Compliance Testing, LLC
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info@ComplianceTesting.com

Test Report

Prepared for: Ubiquiti Networks, Inc

Model: LBE-M5

Description: LiteBeam M5

Serial Number: N/A

FCC ID: SWX-LBE5M

To

FCC Part 15.407

Date of Issue: November 3, 2015

On the behalf of the applicant:	**Ubiquiti Networks, Inc** **2580 Orchard Parkway** **San Jose, CA 95131**
Attention of:	**Michael Taylor, Compliance Manager** **Ph: (408) 942-3085** **E-mail: compliance@ubnt.com**

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Project No: p14a0032

Kenneth Lee
Project Test Engineer

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	October 16, 2015	Kenneth Lee	Original Document
2.0	November 3, 2015	Amanda Reed	Corrected frequency range on page 15

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ILAC / A2LA

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to the joint ISO-ILAC-IAF Communiqué dated January 2009).

The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

Please refer to http://www.compliancetesting.com/labscope.html for current scope of accreditation.

Testing Certificate Number: **2152.01**

FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A

The applicant has been cautioned as to the following

15.21 - Information to User

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) - Special Accessories

Equipment marked to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Standard Test Conditions Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.10-2013 and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F) unless the particular equipment requirements specified testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Measurement results, unless otherwise noted, are worst-case measurements.

Environmental Conditions		
Temperature (ºC)	**Humidity (%)**	**Pressure (mbar)**
23.0 – 26.5	22.7 – 36.5	962.9 – 972.7

EUT Description
Model: LBE-M5
Description: LiteBeam M5
Firmware: N/A
Software: N/A
Serial Number: N/A
Additional Information:
The EUT was tested conducted mode with RF connectors mounted on the EUT at the antenna input.
When the test cable is plugged into the RF connector mounted to the EUT it disables the antenna connection.
The EUT is powered by POE (Power Over Ethernet).
The different data rates were evaluated and the worst case data rate was chosen for all the testing.

EUT Specifications

Equipment Code	NII
Model(s)Tested	LBE-M5
Model(s) covered	LBE-M5
Frequency Range	5150-5250 MHz
Bandwidths	10/20/30/40 MHz
EUT temperature range	-40°C to 80°C
Data Rates	6, 9, 12, 18, 24, 36, 48, 54, MCS0, MCS1, MCS2, MCS3, MCS4, MCS5, MCS6, MCS7, MCS8, MCS9
Modulations	BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM

Antenna List

No.	Manufacturer	Part #	Antenna Type	Peak Gain
1	Ubiquiti	LBE-AC Omni	OMNI	6
2	Ubiquiti	LBE-AC Dish	Dish	23

15.203: Antenna Requirement:

	The antenna is permanently attached to the EUT
	The antenna uses a unique coupling
X	The EUT must be professionally installed
	The antenna requirement does not apply

Accessories:

Qty	Description	Manufacturer	Model	S/N
1	Switching Gigabit Power Supply/POE	Ubiquiti	GP-A240-050G	N/A

Cables: None

Modifications: None

Test Results Summary

Specification	Test Name	Pass, Fail, N/A	Comments
§15.203	Antenna Requirements	Pass	
§15.207 §15.407(b)(6)	Line Conducted Emissions	Pass	
§15.407(a)(1)	Conducted Output Power	Pass	
§15.407(a)(1),(5)	Power Spectral Density	Pass	
§15.403(i) 15.407(a)(5)	26dB Occupied Bandwidth	Pass	
	99% Occupied Bandwidth		
§15.407(b)(1)	Undesirable Emissions	Pass	
§15.205 §15.407(b)(1),(5),(6)(7)	General Field Strength Limits (Restricted Bands and Radiated Emission limits)	Pass	
§15.407(g)	Frequency Stability	Pass	

References	Description
CFR47, Part 15, Subpart B	Unintentional Radiators
CFR47, Part 15, Subpart C	Intentional Radiators
CFR47, Part 15, Subpart E	Unlicensed Nation Information Infrastructure Devices (U-NII)
ANSI C63.10-2009	American National standard for testing Unlicensed Wireless Devices
ANSI C63.4-2009	Method and Measurements of Radio-Noise Emissions from low-Voltage Electrical and Electronic Equipment in the range 9kHz to 40GHz.
ISO/IEC 17025:2005	General requirements for the Competence of Testing and Calibrations Laboratories
KDB 644545 D03	Guidance for IEEE 802 11ac New Rules
KDB 789033 D02	General U-NII Test Procedures New Rules V01
KDB 926956 D01	U-NII Transition Plan

Peak Output Power
Engineer: Alex Macon
Test Date: 6/30/2015

Test Requirements

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

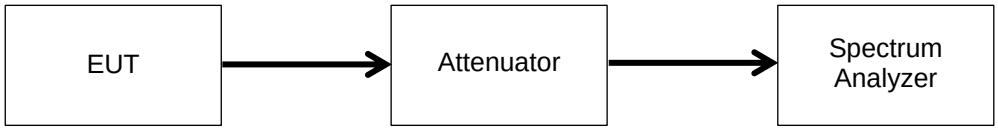
Test Procedure

The RF power was calculated using the spectrum analyzers' band power function per Method SA-1 from KDB 789033 D02 General U-NII Test Procedures New Rules v01. Measurements were made at the low, mid, and high channels of the band.

The Spectrum Analyzer was set to the following:

a. RBW = 1 MHz
b. VBW ≥ 3 MHz
c. Sweep time = auto
d. Detector = RMS
e. 100 traces in power averaging mode

Test Setup



Test Results

6 dbi Antenna

Bandwidth	Frequency	Data Rate	TP	F37 Level	F37 Level	Limit	Margin
MHz	MHz			dBm	mW	dBm	dB
10	5160	6	10	13.4	21.8776	30	-16.6
10	5200	6	20	21.1	128.8250	30	-8.9
10	5245	6	20	22.0	158.4893	30	-8.0
20	5165	6	8	11.9	15.4882	30	-18.1
20	5200	6	20	21.4	138.0384	30	-8.6
20	5240	6	20	21.7	147.9108	30	-8.3
30	5170	6	7	10.5	11.2202	30	-19.5
30	5200	6	19	21.3	134.8963	30	-8.7
30	5235	6	20	22.3	169.8244	30	-7.7
40	5175	f0	7	11.1	12.8825	30	-18.9
40	5200	f0	14	18.1	64.5654	30	-11.9
40	5230	f0	18	20.6	114.8154	30	-9.4

23 dbi Antenna

Bandwidth	Frequency	Data Rate	F37 Level	F37 Level	Limit	Margin
MHz	MHz		dBm	mW	dBm	dB
10	5160	6	8.9	7.7625	30	-21.1
10	5200	6	11.6	14.4544	30	-18.4
10	5245	6	19.2	83.1764	30	-10.8
20	5165	6	4.5	2.8184	30	-25.5
20	5200	6	12.3	16.9824	30	-17.7
20	5240	6	13.9	24.5471	30	-16.1
30	5170	6	2.2	1.6596	30	-27.8
30	5200	6	12.5	17.7828	30	-17.5
30	5235	6	12.9	19.4984	30	-17.1
40	5175	f0	1.9	1.5488	30	-28.1
40	5200	f0	13.3	21.3796	30	-16.7
40	5230	f0	10.2	10.4713	30	-19.8

Transmitter Power Spectral Density
Engineer: Alex Macon
Test Date: 6/30/2015

Test Requirements

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in the maximum conducted power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

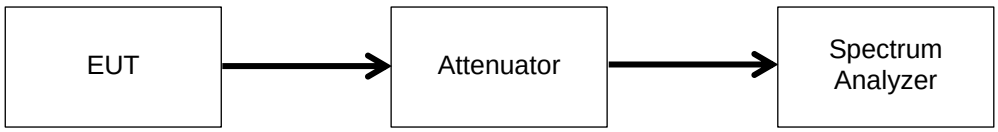
Test Procedure

The Power Spectral Density was measured using the method per SA-1 from KDB 789033 D02 General U-NII Test Procedures New Rules v01. Measurements were made at the low, mid, and high channels of the band. The maximum PSD was determine by finding the peak value across the carrier bandwidth.

The Spectrum Analyzer was set to the following:

a. RBW = 1 MHz
b. VBW ≥ 3 MHz
c. Span 1.5 * BW
d. Sweep time = auto
e. Detector = RMS
f. 100 traces in power averaging mode

Test Setup



Test Results

Bandwidth	Frequency	Data Rate	TP	F37 Level	F37 Level	Limit	Margin
MHz	MHz			dBm	mW	dBm	dB
10	5160	6	10	4.9	3.1	17	-12.1
10	5200	6	20	12.7	18.6	17	-4.3
10	5245	6	20	13.4	21.9	17	-3.6
20	5165	6	8	0.2	1.0	17	-16.8
20	5200	6	20	9.9	9.8	17	-7.1
20	5240	6	20	10.2	10.5	17	-6.8
30	5170	6	7	-2.5	0.6	17	-19.5
30	5200	6	19	8.0	6.3	17	-9.0
30	5235	6	20	8.9	7.8	17	-8.1
40	5175	f0	7	-3.7	0.4	17	-20.7
40	5200	f0	14	3.2	2.1	17	-13.8
40	5230	f0	18	6.1	4.1	17	-10.9

EIRP Higher than 30°
Engineer: Kenneth Lee
Test Date: 10/16/2015

Test Requirements

In addition to the emission limits specified in § 15.407(a)(1)(i), if the access point is an outdoor Point-to-Multipoint device operating in the band 5.15-5.25 GHz, the rules require that the maximum EIRP at any elevation angle above 30° not exceed 125 mW (21 dBm) as measured from the horizon. This restriction leads to a general requirement for the antenna pattern: if the EIRP within 3-dB elevation beam width of any radiation lobe is higher than 125 mW, this lobe must be controlled, either mechanically or electrically, so that the 3-dB elevation beam width of this lobe is below 30° elevation angle relative to horizon.
For the purposes of compliance, information for all the antenna types must be included in the filing. In order for antennas to be considered of similar type, the antenna patterns must also be similar as well as other characteristics of the antenna.

Test procedure

a) The 0 degree reference angle was determined
b) From the provided radiation pattern the highest gain between 30° and 90° was determined
c) The EIRP was calculated based on the highest gain and conducted output power
d) The results were compared with the 125mW limit.

Antenna Model	Highest in Band Gain ≥30° (dBi)	Maximum Conducted Power (dBm)	Maximum EIRP (mW)	Limit (mW)	Margin (mW)
LBE-M5-23 Omni	-7	22.3	33.88	125	-91.12

Undesirable Emissions Conducted
Engineer: Alex Macon
Test Date: 6/30/2015

Test Requirements

Unwanted Emissions that fall Outside Restricted Bands

All emissions outside of the 5.15-5.25 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. As specified in § 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a maximum emission limit of -27 dBm/MHz. However, an out-of-band emission that complies with both the peak and average limits of § 15.209 is not required to satisfy the -27 dBm/MHz maximum emission limit.

The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz

The provisions of §15.205 apply to intentional radiators operating under this section

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209.

For Conducted Unwanted Emissions in the Restricted Bands

For conducted measurements above 1000 MHz, EIRP was determined and then the field strength computed by the following:
E[dBµV/m] = EIRP[dBm] - 20 log(d[meters]) + 104.77, where E = field strength and d = 3m
E[dBµV/m] = EIRP[dBm] + 95.2, for d = 3 meters.

Test Procedure

Per KDB 789033 D02 General U-NII Test Procedures New Rules v01 conducted RF port measurements were made in lieu of radiated. In addition, Cabinet Emissions measurements were performed in a semi-anechoic chamber with the antenna port terminated by a matching load. See additional section for Radiated Emissions.

The following criteria were addressed:

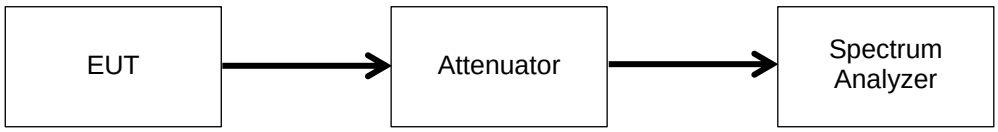
The Spectrum Analyzer was set to the following for emissions > 1000MHz:

a. RBW = 1 MHz
b. VBW ≥ 3 MHz
c. Detector = Peak.
d. Sweep time = auto
e. Trace mode = max hold
    1. Note: For emissions where the peak exceeded that of the average 15.209 emission limit the following was performed.
f. RBW = 1 MHz
g. VBW ≤ RBW/100 (i.e., 10 kHz) but not less than 10 Hz

For emissions below 1000MHz the Spectrum Analyzer settings were as follows:

a. RBW = 100 kHz
b. VBW ≥ 300 kHz
c. Detector = Peak
d. Sweep time = auto
e. Trace mode = max hold

Test Setup



Test Results: **See Annex A: Undesirable Emissions Conducted**

Undesirable Emissions Radiated
Engineer: Kenneth Lee
Test Date: 10/15/2015

Test Requirements

The provision of §15.209 were applied. In addition the requirements of §15.205 were also applied.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits

Frequency (MHz)	Frequency (microvolts/meter)	Frequency (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: E field strength (dBµV/m) = 20 log E field strength (uV/m)

Test Procedure

The EUT was setup in accordance with ANSI C63.10. 2013 and tested per KDB 789033. The antenna was replaced with non-radiating matched load. The EUT is placed on non-conductive platform at a height of 0.8 meters above the ground plane of the semi-anechoic chambers. The EUT was rotated 360 degrees and the receive antenna raised and lowered to find the maximum emissions from 30MHz to the 10th harmonic of the fundamental. The EUT was set to the maximum power level allowed and the low, mid, and high channels were investigated for emissions.

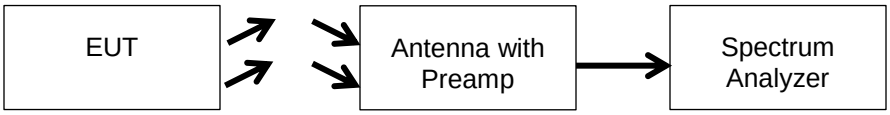
The Spectrum Analyzer was set to the following for emissions > 1000MHz:

a. (RBW = 1 MHz
b. VBW ≥ 3 MHz
c. Detector = Peak
d. Sweep time = auto
e. Trace mode = max hold
    1. Note: For emissions where the peak exceeded that of the average 15.209 emission limit the following was performed.
f. RBW = 1 MHz
g. VBW ≤ RBW/100 (i.e., 10 kHz) but not less than 10Hz

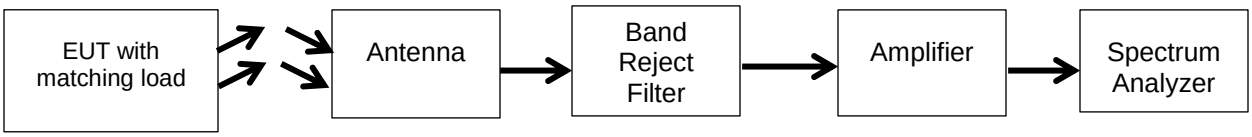
For emissions below 1000MHz the Spectrum Analyzer settings were as follows:

a. RBW = 100 kHz
b. VBW ≥ 300 kHz
c. Detector = Peak
d. Sweep time = auto
e. Trace mode = max hold
    1. Note: A quasi peak detector was used for emissions where the peak exceeded that of the average 15.209 emission limits

Test Setup below 1000MHz



Test Setup above 1000MHz



Test Results: **See Annex B: Undesirable Emission Radiated**

Occupied Bandwidth
Engineer: Alex Macon
Test Date: 6/30/2015

Test Requirement

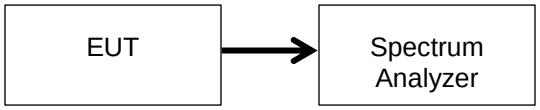
The emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement

Test Procedure

The Spectrum Analyzer was set to the following parameters:

a. RBW = approximately 1% of the emission bandwidth.
b. VBW > RBW.
c. Detector = Peak.
d. Trace mode = max hold.

Test Setup



Test Results: **See Annex C: Occupied Bandwidth**

Frequency Stability
Engineer: Kenneth Lee
Test Date: 7/16/2015

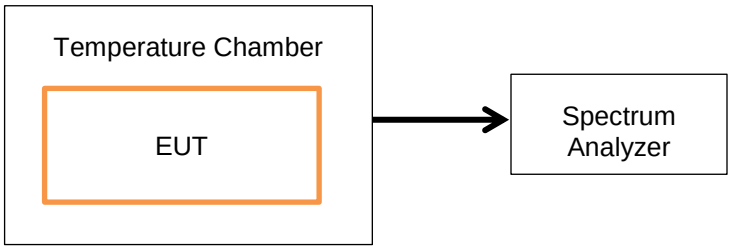
Test Requirement

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

Test Procedure

a. The EUT was placed into a temperature chamber and the temperature ranges were set to the manufacturers' specifications.
b. The RF output of the EUT was connected to a spectrum analyzer
c. The lowest and highest channels of the band were set to transmit
d. The carrier plots were measured to insure that the 26dB band width remained within the band over the prescribed temperature extremes.

Test Setup



Test Results: **See Annex D: Frequency Stability**

A/C Powerline Conducted Emission

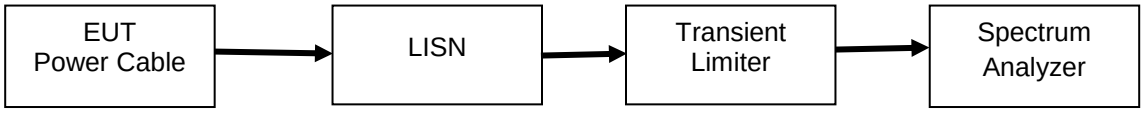
Engineer: Alex Macon

Test Date: 7/10/2015

Test Procedure

The EUT power cable was connected to a LISN and the monitored output of the LISN was connected to a transient limiter, which then connected directly to a spectrum analyzer. The conducted emissions from 150 kHz to 30 MHz were measured and compared to the specification limits.

Test Setup



Test Results: **See Annex E: A/C Powerline Conducted Emission**

Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Temperature Chamber	Tenney	Tenney Jr	i00027	NCR	NCR
Temperature Chamber	Tenney	Tenney II Benchmaster	i00287	NCR	NCR
EMI Receiver	HP	8546A	i00033	2/26/15	2/26/16
Preamplifier	HP	8447D	i00055	NCR	NCR
Horn Antenna	EMCO	3116	i00085	1/29/15	1/29/17
Bi-Log Antenna	Schaffner	CBL611C	i00267	2/24/14	2/24/16
Horn Antenna, Amplified	ARA	DRG-118/A	i00271	5/8/14	5/8/16
Horn Antenna, Amplified	ARA	MWH-1826/B	i00273	4/22/15	4/22/18
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	4/1/15	4/1/16
Spectrum Analyzer	Agilent	E4407B	i00331	9/18/15	9/18/16
Data Logger	Fluke	Hydra Data Bucket	i00343	3/24/15	3/24/16
EMI Analyzer	Agilent	E7405A	i00379	2/5/15	2/5/16
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	11/26/13	3/12/16
PSA Spectrum Analyzer	Agilent	E4445A	i00471	8/26/15	8/26/16

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

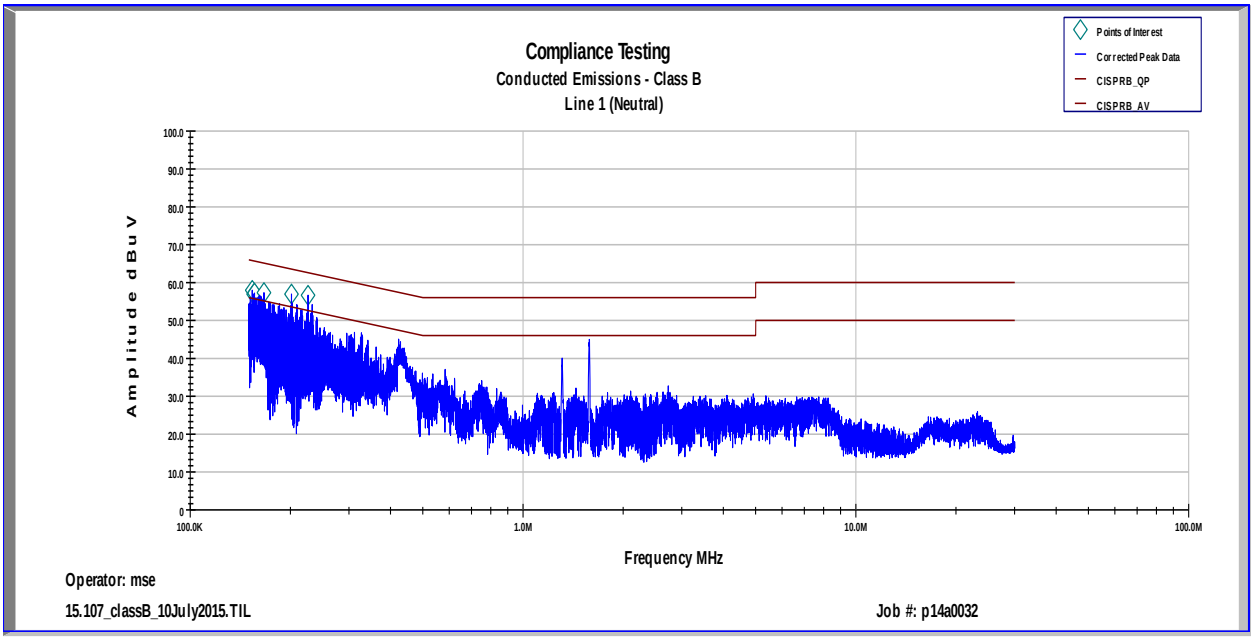
END OF TEST REPORT

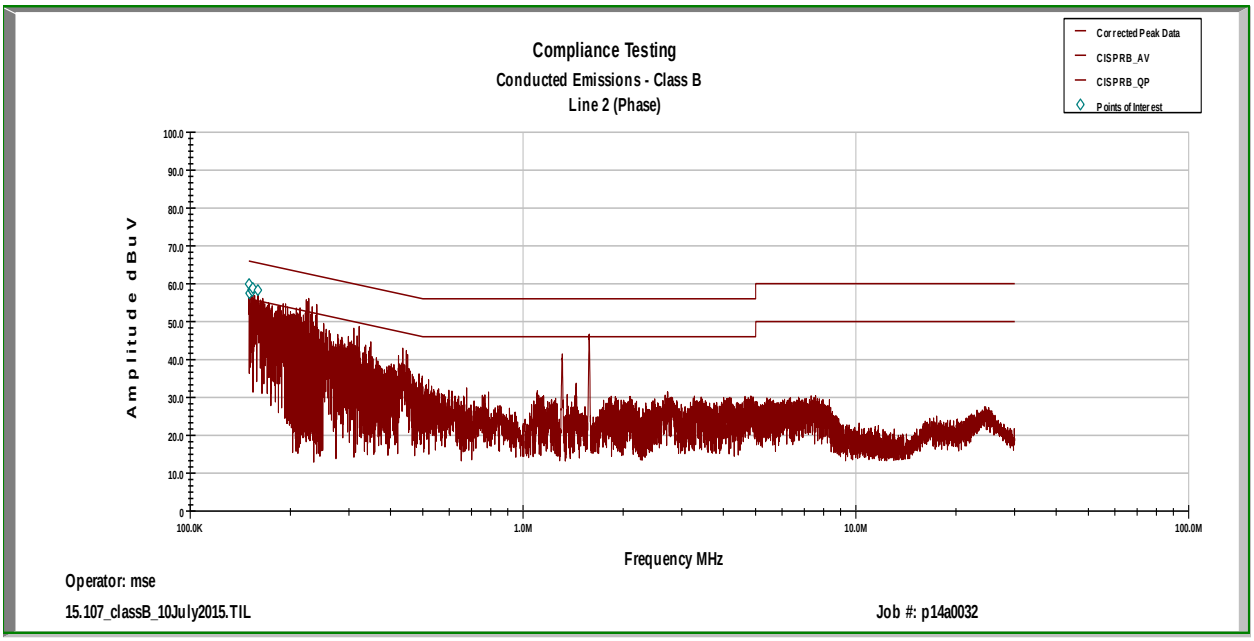
Annex E

15.207

A/C Powerline

Conducted Emission


Compliance Testing
Conducted Emissions - Class B
Line 1 (Neutral)
Points of Interest
Corrected Peak Data
CISPRB_QP
CISPRB_AV
Amplitude dBuV
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
100.0K
1.0M
10.0M
100.0M
Frequency MHz
Operator: mse
15.107_classB_10July2015.TIL
Job #: p14a0032


Compliance Testing
Conducted Emissions - Class B
Line 2 (Phase)
Corrected Peak Data
CISPRB_AV
CISPRB_QP
Points of Interest
Amplitude dBuV
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
100.0K
1.0M
10.0M
100.0M
Frequency MHz
Operator: mse
15.107_classB_10July2015.TIL
Job #: p14a0032

L1 AVG

Frequency	Measured Data	LISN Correction Factor	Cable Correction Factor	Attenuator	Corrected Data	Limit	Margin
220.53 KHz	16.51	0.19	0.021	10.1	26.821	53.985	-27.164
189.99 KHz	17.63	0.2	0.02	10.1	27.953	54.857	-26.904
160.86 KHz	23.5	0.2	0.02	10.191	33.915	55.69	-21.775
159.47 KHz	23.17	0.21	0.02	10.2	33.599	55.729	-22.131
157.01 KHz	23.44	0.23	0.02	10.2	33.887	55.8	-21.913
150.1 KHz	16.49	0.3	0.02	10.2	27.006	55.997	-28.991

L2 AVG

Frequency	Measured Data	LISN Correction Factor	Cable Correction Factor	Attenuator	Corrected Data	Limit	Margin
157.63 KHz	21.8	0.22	0.02	10.2	32.24	55.782	-23.542
155.22 KHz	20.32	0.25	0.02	10.2	30.788	55.851	-25.063
153.07 KHz	18.74	0.27	0.02	10.2	29.226	55.912	-26.686
152.65 KHz	17.92	0.27	0.02	10.2	28.417	55.924	-27.507
151.55 KHz	17.52	0.28	0.02	10.2	28.025	55.956	-27.931
150.95 KHz	16.43	0.29	0.02	10.2	26.937	55.973	-29.036

L1 QP

Frequency	Measured Data	LISN Correction Factor	Cable Correction Factor	Attenuator	Corrected Data	Limit	Margin
157.63 KHz	21.8	0.22	0.02	10.2	32.24	55.782	-23.542
155.22 KHz	20.32	0.25	0.02	10.2	30.788	55.851	-25.063
153.07 KHz	18.74	0.27	0.02	10.2	29.226	55.912	-26.686
152.65 KHz	17.92	0.27	0.02	10.2	28.417	55.924	-27.507
151.55 KHz	17.52	0.28	0.02	10.2	28.025	55.956	-27.931
150.95 KHz	16.43	0.29	0.02	10.2	26.937	55.973	-29.036

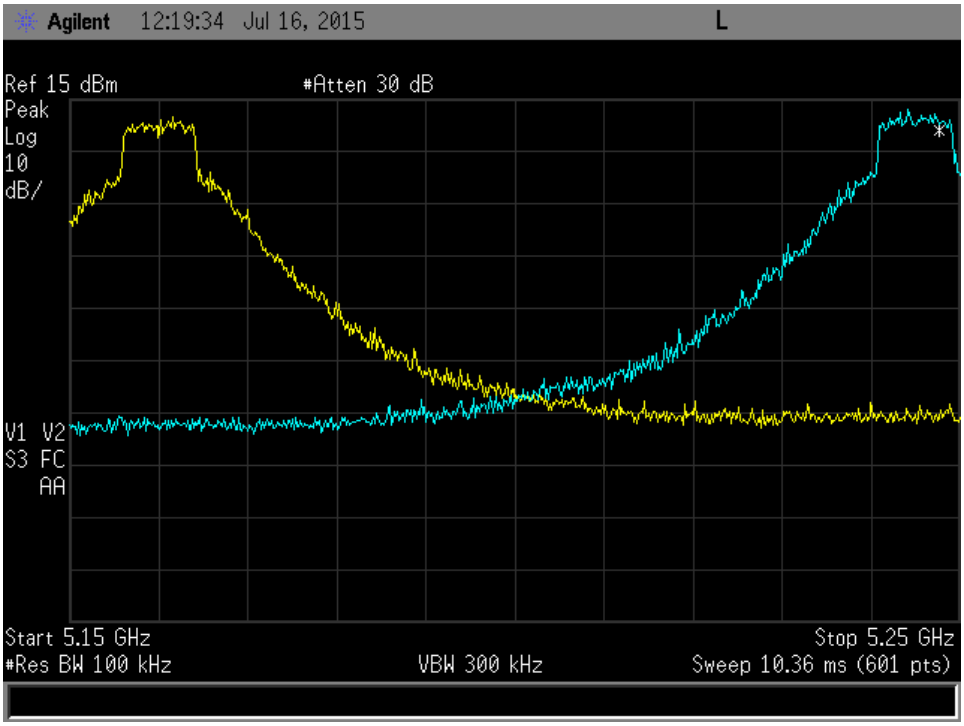
L2 QP

Frequency	Measured Data	LISN Correction Factor	Cable Correction Factor	Attenuator	Corrected Data	Limit	Margin
157.63 KHz	40.63	0.22	0.02	10.2	51.074	65.782	-14.708
155.22 KHz	40.46	0.25	0.02	10.2	50.928	65.851	-14.923
153.07 KHz	39.5	0.27	0.02	10.2	49.989	65.912	-15.923
152.65 KHz	39.32	0.27	0.02	10.2	49.813	65.924	-16.111
151.55 KHz	39.06	0.28	0.02	10.2	49.565	65.956	-16.391
150.95 KHz	38.99	0.29	0.02	10.2	49.5	65.973	-16.472

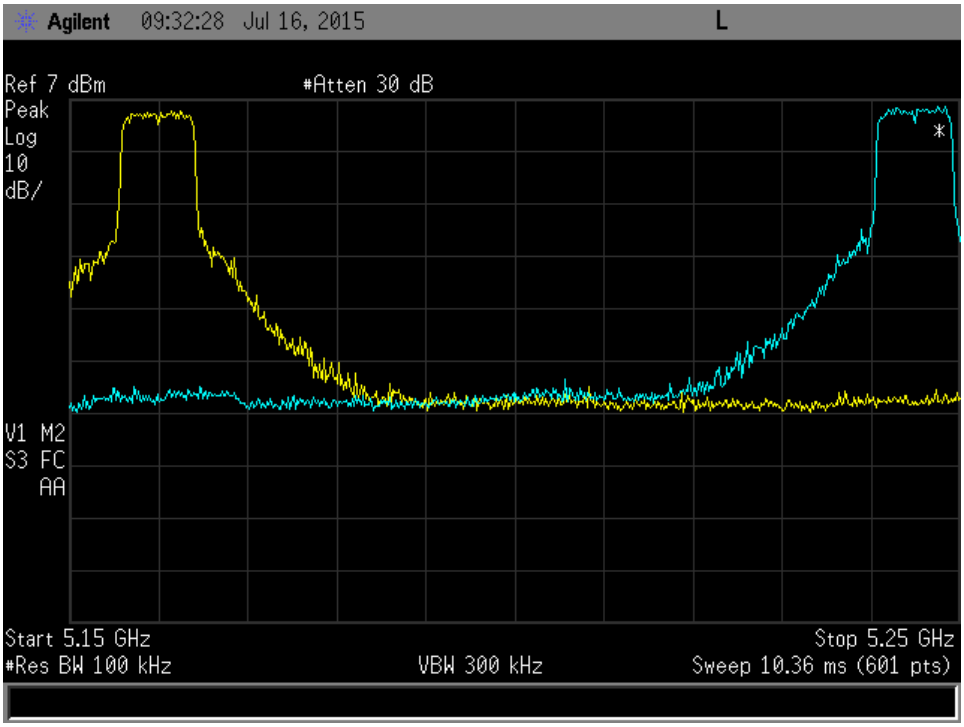
Annex D

Frequency Stability

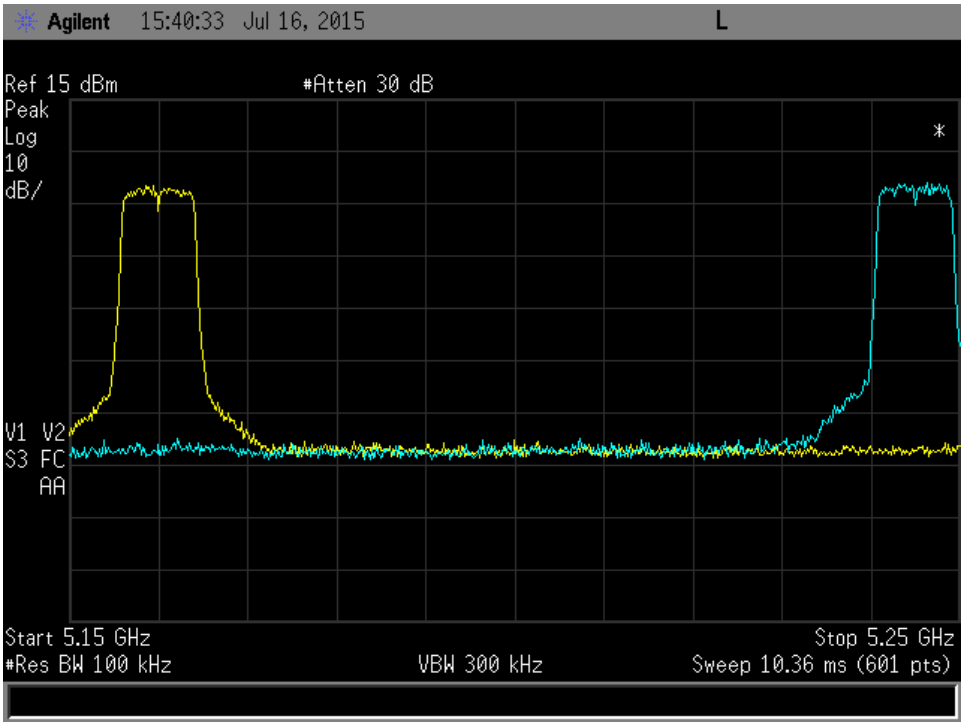
UNI-1 -40C



UNI-1 25C



UNI-1 80C

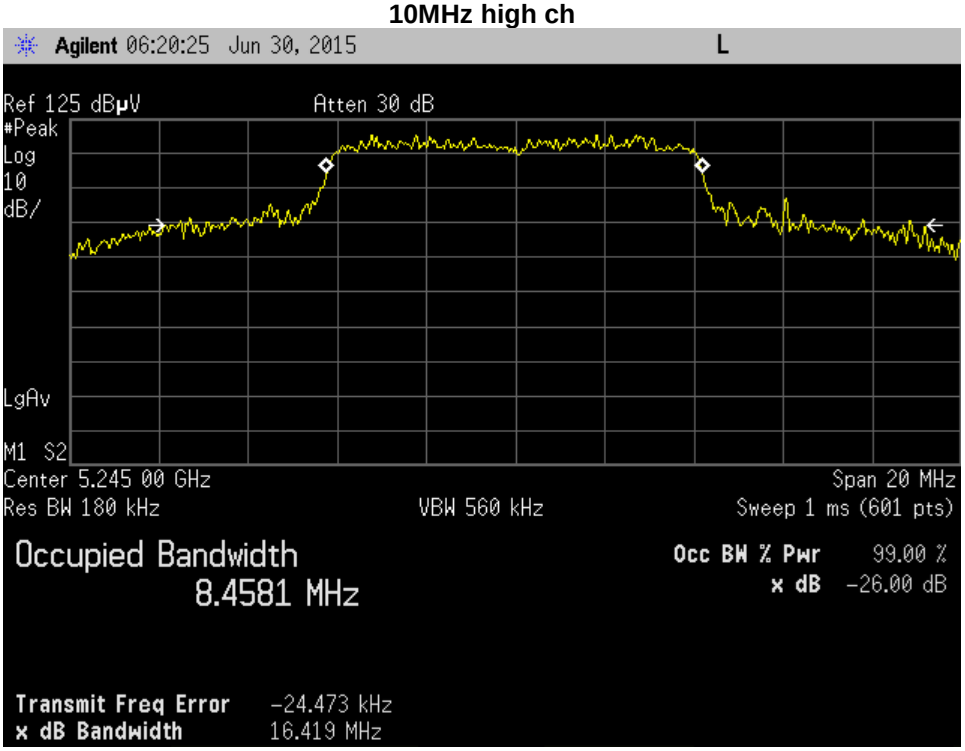

Agilent 15:40:33 Jul 16, 2015
L
Ref 15 dBm
#Atten 30 dB
Peak
Log
10
dB/
V1 V2
S3 FC
AA
Start 5.15 GHz
#Res BW 100 kHz
VBW 300 kHz
Stop 5.25 GHz
Sweep 10.36 ms (601 pts)

Annex C

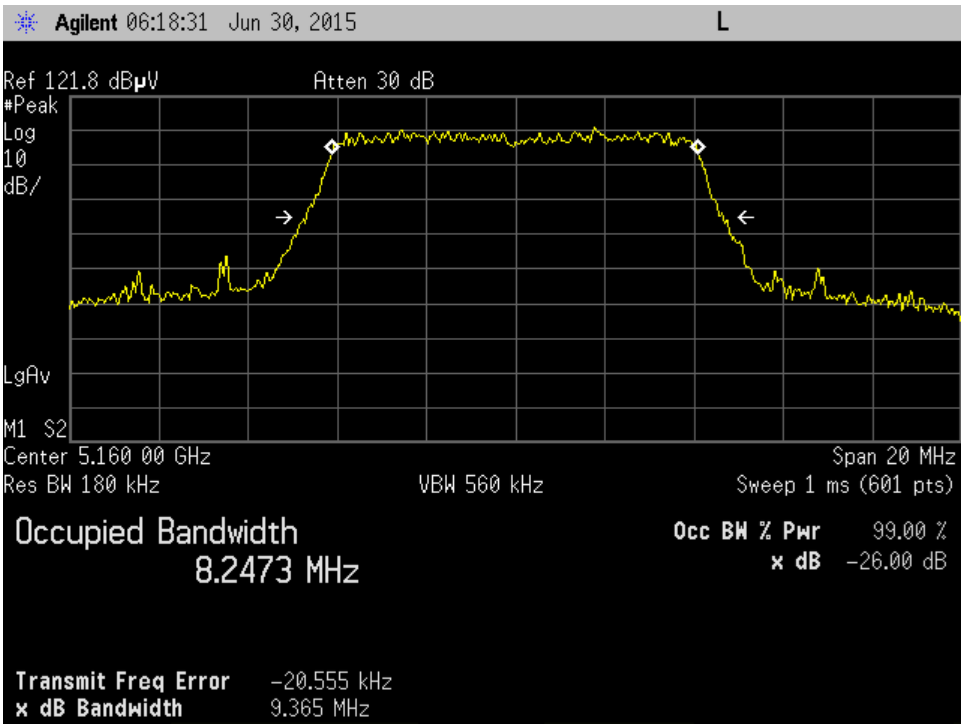
Occupied Bandwidth

Port F37

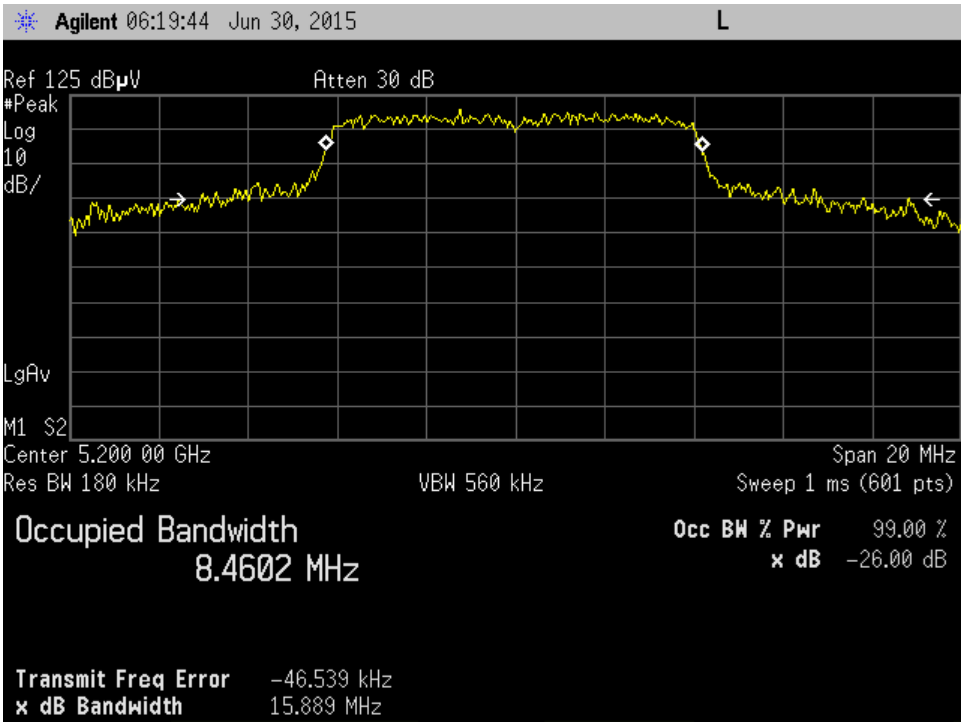
10MHz high ch



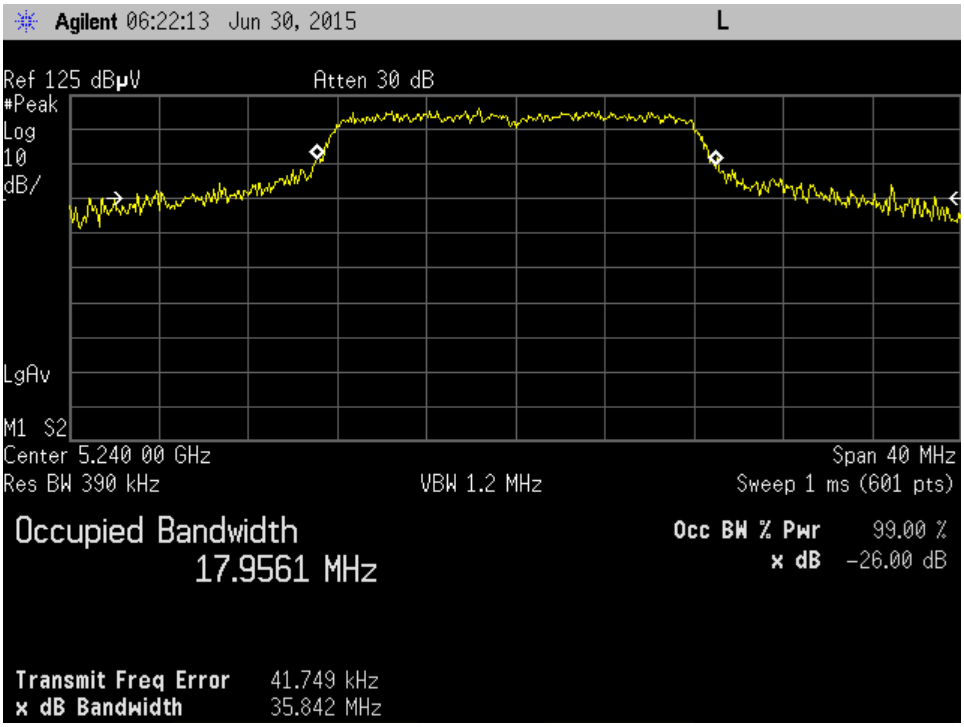
10MHz low ch



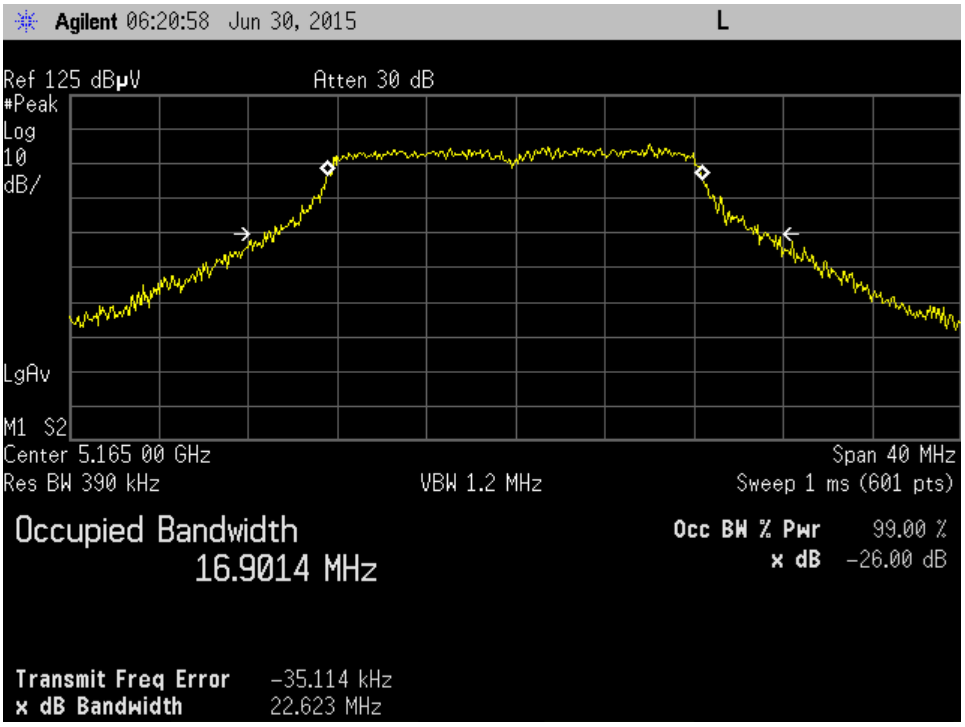
10MHz mid ch



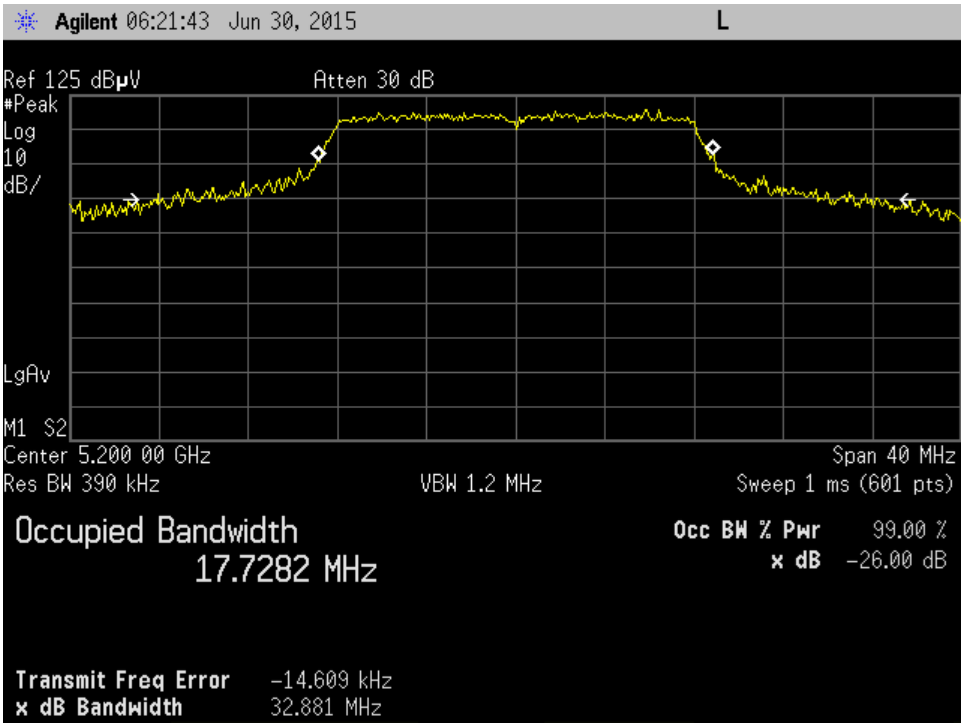
20MHz high ch



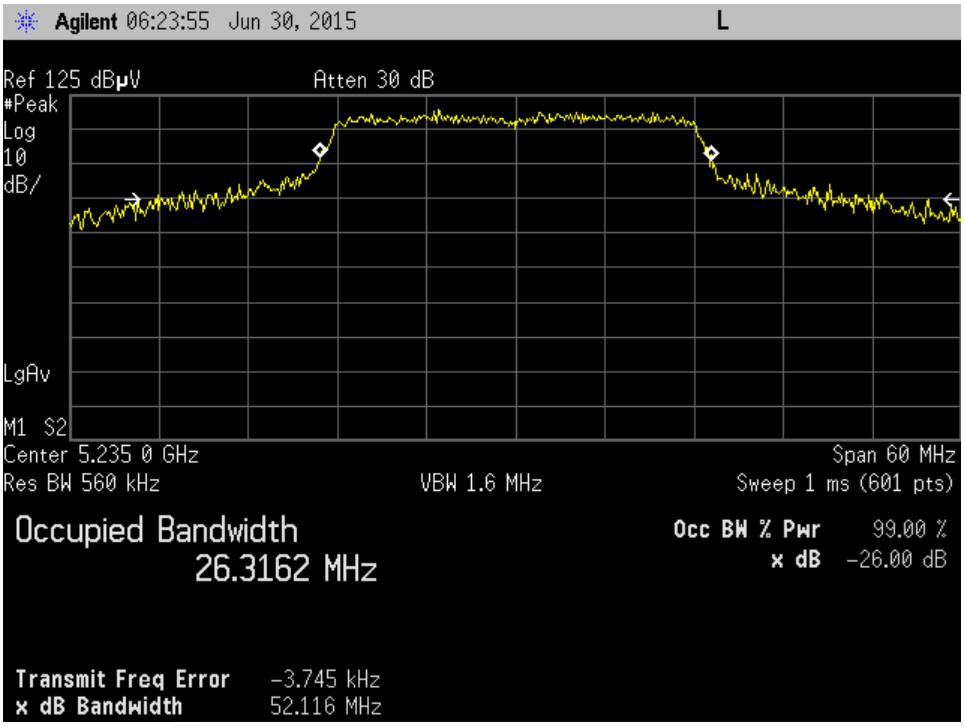
20MHz low ch



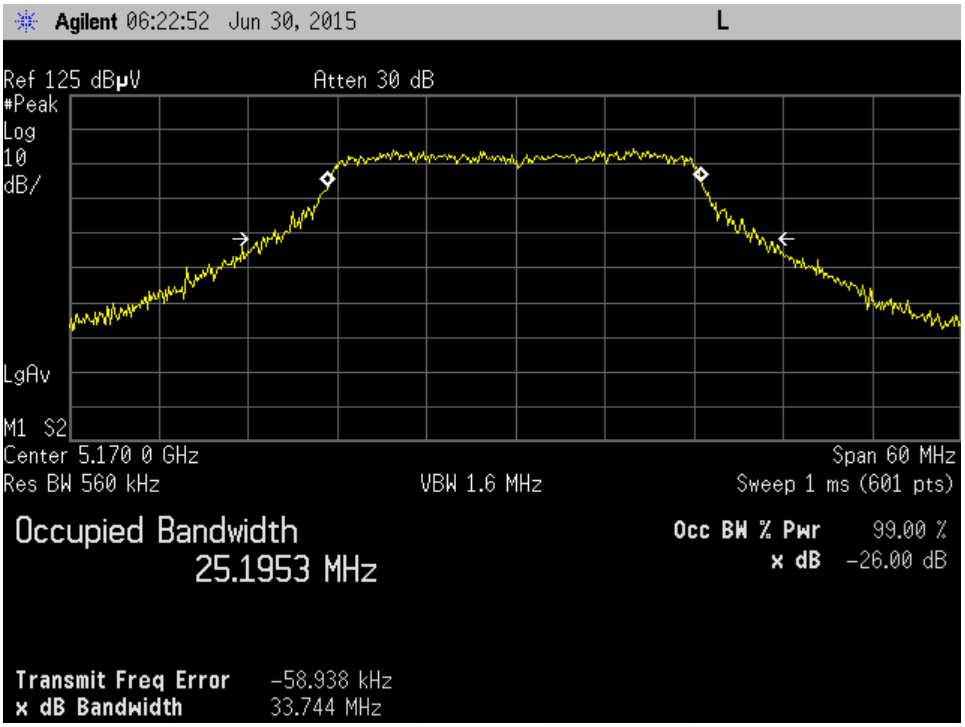
20MHz mid ch



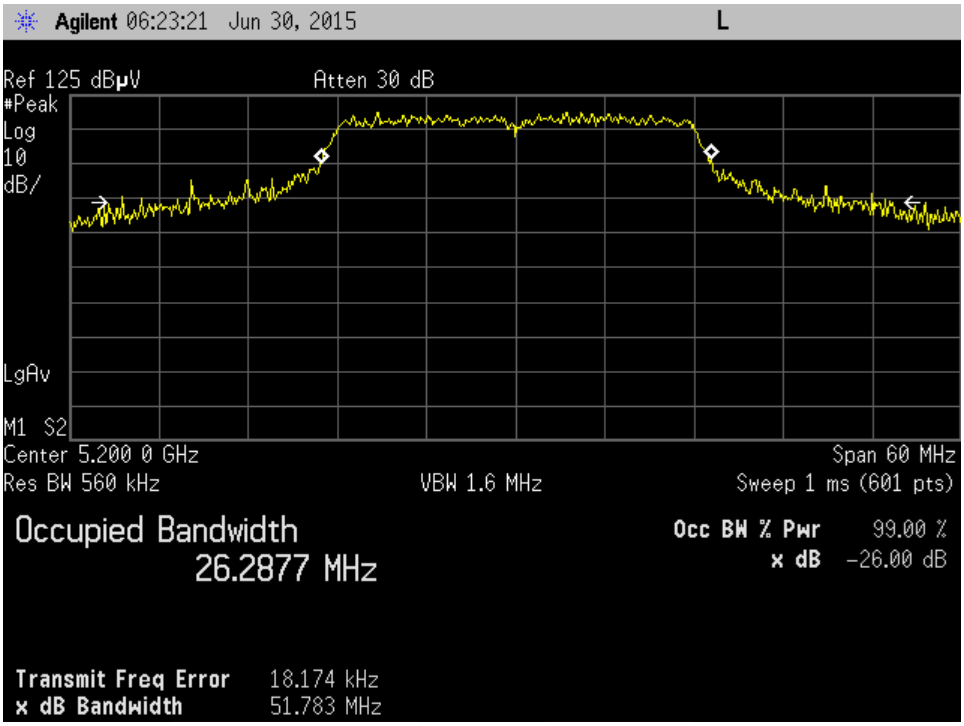
30MHz high ch



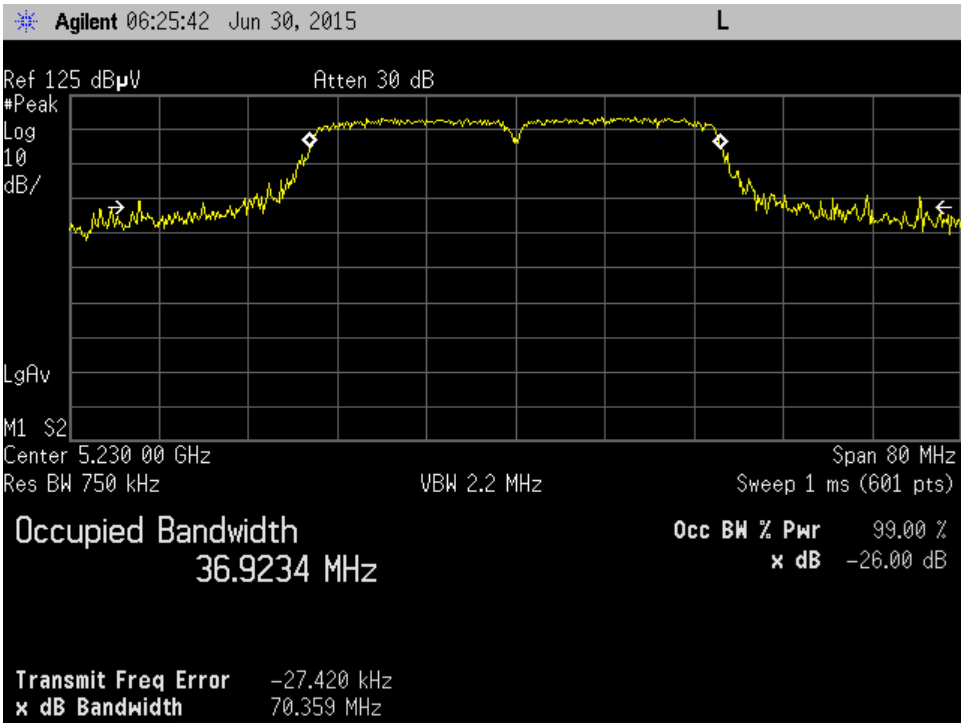
30MHz low ch



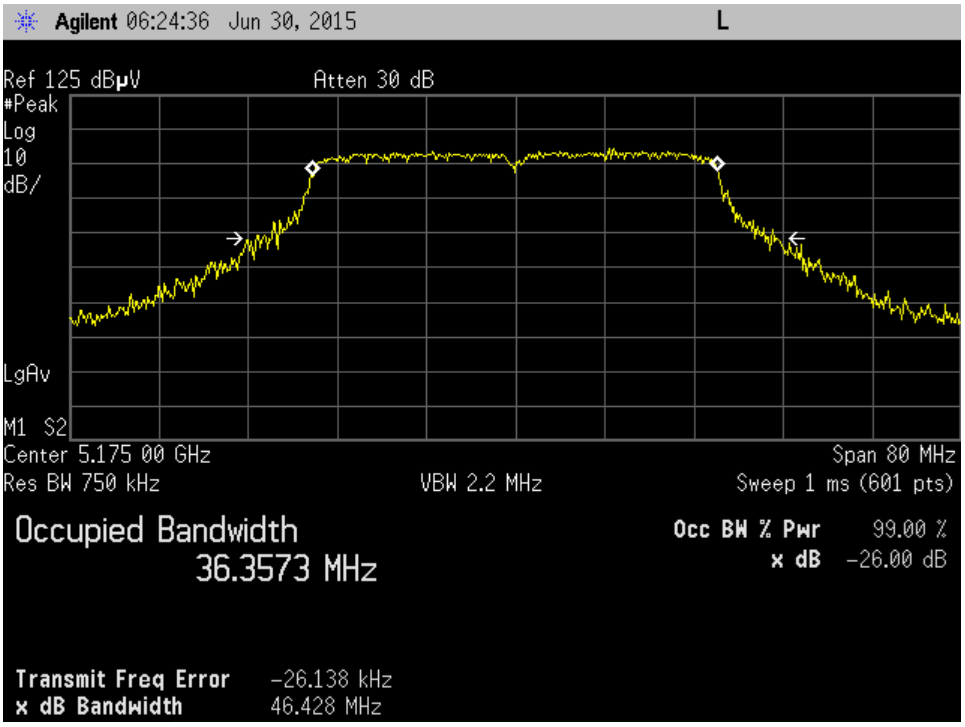
30MHz mid ch



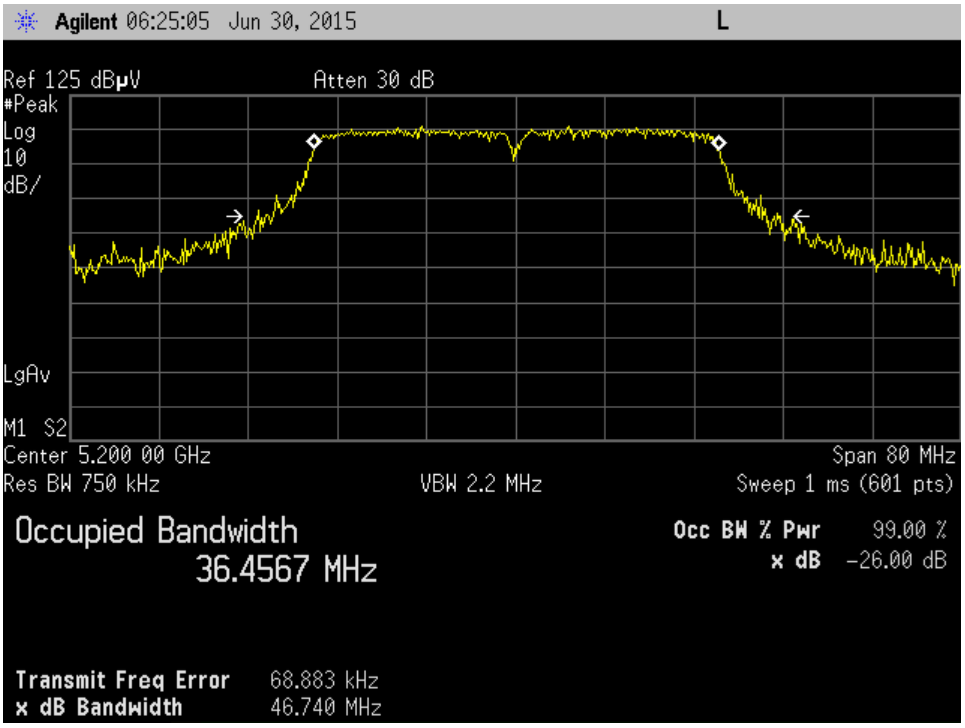
40MHz high ch



40MHz low ch



40MHz mid ch



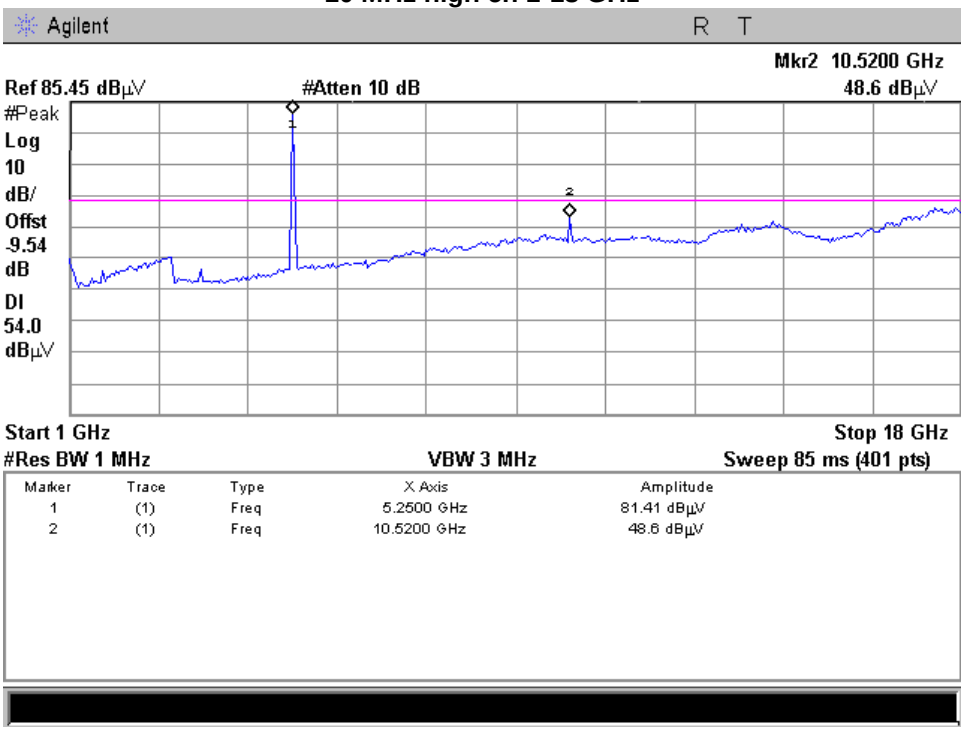
Annex B

Undesireable Emissions

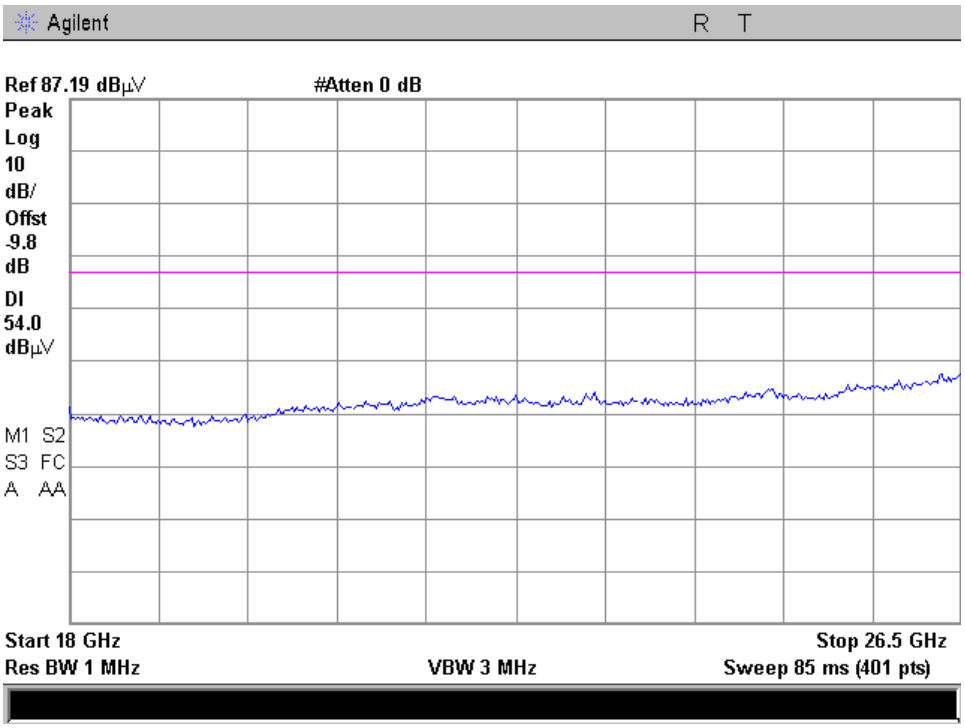
Radiated

Annex B Notes: The emissions that are over the limit in the 30 – 1000 MHz plots are from digital circuitry and not the transmitter, therefor these emissions only need to meet the -27 dBM/MHz general emission requirements. Emissions were investigated up to 40 GHz but only noise floor was measured.

