FCC Testing of the
MiX Telematics International (Pty) Ltd
MiX41MC-3G Model 440FT0426
In accordance with FCC 47 CFR Part 15C

Prepared for: MiX Telematics Europe Limited
Cherry Orchard North
Kembrey Park
Swindon
SN1 2NR
United Kingdom

FCC ID: 2AFMS-41MC3G

Product Service

Choose certainty.
Add value.

COMMERCIAL-IN-CONFIDENCE

Date: February 2017
Document Number: 75936634-09 | Issue: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Steven White	14 February 2017	
Authorised Signatory	Matthew Russell	14 February 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	Dan Ralley	14 February 2017	
Testing	Graeme Lawler	14 February 2017	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY
A sample of this product was tested and found to be in compliance with FCC 47 CFR Part 15C: 2015.

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

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	14 February 2017

Table 1

1.2 Introduction

Applicant	MiX Telematics Europe Limited
Manufacturer	MiX Telematics International (Pty) Ltd
Model Number(s)	MiX41MC-3G
Serial Number(s)	40000278 40000279
Hardware Version(s)	V5A [V2E (pcb)]
Software Version(s)	V1.0.9
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 15C: 2015
Order Number Date	PO086320 18-October-2016
Date of Receipt of EUT	03-November-2016
Start of Test	15-November-2016
Finish of Test	05-December-2016
Name of Engineer(s)	Dan Ralley and Graeme Lawler
Related Document(s)	ANSI C63.10 (2013)

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: 915 MHz SRD Transceiver				
2.1	15.247 (a)(1)	Frequency Hopping Systems - Number of Hopping Channels	Pass	ANSI C63.10
2.2	15.247 (a)(1)	Frequency Hopping Systems - 20 dB Bandwidth	Pass	ANSI C63.10
2.3	15.247 (a)(1)	Frequency Hopping Systems - Channel Separation	Pass	ANSI C63.10
2.4	15.247 (a)(1)	Frequency Hopping Systems - Average Time of Occupancy	Pass	ANSI C63.10
2.5	15.247 (b)	Peak EIRP	Pass	ANSI C63.10
2.6	15.247 (d) and 15.205	Spurious Radiated Emissions	Pass	ANSI C63.10
2.7	15.205	Restricted Band Edges	Pass	ANSI C63.10
2.8	15.247 (d)	Authorised Band Edges	Pass	ANSI C63.10

Table 2

1.4 Application Form

EQUIPMENT DESCRIPTION	
Model Name/Number	MiX41MC-3G
Part Number	440FT0426
Hardware Version	V5A [V2E (pcb)]
Software Version	V1.0.9
FCC ID (if applicable)	2AFMS-41MC3G
Industry Canada ID (if applicable)	
Technical Description (Please provide a brief description of the intended use of the equipment)	The MiX4000 is a high-end Fleet Management product integrating GSM modem, GPS receiver, Blue Tooth Low Energy, 434 / 915MHz short range transceiver and CAN bus.

POWER SOURCE

☐ AC mains — State voltage

AC supply frequency (Hz)

VAC

Max Current

Hz

☐ Single phase ☐ Three phase

And / Or

☒ External DC supply

Nominal voltage 12 V Max Current 0.500 A

Extreme upper voltage 33 V

Extreme lower voltage 10.5 V

Battery

☐ Nickel Cadmium ☐ Lead acid (Vehicle regulated)

☐ Alkaline ☐ Leclanche

☐ Lithium ☐ Other Details :

Volts nominal.

End point voltage as quoted by equipment manufacturer V

FREQUENCY INFORMATION

Frequency Range	902 to928	MHz			
Channel Spacing (where applicable)	400kHz				
Receiver Frequency Range (if different)	902 to928	MHz			
Channel Spacing (if different)					
Test Frequencies*	Bottom	902.2	MHz	Channel Number (if applicable)	0
	Middle	915.0	MHz	Channel Number (if applicable)	32
	Top	927.8	MHz	Channel Number (if applicable)	64
Intermediate Frequencies			MHz		
Highest Internally Generated Frequency :		2100 MHz			

Product Service

POWER CHARACTERISTICS						
Maximum TX power	0.1	W				
Minimum TX power		W (if variable)				
Is transmitter intended for :						
Continuous duty				☐ Yes	☒ No	
Intermittent duty				☒ Yes	☐ No	
If intermittent state DUTY CYCLE						
Transmitter ON	0 seconds					
Transmitter OFF		seconds				

ANTENNA CHARACTERISTICS						
☐	Antenna connector			State impedance		Ohm
☐	Temporary antenna connector			State impedance		Ohm
☒	Integral antenna	Type	PCB Helical	State gain	0	dBi
☐	External antenna	Type		State gain		dBi

MODULATION CHARACTERISTICS			
☐	Amplitude	☒	Frequency
☐	Phase	☐	Other (please provide details):
Can the transmitter operate un-modulated?		☐ Yes	☐ No

CLASS OF EMISSION USED	
ITU designation or Class of Emission:	
1	25K0F1D
(if applicable) 2	
(if applicable) 3	
If more than three classes of emission, list separately:	

BATTERY POWER SUPPLY	
Model name/number	Identification/Part number
Manufacturer	Country of Origin

ANCILLARIES (If applicable)	
Model name/number	Identification/Part number
Manufacturer	Country of Origin

EXTREME CONDITIONS					
Extreme test voltages (Max)	33	V	Extreme test voltages (Min)	10.5	V
Nominal DC Voltage	12	V	DC Maximum Current	0.5	A
Maximum temperature	-20	°C	Minimum temperature	60	°C

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

Name: Steve Dawes Position held: Engineering Manager
Date: 03/11/16

1.5 Product Information

1.5.1 Technical Description

The MiX4000 is a high-end Fleet Management product integrating GSM modem, GPS receiver, Bluetooth Low Energy, 434 / 915MHz short range transceiver and CAN bus.

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: 40000278			
0	As supplied by the customer	Not Applicable	Not Applicable
Serial Number: 40000279			
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: 915 MHz SRD Transceiver		
Frequency Hopping Systems - Number of Hopping Channels	Dan Ralley	UKAS
Frequency Hopping Systems - 20 dB Bandwidth	Dan Ralley	UKAS
Frequency Hopping Systems - Channel Separation	Dan Ralley	UKAS
Frequency Hopping Systems - Average Time of Occupancy	Dan Ralley	UKAS
Peak EIRP	Graeme Lawler	UKAS
Spurious Radiated Emissions	Graeme Lawler	UKAS
Restricted Band Edges	Graeme Lawler	UKAS
Authorised Band Edges	Graeme Lawler	UKAS

Table 4

Product Service

Office Address:

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

2 Test Details

2.1 Frequency Hopping Systems - Number of Hopping Channels

2.1.1 Specification Reference

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

2.1.2 Equipment Under Test and Modification State

MiX41MC-3G, S/N: 40000278 - Modification State 0

2.1.3 Date of Test

15-November-2016

2.1.4 Test Method

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

2.1.5 Environmental Conditions

Ambient Temperature	24.1 - 24.2 °C
Relative Humidity	48.7 - 49.4 %

2.1.6 Test Results

915 MHz SRD Transceiver

Number of Hopping Channels: 64

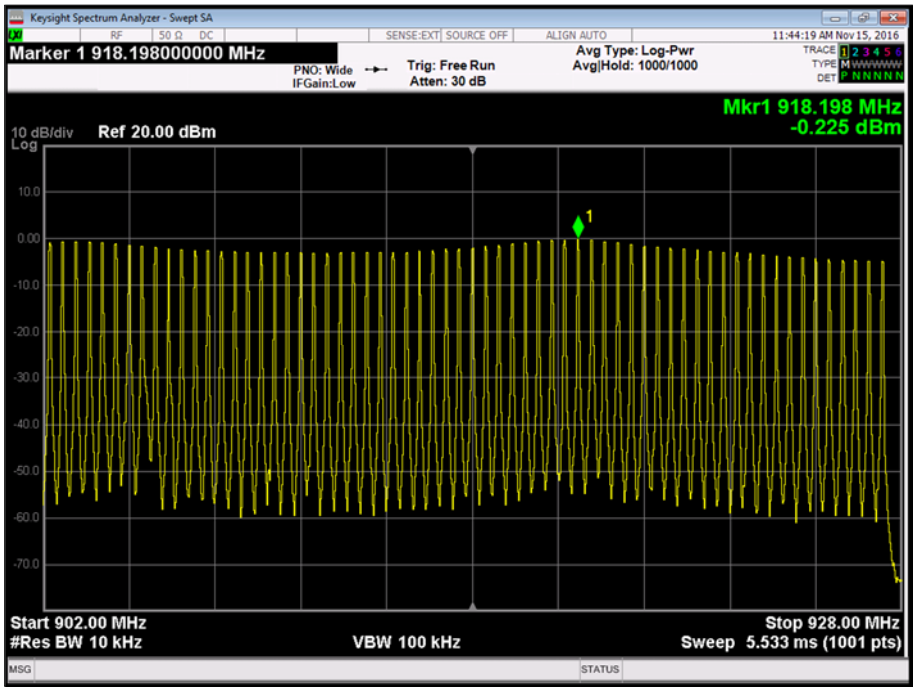

Figure 2 - Measurement Frequency Range: 902–928 MHz

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

20 dB Bandwidth	Minimum Number of Hopping Frequencies
< 250 kHz	50
≥ 250 kHz	25

2.1.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
RF Coupler	TUV SUD Product Service	RFC1	414	-	O/P Mon
Multimeter	Fluke	79 Series III	611	12	14-Sep-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	05-Mar-2017
Hygrometer	Rotronic	I-1000	3220	12	23-Aug-2017
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	05-Mar-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	24-Oct-2017
1 metre K type Cable	IW Microwave	KPS-1501LC-394-KPS-R	4727	12	03-Aug-2017
2 Channel PSU	Rohde & Schwarz	HMP2020	4735	-	O/P Mon

Table 5

O/P Mon – Output Monitored using calibrated equipment

2.2 Frequency Hopping Systems - 20 dB Bandwidth

2.2.1 Specification Reference

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

2.2.2 Equipment Under Test and Modification State

MiX41MC-3G, S/N: 40000278 - Modification State 0

2.2.3 Date of Test

15-November-2016

2.2.4 Test Method

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

2.2.5 Environmental Conditions

Ambient Temperature	21.6 - 24.4 °C
Relative Humidity	34.8 - 49.9 %

2.2.6 Test Results

915 MHz SRD Transceiver

20 dB Bandwidth (kHz)		
902.2 MHz	915.0 MHz	927.4 MHz
42.33	42.32	42.74

Table 6

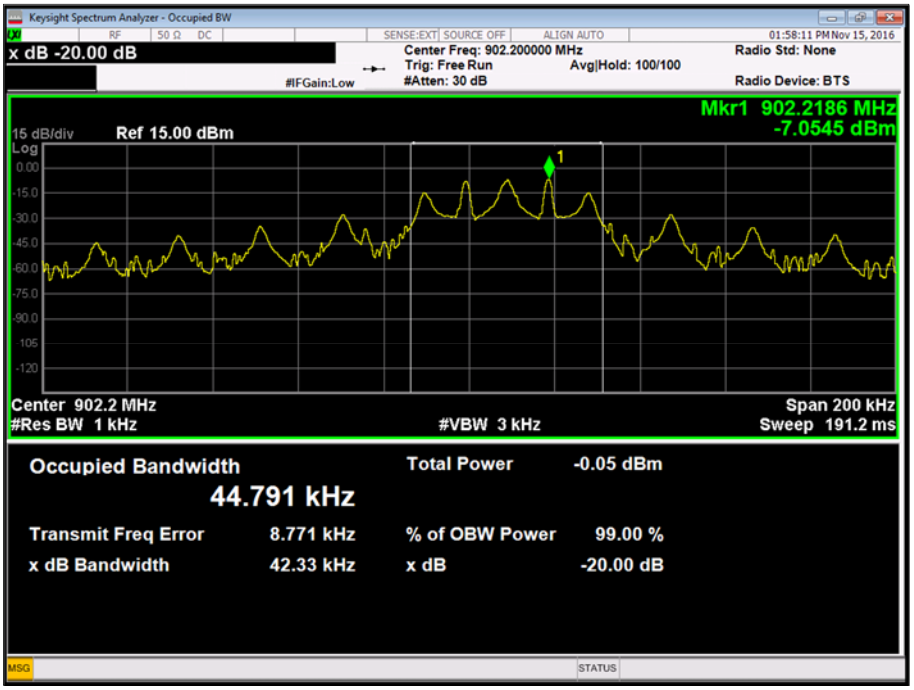

Figure 3 - 902.2 MHz

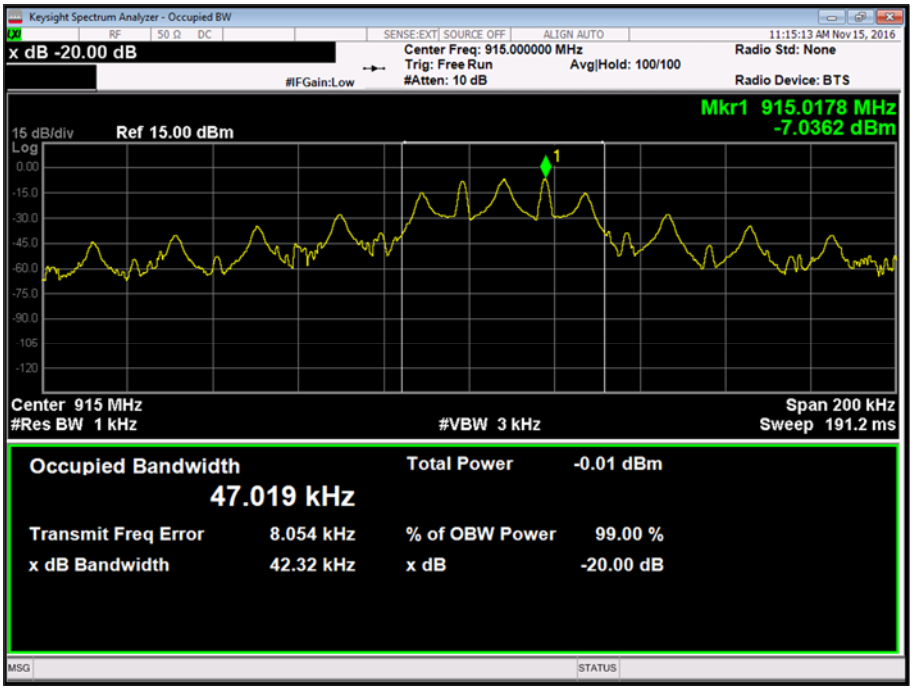

Figure 4 - 915.0 MHz

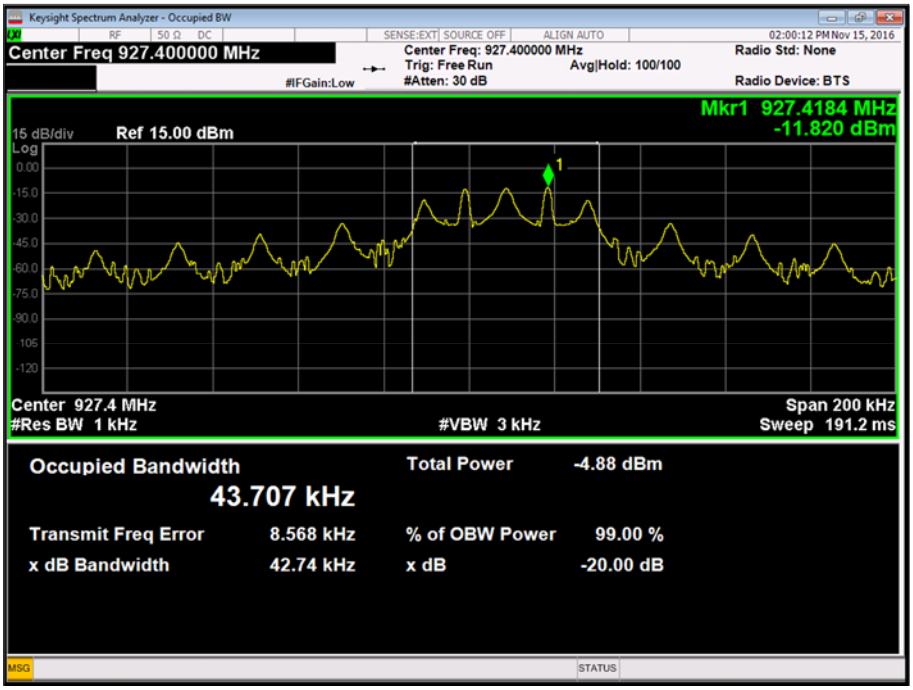

Figure 5 - 927.4 MHz

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

≤ 500 kHz

2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
RF Coupler	TUV SUD Product Service	RFC1	414	-	O/P Mon
Multimeter	Fluke	79 Series III	611	12	14-Sep-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	5-Mar-2017
Hygrometer	Rotronic	I-1000	3220	12	23-Aug-2017
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	5-Mar-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	24-Oct-2017
1 metre K type Cable	IW Microwave	KPS-1501LC-394-KPS-R	4727	12	3-Aug-2017
2 Channel PSU	Rohde & Schwarz	HMP2020	4735	-	O/P Mon

Table 7

O/P Mon – Output Monitored using calibrated equipment

2.3 Frequency Hopping Systems - Channel Separation

2.3.1 Specification Reference

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

2.3.2 Equipment Under Test and Modification State

MiX41MC-3G, S/N: 40000278 - Modification State 0

2.3.3 Date of Test

15-November-2016

2.3.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 7.8.2.

