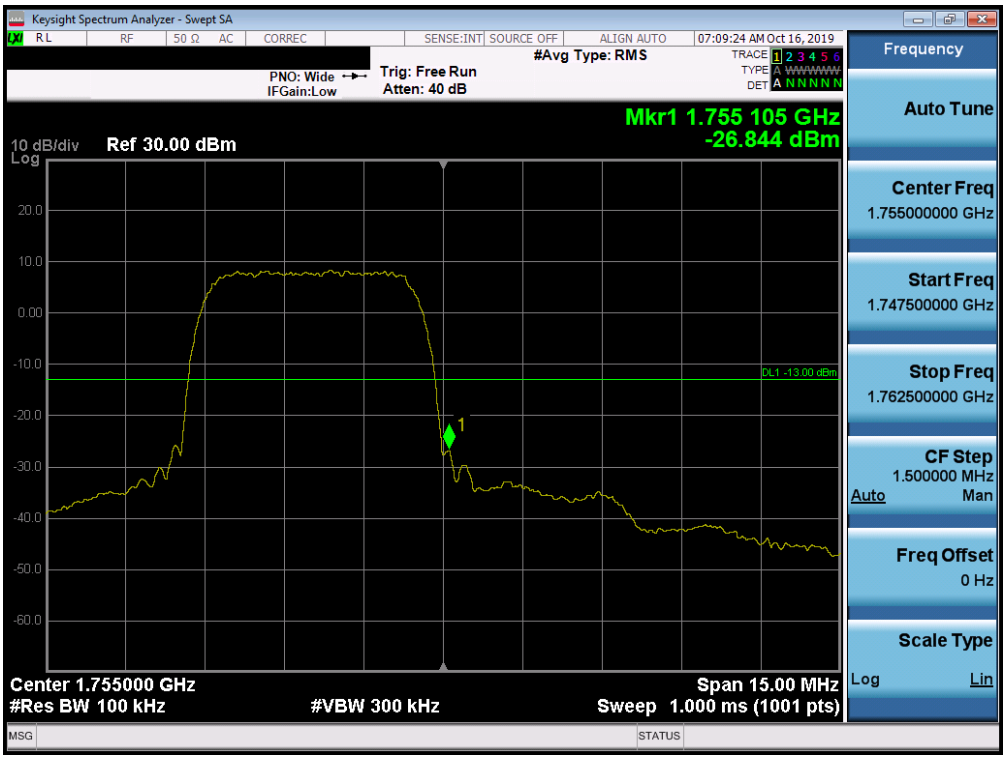
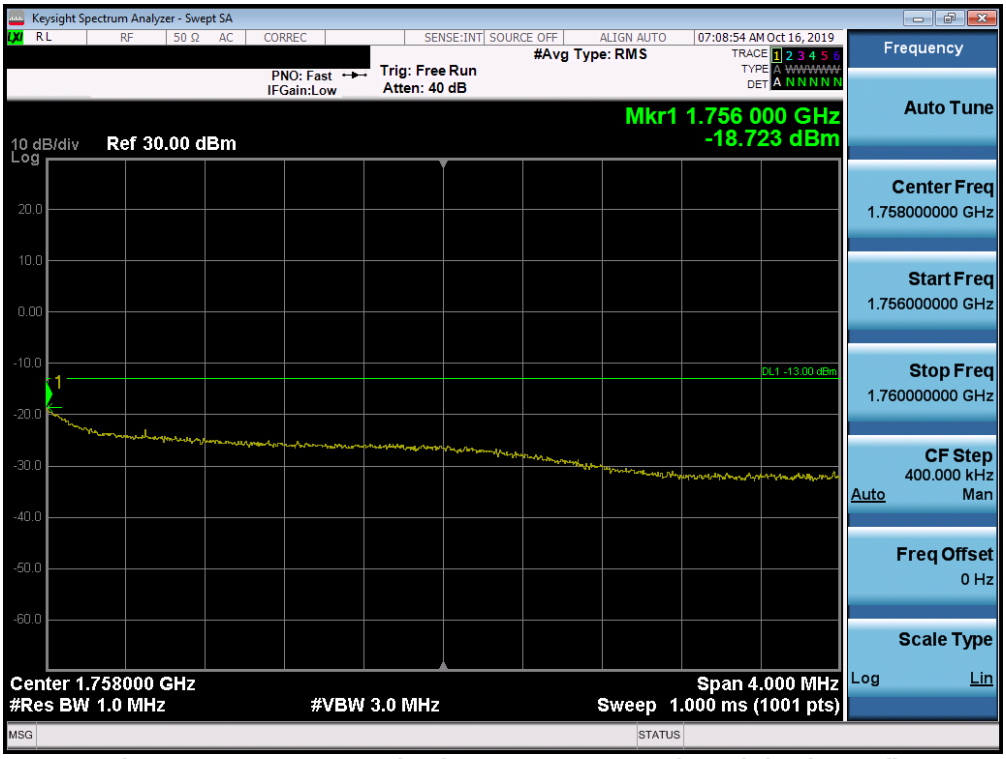
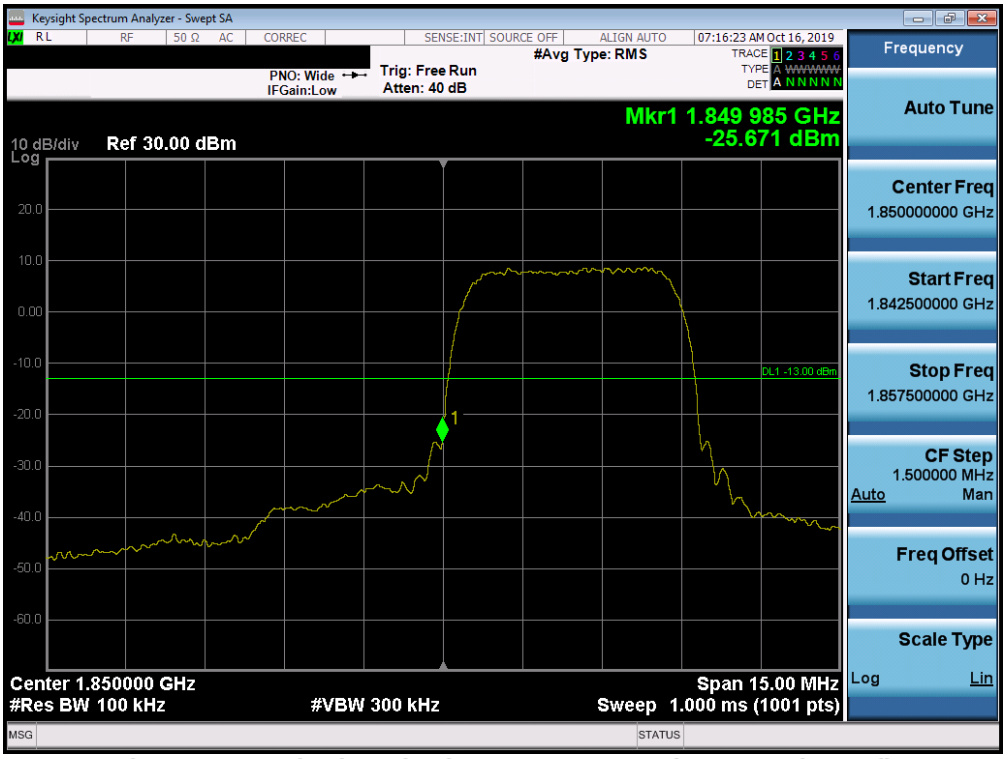


Plot 7-91. Band Edge Plot (AWS WCDMA Mode - High Channel)

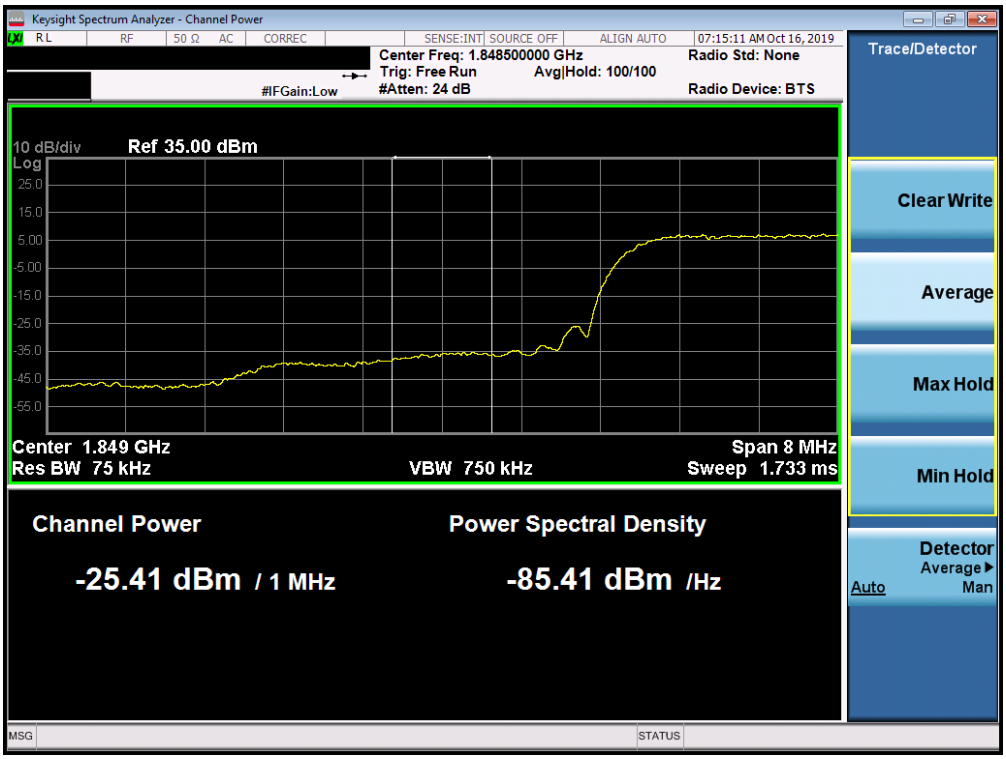


Plot 7-92. 4MHz Span Plot (AWS WCDMA Mode - High Channel)

