Report on the FCC and IC Testing of the Sepura plc Radio Handset, Model: SC2128 Re-chargeable Li-Polymer Battery, Model: 300-01852 and Model: 300-01853 In accordance with FCC 47 CFR Part 15C, Industry Canada RSS-247 and Industry Canada RSS-GEN

Product Service

Choose certainty.
Add value.

Prepared for: Sepura plc
9000 Cambridge Research Park, Beach Drive,
Waterbeach, Cambridge, CB25 9TL,
United Kingdom

FCC ID: XX6SC2128 IC: 8739A-SC2128

COMMERCIAL-IN-CONFIDENCE

Document Number: 75941492-05 | Issue: 02

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Natalie Bennett	14 June 2018	
Authorised Signatory	Simon Bennett	14 June 2018	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

ENGINEERING STATEMENT
The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C, Industry Canada RSS-247 and Industry Canada RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Graeme Lawler	14 June 2018	
Testing	Nicolas Salguero Camarena	14 June 2018	
Testing	Jack Tuckwell	14 June 2018	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
IC2932B-1 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15C :2017, Industry Canada RSS-247: Issue 02 (2017) and Industry Canada RSS-GEN: Issue 04 (2014).

TÜV SÜD Product Service
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Product Service

Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	12 June 2018
2	To amend the Conducted Declared Output Power in the application form	14 June 2018

Table 1

1.2 Introduction

Applicant	Sepura plc
Manufacturer	Sepura plc
Model Number(s)	Handset: SC2128 High Capacity Battery: 300-01853 Charger: 300-01930 Power Supply: ABSP024100240-1
Serial Number(s)	Handset: Not Serialised (75941492-TSR0001) Handset: Not Serialised (75941492-TSR0002) Handset: Not Serialised (75941492-TSR0026) High Capacity Battery: 76000000A99C723D, AC000000A97E403D and 46000000A9C0F03D Charger: 7PP001742B90M6Q Power Supply: N/A
Hardware Version(s)	Production
Software Version(s)	SC 1.5
Number of Samples Tested	3 handsets with 1 type of battery
Test Specification/Issue/Date	FCC 47 CFR Part 15C: 2017 Industry Canada RSS-247: Issue 02 (2017) Industry Canada RSS-GEN: Issue 04 (2014)
Order Number Date	PO 008940 24-January-2018
Date of Receipt of EUT	05-March-2018
Start of Test	03-April-2018
Finish of Test	23-April-2018
Name of Engineer(s)	Nicolas Salguero Camarena Jack Tuckwell Graeme Lawler
Related Document(s)	ANSI C63.10: 2013

Product Service

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C, Industry Canada RSS-247 and Industry Canada RSS-GEN is shown below.

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 15C	RSS-247	RSS-GEN			
Configuration and Mode: Bluetooth (BDR + EDR)						
2.1	15.207	-	8.8	AC Power Line Conducted Emissions	Pass	ANSI C63.10
2.2	15.247 (b)	5.4	6.12	Maximum Conducted Output Power	Pass	ANSI C63.10
2.3	15.247 (a)(1)	5.1	-	Frequency Hopping Systems – Average Time of Occupancy	Pass	ANSI C63.10
2.4	15.247 (a)(1)	5.1	-	Frequency Hopping Systems – Channel Separation	Pass	ANSI C63.10
2.5	15.247 (a)(1)	5.1	-	Frequency Hopping Systems – Number of Hopping Channels	Pass	ANSI C63.10
2.6	15.247 (a)(1)	5.1	-	Frequency Hopping Systems – 20 dB Bandwidth	Pass	ANSI C63.10
2.7	15.247 (d)	5.5	-	Authorised Band Edges	Pass	ANSI C63.10
2.8	15.205	-	8.10	Restricted Band Edges	Pass	ANSI C63.10
2.9	15.247 (d) and 15.205	5.5	6.13	Spurious Radiated Emissions	Pass	ANSI C63.10

Table 2

Product Service

1.4 Application Form

EQUIPMENT DESCRIPTION	
Model Name/Number	SC2128
Part Number	N/A
Hardware Version	Production
Software Version	SC 1.5
FCC ID (if applicable)	XX6SC2128
Industry Canada ID (if applicable)	8739A-SC2128
Technical Description (Please provide a brief description of the intended use of the equipment)	Portable TETRA Radio for use by the emergency services etc.

INTENTIONAL RADIATORS									
Technology	Frequency Band (MHz)	Conducted Declared Output Power (dBm)	Antenna Gain (dBi)	Supported Bandwidth (s) (MHz)	Modulation Scheme(s)	ITU Emission Designator	Test Channels (MHz)		
							Bottom	Middle	Top
TETRA	806-824	35	>0	25kHz	Pi/4DQPSK	22K0DXW	806	815	824
TETRA	851-869	35	>0	25kHz	Pi/4DQPSK	22K0DXW	851	860	869
Bluetooth	2402-2480	7.382	2.5	1.0	8PSK, DQPSK, GFSK	1M00F1D	2402	2441	2480
WLAN	2412-2462	17.3	2.5	16.5 22 16.5	802.11g, 802.11b 802.11n.20	16M5D1D 22M0G1D 16M5D1D	2412	2437	2482

UN-INTENTIONAL RADIATOR	
Highest frequency generated or used in the device or on which the device operates or tunes	19.2 MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	
Class A Digital Device (Use in commercial, industrial or business environment) ☒ Class B Digital Device (Use in residential environment only) ☐	

Power Source			
AC	Single Phase	Three Phase	Nominal Voltage
External DC	Nominal Voltage	Maximum Current	
	7.4vdc	2A	
Battery	Nominal Voltage	Battery Operating End Point Voltage	
	7.4vdc	6.2vdc	
Can EUT transmit whilst being charged?		Yes ☒ No ☐	

EXTREME CONDITIONS					
Maximum temperature	+65	°C	Minimum temperature	-30	°C

Ancillaries
Please list all ancillaries which will be used with the device.
Remote speaker mic, leather cases, pocket clips, earpieces

ANTENNA CHARACTERISTICS					
☐	Antenna connector		State impedance		Ohm
☒	Temporary antenna connector		State impedance	50	Ohm
☐	Integral antenna	Type			
☐	External antenna	Type			

I hereby declare that the information supplied is correct and complete.

Name: Steve Wood

Position held: Product Conformance manager Date: 23/03/18

1.5 Product Information

1.5.1 Technical Description

Portable TETRA Radio for use by the emergency services.

1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Handset: Serial Number: Not Serialised (75941492-TSR0001)			
0	As supplied by the customer	Not Applicable	Not Applicable
Handset: Serial Number: Not Serialised (75941492-TSR0002)			
0	As supplied by the customer	Not Applicable	Not Applicable
Handset: Serial Number: Not Serialised (75941492-TSR0026)			
0	As supplied by the customer	Not Applicable	Not Applicable
High Capacity Battery: Serial Number: 76000000A99C723D			
0	As supplied by the customer	Not Applicable	Not Applicable
High Capacity Battery: Serial Number: AC000000A97E403D			
0	As supplied by the customer	Not Applicable	Not Applicable
High Capacity Battery: Serial Number: 46000000A9C0F03D			
0	As supplied by the customer	Not Applicable	Not Applicable
Charger: Serial Number: 7PP001742B90M6Q			
0	As supplied by the customer	Not Applicable	Not Applicable
Power Supply: Serial Number: N/A			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

1.8 Test Location

TÜV SÜD Product Service conducted the following tests at our Fareham Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: Bluetooth (BDR + EDR)		
AC Power Line Conducted Emissions	Graeme Lawler	UKAS
Maximum Conducted Output Power	Nicolas Salguero Camarena	UKAS
Frequency Hopping Systems – Average Time of Occupancy	Nicolas Salguero Camarena	UKAS
Frequency Hopping Systems – Channel Separation	Nicolas Salguero Camarena	UKAS
Frequency Hopping Systems – Number of Hopping Channels	Nicolas Salguero Camarena	UKAS
Frequency Hopping Systems – 20 dB Bandwidth	Nicolas Salguero Camarena	UKAS
Authorised Band Edges	Jack Tuckwell	UKAS
Restricted Band Edges	Jack Tuckwell	UKAS
Spurious Radiated Emissions	Graeme Lawler	UKAS

Table 4

Office Address:

Octagon House
Concorde Way
Segensworth North
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Test Details

2.1 AC Power Line Conducted Emissions

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.207
Industry Canada RSS-GEN, Clause 8.8

2.1.2 Equipment Under Test and Modification State

Handset: SC2128, S/N: Not Serialised (75941492-TSR0002) - Modification State 0
High Capacity Battery: 300-01853, S/N: 76000000A99C723D - Modification State 0
High Capacity Battery: 300-01853, S/N: AC000000A97E403D - Modification State 0
Charger: 300-01930, S/N: 7PP001742B90M6Q - Modification State 0
Power Supply: ABSP024100240-1, S/N: N/A - Modification State 0

2.1.3 Date of Test

11-April-2018

2.1.4 Test Method

Testing was performed in accordance with ANSI C63.10, clause 6.2.

2.1.5 Environmental Conditions

Ambient Temperature	21.6 °C
Relative Humidity	41.0 %

2.1.6 Test Results

Bluetooth (BDR + EDR)

Applied supply voltage: 120 V AC
Applied supply frequency: 60 Hz

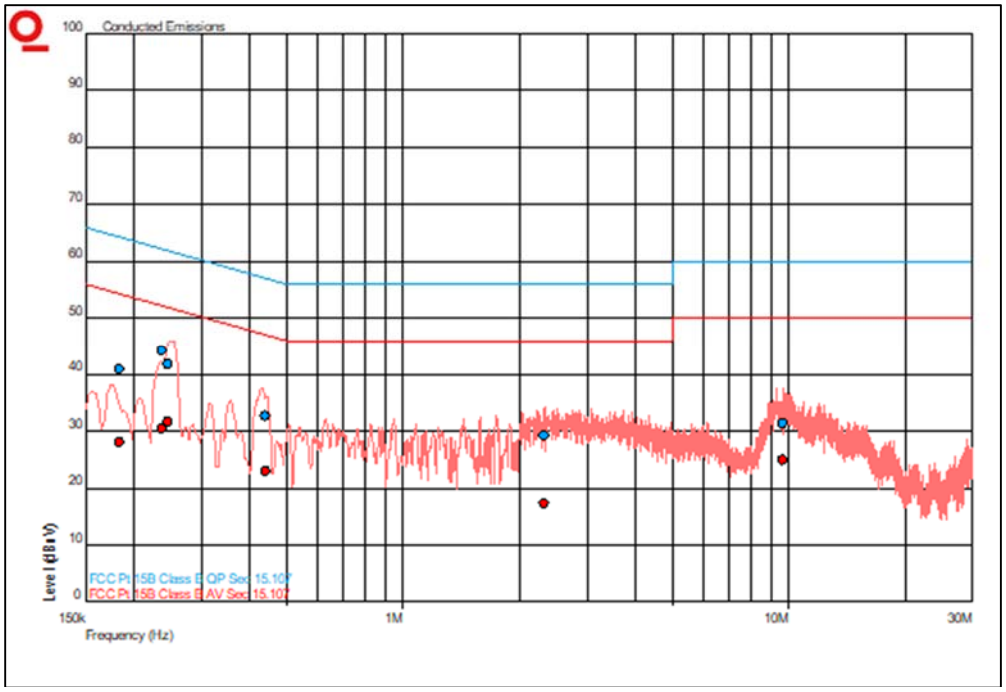

Figure 1 - Conducted Emissions Results – Live Line

Frequency (MHz)	QP Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Level (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)
0.183	40.9	64.3	-23.4	28.1	54.3	-26.3
0.237	44.3	62.2	-17.9	30.5	52.2	-21.7
0.245	41.8	61.9	-20.1	31.7	51.9	-20.3
0.438	32.8	57.1	-24.3	23.0	47.1	-24.1
2.321	29.4	56.0	-26.6	17.4	46.0	-28.6
9.631	31.4	60.0	-28.6	24.9	50.0	-25.1

Table 5 – Live Line

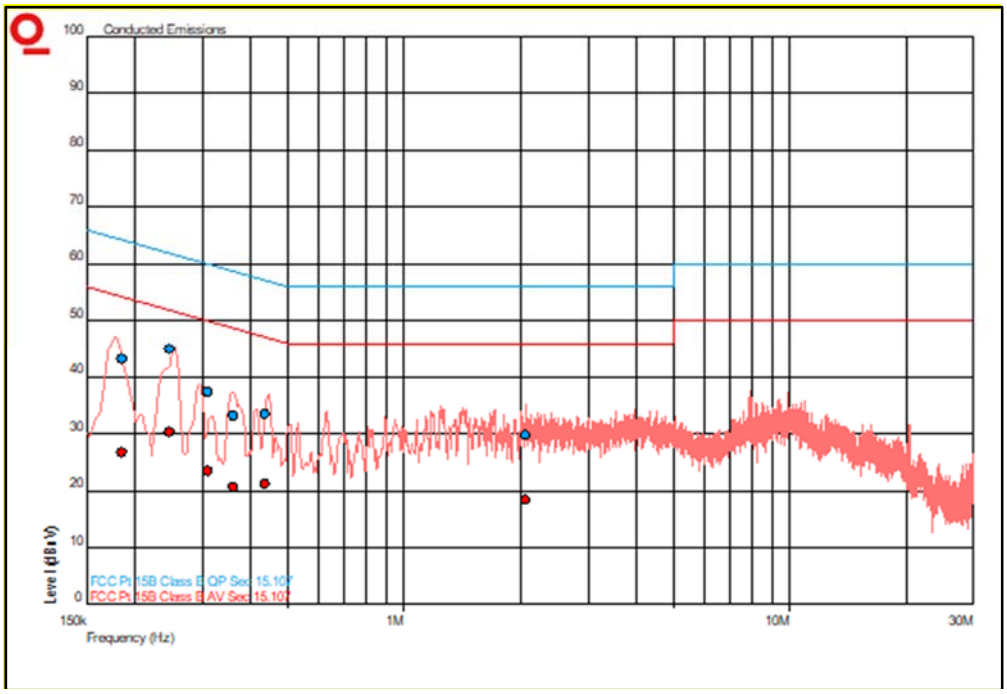

Figure 2 - Conducted Emissions Results – Neutral Line

Frequency (MHz)	QP Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Level (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)
0.185	43.2	64.3	-21.1	26.8	54.3	-27.5
0.247	45.0	61.9	-16.9	30.3	51.9	-21.5
0.310	37.4	60.0	-22.5	23.6	50.0	-26.4
0.359	33.2	58.7	-25.6	20.6	48.7	-28.1
0.435	33.4	57.2	-23.7	21.2	47.2	-25.9
2.064	29.7	56.0	-26.3	18.5	46.0	-27.5

Table 6 – Neutral Line

FCC 47 CFR Part 15, Limit Clause 15.207

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency.

Industry Canada RSS-GEN, Limit Clause 8.8

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency.

2.1.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Transient Limiter	Hewlett Packard	11947A	15	12	30-May-2018
Screened Room (5)	Rainford	Rainford	1545	36	9-Jun-2018
Single Phase LISN	Rohde & Schwarz	ESH3-Z5	1674	12	4-Apr-2019
Hygromer	Rotronic	A1	2138	12	21-Feb-2019
Multimeter	Iso-tech	IDM101	2417	12	2-Oct-2018
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Nov-2018
N to N cable, 4m	Rhophase	2303-002-TUVS	4849	12	18-Dec-2018
N to N cable, 4m	Rhophase	2303-002-TUVS	4850	12	18-Dec-2018

Table 7

2.2 Maximum Conducted Output Power

2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (b)
Industry Canada RSS-247, Clause 5.4
Industry Canada RSS-GEN, Clause 6.12

2.2.2 Equipment Under Test and Modification State

Handset: SC2128, S/N: Not Serialised (75941492-TSR0026) - Modification State 0

2.2.3 Date of Test

10-April-2018

2.2.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 7.8.5.

2.2.5 Environmental Conditions

Ambient Temperature	23.4 °C
Relative Humidity	43.5 %

2.2.6 Test Results

Bluetooth (BDR + EDR)

Testing was performed on the modulation/packet type with the highest conducted output power. This modulation/packet type was GFSK/DH1.

Frequency (MHz)	Output Power	
	Results (dBm)	Result (mW)
2402	6.55	4.52
2440	6.49	4.46
2480	7.06	5.08

Table 8

FCC 47 CFR Part 15, Limit Clause 15.247 (b)

The maximum peak conducted output power of the intentional radiator shall not exceed the following:

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non overlapping hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

Industry Canada RSS-247, Limit Clause 5.4 (2)

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

2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Lab 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
20dB SMA Attenuator dc - 18GHz	Sealectro	60-674-1020-89	345	12	30-Jun-2018
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	11-Apr-2018
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	19-Feb-2019
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	11-Jul-2018
Hygrometer	Rotronic	I-1000	3220	12	30-Aug-2018
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Oct-2018
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	6-Mar-2019
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	11-Apr-2018
Quad Power Supply	Rohde & Schwarz	HMP4040	4954	-	O/P Mon

Table 9

O/P Mon – Output Monitored using calibrated equipment

2.3 Frequency Hopping Systems – Average Time of Occupancy

2.3.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)
Industry Canada RSS-247, Clause 5.1

2.3.2 Equipment Under Test and Modification State

Handset: SC2128, S/N: Not Serialised (75941492-TSR0001) - Modification State 0
Handset: SC2128, S/N: Not Serialised (75941492-TSR0026) - Modification State 0

2.3.3 Date of Test

18-April-2018 and 23-April-2018

2.3.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 7.8.4.

2.3.5 Environmental Conditions

Ambient Temperature	23.5 °C
Relative Humidity	43.5 %

2.3.6 Test Results

Bluetooth (BDR + EDR)

Packet Type	Dwell Time (ms)	Number of Transmissions	Average Occupancy Time (ms)
DH5	2.903	102	296
DH3	1.656	157	260
DH1	0.401	315	126

Table 10

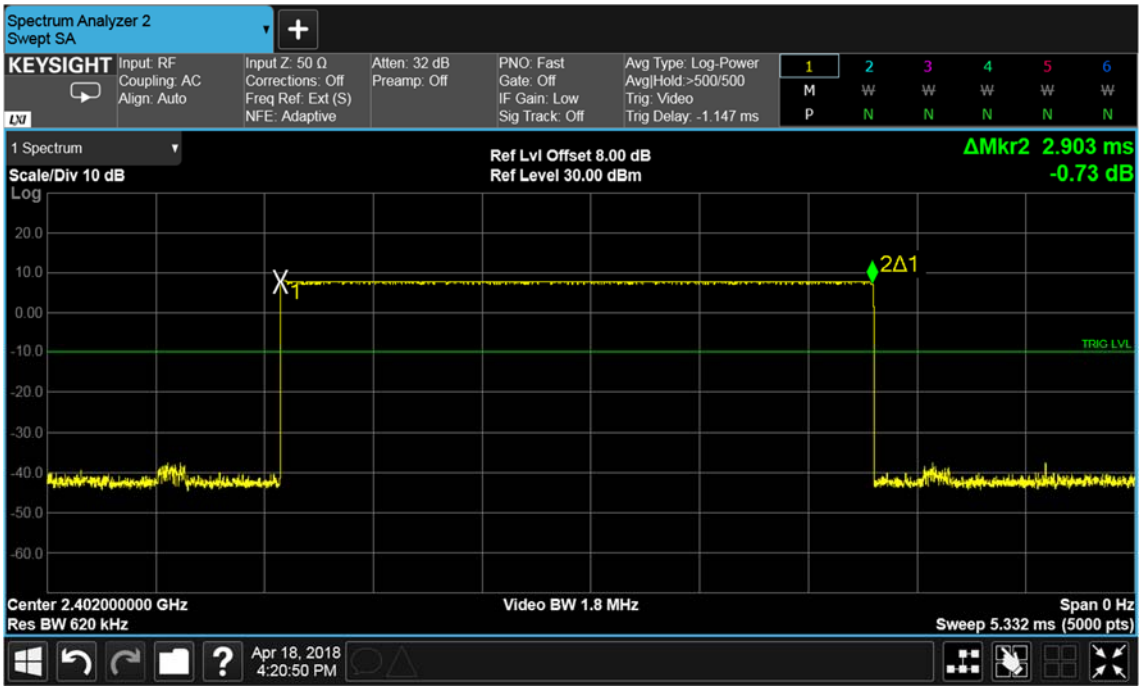

Figure 3 – DH5, Dwell Time

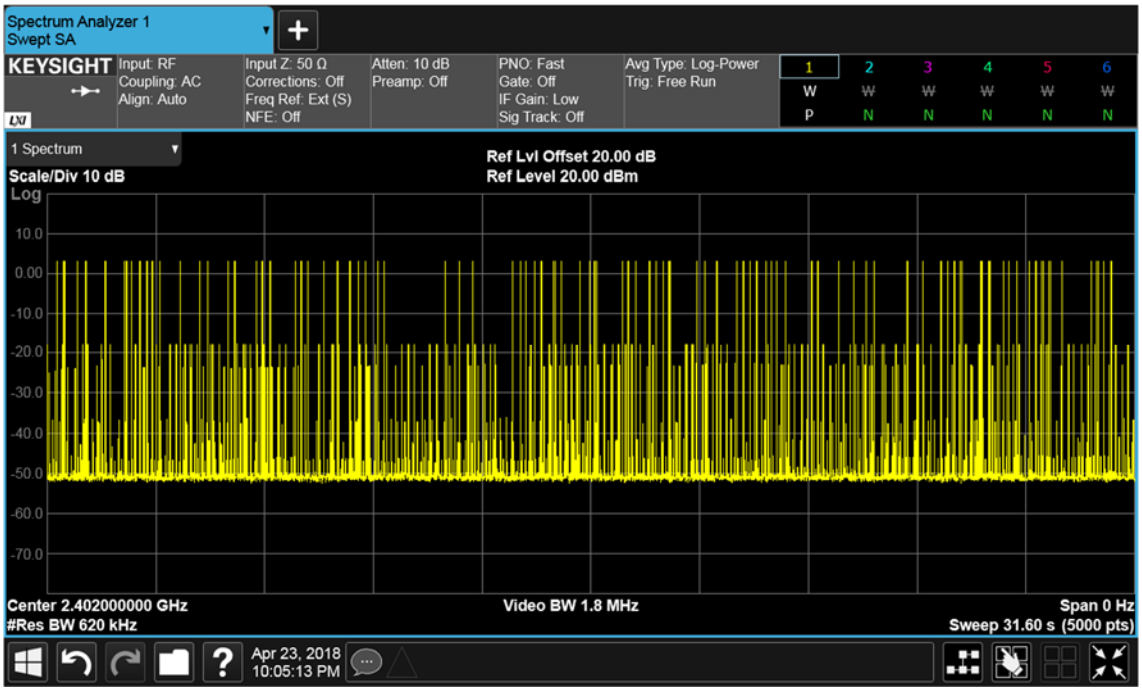

Figure 4 – DH5, Total Average Time of Occupancy

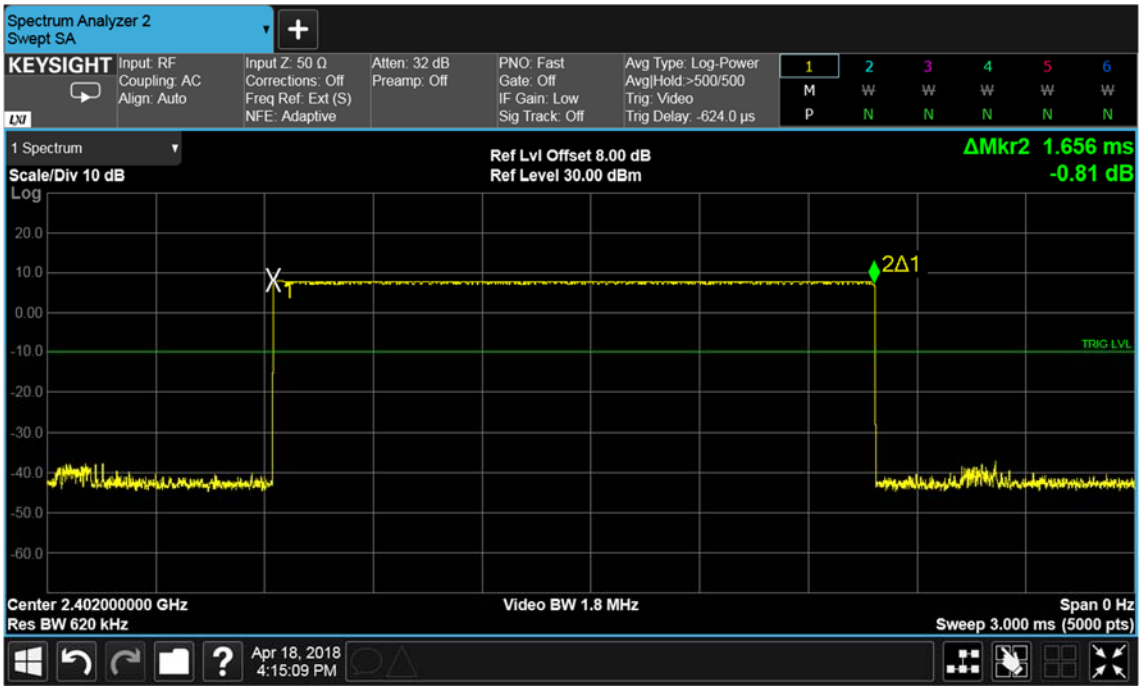

Figure 5 – DH3, Dwell Time

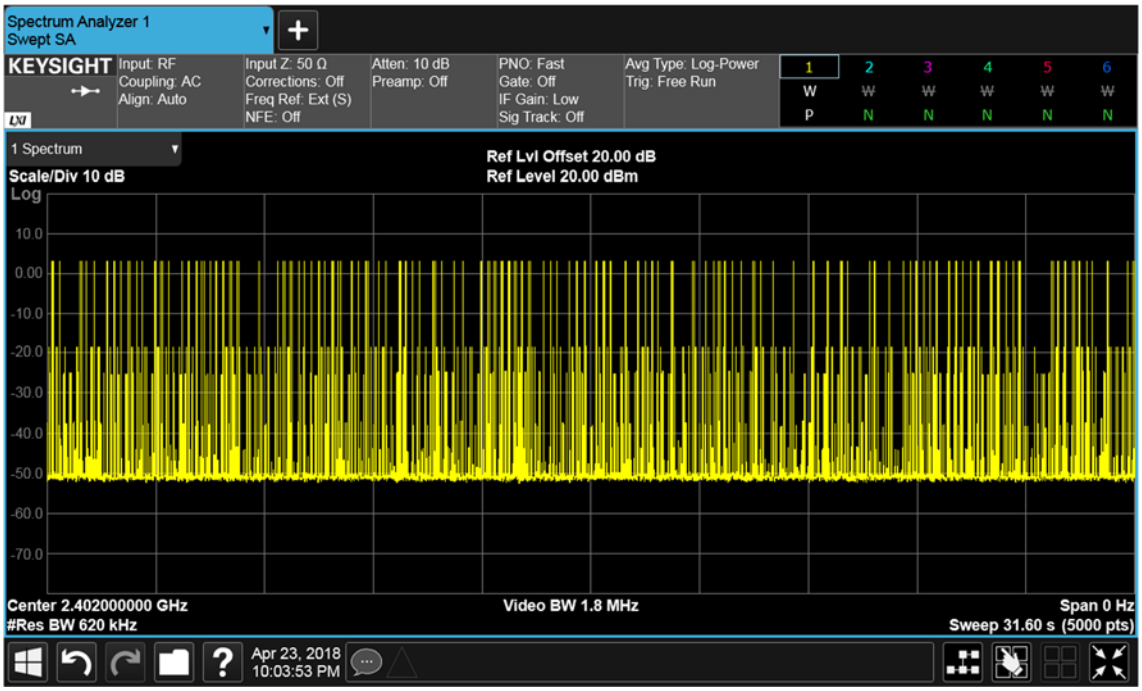

Figure 6 – DH3, Total Average Time of Occupancy

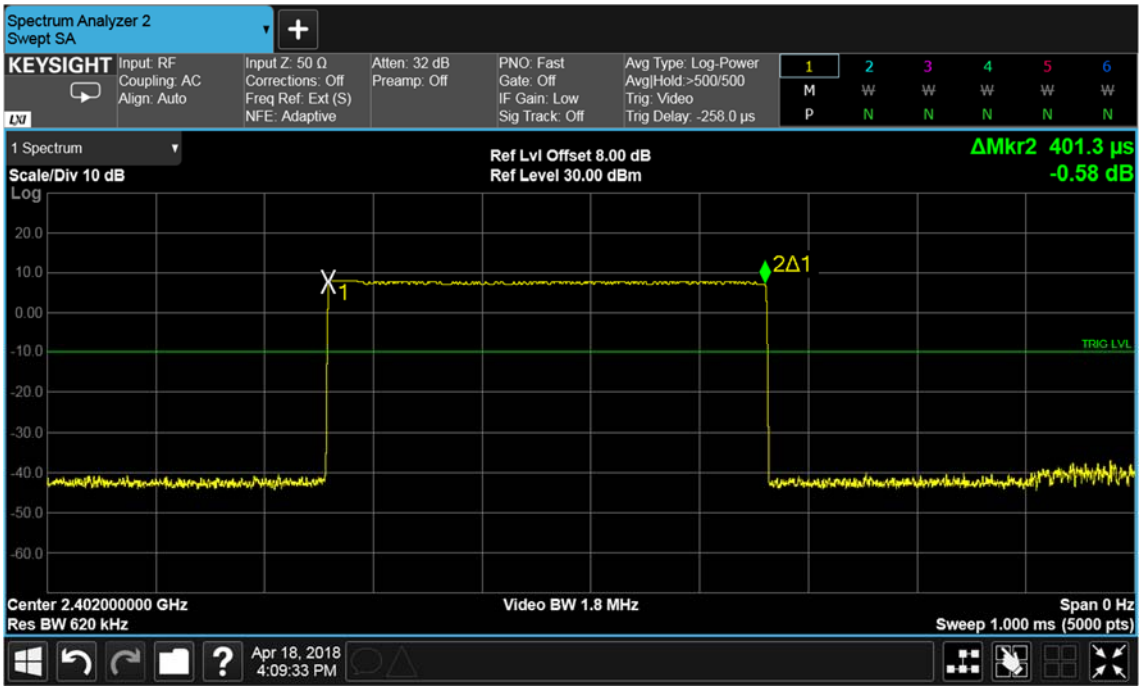

Figure 7 – DH1, Dwell Time

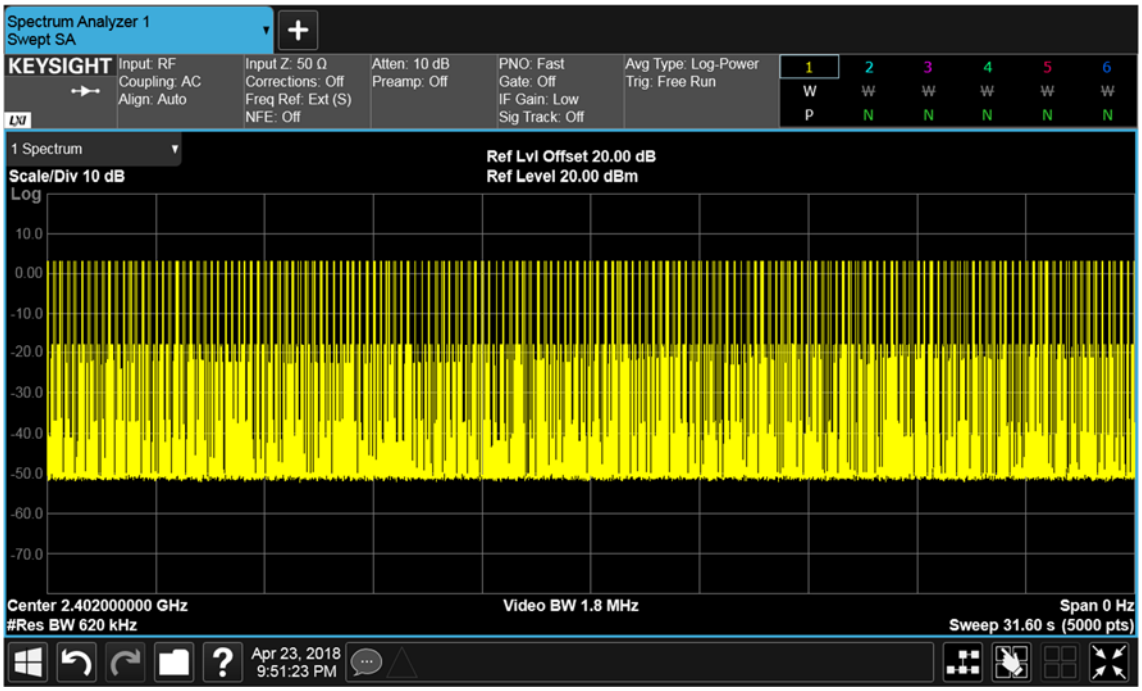

Figure 8 – DH1, Total Average Time of Occupancy

FCC 47 CFR Part 15, Limit Clause 15.247 (a)(1)(iii)

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

Industry Canada RSS-247, Limit Clause 5.1 (4)

FHSS operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds, multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that at least 15 hopping channels are used.

2.3.7 Test Location and Test Equipment Used

This test was carried out in RF Lab 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Termination 50ohm/50W	Bird	8085	389	12	21-Jun-2018
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	20-Oct-2018
Hygrometer	Rotronic	I-1000	3220	12	30-Aug-2018
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Oct-2018
Combiner/Splitter	Weinschel	1506A	3878	12	13-Jun-2018
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4143	12	3-Nov-2018
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	6-Mar-2019
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	20-Oct-2018
EXA	Keysight Technologies	N9010B	4969	12	21-Dec-2018

Table 11

2.4 Frequency Hopping Systems – Channel Separation

2.4.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)
Industry Canada RSS-247, Clause 5.1

2.4.2 Equipment Under Test and Modification State

Handset: SC2128, S/N: Not Serialised (75941492-TSR0001) - Modification State 0

2.4.3 Date of Test

18-April-2018

2.4.4 Test Method

This test was performed in accordance with ANSI C63.10, Clause 7.8.2

2.4.5 Environmental Conditions

Ambient Temperature	23.5 °C
Relative Humidity	43.3 %

2.4.6 Test Results

Bluetooth (BDR + EDR)

Modulation	Channel Separation (MHz)
GFSK	0.999
π/4 DQPSK	0.999
8-DPSK	0.999

Table 12

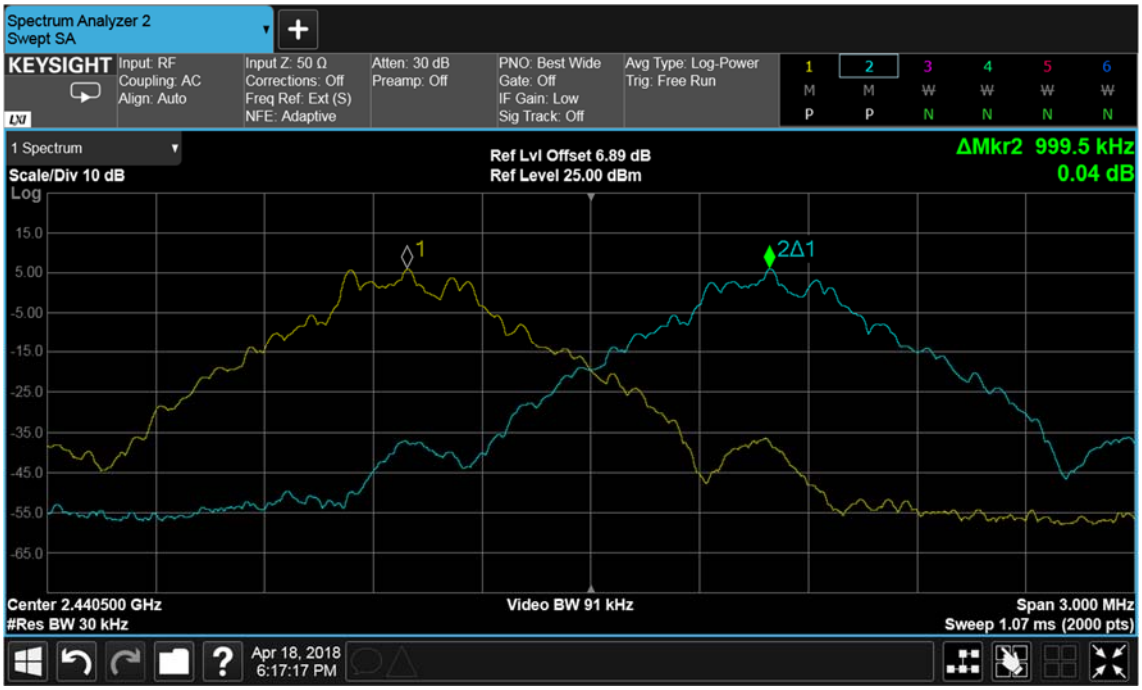

Figure 9 - GFSK

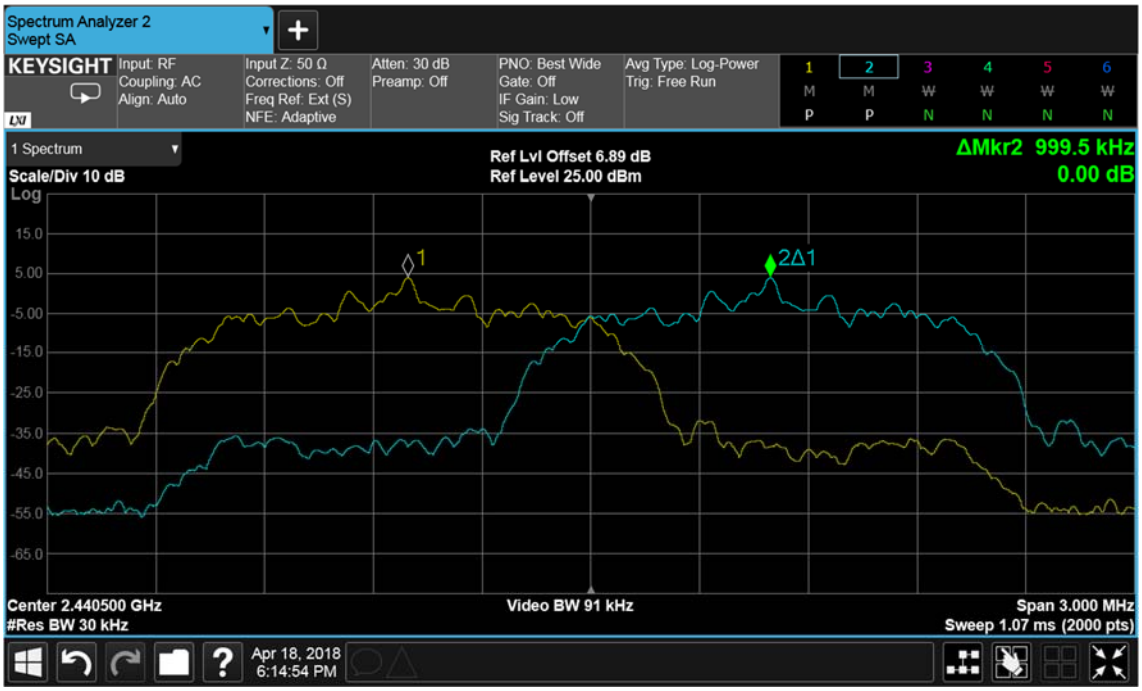

Figure 10 - π/4 DQPSK

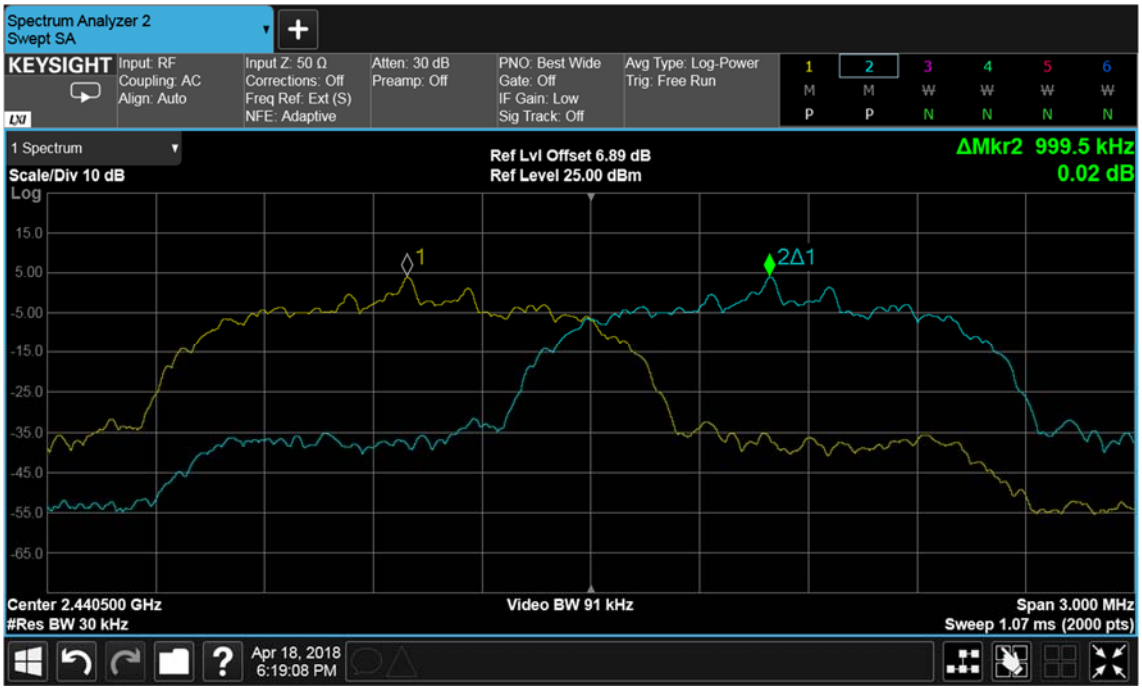

Figure 11 - 8-DPSK

FCC 47 CFR Part 15, Limit Clause 15.247 (a)(1)

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 band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125 W.

Industry Canada RSS-247, Limit Clause 5.1 (2)

FHSS 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, FHSS operating in the band 2400-2483.5 MHz may have hopping channel carrier frequencies that are separated by 25 kHz or two thirds of the -20 dB bandwidth of the hopping channel, whichever is greater, provided that the systems operate with an output power no greater than 0.125 W. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

2.4.7 Test Location and Test Equipment Used

This test was carried out in RF Lab 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Termination 50ohm/50W	Bird	8085	389	12	21-Jun-2018
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	20-Oct-2018
Hygrometer	Rotronic	I-1000	3220	12	30-Aug-2018
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Oct-2018
Combiner/Splitter	Weinschel	1506A	3878	12	13-Jun-2018
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4143	12	3-Nov-2018
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	6-Mar-2019
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	20-Oct-2018
Quad Power Supply	Rohde & Schwarz	HMP4040	4954	-	O/P Mon
EXA	Keysight Technologies	N9010B	4969	12	21-Dec-2018

Table 13

O/P Mon – Output Monitored using calibrated equipment

2.5 Frequency Hopping Systems – Number of Hopping Channels

2.5.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)
Industry Canada RSS-247, Clause 5.1

2.5.2 Equipment Under Test and Modification State

Handset: SC2128, S/N: Not Serialised (75941492-TSR0001) - Modification State 0

2.5.3 Date of Test

18-April-2018

2.5.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 7.8.3.

2.5.5 Environmental Conditions

Ambient Temperature	22.9 °C
Relative Humidity	41.7 %

2.5.6 Test Results

Bluetooth (BDR + EDR)

Number of Hopping Channels: 79

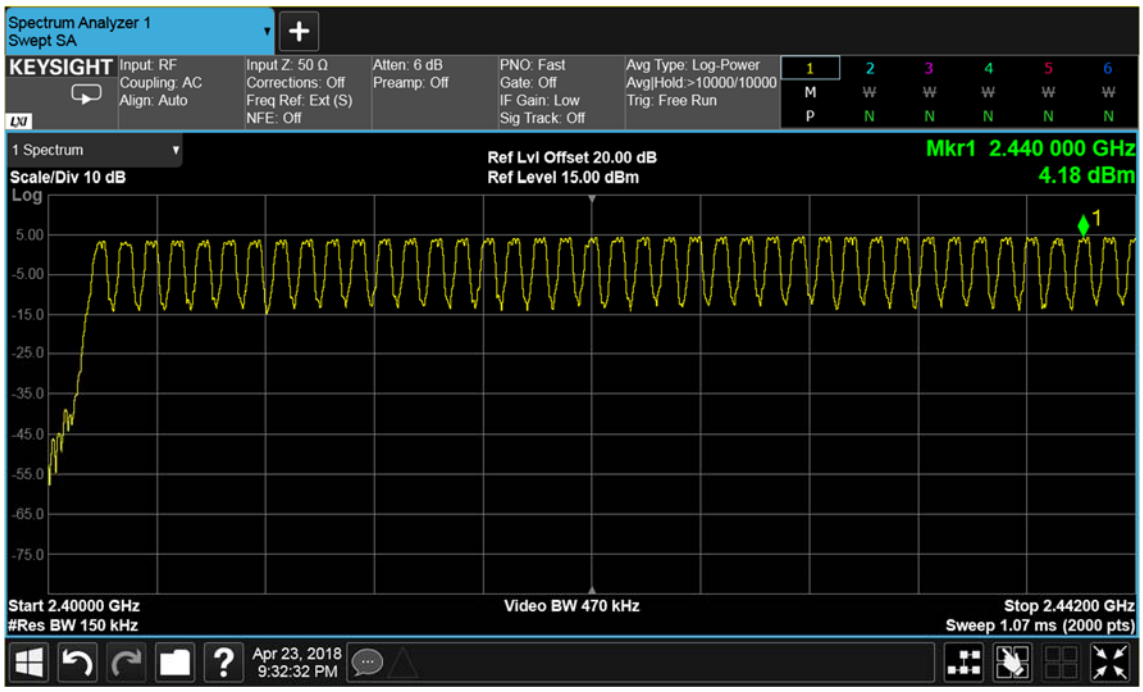

Figure 12 - Measurement Frequency Range: 2400.0 MHz to 2442.0 MHz

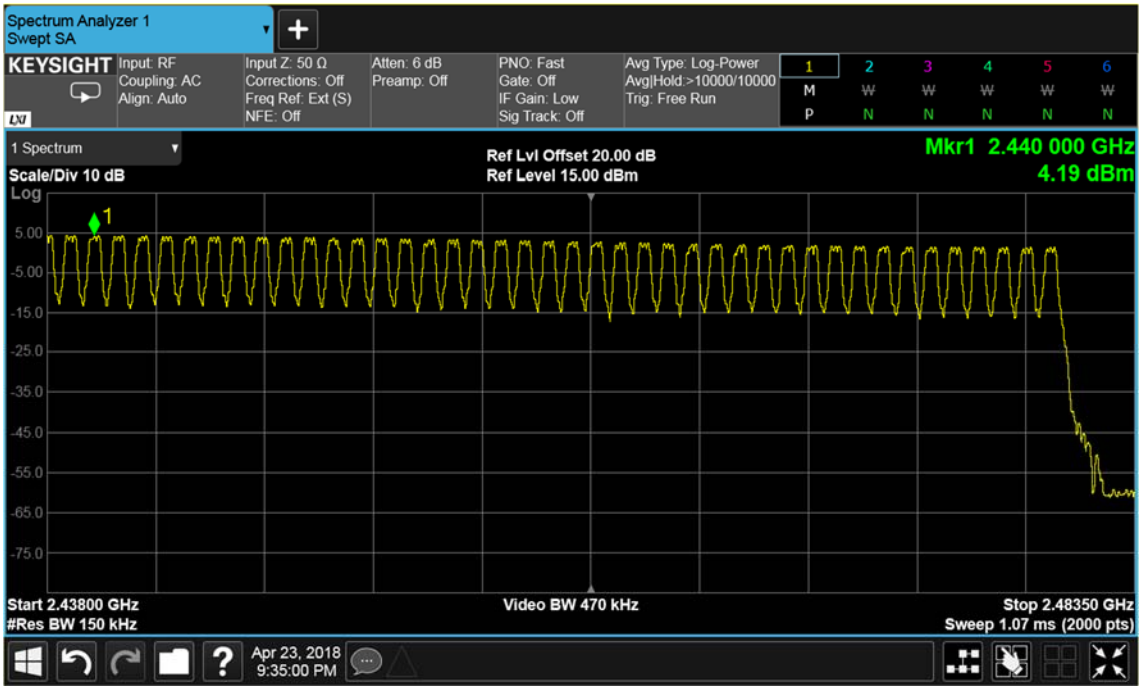

Figure 13 - Measurement Frequency Range: 2438.0 MHz to 2483.5 MHz

FCC 47 CFR Part 15, Limit Clause 15.247 (a)(1)(iii) and Industry Canada RSS-247, Limit Clause 5.1 (4)

≥ 15 channels

FCC 47 CFR Part 15, Limit Clause 15.247 (a)(1)(i) and Industry Canada RSS-247, Limit Clause 5.1 (3)

If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies.

If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies.

2.5.7 Test Location and Test Equipment Used

This test was carried out in RF Lab 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Termination 50ohm/50W	Bird	8085	389	12	21-Jun-2018
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	20-Oct-2018
Hygrometer	Rotronic	I-1000	3220	12	30-Aug-2018
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Oct-2018
Combiner/Splitter	Weinschel	1506A	3878	12	13-Jun-2018
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4143	12	3-Nov-2018
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	6-Mar-2019
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	20-Oct-2018
Quad Power Supply	Rohde & Schwarz	HMP4040	4954	-	O/P Mon
EXA	Keysight Technologies	N9010B	4969	12	21-Dec-2018

Table 14

O/P Mon – Output Monitored using calibrated equipment

2.6 Frequency Hopping Systems – 20 dB Bandwidth

2.6.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(1)
Industry Canada RSS-247, Clause 5.1

2.6.2 Equipment Under Test and Modification State

Handset: SC2128, S/N: Not Serialised (75941492-TSR0026) - Modification State 0

2.6.3 Date of Test

18-April-2018

2.6.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.9.2.

2.6.5 Environmental Conditions

Ambient Temperature	22.6 °C
Relative Humidity	41.3 %

2.6.6 Test Results

Bluetooth (BDR + EDR)

Frequency (MHz)	20 dB Bandwidth (kHz)		
	GFSK	π/4 DQPSK	8-DPSK
2402	825.6	1253	1221
2440	825.6	1257	1220
2480	824.8	1254	1221

Table 15

Figure 14 – 2402 MHz - GFSK

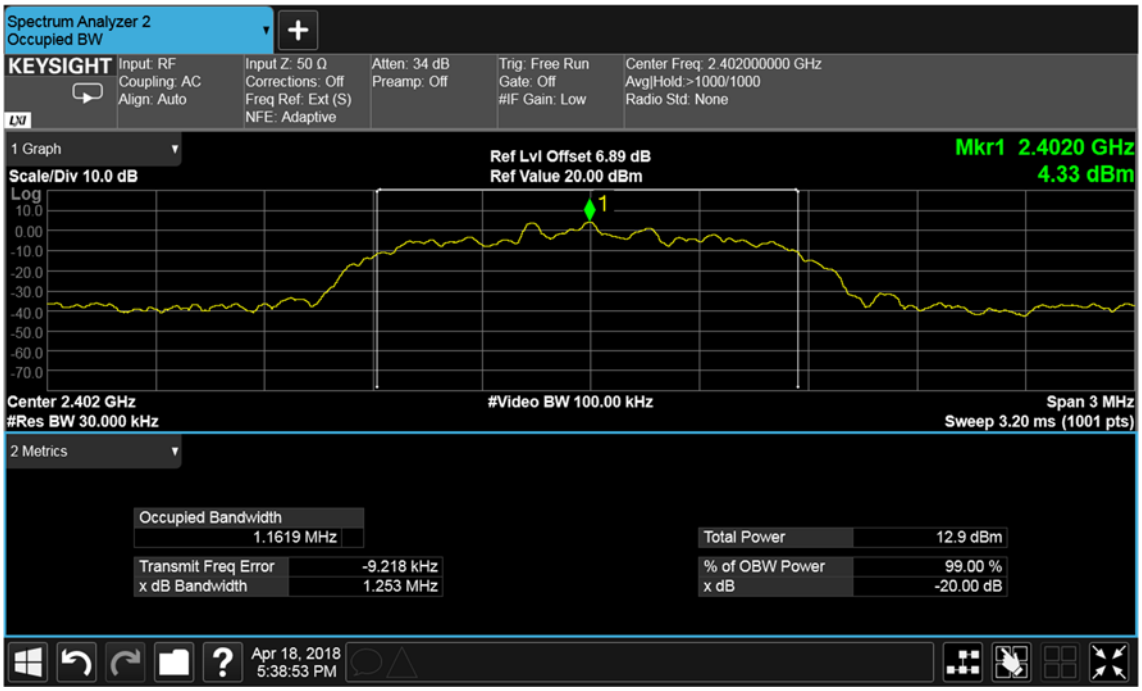

Figure 15 - 2402 MHz - π/4 DQPSK

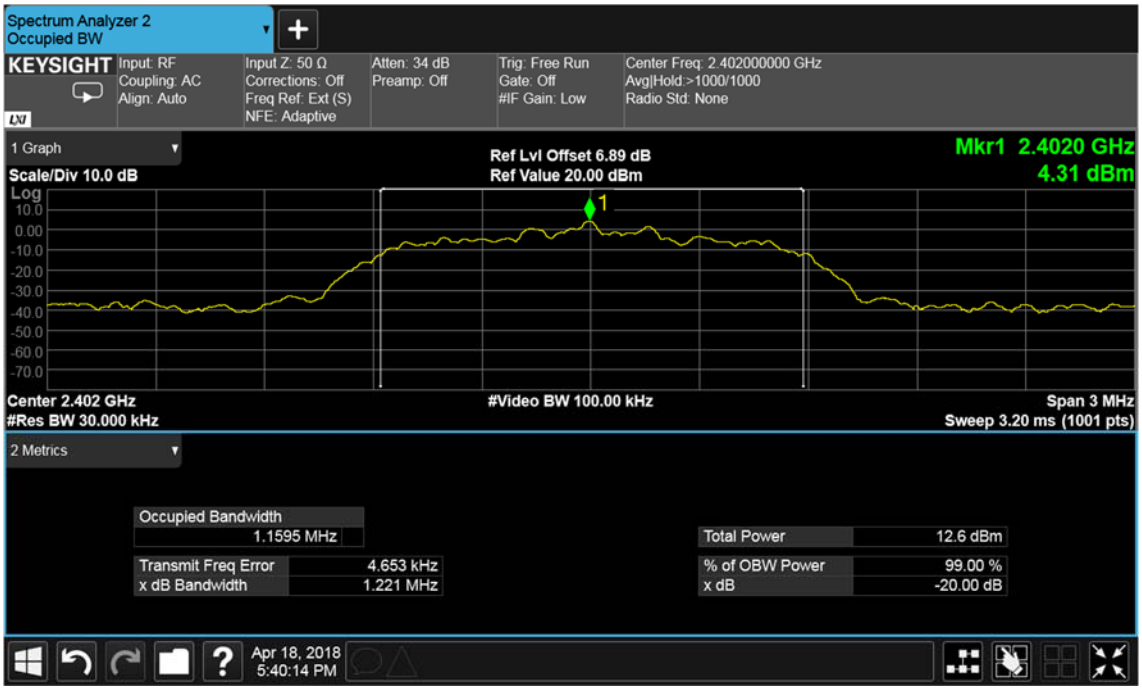

Figure 16 – 2402 MHz - 8-DPSK

Figure 17 – 2440 MHz - GFSK

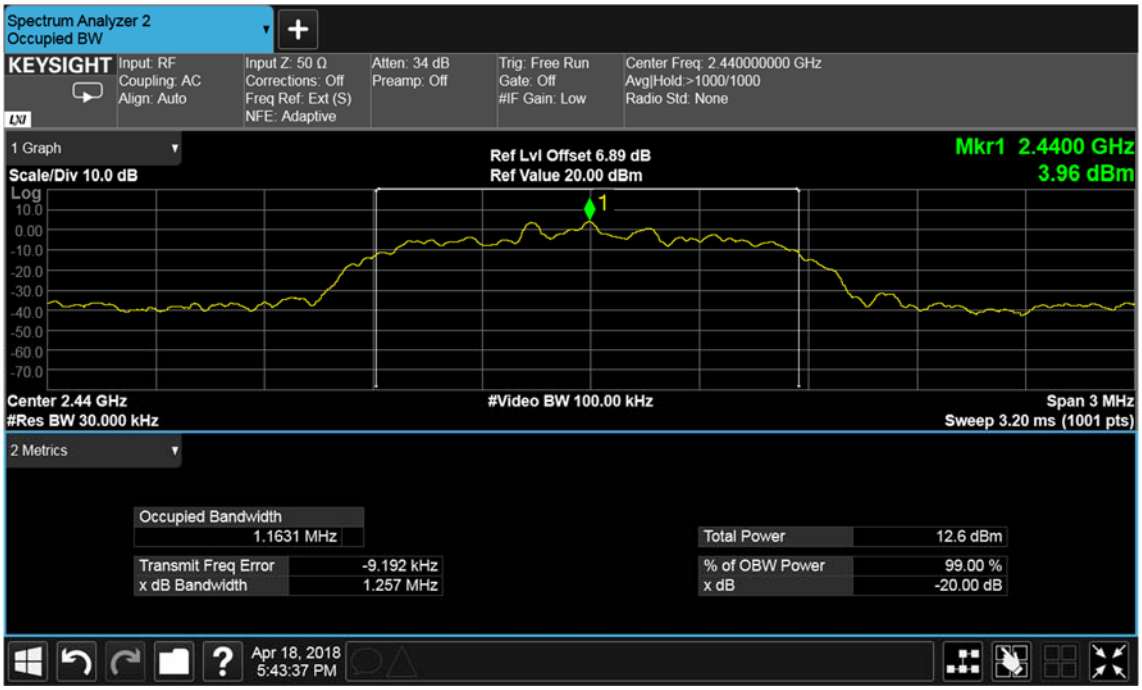

Figure 18 - 2440 MHz - π/4 DQPSK

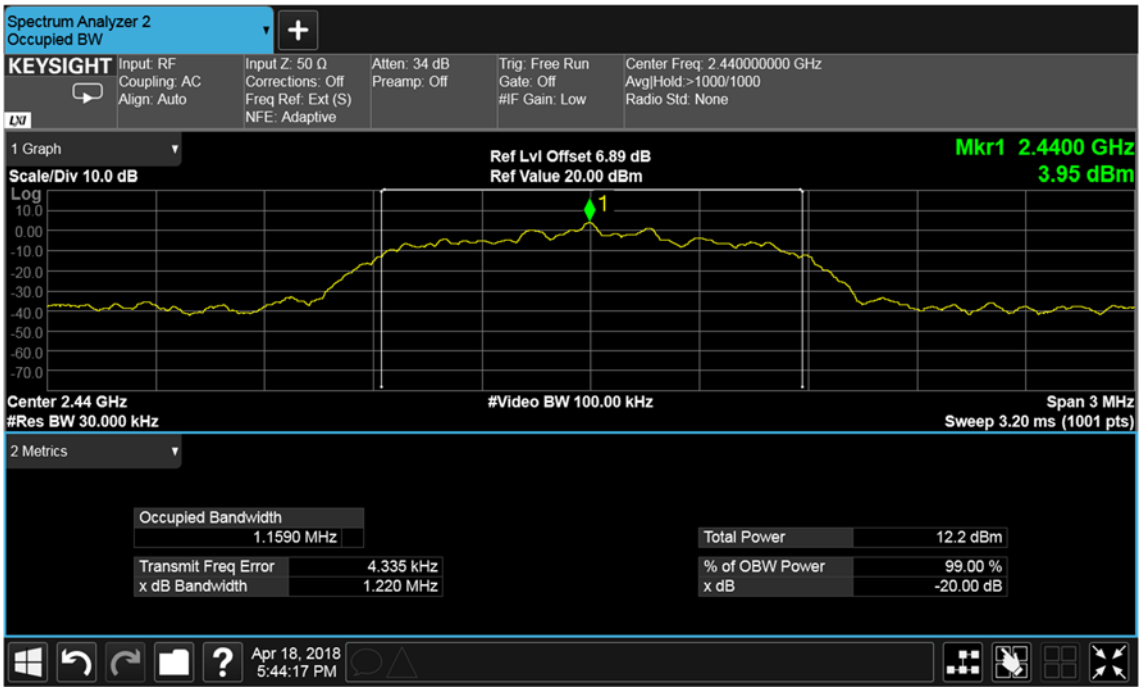

Figure 19 – 2440 MHz - 8-DPSK

Figure 20 – 2480 MHz - GFSK

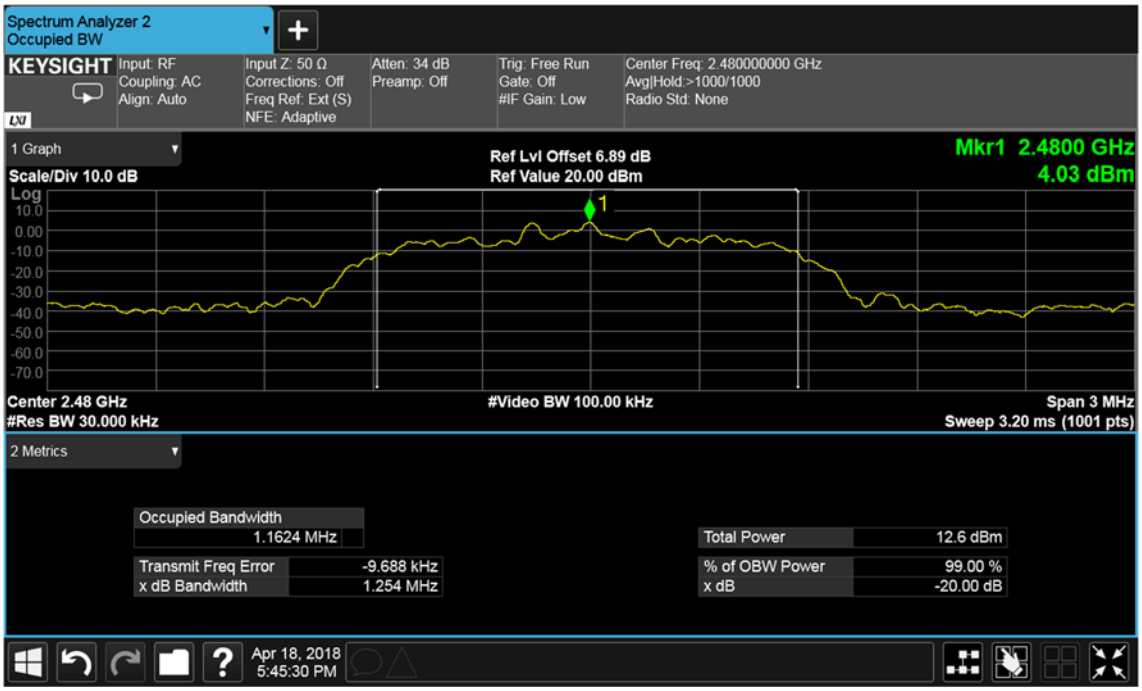

Figure 21 - 2480 MHz - π/4 DQPSK

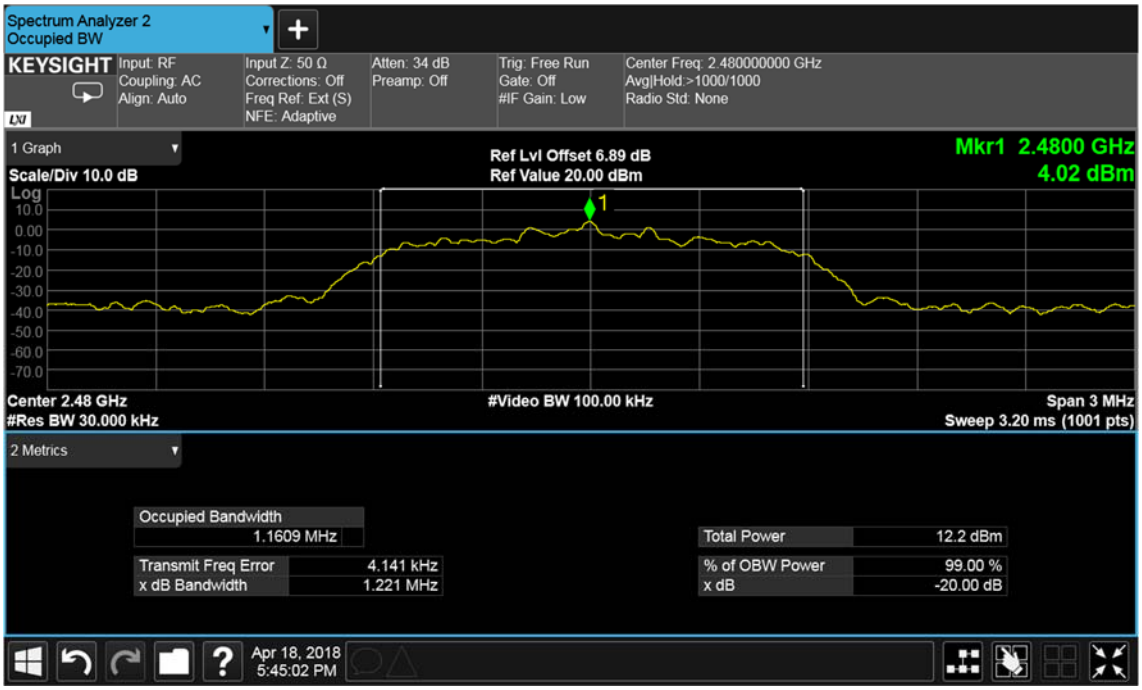

Figure 22 – 2480 MHz - 8-DPSK

FCC 47 CFR Part 15 Limit Clause

None specified.

Industry Canada RSS-247 Limit Clause

None specified.

2.6.7 Test Location and Test Equipment Used

This test was carried out in RF Lab 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Termination 50ohm/50W	Bird	8085	389	12	21-Jun-2018
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	20-Oct-2018
Hygrometer	Rotronic	I-1000	3220	12	30-Aug-2018
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	2-Oct-2018
Combiner/Splitter	Weinschel	1506A	3878	12	13-Jun-2018
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4143	12	3-Nov-2018
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	6-Mar-2019
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	20-Oct-2018
Quad Power Supply	Rohde & Schwarz	HMP4040	4954	-	O/P Mon
EXA	Keysight Technologies	N9010B	4969	12	21-Dec-2018

Table 16

O/P Mon – Output Monitored using calibrated equipment

2.7 Authorised Band Edges

2.7.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d)
Industry Canada RSS-247, Clause 5.5

2.7.2 Equipment Under Test and Modification State

Handset: SC2128, S/N: Not Serialised (75941492-TSR0002) - Modification State 0
High Capacity Battery: 300-01853, S/N: 46000000A9C0F03D - Modification State 0

2.7.3 Date of Test

29-May-2018

2.7.4 Test Method

Testing was performed in accordance with ANSI C63.10, clause 6.10.4

2.7.5 Environmental Conditions

Ambient Temperature	20.2 °C
Relative Humidity	41.0 %

2.7.6 Test Results

Bluetooth (BDR + EDR)

Mode	Modulation	Packet Type	Frequency (MHz)	Measured Frequency (MHz)	Level (dBc)
Static	GFSK	DH5	2402	2400.0	-55.55
Static	π/4 DQPSK	2DH5	2402	2400.0	-48.75
Static	8-DPSK	3DH5	2402	2400.0	-50.13
Static	GFSK	DH5	2480	2483.5	-54.03
Static	π/4 DQPSK	2DH5	2480	2483.5	-52.27
Static	8-DPSK	3DH5	2480	2483.5	-52.26
Hopping	GFSK	DH5	2402	2400.0	-54.54
Hopping	π/4 DQPSK	2DH5	2402	2400.0	-53.04
Hopping	8-DPSK	3DH5	2402	2400.0	-52.64
Hopping	GFSK	DH5	2480	2483.5	-55.28
Hopping	π/4 DQPSK	2DH5	2480	2483.5	-52.96
Hopping	8-DPSK	3DH5	2480	2483.5	-53.80

Table 17

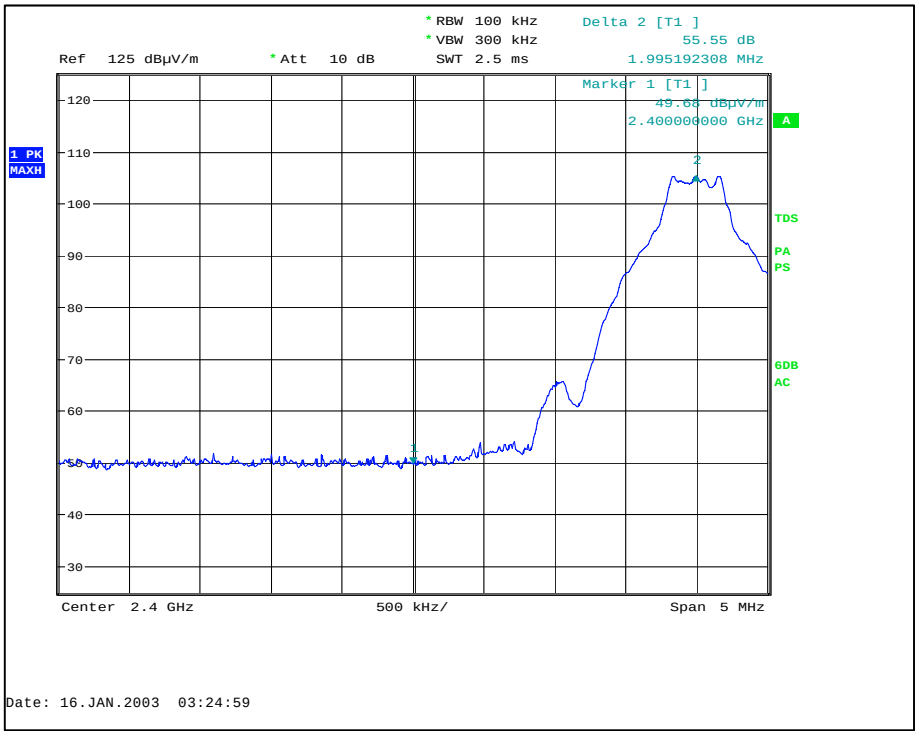

Figure 23 - Static – GFSK/DH5 - 2402 MHz - Measured Frequency 2400.0 MHz

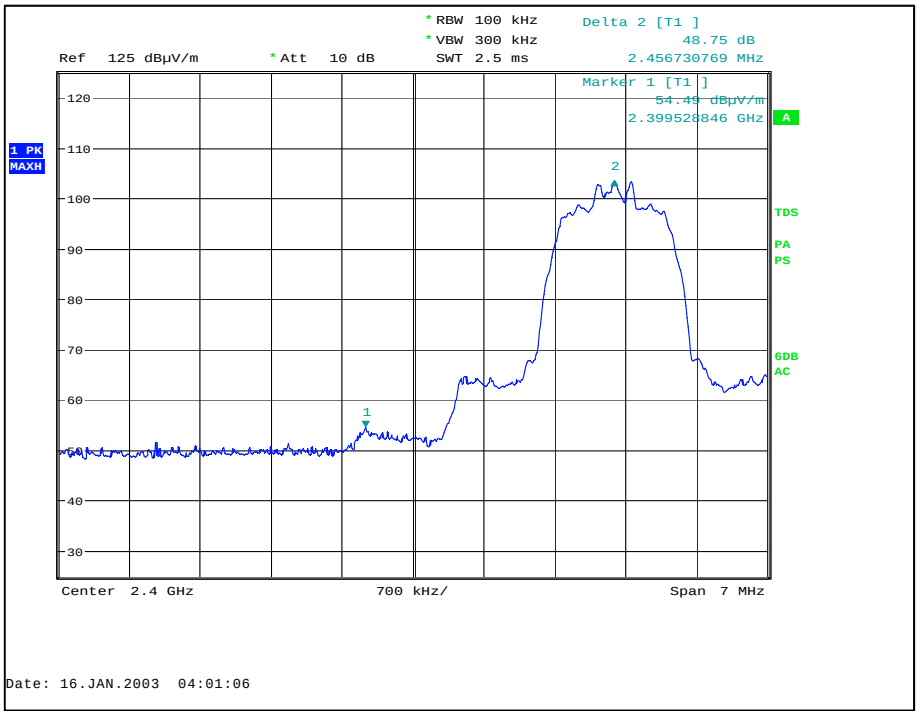

Figure 24 - Static – π/4 DQPSK/2DH5 - 2402 MHz - Measured Frequency 2400.0 MHz

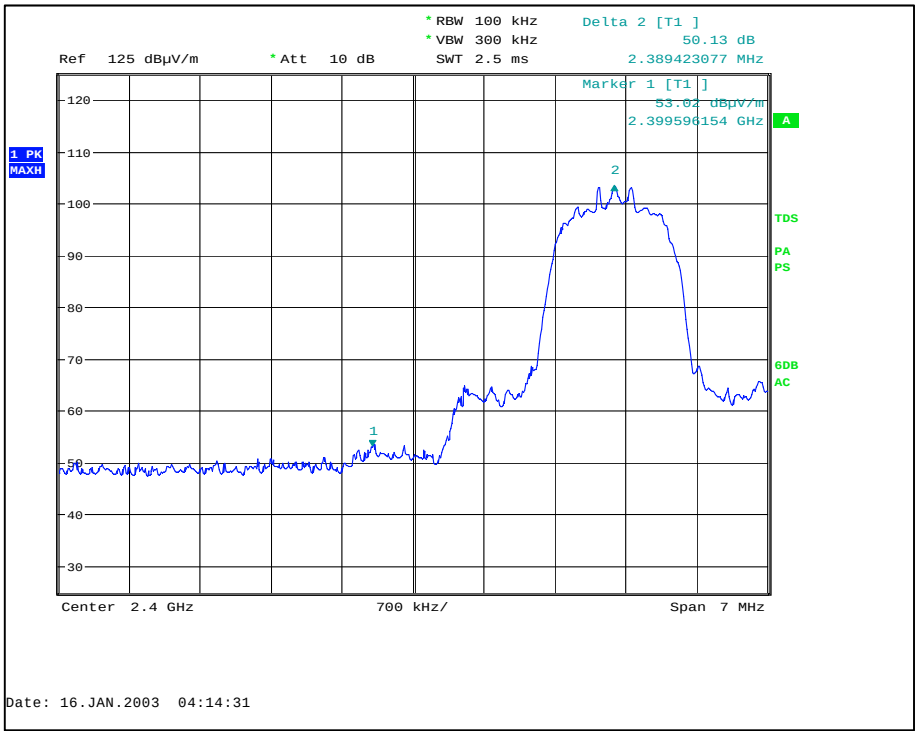

Figure 25 - Static – 8-DPSK/3DH5 - 2402 MHz - Measured Frequency 2400.0 MHz

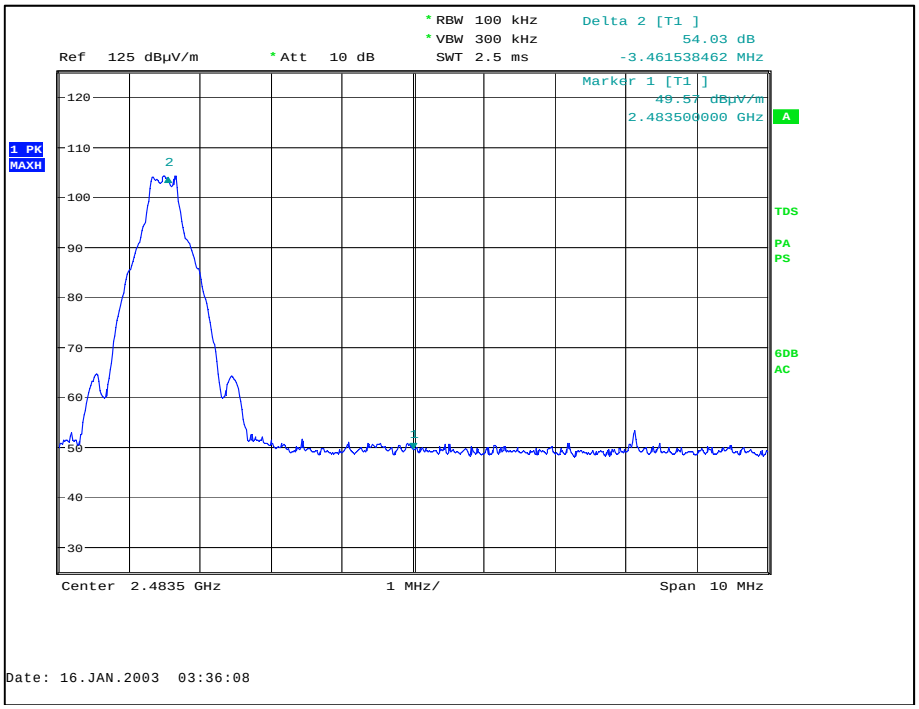

Figure 26 - Static – GFSK/DH5- 2480 MHz - Measured Frequency 2483.5 MHz

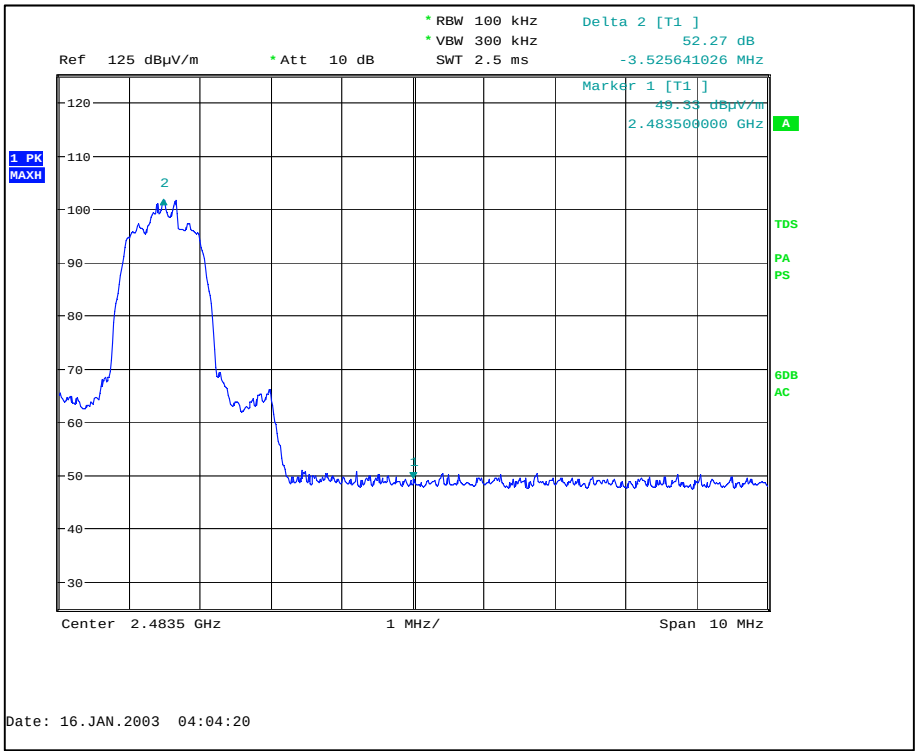

Figure 27 - Static – π/4 DQPSK /2DH5 - 2480 MHz - Measured Frequency 2483.5 MHz

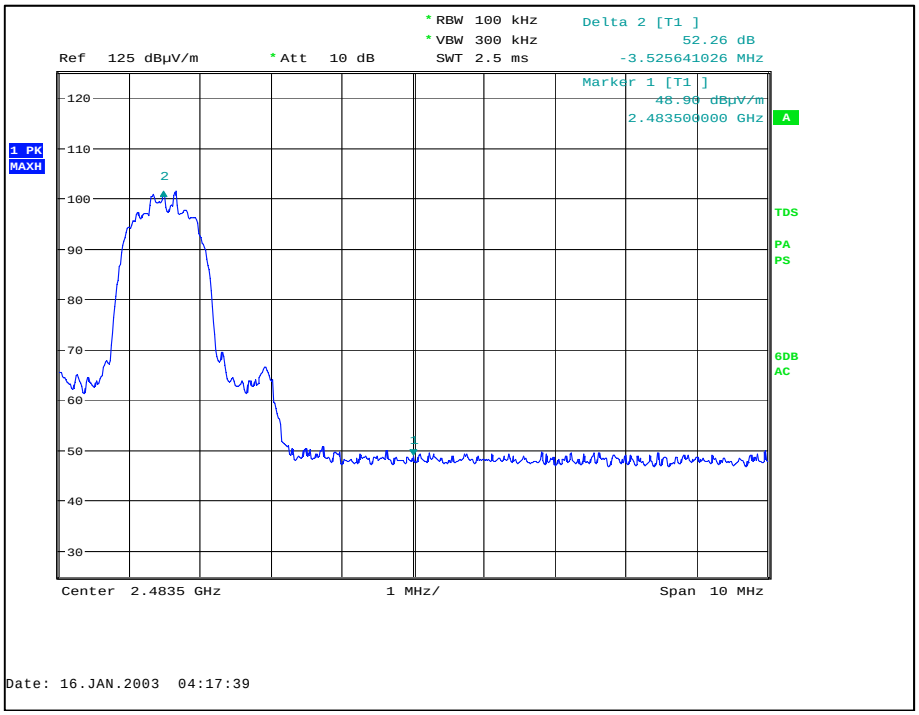

Figure 28 - Static – 8-DPSK /3DH5 - 2480 MHz - Measured Frequency 2483.5 MHz

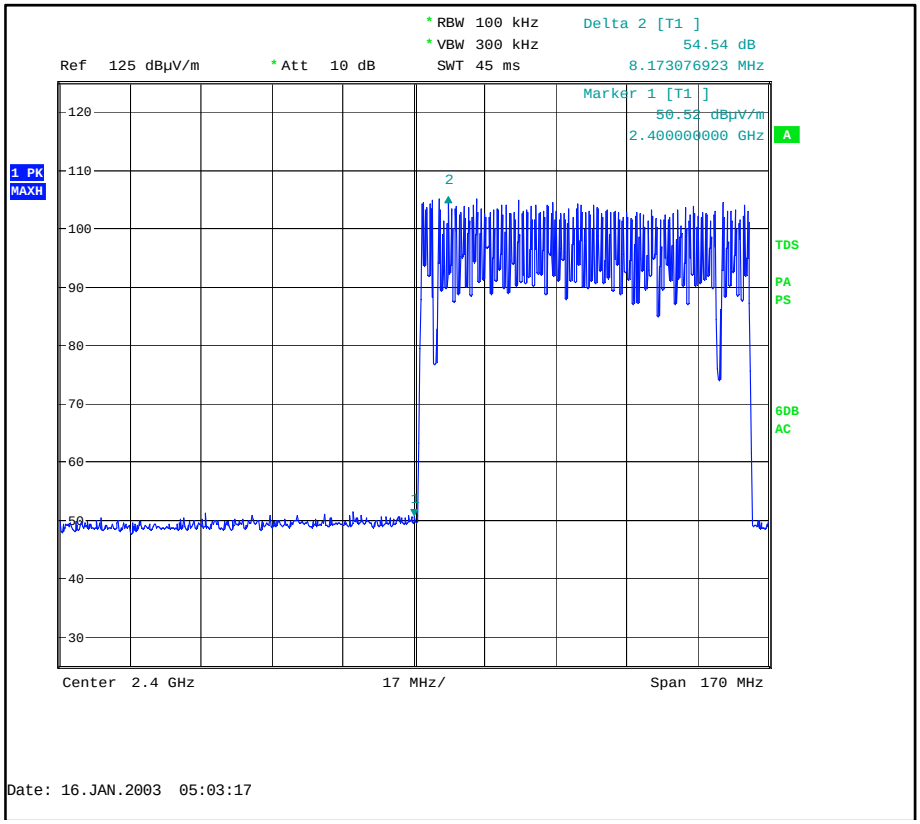

Figure 29 - Hopping - GFSK/DH5 - Measured Frequency 2400.0 MHz

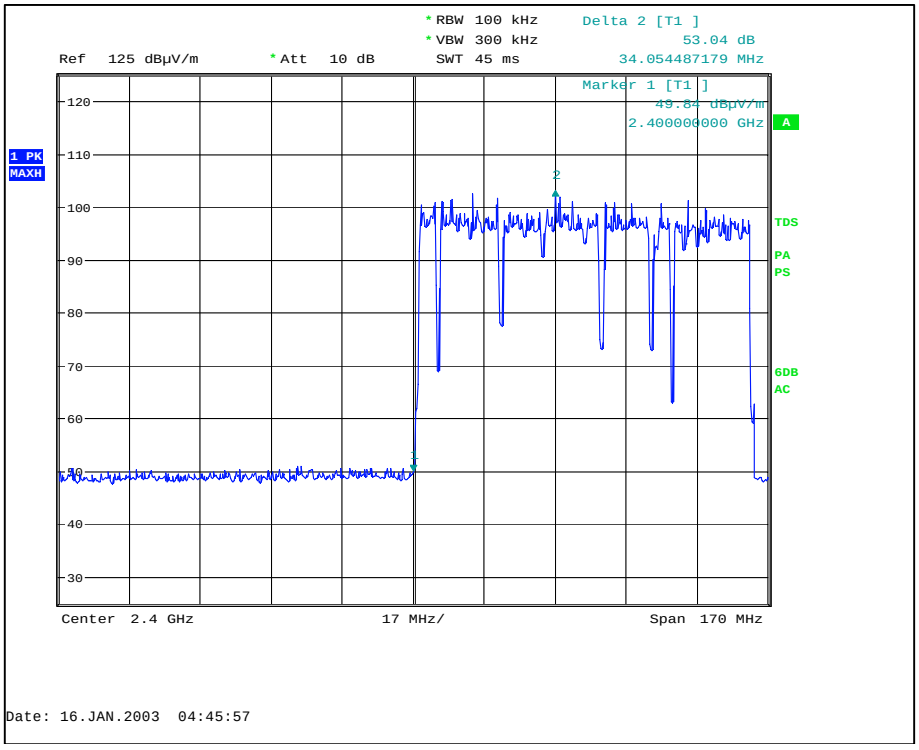

Figure 30 - Hopping - π/4 DQPSK/2DH5 - Measured Frequency 2400.0 MHz

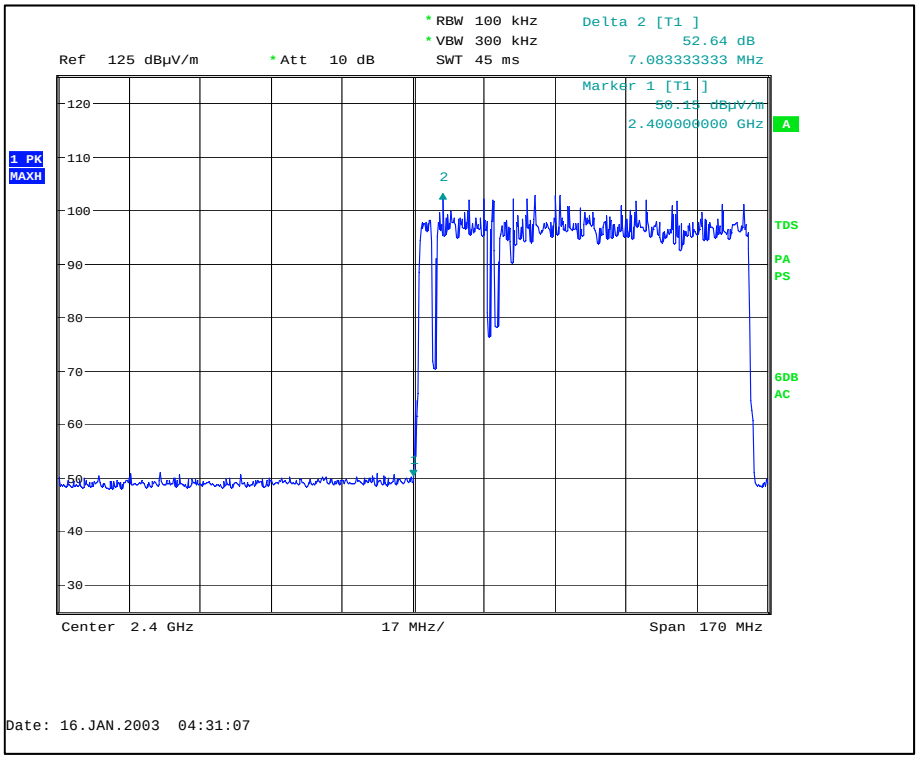

Figure 31 - Hopping - 8-DPSK/3DH5 - Measured Frequency 2400.0 MHz

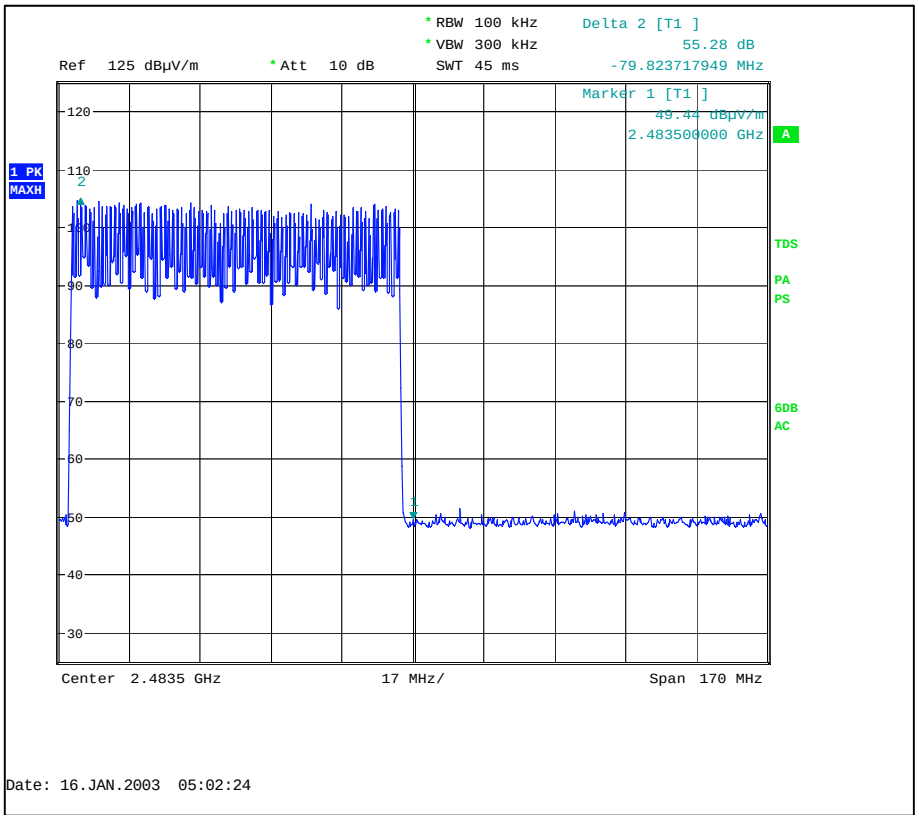

Figure 32 - Hopping - GFSK/DH5 - Measured Frequency 2483.5 MHz

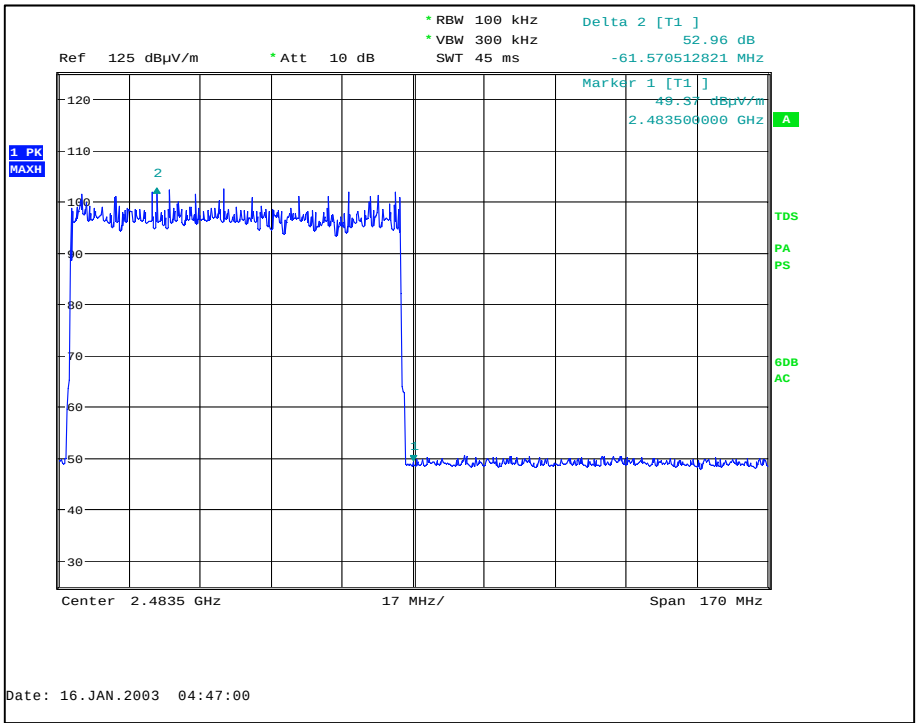

Figure 33 - Hopping - π/4 DQPSK/2DH5 - Measured Frequency 2483.5 MHz

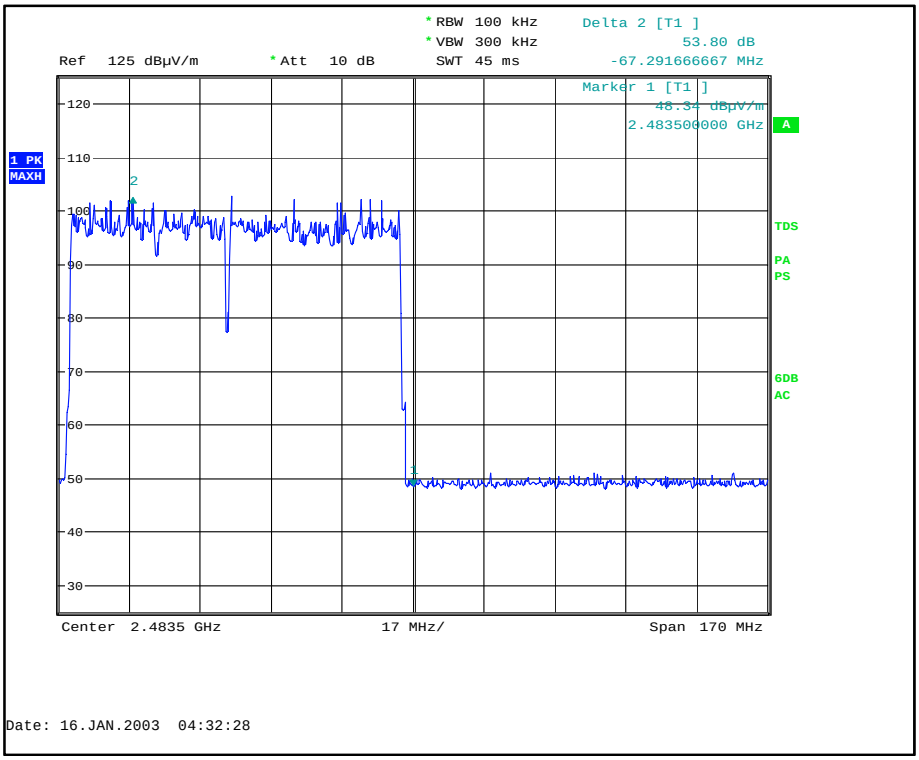

Figure 34 - Hopping - 8-DPSK/3DH5 - Measured Frequency 2483.5 MHz

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

Industry Canada RSS-247, Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

2.7.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Screened Room (5)	Rainford	Rainford	1545	36	9-Jun-2018
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4143	12	3-Nov-2018
Cable (Rx, Nm-Nm, 7m)	Scott Cables	SLU18-NMNM-07.00M	4498	6	19-Jun-2018
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	2-Jul-2018
Mast Controller	Maturo Gmbh	NCD	4810	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	4811	-	TU
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	12-Feb-2019
Hygrometer	Rotronic	HP21	4989	12	26-Apr-2019

Table 18

TU – Traceability Unscheduled

2.8 Restricted Band Edges

2.8.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.205
Industry Canada RSS-GEN, Clause 8.10

2.8.2 Equipment Under Test and Modification State

Handset: SC2128, S/N: Not Serialised (75941492-TSR0002) - Modification State 0
High Capacity Battery: 300-01853, S/N: 46000000A9C0F03D - Modification State 0

2.8.3 Date of Test

03-April-2018 and 23-April-2018

2.8.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 6.10.5.

Plots for average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.3. These are shown for information purposes and were used to determine the worst-case measurement point. Final average measurements were then taken in accordance with ANSI C63.10 clause 4.1.4.2.2. to obtain the measurement result recorded in the test results tables.

The following conversion can be applied to convert from dBµV/m to µV/m:
10^(Field Strength in dBµV/m/20).

2.8.5 Environmental Conditions

Ambient Temperature	20.1 °C
Relative Humidity	41.0 %

2.8.6 Test Results

Bluetooth (BDR + EDR)

Mode	Modulation	Packet Type	Frequency (MHz)	Measured Frequency (MHz)	Peak Level (dBµV/m)	Average Level (dBµV/m)
Static	GFSK	DH5	2402	2390.0	59.11	45.95
Static	π/4 DQPSK	2DH5	2402	2390.0	59.33	44.50
Static	8-DPSK	3DH5	2402	2390.0	59.85	44.76
Static	GFSK	DH5	2480	2483.5	59.31	45.91
Static	π/4 DQPSK	2DH5	2480	2483.5	59.09	45.38
Static	8-DPSK	3DH5	2480	2483.5	60.32	45.41
Hopping	GFSK	DH5	2402	2390.0	59.61	44.75
Hopping	π/4 DQPSK	2DH5	2402	2390.0	62.26	44.53
Hopping	8-DPSK	3DH5	2402	2390.0	60.20	44.56
Hopping	GFSK	DH5	2480	2483.5	59.24	44.55
Hopping	π/4 DQPSK	2DH5	2480	2483.5	59.14	44.75
Hopping	8-DPSK	3DH5	2480	2483.5	58.96	45.69

Table 19

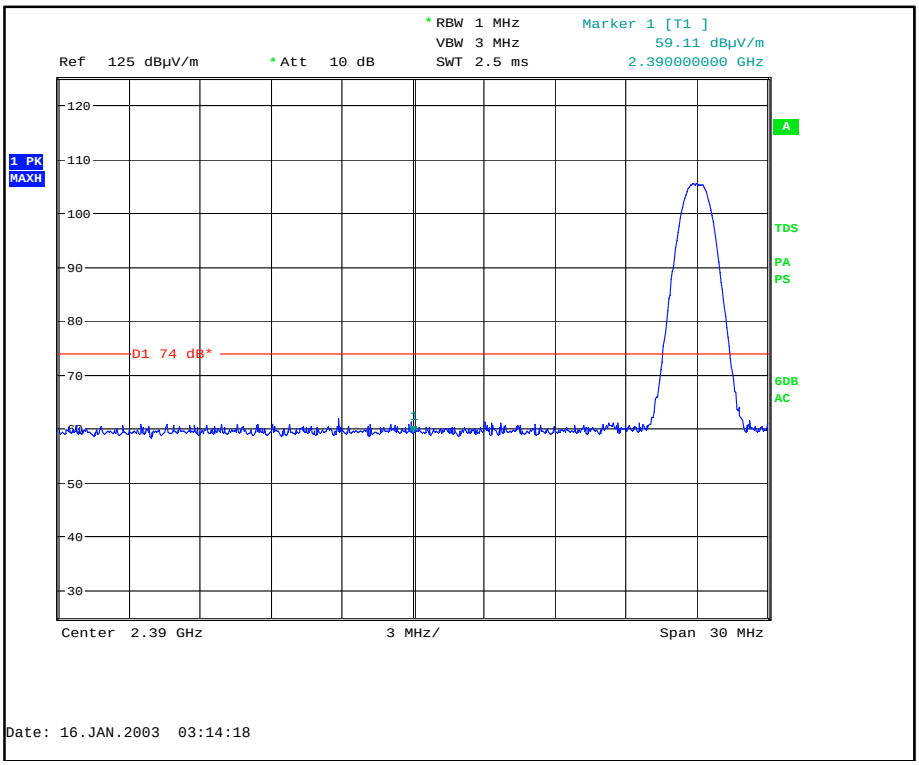

Figure 35 - Static – GFSK/DH5 - 2402 MHz - Measured Frequency 2390.0 MHz - Peak

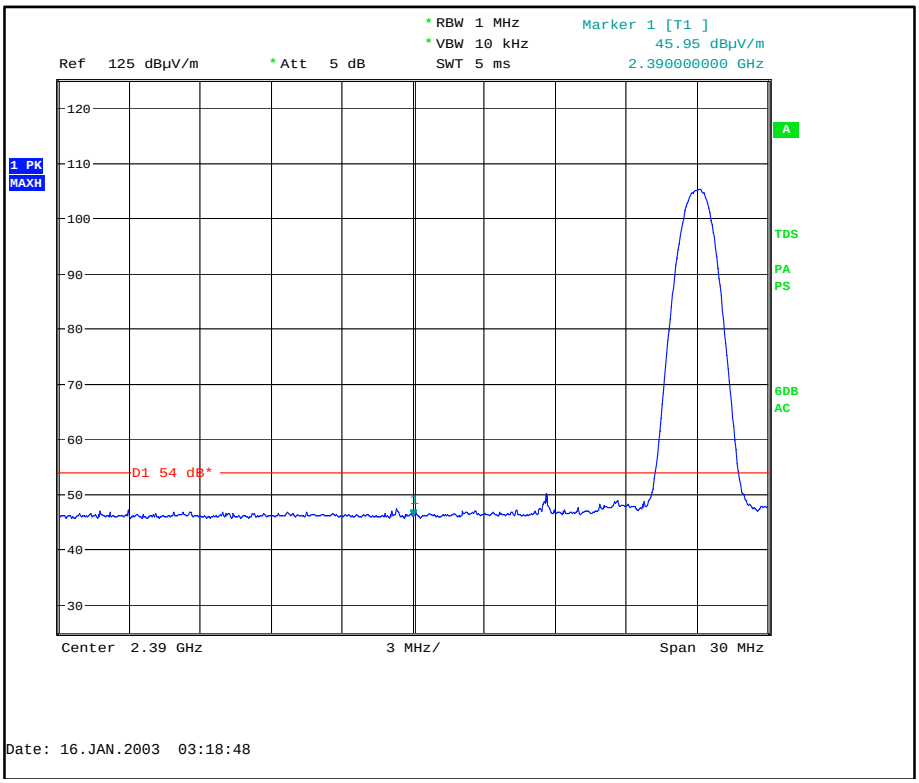

Figure 36 - Static – GFSK/ DH5- 2402 MHz - Measured Frequency 2390.0 MHz - Average

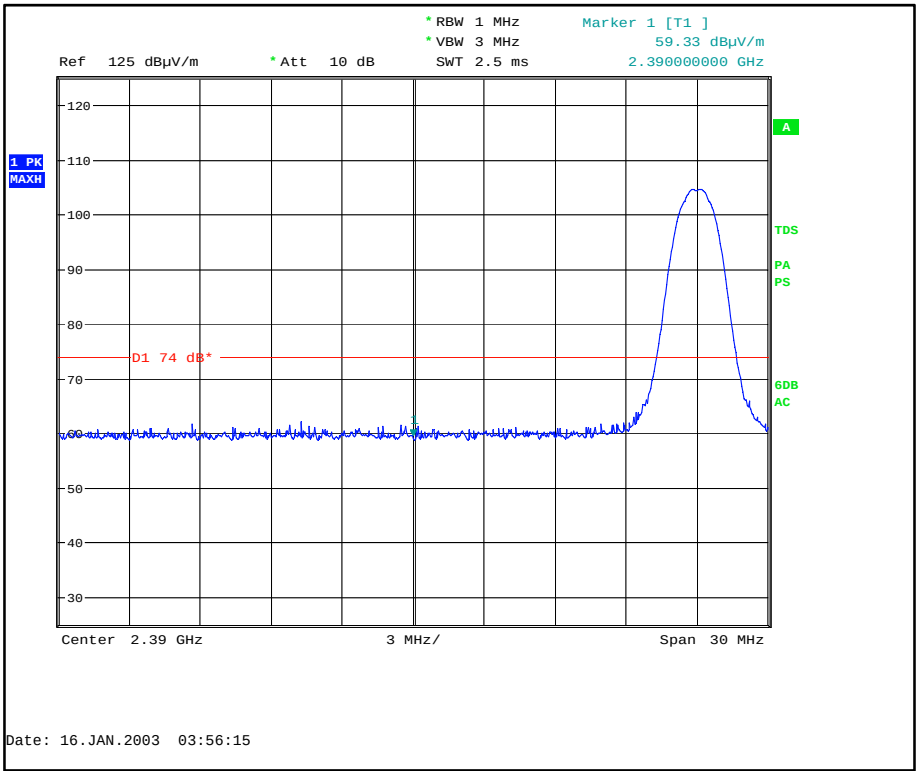

Figure 37 - Static – π/4 DQPSK/2DH5 - 2402 MHz - Measured Frequency 2390.0 MHz - Peak

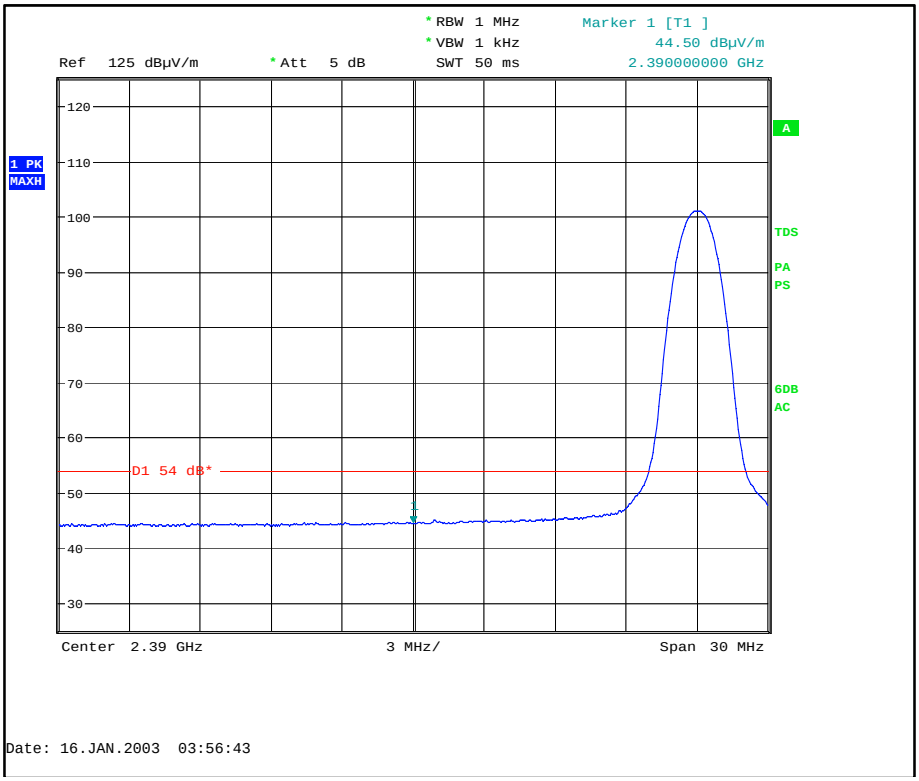

Figure 38 - Static – π/4 DQPSK/2DH5 - 2402 MHz - Measured Frequency 2390.0 MHz – Average

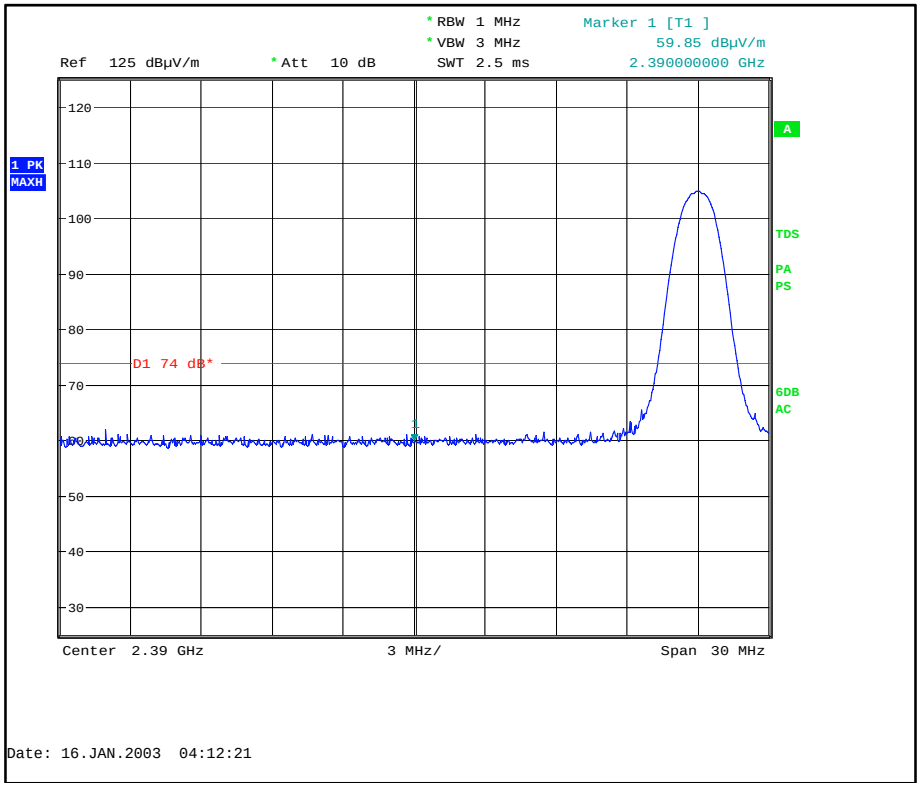

Figure 39 - Static – 8-DPSK/3DH5 - 2402 MHz - Measured Frequency 2390.0 MHz - Peak

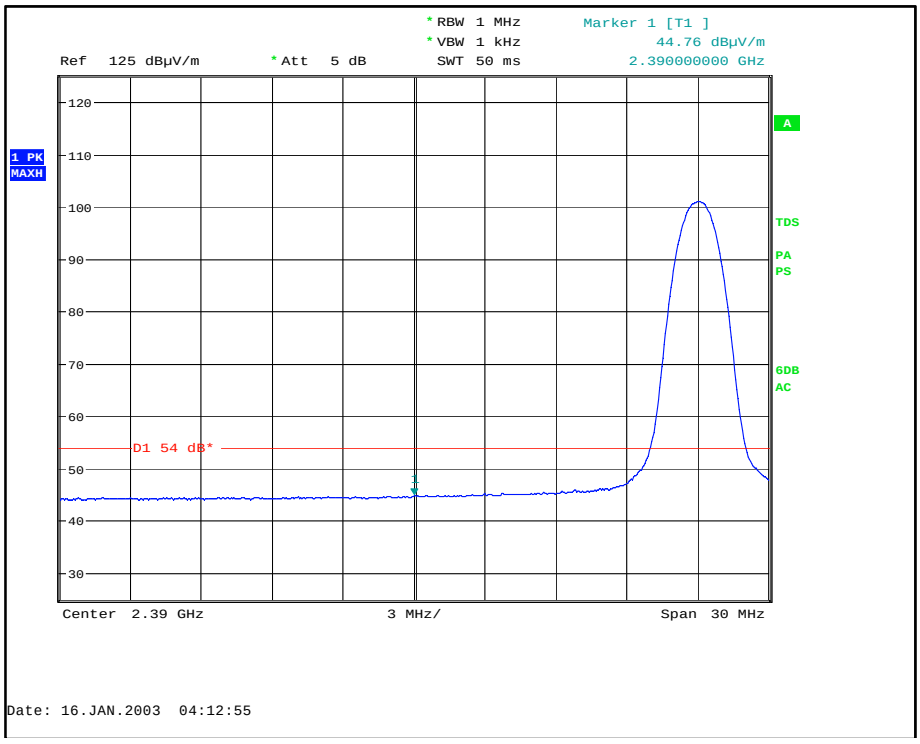

Figure 40 - Static – 8-DPSK 3DH5 - 2402 MHz - Measured Frequency 2390.0 MHz - Average

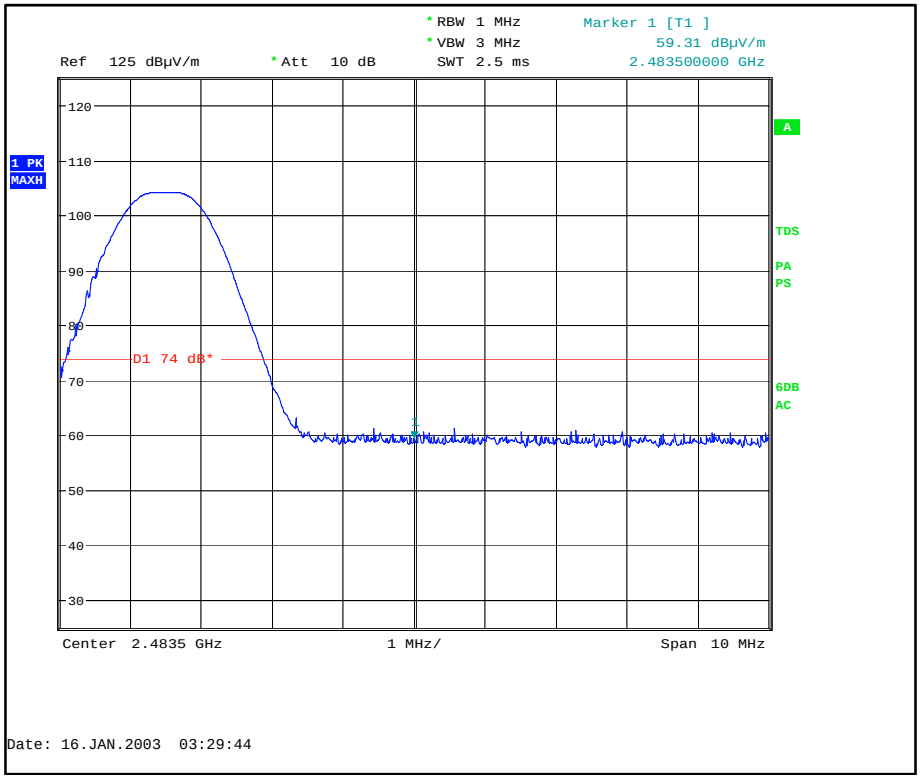

Figure 41 - Static – GFSK/DH5- 2480 MHz - Measured Frequency 2483.5 MHz - Peak

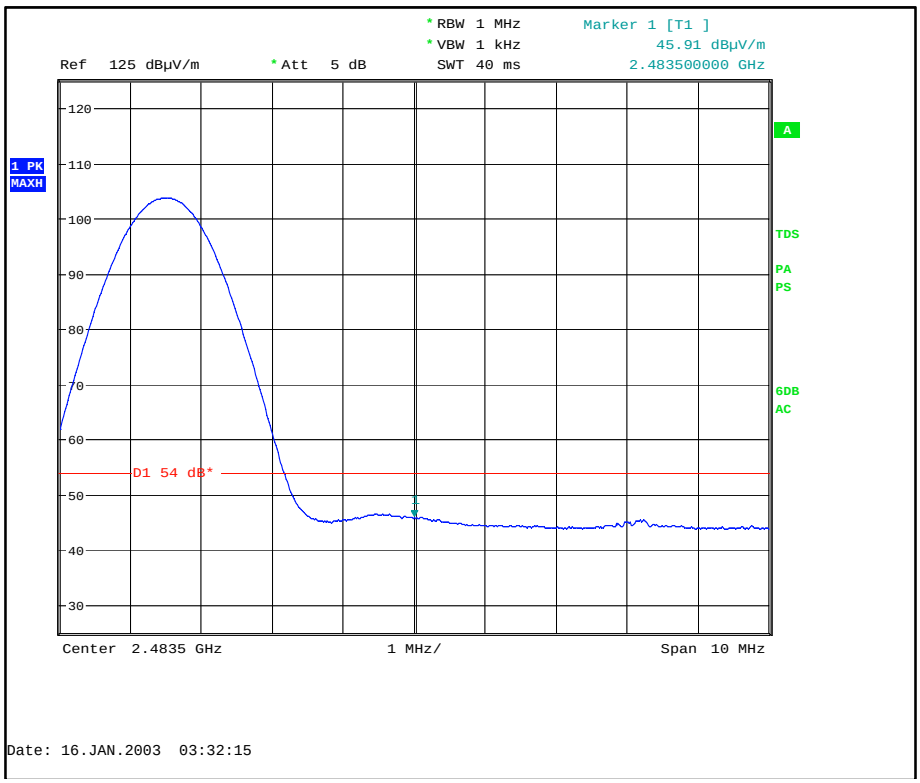

Figure 42 - Static – GFSK/DH5- 2480 MHz - Measured Frequency 2483.5 MHz - Average

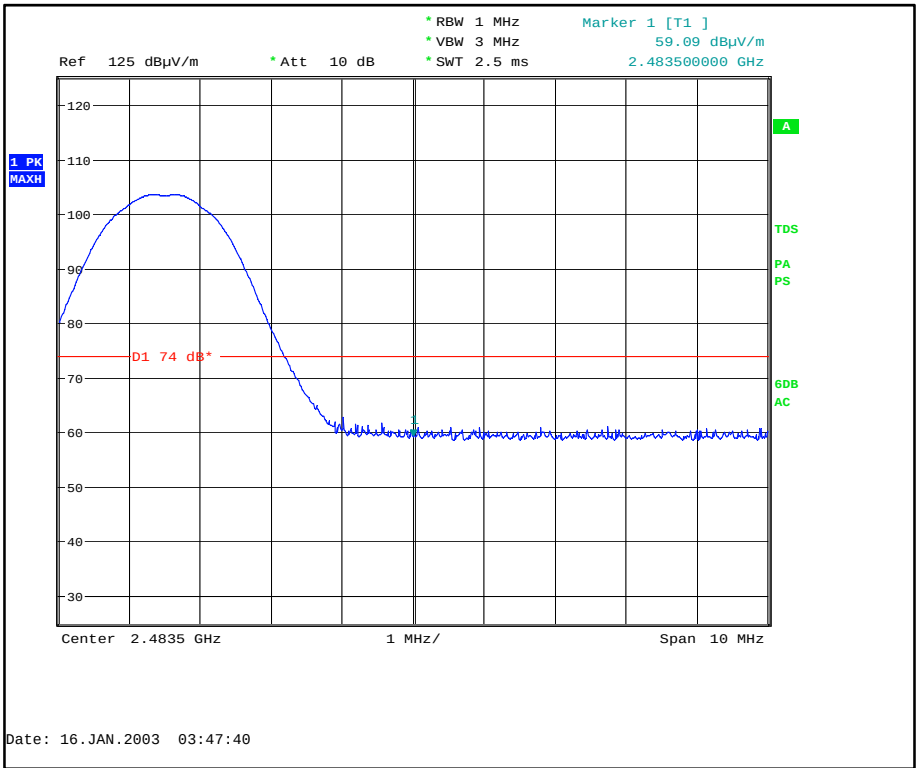

Figure 43 - Static – π/4 DQPSK/2DH5 - 2480 MHz - Measured Frequency 2483.5 MHz - Peak

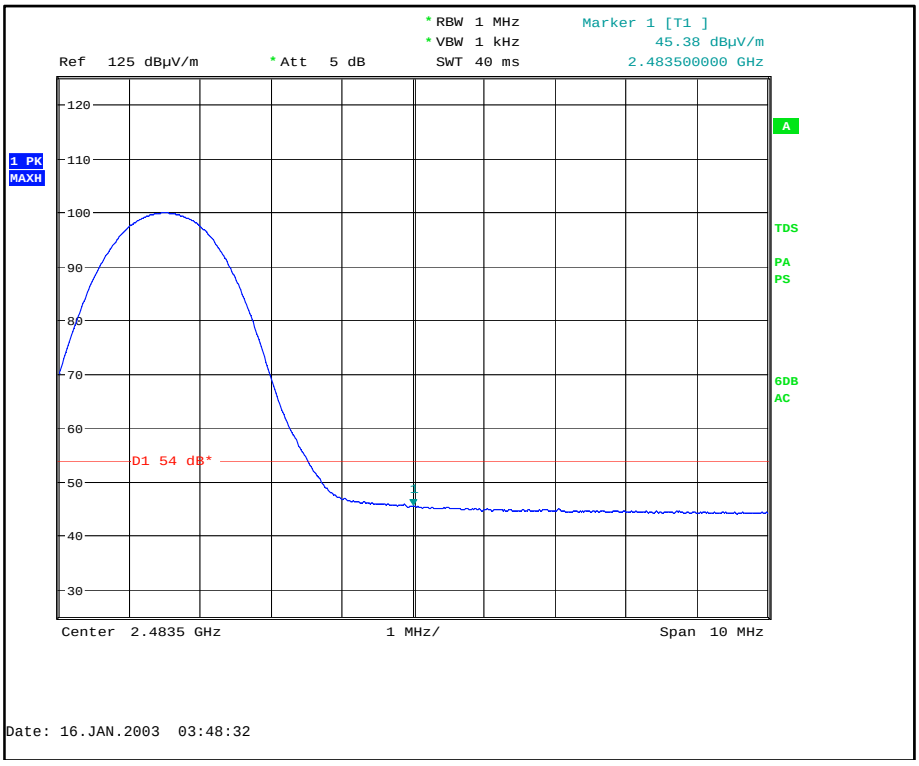

Figure 44 - Static – π/4 DQPSK/2DH5 - 2480 MHz - Measured Frequency 2483.5 MHz - Average

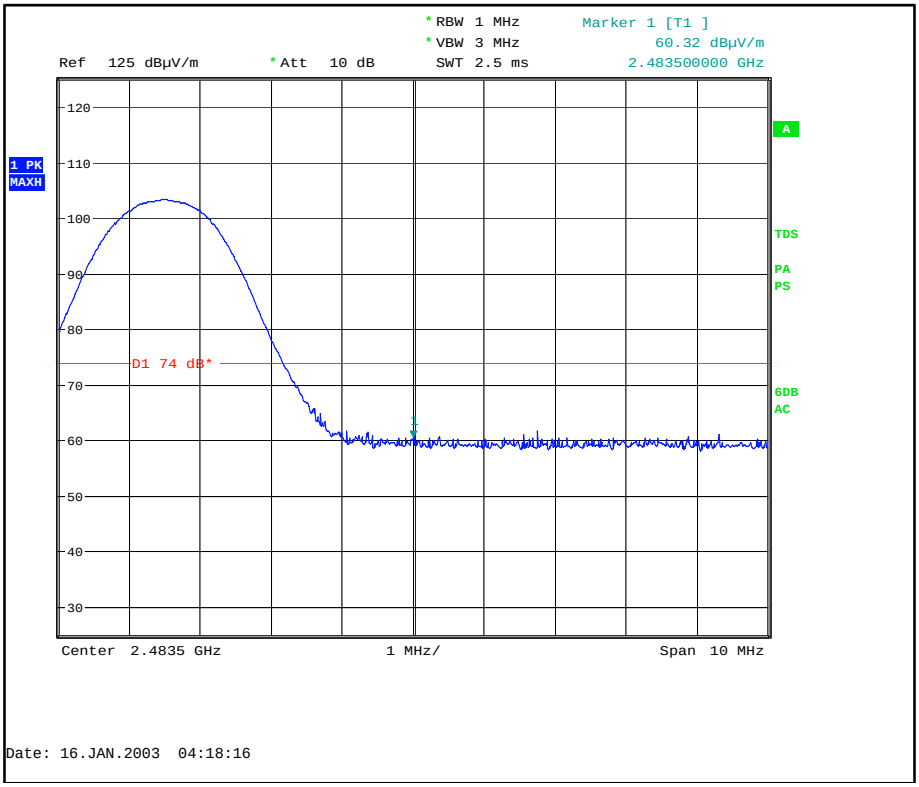

Figure 45 - Static – 8-DPSK/3DH5- 2480 MHz - Measured Frequency 2483.5 MHz - Peak

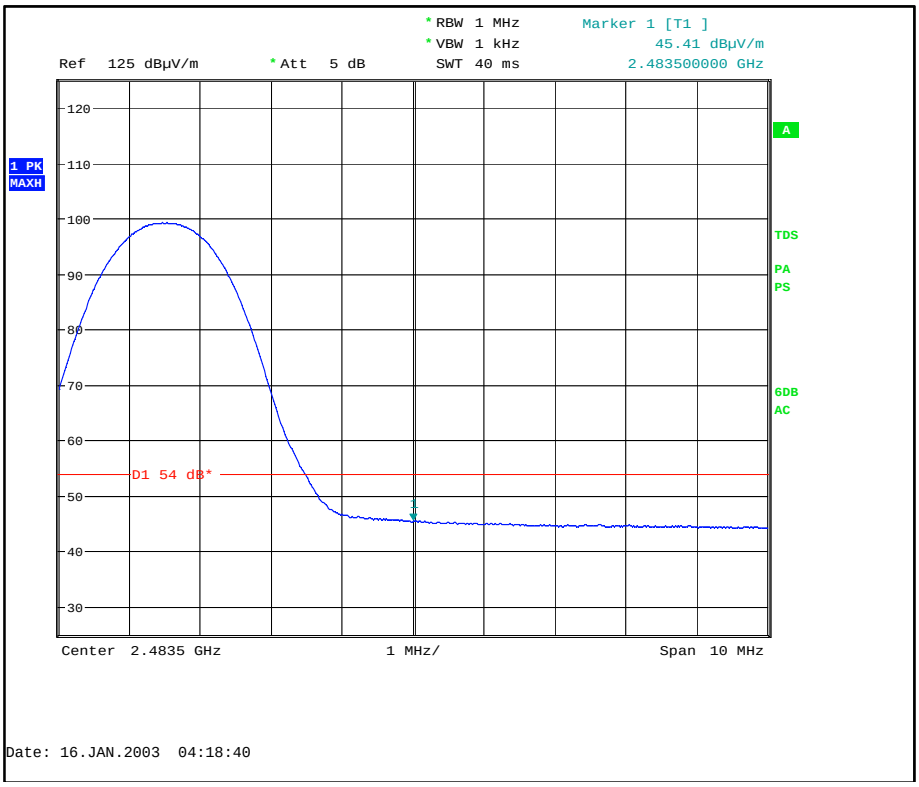

Figure 46 - Static – 8-DPSK/3DH5 - 2480 MHz - Measured Frequency 2483.5 MHz - Average

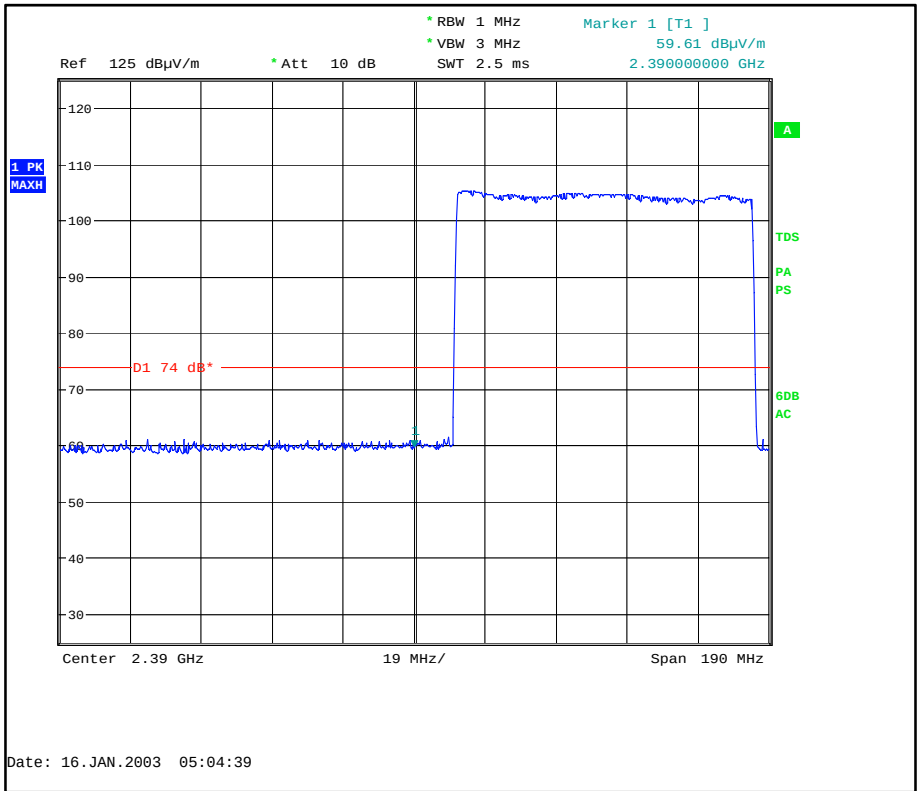

Figure 47 - Hopping - GFSK/DH5 - Measured Frequency 2390.0 MHz - Peak

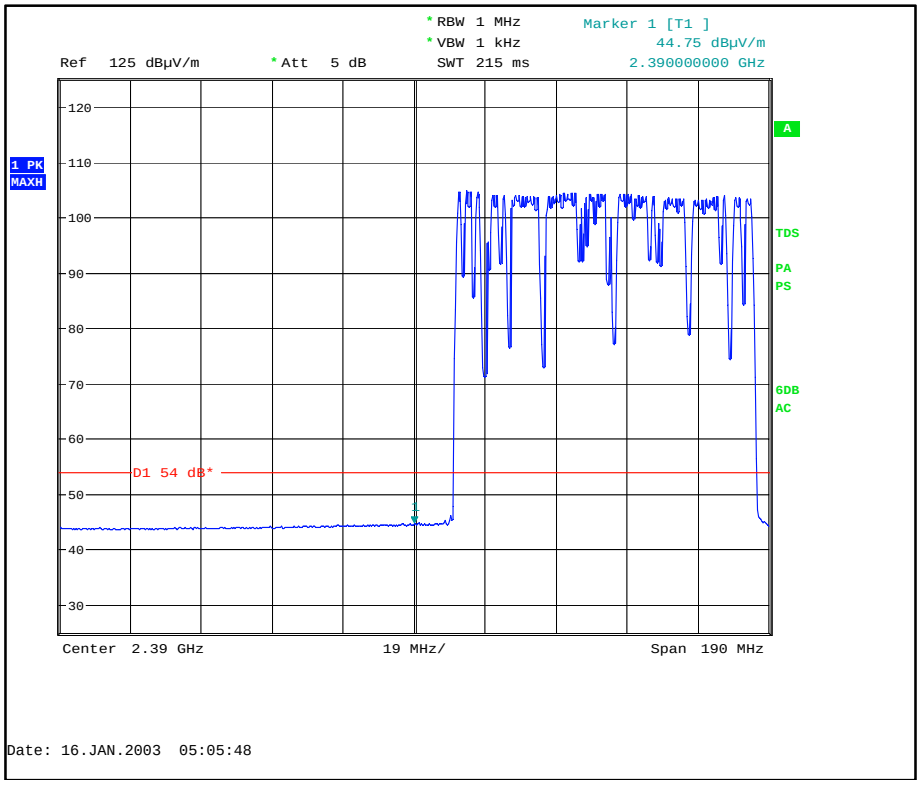

Figure 48 - Hopping - GFSK/DH5 - Measured Frequency 2390.0 MHz - Average

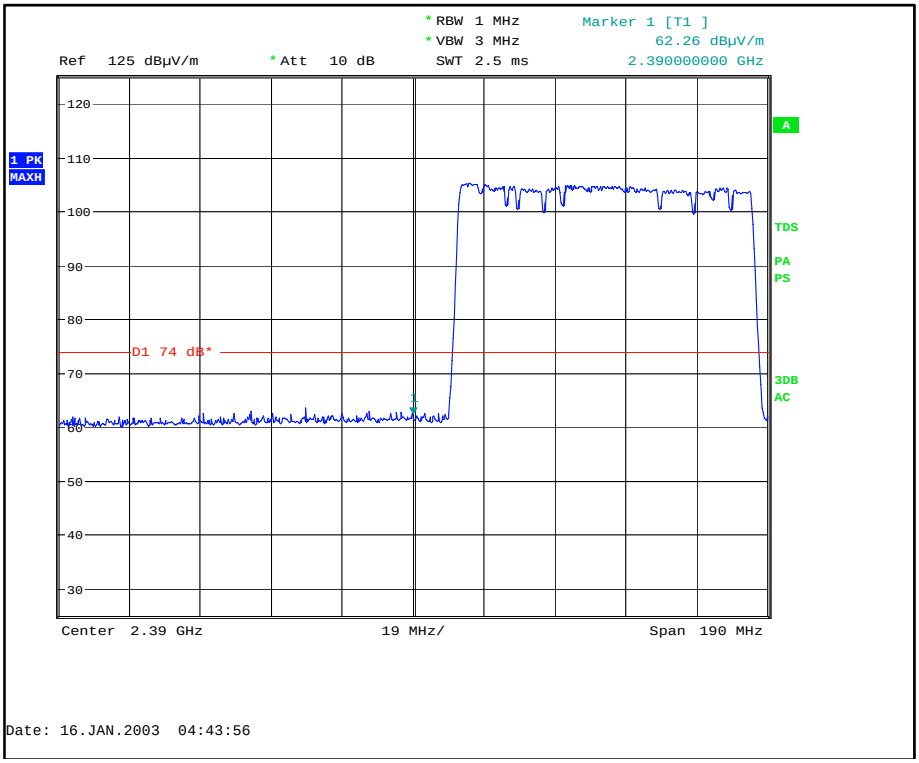

Figure 49 - Hopping - π/4 DQPSK/2DH5 - Measured Frequency 2390.0 MHz - Peak

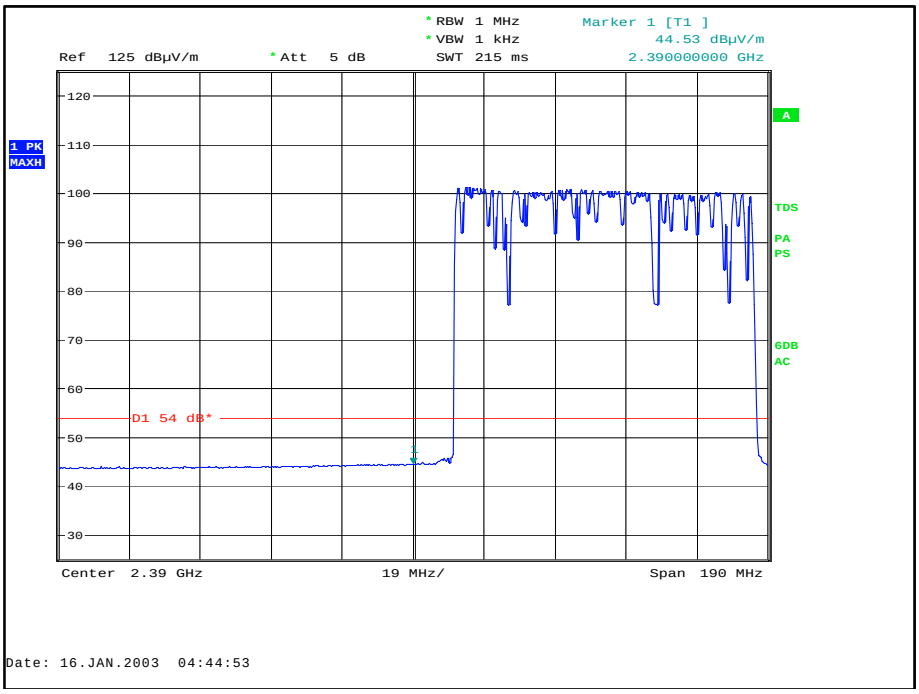

Figure 50 - Hopping - π/4 DQPSK/2DH5 - Measured Frequency 2390.0 MHz - Average

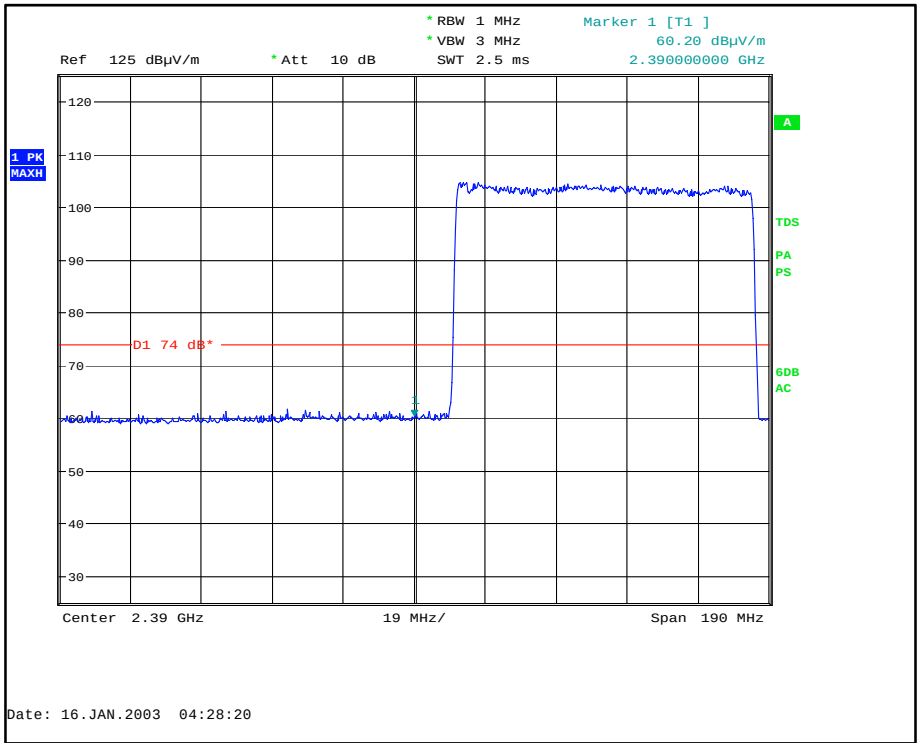

Figure 51 - Hopping - 8-DPSK/3DH5 - Measured Frequency 2390.0 MHz - Peak

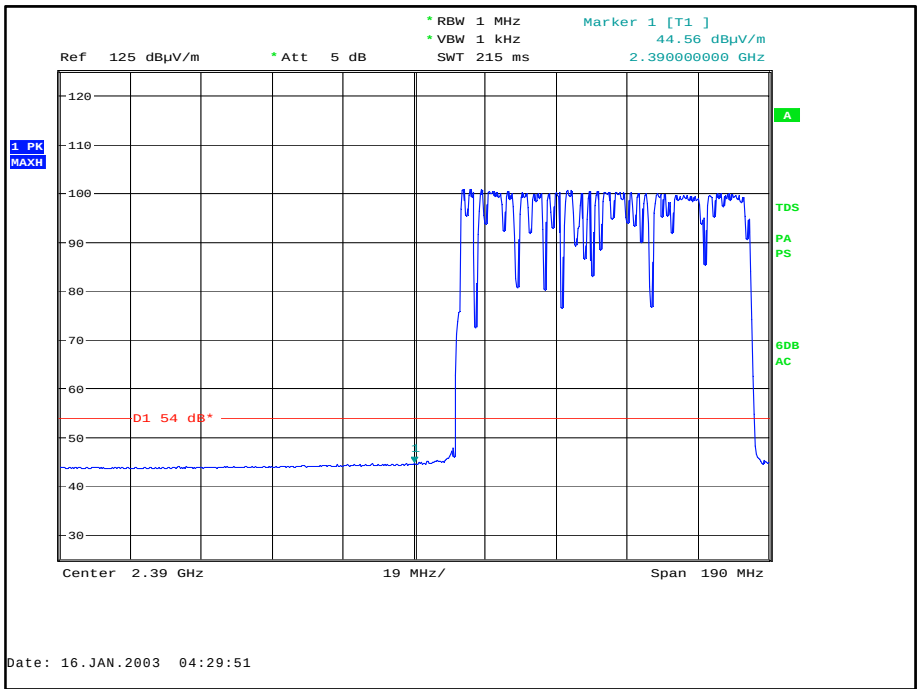

Figure 52 - Hopping - 8-DPSK/3DH5 - Measured Frequency 2390.0 MHz - Average

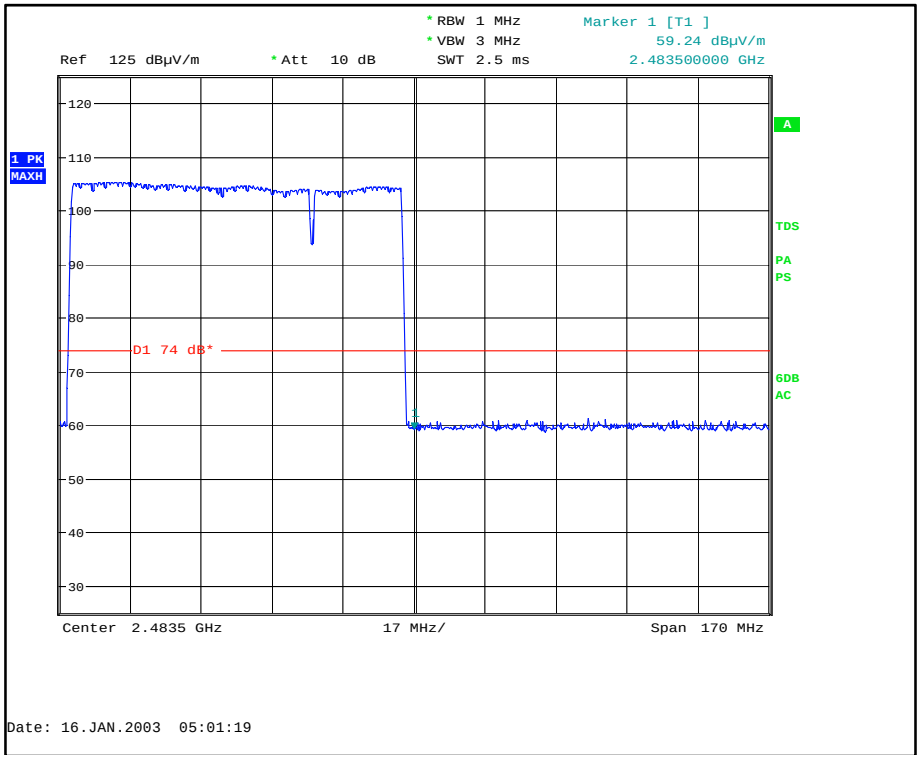

Figure 53 - Hopping - GFSK/DH5 - Measured Frequency 2483.5 MHz - Peak

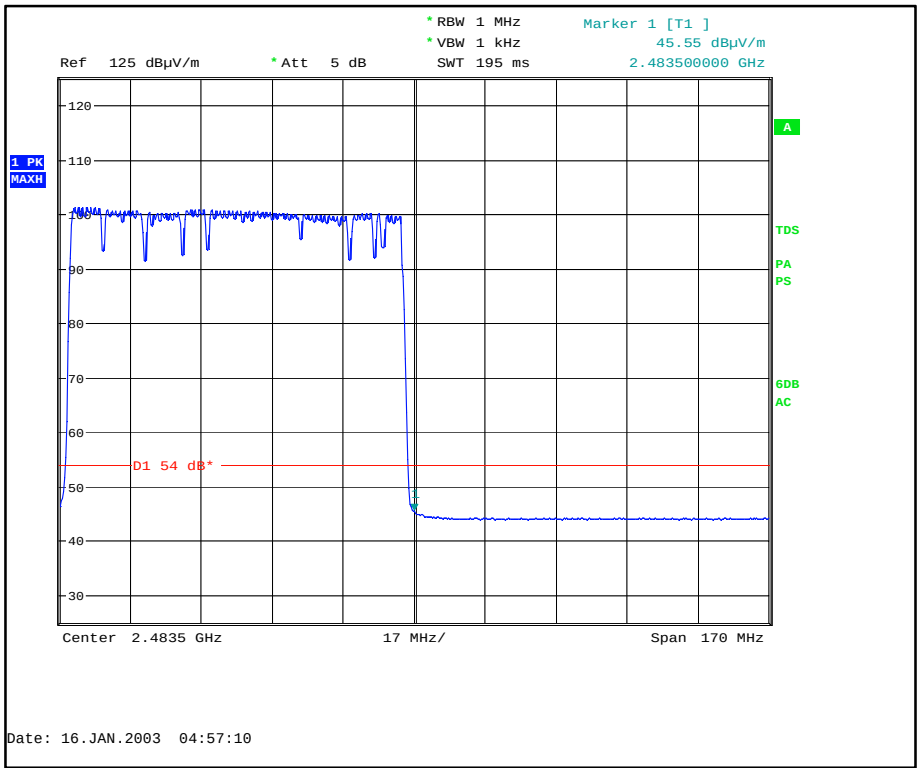

Figure 54 - Hopping - GFSK/DH5 - Measured Frequency 2483.5 MHz – Average

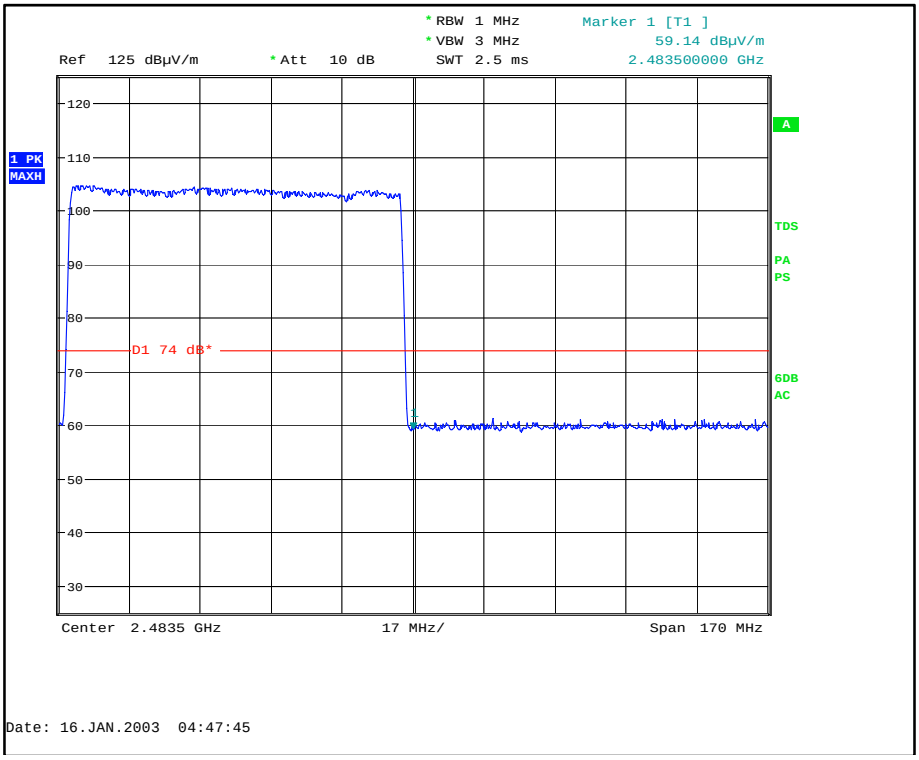

Figure 55 - Hopping - π/4 DQPSK/2DH5 - Measured Frequency 2483.5 MHz - Peak

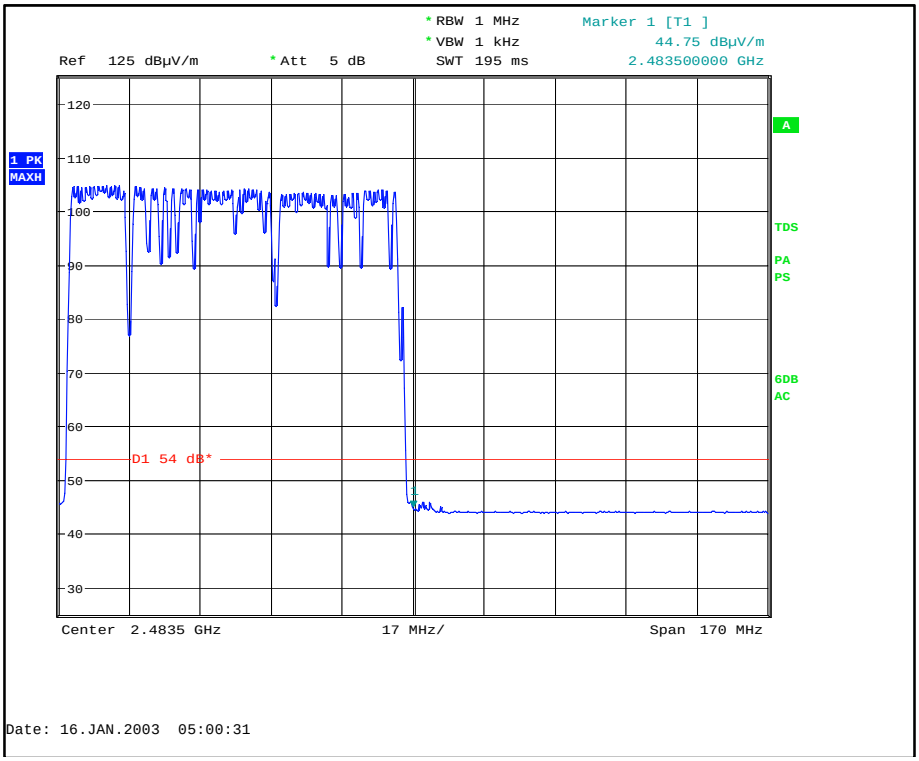

Figure 56 - Hopping - π/4 DQPSK/2DH5 - Measured Frequency 2483.5 MHz - Average

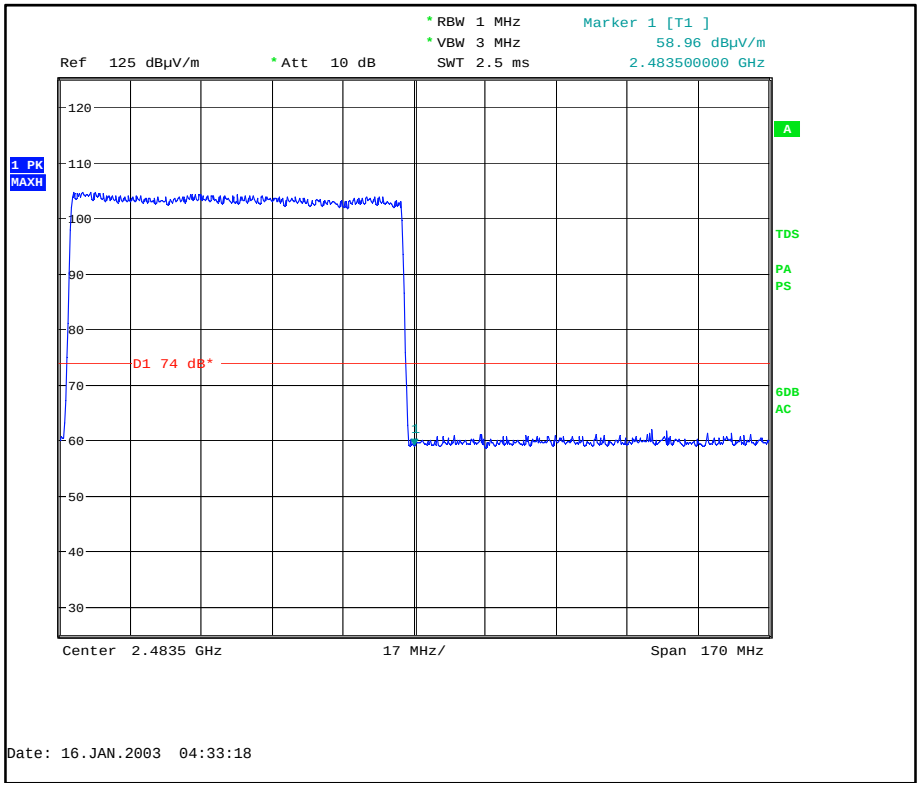

Figure 57 - Hopping - 8-DPSK/3DH5 - Measured Frequency 2483.5 MHz - Peak

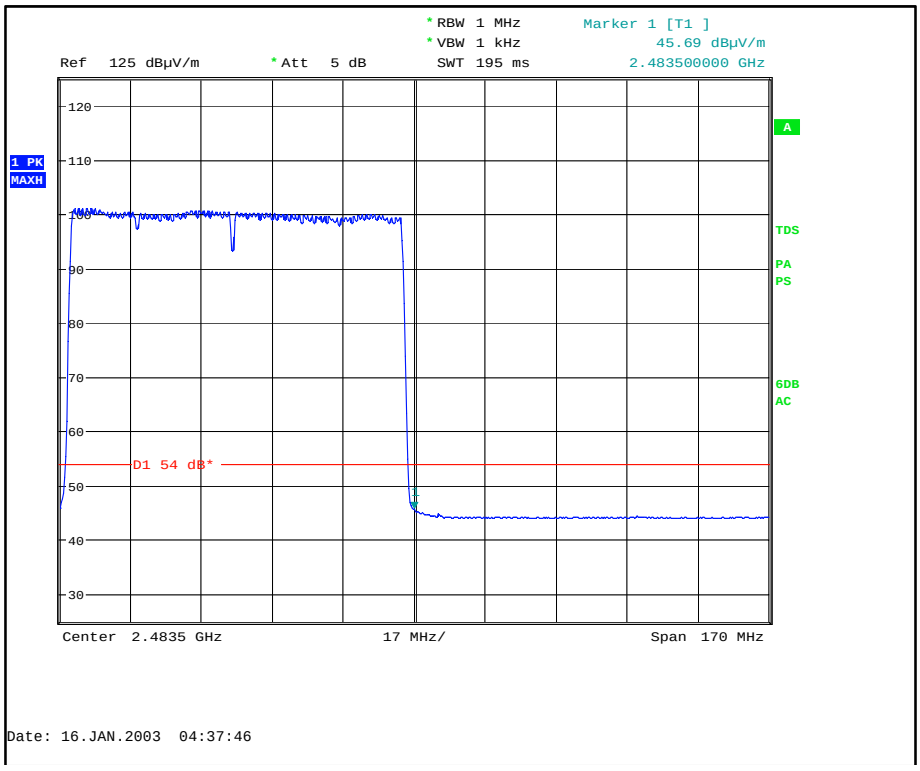

Figure 58 - Hopping - 8-DPSK/3DH5 - Measured Frequency 2483.5 MHz - Average

FCC 47 CFR Part 15, Limit Clause 15.205

	Peak (dBµV/m)	Average (dBµV/m)
Restricted Bands of Operation	74	54

Industry Canada RSS-GEN, Limit Clause 8.9

Frequency (MHz)	Field Strength (µV/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

*Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

2.8.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Screened Room (5)	Rainford	Rainford	1545	36	9-Jun-2018
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4143	12	3-Nov-2018
Cable (Rx, Nm-Nm, 7m)	Scott Cables	SLU18-NMNM-07.00M	4498	6	19-Jun-2018
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	2-Jul-2018
Mast Controller	Maturo Gmbh	NCD	4810	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	4811	-	TU
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	12-Feb-2019
Hygrometer	Rotronic	HP21	4989	12	26-Apr-2019

Table 20

TU – Traceability Unscheduled

2.9 Spurious Radiated Emissions

2.9.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d) and 15.205
Industry Canada RSS-247, Clause 5.5
Industry Canada RSS-GEN, Clause 6.13

2.9.2 Equipment Under Test and Modification State

Handset: SC2128, S/N: Not Serialised (75941492-TSR0002) - Modification State 0
High Capacity Battery: 300-01853, S/N: 76000000A99C723D - Modification State 0

2.9.3 Date of Test

26-April-2018

2.9.4 Test Method

This test was performed in accordance with ANSI C63.10-2013 clause 6.3, 6.5 and 6.6.

For frequencies > 1 GHz, plots for average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.3 to characterise the EUT. Where emissions were detected, final average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.2.

The plots shown are the characterization of the EUT. The limits on the plots represent the most stringent case for restricted bands, (74/54 dBuV/m) when compared to 20 dBc outside restricted bands. The limits shown have been used as a threshold to determine where further measurements are necessary. Where results are within 10 dB of the limits shown on the plots, further investigation was carried out and reported in results tables.

The following conversion can be applied to convert from dBµV/m to µV/m:
10^(Field Strength in dBµV/m/20).

For frequencies > 18 GHz, the measurement distance was reduced to 1 meter and the limit line was increased by 20*LOG (3/1) = 9.54 dB.

The following conversion can be applied to convert from dBµV/m to µV/m:
10^ (Field Strength in dBµV/m/20).

2.9.5 Environmental Conditions

Ambient Temperature	20.7 °C
Relative Humidity	32.0 %

2.9.6 Test Results

Bluetooth (BDR + EDR)

Frequency (GHz)	Result (dBµV/m)		Limit (dBµV/m)		Margin (dBµV/m)	
	Peak	Average	Peak	Average	Peak	Average
*						

Table 21 - 2402 MHz, 30 MHz to 1 GHz, Spurious Emissions Results

*No emissions were detected within 10 dB of the limit.

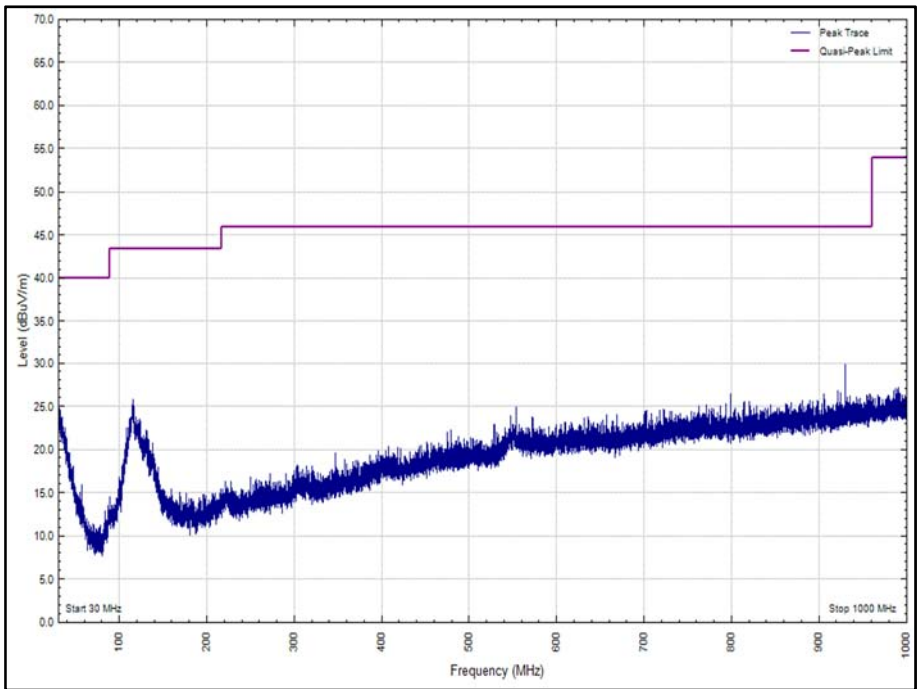

Figure 59 - 2402 MHz – 30 MHz to 1 GHz
Polarity: Horizontal, EUT Orientation: X

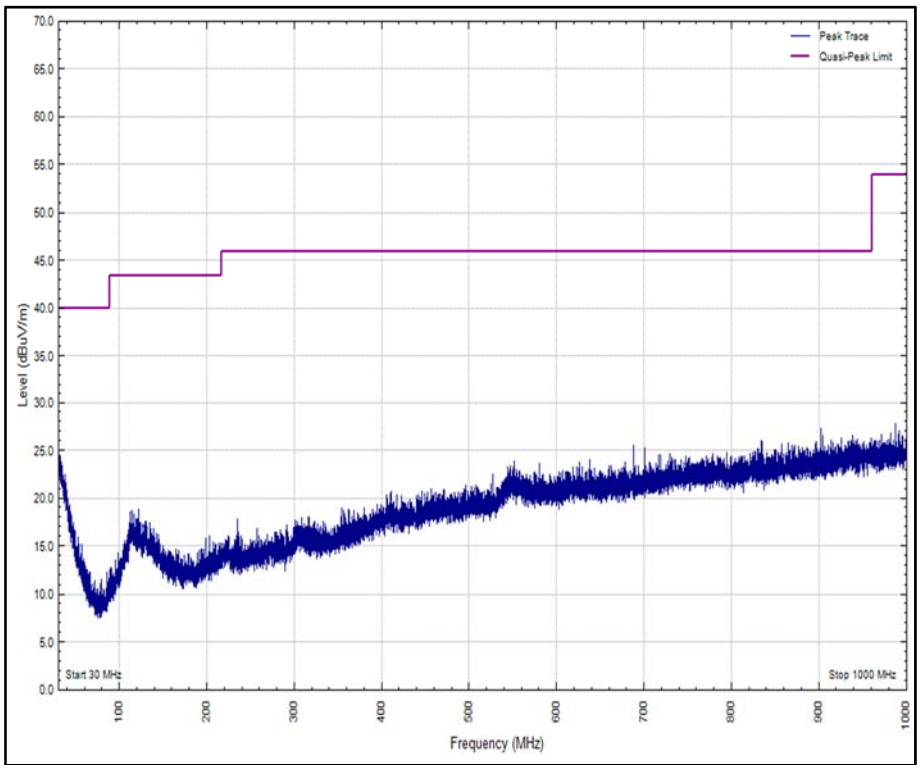

Figure 60 - 2402 MHz – 30 MHz to 1 GHz
Polarity: Vertical, EUT Orientation: X

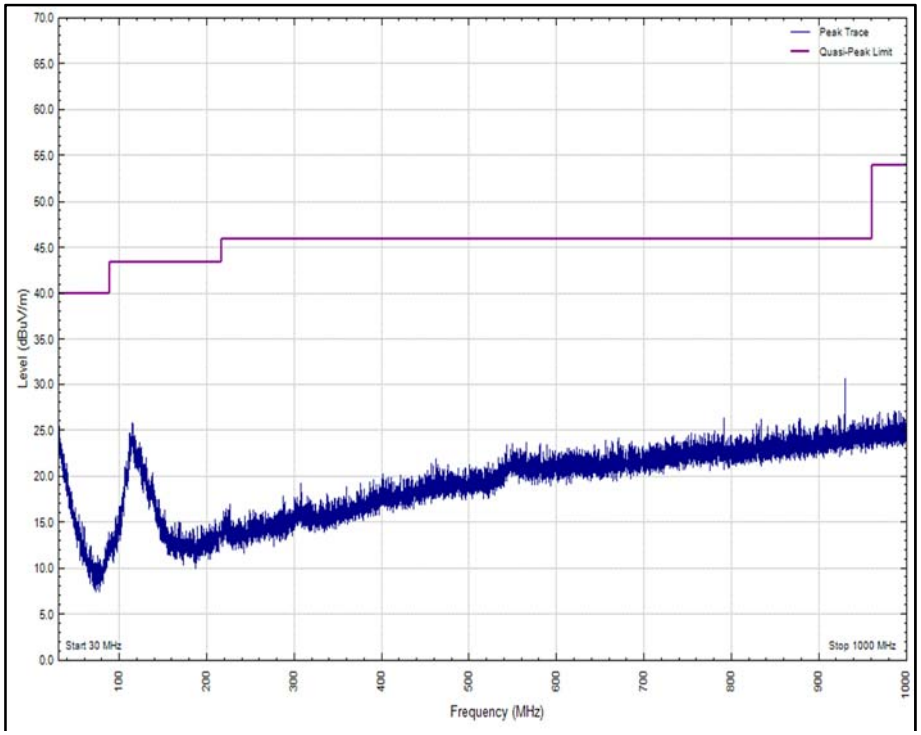

Figure 61 - 2402 MHz – 30 MHz to 1 GHz
Polarity: Horizontal, EUT Orientation: Y

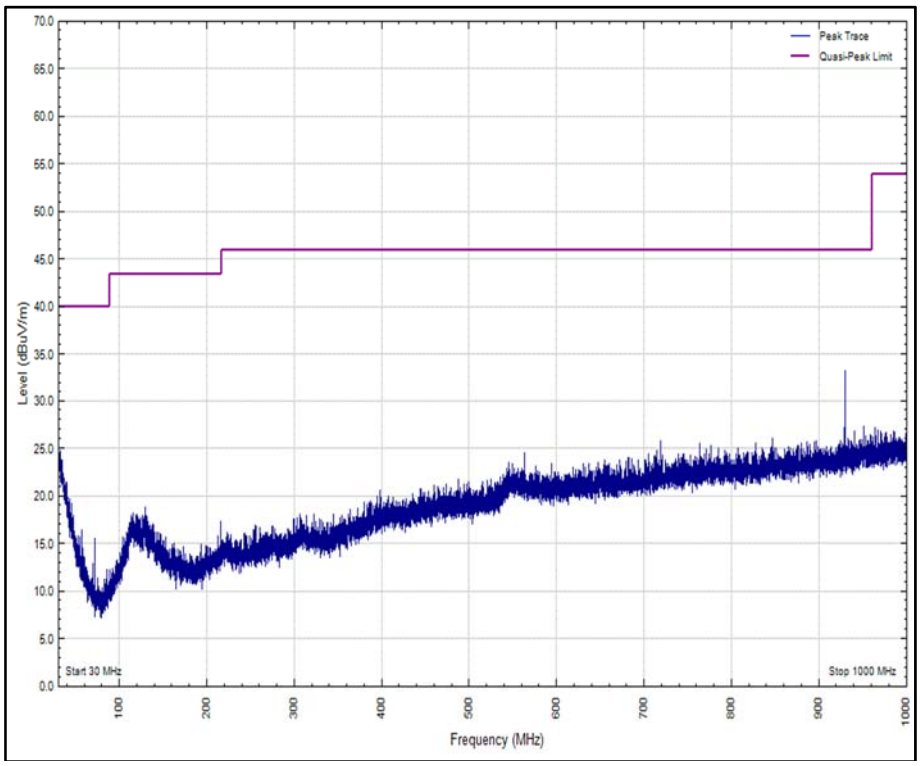

Figure 62 - 2402 MHz – 30 MHz to 1 GHz
Polarity: Vertical, EUT Orientation: Y

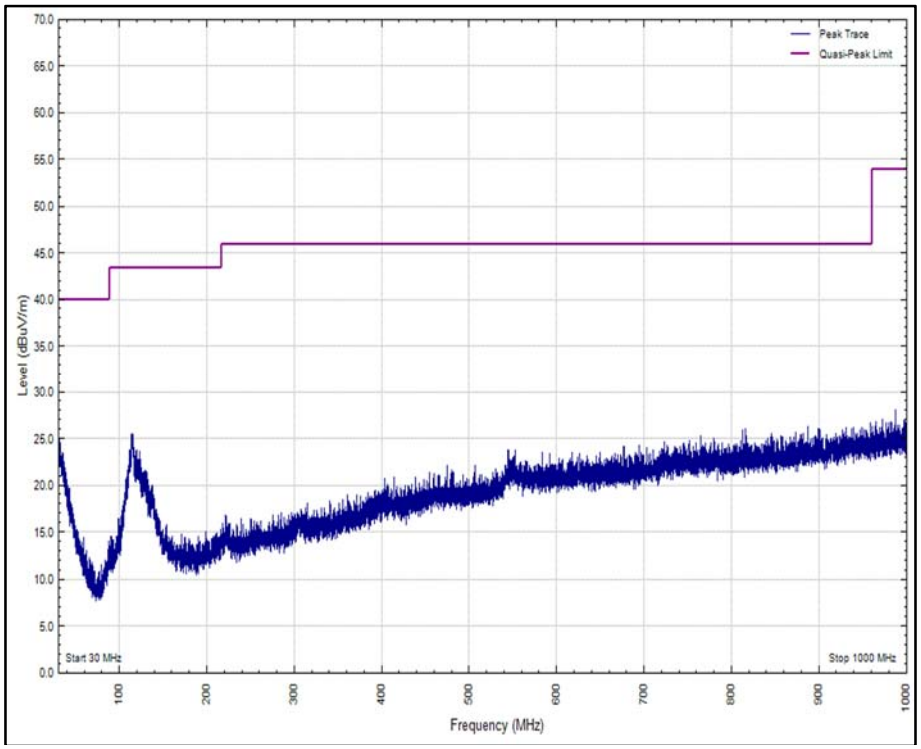

Figure 63 - 2402 MHz – 30 MHz to 1 GHz
Polarity: Horizontal, EUT Orientation: Z

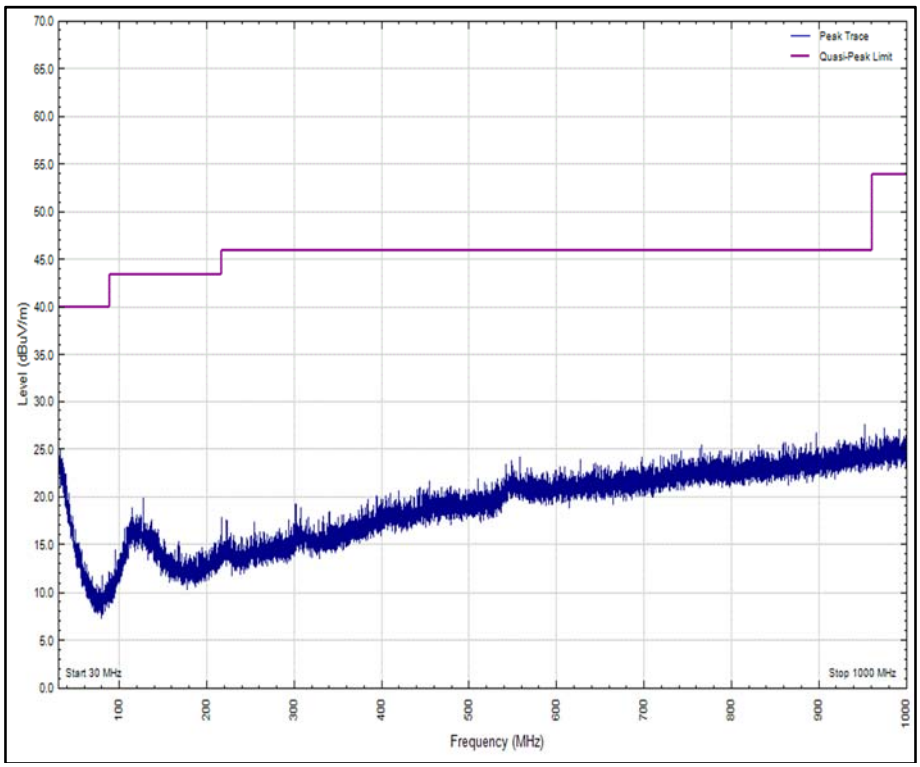

Figure 64 - 2402 MHz – 30 MHz to 1 GHz
Polarity: Vertical, EUT Orientation: Z

Frequency (GHz)	Result (dBµV/m)		Limit (dBµV/m)		Margin (dBµV/m)	
	Peak	Average	Peak	Average	Peak	Average
*						

Table 22 – 2402 MHz, 1 GHz to 25 GHz, Spurious Emissions Results

*No emissions were detected within 10 dB of the limit.

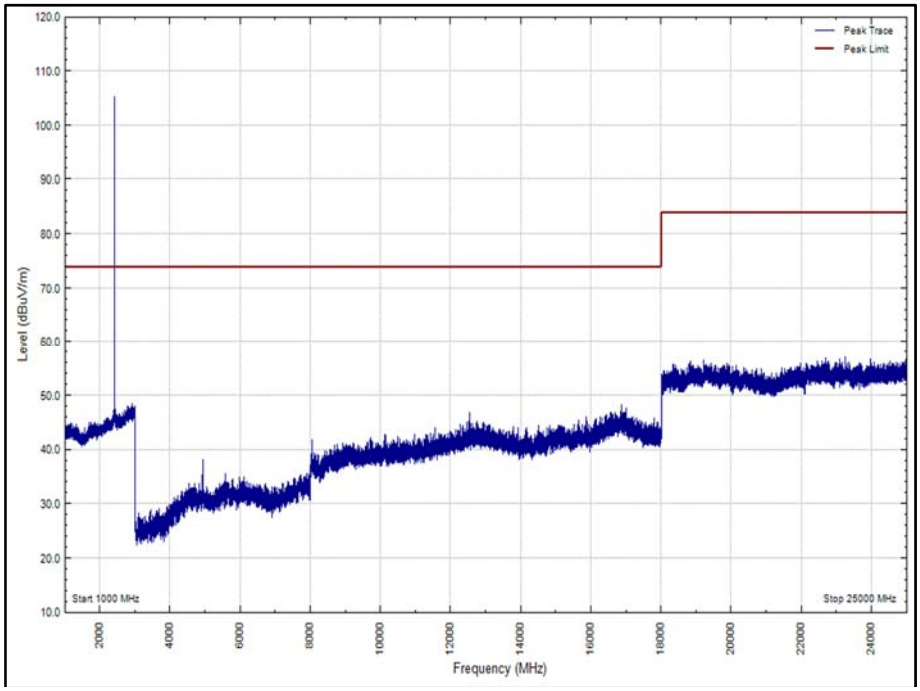

Figure 65 - 2402 MHz – 1 GHz to 25 GHz - Peak
Polarity: Horizontal, EUT Orientation: X

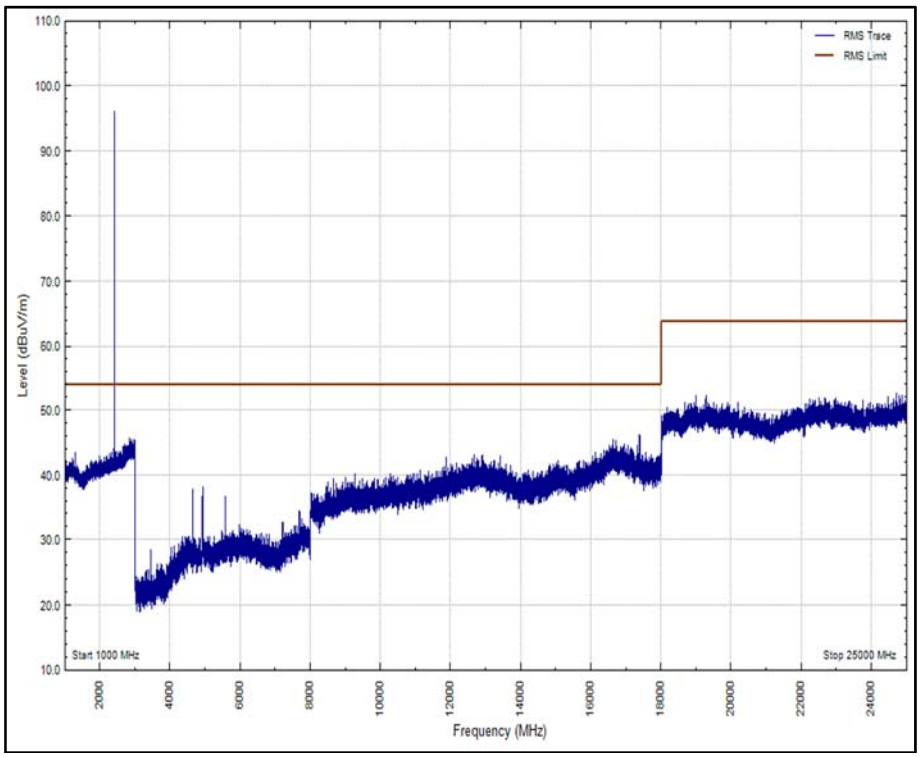

Figure 66 - 2402 MHz – 1 GHz to 25 GHz - Average
Polarity: Horizontal, EUT Orientation: X

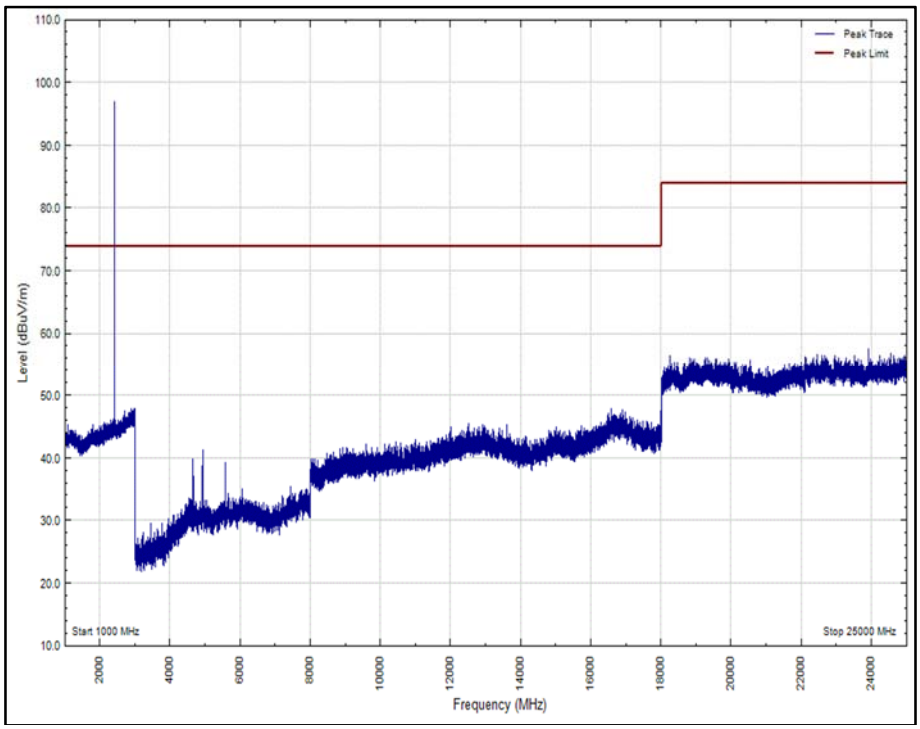

Figure 67- 2402 MHz – 1 GHz to 25 GHz - Peak
Polarity: Vertical, EUT Orientation: X

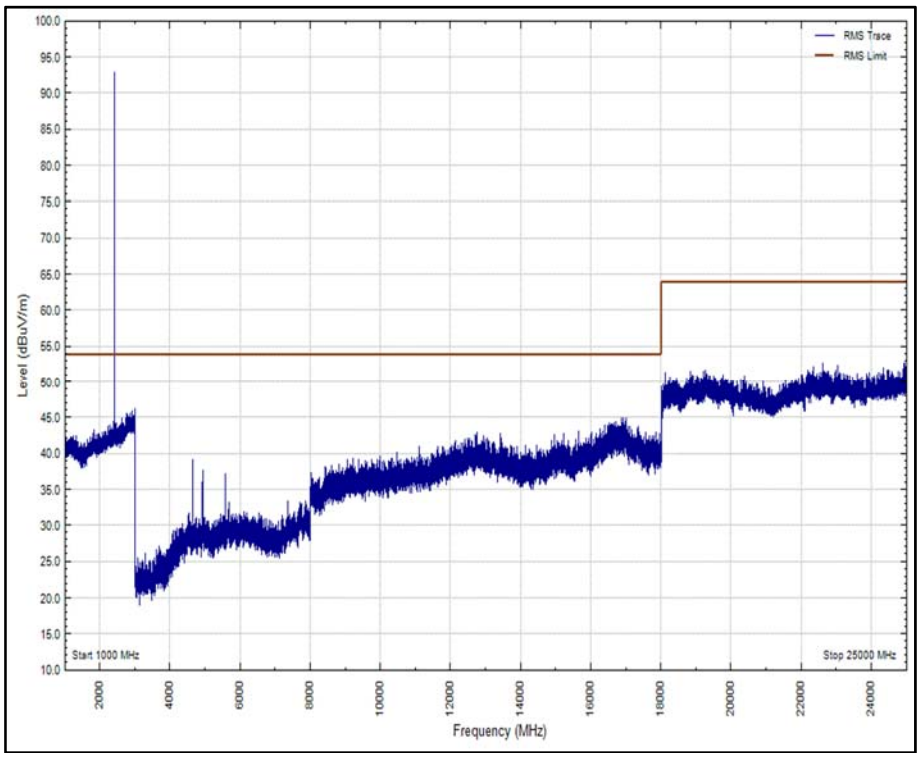

Figure 68 - 2402 MHz – 1 GHz to 25 GHz - Average
Polarity: Vertical, EUT Orientation: X

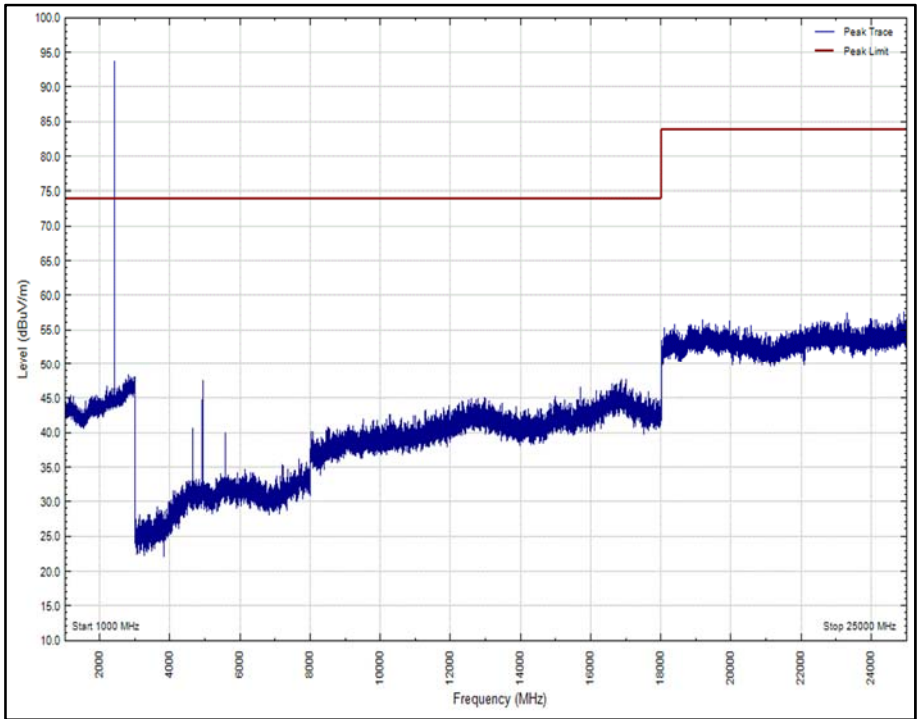

Figure 69 - 2402 MHz – 1 GHz to 25 GHz - Peak
Polarity: Horizontal, EUT Orientation: Y

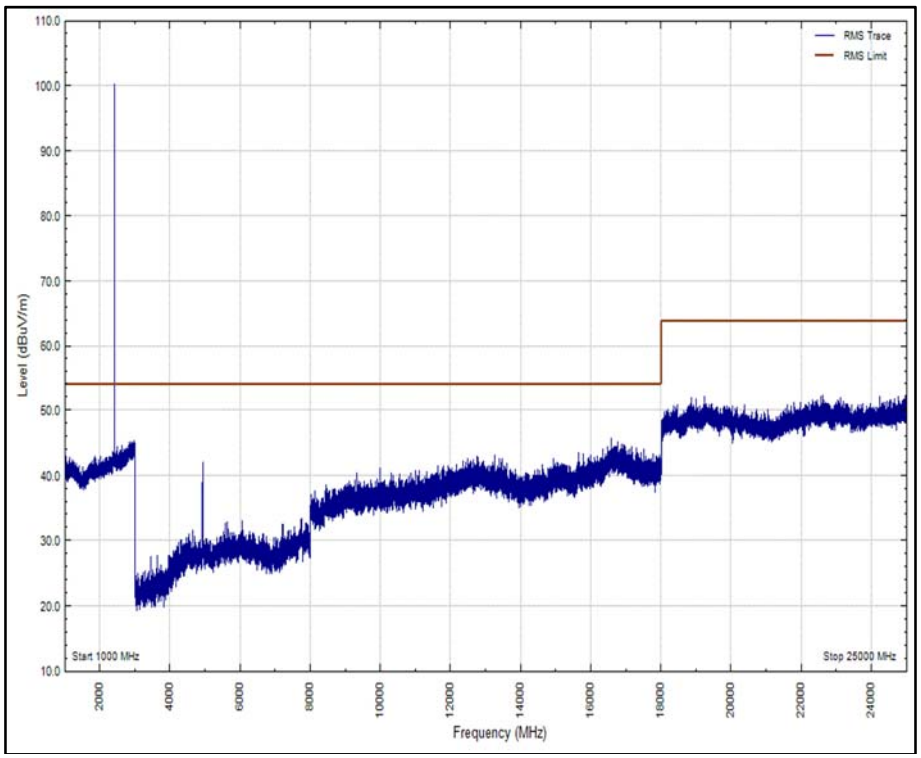

Figure 70- 2402 MHz – 1 GHz to 25 GHz - Average
Polarity: Horizontal, EUT Orientation: Y

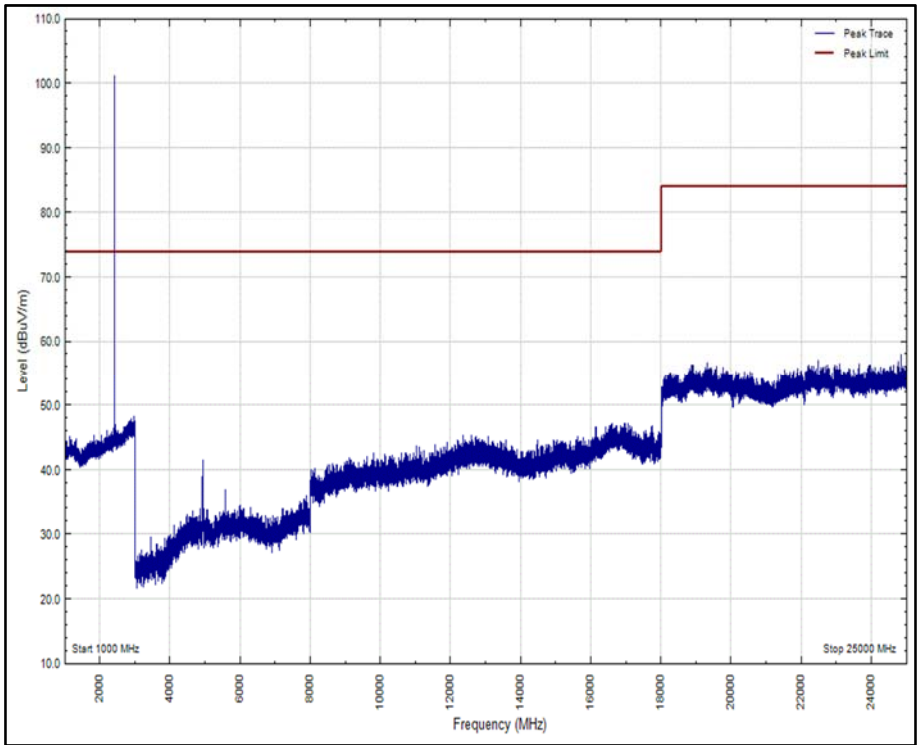

Figure 71 - 2402 MHz – 1 GHz to 25 GHz - Peak
Polarity: Vertical, EUT Orientation: Y

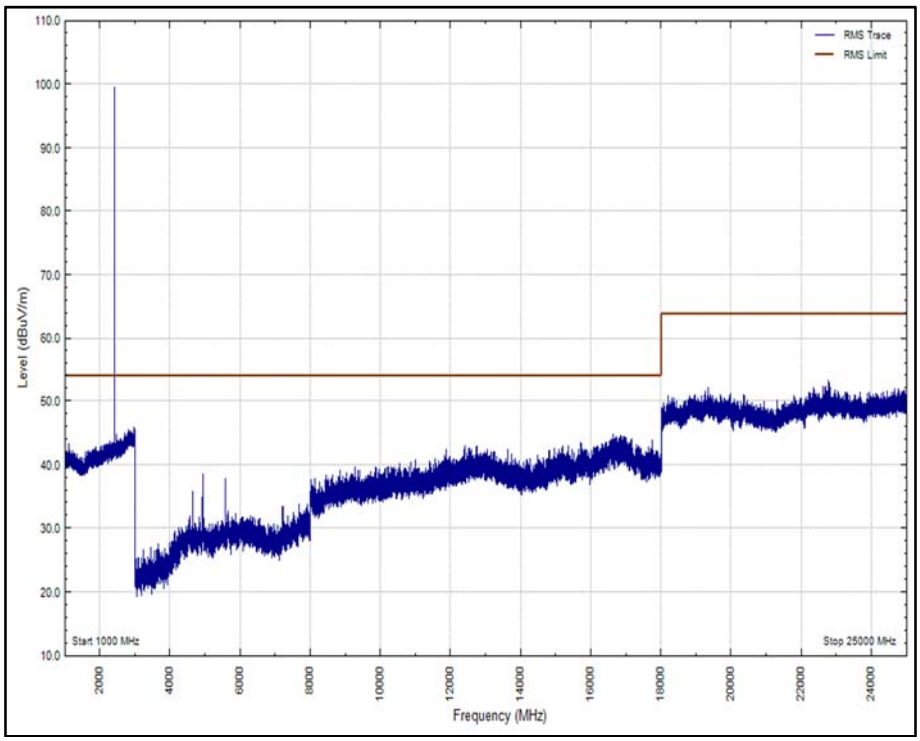

Figure 72- 2402 MHz – 1 GHz to 25 GHz - Average
Polarity: Vertical, EUT Orientation: Y

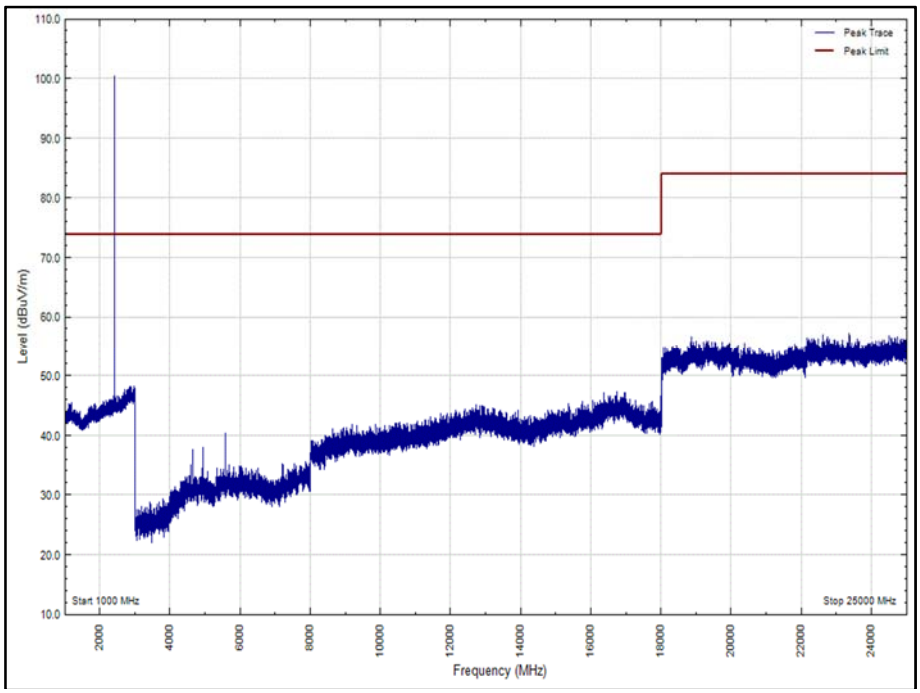

Figure 73 - 2402 MHz – 1 GHz to 25 GHz - Peak
Polarity: Horizontal, EUT Orientation: Z

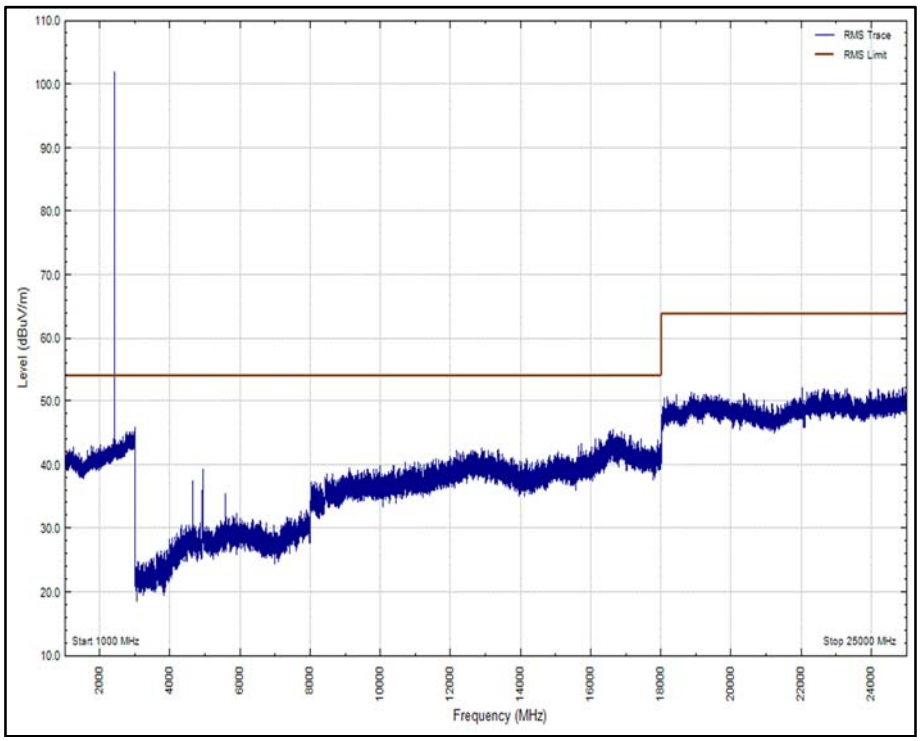

Figure 74 - 2402 MHz – 1 GHz to 25 GHz - Average
Polarity: Horizontal, EUT Orientation: Z

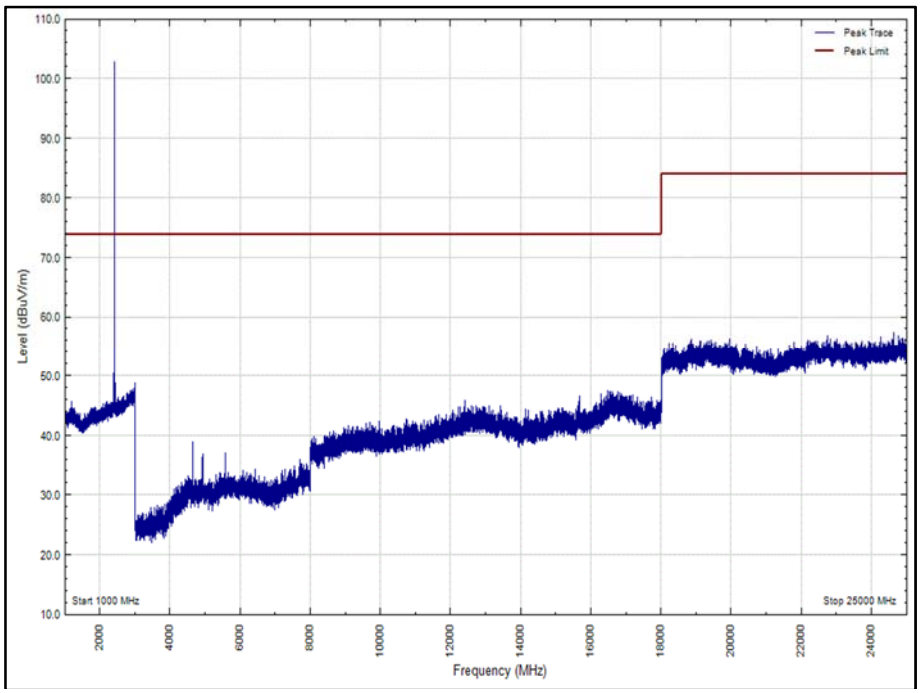

Figure 75 - 2402 MHz – 1 GHz to 25 GHz - Peak
Polarity: Vertical, EUT Orientation: Z

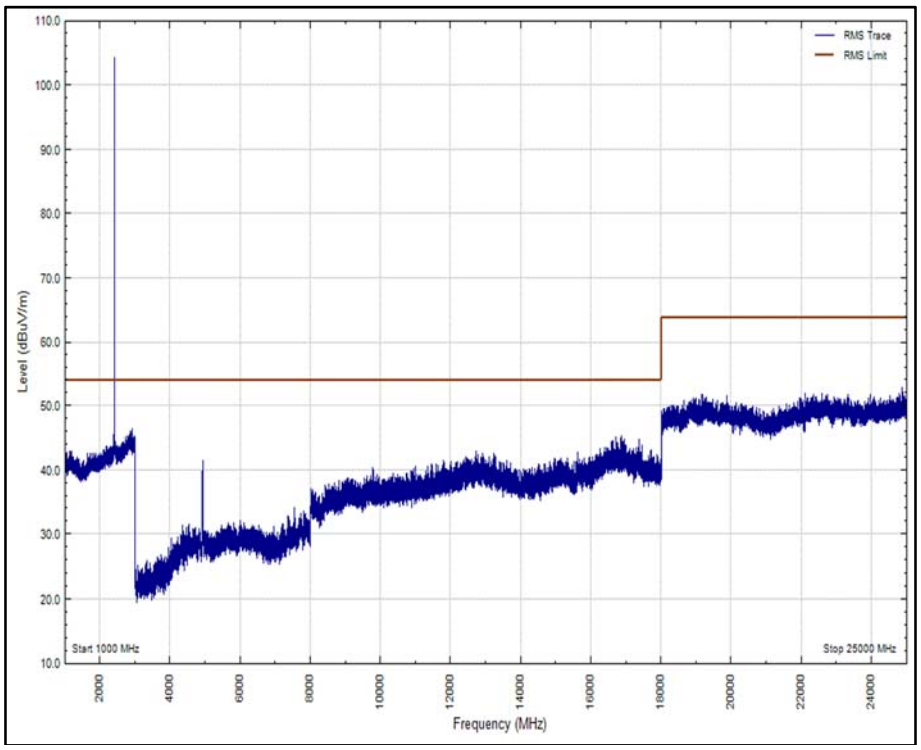

Figure 76- 2402 MHz – 1 GHz to 25 GHz - Average
Polarity: Vertical, EUT Orientation: Z

Frequency (GHz)	Result (dBµV/m)		Limit (dBµV/m)		Margin (dBµV/m)	
	Peak	Average	Peak	Average	Peak	Average
*						

Table 23 - 2440 MHz, 30 MHz to 1 GHz, Spurious Emissions Results

*No emissions were detected within 10 dB of the limit.

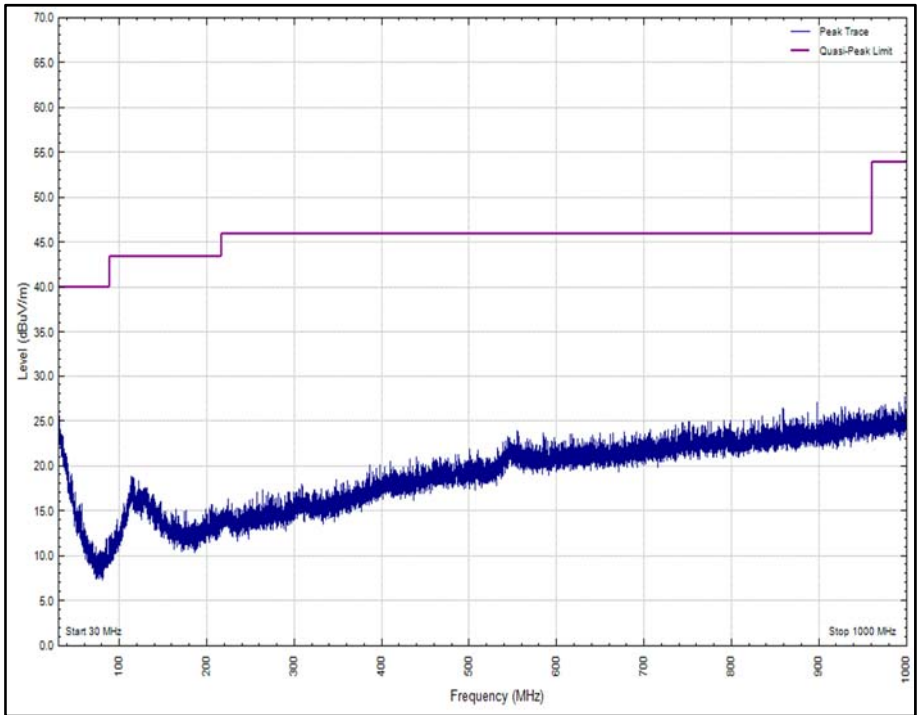

Figure 77 - 2440 MHz – 30 MHz to 1 GHz
Polarity: Horizontal, EUT Orientation: X

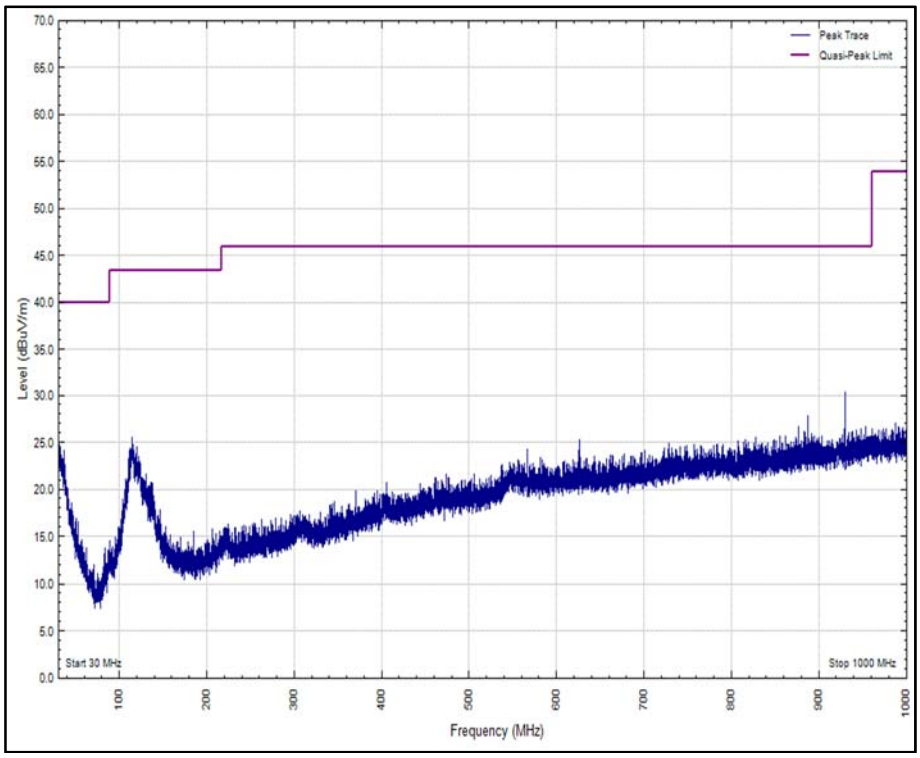

Figure 78 - 2440 MHz – 30 MHz to 1 GHz
Polarity: Vertical, EUT Orientation: X

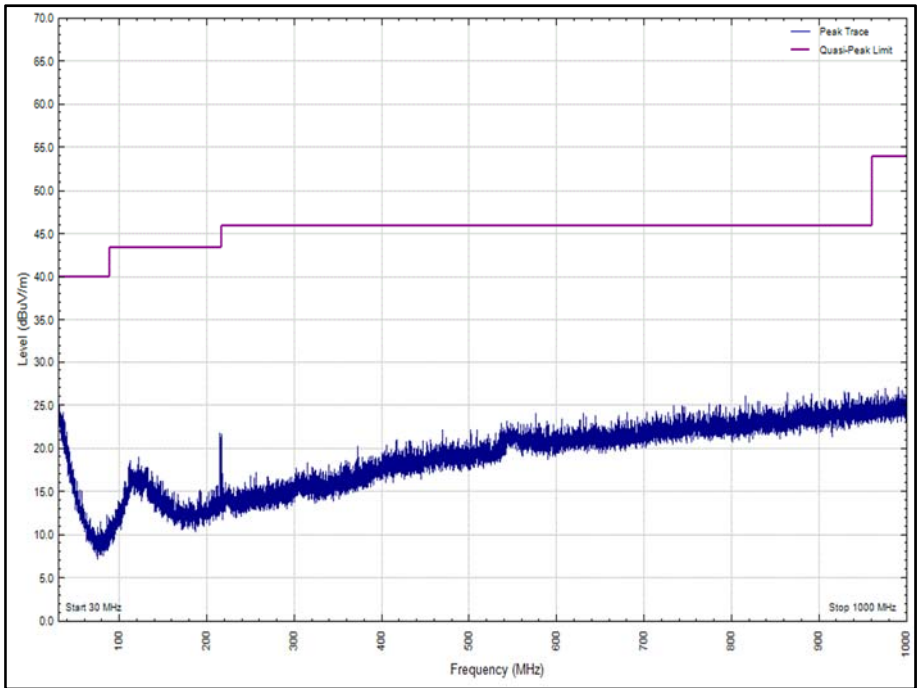

Figure 79 - 2440 MHz – 30 MHz to 1 GHz
Polarity: Horizontal, EUT Orientation: Y

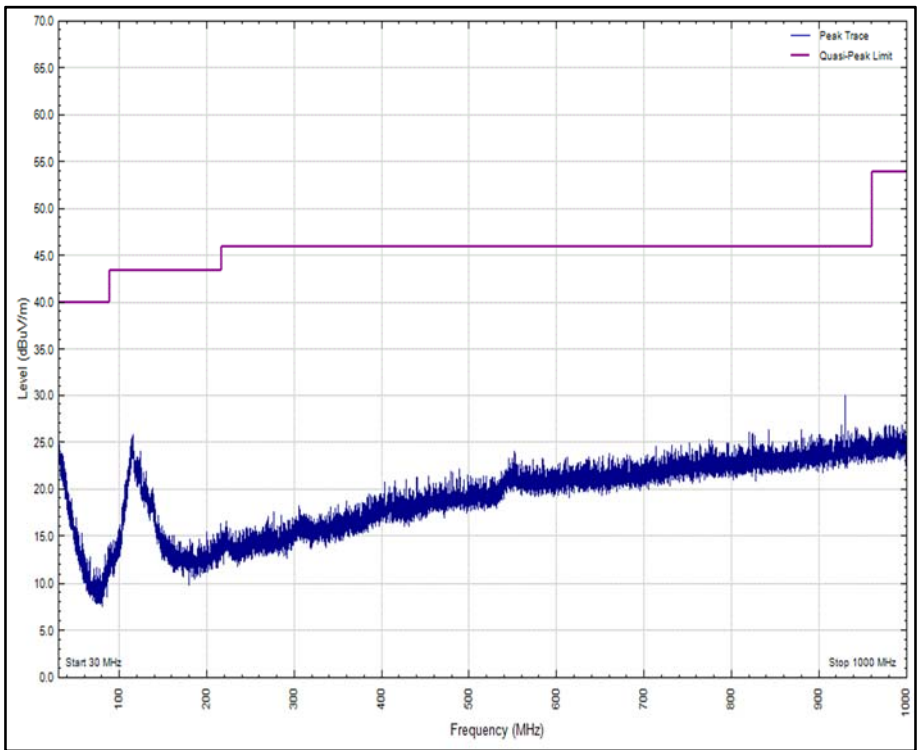

Figure 80 - 2440 MHz – 30 MHz to 1 GHz
Polarity: Vertical, EUT Orientation: Y

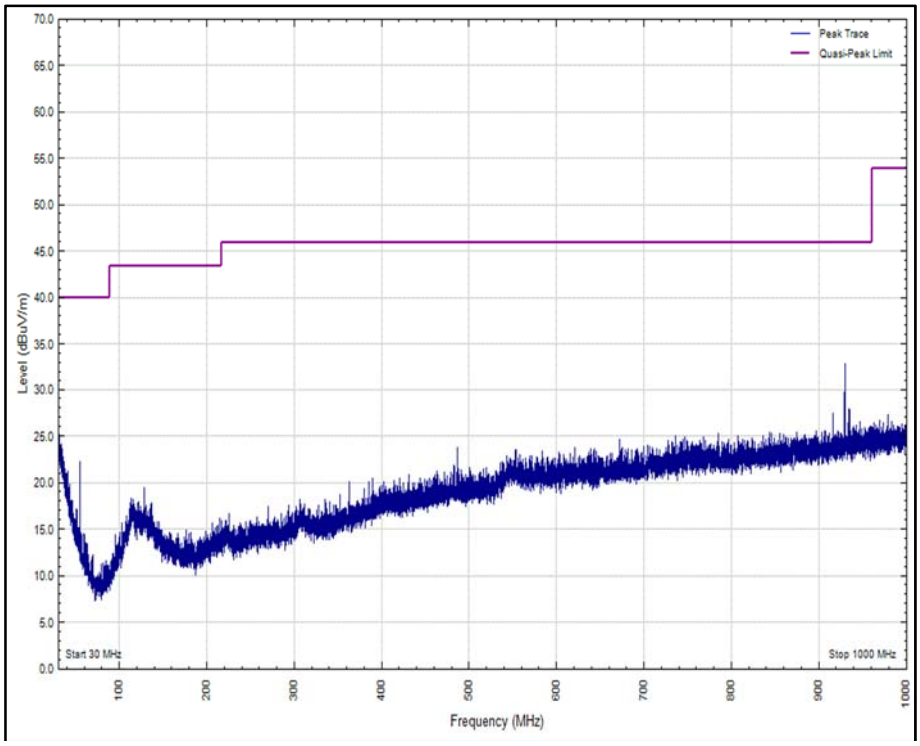

Figure 81 - 2440 MHz – 30 MHz to 1 GHz
Polarity: Horizontal, EUT Orientation: Z

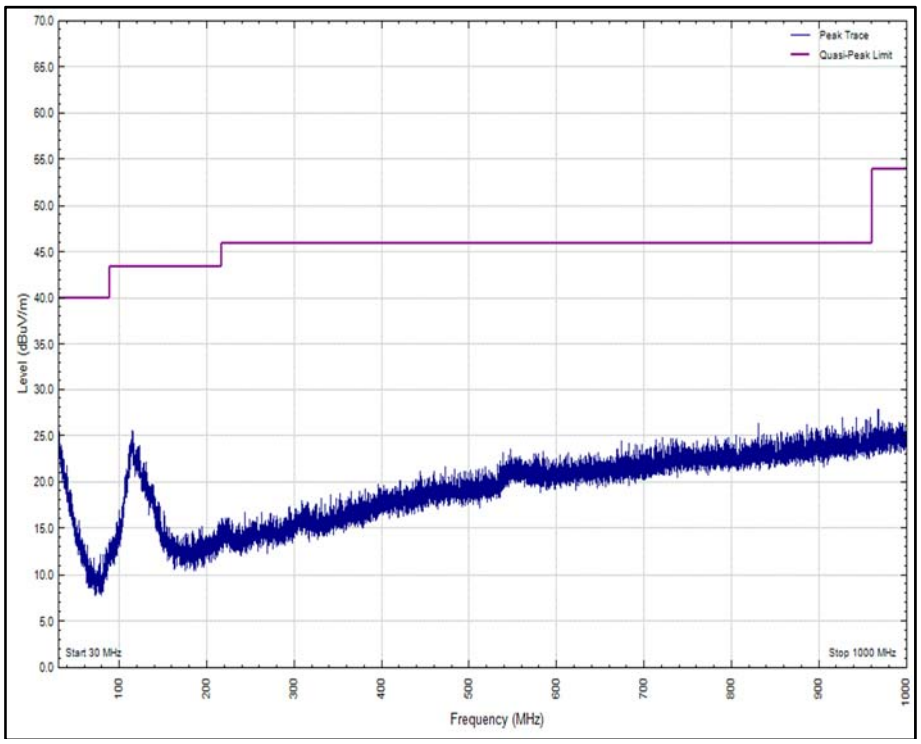

Figure 82 - 2440 MHz – 30 MHz to 1 GHz
Polarity: Vertical, EUT Orientation: Z

Frequency (GHz)	Result (dBµV/m)		Limit (dBµV/m)		Margin (dBµV/m)	
	Peak	Average	Peak	Average	Peak	Average
*						

Table 24 – 2440 MHz, 1 GHz to 25 GHz, Spurious Emissions Results

*No emissions were detected within 10 dB of the limit.

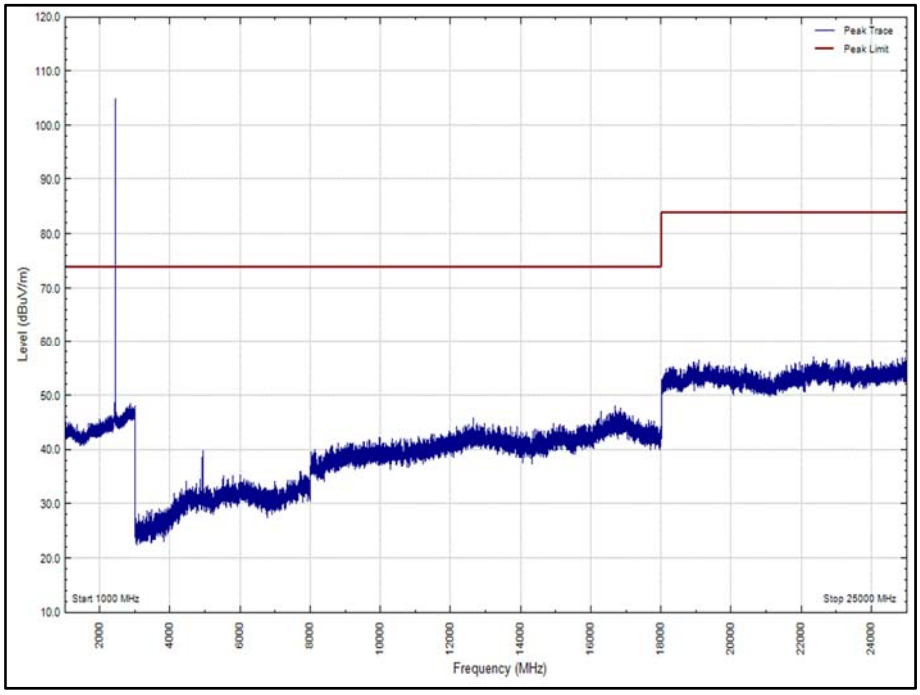

Figure 83 - 2440 MHz – 1 GHz to 25 GHz - Peak
Polarity: Horizontal, EUT Orientation: X

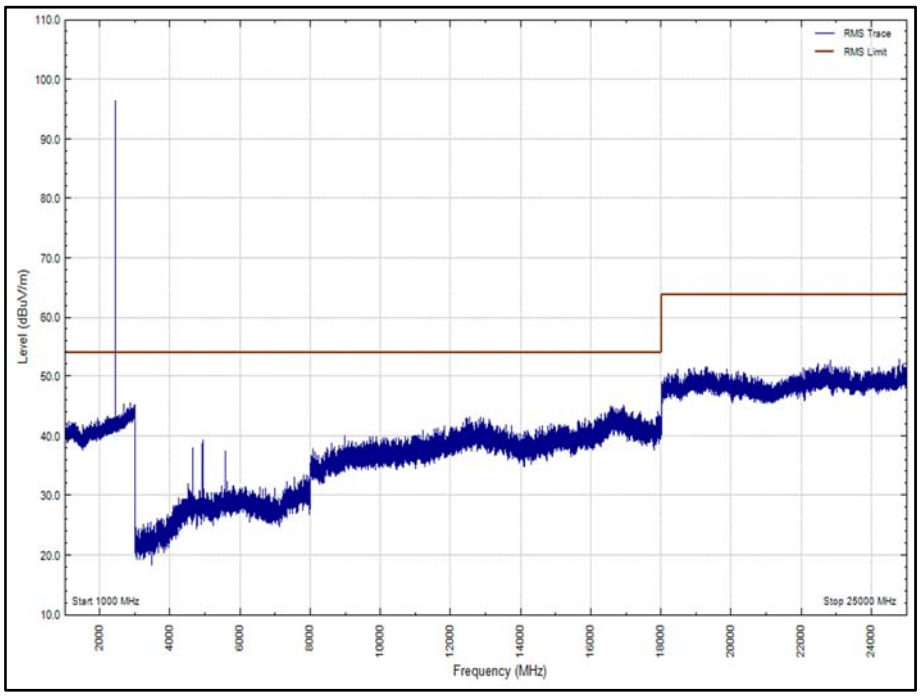

Figure 84 - 2440 MHz – 1 GHz to 25 GHz - Average
Polarity: Horizontal, EUT Orientation: X

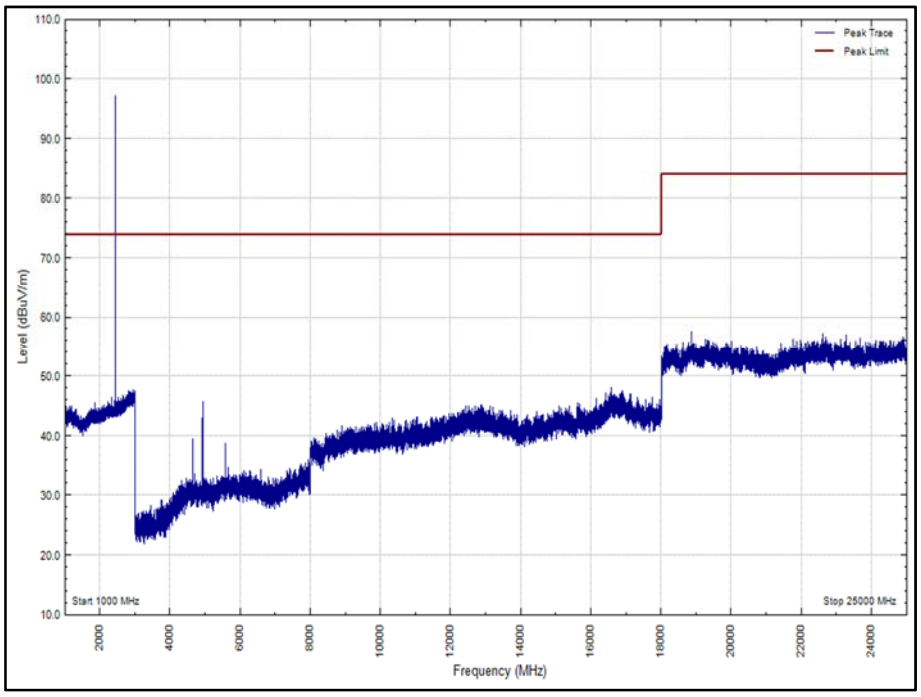

Figure 85- 2440 MHz – 1 GHz to 25 GHz - Peak
Polarity: Vertical, EUT Orientation: X

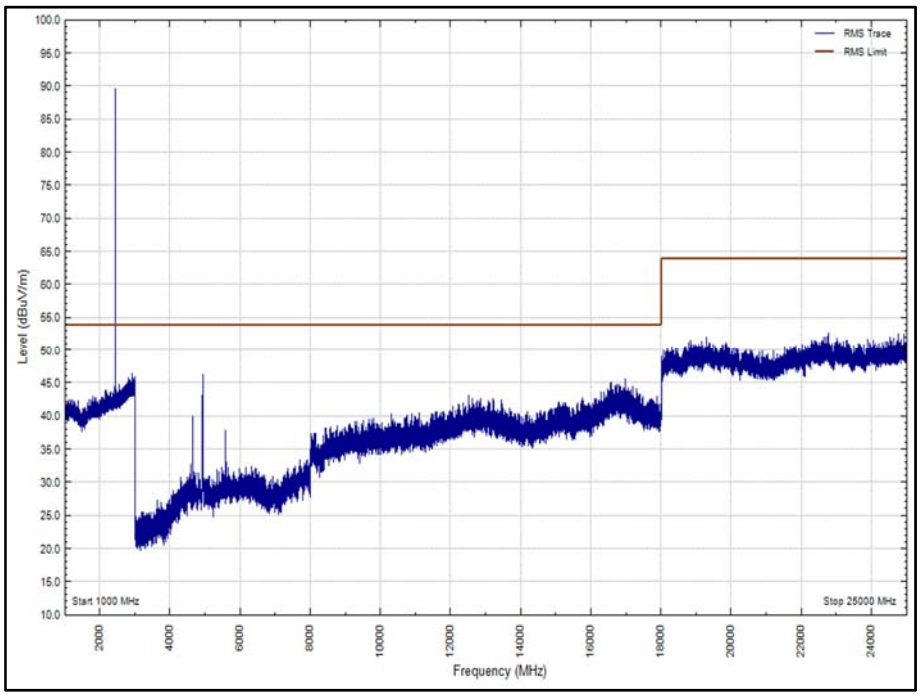

Figure 86 - 2440 MHz – 1 GHz to 25 GHz - Average
Polarity: Vertical, EUT Orientation: X

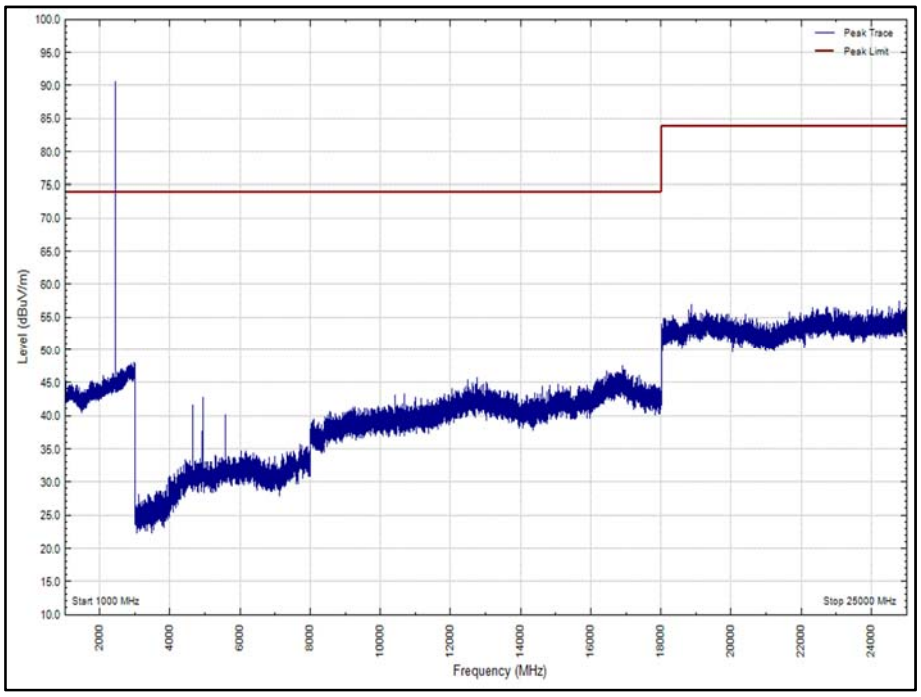

Figure 87 - 2440 MHz – 1 GHz to 25 GHz - Peak
Polarity: Horizontal, EUT Orientation: Y

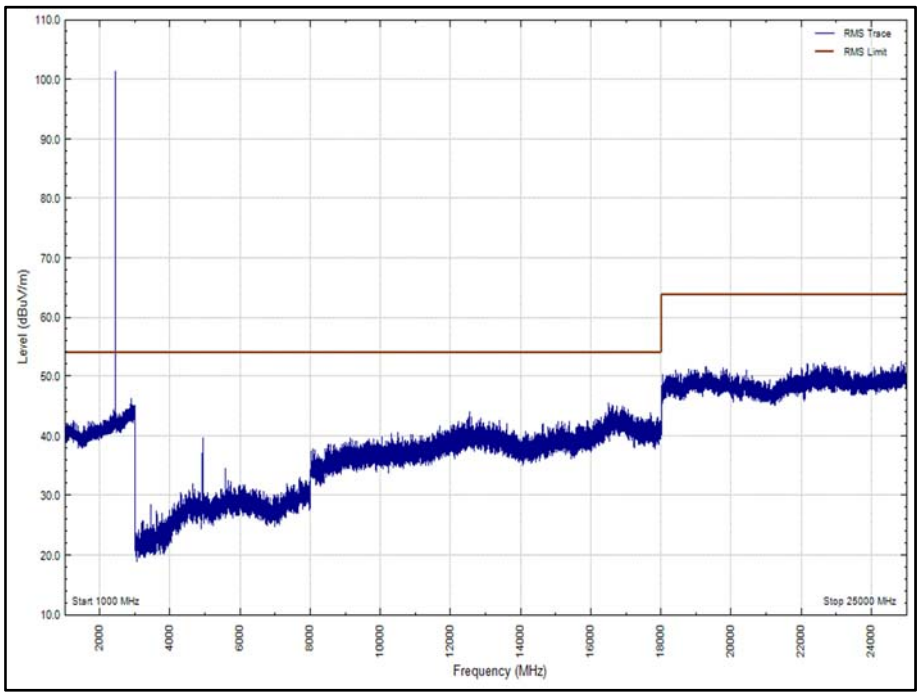

Figure 88- 2440 MHz – 1 GHz to 25 GHz - Average
Polarity: Horizontal, EUT Orientation: Y

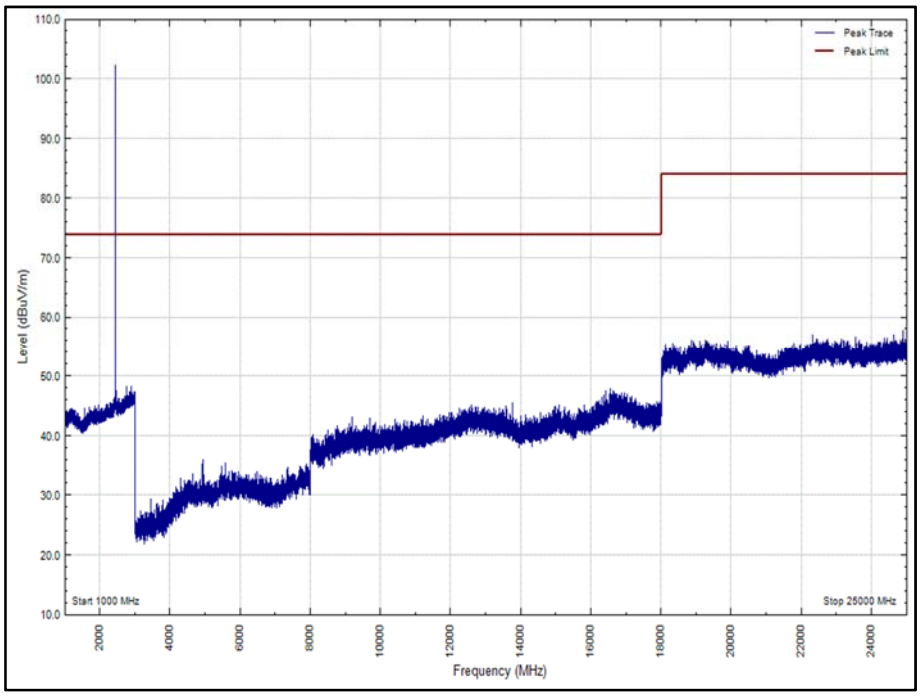

Figure 89 - 2440 MHz – 1 GHz to 25 GHz - Peak
Polarity: Vertical, EUT Orientation: Y

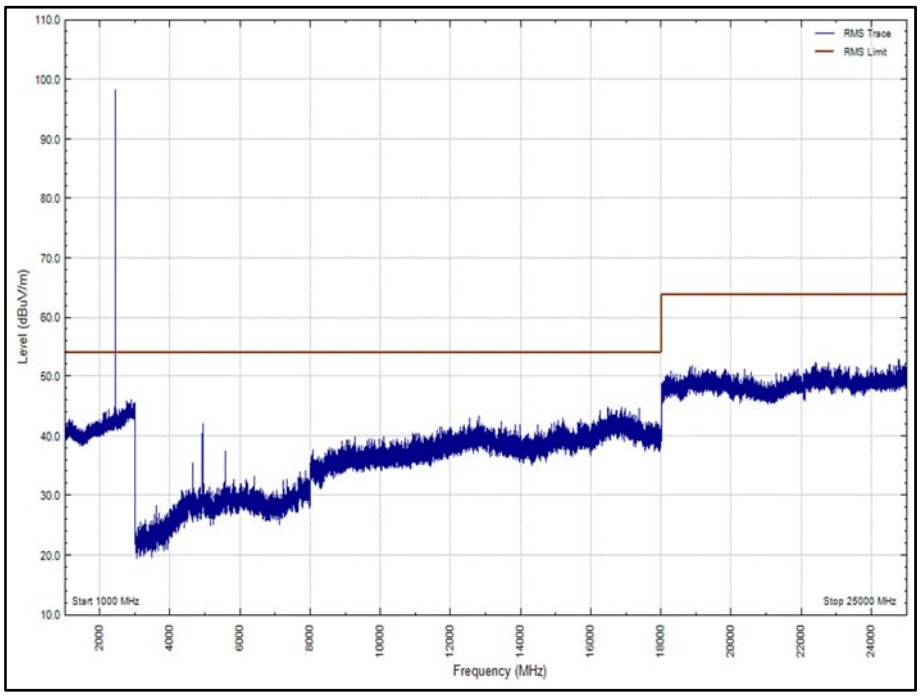

Figure 90- 2440 MHz – 1 GHz to 25 GHz - Average
Polarity: Vertical, EUT Orientation: Y

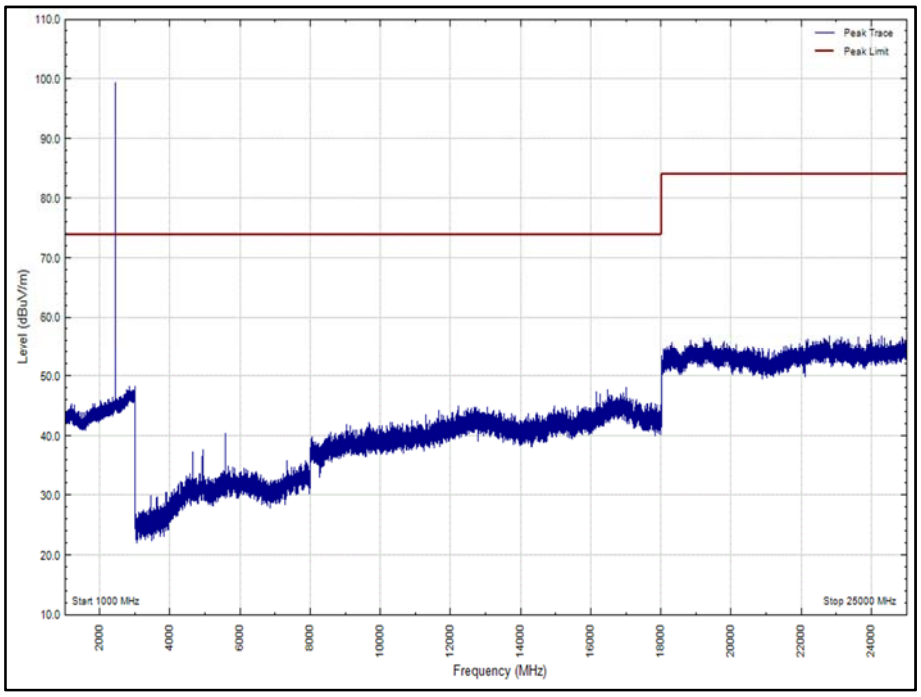

Figure 91 - 2440 MHz – 1 GHz to 25 GHz - Peak
Polarity: Horizontal, EUT Orientation: Z

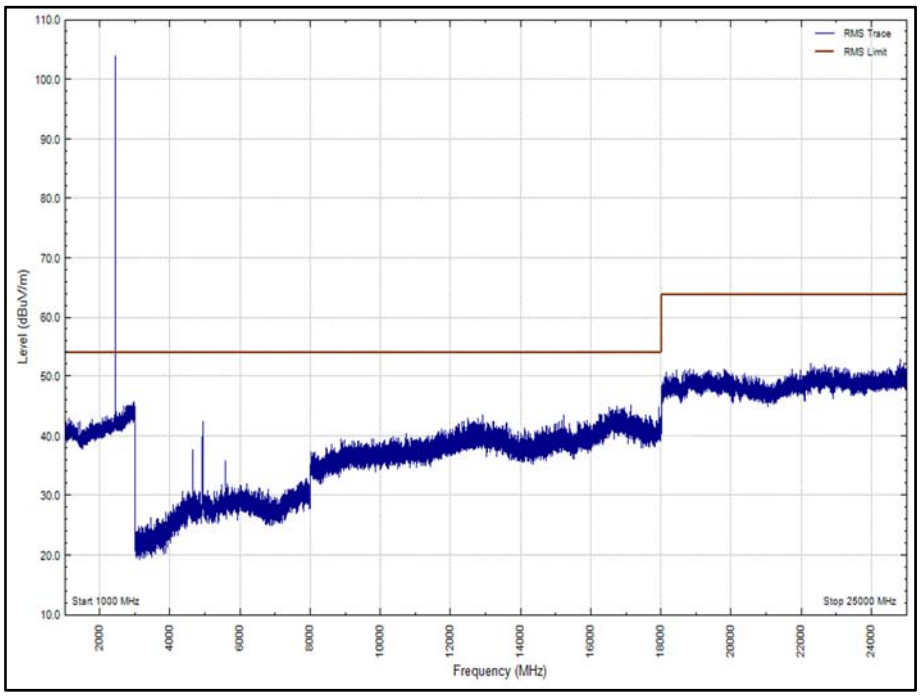

Figure 92- 2440 MHz – 1 GHz to 25 GHz - Average
Polarity: Horizontal, EUT Orientation: Z

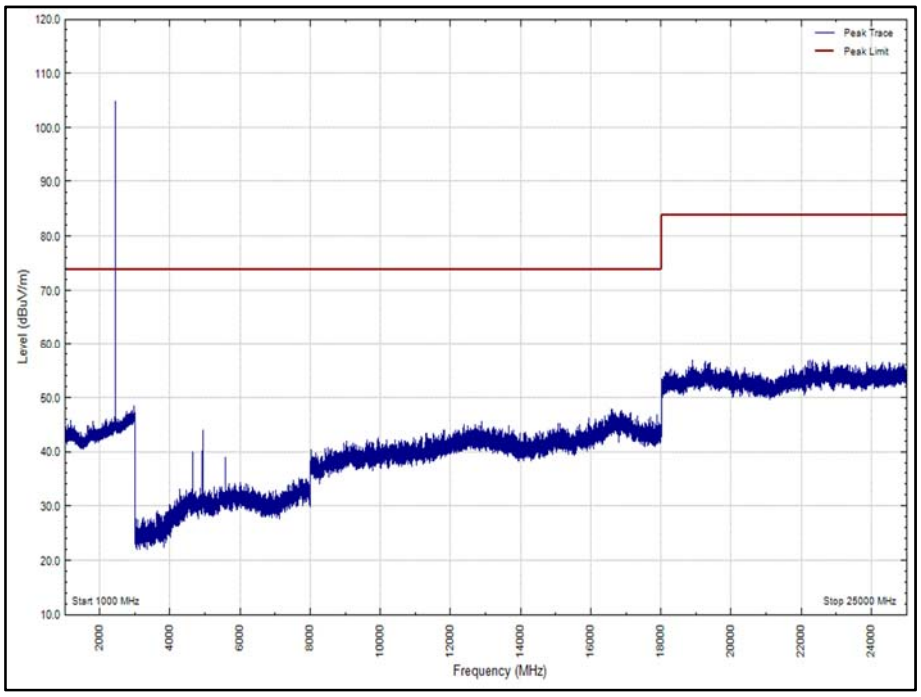

Figure 93 - 2440 MHz – 1 GHz to 25 GHz - Peak
Polarity: Vertical, EUT Orientation: Z

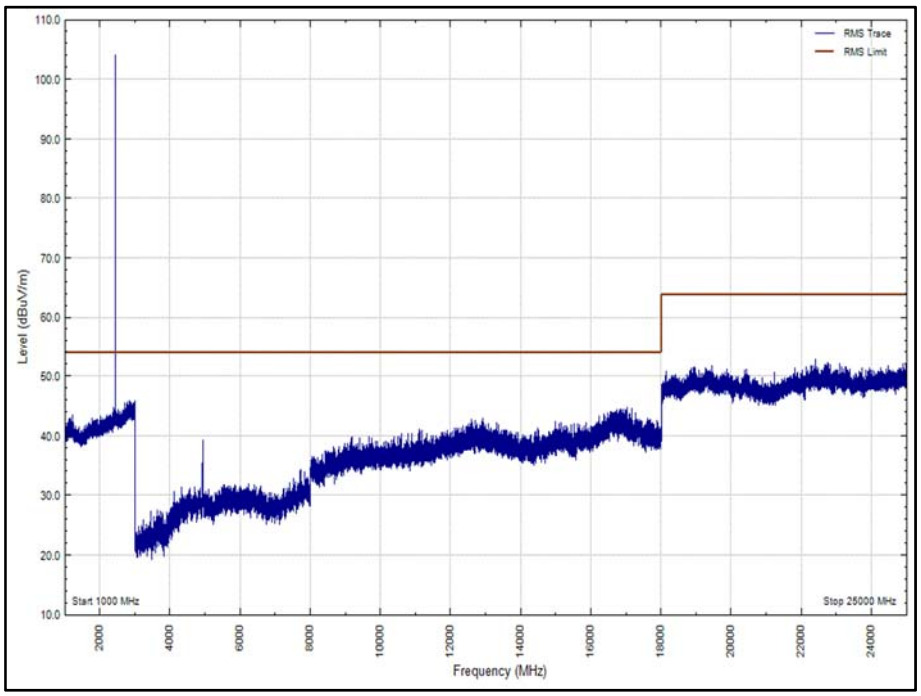

Figure 94- 2440 MHz – 1 GHz to 25 GHz - Average
Polarity: Vertical, EUT Orientation: Z

Frequency (GHz)	Result (dBµV/m)		Limit (dBµV/m)		Margin (dBµV/m)	
	Peak		Peak		Peak	
*						

Table 25 - 2480 MHz, 30 MHz to 1 GHz, Spurious Emissions Results

*No emissions were detected within 10 dB of the limit.

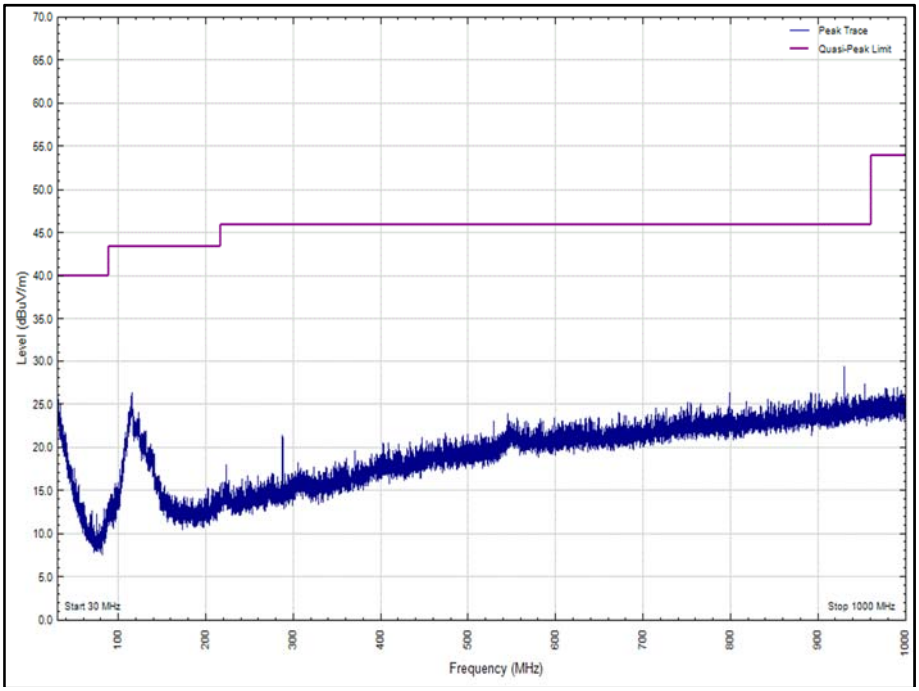

Figure 95 - 2480 MHz – 30 MHz to 1 GHz
Polarity: Horizontal, EUT Orientation: X

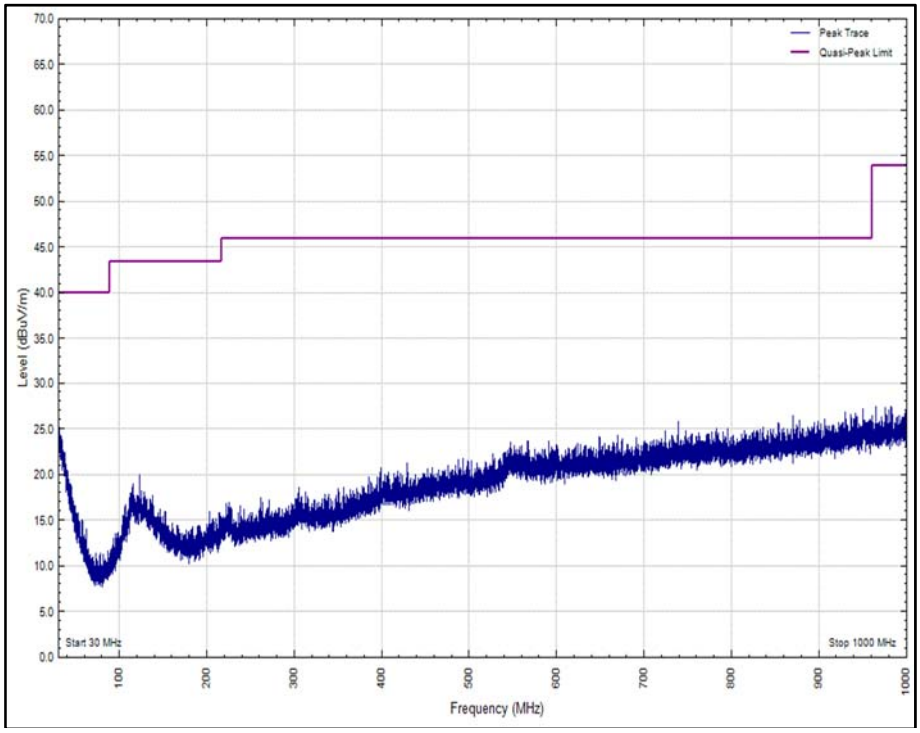

Figure 96 - 2480 MHz – 30 MHz to 1 GHz
Polarity: Vertical, EUT Orientation: X

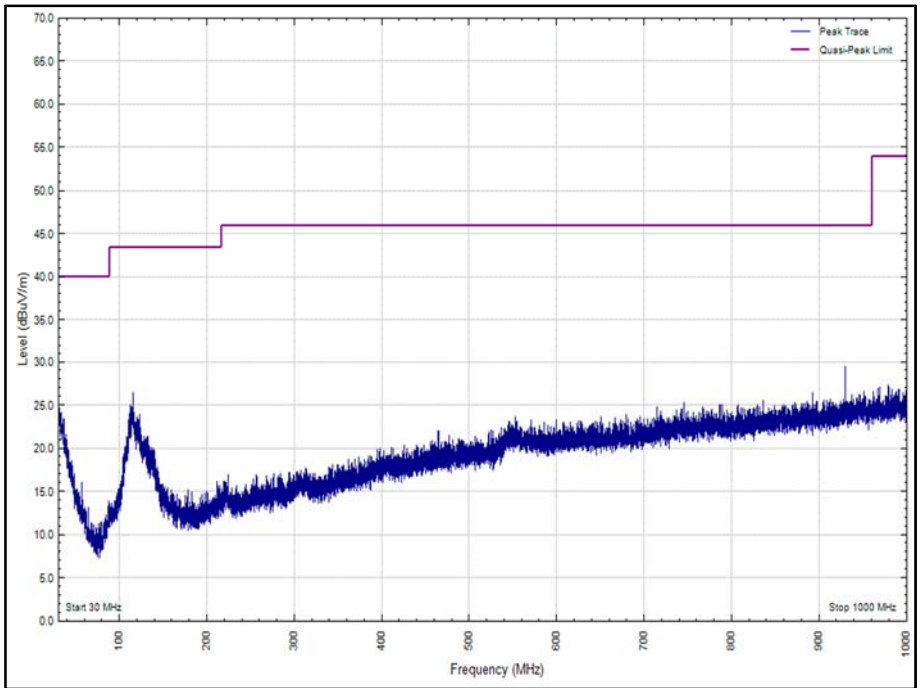

Figure 97 - 2480 MHz – 30 MHz to 1 GHz
Polarity: Horizontal, EUT Orientation: Y

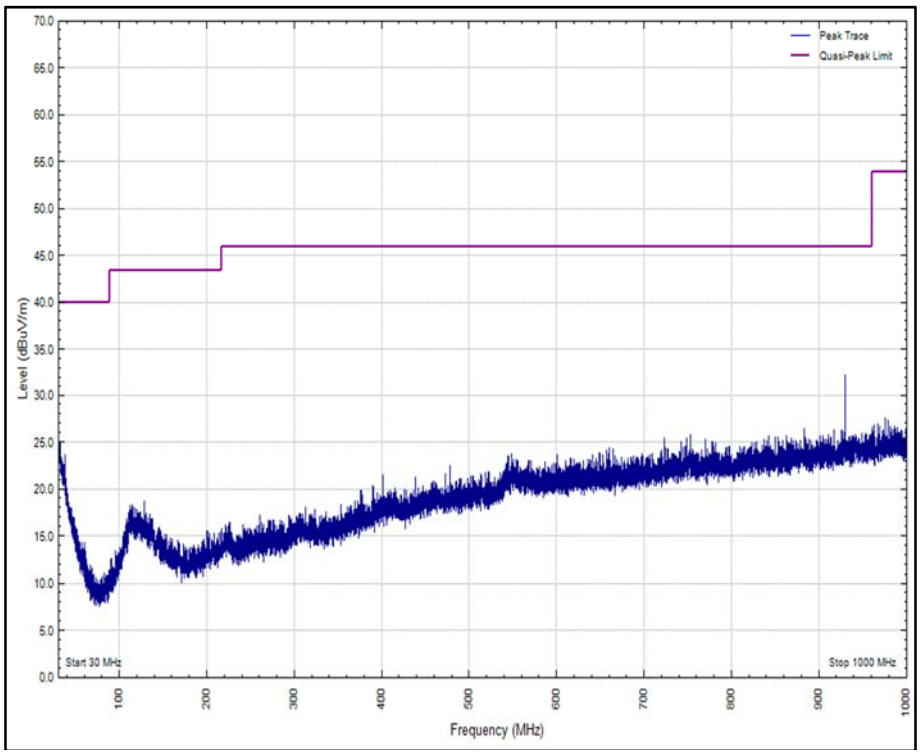

Figure 98 - 2480 MHz – 30 MHz to 1 GHz
Polarity: Vertical, EUT Orientation: Y

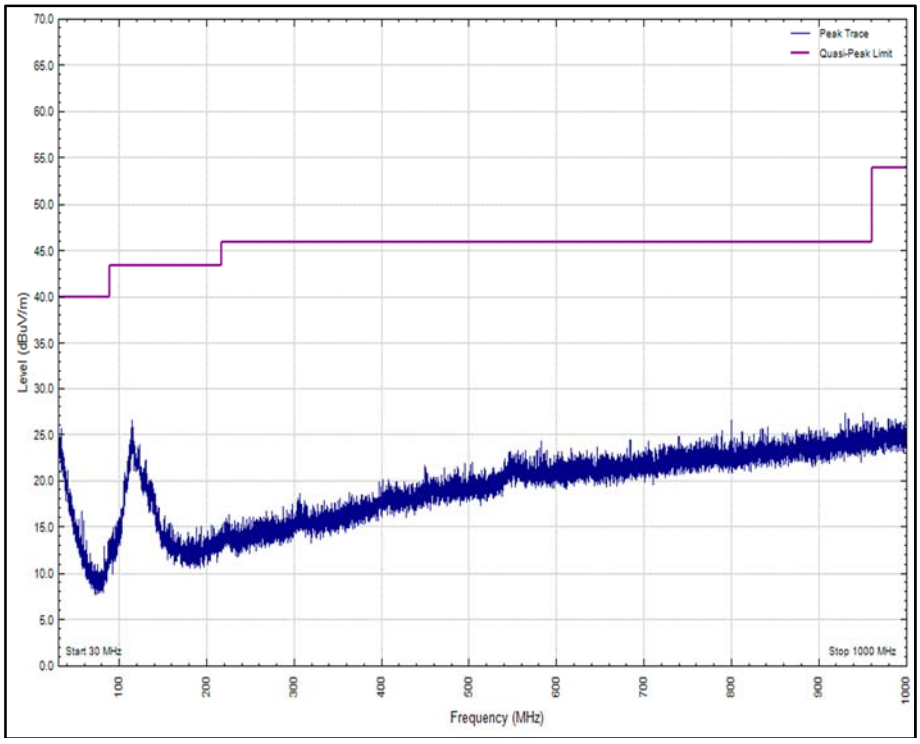

Figure 99 - 2480 MHz – 30 MHz to 1 GHz
Polarity: Horizontal, EUT Orientation: Z

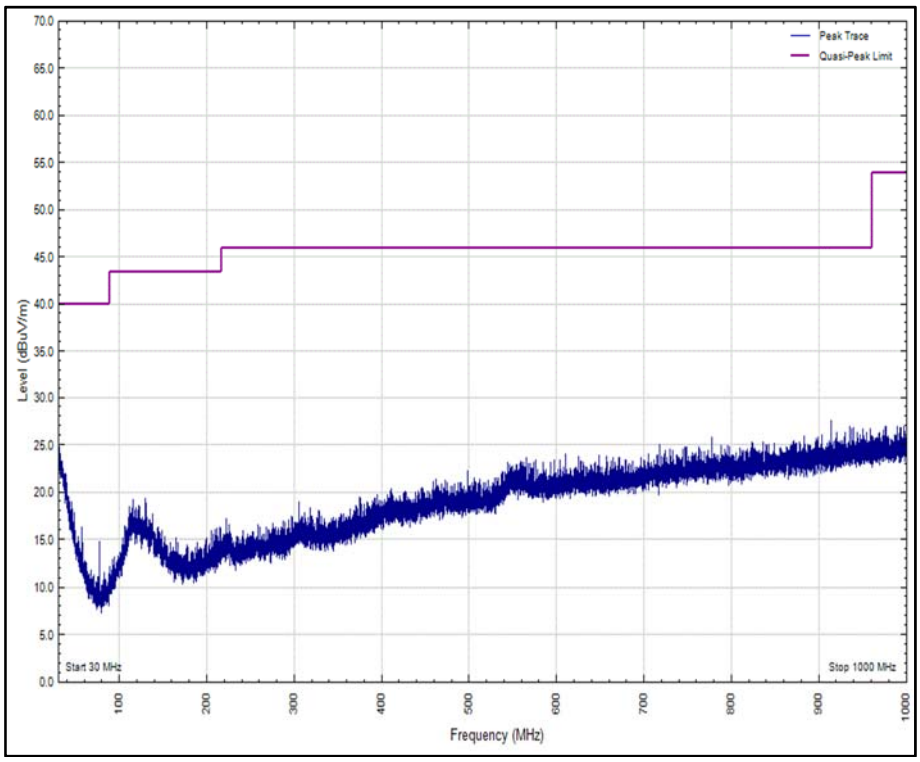

Figure 64 - 2480 MHz – 30 MHz to 1 GHz
Polarity: Vertical, EUT Orientation: Z

Frequency (GHz)	Result (dBµV/m)		Limit (dBµV/m)		Margin (dBµV/m)	
	Peak	Average	Peak	Average	Peak	Average
*						

Table 26 – 2480 MHz, 1 GHz to 25 GHz, Spurious Emissions Results

*No emissions were detected within 10 dB of the limit.

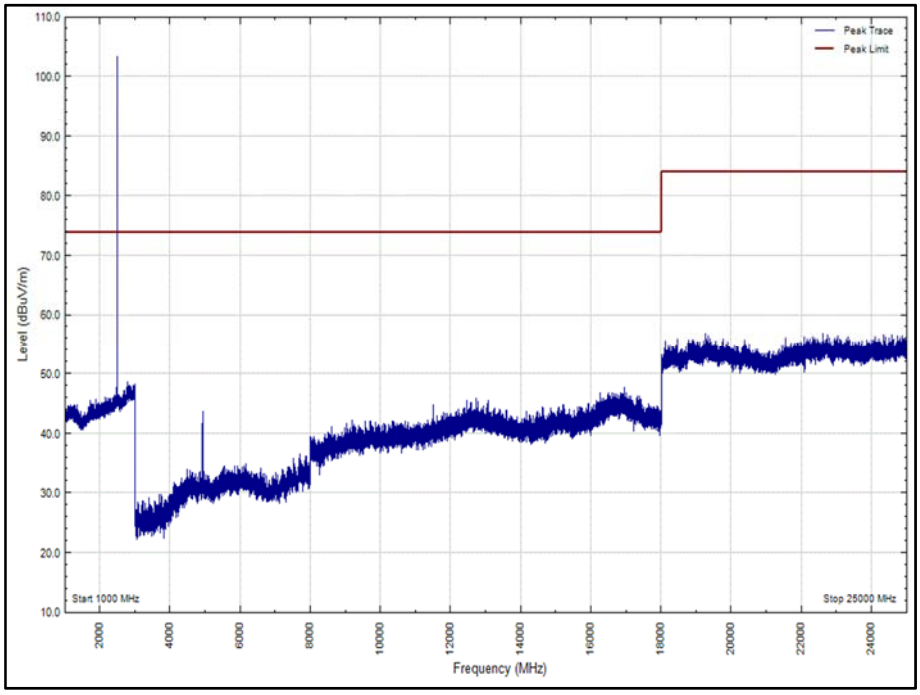

Figure 100 - 2480 MHz – 1 GHz to 25 GHz - Peak
Polarity: Horizontal, EUT Orientation: X

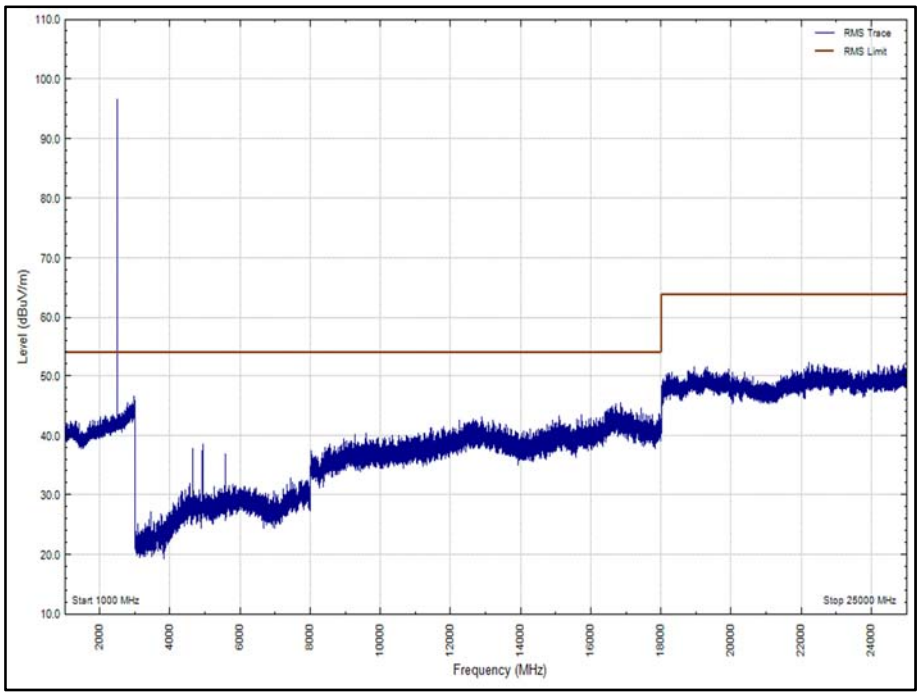

Figure 101 - 2480 MHz – 1 GHz to 25 GHz - Average
Polarity: Horizontal, EUT Orientation: X

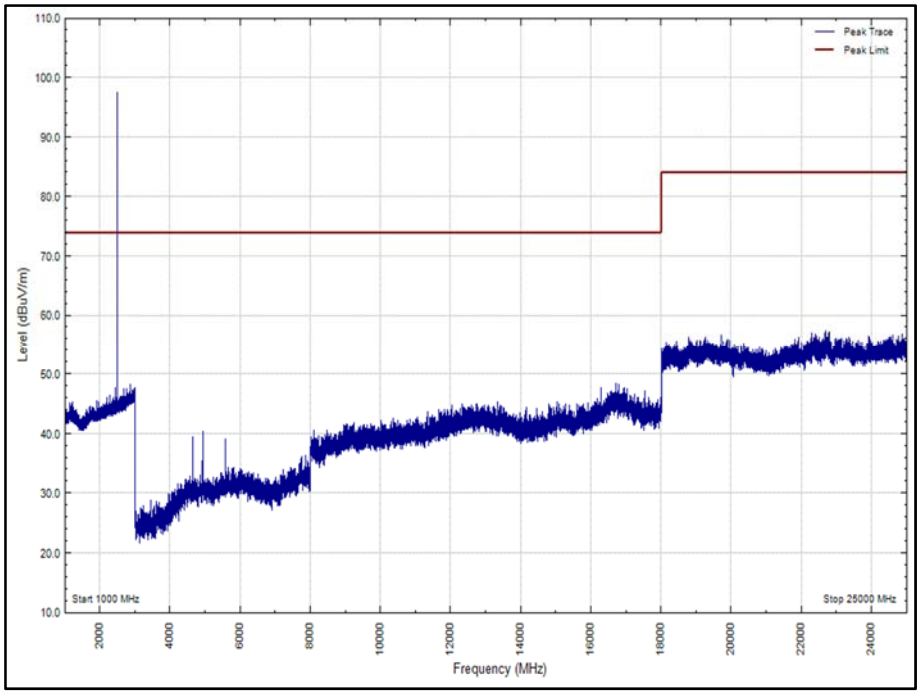

Figure 102- 2480 MHz – 1 GHz to 25 GHz - Peak
Polarity: Vertical, EUT Orientation: X

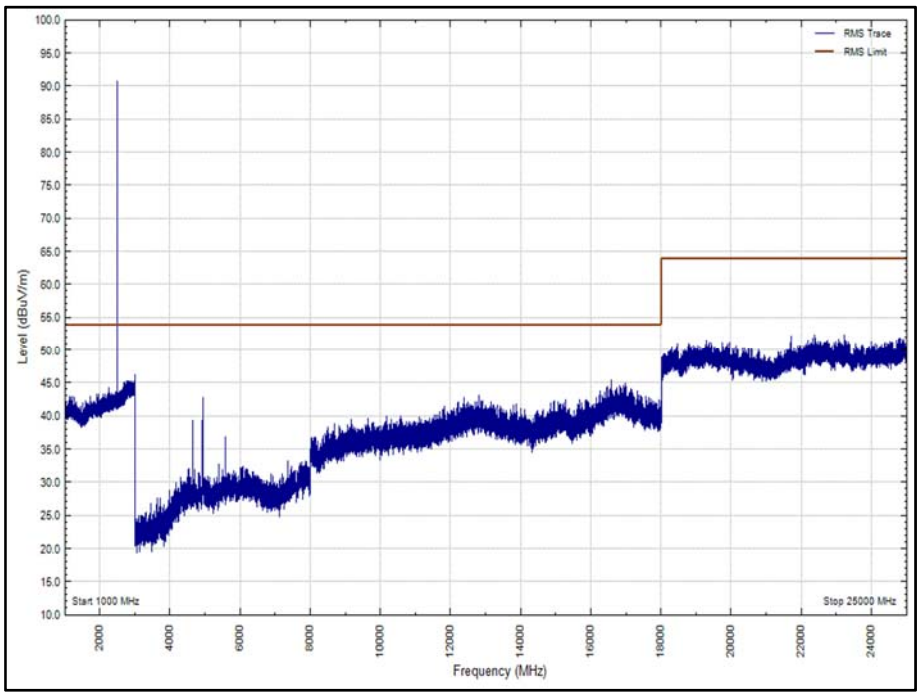

Figure 103 - 2480 MHz – 1 GHz to 25 GHz - Average
Polarity: Vertical, EUT Orientation: X

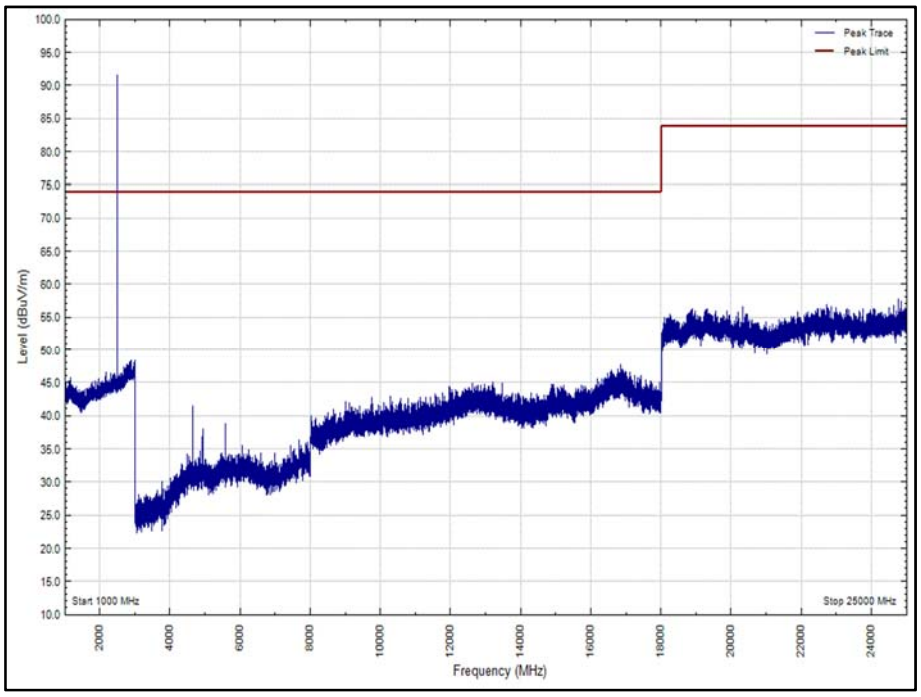

Figure 104 - 2480 MHz – 1 GHz to 25 GHz - Peak
Polarity: Horizontal, EUT Orientation: Y

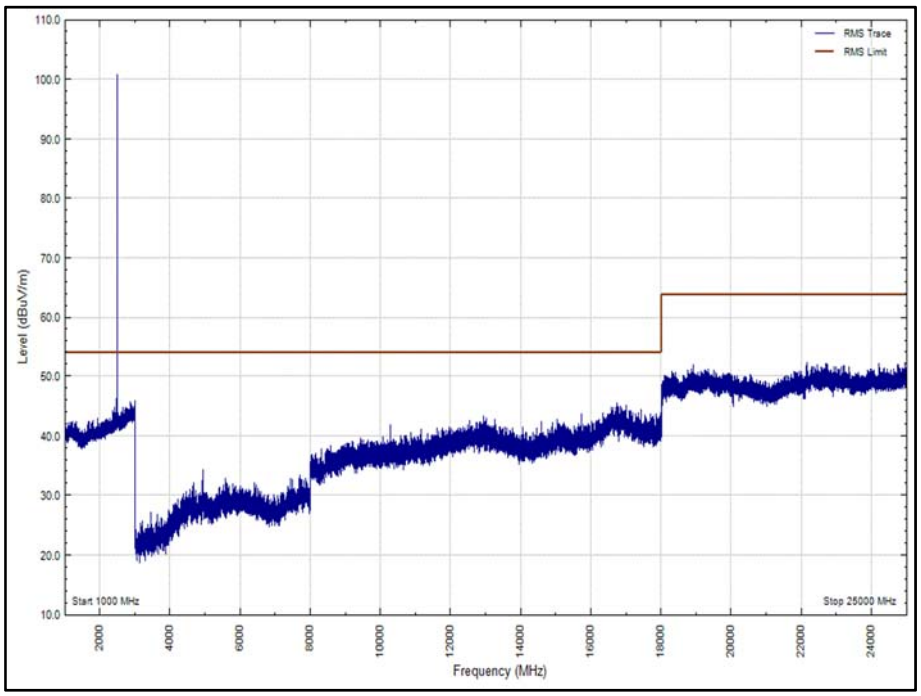

Figure 105- 2480 MHz – 1 GHz to 25 GHz - Average
Polarity: Horizontal, EUT Orientation: Y

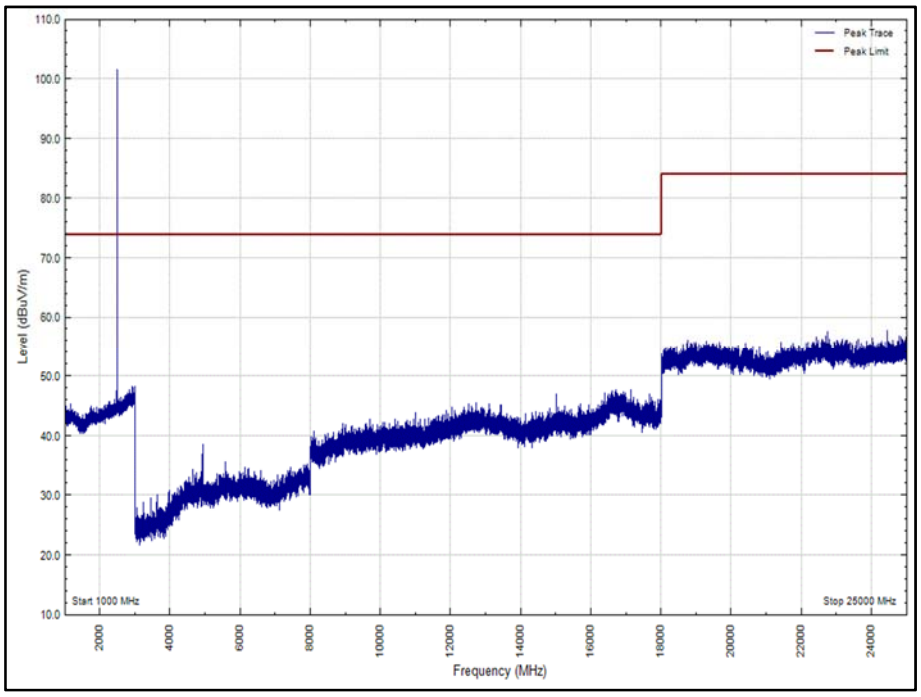

Figure 106 - 2440 MHz – 1 GHz to 25 GHz - Peak
Polarity: Vertical, EUT Orientation: Y

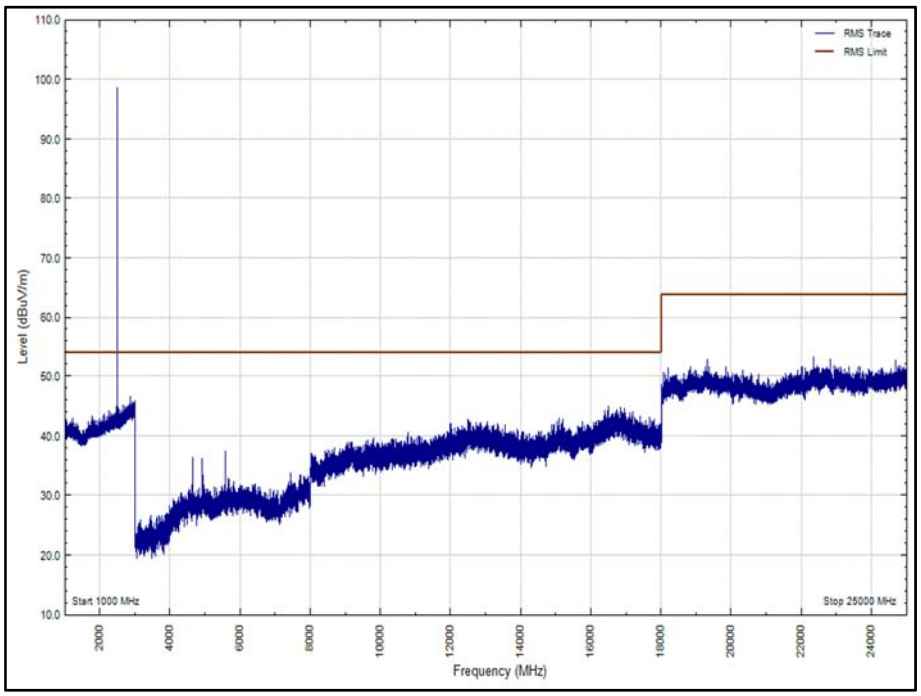

Figure 107- 2480 MHz – 1 GHz to 25 GHz - Average
Polarity: Vertical, EUT Orientation: Y

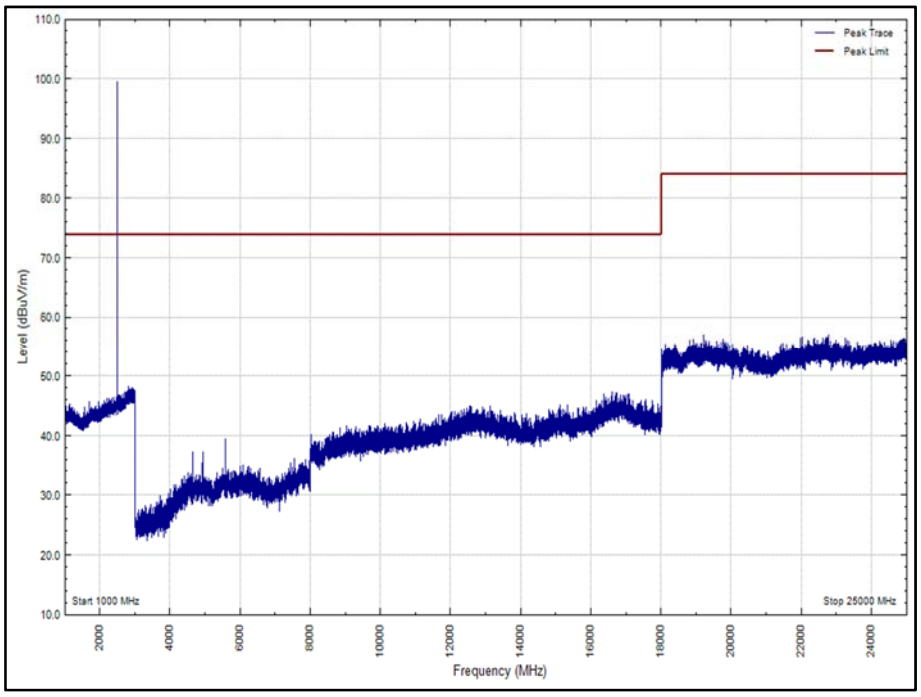

Figure 108 - 2480 MHz – 1 GHz to 25 GHz - Peak
Polarity: Horizontal, EUT Orientation: Z

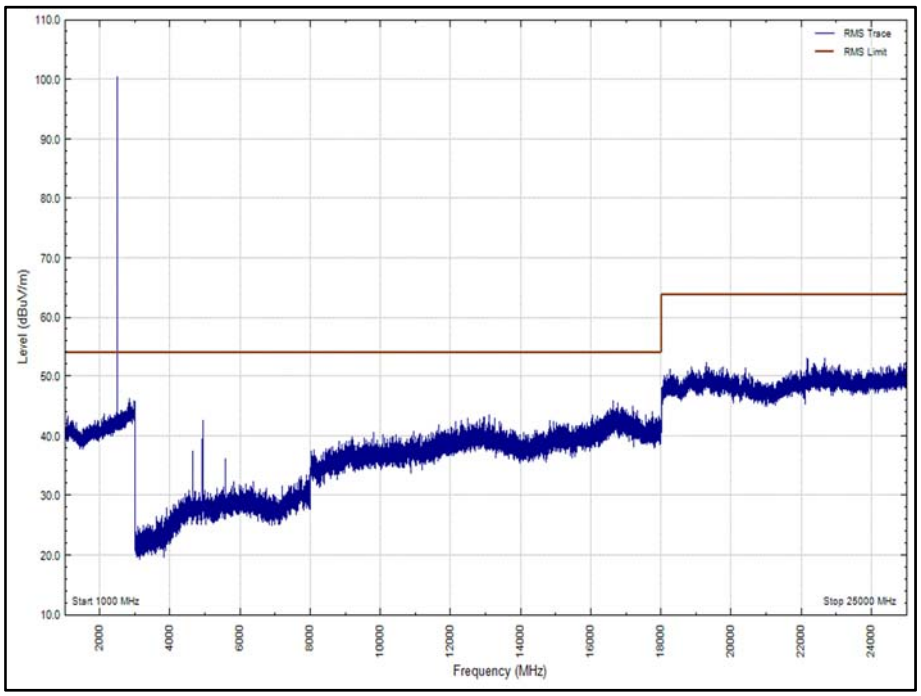

Figure 109- 2440 MHz – 1 GHz to 25 GHz - Average
Polarity: Horizontal, EUT Orientation: Z

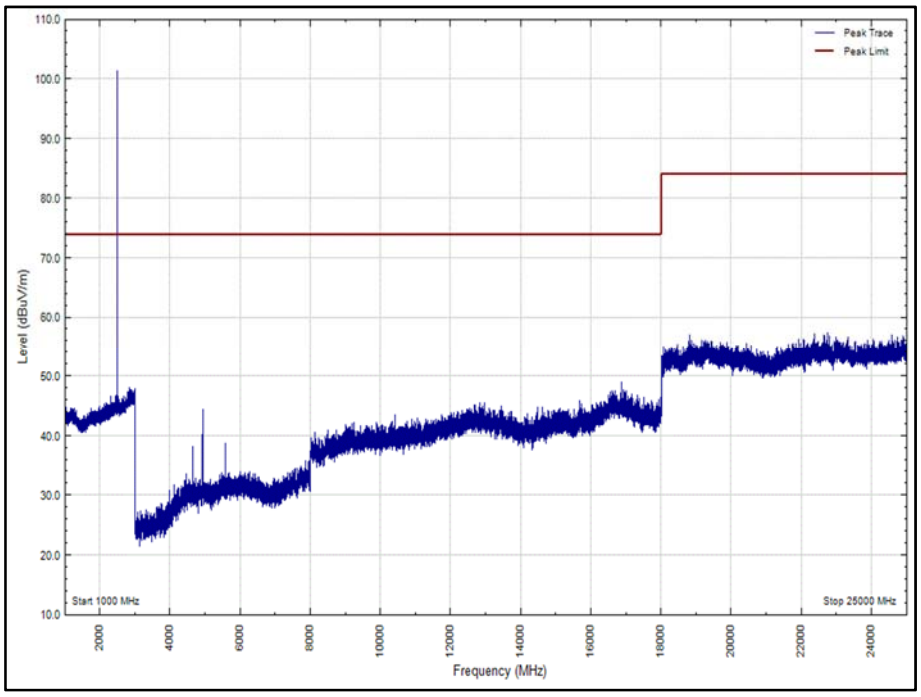

Figure 110 - 2480 MHz – 1 GHz to 25 GHz - Peak
Polarity: Vertical, EUT Orientation: Z

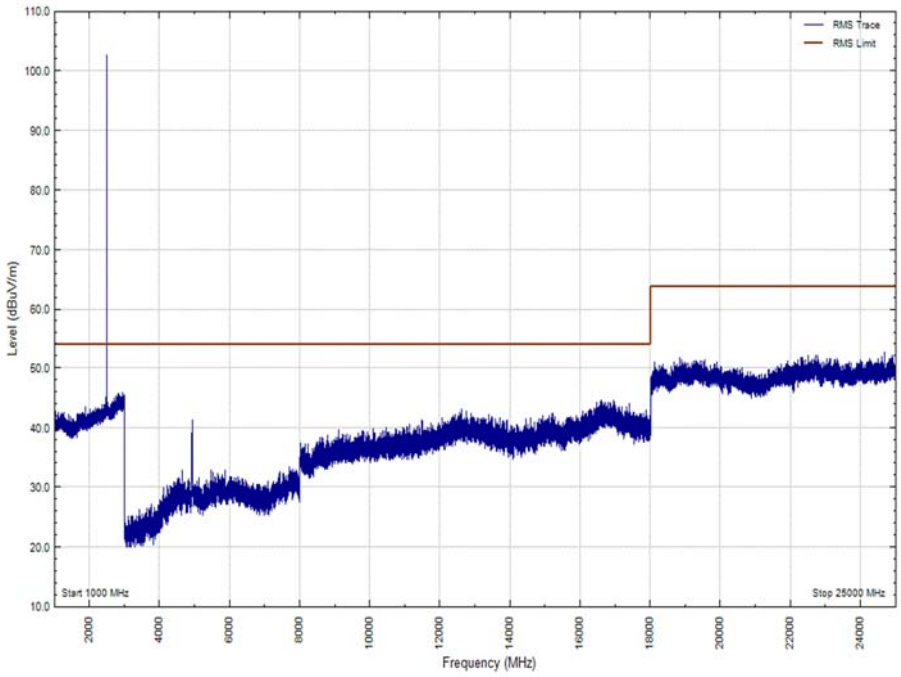

Figure 111- 2480 MHz – 1 GHz to 25 GHz - Average
Polarity: Vertical, EUT Orientation: Z

2.9.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Antenna (Bilog)	Schaffner	CBL6143	287	24	18-Apr-2018
Pre-Amplifier	Phase One	PS04-0086	1533	12	12-Jan-2019
Screened Room (5)	Rainford	Rainford	1545	36	9-Jun-2018
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygromer	Rotronic	A1	2138	12	21-Feb-2019
Multimeter	Iso-tech	IDM101	2417	12	2-Oct-2018
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	12	2-May-2018
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	22-Nov-2018
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	Maturo Gmbh	NCD	3917	-	TU
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	18-Oct-2018
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	22-May-2018
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	6	15-Aug-2018
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	22-May-2018
Cable (Rx, SMAm-SMAm 0.5m)	Scott Cables	SLSLL18-SMSM-00.50M	4528	6	15-Aug-2018
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	1-Mar-2019
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	12-Feb-2019
N to N cable, 4m	Rhophase	2303-002-TUVS	4849	12	18-Dec-2018

Table 27

TU – Traceability Unscheduled

3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
AC Power Line Conducted Emissions	150 kHz to 30 MHz, LISN, ±3.7 dB
Maximum Conducted Output Power	± 0.96 dB
Frequency Hopping Systems – Average Time of Occupancy	-
Frequency Hopping Systems – Channel Separation	± 30.43 kHz
Frequency Hopping Systems – Number of Hopping Channels	-
Frequency Hopping Systems – 20 dB Bandwidth	± 30.43 kHz
Authorised Band Edges	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB
Restricted Band Edges	Radiated: 30 MHz to 1 GHz: ± 5.1 dB Radiated: 1 GHz to 40 GHz: ± 6.3 dB
Spurious Radiated Emissions	Radiated: 30 MHz to 1 GHz: ± 5.1 dB Radiated: 1 GHz to 40 GHz: ± 6.3 dB

Table 28