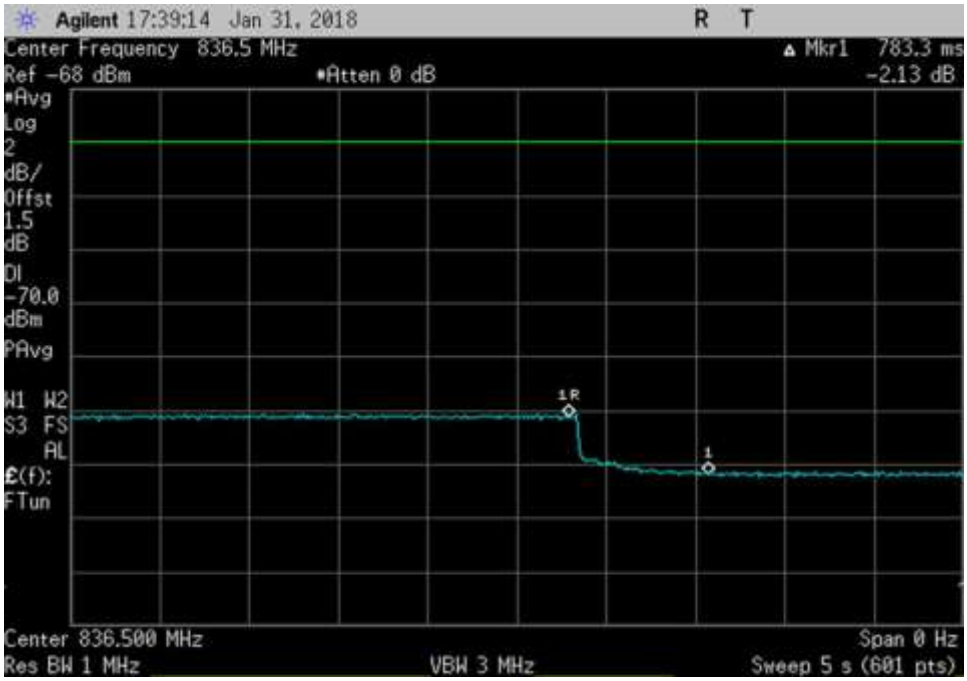
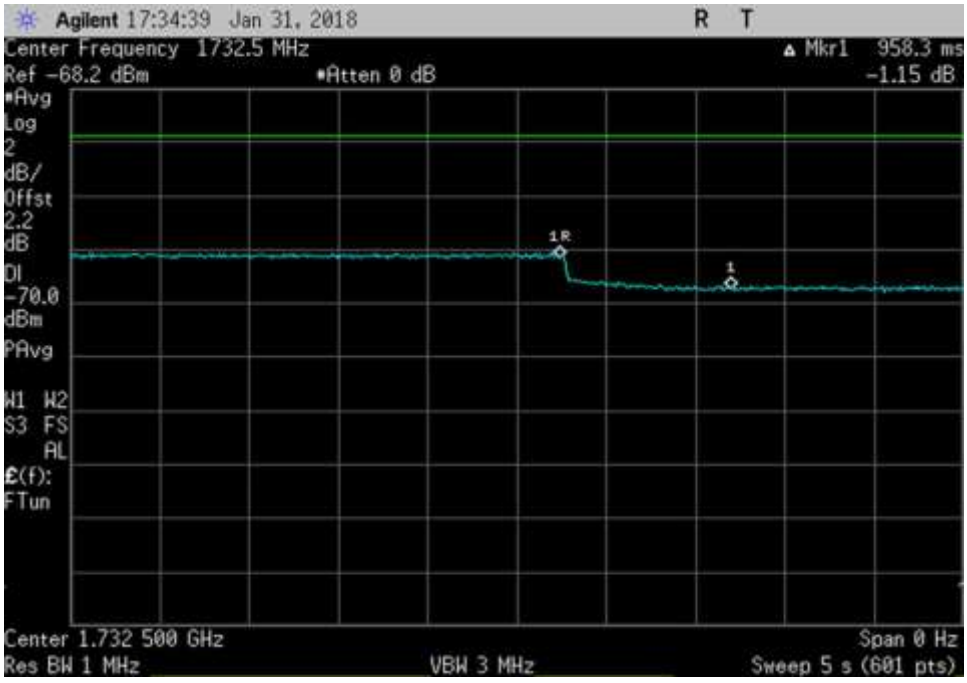
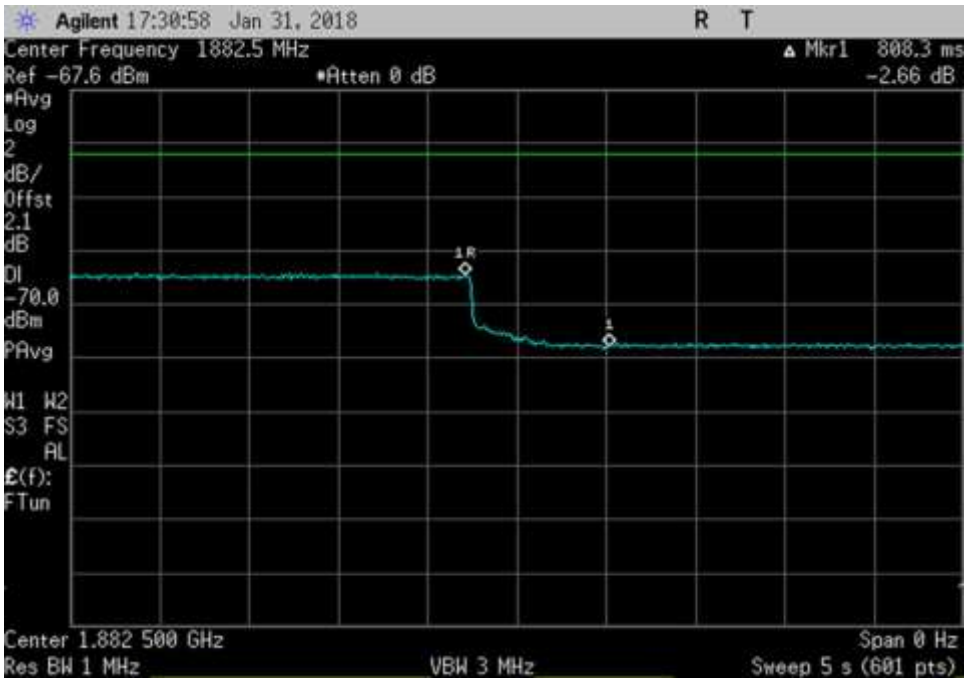


UL_824-849_ 836.5MHz timing



UL_1710-1755_ 1732.5MHz timing



UL_1850-1915_ 1882.5MHz timing

7.8 Uplink Inactivity

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • 510 249 1170		
Customer:	**Cellphone-Mate, Inc.**		
Specification:	**7.8 Uplink Inactivity**		
Work Order #:	**100826**	Date:	1/29/2018
Test Type:	**Conducted Emissions**	Time:	6:49:00 PM
Tested By:	E. Wong	Sequence#:	1
Software:	EMITest 5.03.11		12VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Equipment:

Asset #	Description	Model	Calibration Date	Cal Due Date
03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020
P07191	Cable	32022-29094K-29094K-48TC	10/30/2017	10/30/2019

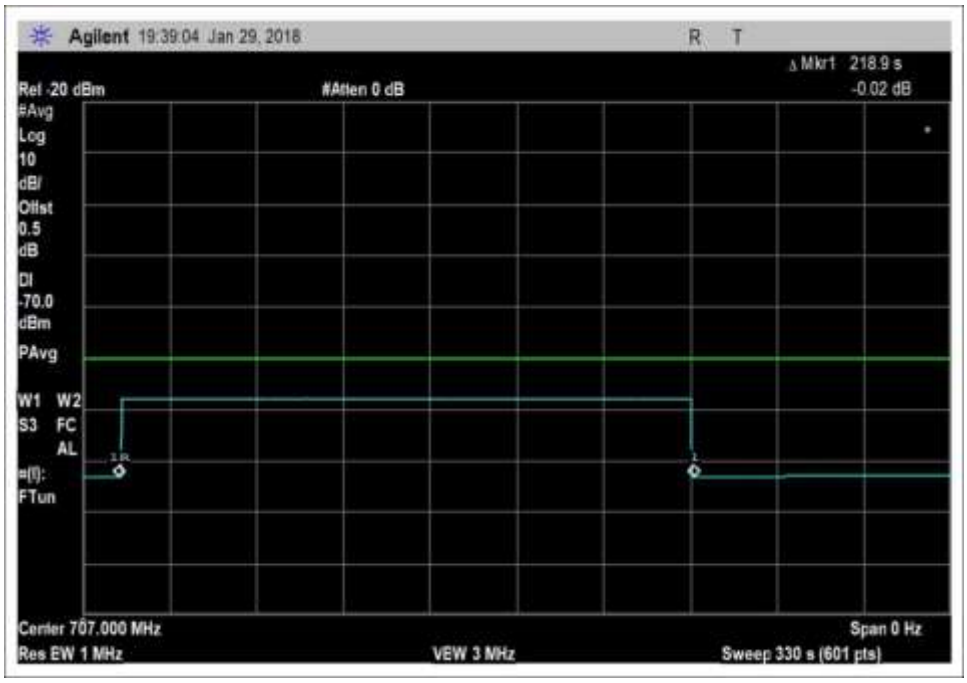
Summary of Results

Pass: As demonstrated, when the booster is not serving an active device connection after 5 minutes the uplink noise power does not exceed -70dBm/MHz

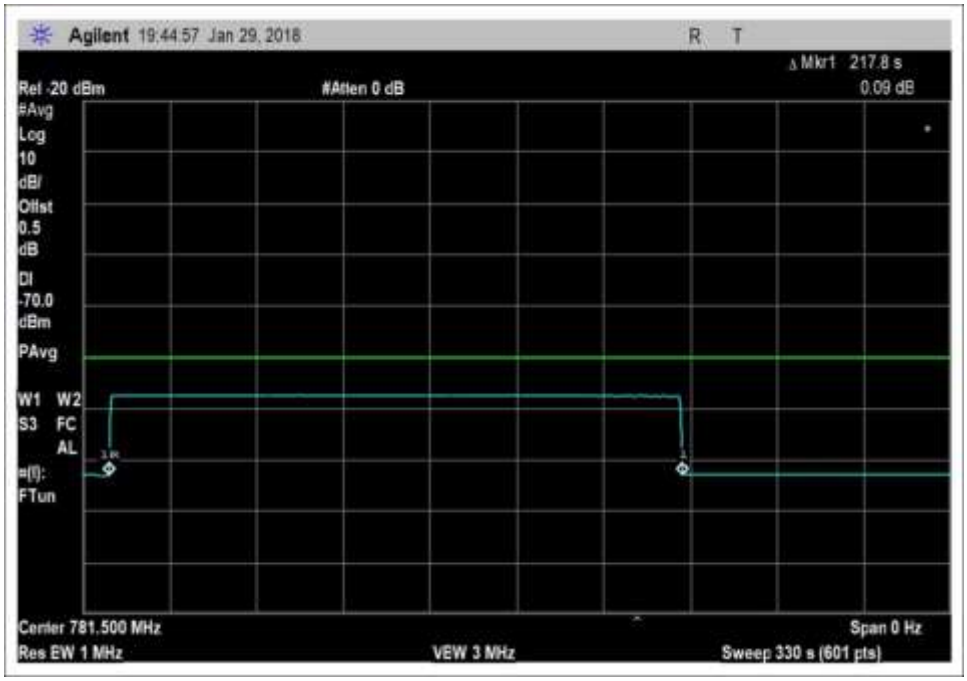
Uplink Inactivity		
Frequency	**Measured**	**Limit**
MHz	**Min**	**Min**
UL1710-1755	3.5	5.0
UL1850-1915	5.2*	5.0
UL824-849	3.6	5.0
UL 698-716	3.6	5.0
UL776-787	3.6	5.0

The measured max noise never exceeds -70dBm/MHz upon powered up.

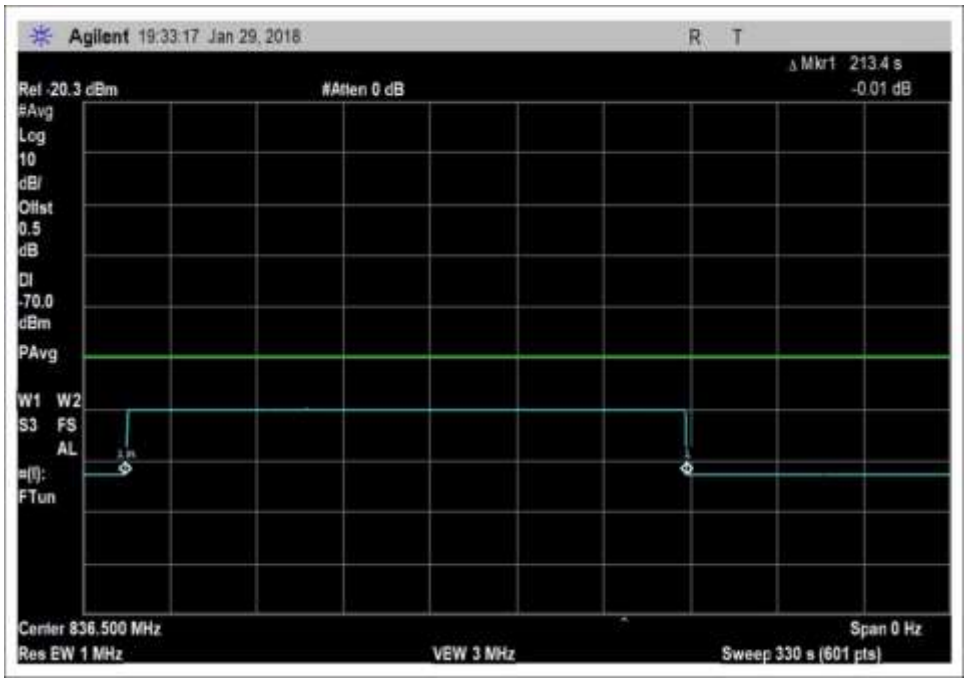
Plots



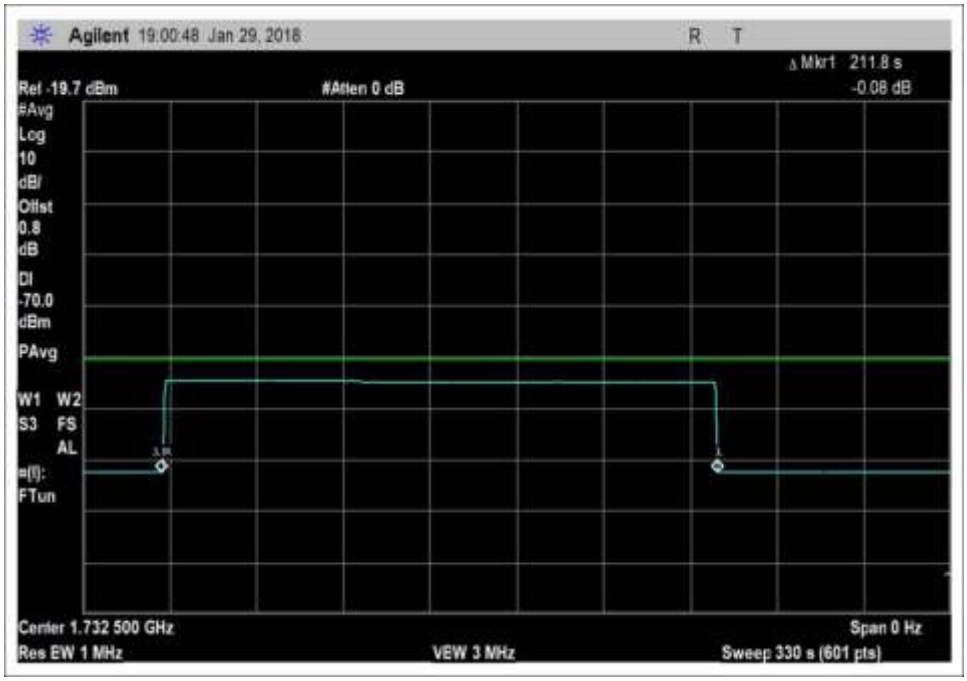
UL 698-716MHz



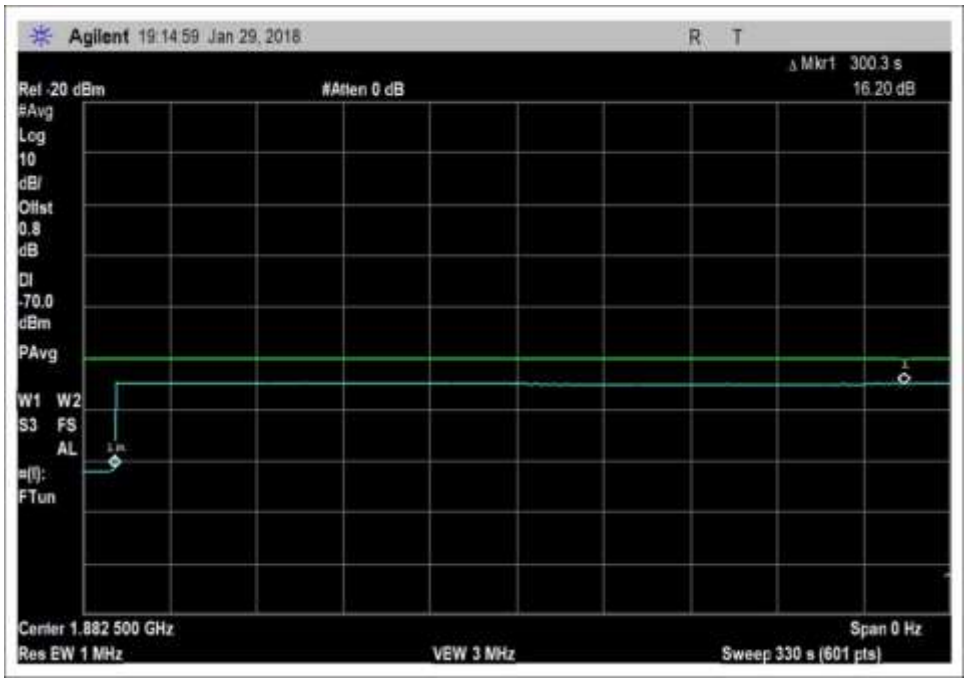
UL_776-787MHz



UL_824-849MHz



UL_1710-1755MHz



UL_1850-1915MHz

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 #:	**100826**	Date:	1/30/2018
Test Type:	**Conducted Emissions**	Time:	2:26:00 PM
Tested By:	E. Wong	Sequence#:	1
Software:	EMITest 5.03.11		12VDC

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: 21°C
Relative Humidity: 41%
Pressure: 100kPa

Manufacturer provided MSCL calculation based on

Antenna Kitting Information

Component	Prod No. Description	Gain/Loss					Notes
		LTE-A	LTE-V	800MHz	1900MHz	1700MHz\2100MHz	
Outdoor Antenna	WPANT10104-S3A（SC325W-WP）	0.5dBi	0.5dBi	2dBi	2dBi	3dBi\3dBi	Integrated antenna
Indoor Antenna	SC128W	-0.1dBi	-0.1dBi	-0.3dBi	3dBi	2.5dBi\3.2dBi	
Indoor Cable	SC174-15FT（15Feet）	3.4dB	3.4dB	3.7dB	6dB	5.5dB \6.2dB	

* All equivalent antennas and cables are suitable for use with the EZ CAR (23dB).
As above information. Remark: Lower gain antenna can also be used.

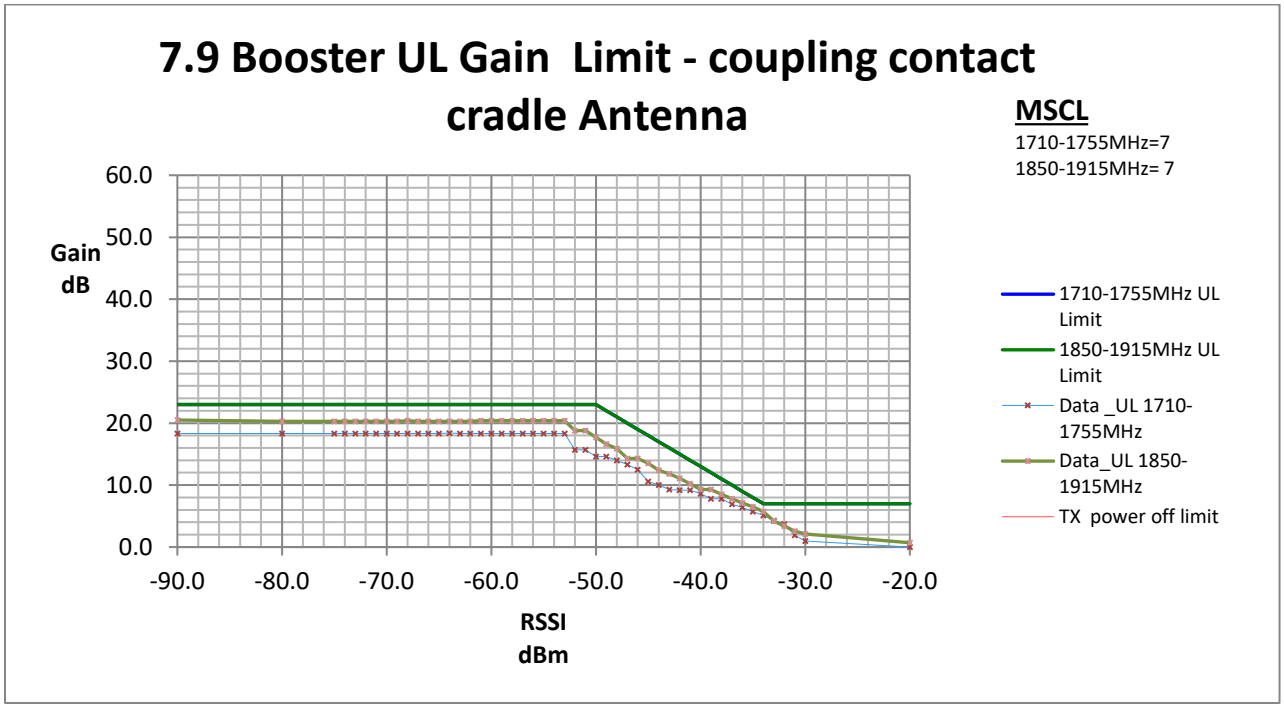
Test Equipment:

Asset #	Description	Model	Calibration Date	Cal Due Date
P05411	Attenuator	54A-10	1/19/2018	1/19/2020
03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020
P07191	Cable	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
P07192	Cable	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
C00082	Directional Coupler	722-10-1.500V	9/18/2017	9/18/2019
C00032	Arbitrary Waveform Generator	E4433B	2/26/2016	2/26/2018
03418	Signal Generator	E4438C	6/19/2017	6/19/2019

Summary of Results

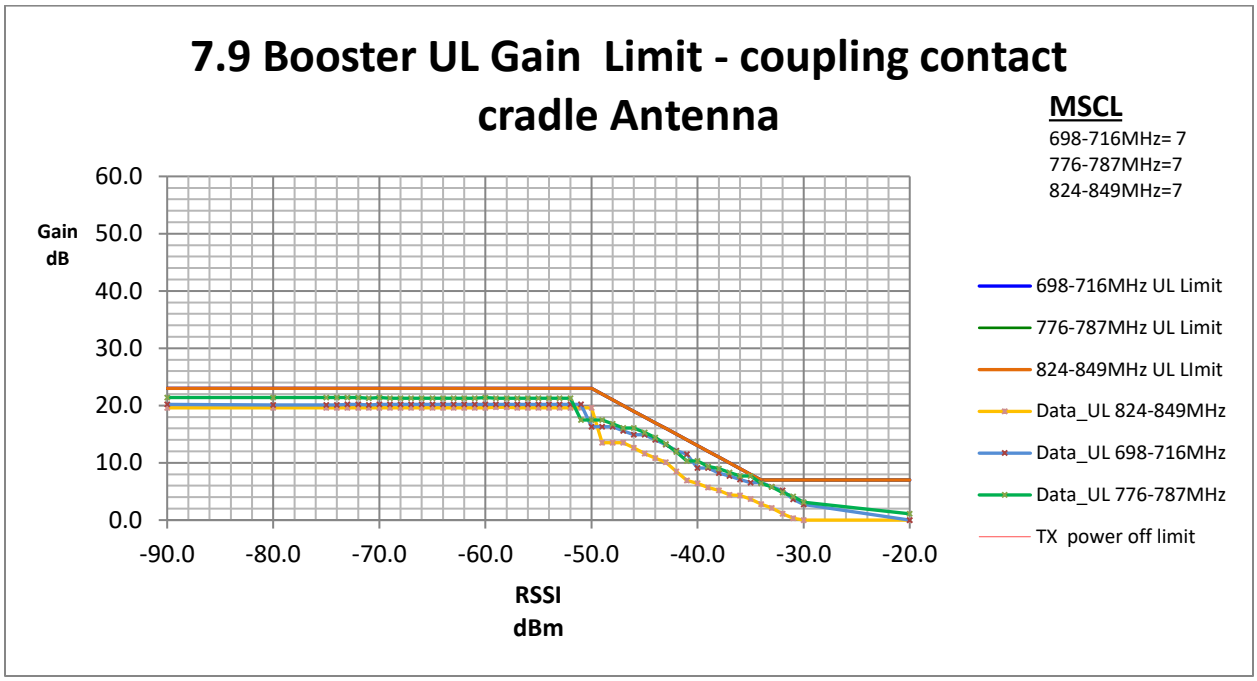
Pass: As demonstrated, computed gains are within the gain limit. All maximum variable uplink gain timings are within 1 second limit.

7.9.1 Maximum gain



1710.0 - 1755.0 MHz							
				Limit			Margin
RSSI	Input	Measured	Measured	RSSI Dependent	Mobile Booster	TX off	
(dBm)	(dBm)	Output (dBm)	Gain (dBm)				
-64.0	-4.2	14.2	18.4	-	23.0	-	-4.6
-35.0	-4.2	1.5	5.7	8.0	-	-	-2.3
-36.0	-4.2	2.2	6.4	9.0	-	-	-2.6
-37.0	-4.2	2.7	6.9	10.0	-	-	-3.1
-34.0	-4.2	0.9	5.1	11.0	-	-	-3.2
-34.0	-4.2	0.9	5.1	-	-	7	-1.9

1850.0 --1915.0MHz							
				Limit			Margin
RSSI	Input	Measured	Measured	RSSI Dependent	Mobile Booster	TX off	
(dBm)	(dBm)	Output (dBm)	Gain (dBm)				
-90.0	-2.8	17.7	20.5	-	23	-	-2.5
-35.0	-2.8	3.7	6.5	8.0	-	-	-1.5
-36.0	-2.8	4.3	7.1	9.0	-	-	-1.9
-37.0	-2.8	5.0	7.8	10.0	-	-	-2.2
-38.0	-2.8	5.7	8.5	11.0	-	-	-2.5
-34.0	-2.8	2.9	5.7	-	-	7	-1.3



824.0 - 849.0 MHz							
				Limit			Margin
RSSI	Input	Measured	Measured	RSSI Dependent	Mobile Booster	TX off	
(dBm)	(dBm)	Output (dBm)	Gain (dBm)				
-59.0	-3.6	16.1	19.7	-	23	-	-3.3
-35.0	-3.6	0.1	3.7	8.0	-	-	-4.3
-36.0	-3.6	0.7	4.3	9.0	-	-	-4.7
-37.0	-3.6	0.8	4.4	10.0	-	-	-5.6
-38.0	-3.6	1.6	5.2	11.0	-	-	-5.8
-34.0	-3.6	-0.8	2.8	-	-	7	-4.2

698.0-716.0MHz							
				Limit			Margin
RSSI	Input	Measured	Measured	RSSI Dependent	Mobile Booster	TX off	
(dBm)	(dBm)	Output (dBm)	Gain (dBm)				
-90.0	-4.7	15.5	20.2	-	23	-	-2.8
-35.0	-4.7	1.8	6.5	8.0	-	-	-1.5
-36.0	-4.7	2.4	7.1	9.0	-	-	-1.9
-37.0	-4.7	3.0	7.7	10.0	-	-	-2.3
-41.0	-4.7	6.8	11.5	14.0	-	-	-2.5
-34.0	-4.7	1.9	6.6	-	-	7	-0.4

776.0 -787.0MHz							
				Limit			Margin
RSSI	Input	Measured	Measured	RSSI Dependent	Mobile Booster	TX off	
(dBm)	(dBm)	Output (dBm)	Gain (dBm)				
-90.0	-6.2	15.2	21.4	-	23	-	-1.6
-35.0	-6.2	1.5	7.7	8.0	-	-	-0.3
-36.0	-6.2	1.5	7.7	9.0	-	-	-1.3
-37.0	-6.2	2.1	8.3	10.0	-	-	-1.7
-38.0	-6.2	2.8	9.0	11.0	-	-	-2.0
-34.0	-6.2	0.2	6.4	-34.0	-	7	-0.6

7.9.2 Variable uplink gain timing

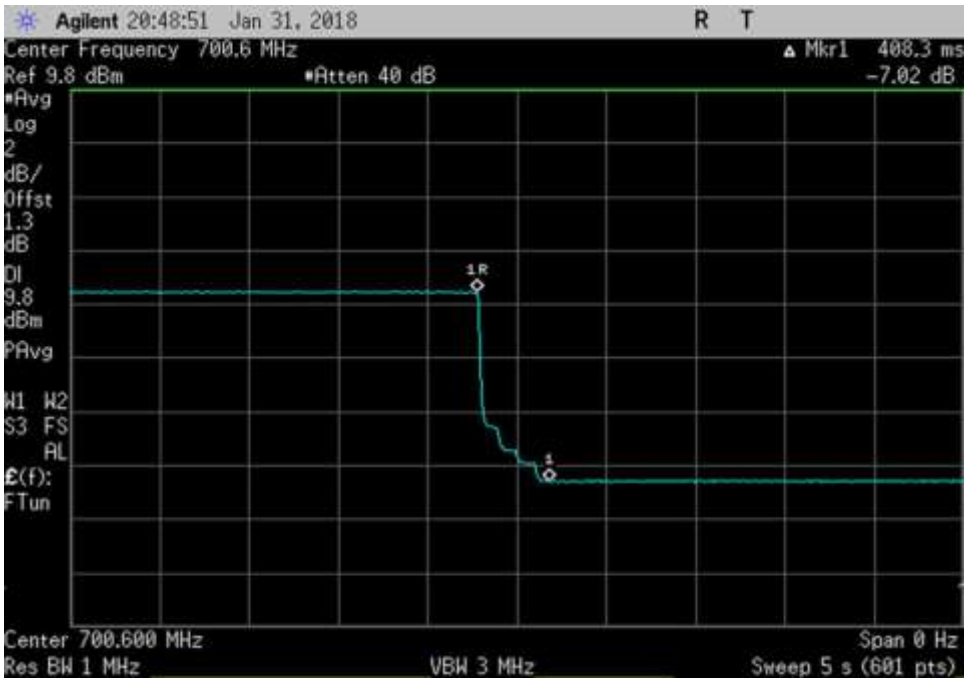
Uplink Gain Timing		
Frequency	Measured	Limit
(MHz)	(Sec)	(Sec)
UL 1710-1755	0.30	1
UL 1850-1915	0.18	1
UL 824-849	0.40	1
UL 698-716	0.41	1
UL 776-787	0.39	1

7.9.1 Maximum Gain

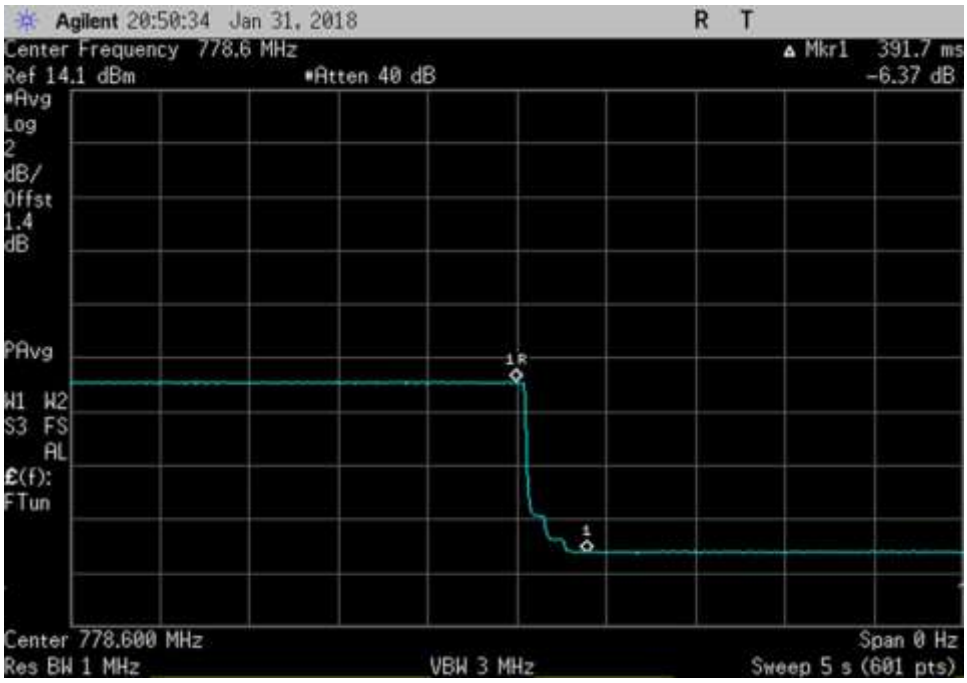
For this subsection, see summary of results of 7.9
7.9.1 Maximum gain

7.9.2 Variable uplink Gain Timing

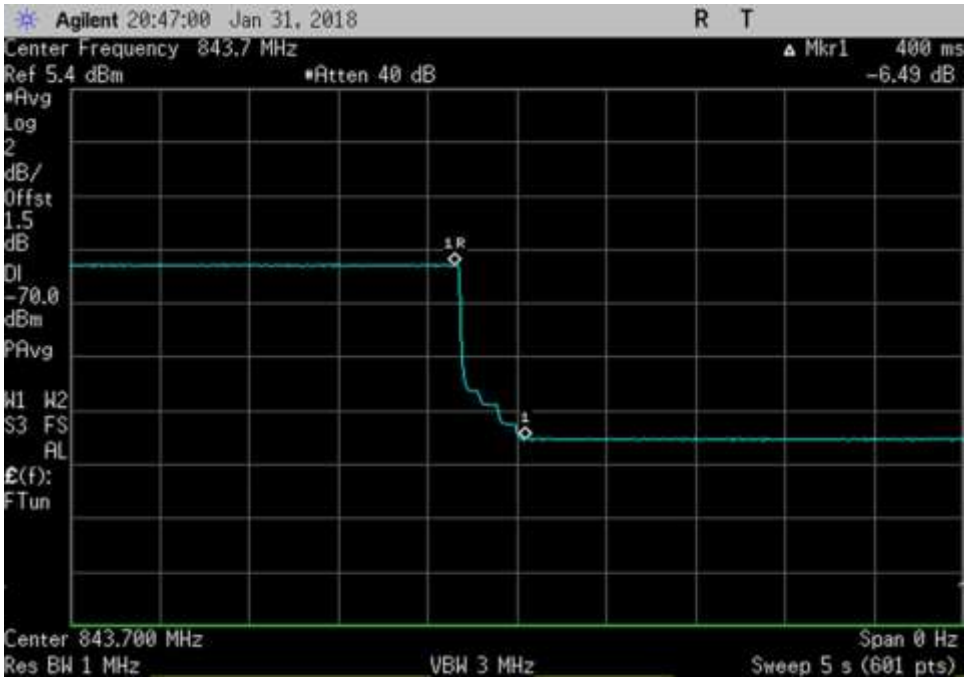
Plots



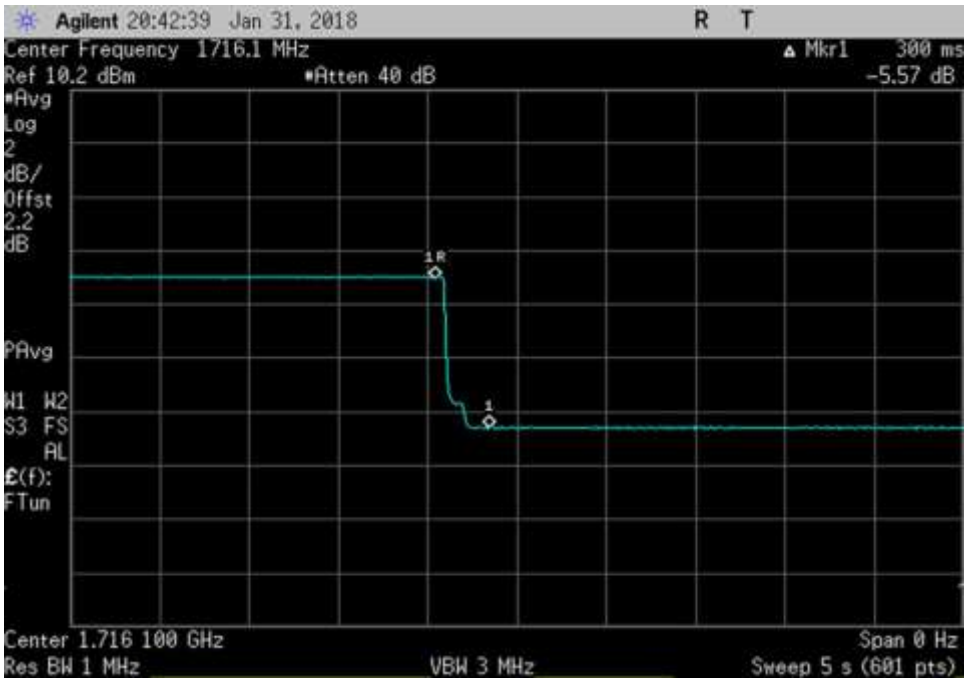
UL_698-716_ 700.6MHz_timing



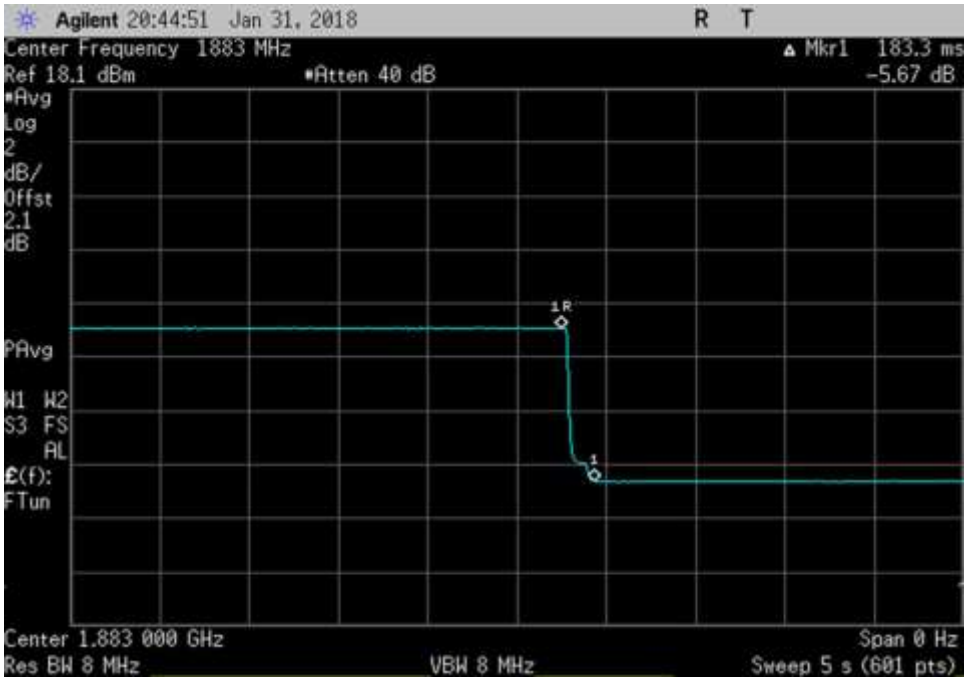
UL_776-787_ 778.6MHz_timing



UL_824-849_ 843.7MHz_timing



UL_1710-1755_ 1716.1MHz_timing



UL_1850-1915_ 1883MHz_timing

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**		
Work Order #:	**100826**	Date:	1/30/2018
Test Type:	**Conducted Emissions**	Time:	2:26:00 PM
Tested By:	E. Wong	Sequence#:	1
Software:	EMITest 5.03.11		12VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Equipment:

Asset #	Description	Model	Calibration Date	Cal Due Date
03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020
P07191	Cable	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
P07191	Cable	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	E4438C	6/19/2017	6/19/2019

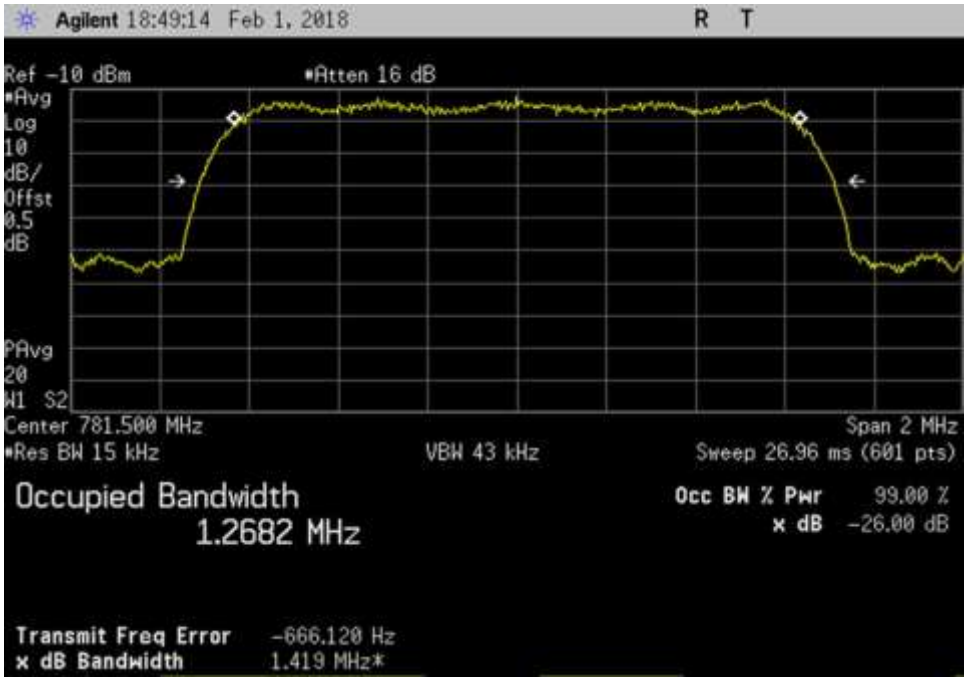
Summary of Results

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

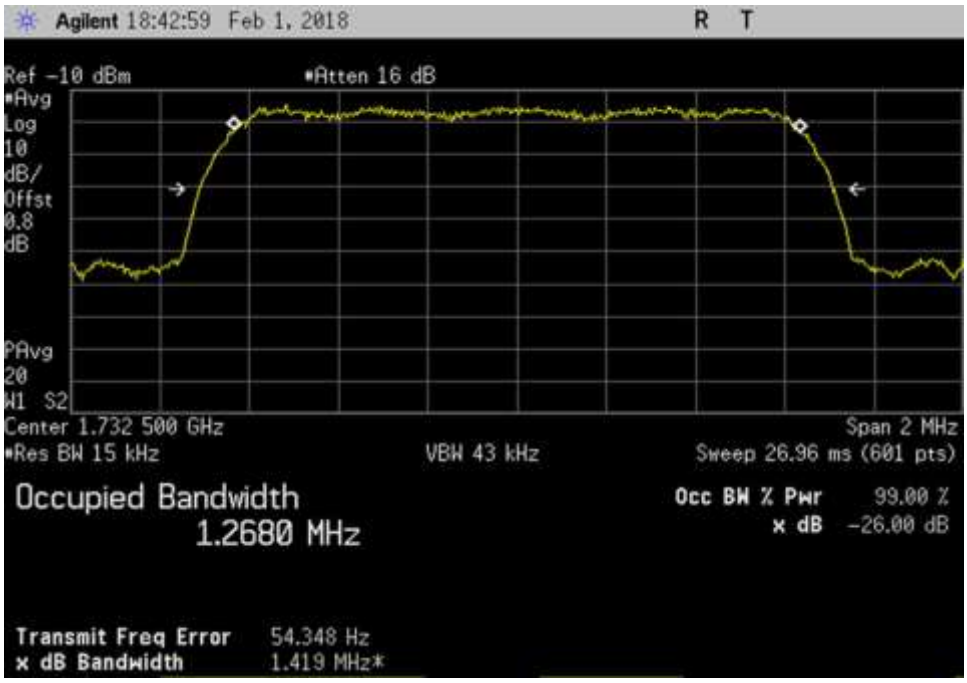
Plots

CDMA Input

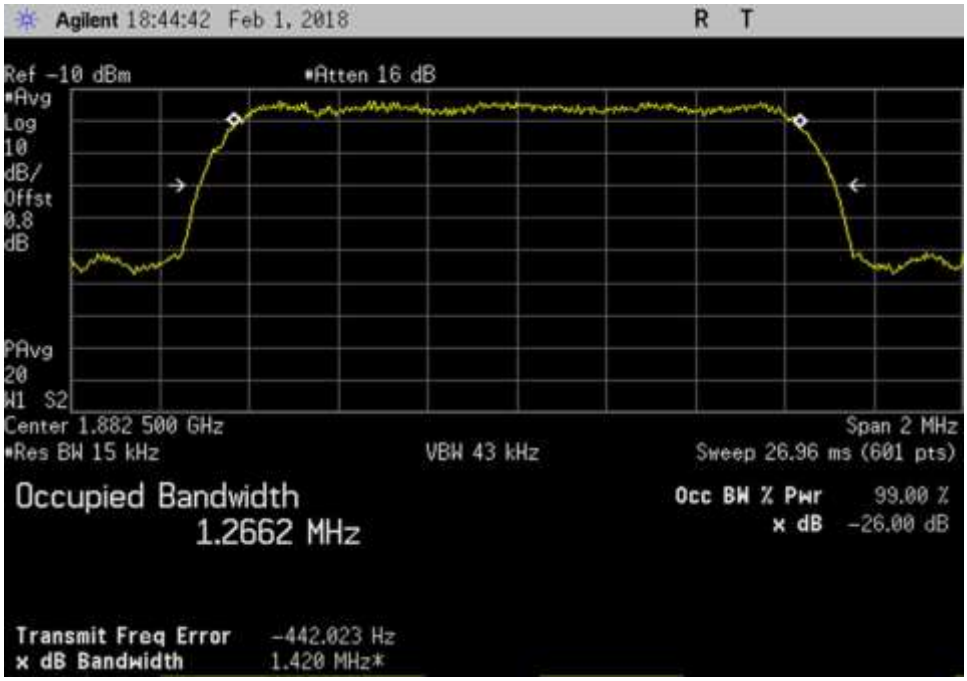
UL_698-716_CDMA_ 707MHz



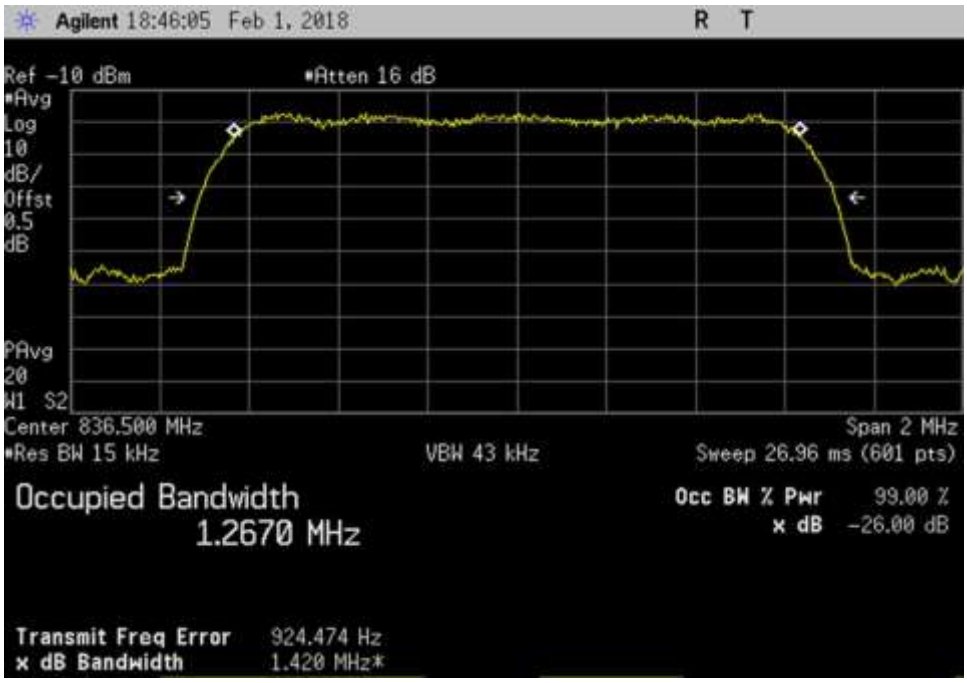
UL_776-787_CDMA_ 781.5MHz



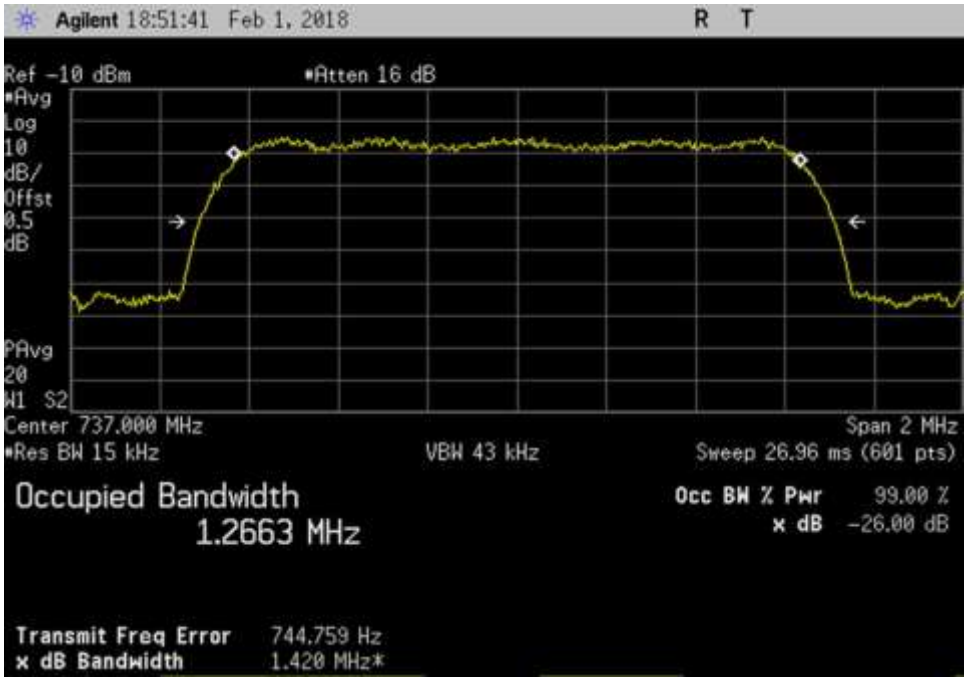
UL_1710-1755_CDMA_ 1732.5MHz



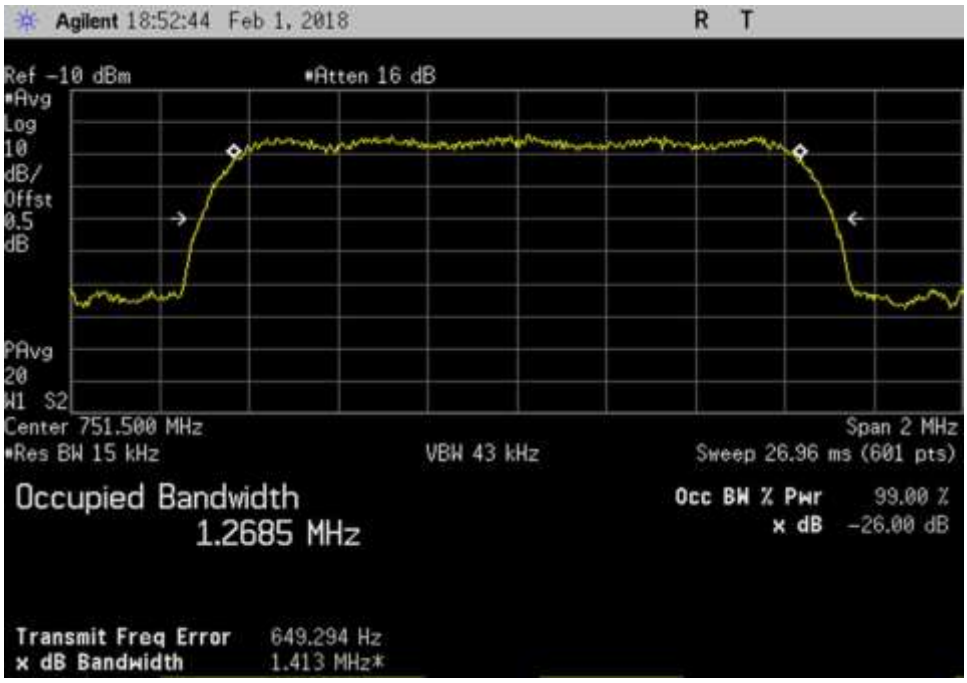
UL_1850-1915_CDMA_ 1882.5MHz



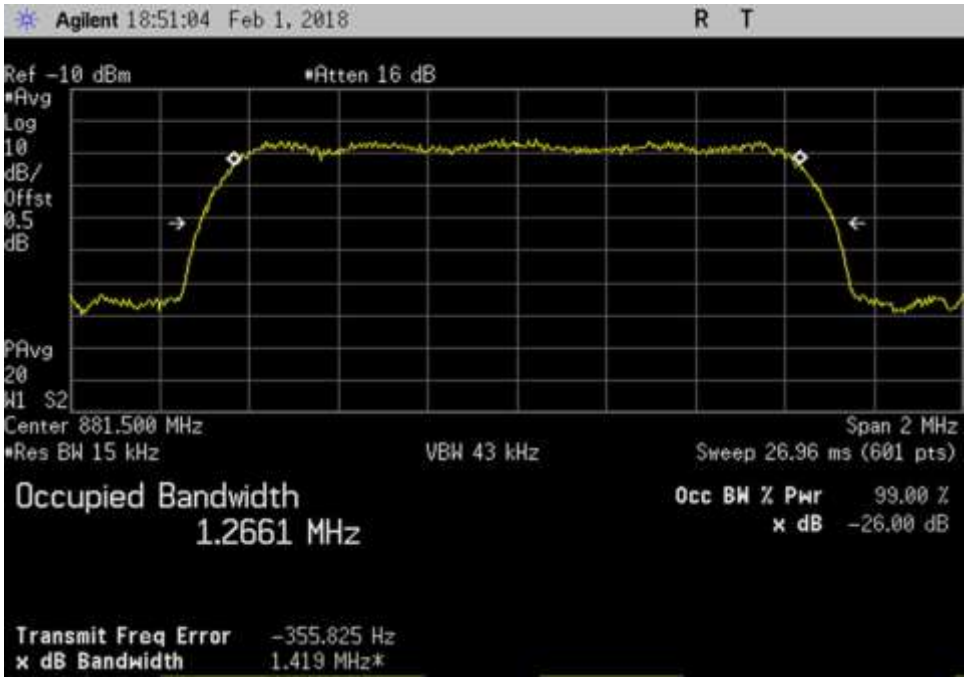
UL_824-849_CDMA_ 836.5MHz



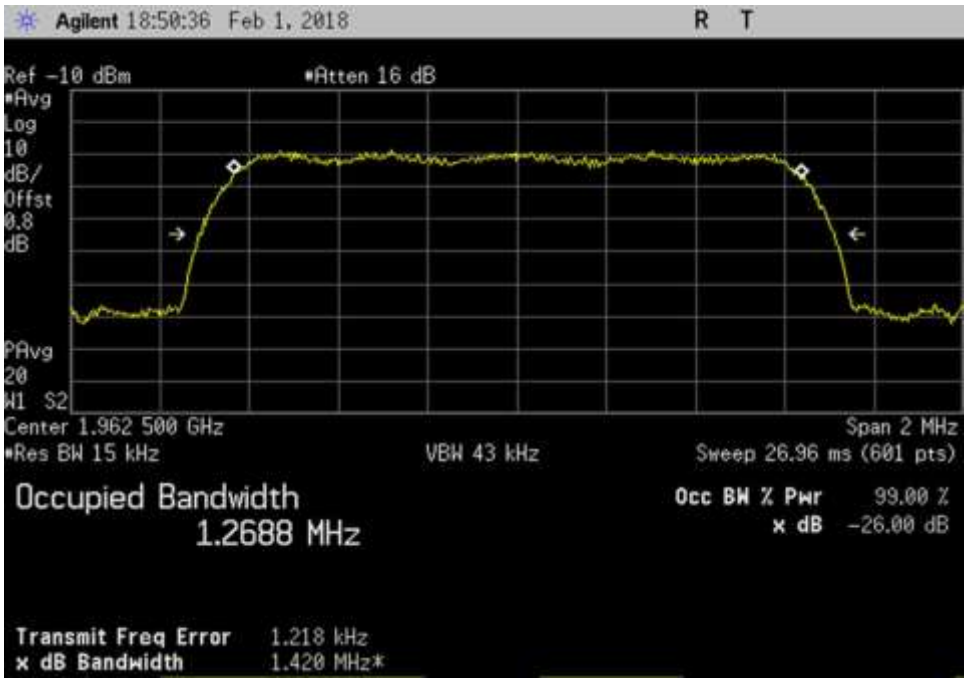
DL_728-746_CDMA_ 737MHz



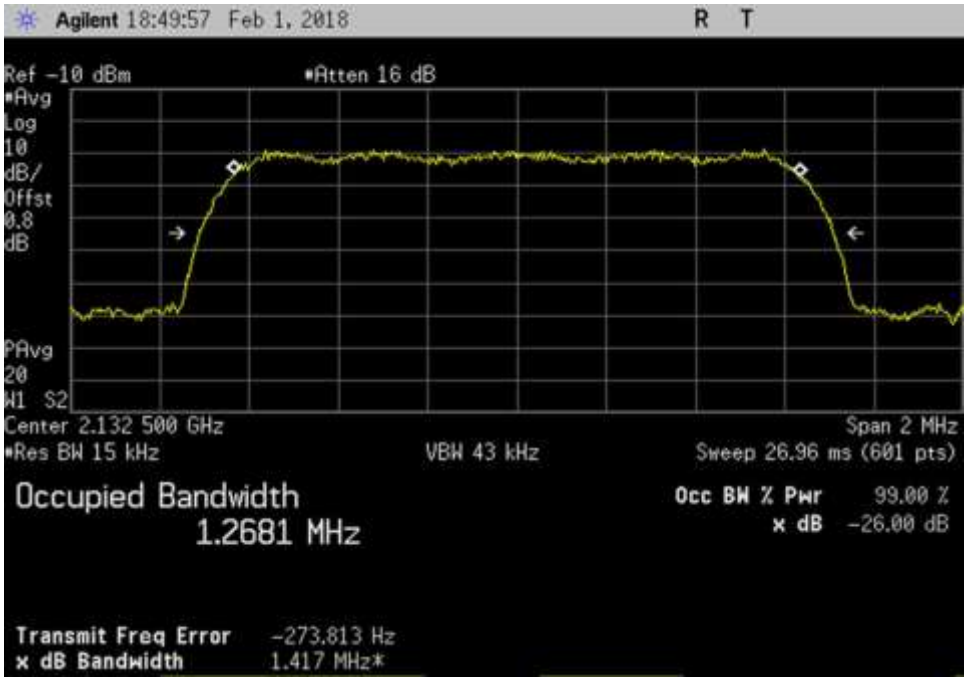
DL_746-757_CDMA_ 751.5MHz



DL_869-894_CDMA_ 881.5MHz

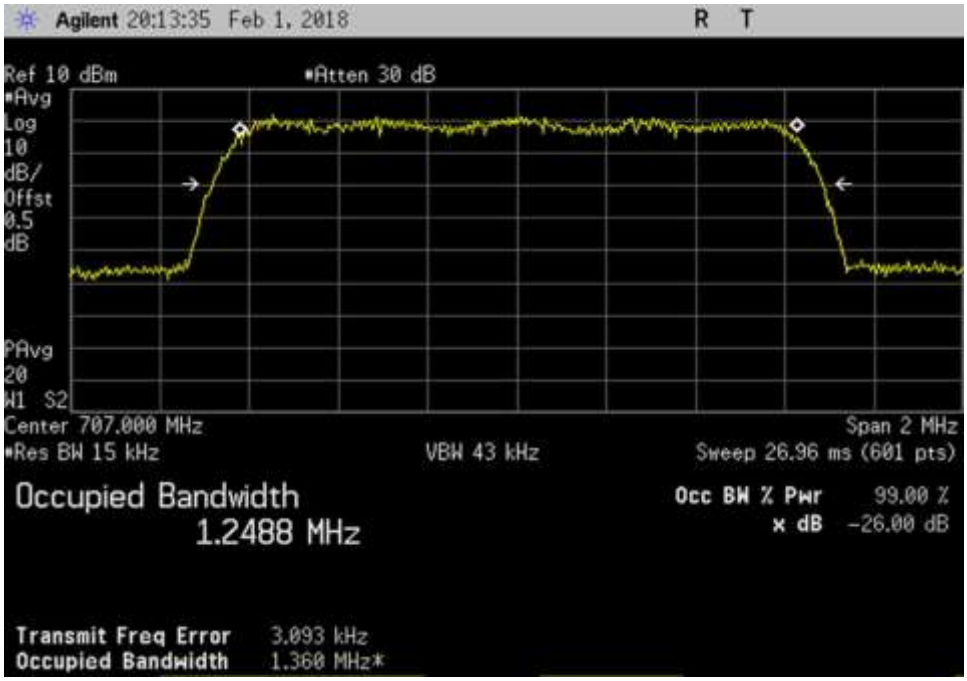


DL_1930-1995_CDMA_ 1962.5MHz

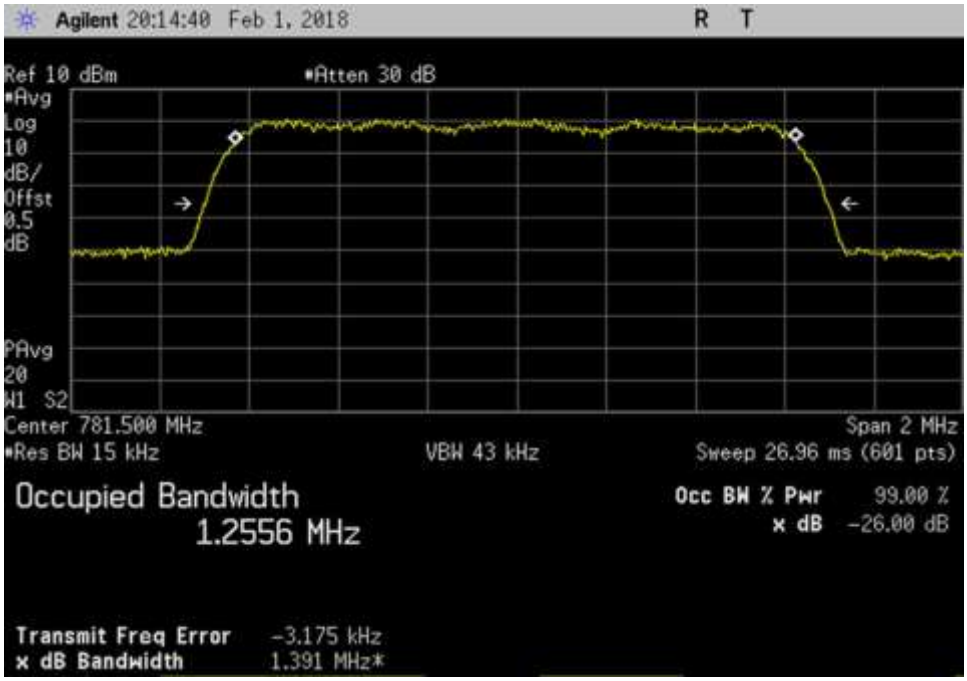


DL_2110-2155_CDMA_ 2132.5MHz

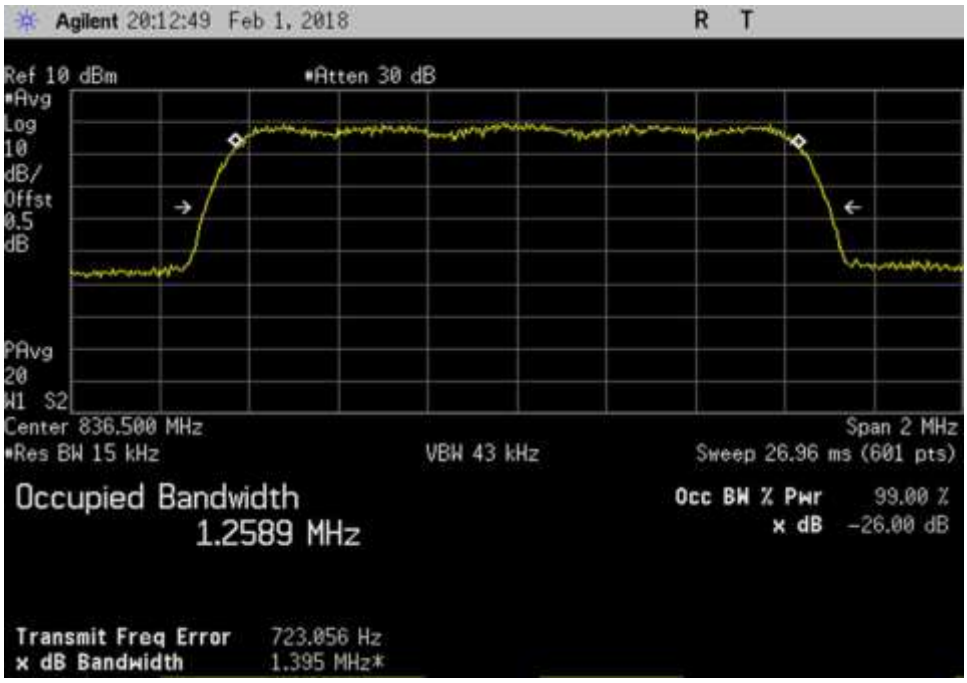
CDMA Output



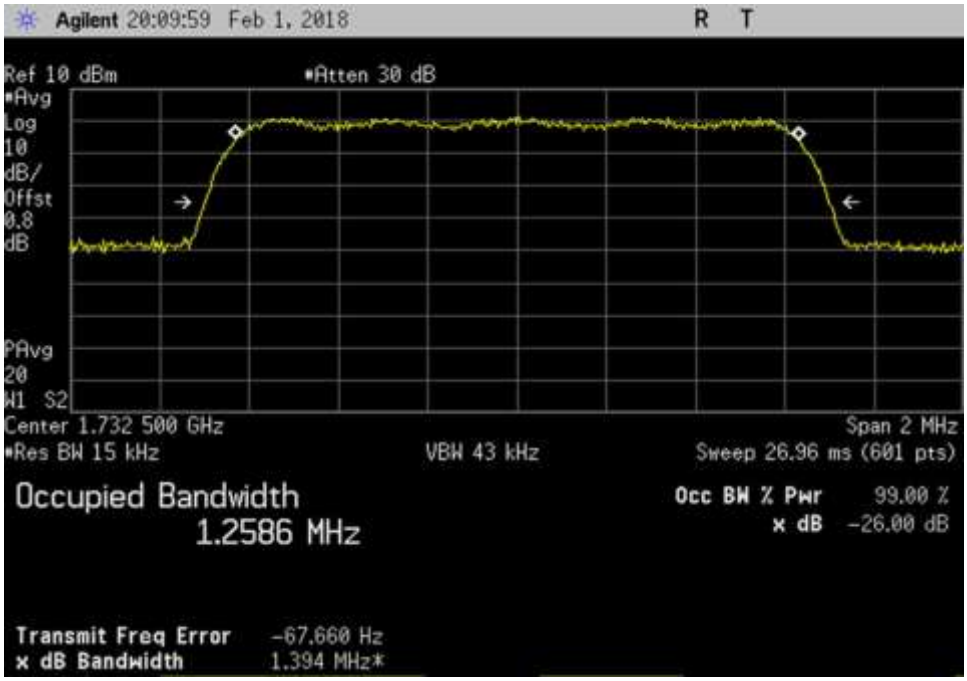
UL_698-716_CDMA_ 707MHz



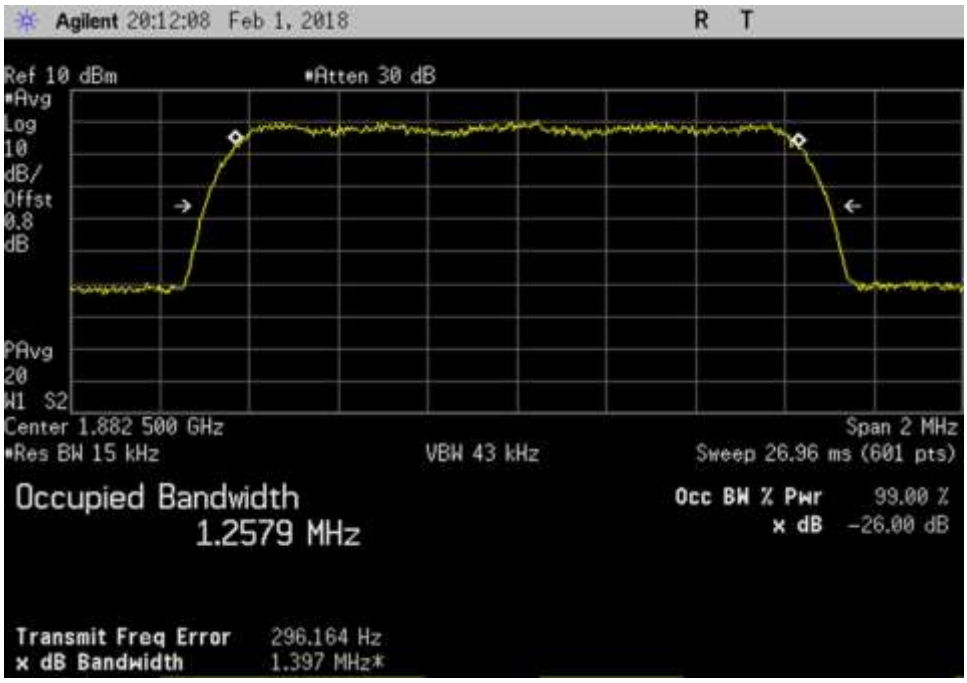
UL_776-787_CDMA_ 781.5MHz



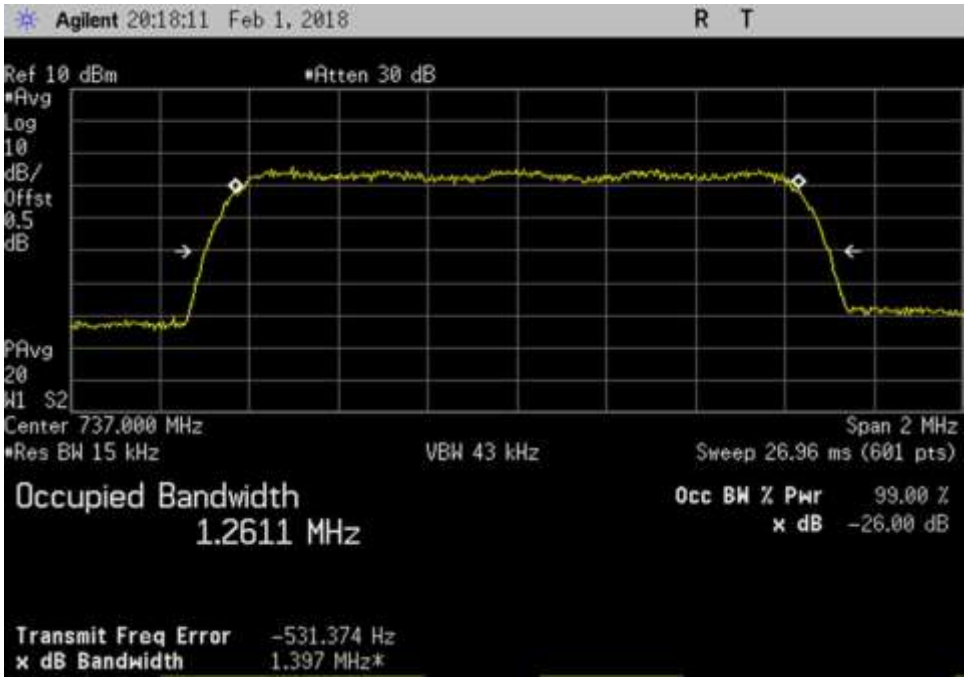
UL_824-849_CDMA_ 836.5MHz



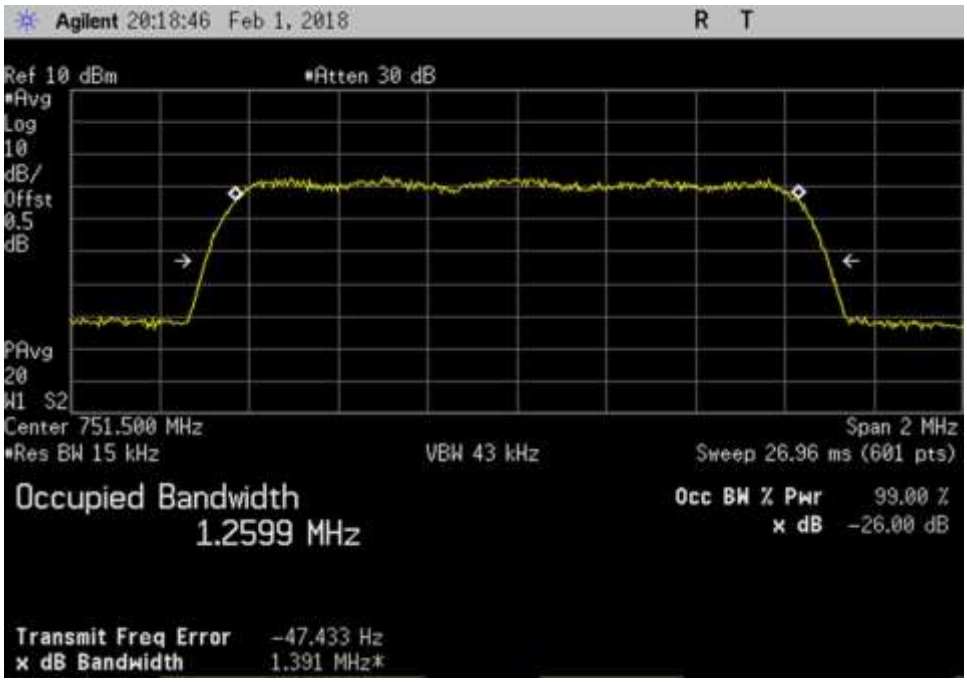
UL_1710-1755_CDMA_ 1732.5MHz



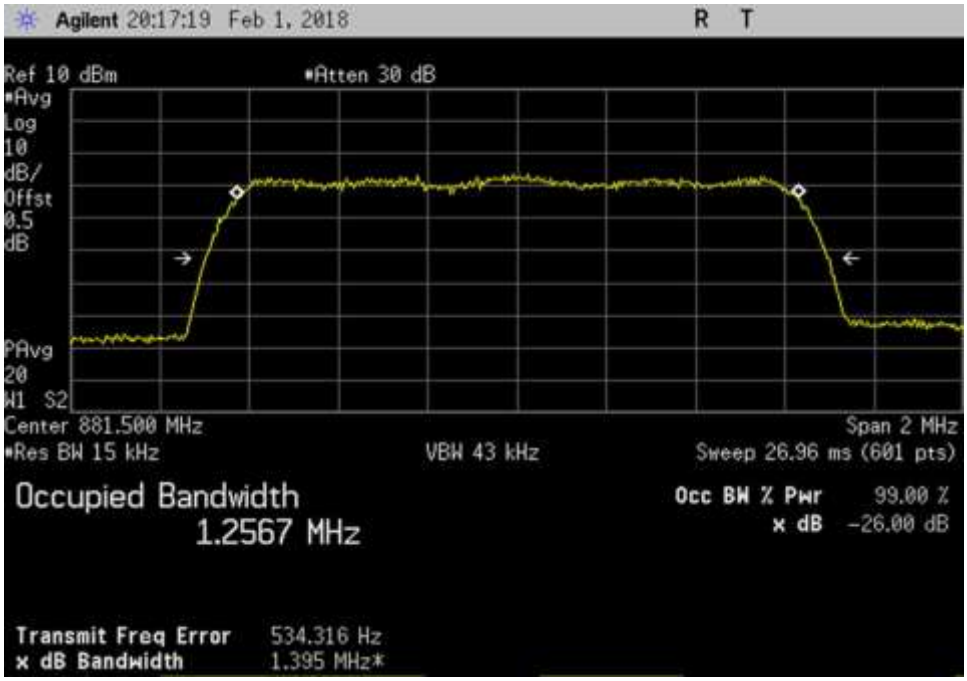
UL_1850-1915_CDMA_ 1882.5MHz



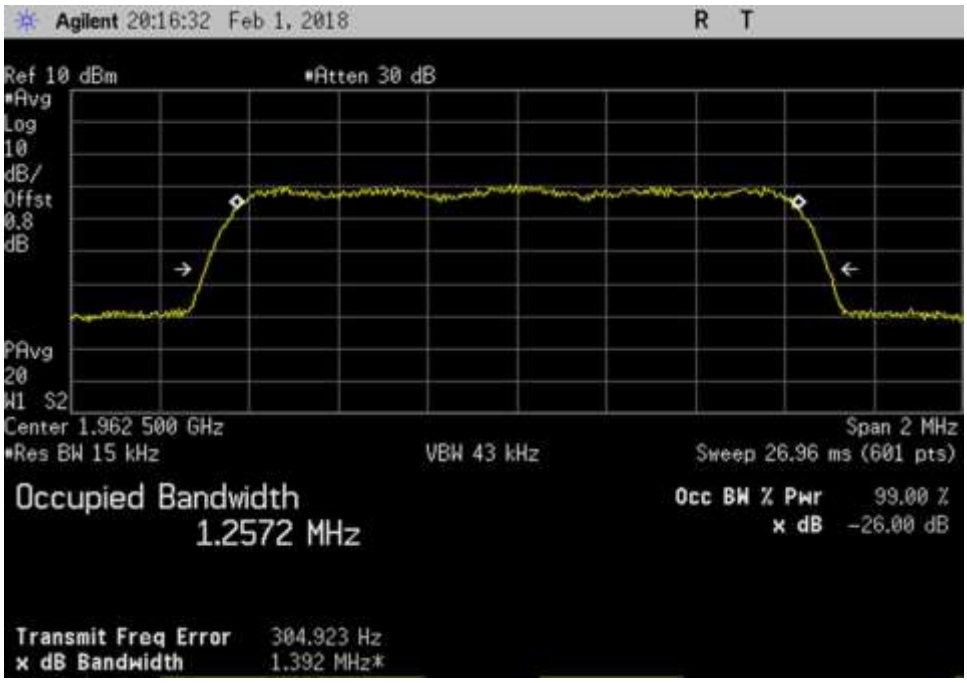
DL_728-746_CDMA_ 737MHz



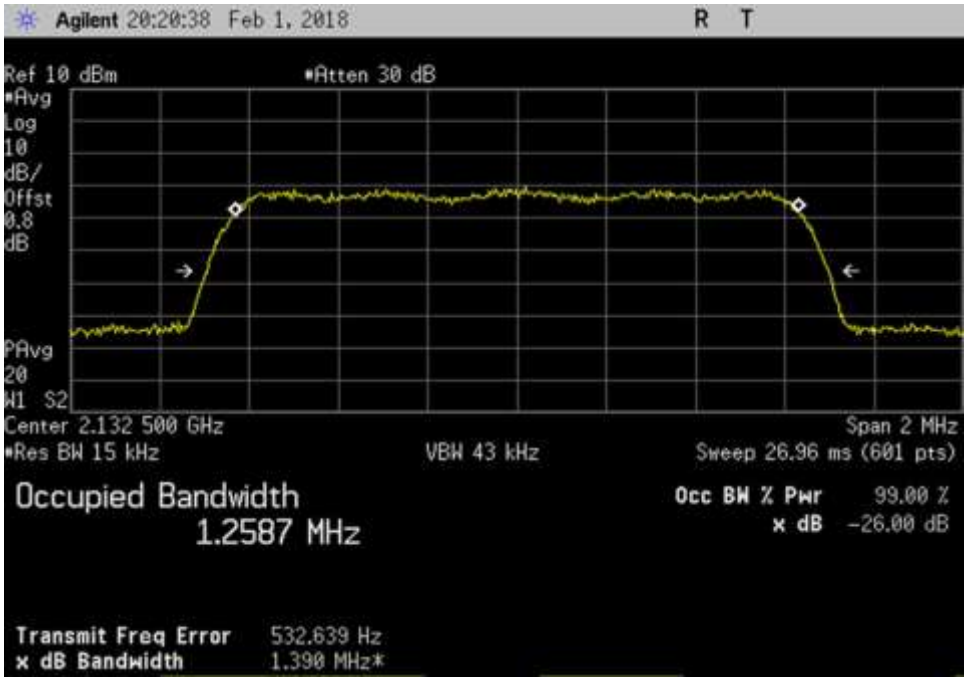
DL_746-757_CDMA_ 751.5MHz



DL_869-894_CDMA_ 881.5MHz

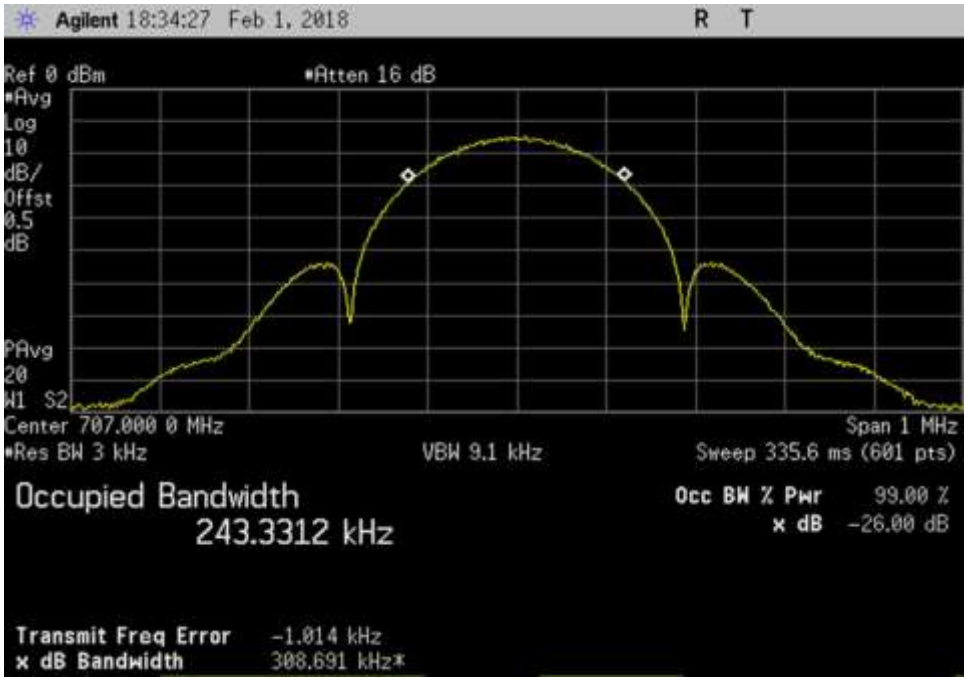


DL_1930-1995_CDMA_ 1962.5MHz

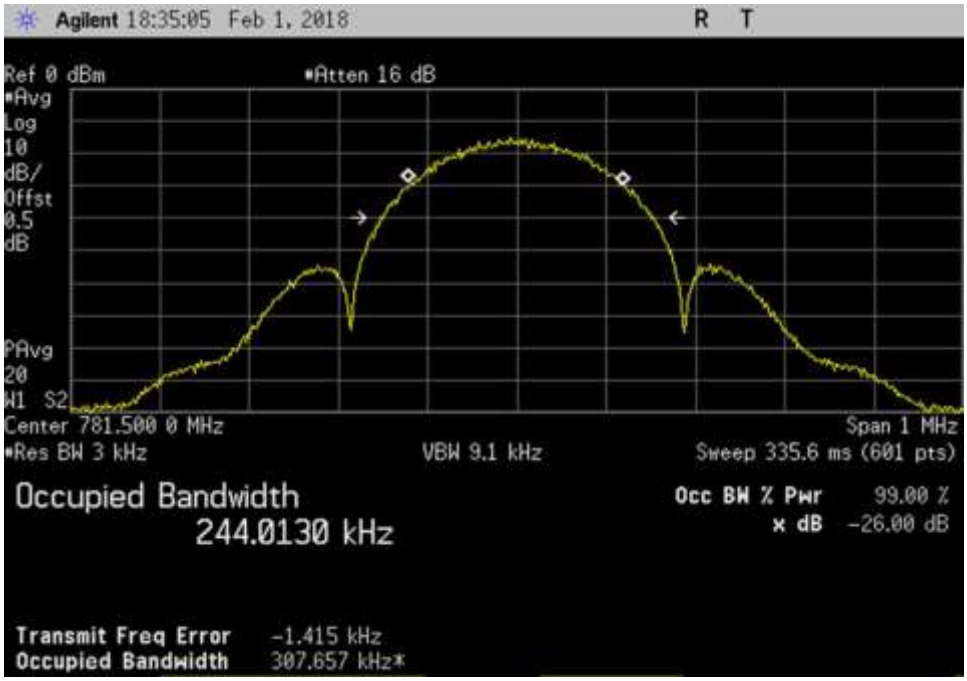


DL_2110-2155_CDMA_ 2132.5MHz

EDGE Input

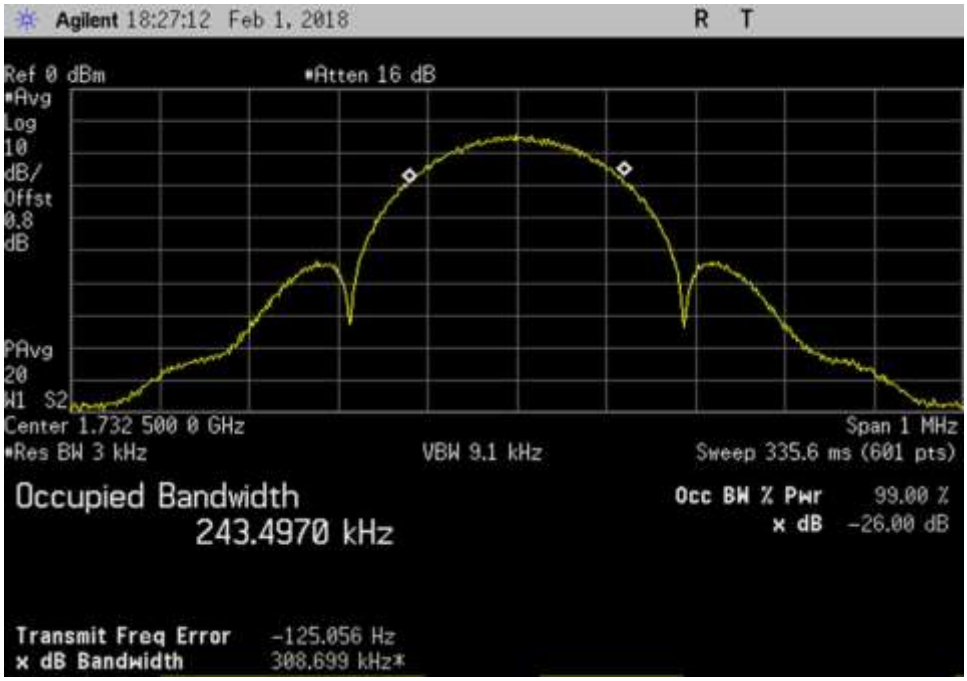


UL_698-716_EDGE_ 707MHz

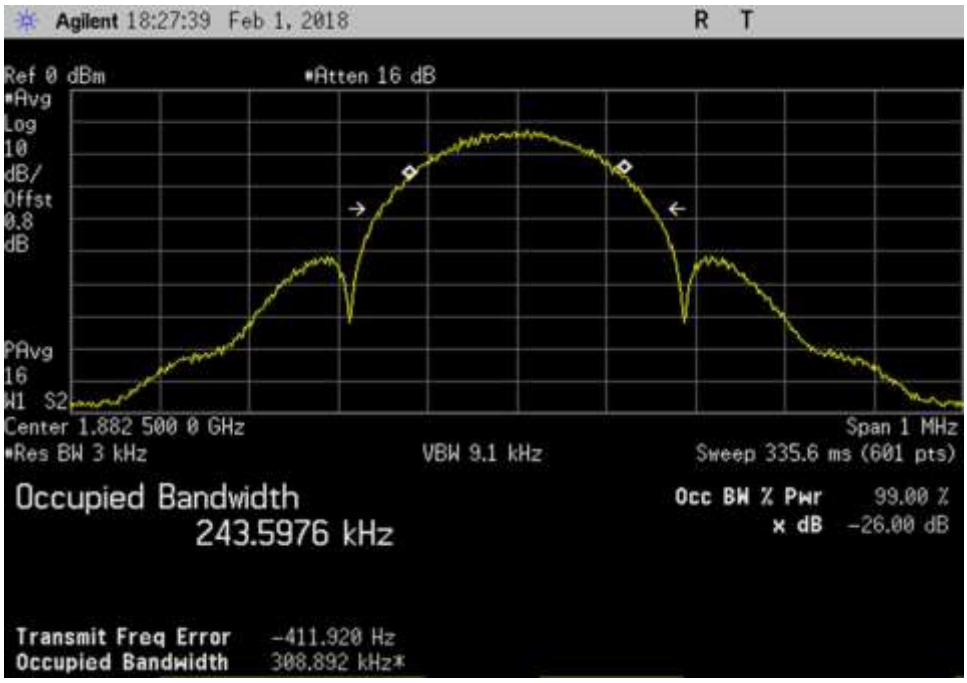


UL_776-787_EDGE_ 781.5MHz

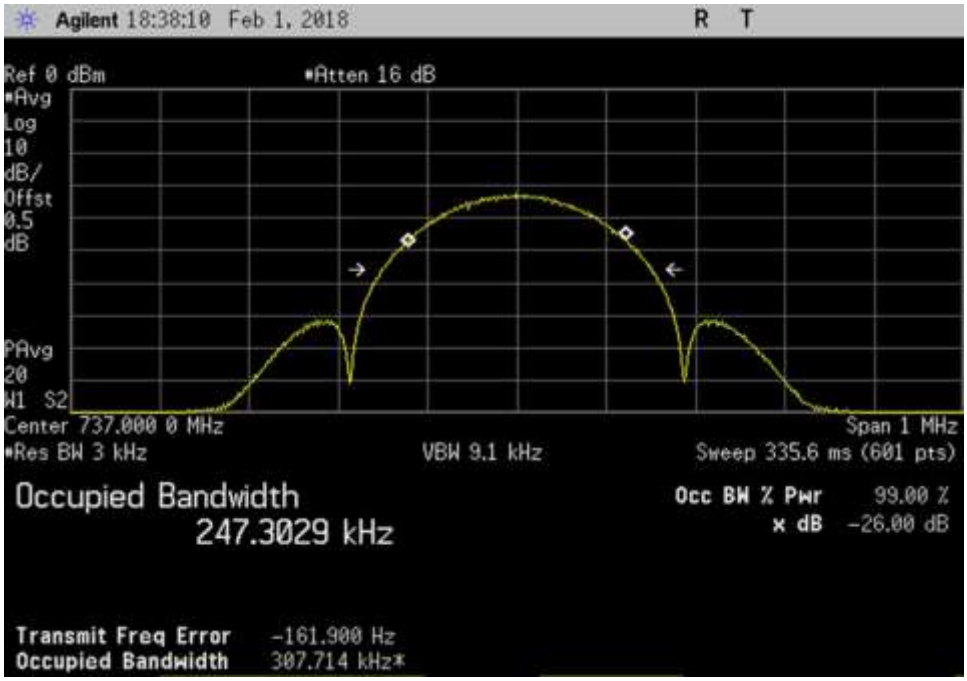
UL_824-849_EDGE_ 836.5MHz



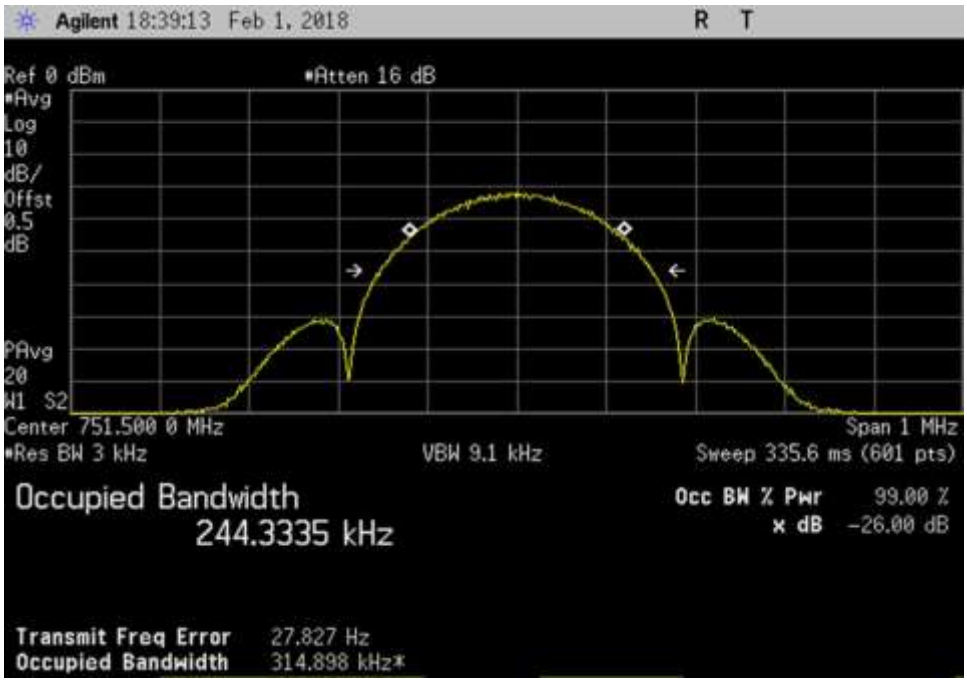
UL_1710-1755_EDGE_ 1732.5MHz



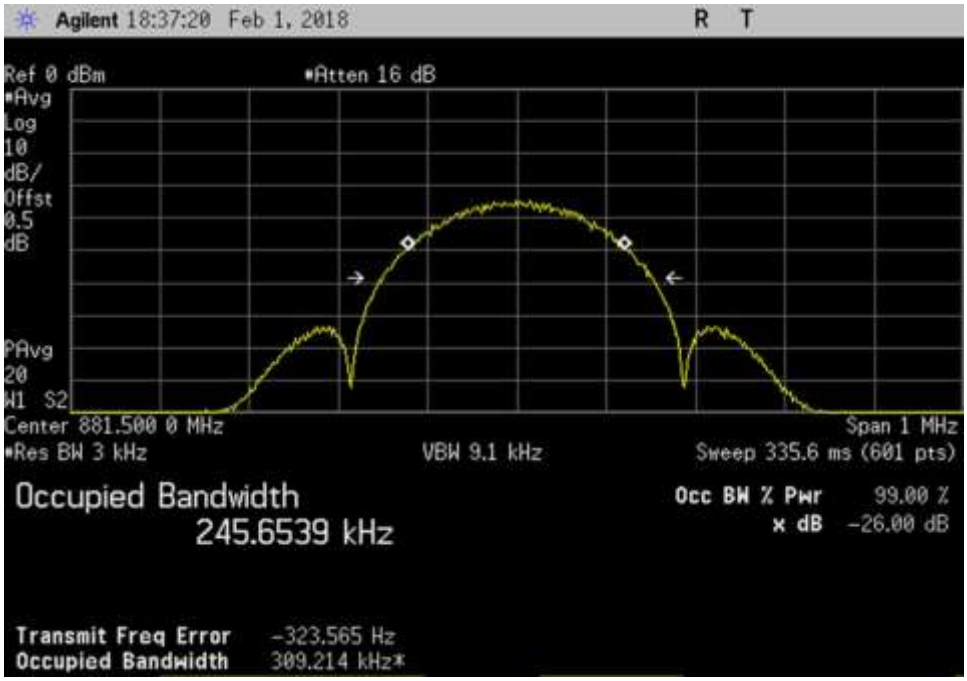
UL_1850-1915_EDGE_ 1882.5MHz



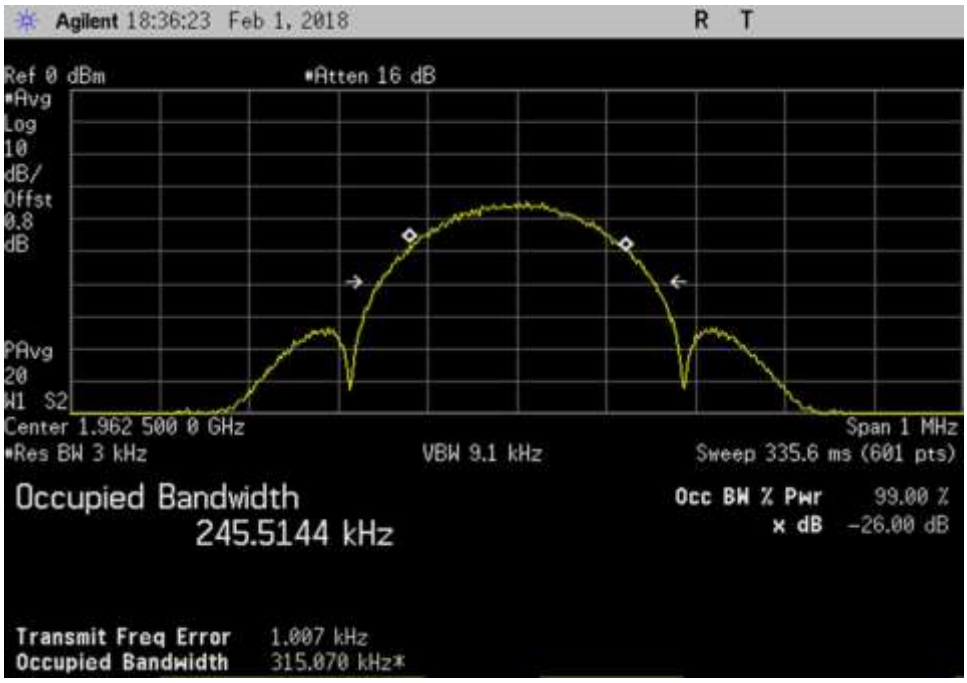
DL_728-746_EDGE_ 737MHz



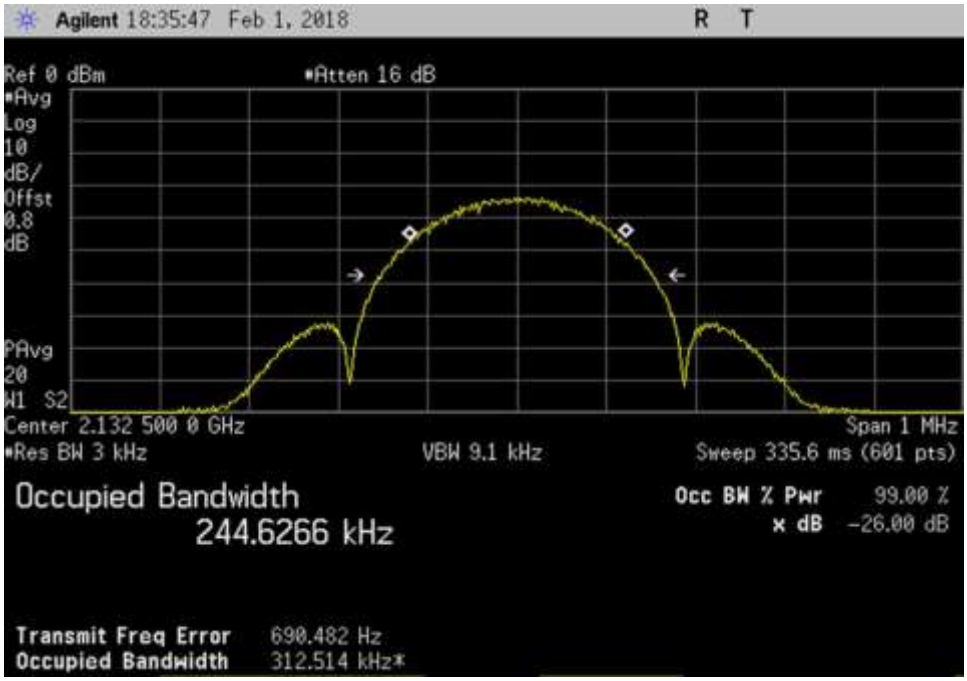
DL_746-757_EDGE_ 751.5MHz



DL_869-894_EDGE_ 881.5MHz

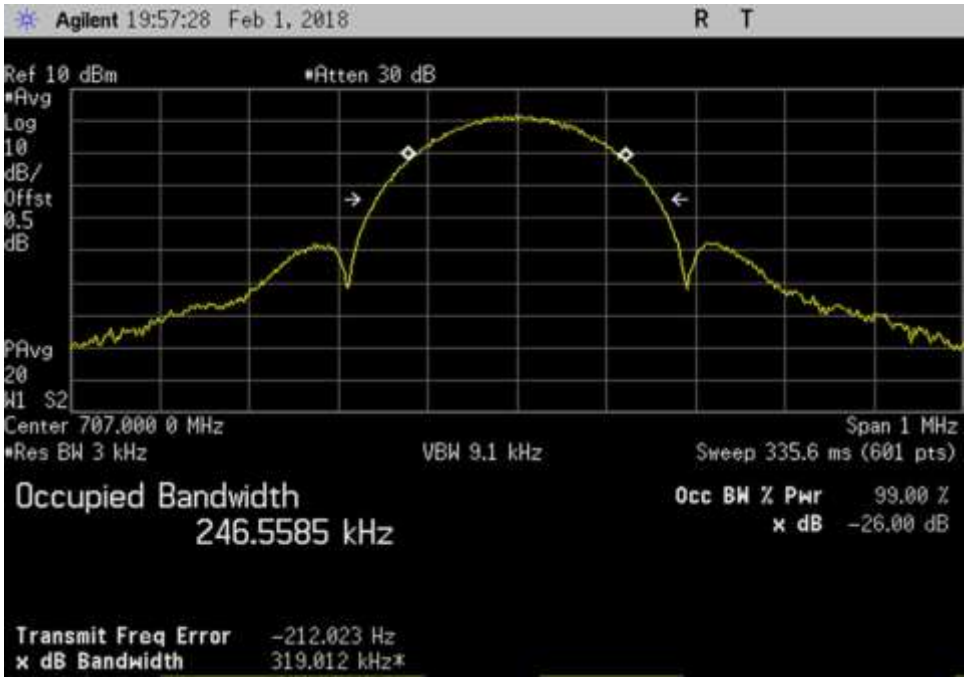


DL_1930-1995_EDGE_ 1962.5MHz

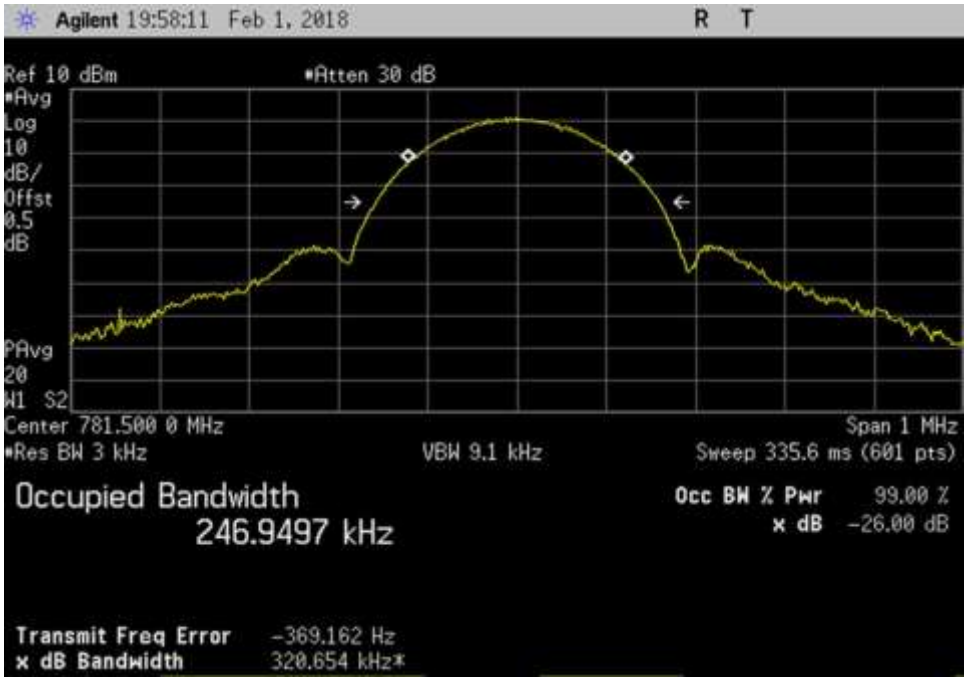


DL_2110-2155_EDGE_ 2132.5MHz

EDGE Output

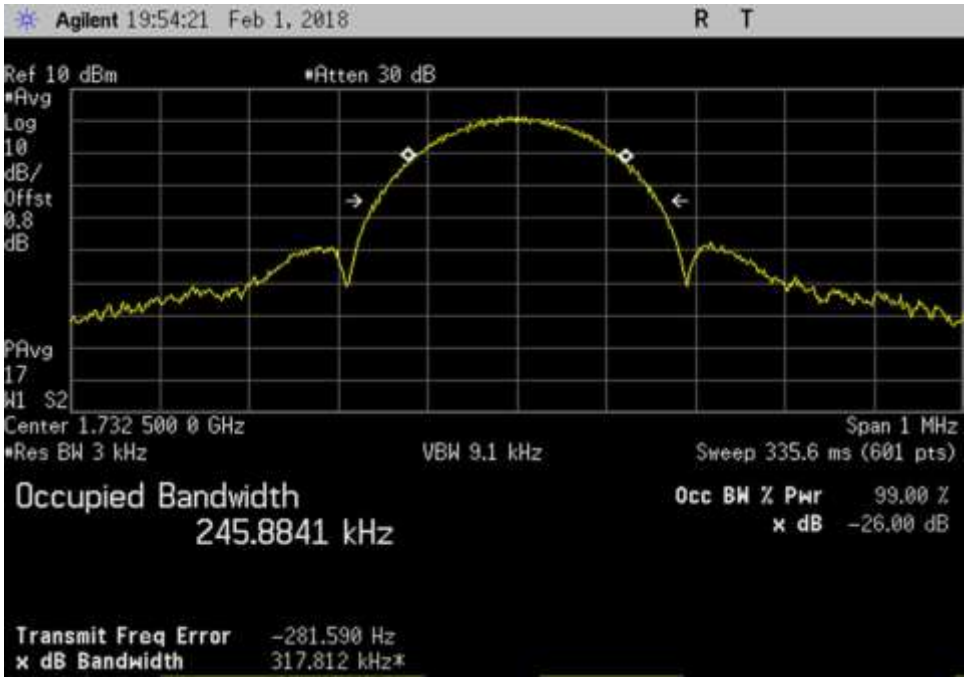


UL_698-716_EDGE_ 707MHz

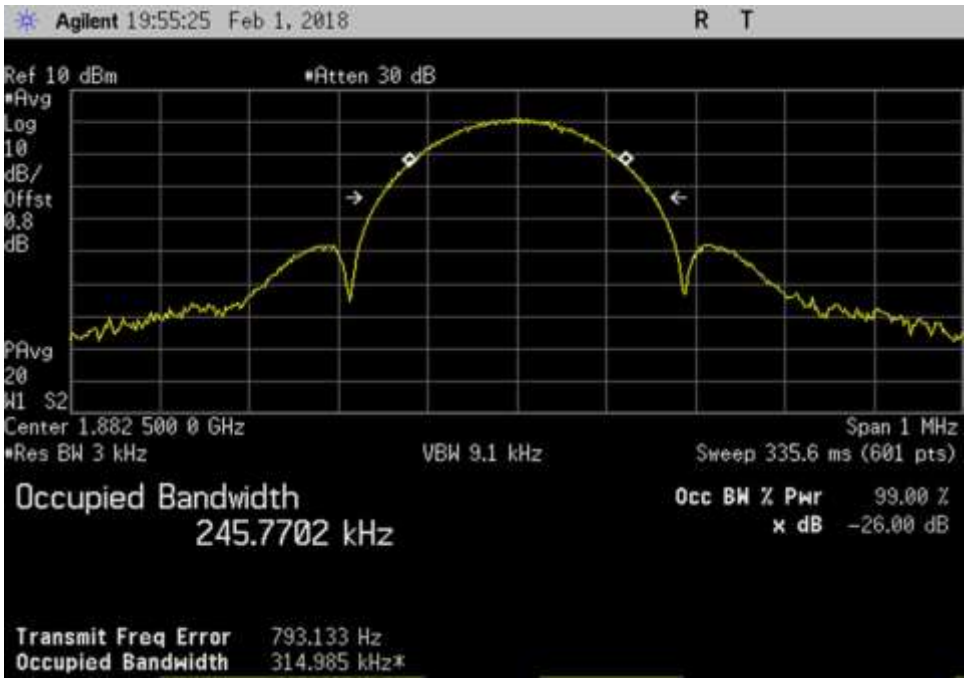


UL_776-787_EDGE_ 781.5MHz

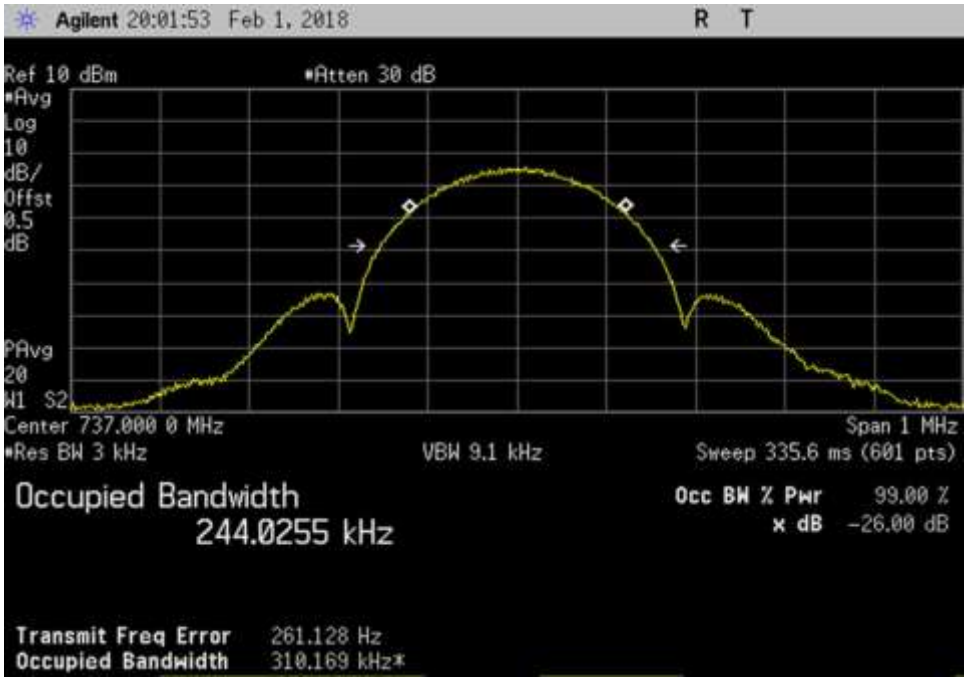
UL_824-849_EDGE_ 836.5MHz



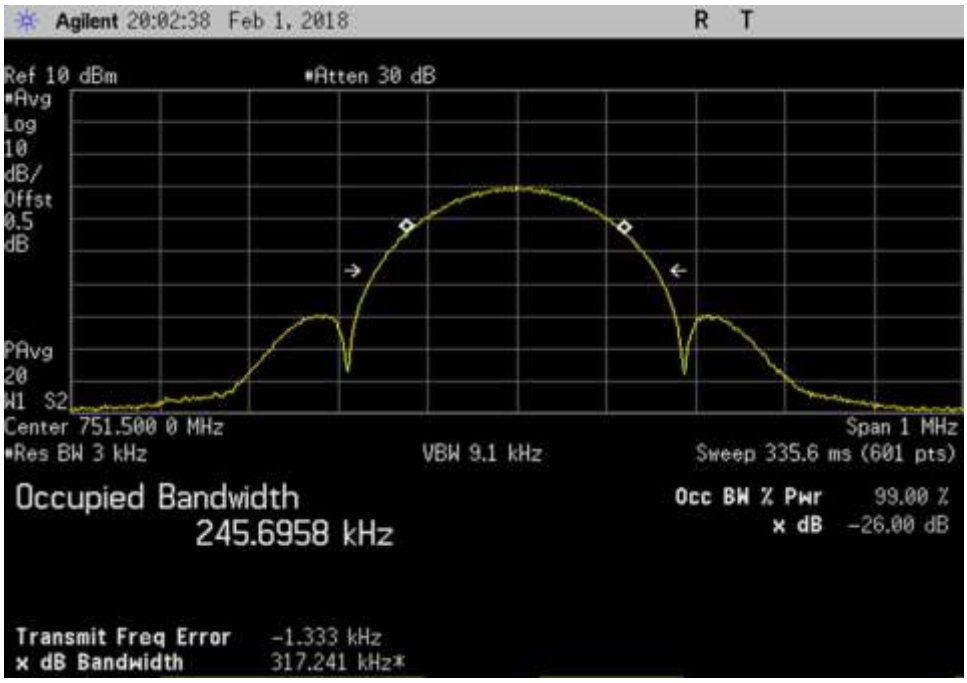
UL_1710-1755_EDGE_ 1732.5MHz



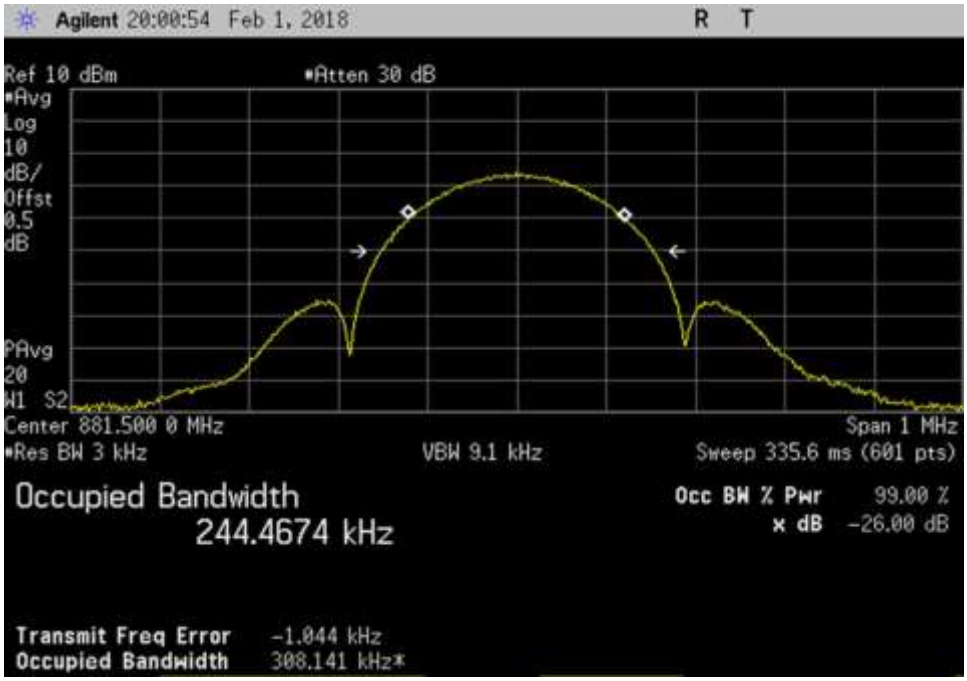
UL_1850-1915_EDGE_ 1882.5MHz



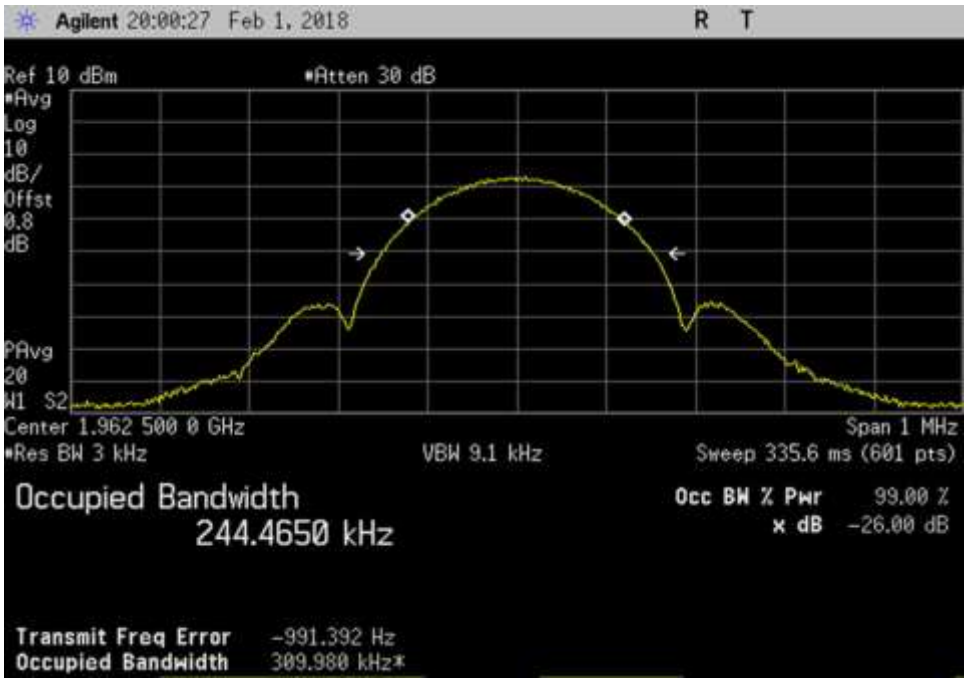
DL_728-746_EDGE_ 737MHz



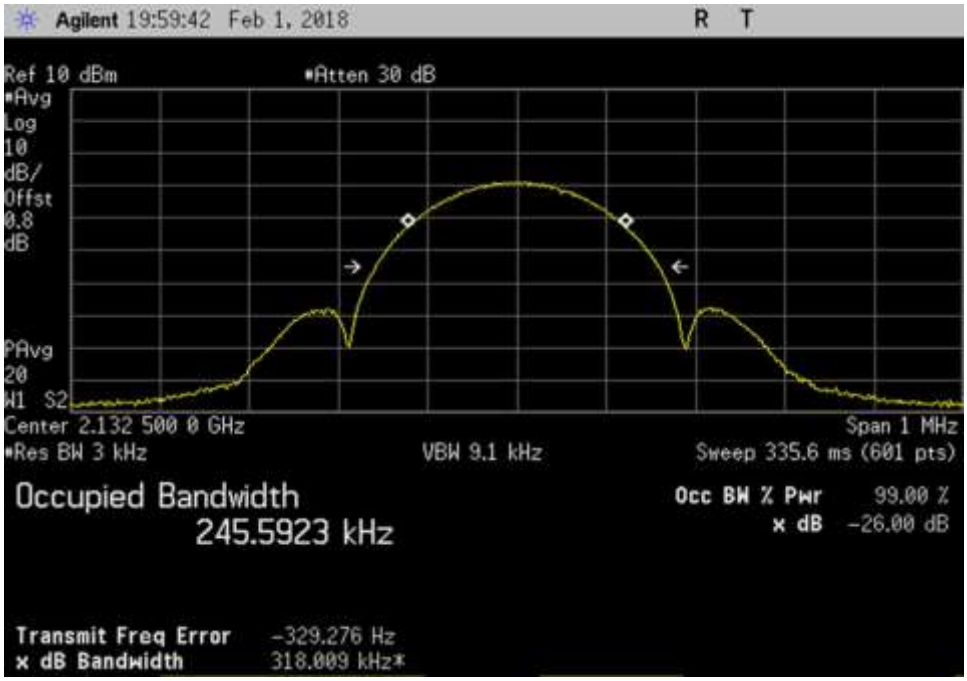
DL_746-757_EDGE_ 751.5MHz



DL_869-894_EDGE_ 881.5MHz

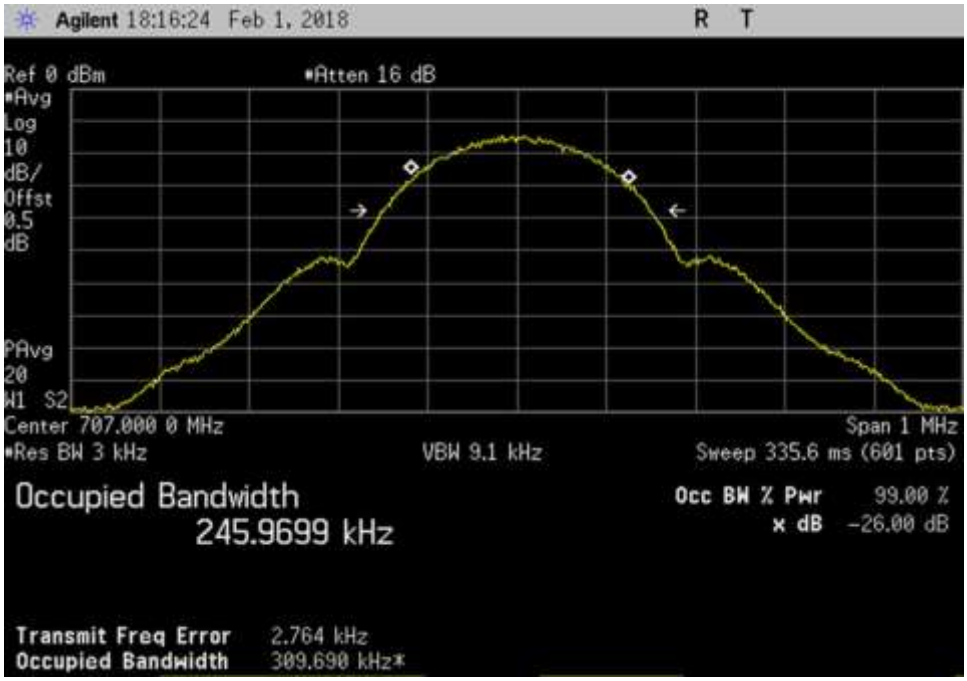


DL_1930-1995_EDGE_ 1962.5MHz

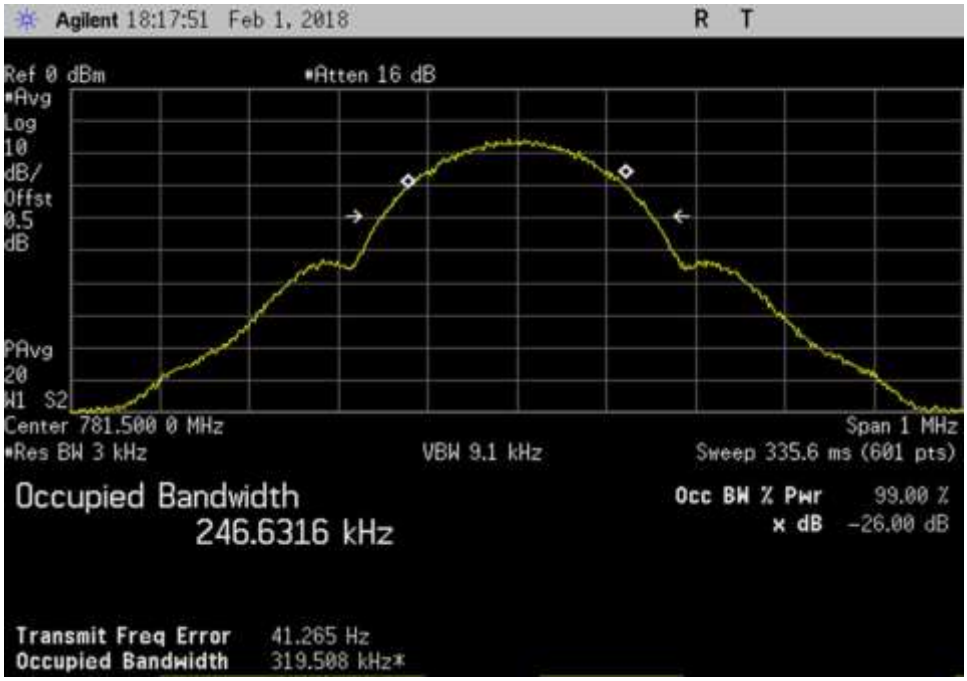


DL_2110-2155_EDGE_ 2132.5MHz

GSM Input

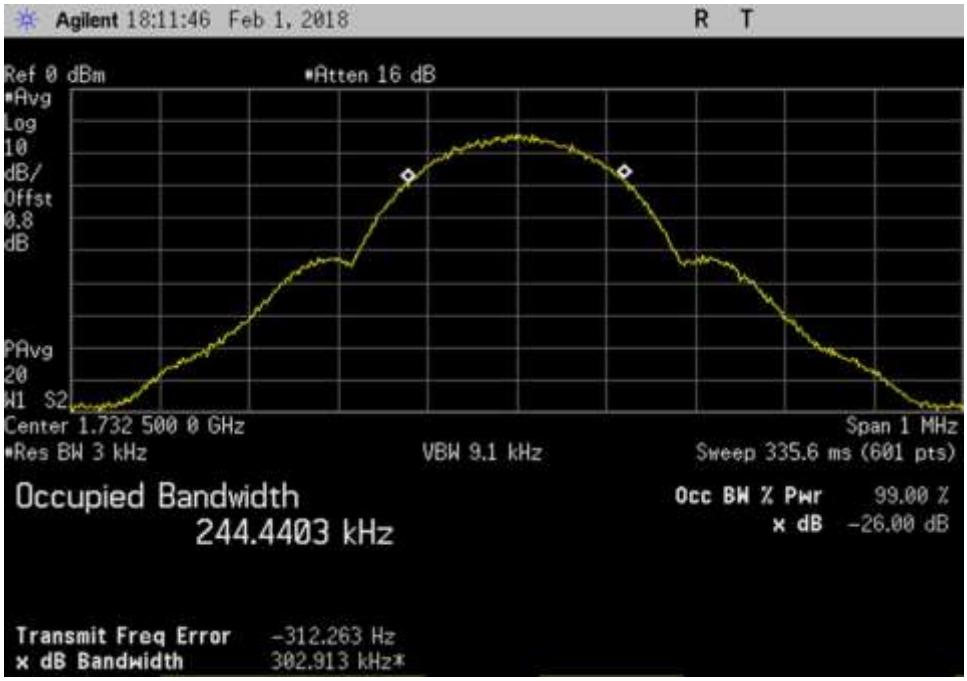


UL_698-716_GSM_ 707MHz

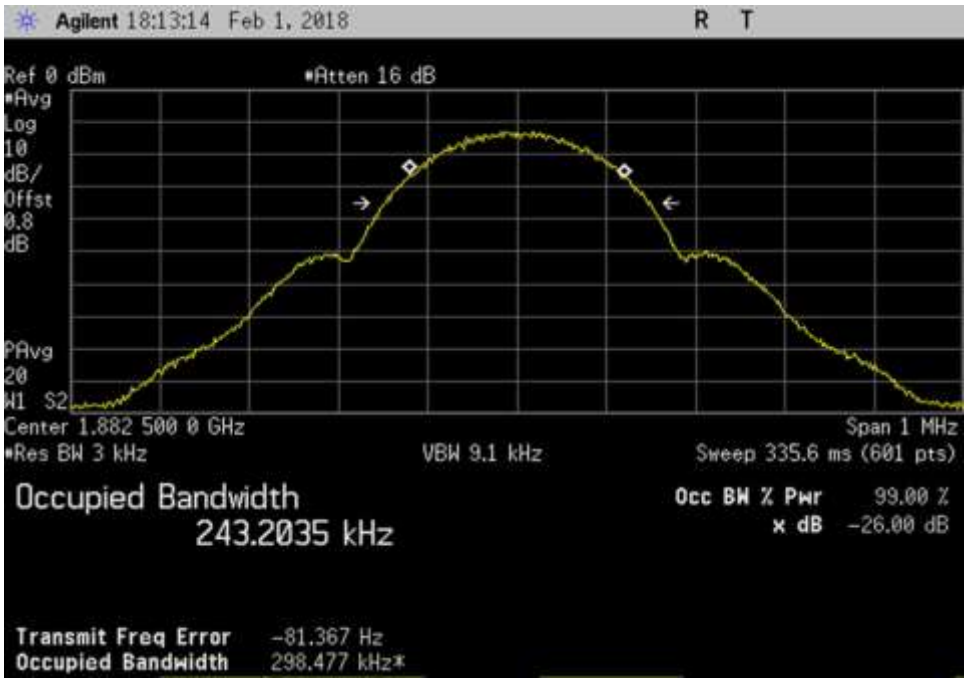


UL_776-787_GSM_ 781.5MHz

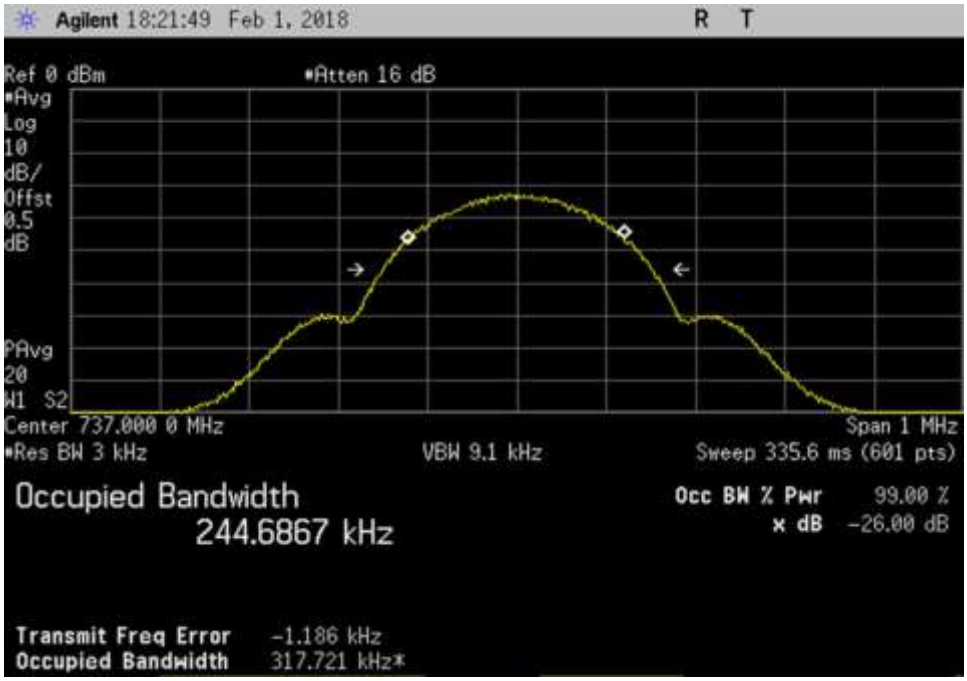
UL_824-849_GSM_ 836.5MHz



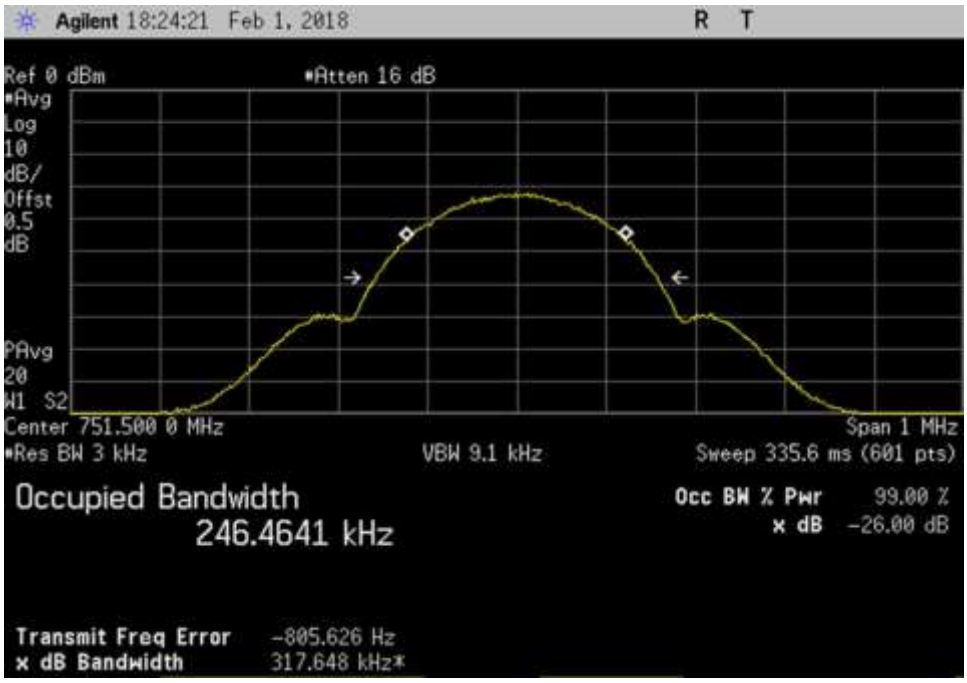
UL_1710-1755_GSM_ 1732.5MHz



UL_1850-1915_GSM_ 1882.5MHz



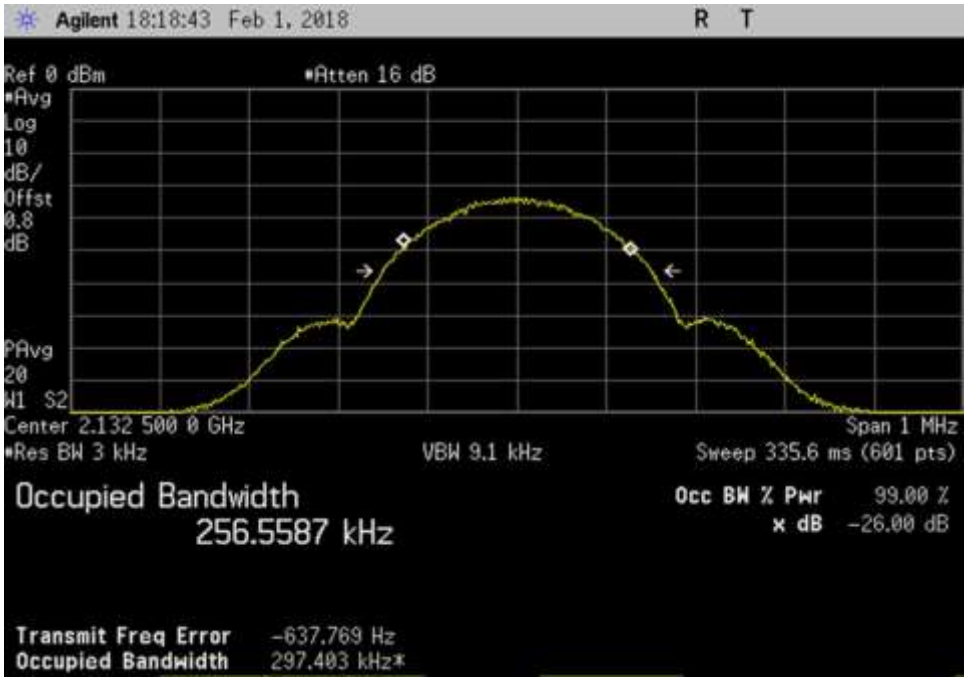
DL_728-746_GSM_ 737MHz



DL_746-757_GSM_ 751.5MHz

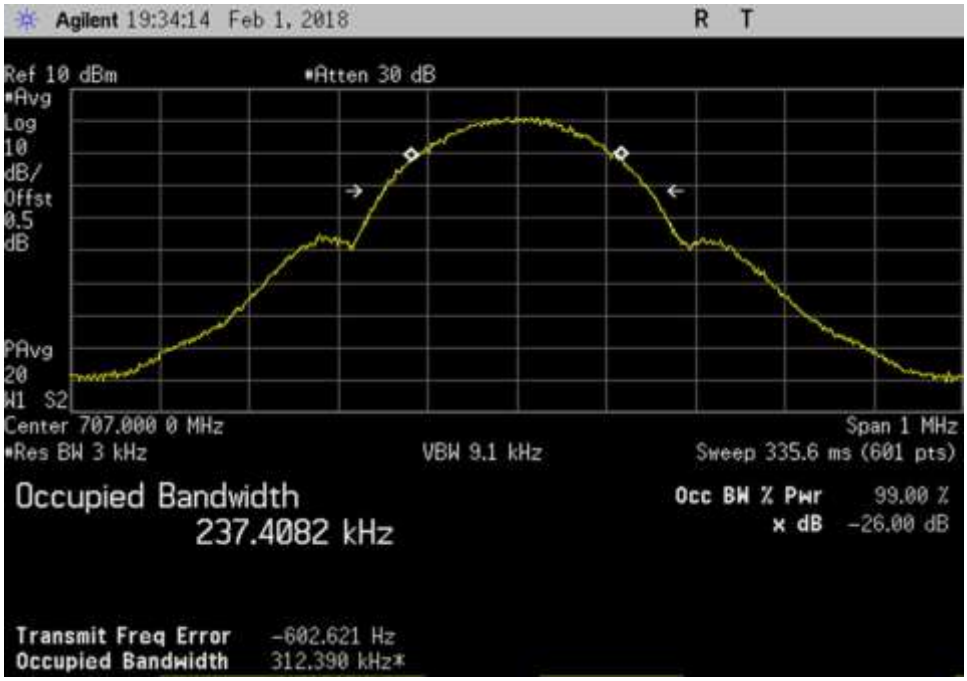
DL_869-894_GSM_ 881.5MHz

DL_1930-1995_GSM_ 1962.5MHz

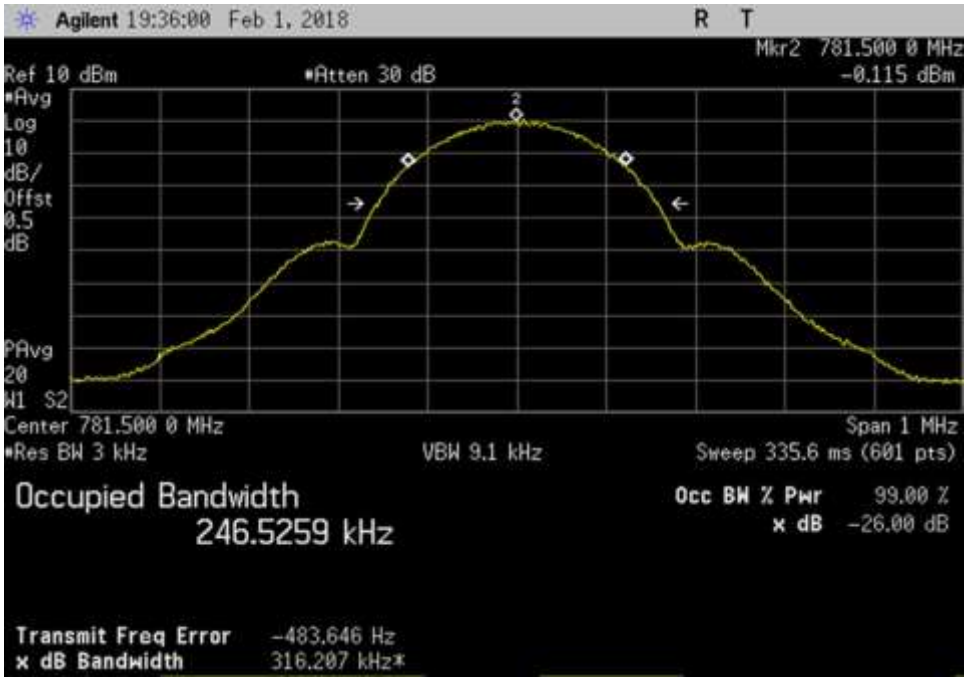


DL_2110-2155_GSM_ 2132.5MHz

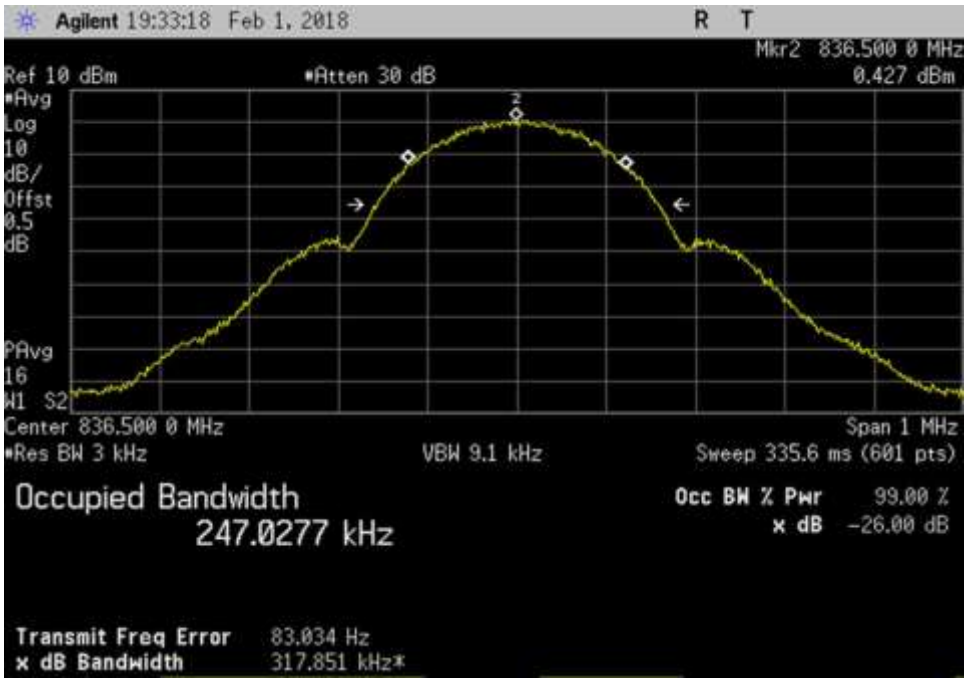
GSM Output



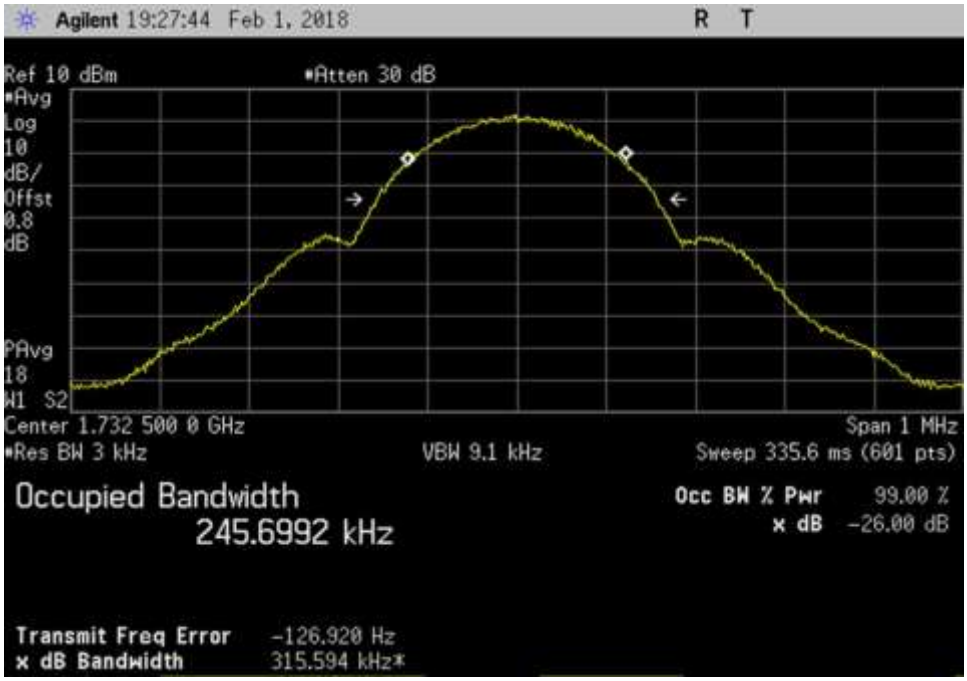
UL_698-716_GSM_ 707MHz



UL_776-787_GSM_ 781.5MHz

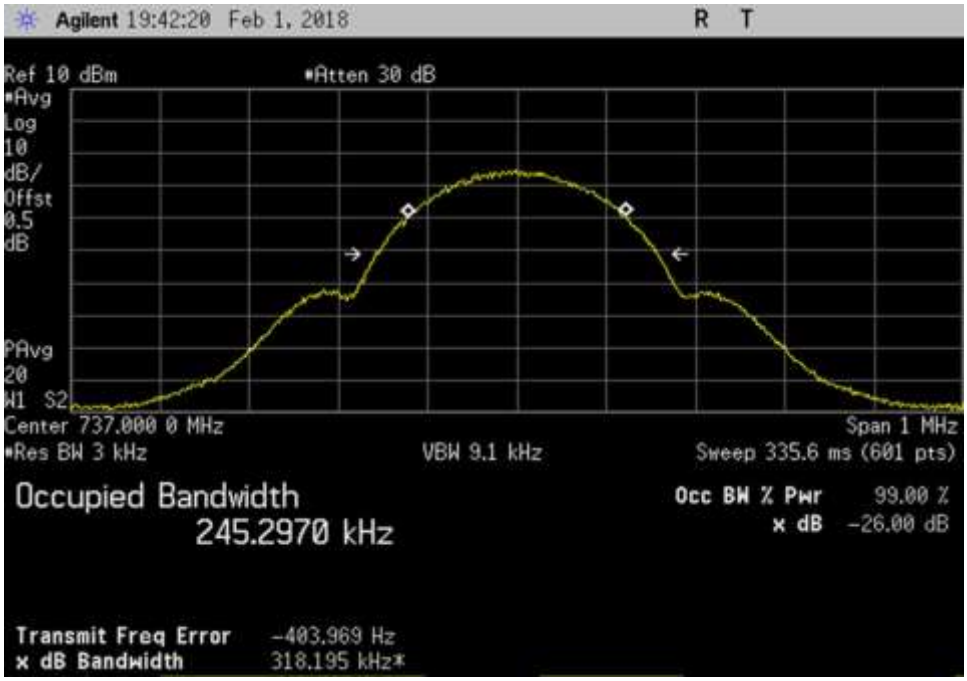


UL_824-849_GSM_ 836.5MHz



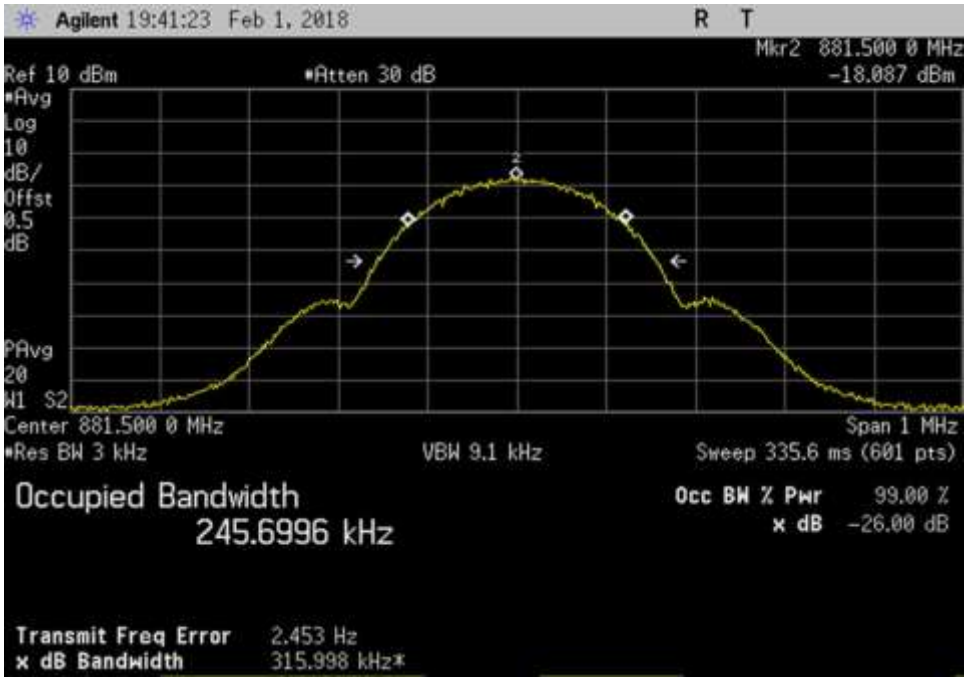
UL_1710-1755_GSM_ 1732.5MHz

UL_1850-1915_GSM_ 1882.5MHz

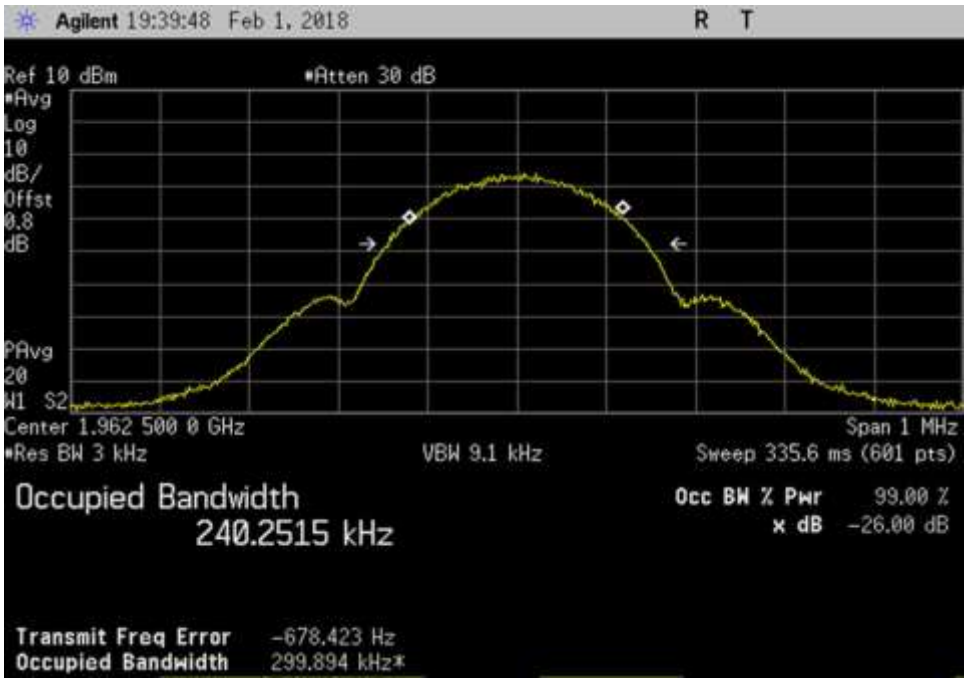


DL_728-746_GSM_ 737MHz

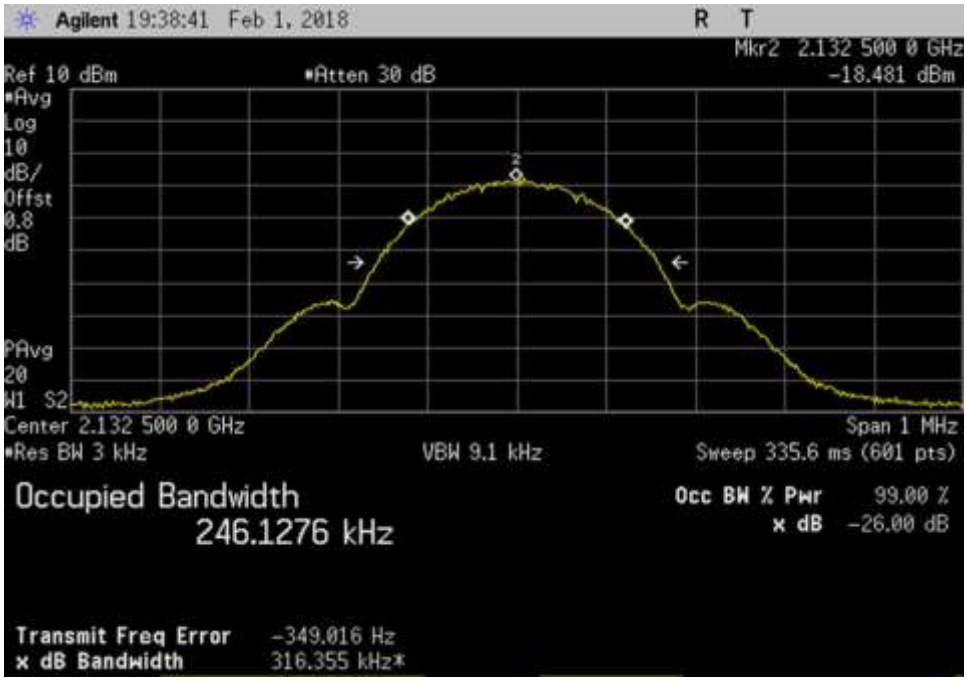
DL_746-757_GSM_ 751.5MHz



DL_869-894_GSM_ 881.5MHz

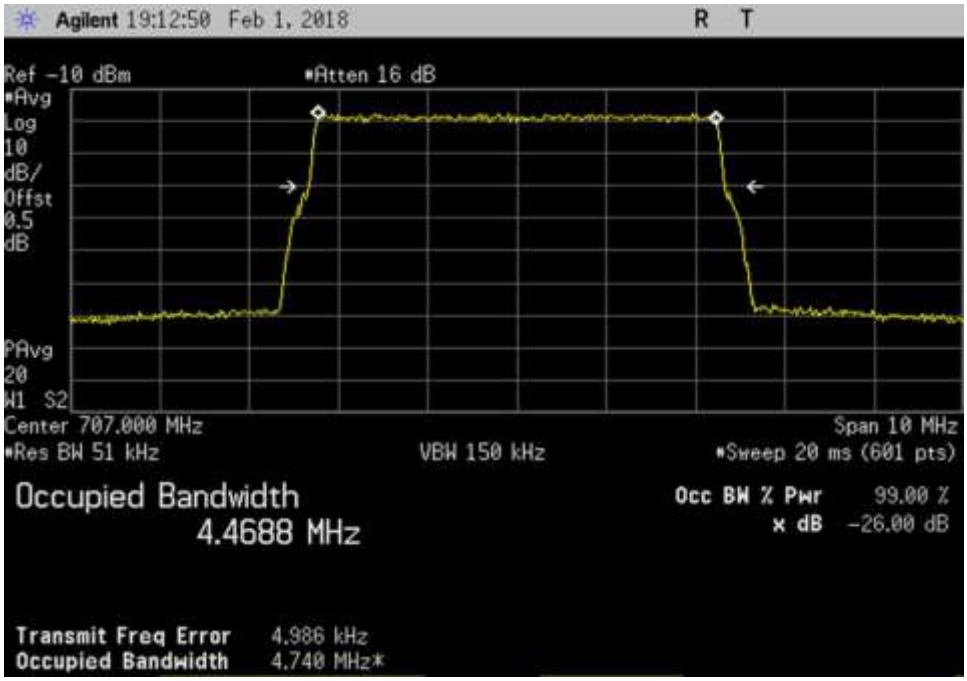


DL_1930-1995_GSM_ 1962.5MHz

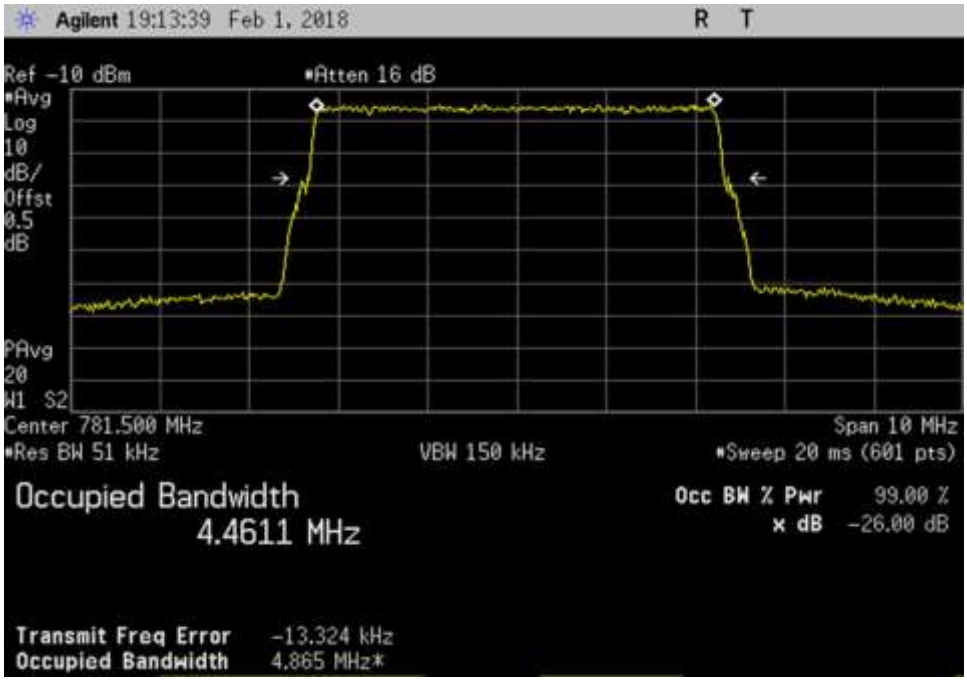


DL_2110-2155_GSM_ 2132.5MHz

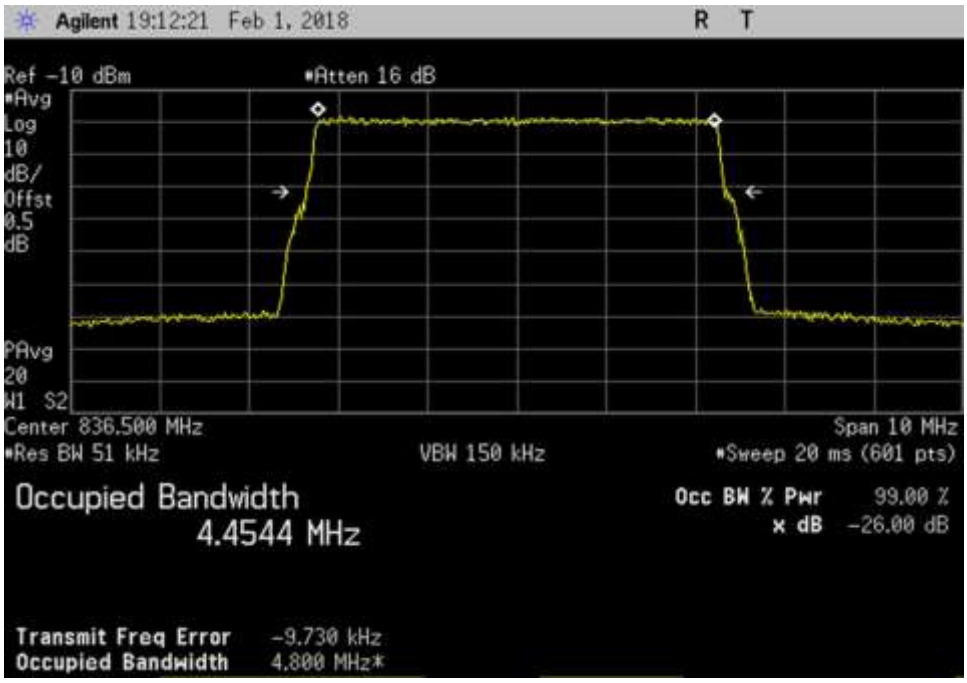
LTE Input



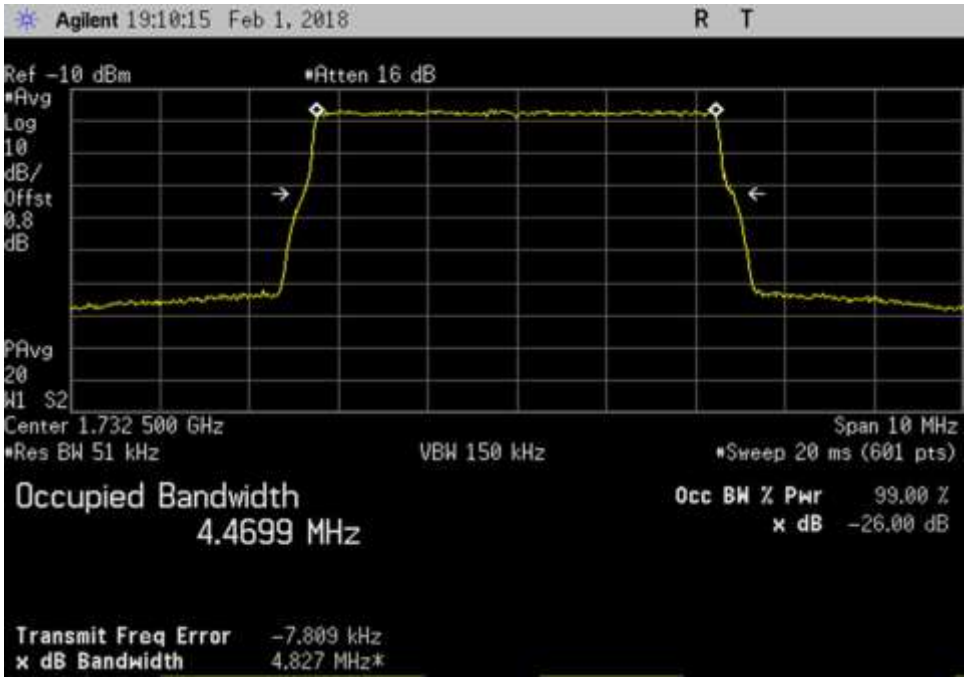
UL_698-716_LTE_ 707MHz



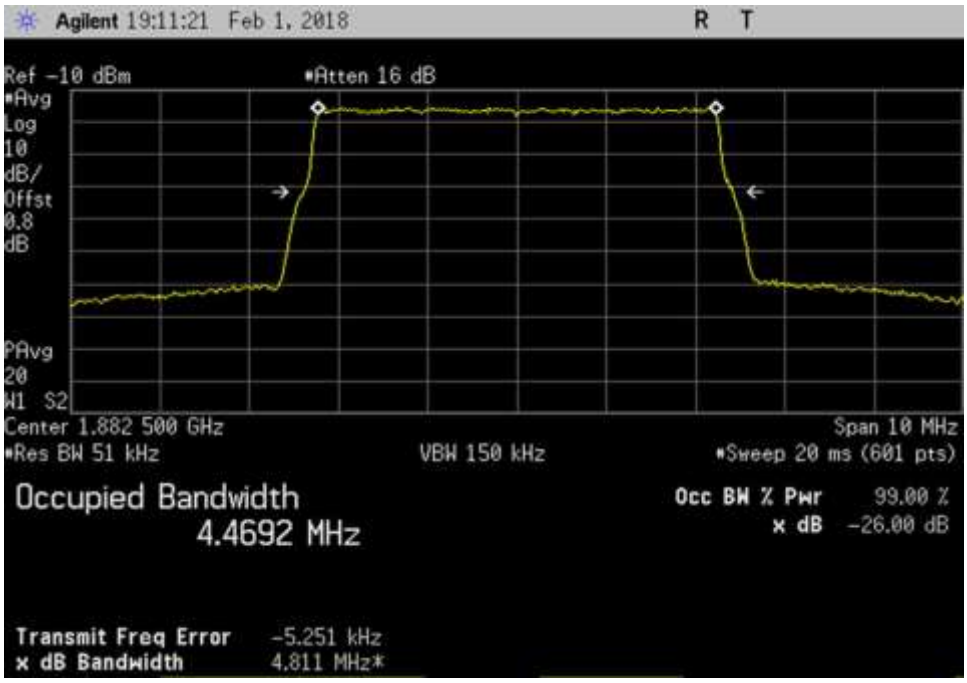
UL_776-787_LTE_ 781.5MHz



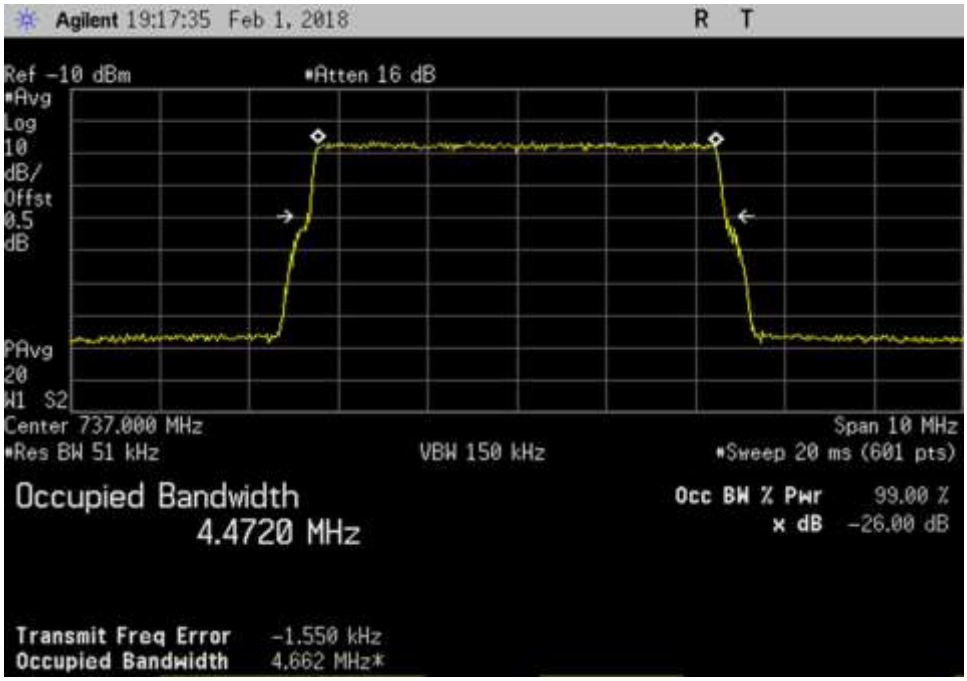
UL_824-849_LTE_ 836.5MHz



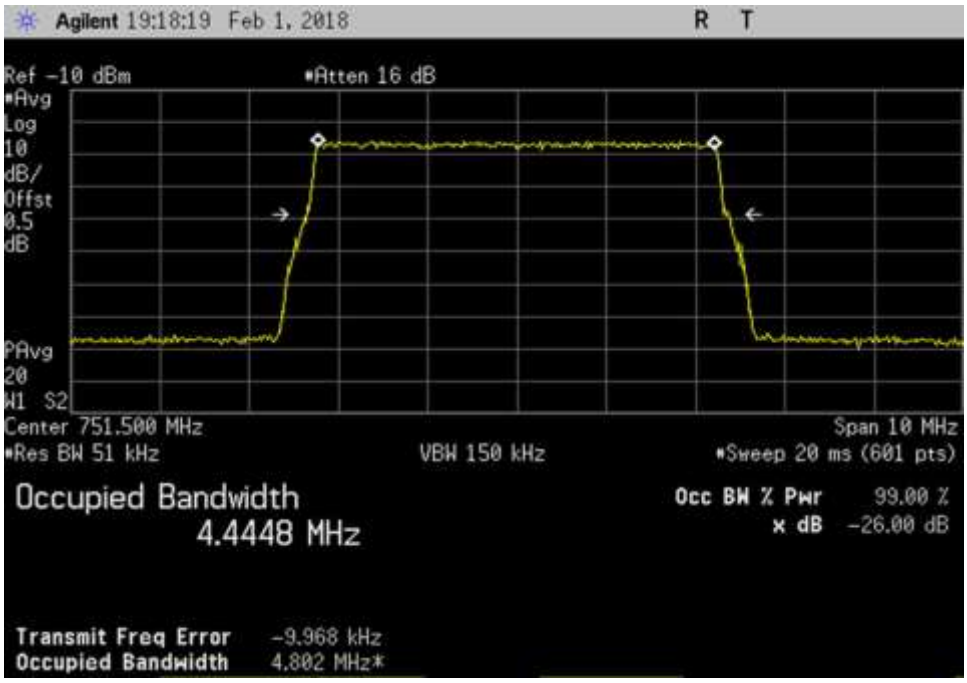
UL_1710-1755_LTE_ 1732.5MHz



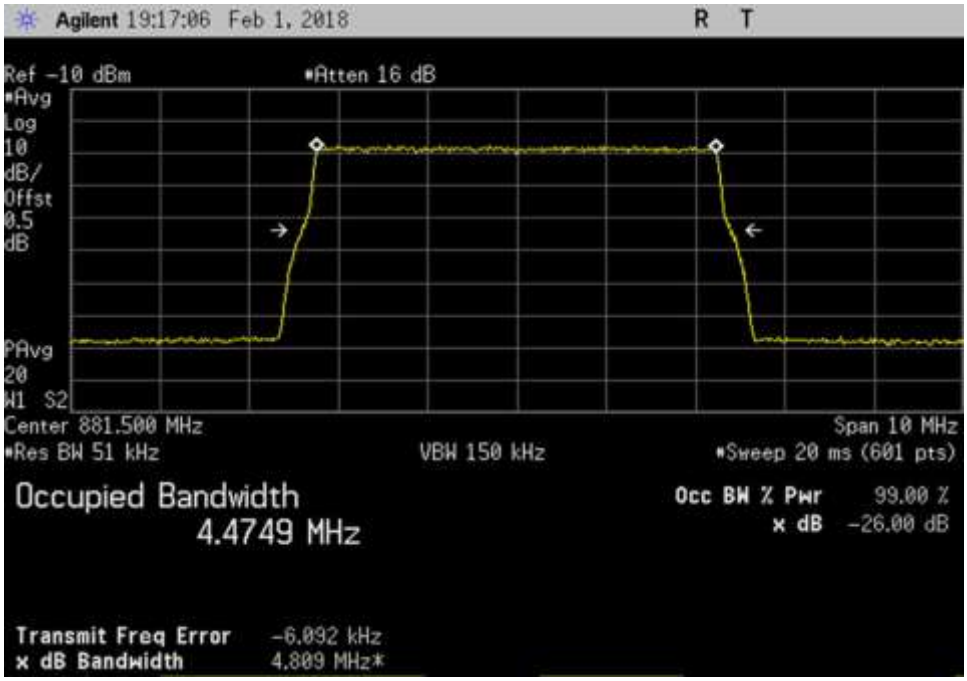
UL_1850-1915_LTE_ 1882.5MHz



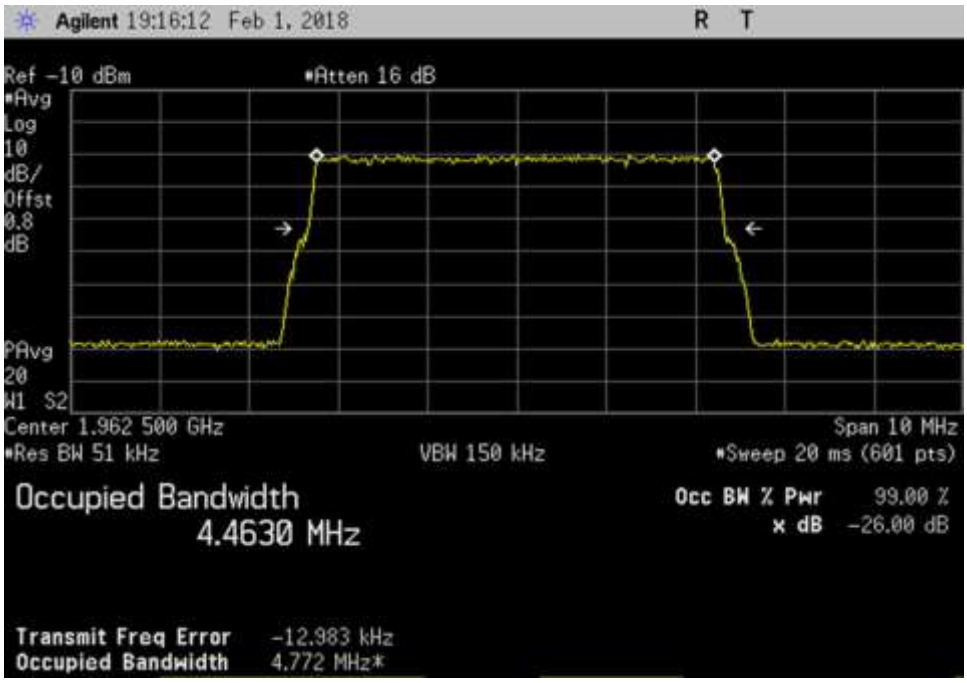
DL_728-746_LTE_ 737MHz



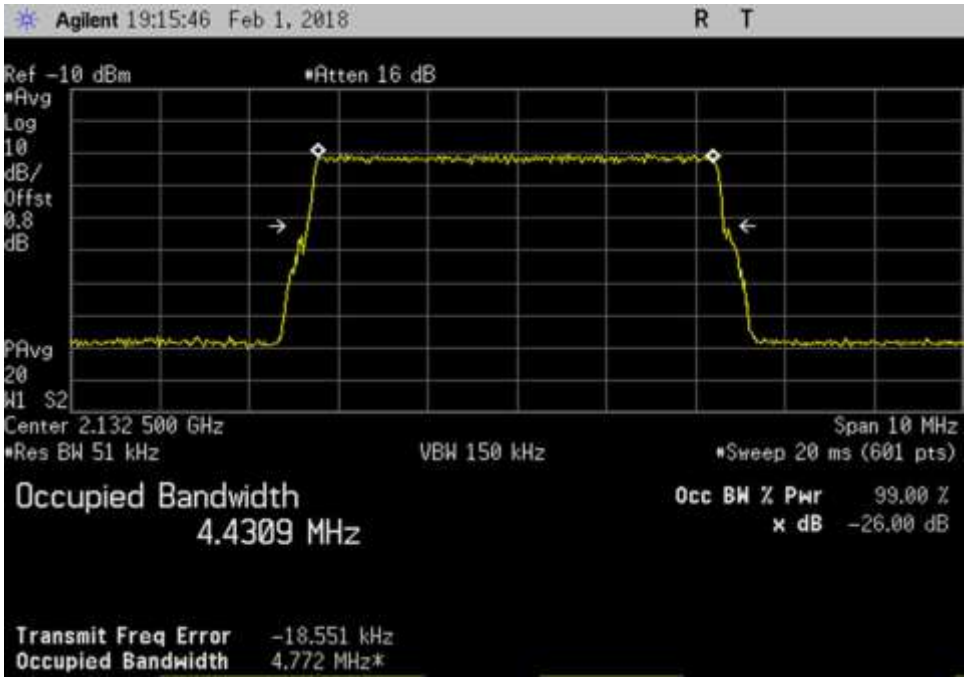
DL_746-757_LTE_ 751.5MHz



DL_869-894_LTE_ 881.5MHz

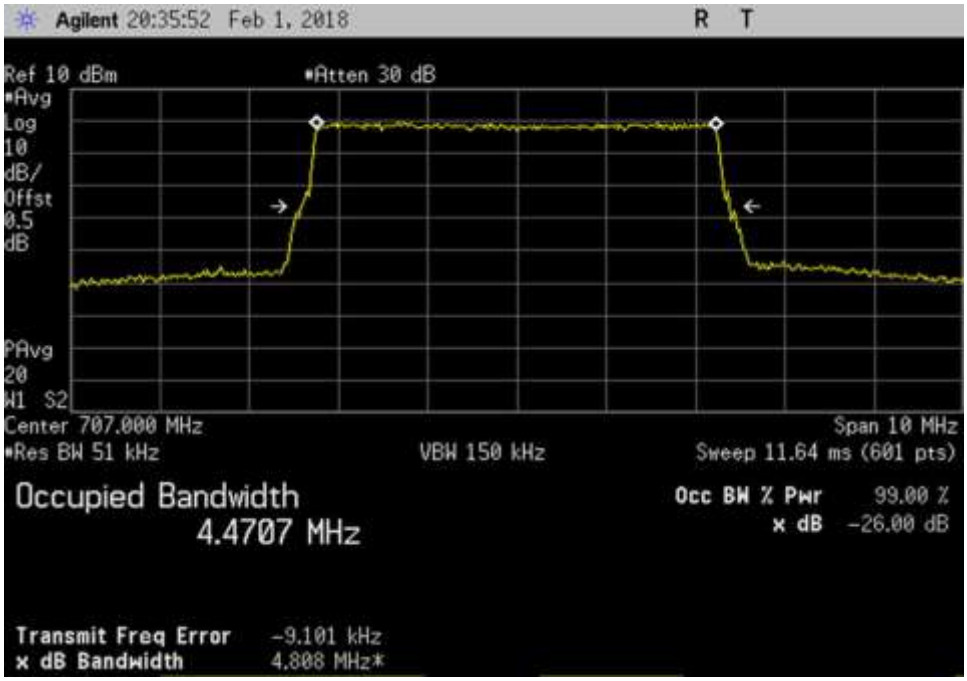


DL_1930-1995_LTE_ 1962.5MHz

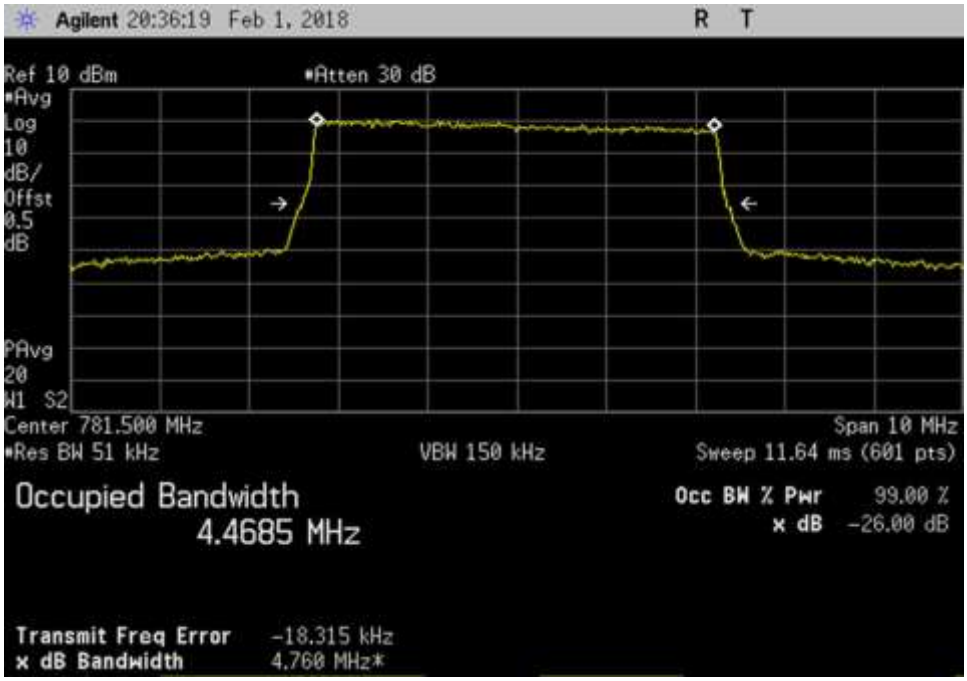


DL_2110-2155_LTE_ 2132.5MHz

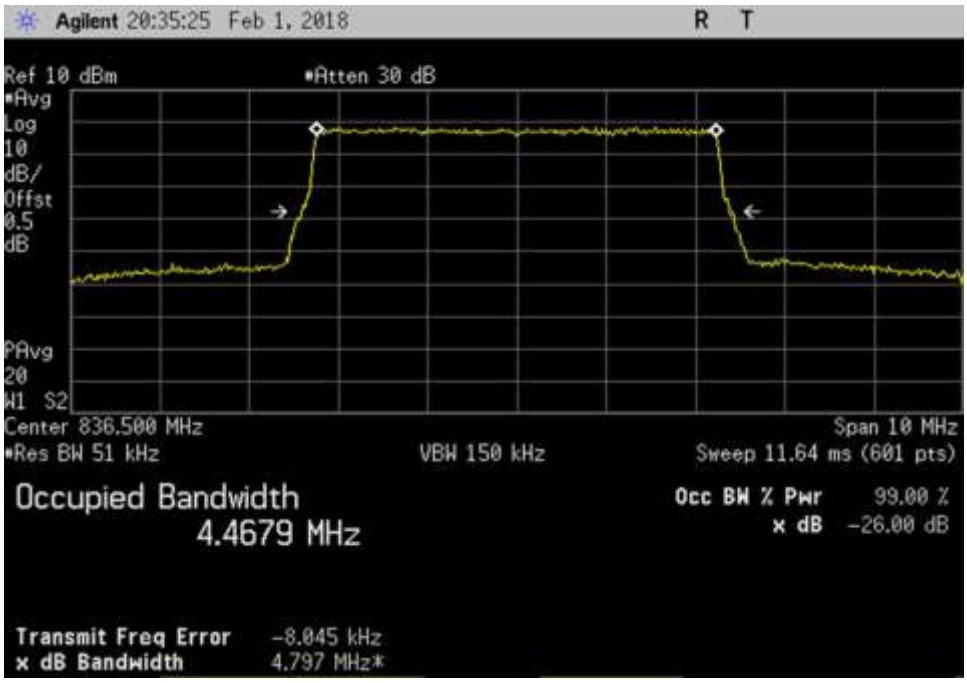
LTE Output



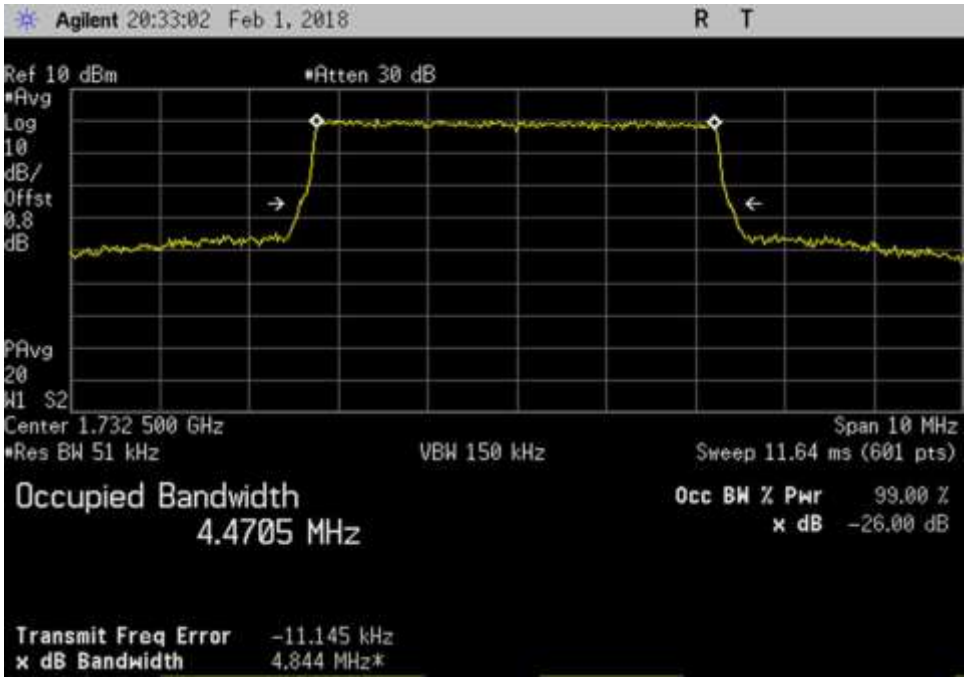
UL_698-716_LTE_ 707MHz



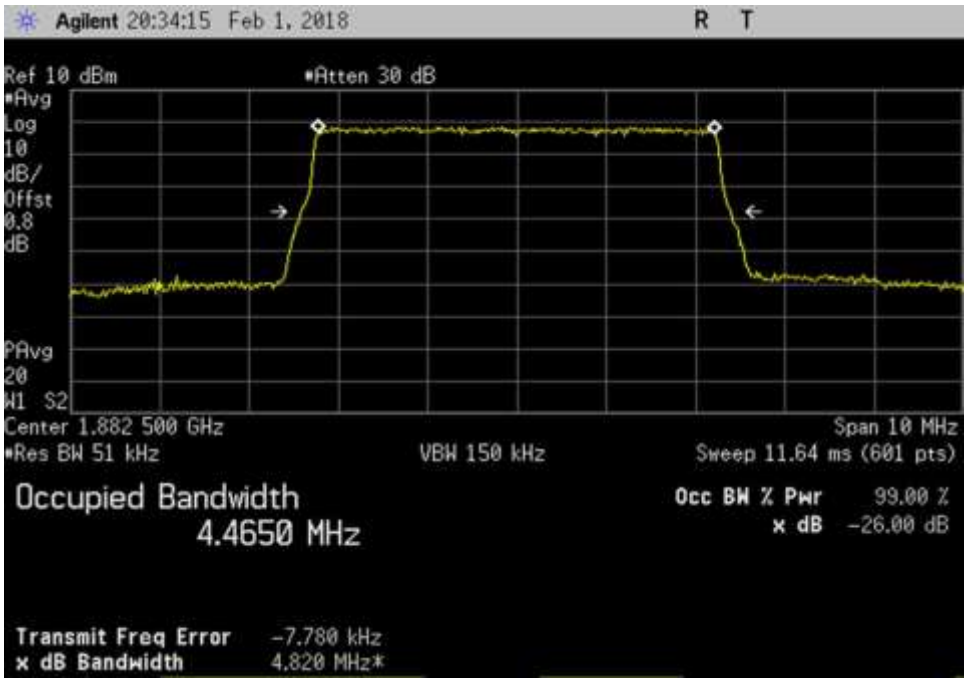
UL_776-787_LTE_ 781.5MHz



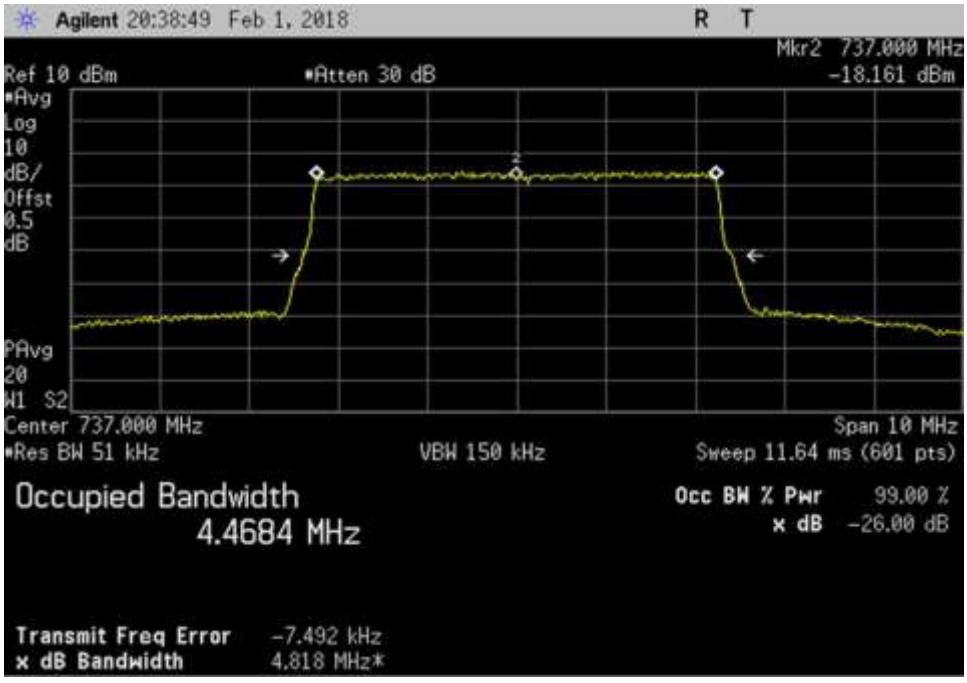
UL_824-849_LTE_ 836.5MHz



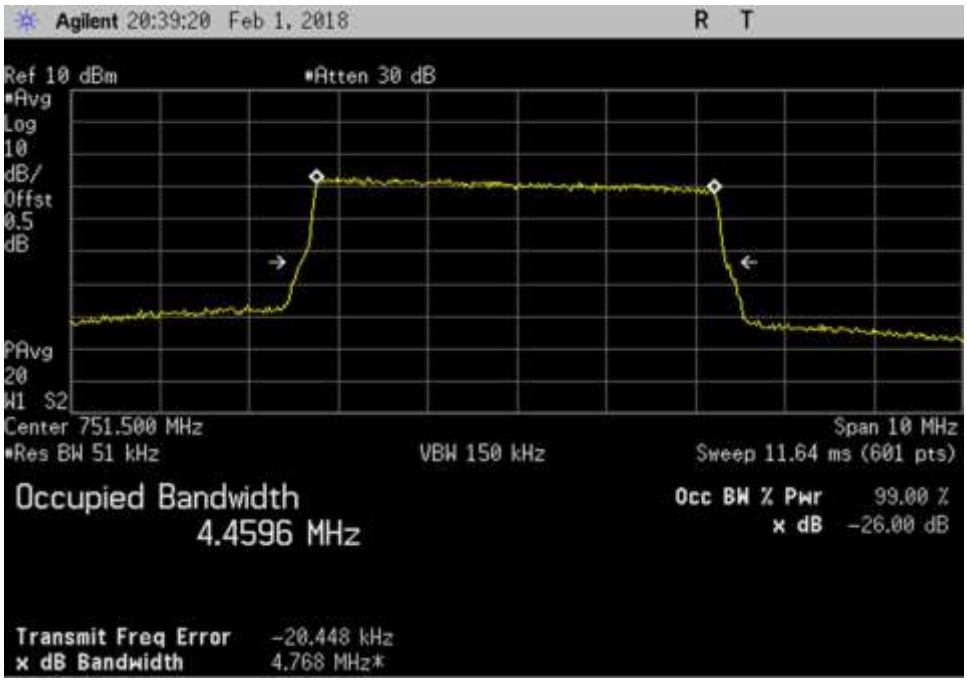
UL_1710-1755_LTE_ 1732.5MHz



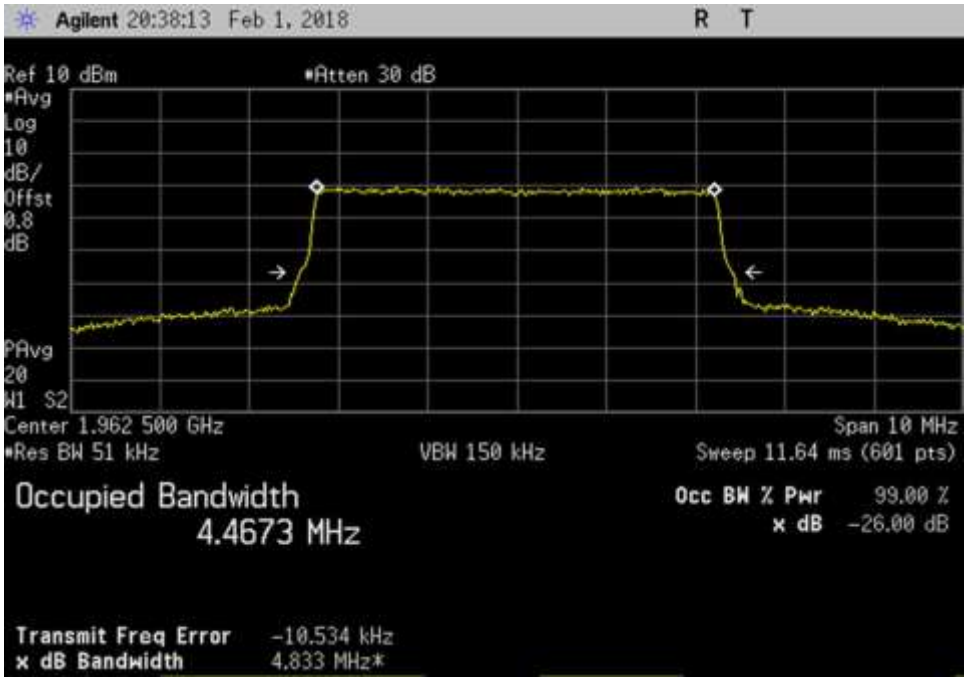
UL_1850-1915_LTE_ 1882.5MHz



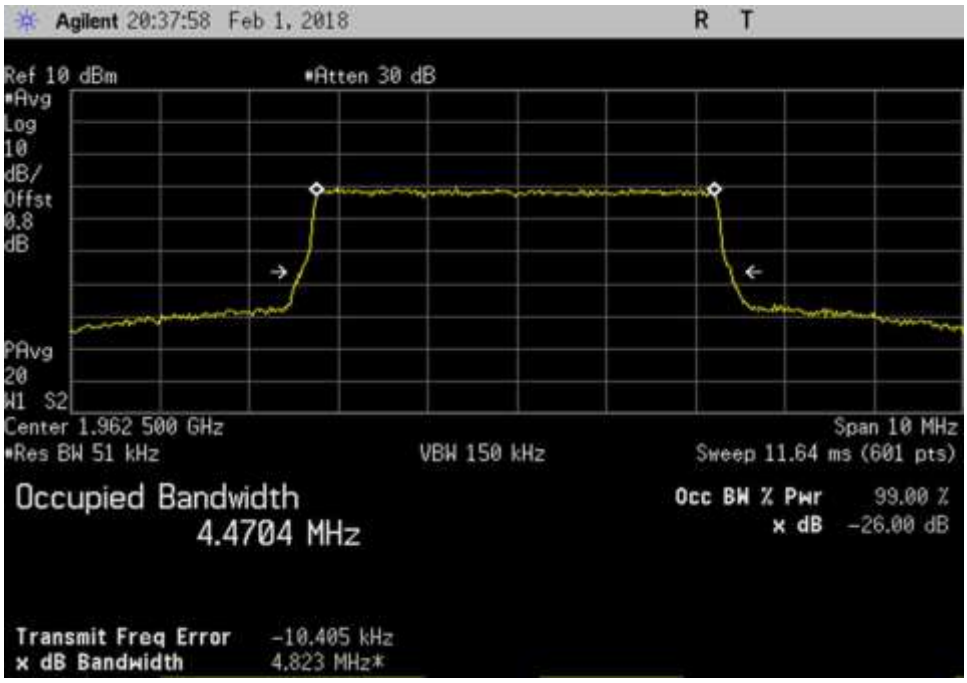
DL_728-746_LTE_ 737MHz



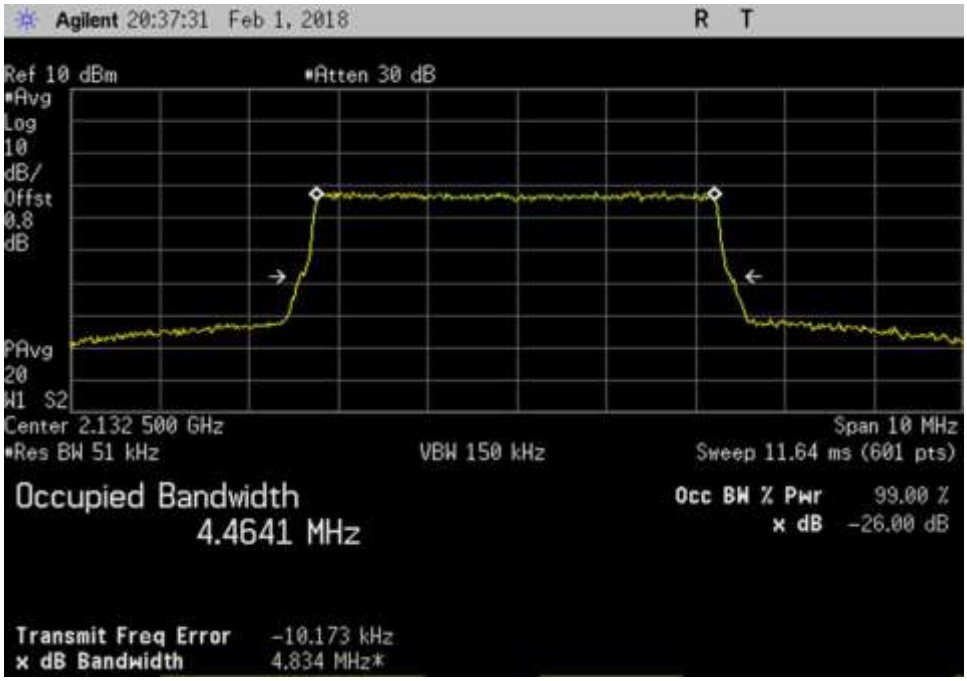
DL_746-757_LTE_ 751.5MHz



DL_869-894_LTE_ 1962.5MHz

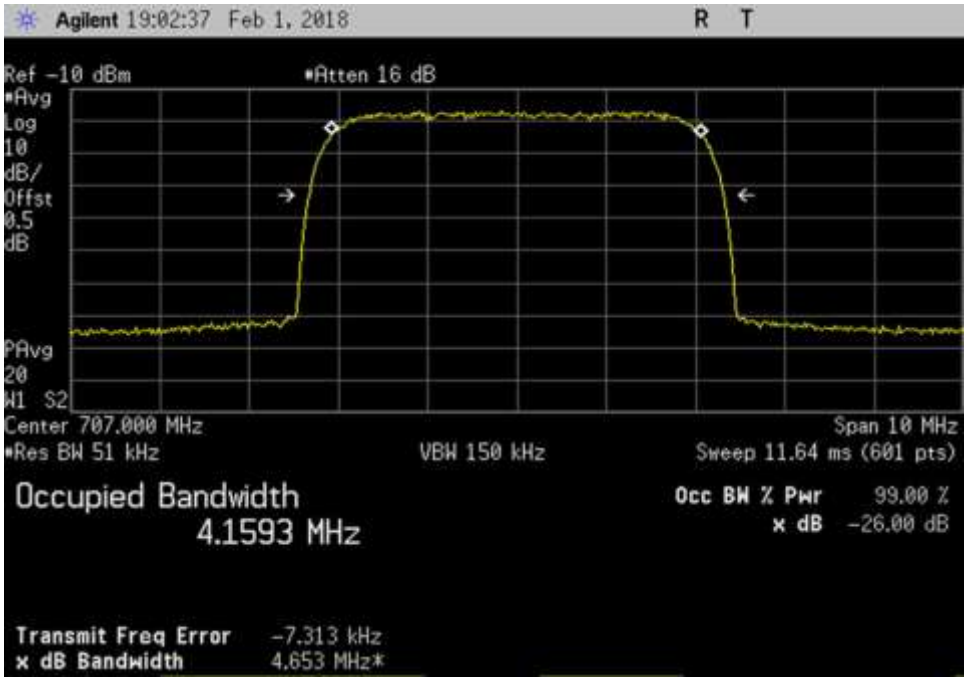


DL_1930-1995_LTE_ 1962.5MHz

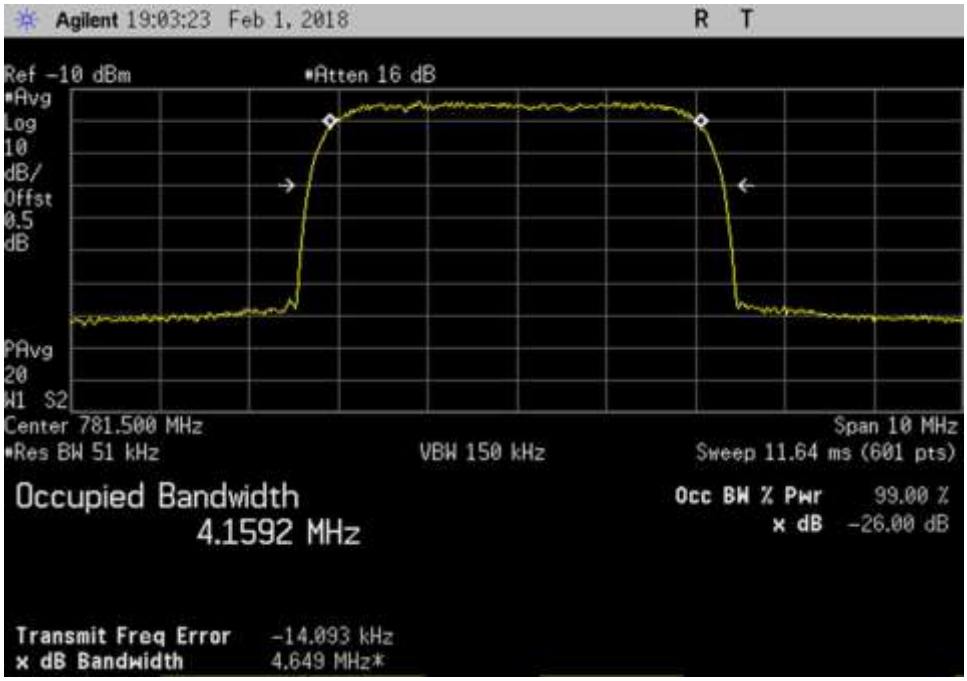


DL_2110-2155_LTE_ 2132.5MHz

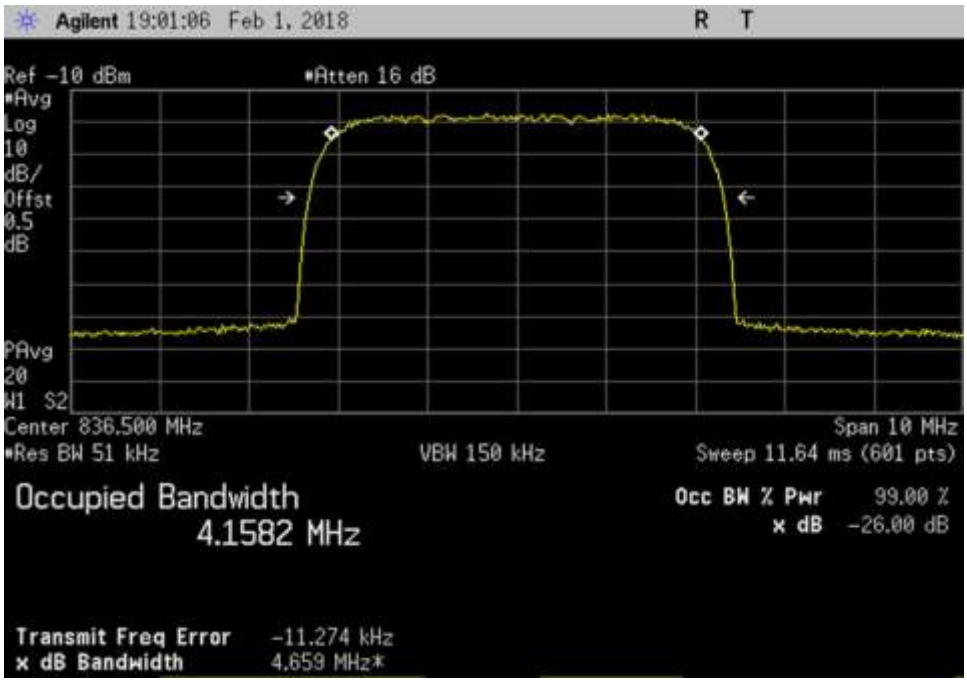
WCDMA Input



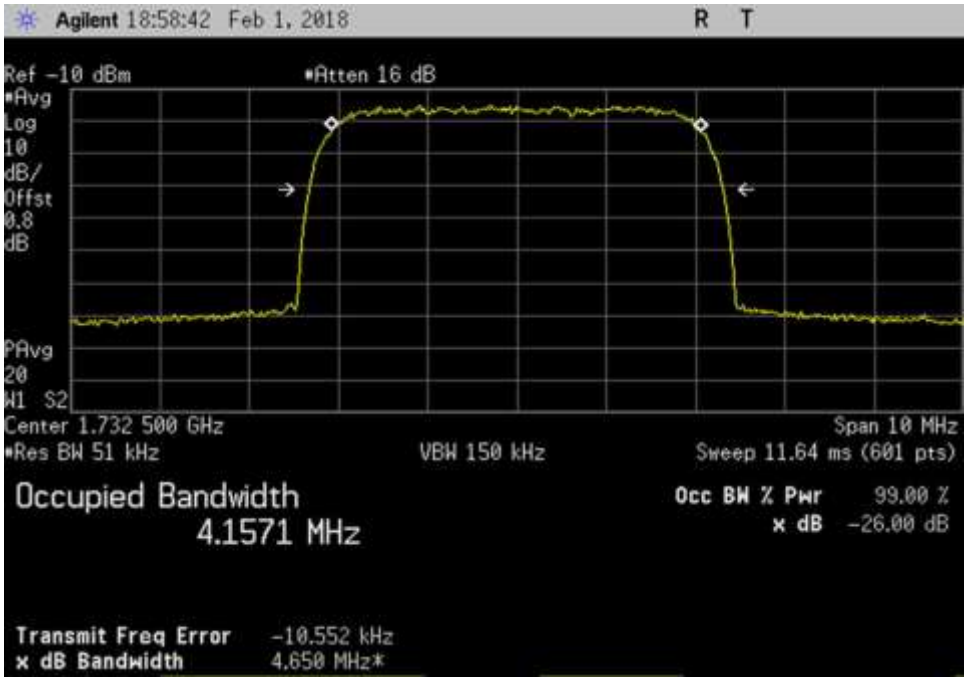
UL_698-716_WCDMA_ 707MHz



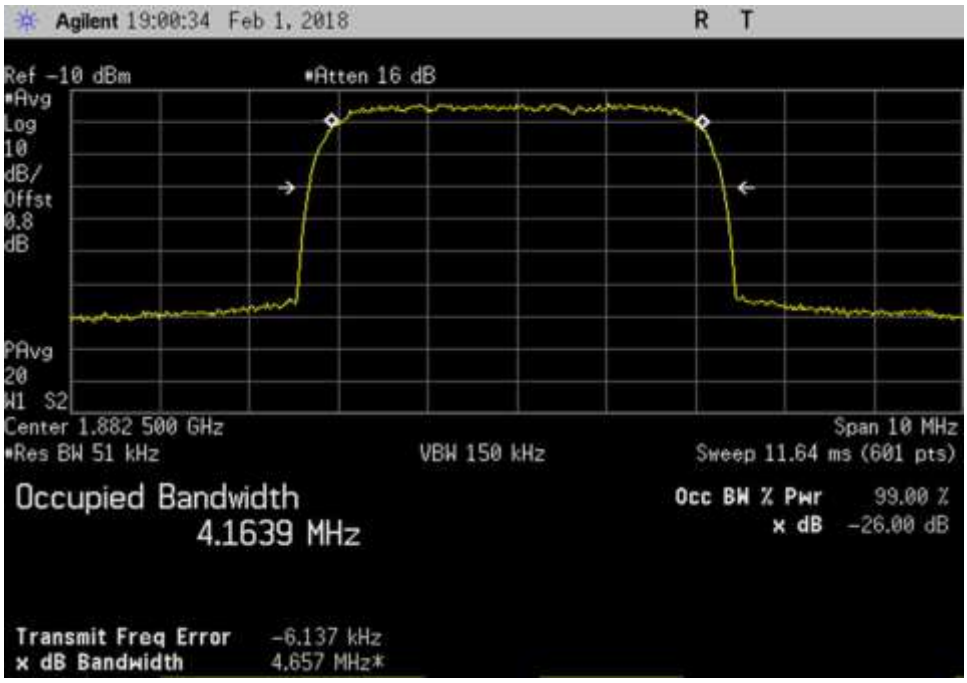
UL_776-787_WCDMA_ 781.5MHz



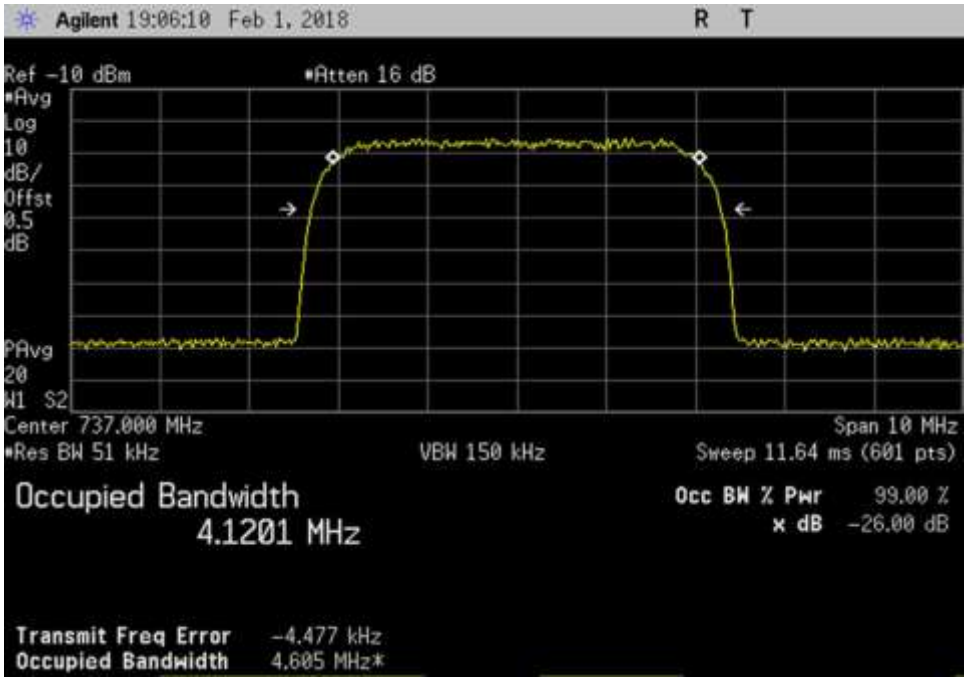
UL_824-849_WCDMA_ 836.5MHz



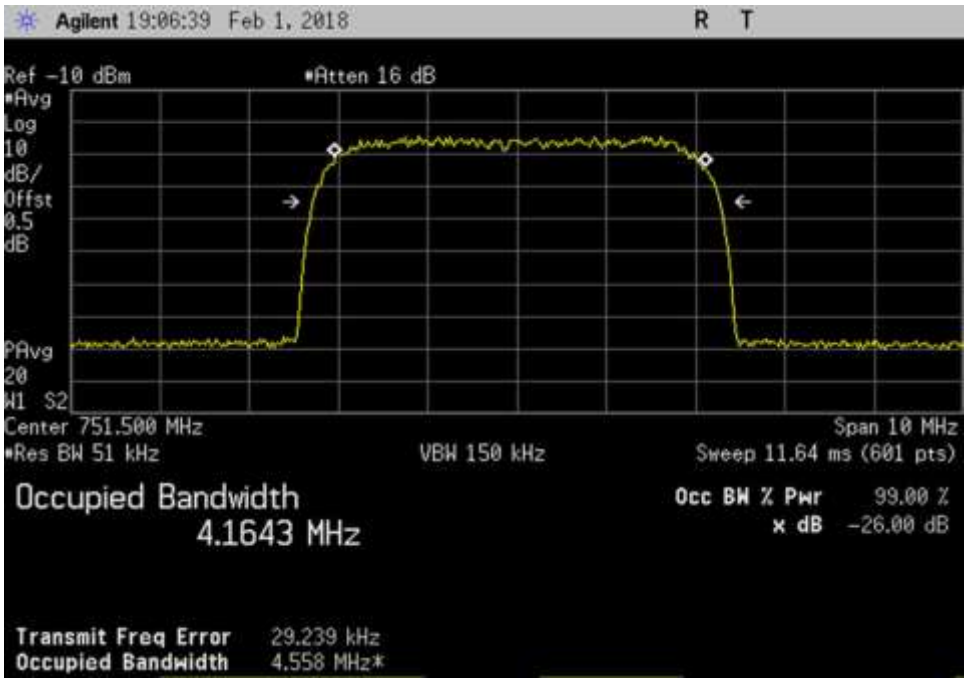
UL_1710-1755_WCDMA_ 1732.5MHz



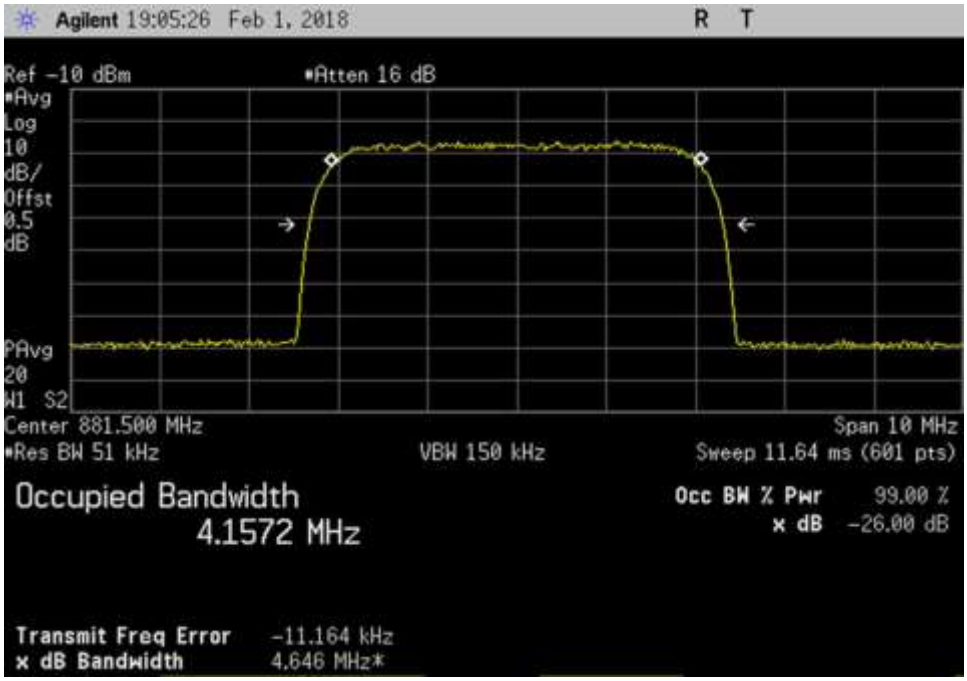
UL_1850-1915_WCDMA_ 1882.5MHz



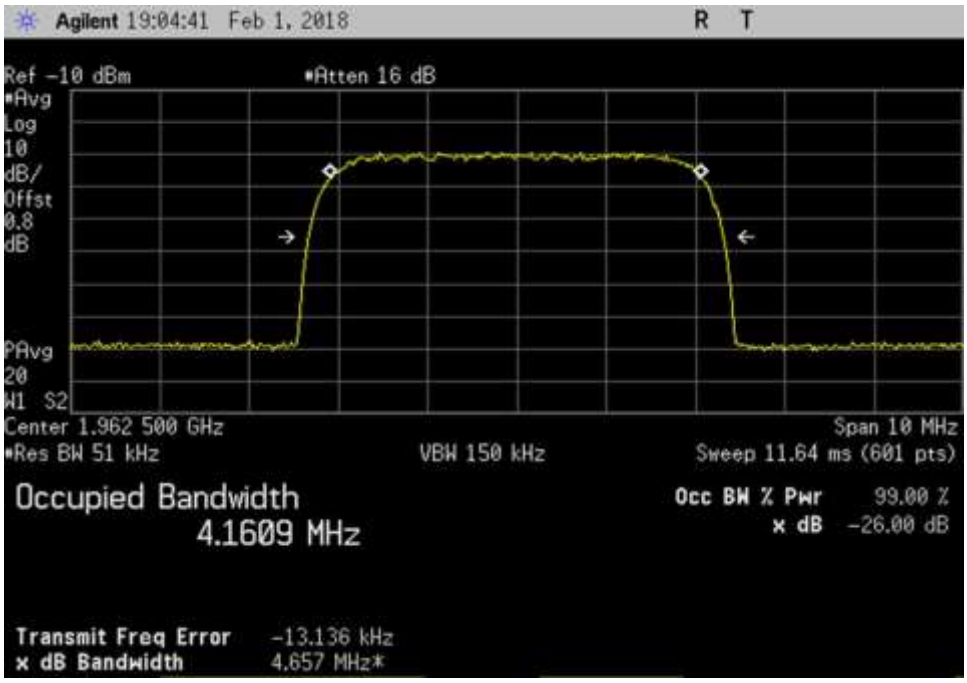
DL_728-746_WCDMA_ 737MHz



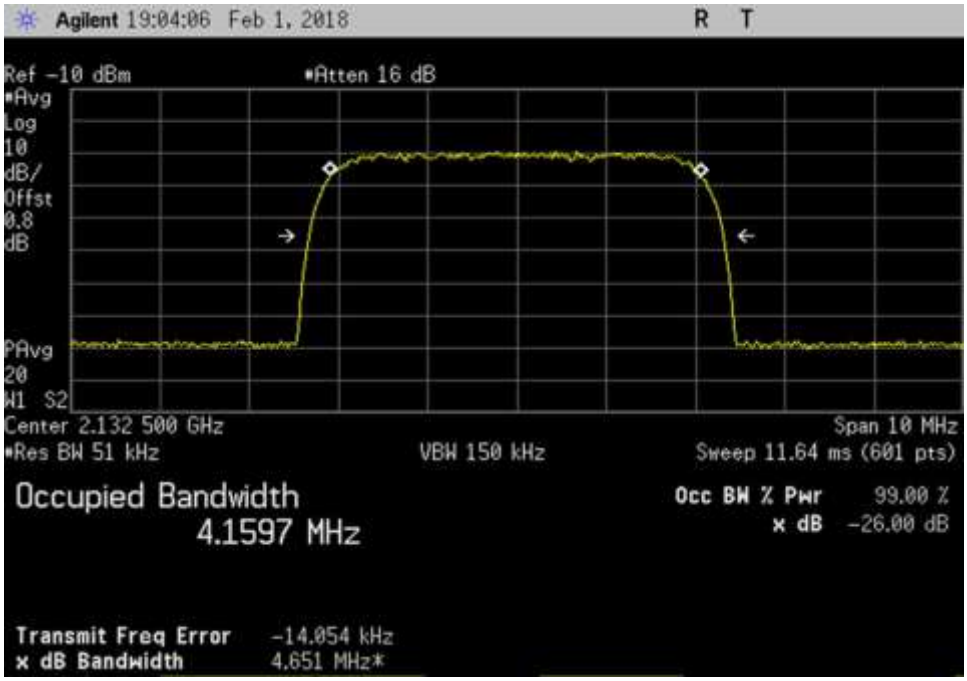
DL_746-757_WCDMA_ 751.5MHz



DL_869-894_WCDMA_ 881.5MHz

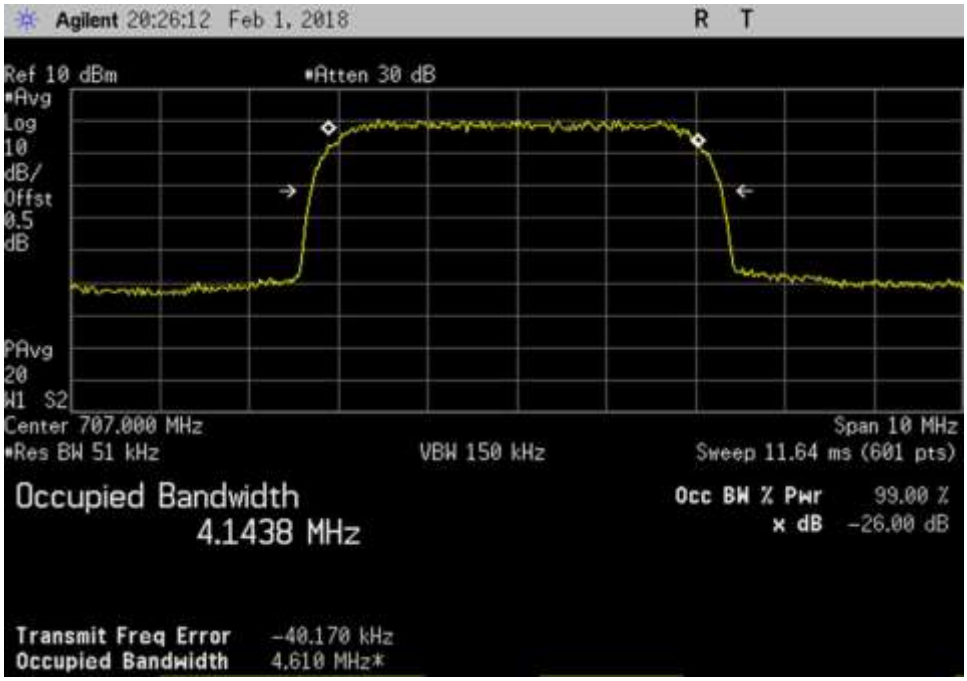


DL_1930-1995_WCDMA_ 1962.5MHz

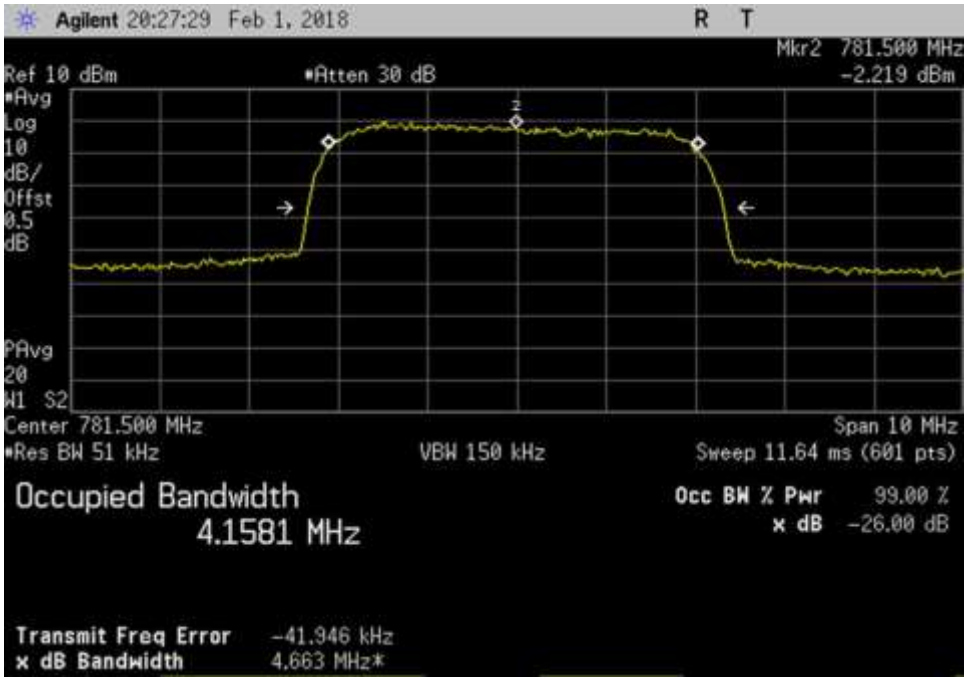


DL_2110-2155_WCDMA_ 2132.5MHz

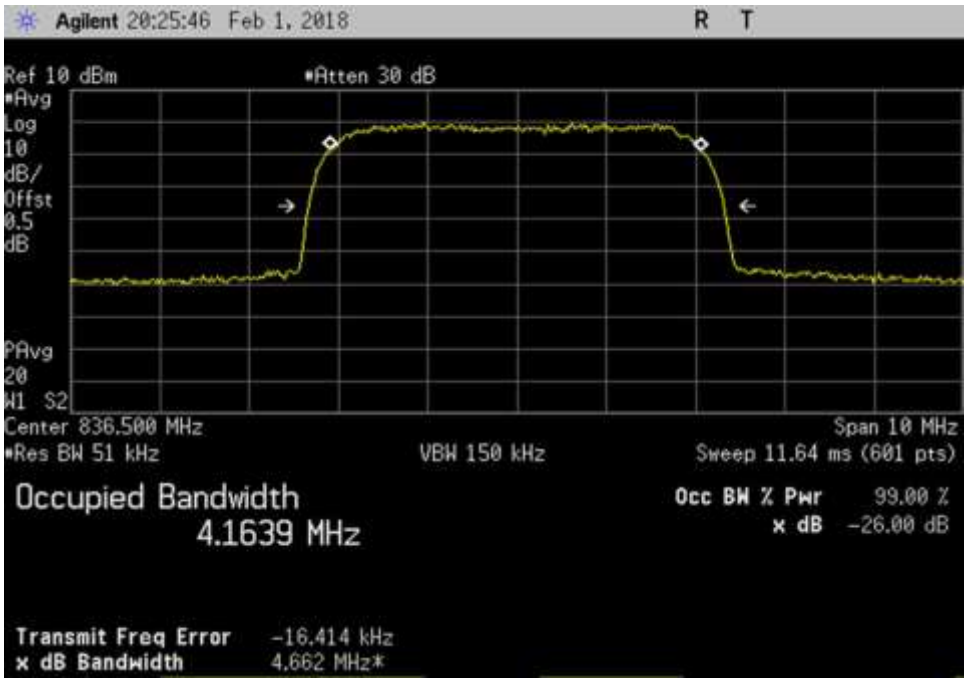
WCDMA Output



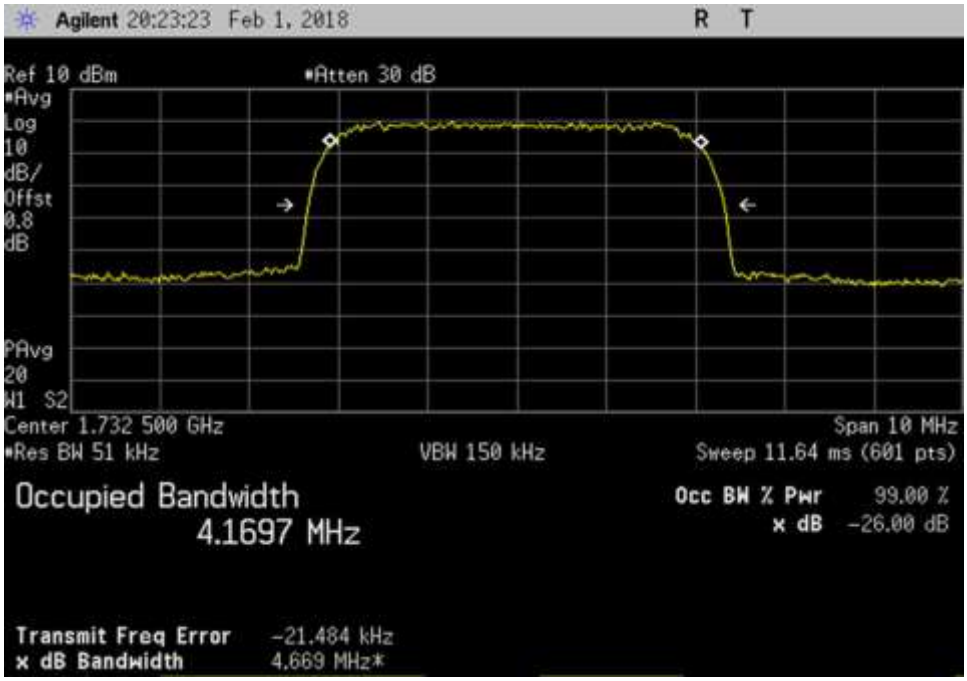
UL_698-716_WCDMA_ 707MHz



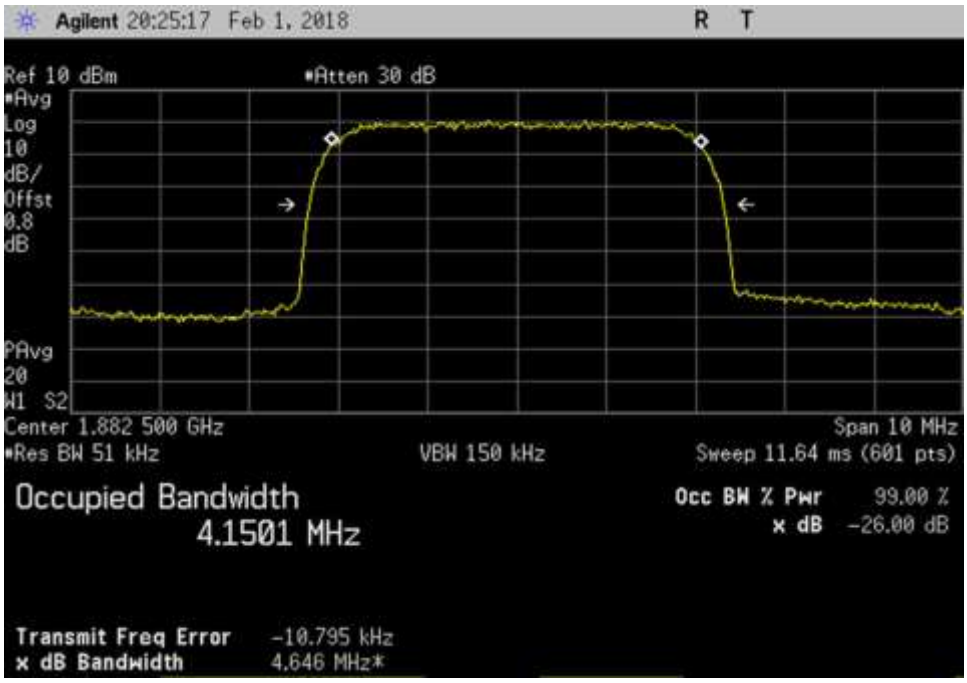
UL_776-787_WCDMA_ 781.5MHz



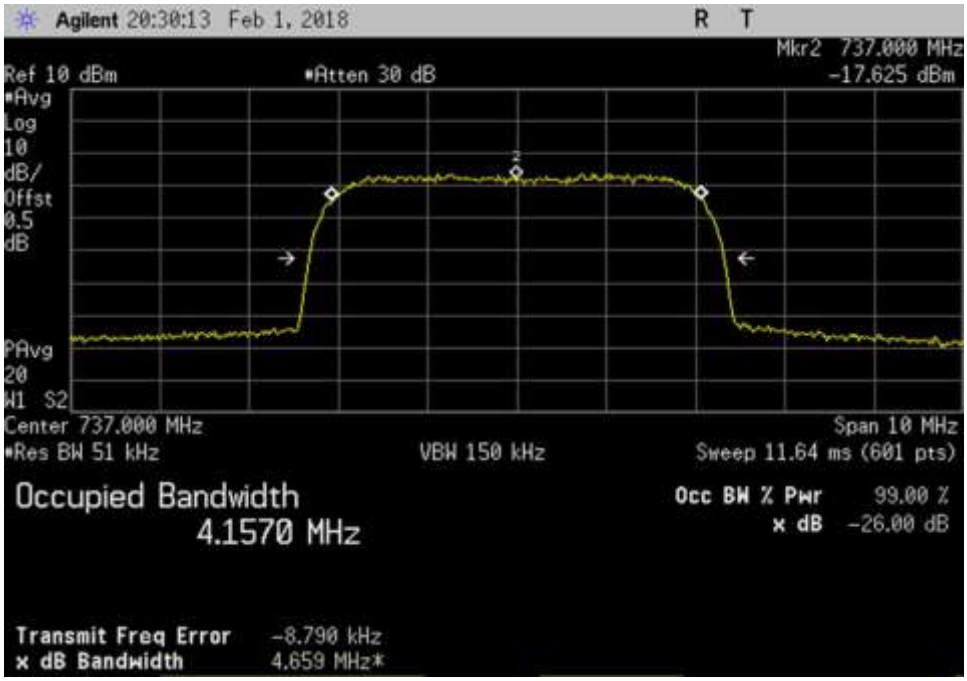
UL_824-849_WCDMA_ 836.5MHz



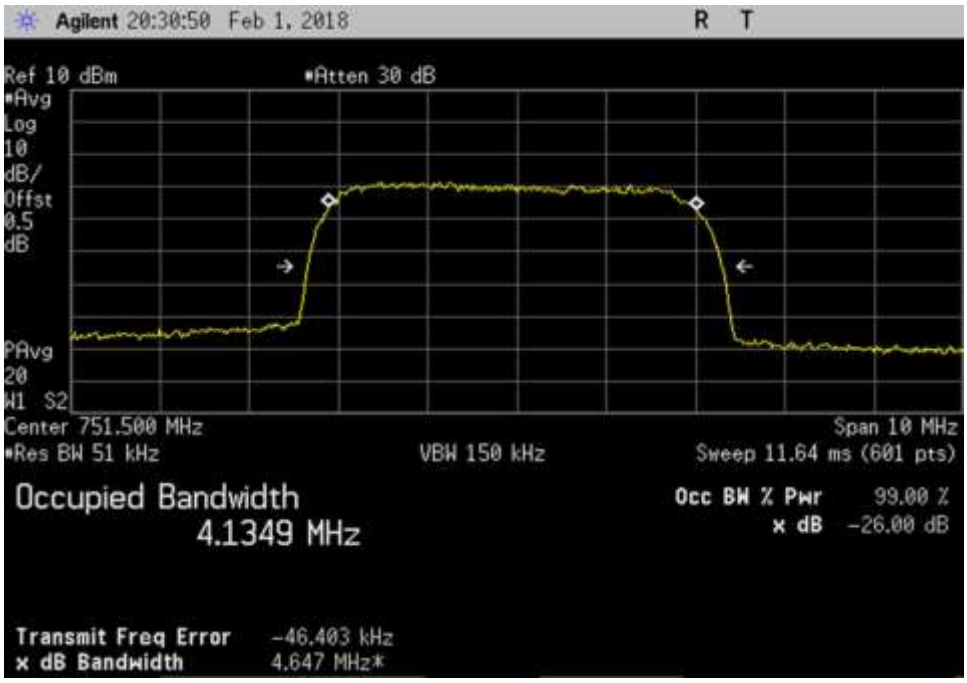
UL_1710-1755_WCDMA_ 1732.5MHz



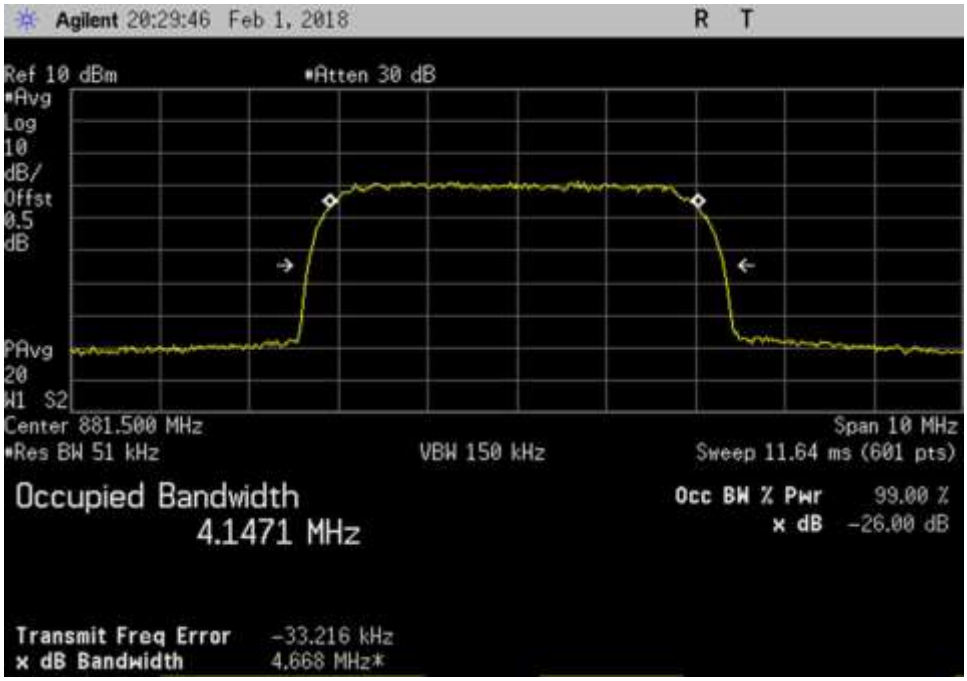
UL_1850-1915_WCDMA_ 1882.5MHz



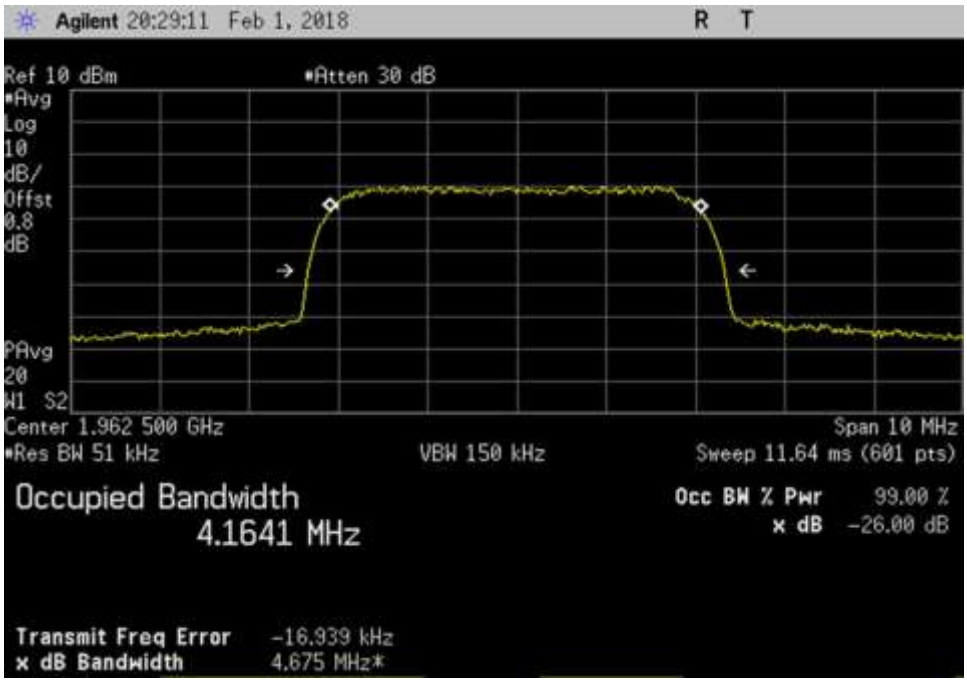
DL_728-746_WCDMA_ 737MHz



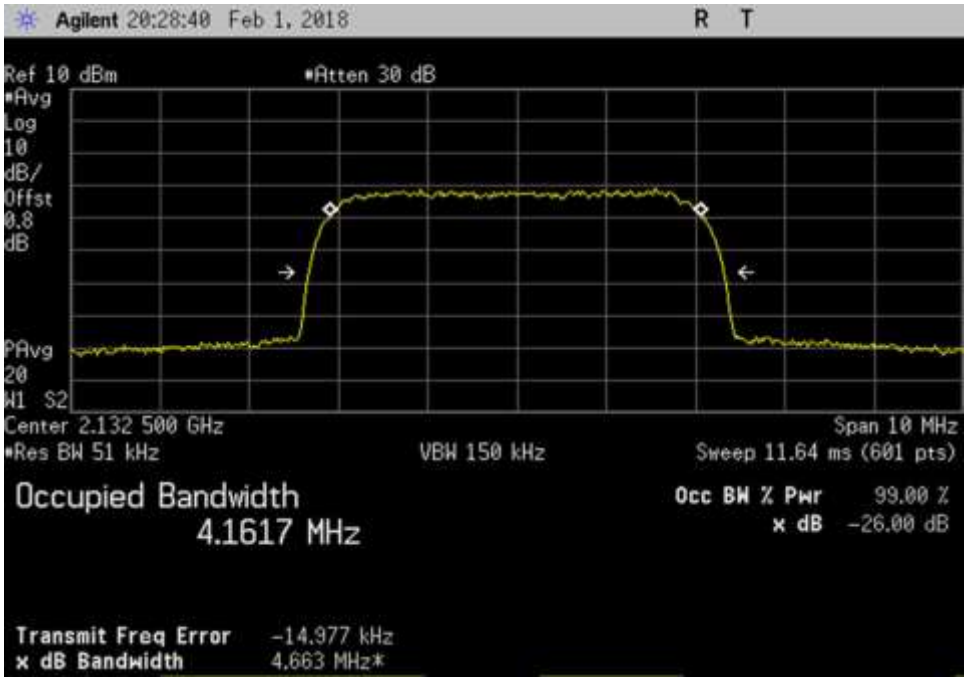
DL_746-757_WCDMA_ 751.5MHz



DL_869-894_WCDMA_ 881.5MHz



DL_1930-1995_WCDMA_ 1962.5MHz



DL_2110-2155_WCDMA_ 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 #:	**100826**	Date:	2/1/2018
Test Type:	**Conducted Emissions**	Time:	8:27:00 AM
Tested By:	E. Wong	Sequence#:	1
Software:	EMITest 5.03.11		12VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Note:
- +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	Model	Calibration Date	Cal Due Date
03470	Spectrum Analyzer	E4440A	1/3/2018	1/3/2020
P07191	Cable	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
P07191	Cable	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	E4438C	6/19/2017	6/19/2019
C00082	Directional Coupler	722-10-1.500V	9/18/2017	9/18/2019
03412	Band Pass Filter	PE8705	8/16/2017	8/16/2019
03413	Band Pass Filter	PE8706	8/16/2017	8/16/2019
03414	Band Pass Filter	PE8707	8/16/2017	8/16/2019
03415	Band Pass Filter	PE8708	8/16/2017	8/16/2019
03447	Band Pass Filter	PE8710	8/16/2017	8/16/2019
03448	Band Pass Filter	PE8711	8/16/2017	8/16/2019
03446	Band Pass Filter	4FV50-707/H18-O/O	8/16/2017	8/16/2019
03467	Band Pass Filter	4FV50-731/H30-O/O	8/16/2017	8/16/2019
03468	Band Pass Filter	4CS10-781.5/E12.2-O/O	8/16/2017	8/16/2019
03469	Band Pass Filter	4CS10-751.5/E12-O/O	8/16/2017	8/16/2019
02475	Attenuator	8494B	6/8/2017	6/8/2019
03429	Attenuator	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 MHz	Measured Sec	Limit Sec	Peak Level dBm	Measured Sec	Limit At least sec	Measured	Limit
UL1710-1755	0.191	0.3	23.3	74	60	2	5
UL1850-1915	0.116	0.3	24.9	74	60	2	5
UL824-894	0.133	0.3	26.2	73	60	2	5
UL 698-716	0.133	0.3	25.0	71	60	2	5
UL776-787	0.0916	0.3	26.9	70	60	2	5
DL2110-2155	0.100	1.0	18.3	72	60	2	5
DL1930-1995	0.116	1.0	15.0	72	60	2	5
DL869-894	0.141	1.0	17.8	69	60	2	5
DL:728-746	0.166	1.0	23.0	68	60	2	5
DL 746-757	0.200	1.0	22.6	70	60	2	5

The booster continues to mitigate at least 1 minute before restarting. The plots demonstrate after **2** 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 dB	Pk-Pk Difference dB	Pk-Pk Difference dB	Pk-Pk Difference dB	Pk-Pk Difference dB	Pk-Pk Difference dB	Limit dB
+5dB	9.0	9.0	6.0	5.0	5.0	12.0
+4dB	10.0	10.0	9.0	7.0	6.0	12.0
+3dB	13.0*	10.2	10.0	8.0	8.0	12.0
+2dB	12.3*	13.0*	14.0*	9.0	7.0	12.0
+1dB	17.0*	17.0*	18.0*	11.0	11.0	12.0
0dB	18.0*	22.0*	24.0*	16.0*	9.0	12.0
-1dB	25.0*	36.0*	93.0*	**	**	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 dB	Pk-Pk Difference dB	Pk-Pk Difference dB	Pk-Pk Difference dB	Pk-Pk Difference dB	Pk-Pk Difference dB	Limit dB
+5dB	2.0	4.0	3.0	9.0	6.0	12.0
+4dB	6.0	5.0	3.0	10.0	8.0	12.0
+3dB	10.0	6.0	4.0	10.0	10.0	12.0
+2dB	10.6	6.0	5.0	12.0*	12.0*	12.0
+1dB	16.0*	8.0	8.0	16.0*	15.0*	12.0
0dB	**	11.0	11.0	20.0*	19.0*	12.0
-1dB	**	16.0*	**	**	25.0*	12.0
-2dB	**	27.0*	**	**	**	12.0
-3dB	**	**	**	**	**	12.0
-4dB	**	**	**	**	**	12.0
-5dB	**	**	**	**	**	12.0

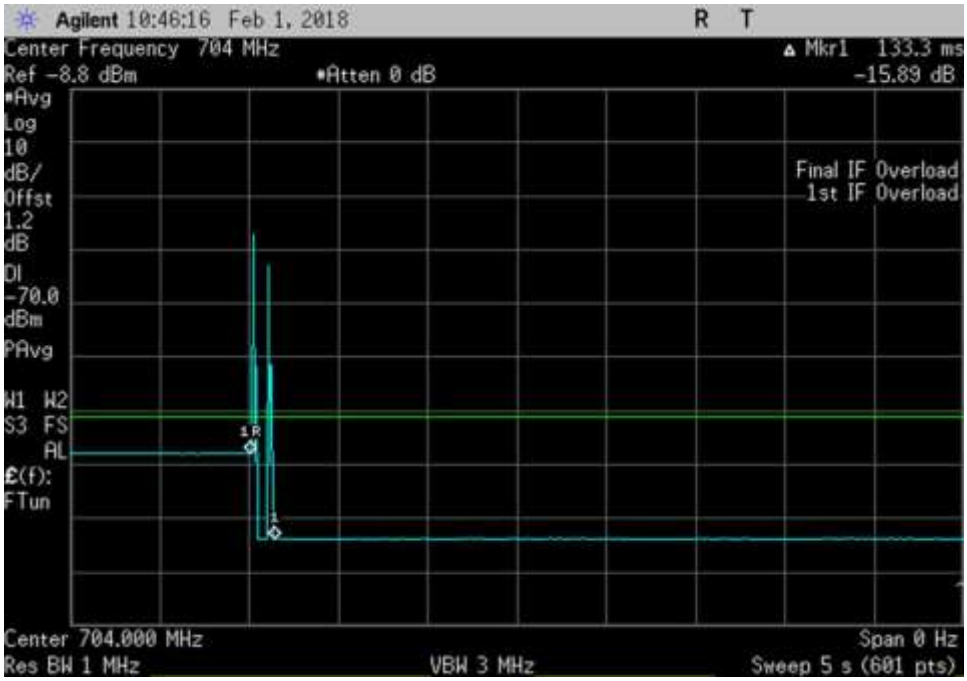
Note:

* 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 **66** seconds for the Uplink bands and 61 seconds for the Downlink bands.

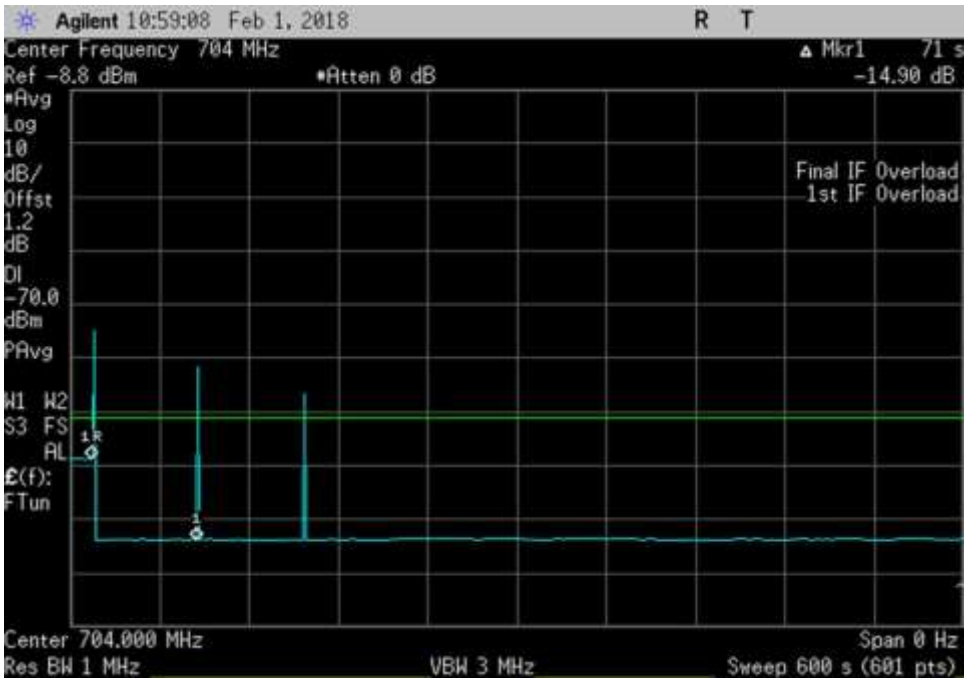
** The device shuts down immediately.

7.11.2 Oscillation Restart Tests

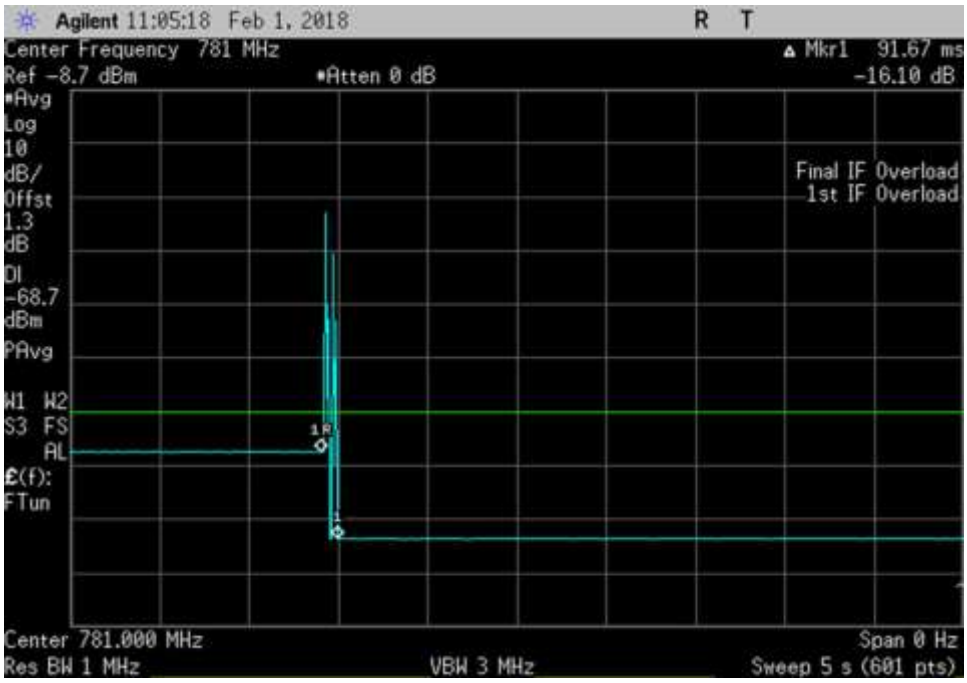
Plots



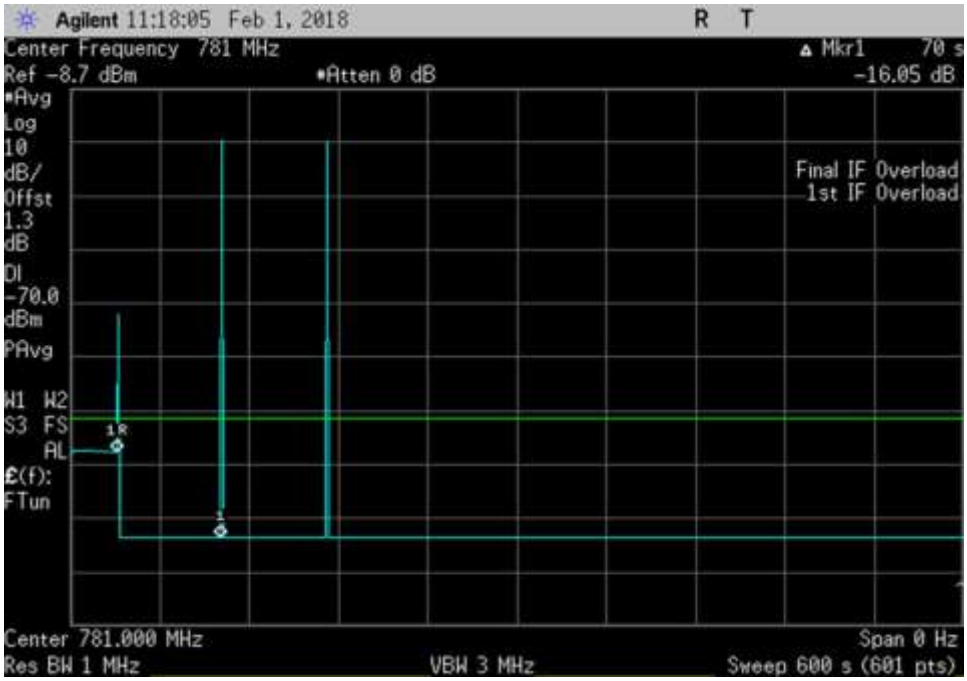
UL__698-716_ 704MHz



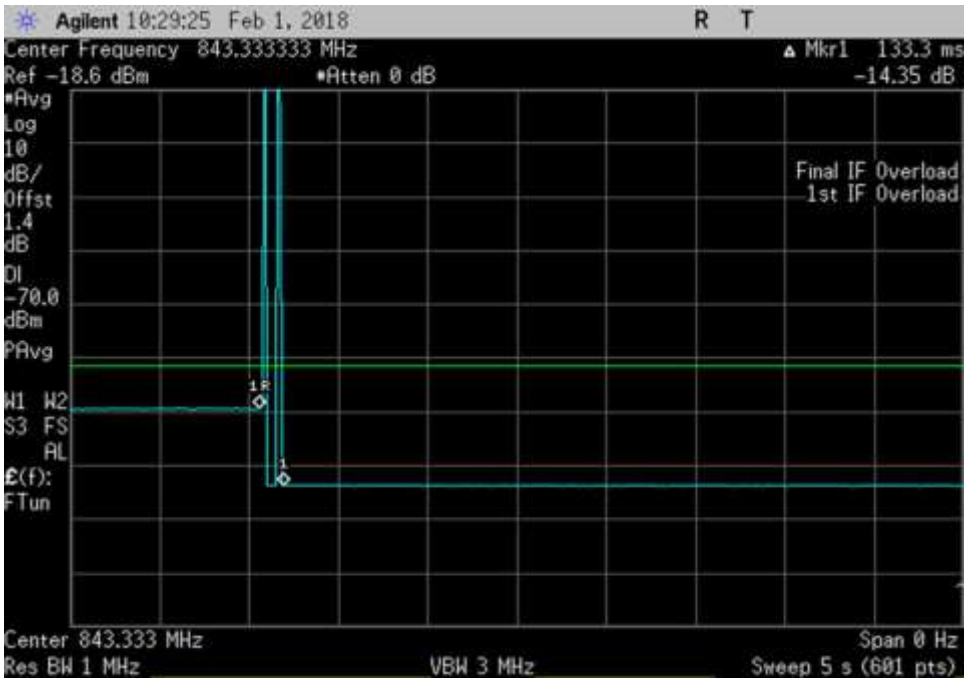
UL_698-716_600sec_ 704MHz



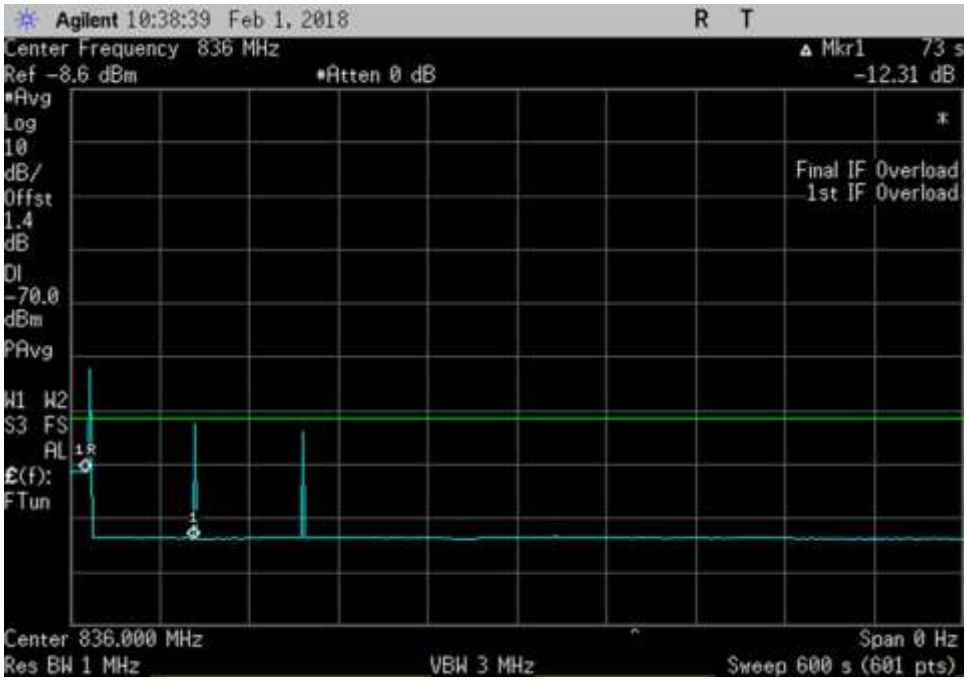
UL_776-787_ 781MHz



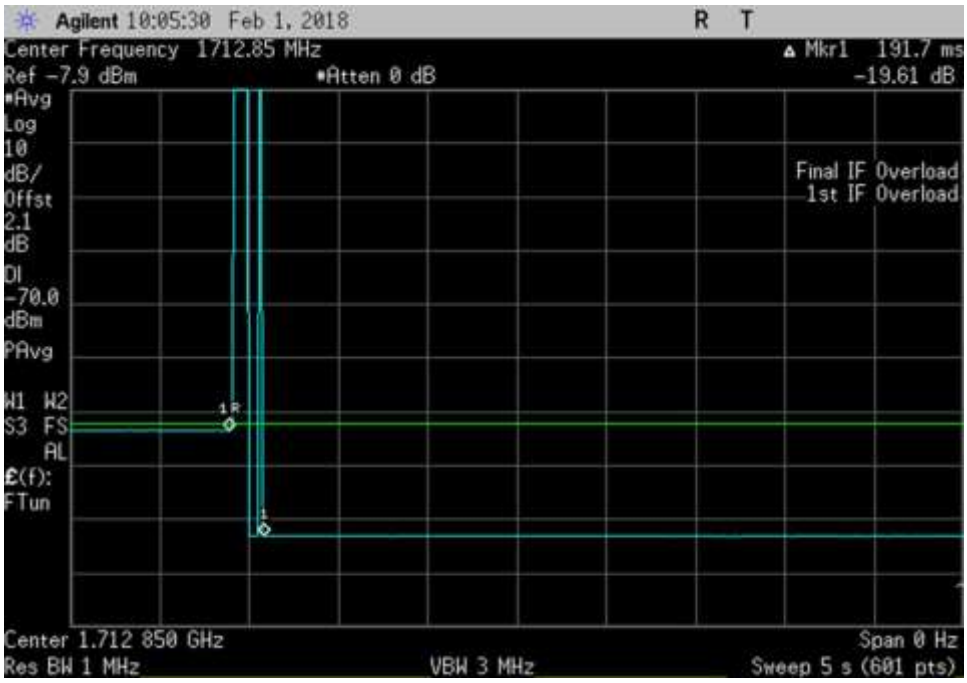
UL_776-787_600sec_ 781MHz



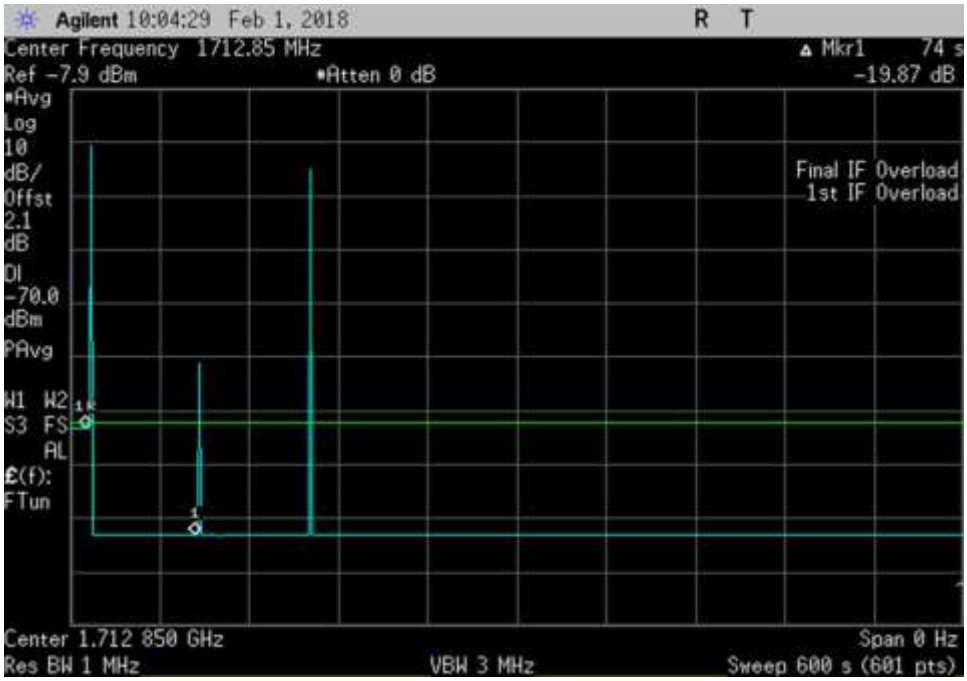
UL_824-849_ 843.33MHz



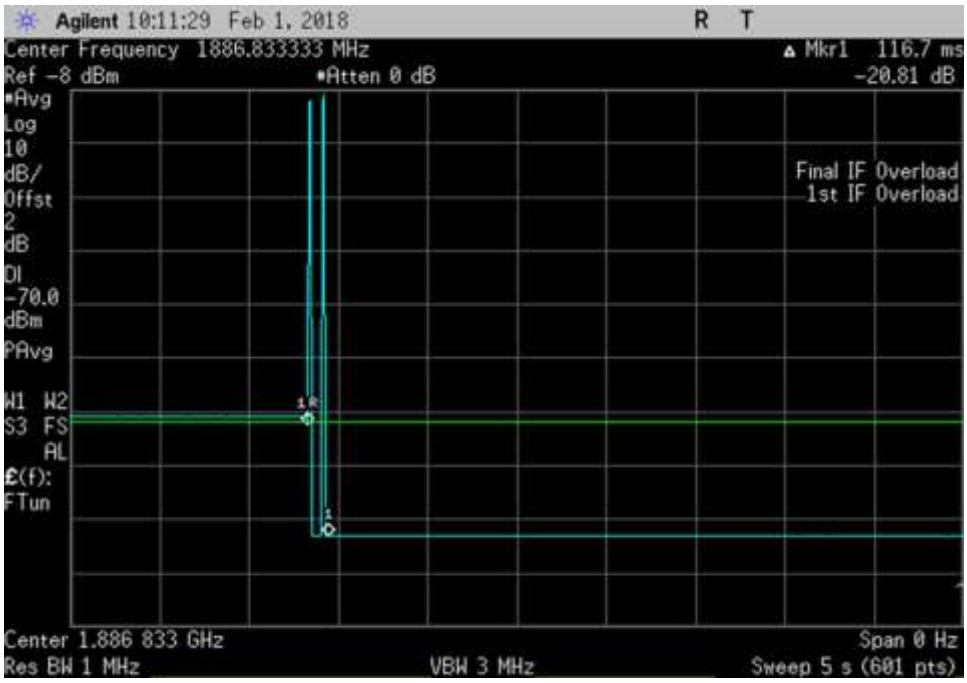
UL_824-849_600sec_ 836MHz



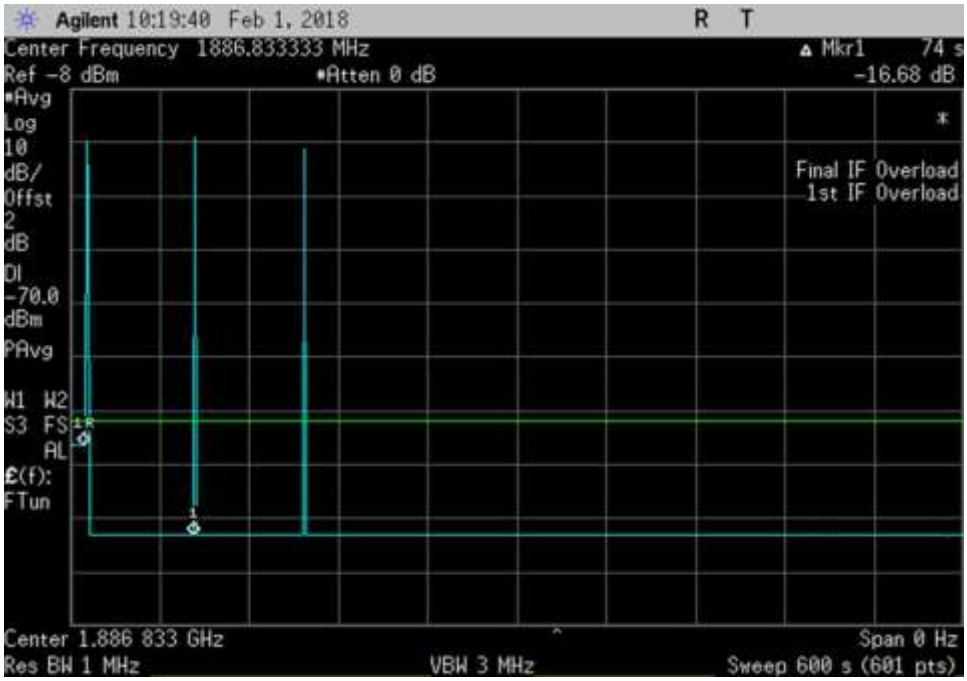
UL_1710-1755_ 1712.85MHz



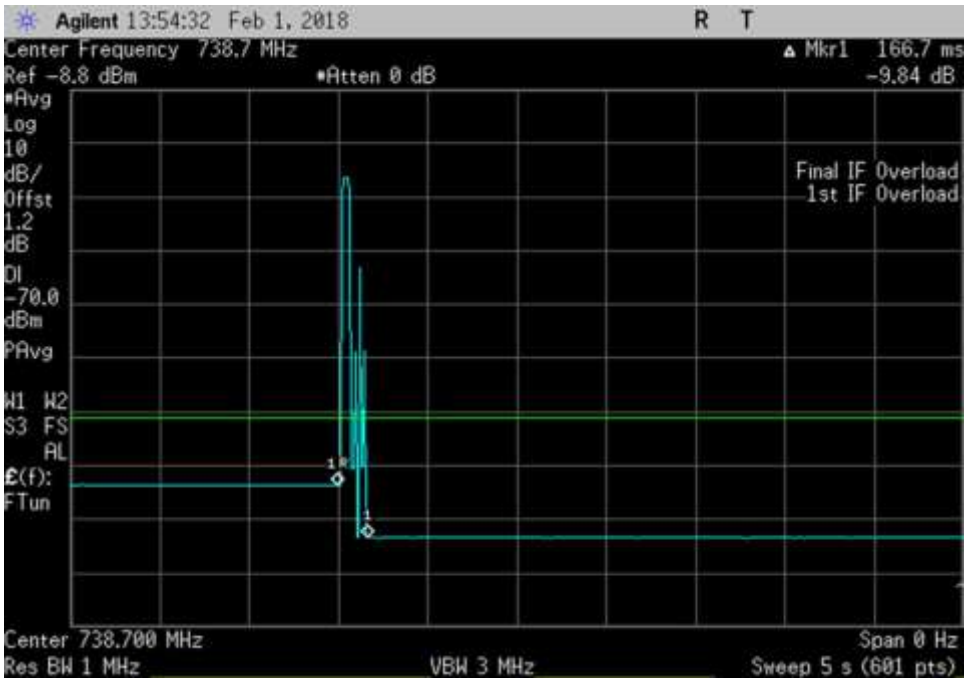
UL_1710-1755_600sec_ 1712.85MHz



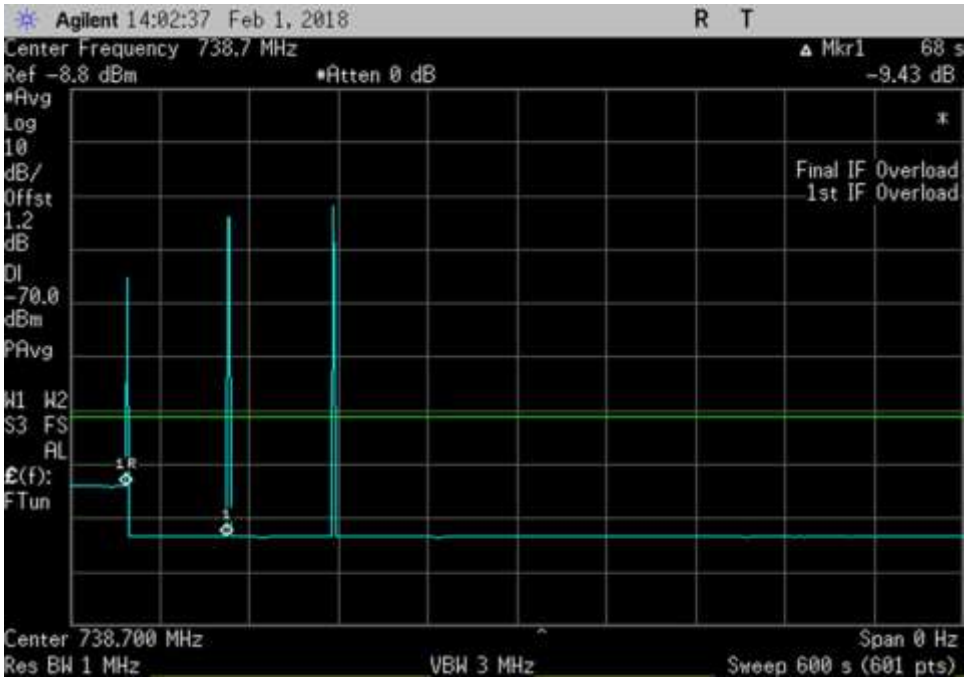
UL_1850-1915_ 1886.8MHz



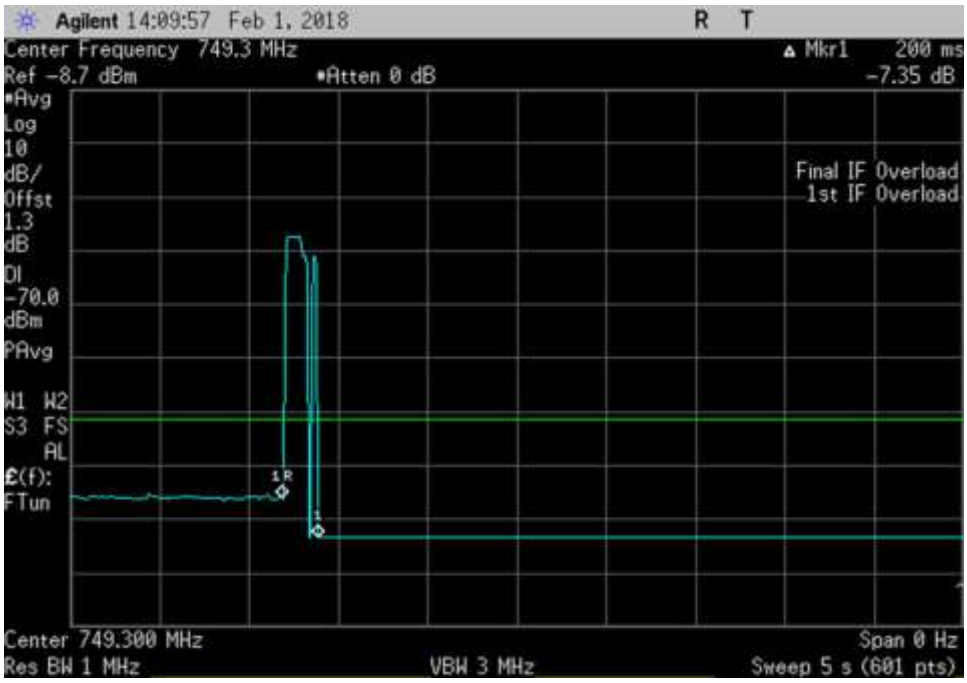
UL_1850-1915_600sec_ 1886.83MHz



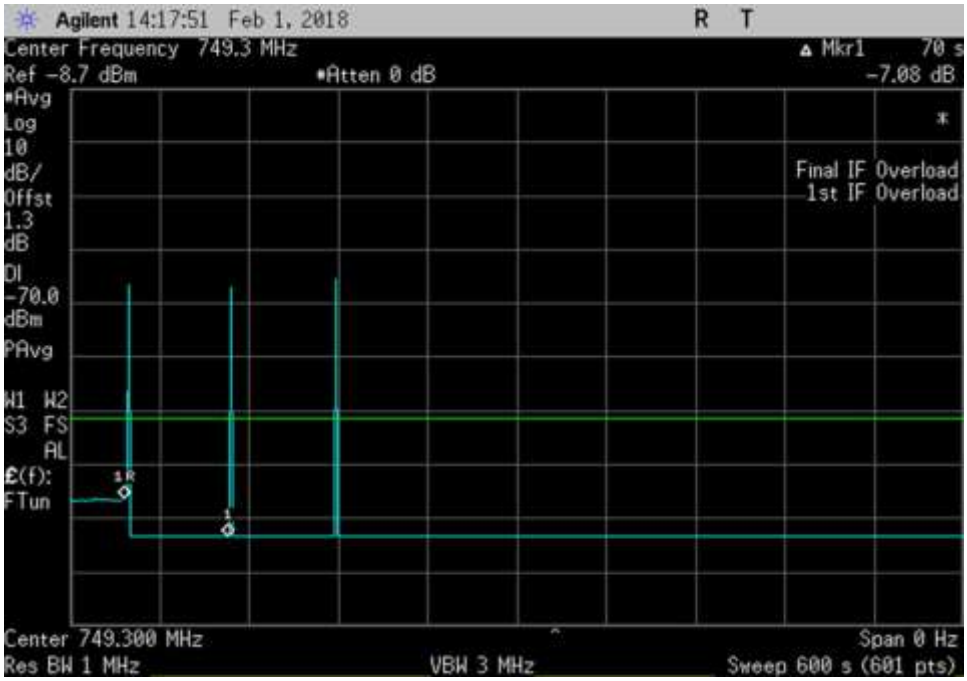
DL_728-746_ 738.7MHz



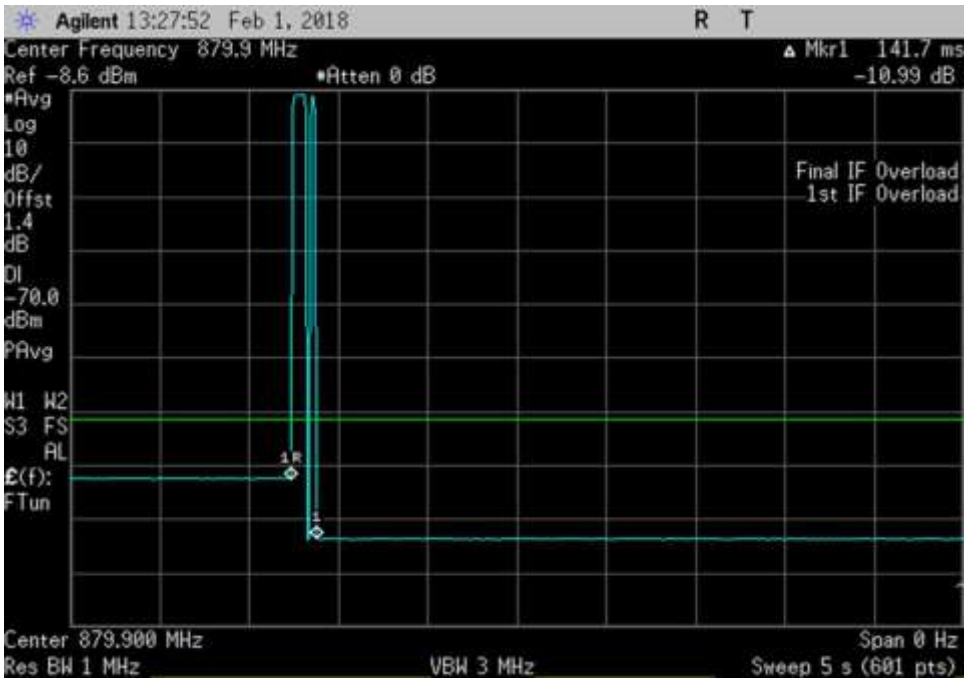
DL_728-746_600sec_ 738.7MHz



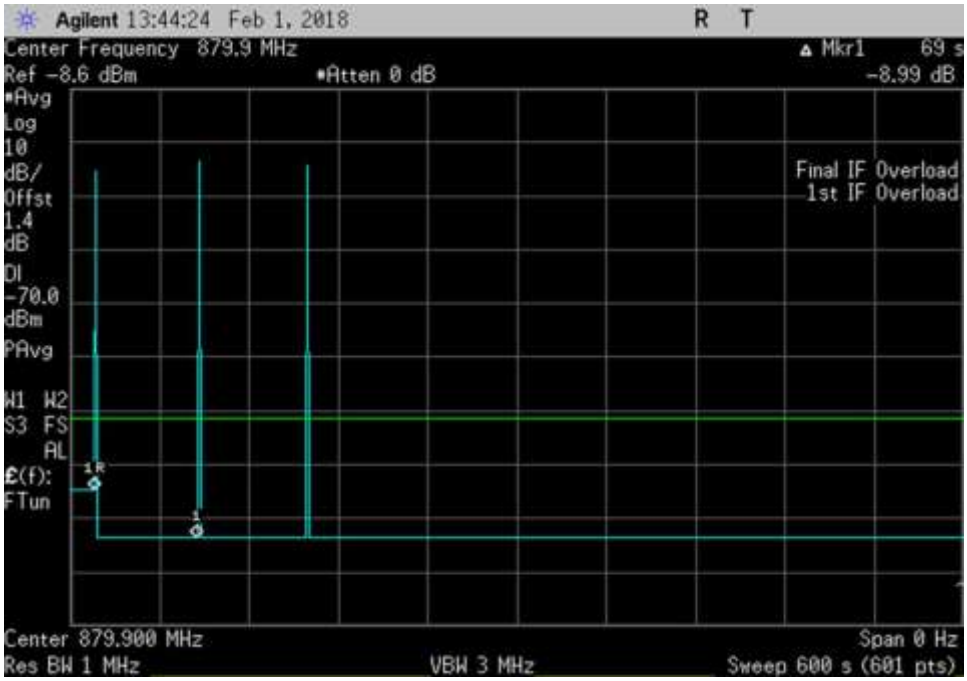
DL_746-757_ 749.3MHz



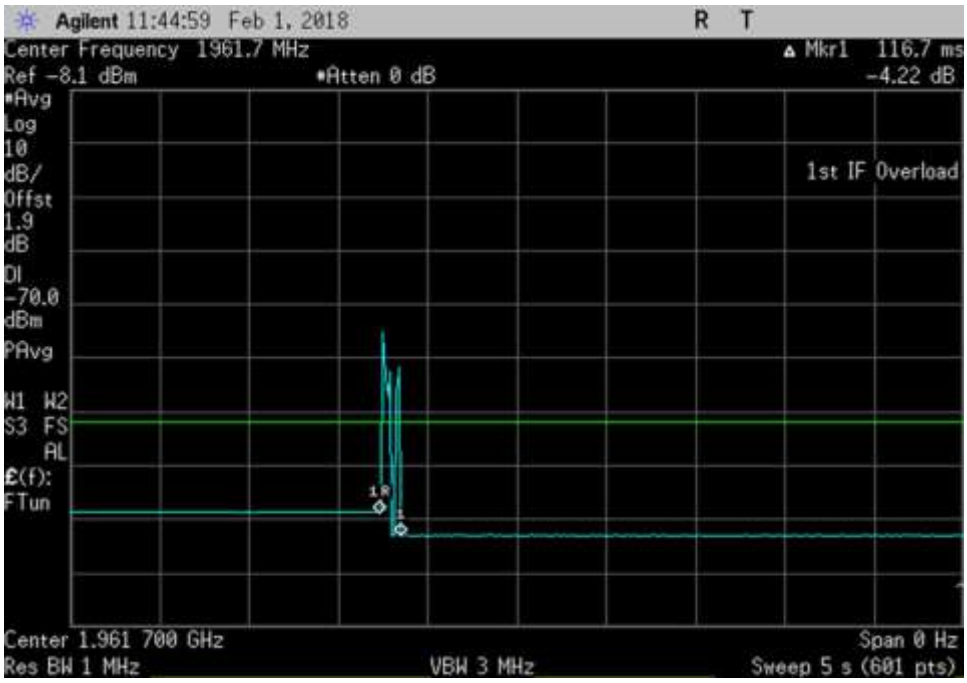
DL_746-757_600sec_ 749.3MHz



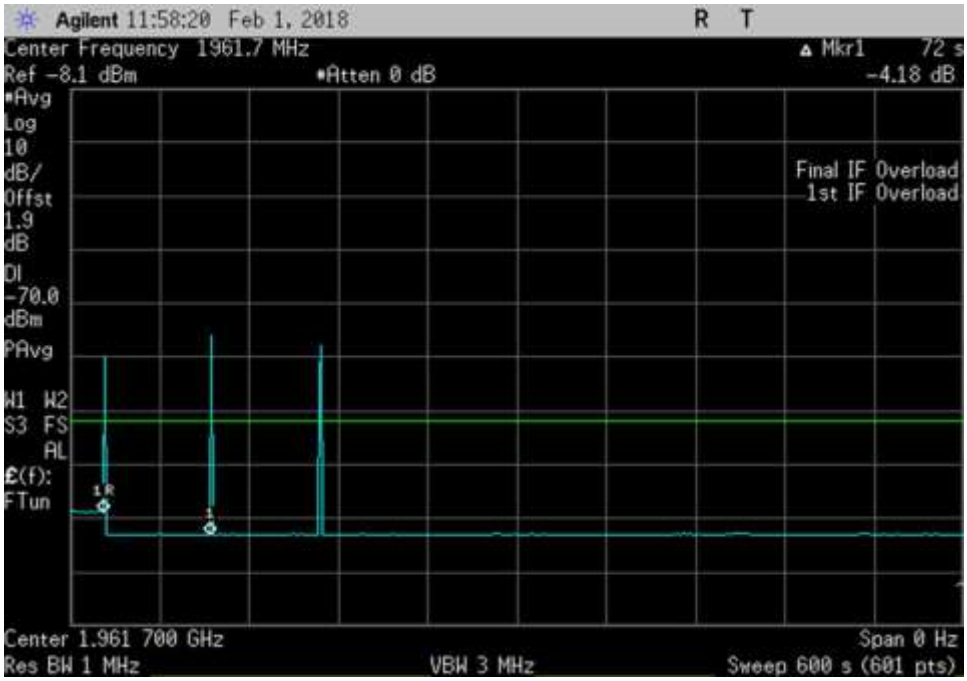
DL_869-894_ 879.9MHz



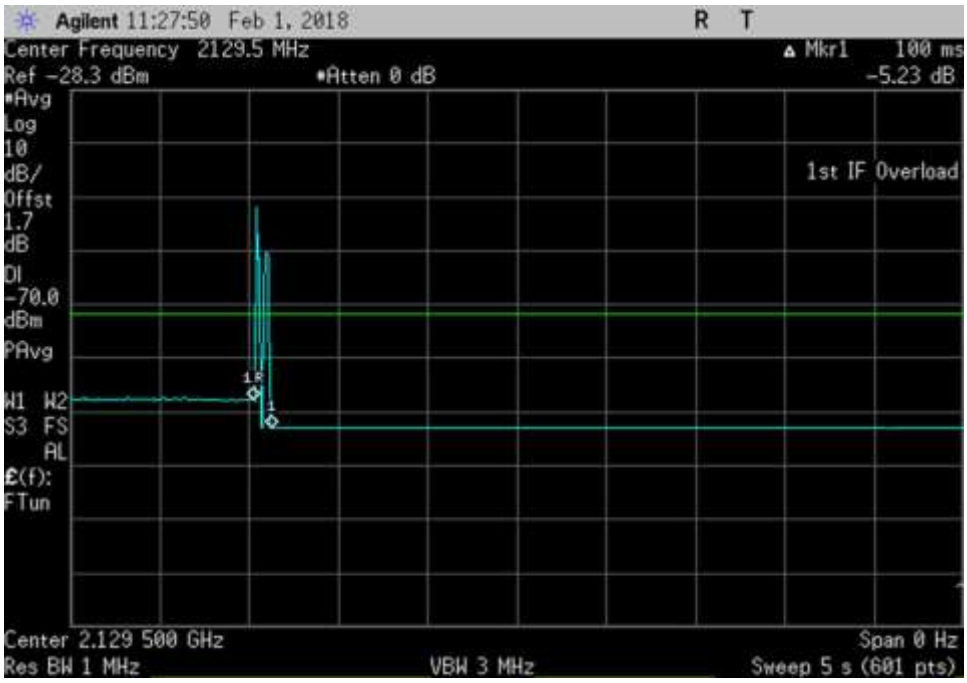
DL_869-894_600sec_ 879.9MHz



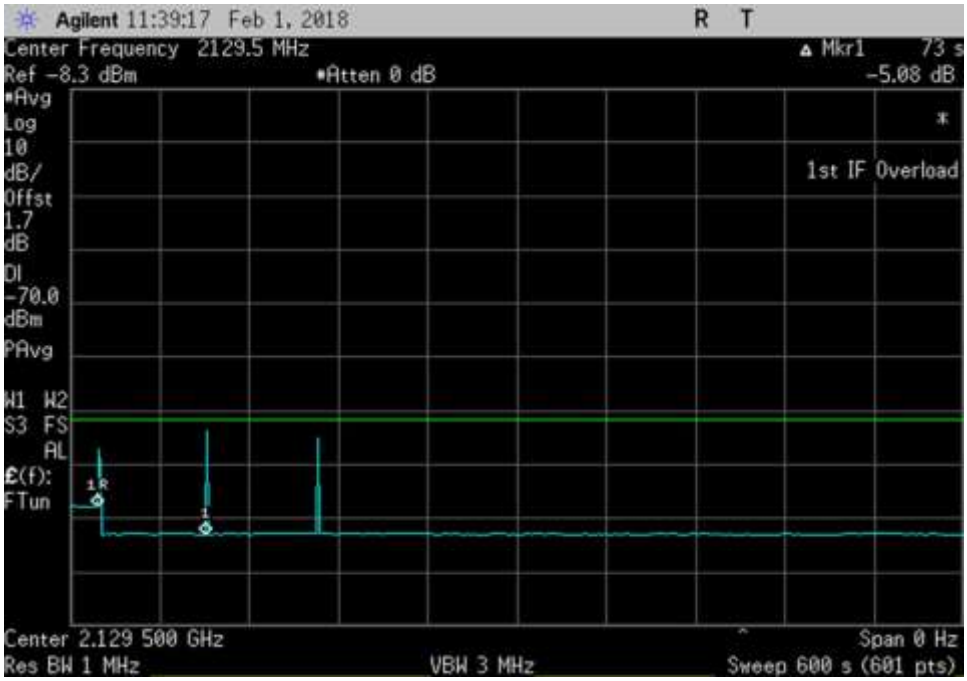
DL_1930-1995_ 1961.7MHz



DL_1930-1995_600sec_ 1961.7MHz



DL_2110-2155_ 2129.5MHz



DL_2110-2155_600sec_ 2129.5MHz

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:	**Radiated Emissions**		
Work Order #:	**100826**	Date:	02/08/2018
Tested By:	Hieu Song Nguyenpham		
Software:	EMITest 5.03.11		12VDC

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: 23.5°C
Relative Humidity: 45%
Pressure: 101.6 kPa

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.

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	Cal Date	Cal Due
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	1/29/2016	1/29/2018
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)

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

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

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

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

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

At 3 meter, r = 3 m
10 Log P_t = 20 Log E (V/m) + 20 Log 3 – 10 Log 30
10 Log P_t = 20 Log E (V/m) + 9.54 – 14.77
10 Log P_t = 20 Log E (V/m) - 5.23

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

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

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

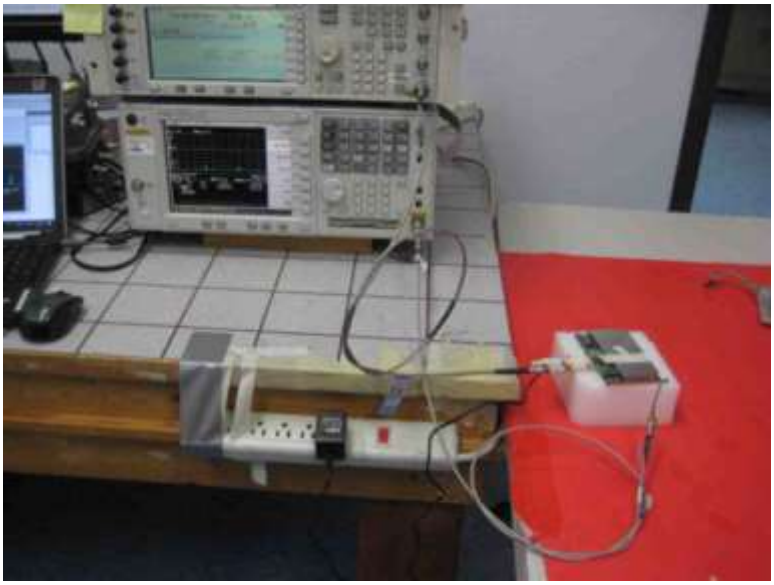
= E_{dBuv} - 43 - 20 Log E (uV/m) + 125.23

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

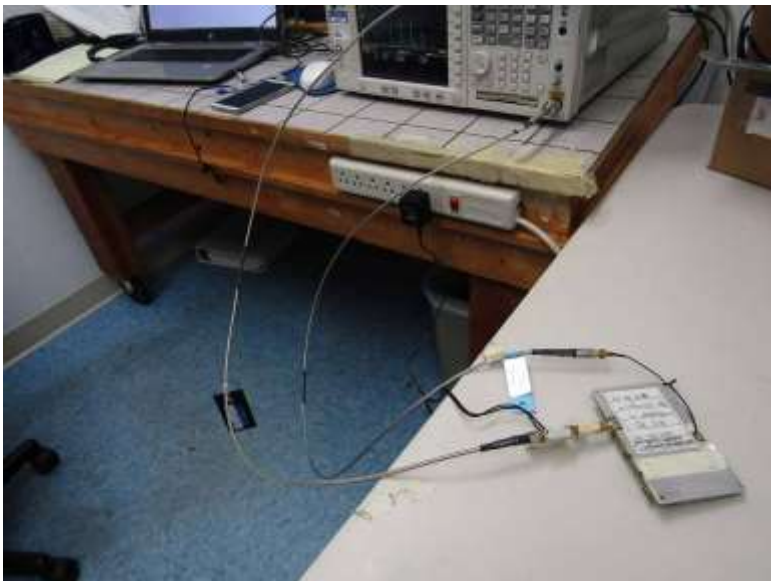
Since 20 Log E (uV/m) = E in dBuV/m = ~~E_{dBuv}~~ - ~~E_{dBuv}~~ + 82.23

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

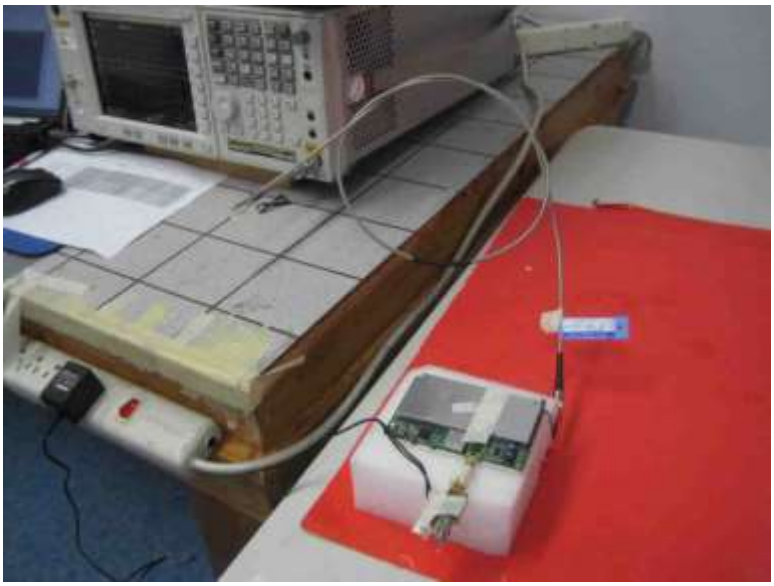
EXHIBIT A: TEST SETUP PHOTOS



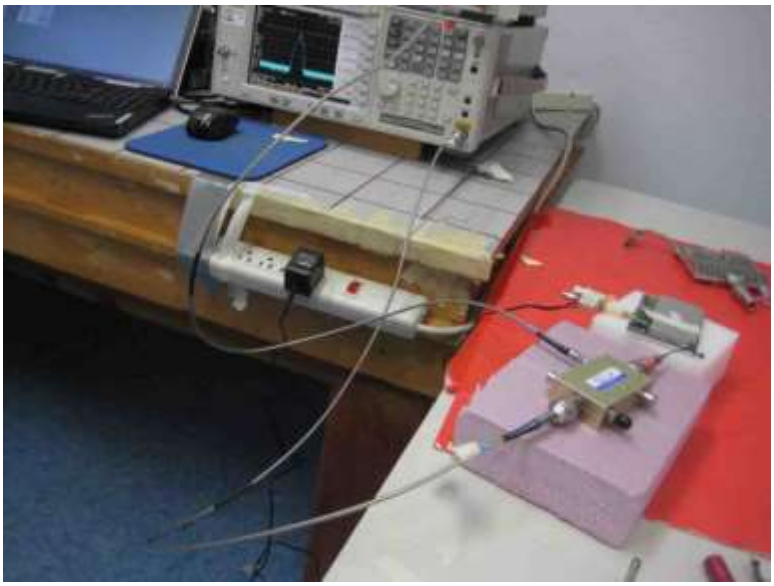
Section 7.1, 7.2, 7.3, 7.5, 7.6, and 7.10



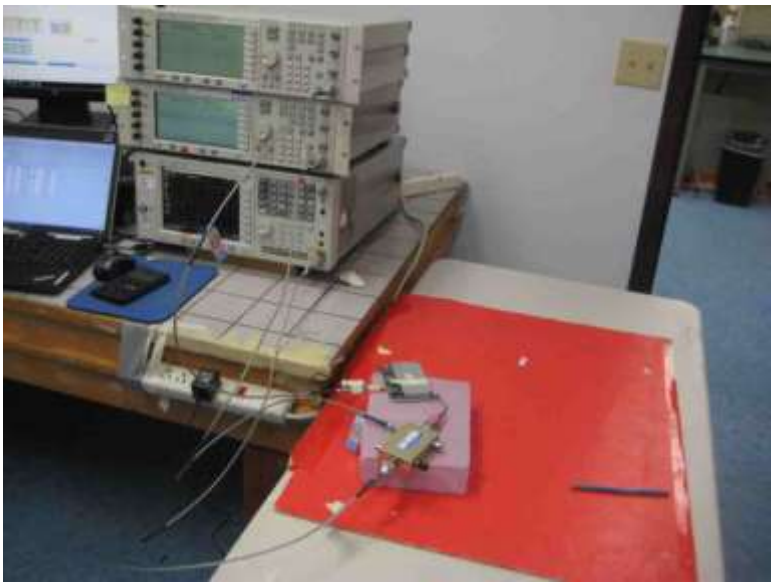
Section 7.4



Section 7.7 and 7.8 Uplink Inactive Max Noise

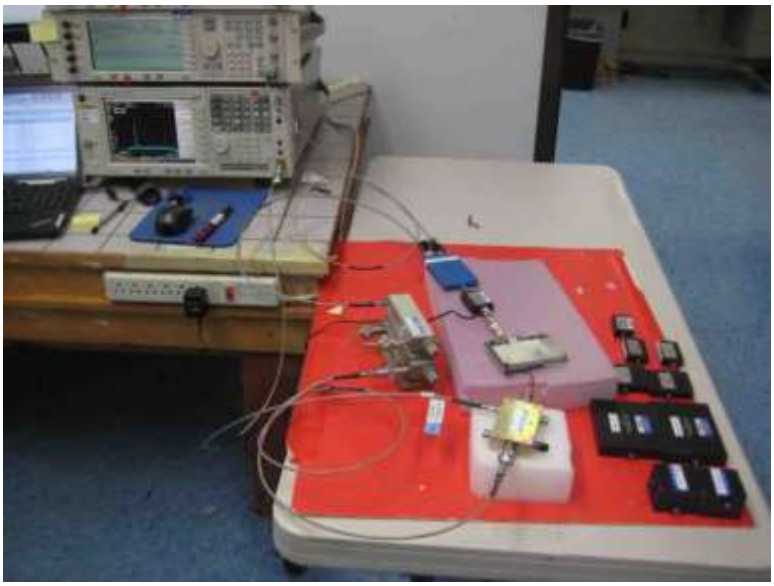


Section 7.7 Variable Noise Timing

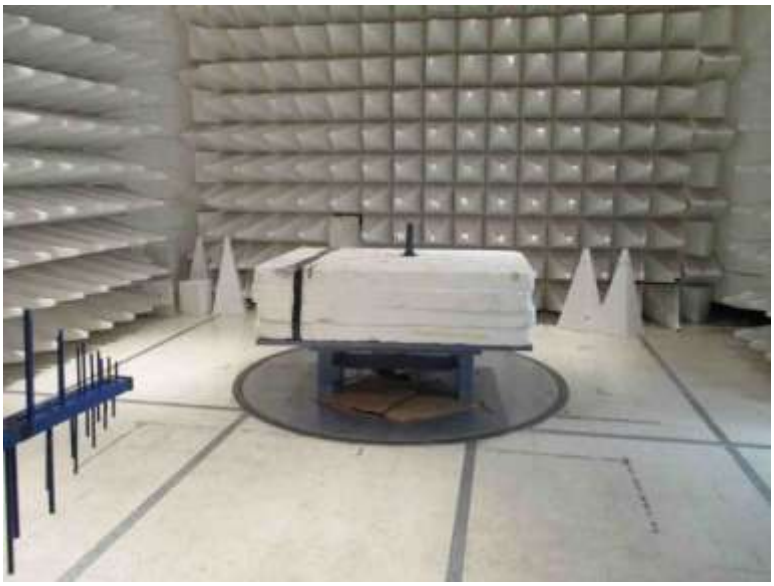


Section 7.9

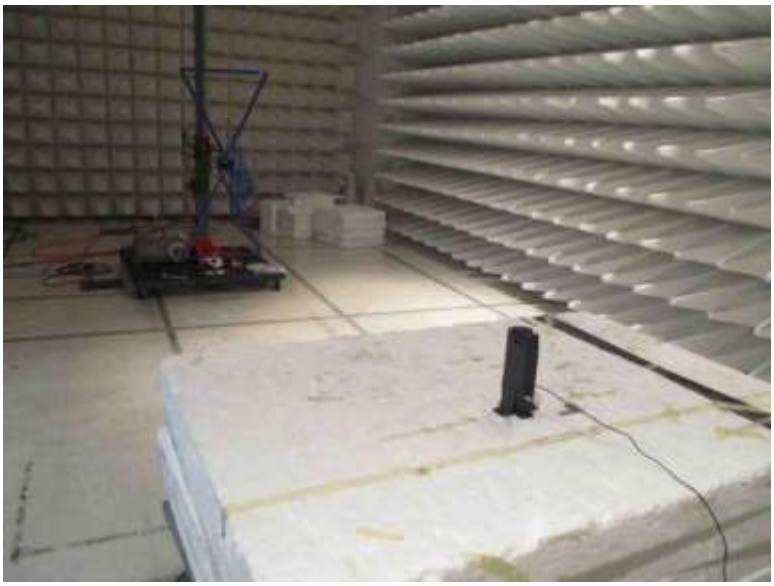
Section 7.11.2



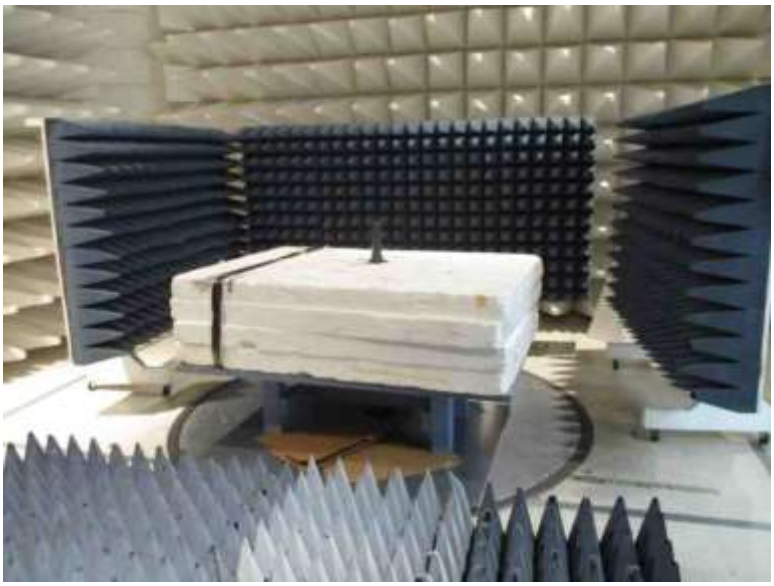
Section 7.11.3



Section 7.12, Below 1GHz



Section 7.12, Below 1GHz



Section 7.12, Above 1GHz, Cone placement

Section 7.12, Above 1GHz, Cone placement