



F2 Labs
16740 Peters Road
Middlefield, Ohio 44062
United States of America
www.f2labs.com

CERTIFICATION TEST REPORT

Manufacturer: **Elster Solutions, LLC**
208 South Rogers Lane
Raleigh, North Carolina 27610-2144 USA

Applicant: **Same As Above**

Product Name: **Wireless Light Control Module**

Product Description: The Elster Model ELIR1 wireless light control module contains a frequency hopping spread spectrum (FHSS) radio operating in the 902-928 MHz ISM frequency band. The ELI NIC (Elster Lighting Intelligence Network Interface Card) PCB is installed on top of the Logic PCB. These two PCB are combined on top of additional PCB that controls power functions. These boards together form the model ELIR1 module which can be mounted on a light fixture to form a complete setup. Some installations of the module can comprise part of an Advanced Metering Infrastructure (AMI) system that utilizes a proprietary network architecture and protocol devised by Elster Electricity LLC., referred to here as the Energy Axis (EA) network. Other installations of the module can comprise a Smart Metering Utility Network (SUN) using a network architecture and protocol conforming to the IEEE 802.15.4g LR_WPAN Standard, referred to as Next Generation Communications (NGC) network.

Model: **ELIR1**

FCC ID: **QZC-ELIR1**

Testing Commenced: Feb. 17, 2016

Testing Ended: Feb. 19, 2016

Summary of Test Results: **In Compliance**

The EUT complies with the FCC requirements when manufactured identically as the unit tested in this report, including any required modifications. Any changes to the design or build of this unit subsequent to this testing may deem it non-compliant.



Standards:

- FCC Part 15 Subpart C, Section 15.247
- FCC15.207(a) - Conducted Limits
- ANSI C63.10:2013
- FCC Part 15.31(e)

Evaluation Conducted by:

Joe Knepper, EMC Proj. Eng.

Report Reviewed by:

Ken Littell, EMC Tech. Mgr.

F2 Labs
26501 Ridge Road
Damascus, MD 20872
Ph 301.253.4500
Fax 301.253.5179

F2 Labs
16740 Peters Road
Middlefield, OH 44062
Ph 440.632.5541
Fax 440.632.5542

This test report may be reproduced in full; partial reproduction only may be made with the written consent of F2 Labs. The results in this report apply only to the equipment tested.



TABLE OF CONTENTS

Section	Title	Page
1	ADMINISTRATIVE INFORMATION	4
2	SUMMARY OF TEST RESULTS/MODIFICATIONS	5
3	TABLE OF MEASURED RESULTS	6
4	ENGINEERING STATEMENT	7
5	EUT INFORMATION AND DATA	8
6	LIST OF MEASUREMENT INSTRUMENTATION	9
7	FCC Part 15.247(a)(2) – -20dB OCCUPIED BANDWIDTH	10
8	FCC Part 15.247(b)(3) – CONDUCTED OUTPUT POWER	17
9	FCC Part 15.31(e) – EXTREME VOLTAGES	24
10	FCC Part 15.247(d) – CONDUCTED SPURIOUS EMISSIONS	31
11	FCC Part 15.247(d) – RADIATED SPURIOUS EMISSIONS	52
12	FCC Part 15.247(e) – PEAK POWER SPECTRAL DENSITY (PSD)	78
13	ANSI 63.10 7.8.2 - FREQUENCY SEPARATION	79
14	ANSI 63.10 7.8.2 – ANSI 63.10 7.8.3 – NUMBER OF CHANNELS	82
15	ANSI 63.10 7.8.4 – DWELL TIME	91
16	FCC Part 15.207 – CONDUCTED LIMITS	96
17	PHOTOS/EXHIBITS	101



1 ADMINISTRATIVE INFORMATION

1.1 Measurement Location:

F2 Labs in Middlefield, Ohio. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD.

1.2 Measurement Procedure:

All measurements were performed according to the 2013 version of ANSI C63.10 and recommended FCC procedure of measurement of DTS operating under Section 15.247 and in KDB558074. A list of the measurement equipment can be found in Section 6.

1.3 Uncertainty Budget:

The uncertainty in EMC measurements arises from several factors which affect the results, some associated with environmental conditions in the measurement room, the test equipment being used and the measurement techniques adopted.

The measurement uncertainty budgets detailed below are calculated from the test and calibration data, and are expressed with a 95% confidence factor. Note: Only measurements listed below which relate to tests included in this Test Report are applicable to it.

Measurement Range	Expanded Uncertainty	Combined Uncertainty
Radiated Emissions <1 GHz @3m	±5.07dB	±2.54
Radiated Emissions <1 GHz @10m	±5.09dB	±2.55
Radiated Emissions 1 GHz to 2.7 Hz	±3.62dB	±1.81
Radiated Emissions 2.7 GHz to 18 GHz	±3.10dB	±1.55
AC Power Line Conducted Emissions, 150kHz to 30 MHz	±2.76dB	±1.38

This Uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.4 Document History

Document Number	Description	Issue Date	Approved By
F2LQ8116-01E	First Issue	Feb. 26, 2016	K. Littell

**2 SUMMARY OF TEST RESULTS**

Test Name	Standard(s)	Results
-20dB Occupied Bandwidth	CFR 47 Part 15.247(a)(2): 18kbps 142.2kbps	Complies Complies
Conducted Output Power	CFR 47 Part 15.247(b)(3): 18kbps 142.2kbps	Complies Complies
Voltage Variations	CFR 47 Part 15.31: 18kbps 142.2kbps	Complies Complies
Conducted Spurious Emissions	CFR 47 Part 15.247(d) / Part 15.207: 18kbps 142.2kbps	Complies Complies
Radiated Spurious Emission with 1.5dBi Integral Antenna	CFR 47 Part 15.247(d) / Part 15.209: 18kbps 142.2kbps	Complies Complies
Peak Power Spectral Density	CFR 47 Part 15.247(e)	Not Required
Frequency Separation	ANSI 63.10 2013 (7.8.2): 18kbps 142.2kbps	Complies Complies
Number of Hopping Frequencies	ANSI 63.10 2013 (7.8.3): 18kbps 142.2kbps	Complies Complies
Dwell Time	ANSI 63.10 2013 (7.8.4): 18kbps 142.2kbps	Complies Complies
Conducted Emissions	CFR 47 Part 15.207(a)	Complies

Modifications Made to the Equipment
None

**3 TABLE OF MEASURED RESULTS**

Test	Low Channel 902.4 MHz	Mid Channel 914.8 MHz	High Channel 927.6 MHz
-20dB Occupied Bandwidth @18kbps	307.43kHz	302.12kHz	307.53kHz
-20dB Occupied Bandwidth @142.2kbps	317.31kHz	314.1kHz	311.8 kHz
-20dB Occupied Bandwidth Limit	<500kHz	<500kHz	<500kHz
Conducted Output Power @ 18kbps	0.1483W, 21.71dBm ¹	0.1507W, 21.78dBm ²	0.1343W, 21.28dBm ²
Conducted Output Power @ 142.2kbps	0.1892W, 22.77dBm ¹	0.1857W, 22.69dBm ²	0.1888W, 22.76dBm
Conducted Output Power Limit	0.25 Watt, 23.979dBm	0.25 Watt, 23.979dBm	0.25 Watt, 23.979dBm
E.I.R.P. with 1.5dBi Integral Antenna @ 18kbps	0.2094W, 23.21dBm	0.2128W, 23.28dBm	0.1897W, 22.78dBm
E.I.R.P. with 1.5dBi Integral Antenna @ 142.2kbps	0.2673W, 24.27dBm	0.2624W, 24.19dBm	0.2667W, 24.26dBm
E.I.R.P. Limit	0.995 Watts, (29.979dBm)	0.995 Watts, (29.979dBm)	0.995 Watts, (29.979dBm)

¹ This result reflects the worst case measurement at 100V to meet the requirements of 15.31.² This result reflects the worst case measurement at 140V to meet the requirements of 15.31.



4 ENGINEERING STATEMENT

This report has been prepared on behalf of Elster Solutions, LLC to provide documentation for the testing described herein. This equipment has been tested and found to comply with Part 15.247 of the FCC Rules using ANSI C63.10 2013 and KDB558074 standards. The test results found in this test report relate only to the items tested.



5 EUT INFORMATION AND DATA

5.1 Equipment Under Test:

Product: **Wireless Light Control Module**

Model: **ELIR1**

Serial Nos.: 42, 20

FCC ID: **QZC-ELIR1**

5.2 Trade Name:

Elster Solutions, LLC

5.3 Power Supply:

120V 60Hz

5.4 Applicable Rules:

CFR 47, Part 15.247, subpart C

5.5 Equipment Category:

Frequency Hopping Spread Spectrum

5.6 Antenna:

1.5dBi Integral Antenna

5.7 Accessories:

N/A

5.8 Test Item Condition:

The equipment to be tested was received in good condition.

5.9 Testing Algorithm:

EUT was set up in a test mode, constantly transmitting at Low (902.4 MHz), Mid (914.8 MHz) and High (927.6 MHz) channels. The EUT had two different bit rates – 18kbps and 142.2kbps. Emissions were checked loaded and unloaded with a light bar. EUT worst case was determined to be unloaded. All tests were performed at worst case voltage levels.

**6 LIST OF MEASUREMENT INSTRUMENTATION**

Equipment Type	Asset Number	Manufacturer	Model	Serial Number	Calibration Due Date
Shielded Chamber	CL166	AlbatrossProjects	B83117-DF435-T261	US140023	Feb. 26 2016
Shield Room	0175-3V	Ray Proof	N/A	11645	Dec. 16, 2016
Temp/Hum. Recorder	CL137	Extech	RH520	CH16992	May 7, 2016
Receiver	CL151	Rohde & Schwarz	ESU40	100319	Nov. 25, 2016
Horn Antenna	CL098	Emco	3115	9809-5580	Dec. 10, 2016
Pre-Amplifier	CL045	Hewlett-Packard	8447D	2944A08445	Nov. 2, 2016
Preamplifier	CL153	Keysight Technologies	83006A	MY39500791	May 6, 2016
Amplifier w/Monopole & 18" Loop	CL163	A.H. Systems, Inc.	EHA-52B	100	Apr. 20, 2016
Software:	Tile Version 1.0		Software Verified: Feb. 17, 2016		
Software:	EMC 32, Version 5.20.2		Software Verified: Feb. 17, 2016		
Antenna, JB3 Combination	CL175	Sunol Sciences	JB3	A030315	Mar. 12, 2016
Spectrum Analyzer	CL138	Agilent Technologies	E4407B	US41192779	Nov. 13, 2016
Temp/Hum. Rec.	CL119	Extech	RH520	H005869	Jan. 29, 2017
Spectrum Analyzer	0141	Hewlett Packard	8591E	3520A04145	Feb. 1, 2017
Transient Limiter	0202	Hewlett Packard	11947A	3107A00729	June 27, 2018
LISN	CL184	Com-Power	LI-125A	191213	June 9, 2016
LISN	CL185	Com-Power	LI-125A	191214	June 9, 2016



7 FCC PART 15.247(a)(2) – OCCUPIED BANDWIDTH

7.1 Requirements:

The -20dB bandwidth shall be greater than 500 kHz.

Bandwidth measurements were made at the low (902.4 MHz), mid (914.8 MHz) and upper (927.6 MHz) frequencies with the resolution Bandwidth set at 10 kHz (video bandwidth set at 30 kHz) while the span was set at 1MHz. The bandwidth was measured using the analyzer's marker function.

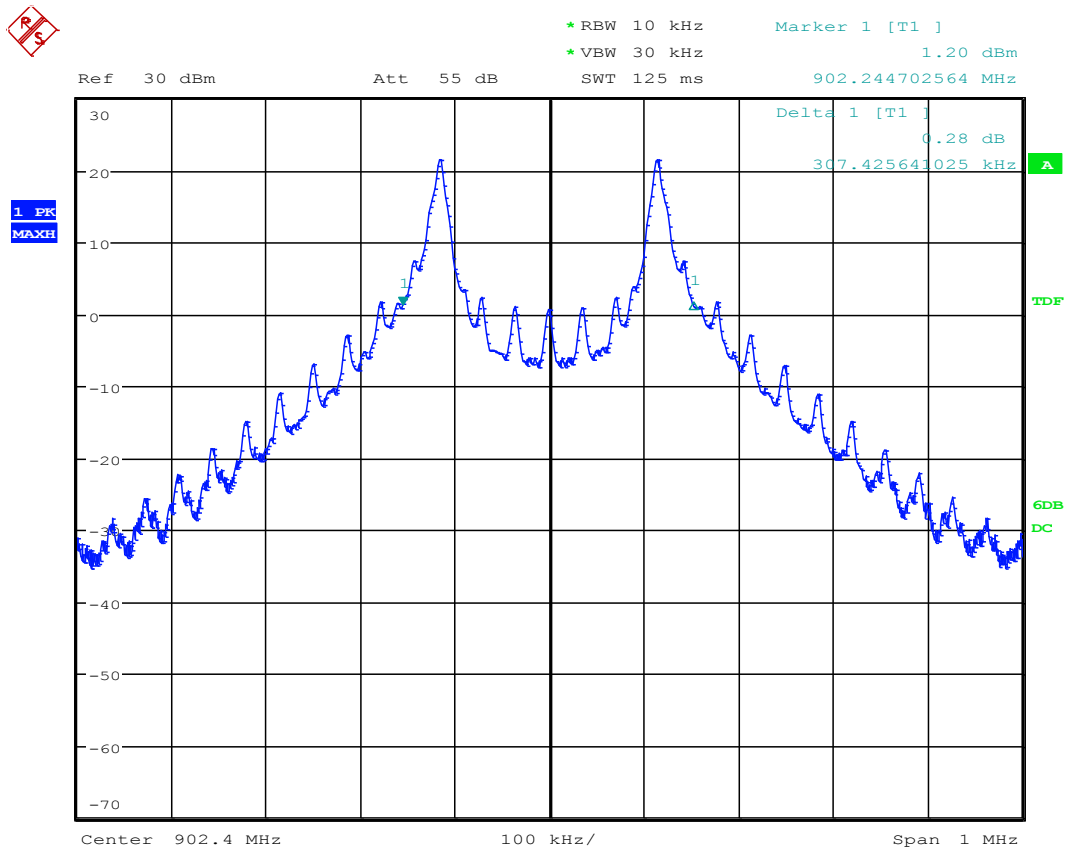
Client states that the receiver bandwidth matches the Transmitter bandwidth per 15.247(a)(i) requirement.



7.2 Occupied Bandwidth Test Data

Test Date(s):	Feb. 17-18, 2016	Test Engineer:	J. Knepper
Standards:	CFR 47 Part 15.247(a)(2); KDB558074	Air Temperature:	20.4°C
		Relative Humidity:	40%

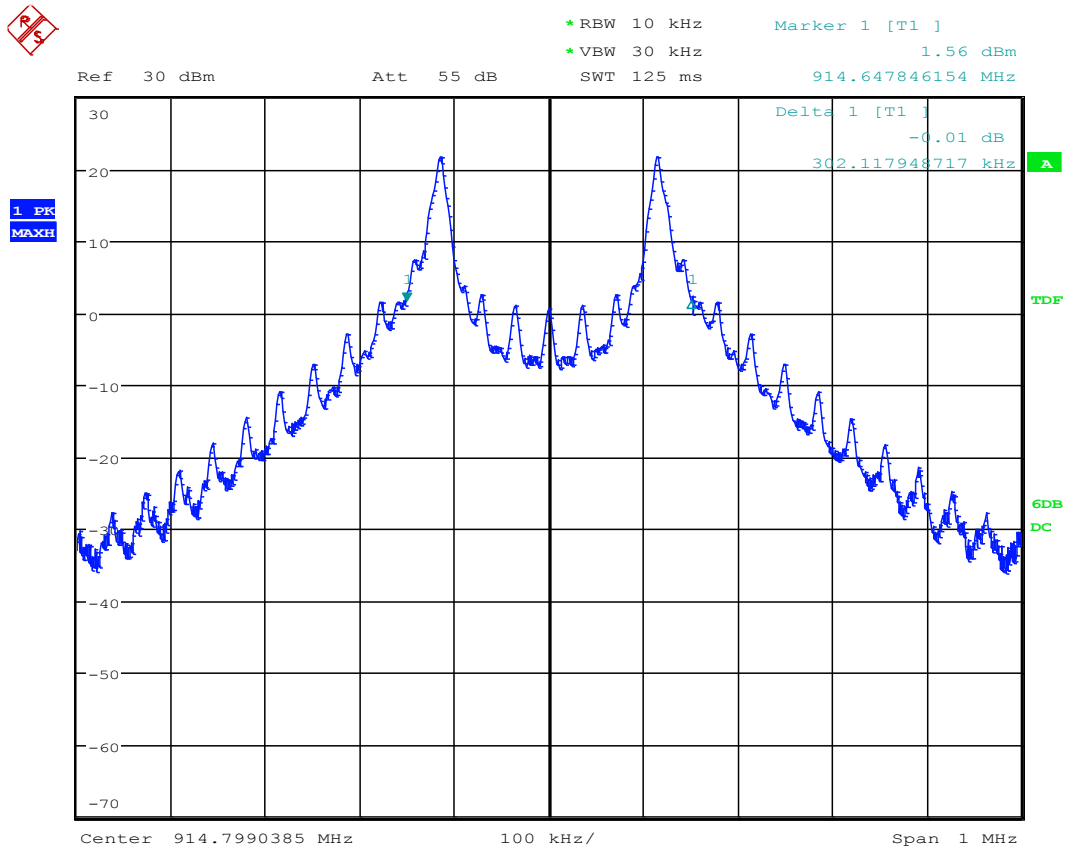
18kbps: Low Channel



Date: 18.FEB.2016 14:53:14



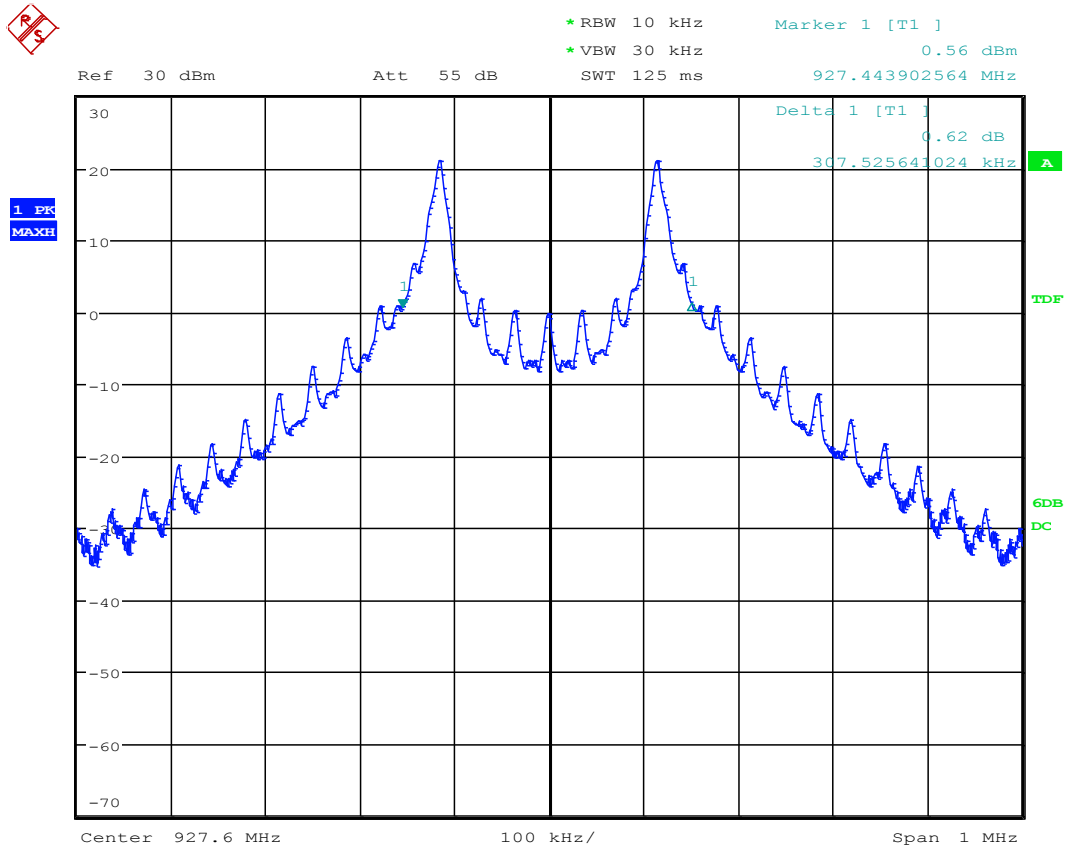
18kbps: Mid Channel



Date: 18.FEB.2016 14:46:47



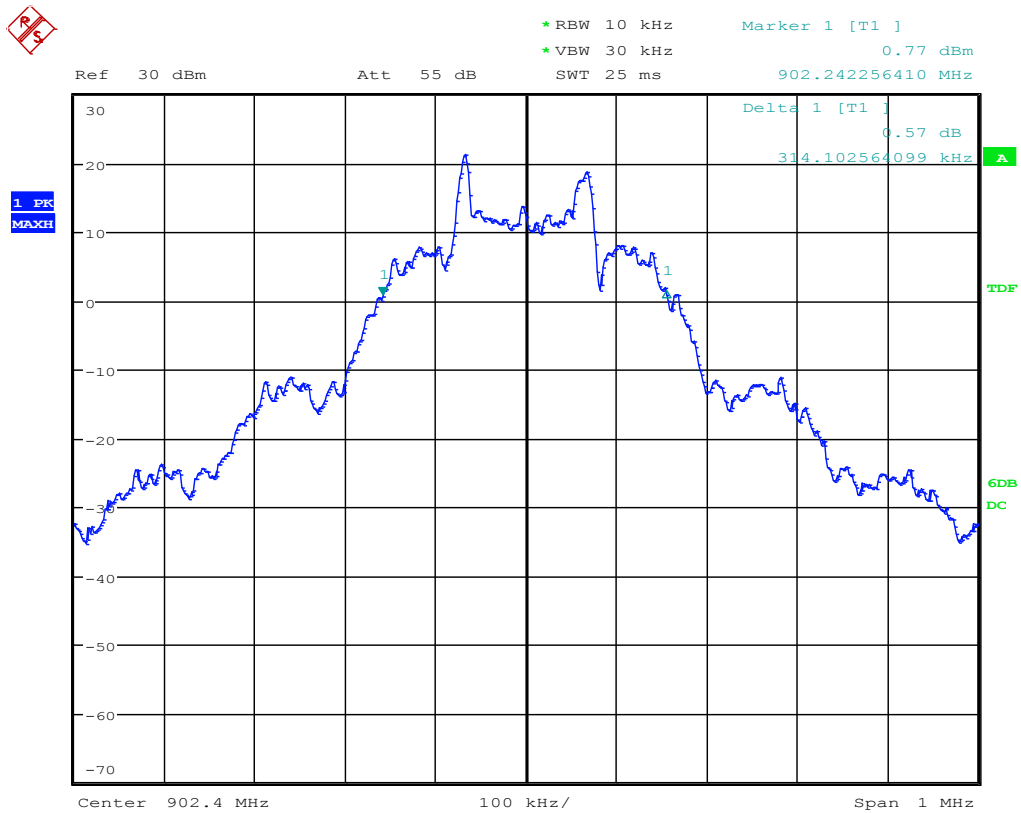
18kbps: High Channel



Date: 18.FEB.2016 14:29:30



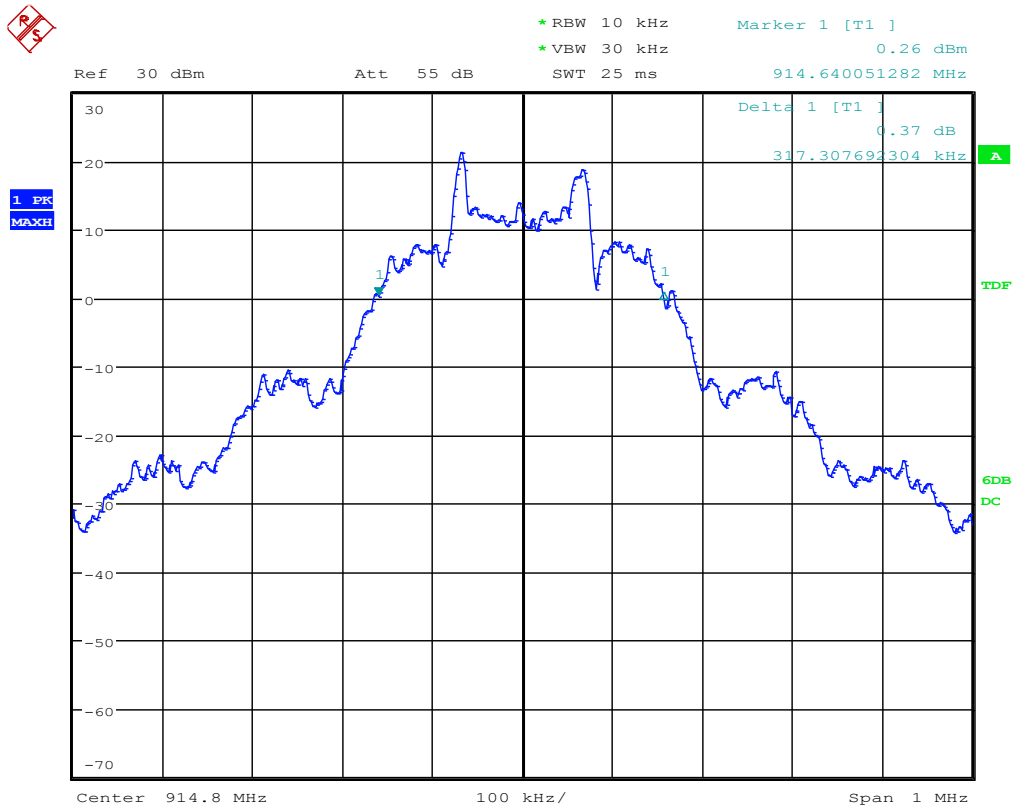
142.2kbps: Low Channel



Date: 19.FEB.2016 09:12:57



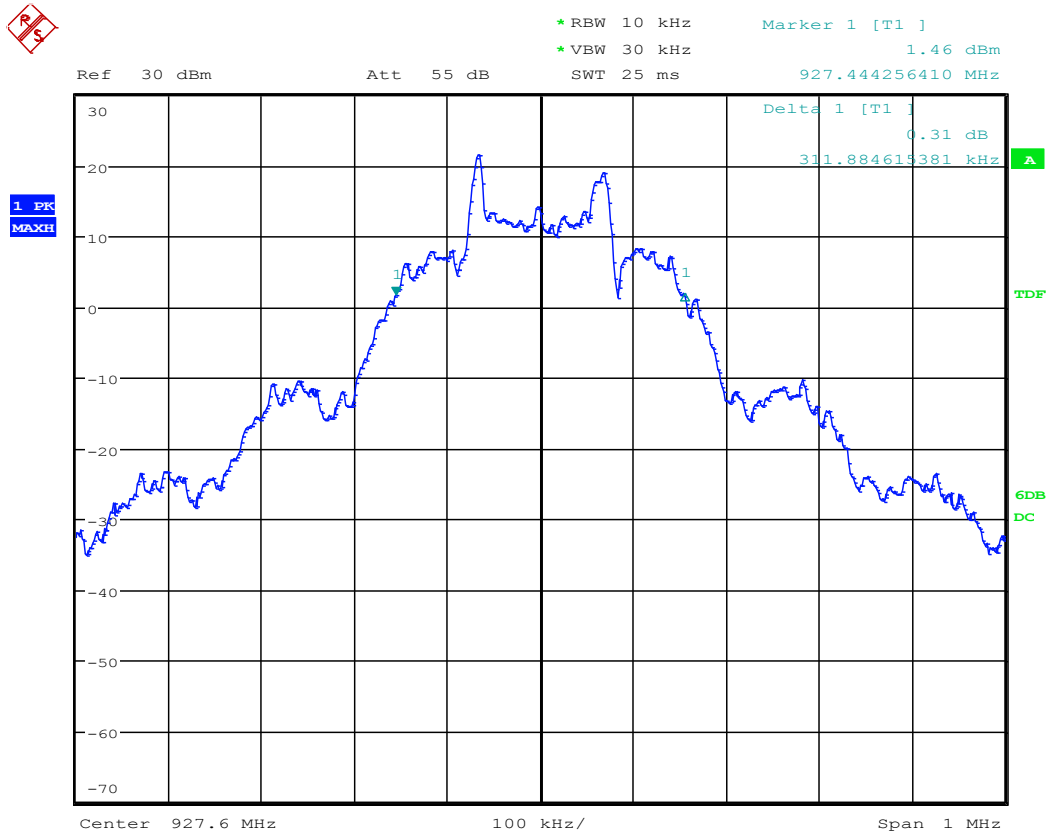
142.2kbps: Mid Channel



Date: 19.FEB.2016 09:34:05



142.2kbps: High Channel



Date: 19.FEB.2016 09:38:43



8 FCC PART 15.247(b)(3) – CONDUCTED OUTPUT POWER

The EUT antenna port was fitted with an SMA connector and directly connected to the input of the receiver. The peak power output was measured.

8.1 Requirements:

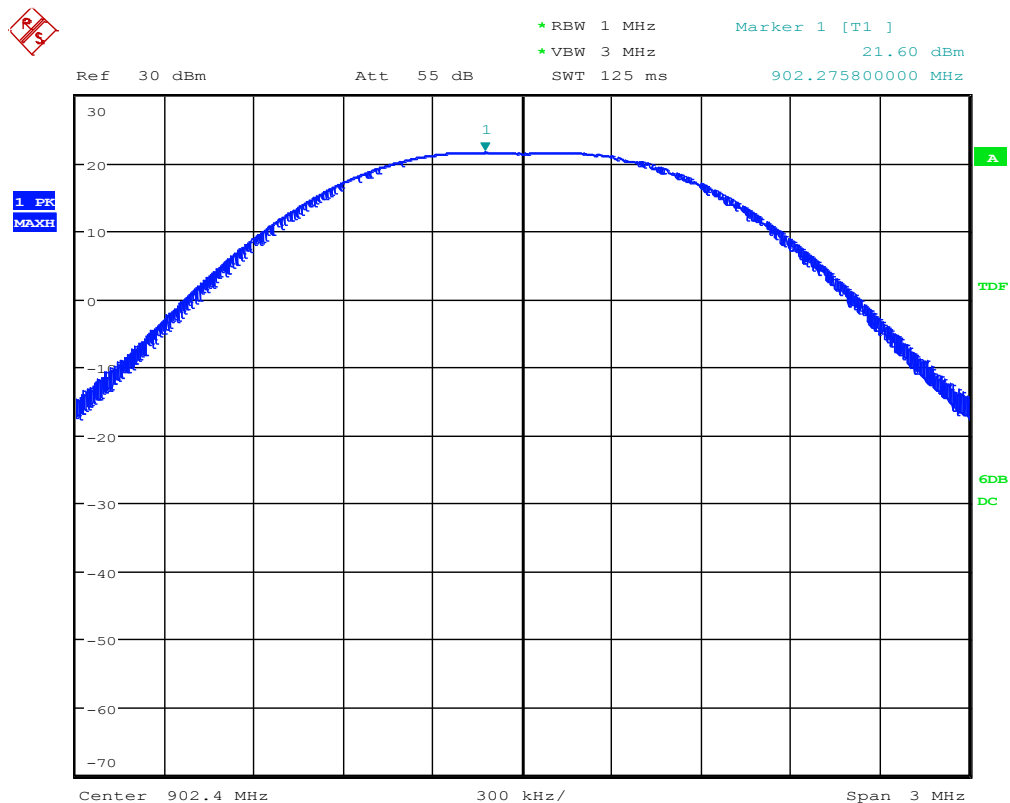
The peak power output shall be 0.25 watts (23.979 dBm) or less when using an antenna with a gain of less than 6dBi. For antennas having a gain of more than 6dBi, the limit is reduced by 1dB for every dB the antenna gain is over 6dBi.



8.2 Conducted Output Power Test Data

Test Date(s)	Feb. 18-19, 2016	Test Engineer:	J. Knepper
Standards:	CFR 47 Part 15.247(b)(3); KDB558074	Air Temperature:	20.2°C
		Relative Humidity:	40%

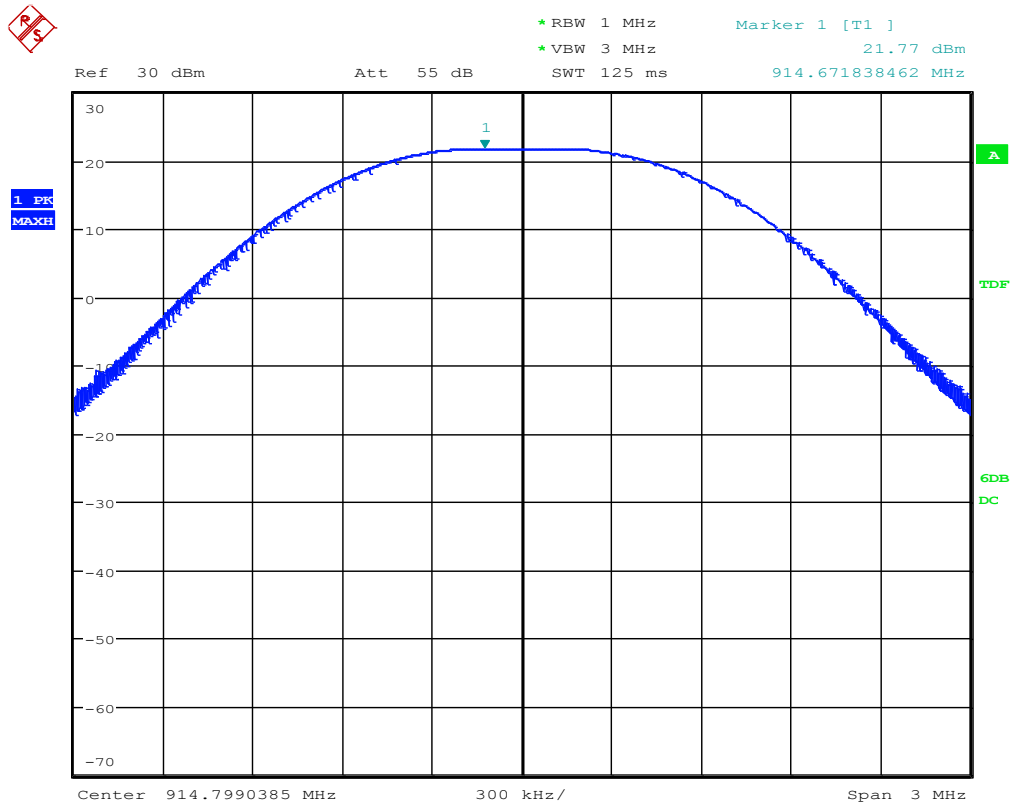
18kbps: Low Channel



Date: 18.FEB.2016 14:50:01



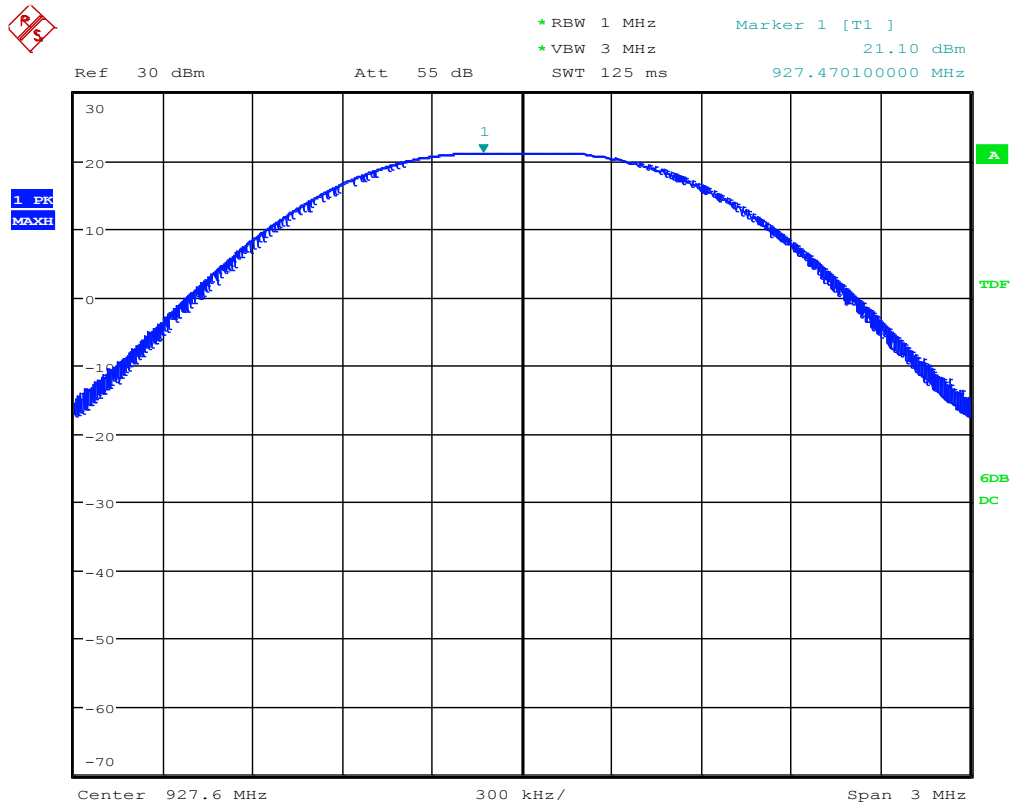
18kbps: Mid Channel



Date: 18.FEB.2016 14:48:00



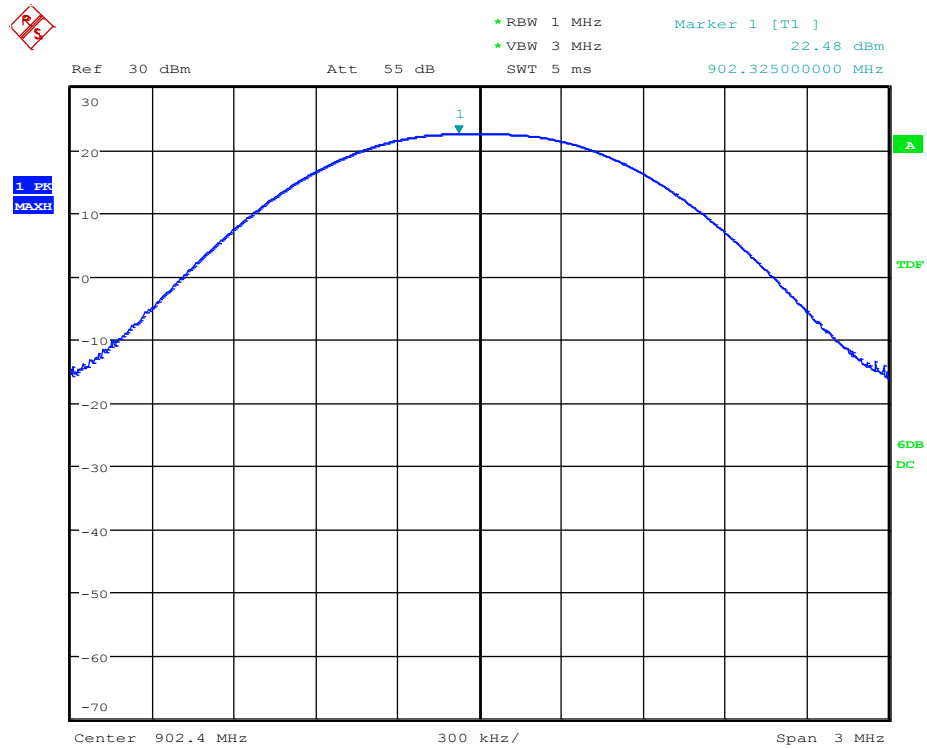
18kbps: High Channel



Date: 18.FEB.2016 14:31:51



142.2kbps: Low Channel



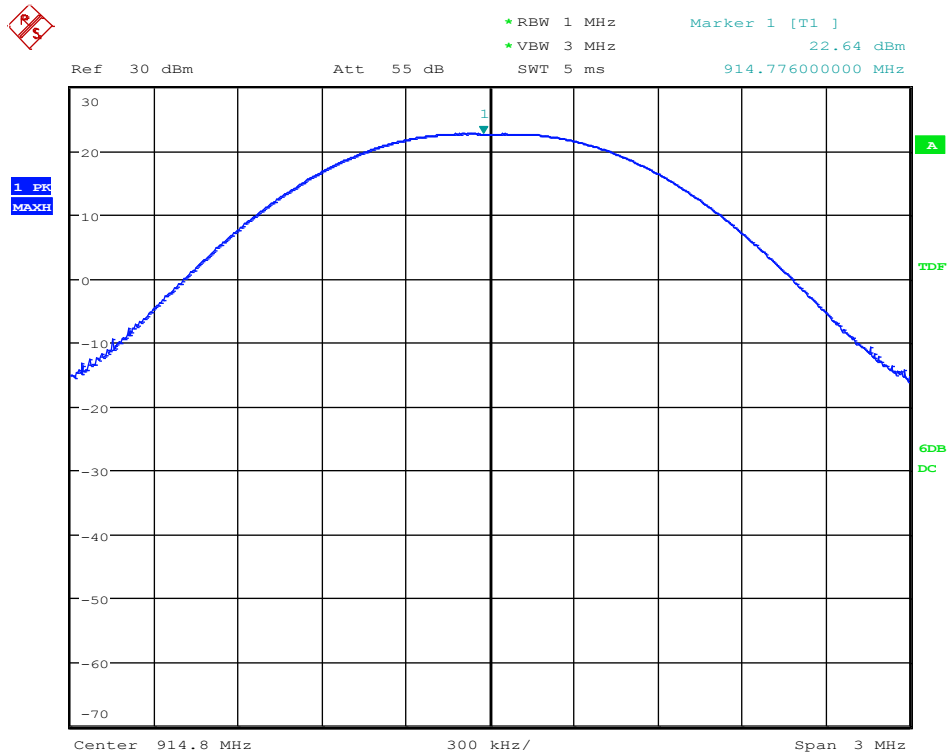
Date: 19.FEB.2016 09:09:36



Order Number: F2LQ8116

Applicant: Elster Solutions, LLC
Model: ELIR1

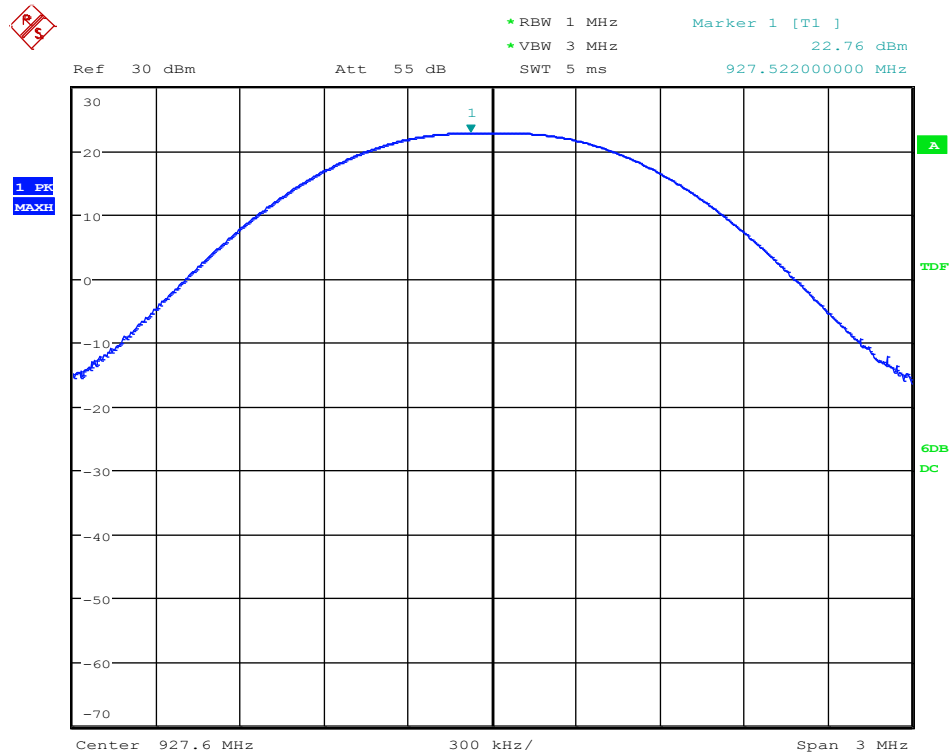
142.2kbps: Mid Channel



Date: 19.FEB.2016 09:35:22



142.2kbps: High Channel



Date: 19.FEB.2016 09:37:47



9 FCC PART 15.31(e) – EXTREME VOLTAGES

9.1 Requirements

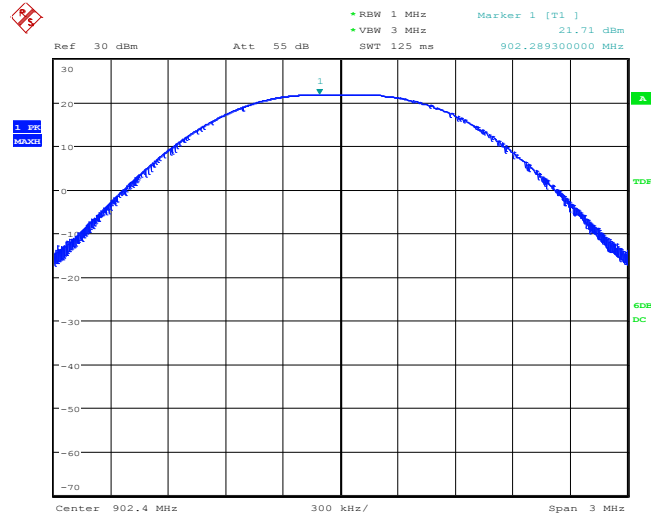
For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery-operated equipment, the equipment tests shall be performed using a new battery.



9.2 Extreme Voltages Test Data

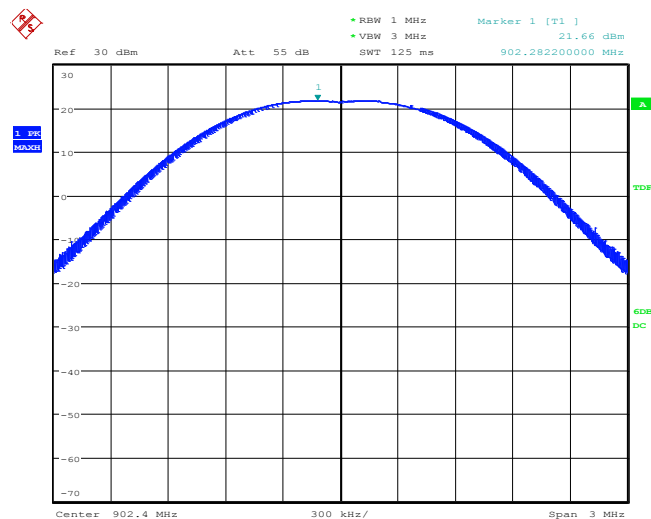
Test Date(s):	Feb. 18-19, 2016	Test Engineer:	J. Knepper
Rule:	15.31(e)	Air Temperature:	20.1° C
Test Results:	Complies	Relative Humidity:	41%

18kbps: Low Channel, 100V



Date: 18.FEB.2016 15:01:45

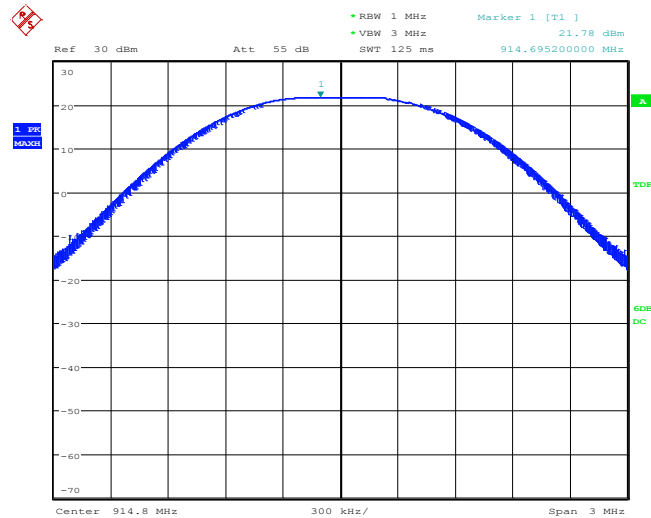
18kbps: Low Channel, 140V



Date: 18.FEB.2016 15:03:08

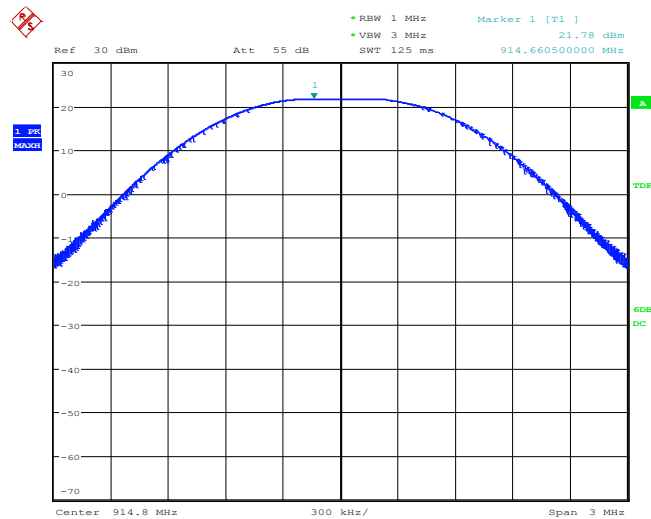


18kbps: Mid Channel, 100V



Date: 18.FEB.2016 15:06:39

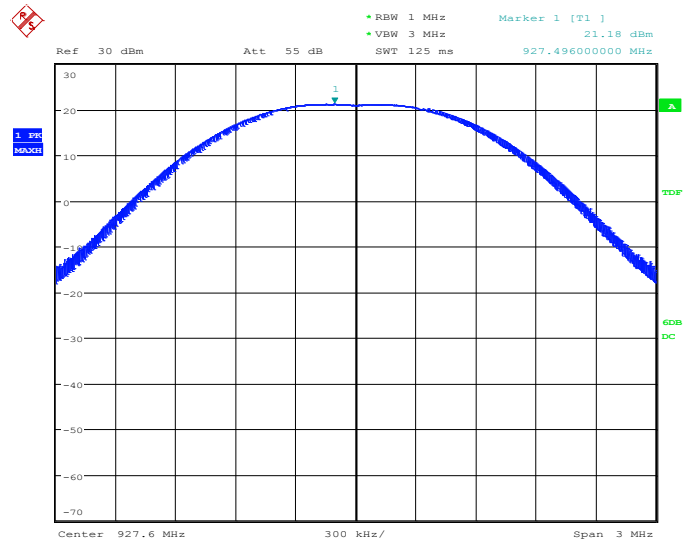
18kbps: Mid Channel, 140V



Date: 18.FEB.2016 15:04:52

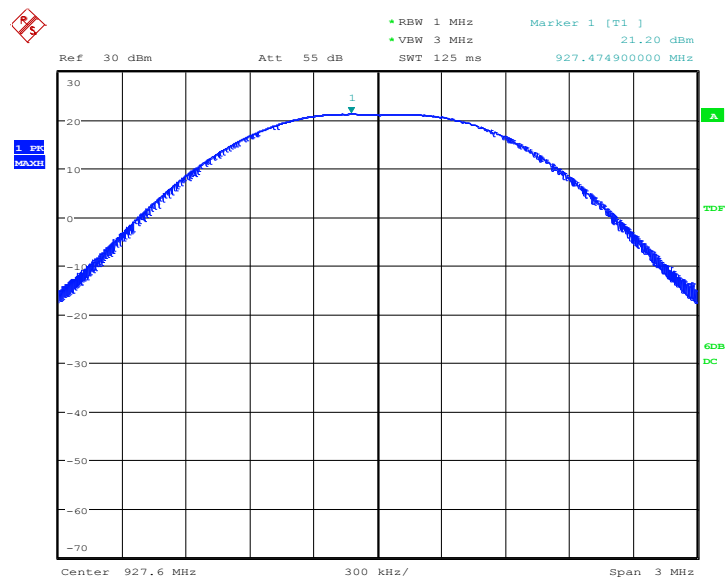


18kbps: High Channel, 100V



Date: 18.FEB.2016 15:07:35

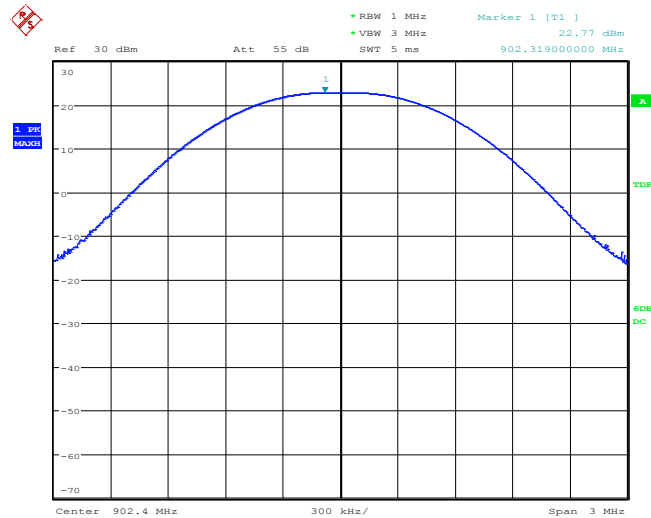
18kbps: High Channel, 140V



Date: 18.FEB.2016 15:08:54

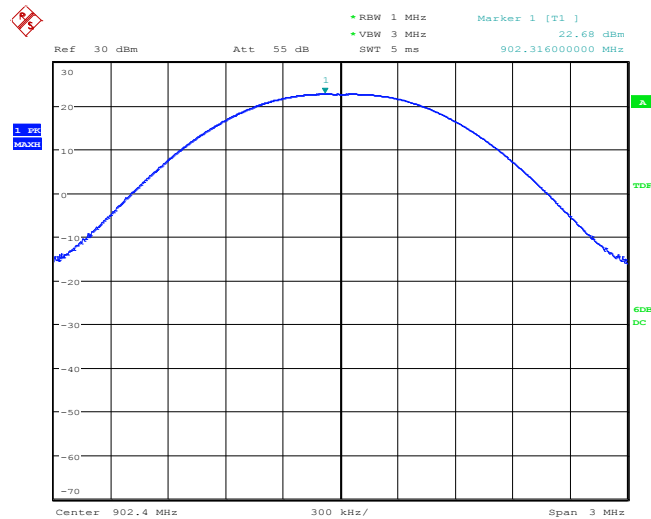


142.2kbps: Low Channel, 100V



Date: 19.FEB.2016 09:56:18

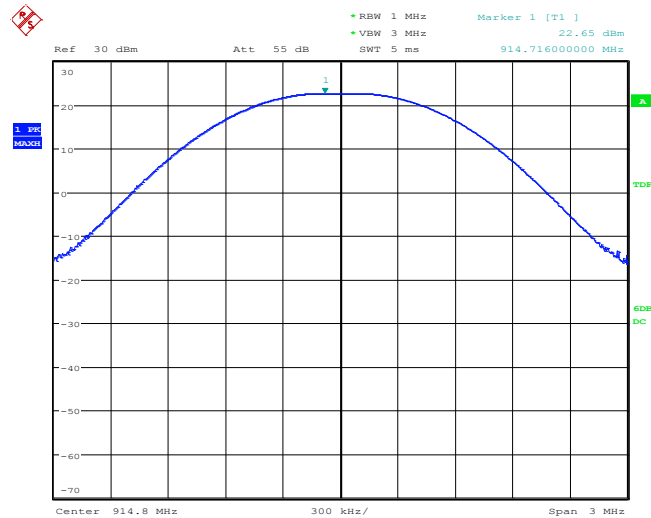
142.2kbps: Low Channel, 140V



Date: 19.FEB.2016 09:57:35

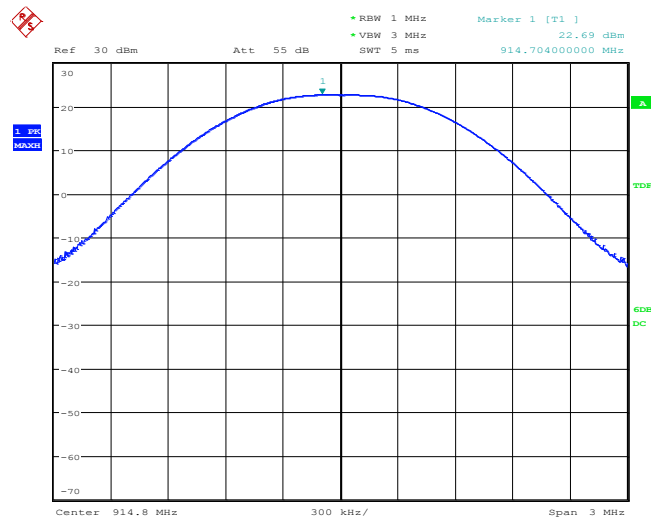


142.2kbps: Mid Channel, 100V



Date: 19.FEB.2016 10:00:01

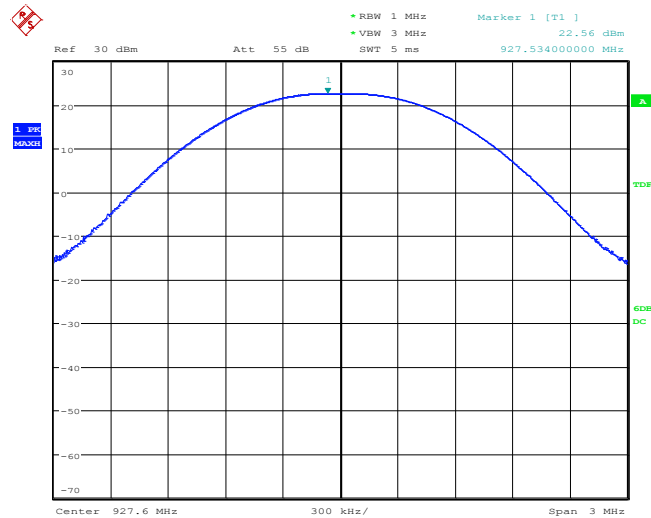
142.2kbps: Mid Channel, 140V



Date: 19.FEB.2016 09:58:49

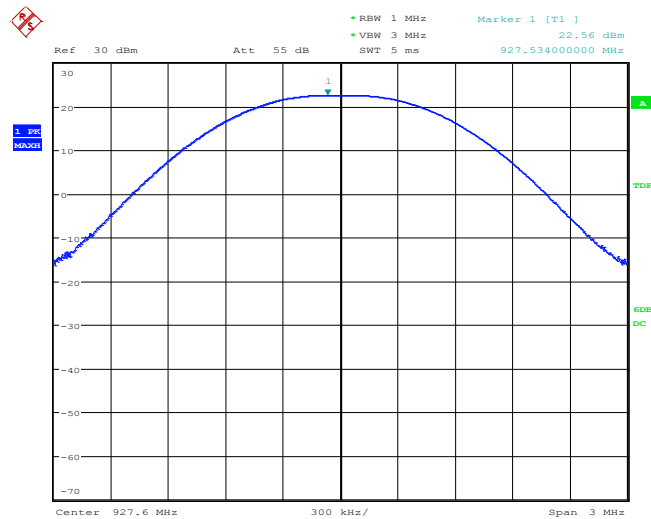


142.2kbps: High Channel, 100V



Date: 19.FEB.2016 10:01:38

142.2kbps: High Channel, 140V



Date: 19.FEB.2016 10:04:50



10 FCC Part 15.247(d) – CONDUCTED SPURIOUS EMISSIONS

The following tests were performed to demonstrate compliance.

RF Antenna Conducted Test

The EUT antenna port was fitted with an SMA connector and directly connected to the input of the spectrum analyzer.

10.1 Requirements:

All Spurious Emissions must be at least 20dB down from the highest emission level measured within the authorized band up through the tenth harmonic.

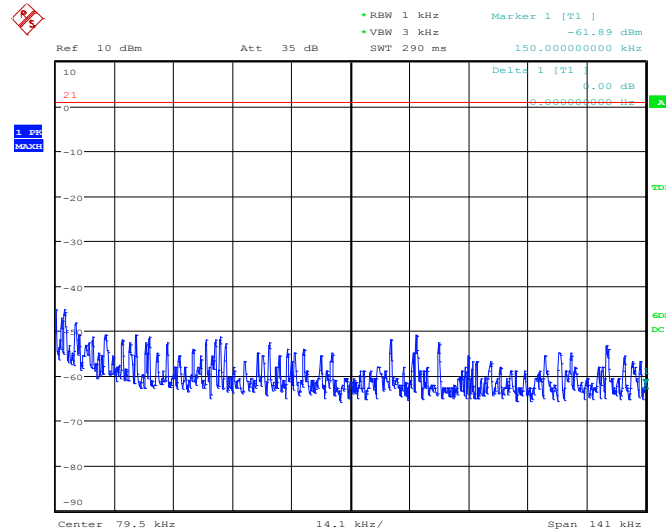
Spurious emissions measurements were made at the low, mid, and upper channels with the appropriate spectrum analyzer impulse bandwidth. Additionally, 20dB down points were measured for the low and high channels to verify band edge compliance.



10.2 Test Data – Conducted Spurious Emissions

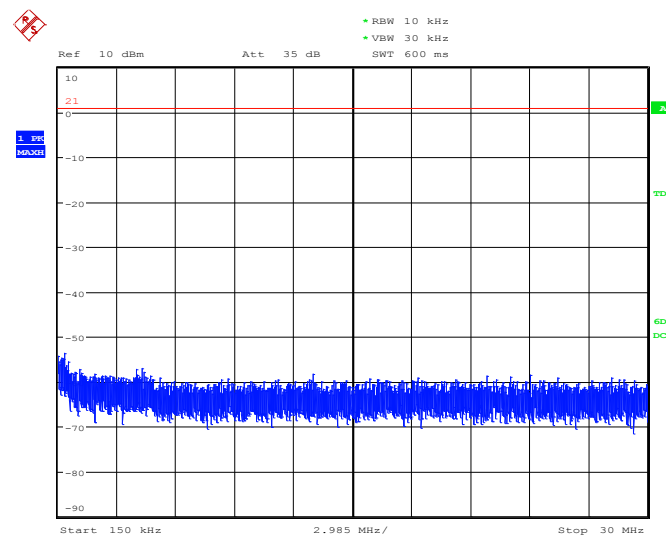
Test Date(s):	Feb. 19, 2016	Test Engineer:	J. Knepper
Standards:	CFR 47 Part 15.247(d) / Part 15.207 KDB558074	Air Temperature:	20.6°C
		Relative Humidity:	41%

18kbps: Low Channel, 9kHz to 150kHz



Date: 18.FEB.2016 14:54:03

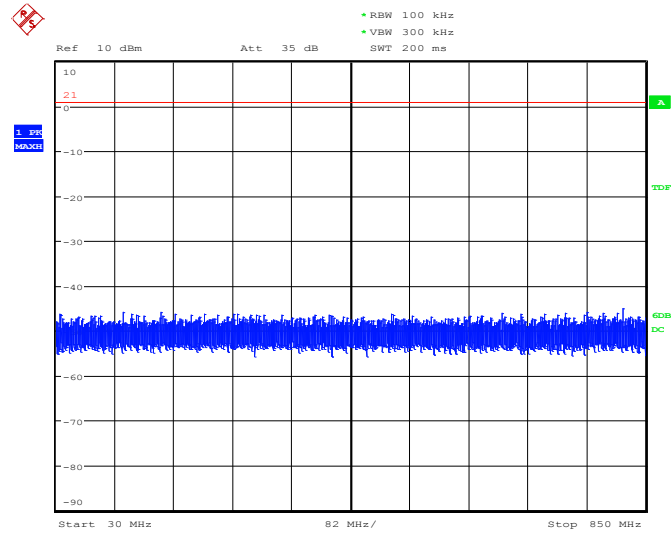
18kbps: Low Channel, 150kHz to 30 MHz



Date: 18.FEB.2016 14:54:31

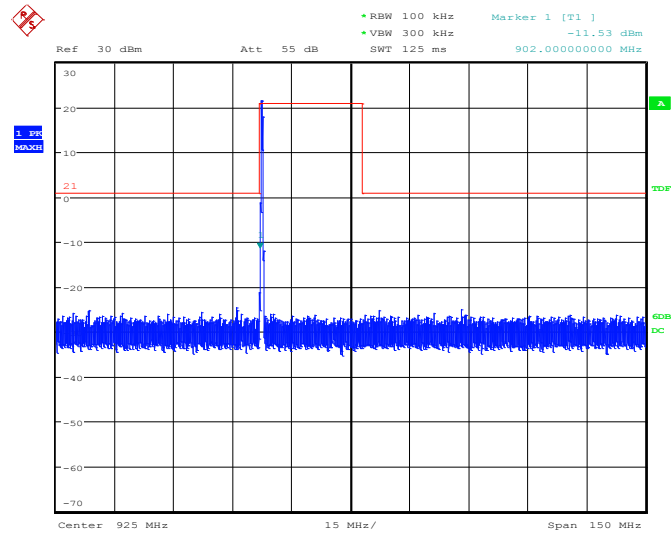


18kbps: Low Channel, 30 MHz to 850 MHz



Date: 18.FEB.2016 14:54:59

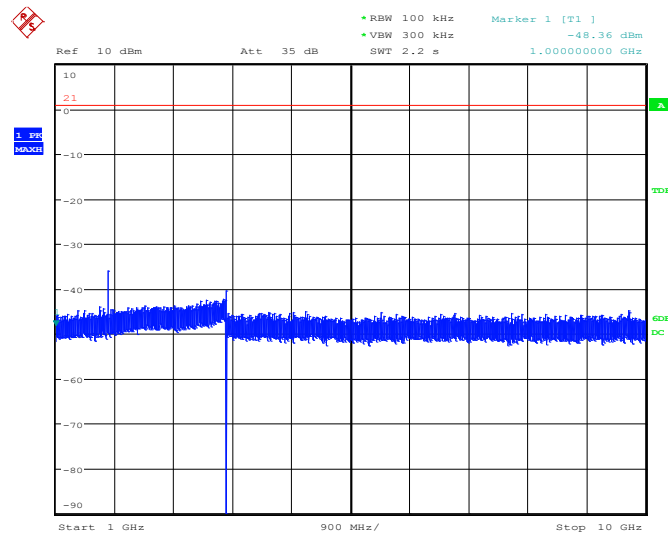
18kbps: Low Channel, 850 MHz to 1 GHz



Date: 18.FEB.2016 14:56:16



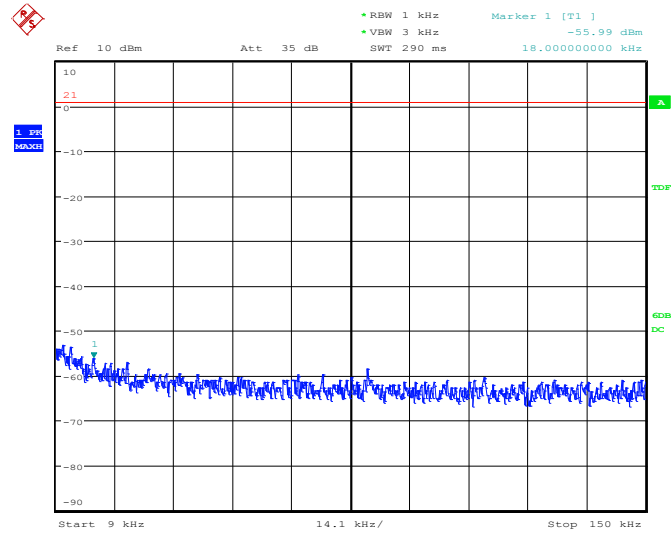
18kbps: Low Channel, 1 GHz to 10 GHz



Date: 18.FEB.2016 14:56:54

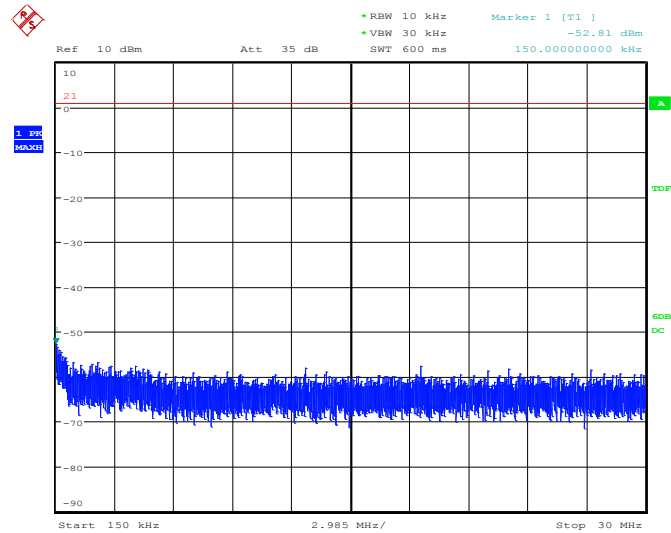


18kbps: Mid Channel, 9kHz to 150kHz



Date: 18.FEB.2016 14:41:31

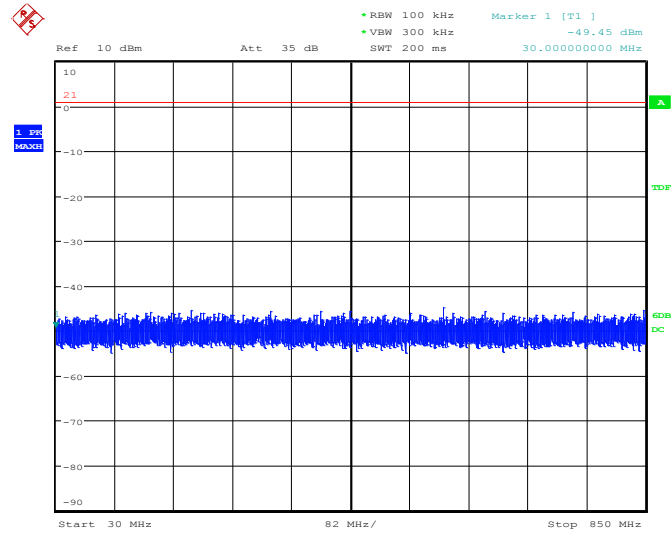
18kbps: Mid Channel, 150kHz to 30 MHz



Date: 18.FEB.2016 14:41:58

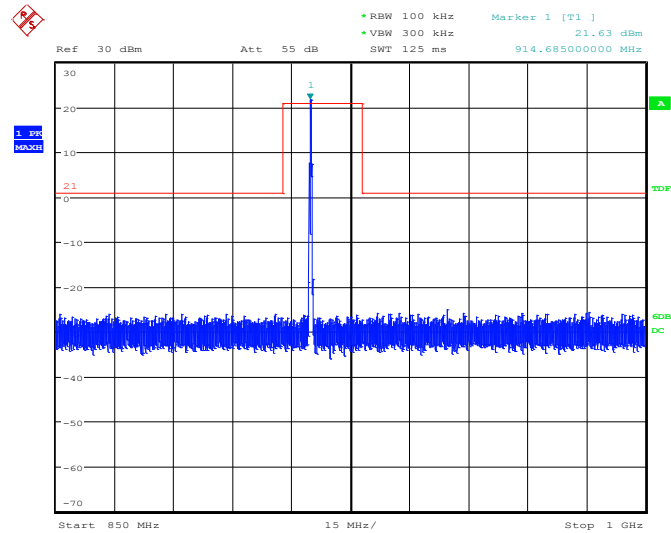


18kbps: Mid Channel, 30 MHz to 850 MHz



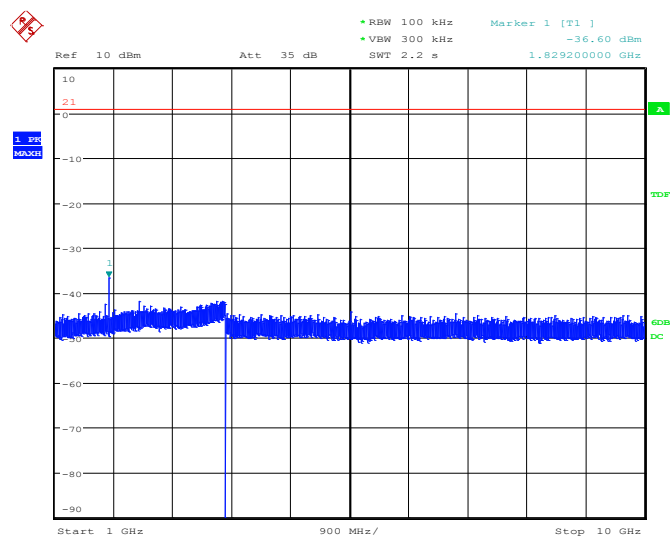
Date: 18.FEB.2016 14:42:29

18kbps: Mid Channel, 850 MHz to 1 GHz



Date: 18.FEB.2016 14:43:02

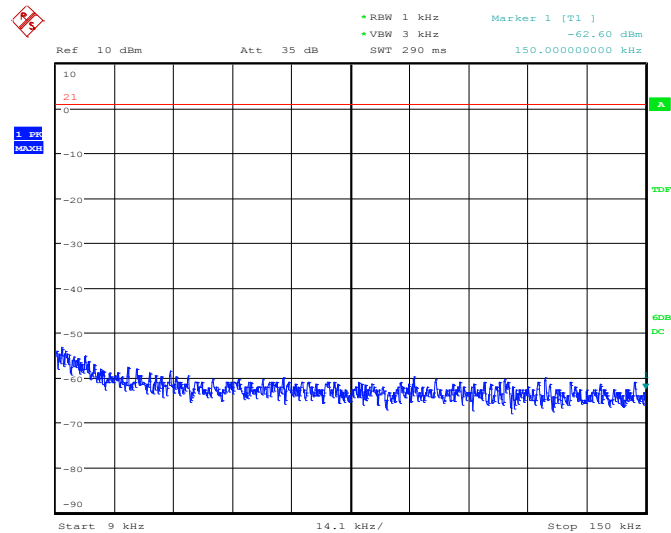
18kbps: Mid Channel, 1 GHz to 10 GHz



Date: 18.FEB.2016 14:44:56

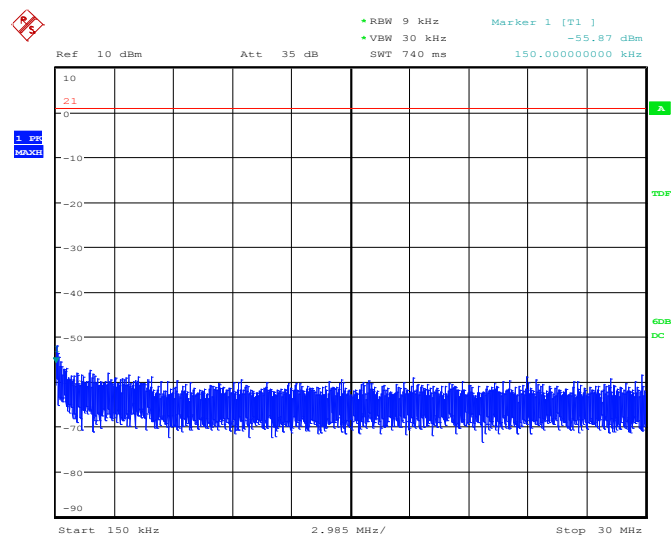


18kbps: High Channel, 9kHz to 150kHz



Date: 18.FEB.2016 14:36:49

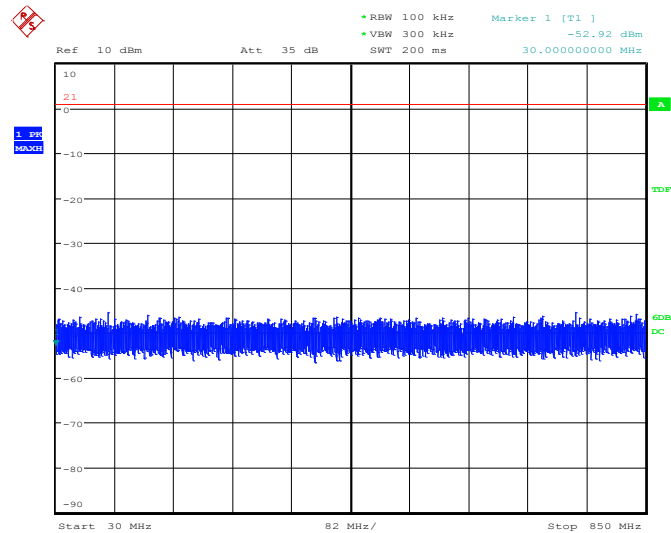
18kbps: High Channel, 150kHz to 30 MHz



Date: 18.FEB.2016 14:37:11

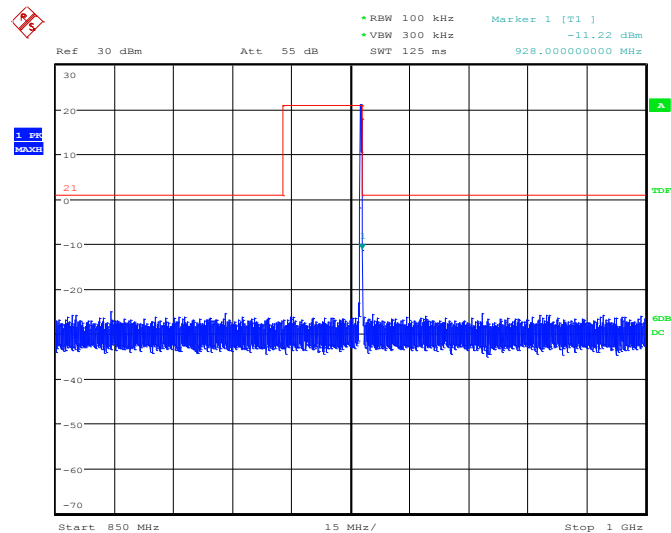


18kbps: High Channel, 30 MHz to 850 MHz



Date: 18.FEB.2016 14:37:39

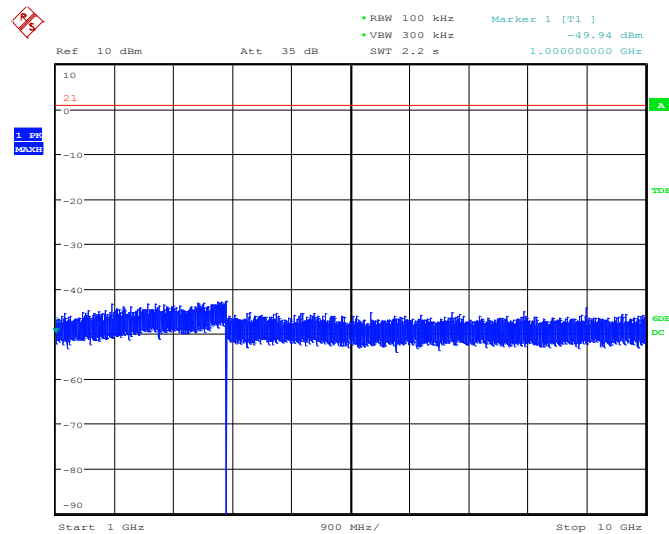
18kbps: High Channel, 850 MHz to 1 GHz



Date: 18.FEB.2016 14:38:06



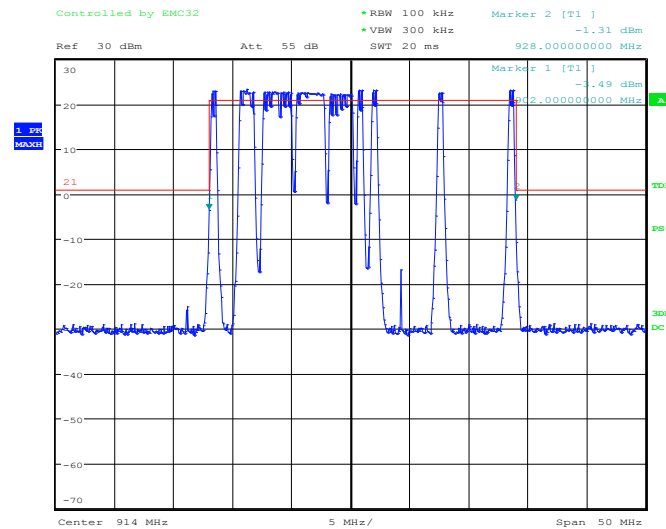
18kbps: High Channel, 1 GHz to 10 GHz



Date: 18.FEB.2016 14:38:33



18kbps: 889 MHz to 989 MHz to 939 MHz Hopping*

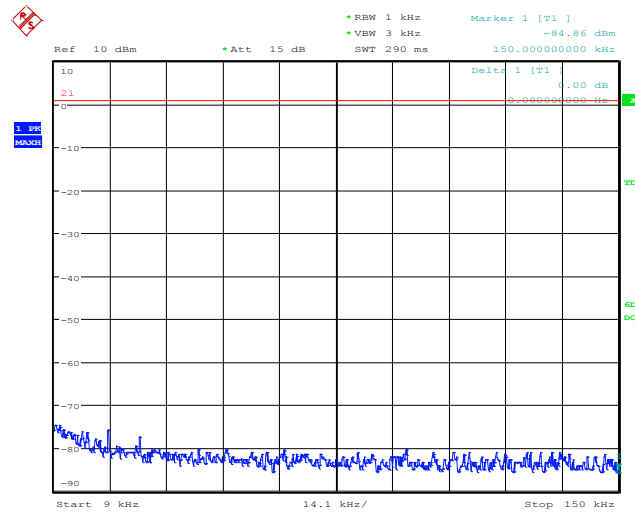


Date: 19.FEB.2016 14:53:52

**Demonstrates that while hopping, EUT does not leave the authorized band.*

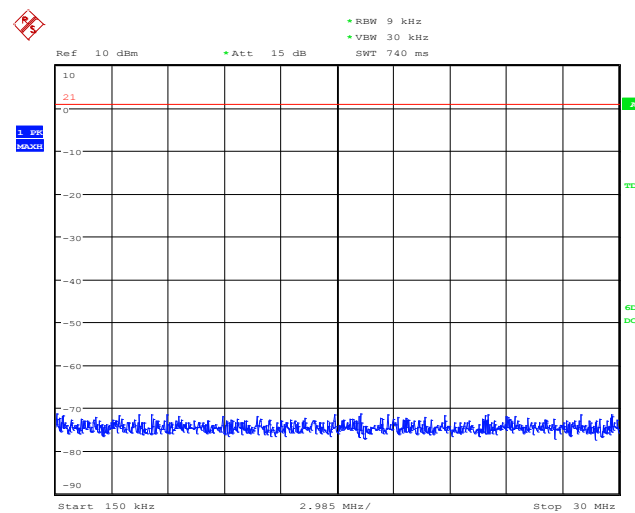


142.2kbps: Low Channel, 9kHz to 150kHz



Date: 19.FEB.2016 09:16:46

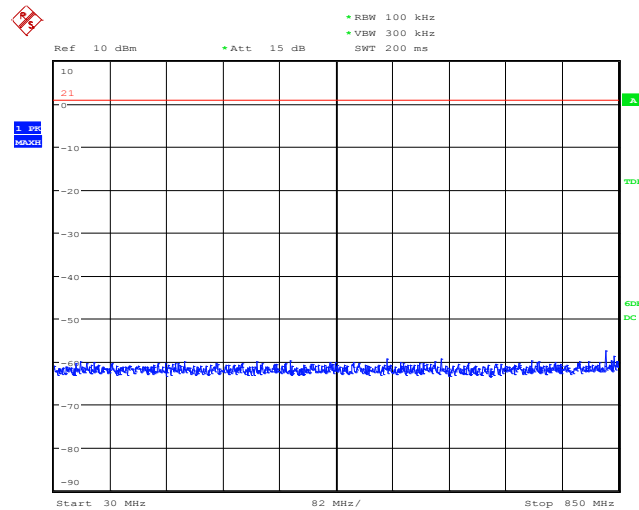
142.2kbps: Low Channel, 150kHz to 30 MHz



Date: 19.FEB.2016 09:17:08

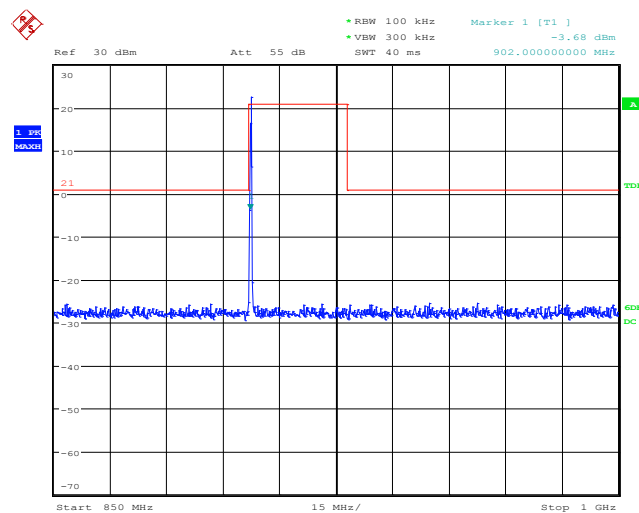


142.2kbps: Low Channel, 30 MHz to 850 MHz



Date: 19.FEB.2016 09:17:31

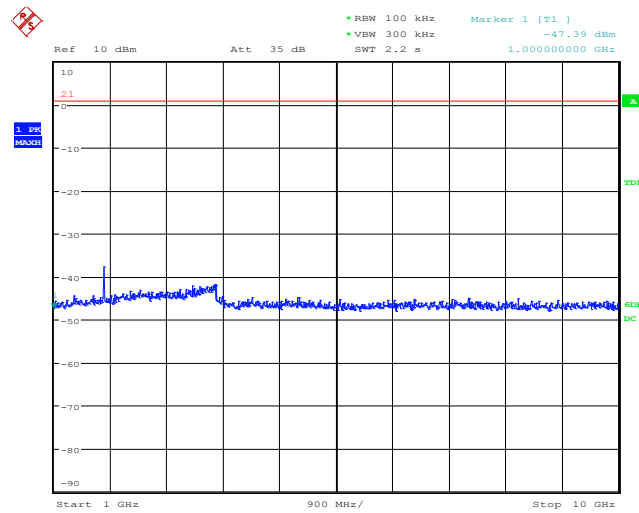
142.2kbps: Low Channel, 850 MHz to 1 GHz



Date: 19.FEB.2016 09:17:56



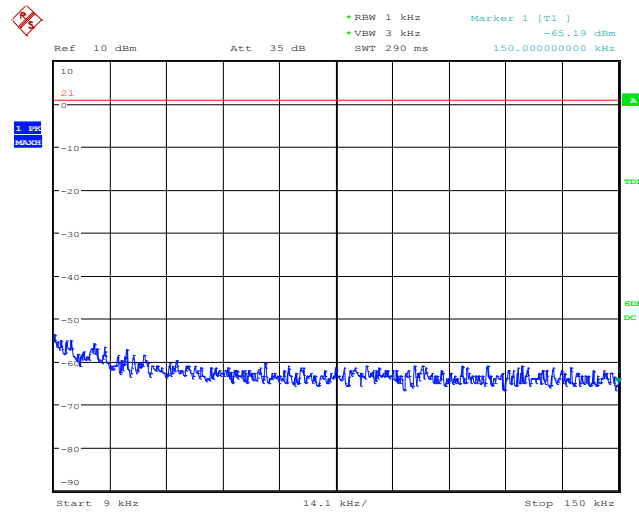
142.2kbps: Low Channel, 1 GHz to 10 GHz



Date: 19.FEB.2016 09:19:36

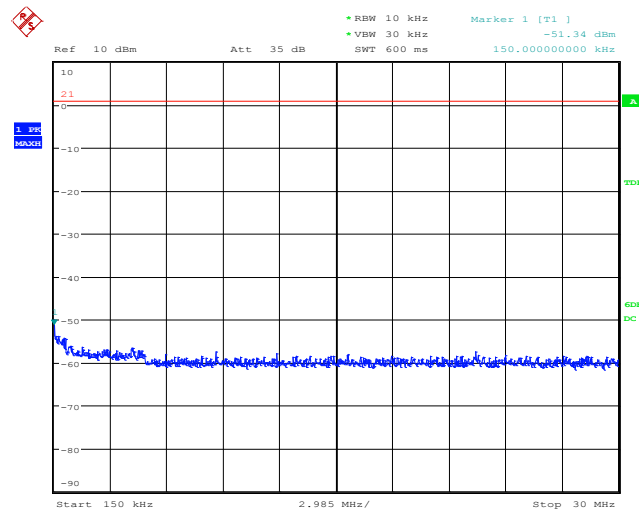


142.2kbps: Mid Channel, 9kHz to 150kHz



Date: 19.FEB.2016 09:20:45

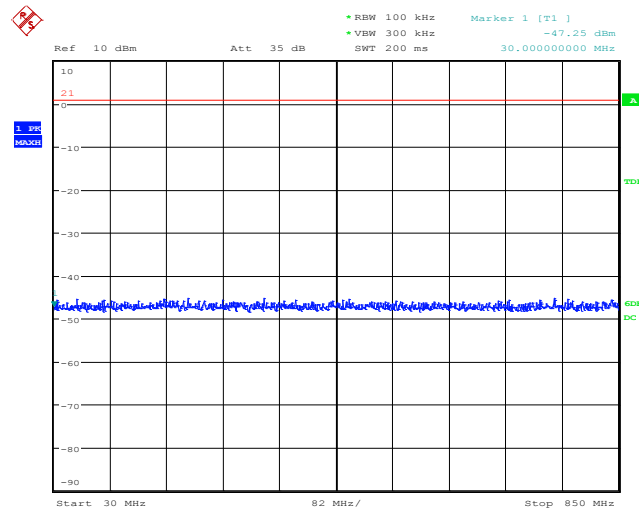
142.2kbps: Mid Channel, 150kHz to 30 MHz



Date: 19.FEB.2016 09:23:24

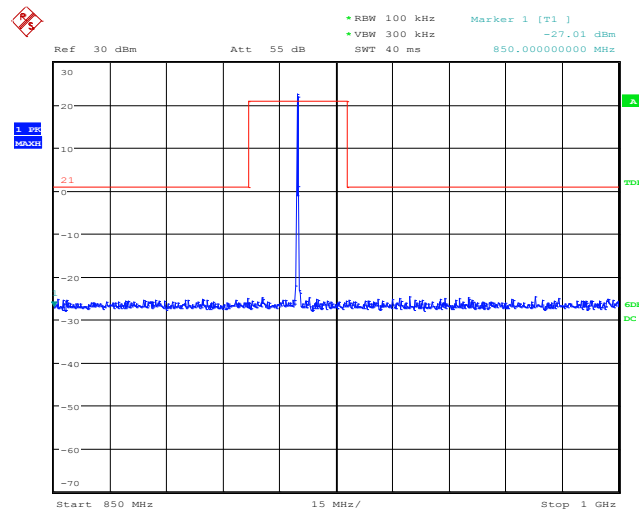


142.2kbps: Mid Channel, 30 MHz to 850 MHz



Date: 19.FEB.2016 09:24:30

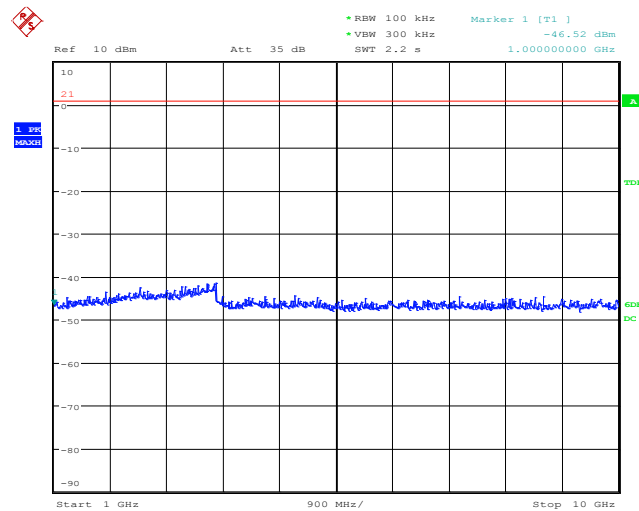
142.2kbps: Mid Channel, 850 MHz to 1 GHz



Date: 19.FEB.2016 09:25:55



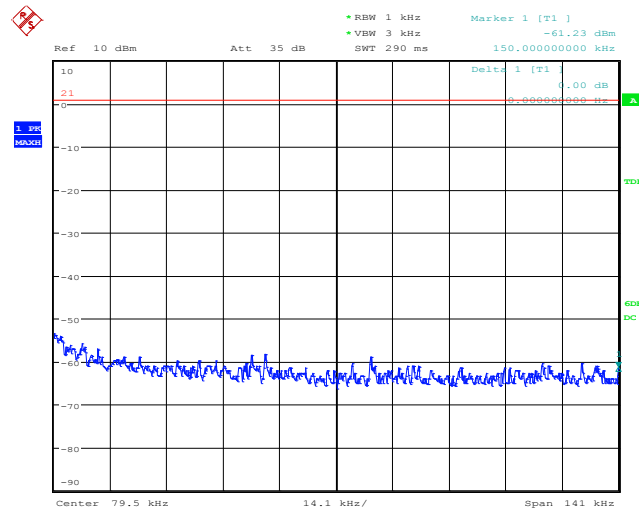
142.2kbps: Mid Channel, 1 GHz to 10 GHz



Date: 19.FEB.2016 09:27:32

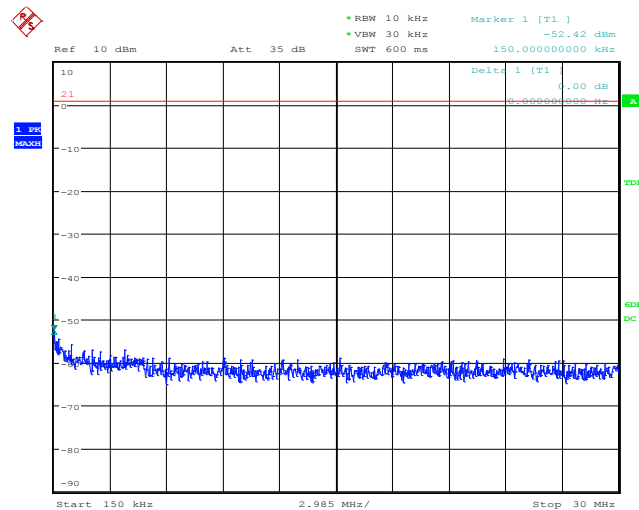


142.2kbps: High Channel, 9kHz to 150kHz



Date: 19.FEB.2016 09:39:28

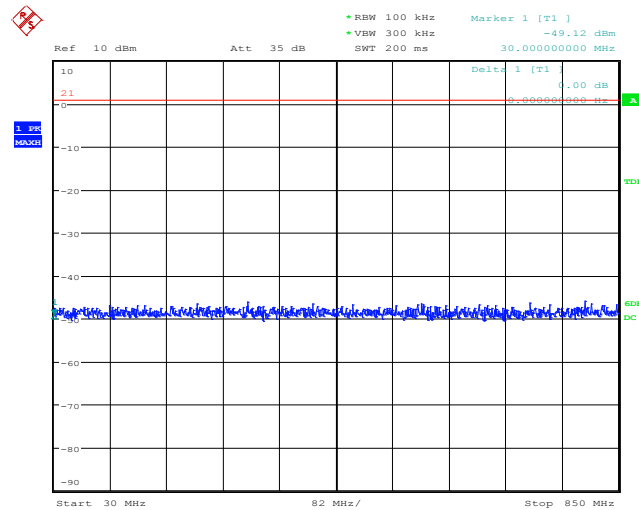
142.2kbps: High Channel, 150kHz to 30 MHz



Date: 19.FEB.2016 09:39:50

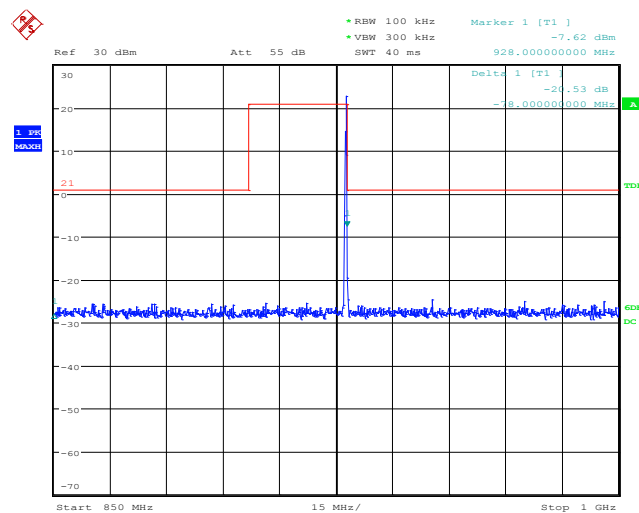


142.2kbps: High Channel, 30 MHz to 850 MHz



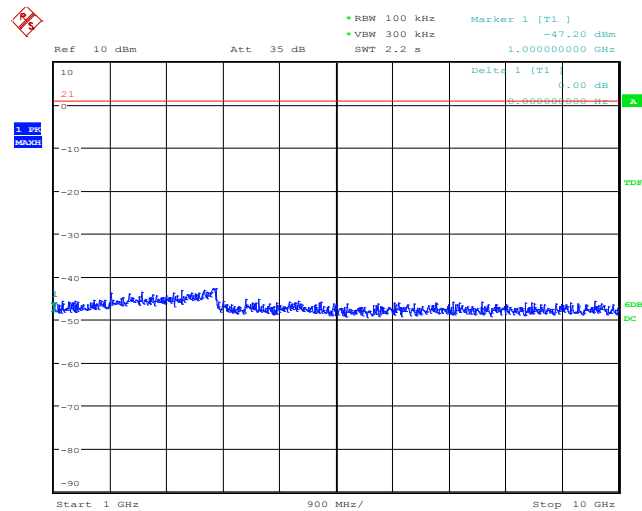
Date: 19.FEB.2016 09:40:11

142.2kbps: High Channel, 850 MHz to 1 GHz



Date: 19.FEB.2016 09:40:33

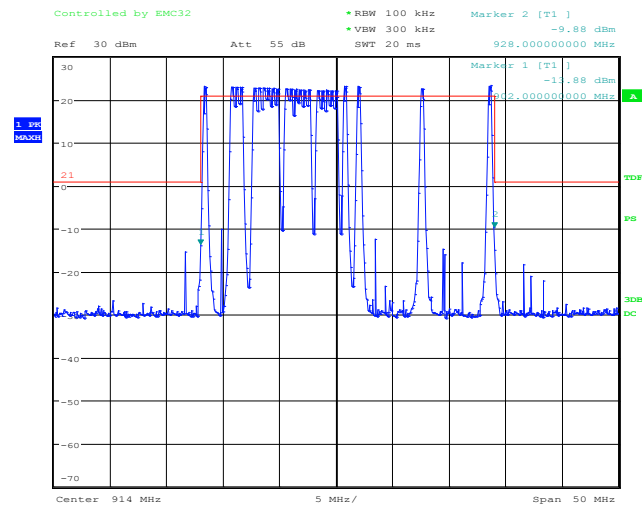
142.2kbps: High Channel, 1 GHz to 10 GHz



Date: 19.FEB.2016 09:40:55



142.2kbps: 889 MHz to 989 MHz to 939 MHz Hopping*



Date: 19.FEB.2016 14:52:00

**Demonstrates that while hopping, EUT does not leave the authorized band.*



11 RADIATED SPURIOUS EMISSION

The EUT antenna port was fitted with its integral/internal chip antenna. Radiated emissions were measured in a Semi-Anechoic Chamber. All emissions generated that fall in the restricted bands per FCC Part 15.205 were examined.

11.1 Requirements:

All emissions that fall in the restricted bands defined in FCC Part 15.205 shall not exceed the maximum field strength listed in FCC Part 15.209(a).



11.2 Radiated Spurious Emission Test Data

Test Date(s):	Feb. 17-19, 2016	Test Engineer:	J. Knepper
Standards:	CFR 47 Part 15.247(d); Part 15.209 / KDB558074	Air Temperature:	20.3°C
		Relative Humidity:	40%

Notes: Plots are peak, max hold prescan data included only to determine what frequencies to investigate and measure. The EUT was initially placed in a semi-anechoic chamber, and rotated in all three orthogonal positions to maximize the emissions. Characterization measurements were then performed to determine at which frequencies significant emissions occurred. These graphs are shown below.

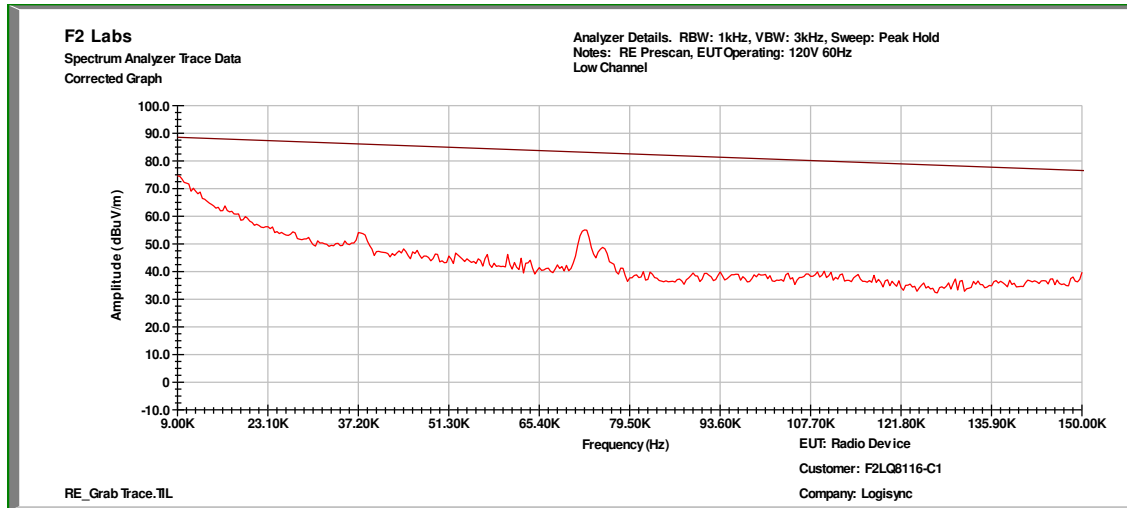
The equipment was fully exercised with all cabling attached to the EUT and was positioned in a semi-anechoic chamber for maximum emissions. While the equipment was energized, the receiving antenna was scanned from 1.0 meter to 4.0 meters in both vertical and horizontal polarities while the turntable was adjusted 360 degrees to determine the maximum field strength. The tables of measured results can be found below.

Some of the frequencies did not change with the EUT on or off. At those frequencies, the test distance was shortened to 1 meter and still no emissions from the EUT were visible or over the ambient or limit.

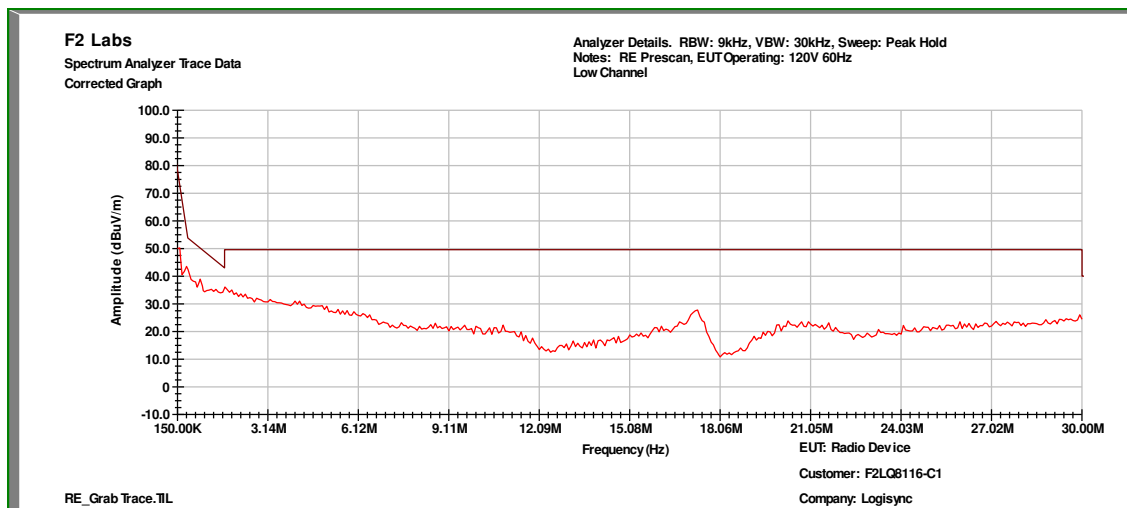
In the following plots, the black line indicates ambient noise and the red line indicates the measurement with the EUT on. Emissions to be found by the EUT were measured and listed in tables. The plots are for reference only and the limit lines are not actual limit lines but merely a guide.



18kbps: Low Channel, 9kHz to 150kHz

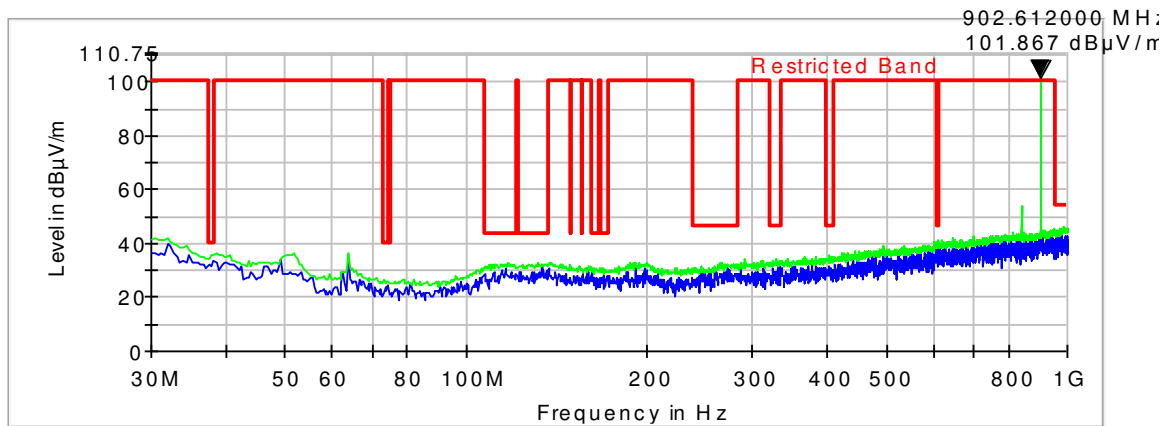


18kbps: Low Channel, 150kHz to 30 MHz

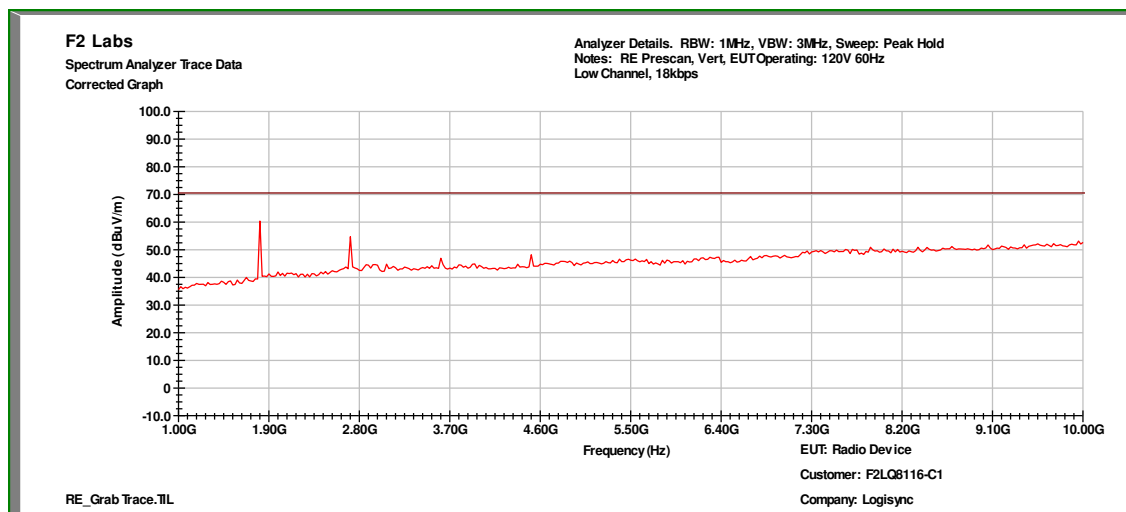




18kbps: Low Channel, 30 MHz to 1 GHz, Vertical

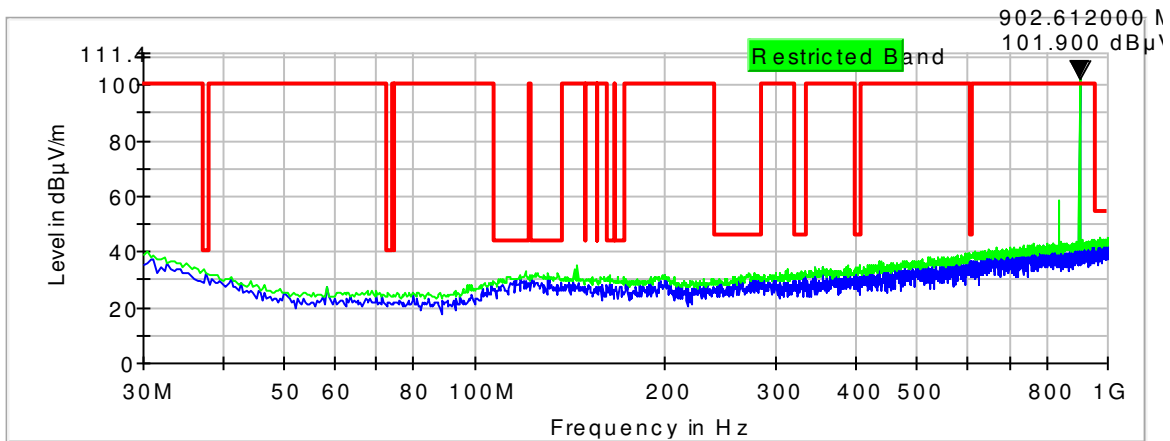


18kbps: Low Channel, 1 GHz to 10 GHz, Vertical

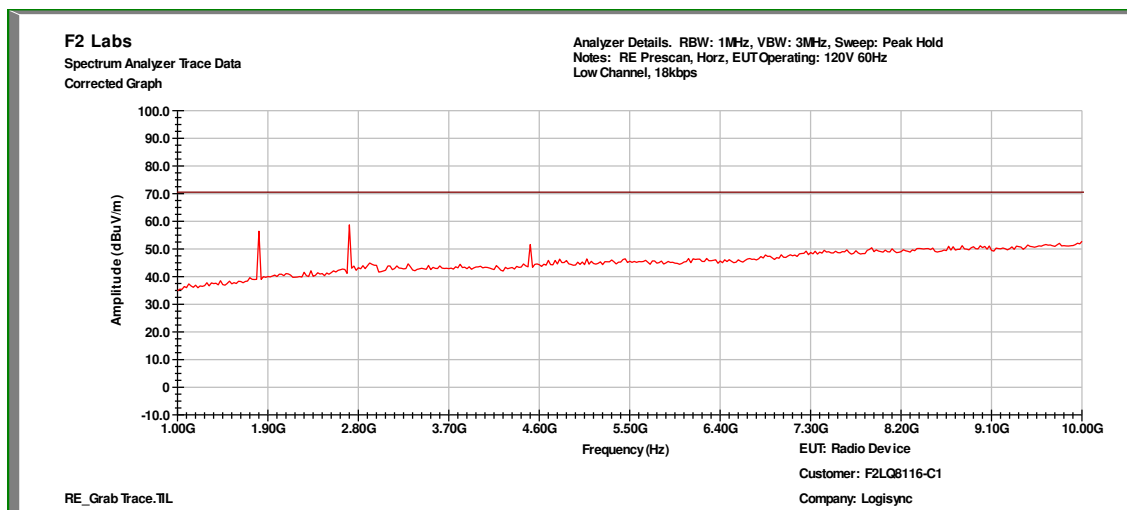




18kbps: Low Channel, 30 MHz to 1 GHz, Horizontal

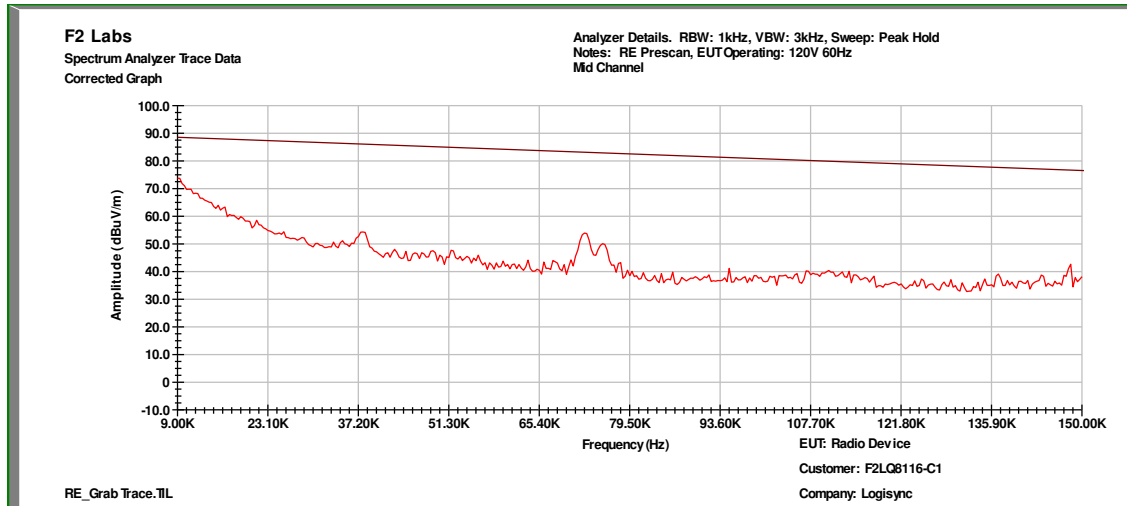


18kbps: Low Channel, 1 GHz to 10 GHz, Horizontal

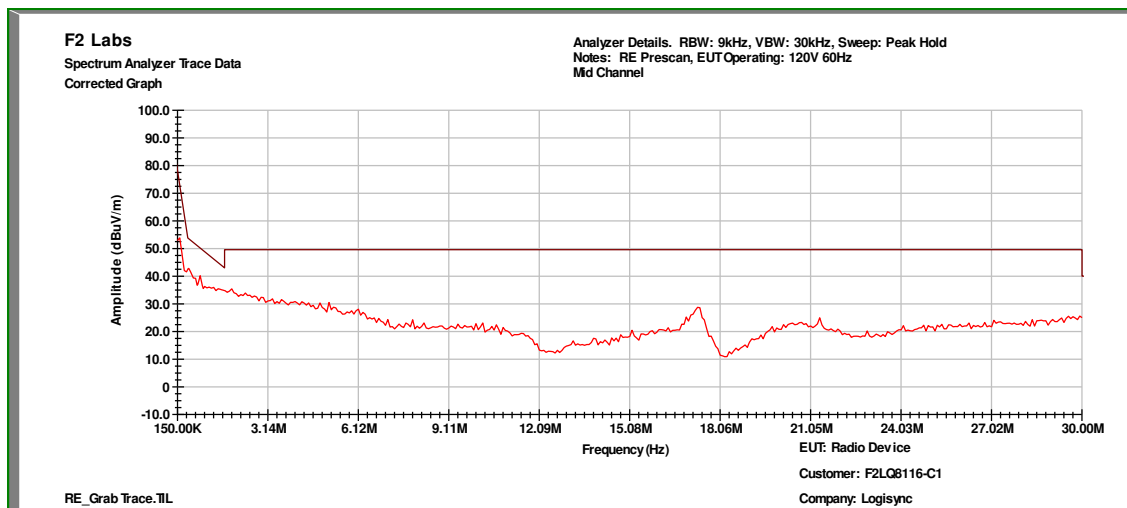




18kbps: Mid Channel, 9kHz to 150kHz

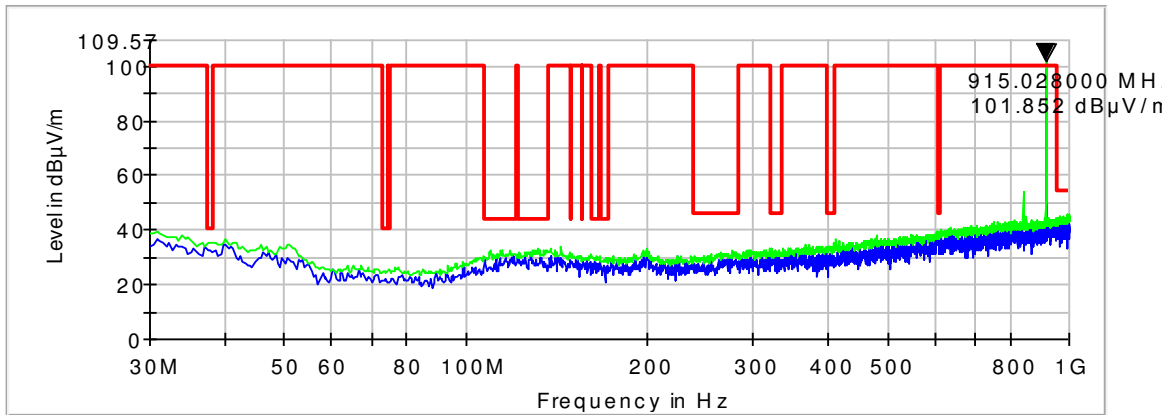


18kbps: Mid Channel, 150kHz to 30 MHz

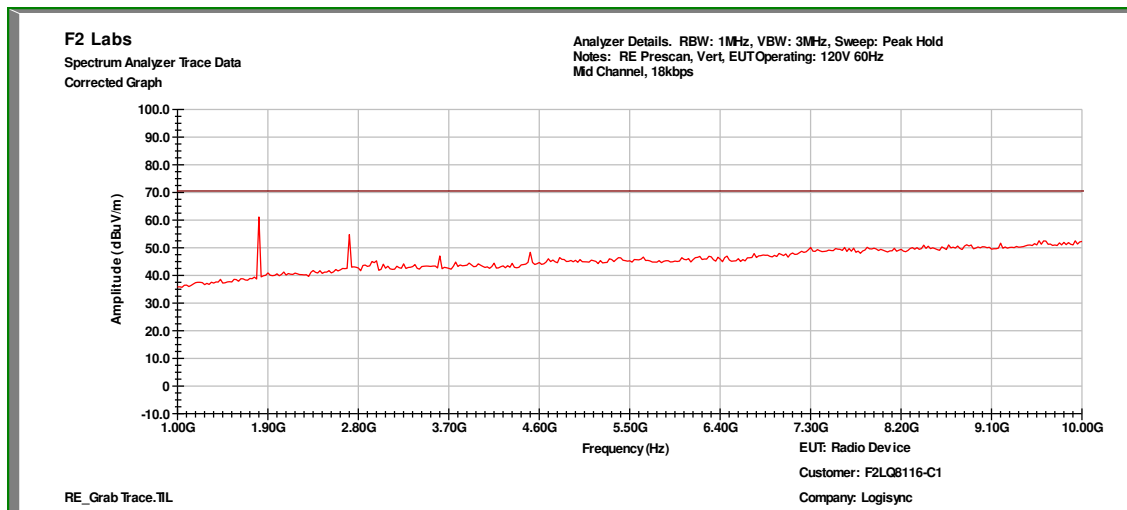




18kbps: Mid Channel, 30 MHz to 1 GHz, Vertical

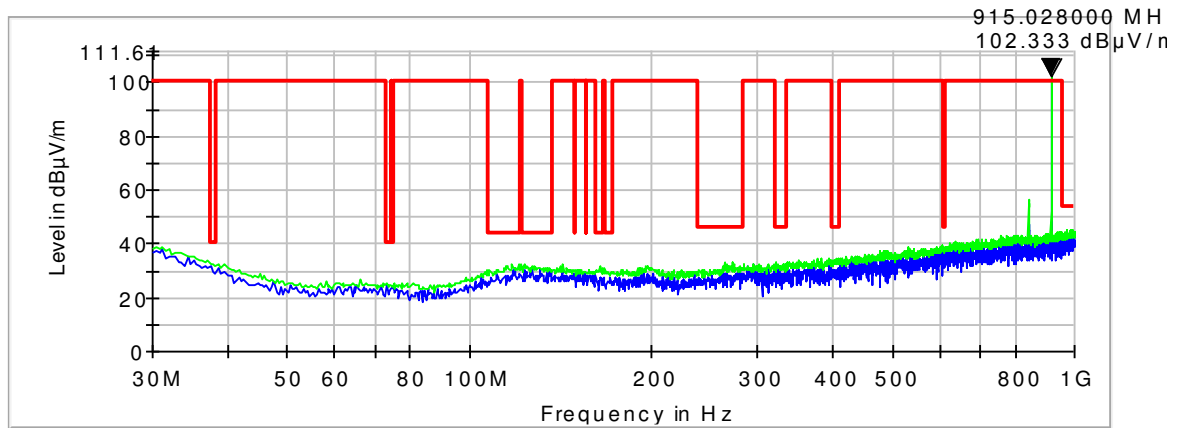


18kbps: Mid Channel, 1 GHz to 10 GHz, Vertical

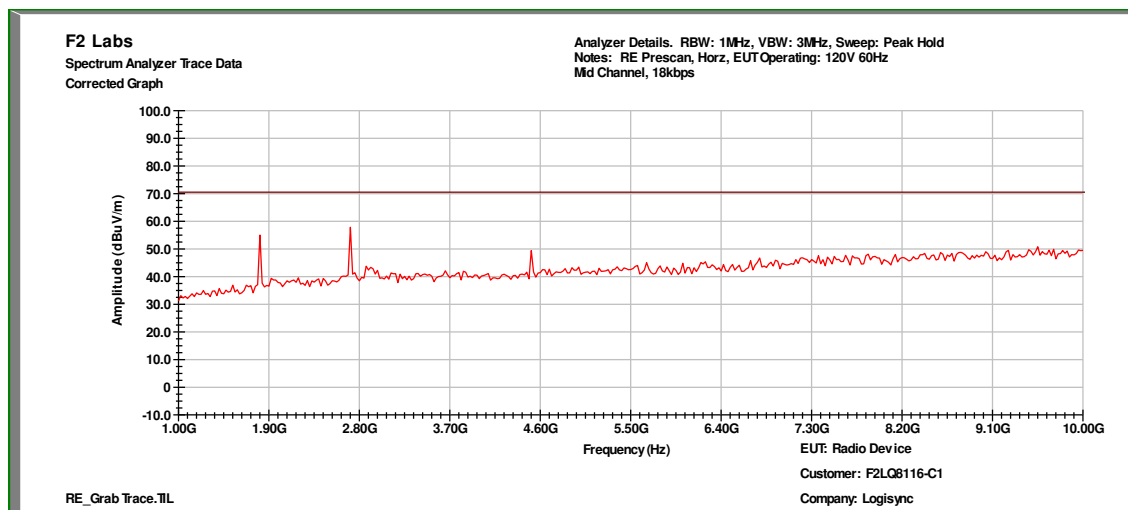




18kbps: Mid Channel, 30 MHz to 1 GHz, Horizontal

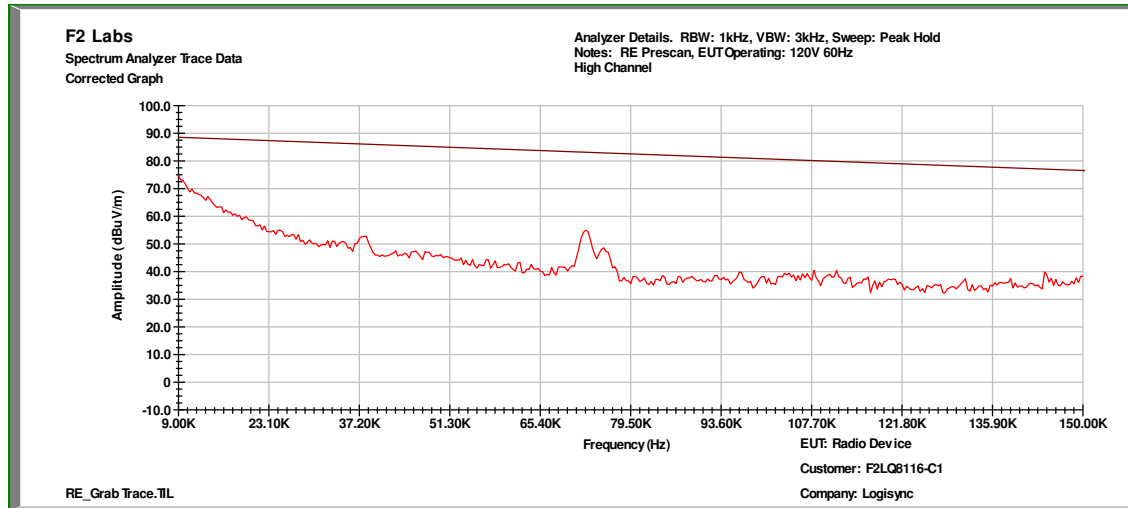


18kbps: Mid Channel, 1 GHz to 10 GHz, Horizontal

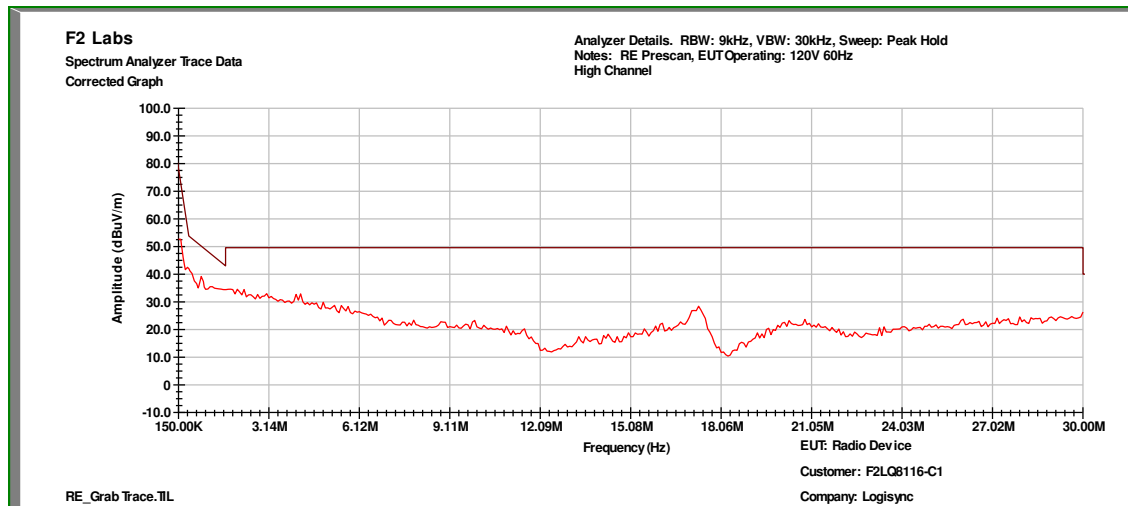




18kbps: High Channel, 9kHz to 150kHz

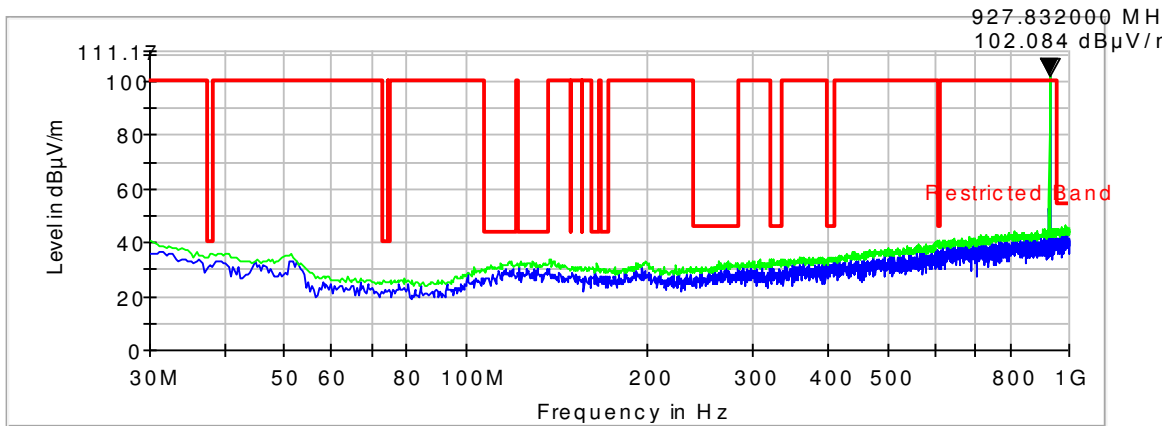


18kbps: High Channel, 150kHz to 30 MHz

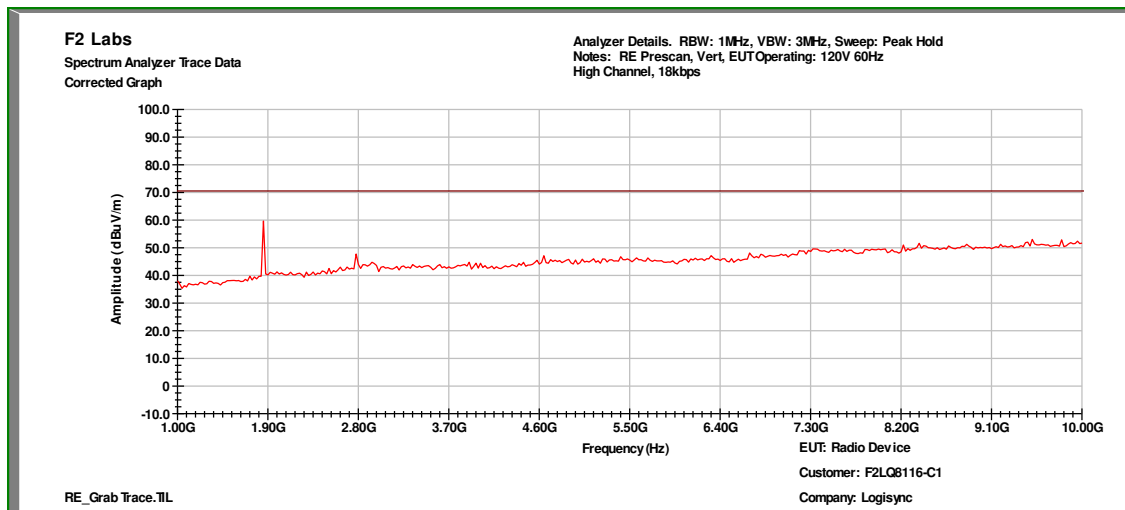




18kbps: High Channel, 30 MHz to 1 GHz, Vertical

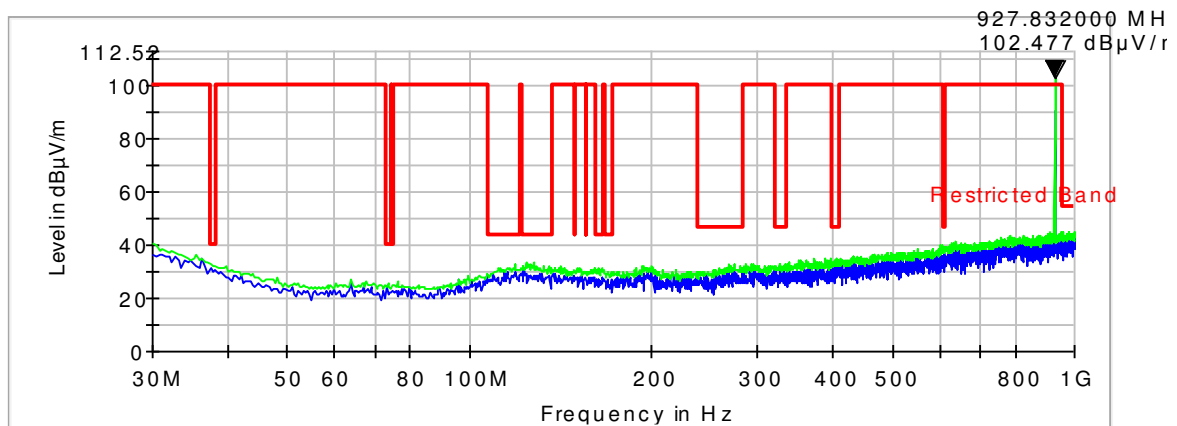


18kbps: High Channel, 1 GHz to 10 GHz, Vertical

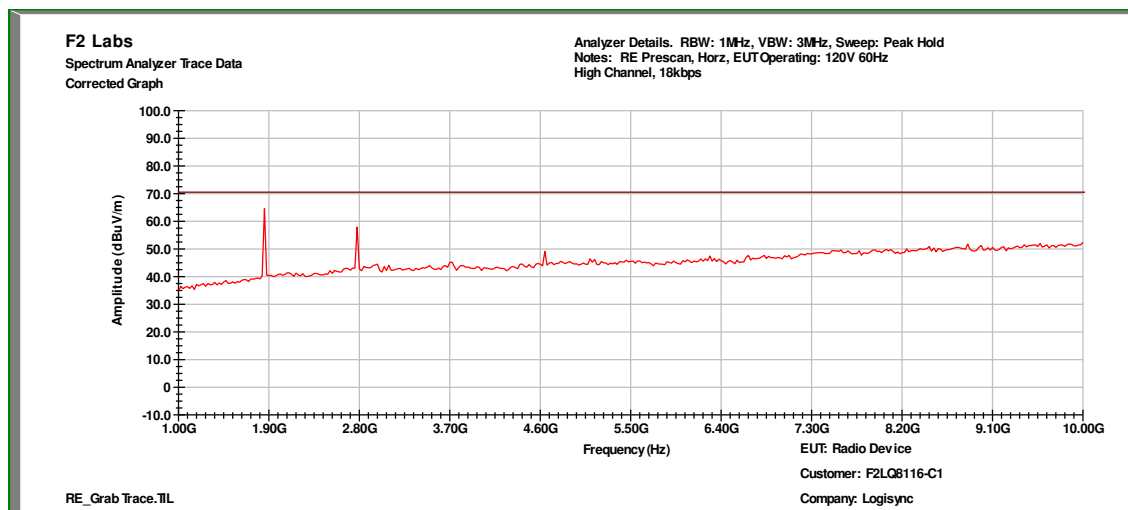




18kbps: High Channel, 30 MHz to 1 GHz, Horizontal



18kbps: High Channel, 1 GHz to 10 GHz, Horizontal



**Measurements****18kbps: Low Channel - MaxPeak**

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2707.600000	H	41.9	7.4	49.30	74.0	-24.7
2707.600000	V	45.9	7.4	53.30	74.0	-20.7

18kbps: Low Channel – Average

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2707.600000	H	31.5	7.4	38.90	54.0	-15.1
2707.600000	V	38.1	7.4	45.50	54.0	-8.5

18kbps: Low Channel – QuasiPeak

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
37.372000	H	6.6	16.4	23.00	40.0	-17.0
37.760000	V	11.4	16.1	27.50	40.0	-12.5
73.068000	H	6.5	8.4	14.90	40.0	-25.1
74.620000	V	6.7	8.4	15.10	40.0	-24.9
113.808000	H	6.7	13.6	20.30	43.5	-23.2
115.360000	V	8.9	13.9	22.80	43.5	-20.7
129.328000	V	8.4	14.2	22.60	43.0	-20.4
130.492000	H	6.5	14.2	20.70	43.5	-22.8
168.128000	V	6.8	12.5	19.30	43.5	-24.2
168.516000	H	7.4	12.4	19.80	43.5	-23.7
276.768000	H	6.7	13.9	20.60	46.0	-25.4
606.956000	V	7.8	19.4	27.20	46.0	-18.8
617.044000	H	7.8	19.6	27.40	46.0	-18.6
960.000000	H	8.9	23.4	32.30	54.0	-21.7
999.224000	V	8.8	24.0	32.80	54.0	-21.2

**18kbps: Mid Channel - MaxPeak**

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2744.000000	V	45.4	7.5	52.90	74.0	-21.1
2744.000000	H	45.6	7.5	53.10	74.0	-20.9

18kbps: Mid Channel – Average

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2744.000000	V	36.7	7.5	44.20	54.0	-9.8
2744.000000	H	37.5	7.5	45.00	54.0	-9.0

18kbps: Mid Channel – QuasiPeak

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
36.984000	H	6.6	16.7	23.30	40.0	-16.7
37.760000	V	12.1	16.1	28.20	40.0	-11.8
73.068000	H	6.5	8.4	14.90	40.0	-25.1
74.620000	V	7.7	8.4	16.10	40.0	-23.9
114.972000	V	8.6	13.8	22.40	43.5	-21.1
115.360000	H	6.7	13.9	20.60	43.5	-22.9
132.044000	V	9.2	14.0	23.20	43.0	-19.8
132.432000	H	6.6	14.0	20.60	43.5	-22.9
132.432000	H	6.6	14.0	20.60	43.5	-22.9
265.516000	V	6.7	13.5	20.20	43.5	-23.3
277.932000	H	6.7	13.9	20.60	46.0	-25.4
321.388000	V	7.0	14.7	21.70	46.0	-24.3
604.240000	H	7.8	19.4	27.20	46.0	-18.8
611.224000	V	7.8	19.4	27.20	46.0	-18.8
971.676000	H	8.7	23.6	32.30	54.0	-21.7
993.404000	V	8.8	24.0	32.80	54.0	-21.2

**18kbps: High Channel - MaxPeak**

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2782.000000	H	43.8	7.6	51.40	74.0	-22.6
2782.000000	V	41.3	7.6	48.90	74.0	-25.1

18kbps: High Channel - Average

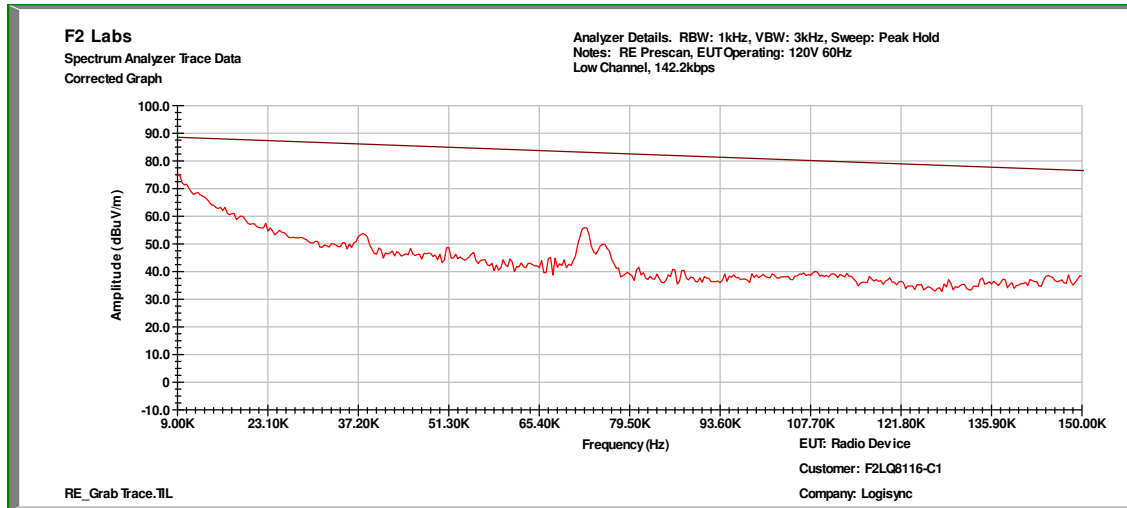
Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2782.000000	H	32.9	7.6	40.50	54.0	-13.5
2782.000000	V	29.6	7.6	37.20	54.0	-16.8

18kbps: High Channel – QuasiPeak

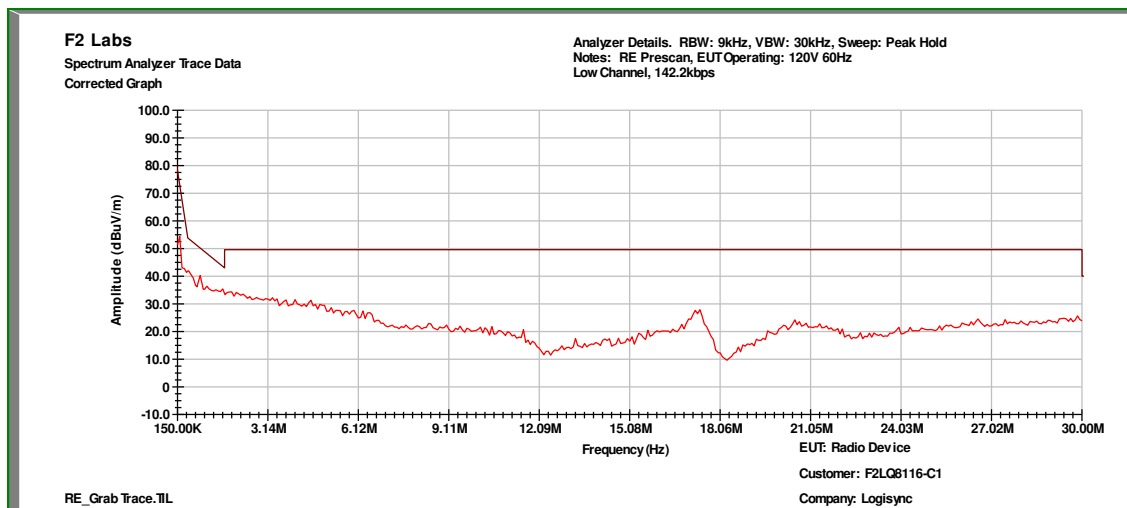
Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
37.372000	H	6.6	16.4	23.00	40.0	-17.0
38.148000	V	12.2	15.8	28.00	40.0	-12.0
73.068000	V	6.5	8.4	14.90	40.0	-25.1
73.456000	H	6.4	8.4	14.80	40.0	-25.2
114.196000	V	8.4	13.6	22.00	43.5	-21.5
115.748000	H	6.7	13.9	20.60	43.5	-22.9
130.880000	V	8.1	14.1	22.20	43.5	-21.3
133.208000	H	6.5	14.0	20.50	43.5	-23.0
171.620000	H	7.4	12.2	19.60	43.5	-23.9
272.888000	V	6.7	13.9	20.60	46.0	-25.4
279.484000	H	6.8	13.9	20.70	46.0	-25.3
405.972000	V	6.9	16.4	23.30	46.0	-22.7
603.852000	H	7.7	19.4	27.10	46.0	-18.9
608.508000	V	7.8	19.4	27.20	46.0	-18.8
986.032000	H	8.7	23.9	32.60	54.0	-21.4
986.032000	V	8.8	23.9	32.70	54.0	-21.3



142.2kbps: Low Channel, 9kHz to 150kHz

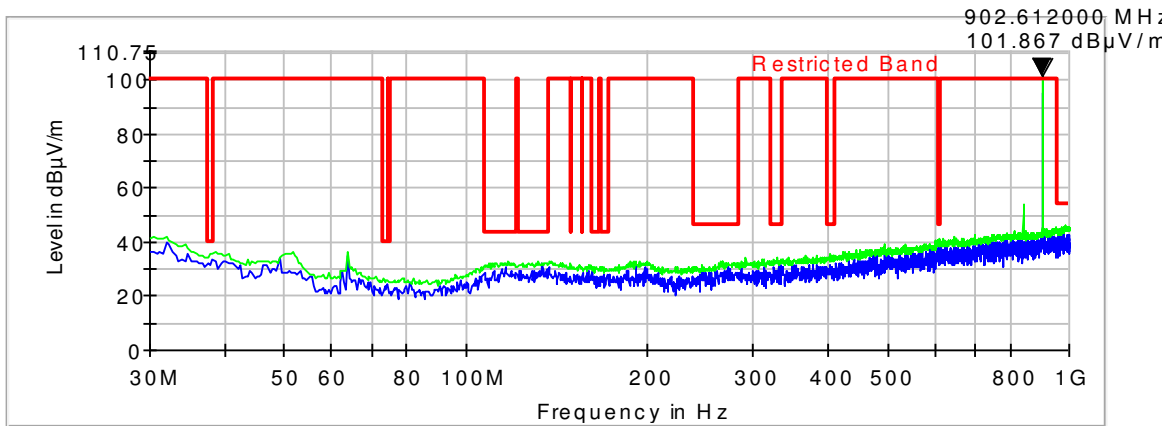


142.2kbps: Low Channel, 150kHz to 30 MHz

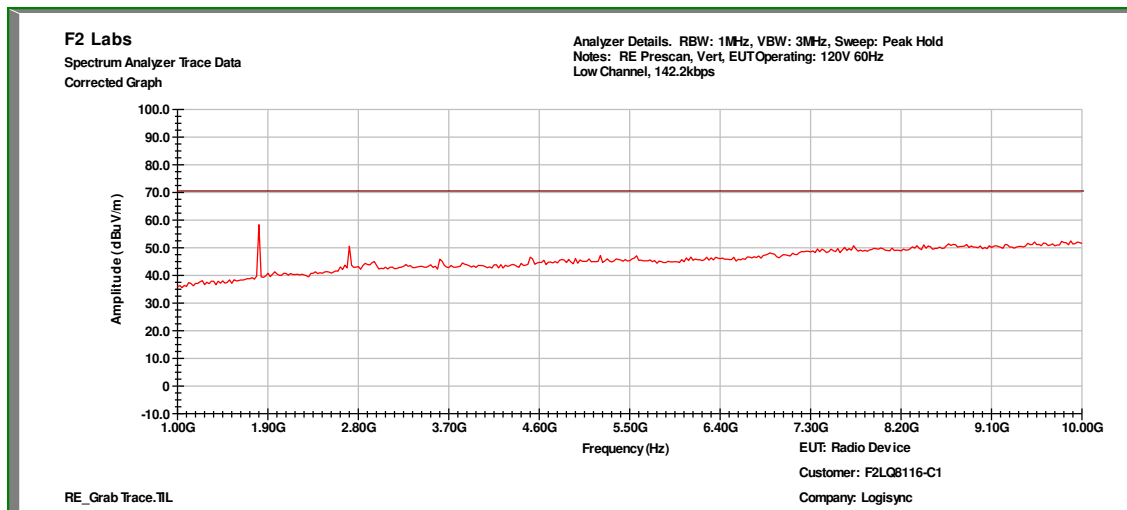




142.2kbps: Low Channel, 30 MHz to 1 GHz, Vertical

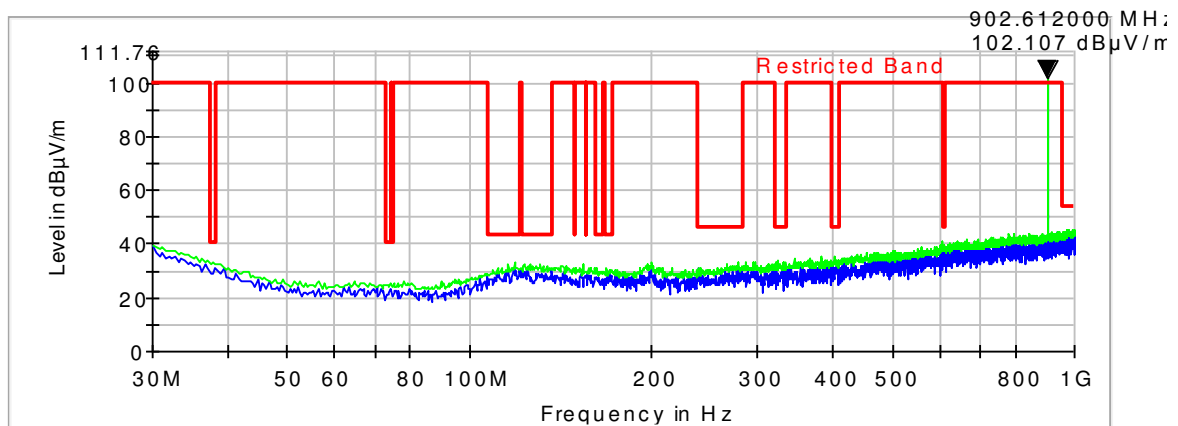


142.2kbps: Low Channel, 1 GHz to 10 GHz, Vertical

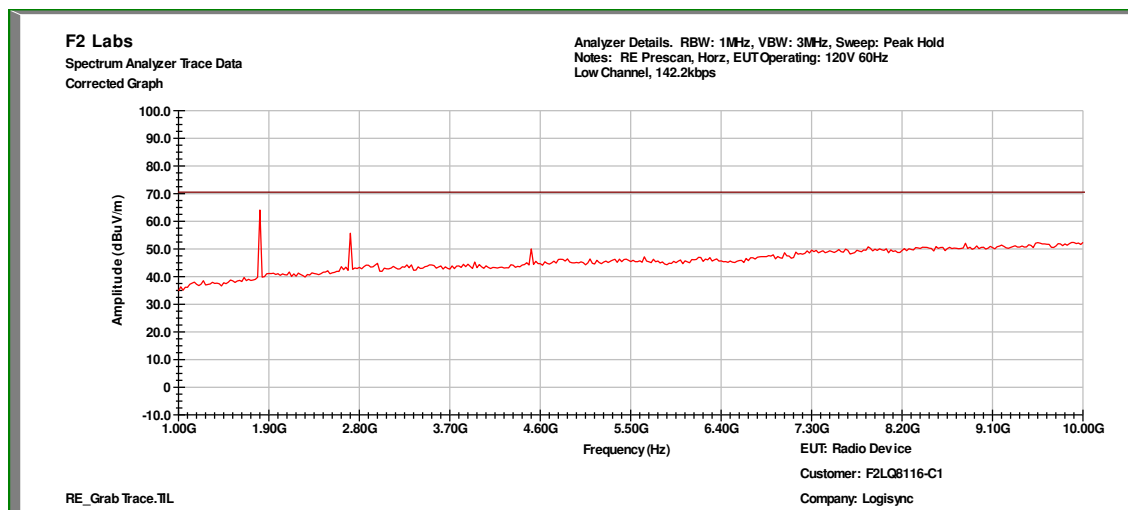




142.2kbps: Low Channel, 30 MHz to 1 GHz, Horizontal

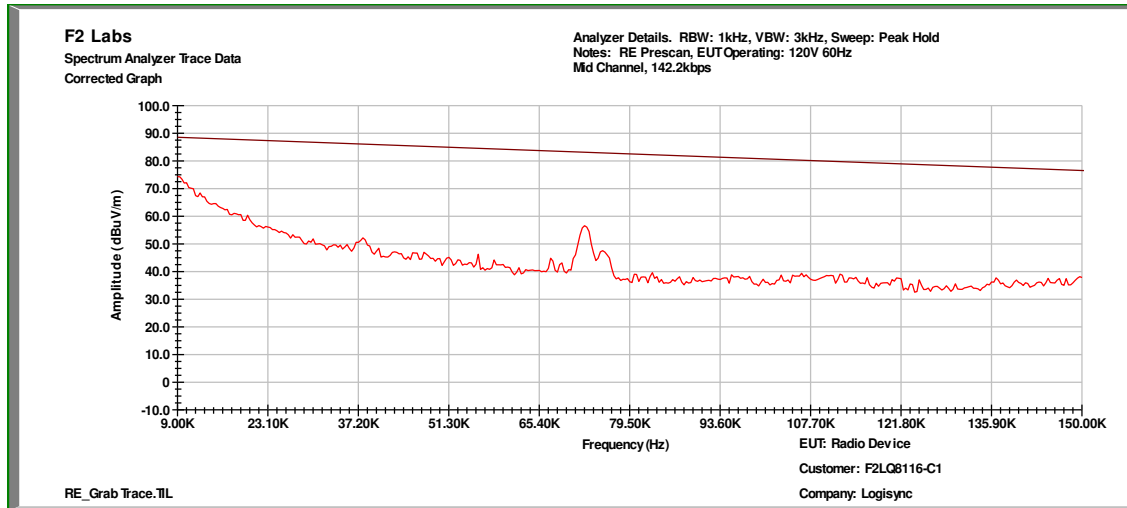


142.2kbps: Low Channel, 1 GHz to 10 GHz, Horizontal

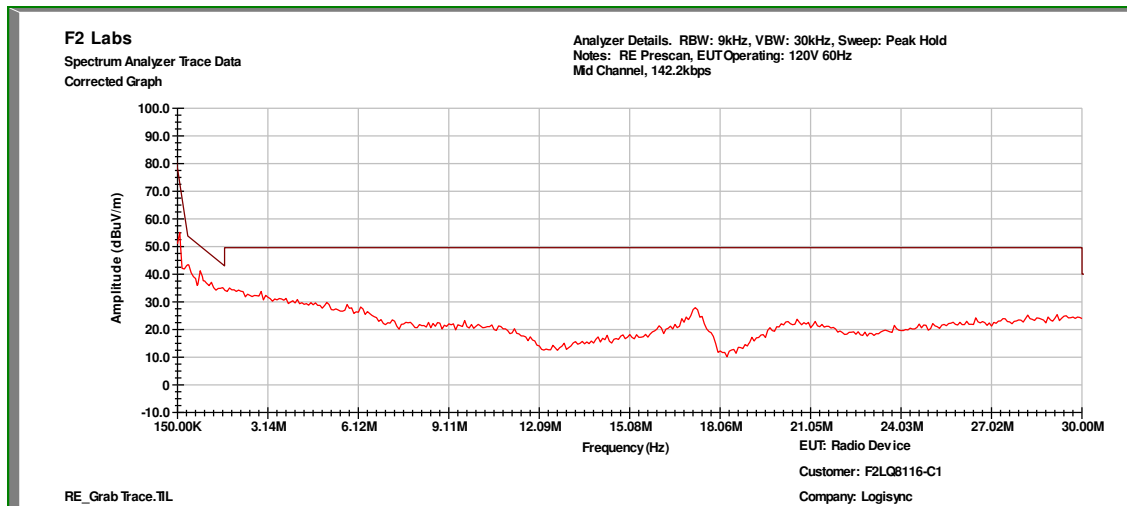




142.2kbps: Mid Channel, 9kHz to 150kHz

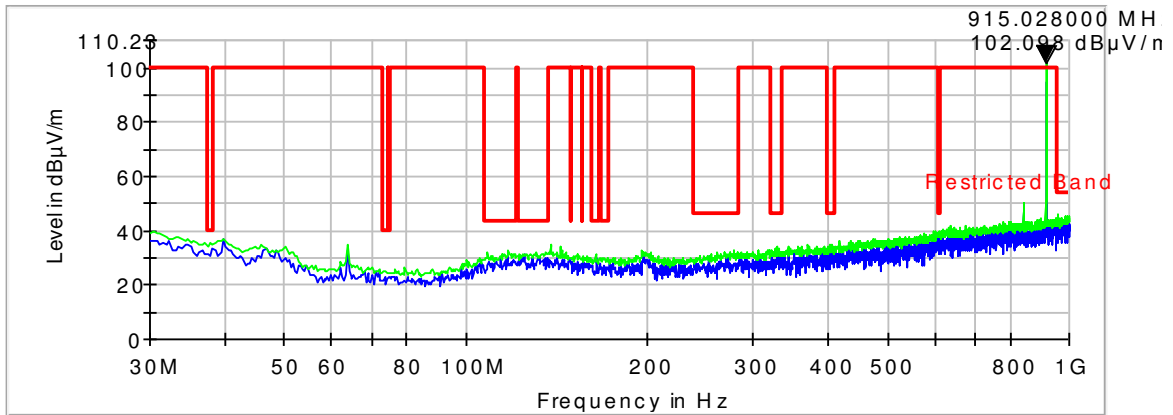


142.2kbps: Mid Channel, 150kHz to 30 MHz

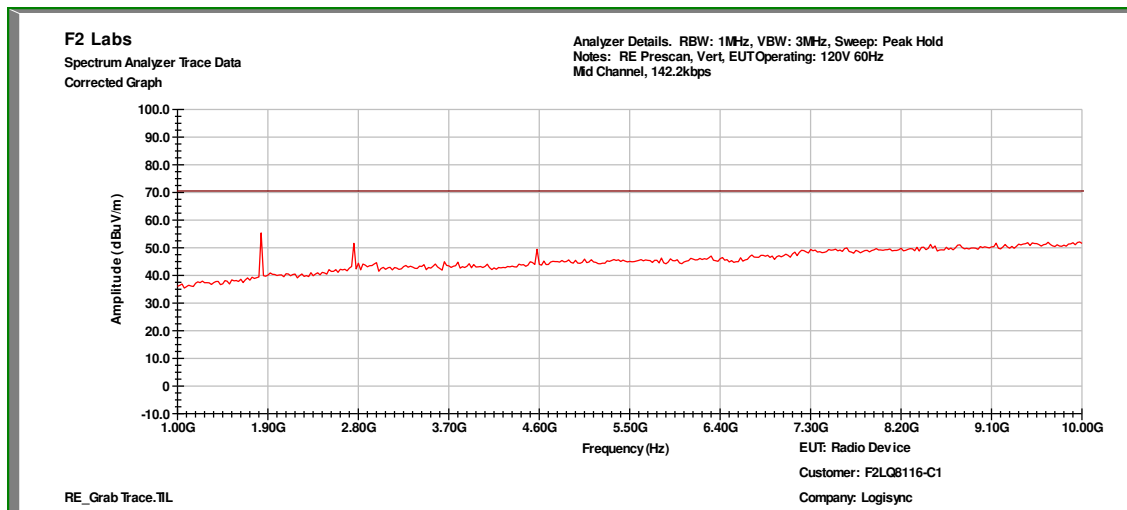




142.2kbps: Mid Channel, 30 MHz to 1 GHz, Vertical

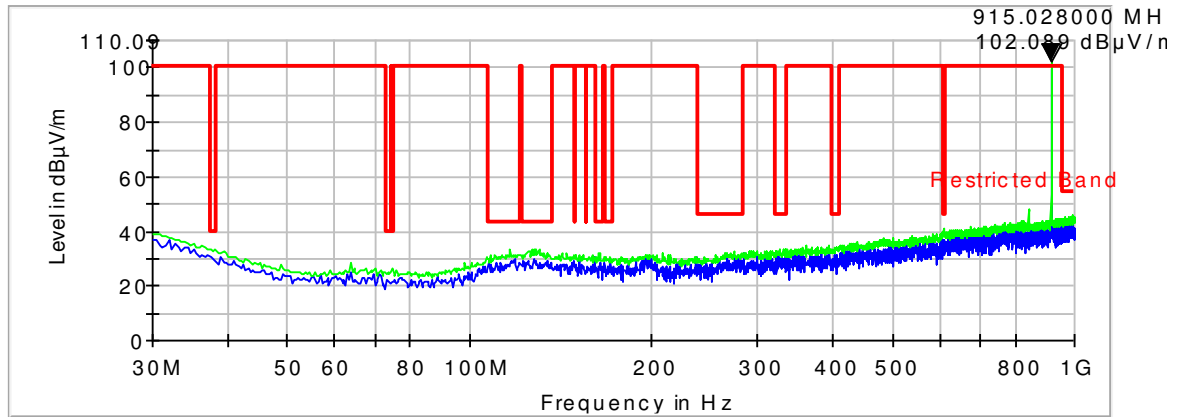


142.2kbps: Mid Channel, 1 GHz to 10 GHz, Vertical

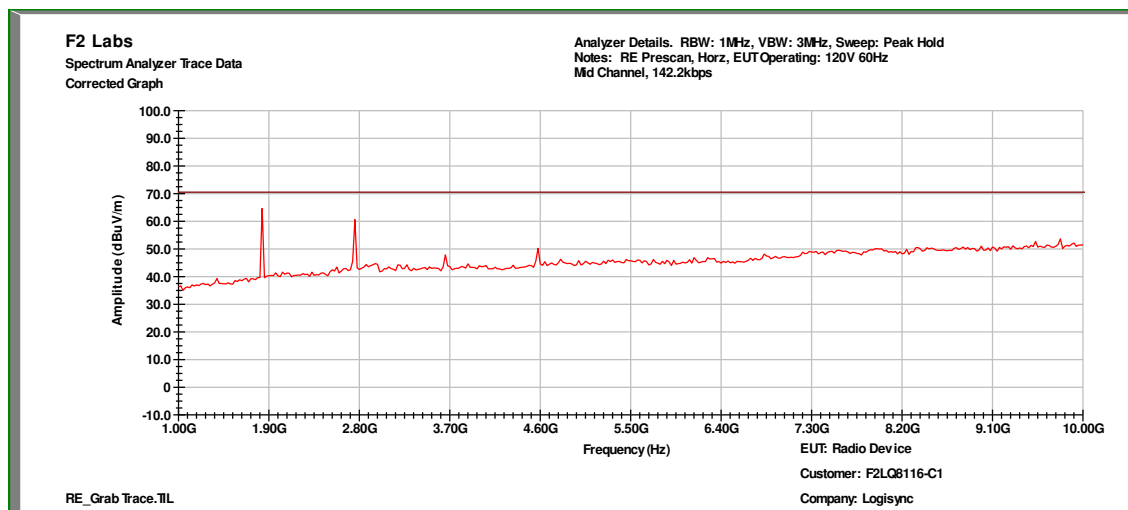




142.2kbps: Mid Channel, 30 MHz to 1 GHz, Horizontal

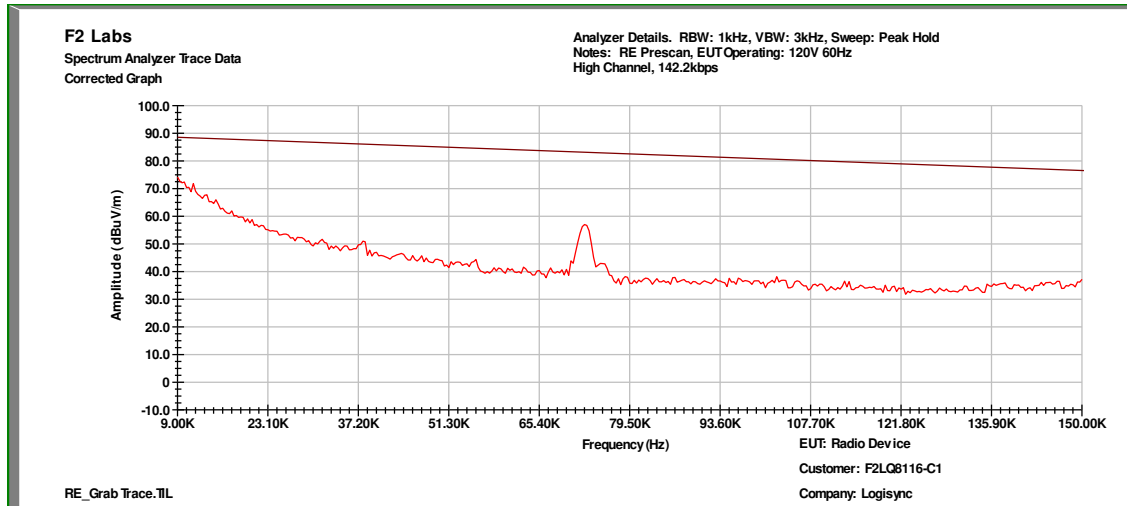


142.2kbps: Mid Channel, 1 GHz to 10 GHz, Horizontal

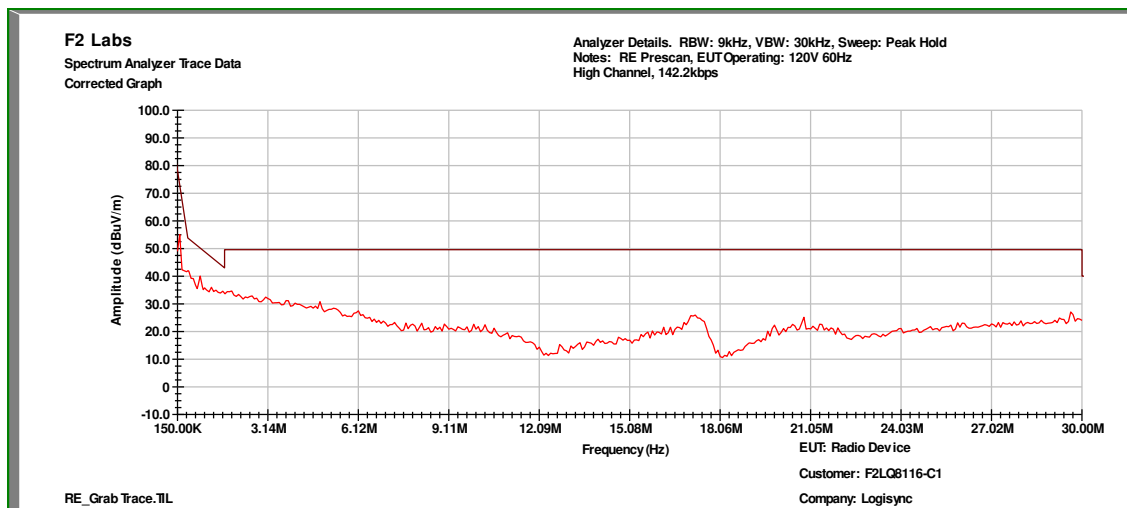




142.2kbps: High Channel, 9kHz to 150kHz

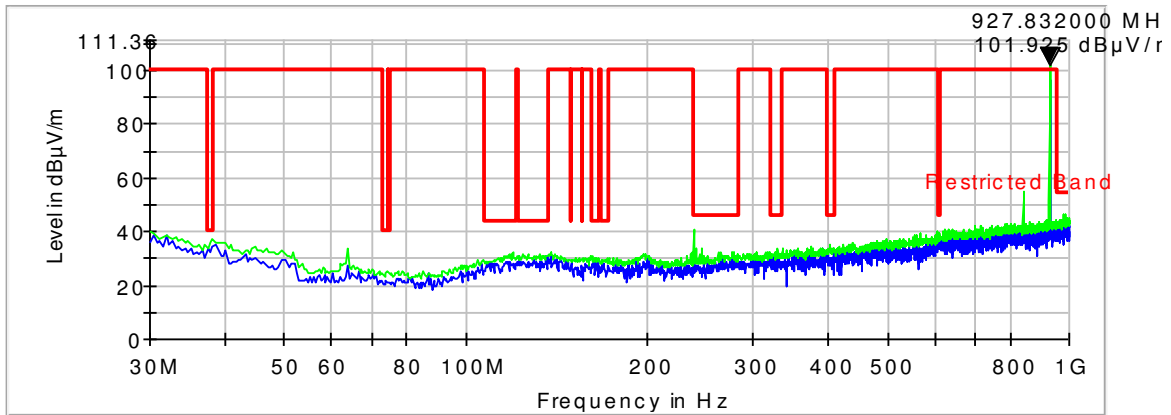


142.2kbps: High Channel, 150kHz to 30 MHz

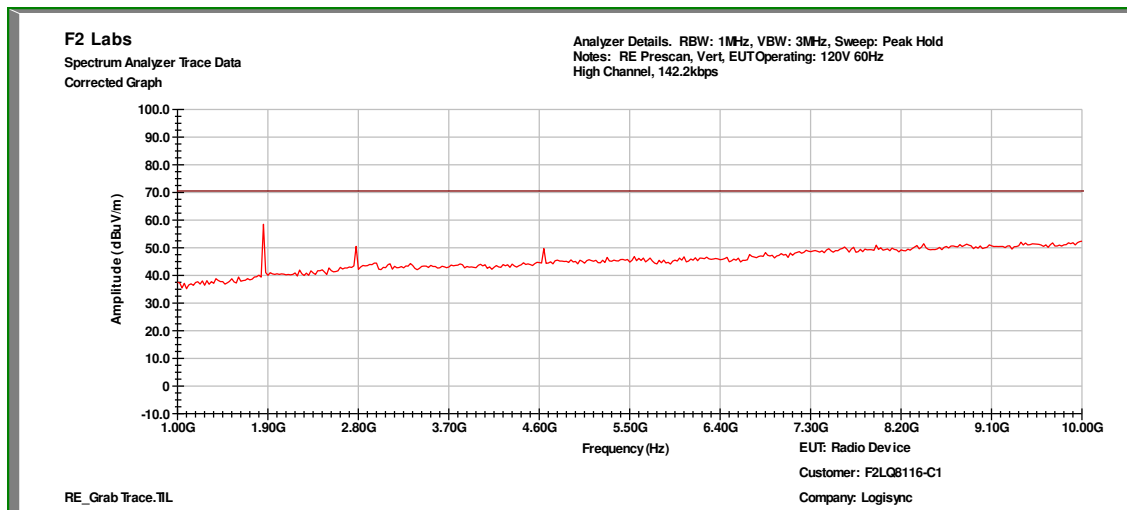




142.2kbps: High Channel, 30 MHz to 1 GHz, Vertical

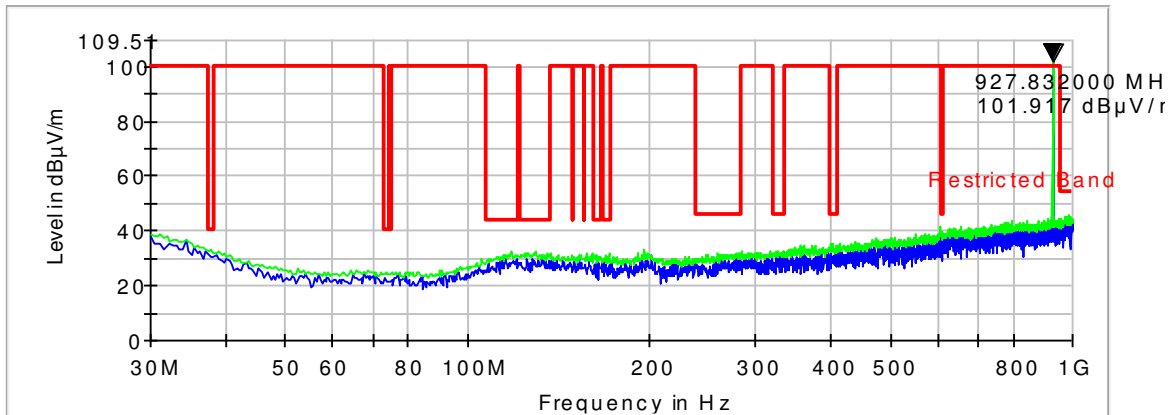


142.2kbps: High Channel, 1 GHz to 10 GHz, Vertical

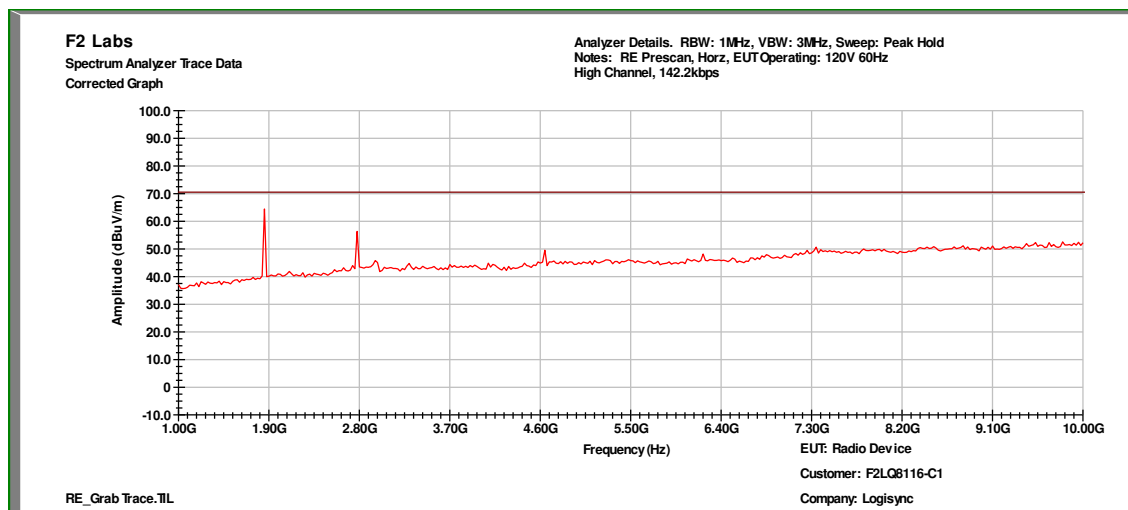




142.2kbps: High Channel, 30 MHz to 1 GHz, Horizontal



142.2kbps: High Channel, 1 GHz to 10 GHz, Horizontal



**Measurements****142.2kbps: Low Channel - MaxPeak**

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2707.000000	V	51.0	7.4	58.40	74.0	-15.6
2707.000000	H	43.9	7.4	51.30	74.0	-22.7

142.2kbps: Low Channel – Average

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Reading w/ DCCF (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2707.000000	V	47.4	44.6	7.4	52.04	54.0	-2.0
2707.000000	H	36.7	33.9	7.4	41.34	54.0	-12.7

142.2kbps: Low Channel – QuasiPeak

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
37.760000	V	11.7	16.1	27.80	40.0	-12.2
38.148000	H	6.5	15.8	22.30	40.0	-17.7
112.256000	V	7.9	13.3	21.20	43.5	-22.3
116.136000	H	6.7	14.0	20.70	43.5	-22.8
130.880000	H	6.7	14.1	20.80	43.5	-22.7
162.308000	H	7.1	12.8	19.90	43.5	-23.6
173.172000	V	7.3	12.1	19.40	43.5	-24.1
603.076000	V	7.9	19.4	27.30	46.0	-18.7
603.852000	H	7.7	19.4	27.10	46.0	-18.9
987.584000	V	8.9	23.9	32.80	54.0	-21.2

15.35(c) - DUTY CYCLE

A duty cycle correction of -2.76dB was added to the field strength measured because the EUT has a 1% duty cycle

The formula used was: $DCCF = 20 \log \left(\frac{72.75ms}{100ms} \right) = -2.76$

**142.2kbps: Mid Channel – MaxPeak**

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2744.500000	H	50.6	7.5	58.10	74.0	-15.9
2744.500000	V	48.2	7.5	55.70	74.0	-18.3

142.2kbps: Mid Channel – Average

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Reading w/ DCCF (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2744.500000	H	46.9	44.1	7.5	51.64	54.0	-2.4
2744.500000	V	43.8	41.0	7.5	48.54	54.0	-5.5

142.2kbps: Mid Channel – QuasiPeak

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
37.372000	H	6.6	16.4	23.00	40.0	-17.0
37.760000	V	12.7	16.1	28.80	40.0	-11.2
73.456000	V	7.3	8.4	15.70	40.0	-24.3
115.360000	H	6.7	13.9	20.60	43.5	-22.9
116.136000	V	6.9	14.0	20.90	43.5	-22.6
128.552000	H	7.1	14.2	21.30	43.5	-22.2
131.268000	V	8.0	14.1	22.10	43.0	-20.9
171.620000	V	7.1	12.2	19.30	43.5	-24.2
270.560000	V	6.8	13.8	20.60	46.0	-25.4
606.956000	H	7.8	19.4	27.20	46.0	-18.8
987.584000	V	8.9	23.9	32.80	54.0	-21.2
993.404000	H	8.8	24.0	32.80	54.0	-21.2

**142.2kbps: High Channel - MaxPeak**

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2782.600000	V	46.2	7.6	53.80	74.0	-20.2
2782.600000	H	48.7	7.6	56.30	74.0	-17.7

142.2kbps: High Channel - Average

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2782.600000	V	40.7	7.6	48.30	54.0	-5.7
2782.600000	H	44.4	7.6	52.00	54.0	-2.0

142.2kbps: High Channel - QuasiPeak

Frequency (MHz)	Antenna Polarization	Reading (dBμV)	Cable Loss & Antenna Factor (dB)	Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
37.760000	H	6.6	16.1	22.70	40.0	-17.3
38.148000	V	14.2	15.8	30.00	40.0	-10.0
73.068000	H	6.5	8.4	14.90	40.0	-25.1
74.232000	V	6.9	8.4	15.30	40.0	-24.7
111.480000	H	6.7	13.1	19.80	43.5	-23.7
114.972000	V	6.8	13.8	20.60	43.5	-22.9
132.044000	V	8.2	14.0	22.20	43.5	-21.3
135.924000	H	6.6	13.8	20.40	43.5	-23.1
171.620000	H	7.7	12.2	19.90	43.5	-23.6
267.844000	H	6.9	13.7	20.60	46.0	-25.4
603.076000	H	7.9	19.4	27.30	46.0	-18.7
607.344000	V	7.8	19.4	27.20	46.0	-18.8
964.692000	V	8.7	23.5	32.20	54.0	-21.8
983.704000	H	8.7	23.9	32.60	54.0	-21.4



12 FCC PART 15.247(e) – PEAK POWER SPECTRAL DENSITY (PSD)

Not Required

- 12.1 This unit is FHSS and is neither a DHSS device nor a Hybrid device to fall under (e) or (f) of FCC 15.247.



13 ANSI 63.10 7.8.2 - FREQUENCY SEPARATION

EUT was directly connected to the analyzer with the Hopping function on.

13.1 Requirements:

Frequency separation must be greater than 25kHz or 20dB bandwidth of the Hopping Channel, whichever is greater.

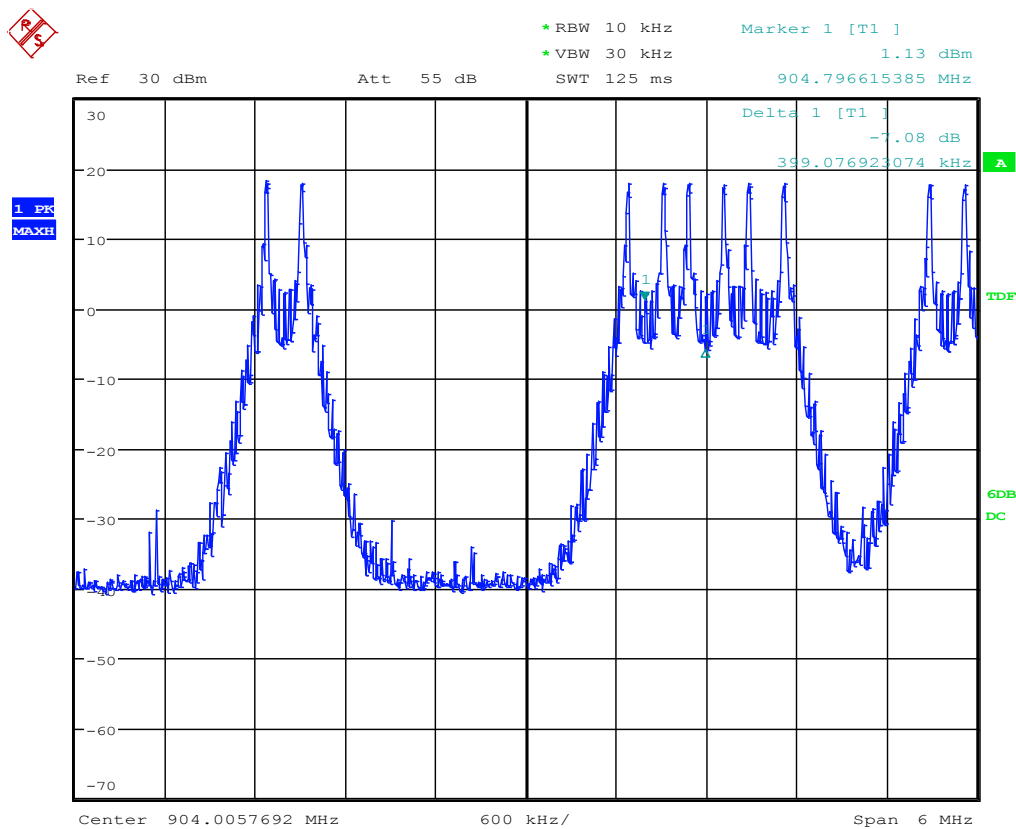


13.2 Frequency Separation Test Data

Test Date(s):	Feb. 18-19, 2016	Test Engineer:	J. Knepper
Standards:	ANSI 63.10 7.8.2	Air Temperature:	19.9°C
		Relative Humidity:	42%

Limit: >317.3kHz

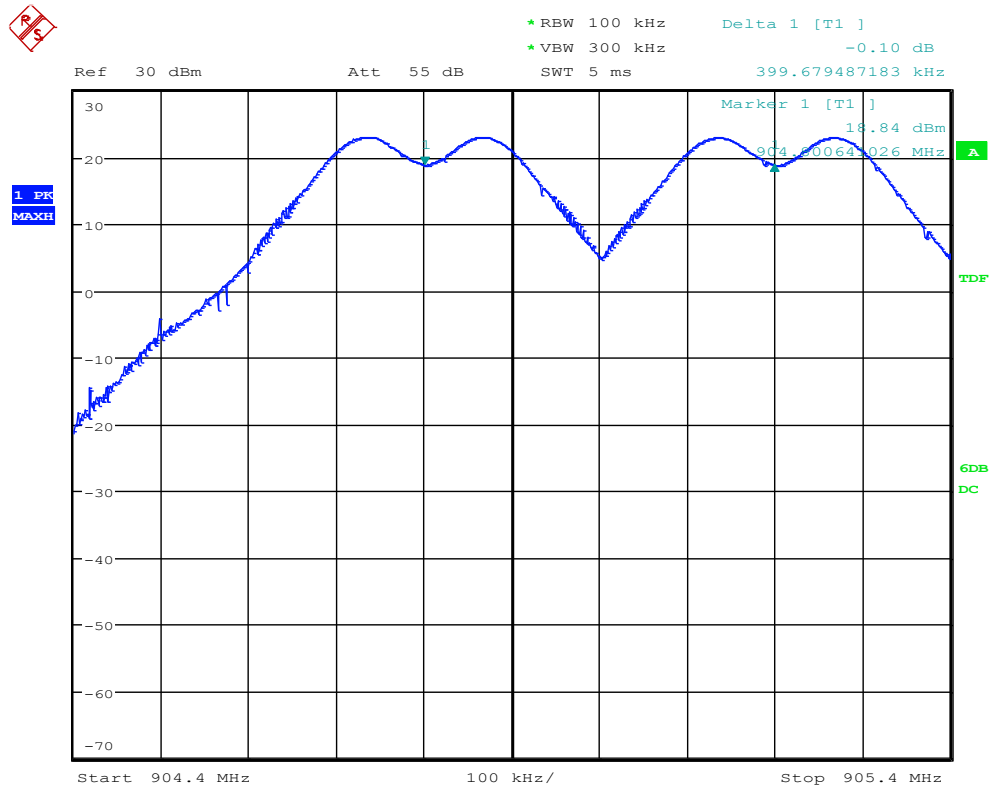
18kbps



Date: 18.FEB.2016 15:26:15



142.2kbps



Date: 19.FEB.2016 09:47:00



14 ANSI 63.10 7.8.3 – NUMBER OF HOPPING FREQUENCIES

The EUT was directly connected to the measurement device through a SMA connector. With the hopping enabled, the EUT was checked to ensure all of the hopping channels were present.

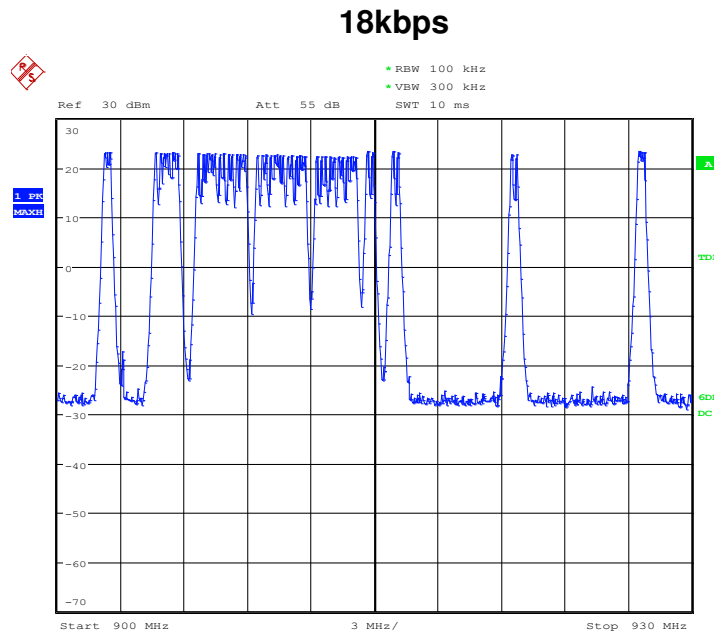
14.1 Requirements:

Verify that all channels are present.



14.2 Number of Hopping Frequencies Test Data

Test Date(s):	Feb. 18-19, 2016	Test Engineer:	J. Knepper
Standards:	ANSI 63.10 7.8.3	Air Temperature:	20.1°C
		Relative Humidity:	41%

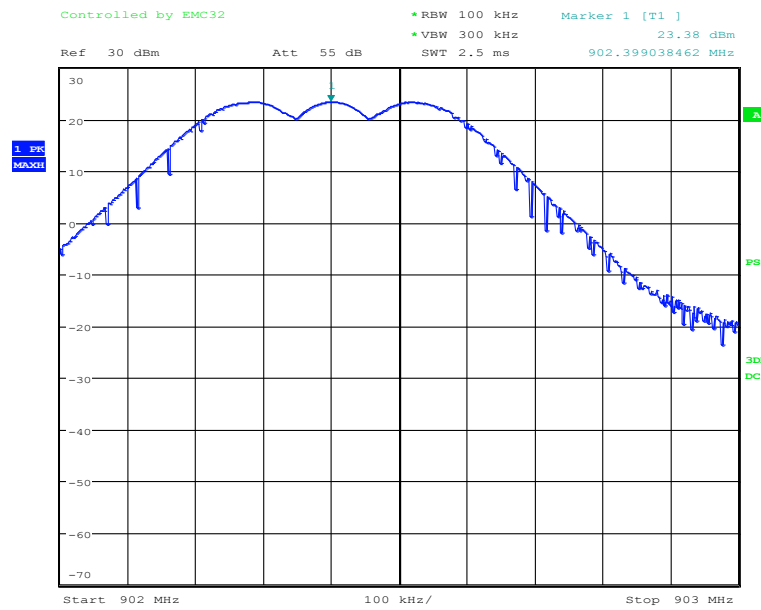


Date: 18-FEB-2016 15:31:57

EUT channels were too close to see, so the channel band was sectioned in accordance with ANSI 63.10 7.8.3 (a)

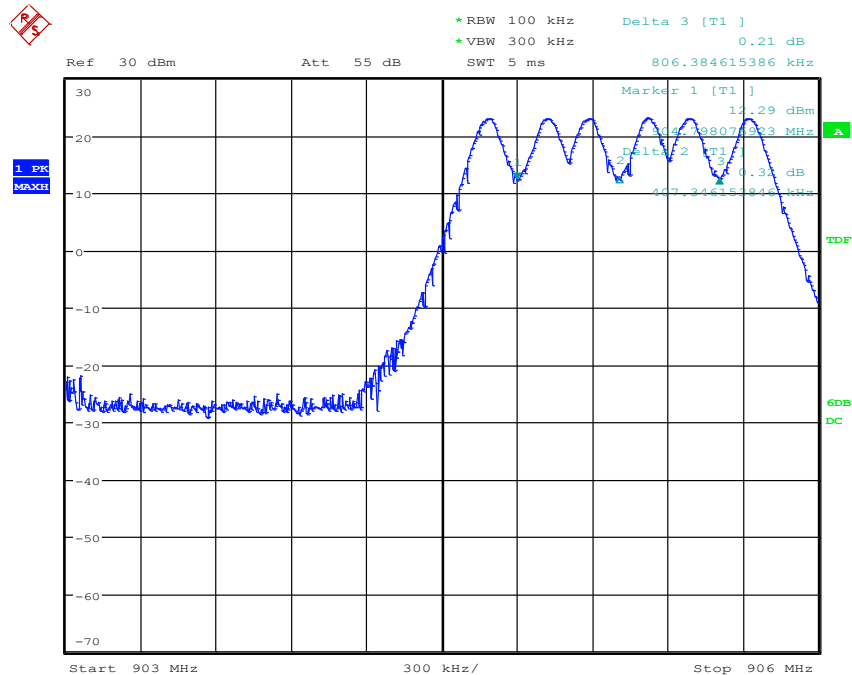


902 MHz to 903 MHz, (One Channel Marked)



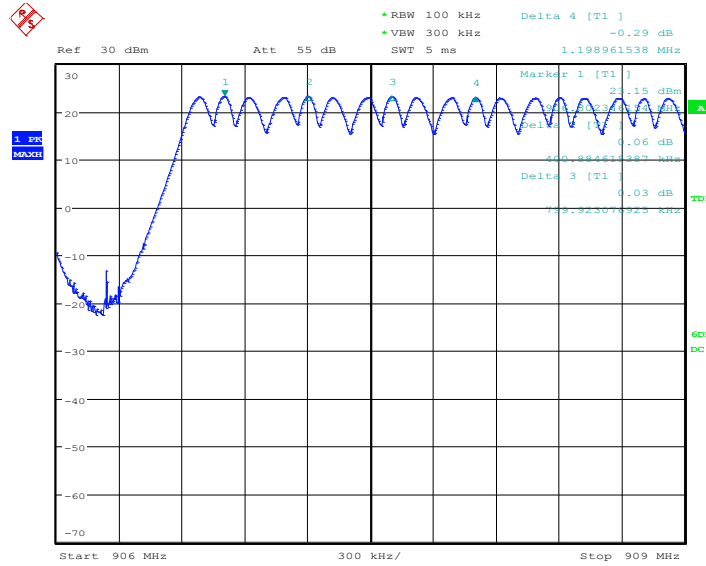
Date: 4.MAR.2016 17:08:40

903 to 906 MHz (Three Channels Marked)



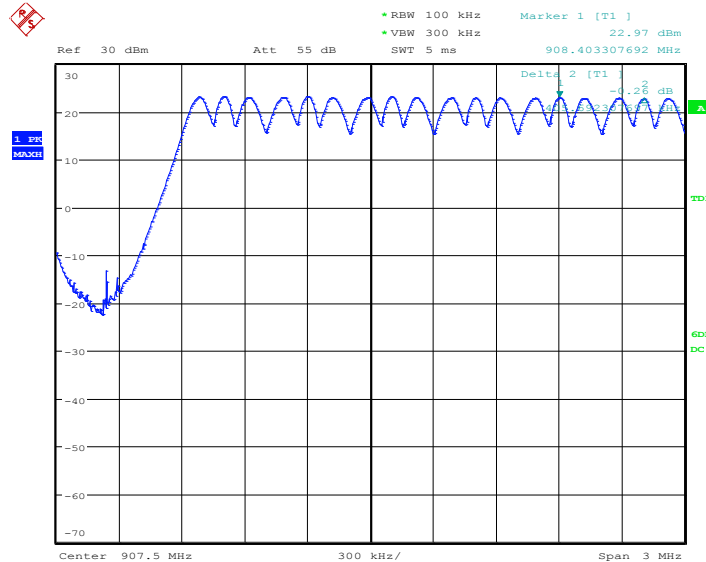


906-909 MHz (Four Channels Marked)



Date: 18.FEB.2016 15:39:18

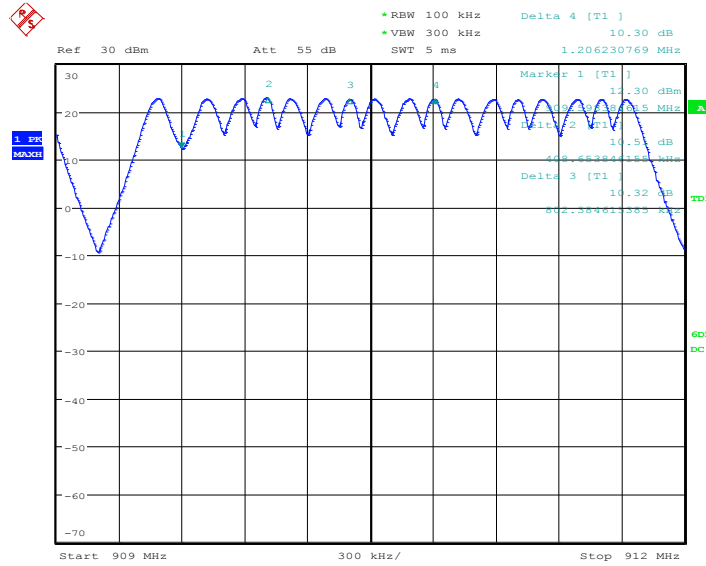
906-909 MHz (Two Remaining Channels Marked)



Date: 18.FEB.2016 15:40:27

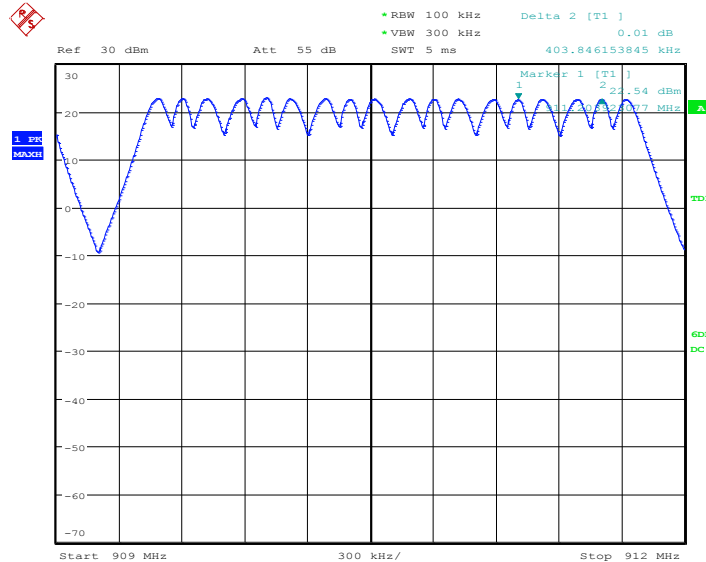


18kbps, cont'd 909-912MHz (Four Channels Marked)



Date: 18.FEB.2016 15:42:01

909-912MHz (Two Remaining Channels Marked)

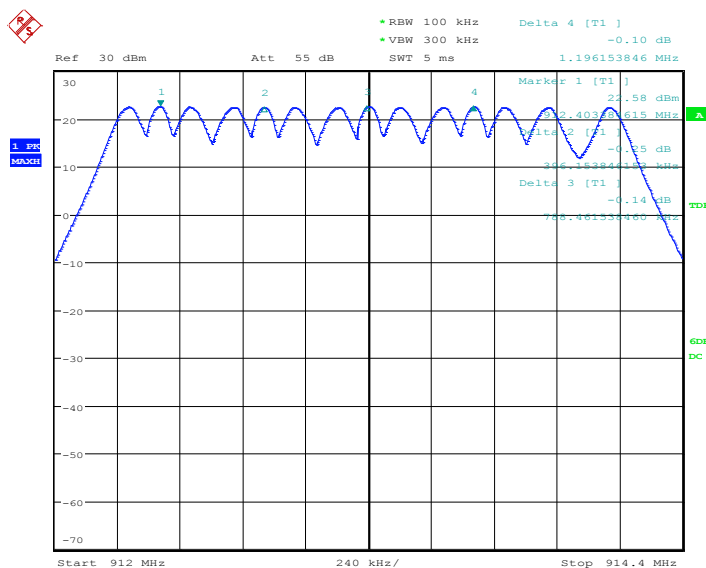


Date: 18.FEB.2016 15:42:51



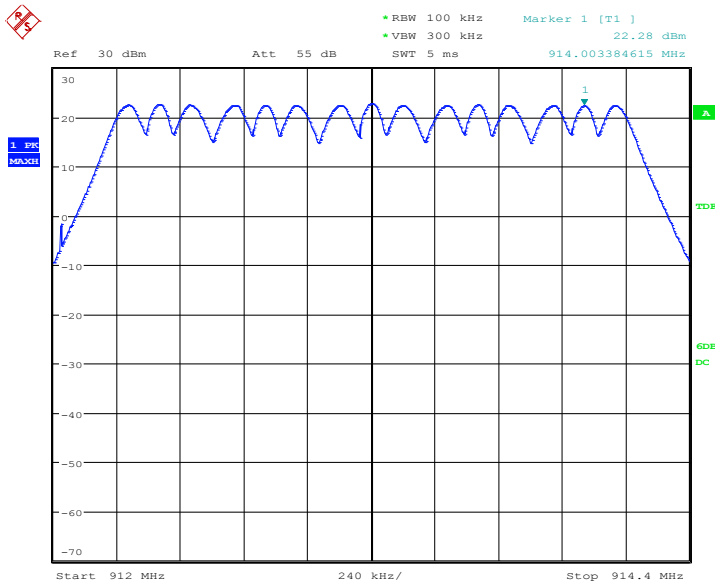
Applicant: Elster Solutions, LLC
Model: ELIR1

18kbps, cont'd
912-914.4 MHz (Four Channels Marked)



Date: 18.FEB.2016 15:48:13

912-914.4 MHz (Remaining Channel Marked)

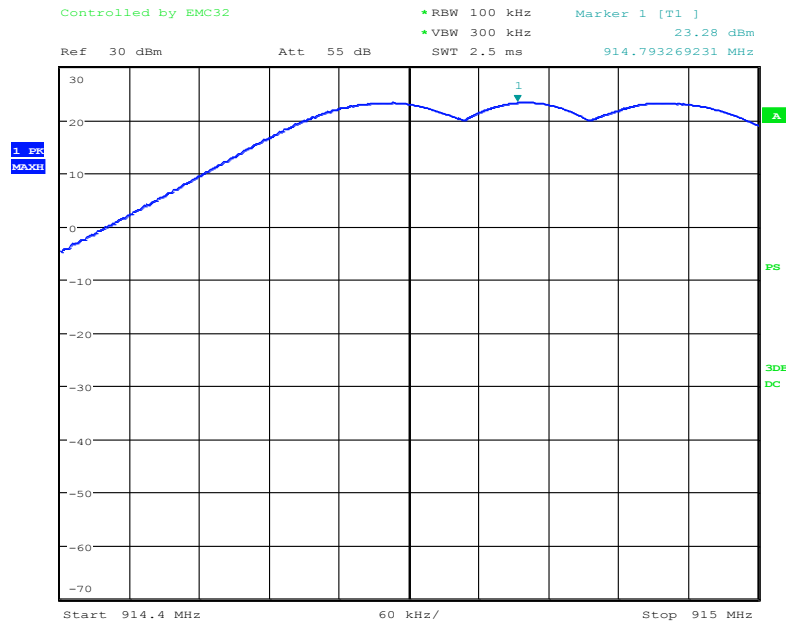


Date: 18.FEB.2016 15:49:07



18kbps, cont'd

914.4 MHz to 915 MHz, (One Channel Marked)



Date: 4.MAR.2016 17:07:43

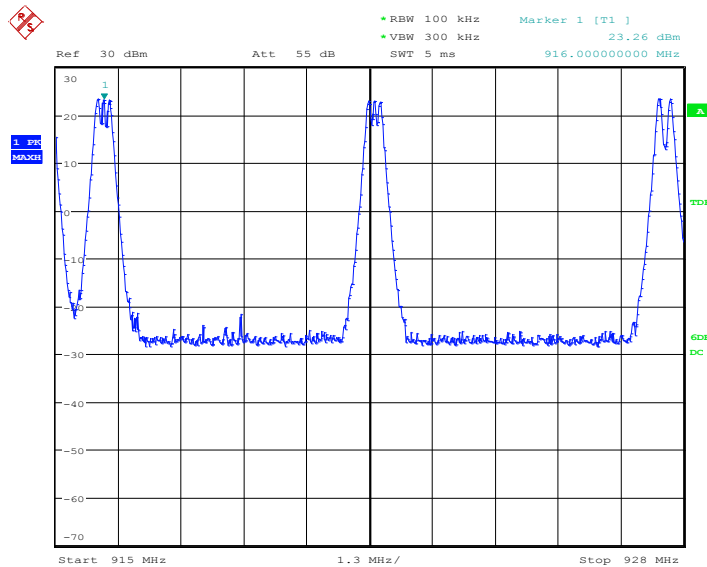


Order Number: F2LQ8116

Applicant: Elster Solutions, LLC

Model: ELIR1

915-928 MHz (Three Channels Present)



Date: 18.FEB.2016 15:51:38

All 25 channels are present.

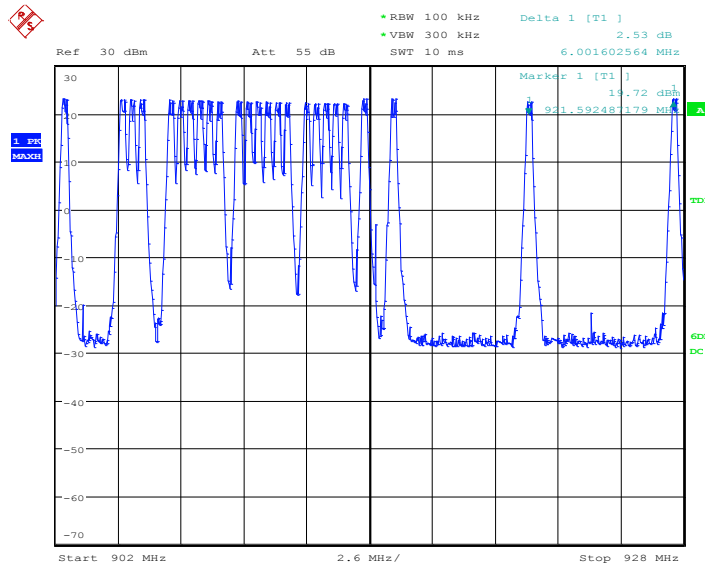


Order Number: F2LQ8116

Applicant: Elster Solutions, LLC

Model: ELIR1

142.2kbps



Date: 19.FEB.2016 09:49:30

At this bitrate, all 25 channels can be seen across the span.



15 ANSI 63.10 7.8.4 – DWELL TIME

Test was to verify the dwell time on any channel while Hopping was on. EUT was directly connected to analyzer. The plots on the following page show how long a transmission is, and the transmissions in ten seconds.

15.1 Requirements:

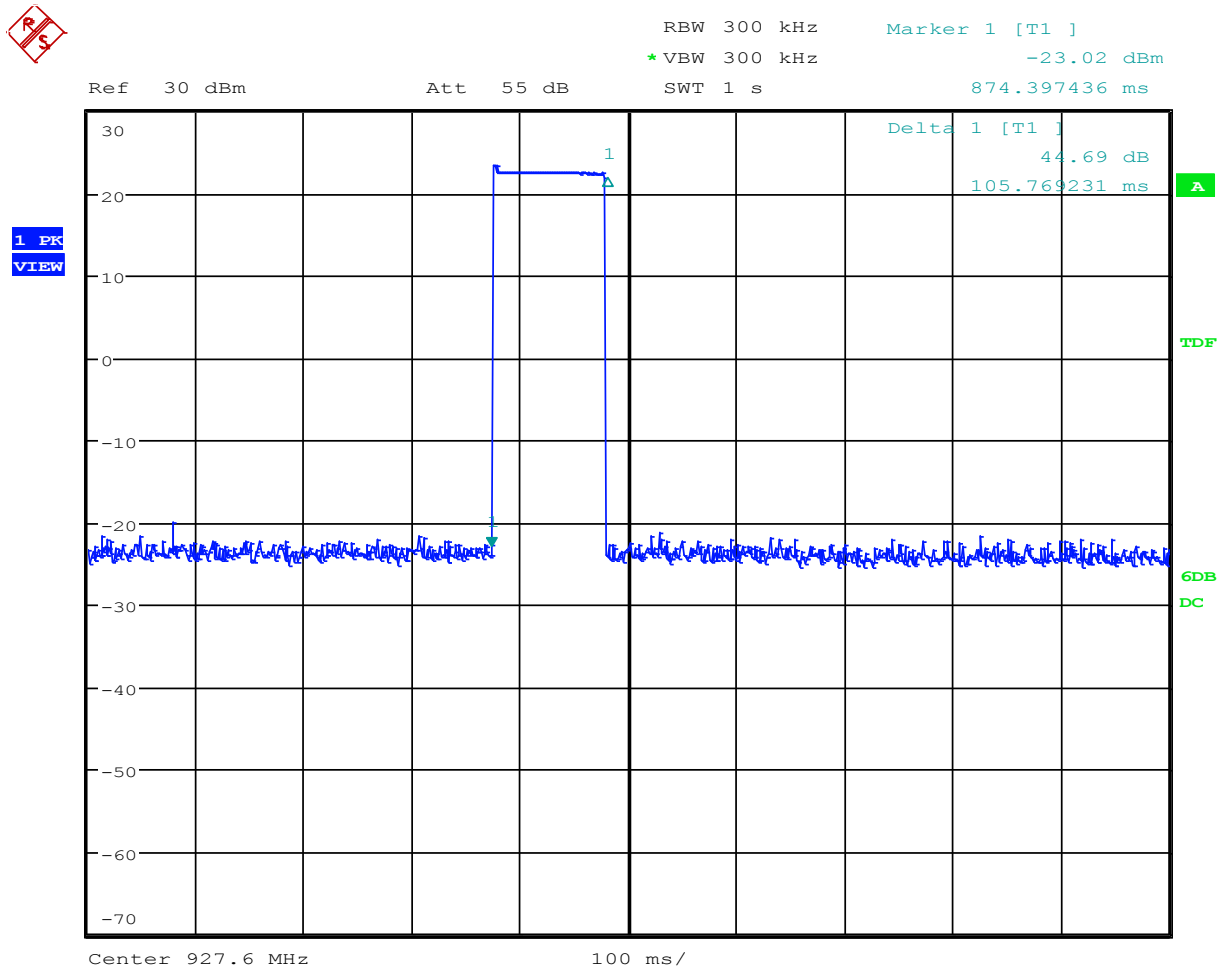
Limit of 0.4 seconds in a 10-second period.



15.2 Dwell Time Test Data

Test Date(s):	Feb. 18-19, 2016	Test Engineer:	J. Knepper
Standards:	ANSI 63.10 7.8.4	Air Temperature:	20.2°C
		Relative Humidity:	41%

18kbps: Length of Transmission



Date: 18.FEB.2016 15:59:12

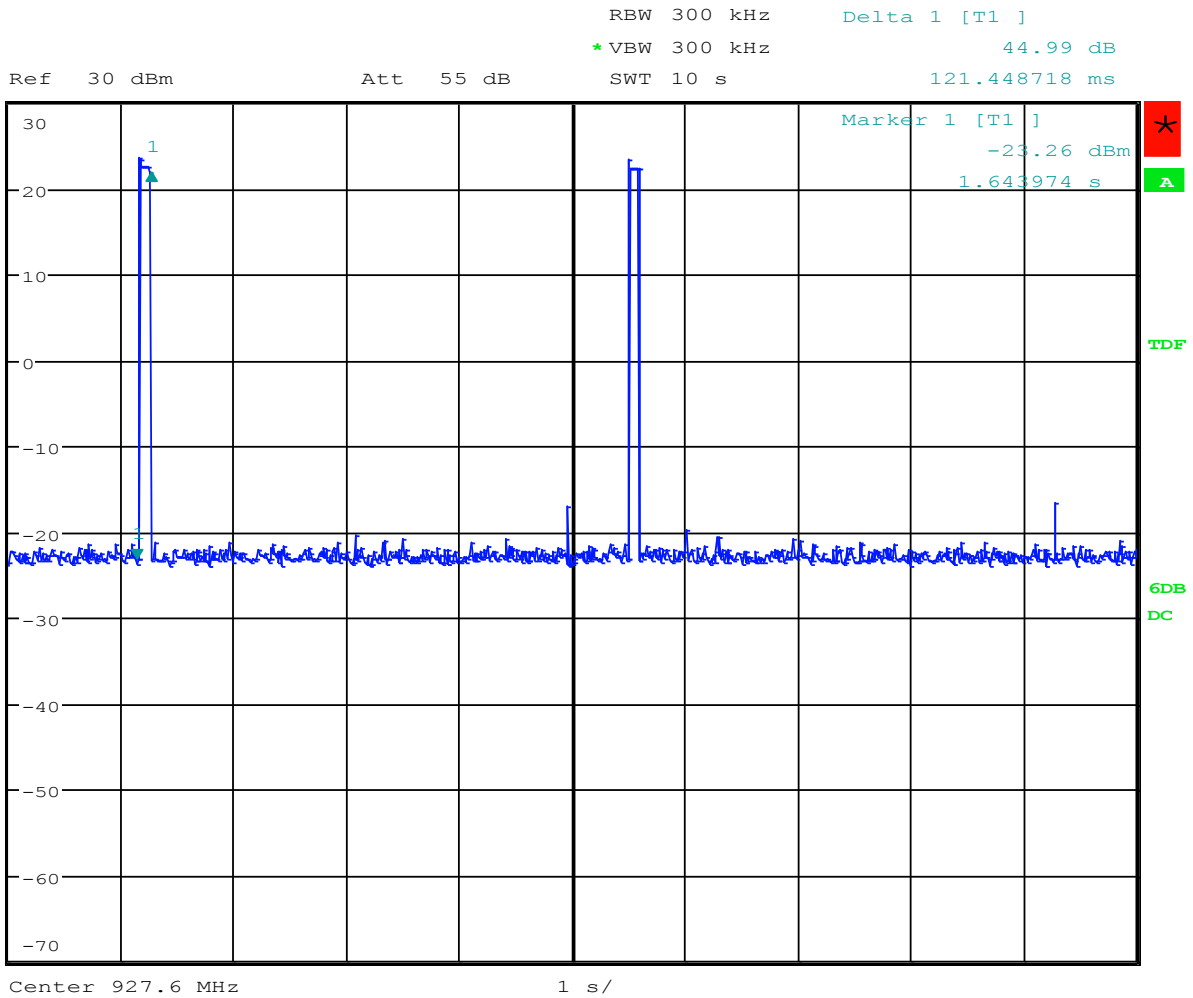


Order Number: F2LQ8116

Applicant: Elster Solutions, LLC

Model: ELIR1

18kbps: Transmissions in Ten Seconds



Date: 18.FEB.2016 16:01:54

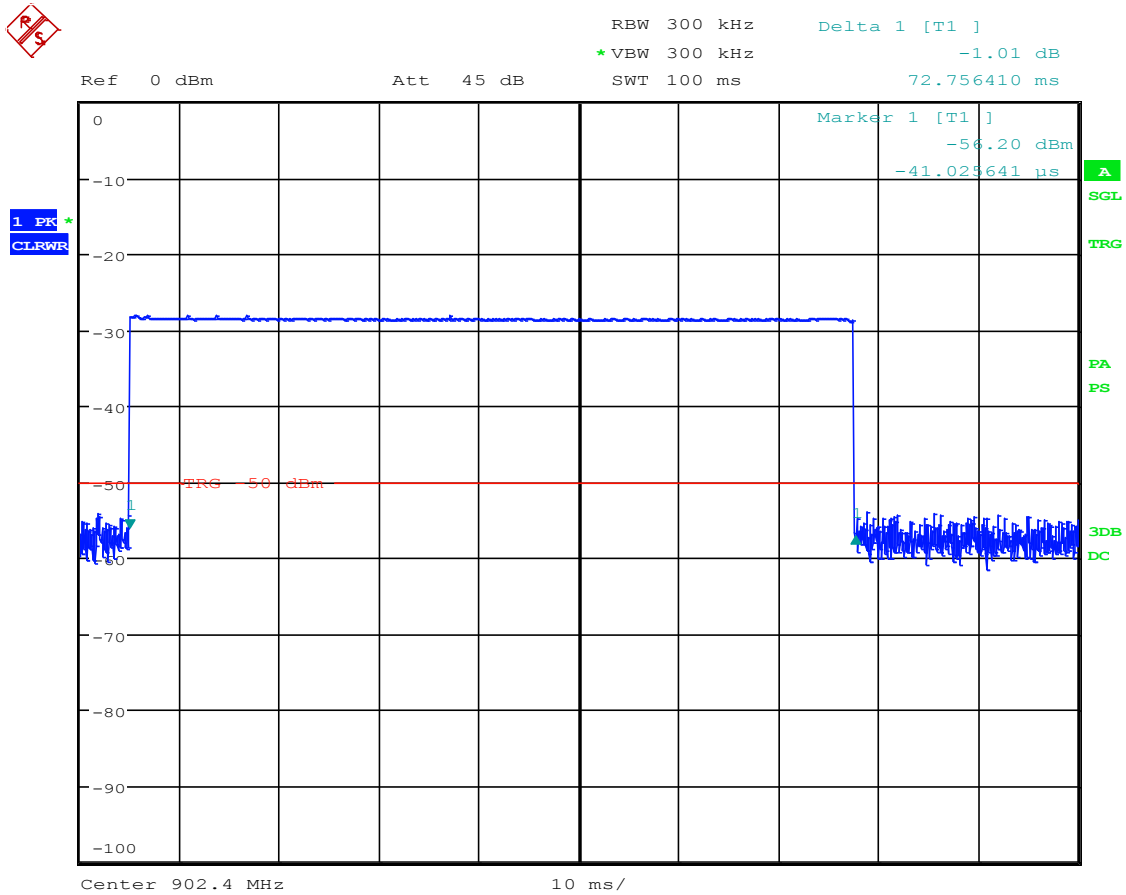
011516

Report Number: F2LQ8116

Issue Date: Feb. 26, 2016



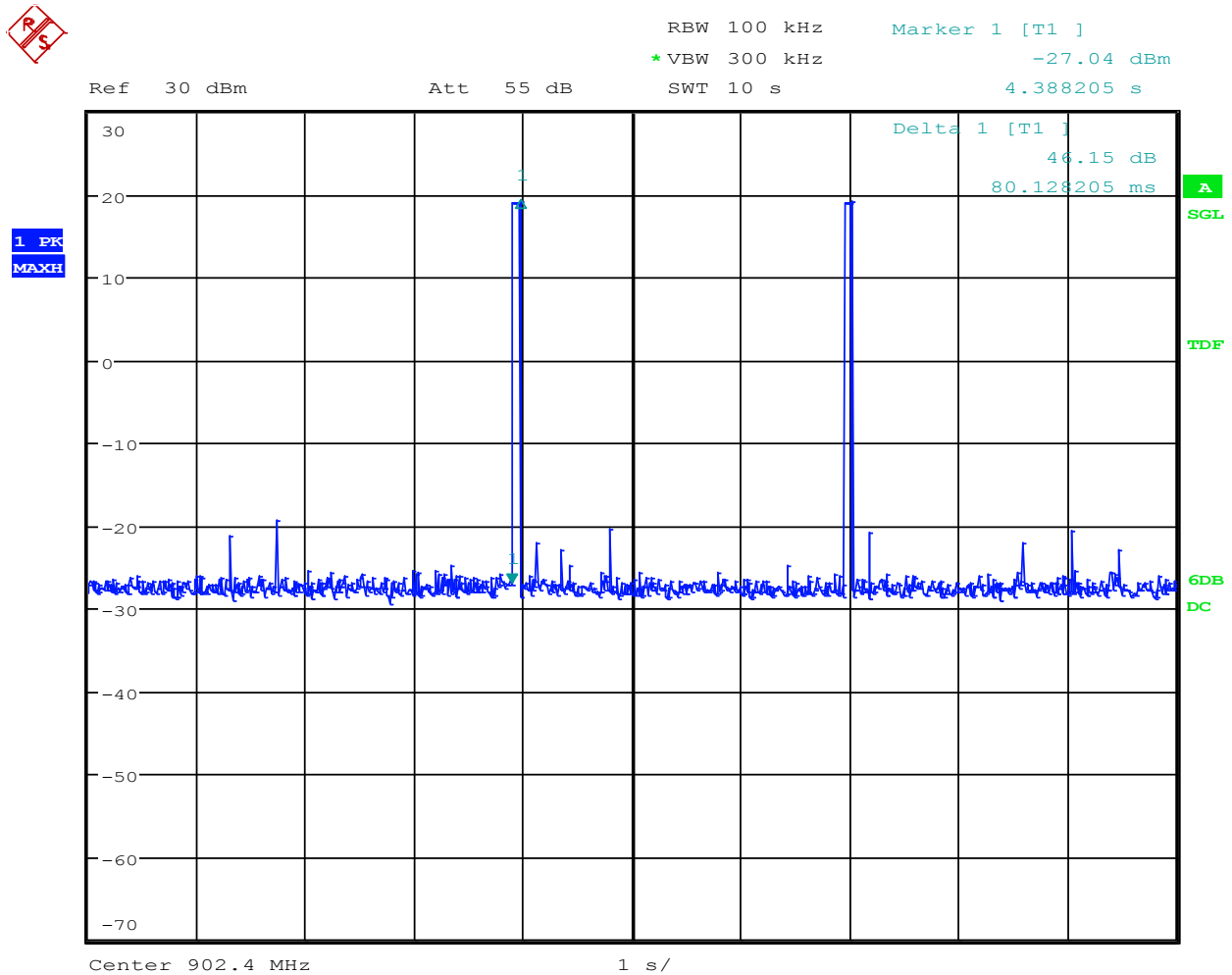
142.2kbps: Length of Transmission



Date: 8.APR.2016 09:24:21



142.2kbps: Transmissions in Ten Seconds



Date: 19.FEB.2016 09:50:55



16 CONDUCTED EMISSIONS

16.1 Requirements

In accordance with FCC CFR 47 Part 15.207(a), "Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

16.2 Procedure

The EUT was placed on a 1.0 x 1.5 meter non-conductive table, 0.8 meter above a horizontal ground plane and 0.4 meter from a vertical ground plane. Power was provided to the EUT through a LISN bonded to a 3 x 2 meter ground plane. The LISN and peripherals were supplied power through a filtered AC power source. The output of the LISN was connected to the input of the receiver via a transient limiter, and emissions in the range 150 kHz to 30 MHz were measured. The measurements were recorded using the quasi-peak and average detectors as directed by the standard, and the resolution bandwidth during testing was 9 kHz. The raw measurements were corrected to allow for attenuation from the LISN, transient limiter and cables.

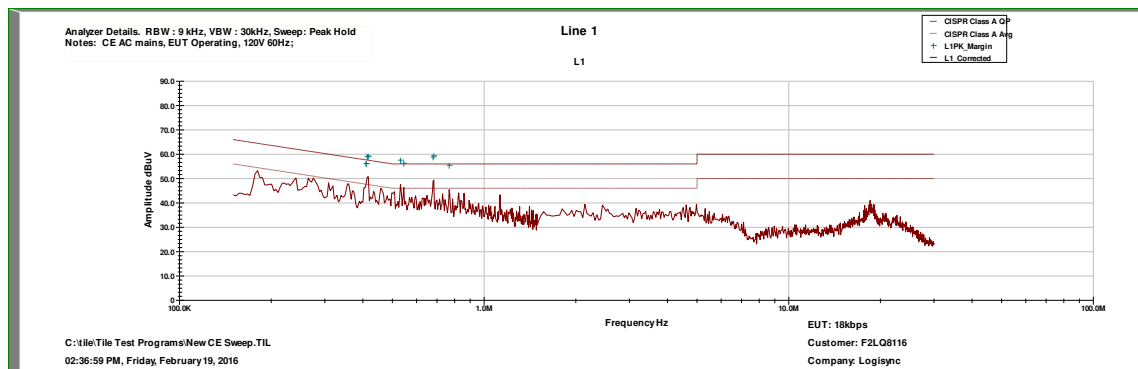


16.3 Conducted Emissions Test Data

Test Date:	Feb. 19, 2016	Test Engineer:	J. Knepper
Rule:	15.207(a)	Air Temperature:	21.5° C
Test Results:	Pass	Relative Humidity:	33%

Note: Test conducted in Hopping Mode, determined to be worst case.

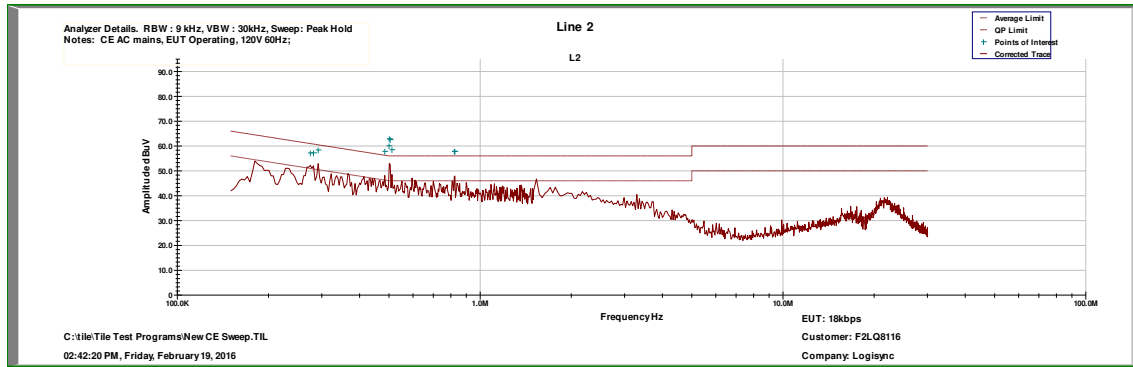
18kbps, Conducted Test – Line 1: 0.15 MHz to 30.0 MHz



Top Discrete Measurements								
No.	Conductor	Frequency (MHz)	Detector	Level (dBμV)	Adjustment (dB)	Results (dBμV)	Limit (dBμV)	Margin (dB)
1	Line 1	0.41	Quasi-Peak	33.800	10.478	44.278	57.6	-13.370
		0.41	Average	20.423	10.478	30.901	47.6	-16.747
2	Line 1	0.41325	Quasi-Peak	34.290	10.474	44.764	57.6	-12.819
		0.41325	Average	19.090	10.474	29.564	47.6	-18.019
3	Line 1	0.415	Quasi-Peak	33.690	10.472	44.162	57.5	-13.386
		0.415	Average	18.945	10.472	29.417	47.5	-18.131
4	Line 1	0.416625	Quasi-Peak	34.170	10.470	44.640	57.5	-12.876
		0.416625	Average	20.028	10.470	30.498	47.5	-17.018
5	Line 1	0.531375	Quasi-Peak	30.580	10.405	40.985	56.0	-15.02
		0.531375	Average	19.090	10.405	29.495	46.0	-16.505
6	Line 1	0.544875	Quasi-Peak	28.250	10.394	38.644	56.0	-17.356
		0.544875	Average	18.157	10.394	28.551	46.0	-17.449
7	Line 1	0.679875	Quasi-Peak	29.130	10.334	39.464	56.0	-16.536
		0.679875	Average	17.153	10.334	27.487	46.0	-18.513
8	Line 1	0.68325	Quasi-Peak	28.590	10.333	38.923	56.0	-17.077
		0.68325	Average	17.400	10.333	27.733	46.0	-18.267
9	Line 1	0.767625	Quasi-Peak	29.610	10.330	39.940	56.0	-16.060
		0.767625	Average	16.702	10.330	27.032	46.0	-18.968



18kbps, Conducted Test – Line 2: 0.15 MHz to 30.0 MHz

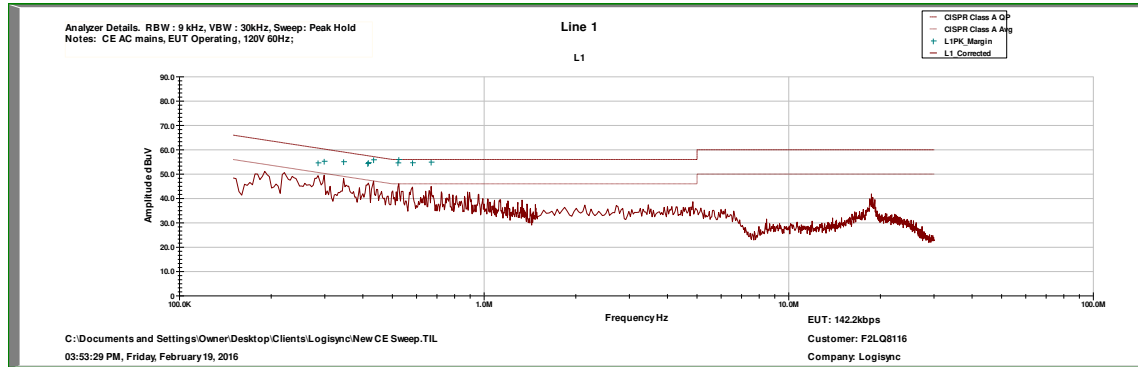


Top Discrete Measurements								
No.	Conductor	Frequency (MHz)	Detector	Level (dBμV)	Adjustment (dB)	Results (dBμV)	Limit (dBμV)	Margin (dB)
1	Line 2	0.274875	Quasi-Peak	36.900	10.700	47.600	60.970	-13.370
		0.274875	Average	27.222	10.700	37.922	50.970	-13.048
2	Line 2	0.281625	Quasi-Peak	36.930	10.681	47.611	60.768	-13.157
		0.281625	Average	26.952	10.681	37.633	50.768	-13.135
3	Line 2	0.29175	Quasi-Peak	35.270	10.653	45.923	60.475	-14.552
		0.29175	Average	25.712	10.653	36.365	50.475	-14.110
4	Line 2	0.484125	Quasi-Peak	31.000	10.430	41.430	56.268	-14.838
		0.484125	Average	21.850	10.430	32.280	46.268	-13.988
5	Line 2	0.5	Quasi-Peak	31.180	10.430	41.610	56.000	-14.39
		0.5	Average	21.200	10.430	31.630	46.000	-14.370
6	Line 2	0.501	Quasi-Peak	32.500	10.429	42.929	56.000	-13.071
		0.501	Average	20.955	10.429	31.384	46.000	-14.616
7	Line 2	0.504375	Quasi-Peak	31.820	10.426	42.246	56.000	-13.754
		0.504375	Average	21.010	10.426	31.436	46.000	-14.564
8	Line 2	0.511125	Quasi-Peak	31.680	10.421	42.101	56.0	-13.899
		0.511125	Average	20.375	10.421	30.796	46.0	-15.204
9	Line 2	0.821625	Quasi-Peak	32.310	10.330	42.640	56.0	-13.360
		0.821625	Average	20.185	10.330	30.515	46.0	-15.485
10	Line 2	0.825	Quasi-Peak	32.070	10.330	42.400	56.0	-13.600
		0.825	Average	20.090	10.330	30.420	46.0	-15.580



Note: Test conducted in Hopping Mode, determined to be worst case.

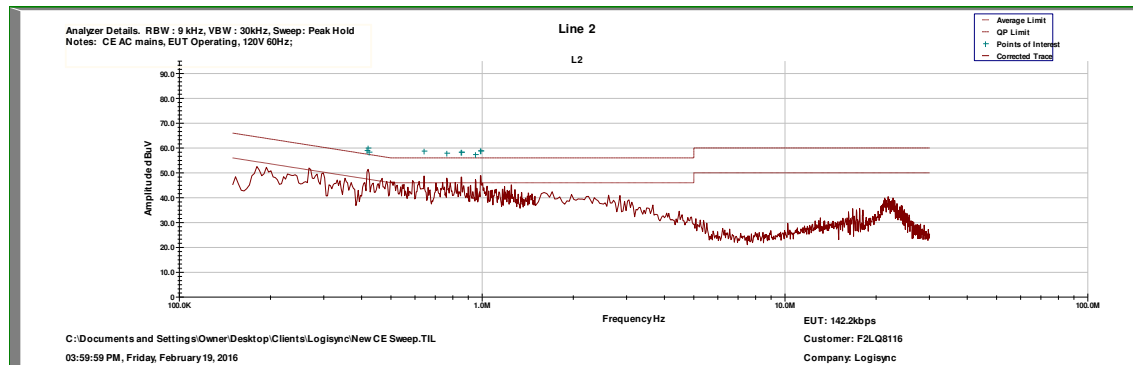
142.2kbps, Conducted Test – Line 1: 0.15 MHz to 30.0 MHz



Top Discrete Measurements								
No.	Conductor	Frequency (MHz)	Detector	Level (dBμV)	Adjustment (dB)	Results (dBμV)	Limit (dBμV)	Margin (dB)
1	Line 1	0.285	Quasi-Peak	35.670	10.672	46.342	60.7	-14.327
		0.285	Average	22.698	10.672	33.370	50.7	-17.299
2	Line 1	0.2985	Quasi-Peak	32.960	10.634	43.594	60.3	-16.691
		0.2985	Average	19.425	10.634	30.059	50.3	-20.226
3	Line 1	0.34575	Quasi-Peak	32.350	10.566	42.916	59.1	-16.148
		0.34575	Average	19.097	10.566	29.663	49.1	-19.401
4	Line 1	0.415	Quasi-Peak	31.850	10.472	42.322	57.5	-15.226
		0.415	Average	17.243	10.472	27.715	47.5	-19.833
5	Line 1	0.416625	Quasi-Peak	31.840	10.470	42.310	57.5	-15.21
		0.416625	Average	16.977	10.470	27.447	47.5	-20.068
6	Line 1	0.4335	Quasi-Peak	30.310	10.450	40.760	57.2	-16.426
		0.4335	Average	16.853	10.450	27.303	47.2	-19.883
7	Line 1	0.52125	Quasi-Peak	29.590	10.413	40.003	56.0	-15.997
		0.52125	Average	16.755	10.413	27.168	46.0	-18.832
8	Line 1	0.524625	Quasi-Peak	29.460	10.410	39.870	56.0	-16.130
		0.524625	Average	13.983	10.410	24.393	46.0	-21.607
9	Line 1	0.582	Quasi-Peak	27.300	10.364	37.664	56.0	-18.336
		0.582	Average	17.338	10.364	27.702	46.0	-18.298
10	Line 1	0.66975	Quasi-Peak	29.610	10.336	39.946	56.0	-16.054
		0.66975	Average	14.747	10.336	25.083	46.0	-20.917



142.2kbps, Conducted Test – Line 2: 0.15 MHz to 30.0 MHz



Top Discrete Measurements								
No.	Conductor	Frequency (MHz)	Detector	Level (dBμV)	Adjustment (dB)	Results (dBμV)	Limit (dBμV)	Margin (dB)
1	Line 2	0.416625	Quasi-Peak	34.610	10.470	45.080	57.5	-12.420
		0.416625	Average	17.978	10.470	28.448	47.5	-19.052
2	Line 2	0.42	Quasi-Peak	34.830	10.466	45.296	57.448	-12.152
		0.42	Average	18.090	10.466	28.556	47.448	-18.892
3	Line 2	0.423375	Quasi-Peak	33.110	10.462	43.572	57.382	-13.810
		0.423375	Average	18.360	10.462	28.822	47.382	-18.560
4	Line 2	0.64275	Quasi-Peak	27.980	10.341	38.321	56.0	-17.679
		0.64275	Average	19.327	10.341	29.668	46.0	-16.332
5	Line 2	0.76425	Quasi-Peak	31.130	10.330	41.460	56.0	-14.54
		0.76425	Average	18.830	10.330	29.160	46.0	-16.840
6	Line 2	0.852	Quasi-Peak	31.900	10.330	42.230	56.0	-13.770
		0.852	Average	19.335	10.330	29.665	46.0	-16.335
7	Line 2	0.855375	Quasi-Peak	31.940	10.330	42.270	56.0	-13.730
		0.855375	Average	19.190	10.330	29.520	46.0	-16.480
8	Line 2	0.949875	Quasi-Peak	29.900	10.330	40.230	56.0	-15.770
		0.949875	Average	16.795	10.330	27.125	46.0	-18.875
9	Line 2	0.987	Quasi-Peak	30.370	10.330	40.700	56.0	-15.300
		0.987	Average	17.505	10.330	27.835	46.0	-18.165



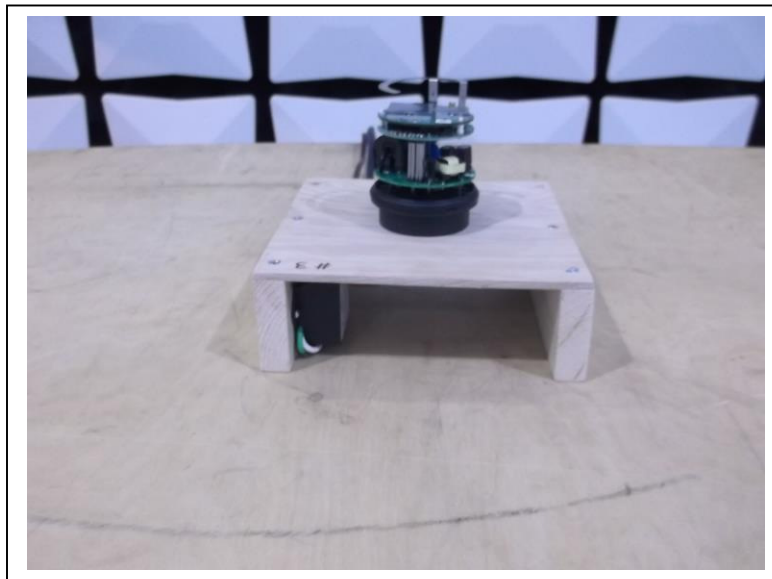
17 PHOTOGRAPHS/EXHIBITS – PRODUCT PHOTOS, TEST SETUPS

Radiated Spurious Emission with 1.5dBi Integral Antenna

<1 GHz

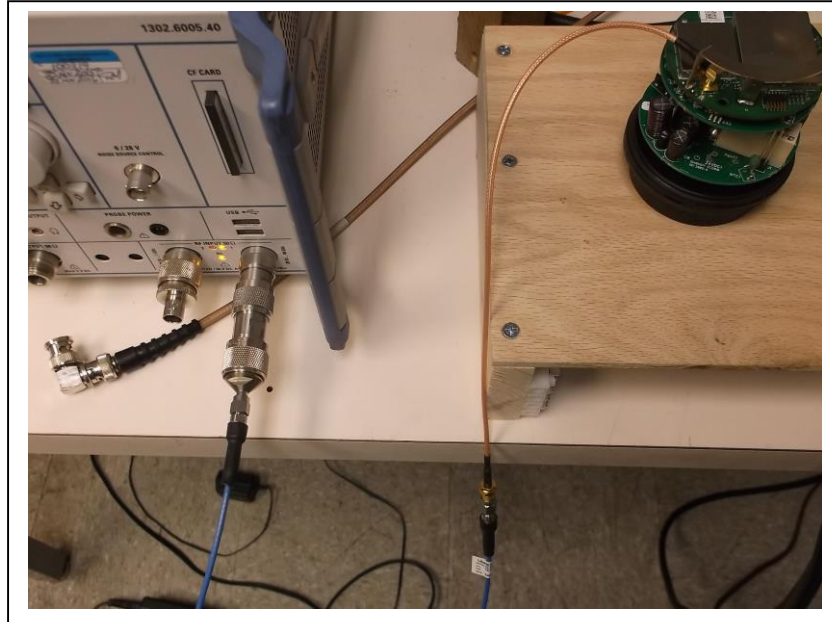


>1 GHz





Conducted Output Power, Voltage Variations, -20dB Occupied Bandwidth, Conducted Spurious Emissions, Frequency Separation and Number of Channels



Conducted Emissions