2.3.5 Environmental Conditions

Ambient Temperature	24.2 °C
Relative Humidity	48.1 %

2.3.6 Test Results

915 MHz SRD Transceiver

Modulation	Channel Separation (MHz)
FM	0.4

Table 8

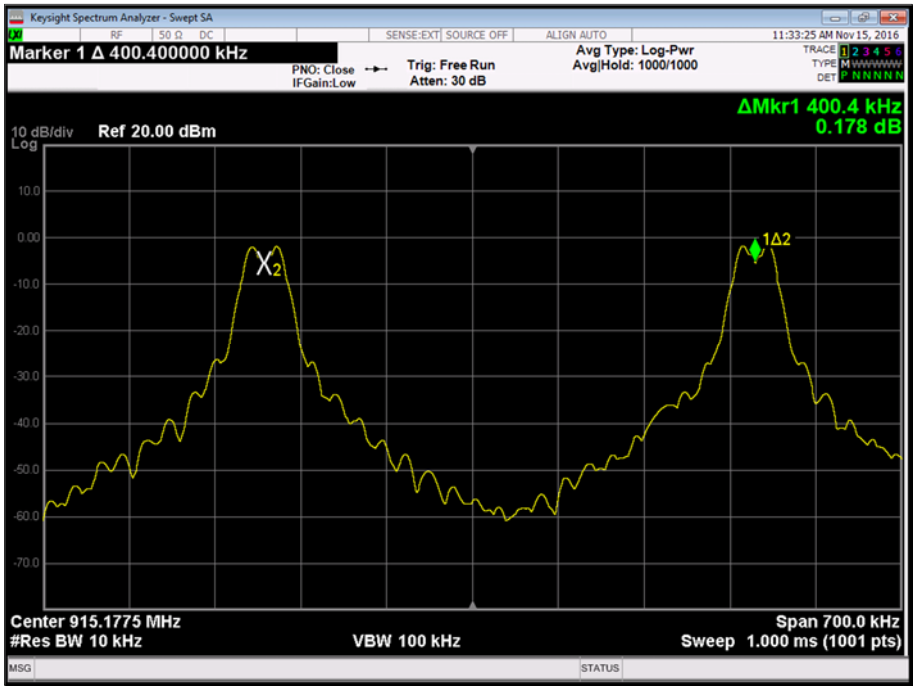

Figure 6 - FM

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.

2.3.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
RF Coupler	TUV SUD Product Service	RFC1	414	-	O/P Mon
Multimeter	Fluke	79 Series III	611	12	14-Sep-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	05-Mar-2017
Hygrometer	Rotronic	I-1000	3220	12	23-Aug-2017
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	05-Mar-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	24-Oct-2017
1 metre K type Cable	IW Microwave	KPS-1501LC-394-KPS-R	4727	12	03-Aug-2017
2 Channel PSU	Rohde & Schwarz	HMP2020	4735	-	O/P Mon

Table 9

O/P Mon – Output Monitored using calibrated equipment

2.4 Frequency Hopping Systems - Average Time of Occupancy

2.4.1 Specification Reference

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

2.4.2 Equipment Under Test and Modification State

MiX41MC-3G, S/N: 40000278 - Modification State 0

2.4.3 Date of Test

15-November-2016

2.4.4 Test Method

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

2.4.5 Environmental Conditions

Ambient Temperature	24.5 °C
Relative Humidity	49.9 %

2.4.6 Test Results

915 MHz SRD Transceiver

Packet Type	Dwell Time (ms)	Number of Transmissions	Average Occupancy Time (ms)
F1D	11.86	24	284.64

Table 10

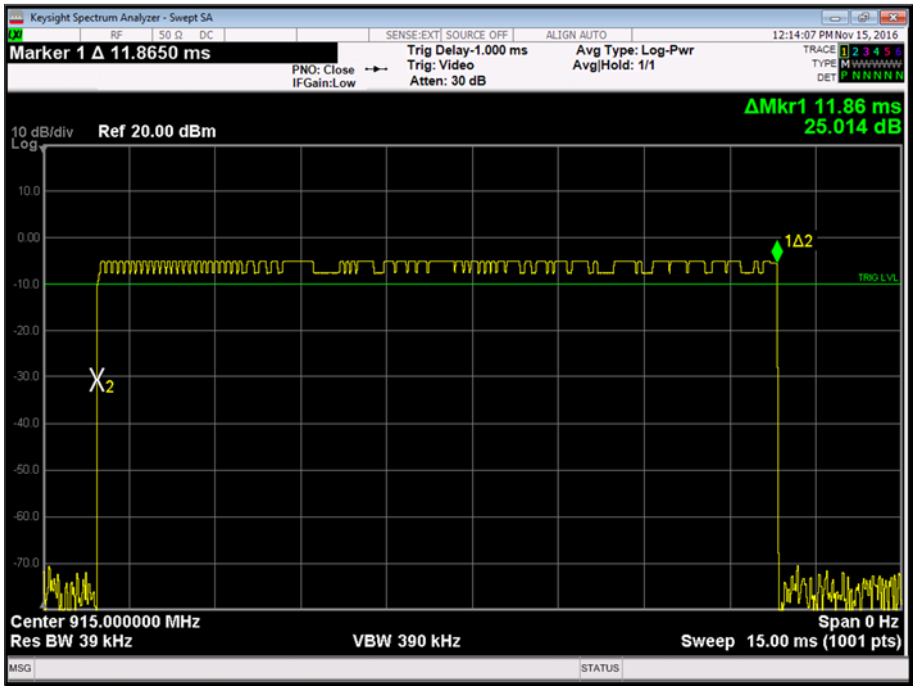

Figure 7 - F1D, Dwell Time

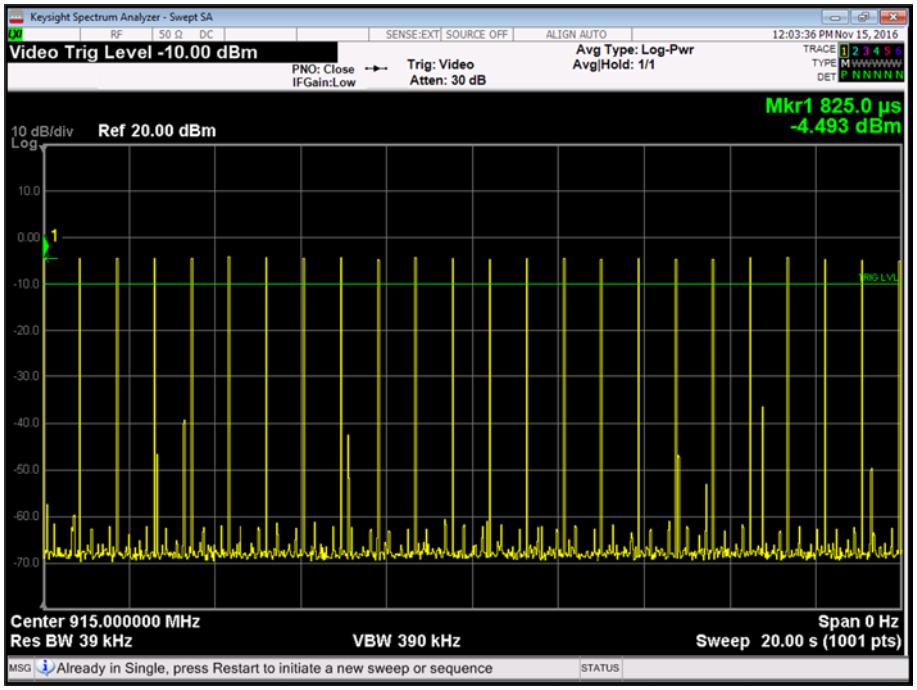

Figure 8 - F1D, Total Average Time of Occupancy

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

For frequency hopping systems operating in the 902–928 MHz band:

If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

2.4.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
RF Coupler	TUV SUD Product Service	RFC1	414	-	O/P Mon
Multimeter	Fluke	79 Series III	611	12	14-Sep-2017
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	5-Mar-2017
Hygrometer	Rotronic	I-1000	3220	12	23-Aug-2017
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	5-Mar-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	24-Oct-2017
1 metre K type Cable	IW Microwave	KPS-1501LC-394-KPS-R	4727	12	3-Aug-2017
2 Channel PSU	Rohde & Schwarz	HMP2020	4735	-	O/P Mon

Table 11

O/P Mon – Output Monitored using calibrated equipment

2.5 Peak EIRP

2.5.1 Specification Reference

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

2.5.2 Equipment Under Test and Modification State

MiX41MC-3G, S/N: 40000278 - Modification State 0

2.5.3 Date of Test

30-November-2016

2.5.4 Test Method

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

A substitution measurement was performed in accordance with Annex G5.3

2.5.5 Environmental Conditions

Ambient Temperature	20.2 °C
Relative Humidity	25.0 %

2.5.6 Test Results

915 MHz SRD Transceiver

Frequency (MHz)	Output Power	
	dBm	mW
902.2	15.15	32.73
915.0	12.86	19.32
927.4	9.68	9.29

Table 12

FCC 47 CFR Part 15, Limit Clause 15.247 (b)(2)(4)

For frequency hopping systems operating in the 902-928 MHz band:

Number of Hopping Channels	Maximum Conducted Power (W)	Maximum Antenna Gain (dBi)
At least 50	1	6
Less than 50 but at least 25	0.25	6

2.5.7 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
Hygrometer	Rotronic	A1	1388	12	13-Apr-2017
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
Antenna (Log Periodic)	Schaffner	UPA6108	3108	12	03-Jun-2017
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	-	O/P Mon
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	26-Feb-2017
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	12-Nov-2017
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	-	O/P Mon
4 Channel PSU	Rohde & Schwarz	HMP4040	4736	-	O/P Mon

Table 13

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment

2.6 Spurious Radiated Emissions

2.6.1 Specification Reference

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

2.6.2 Equipment Under Test and Modification State

MiX41MC-3G, S/N: 40000278 - Modification State 0

2.6.3 Date of Test

04-December-2016 to 05-December-2016

2.6.4 Test Method

Testing was performed in accordance with ANSI C63.10, clause 6.3, 6.5 and 6.6.

Plots for average measurements were taken in accordance with ANSI C63.10, clause 4.1.4.2.3.

Final average measurements were taken in accordance with ANSI C63.10, clause 4.1.4.2.2.

2.6.5 Environmental Conditions

Ambient Temperature	22.7 °C
Relative Humidity	24.0 %

2.6.6 Test Results

915 MHz SRD Transceiver

902.2 MHz

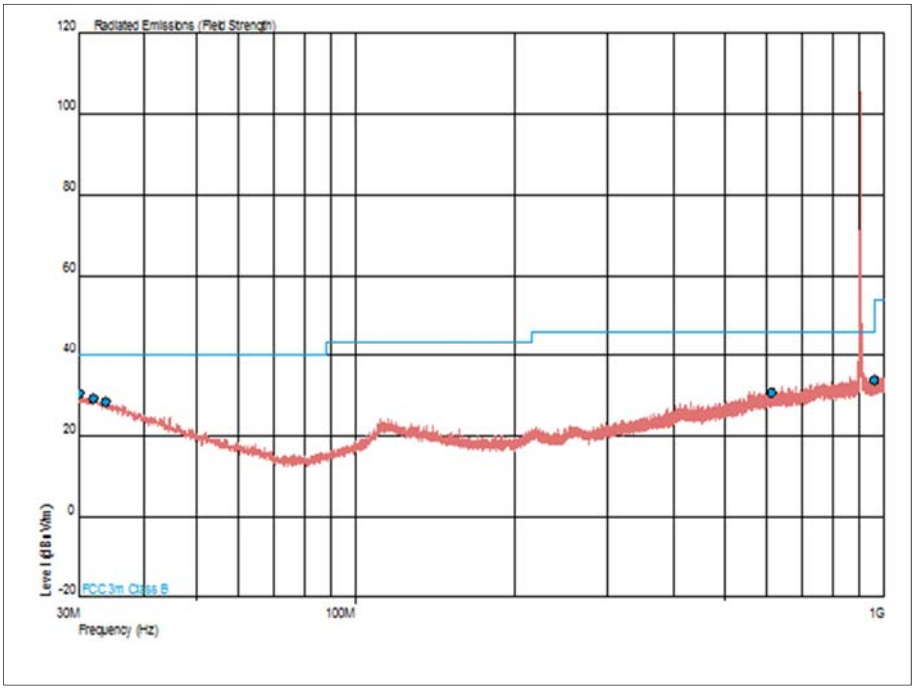

Figure 9 - Frequency Range Under Test: 30 MHz to 1 GHz - Polarity Horizontal and Vertical

Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
30.129	30.4	40.0	-9.6	0	1.00	Vertical
31.987	29.3	40.0	-10.7	0	1.00	Vertical
33.788	28.4	40.0	-11.6	0	1.00	Vertical
614.000	30.6	46.0	-15.4	0	1.00	Vertical
960.000	33.9	46.0	-12.1	0	1.00	Vertical

Table 14

1 GHz to 10 GHz

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

Table 15

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

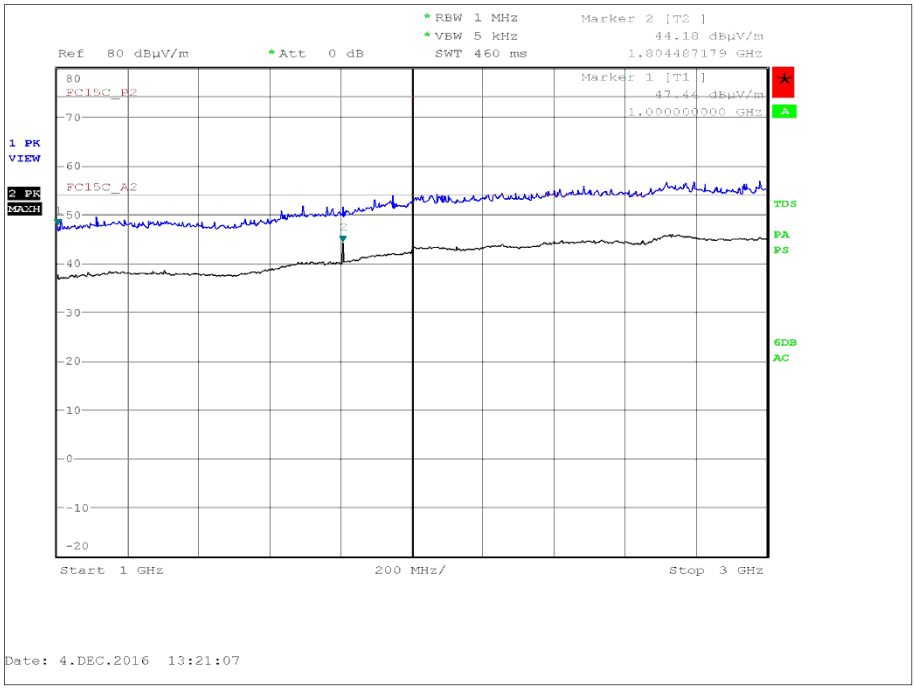

Figure 10 - Frequency Range Under Test: 1 GHz to 3 GHz - Polarity: Horizontal and Vertical

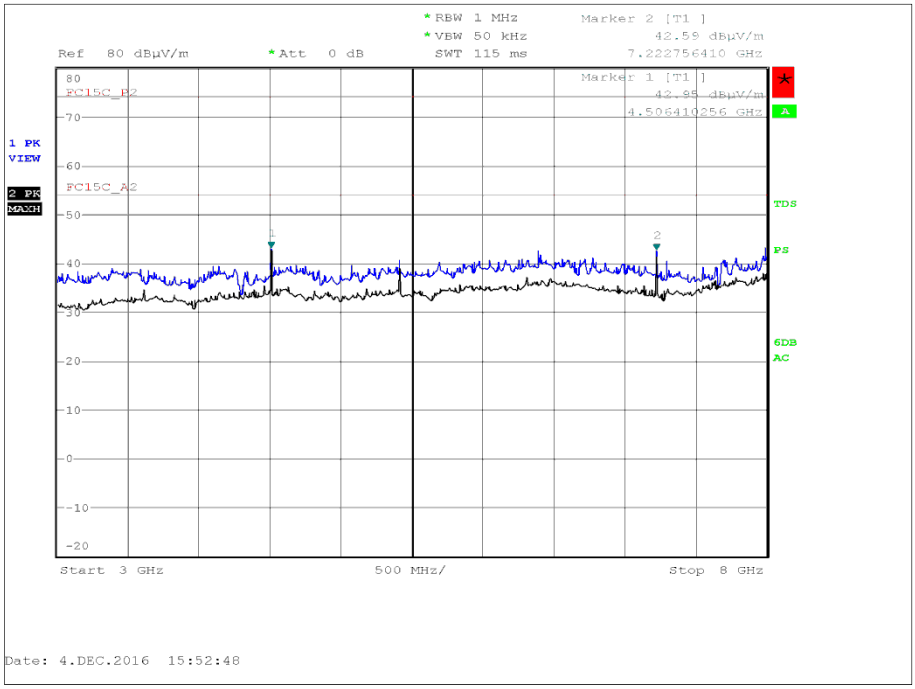

Figure 11 - Frequency Range Under Test: 3 GHz to 8 GHz - Polarity: Horizontal and Vertical

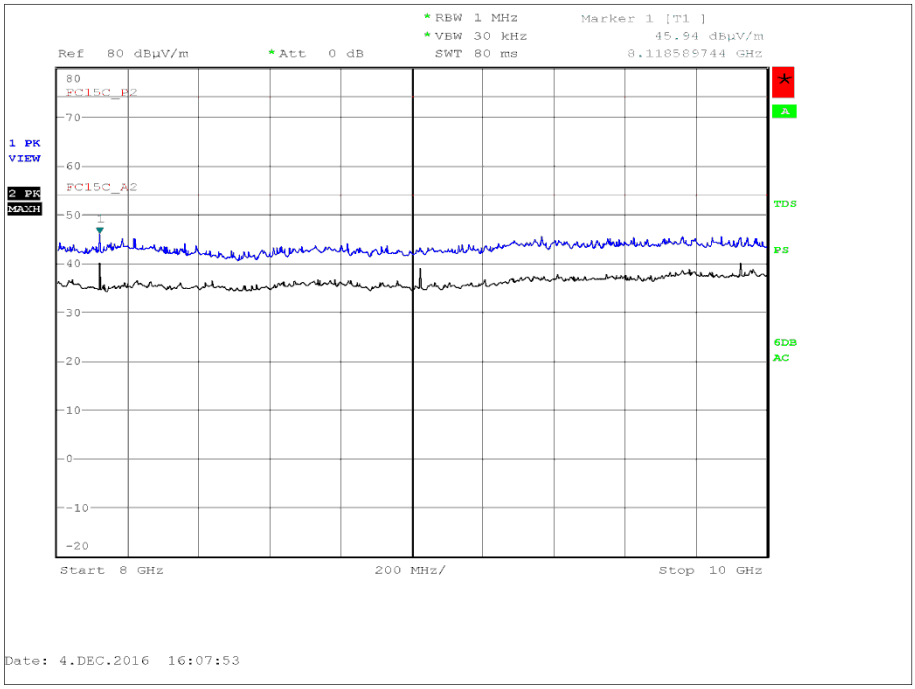

Figure 12 - Frequency Range Under Test: 8 GHz to 10 GHz - Polarity: Horizontal and Vertical

915.0 MHz

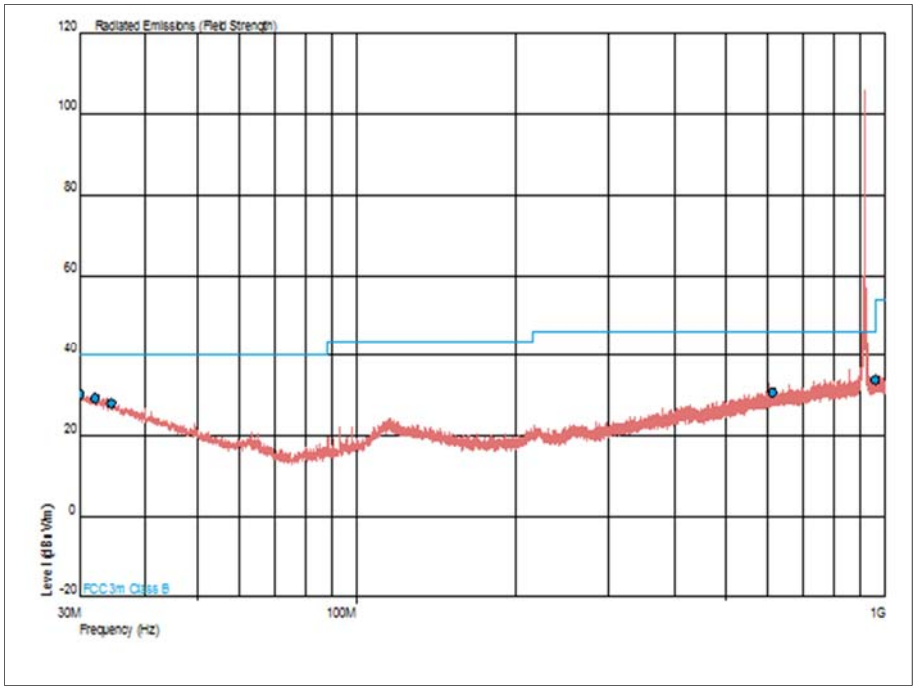

Figure 13 - Frequency Range Under Test: 30 MHz to 1 GHz - Polarity Horizontal and Vertical

Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
30.049	30.4	40.0	-9.6	90	1.00	Horizontal
32.098	29.3	40.0	-10.7	0	1.00	Horizontal
34.478	28.0	40.0	-12.0	0	1.00	Horizontal
614.000	30.6	46.0	-15.4	0	1.00	Horizontal
960.000	33.8	46.0	-12.2	0	1.00	Horizontal

Table 16

1 GHz to 10 GHz

Frequency (GHz)	Result (µV/m)		Limit (µV/m)		Margin (µV/m)	
	Peak	Average	Peak	Average	Peak	Average
4.574908	365.17	222.84	5011.87	501.19	4646.70	278.35
7.319998	320.63	192.53	5011.87	501.19	4691.24	308.66

Table 17

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

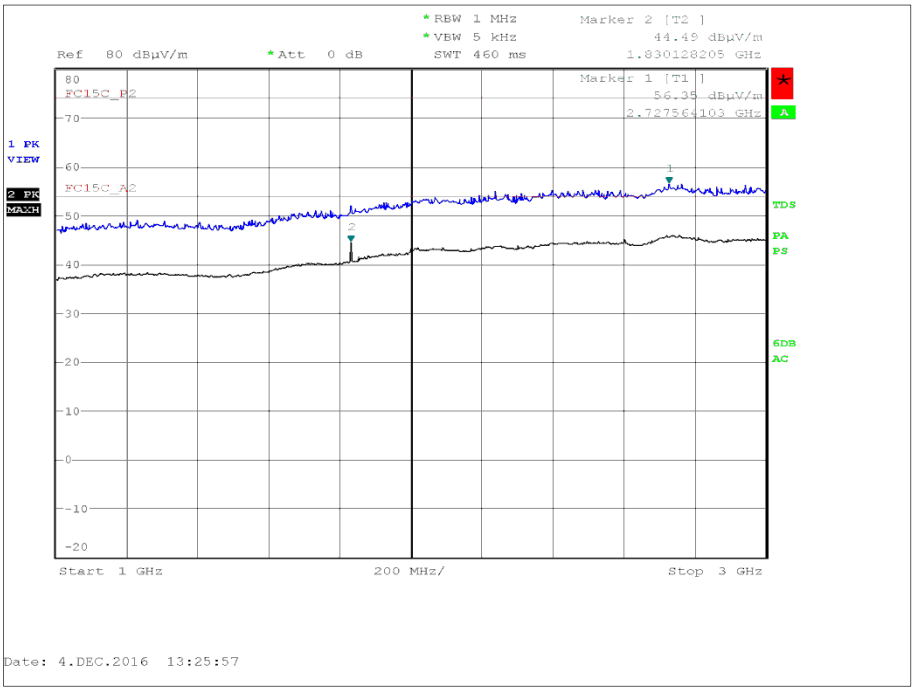

Figure 14 - Frequency Range Under Test: 1 GHz to 3 GHz - Polarity: Horizontal and Vertical

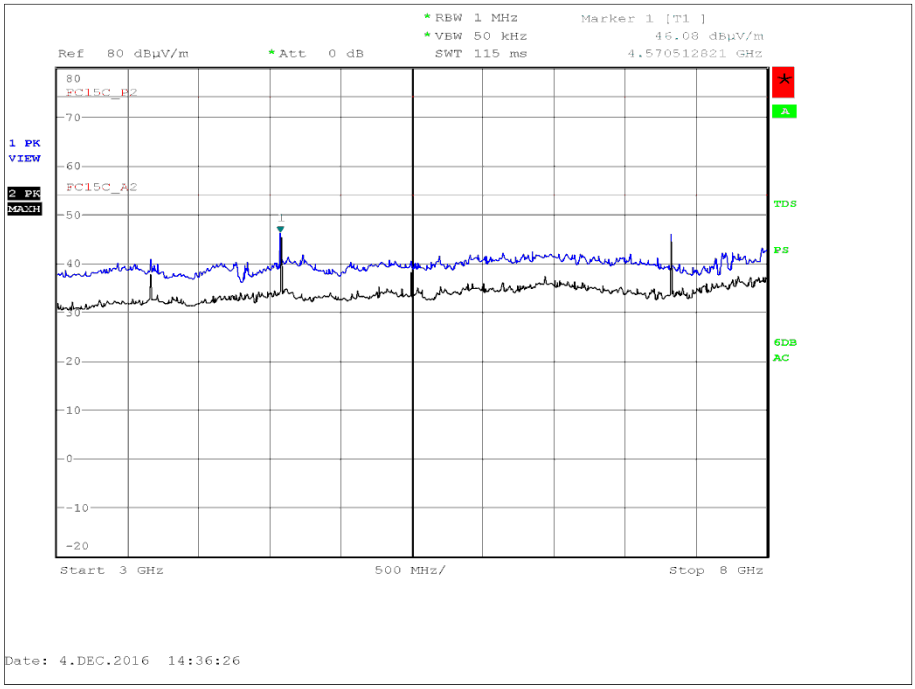

Figure 15 - Frequency Range Under Test: 3 GHz to 8 GHz - Polarity: Horizontal and Vertical

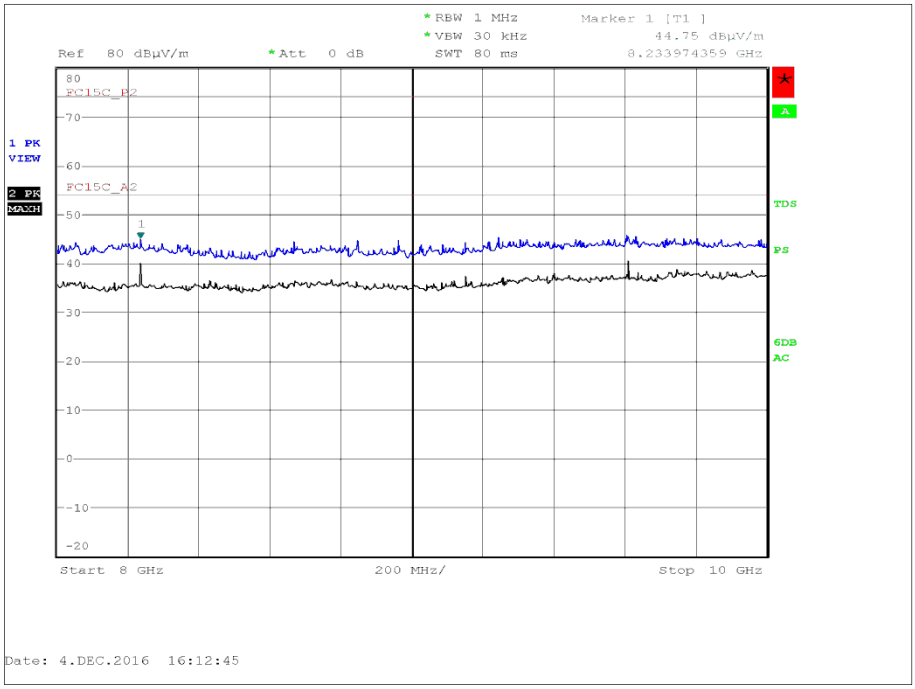

Figure 16 - Frequency Range Under Test: 8 GHz to 10 GHz - Polarity: Horizontal and Vertical

927.4 MHz

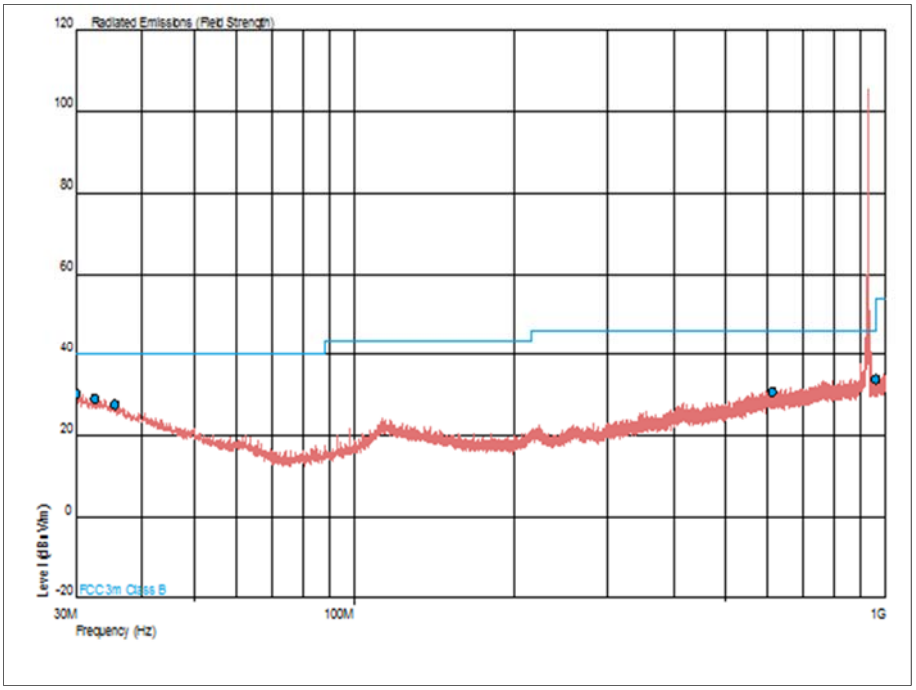

Figure 17 - Frequency Range Under Test: 30 MHz to 1 GHz - Polarity Horizontal and Vertical

Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
30.035	30.3	40.0	-9.7	0	1.00	Vertical
32.553	29.0	40.0	-11.0	0	1.00	Vertical
35.592	27.5	40.0	-12.5	0	1.00	Vertical
614.000	30.6	46.0	-15.4	0	1.00	Vertical
960.000	33.9	46.0	-12.1	0	1.00	Vertical

Table 18

1 GHz to 10 GHz

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

Table 19

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

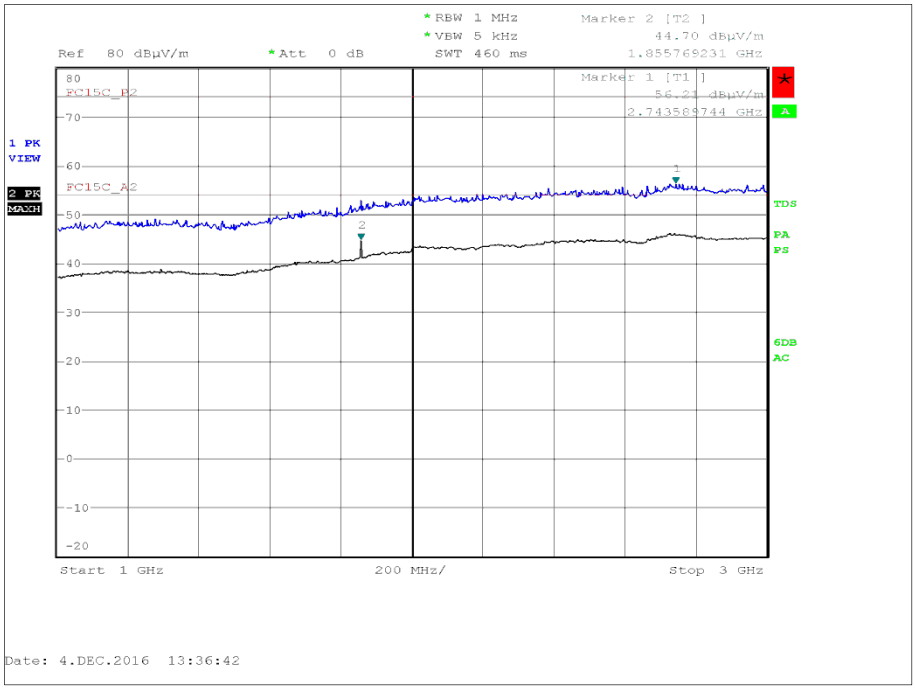

Figure 18 - Frequency Range Under Test: 1 GHz to 3 GHz - Polarity: Horizontal and Vertical

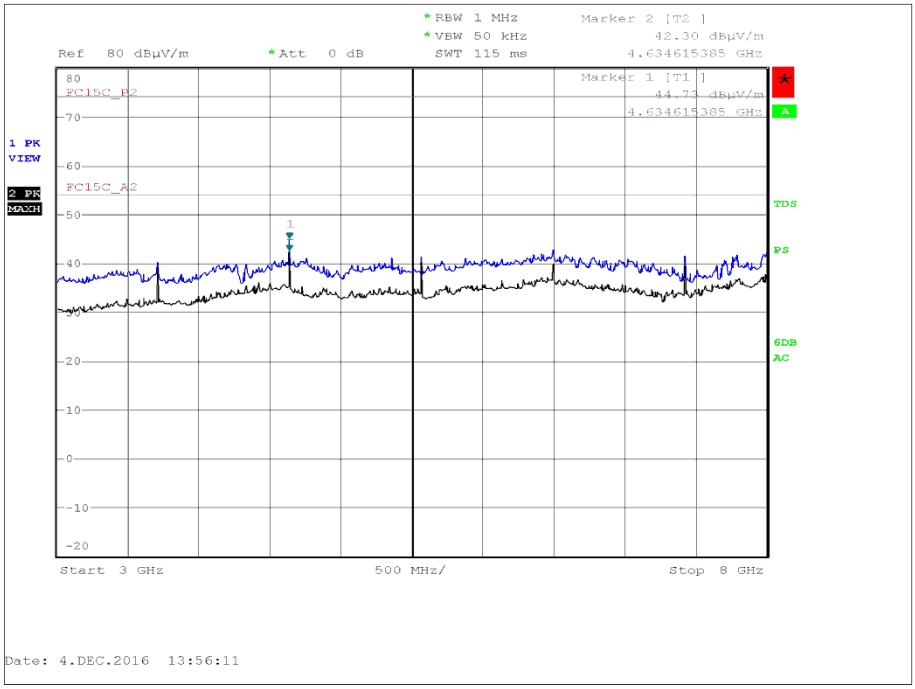

Figure 19 - Frequency Range Under Test: 3 GHz to 8 GHz - Polarity: Horizontal and Vertical

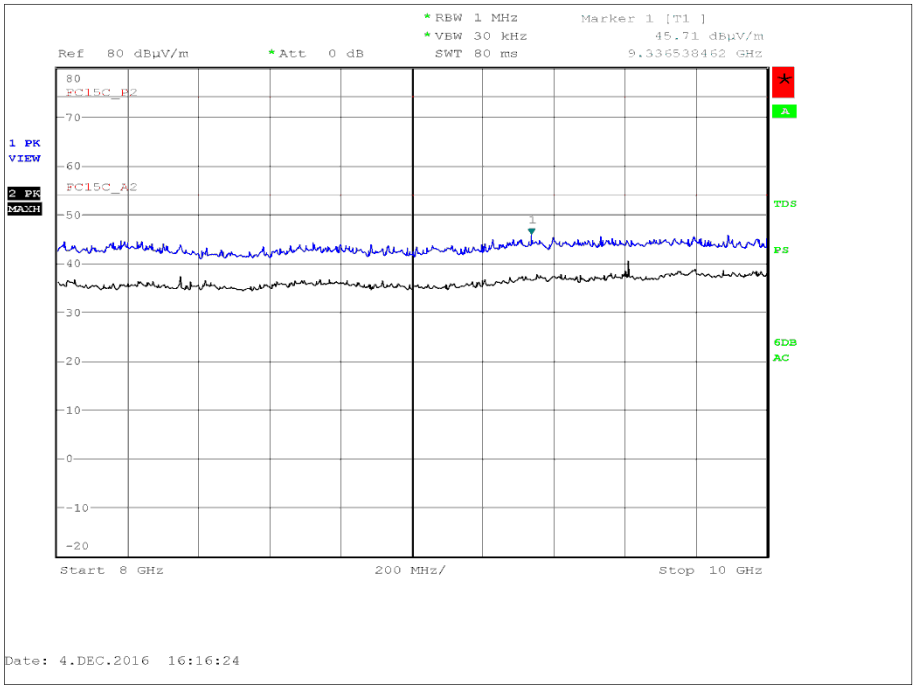

Figure 20 - Frequency Range Under Test: 8 GHz to 10 GHz - Polarity: Horizontal and Vertical

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)

2.6.7 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
Pre-Amplifier	Phase One	PS04-0086	1533	12	29-Jul-2017
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	21-Sep-2017
Multimeter	Iso-tech	IDM101	2417	12	30-Sep-2017
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	02-Nov-2017
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	-	O/P Mon
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	26-Feb-2017
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	12-Nov-2017
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	17-Oct-2017
Suspended Substrate Highpass Filter	Advance Power Components	11SH10-3000/X18000-O/O	4411	12	23-Mar-2017
Suspended Substrate Highpass Filter	Advance Power Components	11SH10-3000/X18000-O/O	4412	12	23-Mar-2017
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	-	O/P Mon
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	29-Dec-2016

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
4 Channel PSU	Rohde & Schwarz	HMP4040	4736	-	O/P Mon

Table 20

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment

2.7 Restricted Band Edges

2.7.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.205

2.7.2 Equipment Under Test and Modification State

MiX41MC-3G, S/N: 40000279 - Modification State 0

2.7.3 Date of Test

30-November-2016

2.7.4 Test Method

The test was performed in accordance ANSI C63.10 clause, 6.3, 6.5 and 6.10.5.

Plots for average measurements were taken in accordance with ANSI C63.10, clause 4.1.4.2.3

Final average measurements were taken in accordance with ANSI C63.10, clause 4.1.4.2.2

2.7.5 Environmental Conditions

Ambient Temperature	22.7 °C
Relative Humidity	36.8 %

2.7.6 Test Results

915 MHz SRD Transceiver

Frequency (MHz)	Measured Frequency (MHz)	Peak Level (dBµV/m)
902.2	614.0	37.39
927.4	960.0	38.57

Table 21

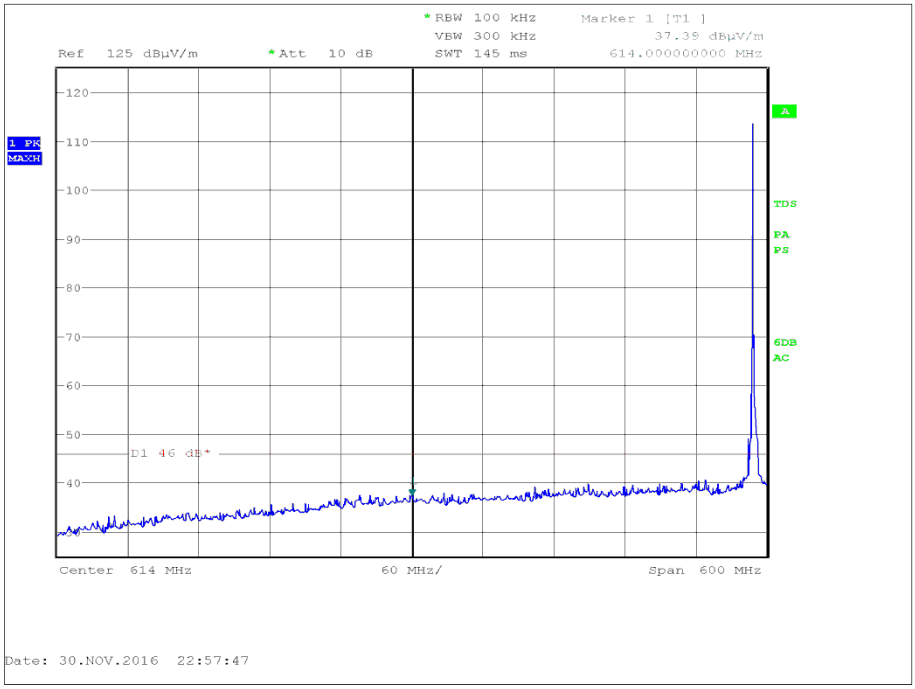

Figure 21 - 902.2 MHz, Measured Frequency 614.0 MHz, Peak

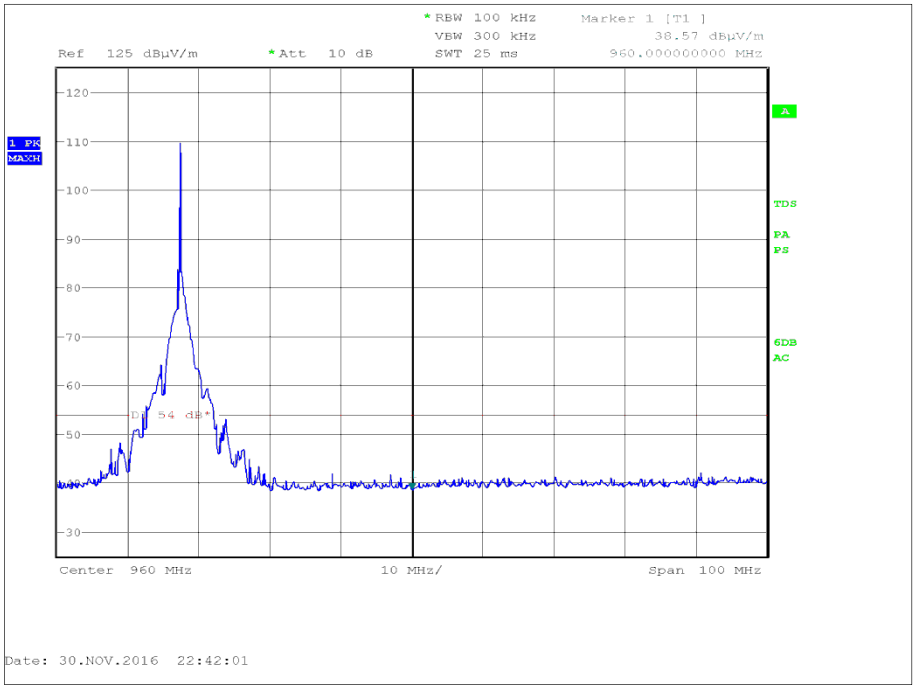

Figure 22 - 927.4 MHz, Measured Frequency 960.0 MHz, Peak

FCC 47 CFR Part 15, Limit Clause 15.205

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

Table 22

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
Hygrometer	Rotronic	A1	1388	12	13-Apr-2017
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	21-Sep-2017
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	-	O/P Mon
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	12-Nov-2017
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	-	O/P Mon
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	29-Dec-2016
4 Channel PSU	Rohde & Schwarz	HMP4040	4736	-	O/P Mon

Table 23

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment

2.8 Authorised Band Edges

2.8.1 Specification Reference

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

2.8.2 Equipment Under Test and Modification State

MiX41MC-3G, S/N: 40000278 - Modification State 0

2.8.3 Date of Test

30-November-2016

2.8.4 Test Method

The test was performed in accordance ANSI C63.10 clause 6.3, 6.5 and 6.10.4.

2.8.5 Environmental Conditions

Ambient Temperature	22.7 °C
Relative Humidity	36.8 %

2.8.6 Test Results

915 MHz SRD Transceiver

Frequency (MHz)	Measured Frequency (MHz)	Peak Level (dBµV/m)
902.2	2400.0	80.73
927.4	2483.5	80.81

Table 24

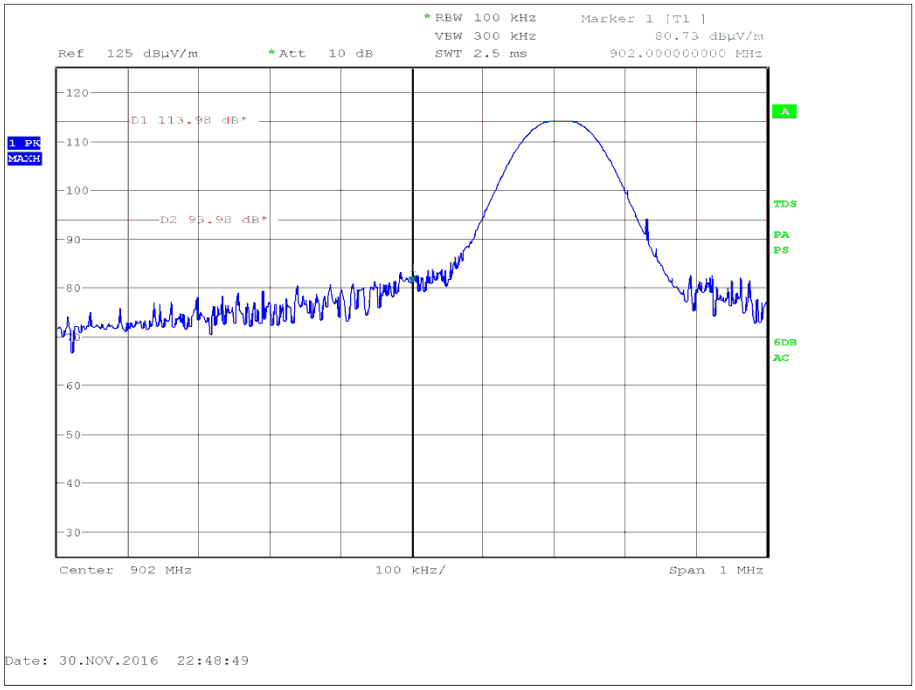

Figure 23 – 902.2 MHz, Measured Frequency 902.0 MHz, Peak

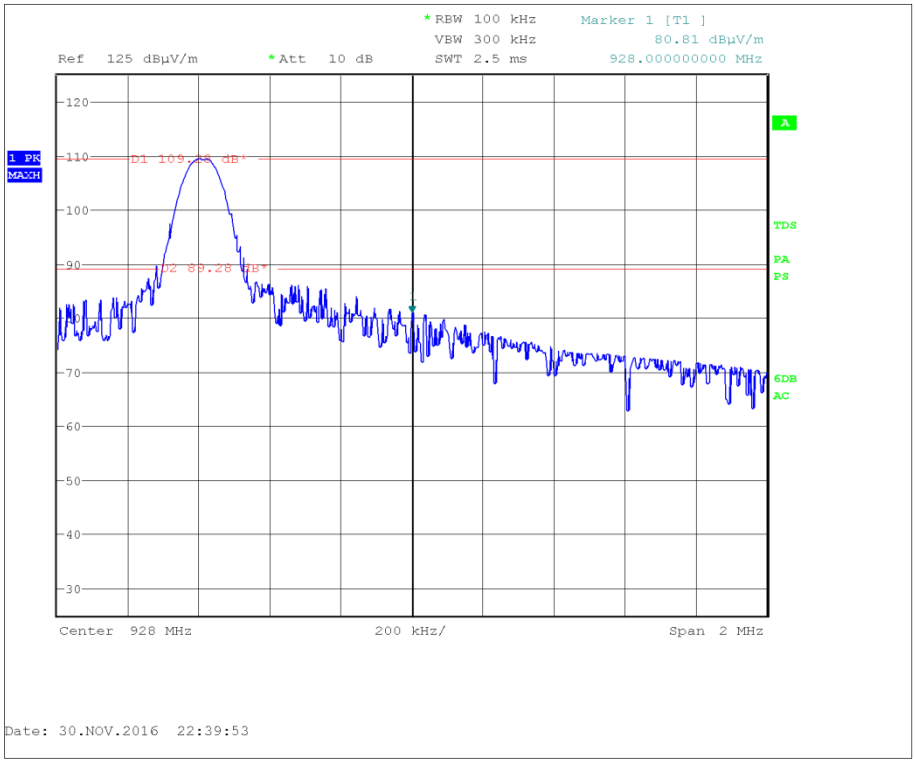

Figure 241 – 927.4 MHz, Measured Frequency 928.0 MHz, Peak

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.

2.8.7 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
Hygrometer	Rotronic	A1	1388	12	13-Apr-2017
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	21-Sep-2017
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	-	O/P Mon
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	12-Nov-2017
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000-KPS	4527	-	O/P Mon
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	29-Dec-2016
4 Channel PSU	Rohde & Schwarz	HMP4040	4736	-	O/P Mon

Table 25

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment

3 Measurement Uncertainty

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

Test Name	Measurement Uncertainty
Frequency Hopping Systems - Number of Hopping Channels	-
Frequency Hopping Systems - 20 dB Bandwidth	± 16.74 kHz
Frequency Hopping Systems - Channel Separation	± 16.74 kHz
Frequency Hopping Systems - Average Time of Occupancy	-
Peak EIRP	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB
Spurious Radiated Emissions	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB
Restricted Band Edges	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB
Authorised Band Edges	Conducted: ± 3.08 dB Radiated: 30 MHz to 1 GHz: ± 5.1 dB Radiated: 1 GHz to 40 GHz: ± 6.3 dB

Table 26