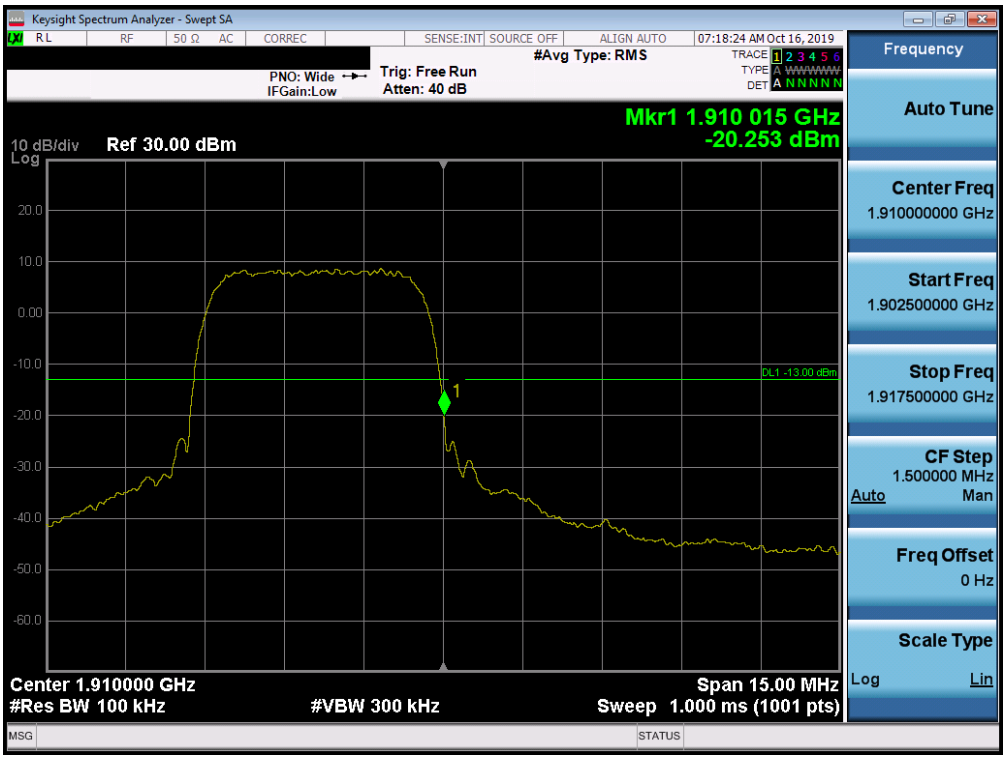
PCS WCDMA Mode



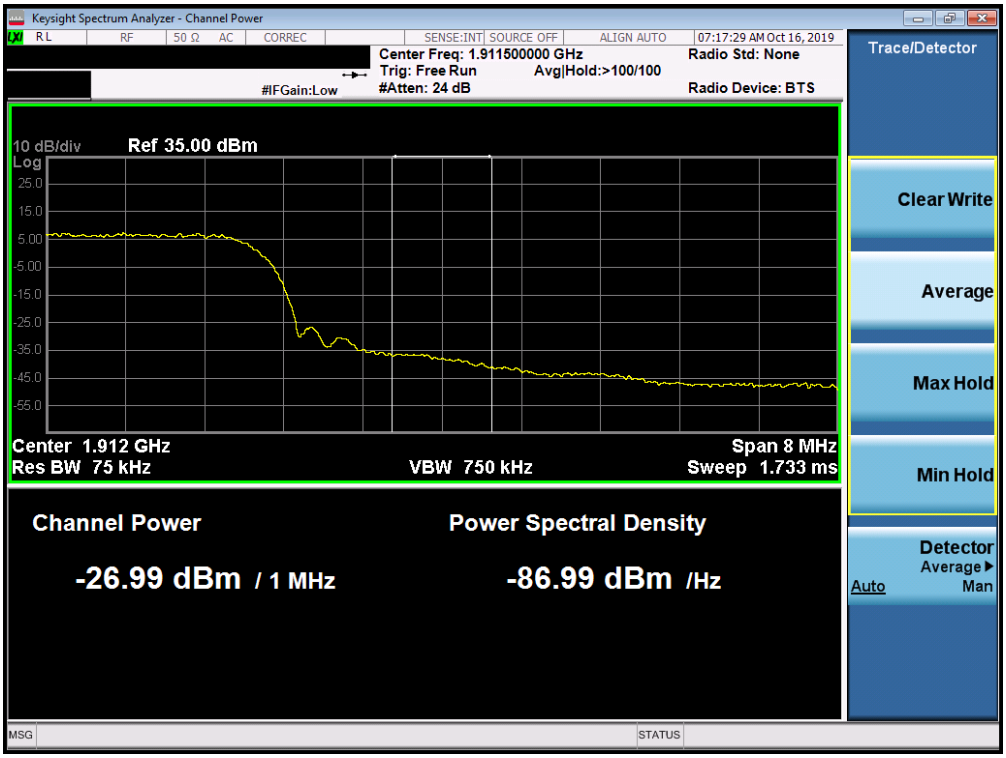
Plot 7-93. Band Edge Plot (PCS WCDMA Mode - Low Channel)



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.

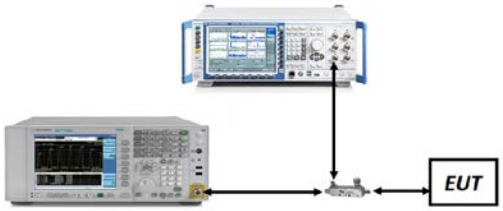
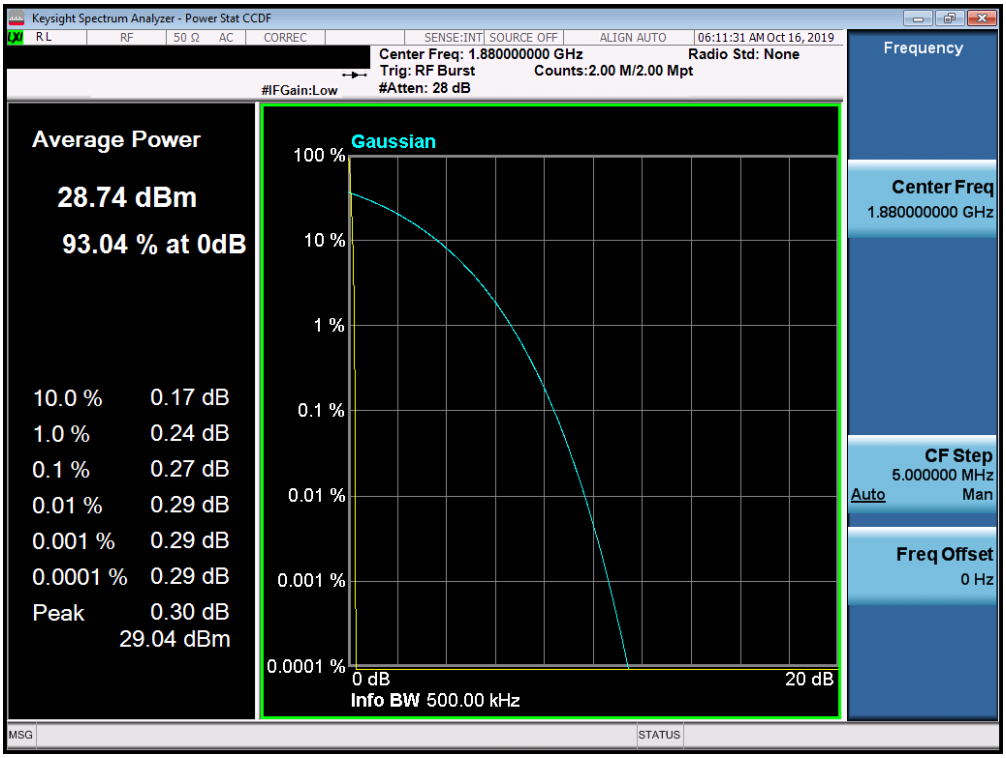


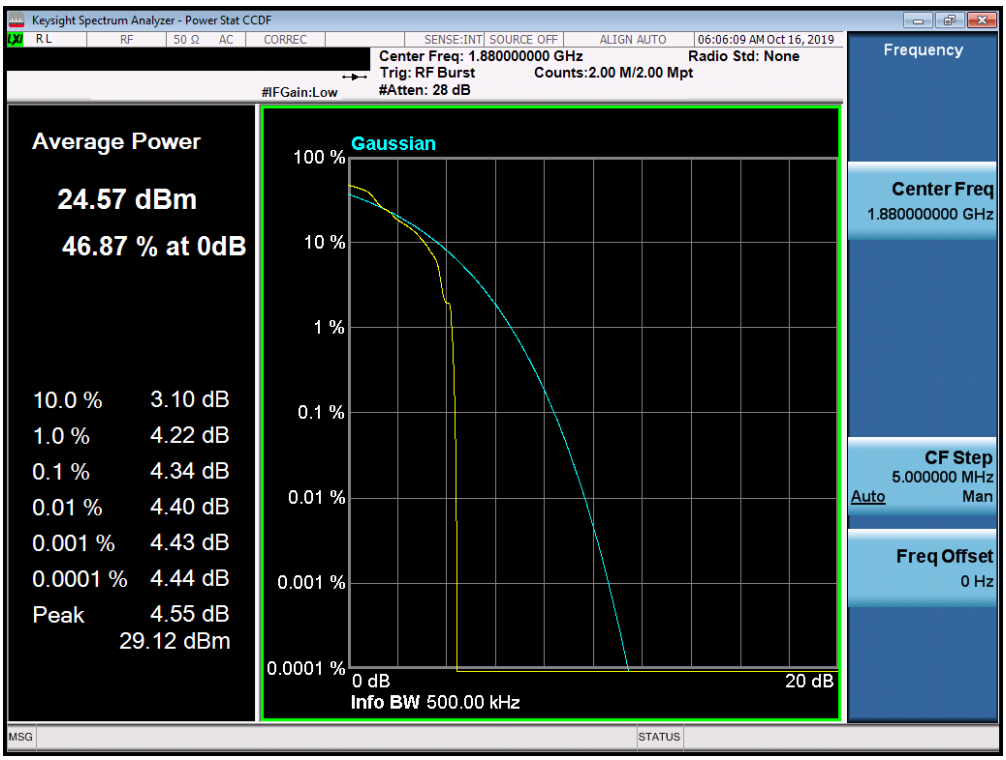
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

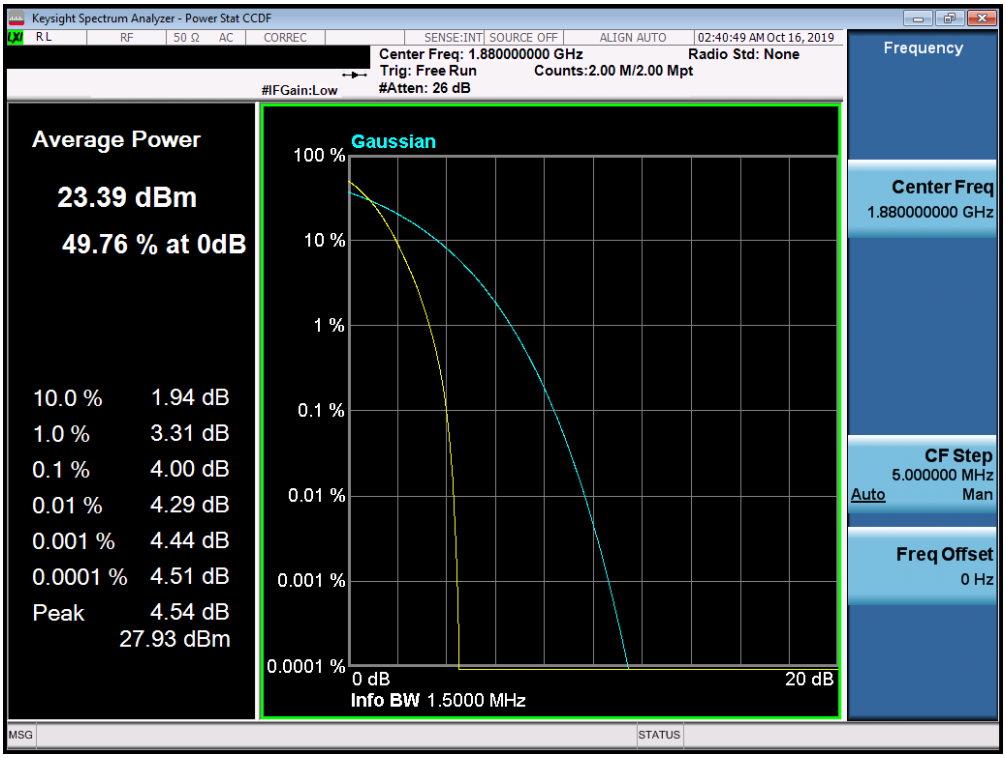
None



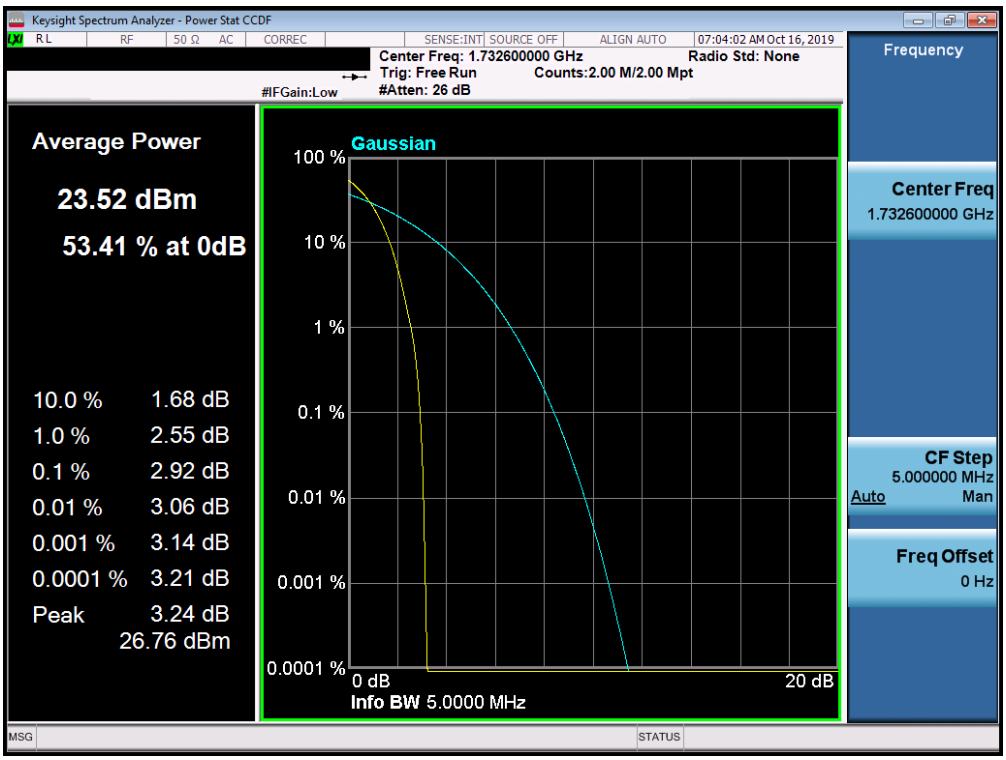
Plot 7-97. Peak-Average Ratio Plot (PCS GSM Mode)



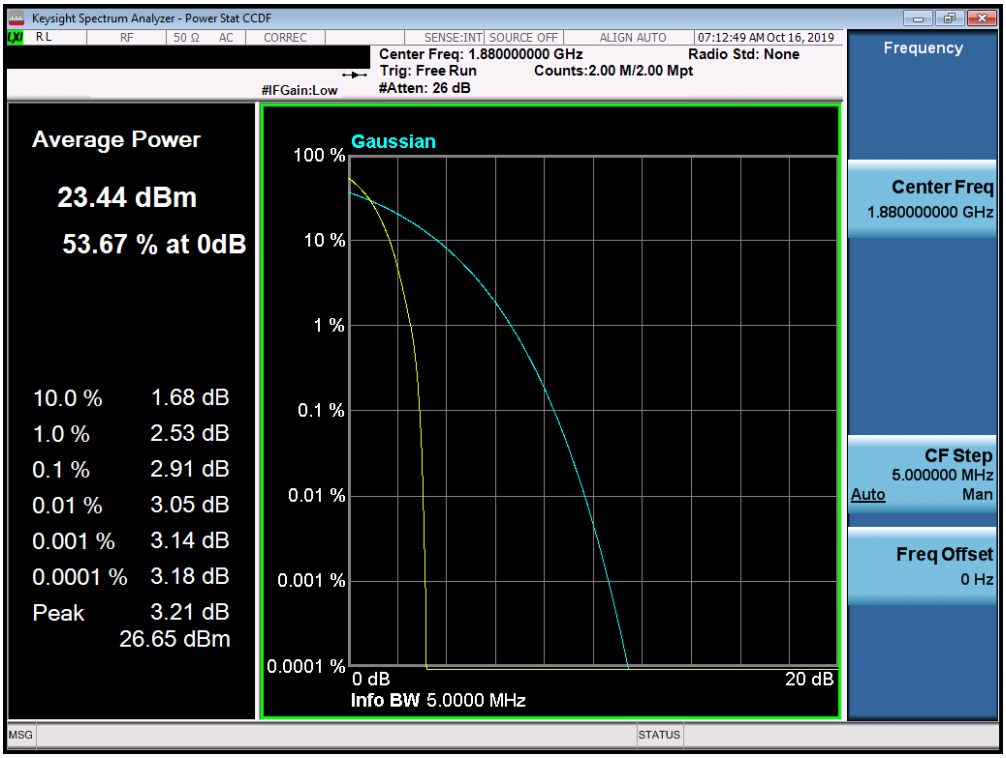
Plot 7-98. Peak-Average Ratio Plot (EDGE1900 Mode)



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.

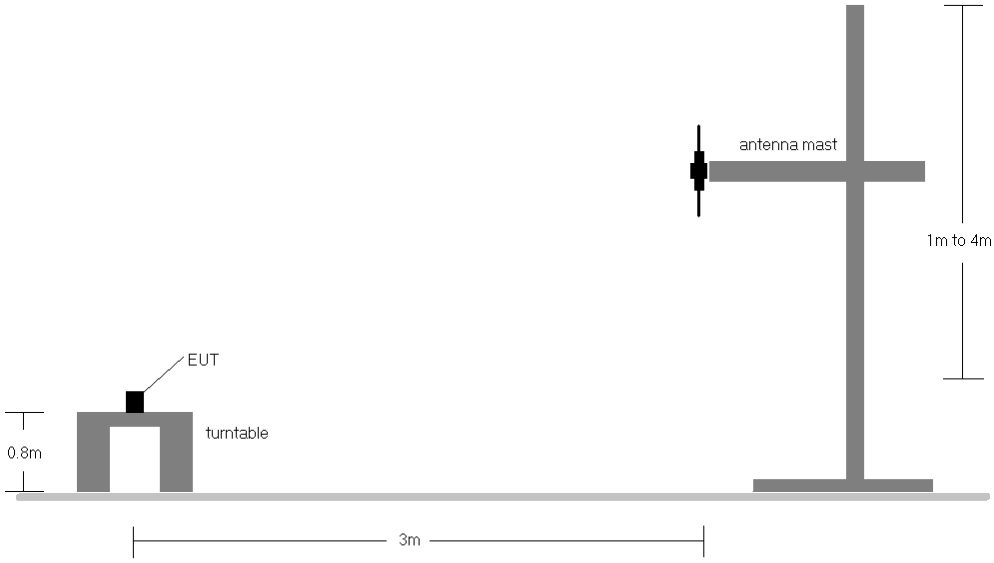


Figure 7-5. Radiated Test Setup <1GHz

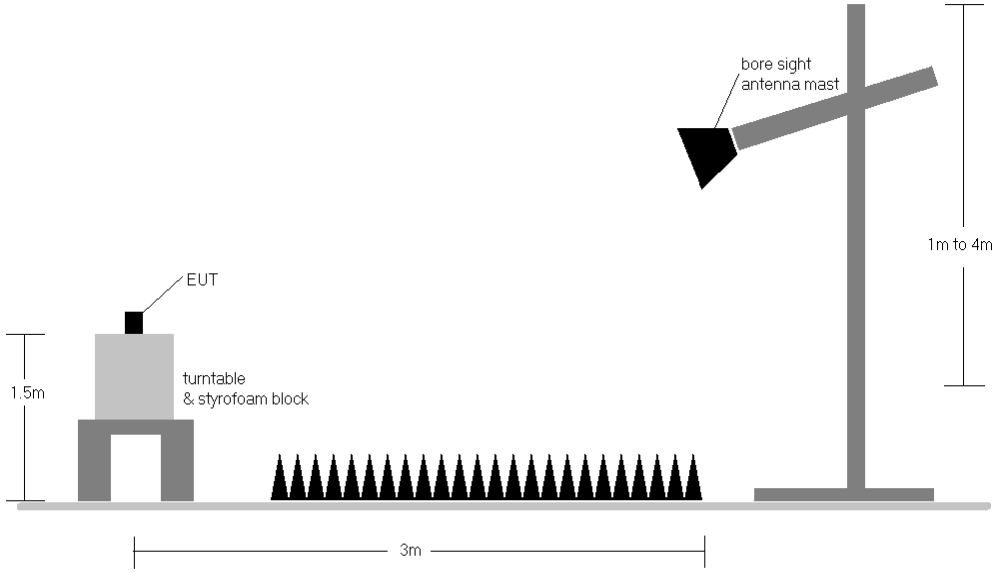


Figure 7-6. Radiated Test Setup >1GHz

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 GSM mode using a Power Control Level of "0" in the PCS Band and "5" in the Cellular Band.

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	172	302	21.50	6.30	25.65	0.367	38.45	-12.80	27.80	0.603	40.61	-12.81
836.60	GPRS850	V	243	251	21.59	6.40	25.84	0.384	38.45	-12.61	27.99	0.630	40.61	-12.62
848.80	GPRS850	V	251	251	21.78	6.50	**26.13**	**0.410**	38.45	-12.32	**28.28**	**0.673**	40.61	-12.33
848.80	GPRS850	H	125	306	19.22	6.70	23.77	0.238	38.45	-14.68	25.92	0.391	40.61	-14.69
848.80	EDGE850	V	251	251	17.47	6.50	**21.82**	0.152	38.45	-16.63	**23.97**	**0.249**	40.61	-16.64
848.80	GPRS850 (WCP)	V	138	321	19.43	6.50	23.78	0.239	38.45	-14.67	25.93	0.392	40.61	-14.68

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	180	248	13.98	6.30	18.13	0.065	38.45	-20.32	20.28	0.107	40.61	-20.33
836.52	CDMA850	V	169	246	14.52	6.40	18.77	0.075	38.45	-19.68	20.92	0.124	40.61	-19.69
848.31	CDMA850	V	254	273	15.05	6.50	**19.40**	**0.087**	38.45	-19.05	**21.55**	**0.143**	40.61	-19.06
848.31	CDMA850	H	335	287	13.19	6.50	17.54	0.057	38.45	-20.91	19.69	0.093	40.61	-20.92
848.31	CDMA850 (WCP)	V	145	252	13.40	6.50	17.75	0.060	38.45	-20.70	19.90	0.098	40.61	-20.71

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	177	248	13.86	6.30	18.01	0.063	38.45	-20.44	20.16	0.104	40.61	-20.45
836.60	WCDMA850	V	175	155	14.09	6.40	**18.34**	**0.068**	38.45	-20.11	**20.49**	**0.112**	40.61	-20.12
846.60	WCDMA850	V	240	264	13.82	6.50	18.17	0.066	38.45	-20.28	20.32	0.108	40.61	-20.29
836.60	WCDMA850	H	139	278	12.35	6.40	16.60	0.046	38.45	-21.85	18.75	0.075	40.61	-21.86
836.60	WCDMA850 (WCP)	V	200	135	9.80	6.40	14.05	0.025	38.45	-24.40	16.20	0.042	40.61	-24.41

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	V	155	320	15.10	9.34	**24.44**	**0.278**	30.00	-5.56
1732.60	WCDMA1700	V	136	343	14.38	9.19	23.57	0.228	30.00	-6.43
1752.60	WCDMA1700	V	160	216	12.69	9.08	21.77	0.150	30.00	-8.23
1712.40	WCDMA1700	H	139	187	14.00	9.34	23.34	0.216	30.00	-6.66
1712.40	WCDMA1700 (WCP)	V	112	292	14.07	9.34	23.41	0.219	30.00	-6.59

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	121	353	17.68	9.48	27.16	0.520	33.01	-5.85
1880.00	GPRS1900	H	115	353	18.71	9.90	**28.61**	**0.726**	33.01	-4.40
1909.80	GPRS1900	H	147	353	17.84	10.26	28.10	0.645	33.01	-4.91
1880.00	GPRS1900	V	125	350	18.02	10.10	28.12	0.649	33.01	-4.89
1880.00	EDGE1900	H	115	353	13.24	9.90	**23.14**	0.206	33.01	-9.87
1880.00	GPRS1900 (WCP)	H	168	212	13.50	9.90	23.40	0.219	33.01	-9.61

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	123	1	14.14	9.49	**23.63**	**0.231**	33.01	-9.38
1880.00	CDMA1900	H	118	358	13.69	9.90	23.59	0.229	33.01	-9.42
1908.75	CDMA1900	H	109	1	13.24	10.25	23.49	0.223	33.01	-9.52
1851.25	CDMA1900	V	136	7	12.94	9.49	22.43	0.175	33.01	-10.58
1851.25	CDMA1900 (WCP)	H	152	320	11.72	9.49	21.21	0.132	33.01	-11.80

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	120	360	14.17	9.51	23.68	0.233	33.01	-9.33
1880.00	WCDMA1900	H	118	1	14.32	9.90	**24.22**	**0.264**	33.01	-8.79
1907.60	WCDMA1900	H	104	4	13.24	10.24	23.48	0.223	33.01	-9.53
1880.00	WCDMA1900	V	158	334	13.40	9.90	23.30	0.214	33.01	-9.71
1880.00	WCDMA1900 (WCP)	H	212	48	13.77	9.90	23.67	0.233	33.01	-9.34

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.

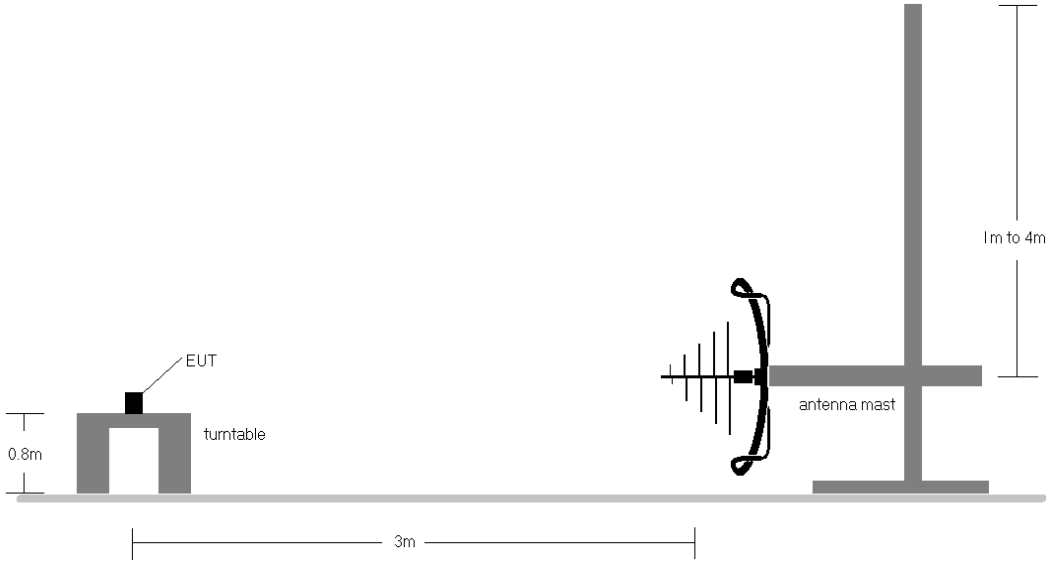


Figure 7-7. Test Instrument & Measurement Setup < 1GHz

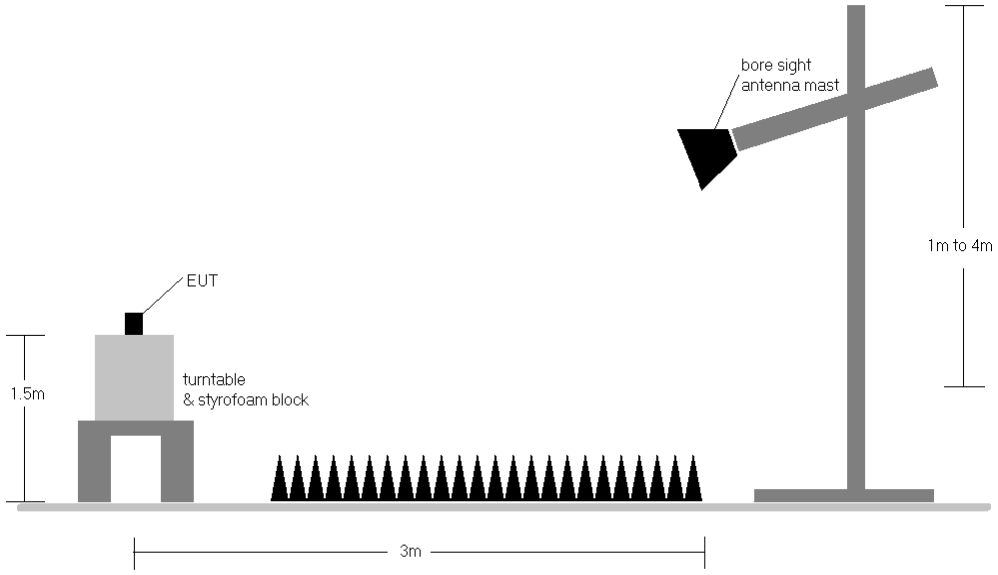


Figure 7-8. Test Instrument & Measurement Setup >1 GHz

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 GSM mode using a Power Control Level of "0" in the PCS Band and "5" in the Cellular Band.

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.

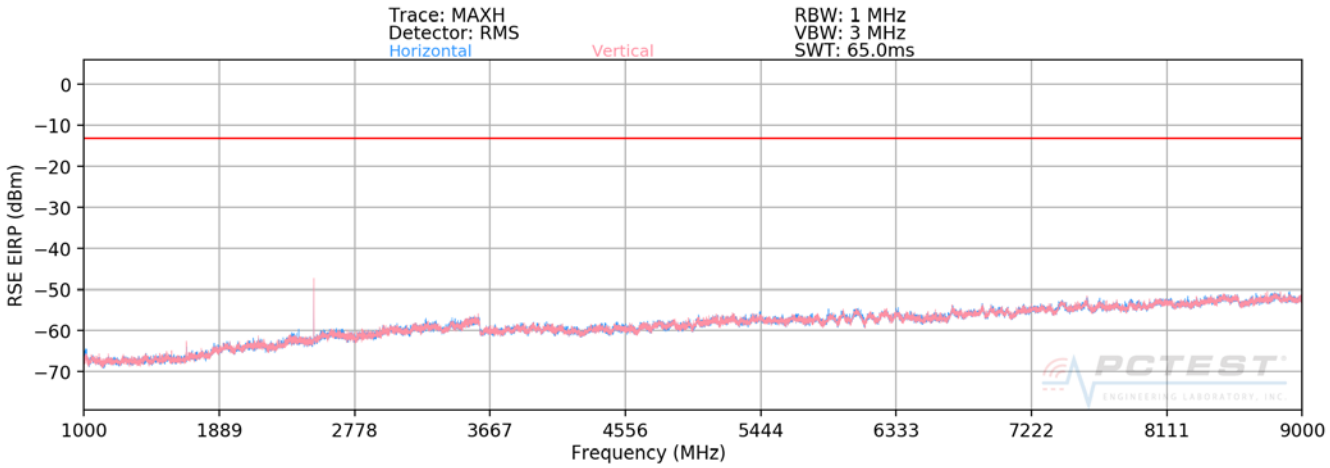
5) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

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 GSM Mode



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

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	V	-	-	-70.31	9.57	-60.74	-47.7
2472.60	V	-	-	-66.77	9.47	-57.31	-44.3

Table 7-9. Radiated Spurious Data (Cellular GSM 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	V	-	-	-69.74	9.54	-60.20	-47.2
2509.80	V	-	-	-67.04	9.42	-57.62	-44.6

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

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	V	-	-	-69.76	9.51	-60.25	-47.2
2546.40	V	-	-	-66.53	9.38	-57.15	-44.1

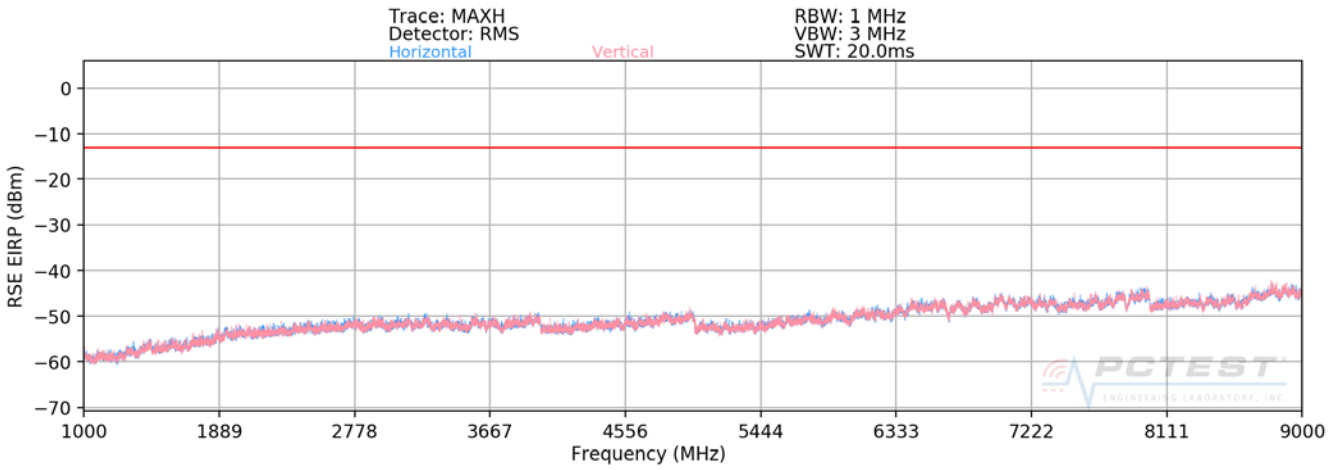
Table 7-11. Radiated Spurious Data (Cellular GSM Mode – Ch. 251)

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	V	-	-	-69.34	9.51	-59.83	-46.8
2546.40	V	-	-	-67.00	9.38	-57.62	-44.6

Table 7-12. Radiated Spurious Data with WCP (Cellular GSM 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	-	-	-75.59	9.56	-66.03	-53.0
2474.10	V	114	241	-70.20	9.47	-60.74	-47.7
3298.80	V	-	-	-70.23	7.52	-62.71	-49.7
4123.50	V	-	-	-69.27	7.98	-61.29	-48.3

Table 7-13. 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	-	-	-75.12	9.54	-65.58	-52.6
2509.56	V	170	234	-70.24	9.42	-60.82	-47.8
3346.08	V	-	-	-69.48	7.32	-62.16	-49.2
4182.60	V	-	-	-69.99	8.16	-61.83	-48.8

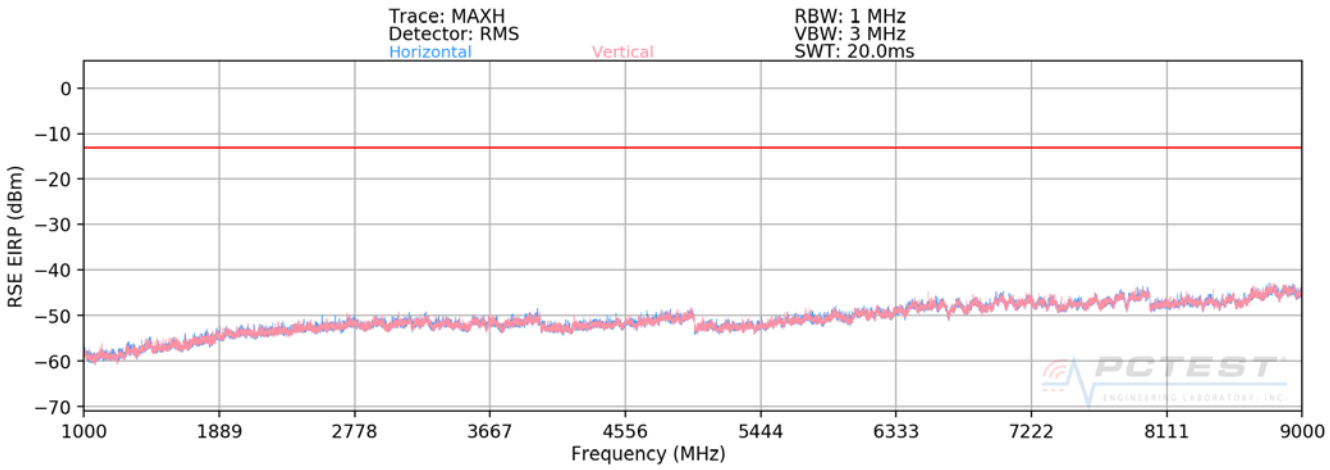
Table 7-14. Radiated Spurious Data (Cellular CDMA Mode – Ch. 384)

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	V	-	-	-75.14	9.51	-65.63	-52.6
2544.93	V	101	236	-70.09	9.38	-60.71	-47.7
3393.24	V	-	-	-69.15	7.32	-61.83	-48.8
4241.55	V	-	-	-69.88	8.47	-61.41	-48.4

Table 7-15. 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	-	-	-75.97	9.56	-66.41	-53.4
2479.20	V	115	72	-68.58	9.46	-59.12	-46.1
3305.60	V	-	-	-69.69	7.49	-62.21	-49.2
4132.00	V	-	-	-69.48	8.01	-61.47	-48.5

Table 7-16. 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	-	-	-75.86	9.54	-66.32	-53.3
2509.80	V	137	223	-69.97	9.42	-60.55	-47.6
3346.40	V	-	-	-68.76	7.31	-61.44	-48.4
4183.00	V	-	-	-69.23	8.16	-61.07	-48.1

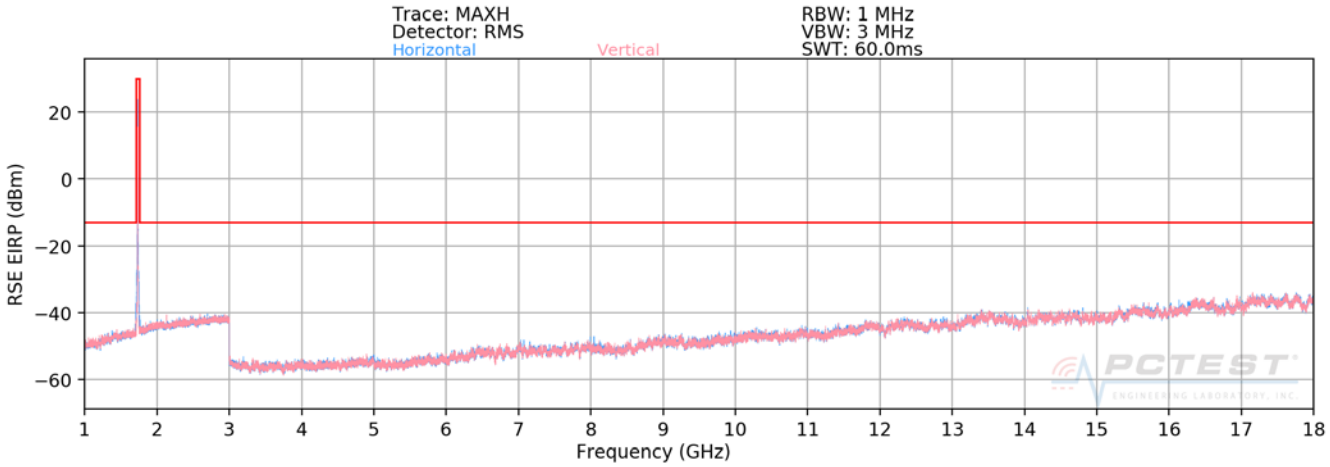
Table 7-17. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4183)

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	V	-	-	-75.39	9.52	-65.88	-52.9
2539.80	V	134	96	-64.55	9.39	-55.16	-42.2
3386.40	V	-	-	-68.96	7.31	-61.65	-48.6
4233.00	V	-	-	-69.31	8.42	-60.89	-47.9

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

AWS WCDMA Mode



Plot 7-105. Radiated Spurious Plot above 1GHz (AWS WCDMA Mode)

OPERATING FREQUENCY:	1712.40	MHz
MODULATION SIGNAL:	WCDMA	
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3424.80	H	-	-	-70.04	7.44	-62.60	-49.6
5137.20	H	-	-	-72.24	11.05	-61.19	-48.2

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

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

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3465.20	H	-	-	-70.14	7.53	-62.61	-49.6
5197.80	H	-	-	-72.11	11.15	-60.96	-48.0

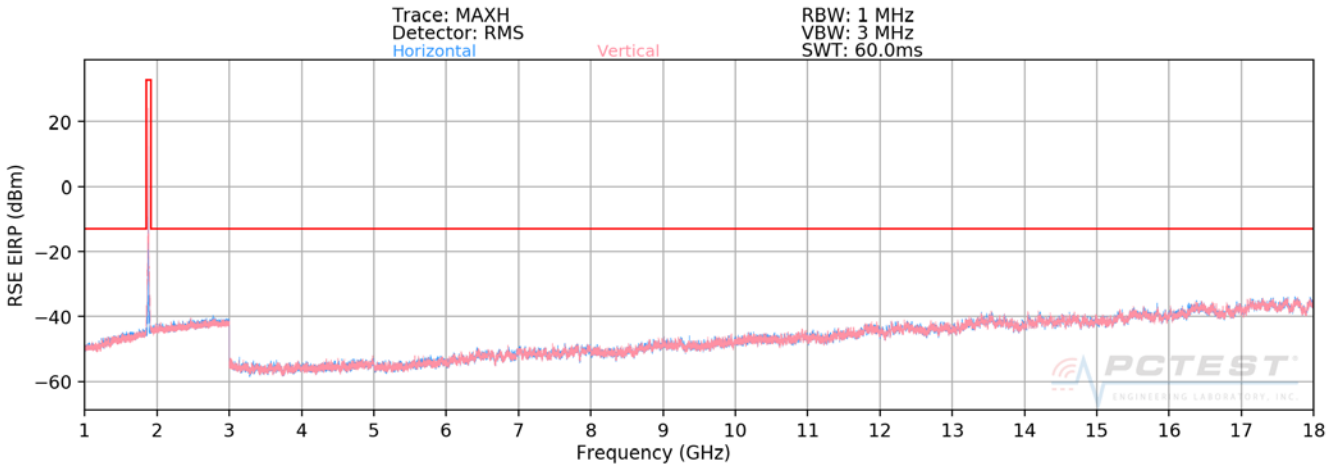
Table 7-20. Radiated Spurious Data (AWS WCDMA Mode – Ch. 1413)

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	H	-	-	-69.22	7.46	-61.76	-48.8
5257.80	H	-	-	-71.80	11.33	-60.47	-47.5

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

PCS GSM Mode



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

OPERATING FREQUENCY: 1850.20 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]
3700.40	H	-	-	-65.04	6.14	-58.90	-45.9
5550.60	H	-	-	-68.25	12.00	-56.24	-43.2

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

OPERATING FREQUENCY: 1880.00 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]
3760.00	H	-	-	-64.57	5.90	-58.67	-45.7
5640.00	H	-	-	-69.24	12.27	-56.97	-44.0

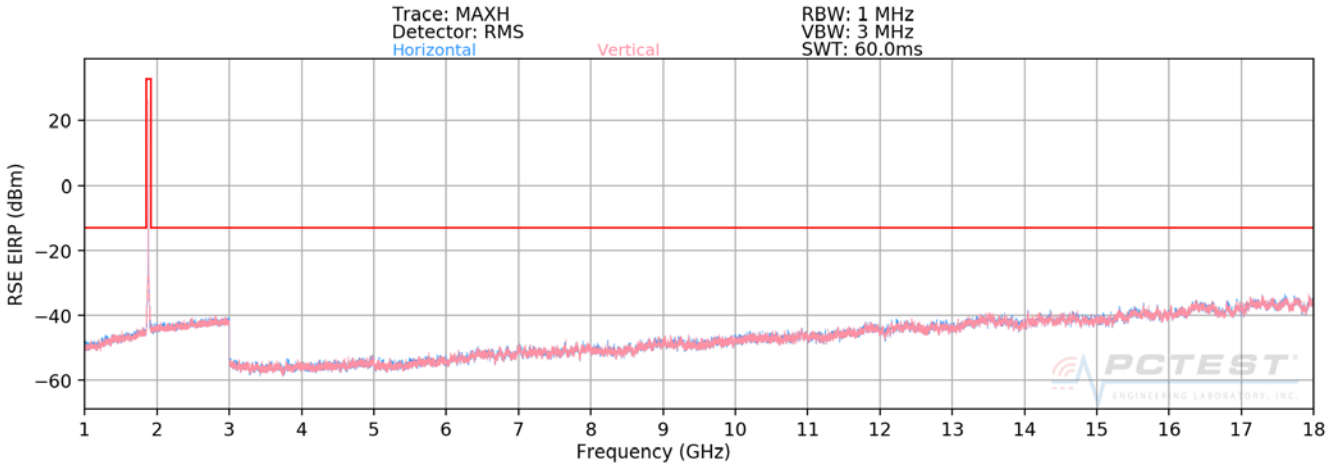
Table 7-23. Radiated Spurious Data (PCS GSM Mode – Ch. 661)

OPERATING FREQUENCY:	1909.80	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]
3819.60	H	-	-	-65.38	5.82	-59.57	-46.6
5729.40	H	-	-	-68.96	12.45	-56.51	-43.5

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

PCS CDMA Mode



Plot 7-107. Radiated Spurious Plot above 1GHz (PCS CDMA Mode)

OPERATING FREQUENCY: 1851.25 MHz
MODULATION SIGNAL: CDMA
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3702.50	H	-	-	-67.44	6.13	-61.31	-48.3
5553.75	H	-	-	-72.12	12.01	-60.11	-47.1

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

OPERATING FREQUENCY: 1880.00 MHz
MODULATION SIGNAL: CDMA
DISTANCE: 3 meters
LIMIT: -13 dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3760.00	H	-	-	-68.27	5.90	-62.37	-49.4
5640.00	H	-	-	-72.46	12.27	-60.19	-47.2

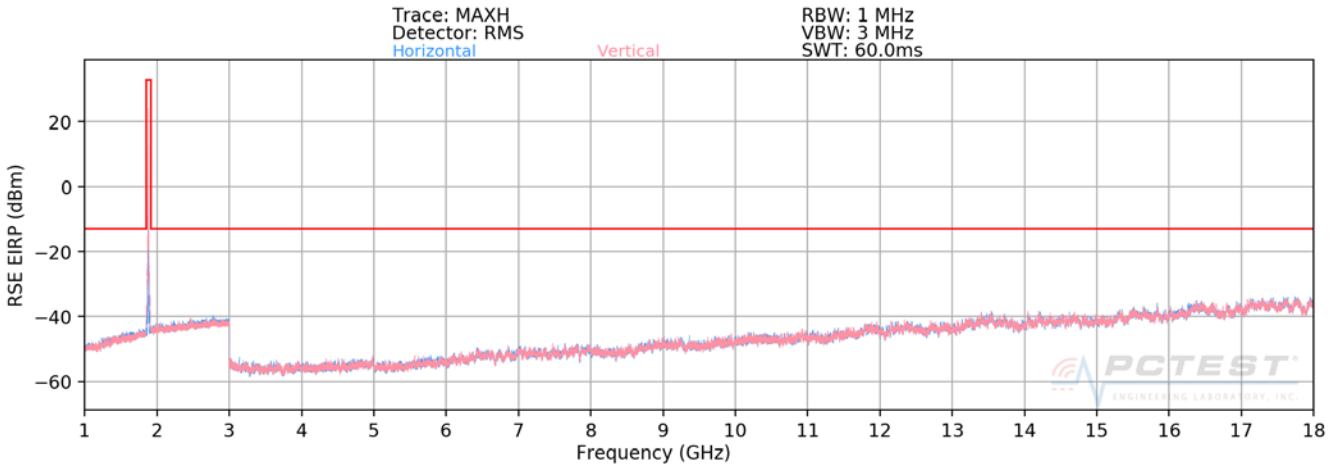
Table 7-26. Radiated Spurious Data (PCS CDMA Mode – Ch. 600)

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	H	-	-	-68.21	5.82	-62.39	-49.4
5726.25	H	-	-	-72.14	12.44	-59.70	-46.7

Table 7-27. 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	-	-	-67.49	6.12	-61.37	-48.4
5557.20	H	-	-	-72.05	12.02	-60.02	-47.0

Table 7-28. 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	-	-	-68.13	5.90	-62.23	-49.2
5640.00	H	-	-	-72.28	12.27	-60.01	-47.0

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	H	-	-	-67.44	5.82	-61.61	-48.6
5722.80	H	-	-	-72.77	12.44	-60.33	-47.3

Table 7-30. 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:	4.19	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.19	- 30	836,600,218	218	0.0000261
100 %		- 20	836,599,822	-178	-0.0000213
100 %		- 10	836,600,023	23	0.0000027
100 %		0	836,599,718	-282	-0.0000337
100 %		+ 10	836,599,926	-74	-0.0000088
100 %		+ 20	836,600,252	252	0.0000301
100 %		+ 30	836,600,119	119	0.0000142
100 %		+ 40	836,599,811	-189	-0.0000226
100 %		+ 50	836,599,634	-366	-0.0000437
BATT. ENDPOINT	3.79	+ 20	836,600,131	131	0.0000157

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

Frequency Stability / Temperature Variation

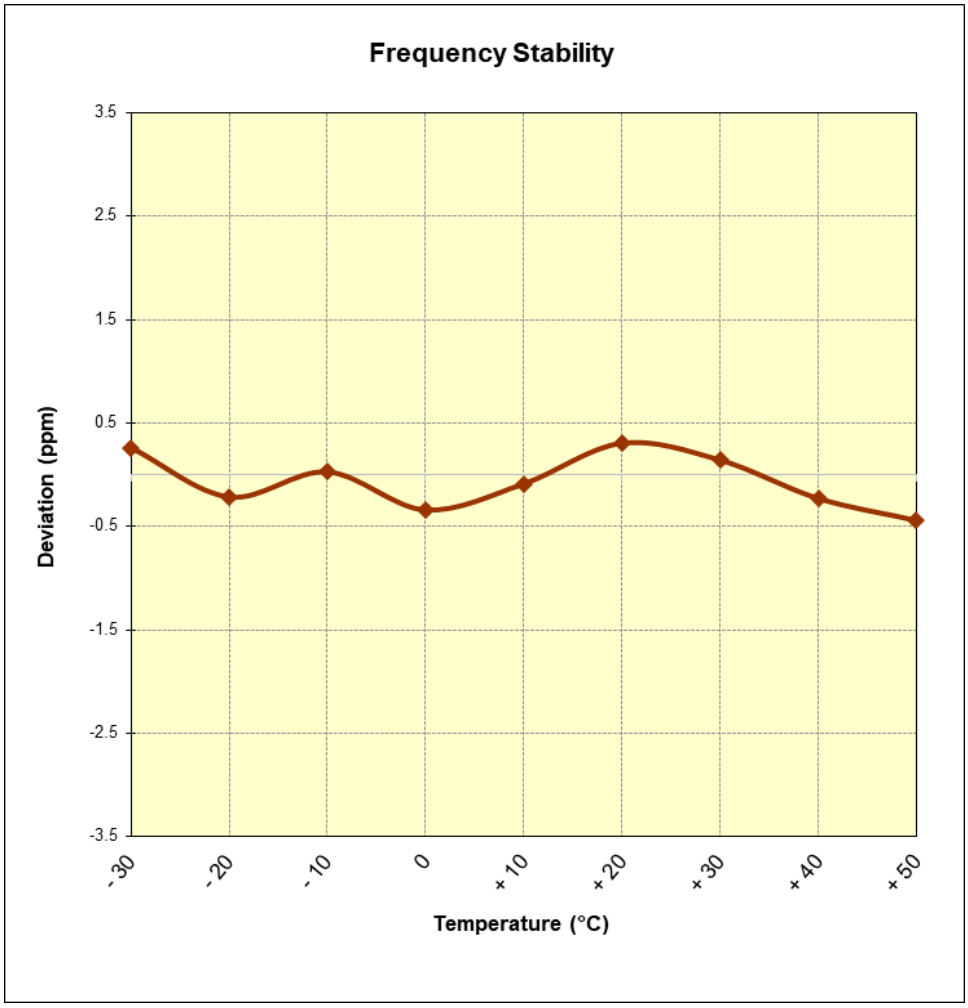


Figure 7-9. Frequency Stability Graph (Cellular GSM Mode – Ch. 190)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	836,520,000	Hz
CHANNEL:	384	
REFERENCE VOLTAGE:	4.19	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.19	- 30	836,520,247	247	0.0000295
100 %		- 20	836,520,032	32	0.0000038
100 %		- 10	836,520,017	17	0.0000020
100 %		0	836,519,911	-89	-0.0000106
100 %		+ 10	836,520,001	1	0.0000001
100 %		+ 20	836,519,936	-64	-0.0000077
100 %		+ 30	836,520,270	270	0.0000323
100 %		+ 40	836,519,679	-321	-0.0000384
100 %		+ 50	836,519,792	-208	-0.0000249
BATT. ENDPOINT	3.79	+ 20	836,519,657	-343	-0.0000410

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

Frequency Stability / Temperature Variation

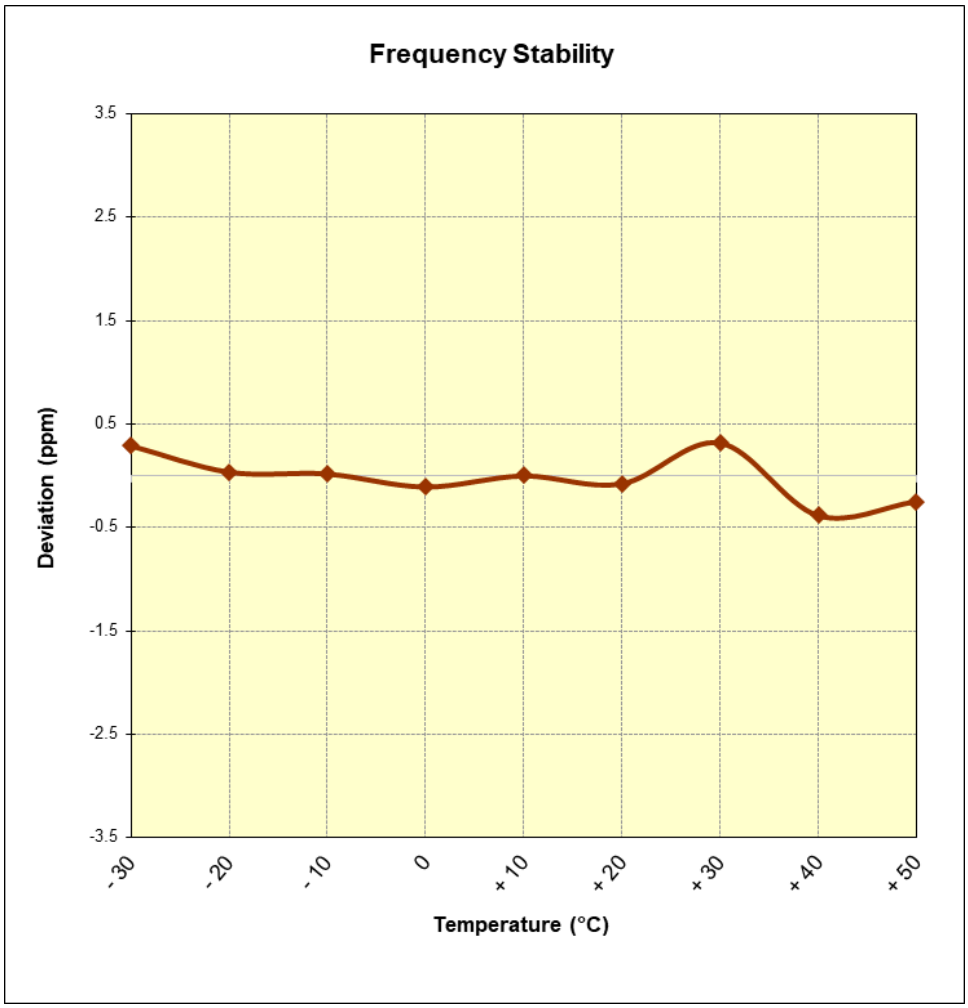


Figure 7-10. Frequency Stability Graph (Cellular CDMA Mode – Ch. 384)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	836,600,000	Hz
CHANNEL:	4183	
REFERENCE VOLTAGE:	4.19	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.19	- 30	836,599,964	-36	-0.0000043
100 %		- 20	836,600,182	182	0.0000218
100 %		- 10	836,600,301	301	0.0000360
100 %		0	836,599,914	-86	-0.0000103
100 %		+ 10	836,599,994	-6	-0.0000007
100 %		+ 20	836,599,802	-198	-0.0000237
100 %		+ 30	836,599,745	-255	-0.0000305
100 %		+ 40	836,600,232	232	0.0000277
100 %		+ 50	836,600,195	195	0.0000233
BATT. ENDPOINT	3.79	+ 20	836,600,073	73	0.0000087

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

Frequency Stability / Temperature Variation

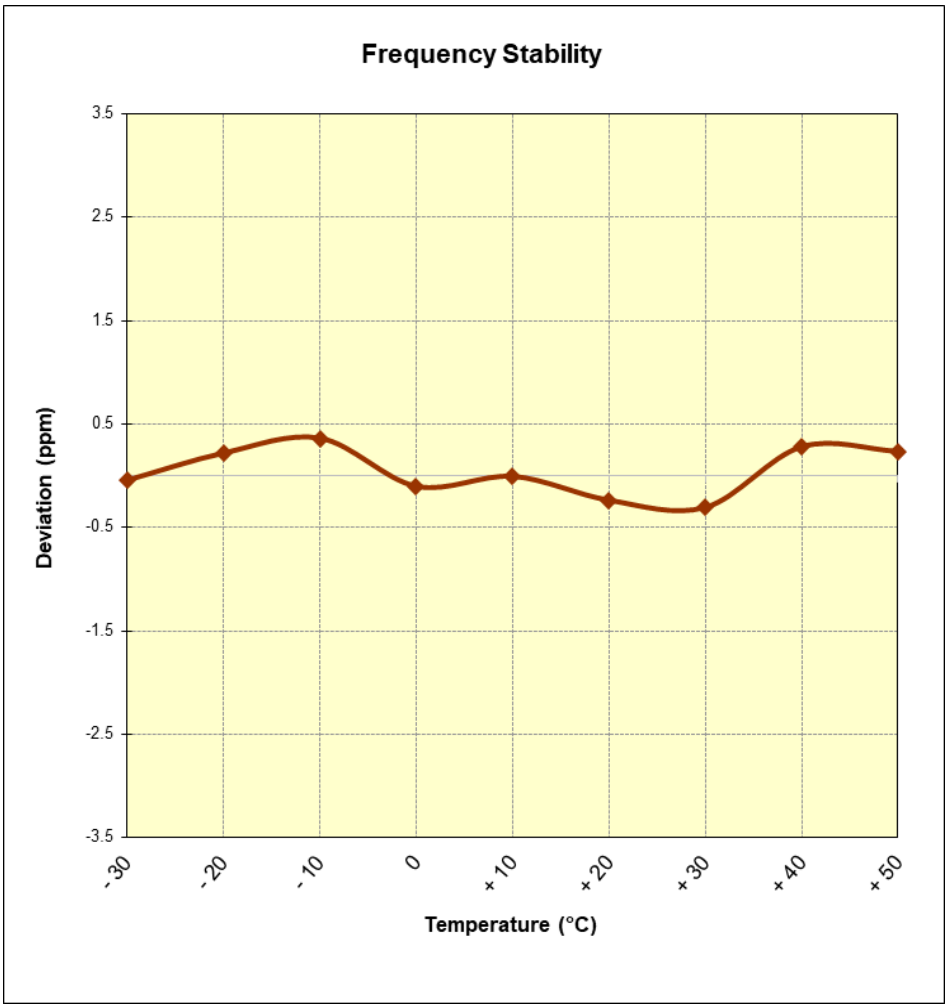


Figure 7-11. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,732,600,000	Hz
CHANNEL:	1413	
REFERENCE VOLTAGE:	4.19	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.19	- 30	1,732,600,292	292	0.0000169
100 %		- 20	1,732,600,265	265	0.0000153
100 %		- 10	1,732,599,702	-298	-0.0000172
100 %		0	1,732,599,988	-12	-0.0000007
100 %		+ 10	1,732,600,088	88	0.0000051
100 %		+ 20	1,732,600,130	130	0.0000075
100 %		+ 30	1,732,599,859	-141	-0.0000081
100 %		+ 40	1,732,599,749	-251	-0.0000145
100 %		+ 50	1,732,600,043	43	0.0000025
BATT. ENDPOINT	3.79	+ 20	1,732,600,117	117	0.0000068

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.

Frequency Stability / Temperature Variation

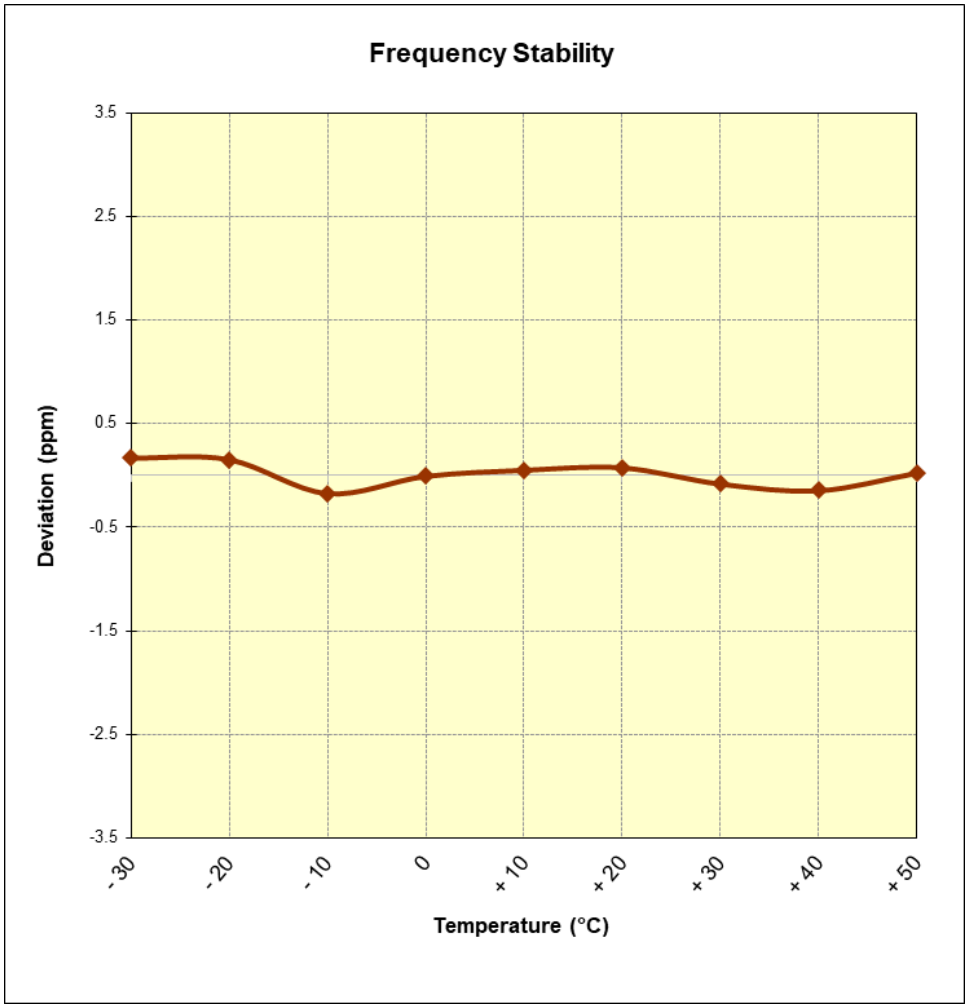


Figure 7-12. Frequency Stability Graph (AWS WCDMA Mode – Ch. 1413)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	661	
REFERENCE VOLTAGE:	4.19	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.19	- 30	1,880,000,042	42	0.0000022
100 %		- 20	1,880,000,030	30	0.0000016
100 %		- 10	1,880,000,117	117	0.0000062
100 %		0	1,880,000,190	190	0.0000101
100 %		+ 10	1,879,999,945	-55	-0.0000029
100 %		+ 20	1,880,000,222	222	0.0000118
100 %		+ 30	1,880,000,039	39	0.0000021
100 %		+ 40	1,880,000,394	394	0.0000210
100 %		+ 50	1,879,999,969	-31	-0.0000016
BATT. ENDPOINT	3.79	+ 20	1,880,000,095	95	0.0000051

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

Frequency Stability / Temperature Variation

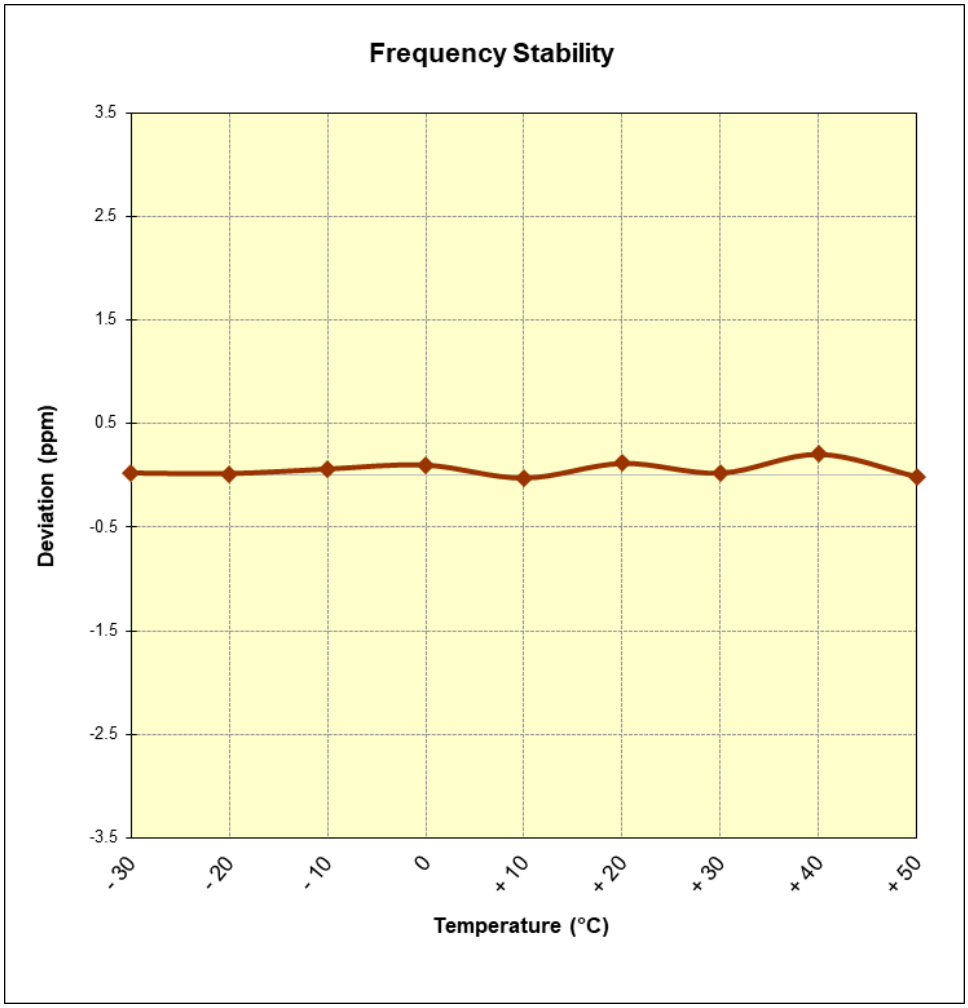


Figure 7-13. Frequency Stability Graph (PCS GSM Mode – Ch. 661)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	600	
REFERENCE VOLTAGE:	4.19	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.19	- 30	1,880,000,066	66	0.0000035
100 %		- 20	1,880,000,203	203	0.0000108
100 %		- 10	1,879,999,816	-184	-0.0000098
100 %		0	1,880,000,265	265	0.0000141
100 %		+ 10	1,879,999,921	-79	-0.0000042
100 %		+ 20	1,880,000,364	364	0.0000194
100 %		+ 30	1,880,000,063	63	0.0000034
100 %		+ 40	1,879,999,630	-370	-0.0000197
100 %		+ 50	1,879,999,984	-16	-0.0000009
BATT. ENDPOINT	3.79	+ 20	1,880,000,112	112	0.0000060

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

Frequency Stability / Temperature Variation

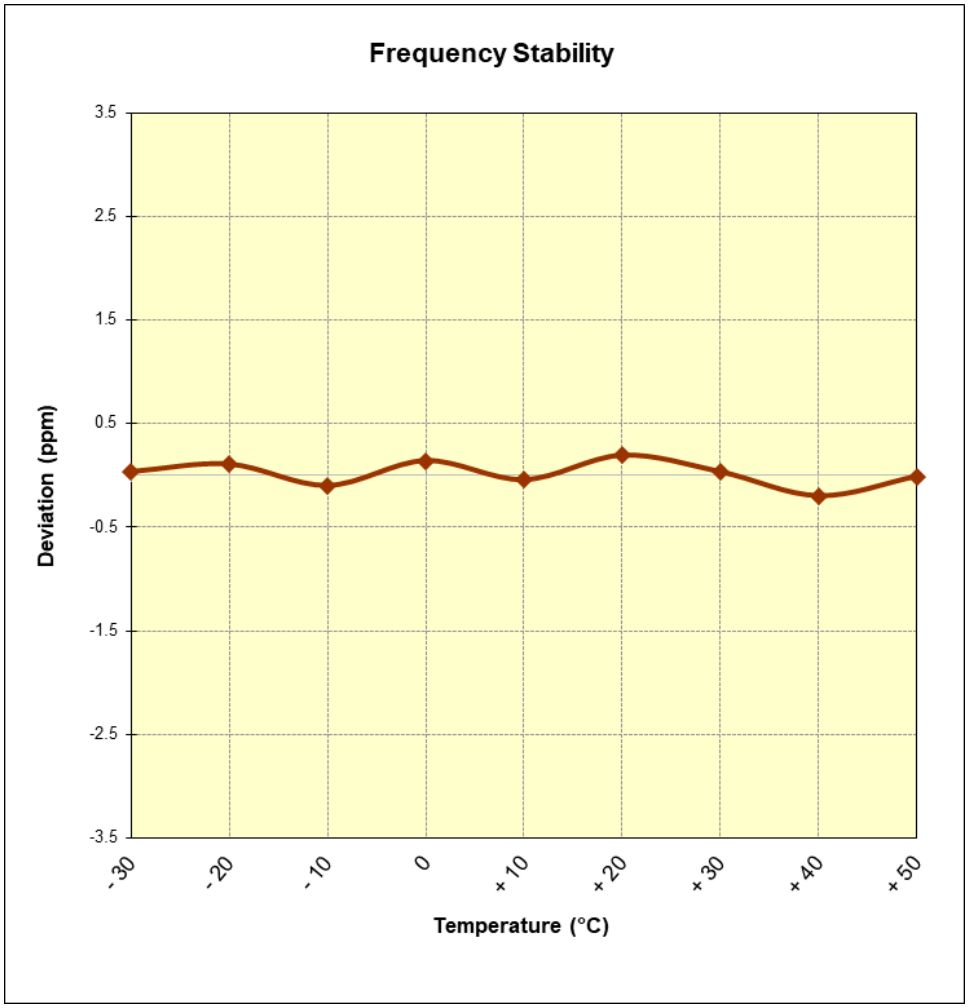


Figure 7-14. Frequency Stability Graph (PCS CDMA Mode – Ch. 600)

Frequency Stability / Temperature Variation

OPERATING FREQUENCY:	1,880,000,000	Hz
CHANNEL:	9400	
REFERENCE VOLTAGE:	4.19	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.19	- 30	1,879,999,998	-2	-0.0000001
100 %		- 20	1,880,000,253	253	0.0000135
100 %		- 10	1,879,999,998	-2	-0.0000001
100 %		0	1,880,000,029	29	0.0000015
100 %		+ 10	1,880,000,264	264	0.0000140
100 %		+ 20	1,880,000,205	205	0.0000109
100 %		+ 30	1,879,999,733	-267	-0.0000142
100 %		+ 40	1,880,000,213	213	0.0000113
100 %		+ 50	1,880,000,084	84	0.0000045
BATT. ENDPOINT	3.79	+ 20	1,880,000,214	214	0.0000114

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

Frequency Stability / Temperature Variation

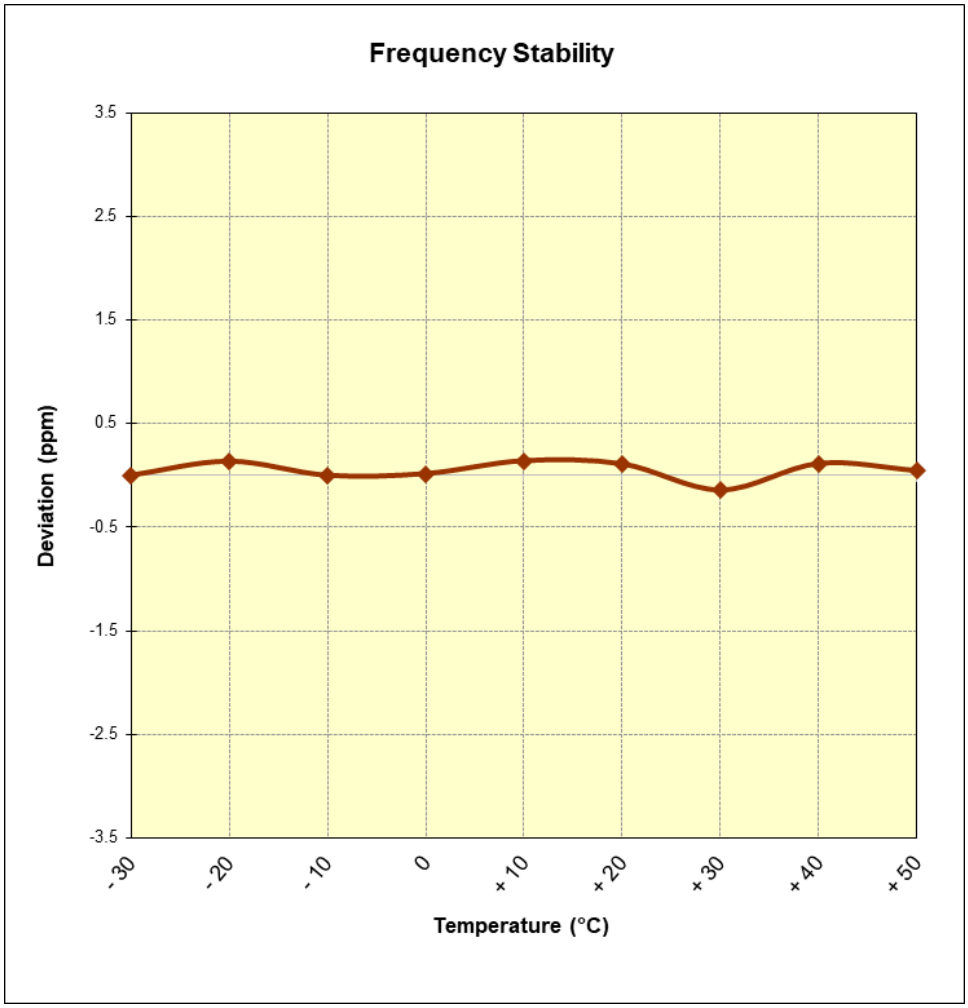


Figure 7-15. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMG986U** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules.