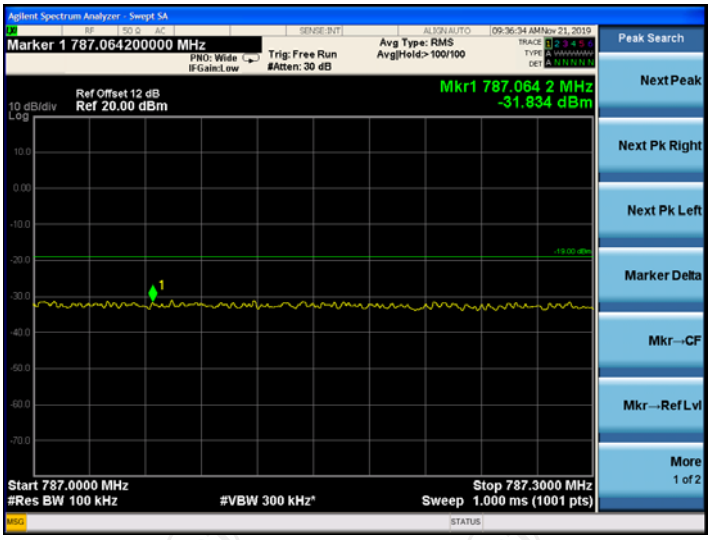
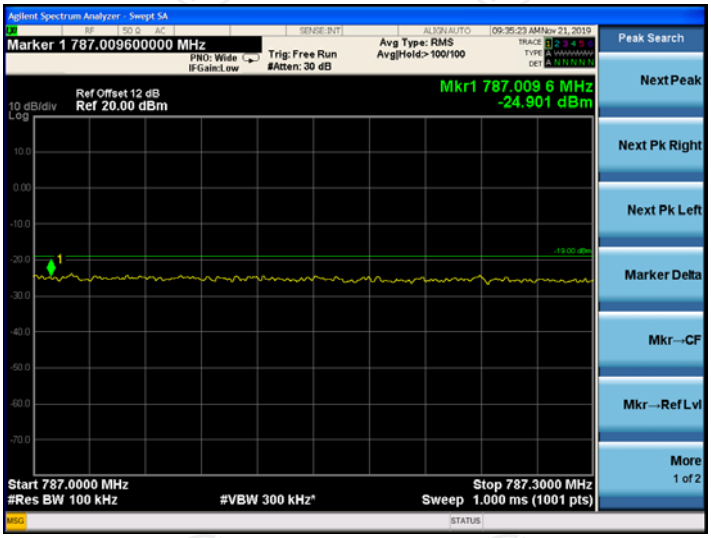
LTE UL Right Side Pre AGC



LTE UL Right Side Pre AGC+10dB



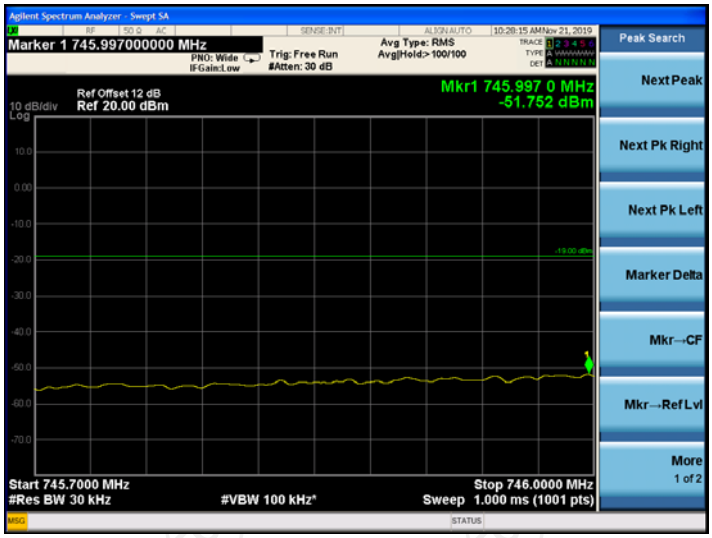
GSM DL Left Side Pre AGC

GSM DL Left Side Pre AGC+10dB

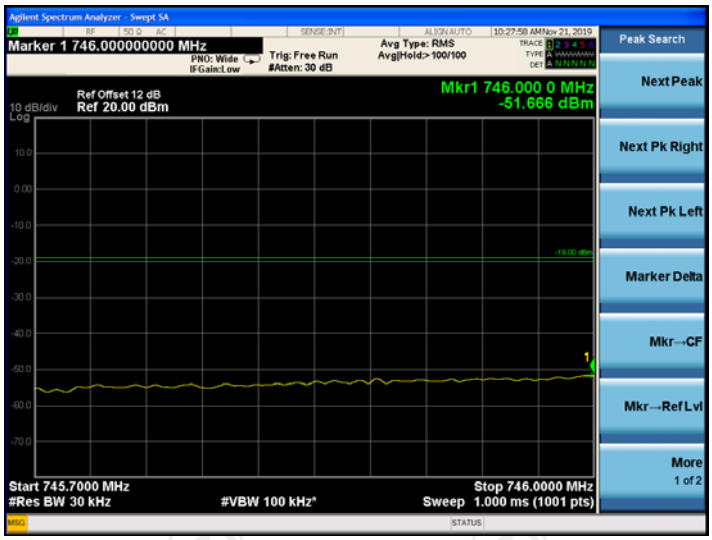
GSM DL Right Side Pre AGC

GSM DL Right Side Pre AGC+10dB

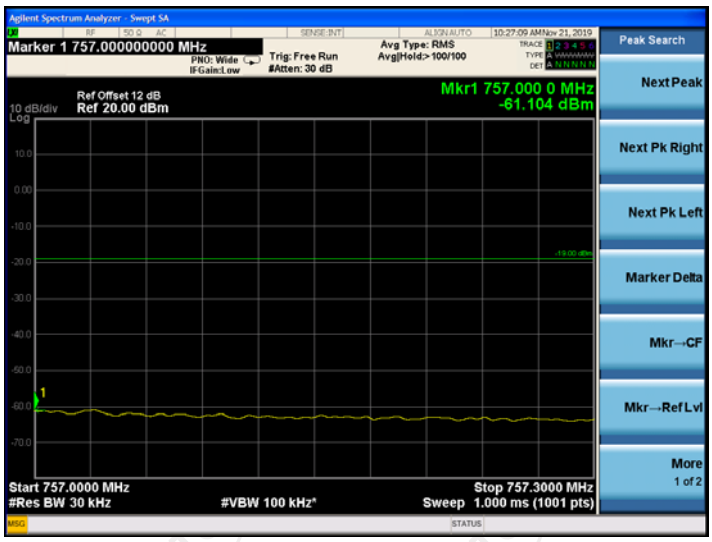
CDMA DL Left Side Pre AGC



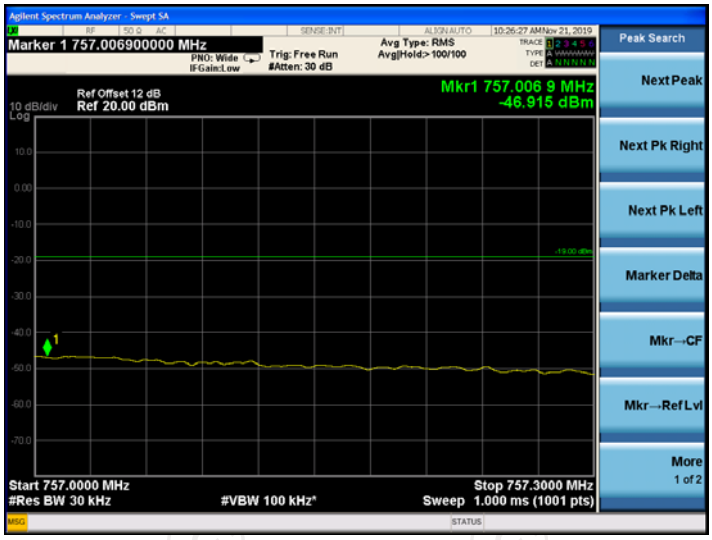
CDMA DL Left Side Pre AGC+10dB



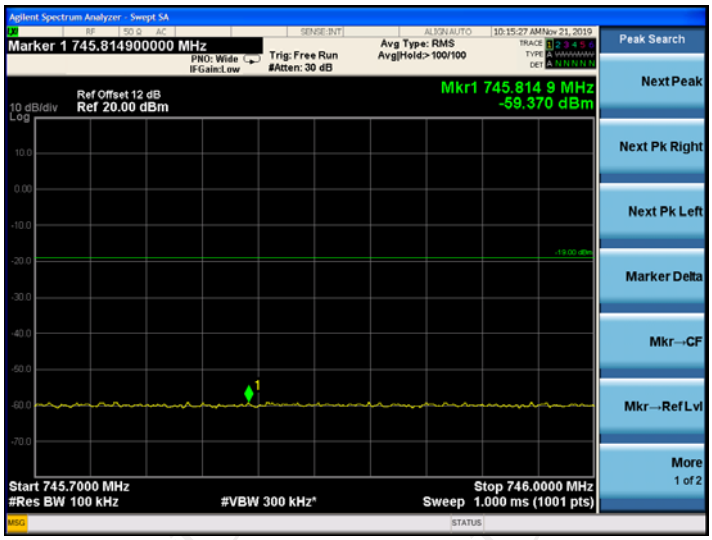
CDMA DL Right Side Pre AGC



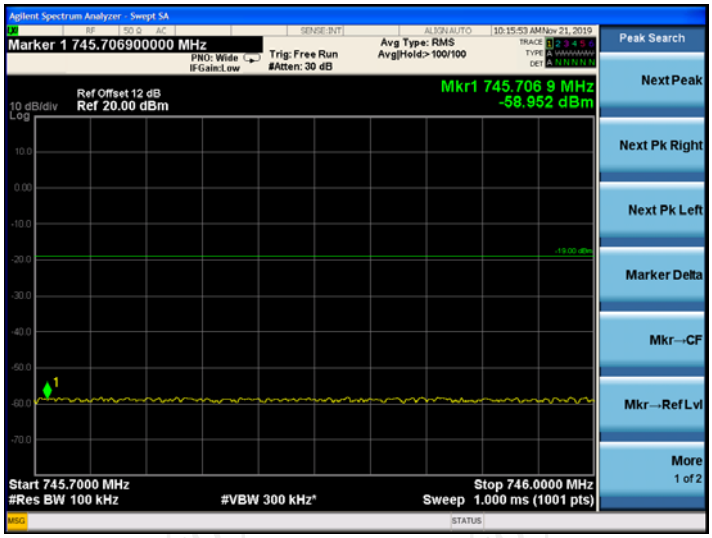
CDMA DL Right Side Pre AGC+10dB



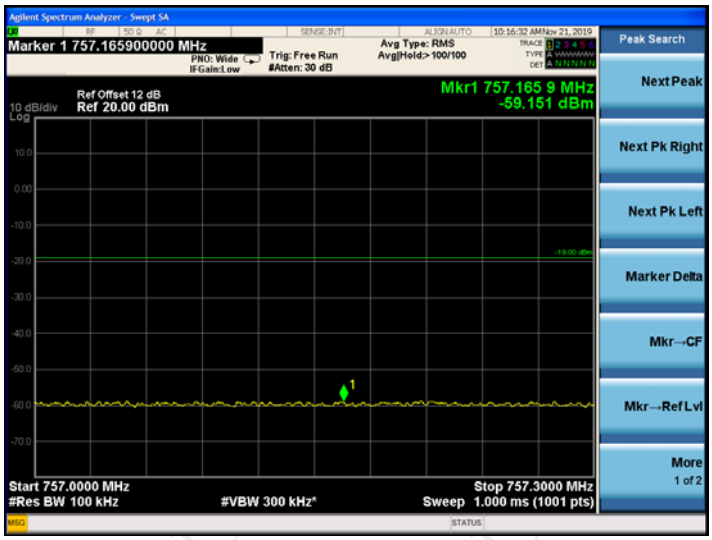
LTE DL Left Side Pre AGC



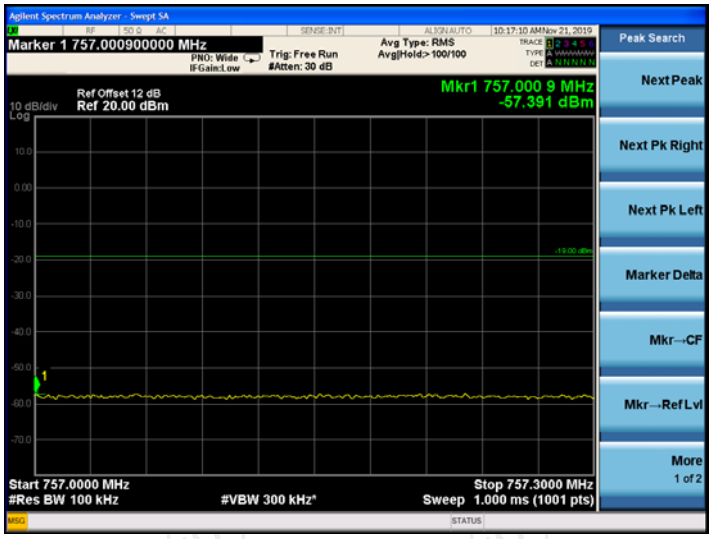
LTE DL Left Side Pre AGC+10dB



LTE DL Right Side Pre AGC

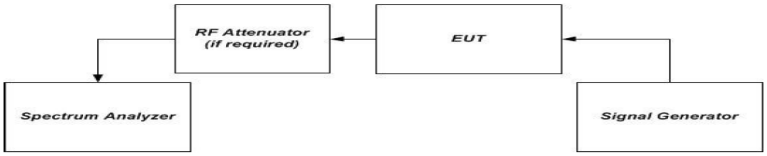


LTE DL Right Side Pre AGC+10dB



6.5. Conducted Spurious Emission

6.5.1. Test Specification

Test Requirement:	FCC Part2 Section 1051; FCC Rules Part 27 Subpart C, Section 27.53
Test Method:	KDB 935210 D03 Signal Booster Measuremets v04r03
Limit:	•§2.1053, Conducted emissions limit = 43 + 10 log (P) = -13 dBm •§27.53(c), For operations in the 746-758 MHz band and the 776-788 MHz band On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB=-46dBm in a 6.25 kHz band segment, for base and fixed stations • §27.53(e), 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(-40dBm)/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW(-50dBm) EIRP for discrete emissions of less than 700 Hz bandwidth.
Test Setup:	
Test Procedure:	a) Connect the EUT to the test equipment as shown in Set-Up. Begin with the uplink output connected to the spectrum analyzer. b) Configure the signal generator for AWGN with a 99% occupied bandwidth of 4.1 MHz operation with a center frequency corresponding to the center of the CMRS band under test. c) Set the signal generator amplitude to the level determined in the power measurement procedure in Maximum power. d) Turn on the signal generator RF output and measure the spurious emission power levels with an appropriate measurement instrument as follows. e) Set RBW = measurement bandwidth specified in the applicable rule section for the operational frequency band under consideration (see Annex A for relevant cross-references). Note that many of the individual rule sections permit the use of a narrower RBW (typically ≥ 1% of the emission bandwidth) to enhance measurement accuracy, but the result must then be integrated over the specified measurement bandwidth. f) Set VBW = 3 X RBW. g) Select the power averaging (RMS) detector. (See above note regarding the use of a peak detector for preliminary measurements.) h) Sweep time = auto-couple. i) Set the analyzer start frequency to the lowest radio frequency signal generated in the equipment, without going below 9 kHz, and the stop frequency to the lower band/block edge frequency minus 100 kHz or 1 MHz, as specified in the applicable rule part. Note that the number of measurement points in each sweep must be ≥ (2 X span/RBW) which may require that the measurement range defined by the start and stop frequencies above be subdivided,

	depending on the available number of measurement points provided by the spectrum analyzer. Trace average at least 10 traces in power averaging (i.e., RMS) mode. j) Use the peak marker function to identify the highest amplitude level over each measured frequency range Record the frequency and amplitude and capture a Test Plots for inclusion in the test report. k) Reset the analyzer start frequency to the upper band/block edge frequency plus 100 kHz or 1 MHz, as specified in the applicable rule part, and the analyzer stop frequency to 10 times the highest frequency of the fundamental emission. Note that the number of measurement points in each sweep must be ≥ (2 X span/RBW) which may require that the measurement range defined by the start and stop frequencies above be subdivided, depending on the available number of measurement points provided by the spectrum analyzer. l) Use the peak marker function to identify the highest amplitude level over each of the measured frequency ranges. Record the frequency and amplitude and capture a Test Plots for inclusion in the test report. m) Repeat steps b) through l) for each supported frequency band of operation.
Test Result:	PASS

6.5.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Signal Generator	Agilent	N5182A	MY47070282	Sep. 12, 2019	Sep. 11, 2020
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 12, 2019	Sep. 11, 2020
Attenuator	50FP-006-H3	JFW	907763	Sep. 12, 2019	Sep. 11, 2020

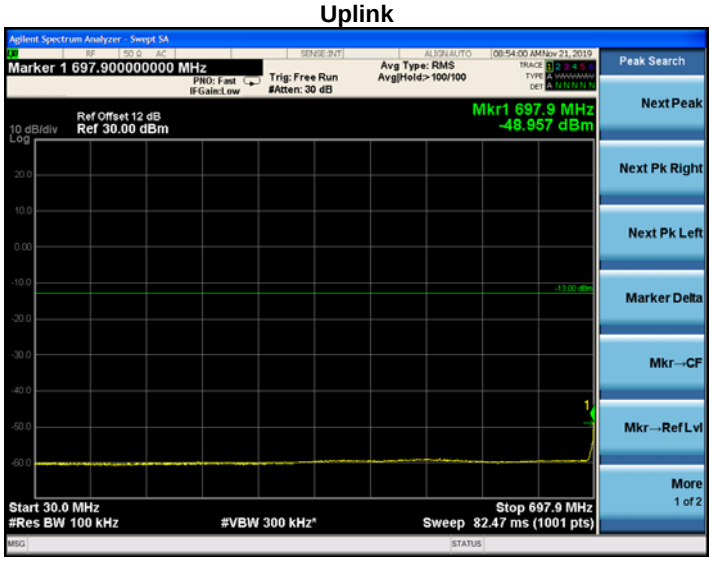
Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

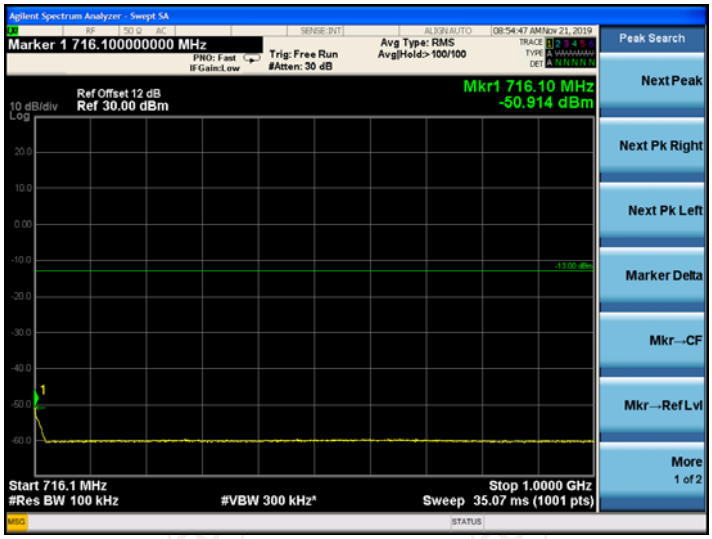
6.5.3. Test data

698 - 716 MHz

Test Plots

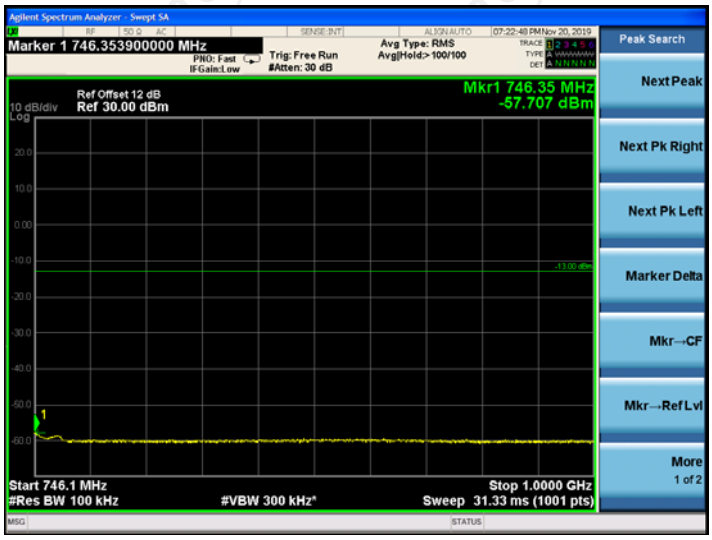
Uplink





Downlink


Agilent Spectrum Analyzer - Swept SA
Marker 1 727.202100000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold:>100/100
07:22:21 PM Nov 20, 2019
Ref Offset 12 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 727.2 MHz
-58.336 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz*
Stop 727.9 MHz
Sweep 86.13 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

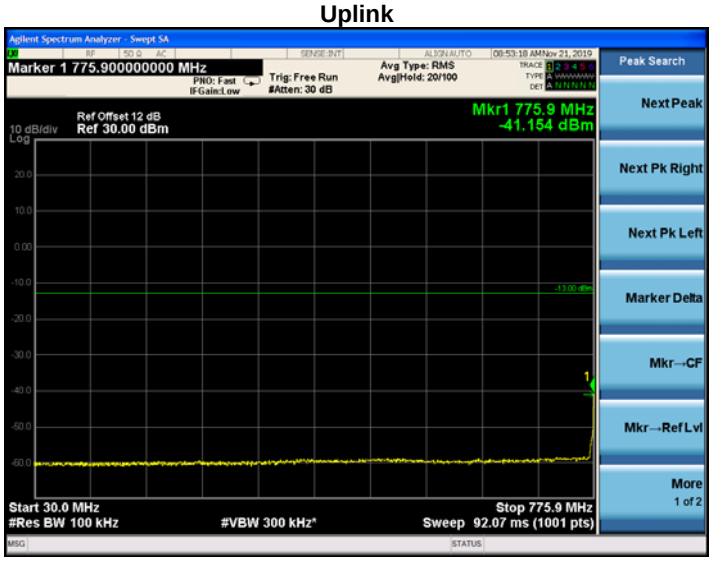

Agilent Spectrum Analyzer - Swept SA
Marker 1 746.353900000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold:>100/100
07:22:48 PM Nov 20, 2019
Ref Offset 12 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 746.35 MHz
-57.707 dBm
Start 746.1 MHz
#Res BW 100 kHz
#VBW 300 kHz*
Stop 1.0000 GHz
Sweep 31.33 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

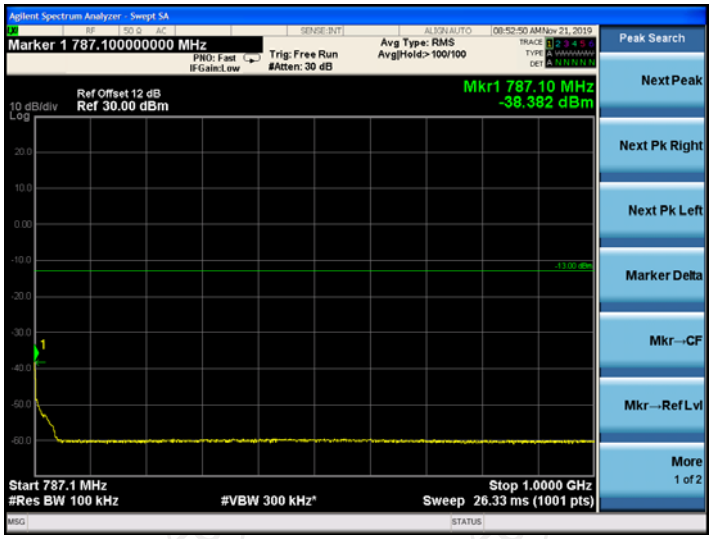

Agilent Spectrum Analyzer - Swept SA
Marker 1 9.370000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold:>100/100
07:20:54 PM Nov 20, 2019
Ref Offset 12 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 9.370 GHz
-44.009 dBm
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 10.000 GHz
Sweep 15.00 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

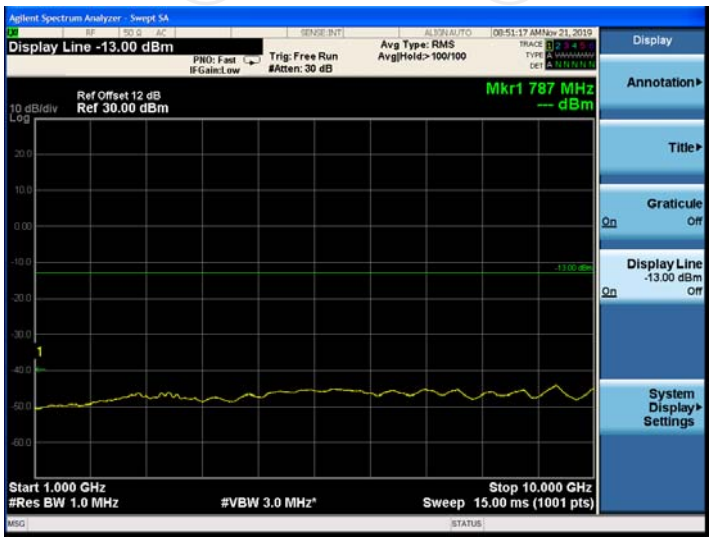
776 - 787 MHz

Test Plots

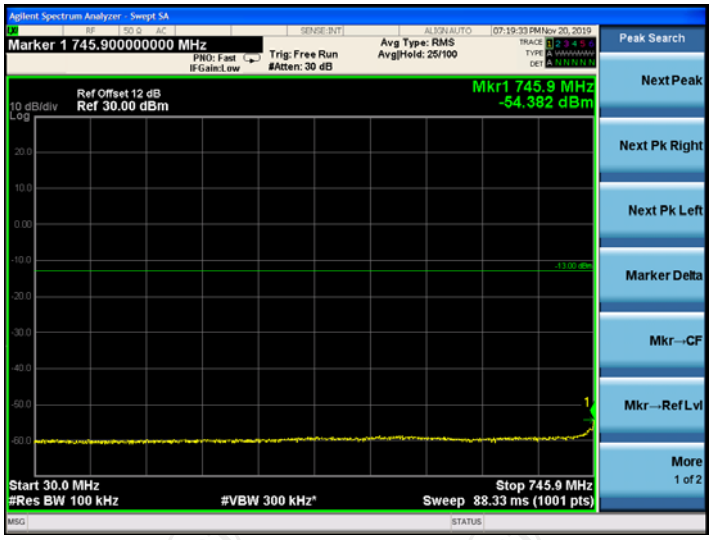
Uplink

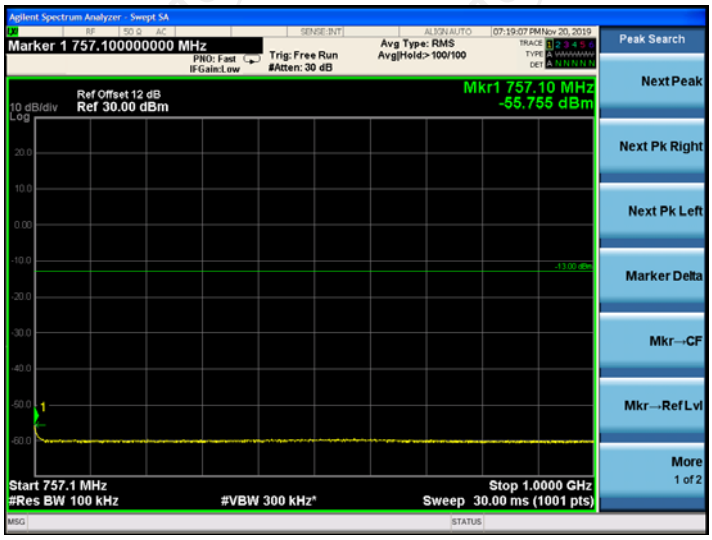






Downlink

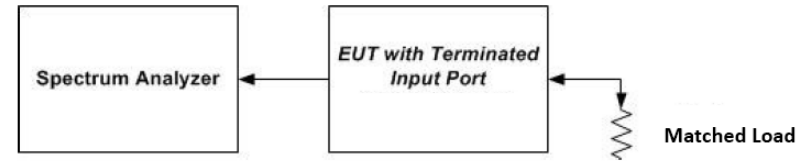
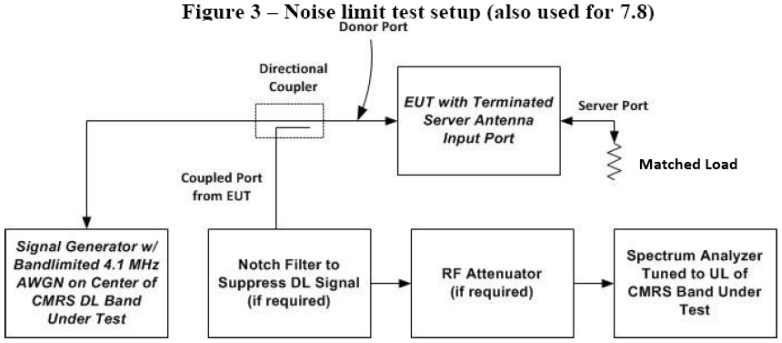

Agilent Spectrum Analyzer - Swept SA
Marker 1 745.900000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold: 25/100
07:19:33 PM Nov 20, 2019
Ref Offset 12 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 745.9 MHz
-54.382 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz*
Stop 745.9 MHz
Sweep 88.33 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2


Agilent Spectrum Analyzer - Swept SA
Marker 1 757.100000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold:>100/100
07:19:07 PM Nov 20, 2019
Ref Offset 12 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 757.10 MHz
-55.755 dBm
Start 757.1 MHz
#Res BW 100 kHz
#VBW 300 kHz*
Stop 1.0000 GHz
Sweep 30.00 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2


Agilent Spectrum Analyzer - Swept SA
Marker 1 9.388000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: RMS
Avg|Hold: 47/100
07:19:56 PM Nov 20, 2019
Ref Offset 12 dB
10 dB/div
Log
Ref 30.00 dBm
Mkr1 9.388 GHz
-43.886 dBm
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz*
Stop 10.000 GHz
Sweep 15.00 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

6.6. Noise Limits

6.6.1. Test Specification

Test Requirement:	FCC Part20 Section 20.21(e)(8)(i)(A); 20.21(e)(8)(i)(H)
Test Method:	KDB D03 signal Booster Measurements v04r03
Limit:	§20.21(e)(8)(i)(A)(1), The transmitted noise power in dBm/MHz of consumer boosters at their uplink and downlink ports shall not exceed −103 dBm/MHz—RSSI. §20.21(e)(8)(i)(A)(2)(i), Fixed booster maximum noise power shall not exceed −102.5 dBm/MHz + 20 log (F), where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.
Test Setup:	 Figure 3 – Noise limit test setup (also used for 7.8)  Figure 4 – Test setup for uplink noise power measurement in the presence of a downlink signal
Test Procedure:	a) Connect the EUT to the test equipment as shown in Figure 3. Begin with the uplink output (donor) port connected to the spectrum analyzer. When measuring downlink noise, connect the downlink output (server) port to the spectrum analyzer. b) Set the spectrum analyzer RBW to 1 MHz with the VBW ≥ 3 . RBW. c) Select the power averaging (rms) detector and trace average over at least 100 traces. d) Set the center frequency of the spectrum analyzer to the center of the CMRS band under test with the span ≥ 2 . the CMRS band. e) Measure the maximum transmitter noise power level. f) Save the spectrum analyzer Test Plots as necessary for inclusion in the final test report. g) Repeat 7.7b) to 7.7f) for all operational uplink and downlink bands. h) Connect the EUT to the test equipment as shown in Figure 4 for uplink noise power measurement in the presence a downlink signal. Affirm the coupled path of the RF coupler is connected to the spectrum analyzer. i) Configure the signal generator for AWGN operation with a 99% OBW of 4.1 MHz.

	j) Set the spectrum analyzer RBW for 1 MHz, VBW ≥ 3 . RBW, with a power averaging (rms) detector with at least 100 trace averages. k) Set the center frequency of the spectrum analyzer to the center of the CMRS band under test, with the span ≥ 2 the CMRS band. This shall include all spectrum blocks in the particular CMRS band under test (see Appendix A). l) For uplink noise measurements, set the spectrum analyzer center frequency for the uplink band under test, and tune the signal generator to the center of the paired downlink band. m) Measure the maximum transmitter noise power level while varying the downlink signal generator output level from −90 dBm to −20 dBm, as measured at the input port (i.e., downlink signal level at the booster donor port node of Figure 4), in 1 dB steps inside the RSSI-dependent region, and in 10 dB steps outside the RSSI-dependent region. Report the six values closest to the limit, with at least two points within the RSSI-dependent region of the limit. See Appendix D for noise limits graphs. n) Repeat 7.7.1h) through 7.7.1m) for all operational uplink bands. **Variable uplink noise timing** Variable uplink noise timing is to be measured as follows, using the test setup shown in Figure 4. a) Set the spectrum analyzer to the uplink frequency to be measured. b) Set the span to 0 Hz, with a sweep time of 10 seconds. c) Set the power level of signal generator to the lowest level of the RSSI-dependent noise [see 7.7.1m)]. d) Select MAX HOLD and increase the power level of signal generator by 10 dB for mobile boosters, and 20 dB for fixed boosters. e) Confirm that the uplink noise decreases to the specified level within 1 second for mobile devices, and within 3 seconds for fixed devices.12 f) Repeat 7.7.2a) to 7.7.2e) for all operational uplink bands. g) Include Test Plotss and summary table in test report.
Test Result:	PASS

6.6.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Signal Generator	Agilent	N5182A	MY47070282	Sep. 12, 2019	Sep. 11, 2020
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 12, 2019	Sep. 11, 2020
RF Combiner	SUNVNDN	SUD-CS 0800	16230009	Sep. 12, 2019	Sep. 11, 2020
Attenuator	50FP-006-H3	JFW	907763	Sep. 12, 2019	Sep. 11, 2020

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.6.3. Test Data

698 - 716 MHz

Max Noise Power			
Frequency (MHz)	Measured dBm/MHz	Limit dBm/MHz	Result (dB)
UL698-716	-46.87	-45.51	PASS
DL728-746	-48.55	-45.51	PASS

776 - 787 MHz

Max Noise Power			
Frequency (MHz)	Measured dBm/MHz	Limit dBm/MHz	Result (dB)
UL776-787	-46.32	-44.64	PASS
DL746-757	-48.64	-44.64	PASS

Note: Fixed booster maximum noise power shall not exceed –102.5 dBm/MHz + 20 log (F), where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.

698 - 716 MHz

Variable Uplink Noise				
Frequency (MHz)	RSSI dBm	Measured dBm/MHz	Limit dBm/MHz	Results
UL698-716	-90	-47.06	-45.51	PASS
	-80	-47.43	-45.51	PASS
	-70	-47.84	-45.51	PASS
	-57	-50.18	-46.00	PASS
	-56	-50.66	-47.00	PASS
	-54	-51.07	-49.00	PASS

776 - 787 MHz

Variable Uplink Noise				
Frequency (MHz)	RSSI dBm	Measured dBm/MHz	Limit dBm/MHz	Results
UL776-787	-90	-48.11	-44.64	PASS
	-80	-48.59	-44.64	PASS
	-70	-48.80	-44.64	PASS
	-58	-51.02	-45.00	PASS
	-57	-51.37	-46.00	PASS
	-55	-52.64	-48.00	PASS

Variable Uplink Noise Timing

698 - 716 MHz

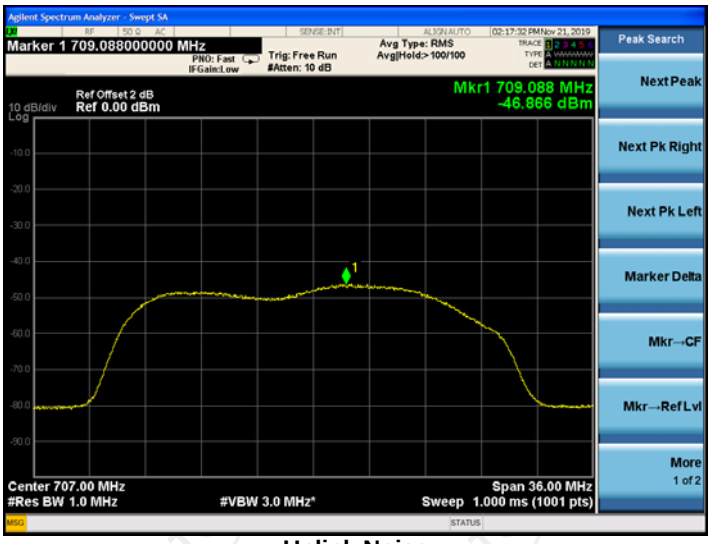
Frequency (MHz)	Measured Sec	Limit Sec	Results
UL698-716	0.823	3	PASS

776 - 787 MHz

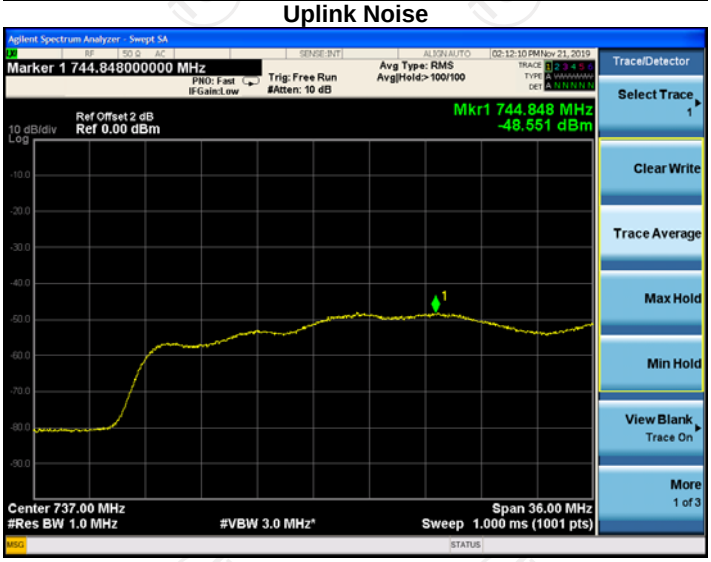
Frequency (MHz)	Measured Sec	Limit Sec	Results
UL776-787	0.995	3	PASS

698 - 716 MHz

Test Plots



Uplink Noise



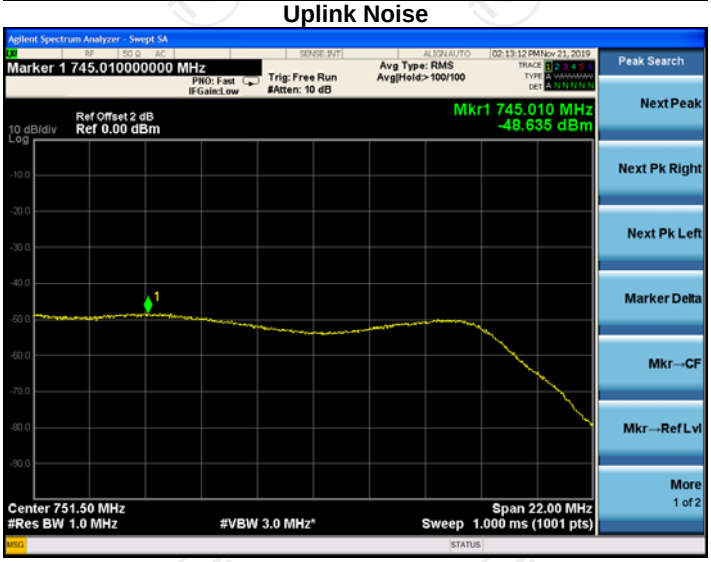
Downlink Noise

Variable Noise Timing Test Plots

776 - 787 MHz

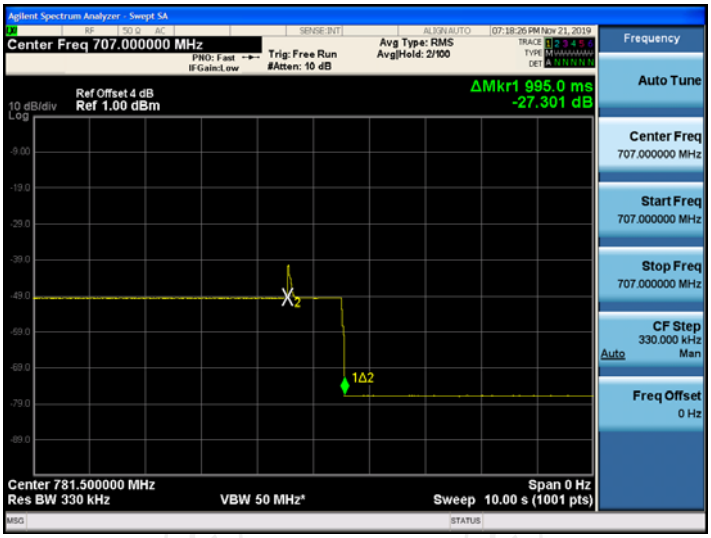
Test Plots

Uplink Noise



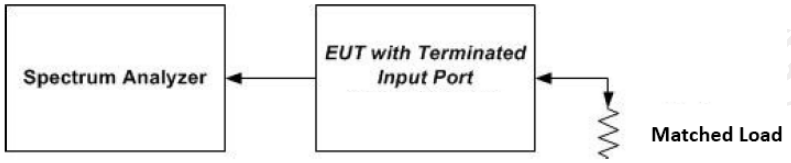
Downlink Noise

Variable Noise Timing Test Plots



6.7. Uplink Inactivity

6.7.1. Test Specification

Test Requirement:	FCC Part20 Section 20.21(e)(8)(i)(I)
Test Method:	KDB835210 D03 Signal Booster Measuremets v04r03
Limit:	20.21(e), When a consumer booster is not serving an active device connection after 5 minutes the uplink noise power shall not exceed .70 dBm/MHz.
Test Setup:	 Figure 3 – Noise limit test setup (also used for 7.8)
Test Procedure:	a) Connect the EUT to the test equipment as shown in Set-Up with the uplink output connected to the spectrum analyzer. b) Select the RMS power averaging detector. c) Set the spectrum analyzer RBW for 1 MHz with the VBW ≥ 3X RBW. d) Set the center frequency of the spectrum analyzer to the center of the uplink operational band. e) Set the span for 0 Hz with a single sweep time for a minimum of 330 seconds. f) Start to capture a new trace using MAX HOLD. g) After approximately 15 seconds turn on the EUT power. h) Once the full spectrum analyzer trace is complete place a MARKER on the leading edge of the pulse and use the DELTA MARKER METHOD to measure the time until the uplink was squelched. i) Ensure the noise level for the squelched signal is below the uplink inactivity noise power limit, as specified by the rules. j) Capture the Test Plots for inclusion in the test report. k) Measure noise using procedures in a) to e). l) Repeat steps c) to k) for all operational uplink bands.
Test Result:	PASS

6.7.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 12, 2019	Sep. 11, 2020

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.7.3. Test Data

698 - 716 MHz

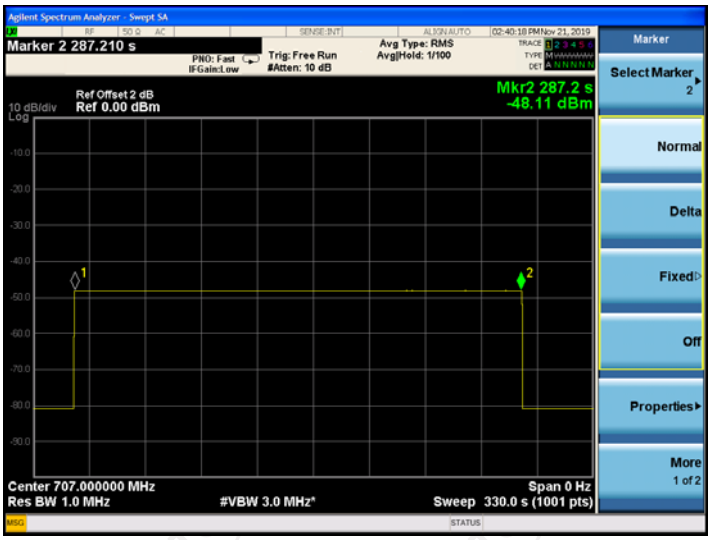
Uplink Inactivity			
Frequency (MHz)	Measured(s)	Limit(s)	Result
UL698-716	287.2	300.0	PASS

776 - 787 MHz

Uplink Inactivity			
Frequency (MHz)	Measured(s)	Limit(s)	Result
UL776-787	287.2	300.0	PASS

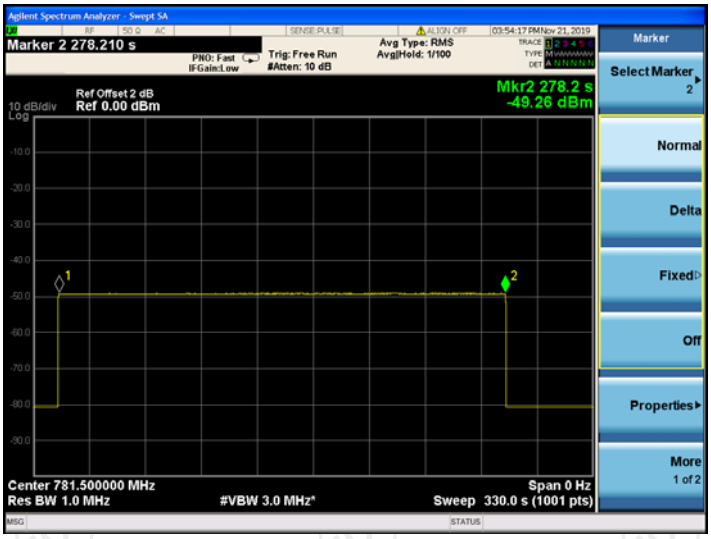
698 - 716 MHz

Test Plots



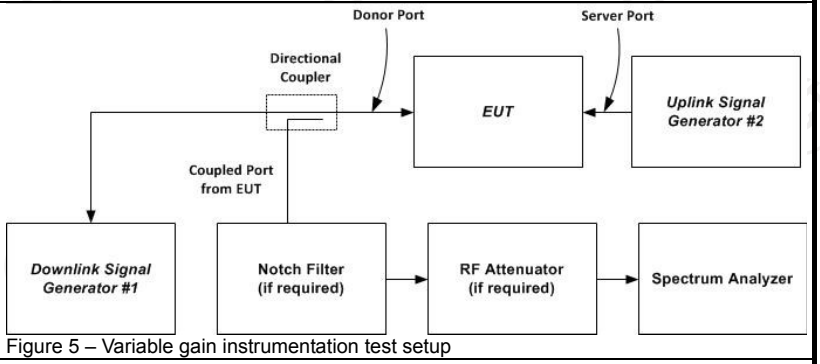
776 - 787 MHz

Test Plots



6.8. Variable Booster Gain

6.8.1. Test Specification

Test Requirement:	FCC Part20 Section 120.21(e)(8)(i)(C)(1) FCC Part20 Section 120.21(e)(8)(i)(H)
Test Method:	KDB835210 D03 Signal booster measurements v04r03
Limit:	-34 dB - RSSI + MSCL.
Test Setup:	 Figure 5 – Variable gain instrumentation test setup
Test Procedure:	**Variable gain:** a) Connect the EUT to the test equipment as shown in Figure 5 with the uplink output (donor) port connected to signal generator #1. Affirm that the coupled path of the RF coupler is connected to the spectrum analyzer. b) Configure downlink signal generator #1 for AWGN operation with a 99% OBW of 4.1 MHz, tuned to the center of the operational band. c) Set the power level and frequency of signal generator #2 to a value that is 5 dB below the AGC level determined from 7.2. The signal type is AWGN with a 99% OBW of 4.1 MHz. d) Set RBW = 100 kHz. e) Set VBW ≥ 300 kHz. f) Select the CHANNEL POWER measurement mode. g) Select the power averaging (rms) detector. h) Affirm that the number of measurement points per sweep ≥ (2 . span)/RBW. i) Sweep time = auto couple or as necessary (but no less than auto couple value). j) Trace average at least 10 traces in power averaging (i.e., rms) mode. k) Measure the maximum channel power and compute maximum gain when varying the signal generator #1 output to a level from .90 dBm to .20 dBm, as measured at the input port (i.e., downlink signal level at the booster donor port node of Figure 5), in 1 dB steps inside the RSSI-dependent region, and 10 dB steps outside the RSSI-dependent region. Report the six values closest to the limit, including at least two points from within the RSSI-dependent region of operation. See gain limit in charts in Appendix D for uplink gain requirements. Additionally, document that the EUT provides equivalent uplink and downlink gain, and when operating in shutoff mode that the uplink and downlink gain is within the transmit power off mode gain limits. l) Repeat 7.9.1b) to 7.9.1k) for all operational uplink bands. **Variable uplink gain timing:** Variable uplink gain timing is to be measured as follows, using the

	test setup shown in Figure 5. a) Set the spectrum analyzer to the uplink frequency to be measured. b) Set the span to 0 Hz with a sweep time of 10 seconds. c) Set the power level of signal generator #1 to the lowest level of the RSSI-dependent gain [see 7.9.1k)]. d) Select MAX HOLD and increase the power level of signal generator #1 by 10 dB for mobile boosters, and by 20 dB for fixed indoor boosters. Signal generator #2 remains same, as described in 7.9.1c). e) Confirm that the uplink gain decreases to the specified levels, within 1 second for mobile devices, and within 3 seconds for fixed devices.13 f) Repeat 7.9.2a) to 7.9.2e) for all operational uplink bands.
Test Result:	PASS

6.8.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Signal Generator	Agilent	E4421B	GB39340839	Jul. 30, 2019	Jul. 29, 2020
Signal Generator	Agilent	N5182A	MY47070282	Sep. 12, 2019	Sep. 11, 2020
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 12, 2019	Sep. 11, 2020
RF Combiner	SUNVNDN	SUD-CS 0800	16230009	Sep. 12, 2019	Sep. 11, 2020
Attenuator	50FP-006-H3	JFW	907763	Sep. 12, 2019	Sep. 11, 2020

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.8.3. Test Data

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.*

698 - 716 MHz

MSCL Calculation							
Operation Frequency	Frequency (MHz)	Distance (m)	Path loss (dB)	Indoor Antenna Gain(dBi)	Indoor Cable Loss(dB)	Polarity Loss(dB)	MSCL (dB)
UL698-716	698	2	35.40	6	1.2	3.01	**33.61**

776 - 787 MHz

MSCL Calculation							
Operation Frequency	Frequency (MHz)	Distance (m)	Path loss (dB)	Indoor Antenna Gain(dBi)	Indoor Cable Loss(dB)	Polarity Loss(dB)	MSCL (dB)
UL776-787	776	2	36.32	6	1.4	3.01	**34.73**

Note: Lp = 20logf + 20logd – 27.5

Polarity loss = 20Log (1/Sin (45deg)) dB = 3.01dB

698 - 716 MHz

Variable booster gain							
Operation Frequency	RSSI (dBm)	Input Power (dBm)	Output Power (dBm)	Measured Gain (dB)	MSCL	Limit	Results
UL698-716	-63	-47.3	13.87	61.17	33.61	62.61	PASS
	-62	-47.3	13.01	60.31	33.61	61.61	PASS
	-60	-47.3	10.64	57.94	33.61	59.61	PASS
	-59	-47.3	9.87	57.17	33.61	58.61	PASS
	-58	-47.3	8.25	55.55	33.61	57.61	PASS
	-56	-47.3	6.76	54.06	33.61	55.61	PASS

776 - 787 MHz

Variable booster gain							
Operation Frequency	RSSI (dBm)	Input Power (dBm)	Output Power (dBm)	Measured Gain (dB)	MSCL	Limit	Results
UL776-787	-63	-46.5	14.16	60.66	34.73	63.73	PASS
	-62	-46.5	13.58	60.08	34.73	62.73	PASS
	-61	-46.5	12.89	59.39	34.73	61.73	PASS
	-59	-46.5	9.72	56.22	34.73	59.73	PASS
	-57	-46.5	8.81	55.31	34.73	57.73	PASS
	-56	-46.5	6.34	52.84	34.73	56.73	PASS

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Variable Uplink Gain Timing

698 - 716 MHz

Operation Frequency	Measured Sec	Limit Sec	Result
698-716	1.090	3.0	PASS

776 - 787 MHz

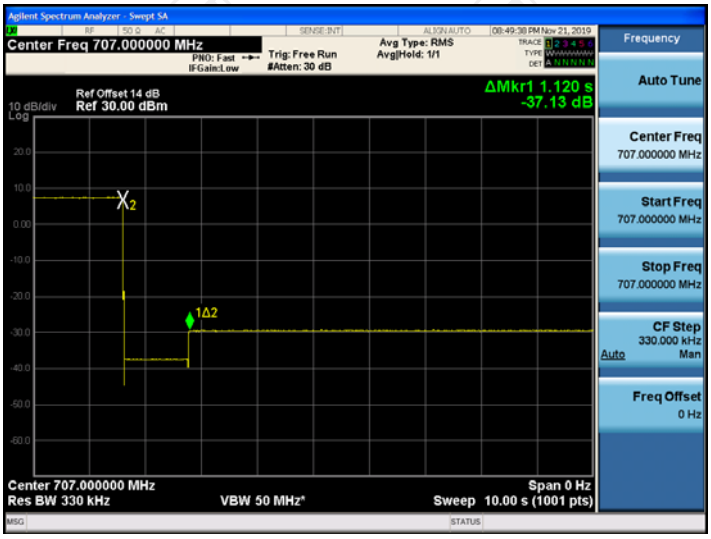
Operation Frequency	Measured Sec	Limit Sec	Result
776-787	1.120	3.0	PASS

698 - 716 MHz

Variable Uplink Gain Timing Test Plots

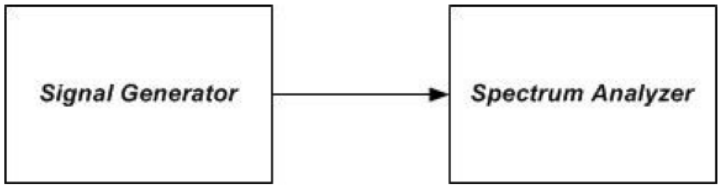
776 - 787 MHz

Variable Uplink Gain Timing Test Plots



6.9. Occupied Bandwidth

6.9.1. Test Specification

Test Requirement:	FCC Part2 Section 2.1049
Test Method:	KDB835210 D03 Signal booster measurements v04r03
Limit:	N/A
Test setup:	 Figure 6 – Test setup for measuring characteristics of test signals used for subsequent EUT occupied bandwidth testing
Test Procedure:	a) Connect the test equipment as shown in Figure 6 to firstly measure the characteristics of the test signals produced by the signal generator. b) Set VBW ≥ 3 . RBW. c) Set the center frequency of the spectrum analyzer to the center of the operational band. The span will be adjusted for each modulation type and OBW as necessary for accurately viewing the signals. d) Set the signal generator for power level to match the values obtained from the tests of 7.2. e) Set the signal generator modulation type for GSM with a PRBS pattern and allow the trace on the signal generator to stabilize adjusting the span as necessary. f) Set the spectrum analyzer RBW for 1% to 5% of the EBW. g) Capture the spectrum analyzer trace for inclusion in the test report. h) Repeat 7.10c) to 7.10g) for CDMA and W-CDMA modulation, adjusting the span as necessary. AWGN or LTE may be used in place of W-CDMA, as an option. i) Repeat 7.10c) to 7.10h) for all uplink and downlink operational bands. j) Connect the test equipment as shown in Figure 1, with the uplink output (donor) port connected to the spectrum analyzer, and the server port connected to the signal generator. k) Repeat 7.10c) to 7.10i) with this EUT uplink path test setup. l) Connect the test equipment as shown in Figure 1, with the downlink output (server) port connected to the spectrum analyzer, and the donor port connected to the signal generator. m) Repeat 7.10c) to 7.10i) with this EUT downlink path test setup.
Test results:	PASS

6.9.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Signal Generator	Agilent	N5182A	MY47070282	Sep. 12, 2019	Sep. 11, 2020
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 12, 2019	Sep. 11, 2020

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.9.3. Test Data

698 - 716 MHz

Operation Band	Signal Type	Input OBW [MHz]	Output OBW [MHz]	Results
UL698-716	GSM	0.245	0.247	PASS
	CDMA	1.237	1.262	PASS
	LTE	4.528	4.521	PASS
DL728-746	GSM	0.246	0.243	PASS
	CDMA	1.242	1.236	PASS
	LTE	4.569	4.534	PASS

776 - 787 MHz

Operation Band	Signal Type	Input OBW [MHz]	Output OBW [MHz]	Results
UL776-787	GSM	0.246	0.245	PASS
	CDMA	1.239	1.243	PASS
	LTE	4.518	4.527	PASS
DL746-757	GSM	0.246	0.244	PASS
	CDMA	1.238	1.240	PASS
	LTE	4.565	4.547	PASS

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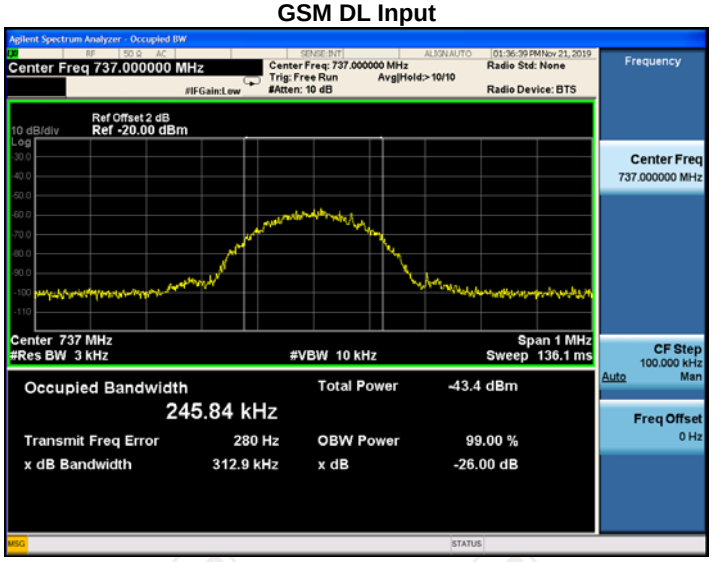
698 - 716 MHz

Test Plots

GSM UL Input

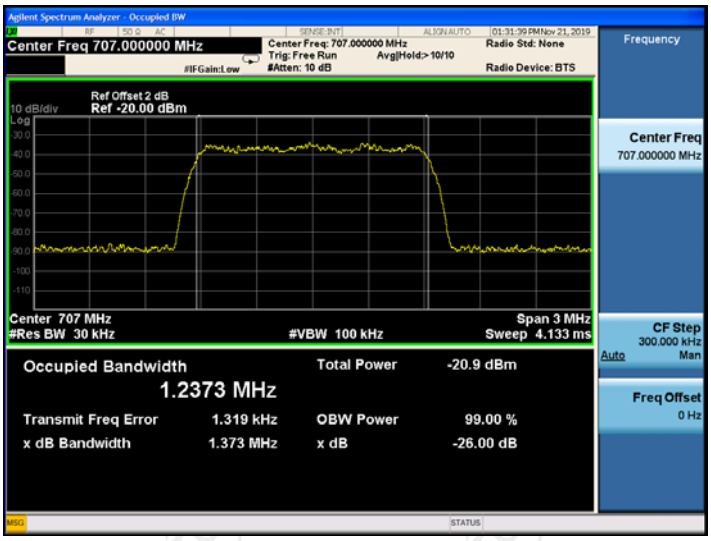
GSM UL output

GSM DL Input

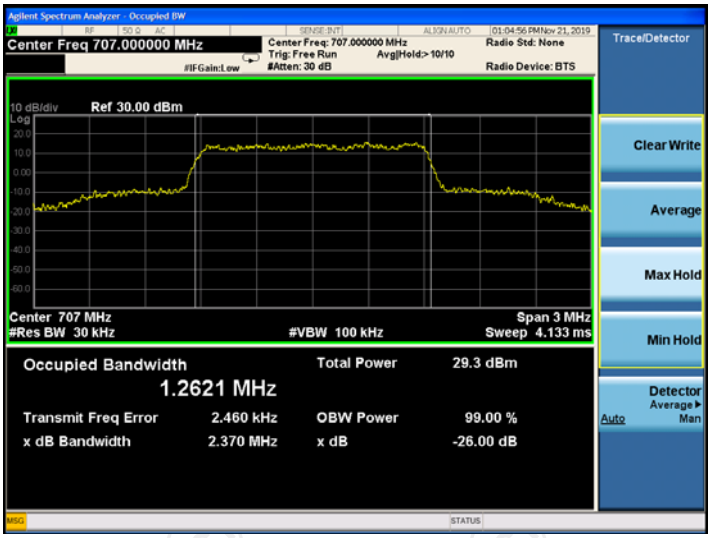


GSM DL Output

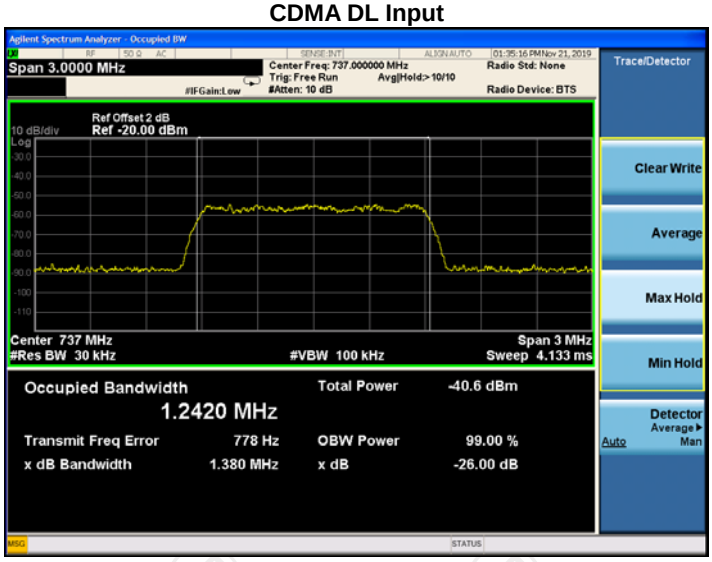
CDMA UL Input



CDMA UL output



CDMA DL Input



CDMA DL Output