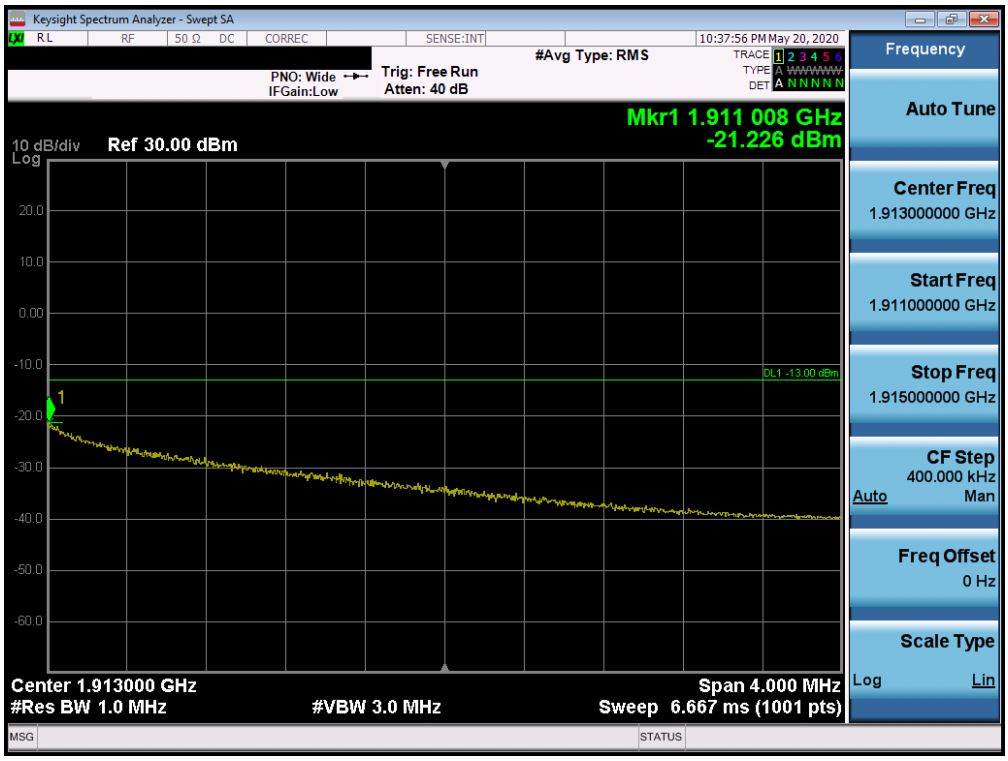
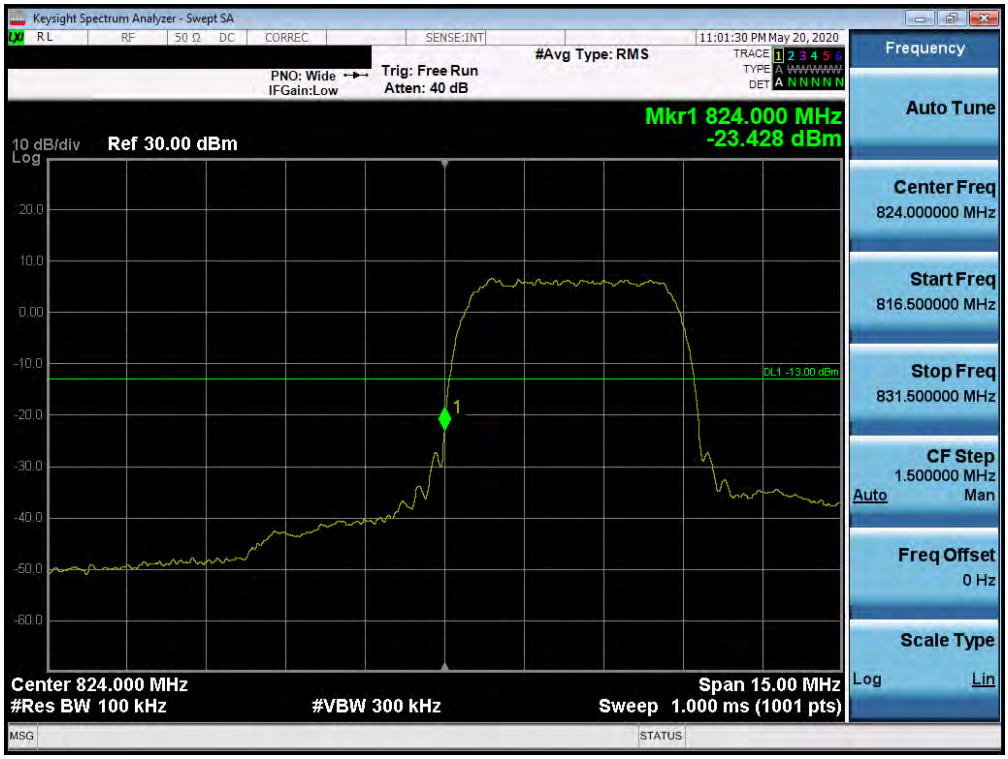
Plot 7-85. Band Edge Plot (PCS CDMA Mode - High Channel)



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

Cellular WCDMA Mode

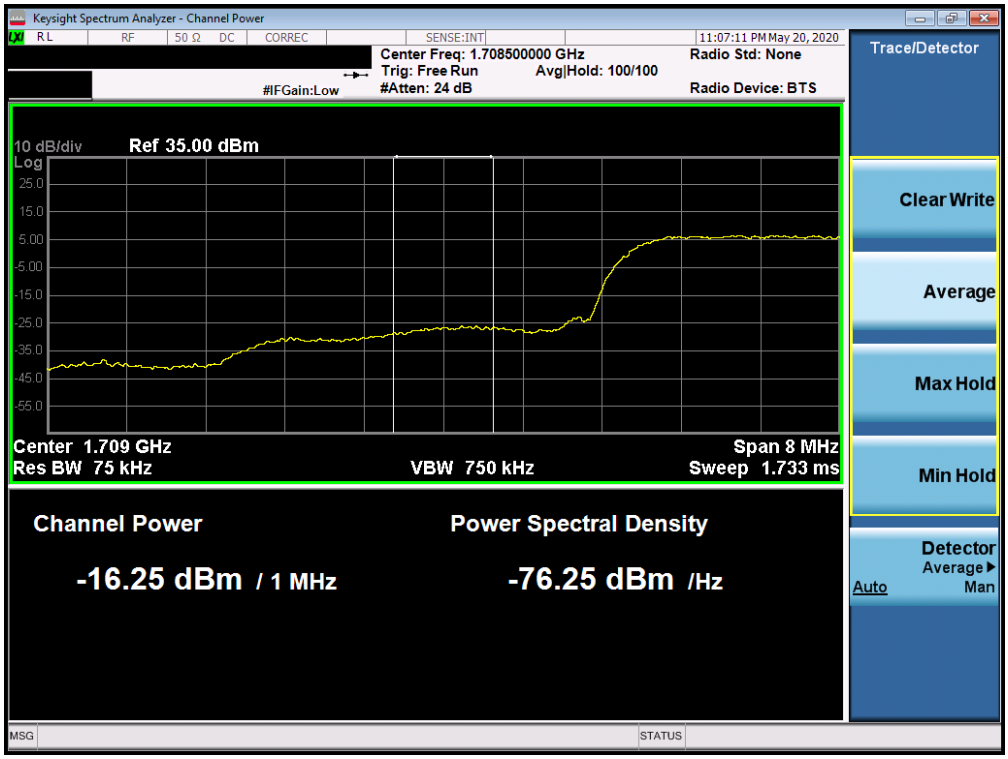


Plot 7-87. Band Edge Plot (Cellular WCDMA Mode - Low Channel)

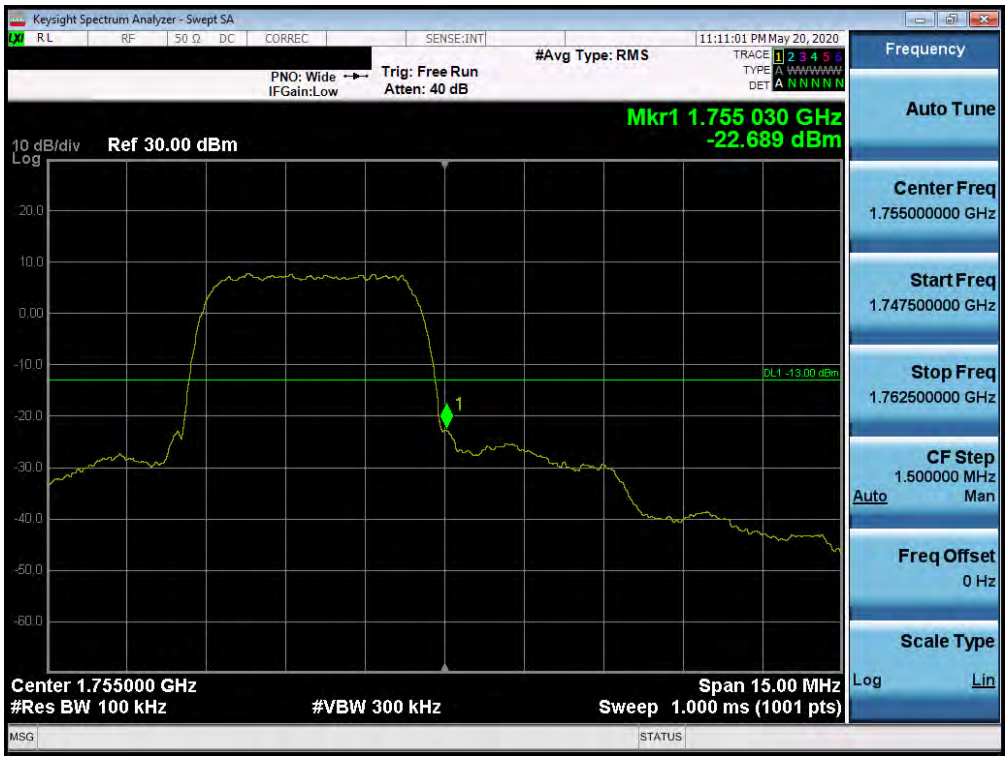
Plot 7-88. Band Edge Plot (Cellular WCDMA Mode - High Channel)

AWS WCDMA Mode

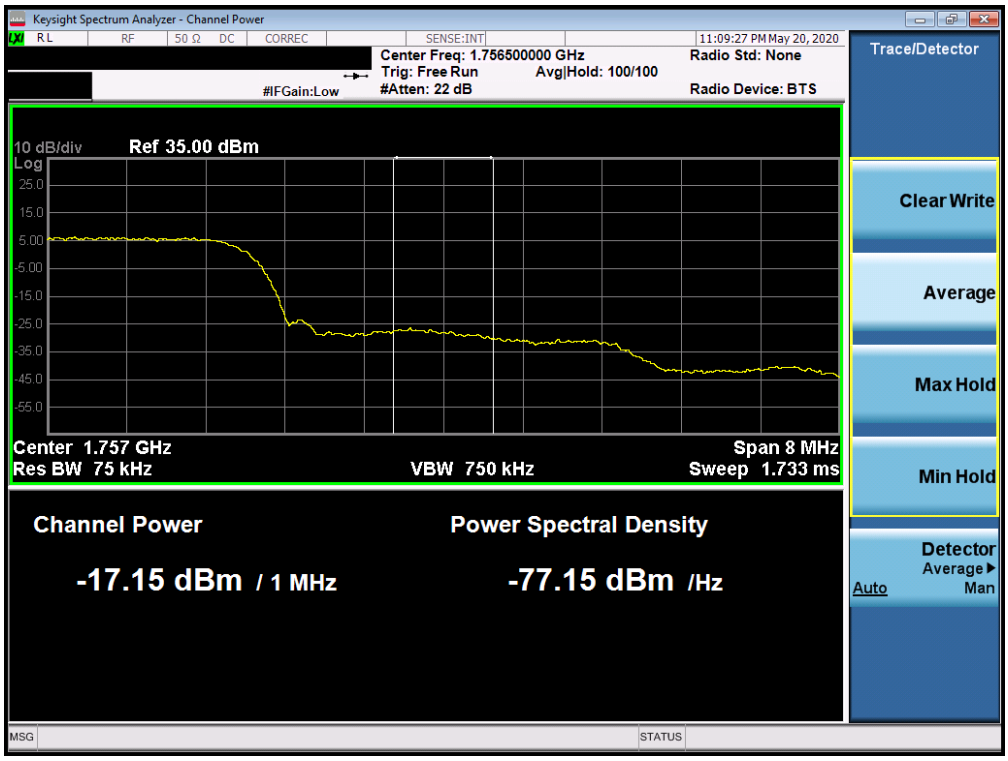
Plot 7-89. Band Edge Plot (AWS WCDMA Mode - Low Channel)



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

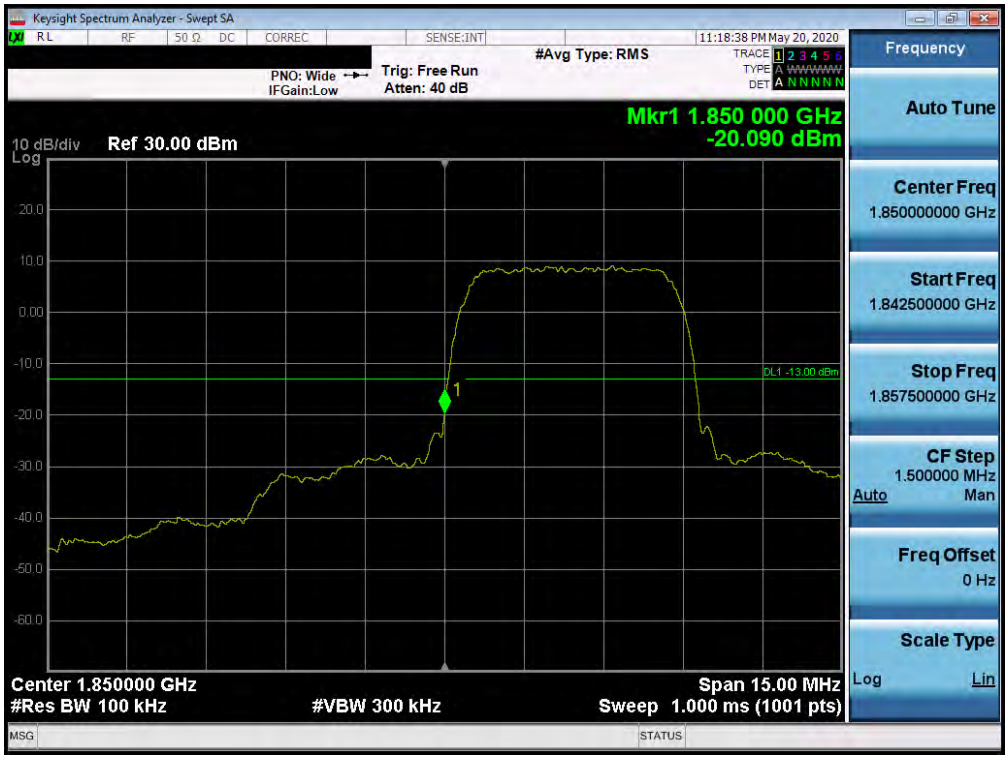


Plot 7-91. Band Edge Plot (AWS WCDMA Mode - High Channel)

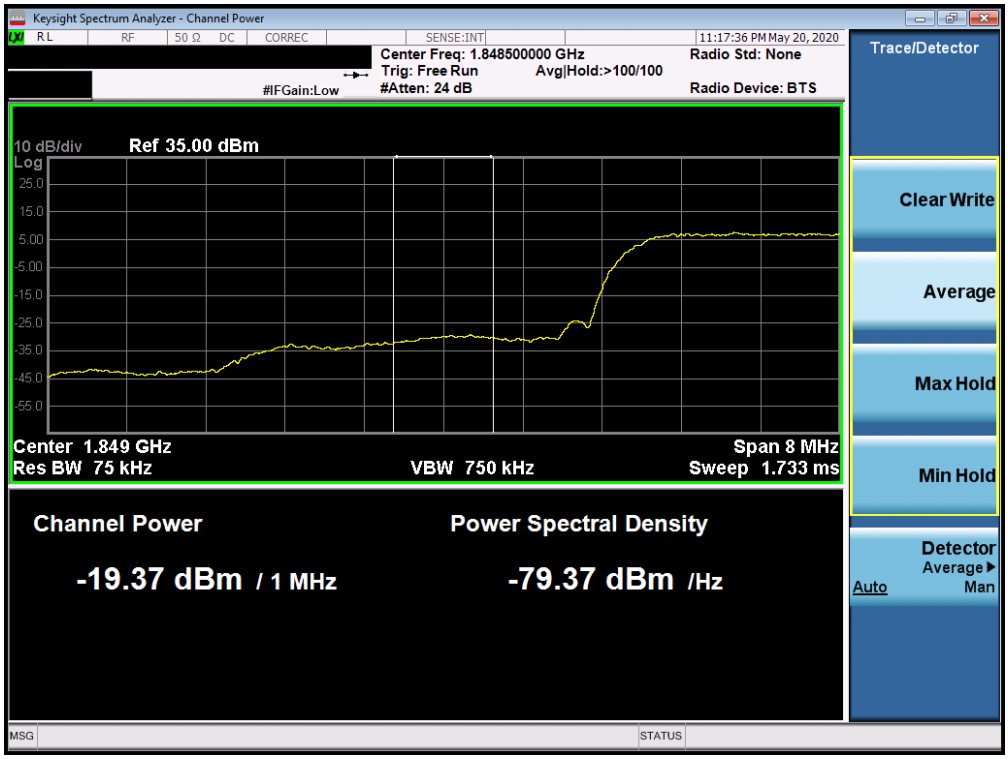


Plot 7-92. 4MHz Span Plot (AWS WCDMA Mode - High Channel)

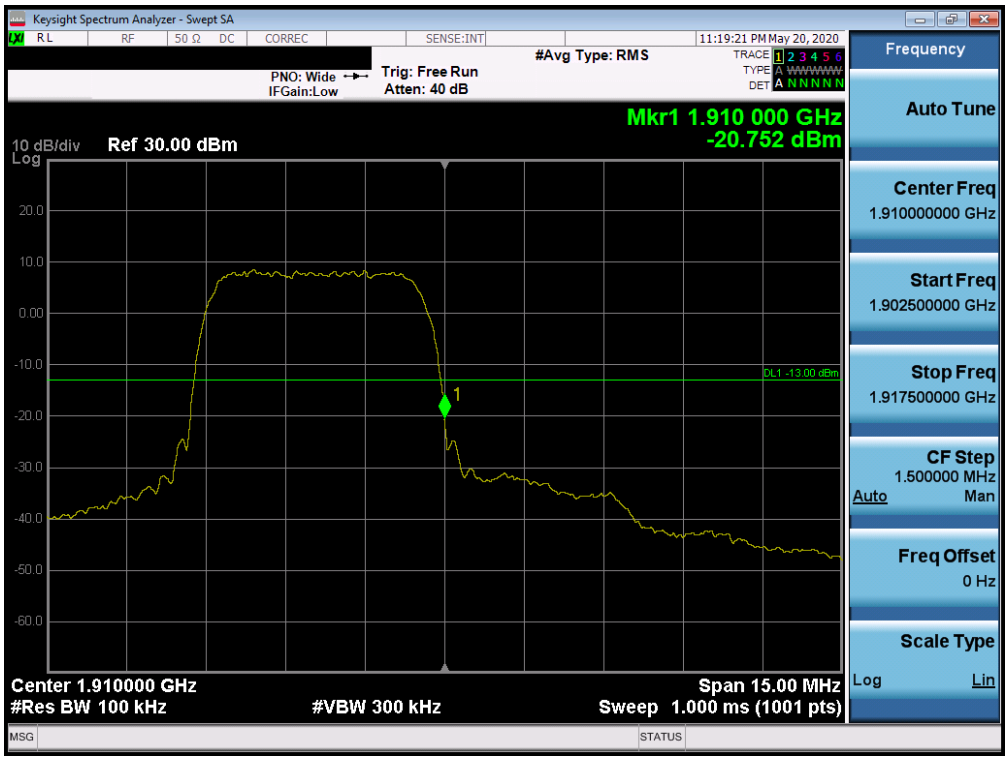
PCS WCDMA Mode



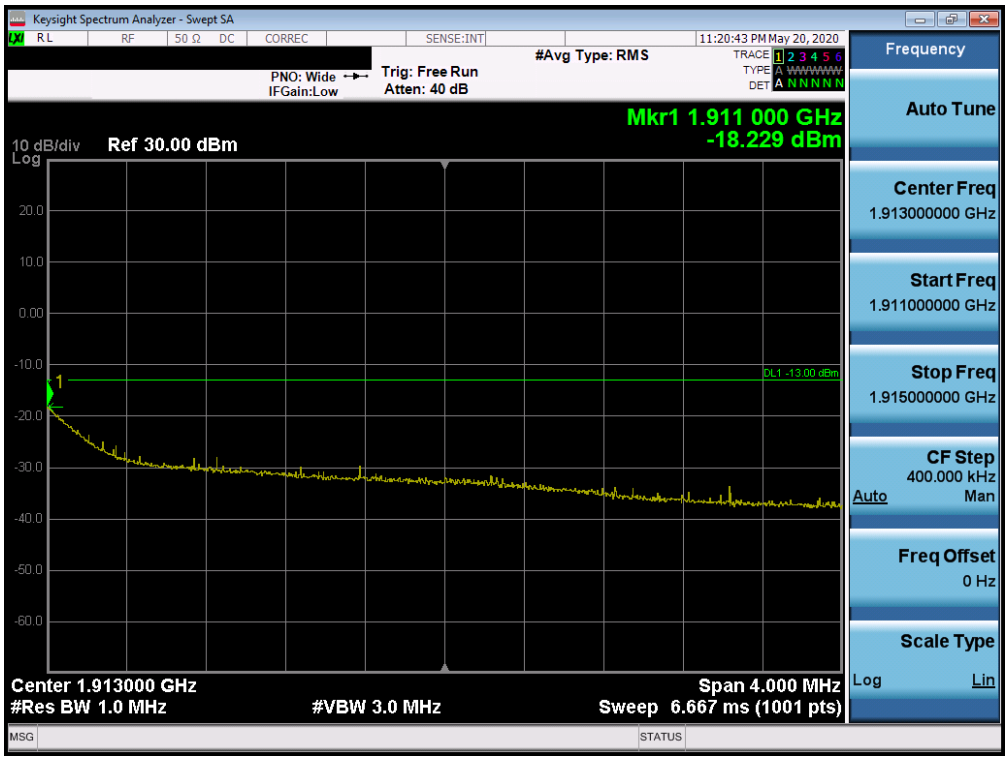
Plot 7-93. Band Edge Plot (PCS WCDMA Mode - Low Channel)



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

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 v03r01 – 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

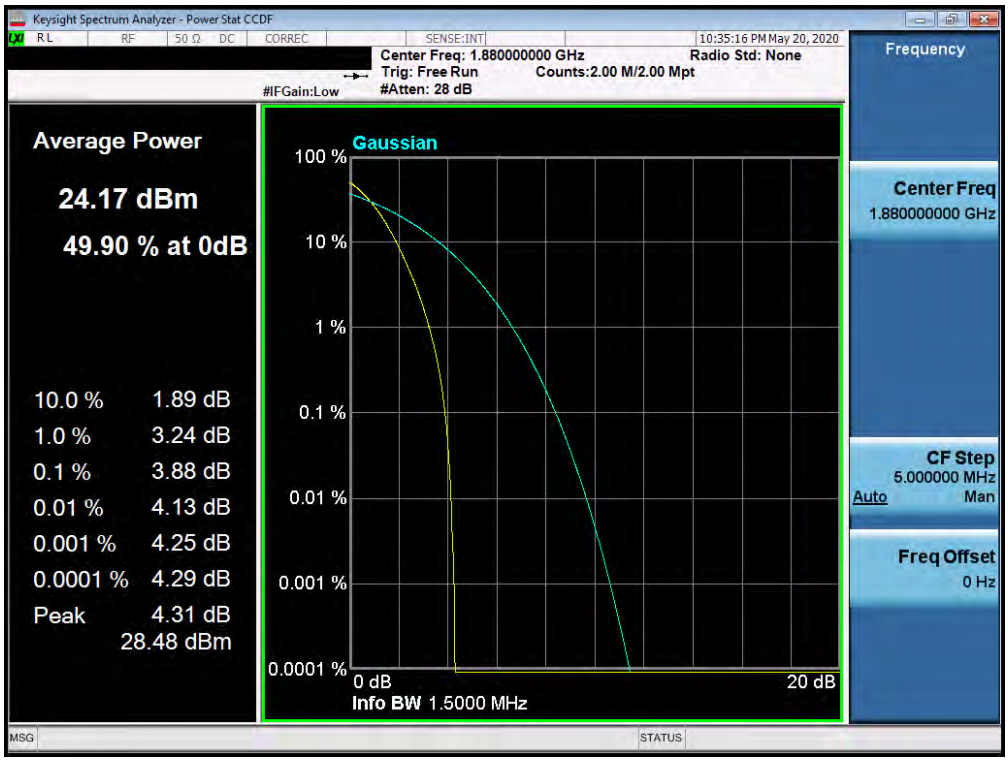
Test Setup

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

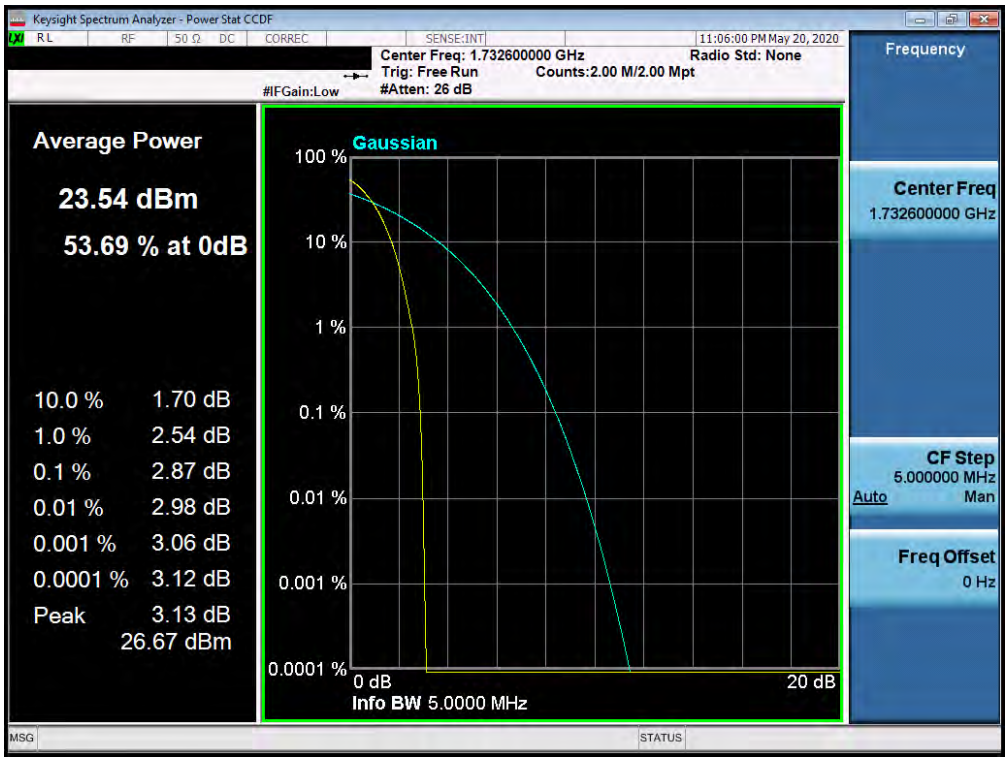
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

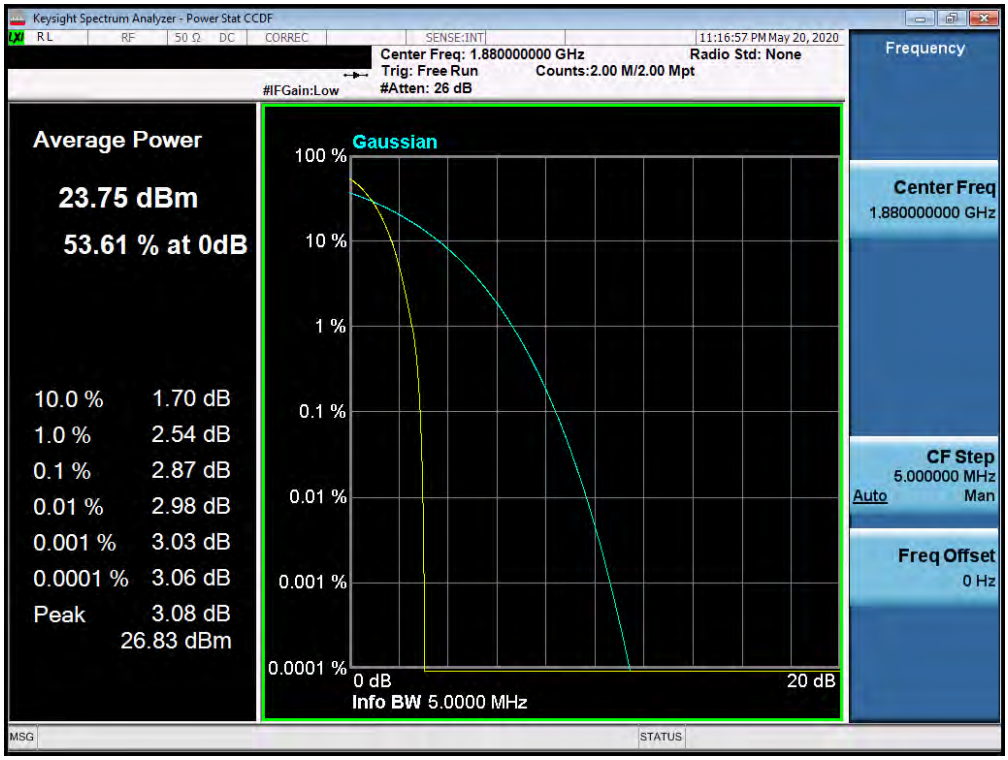
None



Plot 7-97. Peak-Average Ratio Plot (PCS CDMA Mode)



Plot 7-98. Peak-Average Ratio Plot (AWS WCDMA Mode)



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

7.6 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) 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. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

Test Setup

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

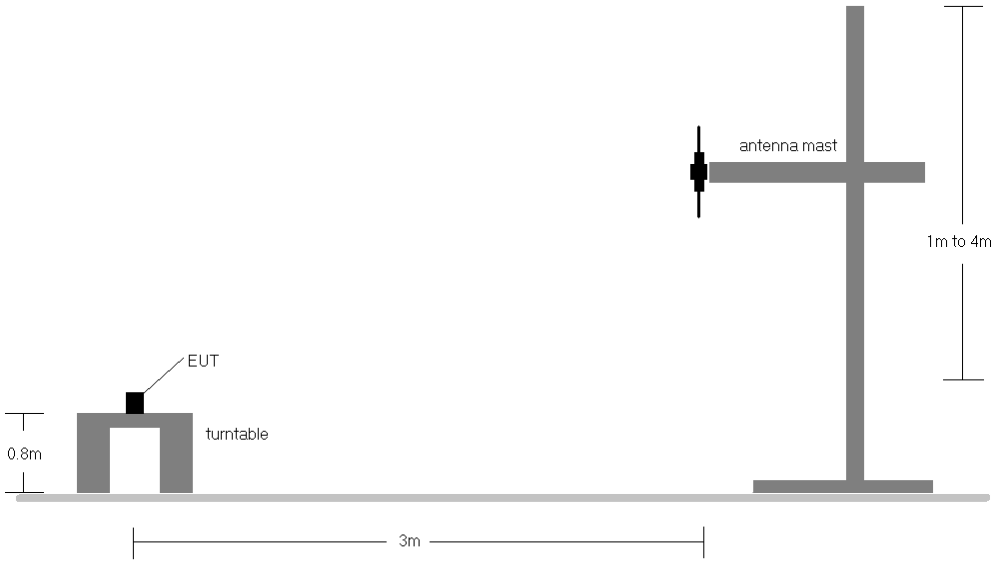


Figure 7-5. Radiated Test Setup <1GHz

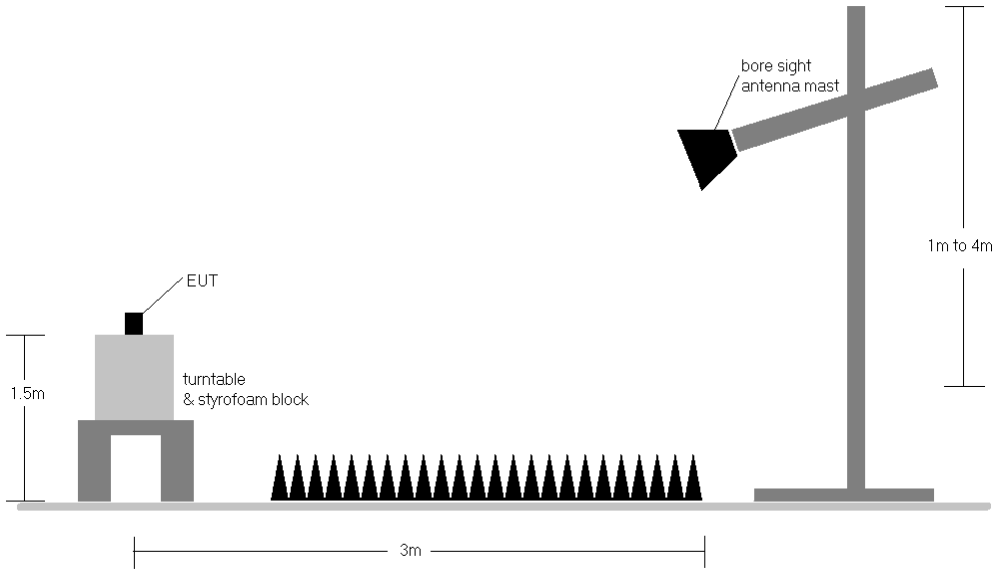


Figure 7-6. Radiated Test Setup >1GHz

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) For CDMA, 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.

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
824.20	GPRS850	V	130	287	25.45	6.35	29.65	38.45	-8.80	31.80	40.61	-8.81
836.60	GPRS850	V	120	295	25.60	6.38	**29.83**	38.45	-8.62	**31.98**	40.61	-8.63
848.80	GPRS850	V	117	284	25.05	6.51	29.41	38.45	-9.05	31.56	40.61	-9.05
836.60	GPRS850	H	206	275	25.07	6.38	29.30	38.45	-9.15	31.45	40.61	-9.16
836.60	EDGE850	V	120	295	21.63	6.38	**25.86**	38.45	-12.59	**28.01**	40.61	-12.60

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

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
824.70	CDMA850	V	141	260	14.80	6.36	19.01	38.45	-19.45	21.16	40.61	-19.45
836.52	CDMA850	V	146	251	15.78	6.38	**20.01**	38.45	-18.44	**22.16**	40.61	-18.45
848.31	CDMA850	V	149	262	15.39	6.50	19.74	38.45	-18.71	21.89	40.61	-18.72
836.52	CDMA850	H	225	307	15.18	6.38	19.41	38.45	-19.04	21.56	40.61	-19.05

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

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
826.40	WCDMA850	V	144	256	14.70	6.37	18.92	38.45	-19.53	21.07	40.61	-19.53
836.60	WCDMA850	V	138	288	15.38	6.38	**19.61**	38.45	-18.84	**21.76**	40.61	-18.85
846.60	WCDMA850	V	141	268	15.14	6.48	19.47	38.45	-18.98	21.62	40.61	-18.98
836.60	WCDMA850	H	222	298	14.21	6.38	18.44	38.45	-20.01	20.59	40.61	-20.02

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

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1712.40	WCDMA1700	H	182	227	14.72	9.46	**24.18**	30.00	-5.82
1732.60	WCDMA1700	H	100	1	14.40	9.34	23.74	30.00	-6.26
1752.60	WCDMA1700	H	182	225	13.61	9.24	22.85	30.00	-7.15
1712.40	WCDMA1700	V	246	354	13.11	9.46	22.57	30.00	-7.43

Table 7-5. EIRP (AWS WCDMA)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1850.20	GPRS1900	V	240	265	18.66	9.90	28.56	33.01	-4.45
1880.00	GPRS1900	V	242	268	18.89	10.13	**29.02**	33.01	-3.99
1909.80	GPRS1900	V	242	266	18.44	10.34	28.78	33.01	-4.23
1880.00	GPRS1900	H	268	199	17.46	10.13	27.59	33.01	-5.42
1880.00	EDGE1900	V	242	268	15.56	10.13	**25.69**	33.01	-7.32

Table 7-6. EIRP (PCS GPRS)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1851.25	CDMA1900	V	157	295	12.77	9.91	22.68	33.01	-10.33
1880.00	CDMA1900	V	362	321	13.38	10.13	**23.51**	33.01	-9.50
1908.75	CDMA1900	V	194	306	12.68	10.33	23.01	33.01	-10.00
1880.00	CDMA1900	H	119	359	12.85	10.13	22.98	33.01	-10.03

Table 7-7. EIRP (PCS CDMA)

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Margin [dB]
1852.40	WCDMA1900	V	160	289	13.72	9.92	23.64	33.01	-9.37
1880.00	WCDMA1900	V	215	334	14.24	10.13	**24.37**	33.01	-8.64
1907.60	WCDMA1900	V	123	269	12.80	10.33	23.13	33.01	-9.88
1880.00	WCDMA1900	H	116	3	13.53	10.13	23.66	33.01	-9.35

Table 7-8. EIRP (PCS WCDMA)

7.7 Radiated Spurious Emissions Measurements

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 v03r01 – 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.

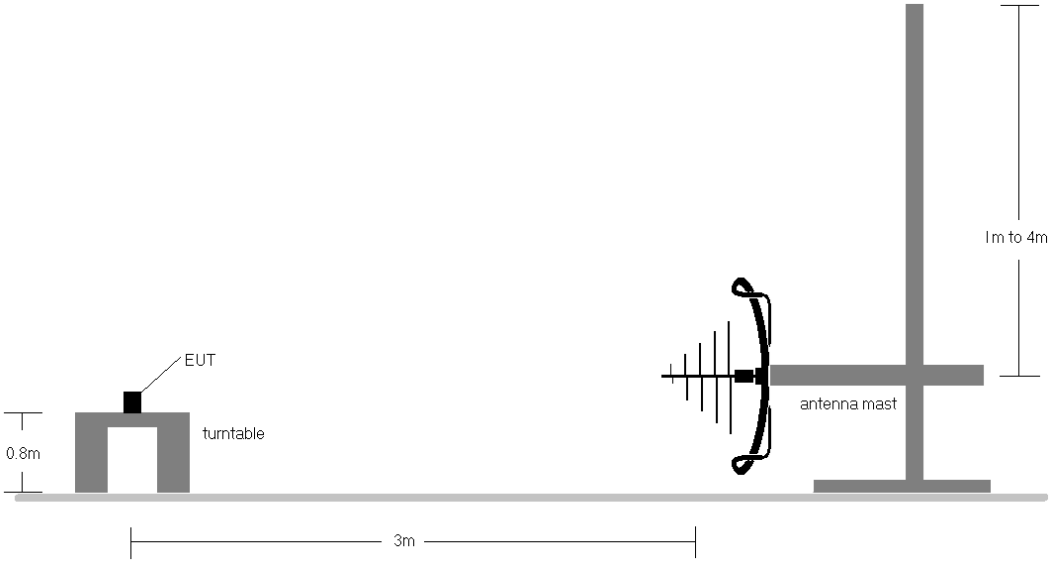


Figure 7-7. Test Instrument & Measurement Setup < 1GHz

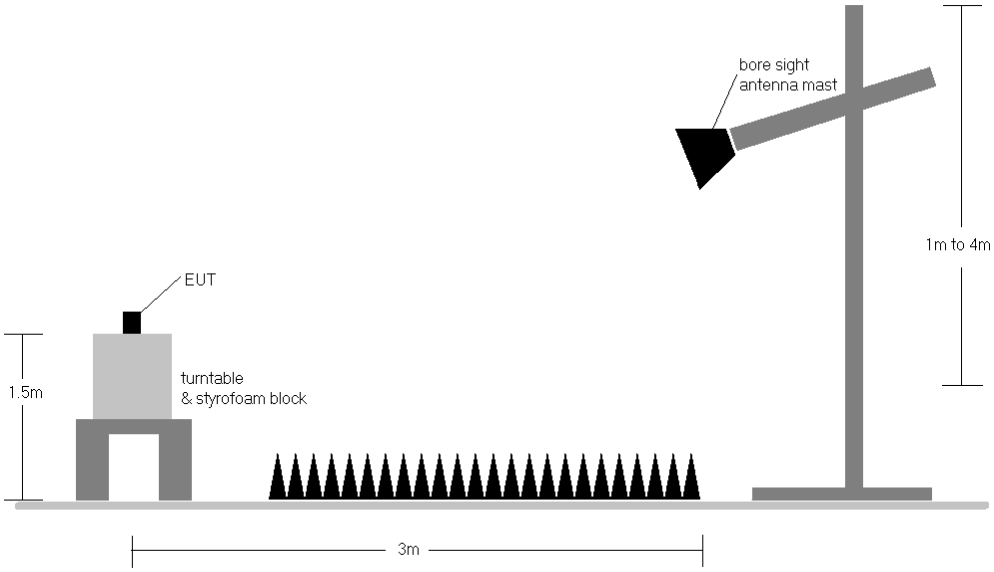


Figure 7-8. Test Instrument & Measurement Setup >1 GHz

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) For CDMA, 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.

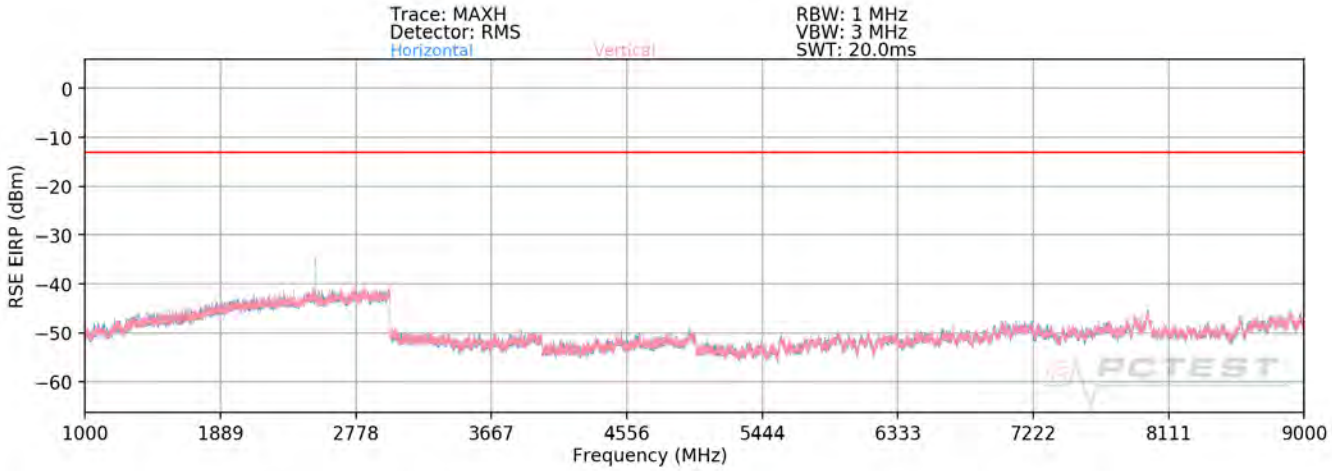
5) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

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



Plot 7-100. Radiated Spurious Plot above 1GHz (Cellular GPRS Mode)

OPERATING FREQUENCY:	824.20	MHz
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	239	188	-57.32	3.07	-54.25	-41.2
2472.60	V	250	331	-48.54	3.82	-44.72	-31.7
3296.80	V	-	-	-59.13	6.00	-53.13	-40.1
4121.00	V	-	-	-59.05	7.67	-51.38	-38.4

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

OPERATING FREQUENCY:	836.60	MHz
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	115	193	-56.42	3.10	-53.32	-40.3
2509.80	V	362	339	-47.47	4.02	-43.45	-30.4
3346.40	V	-	-	-58.19	6.03	-52.16	-39.2
4183.00	V	-	-	-59.81	7.79	-52.02	-39.0

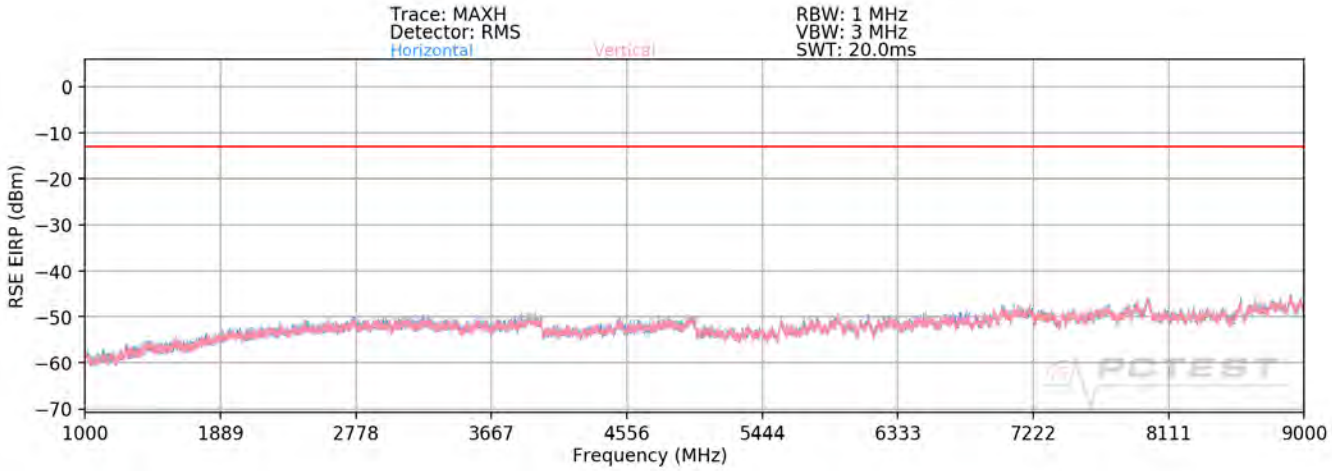
Table 7-10. Radiated Spurious Data (Cellular GPRS Mode – Ch. 190)

OPERATING FREQUENCY:	848.80	MHz
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	126	207	-57.86	3.15	-54.71	-41.7
2546.40	V	233	186	-51.83	4.15	-47.68	-34.7
3395.20	V	-	-	-58.27	6.24	-52.03	-39.0
4244.00	V	-	-	-60.79	7.97	-52.81	-39.8

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

Cellular CDMA Mode



Plot 7-101. Radiated Spurious Plot above 1GHz (Cellular CDMA Mode)

OPERATING FREQUENCY:	824.70	MHz
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	V	137	262	-68.70	3.08	-65.62	-52.6
2474.10	V	-	-	-66.43	3.84	-62.59	-49.6
3298.80	V	-	-	-68.70	6.00	-62.70	-49.7

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

OPERATING FREQUENCY:	836.52	MHz
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	V	102	264	-68.05	3.10	-64.95	-52.0
2509.56	V	-	-	-66.40	4.02	-62.38	-49.4
3346.08	V	-	-	-67.89	6.03	-61.86	-48.9

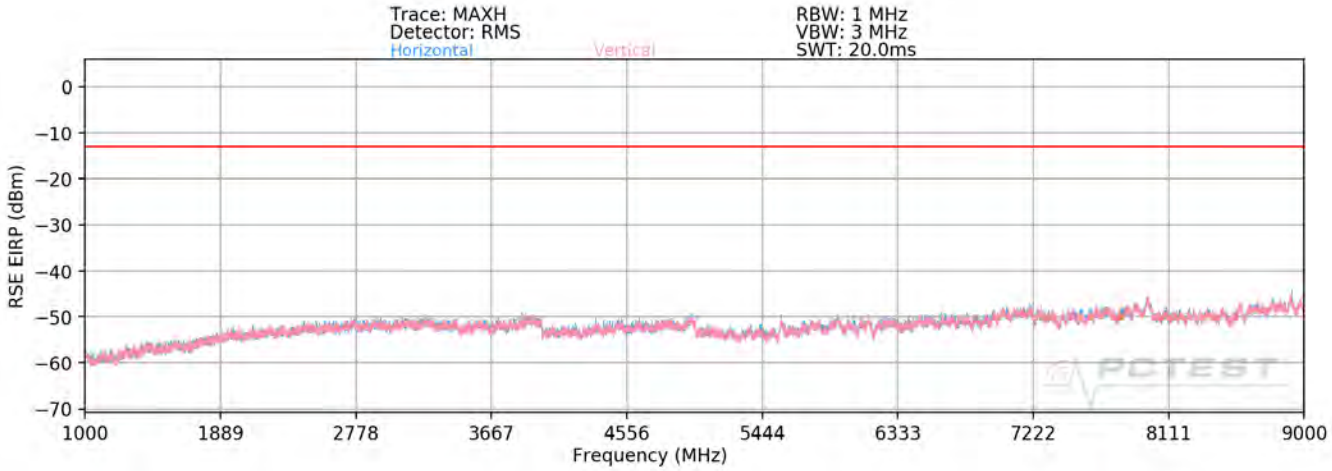
Table 7-13. Radiated Spurious Data (Cellular CDMA Mode – Ch. 384)

OPERATING FREQUENCY:	848.31	MHz
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	V	162	246	-66.92	3.15	-63.77	-50.8
2544.93	V	224	244	-66.80	4.14	-62.65	-49.7
3393.24	V	-	-	-68.08	6.23	-61.85	-48.9

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

Cellular WCDMA Mode



Plot 7-102. Radiated Spurious Plot above 1GHz (Cellular WCDMA Mode)

OPERATING FREQUENCY:	826.40	MHz
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	-	-	-69.13	3.09	-66.03	-53.0
2479.20	V	-	-	-66.38	3.91	-62.48	-49.5
3305.60	V	-	-	-68.69	6.00	-62.69	-49.7

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

OPERATING FREQUENCY:	836.60	MHz
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	130	256	-68.40	3.10	-65.30	-52.3
2509.80	V	-	-	-66.45	4.02	-62.43	-49.4
3346.40	V	-	-	-68.12	6.03	-62.09	-49.1

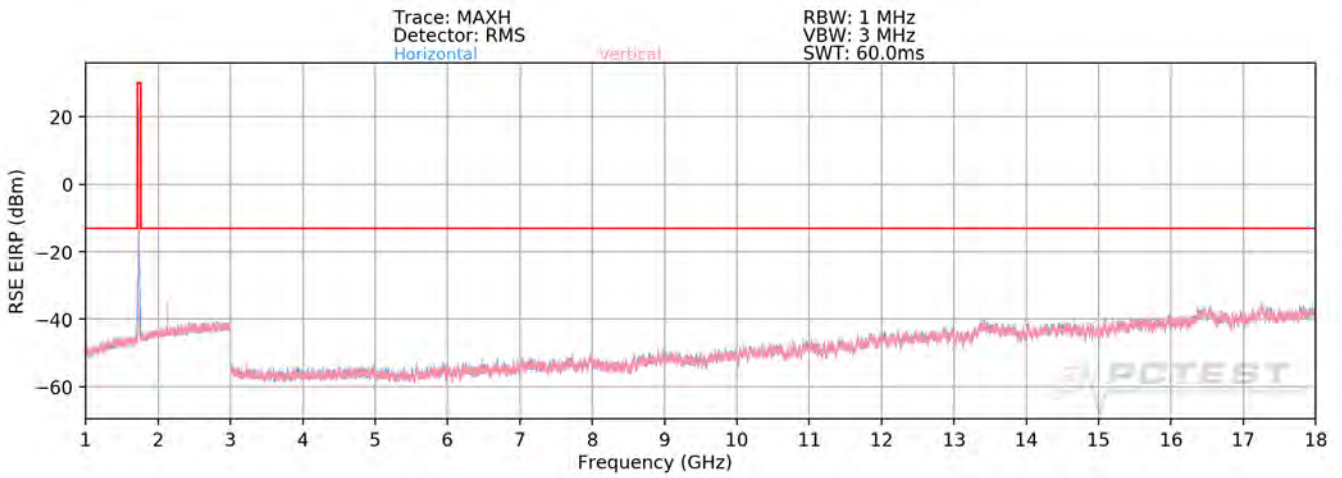
Table 7-16. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4183)

OPERATING FREQUENCY:	846.60	MHz
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	164	286	-69.11	3.17	-65.94	-52.9
2539.80	V	-	-	-67.07	4.13	-62.94	-49.9
3386.40	V	-	-	-67.91	6.20	-61.71	-48.7

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

AWS WCDMA Mode



Plot 7-103. Radiated Spurious Plot above 1GHz (AWS WCDMA Mode)

OPERATING FREQUENCY:	1712.40	MHz
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	-	-	-68.26	6.27	-61.99	-49.0
5137.20	V	-	-	-70.35	8.94	-61.41	-48.4
6849.60	V	-	-	-69.71	9.44	-60.26	-47.3

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

OPERATING FREQUENCY:	1732.60	MHz
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	-	-	-69.33	6.35	-62.97	-50.0
5197.80	V	-	-	-70.95	9.05	-61.90	-48.9
6930.40	V	-	-	-70.44	9.38	-61.06	-48.1

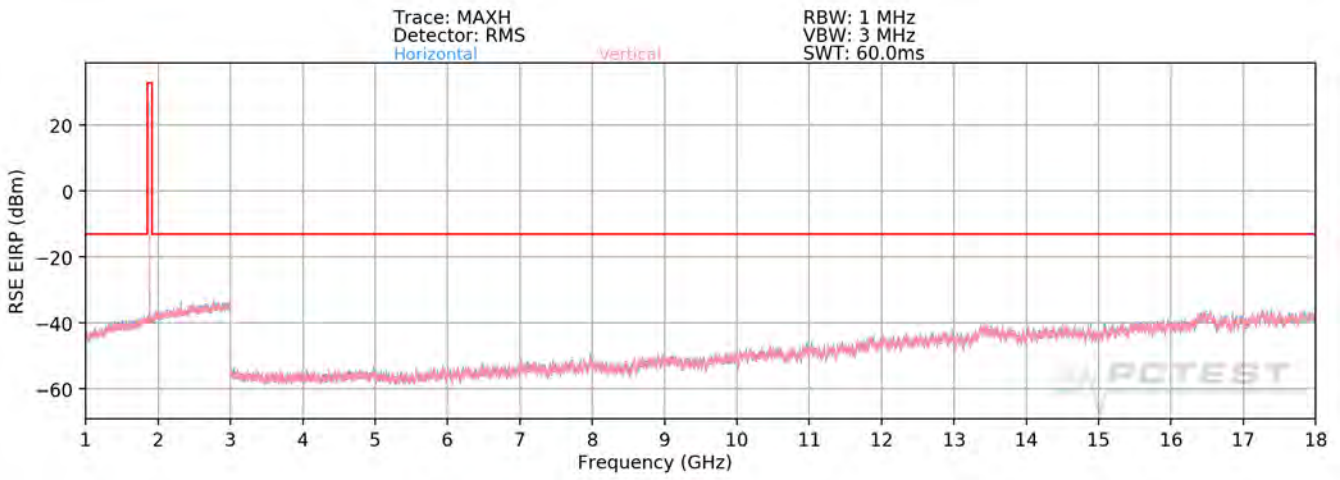
Table 7-19. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1413)

OPERATING FREQUENCY:	1752.60	MHz
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	-	-	-68.49	6.50	-61.99	-49.0
5257.80	V	-	-	-71.07	8.96	-62.11	-49.1
7010.40	V	-	-	-68.50	9.14	-59.35	-46.4

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

PCS GPRS Mode



Plot 7-104. Radiated Spurious Plot above 1GHz (PCS GPRS Mode)

OPERATING FREQUENCY:	1850.20	MHz
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	H	255	327	-65.39	6.89	-58.49	-45.5
5550.60	H	400	337	-57.61	9.02	-48.59	-35.6
7400.80	H	148	64	-55.35	9.21	-46.13	-33.1
9251.00	H	-	-	-58.72	9.45	-49.27	-36.3
11101.20	H	-	-	-54.84	9.44	-45.41	-32.4

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

OPERATING FREQUENCY: 1880.00 MHz
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	H	356	300	-58.05	6.93	-51.12	-38.1
5640.00	H	395	160	-57.72	9.15	-48.57	-35.6
7520.00	H	-	-	-59.79	9.31	-50.48	-37.5
9400.00	H	-	-	-58.96	9.49	-49.47	-36.5

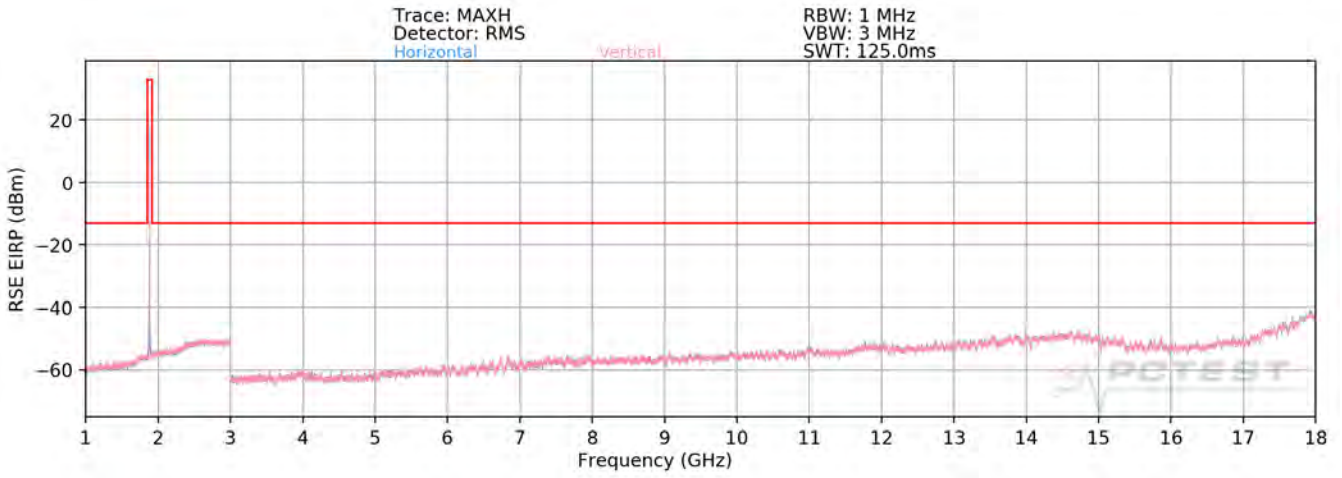
Table 7-22. Radiated Spurious Data (GPRS GSM Mode – Ch. 661)

OPERATING FREQUENCY: 1909.80 MHz
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	H	-	-	-59.58	7.11	-52.47	-39.5
5729.40	H	400	143	-59.92	9.03	-50.89	-37.9
7639.20	H	107	10	-55.78	9.29	-46.49	-33.5
9549.00	H	-	-	-57.78	9.43	-48.35	-35.3
11458.80	H	-	-	-54.93	9.49	-45.43	-32.4

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

PCS CDMA Mode



Plot 7-105. Radiated Spurious Plot above 1GHz (PCS CDMA Mode)

OPERATING FREQUENCY:	1851.25	MHz
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	-	-	-72.48	6.89	-65.58	-52.6
5553.75	H	-	-	-73.10	9.02	-64.08	-51.1
7405.00	H	-	-	-70.11	9.22	-60.89	-47.9

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

OPERATING FREQUENCY:	1880.00	MHz
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	-	-	-72.99	6.93	-66.06	-53.1
5640.00	H	-	-	-72.96	9.15	-63.80	-50.8
7520.00	H	-	-	-70.79	9.31	-61.47	-48.5

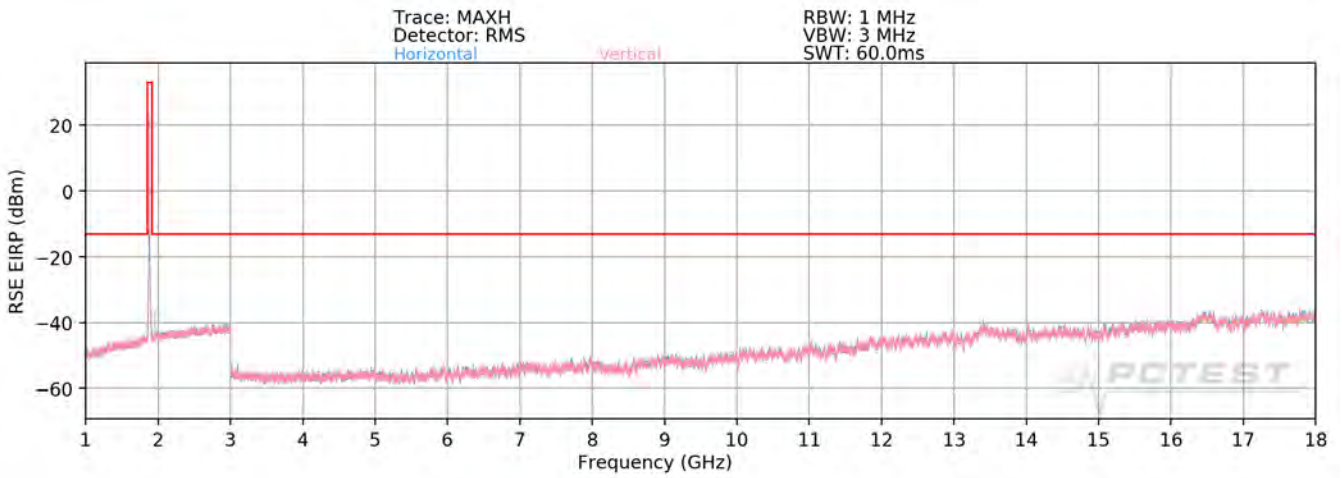
Table 7-25. Radiated Spurious Data (PCS CDMA Mode – Ch. 600)

OPERATING FREQUENCY:	1908.75	MHz
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	-	-	-72.68	7.10	-65.58	-52.6
5726.25	H	-	-	-73.14	9.03	-64.11	-51.1
7635.00	H	-	-	-70.09	9.29	-60.80	-47.8

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

PCS WCDMA Mode



Plot 7-106. Radiated Spurious Plot above 1GHz (PCS WCDMA Mode)

OPERATING FREQUENCY:	1852.40	MHz
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	-	-	-68.68	6.89	-61.79	-48.8
5557.20	H	-	-	-70.22	9.03	-61.19	-48.2
7409.60	H	-	-	-68.83	9.23	-59.60	-46.6

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

OPERATING FREQUENCY:	1880.00	MHz
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	-	-	-69.40	6.93	-62.47	-49.5
5640.00	H	-	-	-70.77	9.15	-61.62	-48.6
7520.00	H	-	-	-69.29	9.31	-59.98	-47.0

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

OPERATING FREQUENCY:	1907.60	MHz
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	-	-	-69.26	7.09	-62.17	-49.2
5722.80	H	-	-	-70.29	9.04	-61.26	-48.3
7630.40	H	-	-	-67.73	9.28	-58.45	-45.4

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

7.8 Frequency Stability / Temperature Variation

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

OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	190	
REFERENCE VOLTAGE:	4.21	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.21	- 30	836,599,739	-261	-0.0000312
100 %		- 20	836,600,175	175	0.0000209
100 %		- 10	836,600,063	63	0.0000075
100 %		0	836,600,275	275	0.0000329
100 %		+ 10	836,599,806	-194	-0.0000232
100 %		+ 20	836,599,929	-71	-0.0000085
100 %		+ 30	836,600,135	135	0.0000161
100 %		+ 40	836,600,059	59	0.0000071
100 %		+ 50	836,600,085	85	0.0000102
BATT. ENDPOINT	3.85	+ 20	836,600,338	338	0.0000404

Table 7-30. Frequency Stability Data (Cellular GSM Mode – Ch. 190)

Frequency Stability / Temperature Variation

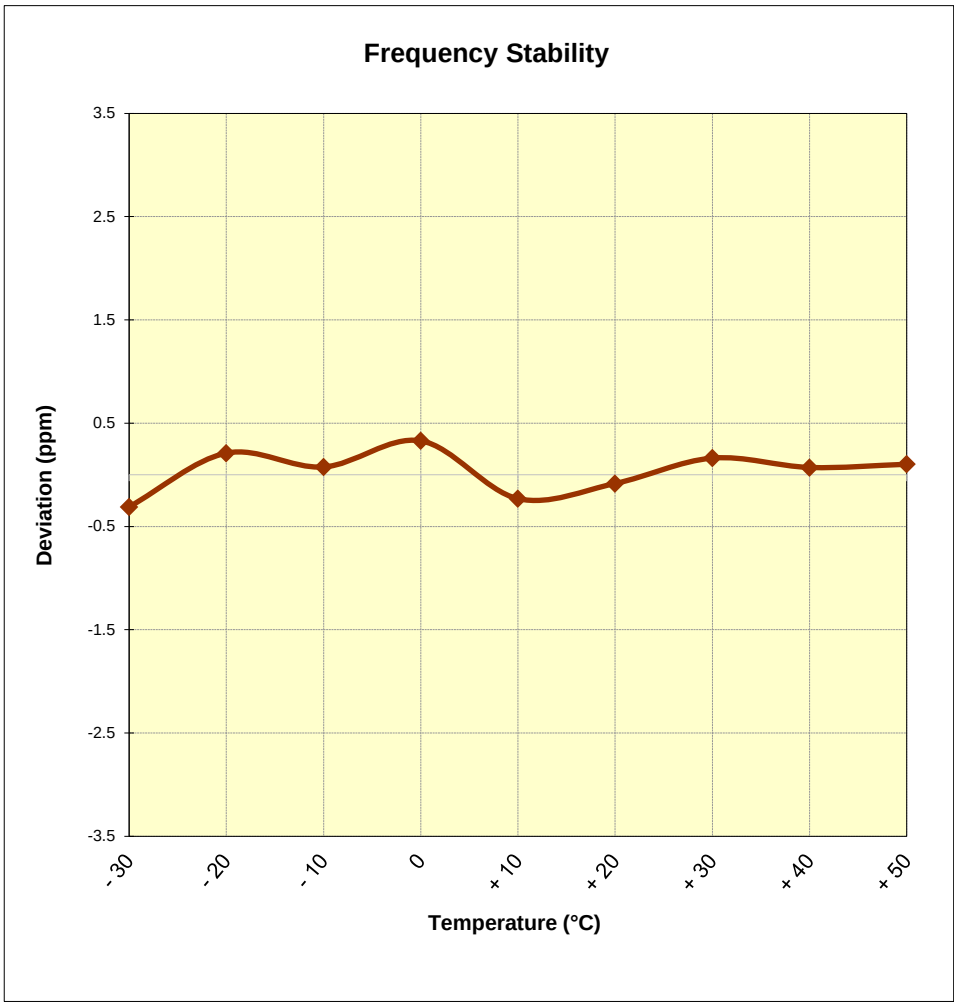


Figure 7-9. Frequency Stability Graph (Cellular GSM Mode – Ch. 190)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	836,520,000	Hz
CHANNEL:	384	
REFERENCE VOLTAGE:	4.21	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.21	- 30	836,519,949	-51	-0.0000061
100 %		- 20	836,520,194	194	0.0000232
100 %		- 10	836,520,009	9	0.0000011
100 %		0	836,520,139	139	0.0000166
100 %		+ 10	836,519,750	-250	-0.0000299
100 %		+ 20	836,519,766	-234	-0.0000280
100 %		+ 30	836,519,980	-20	-0.0000024
100 %		+ 40	836,519,970	-30	-0.0000036
100 %		+ 50	836,520,364	364	0.0000435
BATT. ENDPOINT	3.85	+ 20	836,520,230	230	0.0000275

Table 7-31. Frequency Stability Data (Cellular CDMA Mode – Ch. 384)

Frequency Stability / Temperature Variation

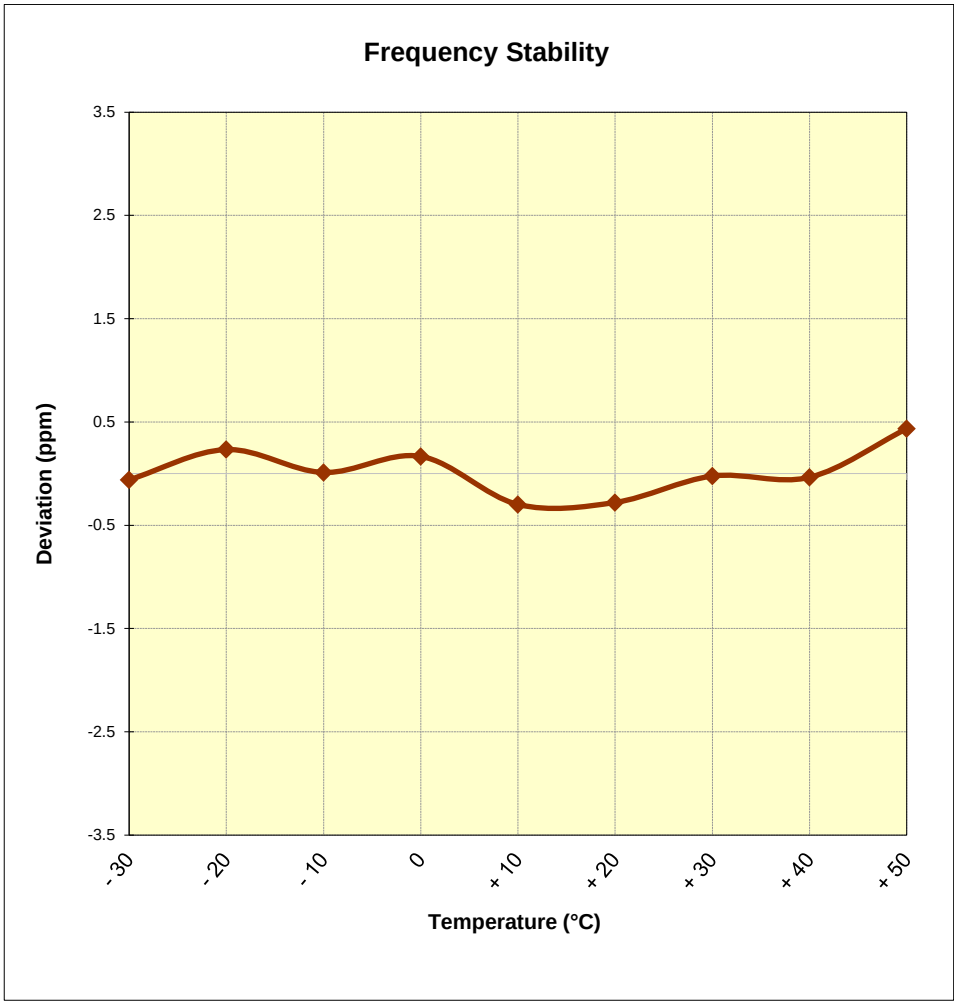


Figure 7-10. Frequency Stability Graph (Cellular CDMA Mode – Ch. 384)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	4183	
REFERENCE VOLTAGE:	4.21	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.21	- 30	836,599,875	-125	-0.0000149
100 %		- 20	836,599,825	-175	-0.0000209
100 %		- 10	836,600,069	69	0.0000082
100 %		0	836,600,015	15	0.0000018
100 %		+ 10	836,600,076	76	0.0000091
100 %		+ 20	836,599,888	-112	-0.0000134
100 %		+ 30	836,600,142	142	0.0000170
100 %		+ 40	836,600,063	63	0.0000075
100 %		+ 50	836,599,550	-450	-0.0000538
BATT. ENDPOINT	3.85	+ 20	836,600,355	355	0.0000424

Table 7-32. Frequency Stability Data (Cellular WCDMA Mode – Ch. 4183)

Frequency Stability / Temperature Variation

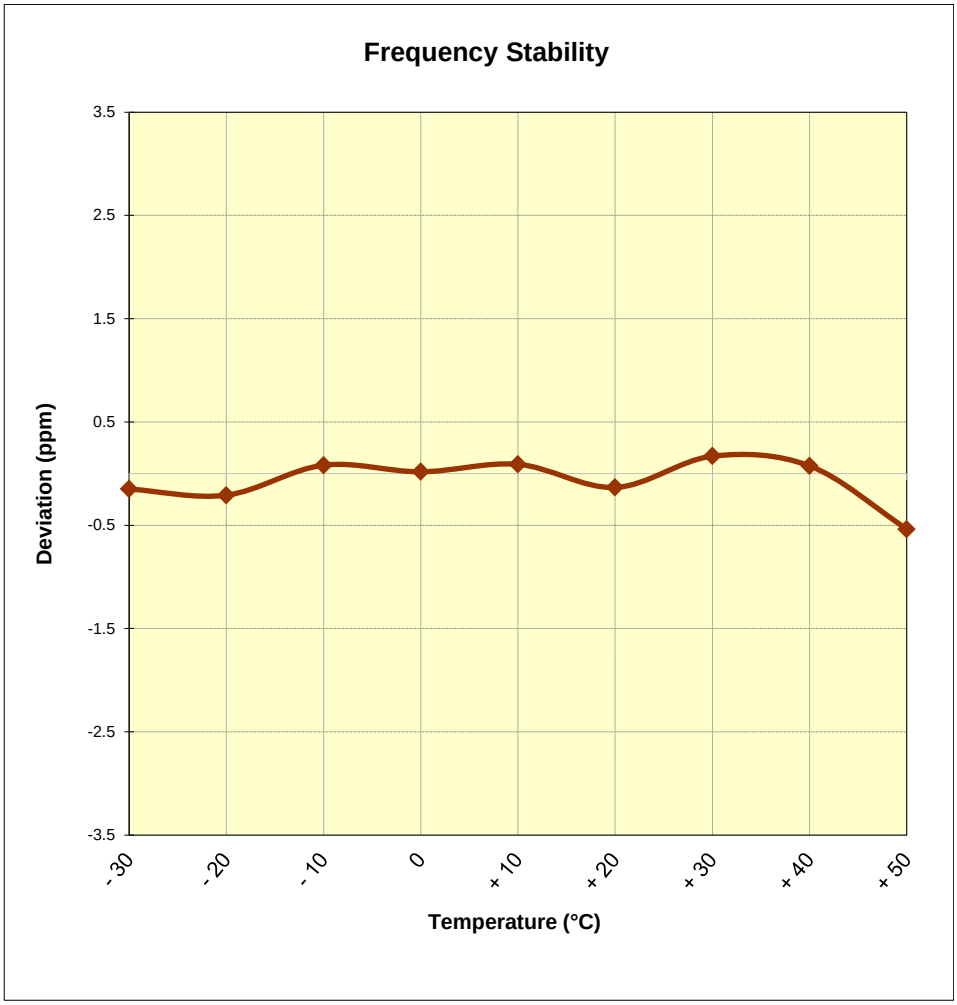


Figure 7-11. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,732,600,000	Hz
CHANNEL:	1413	
REFERENCE VOLTAGE:	4.21	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.21	- 30	1,732,600,263	263	0.0000152
100 %		- 20	1,732,599,991	-9	-0.0000005
100 %		- 10	1,732,600,046	46	0.0000027
100 %		0	1,732,599,863	-137	-0.0000079
100 %		+ 10	1,732,600,013	13	0.0000008
100 %		+ 20	1,732,599,704	-296	-0.0000171
100 %		+ 30	1,732,600,203	203	0.0000117
100 %		+ 40	1,732,599,995	-5	-0.0000003
100 %		+ 50	1,732,600,207	207	0.0000119
BATT. ENDPOINT	3.85	+ 20	1,732,599,702	-298	-0.0000172

Table 7-33. 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

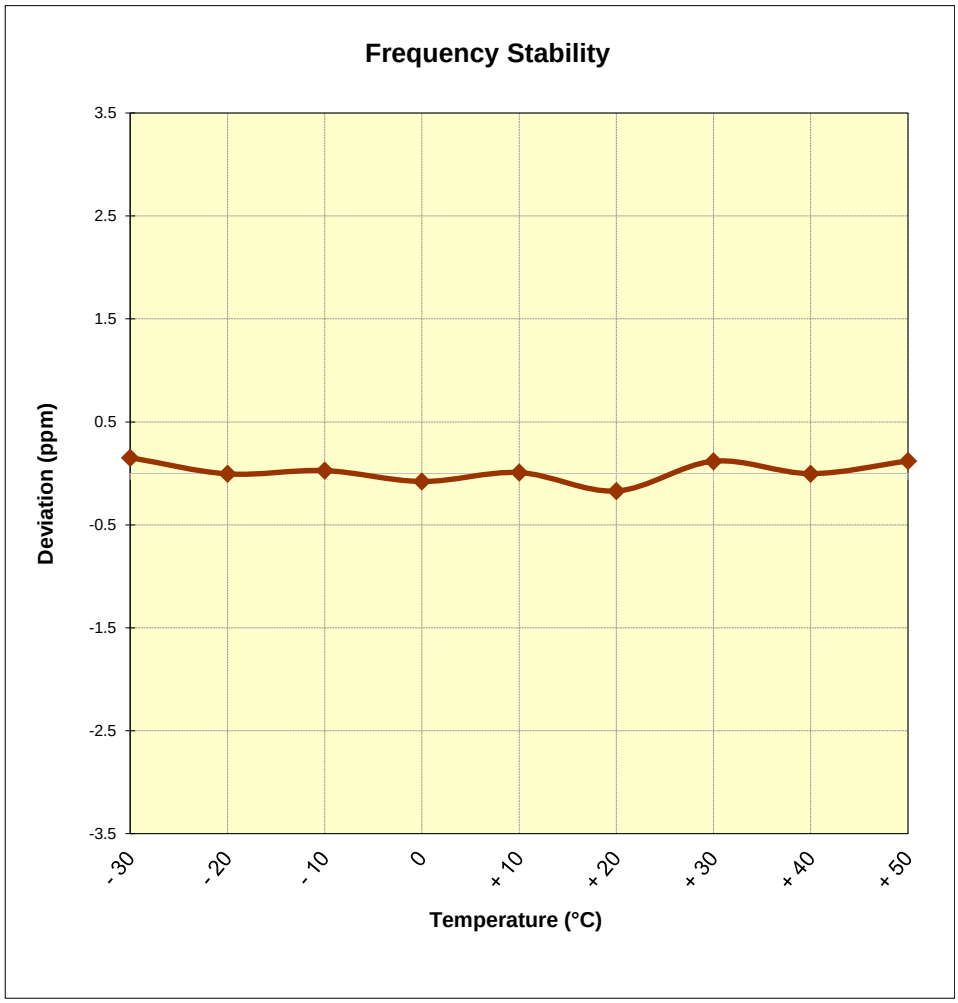


Figure 7-12. Frequency Stability Graph (AWS WCDMA Mode – Ch. 1413)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	661	
REFERENCE VOLTAGE:	4.21	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.21	- 30	1,880,000,052	52	0.0000028
100 %		- 20	1,879,999,905	-95	-0.0000051
100 %		- 10	1,879,999,850	-150	-0.0000080
100 %		0	1,880,000,023	23	0.0000012
100 %		+ 10	1,879,999,669	-331	-0.0000176
100 %		+ 20	1,879,999,992	-8	-0.0000004
100 %		+ 30	1,879,999,793	-207	-0.0000110
100 %		+ 40	1,879,999,729	-271	-0.0000144
100 %		+ 50	1,879,999,767	-233	-0.0000124
BATT. ENDPOINT	3.85	+ 20	1,879,999,920	-80	-0.0000043

Table 7-34. Frequency Stability Data (PCS GSM Mode – Ch. 661)

Frequency Stability / Temperature Variation

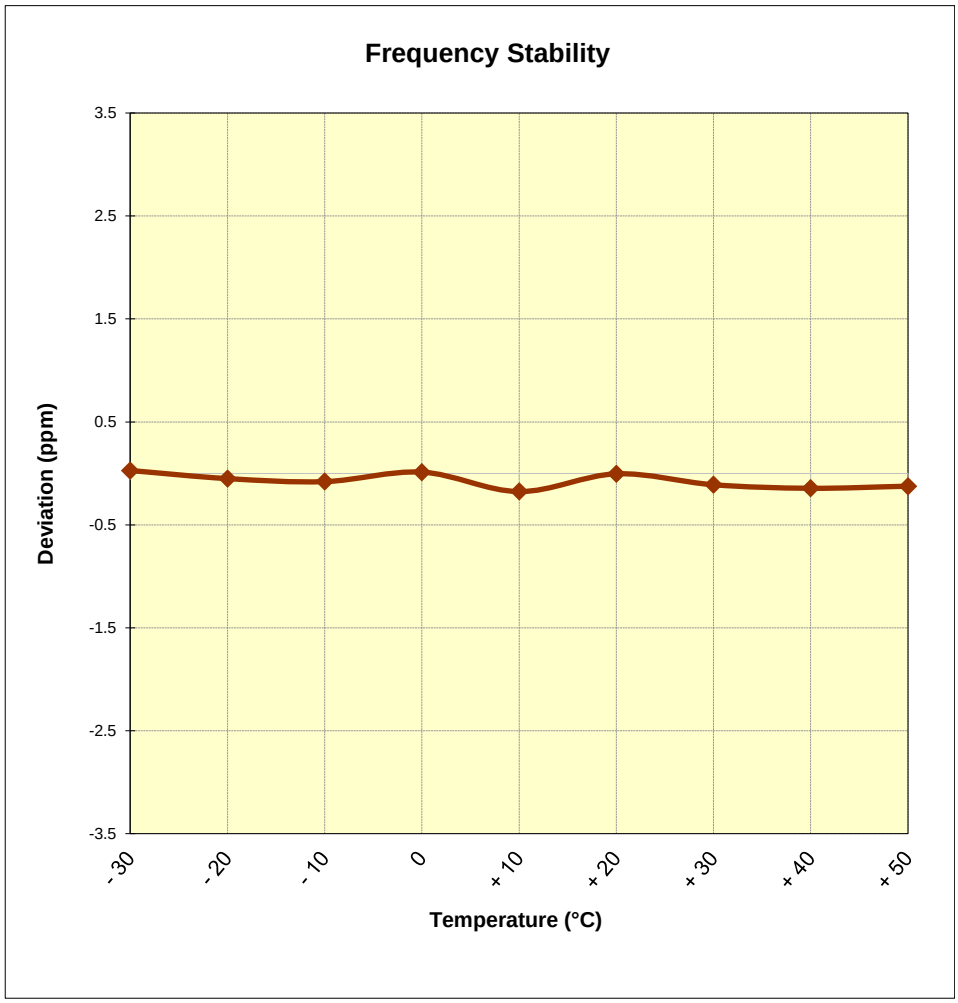


Figure 7-13. Frequency Stability Graph (PCS GSM Mode – Ch. 661)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	600	
REFERENCE VOLTAGE:	4.21	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.21	- 30	1,880,000,097	97	0.0000052
100 %		- 20	1,879,999,902	-98	-0.0000052
100 %		- 10	1,880,000,112	112	0.0000060
100 %		0	1,879,999,834	-166	-0.0000088
100 %		+ 10	1,879,999,919	-81	-0.0000043
100 %		+ 20	1,880,000,312	312	0.0000166
100 %		+ 30	1,880,000,027	27	0.0000014
100 %		+ 40	1,879,999,978	-22	-0.0000012
100 %		+ 50	1,879,999,773	-227	-0.0000121
BATT. ENDPOINT	3.85	+ 20	1,880,000,186	186	0.0000099

Table 7-35. Frequency Stability Data (PCS CDMA Mode – Ch. 600)

Frequency Stability / Temperature Variation

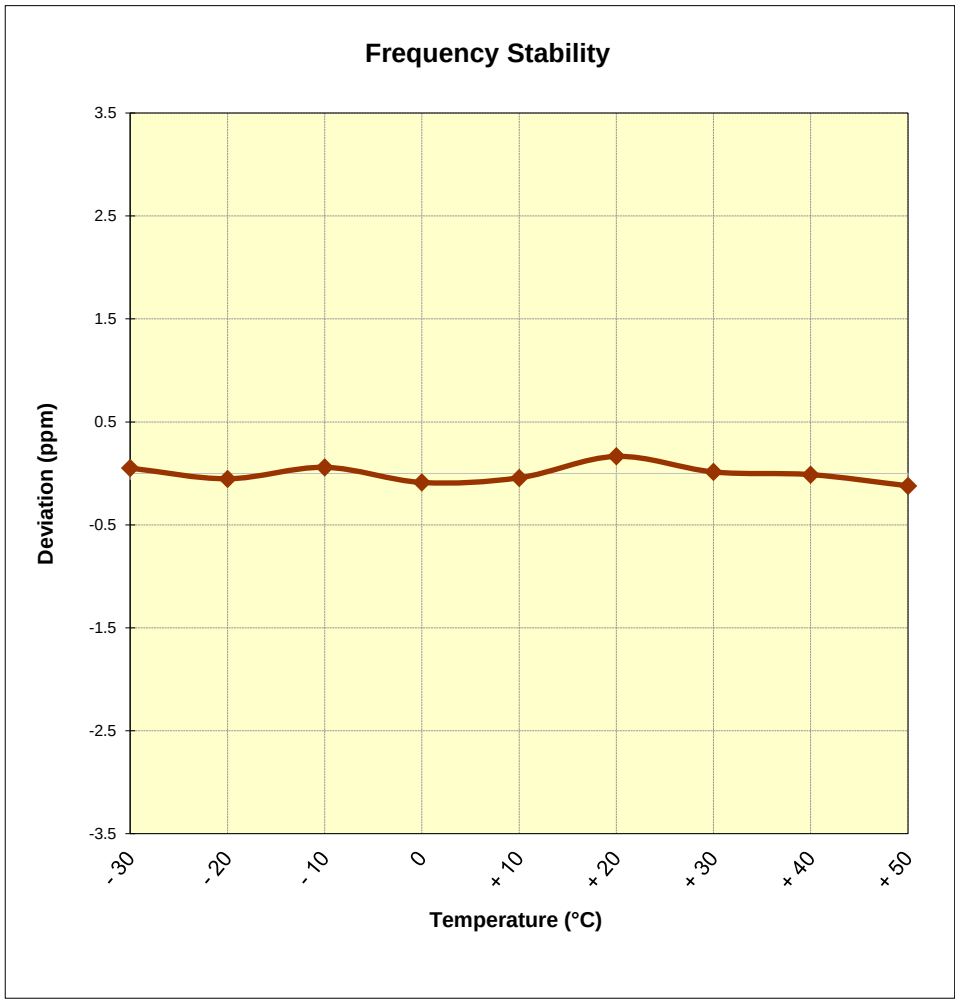


Figure 7-14. Frequency Stability Graph (PCS CDMA Mode – Ch. 600)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	9400	
REFERENCE VOLTAGE:	4.21	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.21	- 30	1,879,999,775	-225	-0.0000120
100 %		- 20	1,880,000,162	162	0.0000086
100 %		- 10	1,880,000,170	170	0.0000090
100 %		0	1,880,000,013	13	0.0000007
100 %		+ 10	1,879,999,978	-22	-0.0000012
100 %		+ 20	1,880,000,302	302	0.0000161
100 %		+ 30	1,879,999,789	-211	-0.0000112
100 %		+ 40	1,880,000,140	140	0.0000074
100 %		+ 50	1,880,000,014	14	0.0000007
BATT. ENDPOINT	3.85	+ 20	1,880,000,130	130	0.0000069

Table 7-36. Frequency Stability Data (PCS WCDMA Mode – Ch. 9400)

Frequency Stability / Temperature Variation

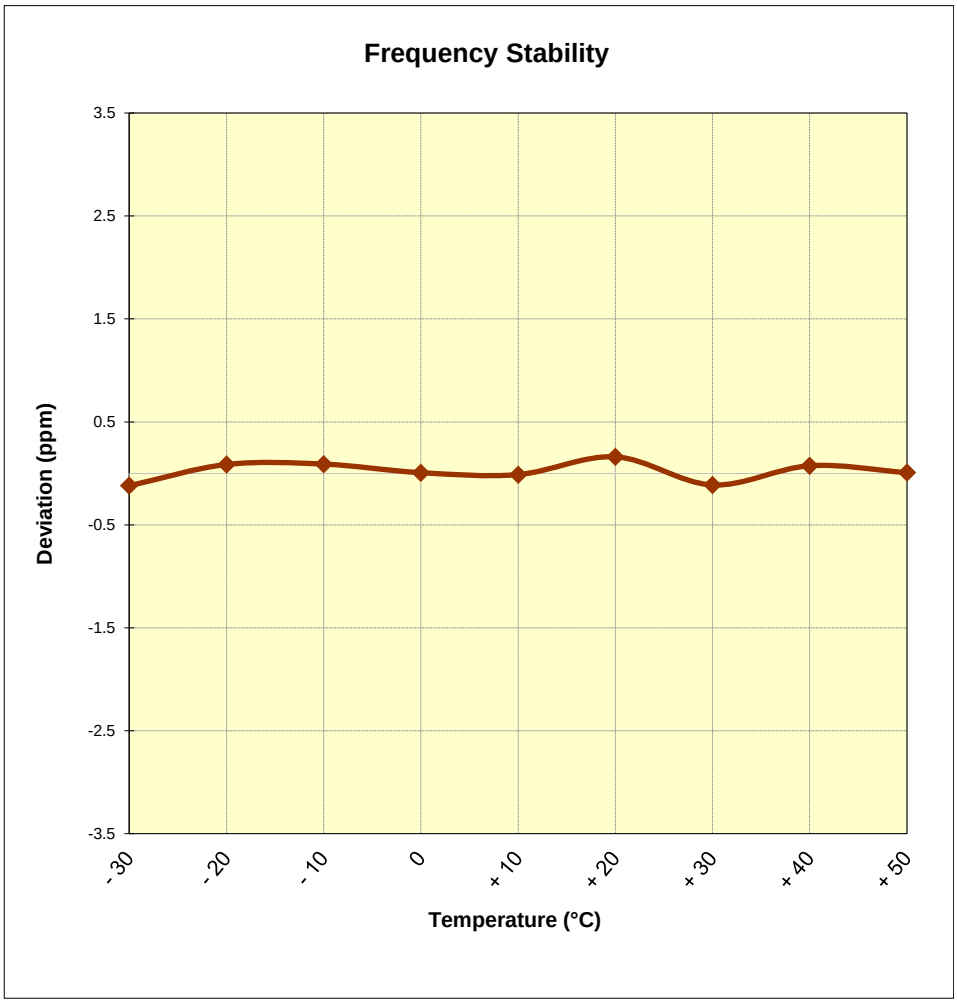


Figure 7-15. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMF707U** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules.