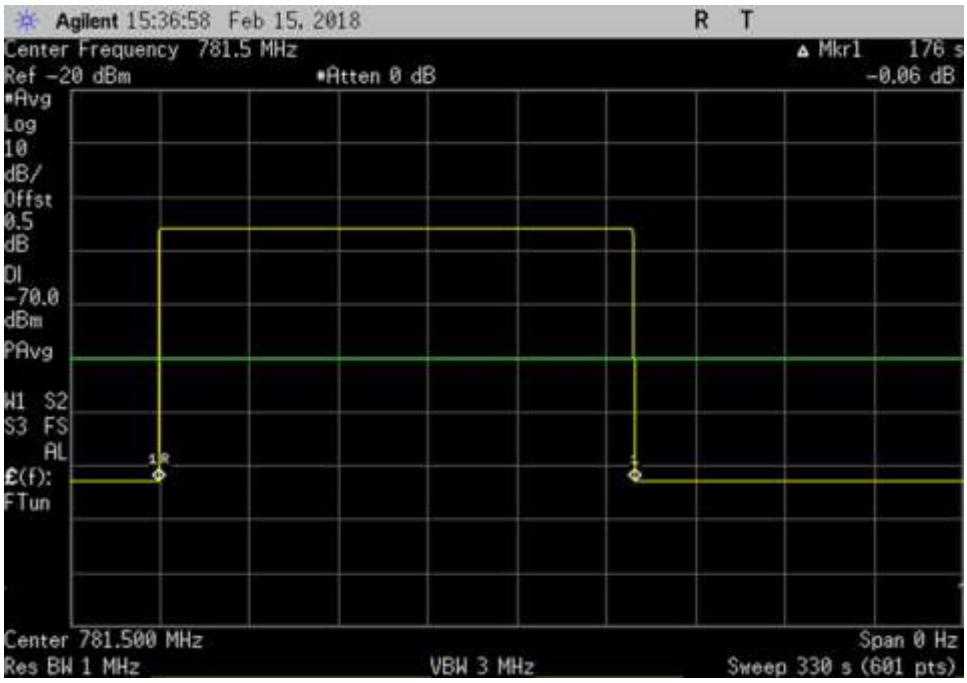
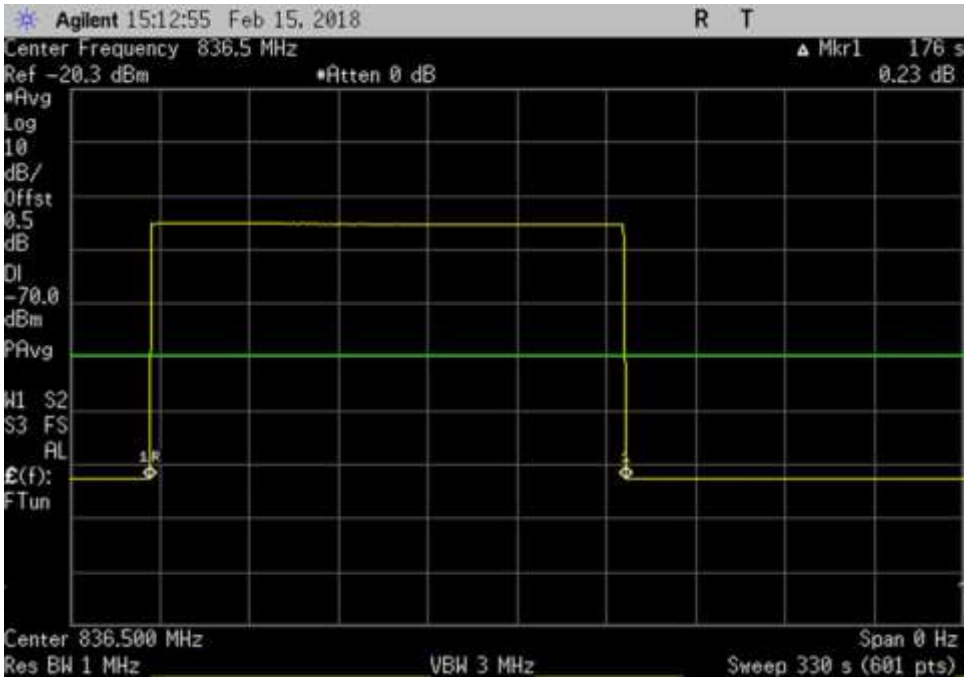
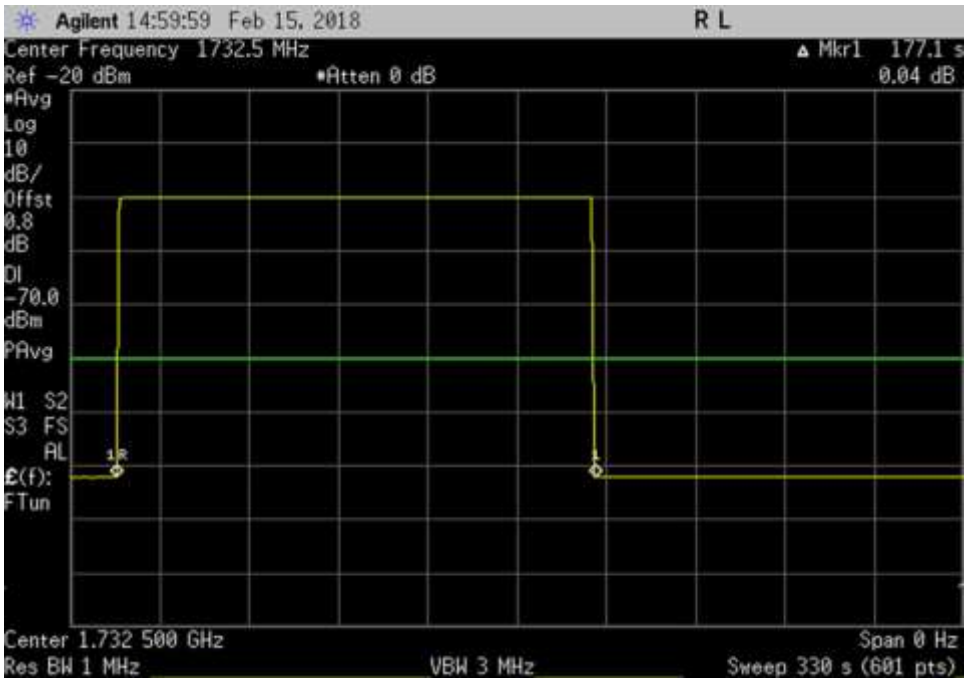


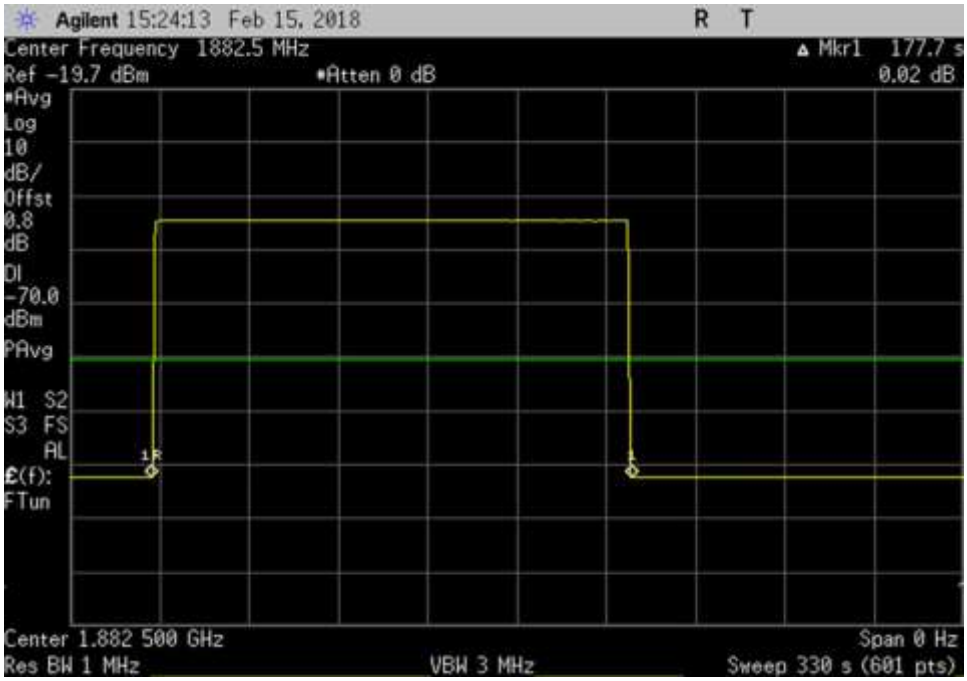
UL_776-787_ 781.5MHz



UL_824-849_ 836.5MHz



UL_1710-1755_ 1732.5MHz



UL_1850-1915_ 1882.5MHz

7.9 Booster Gain Limit

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
Customer:	Cellphone-Mate, Inc.
Specification:	**7.9 Variable Booster gain(Max Gain / Variable Uplink Gain Timing)**
Work Order #:	**100827**
Test Type:	**Conducted Emissions** Date 02/19/18
Tested By:	**Hieu Song Nguyenpham/Eddie Wong**
Software:	EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test environment conditions:
Temperature: 19.8°C
Relative Humidity: 50%
Pressure: 101.5kPa

Note:
Used MSCL provided by the manufacturer's antenna kitting.

Mobile station coupling loss (MSCL): *the minimum coupling loss (in dB) between the wireless device and the input (server) port of the consumer booster. MSCL must be calculated or measured for each band of operation and provided in compliance test reports. MSCL includes the path loss from the wireless device, and the booster's server antenna gain and cable loss. The wireless device is assumed to be an isotropic (0 dBi) antenna reference. Minimum standoff distances from inside wireless devices to the booster's server antenna must be reasonable and specified by the manufacturer in customer provided installation manuals.*

L P = 20logf + 20logd – 27.5
Where:
L P = basic free space path loss,
f = Center frequency,
d = 0.6 meters.

Frequency (MHz)	MSCL (dB)
PCS(1850-1915)	46.7
Cellular(824-849)	41.1
LTE(698-716)	39.4
LTE(776-787)	40.4
AWS(1710-1755)	45.7

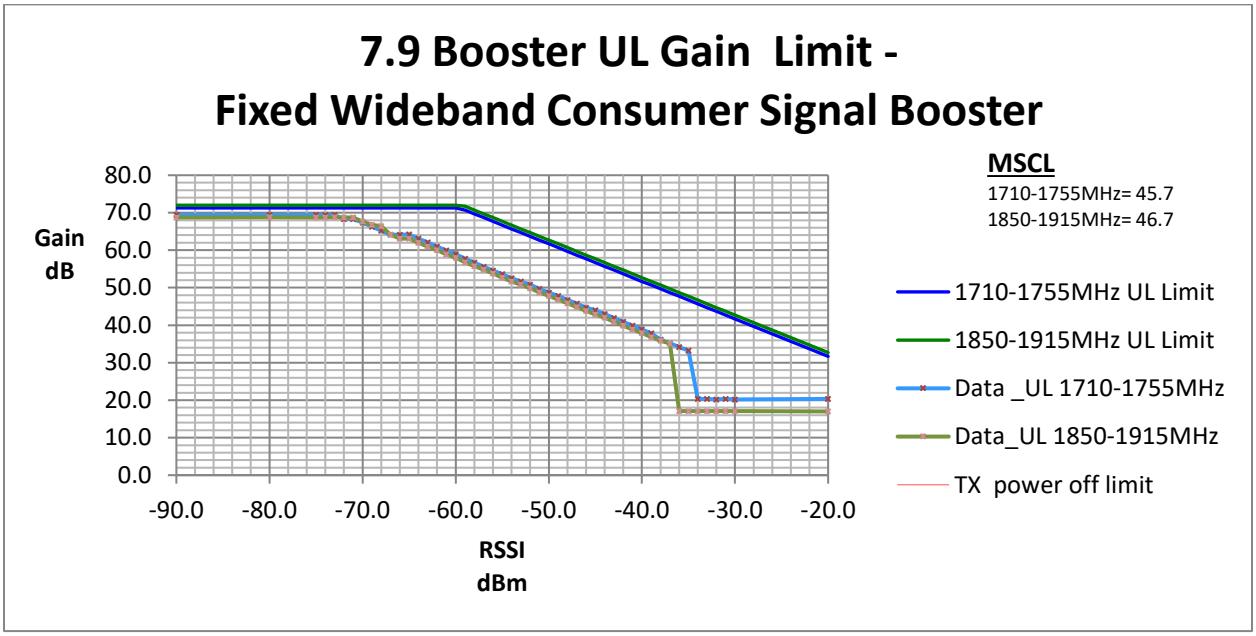
Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
03470	Spectrum Analyzer	Agilent	E4440A	1/3/2018	1/3/2020
P06909	Attenuator	Pasternack	PE7083	12/20/2017	12/20/2019
P06904	Cable	Astrolab	32022-29094K-29094K-36TC	1/4/2018	1/4/2020
C00082	Directional Coupler	MECA Electronics, Inc.	722-10-1.500V	9/18/2017	9/18/2019
C00032	Arbitrary Waveform Generator	Agilent	E4433B	2/26/2016	2/26/2018

Summary of Results

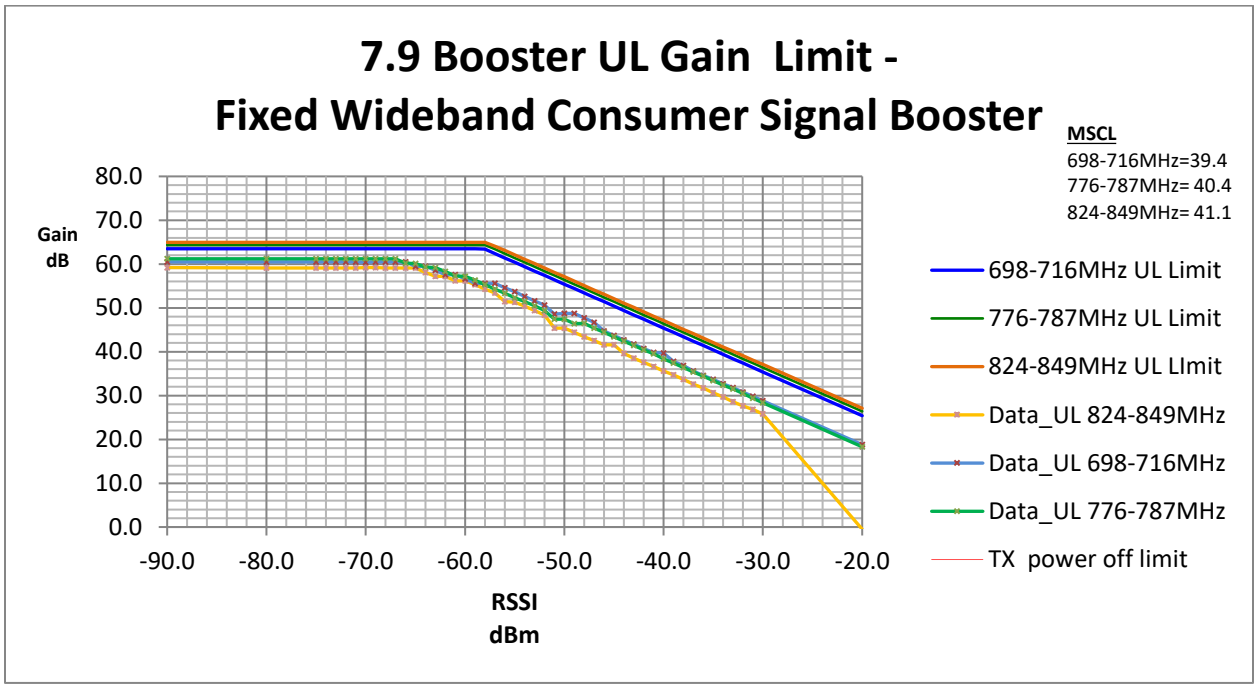
Pass: As demonstrated, computed gains are within the gain limit. All maximum variable uplink gain timings are within 1 second limit.

7.9.1 Maximum gain



1710.0 - 1755.0MHz							
				Limit			Margin
RSSI (dBm)	Input (dBm)	Measured Output (dBm)	Measured Gain (dBm)	RSSI Dependent	Fixed Booster	TX off	
-90.0	-53.9	15.5	69.4	-	71.3	-	-1.9
-80.0	-53.9	15.5	69.4	-	71.3	-	-1.9
-75.0	-53.9	15.5	69.4	-	71.3	-	-1.9
-45.0	-53.9	-9.9	44.0	56.7	-	-	-12.7
-44.0	-53.9	-10.9	43.0	55.7	-	-	-12.7
-20.0	-53.9	-33.6	20.3	31.7	-	-	-11.4

1850.0- 1915.0MHz							
				Limit			Margin
RSSI (dBm)	Input (dBm)	Measured Output (dBm)	Measured Gain (dBm)	RSSI Dependent	Fixed Booster	TX off	
-90.0	-50.8	17.9	68.7	-	72.0	-	-3.3
-80.0	-50.8	18	68.8	-	72.0	-	-3.2
-75.0	-50.8	17.9	68.7	-	72.0	-	-3.3
-45.0	-50.8	-7.9	42.9	61.1	-	-	-14.8
-44.0	-50.8	-8.8	42.0	60.1	-	-	-14.7
-37.0	-50.8	-15.7	35.1	53.1	-	-	-14.6



824.0 - 849.0MHz							
				Limit			Margin
RSSI (dBm)	Input (dBm)	Measured Output (dBm)	Measured Gain (dBm)	RSSI Dependent	Fixed Booster	TX off	
-90.0	-44.4	14.8	59.2	-	64.9	-	-5.7
-80.0	-44.4	14.7	59.1	-	64.9	-	-5.8
-75.0	-44.4	14.7	59.1	-	64.9	-	-5.8
-53.0	-44.4	5.0	49.4	64.4	-	-	-10.7
-52.0	-44.4	4.0	48.4	63.4	-	-	-10.7
-45.0	-44.4	-2.8	41.6	56.4	-	-	-10.5

698.0 - 716.0MHz							
				Limit			Margin
RSSI (dBm)	Input (dBm)	Measured Output (dBm)	Measured Gain (dBm)	RSSI Dependent	Fixed Booster	TX off	
-90.0	-43.5	17.0	60.5	-	63.5	-	-3.0
-80.0	-43.5	17.0	60.5	-	63.5	-	-3.0
-75.0	-43.5	17.0	60.5	-	63.5	-	-3.0
-49.0	-43.5	5.2	48.7	54.4	-	-	-5.7
-48.0	-43.5	4.2	47.7	53.4	-	-	-5.7
-47.0	-43.5	3.2	46.7	52.4	-	-	-5.7

776.0 - 787.0MHz							
				Limit			Margin
RSSI (dBm)	Input (dBm)	Measured Output (dBm)	Measured Gain (dBm)	RSSI Dependent	Fixed Booster	TX off	
-90.0	-45.6	15.6	61.2	-	64.4	-	-3.2
-80.0	-45.6	15.6	61.2	-	64.4	-	-3.2
-75.0	-45.6	15.6	61.2	-	64.4	-	-3.2
-48.0	-45.6	0.9	46.5	58.9	-	-	-7.9
-41.0	-45.6	-6.1	39.5	51.9	-	-	-7.9
-33.0	-45.6	-14.1	31.5	43.9	-	-	-7.9

7.9.2 Variable uplink gain timing

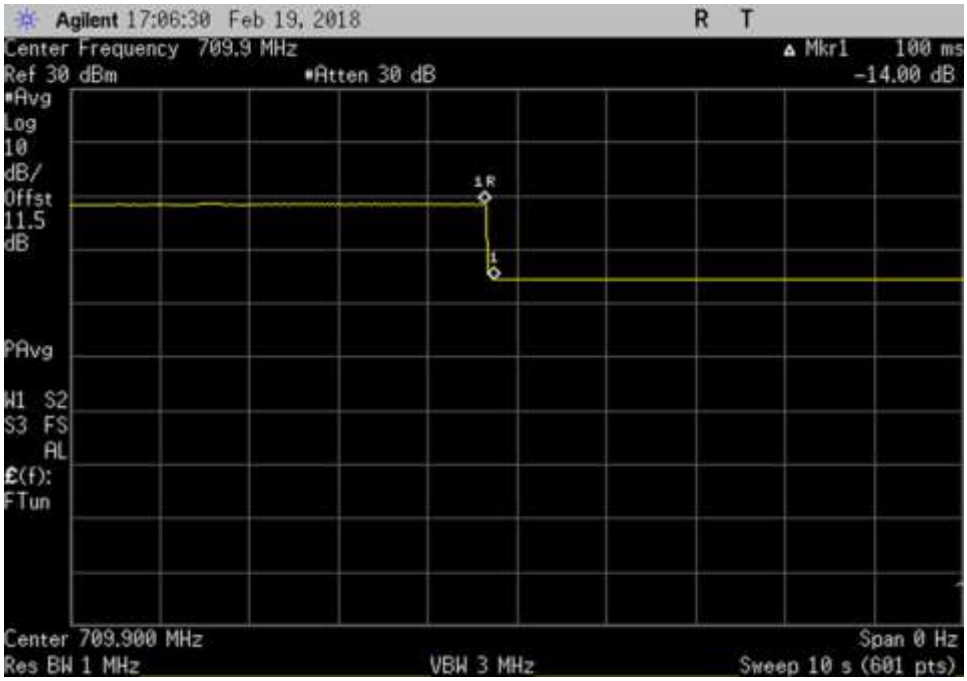
Uplink Gain Timing		
Frequency (MHz)	Measured (Sec)	Limit (Sec)
UL 1710-1755	0.72	3
UL 1850-1915	0.37	3
UL 824-849	0.13	3
UL 698-716	0.10	3
UL 776-787	0.10	3

7.9.1 Maximum Gain

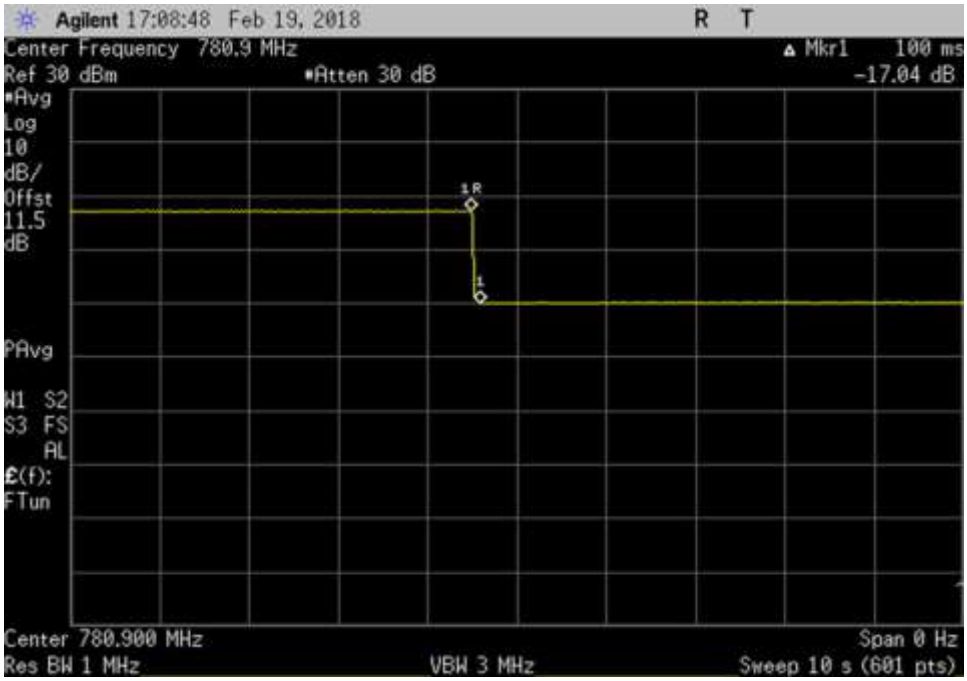
For this subsection, see summary of results of 7.9
7.9.1 Maximum gain

7.9.2 Variable uplink Gain Timing

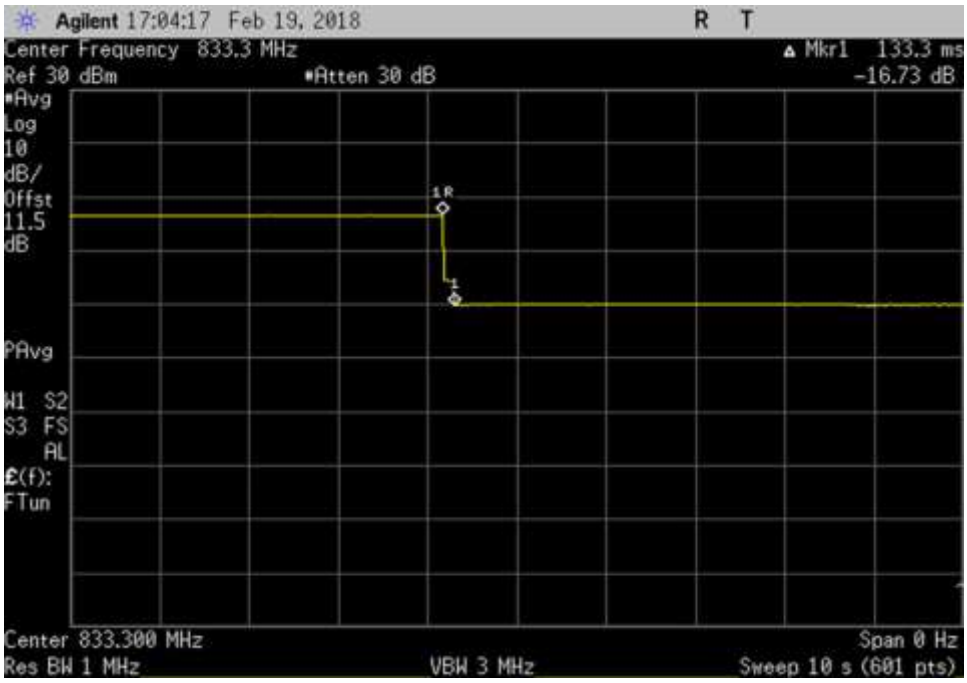
Plots



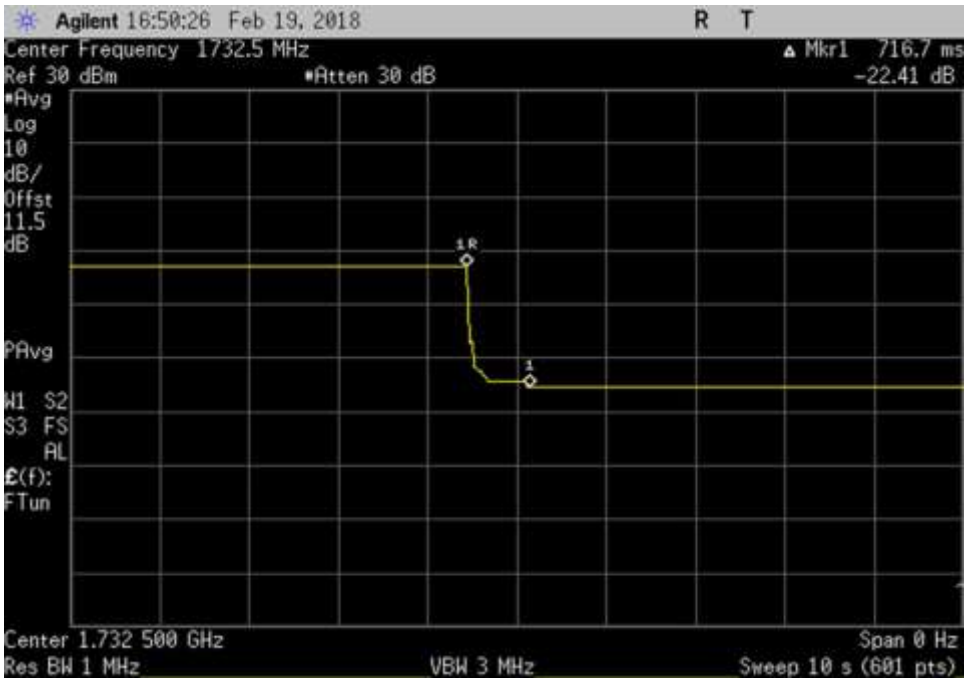
UL_698-716_ 709.9MHz_Var



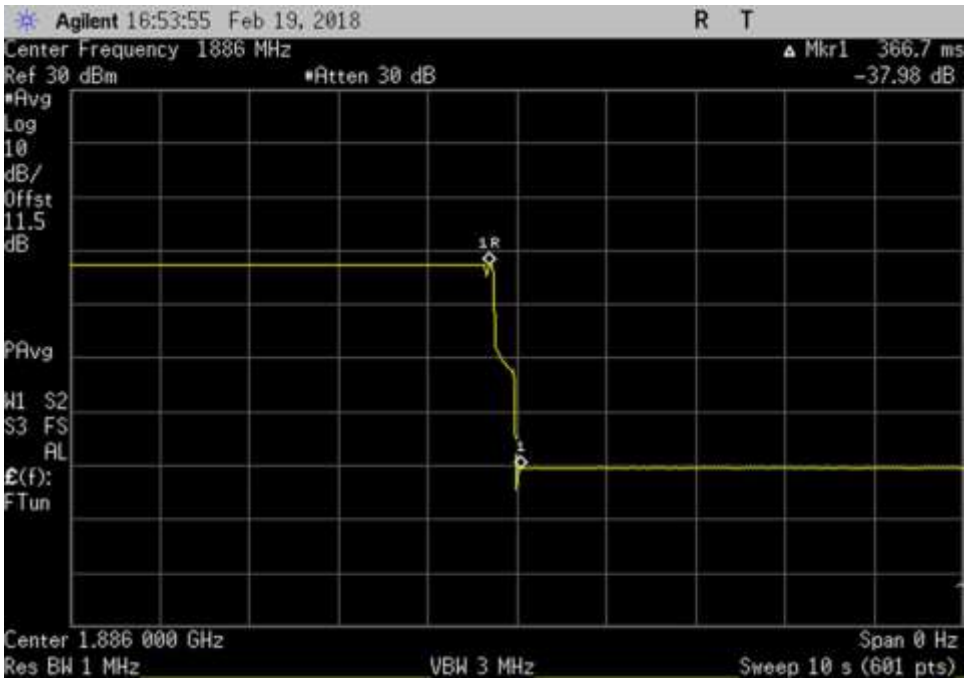
UL_776-787_ 780.9MHz_Var



UL_824-849_ 833.3MHz_Var



UL_1710-1755_ 1732.5MHz_Var



UL_1850-1915_ 1886MHz_Var

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 #:	**100827**
Test Type:	**Conducted Emissions** Date 02/20/18
Tested By:	**Hieu Song Nguyenpham**
Software:	EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test environment conditions:
Temperature: 20.1°C
Relative Humidity: 47%
Pressure: 102.5kPa

Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
03470	Spectrum Analyzer	Agilent	E4440A	1/3/2018	1/3/2020

Summary of Results

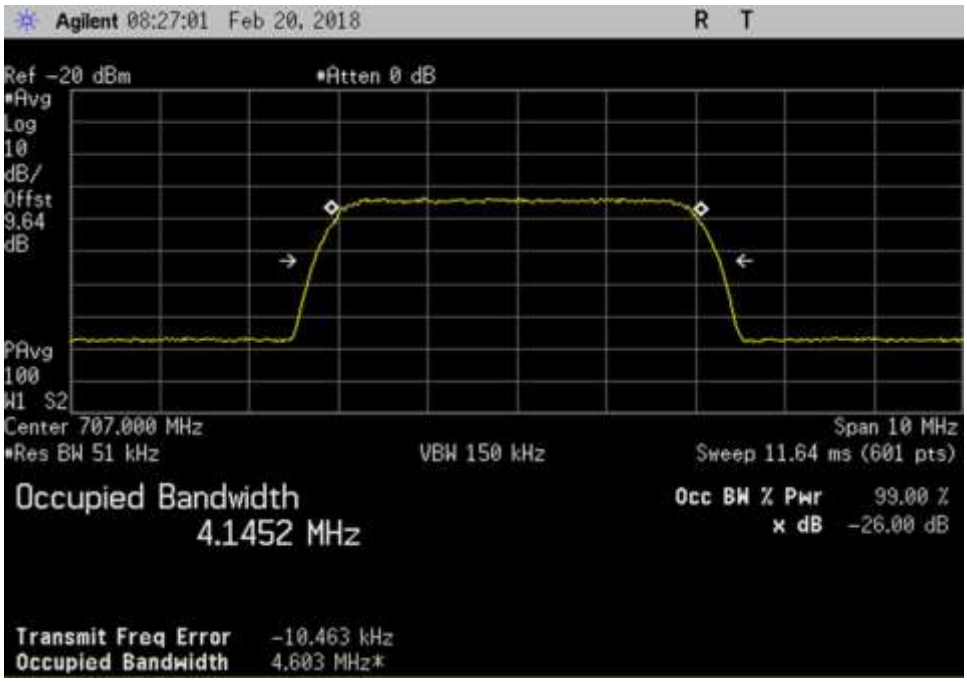
Pass: As summarized in plots and tables below, the uniformity of the output signal relative to the input signal are practically identical. Therefore, the comparison is within limits.

OBW-Input (Hz)						OBW-Output (Hz)				
EDGE	GSM	CDMA	AWGN	LTE		EDGE	GSM	CDMA	AWGN	LTE
244601	244435	1262000	4126600	4457100		243380	245282	1254800	4107200	4453500
245789	244214	1254000	4100000	4458700		247192	247227	1257000	4134400	4451900
245016	246158	1247800	4067700	4449900		251464	245040	1256000	4108500	4454100
245486	246874	1249700	4145200	4440600		247980	244296	1260100	4141300	4461500
244868	247123	1255800	4123300	4426700		248458	248582	1260000	4123400	4452500
245501	244034	1263000	4082900	4467600		245502	242397	1256300	4115200	4453200
246018	244413	1258500	4109900	4467600		243161	245663	1260700	4105000	4454600
244968	244693	1262000	4089700	4448800		246651	244202	1254100	4075000	4444200
244164	243641	1268800	4091900	4435200		244976	243268	1262300	4119800	4451100
244647	245589	1260900	4107500	4456300		244112	244050	1257500	4071800	4430400

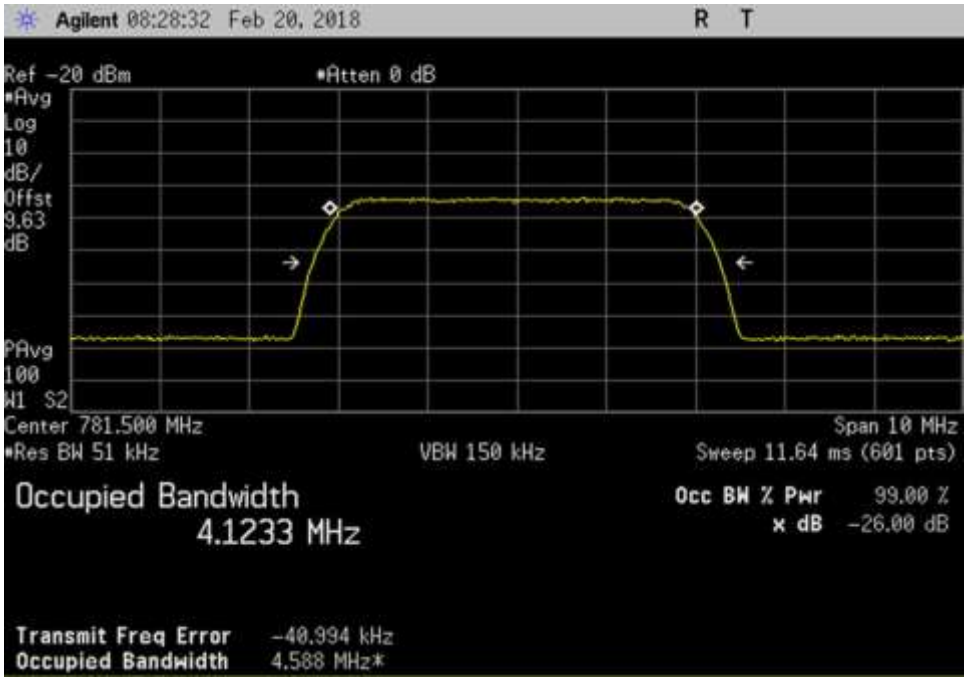
Max Difference In&Out Occ BW 99% Pwr					
Frequency Range	EDGE	GSM	CDMA	AWGN	LTE
UL_1710-1755MHz	0.50%	0.35%	0.57%	0.47%	0.08%
UL_1850-1915MHz	0.57%	1.23%	0.24%	0.84%	0.15%
UL_824-849MHz	2.63%	0.45%	0.66%	1.00%	0.09%
UL_698-716MHz	1.02%	1.04%	0.83%	0.09%	0.47%
UL_777-787MHz	1.47%	0.59%	0.33%	0.00%	0.58%
DL_2110-2155MHz	0.00%	0.67%	0.53%	0.79%	0.32%
DL_1930-1995MHz	1.16%	0.51%	0.17%	0.12%	0.29%
DL_869-894MHz	0.69%	0.20%	0.63%	0.36%	0.10%
DL_728-746MHz	0.33%	0.15%	0.51%	0.68%	0.36%
DL_746-756MHz	0.22%	0.63%	0.27%	0.87%	0.58%

Plots

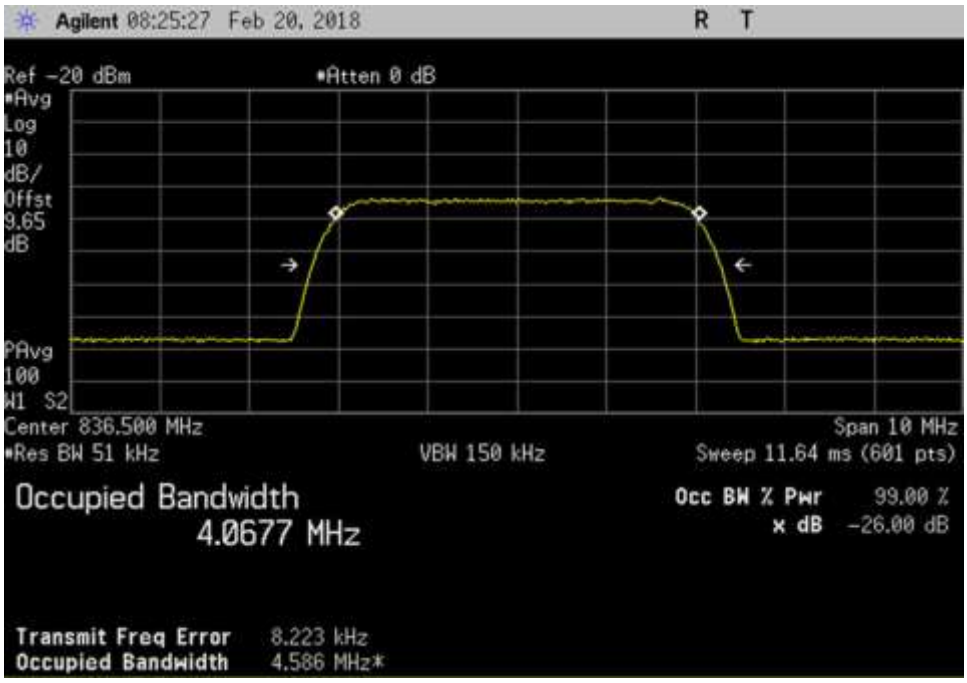
AWGN Input



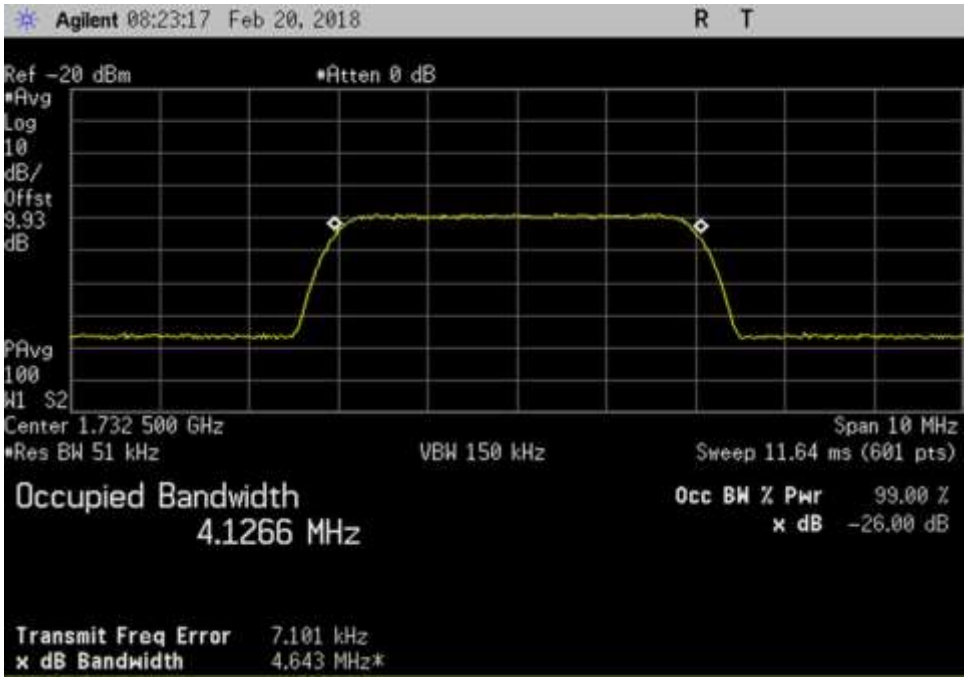
UL_698-716_AWGN_ 707MHz



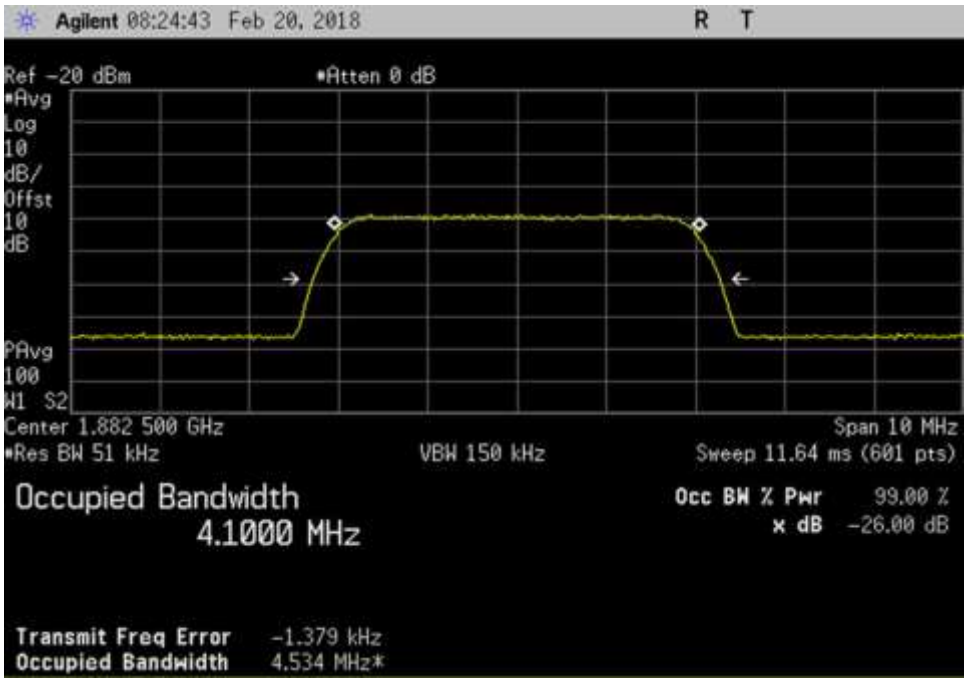
UL_776-787_AWGN_ 781.5MHz



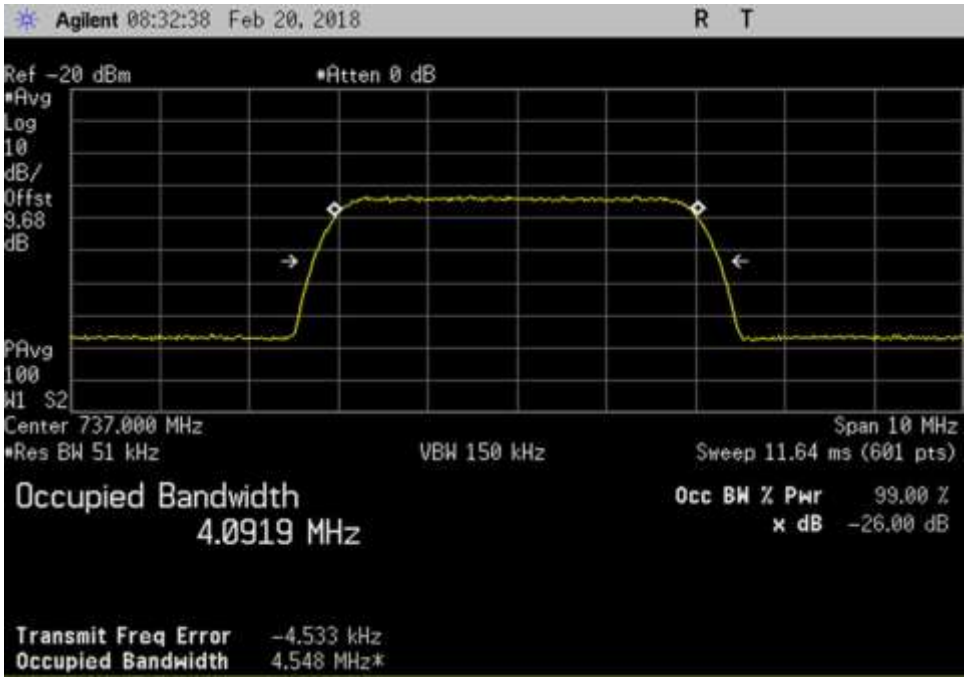
UL_824-849_AWGN_ 836.5MHz



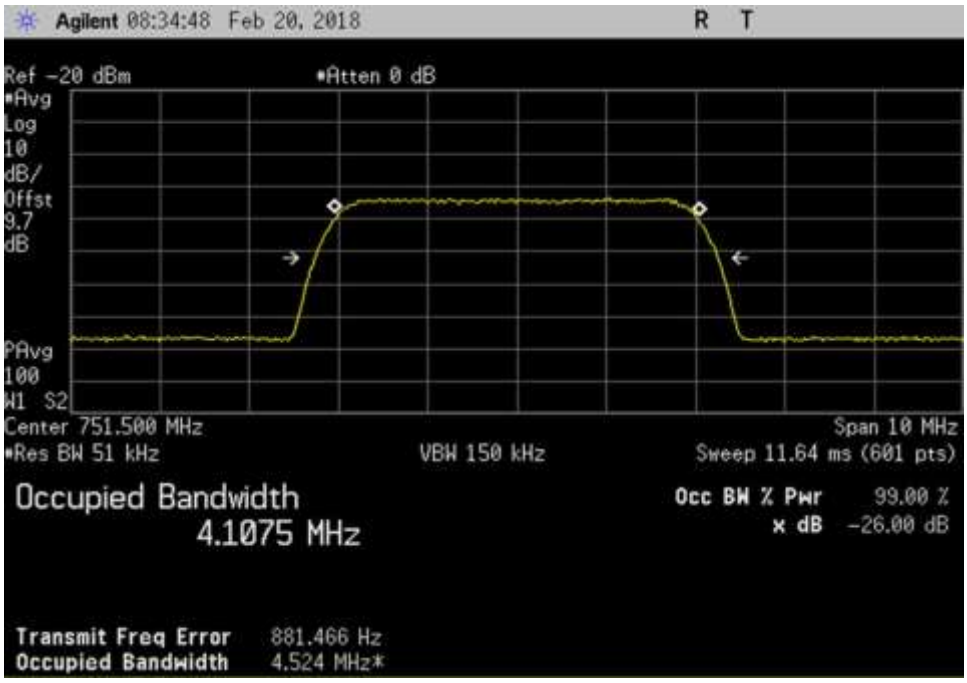
UL_1710-1755_AWGN_ 1732.5MHz



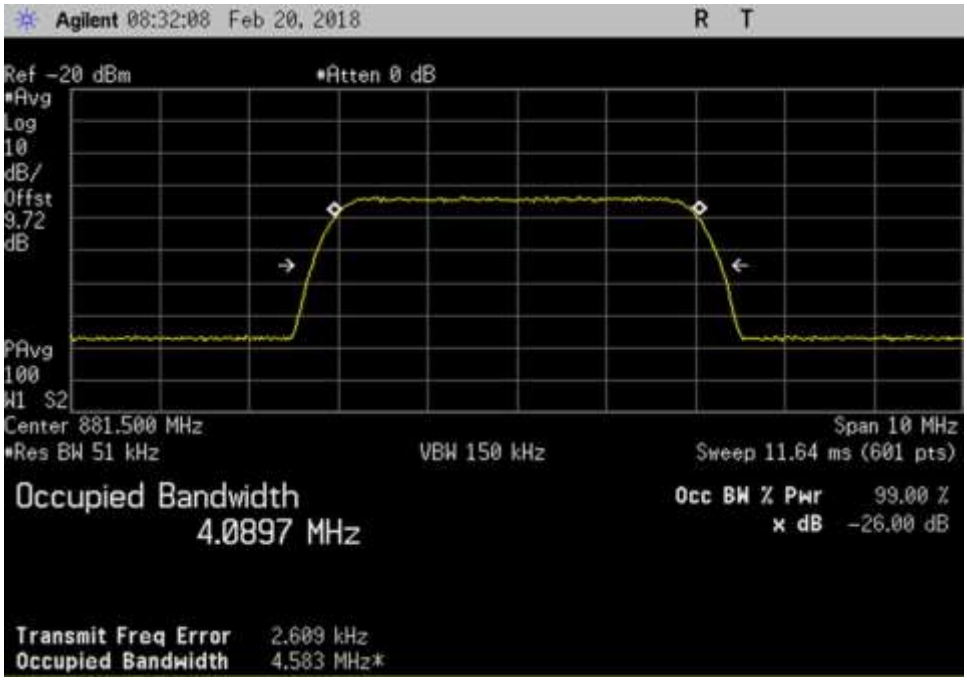
UL_1850-1915_AWGN_ 1882.5MHz



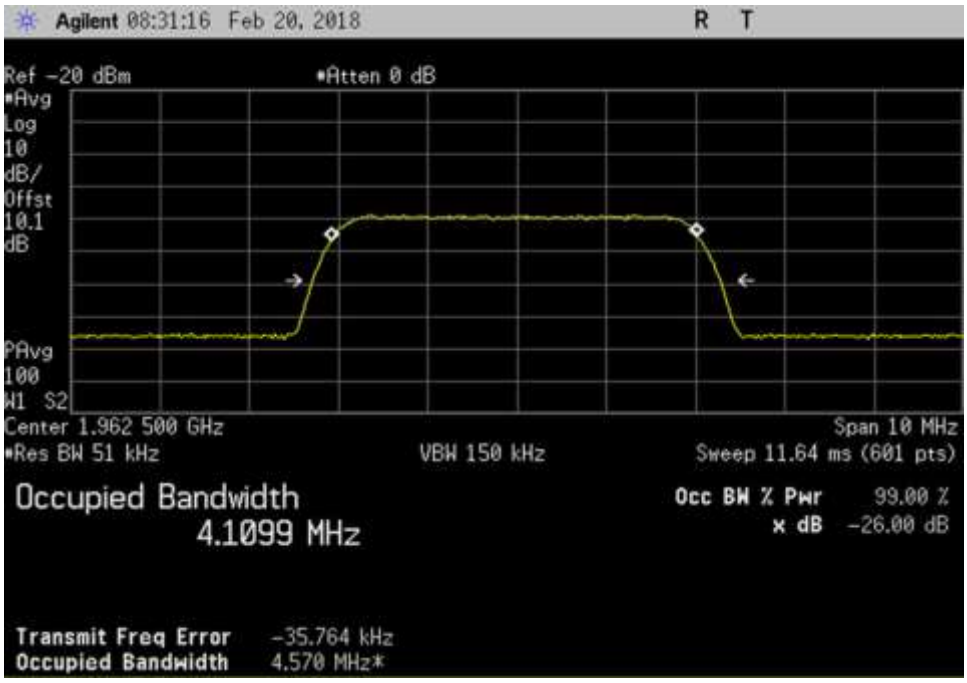
DL_728-746_AWGN_ 737MHz



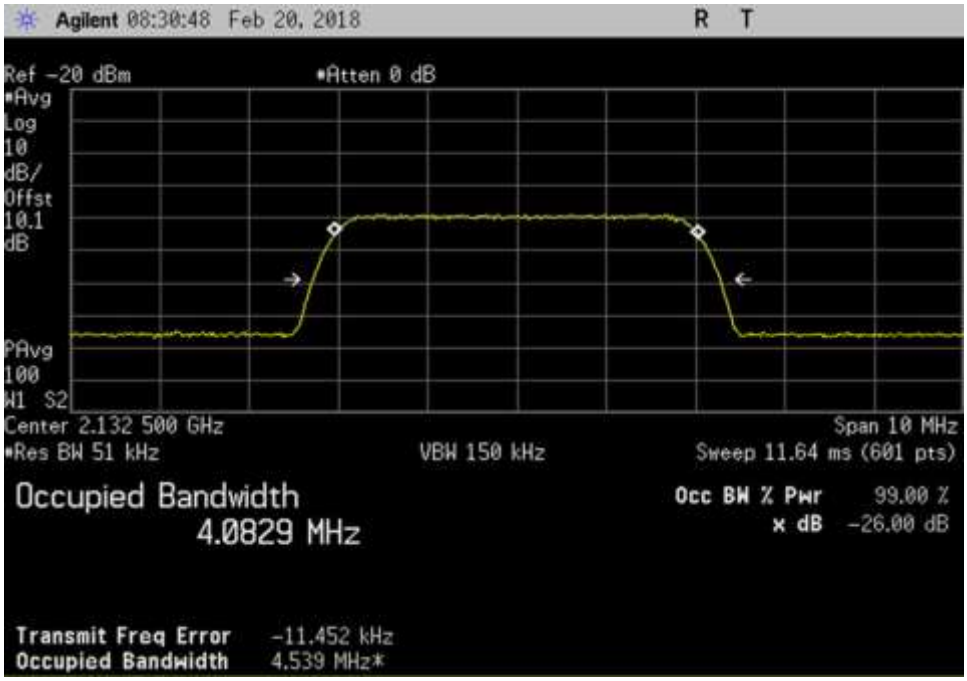
DL_746-757_AWGN_ 751.5MHz



DL_869-894_AWGN_ 881.5MHz

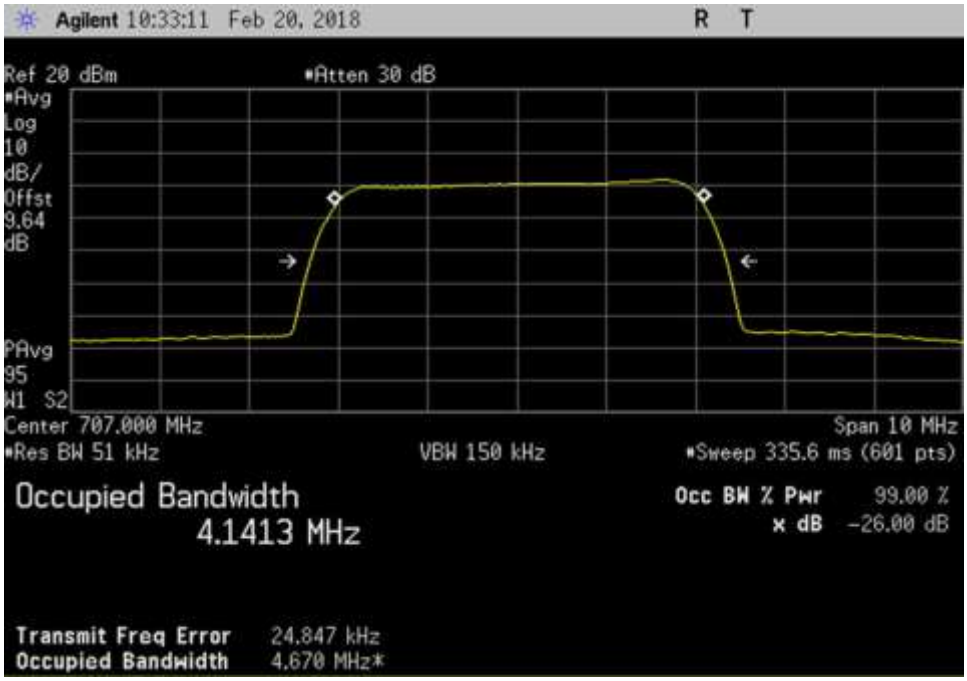


DL_1930-1995_AWGN_ 1962.5MHz

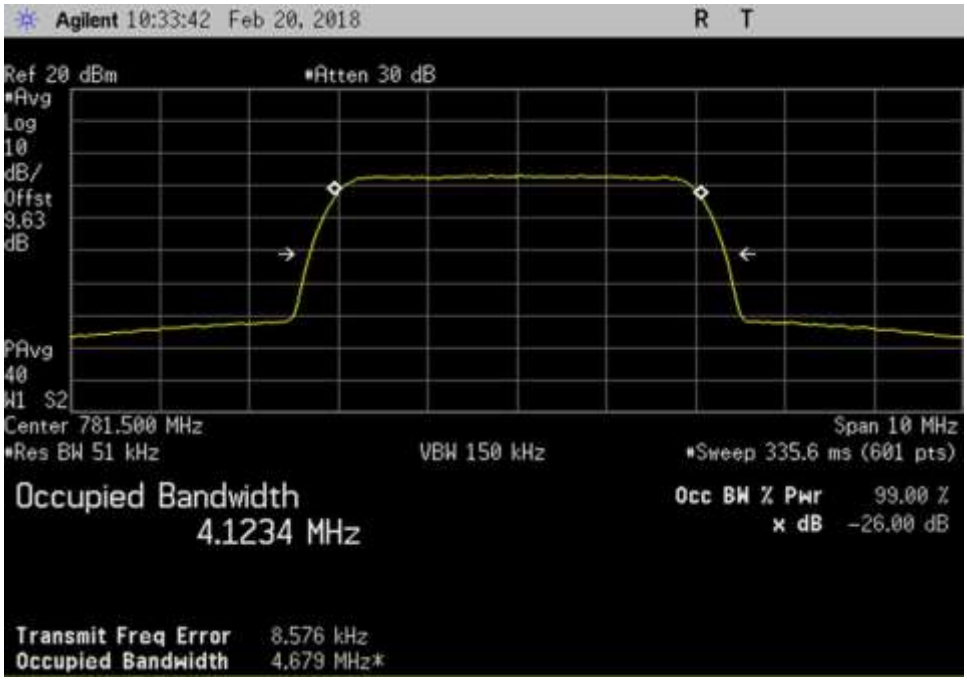


DL_2110-2155_AWGN_ 2132.5MHz

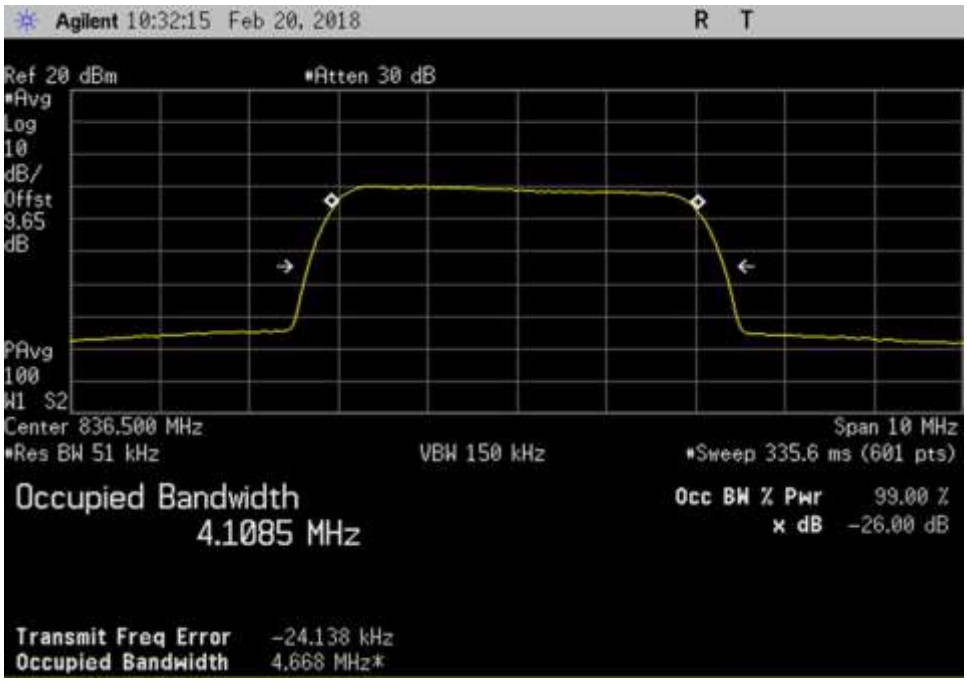
AWGN Output



UL_698-716_AWGN_ 707MHz

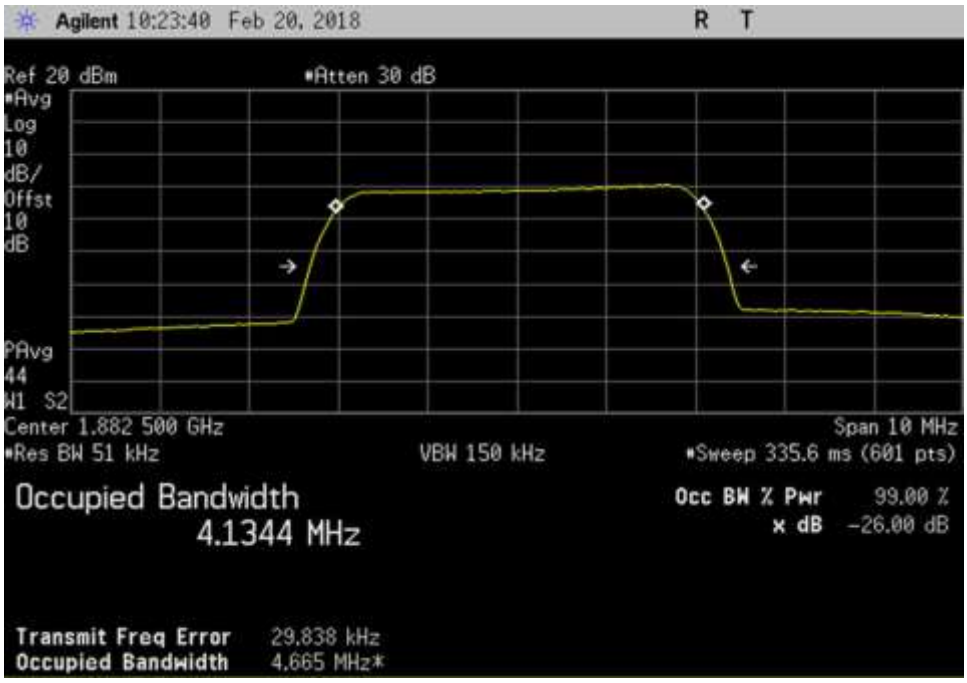


UL_776-787_AWGN_ 781.5MHz

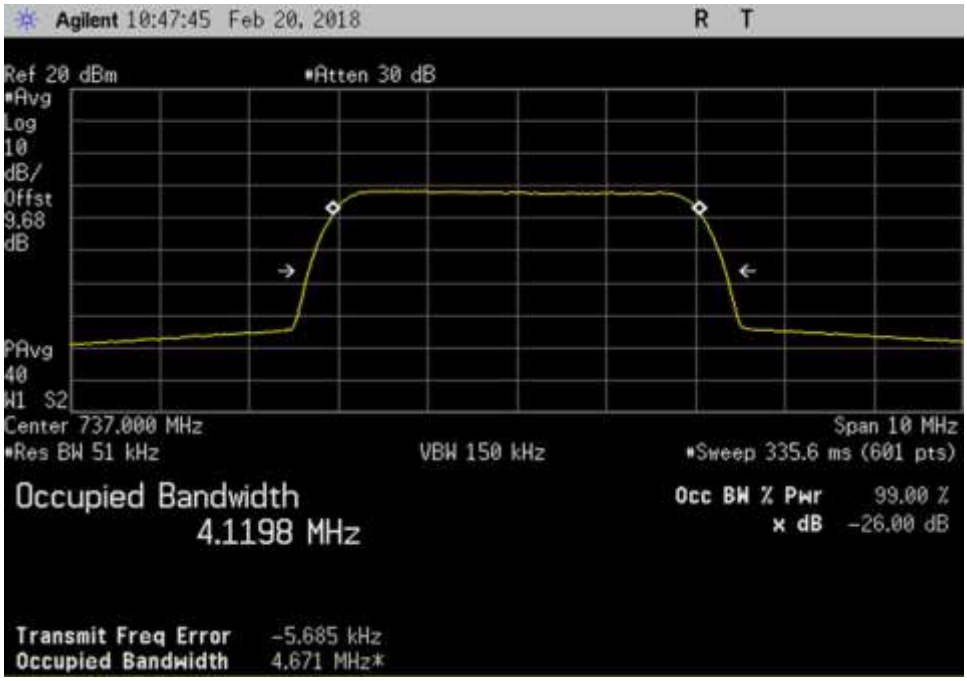


UL_824-849_AWGN_ 836.5MHz

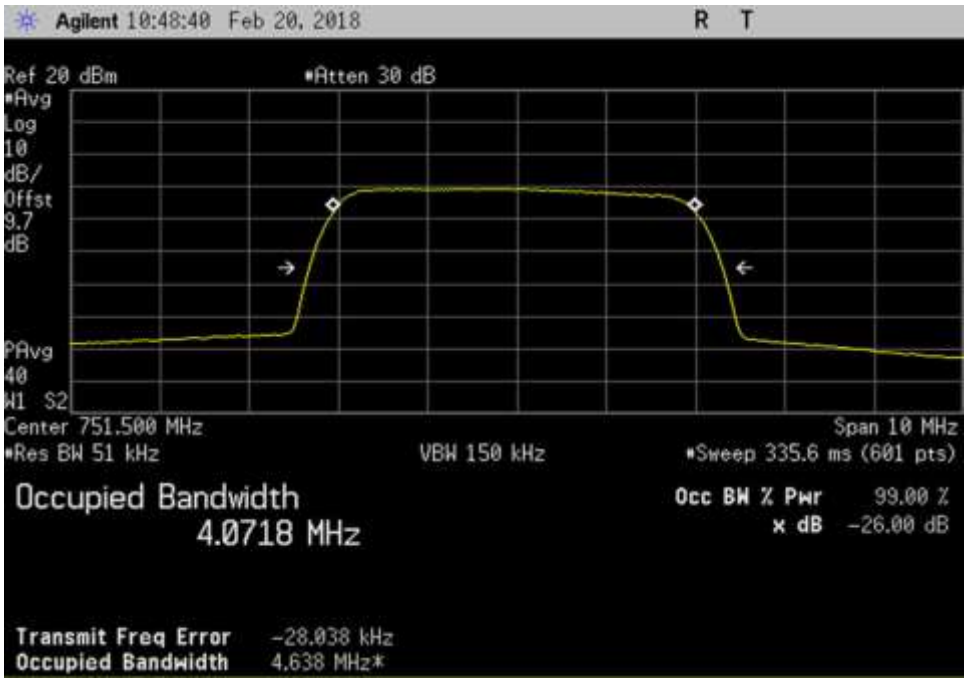
UL_1710-1755_AWGN_ 1732.5MHz



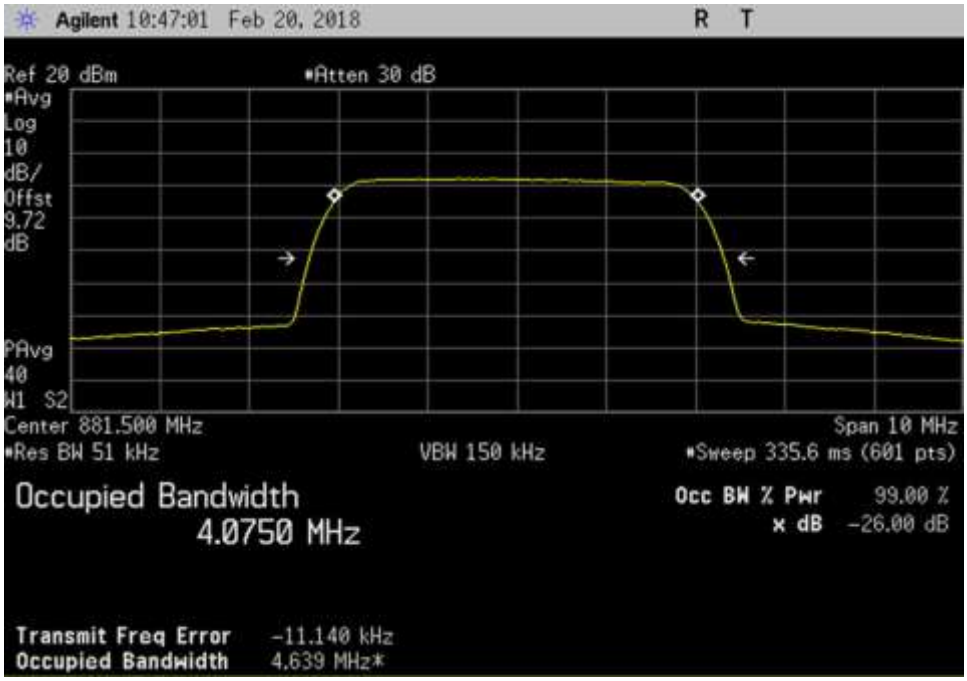
UL_1850-1915_AWGN_ 1882.5MHz



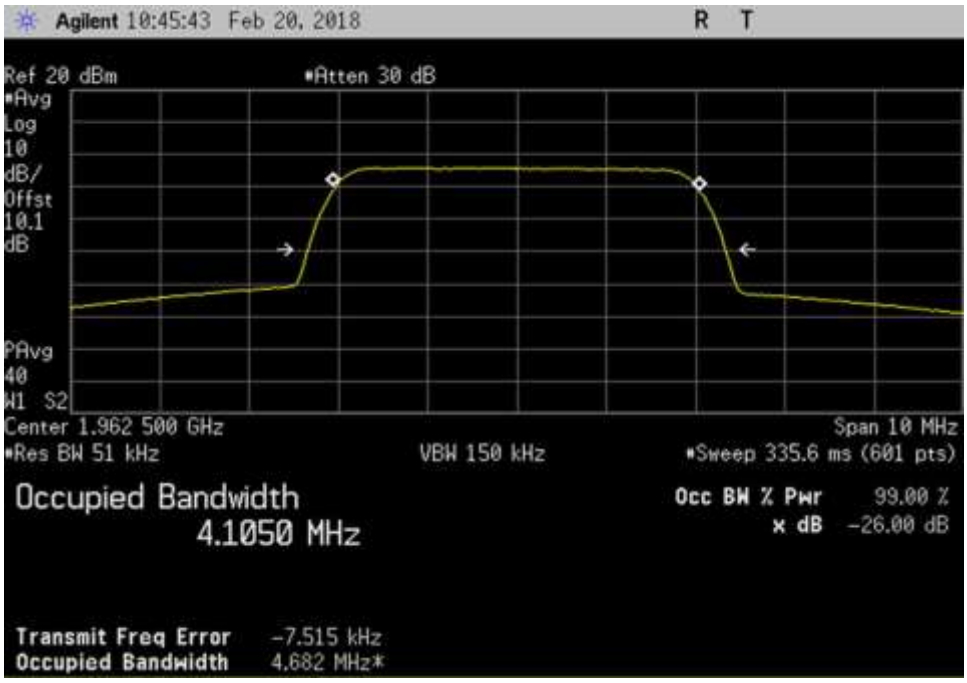
DL_728-746_AWGN_ 737MHz



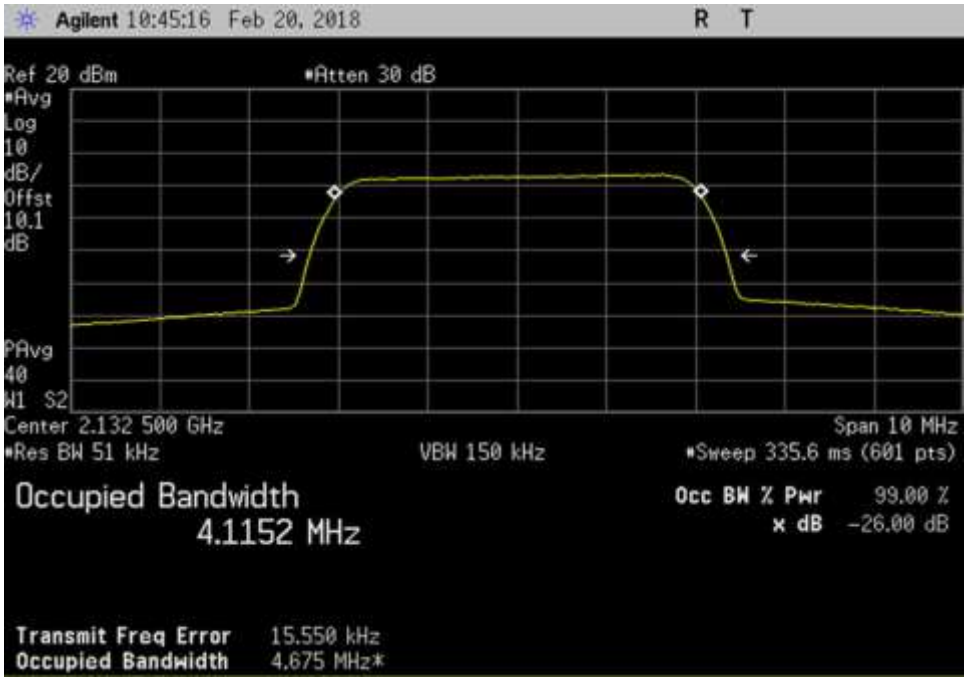
DL_746-757_AWGN_ 751.5MHz



DL_869-894_AWGN_ 881.5MHz

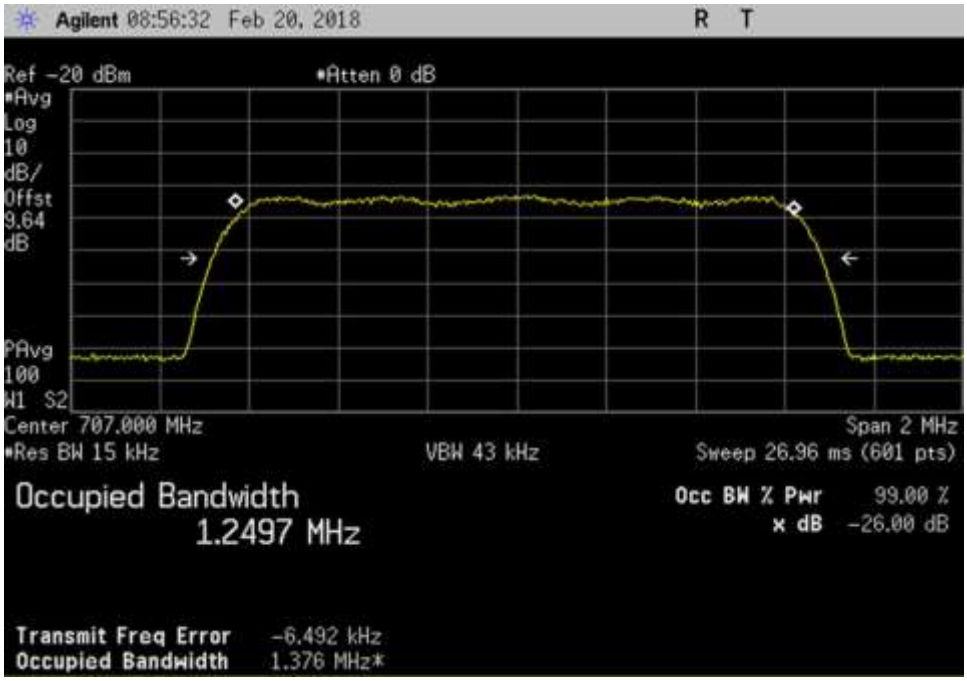


DL_1930-1995_AWGN_ 1962.5MHz

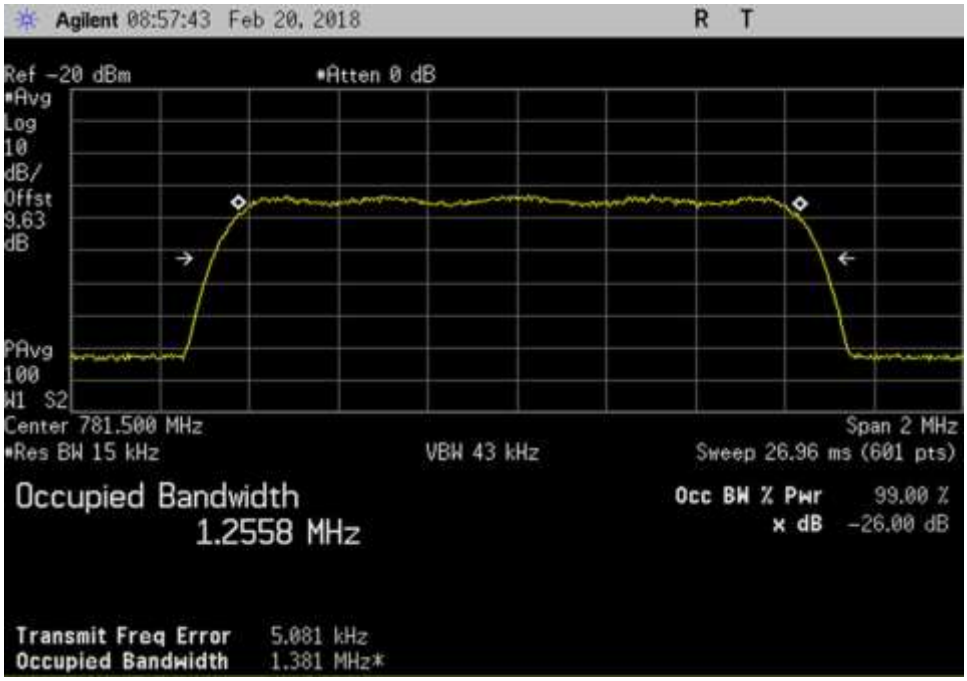


DL_2110-2155_AWGN_ 2132.5MHz

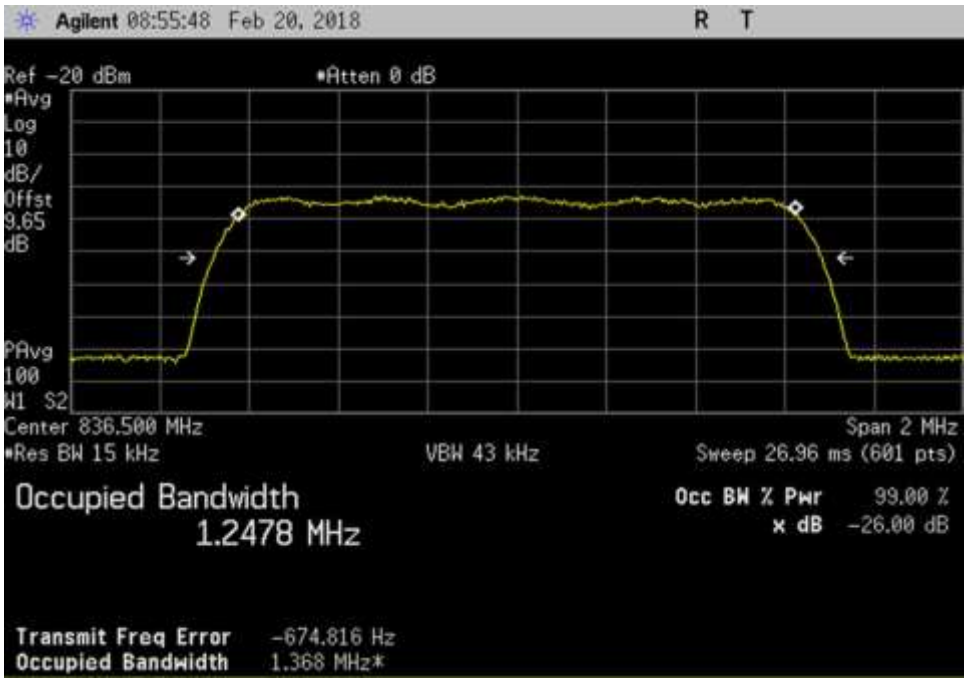
CDMA Input



UL_698-716_CDMA_ 707MHz

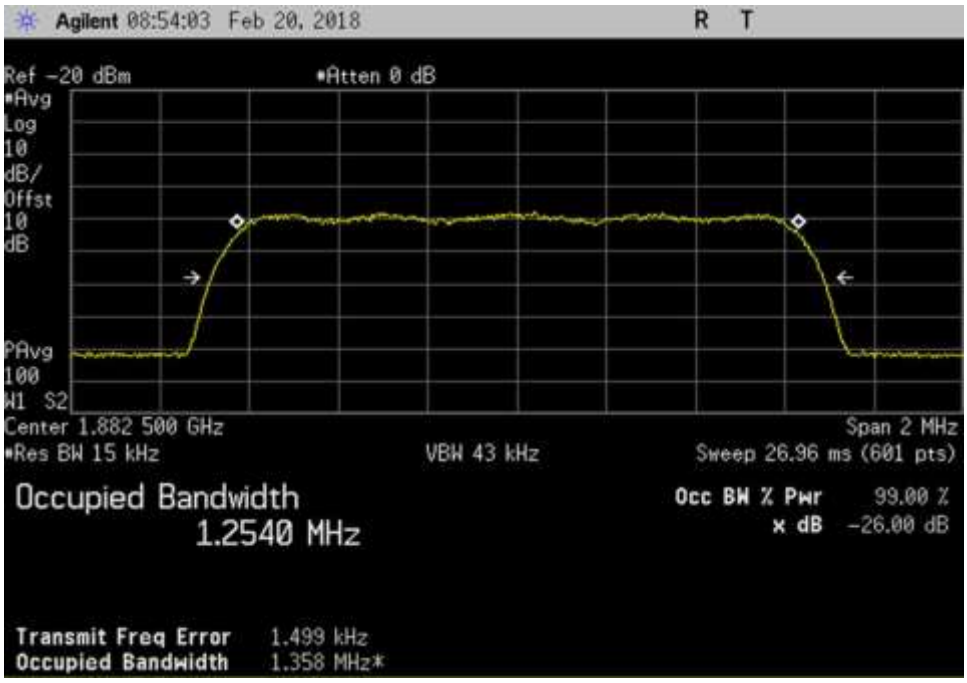


UL_776-787_CDMA_ 781.5MHz

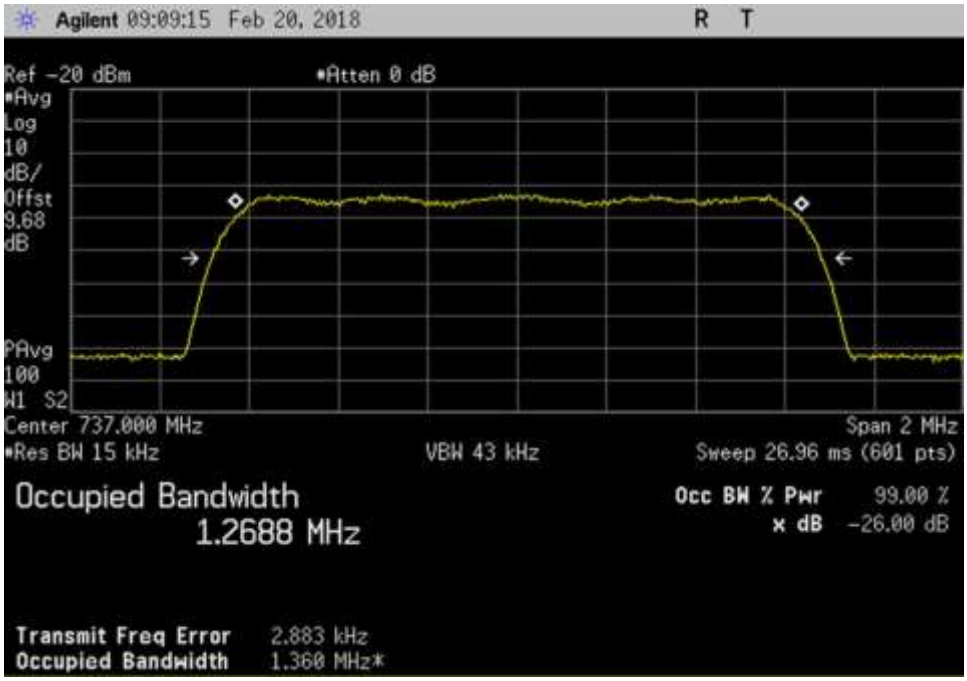


UL_824-849_CDMA_ 836.5MHz

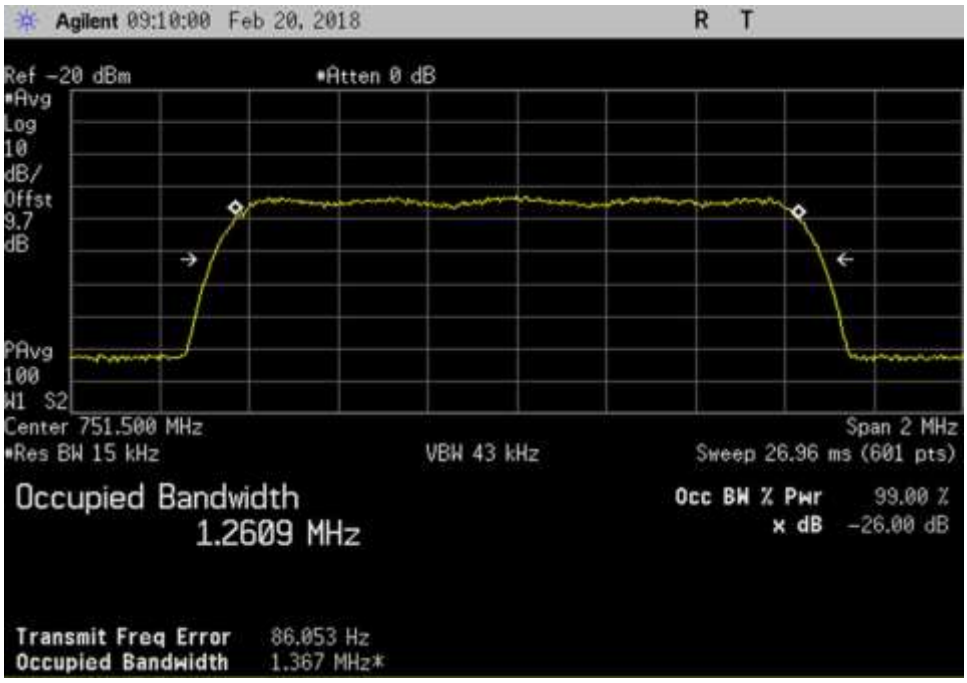
UL_1710-1755_CDMA_ 1732.5MHz



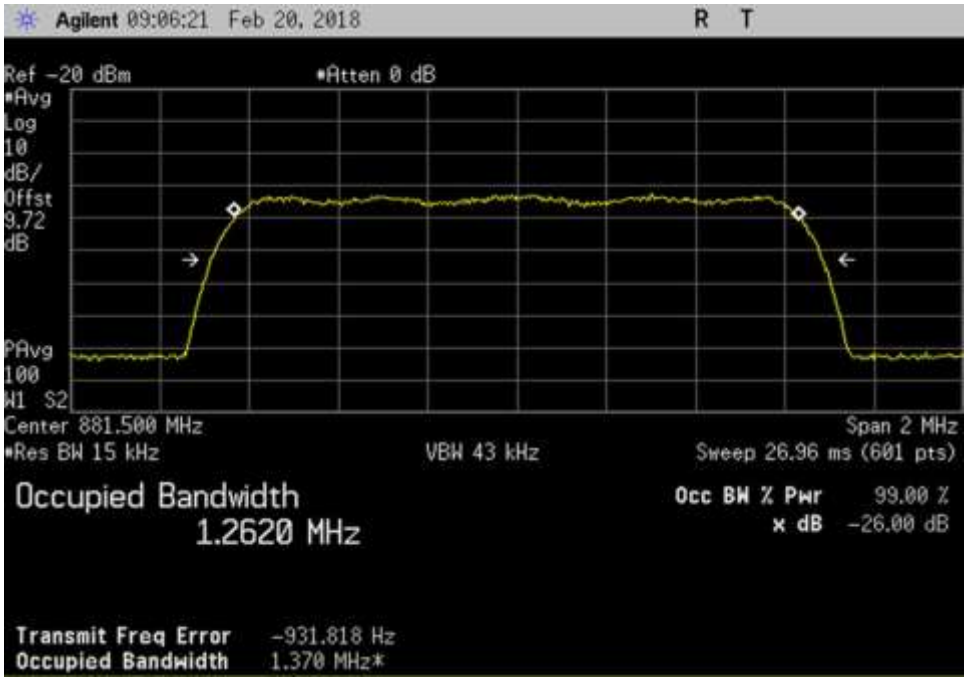
UL_1850-1915_CDMA_ 1882.5MHz



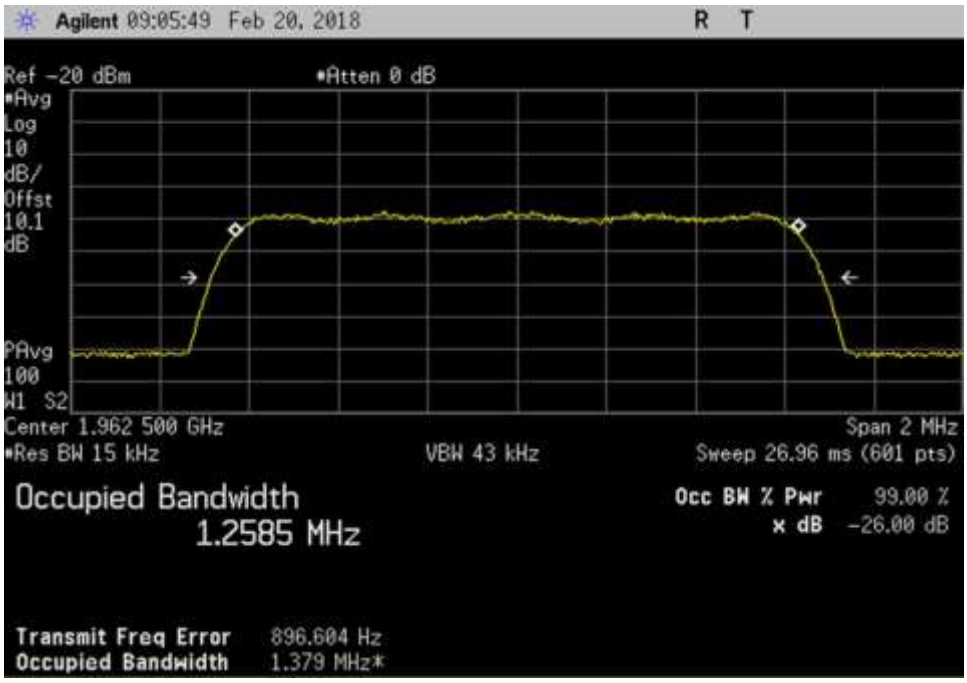
DL_728-746_CDMA_ 737MHz



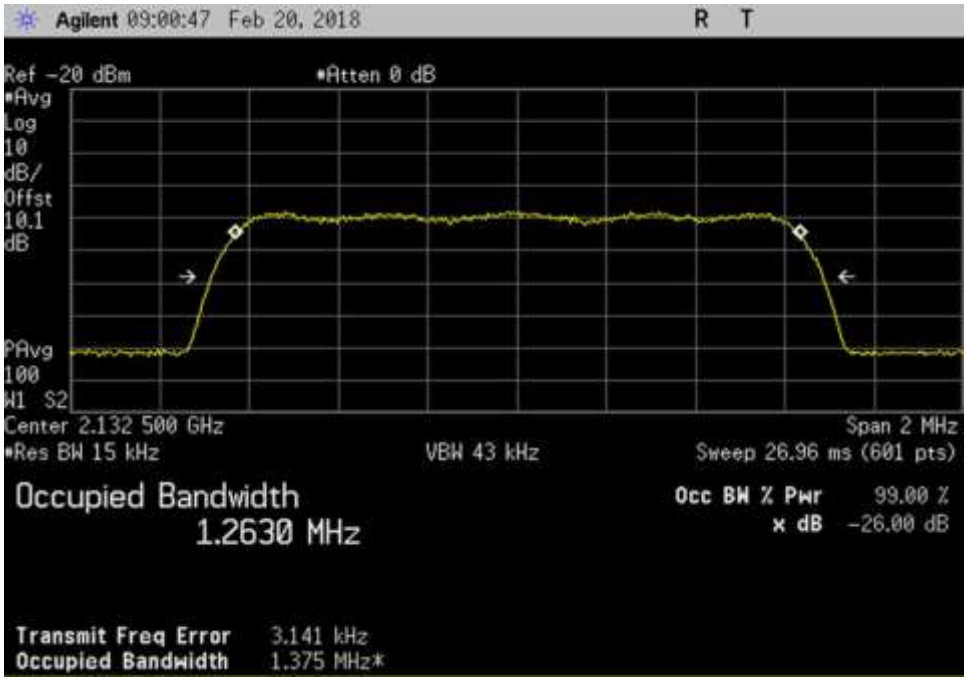
DL_746-757_CDMA_ 751.5MHz



DL_869-894_CDMA_ 881.5MHz



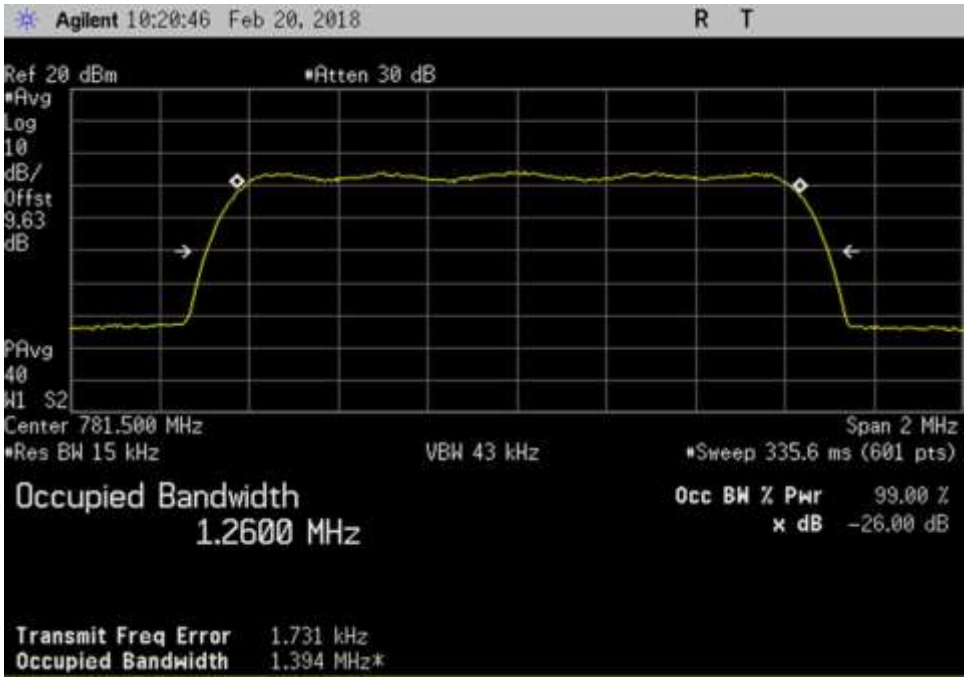
DL_1930-1995_CDMA_ 1962.5MHz



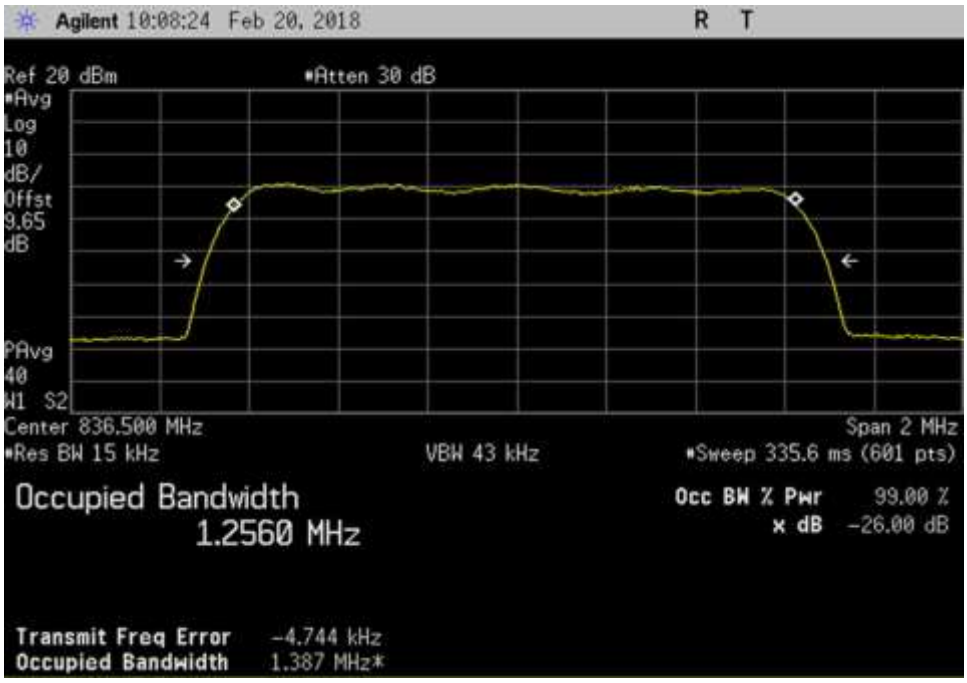
DL_2110-2155_CDMA_ 2132.5MHz

CDMA Output

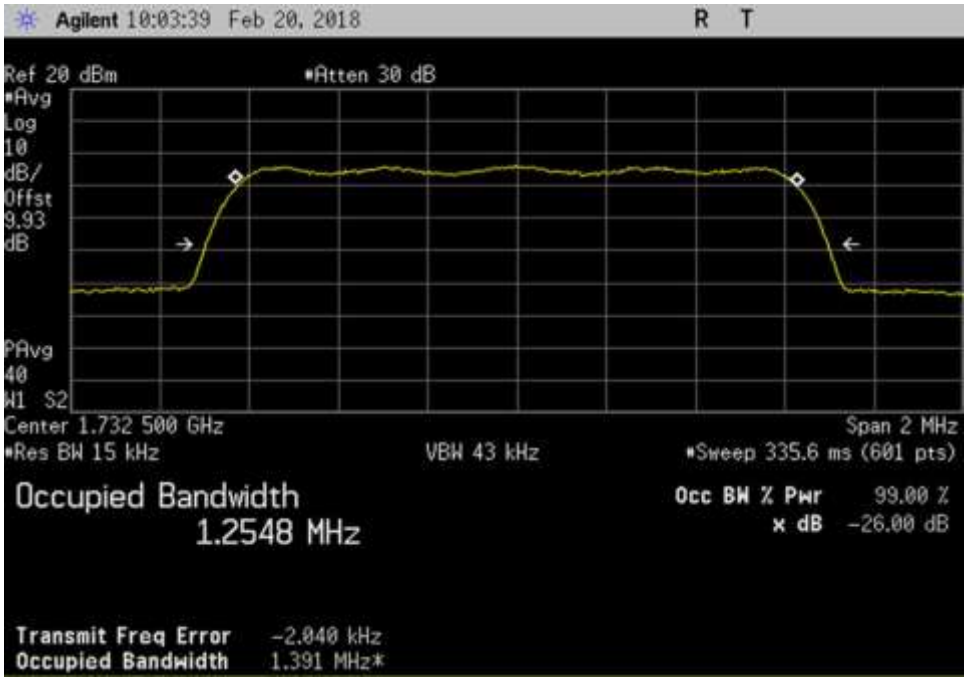
UL_698-716_CDMA_ 707MHz



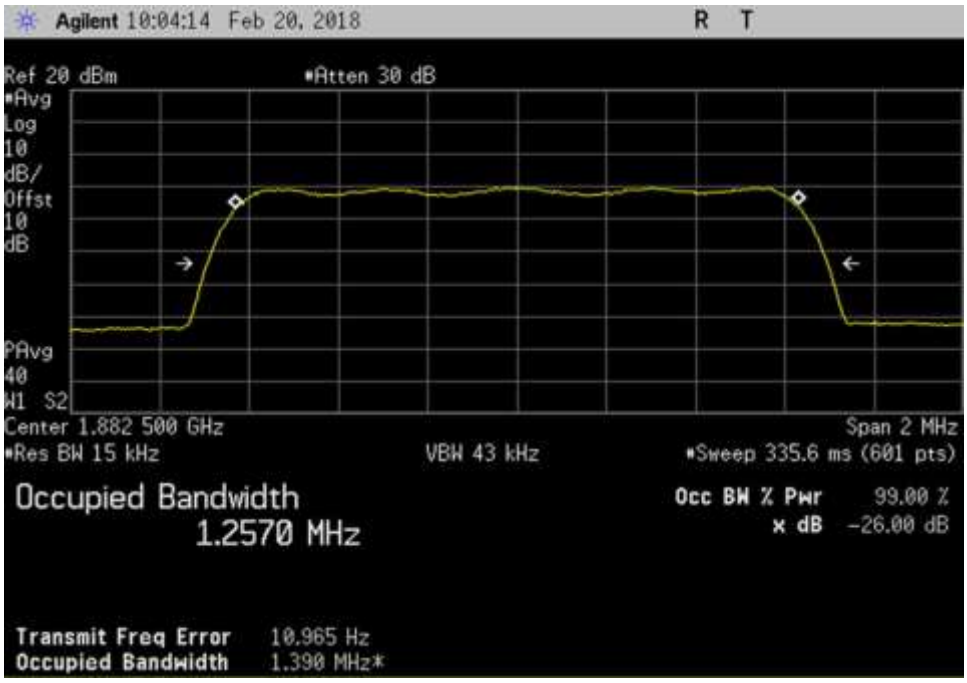
UL_776-787_CDMA_ 781.5MHz



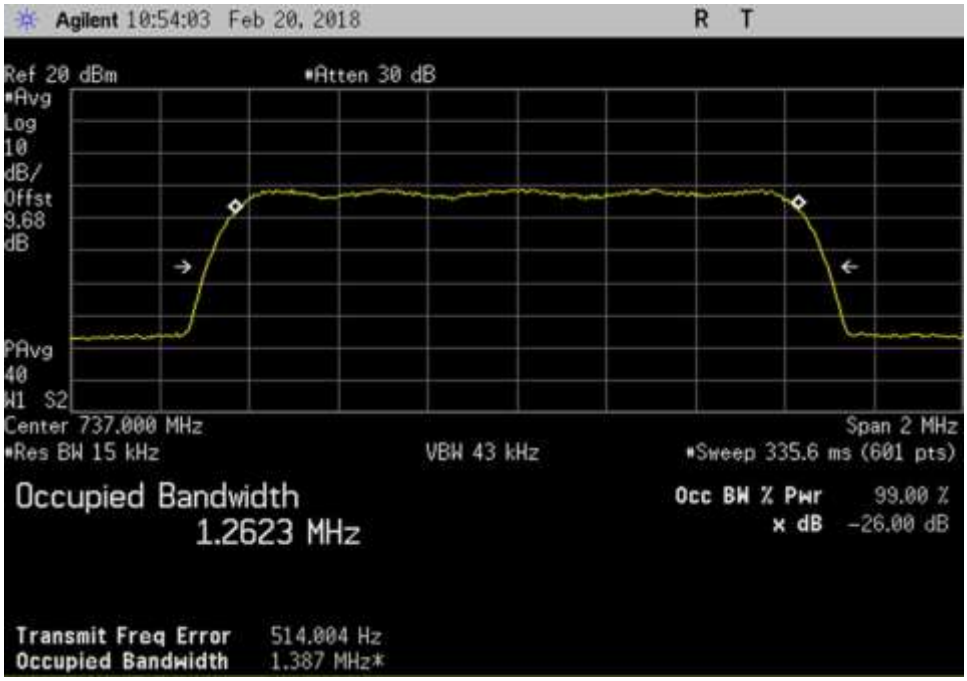
UL_824-849_CDMA_ 836.5MHz



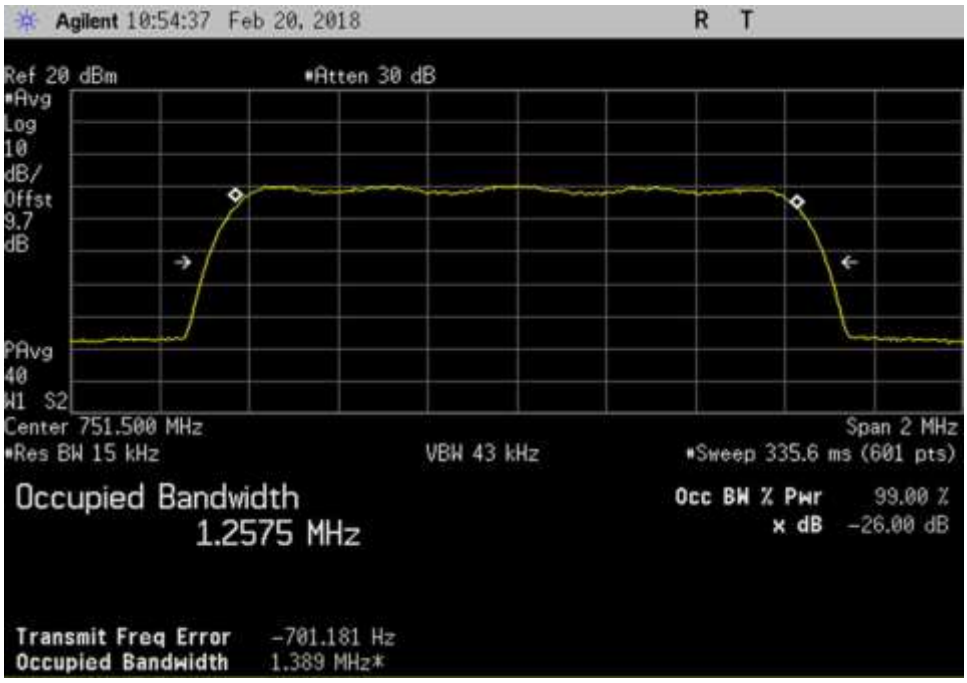
UL_1710-1755_CDMA_ 1732.5MHz



UL_1850-1915_CDMA_ 1882.5MHz

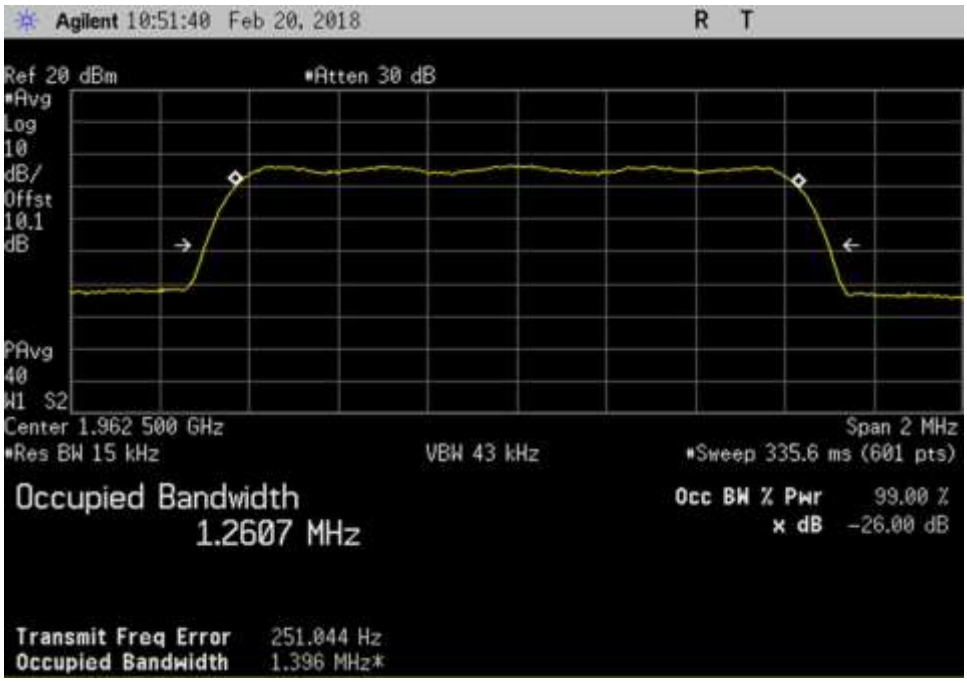


DL_728-746_CDMA_ 737MHz



DL_746-757_CDMA_ 751.5MHz

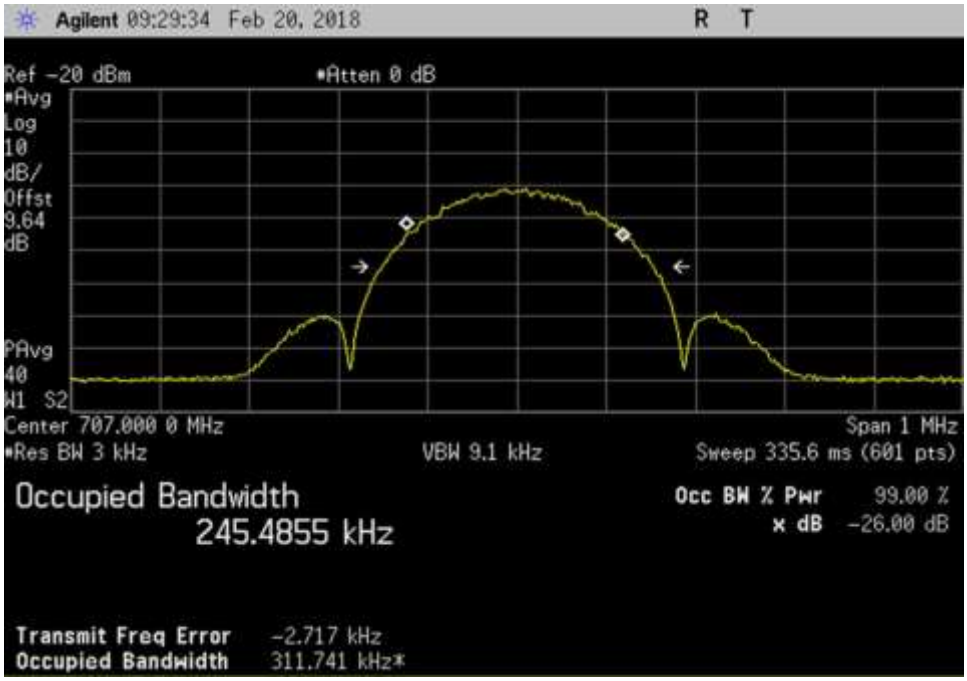
DL_869-894_CDMA_ 881.5MHz



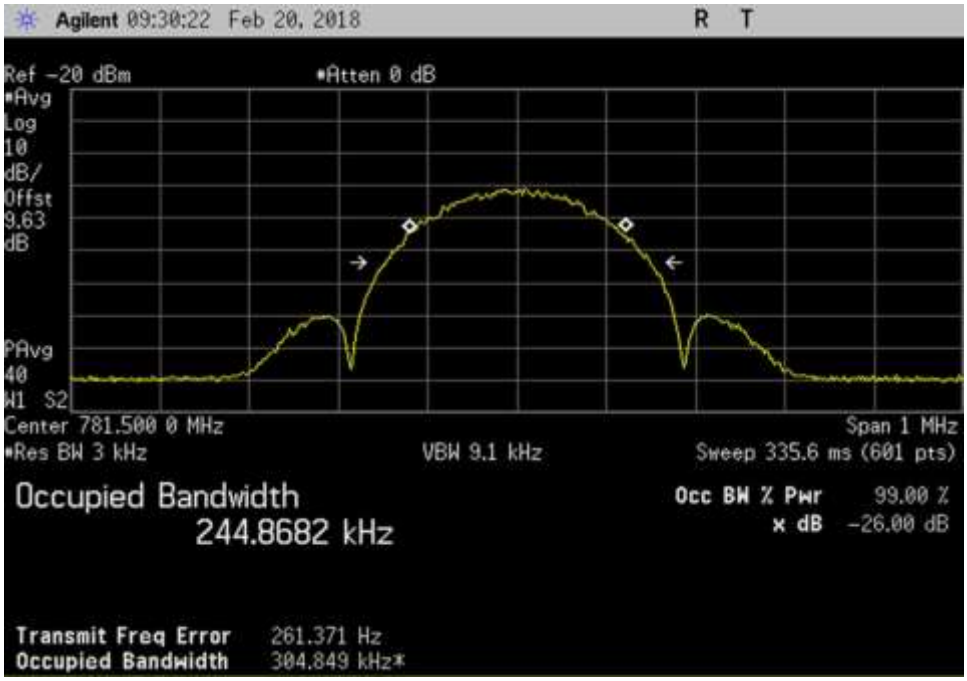
DL_1930-1995_CDMA_ 1962.5MHz

DL_2110-2155_CDMA_ 2132.5MHz

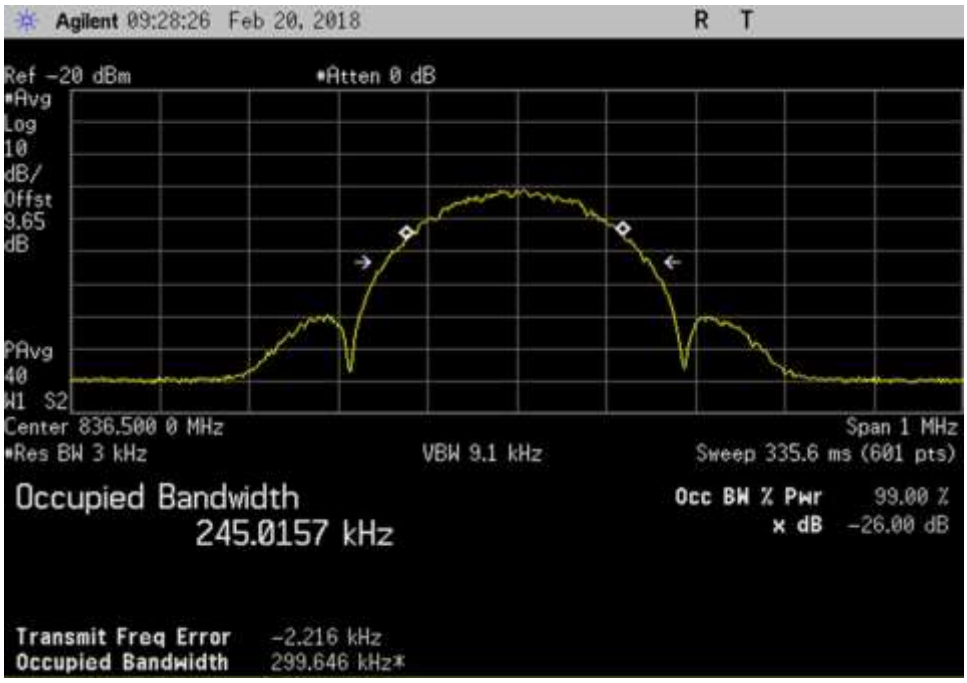
EDGE Input



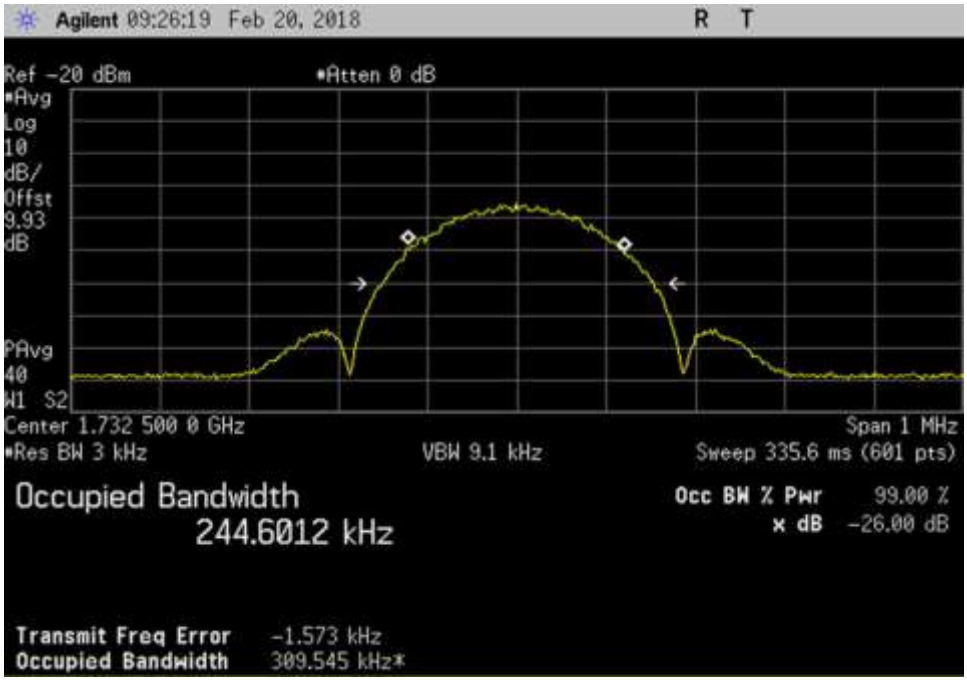
UL_698-716_EDGE_ 707MHz



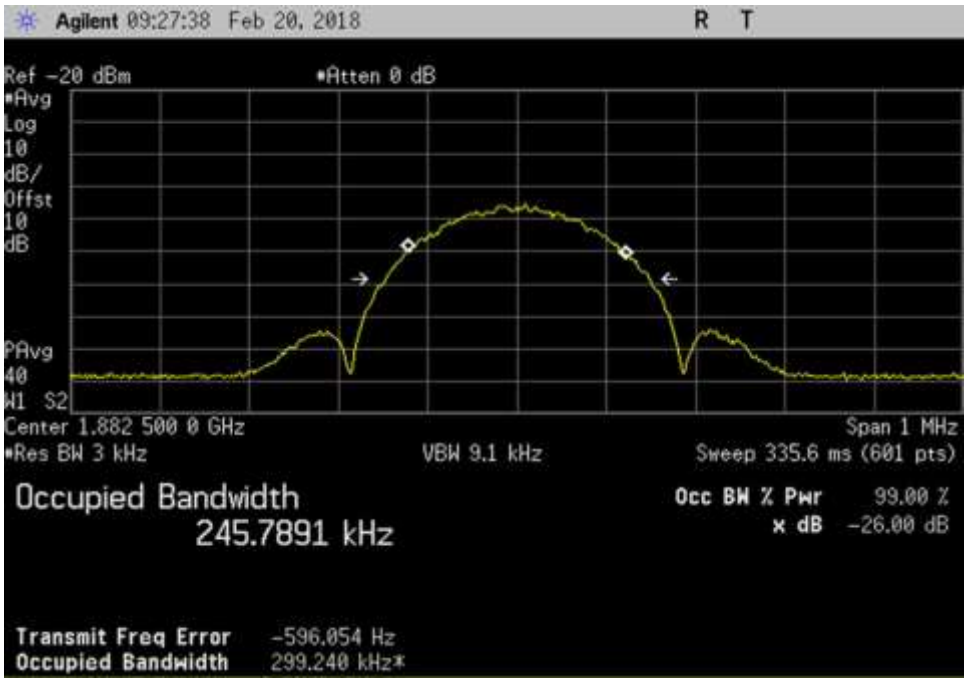
UL_776-787_EDGE_ 781.5MHz



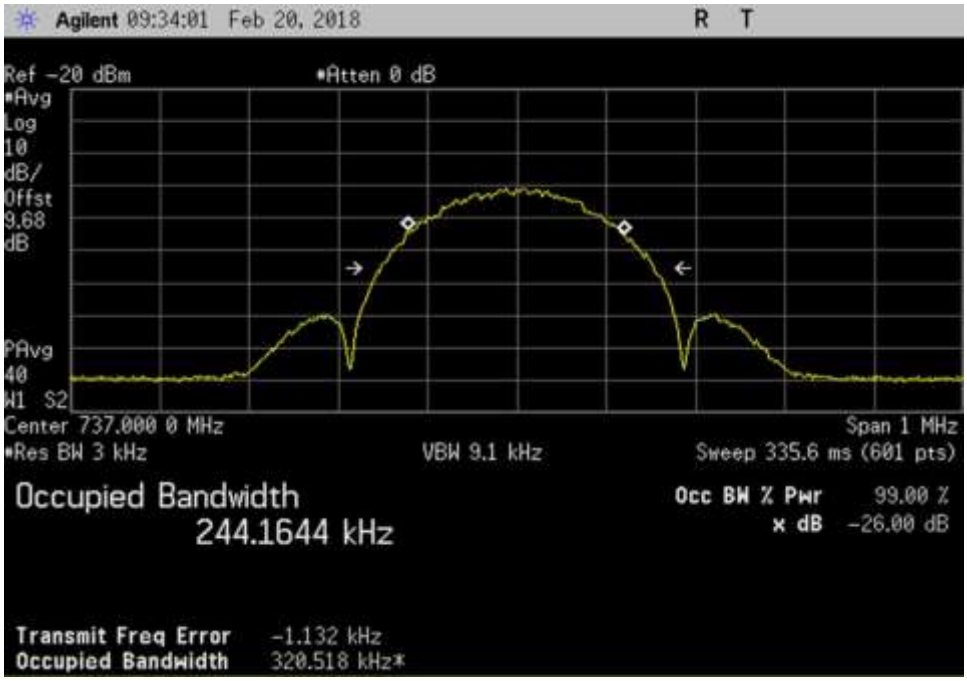
UL_824-849_EDGE_ 836.5MHz



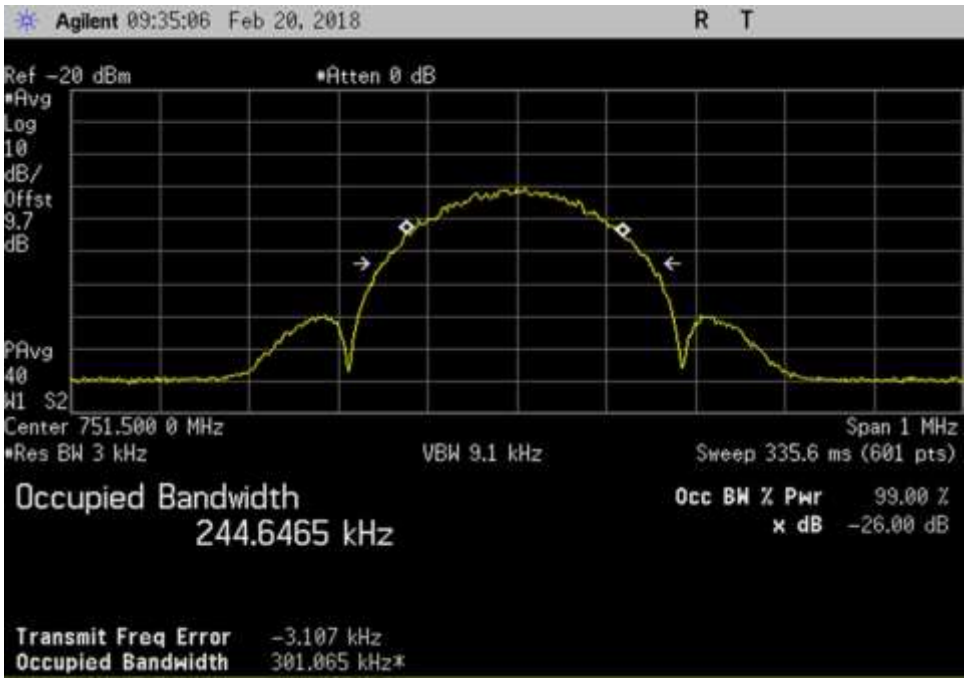
UL_1710-1755_EDGE_ 1732.5MHz



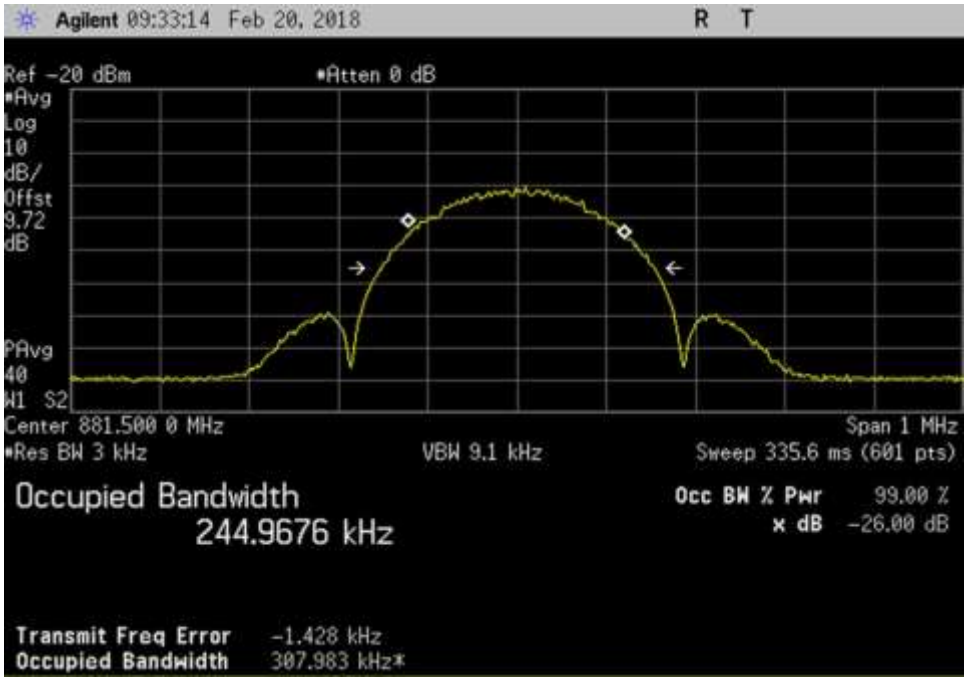
UL_1850-1915_EDGE_ 1882.5MHz



DL_728-746_EDGE_ 737MHz

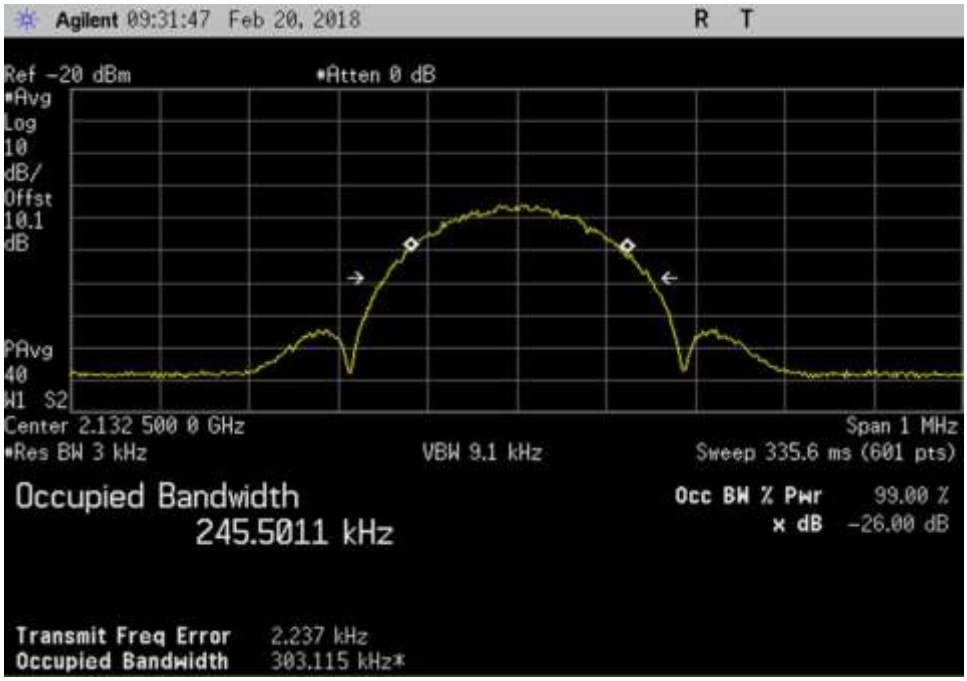


DL_746-757_EDGE_ 751.5MHz



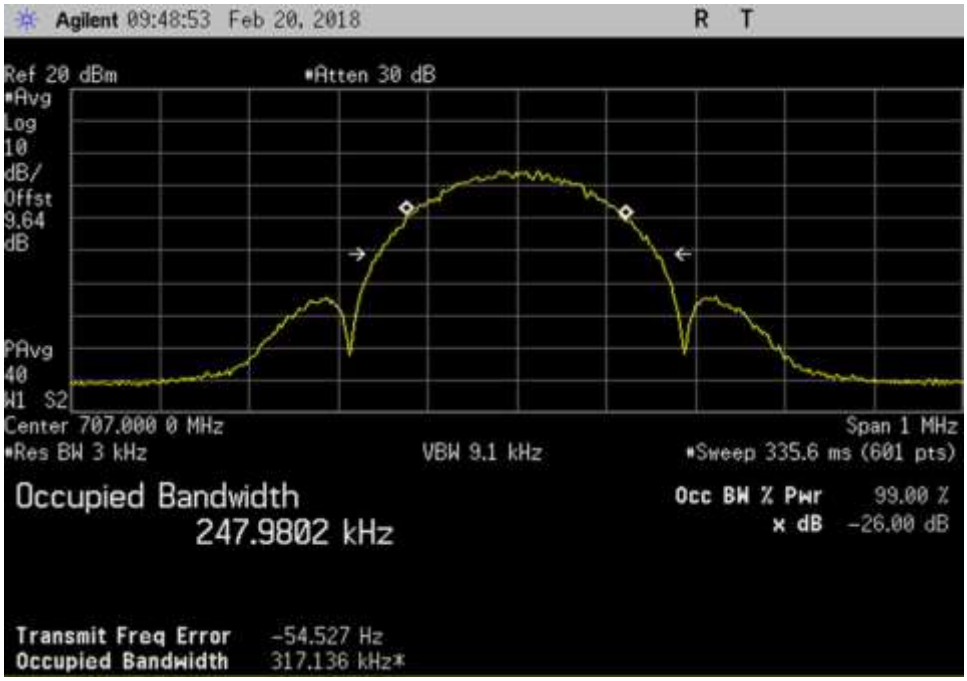
DL_869-894_EDGE_ 881.5MHz

DL_1930-1995_EDGE_ 1962.5MHz

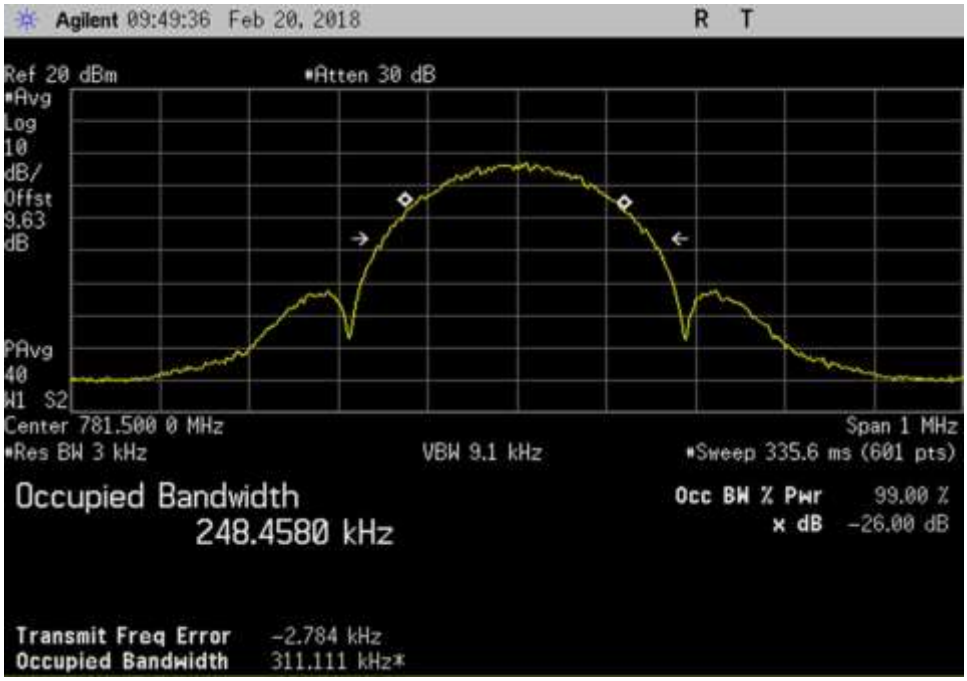


DL_2110-2155_EDGE_ 2132.5MHz

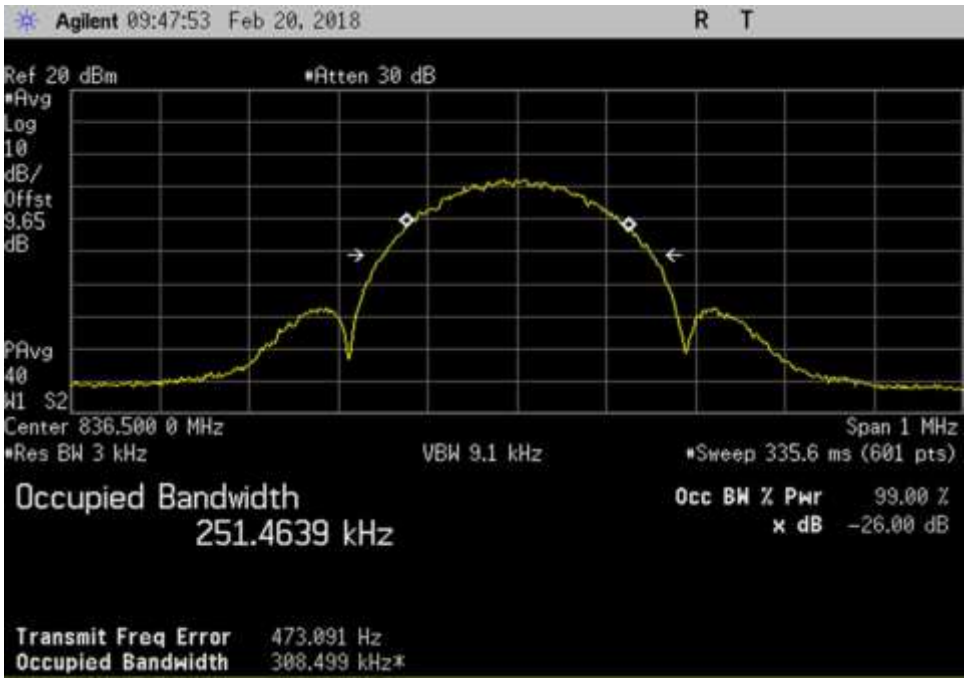
EDGE Output



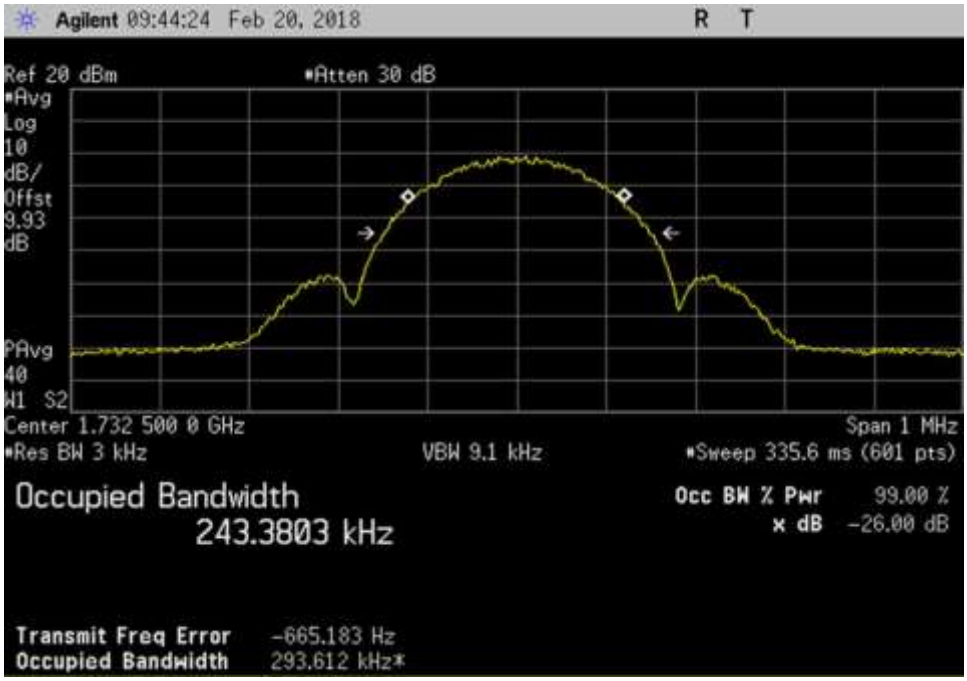
UL_698-716_EDGE_ 707MHz



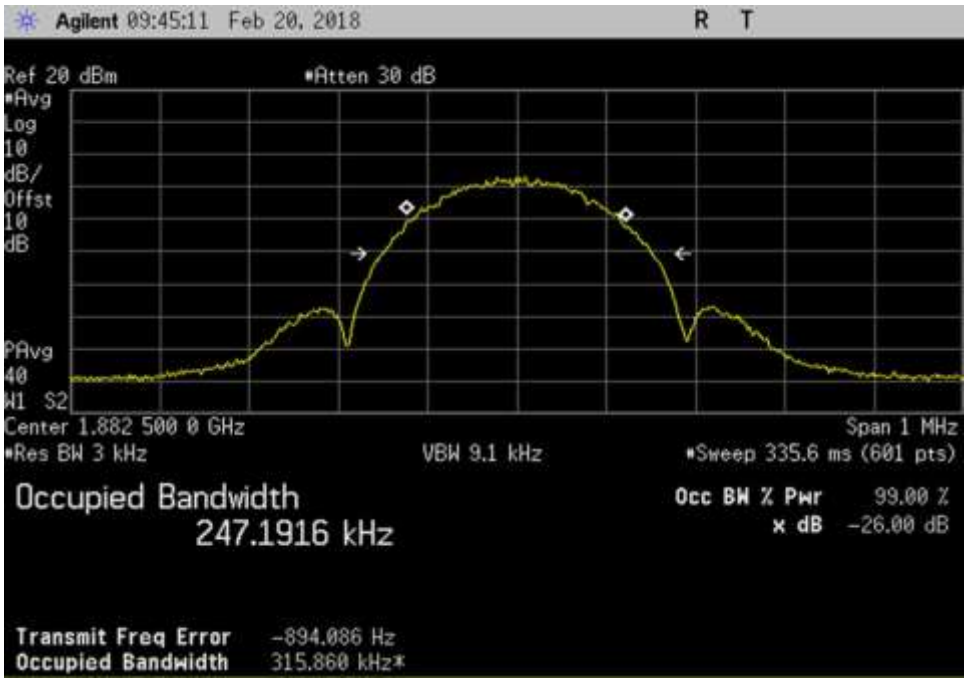
UL_776-787_EDGE_ 781.5MHz



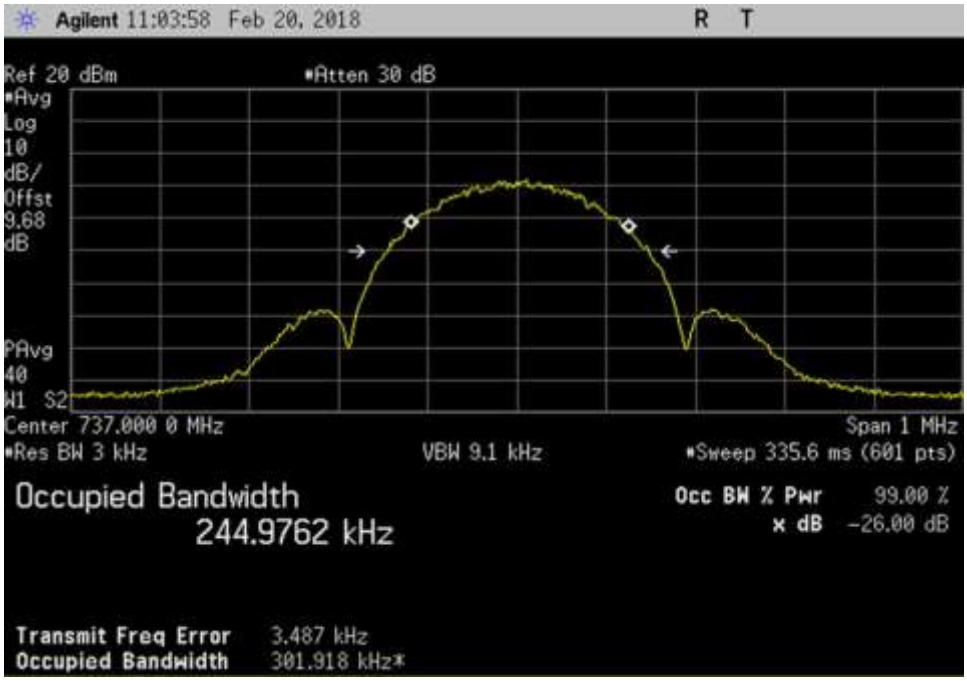
UL_824-849_EDGE_ 836.5MHz



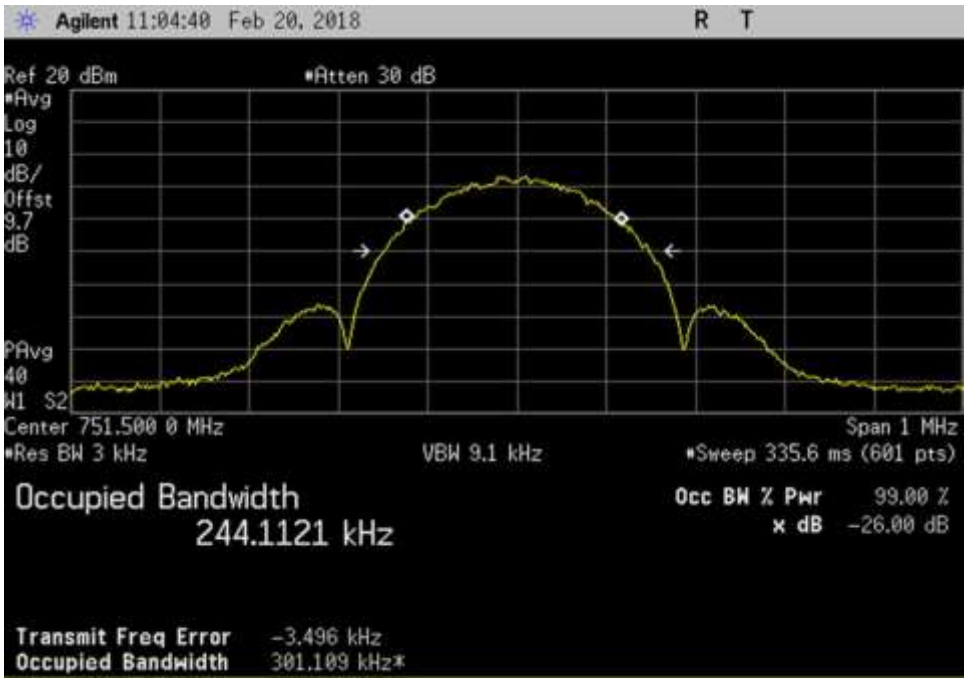
UL_1710-1755_EDGE_ 1732.5MHz



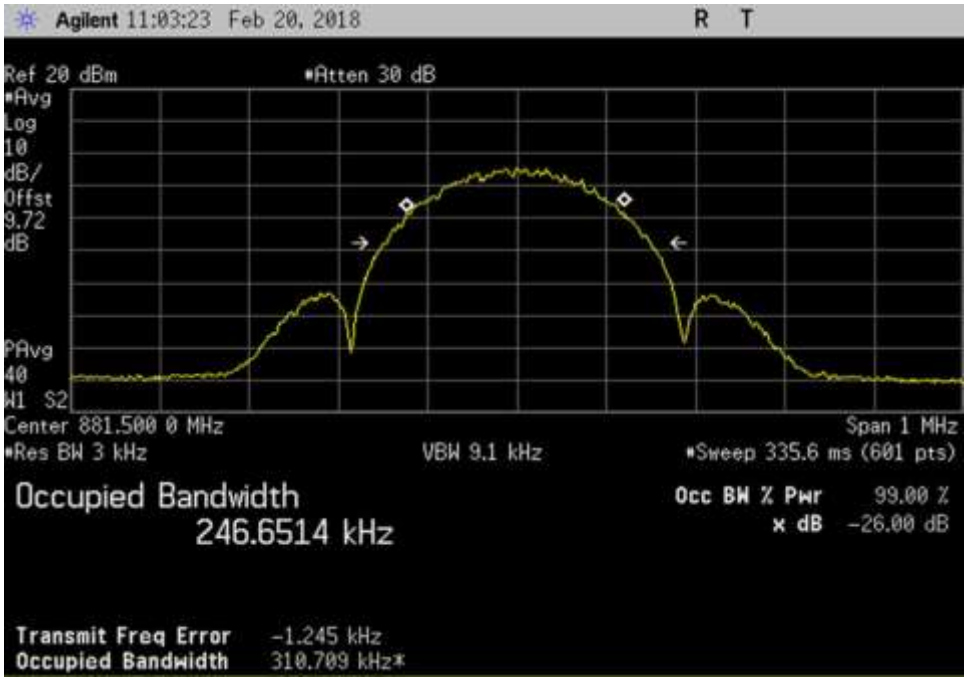
UL_1850-1915_EDGE_ 1882.5MHz



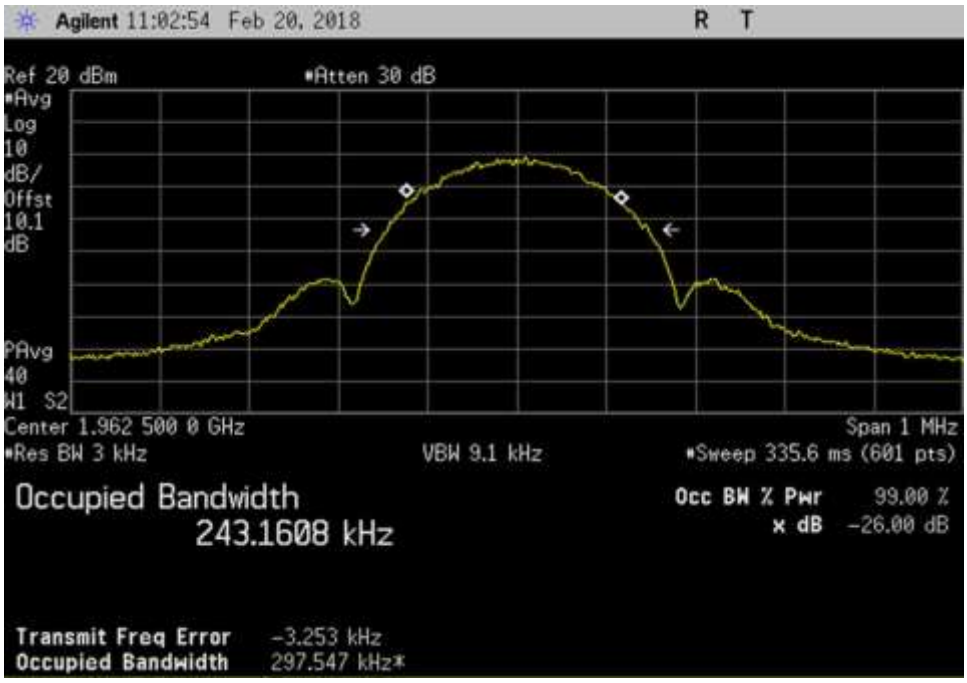
DL_728-746_EDGE_ 737MHz



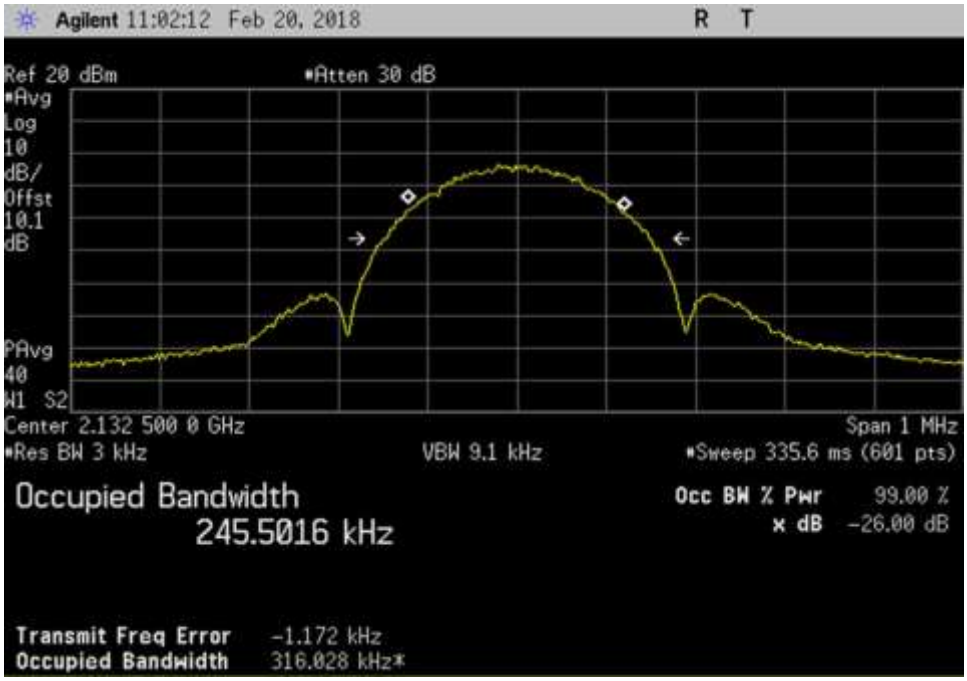
DL_746-757_EDGE_ 751.5MHz



DL_869-894_EDGE_ 881.5MHz

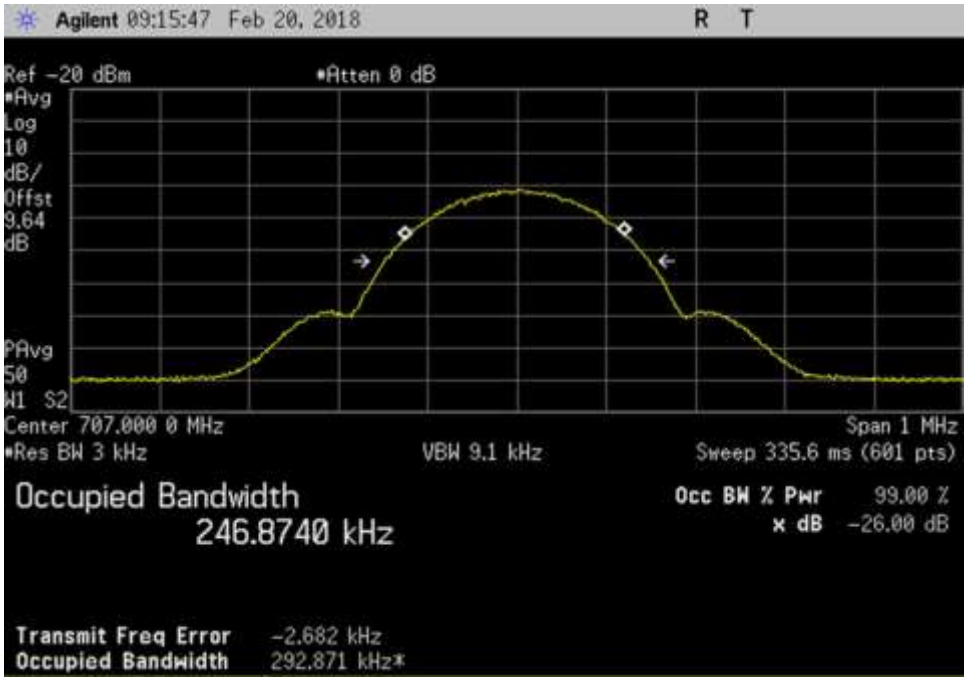


DL_1930-1995_EDGE_ 1962.5MHz

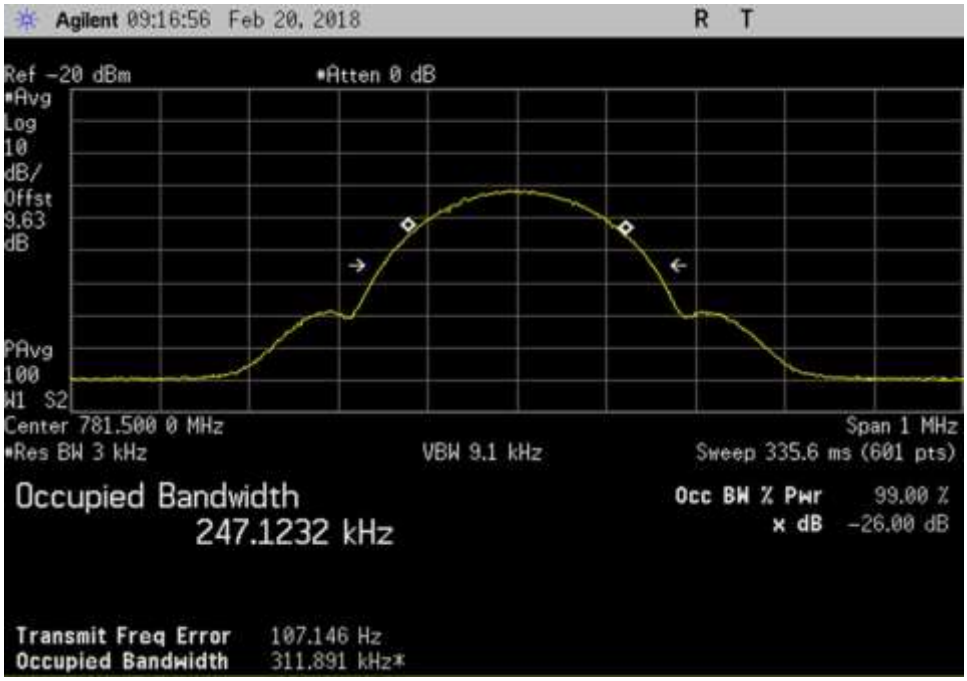


DL_2110-2155_EDGE_ 2132.5MHz

GSM Input

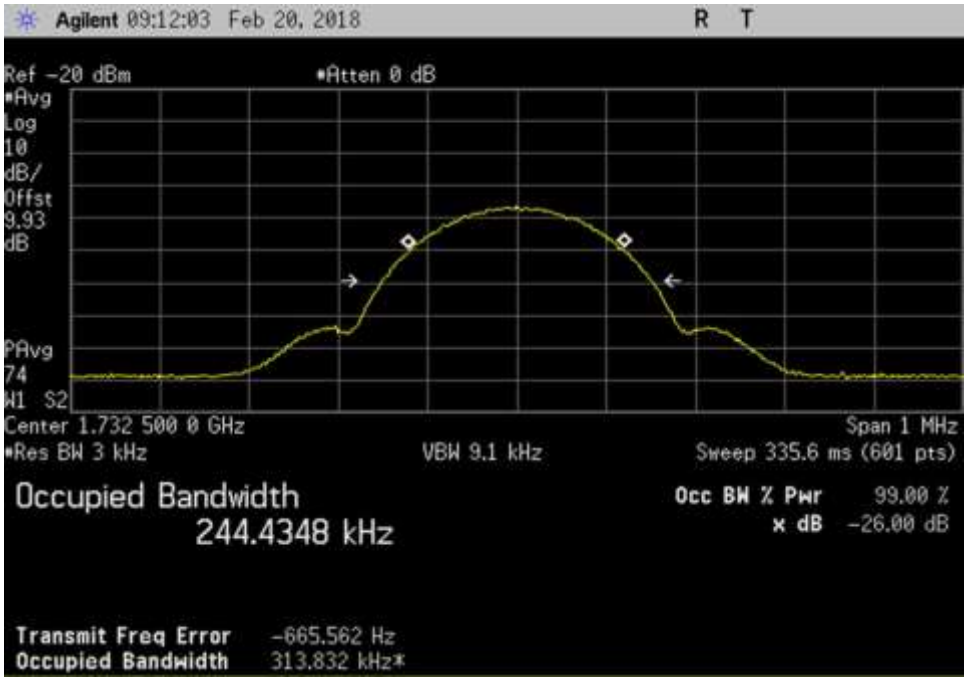


UL_698-716_GSM_ 707MHz



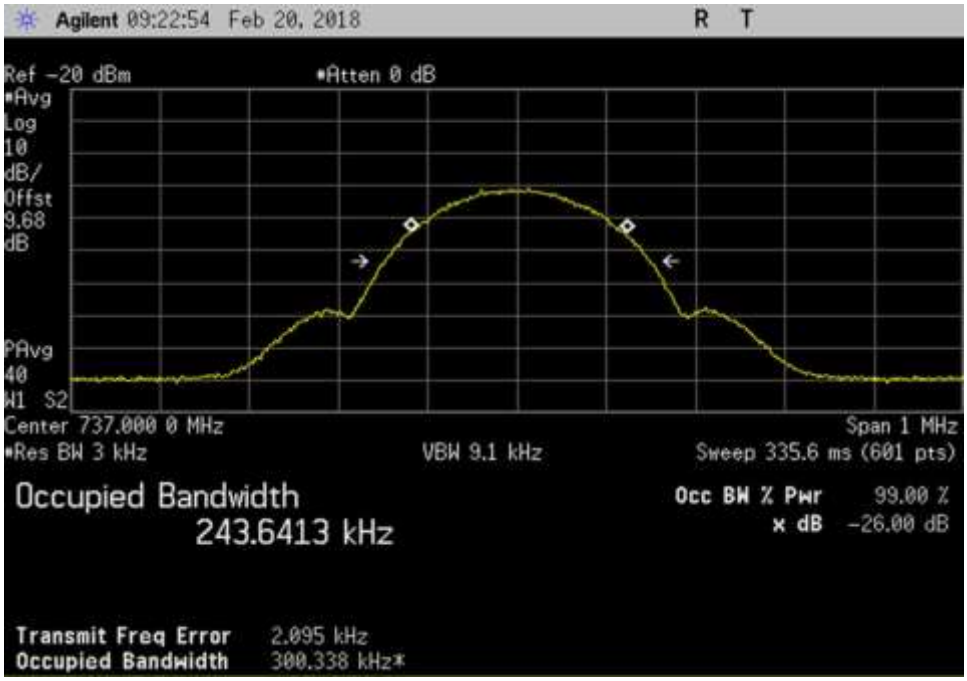
UL_776-787_GSM_ 781.5MHz

UL_824-849_GSM_ 836.5MHz

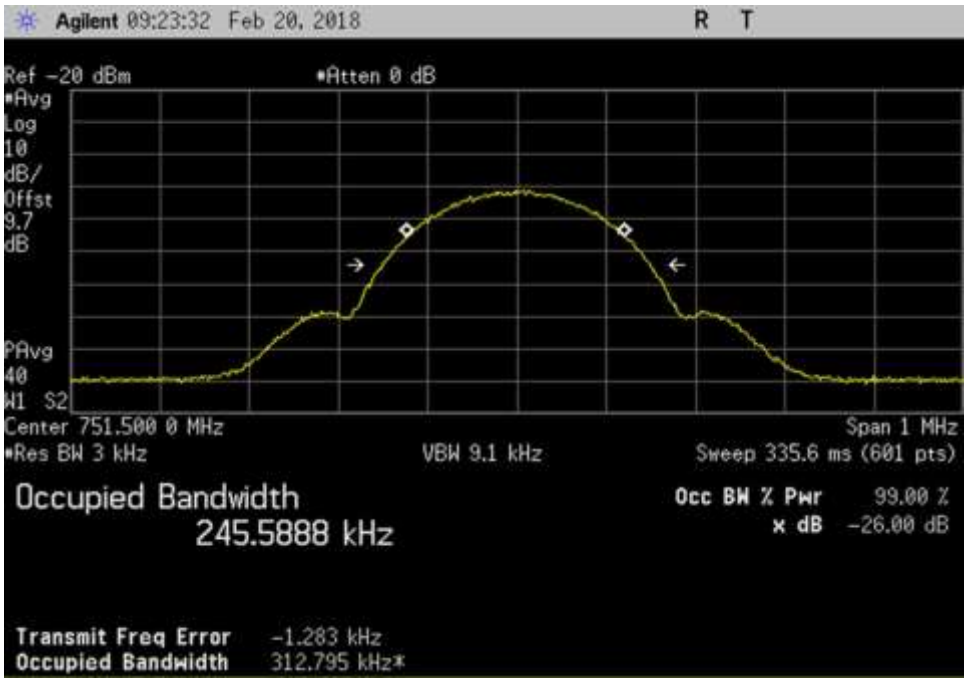


UL_1710-1755_GSM_ 1732.5MHz

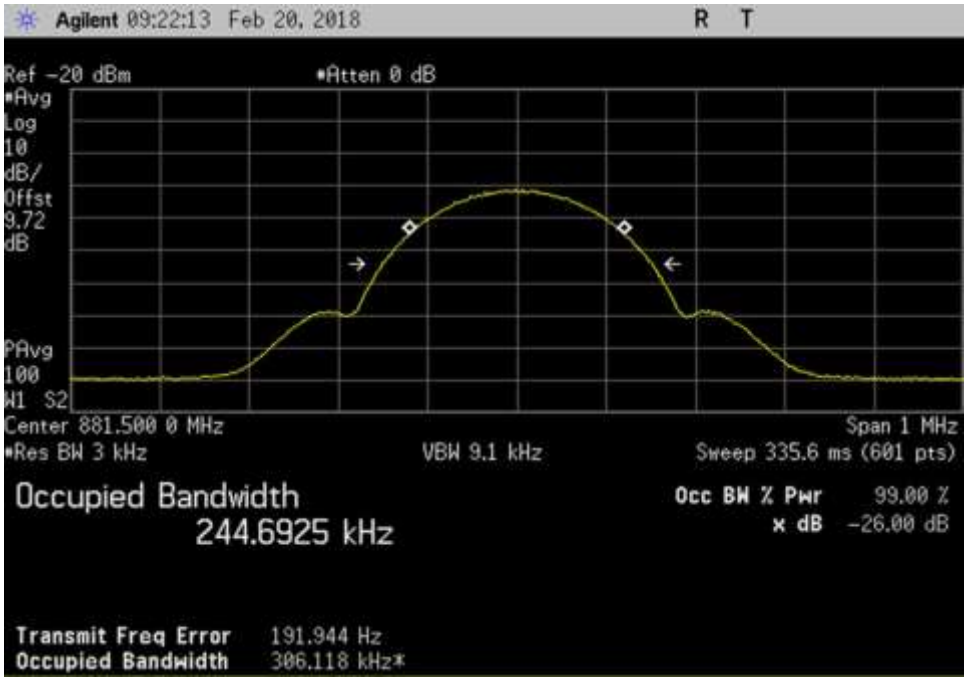
UL_1850-1915_GSM_ 1882.5MHz



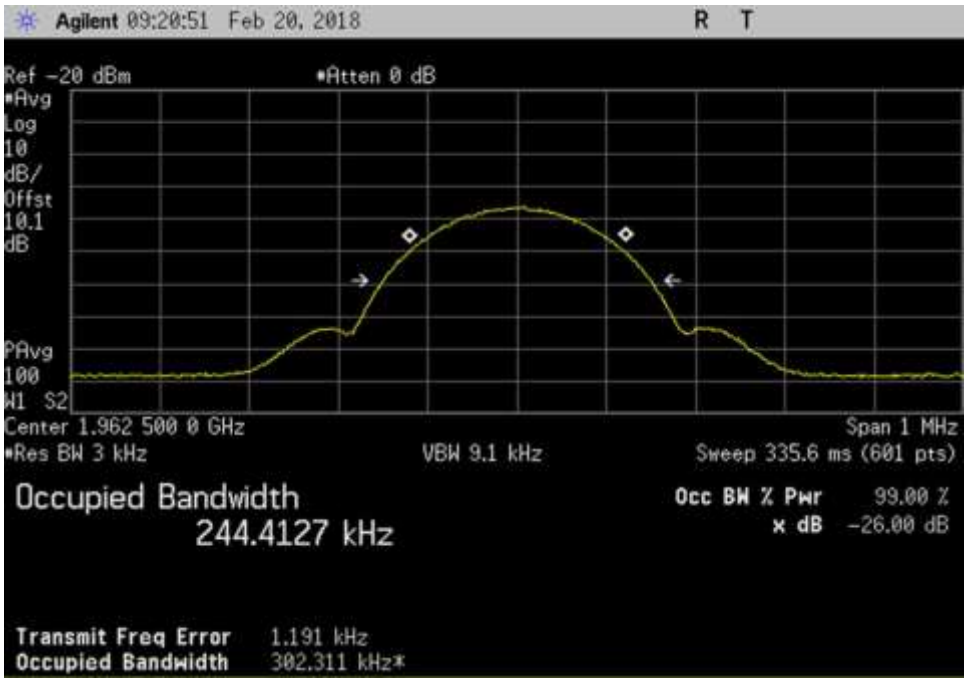
DL_728-746_GSM_ 737MHz



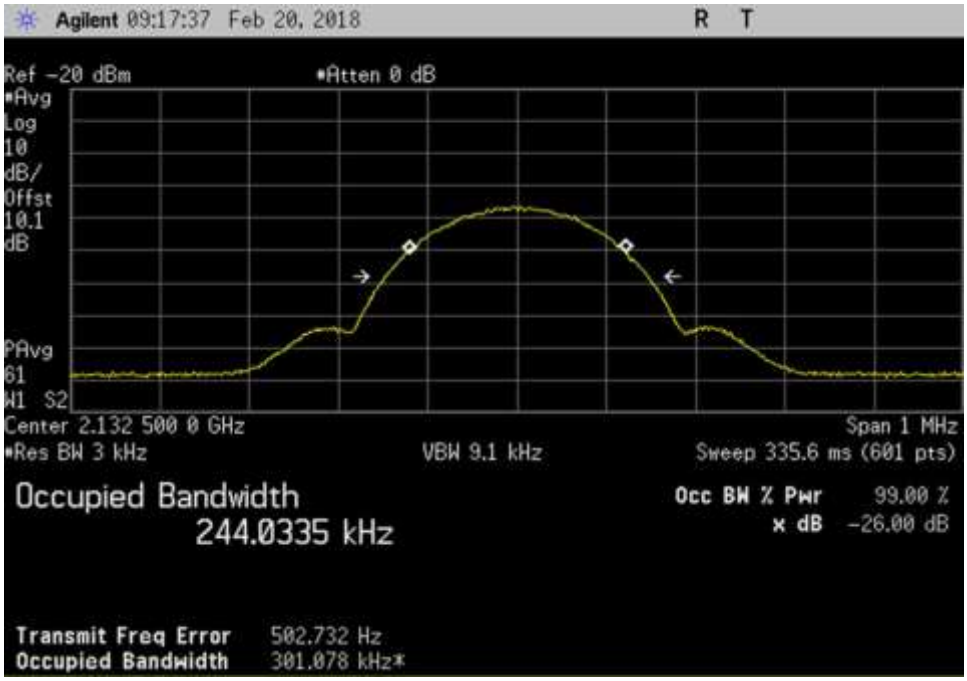
DL_746-757_GSM_ 751.5MHz



DL_869-894_GSM_ 881.5MHz

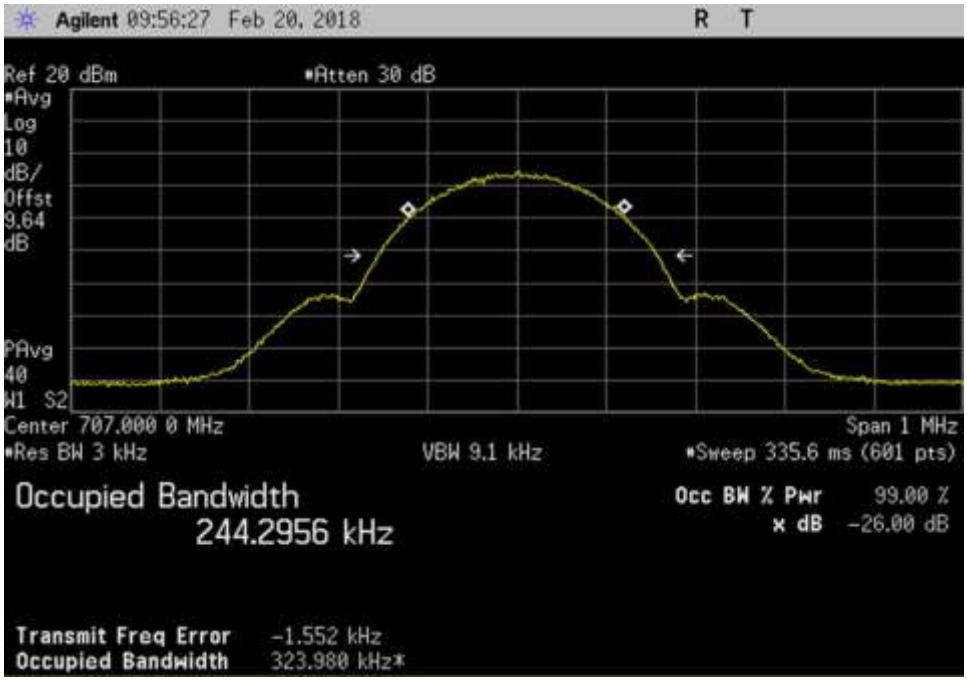


DL_1930-1995_GSM_ 1962.5MHz

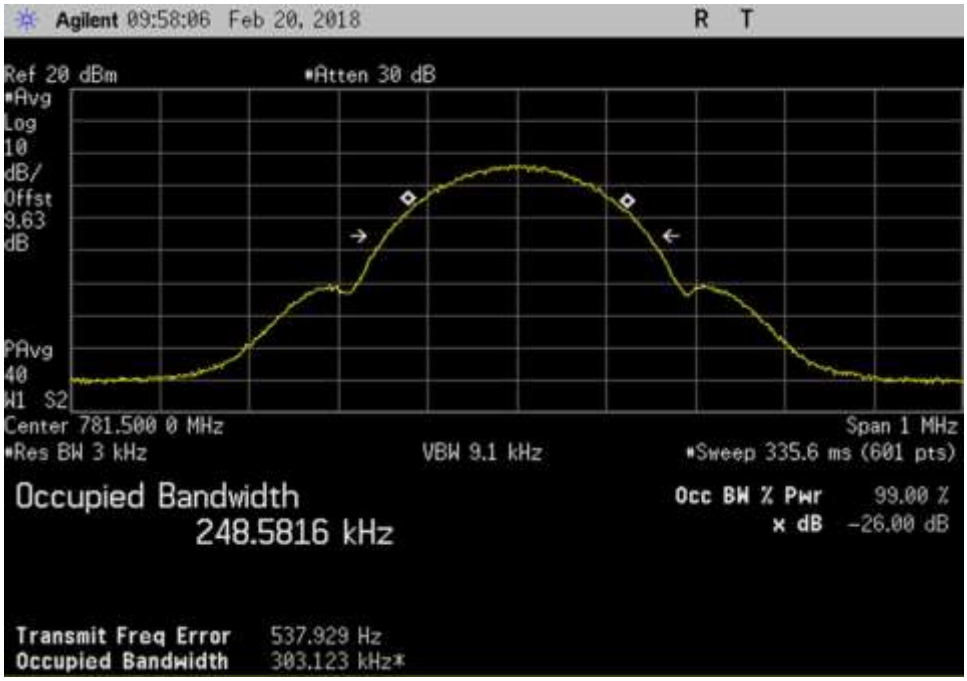


DL_2110-2155_GSM_ 2132.5MHz

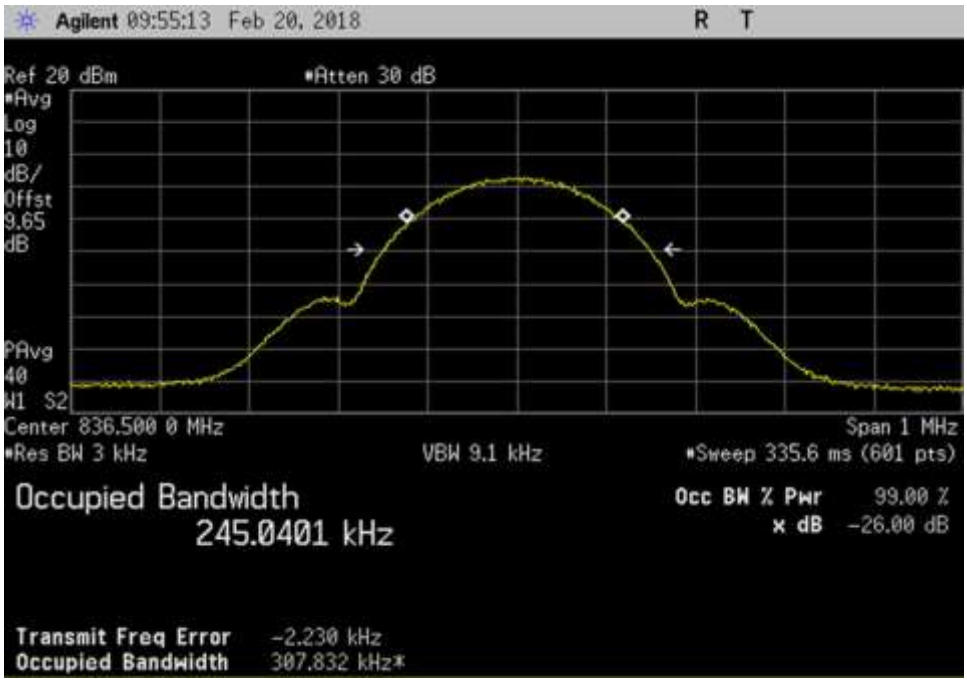
GSM Output



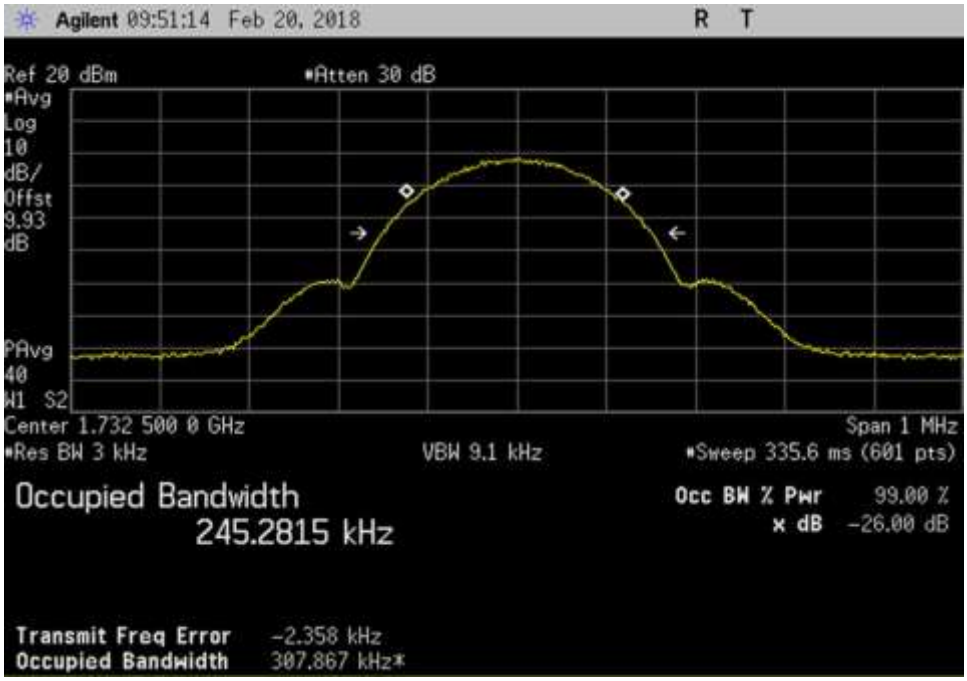
UL_698-716_GSM_ 707MHz



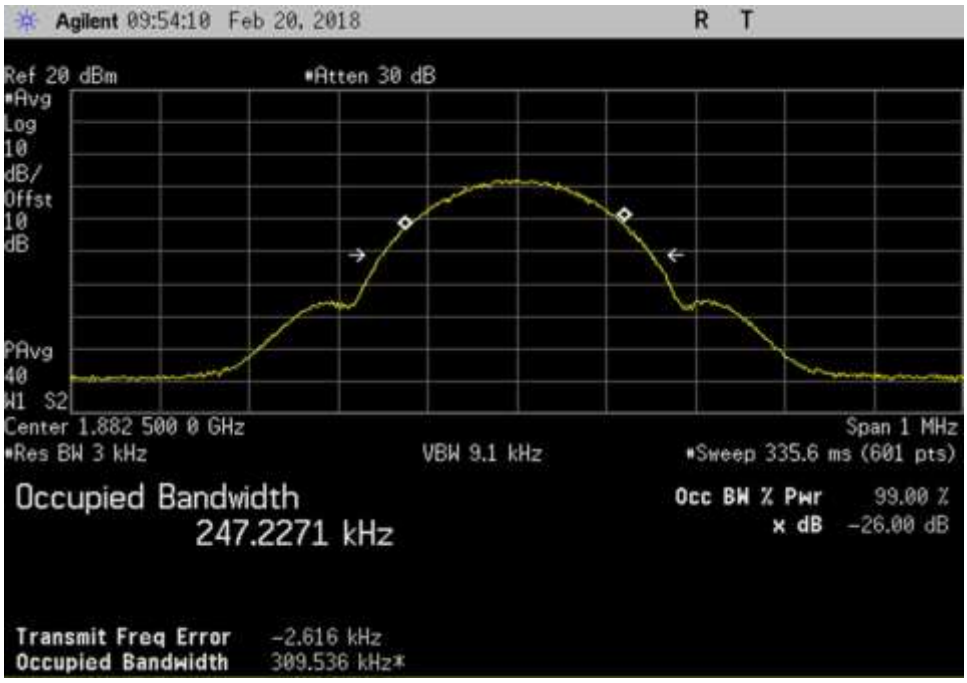
UL_776-787_GSM_ 781.5MHz



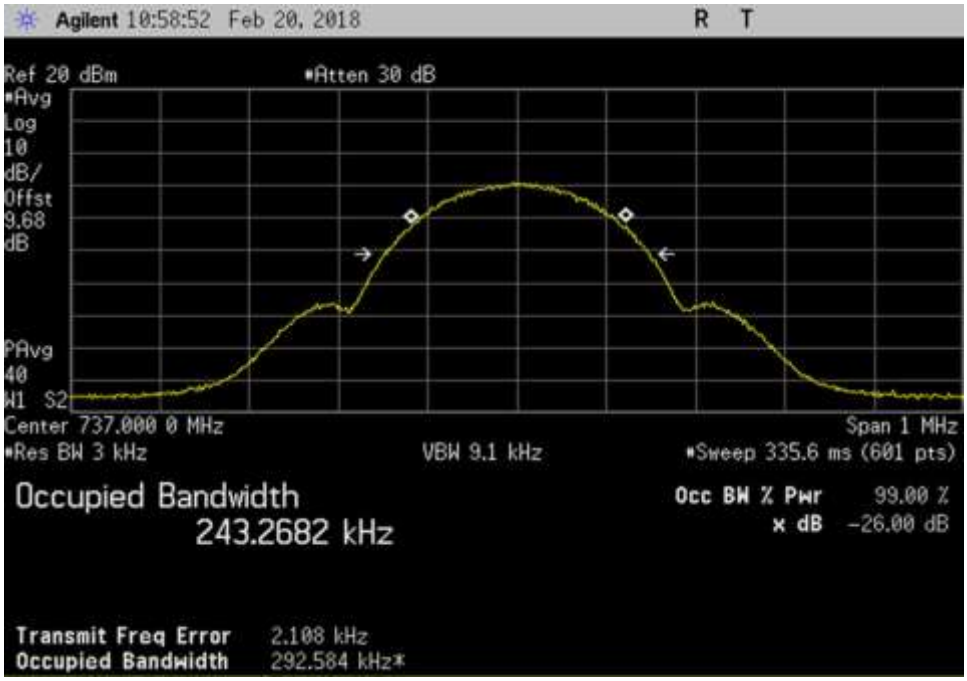
UL_824-849_GSM_ 836.5MHz



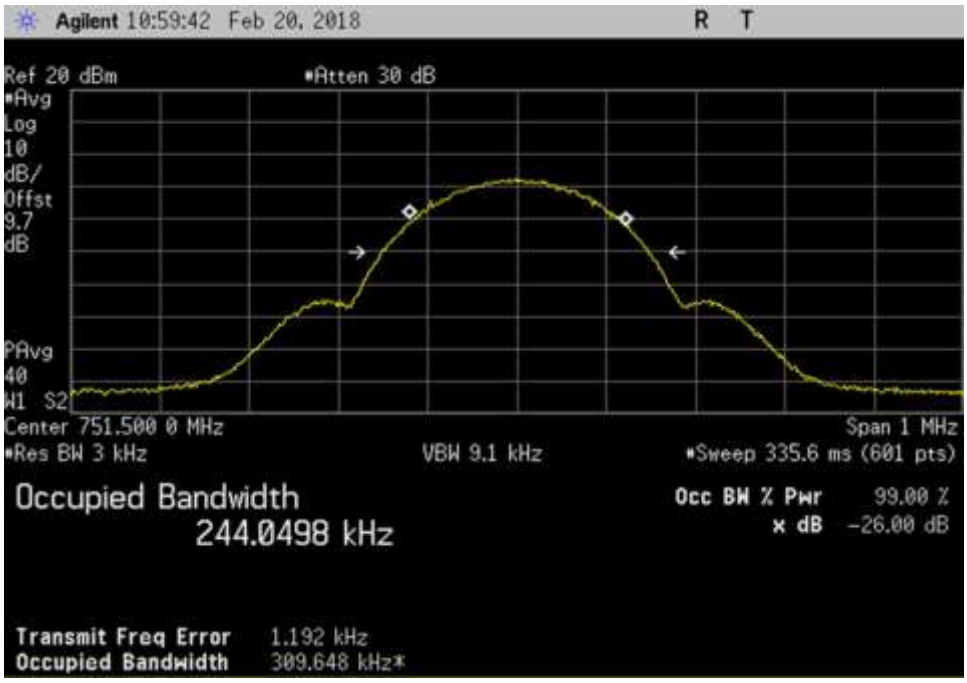
UL_1710-1755_GSM_ 1732.5MHz



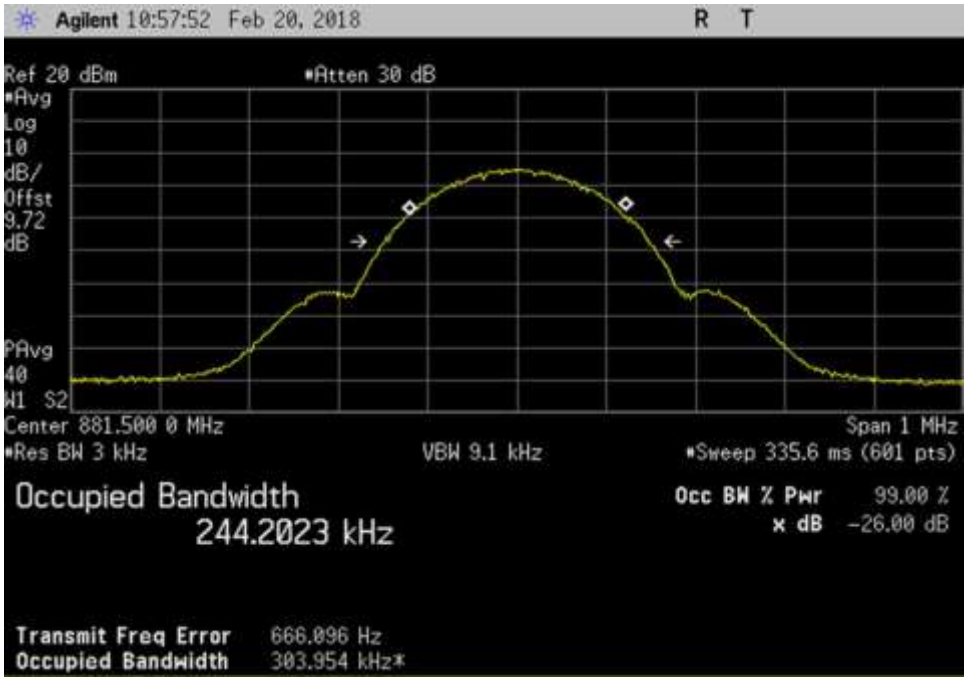
UL_1850-1915_GSM_ 1882.5MHz



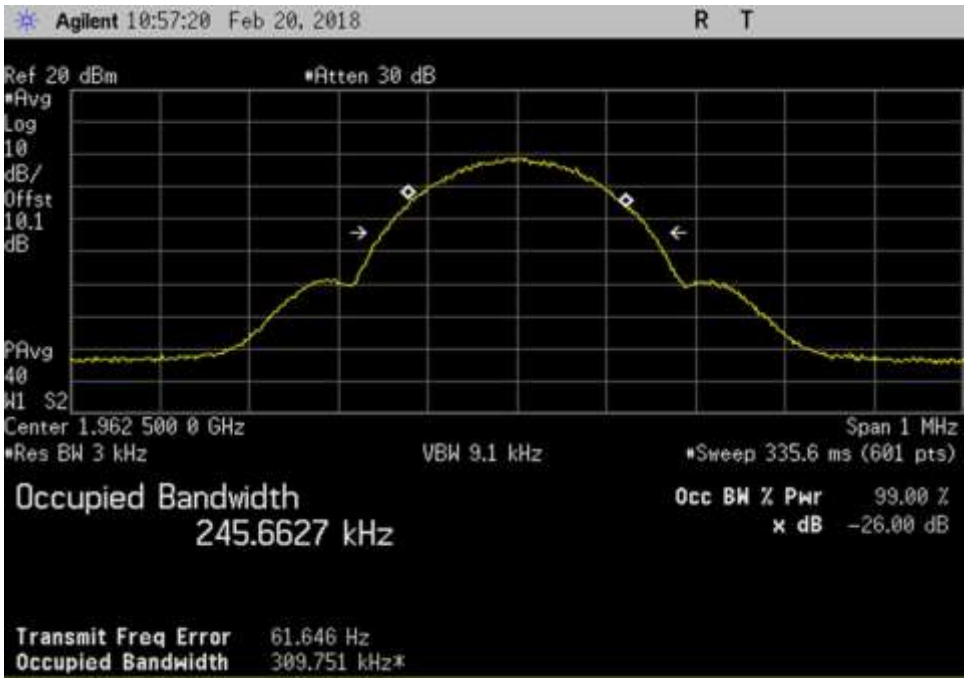
DL_728-746_GSM_ 737MHz



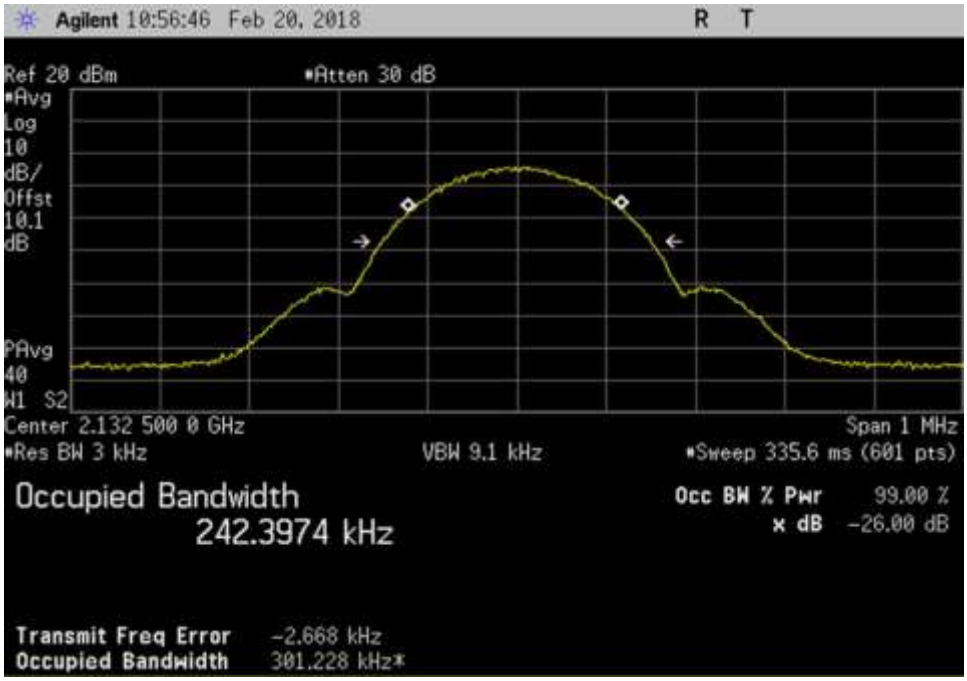
DL_746-757_GSM_ 751.5MHz



DL_869-894_GSM_ 881.5MHz

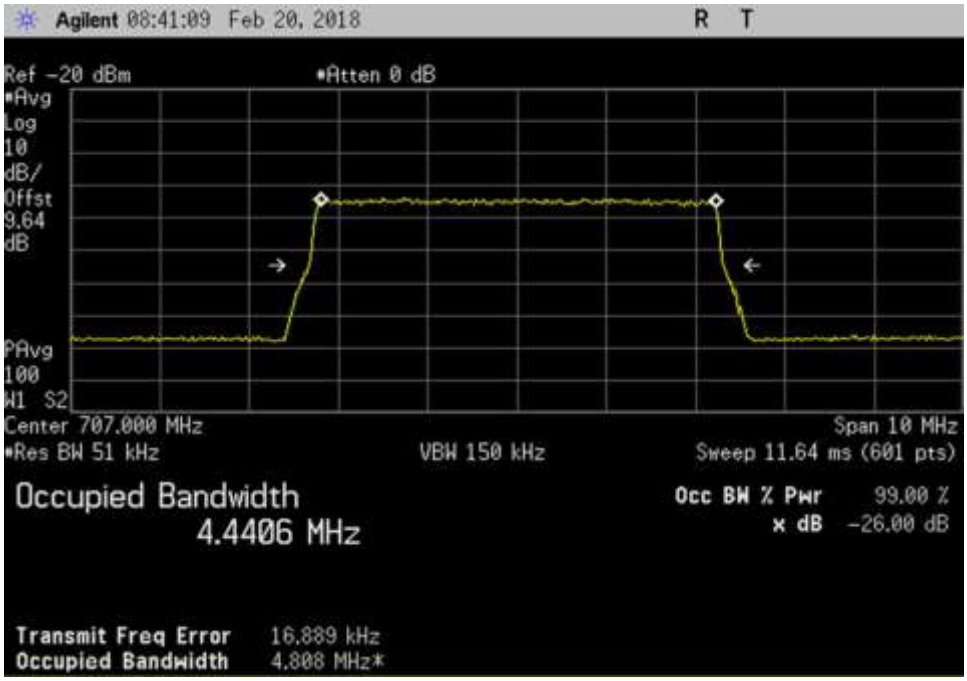


DL_1930-1995_GSM_ 1962.5MHz

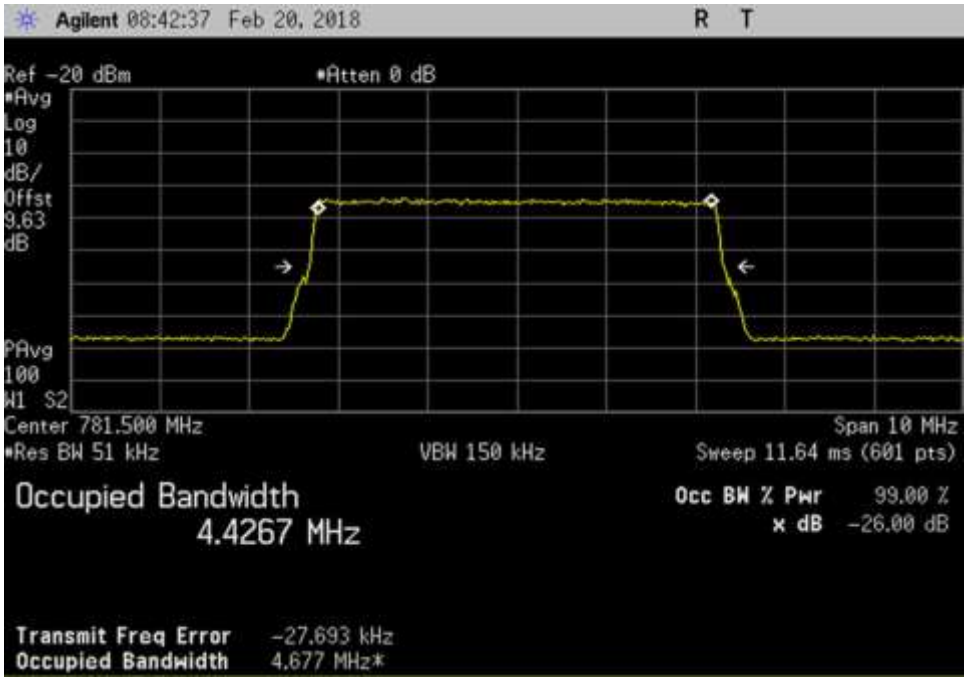


DL_2110-2155_GSM_ 2132.5MHz

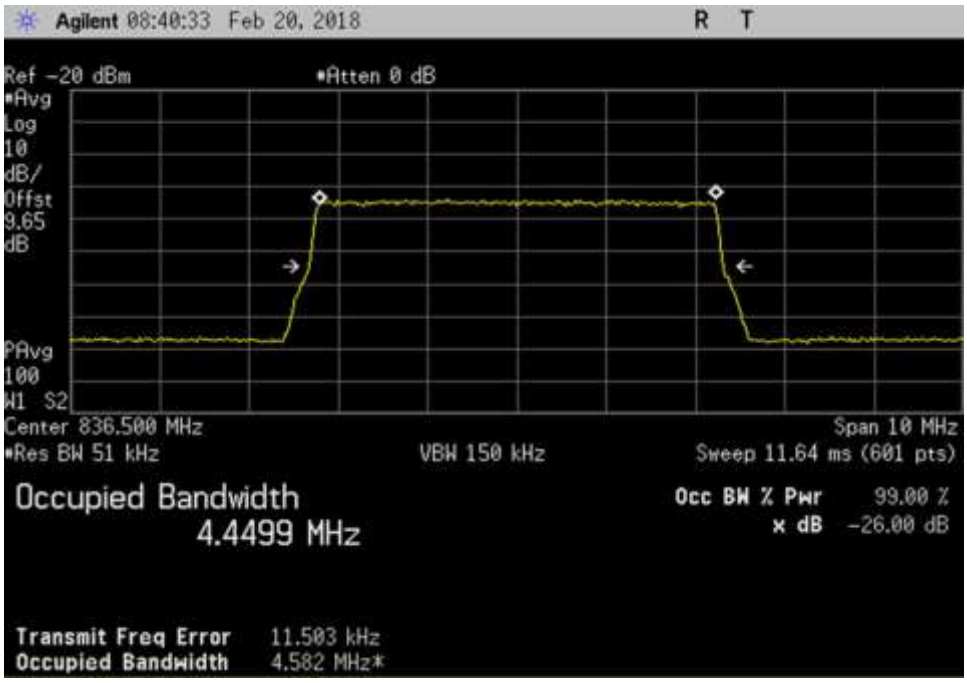
LTE Input



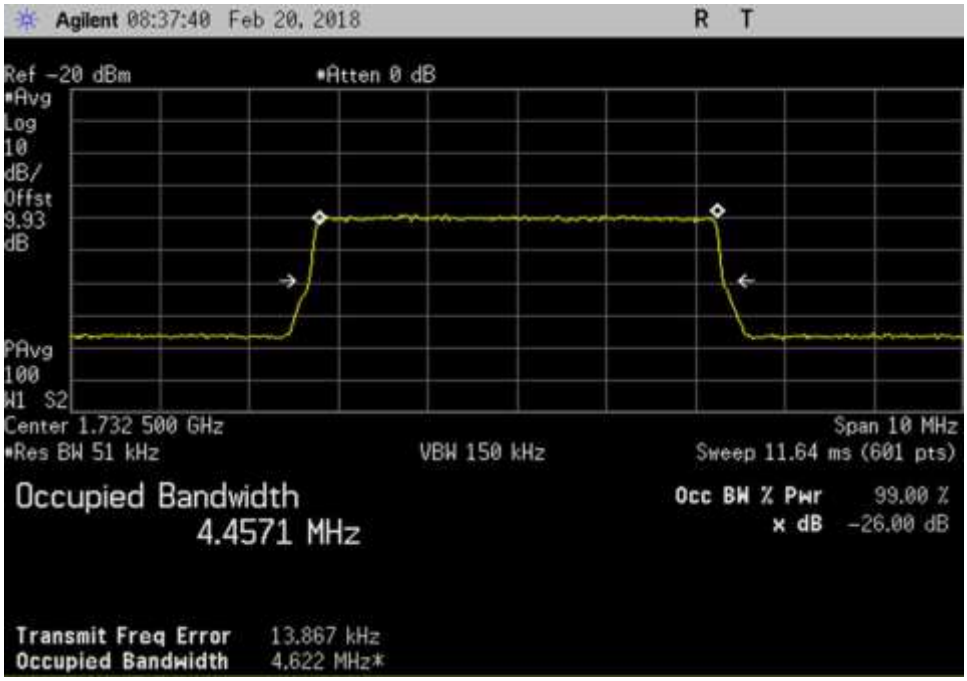
UL_698-716_LTE_ 707MHz



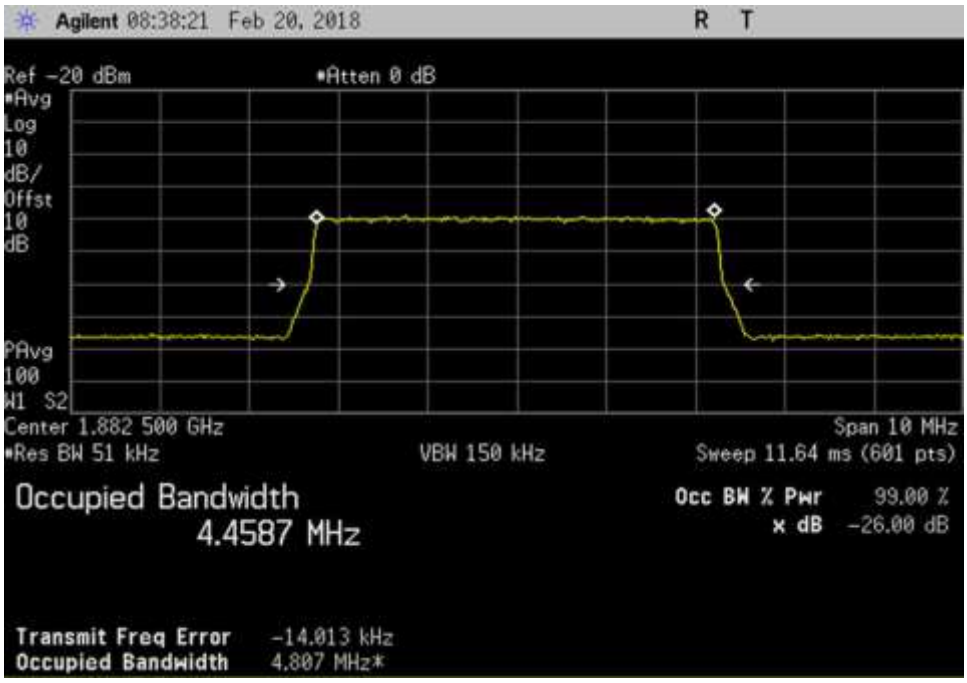
UL_776-787_LTE_ 781.5MHz



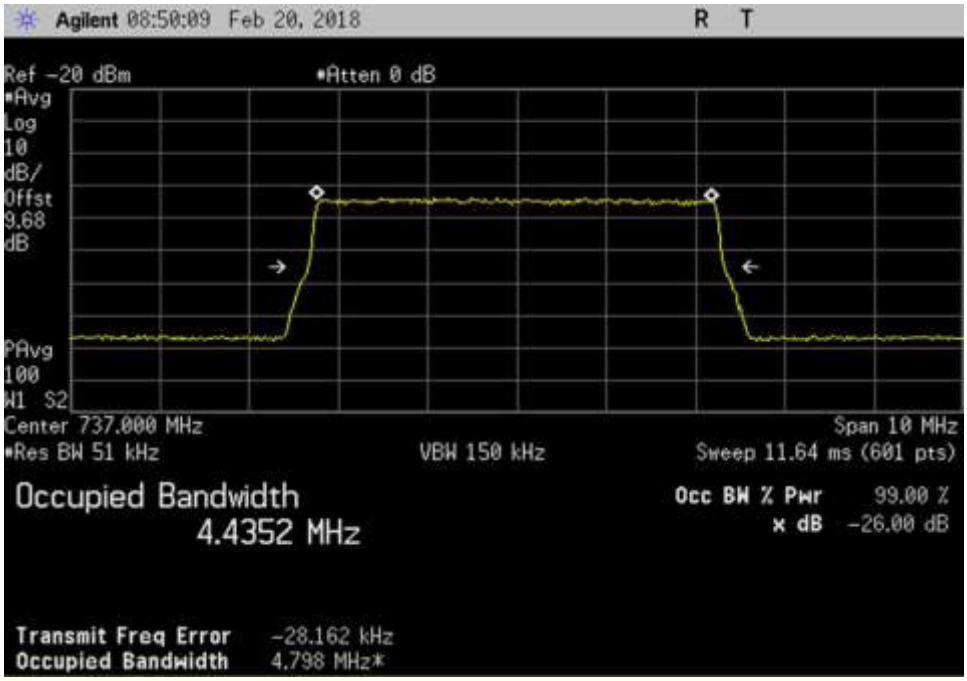
UL_824-849_LTE_ 836.5MHz



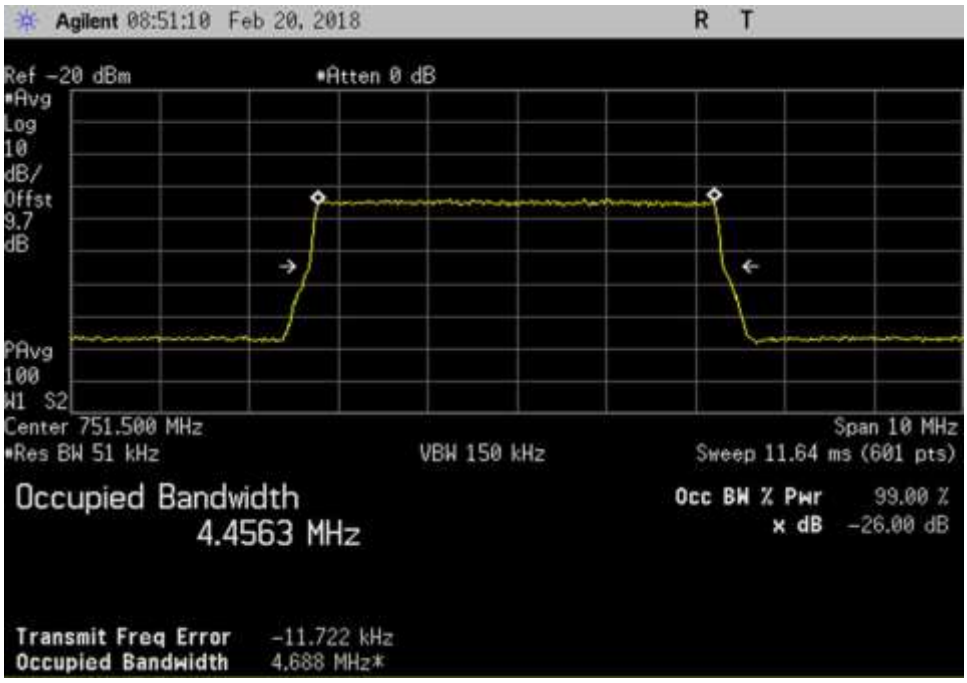
UL_1710-1755_LTE_ 1732.5MHz



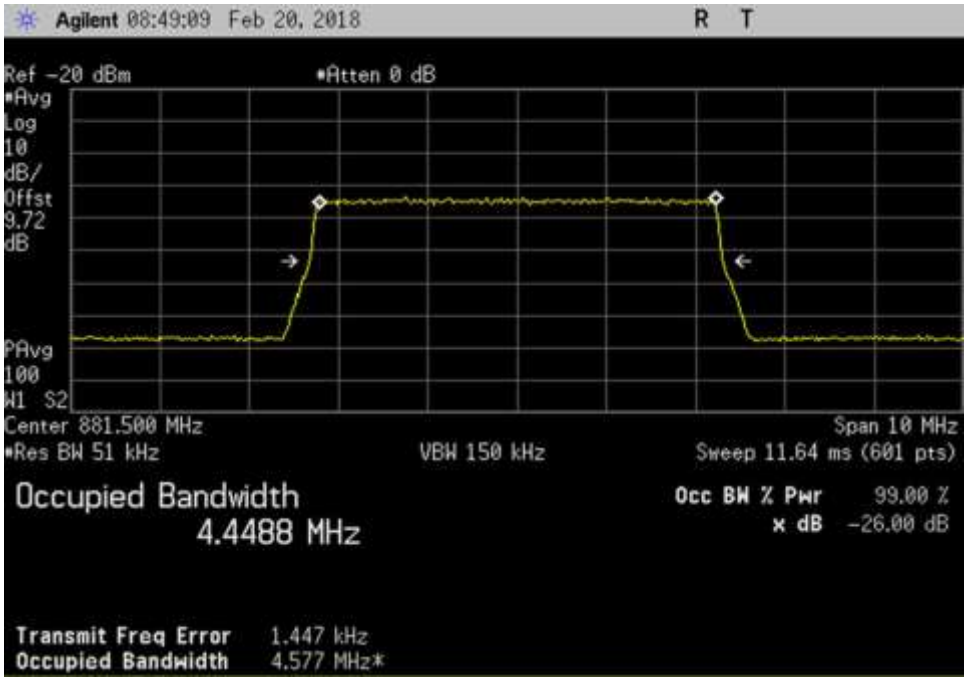
UL_1850-1915_LTE_ 1882.5MHz



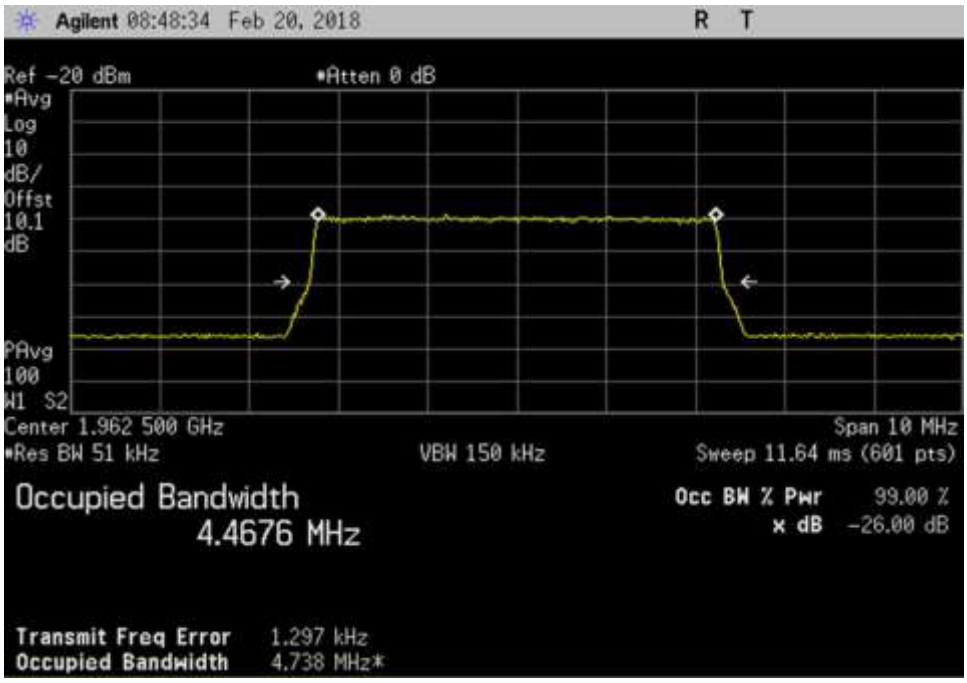
DL_728-746_LTE_ 737MHz



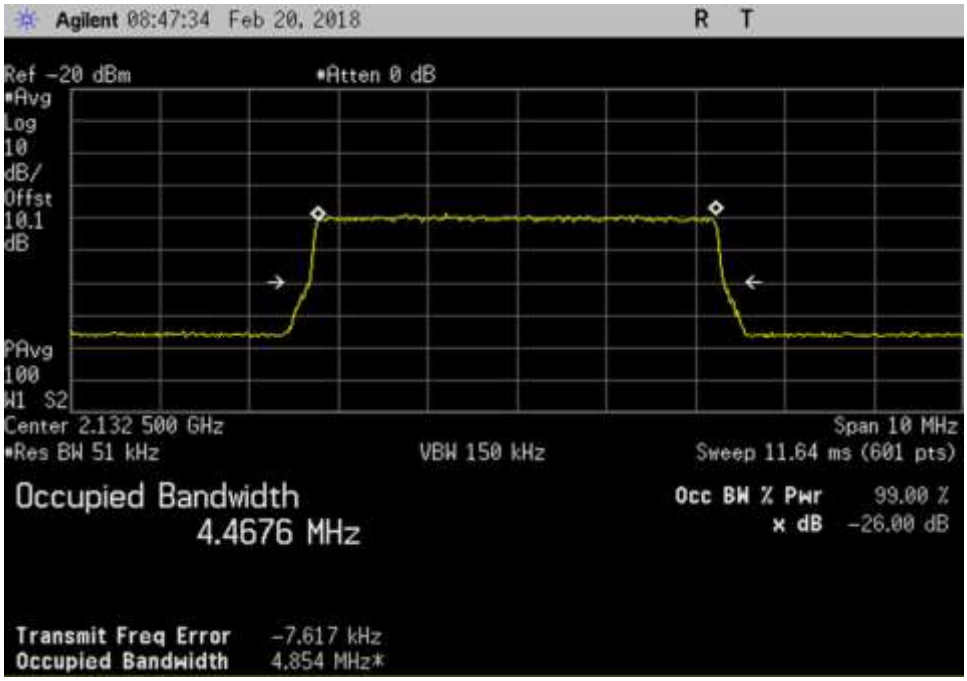
DL_746-757_LTE_ 751.5MHz



DL_869-894_LTE_ 881.5MHz

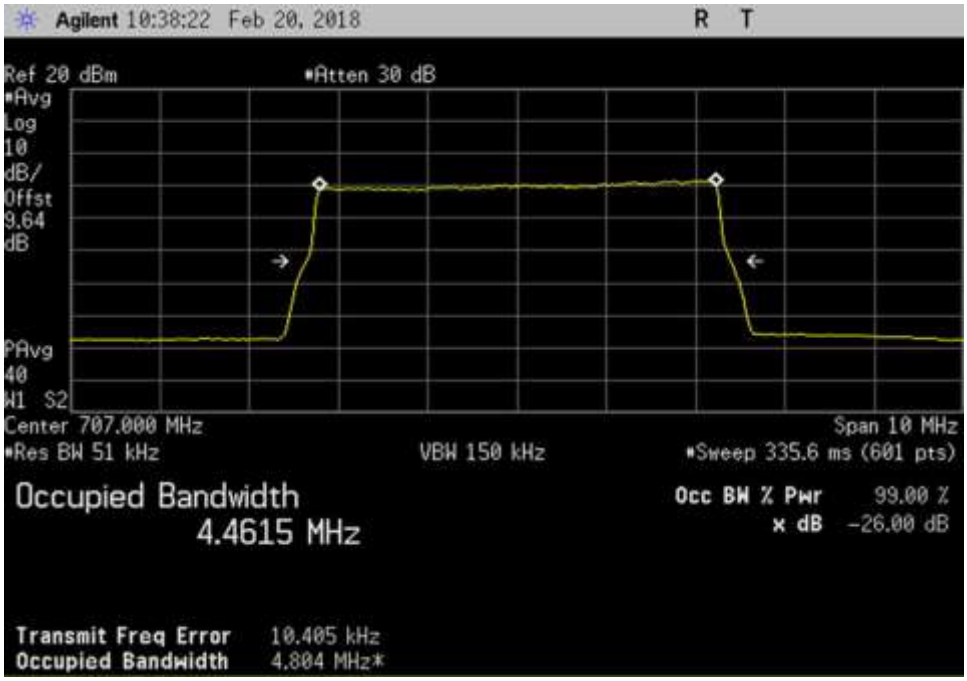


DL_1930-1995_LTE_ 1962.5MHz

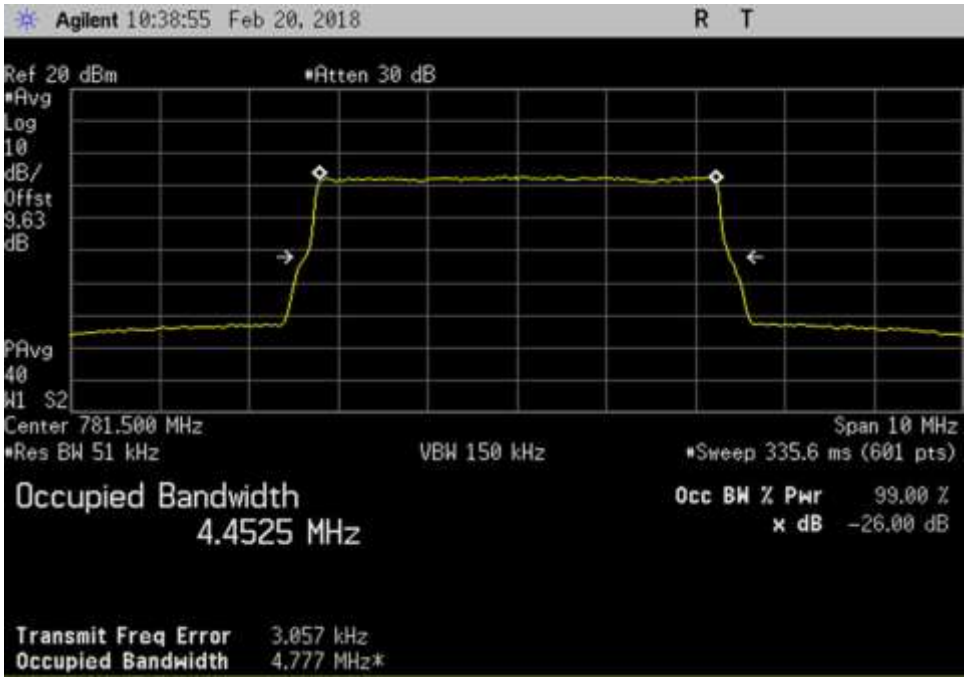


DL_2110-2155_LTE_ 2132.5MHz

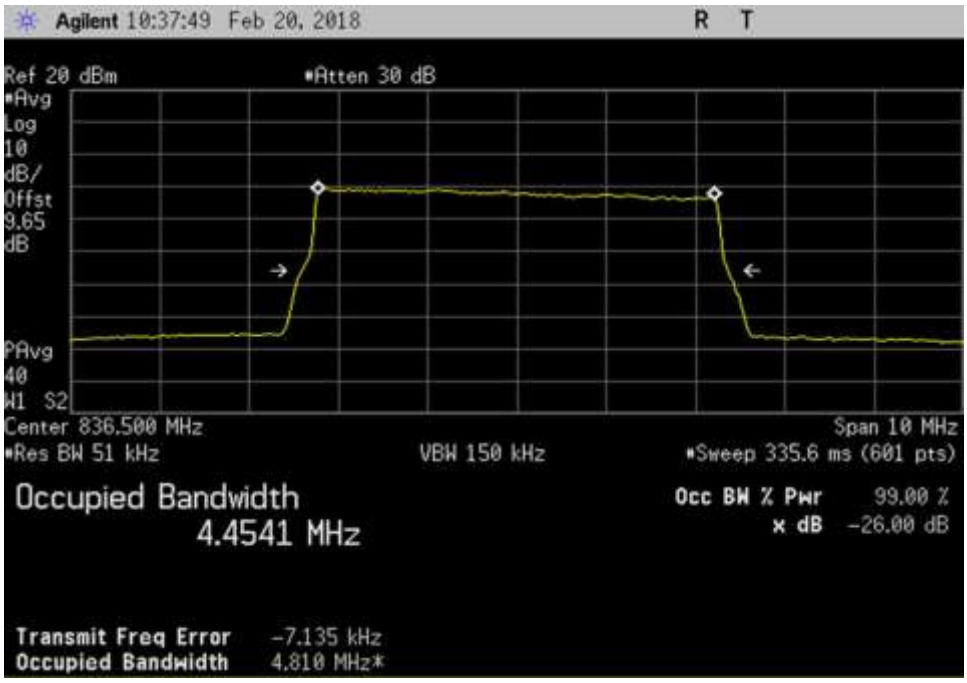
LTE Output



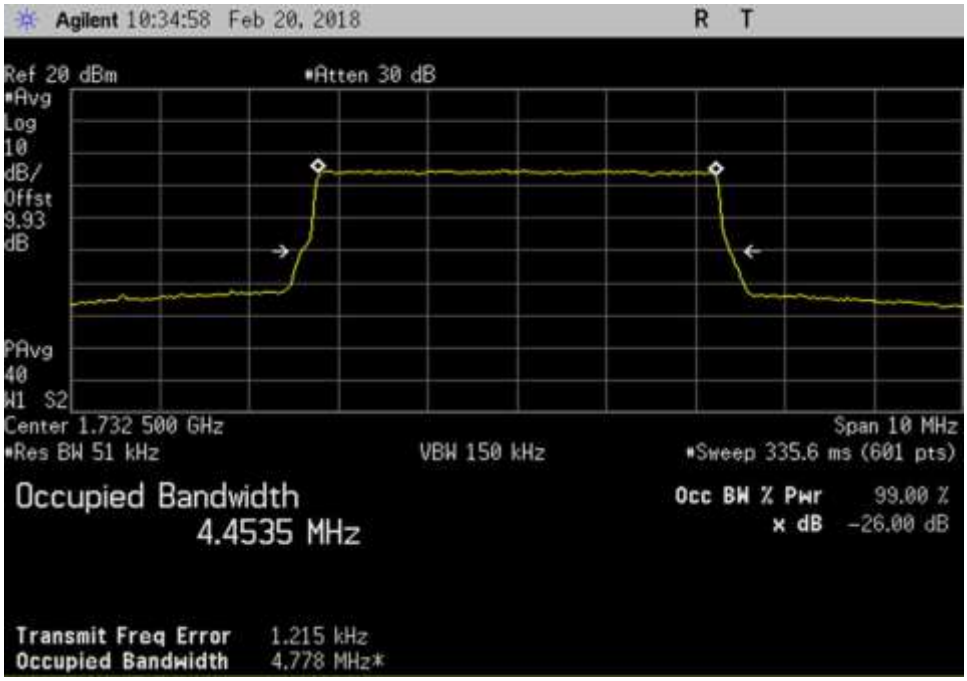
UL_698-716_LTE_ 707MHz



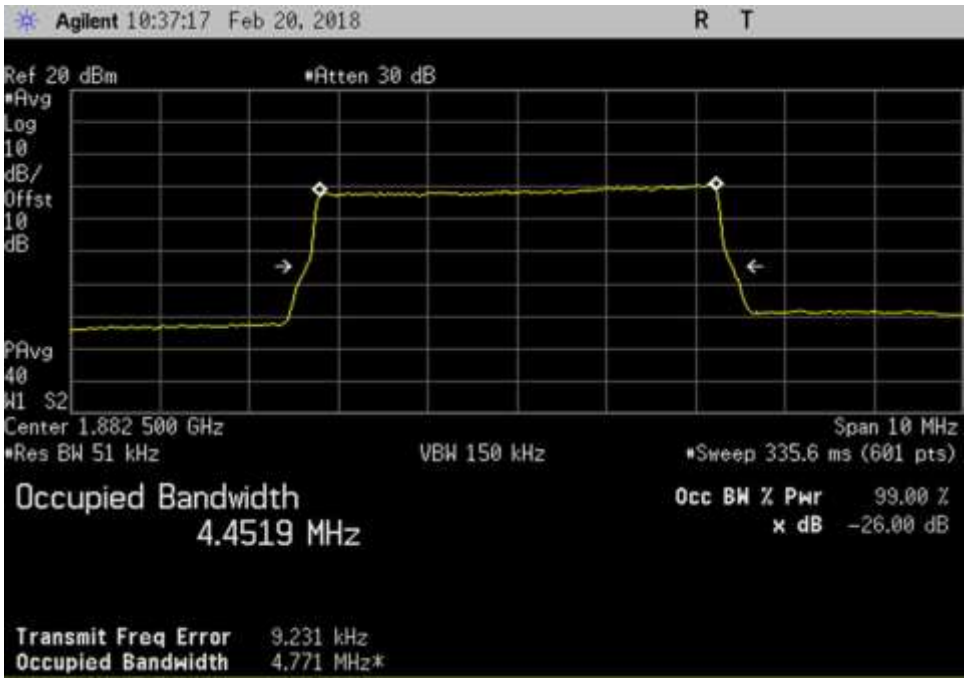
UL_776-787_LTE_ 781.5MHz



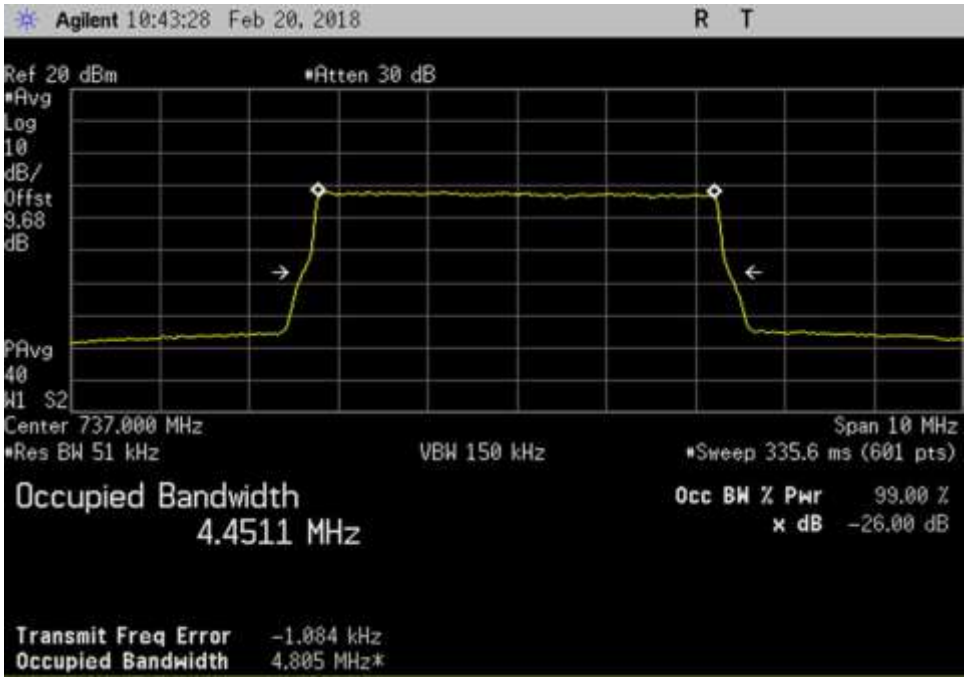
UL_824-849_LTE_ 836.5MHz



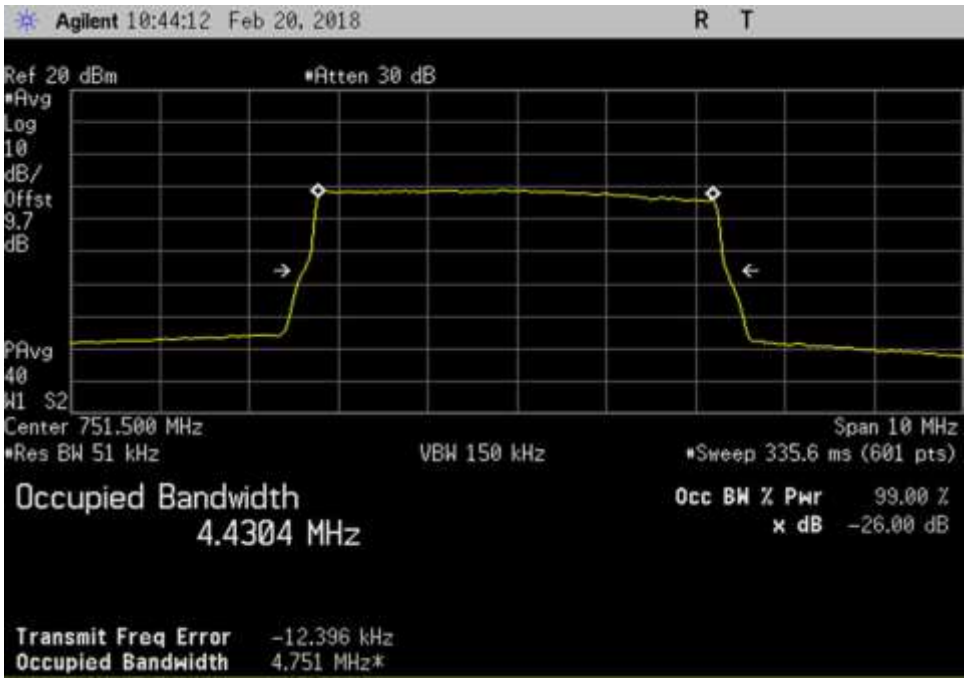
UL_1710-1755_LTE_ 1732.5MHz



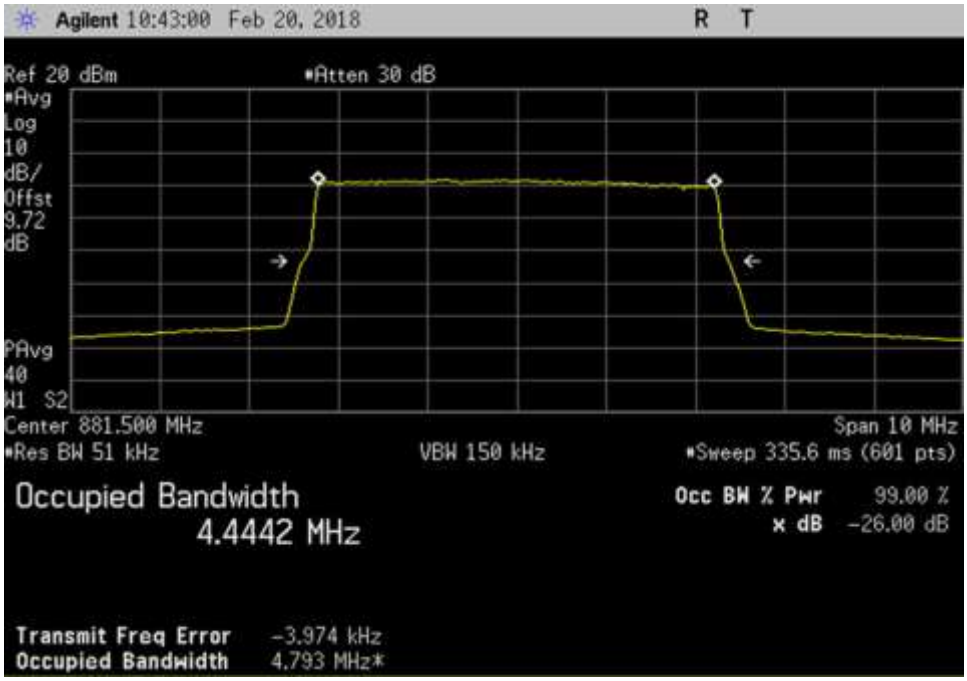
UL_1850-1915_LTE_ 1882.5MHz



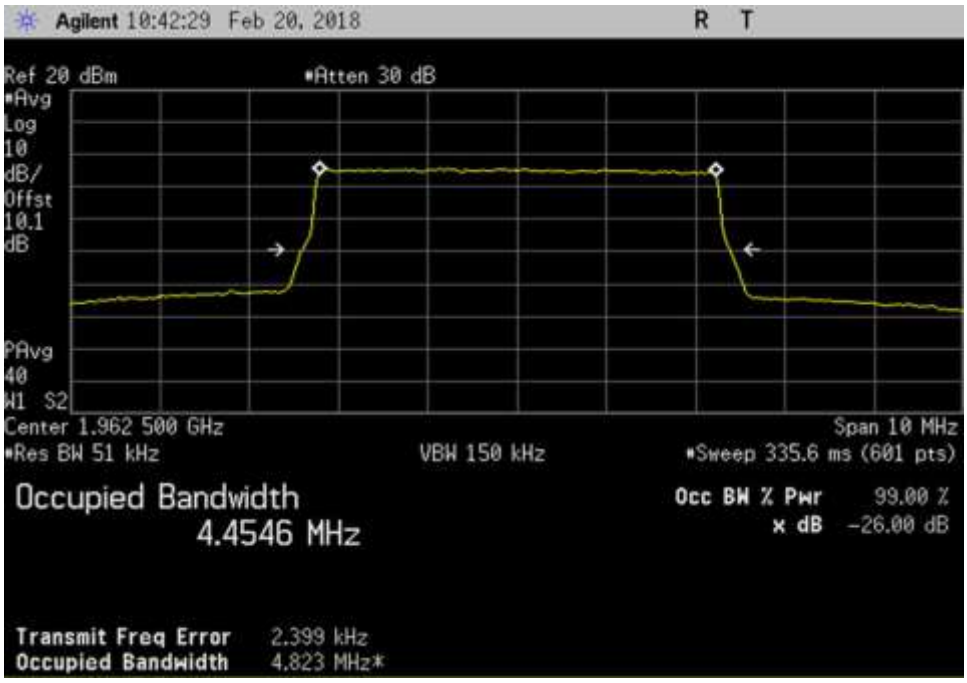
DL_728-746_LTE_ 737MHz



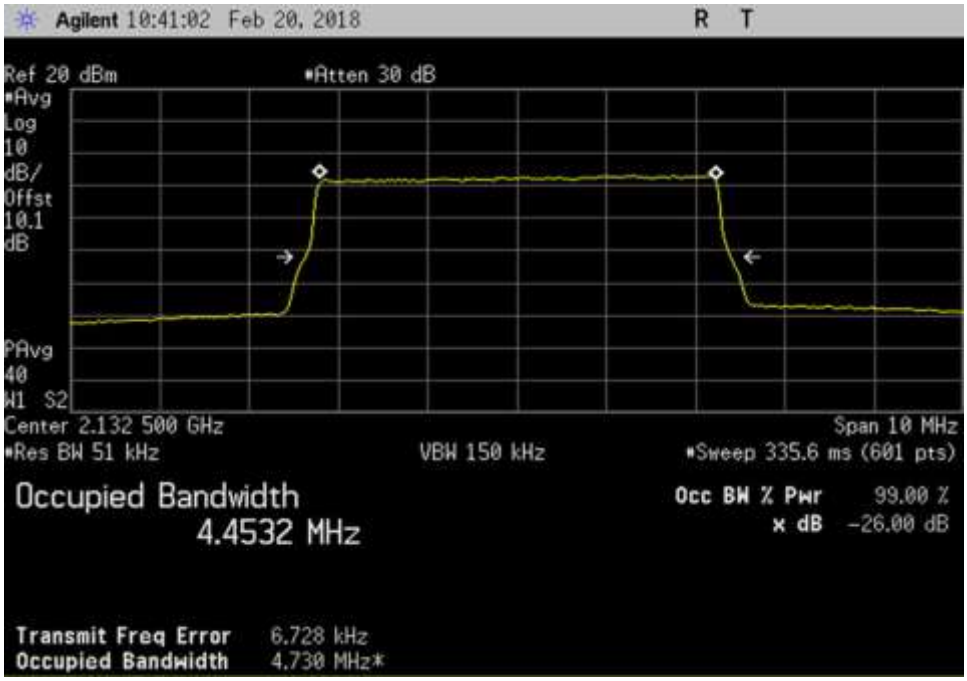
DL_746-757_LTE_ 751.5MHz



DL_869-894_LTE_ 881.5MHz



DL_1930-1995_LTE_ 1962.5MHz



DL_2110-2155_LTE_ 2132.5MHz

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 #:	**100827**
Test Type:	**Conducted Emissions** Date 02/20/18
Tested By:	**Hieu Song Nguyenpham**
Software:	EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test environment conditions:
Temperature: 20.1°C
Relative Humidity: 47%
Pressure: 102.5kPa

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:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
03470	Spectrum Analyzer	Agilent	E4440A	1/3/2018	1/3/2020
P06909	Attenuator	Pasternack	PE7083	12/20/2017	12/20/2019
P06904	Cable	Astrolab	32022-29094K-29094K-36TC	1/4/2018	1/4/2020
C00082	Directional Coupler	MECA Electronics, Inc.	722-10-1.500V	9/18/2017	9/18/2019
03412	Band Pass Filter	Pasternack	PE8705	8/16/2017	8/16/2019
03413	Band Pass Filter	Pasternack	PE8706	8/16/2017	8/16/2019
03414	Band Pass Filter	Pasternack	PE8707	8/16/2017	8/16/2019
03415	Band Pass Filter	Pasternack	PE8708	8/16/2017	8/16/2019
03447	Band Pass Filter	Pasternack	PE8710	8/16/2017	8/16/2019
03448	Band Pass Filter	Pasternack	PE8711	8/16/2017	8/16/2019
03446	Band Pass Filter	K & L	4FV50-707/H18-O/O	8/16/2017	8/16/2019
03467	High Pass Filter	K & L	4FV50-731/H30-O/O	8/16/2017	8/16/2019
03468	High Pass Filter	K & L	4CS10-781.5/E12.2-O/O	8/16/2017	8/16/2019
03469	High Pass Filter	K & L	4CS10-751.5/E12-O/O	8/16/2017	8/16/2019
02475	Attenuator	HP	8494B	6/8/2017	6/8/2019
03429	Attenuator	HP	8496B	11/8/2017	11/8/2019

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	
Frequency	Measured	Limit	Peak Level	Measured	Limit	Measured	Limit
MHz	Sec	Sec	dBm	Sec	At least sec		
UL1710-1755	0.117	0.3	27.3	66	60	2	5
UL1850-1915	0.108	0.3	26.2	69	60	2	5
UL824-894	0.100	0.3	28.0	68	60	2	5
UL 698-716	0.125	0.3	31.5	66	60	2	5
UL776-787	0.192	0.3	31.6	64	60	2	5
DL2110-2155	0.267	1.0	22.7	68	60	2	5
DL1930-1995	0.225	1.0	28.4	68	60	2	5
DL869-894	0.242	1.0	20.8	69	60	2	5
DL:728-746	0.417	1.0	25.6	66	60	2	5
DL 746-757	0.225	1.0	25.6	65	60	2	5

The booster continues to mitigate at least 1 minute before restarting. The plots demonstrate after 1 restart (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	10.5	(17.2) *	10.6	9.1	9.3	12.0
+4dB	(14.0) *	(21.6) *	(12.4) *	11.1	11.7	12.0
+3dB	(17.3) *	(25.3) *	(14.5) *	(12.2)*	(13.8)*	12.0
+2dB	(21.1) *	(41.0) *	(18.2) *	(14.8)*	(18.3)*	12.0
+1dB	(29.6) *	**	(28.5) *	**	(23.9)*	12.0
0dB	**	**	**	**	**	12.0
-1dB	**	**	**	**	**	12.0
-2dB	**	**	**	**	**	12.0
-3dB	**	**	**	**	**	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	(17.1) *	(17.3) *	(15.2) *	11.8	8.6	12.0
+4dB	(20.6) *	(21.3) *	(17.5) *	(14.7)*	9.9	12.0
+3dB	(29.7) *	(27.8) *	(23.4) *	(20.2)*	11.9	12.0
+2dB	(65.9) *	**	(32.5) *	(36.5)*	(14.7)*	12.0
+1dB	**	**	**	**	(56.8)*	12.0
0dB	**	**	**	**	**	12.0
-1dB	**	**	**	**	**	12.0
-2dB	**	**	**	**	**	12.0
-3dB	**	**	**	**	**	12.0
-4dB	**	**	**	**	**	12.0
-5dB	**	**	**	**	**	12.0

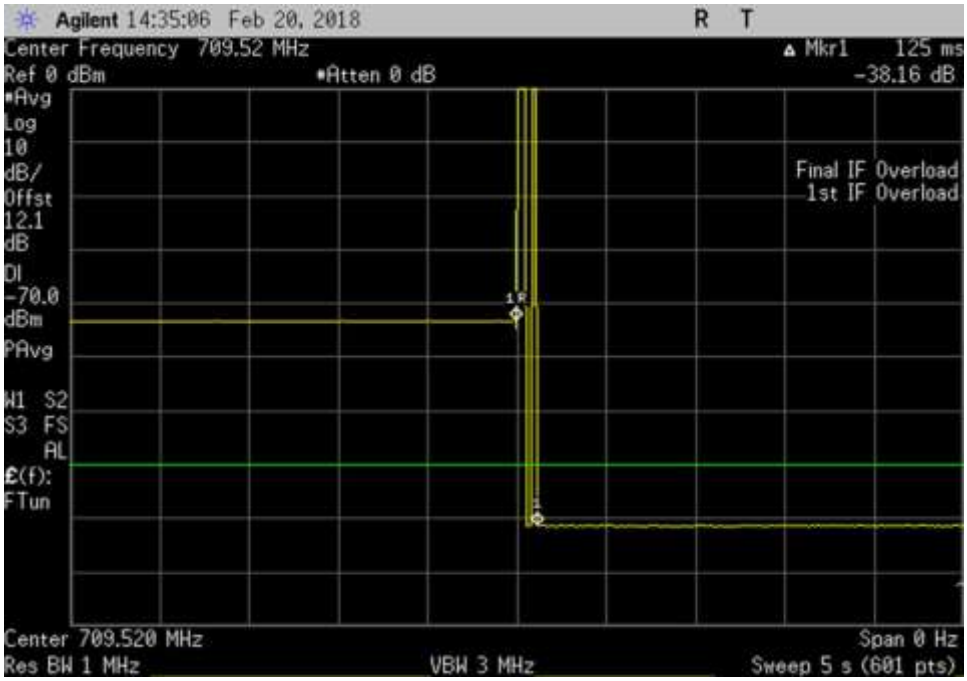
Note:

* 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 187 seconds for the Uplink bands and 191 seconds for the Downlink bands.

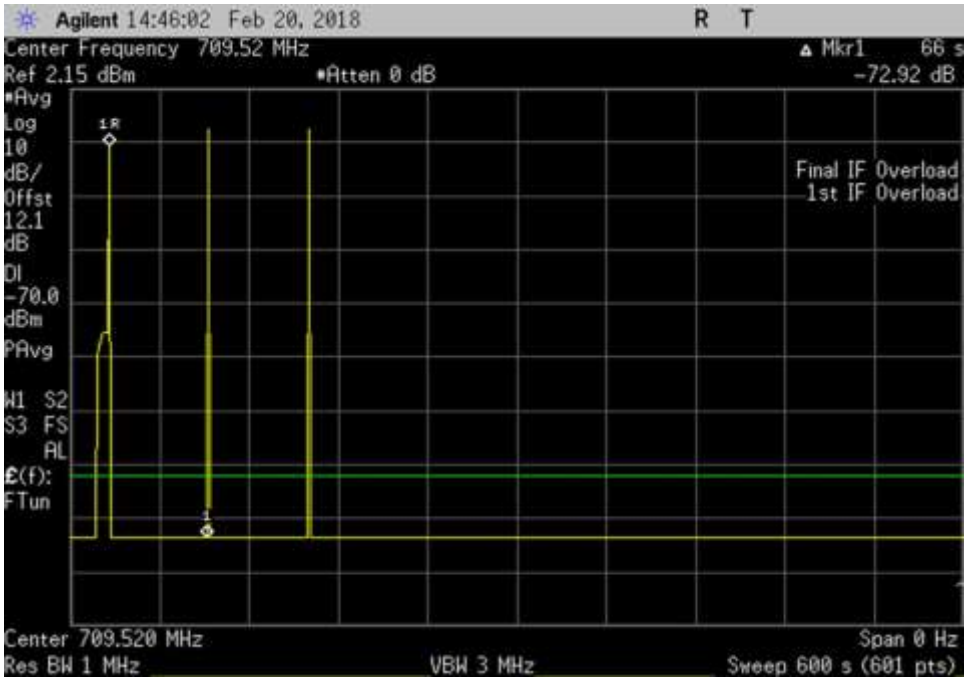
** The device shuts down immediately.

7.11.2 Oscillation Restart Tests

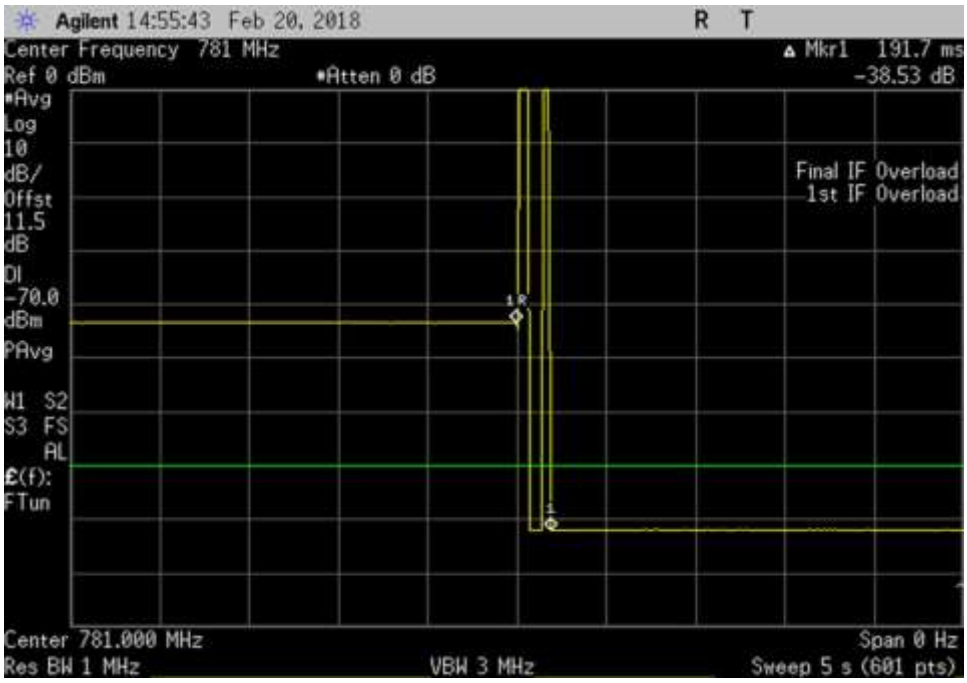
Plots



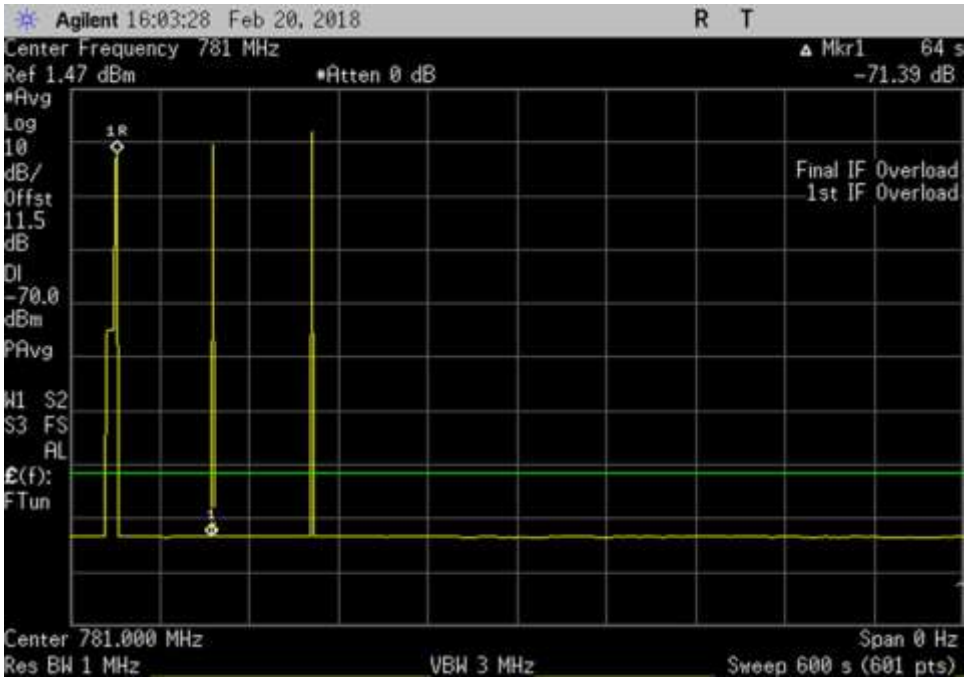
UL_698-716_ 709.52MHz_Time



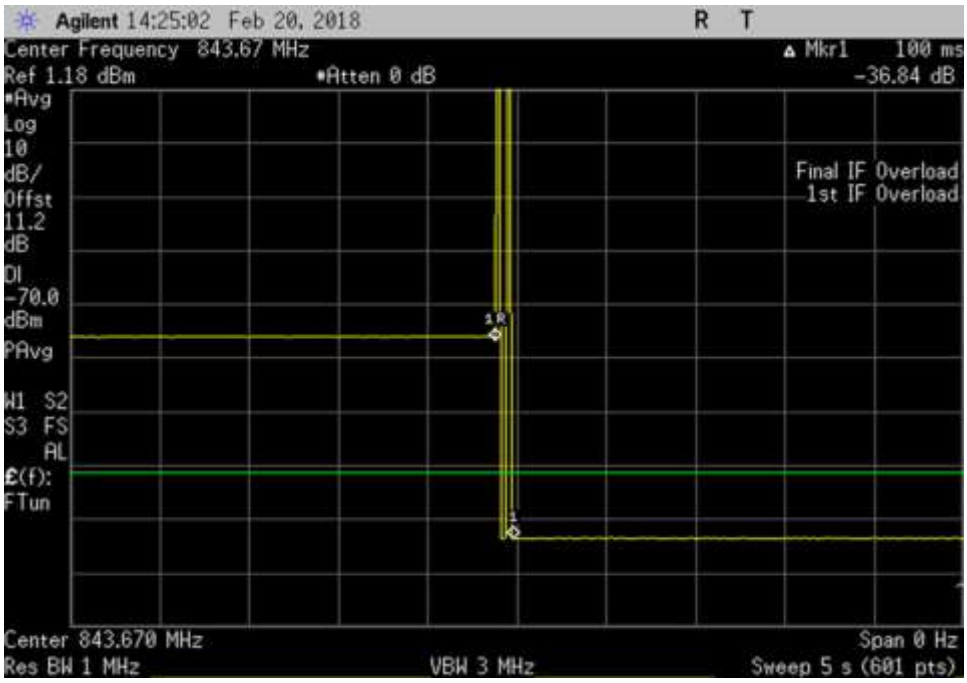
UL_698-716_600sec_ 709.52MHz



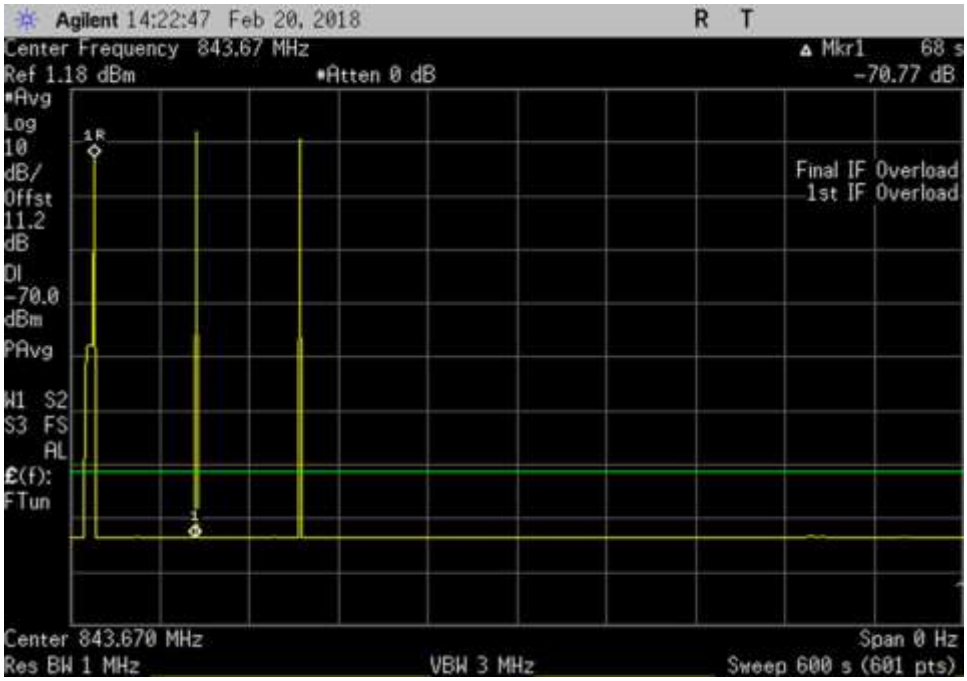
UL_776-787_ 781MHz_Time



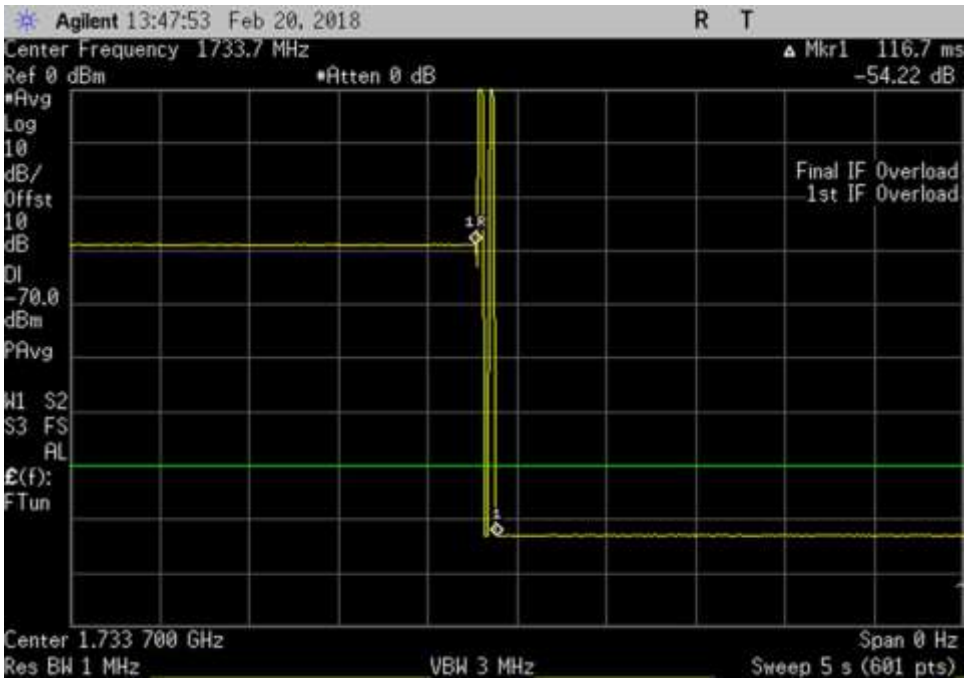
UL_776-787_600sec_ 781MHz



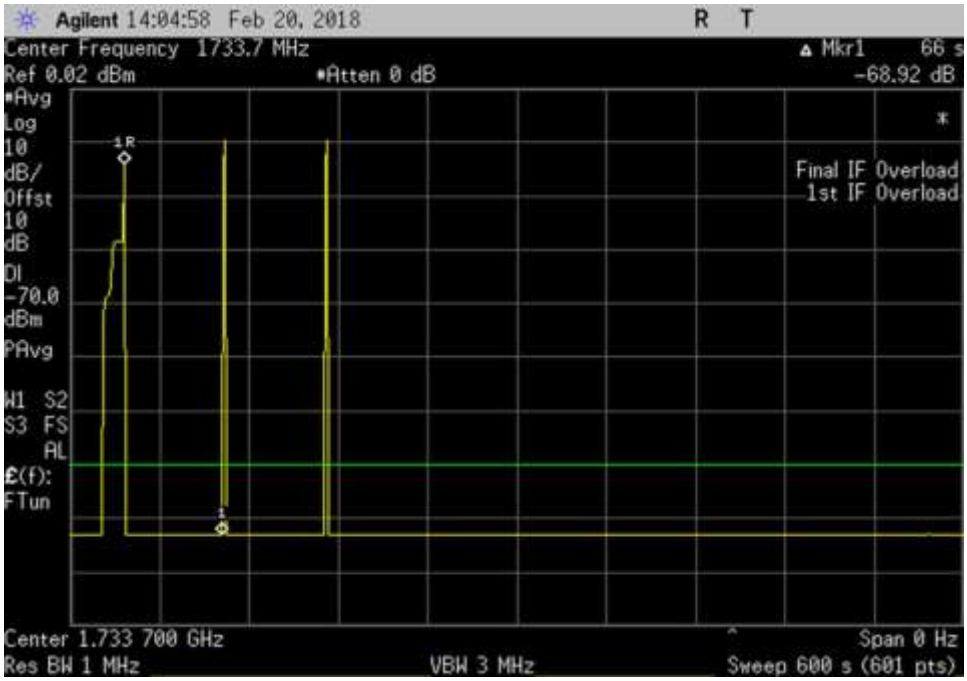
UL_824-849_ 843.67MHz_Time



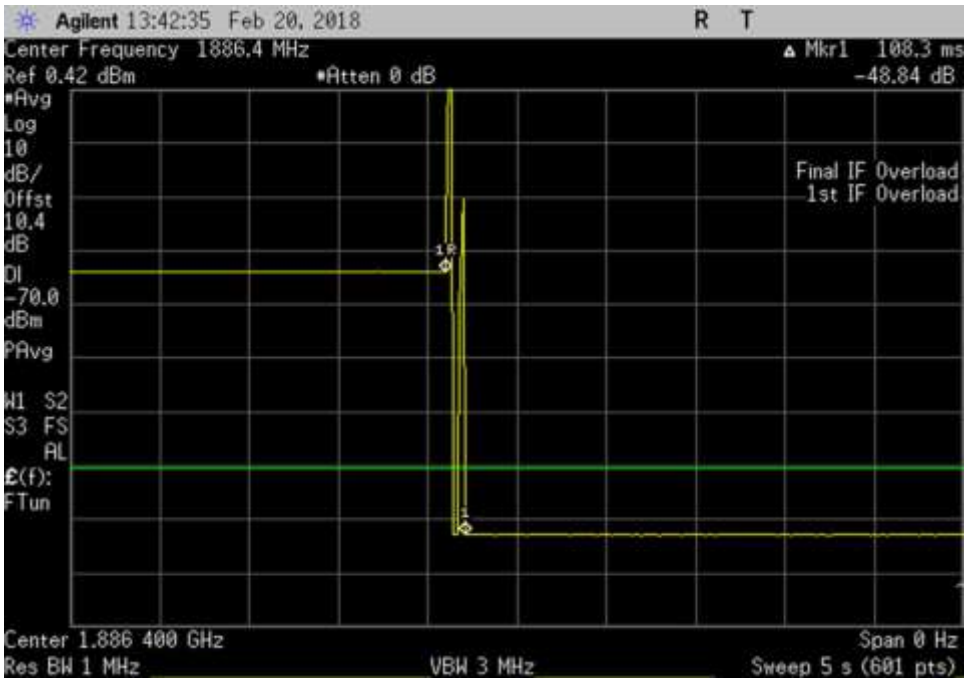
UL_824-849_600sec_ 843.67MHz



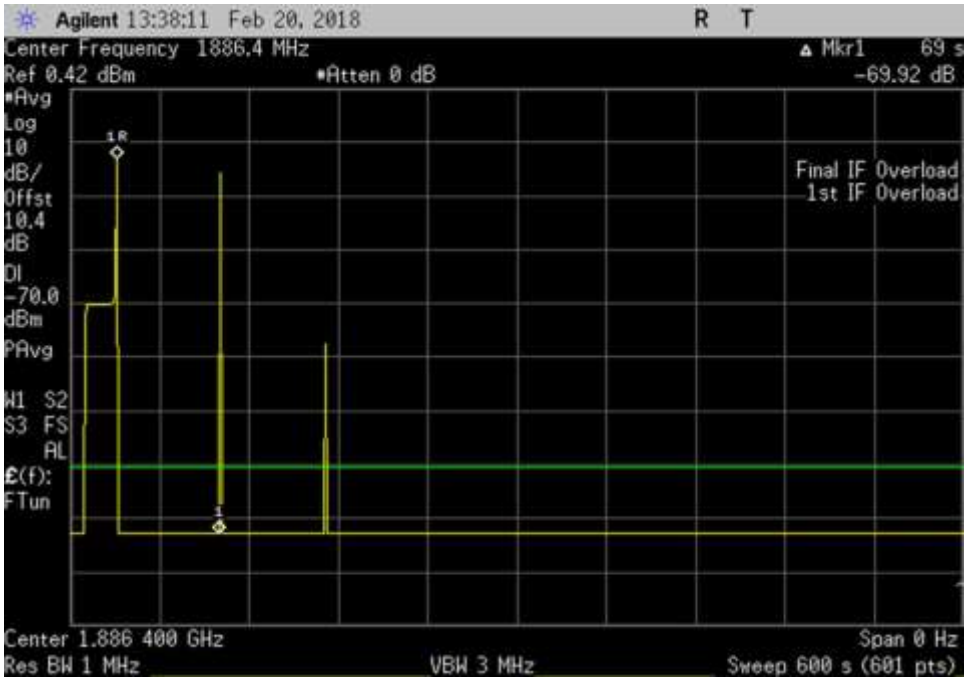
UL_1710-1755_ 1733.7MHz_Time



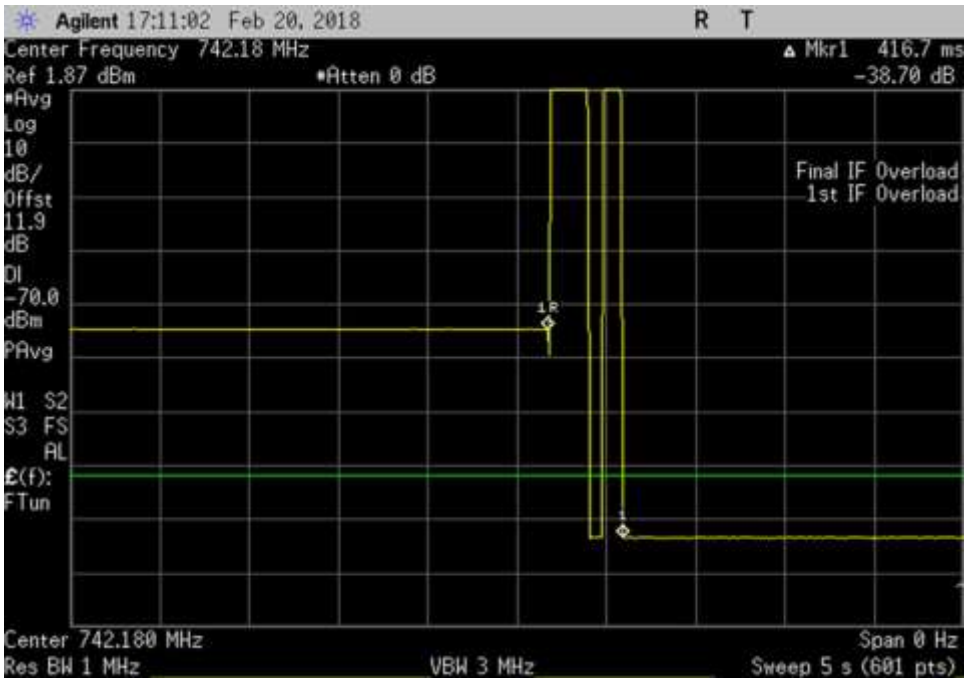
UL_1710-1755_600sec_ 1733.7MHz



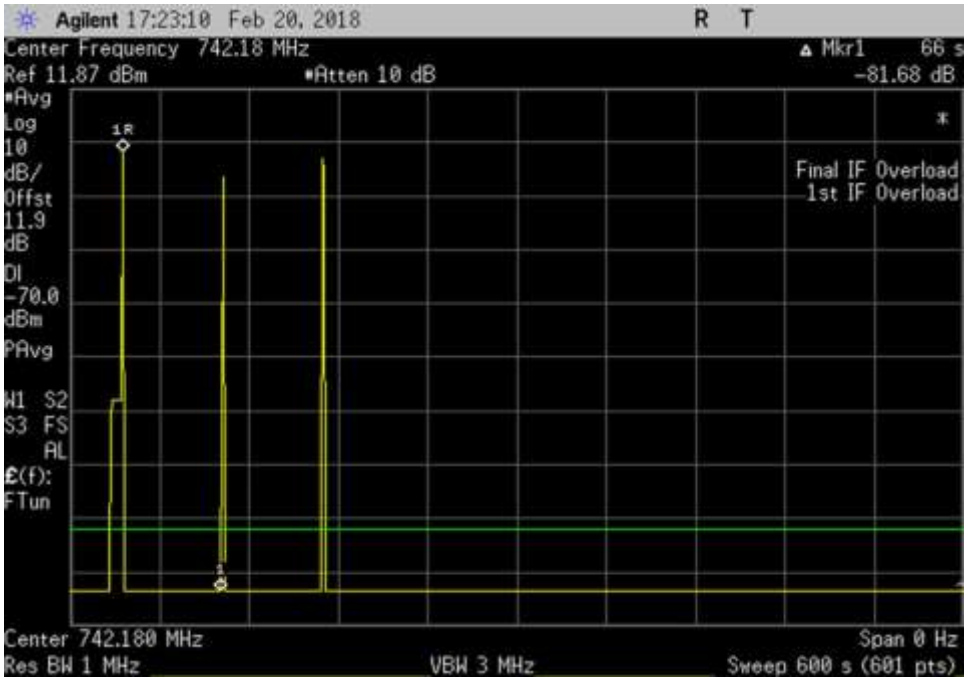
UL_1850-1915_ 1886.4MHz_Time



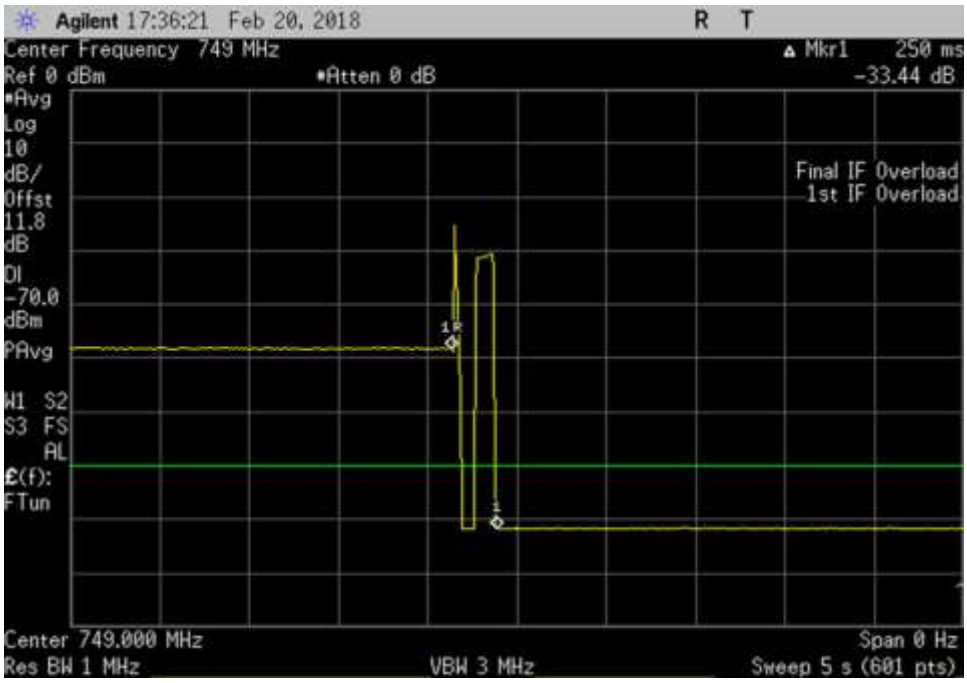
UL_1850-1915_600sec_ 1886.4MHz



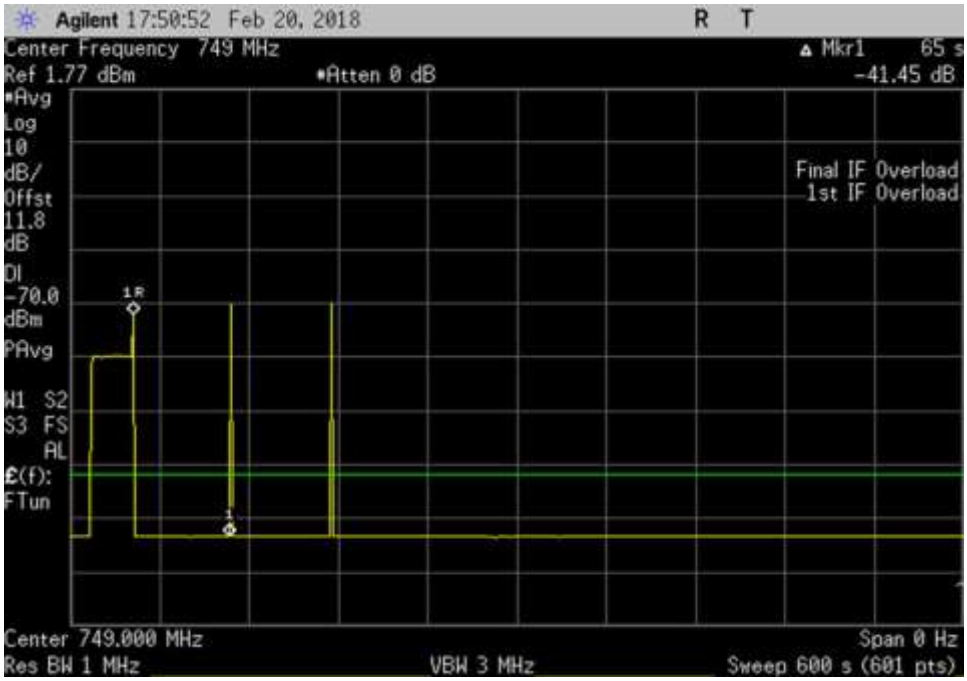
DL_728-746_ 742.18MHz_Time



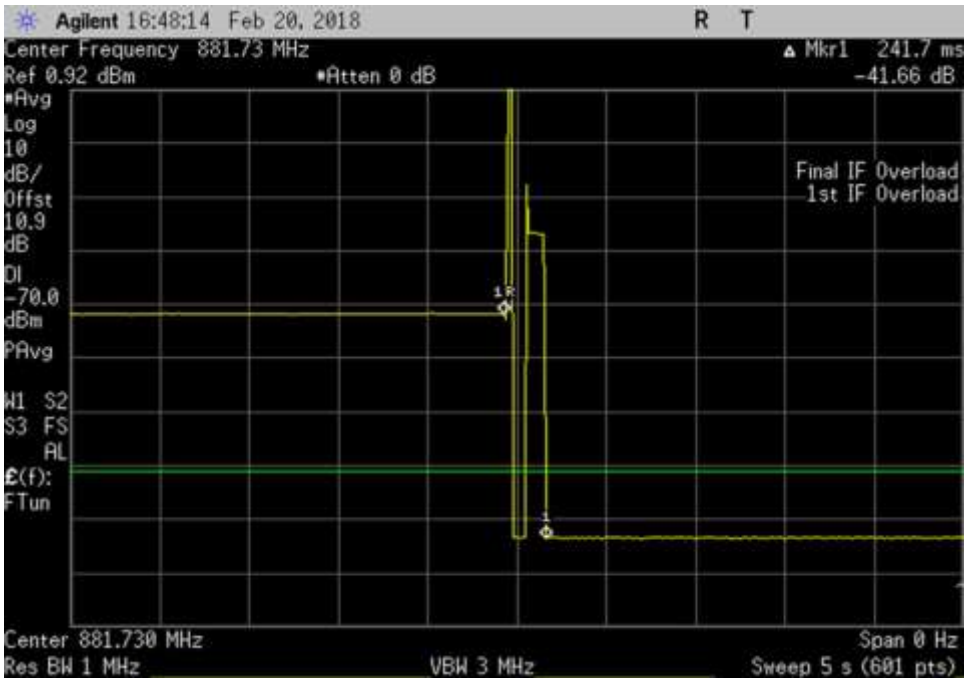
DL_728-746_600sec_ 742.18MHz



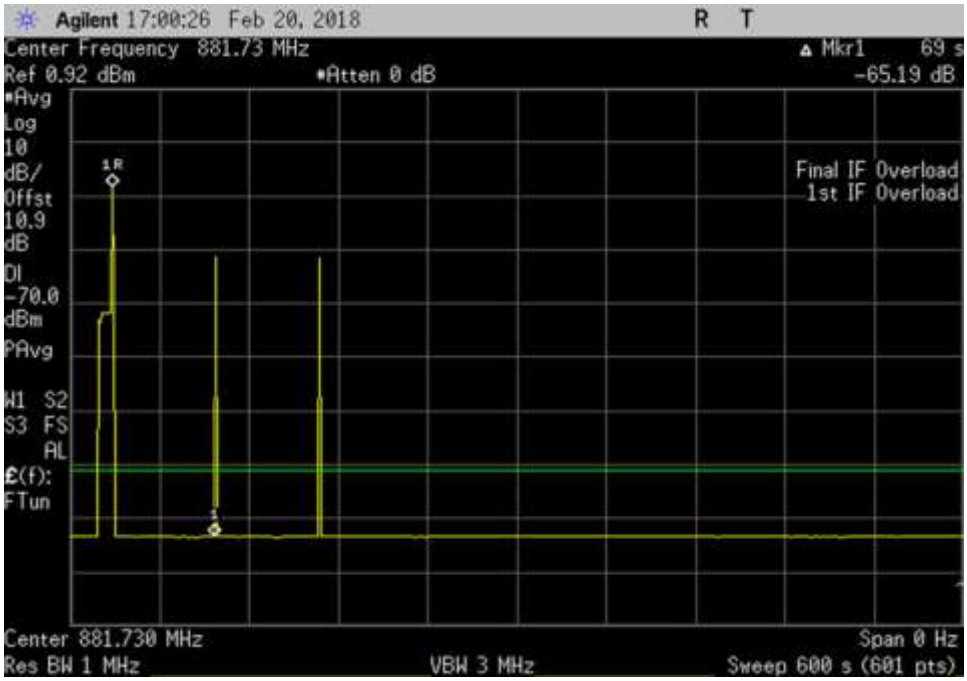
DL_746-757_ 749MHz_Time



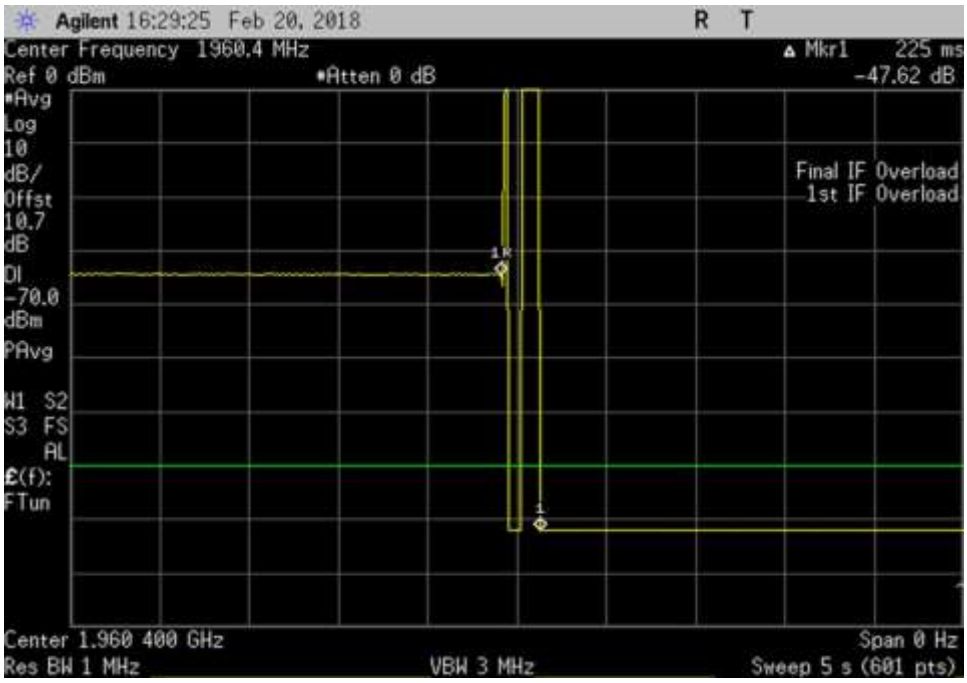
DL_746-757_600sec_ 749MHz



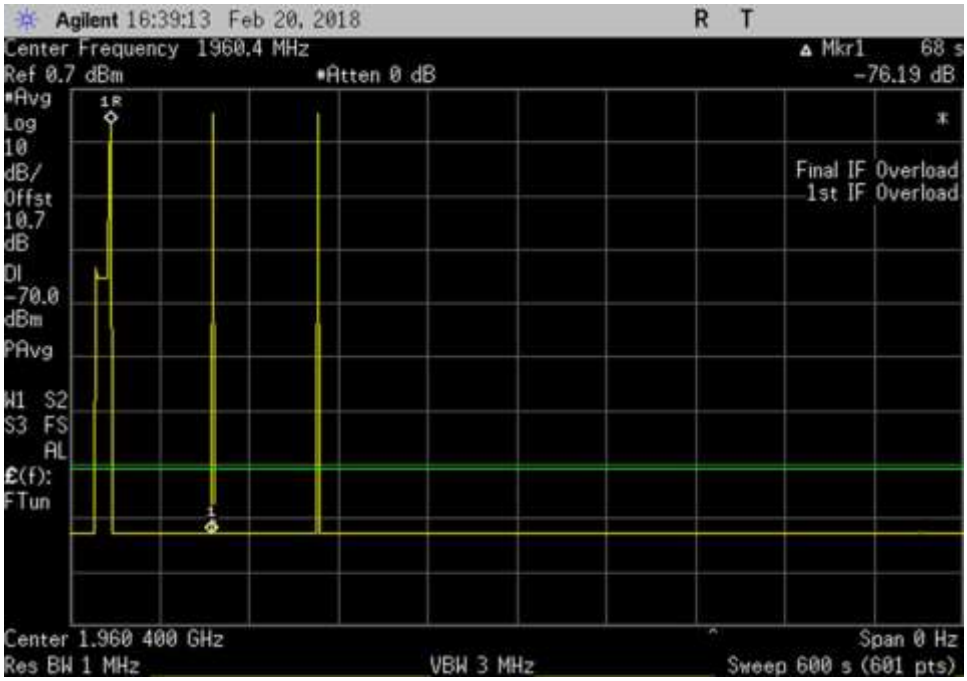
DL_869-894_ 881.73MHz_TIme



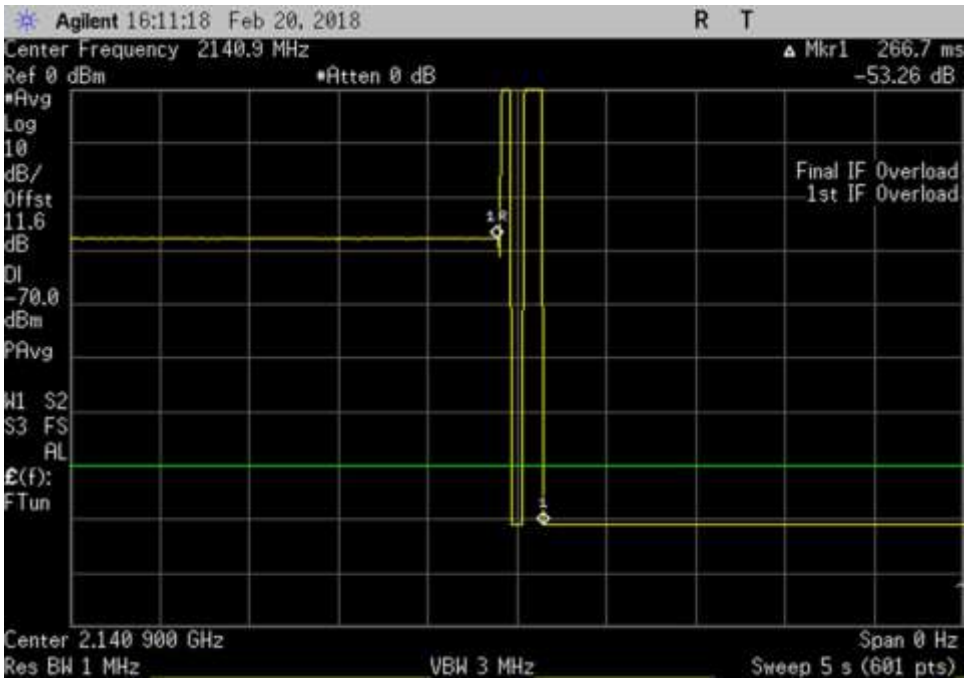
DL_869-894_600sec_ 881.73MHz



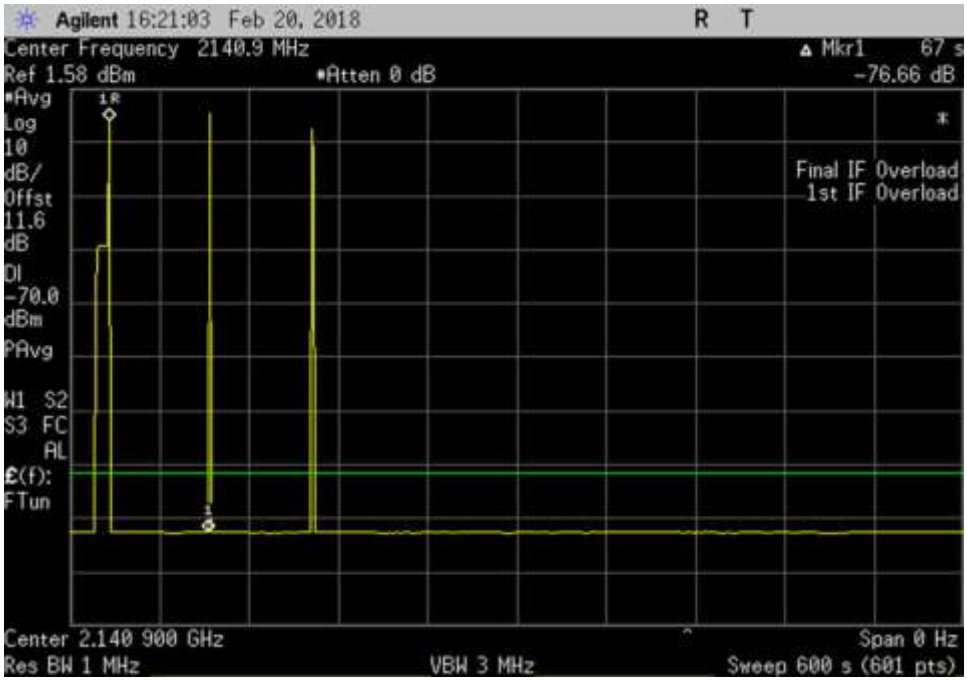
DL_1930-1995_ 1960.4MHz_Time



DL_1930-1995_600sec_ 1960.4MHz



DL_2110-2155_ 2140.9MHz_Time



DL_2110-2155_600sec_ 2140.9MHz

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 #:	**100827**	Date:	02/26/18
Test Type:	**Radiated Emissions**		
Tested By:	**Hieu Song Nguyenpham**		
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test environment conditions:
Temperature: 19.8°C
Relative Humidity: 46%
Pressure: 101.9kPa

Test procedure:
The test was performed in accordance with section 7.12 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04r01 Dated October 27, 2017.

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	Manufacturer	Model	Calibration Date	Cal Due Date
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
P06909	Attenuator	Pasternack	PE7083	12/20/2017	12/20/2019

Test Equipment:

Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
01996	Biconilog Antenna	Chase	CBL6111C	11/1/2016	11/1/2018
P06049	Attenuator	Pasternack	PE7002-6	5/9/2016	5/9/2018
P00880	Cable	Pasternack	RG214U	5/10/2016	5/10/2018
P01187	Cable	Andrews	CNT-195	8/8/2016	8/8/2018
00971A	Preamp	HP	8447D	1/8/2018	1/8/2020
02870	Spectrum Analyzer	Agilent	E4440A	3/31/2016	3/31/2018
02113	Horn Antenna	EMC Test Systems	3115	2/6/2017	2/6/2019
03607	Preamp	Miteq	AMF-7D-00101800-30-10P	6/6/2017	6/6/2019
P01210	Cable	Andrews	FSJ1P-50A-4A	1/16/2017	1/16/2019
03362	Cable	Astrolab	32022-2-29094-48TC	1/10/2017	1/10/2019
03302	Cable	Astrolab	32026-29094K-29094K-72TC	1/15/2018	1/15/2020
P06138	Cable	Astrolab	32022-29094K-29094K-72TC	3/27/2017	3/27/2019
P00928	Cable	various	various	1/15/2018	1/15/2020
P06126	Cable	Astrolab	32022-29094K-29094K-168TC	3/27/2017	3/27/2019
02693	Active Horn Antenna	Miteq	AMFW-5F-12001800-20-10P	5/11/2017	5/11/2019
02694	Horn Antenna	Miteq	AMFW-5F-18002650-20-10P	5/11/2017	5/11/2019
02695	Active Horn Antenna	Miteq	AMFW-5F-260400-33-8P	5/11/2017	5/11/2019
P00929	Cable	various	various	1/15/2018	1/15/2020
00432	Loop Antenna	EMCO	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)

$$E = \sqrt{P_D \times 377}$$

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

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

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

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

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

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 $P_{t \text{ at 3 meter}}$)

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

= 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

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

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, 7.10 Test Setup

Section 7.7 Max Noise and 7.8 Test Setup

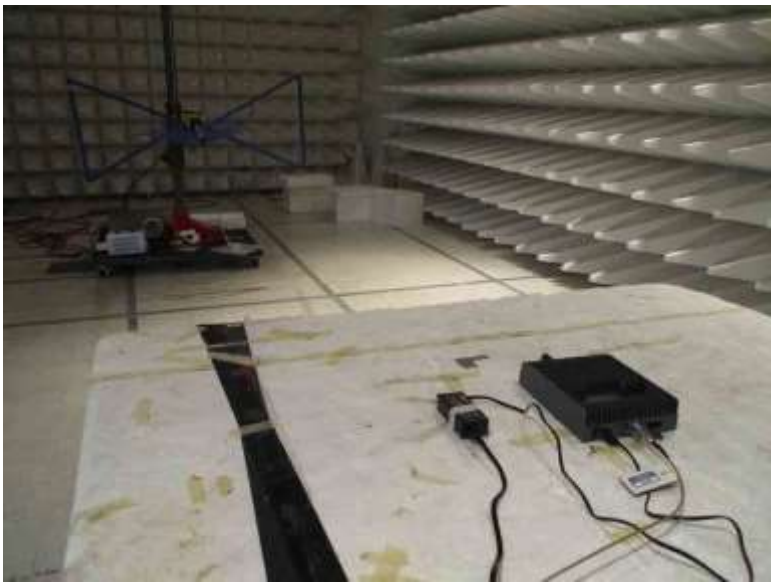
Section 7.7 Variable Noise for UL Test Setup

Section 7.9 Test Setup

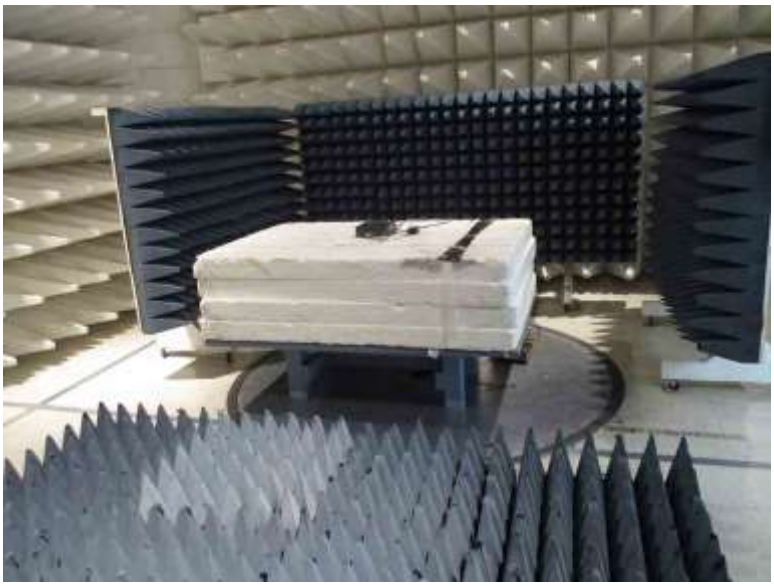
Section 7.11.2 Test Setup

Section 7.11.3 Test Setup

Section 7.12 Below 1GHz Test Setup



Section 7.12 Below 1GHz Test Setup



Section 7.12 Above 1GHz Cone placement Test Setup

Section 7.12 Above 1GHz Cone placement Test Setup