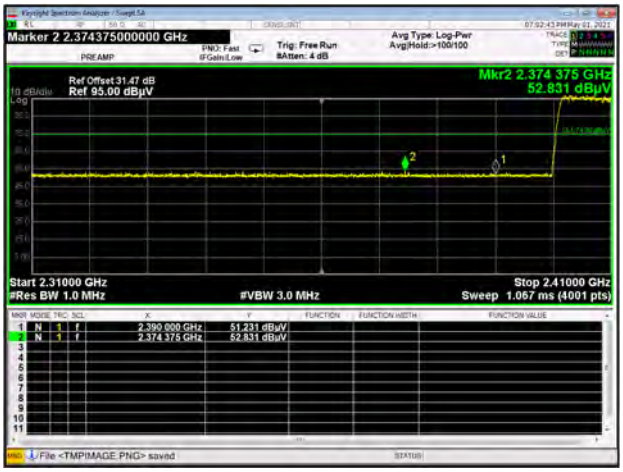
Hopping Mode:

GFSK LOW FREQUENCY BAND, PEAK



GFSK HIGH FREQUENCY BAND, PEAK

8-DPSK LOW FREQUENCY BAND, PEAK



8-DPSK HIGH FREQUENCY BAND, PEAK

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ2140589-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ2140589-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ2140589-AI.PDF”.

--END OF REPORT--