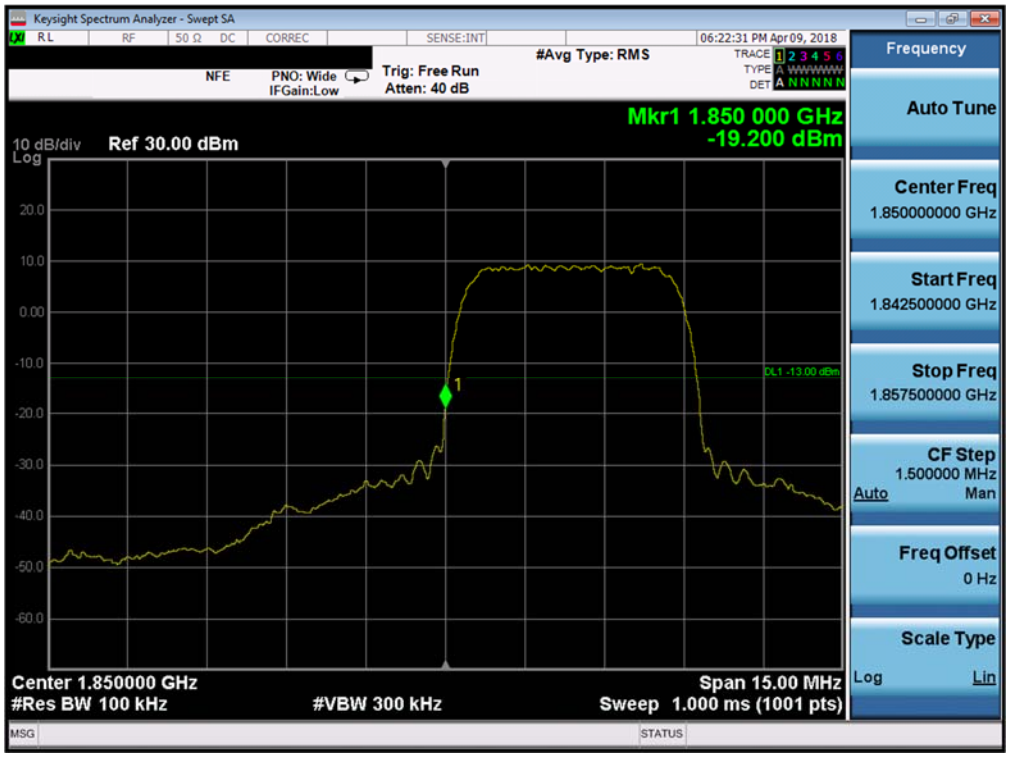
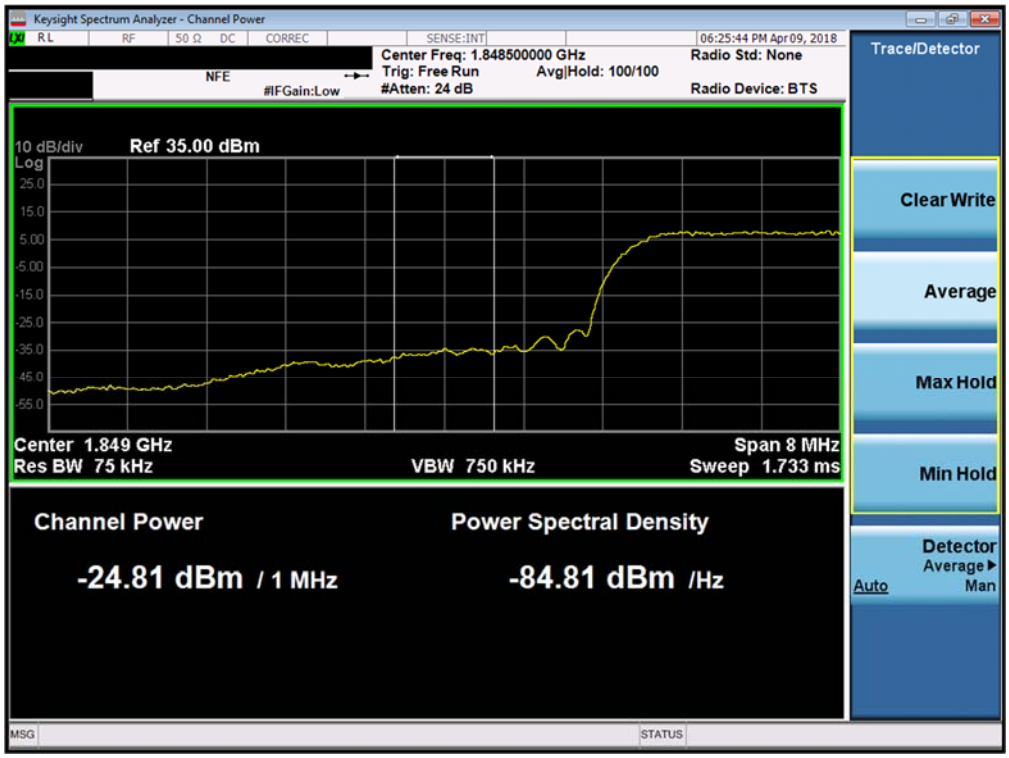
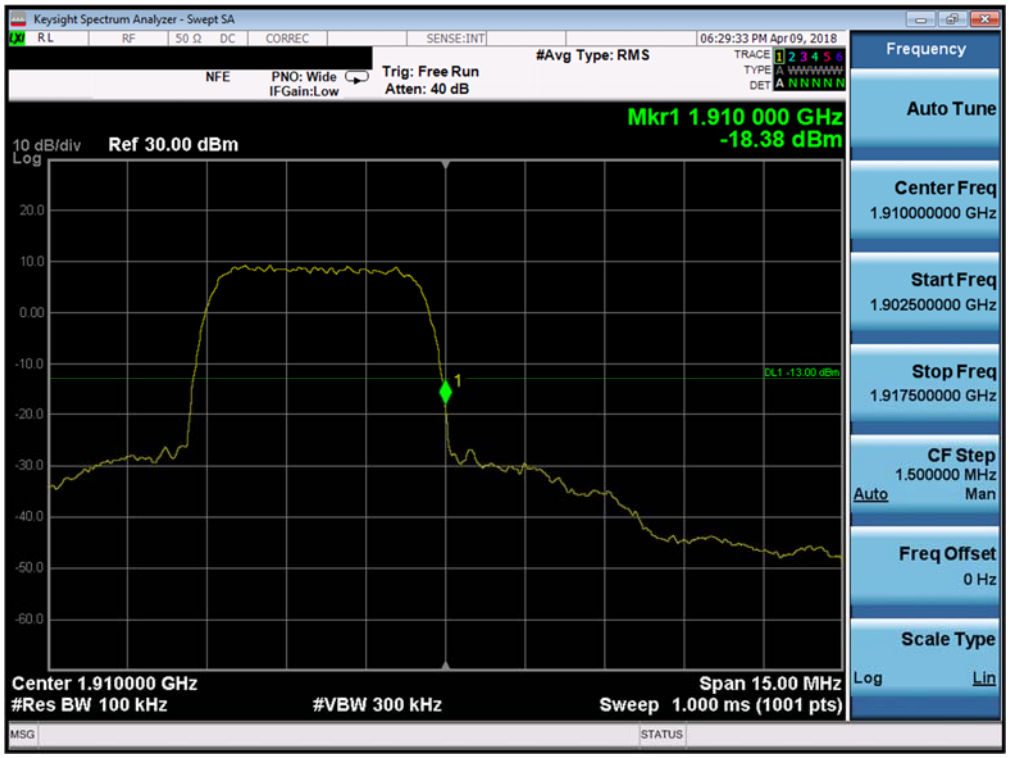


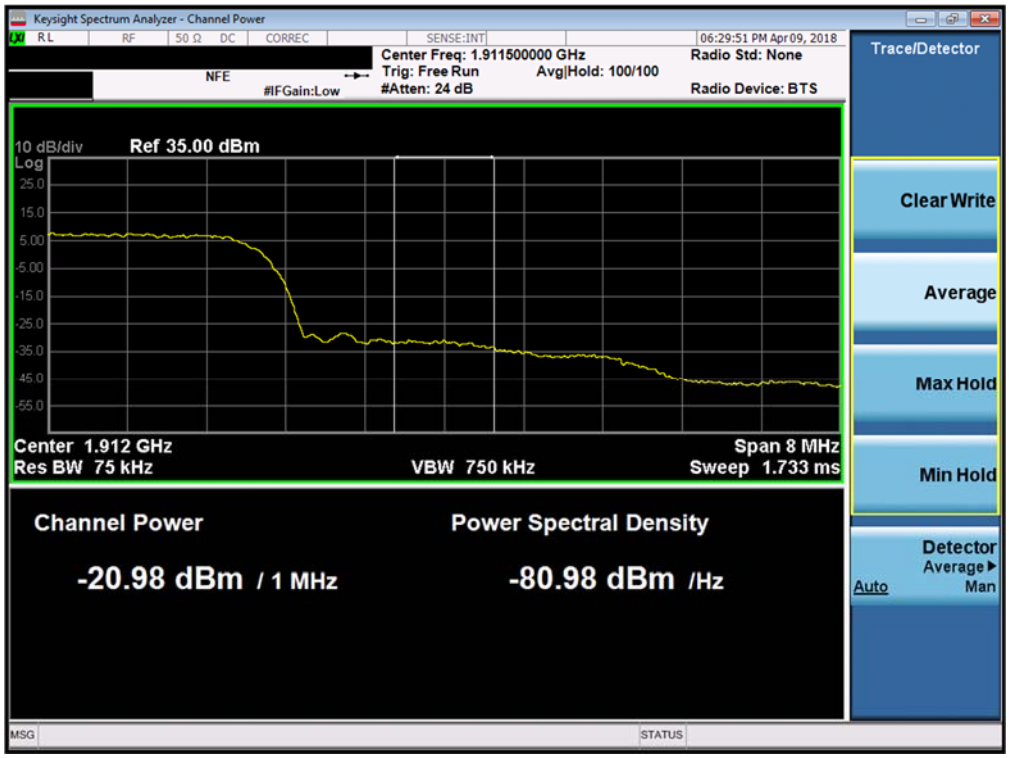
Plot 7-93. Band Edge Plot (PCS WCDMA Mode - Low Channel)



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

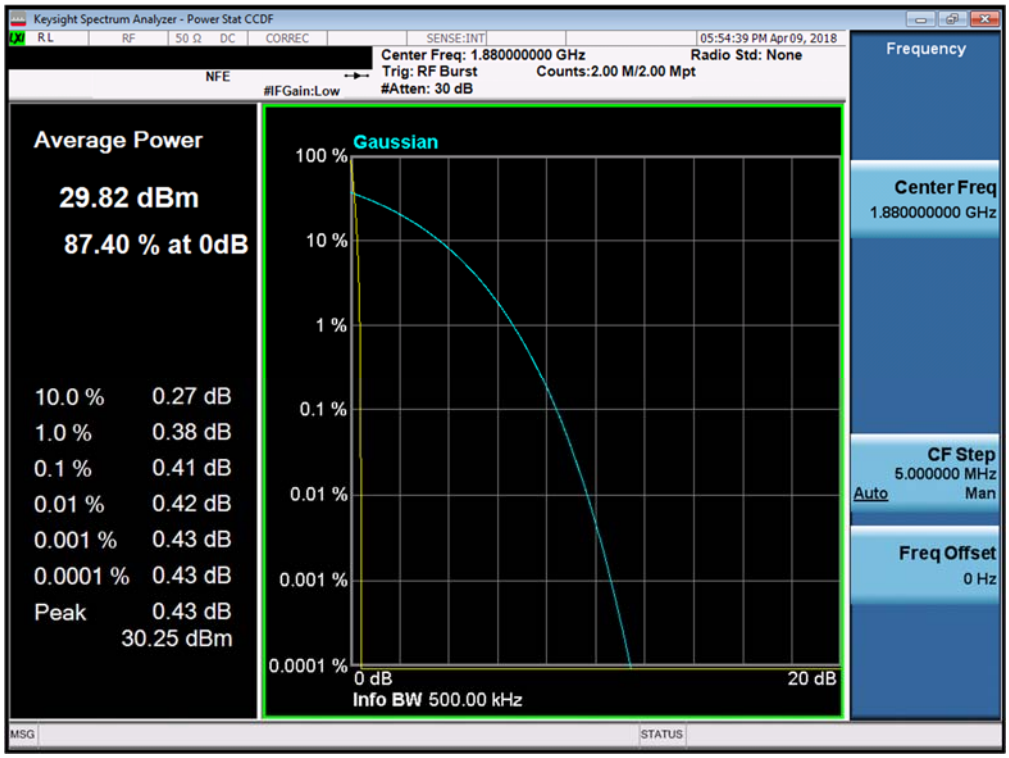
Test Setup

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

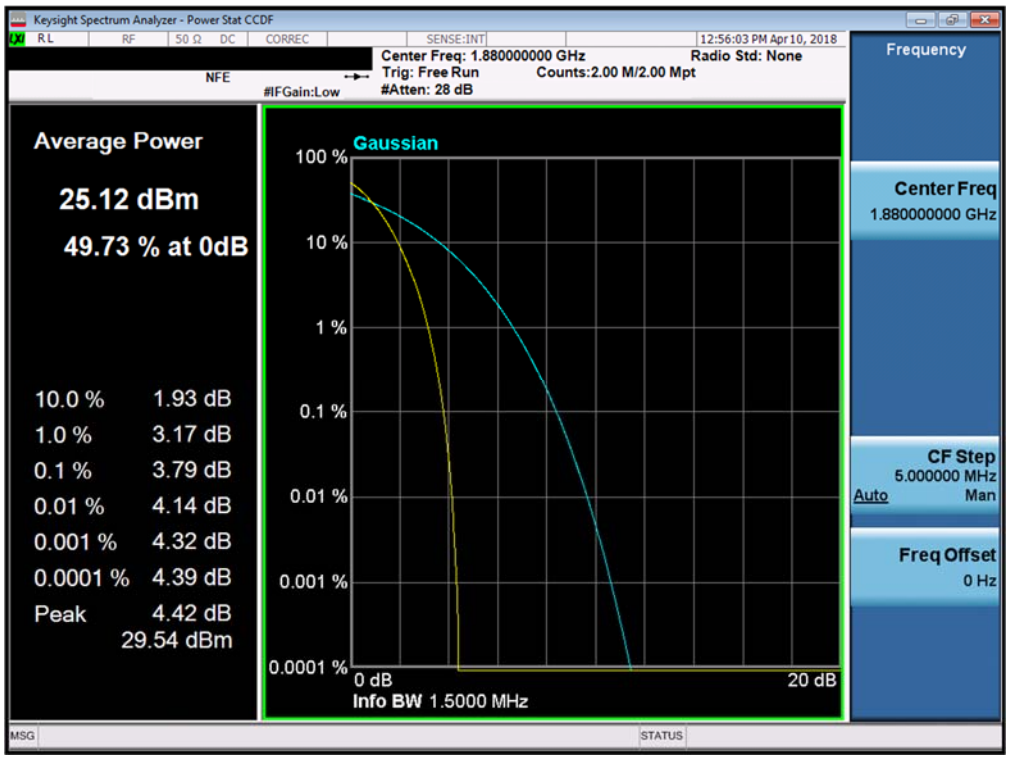
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

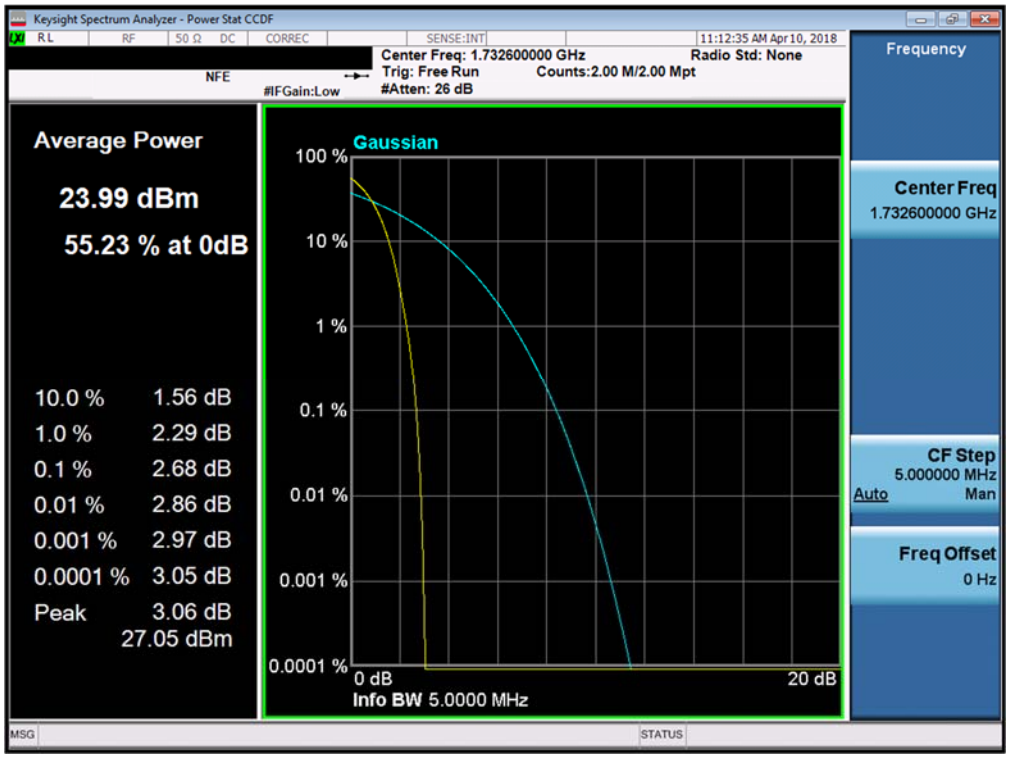
None



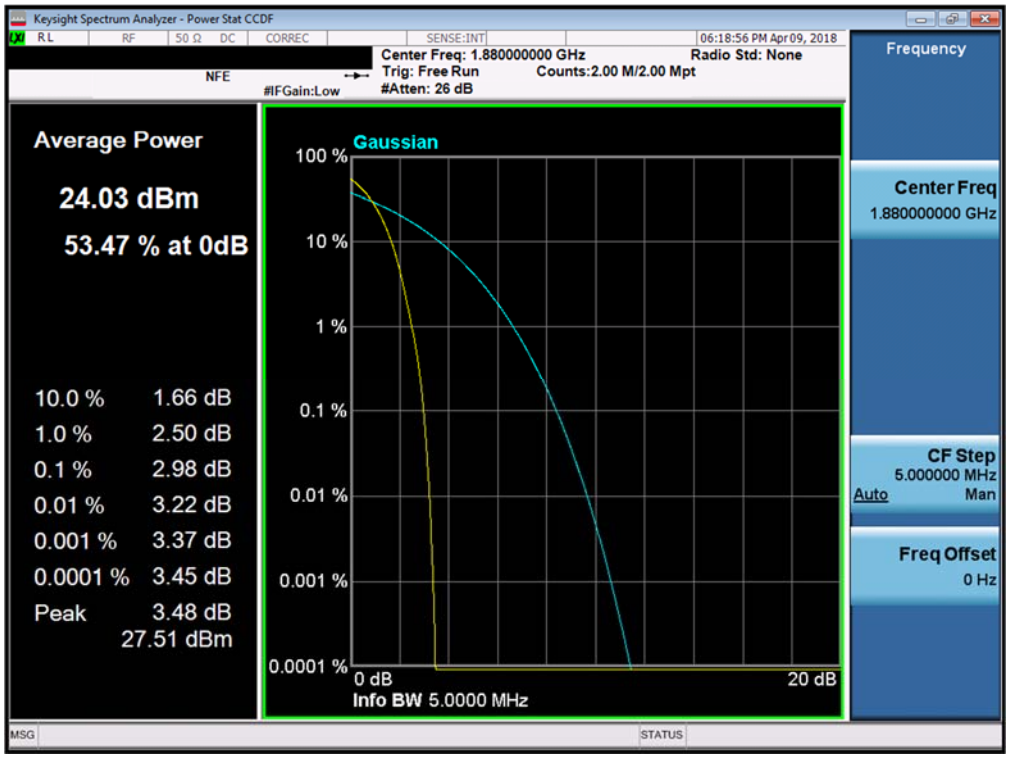
Plot 7-97. Peak-Average Ratio Plot (PCS GPRS Mode)



Plot 7-98. Peak-Average Ratio Plot (PCS CDMA Mode)



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



Plot 7-100. 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.

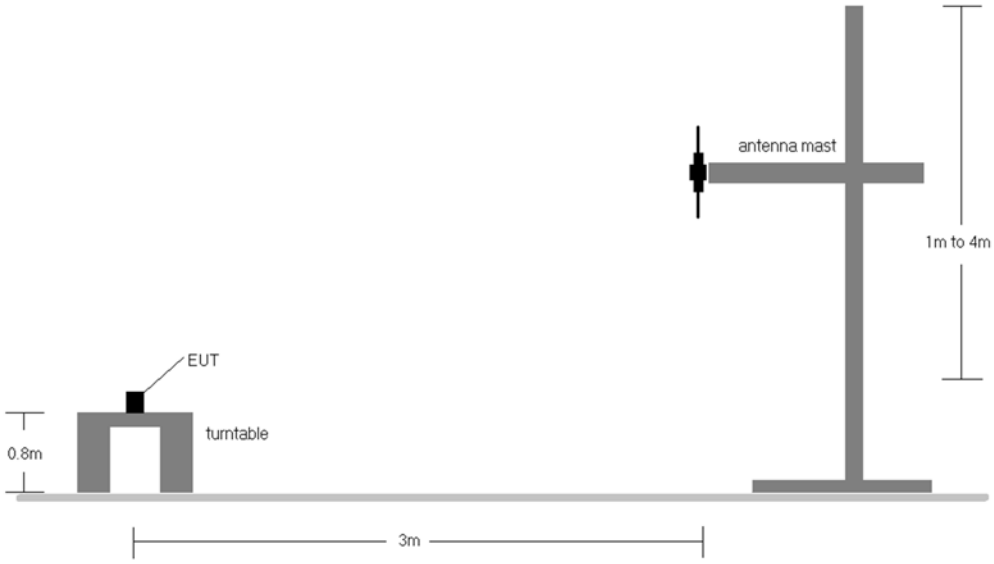


Figure 7-5. Radiated Test Setup <1GHz

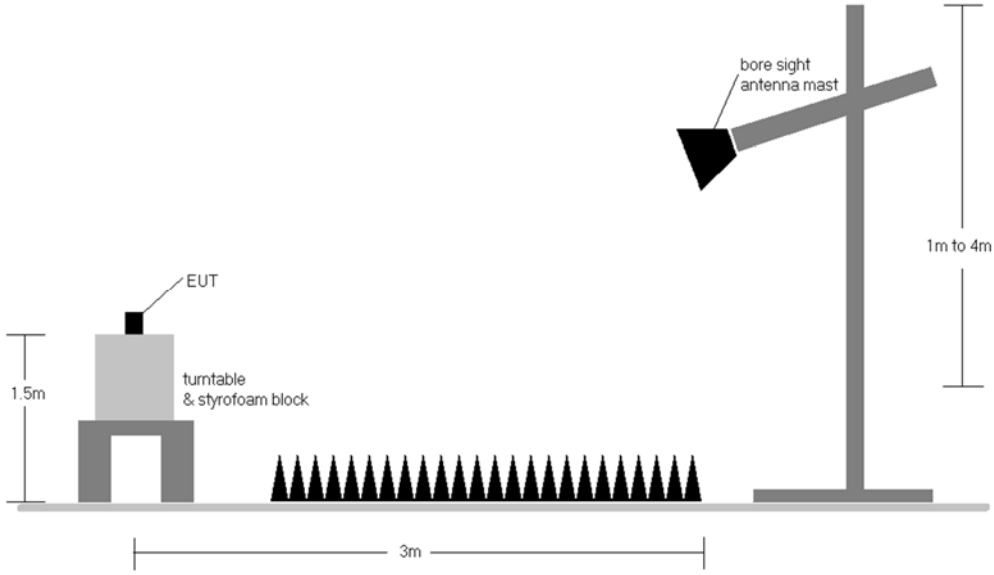


Figure 7-6. Radiated Test Setup >1GHz

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) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1."

3) For CDMA transmission, 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 [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.20	GPRS850	H	150	74	29.90	1.50	**29.24**	**0.840**	38.45	-9.21	**31.39**	**1.379**	40.61	-9.21
836.60	GPRS850	H	150	84	28.73	1.50	28.08	0.643	38.45	-10.37	30.23	1.054	40.61	-10.38
848.80	GPRS850	H	150	72	27.69	1.50	27.04	0.506	38.45	-11.41	29.19	0.830	40.61	-11.42
824.20	GPRS850	V	150	106	27.43	1.50	26.78	0.476	38.45	-11.67	28.93	0.781	40.61	-11.68
824.20	EDGE850	H	150	74	23.96	1.50	**23.31**	0.214	38.45	-15.14	**25.46**	**0.351**	40.61	-15.15

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

Frequency [MHz]	Mode	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Substitute Level [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	H	150	79	21.33	1.50	**20.68**	**0.117**	38.45	-17.77	**22.83**	**0.192**	40.61	-17.78
836.52	CDMA850	H	150	67	20.93	1.50	20.28	0.107	38.45	-18.17	22.43	0.175	40.61	-18.18
848.31	CDMA850	H	150	81	20.48	1.50	19.83	0.096	38.45	-18.62	21.98	0.158	40.61	-18.63
824.70	CDMA850	V	150	103	19.26	1.50	18.61	0.073	38.45	-19.84	20.76	0.119	40.61	-19.85

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 [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
826.40	WCDMA850	H	150	75	21.32	1.50	**20.67**	**0.117**	38.45	-17.78	**22.82**	**0.191**	40.61	-17.79
836.60	WCDMA850	H	150	85	20.95	1.50	20.30	0.107	38.45	-18.15	22.45	0.176	40.61	-18.16
846.60	WCDMA850	H	150	81	20.52	1.50	19.87	0.097	38.45	-18.58	22.02	0.159	40.61	-18.59
826.40	WCDMA850	V	150	117	19.00	1.50	18.35	0.068	38.45	-20.10	20.50	0.112	40.61	-20.11

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 [Watts]	EIRP Limit [dBm]	Margin [dB]
1712.40	WCDMA1700	H	150	355	17.90	5.55	23.45	0.221	30.00	-6.55
1732.60	WCDMA1700	H	150	344	18.12	5.41	**23.53**	**0.225**	30.00	-6.47
1752.60	WCDMA1700	H	150	344	17.57	5.27	22.84	0.192	30.00	-7.16
1732.60	WCDMA1700	V	150	359	16.39	5.41	21.80	0.151	30.00	-8.20

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 [Watts]	EIRP Limit [dBm]	Margin [dB]
1850.20	GPRS1900	V	150	357	25.40	4.79	30.18	1.043	33.01	-2.83
1880.00	GPRS1900	V	150	305	25.30	4.84	30.14	1.034	33.01	-2.87
1909.80	GPRS1900	V	150	309	25.59	4.86	**30.45**	**1.110**	33.01	-2.56
1909.80	GPRS1900	H	150	192	23.06	4.68	27.74	0.594	33.01	-5.27
1909.80	EDGE1900	V	150	309	21.16	4.86	**26.02**	0.400	33.01	-6.99

Table 7-6. EIRP (PCS GPRS/EDGE)

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	V	150	357	19.37	4.79	24.16	0.261	33.01	-8.85
1880.00	CDMA1900	V	150	309	19.48	4.84	24.32	0.271	33.01	-8.69
1908.75	CDMA1900	V	150	309	19.70	4.87	**24.57**	**0.286**	33.01	-8.44
1908.75	CDMA1900	H	150	351	18.06	4.68	22.74	0.188	33.01	-10.27

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	V	150	357	18.98	4.79	23.77	0.238	33.01	-9.24
1880.00	WCDMA1900	V	150	306	19.24	4.84	24.08	0.256	33.01	-8.93
1907.60	WCDMA1900	V	150	309	19.54	4.87	**24.41**	**0.276**	33.01	-8.60
1907.60	WCDMA1900	H	150	354	16.85	4.68	21.53	0.142	33.01	-11.48

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.

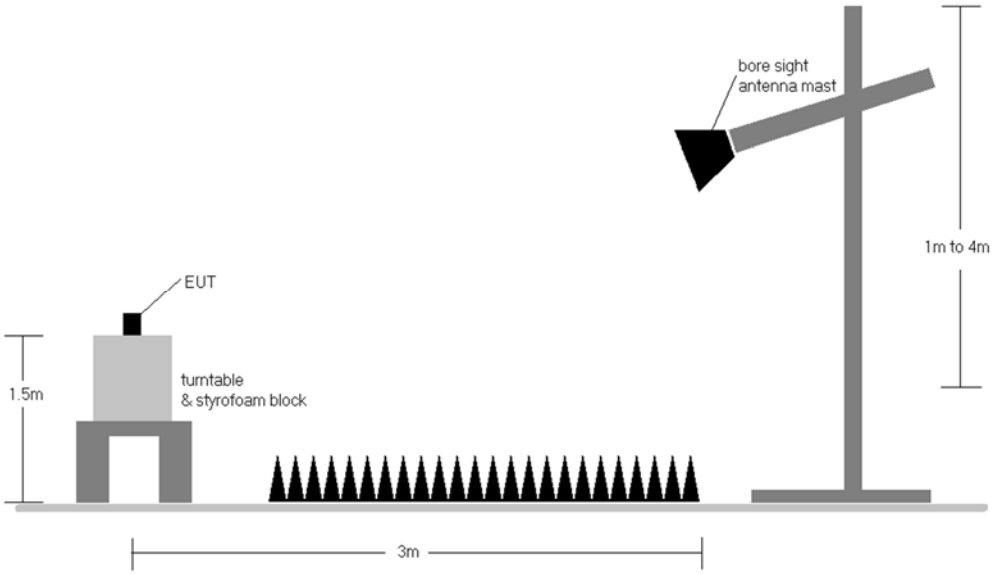


Figure 7-7. Test Instrument & Measurement Setup

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) and HSDPA capabilities. The EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1."

3) For CDMA transmission, 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	H	116	164	-68.43	8.86	-59.57	-46.6
2472.60	H	135	253	-45.96	9.17	-36.78	-23.8
3296.80	H	-	-	-70.21	9.43	-60.78	-47.8
4121.00	H	112	305	-65.71	9.83	-55.88	-42.9
4945.20	H	-	-	-72.04	11.18	-60.86	-47.9

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	H	109	48	-68.25	8.70	-59.55	-46.5
2509.80	H	121	235	-48.19	9.24	-38.96	-26.0
3346.40	H	-	-	-69.24	9.34	-59.90	-46.9
4183.00	H	100	295	-66.55	10.25	-56.31	-43.3
5019.60	H	-	-	-71.33	11.09	-60.24	-47.2

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	H	105	130	-68.71	8.55	-60.16	-47.2
2546.40	H	135	217	-46.24	9.20	-37.04	-24.0
3395.20	H	-	-	-69.07	9.45	-59.62	-46.6
4244.00	H	112	287	-68.21	10.49	-57.72	-44.7
5092.80	H	-	-	-70.85	10.89	-59.96	-47.0

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	-	-	-81.93	8.85	-73.07	-60.1
2474.10	H	125	308	-76.78	9.18	-67.60	-54.6
3298.80	H	-	-	-77.21	9.43	-67.78	-54.8

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	100	317	-81.10	8.71	-72.40	-59.4
2509.56	H	100	302	-78.99	9.24	-69.75	-56.8
3346.08	H	-	-	-78.35	9.34	-69.01	-56.0

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	100	319	-79.92	8.56	-71.37	-58.4
2544.93	H	149	301	-76.89	9.20	-67.69	-54.7
3393.24	H	-	-	-76.32	9.44	-66.88	-53.9

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	H	236	163	-79.07	8.99	-70.07	-57.1
2479.20	H	-	-	-77.27	9.12	-68.15	-55.1

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	H	112	170	-79.54	8.85	-70.70	-57.7
2509.80	H	-	-	-77.51	9.17	-68.35	-55.3

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	H	-	-	-79.88	8.70	-71.17	-58.2
2539.80	H	-	-	-77.86	9.26	-68.60	-55.6

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	H	125	147	-69.78	9.50	-60.27	-47.3
5137.20	H	-	-	-73.12	10.74	-62.38	-49.4

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	H	121	142	-66.01	9.57	-56.44	-43.4
5197.80	H	-	-	-72.08	10.79	-61.29	-48.3

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	H	113	133	-67.07	9.64	-57.42	-44.4
5257.80	H	-	-	-72.22	10.96	-61.26	-48.3

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	H	328	294	-55.07	9.83	-45.24	-32.2
5550.60	H	247	306	-54.93	10.97	-43.95	-31.0
7400.80	H	232	20	-58.93	10.72	-48.21	-35.2
9251.00	H	244	22	-41.20	12.32	-28.88	-15.9
11101.20	H	259	27	-60.43	12.94	-47.49	-34.5

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	H	288	310	-54.06	9.62	-44.44	-31.4
5640.00	H	232	9	-56.33	11.12	-45.21	-32.2
7520.00	H	203	17	-60.86	11.00	-49.86	-36.9
9400.00	H	256	60	-38.29	12.15	-26.14	-13.1
11280.00	H	237	77	-50.09	13.22	-36.87	-23.9

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	H	145	308	-50.87	9.23	-41.63	-28.6
5729.40	H	148	321	-51.40	11.29	-40.11	-27.1
7639.20	H	163	309	-53.56	11.29	-42.27	-29.3
9549.00	H	104	12	-44.22	12.22	-32.01	-19.0
11458.80	H	253	68	-51.21	13.24	-37.97	-25.0

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	V	-	-	-74.18	9.82	-64.36	-51.4
5553.75	V	250	0	-72.57	10.98	-61.59	-48.6
7405.00	V	-	-	-68.06	10.73	-57.33	-44.3

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	V	376	129	-74.65	9.62	-65.03	-52.0
5640.00	V	-	-	-73.17	11.12	-62.05	-49.0
7520.00	V	-	-	-68.74	11.00	-57.74	-44.7

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	V	-	-	-72.26	9.24	-63.02	-50.0
5726.25	V	215	356	-72.19	11.29	-60.90	-47.9
7635.00	V	-	-	-69.38	11.28	-58.09	-45.1

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	100	134	-65.65	9.81	-55.83	-42.8
5557.20	H	-	-	-72.32	10.98	-61.34	-48.3

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	130	136	-67.60	9.62	-57.98	-45.0
5640.00	H	-	-	-72.25	11.12	-61.13	-48.1

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	121	33	-68.98	9.25	-59.73	-46.7
5722.80	H	-	-	-73.17	11.28	-61.89	-48.9

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

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	836,599,876	-124	-0.0000148
100 %		- 30	836,600,377	377	0.0000451
100 %		- 20	836,599,991	-9	-0.0000011
100 %		- 10	836,600,107	107	0.0000128
100 %		0	836,599,872	-128	-0.0000153
100 %		+ 10	836,600,038	38	0.0000045
100 %		+ 20	836,600,143	143	0.0000171
100 %		+ 30	836,599,870	-130	-0.0000155
100 %		+ 40	836,599,687	-313	-0.0000374
100 %		+ 50	836,600,074	74	0.0000088
BATT. ENDPOINT	3.40	+ 20	836,600,107	107	0.0000128

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

Frequency Stability / Temperature Variation

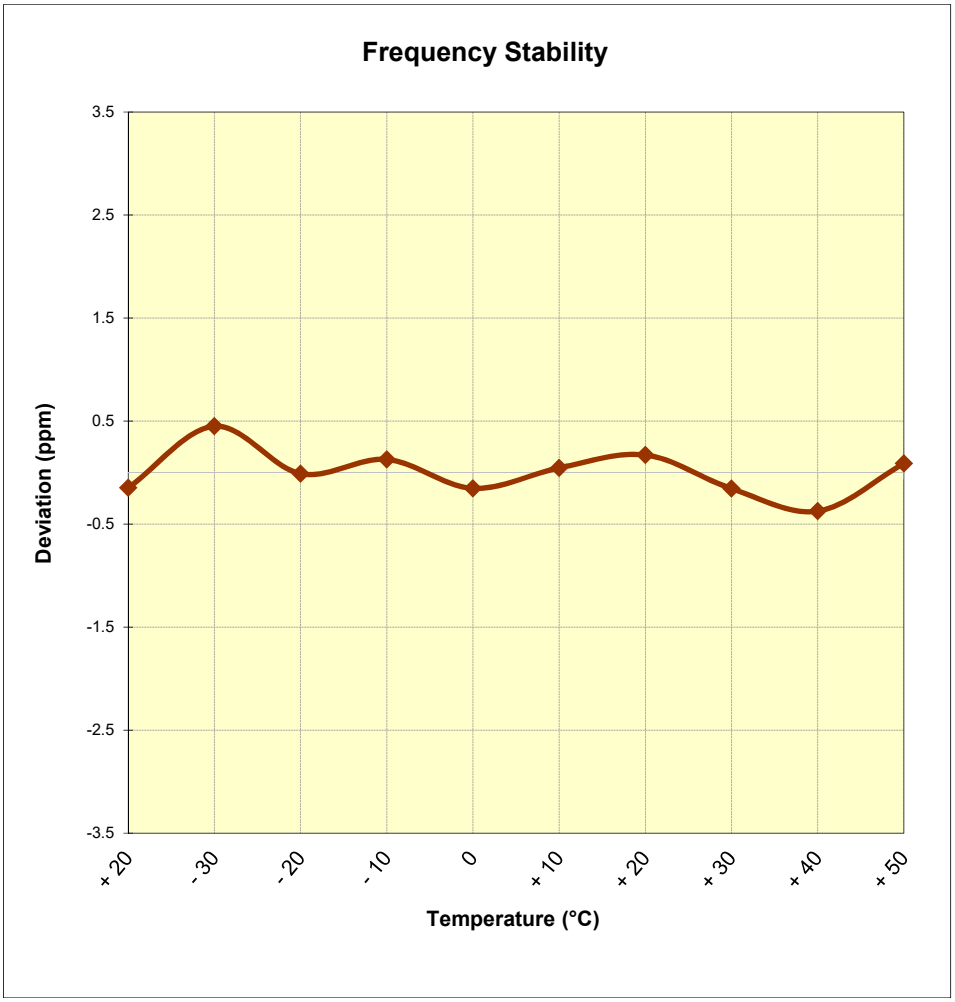


Figure 7-8. Frequency Stability Graph (Cellular GPRS Mode – Ch. 190)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	836,520,000	Hz
CHANNEL:	384	
REFERENCE VOLTAGE:	4.40	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	836,519,765	-235	-0.0000281
100 %		- 30	836,520,108	108	0.0000129
100 %		- 20	836,519,962	-38	-0.0000045
100 %		- 10	836,519,767	-233	-0.0000279
100 %		0	836,520,236	236	0.0000282
100 %		+ 10	836,520,045	45	0.0000054
100 %		+ 20	836,519,891	-109	-0.0000130
100 %		+ 30	836,520,370	370	0.0000442
100 %		+ 40	836,519,983	-17	-0.0000020
100 %		+ 50	836,519,865	-135	-0.0000161
BATT. ENDPOINT	3.40	+ 20	836,519,628	-372	-0.0000445

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

Frequency Stability / Temperature Variation

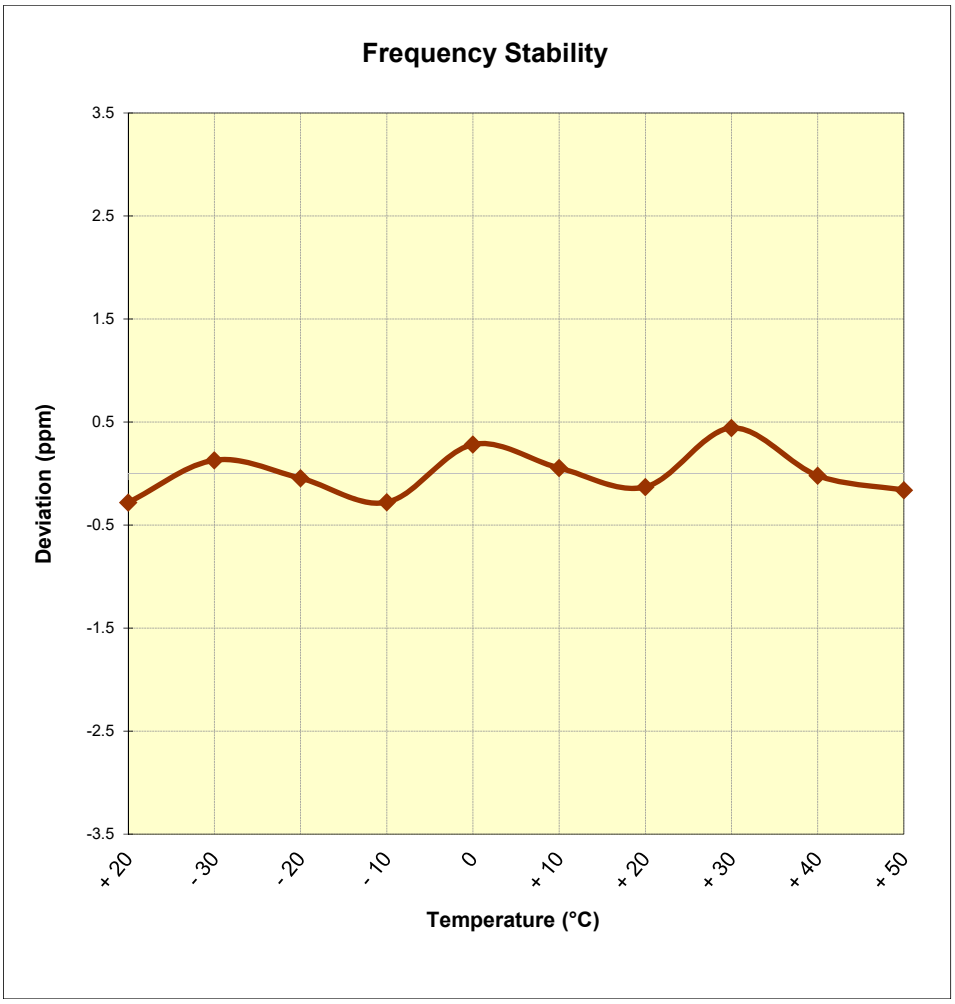


Figure 7-9. Frequency Stability Graph (Cellular CDMA Mode – Ch. 384)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	4183	
REFERENCE VOLTAGE:	4.40	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	836,599,959	-41	-0.0000049
100 %		- 30	836,600,019	19	0.0000023
100 %		- 20	836,600,150	150	0.0000179
100 %		- 10	836,599,984	-16	-0.0000019
100 %		0	836,600,109	109	0.0000130
100 %		+ 10	836,600,063	63	0.0000075
100 %		+ 20	836,600,098	98	0.0000117
100 %		+ 30	836,600,039	39	0.0000047
100 %		+ 40	836,599,806	-194	-0.0000232
100 %		+ 50	836,599,897	-103	-0.0000123
BATT. ENDPOINT	3.40	+ 20	836,599,977	-23	-0.0000027

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

Frequency Stability / Temperature Variation

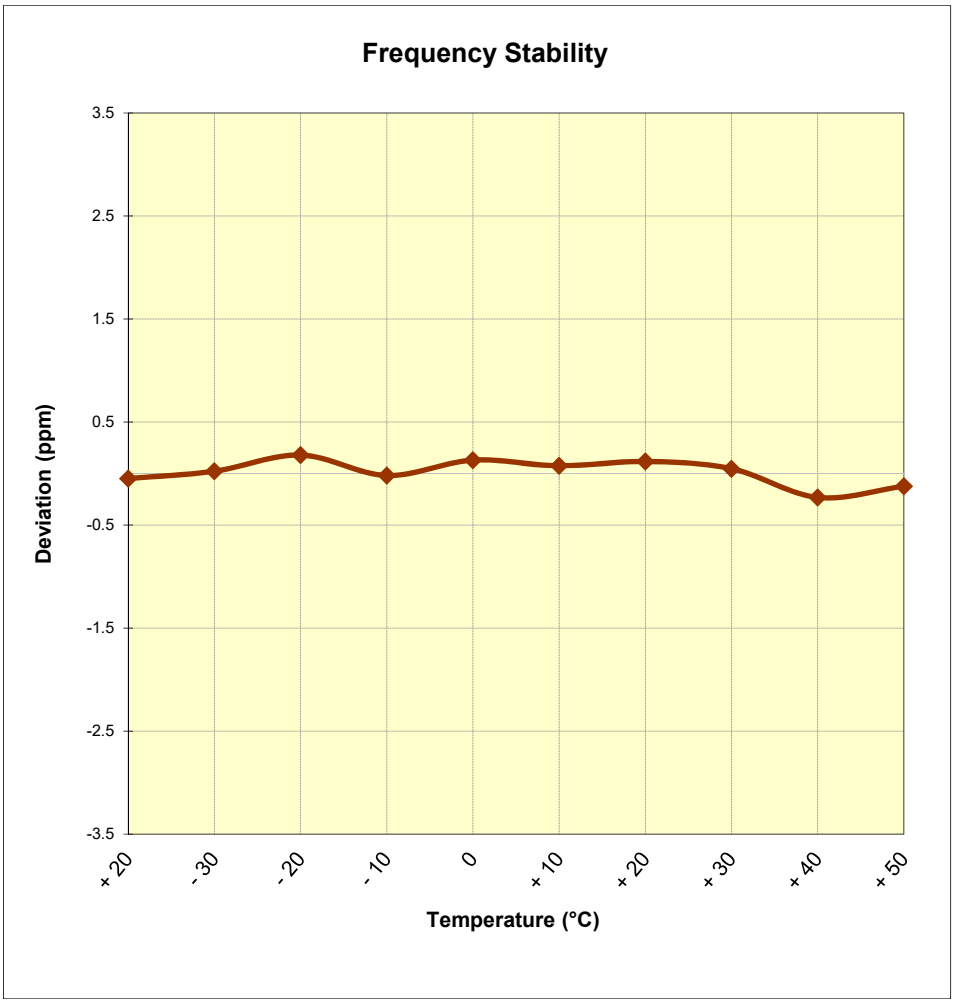


Figure 7-10. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,732,600,000	Hz
CHANNEL:	1413	
REFERENCE VOLTAGE:	4.40	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	1,732,599,935	-65	-0.0000038
100 %		- 30	1,732,600,006	6	0.0000003
100 %		- 20	1,732,600,143	143	0.0000083
100 %		- 10	1,732,600,150	150	0.0000087
100 %		0	1,732,599,865	-135	-0.0000078
100 %		+ 10	1,732,599,865	-135	-0.0000078
100 %		+ 20	1,732,600,254	254	0.0000147
100 %		+ 30	1,732,600,073	73	0.0000042
100 %		+ 40	1,732,599,935	-65	-0.0000038
100 %		+ 50	1,732,599,870	-130	-0.0000075
BATT. ENDPOINT	3.40	+ 20	1,732,599,983	-17	-0.0000010

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

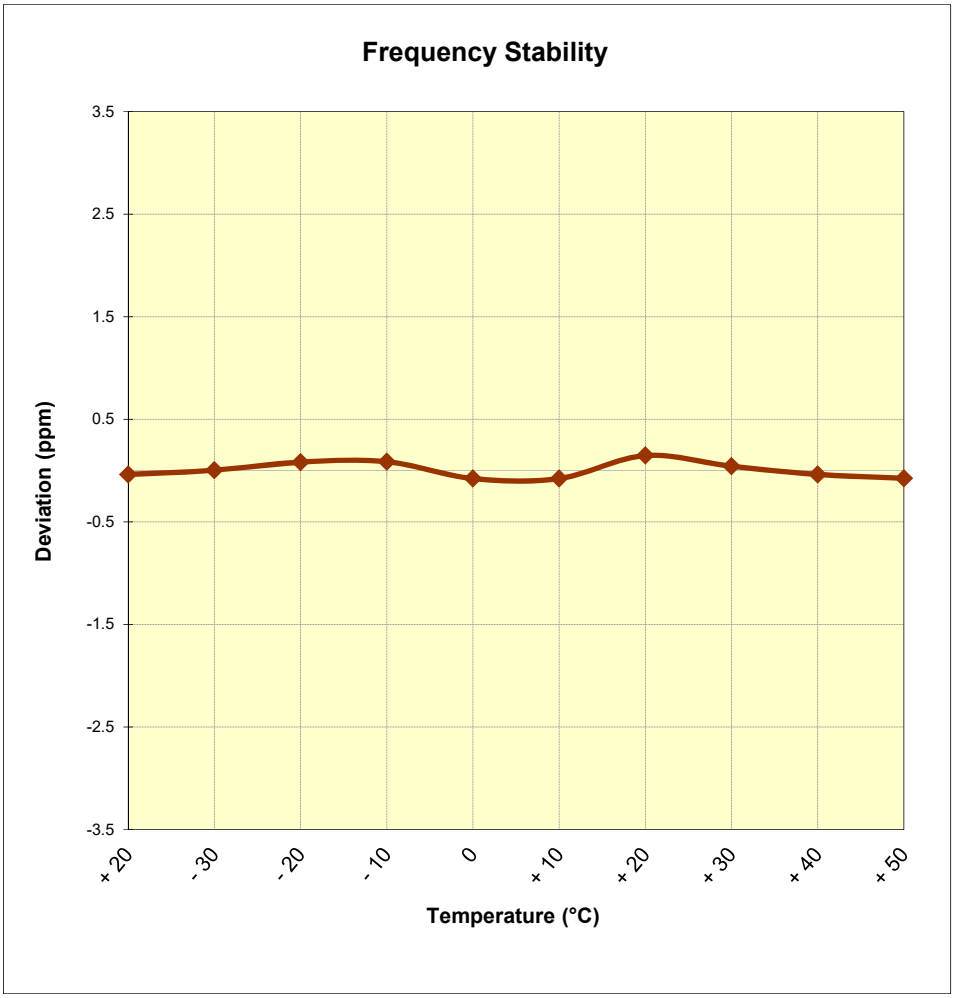


Figure 7-11. Frequency Stability Graph (AWS WCDMA Mode – Ch. 1413)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	661	
REFERENCE VOLTAGE:	4.40	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	1,879,999,763	-237	-0.0000126
100 %		- 30	1,880,000,388	388	0.0000206
100 %		- 20	1,879,999,770	-230	-0.0000122
100 %		- 10	1,879,999,532	-468	-0.0000249
100 %		0	1,880,000,144	144	0.0000077
100 %		+ 10	1,879,999,966	-34	-0.0000018
100 %		+ 20	1,880,000,260	260	0.0000138
100 %		+ 30	1,879,999,882	-118	-0.0000063
100 %		+ 40	1,880,000,074	74	0.0000039
100 %		+ 50	1,879,999,749	-251	-0.0000134
BATT. ENDPOINT	3.40	+ 20	1,879,999,979	-21	-0.0000011

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

Frequency Stability / Temperature Variation

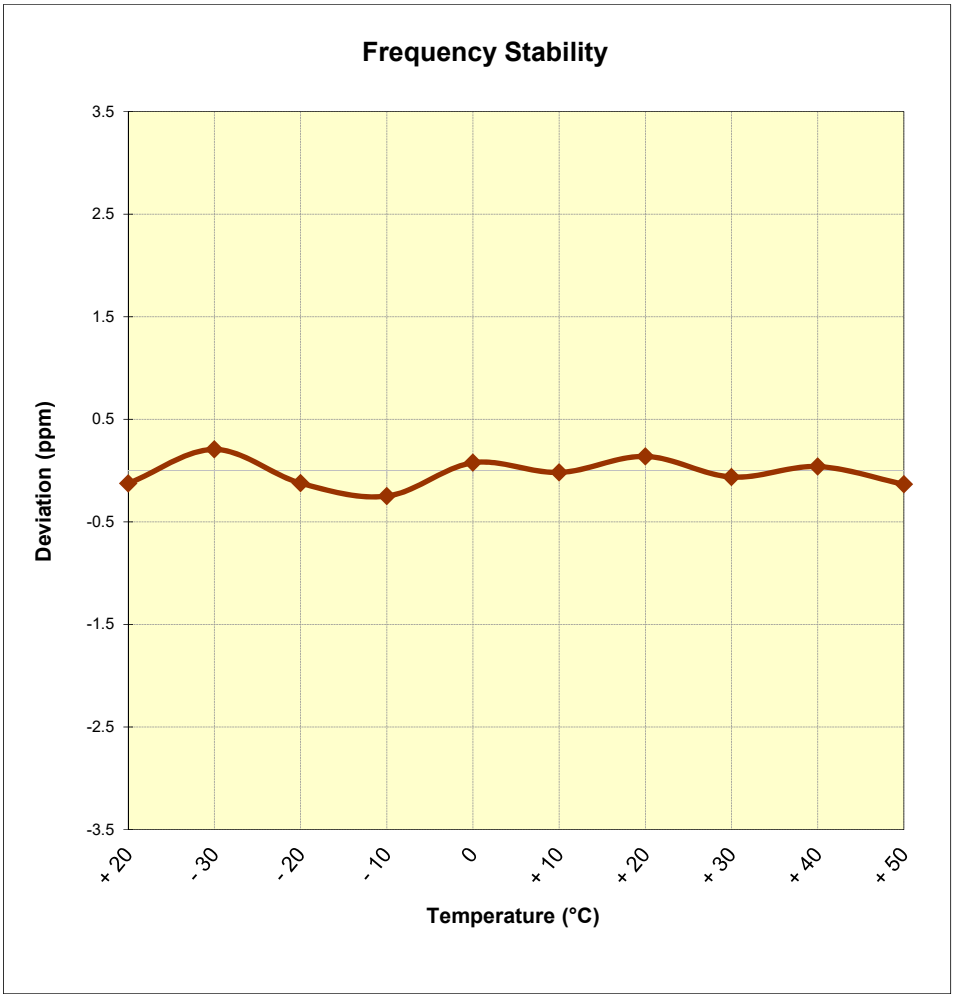


Figure 7-12. Frequency Stability Graph (PCS GPRS Mode – Ch. 661)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	600	
REFERENCE VOLTAGE:	4.40	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	1,880,000,101	101	0.0000054
100 %		- 30	1,880,000,244	244	0.0000130
100 %		- 20	1,880,000,036	36	0.0000019
100 %		- 10	1,880,000,107	107	0.0000057
100 %		0	1,880,000,001	1	0.0000001
100 %		+ 10	1,879,999,804	-196	-0.0000104
100 %		+ 20	1,880,000,021	21	0.0000011
100 %		+ 30	1,879,999,971	-29	-0.0000015
100 %		+ 40	1,880,000,106	106	0.0000056
100 %		+ 50	1,880,000,196	196	0.0000104
BATT. ENDPOINT	3.40	+ 20	1,880,000,273	273	0.0000145

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

Frequency Stability / Temperature Variation

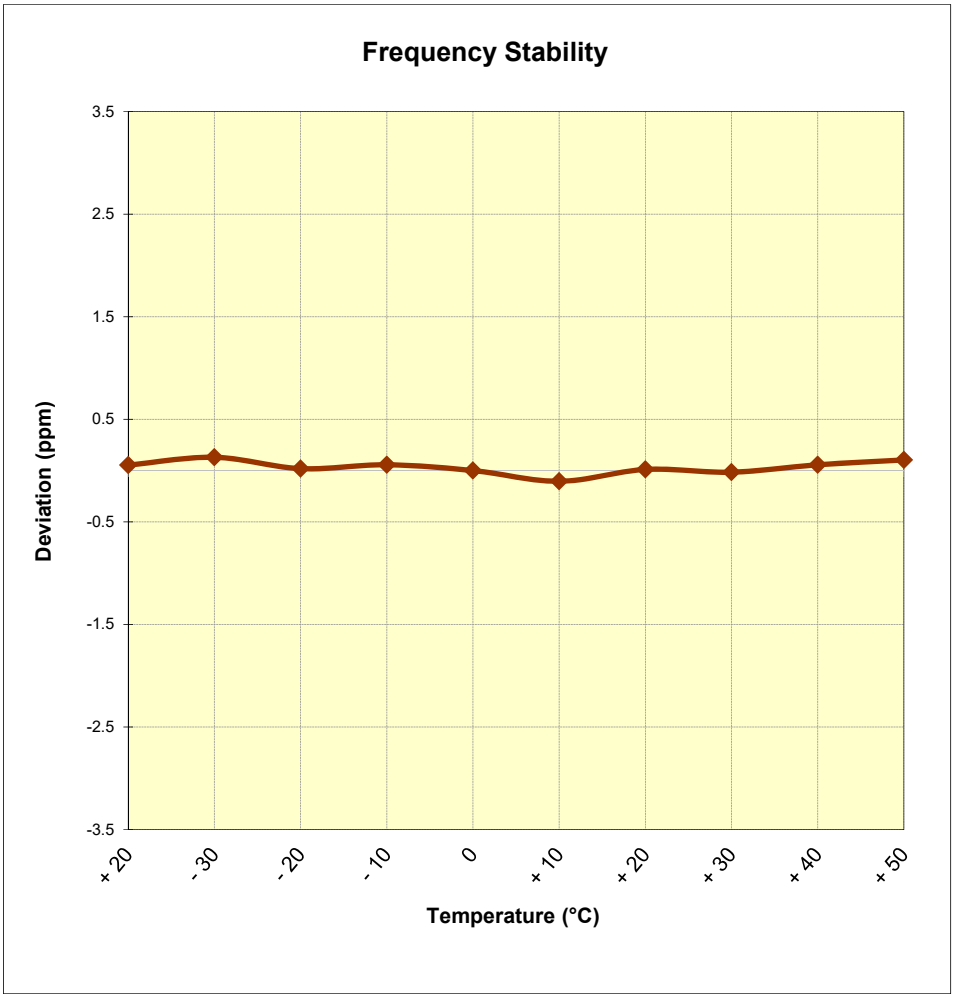


Figure 7-13. Frequency Stability Graph (PCS CDMA Mode – Ch. 600)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	9400	
REFERENCE VOLTAGE:	4.40	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.40	+ 20 (Ref)	1,879,999,644	-356	-0.0000189
100 %		- 30	1,879,999,971	-29	-0.0000015
100 %		- 20	1,880,000,038	38	0.0000020
100 %		- 10	1,880,000,192	192	0.0000102
100 %		0	1,880,000,136	136	0.0000072
100 %		+ 10	1,879,999,780	-220	-0.0000117
100 %		+ 20	1,879,999,692	-308	-0.0000164
100 %		+ 30	1,879,999,867	-133	-0.0000071
100 %		+ 40	1,880,000,103	103	0.0000055
100 %		+ 50	1,880,000,146	146	0.0000078
BATT. ENDPOINT	3.40	+ 20	1,880,000,263	263	0.0000140

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

Frequency Stability / Temperature Variation

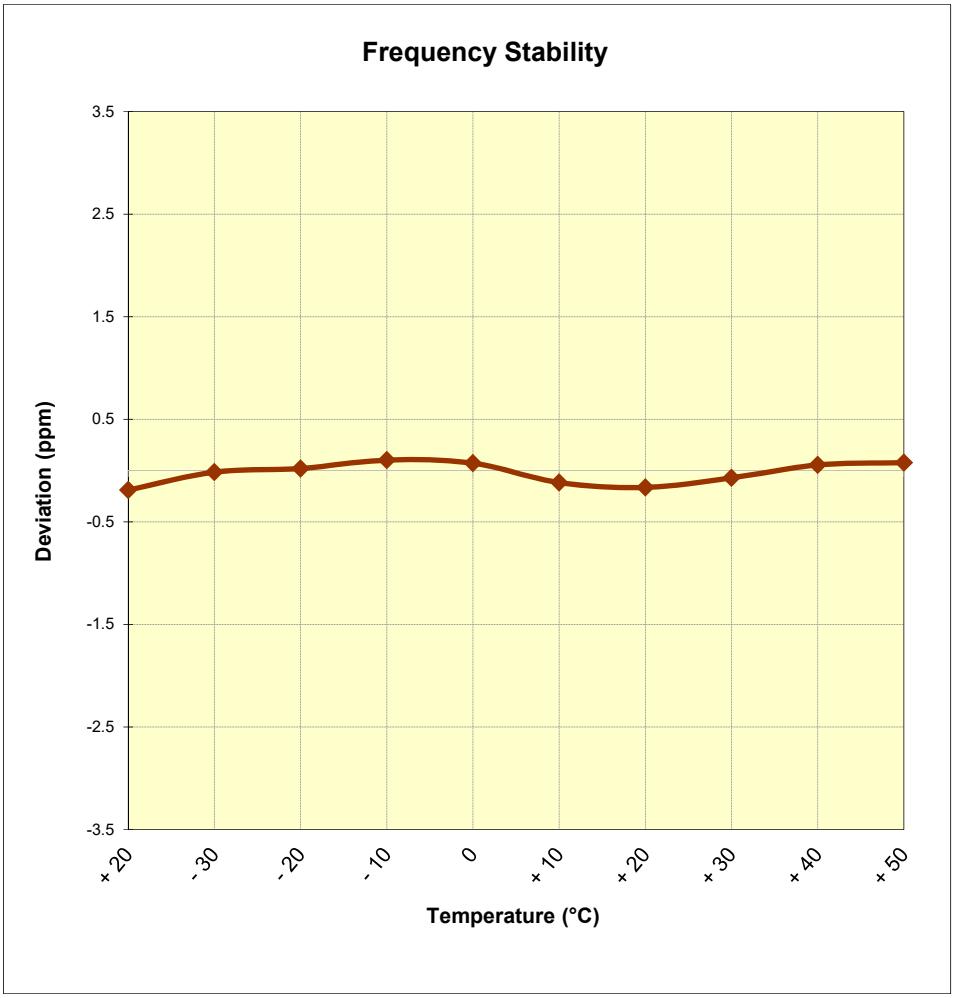


Figure 7-14. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFQ710US** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules.