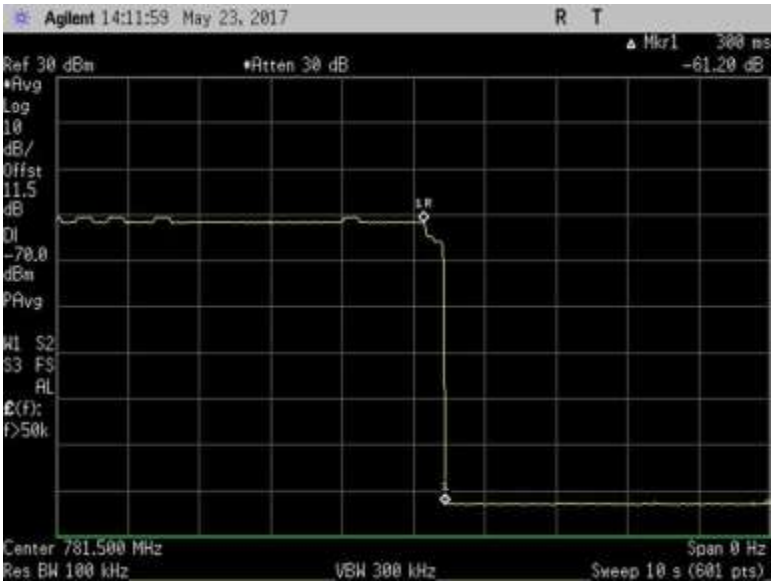
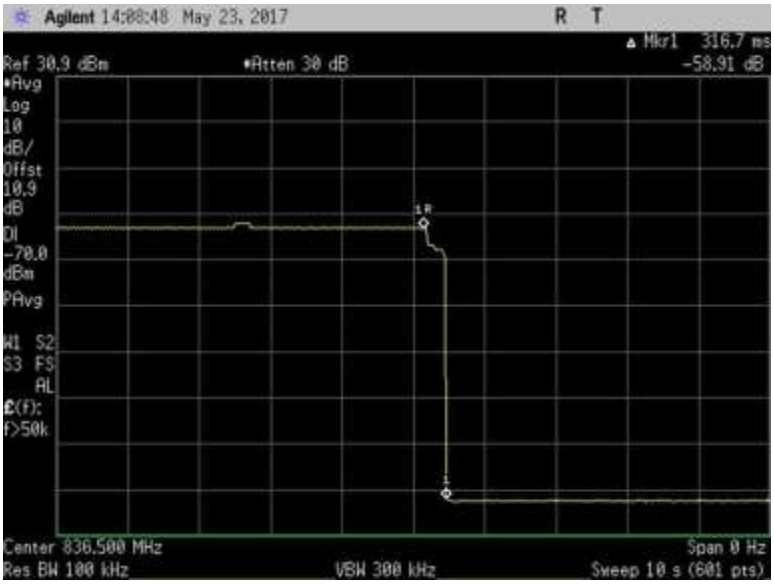
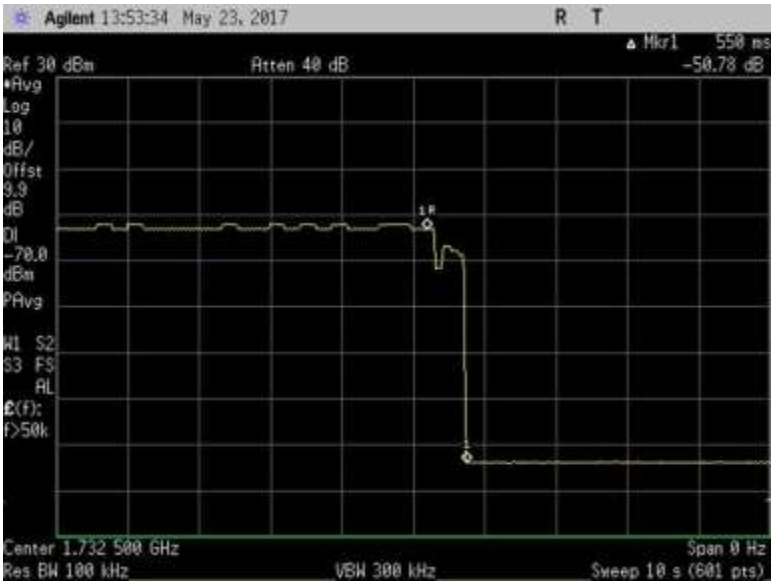


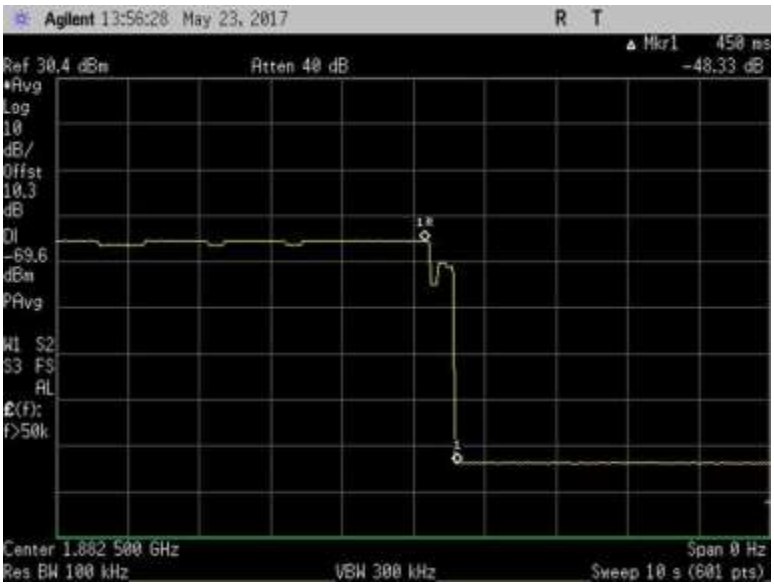
7.9.2_VarULGainTiming_UL_776-787MHz



7.9.2_VarULGainTiming_UL_824-849MHz



7.9.2_VarULGainTiming_UL_1710-1755MHz



7.9.2_VarULGainTiming_UL_1850-1915MHz

7.10 Occupied Band Width

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc		
Specification:	**7.10 Occupied Band Width / 47 CFR §2.1049 Occupied Band Width**		
Work Order #:	**99983**	Date:	5/22/2017
Test Type:	**Conducted Emissions**	Time:	13:17:00 PM
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

Test Conditions / Notes:

The equipment under test (EUT) is a Mobile Wideband Consumer Booster.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is a type FME connector and 50-ohm impedance.
The EUT Donor port is type FME connector and 50-ohm impedance.
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

Test procedure:
The test was performed in accordance with section 7.10 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016.
Firmware: 1.7
Test environment conditions: Test environment conditions: 22°C, 45% Relative Humidity, 101.5 kPa

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03418	Signal Generator	E4438C	7/30/2015	7/30/2017
	ANP06239	Attenuator	54A-10	8/8/2016	8/8/2018
	ANP06897	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP06898	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP05411	Attenuator	54A-10	1/18/2016	1/18/2018
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018

Summary of Results

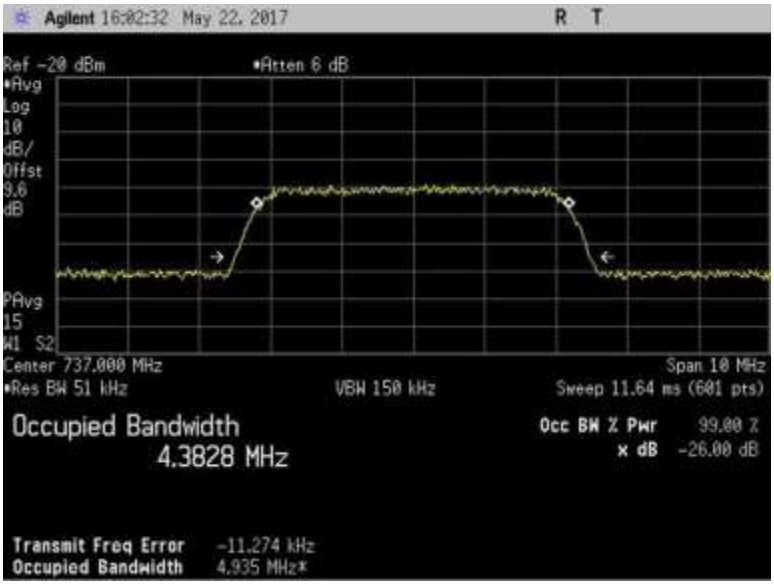
Pass: As summarized in plots and table below, the uniformity of the output signal relative to the input signal are practically identical. Therefore, the comparison is within limits.

OBW-Input (Hz)							OBW-Output (Hz)				
EDGE	GSM	CDMA	WCDMA	LTE			EDGE	GSM	CDMA	WCDMA	LTE
315788	314370	1358604	4909805	4753502			314140	313541	1364080	4927654	4745439
315148	318521	1358950	4943106	4749138			313370	314358	1367825	4933914	4741862
312644	314723	1363435	4904805	4803807			318072	313344	1365654	4925392	4763371
315449	312534	1361271	4919981	4756300			310944	312601	1363701	4893393	4754433
313984	314310	1356552	4944323	4774959			314241	315156	1320045	4900426	4722457
314962	310087	1367565	4952013	4790679			316123	315134	1367457	4931778	4840708
316466	314467	1363513	4933714	4819468			314740	314641	1356942	4936940	4792990
314587	313775	1367332	4947384	4805381			314763	316359	1369047	4887724	4768251
315760	312635	1358312	4934837	4860923			313384	313743	1366523	4898758	4767731
315165	314430	1371608	4928200	4808815			315523	310124	1354610	4890753	4807922

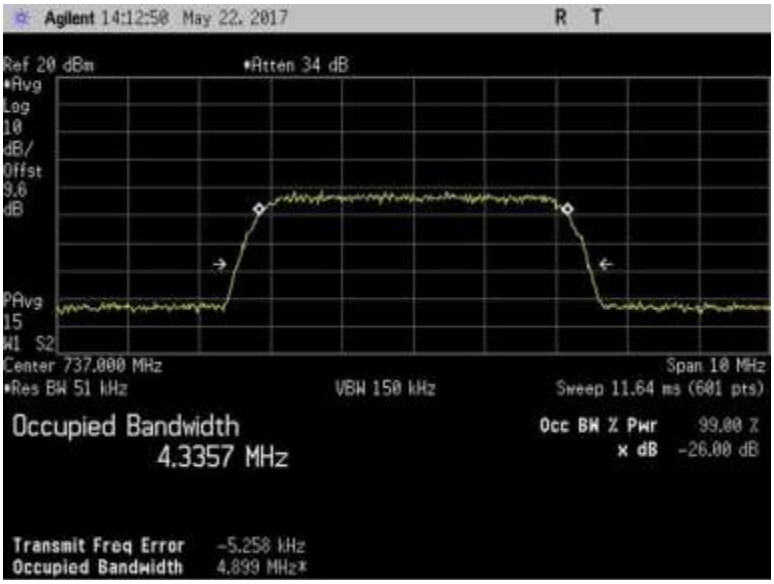
Occupied Bandwidth Difference at -26dB (%)					
Frequency Range	**EDGE**	**GSM**	**CDMA**	**WCDMA**	**LTE**
UL_1710-1755MHz	0.52%	0.26%	0.40%	0.36%	0.17%
UL_1850-1915MHz	0.56%	1.31%	0.65%	0.19%	0.15%
UL_824-849MHz	1.74%	0.44%	0.16%	0.42%	0.84%
UL_698-716MHz	1.43%	0.02%	0.18%	0.54%	0.04%
UL_776-787MHz	0.08%	0.27%	2.69%	0.89%	1.10%
DL_2110-2155MHz	0.37%	1.63%	0.01%	0.41%	1.04%
DL_1930-1995MHz	0.55%	0.06%	0.48%	0.07%	0.55%
DL_869-894MHz	0.06%	0.82%	0.13%	1.21%	0.77%
DL_728-746MHz	0.75%	0.35%	0.60%	0.73%	1.92%
DL_746-757MHz	0.11%	1.37%	1.24%	0.76%	0.02%

Plots

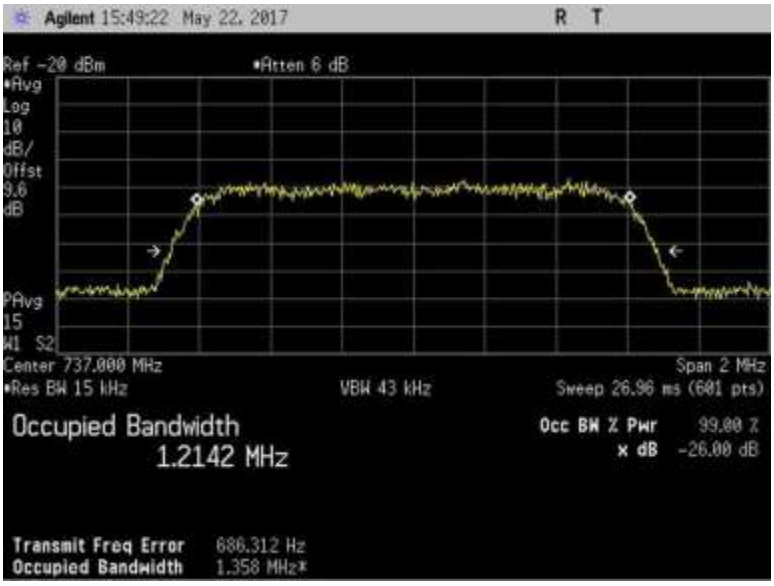
DL
AWGN, CDMA, EDGE, GSM and LTE



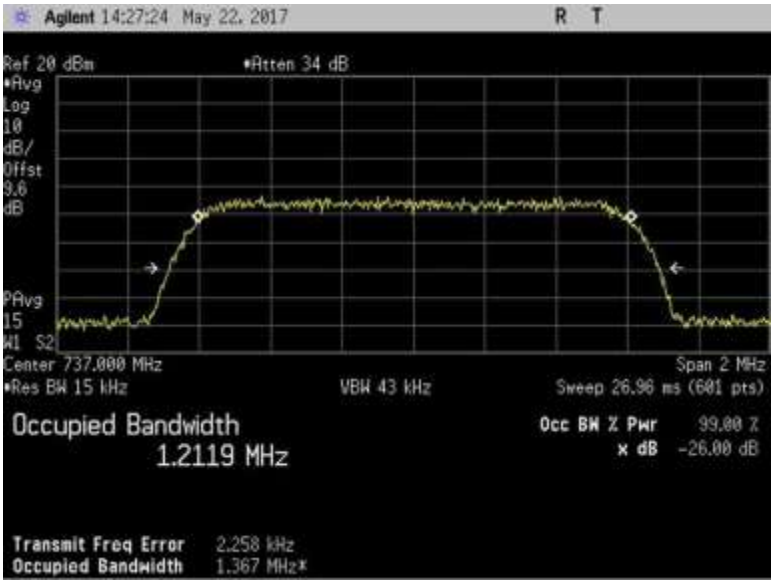
7.10_OBW_DL_728-746MHz_AWGN_In



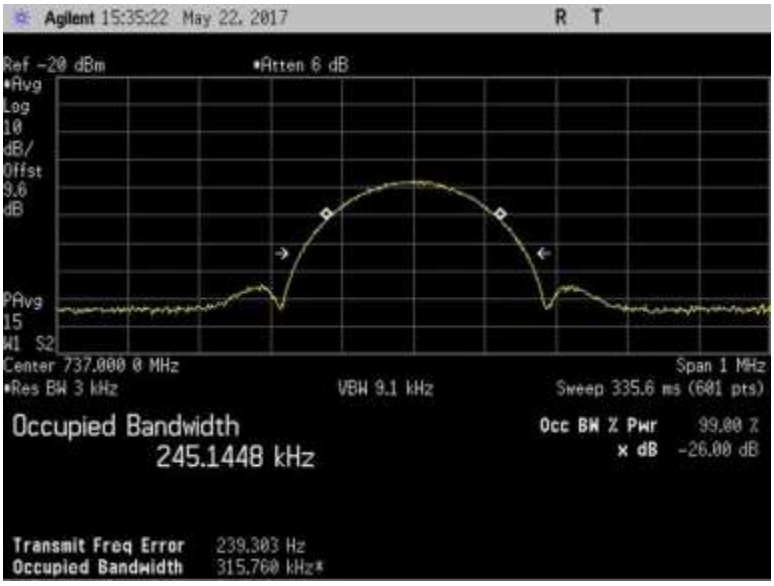
7.10_OBW_DL_728-746MHz_AWGN_Out



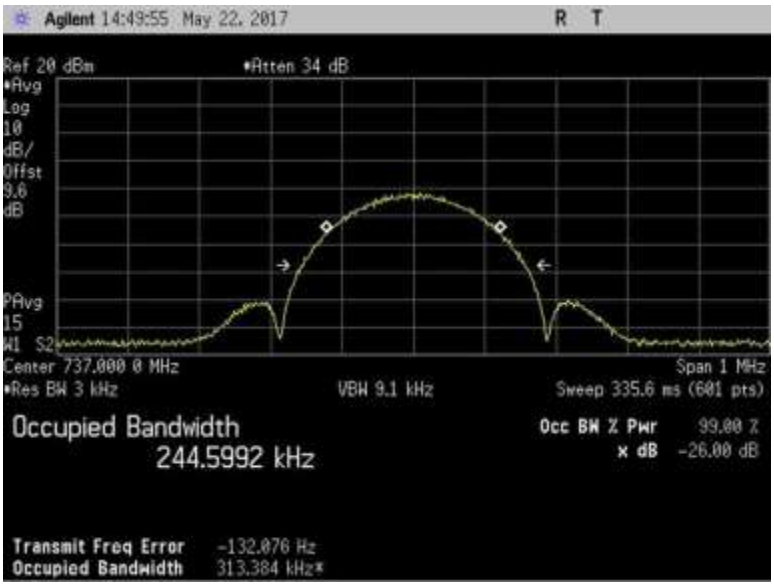
7.10_OBW_DL_728-746MHz_CDMA_In



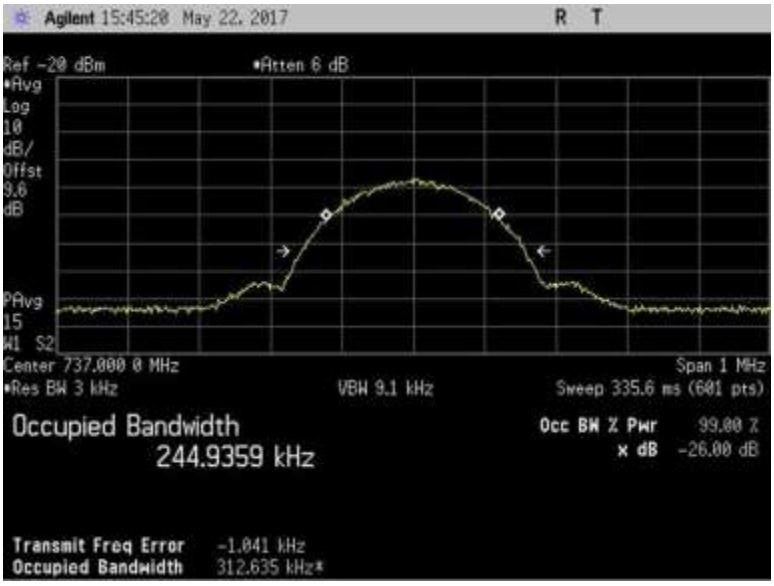
7.10_OBW_DL_728-746MHz_CDMA_Out



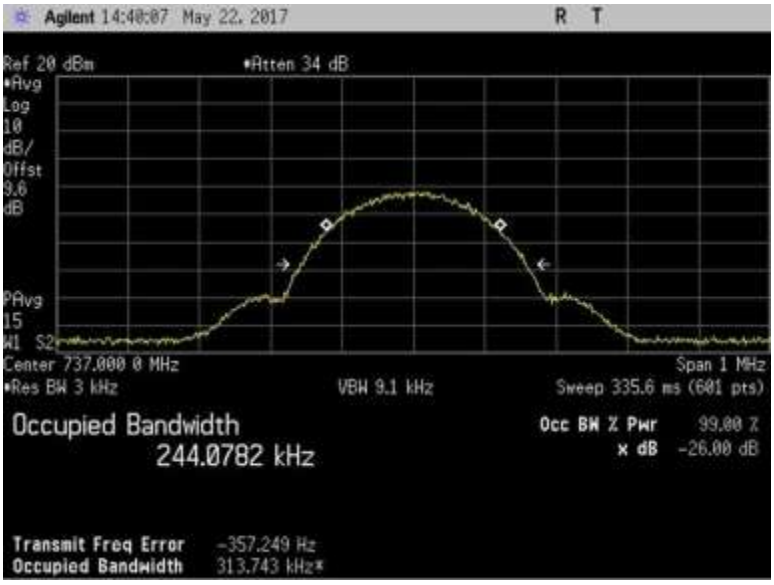
7.10_OBW_DL_728-746MHz_EDGE_In



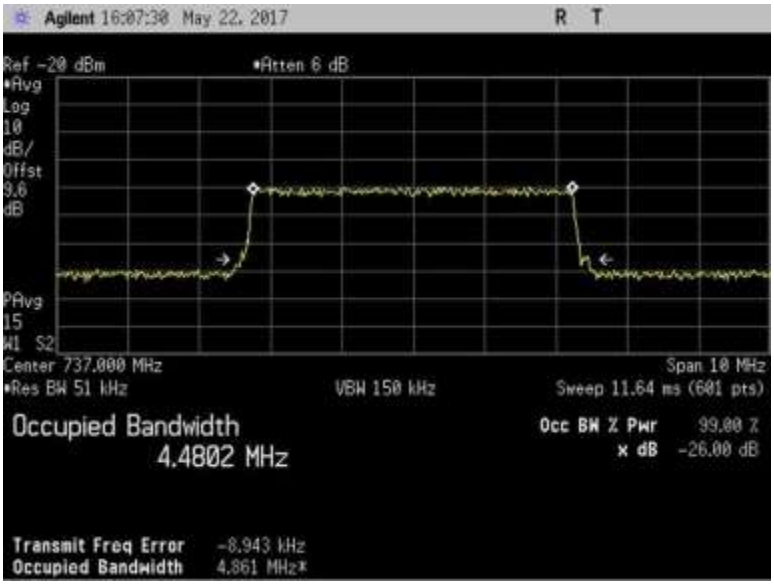
7.10_OBW_DL_728-746MHz_EDGE_Out



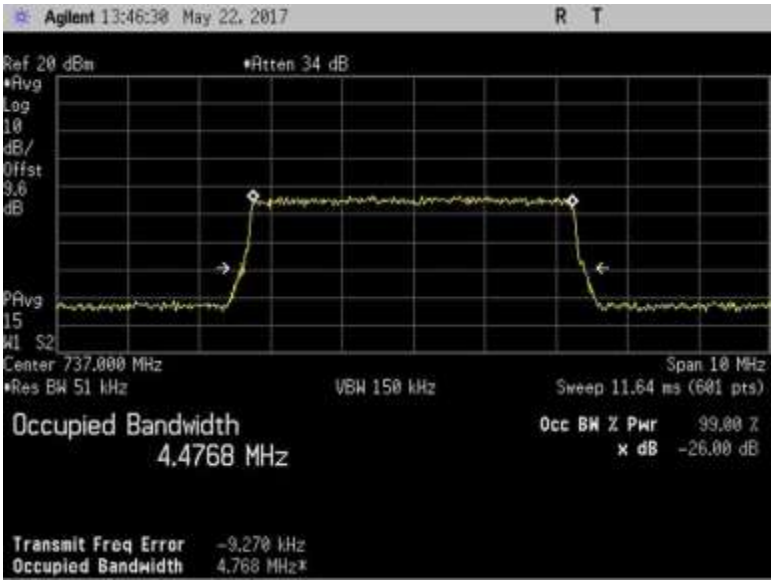
7.10_OBW_DL_728-746MHz_GSM_In



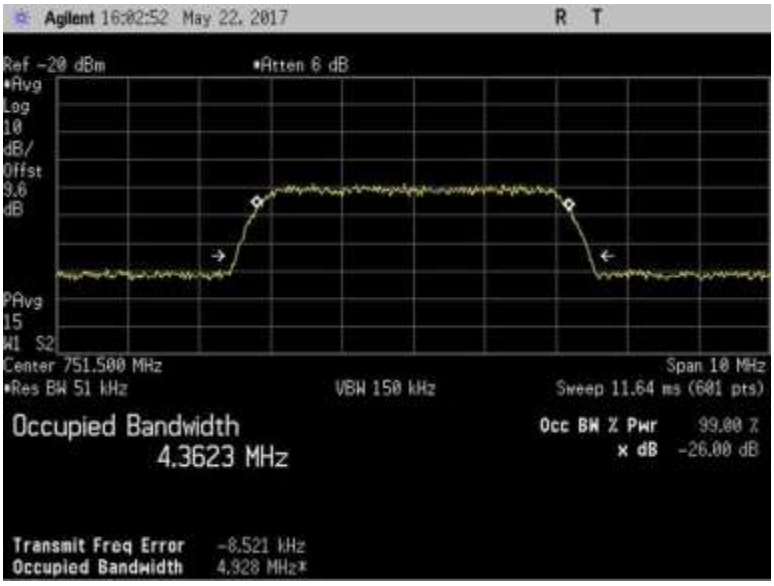
7.10_OBW_DL_728-746MHz_GSM_Out



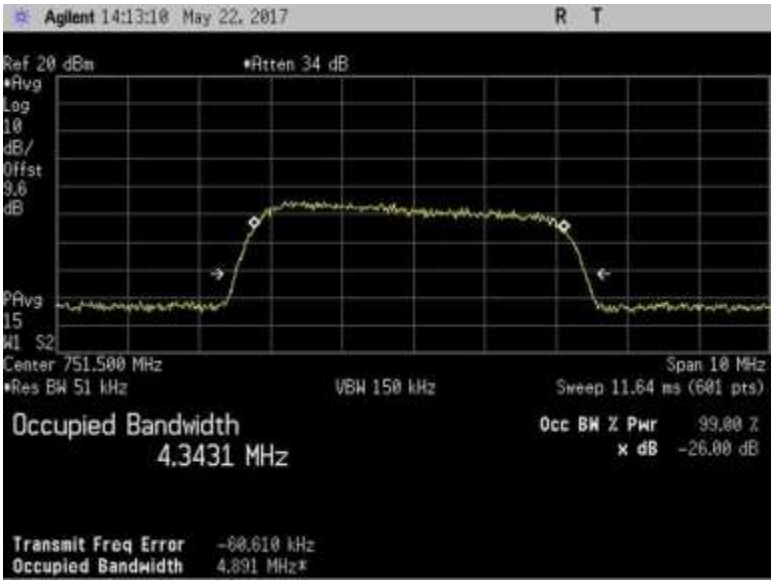
7.10_OBW_DL_728-746MHz_LTE_In



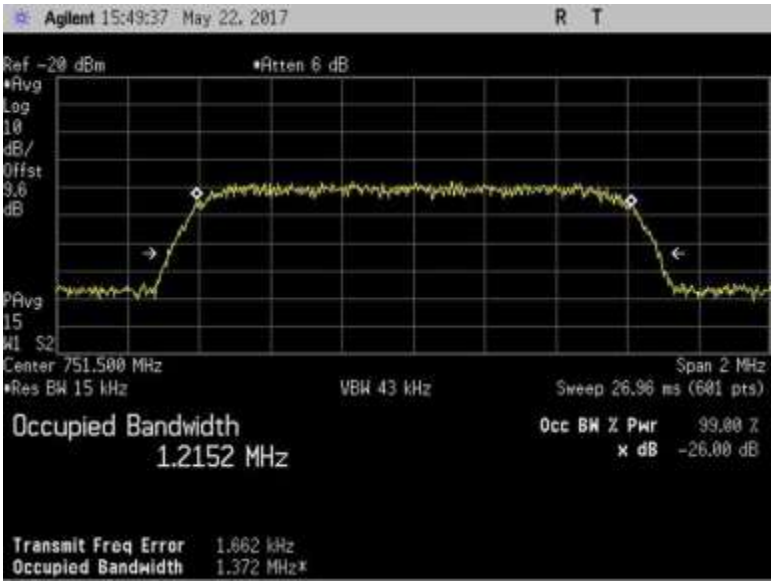
7.10_OBW_DL_728-746MHz_LTE_Out



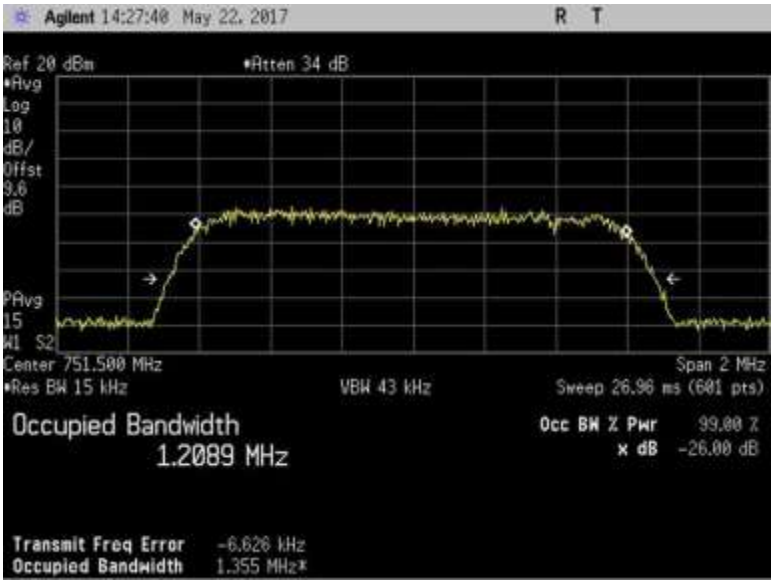
7.10_OBW_DL_746-757MHz_AWGN_In



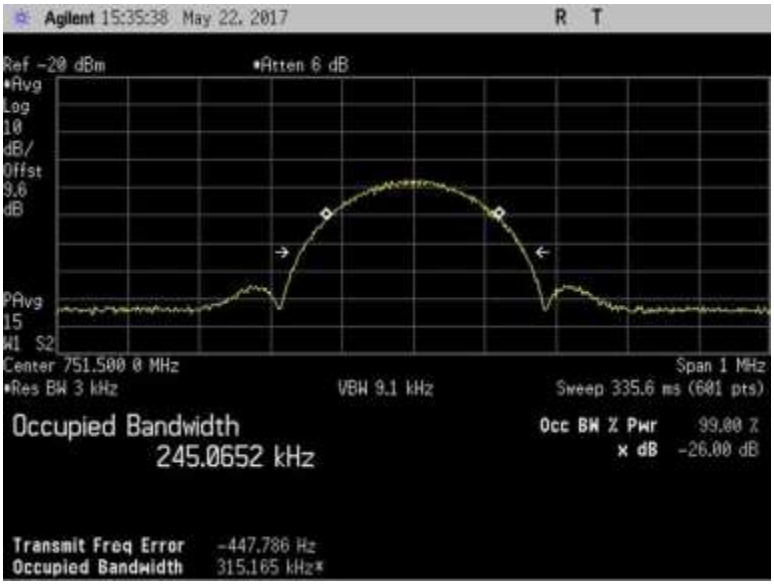
7.10_OBW_DL_746-757MHz_AWGN_Out



7.10_OBW_DL_746-757MHz_CDMA_In

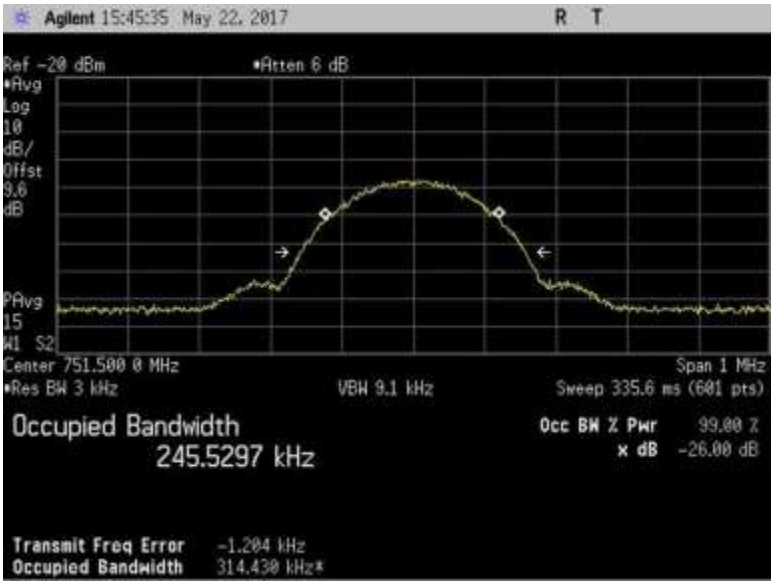


7.10_OBW_DL_746-757MHz_CDMA_Out

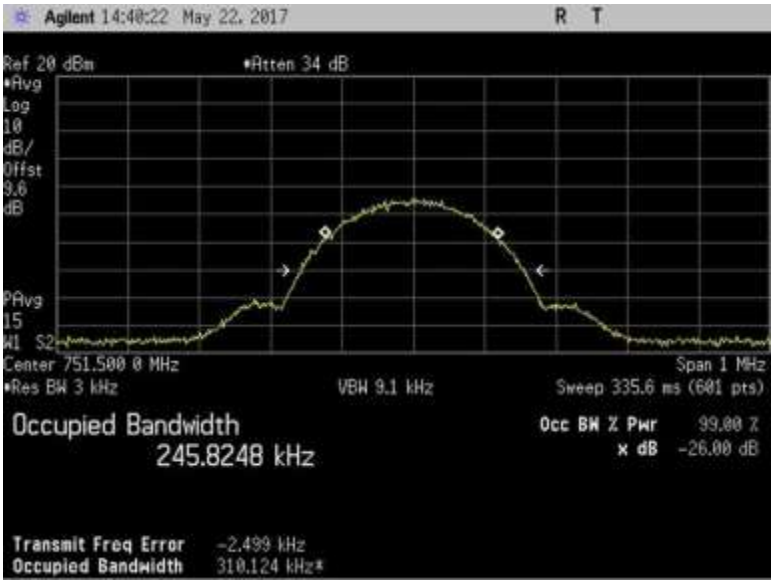


7.10_OBW_DL_746-757MHz_EDGE_In

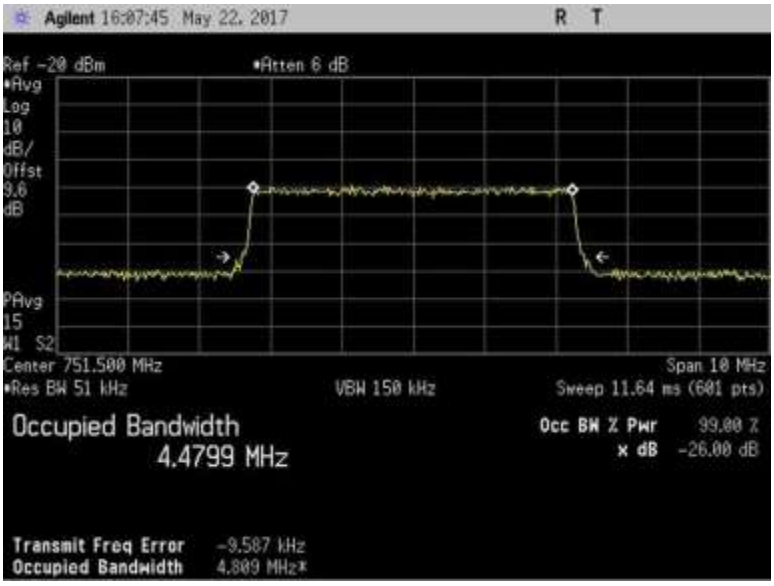
7.10_OBW_DL_746-757MHz_EDGE_Out



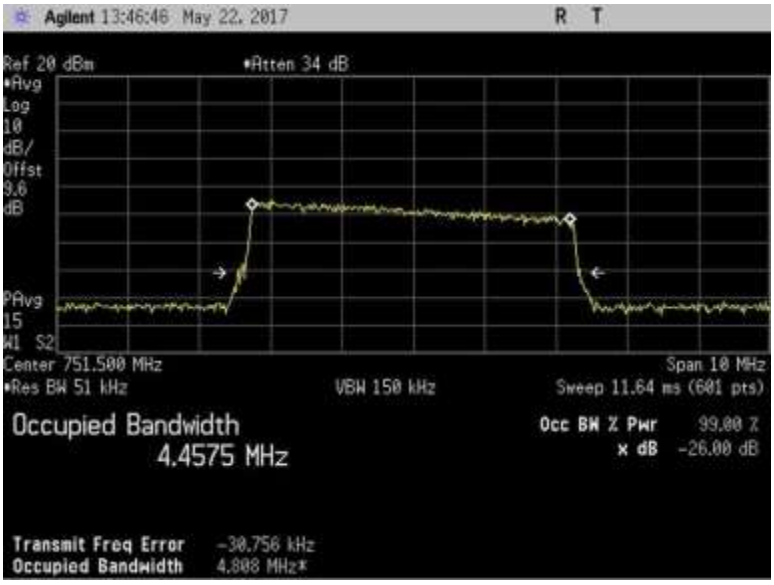
7.10_OBW_DL_746-757MHz_GSM_In



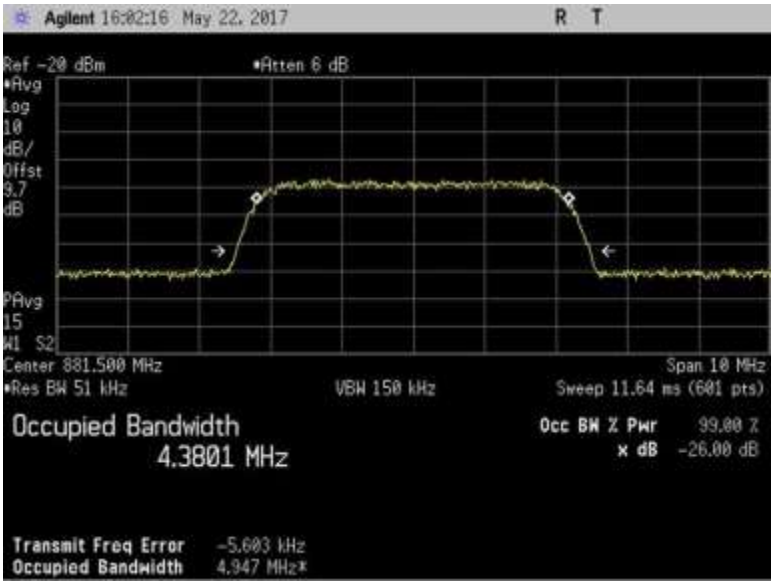
7.10_OBW_DL_746-757MHz_GSM_Out



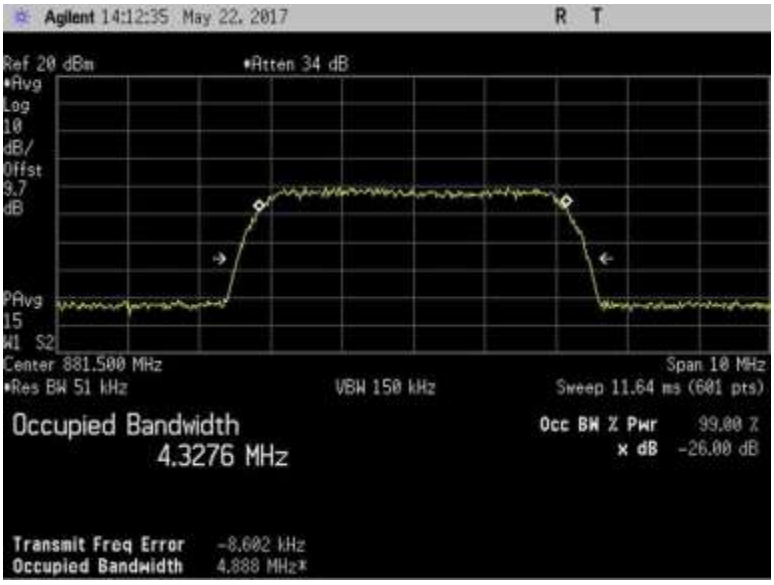
7.10_OBW_DL_746-757MHz_LTE_In



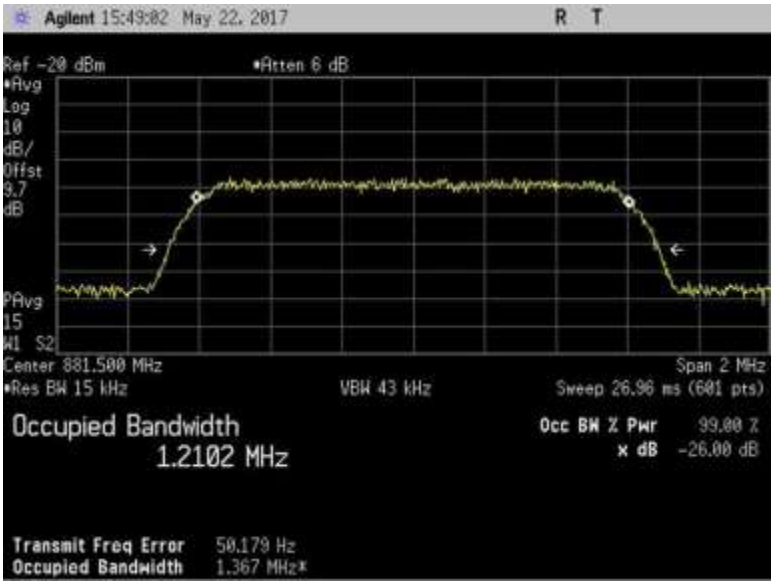
7.10_OBW_DL_746-757MHz_LTE_Out



7.10_OBW_DL_869-894MHz_AWGN_In

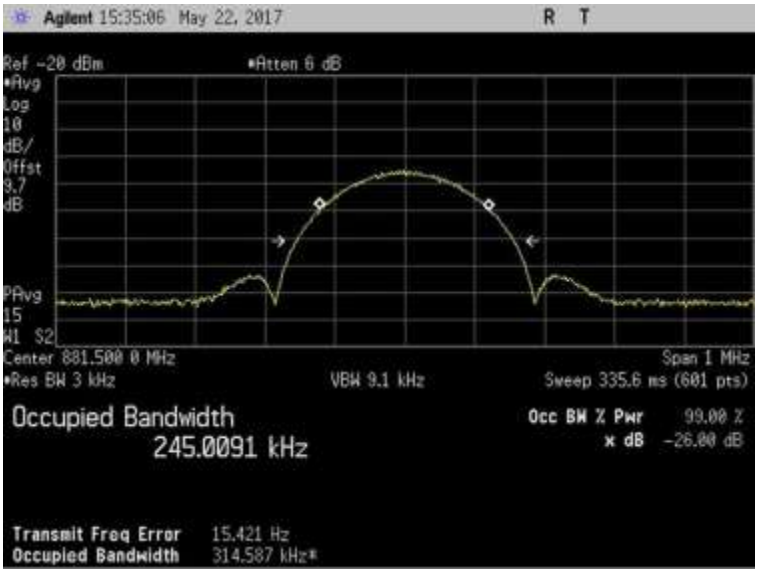


7.10_OBW_DL_869-894MHz_AWGN_Out

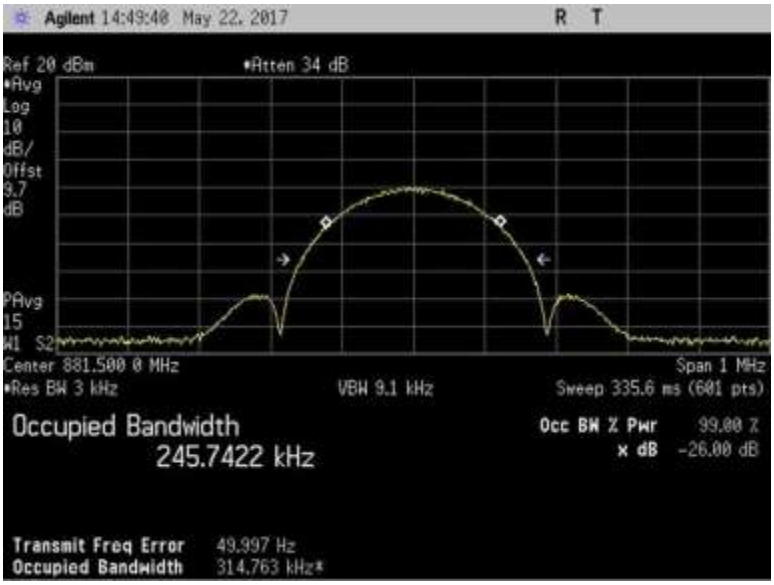


7.10_OBW_DL_869-894MHz_CDMA_In

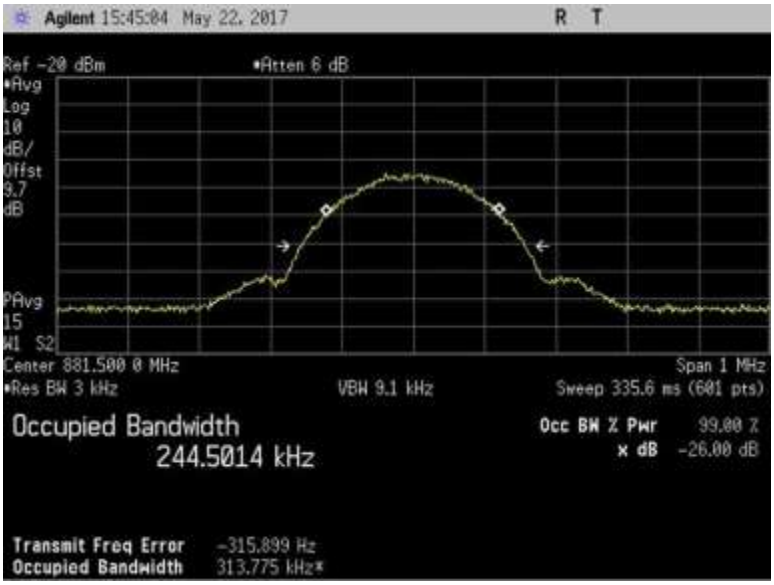
7.10_OBW_DL_869-894MHz_CDMA_Out



7.10_OBW_DL_869-894MHz_EDGE_In

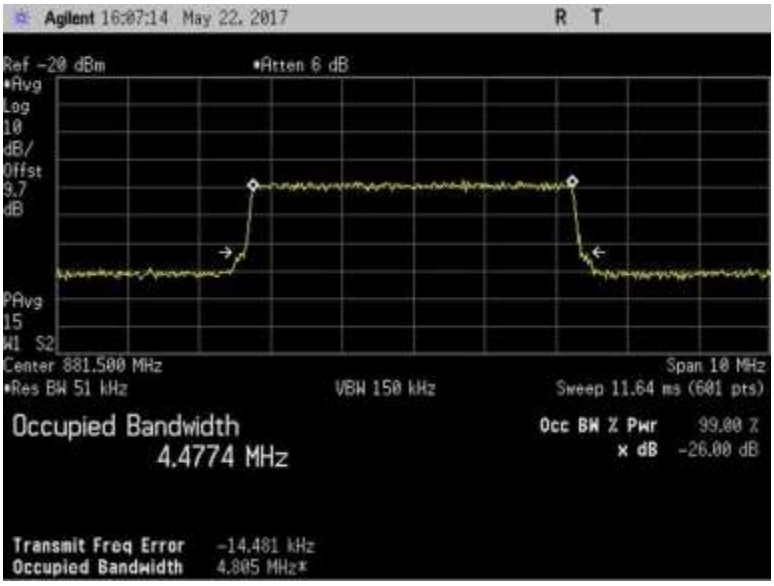


7.10_OBW_DL_869-894MHz_EDGE_Out

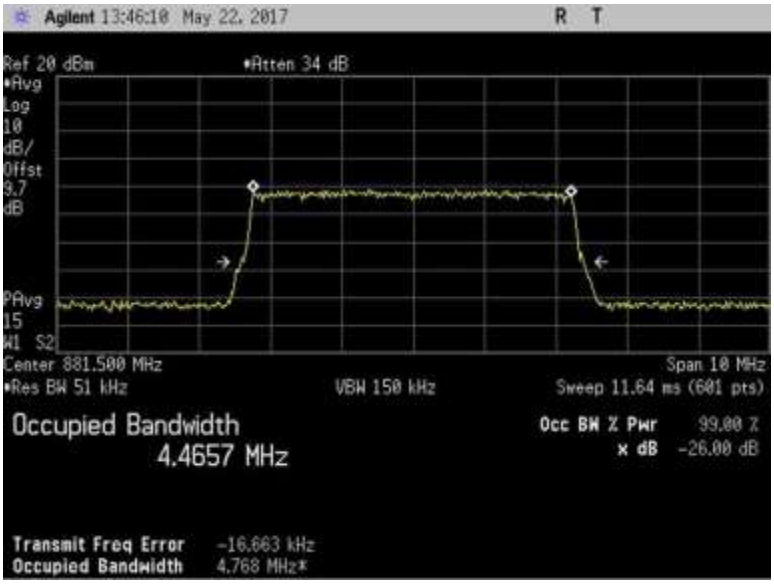


7.10_OBW_DL_869-894MHz_GSM_In

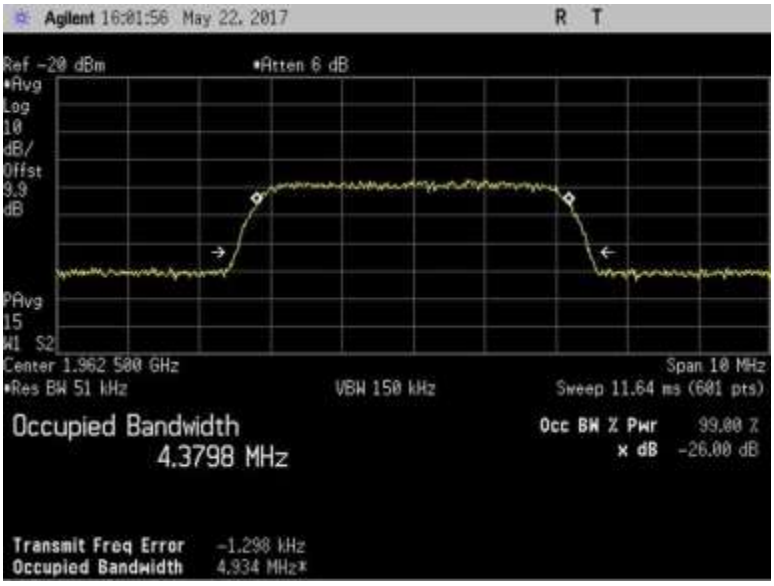
7.10_OBW_DL_869-894MHz_GSM_Out



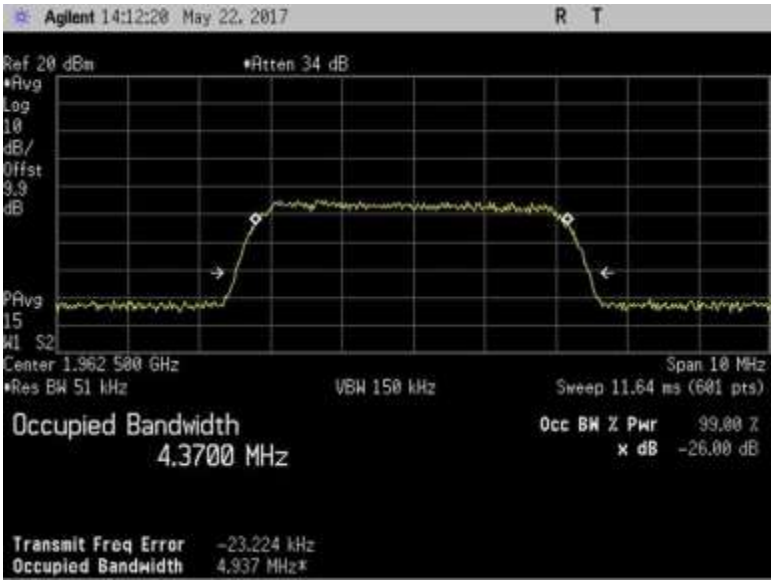
7.10_OBW_DL_869-894MHz_LTE_In



7.10_OBW_DL_869-894MHz_LTE_Out

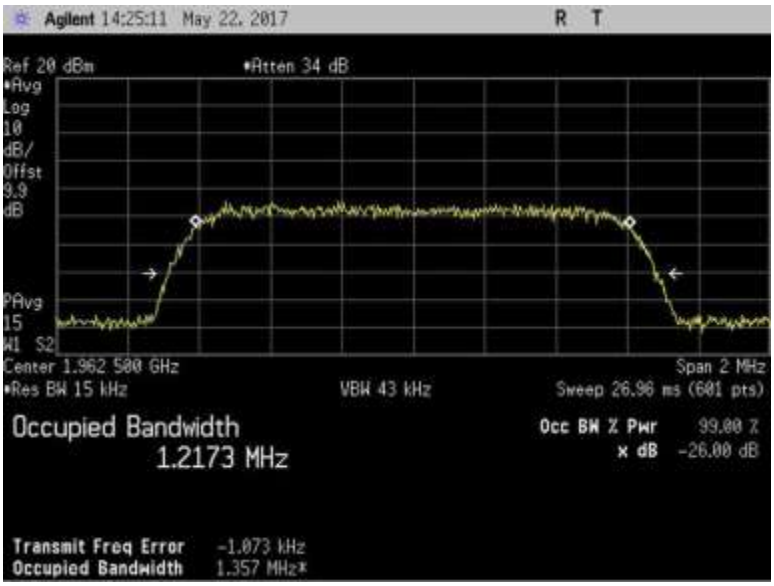


7.10_OBW_DL_1930-1995MHz_AWGN_In

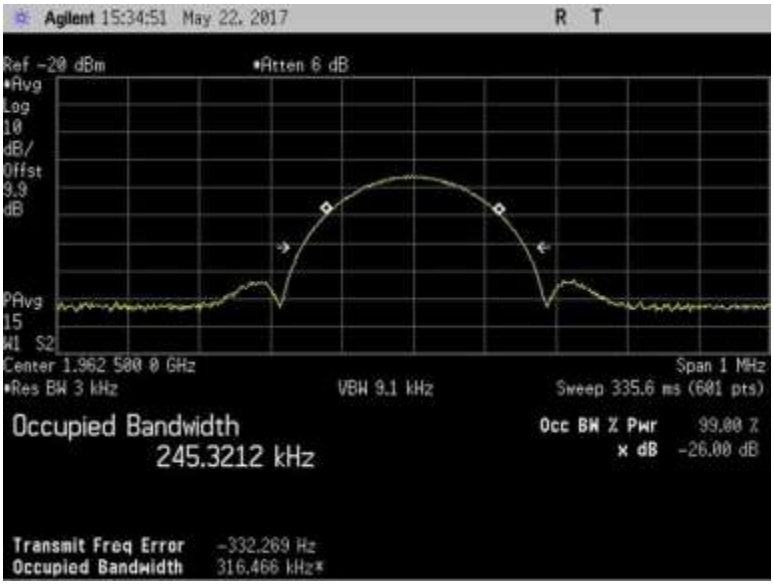


7.10_OBW_DL_1930-1995MHz_AWGN_Out

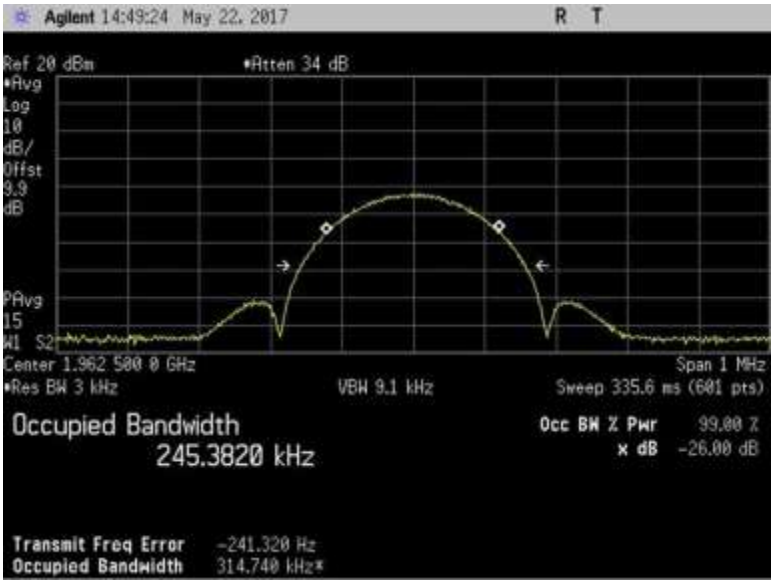
7.10_OBW_DL_1930-1995MHz_CDMA_In



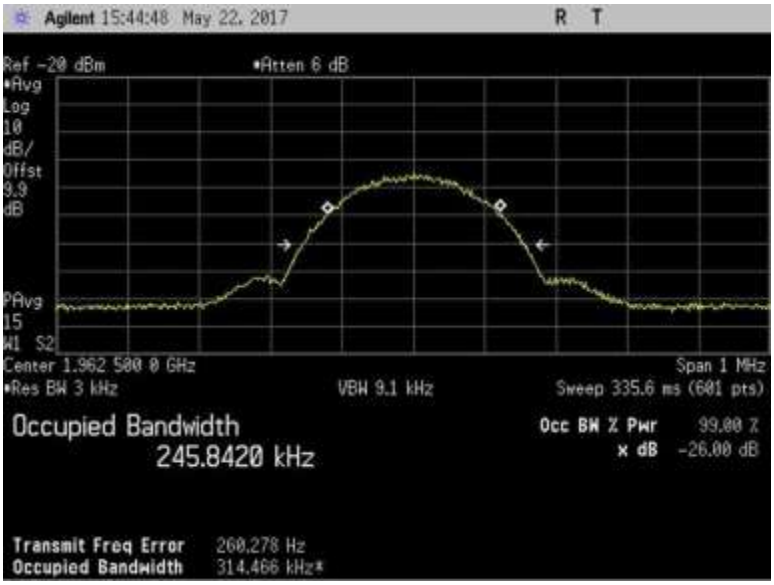
7.10_OBW_DL_1930-1995MHz_CDMA_Out



7.10_OBW_DL_1930-1995MHz_EDGE_In

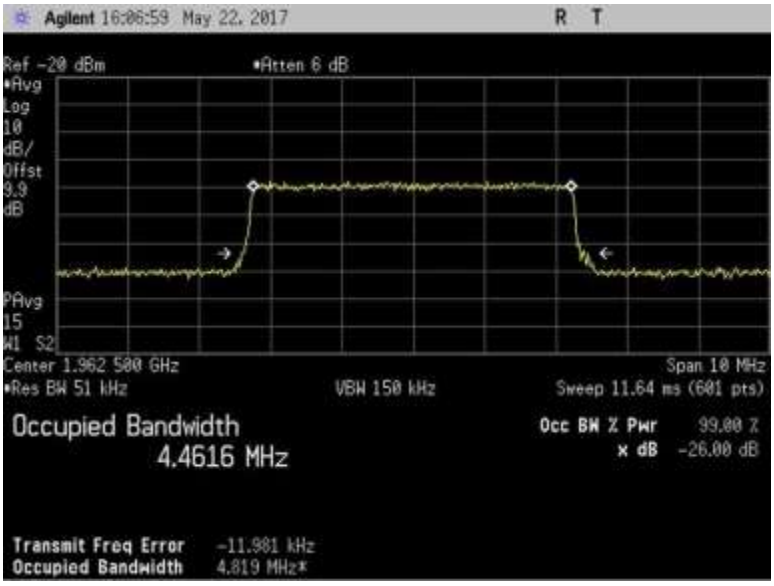


7.10_OBW_DL_1930-1995MHz_EDGE_Out

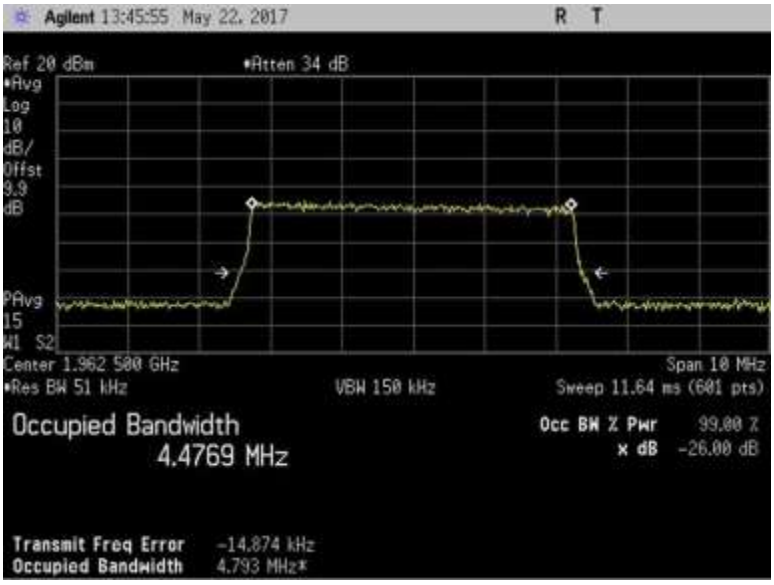


7.10_OBW_DL_1930-1995MHz_GSM_In

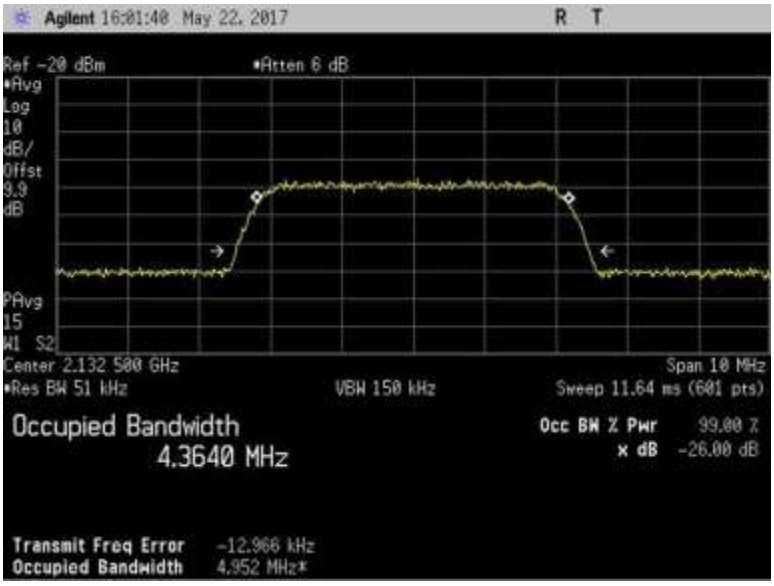
7.10_OBW_DL_1930-1995MHz_GSM_Out



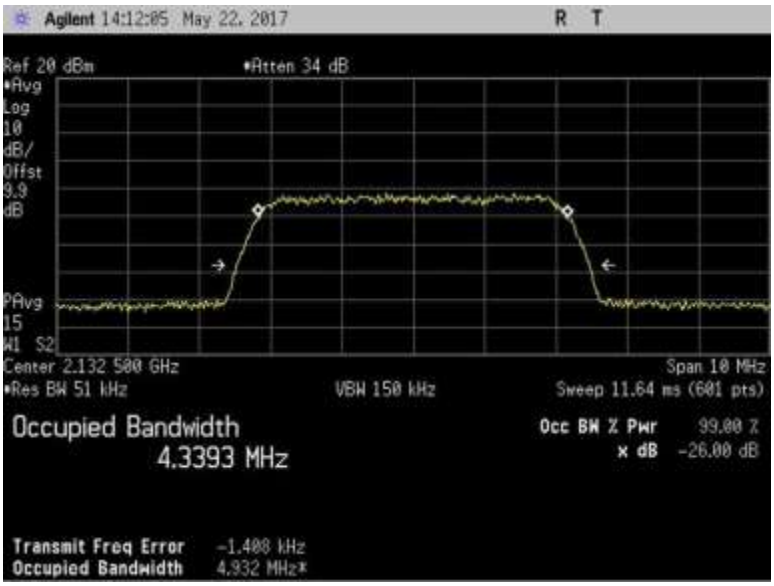
7.10_OBW_DL_1930-1995MHz_LTE_In



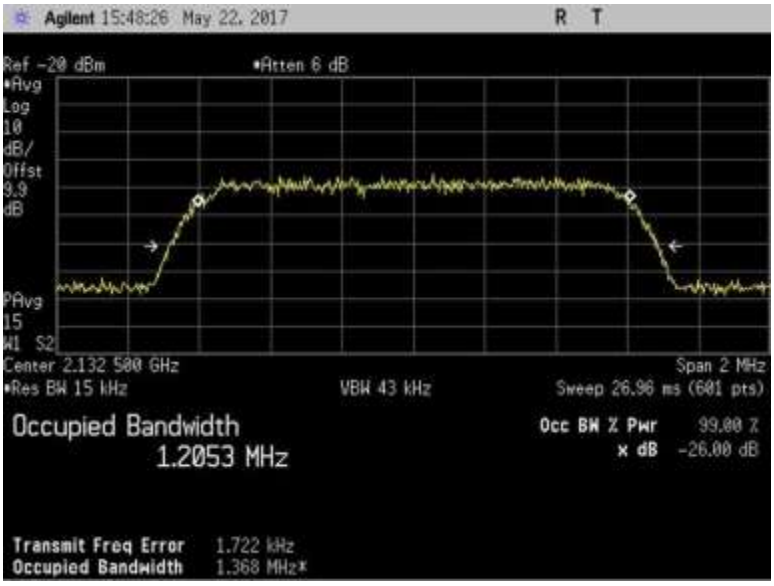
7.10_OBW_DL_1930-1995MHz_LTE_Out



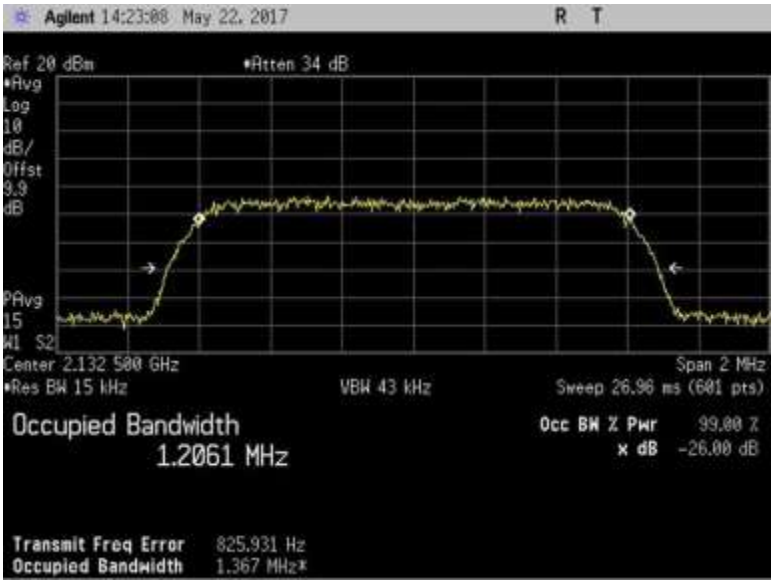
7.10_OBW_DL_2110-2155MHz_AWGN_In



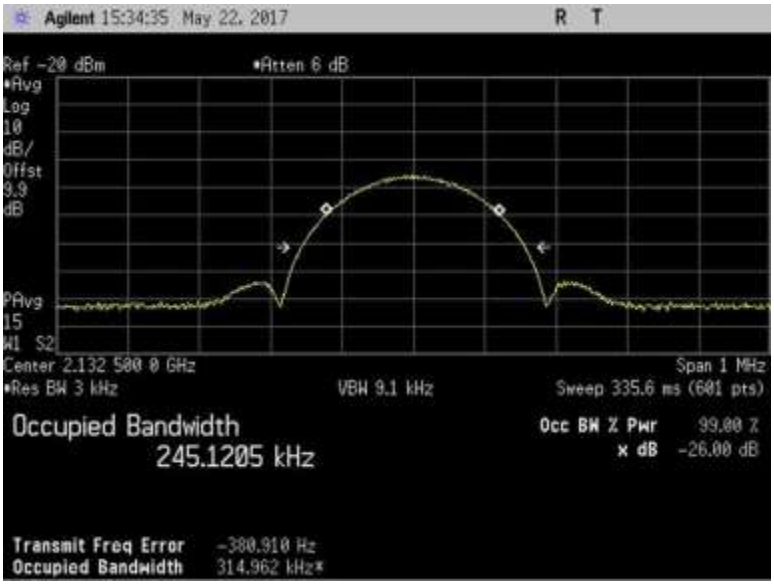
7.10_OBW_DL_2110-2155MHz_AWGN_Out



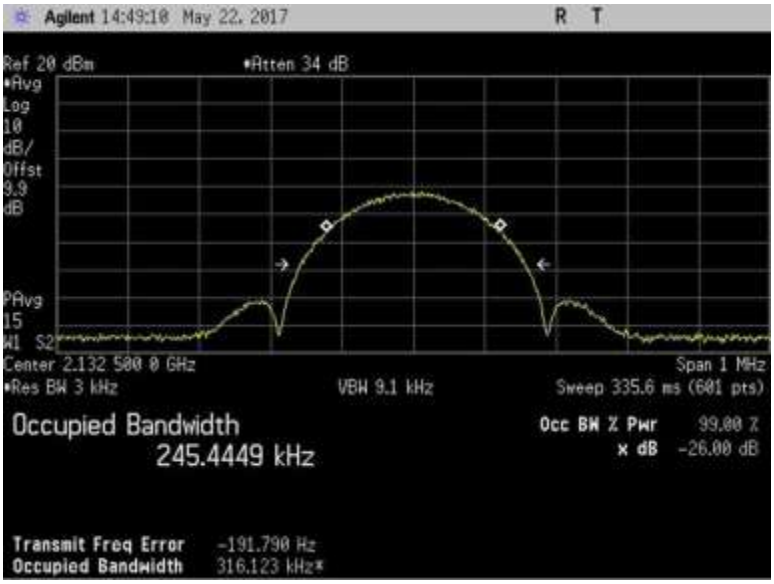
7.10_OBW_DL_2110-2155MHz_CDMA_In



7.10_OBW_DL_2110-2155MHz_CDMA_Out



7.10_OBW_DL_2110-2155MHz_EDGE_In



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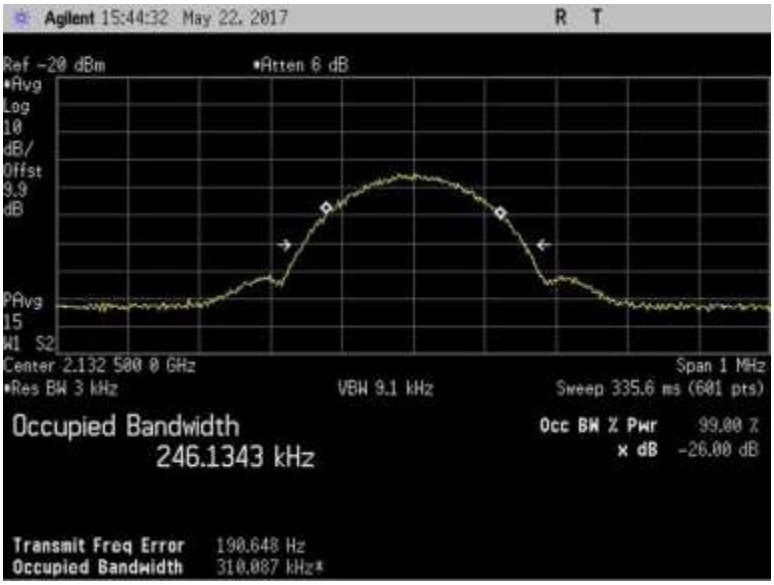
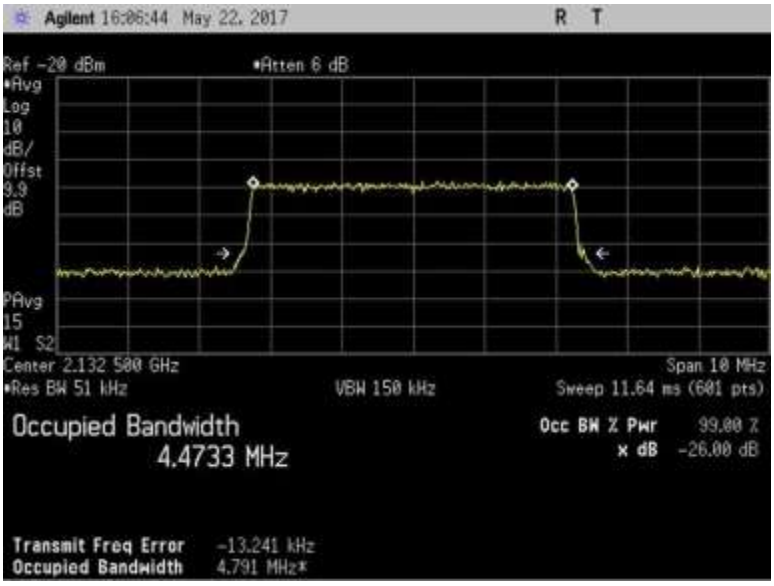
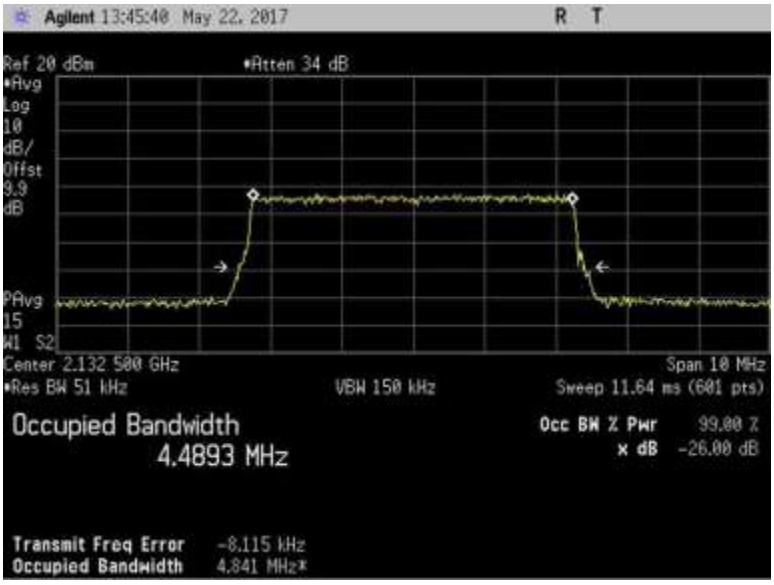


7.10_OBW_DL_2110-2155MHz_GSM_In

7.10_OBW_DL_2110-2155MHz_GSM_Out

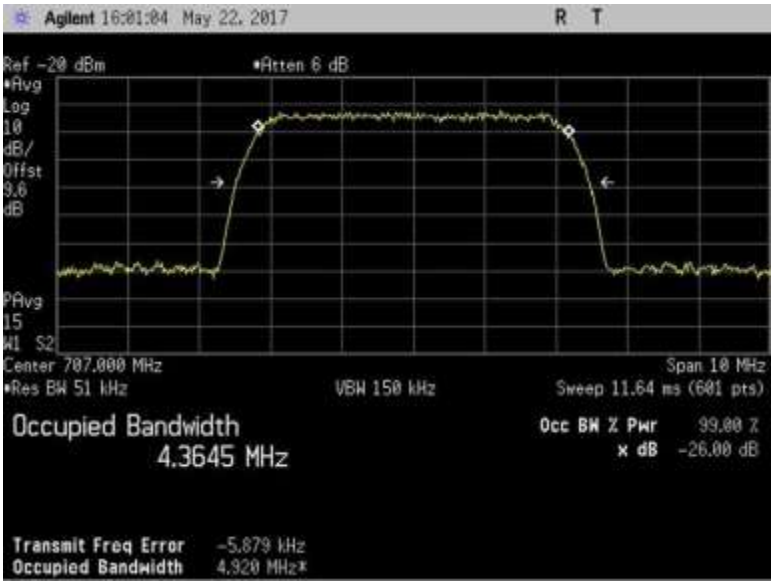


7.10_OBW_DL_2110-2155MHz_LTE_In

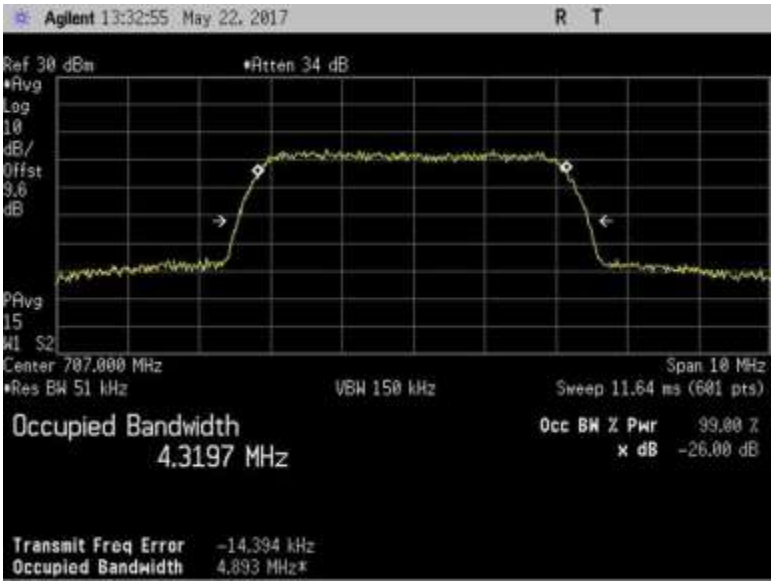


7.10_OBW_DL_2110-2155MHz_LTE_Out

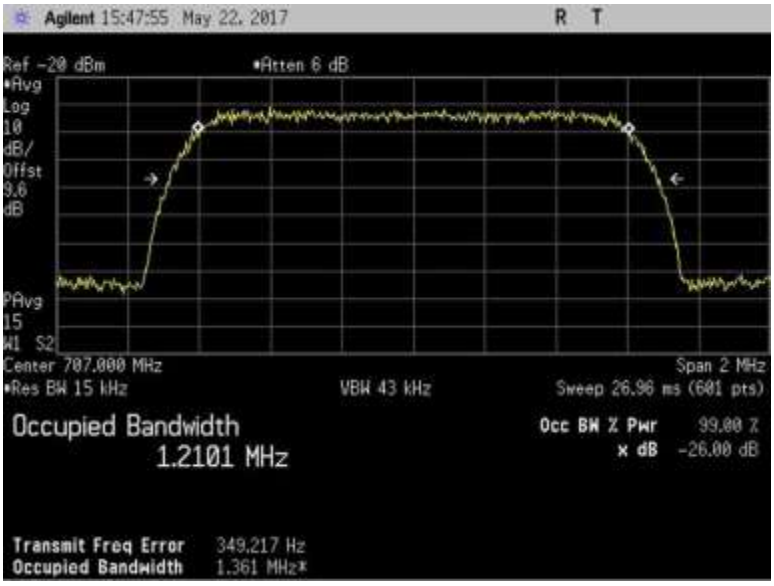
UL
AWGN, DCMA, EDGE, GSM and LTE



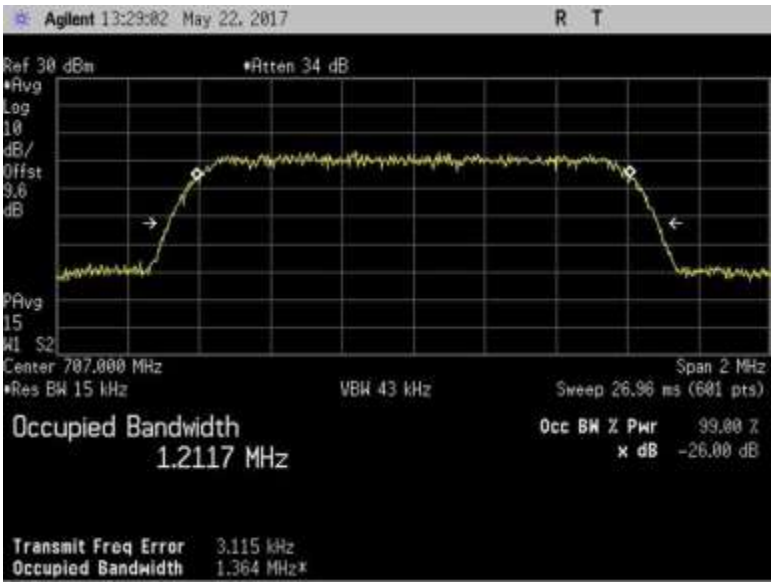
7.10_OBW_UL_698-716MHz_AWGN_In



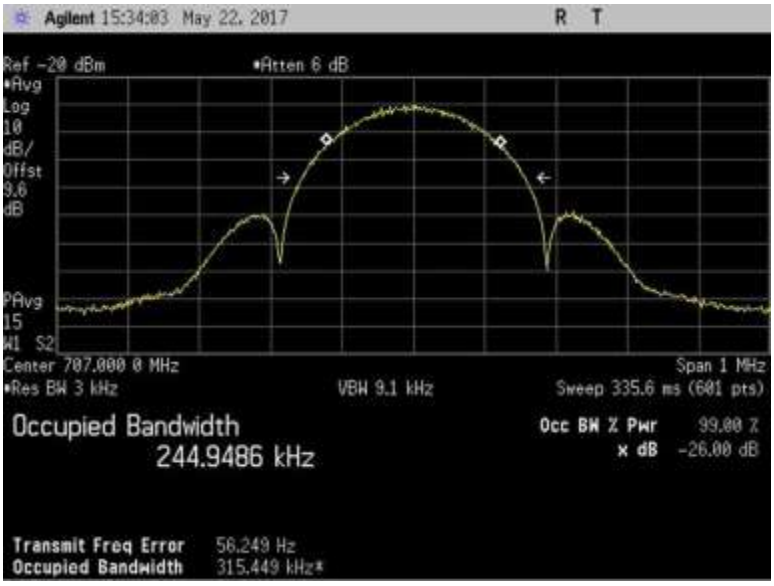
7.10_OBW_UL_698-716MHz_AWGN_Out



7.10_OBW_UL_698-716MHz_CDMA_In

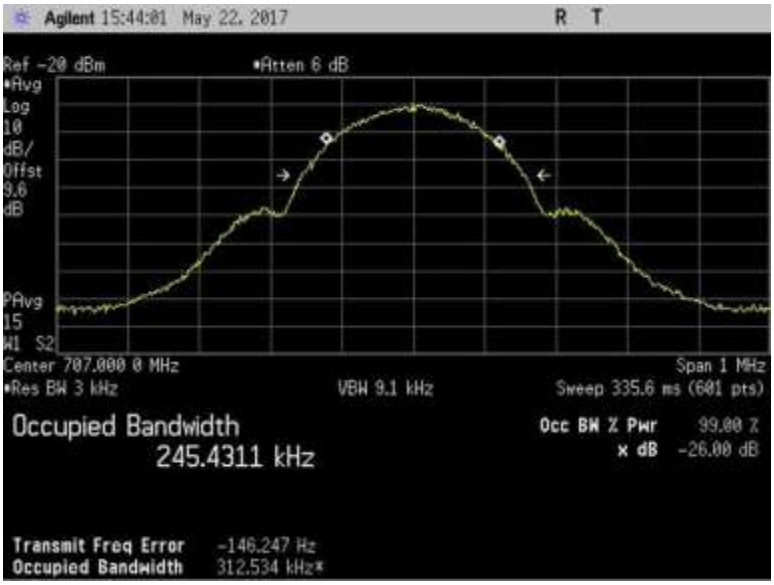


7.10_OBW_UL_698-716MHz_CDMA_Out



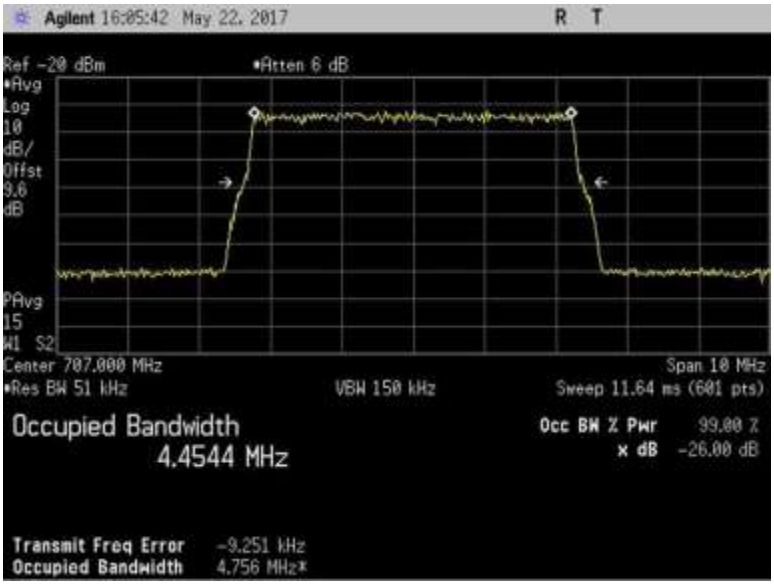
7.10_OBW_UL_698-716MHz_EDGE_In

7.10_OBW_UL_698-716MHz_EDGE_Out

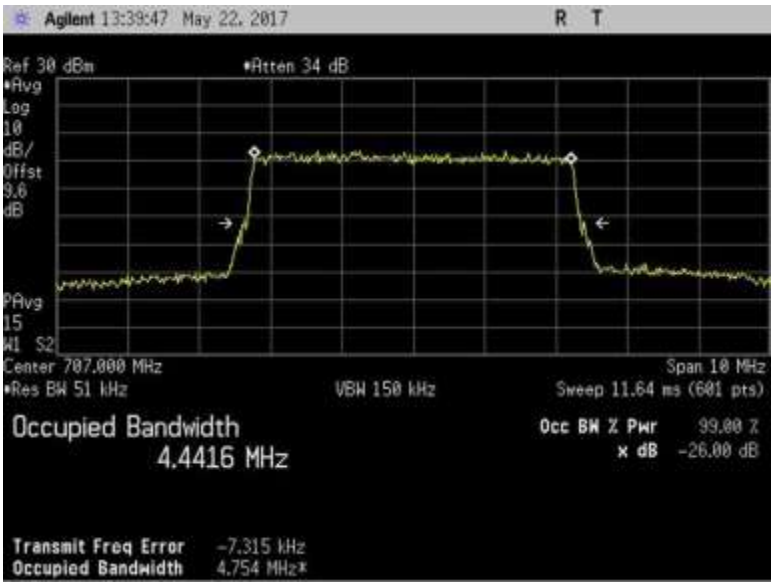


7.10_OBW_UL_698-716MHz_GSM_In

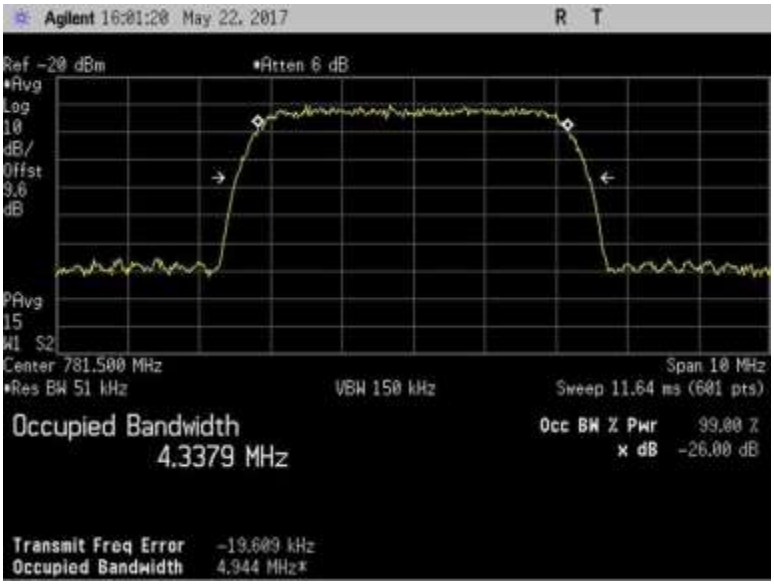
7.10_OBW_UL_698-716MHz_GSM_Out



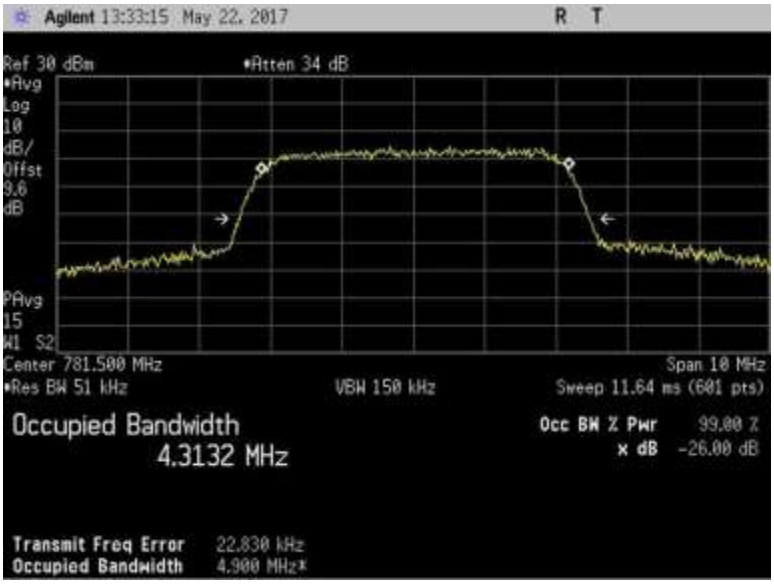
7.10_OBW_UL_698-716MHz_LTE_In



7.10_OBW_UL_698-716MHz_LTE_Out



7.10_OBW_UL_776-787MHz_AWGN_In



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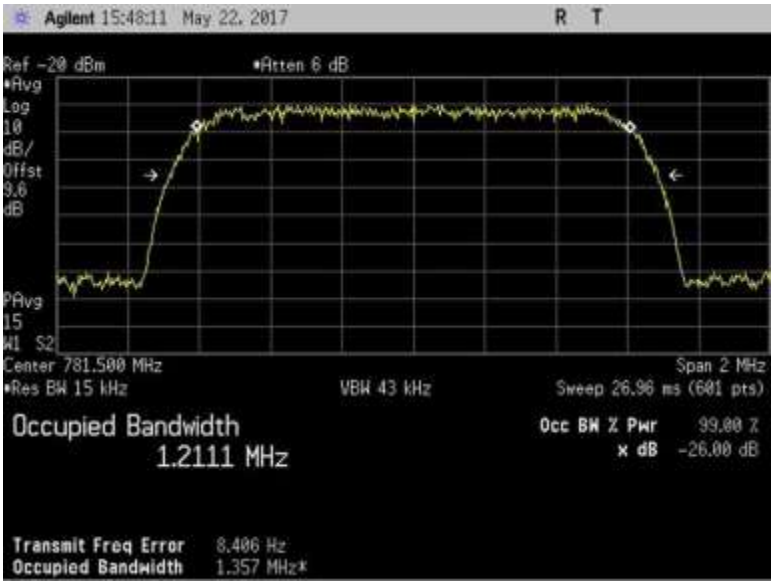

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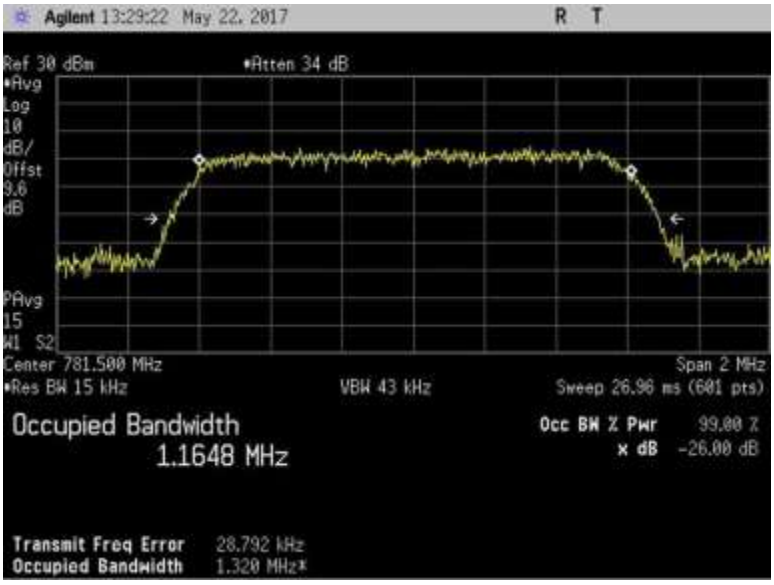
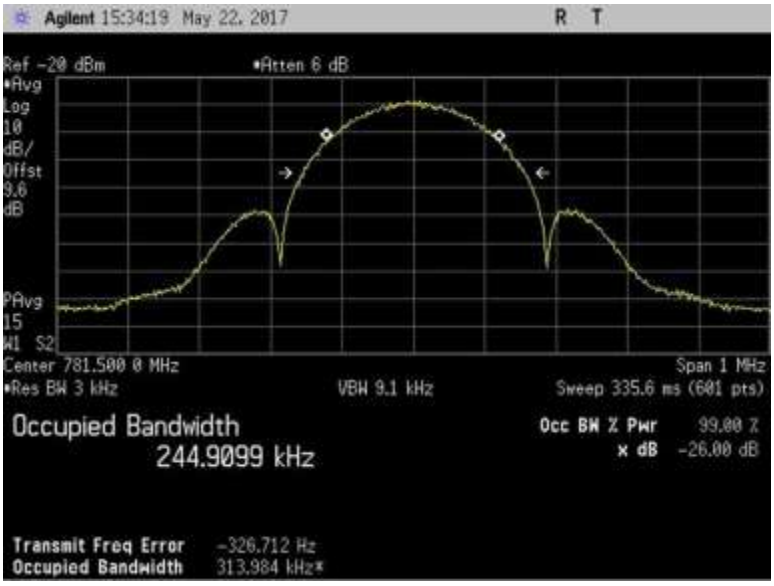


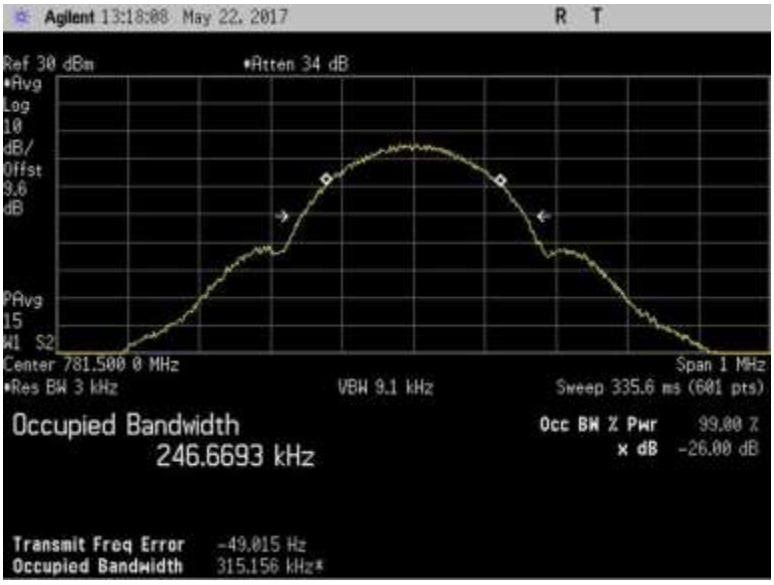
7.10_OBW_UL_776-787MHz_CDMA_Out



7.10_OBW_UL_776-787MHz_EDGE_In

7.10_OBW_UL_776-787MHz_EDGE_Out

7.10_OBW_UL_776-787MHz_GSM_In



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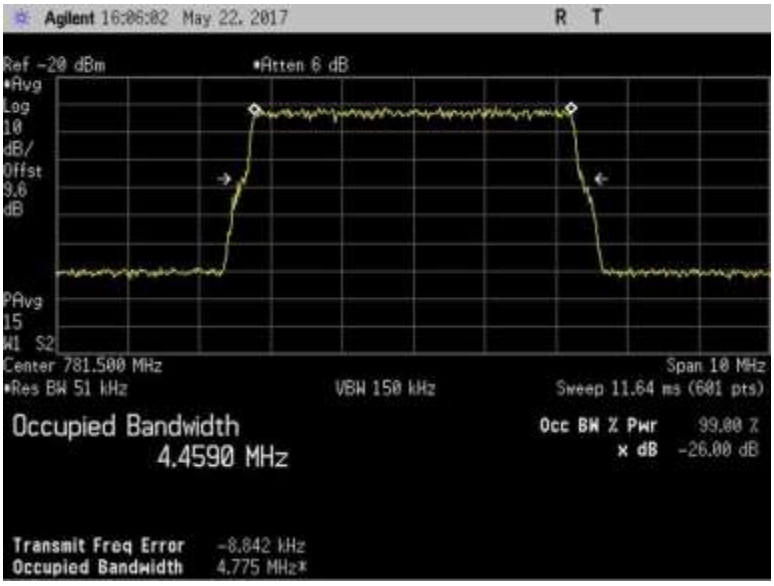
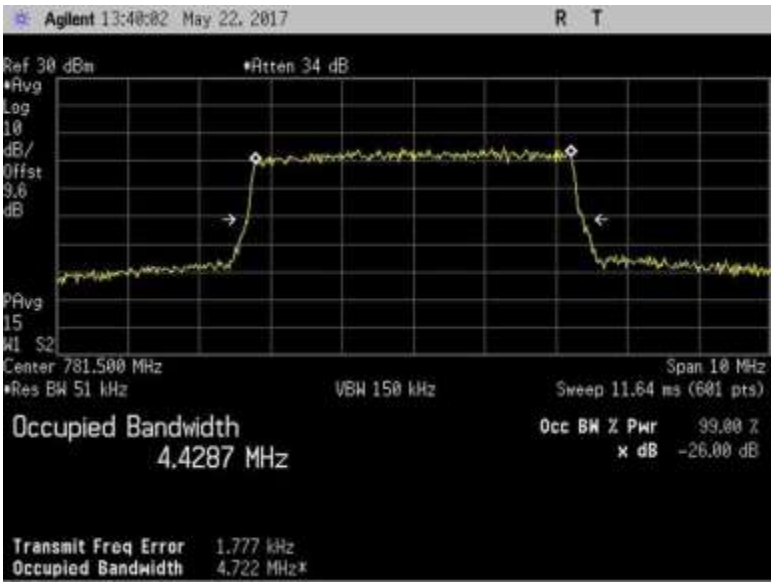


7.10_OBW_UL_776-787MHz_LTE_In



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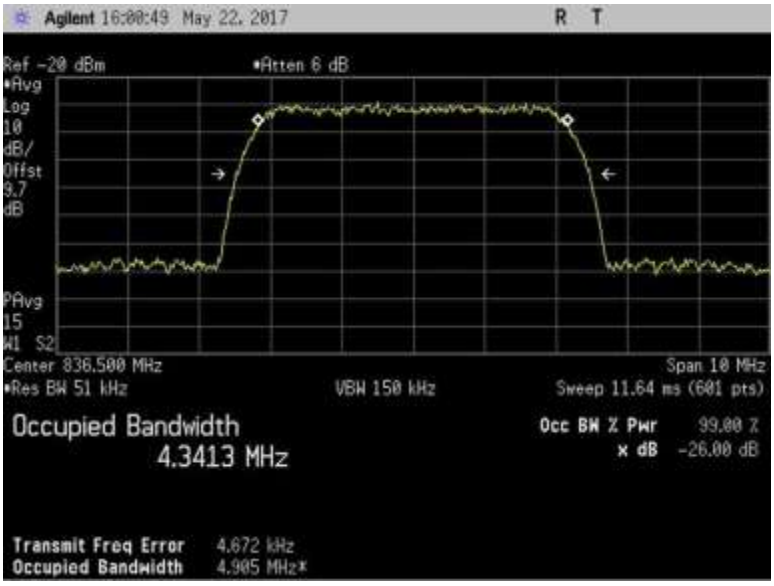
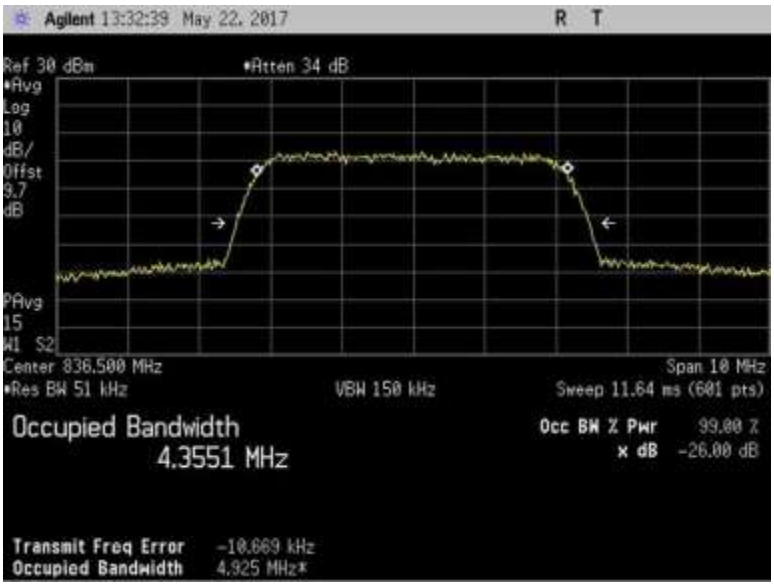


7.10_OBW_UL_824-849MHz_AWGN_In



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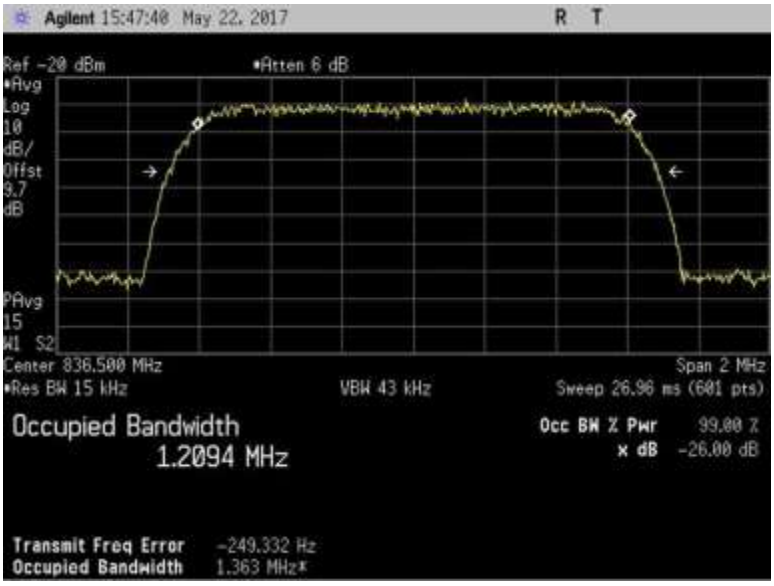

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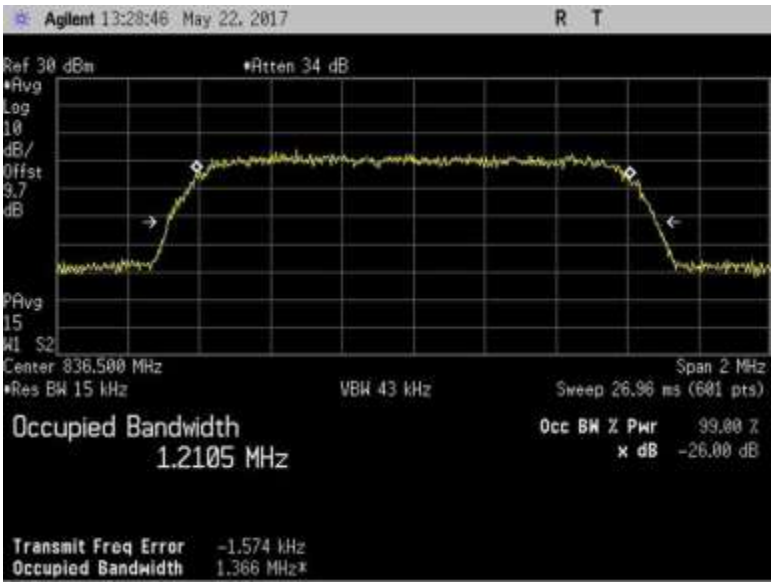

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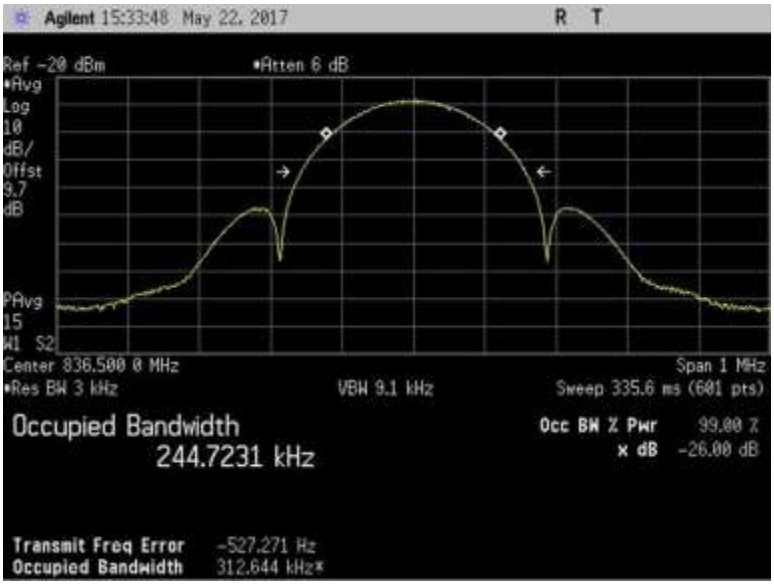
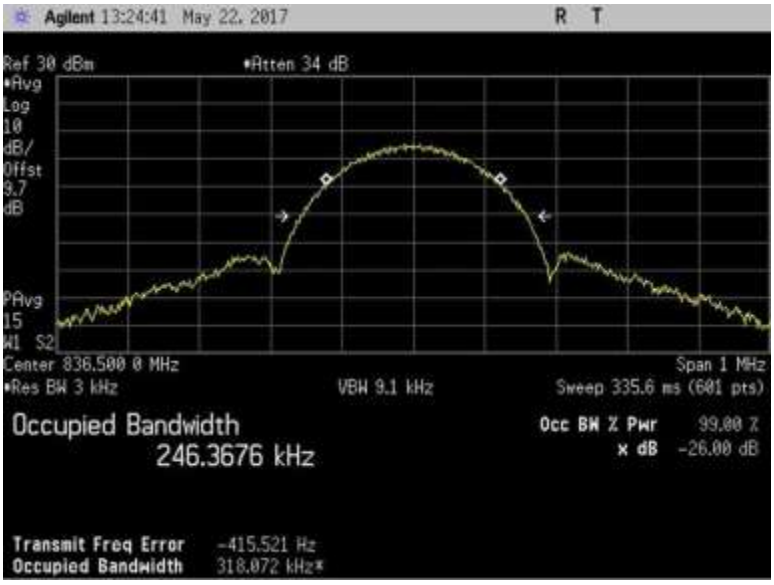


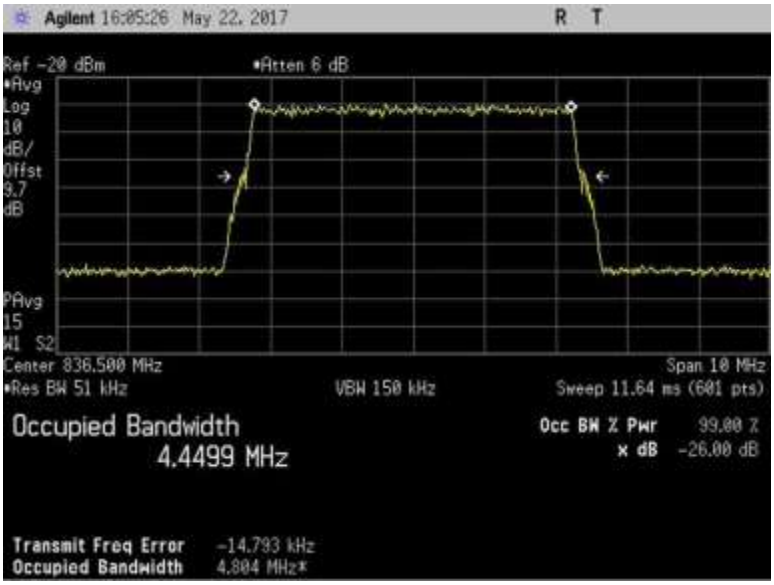
7.10_OBW_UL_824-849MHz_EDGE_In



7.10_OBW_UL_824-849MHz_EDGE_Out

7.10_OBW_UL_824-849MHz_GSM_In

7.10_OBW_UL_824-849MHz_GSM_Out



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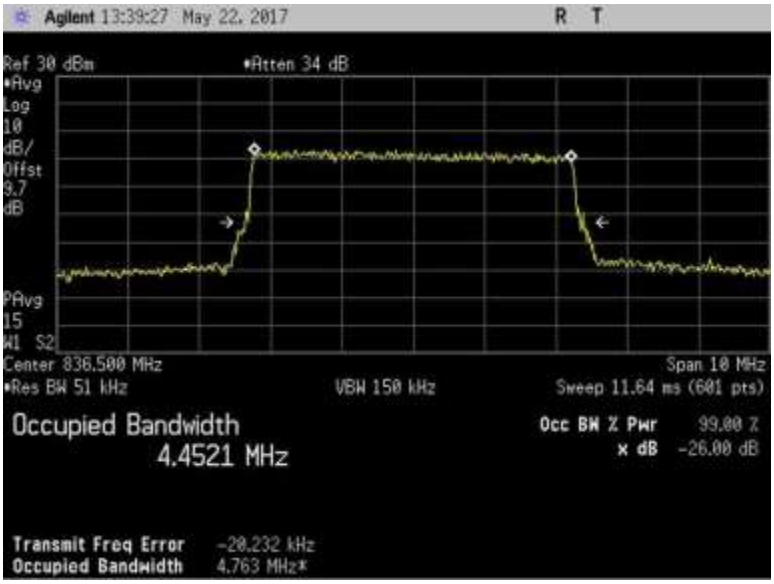
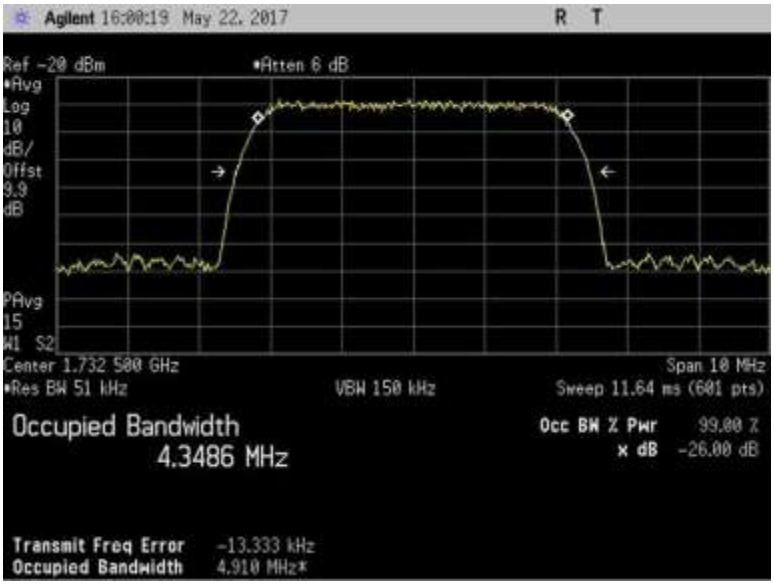
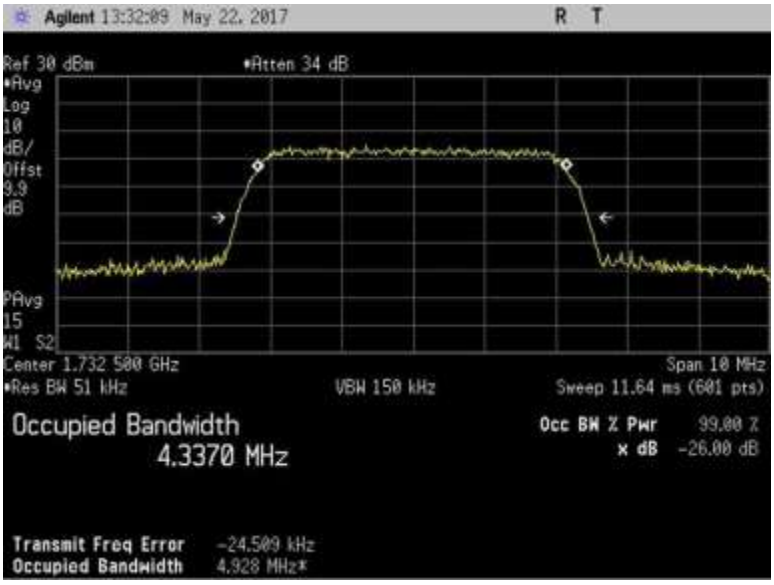


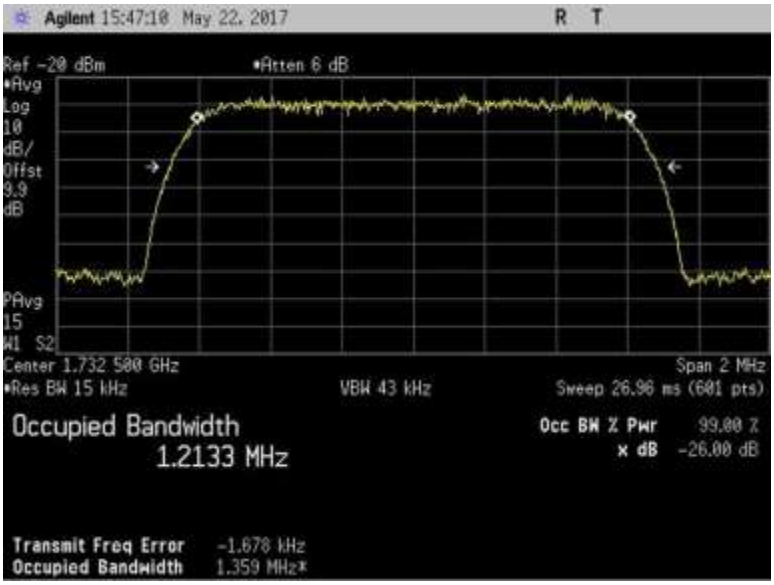
7.10_OBW_UL_824-849MHz_LTE_Out



7.10_OBW_UL_1710-1755MHz_AWGN_In

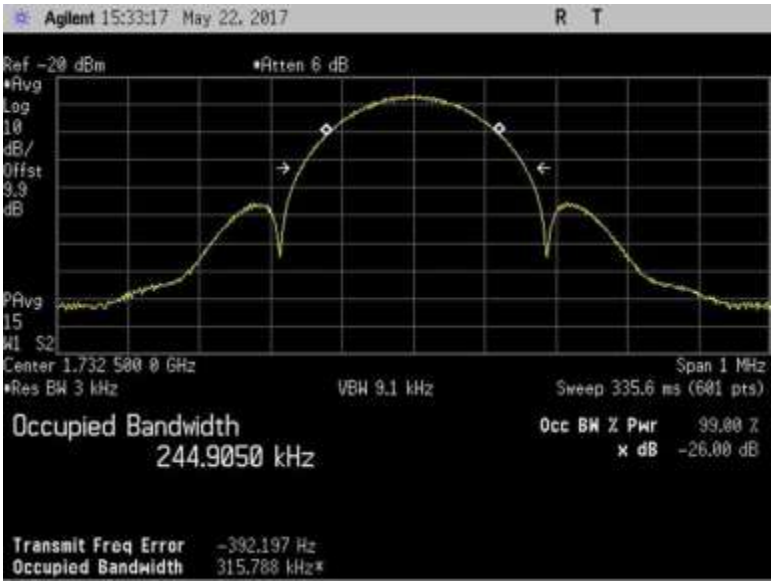


7.10_OBW_UL_1710-1755MHz_AWGN_Out

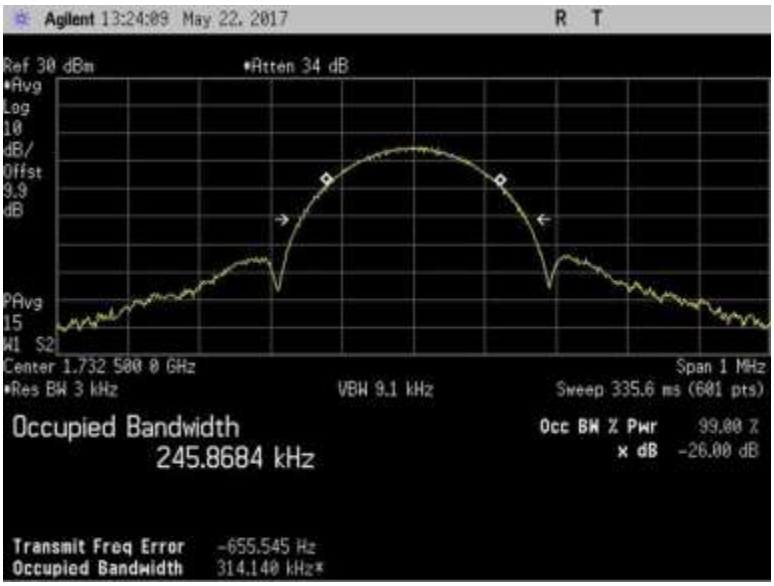


7.10_OBW_UL_1710-1755MHz_CDMA_In

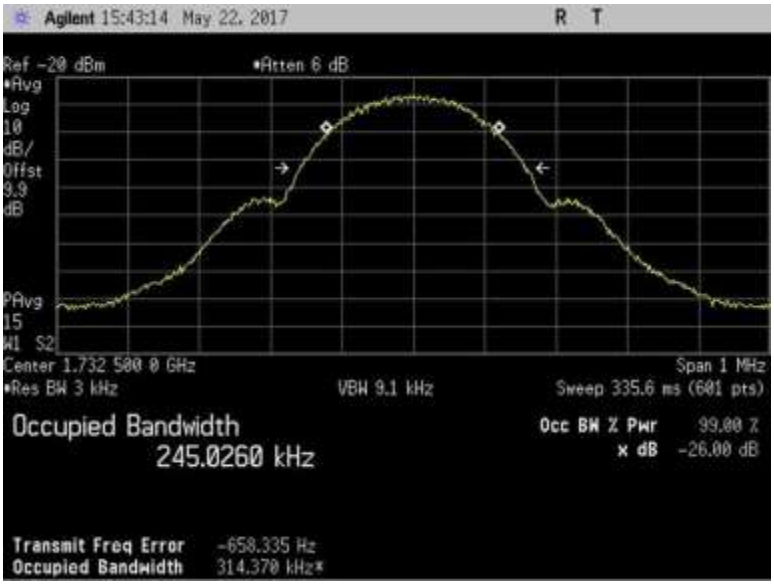
7.10_OBW_UL_1710-1755MHz_CDMA_Out



7.10_OBW_UL_1710-1755MHz_EDGE_In

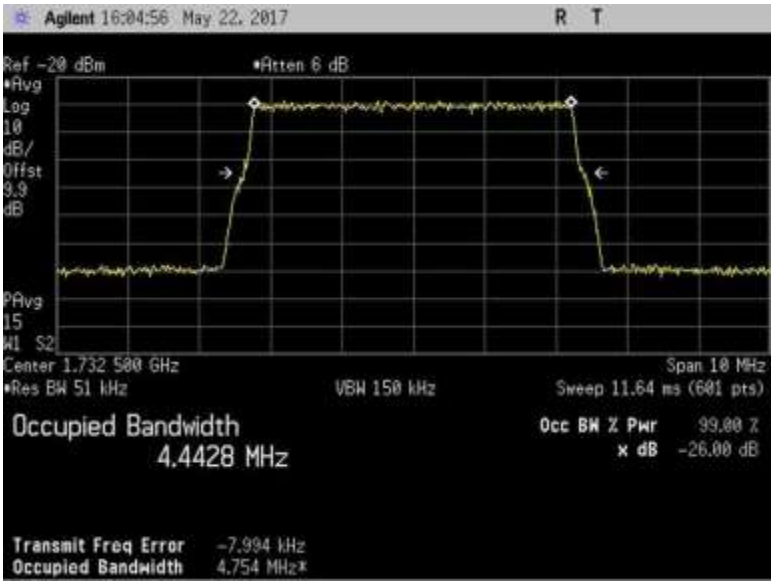


7.10_OBW_UL_1710-1755MHz_EDGE_Out



7.10_OBW_UL_1710-1755MHz_GSM_In

7.10_OBW_UL_1710-1755MHz_GSM_Out



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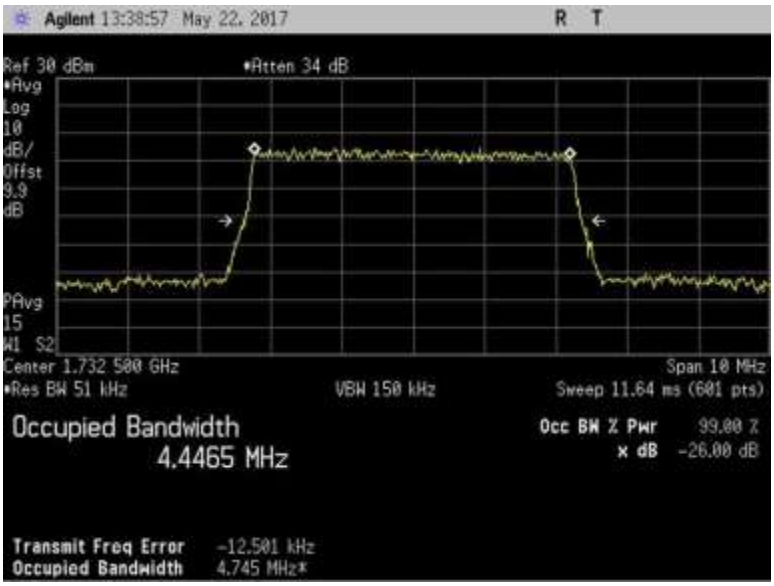

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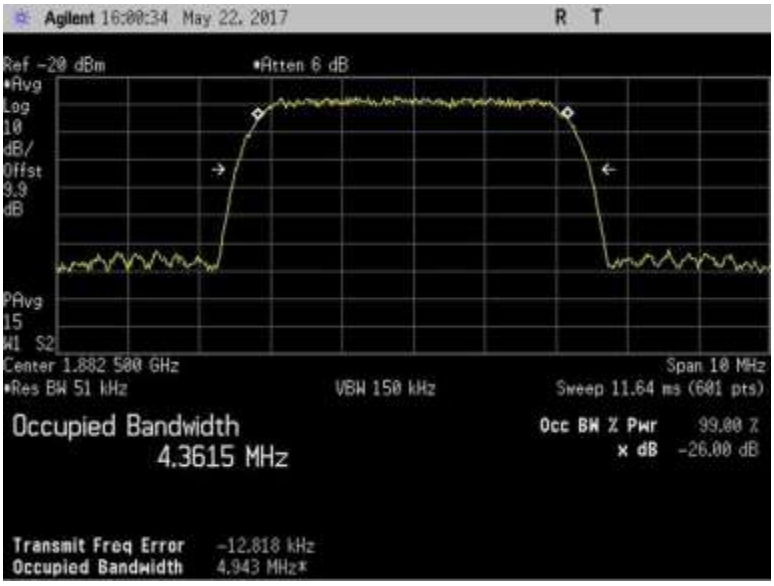
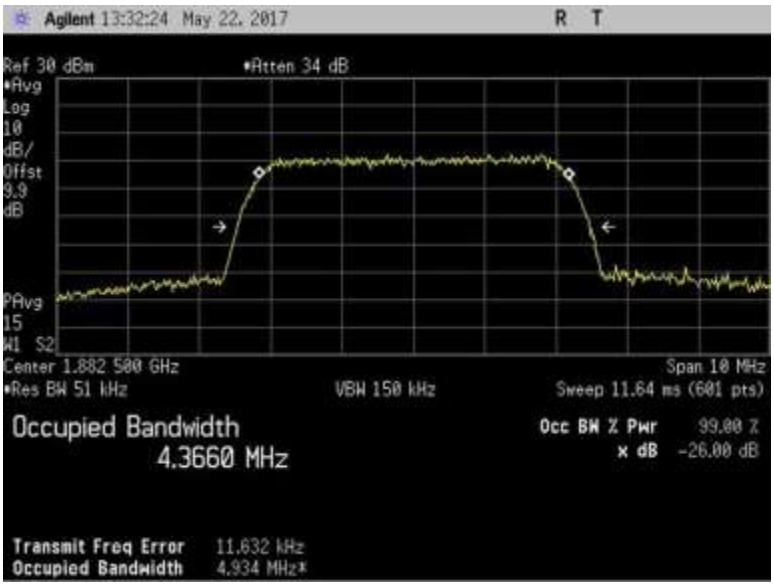


7.10_OBW_UL_1850-1915MHz_AWGN_In



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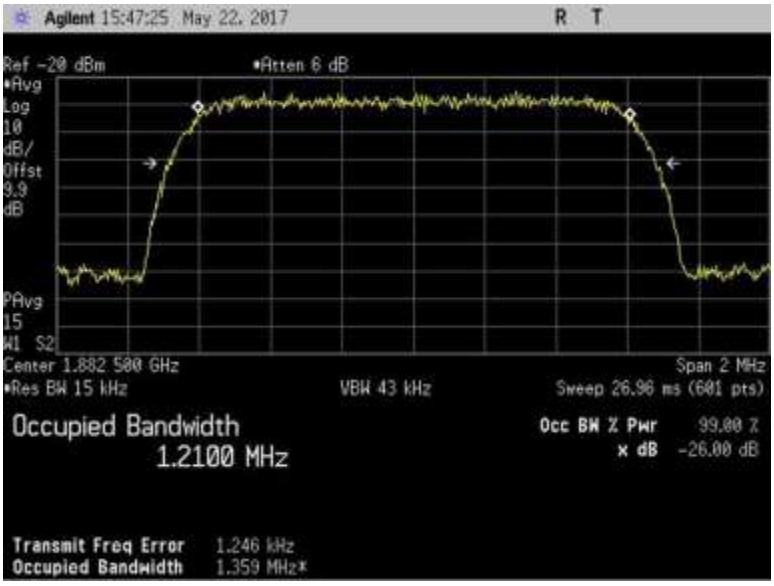
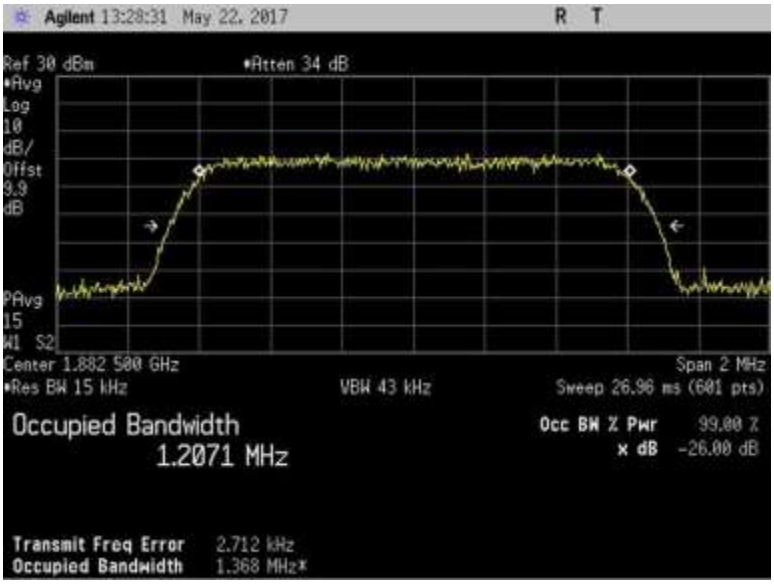
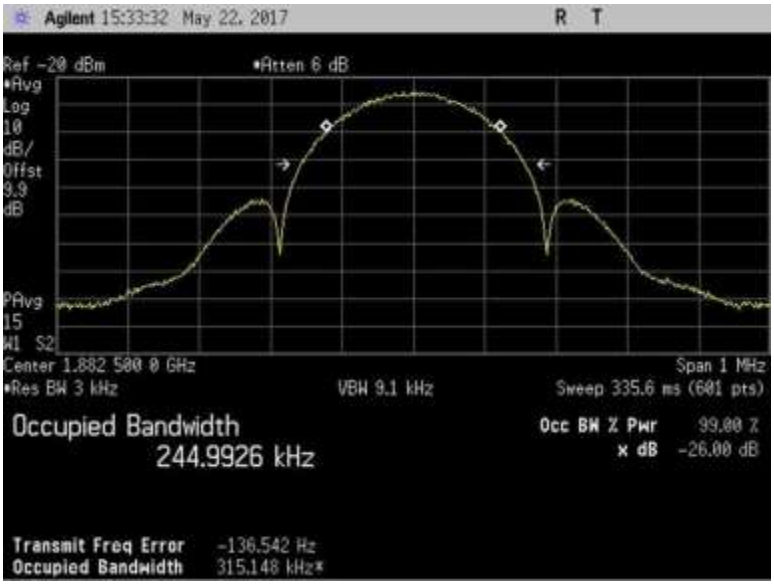


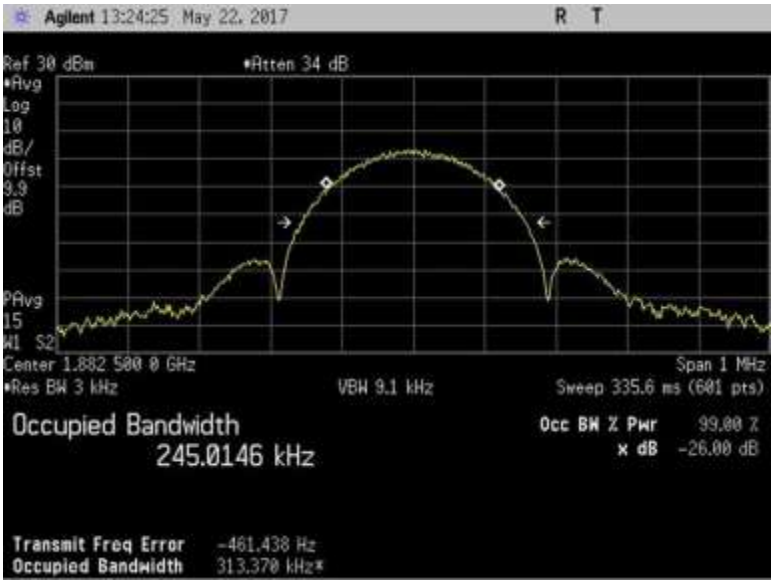
7.10_OBW_UL_1850-1915MHz_CDMA_In



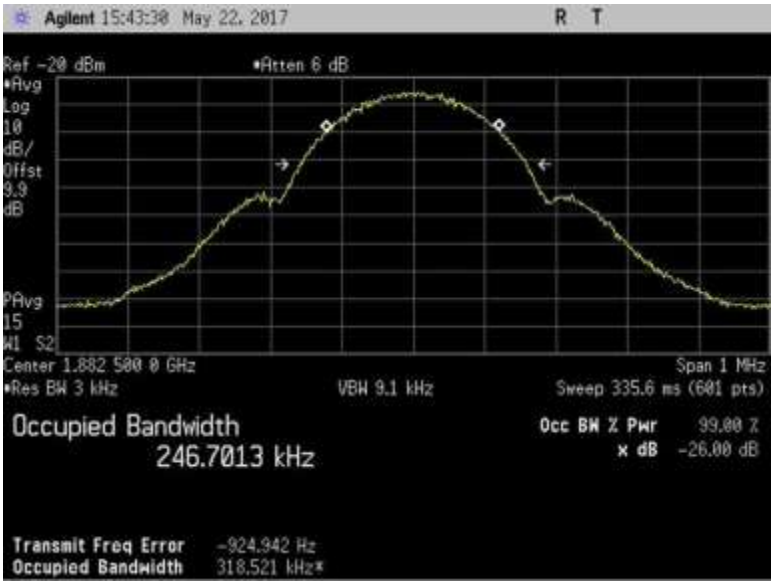
7.10_OBW_UL_1850-1915MHz_CDMA_Out



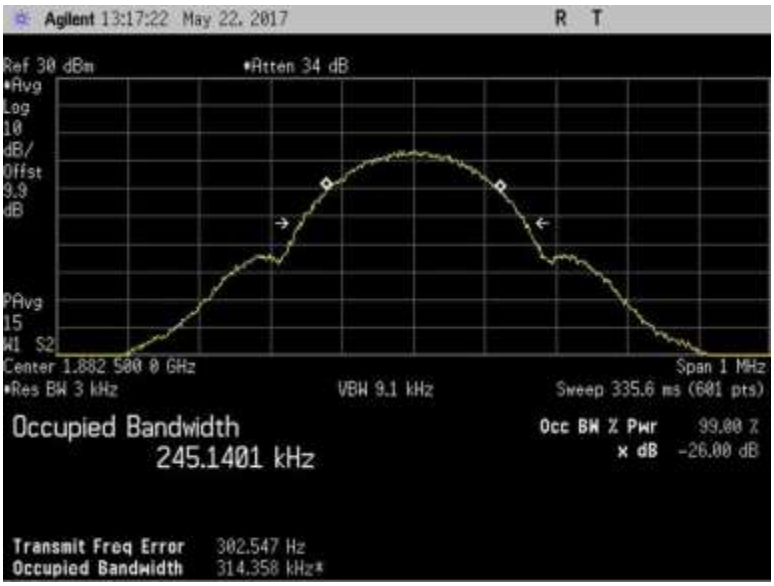
7.10_OBW_UL_1850-1915MHz_EDGE_In



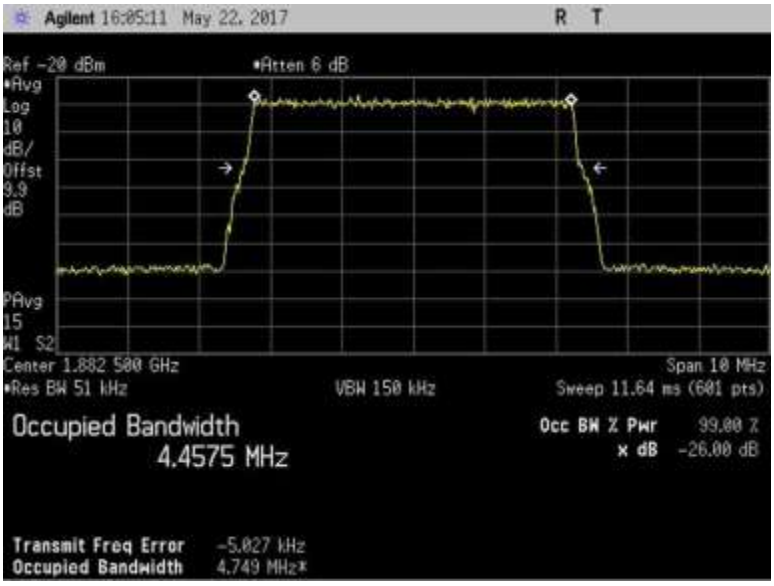
7.10_OBW_UL_1850-1915MHz_EDGE_Out



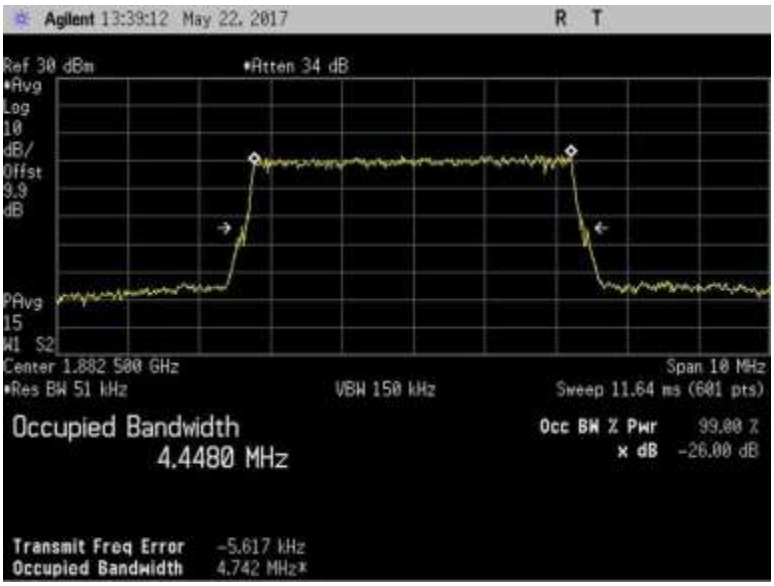
7.10_OBW_UL_1850-1915MHz_GSM_In



7.10_OBW_UL_1850-1915MHz_GSM_Out



7.10_OBW_UL_1850-1915MHz_LTE_In



7.10_OBW_UL_1850-1915MHz_LTE_Out

7.11 Oscillation Detection

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc		
Specification:	**7.11 Anti-Oscillation (Oscillation Restarts / Oscillation mitigation or shutdown)**		
Work Order #:	**99983**	Date:	5/24/2017
Test Type:	**Conducted Emissions**	Time:	13:23:00 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

Test Conditions / Notes:

The equipment under test (EUT) is a Mobile Wideband Consumer Booster.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Server port is a type FME connector and 50-ohm impedance.
The EUT Donor port is type FME connector and 50-ohm impedance.
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

Test procedure:
The test was performed in accordance with section 7.11 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016.
Firmware: 1.7
Test environment conditions: Test environment conditions: 22°C, 38% Relative Humidity, 101.2 kPa
Note: UL1850-1915MHz -AWGNL+5:
- AWGNL denotes a 4.1MHz AWGN signal (99% occupied bandwidth) tuned to the frequency of 2.5 MHz above the lower edge of the operating band 1850-1915MHz
- +5 denotes a variable attenuator adjusted such that the insertion loss for center of band under test (isolation) between the booster's donor and server ports is 5 dB greater than the maximum gain, as recorded in the maximum gain test procedure, for the band under test.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANP06897	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	ANP06898	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
	AN03471	Spectrum Analyzer	E4440A	1/4/2016	1/4/2018
	AN03412	Band Pass Filter	PE8705	8/12/2015	8/12/2017
	AN03413	Band Pass Filter	PE8706	8/12/2015	8/12/2017
	AN03414	Band Pass Filter	PE8707	8/12/2015	8/12/2017
	AN03415	Band Pass Filter	PE8708	8/12/2015	8/12/2017
	AN03447	Band Pass Filter	PE8710	8/12/2015	8/12/2017
	AN03448	Band Pass Filter	PE8711	8/12/2015	8/12/2017
	AN03446	Band Pass Filter	4FV50-707/H18-O/O	1/04/2016	1/04/2018
	AN03467	Band Pass Filter	4FV50-731/H30-O/O	1/04/2016	1/04/2018
	AN03468	Band Pass Filter	4CS10-781.5/E12.2-O/O	1/04/2016	1/04/2018
	AN03469	Band Pass Filter	4CS10-751.5/E12-O/O	1/04/2016	1/04/2018
	AN02475	1 dB step Attenuator	8494B	6/29/2015	6/29/2017
	AN03429	10dB step Attenuator	8496B	8/27/2015	8/27/2017
	ANC00082	RF Coupler	722-10-1.500V	8/26/2015	8/26/2017
	ANC00087	Combiner	44000	1/07/2016	1/07/2018

Summary of Results

Pass: All oscillations detections and mitigations occur within 0.3 seconds in uplink bands, within 1 second in the downlink bands and the noise level is below the -70dBm/MHz limit.

7.11.2 Oscillation restart tests

Oscillation detection				Time Between restart		Number of restart	
Freq	Measured	Limit	Peak Level	Measured	Limit	Measured	Limit
MHz	Sec	Sec	dBm	Sec	At least sec		
UL1710-1755	0.26	0.30	25.2	69	60	5	5
UL1850-1915	0.25	0.30	23.5	71	60	5	5
UL824-894	0.25	0.30	29.0	70	60	5	5
UL 698-716	0.24	0.30	29.0	69	60	5	5
UL776-787	0.25	0.30	29.3	70	60	5	5
DL2110-2155	0.32	1.00	14.5	70	60	5	5
DL1930-1995	0.80	1.00	20.0	70	60	5	5
DL869-894	0.56	1.00	25.0	69	60	5	5
DL:728-746	0.56	1.00	22.6	70	60	5	5
DL 746-757	0.32	1.00	22.0	70	60	5	5

The booster continues to mitigate at least 1 minute before restarting. The plots demonstrate after 5 restarts (the limit is 5 restart), the booster does not resume operation until manually reset.

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	9.0	9.8	8.5	10.0	10.1	12.0
+4dB	11.1	10.8	9.7	11.0	11.7	12.0
+3dB	(12.4)*	11.9	11.2	(12.8)*	(12.8)*	12.0
+2dB	(17.8)*	(12.7)*	(13.3)*	(14)*	(14.9)*	12.0
+1dB	(20.8)*	(14.1)*	(15.7)*	(17.3)*	(17.7)*	12.0
0dB	(29.3)*	(16.7)*	(25.3)*	(21.6)*	(23.2)*	12.0
-1dB	(84.5)*	(19.1)*	(93.2)*	(33.3)*	(87.5)*	12.0
-2dB	**	(25.5)*	**	**	**	12.0
-3dB	**	(46.8)*	**	**	**	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	8.8	11.9	8.7	10.3	8.9	12.0
+4dB	9.7	(15.2)*	10.5	11.4	9.2	12.0
+3dB	10.9	(18.6)*	11.7	(13.3)*	10.8	12.0
+2dB	(14.5)*	(22.5)*	(12.9)*	(15.9)*	11.4	12.0
+1dB	(15.8)*	(39.6)*	(14.3)*	(19.4)*	(15.1)*	12.0
0dB	(21.3)*	(41.5)*	(17.6)*	(20)*	(17.1)*	12.0
-1dB	(38.4)*	**	(21)*	(27.6)*	(18.2)*	12.0
-2dB	**	**	(27.2)*	**	(26.3)*	12.0
-3dB	**	**	**	**	**	12.0
-4dB	**	**	**	**	**	12.0
-5dB	**	**	**	**	**	12.0

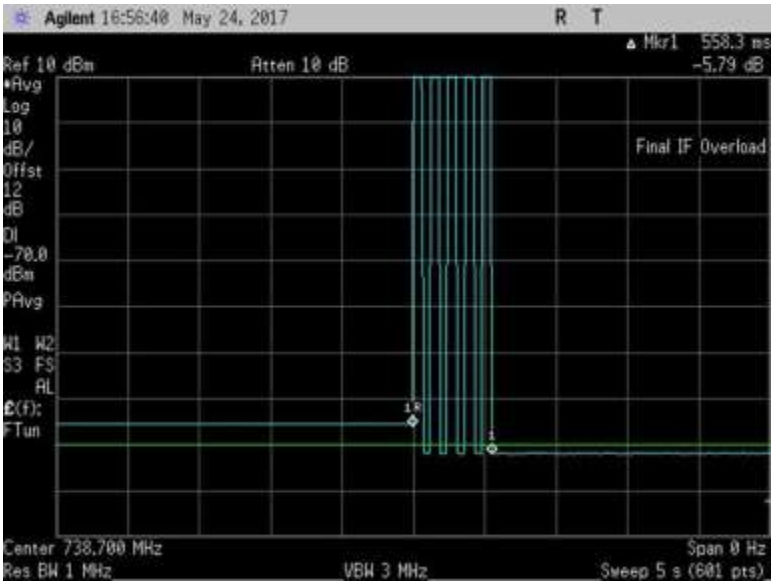
Note:
* The measured difference exceeds the limit for a period of less than 300 second before device mitigates or shuts down. The maximum recorded time prior to shutdown was 200 seconds for the Uplink bands and 220 seconds for the Downlink bands.

** The device shuts down immediately.

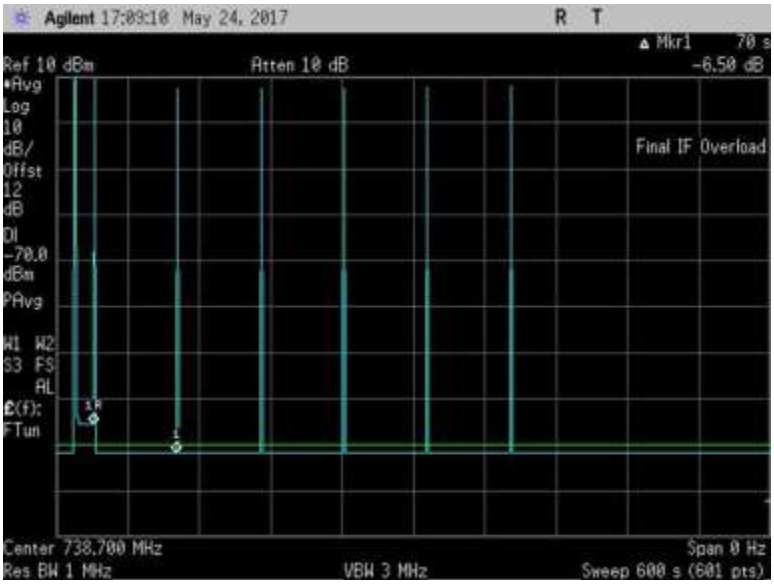
7.11.2 Oscillation Restart Tests

Plots

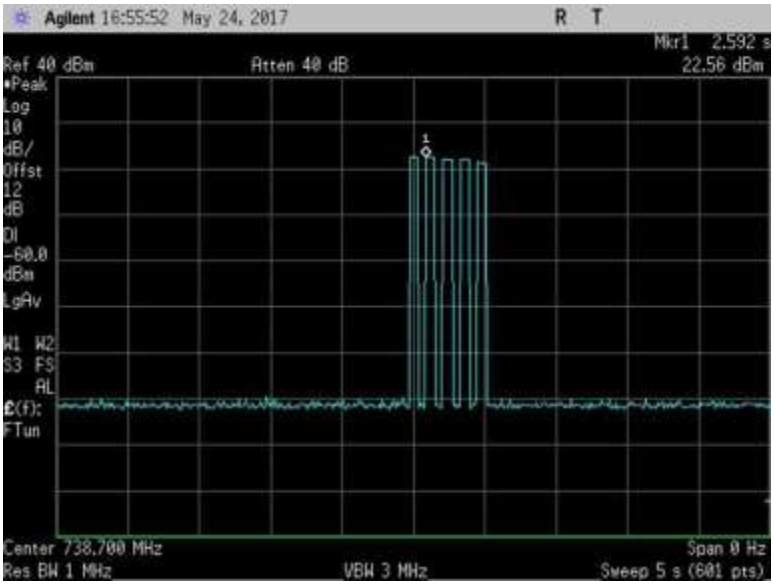
DL



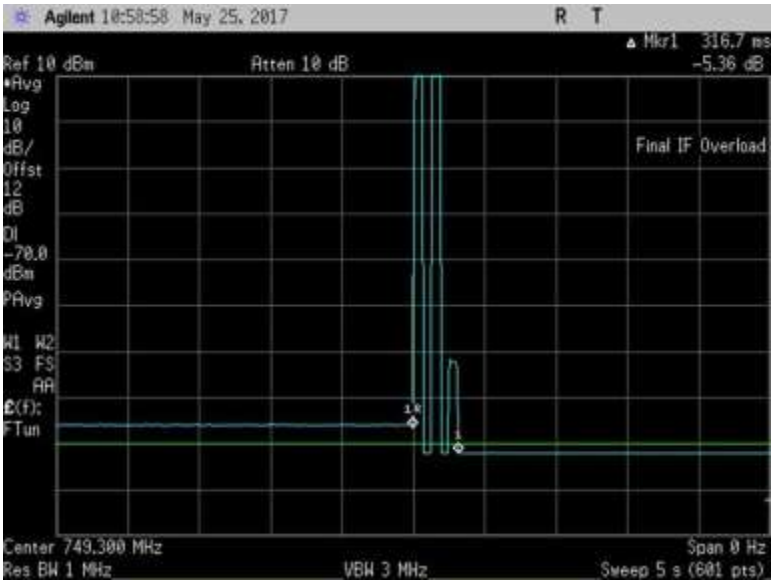
7.11.2_osc_DL_728-746MHz



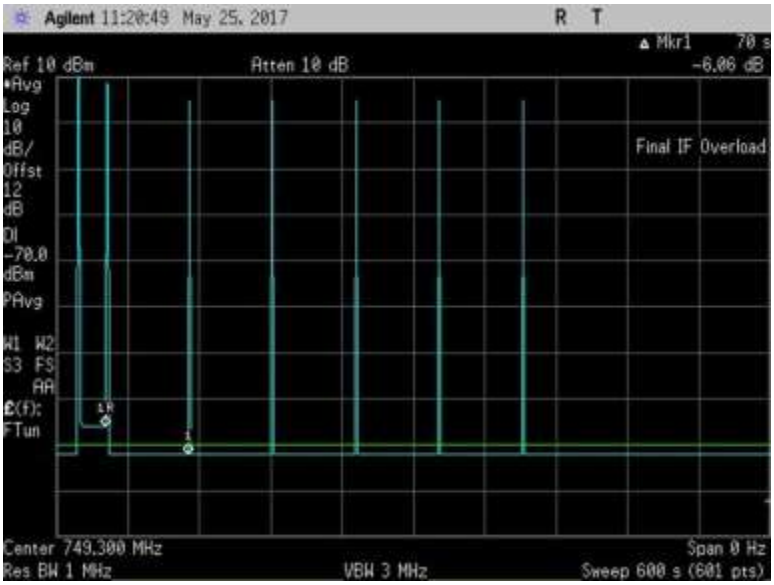
7.11.2_osc_DL_728-746MHz600sec



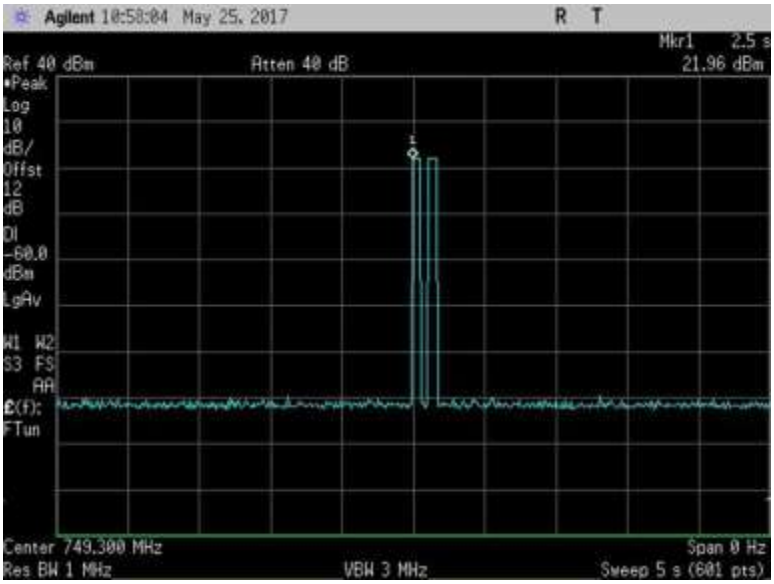
7.11.2_osc_DL_728-746MHzPk



7.11.2_osc_DL_746-757MHz



7.11.2_osc_DL_746-757MHz600sec



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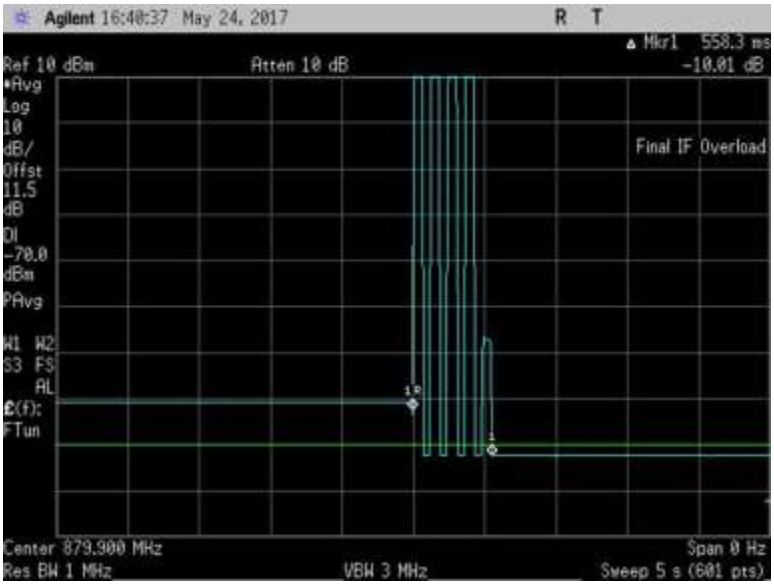
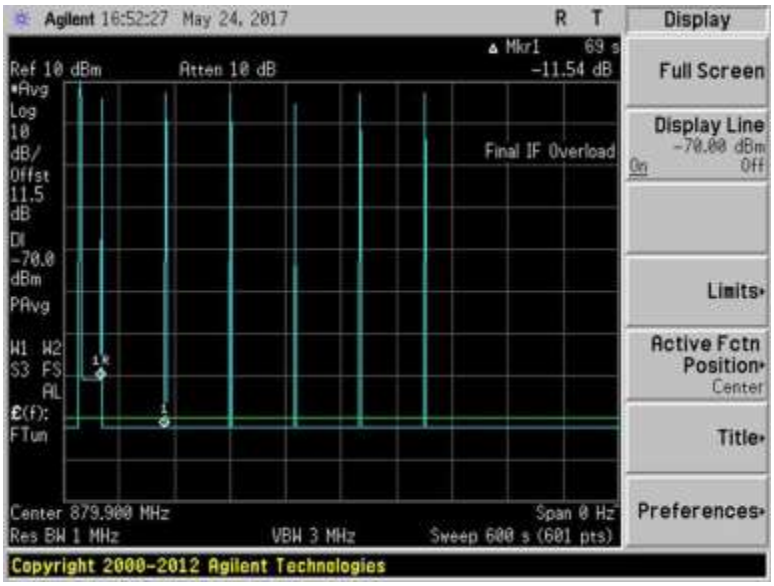


7.11.2_osc_DL_869-894MHz



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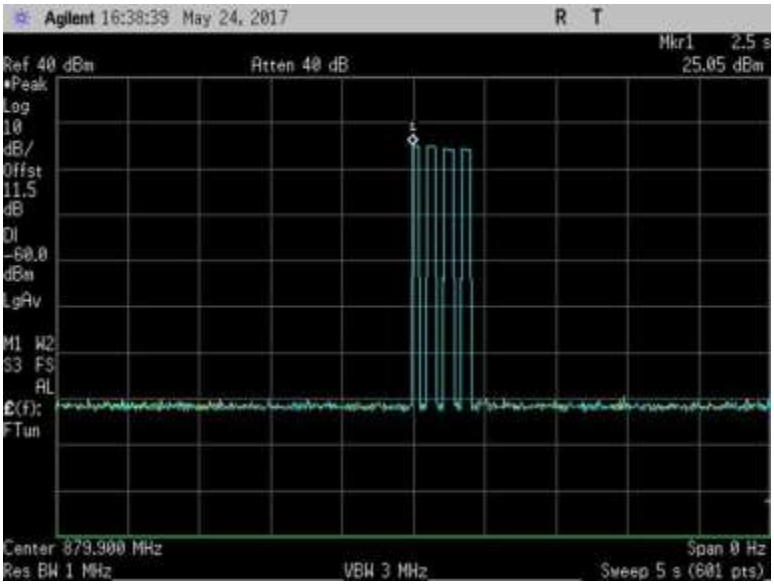

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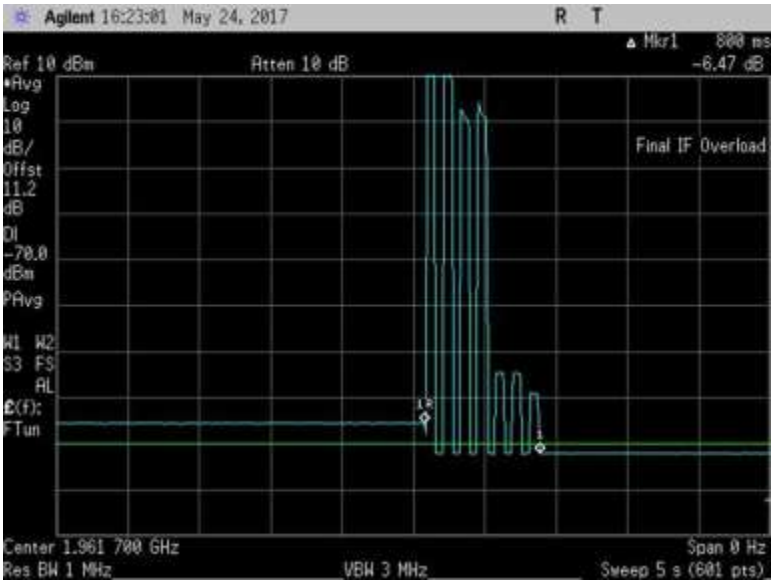
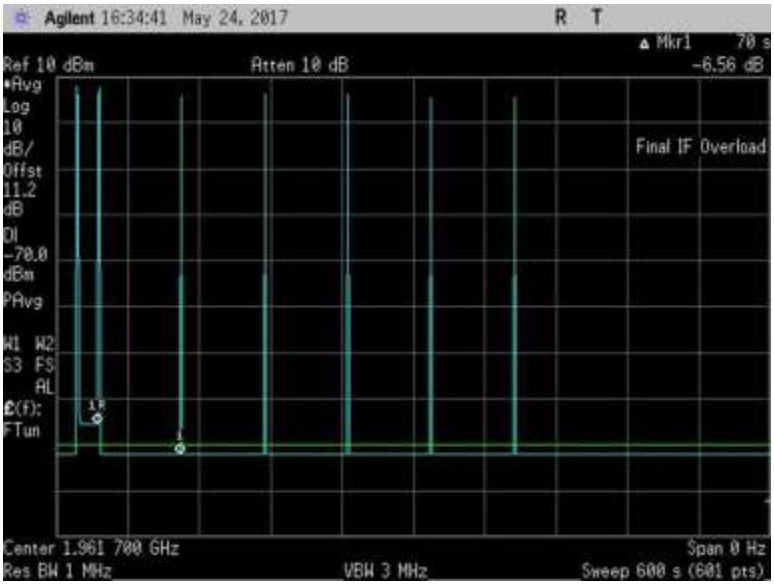


7.11.2_osc_DL_1930-1995MHz



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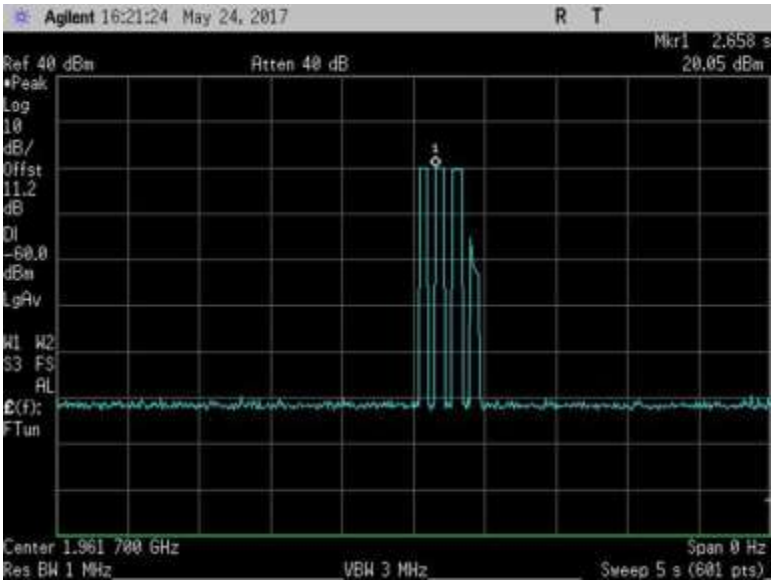
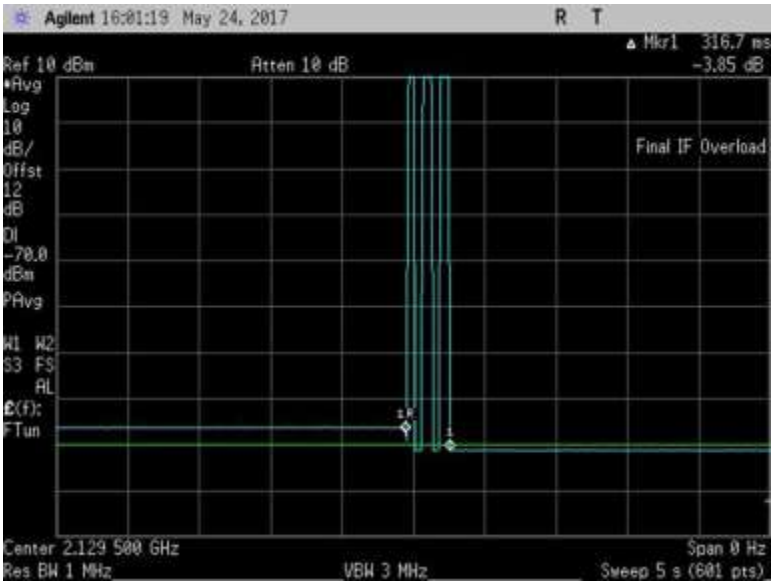
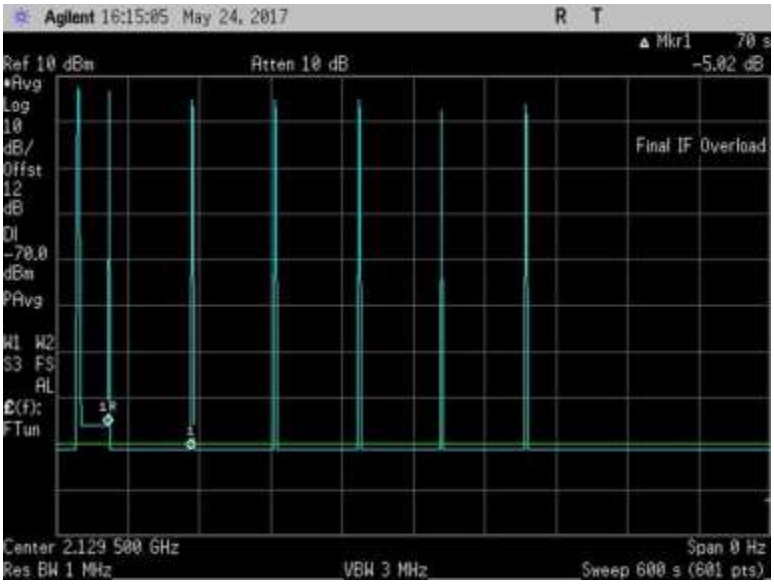


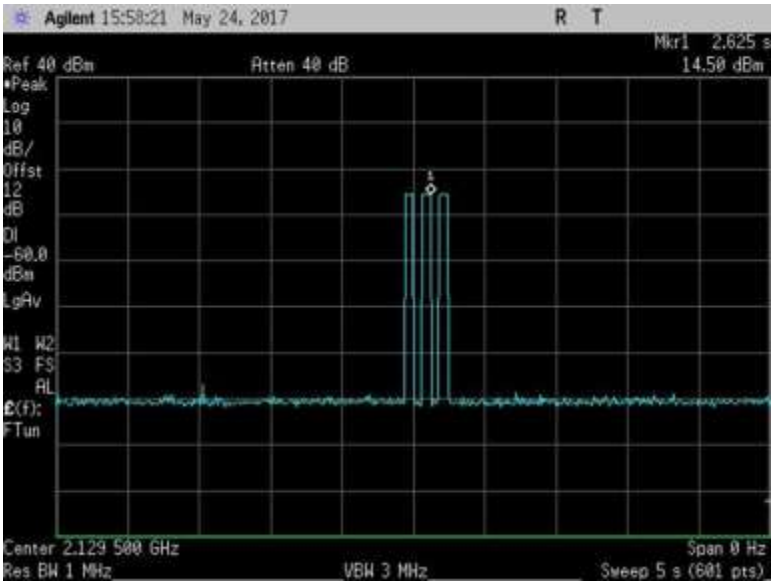
7.11.2_osc_DL_1930-1995MHzPk



7.11.2_osc_DL_2110-2155MHz

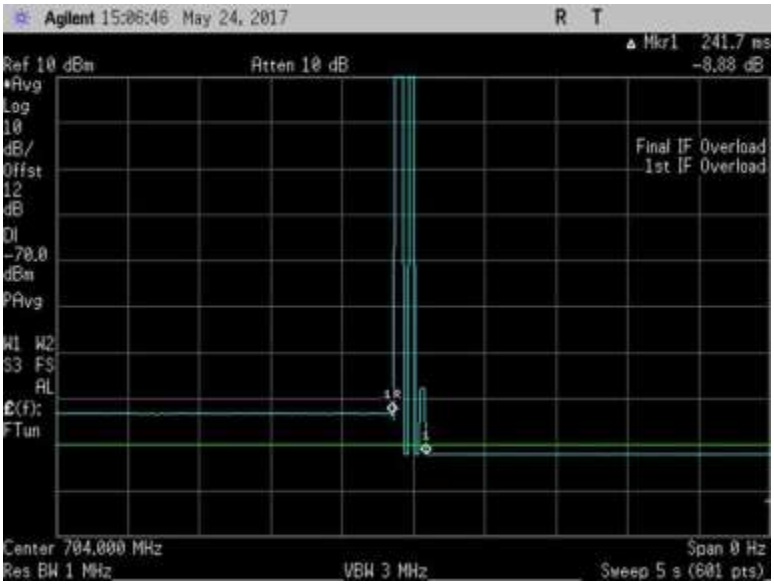


7.11.2_osc_DL_2110-2155MHz600sec

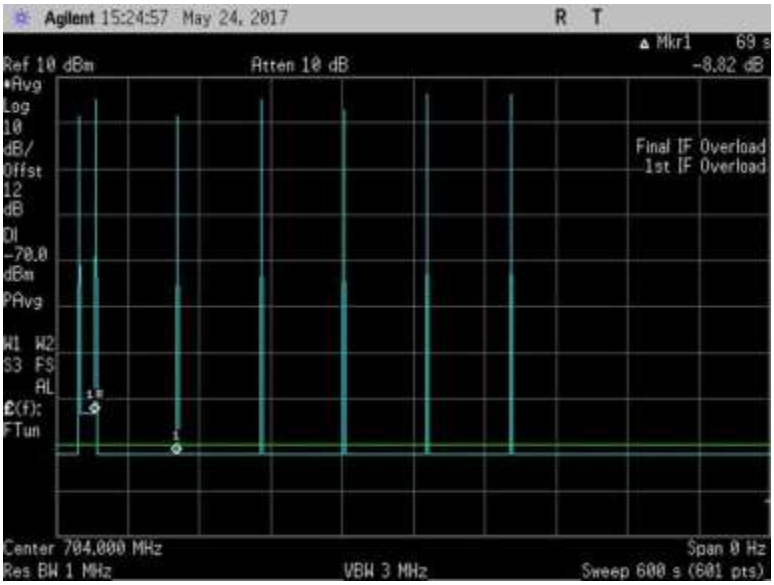


7.11.2_osc_DL_2110-2155MHzPk

UL



7.11.2_osc_UL_698-716MHz



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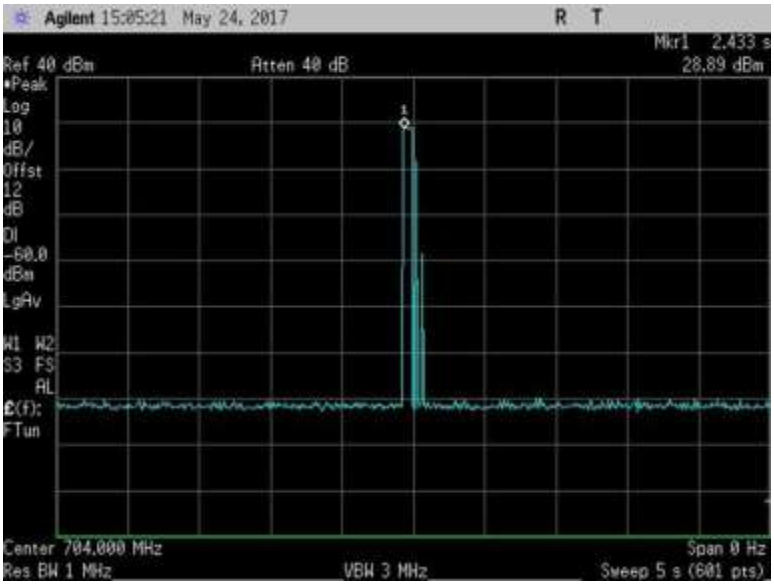
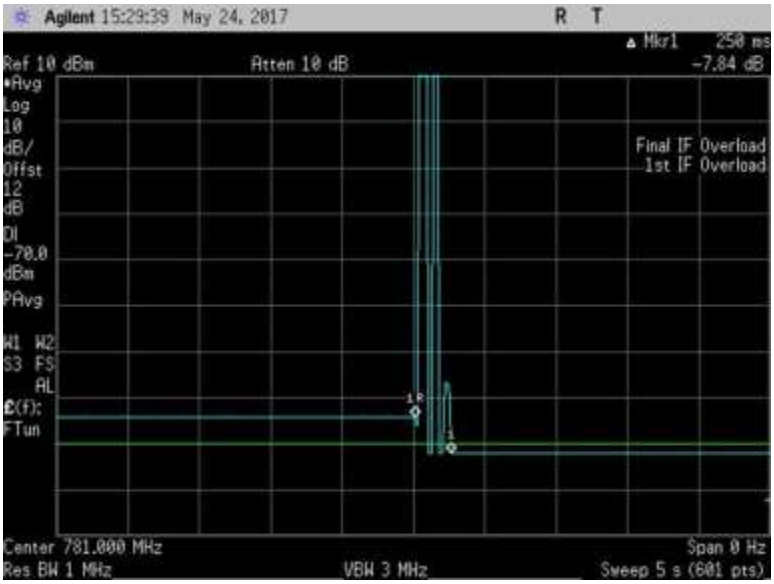
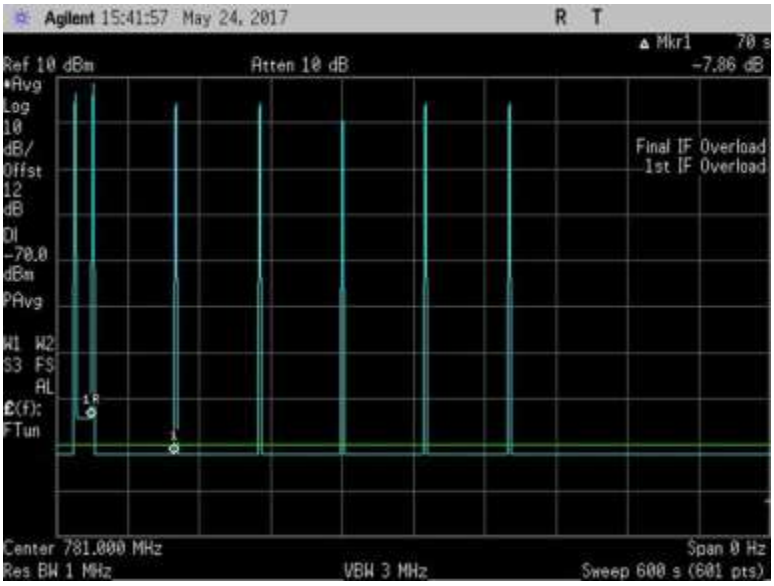


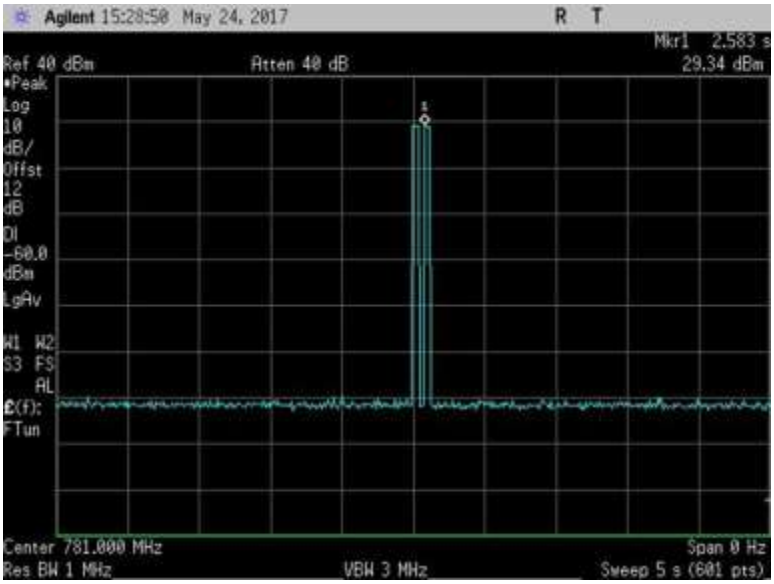
7.11.2_osc_UL_698-716MHzPk



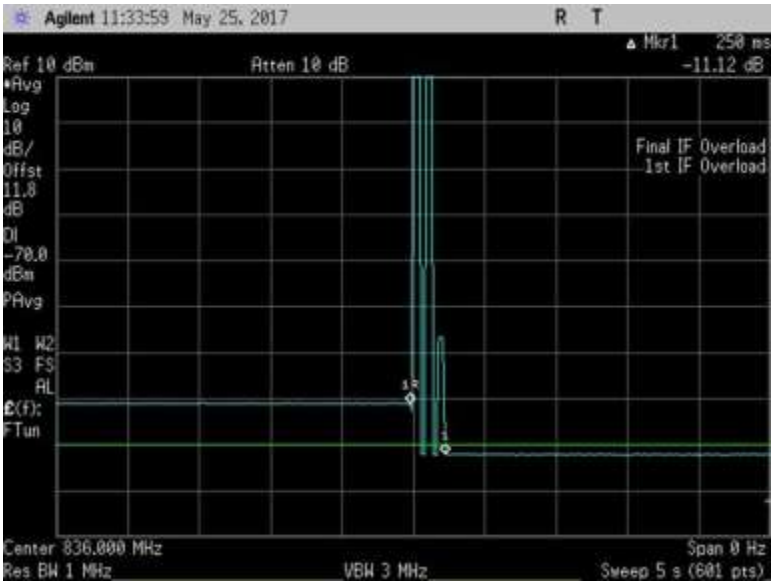
7.11.2_osc_UL_776-787MHz



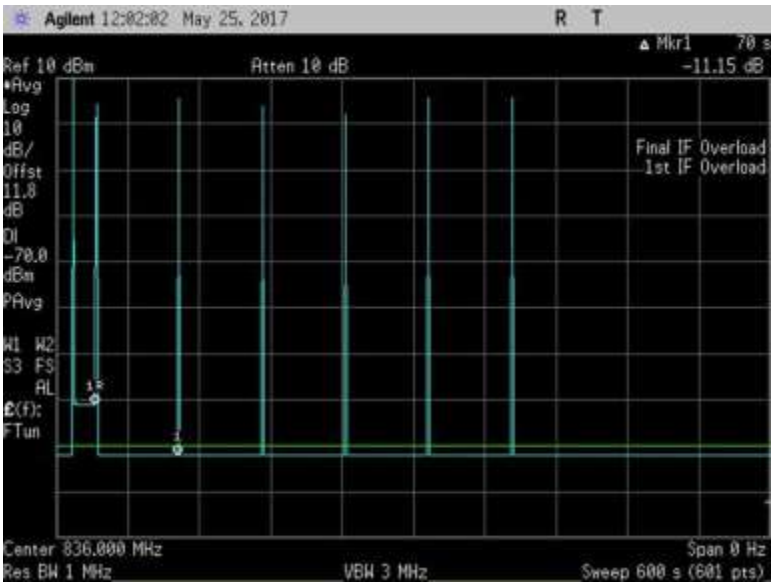
7.11.2_osc_UL_776-787MHz600sec



7.11.2_osc_UL_776-787MHzPk



7.11.2_osc_UL_824-849MHz



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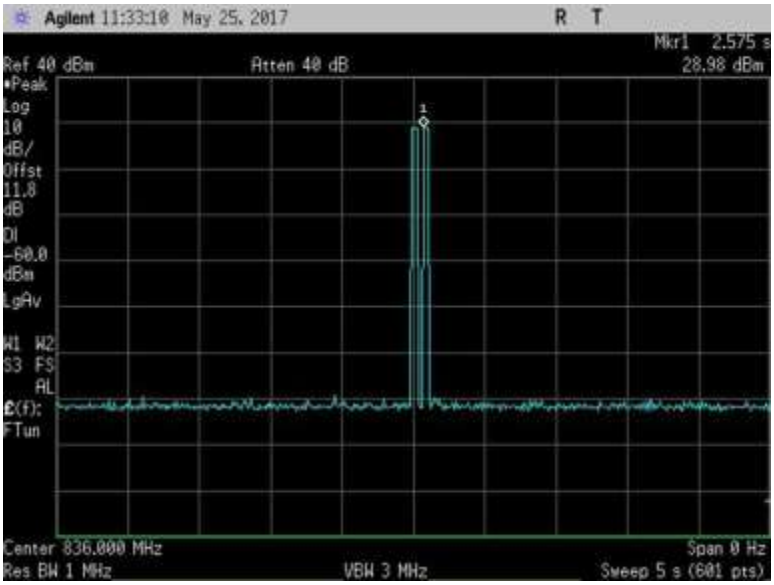
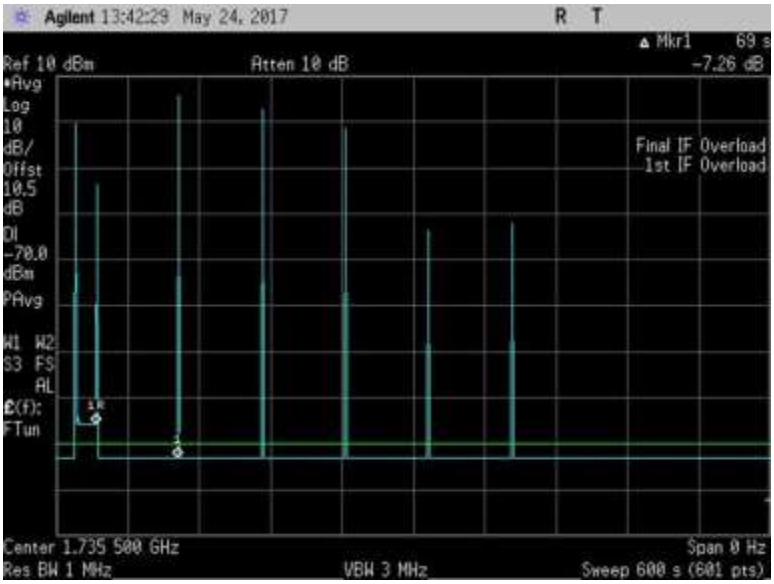


7.11.2_osc_UL_824-849MHzPk

7.11.2_osc_UL_1710-1755MHz



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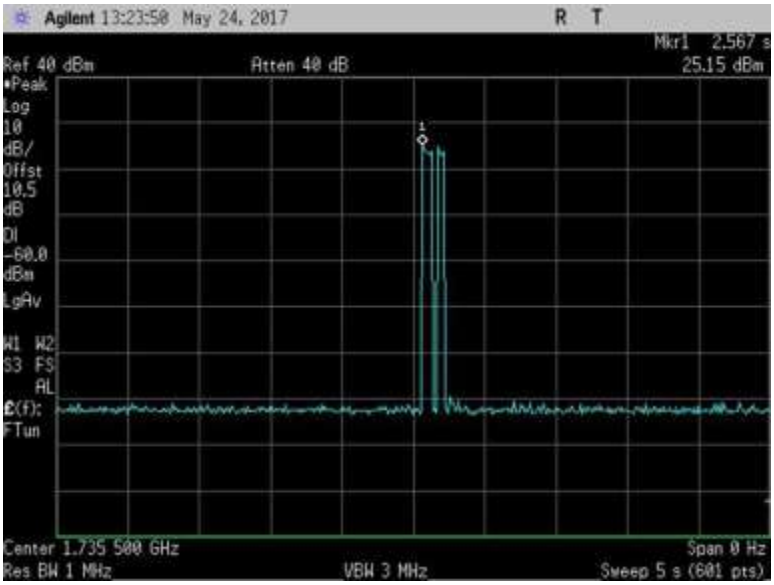

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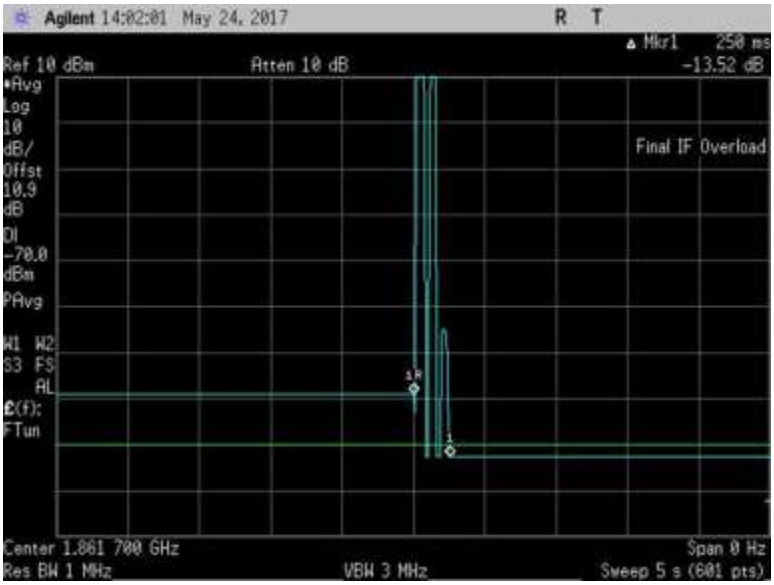
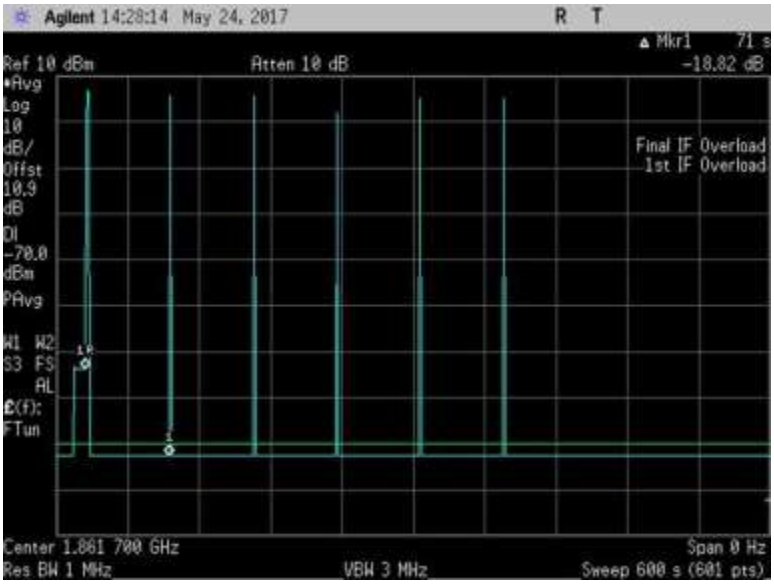
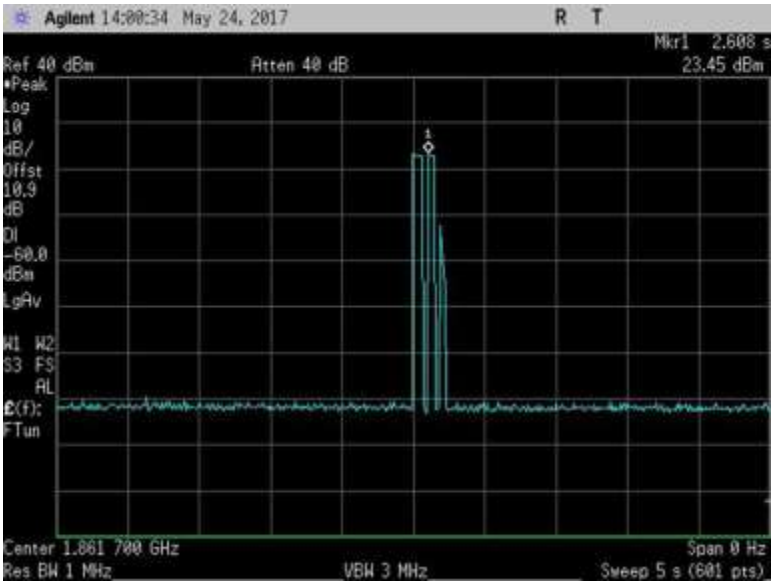


7.11.2_osc_UL_1850-1915MHz



7.11.2_osc_UL_1850-1915MHz600sec

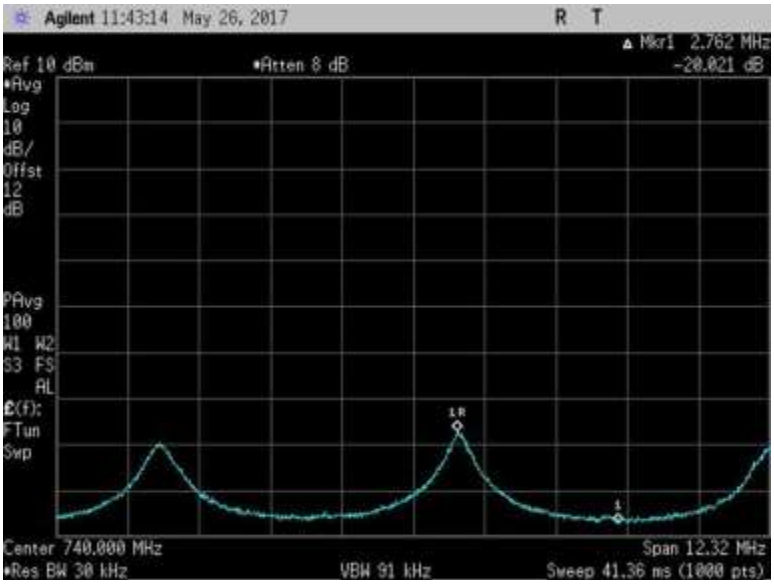


7.11.2_osc_UL_1850-1915MHzPk

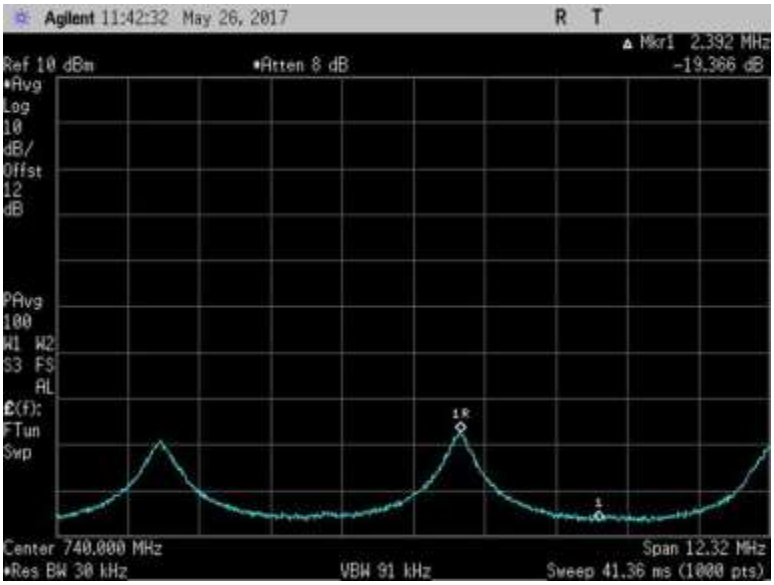
7.11.3 Measuring Oscillation Mitigation or Shutdown

Plots

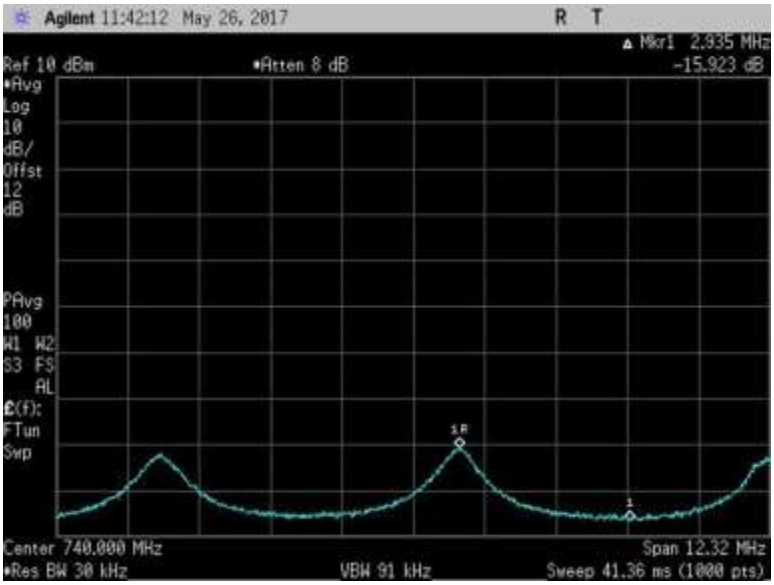
DL, AWGNR / AWGNL



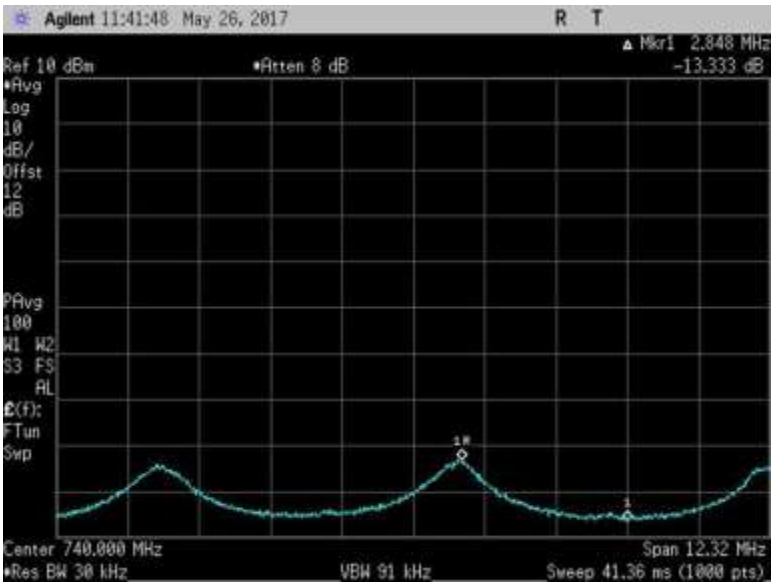
7.11.3_Osc_DL_728-746MHz+0_AWGNL



7.11.3_Osc_DL_728-746MHz+1_AWGNL



7.11.3_Osc_DL_728-746MHz+2_AWGNL



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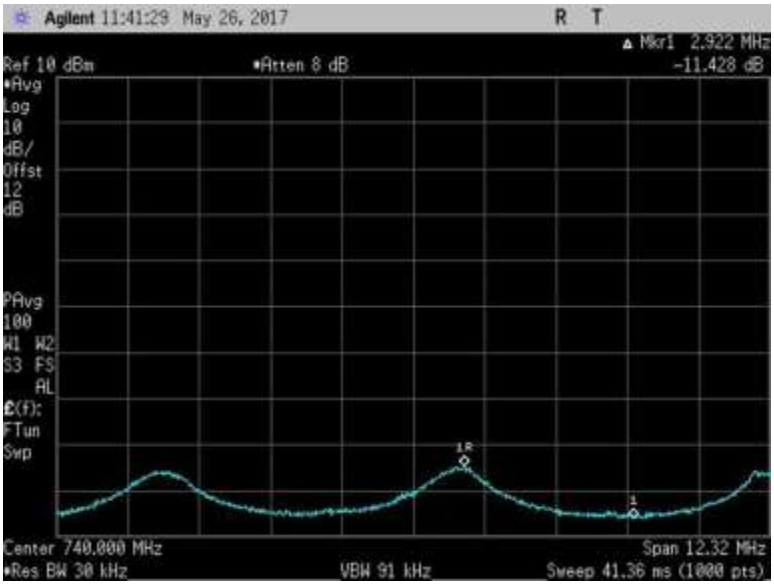
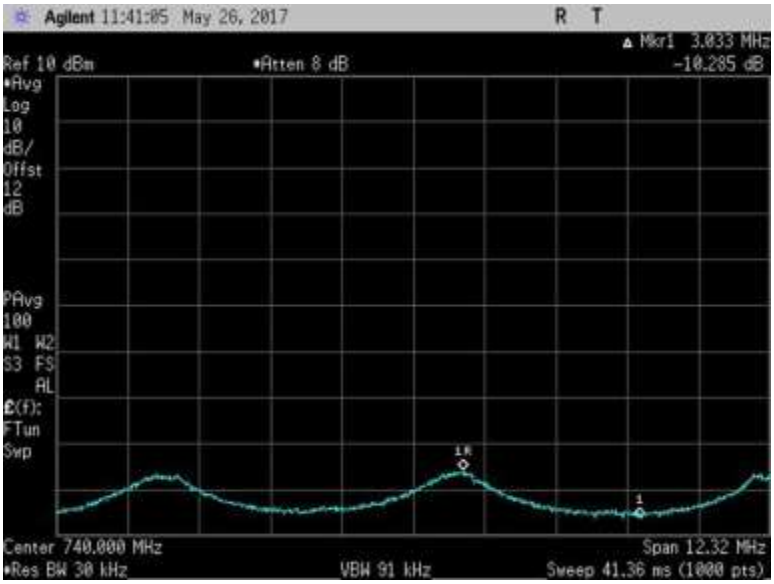
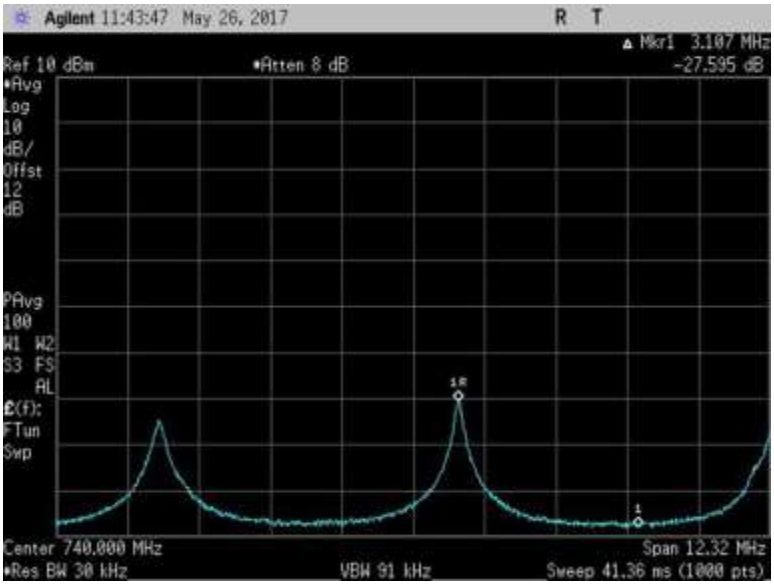


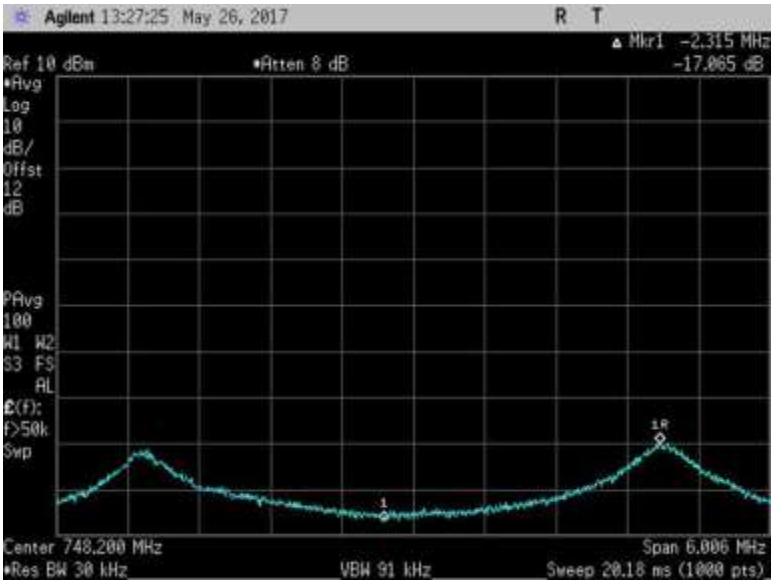
7.11.3_Osc_DL_728-746MHz+4_AWGNL



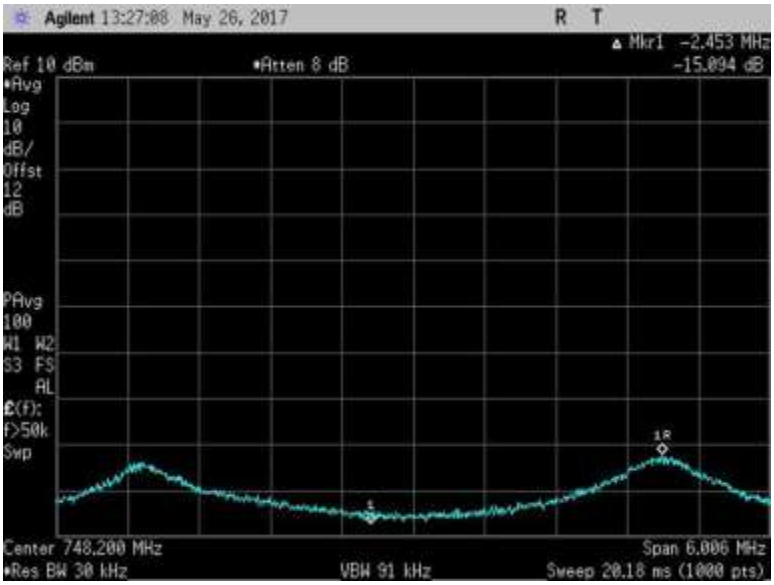
7.11.3_Osc_DL_728-746MHz+5_AWGNL



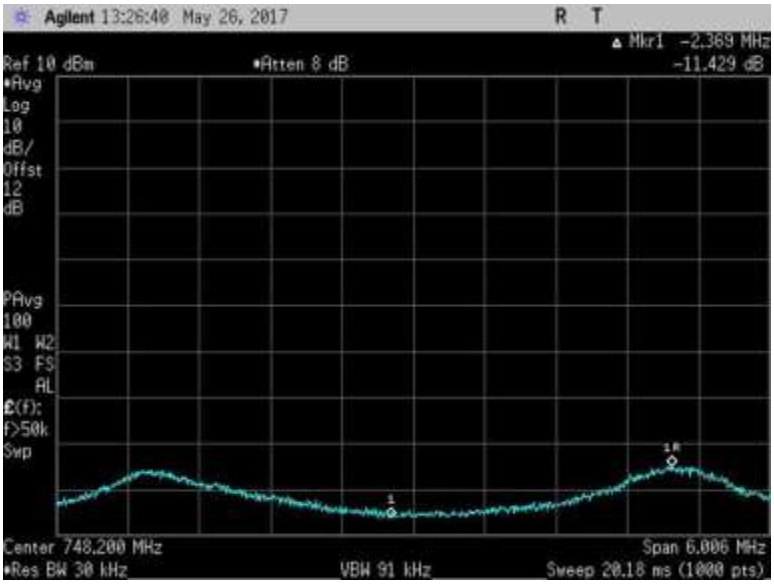
7.11.3_Osc_DL_728-746MHz-1_AWGNL



7.11.3_Osc_DL_746-757MHz+0_AWGNR



7.11.3_Osc_DL_746-757MHz+1_AWGNR



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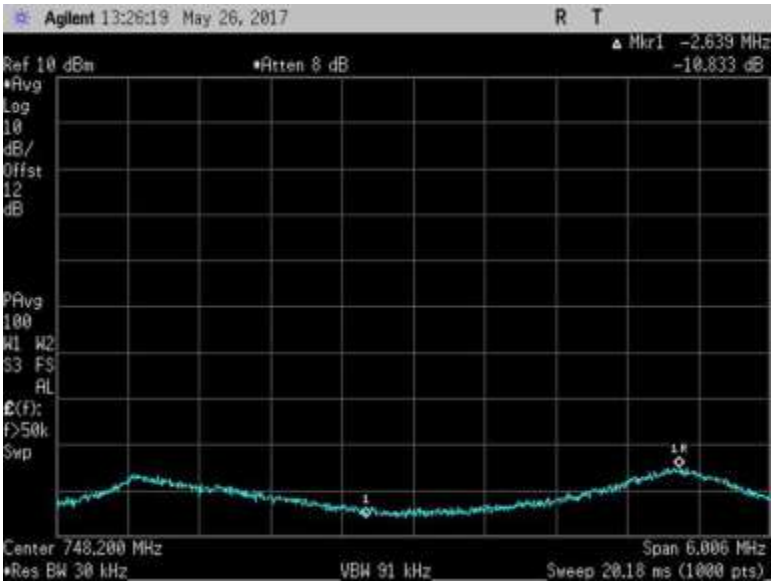
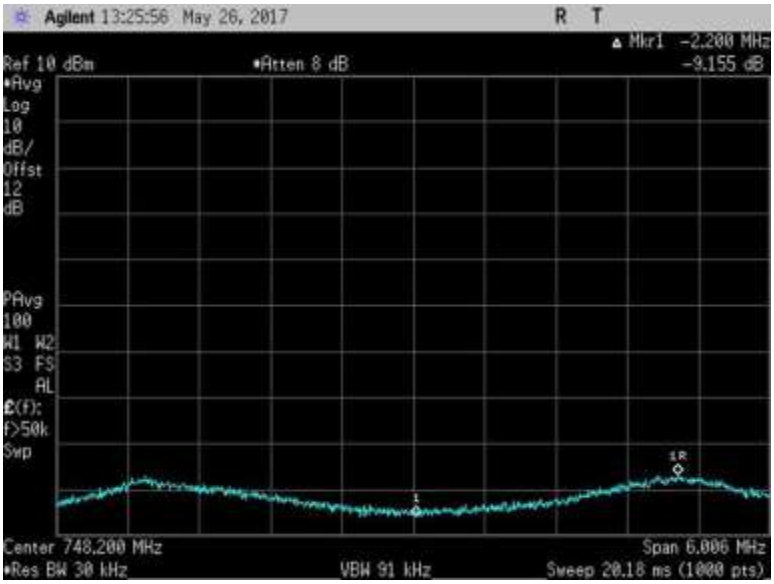
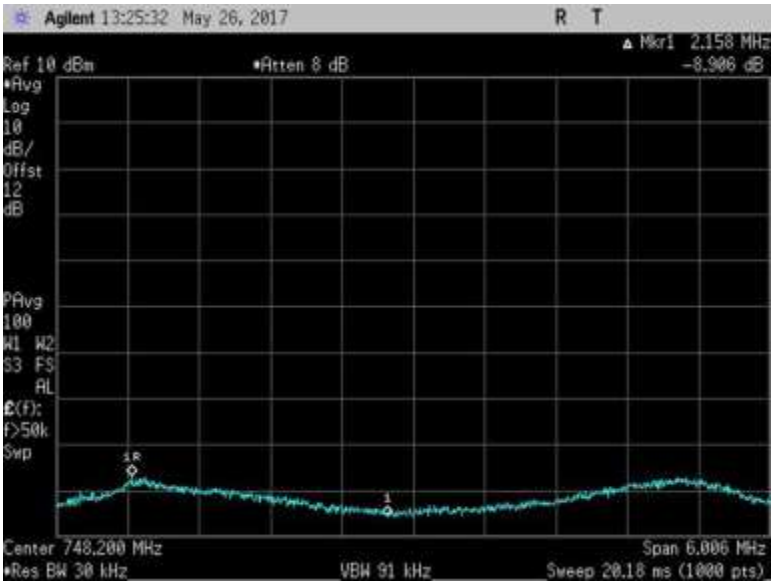


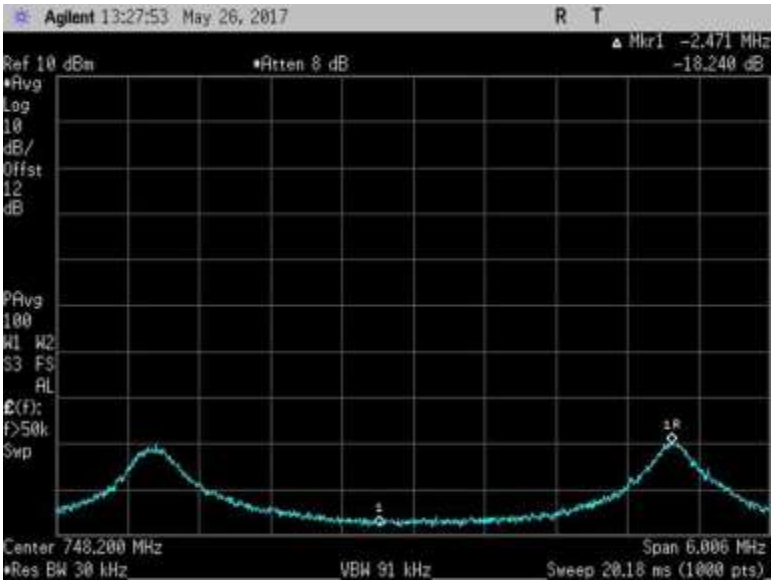
7.11.3_Osc_DL_746-757MHz+3_AWGNR



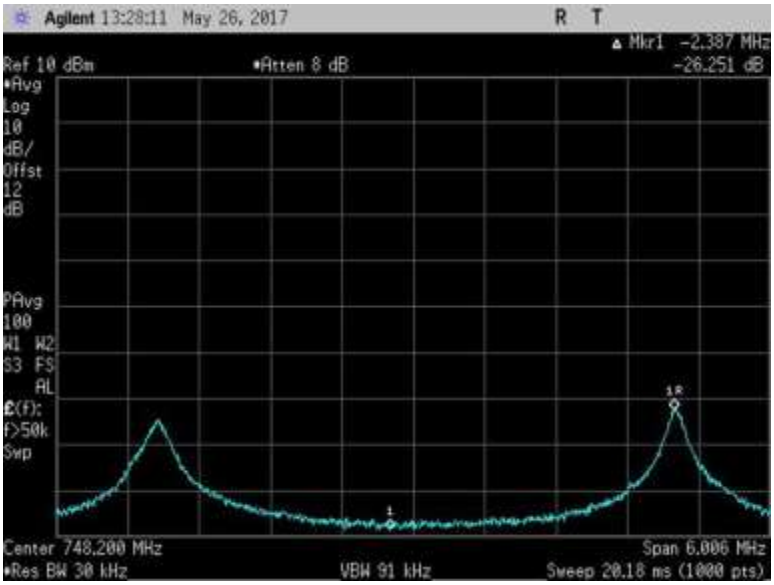
7.11.3_Osc_DL_746-757MHz+4_AWGNR



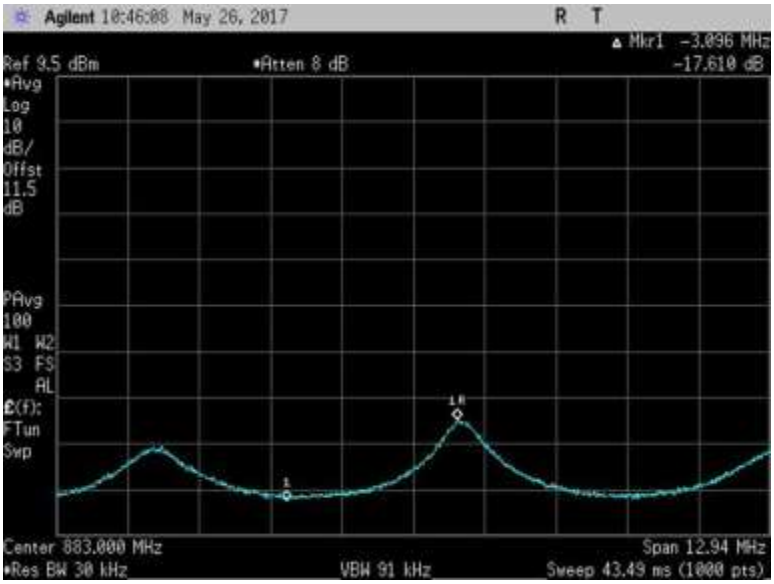
7.11.3_Osc_DL_746-757MHz+5_AWGNR



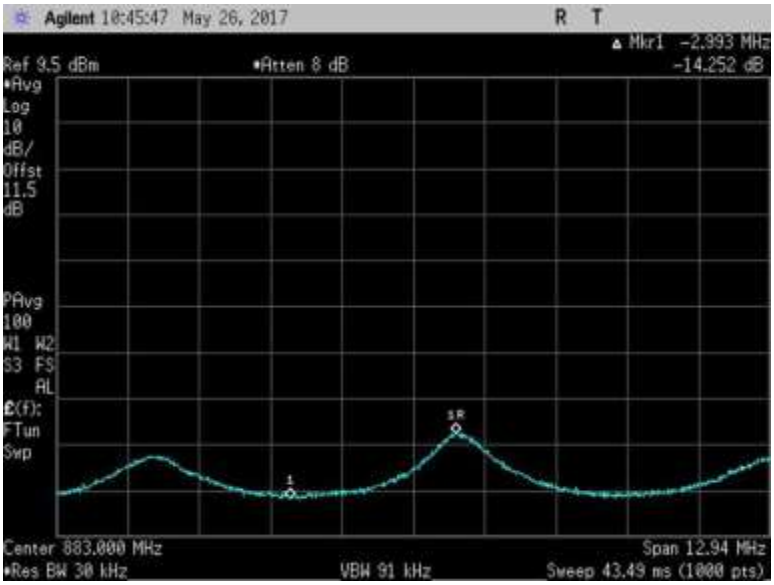
7.11.3_Osc_DL_746-757MHz-1_AWGNR



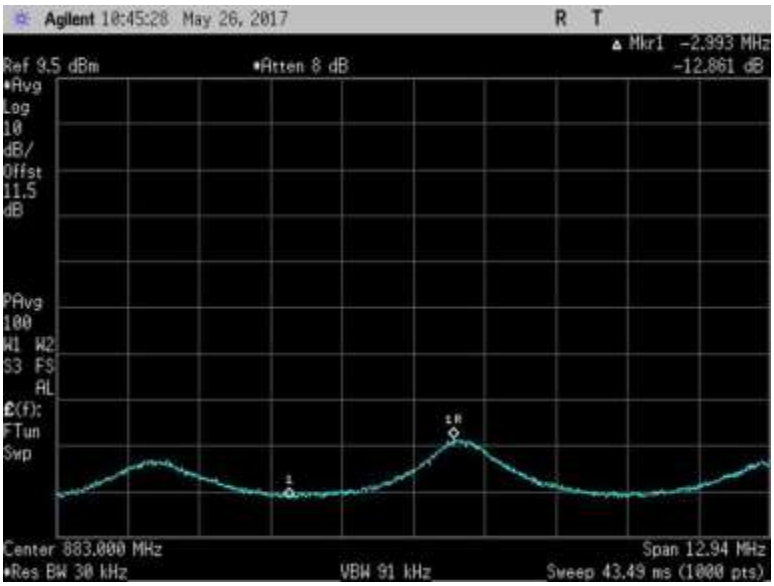
7.11.3_Osc_DL_746-757MHz-2_AWGNR



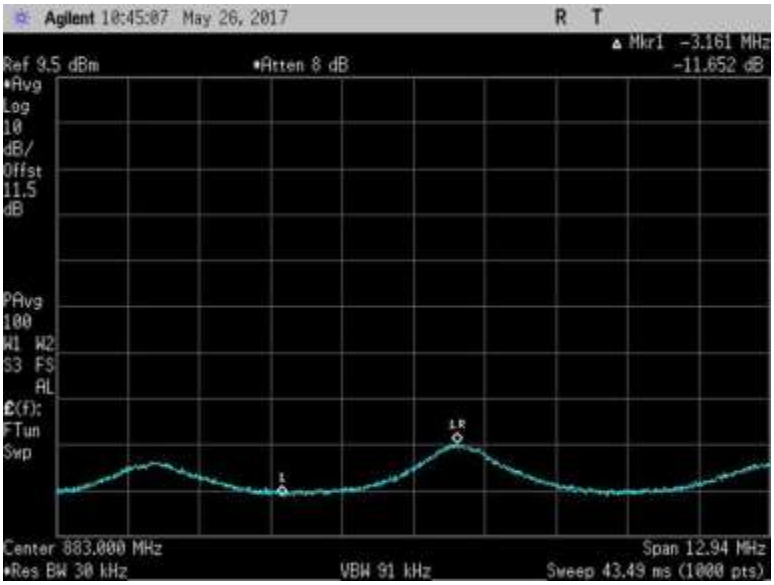
7.11.3_Osc_DL_869-894MHz+0_AWGNL



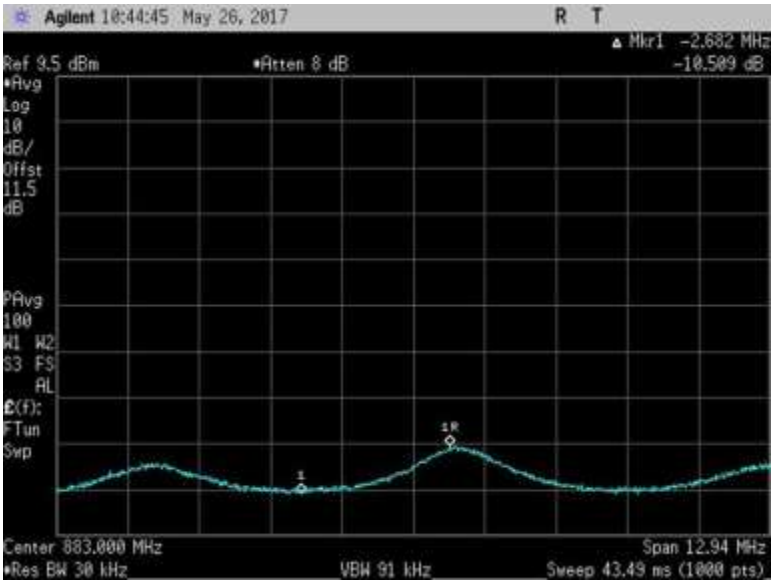
7.11.3_Osc_DL_869-894MHz+1_AWGNL



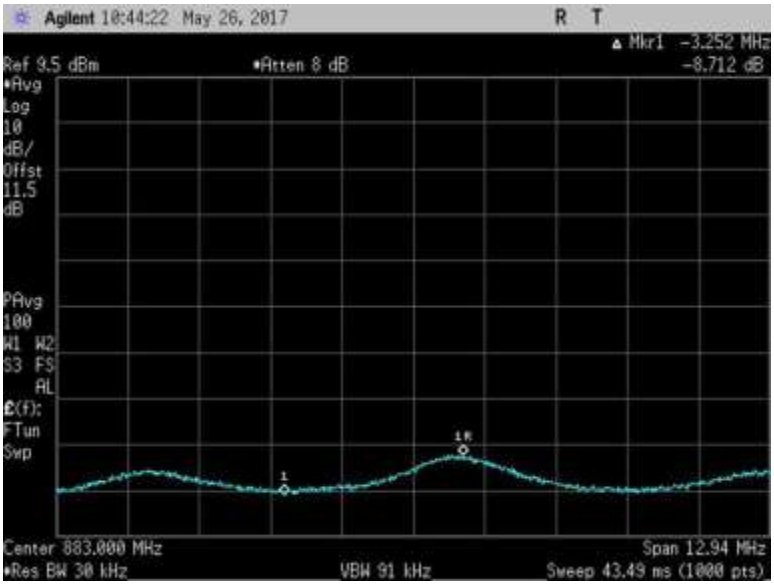
7.11.3_Osc_DL_869-894MHz+2_AWGNL



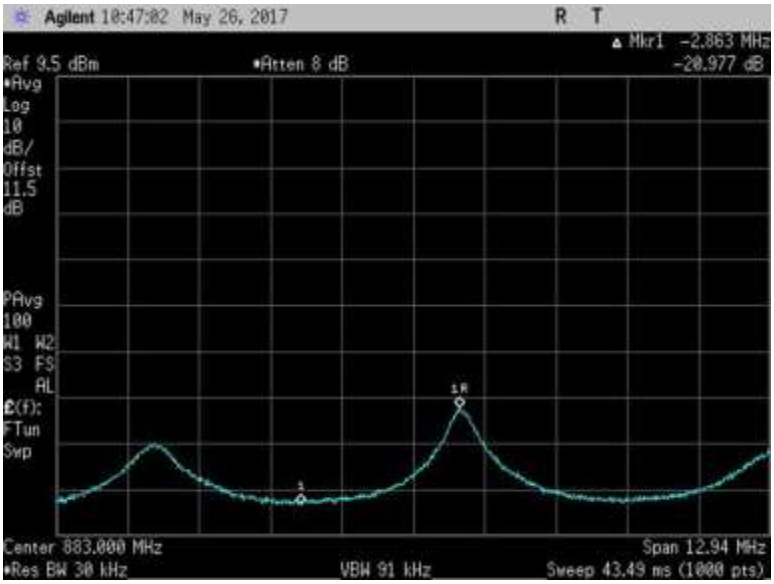
7.11.3_Osc_DL_869-894MHz+3_AWGNL



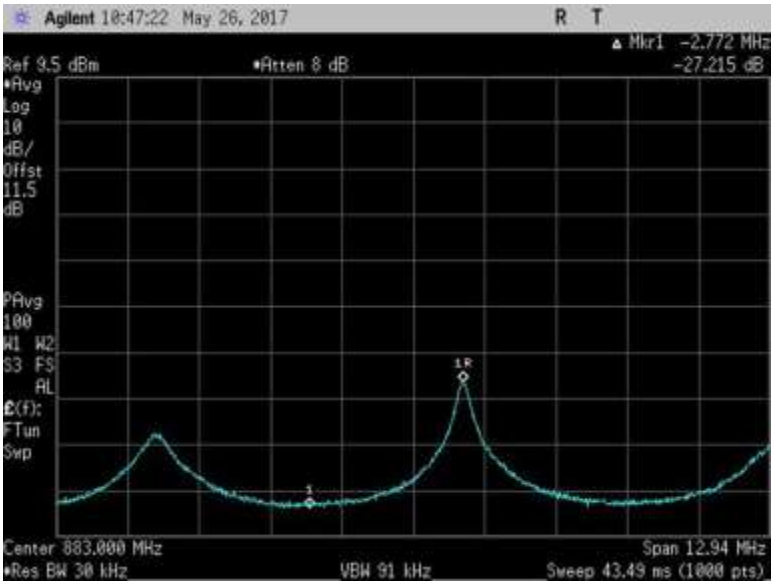
7.11.3_Osc_DL_869-894MHz+4_AWGNL



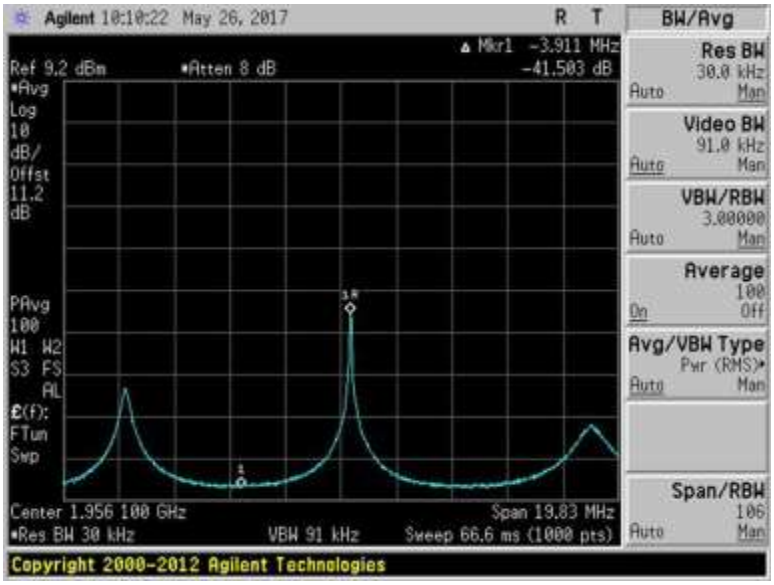
7.11.3_Osc_DL_869-894MHz+5_AWGNL



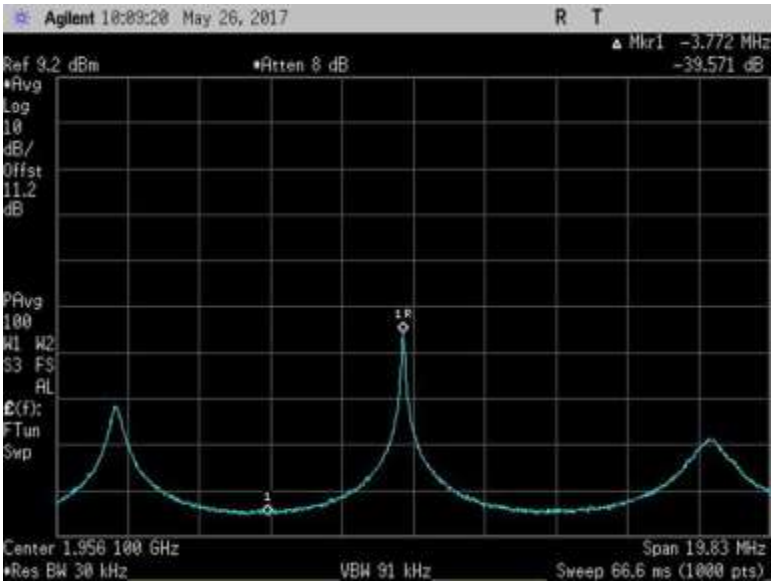
7.11.3_Osc_DL_869-894MHz-1_AWGNL



7.11.3_Osc_DL_869-894MHz-2_AWGNL



7.11.3_Osc_DL_1930-1995MHz+0_AWGNR



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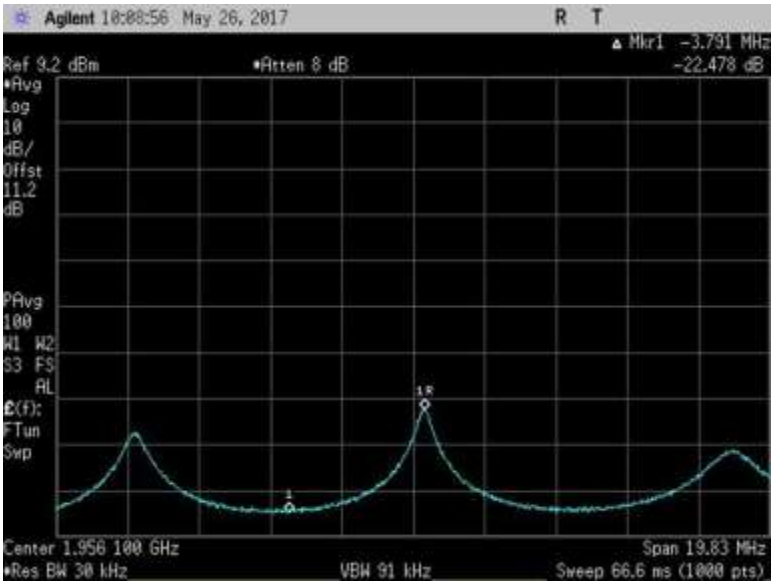

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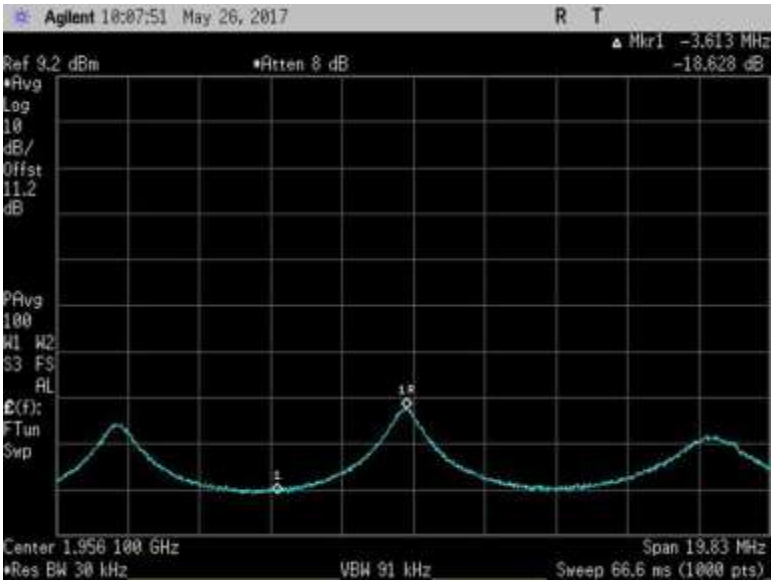
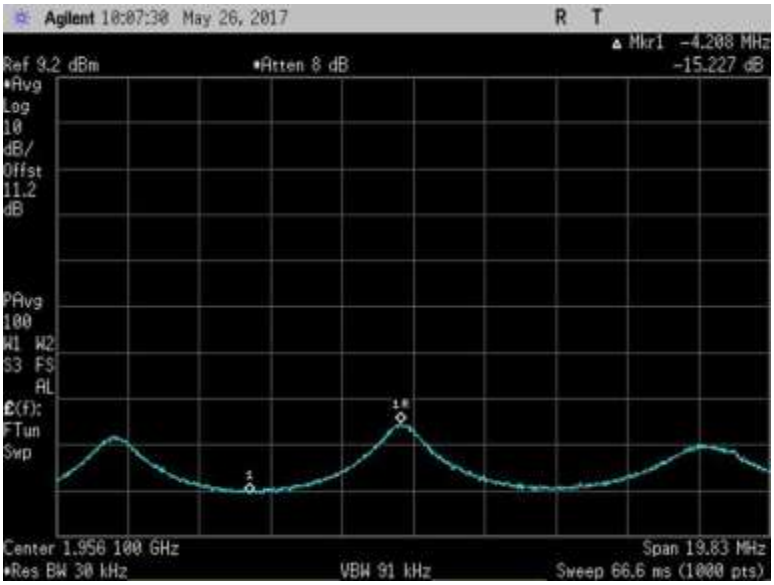


7.11.3_Osc_DL_1930-1995MHz+3_AWGNR



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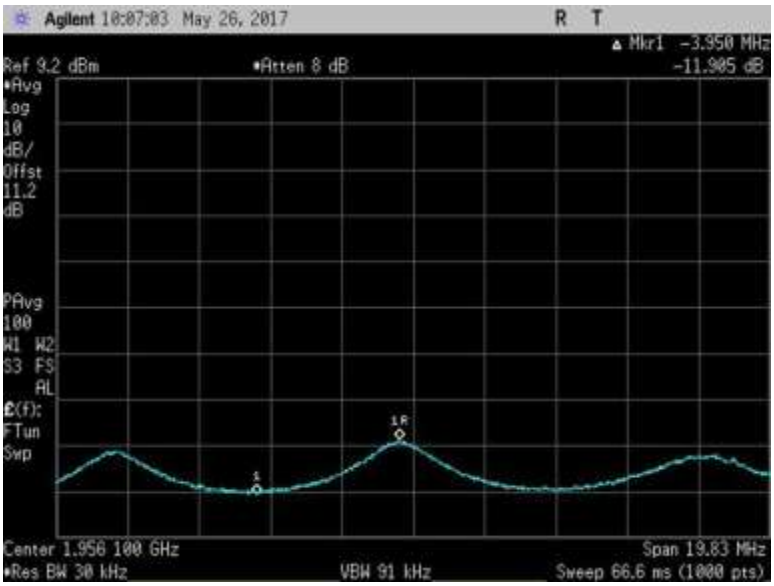
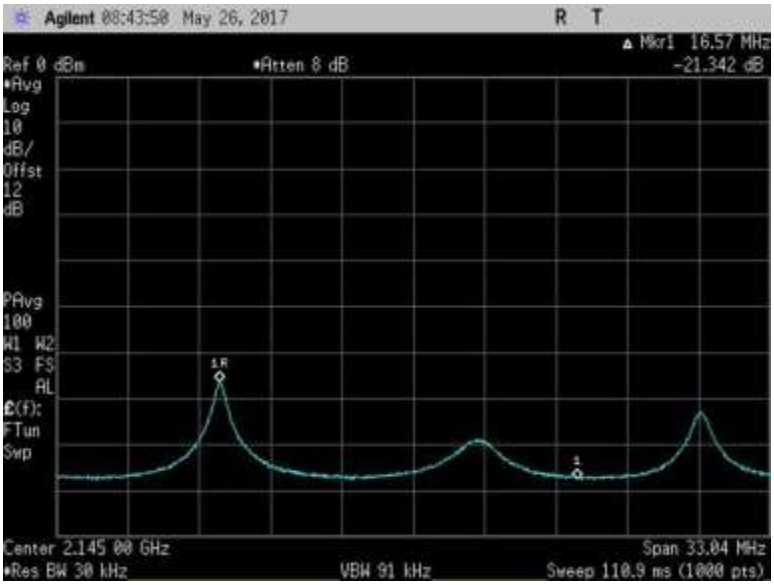
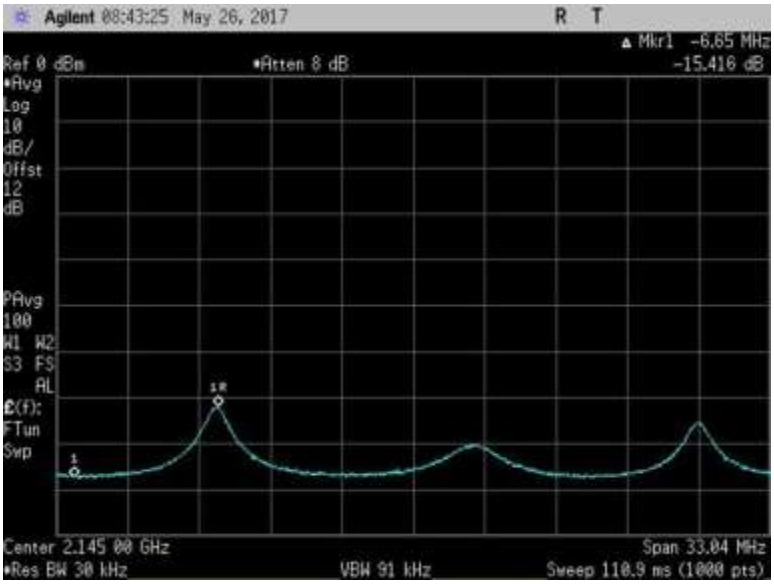


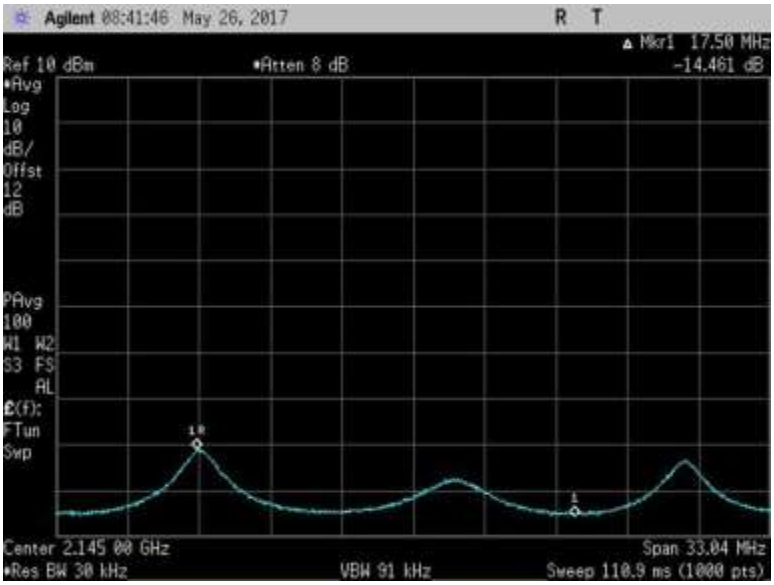
7.11.3_Osc_DL_1930-1995MHz+5_AWGNR



7.11.3_Osc_DL_2110-2155MHz+0_AWGNL



7.11.3_Osc_DL_2110-2155MHz+1_AWGNL



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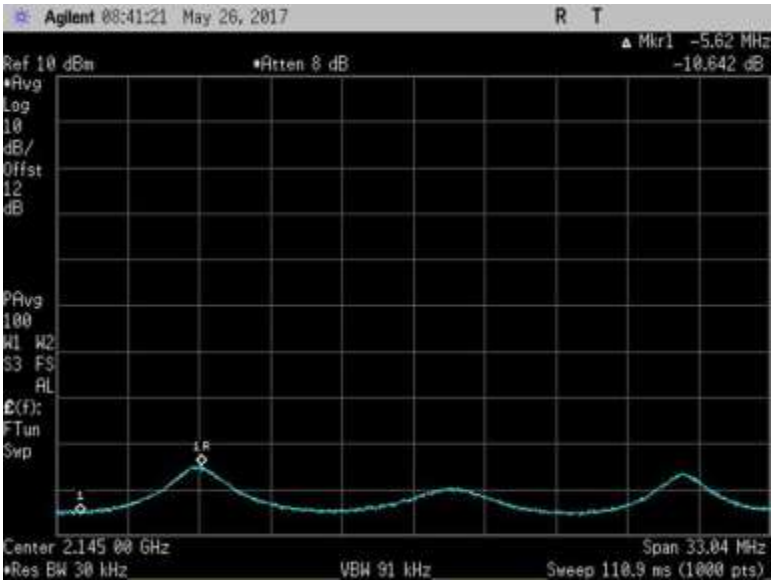

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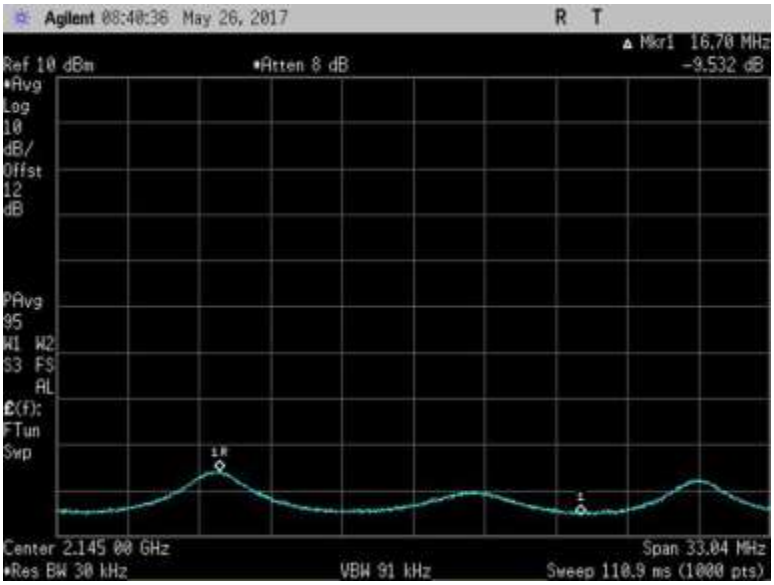

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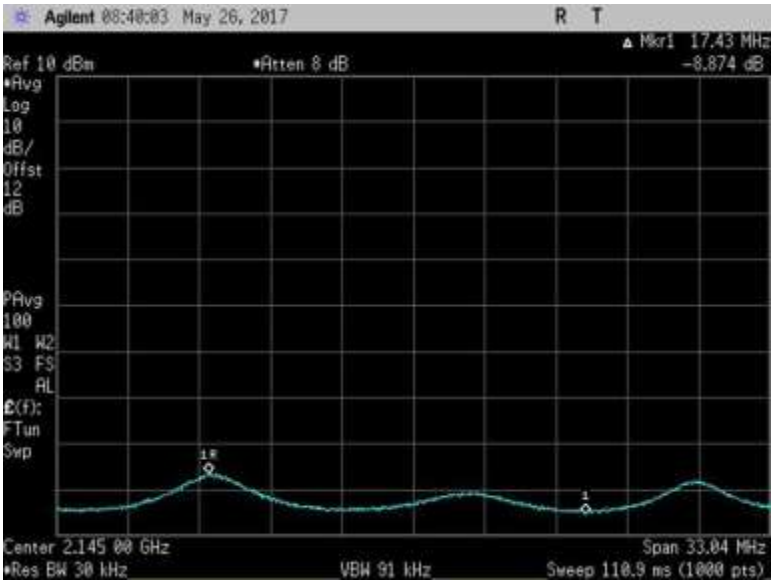

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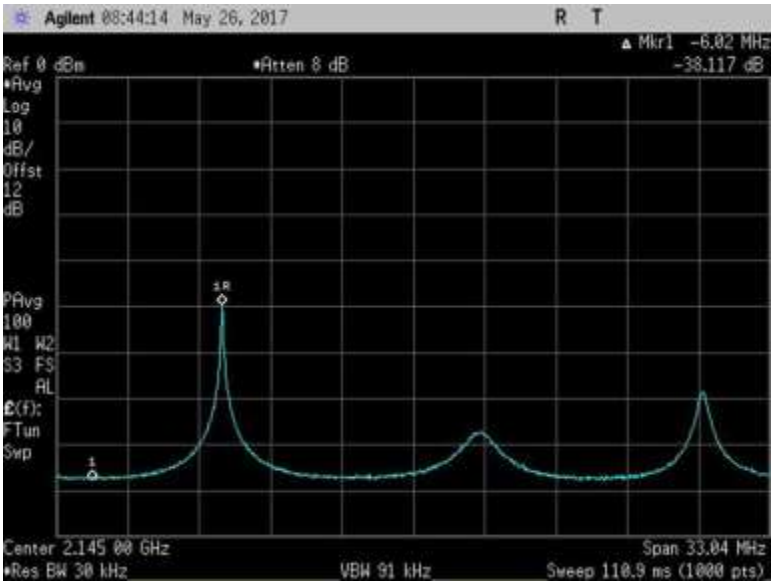
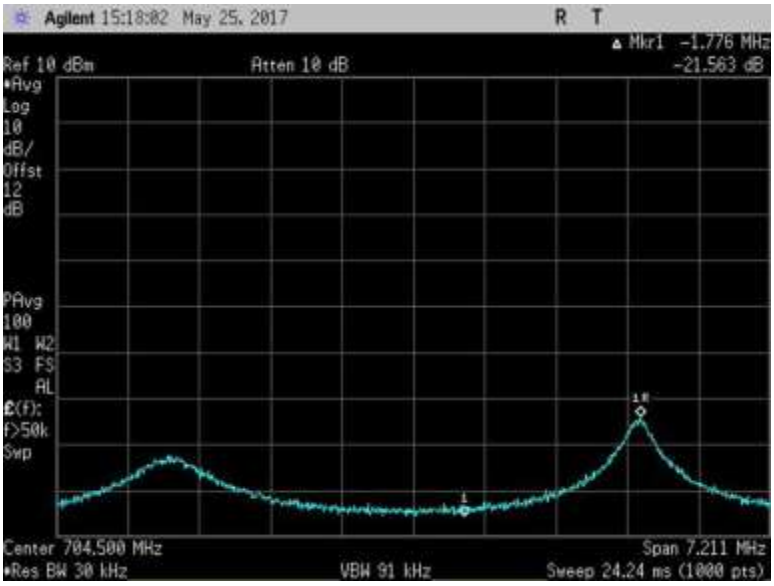
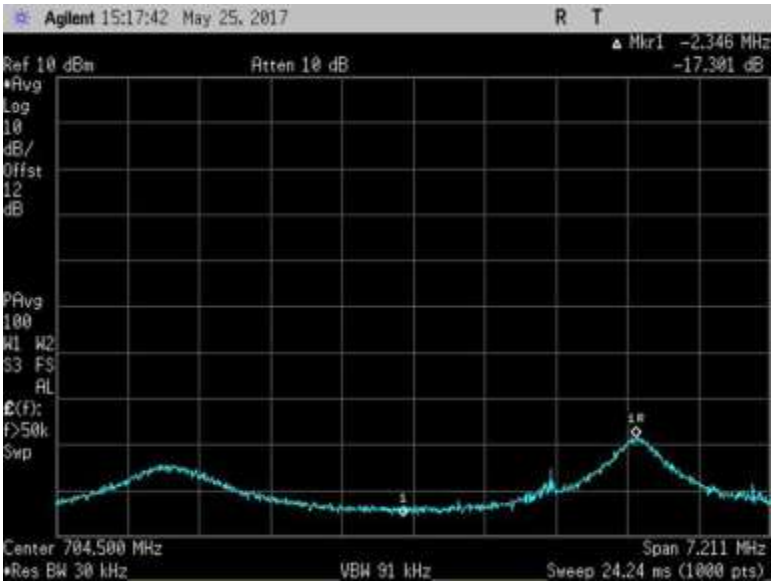


7.11.3_Osc_DL_2110-2155MHz-1_AWGNL

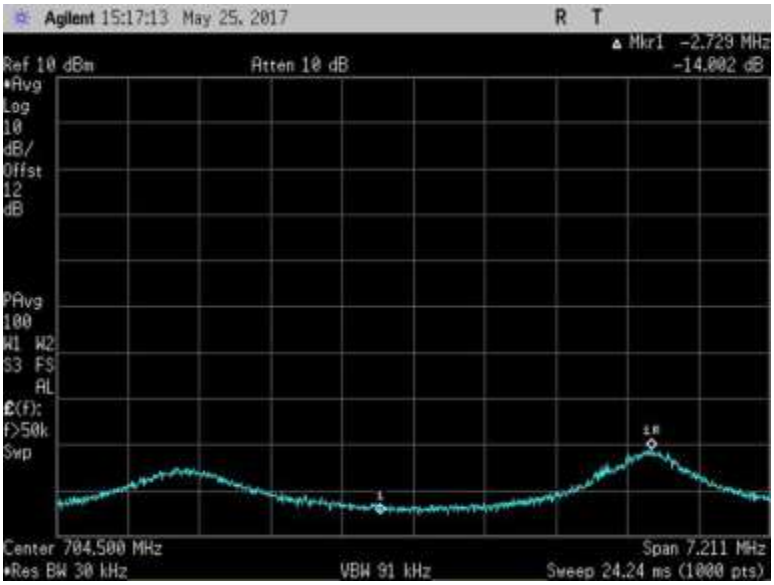
UL, AWGNR / AWGNL



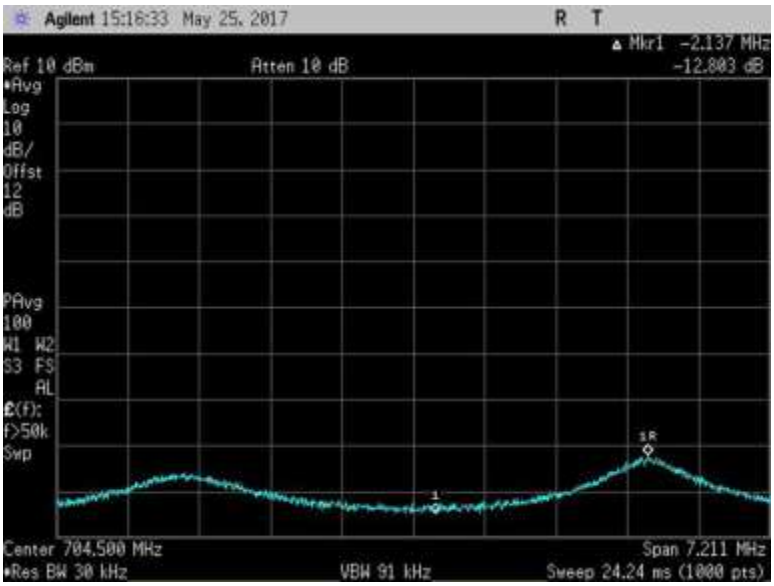
7.11.3_Osc_UL_698-716MHz+0_AWGNR



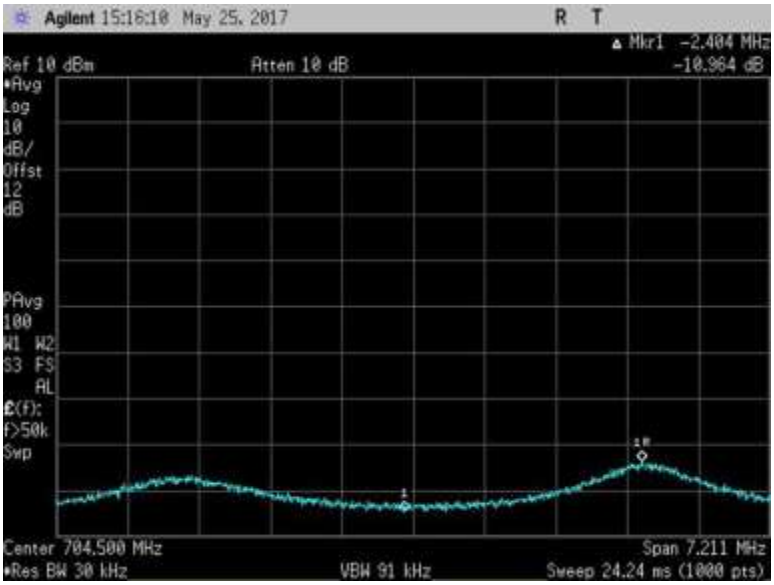
7.11.3_Osc_UL_698-716MHz+1_AWGNR



7.11.3_Osc_UL_698-716MHz+2_AWGNR



7.11.3_Osc_UL_698-716MHz+3_AWGNR



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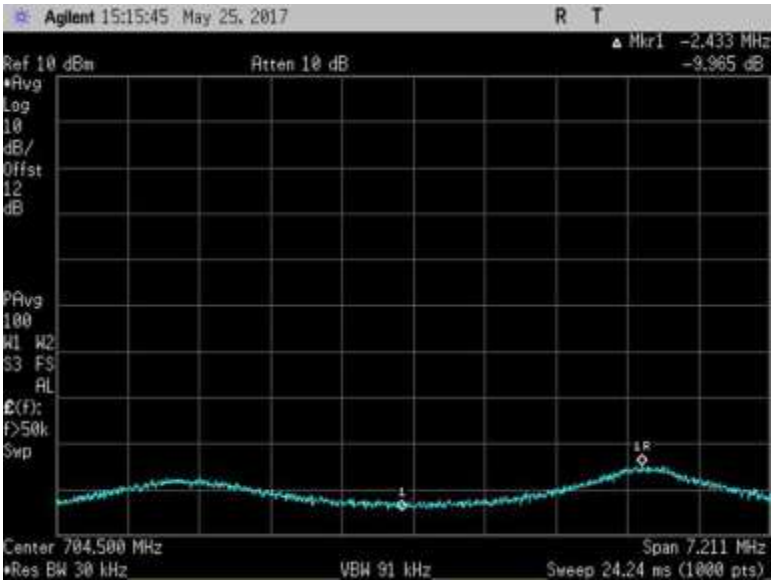
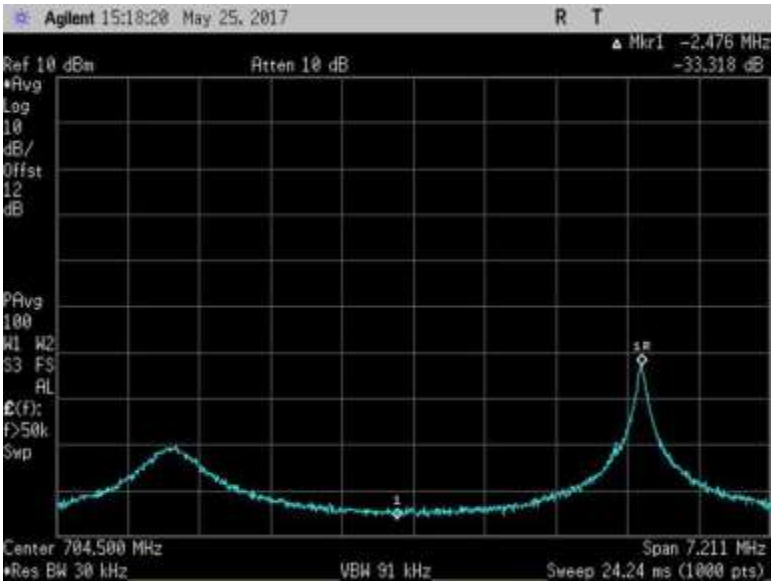
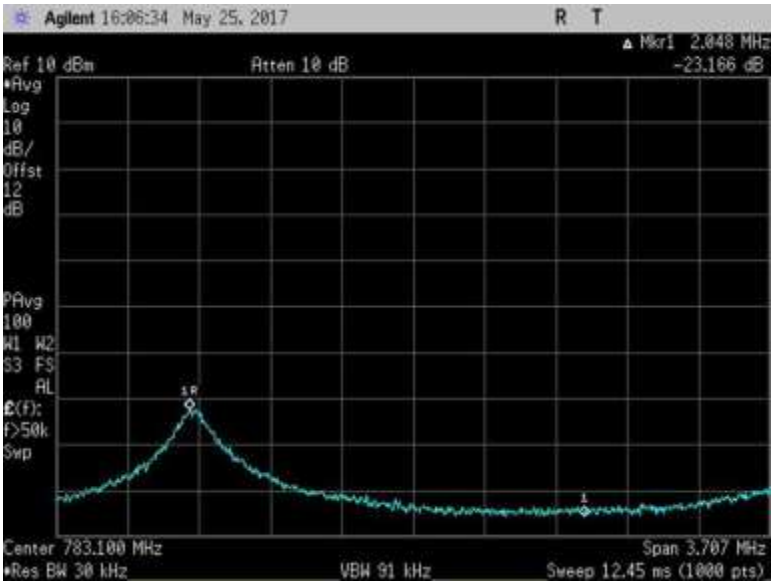


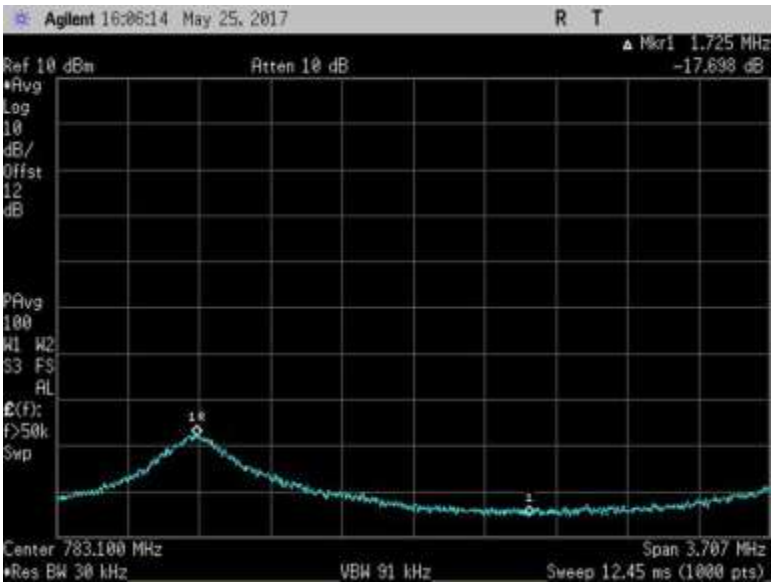
7.11.3_Osc_UL_698-716MHz+5_AWGNR



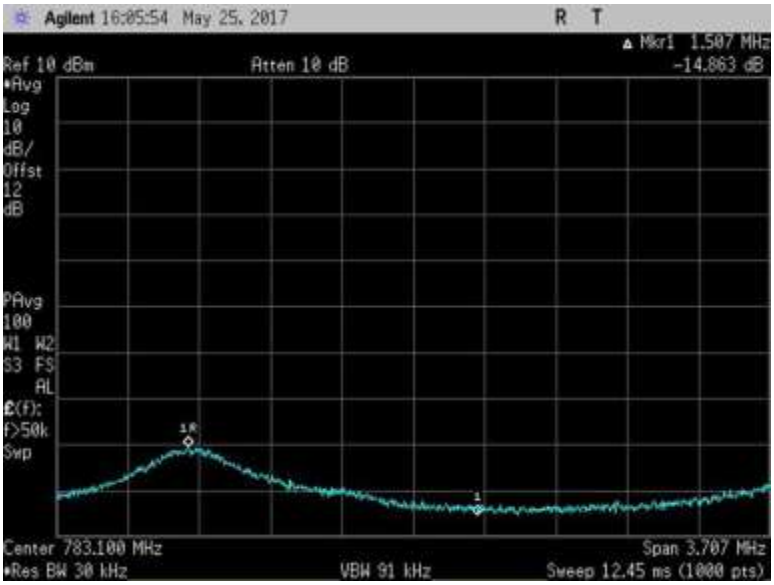
7.11.3_Osc_UL_698-716MHz-1_AWGNR



7.11.3_Osc_UL_776-787MHz+0_AWGNL



7.11.3_Osc_UL_776-787MHz+1_AWGNL



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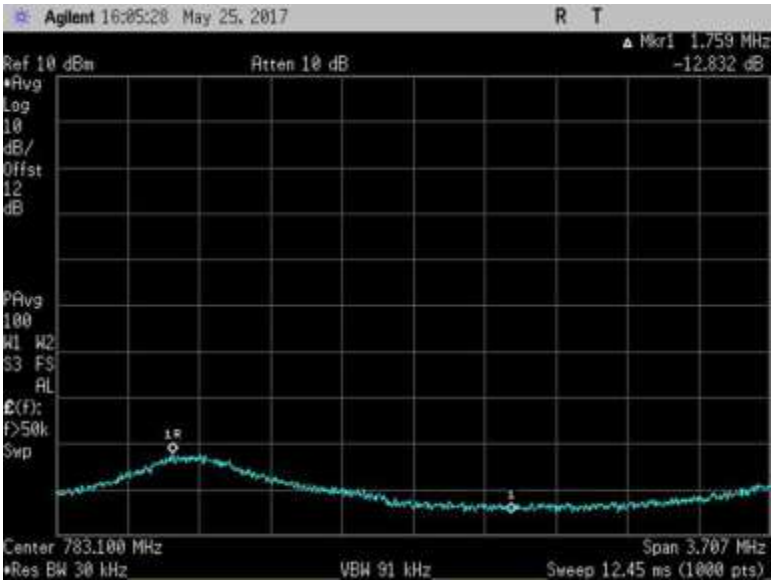
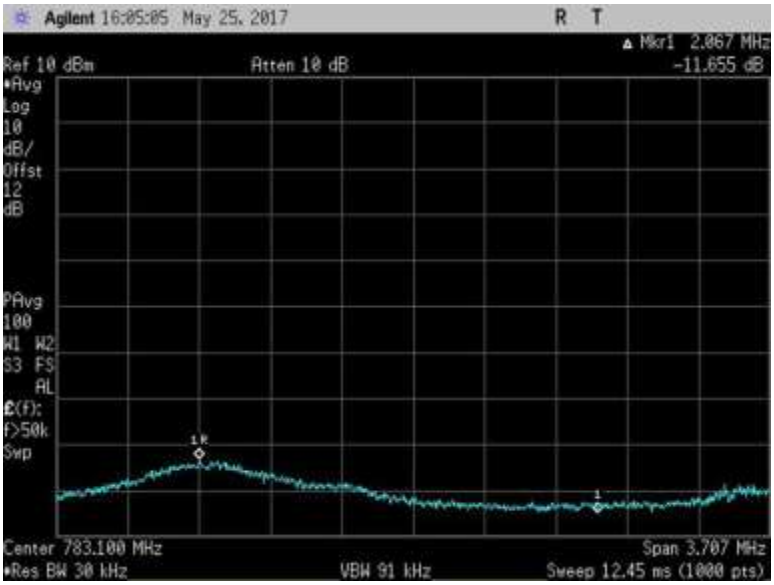


7.11.3_Osc_UL_776-787MHz+3_AWGNL



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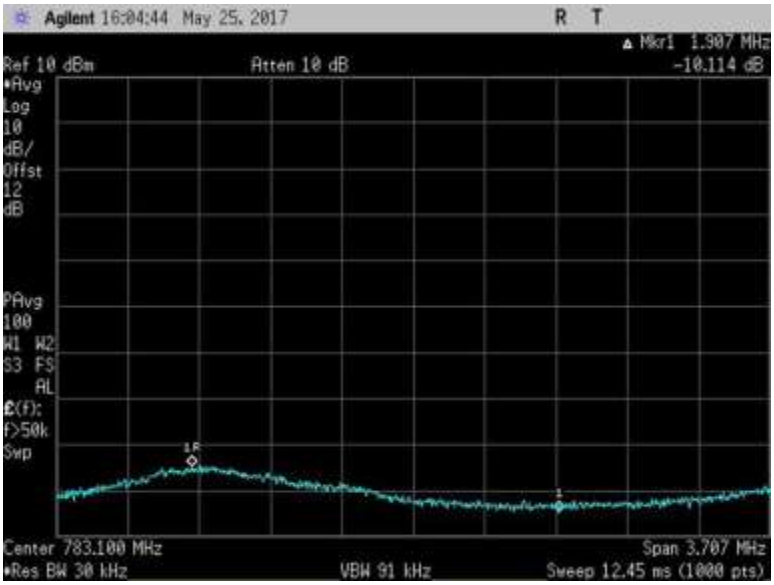
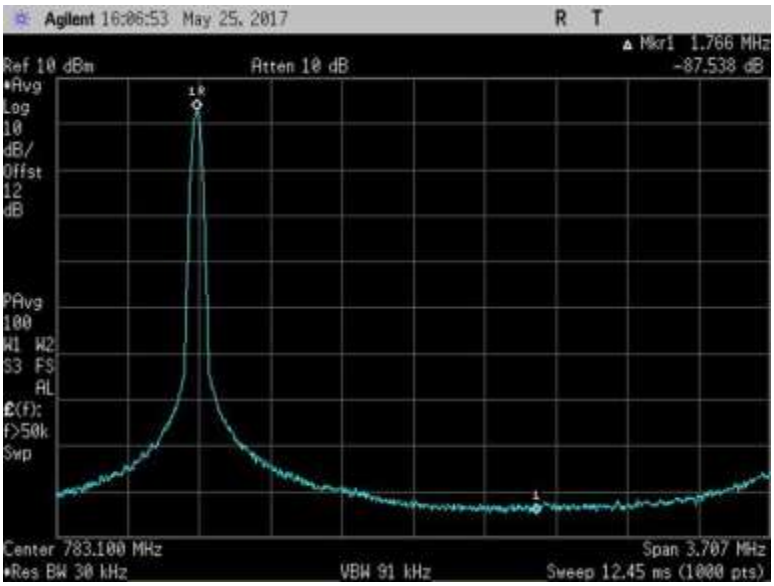
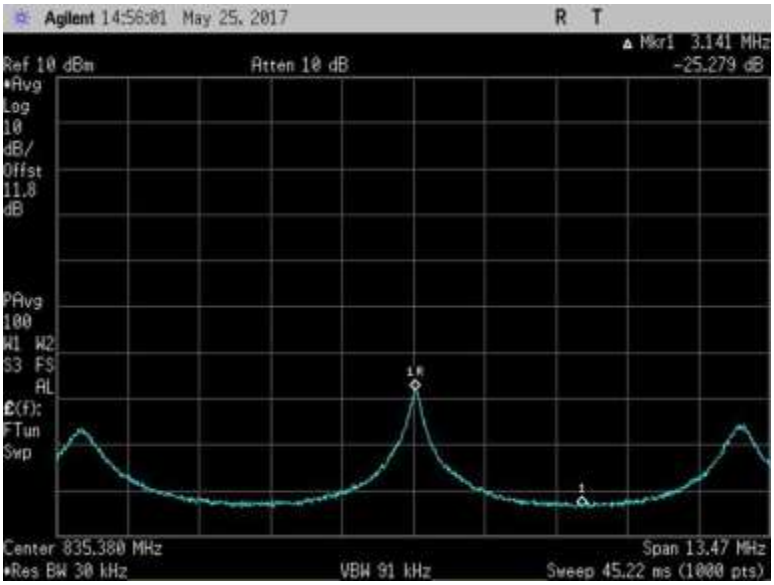


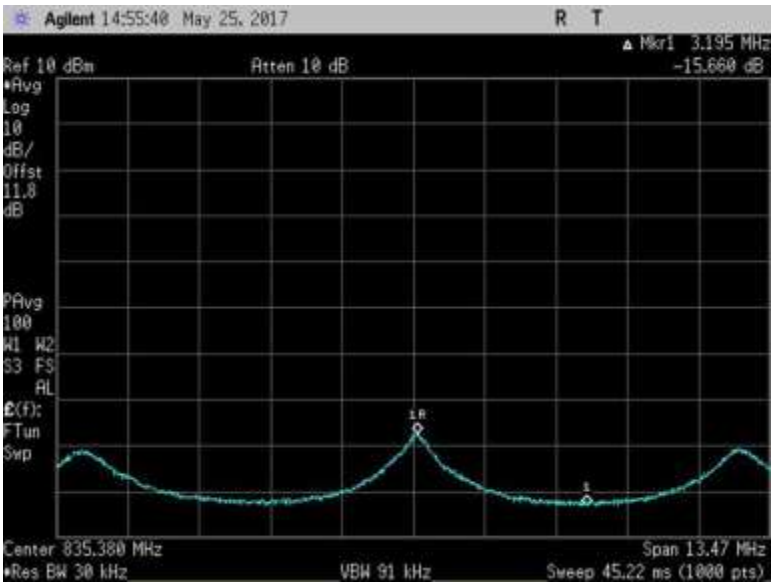
7.11.3_Osc_UL_776-787MHz+5_AWGNL



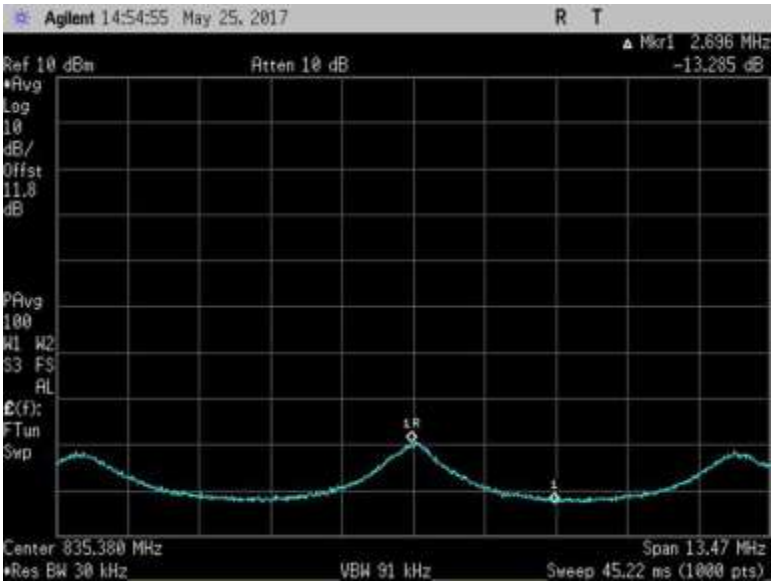
7.11.3_Osc_UL_776-787MHz-1_AWGNL



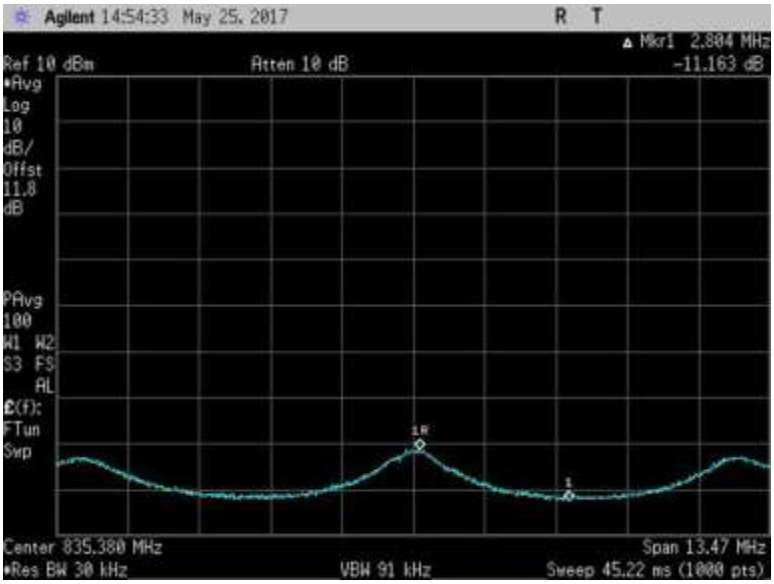
7.11.3_Osc_UL_824-849MHz+0_AWGNR



7.11.3_Osc_UL_824-849MHz+1_AWGNR



7.11.3_Osc_UL_824-849MHz+2_AWGNR



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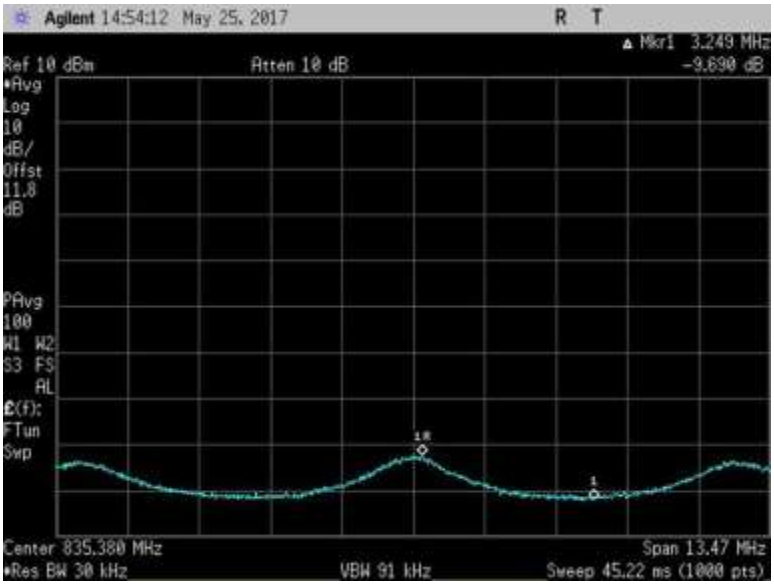

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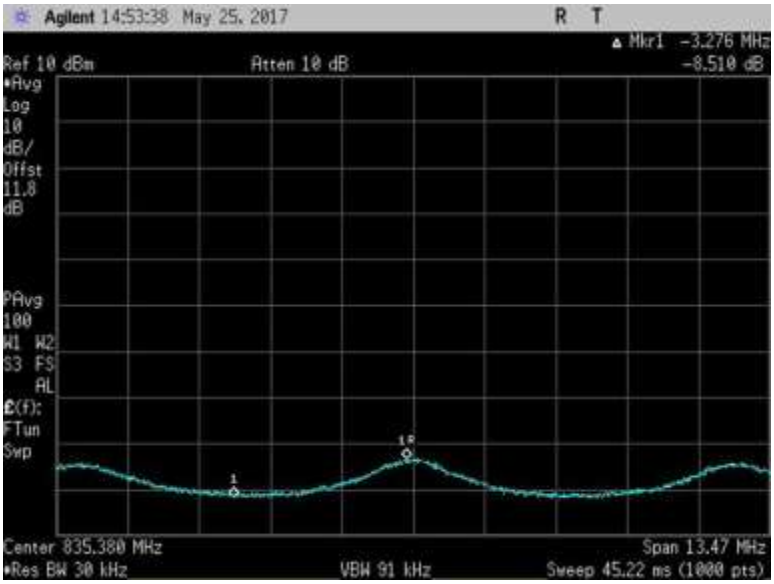

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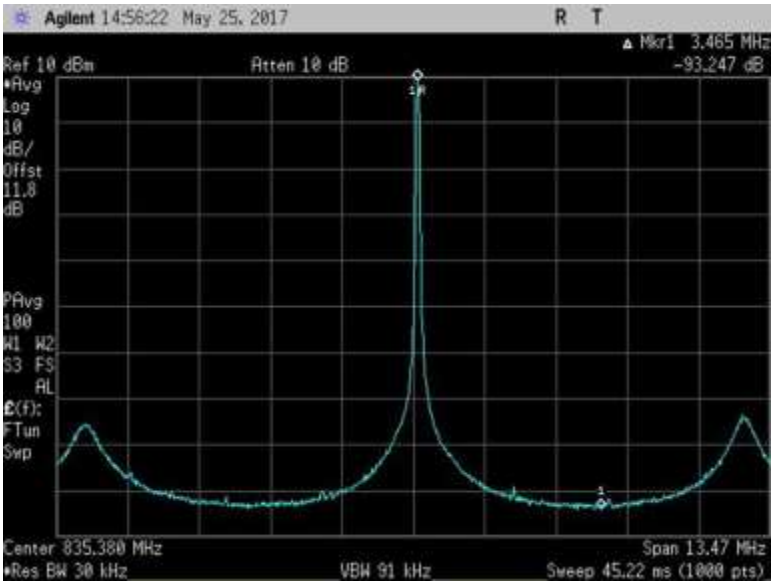
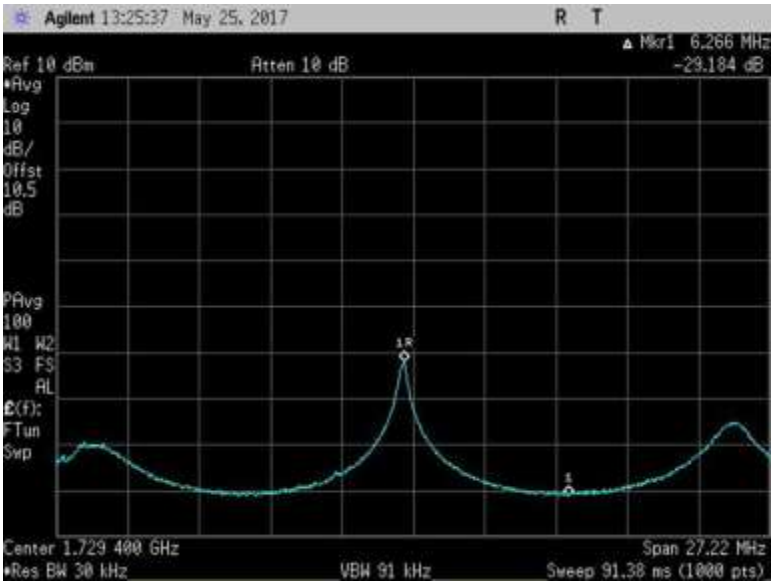
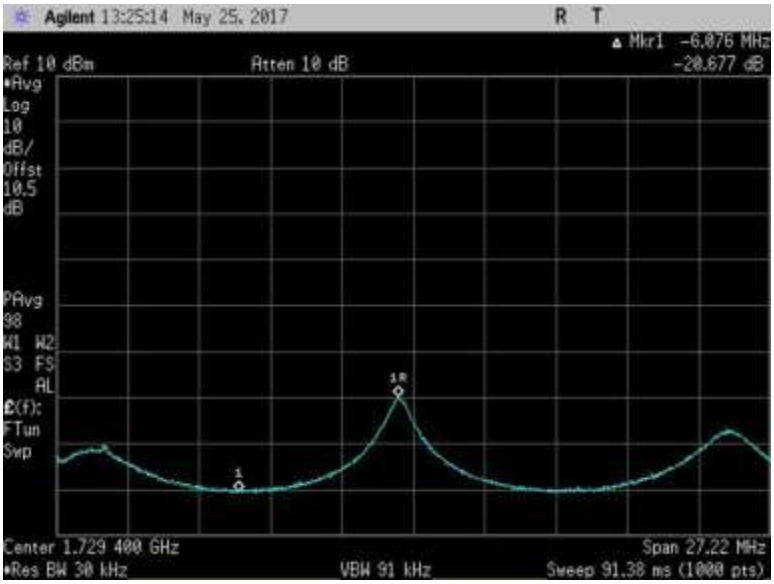


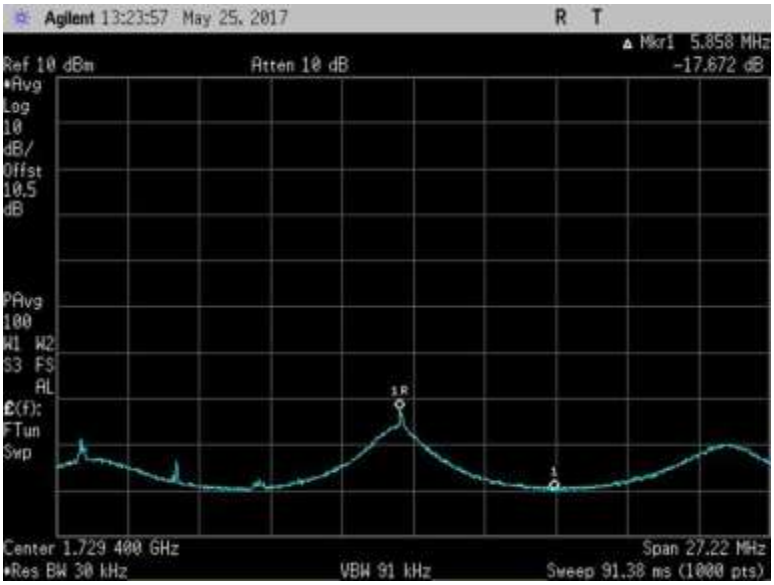
7.11.3_Osc_UL_824-849MHz-1_AWGNR



7.11.3_Osc_UL_1710-1755MHz+0_AWGNR



7.11.3_Osc_UL_1710-1755MHz+1_AWGNR



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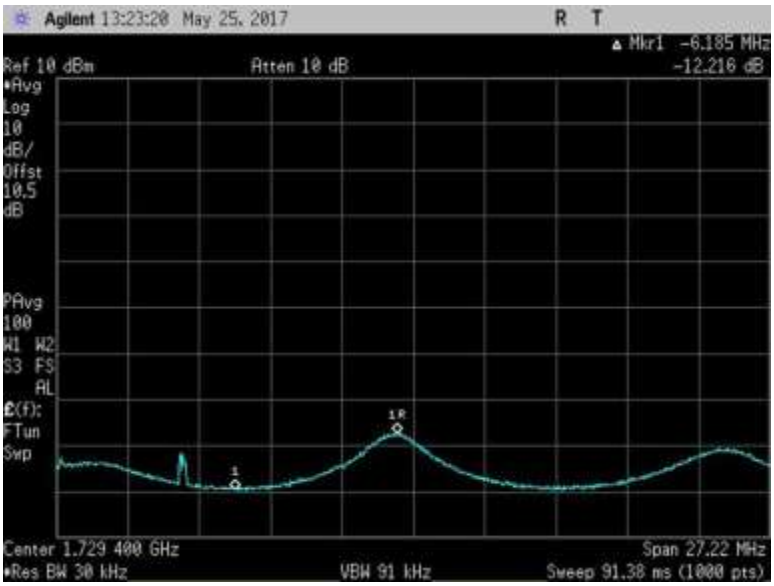
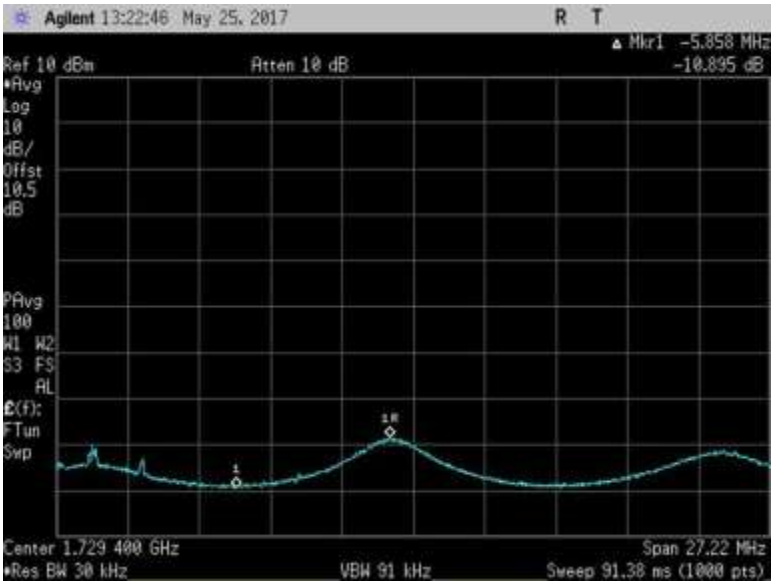
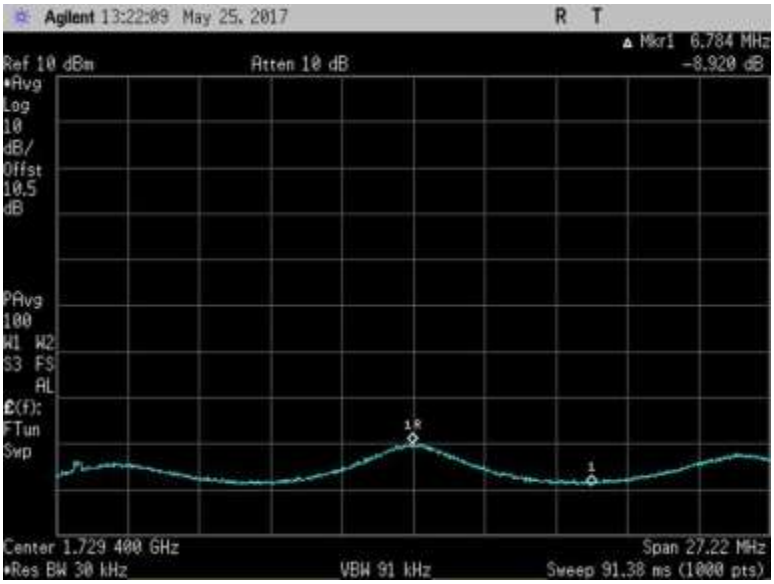


7.11.3_Osc_UL_1710-1755MHz+3_AWGNR



7.11.3_Osc_UL_1710-1755MHz+4_AWGNR



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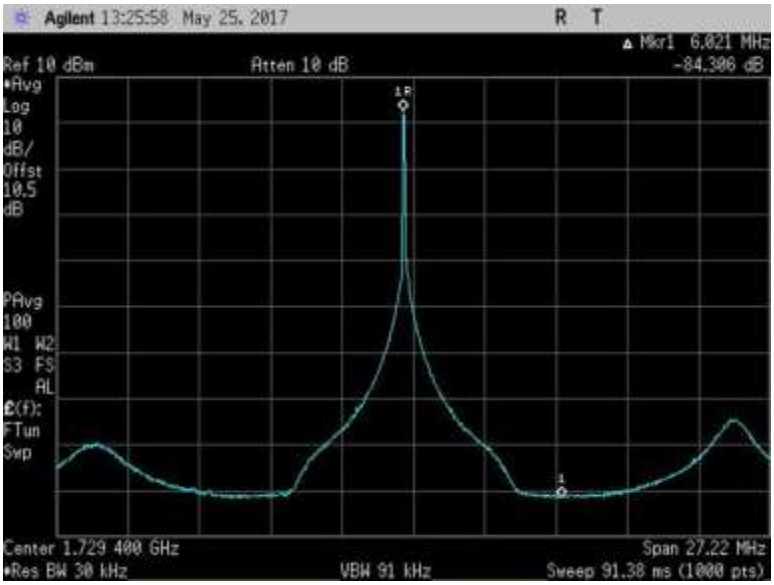
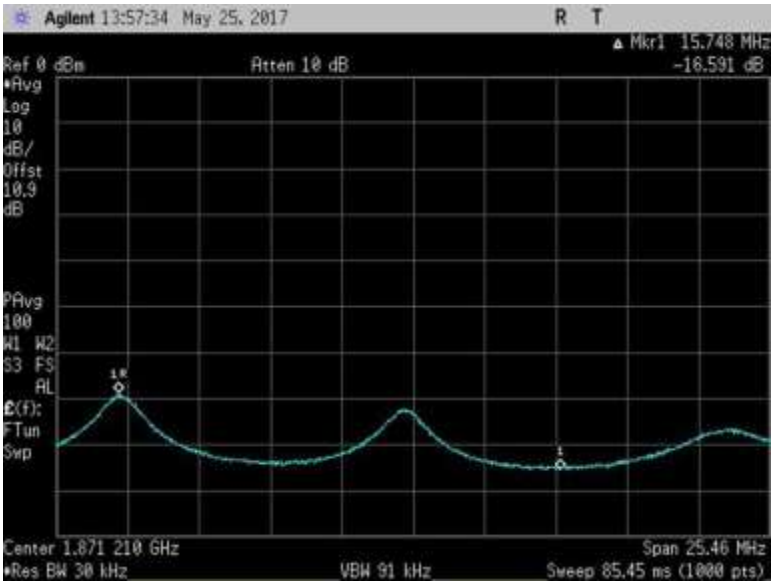
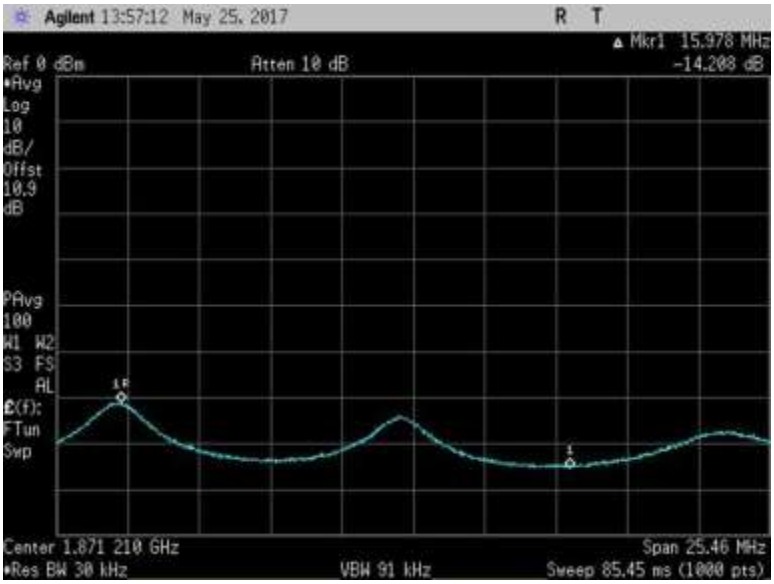


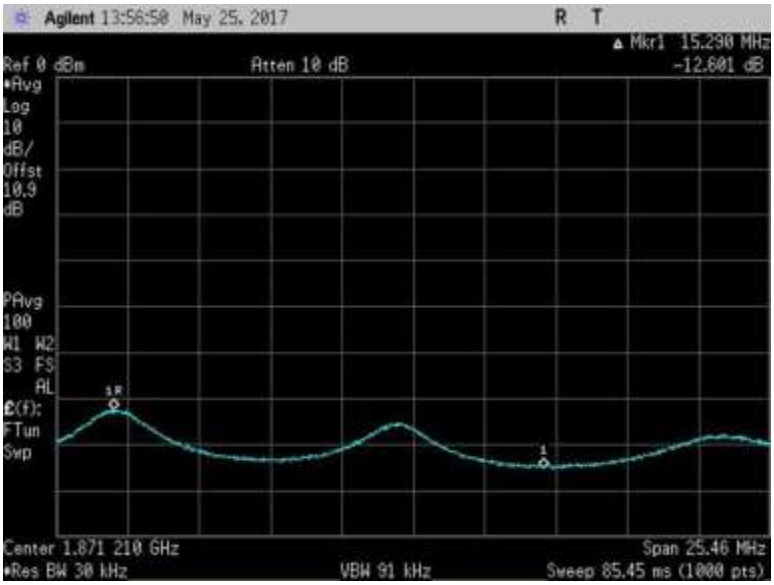
7.11.3_Osc_UL_1710-1755MHz-1_AWGNR



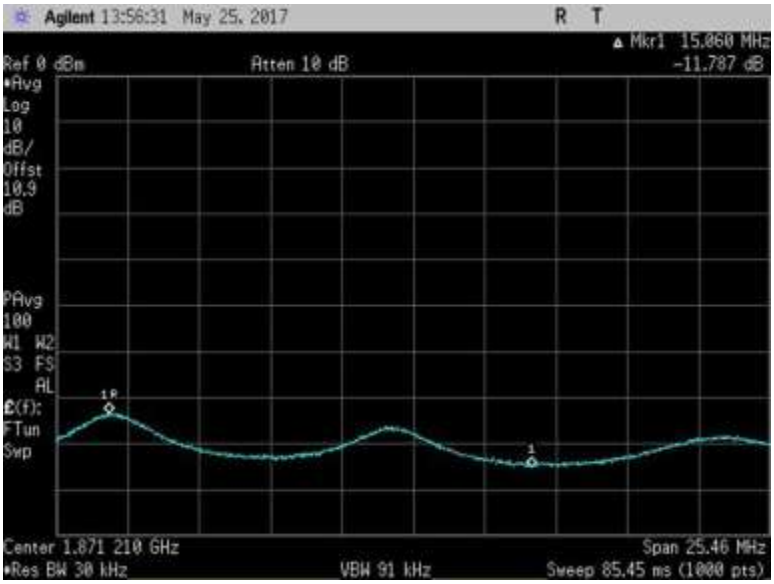
7.11.3_Osc_UL_1850-1915MHz+0_AWGNR



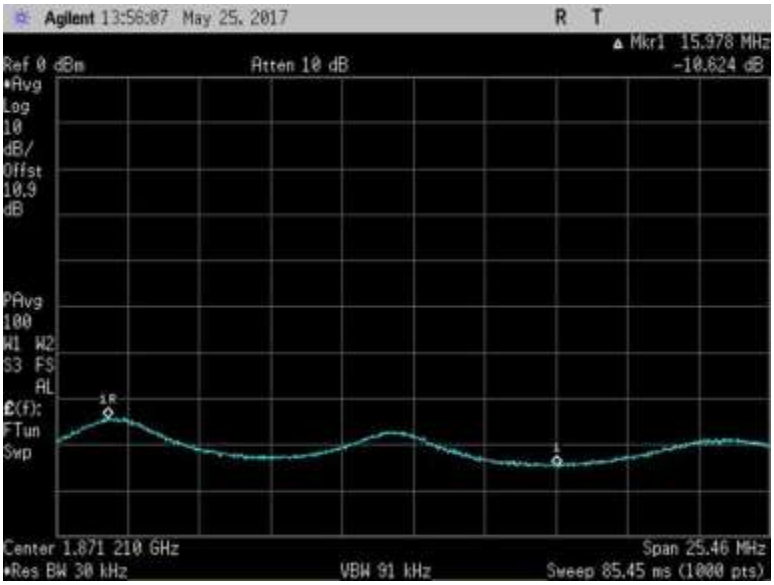
7.11.3_Osc_UL_1850-1915MHz+1_AWGNR



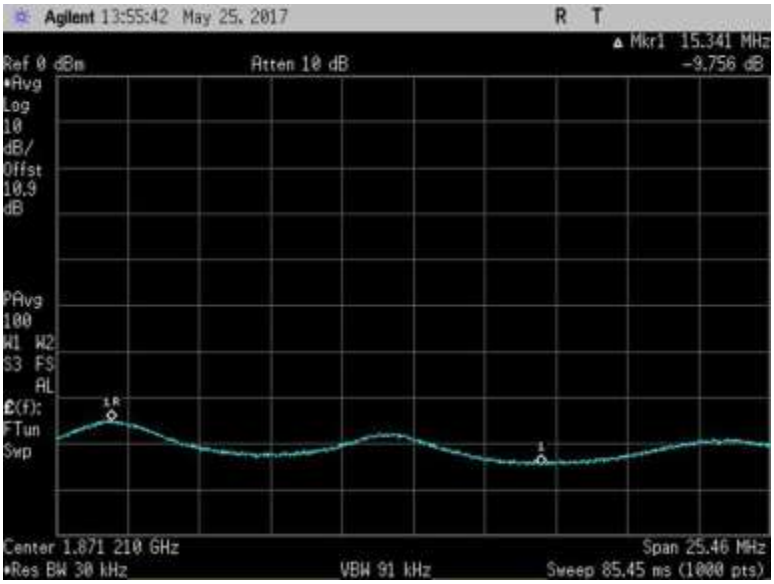
7.11.3_Osc_UL_1850-1915MHz+2_AWGNR



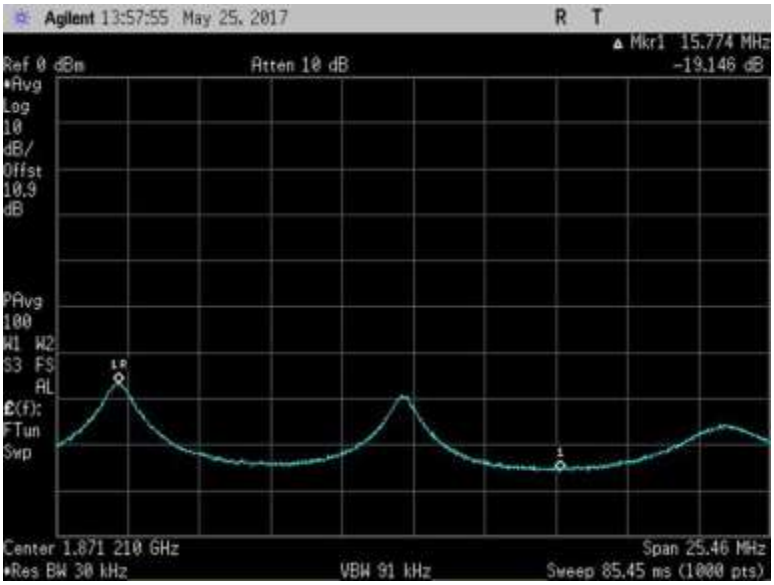
7.11.3_Osc_UL_1850-1915MHz+3_AWGNR



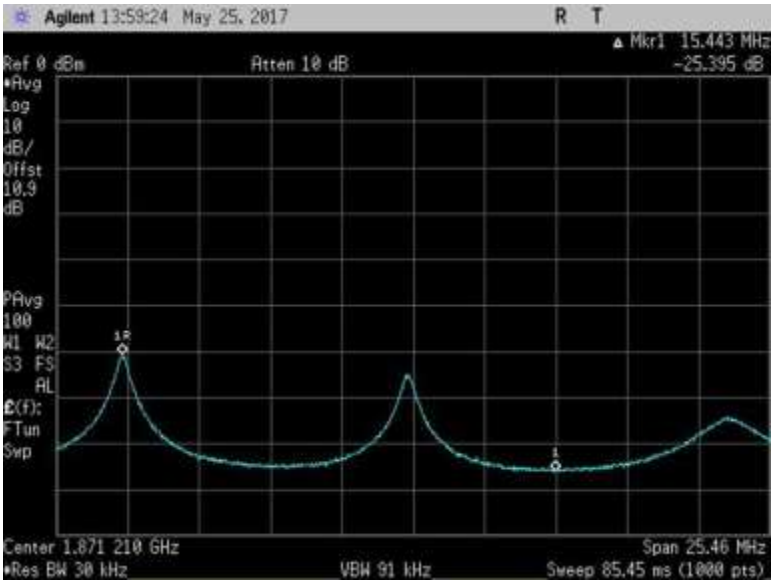
7.11.3_Osc_UL_1850-1915MHz+4_AWGNR



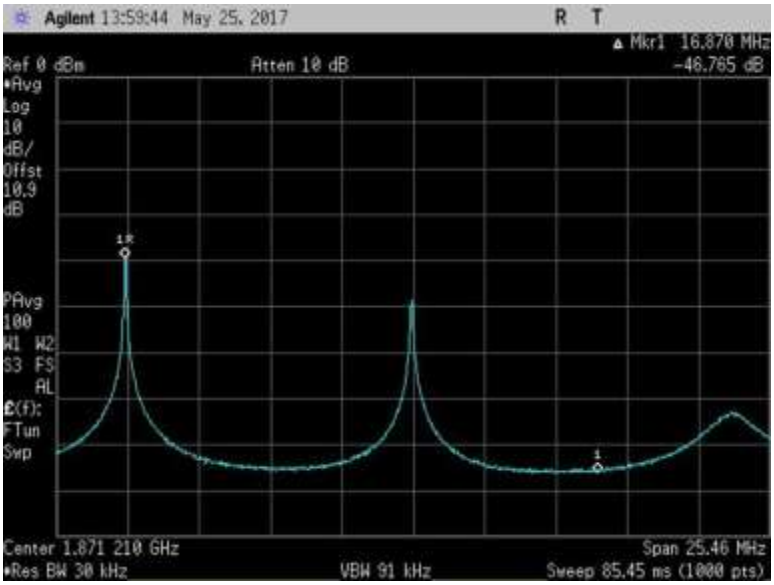
7.11.3_Osc_UL_1850-1915MHz+5_AWGNR



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

7.12 Radiated Spurious Emissions

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
Customer:	Cellphone-Mate, Inc
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 #:	**99983**	Date:	5/30/2017
Test Type:	**Radiated Emissions**	Time:	8:30:00 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

Test Conditions / Notes:

The equipment under test (EUT) is a Mobile 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.
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

Test procedure:
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.
Firmware: 1.7
Test environment conditions: 21.5°C, 48% Relative Humidity, 101.5 kPa

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

Note:
No spurious emissions were found within 20dB of the limit line.
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:

Asset #	Description	Model	Calibration Date	Cal Due Date
AN03418	Signal Generator	E4438C	7/30/2015	7/30/2017
ANP06239	Attenuator	54A-10	8/8/2016	8/8/2018
ANP06897	Cable	32022-29094K-29094K-48TC	12/30/2015	12/30/2017
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
ANP06691	Cable	PE3062-180	6/23/2016	6/23/2018
AN00971A	Preamp	8447D	2/5/2016	2/5/2018
ANP01187	Cable	CNT-195	8/8/2016	8/8/2018
AN03470	Spectrum Analyzer	E4440A	12/9/2015	12/9/2017
AN02113	Horn Antenna-ANSI C63.5	3115	2/6/2017	2/6/2019
ANP06900	Cable	32022-29094K-29094K-36TC	12/30/2015	12/30/2017
AN02810	Preamp	83051A	2/26/2016	2/26/2018
ANP01210	Cable	FSJ1P-50A-4A	1/16/2017	1/16/2019
AN03302	Cable	32026-29094K-29094K-72TC	1/29/2016	1/29/2018

Test Equipment Continued:

Asset #	Description	Model	Calibration Date	Cal Due Date
AN03143	Cable	32022-29094K-144TC	3/27/2017	3/27/2019
AN02741	Active Horn Antenna	AMFW-5F-12001800-20-10P	3/30/2017	3/30/2019
ANP00928	Cable	various	1/25/2016	1/25/2018
AN02742	Active Horn Antenna	AMFW-5F-18002650-20-10P	10/7/2016	10/7/2018
ANP00929	Cable	various	1/25/2016	1/25/2018
AN00432	Loop Antenna	6502	5/30/2017	5/30/2019

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)

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

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

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

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

$10 \text{ Log } P_t = 10 \text{ Log } E^2 \text{ (V/m)} + 10 \text{ Log } r^2 - 10 \text{ Log } 30$

$10 \text{ Log } P_t = 20 \text{ Log } E \text{ (V/m)} + 20 \text{ Log } r - 10 \text{ Log } 30$

At 3 meter, r = 3 m

$10 \text{ Log } P_t = 20 \text{ Log } E \text{ (V/m)} + 20 \text{ Log } 3 - 10 \text{ Log } 30$

$10 \text{ Log } P_t = 20 \text{ Log } E \text{ (V/m)} + 9.54 - 14.77$

$10 \text{ Log } P_t = 20 \text{ Log } E \text{ (V/m)} - 5.23$

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

$10 \text{ Log } P_t = 20 \text{ Log } E \text{ (uV/m)} - 120 - 5.23$

$10 \text{ Log } P_t = 20 \text{ Log } E \text{ (uV/m)} - 125.23$

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

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

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

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

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

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

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

= $\cancel{E_{dBuv}} - \cancel{E_{dBuv}} + 82.23$

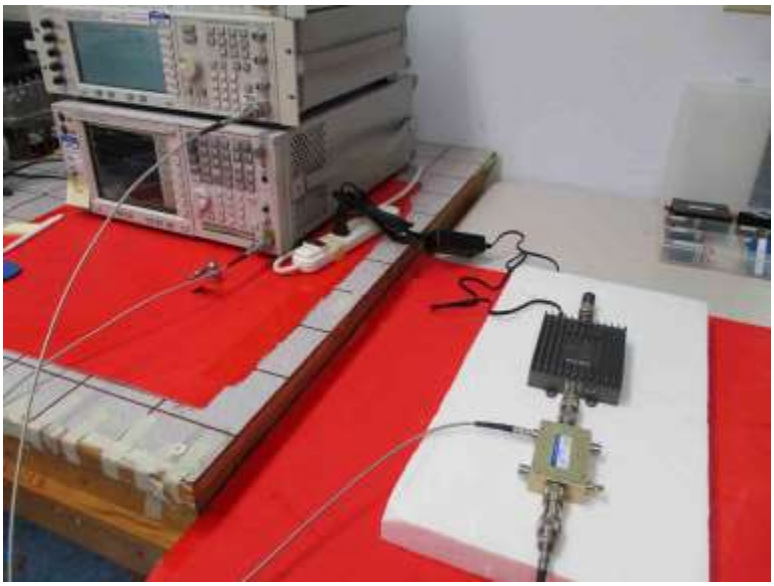
Radiated Emission limit $_{3 \text{ meter}}$ = 82.23 dBuV at any power level measured in dBuV

EXHIBIT A: TEST SETUP PHOTOS

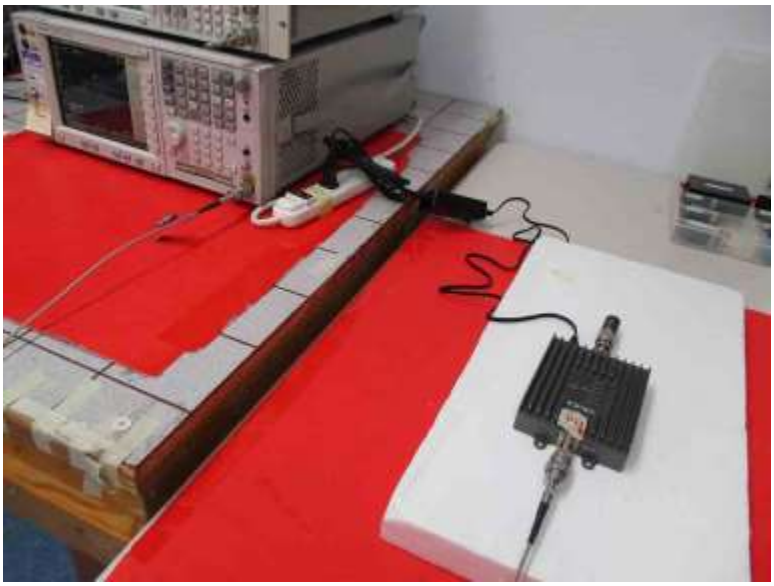
Section 7.1, 7.2, 7.3, 7.5, 7.6 and 7.10 Test Setup

Section 7.4 Test Setup

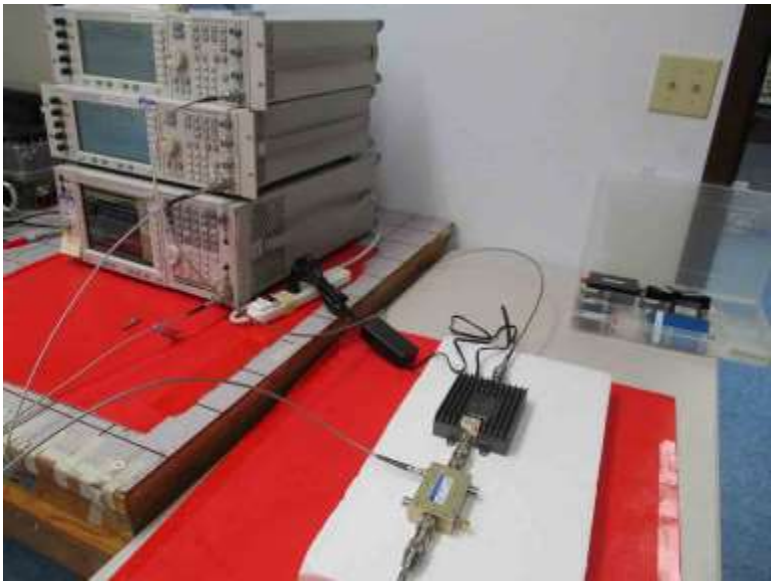
Section 7.7.1, Figure 3 Test Setup



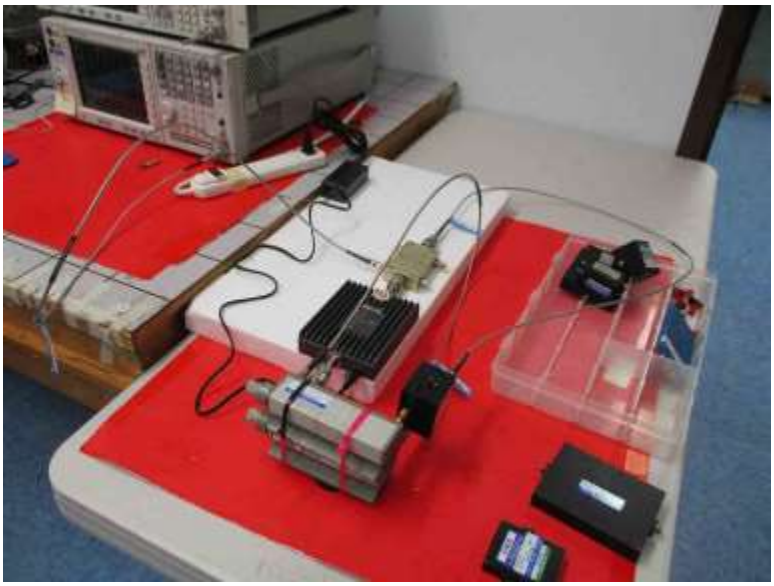
Section 7.7.1, Figure 4 Test Setup



Section 7.8, Test Setup



Section 7.9, Test Setup



Section 7.11.2, Test Setup

Section 7.11.3, Test Setup

Section 7.12, Test Setup, Front View

Section 7.12, Test Setup, Back View