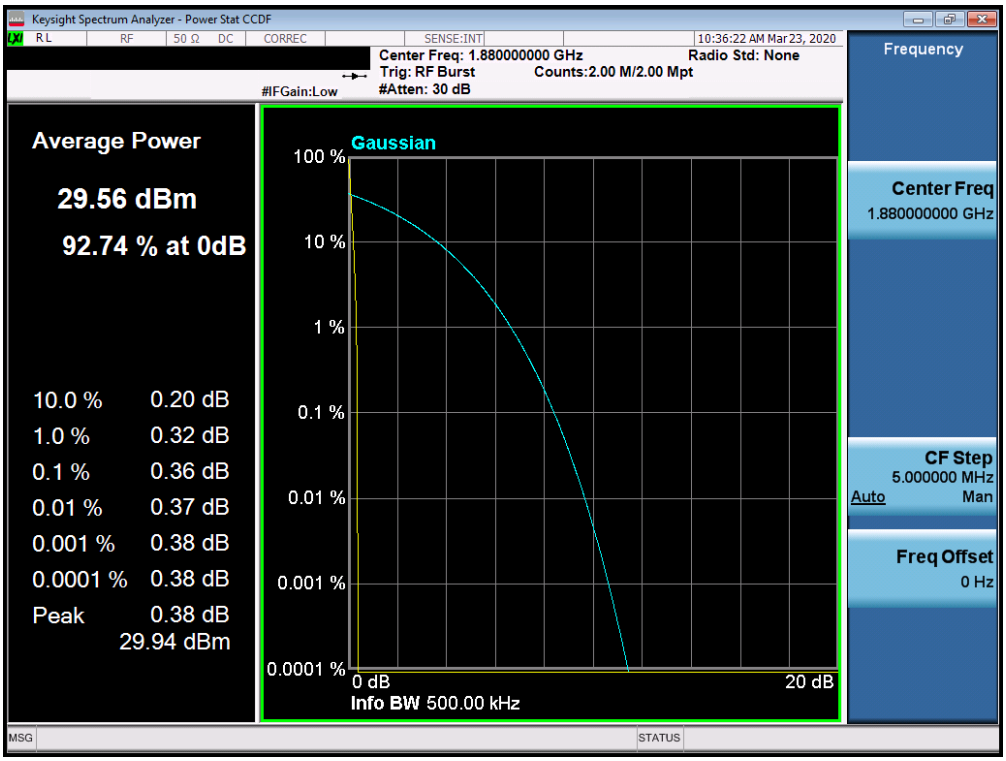
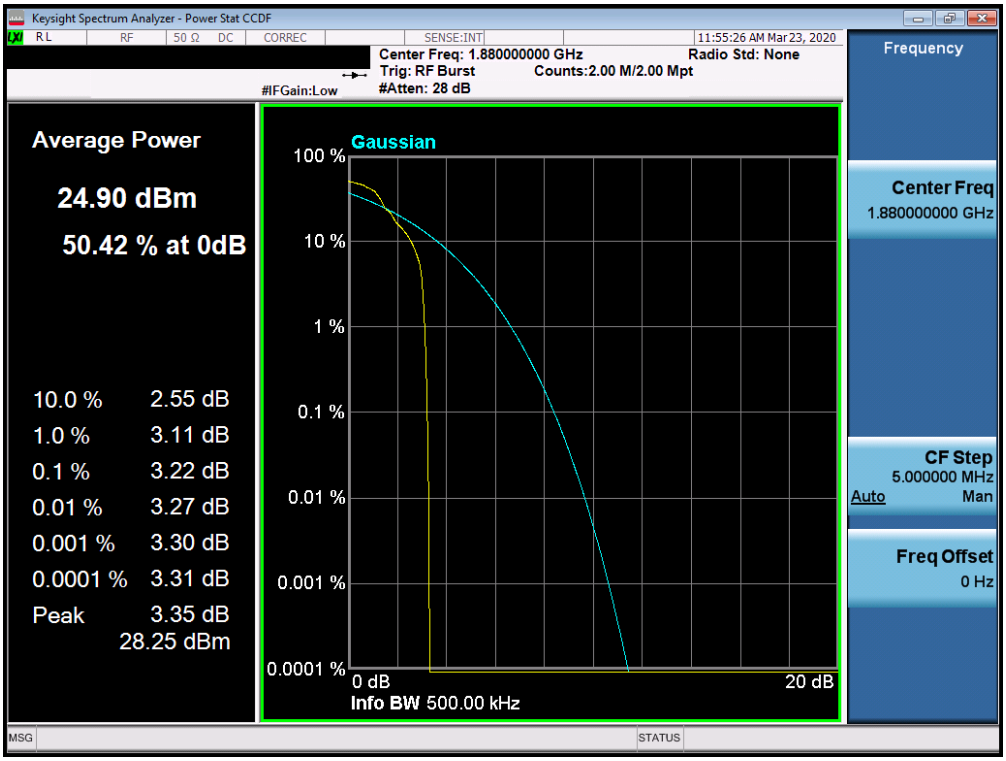


Plot 7-99. Peak-Average Ratio Plot (PCS GPRS Mode)



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

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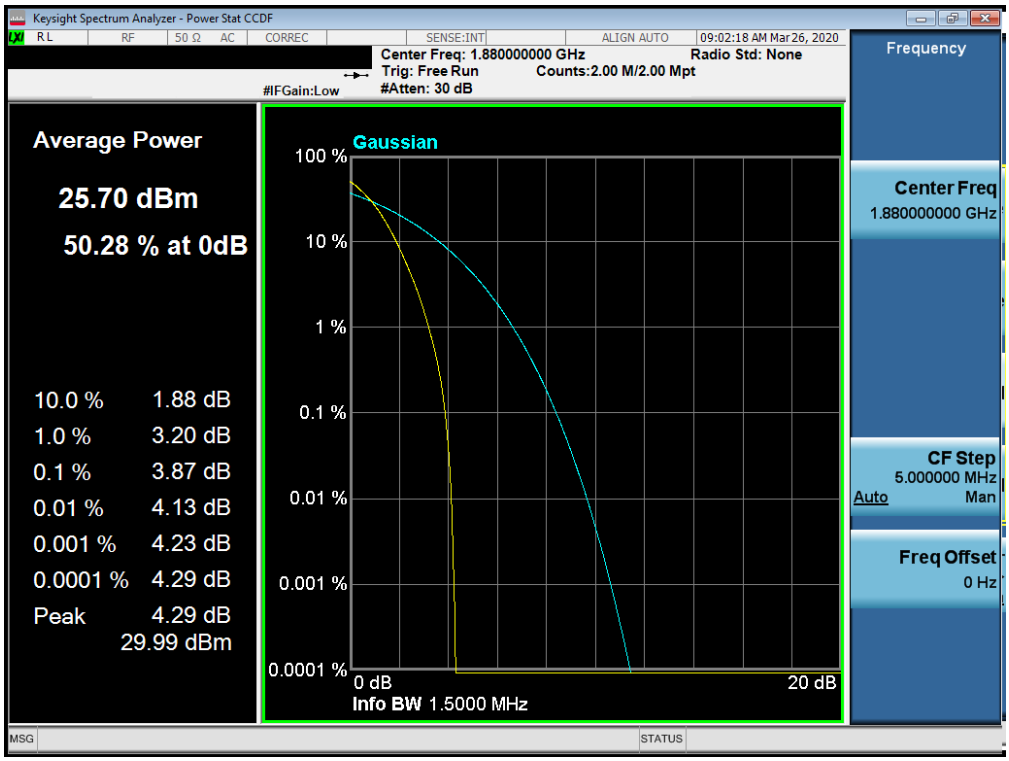
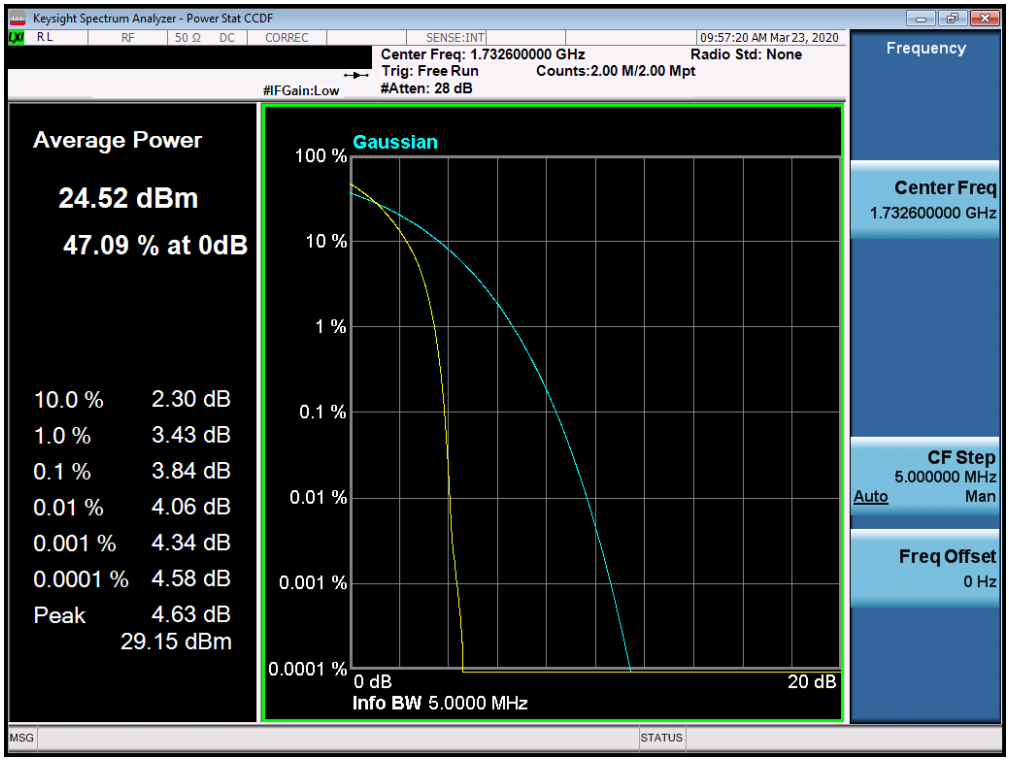


Plot 7-101. Peak-Average Ratio Plot (PCS CDMA Mode)



Plot 7-102. Peak-Average Ratio Plot (AWS WCDMA Mode)

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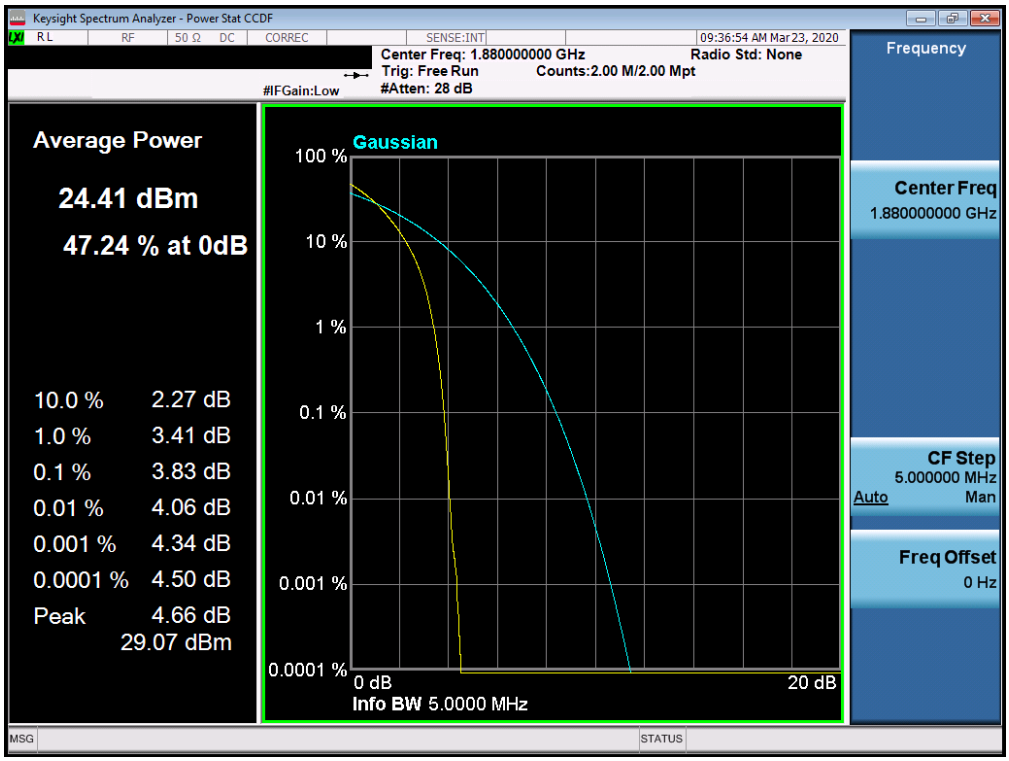

Plot 7-103. Peak-Average Ratio Plot (PCS WCDMA Mode)

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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

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Test Setup

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

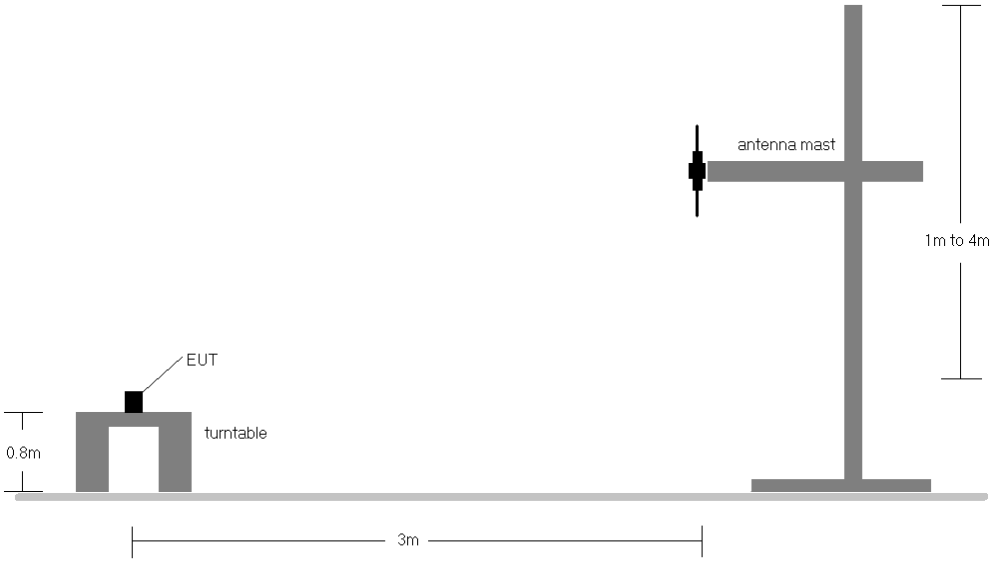

Figure 7-5. Radiated Test Setup <1GHz

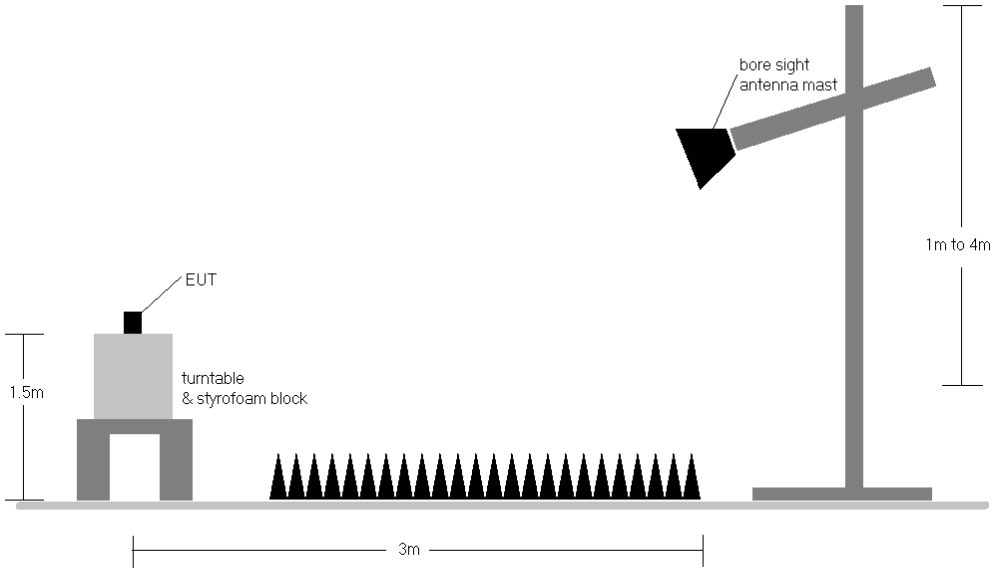

Figure 7-6. Radiated Test Setup >1GHz

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

4) This unit was tested with its standard battery.

5) The 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	V	141	88	21.40	6.35	25.60	0.363	38.45	-12.85	27.75	0.596	40.61	-12.86
836.60	GPRS850	V	144	88	21.50	6.38	**25.73**	**0.374**	38.45	-12.72	**27.88**	**0.614**	40.61	-12.73
848.80	GPRS850	V	146	90	20.70	6.51	25.06	0.320	38.45	-13.40	27.21	0.525	40.61	-13.40
836.60	GPRS850	H	226	85	19.31	6.38	23.54	0.226	38.45	-14.91	25.69	0.371	40.61	-14.92
836.60	EDGE850	V	144	88	15.17	6.38	**19.40**	0.087	38.45	-19.05	**21.55**	**0.143**	40.61	-19.06
836.60	GSM850 (WCP)	H	201	73	17.72	6.38	21.95	0.157	38.45	-16.50	24.10	0.257	40.61	-16.51

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

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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	V	139	74	13.44	6.36	17.65	0.058	38.45	-20.81	19.80	0.095	40.61	-20.81
836.52	CDMA850	V	142	73	13.95	6.38	**18.18**	**0.066**	38.45	-20.27	**20.33**	**0.108**	40.61	-20.28
848.31	CDMA850	V	142	74	13.02	6.50	17.37	0.055	38.45	-21.08	19.52	0.090	40.61	-21.09
836.52	CDMA850	V	224	104	11.69	6.50	16.04	0.040	38.45	-22.41	18.19	0.066	40.61	-22.42
836.52	CDMA850 (WCP)	H	199	324	12.17	6.50	16.52	0.045	38.45	-21.93	18.67	0.074	40.61	-21.94

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	V	140	82	13.58	6.37	17.80	0.060	38.45	-20.65	19.95	0.099	40.61	-20.65
836.60	WCDMA850	V	146	95	13.69	6.38	**17.92**	**0.062**	38.45	-20.53	**20.07**	**0.102**	40.61	-20.54
846.60	WCDMA850	V	142	81	12.86	6.48	17.19	0.052	38.45	-21.26	19.34	0.086	40.61	-21.26
836.60	WCDMA850	H	223	81	11.70	6.38	15.93	0.039	38.45	-22.52	18.08	0.064	40.61	-22.53

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	138	120	9.93	9.46	19.39	0.087	30.00	-10.61
1732.60	WCDMA1700	H	148	128	10.87	9.34	**20.21**	**0.105**	30.00	-9.79
1752.60	WCDMA1700	H	142	135	9.23	9.24	18.47	0.070	30.00	-11.53
1732.60	WCDMA1700	V	128	28	6.47	9.34	15.81	0.038	30.00	-14.19

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	H	176	353	14.59	9.51	24.10	0.257	33.01	-8.91
1880.00	GPRS1900	H	116	353	15.11	9.93	**25.04**	**0.319**	33.01	-7.97
1909.80	GPRS1900	H	124	346	14.13	10.28	24.41	0.276	33.01	-8.60
1880.00	GPRS1900	V	161	36	13.83	9.93	23.76	0.237	33.01	-9.25
1880.00	EDGE1900	H	116	353	10.59	9.93	**20.52**	0.113	33.01	-12.49

Table 7-6. EIRP (PCS GPRS)

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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	129	320	8.19	9.52	17.71	0.059	33.01	-15.30
1880.00	CDMA1900	H	138	351	9.69	9.93	**19.62**	**0.092**	33.01	-13.39
1908.75	CDMA1900	H	130	334	9.16	10.27	19.43	0.088	33.01	-13.58
1880.00	CDMA1900	V	153	38	7.66	9.93	17.59	0.057	33.01	-15.42

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	146	38	9.62	9.54	19.16	0.082	33.01	-13.85
1880.00	WCDMA1900	H	145	35	10.79	9.93	**20.72**	**0.118**	33.01	-12.29
1907.60	WCDMA1900	H	140	54	10.11	10.26	20.37	0.109	33.01	-12.64
1880.00	WCDMA1900	V	120	97	8.54	9.93	18.47	0.070	33.01	-14.54

Table 7-8. EIRP (PCS WCDMA)

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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

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Test Setup

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

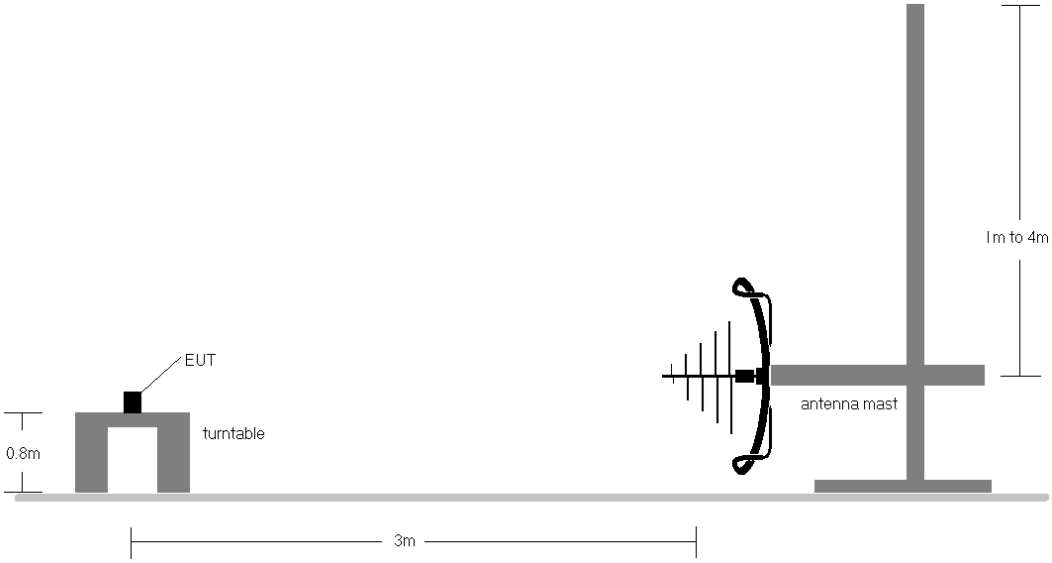

Figure 7-7. Test Instrument & Measurement Setup < 1GHz

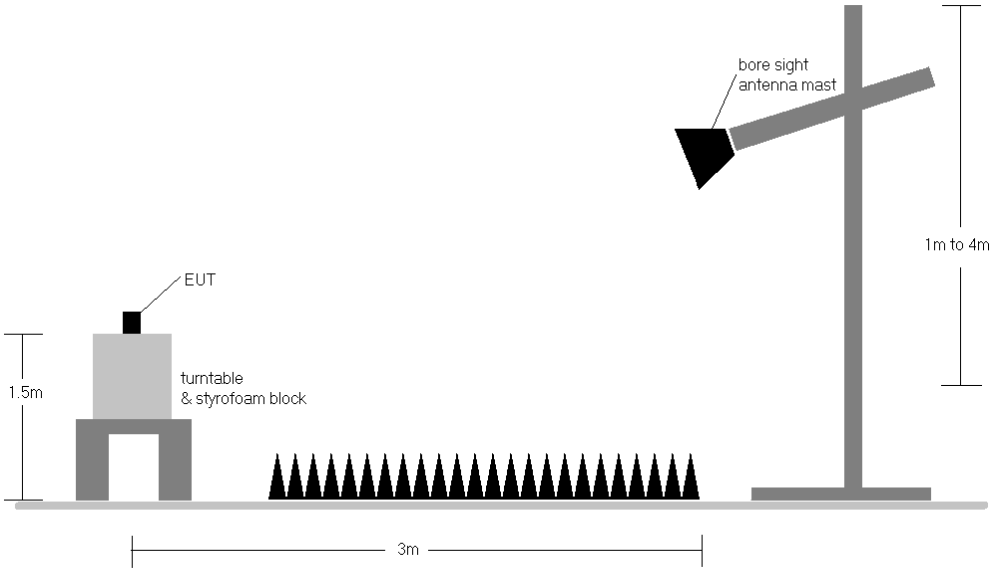

Figure 7-8. Test Instrument & Measurement Setup >1 GHz

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) 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."

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

4) This unit was tested with its standard battery.

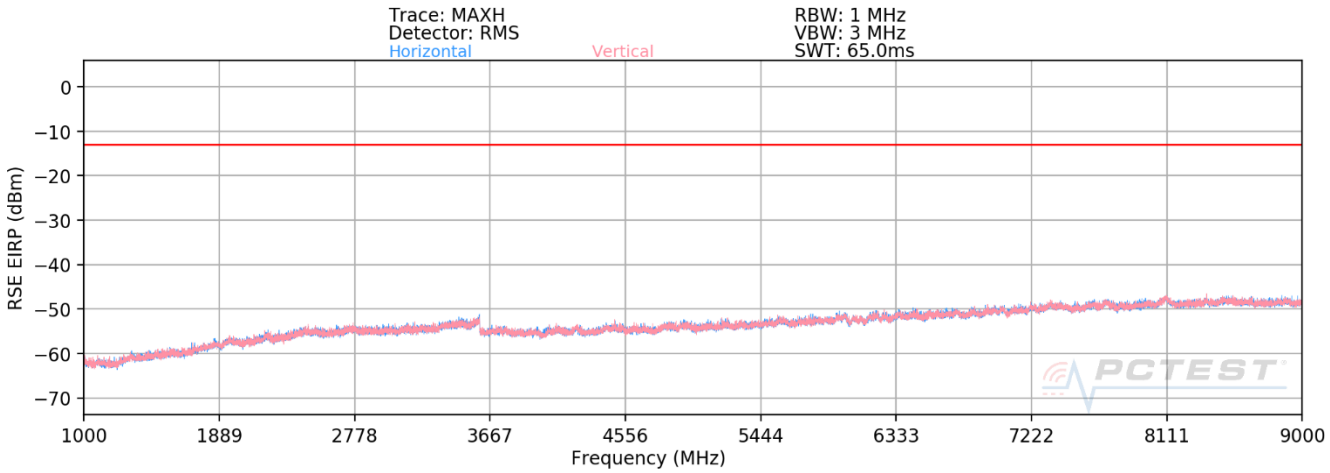
5) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

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

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OPERATING FREQUENCY: 824.20 MHz
MODULATION SIGNAL: GSM (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	130	38	-57.60	5.99	-51.61	-38.6
2472.60	H	342	167	-46.80	5.78	-41.03	-28.0
3296.80	H	-	-	-57.17	7.77	-49.40	-36.4
4121.00	H	125	326	-60.06	8.54	-51.52	-38.5
4945.20	H	-	-	-62.57	9.96	-52.61	-39.6
5769.40	H	-	-	-62.37	10.61	-51.76	-38.8
6593.60	H	-	-	-60.89	10.90	-49.99	-37.0

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

OPERATING FREQUENCY: 836.60 MHz
MODULATION SIGNAL: GSM (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	325	185	-51.24	6.02	-45.21	-32.2
2509.80	H	100	35	-40.82	5.72	-35.10	-22.1
3346.40	H	-	-	-57.69	7.90	-49.80	-36.8
4183.00	H	337	228	-61.40	8.66	-52.75	-39.7
5019.60	H	-	-	-63.15	10.03	-53.11	-40.1
5856.20	H	-	-	-62.10	10.56	-51.54	-38.5
6692.80	H	-	-	-61.01	11.06	-49.95	-36.9

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

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OPERATING FREQUENCY: 848.80 MHz
MODULATION SIGNAL: GSM (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	257	197	-53.19	5.92	-47.27	-34.3
2546.40	H	131	238	-44.64	6.02	-38.62	-25.6
3395.20	H	-	-	-57.99	8.06	-49.92	-36.9
4244.00	H	119	314	-62.03	8.72	-53.30	-40.3
5092.80	H	-	-	-62.98	10.06	-52.92	-39.9
5941.60	H	-	-	-61.09	10.49	-50.59	-37.6

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

OPERATING FREQUENCY: 836.60 MHz
CHANNEL: 190
MODULATION SIGNAL: GSM (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	351	5	-52.07	4.33	-47.73	-34.7
2509.80	H	113	135	-58.03	4.89	-53.13	-40.1
3346.40	H	-	-	-65.85	6.32	-59.53	-46.5
4183.00	H	394	56	-67.60	7.81	-59.79	-46.8
5019.60	H	-	-	-70.48	8.50	-61.98	-49.0
5856.20	H	-	-	-70.00	8.93	-61.07	-48.1

Table 7-12. Radiated Spurious Data with WCP (Cellular GPRS Mode – Ch. 190)

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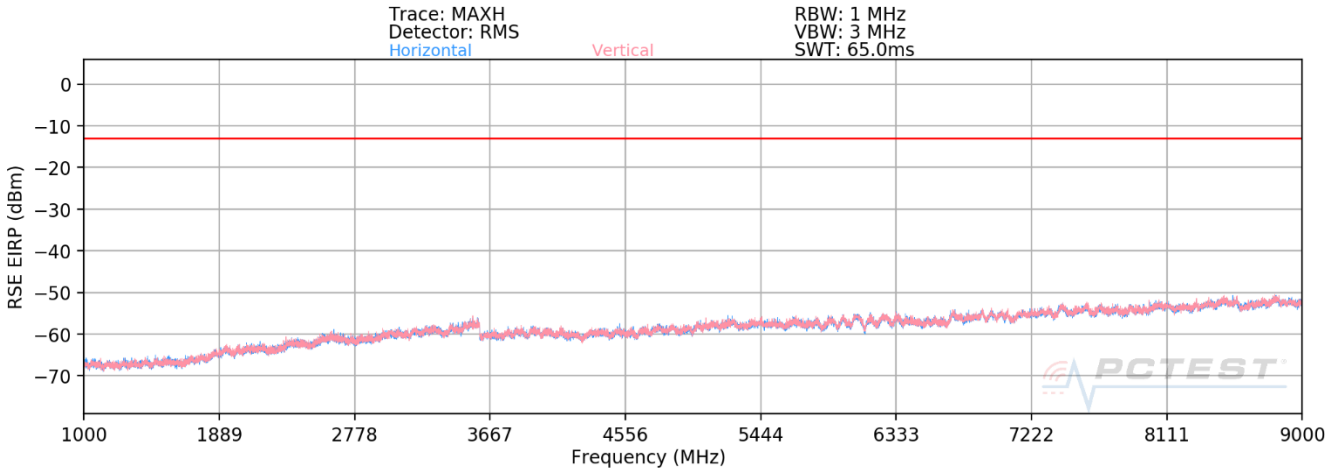
Cellular CDMA Mode



Plot 7-105. 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	387	191	-80.26	8.98	-71.29	-58.3
2474.10	H	-	-	-78.30	9.68	-68.62	-55.6
3298.80	H	-	-	-74.76	9.61	-65.15	-52.2

Table 7-13. Radiated Spurious Data (Cellular CDMA Mode – Ch. 1013)

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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	356	268	-80.53	8.98	-71.55	-58.5
2509.56	H	-	-	-78.07	9.78	-68.28	-55.3
3346.08	H	-	-	-75.45	9.63	-65.82	-52.8

Table 7-14. 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	114	212	-79.51	8.98	-70.53	-57.5
2544.93	H	-	-	-77.87	9.77	-68.09	-55.1
3393.24	H	-	-	-75.92	9.80	-66.11	-53.1

Table 7-15. Radiated Spurious Data (Cellular CDMA Mode – Ch. 777)

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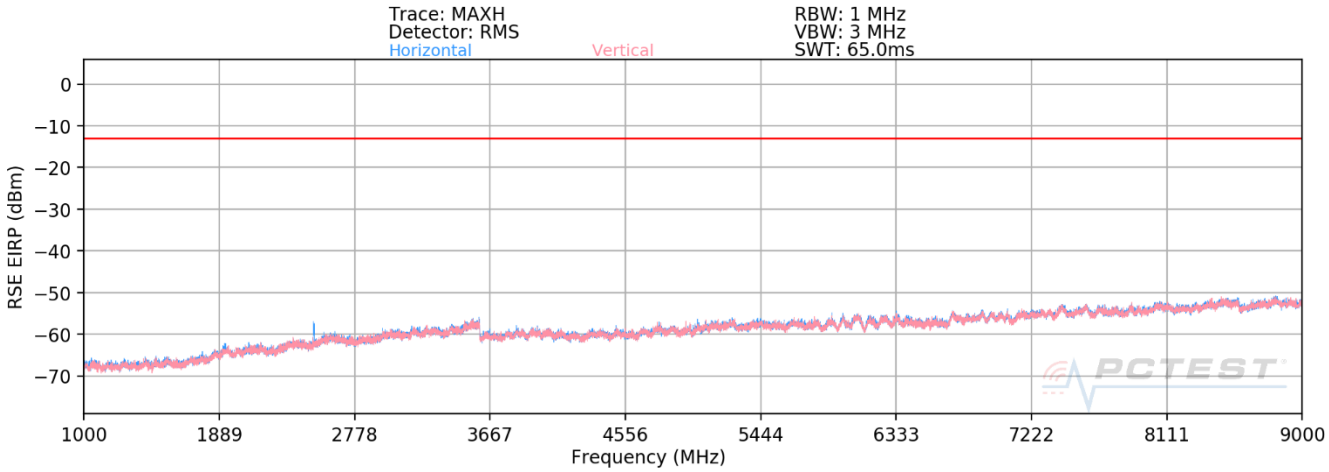
Cellular WCDMA Mode



Plot 7-106. 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	126	302	-75.57	6.01	-69.56	-56.6
2479.20	H	116	222	-68.57	5.79	-62.78	-49.8
3305.60	H	-	-	-73.25	7.80	-65.46	-52.5

Table 7-16. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4132)

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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	125	308	-75.05	6.02	-69.02	-56.0
2509.80	H	113	267	-67.24	5.72	-61.52	-48.5
3346.40	H	-	-	-73.12	7.90	-65.23	-52.2

Table 7-17. 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	113	324	-76.62	5.99	-70.64	-57.6
2539.80	H	112	329	-68.23	5.96	-62.27	-49.3
3386.40	H	-	-	-73.79	8.03	-65.75	-52.8

Table 7-18. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4233)

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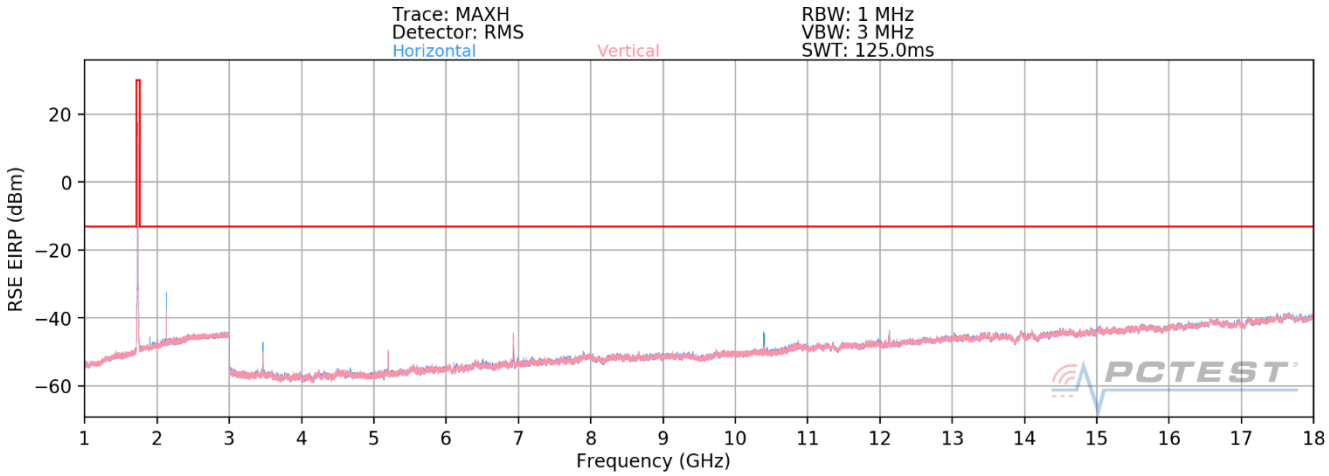
AWS WCDMA Mode



Plot 7-107. 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	379	190	-63.25	8.13	-55.12	-42.1
5137.20	V	128	333	-63.41	10.09	-53.32	-40.3
6849.60	V	-	-	-66.66	11.36	-55.30	-42.3
8562.00	V	-	-	-65.83	13.11	-52.71	-39.7
10274.40	V	168	181	-61.74	13.01	-48.73	-35.7
11986.80	V	-	-	-60.91	13.08	-47.83	-34.8
13699.20	V	-	-	-59.93	14.39	-45.54	-32.5

Table 7-19. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1312)

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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	377	144	-55.55	8.21	-47.34	-34.3
5197.80	V	394	206	-63.32	10.10	-53.21	-40.2
6930.40	V	101	167	-62.40	11.39	-51.00	-38.0
8663.00	V	-	-	-65.31	13.08	-52.24	-39.2
10395.60	V	400	177	-60.44	13.06	-47.39	-34.4
12128.20	V	212	180	-58.23	13.06	-45.17	-32.2
13860.80	V	-	-	-61.45	14.46	-46.99	-34.0

Table 7-20. 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	400	146	-51.65	8.29	-43.37	-30.4
5257.80	V	102	228	-58.43	10.05	-48.38	-35.4
7010.40	V	100	170	-57.64	11.45	-46.19	-33.2
8763.00	V	104	183	-64.45	13.05	-51.41	-38.4
10515.60	V	123	178	-59.40	13.03	-46.36	-33.4
12268.20	V	197	207	-58.93	13.11	-45.83	-32.8
14020.80	V	-	-	-60.42	14.55	-45.87	-32.9
15773.40	V	-	-	-57.02	13.93	-43.09	-30.1

Table 7-21. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1513)

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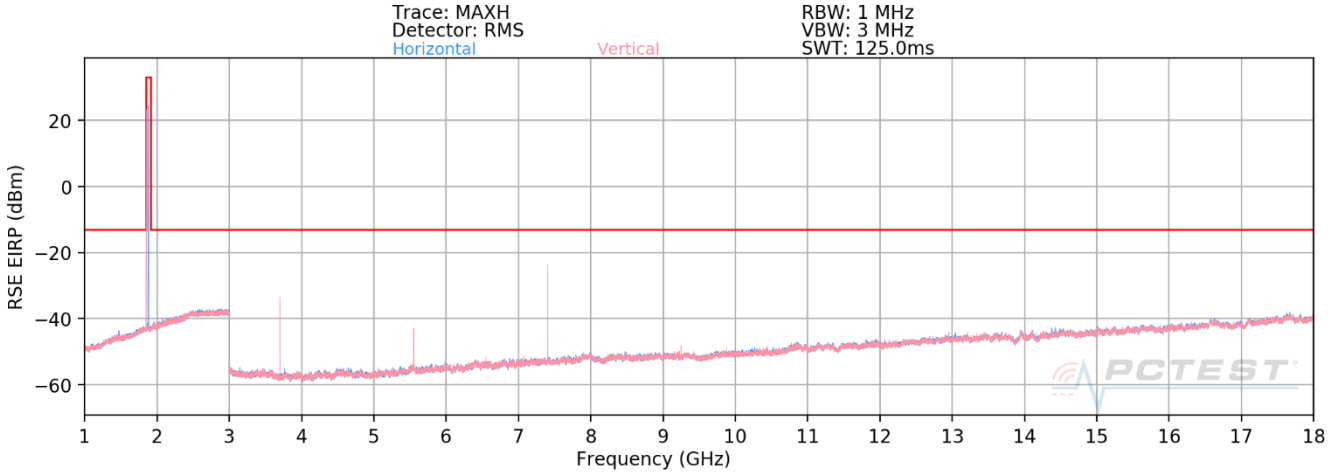
PCS GPRS Mode



Plot 7-108. Radiated Spurious Plot above 1GHz (PCS GPRS Mode)

OPERATING FREQUENCY:	1850.20	MHz
MODULATION SIGNAL:	GPRS	
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	102	173	-35.72	8.35	-27.37	-14.4
5550.60	V	101	187	-43.75	10.58	-33.17	-20.2
7400.80	V	101	181	-29.54	11.89	-17.65	-4.6
9251.00	V	112	208	-55.82	13.28	-42.53	-29.5
11101.20	V	-	-	-56.51	13.10	-43.41	-30.4
12951.40	V	101	221	-49.94	13.36	-36.58	-23.6
14801.60	V	-	-	-53.09	14.10	-38.99	-26.0
16651.80	V	-	-	-48.69	13.00	-35.70	-22.7

Table 7-22. Radiated Spurious Data (PCS GPRS Mode – Ch. 512)

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OPERATING FREQUENCY: 1880.00 MHz
MODULATION SIGNAL: GPRS
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	362	182	-53.46	8.29	-45.18	-32.2
5640.00	V	139	236	-58.20	10.65	-47.55	-34.6
7520.00	V	123	179	-55.88	12.02	-43.86	-30.9
9400.00	V	-	-	-59.23	13.16	-46.07	-33.1
11280.00	V	-	-	-56.05	13.21	-42.84	-29.8
13160.00	V	-	-	-53.88	13.68	-40.20	-27.2

Table 7-23. Radiated Spurious Data (PCS GPRS Mode – Ch. 661)

OPERATING FREQUENCY: 1909.80 MHz
MODULATION SIGNAL: GPRS
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	182	128	-59.98	8.31	-51.67	-38.7
5729.40	V	188	240	-59.36	10.65	-48.71	-35.7
7639.20	V	104	182	-58.19	12.14	-46.06	-33.1
9549.00	V	-	-	-59.19	13.13	-46.05	-33.1
11458.80	V	-	-	-55.56	13.21	-42.34	-29.3
13368.60	V	-	-	-54.69	13.80	-40.89	-27.9

Table 7-24. Radiated Spurious Data (PCS GPRS Mode – Ch. 810)

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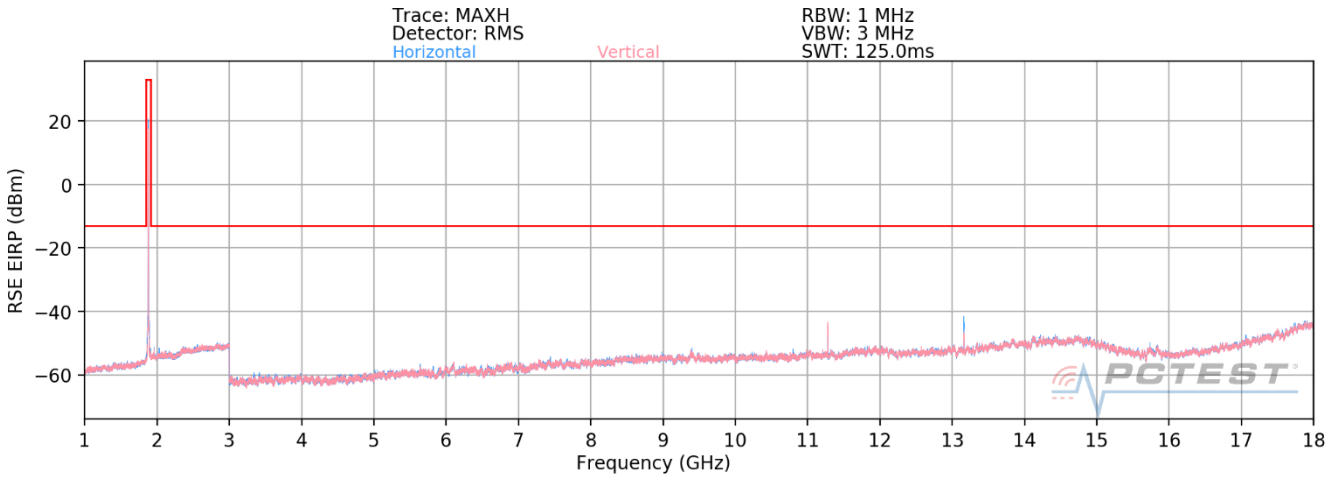
PCS CDMA Mode



Plot 7-109. 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	V	116	345	-66.23	9.60	-56.62	-43.6
5553.75	V	136	197	-66.54	10.98	-55.56	-42.6
7405.00	V	400	32	-69.23	10.99	-58.24	-45.2
9256.25	V	328	30	-69.16	11.66	-57.51	-44.5
11107.50	V	160	16	-60.46	12.77	-47.69	-34.7
12958.75	V	3	5	-52.52	13.34	-39.17	-26.2
14810.00	V	-	-	-67.12	12.50	-54.62	-41.6

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

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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	V	115	265	-71.04	9.40	-61.65	-48.6
5640.00	V	139	34	-65.24	11.20	-54.04	-41.0
7520.00	V	-	-	-71.17	11.14	-60.03	-47.0
9400.00	V	338	31	-64.89	11.60	-53.29	-40.3
11280.00	V	139	330	-59.45	12.78	-46.67	-33.7
13160.00	V	302	7	-56.24	13.20	-43.05	-30.0
15040.00	V	-	-	-68.67	13.56	-55.11	-42.1

Table 7-26. 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	V	360	287	-73.72	9.33	-64.39	-51.4
5726.25	V	377	352	-61.08	11.41	-49.67	-36.7
7635.00	V	-	-	-72.19	11.35	-60.84	-47.8
9543.75	V	-	-	-70.33	11.81	-58.53	-45.5

Table 7-27. Radiated Spurious Data (PCS CDMA Mode – Ch. 1175)

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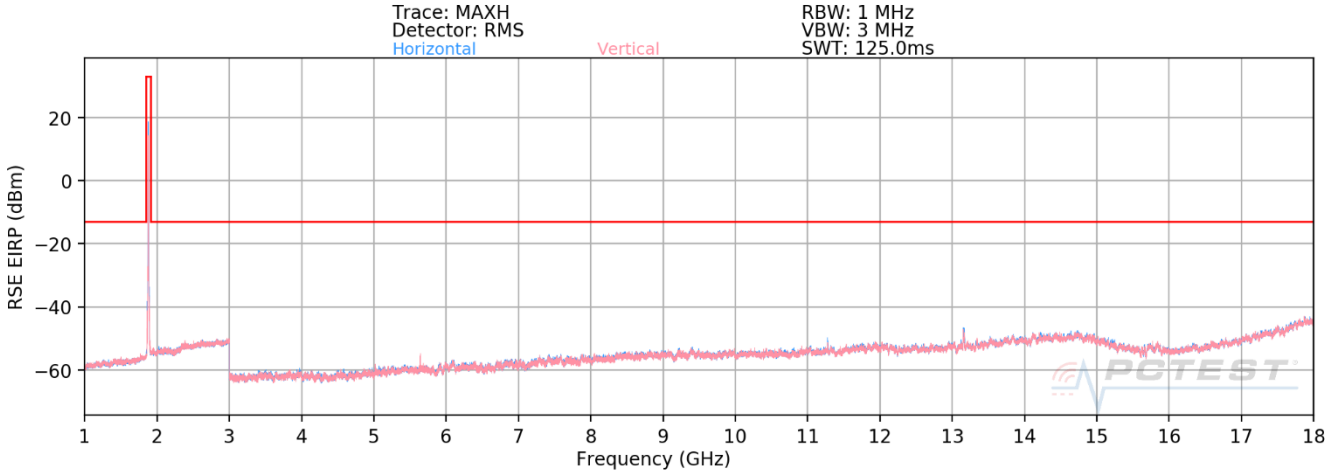
PCS WCDMA Mode



Plot 7-110. 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	V	118	1	-69.99	8.34	-61.65	-48.6
5557.20	V	155	351	-66.16	10.58	-55.57	-42.6
7409.60	V	400	27	-71.69	11.90	-59.79	-46.8
9262.00	V	371	34	-70.27	13.26	-57.01	-44.0
11114.40	V	163	357	-63.03	13.11	-49.92	-36.9
12966.80	V	354	10	-60.21	13.37	-46.84	-33.8
14819.20	V	-	-	-67.87	14.10	-53.77	-40.8

Table 7-28. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9262)

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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	V	394	142	-72.69	8.29	-64.41	-51.4
5640.00	V	140	39	-65.51	10.65	-54.87	-41.9
7520.00	V	-	-	-72.09	12.02	-60.07	-47.1
9400.00	V	393	357	-71.11	13.16	-57.95	-45.0
11280.00	V	127	11	-66.02	13.21	-52.80	-39.8
13160.00	V	351	8	-61.50	13.68	-47.81	-34.8
15040.00	V	-	-	-71.38	14.13	-57.26	-44.3

Table 7-29. 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	V	388	7	-72.16	8.30	-63.86	-50.9
5722.80	V	374	365	-62.31	10.66	-51.65	-38.7
7630.40	V	392	37	-71.96	12.13	-59.83	-46.8
9538.00	V	111	345	-69.76	13.13	-56.63	-43.6
11445.60	V	132	22	-65.70	13.22	-52.48	-39.5
13353.20	V	195	328	-63.56	13.78	-49.78	-36.8
15260.80	V	-	-	-70.27	14.12	-56.14	-43.1

Table 7-30. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9538)

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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

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Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	190	
REFERENCE VOLTAGE:	4.42	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.42	- 30	836,600,000	0	0.0000000
100 %		- 20	836,600,130	130	0.0000155
100 %		- 10	836,600,123	123	0.0000147
100 %		0	836,600,057	57	0.0000068
100 %		+ 10	836,599,972	-28	-0.0000033
100 %		+ 20	836,599,892	-108	-0.0000129
100 %		+ 30	836,600,005	5	0.0000006
100 %		+ 40	836,599,871	-129	-0.0000154
100 %		+ 50	836,600,120	120	0.0000143
BATT. ENDPOINT	3.67	+ 20	836,599,921	-79	-0.0000094

Table 7-31. Frequency Stability Data (Cellular GPRS Mode – Ch. 190)

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Frequency Stability / Temperature Variation

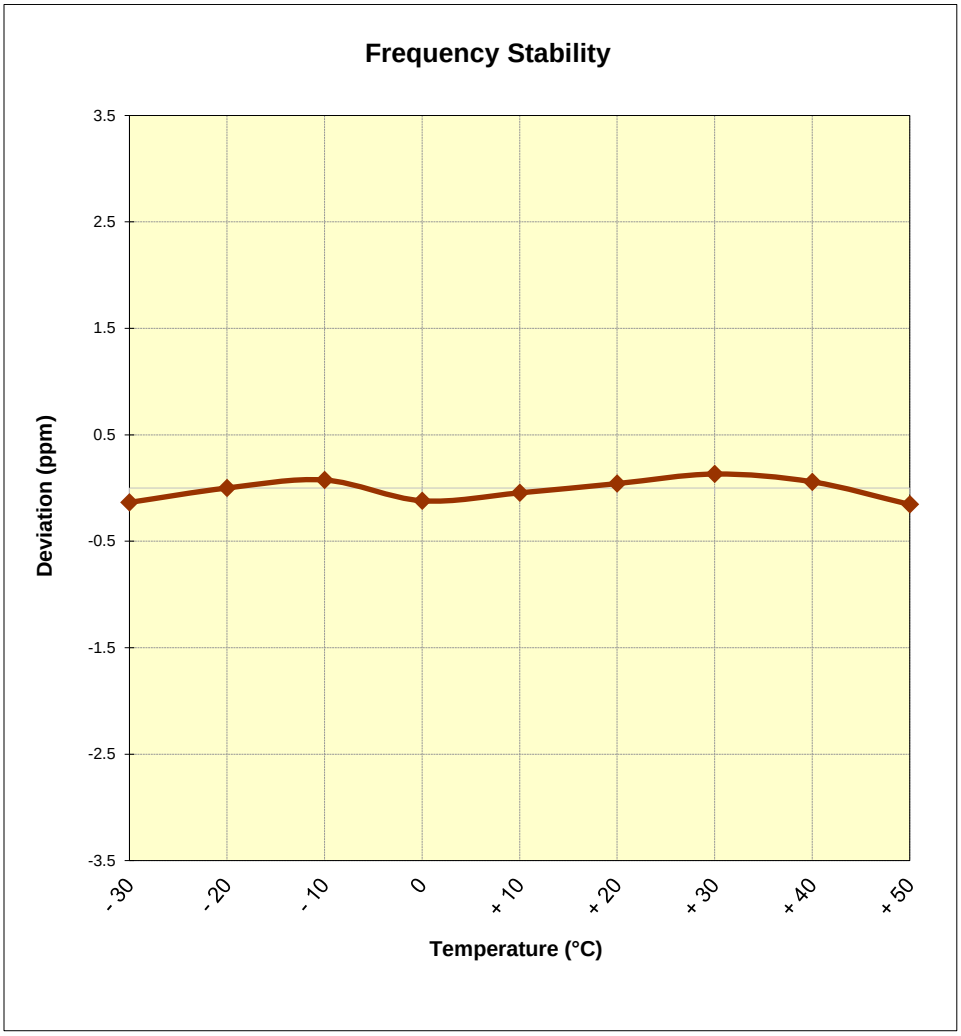

Figure 7-9. Frequency Stability Graph (Cellular GPRS Mode – Ch. 190)

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Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	836,520,000	Hz
CHANNEL:	384	
REFERENCE VOLTAGE:	4.42	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.42	- 30	836,519,889	-111	-0.0000133
100 %		- 20	836,519,918	-82	-0.0000098
100 %		- 10	836,520,038	38	0.0000045
100 %		0	836,520,033	33	0.0000039
100 %		+ 10	836,519,995	-5	-0.0000006
100 %		+ 20	836,519,912	-88	-0.0000105
100 %		+ 30	836,519,989	-11	-0.0000013
100 %		+ 40	836,519,943	-57	-0.0000068
100 %		+ 50	836,520,045	45	0.0000054
BATT. ENDPOINT	3.67	+ 20	836,519,952	-48	-0.0000057

Table 7-32. Frequency Stability Data (Cellular CDMA Mode – Ch. 384)

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Frequency Stability / Temperature Variation

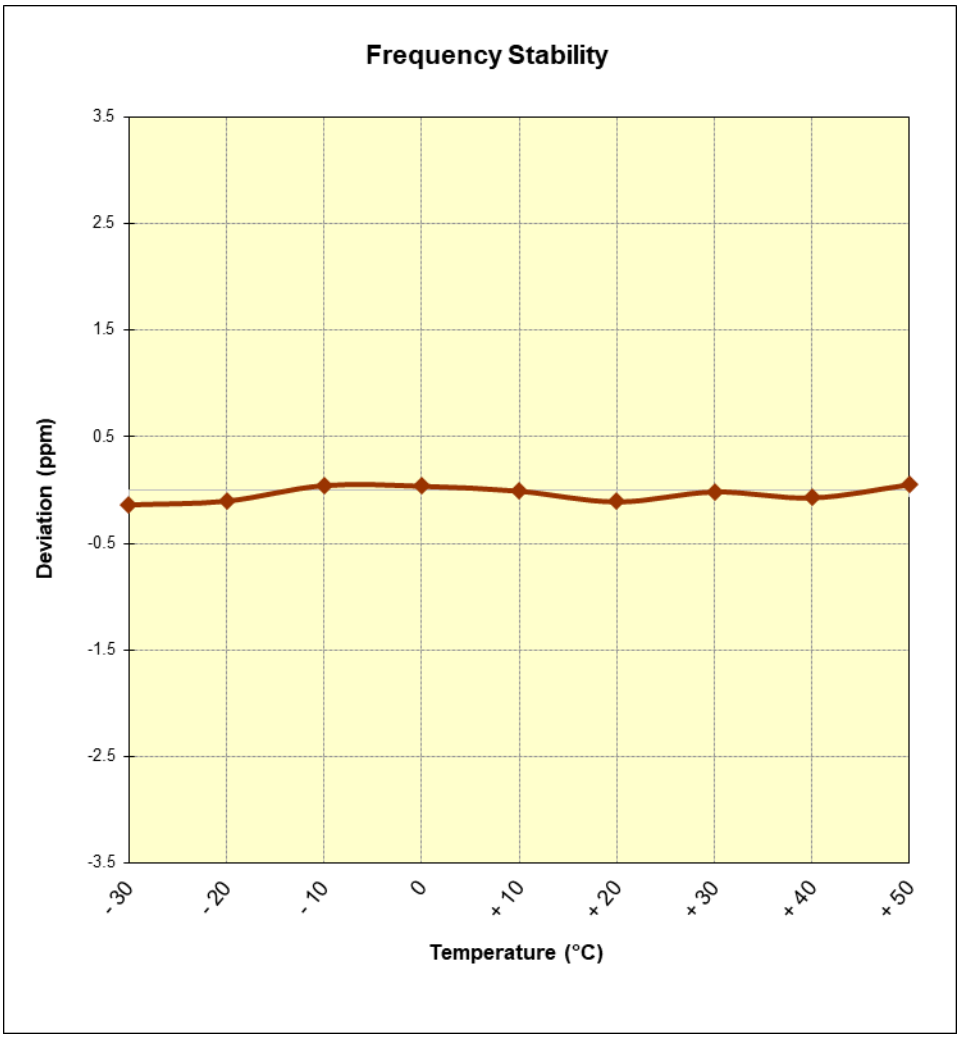

Figure 7-10. Frequency Stability Graph (Cellular CDMA Mode – Ch. 384)

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Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	4183	
REFERENCE VOLTAGE:	4.42	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.42	- 30	836,599,973	-27	-0.0000032
100 %		- 20	836,600,122	122	0.0000146
100 %		- 10	836,599,957	-43	-0.0000051
100 %		0	836,600,032	32	0.0000038
100 %		+ 10	836,599,944	-56	-0.0000067
100 %		+ 20	836,600,110	110	0.0000131
100 %		+ 30	836,600,007	7	0.0000008
100 %		+ 40	836,599,872	-128	-0.0000153
100 %		+ 50	836,599,868	-132	-0.0000158
BATT. ENDPOINT	3.67	+ 20	836,599,978	-22	-0.0000026

Table 7-33. Frequency Stability Data (Cellular WCDMA Mode – Ch. 4183)

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Frequency Stability / Temperature Variation

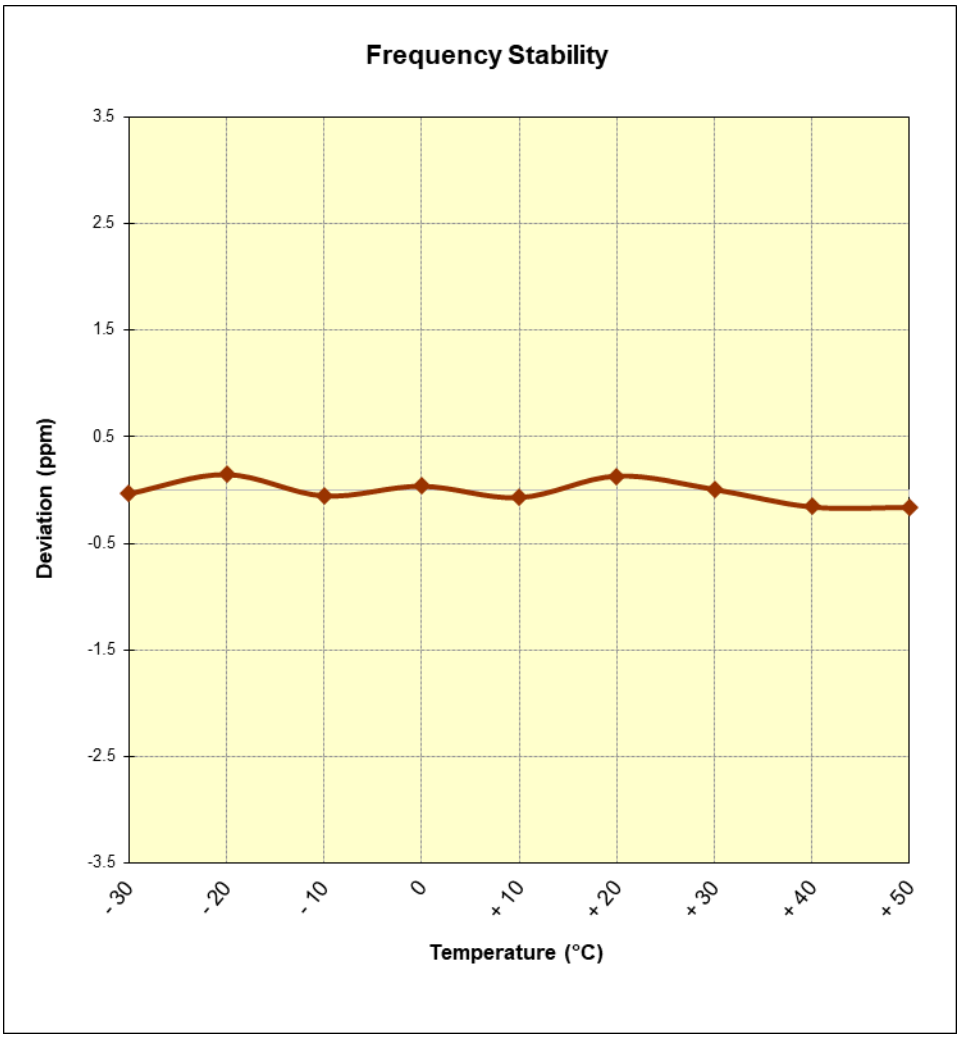

Figure 7-11. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)

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Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,732,600,000	Hz
CHANNEL:	1413	
REFERENCE VOLTAGE:	4.42	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.42	- 30	1,732,600,115	115	0.0000066
100 %		- 20	1,732,600,018	18	0.0000010
100 %		- 10	1,732,599,885	-115	-0.0000066
100 %		0	1,732,600,132	132	0.0000076
100 %		+ 10	1,732,599,865	-135	-0.0000078
100 %		+ 20	1,732,599,964	-36	-0.0000021
100 %		+ 30	1,732,599,994	-6	-0.0000003
100 %		+ 40	1,732,600,056	56	0.0000032
100 %		+ 50	1,732,599,895	-105	-0.0000061
BATT. ENDPOINT	3.67	+ 20	1,732,599,866	-134	-0.0000077

Table 7-34. 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.

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Frequency Stability / Temperature Variation

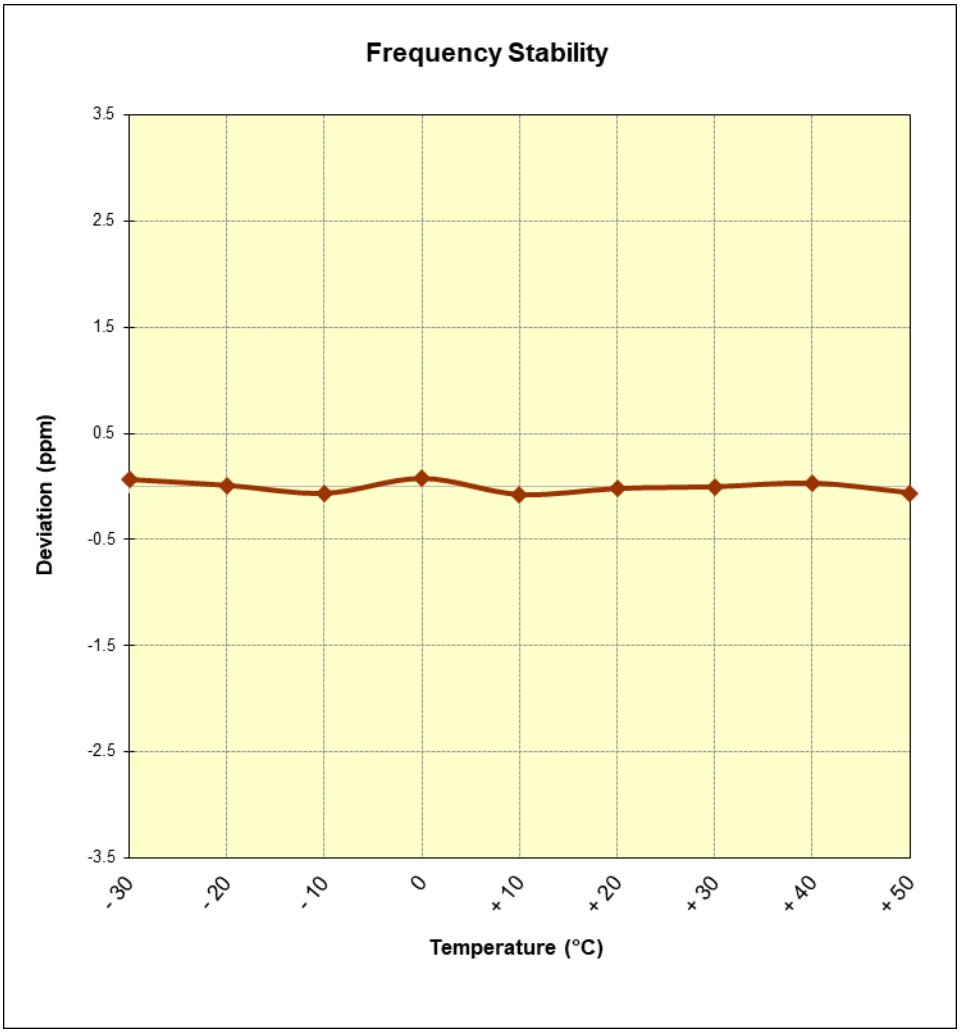

Figure 7-12. Frequency Stability Graph (AWS WCDMA Mode – Ch. 1413)

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Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	661	
REFERENCE VOLTAGE:	4.42	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.42	- 30	1,879,999,933	-67	-0.0000036
100 %		- 20	1,880,000,068	68	0.0000036
100 %		- 10	1,880,000,129	129	0.0000069
100 %		0	1,879,999,881	-119	-0.0000063
100 %		+ 10	1,879,999,892	-108	-0.0000057
100 %		+ 20	1,879,999,872	-128	-0.0000068
100 %		+ 30	1,880,000,099	99	0.0000053
100 %		+ 40	1,879,999,868	-132	-0.0000070
100 %		+ 50	1,879,999,867	-133	-0.0000071
BATT. ENDPOINT	3.67	+ 20	1,879,999,964	-36	-0.0000019

Table 7-35. Frequency Stability Data (PCS GPRS Mode – Ch. 661)

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Frequency Stability / Temperature Variation

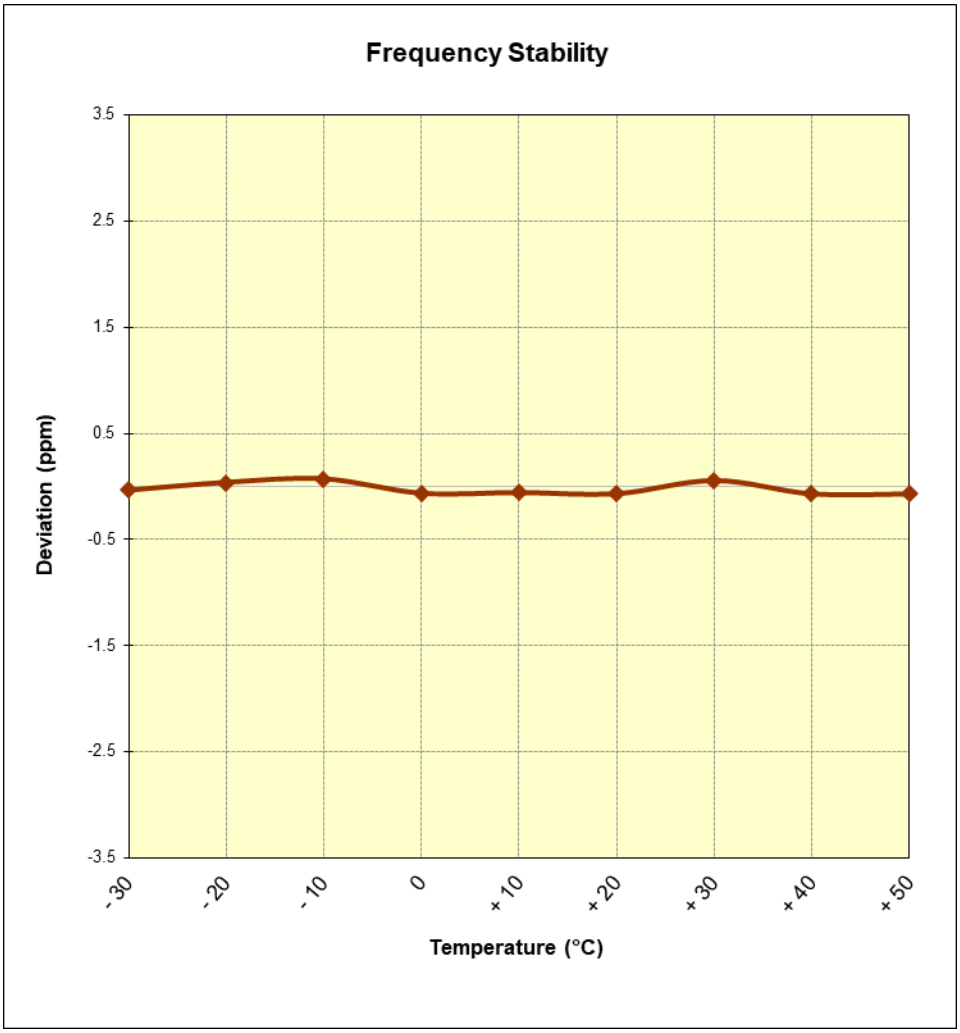

Figure 7-13. Frequency Stability Graph (PCS GPRS Mode – Ch. 661)

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Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	600	
REFERENCE VOLTAGE:	4.42	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.42	- 30	1,880,000,107	107	0.0000057
100 %		- 20	1,880,000,010	10	0.0000005
100 %		- 10	1,880,000,045	45	0.0000024
100 %		0	1,879,999,985	-15	-0.0000008
100 %		+ 10	1,880,000,078	78	0.0000041
100 %		+ 20	1,880,000,127	127	0.0000068
100 %		+ 30	1,879,999,922	-78	-0.0000041
100 %		+ 40	1,879,999,936	-64	-0.0000034
100 %		+ 50	1,879,999,966	-34	-0.0000018
BATT. ENDPOINT	3.67	+ 20	1,880,000,081	81	0.0000043

Table 7-36. Frequency Stability Data (PCS CDMA Mode – Ch. 600)

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Frequency Stability / Temperature Variation

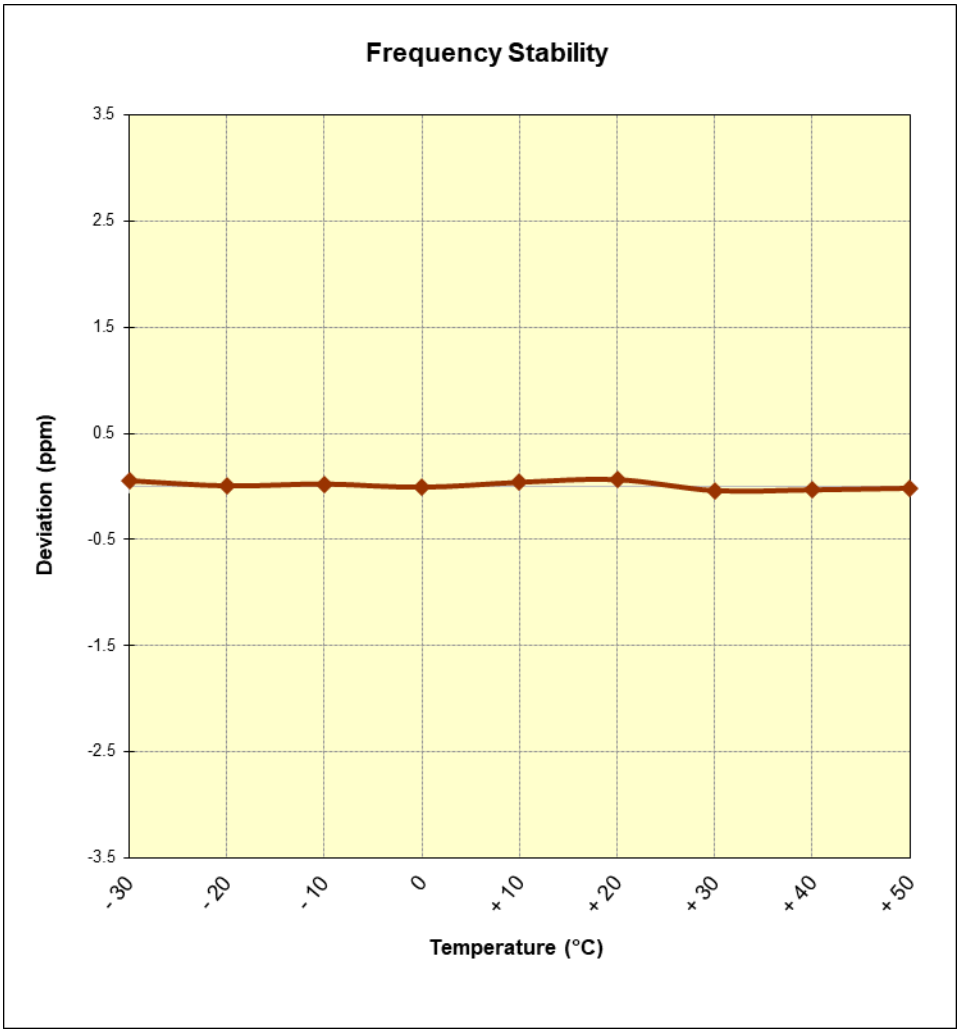

Figure 7-14. Frequency Stability Graph (PCS CDMA Mode – Ch. 600)

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Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	9400	
REFERENCE VOLTAGE:	4.42	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.42	- 30	1,879,999,974	-26	-0.0000014
100 %		- 20	1,879,999,980	-20	-0.0000011
100 %		- 10	1,880,000,102	102	0.0000054
100 %		0	1,879,999,954	-46	-0.0000024
100 %		+ 10	1,879,999,907	-93	-0.0000049
100 %		+ 20	1,879,999,984	-16	-0.0000009
100 %		+ 30	1,879,999,877	-123	-0.0000065
100 %		+ 40	1,880,000,012	12	0.0000006
100 %		+ 50	1,880,000,108	108	0.0000057
BATT. ENDPOINT	3.67	+ 20	1,879,999,871	-129	-0.0000069

Table 7-37. Frequency Stability Data (PCS WCDMA Mode – Ch. 9400)

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Frequency Stability / Temperature Variation

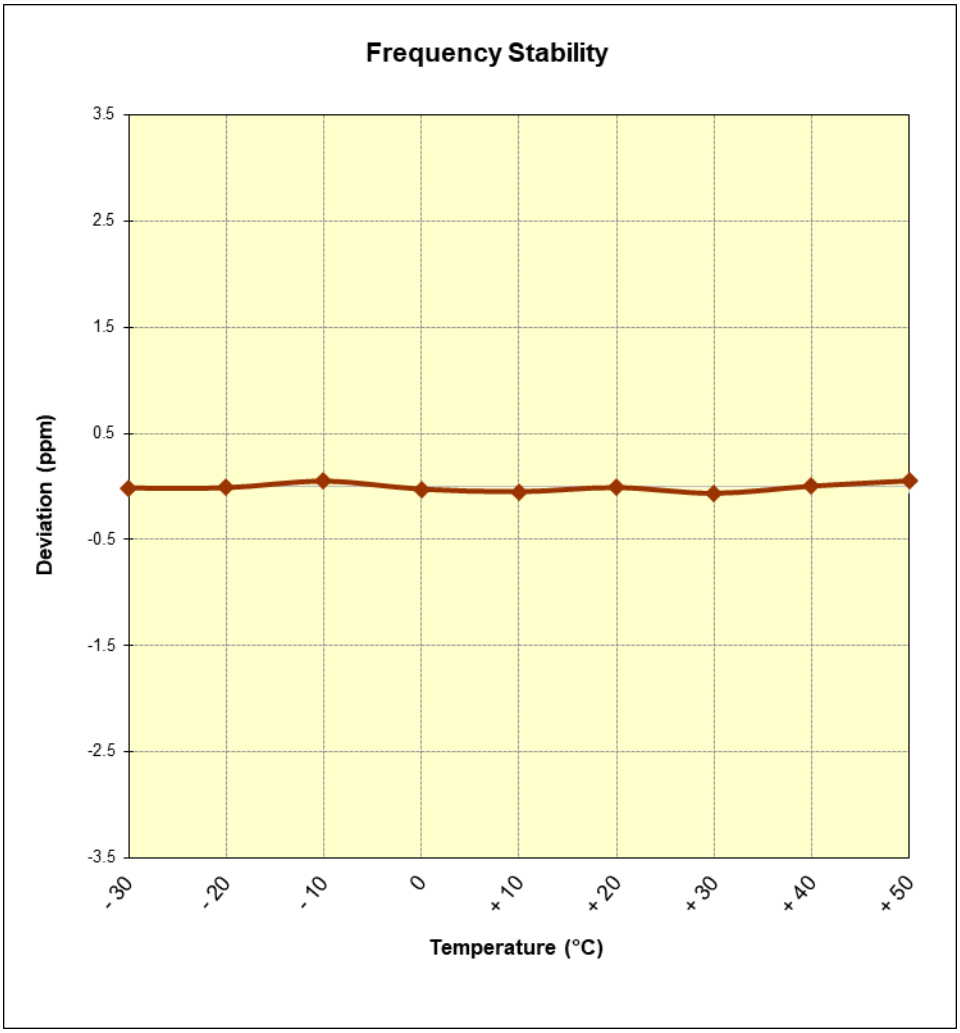

Figure 7-15. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFG900UM** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules.

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