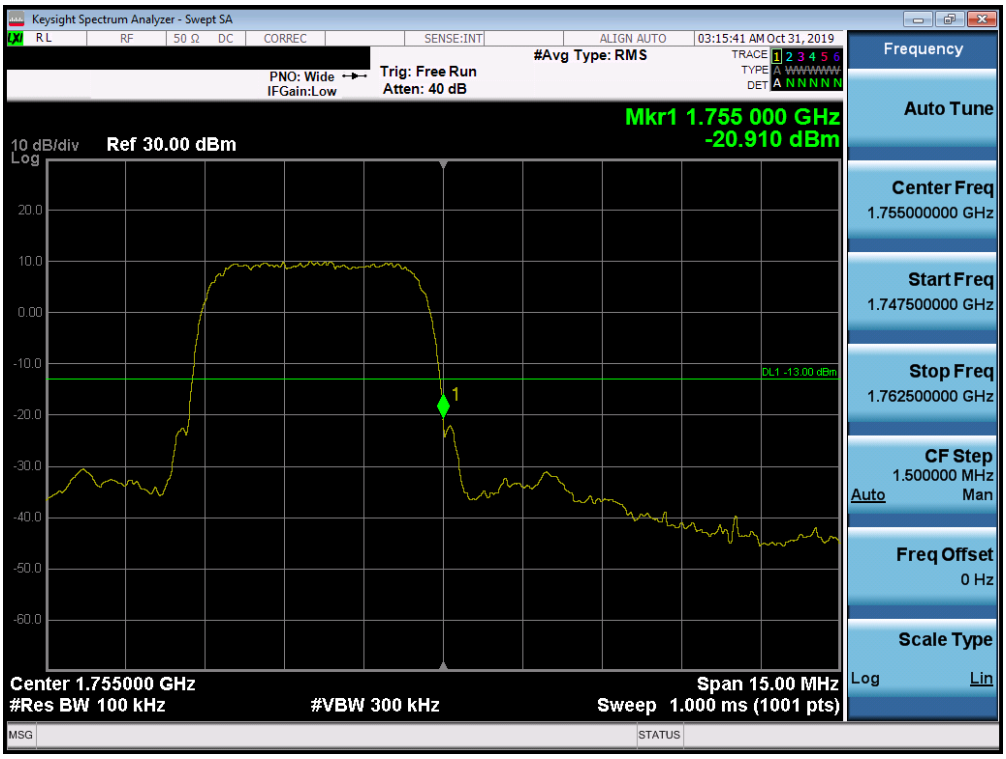
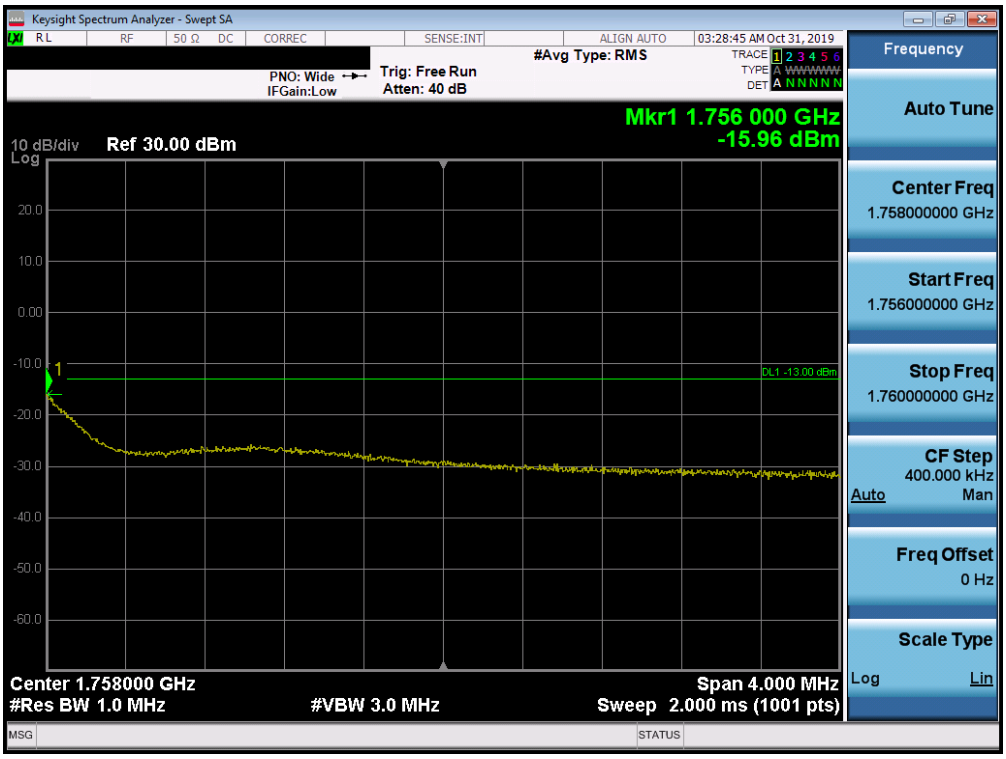
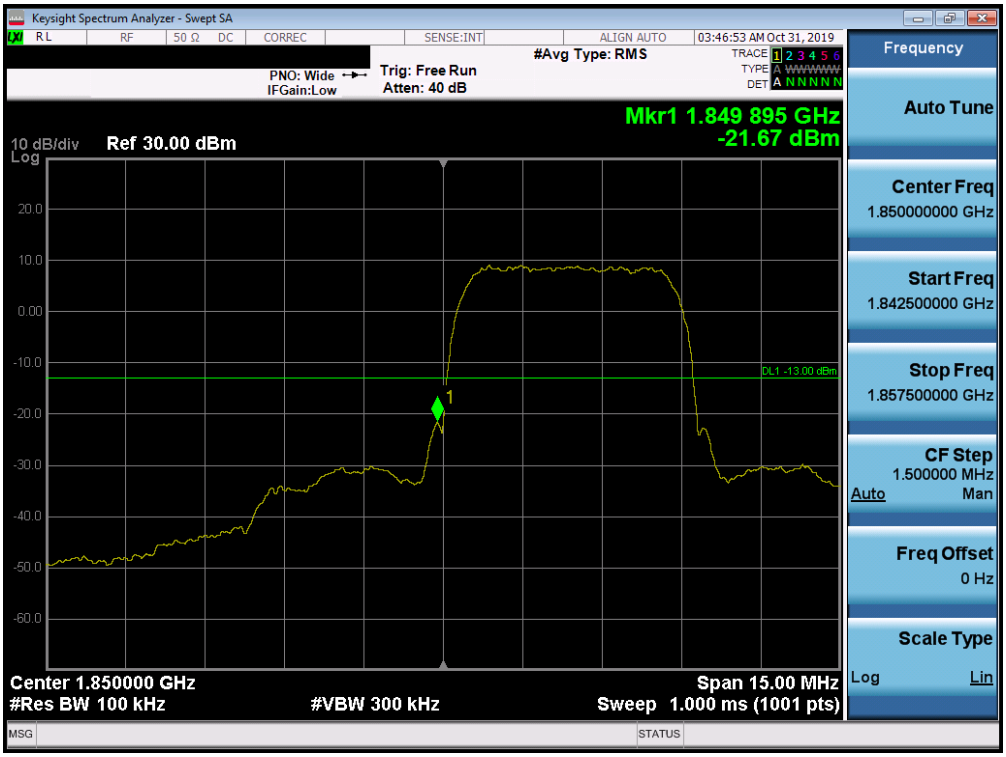


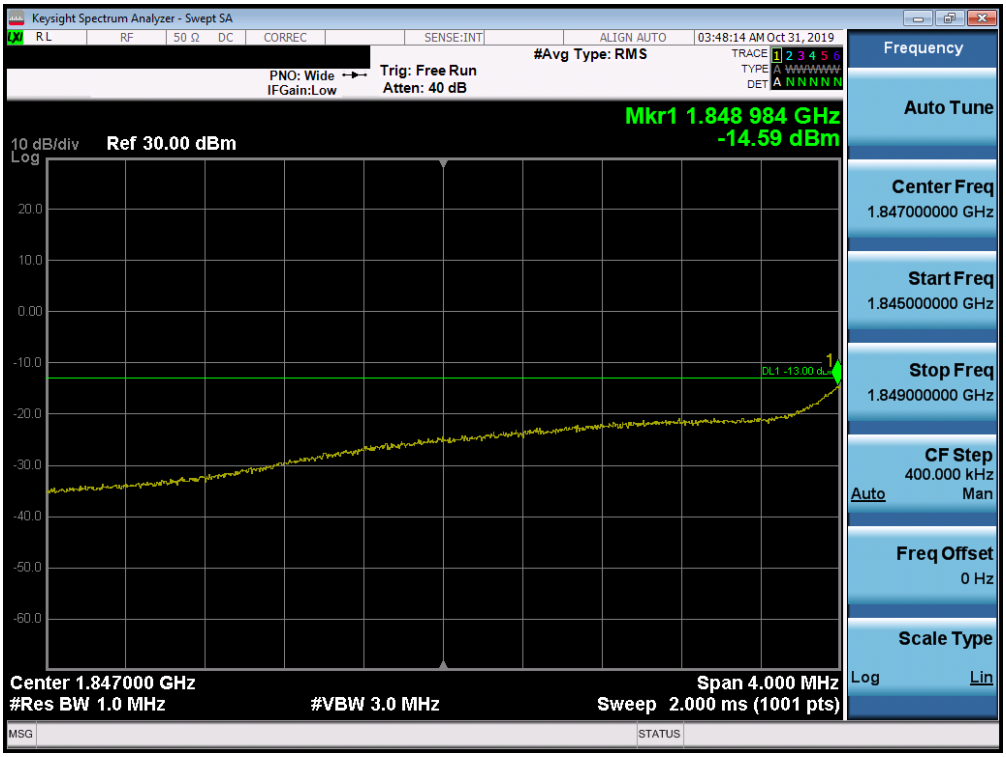
Plot 7-91. Band Edge Plot (AWS WCDMA Mode - High Channel)



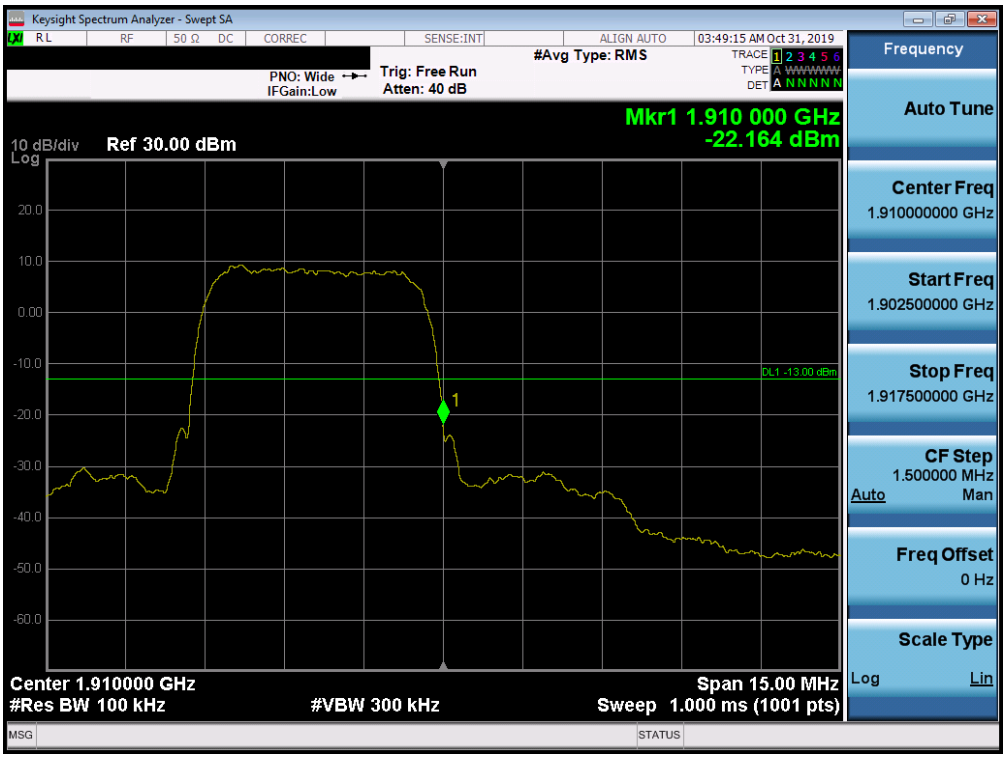
Plot 7-92. 4MHz Span Plot (AWS WCDMA Mode - High Channel)



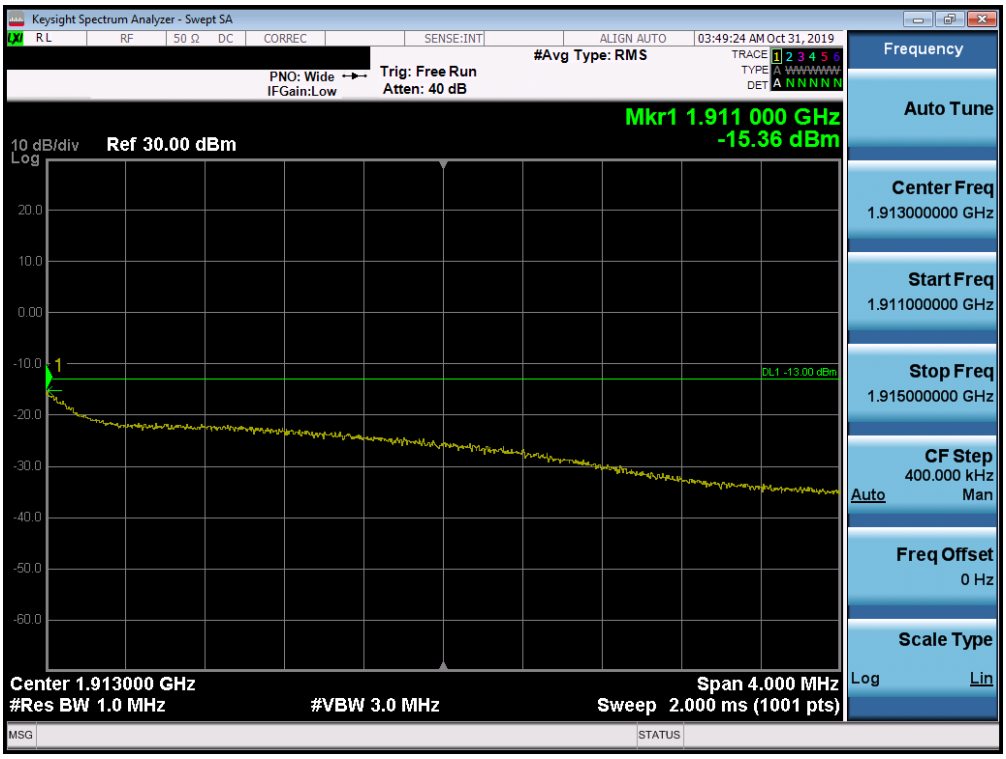
Plot 7-93. Band Edge Plot (PCS WCDMA Mode - Low Channel)



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

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.

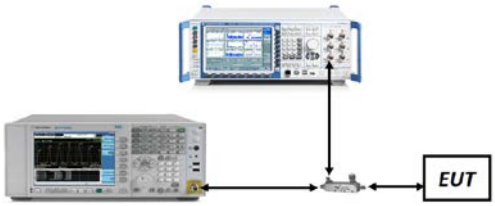
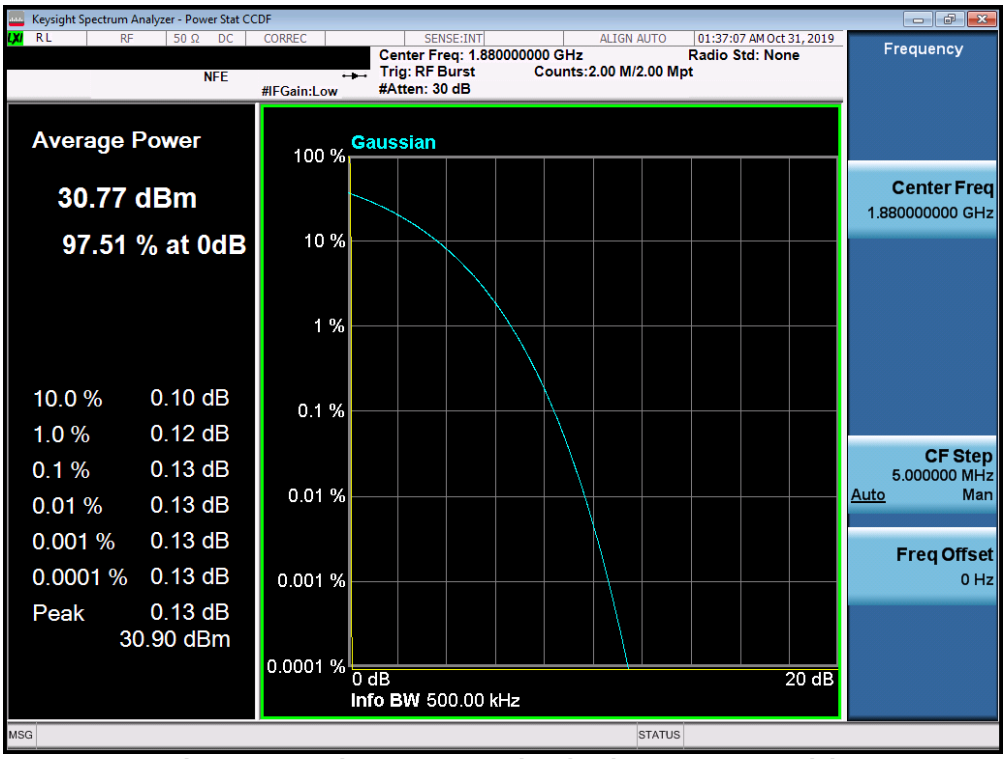


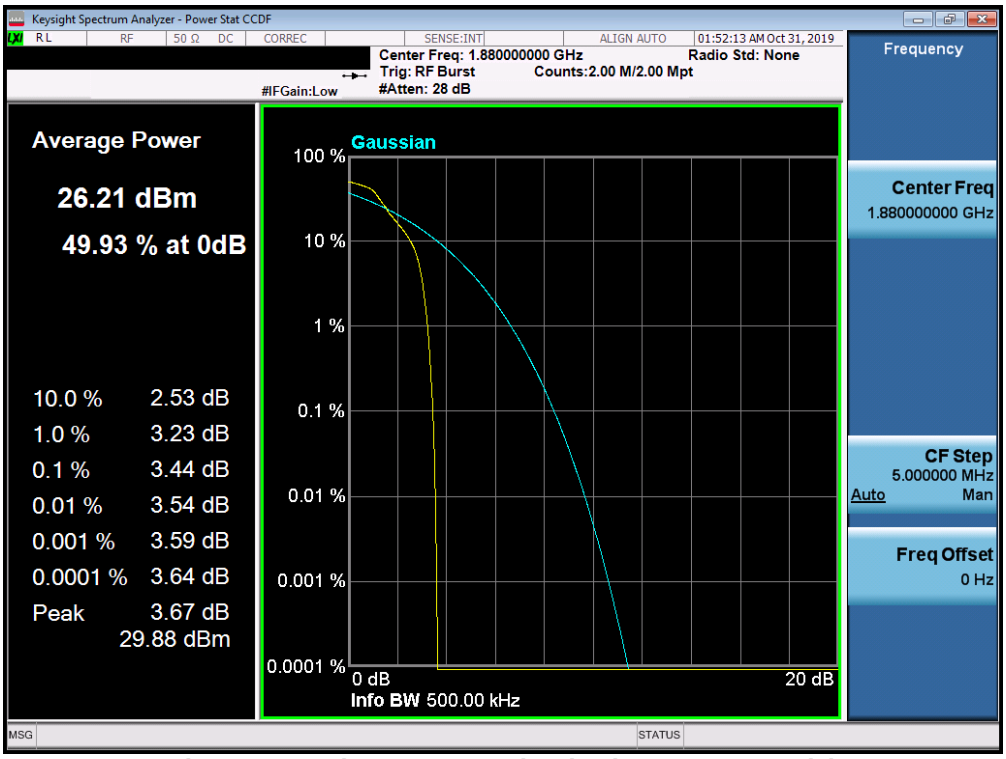
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

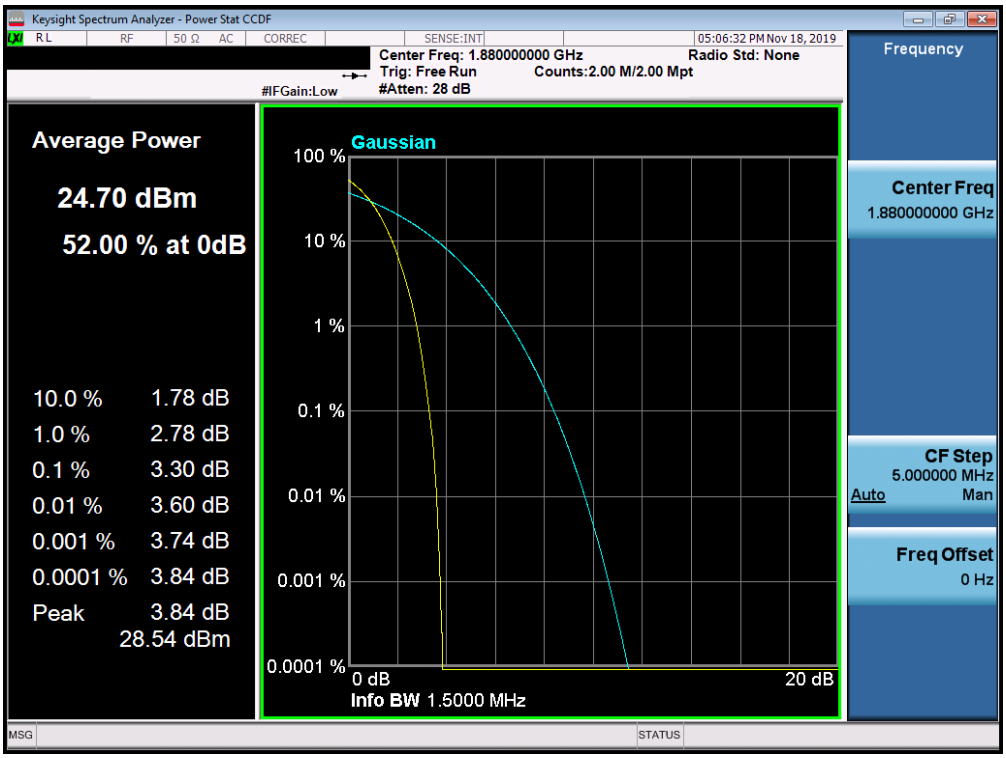
None



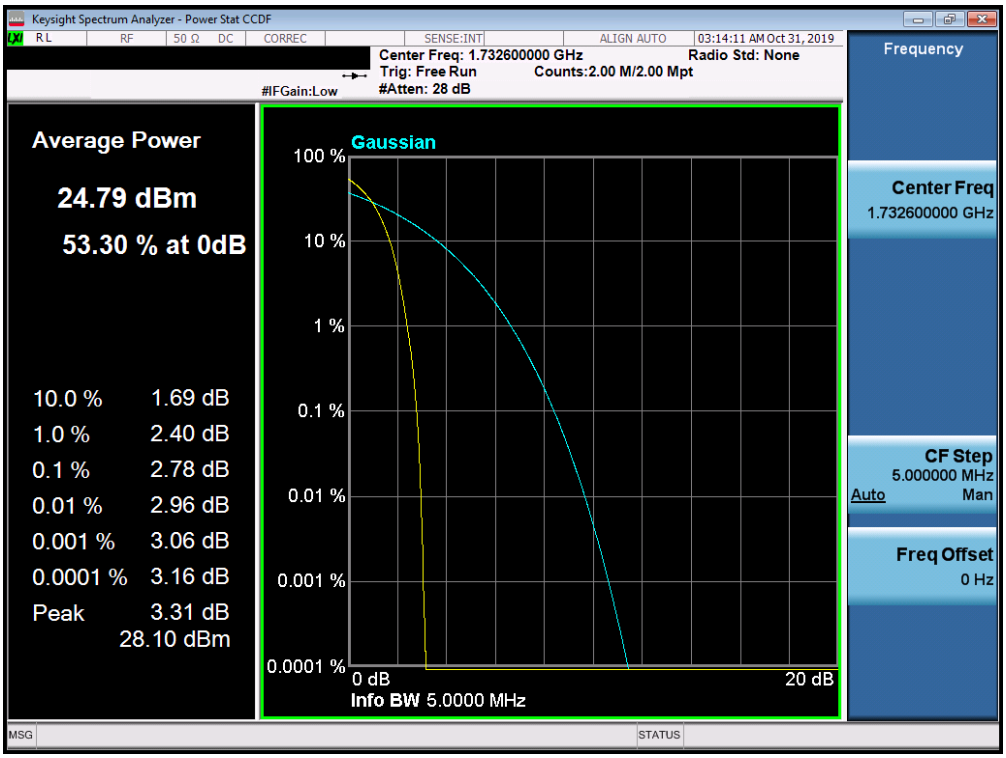
Plot 7-97. Peak-Average Ratio Plot (PCS GPRS Mode)



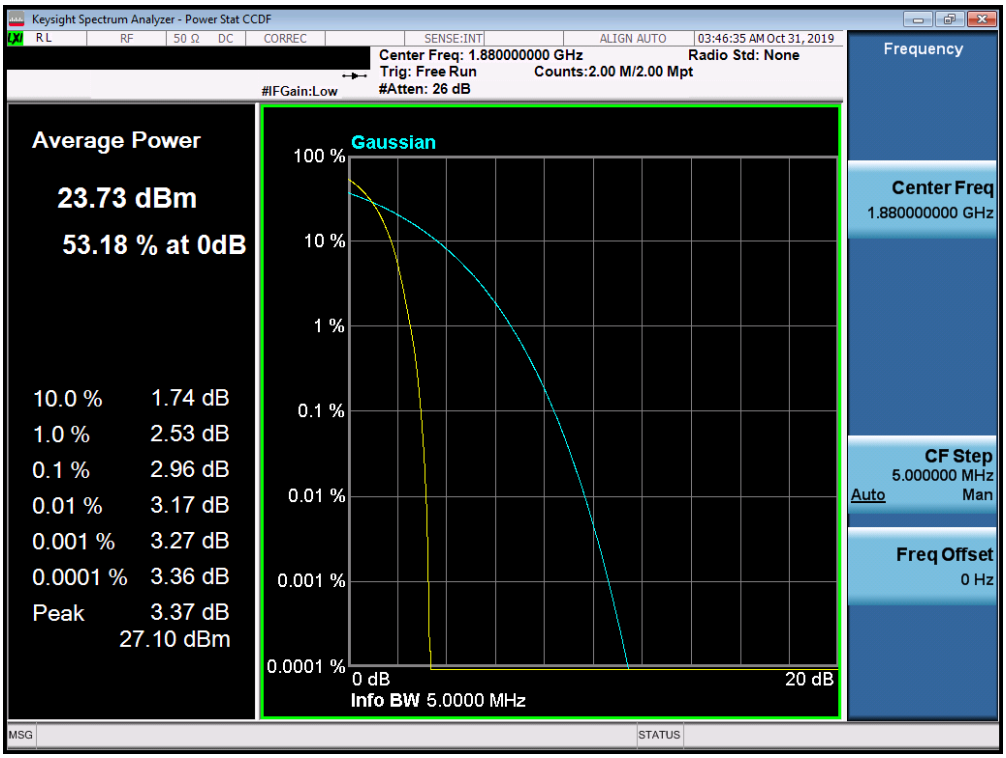
Plot 7-98. Peak-Average Ratio Plot (EDGE1900 Mode)



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



Plot 7-100. Peak-Average Ratio Plot (AWS WCDMA Mode)



Plot 7-101. 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.

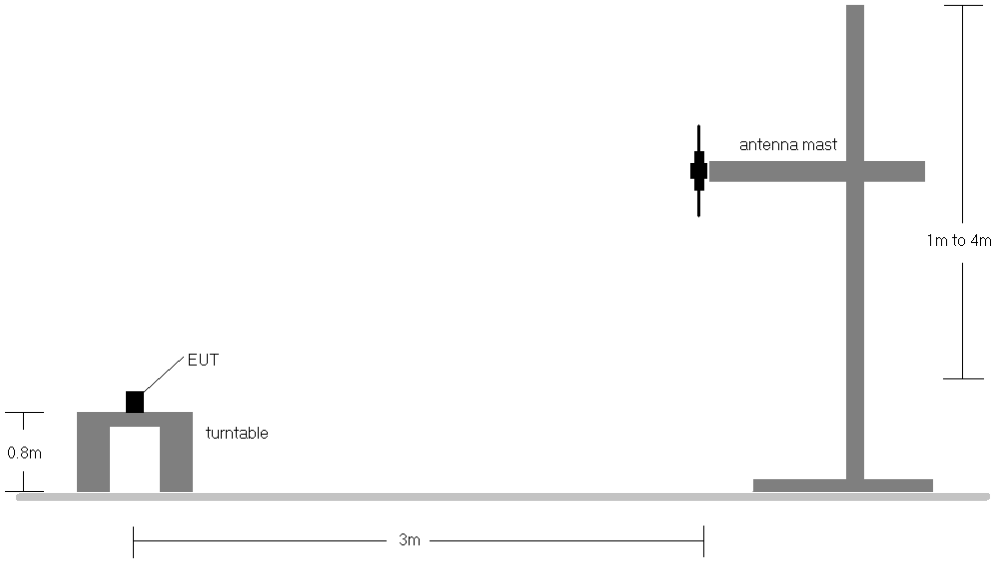


Figure 7-5. Radiated Test Setup <1GHz

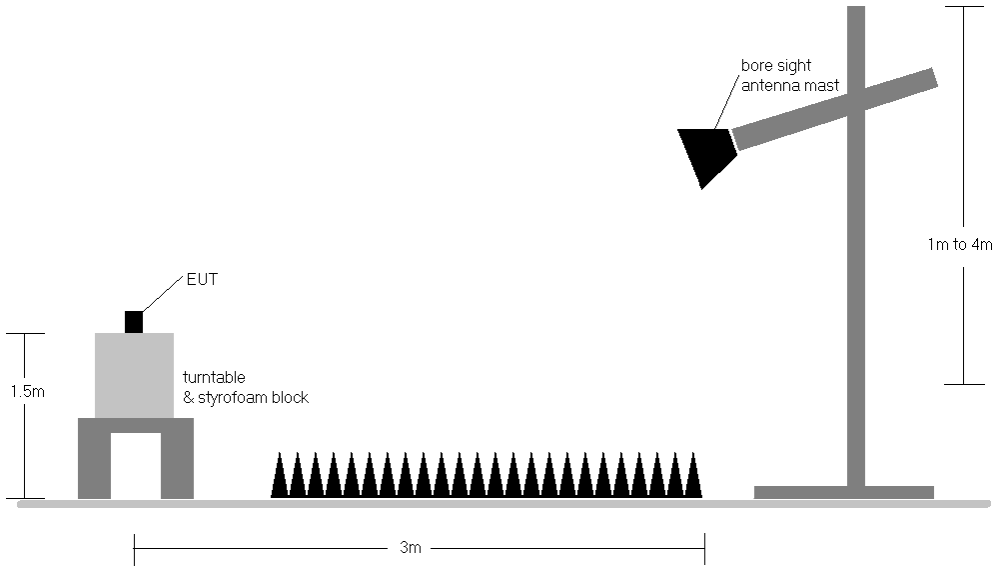


Figure 7-6. Radiated Test Setup >1GHz

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) 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	H	216	291	23.52	6.70	28.07	38.45	-10.38	30.22	40.61	-10.39
836.60	GPRS850	H	201	290	24.64	6.70	29.19	38.45	-9.26	31.34	40.61	-9.27
848.80	GPRS850	H	205	287	25.23	6.70	**29.78**	38.45	-8.67	**31.93**	40.61	-8.68
848.80	GPRS850	V	151	249	24.34	6.70	28.89	38.45	-9.56	31.04	40.61	-9.57
848.80	EDGE850	H	205	287	17.64	6.70	**22.19**	38.45	-16.26	**24.34**	40.61	-16.27

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	H	100	304	15.36	6.70	19.91	38.45	-18.54	22.06	40.61	-18.55
836.52	CDMA850	H	100	295	15.75	6.70	**20.30**	38.45	-18.15	**22.45**	40.61	-18.16
848.31	CDMA850	H	114	303	15.18	6.70	19.73	38.45	-18.72	21.88	40.61	-18.73
836.52	CDMA850	V	232	118	15.26	6.70	19.81	38.45	-18.64	21.96	40.61	-18.65

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	H	100	295	15.93	6.70	**20.48**	38.45	-17.97	**22.63**	40.61	-17.98
836.60	WCDMA850	H	102	304	15.82	6.70	20.37	38.45	-18.08	22.52	40.61	-18.09
846.60	WCDMA850	H	115	309	15.30	6.60	19.75	38.45	-18.70	21.90	40.61	-18.71
826.40	WCDMA850	V	115	273	15.33	6.70	19.88	38.45	-18.57	22.03	40.61	-18.58

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	116	15	15.36	9.44	24.80	30.00	-5.20
1732.60	WCDMA1700	H	101	24	15.73	9.31	**25.04**	30.00	-4.96
1752.60	WCDMA1700	H	103	13	15.46	9.21	24.67	30.00	-5.33
1732.60	WCDMA1700	V	122	288	14.46	9.31	23.77	30.00	-6.23

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	H	102	22	21.17	9.48	30.65	33.01	-2.36
1880.00	GPRS1900	H	117	15	20.90	9.90	30.80	33.01	-2.21
1909.80	GPRS1900	H	107	23	20.77	10.26	**31.03**	33.01	-1.98
1909.80	GPRS1900	V	109	70	20.60	9.90	30.50	33.01	-2.51
1909.80	EDGE1900	H	107	23	17.14	9.90	**27.04**	33.01	-5.97

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 [Watts]	EIRP Limit [dBm]	Margin [dB]
1851.25	CDMA1900	H	126	25	16.36	9.49	25.85	0.385	33.01	-7.16
1880.00	CDMA1900	H	120	21	16.29	9.90	26.19	0.416	33.01	-6.82
1908.75	CDMA1900	H	115	23	16.23	10.25	**26.48**	**0.444**	33.01	-6.53
1908.75	CDMA1900	V	129	73	15.24	10.25	25.49	0.354	33.01	-7.52

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 [Watts]	EIRP Limit [dBm]	Margin [dB]
1852.40	WCDMA1900	H	135	23	16.32	9.51	25.83	0.383	33.01	-7.18
1880.00	WCDMA1900	H	122	18	16.46	9.90	**26.36**	**0.432**	33.01	-6.65
1907.60	WCDMA1900	H	149	22	15.55	10.24	25.79	0.379	33.01	-7.22
1880.00	WCDMA1900	V	130	276	15.62	9.90	25.52	0.356	33.01	-7.49

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.

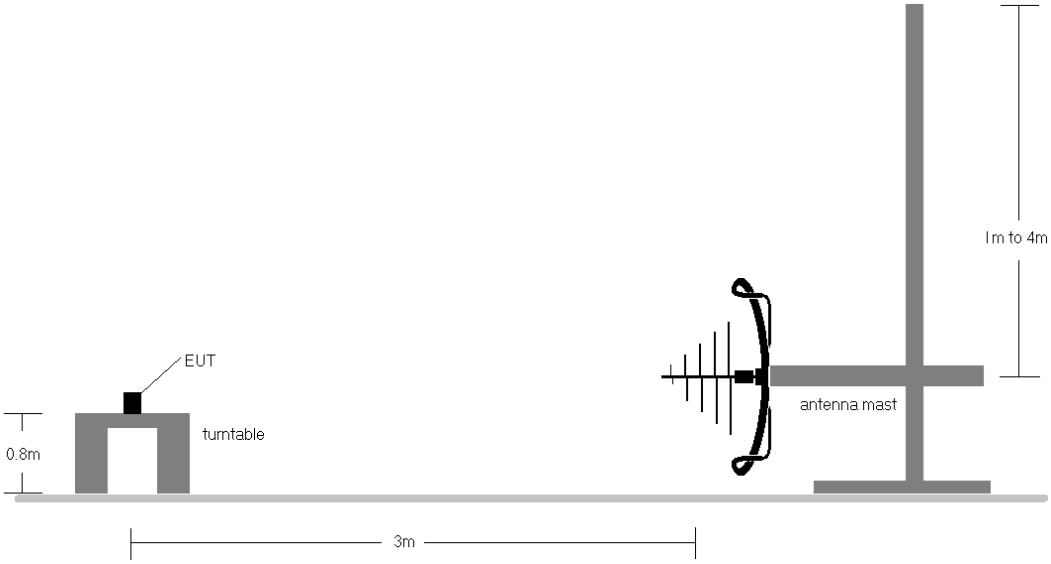


Figure 7-7. Test Instrument & Measurement Setup < 1GHz

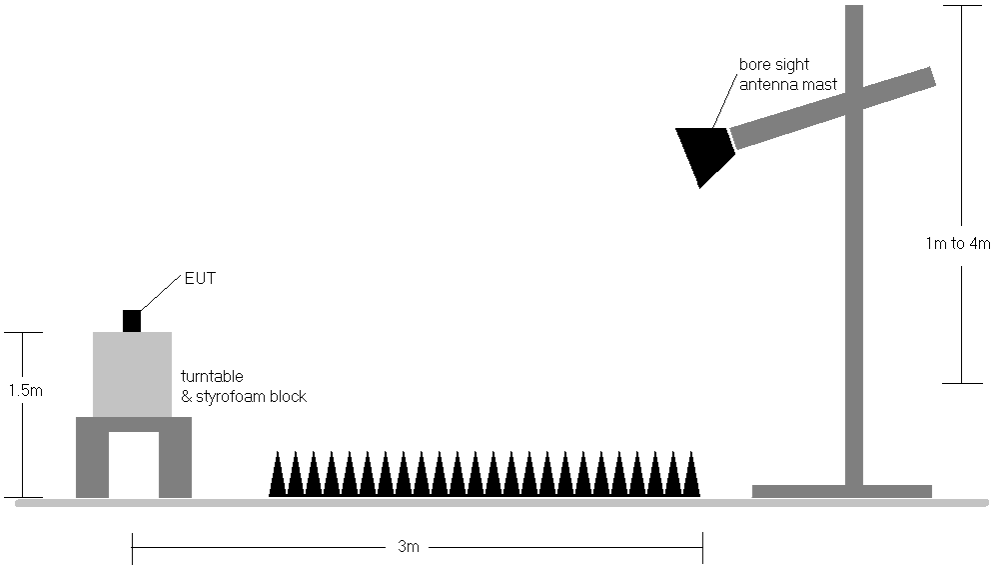


Figure 7-8. Test Instrument & Measurement Setup >1 GHz

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) 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.

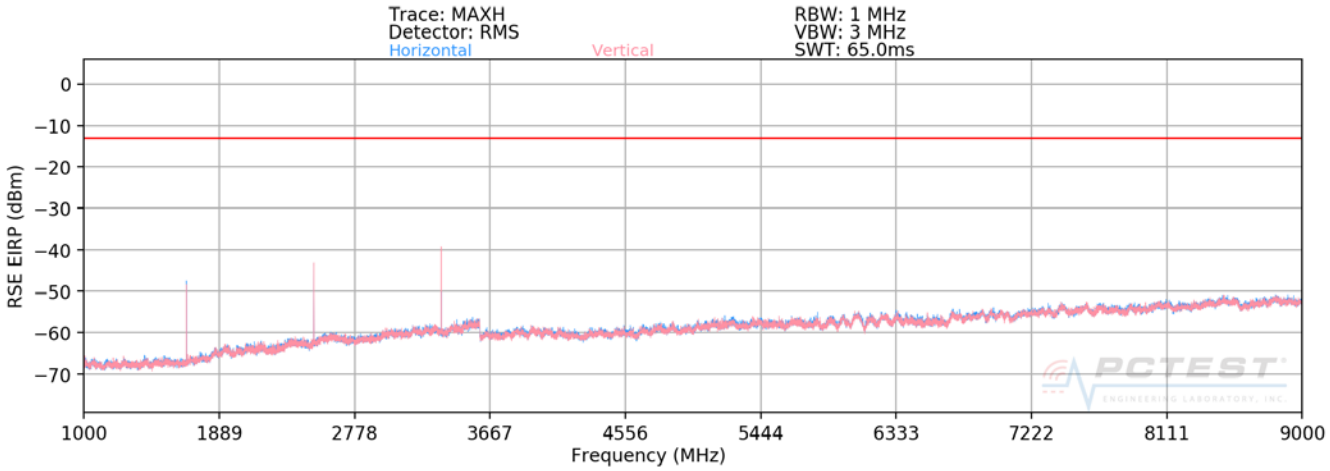
5) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

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 7-102. 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	181	95	-47.88	3.07	-44.81	-31.8
2472.60	V	130	72	-43.49	3.82	-39.67	-26.7
3296.80	V	223	22	-46.61	6.00	-40.61	-27.6
4121.00	V	112	160	-62.69	7.67	-55.02	-42.0
4945.20	V	-	-	-71.01	8.72	-62.29	-49.3
5769.40	V	-	-	-69.65	9.09	-60.56	-47.6

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	168	97	-46.26	3.10	-43.16	-30.2
2509.80	V	143	83	-41.90	4.02	-37.88	-24.9
3346.40	V	218	34	-44.07	6.03	-38.04	-25.0
4183.00	V	131	159	-60.81	7.79	-53.02	-40.0
5019.60	V	-	-	-69.61	8.78	-60.83	-47.8

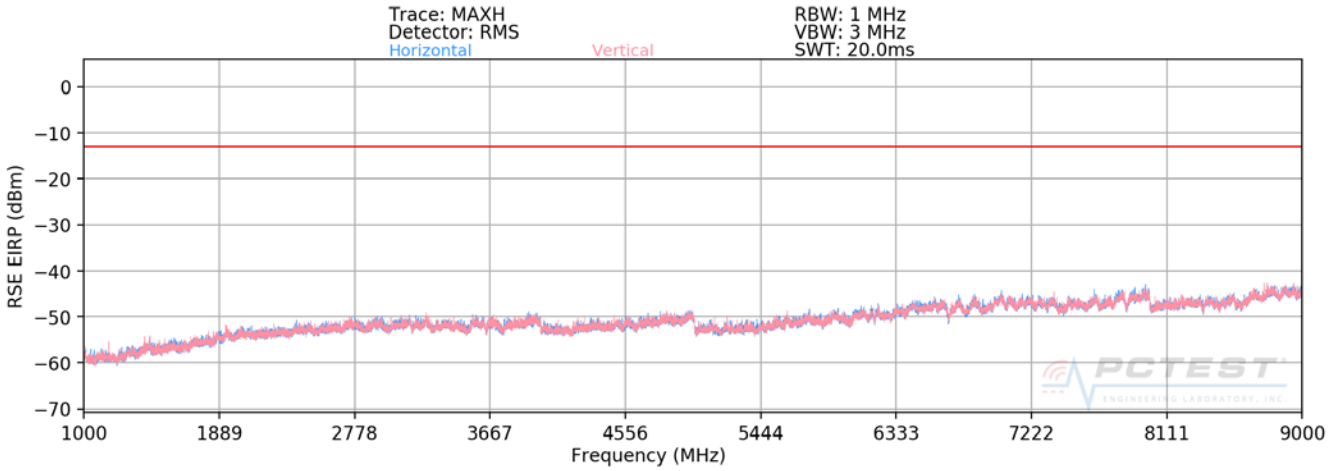
Table 7-10. Radiated Spurious Data (Cellular GPRS Mode – Ch. 190)

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	188	82	-44.70	3.15	-41.55	-28.5
2546.40	V	146	77	-43.54	4.15	-39.39	-26.4
3395.20	V	238	21	-41.46	6.24	-35.23	-22.2
4244.00	V	127	163	-58.98	7.97	-51.01	-38.0
5092.80	V	-	-	-70.40	8.88	-61.52	-48.5
5941.60	V	-	-	-70.25	9.31	-60.94	-47.9

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

Cellular CDMA Mode



Plot 7-103. 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	H	194	243	-66.09	3.08	-63.02	-50.0
2474.10	H	151	225	-62.95	3.84	-59.11	-46.1
3298.80	H	-	-	-68.80	6.00	-62.80	-49.8
4123.50	H	-	-	-68.84	7.68	-61.16	-48.2

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	H	188	260	-66.81	3.10	-63.71	-50.7
2509.56	H	147	233	-65.06	4.02	-61.05	-48.0
3346.08	H	-	-	-68.17	6.03	-62.14	-49.1
4182.60	H	-	-	-69.66	7.79	-61.87	-48.9

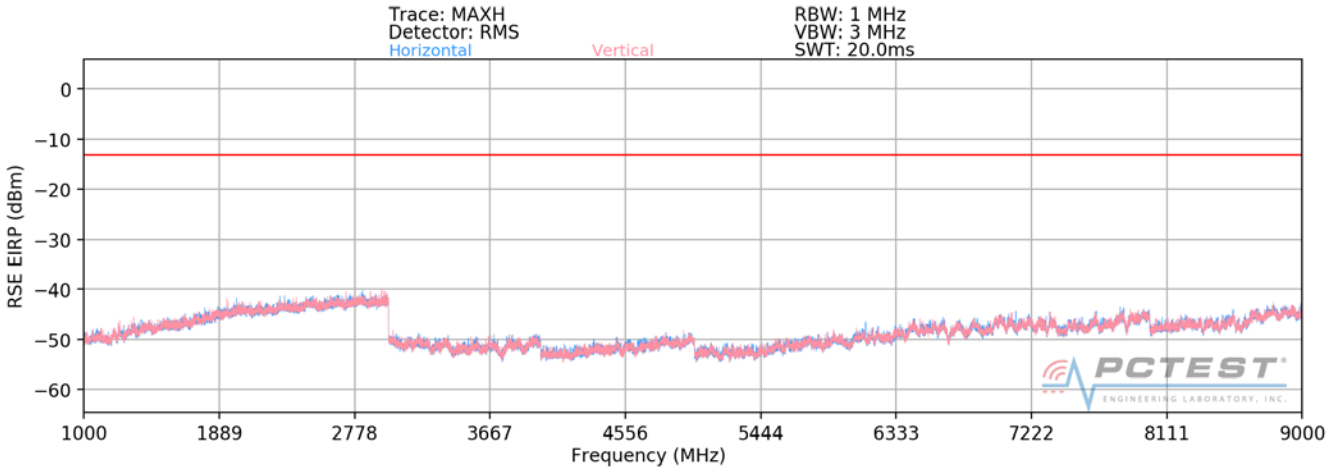
Table 7-13. Radiated Spurious Data (Cellular CDMA Mode – Ch. 384)

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	H	190	261	-66.19	3.15	-63.04	-50.0
2544.93	H	150	235	-64.64	4.14	-60.50	-47.5
3393.24	H	-	-	-67.66	6.23	-61.43	-48.4
4241.55	H	-	-	-70.09	7.96	-62.13	-49.1

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

Cellular WCDMA Mode



Plot 7-104. 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	H	-	-	-68.87	3.09	-65.78	-52.8
2479.20	H	-	-	-65.79	3.91	-61.88	-48.9

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	H	-	-	-68.63	3.10	-65.53	-52.5
2509.80	H	-	-	-66.75	4.02	-62.73	-49.7

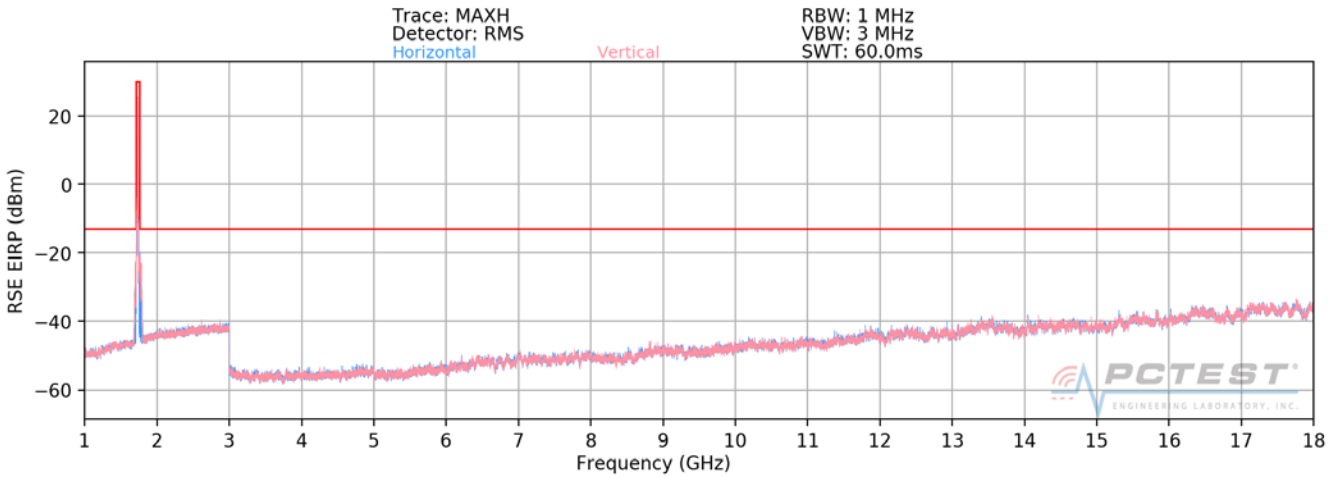
Table 7-16. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4183)

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	H	-	-	-68.78	3.17	-65.61	-52.6
2539.80	H	-	-	-67.04	4.13	-62.91	-49.9

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

AWS WCDMA Mode



Plot 7-105. 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	H	-	-	-68.70	6.27	-62.43	-49.4
5137.20	H	-	-	-69.51	8.94	-60.57	-47.6

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	H	-	-	-67.92	6.35	-61.57	-48.6
5197.80	H	-	-	-69.52	9.05	-60.47	-47.5

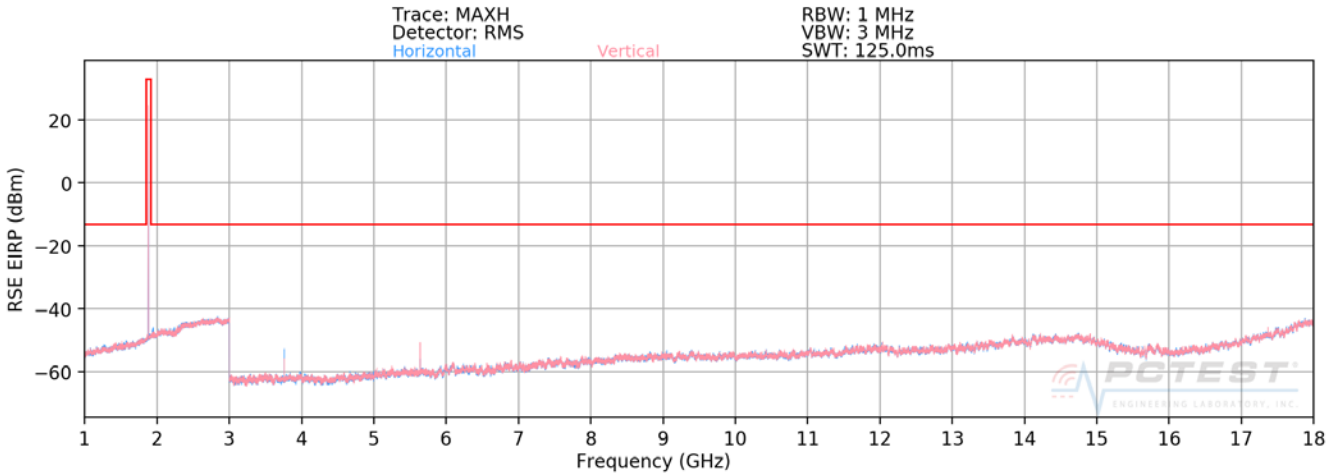
Table 7-19. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1413)

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	H	-	-	-68.01	6.50	-61.50	-48.5
5257.80	H	-	-	-69.65	8.96	-60.69	-47.7

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

PCS GPRS Mode



Plot 7-106. 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	V	164	347	-51.46	9.58	-41.88	-28.9
5550.60	V	150	330	-55.56	10.94	-44.62	-31.6
7400.80	V	-	-	-68.14	10.96	-57.18	-44.2
9251.00	V	-	-	-66.36	11.63	-54.73	-41.7

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	V	165	333	-51.43	9.37	-42.07	-29.1
5640.00	V	133	356	-70.69	11.17	-59.52	-46.5
7520.00	V	-	-	-69.25	11.11	-58.13	-45.1
9400.00	V	-	-	-66.13	11.57	-54.56	-41.6

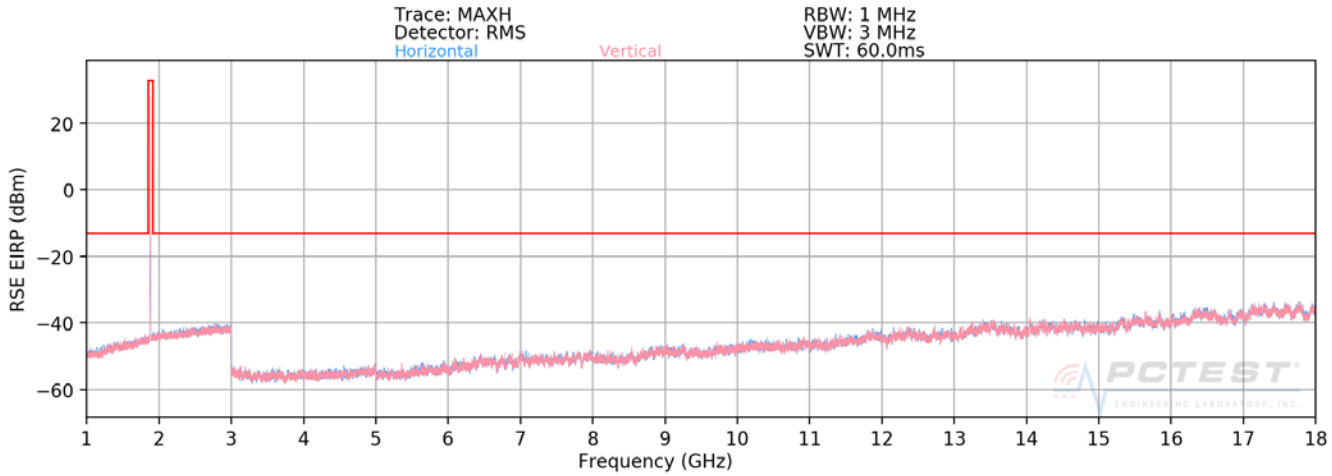
Table 7-22. Radiated Spurious Data (PCS GPRS Mode – Ch. 661)

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	V	310	325	-51.98	9.30	-42.68	-29.7
5729.40	V	111	181	-64.42	11.39	-53.03	-40.0
7639.20	V	-	-	-69.84	11.33	-58.50	-45.5
9549.00	V	-	-	-67.34	11.79	-55.55	-42.5

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

PCS CDMA Mode



Plot 7-107. 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	-	-	-67.10	6.89	-60.21	-47.2
5553.75	H	312	348	-60.99	9.02	-51.97	-39.0
7405.00	H	-	-	-66.25	9.22	-57.03	-44.0
9256.25	H	-	-	-62.63	9.45	-53.18	-40.2

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	-	-	-68.91	6.93	-61.98	-49.0
5640.00	H	300	350	-63.32	9.15	-54.17	-41.2
7520.00	H	-	-	-66.69	9.31	-57.38	-44.4
9400.00	H	-	-	-62.89	9.49	-53.40	-40.4

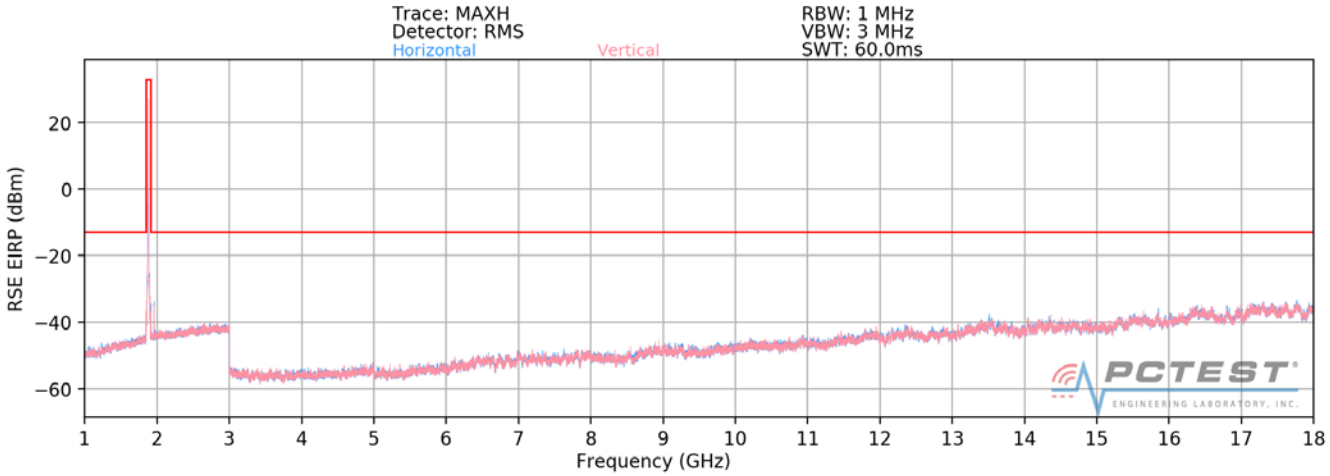
Table 7-25. Radiated Spurious Data (PCS CDMA Mode – Ch. 600)

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	-	-	-67.86	7.10	-60.76	-47.8
5726.25	H	303	342	-64.38	9.03	-55.34	-42.3
7635.00	H	-	-	-64.64	9.29	-55.35	-42.4
9543.75	H	-	-	-63.96	9.44	-54.53	-41.5

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

PCS WCDMA Mode



Plot 7-108. 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	-	-	-68.15	6.89	-61.25	-48.3
5557.20	H	-	-	-68.69	9.03	-59.66	-46.7

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	-	-	-69.15	6.93	-62.22	-49.2
5640.00	H	-	-	-67.56	9.15	-58.41	-45.4

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	-	-	-68.62	7.09	-61.53	-48.5
5722.80	H	-	-	-68.86	9.04	-59.82	-46.8

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:	4.18	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.18	- 30	836,600,027	27	0.0000032
100 %		- 20	836,600,410	410	0.0000490
100 %		- 10	836,599,938	-62	-0.0000074
100 %		0	836,599,915	-85	-0.0000102
100 %		+ 10	836,599,741	-259	-0.0000310
100 %		+ 20	836,600,056	56	0.0000067
100 %		+ 30	836,599,962	-38	-0.0000045
100 %		+ 40	836,600,082	82	0.0000098
100 %		+ 50	836,600,062	62	0.0000074
BATT. ENDPOINT	3.45	+ 20	836,599,587	-413	-0.0000494

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

Frequency Stability / Temperature Variation

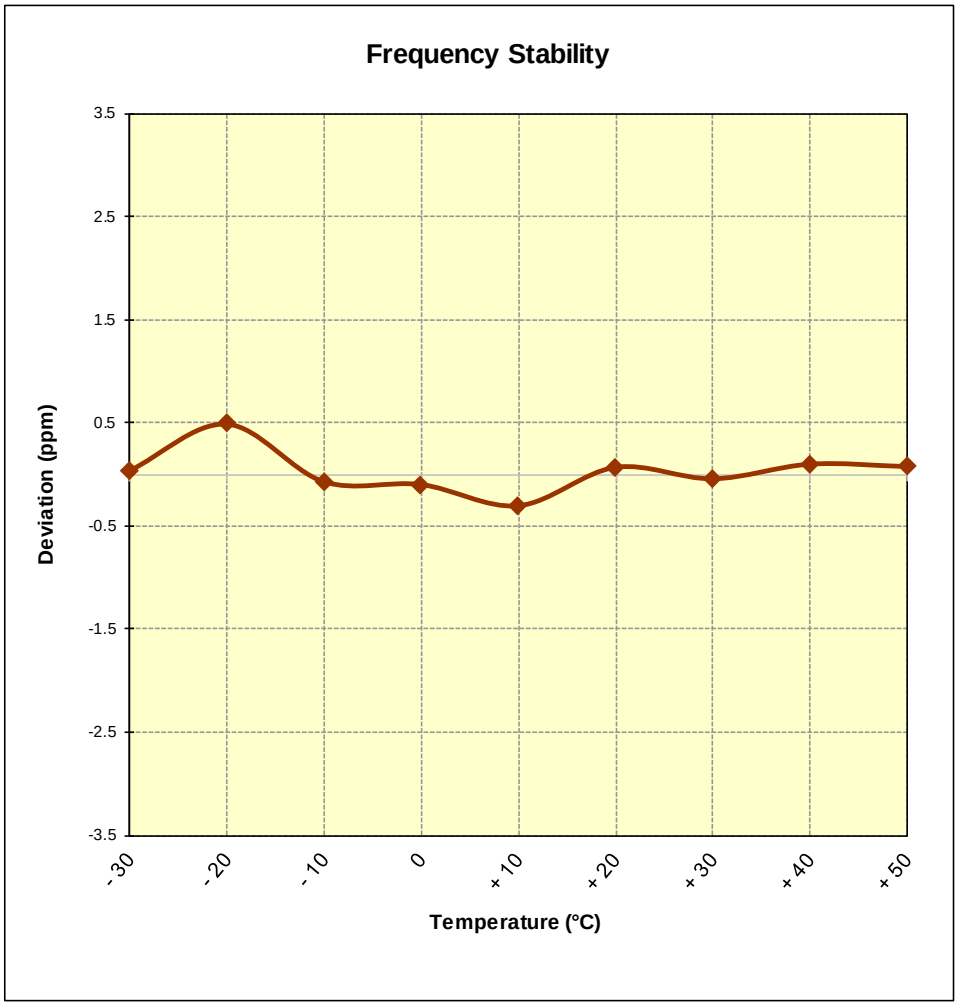


Figure 7-9. Frequency Stability Graph (Cellular GPRS Mode – Ch. 190)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	836,520,000	Hz
CHANNEL:	384	
REFERENCE VOLTAGE:	4.18	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.18	- 30	836,520,005	5	0.0000006
100 %		- 20	836,519,955	-45	-0.0000054
100 %		- 10	836,520,026	26	0.0000031
100 %		0	836,519,919	-81	-0.0000097
100 %		+ 10	836,520,252	252	0.0000301
100 %		+ 20	836,520,064	64	0.0000077
100 %		+ 30	836,519,896	-104	-0.0000124
100 %		+ 40	836,519,889	-111	-0.0000133
100 %		+ 50	836,520,016	16	0.0000019
BATT. ENDPOINT	3.45	+ 20	836,519,969	-31	-0.0000037

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

Frequency Stability / Temperature Variation

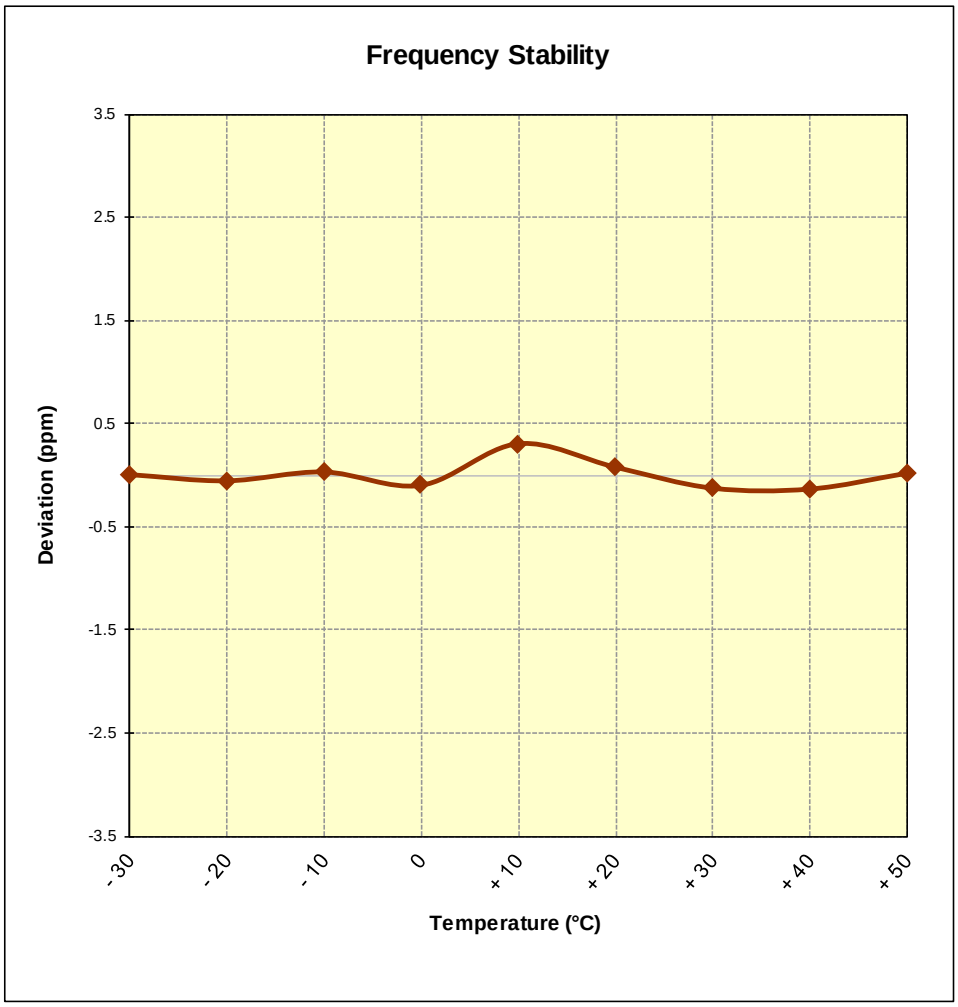


Figure 7-10. Frequency Stability Graph (Cellular CDMA Mode – Ch. 384)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	4183	
REFERENCE VOLTAGE:	4.18	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.18	- 30	836,599,975	-25	-0.0000030
100 %		- 20	836,600,156	156	0.0000186
100 %		- 10	836,599,942	-58	-0.0000069
100 %		0	836,600,144	144	0.0000172
100 %		+ 10	836,599,807	-193	-0.0000231
100 %		+ 20	836,600,097	97	0.0000116
100 %		+ 30	836,600,028	28	0.0000033
100 %		+ 40	836,599,990	-10	-0.0000012
100 %		+ 50	836,599,702	-298	-0.0000356
BATT. ENDPOINT	3.45	+ 20	836,600,067	67	0.0000080

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

Frequency Stability / Temperature Variation

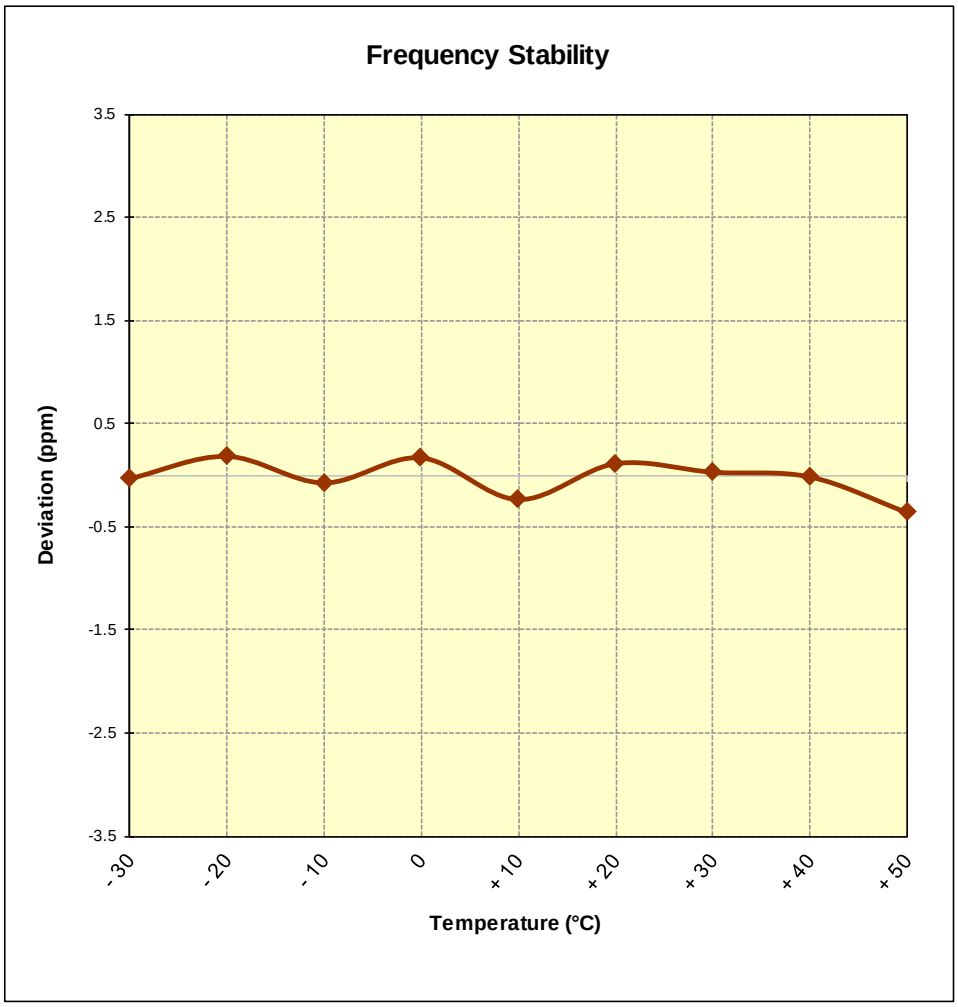


Figure 7-11. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,732,600,000	Hz
CHANNEL:	1413	
REFERENCE VOLTAGE:	4.18	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.18	- 30	1,732,600,039	39	0.0000023
100 %		- 20	1,732,599,770	-230	-0.0000133
100 %		- 10	1,732,600,046	46	0.0000027
100 %		0	1,732,600,074	74	0.0000043
100 %		+ 10	1,732,599,992	-8	-0.0000005
100 %		+ 20	1,732,600,232	232	0.0000134
100 %		+ 30	1,732,600,095	95	0.0000055
100 %		+ 40	1,732,599,844	-156	-0.0000090
100 %		+ 50	1,732,600,324	324	0.0000187
BATT. ENDPOINT	3.45	+ 20	1,732,600,102	102	0.0000059

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

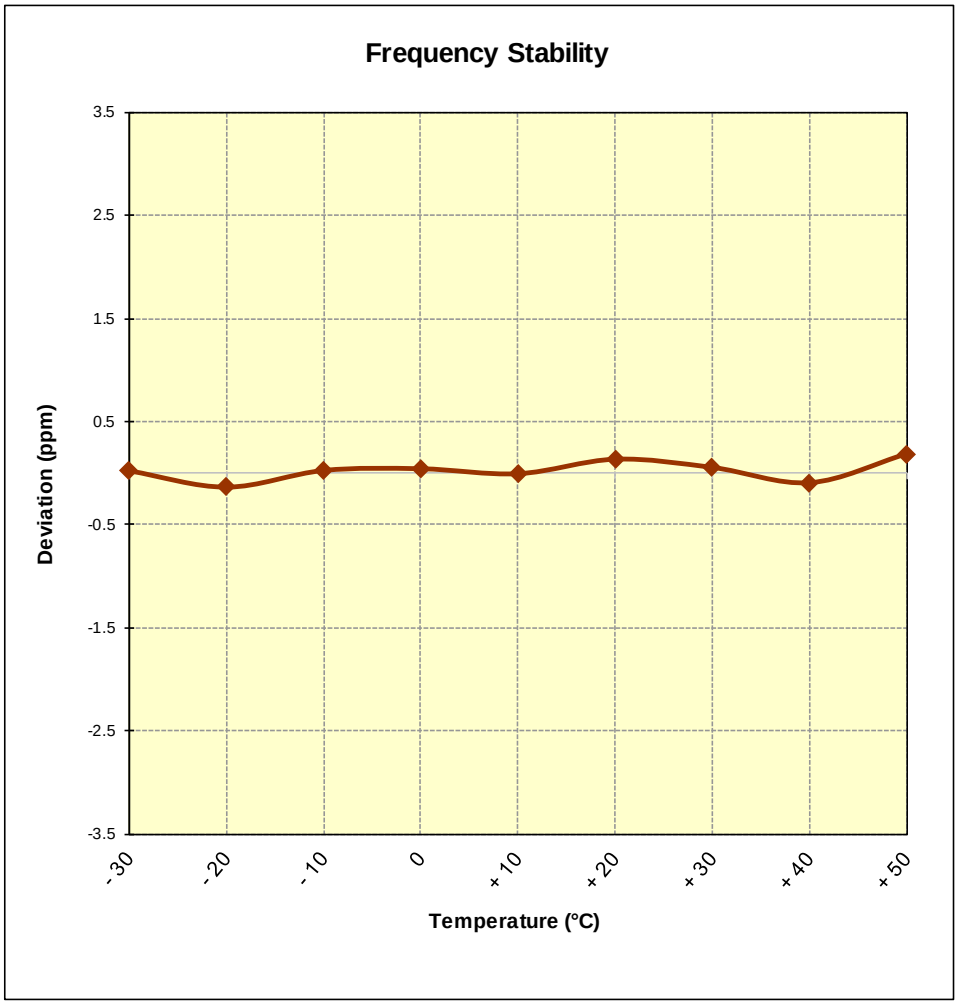


Figure 7-12. Frequency Stability Graph (AWS WCDMA Mode – Ch. 1413)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	661	
REFERENCE VOLTAGE:	4.18	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.18	- 30	1,880,000,083	83	0.0000044
100 %		- 20	1,880,000,301	301	0.0000160
100 %		- 10	1,880,000,305	305	0.0000162
100 %		0	1,880,000,186	186	0.0000099
100 %		+ 10	1,879,999,833	-167	-0.0000089
100 %		+ 20	1,880,000,066	66	0.0000035
100 %		+ 30	1,879,999,881	-119	-0.0000063
100 %		+ 40	1,879,999,787	-213	-0.0000113
100 %		+ 50	1,880,000,057	57	0.0000030
BATT. ENDPOINT	3.45	+ 20	1,879,999,759	-241	-0.0000128

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

Frequency Stability / Temperature Variation

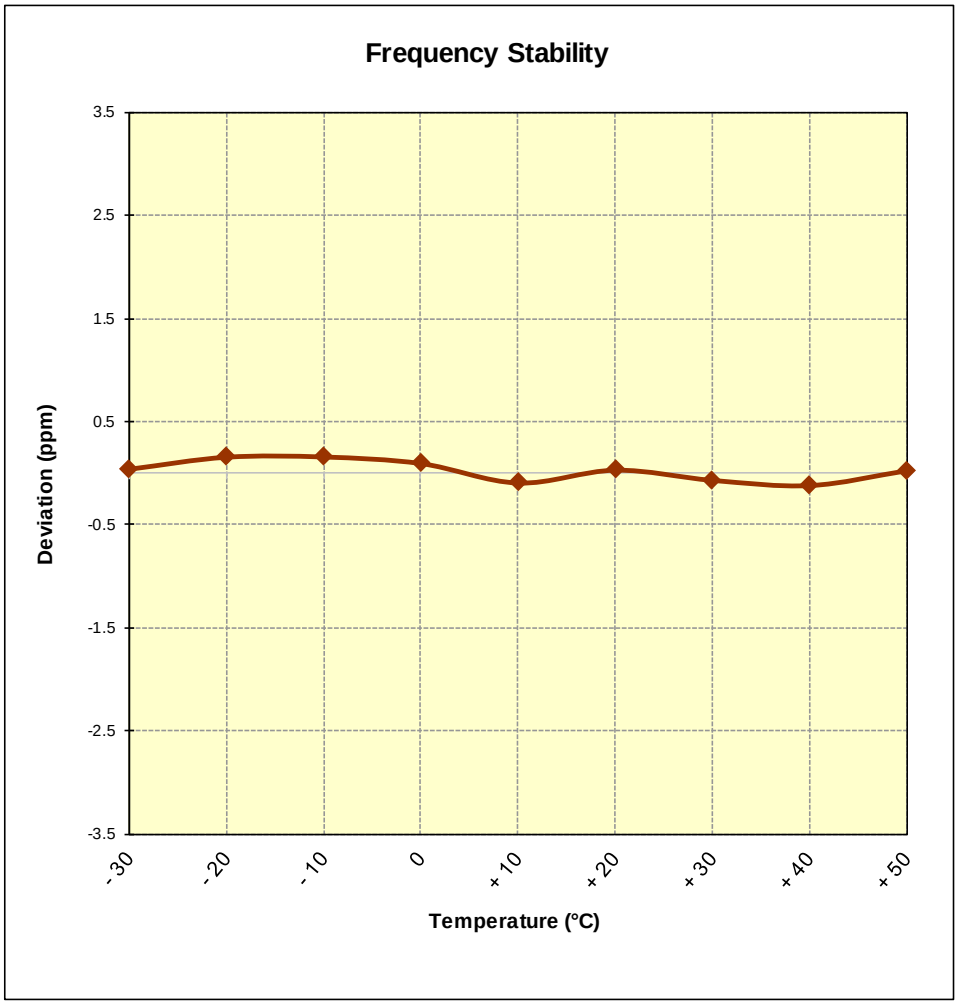


Figure 7-13. Frequency Stability Graph (PCS GPRS Mode – Ch. 661)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	600	
REFERENCE VOLTAGE:	4.18	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.18	- 30	1,880,000,245	245	0.0000130
100 %		- 20	1,880,000,064	64	0.0000034
100 %		- 10	1,879,999,980	-20	-0.0000011
100 %		0	1,879,999,870	-130	-0.0000069
100 %		+ 10	1,879,999,654	-346	-0.0000184
100 %		+ 20	1,880,000,288	288	0.0000153
100 %		+ 30	1,880,000,286	286	0.0000152
100 %		+ 40	1,879,999,985	-15	-0.0000008
100 %		+ 50	1,879,999,876	-124	-0.0000066
BATT. ENDPOINT	3.45	+ 20	1,879,999,905	-95	-0.0000051

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

Frequency Stability / Temperature Variation

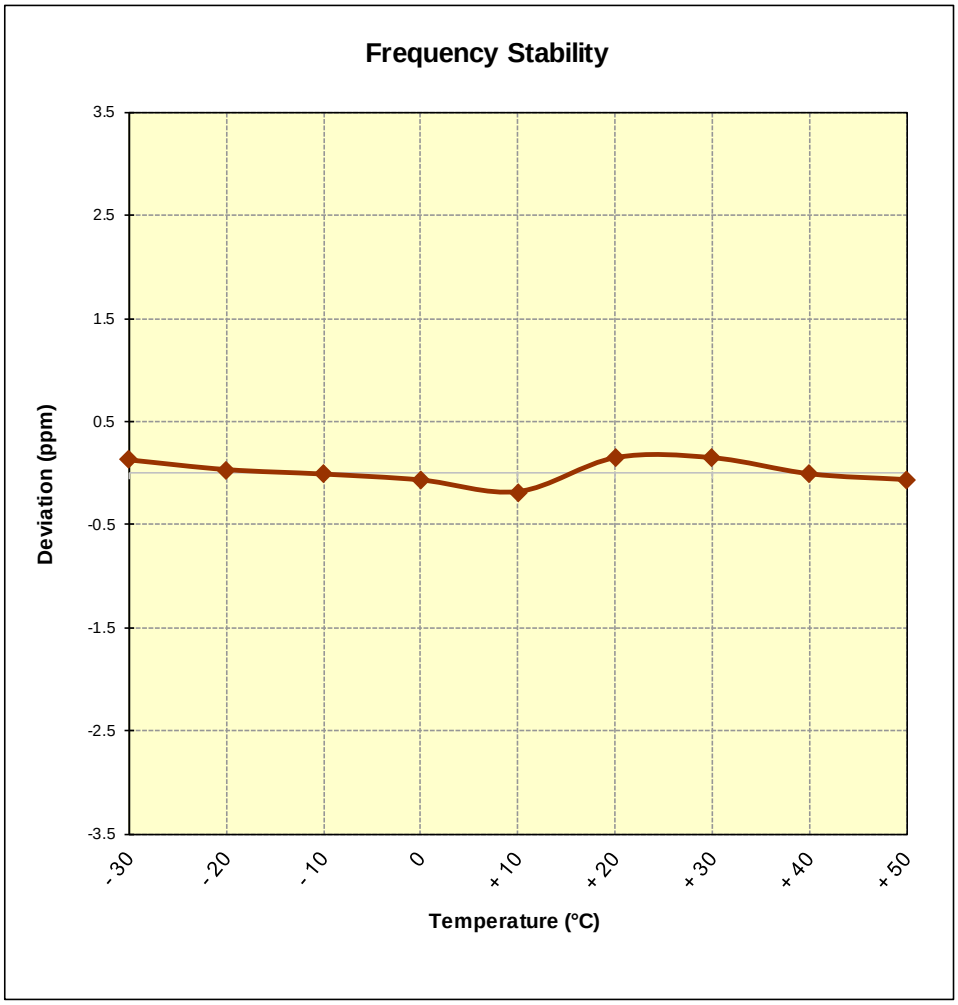


Figure 7-14. Frequency Stability Graph (PCS CDMA Mode – Ch. 600)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	9400	
REFERENCE VOLTAGE:	4.18	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.18	- 30	1,879,999,919	-81	-0.0000043
100 %		- 20	1,879,999,757	-243	-0.0000129
100 %		- 10	1,879,999,764	-236	-0.0000126
100 %		0	1,879,999,989	-11	-0.0000006
100 %		+ 10	1,879,999,985	-15	-0.0000008
100 %		+ 20	1,879,999,937	-63	-0.0000034
100 %		+ 30	1,879,999,970	-30	-0.0000016
100 %		+ 40	1,880,000,201	201	0.0000107
100 %		+ 50	1,879,999,717	-283	-0.0000151
BATT. ENDPOINT	3.45	+ 20	1,880,000,039	39	0.0000021

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

Frequency Stability / Temperature Variation

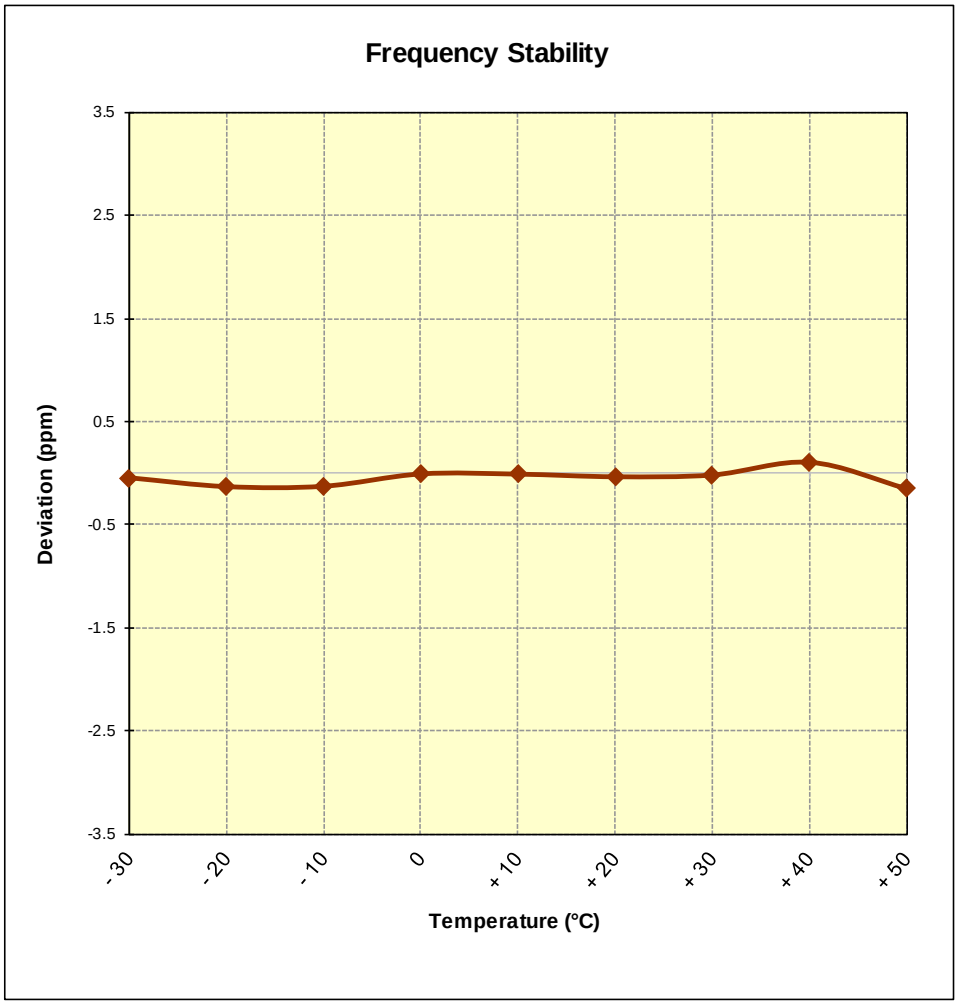


Figure 7-15. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFL555DL** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules.