

Report on the FCC Testing of the Monica Healthcare Ltd Novii Pod. Model: Novii System Pod In accordance with FCC 47 CFR Part 15C

Prepared for: Monica Healthcare Ltd
Interchange 25 business Park
Unit 8
Bostocks lane
Nottingham
NG10 5QG
United Kingdom

FCC ID: YOM-6960-MON



Product Service

**Choose certainty.
Add value.**

COMMERCIAL-IN-CONFIDENCE

Date: December 2017

Document Number: 75941097-02 | Issue: 02

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Clare Wright	14 December 2017	
Authorised Signatory	Matthew Russell	14 December 2017	

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. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Graeme Lawler	14 December 2017	
Testing	Jack Tuckwell	14 December 2017	

FCC Accreditation

90987 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: 2016.



DISCLAIMER AND COPYRIGHT

This non-binding report has been prepared by TÜV SÜD Product Service with all reasonable skill and care. The document is confidential to the potential Client and TÜV SÜD Product Service. No part of this document may be reproduced without the prior written approval of TÜV SÜD Product Service. © 2017 TÜV SÜD Product Service.

ACCREDITATION

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation. Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

TÜV SÜD Product Service
is a trading name of TÜV SÜD Ltd
Registered in Scotland at East Kilbride,
Glasgow G75 0QF, United Kingdom
Registered number: SC215164

TÜV SÜD Ltd is a
TÜV SÜD Group Company

Phone: +44 (0) 1489 558100
Fax: +44 (0) 1489 558101
www.tuv-sud.co.uk

TÜV SÜD Product Service
Octagon House
Concorde Way
Fareham
Hampshire PO15 5RL
United Kingdom



Contents

1	Report Summary	2
1.1	Report Modification Record.....	2
1.2	Introduction.....	2
1.3	Brief Summary of Results	3
1.4	Application Form	4
1.5	Product Information	6
1.6	Deviations from the Standard.....	6
1.7	EUT Modification Record	6
1.8	Test Location.....	7
2	Test Details	8
2.1	Peak EIRP	8
2.2	Spurious Radiated Emissions	10
2.3	Restricted Band Edges	24
2.4	Authorised Band Edges	38
3	Measurement Uncertainty	46



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	13 December 2017
2	Further details were added to section 2.1.4 to explain how the conducted limit was interpreted to the radiated measurement that was made.	13 December 2017

Table 1

1.2 Introduction

Applicant	Monica Healthcare Ltd
Manufacturer	Monica Healthcare Ltd
Model Number(s)	Pod
Serial Number(s)	AA5425
Hardware Version(s)	Rev H
Software Version(s)	V2.54
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15C: 2016
Order Number	Issue 2 501559
Date	30-November-2017
Date of Receipt of EUT	28-November-2017
Start of Test	28-November-2017
Finish of Test	05-December-2017
Name of Engineer(s)	Graeme Lawler and Jack Tuckwell
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 is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: Bluetooth (BR + EDR)				
2.1	15.247 (b)	Peak EIRP	Pass	ANSI C63.10
2.2	15.247 (d) and 15.205	Spurious Radiated Emissions	Pass	ANSI C63.10
2.3	15.205	Restricted Band Edges	Pass	ANSI C63.10
2.4	15.247 (d)	Authorised Band Edges	Pass	ANSI C63.10

Table 2



1.4 Application Form

EQUIPMENT DESCRIPTION	
Model Name/Number	Novii System Pod
Part Number	107-PT-003
Hardware Version	Rev H
Software Version	V2.54
FCC ID (if applicable)	YOM-6960-MON
Industry Canada ID (if applicable)	
Technical Description (Please provide a brief description of the intended use of the equipment)	The Novii System Pod is part of the Novii Wireless Patch System: a Maternal/Fetal monitor that records Fetal heart rate, Maternal Heart Rate and Uterine Contractions from a pregnant subject.

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
Bluetooth	2402-2480	10	1.18	1MHz / channel	V2.1 + EDR	1M00F1D	2402	2440	2480
Qi Wireless Charger receiver	0.110 to 0.205	N/A		0.095	Frequency Modulation				

UN-INTENTIONAL RADIATOR	
Highest frequency generated or used in the device or on which the device operates or tunes	26MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	0Hz



Power Source			
AC	Single Phase	Three Phase	Nominal Voltage
External DC	Nominal Voltage		Maximum Current
Battery	Nominal Voltage		Battery Operating End Point Voltage
	4.2V		3.7V
Can EUT transmit whilst being charged?			Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

EXTREME CONDITIONS			
Maximum temperature	30	°C	Minimum temperature 10 °C

Ancillaries
Please list all ancillaries which will be used with the device.
Novii System Interface Unit and Novii System Patch

ANTENNA CHARACTERISTICS			
<input type="checkbox"/> Antenna connector		State impedance	Ohm
<input type="checkbox"/> Temporary antenna connector		State impedance	Ohm
<input checked="" type="checkbox"/> Integral antenna	Type	Ceramic (Antenova SRCW004)	
<input type="checkbox"/> External antenna	Type		

I hereby declare that the information supplied is correct and complete

Name: Jean-Francois Pieri

Position held: CTO

Date: 12th December 2017



1.5 Product Information

1.5.1 Technical Description

The Monica Novii POD is an intrapartum Maternal/Fetal Monitor that non-invasively measures and displays fetal heart rate (FHR), uterine activity (UA) and maternal heart rate (MHR).

The Novii POD acquires and displays the FHR tracing from abdominal surface electrodes that pick up the fetal ECG (fECG) signal. Using the same surface electrodes, the POD also acquires and displays the UA tracing from the uterine electromyography (EMG) signal and the MHR tracing from the maternal ECG signal (mECG).

The POD is indicated for use on women who are at >36 completed weeks, in labor, with singleton pregnancies, using surface electrodes on the maternal abdomen.

The Novii Patch is an accessory to the Novii POD that connects directly to the Novii POD and contains the surface electrodes that attach to the abdomen. The Novii Interface is an accessory to the Novii POD which provides a means of interfacing the wireless output of the Novii POD to the transducer inputs of a Maternal/Fetal Monitor.

The Novii Interface enables signals collected by the Novii POD to be printed and displayed on a Maternal/Fetal Monitor and sent on to a central network, if connected.

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
Serial Number: AA5425			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3



Product Service

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 (BR + EDR)		
Peak EIRP	Graeme Lawler and Jack Tuckwell	UKAS
Spurious Radiated Emissions	Jack Tuckwell	UKAS
Restricted Band Edges	Jack Tuckwell	UKAS
Authorised Band Edges	Jack Tuckwell	UKAS

Table 4

Office Address:

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



2 Test Details

2.1 Peak EIRP

2.1.1 Specification Reference

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

2.1.2 Equipment Under Test and Modification State

Pod, S/N: AA5425- Modification State 0

2.1.3 Date of Test

05-December-2017

2.1.4 Test Method

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

The test was performed radiated in an emissions chamber with the EUT antenna connected. The measurement antenna in the chamber was varied in elevation and azimuth and the EUT was placed in the orientation and rotation that resulted in the highest EIRP.

NOTE: The limit specified in Clause 15.247 (b) is based on maximum peak conducted output power. The evidence of compliance shown is based on radiated power taking into account the integral antenna used with the product. The radiated limit based on the table below is 4W (1W+6 dBi = 4W) the test results shown in table 5 provide evidence of compliance to this limit.

2.1.5 Environmental Conditions

Ambient Temperature 19.0 °C
Relative Humidity 34.0 %

2.1.6 Test Results

Bluetooth (BR + EDR)

Frequency	Output Power	
	dBm	mW
2402 MHz	0.57	1.14
2440 MHz	-1.43	0.72
2480 MHz	-2.23	0.60

Table 5

FCC 47 CFR Part 15, Limit Clause 15.247 (b)(1)(4)

For frequency hopping systems operating in the 2400-2483.5 MHz and 5725-5850 MHz band:

Number of Hopping Channels	Maximum Conducted Power (W)	Maximum Antenna Gain (dBi)
At least 75	1	6
Less than 75	0.125	6



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
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	1002	12	20-Oct-2018
Test Receiver	Rohde & Schwarz	ESIB40	1006	12	28-Jun-2018
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygrometer	Rotronic	HYGROPALM 1	2338	12	24-Oct-2018
Antenna (DRG Horn)	ETS-Lindgren	3115	3125	12	21-Jul-2018
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	12	02-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
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	4143	12	03-Nov-2018
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	22-May-2018
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	17-Feb-2018

Table 6

TU - Traceability Unscheduled



2.2 Spurious Radiated Emissions

2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d) and 15.205

2.2.2 Equipment Under Test and Modification State

Pod, S/N: AA5425- Modification State 0

2.2.3 Date of Test

01-December-2017 to 04-December-2017

2.2.4 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 characterize 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:
 $10^{(\text{Field Strength in dB}\mu\text{V/m}/20)}$.

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

2.2.5 Environmental Conditions

Ambient Temperature	18.1 °C
Relative Humidity	37.0 %

2.2.6 Test Results

Bluetooth (BR + EDR)

Testing was performed on the modulation and packet type which resulted in the highest conducted output power. The Modulation/Package type was GFSK/DH5.

Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
32.472	29.6	40.0	-10.4	207	1.00	Horizontal
147.521	20.6	43.5	-22.9	1	2.79	Horizontal
978.596	34.5	54.0	-19.5	360	1.00	Vertical

Table 7 - 2402 MHz - 30 MHz to 1 GHz Emissions Results

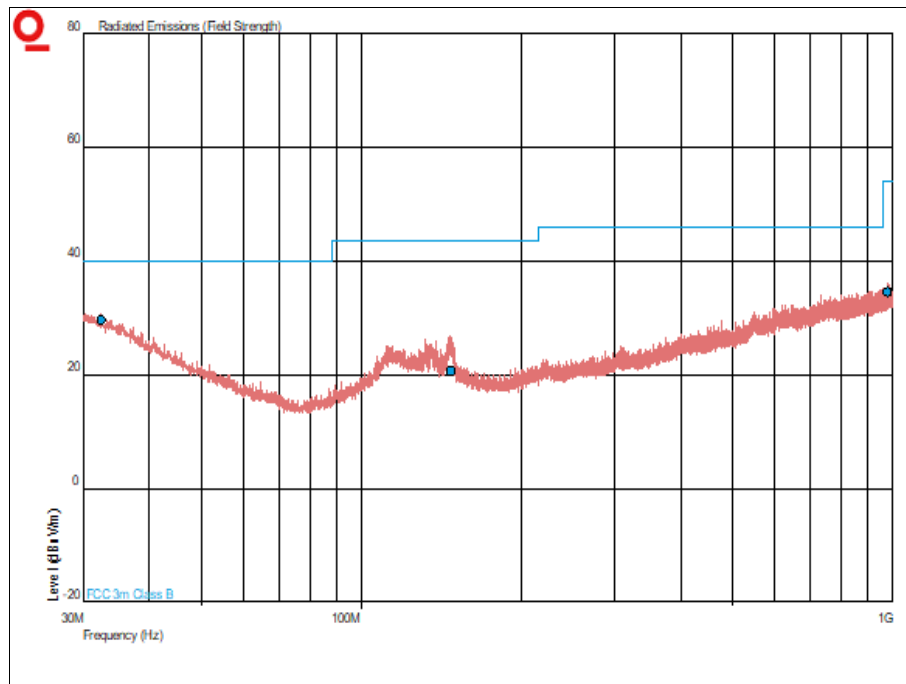


Figure 1 - 2402 MHz - 30 MHz to 1 GHz - Horizontal and Vertical



Frequency (GHz)	Result (dBμV/m)		Limit (dBμV/m)		Margin (dBμV/m)	
	Peak	Average	Peak	Average	Peak	Average
2.361529	64.31	36.55	74.0	54.0	9.69	17.45
2.379942	65.34	36.64	74.0	54.0	9.66	17.36
4.803967	52.28	45.36	74.0	54.0	11.72	8.64
7.206*						
12.009453	50.13	39.34	74.0	54.0	23.87	14.66
19.2147	62.05	44.17	84.0	64.0	21.95	19.83
24.02*						

Table 8 - 2402 MHz - 1 GHz to 25GHz Emissions Results

No other emissions were detected within 6 dB of the limit.

*Emission is above -6 dB of the limit in the restricted band of 74 dBμV/m (Peak) or 54 dBμV/m (Average) however the frequency does not fall in a restricted band and therefore the limit is -20 dBc of which there is more than 6 dB margin hence the emission was not further investigated.

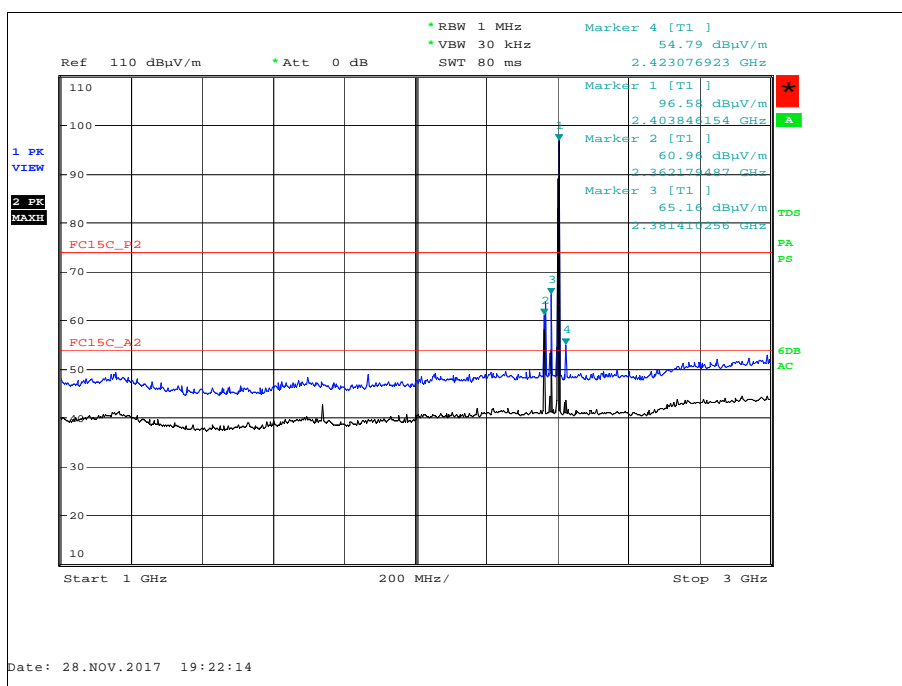


Figure 2 - 2402 MHz - 1 GHz to 3 GHz - Horizontal and Vertical

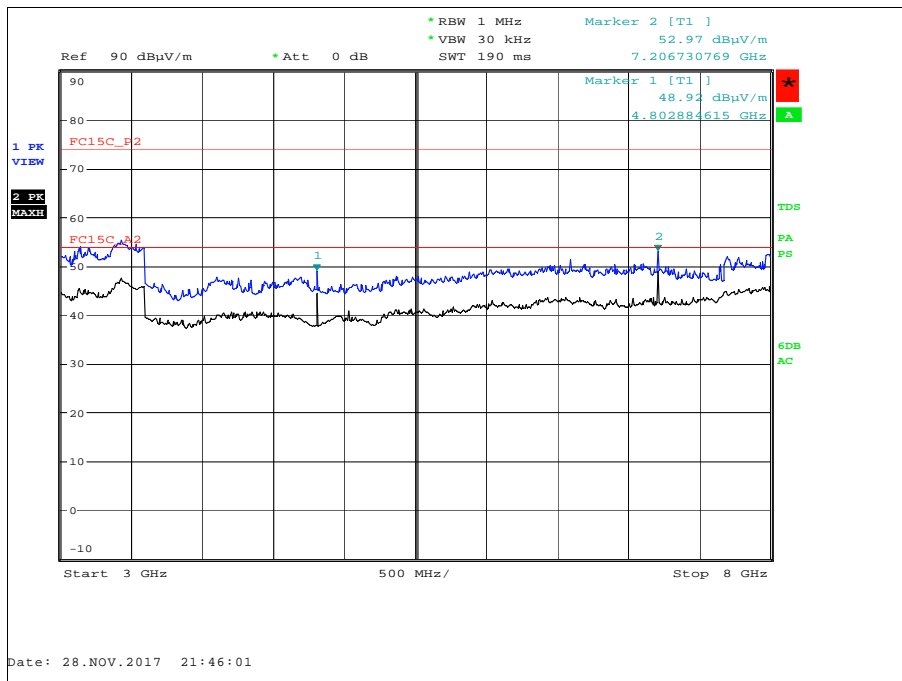


Figure 3 - 2402 MHz - 3 GHz to 8 GHz - Horizontal and Vertical

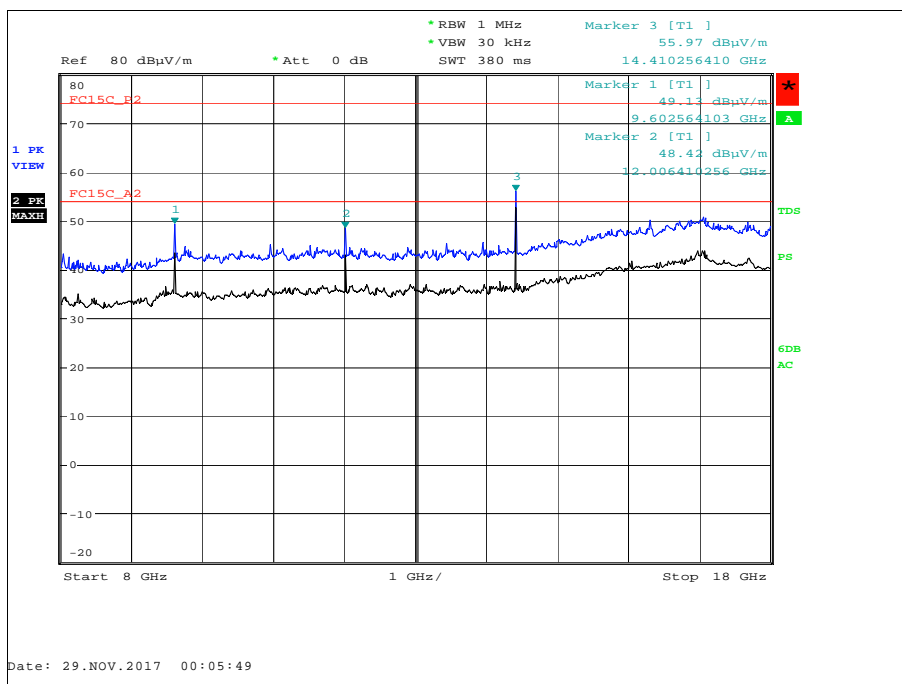


Figure 4 - 2402 MHz - 8 GHz to 18 GHz - Horizontal and Vertical



Product Service

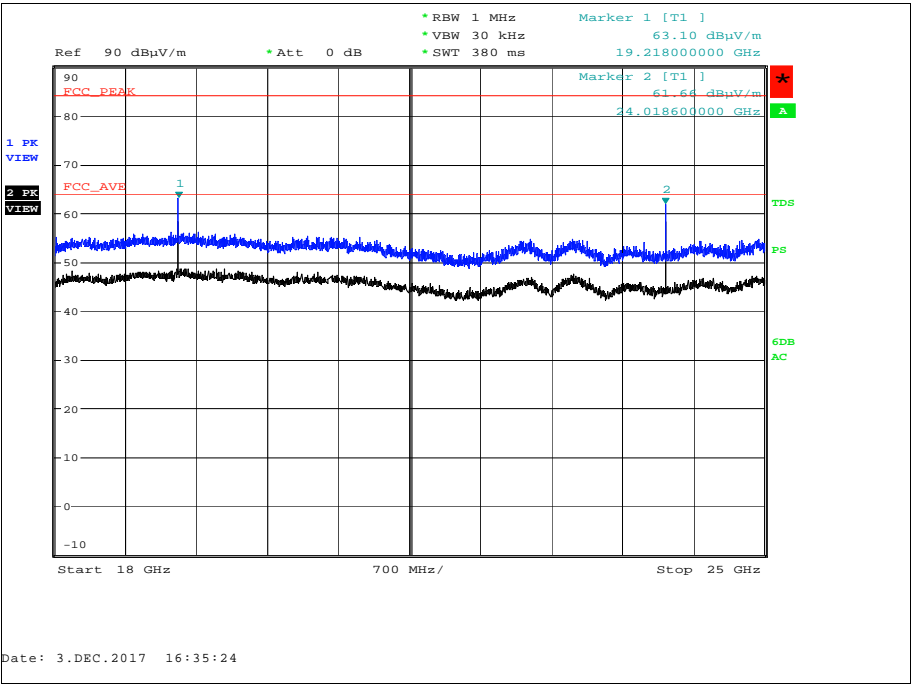


Figure 5 - 2402 MHz - 18 GHz to 25 GHz - Horizontal and Vertical



Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
30.634	30.5	40.0	-9.5	359	1.00	Horizontal
132.544	21.7	43.5	-21.8	213	1.00	Horizontal
922.278	33.8	46.0	-12.2	147	1.00	Horizontal

Table 9 - 2440 MHz - 30 MHz to 1 GHz Emissions Results

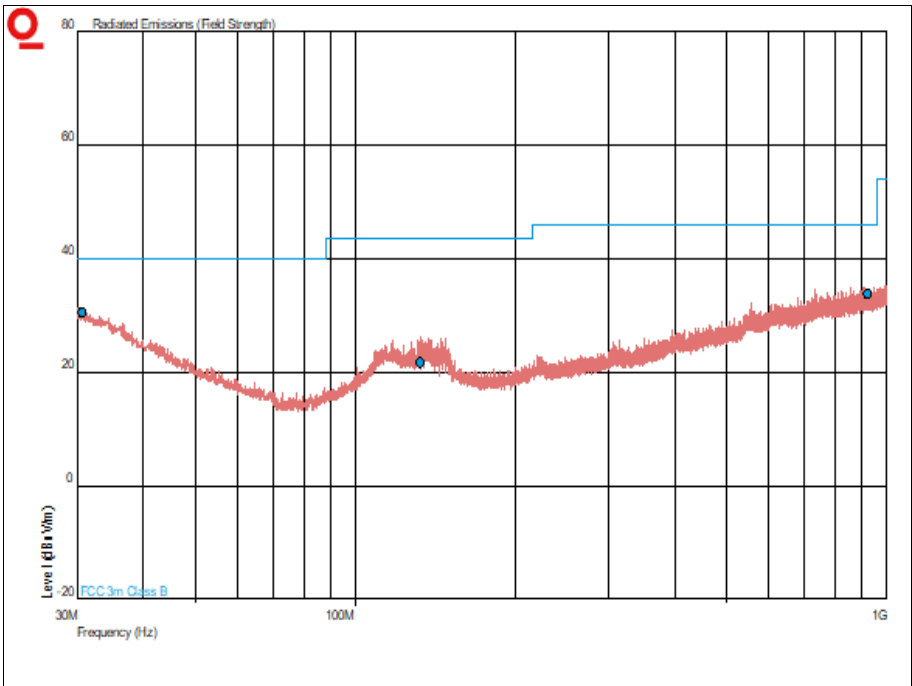


Figure 6 - 2440 MHz - 30 MHz to 1 GHz - Horizontal and Vertical



Frequency (GHz)	Result (dBμV/m)		Limit (dBμV/m)		Margin (dBμV/m)	
	Peak	Average	Peak	Average	Peak	Average
2.361415	66.33	36.57	74.0	54.0	27.67	17.43
4.882011	53.47	46.62	74.0	54.0	20.53	17.38
7.322968	54.69	44.19	74.0	54.0	19.31	9.81
14.646974*						
19.5293	62.15	44.8	84.0	64.0	21.85	19.2

Table 10 - 2440 MHz - 1 GHz to 25 GHz Emissions Results

No other emissions were detected within 6 dB of the limit.

*Emission is above -6 dB of the limit in the restricted band of 74 dBμV/m (Peak) or 54 dBμV/m (Average) however the frequency does not fall in a restricted band and therefore the limit is -20 dBc of which there is more than 6 dB margin hence the emission was not further investigated.

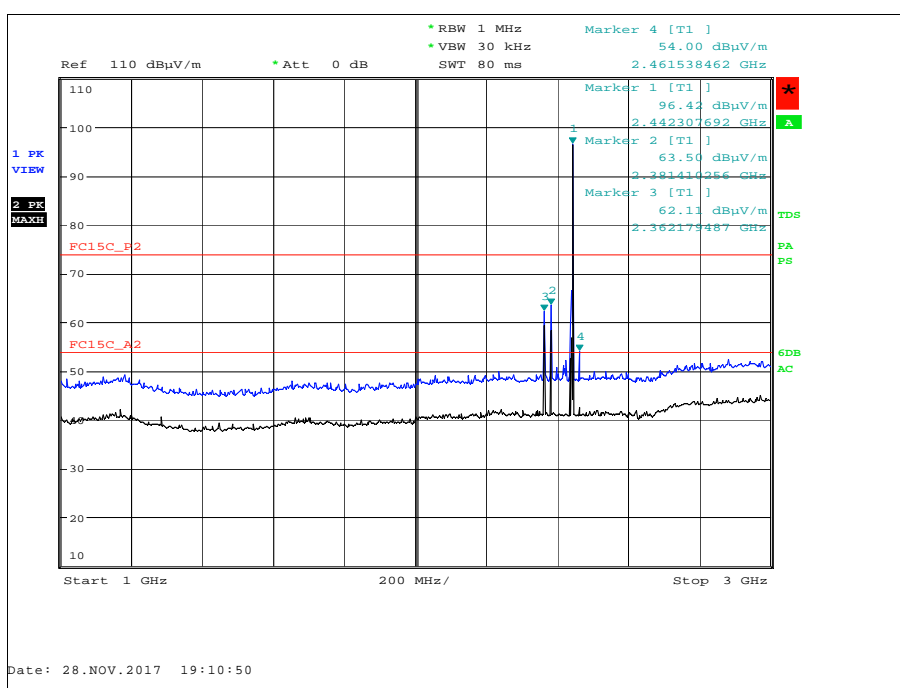


Figure 7 - 2440 MHz - 1 GHz to 3 GHz - Horizontal and Vertical



Product Service

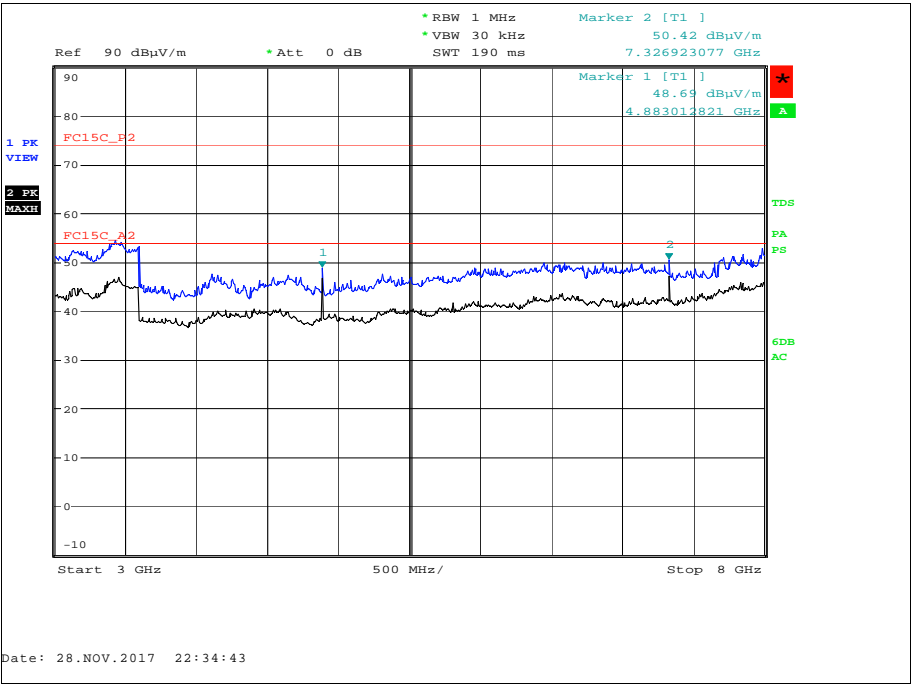


Figure 8 - 2440 MHz - 3 GHz to 8 GHz - Horizontal and Vertical

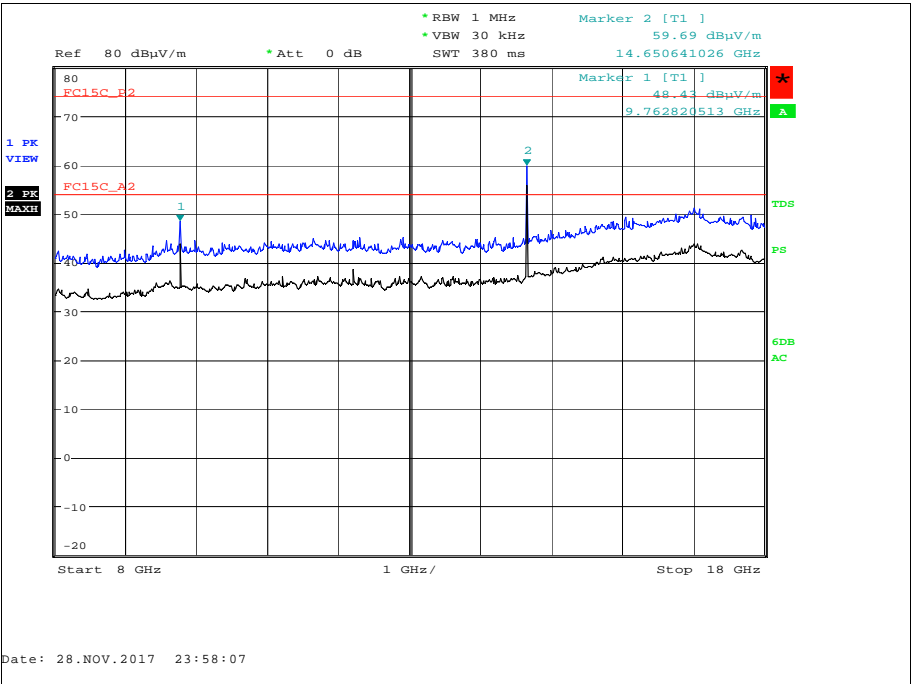


Figure 9 - 2440 MHz - 8 GHz to 18 GHz - Horizontal and Vertical



Product Service

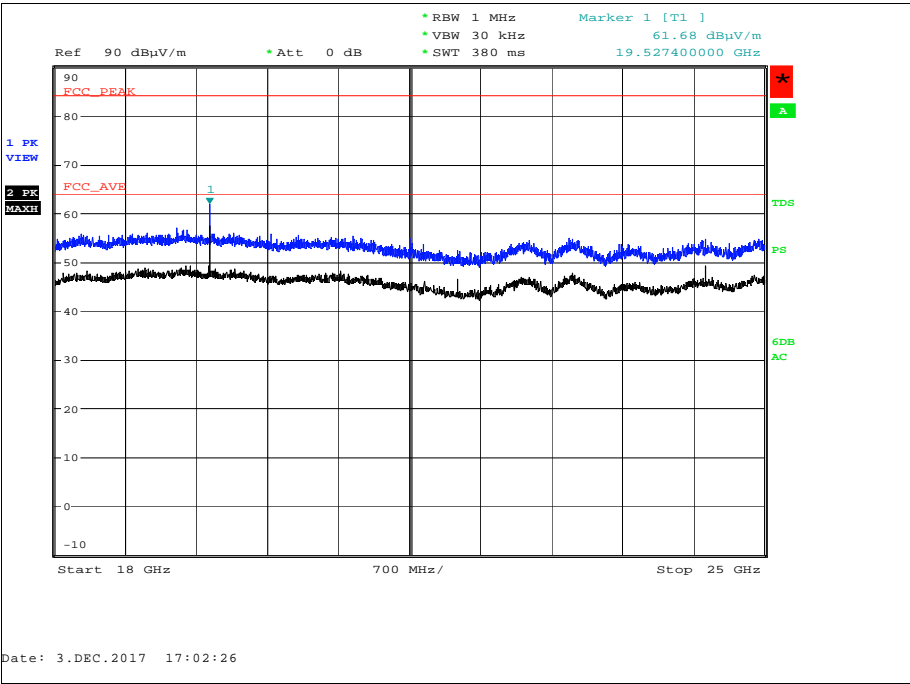


Figure 10 - 2440 MHz - 18 GHz to 25 GHz - Horizontal and Vertical

Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
31.704	30.1	40.0	-9.9	198	1.00	Horizontal
146.980	21.4	43.5	-22.1	259	1.00	Horizontal
966.568	34.2	54.0	-19.8	318	1.00	Horizontal

Table 11 - 2480 MHz - 30 MHz to 1 GHz Emissions Results

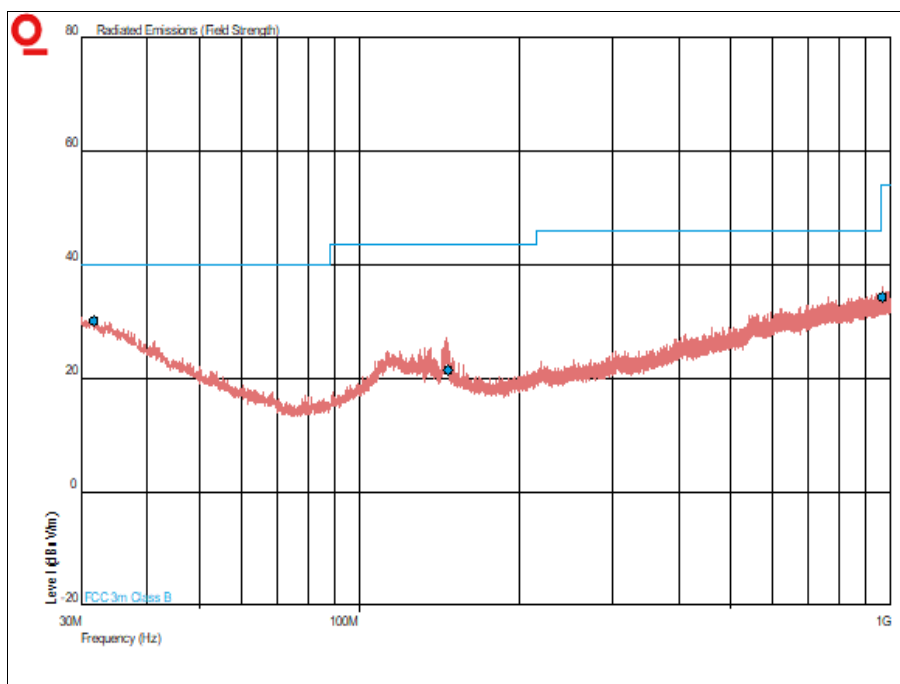


Figure 11 - 2480 MHz - 30 MHz to 1 GHz - Horizontal and Vertical



Frequency (GHz)	Result (dBμV/m)		Limit (dBμV/m)		Margin (dBμV/m)	
	Peak	Average	Peak	Average	Peak	Average
2.360458	65.04	36.57	74.0	54.0	18.96	17.43
2.378631	66.35	36.62	74.0	54.0	17.65	17.38
4.959735	57.76	52.07	74.0	54.0	19.93	1.93
9.923*						
14.880973*						

Table 12 - 2480 MHz - 1 GHz to 25 GHz Emissions Results

No other emissions were detected within 6 dB of the limit.

*Emission is above -6 dB of the limit in the restricted band of 74 dBμV/m (Peak) or 54 dBμV/m (Average) however the frequency does not fall in a restricted band and therefore the limit is -20 dBc of which there is more than 6 dB margin hence the emission was not further investigated.

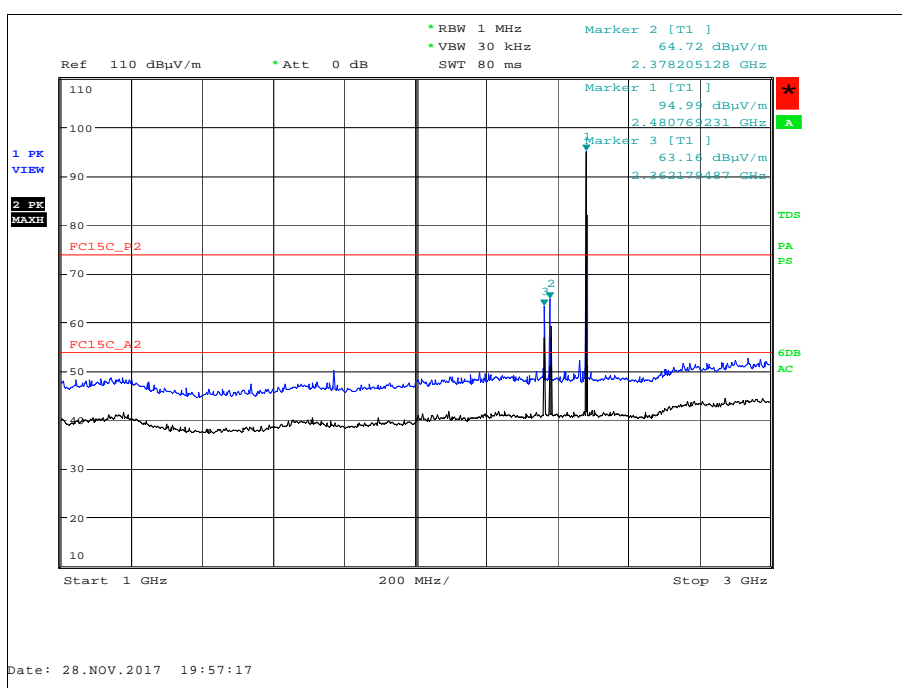


Figure 12 - 2480 MHz - 1 GHz to 3 GHz - Horizontal and Vertical

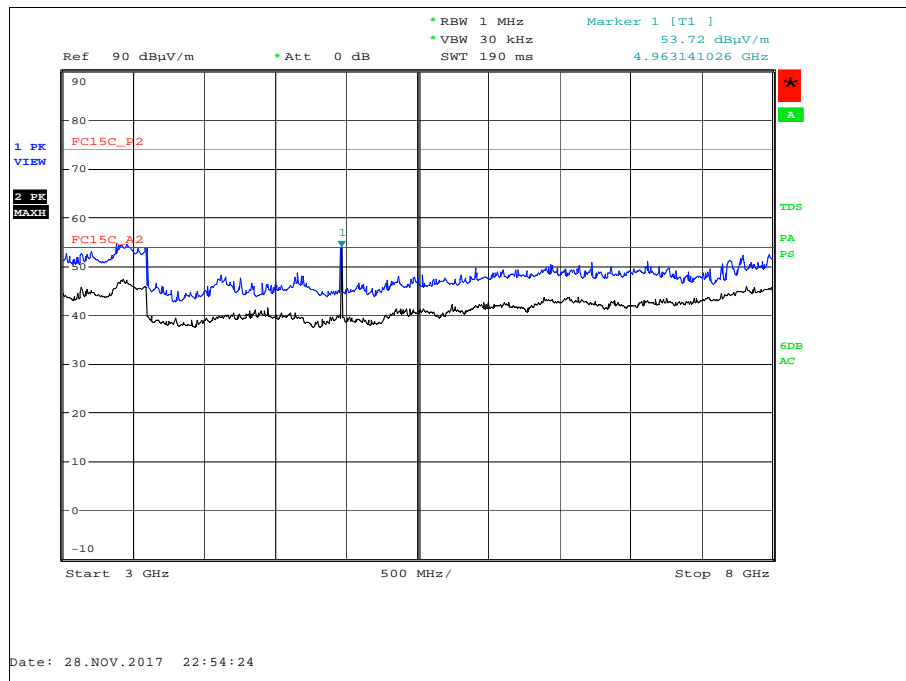


Figure 13 - 2480 MHz - 3 GHz to 8 GHz - Horizontal and Vertical

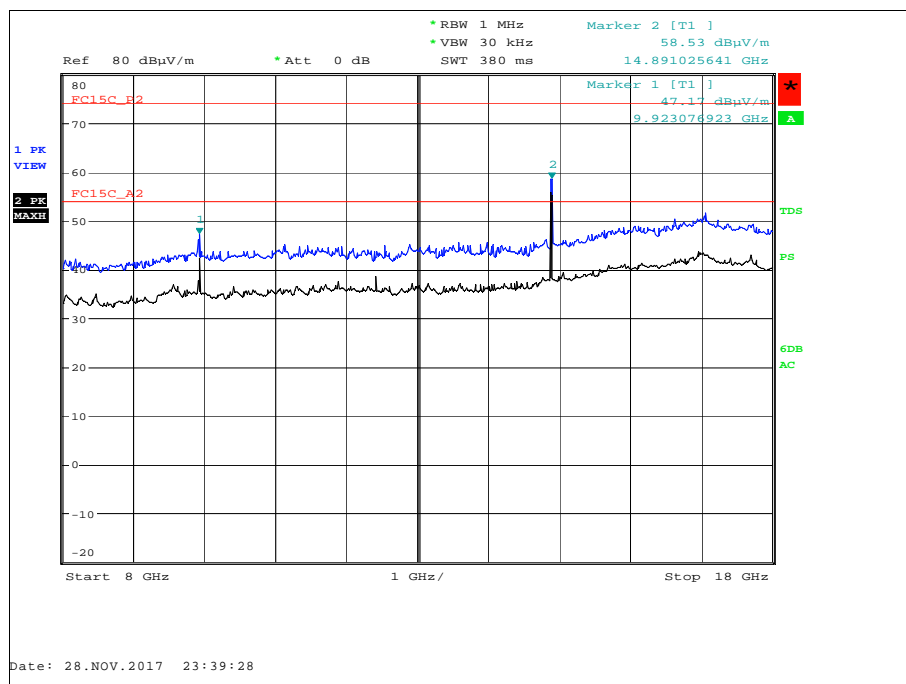


Figure 14 - 2480 MHz - 8 GHz to 18 GHz - Horizontal and Vertical

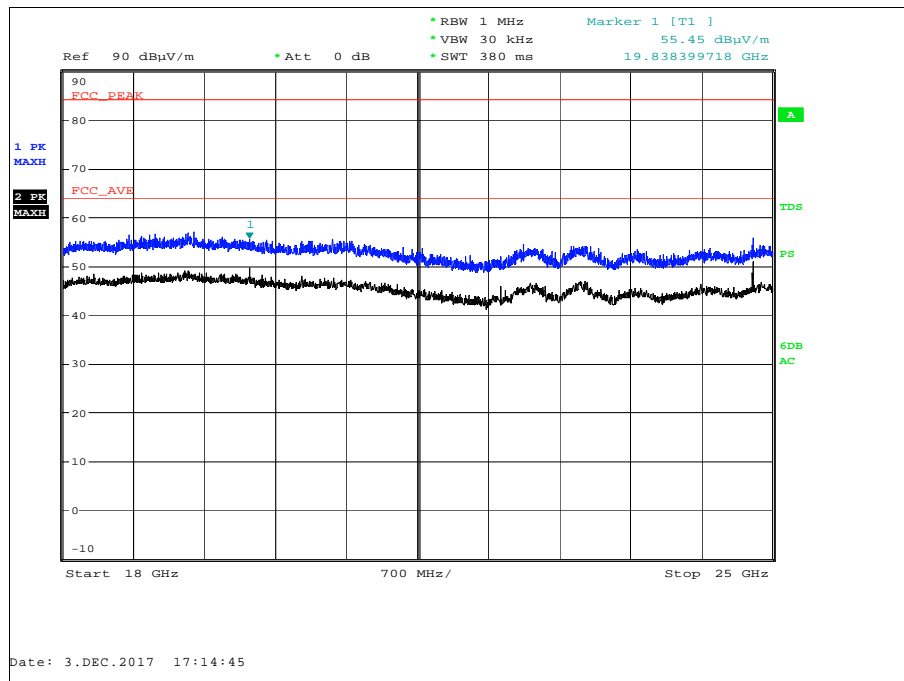


Figure 15 - 2480 MHz - 18 GHz to 25 GHz - Horizontal and Vertical

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

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).



2.2.7 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	31-Jul-2018
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygrometer	Rotronic	HYGROPALM 1	2338	12	24-Oct-2018
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	12	02-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
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	03-Feb-2017
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	17-Feb-2018
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	17-Feb-2018

Table 13

TU - Traceability Unscheduled



2.3 Restricted Band Edges

2.3.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.205

2.3.2 Equipment Under Test and Modification State

Pod, S/N: AA5425 - Modification State 0

2.3.3 Date of Test

28-November-2017 to 04-December-2017

2.3.4 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:
 $10^{(\text{Field Strength in dB}\mu\text{V/m}/20)}$

2.3.5 Environmental Conditions

Ambient Temperature 17.1 °C
Relative Humidity 31.0 %

2.3.6 Test Results

Bluetooth (BR + EDR)

Mode	Modulation	Frequency (MHz)	Measured Frequency (MHz)	Peak Level (dBμV/m)	Average Level (dBμV/m)
Static	GFSK	2402	2390.0	66.22	46.37
Static	GFSK	2480	2483.5	57.56	45.90
Hopping	GFSK	2402	2390.0	65.62	46.37
Hopping	GFSK	2480	2483.5	58.45	45.87
Static	π/4 DQPSK	2402	2390.0	65.40	46.22
Static	π/4 DQPSK	2480	2483.5	61.01	47.16
Hopping	π/4 DQPSK	2402	2390.0	65.91	46.37
Hopping	π/4 DQPSK	2480	2483.5	59.44	45.90
Static	8-DPSK	2402	2390.0	65.22	46.42
Static	8-DPSK	2480	2483.5	62.82	47.57
Hopping	8-DPSK	2402	2390.0	65.22	46.22
Hopping	8-DPSK	2480	2483.5	58.66	46.91

Table 14 - Restricted Band Edge Results

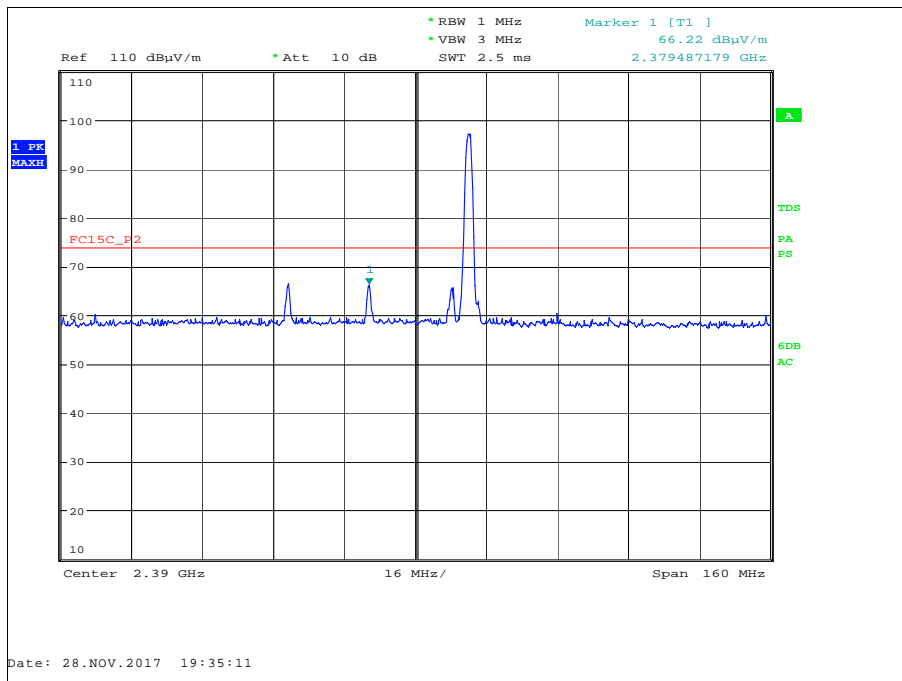


Figure 16 - Static - GFSK - 2402 MHz - Measured Frequency 2390.0 MHz - Peak

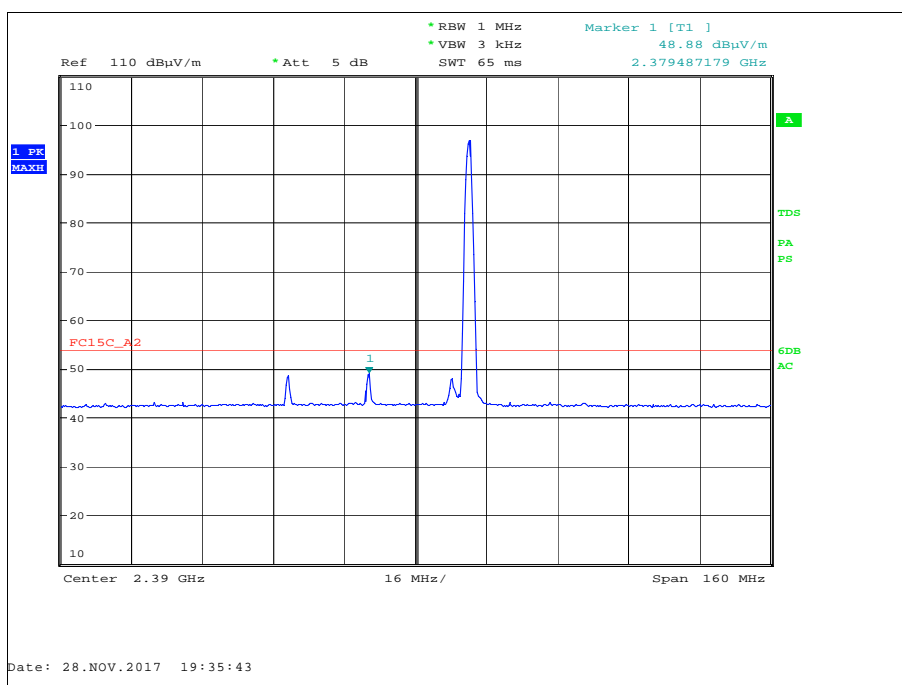


Figure 17 - Static - GFSK - 2402 MHz - Measured Frequency 2390.0 MHz - Average



Product Service

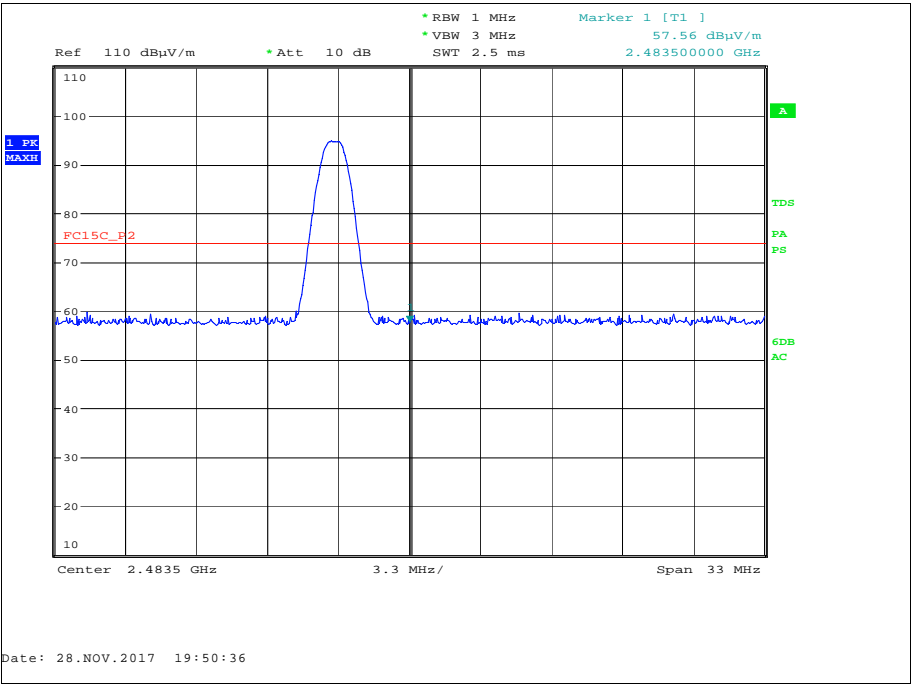


Figure 18 - Static - GFSK - 2480 MHz - Measured Frequency 2483.5 MHz - Peak

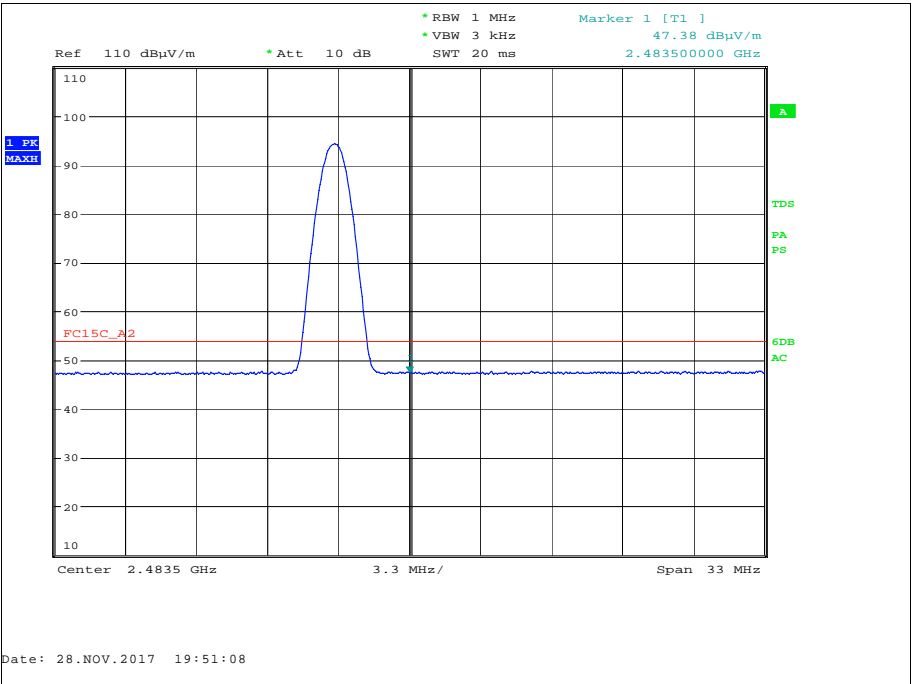


Figure 19 - Static - GFSK - 2480 MHz - Measured Frequency 2483.5 MHz - Average

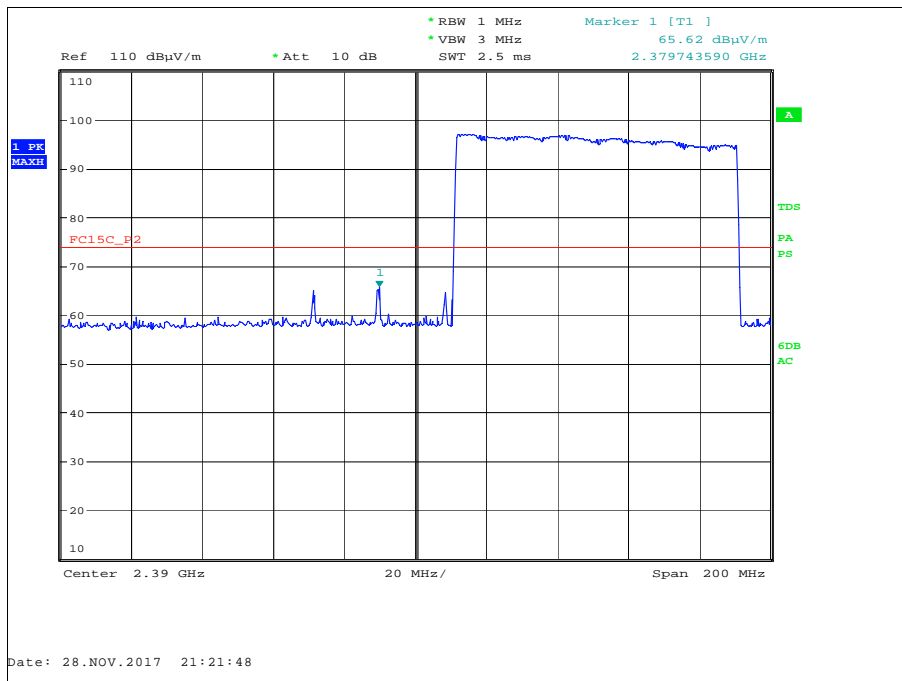


Figure 20 - Hopping - GFSK - 2402 MHz - Measured Frequency 2390.0 MHz - Peak

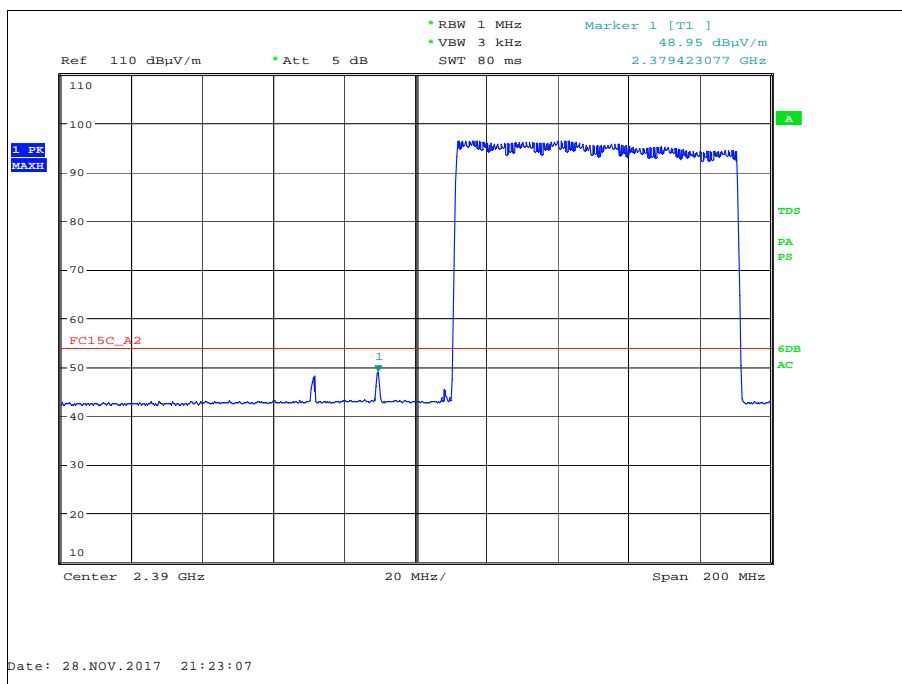


Figure 21 - Hopping - GFSK - 2402 MHz - Measured Frequency 2390.0 MHz - Average

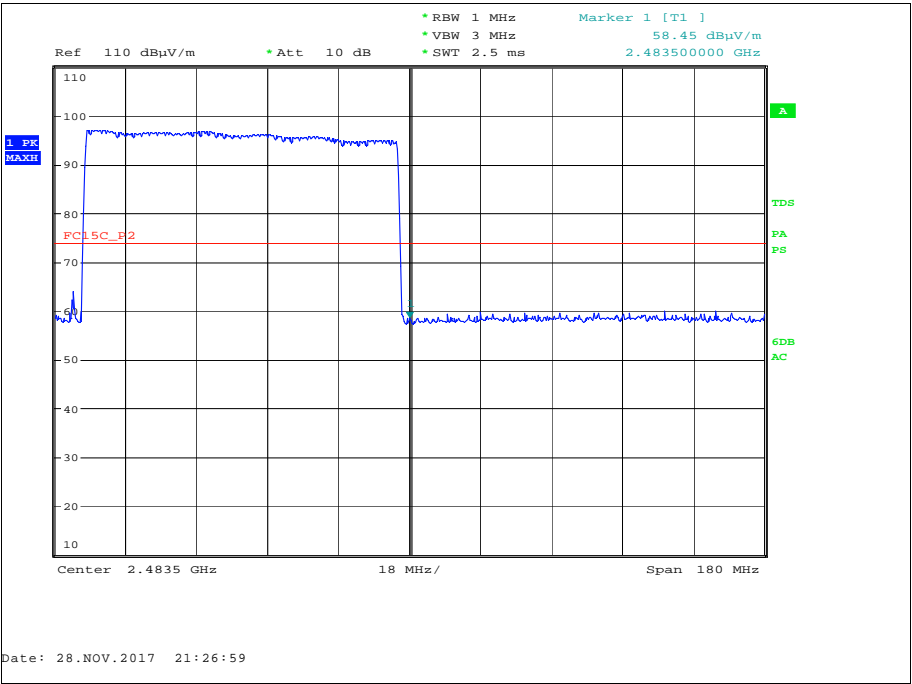


Figure 22 - Hopping - GFSK - 2480 MHz - Measured Frequency 2483.5 MHz - Peak

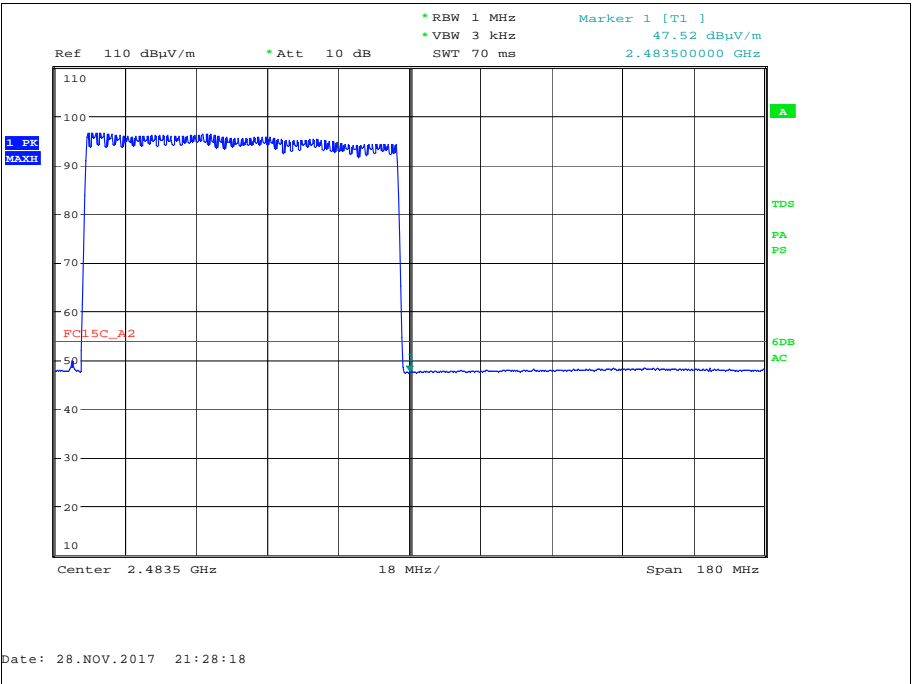


Figure 23 - Hopping - GFSK - 2480 MHz - Measured Frequency 2483.5 MHz - Average

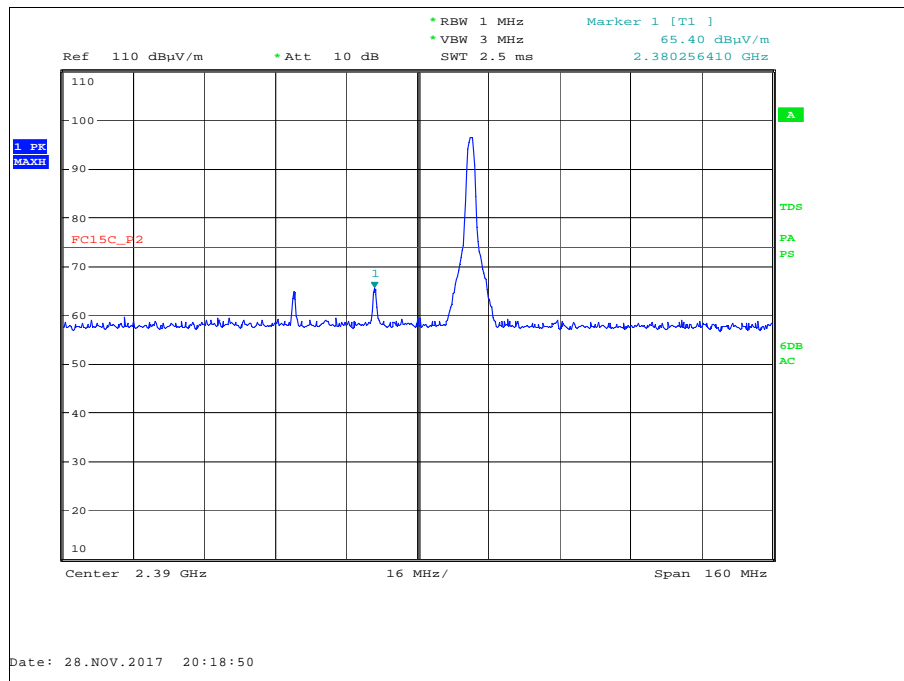


Figure 24 - Static - $\pi/4$ DQPSK - 2402 MHz - Measured Frequency 2390.0 MHz - Peak

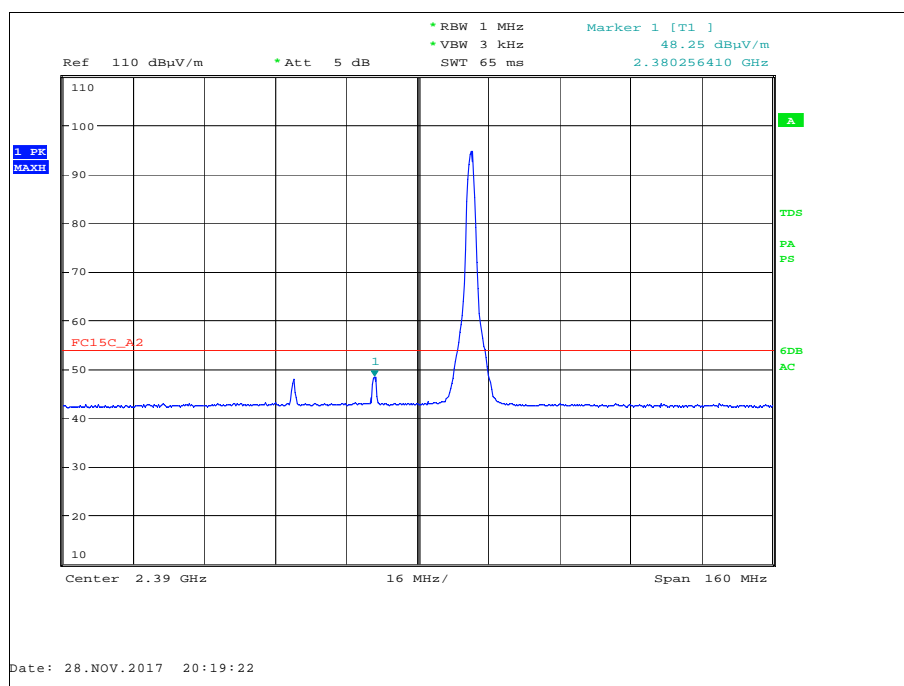


Figure 25 - Static - $\pi/4$ DQPSK - 2402 MHz - Measured Frequency 2390.0 MHz - Average

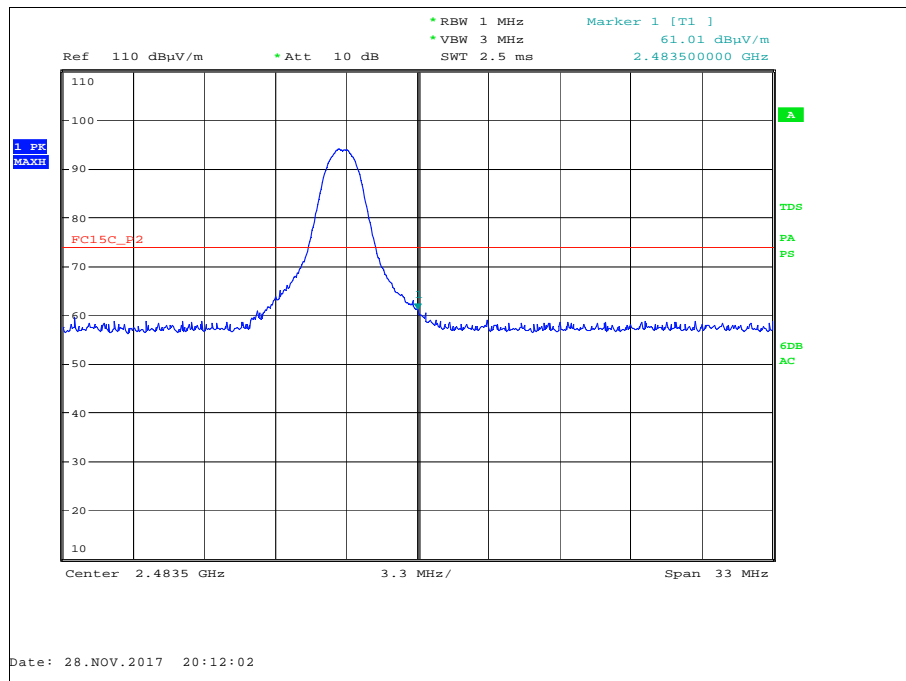


Figure 26 - Static - $\pi/4$ DQPSK - 2480 MHz - Measured Frequency 2483.5 MHz - Peak

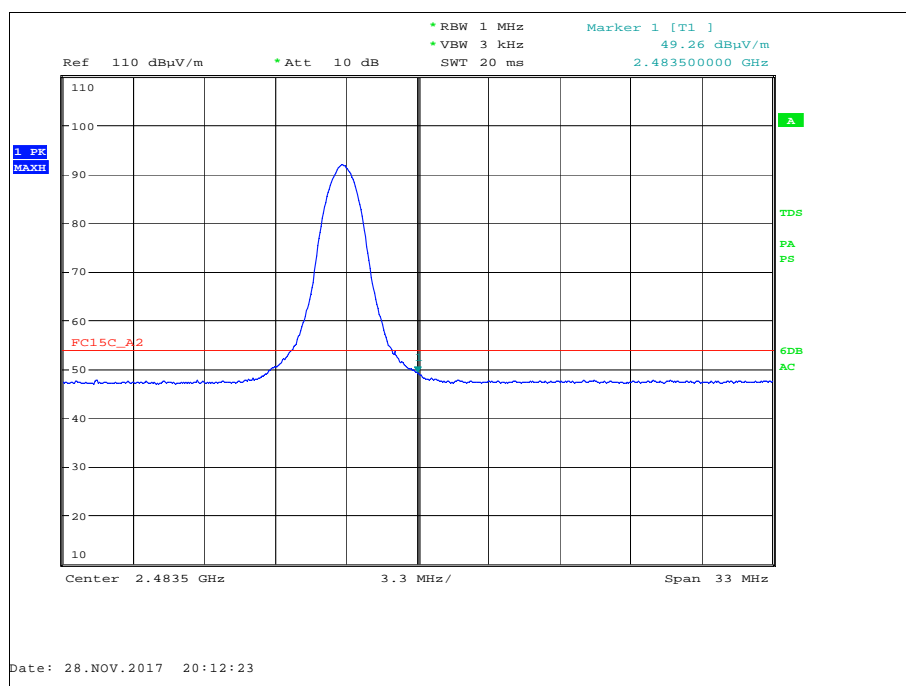


Figure 27 - Static - $\pi/4$ DQPSK - 2480 MHz - Measured Frequency 2483.5 MHz - Average

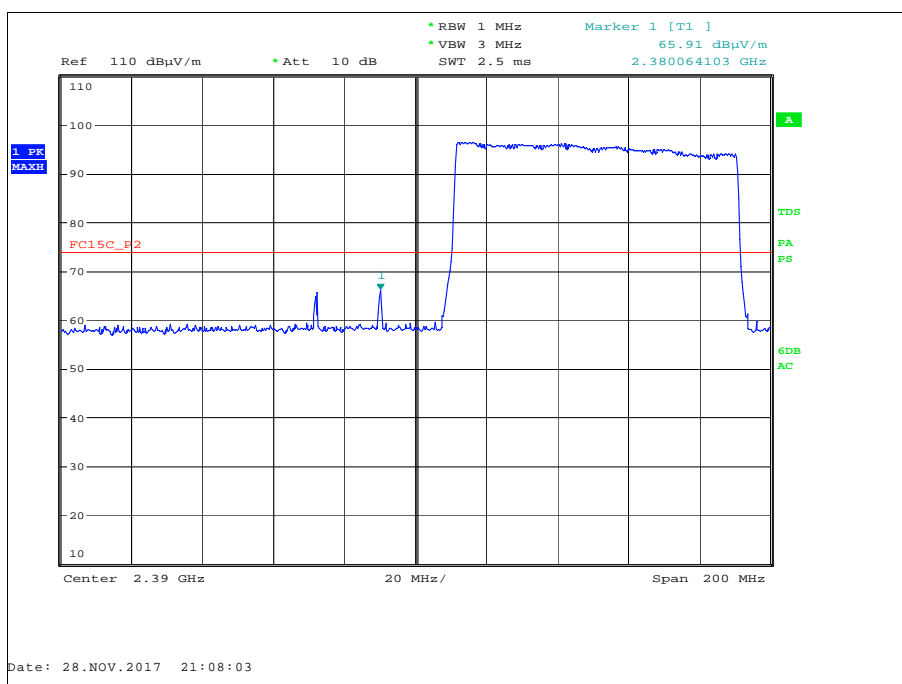


Figure 28 - Hopping - $\pi/4$ DQPSK - 2402 MHz - Measured Frequency 2390.0 MHz - Peak

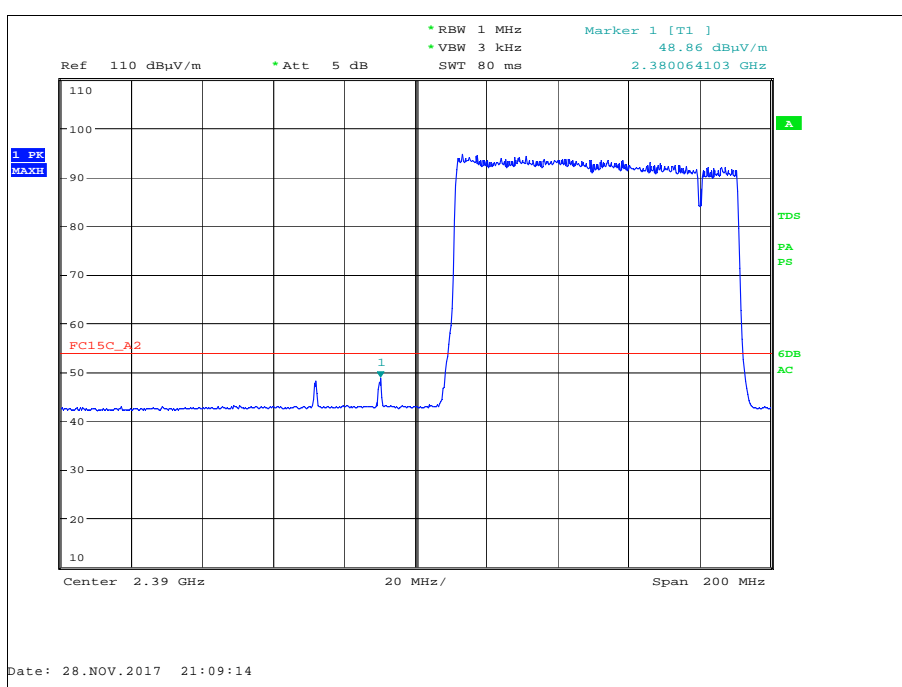


Figure 29 - Hopping - $\pi/4$ DQPSK - 2402 MHz - Measured Frequency 2390.0 MHz - Average

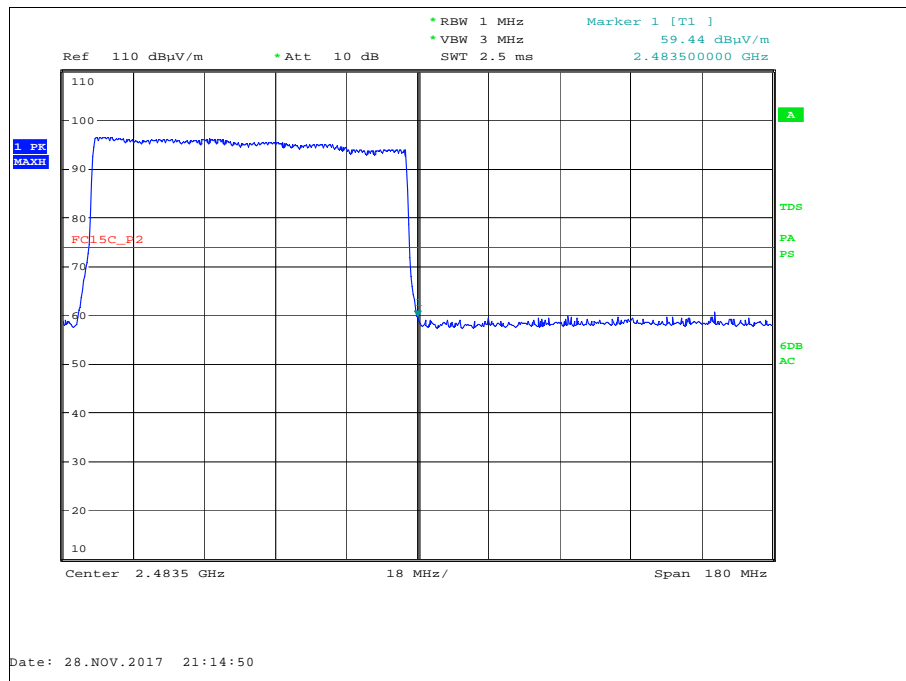


Figure 30 - Hopping - $\pi/4$ DQPSK - 2480 MHz - Measured Frequency 2483.5 MHz - Peak

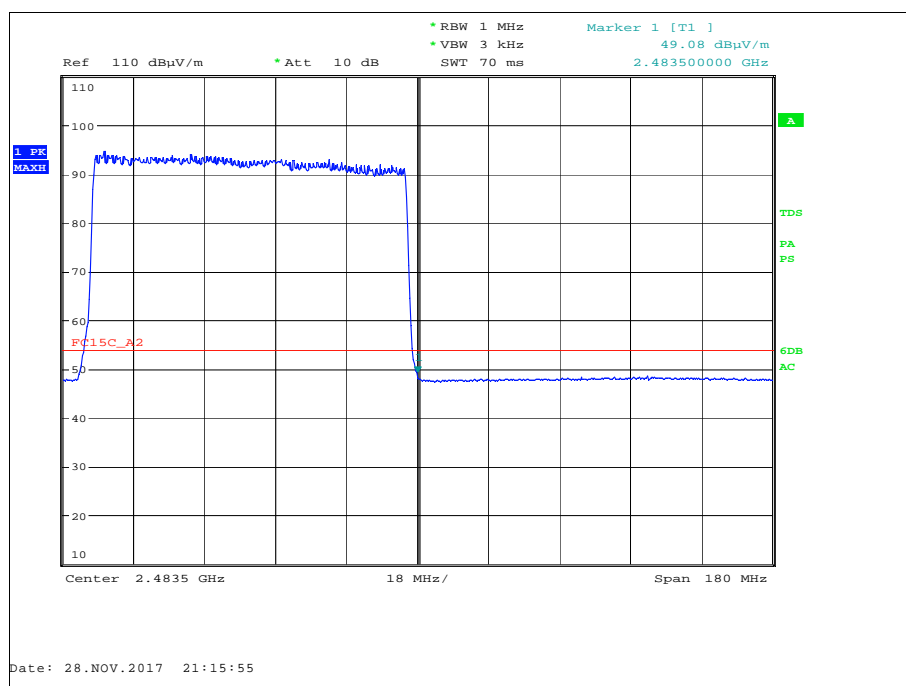


Figure 31 - Hopping - $\pi/4$ DQPSK - 2480 MHz - Measured Frequency 2483.5 MHz - Average

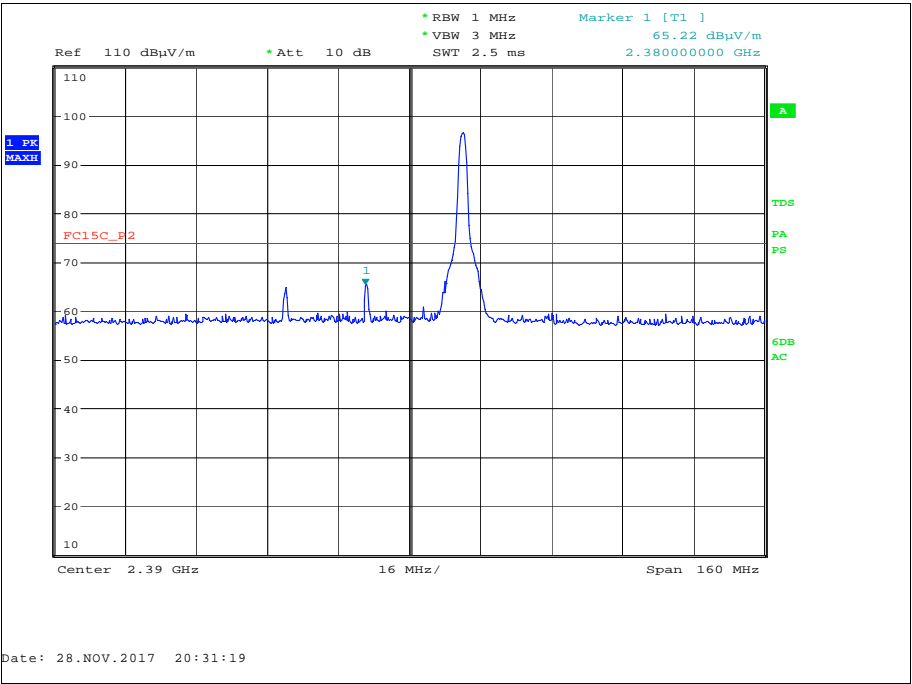


Figure 32 - Static - 8-DPSK - 2402 MHz - Measured Frequency 2390.0 MHz - Peak

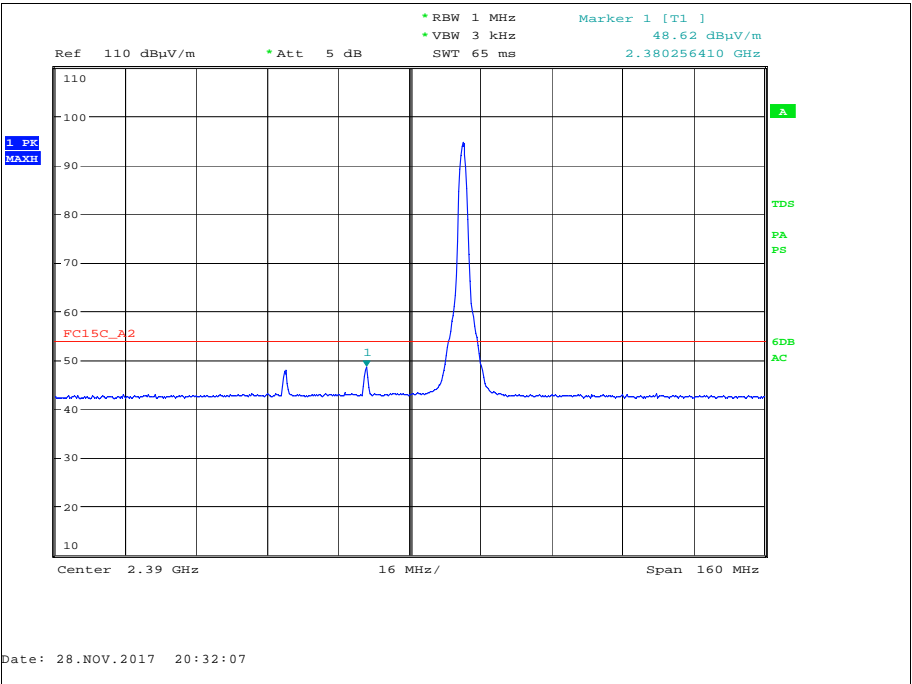


Figure 33 - Static - 8-DPSK - 2402 MHz - Measured Frequency 2390.0 MHz - Average

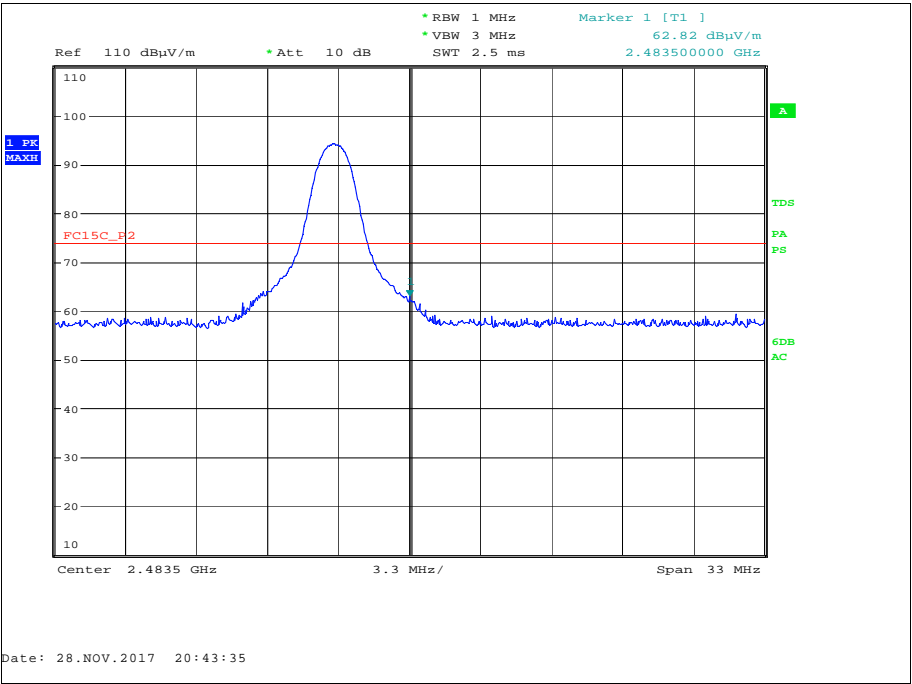


Figure 34 - Static - 8-DPSK - 2480 MHz - Measured Frequency 2483.5 MHz - Peak

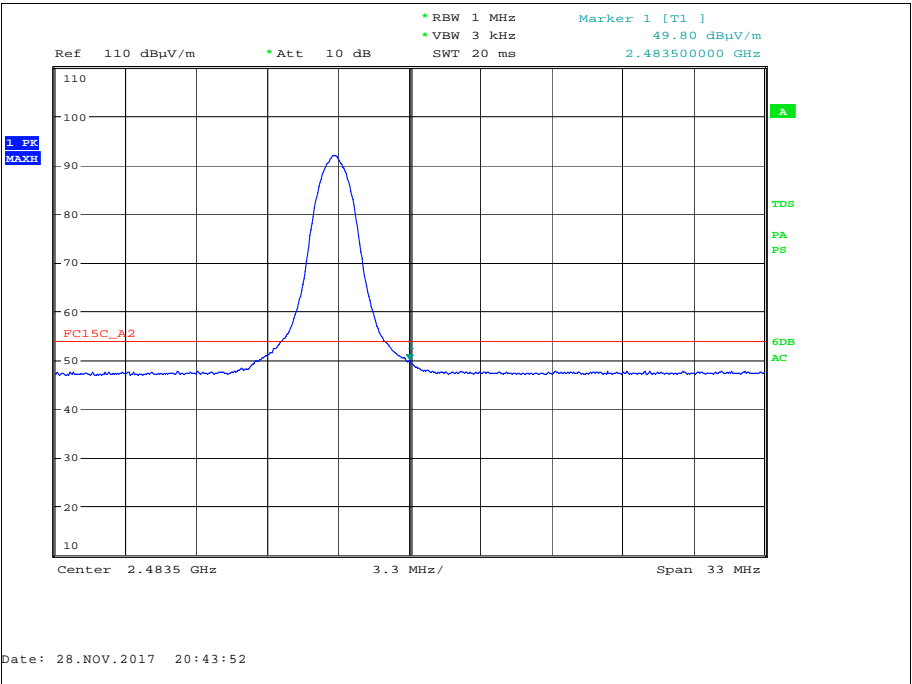


Figure 35 - Static - 8-DPSK - 2480 MHz - Measured Frequency 2483.5 MHz - Average



Product Service

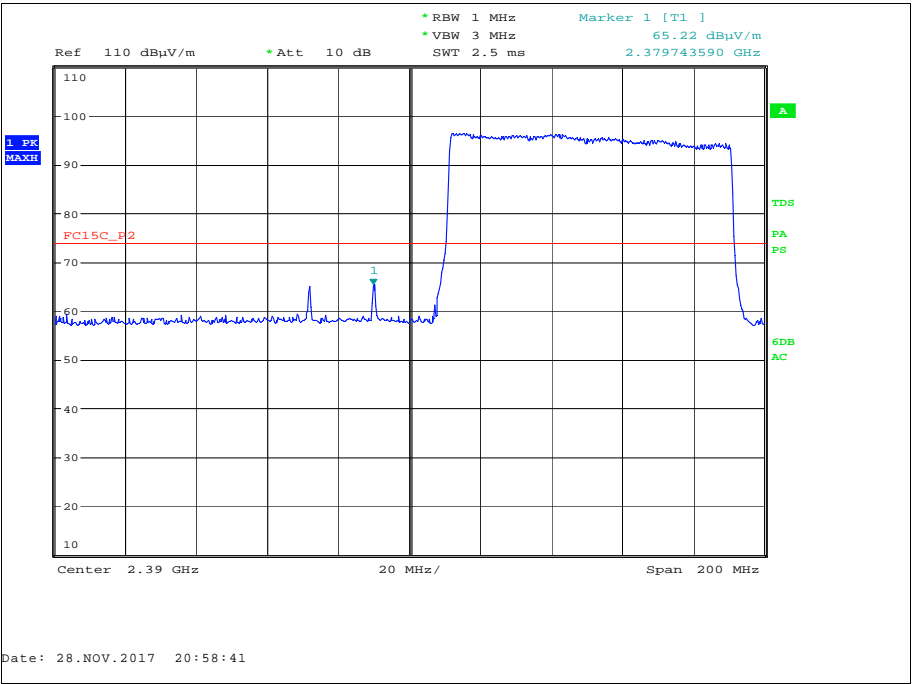


Figure 36 - Hopping - 8-DPSK - 2402 MHz - Measured Frequency 2390.0 MHz - Peak

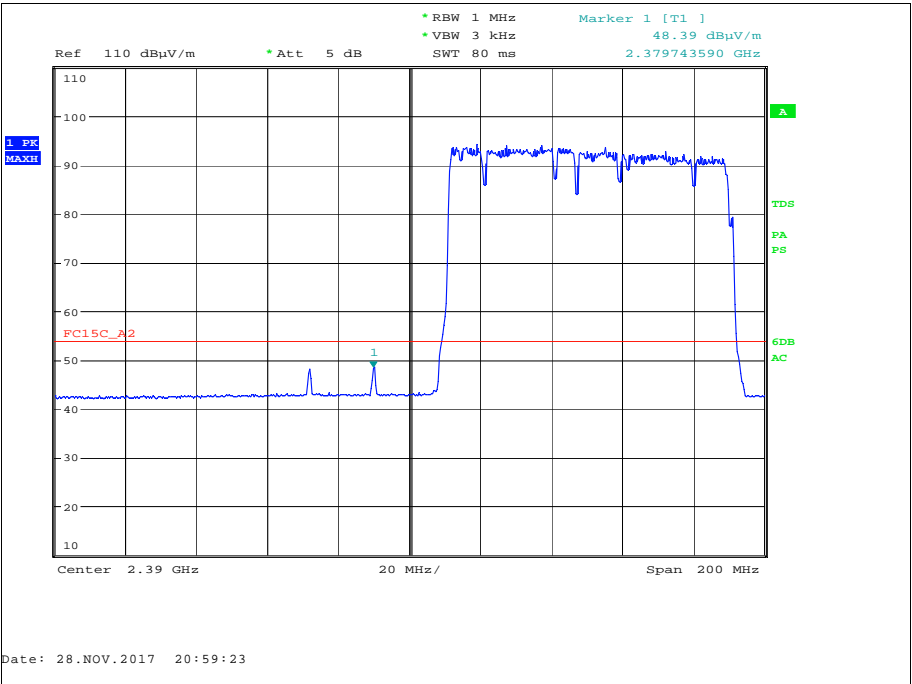


Figure 37 - Hopping - 8-DPSK - 2402 MHz - Measured Frequency 2390.0 MHz - Average

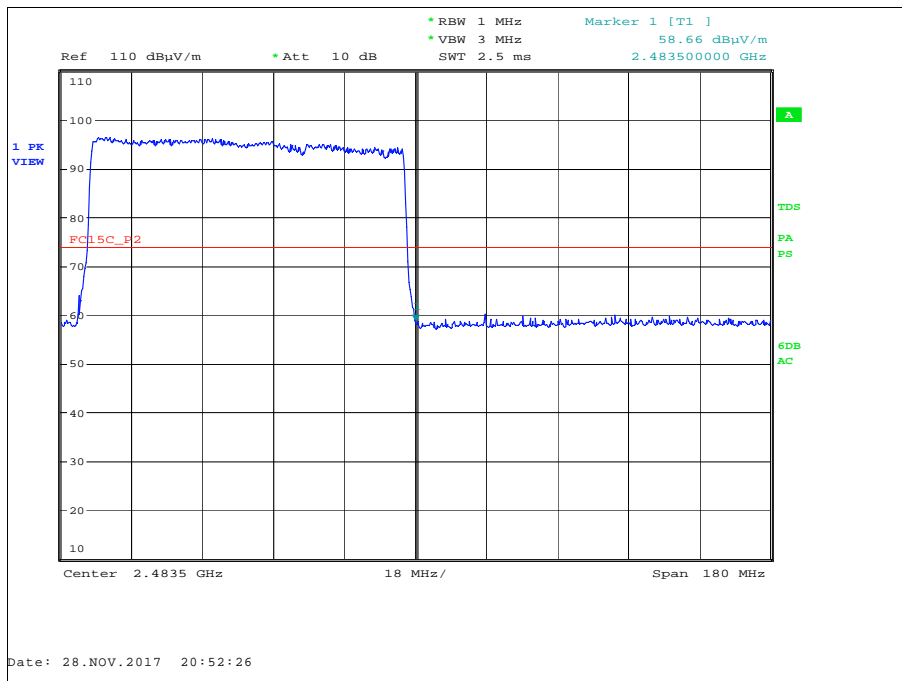


Figure 38 - Hopping - 8-DPSK - 2480 MHz - Measured Frequency 2483.5 MHz - Peak

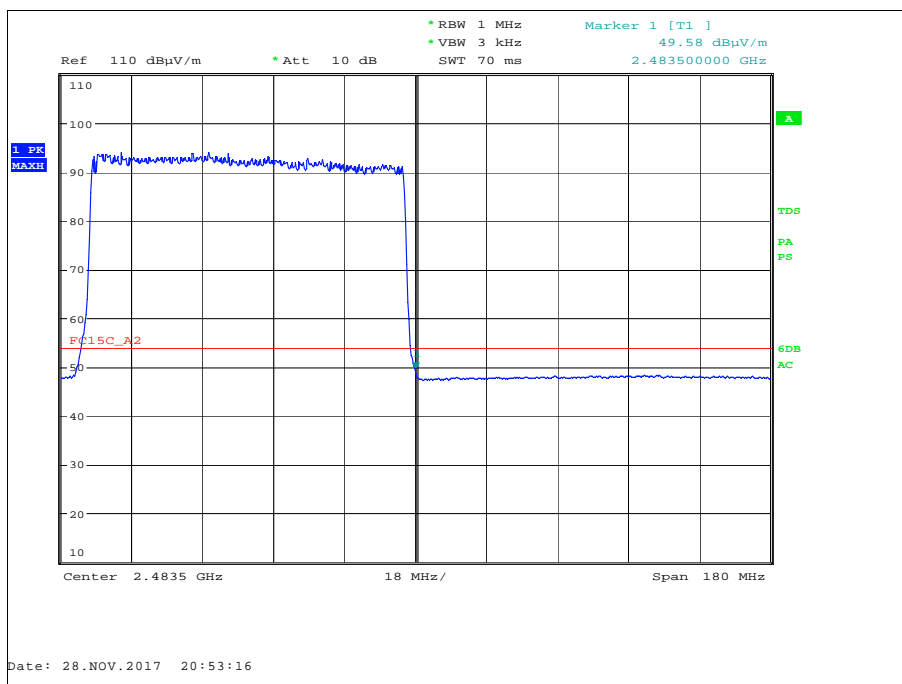


Figure 39 - Hopping - 8-DPSK - 2480 MHz - Measured Frequency 2483.5 MHz - Average

FCC 47 CFR Part 15, Limit Clause 15.205

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

Table 15



2.3.7 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	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygrometer	Rotronic	HYGROPALM 1	2338	12	24-Oct-2018
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	12	02-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
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	22-May-2018
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	17-Feb-2018

Table 16

TU - Traceability Unscheduled



2.4 Authorised Band Edges

2.4.1 Specification Reference

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

2.4.2 Equipment Under Test and Modification State

Pod, S/N: AA5425 - Modification State 0

2.4.3 Date of Test

28-November-2017 to 04-December-2017

2.4.4 Test Method

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

2.4.5 Environmental Conditions

Ambient Temperature 17.1 °C

Relative Humidity 33.0 %

2.4.6 Test Results

Bluetooth (BR + EDR)

Mode	Modulation	Frequency (MHz)	Measured Frequency (MHz)	Level (dBc)
Static	GFSK	2402	2400.0	37.24
Static	GFSK	2480	2483.5	49.10
Hopping	GFSK	2402	2400.0	37.90
Hopping	GFSK	2480	2483.5	49.14
Static	$\pi/4$ DQPSK	2402	2400.0	35.11
Static	$\pi/4$ DQPSK	2480	2483.5	44.00
Hopping	$\pi/4$ DQPSK	2402	2400.0	35.56
Hopping	$\pi/4$ DQPSK	2480	2483.5	48.68
Static	8-DPSK	2402	2400.0	34.64
Static	8-DPSK	2480	2483.5	42.82
Hopping	8-DPSK	2402	2400.0	34.37
Hopping	8-DPSK	2402	2483.5	47.19

Table 17

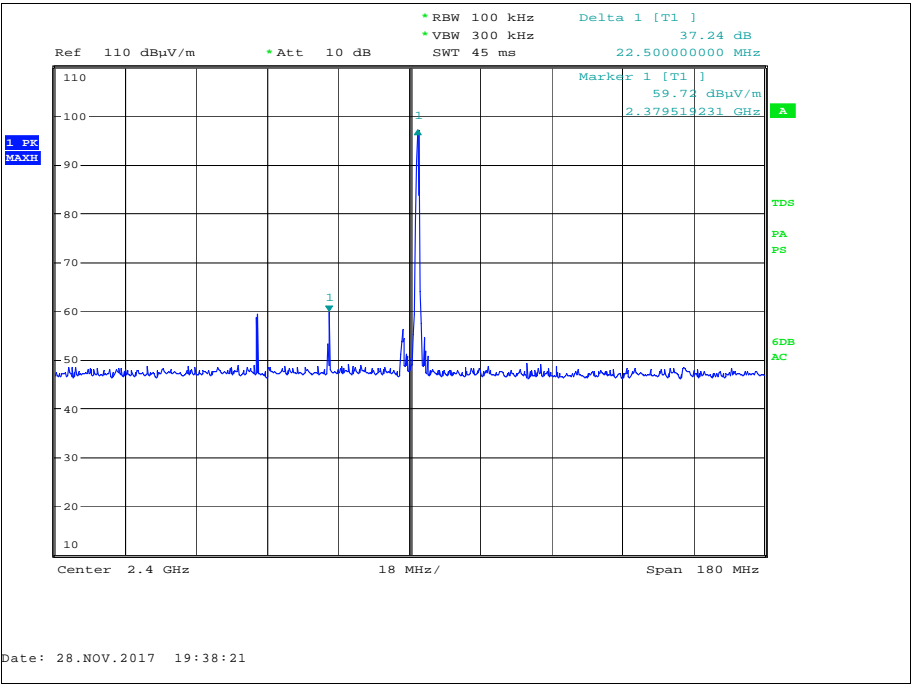


Figure 40 - Static - GFSK - 2402 MHz - Measured Frequency 2400.0 MHz

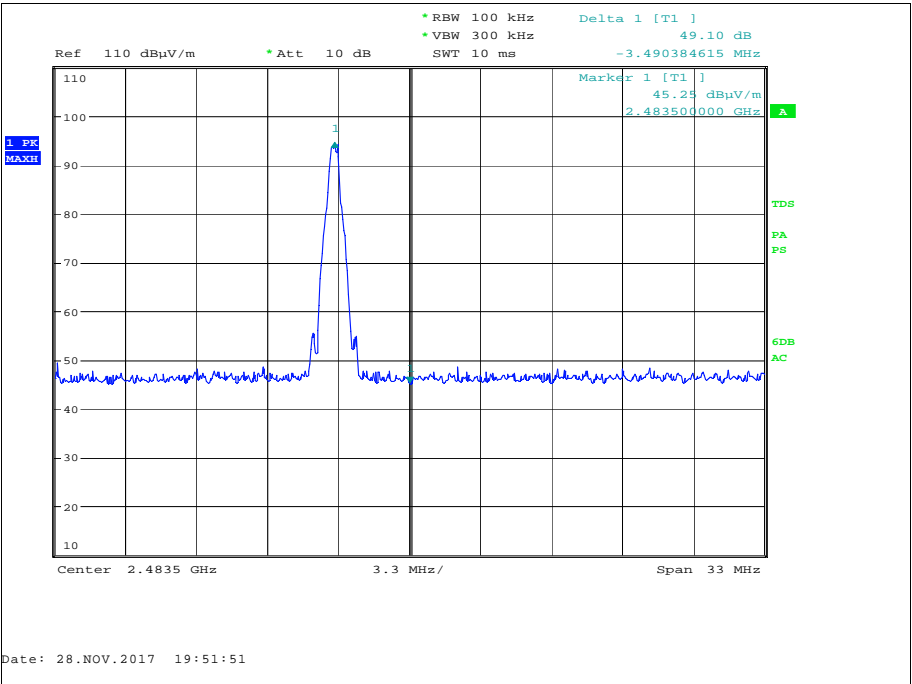


Figure 41 - Static - GFSK - 2480 MHz - Measured Frequency 2483.5 MHz



Product Service

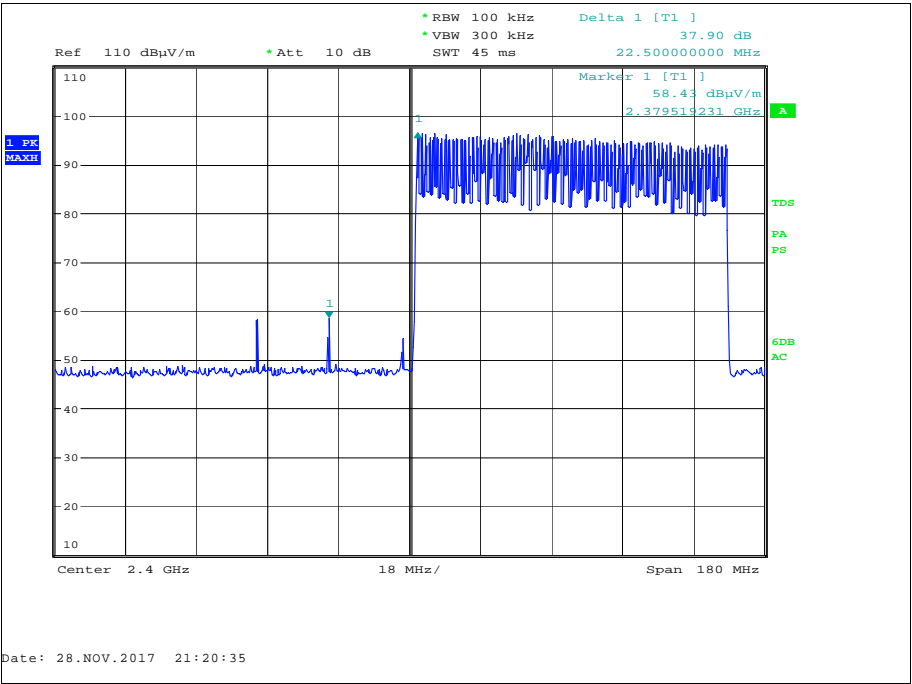


Figure 42 - Hopping - GFSK - 2402 MHz - Measured Frequency 2400.0 MHz

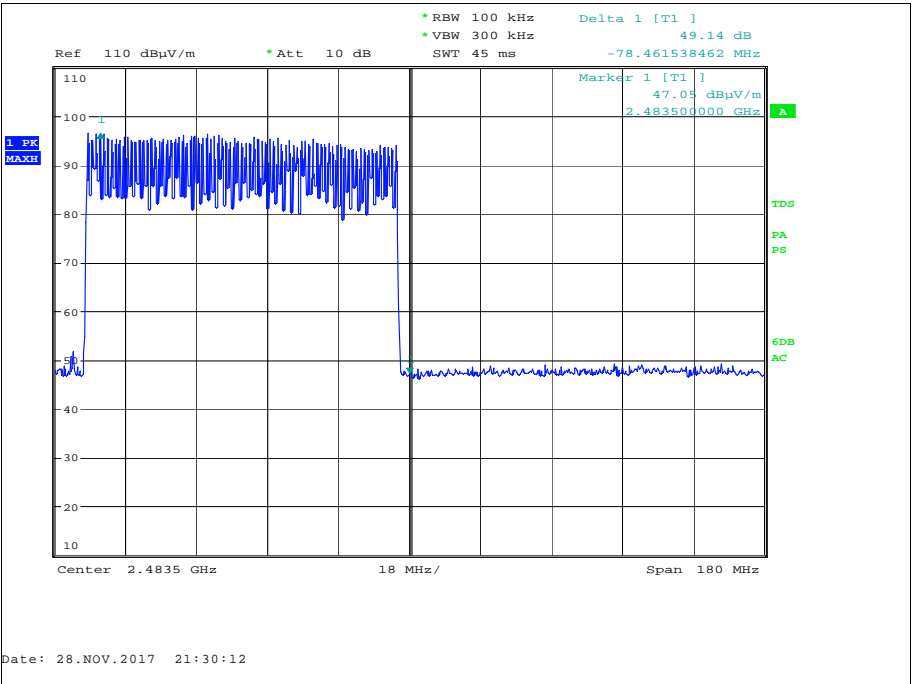


Figure 43 - Hopping - GFSK - 2480 MHz - Measured Frequency 2483.5 MHz

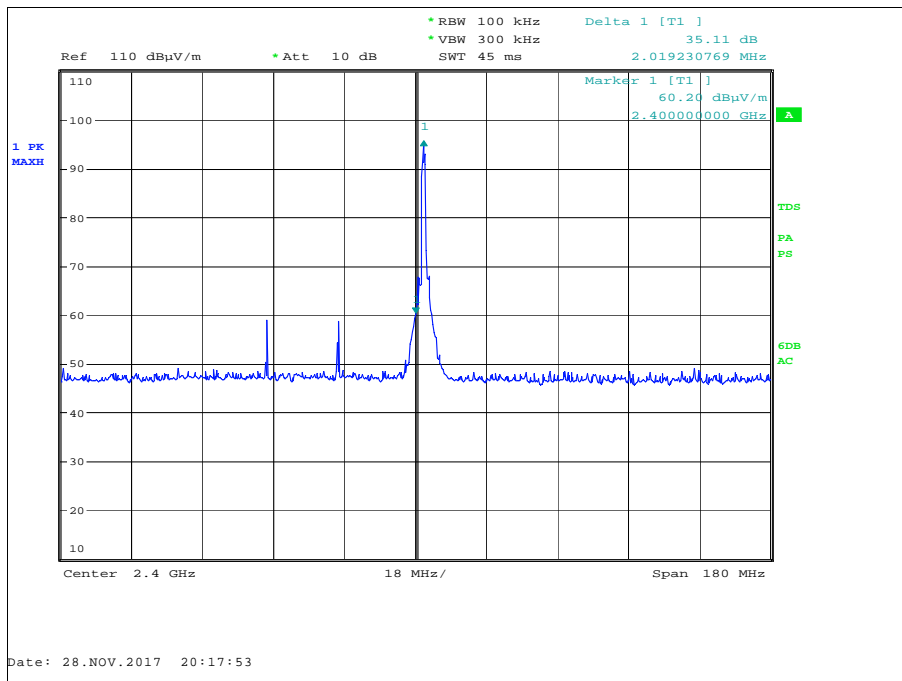


Figure 44 - Static - $\pi/4$ DQPSK - 2402 MHz - Measured Frequency 2400.0 MHz

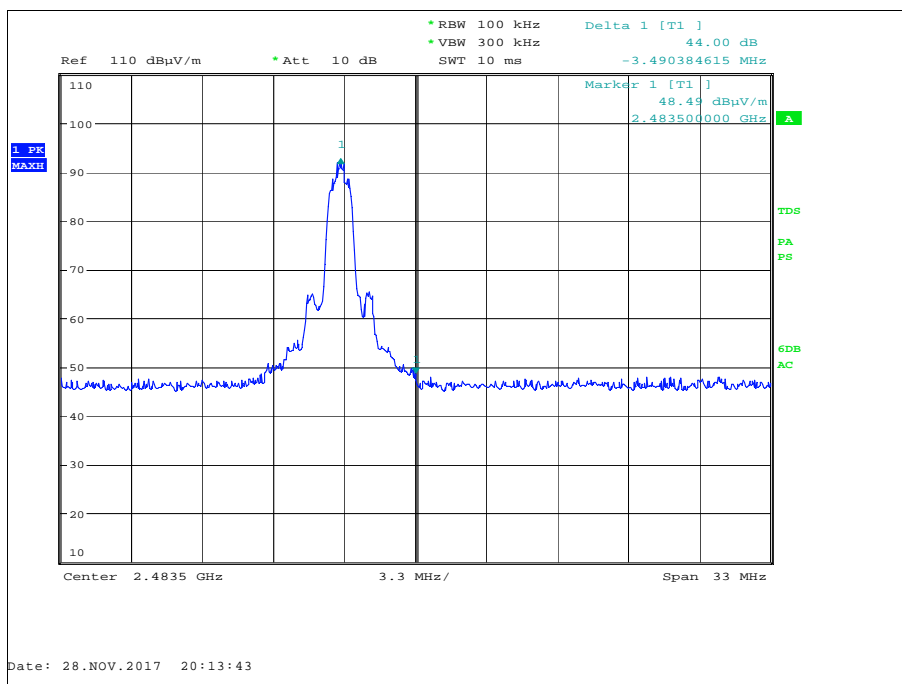


Figure 45 - Static - $\pi/4$ DQPSK - 2480 MHz - Measured Frequency 2483.5 MHz



Product Service

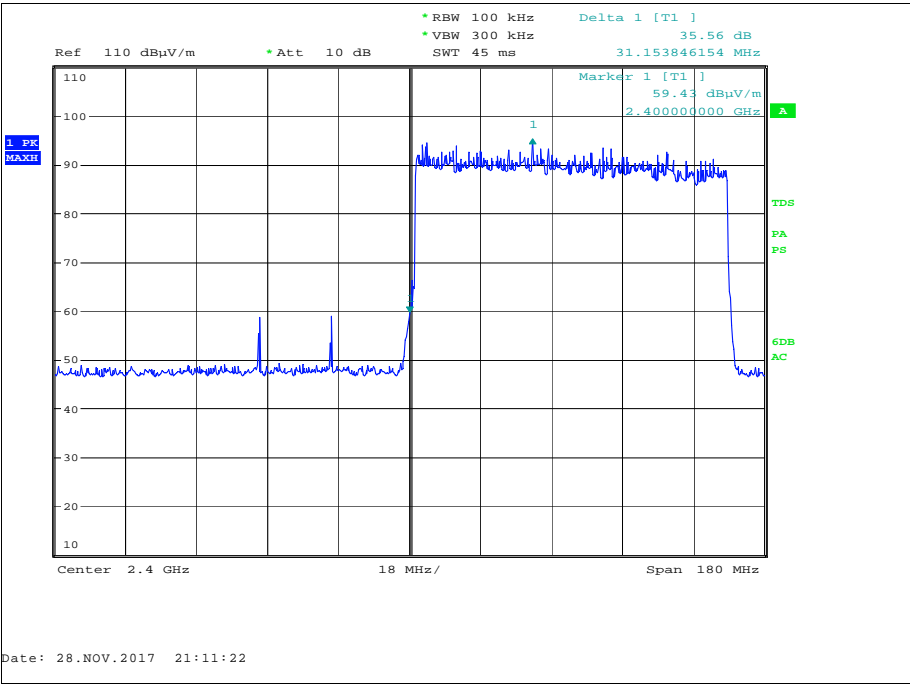


Figure 46 - Hopping - $\pi/4$ DQPSK - 2402 MHz - Measured Frequency 2400.0 MHz

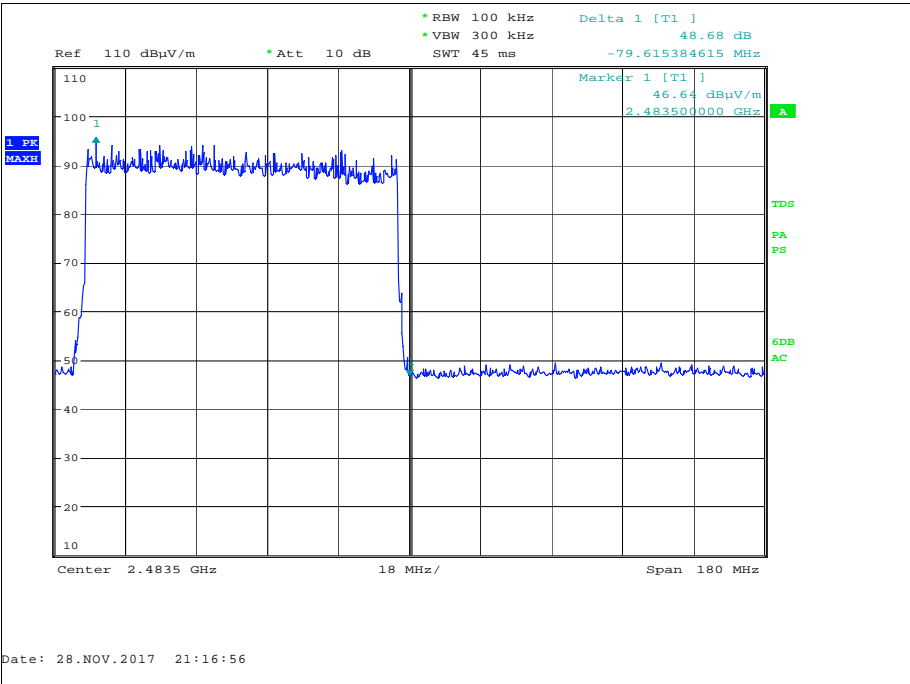


Figure 47 - Hopping - $\pi/4$ DQPSK - 2480 MHz - Measured Frequency 2483.5 MHz



Product Service

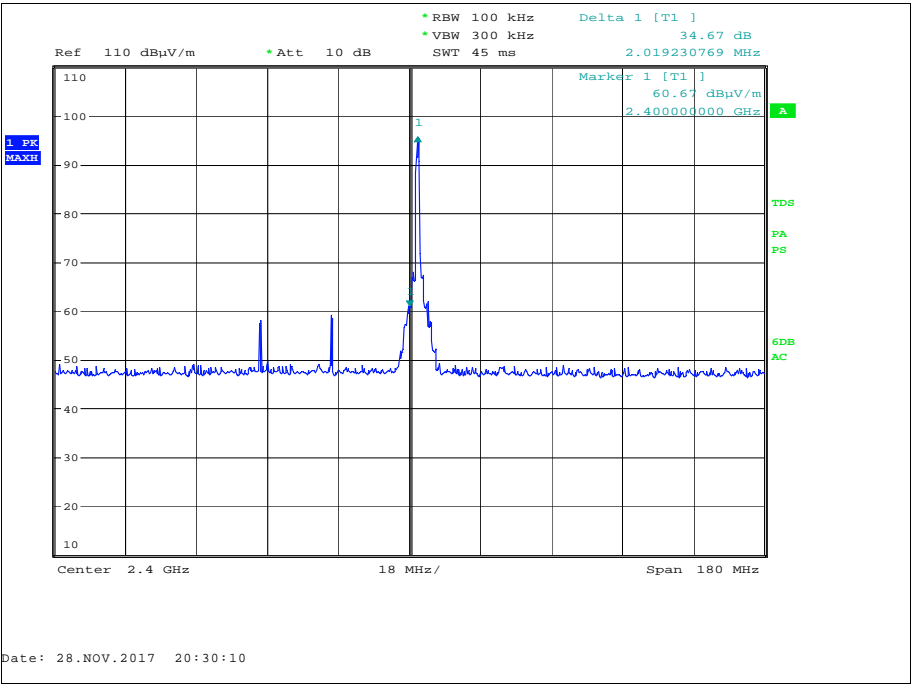


Figure 48 - Static - 8-DPSK - 2402 MHz - Measured Frequency 2400.0 MHz

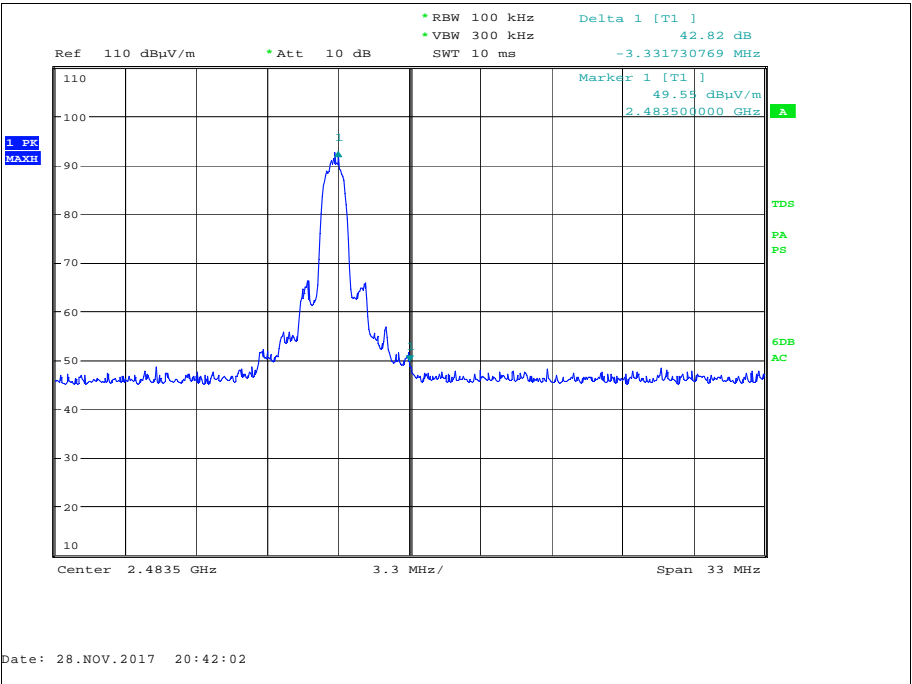


Figure 49 - Static - 8-DPSK - 2480 MHz - Measured Frequency 2483.5 MHz

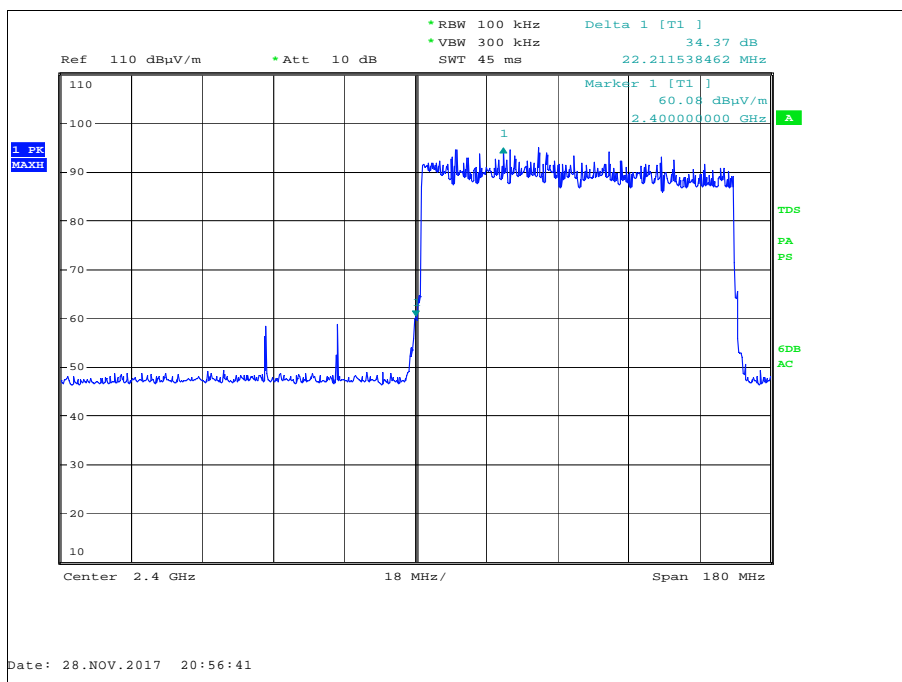


Figure 50 - Hopping - 8-DPSK - 2402 MHz - Measured Frequency 2400.0 MHz

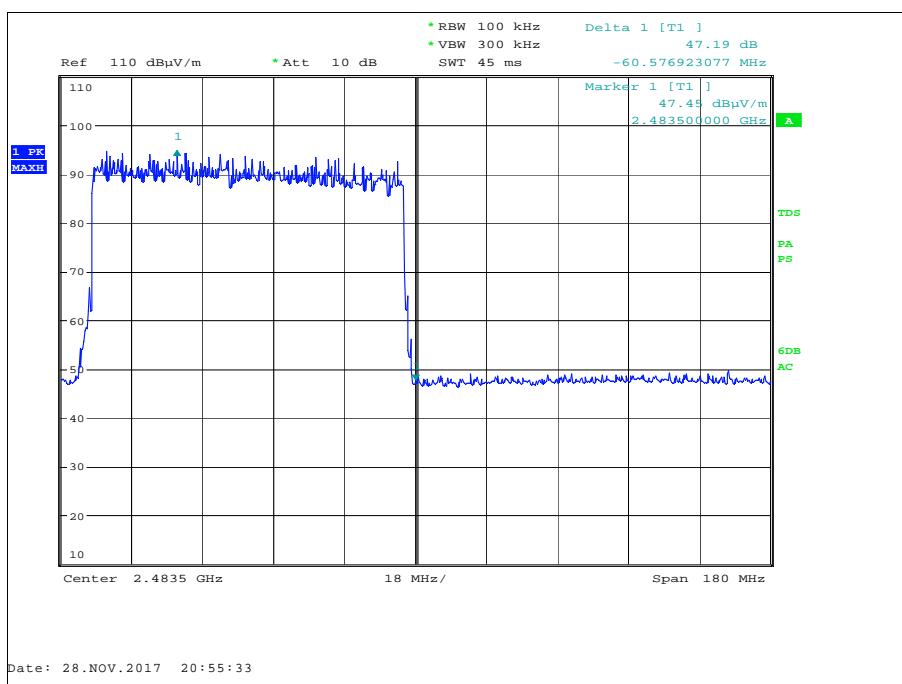


Figure 51 - Hopping - 8-DPSK - 2402 MHz - Measured Frequency 2483.5 MHz

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.



2.4.7 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	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygrometer	Rotronic	HYGROPALM 1	2338	12	24-Oct-2018
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	12	02-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
Cable (Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4526	6	22-May-2018
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	17-Feb-2018

Table 18

TU - Traceability Unscheduled



3 Measurement Uncertainty

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

Test Name	Measurement Uncertainty
Peak EIRP	Radiated: 1 GHz to 40 GHz: ± 6.3 dB
Spurious Radiated Emissions	Radiated: 30 MHz to 1 GHz: ± 5.2 dB Radiated: 1 GHz to 40 GHz: ± 6.3 dB
Restricted Band Edges	Radiated: 30 MHz to 1 GHz: ± 5.2 dB Radiated: 1 GHz to 40 GHz: ± 6.3 dB
Authorised Band Edges	Radiated: 30 MHz to 1 GHz: ± 5.2 dB Radiated: 1 GHz to 40 GHz: ± 6.3 dB

Table 19