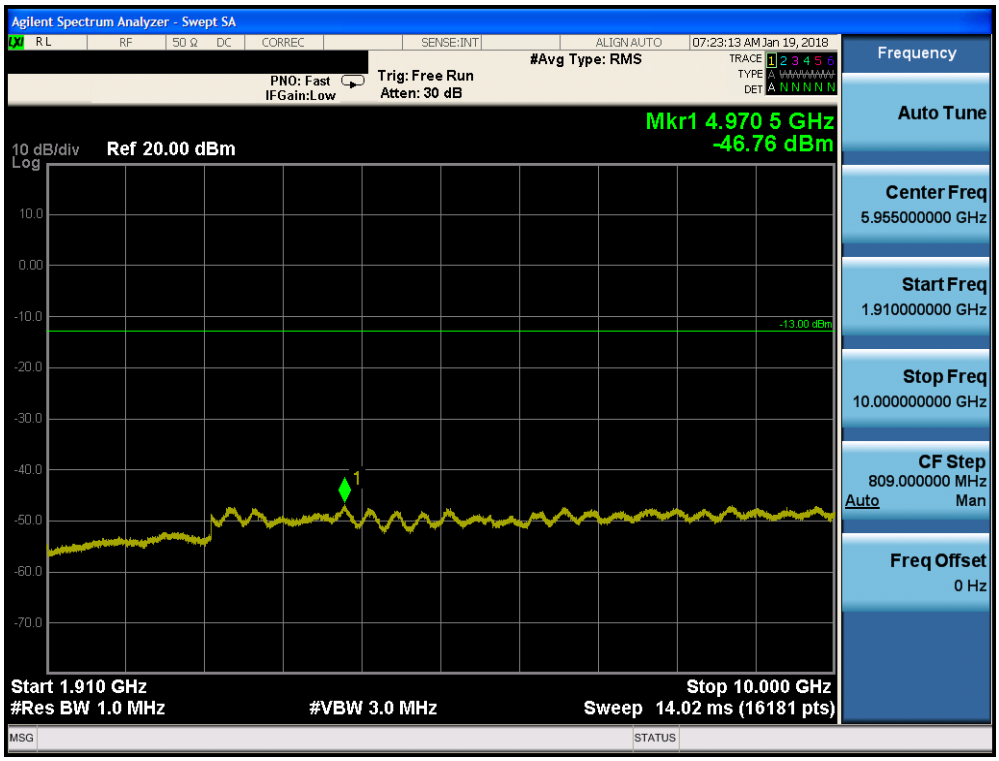
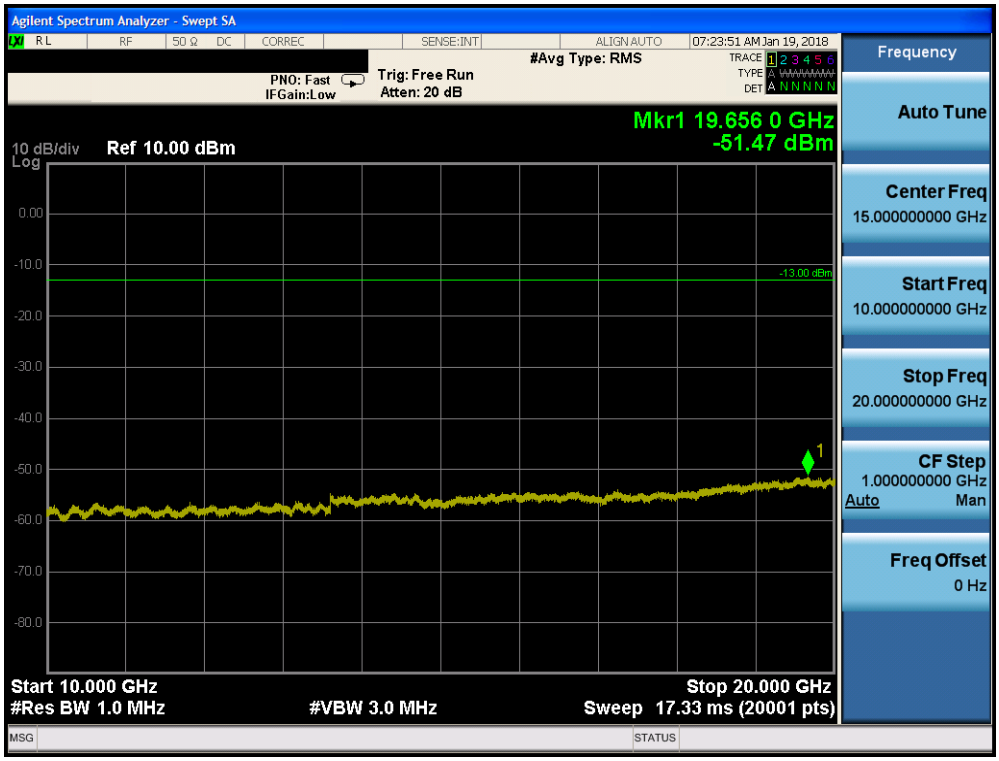
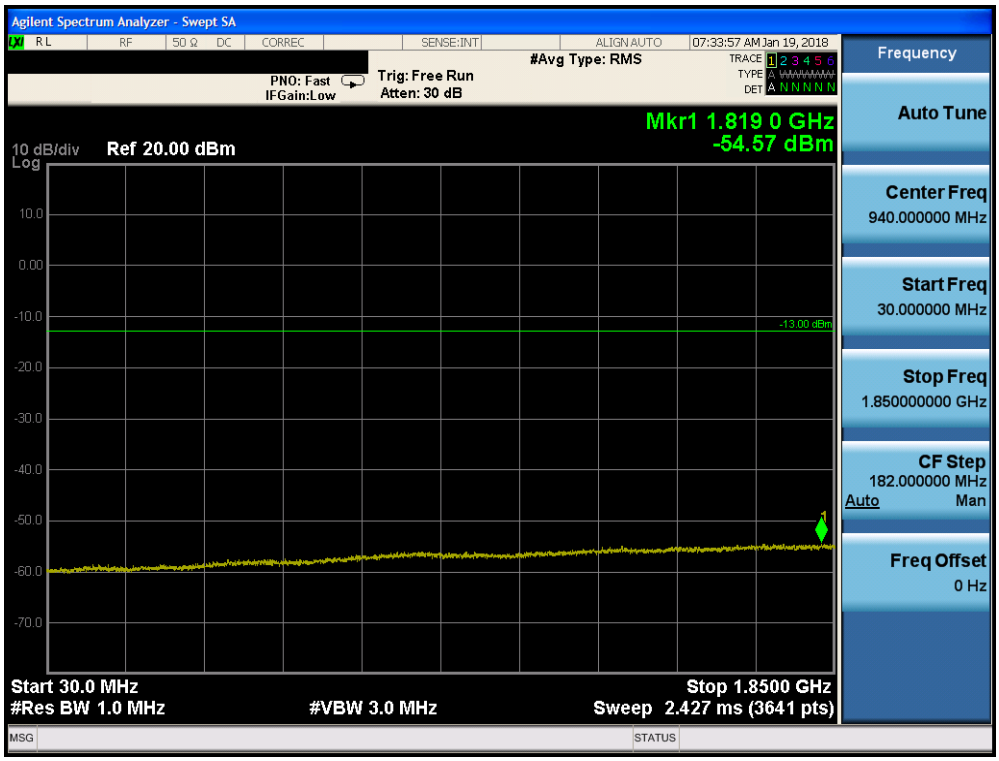


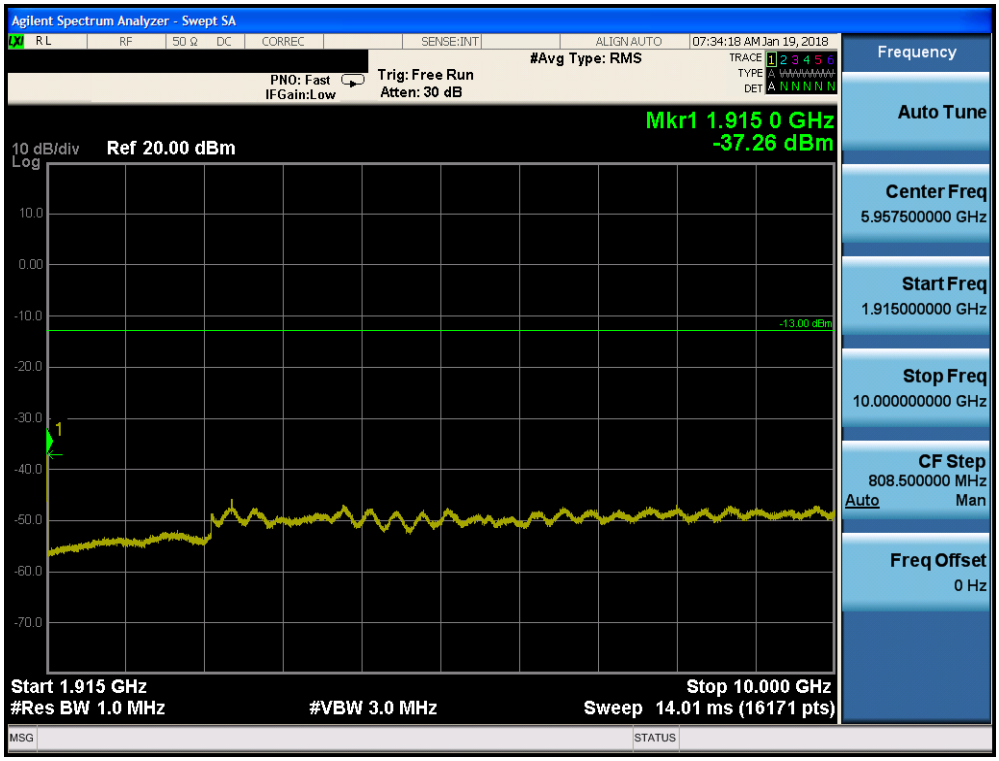
Plot 7-68. Conducted Spurious Plot (PCS WCDMA Mode - Mid Channel)



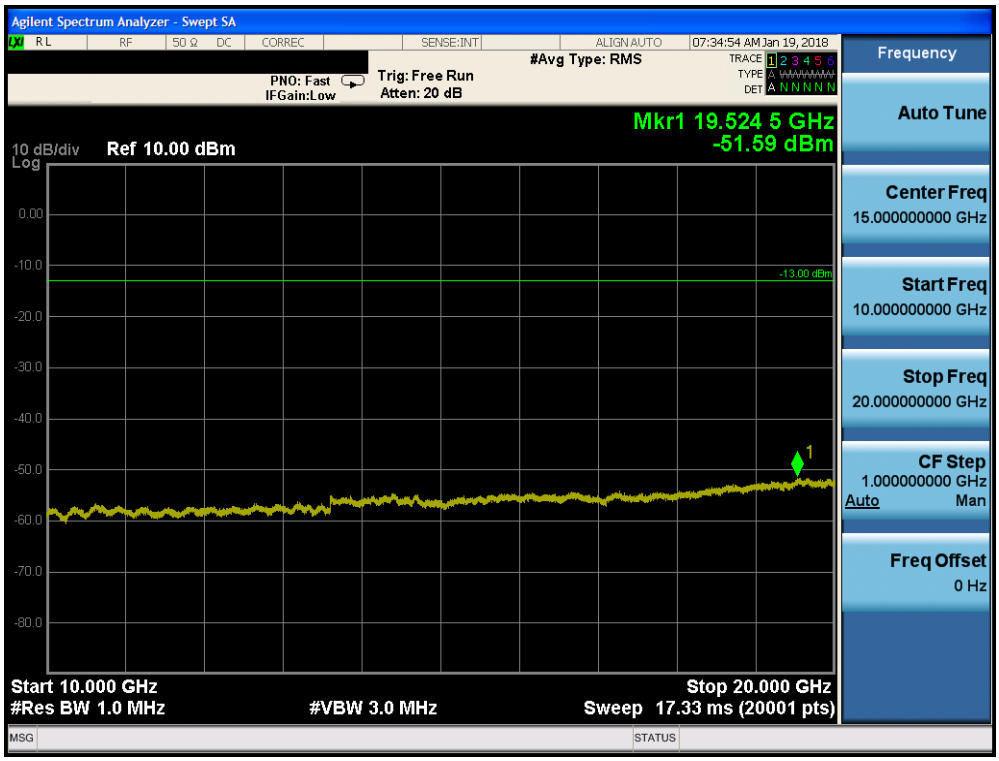
Plot 7-69. Conducted Spurious Plot (PCS WCDMA Mode - Mid Channel)



Plot 7-70. Conducted Spurious Plot (PCS WCDMA Mode - High Channel)



Plot 7-71. Conducted Spurious Plot (PCS WCDMA Mode - High Channel)



Plot 7-72. Conducted Spurious Plot (PCS WCDMA Mode - High Channel)

7.4 Band Edge Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) §27.53(h) RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is 43 + $\log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 D01 v03 – Section 6.0

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW ≥ 1% of the emission bandwidth
4. VBW ≥ 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

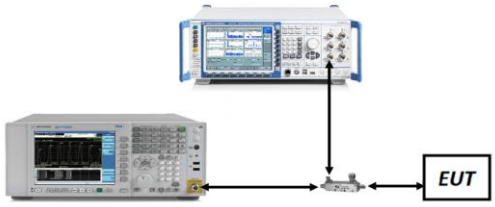
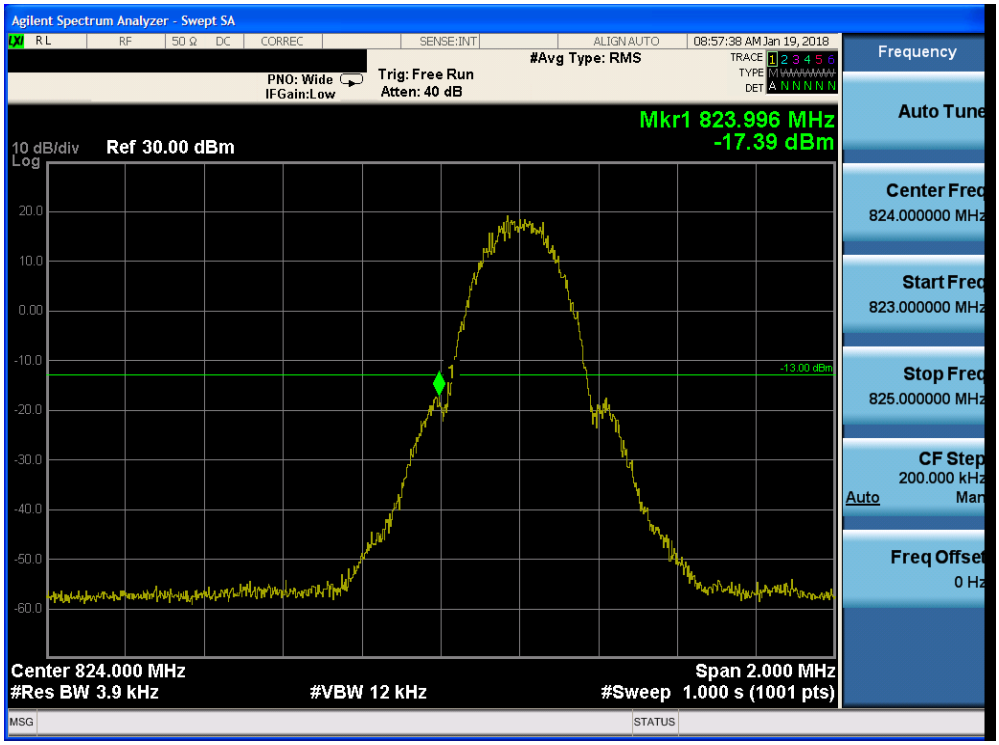


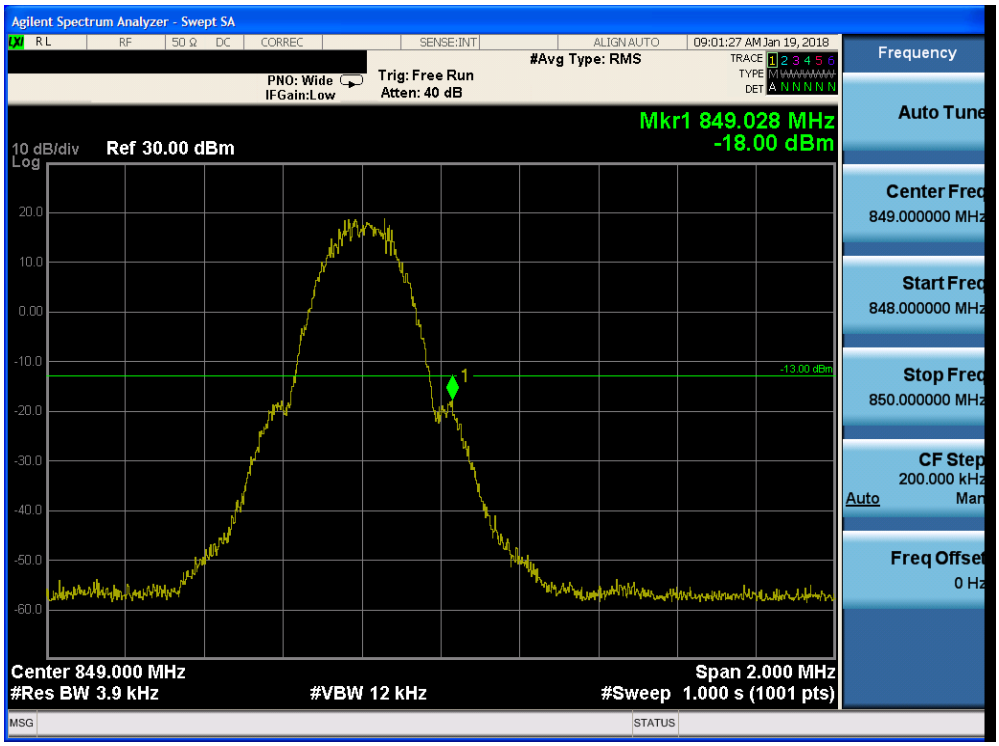
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

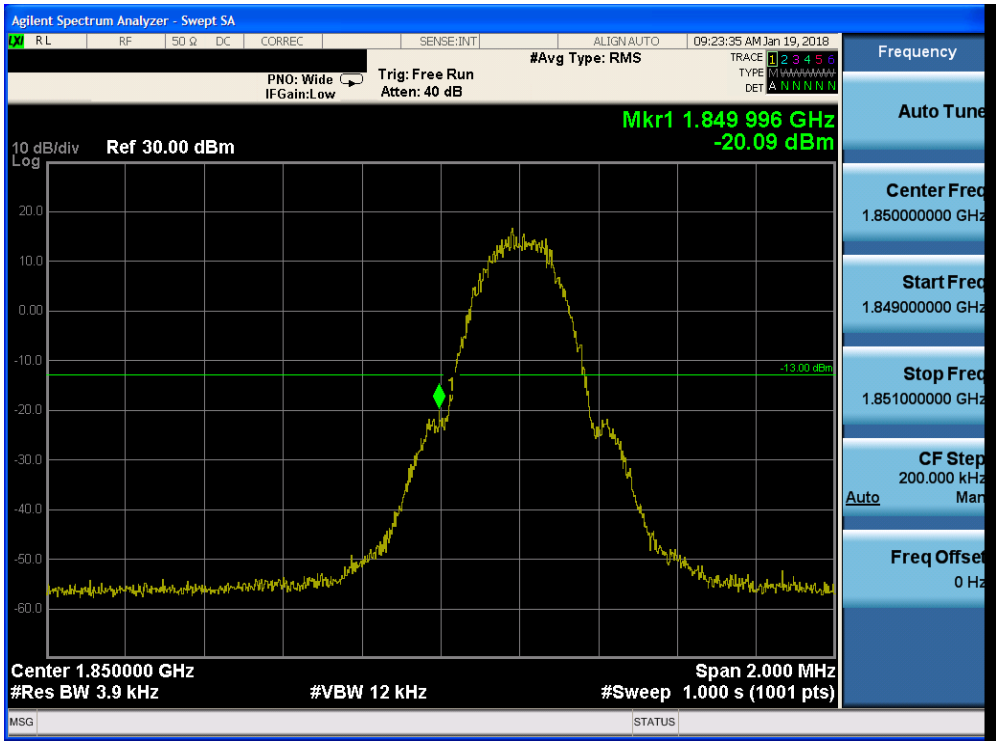
Per 22.917(b), 24.238(b), 27.53(h)(3) and RSS-132(5.5), RSS-133(6.5), RSS-139(6.5) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.



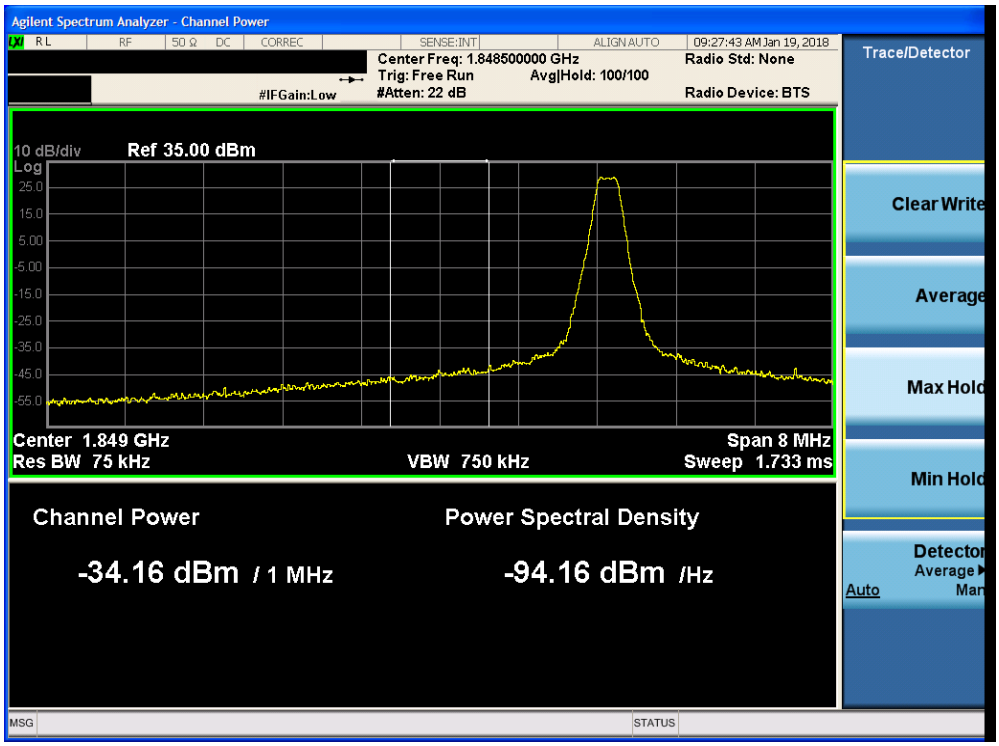
Plot 7-73. Band Edge Plot (Cellular GPRS Mode - Low Channel)



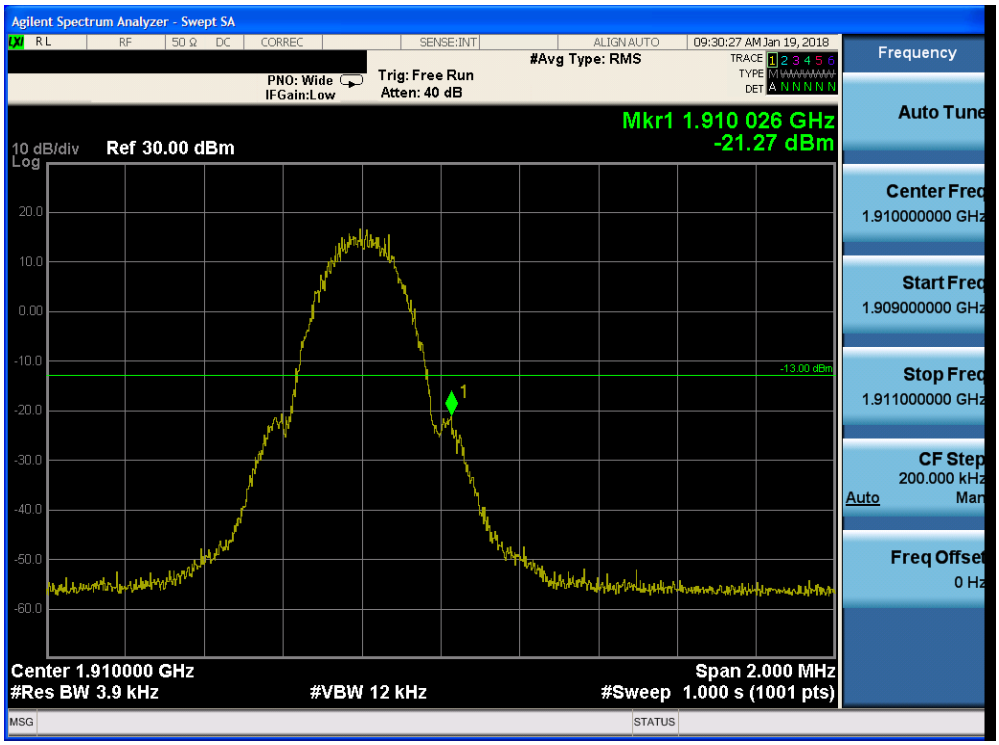
Plot 7-74. Band Edge Plot (Cellular GPRS Mode - High Channel)



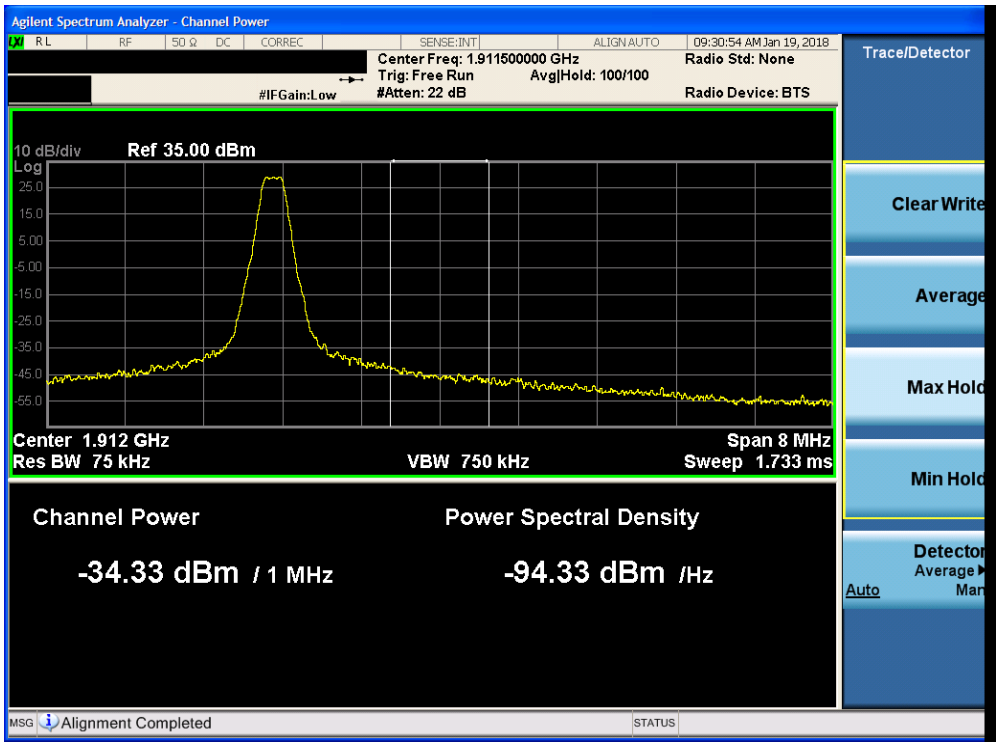
Plot 7-75. Band Edge Plot (PCS GPRS Mode - Low Channel)



Plot 7-76. 4MHz Span Plot (PCS GPRS Mode - Low Channel)

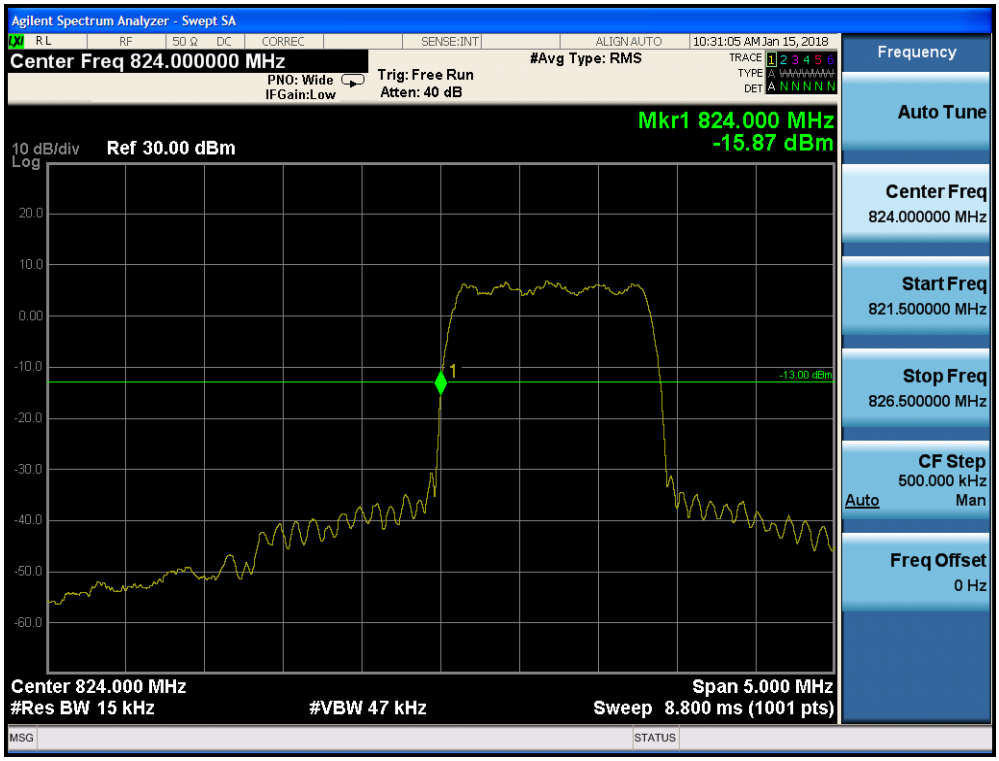


Plot 7-77. Band Edge Plot (PCS GPRS Mode - High Channel)



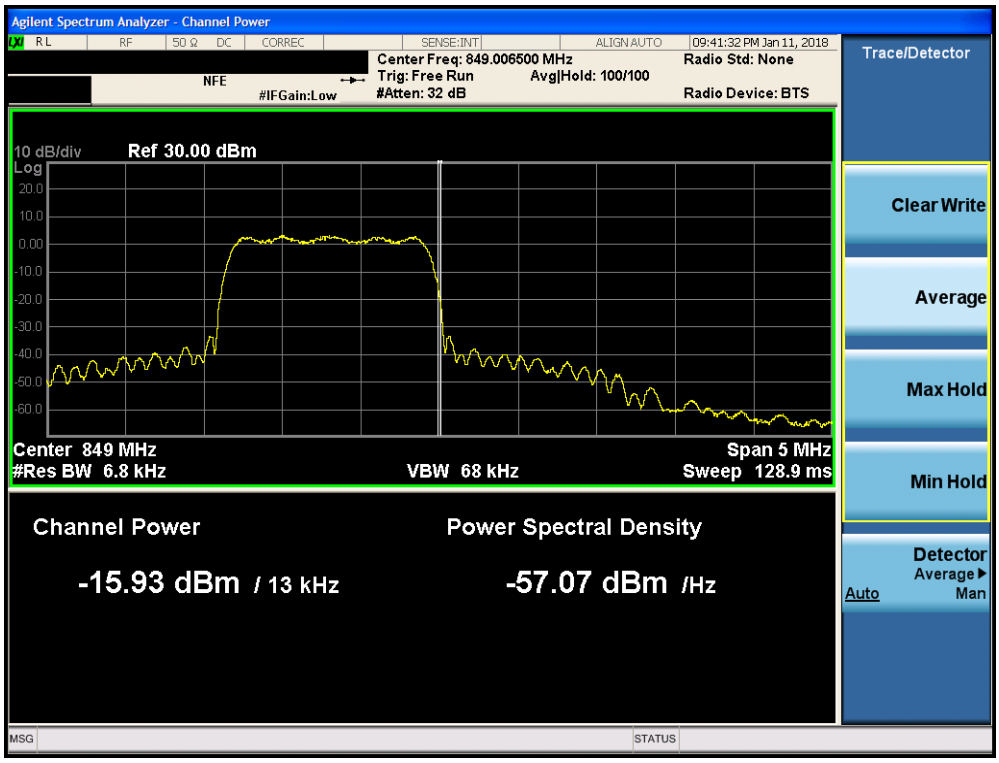
Plot 7-78. 4MHz Span Plot (PCS GPRS Mode - High Channel)

Cellular CDMA Mode

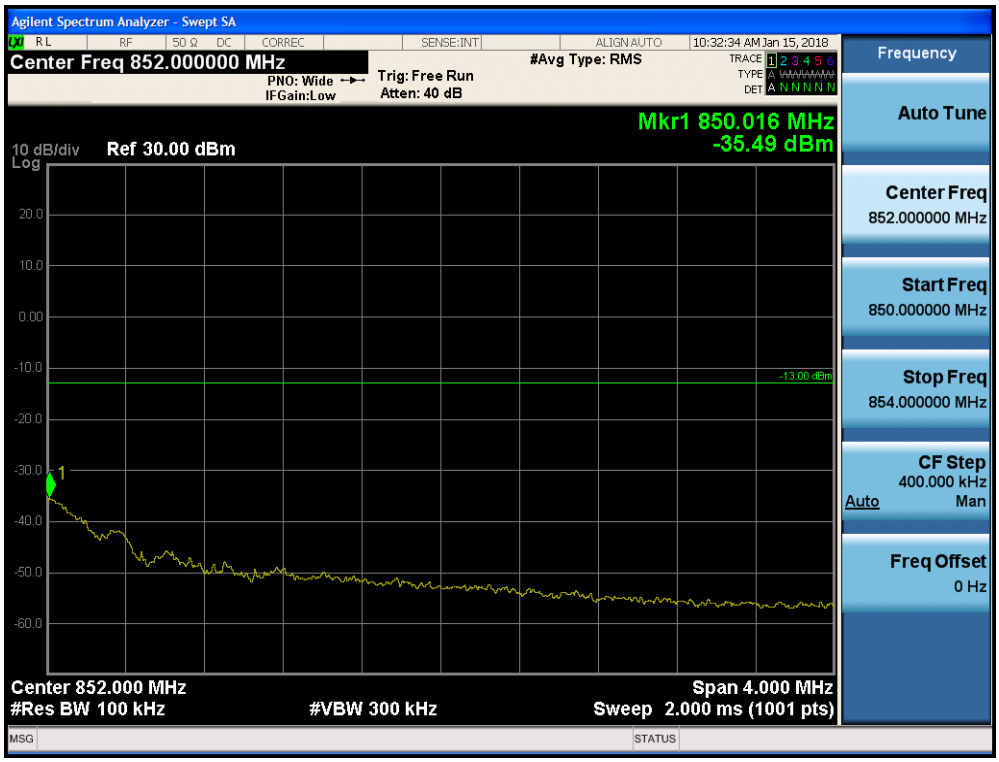


Plot 7-79. Band Edge Plot (Cellular CDMA Mode - Low Channel)

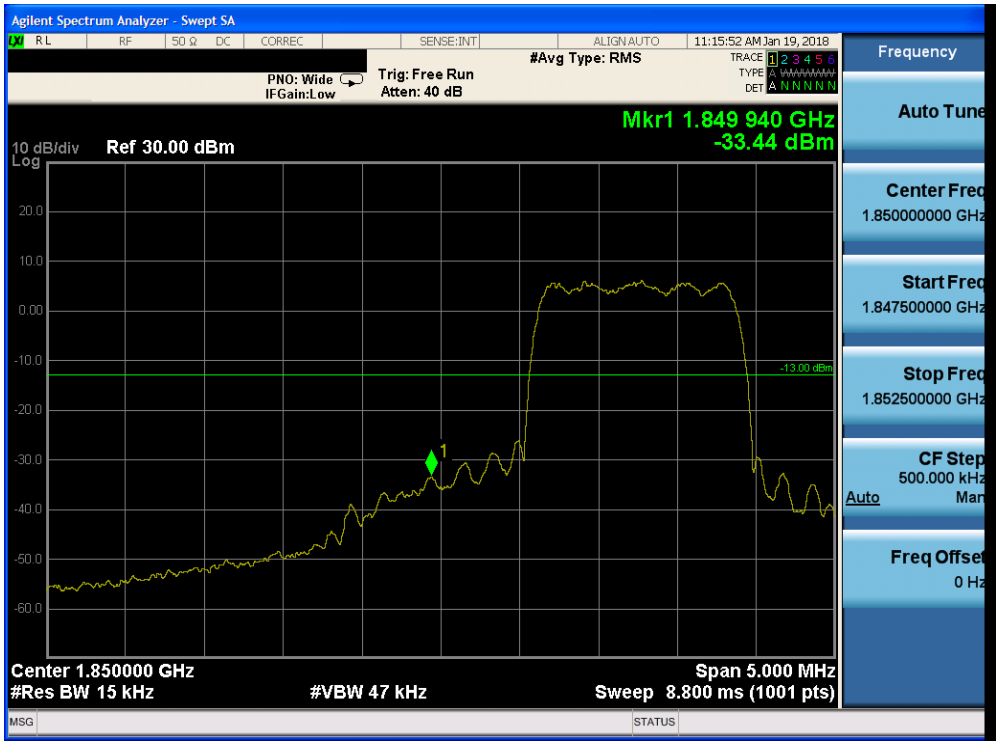
Plot 7-80. 4MHz Span Plot (Cellular CDMA Mode - Low Channel)



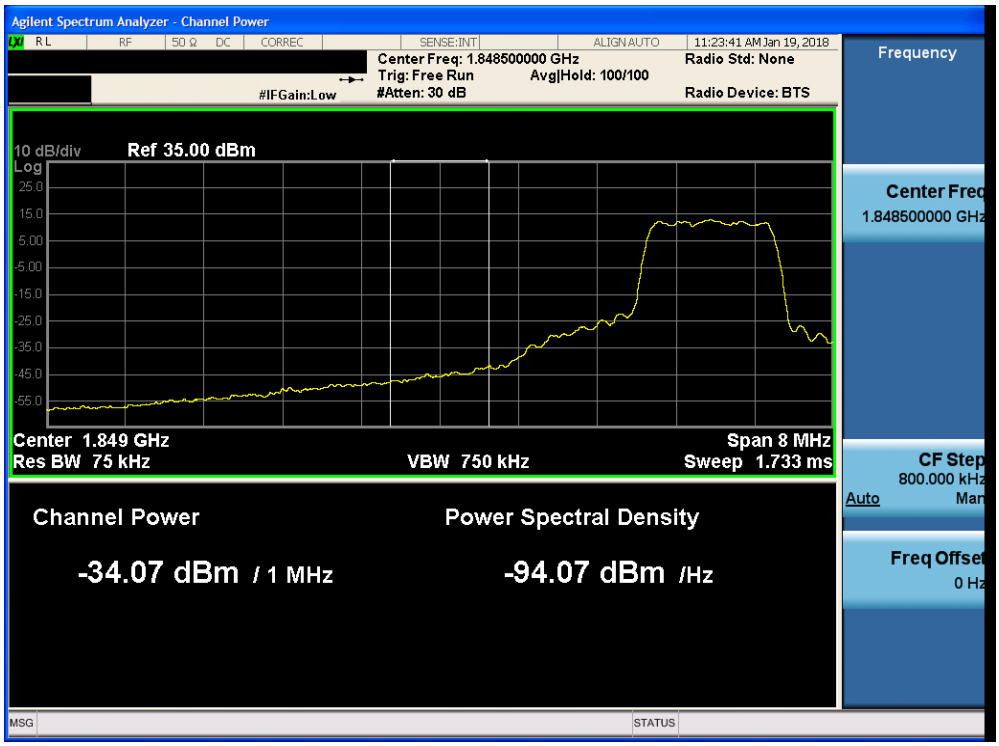
Plot 7-81. Band Edge Plot (Cellular CDMA Mode - High Channel)



Plot 7-82. 4MHz Span Plot (Cellular CDMA Mode - High Channel)

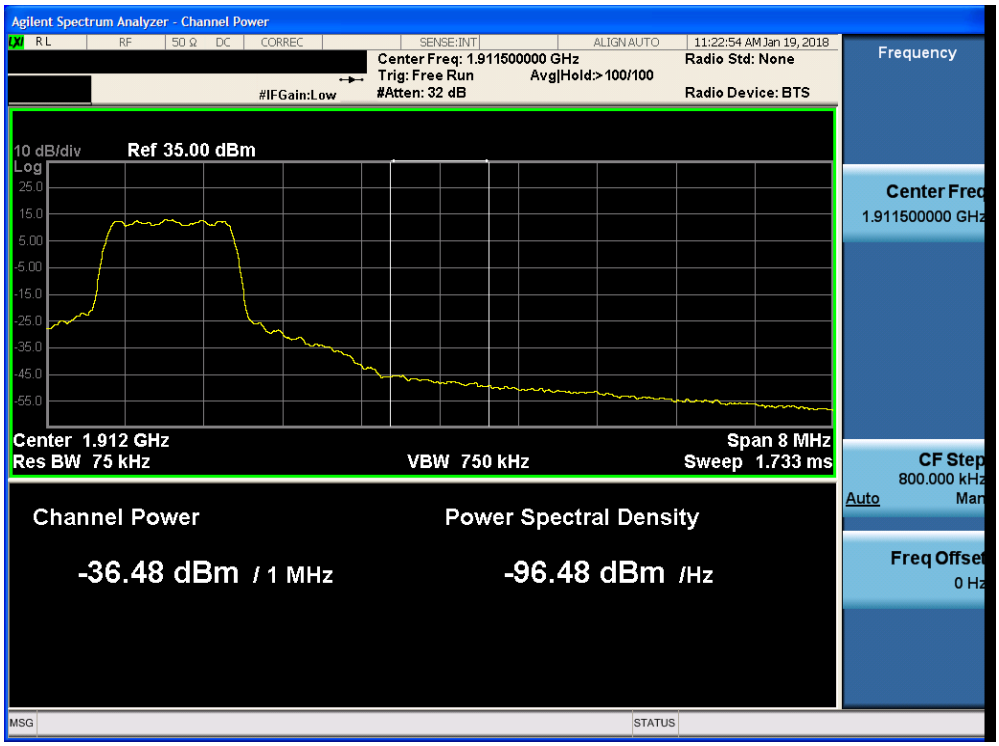


Plot 7-83. Band Edge Plot (PCS CDMA Mode - Low Channel)



Plot 7-84. 4MHz Span Plot (PCS CDMA Mode - Low Channel)

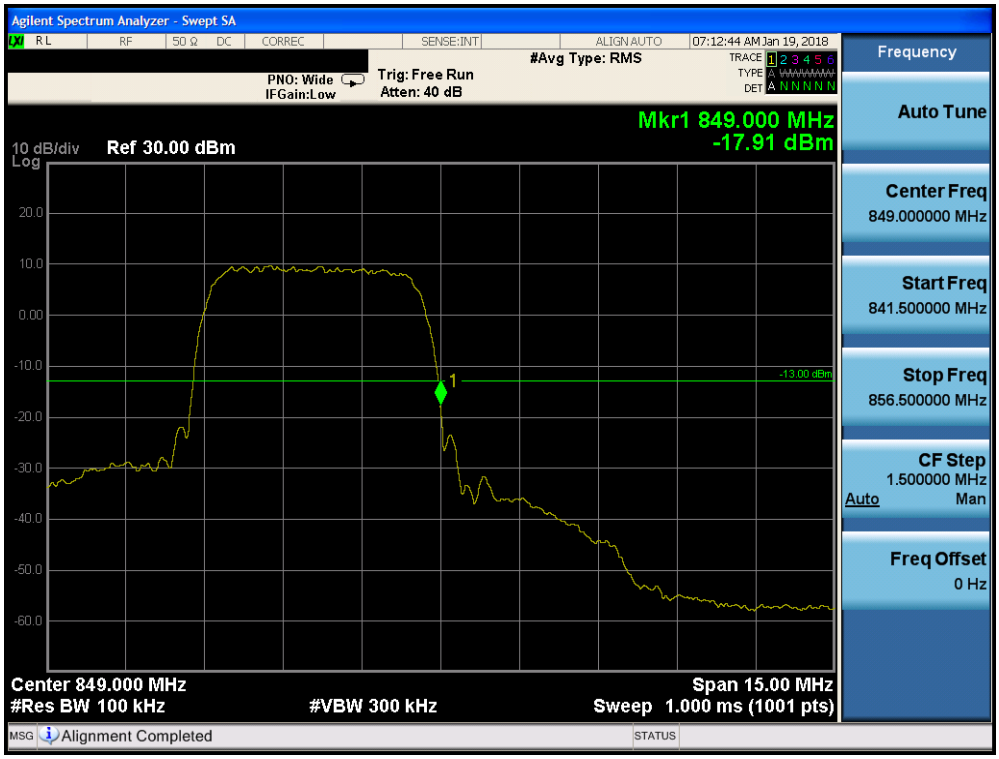
Plot 7-85. Band Edge Plot (PCS CDMA Mode - High Channel)



Plot 7-86. 4MHz Span Plot (PCS CDMA Mode - High Channel)

Cellular WCDMA Mode

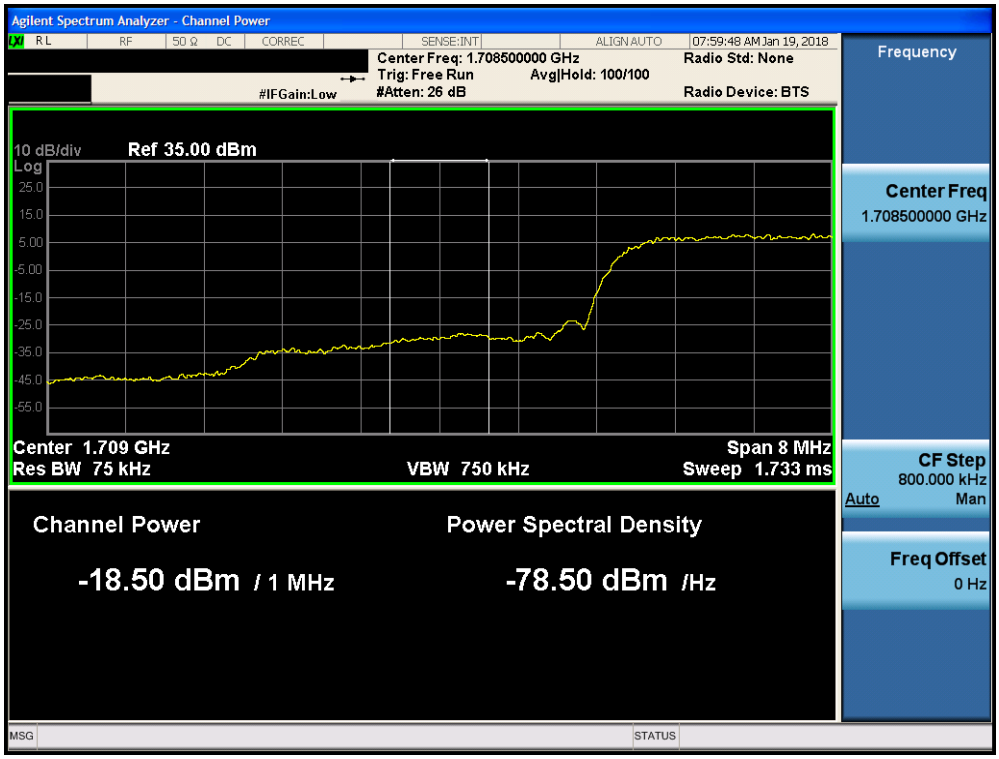
Plot 7-87. Band Edge Plot (Cellular WCDMA Mode - Low Channel)



Plot 7-88. Band Edge Plot (Cellular WCDMA Mode - High Channel)

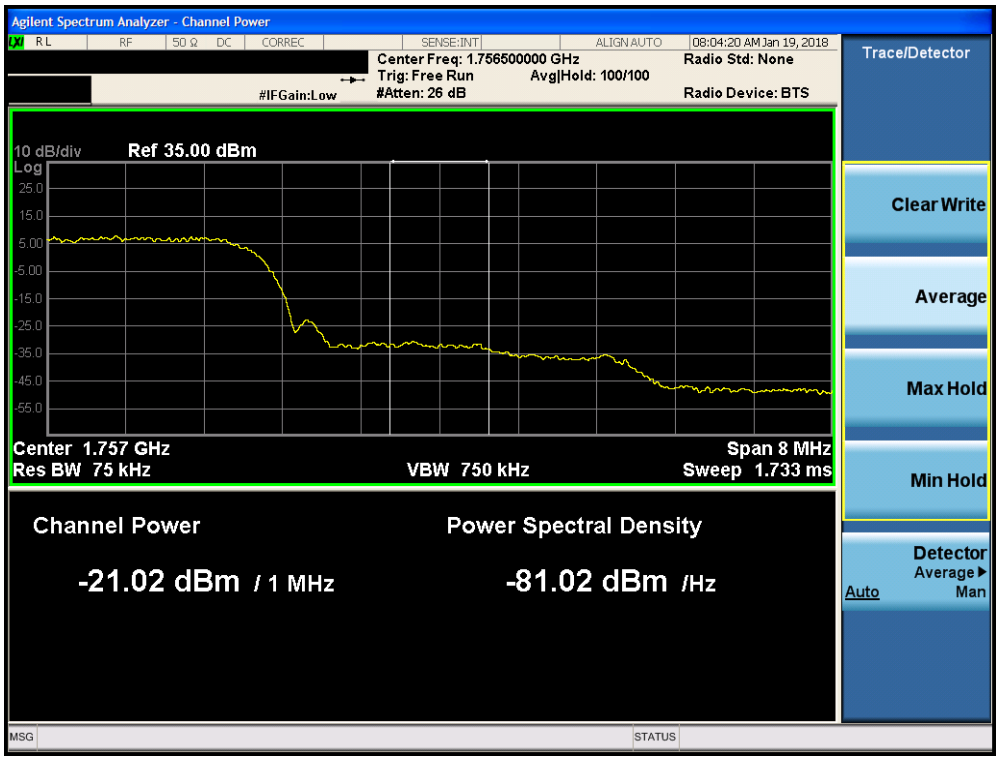
AWS WCDMA Mode

Plot 7-89. Band Edge Plot (AWS WCDMA Mode - Low Channel)

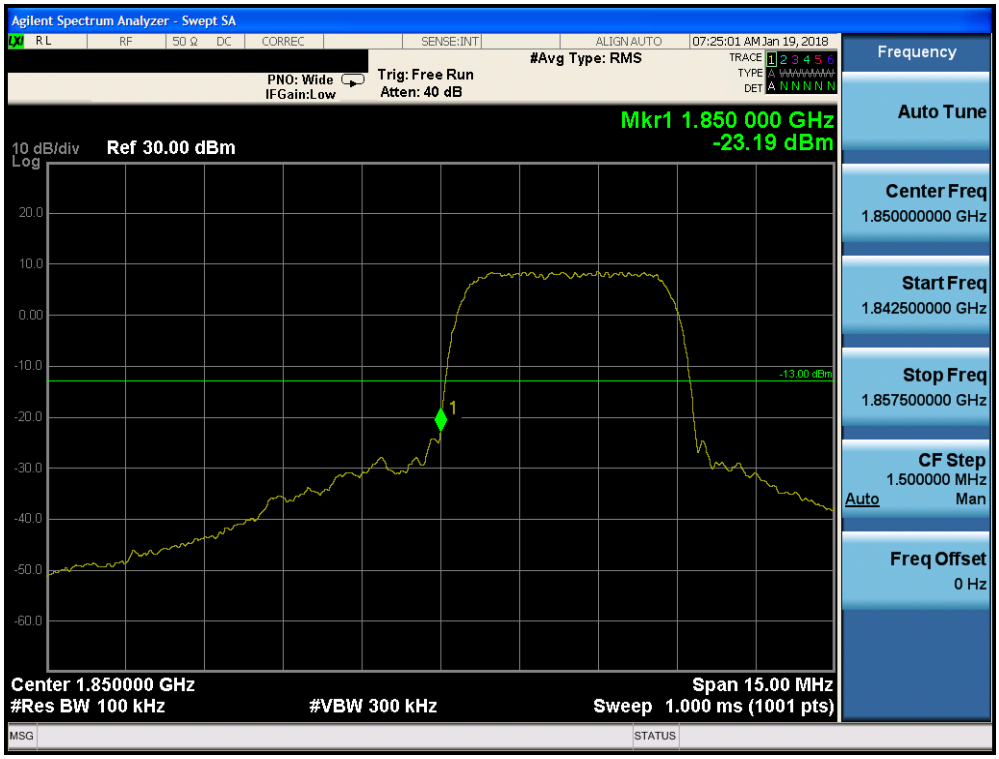


Plot 7-90. 4MHz Span Plot (AWS WCDMA Mode - Low Channel)

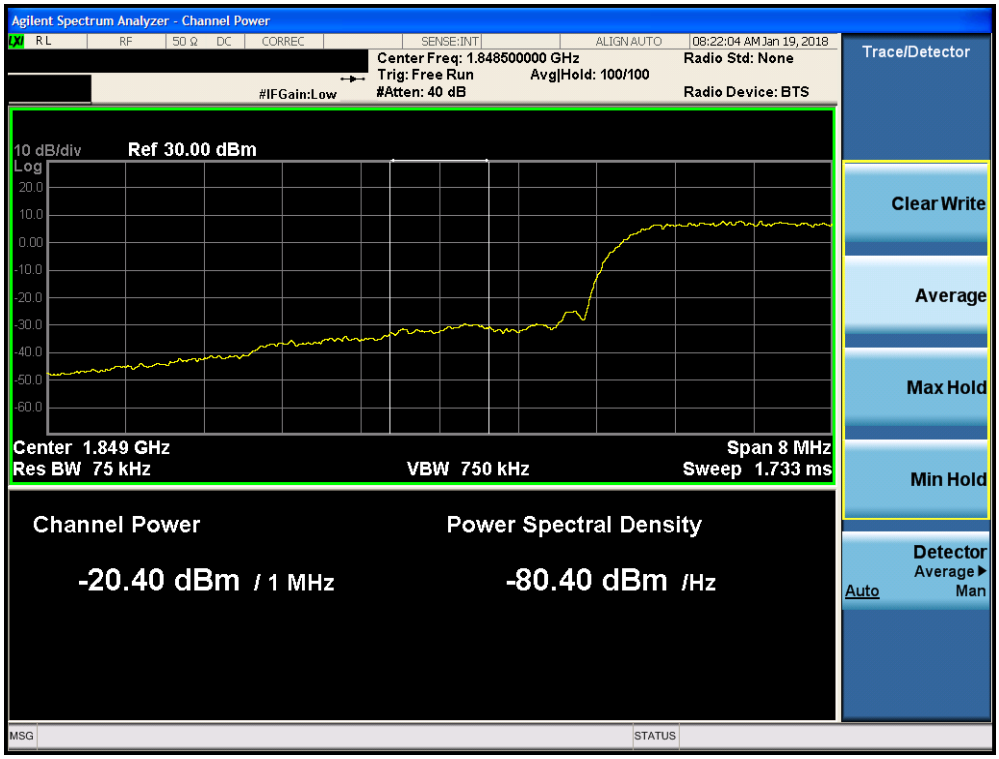
Plot 7-91. Band Edge Plot (AWS WCDMA Mode - High Channel)



Plot 7-92. 4MHz Span Plot (AWS WCDMA Mode - High Channel)

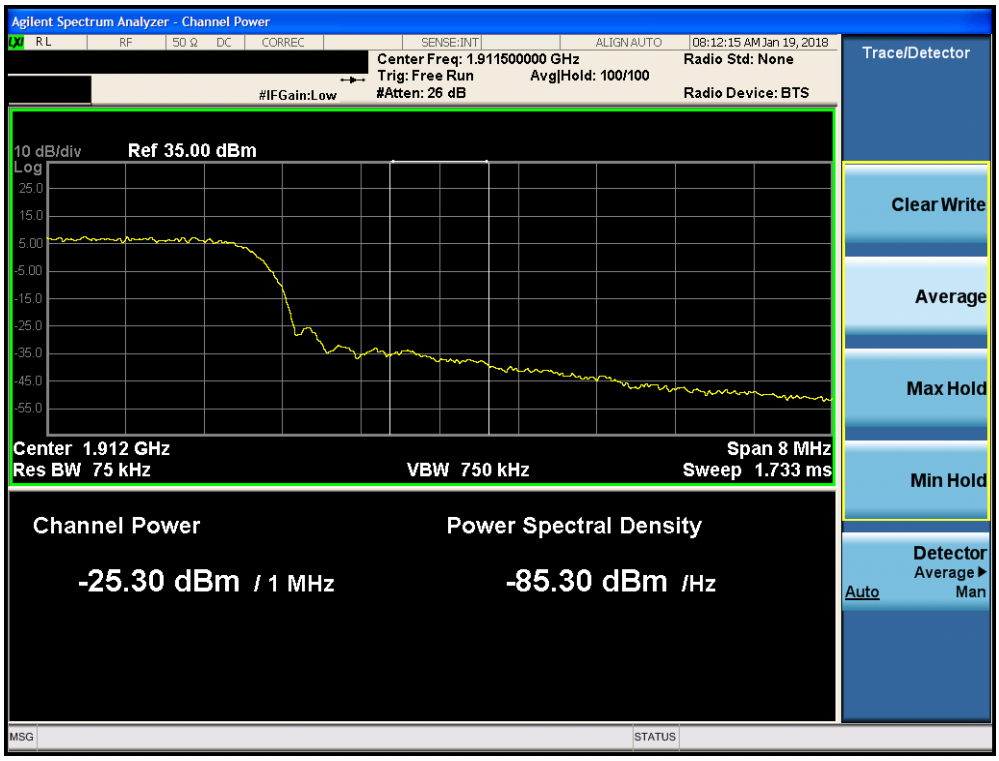


Plot 7-93. Band Edge Plot (PCS WCDMA Mode - Low Channel)



Plot 7-94. 4MHz Span Plot (PCS WCDMA Mode - Low Channel)

Plot 7-95. Band Edge Plot (PCS WCDMA Mode - High Channel)



Plot 7-96. 4MHz Span Plot (PCS WCDMA Mode - High Channel)

7.5 Peak-Average Ratio

§24.232(d) RSS-132(5.4) RSS-133(6.4) RSS-139(6.5)

Test Overview

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

Test Procedure Used

KDB 971168 D01 v03 – Section 5.7.1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

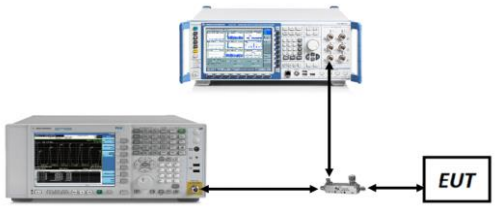
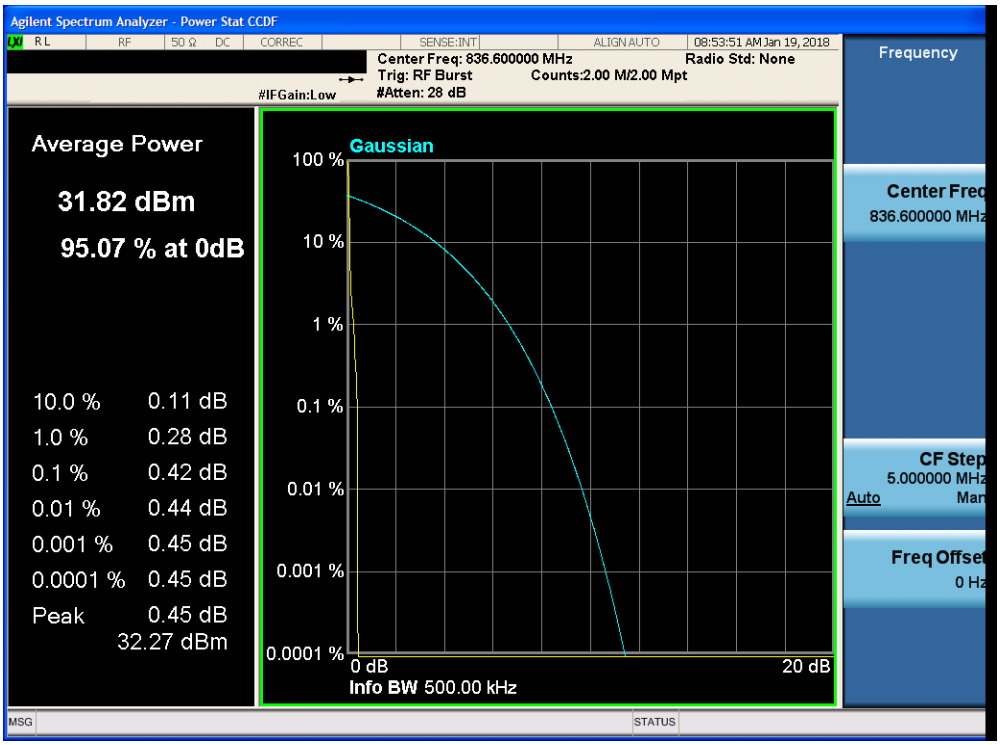


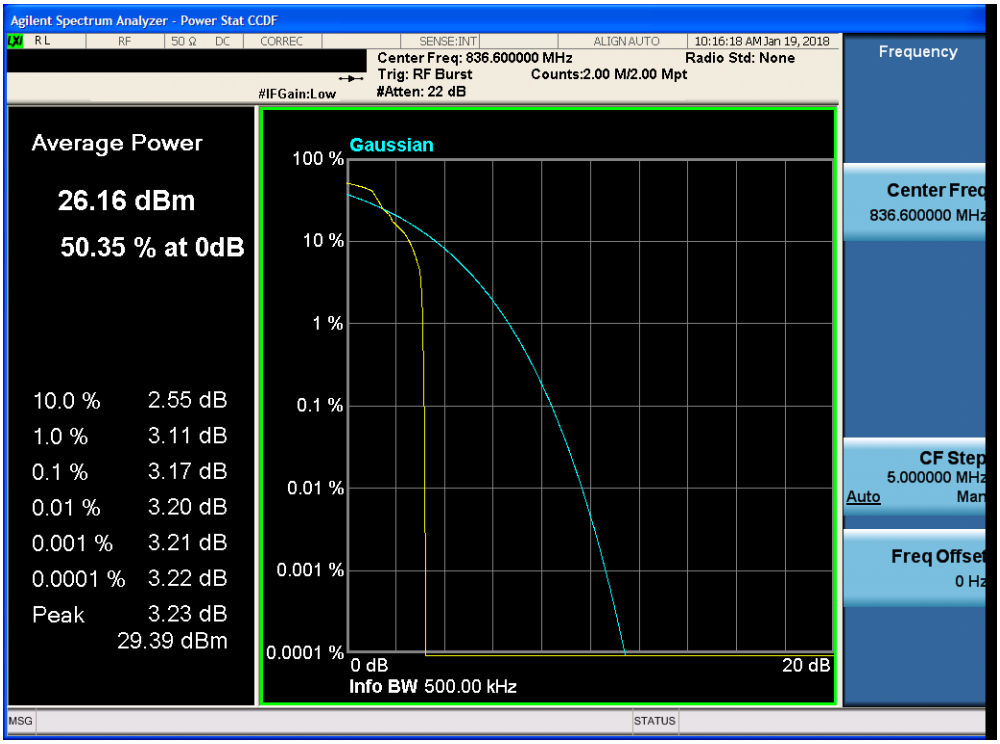
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

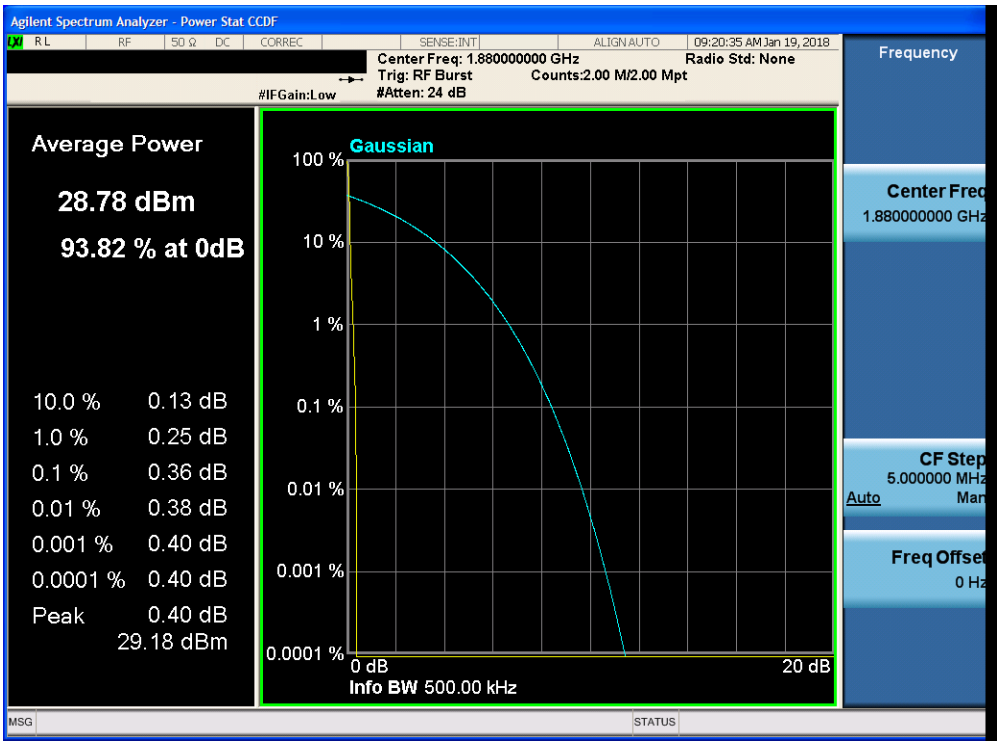
None



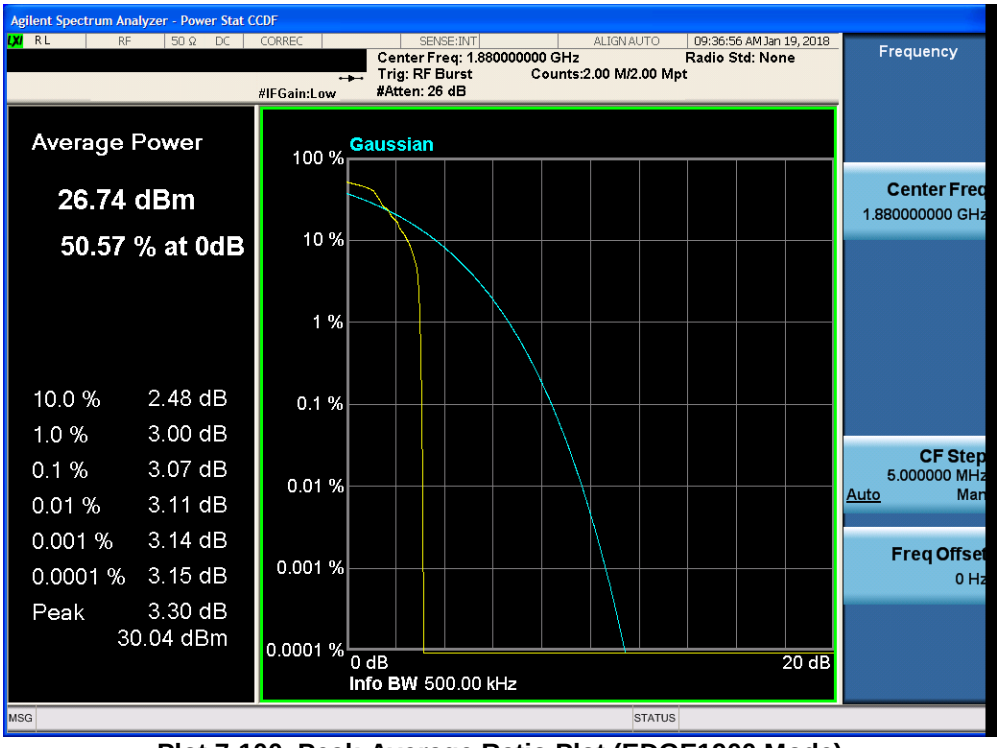
Plot 7-97. Peak-Average Ratio Plot (Cellular GPRS Mode)



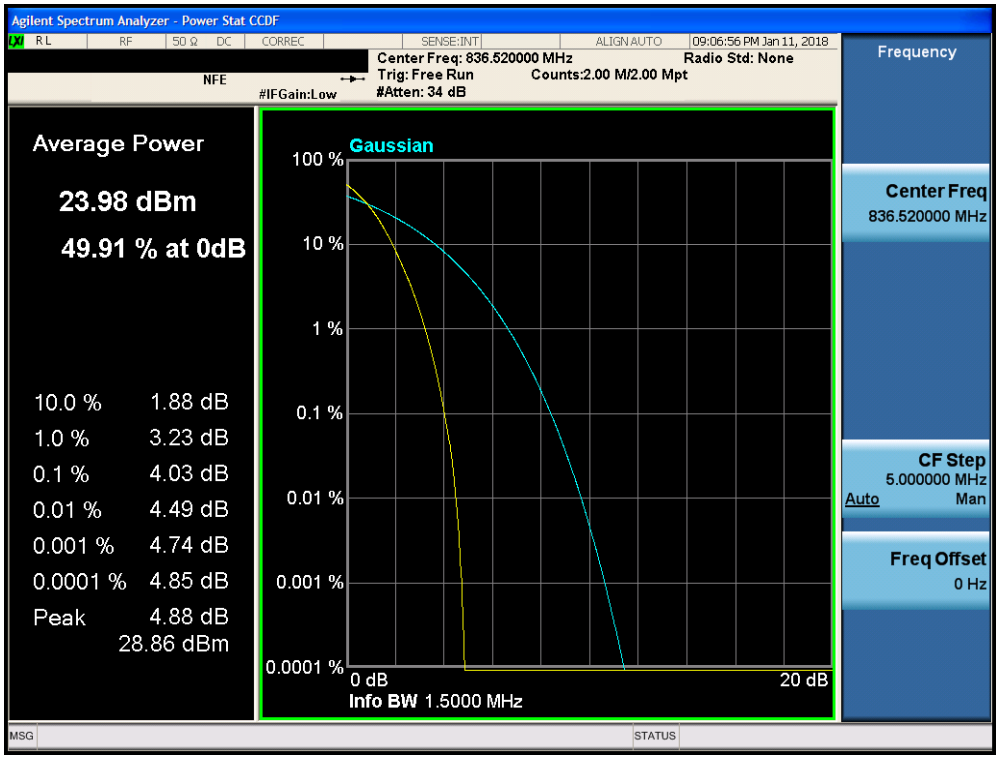
Plot 7-98. Peak-Average Ratio Plot (EDGE850 Mode)



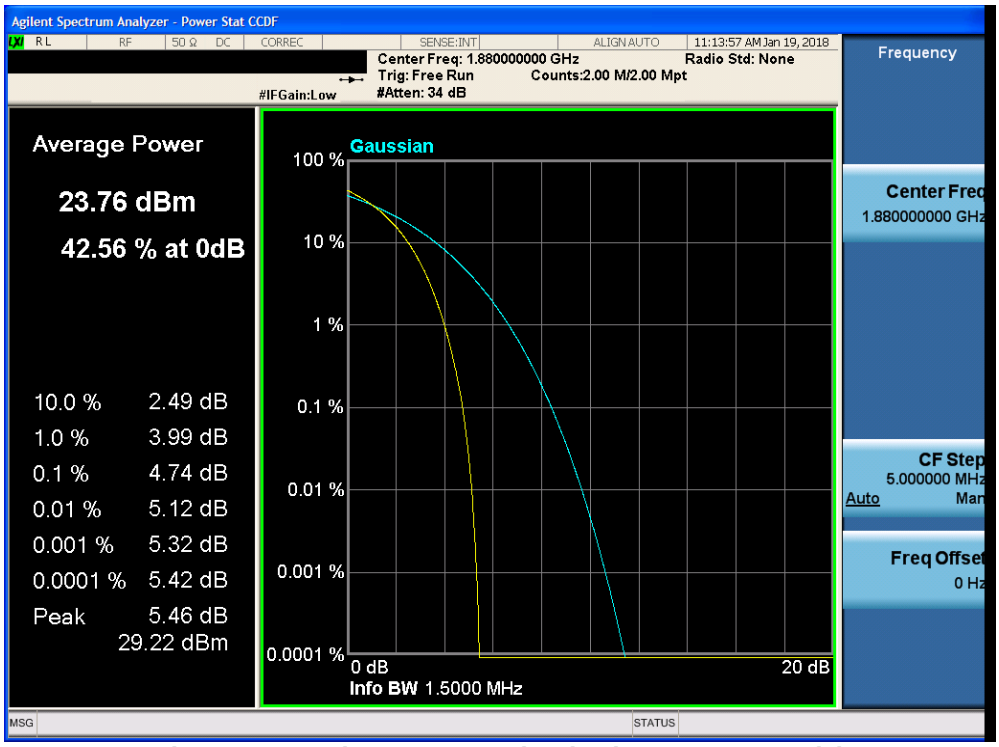
Plot 7-99. Peak-Average Ratio Plot (PCS GPRS Mode)



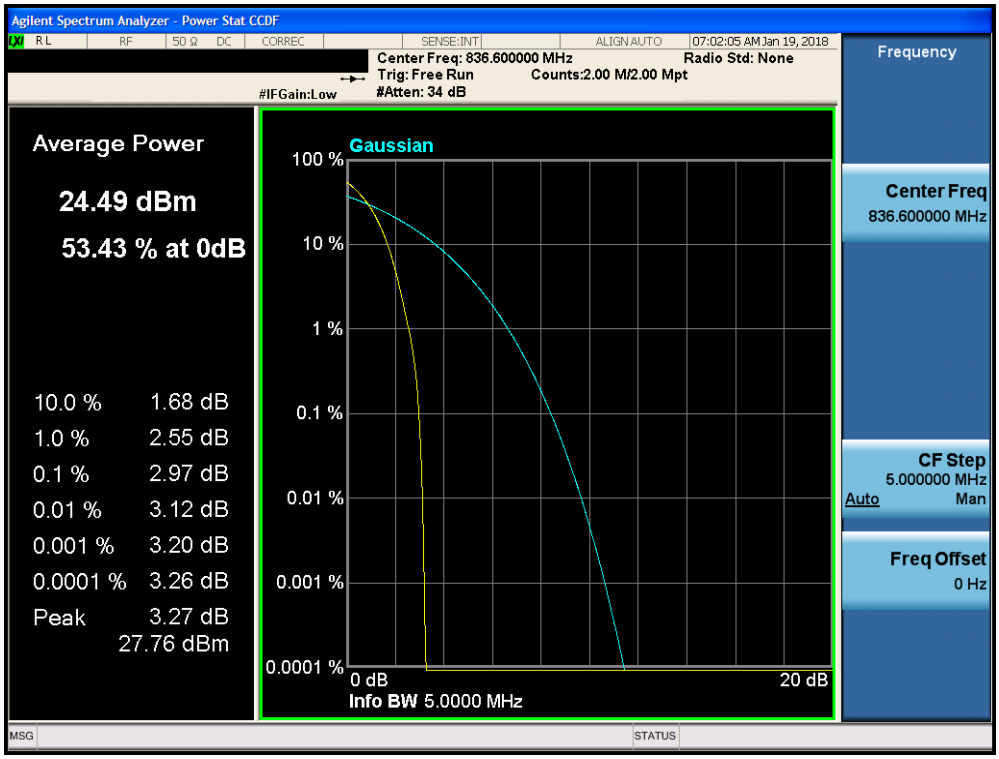
Plot 7-100. Peak-Average Ratio Plot (EDGE1900 Mode)



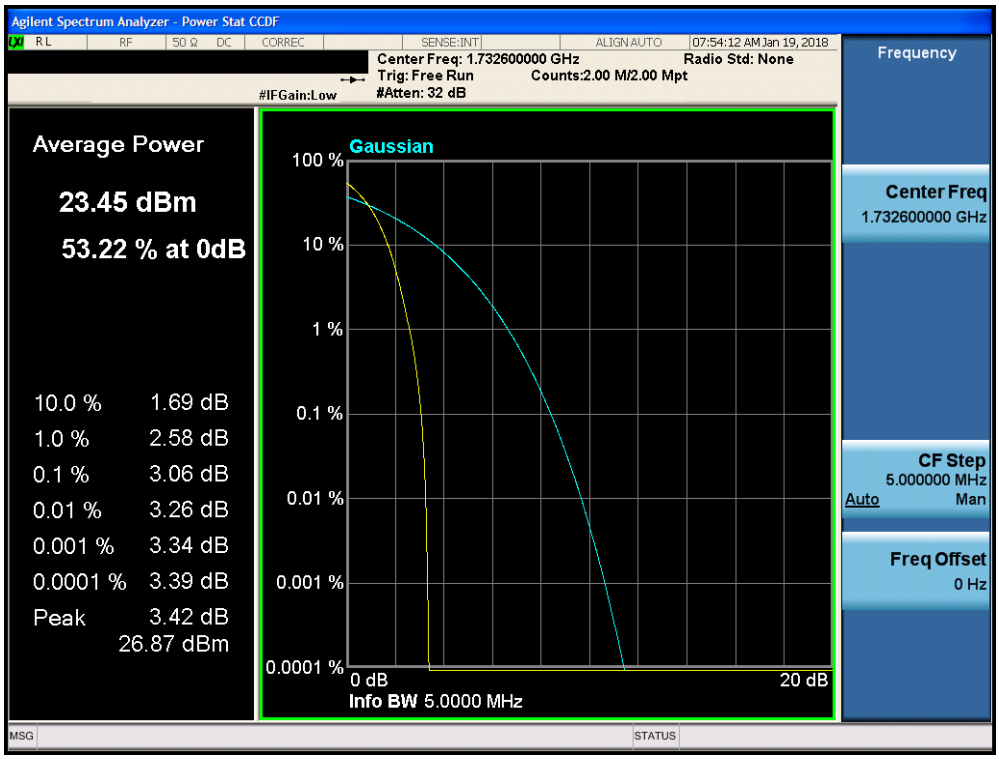
Plot 7-101. Peak-Average Ratio Plot (Cellular CDMA Mode)



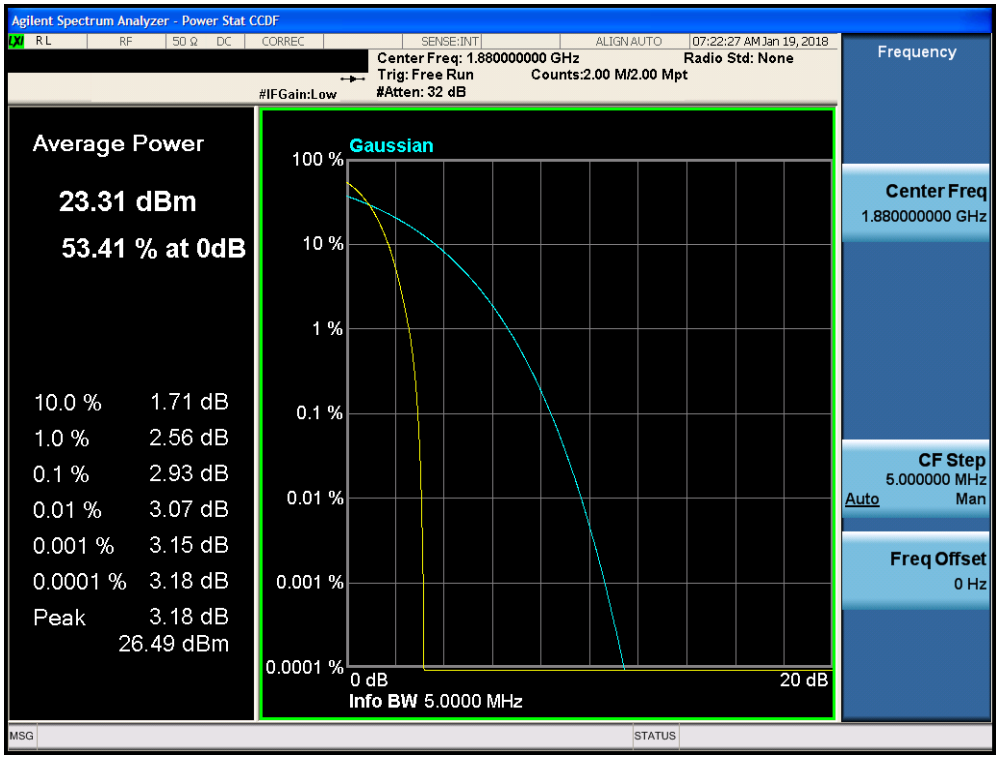
Plot 7-102. Peak-Average Ratio Plot (PCS CDMA Mode)



Plot 7-103. Peak-Average Ratio Plot (Cellular WCDMA Mode)



Plot 7-104. Peak-Average Ratio Plot (AWS WCDMA Mode)



Plot 7-105. Peak-Average Ratio Plot (PCS WCDMA Mode)

7.6 ERP/EIRP

§22.913(a)(2) 24.232(c) 27.50(d)(4) RSS-132(5.4) RSS-133(6.4) RSS-139(6.5)

Test Overview

Effective Radiated Power (ERP) is specified when the operating frequency is less than or equal to 1 GHz and Equivalent Isotropic Radiated Power (EIRP) is specified when the operating frequency is greater than 1 GHz. Both are determined by adding the transmit antenna gain to the conducted RF output power with the primary difference between the two being that when determining the ERP, the transmit antenna gain is referenced to a dipole antenna (i.e., dBd) whereas when determining the EIRP, the transmit antenna gain is referenced to an isotropic antenna (dBi).

Test Procedures Used

KDB 971168 D01 v03 – Section 5.6

Test Settings

The relevant equation for determining the ERP or EIRP from the conducted RF output power measured is:

ERP/EIRP = PMeas – LC + GT

Where:

ERP/EIRP = effective or equivalen radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm)

PMeas = measured transmitter output power or PSD, in dBW or dBm

LC = signal attenuation in the connecting cable between the transmitter and antenna in dB

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

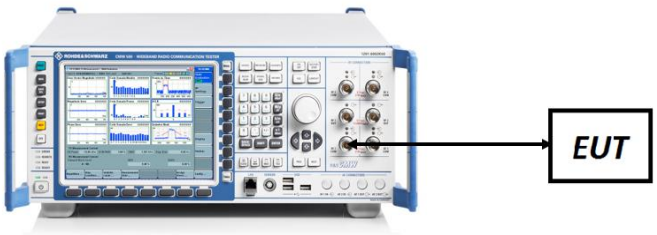


Figure 7-5. ERP/EIRP Measurement Setup

Test Notes

1) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest power is reported in GPRS mode while transmitting with one slot active.

2) This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, and HSUPA capabilities. For WCDMA and HSUPA transmission, all configurations, were investigated, and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2 kbps with HSDPA inactive and TPC bits all set to "1."

3) This device employs CDMA/EvDO capabilities. The EUT was tested under all RC and SO combinations and the worst case is reported with RC3/SO55 with "All Up" power control bits.

4) This unit was tested with its standard battery.

5) The Ant. Gains (GT) are listed in dBi.

Frequency [MHz]	Mode	Conducted Power [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.20	GPRS850	33.10	0.43	31.38	1.374	38.45	-7.07	33.53	2.254	40.61	-7.08
836.60	GPRS850	33.10	0.43	31.38	1.374	38.45	-7.07	33.53	2.254	40.61	-7.08
848.80	GPRS850	33.15	0.43	31.43	1.390	38.45	-7.02	33.58	2.280	40.61	-7.03
848.80	EDGE850	28.61	0.43	26.89	0.489	38.45	-11.56	29.04	0.802	40.61	-11.57

Table 7-2. ERP/EIRP (Cellular GPRS)

Frequency [MHz]	Mode	Conducted Power [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.70	CDMA850	24.23	0.43	22.51	0.178	38.45	-15.94	24.66	0.292	40.61	-15.95
836.52	CDMA850	24.18	0.43	22.46	0.176	38.45	-15.99	24.61	0.289	40.61	-16.00
848.31	CDMA850	24.22	0.43	22.50	0.178	38.45	-15.95	24.65	0.292	40.61	-15.96

Table 7-3. ERP/EIRP (Cellular CDMA)

Frequency [MHz]	Mode	Conducted Power [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
826.40	WCDMA850	24.96	0.43	23.24	0.211	38.45	-15.21	25.39	0.346	40.61	-15.22
836.60	WCDMA850	24.80	0.43	23.08	0.203	38.45	-15.37	25.23	0.333	40.61	-15.38
846.60	WCDMA850	24.78	0.43	23.06	0.202	38.45	-15.39	25.21	0.332	40.61	-15.40

Table 7-4. ERP/EIRP (Cellular WCDMA)

Frequency [MHz]	Mode	Conducted Power [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1712.40	WCDMA1700	24.92	2.13	27.05	0.507	30.00	-2.95
1732.60	WCDMA1700	24.86	2.13	26.99	0.500	30.00	-3.01
1752.60	WCDMA1700	24.83	2.13	26.96	0.497	30.00	-3.04

Table 7-5. EIRP (AWS WCDMA)

Frequency [MHz]	Mode	Conducted Power [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.20	GPRS1900	28.93	2.88	31.81	1.517	33.01	-1.20
1880.00	GPRS1900	28.96	2.88	31.84	1.528	33.01	-1.17
1909.80	GPRS1900	29.00	2.88	31.88	1.542	33.01	-1.13
1909.80	EDGE1900	27.72	2.88	30.60	1.148	33.01	-2.41

Table 7-6. EIRP (PCS GPRS)

Frequency [MHz]	Mode	Conducted Power [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1851.25	CDMA1900	24.76	2.88	27.64	0.581	33.01	-5.37
1880.00	CDMA1900	24.98	2.88	27.86	0.611	33.01	-5.15
1908.75	CDMA1900	24.88	2.88	27.76	0.597	33.01	-5.25

Table 7-7. EIRP (PCS CDMA)

Frequency [MHz]	Mode	Conducted Power [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1852.40	WCDMA1900	24.96	2.88	27.84	0.608	33.01	-5.17
1880.00	WCDMA1900	24.85	2.88	27.73	0.593	33.01	-5.28
1907.60	WCDMA1900	24.77	2.88	27.65	0.582	33.01	-5.36

Table 7-8. EIRP (PCS WCDMA)

7.7 Radiated Spurious Emissions Measurements

§2.1053 §22.917(a) 24.238(a) 27.53(h) RSS-132(5.5) RSS-133(5.5) RSS-139(6.6)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

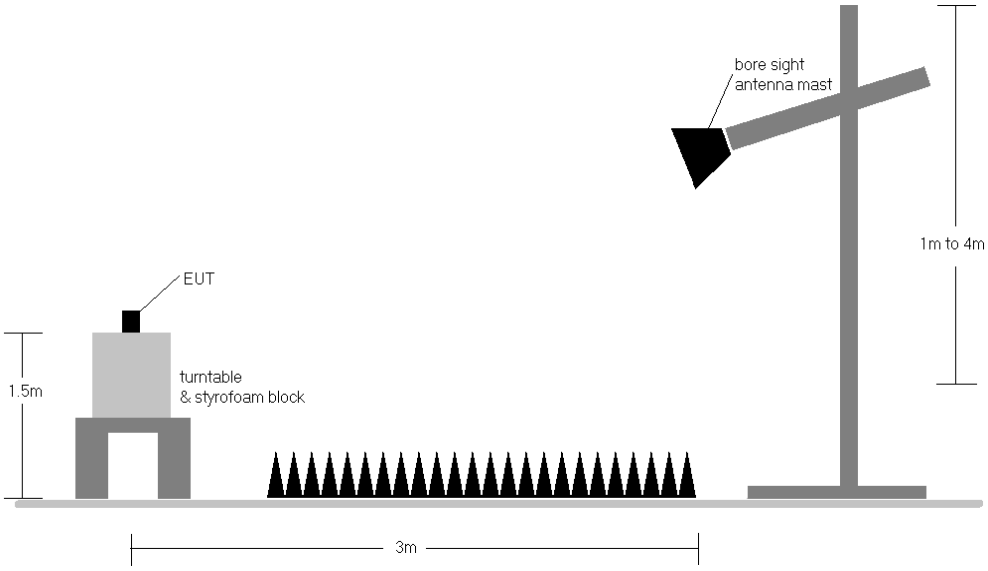


Figure 7-6. Test Instrument & Measurement Setup

Test Notes

1) This device employs GSM, GPRS, and EDGE capabilities. The EUT was tested under all configurations and the highest power is reported in GPRS mode while transmitting with one slot active

2) This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, and HSUPA capabilities. For WCDMA and HSUPA transmission, all configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2kbps with HSDPA inactive and TPC bits all set to "1."

3) This device employs CDMA/EvDO capabilities. This device was tested under all RC and SO combinations and the worst case is reported with RC3/SO55 with "All Up" power control bits.

4) This unit was tested with its standard battery.

5) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

6) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

7) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

8) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Cellular GPRS Mode

OPERATING FREQUENCY:	824.20	MHz
CHANNEL:	128	
MODULATION SIGNAL:	GPRS (GMSK)	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1648.40	V	203	346	-53.62	8.56	-45.06	-32.1
2472.60	V	127	34	-48.06	3.92	-44.14	-31.1
3296.80	V	-	-	-58.08	4.14	-53.94	-40.9
4121.00	V	-	-	-59.94	7.06	-52.89	-39.9

Table 7-9. Radiated Spurious Data (Cellular GPRS Mode – Ch. 128)

OPERATING FREQUENCY:	836.60	MHz
CHANNEL:	190	
MODULATION SIGNAL:	GPRS (GMSK)	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.20	V	121	116	-46.78	3.12	-43.66	-30.7
2509.80	V	136	98	-41.88	-0.99	-42.87	-29.9
3346.40	V	-	-	-62.02	8.51	-53.51	-40.5
4183.00	V	-	-	-60.30	8.31	-51.98	-39.0

Table 7-10. Radiated Spurious Data (Cellular GPRS Mode – Ch. 190)

OPERATING FREQUENCY:	848.80	MHz
CHANNEL:	251	
MODULATION SIGNAL:	GPRS (GMSK)	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1697.60	V	189	350	-53.31	3.14	-50.17	-37.2
2546.40	V	218	91	-43.54	-1.25	-44.78	-31.8
3395.20	V	-	-	-59.96	6.54	-53.42	-40.4
4244.00	V	-	-	-62.29	9.13	-53.16	-40.2

Table 7-11. Radiated Spurious Data (Cellular GPRS Mode – Ch. 251)

Cellular CDMA Mode

OPERATING FREQUENCY:	824.70	MHz
CHANNEL:	1013	
MODULATION SIGNAL:	CDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1649.40	H	-	-	-75.38	8.56	-66.82	-53.8
2474.10	H	-	-	-66.65	3.92	-62.73	-49.7
3298.80	H	-	-	-66.60	4.14	-62.46	-49.5

Table 7-12. Radiated Spurious Data (Cellular CDMA Mode – Ch. 1013)

OPERATING FREQUENCY:	836.52	MHz
CHANNEL:	384	
MODULATION SIGNAL:	CDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.04	H	-	-	-69.94	3.12	-66.82	-53.8
2509.56	H	-	-	-61.88	-0.99	-62.88	-49.9
3346.08	H	-	-	-70.68	8.51	-62.17	-49.2

Table 7-13. Radiated Spurious Data (Cellular CDMA Mode – Ch. 384)

OPERATING FREQUENCY:	848.31	MHz
CHANNEL:	777	
MODULATION SIGNAL:	CDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1696.62	H	-	-	-69.81	3.14	-66.67	-53.7
2544.93	H	-	-	-61.81	-1.24	-63.05	-50.1
3393.24	H	-	-	-68.81	6.53	-62.28	-49.3

Table 7-14. Radiated Spurious Data (Cellular CDMA Mode – Ch. 777)

Cellular WCDMA Mode

OPERATING FREQUENCY:	826.40	MHz
CHANNEL:	4132	
MODULATION SIGNAL:	WCDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1652.80	V	303	136	-69.97	3.11	-66.86	-53.9
2479.20	V	-	-	-66.72	3.92	-62.79	-49.8
3305.60	V	-	-	-70.78	8.30	-62.48	-49.5

Table 7-15. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4132)

OPERATING FREQUENCY:	836.60	MHz
CHANNEL:	4183	
MODULATION SIGNAL:	WCDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.20	V	226	298	-70.01	3.12	-66.89	-53.9
2509.80	V	-	-	-61.85	-0.99	-62.84	-49.8
3346.40	V	-	-	-70.78	8.51	-62.27	-49.3

Table 7-16. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4183)

OPERATING FREQUENCY:	846.60	MHz
CHANNEL:	4233	
MODULATION SIGNAL:	WCDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1693.20	V	121	355	-69.70	3.14	-66.56	-53.6
2539.80	V	-	-	-61.85	-1.20	-63.05	-50.1
3386.40	V	-	-	-68.78	6.52	-62.26	-49.3

Table 7-17. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4233)

AWS WCDMA Mode

OPERATING FREQUENCY:	1712.40	MHz
CHANNEL:	1312	
MODULATION SIGNAL:	WCDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3424.80	V	132	10	-68.46	8.47	-59.99	-47.0
5137.20	V	-	-	-67.49	8.47	-59.02	-46.0
6849.60	V	-	-	-64.19	9.07	-55.11	-42.1

Table 7-18. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1312)

OPERATING FREQUENCY:	1732.60	MHz
CHANNEL:	1413	
MODULATION SIGNAL:	WCDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3465.20	V	296	282	-68.00	6.16	-61.84	-48.8
5197.80	V	-	-	-67.07	8.07	-59.01	-46.0
6930.40	V	-	-	-65.31	10.28	-55.04	-42.0

Table 7-19. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1413)

OPERATING FREQUENCY:	1752.60	MHz
CHANNEL:	1513	
MODULATION SIGNAL:	WCDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3505.20	V	299	307	-69.88	7.92	-61.97	-49.0
5257.80	V	-	-	-69.50	9.22	-60.28	-47.3
7010.40	V	-	-	-63.13	8.71	-54.42	-41.4

Table 7-20. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1513)

PCS GPRS Mode

OPERATING FREQUENCY:	1850.20	MHz
CHANNEL:	512	
MODULATION SIGNAL:	GPRS (GMSK)	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3700.40	V	155	41	-56.86	8.05	-48.81	-35.8
5550.60	V	269	135	-58.51	8.70	-49.81	-36.8
7400.80	V	-	-	-57.52	9.61	-47.91	-34.9
9251.00	V	-	-	-55.81	9.31	-46.50	-33.5

Table 7-21. Radiated Spurious Data (PCS GPRS Mode – Ch. 512)

OPERATING FREQUENCY:	1880.00	MHz
CHANNEL:	661	
MODULATION SIGNAL:	GPRS (GMSK)	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	V	264	190	-56.74	7.40	-49.33	-36.3
5640.00	V	-	-	-58.85	9.28	-49.57	-36.6
7520.00	V	-	-	-55.12	8.66	-46.46	-33.5

Table 7-22. Radiated Spurious Data (PCS GPRS Mode – Ch. 661)

OPERATING FREQUENCY:	1909.80	MHz
CHANNEL:	810	
MODULATION SIGNAL:	GPRS (GMSK)	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3819.60	V	179	277	-56.64	6.38	-50.26	-37.3
5729.40	V	113	219	-57.65	10.19	-47.46	-34.5
7639.20	V	-	-	-56.71	9.19	-47.52	-34.5

Table 7-23. Radiated Spurious Data (PCS GPRS Mode – Ch. 810)

PCS CDMA Mode

OPERATING FREQUENCY:	1851.25	MHz
CHANNEL:	25	
MODULATION SIGNAL:	CDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3702.50	H	100	10	-69.21	8.05	-61.16	-48.2
5553.75	H	-	-	-68.20	8.70	-59.50	-46.5
7405.00	H	-	-	-63.55	9.61	-53.93	-40.9

Table 7-24. Radiated Spurious Data (PCS CDMA Mode – Ch. 25)

OPERATING FREQUENCY:	1880.00	MHz
CHANNEL:	600	
MODULATION SIGNAL:	CDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	H	132	13	-67.34	7.40	-59.93	-46.9
5640.00	H	-	-	-68.65	9.28	-59.37	-46.4
7520.00	H	-	-	-62.55	8.66	-53.89	-40.9

Table 7-25. Radiated Spurious Data (PCS CDMA Mode – Ch. 600)

OPERATING FREQUENCY:	1908.75	MHz
CHANNEL:	1175	
MODULATION SIGNAL:	CDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3817.50	H	141	17	-66.66	6.38	-60.27	-47.3
5726.25	H	-	-	-69.15	10.18	-58.97	-46.0
7635.00	H	-	-	-62.83	9.19	-53.63	-40.6

Table 7-26. Radiated Spurious Data (PCS CDMA Mode – Ch. 1175)

PCS WCDMA Mode

OPERATING FREQUENCY:	1852.40	MHz
CHANNEL:	9262	
MODULATION SIGNAL:	WCDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3704.80	H	-	-	-69.83	8.06	-61.77	-48.8
5557.20	H	-	-	-68.17	8.70	-59.48	-46.5
7409.60	H	-	-	-63.52	9.61	-53.91	-40.9

Table 7-27. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9262)

OPERATING FREQUENCY:	1880.00	MHz
CHANNEL:	9400	
MODULATION SIGNAL:	WCDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	H	100	20	-68.00	7.40	-60.59	-47.6
5640.00	H	-	-	-68.66	9.28	-59.38	-46.4
7520.00	H	-	-	-62.59	8.66	-53.93	-40.9

Table 7-28. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9400)

OPERATING FREQUENCY:	1907.60	MHz
CHANNEL:	9538	
MODULATION SIGNAL:	WCDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3815.20	H	150	20	-65.88	6.38	-59.49	-46.5
5722.80	H	-	-	-69.19	10.17	-59.02	-46.0
7630.40	H	-	-	-62.89	9.20	-53.70	-40.7

Table 7-29. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9538)

7.8 Radiated Spurious Emissions Measurements – Below 1GHz

§2.1053 §22.917(a) §24.238(a) §27.53(c) §27.53(f) §27.53(g) §27.53(h) §27.53(m)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

Test Settings

1. RBW = 100kHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

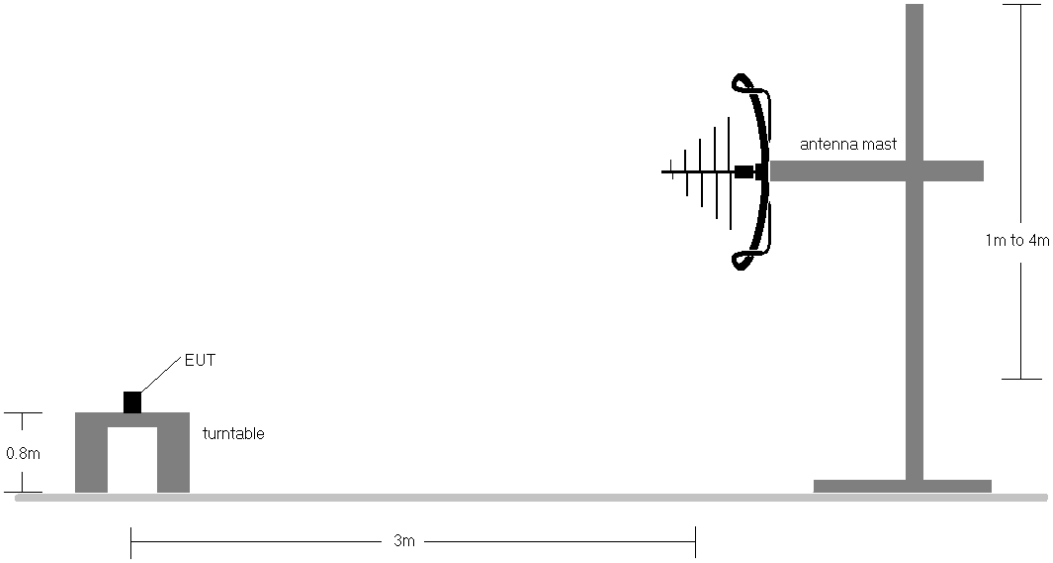


Figure 7-7. Test Instrument & Measurement Setup

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

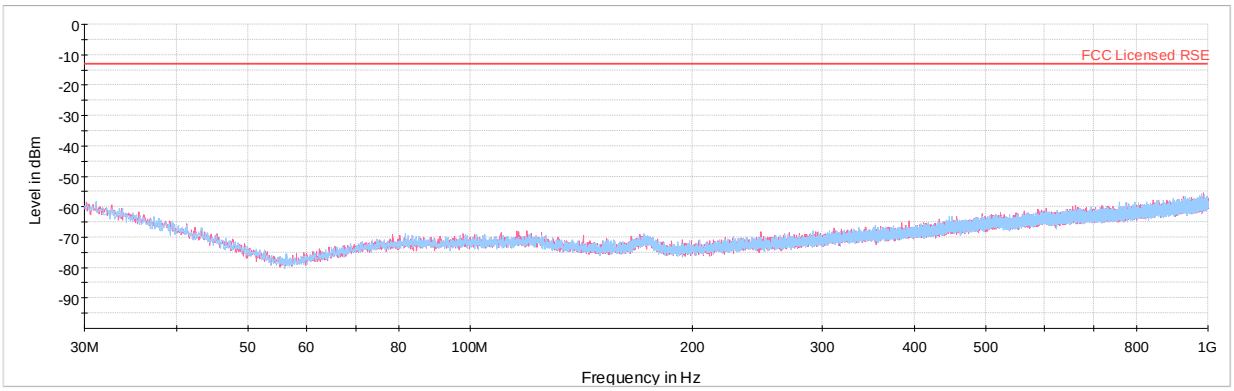
2) This unit was tested with its standard battery.

3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter.

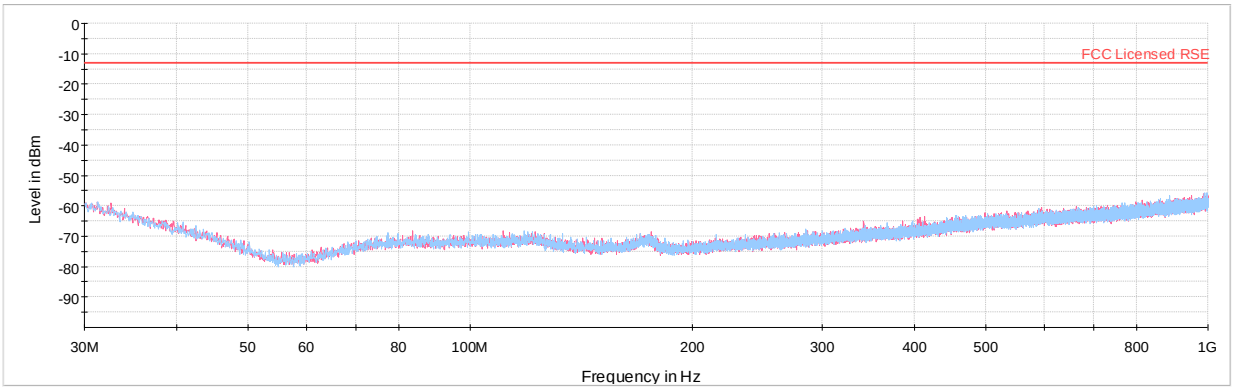
4) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

5) The spurious emissions 20dB below the limit is not reported.

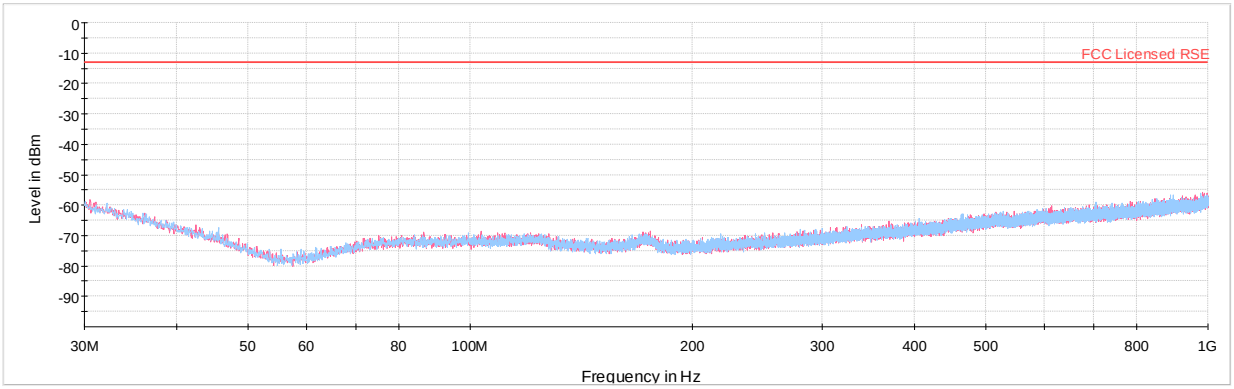
6) All modes were investigated. The worst case emissions are reported.



Plot 7-30. Radiated Spurious Plot (GPRS 1900)



Plot 7-31. Radiated Spurious Plot (CDMA 1900)



Plot 7-32. Radiated Spurious Plot (WCDMA 1900)

7.9 Frequency Stability / Temperature Variation

§2.1055 §22.355 §24.235 §27.54 RSS-132(5.3) RSS-133(6.3) RSS-139(6.4)

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, RSS-132 and RSS-133, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24 Part 27 and RSS-139, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-E-2016

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

None

Frequency Stability / Temperature Variation

§2.1055 §22.355 RSS-132(5.3)

OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	190	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,600,027	27.25	0.0000033
100 %		- 30	836,600,029	28.90	0.0000035
100 %		- 20	836,600,035	35.22	0.0000042
100 %		- 10	836,600,033	32.96	0.0000039
100 %		0	836,600,031	31.45	0.0000038
100 %		+ 10	836,600,030	29.99	0.0000036
100 %		+ 20	836,600,031	31.06	0.0000037
100 %		+ 30	836,600,030	30.32	0.0000036
100 %		+ 40	836,600,030	30.45	0.0000036
100 %		+ 50	836,600,032	31.58	0.0000038
BATT. ENDPOINT	3.19	+ 20	836,600,028	27.86	0.0000033

Table 7-33. Frequency Stability Data (Cellular GPRS Mode – Ch. 190)

Frequency Stability / Temperature Variation

§2.1055 §22.355 RSS-132(5.3)

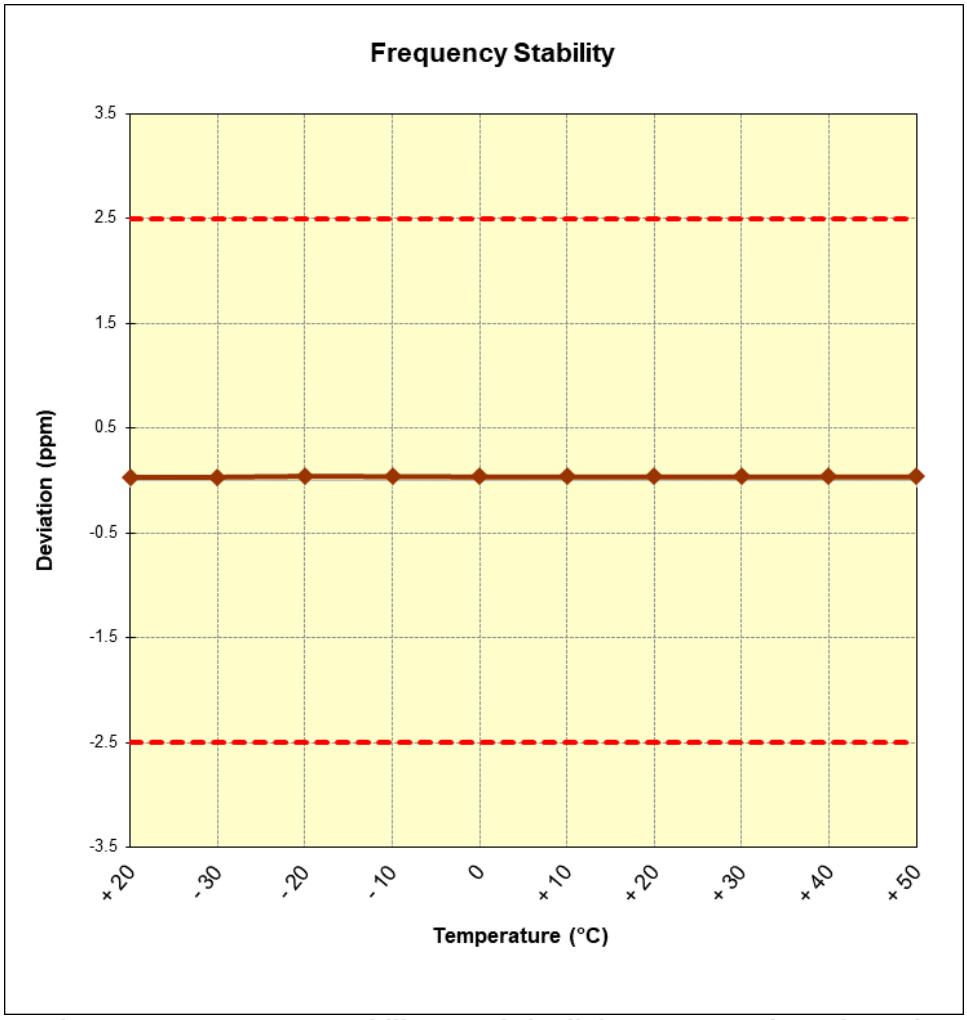


Figure 7-8. Frequency Stability Graph (Cellular GPRS Mode – Ch. 190)

Frequency Stability / Temperature Variation

§2.1055 §22.355 RSS-132(5.3)

OPERATING FREQUENCY:	836,520,000	Hz
CHANNEL:	384	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,519,995	-5.20	-0.0000006
100 %		- 30	836,520,003	3.21	0.0000004
100 %		- 20	836,520,002	2.34	0.0000003
100 %		- 10	836,520,004	4.25	0.0000005
100 %		0	836,520,005	4.54	0.0000005
100 %		+ 10	836,520,005	4.98	0.0000006
100 %		+ 20	836,519,996	-4.12	-0.0000005
100 %		+ 30	836,519,995	-5.42	-0.0000006
100 %		+ 40	836,519,993	-7.10	-0.0000008
100 %		+ 50	836,519,994	-6.37	-0.0000008
BATT. ENDPOINT	3.19	+ 20	836,519,995	-4.76	-0.0000006

Figure 7-9. Frequency Stability Graph (Cellular CDMA Mode – Ch. 384)

Frequency Stability / Temperature Variation

§2.1055 §22.355 RSS-132(5.3)

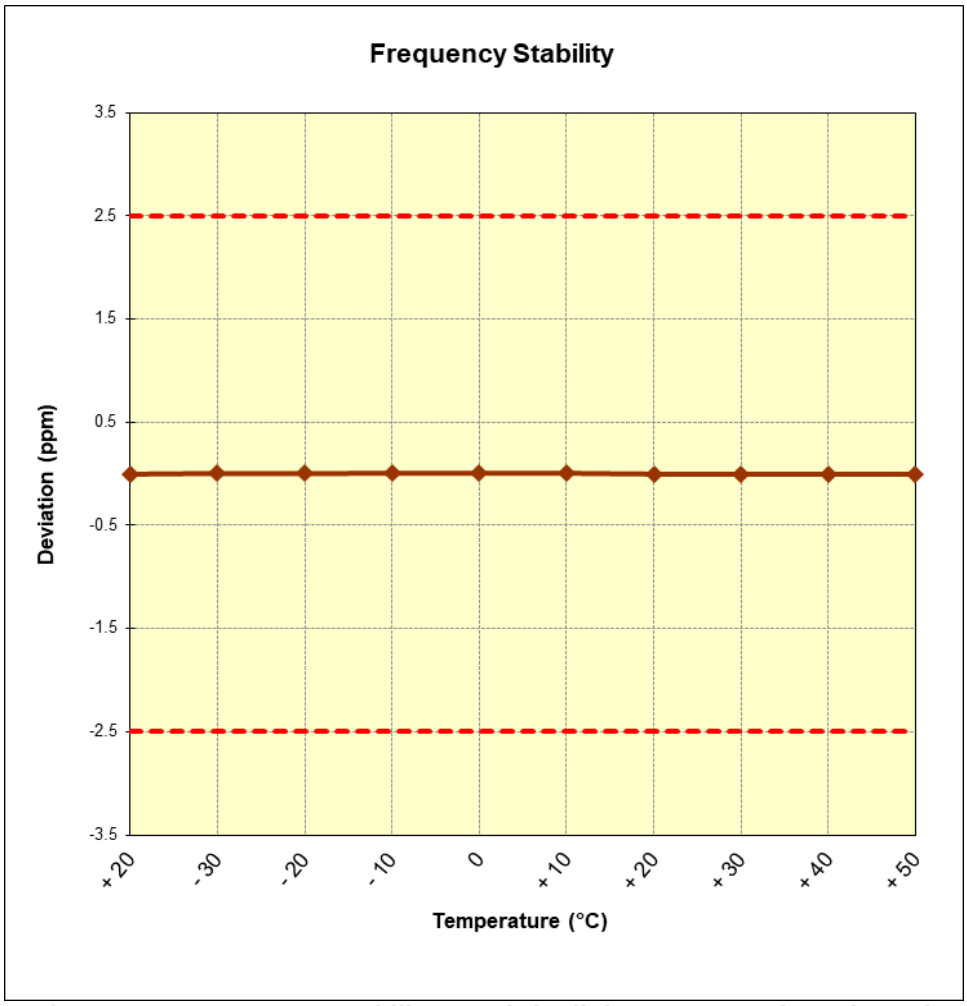


Figure 7-10. Frequency Stability Graph (Cellular CDMA Mode – Ch. 384)

Frequency Stability / Temperature Variation

§2.1055 §22.355 RSS-132(5.3)

OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	4183	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,599,996	-3.84	-0.0000005
100 %		- 30	836,599,997	-2.51	-0.0000003
100 %		- 20	836,599,997	-2.92	-0.0000003
100 %		- 10	836,599,997	-2.85	-0.0000003
100 %		0	836,599,996	-3.66	-0.0000004
100 %		+ 10	836,599,997	-2.74	-0.0000003
100 %		+ 20	836,599,996	-3.58	-0.0000004
100 %		+ 30	836,599,995	-4.89	-0.0000006
100 %		+ 40	836,599,995	-5.32	-0.0000006
100 %		+ 50	836,599,995	-4.79	-0.0000006
BATT. ENDPOINT	3.19	+ 20	836,599,995	-5.48	-0.0000007

Table 7-34. Frequency Stability Data (Cellular WCDMA Mode – Ch. 4183)

Frequency Stability / Temperature Variation

§2.1055 §22.355 RSS-132(5.3)

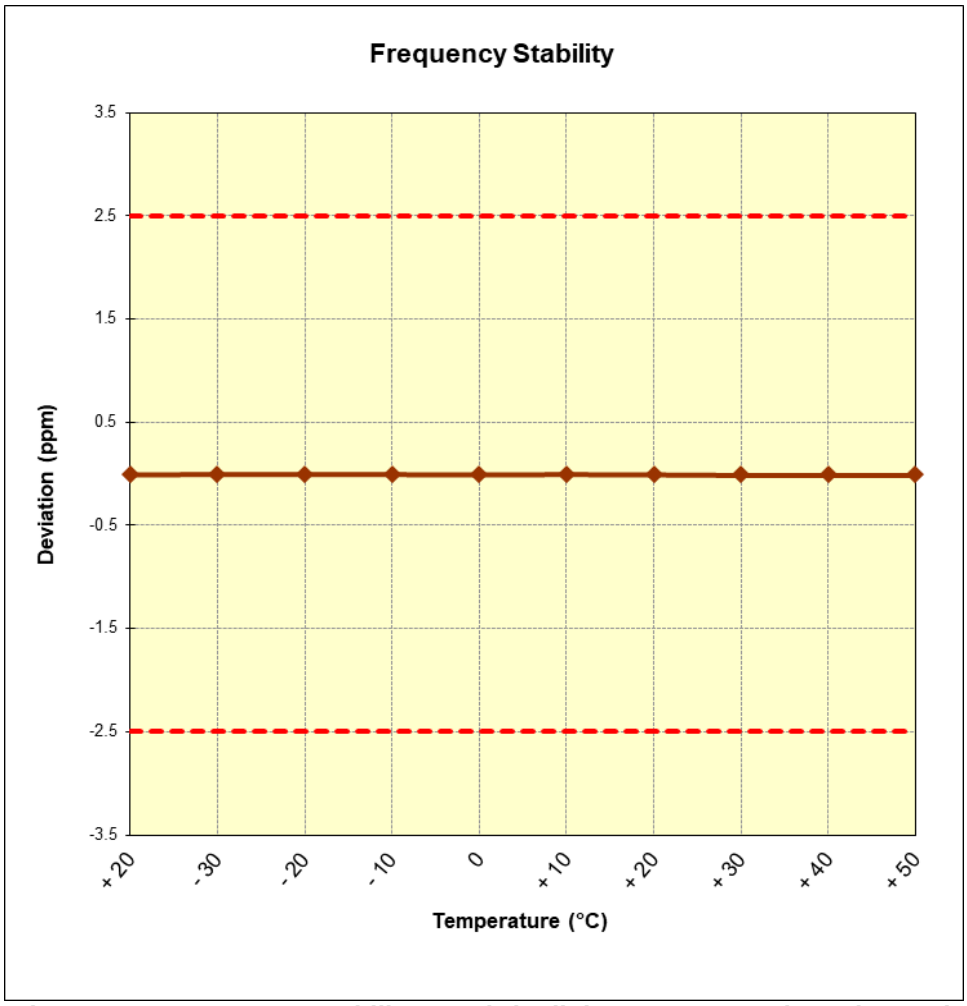


Figure 7-11. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)

Frequency Stability / Temperature Variation

§2.1055 §27.54 RSS-139(6.4)

OPERATING FREQUENCY:	1,732,600,000	Hz
CHANNEL:	1413	
REFERENCE VOLTAGE:	3.80	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,732,599,995	-4.62	-0.0000003
100 %		- 30	1,732,599,995	-4.79	-0.0000003
100 %		- 20	1,732,599,994	-5.88	-0.0000003
100 %		- 10	1,732,599,995	-5.39	-0.0000003
100 %		0	1,732,599,994	-5.74	-0.0000003
100 %		+ 10	1,732,599,994	-6.12	-0.0000004
100 %		+ 20	1,732,599,994	-5.89	-0.0000003
100 %		+ 30	1,732,599,994	-6.19	-0.0000004
100 %		+ 40	1,732,599,994	-6.22	-0.0000004
100 %		+ 50	1,732,599,994	-5.58	-0.0000003
BATT. ENDPOINT	3.19	+ 20	1,732,599,994	-5.84	-0.0000003

Table 7-35. Frequency Stability Data (AWS WCDMA Mode – Ch. 1413)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Frequency Stability / Temperature Variation

§2.1055 §27.54 RSS-139(6.4)

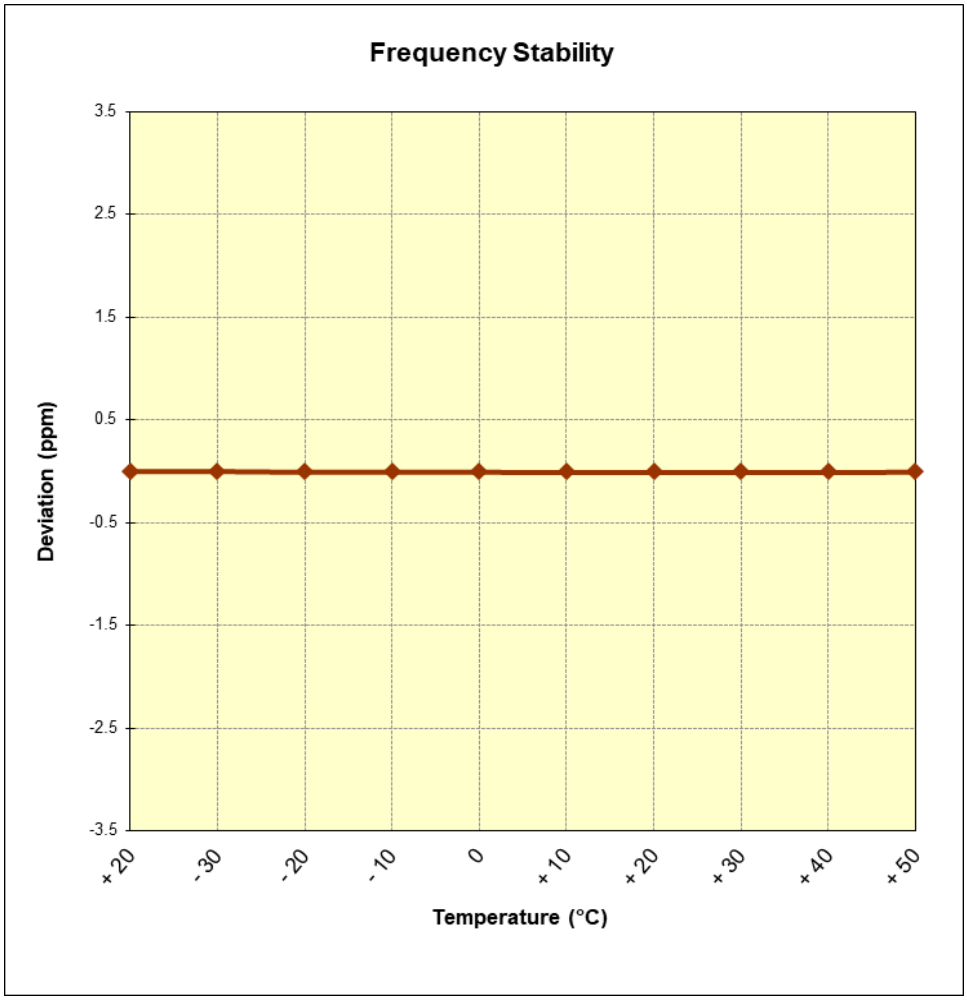


Figure 7-12. Frequency Stability Graph (AWS WCDMA Mode – Ch. 1413)

Frequency Stability / Temperature Variation

§2.1055 §24.235 RSS-133(6.4)

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	661	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,880,000,081	80.84	0.0000043
100 %		- 30	1,880,000,086	85.69	0.0000046
100 %		- 20	1,880,000,073	72.87	0.0000039
100 %		- 10	1,880,000,050	49.53	0.0000026
100 %		0	1,880,000,055	55.24	0.0000029
100 %		+ 10	1,880,000,074	74.29	0.0000040
100 %		+ 20	1,880,000,071	70.96	0.0000038
100 %		+ 30	1,880,000,056	55.53	0.0000030
100 %		+ 40	1,880,000,068	68.25	0.0000036
100 %		+ 50	1,880,000,053	52.53	0.0000028
BATT. ENDPOINT	3.19	+ 20	1,880,000,063	62.96	0.0000033

Table 7-36. Frequency Stability Data (PCS GPRS Mode – Ch. 661)

Frequency Stability / Temperature Variation

§2.1055 §24.235 RSS-133(6.4)

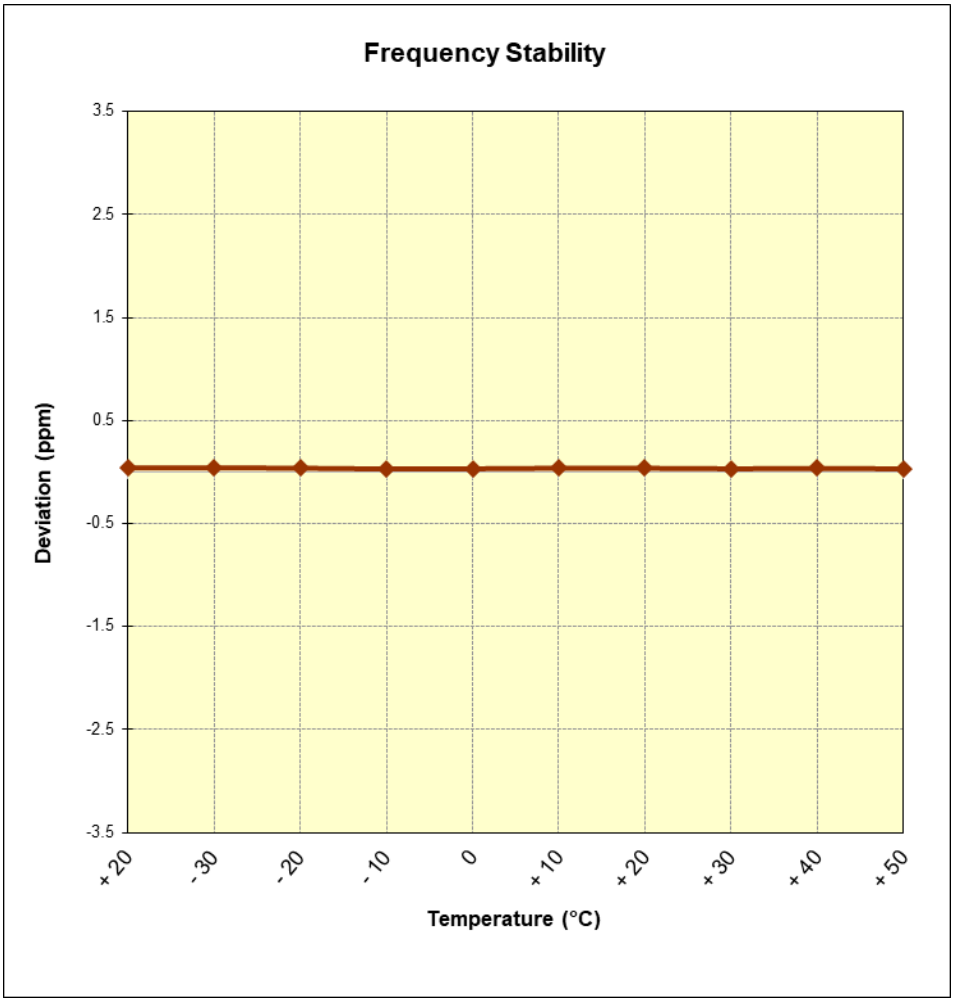


Figure 7-13. Frequency Stability Graph (PCS GPRS Mode – Ch. 661)

Frequency Stability / Temperature Variation

§2.1055 §24.235 RSS-133(6.4)

OPERATING FREQUENCY:	836,520,000	Hz
CHANNEL:	384	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,519,995	-5.20	-0.0000006
100 %		- 30	836,520,003	3.21	0.0000004
100 %		- 20	836,520,002	2.34	0.0000003
100 %		- 10	836,520,004	4.25	0.0000005
100 %		0	836,520,005	4.54	0.0000005
100 %		+ 10	836,520,005	4.98	0.0000006
100 %		+ 20	836,519,996	-4.12	-0.0000005
100 %		+ 30	836,519,995	-5.42	-0.0000006
100 %		+ 40	836,519,993	-7.10	-0.0000008
100 %		+ 50	836,519,994	-6.37	-0.0000008
BATT. ENDPOINT	3.19	+ 20	836,519,995	-4.76	-0.0000006

Table 7-37. Frequency Stability Data (PCS CDMA Mode – Ch. 600)

Frequency Stability / Temperature Variation

§2.1055 §24.235 RSS-133(6.4)

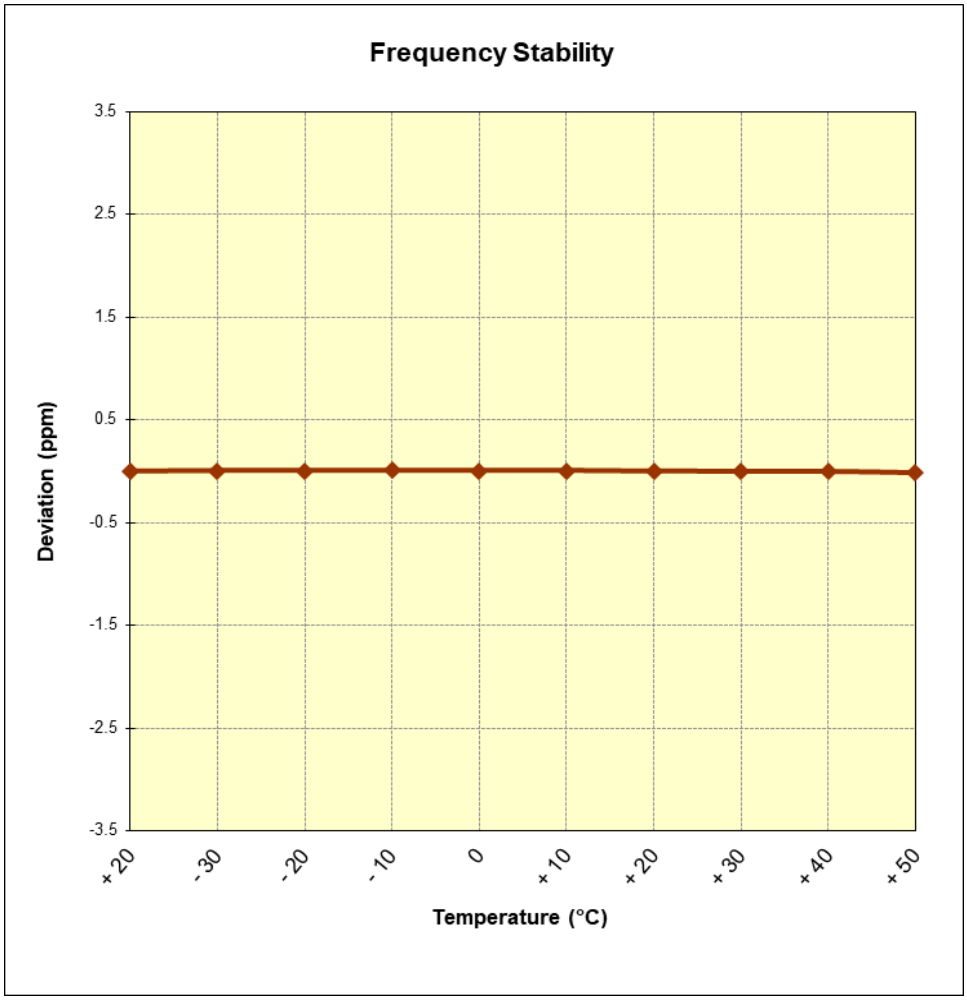


Figure 7-14. Frequency Stability Graph (PCS CDMA Mode – Ch. 600)

Frequency Stability / Temperature Variation

§2.1055 §24.235 RSS-133(6.4)

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	9400	
REFERENCE VOLTAGE:	3.80	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	1,879,999,995	-5.21	-0.0000003
100 %		- 30	1,879,999,995	-4.86	-0.0000003
100 %		- 20	1,879,999,994	-6.17	-0.0000003
100 %		- 10	1,879,999,994	-6.33	-0.0000003
100 %		0	1,879,999,995	-4.89	-0.0000003
100 %		+ 10	1,879,999,995	-4.75	-0.0000003
100 %		+ 20	1,879,999,994	-5.57	-0.0000003
100 %		+ 30	1,879,999,994	-5.88	-0.0000003
100 %		+ 40	1,879,999,995	-5.12	-0.0000003
100 %		+ 50	1,879,999,994	-5.59	-0.0000003
BATT. ENDPOINT	3.19	+ 20	1,879,999,994	-6.27	-0.0000003

Table 7-38. Frequency Stability Data (PCS WCDMA Mode – Ch. 9400)

Frequency Stability / Temperature Variation

§2.1055 §24.235 RSS-133(6.4)

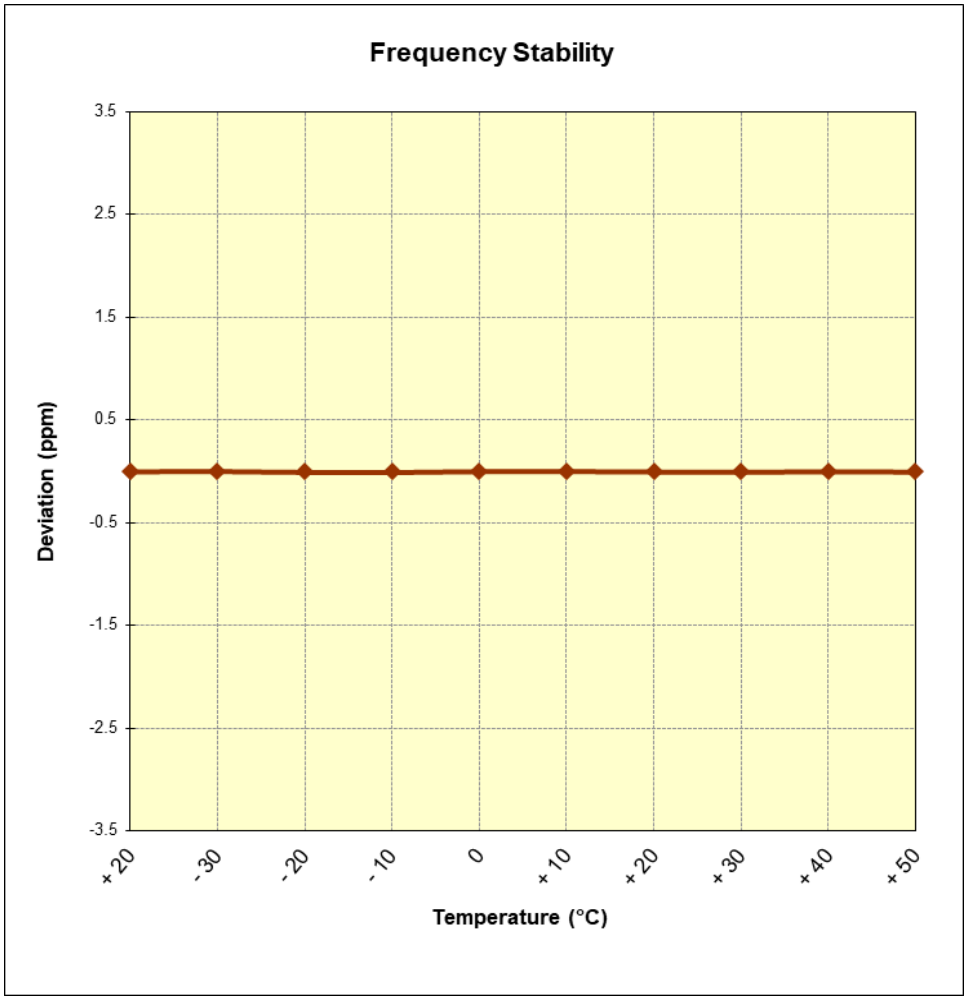


Figure 7-15. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Apple Tablet Device FCC ID: BCGA1954** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules and RSS-132, RSS-133, RSS-139 of the Innovation, Science and Economic Development Canada Rules.