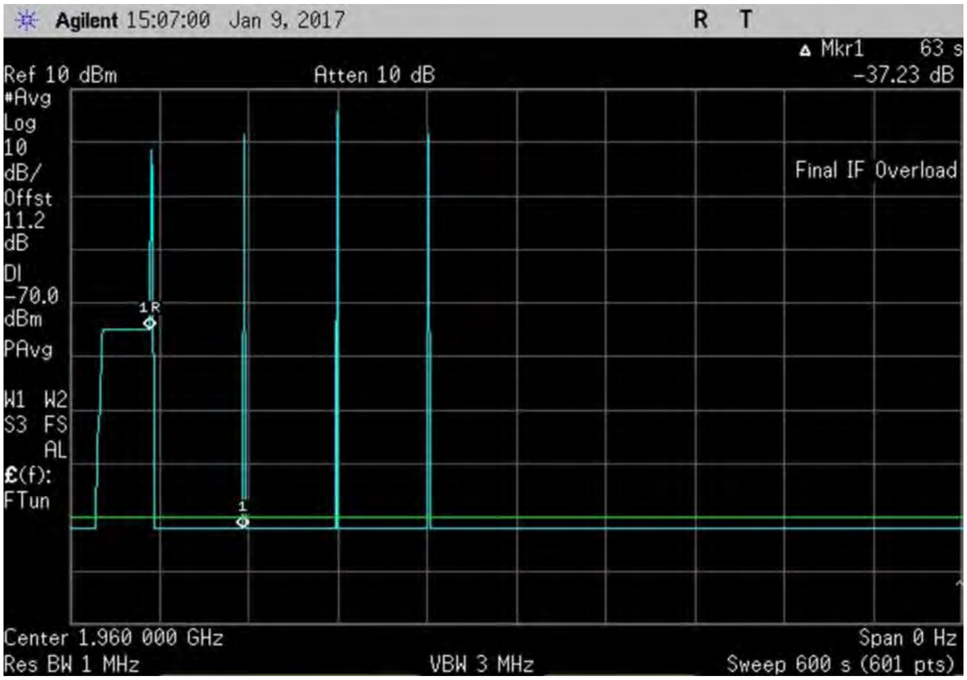
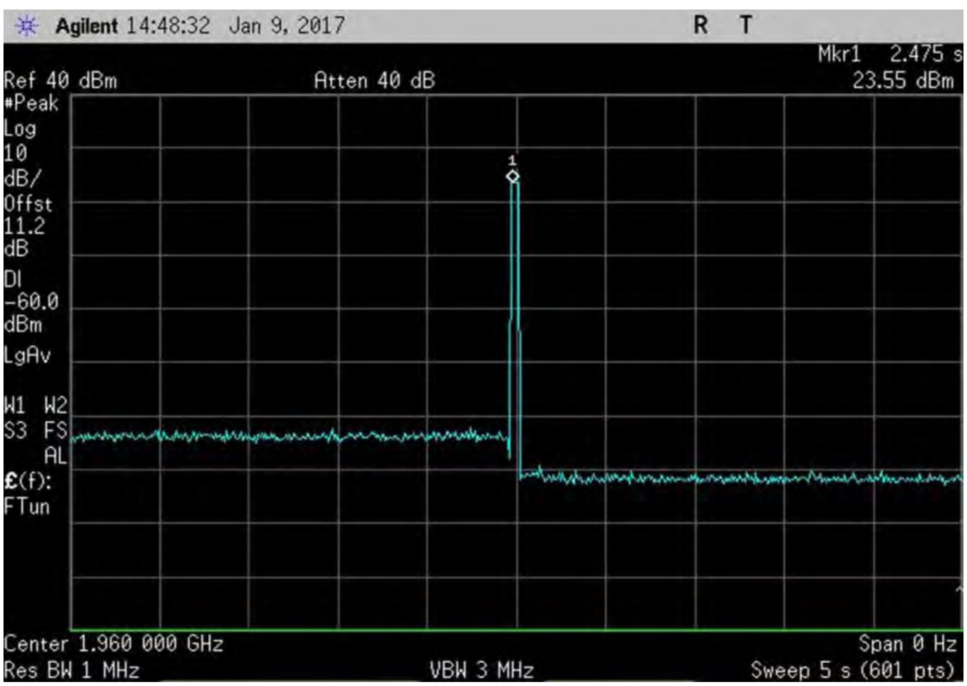
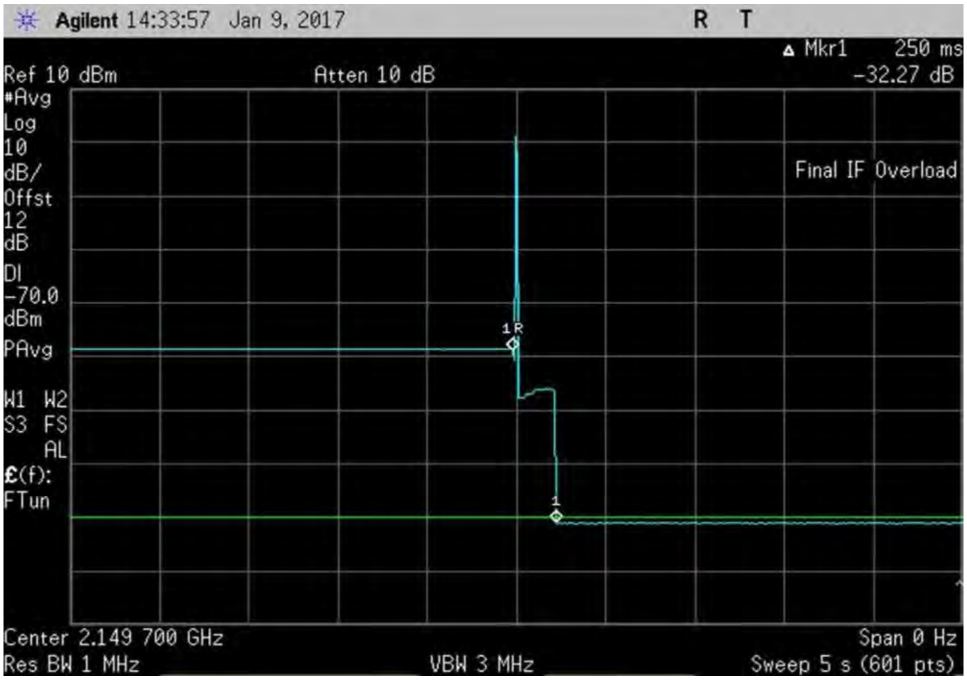


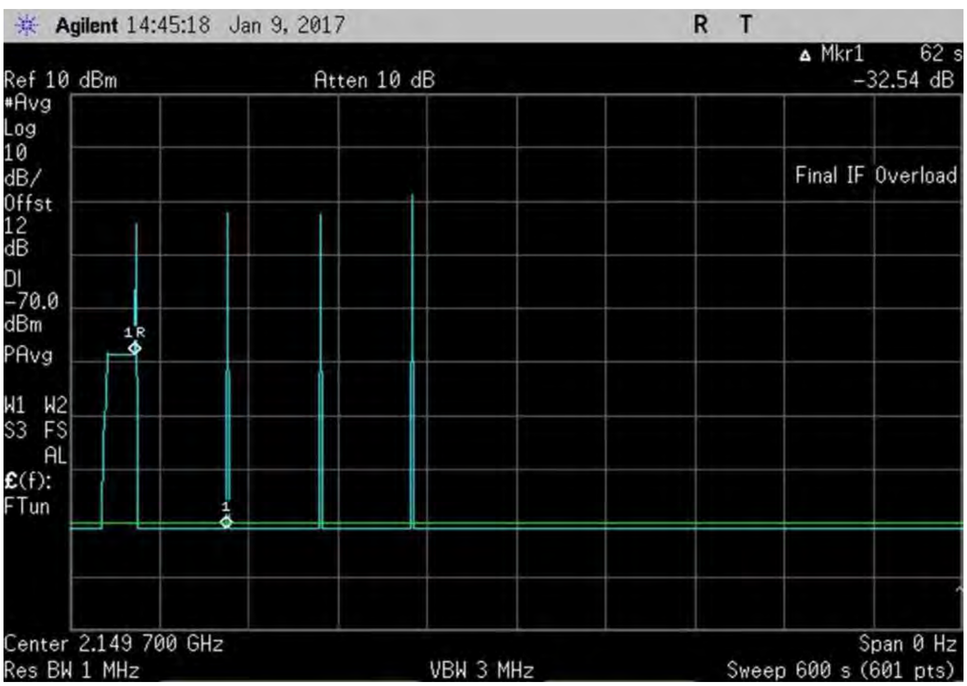
7.11.2_osc_DL_1930-1995MHz600sec



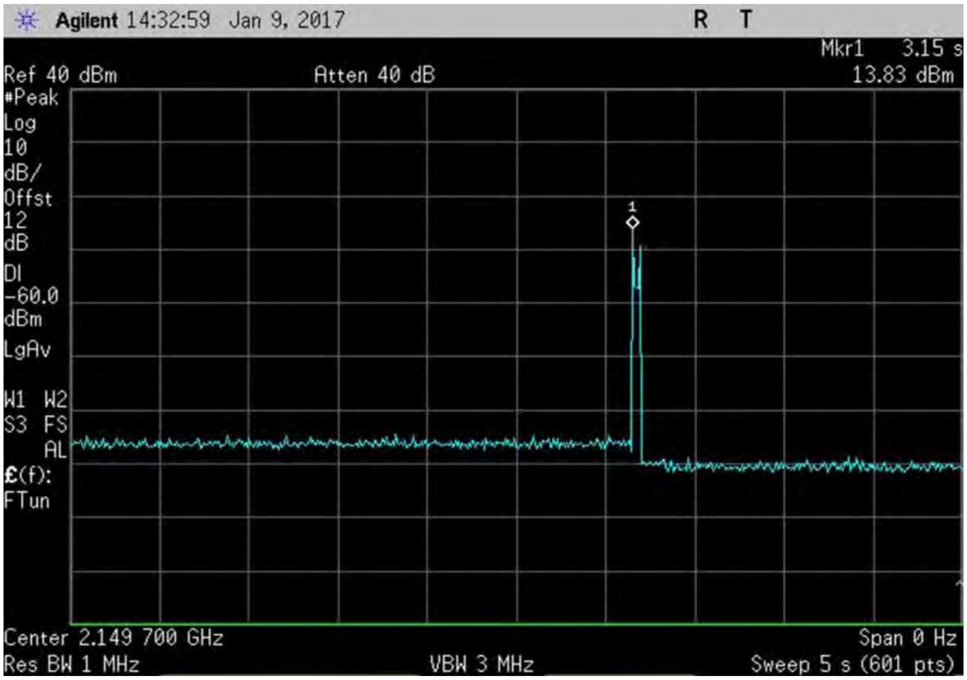
7.11.2_osc_DL_1930-1995MHzPk



7.11.2_osc_DL_2110-2155MHz



7.11.2_osc_DL_2110-2155MHz600sec



7.11.2_osc_DL_2110-2155MHzPk

7.11.3 Measuring Oscillation Mitigation or Shutdown

Summary of Results

7.11.3 Test procedure for measuring oscillation mitigation or shutdown

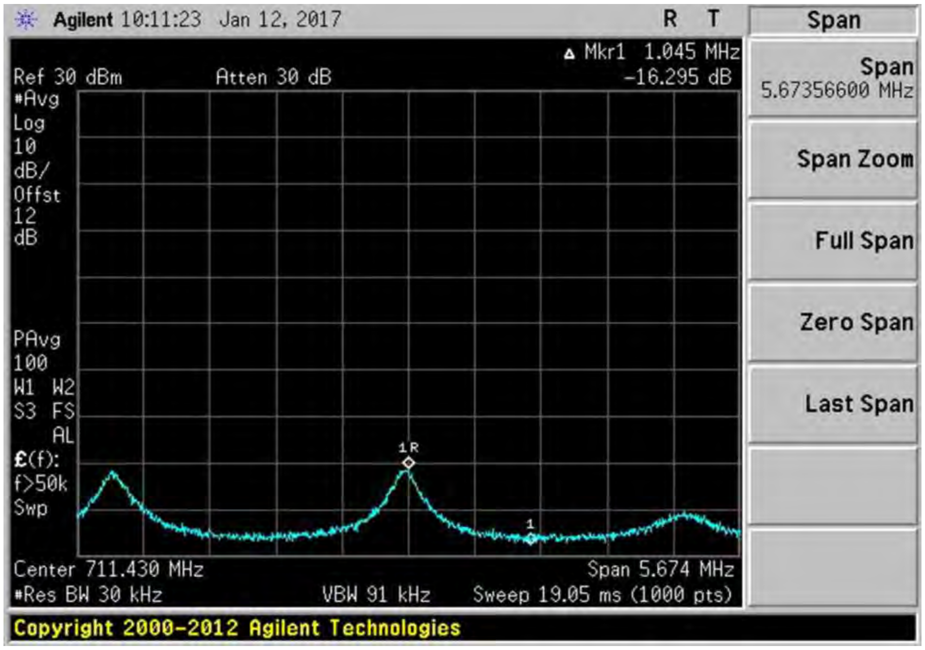
	UL 1710-1755	UL1850-1915	UL 824-894	UL 698-716	UL 776-787	
Max Gain Isolation	Pk-Pk Difference	Pk-Pk Difference	Pk-Pk Difference	Pk-Pk Difference	Pk-Pk Difference	Limit
dB	dB	dB	dB	dB	dB	dB
+5dB	10.4	10.3	7.0	8.1	9.2	12.0
+4dB	11.8	11.6	8.4	9.1	9.8	12.0
+3dB	(13.7)*	(12.1)*	8.9	10.2	11.0	12.0
+2dB	(15.6)*	(14.6)*	10.1	11.6	(12.5)*	12.0
+1dB	(19.1)*	(16.8)*	11.6	(13.2)*	(14.3)*	12.0
0dB	(24.3)*	(20.8)*	(13.8)*	(16.3)*	(16.9)*	12.0
-1dB	(67.6)*	(27.4)*	(17.3)*	(24)*	(20.3)*	12.0
-2dB	**	(62.7)*	(24.5)*	**	(27.6)*	12.0
-3dB	**	**	**	**	(69.4)*	12.0
-4dB	**	**	**	**	**	12.0
-5dB	**	**	**	**	**	12.0

	DL 2110-2155	DL 1930-1995	DL 869-894	DL 728-746	DL 746-775	
Max Gain Isolation	Pk-Pk Difference	Pk-Pk Difference	Pk-Pk Difference	Pk-Pk Difference	Pk-Pk Difference	Limit
dB	dB	dB	dB	dB	dB	dB
+5dB	9.2	10.7	8.2	11.0	10.7	12.0
+4dB	9.9	10.8	9.8	(12)*	11.3	12.0
+3dB	11.3	(12.1)*	11.0	(13.7)*	(12.3)*	12.0
+2dB	(12.9)*	(14.2)*	(13.4)*	(16.1)*	(13.3)*	12.0
+1dB	(14.6)*	(16.3)*	(16)*	(18.5)*	(14.3)*	12.0
0dB	(17.3)*	(20.6)*	(20.4)*	(22.1)*	(15)*	12.0
-1dB	(21.1)*	(26.9)*	(29.6)*	(32.2)*	(17.6)*	12.0
-2dB	(27.4)*	(61.3)*	**	**	(20.8)*	12.0
-3dB	(52.7)*	**	**	**	(25.9)*	12.0
-4dB	**	**	**	**	(38.7)*	12.0
-5dB	**	**	**	**	**	12.0

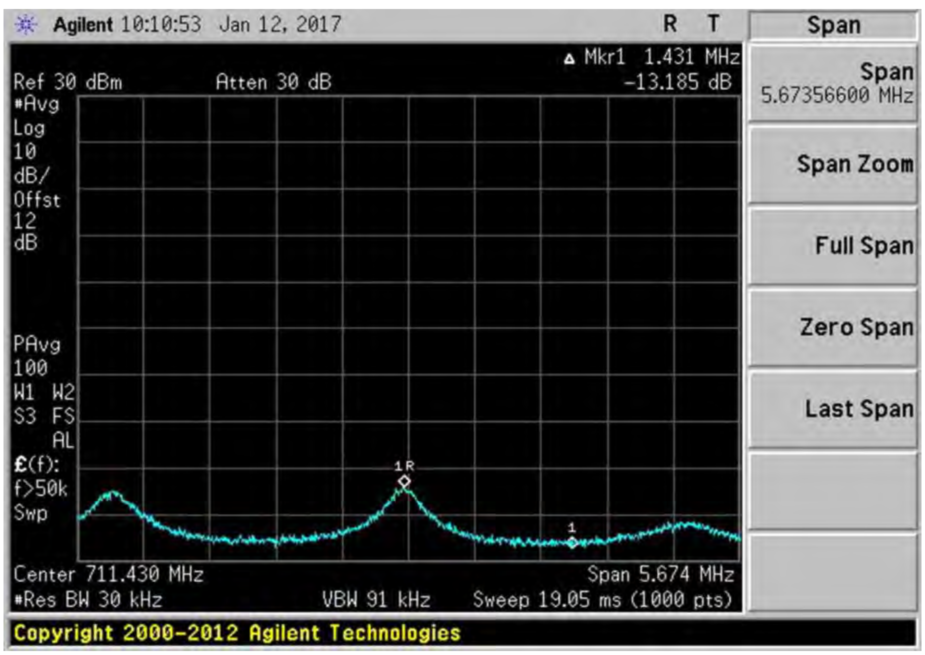
Note: * The measured difference exceeds the limit for a period of less than 300 second before device mitigates and shuts down. The maximum recorded time prior to shutdown was 108 seconds for the Uplink bands and 106 seconds for the Downlink bands.

** The device shuts down immediately.

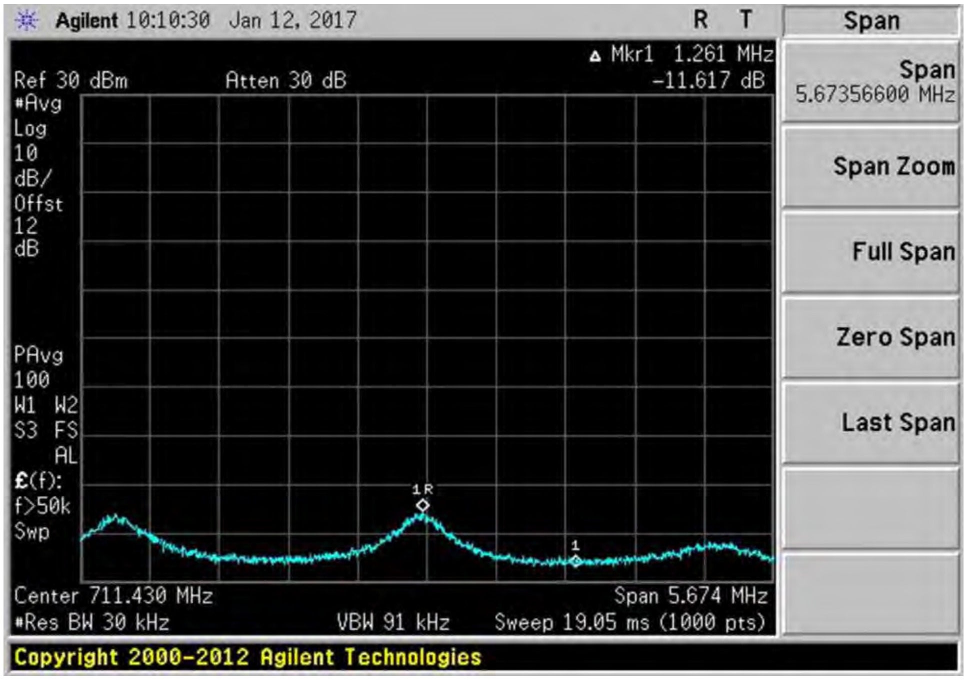
Plots



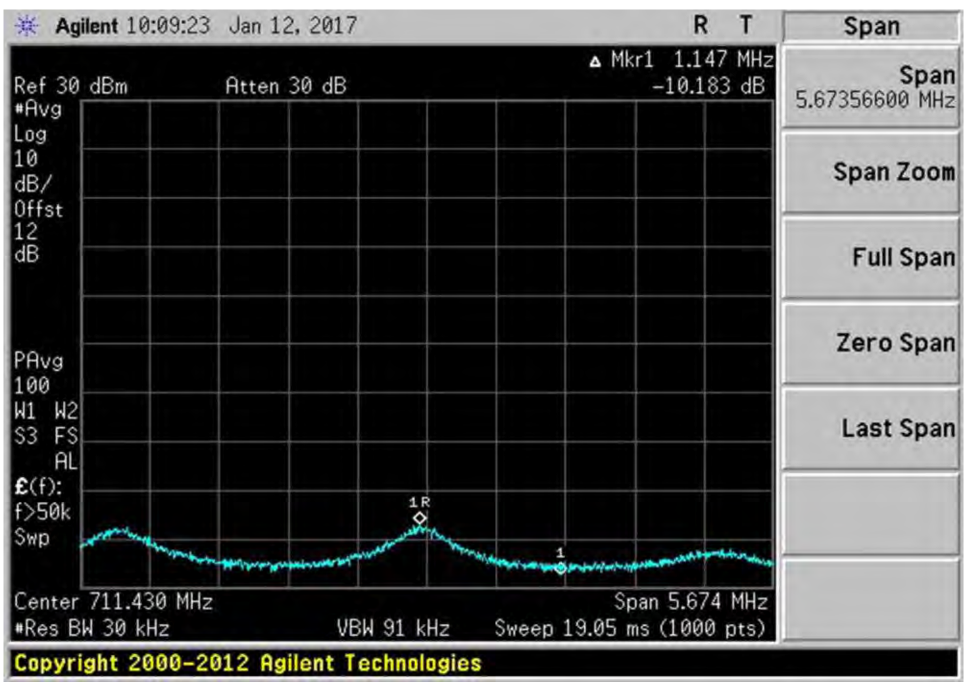
7.11.3_Osc_UL_698-716MHz+0_AWGNL



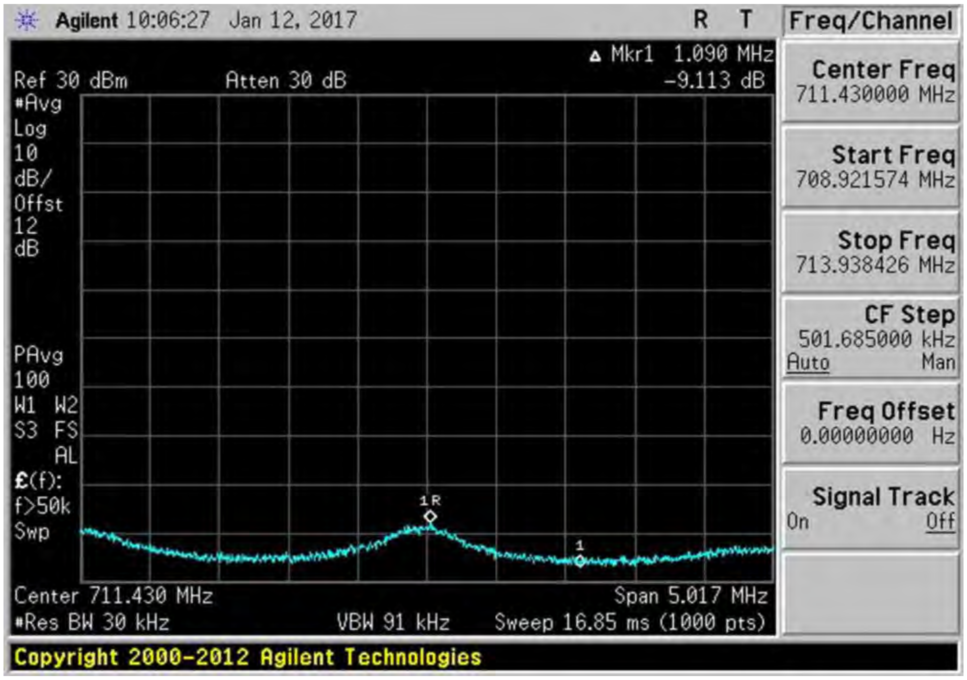
7.11.3_Osc_UL_698-716MHz+1_AWGNL



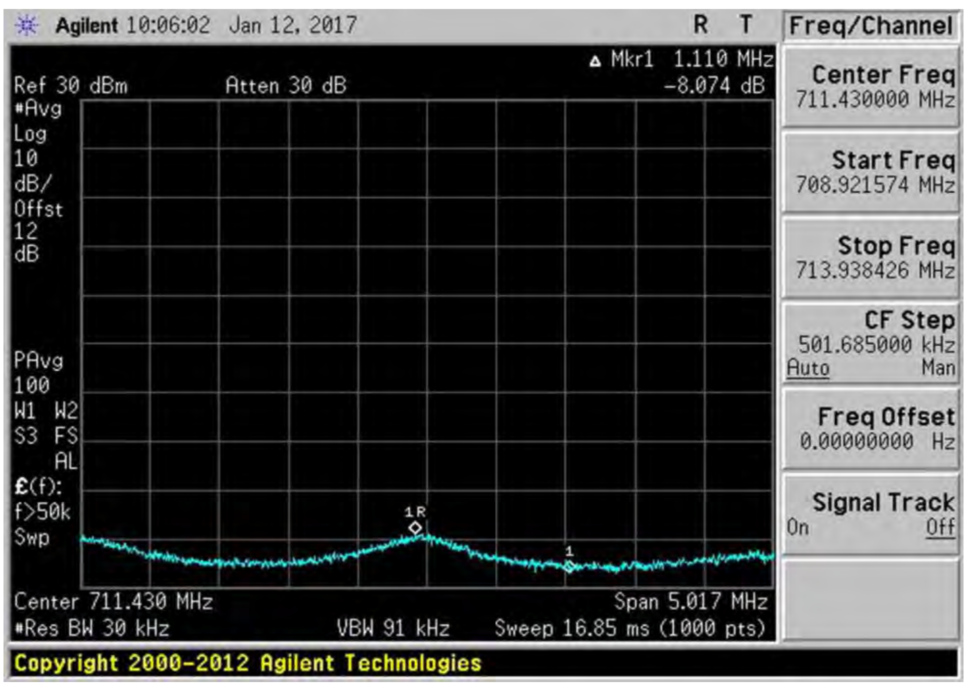
7.11.3_Osc_UL_698-716MHz+2_AWGNL



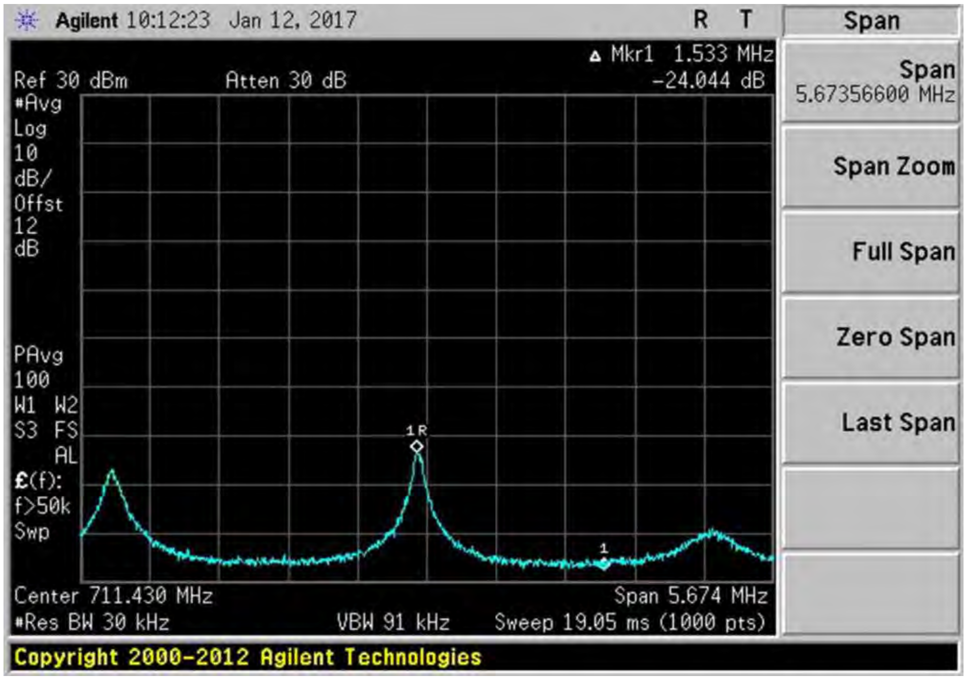
7.11.3_Osc_UL_698-716MHz+3_AWGNL



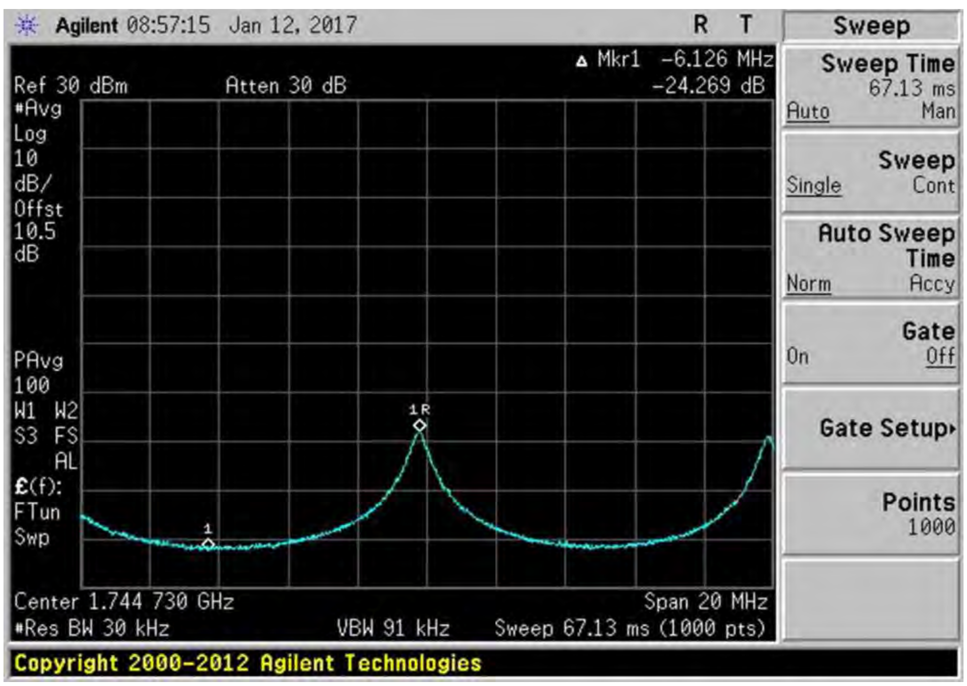
7.11.3_Osc_UL_698-716MHz+4_AWGNL



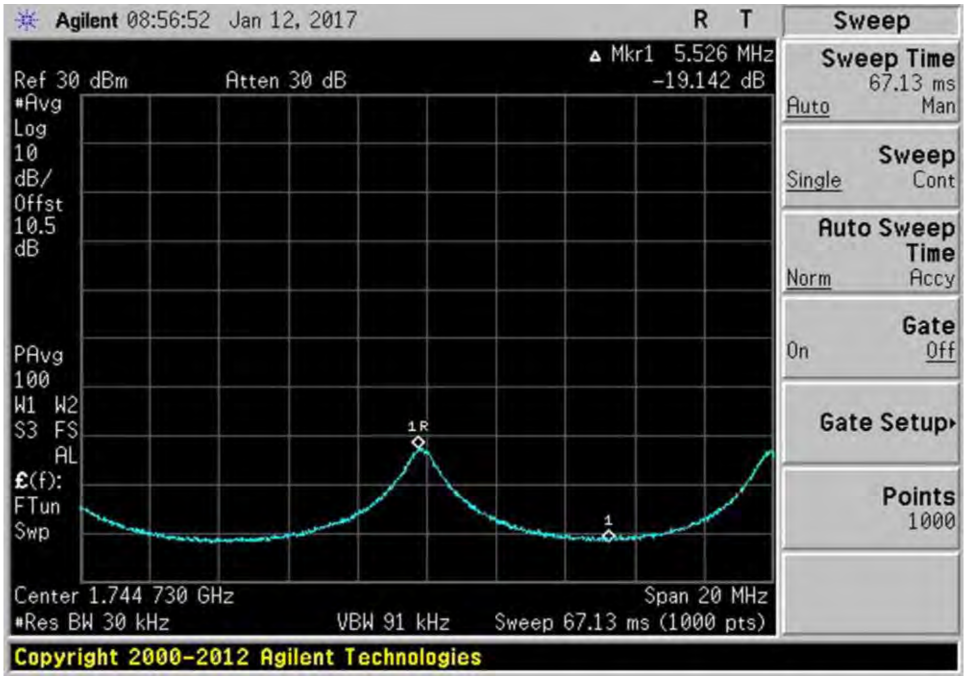
7.11.3_Osc_UL_698-716MHz+5_AWGNL



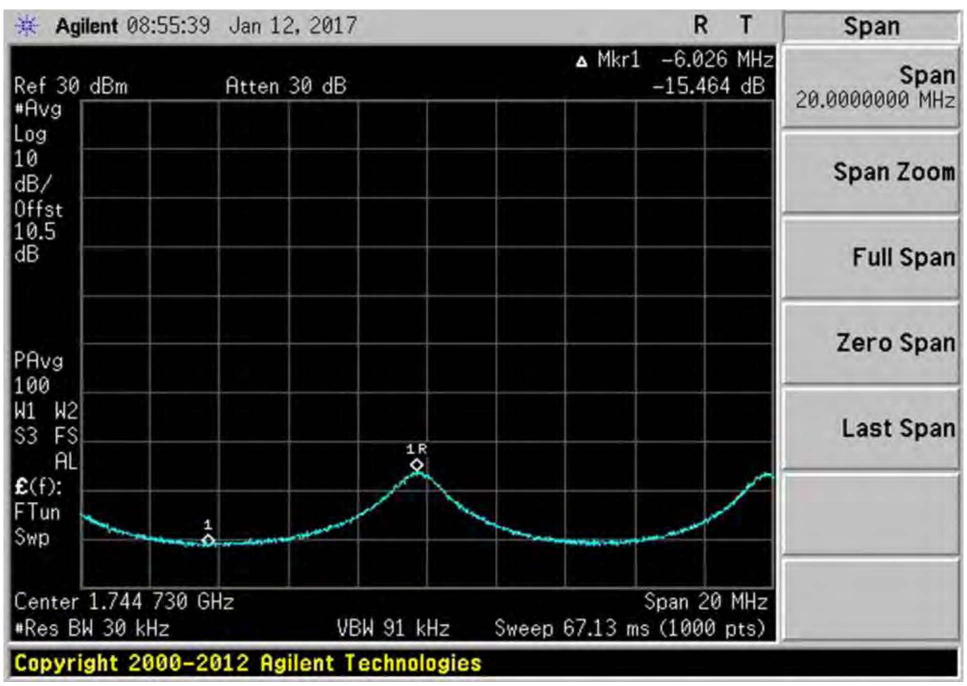
7.11.3_Osc_UL_698-716MHz-1_AWGNL



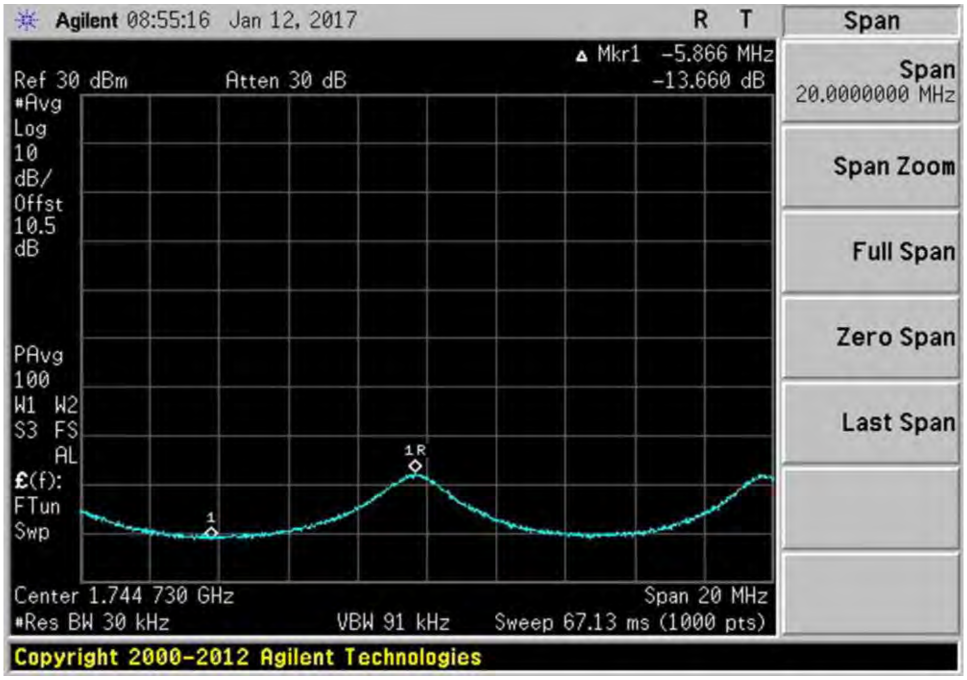
7.11.3_Osc_UL_1710-1755MHz+0_AWGNL



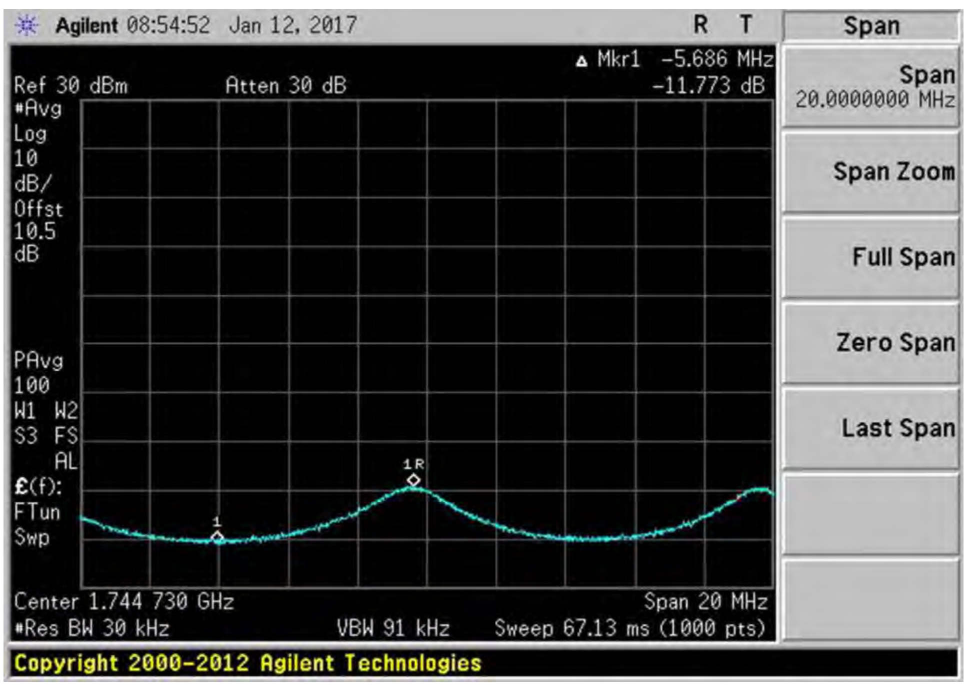
7.11.3_Osc_UL_1710-1755MHz+1_AWGNL



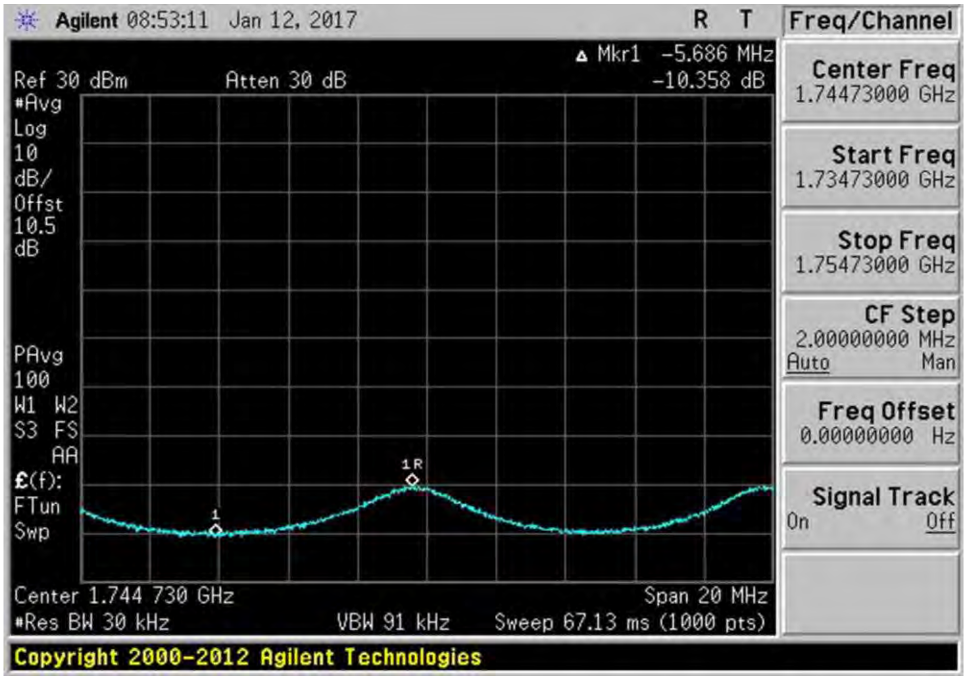
7.11.3_Osc_UL_1710-1755MHz+2_AWGNL



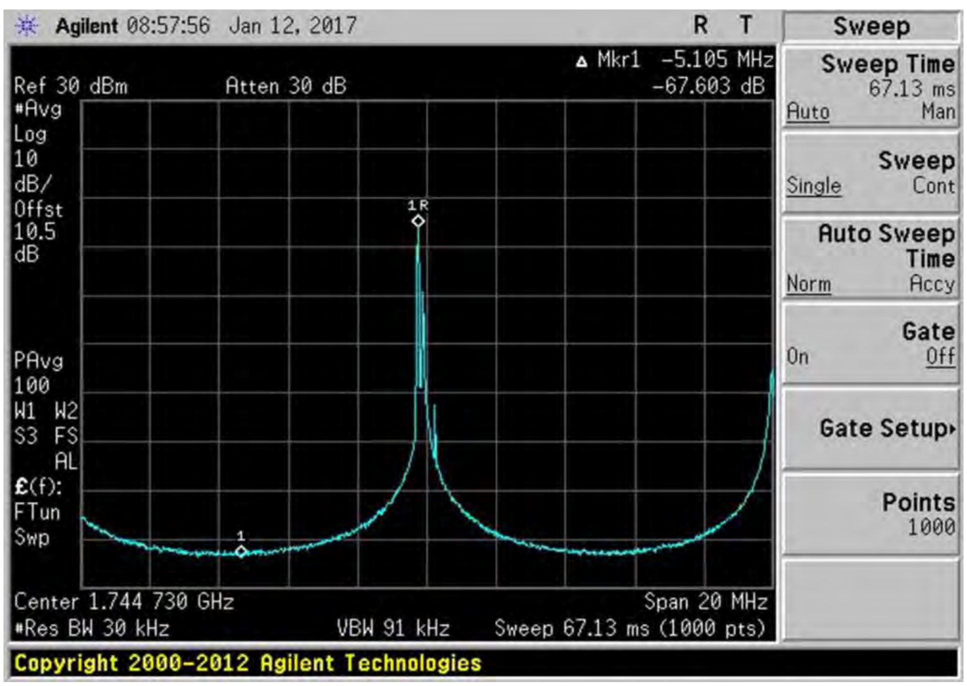
7.11.3_Osc_UL_1710-1755MHz+3_AWGNL



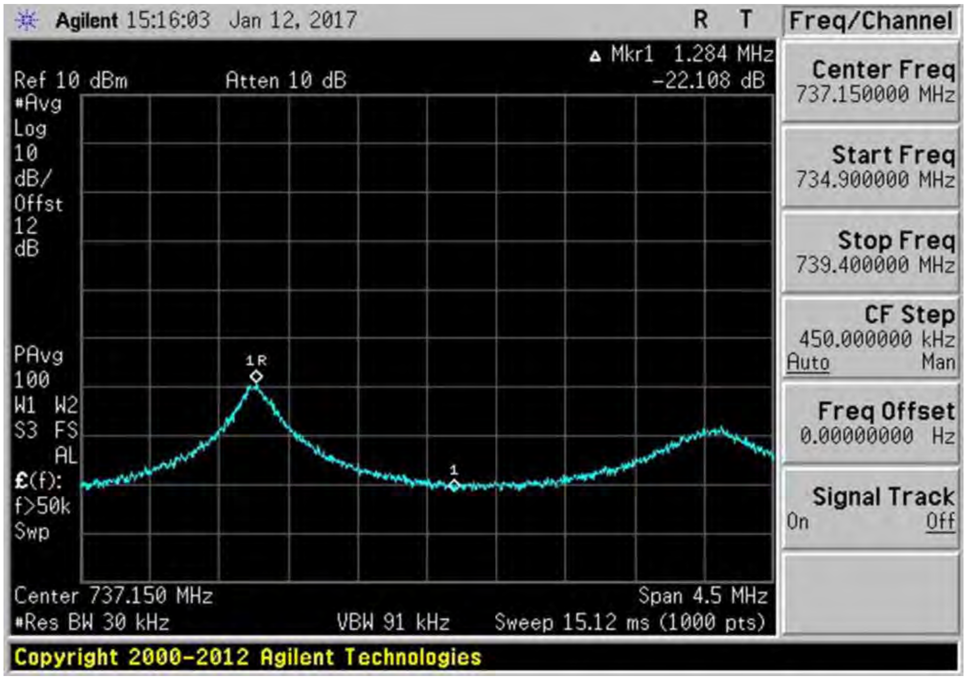
7.11.3_Osc_UL_1710-1755MHz+4_AWGNL



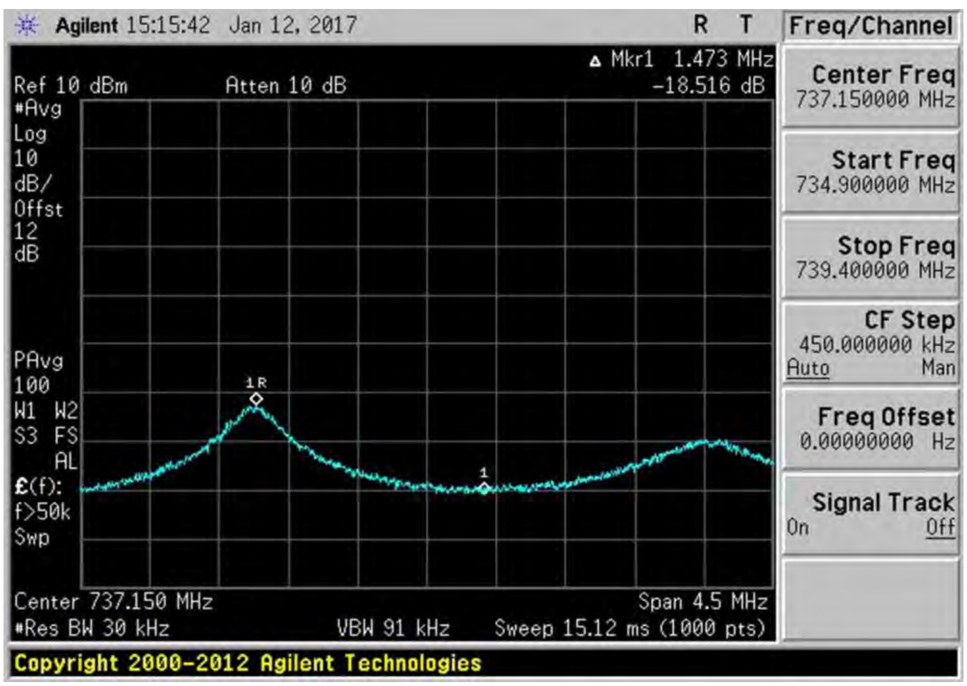
7.11.3_Osc_UL_1710-1755MHz+5_AWGNL



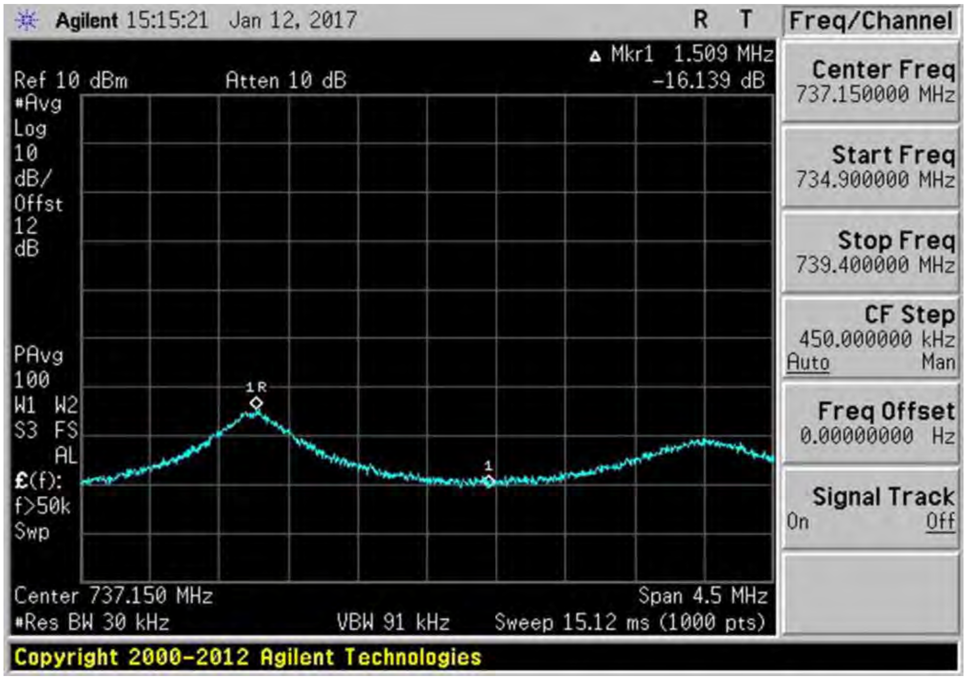
7.11.3_Osc_UL_1710-1755MHz-1_AWGNL



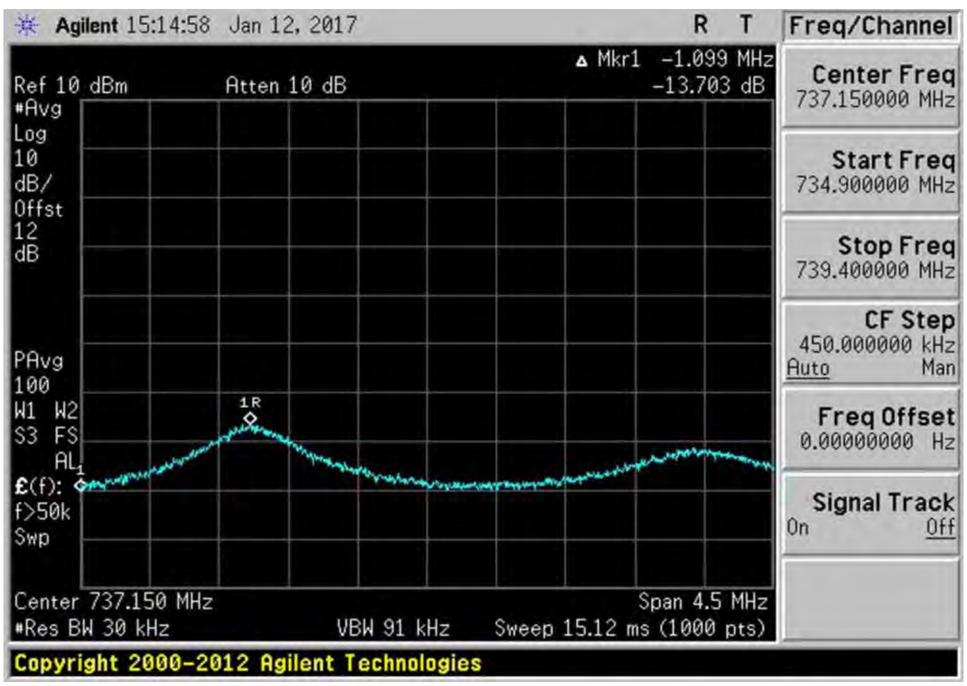
7.11.3_Osc_DL_728-746MHz+0_AWGNL



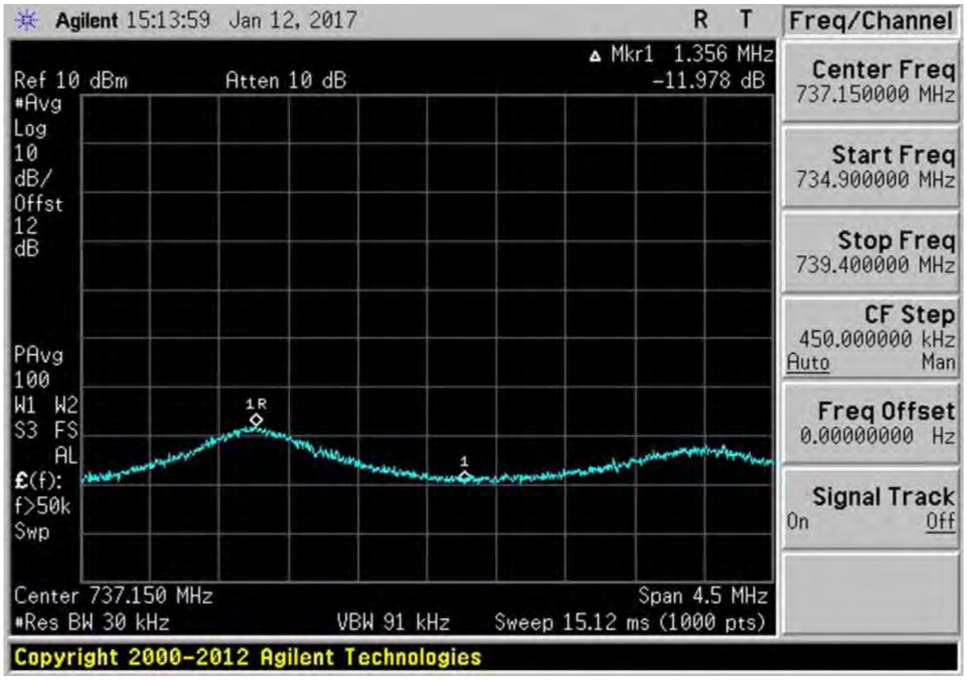
7.11.3_Osc_DL_728-746MHz+1_AWGNL



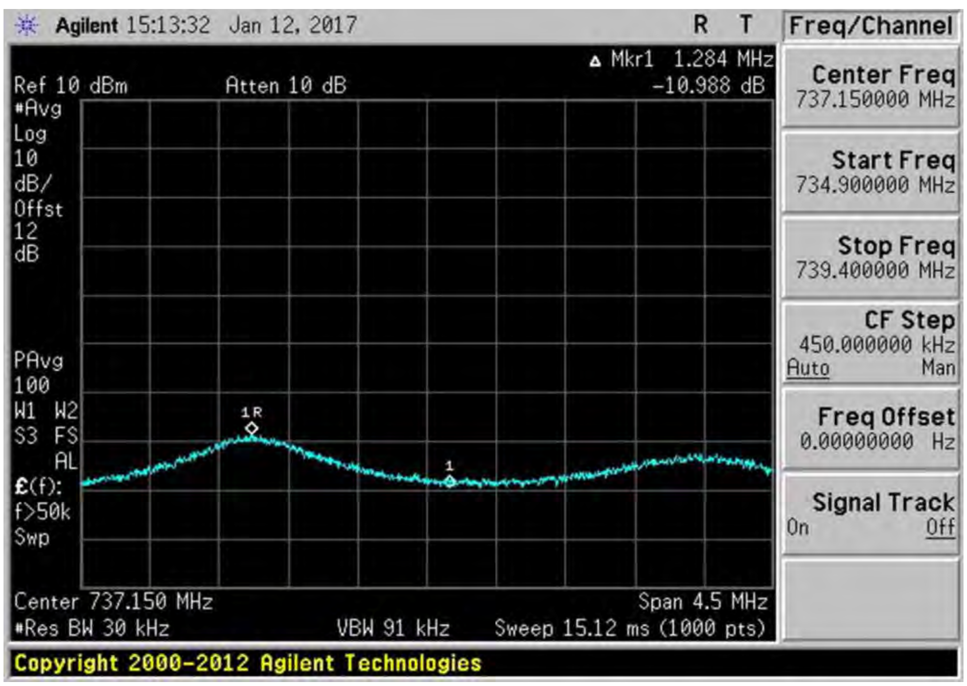
7.11.3_Osc_DL_728-746MHz+2_AWGNL



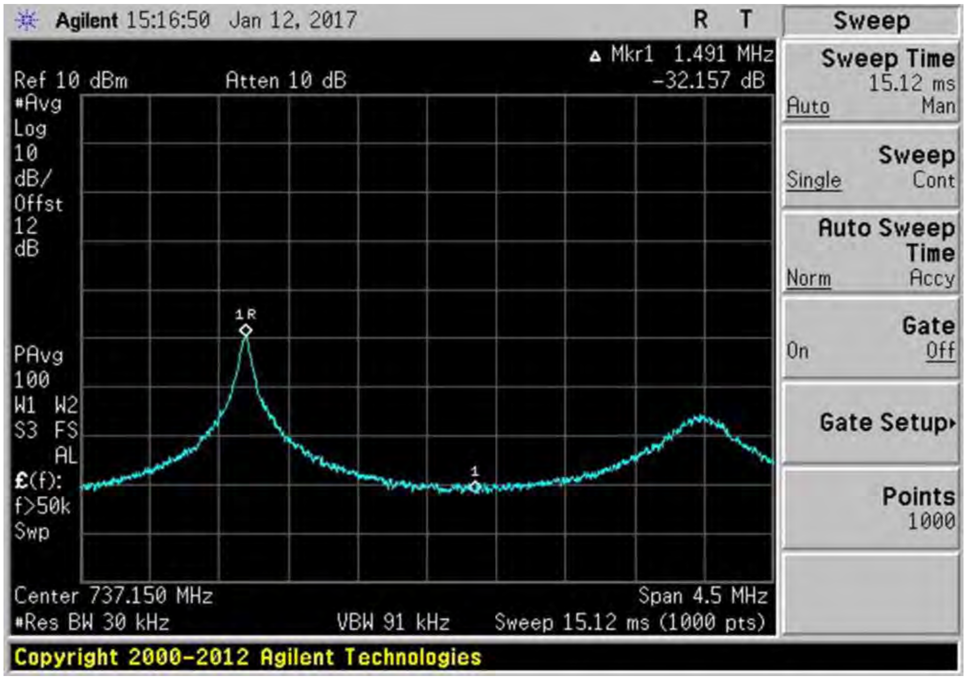
7.11.3_Osc_DL_728-746MHz+3_AWGNL



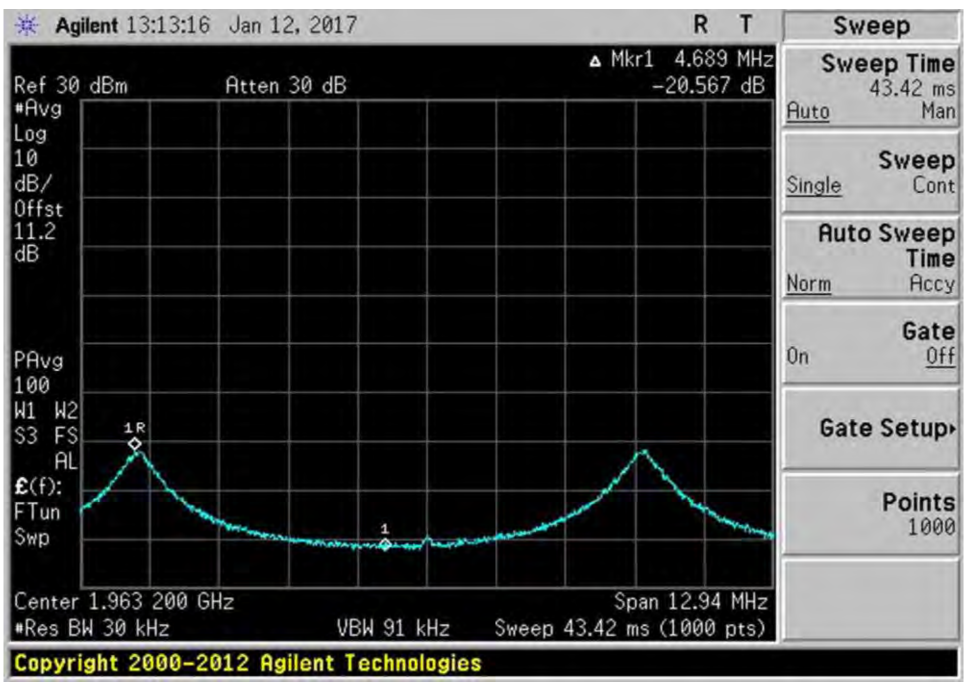
7.11.3_Osc_DL_728-746MHz+4_AWGNL



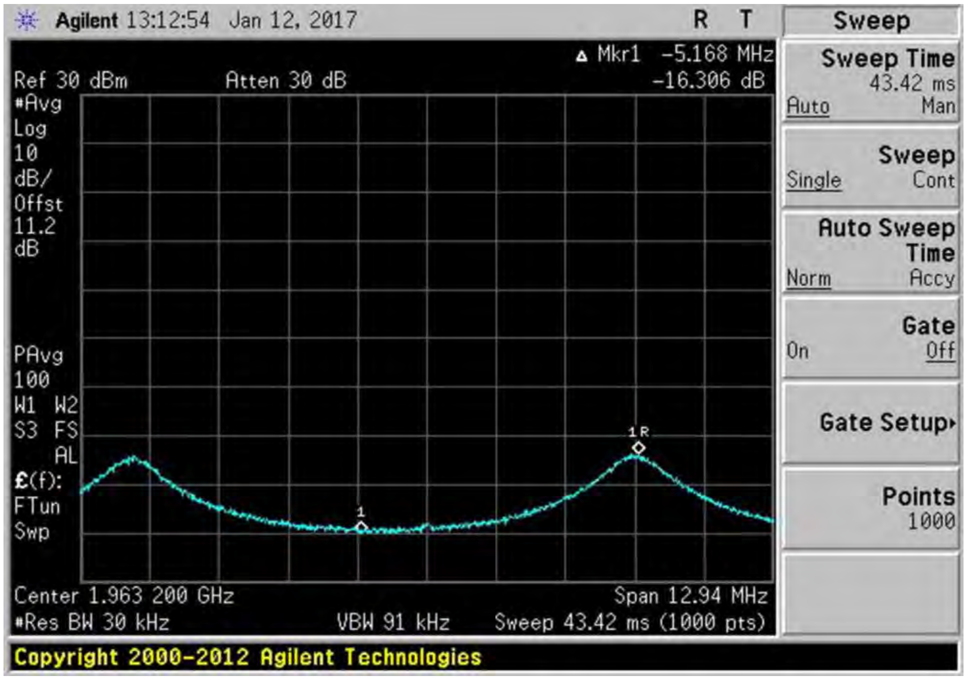
7.11.3_Osc_DL_728-746MHz+5_AWGNL



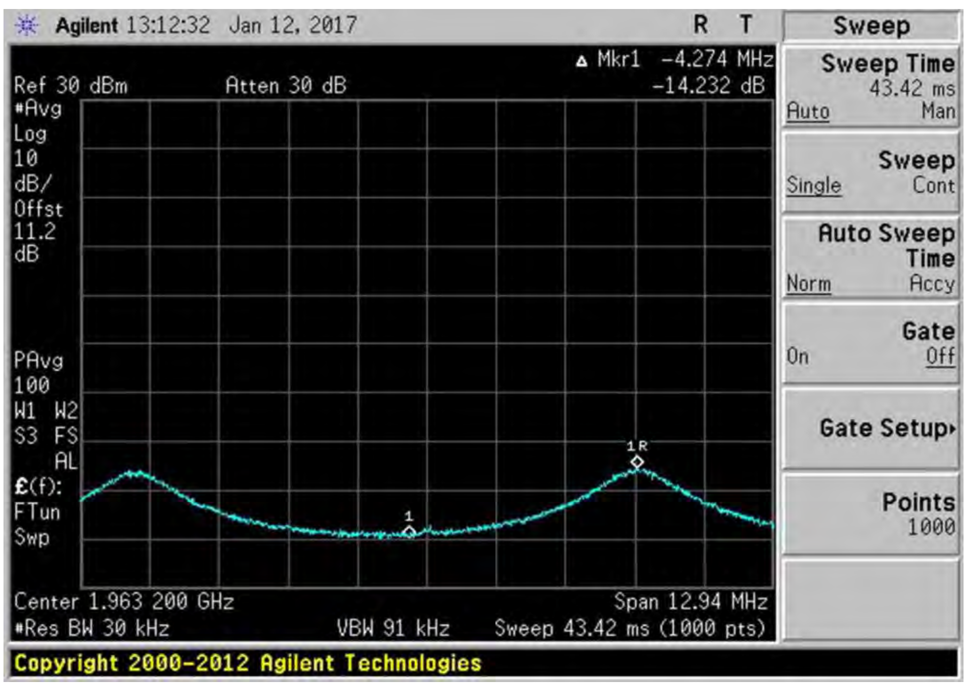
7.11.3_Osc_DL_728-746MHz-1_AWGNL



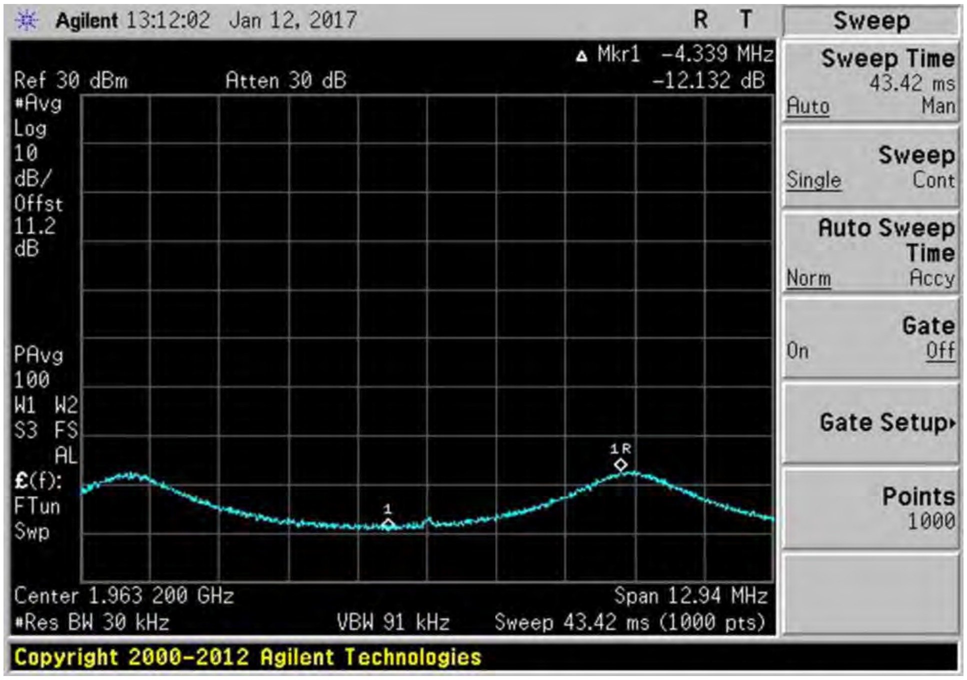
7.11.3_Osc_DL_1930-1995MHz+0_AWGNL



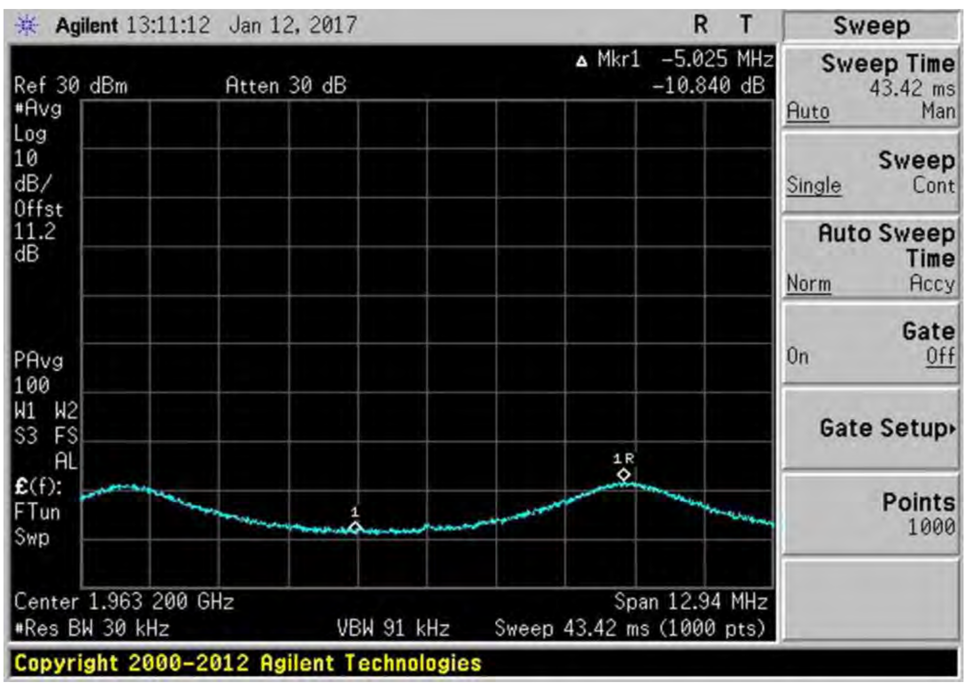
7.11.3_Osc_DL_1930-1995MHz+1_AWGNL



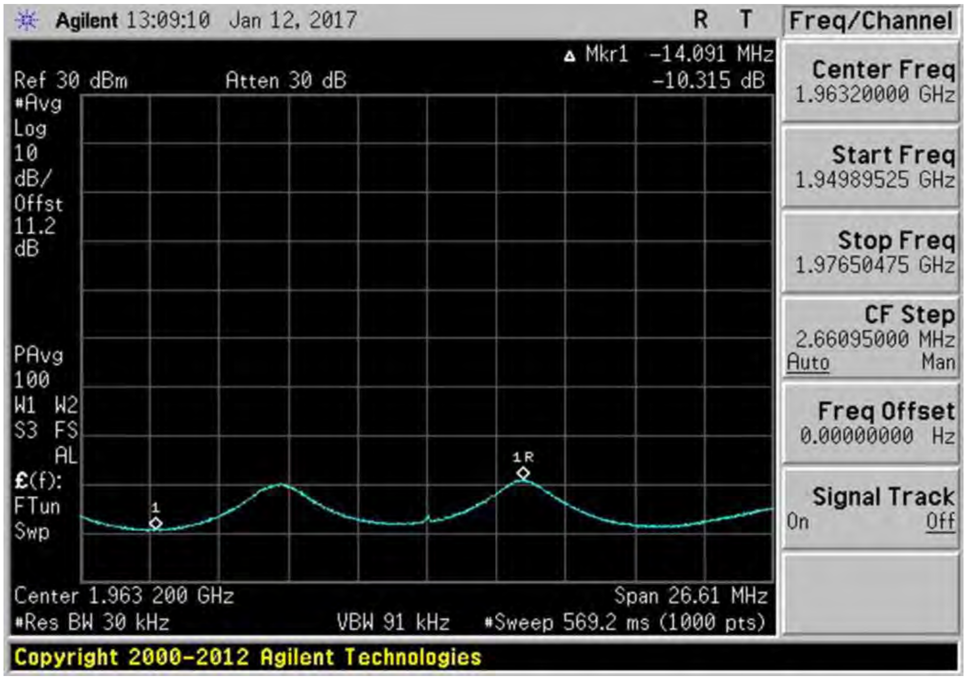
7.11.3_Osc_DL_1930-1995MHz+2_AWGNL



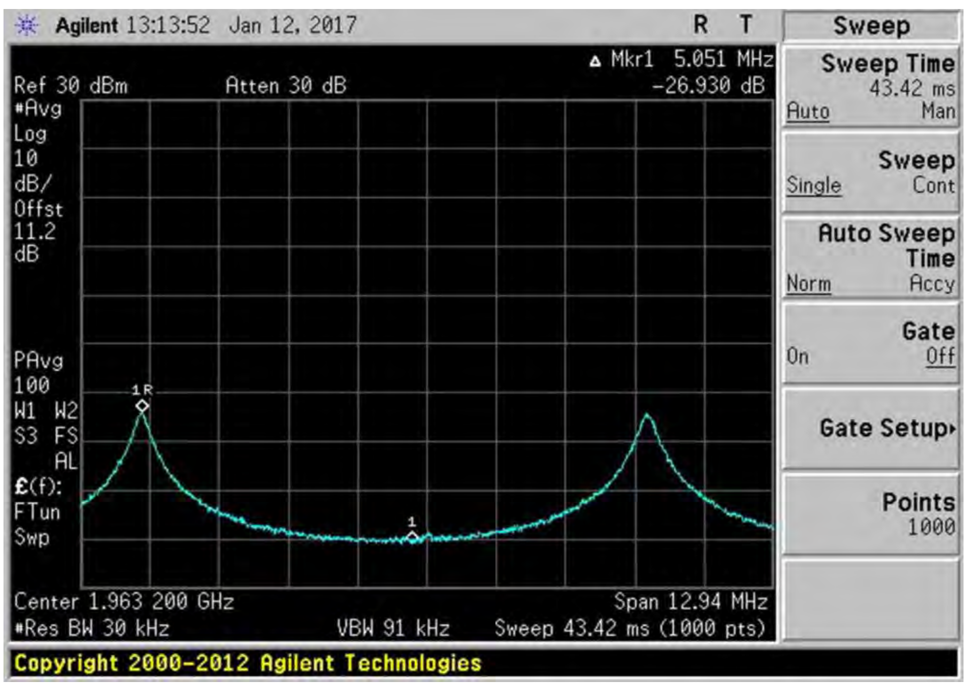
7.11.3_Osc_DL_1930-1995MHz+3_AWGNL



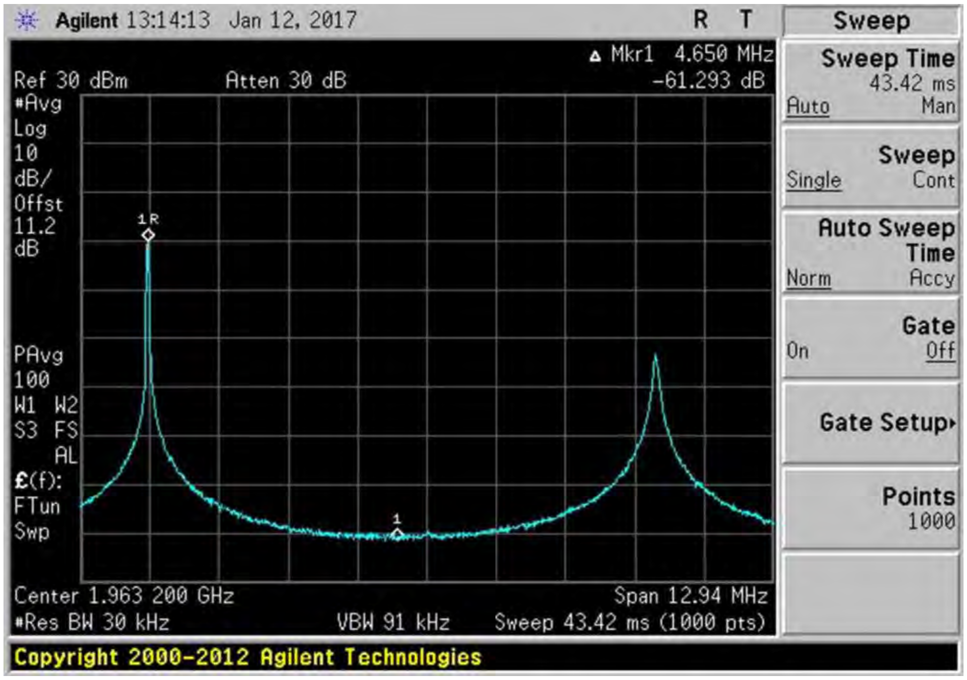
7.11.3_Osc_DL_1930-1995MHz+4_AWGNL



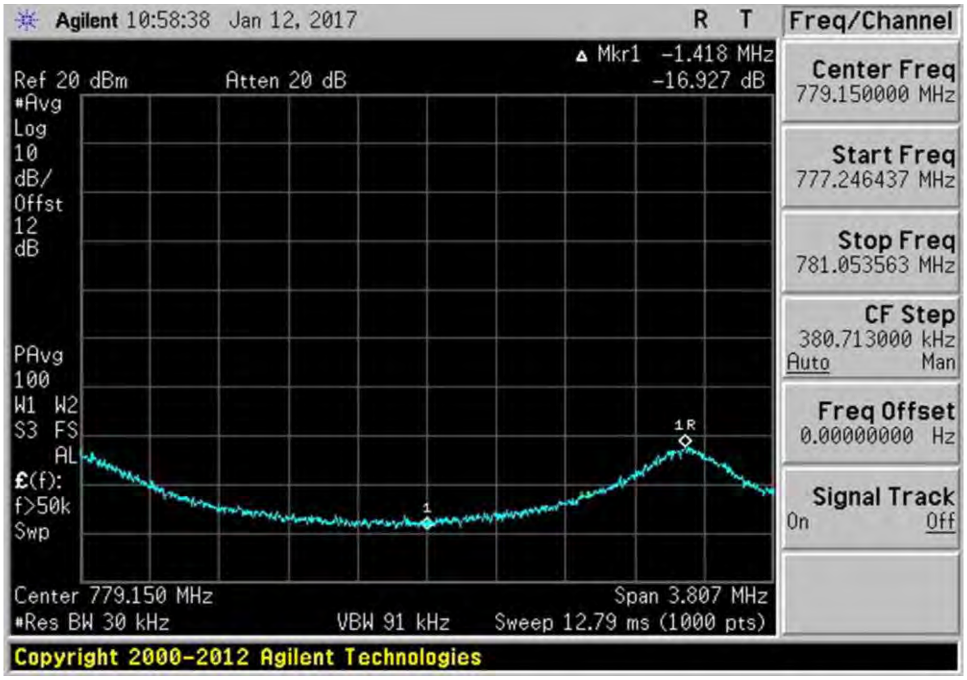
7.11.3_Osc_DL_1930-1995MHz+5_AWGNL



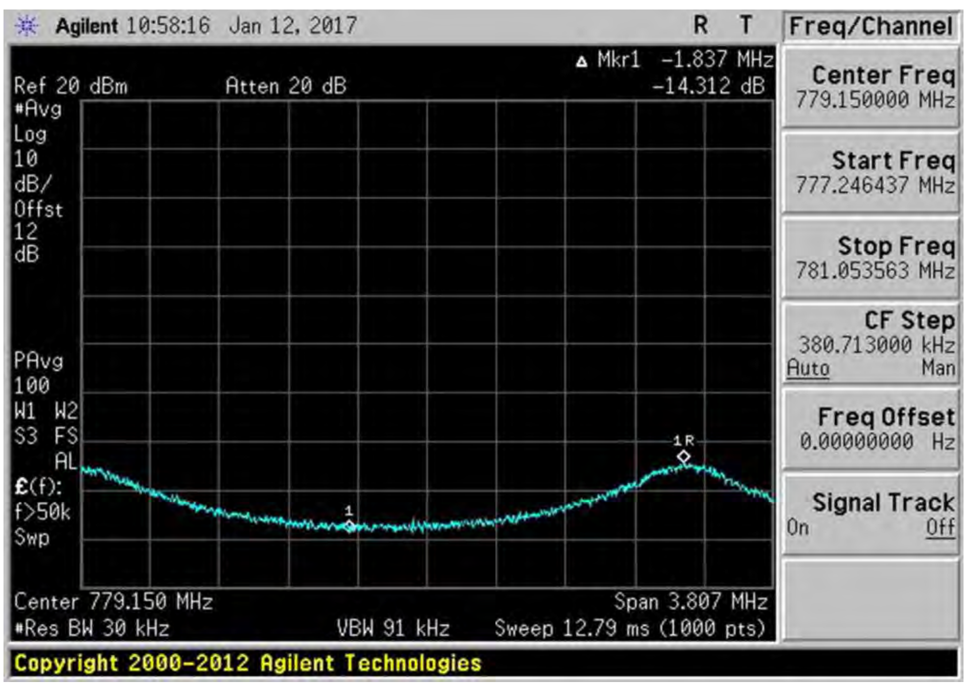
7.11.3_Osc_DL_1930-1995MHz-1_AWGNL



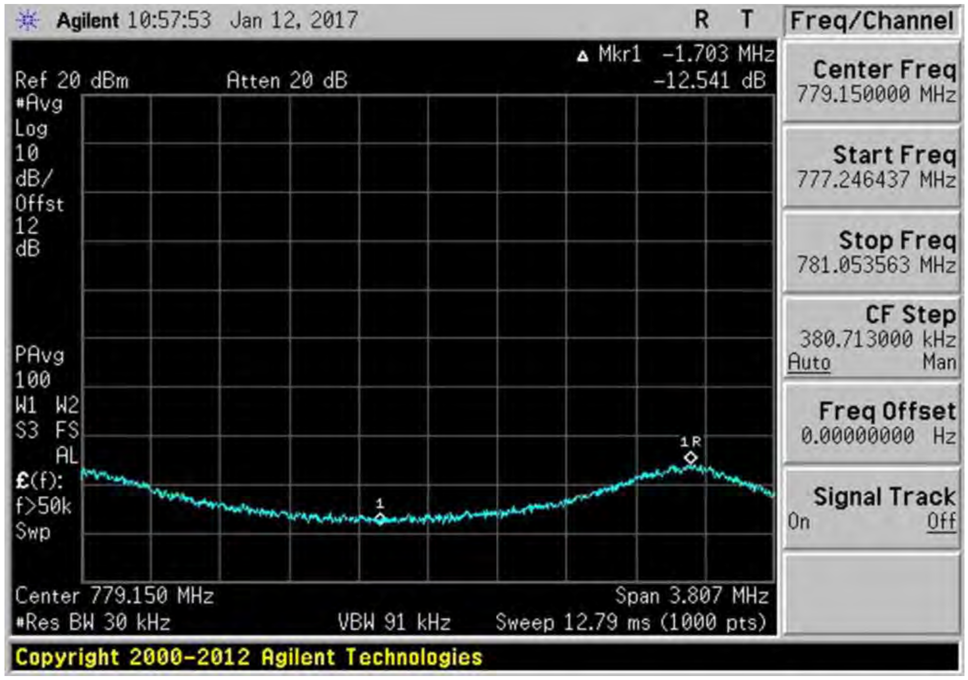
7.11.3_Osc_DL_1930-1995MHz-2_AWGNL



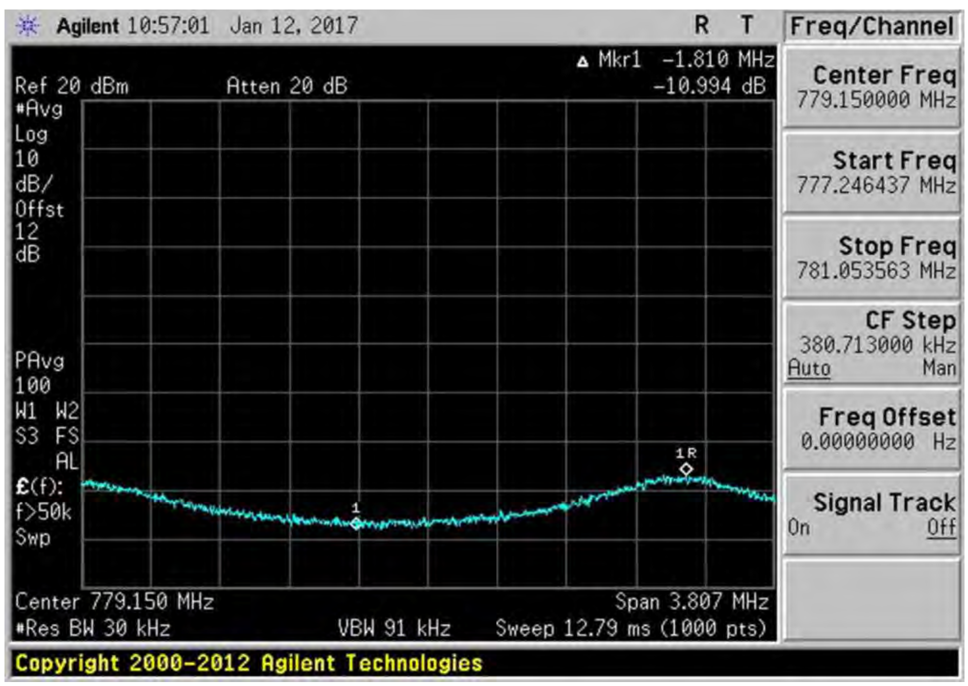
7.11.3_Osc_UL_776-787MHz+0_AWGNR



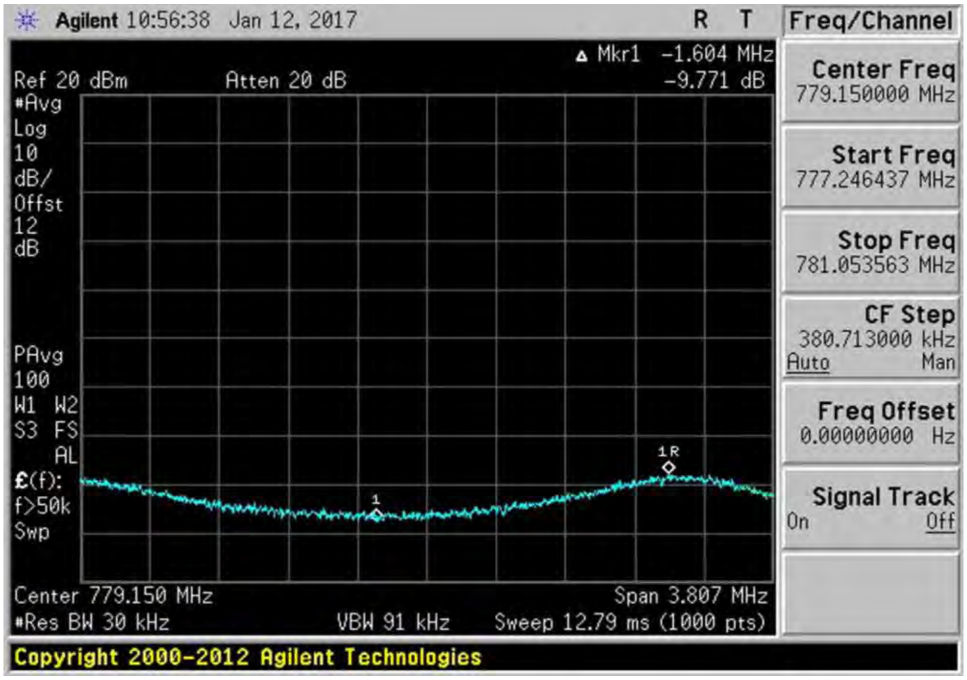
7.11.3_Osc_UL_776-787MHz+1_AWGNR



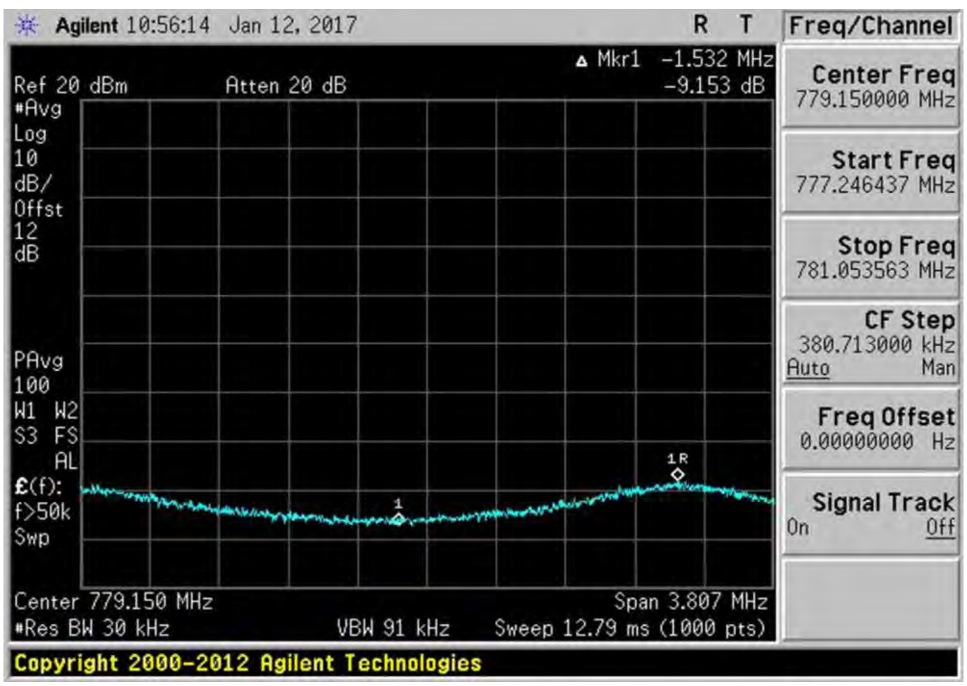
7.11.3_Osc_UL_776-787MHz+2_AWGNR



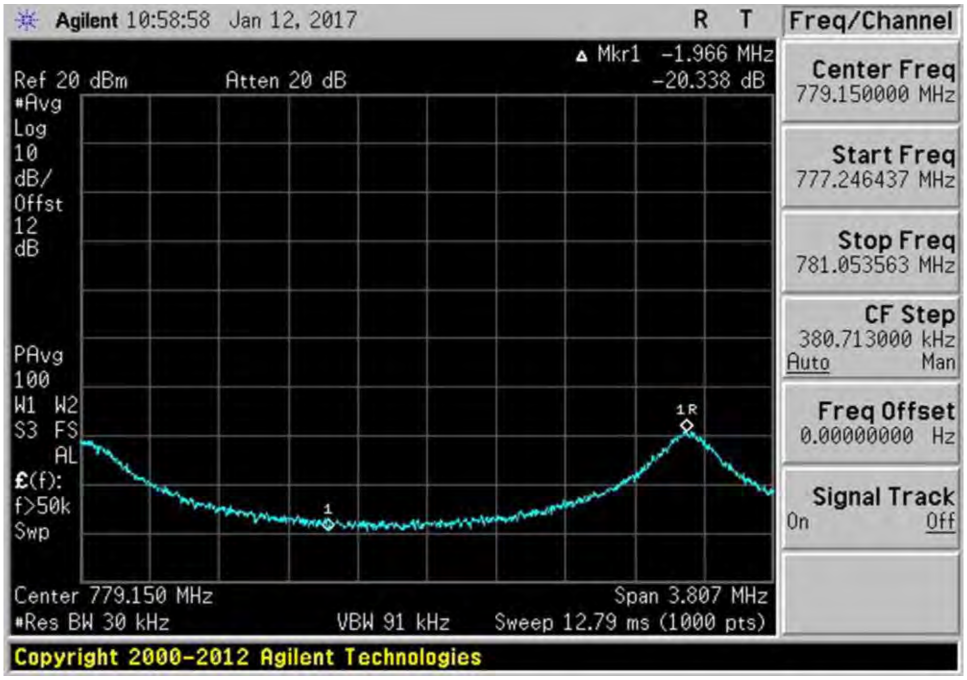
7.11.3_Osc_UL_776-787MHz+3_AWGNR



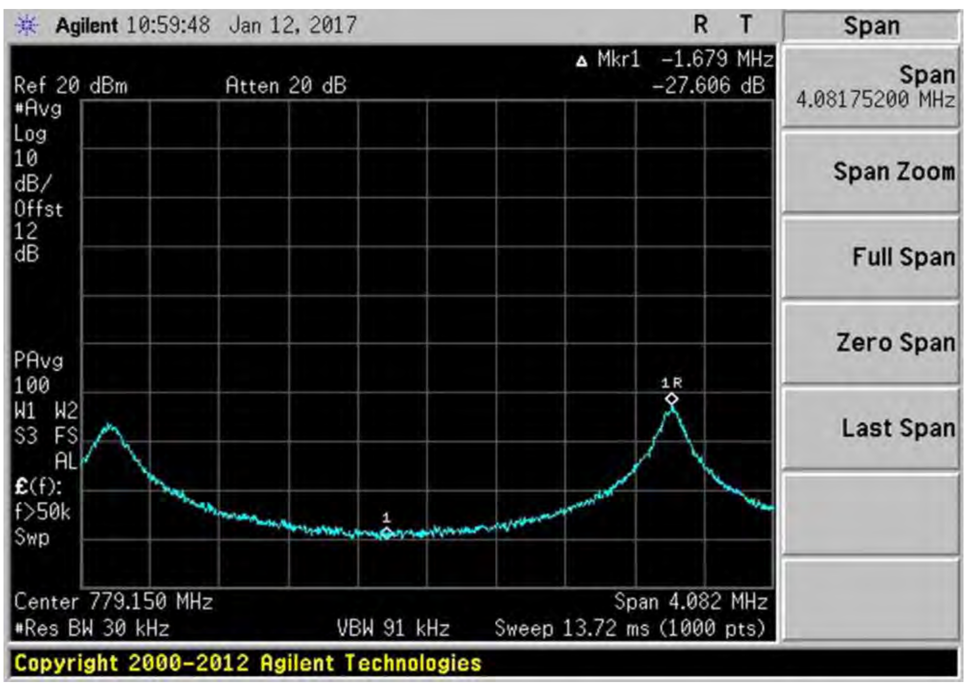
7.11.3_Osc_UL_776-787MHz+4_AWGNR



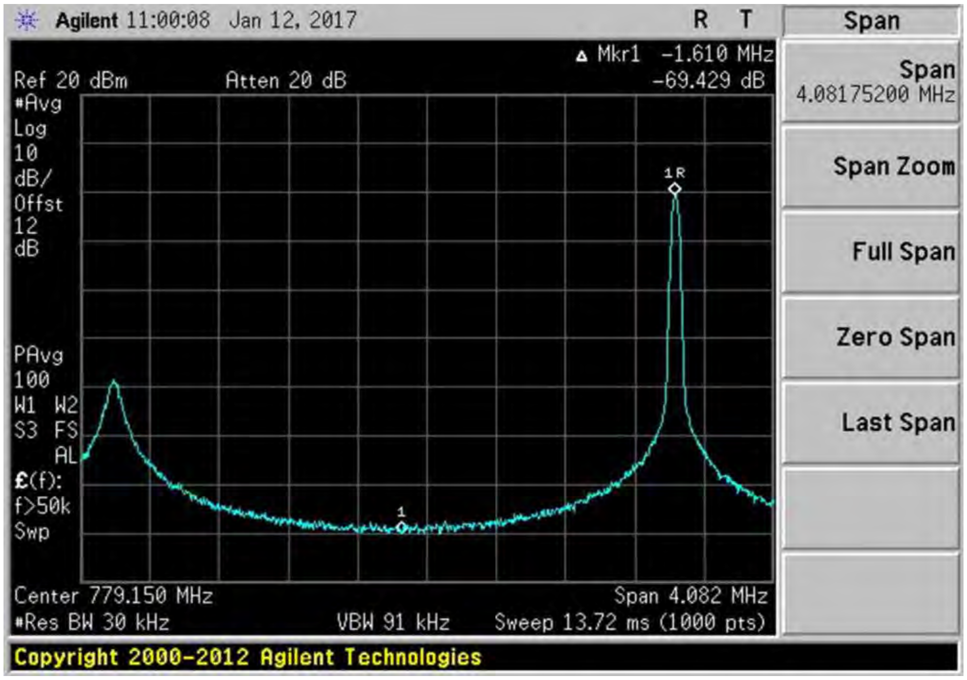
7.11.3_Osc_UL_776-787MHz+5_AWGNR



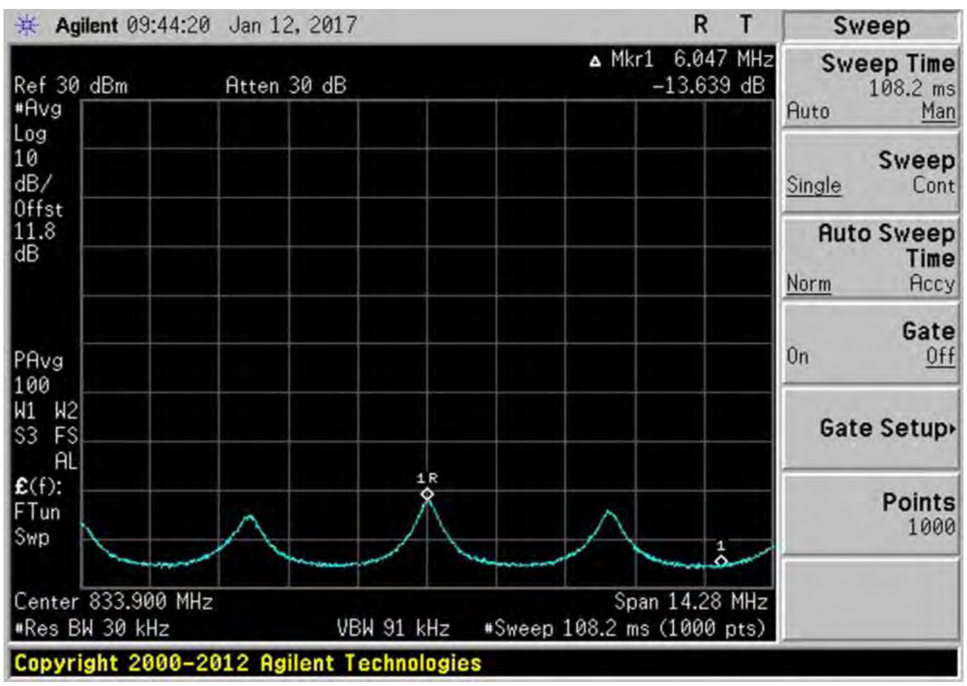
7.11.3_Osc_UL_776-787MHz-1_AWGNR



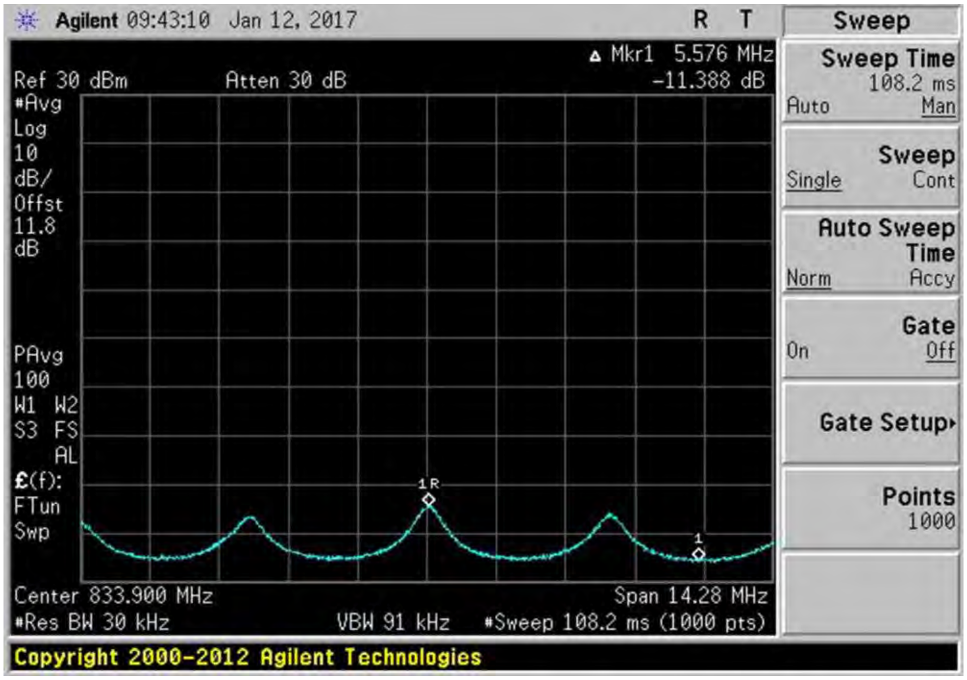
7.11.3_Osc_UL_776-787MHz-2_AWGNR



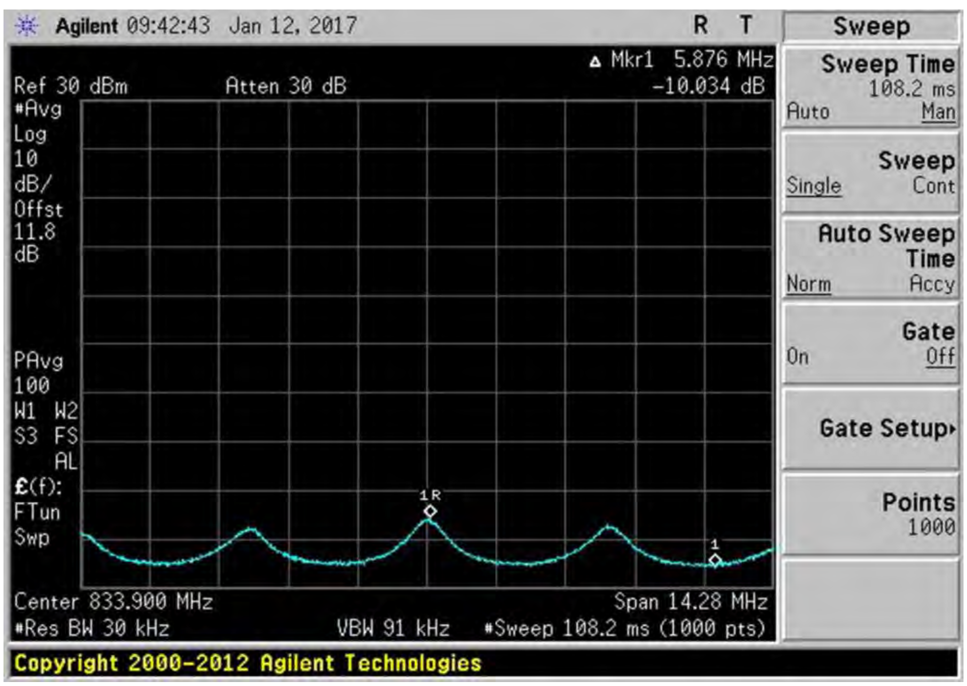
7.11.3_Osc_UL_776-787MHz-3_AWGNR



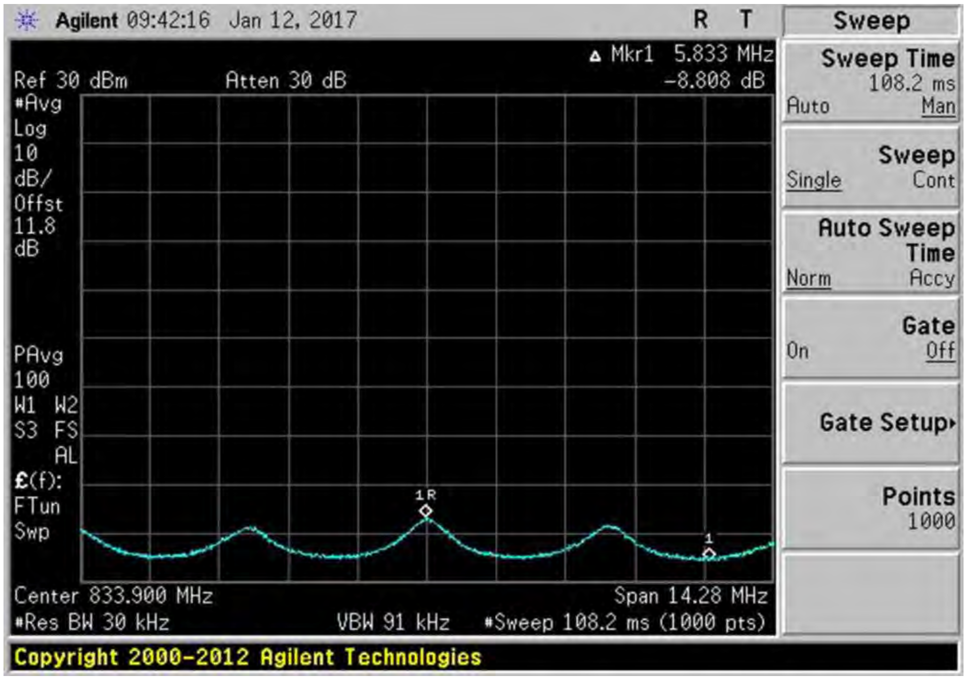
7.11.3_Osc_UL_824-849MHz+0_AWGNR



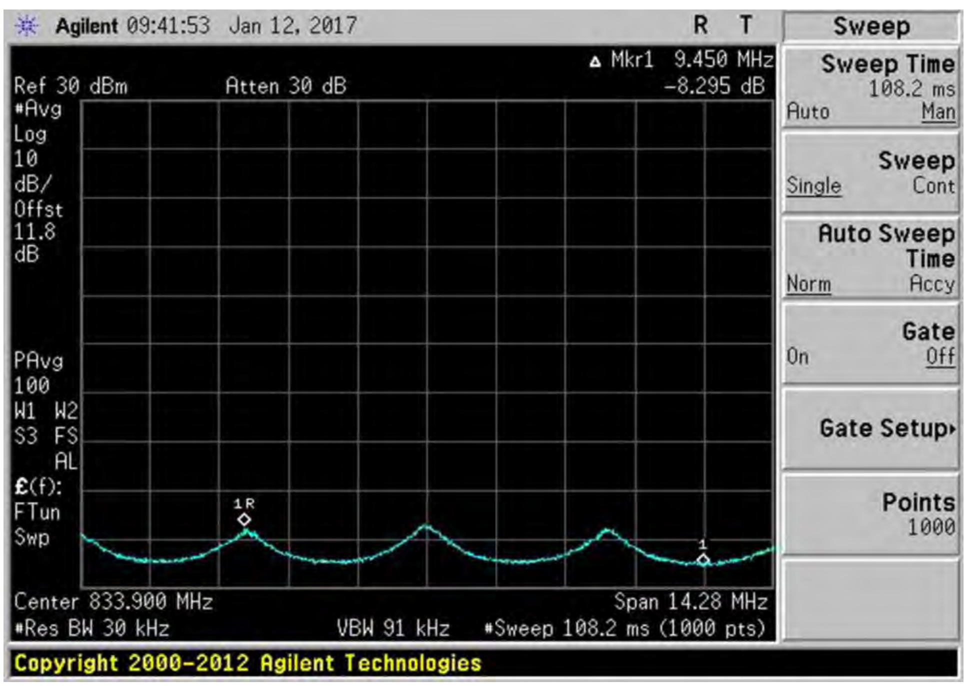
7.11.3_Osc_UL_824-849MHz+1_AWGNR



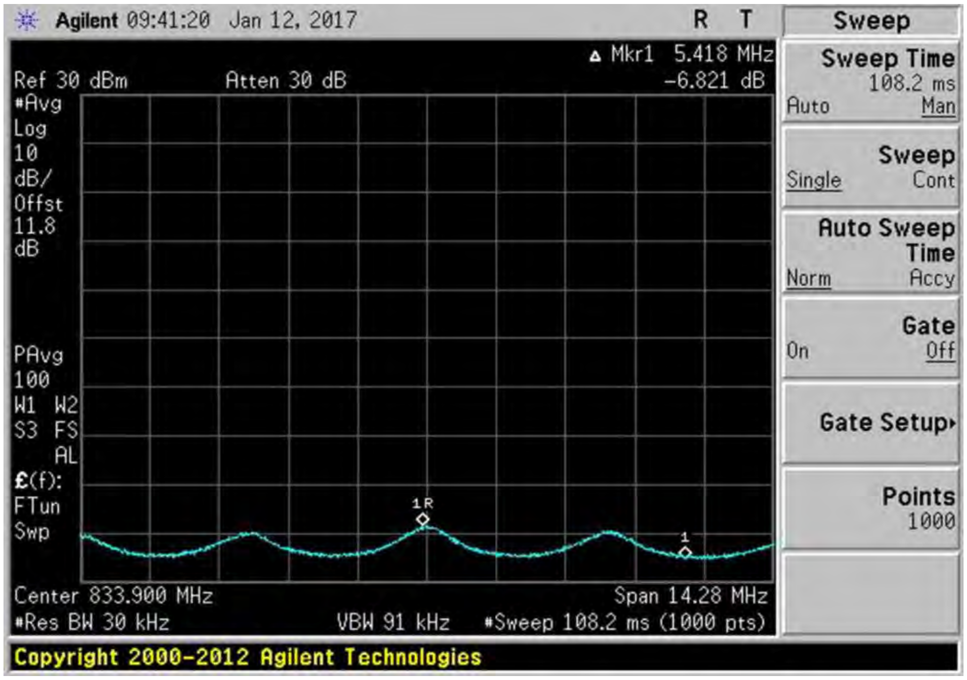
7.11.3_Osc_UL_824-849MHz+2_AWGNR



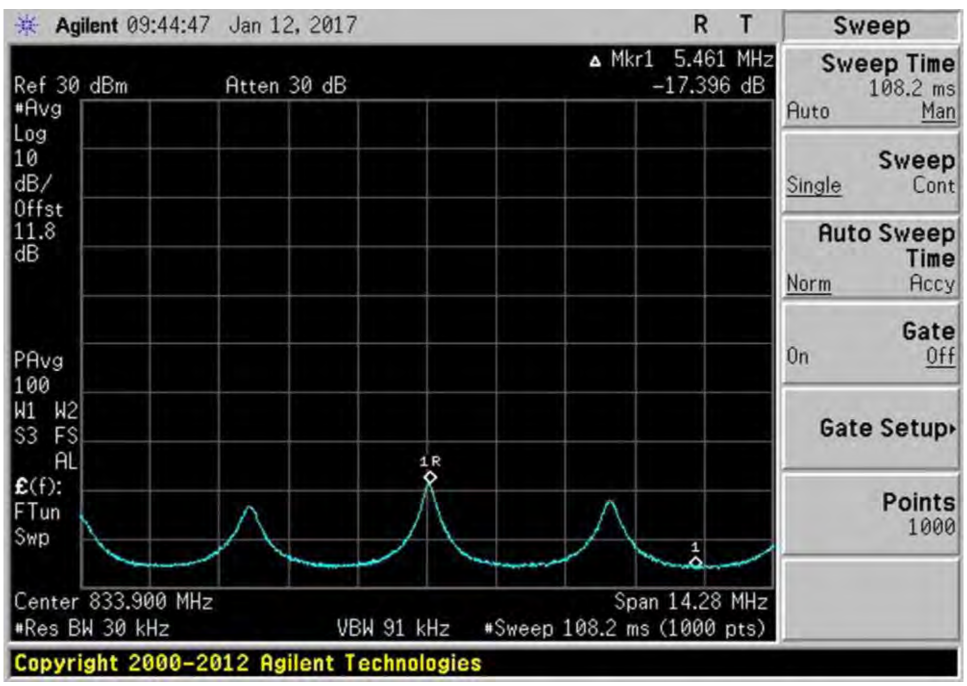
7.11.3_Osc_UL_824-849MHz+3_AWGNR



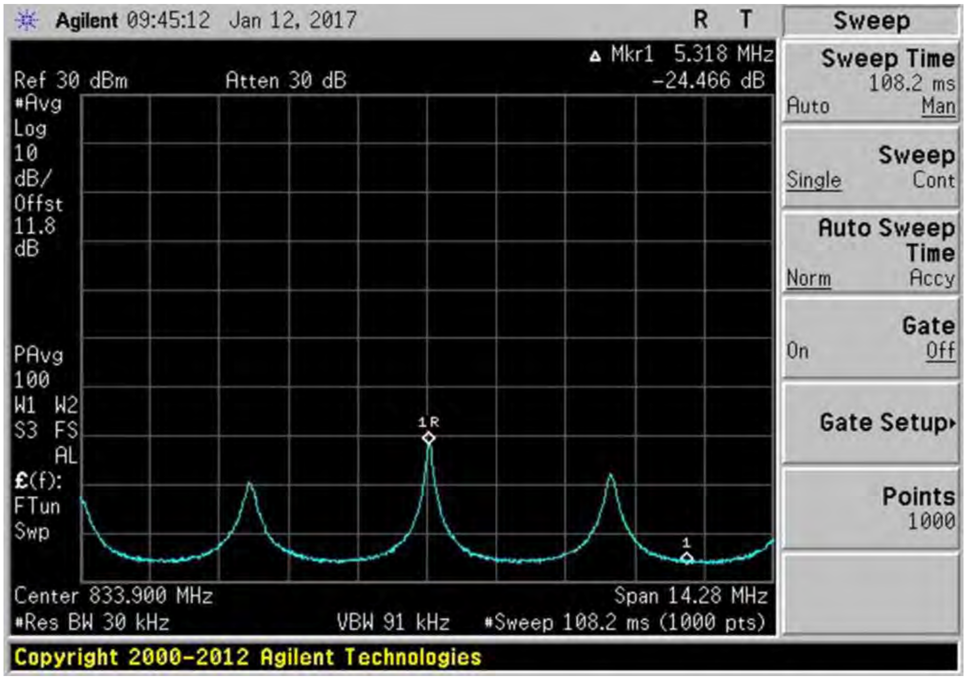
7.11.3_Osc_UL_824-849MHz+4_AWGNR



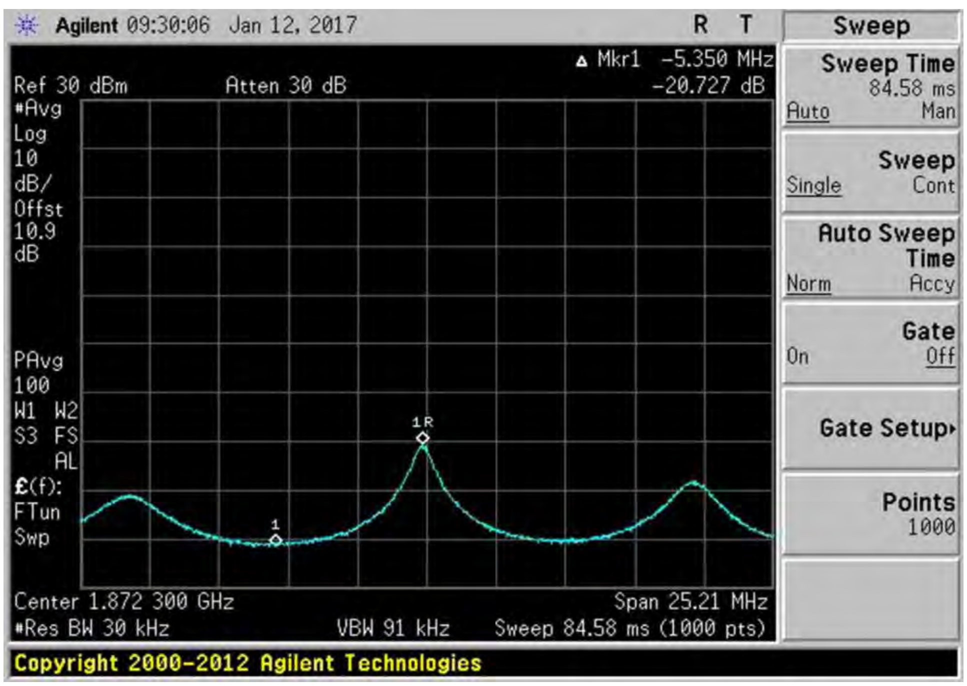
7.11.3_Osc_UL_824-849MHz+5_AWGNR



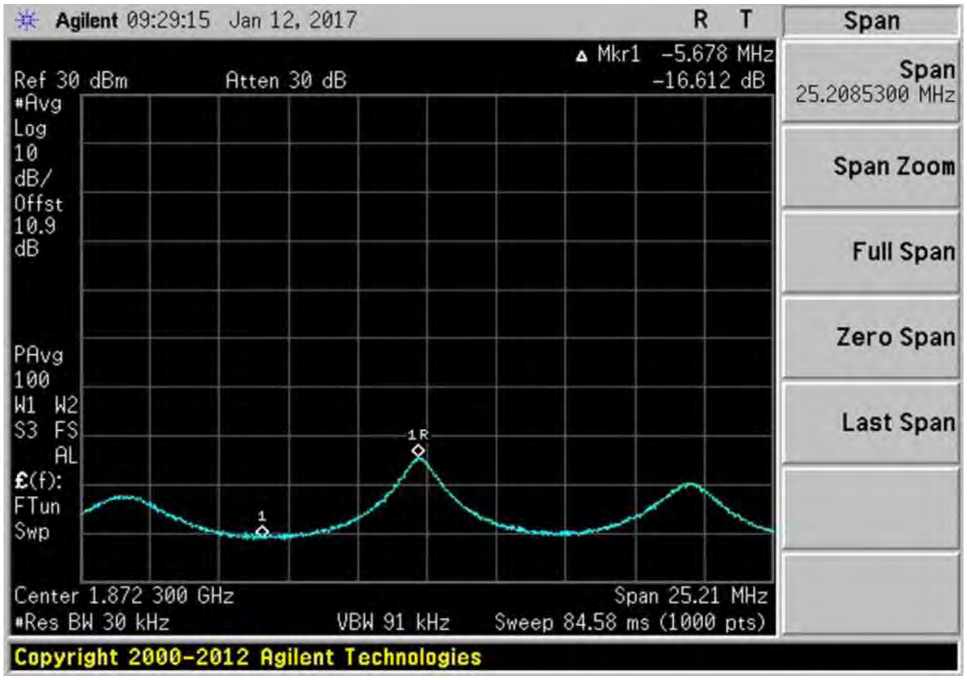
7.11.3_Osc_UL_824-849MHz-1_AWGNR



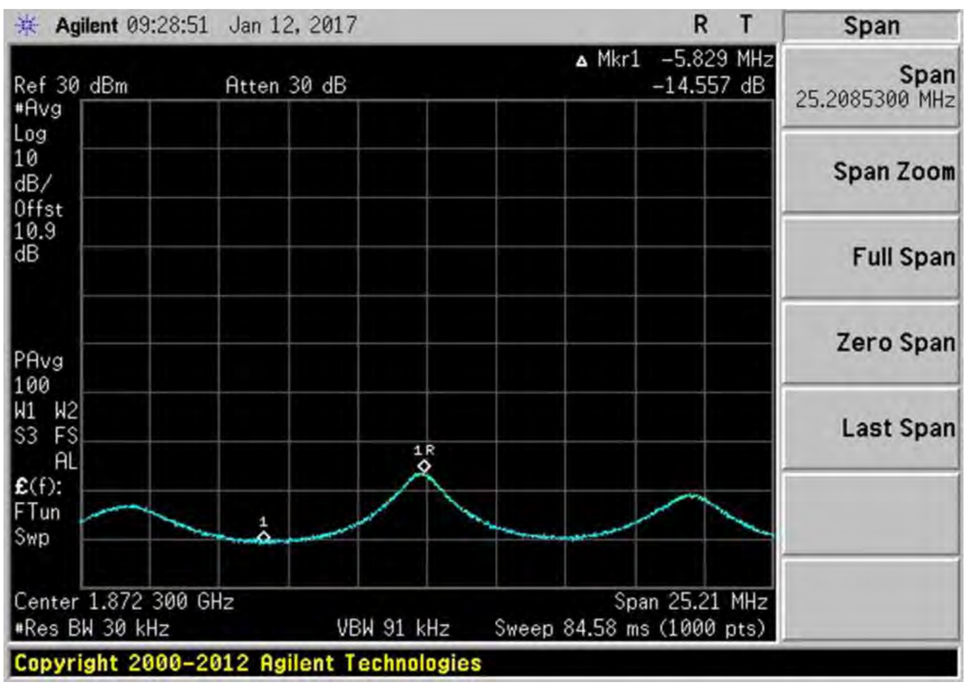
7.11.3_Osc_UL_824-849MHz-2_AWGNR



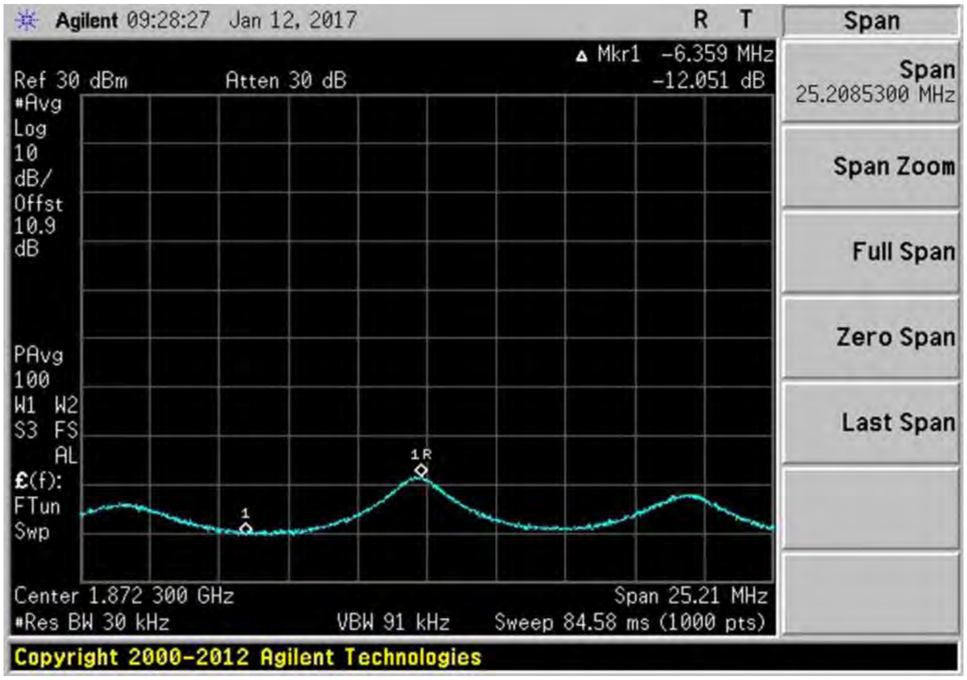
7.11.3_Osc_UL_1850-1915MHz+0_AWGNR



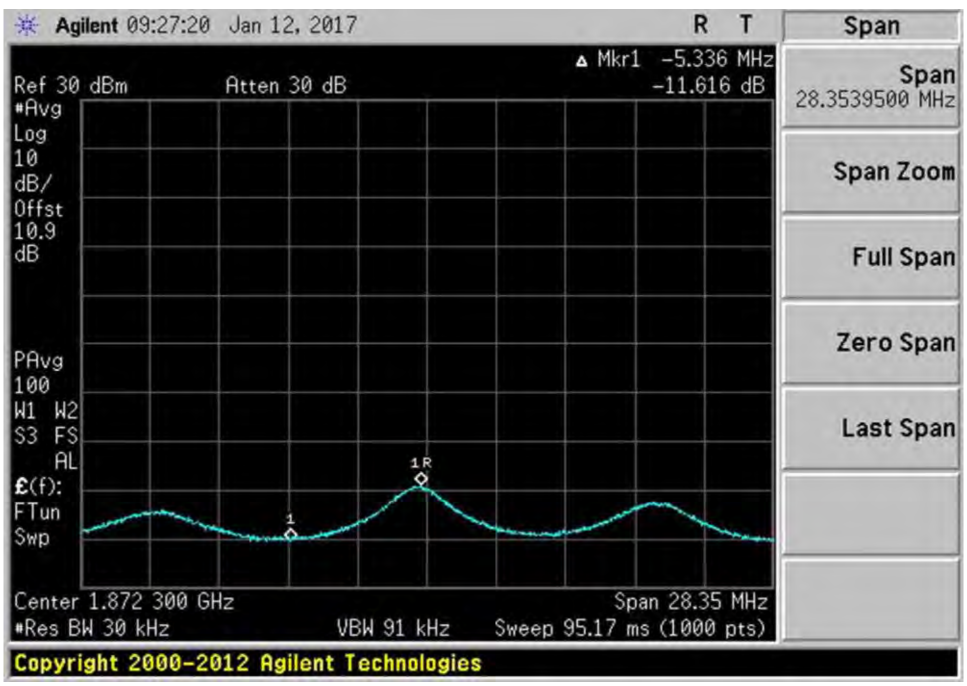
7.11.3_Osc_UL_1850-1915MHz+1_AWGNR



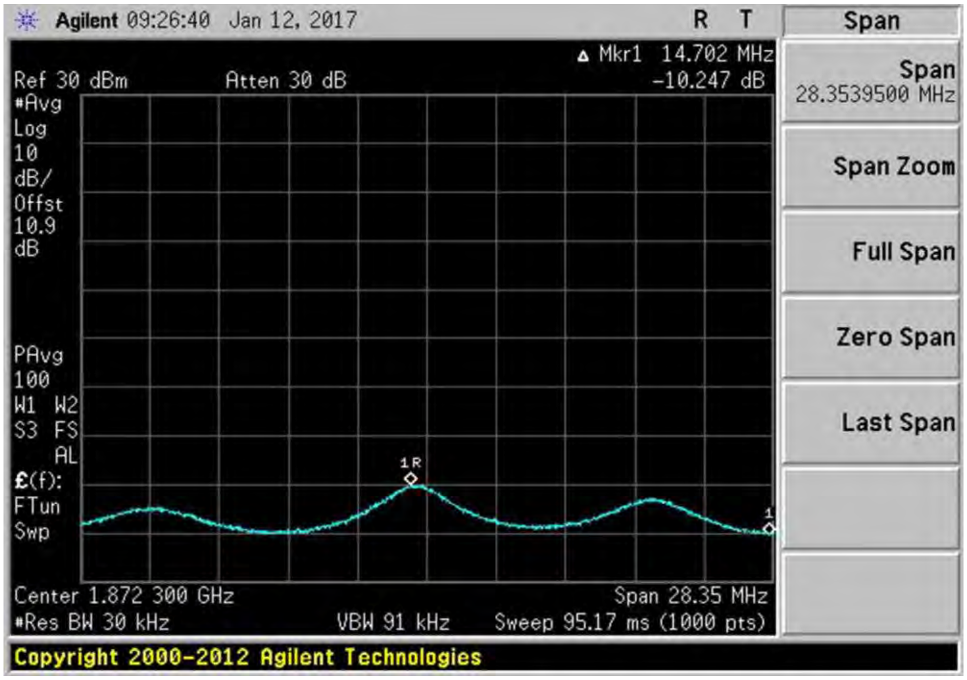
7.11.3_Osc_UL_1850-1915MHz+2_AWGNR



7.11.3_Osc_UL_1850-1915MHz+3_AWGNR



7.11.3_Osc_UL_1850-1915MHz+4_AWGNR



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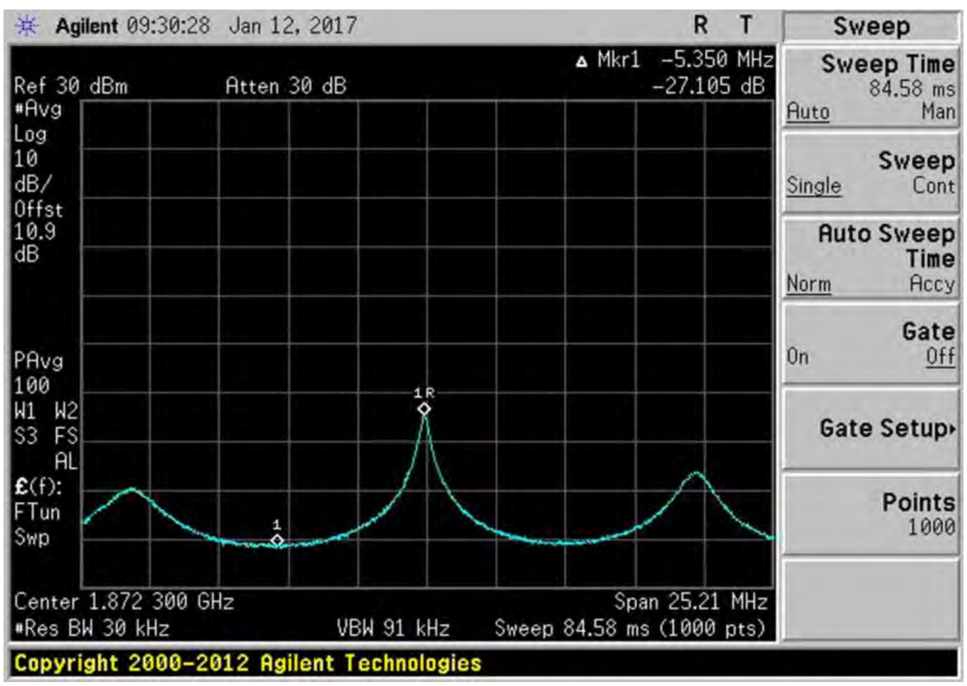

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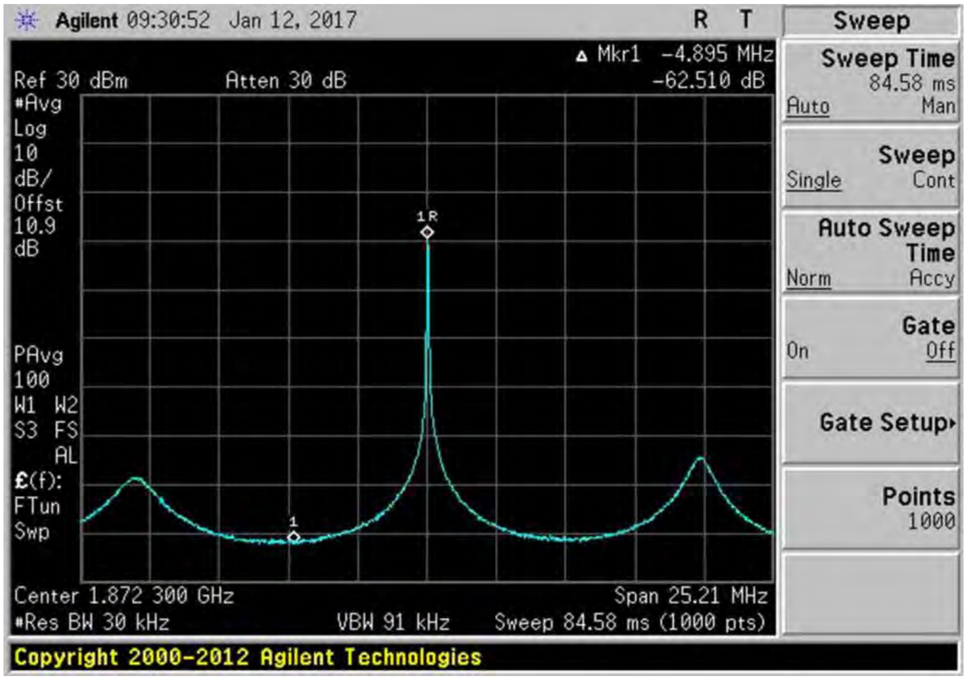
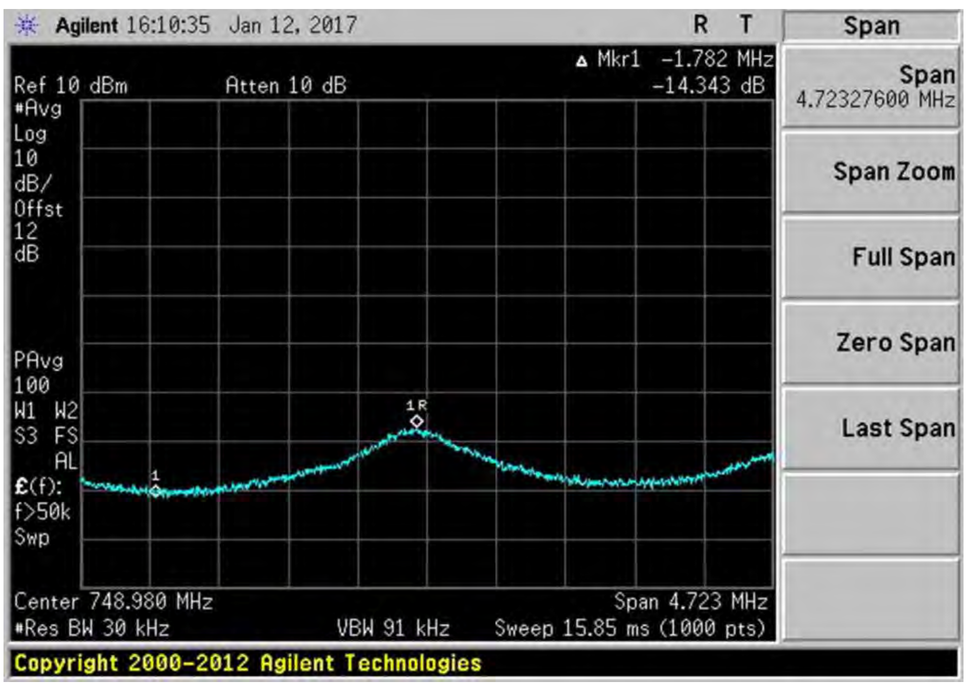


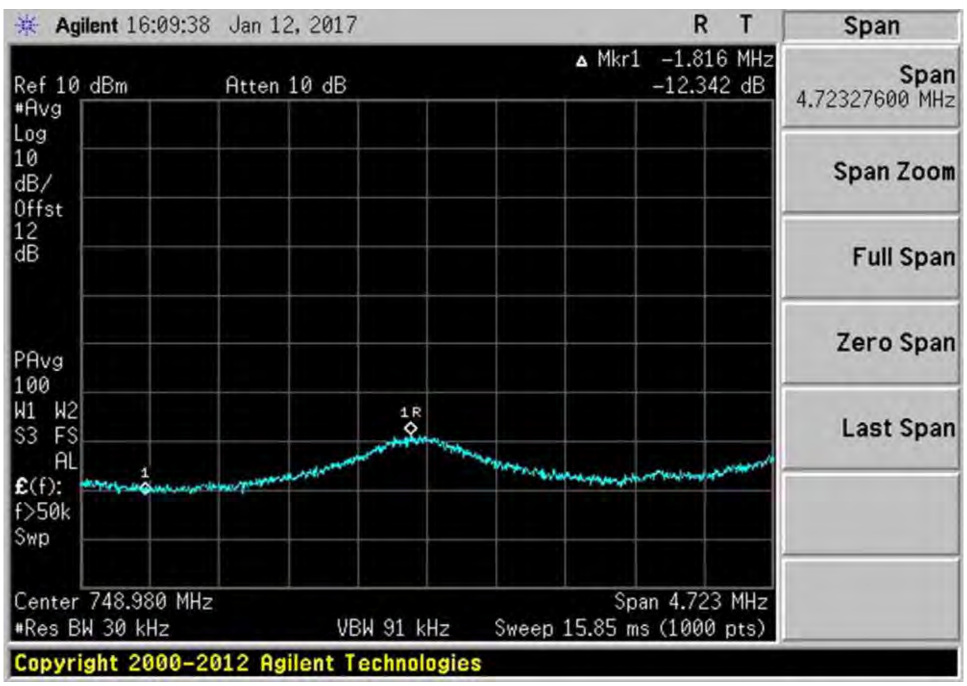
7.11.3_Osc_UL_1850-1915MHz-2_AWGNR

7.11.3_Osc_DL_746-757MHz+0_AWGNR



7.11.3_Osc_DL_746-757MHz+1_AWGNR

7.11.3_Osc_DL_746-757MHz+2_AWGNR



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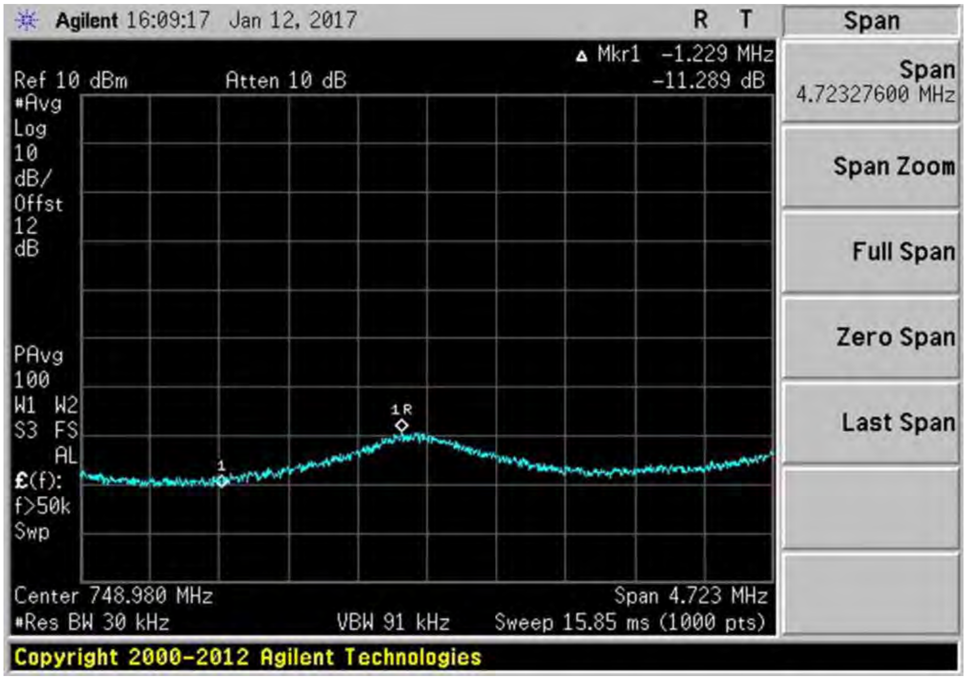

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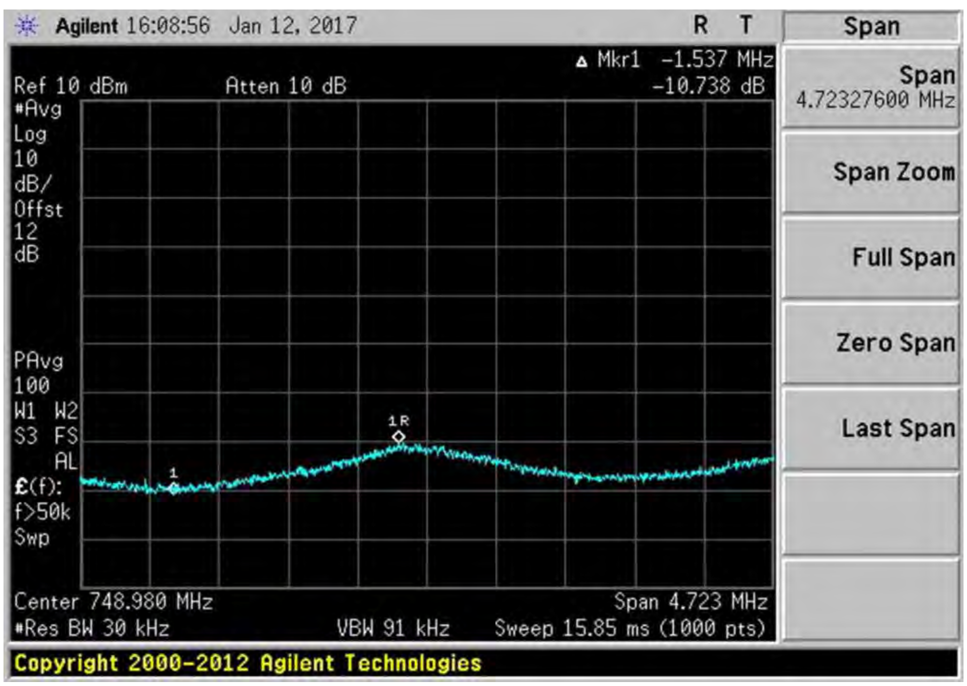

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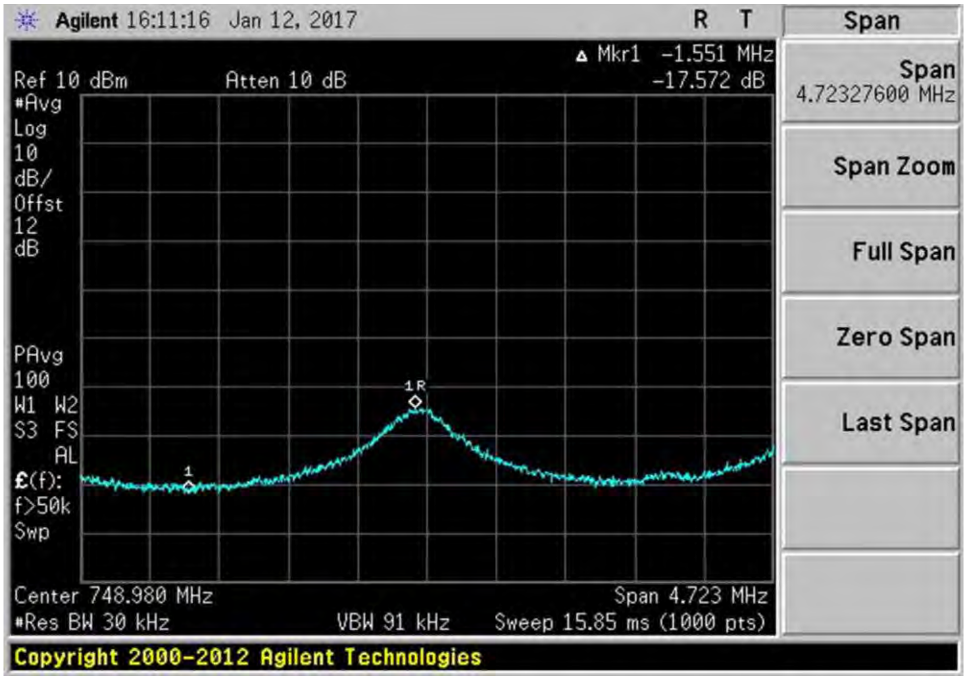

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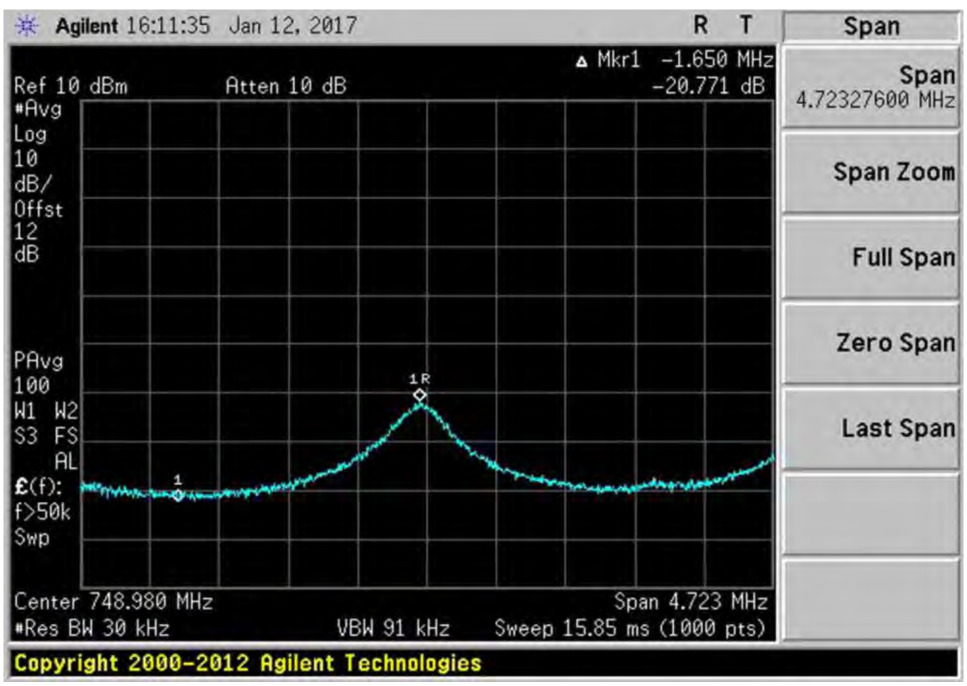

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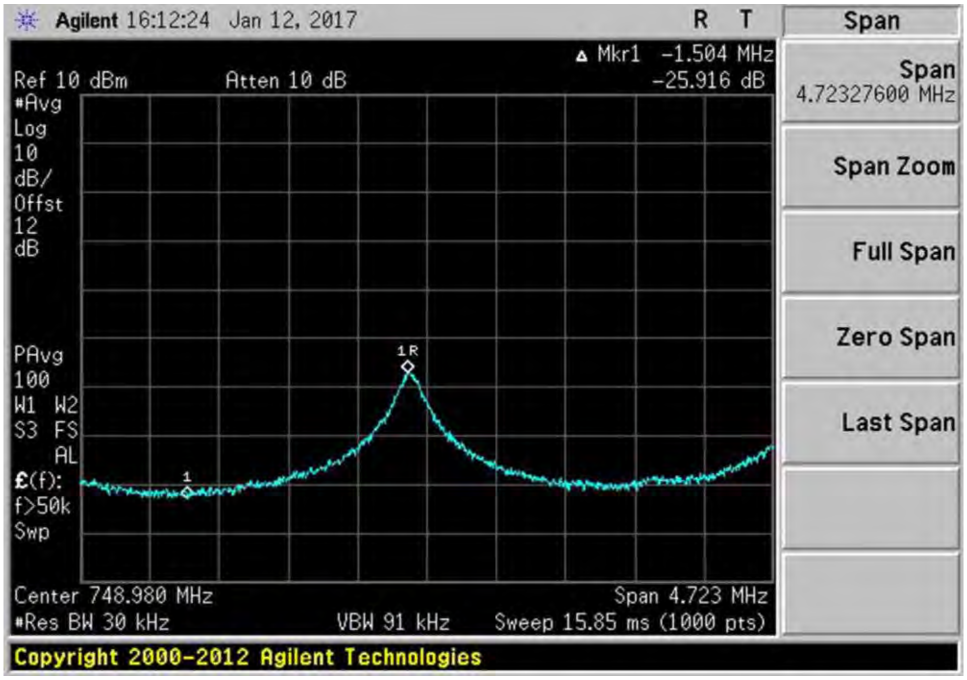

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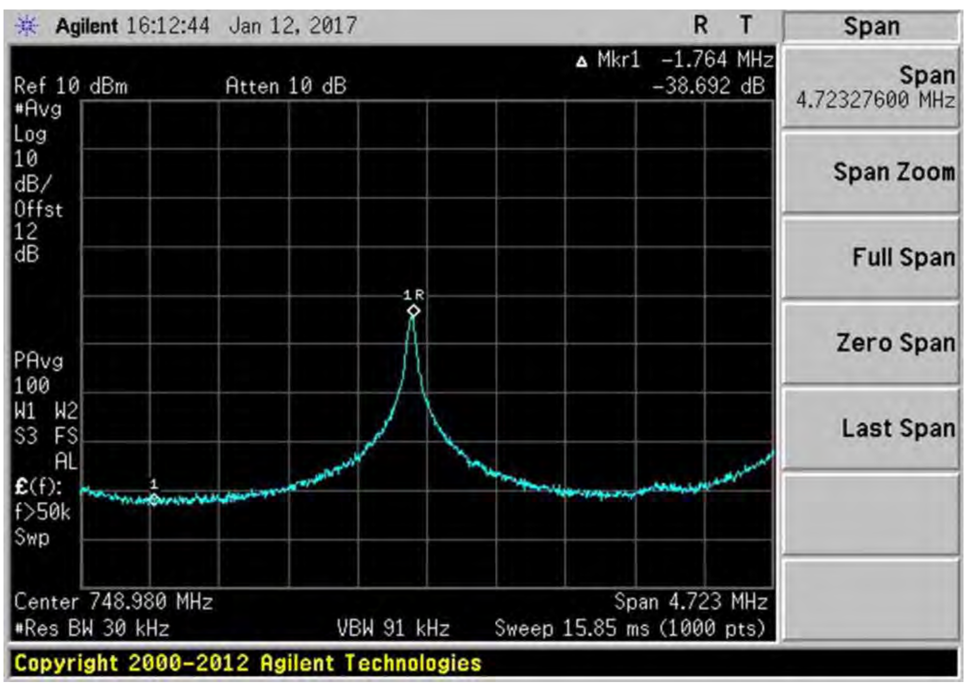
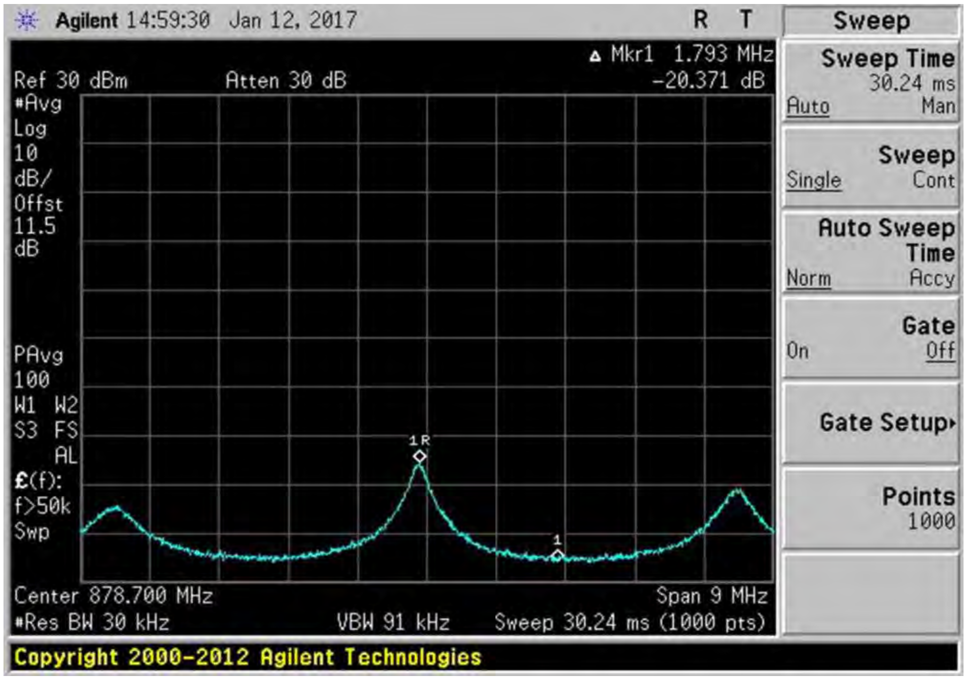
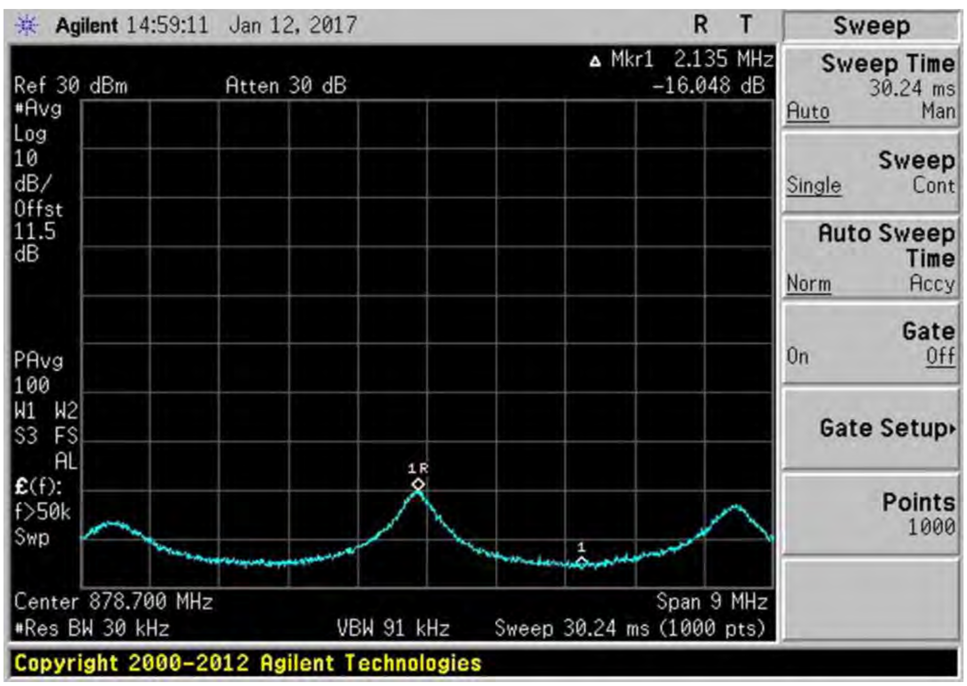


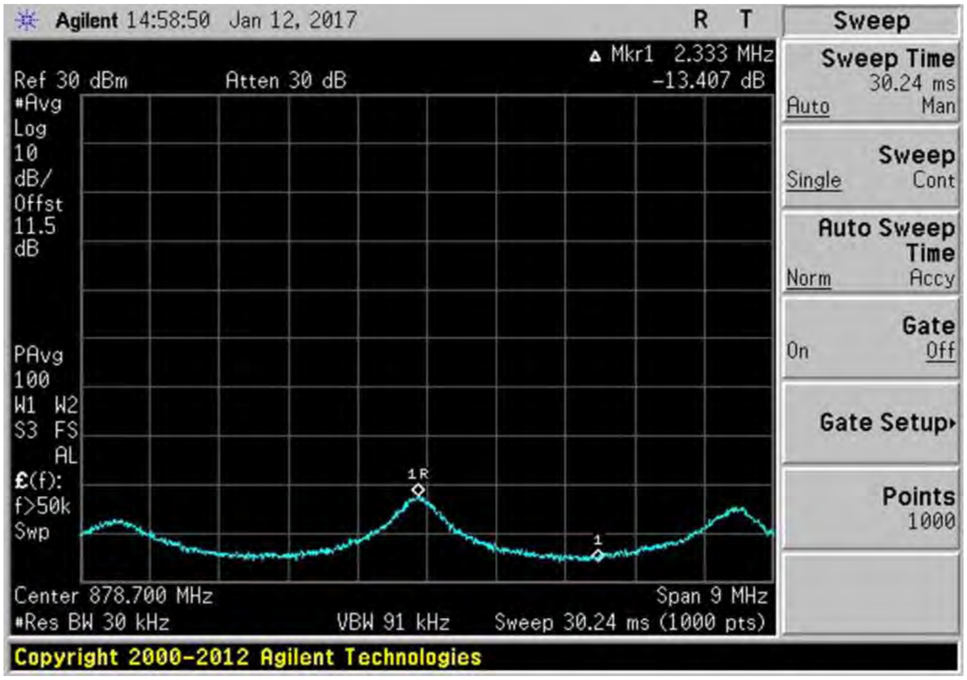
7.11.3_Osc_DL_746-757MHz-4_AWGNR



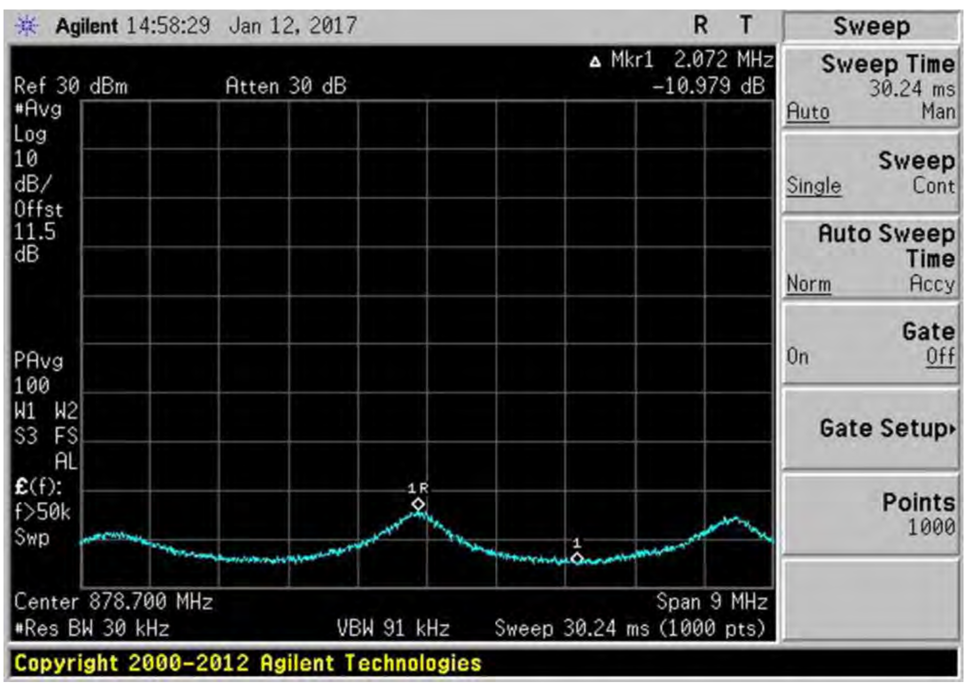
7.11.3_Osc_DL_869-894MHz+0_AWGNR



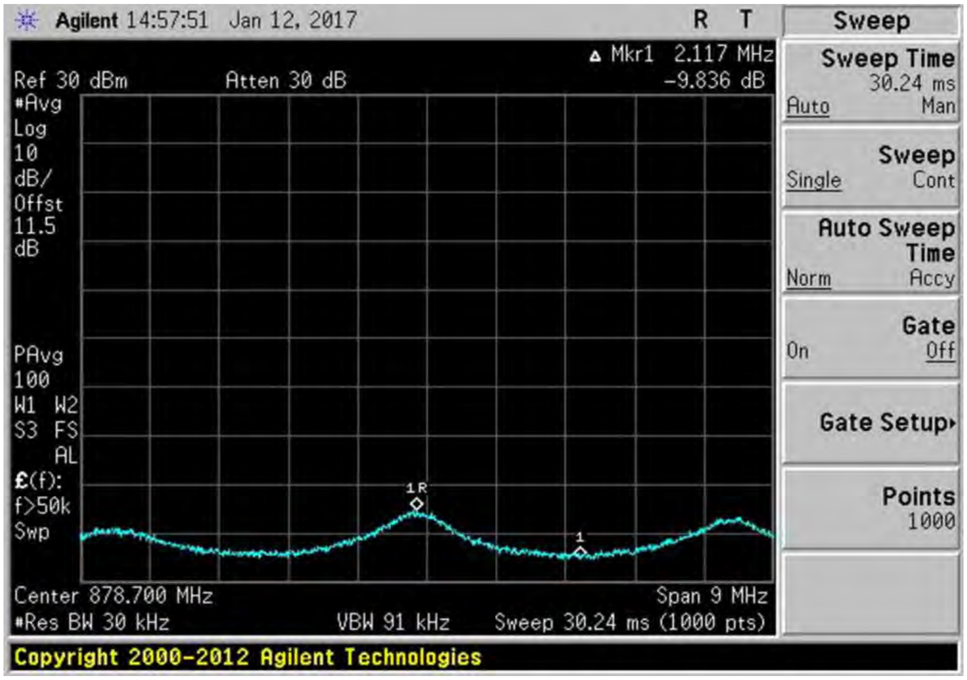
7.11.3_Osc_DL_869-894MHz+1_AWGNR



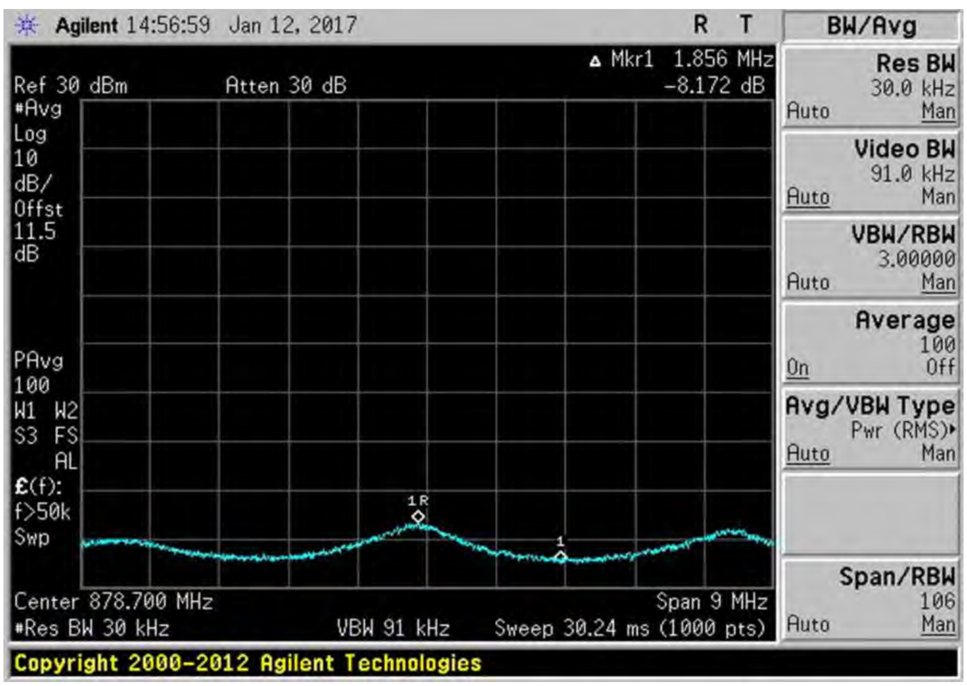
7.11.3_Osc_DL_869-894MHz+2_AWGNR



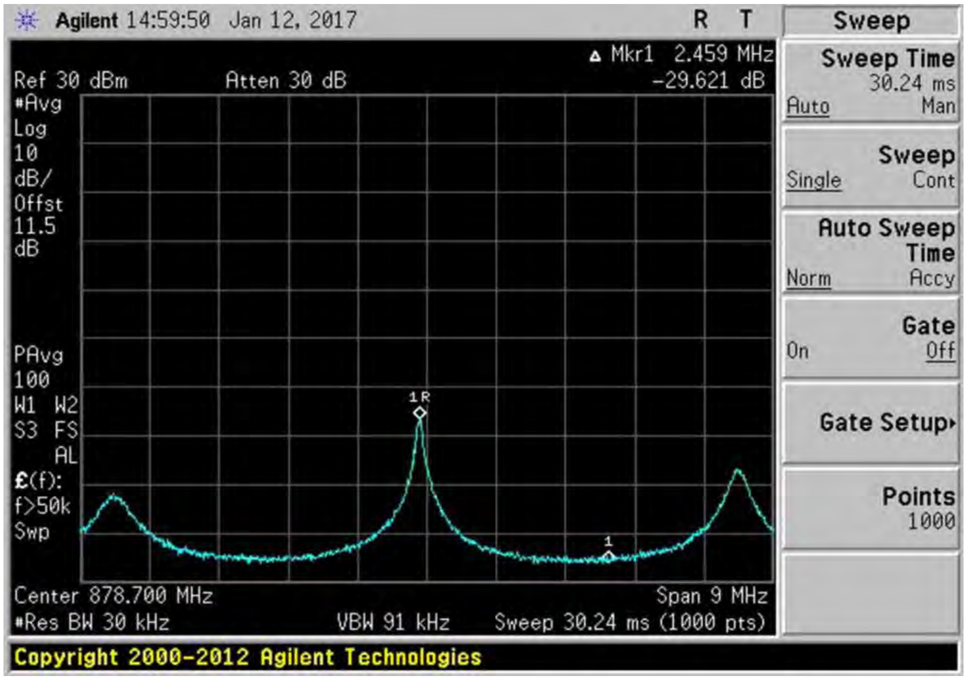
7.11.3_Osc_DL_869-894MHz+3_AWGNR



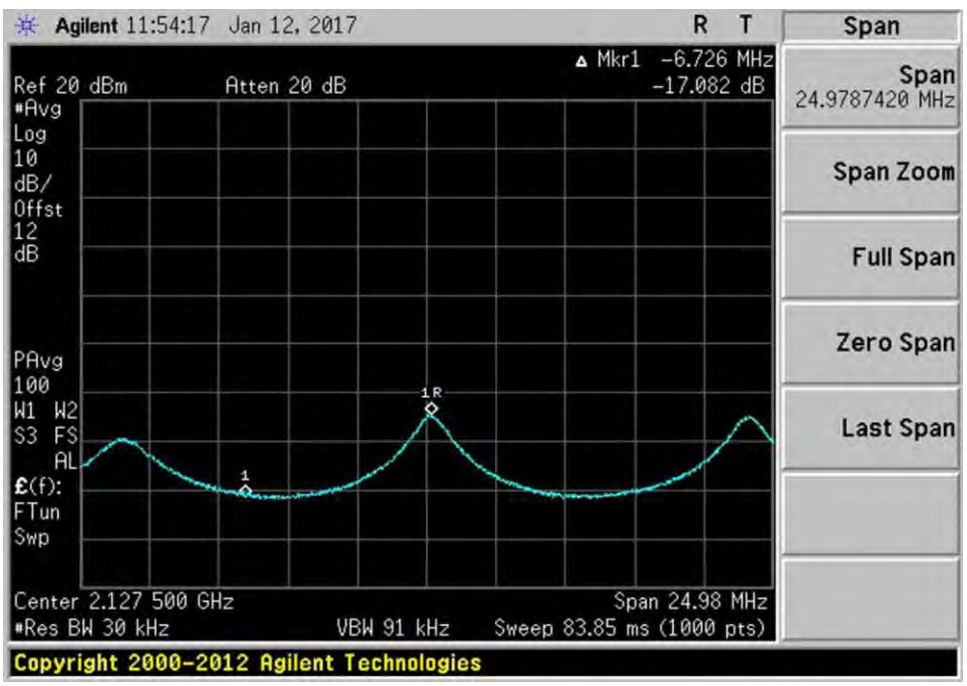
7.11.3_Osc_DL_869-894MHz+4_AWGNR



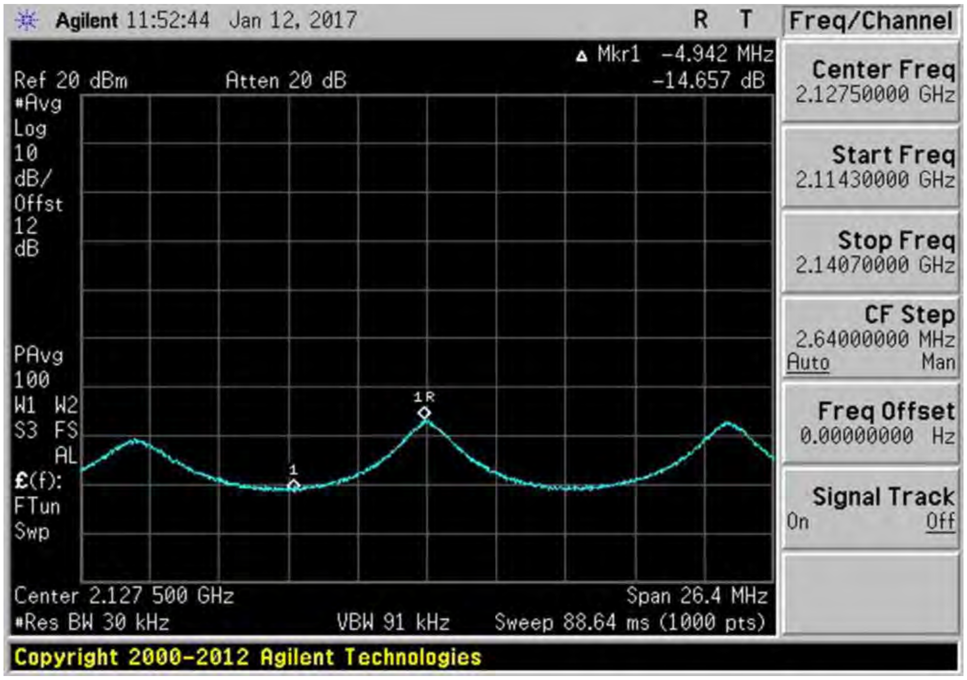
7.11.3_Osc_DL_869-894MHz+5_AWGNR



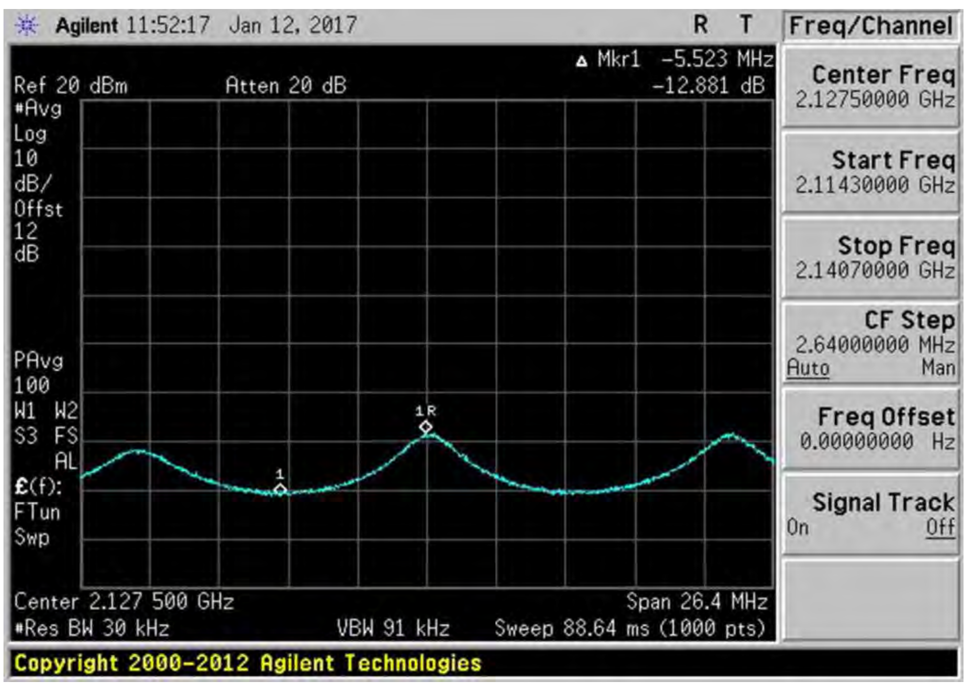
7.11.3_Osc_DL_869-894MHz-1_AWGNR



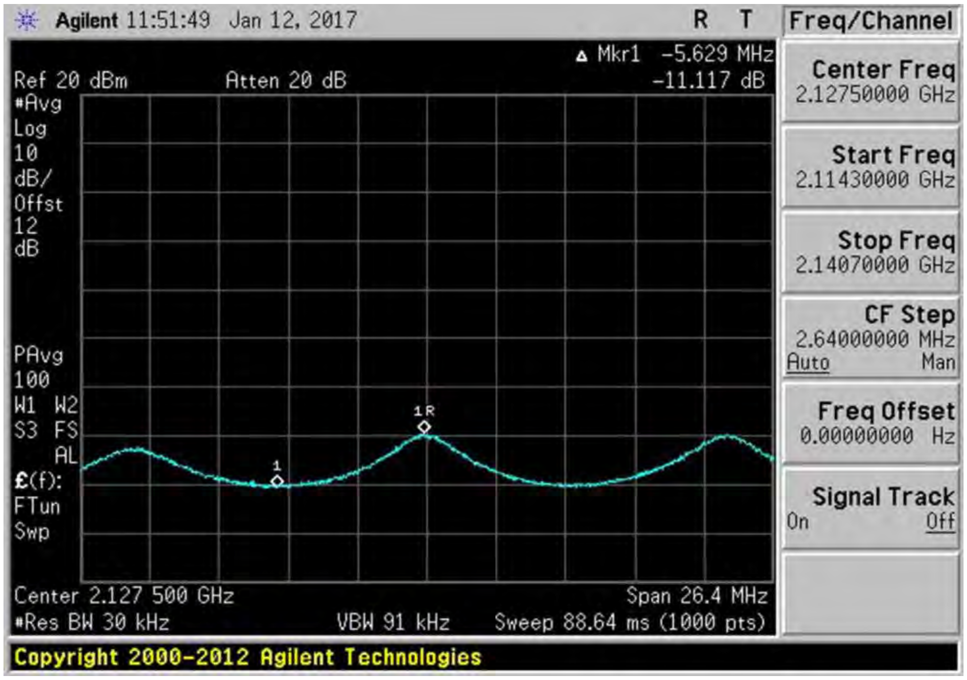
7.11.3_Osc_DL_2110-2155MHz+0_AWGNR



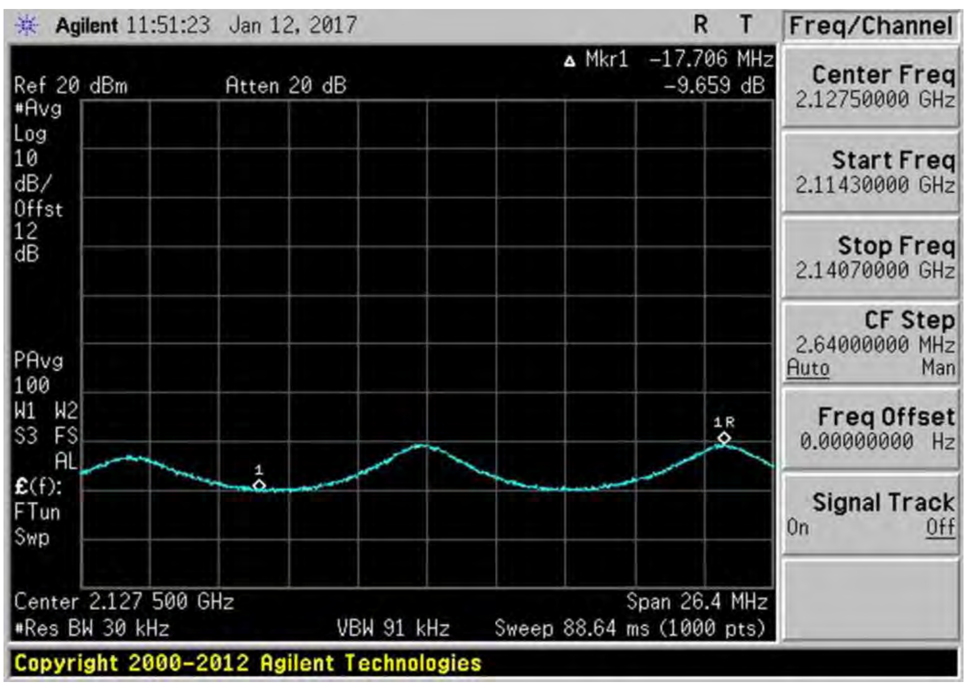
7.11.3_Osc_DL_2110-2155MHz+1_AWGNR



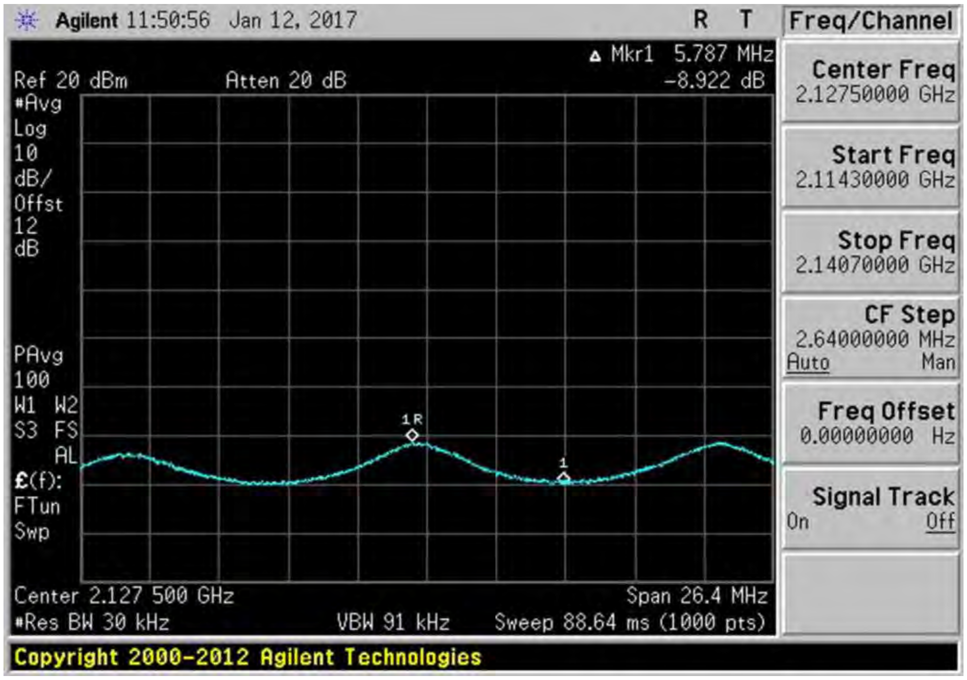
7.11.3_Osc_DL_2110-2155MHz+2_AWGNR



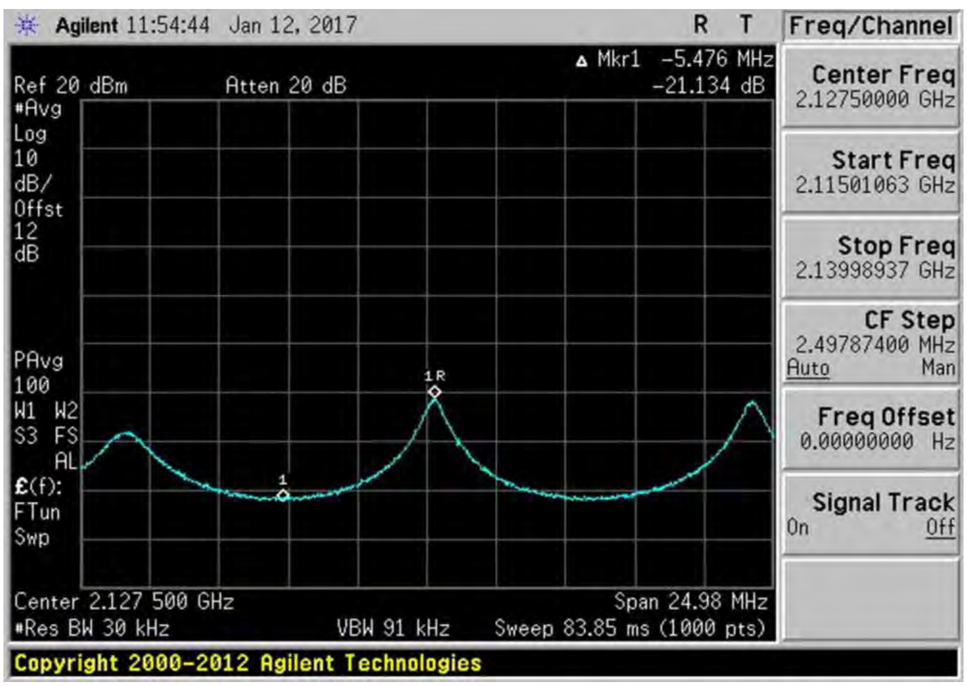
7.11.3_Osc_DL_2110-2155MHz+3_AWGNR



7.11.3_Osc_DL_2110-2155MHz+4_AWGNR



7.11.3_Osc_DL_2110-2155MHz+5_AWGNR



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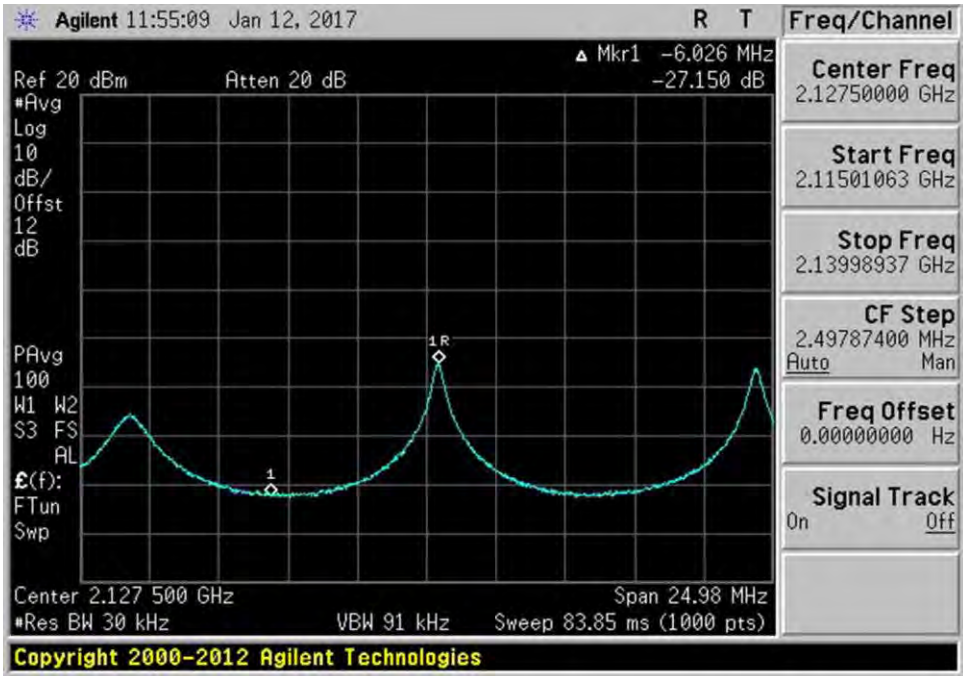
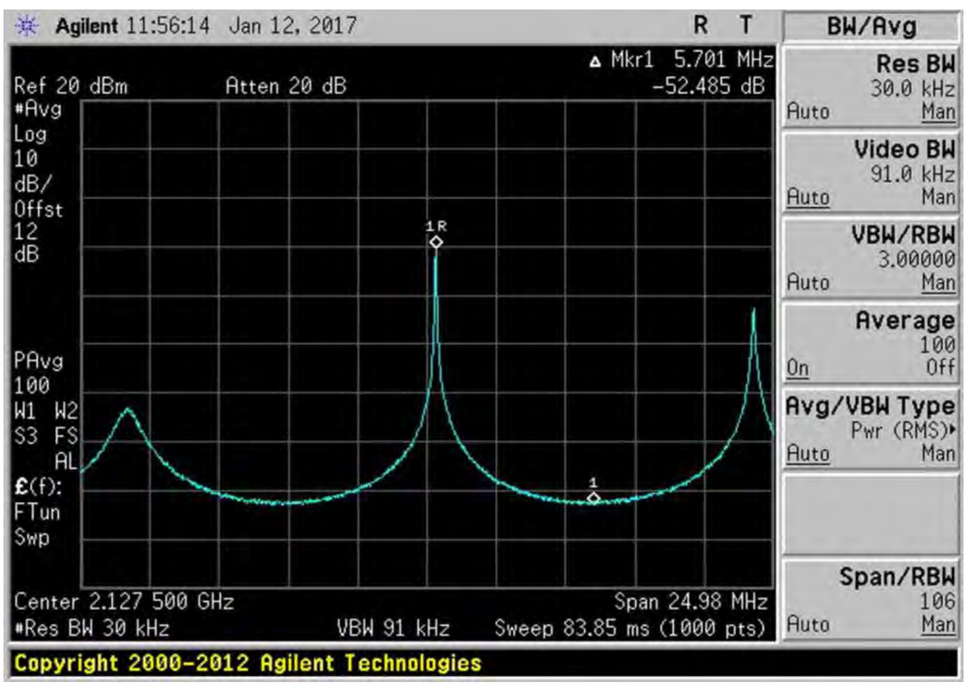


7.11.3_Osc_DL_2110-2155MHz-2_AWGNR



7.11.3_Osc_DL_2110-2155MHz-3_AWGNR

7.12 Radiated Spurious Emissions

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
Customer:	Huaptec
Specification:	**7.12 Radiated Spurious Emissions / 2.1053 Radiated Spurious Emissions** **47 CFR §22.917(a) Radiated Spurious Emissions** **47 CFR §24.238(a) Radiated Spurious Emissions** **47 CFR §27.53(c), (f), (g) and (h) Spurious Emissions**
Work Order #:	**99345** Date: 01/13/2017
Test Type:	**Radiated Emissions** Time: 7:20:50 AM
Tested By:	**Daniel Bertran** Sequence#: 1
Software:	EMITest 5.03.02

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed CMRS Wideband Consumer Booster.
During testing, the (EUT) is placed on the Styrofoam table top.
Five different CW signals (one per each band) are injected sequentially to the input port of EUT using a signal generator. The signal generator is set to produce a CW signal with the frequency set to the center of each operational band under test and the power level is set at Pin as determined from 7.2 section of the test procedure indicated further below.
Evaluation of DL path was performed with signals fed into the Outside antenna port while Inside antenna port was terminated with equivalent 50 Ohm Pasternack load (MN: PE6187 / SN: 1443).
Evaluation of UL path was performed with signal fed into the Inside antenna port while Outside antenna port was terminated with the same above 50 Ohm load.

Test environment conditions:
Temperature: 20.3°C
Relative Humidity: 48%
Pressure: 101.4 kPa

Part 22
UL: 824-849MHz
DL: 869-894MHz
Part 24
UL: 1850-1915MHz
DL: 1930-1995MHz
Part 27
UL: 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 2110-2155MHz, 728-746MHz, 746-757MHz

TX Freq = Center frequency of above listed bands.
Modulation= CW

Frequency range of measurement = 9 kHz- 22 GHz.
9 kHz - 150 kHz - RBW=200 Hz VBW=200 Hz
150 kHz - 30 MHz - RBW=9 kHz VBW=9 kHz
30 MHz - 1000MHz - RBW=120 kHz VBW=120 kHz
1000 MHz-22000MHz -RBW=1 MHz VBW=1 MHz

The test was performed in accordance with section 7.12 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016.

Note: Emissions in the band 1559-1610 MHz were investigated and these were not found within 20dB of the limit line.

27.53(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN01996	Biconilog Antenna	CBL6111C	11/1/2016	11/1/2018
	ANP06049	Attenuator	PE7002-6	5/9/2016	5/9/2018
	ANP00880	Cable	RG214U	5/10/2016	5/10/2018
	P06691	Cable	PE3062-180	6/23/2016	6/23/2018
	AN00971A	Preamp	8447D	2/5/2016	2/5/2018
	P01187	Cable	CNT-195	8/8/2016	8/8/2018
	AN02660	Spectrum Analyzer	E4446A	10/10/2016	10/10/2018
	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
	ANP06900	Cable	32022-29094K-29094K-36TC	12/30/2015	12/30/2017
	AN03114	Preamp	AMF-7D-00101800-30-10P	4/22/2015	4/22/2017
	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
	AN03302	Cable	32026-29094K-29094K-72TC	1/29/2016	1/29/2018
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F-12001800-20-10P	5/6/2015	5/6/2017
	AN02694	Horn Antenna-ANSI C63.5 3m	AMFW-5F-18002650-20-10P	5/7/2015	5/7/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP00929	Cable	various	1/25/2016	1/25/2018
	ANP06126	Cable	32022-29094K-29094K-168TC	3/18/2015	3/18/2017
	ANP06904	Cable	32022-29094K-29094K-36TC	12/30/2015	12/30/2017
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
	ANP06467	Attenuator	PE7014-10	5/13/2015	5/13/2017
	ANP06897	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017

Summary of Results

Pass: All Radiated Spurious Emissions were found with more than 20dB margin of the limit line.

Frequency Range of measurement 9kHz –> 22GHz

LIMIT LINE FOR SPURIOUS RADIATED EMISSION

REQUIRED ATTENUATION = 43+10 LOG P (DB)

For radiated spurious emission measured at 3 meter test distance,
Required attenuation = 43+10 Log $P_{t\ at\ 3\ meter}$ dB
Limit line (dBuV) = E_{dBuv} - Attenuation

E_{dBuv} = Measured field strength at 3 meter in dBuV/m

Power Density (Isotropic)

$$P_D = \frac{P_t}{4\pi r^2}$$

P_D = Power Density in Watts /m^2
Pt = Average Transmit Power
r = Test distance

Field Intensity E (V/m)

$$E = \sqrt{P_D \text{ x } 377}$$

$$E = \frac{\sqrt{P_t \text{ x } 377}}{4\pi r^2}$$

$$E = \sqrt{\frac{P_t \text{ x } 30}{r^2}}$$

$$P_t = \left(\frac{E^2 \text{ x } r^2}{30}\right)$$

10 Log P_t = 10 Log E^2 (V/m)+ 10 Log r^2 – 10 Log 30
10 Log P_t = 20 Log E (V/m) + 20 Log r – 10 Log 30

At 3 meter, r = 3 m

10 Log P_t = 20 Log E (V/m) + 20 Log 3 – 10 Log 30

10 Log P_t = 20 Log E (V/m) + 9.54 – 14.77
10 Log P_t = 20 Log E (V/m) - 5.23

<u>Since 20 Log E (V/m) = 20 Log E (uV/m) –120</u>

10 Log P_t = 20 Log E (uV/m) - 120 - 5.23
10 Log P_t = 20 Log E (uV/m) –125.23

Limit line (dBuV) at 3 meter = E_{dBuv} – Attenuation

= E_{dBuv} - (43+10 Log $P_{t\ at\ 3\ meter}$)

= E_{dBuv} - 43 - 10 Log $P_{t\ at\ 3\ meter}$

= E_{dBuv} - 43 – (20 Log E (uV/m) –125.23)

= E_{dBuv} - 43 - 20 Log E (uV/m) + 125.23

= E_{dBuv} - 20 Log E (uV/m) + 82.23

= ~~E_{dBuv}~~ - ~~E_{dBuv}~~ + 82.23

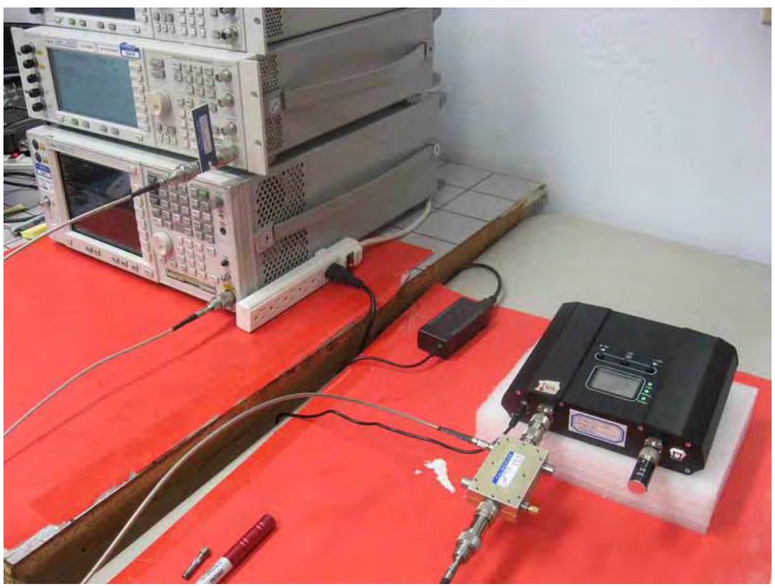
Since 20 Log E (uV/m) = E in dBuV/m

Radiated Emission limit 3 meter = 82.23 dBuV at any power level measured in dBuV

EXHIBIT A: TEST SETUP PHOTOS

Section 7.1, 7.2, 7.3, 7.4, 7.5, 7.6 and 7.10 Test Setup

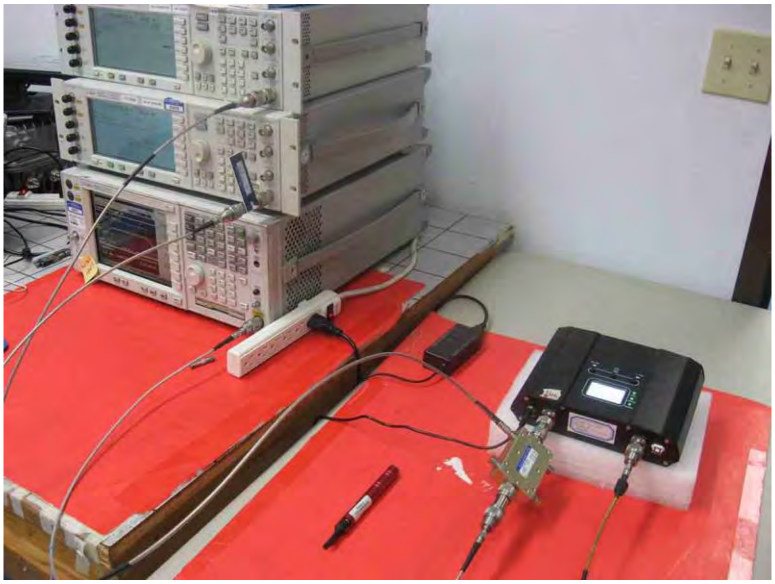
Section 7.7.1 Noise Test Setup



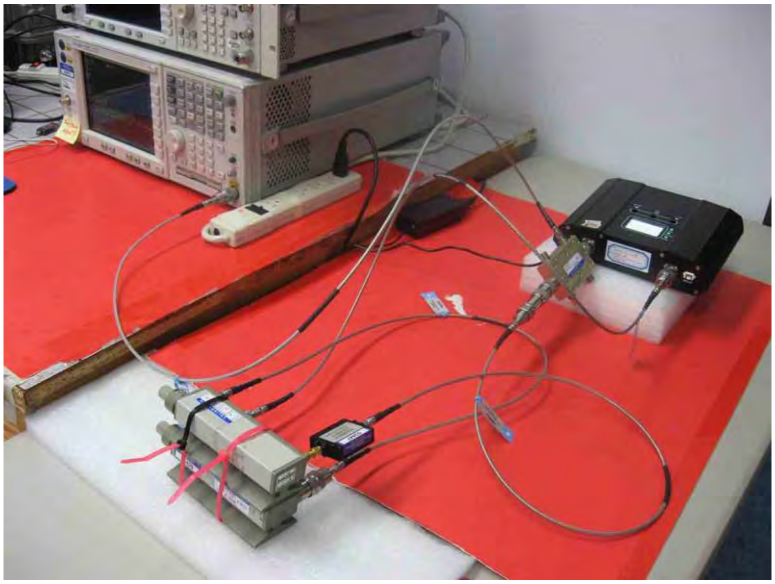
Section 7.7.1 Noise Test Setup

Section 7.8 Uplink Test Setup

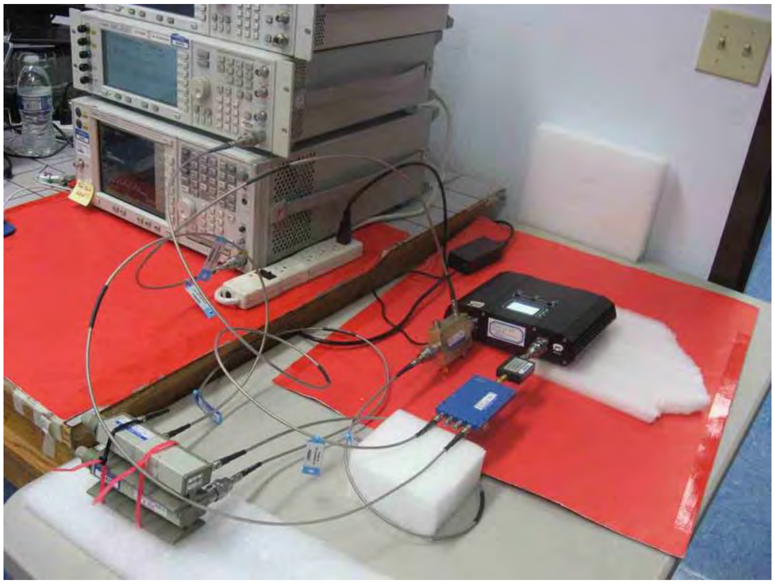
Section 7.9.1 Max Gain Test Setup



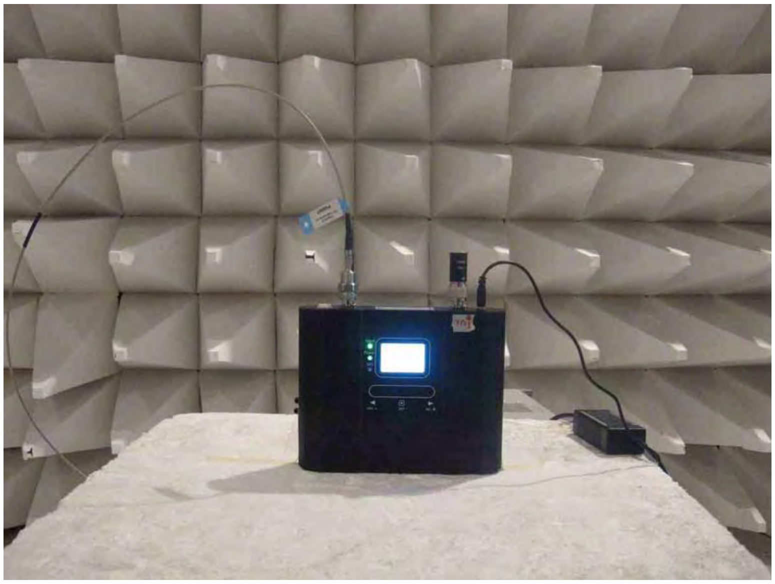
Section 7.9.2 Variable Gain Test Setup



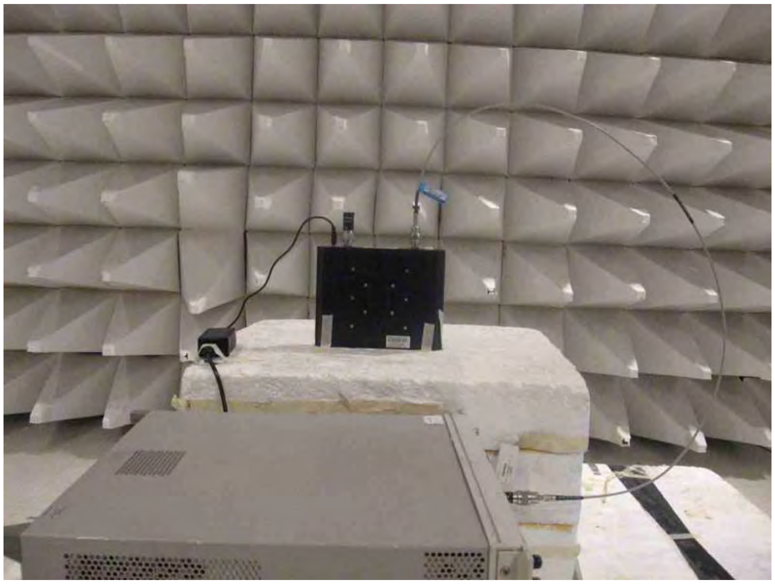
Section 7.11.2 Test Setup



Section 7.11.3 Test Setup



Section 7.12 Test Setup



Section 7.12 Test Setup

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBμV/m, the spectrum analyzer reading in dBμV was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBμV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBμV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.