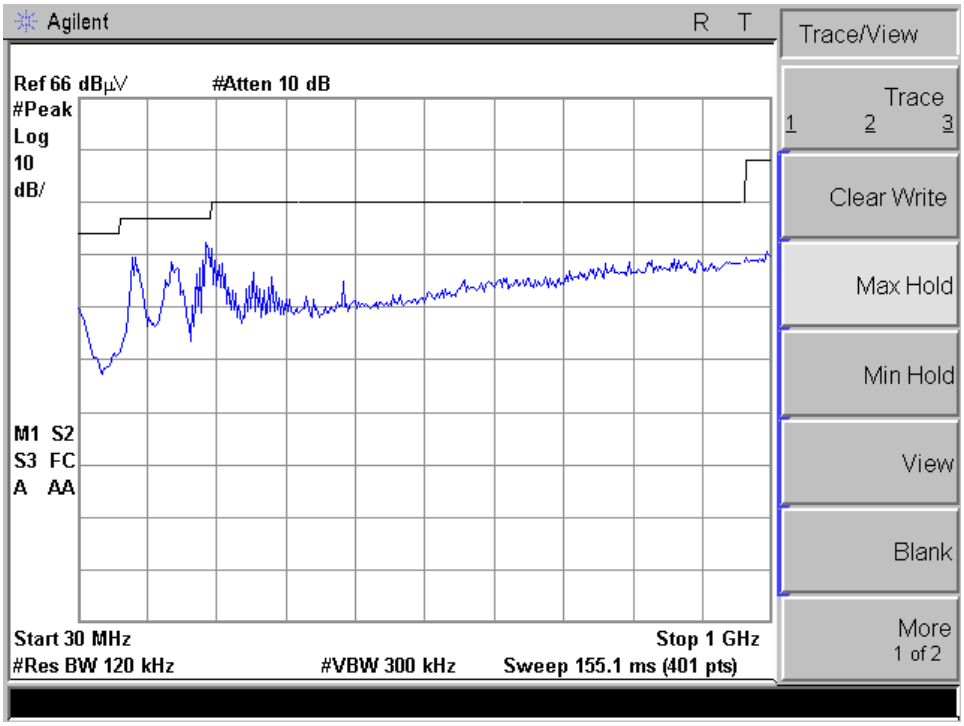
10 MHz high ch 1-18 GHz



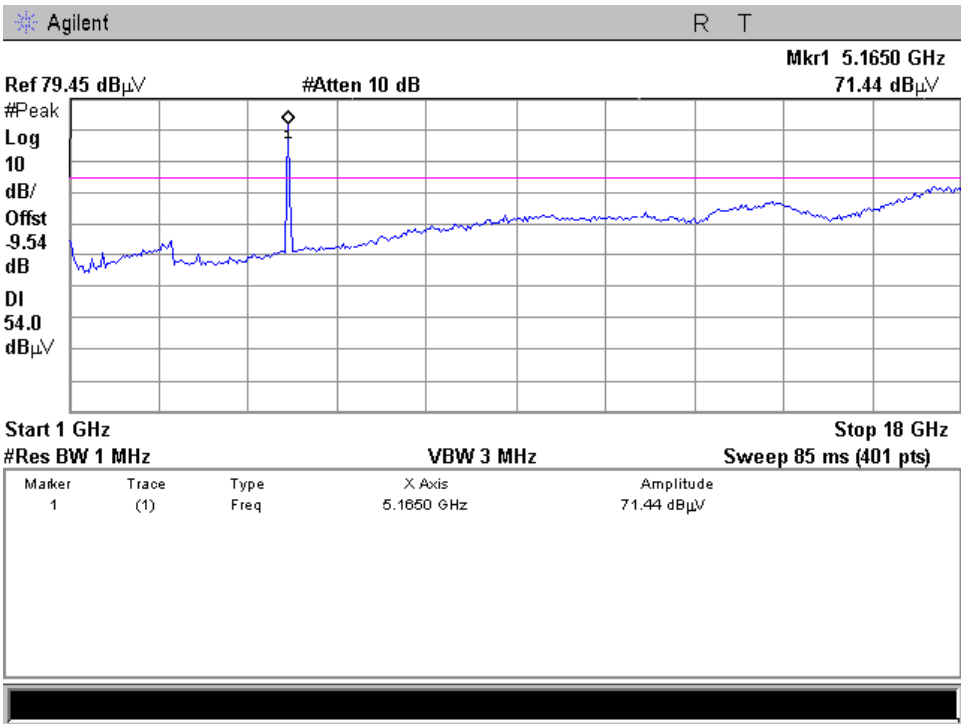
10 MHz high ch 18-26.5 GHz



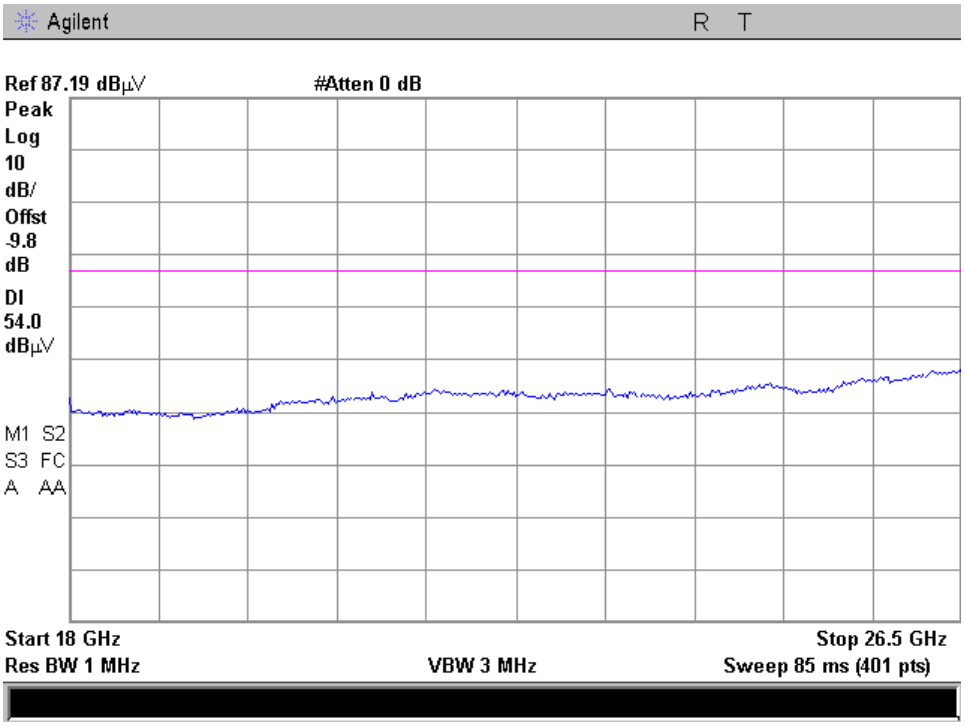
10 MHz high ch 30-1000 MHz



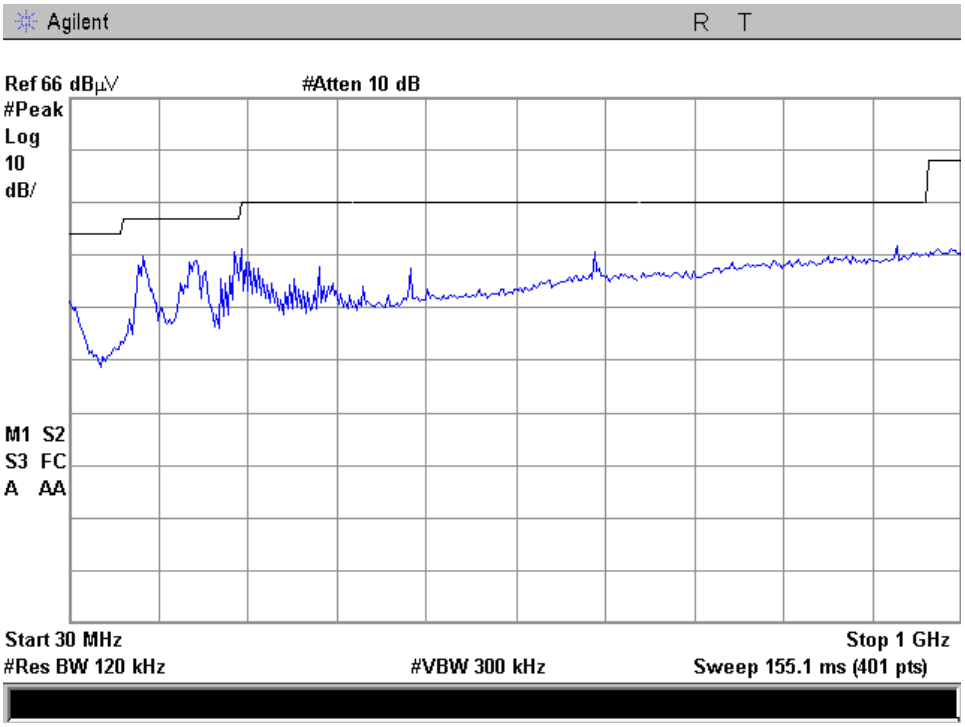
10 MHz low ch 1-18 GHz



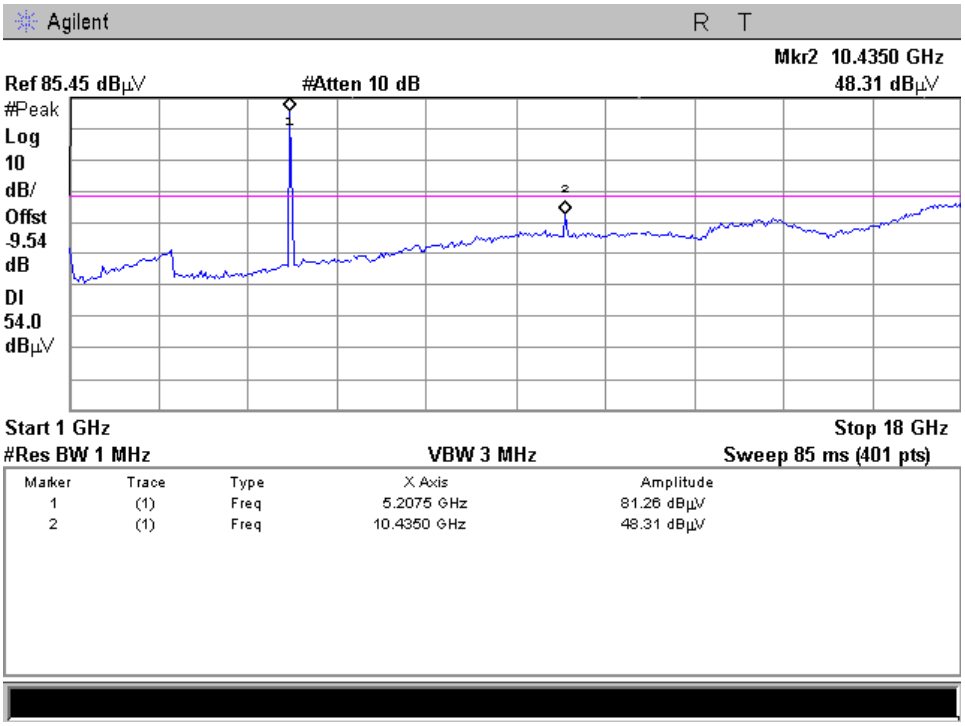
10 MHz low ch 18-26.5 GHz



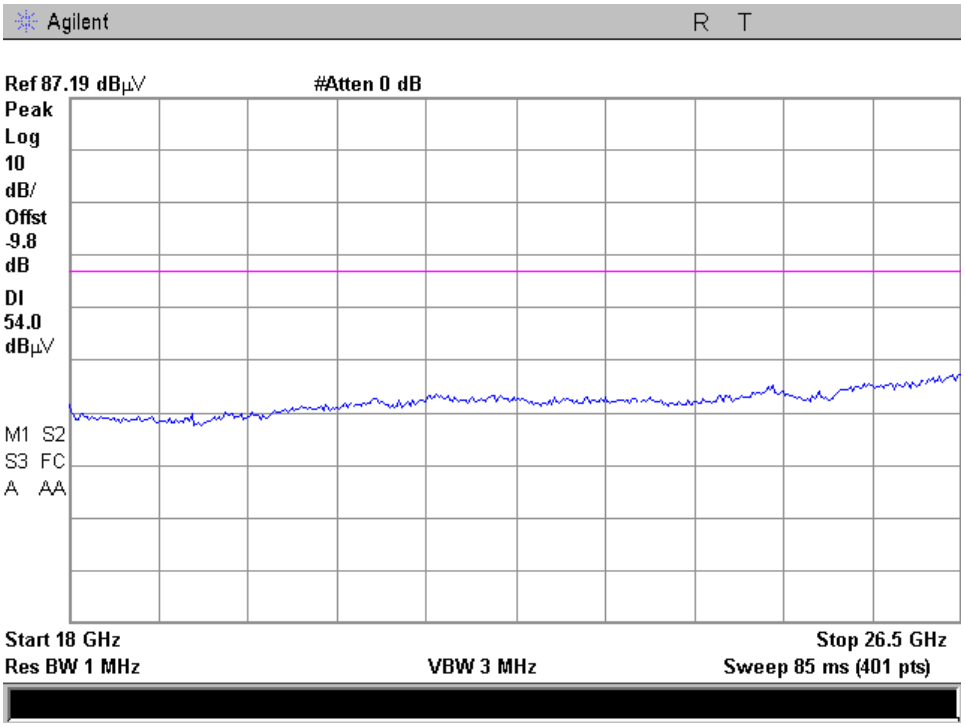
10 MHz low ch 30-1000 MHz



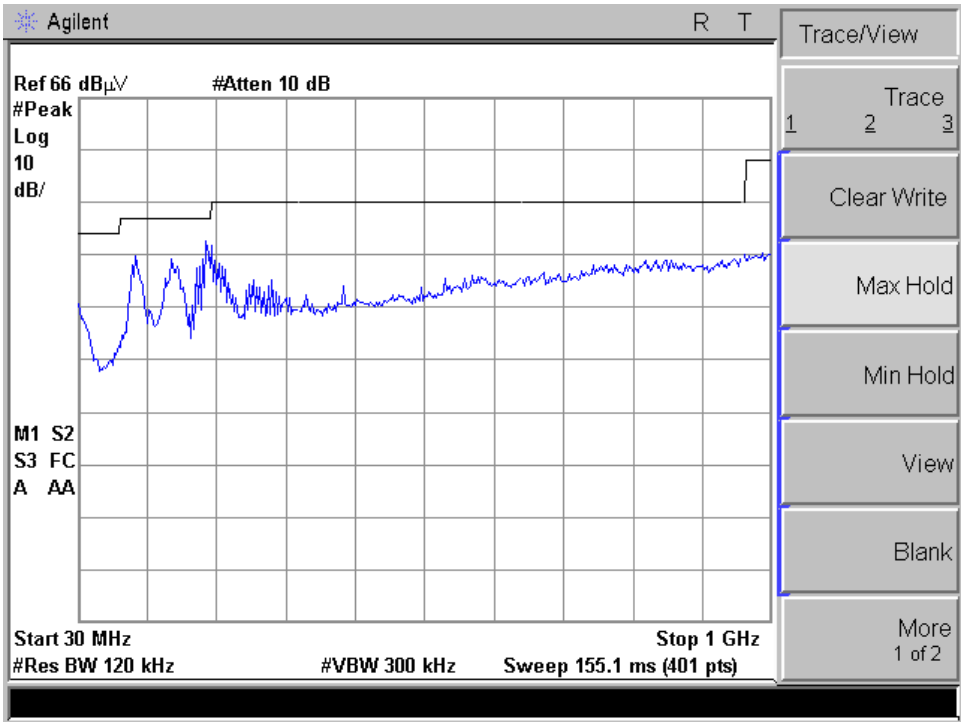
10 MHz mid ch 1-18 GHz



10 MHz mid ch 18-26.5 GHz



10 MHz mid ch 30-1000 MHz



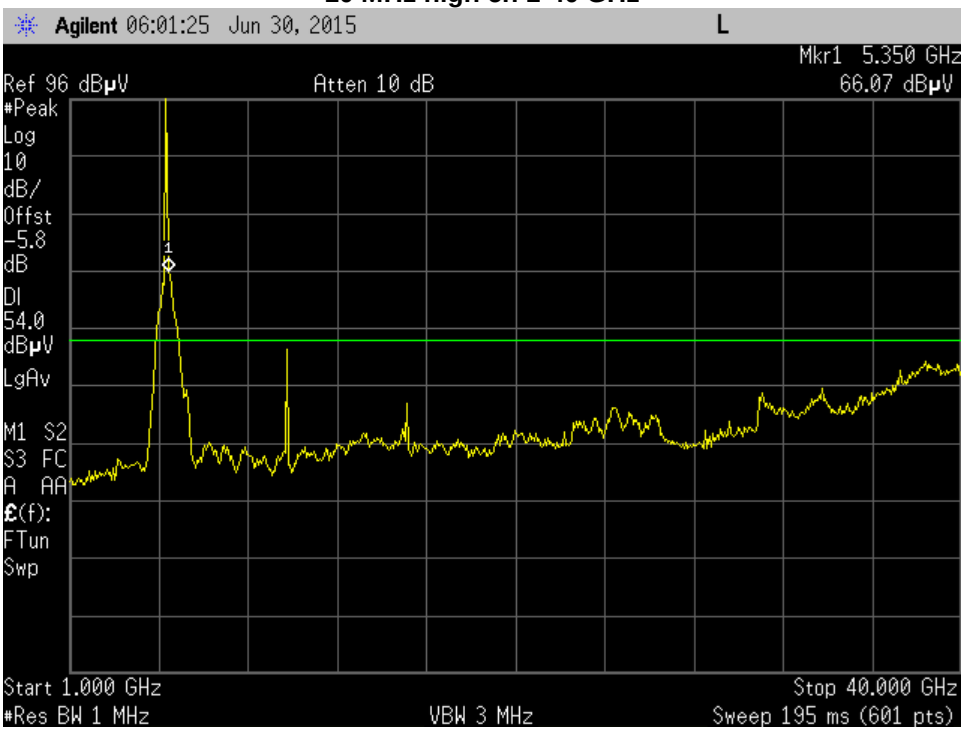
Annex A

Undesirable Emissions Conducted

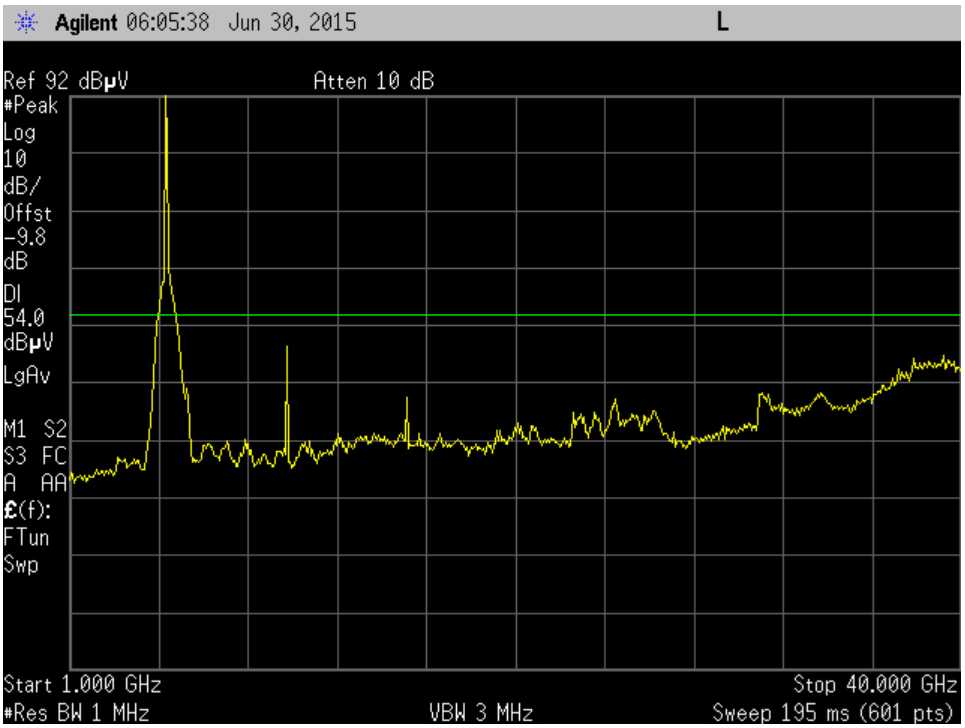
30-40000MHz

Port F37

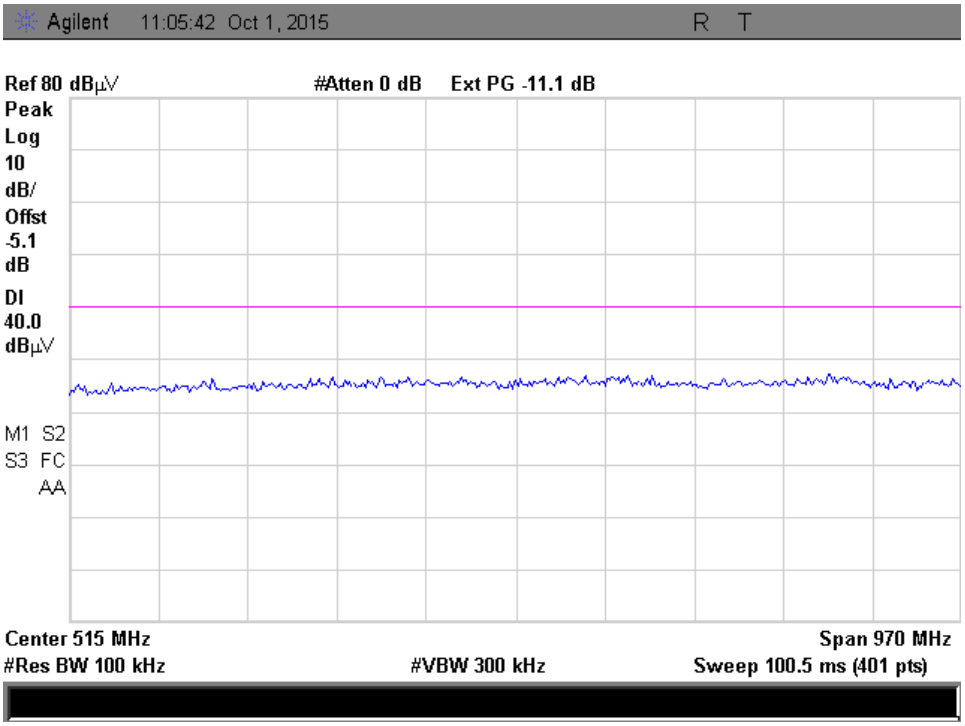
10 MHz high ch 1-40 GHz



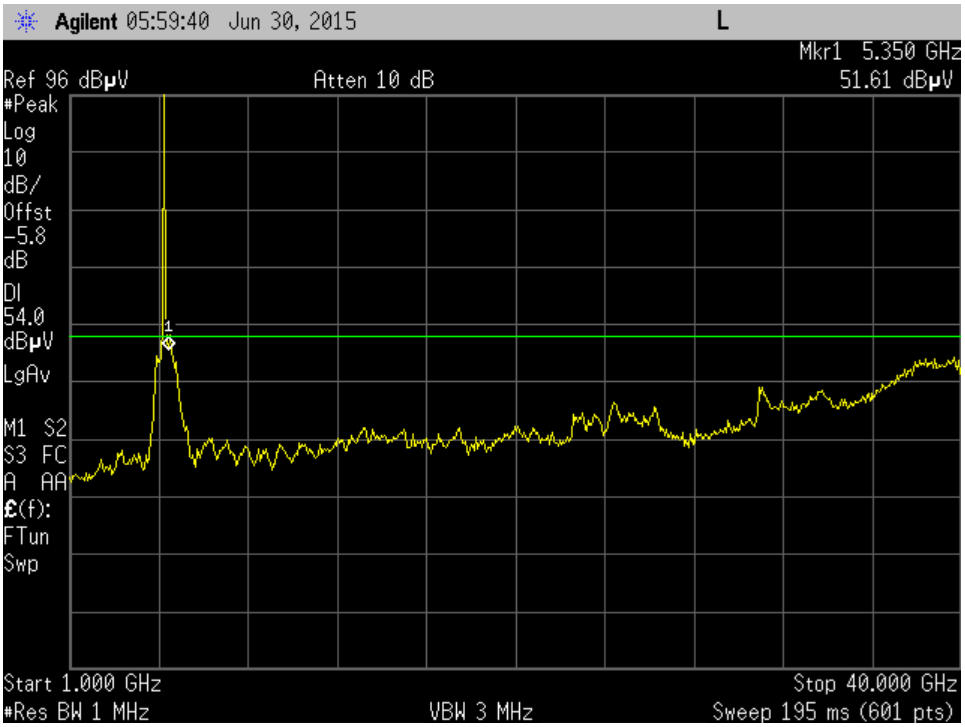
10 MHz high ch 1-40 GHz_



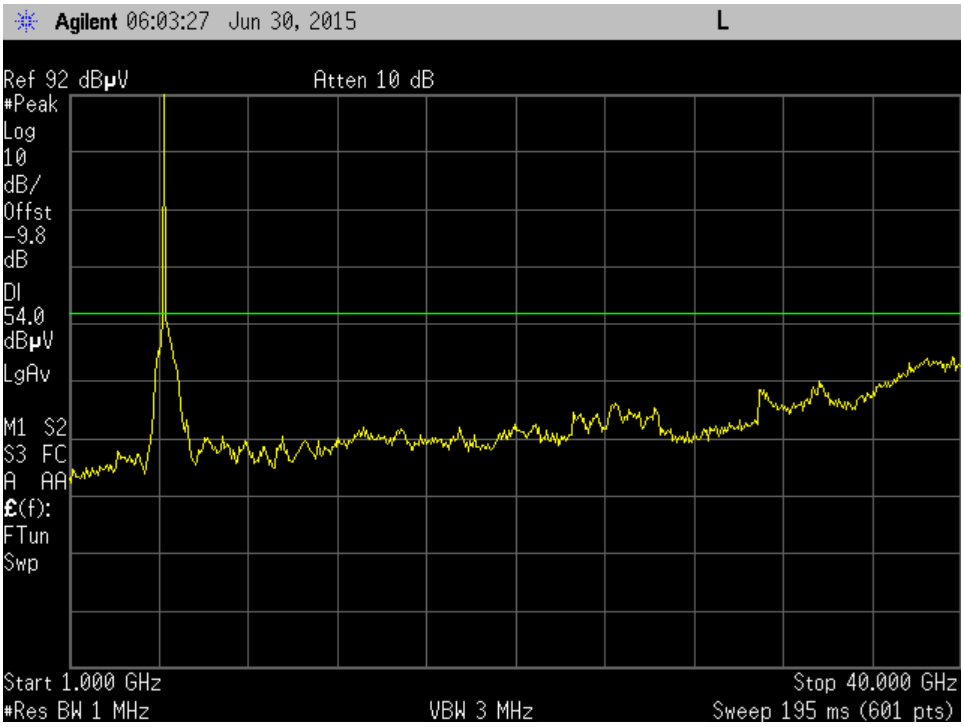
10 MHz high ch 30-1000 MHz



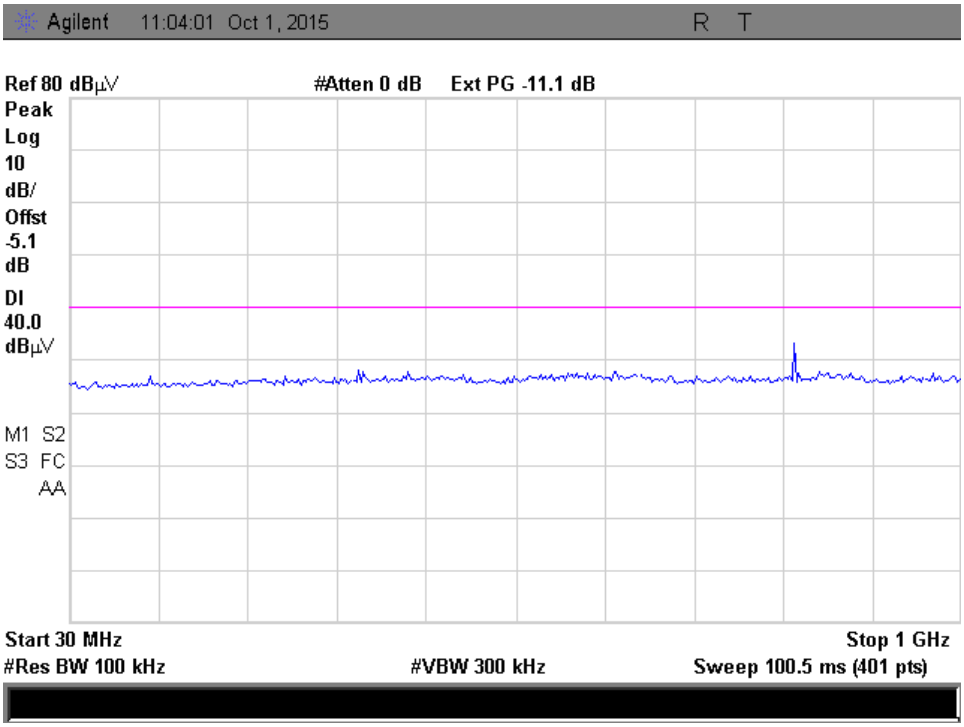
10 MHz low ch 1-40 GHz



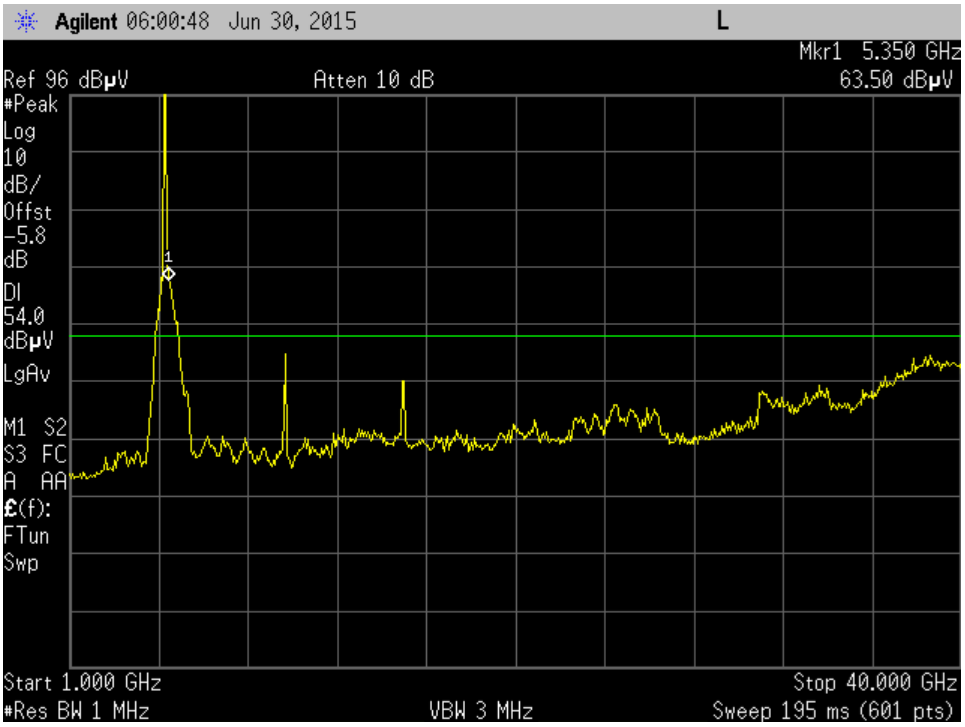
10 MHz low ch 1-40 GHz_



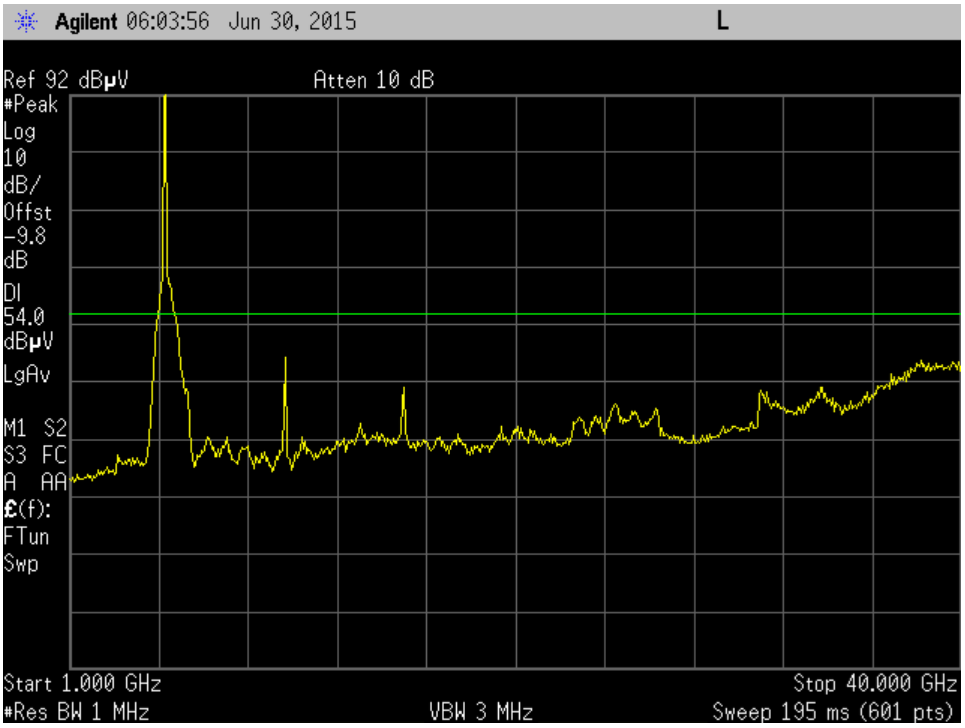
10 MHz low ch 30-1000 MHz



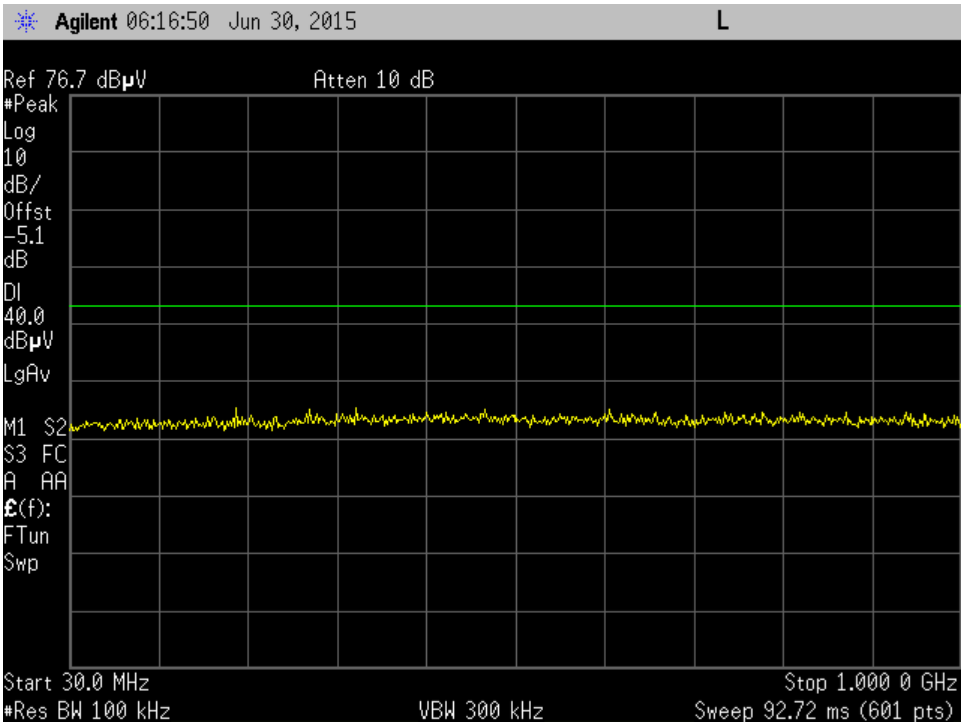
10 MHz mid ch 1-40 GHz



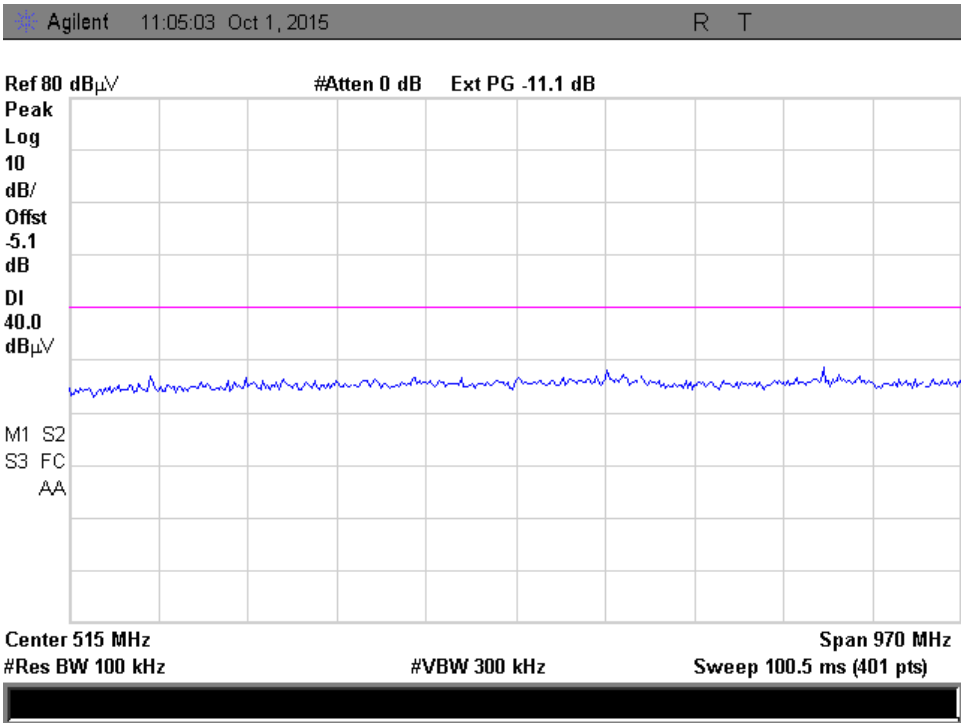
10 MHz mid ch 1-40 GHz_



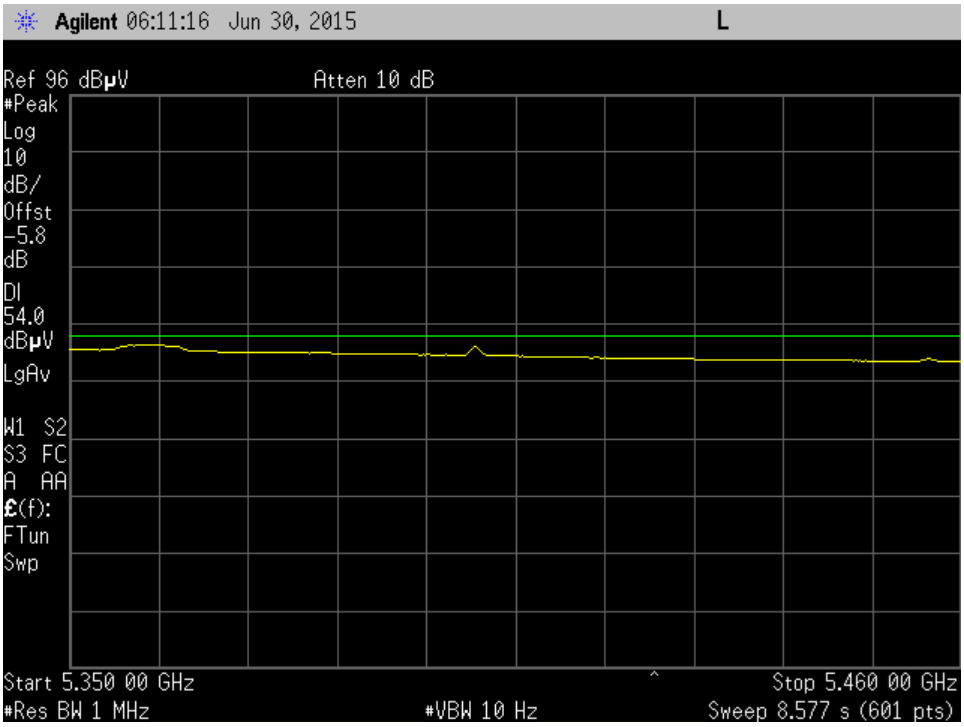
10 MHz mid ch 30-1000 MHz. Sample



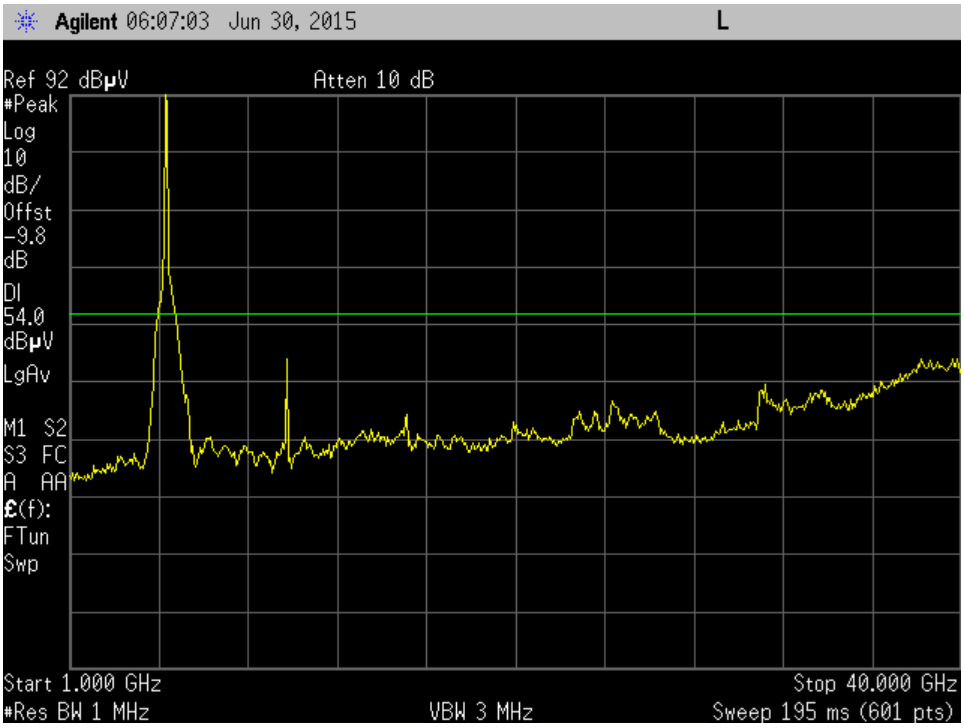
10 MHz mid ch 30-1000 MHz



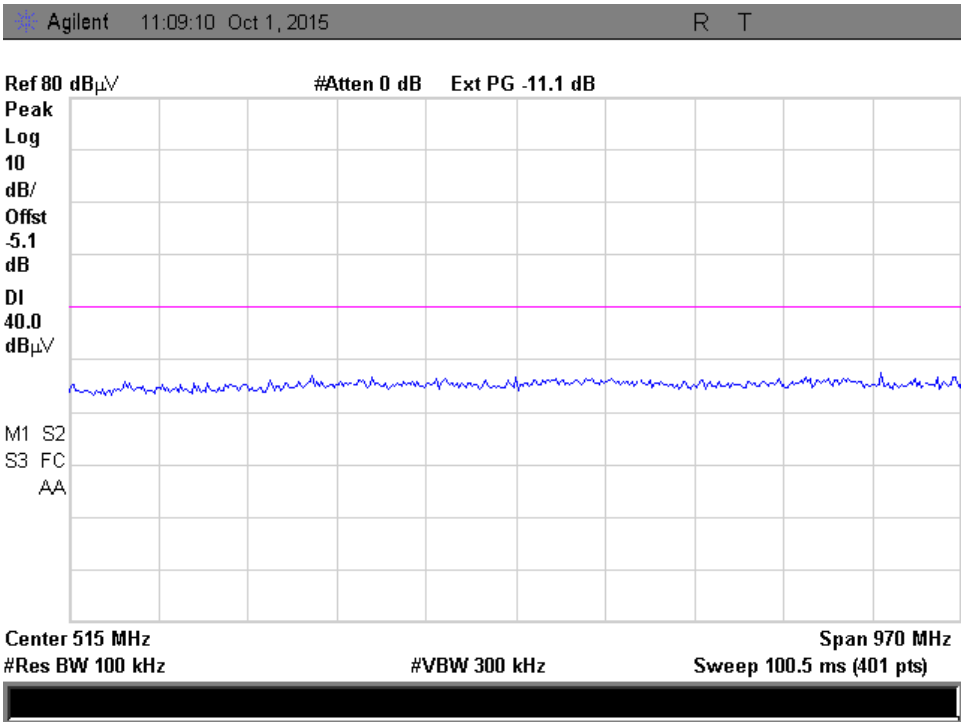
10 MHz mid ch 5350-5460



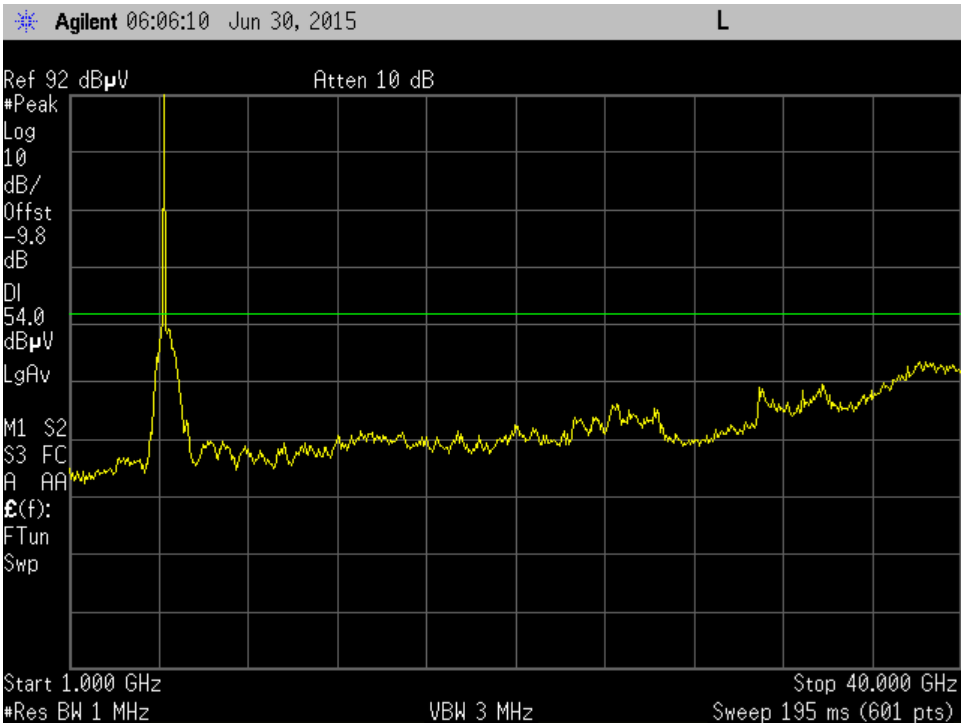
20 MHz high ch 1-40 GHz



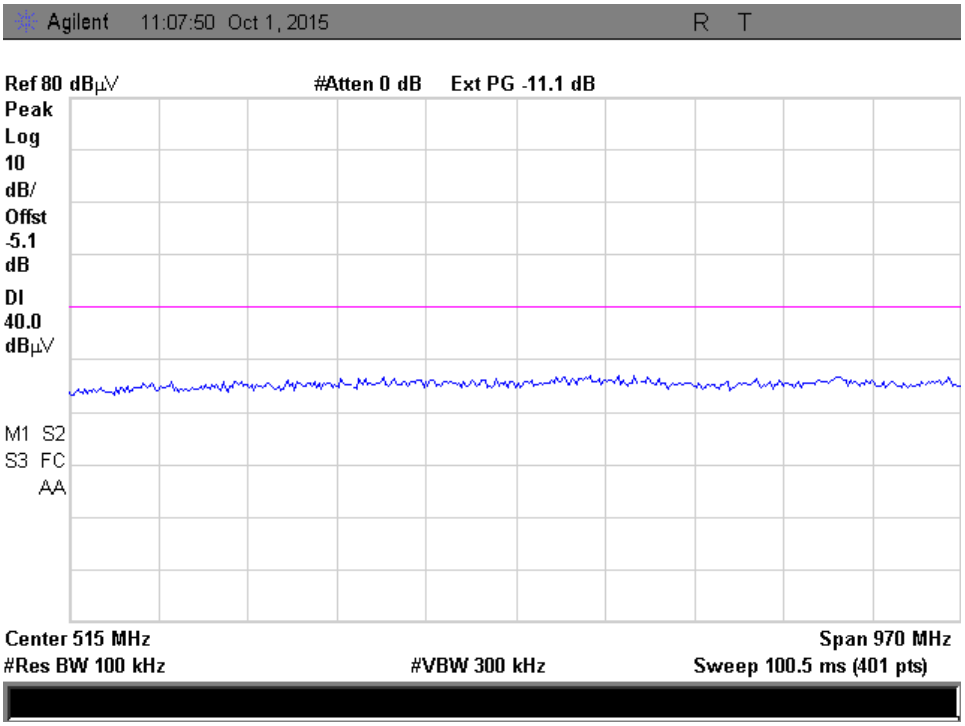
20 MHz high ch 30-1000 MHz



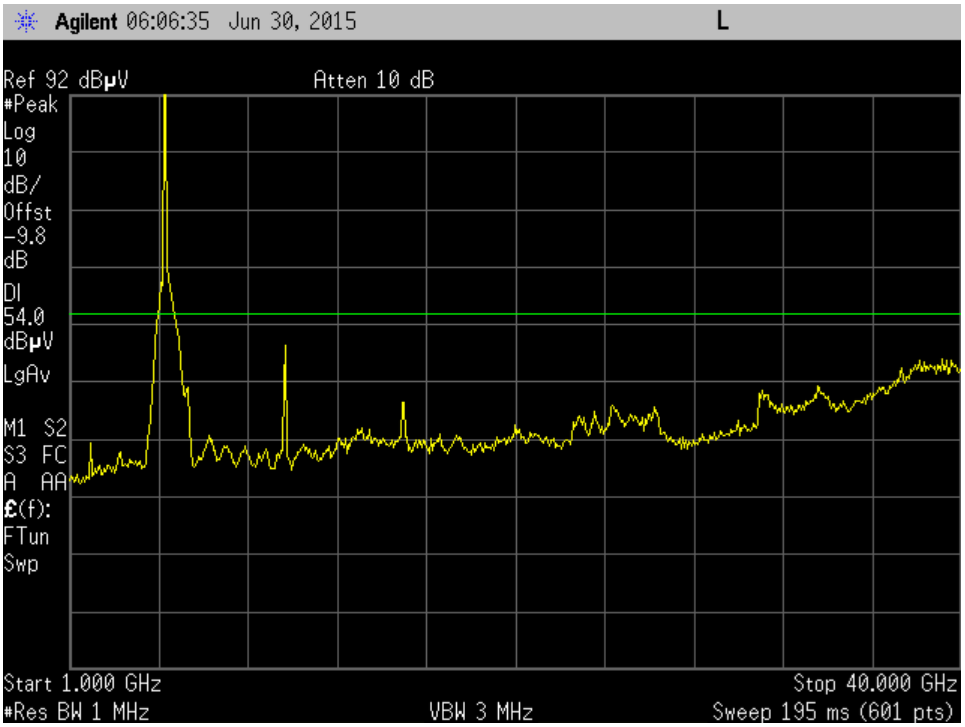
20 MHz low ch 1-40 GHz



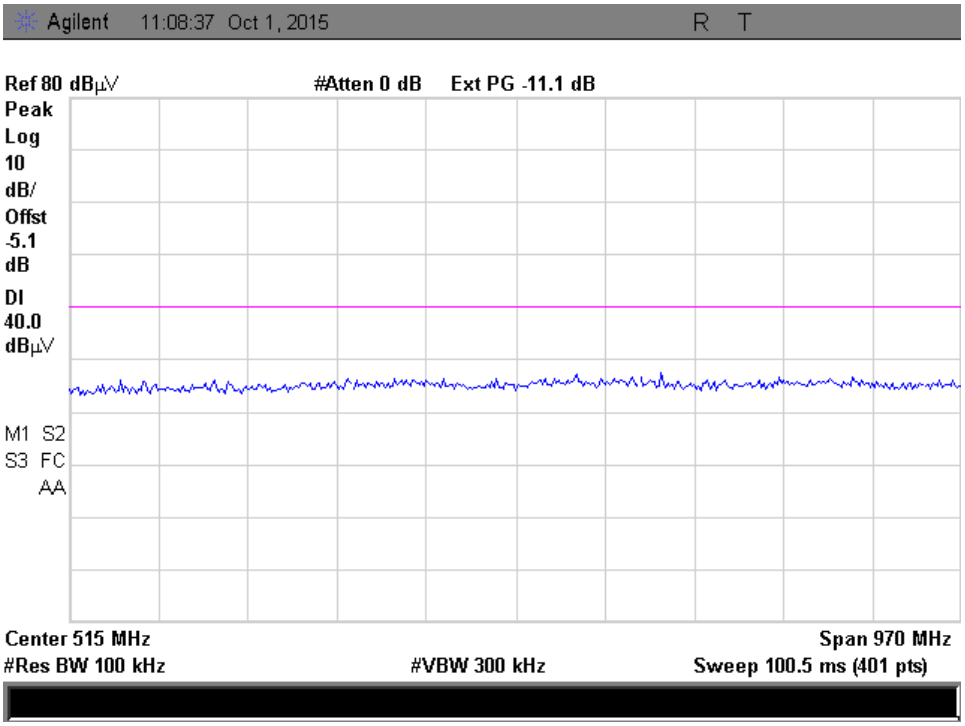
20 MHz low ch 30-1000 MHz



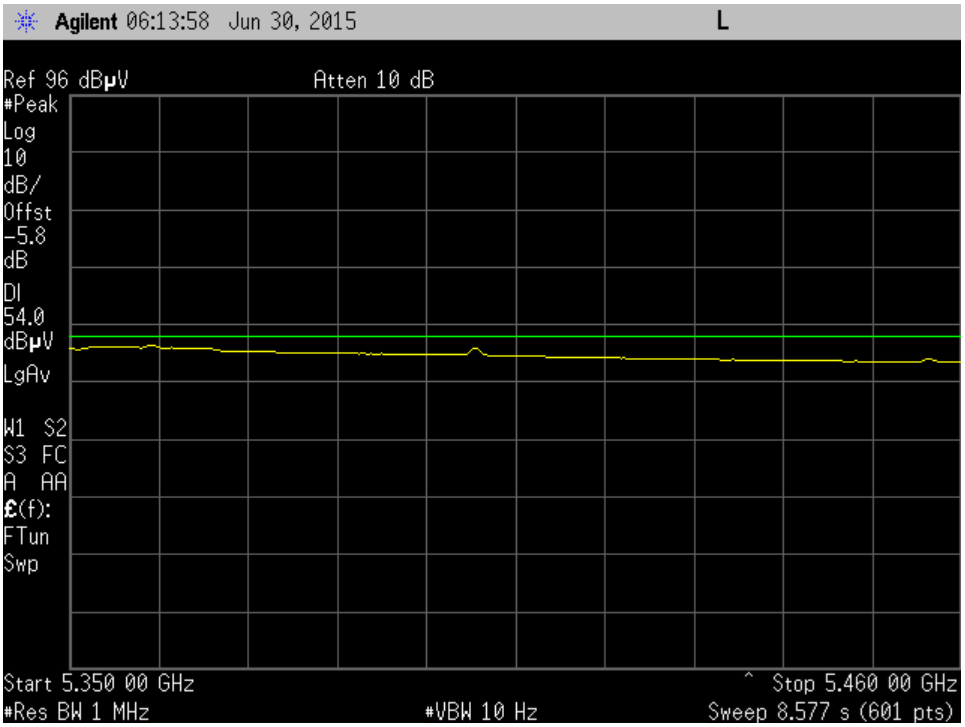
20 MHz mid ch 1-40 GHz



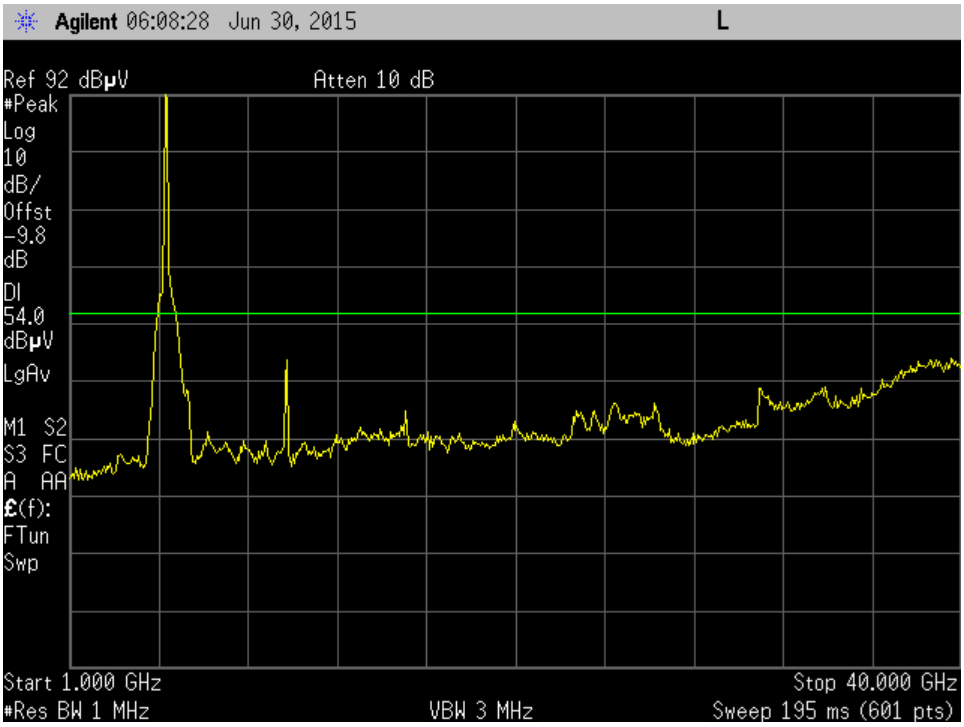
20 MHz mid ch 30-1000 MHz



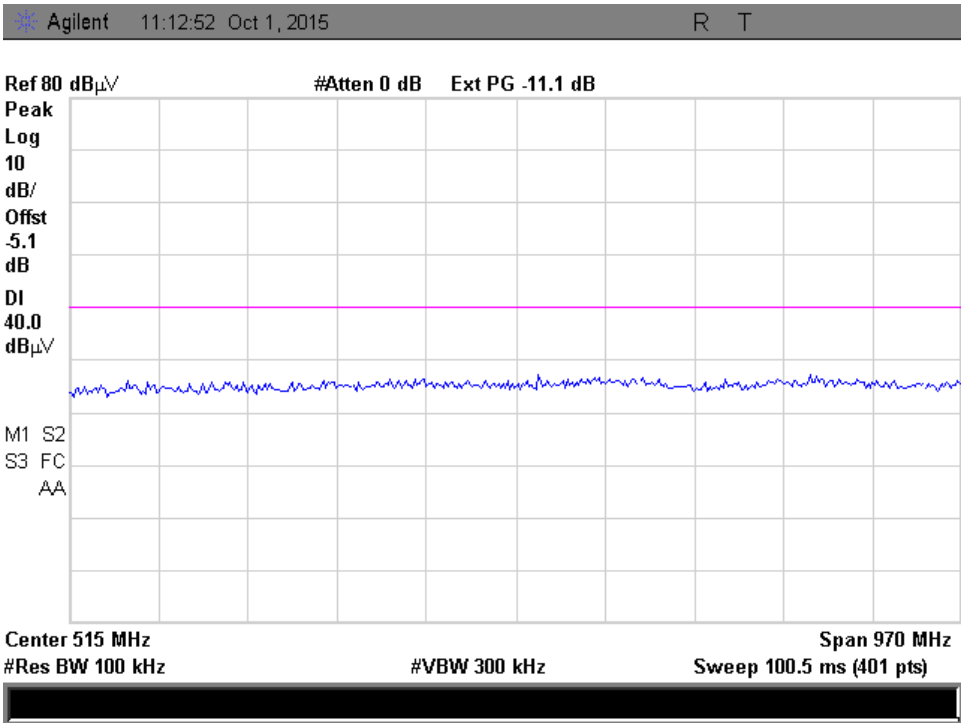
20 MHz mid ch 5350-5460



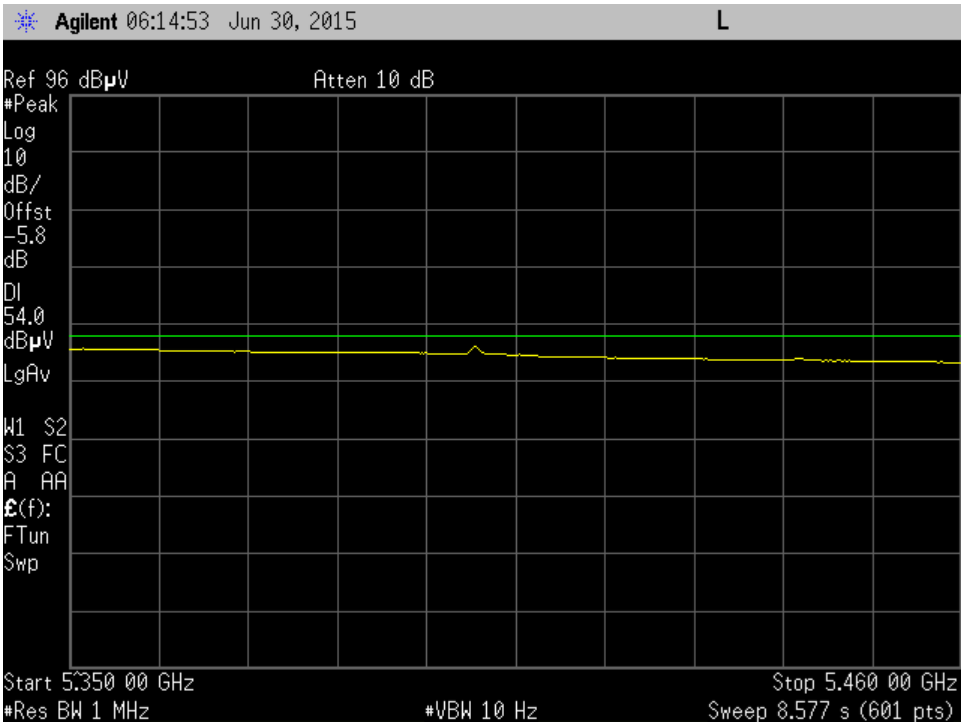
30 MHz high ch 1-40 GHz



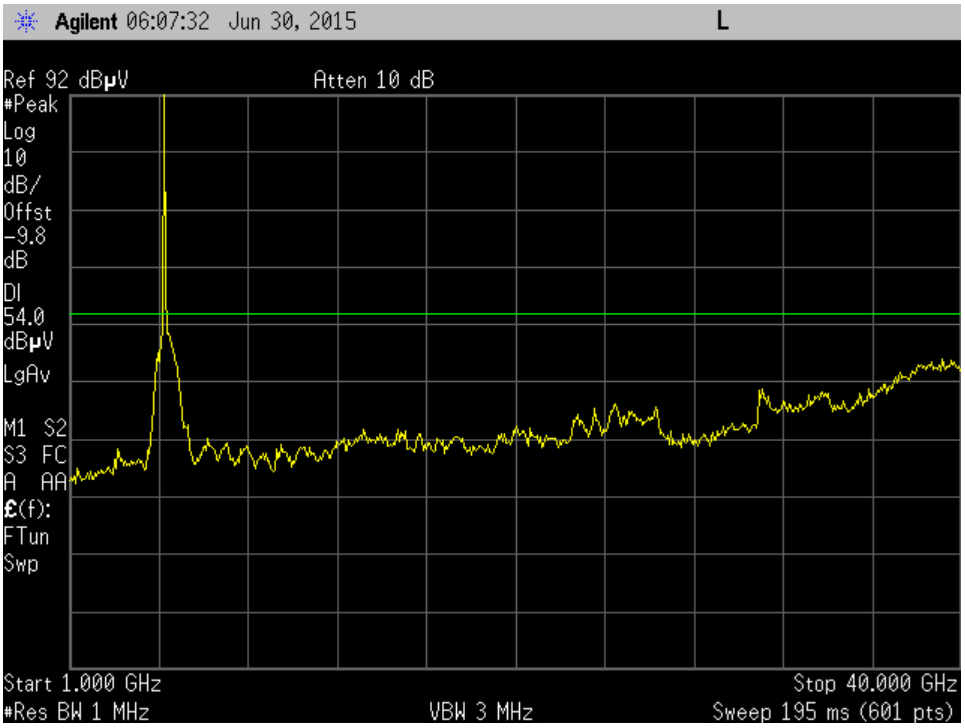
30 MHz high ch 30-1000 MHz



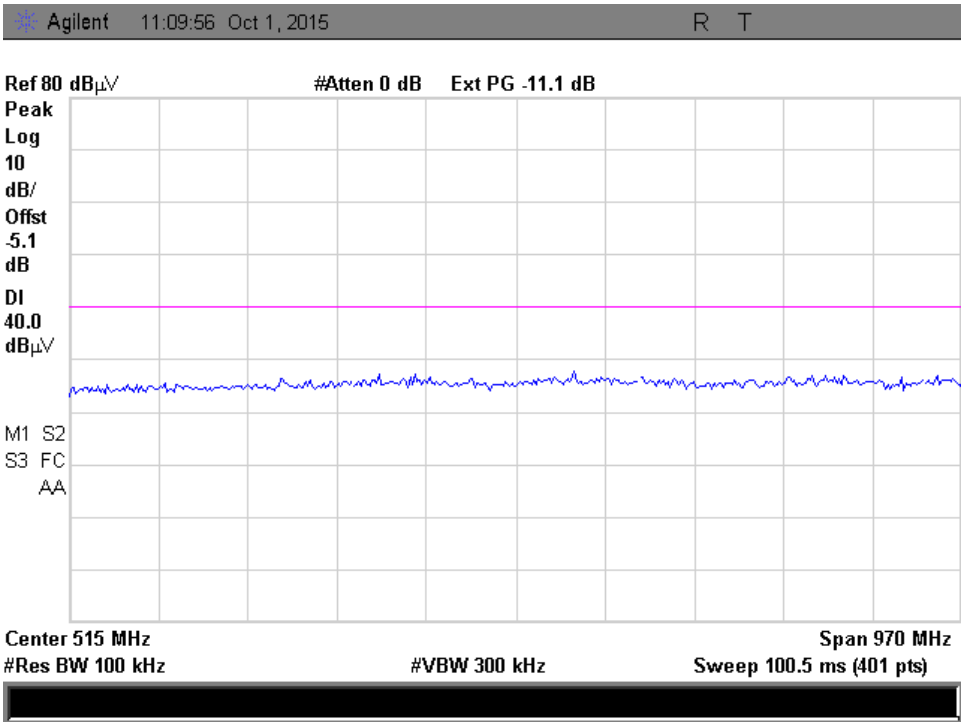
30 MHz high ch 5350-5460



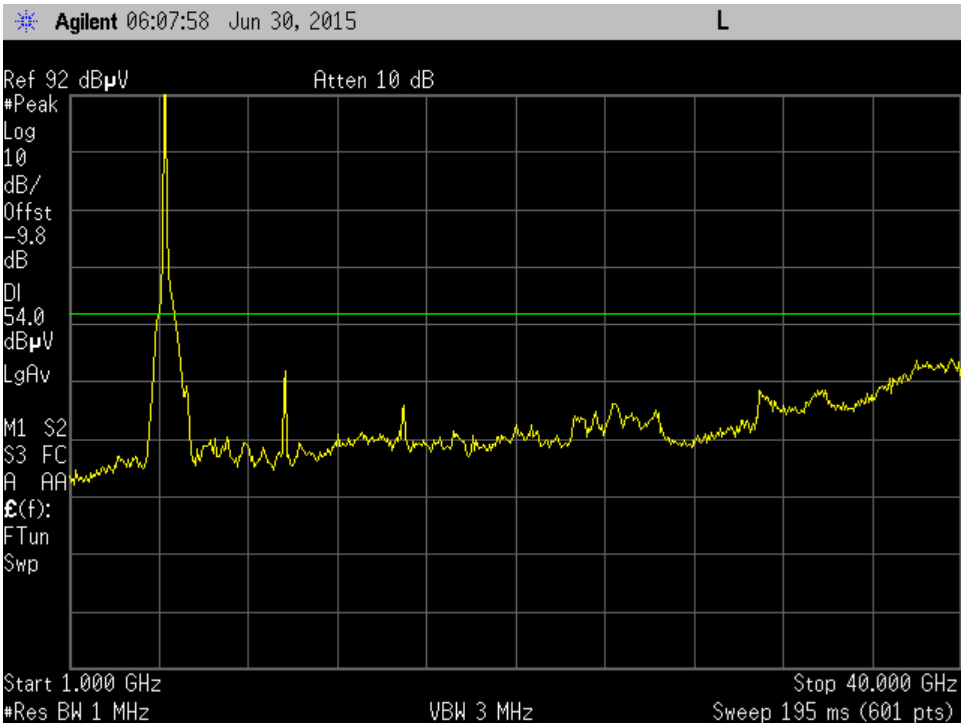
30 MHz low ch 1-40 GHz



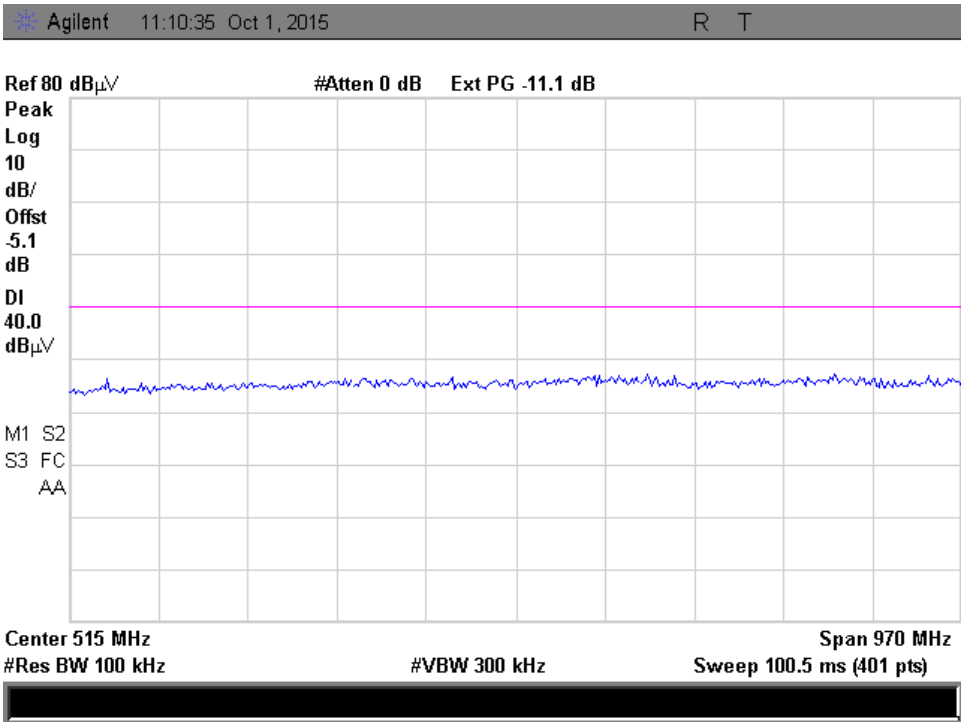
30 MHz low ch 30-1000 MHz



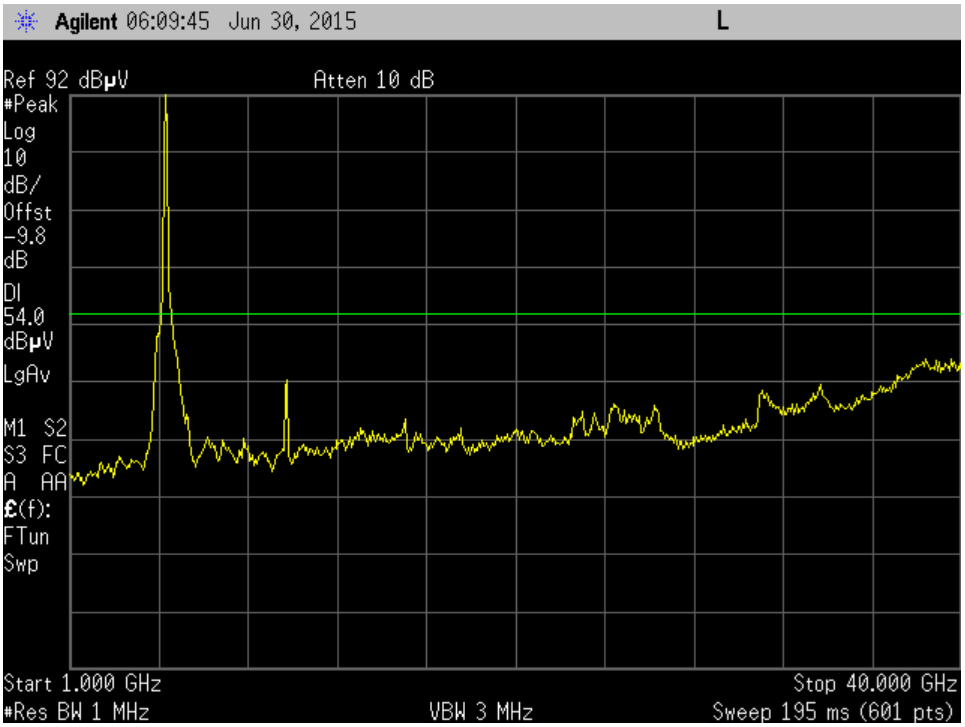
30 MHz mid ch 1-40 GHz



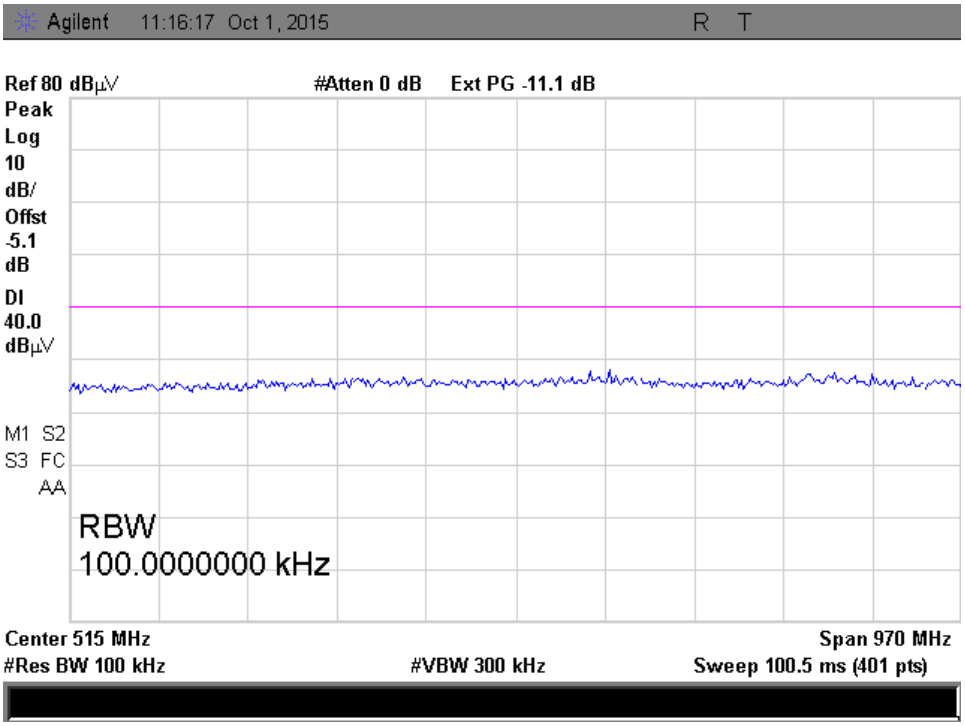
30 MHz mid ch 30-1000 MHz



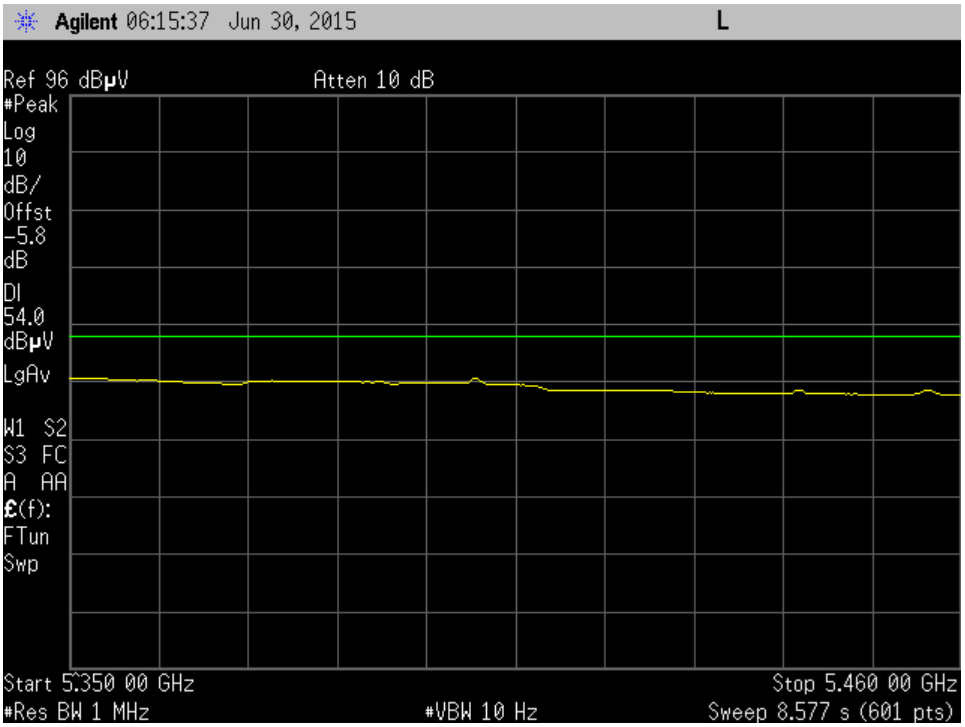
40 MHz high ch 1-40 GHz



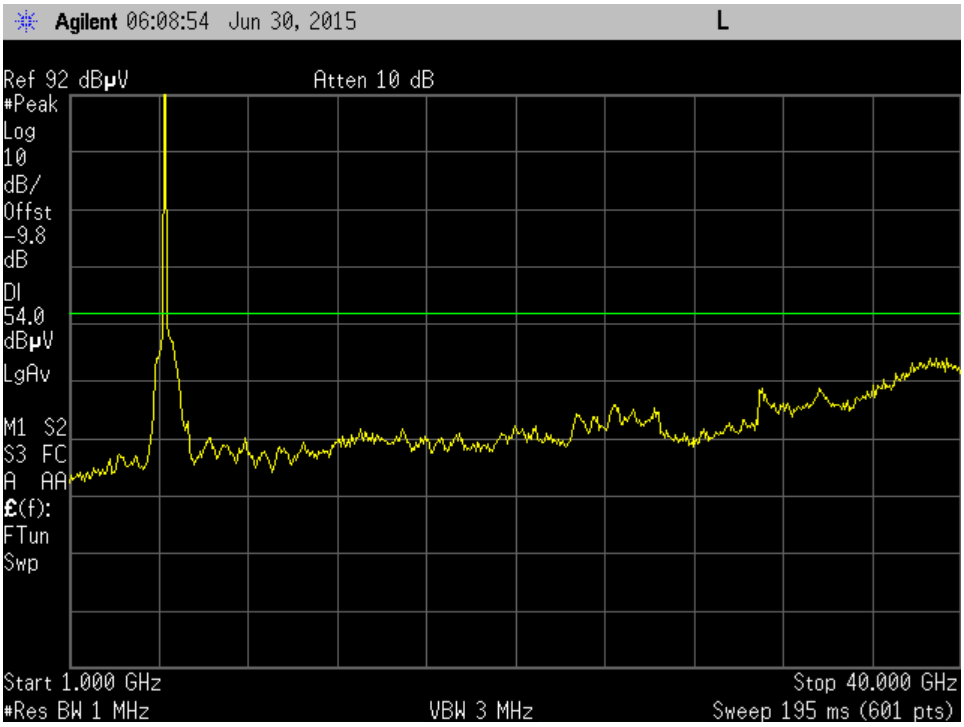
40 MHz high ch 30-1000 MHz



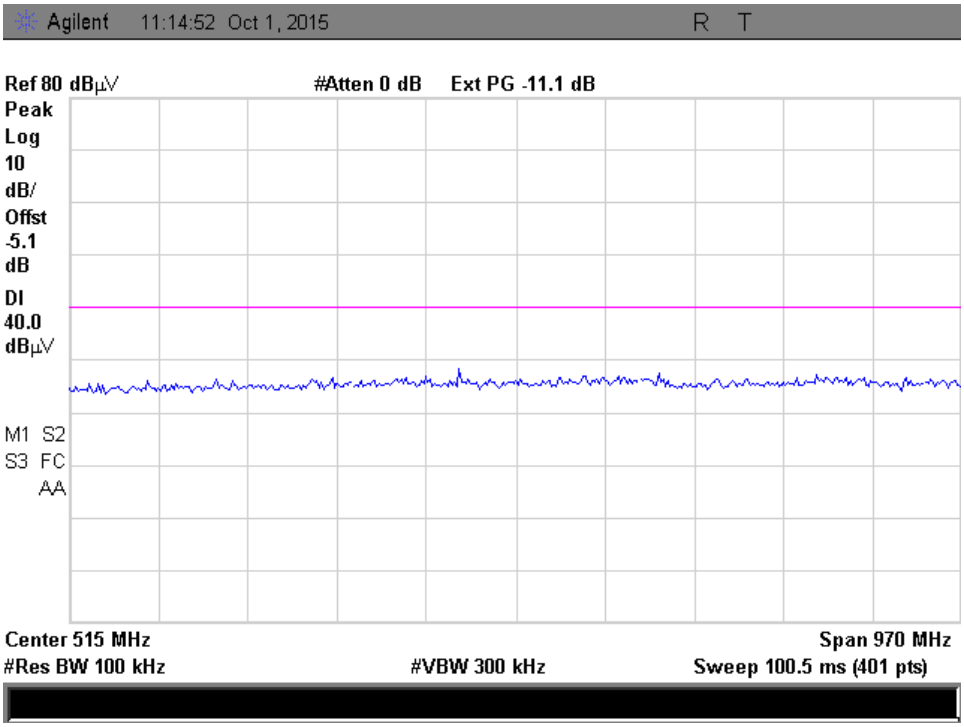
40 MHz high ch 5350-5460



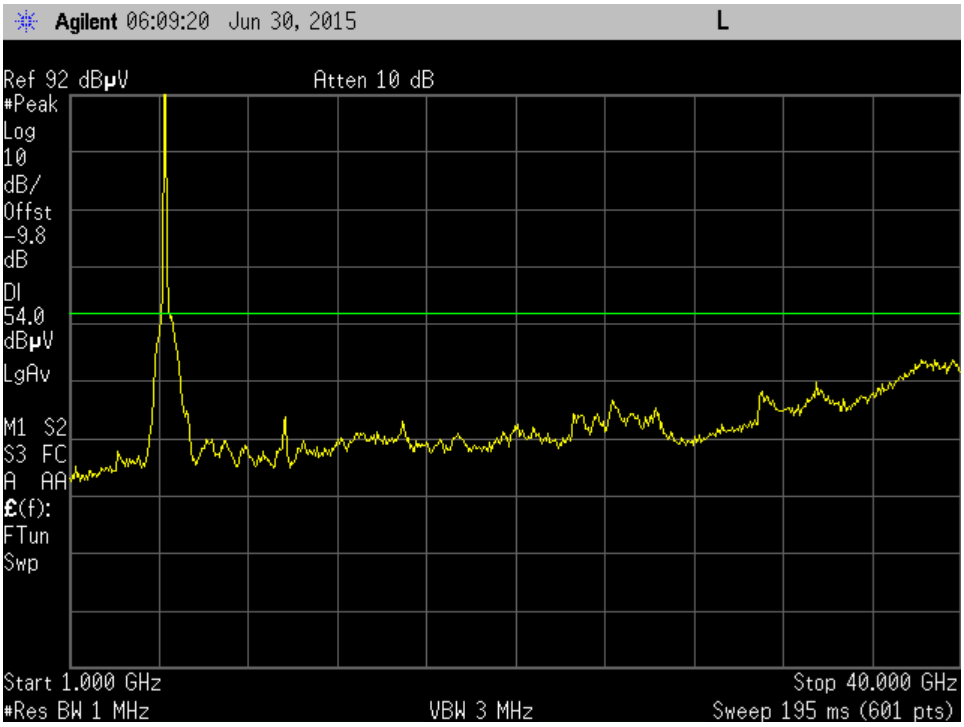
40 MHz low ch 1-40 GHz



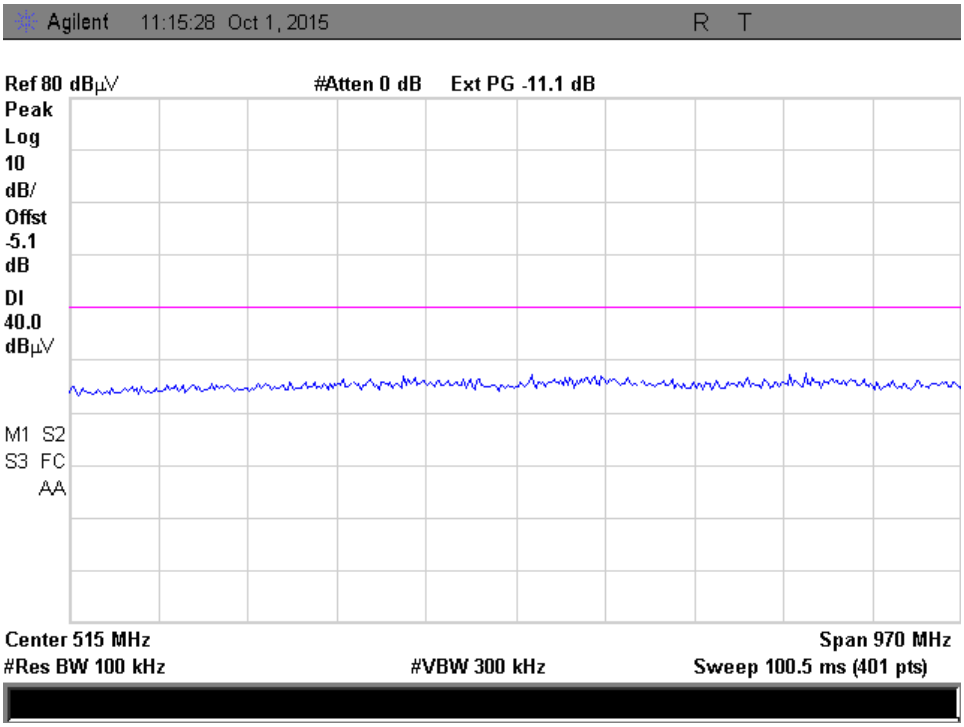
40 MHz low ch 30-1000 MHz



40 MHz mid ch 1-40 GHz



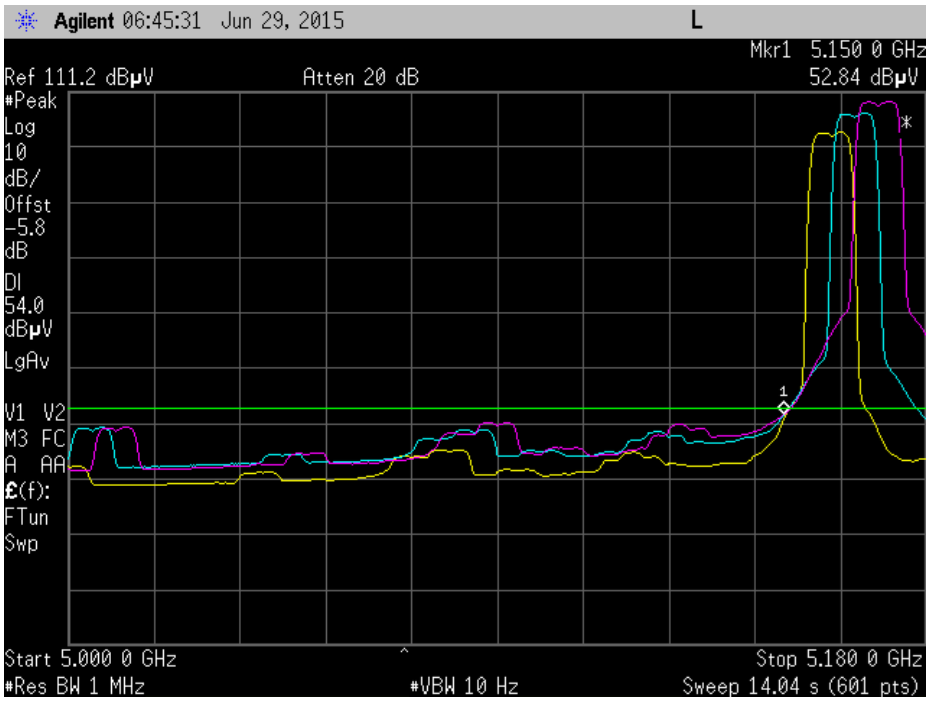
40 MHz mid ch 30-1000 MHz



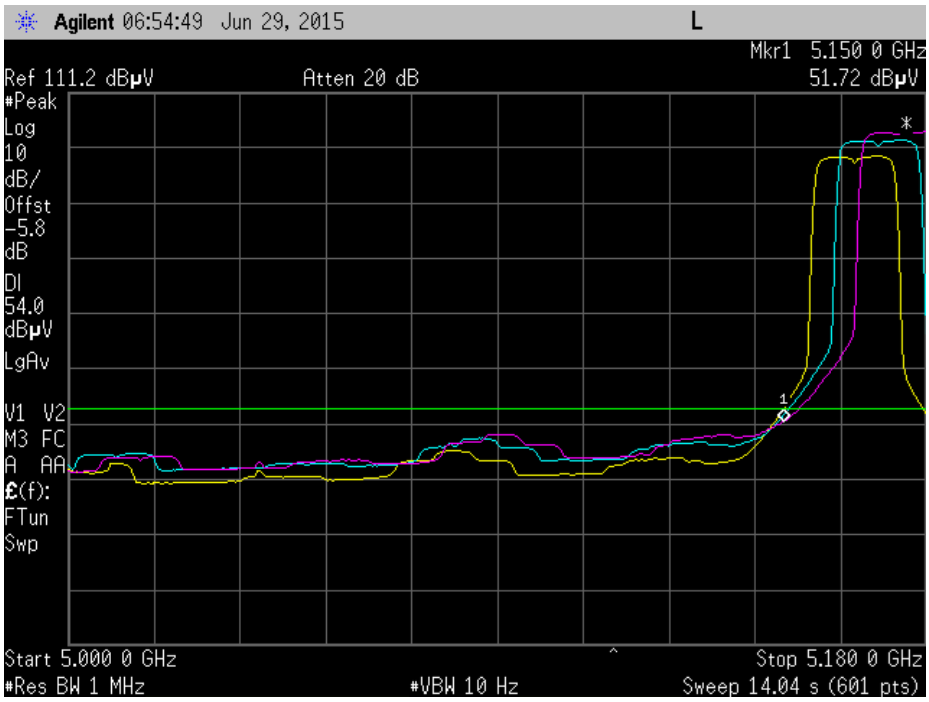
Band Edges

Bandwidth	Frequency	Data Rate	TP	F37 Level	Limit	F37 Margin
MHz	MHz			dBm	dBm/MHz	dB
10	5160	6	10	-40.7	-27	-13.7
10	5165	6	14	-38.1	-27	-11.1
10	5170	6	17	-36.4	-27	-9.4
20	5165	6	8	-36.4	-27	-9.4
20	5170	6	12	-37.7	-27	-10.7
20	5175	6	14	-32.7	-27	-5.7
20	5200	6	20	-37.3	-27	-10.3
30	5170	6	7	-34.1	-27	-7.1
30	5175	6	12	-35.5	-27	-8.5
30	5180	6	15	-29	-27	-2
30	5190	6	17	-28.4	-27	-1.4
30	5200	6	19	-30.4	-27	-3.4
40	5175	f0	7	-33.9	-27	-6.9
40	5180	f0	9	-37.7	-27	-10.7
40	5185	f0	11	-38.1	-27	-11.1
40	5190	f0	12	-37.3	-27	-10.3
40	5200	f0	14	-34.7	-27	-7.7

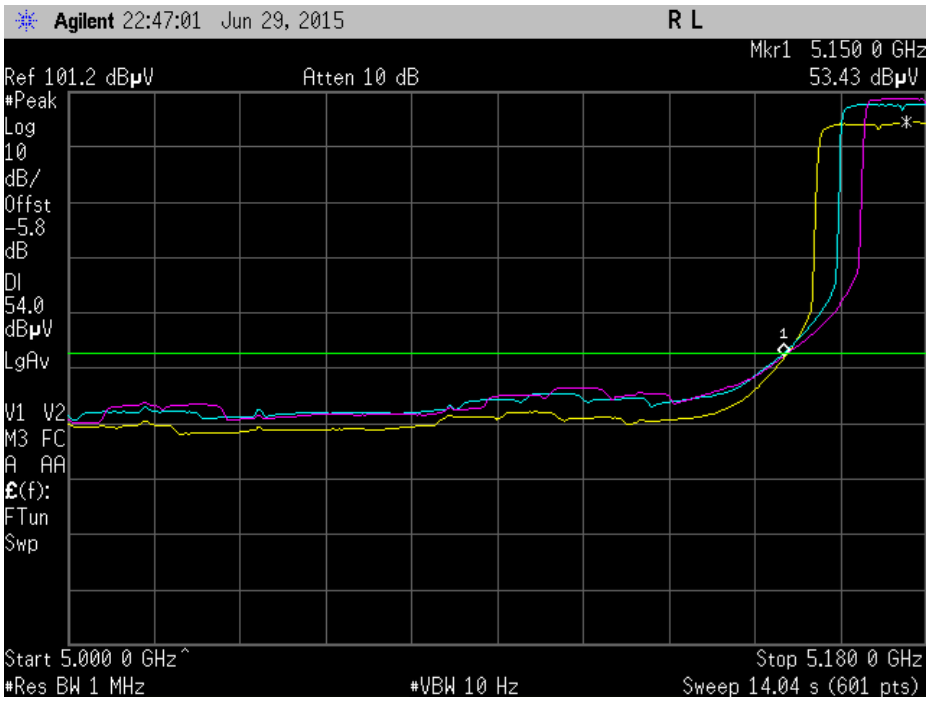
10 MHz Low Side



20 MHz Low Side



3- MHz Low Side



40 MHz Low Side