



Conducted Spurious Emissions / Upper 700 MHz / Downlink / 9 kHz ~ 150 kHz

Conducted Spurious Emissions / Upper 700 MHz / Downlink / 150 kHz ~ 30 MHz

Cen		15.0750	00 MHz	RREC NO: Wicle → Gain: Low			Avg Type Avg Hold	ALIGN AUTO 2: RM S 2: 10/10	107:15:024 THA TY D	M An 18, 2024 CE 1 2 3 4 0 PE A ET A A A A A A A		requency
10 di	3/div R	ef -10.00				940000				190 kHz 92 dBm		Auto Tun
-2010										D.4-23353699		Center Fre
-30.0 -4010												Start Fre
-50 0											3	Stop Fre
-76,0	1										Auto	CF Ste 2.985000 Mi Mi
-9010		İ lan İli i				Li li titur		i t ana				Freq Offse 0H
	t 150 kH: s BW 10	z		Vir 2015/2019	/ 30 kHz				Stop 3	0.00 MHz (6001 pts)	Log	Scale Typ



L HF 50 R DC Center Freq 387.950000 M NFE	PNO: East Trig: Free Run	Avg Type: RMS Avg Hold: 10/10	07:15:09 PM Jun 18, 2024 TRACE 1 2 4 5 TyPE A	Frequency
o dBidiy Ref 10.00 dBm	IFGain:Low #Atten: 20 dB	Mkr	1 745.83 MHz -54.946 dBm	Auto Tune
				Center Freq 387.950000 MHz
12.0			201-13.00 235	Start Freq 30.000000 MHz
10 D				Stop Freq 745.900000 MHz
wo				CF Step 71.590000 MHz <u>Luto</u> Man
zo o Hall Min I Mari Slava da Andrea Mina Labor Start Start		<mark>nah dinahan dan bahar</mark> Managina dan bahar ba	<mark>linatio Aldul)</mark> Programmer	Freq Offset 0 Hz
00				Scale Type
Start 30.0 MHz Res BW 100 kHz	#VBW 300 kHz*	Sweep 34.6	Stop 745.9 MHz 7 ms (20001 pts)	og Lin

Conducted Spurious Emissions / Upper 700 MHz / Downlink / 30 MHz ~ 745.9 MHz

Conducted Spurious Emissions / Upper 700 MHz / Downlink / 756.1 MHz ~ 2 GHz

Center Freq 1.37855000		SOURCE OFF ALIGN AUTO Avg Type: RMS Avg[Hold: 10/10	17:15:16 PM Am 18, 2024 TRACE 1 2 3 4 5 5 TYPE A COMPANY DET A A A A A A	Frequency
10 dB/div Ref 10.00 dBm		Mkr	757.10 MHz -54.486 dBm	Auto Tur
1.00				Center Fr 1.378550000 G
-10.0			D.1-12.00 (5%)	Start Fre 757.100000 M
-20.0				Stop Fra 2.00000000 Gi
-600 2				CF Sta 124,290000 M uto M
	l in busic line of the set of the set	nameli da anciente a de	NO DECEMPTOR AND A	Freq Offs 01
Start 0.7571 GHz #Res BW 100 kHz	#VBW 300 kHz*		top 2.0000 GHz ms (30001 pts)	Scale Tyj



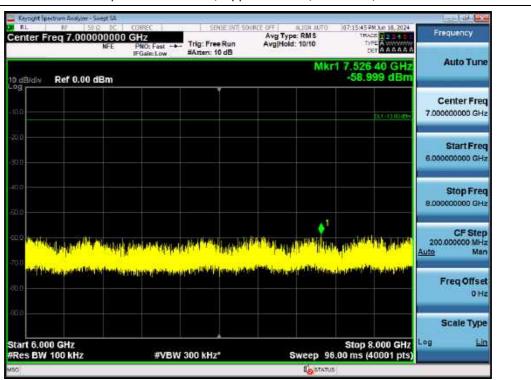


Conducted Spurious Emissions / Upper 700 MHz / Downlink / 2 GHz ~ 4 GHz

Conducted Spurious Emissions / Upper 700 MHz / Downlink / 4 GHz ~ 6 GHz

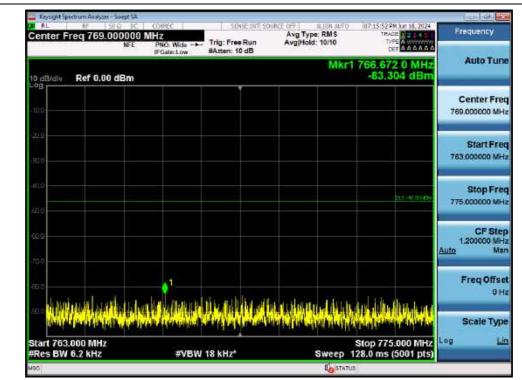
Center Freq 5.0000000	00 GHz	ig: Free Run	Avg Type: RMS Avg Hold: 10/10	07:15:36 PM Jun 18, 2024 TRACE 2 2 4 5 TYPE A TYPE A	Frequency
10 dB/div Ref 0.00 dBm	in States - Cont		Mkr	1 4.630 60 GHz -58.862 dBm	Auto Tur
- 10.D				13.1 - 13.163 d 0 %	Center Fre 5.00000000 Gi
-200					Start Fre 4.00000000 GF
-0.0					Stop Fre 6.00000000 GP
	sind and sind of the	ilisteitik og "milte	and the second state of the second	.1., //// ¹⁴⁰ 003.1.////	CF Ste 200.000000 Mi Auto Ma
	<mark>169 may service subjectives</mark>	With Manual	Nikiba na pantikina p	0.391	Freq Offs
<u>ean</u>					Scale Typ
Start 4.000 GHz				Stop 6.000 GHz	Log L



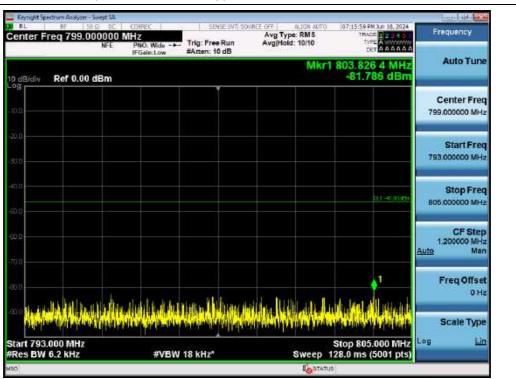


Conducted Spurious Emissions / Upper 700 MHz / Downlink / 6 GHz ~ 8 GHz

Conducted Spurious Emissions / Upper 700 MHz / Downlink / 763 MHz ~ 775 MHz

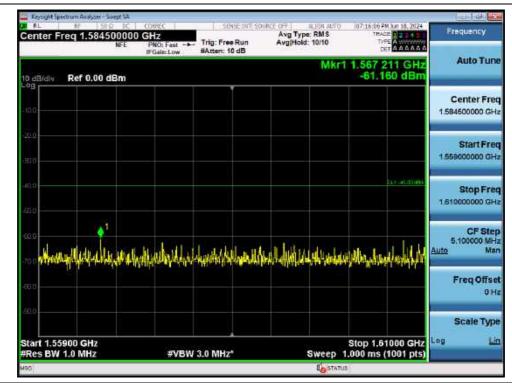






Conducted Spurious Emissions / Upper 700 MHz / Downlink / 793 MHz ~ 805 MHz

Conducted Spurious Emissions / Upper 700 MHz / Downlink / 1.559 GHz ~ 1.610 GHz





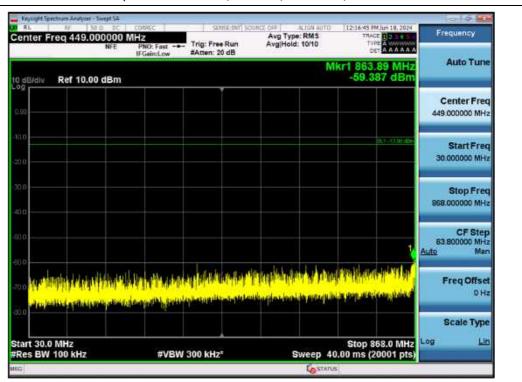


Conducted Spurious Emissions / Cellular / Downlink / 9 kHz ~ 150 kHz

Conducted Spurious Emissions / Cellular / Downlink / 150 kHz ~ 30 MHz

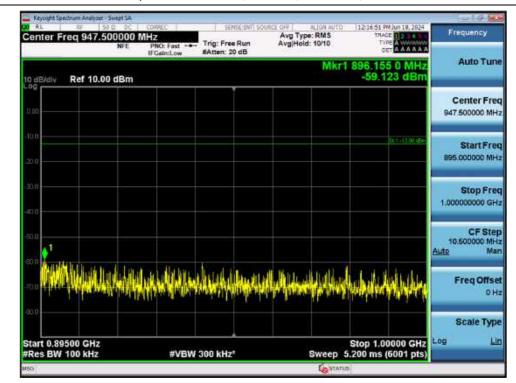
Center Freq 15.07	5000 MH2 NFE PNC: Wide ↔ IFGain:Low	- Trig: Free Run #Atten: 10 dB	Avg Type: RMS Avg Hold: 10/10		Frequency
10 dBidly Ref -10.0	10 dBm			Mkr1 334 kHz -80.988 dBm	Auto Tun
.23.0				26.1 - 22.0% d ave	Center Fre 15.075000 MH
-53.0					Start Fre 150.000 kH
-50 A					Stop Fre 30.000000 MH
-mo-					CF Ste 2.985000 MH
					Freq Offse 0 H
Start 150 kHz				Stop 30.00 MHz	Scale Type





Conducted Spurious Emissions / Cellular / Downlink / 30 MHz ~ 868 MHz

Conducted Spurious Emissions / Cellular / Downlink / 895 MHz ~ 1 GHz





Frequency	TYPE A WARAAAA	Avg Type: RMS Avg Hold: 10/10	Trig: Free Run #Atten: 20 dB	PNO: Fast	1 5.50000000 NFE	enter Fr
Auto Tune	1 9.981 10 GHz -39.001 dBm	Mkr			ef 10.00 dBm	dB/dly
Center Freq 5.500000000 GHz						100
Start Freq 1.000000000 GHz	0.5 -13 00 (Br)					ao co
Stop Freq 10.000000000 GHz	1	a	Lars Las			00
CF Step 900.000000 MHz <u>Auto</u> Man						
Freq Offset 0 Hz						0.0
Scale Type	Stop 10.000 GHz 5.00 ms (20001 pts)	Swaap 16	3.0 MHz*	#\/BW		tart 1.000 Res BW 1
		Conte print	5.0 MITZ		11112	AUS DIT

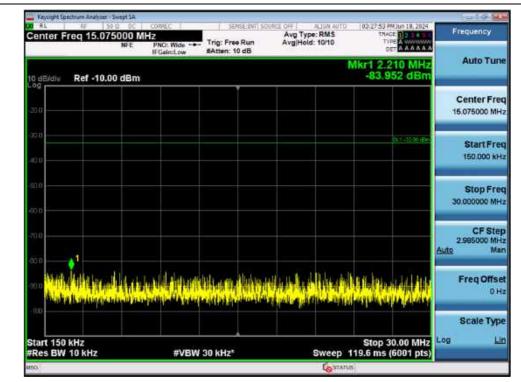
Conducted Spurious Emissions / Cellular / Downlink / $1 \text{ GHz} \sim 10 \text{ GHz}$





Conducted Spurious Emissions / AWS-1 / Downlink / 9 kHz ~ 150 kHz

Conducted Spurious Emissions / AWS-1 / Downlink / 150 kHz ~ 30 MHz

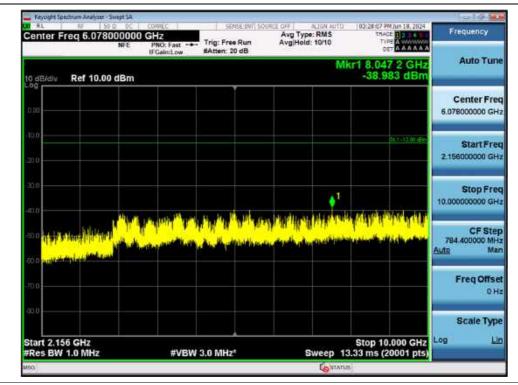




nter F	req 1.06950000 NFE		Avg Type: RMS Avg Hold: 10/10	03:27:59 PMJun 18, 2024 TRACE 12 2 4 5 TYPE A COMMON	Frequency
sB/dlv	Ref 10.00 dBm		Mkr	1 2.081 45 GHz -45.635 dBm	Auto Tune
0					Center Freq 1.069500000 GHz
,				8.5-13.00 (Br)	Start Freq 30.000000 MHz
·					Stop Freq 2.10900000 GHz
Martin	an a shi ni di ku	une miteriore developmente a			CF Step 207.900000 MHz Auto Man
nyi ili	staped by project	an a the state of			Freq Offset 0 Hz
0					Scale Type
rt 0.03 es BW	0 GHz 1.0 MHz	#VBW 3.0 MHz*	Sweep 2.0	Stop 2.109 GHz 667 ms (20001 pts)	Log Lin

Conducted Spurious Emissions / AWS-1 / Downlink / 30 MHz ~ 2.109 GHz

Conducted Spurious Emissions / AWS-1 / Downlink / 2.156 GHz ~ 10 GHz







Conducted Spurious Emissions / AWS-1 / Downlink / 10 GHz ~ 26.5 GHz





Conducted Spurious Emissions / Broadband PCS / Downlink / 9 kHz ~ 150 kHz

Conducted Spurious Emissions / Broadband PCS / Downlink / 150 kHz ~ 30 MHz

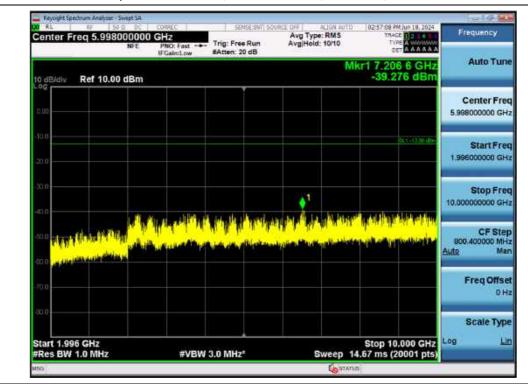
Center F	req 15.075	NFE P	NO: Wide 🕶 Gain:Low	Trig: Fre #Atten: 1	Avg Type Avg Hold	10/10	TV D			Frequency
10 dB/dly	Ref -10.00	dBm						374 kHz 71 dBm		Auto Tun
-20.0										Center Free
-30.0								61.5-12.00 (Em		Start Free 150.000 kH
500										Stop Fre
-70.0									Auto	CF Ste 2.985000 MH Ma
-30 p				i laik						Freq Offse 0 H
1002										Scale Typ
Start 150 #Res BW			#VBW	30 kHz*		Sweep 1	19.6 ms	0.00 MHz (6001 pts)	Log	Ц



nter Fr	eq 979.500	000 MHz NFE PNO: Fas IFGaineLo		Avg Type: RMS Avg Hold: 10/10	TYPE A WALLAND	Frequency
dErdiv	Ref 10.00 d	Bm	ALA AMANANA ARAA UK	Mk	1 1.836 80 GHz -46.496 dBm	Auto Tune
a						Center Freq 979.500000 MHz
					8.5+03.00 (Br)	Start Freq 30.000000 MHz
1 1						Stop Freq 1.929000000 GHz
	n h i h i	- Walkodki	an de la compart	in protocol and the		CF Step 189.900000 MHz Auto Man
djetare	And and A Desired	449648041184964				Freq Offset 0 Hz
0						Scale Type
rt 0.030	00 GHz 1.0 MHz		/BW 3.0 MHz*	2	Stop 1.9290 GHz 667 ms (20001 pts)	.og <u>Lin</u>

Conducted Spurious Emissions / Broadband PCS / Downlink / 30 MHz ~ 1.929 GHz

Conducted Spurious Emissions / Broadband PCS / Downlink / 1.996 GHz ~ 10 GHz







Conducted Spurious Emissions / Broadband PCS / Downlink / 10 GHz ~ 26.5 GHz



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 v04r04.

7.7.1 Maximum transmitter noise power level

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 \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 \geq 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 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 $\ge 2 \times$ 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 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.

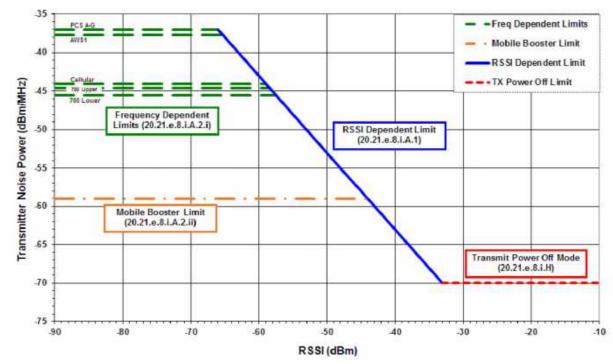
f) Repeat a) to e) for all operational uplink bands.

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 $\log_{10}(f))$ 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. Tests refer to following noise limit in appendix D of KDB 935210 D03 v04r04.





Test Result:

Tabulated Result of Uplink Maximum Transmitter Noise Power Level

Band	Freqeuncy (MHz)	Limit (dBm/MHz)	Noise Level (dBm/MHz)
Lower 700 MHz	712.256	-45.51	-48.88
Upper 700 MHz	781.522	-44.64	-48.14
Cellular	826.050	-44.05	-45.05
AWS-1	1737.540	-37.73	-38.39
Broadband PCS	1853.900	-37.01	-37.85

Tabulated Result of Downlink Maximum Transmitter Noise Power Level

Band	Freqeuncy (MHz)	Limit (dBm/MHz)	Noise Level (dBm/MHz)
Lower 700 MHz	737.000	-45.15	-46.90
Upper 700 MHz	740.720	-44.98	-47.42
Cellular	880.550	-43.60	-45.14
AWS-1	2141.410	-35.92	-37.55
Broadband PCS	1967.310	-36.64	-38.78



Tabulated Result of Variable Uplink Noise Power

Band	RSSI (dBm)	Freqeuncy (MHz)	Limit (dBm/MHz)	Noise Level (dBm/MHz
	-90.00	710.096	-45.51	-49.170
	-80.00	710.924	-45.51	-49.227
Lewer 700 Mile	-60.00	705.308	-45.51	-49.331
Lower 700 MHz	-70.00	711.032	-45.51	-49.347
	-45.49	712.508	-57.51	-61.600
	-46.49	710.744	-56.51	-60.876
	-44.36	781.610	-58.64	-60.380
	-45.36	780.466	-57.64	-59.840
	-51.36	781.918	-51.64	-53.925
Upper 700 MHz	-46.36	781.720	-56.64	-58.937
	-47.36	781.786	-55.64	-57.978
	-53.36	781.654	-49.64	-52.007
	-45.95	824.450	-57.05	-58.092
	-46.95	831.150	-56.05	-57.436
Cellular	-90.00	824.750	-44.05	-45.445
Cellular	-47.95	824.700	-55.05	-56.446
	-60.00	831.350	-44.05	-45.534
	-80.00	830.600	-44.05	-45.594
	-46.27	1749.690	-56.73	-56.798
	-47.27	1750.050	-55.73	-55.823
A)A/C 1	-70.00	1752.300	-37.73	-38.033
AWS-1	-80.00	1750.500	-37.73	-38.112
	-90.00	1750.410	-37.73	-38.117
	-48.27	1750.320	-54.73	-55.279
	-60.99	1864.820	-42.01	-42.492
	-61.99	1864.170	-41.01	-41.524
Broadband DCS	-57.99	1865.340	-45.01	-45.569
Broadband PCS	-65.99	1864.430	-37.01	-37.574
-	-51.99	1864.170	-51.01	-51.596
	-70.00	1864.040	-37.01	-37.601

Tabulated Result of Variable Uplink Noise Timing

Band	Freqeuncy (MHz)	Limit (ms)	Noise Timing (ms)
Lower 700 MHz	707.000		110.00
Upper 700 MHz	781.500		50.00
Cellular	836.500	3 000	30.00
AWS-1	1732.500		20.00
Broadband PCS	1882.500		60.00



Plot data of Maximum transmitter noise power level



Maximum noise level / Upper 700 MHz / Uplink



F-TP22-03 (Rev. 06)





Maximum noise level / Cellular / Uplink

Maximum noise level / AWS-1 / Uplink



F-TP22-03 (Rev. 06)







Maximum noise level / Broadband PCS / Uplink





Maximum noise level / Lower 700 MHz / Downlink

Maximum noise level / Upper 700 MHz / Downlink



F-TP22-03 (Rev. 06)





Maximum noise level / Cellular / Downlink

Maximum noise level / AWS-1 / Downlink







Maximum noise level / Broadband PCS / Downlink



Plot data of Variable Uplink Noise Timing

voget Spectrum Andread Swept 34 L III NF Selo oc I nter Freg 707.000000 M	CORREC SENSE UNT S	Avg Type: RM5	04:39:53 PM Jun 19, 2024	Frequency
NFE	PNO: Fast Trig: Free Run IFGain:High #Atten: 0 dB	Avg Hold: 1/1	DET A A A A A	1.000.000
E/dly Ref -20.00 dBm		1	4Mkr1 110.0 ms -54.791 dB	Auto Tune
				Center Freq 707.000000 MHz
<2 12				Start Freq 707.000000 MHz
				Stop Freq 707.000000 MHz
				CF Step 3.000000 MHz <u>Auto</u> Man
142				Freq Offset 0 Hz
				Scale Type
ter 707.000000 MHz BW 3.0 MHz	VBW 50 MHz*	Sweep	Span 0 Hz 10.00 s (1001 pts)	Log <u>Lin</u>

Uplink Noise Timing / Upper 700 MHz

IFGain:High #Atten: 0 dB	XXRCE 0FF ALIGN AUTO 104:47:22 PMJym 19, 2024 Avg Type: RMS trace 22, 41 Avg[Hold: 1/1 tries 102 Det A A A A A A A A A A A	Frequency
	ΔMkr1 50.00 ms -26.805 dB	Auto Tun
		Center Fre 781.500000 MH
		Start Fre 781.500000 MF
		Stop Fre 781.500000 MP
		CF Ste 3.000000 Mi <u>Auto</u> Ma
а. сулна и на ок. солност и ла е		Freq Offs 01
	Span 0 Hz	Scale Typ
	PNO: Fast Trig: Free Run	Hz PFG:// Fast Trig: Free Run #Atten: 0 dB Avg Type: RMS AvgHold: 11 Trace: B12 0408 The CB 2008 B AMKr1 50.00 ms -26.805 dB

F-TP22-03 (Rev. 06)





RL NF SEC CC enter Freq 836.500000 M NFE	PNO: Fast Trig: Free Run IFGein:High #Atten: 0 dB	Avg Type: RMS TRACE 10:13:50 4M Jun 20, 2024 Avg Type: RMS TRACE 10:14 Avg Hold: 1/1 Type A A A A A	0.0177.017.02
dB/dly Ref -20.00 dBm	Auto Tune		
0			Center Freq 836.500000 MHz
0 162			Start Freq 836.500000 MHz
o			Stop Freq 836.500000 MHz
o			CF Step 3.000000 MHz <u>Auto</u> Man
			Freq Offset 0 Hz
enter 836.500000 MHz	VBW 50 MHz*	Span 0 Hz Sweep 10.00 s (1001 pts	Scale Type

Uplink Noise Timing / Cellular

Uplink Noise Timing / AWS-1

Center I	Freq 1.732	500000 GI	NO: Fast Tr	ig: Free Run tten: 0 dB	Avg Type: RMS Avg Hold: 1/1	TRACE	1 2 3 4 5 Northennoon A A A A A A	Frequency
10 dB/dly	Ref -20.0	0 dBm				ΔMkr1 20 -3.4	00 ms 442 dB	Auto Tun
30.0								Center Fre 1.732500000 GH
-40.0								Start Free 1.732500000 GH
-60.0								Stop Fre 1.732500000 GH
-000								CF Ste 3.000000 MH Auto Ma
-100	l						<u></u>	Freq Offse 0 H
	.732500000	GHz				SI	an 0 Hz	Scale Typ
Res BW	3.0 MHZ		VBW 50 N	IHZ"		eep 10.00 s (1	out pts)	





enter Freq 1.882500000 NFE		Avg Type: RMS Avg Hold: 1/1	11:06:08 4M Jun 20, 2024 TRACE 22:06 TYPE TYPE M WWW.WWW DET A A A A A A	Frequency
dB/div Ref -20.00 dBm		4	Mkr1 60.00 ms -1.623 dB	Auto Tune
1Δ2 (2				Center Freq 1.882500000 GHz
				Start Freq 1.882500000 GHz
0				Stop Freq 1.882500000 GHz
0				CF Step 3.000000 MHz Auto Man
0				Freq Offset 0 Hz
enter 1.882500000 GHz	VBW 50 MHz*		Span 0 Hz 10.00 s (1001 pts)	Scale Type

Uplink Noise Timing / Broadband PCS



5.8. UPLINK INACTIVITY

Test Requirements:

§ 20.21(e)(8)(i)(I) 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 v04r04.

- 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).
- l) 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)	Limit (s)	inactivity time (s)
Lower 700 MHz	707.00		178.90
Upper 700 MHz	781.50		178.50
Cellular	836.50	<u> </u>	178.30
AWS-1	1732.50		176.40
Broadband PCS	1882.50		176.60

Tabulated Result of Uplink Inactivity Noise

Band	Frequency (MHz)	Limit (dBm/MHz)	Noise Level (dBm/MHz)
Lower 700 MHz	724.89		-103.70
Upper 700 MHz	780.47		-100.69
Cellular	819.75	-70	-101.02
AWS-1	1734.84		-100.65
Broadband PCS	1898.36		-99.37



Plot data of Inactivity timing



Inactivity Timing / Upper 700 MHz

Center F		500000 MFE	CORREC MHZ PNO: Wide ~ IFGein:Low	Trig: Free Run #Atten: 6 dB	Avg Type: RN Avg Hold: 1/1	L MUTO 06:26:30 PM Jun 18, 202 IS TRACE 2 3 4 TYPE Mittown DET A A A A A	Frequency
10 dB/div	Ref -20.	00 dBm				ΔMkr1 178.5 -51.910 di	Auto Tun
							Center Fre 781.500000 Mi-
40.0 	X2						Start Fre 781.500000 Mi
-700							Stop Fre 781.500000 MP
80.0							CF Sto 1.000000 MP Auto Mr
-100					1∆2		Freq Offs 01
Center 78 Res BW 1		MHz	#VBI	W 3.0 MHz*		Span 0 H weep 330.0 s (1001 pts	Scale Typ

Inactivity Timing / Lower 700 MHz





RL W 550 Marker 1 Δ 178.300	2 DC CONSC S NFE PNO: Wide ↔ IFGain:Low	Trig: Free Run #Atten: 6 dB	Avg Type: RMS Avg Hold: 1/1	TYACE 12 2 4 5 1	Marker Select Marker
to dBrdiv Ref -20.00	dBm			ΔMkr1 178.3 s -52.162 dB	
30.0					Normal
60 0 X2					Delta
000 700					FixedP
60.0					on
-100			142		Properties>
Center 836.500000 M	HZ			Span 0 Hz	More 1 of 2

Inactivity Timing / Cellular

Inactivity Timing / AWS-1

Center Freq	F 50 0 00 1.732500000 NFE		ee Run Av	g Type: RMS g Hold: 1/1	03:20:07 PMJun 17, 2024 TVACE 12 TVPE NOVEMBER 05T A A A A A	Frequency
10 dBidly Re	f -20.00 dBm				ΔMkr1 176.4 s -59.638 dB	Auto Turr
-30.0						Center Free 1.732500000 GH
-600	X2					Start Fre 1.732500000 GH
-60.0						Stop Fre 1.732500000 GH
eno						CF Ste 1.000000 MH Auto Ma
-100				1Δ2		Freq Offse 0 H
-110						Scale Typ
Center 1.7325 Res BW 1.0 M		#VBW 3.0 MH	Z±	Swee	Span 0 Hz 330.0 s (1001 pts)	Log Li





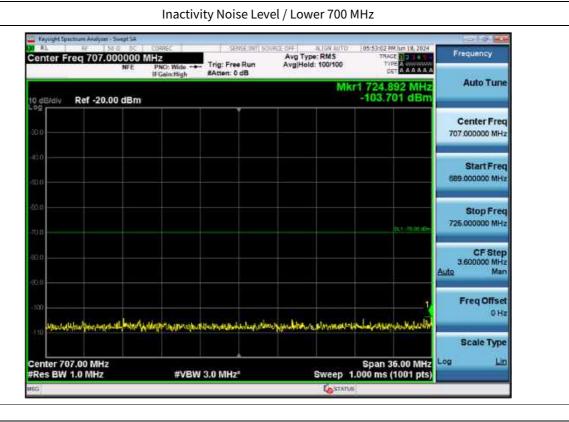
Frequency	TYACE DI LA SALA A TYPE MONANCION DET A A A A A A	Avg Type: RMS Avg Hold: 1/1	Trig: Free Run #Atten: 6 dB	PNO: Wide IFGain:Low	1.882500000 NFE	ter Fred
Auto Tune	ΔMkr1 176.6 s -60.068 dB				-20.00 dBm	ifdiv R
Center Freq 1.882500000 GHz						
Start Freq 1.882500000 GHz					2	
Stop Freq 1.882500000 GHz						; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;
CF Step 1.000000 MHz <u>suto</u> Man						
Freq Offset 0 Hz		142				
Scale Type	Cross 0 Ha				00000 GHz	or 4 00*
	Span 0 Hz 330.0 s (1001 pts)	Sweep	3.0 MHz*	#VBW		er 1.882 BW 1.0

Inactivity Timing / Broadband PCS





Plot data of Inactivity Noise Level



Inactivity Noise Level / Upper 700 MHz

Center F	req 781.5	00000 N NFE	II FIZ PNO: Wide →→ IFGain:High	Trig: Free #Atten: 0		Avg Typ Avg Hol	d: 100/100		TAAAAAA	Frequency
0 dB/div	Ref -20.0	10 dBm					Mk	1 780.4	66 MHz 94 dBm	Auto Tur
30.0										Center Fre 781.500000 Mil
40.0 53.0										Start Fre 770,500000 Mi
50.0 70.0									DL1 (70.00/48s	Stop Fre 792.500000 Mi
80.0 70.0										CF Sta 2.200000 Mil Auto Mi
-100 (1444)	wand	a the state of the	atriculdarichiseda	1 Anorineth	Statural	Andola	n Horit Richard	mundite	almilian AN	Freq Offs 01
-110										Scale Typ
	81.50 MHz 1.0 MHz		#VBW	3.0 MHz	*		Sweep 1	Span 2 .000 ms (2.00 MHz 1001 pts)	Log L

F-TP22-03 (Rev. 06)







Inactivity Noise Level / Cellular

Inactivity Noise Level / AWS-1

Center F	req 1.7325	NFE	PNO: Fast -+ IFGain:High	Trig: Free #Atten: 0 d		Avg Type: R Avg Hold: 10		TYIAGE	
10 dB/div	Ref -20.00) dBm					Mkr1 1 -1	.734 84 GH 00.645 dBn	Auto Tun
30,0									Center Fre 1.732500000 GH
-40.0									Start Fre 1.687500000 GH
-70.0								pus chrones	Stop Fre 1.777500000 GH
-000									CF Ste 9.000000 MH Auto Ma
-100	interplanation	وتلبوه والملاء	inhimmed and	maldowards	1 helenson	رباي موجرا مديعلواتها	manshiphor	and the for property and	Freq Offse 0 H
-110	73250 GHz			3.0 MHz*			s	pan 90.00 MH 0 ms (1001 pts	Scale Typ





Frequency Auto Tune	11:17:41 4MJun 19, 2024 TRACE 12, 24 10 TYPE A 44 A A A A DET A A A A A A	ype: RMS old: 100/100	1	Free Run in: 0 dB	Trig: F	NO: Fast ↔ Gain:High	00000 C	1.8825	er Fre
	Mkr1 1.898 36 GHz Vidly Ref -20.00 dBm -99.365 dBm								
Center Freq 1.882500000 GHz									
Start Freq 1.817500000 GHz									
Stop Freq 1.947500000 GHz	01,5-70,20 (dlas								
CF Step 13.000000 MHz Auto Man									
Freq Offset 0 Hz	have been and a	and hadden	rhand		- alexa ob	wangal mana	المتعجر أوعان	والمانية	Jacilla
Scale Type		4. 8. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.		e i i des alla con		1997 B 1997	a bio trates		
Log <u>Lin</u>	Span 130.0 MHz 000 ms (1001 pts)	Sweep 1		1Hz*	3.0 MH	#VBW		250 GHz) MHz	er 1.8 BW 1

Inactivity Noise Level / Broadband PCS



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.

§ 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 v04r04.

7.9.1 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 \geq 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 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. 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 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.

L_p = 20 x Log (Uplink Band the Lowest frequency) + 20 x Log (Distance) -27.5 MSCL = Lp - Antenna gain + Cable loss

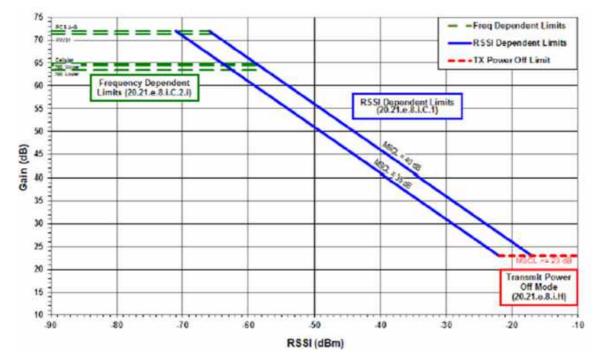
Frequency (MHz)	Server Ant. Gain (dBi)	Sever Cable Loss (dB)	Distance (m)	Lp	MSCL
698	2.6	9.00	2	35.398	41.798
776	2.6	9.00	2	36.318	42.718
824	3.9	9.70	2	36.839	42.639
1710	5.4	14.40	2	43.181	52.181
1850	5.4	13.70	2	43.864	52.164

[#] 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 v04r04.

The report shall not be (partly) reproduced except in full without approval of the laboratory.





Test Result:

Tabulated Result of Variable Booster Gain

Band	MSCL	RSSI (dBm)	Input Power (dBm)	Output Power (dBm)	Limit (dB)	Variable Gain (dB)
		-53.69	-40.17	15.17	61.49	55.34
		-49.69	-40.17	11.17	57.49	51.34
		-51.69	-40.17	13.11	59.49	53.28
Lower 700 MHz	41.798	-54.69	-40.17	16.11	62.49	56.28
		-48.69	-40.17	10.08	56.49	50.25
		-40.69	-40.17	2.07	48.49	42.24
		-34.64	-40.00	-2.30	43.36	37.70
		-38.64	-40.00	1.69	47.36	41.69
	10 710	-39.64	-40.00	2.64	48.36	42.64
Upper 700 MHz	42.718	-40.64	-40.00	3.61	49.36	43.61
		-46.64	-40.00	9.61	55.36	49.61
		-37.64	-40.00	0.61	46.36	40.61
		-53.31	-44.39	16.25	61.95	60.64
	42.718	-51.31	-44.39	14.25	59.95	58.64
		-45.31	-44.39	8.23	53.95	52.62
Cellular		-47.31	-44.39	10.22	55.95	54.61
		-49.31	-44.39	12.17	57.95	56.56
		-52.31	-44.39	15.16	60.95	59.55
		-80.00	-54.03	16.75	71.27	70.78
		-60.00	-54.03	16.68	71.27	70.71
114/6 1		-90.00	-54.03	16.66	71.27	70.69
AWS-1	42.639	-70.00	-54.03	16.59	71.27	70.62
		-48.09	-54.03	10.27	66.27	64.30
		-52.09	-54.03	14.27	70.27	68.30
		-34.83	-53.00	-0.58	52.99	52.42
		-36.83	-53.00	1.37	54.99	54.37
Broadband	52.164	-37.83	-53.00	2.37	55.99	55.37
PCS	53.164	-39.83	-53.00	4.35	57.99	57.35
		-44.83	-53.00	9.34	62.99	62.34
		-35.83	-53.00	0.34	53.99	53.34

Tabulated Result of Variable Gain Timing

Band	Freqeuncy (MHz)	Limit (ms)	Gain Timing (ms)
Lower 700 MHz	707.000		200.00
Upper 700 MHz	781.500		90.00
Cellular	836.500	1 000	150.00
AWS-1	1732.500		180.00
Broadband PCS	1882.500		40.00



Plot data of Variable Gain Timing



Variable Gain Timing / Upper 700 MHz

		Fast Trig: Fro mLow #Atten:	eRun AvgH	ype: RMS old: 1/1		Frequency
10 dBidiy Ref 30.00	dBm			ΔN	lkr1 90.00 ms -9.756 dB	Auto Tun
142						Center Fre 781.500000 MH
0.01						Start Fre 781.500000 MH
-10.0						Stop Fre 781.500000 Mi
00.0 Jaho						CF Ste 3.000000 Mi Auto Ma
60.0						Freq Offse 01-
Center 781.500000 M Res BW 3.0 MHz	Hz				Span 0 Hz 0.00 s (1001 pts)	Scale Typ Log Li





RL IF 550.00 arker 1 Δ 150.000 ms NFE	PNO: Fast	Sense thri so Trig: Free Run #Atten: 40 dB	Avg Type: RMS Avg Hold: 1/1	11:44:01 4MJun 21, 2024 TRACE 1 2 2 4 5 TVPE MYNWWW DET A A A A A	Marker Select Marker
dB/dly Ref 30.00 dBm			Δ	Mkr1 150.0 ms -76.847 dB	1
- (<mark>2</mark>					Normal
10					Delta
a					Fixed
					on
142					Properties
nter 836.500000 MHz s BW 3.0 MHz	VBW 5	0 MHz*	Sweep	Span 0 Hz 10.00 s (1001 pts)	More 1 of 2

Variable Gain Timing / Cellular

Variable Gain Timing / AWS-1

Center Freq 1.731	NEE PNO: Fast Trig:	SENSE: INT SOURCE OF AL Avg Type: 1 : Free Run Avg Hold: 1 en: 40 dB	LGN AUTD 12:00:54 PM.) RMS 174ACE 1/1 TVPE 0ET	Trace/Defector
10 dB/dly Ref 30.00			ΔMkr1 180 -3.8	0.0 ms 130 dB
2010 🍋 142				Clear Writ
1000				Trace Averag
-10.0				Max Hol
-200				Min Hol
-50.0				View Blank Trace On
Center 1.731900000 Res BW 3.0 MHz	GHz VBW 50 MH		Sp:	Mor an 0 Hz
Res BW 3.0 MHZ	VBW 50 MP	14	Sweep 10.00 s (10	





	PRO: Fast Trig: Free Run FGaintLow #Atten: 40 dB	Avg Type: RMS Avg Hold: 1/1	10:41:58 AM Jun 21, 2024 TRACE 0 2 2 4 5 TYPE NO.	
dB/div Ref 30.00 dBm		ΔN	lkr1 40.00 ms -75.897 dB	Auto Tune
				Center Freq 1.882500000 GHz
5 5				Start Freq 1.882500000 GHz
10				Stop Freq 1.882500000 GHz
10				CF Step 3.000000 MHz <u>Auto</u> Man
102				Freq Offset 0 Hz
10				Scale Type
enter 1.882500000 GHz es BW 3.0 MHz	VBW 50 MHz*	Sweep 1	Span 0 Hz 0.00 s (1001 pts)	Log Lin

Variable Gain Timing / Broadband PCS



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 v04r04.

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 \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.

l) 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 (-26 dB OBW)	

Band	Signal	Freqeuncy (MHz)	Input OBW (kHz)	Output OBW (kHz)	Comparison (%)
Lower 700 MHz		707.000	243.57	243.51	-0.02
Upper 700 MHz		781.500	243.44	245.92	1.02
Cellular	GSM	836.500	244.48	246.65	0.89
AWS-1		1732.500	243.30	245.92	1.08
Broadband PCS		1882.500	244.04	244.75	0.29
Band	Signal	Freqeuncy (MHz)	Input OBW (MHz)	Output OBW (MHz)	Comparison (%)
Lower 700 MHz		707.000	1.2344	1.2378	0.28
Upper 700 MHz		781.500	1.2335	1.2415	0.64
Cellular	CDMA	836.500	1.2403	1.2362	-0.33
AWS-1		1732.500	1.2363	1.2418	0.45
Broadband PCS		1882.500	1.2356	1.2407	0.41
Lower 700 MHz		707.000	4.1889	4.1887	0.00
Upper 700 MHz		781.500	4.1689	4.1798	0.26
Cellular	WCDMA	836.500	4.1883	4.1880	-0.01
AWS-1		1732.500	4.1999	4.1854	-0.35
Broadband PCS		1882.500	4.2007	4.1797	-0.50

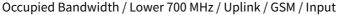
Tabulated Result of Downlink Occupied Bandwidth (-26 dB OBW)

Band	Signal	Freqeuncy (MHz)	Input OBW (kHz)	Output OBW (kHz)	Comparison (%)
Lower 700 MHz		737.000	244.48	242.34	-0.88
Upper 700 MHz		751.500	245.54	245.97	0.18
Cellular	GSM	881.500	244.89	244.98	0.04
AWS-1		2132.500	244.97	245.62	0.27
Broadband PCS		1962.500	245.86	244.91	-0.39
Band	Signal	Freqeuncy (MHz)	Input OBW (MHz)	Output OBW (MHz)	Comparison (%)
Lower 700 MHz		737.000	1.2327	1.2374	0.39
Upper 700 MHz		751.500	1.2407	1.2369	-0.31
Cellular	CDMA	881.500	1.2365	1.2425	0.49
AWS-1		2132.500	1.2454	1.2359	-0.76
Broadband PCS		1962.500	1.2395	1.2379	-0.13
Lower 700 MHz		737.000	4.1970	4.1749	-0.53
Upper 700 MHz		751.500	4.1769	4.1827	0.14
Cellular	WCDMA	881.500	4.2018	4.1869	-0.35
AWS-1		2132.500	4.2946	4.1774	-2.73
Broadband PCS		1962.500	4.2402	4.2028	-0.88



Plot data of Occupied Bandwidth

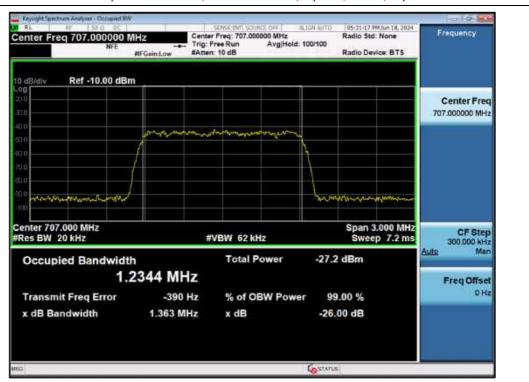




Occupied Bandwidth / Lower 700 MHz / Uplink / GSM / Output







Occupied Bandwidth / Lower 700 MHz / Uplink / CDMA/ Input

Occupied Bandwidth / Lower 700 MHz / Uplink / CDMA / Output





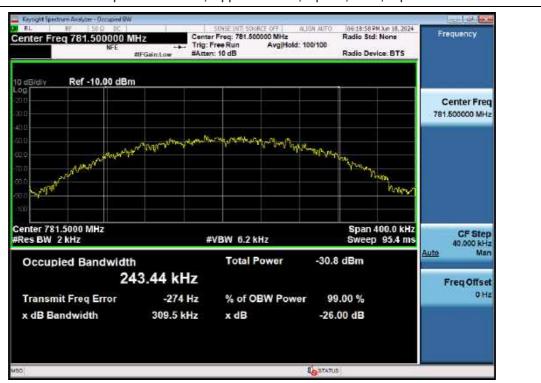


Occupied Bandwidth / Lower 700 MHz / Uplink / WCDMA/ Input

Occupied Bandwidth / Lower 700 MHz / Uplink / WCDMA / Output







Occupied Bandwidth / Upper 700 MHz / Uplink / GSM / Input

Occupied Bandwidth / Upper 700 MHz / Uplink / GSM / Output





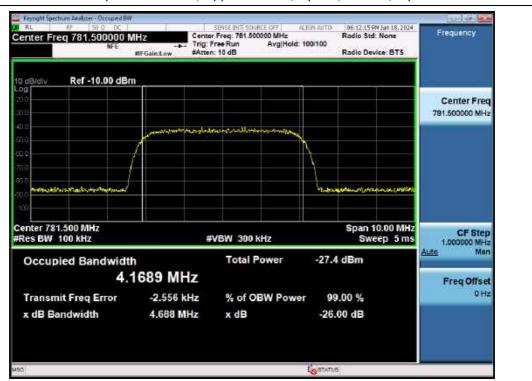


Occupied Bandwidth / Upper 700 MHz / Uplink / CDMA/ Input

Occupied Bandwidth / Upper 700 MHz / Uplink / CDMA / Output







Occupied Bandwidth / Upper 700 MHz / Uplink / WCDMA/ Input

Occupied Bandwidth / Upper 700 MHz / Uplink / WCDMA / Output







Occupied Bandwidth / Cellular / Uplink / GSM / Input

Occupied Bandwidth / Cellular / Uplink / GSM / Output





Transmit Freq Error	.2403 MHz -578 Hz 1.359 MHz	% of OBW Power x dB	99.00 % -26.00 dB	Freq Offset 0 Hz
Occupied Bandwid		Total Power		<u>Auto</u> Man
enter 836.500 MHz Res BW 20 kHz	#	#VBW 62 kHz		MHZ CF Step ms 300.000 kHz
0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	/		Concernant	1
0 0 0	1 magana	- manana m		
0 				Center Freq 836.500000 MHz
dBidly Ref -10.00 dB	m			
enter Freq 836.500000	Trig: 1	sense fim sound off all r Freq: 836.500000 MHz Free Run Avg(Hold: 10 r: 10 dB	Radio Std: None	Frequency

Occupied Bandwidth / Cellular / Uplink / CDMA/ Input

Occupied Bandwidth / Cellular / Uplink / CDMA / Output





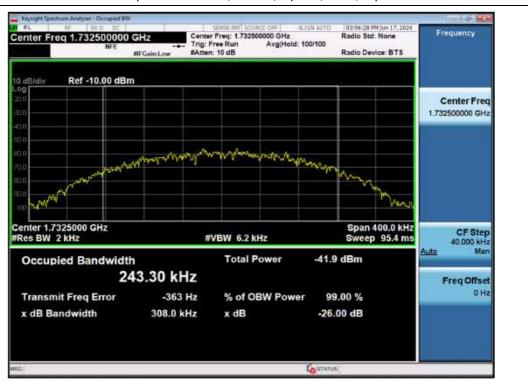


Occupied Bandwidth / Cellular / Uplink / WCDMA/ Input

Occupied Bandwidth / Cellular / Uplink / WCDMA / Output





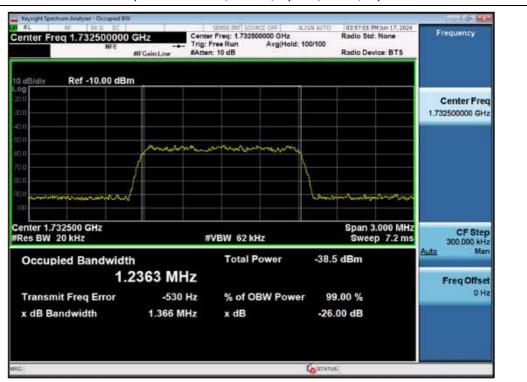


Occupied Bandwidth / AWS-1 / Uplink / GSM / Input

Occupied Bandwidth / AWS-1 / Uplink / GSM / Output

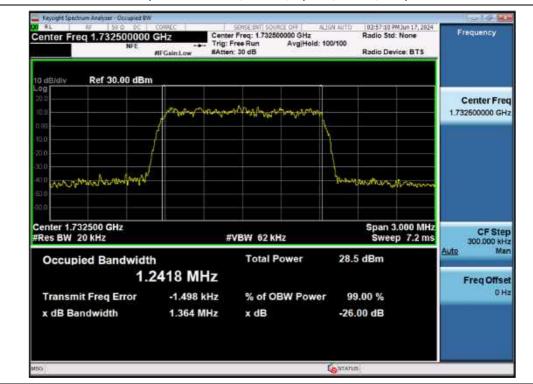






Occupied Bandwidth / AWS-1 / Uplink / CDMA/ Input

Occupied Bandwidth / AWS-1 / Uplink / CDMA / Output

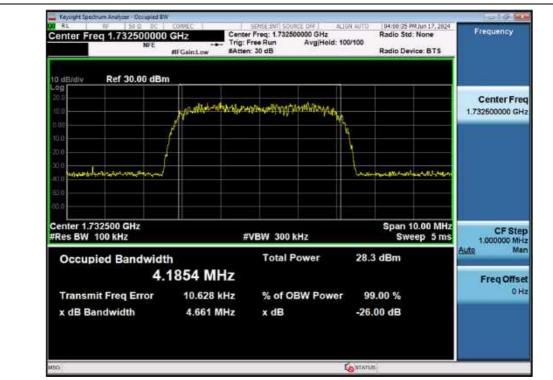






Occupied Bandwidth / AWS-1 / Uplink / WCDMA/ Input

Occupied Bandwidth / AWS-1 / Uplink / WCDMA / Output







Occupied Bandwidth / Broadband PCS / Uplink / GSM / Input

Occupied Bandwidth / Broadband PCS / Uplink / GSM / Output







Occupied Bandwidth / Broadband PCS / Uplink / CDMA/ Input

Occupied Bandwidth / Broadband PCS / Uplink / CDMA / Output







Occupied Bandwidth / Broadband PCS / Uplink / WCDMA/ Input

Occupied Bandwidth / Broadband PCS / Uplink / WCDMA / Output





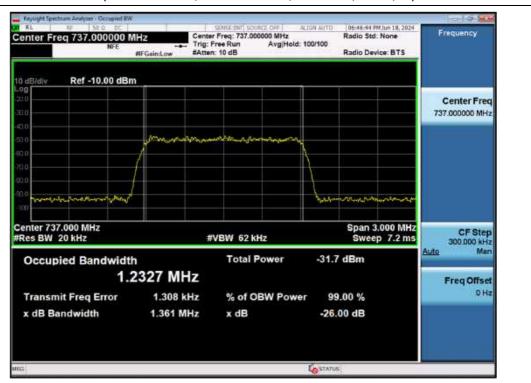


Occupied Bandwidth / Lower 700 MHz / Downlink / GSM / Input

Occupied Bandwidth / Lower 700 MHz / Downlink / GSM / Output







Occupied Bandwidth / Lower 700 MHz / Downlink / CDMA/ Input

Occupied Bandwidth / Lower 700 MHz / Downlink / CDMA / Output







Occupied Bandwidth / Lower 700 MHz / Downlink / WCDMA/ Input

Occupied Bandwidth / Lower 700 MHz / Downlink / WCDMA / Output





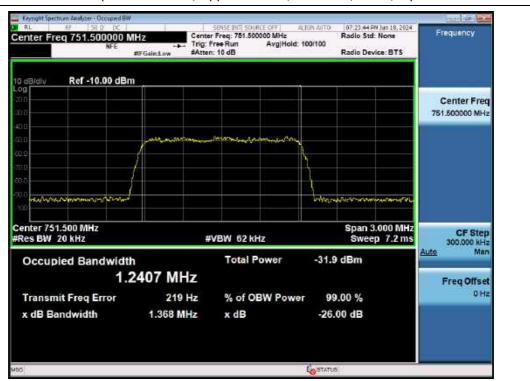


Occupied Bandwidth / Upper 700 MHz / Downlink / GSM / Input

Occupied Bandwidth / Upper 700 MHz / Downlink / GSM / Output







Occupied Bandwidth / Upper 700 MHz / Downlink / CDMA/ Input

Occupied Bandwidth / Upper 700 MHz / Downlink / CDMA / Output







Occupied Bandwidth / Upper 700 MHz / Downlink / WCDMA/ Input

Occupied Bandwidth / Upper 700 MHz / Downlink / WCDMA / Output







Occupied Bandwidth / Cellular / Downlink / GSM / Input

Occupied Bandwidth / Cellular / Downlink / GSM / Output

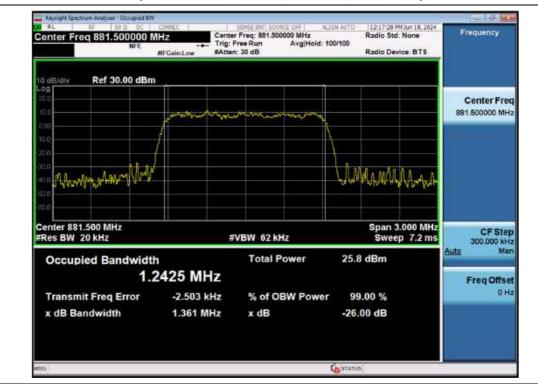






Occupied Bandwidth / Cellular / Downlink / CDMA/ Input

Occupied Bandwidth / Cellular / Downlink / CDMA / Output







Occupied Bandwidth / Cellular / Downlink / WCDMA/ Input

Occupied Bandwidth / Cellular / Downlink / WCDMA / Output





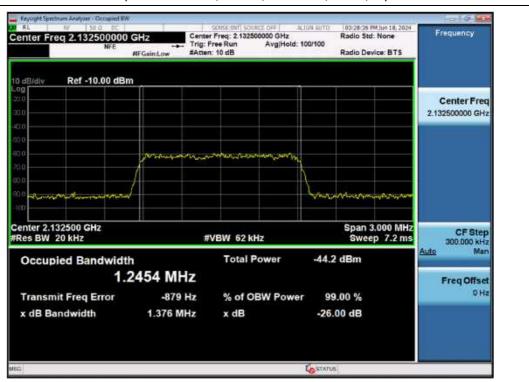


Occupied Bandwidth / AWS-1 / Downlink / GSM / Input

Occupied Bandwidth / AWS-1 / Downlink / GSM / Output

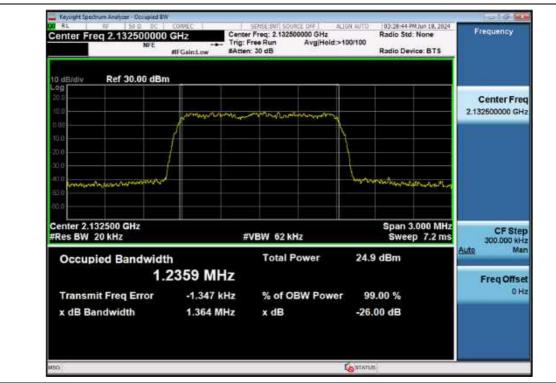






Occupied Bandwidth / AWS-1 / Downlink / CDMA/ Input

Occupied Bandwidth / AWS-1 / Downlink / CDMA / Output







Occupied Bandwidth / AWS-1 / Downlink / WCDMA/ Input

Occupied Bandwidth / AWS-1 / Downlink / WCDMA / Output







Occupied Bandwidth / Broadband PCS / Downlink / GSM / Input

Occupied Bandwidth / Broadband PCS / Downlink / GSM / Output

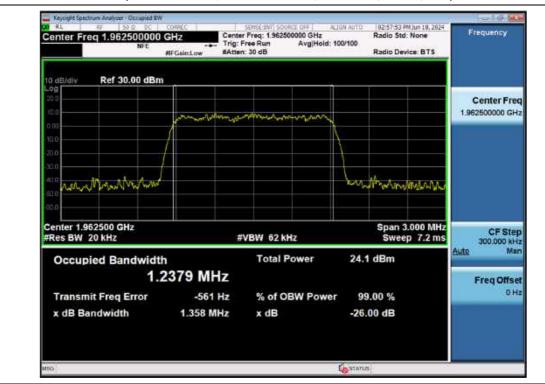






Occupied Bandwidth / Broadband PCS / Downlink / CDMA/ Input

Occupied Bandwidth / Broadband PCS / Downlink / CDMA / Output

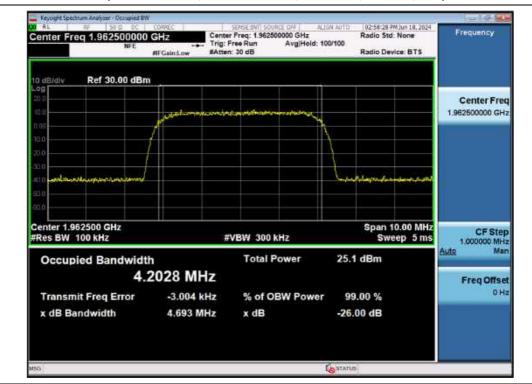






Occupied Bandwidth / Broadband PCS / Downlink / WCDMA/ Input

Occupied Bandwidth / Broadband PCS / Downlink / WCDMA / Output





5.11. OSCILLATION

Test Requirements:

§ 20.21(e)(8)(ii)(A) ANTI-OSCILLATION.

Consumer boosters must be able to detect and mitigate (i.e., by automatic gain reduction or shut down), any oscillations in uplink and downlink bands. Oscillation detection and mitigation must occur automatically within 0.3 seconds in the uplink band and within 1 second in the downlink band. In cases where oscillation is detected, the booster must continue mitigation for at least one minute before restarting. After five such restarts, the booster must not resume operation until manually reset.

Test Procedures:

Measurements were in accordance with the test methods section 7.11 of KDB 935210 D03 v04r04.

7.11.2 Oscillation restart tests

a) Beginning with the spectrum analyzer on the uplink output (donor) port. Confirm that the RF coupled path is connected to the spectrum analyzer.

b) Spectrum analyzer settings:

- 1) Center frequency at the center of the band under test
- 2) Span equal or slightly exceeding the width of the band under test
- 3) Continuous sweep, max-hold
- 4) RBW x 1 MHz, VBW > 3 x RBW

c) Decrease the variable attenuator until the spectrum analyzer displays a signal within the band under test. Using a marker, identify the approximate center frequency of this signal on the max-hold display, increase the attenuation by 10 dB, then reset the EUT (e.g., cycle ac/dc power).

d) Repeat c) twice to ensure that the center of the signal created by the booster remains within 250 kHz of the spectrum analyzer display center frequency. If the frequency of the signal is unstable, confirm that the spectrum analyzer display is centered between the frequency extremes observed. If the signal is wider than 1 MHz, ensure that the spectrum analyzer display is centered on the signal by increasing the RBW. Reset the EUT (e.g., cycle ac/dc power) after each oscillation event, if necessary. Set the spectrum analyzer sweep trigger level to just below the peak amplitude of the displayed EUT oscillation signal.

e) Set the spectrum analyzer to zero-span, with a sweep time of 5 seconds, and single-sweep with max-hold. The spectrum analyzer sweep trigger level in this and the subsequent steps shall be the level identified in d).

f) Decrease the variable attenuator until the spectrum analyzer sweep is triggered, increase the attenuation by 10 dB, then reset the EUT (e.g., cycle ac/dc power).

g) Reset the zero-span trigger of the spectrum analyzer, then repeat f) twice to ensure that the spectrum analyzer is reliably triggered, resetting the EUT (e.g., cycle ac/dc power) after each oscillation event if necessary.

h) Reset the zero-span sweep trigger of the spectrum analyzer, and reset the EUT (e.g., cycle ac/dc power).

i) Force the EUT into oscillation by reducing the attenuation.

j) Use the marker function of the spectrum analyzer to measure the time from the onset of oscillation until the EUT turns off, by setting Marker 1 on the leading edge of the oscillation signal and Marker 2 on the trailing edge. The



spectrum analyzer sweep time may be adjusted to improve the time resolution of these cursors.

k) Capture the spectrum analyzer zero-span trace for inclusion in the test report. Report the power level associated with the oscillation separately if it can't be displayed on the trace.

l) Repeat b) to k) for all operational uplink and downlink bands.

m) Set the spectrum analyzer zero-span sweep time for longer than 60 seconds, then measure the restart time for each operational uplink and downlink band.

n) Replace the normal-operating mode EUT with the EUT that supports an anti-oscillation test mode.

o) Set the spectrum analyzer zero-span time for a minimum of 120 seconds, and a single sweep.

p) Manually trigger the spectrum analyzer zero-span sweep, and manually force the booster into oscillation as described in i).

q) When the sweep is complete, place cursors between the first two oscillation detections, and save the plot for inclusion in the test report. The time between restarts must match the manufacturer's timing for the test mode, and there shall be no more than 5 restarts.

r) Repeat m) to q) for all operational uplink and downlink bands.

7.11.3 Test procedure for measuring oscillation mitigation or shutdown

a) Connect the normal-operating mode EUT to the test equipment.

b) Set the spectrum analyzer center frequency to the center of band under test, and use the following settings:

1) RBW=30 kHz, VBW \geq 3 × RBW,

2) power averaging (rms) detector,

3) trace averages \geq 100,

4) span \geq 120% of operational band under test,

5) number of sweep points $\geq 2 \times \text{Span/RBW}$.

c) Configure the signal generator for AWGN operation with a 99% OBW of 4.1 MHz, tuned to the frequency of 2.5 MHz above the lower edge or below the upper edge of the operating band under test. Adjust the RF output level of the signal generator such that the measured power level of the AWGN signal at the output port of the booster is 30 dB less than the maximum power of the booster for the band under test. Affirm that the input signal is not obstructing the measurement of the strongest oscillation peak in the band, and is not included within the span in the measurement.

1) Boosters with operating spectrum passbands of 10 MHz or less may use a CW signal source at the band edge rather than AWGN.

2) For device passbands greater than 10 MHz, standard CMRS signal sources (i.e., CDMA, W-CDMA, LTE) may be used instead of AWGN at the band edge.

d) Set the variable attenuator to a high attenuation setting such that the booster will operate at maximum gain when powered on. Reset the the EUT (e.g., cycle ac/dc power). Allow the EUT to complete its boot-up process, to reach full operational gain, and to stabilize its operation.

e) Set the variable attenuator such that the insertion loss for the center of the band under test (isolation) between the booster donor port and server port is 5 dB greater than the maximum gain, as recorded in the maximum gain



test procedure, for the band under test.

f) Verify the EUT shuts down, i.e., to mitigate the oscillations. If the booster does not shut down, measure and verify the peak oscillation level as follows.

1) Allow the spectrum analyzer trace to stabilize.

2) Place the marker at the highest oscillation level occurring within the span, and record its output level and frequency.

3) Set the spectrum analyzer center frequency to the frequency with the highest oscillation signal level, and reduce the span such that the upper and lower adjacent oscillation peaks are within the span.

4) Use the Minimum Search Marker function to find the lowest output level that is within the span, and within the operational band under test, and record its output level and frequency.

5) Affirm that the peak oscillation level measured in 2), does not exceed by 12.0 dB the minimal output level measured in 4). Record the measurement results of 2) and 4) in tabular format for inclusion in the test report.

6) The procedure of 1) to 5) allows the spectrum analyzer trace to stabilize, and verification of shutdown or oscillation level measurement must occur within 300 seconds.

g) Decrease the variable attenuator in 1 dB steps, and repeat step f) for each 1 dB step. Continue testing to the level when the insertion loss for the center of band under test (isolation) between the booster donor port and server port is 5 dB lower than the maximum gain.

h) Repeat a) to g) for all operational uplink and downlink bands.

Note1. According to § 20.21(e)(8)(ii)(A), limits of oscillation test are as follows.

- Detect and migration time: Uplink 0.3 second, Downlink 1 second.
- Migration duration: 1 minute.
- Number of restart: 5 times.
- Oscillation Migration limit '12 dB' refers to section 7.11.3 of KDB 935210 D03

Note2. We adjusted the sweep time of test in KDB procedure to show the data.

Note3. 4.1 MHz AWGN Signal is used for migration test.

Note4. Because shutdown process did not occur in migration test, shutdown time data was not provided in this report

Note5. Marker 1 is the initial oscillation signal, and Markers 2 to 5 are the restart signals.



Test Result:

Tabulated Result of Uplink Oscillation Detection

Band	Freqeuncy (MHz)	Limit (ms)	Detect Time (ms)
Lower 700 MHz	706.730		236.00
Upper 700 MHz	780.785		253.10
Cellular	832.400	300	251.40
AWS-1	1746.540		251.20
Broadband PCS	Broadband PCS 1894.980		251.20

Tabulated Result of Downlink Oscillation Detection

Band	Freqeuncy (MHz)	Limit (ms)	Detect Time (ms)
Lower 700 MHz	740.240		251.00
Upper 700 MHz	753.810		250.80
Cellular	875.650	1 000	251.00
AWS-1	2131.870		251.00
Broadband PCS	Broadband PCS 1964.385		250.90

Tabulated Result of Uplink Oscillation Restart

Band	Freqeuncy (MHz)	Time Limit (s)	Restart Limit	Restart Time (s)	Number of Restart
Lower 700 MHz	705.668			63.01	4.00
Upper 700 MHz	781.874			62.72	4.00
Cellular	832.400	60	5	62.69	4.00
AWS-1	1733.535			62.86	4.00
Broadband PCS	1894.980			62.70	4.00

Tabulated Result of Downlink Oscillation Restart

Band	Freqeuncy (MHz)	Time Limit (s)	Restart Limit	Restart Time (s)	Number of Restart
Lower 700 MHz	739.808			62.18	4.00
Upper 700 MHz	753.810			62.50	4.00
Cellular	875.650	60	5	62.32	4.00
AWS-1	2131.870			62.37	4.00
Broadband PCS	1964.385			62.27	4.00

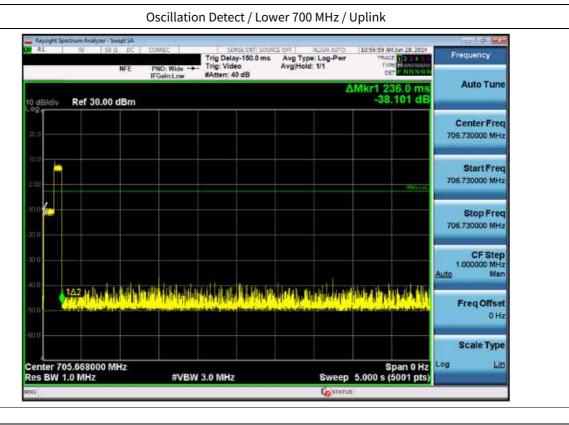


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Band	Variable Att. (dB)	Max Freq. (MHz)	Max Level (dBm)	Min Freq. (MHz)	Min Level (dBm)	Limit (dB)	Difference (dB)
Lower 700 MHz				Shut down			
Band	Variable Att. (dB)	Max Freq. (MHz)	Max Level (dBm)	Min Freq. (MHz)	Min Level (dBm)	Limit (dB)	Difference (dB)
Upper 700 MHz				Shut down			
Band	Variable Att. (dB)	Max Freq. (MHz)	Max Level (dBm)	Min Freq. (MHz)	Min Level (dBm)	Limit (dB)	Difference (dB)
Cellular				Shut down			
Band	Variable Att. (dB)	Max Freq. (MHz)	Max Level (dBm)	Min Freq. (MHz)	Min Level (dBm)	Limit (dB)	Difference (dB)
AWS-1				Shut down			
Band	Variable Att. (dB)	Max Freq. (MHz)	Max Level (dBm)	Min Freq. (MHz)	Min Level (dBm)	Limit (dB)	Difference (dB)
Broadband PCS				Shut down		1	

Tabulated Result of Uplink Oscillation Mitigation



Plot data of Oscillation Detect



Oscillation Detect / Upper 700 MHz / Uplink

Reysignt S	pectrum Analyzer - S RF 50 S		ORREC]		BEIRNT SOUR		N.ION MUTO		M.Jun 28, 2024	Frequ	
			PNO: Wide ++-			Avg Type Avg Hold:	Log-Pwr 1/1	TV		rrequ	ienicy.
o dB/div	Ref 30.00						۵	Mkr1 2 -37	49.0 ms .734 dB	At	ito Tun
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10,0 0 60									tua Lu		tart Fre 5000 MH
20.0											top Fre
33.0		7.34				30					CF Ste 0000 MF Ma
6 0.0	142	laten del				<u>a Anga</u>		u lidi i		Fre	q Offs 0 F
eno											ale Typ
	81.874000 M 1.0 MHz	Hz	#VBW	3.0 MHz			Sweep	5.000 s (ipan 0 Hz 5001 pts)	Log	1
IBG							E STATUS	1			

F-TP22-03 (Rev. 06)

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enter Freq 832.400000 Mi	CHREC SENSE INTI SOURCE Trig Delay-150.0 ms PND: Wide + Trig: Video IFGain:Low #Atten: 40 dB	Ava Type: Log-Pwr 175401	Frequency
dB/div Ref 30.00 dBm	Polinitow wetten, no do	ΔMkr1 240 -43.5	0.0 ms Auto Tune 87 dB
0.0			Center Freq 832.400000 MHz
.00			Start Freq 832,400000 MHz
ай ай			Stop Freq 832.400000 MHz
			CF Step 1 000000 Mi-iz Auto Men
			Freq Offset 0 Hz
enter 832.400000 MHz			Scale Type an 0 Hz Log <u>Lin</u>

Oscillation Detect / Cellular / Uplink

Oscillation Detect / AWS-1 / Uplink

2017 RL 197 S0 0 0C Center Freq 1.746540000 NFE	CORREC SENSE INT SOL GHZ PNO: Wide Trig: Video IFGain:Low #Atten: 40 dB		8:55 PH Jun 26, 2024 TRACE D 2 4 8 TYPE TYPE PURATE	Frequency
10 dB/div Ref 30.00 dBm		ΔMk	1 32.00 ms -46.941 dB	Auto Tuni
20.0				Center Free 1.746540000 GH
π.0 0.00 Χ 2			TIGUS	Start Free 1.746540000 GH
.10.0				Stop Free 1.746540000 GH
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40 0				Freq Offse 0 H
Center 1.733535000 GHz			Span 0 Hz	Scale Type
Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep 5.00	0 s (5001 pts)	



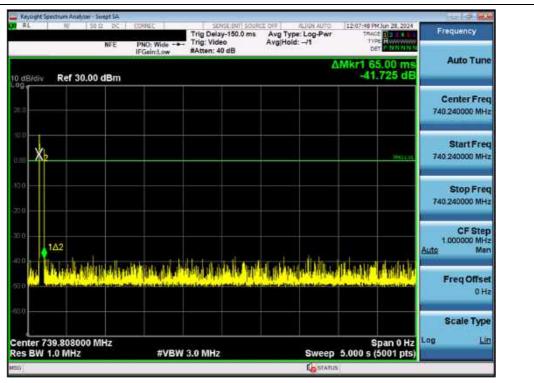


enter Freq 1.894980000 G	Figure Trig Delay-150.0 m PNO: Wide Trig: Video FGain:Low #Atten: 40 dB	Avg Type: Log-Pwr Avg[Hold: 1/1	TYPE NUMERAL	Frequency
dB/div Ref 30.00 dBm		ΔΜ	kr1 23.00 ms -43.583 dB	Auto Tune
0				Center Freq 1.894980000 GHz
				Start Freq 1.894980000 GHz
X2			Distant	Stop Freq 1.894980000 GHz
o o bill a star diseased as a	dealtainid a' tarrichta ana	ala sedda sed	utun da dad	CF Step 1.000000 MHz Man
⁰ 1∆2				Freq Offset 0 Hz
10				Scale Type
enter 1.894980000 GHz	#VBW 3.0 MHz	Sweep 5.	Span 0 Hz 000 s (5001 pts)	og <u>Lin</u>

Oscillation Detect / Broadband PCS / Uplink







Oscillation Detect / Lower 700 MHz / Downlink

Oscillation Detect / Upper 700 MHz / Downlink

11. 年 5	NFE NFE	PNO: Wide +++	SENSE INT SOUN Trig Delay-150.0 ms Trig: Video #Atten: 40 dB	Avg Type: Log-Pwr Avg Hold: 1/1	12:23:59 PM Jun 28, 2024 TRACE 1 2 3 4 5 TYPE MYNWWWW DET P N N N N N	Frequency
10 dB/div Ref 30.00) dBm			۵	Mkr1 5.000 ms -45.110 dB	Auto Tune
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10.0 X2					7589 1.91	Start Free 753.810000 MH
-10.0						Stop Fre 753.810000 MH
			9 8 9 I	95570 W		CF Step 1.000000 MH Auto Ma
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Center 753.810000 I	MHz				Span 0 Hz	Scale Type
Res BW 1.0 MHz	100	#VBW	3.0 MHz	Sweep	5.000 s (5001 pts)	

F-TP22-03 (Rev. 06)

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Frequency	TI101:28 AM Jun 27, 2024 TRACE 12 CONTRACT TYPE NUMBER OF	Avg Type: Log-Pwr Avg Hold: 1/1	Trig Delay-150.0 ms Trig: Video	FE PNO: Wide ++++	Freq 875.650
Auto Tune	Mkr1 75.00 ms -38.096 dB	Δ	#Atten: 40 dB	IFGain:Low	Ref 30.00 d
Center Freq 875.650000 MHz					
Start Freq 875.650000 MHz					<u>6</u>
Stop Freq 875.650000 MHz	-1403(32)				
CF Step 1.000000 MHz Man					1Δ2
Freq Offset 0 Hz			the filler of a network.	<u>etranilin</u>	PHAN
Scale Type					
og <u>Lin</u>	Span 0 Hz 5.000 s (5001 pts)	Sweep	3.0 MHz		875.650000 MI 1.0 MHz

Oscillation Detect / Cellular / Downlink

Oscillation Detect / AWS-1 / Downlink

Center Fr	req 2.13187	0000 GI	RREC 12 NO: Wide Gain:Low	Trig Dela			Log-Pwr 1/1	TRA T	94 Jun 26, 2924 DE 12 Jun 26, 2924 ET 12 JUN NUMBER	Frequ	iency
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	31870000 G	Hz	to to test				1.295045040		Span 0 Hz		ale Type Lir
Res BW 1	.0 MHz s changed; all l			3.0 MHz	8		Sweep	5.000 s	(5001 pts)		

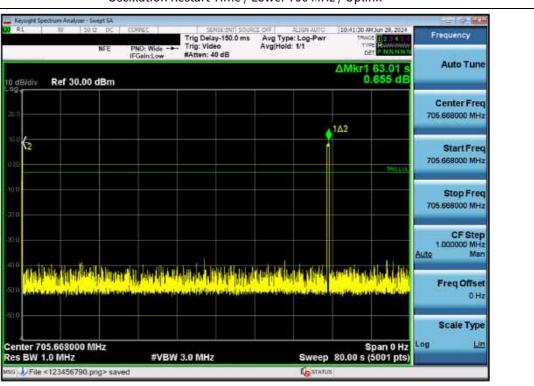


Frequency	TYPE NINNN	Avg Type: Log-Pwr Avg[Hold: 1/1	j Delay-150.0 ms j: Video ten: 40 dB	O Wide +++	NFE PN	q 1.96438	er Fre	ent
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Start Freq 1.964385000 GHz							X	00
Stop Freq 1.964385000 GHz	TROLUL							10
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Freq Offset 0 Hz								
Scale Type								10
Log <u>Lin</u>	Span 0 Hz 5.000 s (5001 pts)	Sweep	MHz	#VBW 3.	Hz	4385000 G MHz	er 1.96 3W 1.0	

Oscillation Detect / Broadband PCS / Downlink



Plot data of Oscillation Restart Time



Oscillation Restart Time / Upper 700 MHz / Uplink

Center Free		DOO MH	RREC Z NO: Wide -+ Gain: Low	Trig Dela			#16# #010 E Log-Pwr : 1/1	TRAC	M.Jun 28, 2024 26 0 2 0 4 0 26 1 2 0 4 0	Frequ	iency
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RL 8 500 00 enter Freq 832.400000 NFE	CORREC SENSE INT SOUR MH2 Trig Delay-150.0 ms Trig: Video IFGaintLow #Atten: 40 dB	Avg Type: Log-Pwr Avg[Hold: 1/1	21:57 AM Jan 28, 2024 TMACE 22 TYPE AV	Frequency
dB/div Ref 30.00 dBm		ΔN	lkr1 62.69 s -7.682 dB	Auto Tune
70				Center Freq 832.400000 MHz
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io				Stop Freq 832.400000 MHz
	Next: 16 rokan rationer, 12 andar 2011 back			CF Step 1 000000 Mi-iz Auto Man
				Freq Offset 0 Hz
enter 832.400000 MHz			Span 0 Hz	Scale Type

Oscillation Restart Time / Cellular / Uplink

Oscillation Restart Time / AWS-1 / Uplink

Cent	ter Freq		5000 GH	ND: Wide Gain:Low	Trig Dela		Avg Type Avg[Hold:	LIGN AUTO Log-Pwi 1/1	. TR4	H Jun 26, 2924 DE H Jun 26, 2924 ET H N N N D B	Frequency
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20.0											Center Fre 1.733535000 GH
112.0	4								142		
0.00	V2										Start Fre 1.733535000 GH
										THE CAL	N
-10.0											Stop Fre 1.733535000 GH
30.0		Ava.	. A 14						and so as a		CF Ste 1.000000 MH Auto Ma
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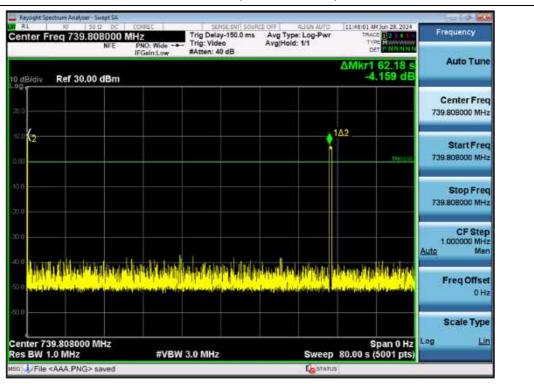




enter Freq 1.894980000 GI	Trig Delay-150.0 m NO: Wide Trig: Video Geint.Low #Atten: 40 dB	s Avg Type: Log-Pwr Avg Hold: 1/1	TYPE DET	Frequency
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92 gr				Center Freq 1.894980000 GHz
0.0 .00 <mark>-{2</mark>			142	Start Freq 1.894980000 GHz
ао • • • • • • • • • • • • • • • • • • •			1905-1145	Stop Freq 1.894980000 GHz
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20 way are not a state of the s				Freq Offset 0 Hz
				Scale Type
enter 1.894980000 GHz es BW 1.0 MHz	#VBW 3.0 MHz	Sweep	Span 0 Hz 80.00 s (5001 pts)	Log <u>Lin</u>

Oscillation Restart Time / Broadband PCS / Uplink





Oscillation Restart Time / Lower 700 MHz / Downlink

Oscillation Restart Time / Upper 700 MHz / Downlink

RL HF 50	R BC	COBREC	SENSE INT SC Trig Delay-150.0 m	s Avg Type: Log-Pw	TRAC	4.3un 28, 2024 = 1 2 4 4 5 4	Frequency
	NFE	PNO: Wide	Trig: Video #Atten: 40 dB	Avg Hold: 1/1	TVP DE	E MUNICIPALITY	1972 12
10 dBidiv Ref 30.00	dBm				ΔMkr1 -6	62.50 s .179 dB	Auto Tuni
200							Center Free 763.810000 MH
10.0 (2					162	TRIGLY	Start Free 753,810000 MH
-10.0							Stop Fre 753.810000 MH
-000							CF Step 1.000000 MH Auto Ma
.co. () () () () () () () () () () () () ()							Freq Offse 0H
Center 753.810000 I	MHz				s	pan 0 Hz	Scale Type
Res BW 1.0 MHz	1000	#VBW	3.0 MHz	Swee	9 80.00 s (5001 pts)	





2 RL 10 500 Center Freq 875.650		Trig Delay-150.0 ms Trig: Video #Atten: 40 dB		11:04:55 AM3 TRACE TYPE DET	un 27, 2924	Frequency
0 dB/div Ref 30.00 (lBm			ΔMkr1 6 -3.7	2.32 s 33 dB	Auto Tune
R: 0						Center Freq 875.650000 MHz
0.00 (2				142		Start Freq 875.650000 MHz
00					TROLM	Stop Freq 875.650000 MHz
00 		1.1.1.1				CF Step 1.000000 MHz Suto Man
	<mark>i letter tin den den den den den den den den den de</mark>					Freq Offset 0 Hz
80						Scale Type
enter 875.650000 Mi tes BW 1.0 MHz		3.0 MHz	Sween	Sp 80.00 s (5	an v 112	og <u>Lir</u>

Oscillation Restart Time / Cellular / Downlink

Oscillation Restart Time / AWS-1 / Downlink

w st. s Center Freq 2.	131870000 GI		deo Avgit	Type: Log-Pwr Iold: 1/1	110:17:15 PH TRACE TYPE DET		Frequency
10 dB/dlv Ref 3	0.00 dBm	AIRCOW			ΔMkr1 (-0.	52.37 s 631 dB	Auto Tune
20.0							Center Free 2.131870000 GH
110.00 A 2				1	142		Start Free 2.131870000 GH
-10.0						TRULM	Stop Free 2.131870000 GH
300 - 00 4111, 47 41 min	li docentedet	filian estat et de dec	aller og økter som	أعمراهما	ar havra	and the da	CF Step 1.000000 MH: Auto Mar
eo o						alanan. Manan	Freq Offse 0 H
Center 2.131870		#VBW 3.0 MH		Sween	Sp 80.00 s (5	an 0 Hz	Scale Type .og <u>Lit</u>



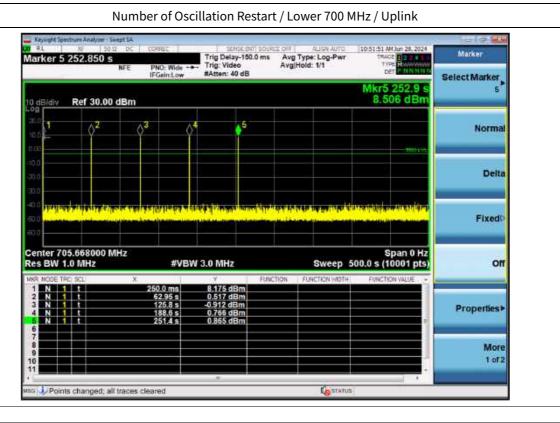


	NO: Wide +++ Trig: Video Gain:Low #Atten: 40 dB		NACE DO NOT	Frequency
dB/div Ref 30.00 dBm		ΔMk	1 62.27 s -0.652 dB	Auto Tune
5.0				Center Freq 1.964385000 GHz
00 x 2		142		Start Freq 1.964385000 GHz
ро ји			TROLAL	Stop Freq 1.964385000 GHz
50 รดไม่ปี นี้ให้สมมัก เป็น แต่ เหมืองได้แป	n sont his new steaded sent	and the state of the state of the		CF Step 1.000000 Mi-iz Auto Man
10 Para and the local sector of the local sect	nation intervention and a solution Nation intervention	names to the second second second second second second second second second second second second second second Second second br>Second second		Freq Offset 0 Hz
enter 1.964385000 GHz			Span 0 Hz	Scale Type

Oscillation Restart Time / Broadband PCS / Downlink



Plot data of Number of Oscillation Restart

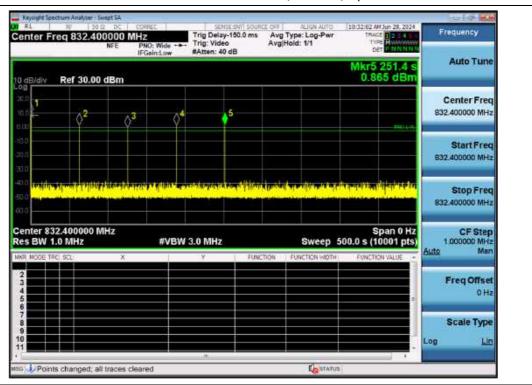


Number of Oscillation Restart / Upper 700 MHz / Uplink

Keysight Spectrum Analyzer - Swept S						
enter Freq 781.87400	0 MHz	Trig Delay-15	Avg	Type: Log-Pwr Hold: 1/1	11:12:04 AM Jun 28, 202 TRACE 1 2 4 TYPE 5 DET EN NYM	Frequency
desidiy Ref 30.00 dBr	s Auto Tur n					
	\$ ³ (4 5				Center Fre 781.874000 MH
0.0						Start Fre 791,874000 MH
and the second second second second						
e.e.				andres en 19 des entre	en en en en en en en en en en en en en e	
an Her 781.874000 MHz		W 3.0 MHz			Span 0 H 00.0 s (10001 pt	781,874000 Mi 2 CF Sta 5) 1.000000 Mi
enter 781.874000 MHz es BW 1.0 MHz	#VB	W 3.0 MHz	FUNCTION			781,874000 Mi 2 CF Sta 5) 1.000000 Mi
enter 781.874000 MHz es BW 1.0 MHz	#VB			Sweep 5	00.0 s (10001 pt	781.874000 Mi CF Ste 1.000000 Mi <u>Auto</u> Mi
enter 781.874000 MHz es BW 1.0 MHz	#VB × 200.0 ms 63.20 s 126.4 s	W 3.0 MHz 8.035 dBm 8.606 dBm 8.595 dBm		Sweep 5	00.0 s (10001 pt	781.874000 M S Auto Freq Offs
enter 781.874000 MHz es BW 1.0 MHz READE TRO SC. 1 N 1 t 2 N 1 t 3 N 1 t 4 N 1 t 5 N 1 t	#VB 200.0 ms 63.20 s	W 3.0 MHz 8.035 dBm 8.606 dBm		Sweep 5	00.0 s (10001 pt	781.874000 M S Auto M Freq Offs
000 The construction of th	#VB 200.0 ms 63.20 s 126.4 s 189.7 s	W 3.0 MHz V 8.035 dBm 8.596 dBm 8.596 dBm		Sweep 5	00.0 s (10001 pt	2 CF Sta 1.000000 Mi Auto Mi Freq Offs 01 Scale Typ
enter 781.874000 MHz es BW 1.0 MHz RR MODE TRC BQ. 1 N 1 t 2 N 1 t 3 N 1 t 4 N 1 t 6 N 1 t 6 N 1 t	#VB 200.0 ms 63.20 s 126.4 s 189.7 s	W 3.0 MHz V 8.035 dBm 8.596 dBm 8.596 dBm		Sweep 5	00.0 s (10001 pt	5) 1.000000 Mi

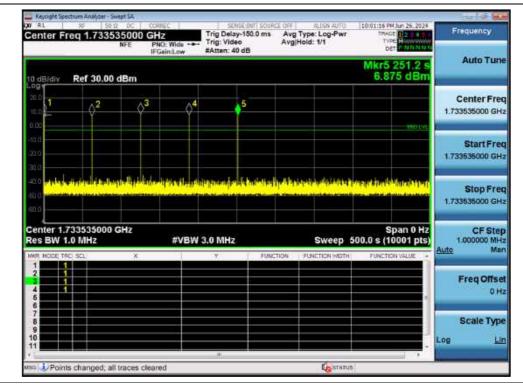




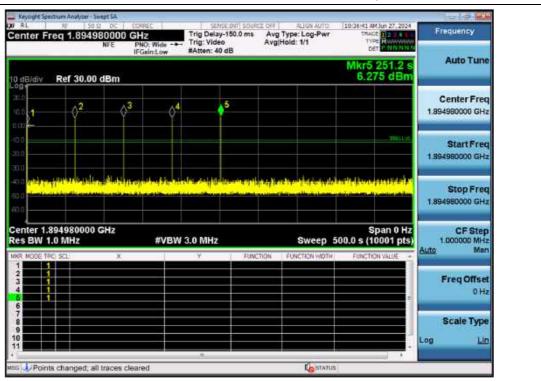


Number of Oscillation Restart / Cellular / Uplink

Number of Oscillation Restart / AWS-1 / Uplink

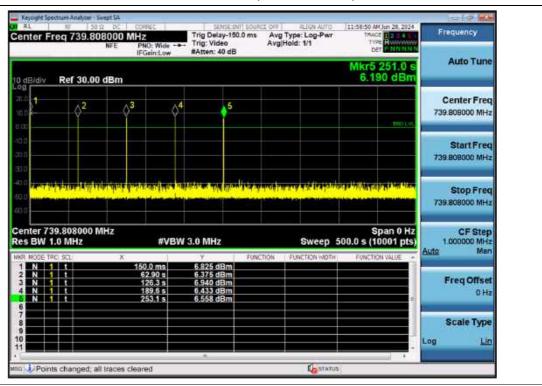






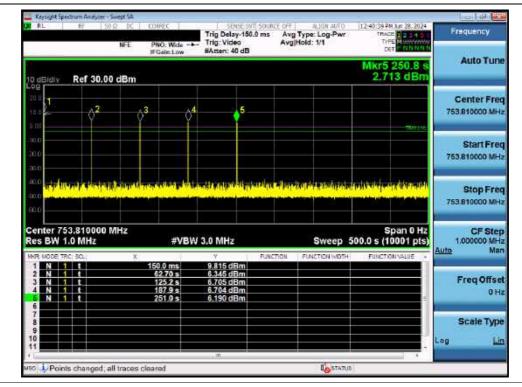
Number of Oscillation Restart / Broadband PCS / Uplink



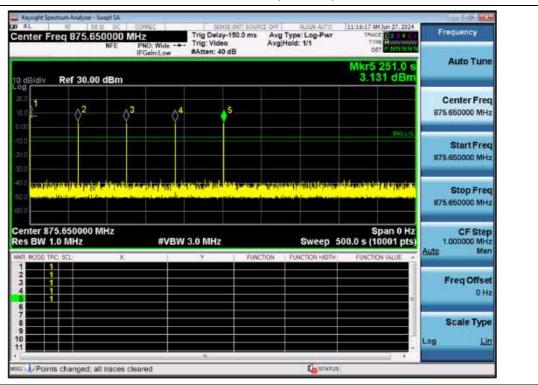


Number of Oscillation Restart / Lower 700 MHz / Downlink

Number of Oscillation Restart / Upper 700 MHz / Downlink

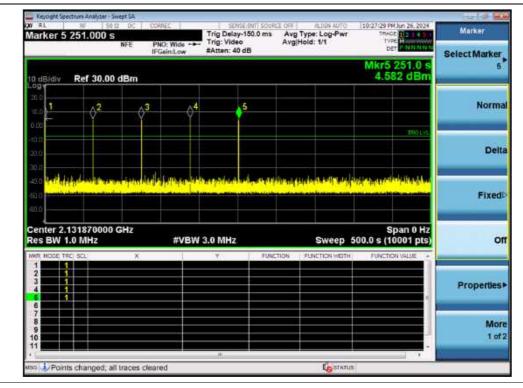




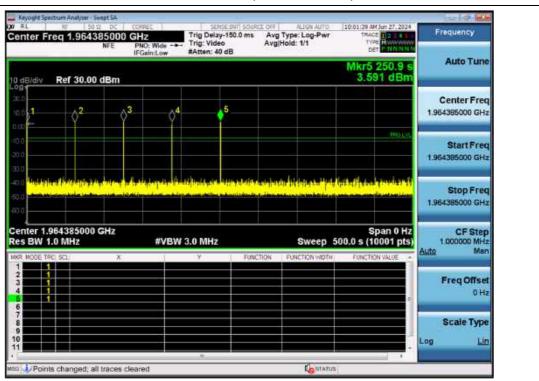


Number of Oscillation Restart / Cellular / Downlink

Number of Oscillation Restart / AWS-1 / Downlink







Number of Oscillation Restart / Broadband PCS / Downlink



5.12. RADIATED SPURIOUS EMISSIONS

Test Requirements:

§ 2.1053 Measurements required: Field strength of spurious radiation.

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

(b) The measurements specified in paragraph (a) of this section shall be made for the following equipment:

- (1) Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
- (2) All equipment operating on frequencies higher than 25 MHz.
- (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
- (4) Other types of equipment as required, when deemed necessary by the Commission.

Test Procedures:

Measurements were in accordance with the test methods section 7.12 of KDB 935210 D03 v04r04

a) Place the EUT on an OATS or semi-anechoic chamber turntable 3 m from the receiving antenna.

b) Connect the EUT to the test equipment beginning with the uplink output (donor) port.

c) Set the signal generator to produce a CW signal with the frequency set to the center of the operational band under test, and the power level set at P_{IN} as determined from measurement results per maximum power measurement.

d) Measure the radiated spurious emissions from the EUT from the lowest to the highest frequencies as specified in Section 2.1057. Maximize the radiated emissions by using the procedures described in ANSI C63.26.

e) Capture the peak emissions plots using a peak detector with Max-Hold for inclusion in the test report. Tabular data is acceptable in lieu of spectrum analyzer plots.

f) Repeat c) through e) for all uplink and downlink operational bands.



Note1. Limit is according to '-13 dBm' of spurious test.

Note2. Test results of below 1 GHz band were not recorded in this report, because its result was in 20 dB lower than limit.



Test Result:

Test Band	Signal	Frequency (MHz)	Measured Level (dΒμV)	Ant. Factor (dB/m)	A.G.+C.L. +H.P.F. (dB)	Pol.	Measured Power (dBm)	Result (dBm/m)
			No ci	ritical peaks f	ound			

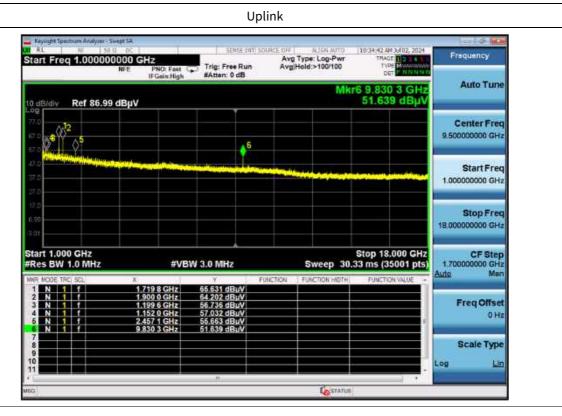
C.L.: Cable Loss / A.G.: Amp. Gain / H.P.F.: High Pass Filter

Note:

- 1. We have done horizontal and vertical polarization in detecting antenna.
- 2. Measure distance = 3 m
- 3. The amplitude of the spurious domain emission attenuated by more than 20 dB over the permissible value was not recorded according to ANSI C63.26, clause 5.1.1., c).
- 4. Test data were only the worst case.
- 5. Among the data of simultaneous and single band emission conditions, the single emission condition is the worst.

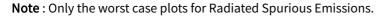


Plot data of radiated spurious emissions



Downlink

Start Freq 1.000000	NFE PNO: Fast (IFGain:High	Trig: Free Run #Atten: 0 dB	Avg Type: Log-Pwr Avg Hold:>100/100	TYPE MONINAL	Frequency
o dBidly Ref 86.99	dBµV		Mk	4 9.830 3 GHz 51.437 dBµV	Auto Tun
		4			Center Fre 9.500000000 GH
47.0 27.0	atiplicas at a second				Start Fre 1.000000000 GH
17.0 0.99 3.01					Stop Fre 18.000000000 GF
Start 1.000 GHz Res BW 1.0 MHz	#VB	W 3.0 MHz	and the second second second second second second second second second second second second second second second	Stop 18.000 GHz 33 ms (35001 pts)	CF Ste 1.700000000 GF Auto Ma
KKR MODE TRC: SCL	× 1,965 1 GHz	7 62.952 dBuV	FUNCTION FUNCTION WOTH	FUNCTION VALUE +	Lotation .
	1,151 5 GHz 2,457 6 GHz 9,830 3 GHz	57.725 dBuV 54.520 dBuV 51.437 dBuV			Freq Offse 0 H
7 8					Scale Typ
9					Log L





6. Annex A_EUT AND TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2407-FC034-P