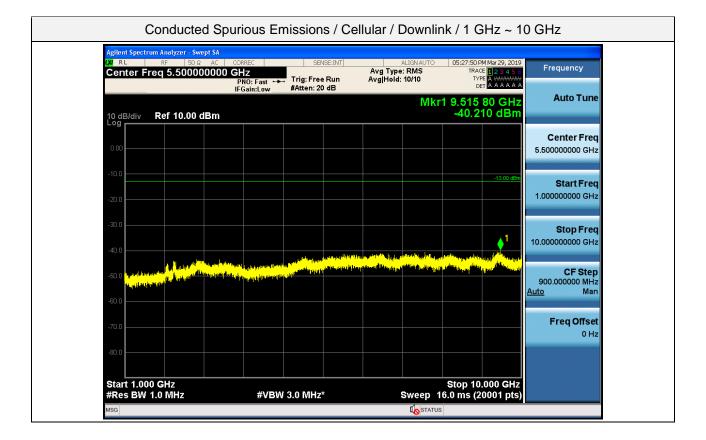


Agilent Spectrum A			REC	SE	NSE:INT		ALIGN AUTO	05:27:43 P	PM Mar 29, 2019	
Center Freq		0000 MH2		Trig: Fre	e Run	Avg Type Avg Hold:	: RMS	TRAC		Frequency
		IF	Gain:Low	#Atten: 20	0 dB		Mkr1		7 5 MHz	Auto Tune
10 dB/div R	ef 10.00 c	lBm							93 dBm	
										Center Freq
0.00										947.500000 MHz
-10.0									-13.00 dBm	Start Freq
-20.0										895.000000 MHz
-30.0										Stop From
-40.0										Stop Freq 1.00000000 GHz
-40.0										
-50.0									1 [−]	CF Step 10.500000 MHz Auto Man
-60.0 <mark>behiliki de bi</mark>				a da ang			Warden (And the second	<u>Auto</u> Man
-70.0							ant le a	·]		Freq Offset
-80.0										0 Hz
-00/01										
Start 895.00	MHz							Stop 1.00	0000 GHz 6001 pts)	







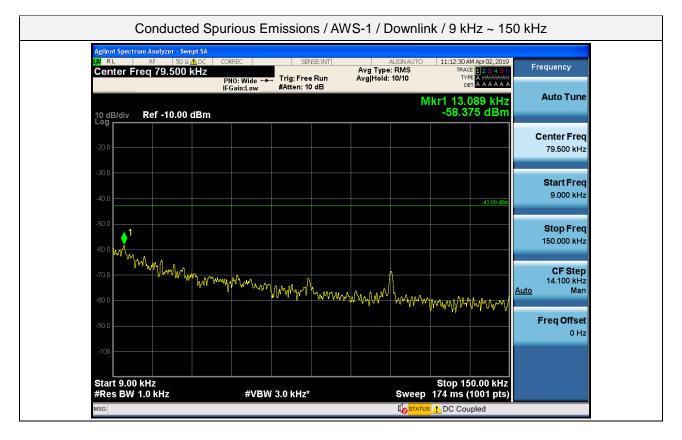
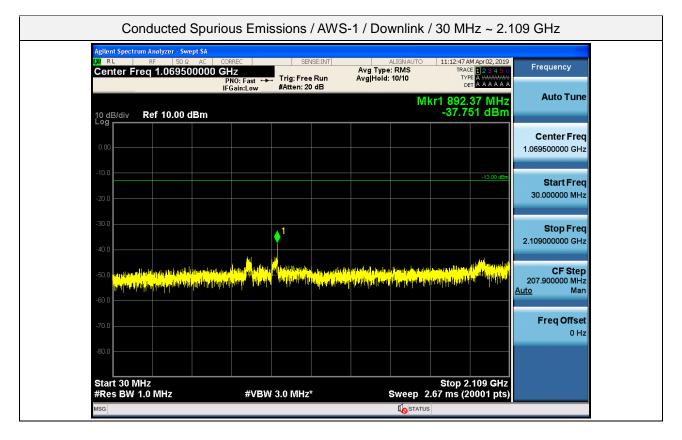


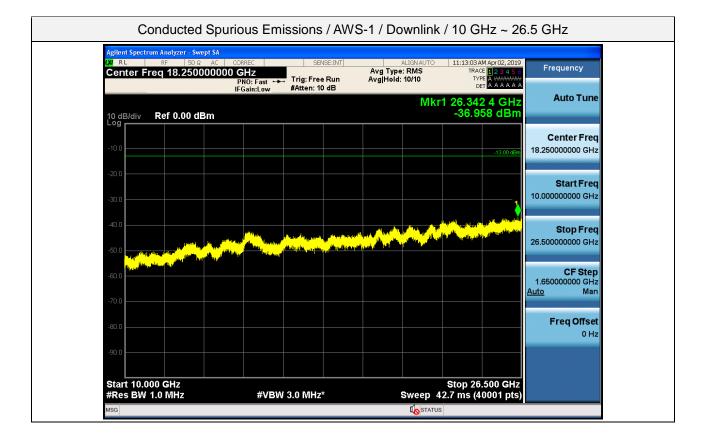
Image: Non-state Image: Non-state<	o Tune er Freq
10 dB/div Ref -10.00 dBm -60.310 dBm -20.0 -30.0 -33.00 dEm -33.00 dEm	
-20.0 -30.0 -30.0	er Freq
	000 MHz
150	urt Freq
	000 kHz
	op Freq
700	F Step
	Man
	0 ffset 0 Hz
-100	



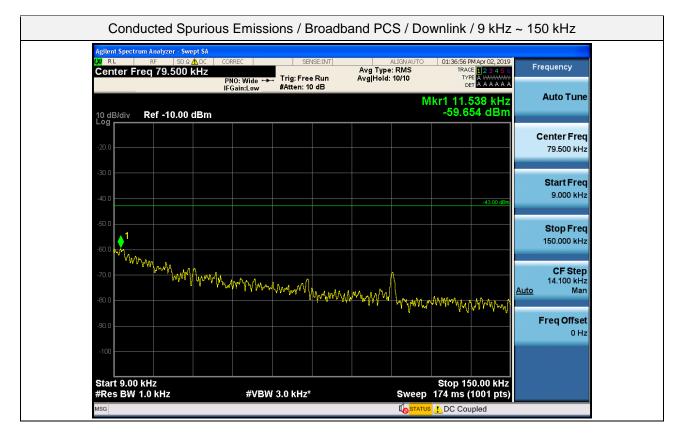


Agilent Spectrum Analyzer - Swept S (X) RL RF 50 Ω A		ALIGN AUTO	11:12:55 AM Apr 02, 2019	
Center Freq 6.0780000		Avg Type: RMS	TRACE 123456	Frequency
	IFGain:Low #Atten: 20 dB	Mkrd	9.503 9 GHz	Auto Tune
10 dB/div Ref 10.00 dBr	n		-39.444 dBm	
Log				Center Freq
0.00				6.078000000 GHz
-10.0			-13.00 dBm	
				Start Freq 2.15600000 GHz
-20.0				
-30.0				Stop Freq
-40.0				10.000000000 GHz
	en delen er besteren stratik besteren delet te besteren i besteren er gener perioderen anderen er besteren er	la positivitationes de la catalitativitation de la catalitativa. Al territo de la catalitativa de la		CF Step
-50.0 10.00 10.000 10.000 10.000	and a state of the			784.400000 MHz Auto Man
-60.0				<u>kuto</u> Man
-70.0				Freq Offset
				0 Hz
-80.0				
Start 2.156 GHz			top 10.000 GHz	
#Res BW 1.0 MHz	#VBW 3.0 MHz*		3 ms (20001 pts)	





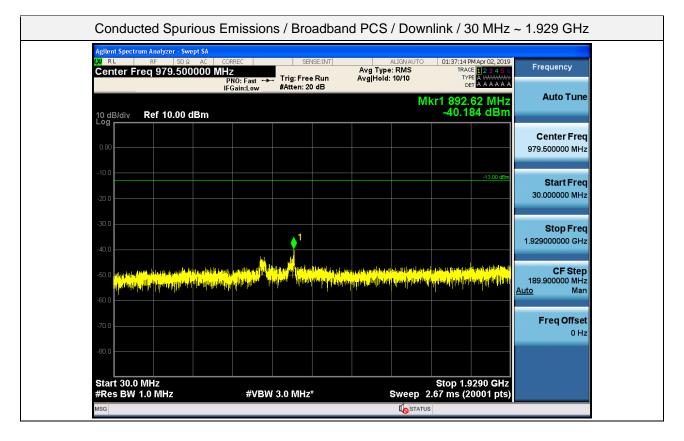


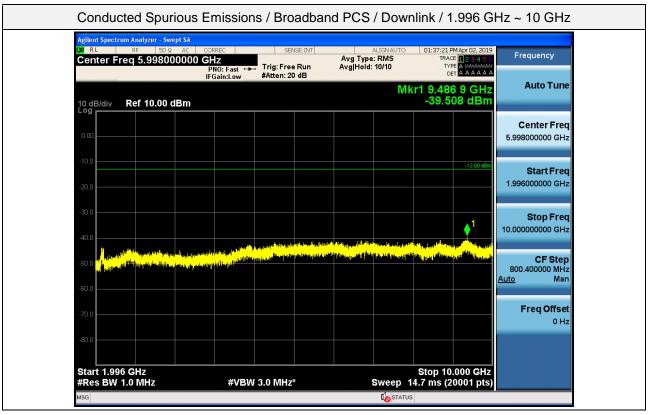


	▲ DC CORREC	SEN:	BE:INT		ALIGN AUTO		PM Apr 02, 2019	Frequency
Center Freq 15.0750	DOO MHz PNO: Fast ↔ IFGain:Low	Trig: Free #Atten: 10		Avg Type Avg Hold:	: RMS 10/10	TY	CE 1 2 3 4 5 6 PE A WWWWW ET A A A A A A	requercy
							150 kHz	Auto Tune
10 dB/div Ref -10.00	dBm					-60.1	82 dBm	
-20.0								Center Freq 15.075000 MHz
								15.075000 MHZ
-30.0							-33.00 dBm	Start Freq
-40.0								150.000 kHz
-50.0								
1								Stop Freq 30.000000 MHz
-60.0								
-70.0								CF Step 2.985000 MHz
-80.0	and with hitse strategiest we		at the state of th			uda tilanını		<u>Auto</u> Man
			al a sur a		I. STATISTICS			Freq Offset
-90.0								0 Hz
-100								
Start 150 kHz #Res BW 10 kHz	#VB)	V 30 kHz*			Sween		0.00 MHz 6001 pts)	

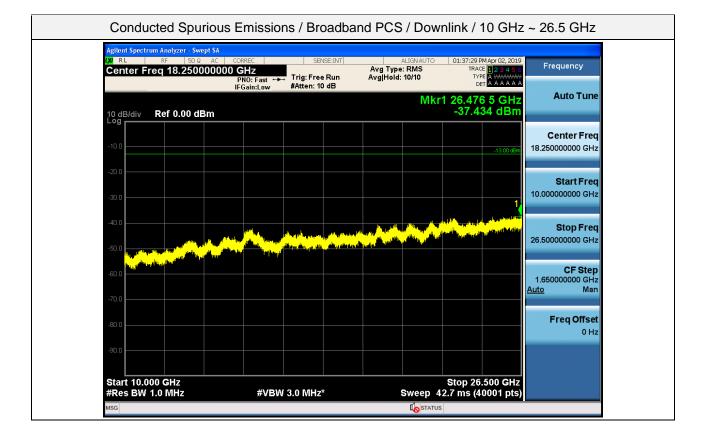














5.7. NOISE LIMITS

Test Requirements:

§20.21(e)(8)(i)(A) NOISE LIMITS.

(1) The transmitted noise power in dBm/MHz of consumer boosters at their uplink port shall not exceed -103 dBm/MHz—RSSI. RSSI (received signal strength indication expressed in negative dB units relative to 1 mW) is the downlink composite received signal power in dBm at the booster donor port for all base stations in the band of operation.

(2) The transmitted maximum noise power in dBm/MHz of consumer boosters at their uplink and downlink ports shall not exceed the following limits:

(i) Fixed booster maximum noise power shall not exceed $-102.5 \text{ dBm/MHz} + 20 \text{ Log}_{10}$ (Frequency), where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.

(ii) Mobile booster maximum noise power shall not exceed-59 dBm/MHz.

(iii) Compliance with Noise limits will use instrumentation calibrated in terms of RMS equivalent voltage, and with booster input ports terminated or without input signals applied within the band of measurement.

§20.21(e)(8)(i)(H) Transmit Power Off Mode (uplink and downlink noise power).

When the consumer booster cannot otherwise meet the noise and gain limits defined herein it must operate in "Transmit Power Off Mode." In this mode of operation, the uplink and downlink noise power shall not exceed -70 dBm/MHz and both uplink and downlink gain shall not exceed the lesser of 23 dB or MSCL.

Test Procedures:

Measurements were in accordance with the test methods section 7.7 of KDB 935210 D03 v04r03.

7.7.1 Maximum transmitter noise power level

a) Begin with the uplink output (donor) port connected to the spectrum analyzer.

b) Set the spectrum analyzer RBW to 1 MHz with the VBW \geq 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 plot as necessary for inclusion in the final test report.

g) Repeat b) to f) for all operational uplink and downlink bands.

h) Connect the EUT 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



 \geq 2 the CMRS band. This shall include all spectrum blocks in the particular CMRS band under.

I) 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, 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.

n) Repeat h) through m) for all operational uplink bands.

- 7.7.2 Variable uplink noise timing
- 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.

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.

- f) Repeat a) to e) for all operational uplink bands.
- g) Include plots and summary table in test report.

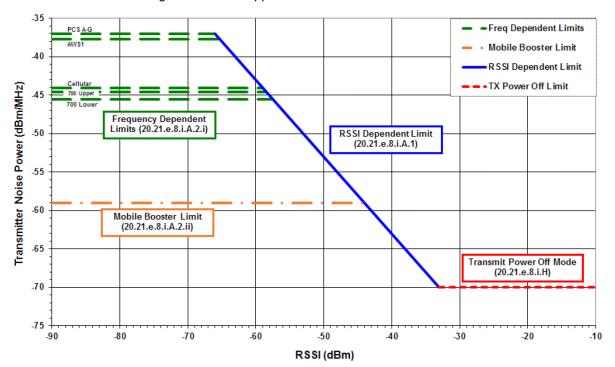
Note1. Test limit is according to 'Frequency Dependent Limits' line of figure in Note3.

- Limit in -90 dBm to -103 dBm/MHz (-102.5 dBm/MHz + 20 log₁₀(f)), RSSI range
- : -102.5 dBm/MHz + 20 log₁₀(f)
- Limit in -103 dBm/MHz (-102.5 dBm/MHz + 20 log₁₀(f)) to -33 dBm, RSSI range : -103 dBm/MHz—RSSI
- Limit in -33 dBm to -10 dBm RSSI range: -70 dBm/MHz
- Timing limit is according to fixed devices 3 second limit in section 7.7.2 of KDB 935210 D03
- * (f) is the uplink mid-band frequency of the operating frequency bands (in MHz).

Note2. Following switch coupled loss is corrected in signal generating.

Band	Uplink generating loss (dB)	Downlink generating loss (dB)
Lower 700 MHz	3.46	4.62
Upper 700 MHz	4.04	3.96
Cellular	4.53	4.78
AWS-1	4.97	5.13
Broadband PCS	8.17	5.16





Note3. Tests refer to following noise limit in appendix D of KDB 935210 D03 v04r03.



Test Result:

Tabulated Result of Uplink Maximum Transmitter Noise Power Level

Band	Frequency (MHz)	Limit (dBm/MHz)	Noise Level (dBm/MHz)
Lower 700 MHz	708.920	-45.470	-48.004
Upper 700 MHz	788.958	-44.640	-46.568
Cellular	831.500	-44.050	-49.589
AWS-1	1 726.020	-37.730	-45.782
Broadband PCS	1 895.630	-37.010	-44.877

Tabulated Result of Downlink Maximum Transmitter Noise Power Level

Band	Frequency (MHz)	Limit (dBm/MHz)	Noise Level (dBm/MHz)
Lower 700 MHz	751.280	-45.120	-45.511
Upper 700 MHz	749.894	-44.980	-45.320
Cellular	885.100	-43.600	-45.327
AWS-1	2 162.650	-35.920	-42.248
Broadband PCS	1 957.690	-36.640	-46.168



Band	RSSI (dBm)	Frequency (MHz)	Limit (dBm/MHz)	Noise Level (dBm/MHz)
	-34	708.824	-69.47	-70.110
	-80	708.872	-45.47	-46.816
Lower	-60	708.776	-45.47	-47.145
700 MHz	-90	708.968	-45.47	-47.195
	-35	708.536	-68.47	-70.261
	-70	708.320	-45.47	-47.335
	-33	781.852	-69.64	-70.341
	-34	781.632	-68.64	-69.501
Upper	-35	781.830	-67.64	-68.771
700 MHz	-37	782.050	-65.64	-66.811
	-38	782.072	-64.64	-65.820
	-36	782.226	-66.64	-67.841
	-34	827.700	-69.05	-73.302
	-35	827.700	-68.05	-73.286
	-38	827.950	-65.05	-70.296
Cellular	-36	827.950	-67.05	-72.357
	-70	828.300	-44.05	-49.508
	-60	827.750	-44.05	-49.512
	-34	1 719.540	-68.73	-68.878
	-47	1 719.090	-55.73	-55.987
A)A/O 4	-58	1 719.630	-44.73	-45.313
AWS-1	-38	1 720.350	-64.73	-65.396
	-35	1 719.810	-67.73	-68.793
	-51	1 720.260	-51.73	-52.818
	-34	1 883.150	-69.01	-69.245
	-35	1 881.460	-68.01	-69.251
Broadband	-48	1 882.890	-55.01	-56.284
PCS	-61	1 882.890	-42.01	-43.368
	-36	1 883.540	-67.01	-68.461
	-50	1 881.460	-53.01	-54.590

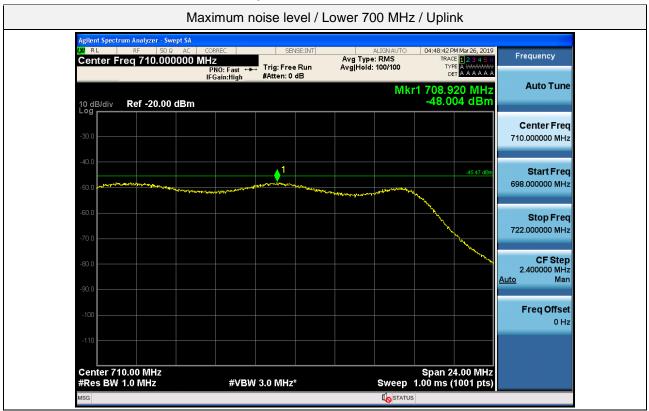
Tabulated Result of Variable Uplink Noise Power



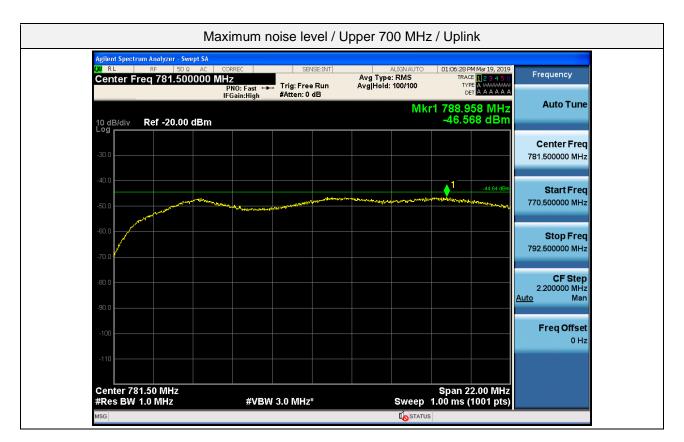
Band	Frequency (MHz)	Limit (ms)	Noise Timing (ms)
Lower 700 MHz	710.000		50
Upper 700 MHz	781.500		120
Cellular	836.500	3 000	180
AWS-1	1 732.500		40
Broadband PCS	1 882.500		240

Tabulated Result of Variable Uplink Noise Timing

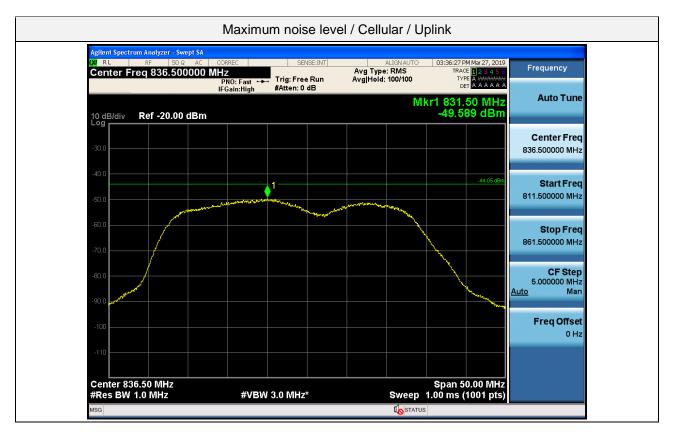




Plot data of Maximum transmitter noise power level

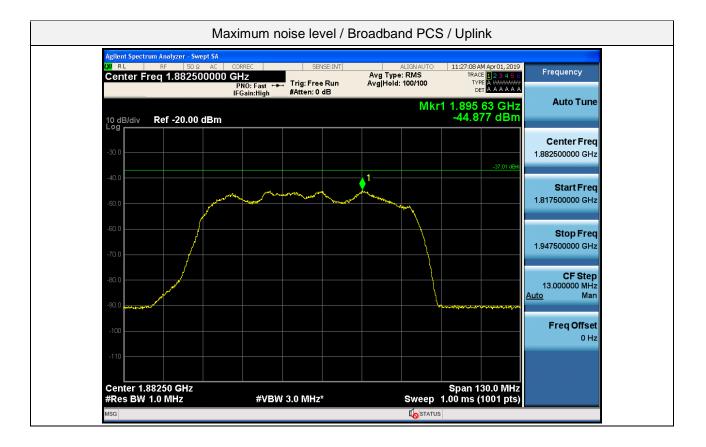




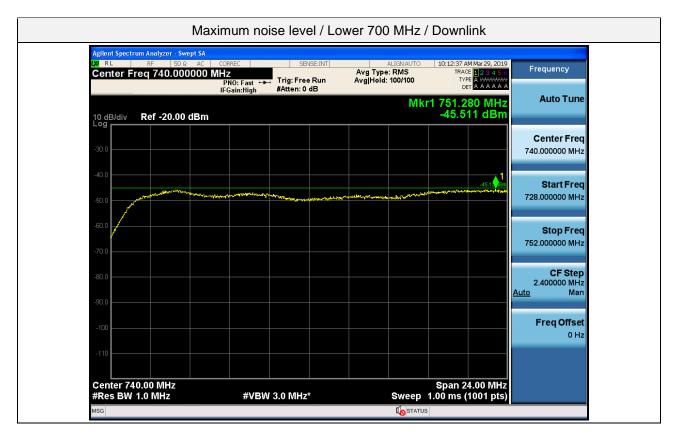


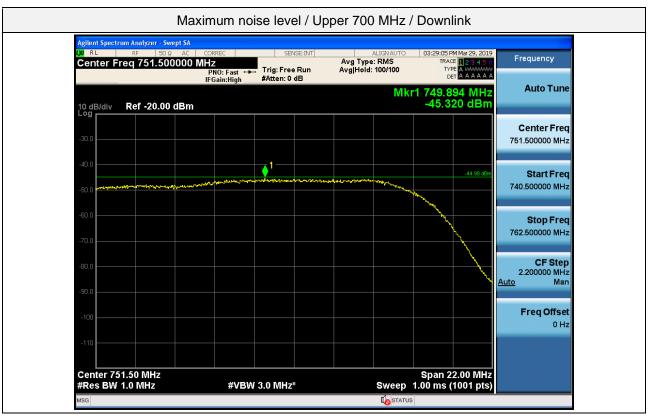
Agilent Spectrum Analyzer - Swept Si				
Center Freq 1.7325000		ALIGNAUTO 07 Avg Type: RMS Avg Hold: 100/100	23:10 PM Mar 28, 2019 TRACE 1 2 3 4 5 6 TYPE A WWWWW	Frequency
	IFGain:High #Atten: 0 dB	Mkr1 1	DET A A A A A A A 726 02 GHz	Auto Tune
10 dB/div Ref -20.00 dBr	n		45.782 dBm	
				Center Freq
-30.0			-37.73 dBm	1.732500000 GHz
-40.0			-37.73 dBm	Start Freq
-50.0	ward the star and the start of	multiple and the second second		1.687500000 GHz
		and the second se	www	
-60.0				Stop Freq 1.777500000 GHz
-70.0			<u> </u>	1.777500000 GH2
-80.0				CF Step 9.000000 MHz
-90.0			Source Ver	<u>Auto</u> Man
				Freq Offset
-100				0 Hz
-110				
Center 1.73250 GHz #Res BW 1.0 MHz	#VBW 3.0 MHz*	Spusser 1 89	an 90.00 MHz ms (1001 pts)	









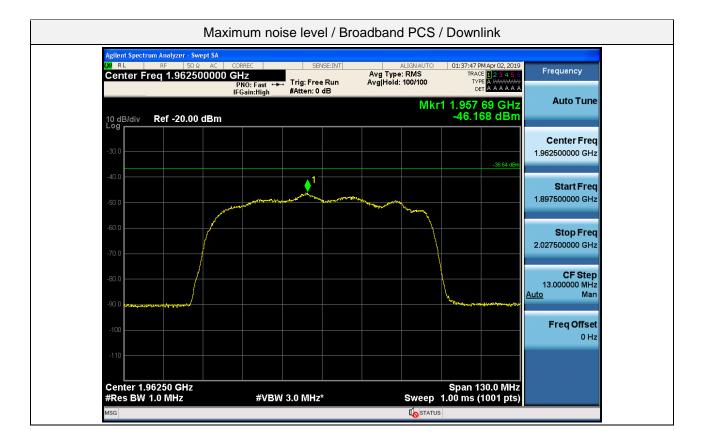






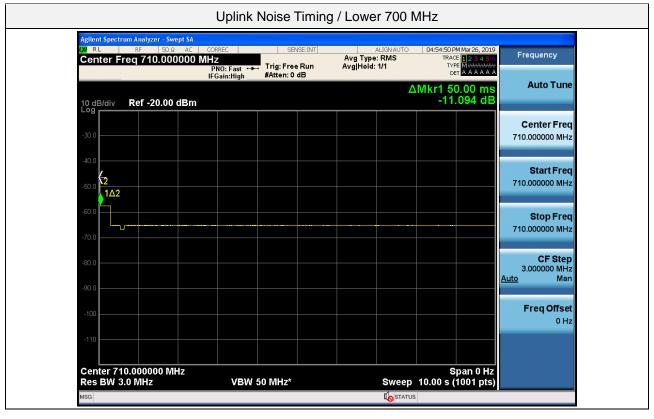
Agilent Spectrum Analyzer - Sw LXI RL RF 50 Ω					
Center Freq 2.1325		SENSE:INT	ALIGN AUTO Avg Type: RMS Avg Hold: 100/100	11:13:21 AM Apr 02, 2019 TRACE 1 2 3 4 5 6 TYPE A WWWWW	Frequency
	IFGain:High	#Atten: 0 dB	Mk	DET A A A A A A	Auto Tune
10 dB/div Ref -20.00	dBm			-42.248 dBm	
Log					Center Freq
-30.0				-35.92 dBm	2.132500000 GHz
-40.0					Otort From
-50.0	manuter and	North Conception and the start of the start			Start Freq 2.087500000 GHz
-50.0			·		
-60.0					Stop Freq 2.177500000 GHz
-70.0					2.177500000 GHz
-80.0					CF Step 9.000000 MHz
				1 × 1	Auto Man
-90.0					
-100					Freq Offset 0 Hz
-110					
Center 2.13250 GHz #Res BW 1.0 MHz		W 3.0 MHz*	<u></u>	Span 90.00 MHz 1.00 ms (1001 pts)	





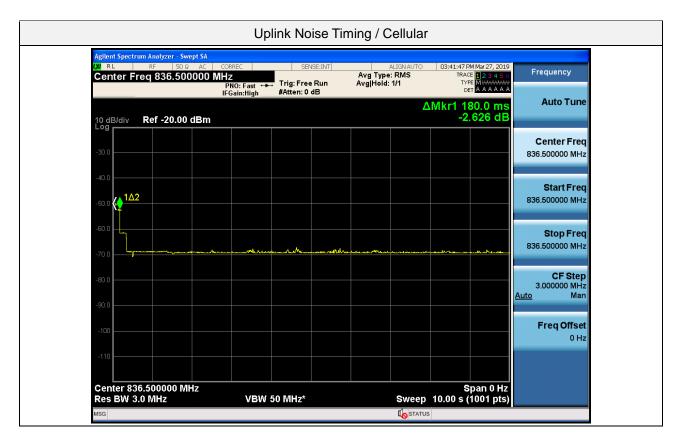


Plot data of Variable Uplink Noise Timing



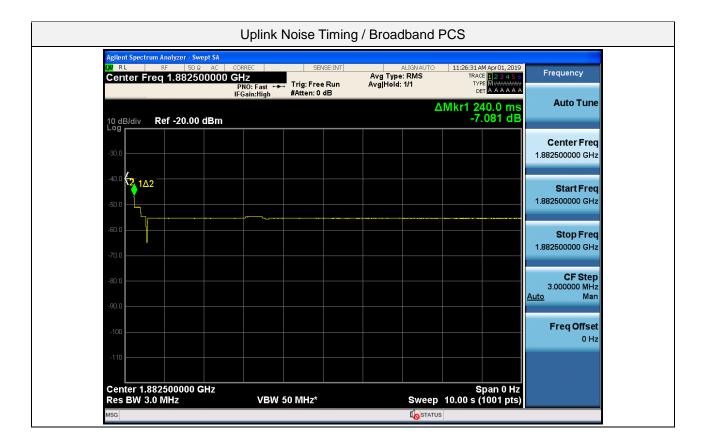
Agilent Spectrum Analyzer - Swept SA Δ R RF 50 Ω AC Center Freq 781.500000 C C C C	CORREC		ALIGN AUTO	01:40:47 PM Mar 19, 2019 TRACE 12 3 4 5 6	Frequency
	PNO: Fast +++ Trig: F IFGain:High #Atten:	ree Run Avg Hol	d: 1/1	TRACE 1 2 3 4 5 6 TYPE MWWWWW DET A A A A A A	Auto Tune
10 dB/div Ref -20.00 dBn	n		Δ	Mkr1 120.0 ms -10.946 dB	Auto Tune
					Center Freq
-30.0					781.500000 MHz
-40.0					Start Freq
-50.0					781.500000 MHz
-60.0					Stop Freq
-70.0					781.500000 MHz
-80.0					CF Step 3.000000 MHz
-90.0					<u>Auto</u> Man
-100					Freq Offset
-110					0 Hz
Center 781.500000 MHz Res BW 3.0 MHz	VBW 50 MHz	*	Sween	Span 0 Hz 10.00 s (1001 pts)	





Agilent Spectrum Analyzer - Swept SA X/ RL RF 50 Ω AC	CORREC SENSE:INT	ALIGN AUTO	07:36:11 PM Mar 28, 2019	
Center Freq 1.732500000	GHz PNO: Fast +++ Trig: Free Run	Avg Type: RMS Avg Hold: 1/1	TRACE 1 2 3 4 5 6 TYPE MWWWW DET A A A A A A	Frequency
	IFGain:High #Atten: 0 dB		∆Mkr1 40.00 ms	Auto Tune
10 dB/div Ref -20.00 dBm			-2.375 dB	
				Center Freq
-30.0				1.732500000 GHz
-40.0 1 Δ2				Start Freq
-50.0				1.732500000 GHz
-60.0				
				Stop Freq 1.732500000 GHz
-70.0				
-80.0				CF Step 3.000000 MHz
-90.0				<u>Auto</u> Man
				Freq Offset
-100				0 Hz
-110				
Center 1.732500000 GHz			Span 0 Hz	







5.8. UPLINK INACTIVITY

Test Requirements:

§ 20.21(e)(8)(i)(A) NOISE LIMITS (Uplink).

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 Procedures:

Measurements were in accordance with the test methods section 7.8 of KDB 935210 D03 v04r03.

- a) The uplink output (donor) port connected to the spectrum analyzer.
- b) Select the power averaging (rms) detector.
- c) Set the spectrum analyzer RBW for 1 MHz with the VBW \geq 3 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) After the full spectrum analyzer trace is complete, place a MARKER on the leading edge of the pulse, then use the DELTA MARKER METHOD to measure the time until the uplink becomes inactive.

- i) Affirm that the noise level is below the uplink inactivity noise power limit, as specified by the rules.
- j) Capture the plot for inclusion in the test report.
- k) Measure noise using procedures in a) to f).
- I) Repeat d) through k) for all operational uplink bands.

Note1. Test limit is applied both time (5 minutes) and level (-70 dBm/MHz) in § 20.21(e)(8)(i)(A)



Test Result:

Tabulated Result of Uplink Inactivity

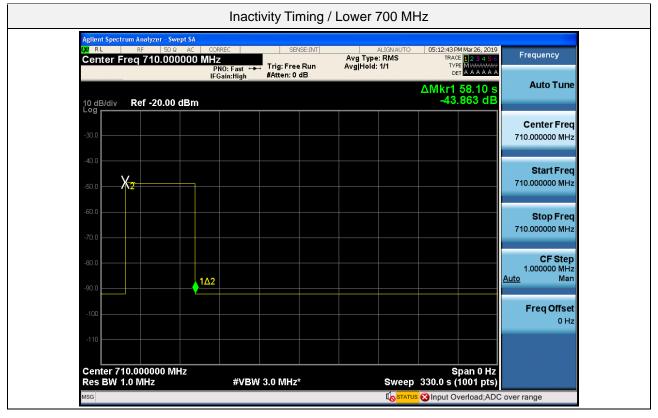
Band	Frequency (MHz)	Time Limit (s)	Inactivity Timing (s)
Lower 700 MHz	710.000		58.10
Upper 700 MHz	781.500		58.40
Cellular	836.500	3 000	58.40
AWS-1	1 732.500		58.10
Broadband PCS	1 882.500		58.40

Tabulated Result of Uplink Inactivity Noise

Band	Frequency (MHz)	Noise Limit (dBm/MHz)	Noise Level (dBm/MHz)
Lower 700 MHz	712.640		-91.295
Upper 700 MHz	783.106		-90.789
Cellular	821.60	-70	-91.029
AWS-1	1 752.48		-89.850
Broadband PCS	1 865.08		-89.178

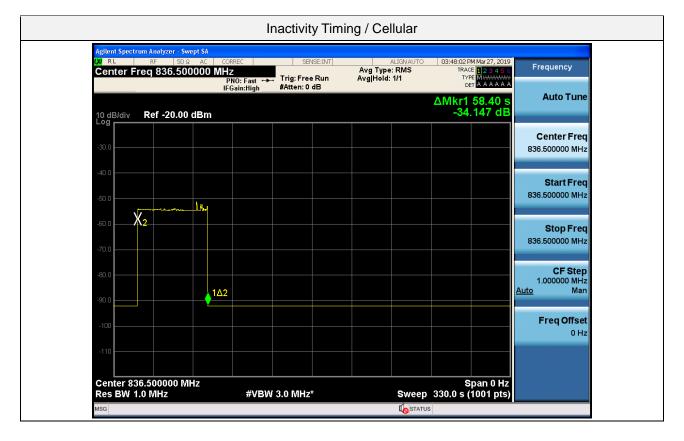


Plot data of Inactivity timing



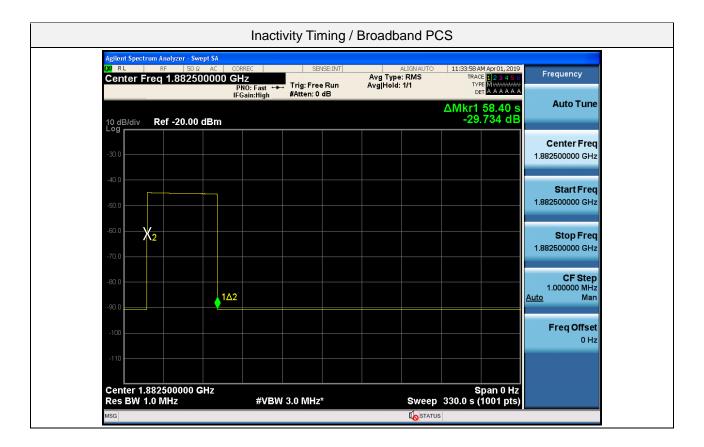
Agilent Spectrum Analyzer - Swept IXI RL RF 50 Ω	AC CORREC	SENSE:INT	ALIGN AUTO	01:59:26 PM Mar 27, 2019	Francisco
Center Freq 781.5000	DOMHz PNO: Fast ↔ IFGain:High	Trig: Free Run #Atten: 0 dB	Avg Type: RMS Avg Hold: 1/1	TRACE 123456 TYPE MWWWW DET A A A A A A	Frequency
10 dB/div Ref -20.00 dB				∆Mkr1 58.40 s -37.296 dB	Auto Tune
Log -30.0					Center Freq 781.500000 MHz
-40.0					
-50.0 X2	1				Start Freq 781.500000 MHz
-60.0					Stop Freq 781.500000 MHz
-70.0					
-80.0	1Δ2				CF Step 1.000000 MHz <u>Auto</u> Man
-100					Freq Offset
-110					0 Hz
Center 781.500000 MHz				Span 0 Hz	





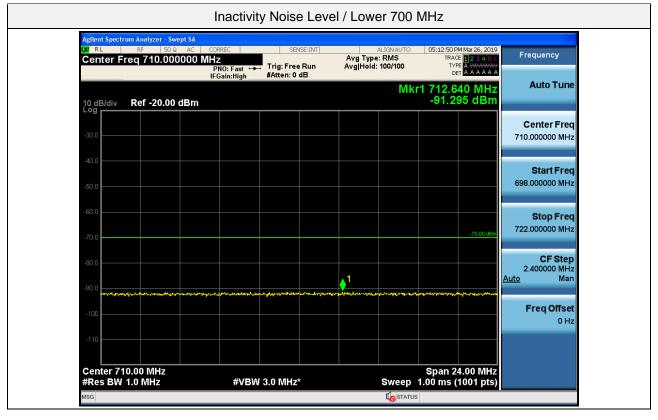
Agilent Spectrum Analyzer	50 Ω AC CORREC	SEN	SE:INT	ALIGNAUTO	04:12:36 PM Apr 01, 201	Frequency
Center Freq 1.752	PNO: F IFGain:h	ast ↔ Trig: Free ligh #Atten: 0 d	Run Av	g Hold: 1/1	TRACE 12345 TYPE MWWWW DET A A A A A	
10 dB/div Ref -20.	00 dBm				ΔMkr1 58.10 s -4.392 dE	Auto Tune
Log						Center Freq
-30.0						1.732500000 GHz
-40.0	1Δ2					Start Freq
-50.0 X2						1.732500000 GHz
-60.0						Stop Freq
-70.0						1.732500000 GHz
-80.0						CF Step 1.000000 MHz
-90.0						<u>Auto</u> Man
-100						Freq Offset
						0 Hz
-110						
Center 1.73250000 Res BW 1.0 MHz		#VBW 3.0 MHz*		0	Span 0 Hz 330.0 s (1001 pts	





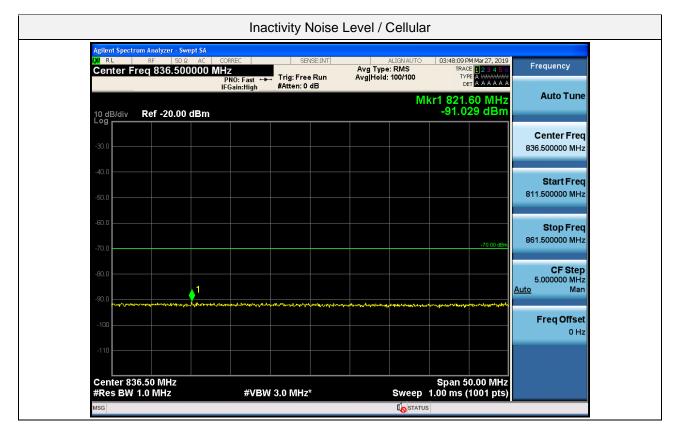


Plot data of Inactivity Noise Level



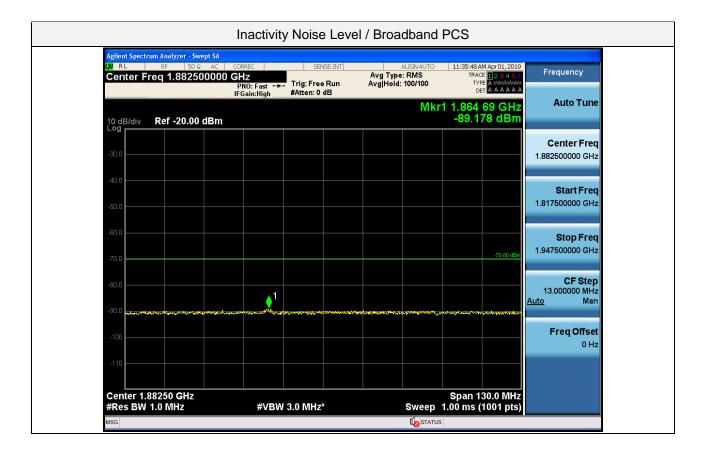
Agilent Spectrum Analyzer - Swept IXI RL RF 50 Ω /		SENSE:INT			01:59:33 PM Mar 27, 2019	E
Center Freq 781.5000	PNO: Fast 🕶	Trig: Free Run #Atten: 0 dB	Avg Type: F Avg Hold: 10	RMS	TRACE 1 2 3 4 5 6 TYPE A WWWW DET A A A A A A	Frequency
	IFGain:High	#Atten: 0 dB		Mkr1	783.106 MHz	Auto Tuno
10 dB/div Ref -20.00 dE	3m				-90.789 dBm	
-30.0						Center Freq 781.500000 MHz
						781.500000 MH2
-40.0						Start Freq
-50.0						770.500000 MHz
-60.0						Stop Freq
-70.0					-70.00 dBm	792.500000 MHz
						CF Step
-80.0			1			2.200000 MHz <u>Auto</u> Man
-90.0	๚๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛	ศาสตร์ชูไปทางประการของเหตุการกระบาท	and with a many of the second	n_glangamadul	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
-100						Freq Offset 0 Hz
-110						
Center 781.50 MHz #Res BW 1.0 MHz	#\(B)(√ 3.0 MHz*		woon 1	Span 22.00 MHz 00 ms (1001 pts)	





Agilent Spectrum Analyzer - Swept SA		se Level / AWS-1		
00 RL RF 50Ω AC Center Freq 1.73250000		ALIGN AUTO Avg Type: RMS Avg Hold: 100/100	04:12:43 PM Apr 01, 2019 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A A A A A A	Frequency
10 dB/div Ref -20.00 dBm	. stannigh	Mk	r1 1.752 48 GHz -89.850 dBm	Auto Tune
-30.0				Center Freq 1.732500000 GHz
-40.0				Start Freq 1.687500000 GHz
-60.0			-70.00 dBm	Stop Freq 1.777500000 GHz
-80.0		1		CF Step 9.000000 MHz
-90.0	n gan an a		and the second state of the sec	<u>Auto</u> Man Freq Offset
-110				0 Hz
Center 1.73250 GHz #Res BW 1.0 MHz	#VBW 3.0 MHz*	Sweep	Span 90.00 MHz 1.00 ms (1001 pts)	







5.9. VARIABLE BOOSTER GAIN

Test Requirements:

§20.21(e)(8)(i)(C)(1) BOOSTER GAIN LIMITS (Variable gain)

(1) The uplink gain in dB of a consumer booster referenced to its input and output ports shall not exceed −34 dB—RSSI + MSCL.

(i) Where RSSI is the downlink composite received signal power in dBm at the booster donor port for all base stations in the band of operation. RSSI is expressed in negative dB units relative to 1 mW.

(ii) Where MSCL (Mobile Station Coupling Loss) is the minimum coupling loss in dB between the wireless device and input port of the consumer booster. MSCL must be calculated or measured for each band of operation and provided in compliance test reports.

(2) The uplink and downlink maximum gain of a Consumer Booster referenced to its input and output ports shall not exceed the following limits:

(i) Fixed Booster maximum gain shall not exceed 6.5 dB + 20 Log₁₀ (Frequency)

(ii) Where, Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.

§20.21(e)(8)(i)(H) TRANSMIT POWER OFF MODE (Uplink gain).

When the consumer booster cannot otherwise meet the noise and gain limits defined herein it must operate in "Transmit Power Off Mode." In this mode of operation, the uplink and downlink noise power shall not exceed –70 dBm/MHz and both uplink and downlink gain shall not exceed the lesser of 23 dB or MSCL.

Test Procedures:

Measurements were in accordance with the test methods section 7.9 of KDB 935210 D03 v04r03.

7.9.1 Variable gain

a) 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 \geq (2 x span)/RBW.

i) Sweep time = auto couple.

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, in 1 dB steps inside the RSSIdependent 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. 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. I) Repeat b) to k) for all operational uplink bands.

7.9.2 Variable uplink gain timing

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.

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.

e) Confirm that the uplink gain decreases to the specified levels, within 1 second for mobile devices, and within 3 seconds for fixed devices.

f) Repeat a) to e) for all operational uplink bands.

Note1. Test limit is according to 'Frequency Dependent Limits' line of figure in Note4.

- Limit in -90 dBm to (-34 (6.5 + 20 log₁₀(f)) + MSCL) dBm, RSSI range
- : 6.5 + 20 log₁₀(f) dB
- Limit in (-34 (6.5 + 20 log₁₀(f)) + MSCL) dBm to (-34 23 + MSCL) dBm RSSI range
- : -34 dB RSSI + MSCL
- Limit in -30 dBm to -20 dBm RSSI range: 23 dB
- Timing limit is according to fixed devices 3 second limit in section 7.9.2 of KDB 935210 D03

Note2. Minimum MSCL value in this test is calculated according to following formula and table.

Lp = 20 x Log (Uplink Band the Lowest frequency) + 20 x Log (Distance) -27.5

MSCL = Lp - Antenna gain + Cable loss

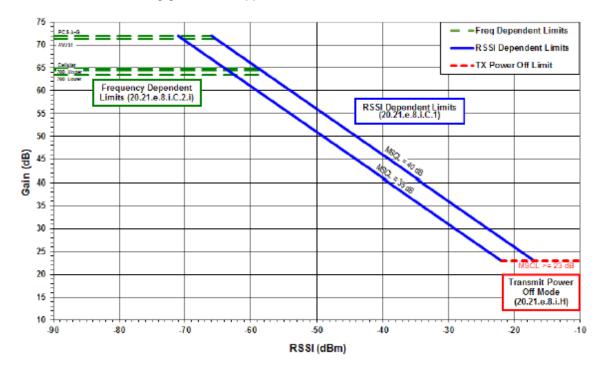
Frequency (MHz)	Server Ant. Gain (dBi)	Sever Cable Loss (dB)	Distance (m)	Lp	MSCL
704	-14.10	0	1	29.451	43.551
776	-9.52	0	1	30.297	39.817
824	-8.96	0	1	30.819	39.779
1710	-2.42	0	1	37.160	39.580
1850	-0.01	0	1	37.843	37.853

* Server Antenna gain is quoted from measurements provide by vendor.

* Distance is specified by manufacture and information is provided in the manual.



Note3. RSSI input is corrected by table in Noise limit test note2 of this report.



Note4. Tests refer to following gain limit in appendix D of KDB 935210 D03 v04r03.



Test Result:

Tabulated Result of Variable Booster Gain

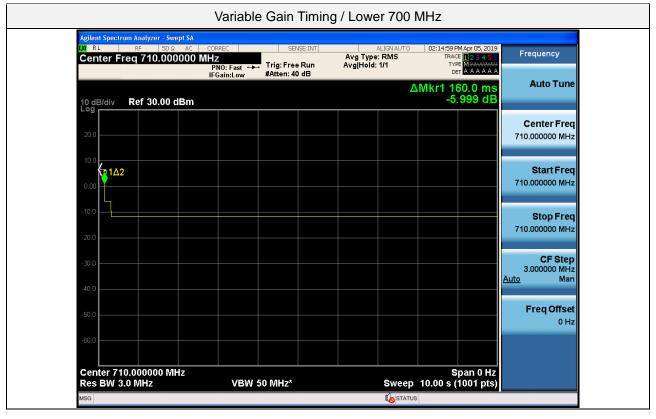
Band	MSCL	RSSI (dBm)	Input Power (dBm)	Output Power (dBm)	Limit (dB)	Variable Gain (dB)	
		-80.000		13.19	63.53	59.39	
		-90.000		13.09	63.53	59.29	
Lower	Lower	-70.000	40.00	13.09	63.53	59.29	
700 MHz	43.551	-60.000	-46.20	13.01	63.53	59.21	
		-32.979	-	-11.45	42.53	34.75	
		-32.762		-10.02	51.53	36.18	
		-32.543		-11.23	38.36	33.97	
		-33.543		-11.30	39.36	33.90	
Upper	00.047	-90.000		13.12	64.36	58.32	
700 MHz	39.817	-36.543	-45.20	-8.91	42.36	36.29	
		-80.000	-	13.08	64.36	58.28	
		-70.000		13.04	64.36	58.24	
	Cellular 39.779	-34.171		-15.09	39.95	30.71	
		-90.000	-45.80	9.74	64.95	55.54	
		-80.000		9.70	64.95	55.50	
Cellular		-70.000		9.64	64.95	55.44	
		-60.000		9.08	64.95	54.88	
		-35.171		-15.07	40.95	30.73	
		-54.690		8.32	60.27	54.32	
		-34.690		-11.69	40.27	34.31	
1110 4	00.50	-55.690	40.00	9.24	61.27	55.24	
AWS-1	39.58	VS-1 39.58	-57.690	-46.00	11.00	63.27	57.00
		-58.690		11.51	64.27	57.51	
		-50.690		3.49	56.27	49.49	
		-31.137		-10.59	34.99	34.71	
		-32.137		-10.66	35.99	34.64	
Broadband	07.050	-33.137	45.00	-10.58	36.99	34.72	
PCS	37.853	-36.137	-45.30	-8.31	39.99	36.99	
		-38.137		-6.34	41.99	38.96	
		-34.137		-10.38	37.99	34.92	



Band	Frequency (MHz)	Limit (ms)	Gain Timing (ms)
Lower 700 MHz	710.00		160.00
Upper 700 MHz	781.50		260.00
Cellular	836.50	3 000	240.00
AWS-1	1732.50		20.00
Broadband PCS	1882.50		50.00

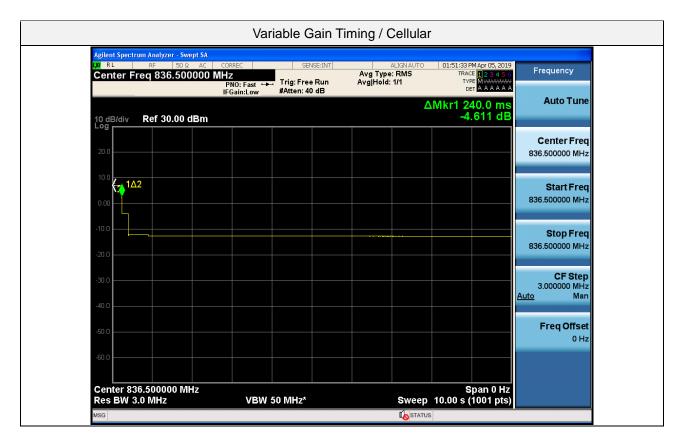


Plot data of Variable Gain Timing



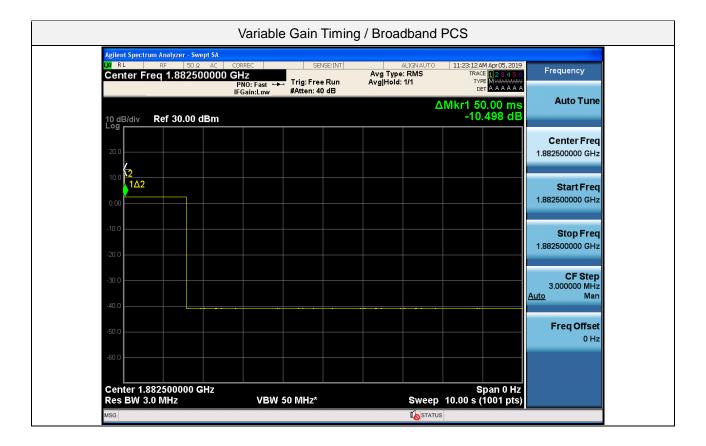
Agilent Spectrum Analyzer - Swept SA				
Center Freq 781.500000		ALIGNAUTO Avg Type: RMS Avg Hold: 1/1	02:03:32 PM Apr 05, 2019 TRACE 1 2 3 4 5 6 TYPE MWWWW DET A A A A A A	Frequency
10 dB/div Ref 30.00 dBm		Δ	Mkr1 260.0 ms -8.855 dB	Auto Tune
Log				Center Freq
20.0				781.500000 MHz
10.0 102				Start Freq
0.00				781.500000 MHz
-10.0				Stop Freq
-20.0				781.500000 MHz
-30.0				CF Step 3.000000 MHz
-40.0				<u>Auto</u> Man
-50.0				Freq Offset
-60.0				0 Hz
Center 781.500000 MHz Res BW 3.0 MHz	VBW 50 MHz*		Span 0 Hz 10.00 s (1001 pts)	





Agilent Spectrum Analyzer - Swept SA	Variable Gain	Timing / AWS-1		
Center Freq 1.73250000		ALIGNAUTO Avg Type: RMS Avg Hold: 1/1	04:22:34 PM Apr 01, 2019 TRACE 1 2 3 4 5 6 TYPE MUMUUUU DET A A A A A A	Frequency
10 dB/div Ref 30.00 dBm		ΔΜ	kr1 20.00 ms -2.346 dB	Auto Tune
20.0				Center Freq 1.732500000 GHz
10.0 1 1 Δ 2				Start Freq 1.732500000 GHz
-10.0				Stop Freq 1.732500000 GHz
-30.0				CF Step 3.000000 MHz
-40.0				<u>Auto</u> Man Freq Offset
-60.0				0 Hz
Center 1.732500000 GHz Res BW 3.0 MHz	VBW 50 MHz*	Sweep 10	Span 0 Hz).00 s (1001 pts)	
MSG		STATUS		







5.10. OCCUPIED BANDWIDTH

Test Requirements:

§ 2.1049 Measurements required: Occupied bandwidth.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

Test Procedures:

Measurements were in accordance with the test methods section 7.10 of KDB 935210 D03 v04r03.

a) Connect the test equipment to firstly measure the characteristics of the test signals produced by the signal generator.

b) Set VBW \geq 3 x 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 maximum output power measurement.

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 c) to g) for CDMA and W-CDMA modulation, adjusting the span as necessary.

i) Repeat c) to h) for all uplink and downlink operational bands.

j) The uplink output (donor) port connected to the spectrum analyzer, and the server port connected to the signal generator.

k) Repeat c) to i) with this EUT uplink path test setup.

I) The downlink output (server) port connected to the spectrum analyzer, and the donor port connected to the signal generator.

m) Repeat c) to i) with this EUT downlink path test setup.



Test Result:

Tabulated Result of Uplink Occupied Bandwidth

Band	Signal	Frequency (MHz)	Input OBW (kHz)	Output OBW (kHz)	Comparison (%)	
Lower 700 MHz	GSM	710.000	243.7	244.2	0.22	
Upper 700 MHz			781.500	242.9	243.8	0.35
Cellular		836.500	242.0	242.7	0.29	
AWS-1		1 732.500	242.4	242.6	0.10	
Broadband PCS		1 882.500	241.4	241.6	0.10	
Band	Signal	Frequency (MHz)	Input OBW (MHz)	Output OBW (MHz)	Comparison (%)	
Lower 700 MHz	CDMA	710.000	1.234	1.230	-0.27	
	WCDMA		4.186	4.183	-0.07	
Upper 700 MHz	CDMA	781.500	1.237	1.241	0.29	
	WCDMA	781.500	4.199	4.178	-0.51	
Cellular	CDMA	836.500	1.232	1.237	0.41	
	WCDMA		4.203	4.207	0.09	
AWS-1	CDMA	1 732.500	1.239	1.236	-0.23	
	WCDMA	1732.300	4.193	4.178	-0.36	
Broadband PCS	CDMA	1 882.500	1.239	1.236	-0.22	
	WCDMA		4.195	4.200	0.11	



		•				
Band	Signal	Frequency (MHz)	Input OBW (kHz)	Output OBW (kHz)	Comparison (%)	
Lower 700 MHz	GSM	740.000	244.0	242.4	-0.64	
Upper 700 MHz			751.500	244.6	241.4	-1.31
Cellular		881.500	241.5	241.9	0.20	
AWS-1		2 132.500	243.3	245.2	0.78	
Broadband PCS		1 962.500	243.3	241.2	-0.87	
Band	Signal	Frequency (MHz)	Input OBW (MHz)	Output OBW (MHz)	Comparison (%)	
Lower 700 MHz	CDMA	740.000	1.258	1.235	-1.85	
	WCDMA		4.206	4.216	0.25	
Upper 700 MHz	CDMA	751 500	1.259	1.231	-2.17	
	WCDMA	751.500	4.211	4.217	0.13	
Cellular	CDMA	881.500	1.246	1.237	-0.68	
	WCDMA		4.206	4.201	-0.13	
AWS-1	CDMA	2 132.500	1.265	1.240	-1.97	
	WCDMA		4.214	4.196	-0.44	
Broadband PCS	CDMA	1 962.500	1.235	1.236	0.12	
	WCDMA		4.221	4.193	-0.66	

Tabulated Result of Downlink Occupied Bandwidth



Plot data of Occupied Bandwidth

