CFR 47 FCC PART 15 SUBPART C
ISED RSS-247 ISSUE 2

CERTIFICATION TEST REPORT

For

Bluetooth Headset

MODEL NUMBER: JR310BT

FCC ID: APIJBLJR310BT

IC: 6132A-JBLJR310BT

REPORT NUMBER: 4789485754-5

ISSUE DATE: June 01, 2020

Prepared for

HARMAN INTERNATIONAL INDUSTRIES INC
8500 Balboa Blvd Nothridge CA 91329,UNITED STATES

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	06/01/2020	Initial Issue	

Summary of Test Results			
Clause	**Test Items**	**FCC/ISED Rules**	**Test Results**
1	20dB Bandwidth and 99% Occupied Bandwidth	FCC 15.247 (a) (1) RSS-247 Clause 5.1 (a) RSS-Gen Clause 6.7	Pass
2	Conducted Output Power	FCC 15.247 (b) (1) RSS-247 Clause 5.1 (b)	Pass
3	Carrier Hopping Channel Separation	FCC 15.247 (a) (1) RSS-247 Clause 5.1 (b)	Pass
4	Number of Hopping Frequency	15.247 (a) (1) III RSS-247 Clause 5.1 (d)	Pass
5	Time of Occupancy (Dwell Time)	15.247 (a) (1) III RSS-247 Clause 5.1 (d)	Pass
6	Conducted Bandedge	FCC 15.247 (d) RSS-247 Clause 5.5	Pass
7	Radiated Bandedge and Spurious	FCC 15.247 (d) FCC 15.209 FCC 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9 RSS-GEN Clause 8.10	Pass
8	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	Pass
9	Antenna Requirement	FCC 15.203 RSS-GEN Clause 6.8	Pass

Note:
1.This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
2.The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 15 SUBPART C >< ISED RSS-247 > when <Accuracy Method> decision rule is applied.

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: HARMAN INTERNATIONAL INDUSTRIES INC
Address: 8500 Balboa Blvd Nothridge CA 91329,UNITED STATES

Manufacturer Information

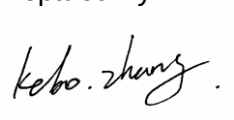
Company Name: HARMAN INTERNATIONAL INDUSTRIES INC
Address: 8500 Balboa Blvd Nothridge CA 91329,UNITED STATES

EUT Description

EUT Name: Bluetooth Headset
Model: JR310BT
Brand: JBL
Sample Received Date: May 20, 2020
Sample Status: Normal
Sample ID: 3072495
Date of Tested: May 20~29, 2020

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 FCC PART 15 SUBPART C	PASS
ISED RSS-247 Issue 2	PASS
ISED RSS-GEN Issue 5	PASS

Prepared By:



Kebo Zhang
Project Engineer

Checked By:

Shawn Wen
Laboratory Leader

Approved By:

Stephen Guo
Laboratory Manager

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part2, CFR 47 FCC Part 15, ANSI C63.10-2013, ISED RSS-247 Issue 2 and ISED RSS-GEN Issue 5.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	**A2LA (Certificate No.: 4102.01)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA. **FCC (FCC Designation No.: CN1187)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Delcaration of Conformity (DoC) and Certification rules **ISED(Company No.: 21320)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320. **VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793. Facility Name: Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B , the VCCI registration No. is C-20012 and T-20011

Note:

1. All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China.
2. The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.
3. For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30MHz had been correlated to measurements performed on an OFS.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Conduction emission	3.62dB
Radiation Emission test(include Fundamental emission) (9kHz-30MHz)	2.2dB
Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	4.00dB
Radiation Emission test (1GHz to 26GHz)(include Fundamental emission)	5.78dB (1GHz-18GHz)
	5.23dB (18GHz-26GHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name	Bluetooth Headset	
Model	JR310BT	
Product Description (Bluetooth)	Operation Frequency	2402 MHz ~ 2480 MHz
	Modulation Type	Data Rate
	GFSK	1Mbps
	∏/4-DQPSK	2Mbps
	8DPSK	3Mbps
Bluetooth Version	V5.0 BR+EDR	
Input Rating:	5.0 V DC, 1.0 A	
Battery	3.7V, 400mAh	

5.2. MAXIMUM OUTPUT POWER

Bluetooth Mode	Frequency (MHz)	Channel Number	Max PEAK Output Power (dBm)	EIRP (dBm)
GFSK	2402-2480	0-78[79]	0.18	3.50
8DPSK	2402-2480	0-78[79]	0.21	3.53

5.3. PACKET TYPE CONFIGURATION

Bluetooth Mode	Test Mode	Setting(Packet Length)
GFSK	DH1	27
	DH3	183
	DH5	339
∏/4-DQPSK	2-DH1	54
	2-DH3	367
	2-DH5	679
8DPSK	3-DH1	83
	3-DH3	552
	3-DH5	1021

5.4. CHANNEL LIST

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

5.5. TEST CHANNEL CONFIGURATION

Modulation Type	Test Channel	Frequency
GFSK	CH0, CH39, CH78/ Low, Middle, High	2402MHz, 2441MHz, 2480MHz
GFSK-Hopping mode	/	2402~2480MHz
8DPSK	CH0, CH39, CH78/ Low, Middle, High	2402MHz, 2441MHz, 2480MHz
8DPSK - Hopping mode	/	2402~2480MHz

5.6. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band				
Test Software		Non Signaling Test Tool		
Modulation Type	Transmit Antenna Number	Test Software setting value		
		CH 0	CH 39	CH 78
GFSK	1	1	1	1
8DPSK	1	1	1	1

5.7. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)
1	2402-2480	PCB Antenna	3.32

Note: The value of the antenna gain was declared by customer.

5.8. WORST-CASE CONFIGURATIONS

Bluetooth Mode	Modulation Technology	Modulation Type	Data Rate (Mbps)
BR	FHSS	GFSK(DH5)	1Mbit/s
EDR	FHSS	8DPSK(3DH5)	3Mbit/s

Note: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.

5.9. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	45 ~ 70%	
Atmospheric Pressure:	101kPa	
Temperature	TN	22 ~ 28 °C
Voltage:	VL	N/A
	VN	DC 3.7V
	VH	N/A

Note: VL= Lower Extreme Test Voltage
VN= Nominal Voltage.
VH= Upper Extreme Test Voltage
TN= Normal Temperature

5.10. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	Laptop	Lenovo	TP00094A	/
2	UART	/	/	/

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	TYPE C	/	1.0	/

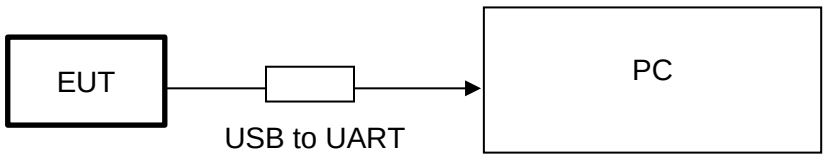
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	/	/	/	/

TEST SETUP

The EUT can work in an engineer mode with software through a PC.

SETUP DIAGRAM FOR TESTS



6. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions						
Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	EMI Test Receiver	R&S	ESR3	101961	Dec.05,2019	Dec.05,2020
☑	Two-Line V-Network	R&S	ENV216	101983	Dec.05,2019	Dec.05,2020
☑	Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Dec.05,2019	Dec.05,2020
Software						
Used	Description		Manufacturer	Name	Version	
☑	Test Software for Conducted disturbance		Farad	EZ-EMC	Ver. UL-3A1	
Radiated Emissions						
Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Dec.06,2019	Dec.06,2020
☑	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Sep.17, 2018	Sep.17, 2021
☑	Preamplifier	HP	8447D	2944A09099	Dec.05,2019	Dec.05,2020
☑	EMI Measurement Receiver	R&S	ESR26	101377	Dec.05,2019	Dec.05,2020
☑	Horn Antenna	TDK	HRN-0118	130939	Sep.17, 2018	Sep.17, 2021
☑	High Gain Horn Antenna	Schwarzbeck	BBHA-9170	691	Aug.11, 2018	Aug.11, 2021
☑	Preamplifier	TDK	PA-02-0118	TRS-305-00066	Dec.05,2019	Dec.05,2020
☑	Preamplifier	TDK	PA-02-2	TRS-307-00003	Dec.05,2019	Dec.05,2020
☑	Loop antenna	Schwarzbeck	1519B	00008	Jan.07, 2019	Jan.07, 2022
☑	Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	4	Dec.05,2019	Dec.05,2020
☑	High Pass Filter	Wi	WHKX10-2700-3000-18000-40SS	23	Dec.05,2019	Dec.05,2020
Software						
Used	Description		Manufacturer	Name	Version	
☑	Test Software for Radiated disturbance		Farad	EZ-EMC	Ver. UL-3A1	

Other instruments						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9030A	MY55410512	Dec.06,2019	Dec.06,2020
☑	Power Meter	Keysight	N1911A	MY55416024	Dec.06,2019	Dec.06,2020
☑	Power Sensor	Keysight	U2021XA	MY5100022	Dec.06,2019	Dec.06,2020

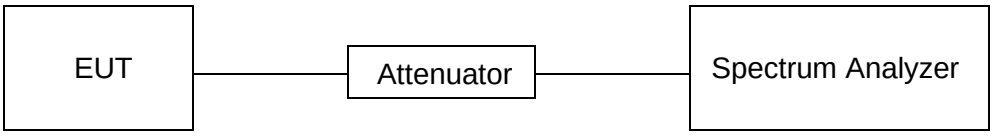
7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only

TEST SETUP



TEST ENVIRONMENT

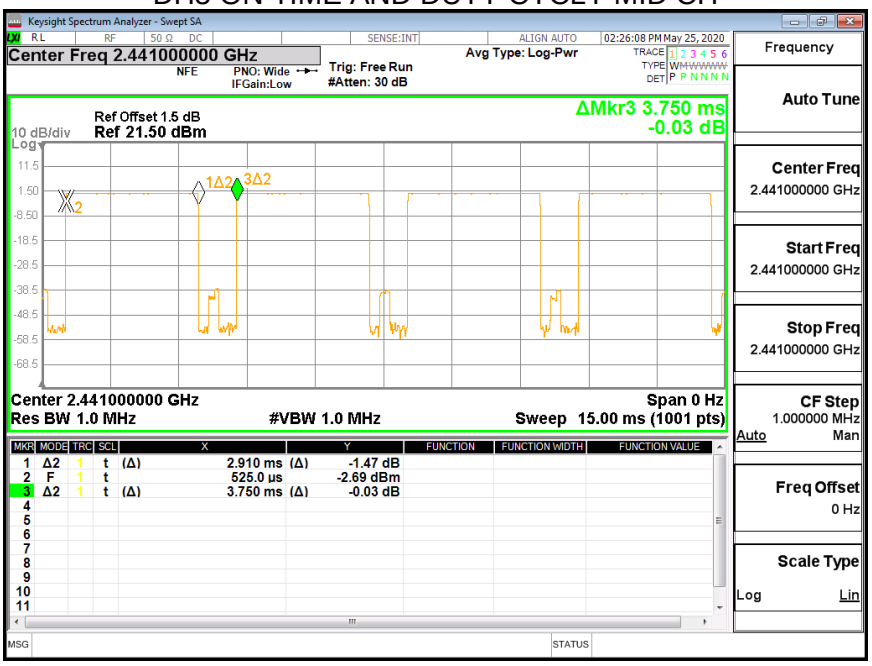
Temperature	24.0°C	Relative Humidity	67.7%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.7V

RESULTS

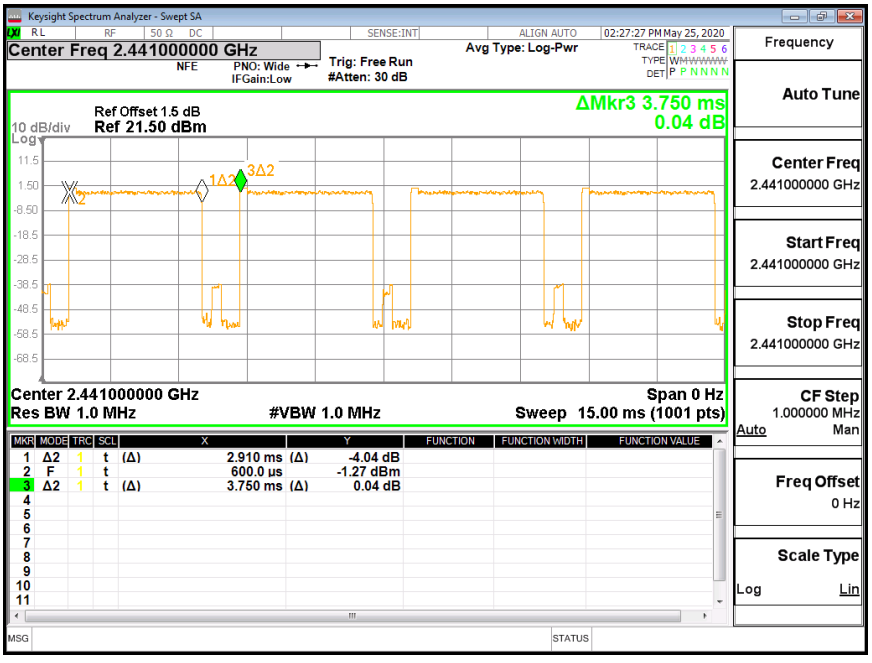
Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
GFSK	2.910	3.750	0.776	77.6%	1.10	0.34	0.5
8DPSK	2.910	3.750	0.776	77.6%	1.10	0.34	0.5

Note:
Duty Cycle Correction Factor=10log (1/x).
Where: x is Duty Cycle (Linear)
Where: T is On Time
If that calculated VBW is not available on the analyzer then the next higher value should be used.

DH5 ON TIME AND DUTY CYCLY MID CH



3DH5 ON TIME AND DUTY CYCLY MID CH



7.2. 20dB BANDWIDTH AND 99% OCCUPIED BANDWIDTH

LIMITS

CFR 47FCC Part15 (15.247) Subpart C ISED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247 (a) (1) RSS-247 Clause 5.1 (a)	20dB Occupied Bandwidth	/	2400-2483.5
ISED RSS-Gen Clause 6.7	99% Occupied Bandwidth	/	2400-2483.5

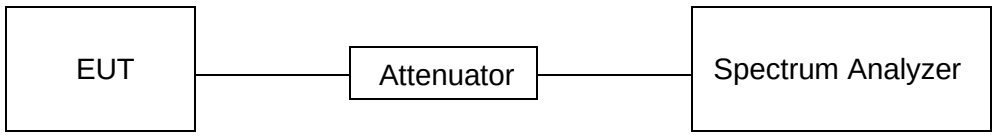
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	For 20dB:Occupied Bandwidth:1% to 5% of the 20 dB bandwidth For 99%:Occupied Bandwidth: 1% to 5% of the occupied bandwidth
VBW	For 20dB Occupied Bandwidth: approximately 3×RBW For 99% Occupied Bandwidth: ≥ 3×RBW
Span	For 20dB: between 2 times and 5 times the OBW. For 99dB: between 1.5 times and 5.0 times the OBW.
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB and 99% relative to the maximum level measured in the fundamental emission.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.0°C	Relative Humidity	67.7%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.7V

RESULTS

Please refer to Appendix A and B.

7.3. CONDUCTED OUTPUT POWER

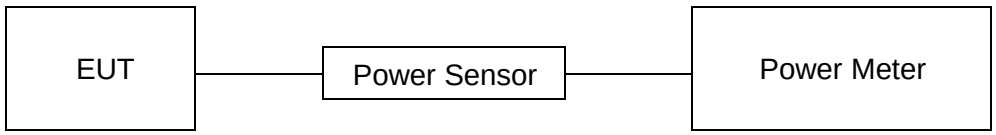
LIMITS

CFR 47 FCC Part15 (15.247) , Subpart C ISED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247 (b) (1) ISED RSS-247 Clause 5.4 (b)	Peak Conducted Output Power	Hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel : 1 watt or 30dBm; Hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel : 125 mW or 21dBm	2400-2483.5

TEST PROCEDURE

Place the EUT on the table and set it in the transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.
Measure peak power of each channel.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.0°C	Relative Humidity	67.7%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.7V

RESULTS

Please refer to Appendix C.

7.4. CARRIER HOPPING CHANNEL SEPARATION

LIMITS

CFR 47 FCC Part15 (15.247) , Subpart C ISED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247 (a) (1) ISED RSS-247 Clause 5.1 (b)	Carrier Hopping Channel Separation	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel.	2400-2483.5

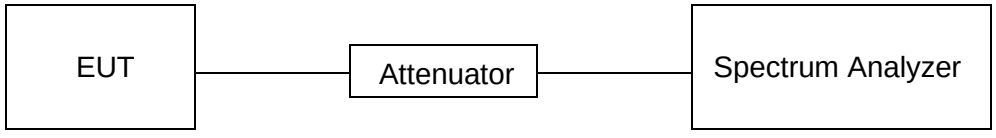
TEST PROCEDURE

Connect the UUT to the spectrum Analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Span	wide enough to capture the peaks of two adjacent channels
Detector	Peak
RBW	Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
VBW	≥RBW
Trace	Max hold
Sweep time	Auto couple

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.
Compliance of an EUT with the appropriate regulatory limit shall be determined.
A plot of the data shall be included in the test report.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.0°C	Relative Humidity	67.7%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.7V

RESULTS

Please refer to Appendix D.

7.5. NUMBER OF HOPPING FREQUENCY

LIMITS

CFR 47 FCC Part15 (15.247) , Subpart C ISED RSS-247 ISSUE 2		
Section	Test Item	Limit
CFR 47 15.247 (a) (1) III ISED RSS-247 Clause 5.1 (d)	Number of Hopping Frequency	at least 15 hopping channels

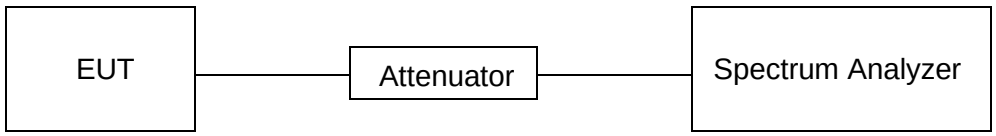
TEST PROCEDURE

Connect the EUT to the spectrum Analyzer and use the following settings:

Detector	Peak
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
Span	The frequency band of operation
Trace	Max hold
Sweep time	Auto couple

Set EUT to transmit maximum output power and switch on frequency hopping function. then set enough count time (larger than 5000 times) to get all the hopping frequency channel displayed on the screen of spectrum analyzer.
Count the quantity of peaks to get the number of hopping channels.
FHSS Mode: 79 Channels observed.
AFHSS Mode: 20 Channels declared.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.0°C	Relative Humidity	67.7%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.7V

RESULTS

Please refer to Appendix F

7.6. TIME OF OCCUPANCY (DWELL TIME)

LIMITS

CFR 47 FCC Part15 (15.247) , Subpart C ISED RSS-247 ISSUE 2		
Section	Test Item	Limit
CFR 47 15.247 (a) (1) III ISED RSS-247 Clause 5.1 (d)	Time of Occupancy (Dwell Time)	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.

TEST PROCEDURE

Connect the UUT to the spectrum Analyzer and use the following settings:

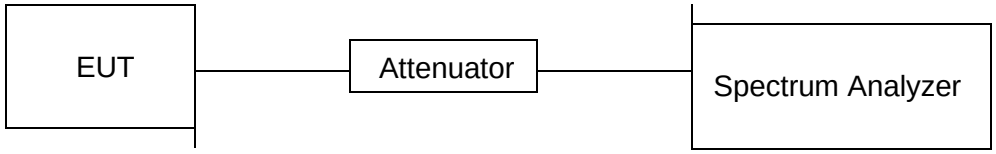
Center Frequency	The center frequency of the channel under test
Detector	Average
RBW	1MHz
VBW	≥RBW
Span	zero span
Trace	Clear Write
Sweep time	As necessary to capture the entire dwell time per hopping channel

a. The transmitter output (antenna port) was connected to the spectrum analyzer
b. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.
g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
h. Measure the maximum time duration of one single pulse.
A Period Time = (channel number)*0.4

For FHSS Mode (79 Channel):
DH1 Time Slot: Reading * (1600/2)*31.6/(channel number)
DH3 Time Slot: Reading * (1600/4)*31.6/(channel number)
DH5 Time Slot: Reading * (1600/6)*31.6/(channel number)

For AFHSS Mode (20 Channel):
DH1 Time Slot: Reading * (800/2)*8/(channel number)
DH3 Time Slot: Reading * (800/4)*8/(channel number)
DH5 Time Slot: Reading * (800/6)*8/(channel number)

TEST SETUP



TEST ENVIRONMENT

Temperature	24.0°C	Relative Humidity	67.7%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.7V

RESULTS

Please refer to Appendix E.

7.7. CONDUCTED SPURIOUS EMISSION

LIMITS

CFR 47 FCC Part15 (15.247) , Subpart C ISED RSS-247 ISSUE 2		
Section	Test Item	Limit
CFR 47 FCC §15.247 (d) ISED RSS-247 5.5	Conducted Spurious Emission	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

For Bandedge use the following settings:

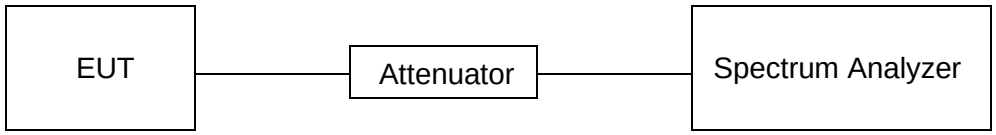
Detector	Peak
RBW	100kHz
VBW	300kHz
Span	wide enough to fully capture the emission being measured
Trace	Max hold
Sweep time	Auto couple.

For Spurious Emission use the following settings:

Detector	Peak
RBW	100kHz
VBW	300kHz
Span	wide enough to fully capture the emission being measured
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level**.**

TEST SETUP



TEST ENVIRONMENT

Temperature	24.0°C	Relative Humidity	67.7%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.7V

RESULTS

Please refer to Appendix G & H.

8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

Please refer to CFR 47 FCC §15.205 and §15.209.

Please refer to ISED RSS-GEN Clause 8.9 and Clause 8.10.

Radiation Disturbance Test Limit for FCC (Class B) (9kHz-1GHz)

Emissions radiated outside of the specified frequency bands above 30MHz			
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m	
		Quasi-Peak	
30 - 88	100	40	
88 - 216	150	43.5	
216 - 960	200	46	
Above 960	500	54	
Above 1000	500	Peak	Average
		74	54

FCC Emissions radiated outside of the specified frequency bands below 30MHz		
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30

ISED General field strength limits at frequencies below 30 MHz

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (µA/m)	Measurement distance (m)
9 - 490 kHz[Note 1]	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

ISED Restricted bands please refer to ISED RSS-GEN Clause 8.10

Table 7 – Restricted frequency bands[Note 1]		
MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 – 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 – 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 – 8500	
108 – 138		

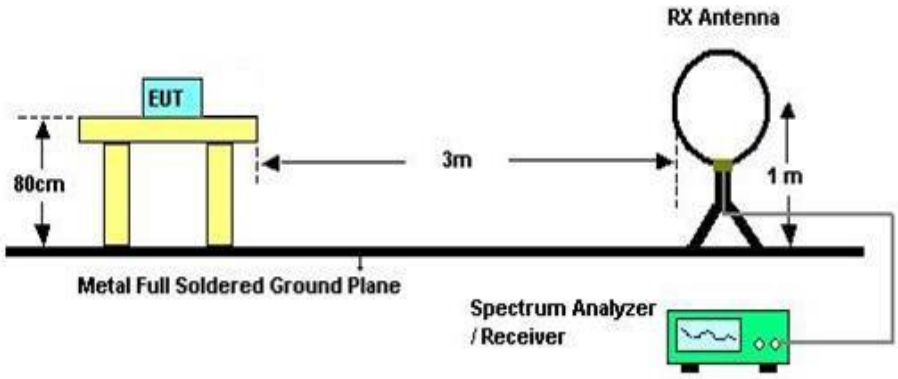
Note 1: Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

FCC Restricted bands of operation refer to FCC §15.205 (a):

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

Note: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 38.6c

TEST SETUP AND PROCEDURE
Below 30MHz



The setting of the spectrum Analyzer

RBW	200Hz (From 9kHz to 0.15MHz)/ 9kHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9kHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm meter above ground.

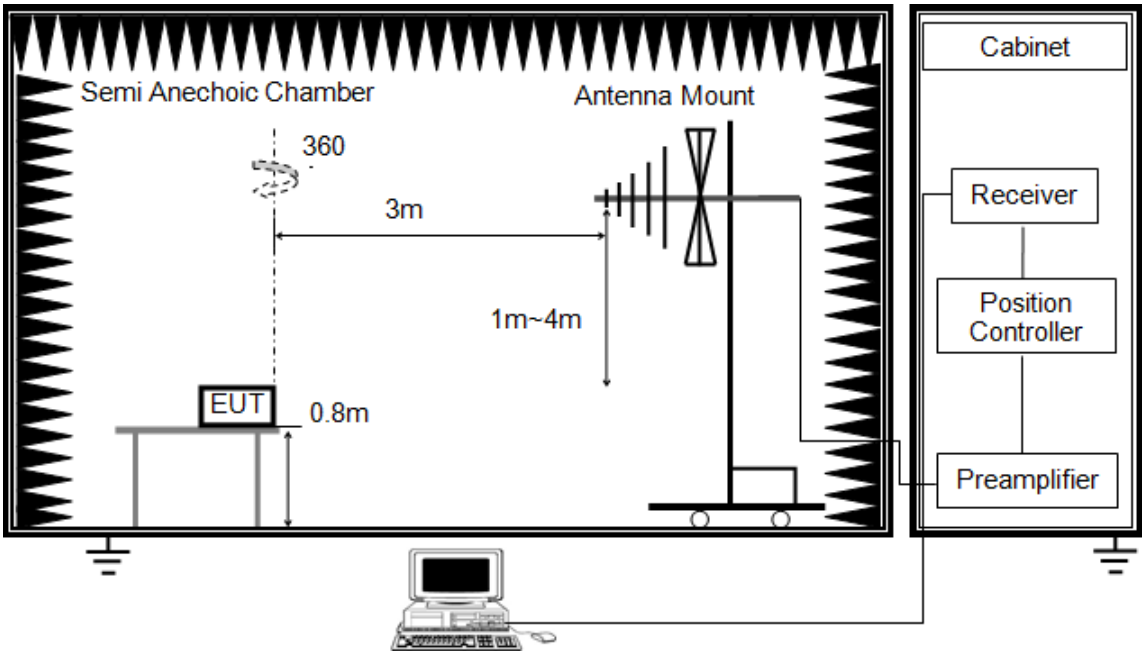
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. 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.

7. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m OFS. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Below 1G and above 30MHz



The setting of the spectrum Analyzer

RBW	120kHz
VBW	300kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

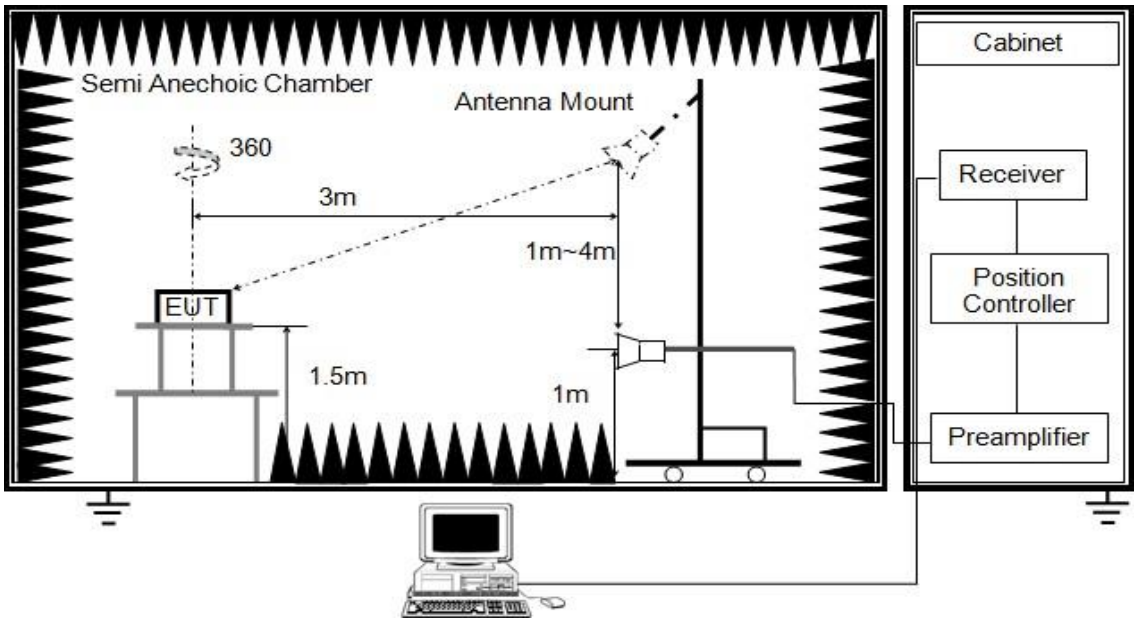
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peakdetector 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.

Above 1G



RBW	1MHz
VBW	PEAK: 3MHz AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

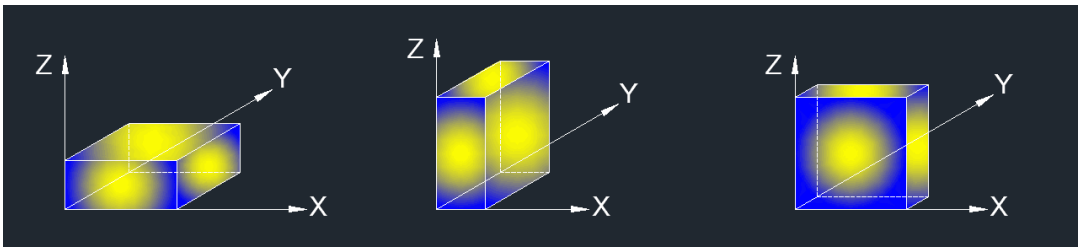
3. The EUT was placed on a turntable with 150cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector. For the Duty Cycle please refer to clause 7.1.ON TIME AND DUTY CYCLE.

X axis, Y axis, Z axis positions:



Note 1: For radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

Note 2: The EUT does not support simultaneous transmission.

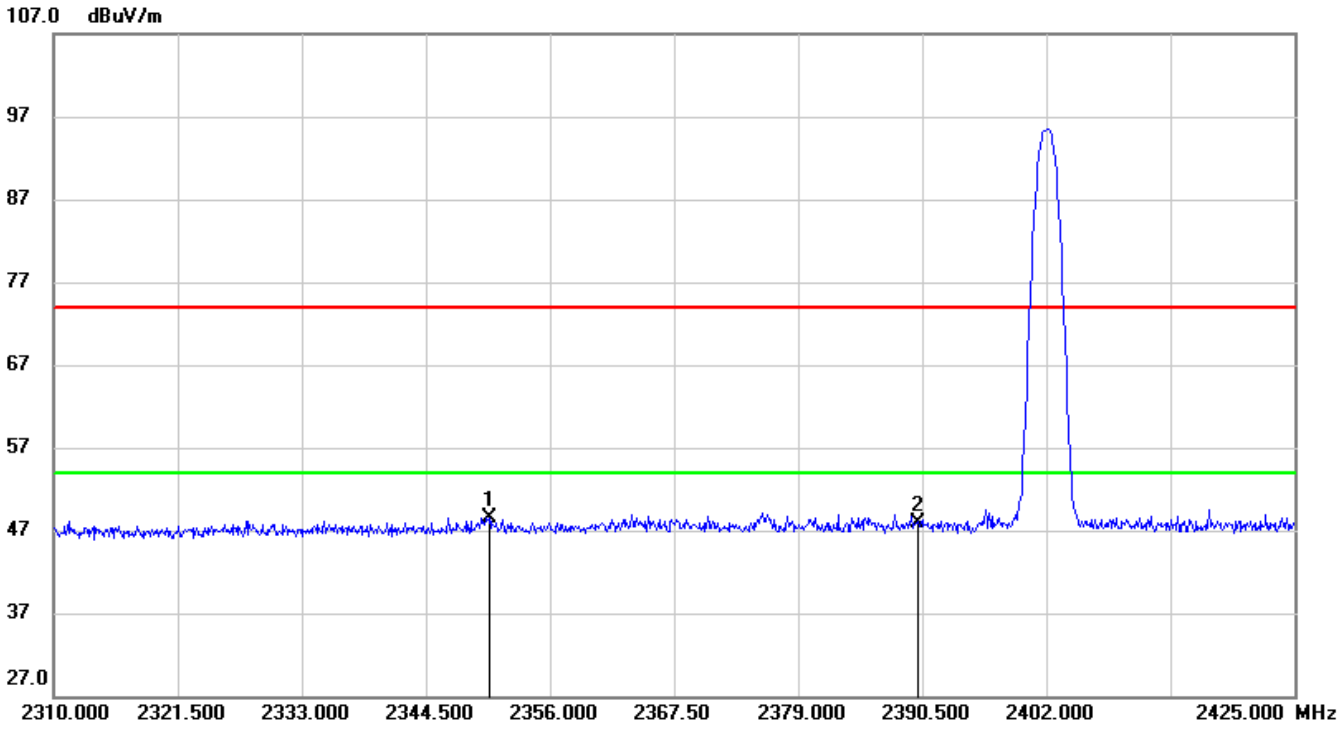
TEST ENVIRONMENT

Temperature	23.5°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.7V

8.2. RESTRICTED BANDEDGE

8.2.1. GFSK MODE

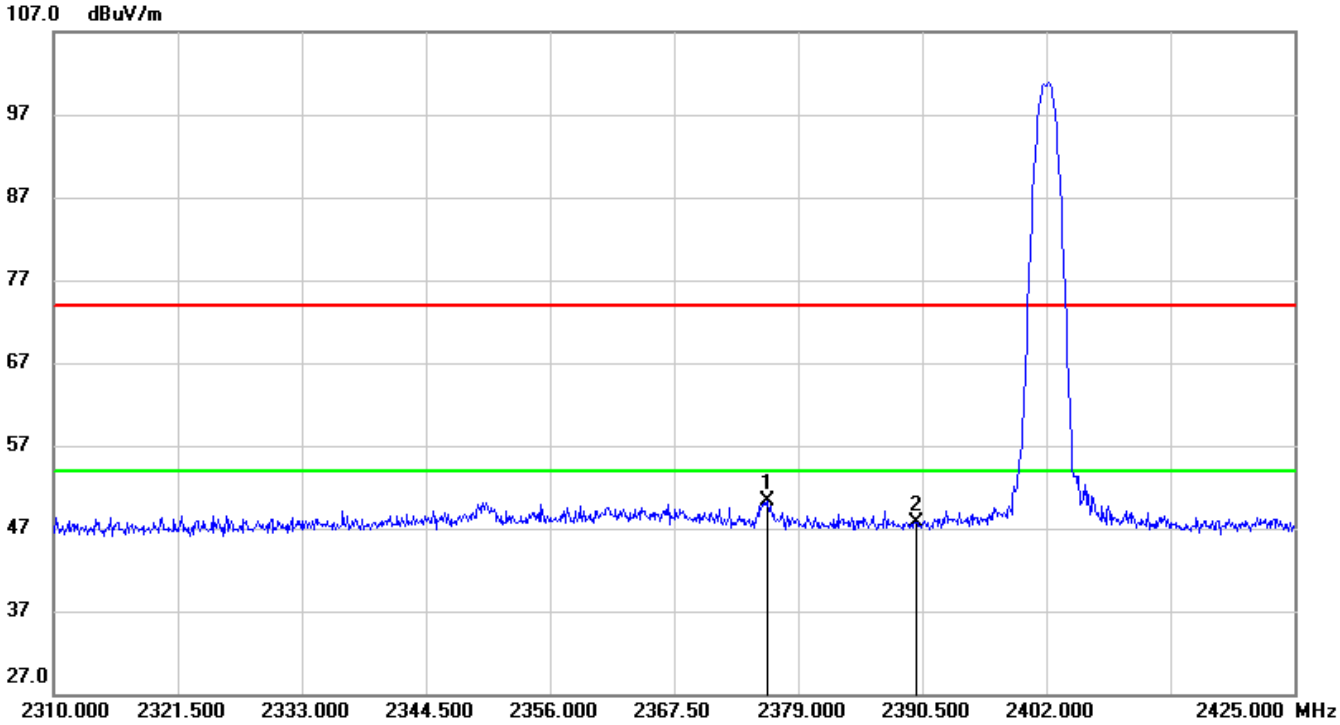
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2350.365	15.73	32.81	48.54	74.00	-25.46	peak
2	2390.000	14.92	32.94	47.86	74.00	-26.14	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

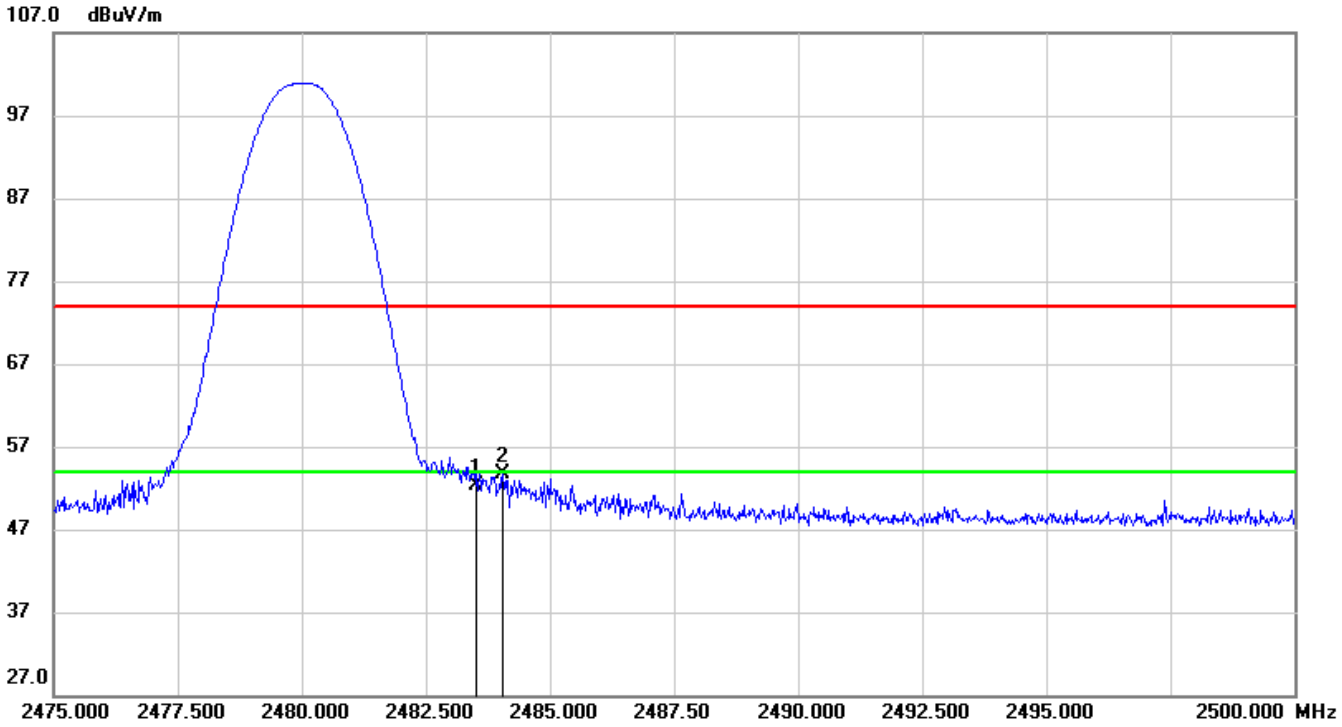


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2376.125	17.42	32.90	50.32	74.00	-23.68	peak
2	2390.000	14.77	32.94	47.71	74.00	-26.29	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2.If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3.Peak: Peak detector.
4.Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

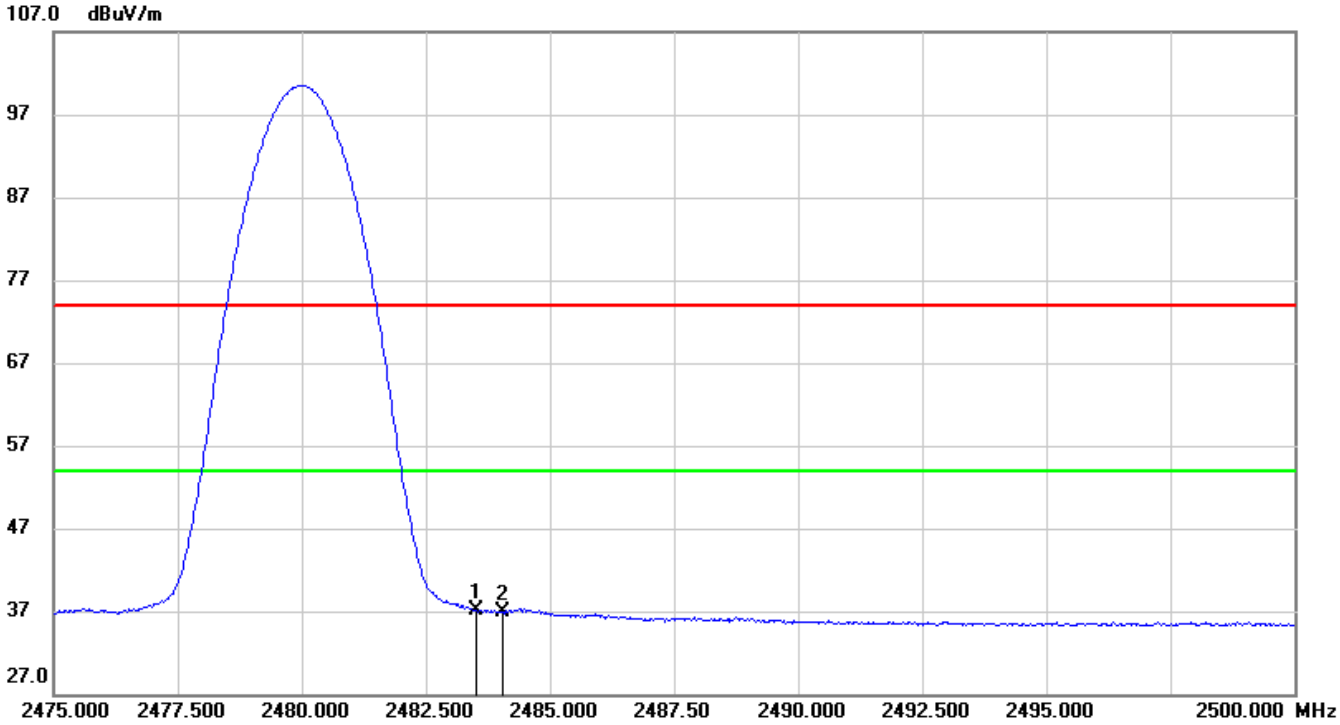
PEAK



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	18.77	33.58	52.35	74.00	-21.65	peak
2	2484.050	20.20	33.58	53.78	74.00	-20.22	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2.If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3.Peak: Peak detector.
4.Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

AVG

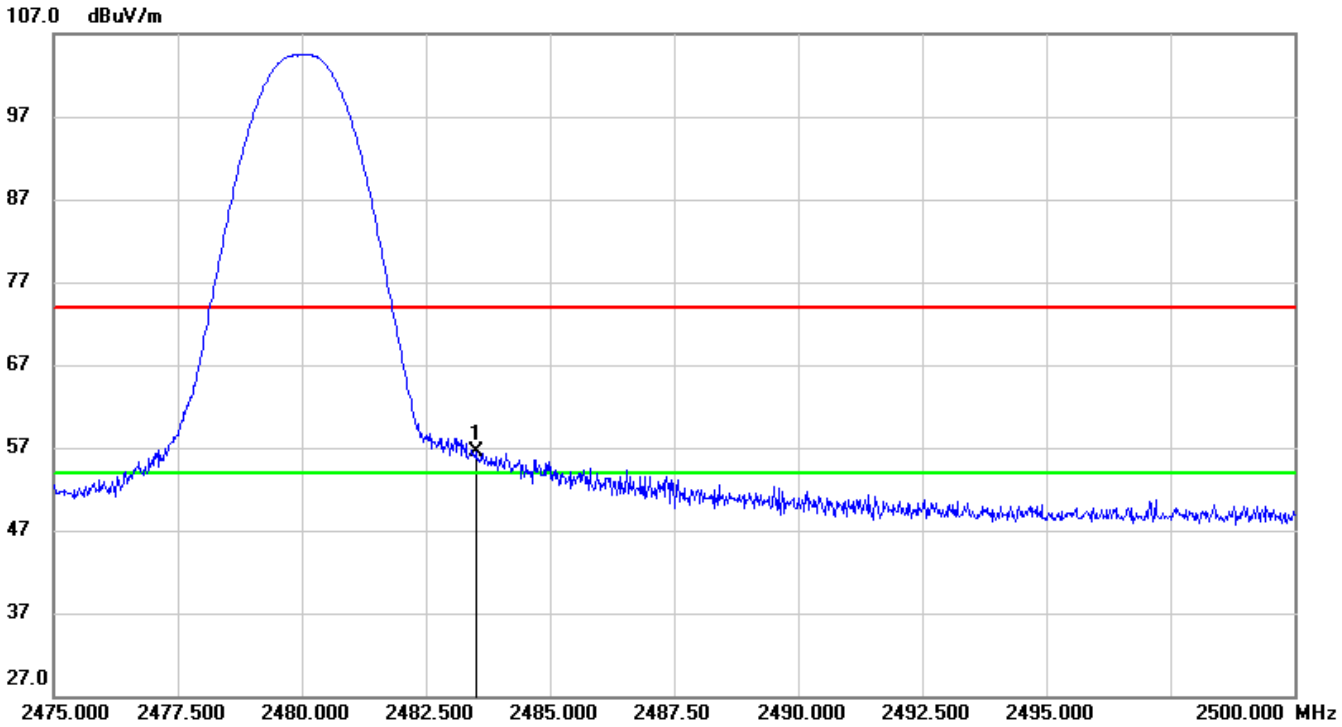


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	3.54	33.58	37.12	54.00	-16.88	AVG
2	2484.050	3.38	33.58	36.96	54.00	-17.04	AVG

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. For transmit duration, please refer to clause 7.1.
5. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

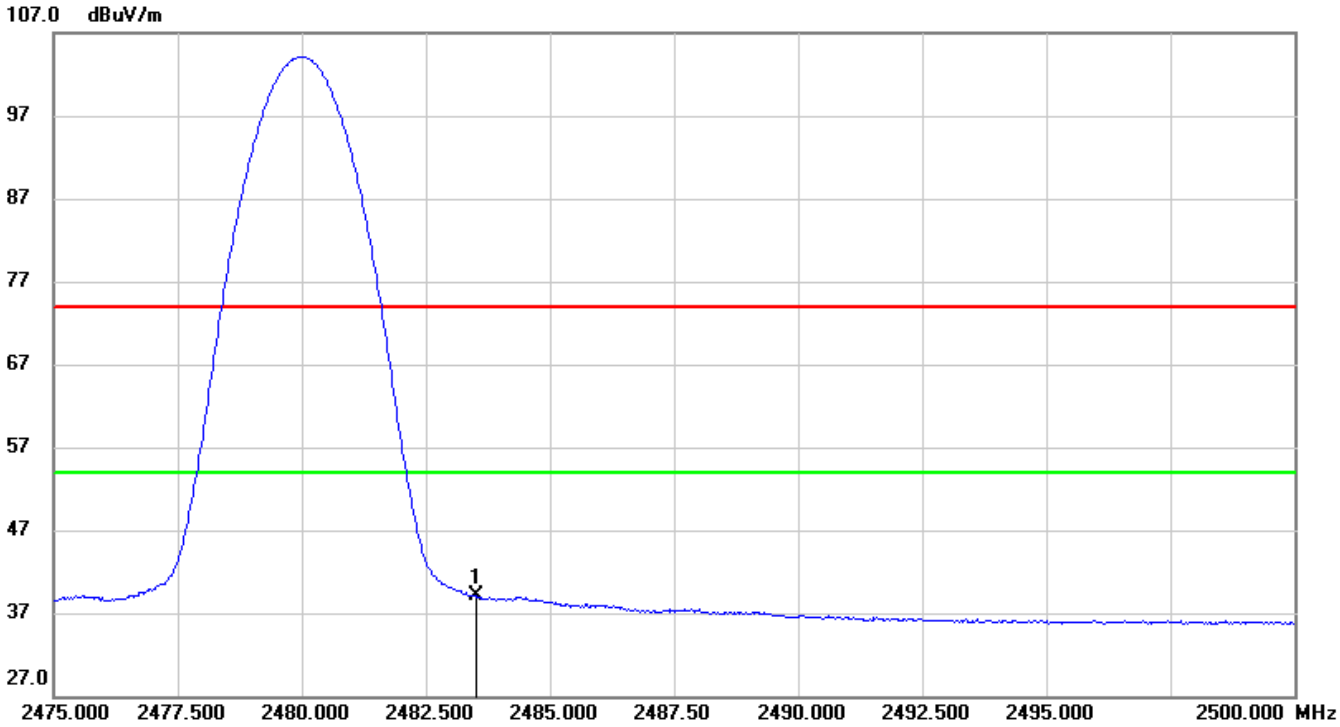
PEAK



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	22.89	33.58	56.47	74.00	-17.53	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2.If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3.Peak: Peak detector.
4.Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

AVG

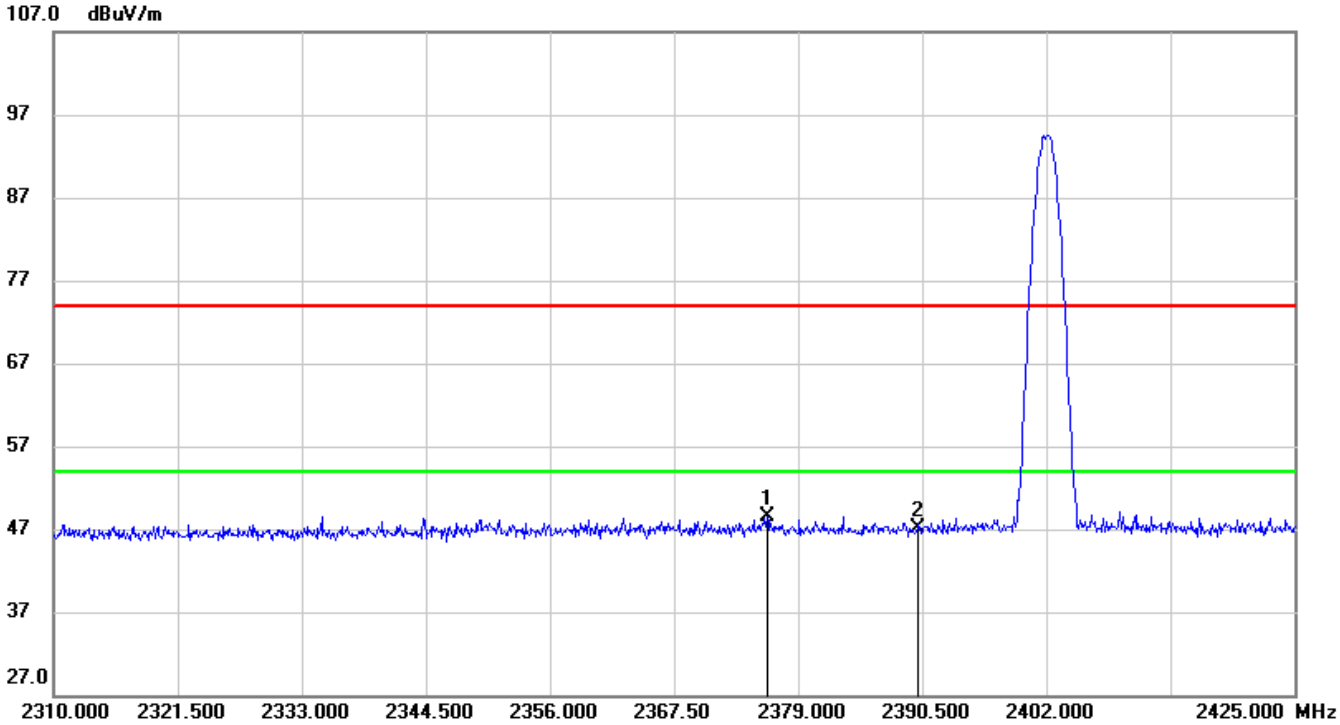


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	5.46	33.58	39.04	54.00	-14.96	AVG

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. For transmit duration, please refer to clause 7.1.
5. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

8.2.2. 8DPSK MODE

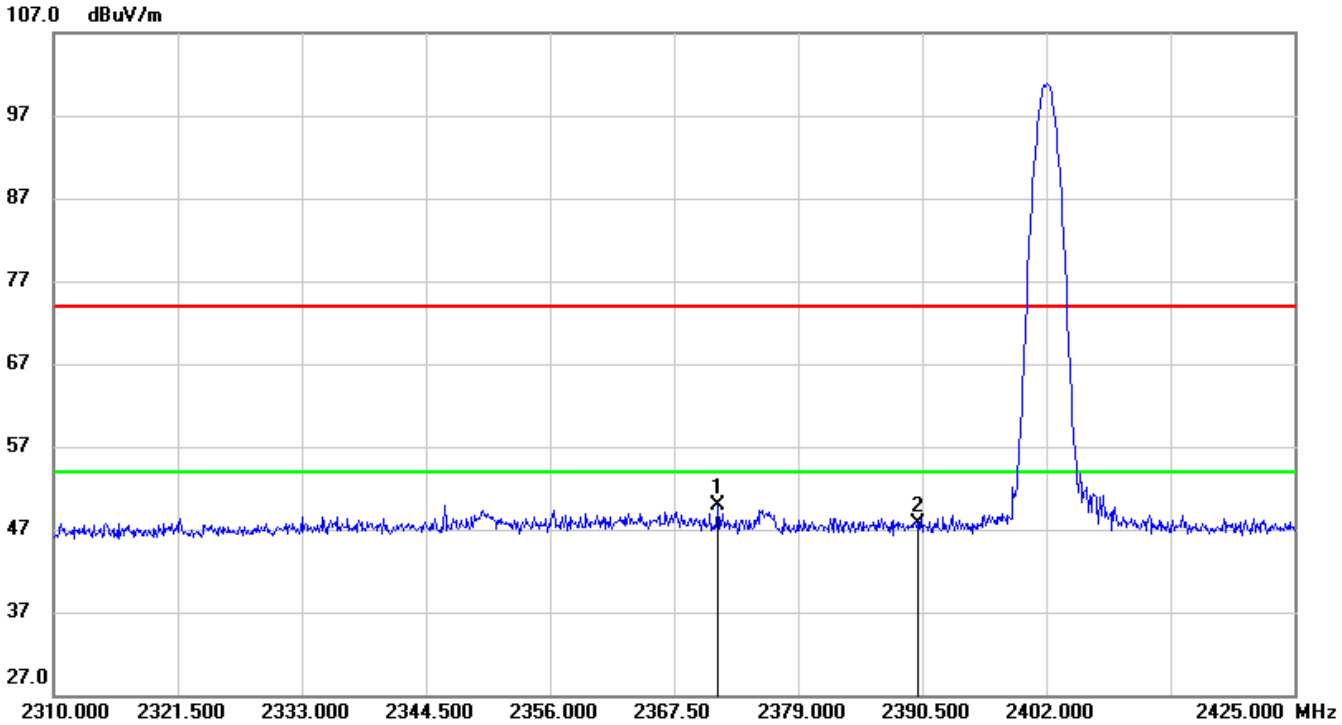
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2376.125	15.67	32.90	48.57	74.00	-25.43	peak
2	2390.000	14.22	32.94	47.16	74.00	-26.84	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

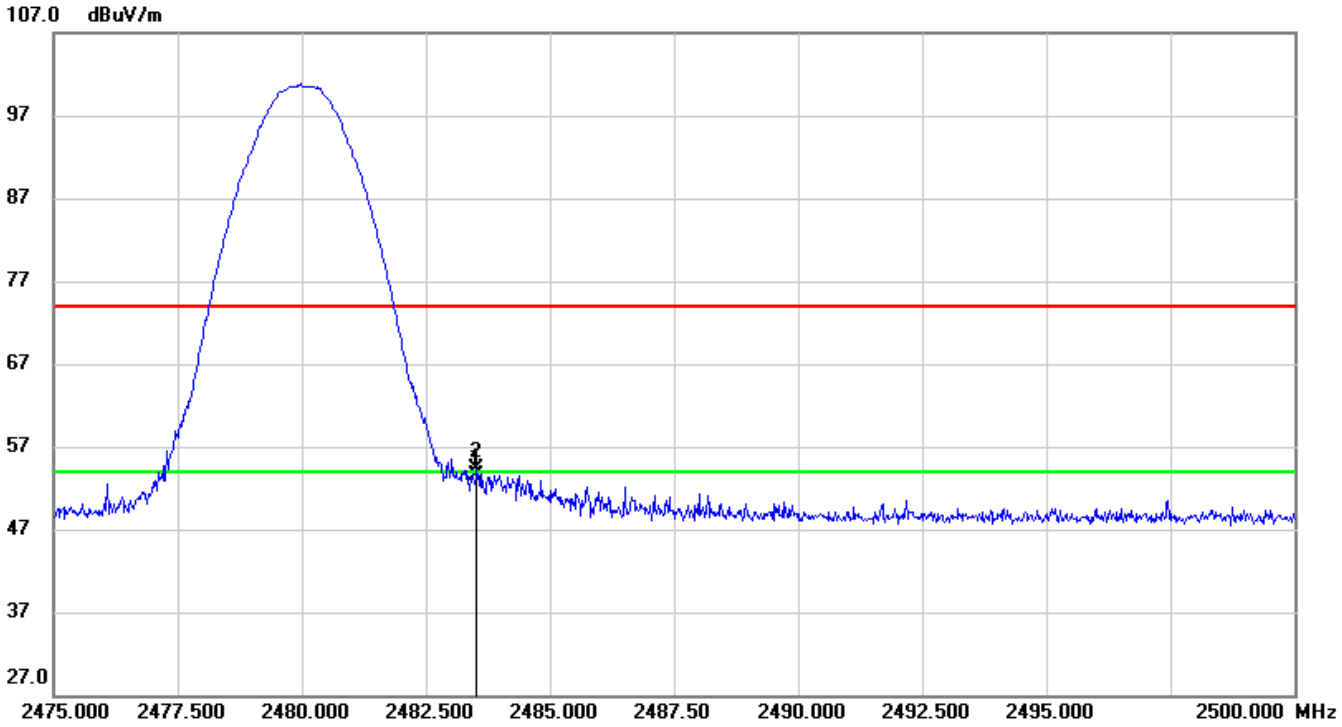


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2371.525	17.09	32.88	49.97	74.00	-24.03	peak
2	2390.000	14.84	32.94	47.78	74.00	-26.22	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

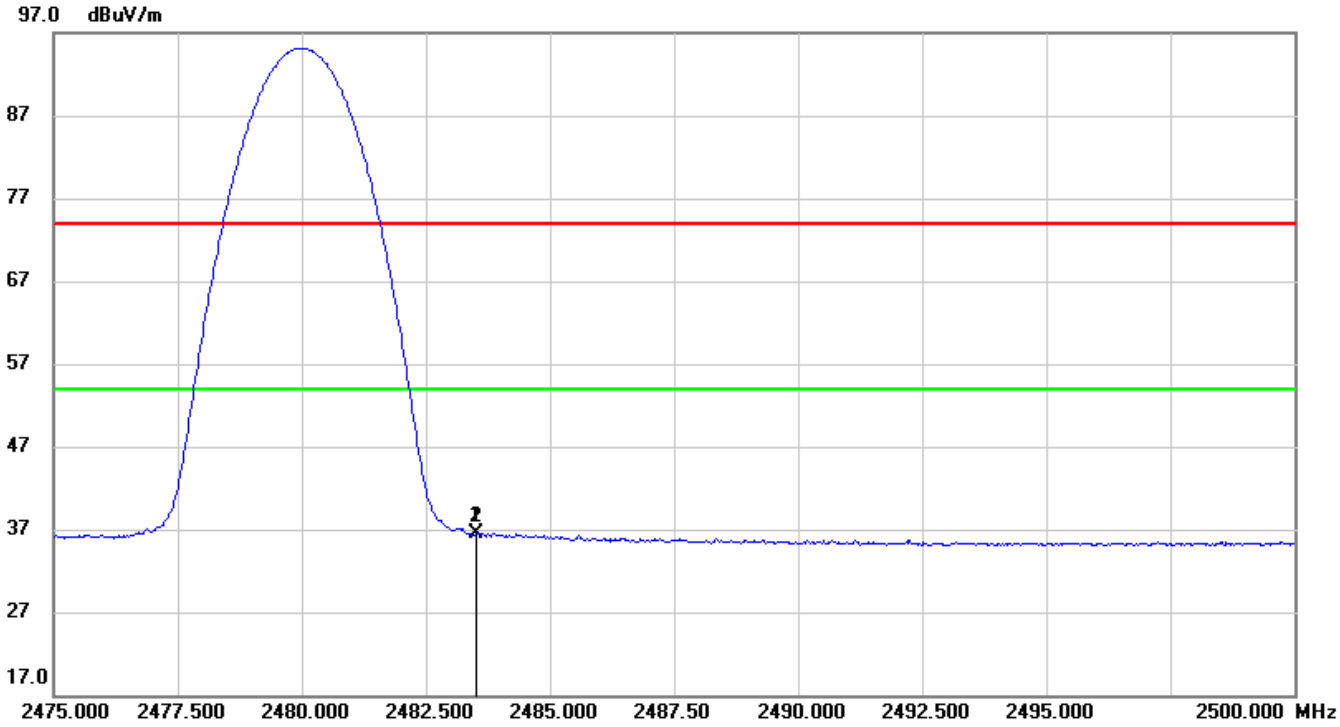
PEAK



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	19.90	33.58	53.48	74.00	-20.52	peak
2	2483.525	20.66	33.58	54.24	74.00	-19.76	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

AVG

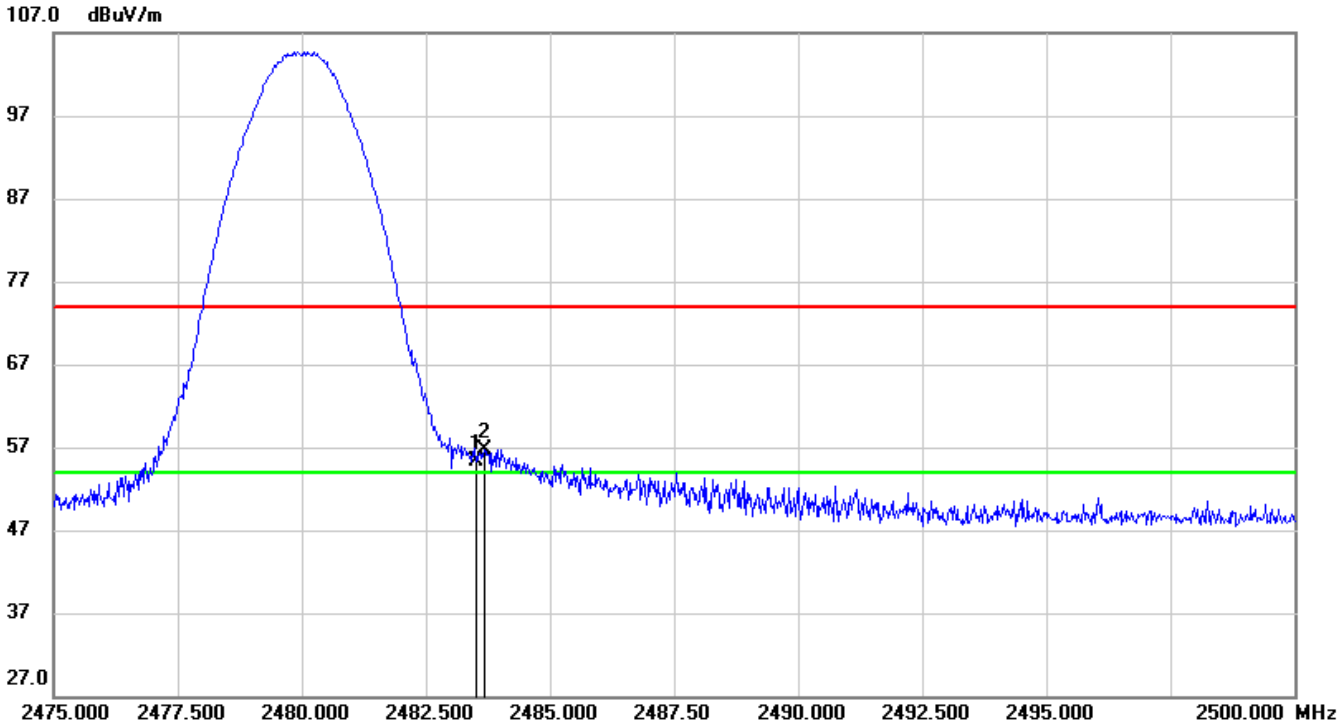


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	2.93	33.58	36.51	54.00	-17.49	AVG
2	2483.525	2.96	33.58	36.54	54.00	-17.46	AVG

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. For transmit duration, please refer to clause 7.1.
5. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

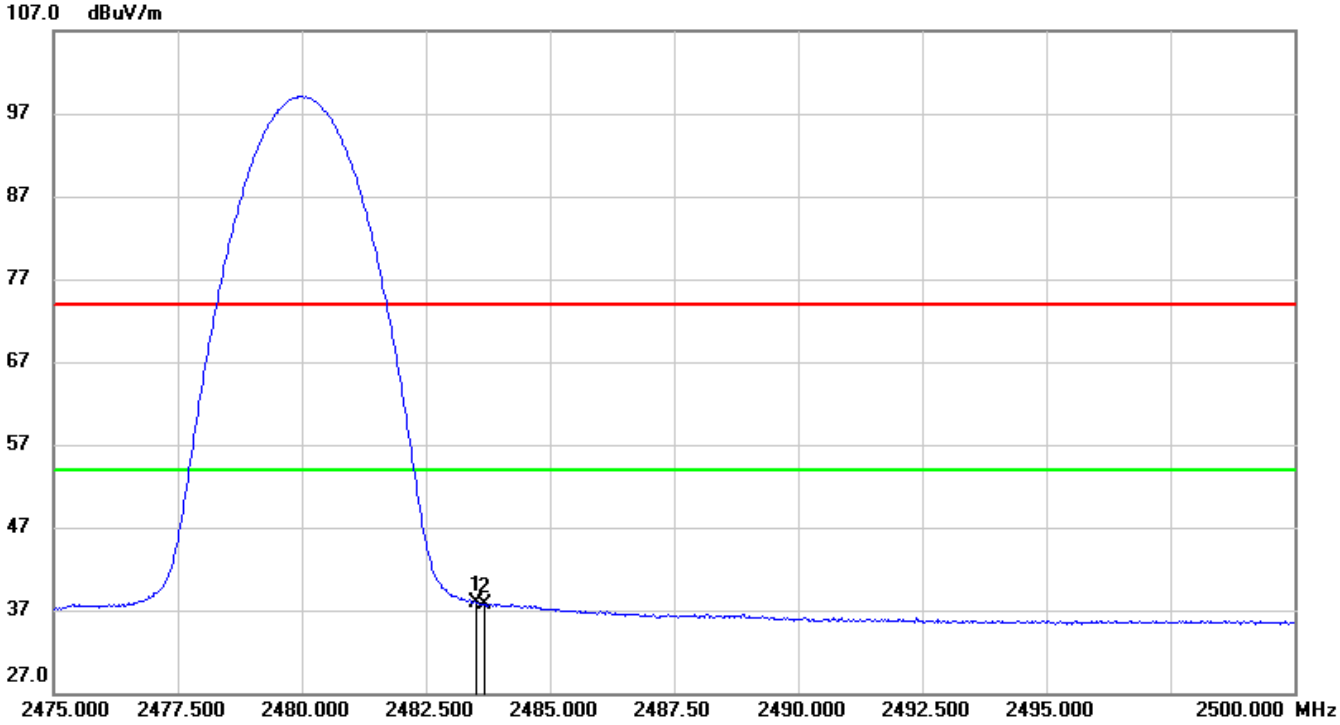
PEAK



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	21.67	33.58	55.25	74.00	-18.75	peak
2	2483.675	23.20	33.58	56.78	74.00	-17.22	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

AVG



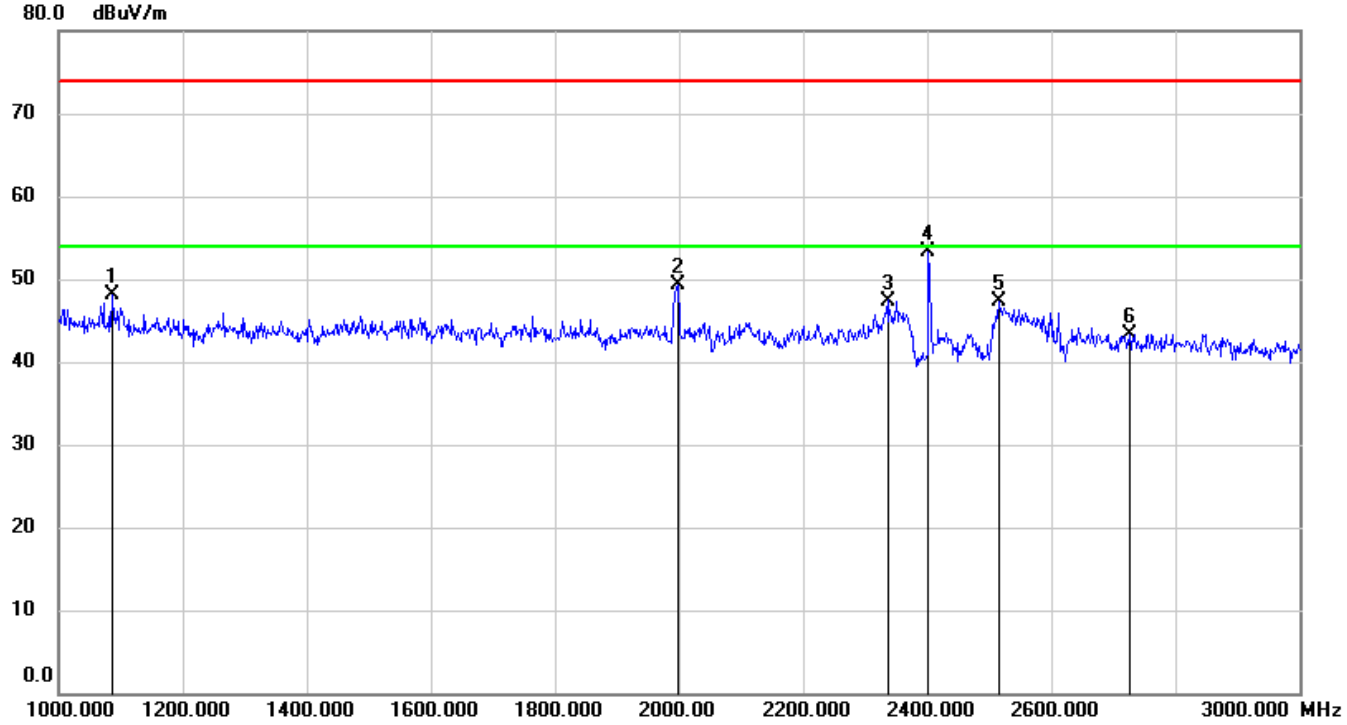
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	4.25	33.58	37.83	54.00	-16.17	AVG
2	2483.675	4.05	33.58	37.63	54.00	-16.37	AVG

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton where: ton is transmit duration.
4. For transmit duration, please refer to clause 7.1.
5. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

8.3. SPURIOUS EMISSIONS (1~3GHz)

8.3.1. GFSK MODE

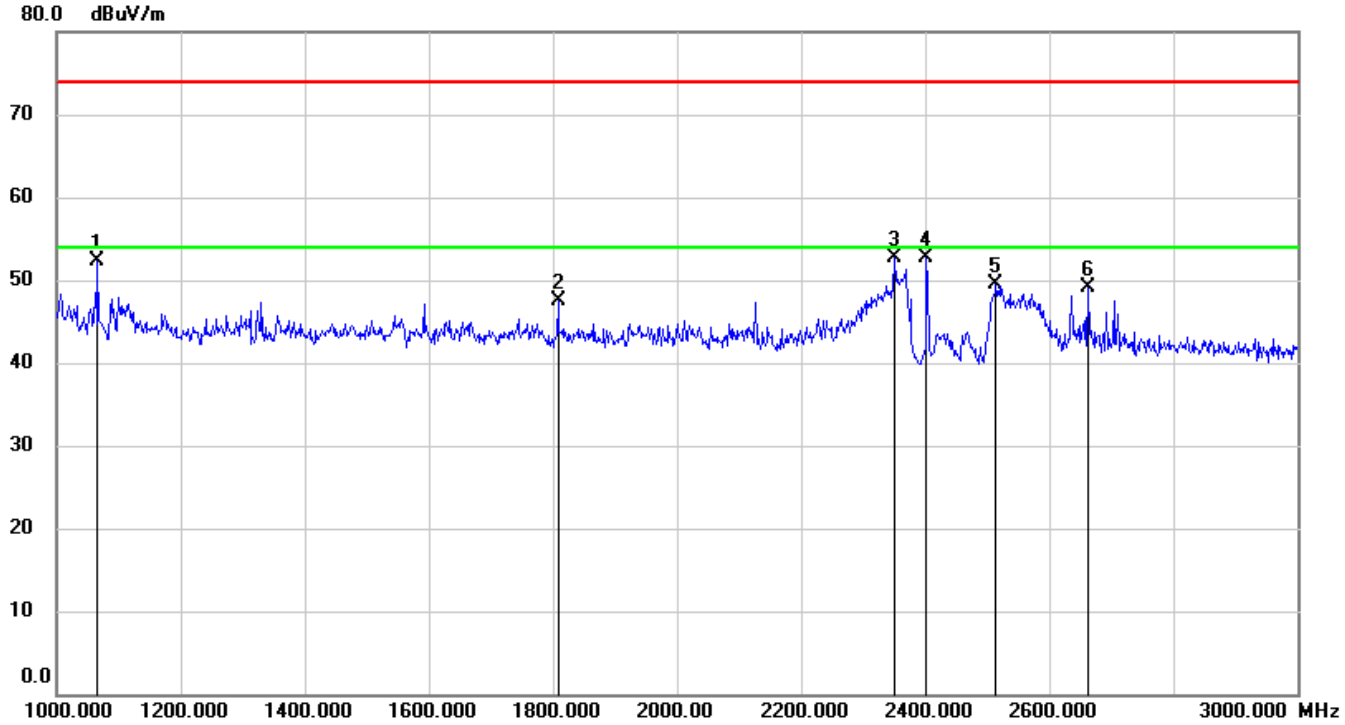
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1086.000	65.29	-17.27	48.02	74.00	-25.98	peak
2	1998.000	64.10	-14.79	49.31	74.00	-24.69	peak
3	2336.000	61.40	-14.00	47.40	74.00	-26.60	peak
4	2402.000	67.13	-13.85	53.28	/	/	fundamental
5	2516.000	60.78	-13.55	47.23	74.00	-26.77	peak
6	2726.000	56.09	-12.69	43.40	74.00	-30.60	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

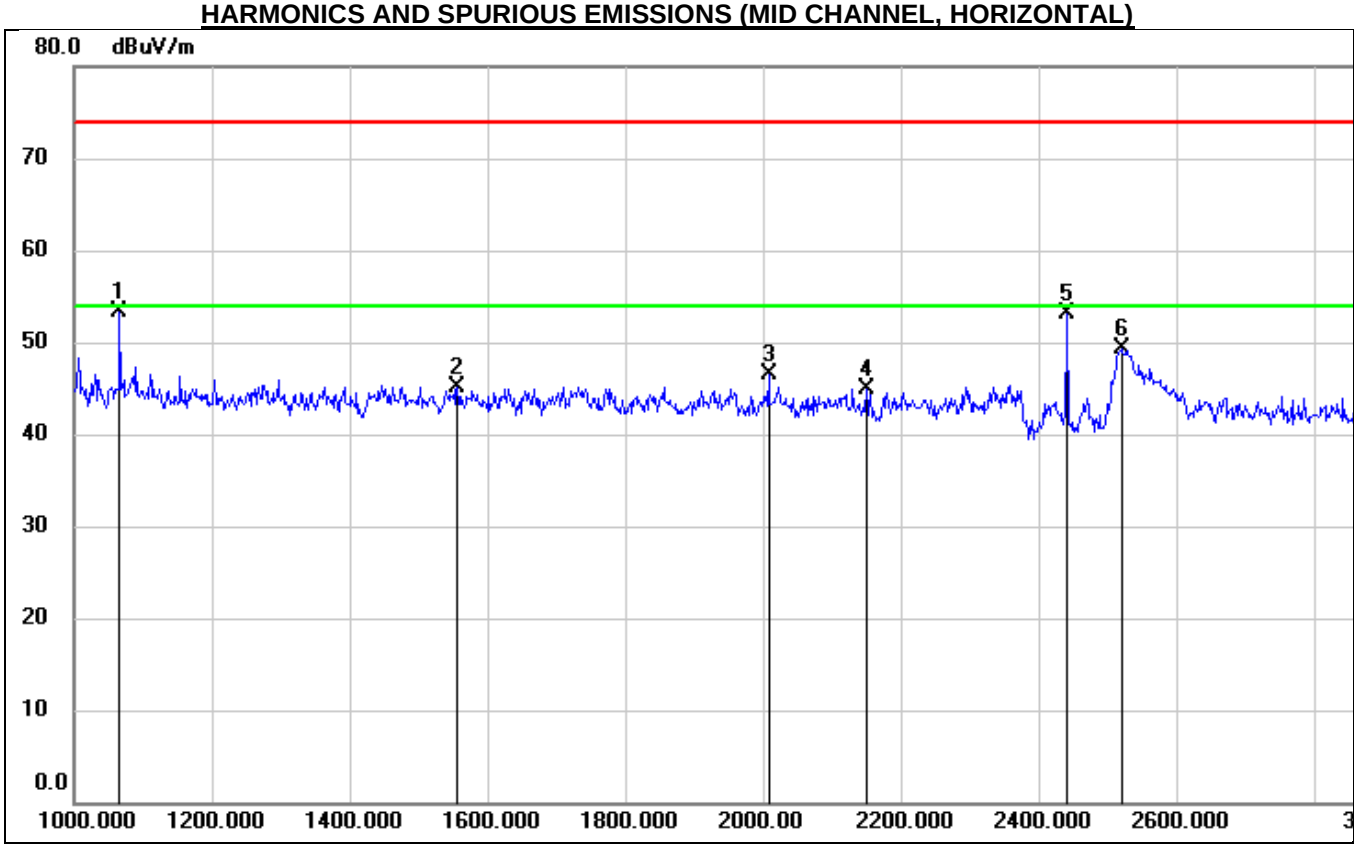
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1066.000	69.68	-17.29	52.39	74.00	-21.61	peak
2	1808.000	62.89	-15.48	47.41	74.00	-26.59	peak
3	2350.000	66.64	-13.96	52.68	74.00	-21.32	peak
4	2402.000	66.48	-13.85	52.63	/	/	fundamental
5	2514.000	63.03	-13.56	49.47	74.00	-24.53	peak
6	2662.000	62.01	-12.95	49.06	74.00	-24.94	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

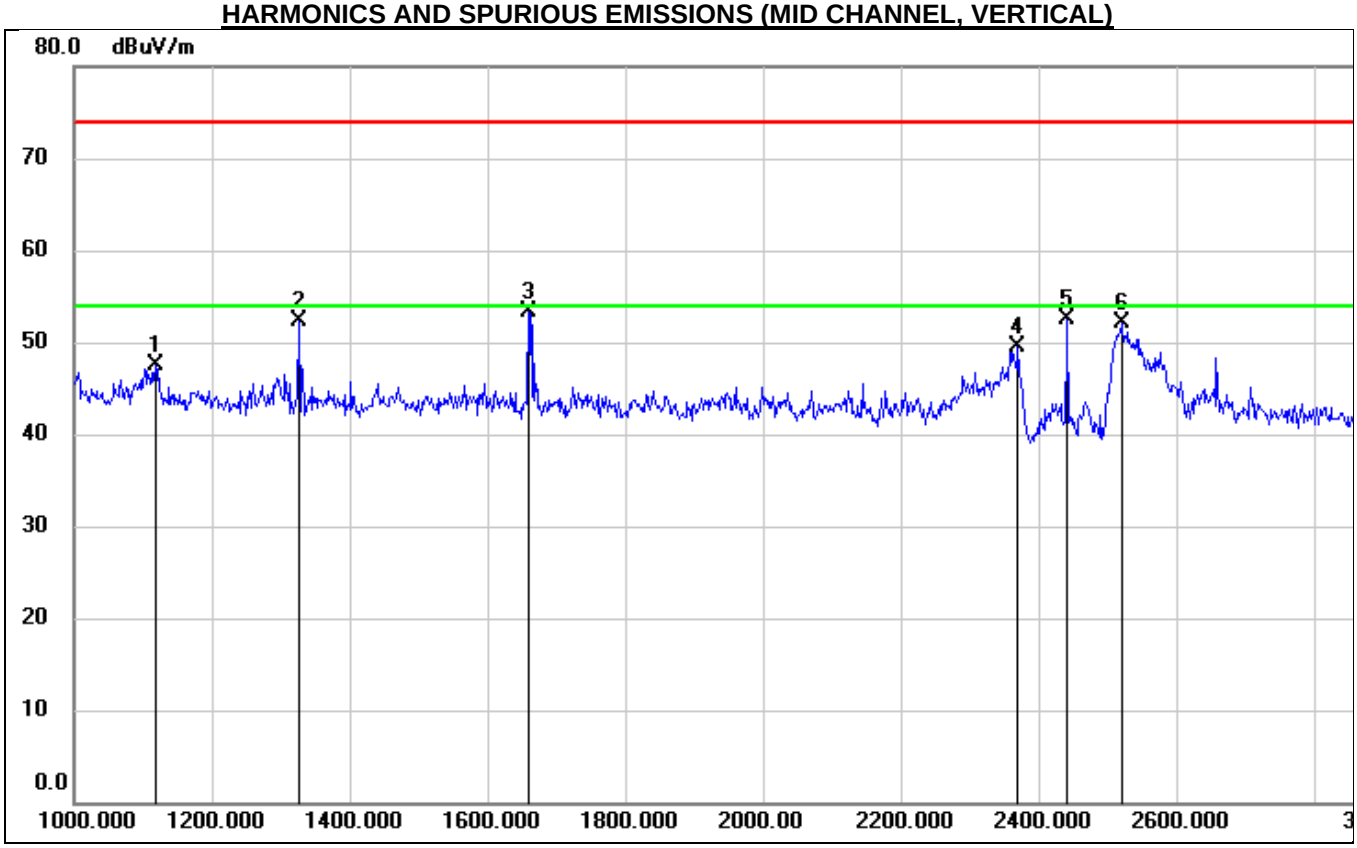
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1066.000	70.68	-17.29	53.39	74.00	-20.61	peak
2	1556.000	61.47	-16.39	45.08	74.00	-28.92	peak
3	2008.000	61.34	-14.77	46.57	74.00	-27.43	peak
4	2150.000	59.34	-14.43	44.91	74.00	-29.09	peak
5	2441.000	66.86	-13.75	53.11	/	/	fundamental
6	2520.000	62.77	-13.53	49.24	74.00	-24.76	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

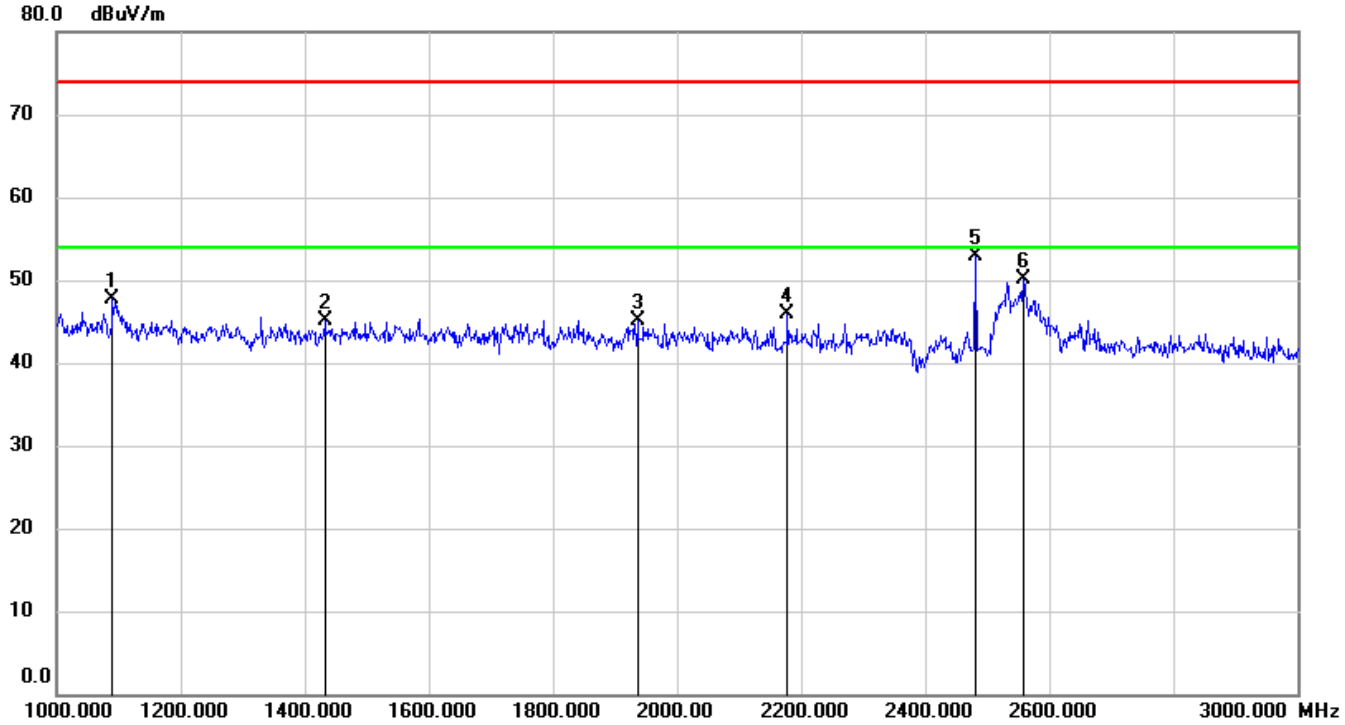
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1118.000	64.71	-17.21	47.50	74.00	-26.50	peak
2	1326.000	69.16	-16.87	52.29	74.00	-21.71	peak
3	1660.000	69.31	-16.01	53.30	74.00	-20.70	peak
4	2370.000	63.50	-13.91	49.59	74.00	-24.41	peak
5	2441.000	66.20	-13.75	52.45	/	/	fundamental
6	2520.000	65.72	-13.53	52.19	74.00	-21.81	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

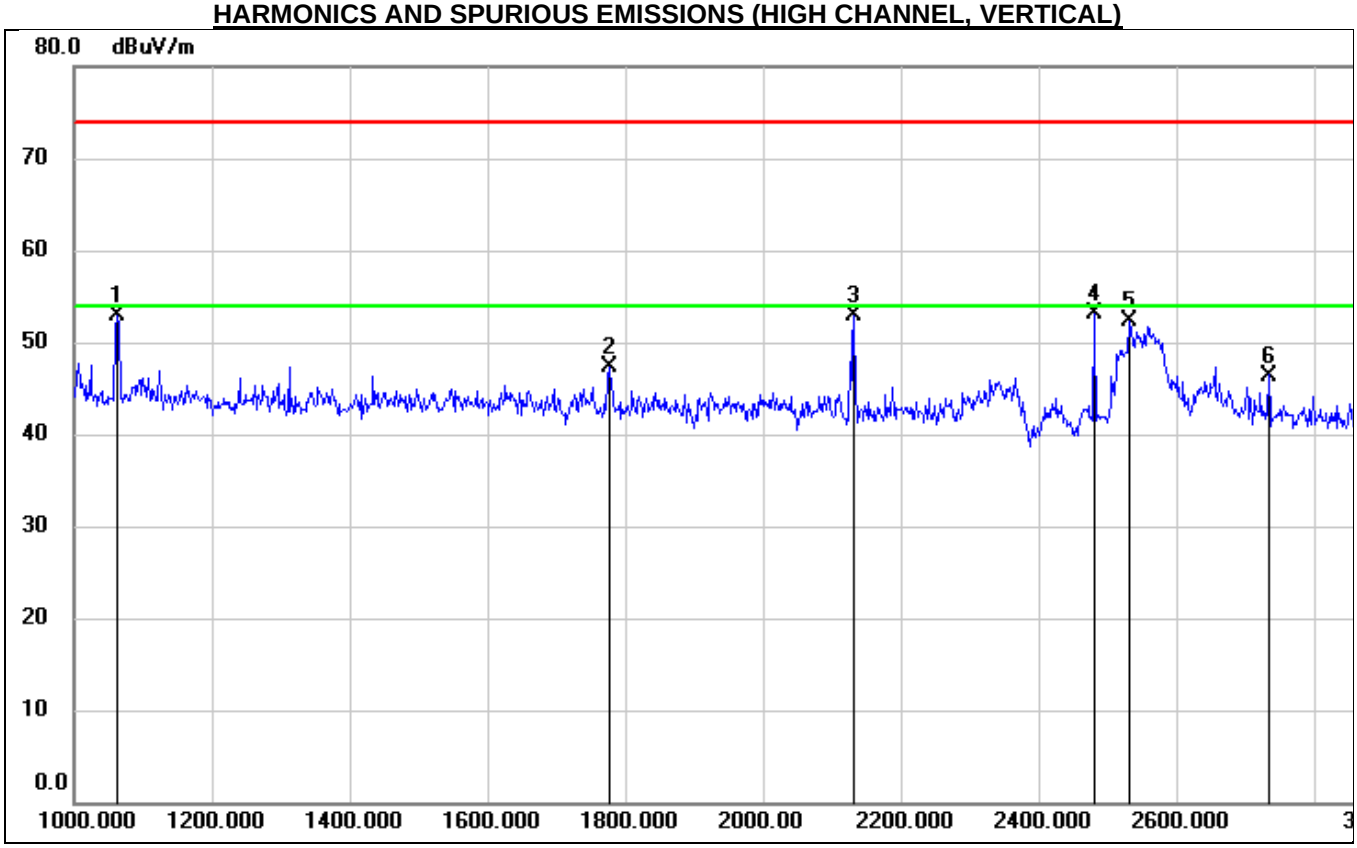
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1090.000	64.89	-17.26	47.63	74.00	-26.37	peak
2	1432.000	61.75	-16.70	45.05	74.00	-28.95	peak
3	1936.000	60.12	-15.01	45.11	74.00	-28.89	peak
4	2178.000	60.36	-14.37	45.99	74.00	-28.01	peak
5	2480.000	66.53	-13.67	52.86	/	/	fundamental
6	2558.000	63.55	-13.37	50.18	74.00	-23.82	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)

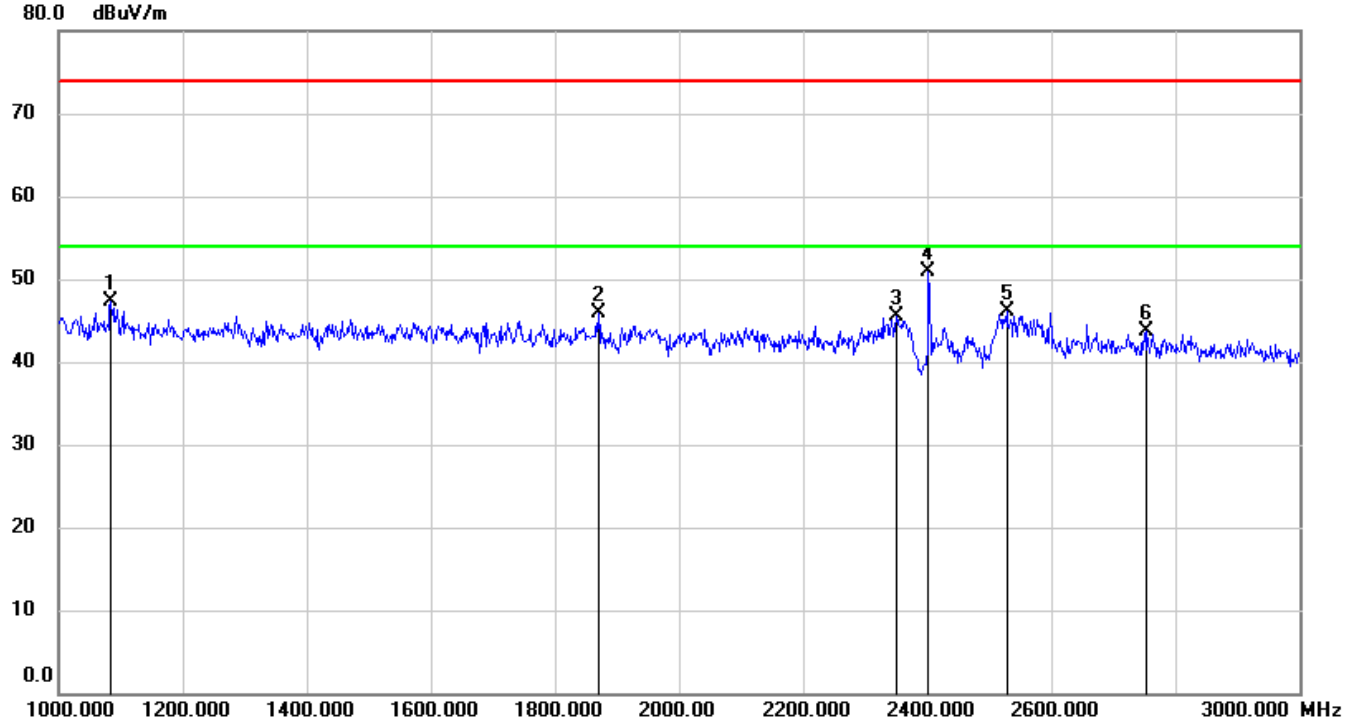


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1062.000	70.22	-17.30	52.92	74.00	-21.08	peak
2	1776.000	62.96	-15.59	47.37	74.00	-26.63	peak
3	2132.000	67.28	-14.47	52.81	74.00	-21.19	peak
4	2480.000	66.78	-13.67	53.11	/	/	fundamental
5	2532.000	65.77	-13.48	52.29	74.00	-21.71	peak
6	2734.000	59.05	-12.65	46.40	74.00	-27.60	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

8.3.2. 8DPSK MODE

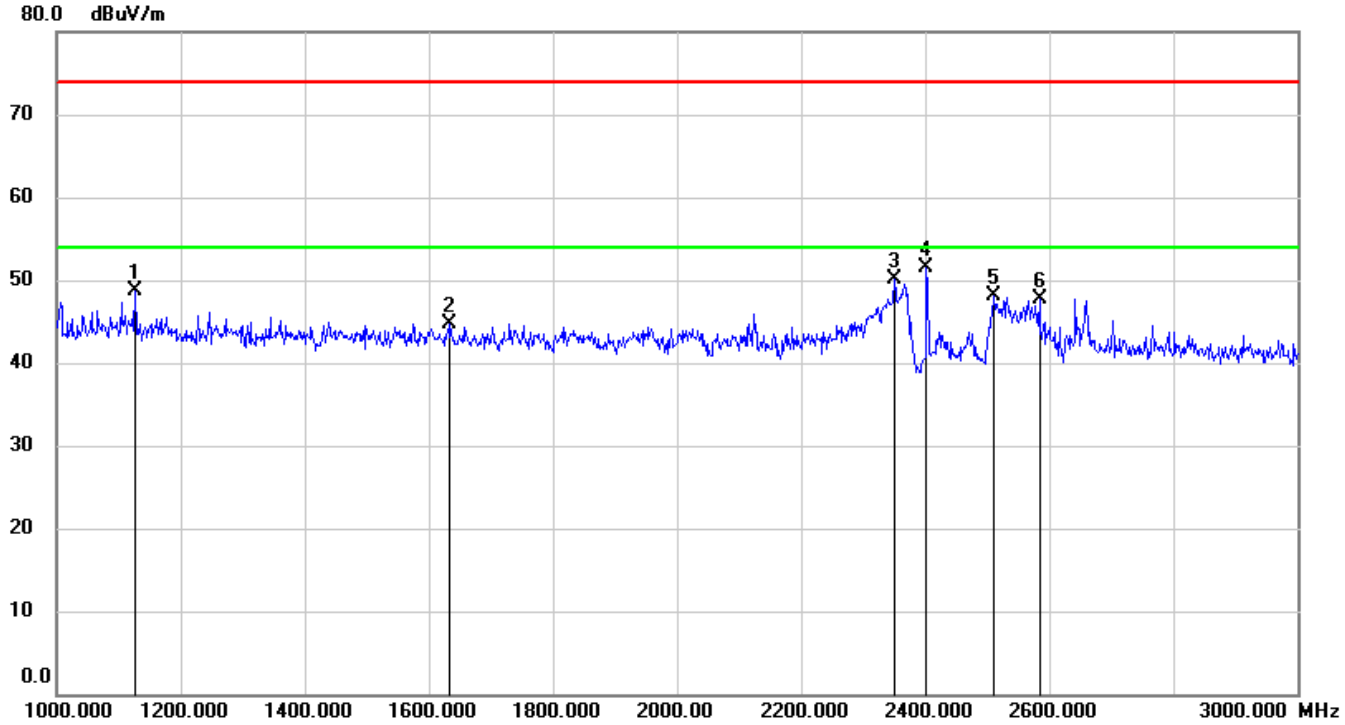
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1084.000	64.62	-17.27	47.35	74.00	-26.65	peak
2	1870.000	61.18	-15.25	45.93	74.00	-28.07	peak
3	2350.000	59.48	-13.96	45.52	74.00	-28.48	peak
4	2402.000	64.74	-13.85	50.89	/	/	fundamental
5	2528.000	59.59	-13.50	46.09	74.00	-27.91	peak
6	2754.000	56.28	-12.57	43.71	74.00	-30.29	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1126.000	65.94	-17.19	48.75	74.00	-25.25	peak
2	1634.000	60.81	-16.10	44.71	74.00	-29.29	peak
3	2350.000	64.00	-13.96	50.04	74.00	-23.96	peak
4	2402.000	65.27	-13.85	51.42	/	/	fundamental
5	2510.000	61.67	-13.57	48.10	74.00	-25.90	peak
6	2584.000	60.93	-13.27	47.66	74.00	-26.34	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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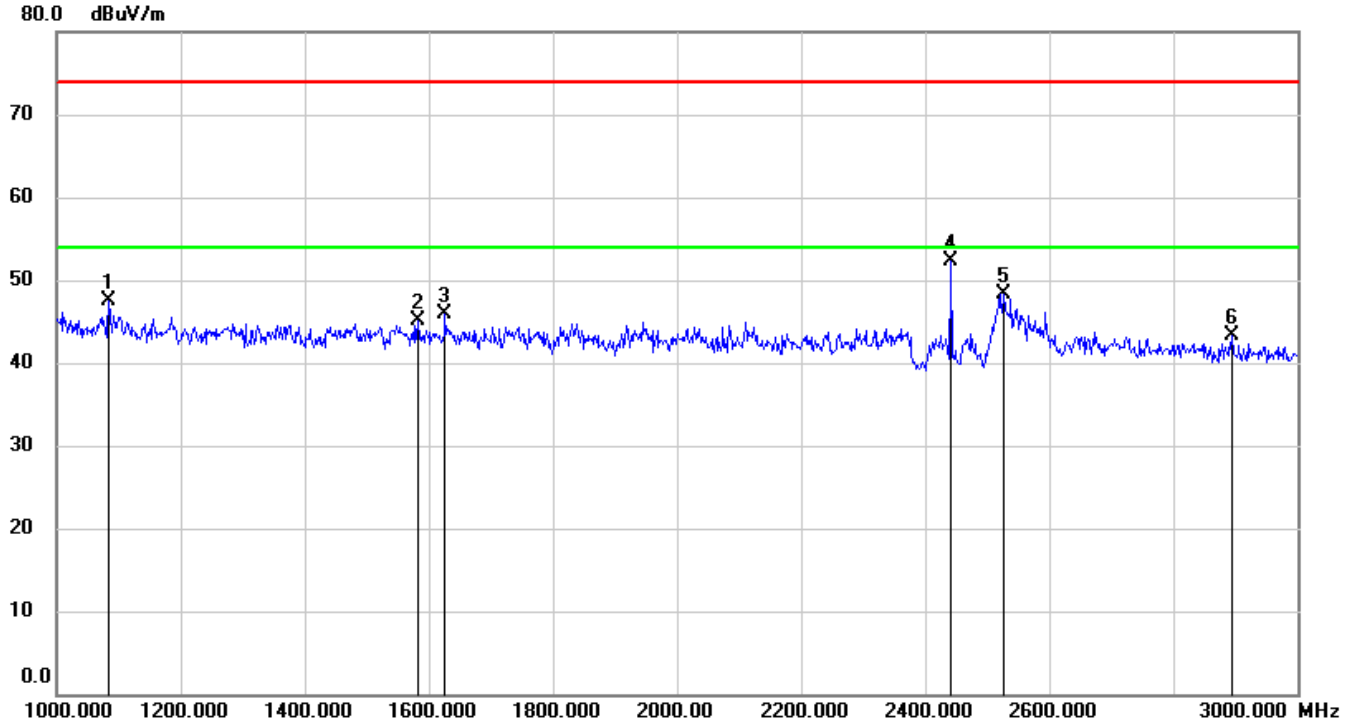
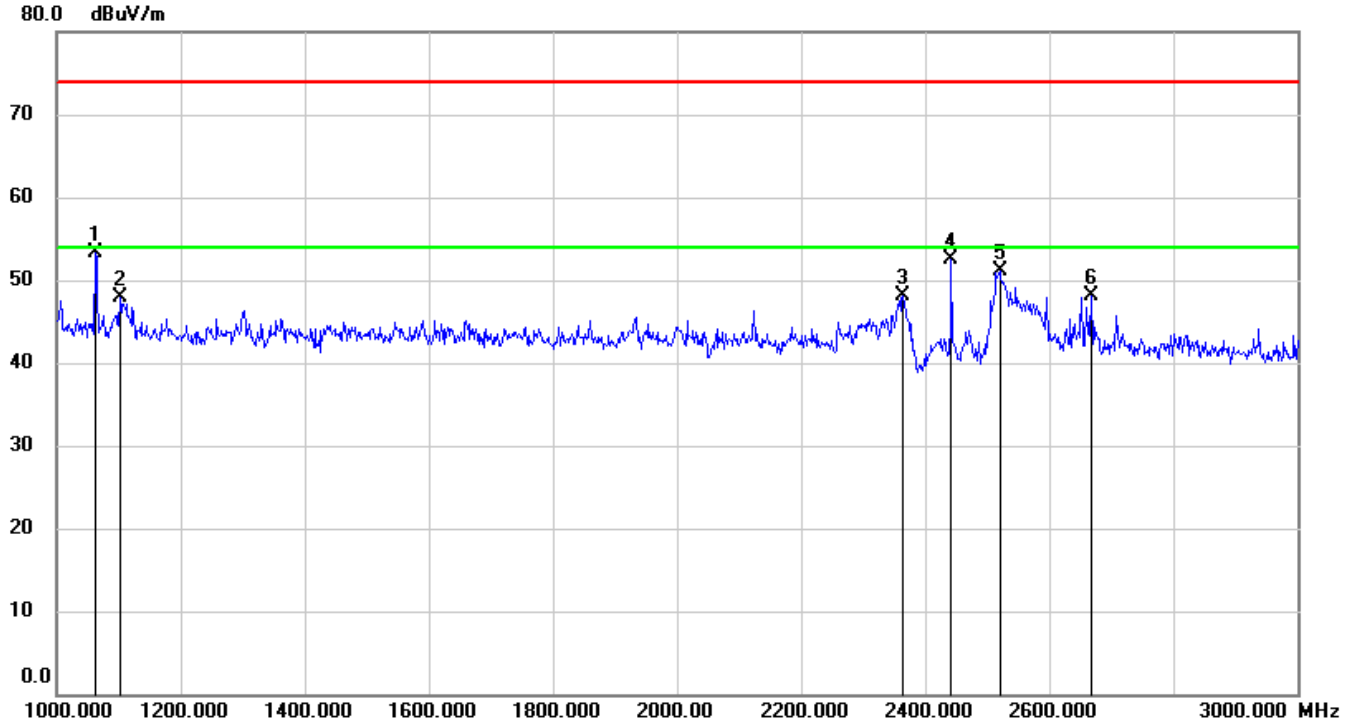
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1084.000	64.68	-17.27	47.41	74.00	-26.59	peak
2	1582.000	61.35	-16.29	45.06	74.00	-28.94	peak
3	1626.000	61.98	-16.13	45.85	74.00	-28.15	peak
4	2441.000	66.12	-13.75	52.37	/	/	fundamental
5	2526.000	61.86	-13.51	48.35	74.00	-25.65	peak
6	2894.000	55.23	-11.99	43.24	74.00	-30.76	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

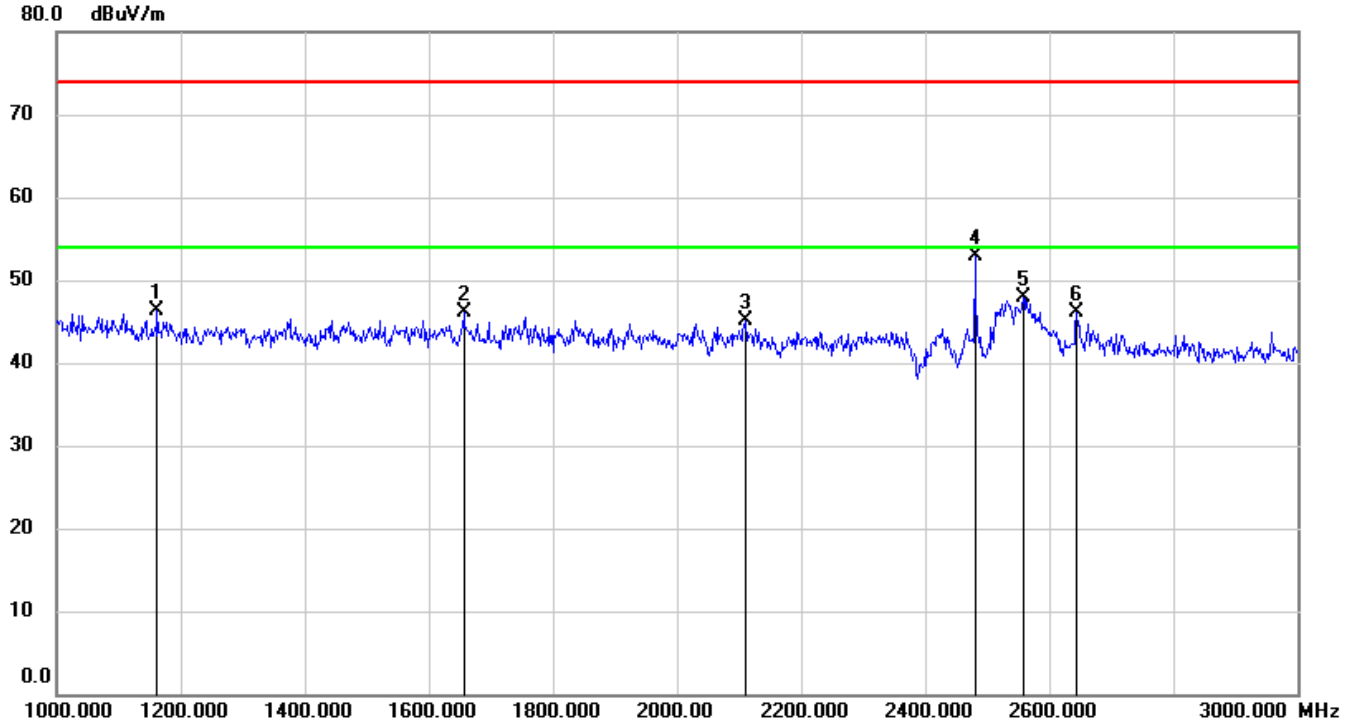
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1062.000	70.55	-17.30	53.25	74.00	-20.75	peak
2	1102.000	65.15	-17.24	47.91	74.00	-26.09	peak
3	2364.000	62.10	-13.93	48.17	74.00	-25.83	peak
4	2441.000	66.29	-13.75	52.54	/	/	fundamental
5	2520.000	64.65	-13.53	51.12	74.00	-22.88	peak
6	2668.000	60.97	-12.93	48.04	74.00	-25.96	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

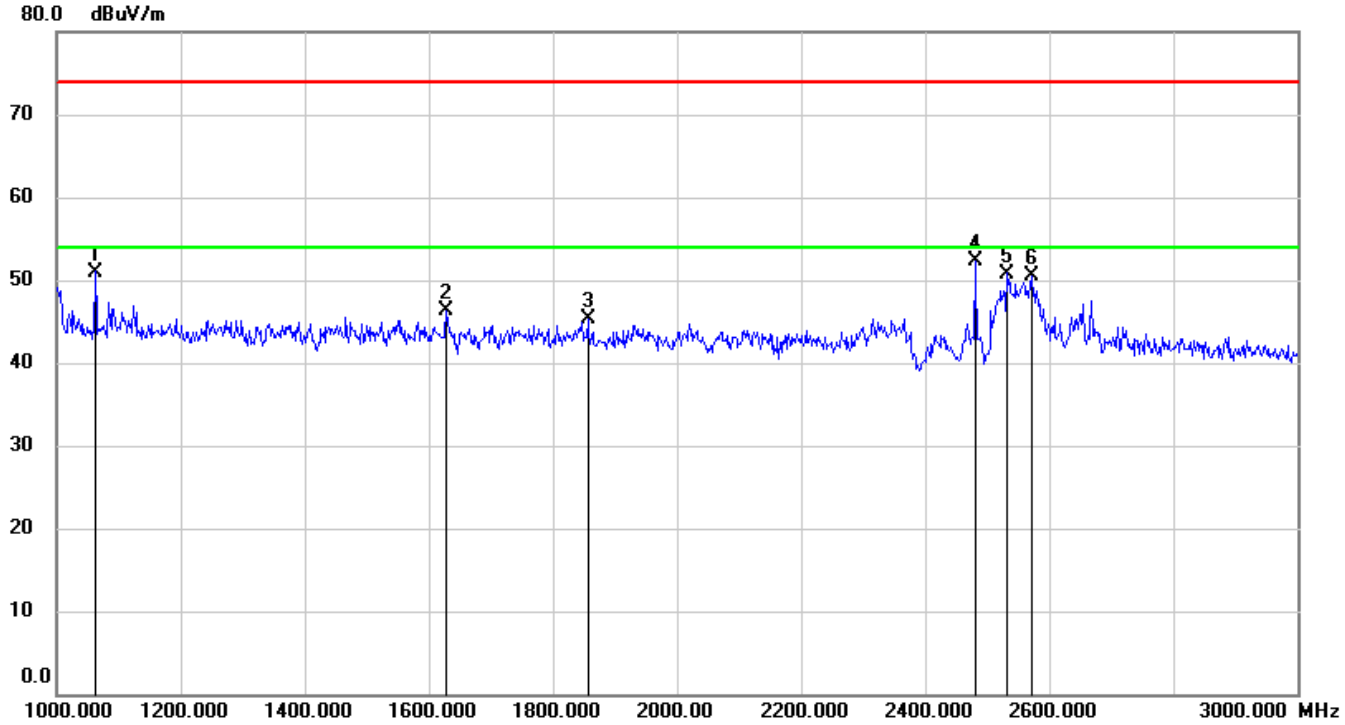
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1162.000	63.42	-17.14	46.28	74.00	-27.72	peak
2	1656.000	62.07	-16.03	46.04	74.00	-27.96	peak
3	2110.000	59.60	-14.52	45.08	74.00	-28.92	peak
4	2480.000	66.52	-13.67	52.85	/	/	fundamental
5	2558.000	61.26	-13.37	47.89	74.00	-26.11	peak
6	2644.000	59.13	-13.02	46.11	74.00	-27.89	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



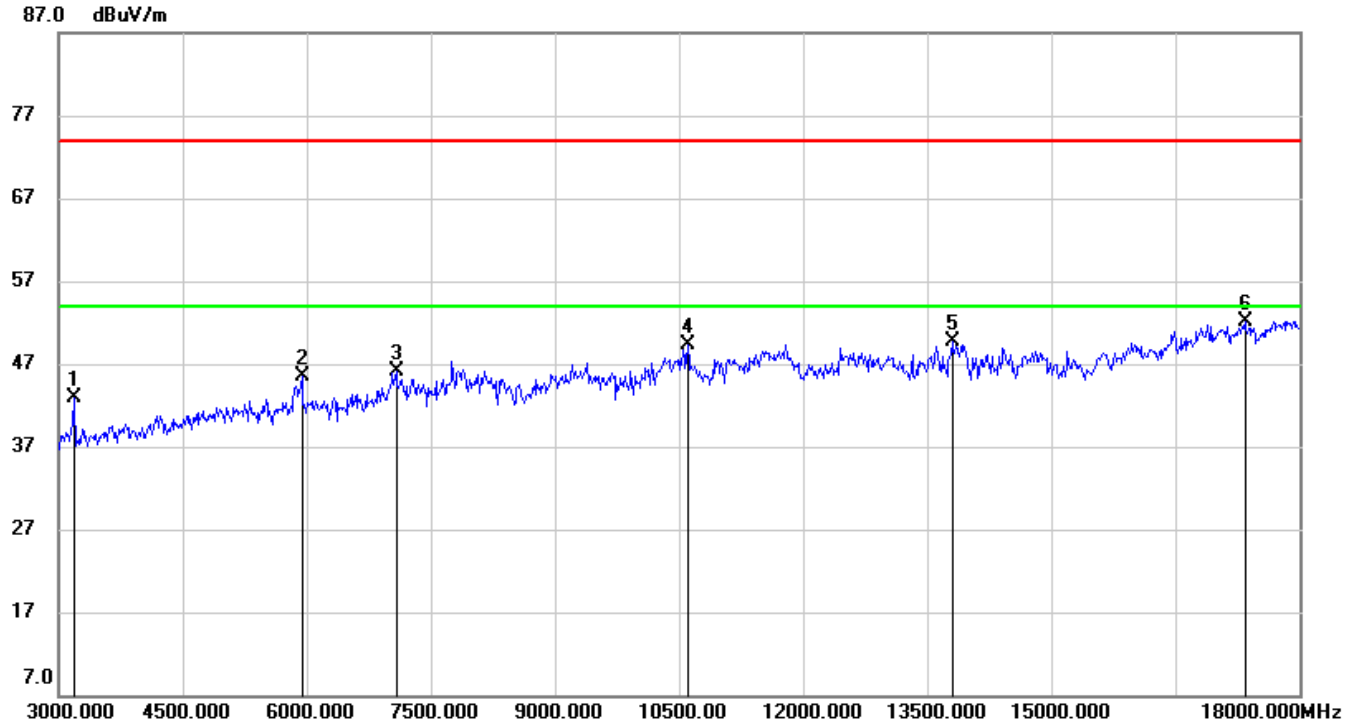
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1062.000	68.30	-17.30	51.00	74.00	-23.00	peak
2	1628.000	62.41	-16.12	46.29	74.00	-27.71	peak
3	1856.000	60.52	-15.30	45.22	74.00	-28.78	peak
4	2480.000	65.97	-13.67	52.30	/	/	fundamental
5	2532.000	64.28	-13.48	50.80	74.00	-23.20	peak
6	2572.000	63.74	-13.32	50.42	74.00	-23.58	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

8.4. SPURIOUS EMISSIONS (3~18GHz)

8.4.1. GFSK MODE

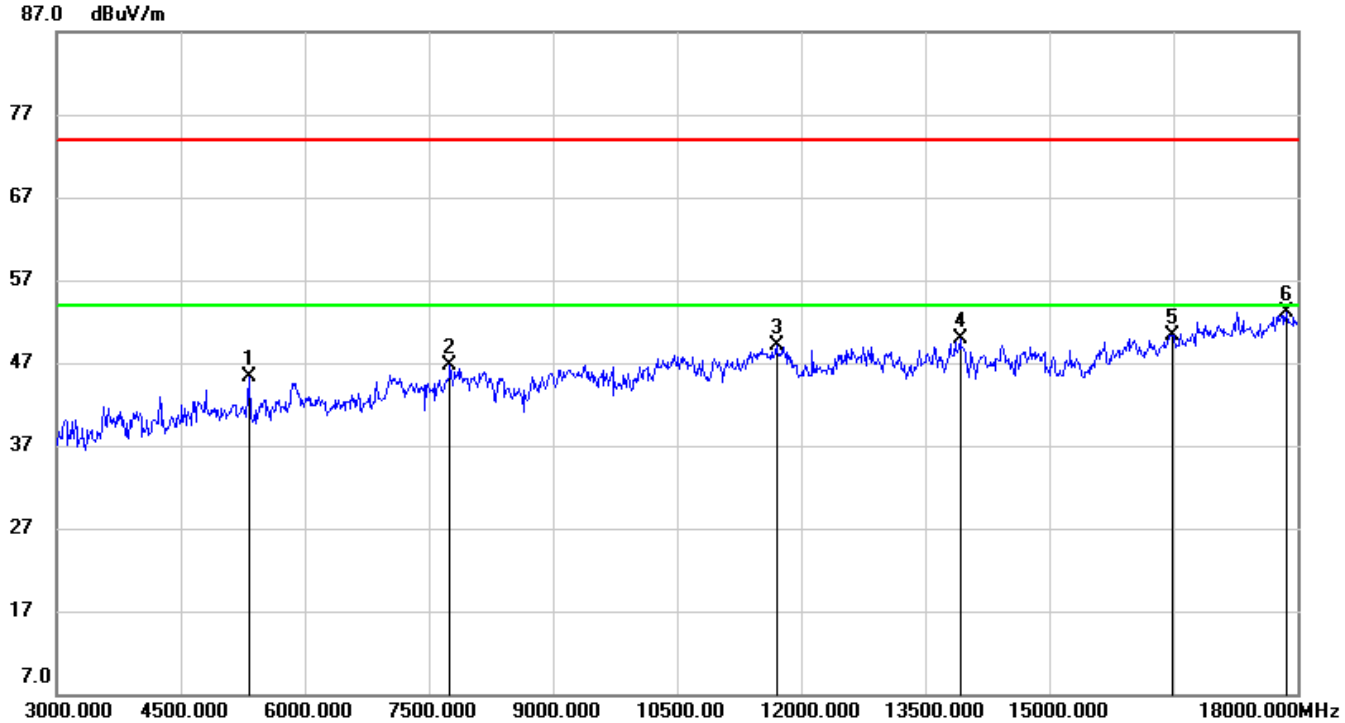
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3180.000	47.22	-4.33	42.89	74.00	-31.11	peak
2	5940.000	41.19	4.30	45.49	74.00	-28.51	peak
3	7080.000	40.14	5.89	46.03	74.00	-27.97	peak
4	10605.000	37.33	11.93	49.26	74.00	-24.74	peak
5	13800.000	32.53	17.10	49.63	74.00	-24.37	peak
6	17340.000	30.45	21.61	52.06	74.00	-21.94	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

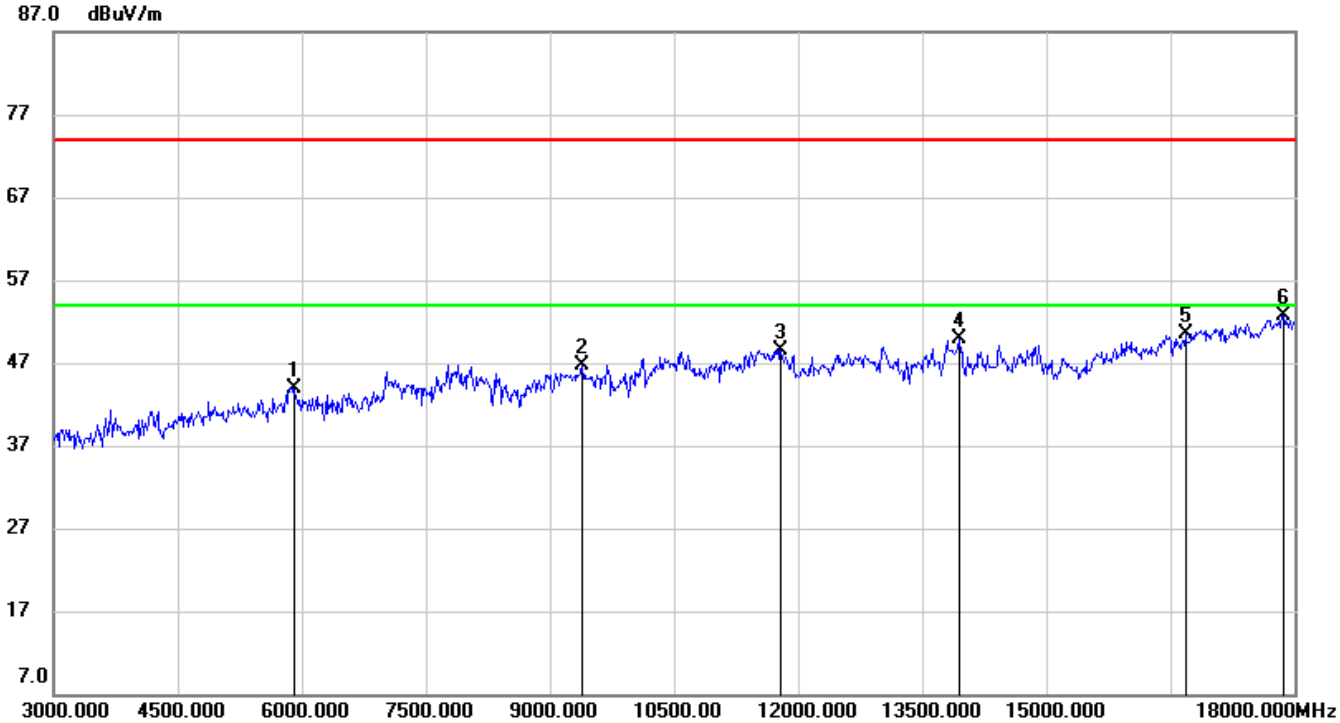
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	5325.000	43.27	1.99	45.26	74.00	-28.74	peak
2	7755.000	39.35	7.29	46.64	74.00	-27.36	peak
3	11700.000	36.15	12.95	49.10	74.00	-24.90	peak
4	13920.000	33.67	16.17	49.84	74.00	-24.16	peak
5	16485.000	31.26	19.13	50.39	74.00	-23.61	peak
6	17865.000	29.79	23.33	53.12	74.00	-20.88	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

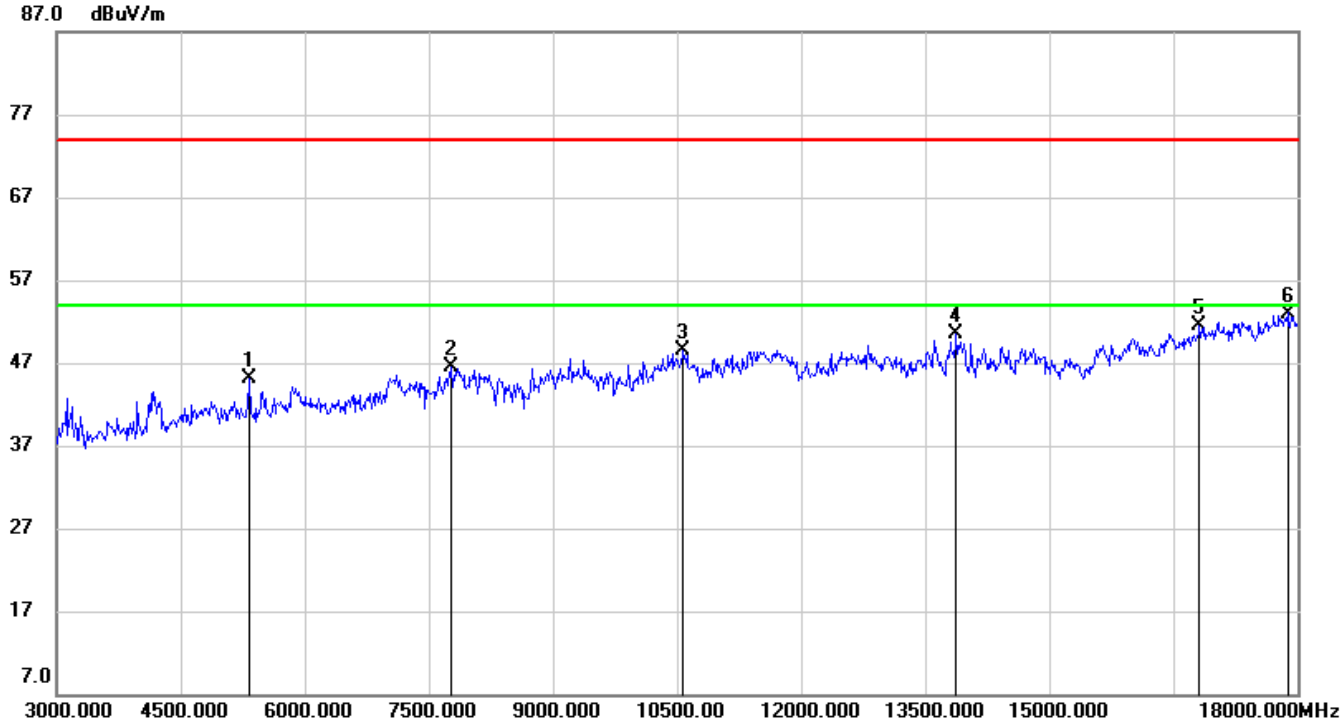
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5910.000	39.08	4.79	43.87	74.00	-30.13	peak
2	9390.000	37.15	9.53	46.68	74.00	-27.32	peak
3	11790.000	35.42	13.17	48.59	74.00	-25.41	peak
4	13950.000	33.87	16.11	49.98	74.00	-24.02	peak
5	16680.000	30.62	19.84	50.46	74.00	-23.54	peak
6	17865.000	29.46	23.33	52.79	74.00	-21.21	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

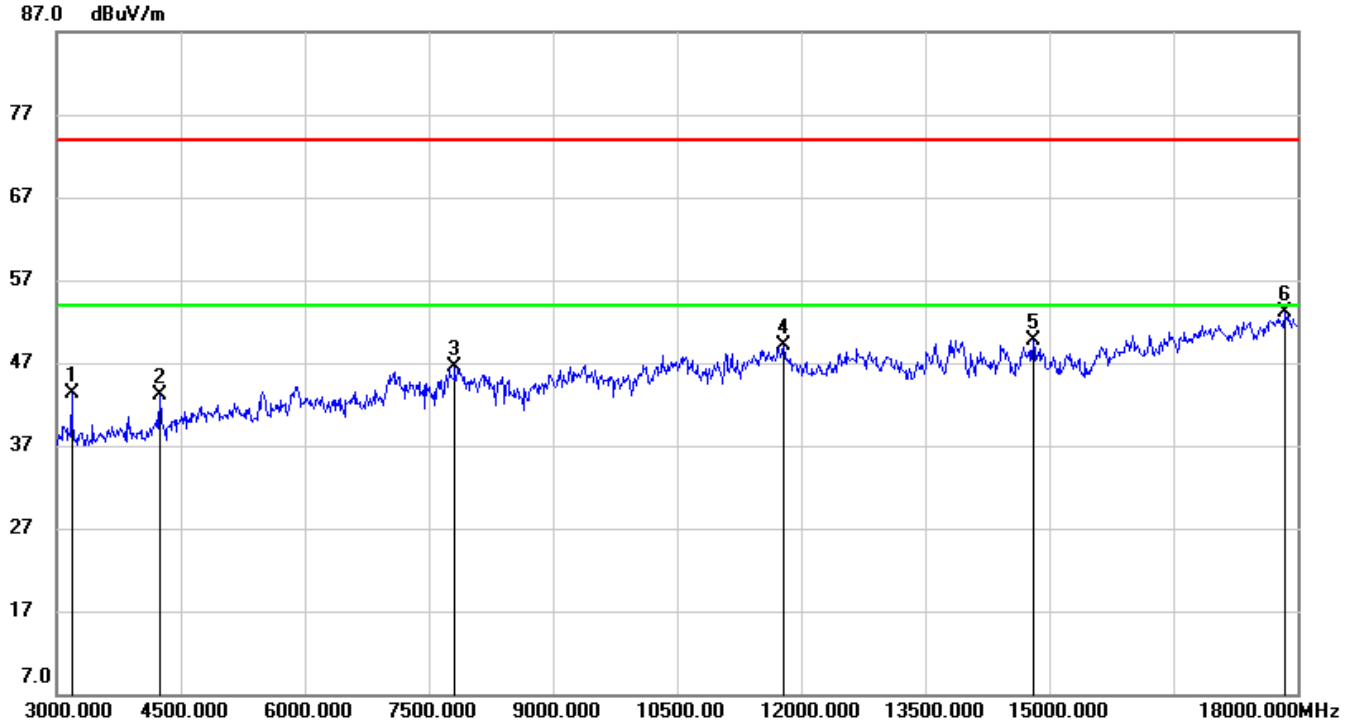
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	5325.000	43.11	1.99	45.10	74.00	-28.90	peak
2	7770.000	39.02	7.50	46.52	74.00	-27.48	peak
3	10575.000	36.61	11.81	48.42	74.00	-25.58	peak
4	13875.000	34.02	16.44	50.46	74.00	-23.54	peak
5	16815.000	31.53	19.96	51.49	74.00	-22.51	peak
6	17880.000	29.66	23.34	53.00	74.00	-21.00	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

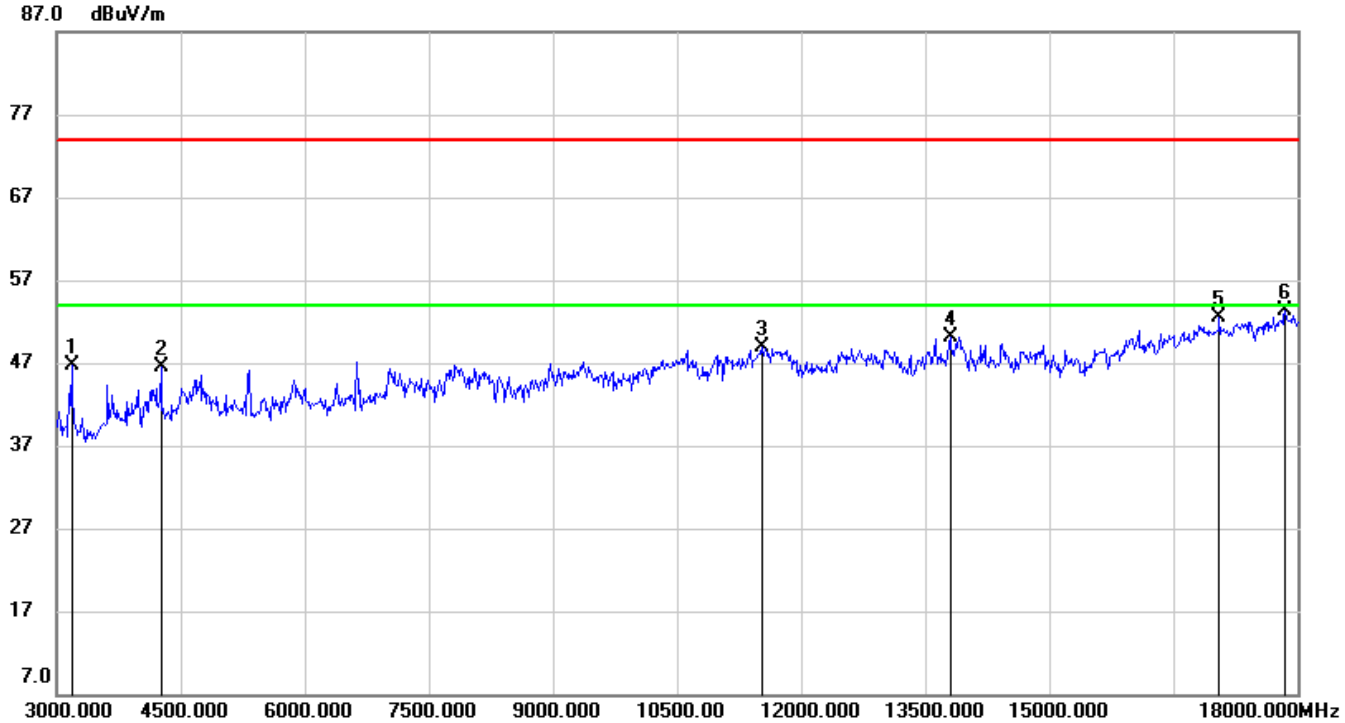
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3180.000	47.54	-4.33	43.21	74.00	-30.79	peak
2	4245.000	44.66	-1.59	43.07	74.00	-30.93	peak
3	7815.000	38.60	7.83	46.43	74.00	-27.57	peak
4	11790.000	35.97	13.17	49.14	74.00	-24.86	peak
5	14805.000	33.76	15.92	49.68	74.00	-24.32	peak
6	17850.000	29.71	23.32	53.03	74.00	-20.97	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)

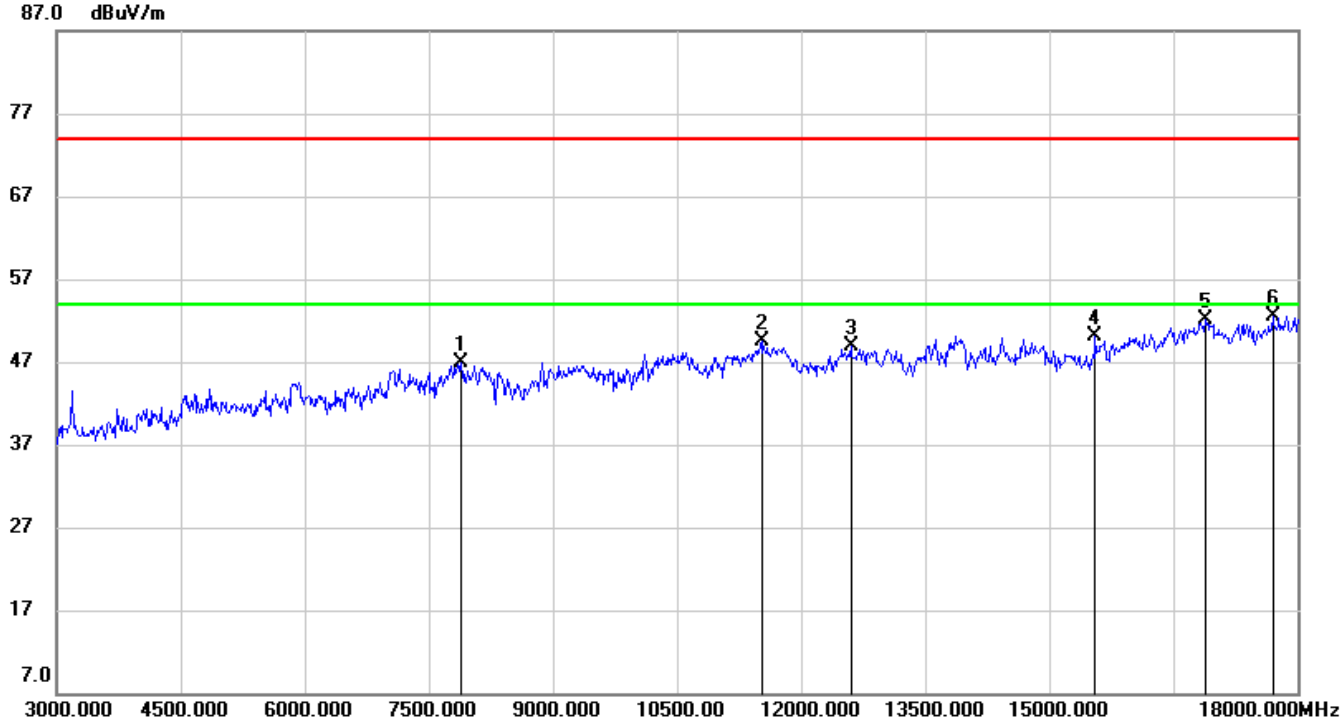


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3180.000	50.96	-4.33	46.63	74.00	-27.37	peak
2	4260.000	48.12	-1.71	46.41	74.00	-27.59	peak
3	11520.000	35.53	13.38	48.91	74.00	-25.09	peak
4	13800.000	32.92	17.10	50.02	74.00	-23.98	peak
5	17055.000	31.89	20.53	52.42	74.00	-21.58	peak
6	17850.000	30.07	23.32	53.39	74.00	-20.61	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

8.4.2. 8DPSK MODE

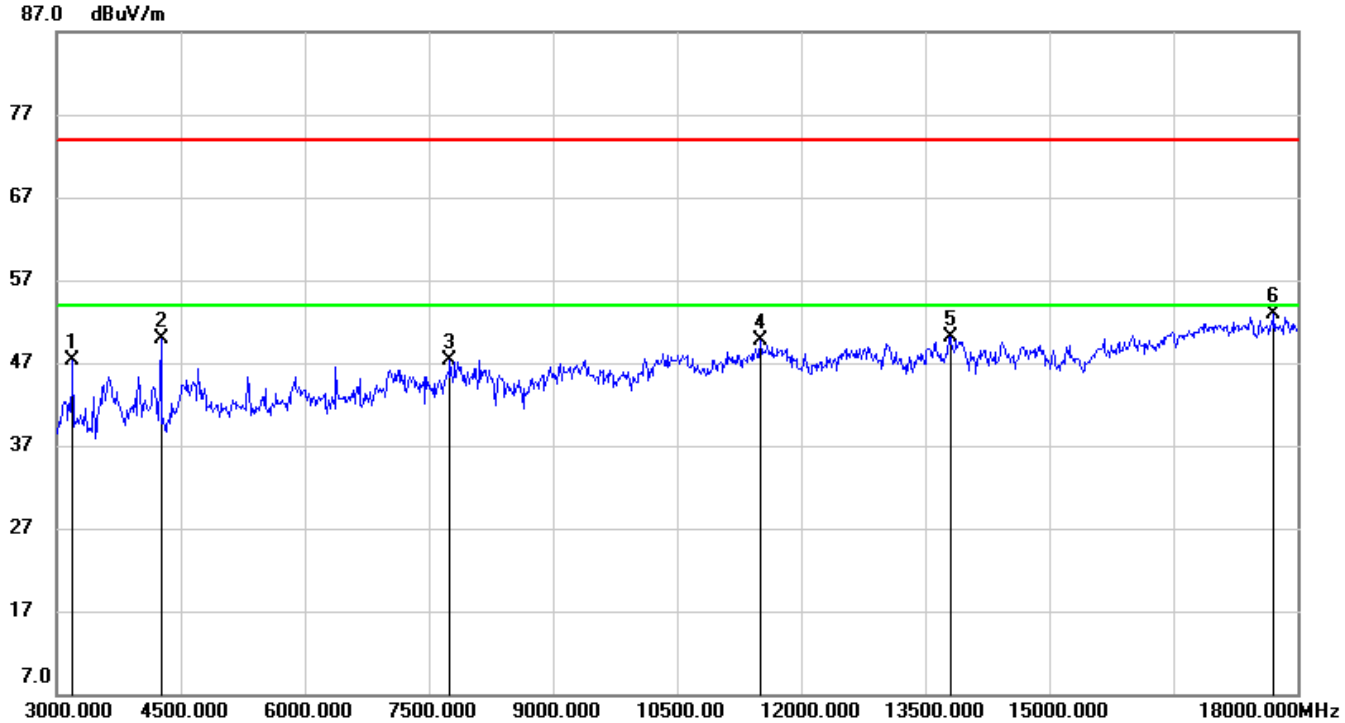
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	7890.000	39.55	7.30	46.85	74.00	-27.15	peak
2	11520.000	36.05	13.38	49.43	74.00	-24.57	peak
3	12600.000	34.90	13.99	48.89	74.00	-25.11	peak
4	15555.000	33.36	16.66	50.02	74.00	-23.98	peak
5	16890.000	32.19	19.97	52.16	74.00	-21.84	peak
6	17700.000	30.09	22.43	52.52	74.00	-21.48	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3195.000	51.65	-4.42	47.23	74.00	-26.77	peak
2	4260.000	51.53	-1.71	49.82	74.00	-24.18	peak
3	7755.000	40.08	7.29	47.37	74.00	-26.63	peak
4	11505.000	36.33	13.42	49.75	74.00	-24.25	peak
5	13800.000	33.03	17.10	50.13	74.00	-23.87	peak
6	17715.000	30.36	22.56	52.92	74.00	-21.08	peak

Note: 1. Measurement = Reading Level + Correct Factor.

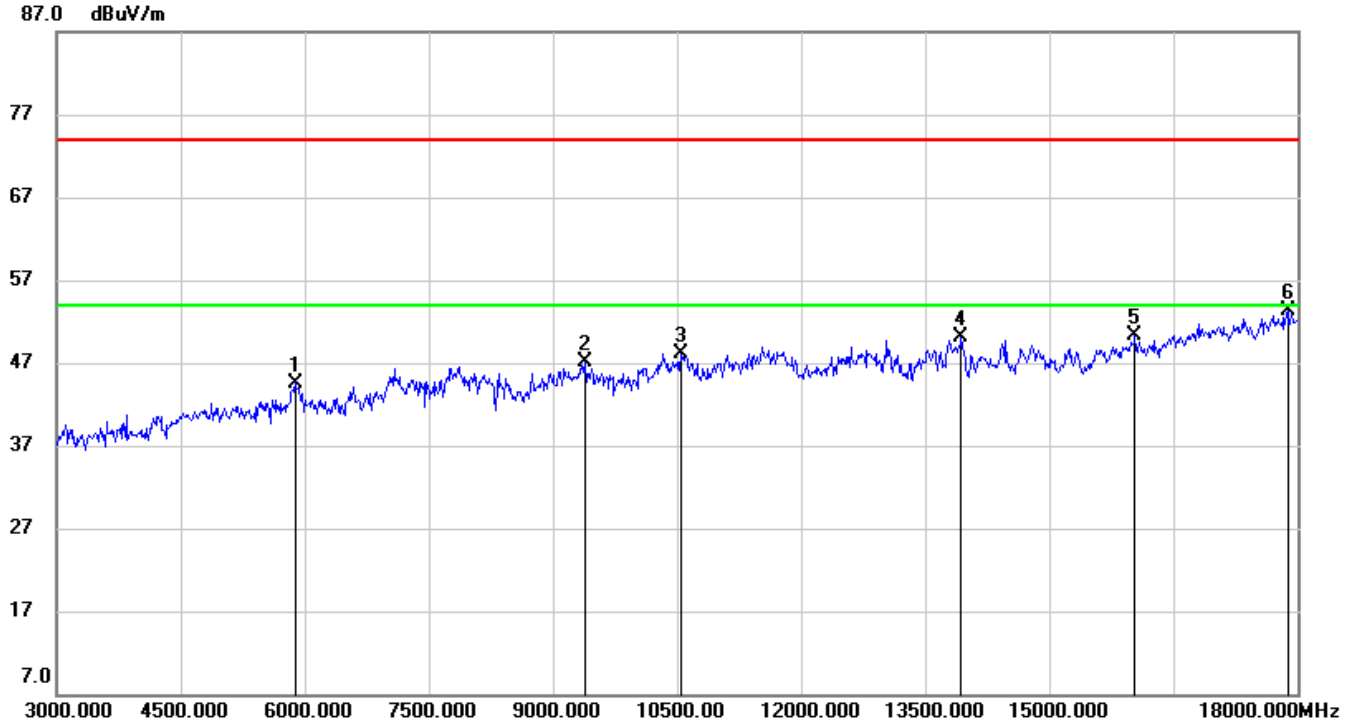
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

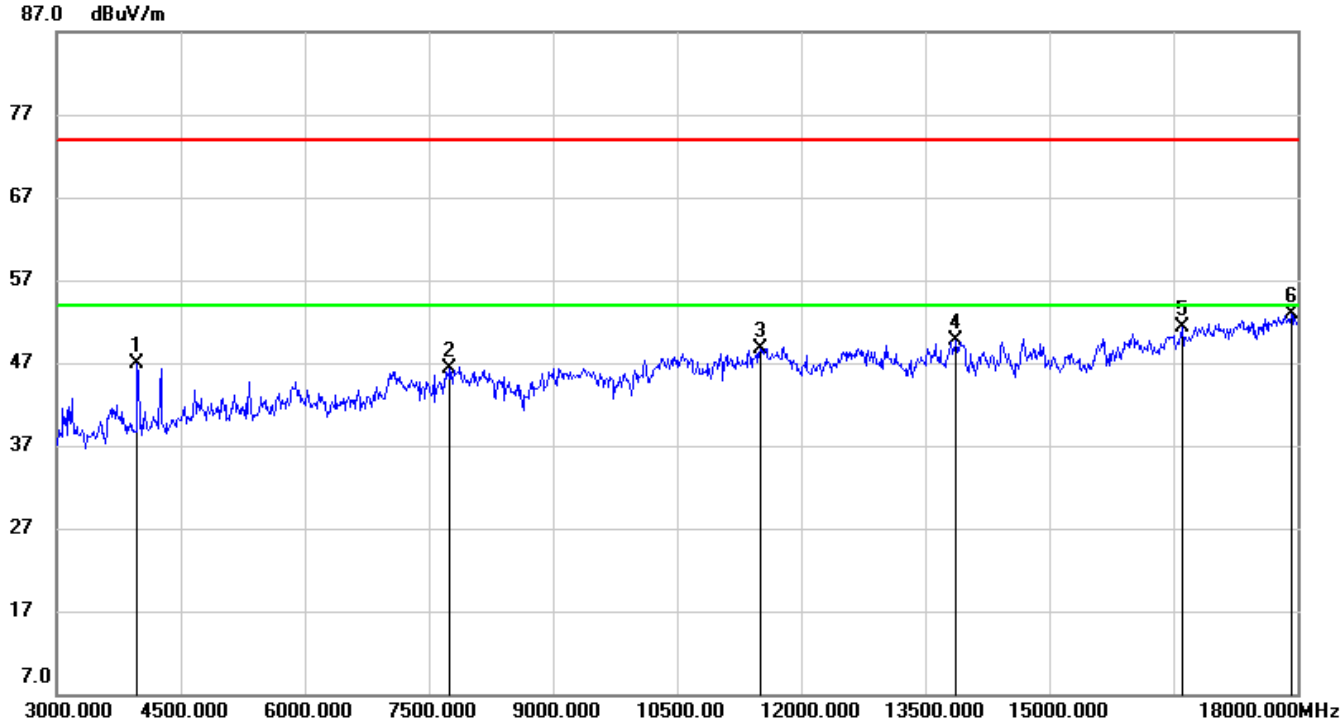
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	5880.000	40.01	4.59	44.60	74.00	-29.40	peak
2	9390.000	37.53	9.53	47.06	74.00	-26.94	peak
3	10545.000	36.44	11.64	48.08	74.00	-25.92	peak
4	13935.000	33.87	16.15	50.02	74.00	-23.98	peak
5	16035.000	32.39	17.85	50.24	74.00	-23.76	peak
6	17880.000	30.02	23.34	53.36	74.00	-20.64	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

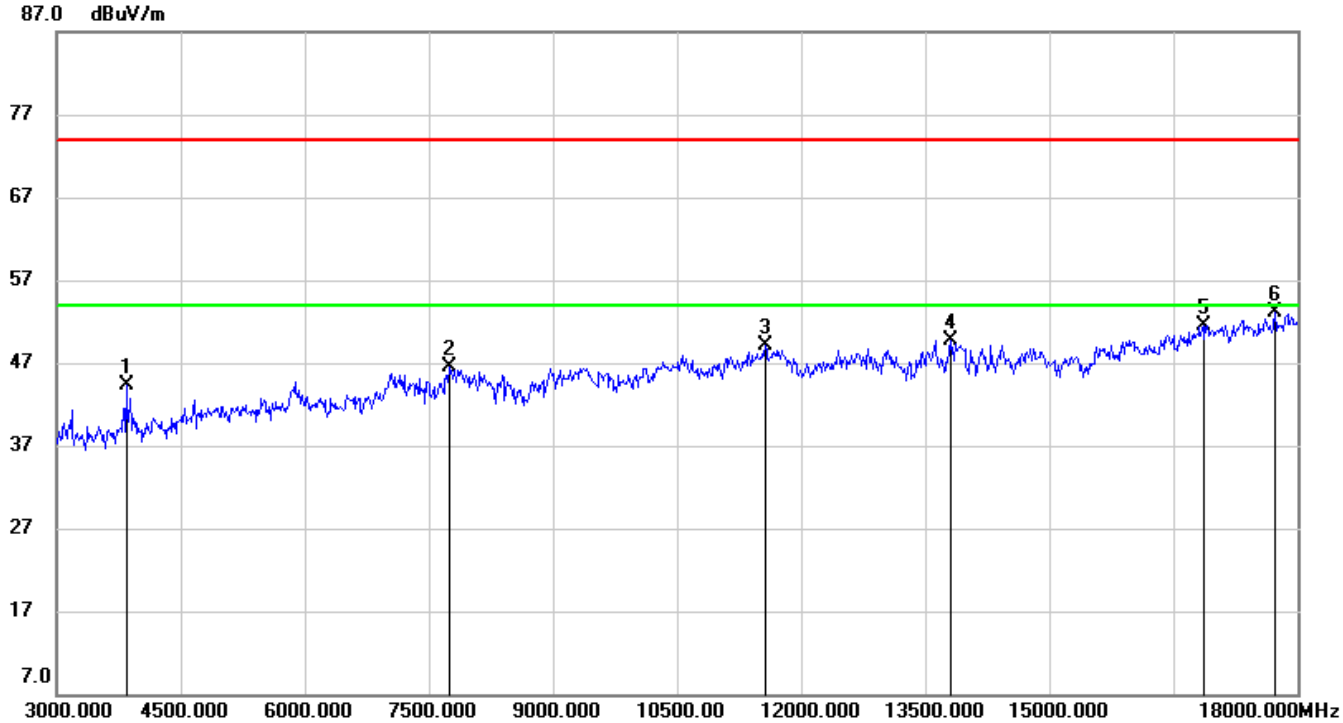
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3975.000	49.76	-2.90	46.86	74.00	-27.14	peak
2	7755.000	38.92	7.29	46.21	74.00	-27.79	peak
3	11505.000	35.31	13.42	48.73	74.00	-25.27	peak
4	13875.000	33.21	16.44	49.65	74.00	-24.35	peak
5	16605.000	31.78	19.49	51.27	74.00	-22.73	peak
6	17925.000	29.56	23.37	52.93	74.00	-21.07	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

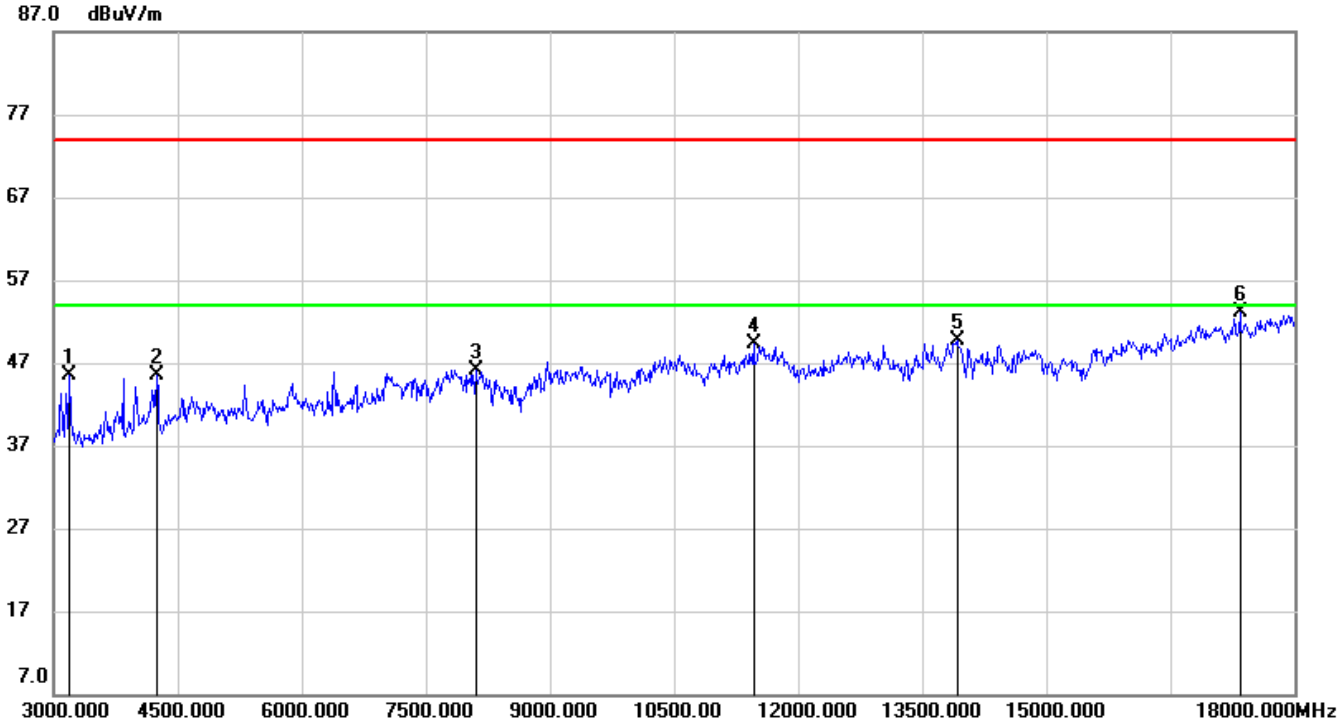
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3840.000	47.21	-2.84	44.37	74.00	-29.63	peak
2	7740.000	39.42	7.08	46.50	74.00	-27.50	peak
3	11565.000	35.78	13.26	49.04	74.00	-24.96	peak
4	13800.000	32.56	17.10	49.66	74.00	-24.34	peak
5	16860.000	31.62	19.95	51.57	74.00	-22.43	peak
6	17730.000	30.45	22.70	53.15	74.00	-20.85	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



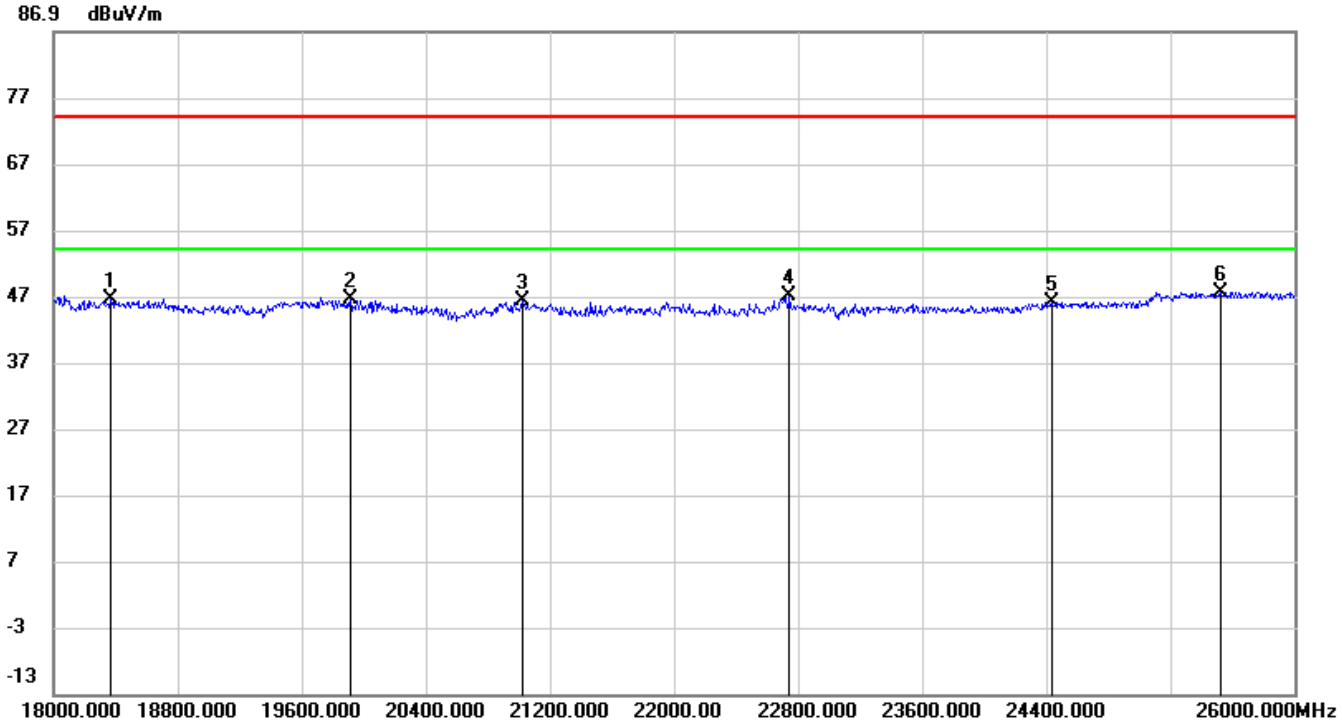
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3195.000	49.94	-4.42	45.52	74.00	-28.48	peak
2	4245.000	47.12	-1.59	45.53	74.00	-28.47	peak
3	8100.000	38.36	7.81	46.17	74.00	-27.83	peak
4	11460.000	36.19	13.11	49.30	74.00	-24.70	peak
5	13920.000	33.45	16.17	49.62	74.00	-24.38	peak
6	17340.000	31.52	21.61	53.13	74.00	-20.87	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: VBW=1/Ton where: ton is transmit duration.
5. For transmit duration, please refer to clause 7.1.
6. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
7. Proper operation of the transmitter prior to adding the filter to the measurement chain.

8.5. SPURIOUS EMISSIONS 18G ~ 26GHz

8.5.1. GFSK MODE

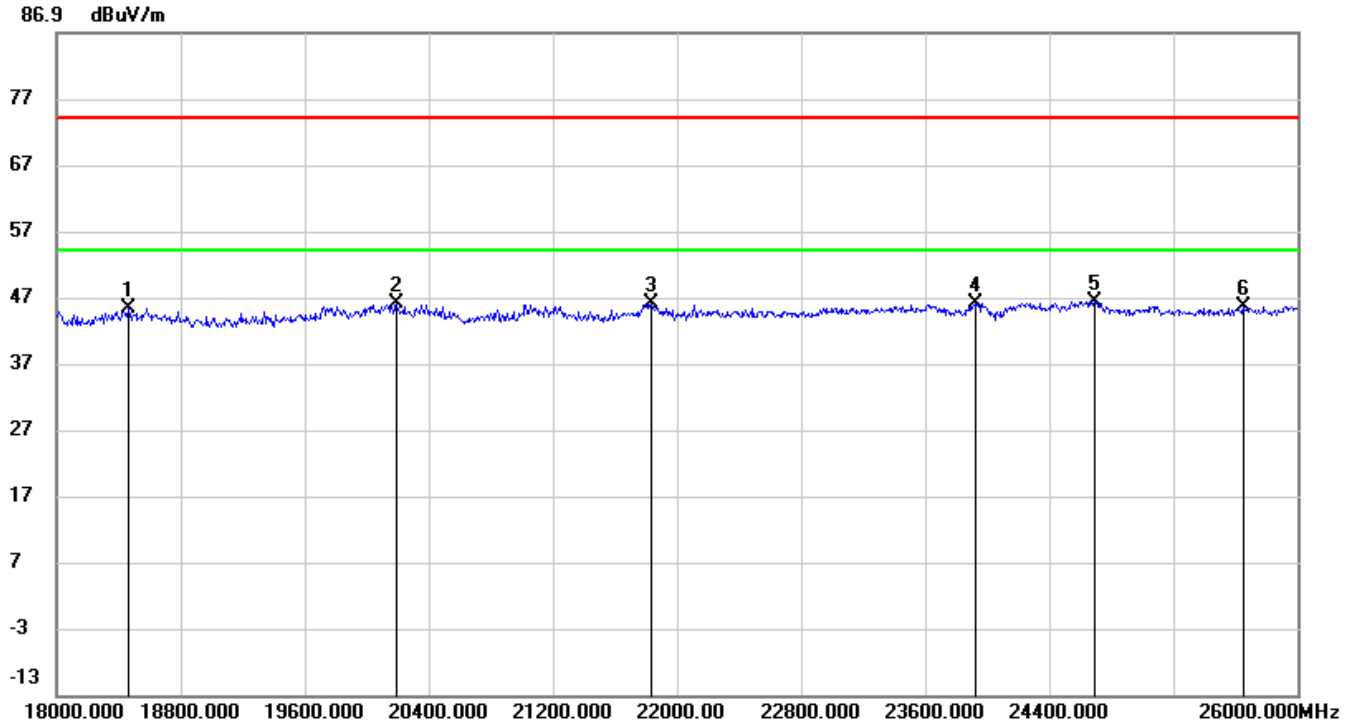
SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18368.000	51.01	-4.38	46.63	74.00	-27.37	peak
2	19912.000	50.91	-4.36	46.55	74.00	-27.45	peak
3	21024.000	51.62	-5.30	46.32	74.00	-27.68	peak
4	22744.000	52.68	-5.74	46.94	74.00	-27.06	peak
5	24432.000	48.97	-2.86	46.11	74.00	-27.89	peak
6	25520.000	49.43	-1.78	47.65	74.00	-26.35	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.

SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18464.000	49.70	-4.39	45.31	74.00	-28.69	peak
2	20192.000	50.87	-4.76	46.11	74.00	-27.89	peak
3	21832.000	52.03	-5.92	46.11	74.00	-27.89	peak
4	23920.000	50.29	-4.21	46.08	74.00	-27.92	peak
5	24696.000	48.47	-2.08	46.39	74.00	-27.61	peak
6	25648.000	47.12	-1.53	45.59	74.00	-28.41	peak

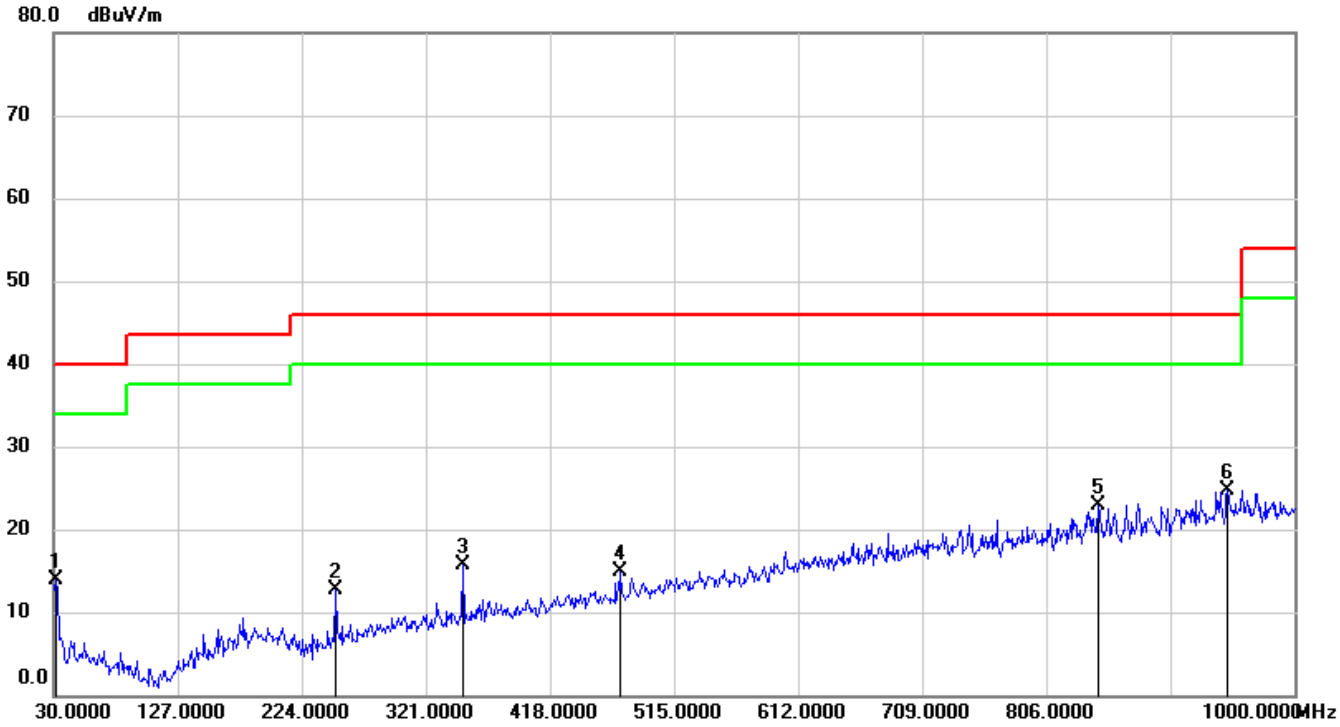
Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.

Note: All test modes have been tested, only the worst data record in the report.

8.6. SPURIOUS EMISSIONS 30M ~ 1 GHz

8.6.1. GFSK MODE

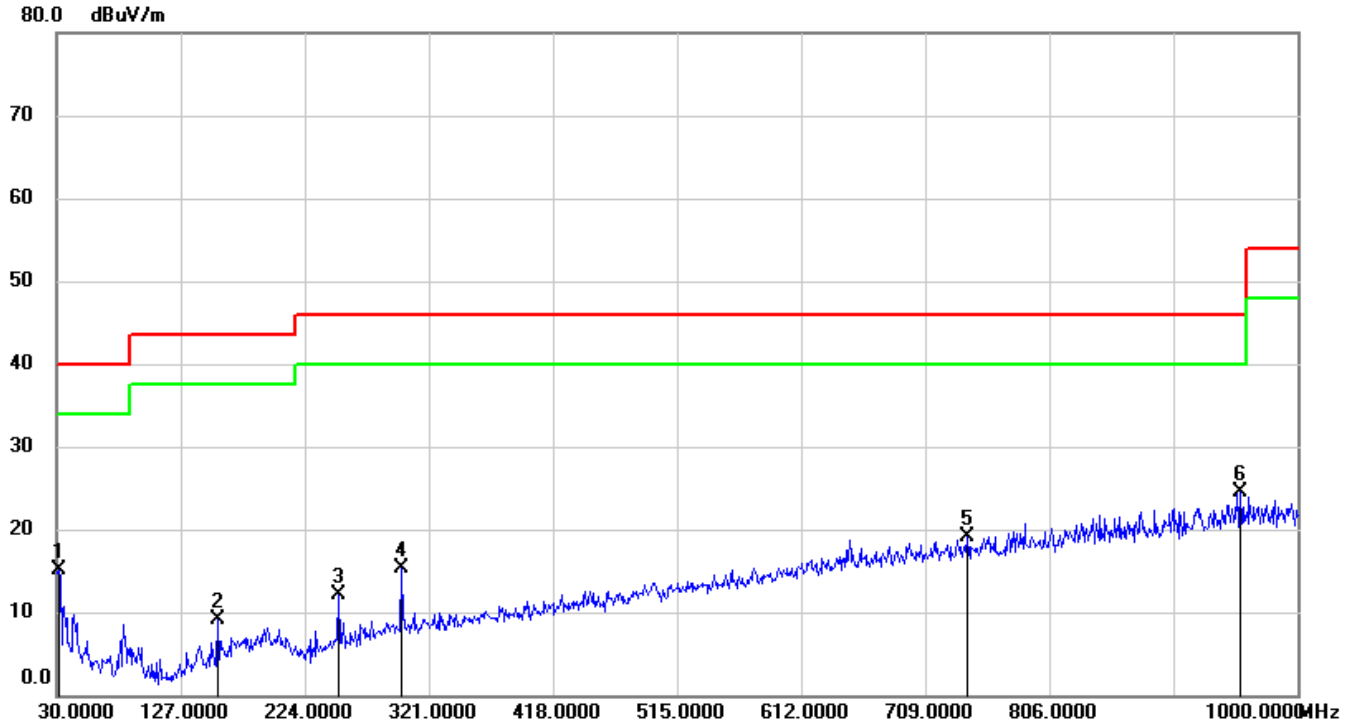
SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	31.9400	30.97	-17.05	13.92	40.00	-26.08	QP
2	250.1900	29.09	-16.34	12.75	46.00	-33.25	QP
3	350.1000	29.15	-13.52	15.63	46.00	-30.37	QP
4	473.2900	26.18	-11.35	14.83	46.00	-31.17	QP
5	846.7400	27.76	-4.80	22.96	46.00	-23.04	QP
6	947.6200	28.25	-3.47	24.78	46.00	-21.22	QP

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	31.9400	32.07	-17.05	15.02	40.00	-24.98	QP
2	156.1000	27.20	-18.01	9.19	43.50	-34.31	QP
3	250.1900	28.48	-16.34	12.14	46.00	-33.86	QP
4	299.6600	29.68	-14.39	15.29	46.00	-30.71	QP
5	741.9800	25.46	-6.41	19.05	46.00	-26.95	QP
6	955.3800	27.91	-3.46	24.45	46.00	-21.55	QP

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto

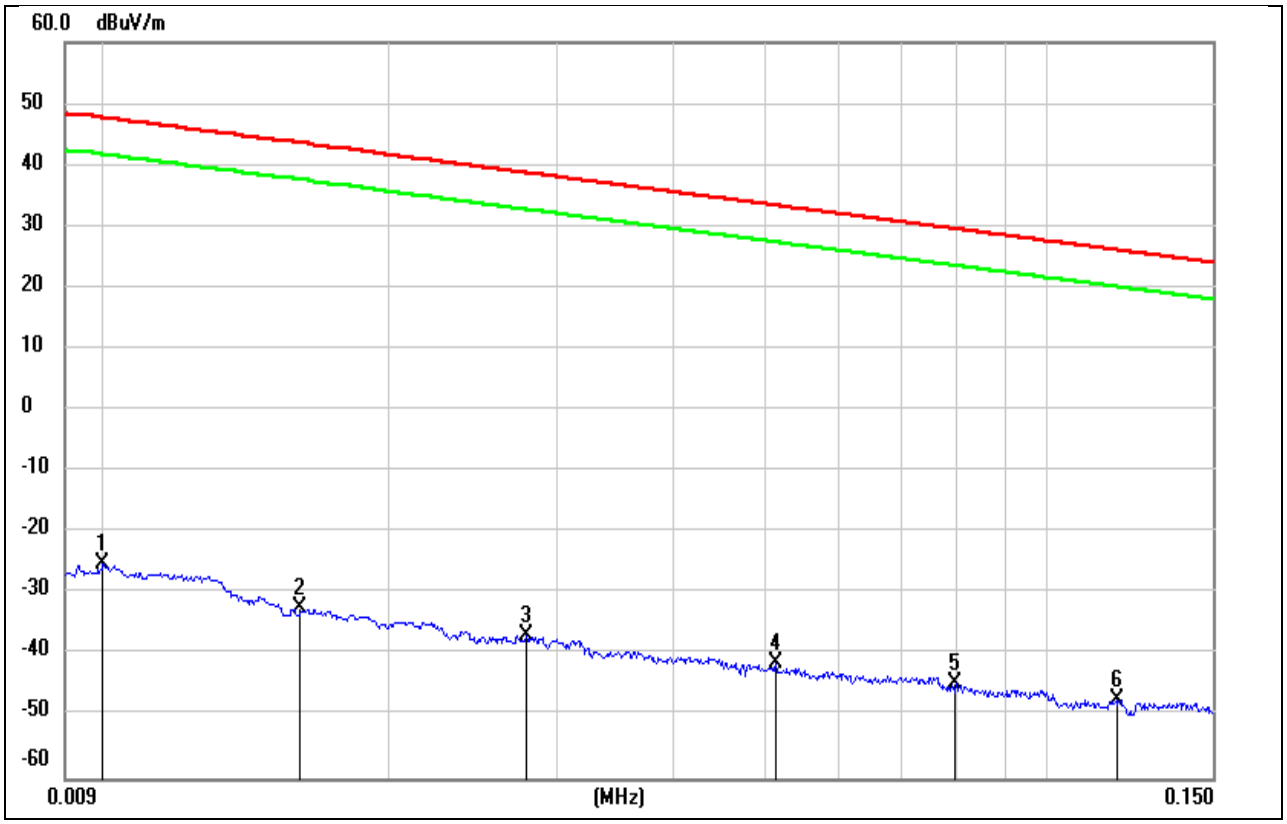
Note: All test modes have been tested, only the worst data record in the report.

8.7. SPURIOUS EMISSIONS BELOW 30M

8.7.1. GFSK MODE

SPURIOUS EMISSIONS (MID CHANNEL, LOOP ANTENNA FACE ON TO THE EUT, WORST-CASE CONFIGURATION)

9kHz~ 150kHz



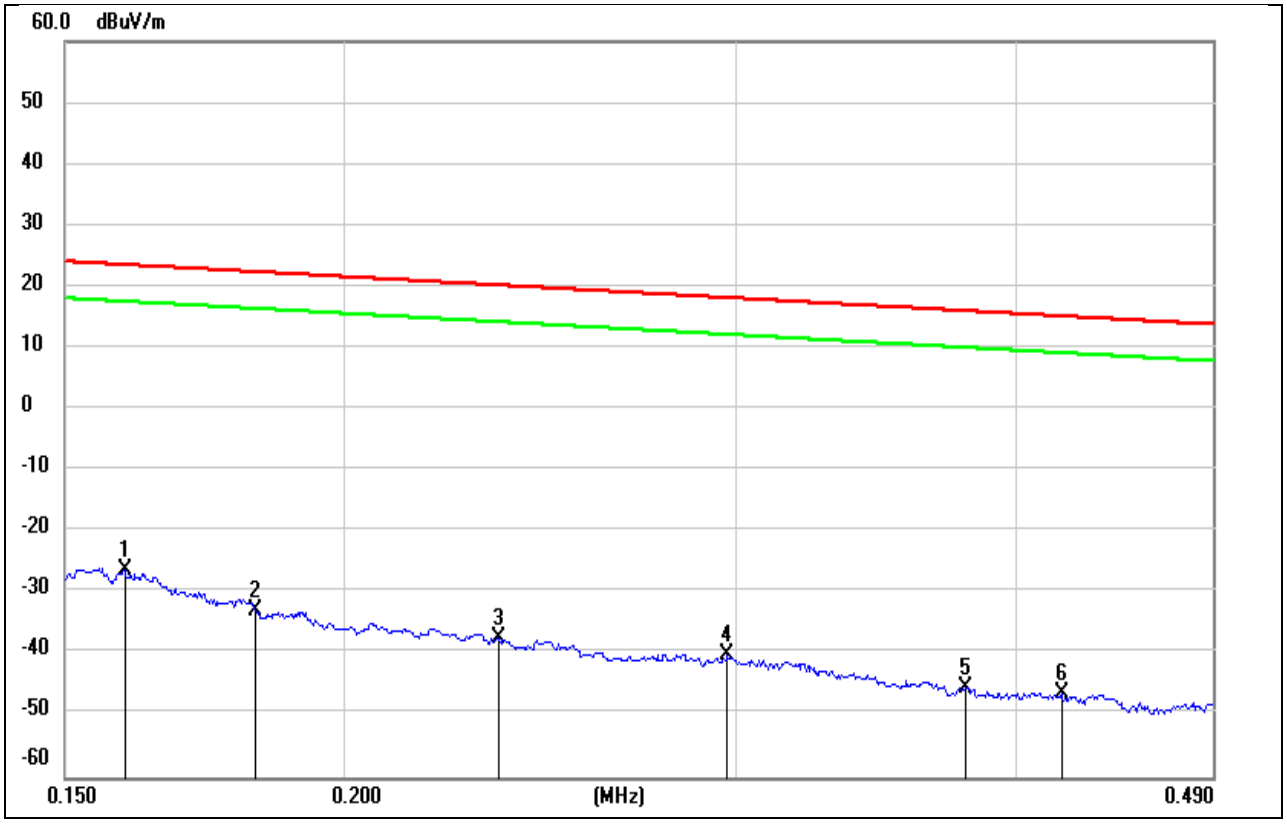
No.	Frequency	Reading	Correct	Result	Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.0100	76.22	-101.40	-25.18	47.60	-76.68	-3.90	-72.78	peak
2	0.0160	68.97	-101.37	-32.40	43.52	-83.90	-7.98	-75.92	peak
3	0.0279	64.67	-101.38	-36.71	38.69	-88.21	-12.81	-75.40	peak
4	0.0514	60.18	-101.48	-41.30	33.38	-92.8	-18.12	-74.68	peak
5	0.0796	57.03	-101.63	-44.60	29.58	-96.10	-21.92	-74.18	peak
6	0.1184	54.52	-101.74	-47.22	26.14	-98.72	-25.36	-73.36	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

150kHz ~ 490kHz



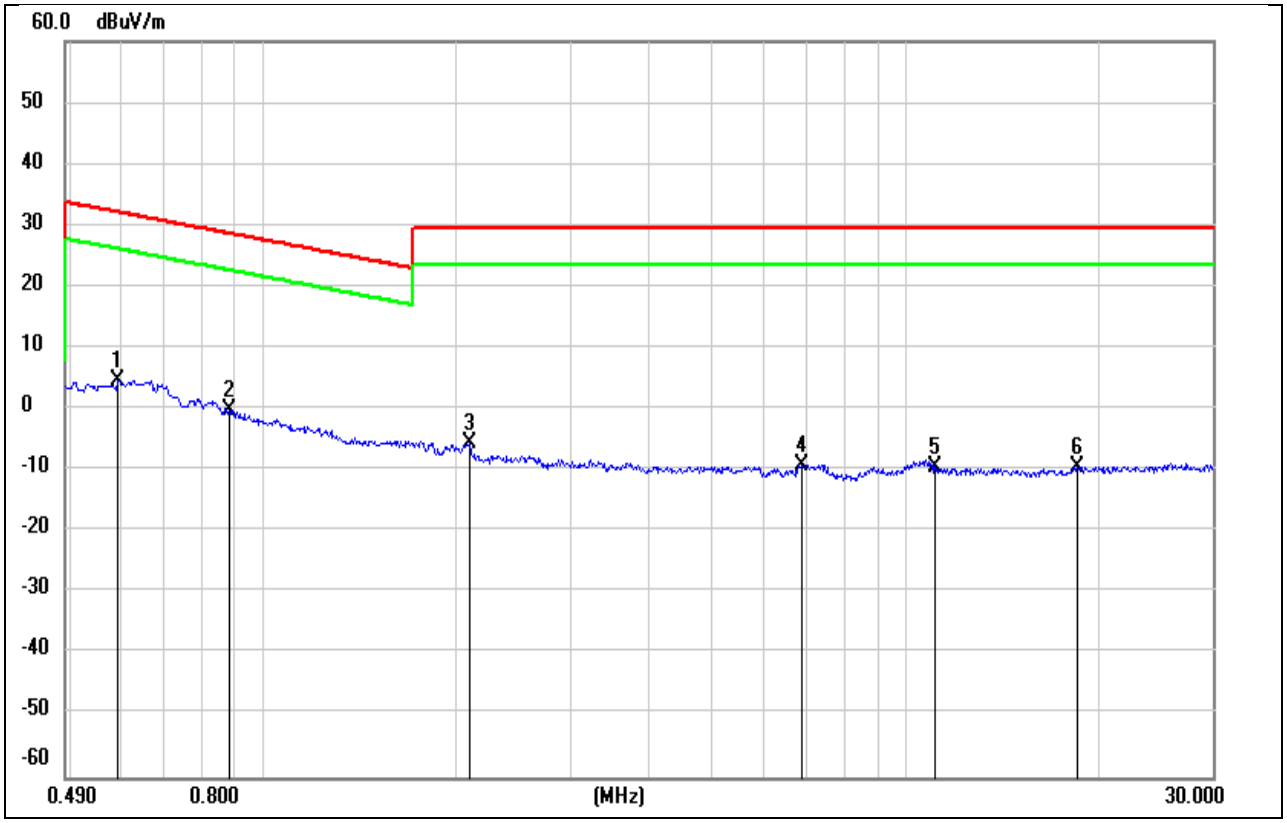
No.	Frequency	Reading	Correct	Result	Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.1595	75.36	-101.65	-26.29	23.55	-77.79	-27.95	-49.84	peak
2	0.1826	68.76	-101.69	-32.93	22.38	-84.43	-29.12	-55.31	peak
3	0.2346	64.35	-101.77	-37.42	20.19	-88.92	-31.31	-57.61	peak
4	0.2972	61.66	-101.85	-40.19	18.14	-91.69	-33.36	-58.33	peak
5	0.3800	56.52	-101.94	-45.42	16.01	-96.92	-35.49	-61.43	peak
6	0.4193	55.68	-101.98	-46.30	15.15	-97.80	-36.35	-61.45	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

490kHz ~ 30MHz



No.	Frequency	Reading	Correct	Result	Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.5917	66.74	-62.08	4.66	32.16	-46.84	-19.34	-27.50	peak
2	0.8820	62.18	-62.19	-0.01	28.69	-51.51	-22.81	-28.70	peak
3	2.0939	56.39	-61.79	-5.40	29.54	-56.90	-21.96	-34.94	peak
4	6.8936	52.09	-61.22	-9.13	29.54	-60.63	-21.96	-38.67	peak
5	11.0838	51.28	-60.84	-9.56	29.54	-61.06	-21.96	-39.10	peak
6	18.4908	51.55	-60.89	-9.34	29.54	-60.84	-21.96	-38.88	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

Note: All test modes have been tested, only the worst data record in the report.

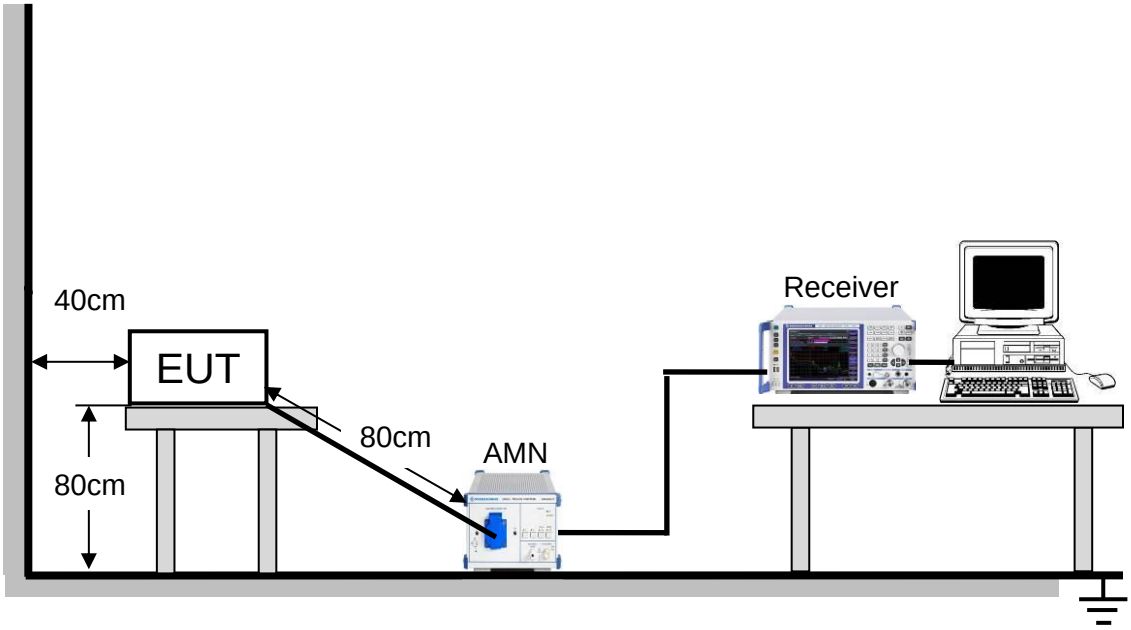
9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

Please refer to CFR 47 FCC §15.207 (a) and ISED RSS-Gen Clause 8.8.

FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

TEST SETUP AND PROCEDURE



The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.
The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

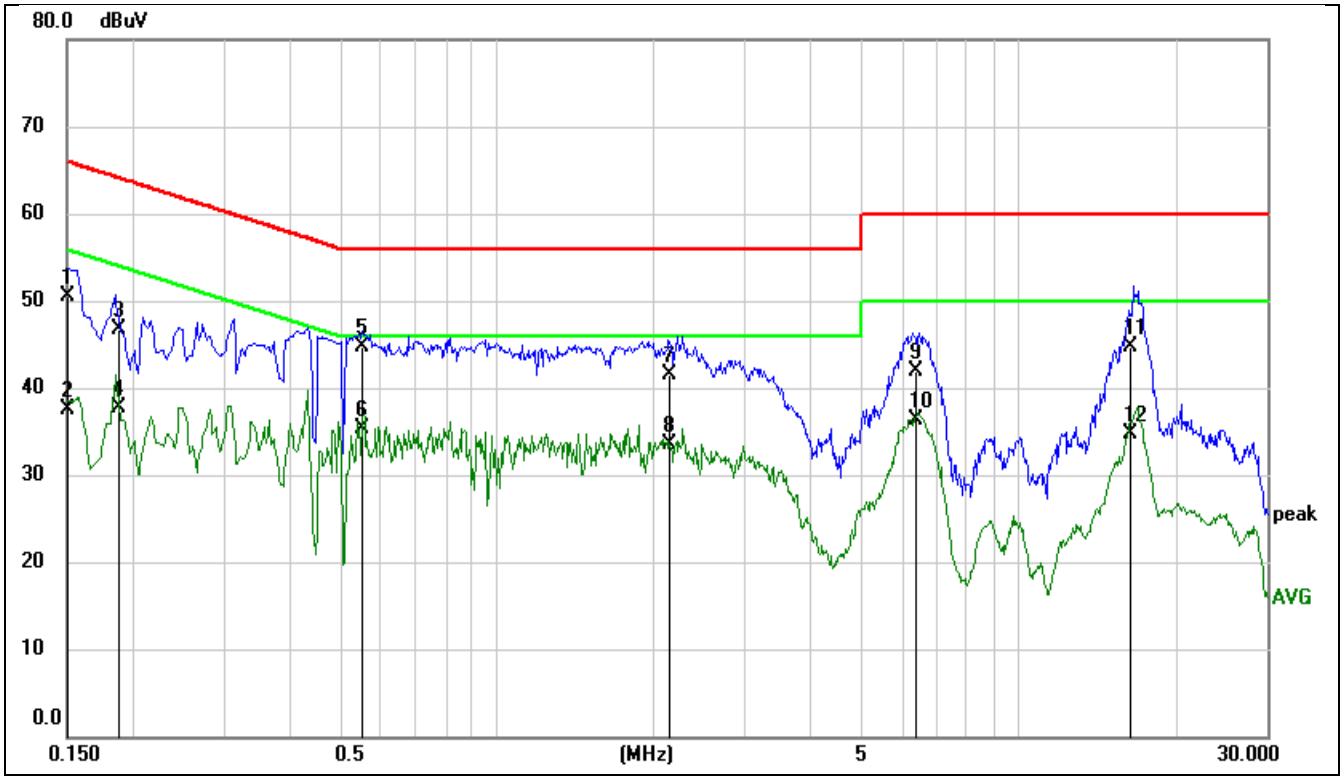
TEST ENVIRONMENT

Temperature	22.0°C	Relative Humidity	68.3%
Atmosphere Pressure	101kPa	Test Voltage	AC120V 60Hz

9.1. 8DPSK MODE

TEST RESULTS (HIGH CHANNEL, WORST-CASE CONFIGURATION)

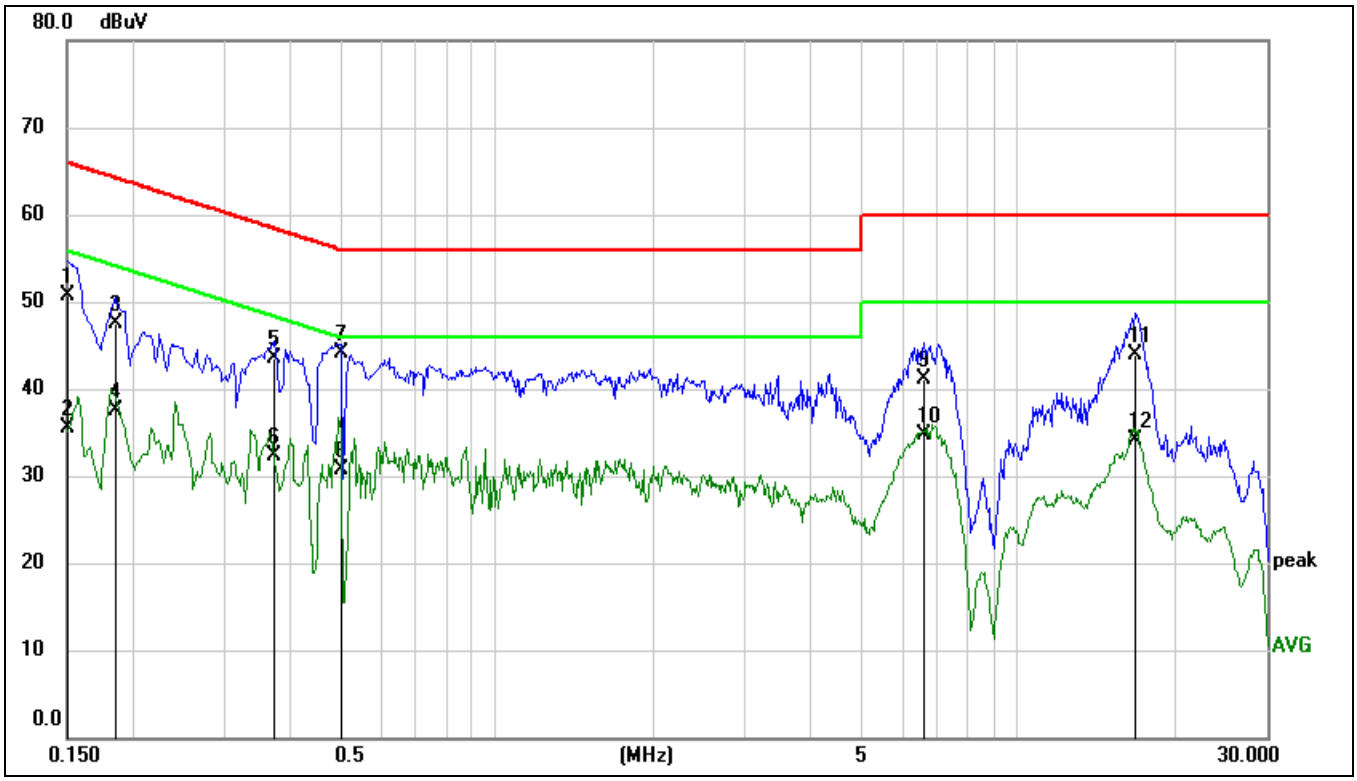
LINE N RESULTS



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1511	40.86	9.60	50.46	65.94	-15.48	QP
2	0.1511	27.83	9.60	37.43	55.94	-18.51	AVG
3	0.1887	37.10	9.60	46.70	64.09	-17.39	QP
4	0.1887	28.17	9.60	37.77	54.09	-16.32	AVG
5	0.5577	35.19	9.60	44.79	56.00	-11.21	QP
6	0.5577	25.78	9.60	35.38	46.00	-10.62	AVG
7	2.1547	31.96	9.63	41.59	56.00	-14.41	QP
8	2.1547	23.84	9.63	33.47	46.00	-12.53	AVG
9	6.3794	32.19	9.71	41.90	60.00	-18.10	QP
10	6.3794	26.52	9.71	36.23	50.00	-13.77	AVG
11	16.5497	34.66	10.00	44.66	60.00	-15.34	QP
12	16.5497	24.67	10.00	34.67	50.00	-15.33	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

LINE L RESULTS



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1511	41.17	9.61	50.78	65.94	-15.16	QP
2	0.1511	25.82	9.61	35.43	55.94	-20.51	AVG
3	0.1855	37.92	9.60	47.52	64.24	-16.72	QP
4	0.1855	27.95	9.60	37.55	54.24	-16.69	AVG
5	0.3764	33.88	9.60	43.48	58.36	-14.88	QP
6	0.3764	22.65	9.60	32.25	48.36	-16.11	AVG
7	0.5001	34.42	9.60	44.02	56.00	-11.98	QP
8	0.5001	21.13	9.60	30.73	46.00	-15.27	AVG
9	6.6373	31.39	9.70	41.09	60.00	-18.91	QP
10	6.6373	24.95	9.70	34.65	50.00	-15.35	AVG
11	16.7912	34.00	9.94	43.94	60.00	-16.06	QP
12	16.7912	24.07	9.94	34.01	50.00	-15.99	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

Note: All the modes and channels had been tested, but only the worst data recorded in the report.

10. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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.

Please refer to FCC §15.247(b)(4)
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RESULTS

Complies

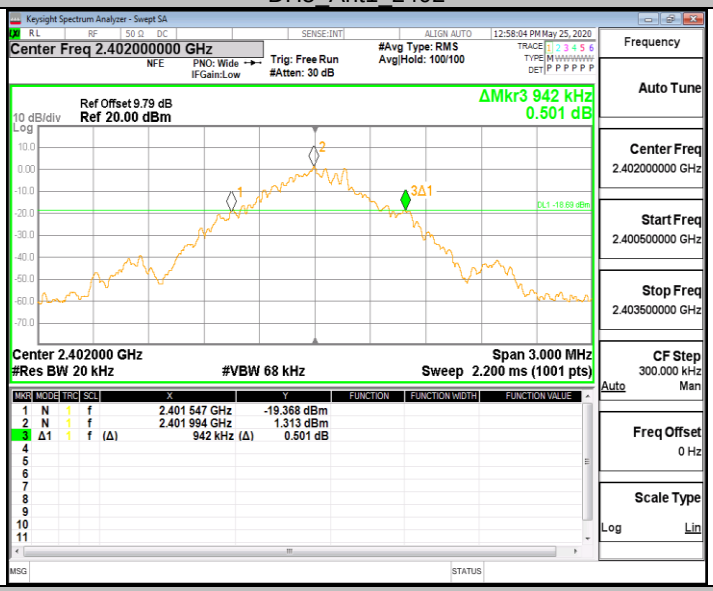
Appendix A: 20dB Emission Bandwidth

Test Result

Test Mode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.942	2401.547	2402.489	---	PASS
		2441	1.017	2440.481	2441.498	---	PASS
		2480	0.930	2479.499	2480.429	---	PASS
3DH5	Ant1	2402	1.275	2401.352	2402.627	---	PASS
		2441	1.179	2440.421	2441.600	---	PASS
		2480	1.155	2479.427	2480.582	---	PASS

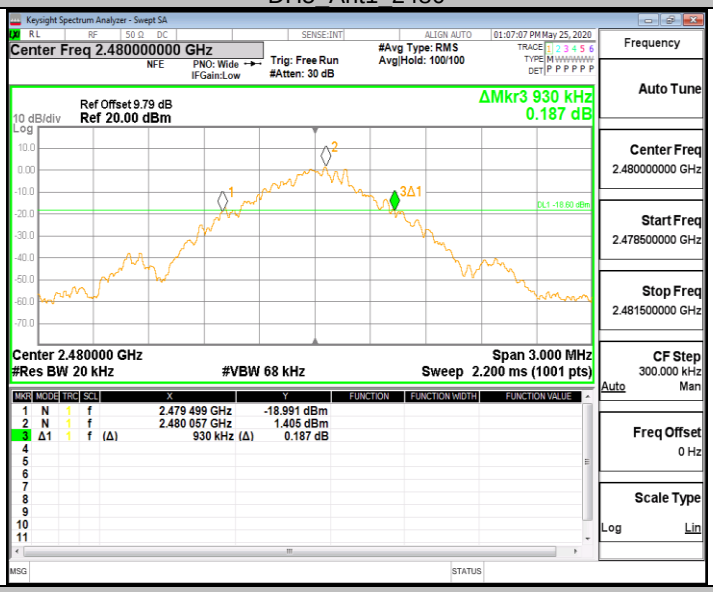
Test Graphs

DH5_Ant1_2402

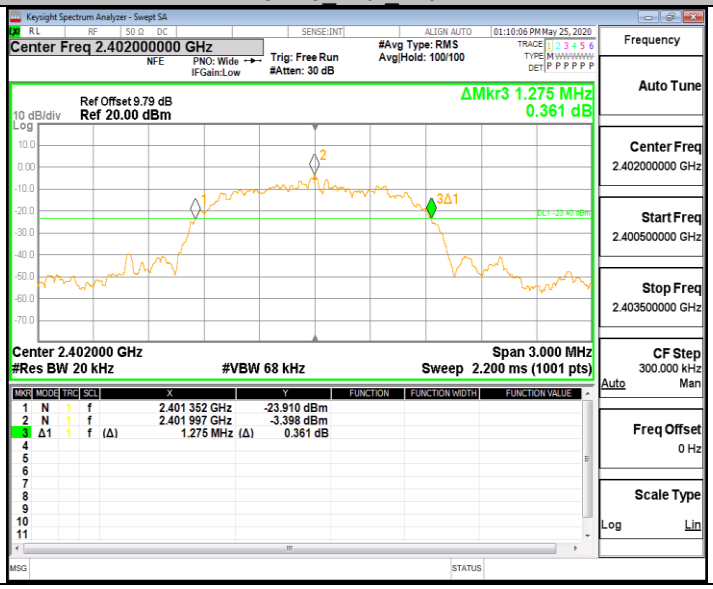


DH5_Ant1_2441

DH5_Ant1_2480



3DH5_Ant1_2402



3DH5_Ant1_2441

3DH5_Ant1_2480

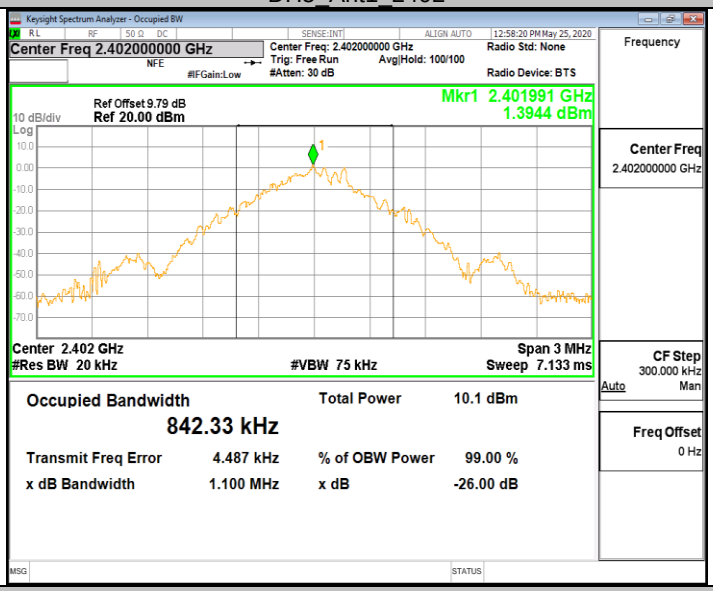
Appendix B: Occupied Channel Bandwidth

Test Result

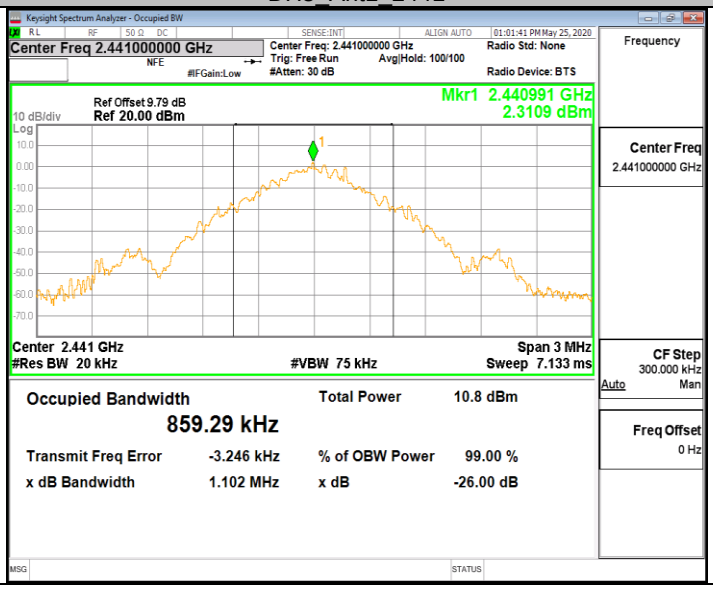
Test Mode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.84233	2401.583	2402.426	---	PASS
		2441	0.85929	2440.567	2441.426	---	PASS
		2480	0.87450	2479.554	2480.428	---	PASS
3DH5	Ant1	2402	1.1514	2401.420	2402.572	---	PASS
		2441	1.1431	2440.426	2441.569	---	PASS
		2480	1.1630	2479.416	2480.579	---	PASS

Test Graphs

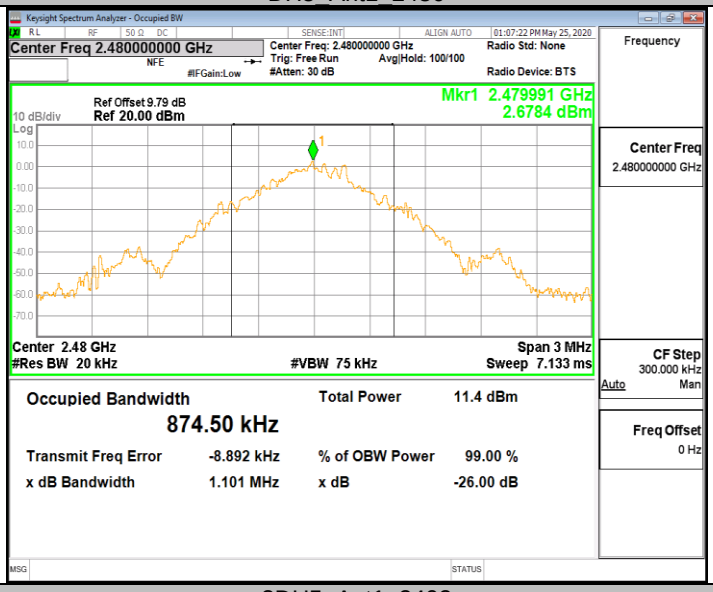
DH5_Ant1_2402



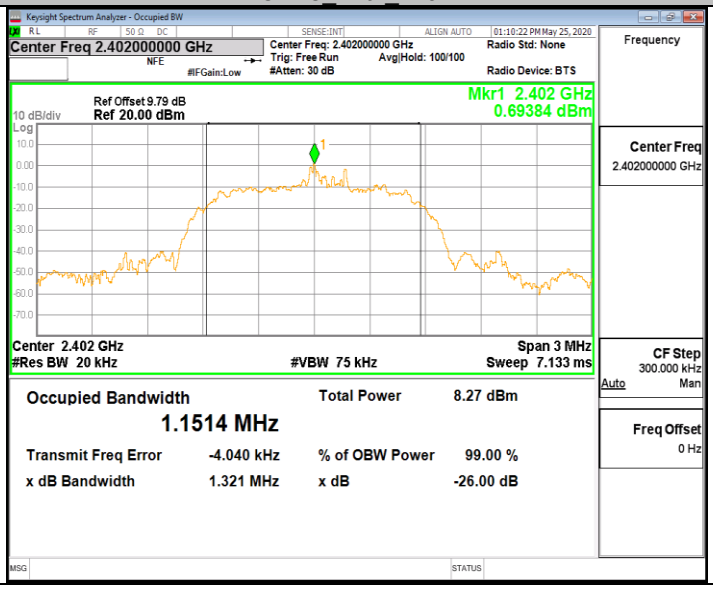
DH5_Ant1_2441



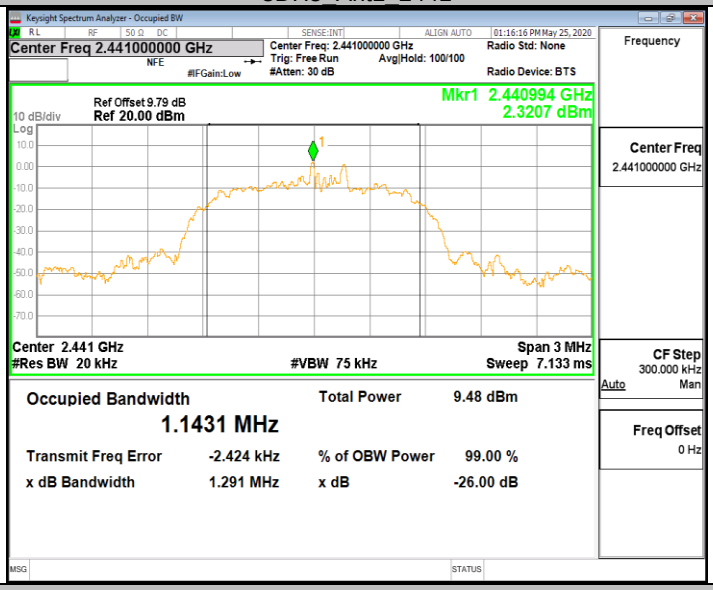
DH5_Ant1_2480



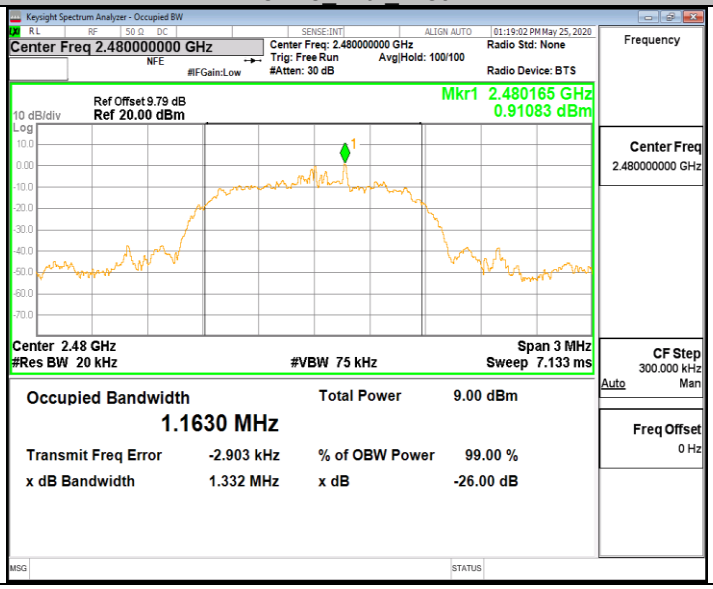
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



Appendix C: Maximum Peak conducted output power

Test Result

Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
DH5	Ant1	2402	0.18	<=21	PASS
		2441	-0.80	<=21	PASS
		2480	-0.90	<=21	PASS
3DH5	Ant1	2402	0.21	<=21	PASS
		2441	-0.83	<=21	PASS
		2480	-0.87	<=21	PASS

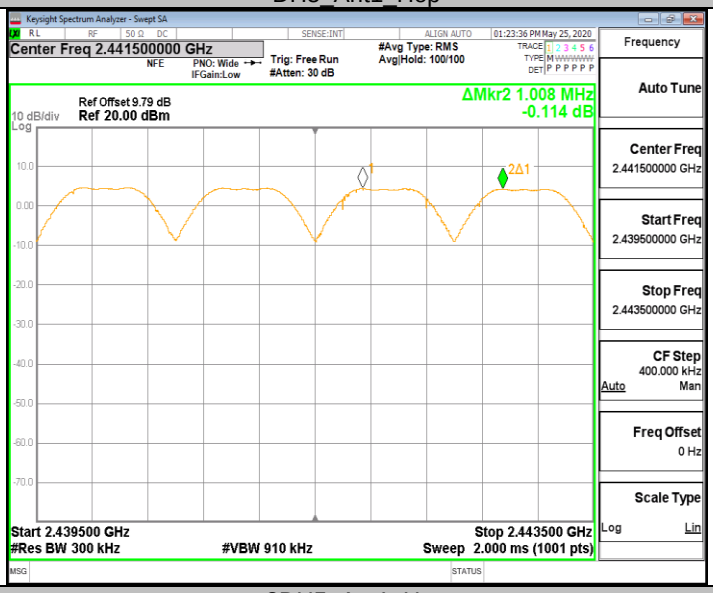
Appendix D: Carrier frequency separation

Test Result

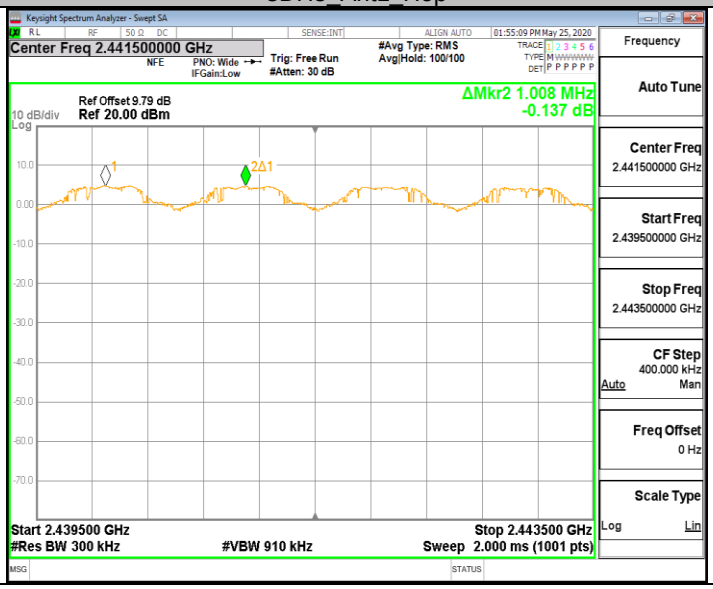
Test Mode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	1.008	>=0.678	PASS
3DH5	Ant1	Hop	1.008	>=0.850	PASS

Test Graphs

DH5_Ant1_Hop



3DH5_Ant1_Hop



Appendix E: Time of occupancy

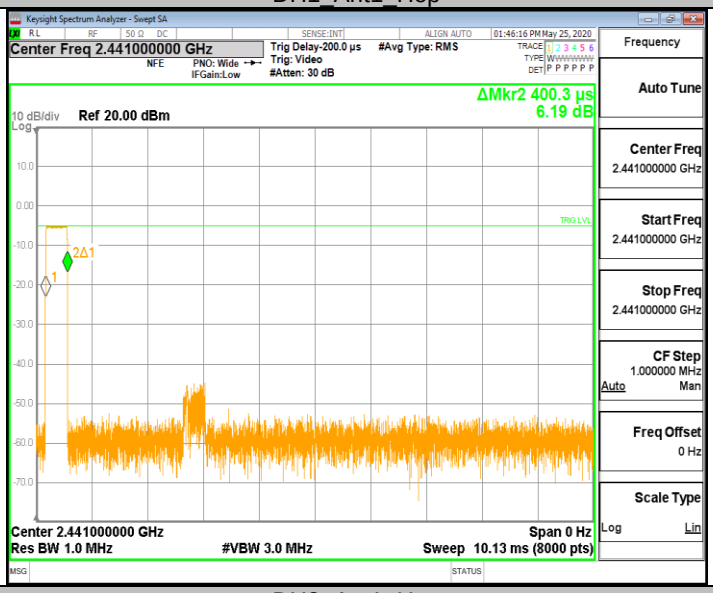
Test Result

FHSS Mode						
Test Mode	Antenna	Channel	BurstWidth [ms]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.40	0.128	<=0.4	PASS
DH3	Ant1	Hop	1.66	0.266	<=0.4	PASS
DH5	Ant1	Hop	2.90	0.309	<=0.4	PASS
3DH1	Ant1	Hop	0.41	0.131	<=0.4	PASS
3DH3	Ant1	Hop	1.66	0.266	<=0.4	PASS
3DH5	Ant1	Hop	2.91	0.310	<=0.4	PASS

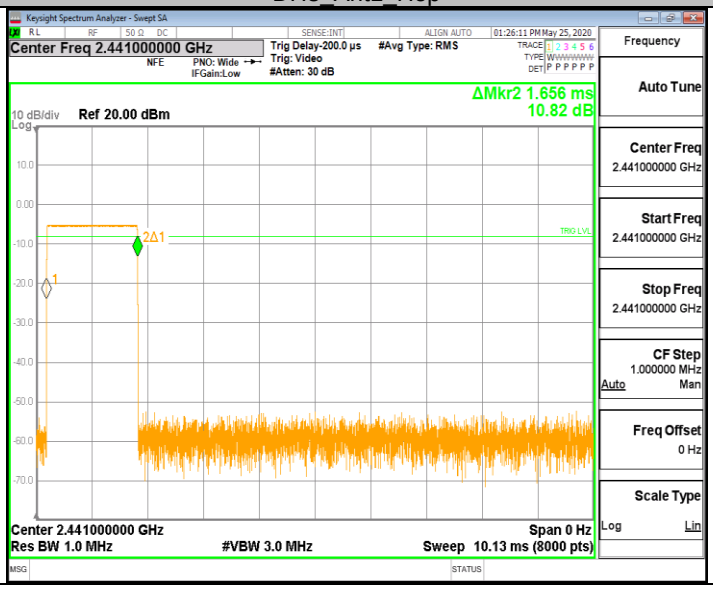
AFHSS Mode						
Test Mode	Antenna	Channel	BurstWidth [ms]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.40	0.064	<=0.4	PASS
DH3	Ant1	Hop	1.66	0.133	<=0.4	PASS
DH5	Ant1	Hop	2.90	0.155	<=0.4	PASS
3DH1	Ant1	Hop	0.41	0.066	<=0.4	PASS
3DH3	Ant1	Hop	1.66	0.133	<=0.4	PASS
3DH5	Ant1	Hop	2.91	0.155	<=0.4	PASS

Test Graphs

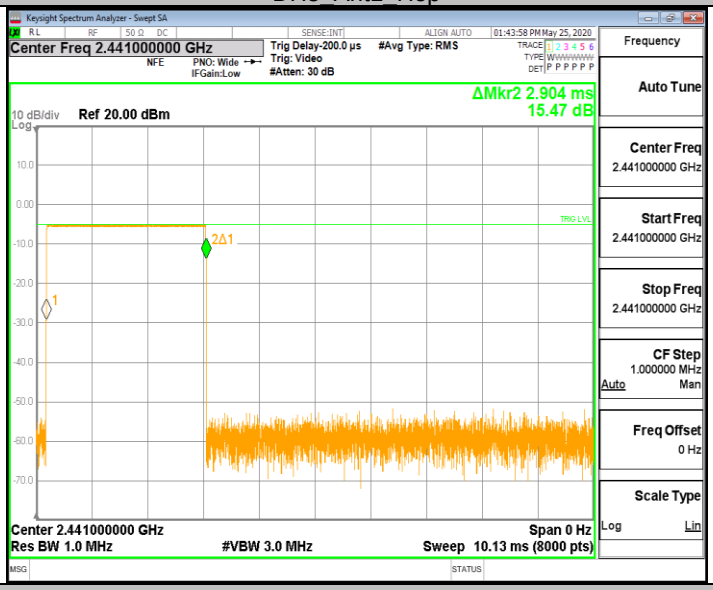
DH1_Ant1_Hop



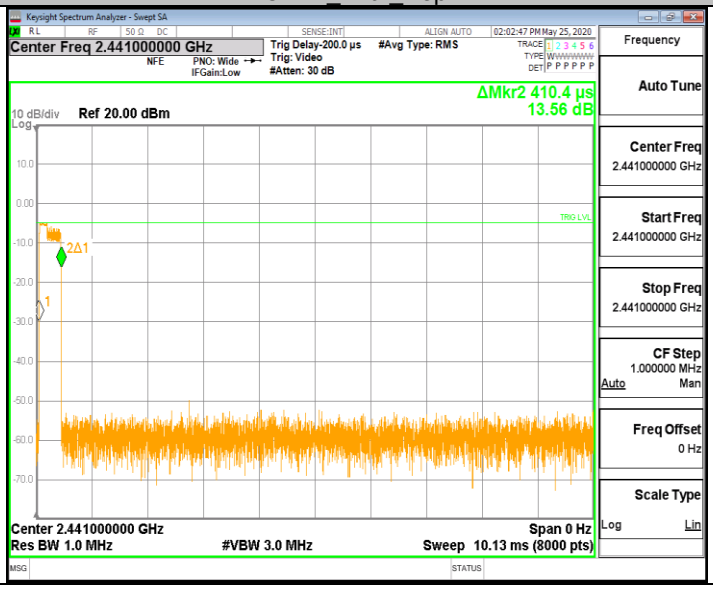
DH3_Ant1_Hop

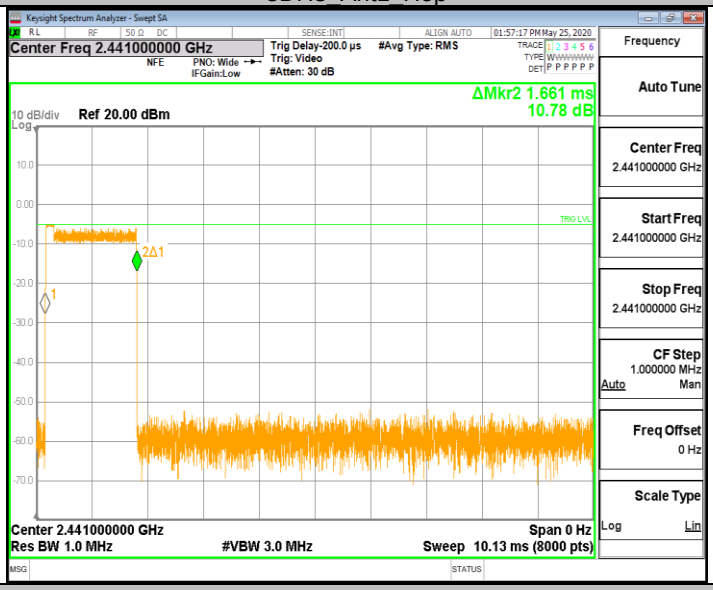
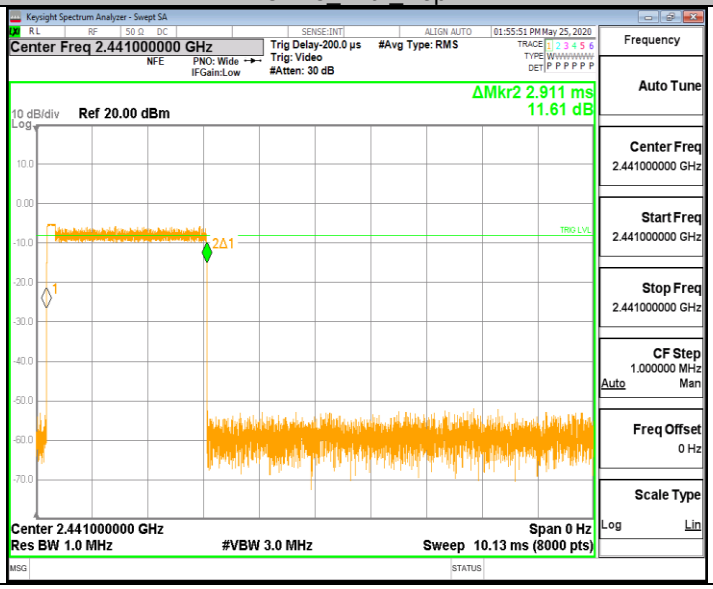


DH5_Ant1_Hop



3DH1_Ant1_Hop



3DH3_Ant1_Hop

3DH5_Ant1_Hop


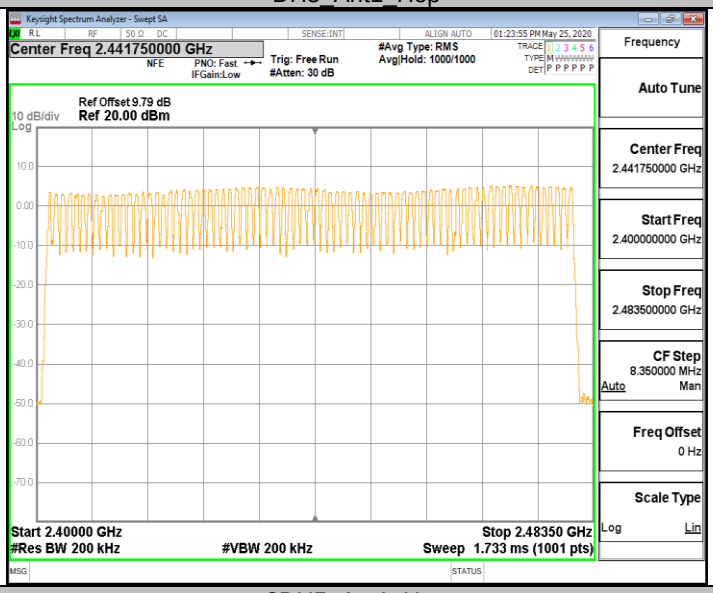
Appendix F: Number of hopping channels

Test Result

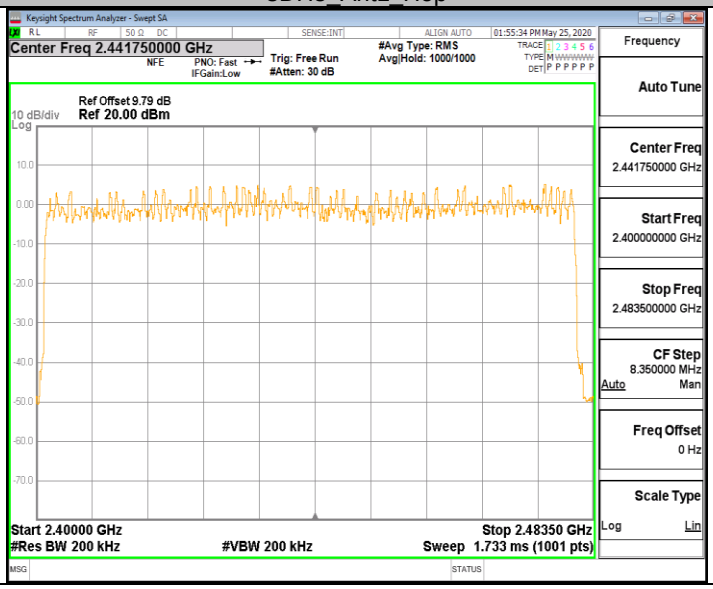
Test Mode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	>=15	PASS
3DH5	Ant1	Hop	79	>=15	PASS

Test Graphs

DH5_Ant1_Hop



3DH5_Ant1_Hop



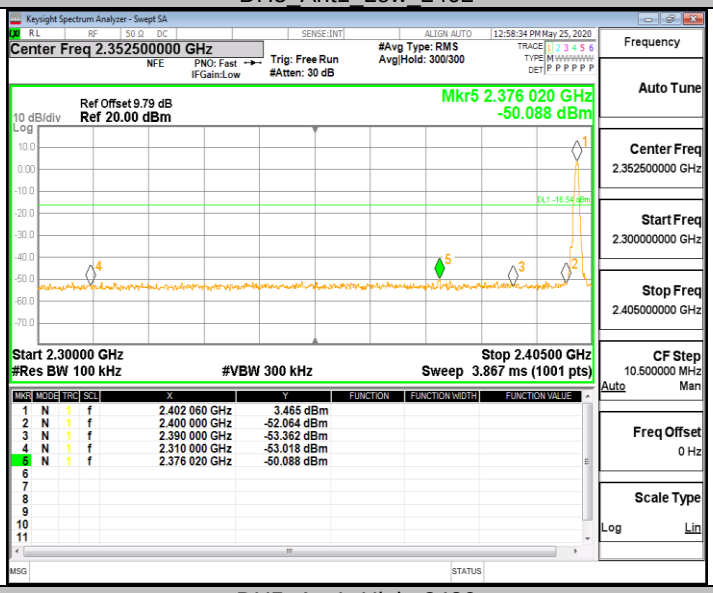
Appendix G: Band edge measurements

Test Result

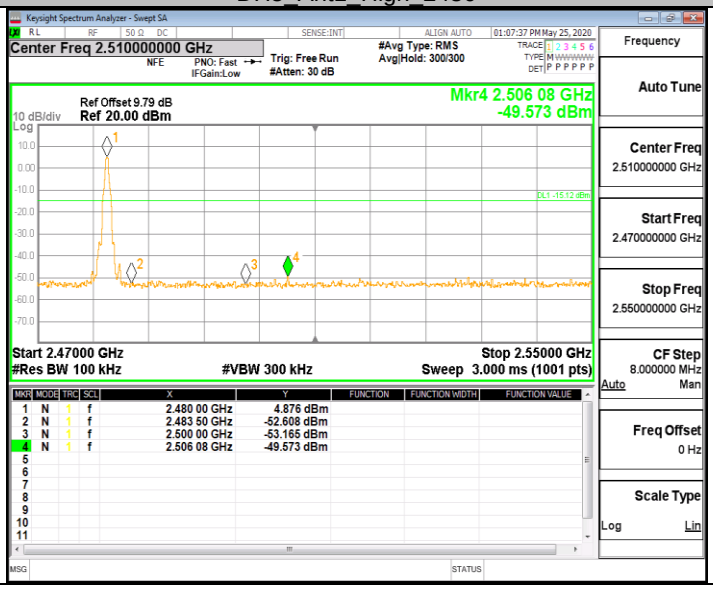
Test Mode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	3.47	-50.09	<=-16.54	PASS
		High	2480	4.88	-49.57	<=-15.12	PASS
		Low	Hop_2402	3.07	-48.9	-16.93	PASS
		High	Hop_2480	5.09	-49.84	-14.91	PASS
3DH5	Ant1	Low	2402	3.51	-50.75	<=-16.49	PASS
		High	2480	4.74	-50.04	<=-15.26	PASS
		Low	Hop_2402	0.55	-50.92	-19.45	PASS
		High	Hop_2480	5.10	-50.24	-14.9	PASS

Test Graphs

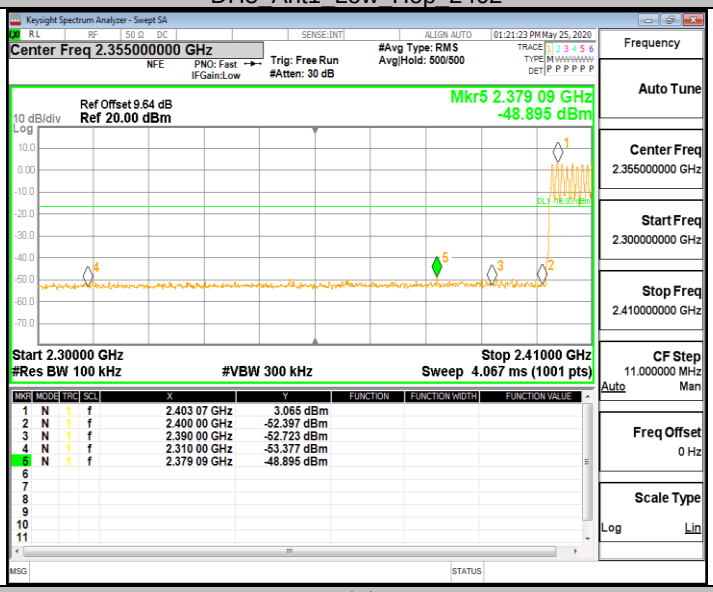
DH5_Ant1_Low_2402



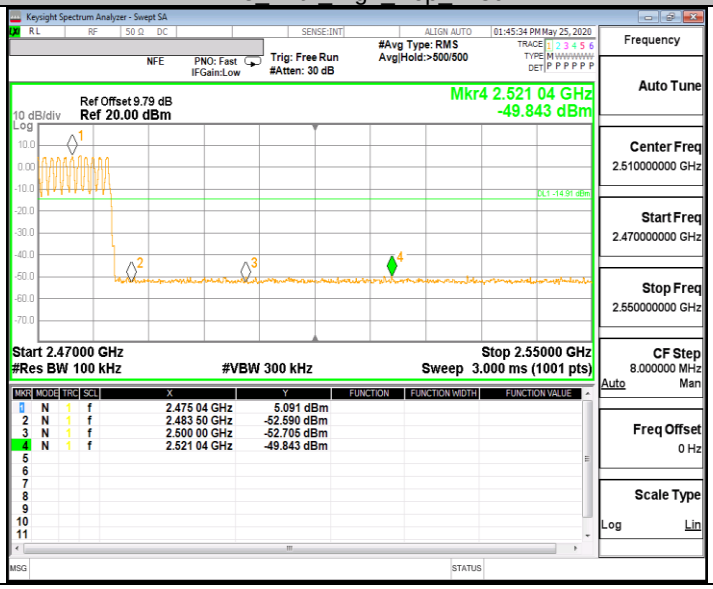
DH5_Ant1_High_2480



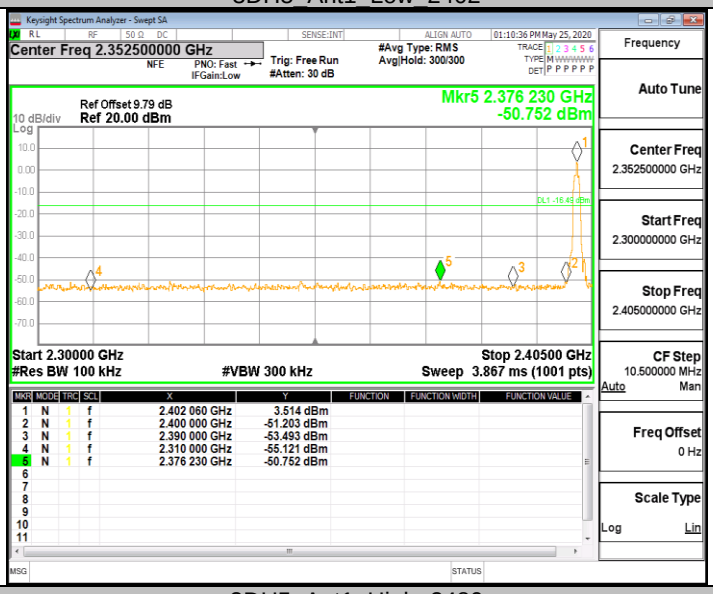
DH5_Ant1_Low_Hop_2402



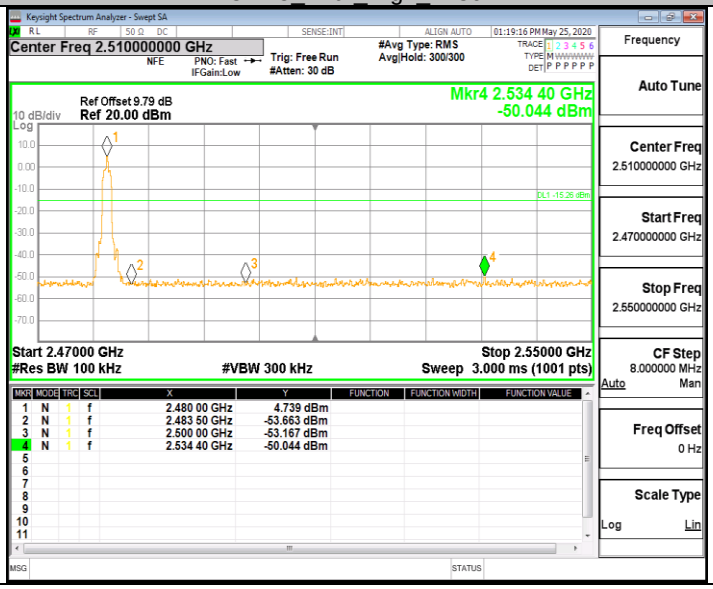
DH5_Ant1_High_Hop_2480



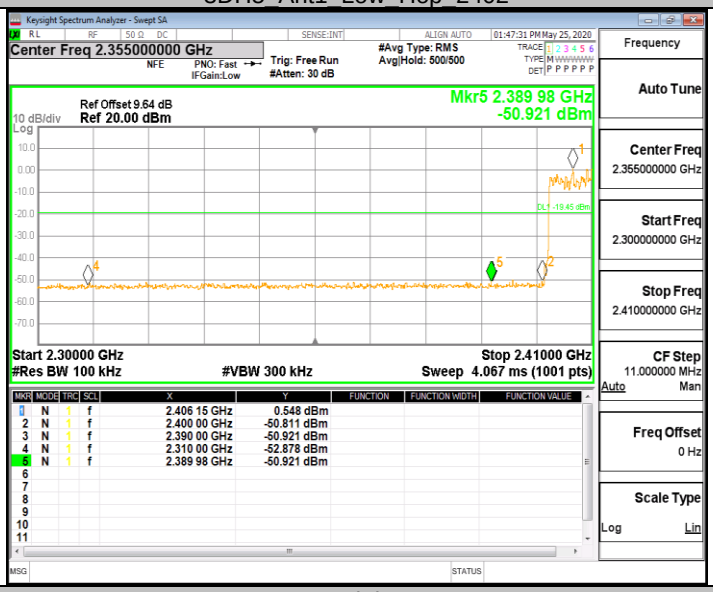
3DH5_Ant1_Low_2402



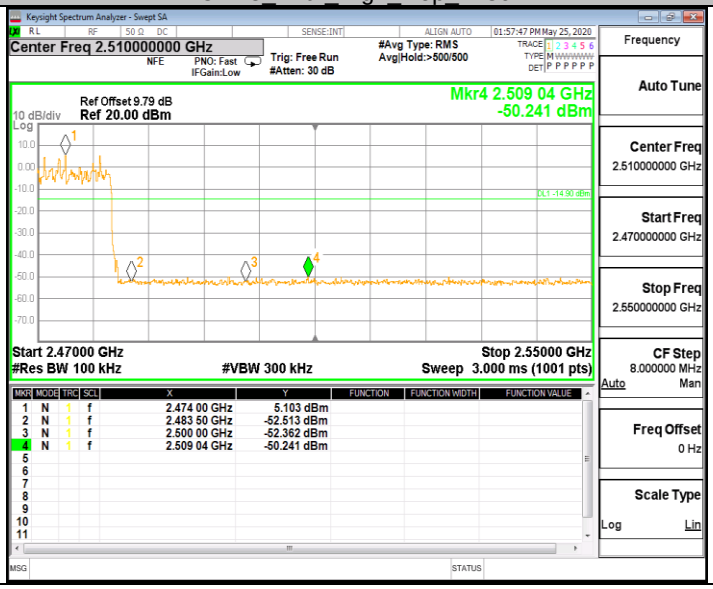
3DH5_Ant1_High_2480



3DH5_Ant1_Low_Hop_2402



3DH5_Ant1_High_Hop_2480



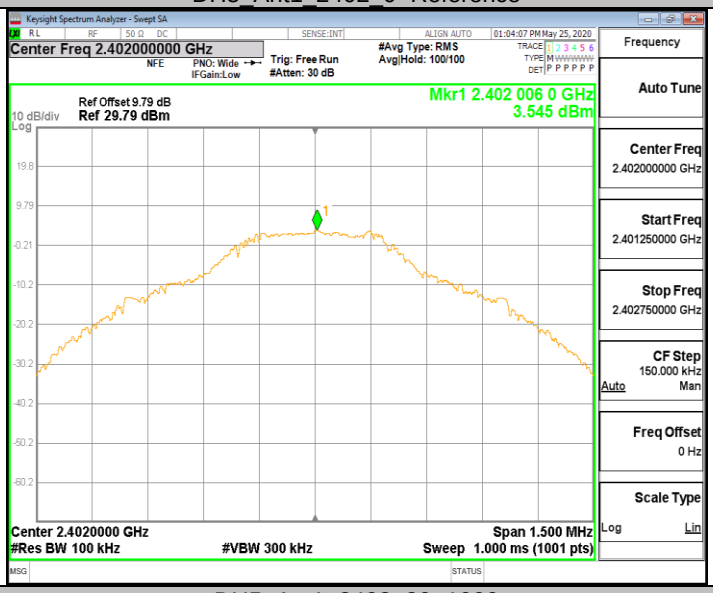
Appendix H: Conducted Spurious Emission

Test Result

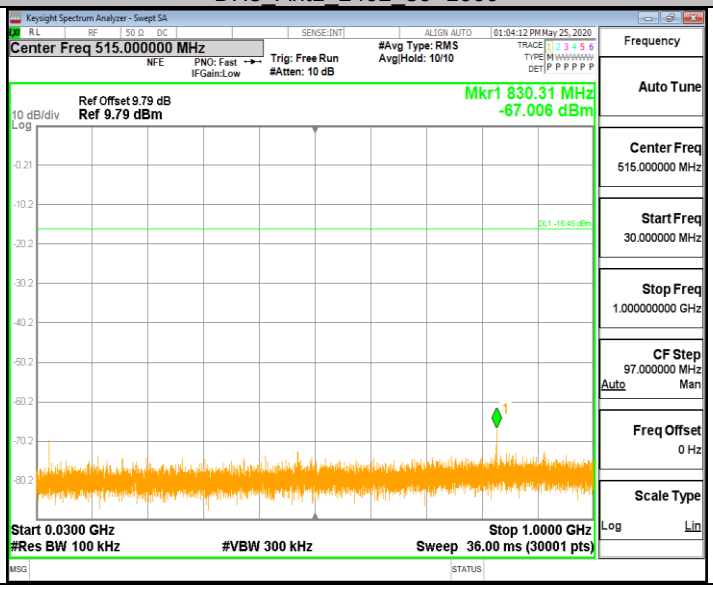
Test Mode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	3.55	3.55	---	PASS
			30~1000	30~1000	-67.006	<=-16.455	PASS
			1000~26500	1000~26500	-54.859	<=-16.455	PASS
		2441	Reference	4.33	4.33	---	PASS
			30~1000	30~1000	-61.15	<=-15.669	PASS
			1000~26500	1000~26500	-56.582	<=-15.669	PASS
		2480	Reference	4.78	4.78	---	PASS
			30~1000	30~1000	-69.211	<=-15.223	PASS
			1000~26500	1000~26500	-55.976	<=-15.223	PASS
3DH5	Ant1	2402	Reference	2.75	2.75	---	PASS
			30~1000	30~1000	-71.229	<=-17.253	PASS
			1000~26500	1000~26500	-57.419	<=-17.253	PASS
		2441	Reference	4.23	4.23	---	PASS
			30~1000	30~1000	-72.587	<=-15.771	PASS
			1000~26500	1000~26500	-57.324	<=-15.771	PASS
		2480	Reference	2.65	2.65	---	PASS
			30~1000	30~1000	-69.635	<=-17.355	PASS
			1000~26500	1000~26500	-60.274	<=-17.355	PASS

Test Graphs

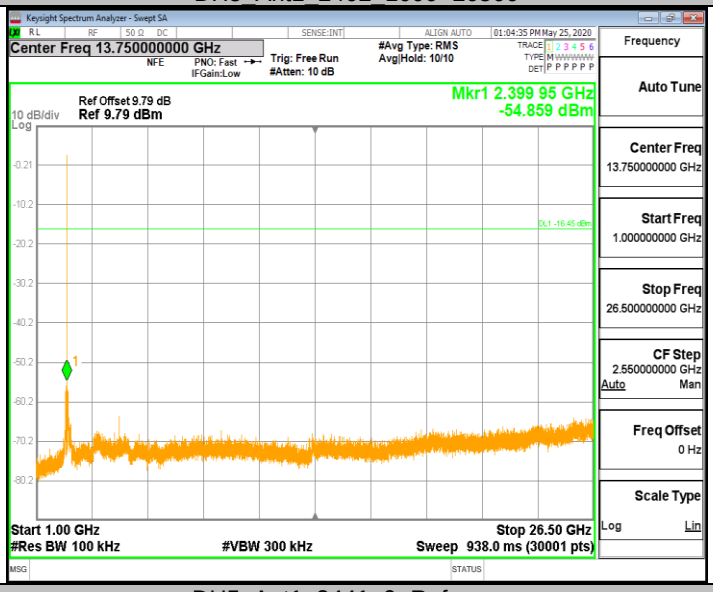
DH5_Ant1_2402_0~Reference



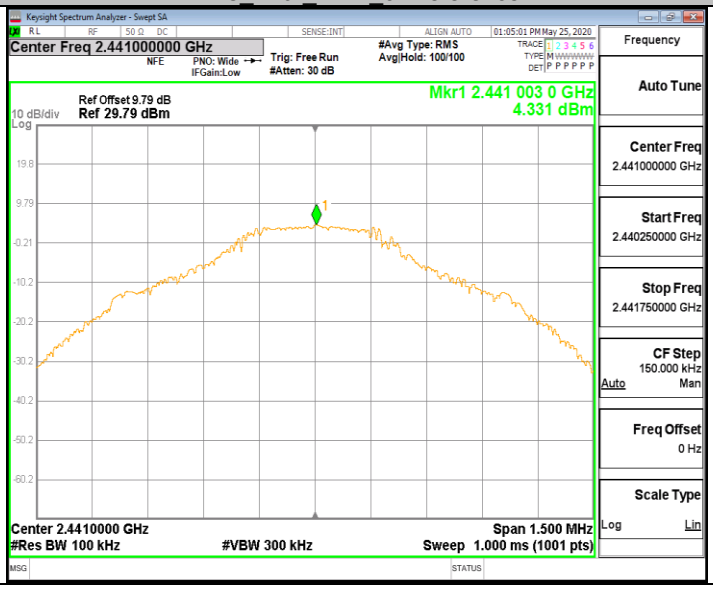
DH5_Ant1_2402_30~1000



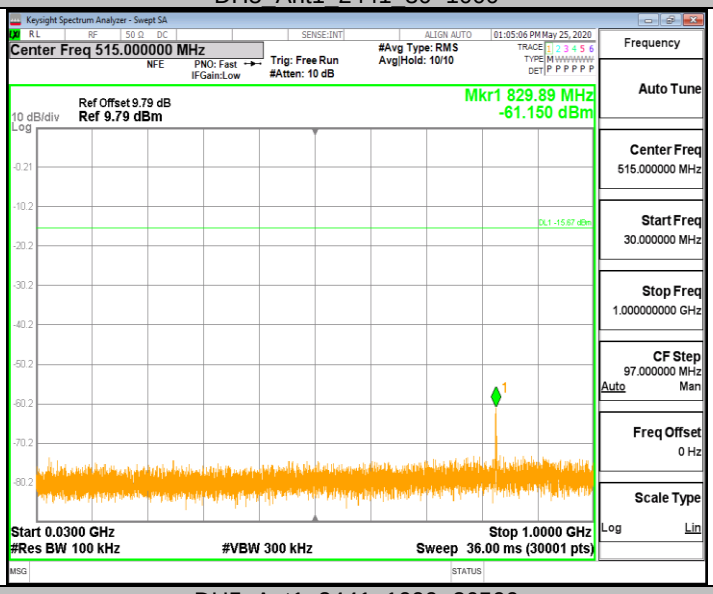
DH5_Ant1_2402_1000~26500



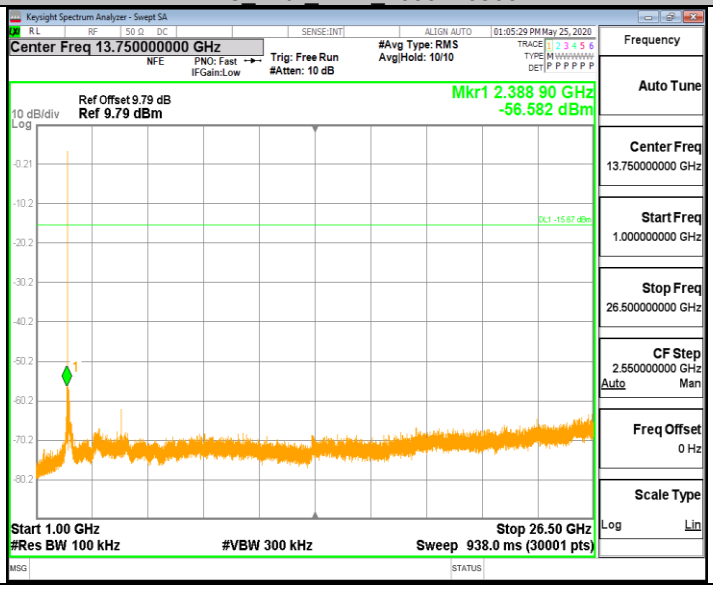
DH5_Ant1_2441_0~Reference



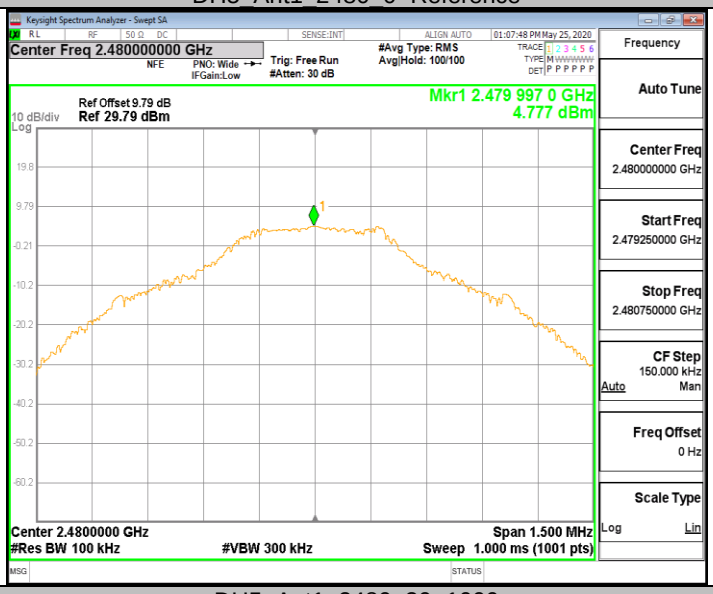
DH5_Ant1_2441_30~1000



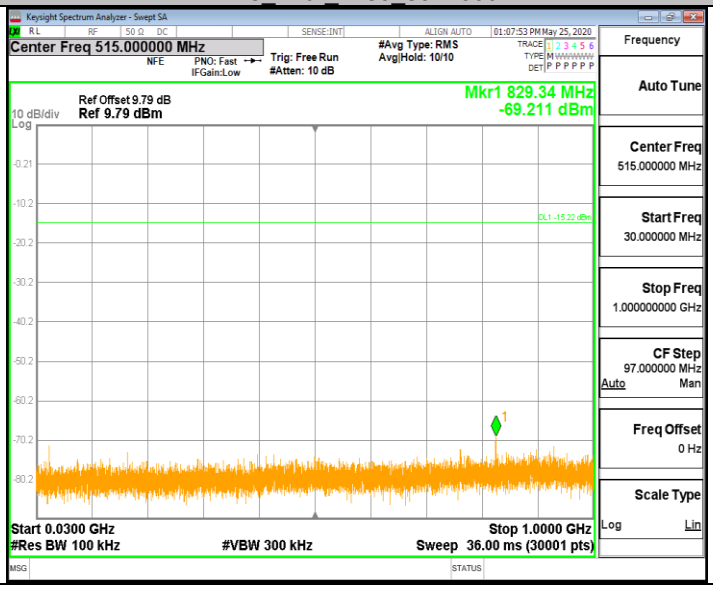
DH5_Ant1_2441_1000~26500



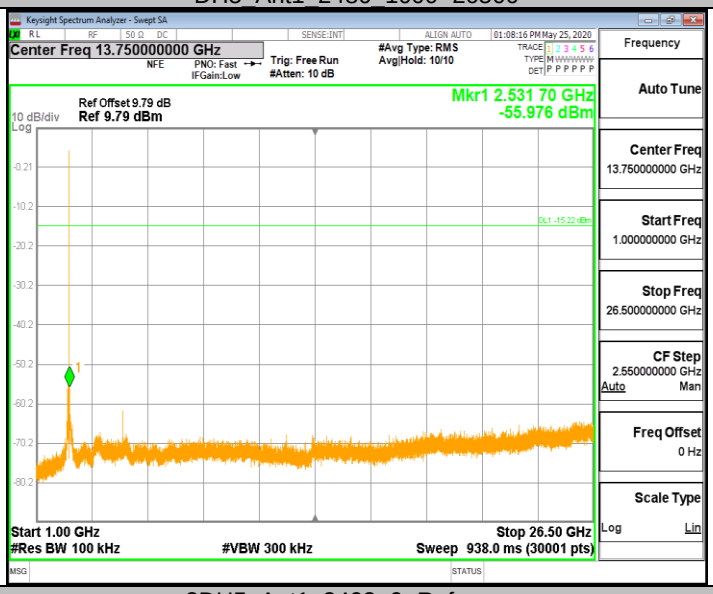
DH5_Ant1_2480_0~Reference



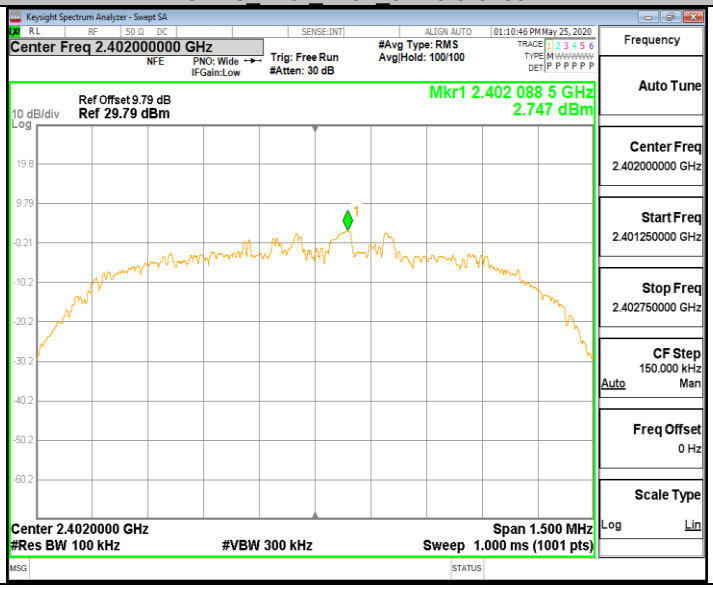
DH5_Ant1_2480_30~1000

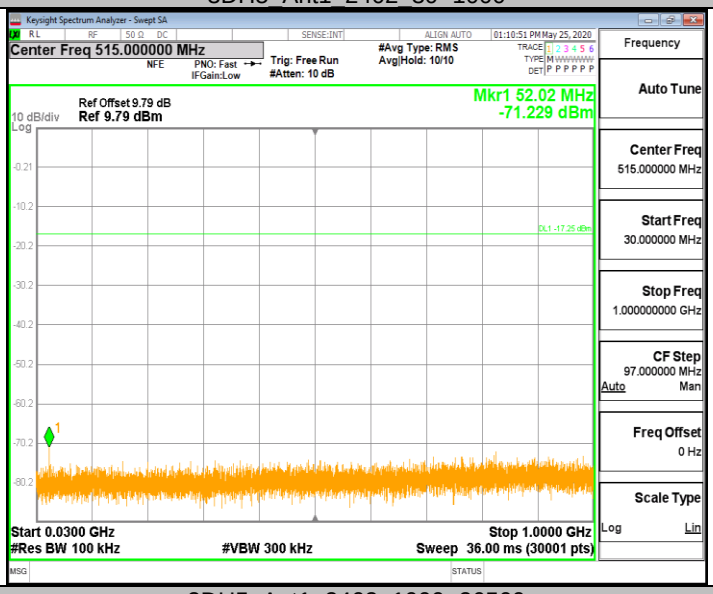


DH5_Ant1_2480_1000~26500



3DH5_Ant1_2402_0~Reference



3DH5_Ant1_2402_30~1000

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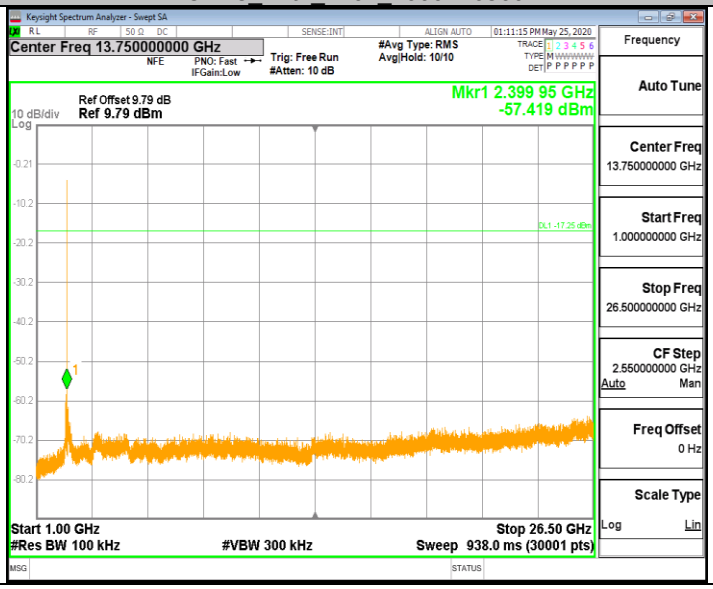

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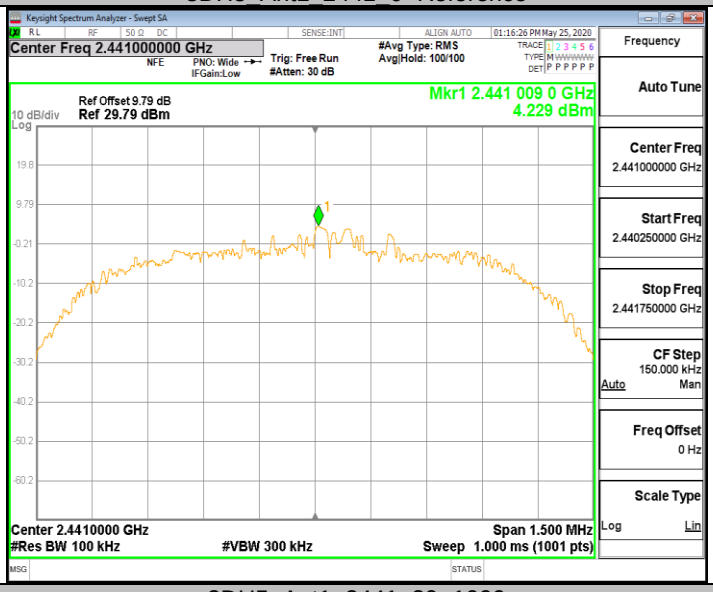
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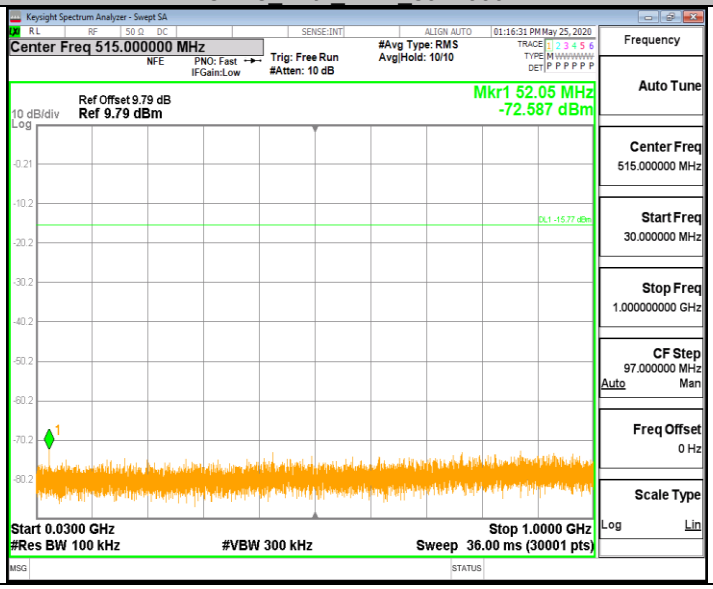

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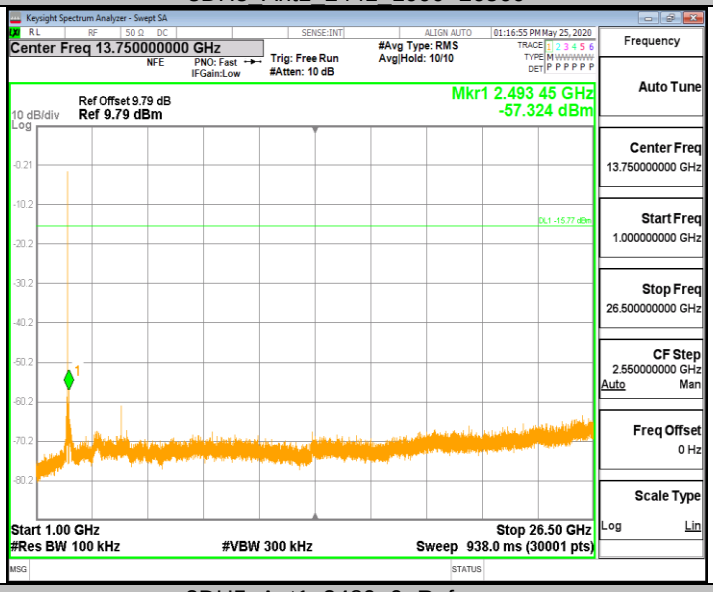
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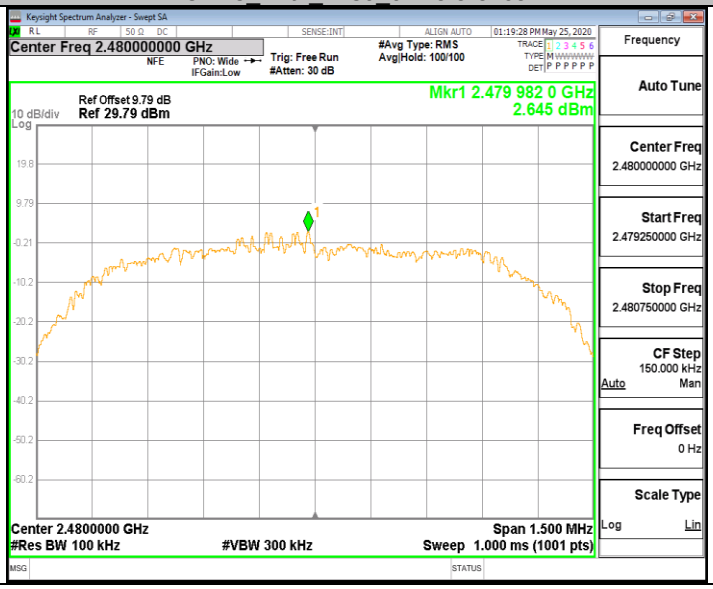

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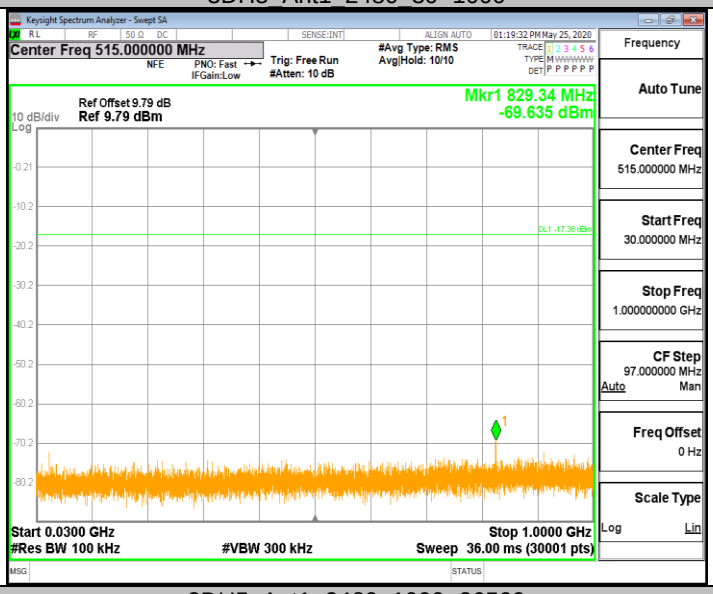
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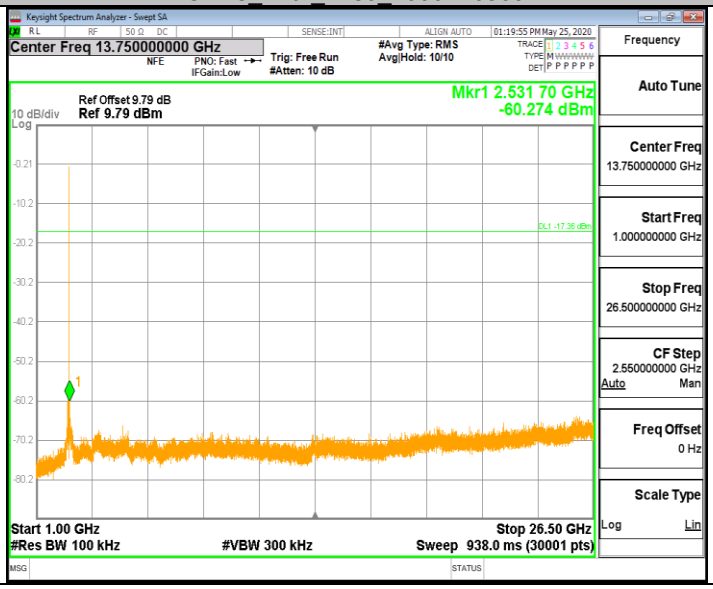

End of Report