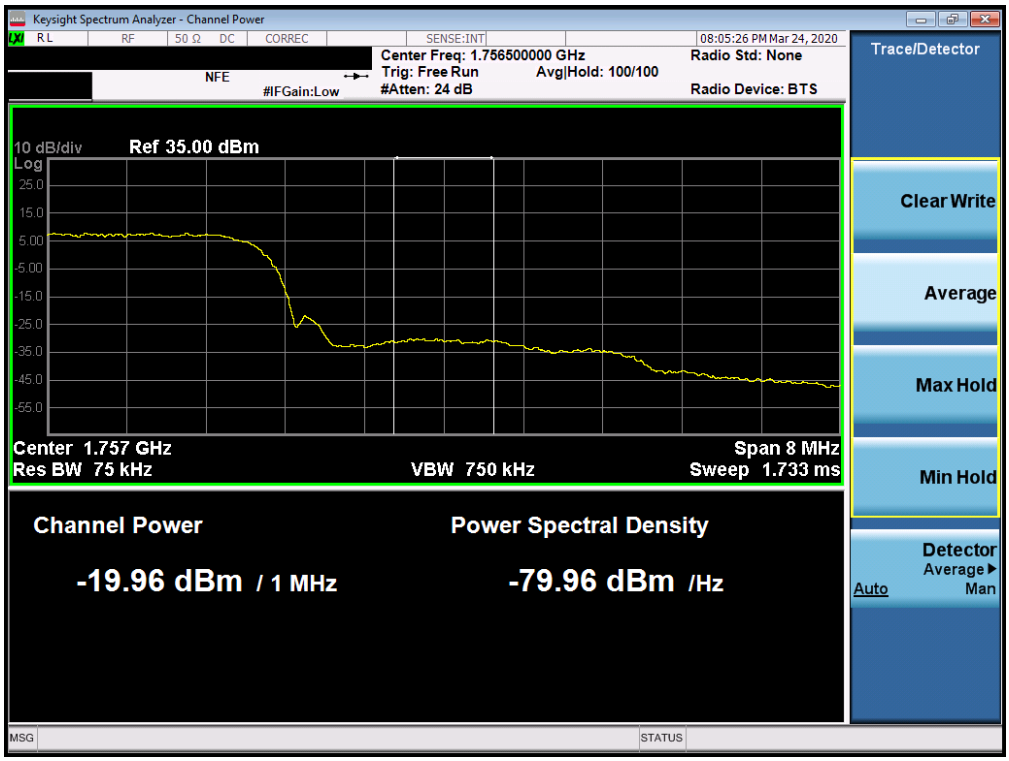
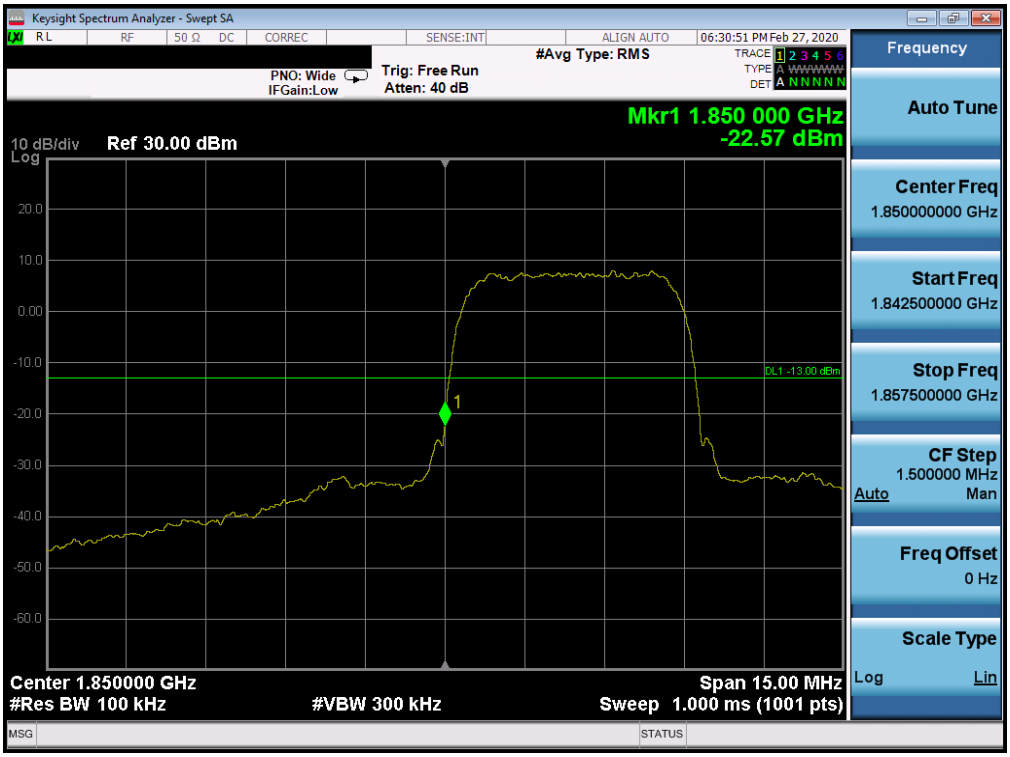
Plot 7-91. Band Edge Plot (AWS WCDMA Mode - High Channel)

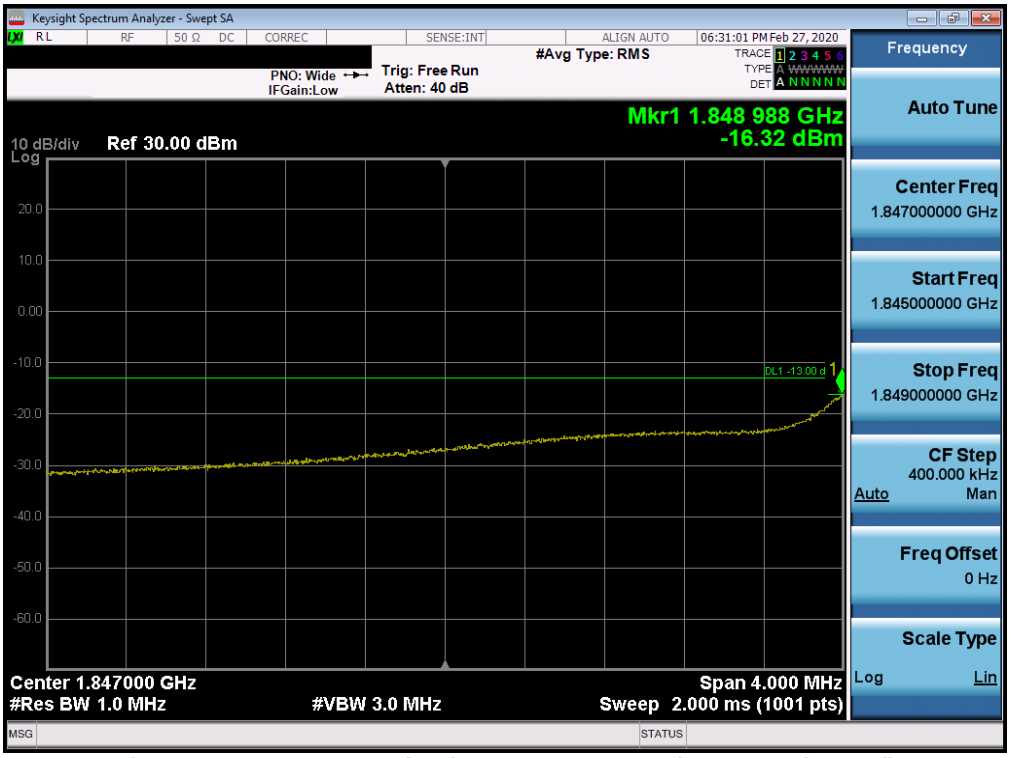


Plot 7-92. 4MHz Span Plot (AWS WCDMA Mode - High Channel)

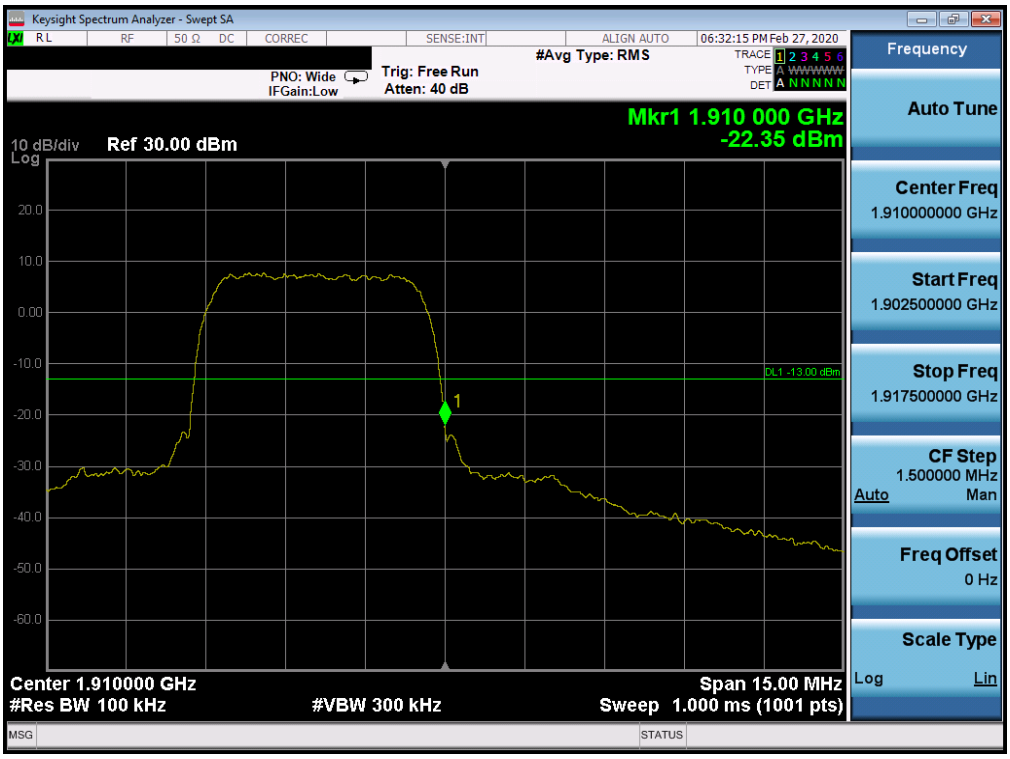
PCS WCDMA Mode



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



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



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

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

7.5 Peak-Average Ratio

Test Overview

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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 5.7.1

Test Settings

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

Test Setup

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

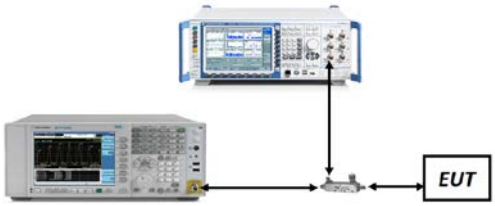
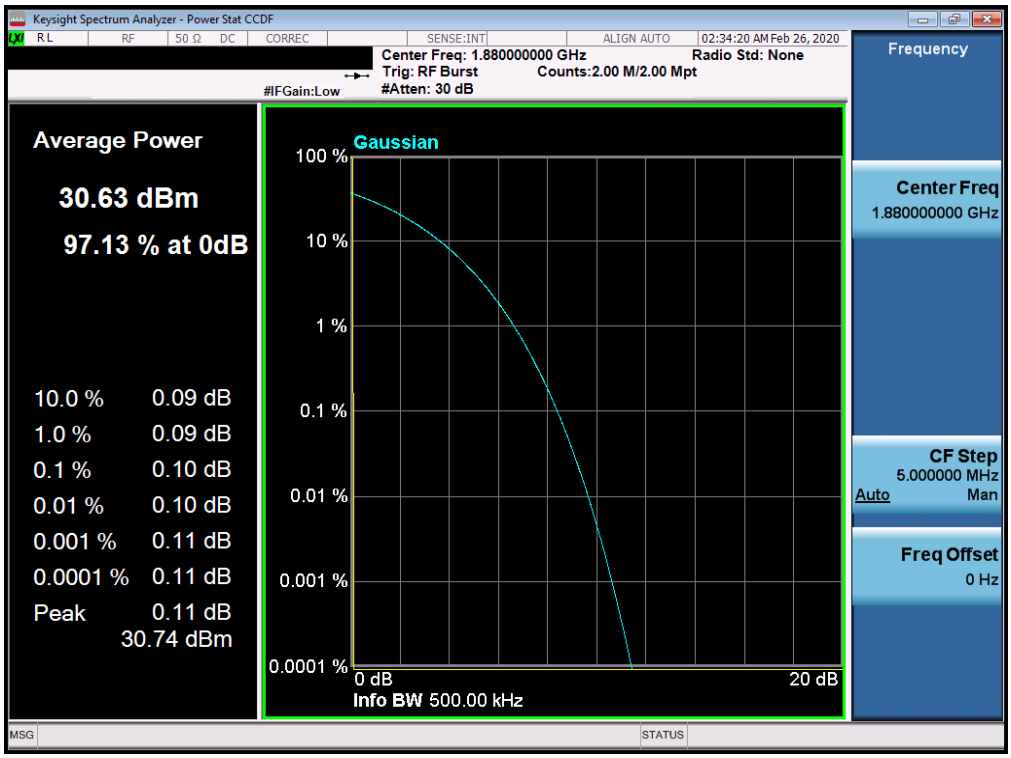


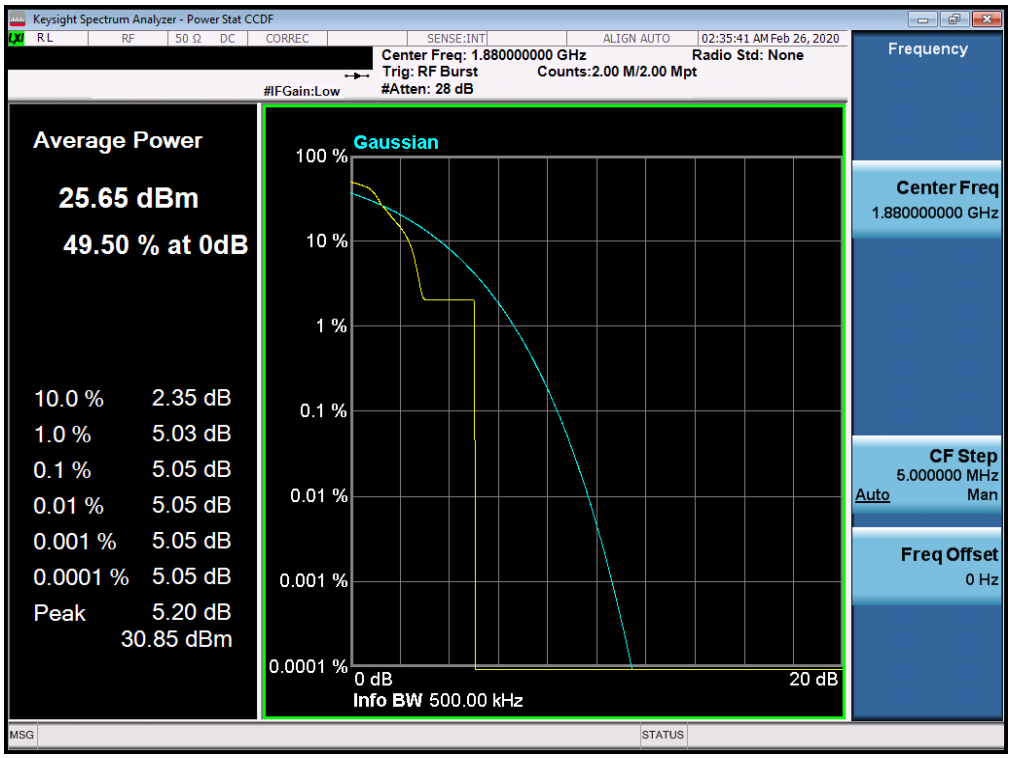
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

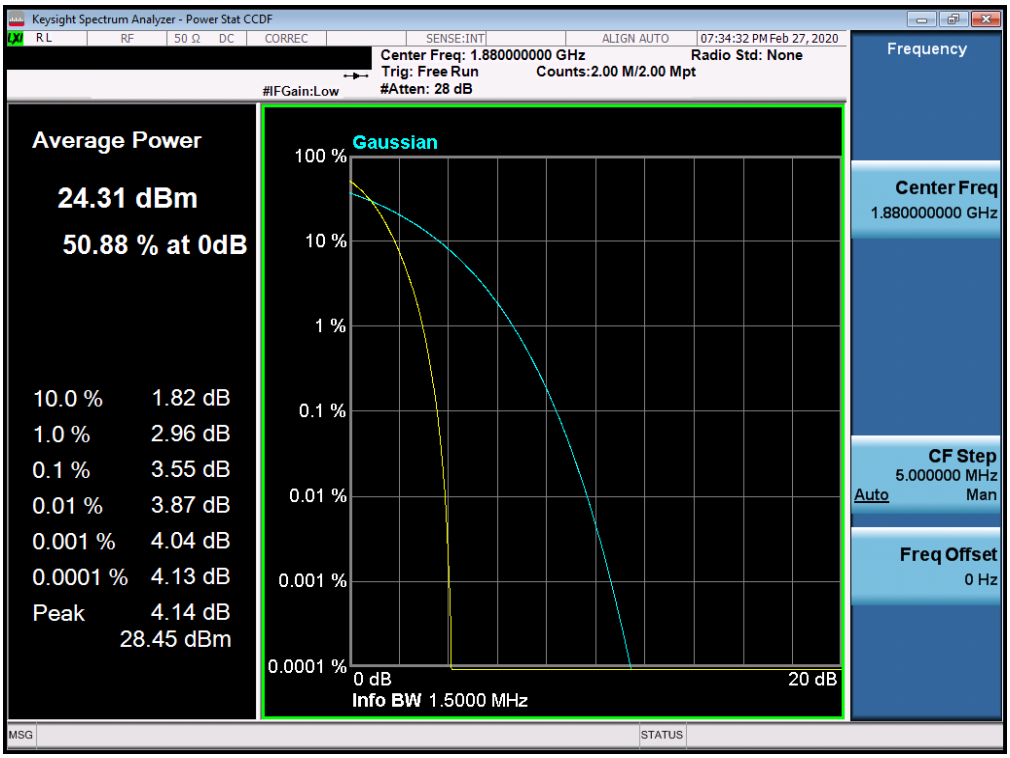
None



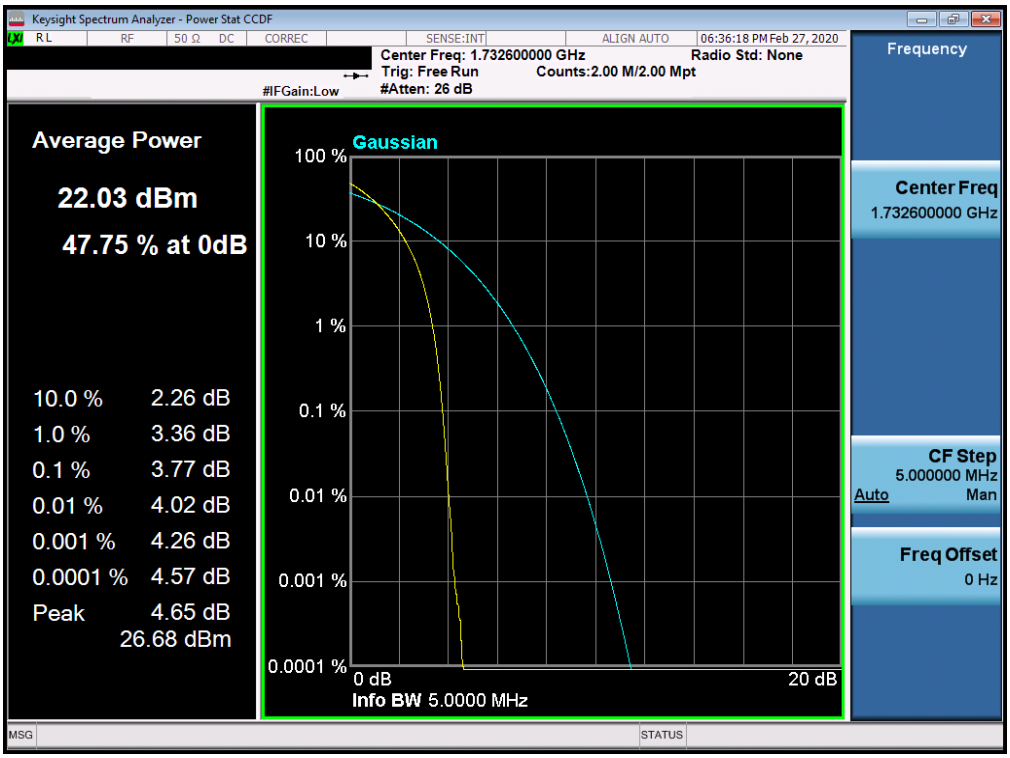
Plot 7-97. Peak-Average Ratio Plot (PCS GPRS Mode)



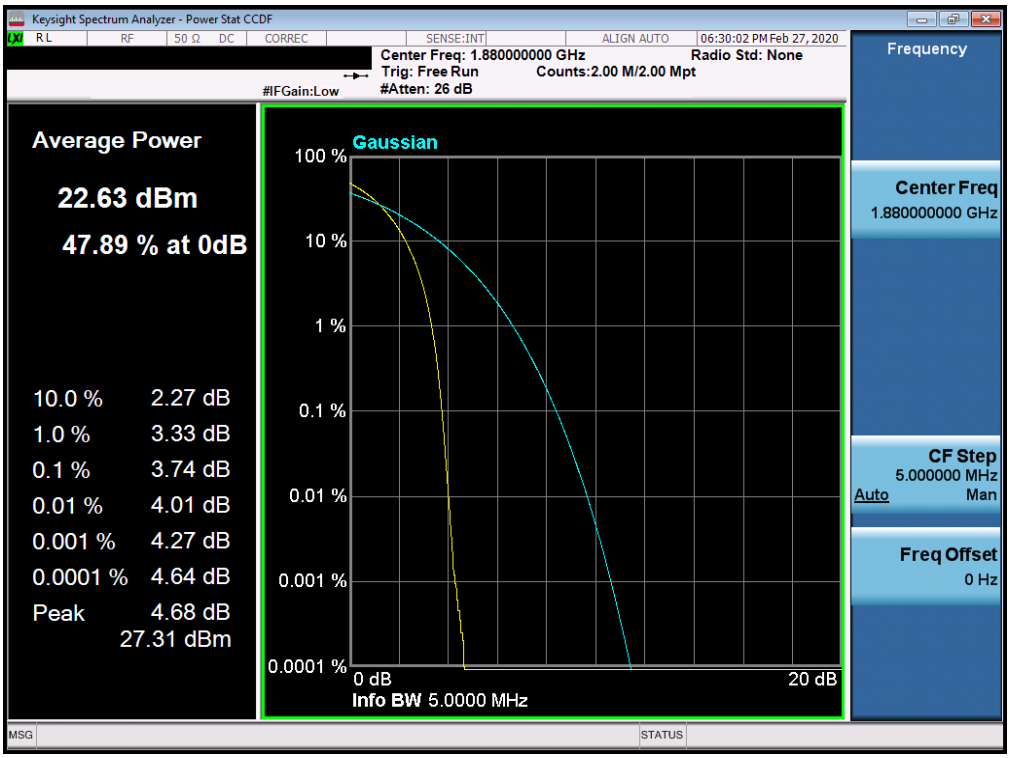
Plot 7-98. Peak-Average Ratio Plot (EDGE1900 Mode)



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.

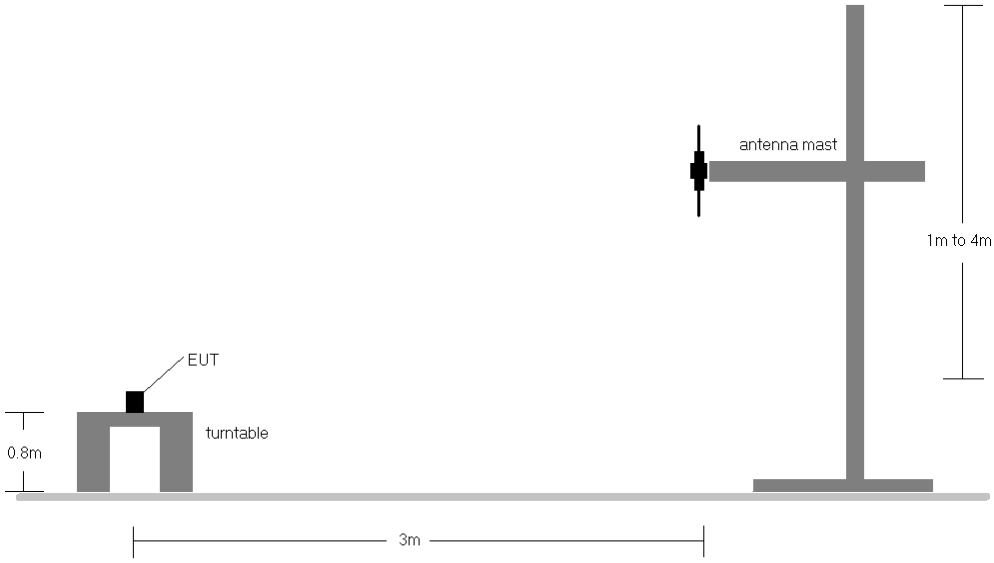


Figure 7-5. Radiated Test Setup <1GHz

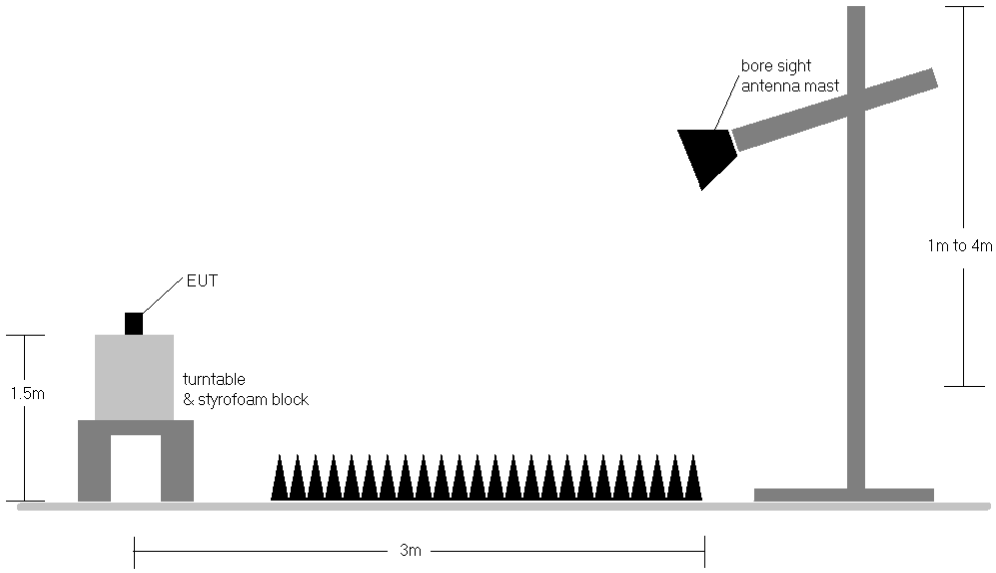


Figure 7-6. Radiated Test Setup >1GHz

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) 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 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	248	317	18.22	6.30	22.37	0.173	38.45	-16.08	24.52	0.283	40.61	-16.09
836.60	GPRS850	V	149	314	22.13	6.40	26.38	0.435	38.45	-12.07	28.53	0.713	40.61	-12.08
848.80	GPRS850	V	116	225	22.38	6.50	**26.73**	**0.471**	38.45	-11.72	**28.88**	**0.773**	40.61	-11.73
848.80	GPRS850	H	204	277	19.98	6.40	24.23	0.265	38.45	-14.22	26.38	0.435	40.61	-14.23
848.80	EDGE850	V	116	225	18.31	6.50	**22.66**	0.185	38.45	-15.79	**24.81**	**0.303**	40.61	-15.80

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 [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
824.70	CDMA850	V	139	45	14.65	6.30	18.80	0.076	38.45	-19.65	20.95	0.124	40.61	-19.66
836.52	CDMA850	V	139	45	15.38	6.40	**19.63**	**0.092**	38.45	-18.82	**21.78**	**0.151**	40.61	-18.83
848.31	CDMA850	V	144	42	14.66	6.50	19.01	0.080	38.45	-19.44	21.16	0.131	40.61	-19.45
836.52	CDMA850	H	204	349	13.08	6.40	17.33	0.054	38.45	-21.12	19.48	0.089	40.61	-21.13

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	239	307	12.05	6.30	16.20	0.042	38.45	-22.25	18.35	0.068	40.61	-22.26
836.60	WCDMA850	V	216	216	12.27	6.40	16.52	0.045	38.45	-21.93	18.67	0.074	40.61	-21.94
846.60	WCDMA850	V	211	208	12.85	6.50	**17.20**	**0.052**	38.45	-21.25	**19.35**	**0.086**	40.61	-21.26
846.60	WCDMA850	H	139	61	11.12	6.50	15.47	0.035	38.45	-22.98	17.62	0.058	40.61	-22.99

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	162	44	11.05	9.43	20.48	0.112	30.00	-9.52
1732.60	WCDMA1700	H	154	79	11.64	9.31	**20.95**	**0.124**	30.00	-9.05
1752.60	WCDMA1700	H	152	68	10.16	9.21	19.37	0.086	30.00	-10.63
1732.60	WCDMA1700	V	256	32	8.59	9.31	17.90	0.062	30.00	-12.10

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	284	99	17.15	9.87	**27.02**	**0.504**	33.01	-5.99
1880.00	GPRS1900	V	275	100	16.53	10.10	26.63	0.461	33.01	-6.38
1909.80	GPRS1900	V	271	101	16.53	10.31	26.84	0.483	33.01	-6.17
1850.20	GPRS1900	H	138	342	16.90	10.10	27.00	0.502	33.01	-6.01
1850.20	EDGE1900	V	284	99	14.10	10.10	**24.20**	0.263	33.01	-8.81

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	156	139	12.73	9.49	22.22	0.167	33.01	-10.79
1880.00	CDMA1900	H	153	125	12.35	9.90	**22.25**	**0.168**	33.01	-10.76
1908.75	CDMA1900	H	155	52	11.44	10.25	21.69	0.148	33.01	-11.32
1880.00	CDMA1900	V	237	294	11.63	9.90	21.53	0.142	33.01	-11.48

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	185	126	12.08	9.89	**21.97**	**0.157**	33.01	-11.04
1880.00	WCDMA1900	V	143	155	9.74	10.10	19.84	0.096	33.01	-13.17
1907.60	WCDMA1900	V	120	176	10.34	10.30	20.64	0.116	33.01	-12.37
1852.40	WCDMA1900	H	111	346	10.53	10.10	20.63	0.116	33.01	-12.38

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.

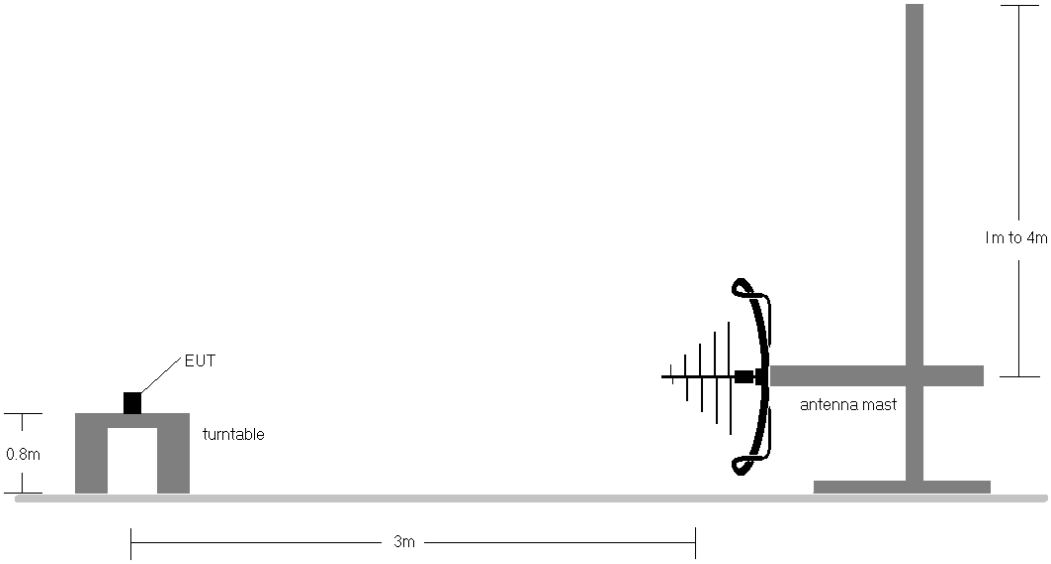


Figure 7-7. Test Instrument & Measurement Setup < 1GHz

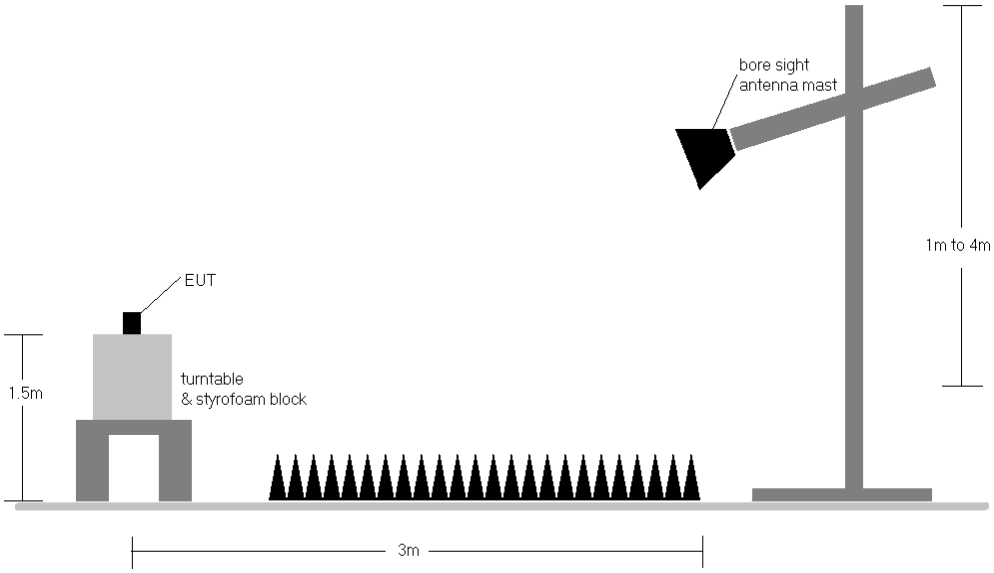


Figure 7-8. Test Instrument & Measurement Setup >1 GHz

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) 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 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.

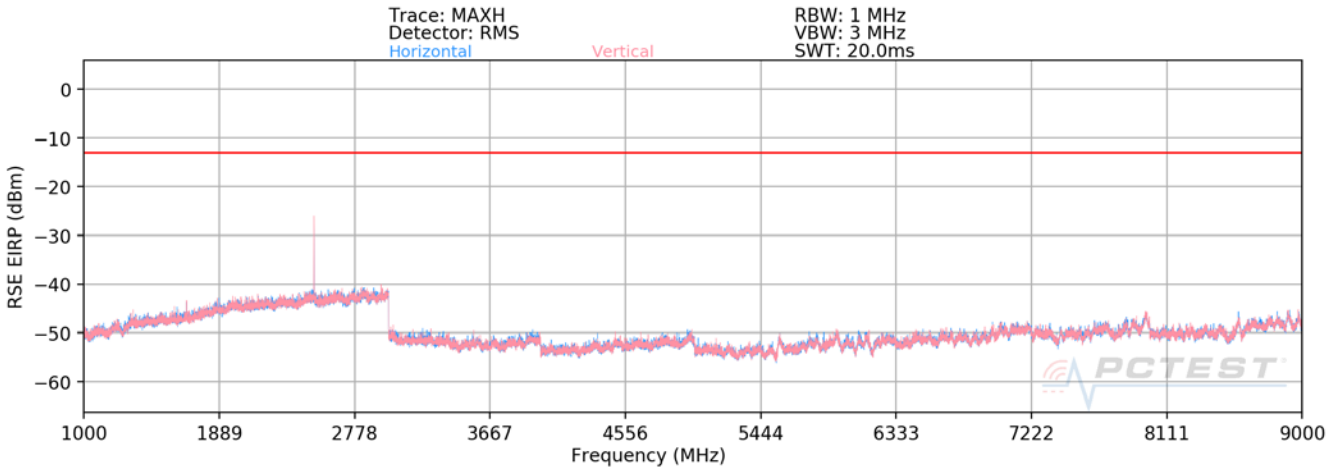
5) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

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	-	-	-63.05	3.07	-59.98	-47.0
2472.60	V	142	44	-49.57	3.82	-45.75	-32.7
3296.80	V	-	-	-60.30	6.00	-54.30	-41.3
4121.00	V	-	-	-60.68	7.67	-53.01	-40.0

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	-	-	-61.80	3.10	-58.70	-45.7
2509.80	V	156	66	-50.51	4.02	-46.49	-33.5
3346.40	V	-	-	-60.50	6.03	-54.47	-41.5
4183.00	V	-	-	-60.38	7.79	-52.59	-39.6

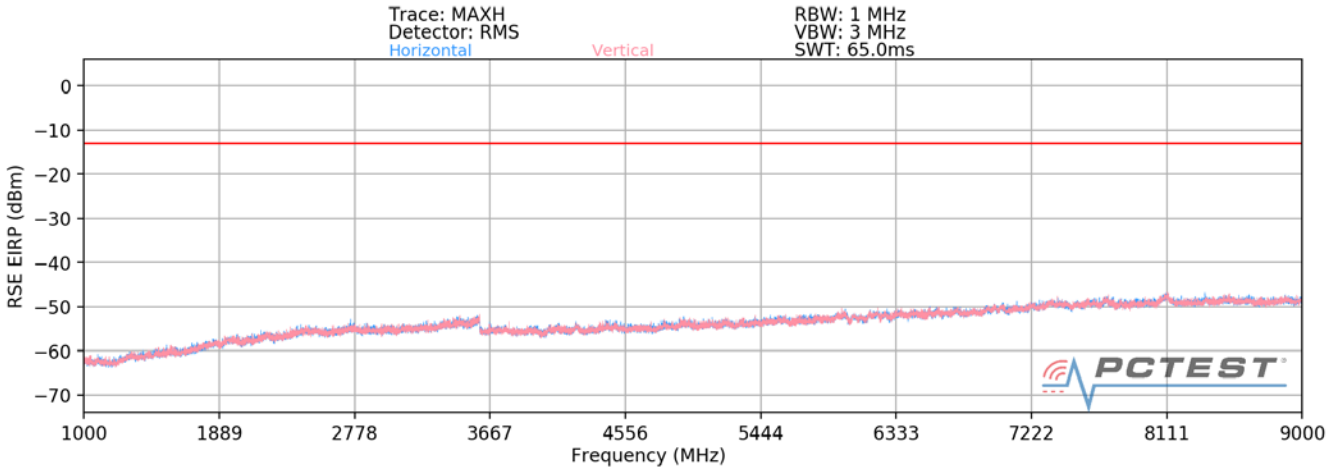
Table 7-10. Radiated Spurious Data (Cellular GPRS Mode – Ch. 190)

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	-	-	-61.22	3.15	-58.07	-45.1
2546.40	V	160	29	-49.96	4.15	-45.81	-32.8
3395.20	V	-	-	-59.29	6.24	-53.05	-40.1
4244.00	V	-	-	-61.70	7.97	-53.72	-40.7

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	V	-	-	-63.39	3.61	-59.78	-46.8
2474.10	V	-	-	-60.78	4.22	-56.56	-43.6
3298.80	V	-	-	-61.82	5.78	-56.04	-43.0

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.04	V	-	-	-63.89	3.62	-60.27	-47.3
2509.56	V	-	-	-61.44	4.33	-57.10	-44.1
3346.08	V	-	-	-61.55	5.92	-55.63	-42.6

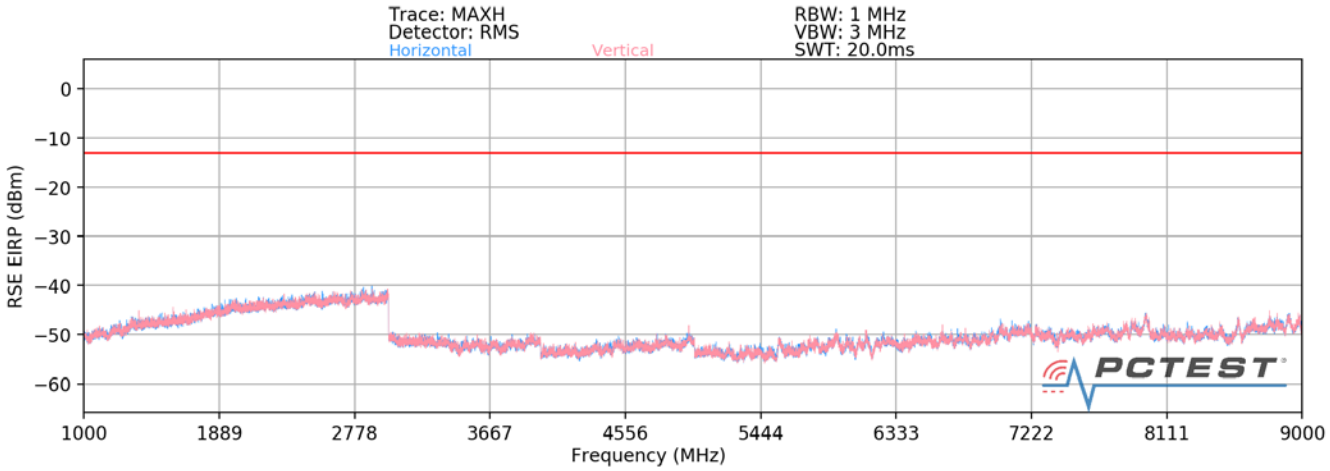
Table 7-13. Radiated Spurious Data (Cellular CDMA Mode – Ch. 384)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1696.62	V	-	-	-63.08	3.63	-59.45	-46.5
2544.93	V	-	-	-61.67	4.55	-57.12	-44.1
3393.24	V	-	-	-61.29	6.13	-55.16	-42.2

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	V	346	71	-59.78	3.09	-56.68	-43.7
2479.20	V	-	-	-57.40	3.91	-53.50	-40.5
3305.60	V	-	-	-59.73	6.00	-53.73	-40.7

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.20	V	-	-	-59.86	3.10	-56.76	-43.8
2509.80	V	-	-	-57.76	4.02	-53.74	-40.7
3346.40	V	-	-	-58.52	6.03	-52.49	-39.5
4183.00	V	-	-	-58.47	7.79	-50.68	-37.7

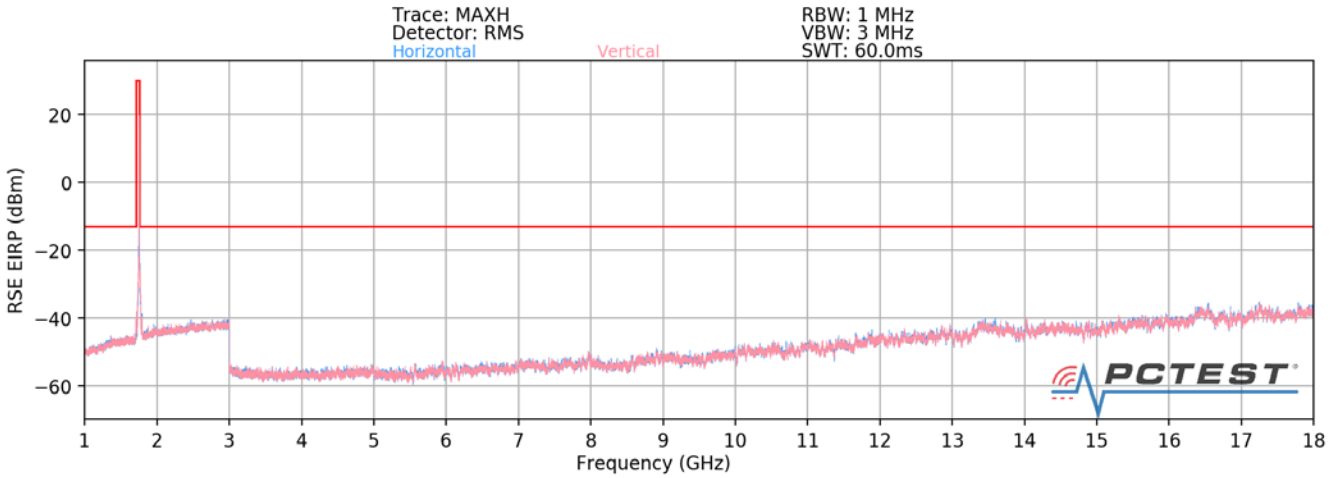
Table 7-16. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4183)

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	V	-	-	-60.50	3.17	-57.33	-44.3
2539.80	V	-	-	-57.10	4.13	-52.97	-40.0
3386.40	V	-	-	-58.64	6.20	-52.44	-39.4

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	V	-	-	-65.64	6.20	-59.45	-46.4
5137.20	V	-	-	-65.98	8.66	-57.32	-44.3
6849.60	V	-	-	-61.67	8.77	-52.89	-39.9

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3465.20	V	-	-	-65.08	6.27	-58.81	-45.8
5197.80	V	-	-	-66.57	8.71	-57.86	-44.9
6930.40	V	-	-	-63.62	8.72	-54.90	-41.9

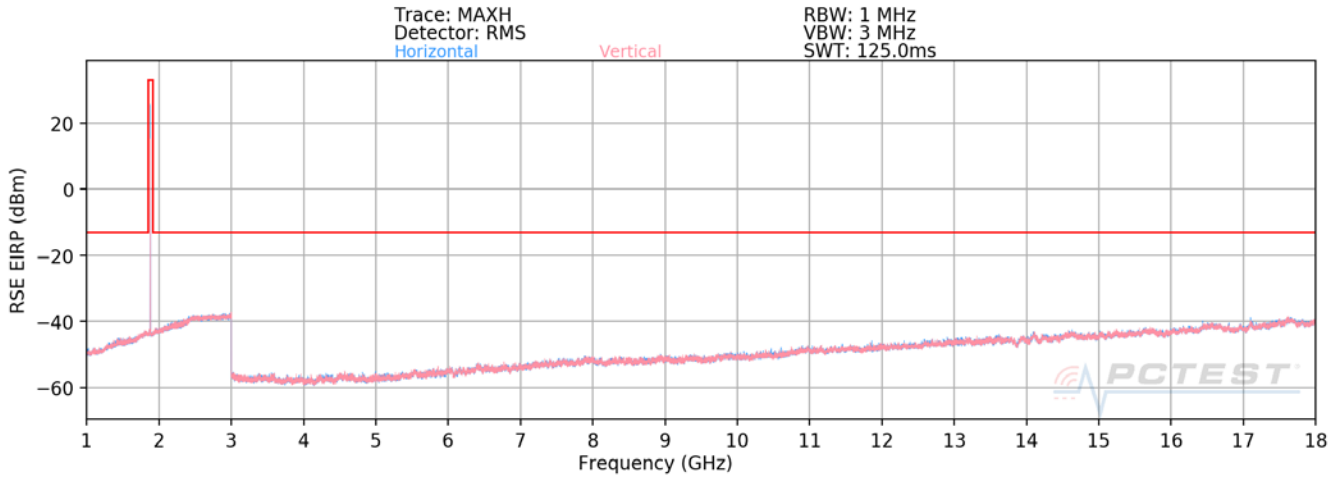
Table 7-19. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1413)

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3505.20	V	-	-	-65.91	6.34	-59.57	-46.6
5257.80	V	-	-	-66.58	8.72	-57.86	-44.9
7010.40	V	-	-	-62.21	8.75	-53.46	-40.5

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	H	153	75	-60.05	6.56	-53.48	-40.5
5550.60	H	146	88	-59.24	8.72	-50.52	-37.5
7400.80	H	-	-	-62.50	8.41	-54.10	-41.1
9251.00	H	153	66	-55.31	9.47	-45.84	-32.8
11101.20	H	-	-	-59.23	9.31	-49.92	-36.9

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	H	107	246	-56.98	6.67	-50.31	-37.3
5640.00	H	115	246	-57.81	8.81	-48.99	-36.0
7520.00	H	-	-	-62.65	8.48	-54.16	-41.2
9400.00	H	122	253	-57.24	9.32	-47.93	-34.9
11280.00	H	-	-	-59.04	9.24	-49.81	-36.8

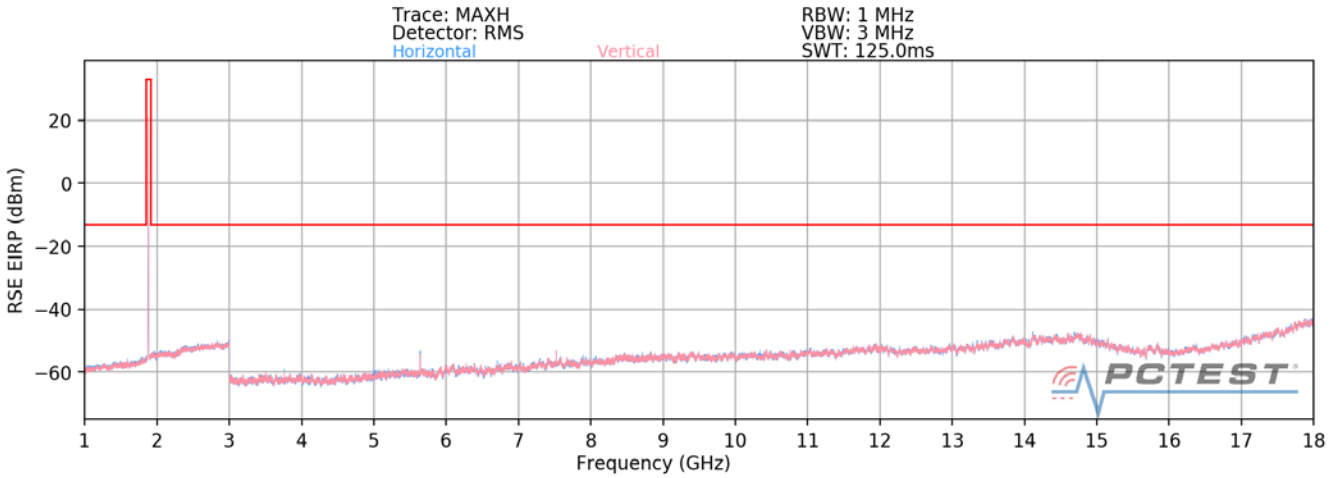
Table 7-22. Radiated Spurious Data (PCS GPRS Mode – Ch. 661)

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	H	142	75	-62.68	7.00	-55.69	-42.7
5729.40	H	136	66	-64.97	8.77	-56.20	-43.2
7639.20	H	-	-	-62.69	8.54	-54.15	-41.1
9549.00	H	138	66	-55.98	9.43	-46.55	-33.6
11458.80	H	-	-	-59.25	9.17	-50.07	-37.1

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	158	143	-63.09	6.56	-56.52	-43.5
5553.75	H	-	-	-65.03	8.72	-56.31	-43.3
7405.00	H	-	-	-62.29	8.41	-53.88	-40.9
9256.25	H	-	-	-62.61	9.45	-53.15	-40.2
11107.50	H	-	-	-58.98	9.31	-49.67	-36.7

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	115	143	-62.39	6.67	-55.72	-42.7
5640.00	H	-	-	-66.16	8.81	-57.34	-44.3
7520.00	H	130	158	-62.32	8.48	-53.83	-40.8
9400.00	H	-	-	-62.46	9.32	-53.15	-40.1
11280.00	H	100	165	-58.02	9.24	-48.79	-35.8
13160.00	H	-	-	-57.10	9.07	-48.03	-35.0

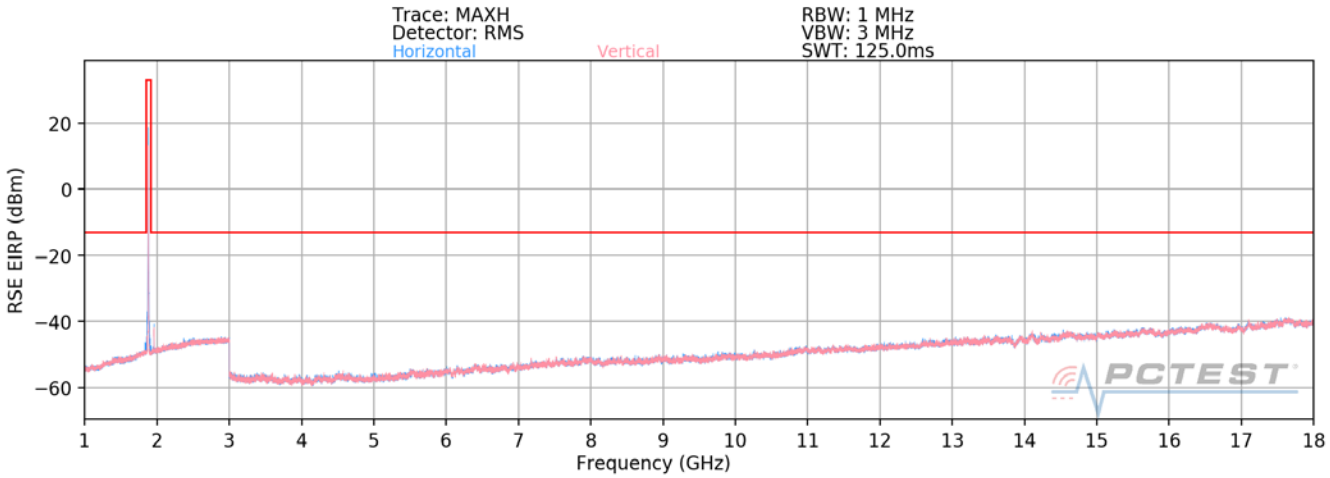
Table 7-25. Radiated Spurious Data (PCS CDMA Mode – Ch. 600)

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	115	140	-60.15	6.98	-53.17	-40.2
5726.25	H	-	-	-65.48	8.77	-56.71	-43.7
7635.00	H	102	152	-61.70	8.53	-53.17	-40.2
9543.75	H	-	-	-62.50	9.42	-53.08	-40.1
11452.50	H	101	121	-57.61	9.17	-48.44	-35.4

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	115	147	-56.86	6.89	-49.97	-37.0
5557.20	H	-	-	-60.71	9.03	-51.68	-38.7
7409.60	H	-	-	-60.01	9.23	-50.78	-37.8

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	345	155	-57.41	6.93	-50.48	-37.5
5640.00	H	-	-	-61.72	9.15	-52.57	-39.6
7520.00	H	-	-	-59.88	9.31	-50.57	-37.6

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	116	136	-55.94	7.09	-48.85	-35.8
5722.80	H	-	-	-60.97	9.04	-51.94	-38.9
7630.40	H	-	-	-58.51	9.28	-49.23	-36.2

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 the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24, Part 22, 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:	4.11	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.11	- 30	836,600,400	400	0.0000478
100 %		- 20	836,599,917	-83	-0.0000099
100 %		- 10	836,599,836	-164	-0.0000196
100 %		0	836,599,874	-126	-0.0000151
100 %		+ 10	836,599,950	-50	-0.0000060
100 %		+ 20	836,599,661	-339	-0.0000405
100 %		+ 30	836,600,023	23	0.0000027
100 %		+ 40	836,600,247	247	0.0000295
100 %		+ 50	836,600,192	192	0.0000230
BATT. ENDPOINT	3.67	+ 20	836,599,846	-154	-0.0000184

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

Frequency Stability / Temperature Variation

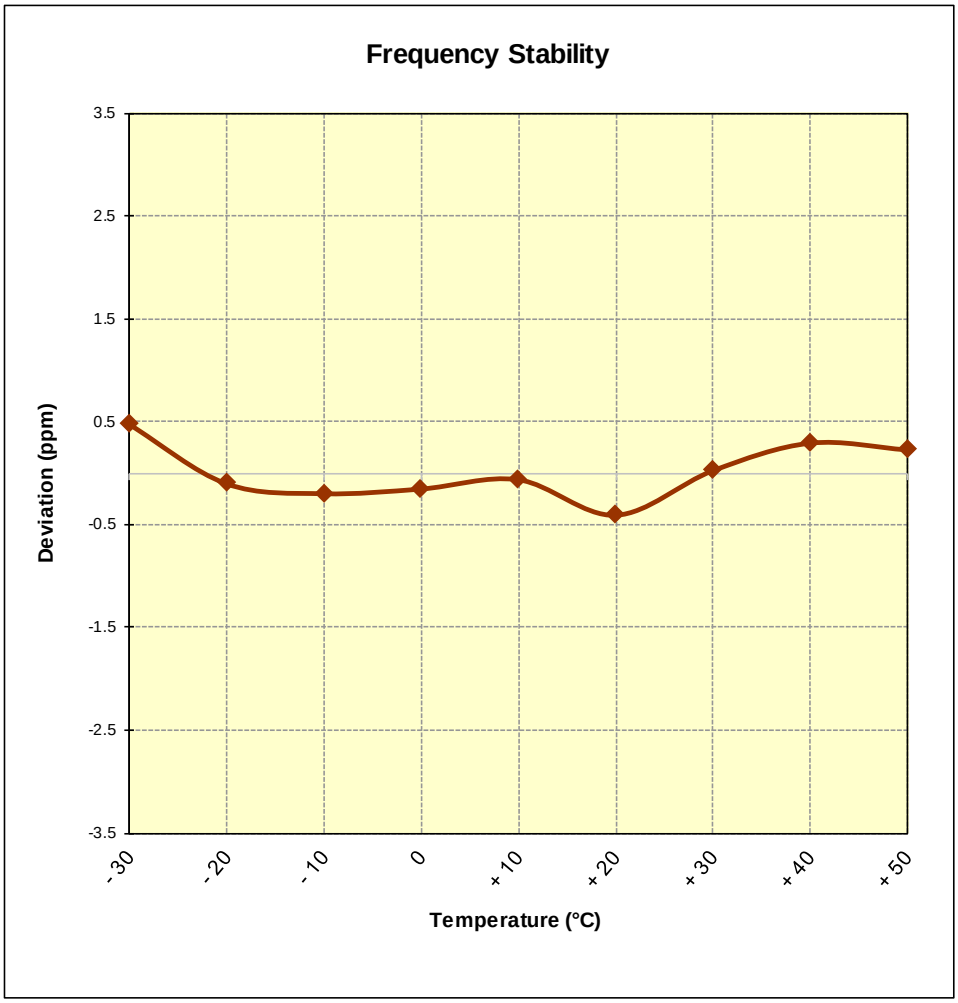


Figure 7-9. Frequency Stability Graph (Cellular GPRS Mode – Ch. 190)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	836,520,000	Hz
CHANNEL:	384	
REFERENCE VOLTAGE:	4.11	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.11	- 30	836,519,929	-71	-0.0000085
100 %		- 20	836,519,848	-152	-0.0000182
100 %		- 10	836,520,017	17	0.0000020
100 %		0	836,519,882	-118	-0.0000141
100 %		+ 10	836,519,598	-402	-0.0000481
100 %		+ 20	836,520,263	263	0.0000314
100 %		+ 30	836,520,151	151	0.0000181
100 %		+ 40	836,519,953	-47	-0.0000056
100 %		+ 50	836,520,367	367	0.0000439
BATT. ENDPOINT	3.67	+ 20	836,520,042	42	0.0000050

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

Frequency Stability / Temperature Variation

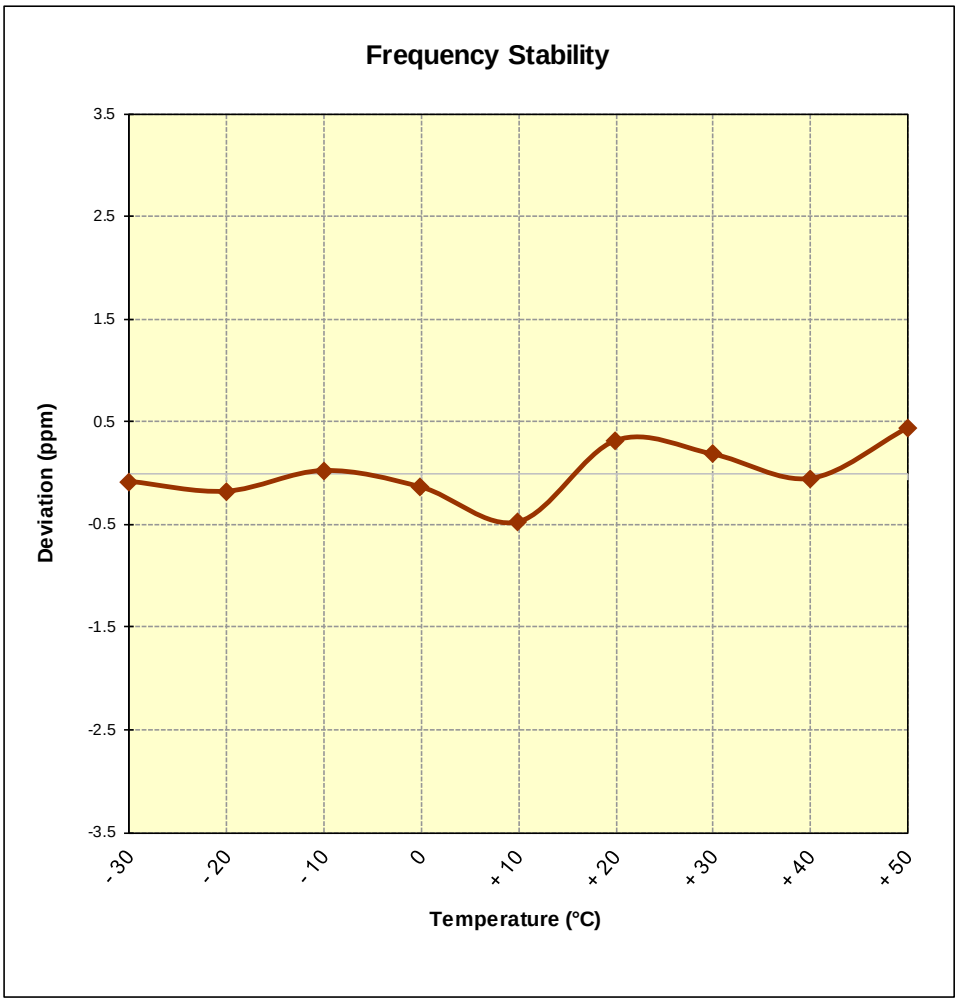


Figure 7-10. Frequency Stability Graph (Cellular CDMA Mode – Ch. 384)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	4183	
REFERENCE VOLTAGE:	4.11	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.11	- 30	836,600,299	299	0.0000357
100 %		- 20	836,600,162	162	0.0000194
100 %		- 10	836,600,062	62	0.0000074
100 %		0	836,600,090	90	0.0000108
100 %		+ 10	836,600,227	227	0.0000271
100 %		+ 20	836,599,975	-25	-0.0000030
100 %		+ 30	836,599,614	-386	-0.0000461
100 %		+ 40	836,599,924	-76	-0.0000091
100 %		+ 50	836,599,848	-152	-0.0000182
BATT. ENDPOINT	3.67	+ 20	836,600,261	261	0.0000312

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

Frequency Stability / Temperature Variation

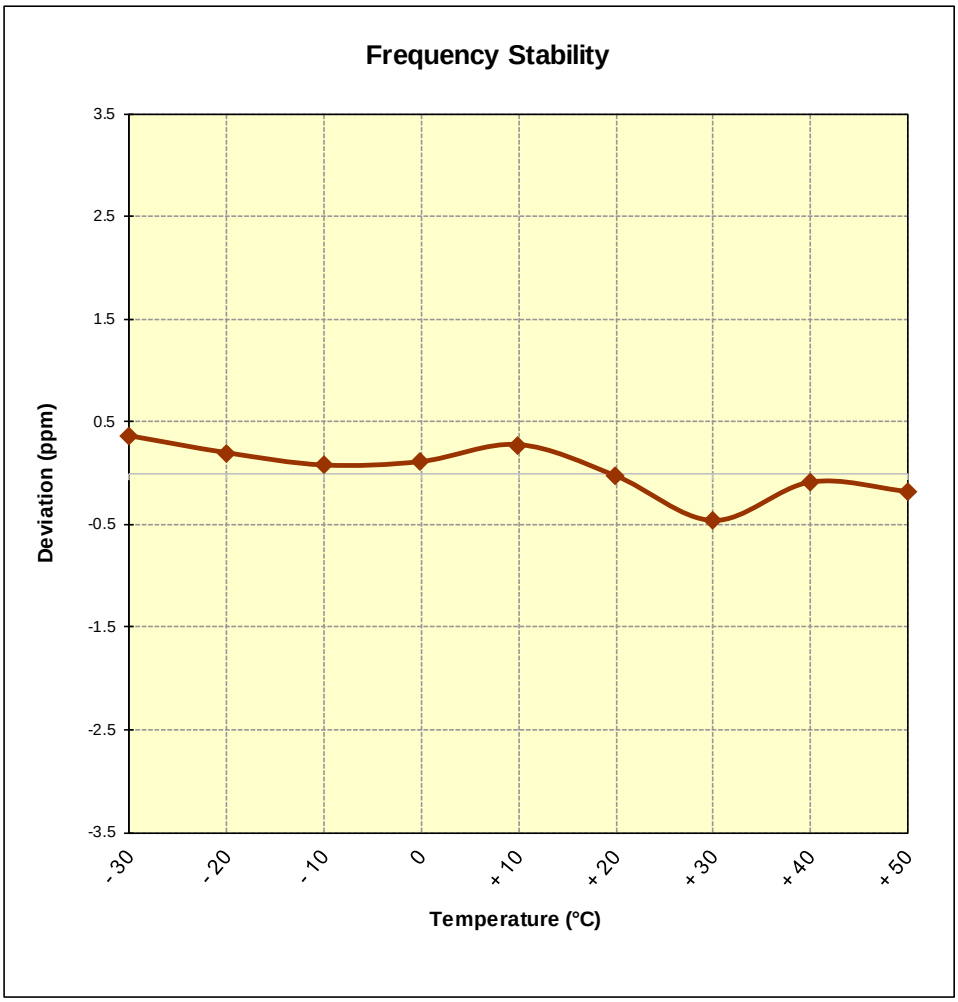


Figure 7-11. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,732,600,000	Hz
CHANNEL:	1413	
REFERENCE VOLTAGE:	4.11	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.11	- 30	1,732,599,932	-68	-0.0000039
100 %		- 20	1,732,599,909	-91	-0.0000053
100 %		- 10	1,732,599,949	-51	-0.0000029
100 %		0	1,732,600,239	239	0.0000138
100 %		+ 10	1,732,600,187	187	0.0000108
100 %		+ 20	1,732,600,179	179	0.0000103
100 %		+ 30	1,732,600,068	68	0.0000039
100 %		+ 40	1,732,599,890	-110	-0.0000063
100 %		+ 50	1,732,599,852	-148	-0.0000085
BATT. ENDPOINT	3.67	+ 20	1,732,600,213	213	0.0000123

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

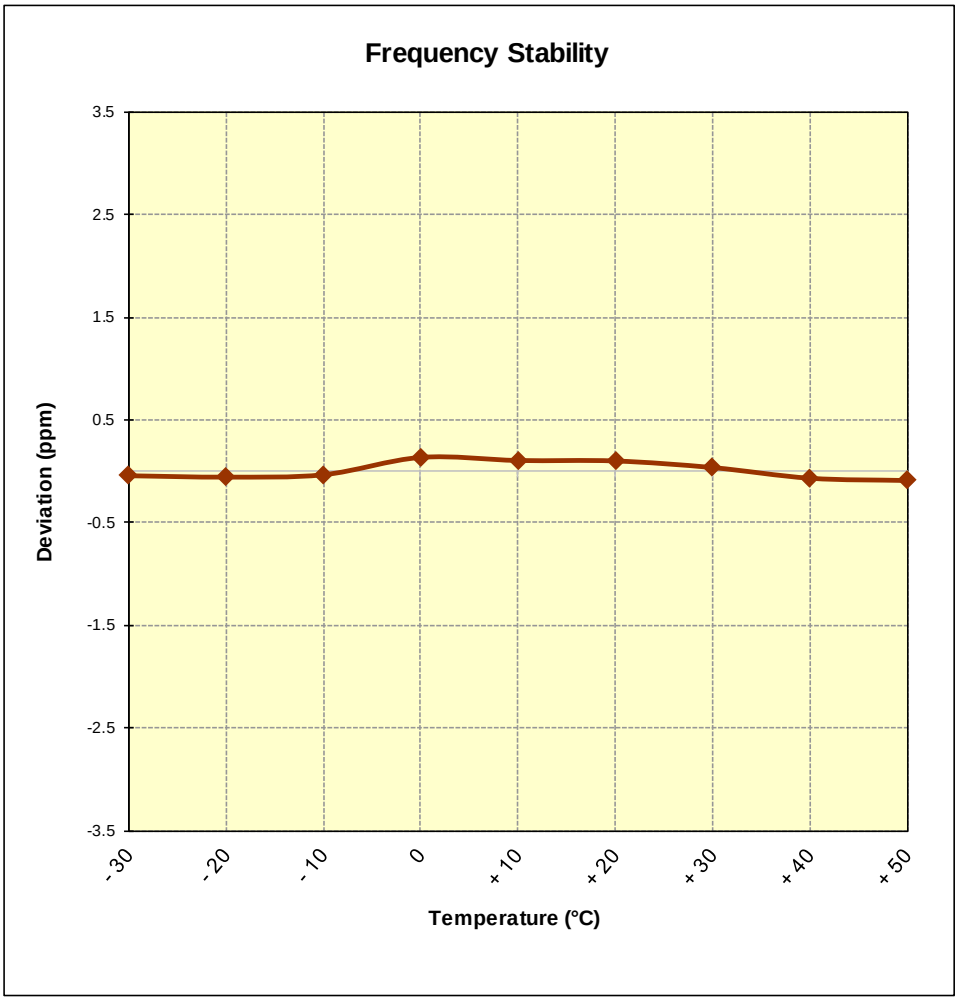


Figure 7-12. Frequency Stability Graph (AWS WCDMA Mode – Ch. 1413)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	661	
REFERENCE VOLTAGE:	4.11	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.11	- 30	1,880,000,112	112	0.0000060
100 %		- 20	1,880,000,044	44	0.0000023
100 %		- 10	1,880,000,232	232	0.0000123
100 %		0	1,880,000,158	158	0.0000084
100 %		+ 10	1,880,000,326	326	0.0000173
100 %		+ 20	1,880,000,014	14	0.0000007
100 %		+ 30	1,879,999,998	-2	-0.0000001
100 %		+ 40	1,879,999,948	-52	-0.0000028
100 %		+ 50	1,880,000,062	62	0.0000033
BATT. ENDPOINT	3.67	+ 20	1,880,000,083	83	0.0000044

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

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

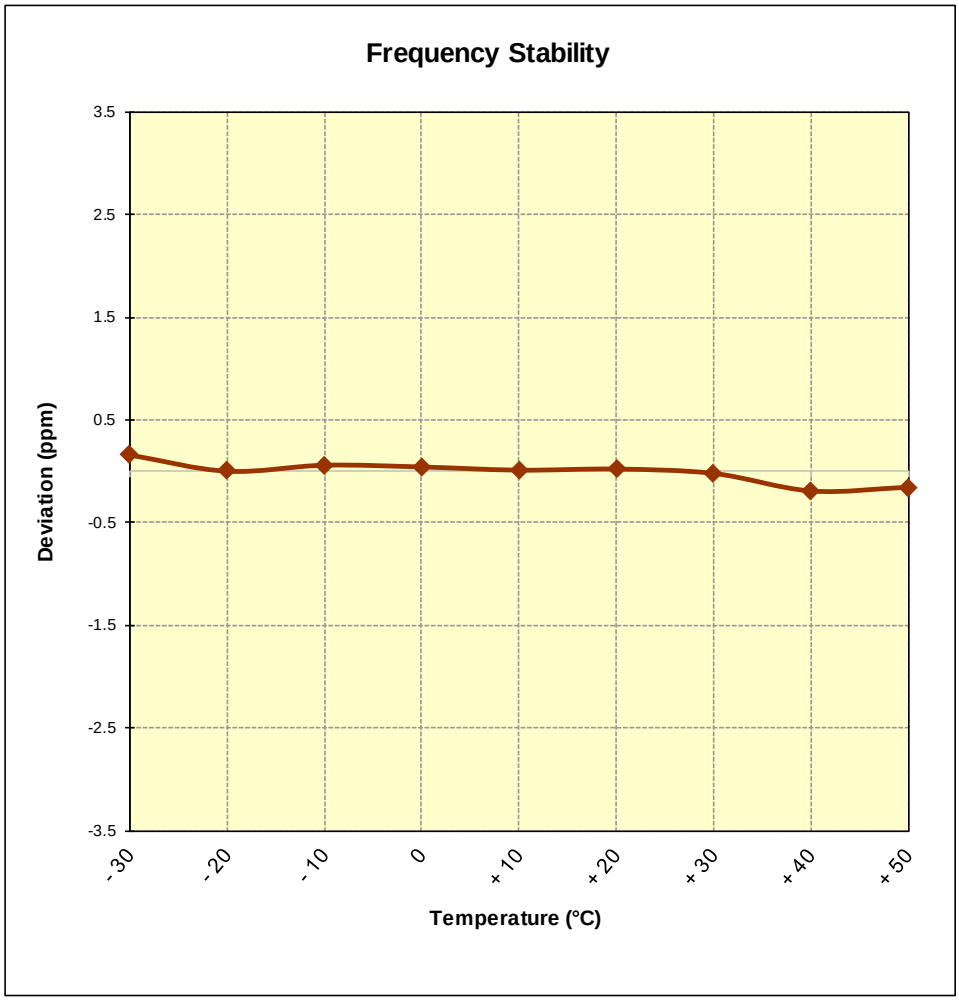


Figure 7-13. Frequency Stability Graph (PCS GPRS Mode – Ch. 661)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	600	
REFERENCE VOLTAGE:	4.11	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.11	- 30	1,879,999,803	-197	-0.0000105
100 %		- 20	1,879,999,993	-7	-0.0000004
100 %		- 10	1,879,999,838	-162	-0.0000086
100 %		0	1,880,000,159	159	0.0000085
100 %		+ 10	1,879,999,745	-255	-0.0000136
100 %		+ 20	1,880,000,306	306	0.0000163
100 %		+ 30	1,880,000,046	46	0.0000024
100 %		+ 40	1,879,999,766	-234	-0.0000124
100 %		+ 50	1,879,999,936	-64	-0.0000034
BATT. ENDPOINT	3.67	+ 20	1,880,000,108	108	0.0000057

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

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

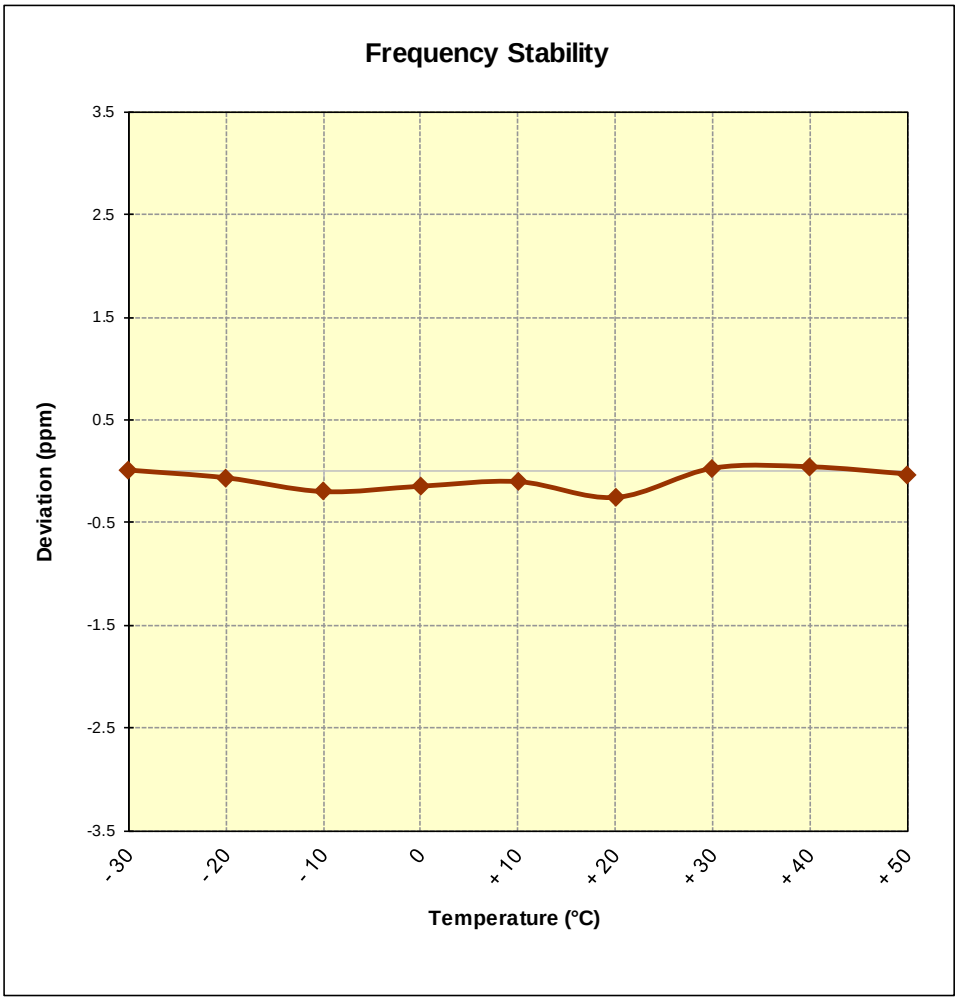


Figure 7-14. Frequency Stability Graph (PCS CDMA Mode – Ch. 600)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	9400	
REFERENCE VOLTAGE:	4.11	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.11	- 30	1,880,000,210	210	0.0000112
100 %		- 20	1,880,000,009	9	0.0000005
100 %		- 10	1,879,999,806	-194	-0.0000103
100 %		0	1,879,999,858	-142	-0.0000076
100 %		+ 10	1,879,999,882	-118	-0.0000063
100 %		+ 20	1,880,000,153	153	0.0000081
100 %		+ 30	1,879,999,981	-19	-0.0000010
100 %		+ 40	1,880,000,235	235	0.0000125
100 %		+ 50	1,880,000,216	216	0.0000115
BATT. ENDPOINT	3.67	+ 20	1,879,999,959	-41	-0.0000022

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

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

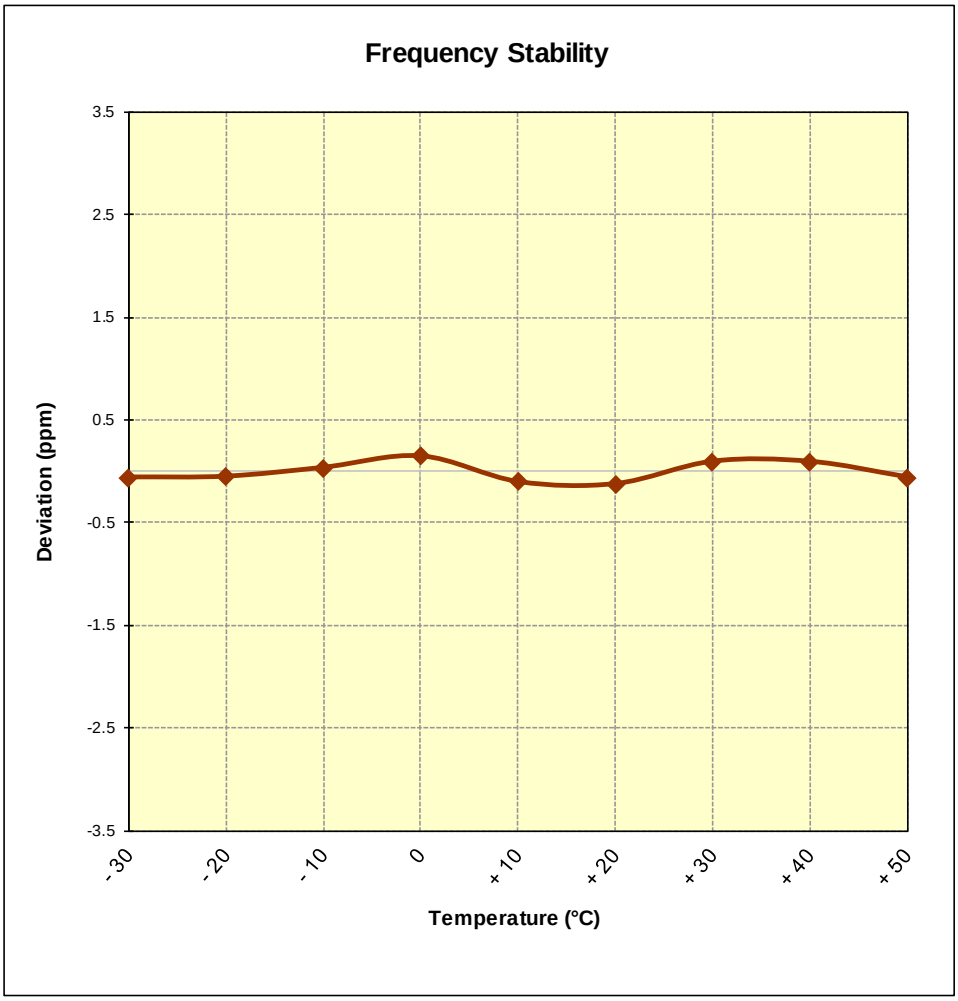


Figure 7-15. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFK300TM** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules.