mPERS FCC Part 22 & 24 Conducted Test Report

FCC ID: ZQR-LC120

80-H1151-1 Rev A

November 2011

QUALCOMM Incorporated
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San Diego, CA 92121-1714
U.S.A.

mPERS FCC Part 22 & 24 Conducted Test Report
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FCC Part 22 and 24 Certification	
FCC ID:	**ZQR-LC120 (Watch)** **ZRQ-LC130 (Belt Clip)** **ZRQ-LC140 (Pendant)**
Model:	**MPERS LC120/LC130/LC140**

STATEMENT OF CERTIFICATION

The data, data evaluation and equipment configuration represented herein are a true and accurate representation of the measurements of the sample's radio frequency interference emissions characteristics as of the dates and at the times of the test under the conditions herein specified.

Test performed by:	QUALCOMM Incorporated 5775 Morehouse Drive San Diego, CA 92121-1714
Report Prepared by:	QUALCOMM Incorporated 5775 Morehouse Drive San Diego, CA 92121-1714
Tests that required an OATS site were performed by Compliance Certification Services.	

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1. Introduction and Purpose

This document presents FCC test data for the CDMA 1x 850/1900 MHz RF module used in three Wireless Personal Emergency Service ("MPERS") products that will have unique FCC identifiers follows:

- Watch: Model LC120 (FCC ID ZQR-LC120)
- Belt Clip: Model LC130 (FCC ID ZQR-LC130)
- Pendant/Lanyard: Model LC140 (FCC ID ZQR-LC140)

Although the three MPERS devices share a common RF module, each model is a unique design with a unique antenna. The RF module is physically customized to these three devices and is not intended for use with any other product. For that reason the conducted measurements from this test report are applicable to all three units.

The test results included in this report are limited to conducted test results.

Radiated testing for each unit was performed at UL Compliance Certification Services in Fremont, CA, and the test results are contained in the MPERS FCC Part 22 & 24 Radiated Test Report.

Table 1-1 EUT Information

EUT Model	MPERS RF Module for LC120, LC130, and LC140
FCC ID	ZQR-LC120, ZQR-LC130, ZQR-LC140
EUT description	RF module used in MPERS watch, belt clip, and lanyard
WWAN Technologies	CDMA 2000 1x
Unlicensed Technologies	None
TX Frequencies	CDMA 1x Band Class 0: 824.2 – 848.8 MHz CDMA 1x Band Class 1: 1850.2 – 1909.8 MHz
Nominal Factory Transmit Power (dBm)	Band Class 0: 24dBm Band Class 1: 24dBm
Duty Cycle(s)	CDMA: 100%

2. Test Summary

FCC/IC Rule	Description of Test	Result
§2.1046	RF Power Output	**Complies**
§2.1049	Occupied Bandwidth	**Complies**
§22.359, 24.238, 27.53(g)	Band Edge Requirement	**Complies**
§2.1051, 22.917, 24.238(a), 27.53	Out of Band Emission at Antenna Terminals	**Complies**
§2.1055, 22.355, 24.235, 27.54	Frequency Stability vs. Temperature vs. Voltage	**Complies**
§1.1310, 2.1091	RF Exposure	**Complies**
§2.1053, 22.917. 24.238(a), 27.55	Field Strength of Spurious Radiation	**Complies**

3. Test Setup Photos

Figure 3-1 Conducted Measurement Test Setup

Figure 3-2 Frequency Stability Test Setup

4. RF Power Output Verification

FCC:	§ 2.1046
Limit:	n/a
DUT SN	1 & 4

4.1 Base Station Emulator Settings and Measurement Procedures

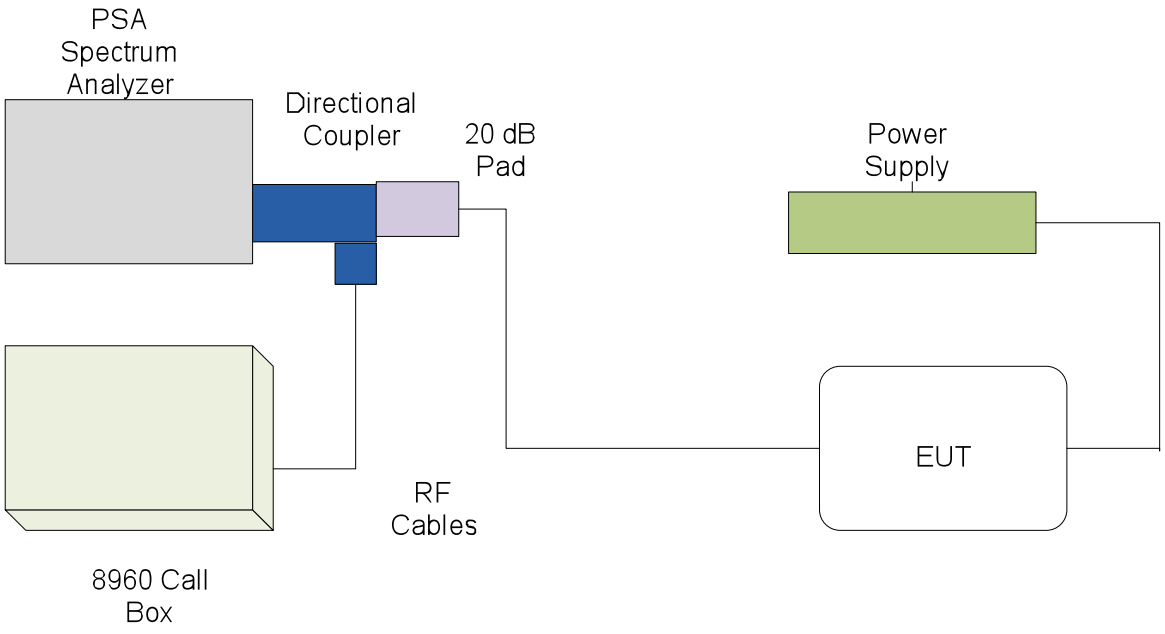
As shown in the figure below, connect the transmitter output of the MPERS to the communication test set (Agilent 8960) and configure it to operate at maximum power in a call. Measure the power at three equally spaced operating frequencies for each band.

Use the build-in power measurement capability in the 8960 box to measure CDMA 1x conducted power output.

The relevant cable loss is measured for the specific frequencies under test and added as a correction factor for all the tests.

All conducted measurements except frequency stability were performed using the following test setup:

Figure 4-1 Conducted RF Measurements Test Setup



4.2 Test Results

Table 4-1 Maximum Conducted Output Power

Device	Band	Channel	Cond. Pwr (dBm)
Module #4 used for Watch and Belt Clip	BC0	1013	24.4
		383	24.1
		777	23.7
	BC1	25	24.1
		600	24.2
		1175	24.3

Test Case			Cell Channel			PCS Channel		
	FWD	REV						
#	RC/TAP	RC/TAP	1013	384	777	25	600	1175
1	RC1	RC1 (SO2)	24.3	24.0	23.9	24.0	24.0	24.3
2	RC1	RC1 (SO55)	24.4	24.1	23.7	24.0	24.0	24.3
3	RC2	RC2 (SO9)	24.4	24.1	23.7	23.9	24.1	24.2
4	RC2	RC2 (SO55)	24.4	24.1	23.7	23.9	24.0	24.3
5	**RC3**	**RC3 (SO55)**	24.4	24.1	23.7	24.1	24.2	24.3
6	RC3	RC3 (SO32)	24.4	24.1	23.7	23.8	23.8	24.2

5. Occupied Bandwidth

FCC:	§2.1049
Limit:	n/a
DUT SN	4

5.1 Test Procedures

As the figure below indicates, the transmitter output is connected to a calibrated coaxial cable and coupler. The other end of coupler was connected to the spectrum analyzer. Measured the occupied bandwidth (defined as the 99% power bandwidth) with the appropriate personality features integrated in the PSA.

An Agilent 8960 call box was used for all measurements.

5.2 Test Results

The occupied bandwidth was measured at low, mid and high channel in each band.

Table 5-1 Occupied Bandwidth Test Result Summary

Mode	Frequency (MHz)	Channel	99% Occupied Bandwidth (MHz)	Plot number
RC3 SO55	824.7	1013 (low)	1.2767	Figure 5-1
	836.52	384 (mid)	1.2787	Figure 5-2
	848.31	777 (high)	1.2811	Figure 5-3
	1851.25	25 (low)	1.2749	Figure 5-4
	1880	600 (mid)	1.2668	Figure 5-5
	1908.75	1175 (high)	1.2824	Figure 5-6

5.3 Plots

Figure 5-1 (Ch. 1013, RC3 SO55)

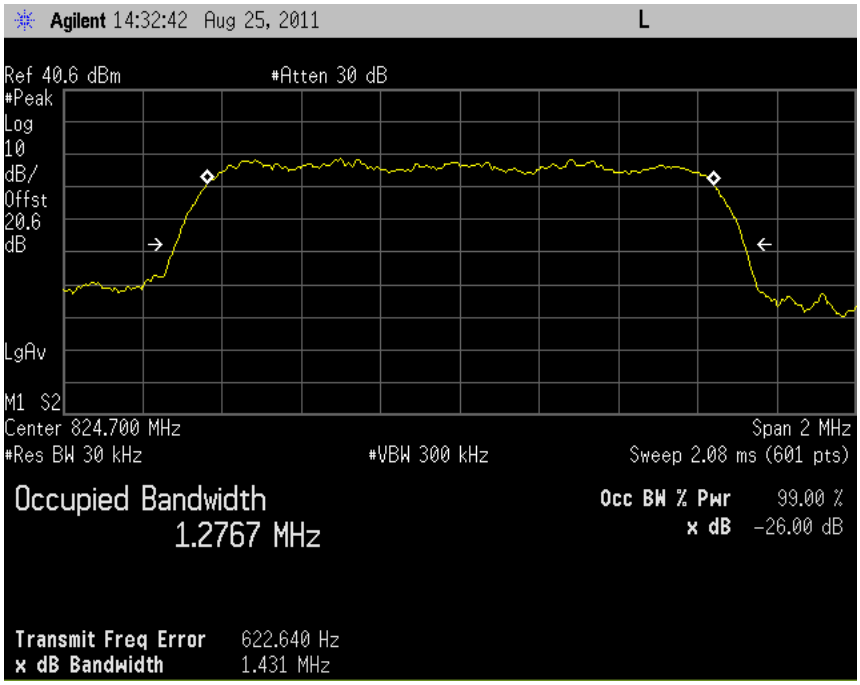


Figure 5-2 (Ch. 384, RC3 SO55)

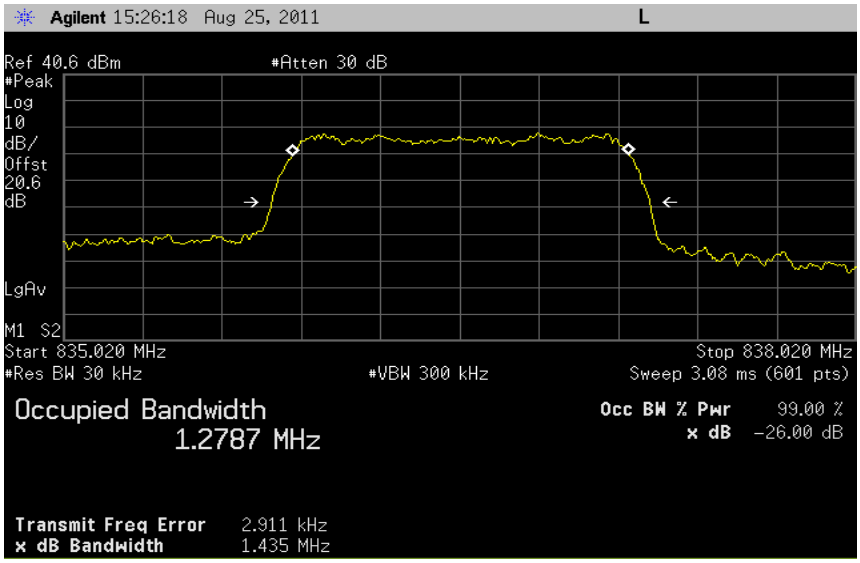


Figure 5-3 (Ch. 777, RC3 SO55)

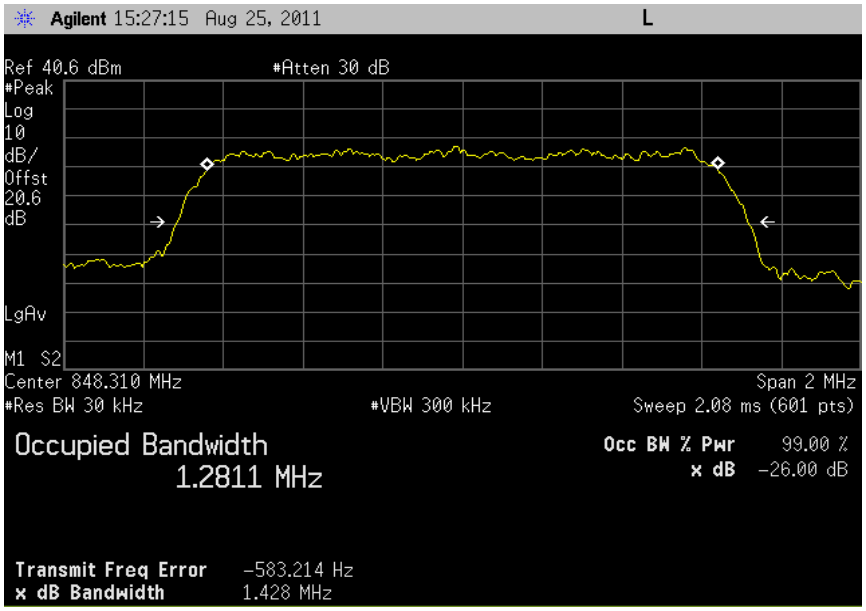


Figure 5-4 (Ch. 25, RC3 SO55)

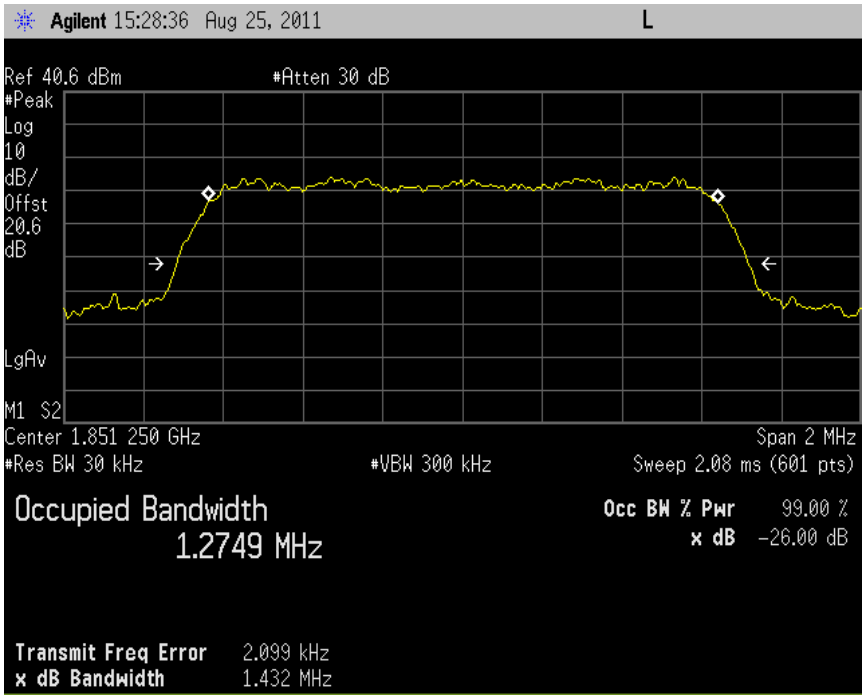


Figure 5-5 (Ch. 600, RC3 SO55)

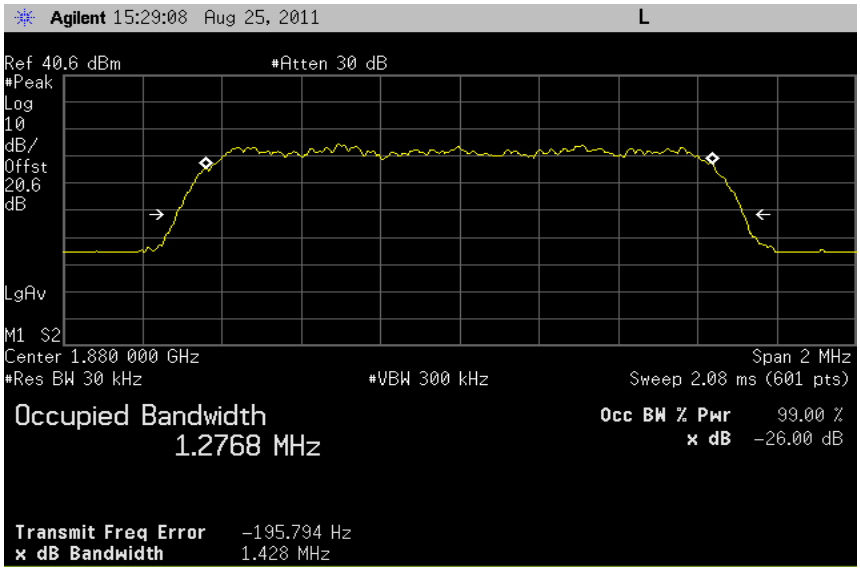
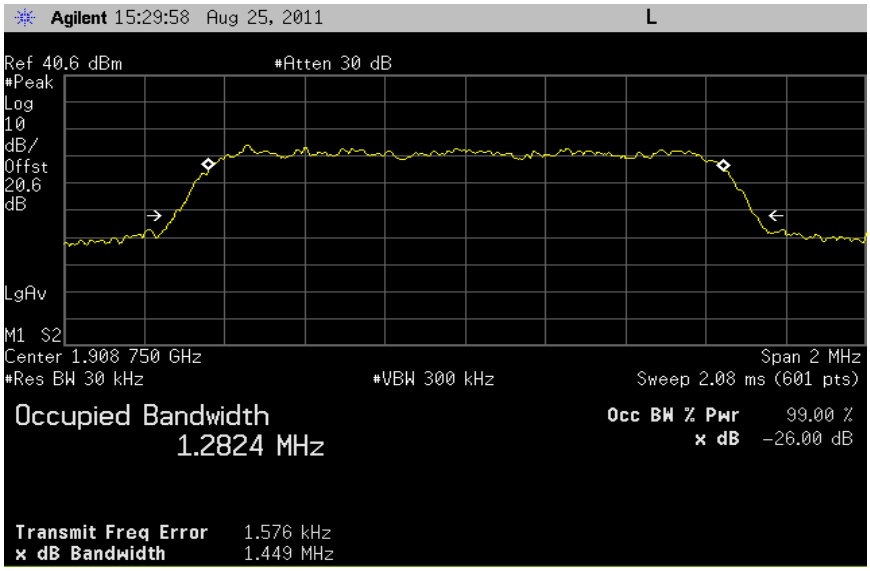


Figure 5-6 (Ch. 1175, RC3 SO55)



6. Band Edge Compliance

FCC:	§22.359, 24.238, 27.53(g)
Limit:	-13dBm
DUT SN	4

6.1 Test Procedures

As shown in Figure below, connected the RF output to 8960 or 8820B, configured the MPERS to operate at maximum power. The block edge emissions are measured at the required operating frequencies in each band on the spectrum analyzer.

For each block edge measurement:

- Set the spectrum analyzer span to include the block edge frequency (824, 848, 1850, 1910 MHz)
- Set a marker to point the corresponding block edge frequency in each test case
- Set display line at -13dBm
- Set resolution bandwidth to at least 1% of emission BW
- For CDMA measurement, set video averaging to 10 samples

The 1% emission BW for CDMA technology is 12.5 kHz:

The 8960 call box was used all measurements.

6.2 Test Results

The test was conducted at band edges in each band.

Table 6-1 Band Edge Test Result Summary

Mode	Frequency (MHz)	Channel Tested	Corresponding Plot number	Test Result
RC3 SO55	**824**	**1013 (low)**	Figure 6-1	Complies
	849	**777 (high)**	Figure 6-2	Complies
	1850	**25 (low)**	Figure 6-3	Complies
	1910	**1175 (high)**	Figure 6-4	Complies

6.3 Plots

Figure 6-1 (Ch. 1013, RC3 SO55)

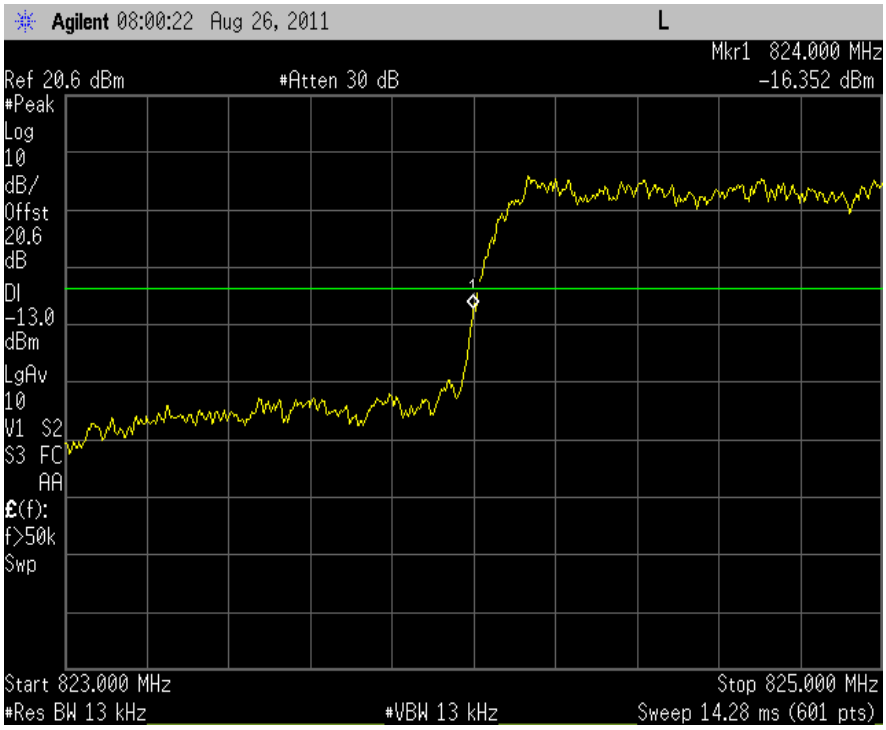


Figure 6-2 (Ch. 777, RC3 SO55)

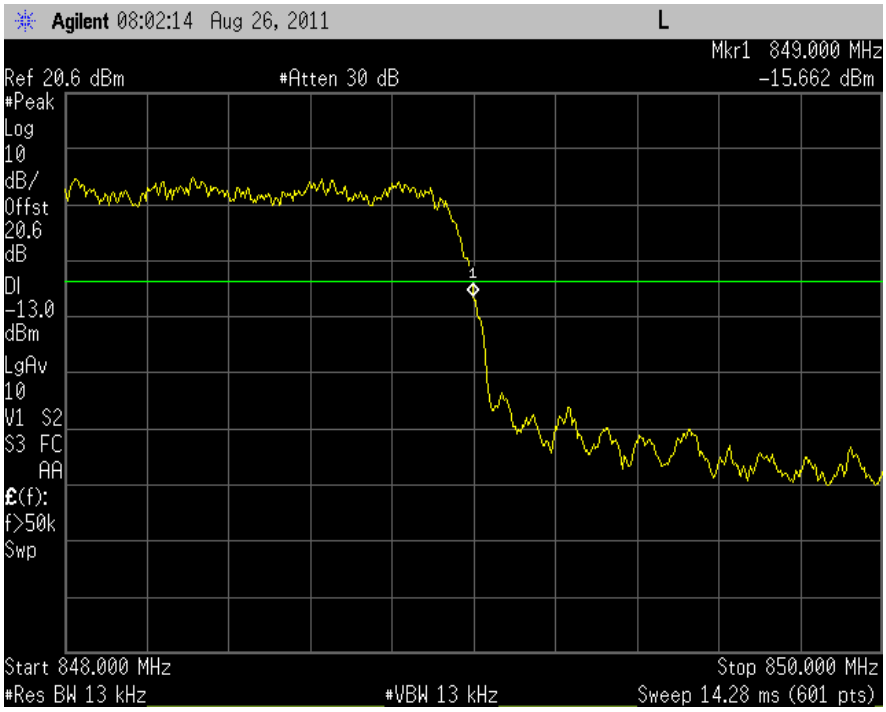


Figure 6-3 (Ch. 25, RC3 SO55)

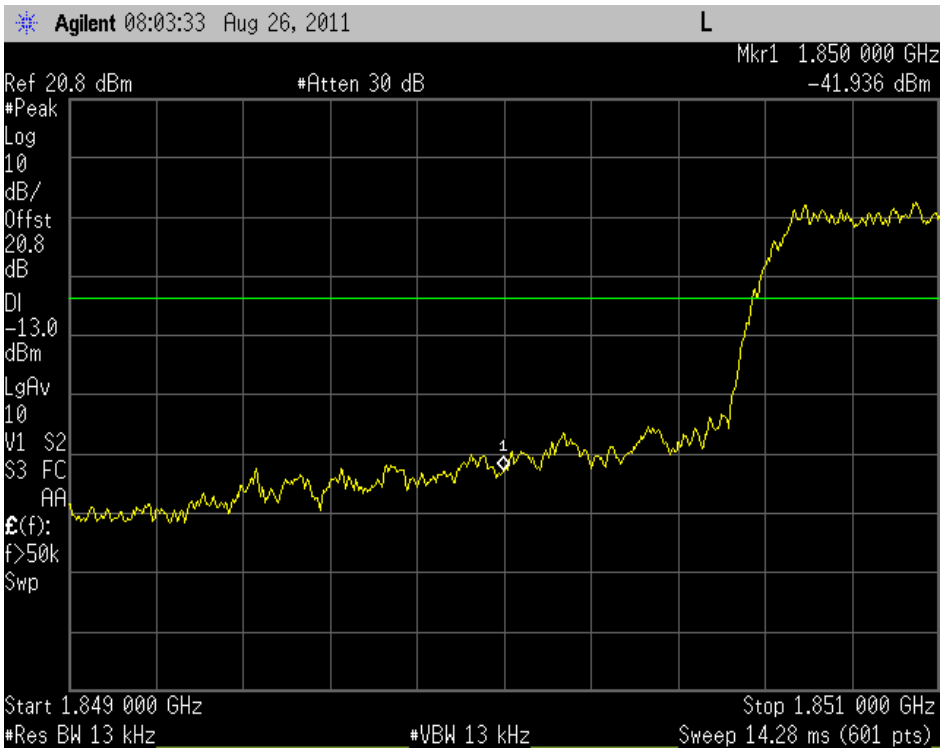
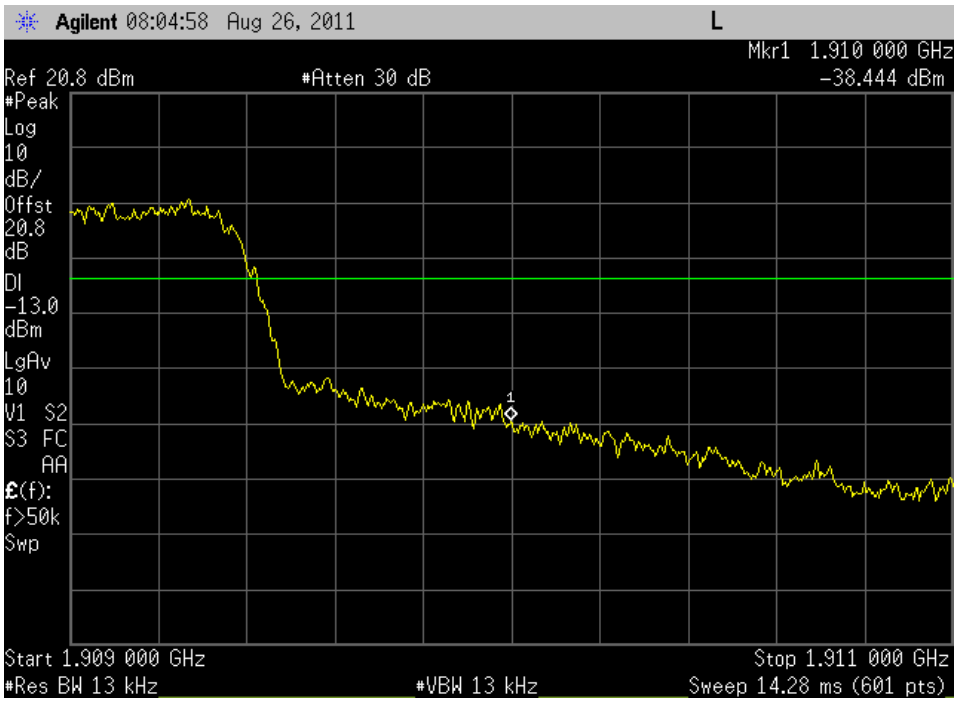


Figure 6-4 (Ch. 1175, RC3 SO55)



7. Out of Band Emissions at Antenna Terminals

FCC:	§22.901(d), 22.917, 24.238 (a), 27.53
Limit:	-13dBm
DUT SN	4

7.1 Test Procedure

As shown in the figure below, the RF output to the spectrum analyzer is connected through a calibrated coaxial cable. Scan the out-of-band emission up to 10th harmonics. Set RBW and VBW as 100 kHz for the measurement below 1GHz, and 1MHz for testing above 1GHz. Recorded multiple sweeps in maximum hold mode using a peak detector to ensure that the worst case emission was caught.

The 8960 call box was used for all measurements.

Figure 4-1shows the test setup. All plots include an offset factor that takes into account cable losses.

7.2 Test Results

The test was conducted at low, mid and high channel in each band.

Table 7-1 Conducted Spurious Emissions Test Result Summary

Mode	Frequency (MHz)	Channel Tested	Corresponding Plot number	Test Result
RC3 SO55 850 MHz	0 ~ 1 GHz	1013	Figure 7-1	Complies
	1-10 GHz	1013	Figure 7-2	Complies
	10-20 GHz	1013	Figure 7-3	Complies
	0 ~ 1 GHz	384	Figure 7-4	Complies
	1-10 GHz	384	Figure 7-5	Complies
	10-20 GHz	384	Figure 7-6	Complies
	0 ~ 1 GHz	777	Figure 7-7	Complies
	1-10 GHz	777	Figure 7-8	Complies
	10-20 GHz	777	Figure 7-9	Complies
RC3 SO55 1900 MHz	0 ~ 1 GHz	25	Figure 7-10	Complies
	1-10 GHz	25	Figure 7-11	Complies
	10-20 GHz	25	Figure 7-12	Complies
	0 ~ 1 GHz	600	Figure 7-13	Complies
	1-10 GHz	600	Figure 7-14	Complies
	10-20 GHz	600	Figure 7-15	Complies
	0 ~ 1 GHz	1175	Figure 7-16	Complies
	1-10 GHz	1175	Figure 7-17	Complies
	10-20 GHz	1175	Figure 7-18	Complies

7.3 Plots

Figure 7-1(Ch. 1013, RC3 SO55)

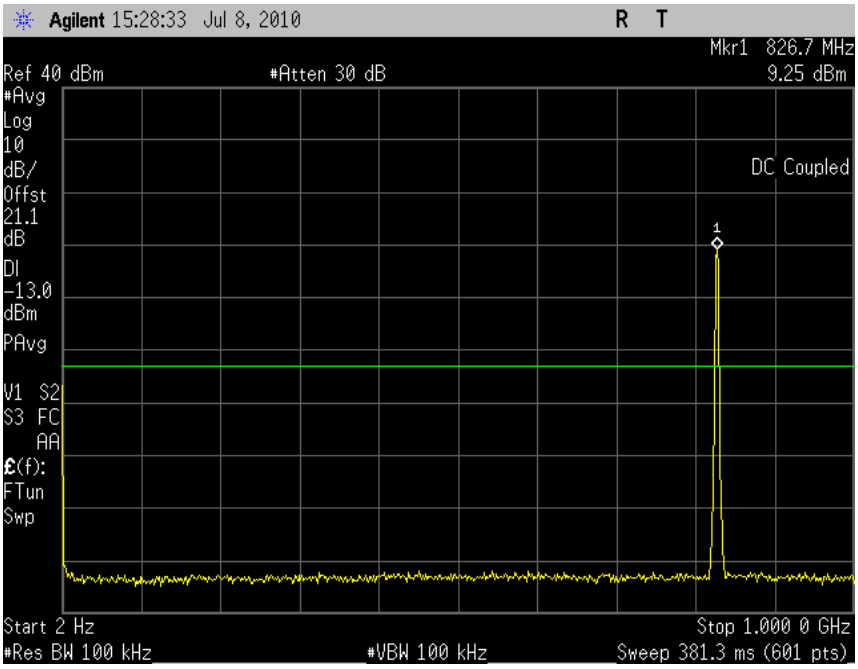


Figure 7-2 (Ch. 1013, RC3 SO55)

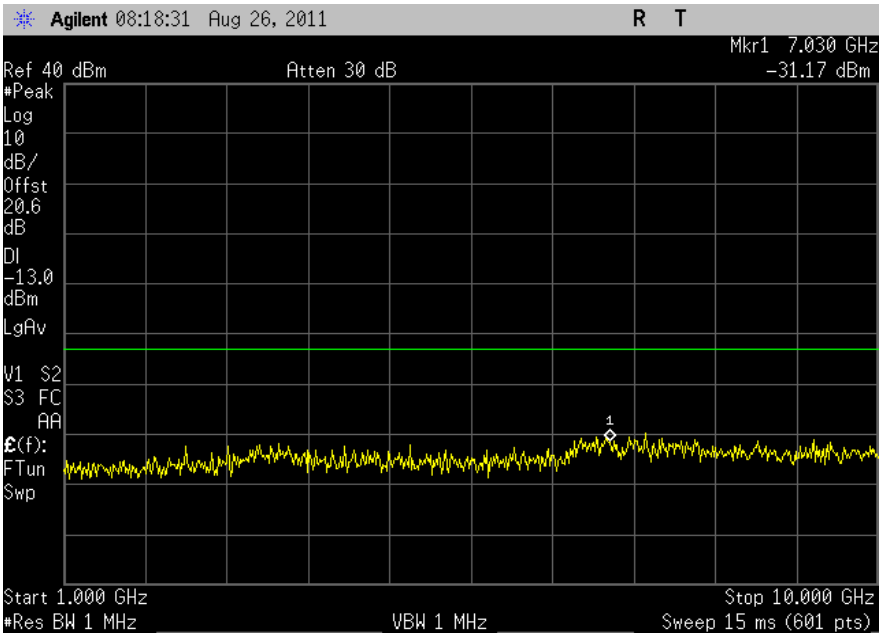


Figure 7-3 (Ch. 1013, RC3 SO55)

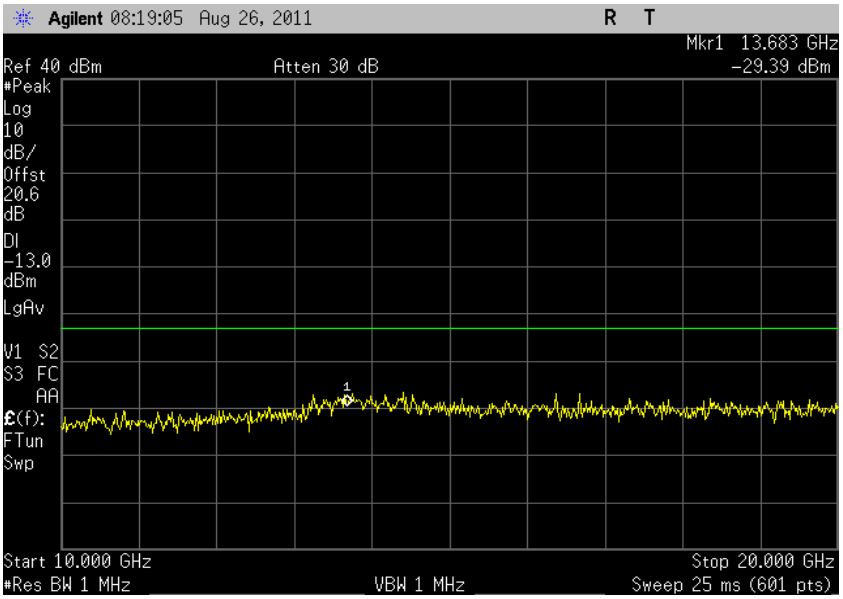


Figure 7-4 (Ch. 384, RC3 SO55)

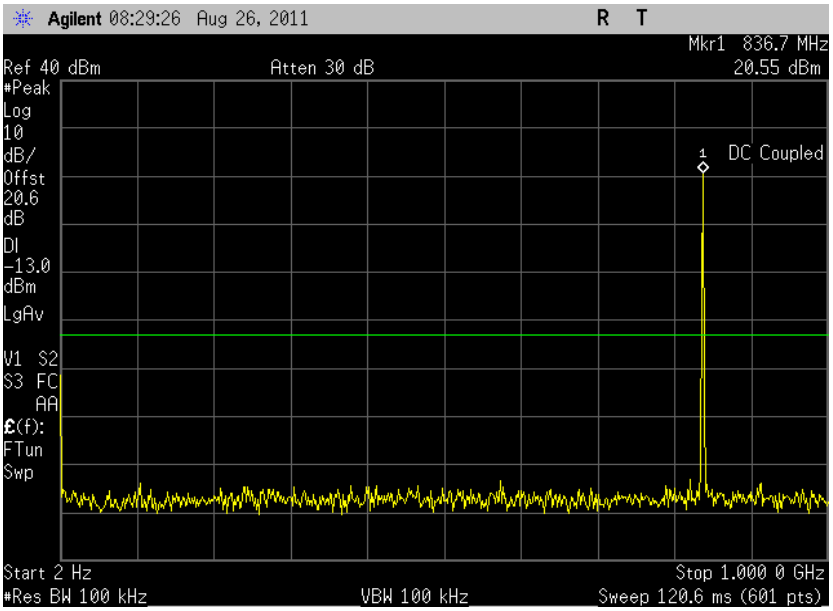


Figure 7-5 (Ch. 384, RC3 SO55)

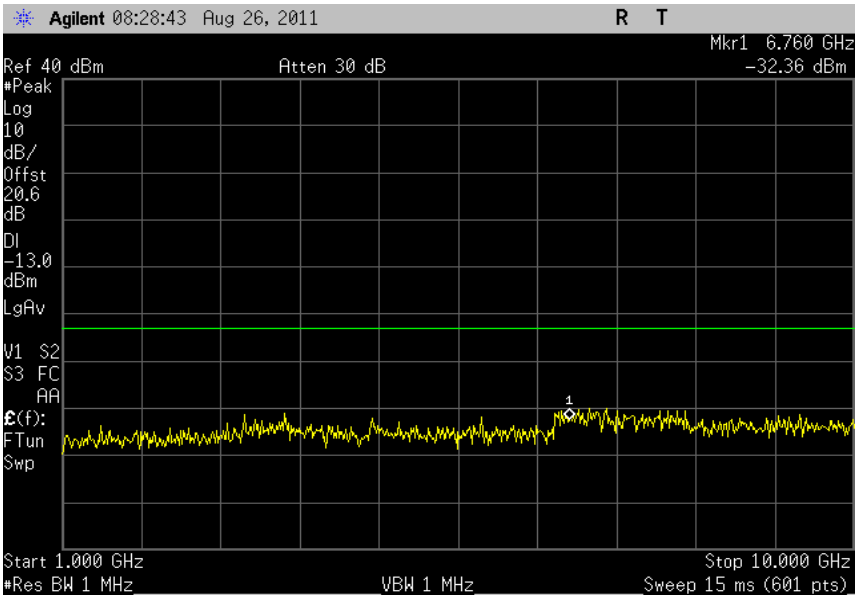


Figure 7-6 (Ch. 384, RC3 SO55)

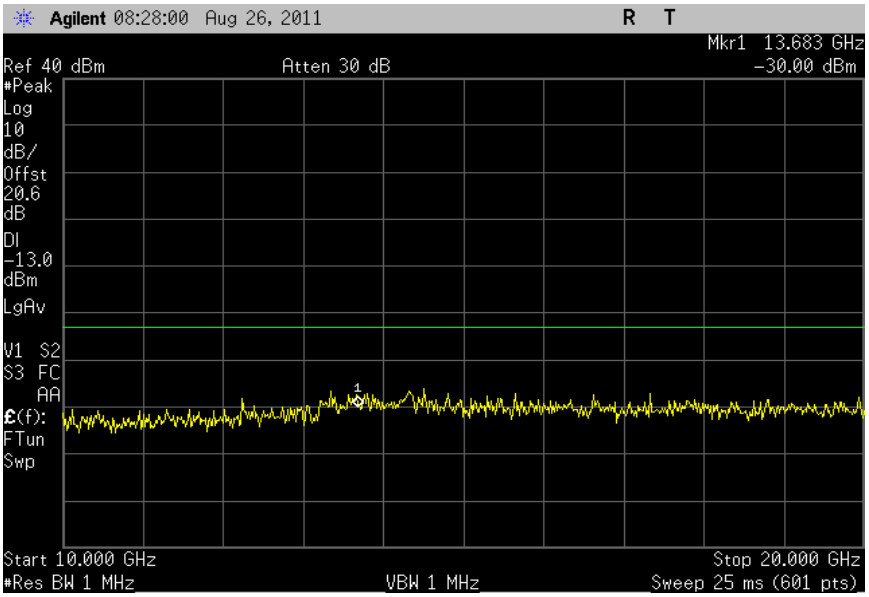


Figure 7-7 (Ch. 777, RC3 SO55)

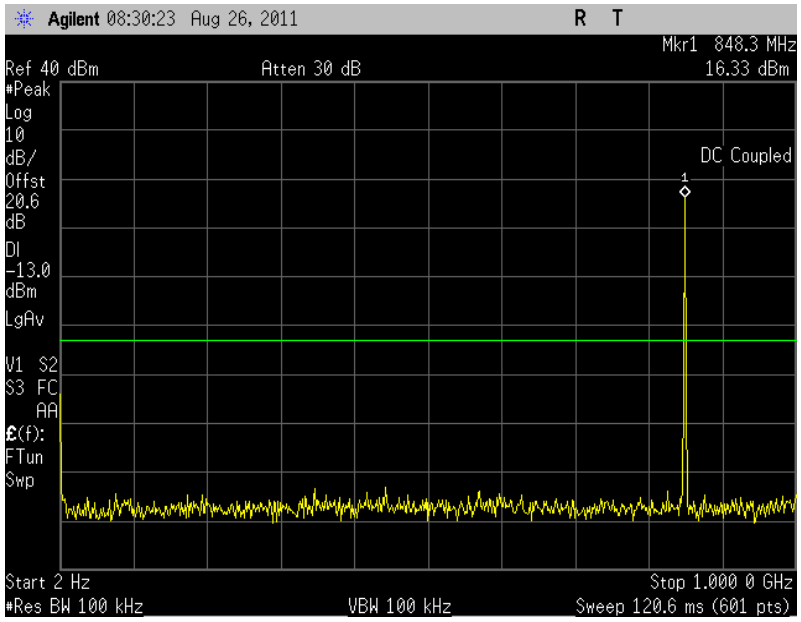


Figure 7-8 (Ch. 777, RC3 SO55)

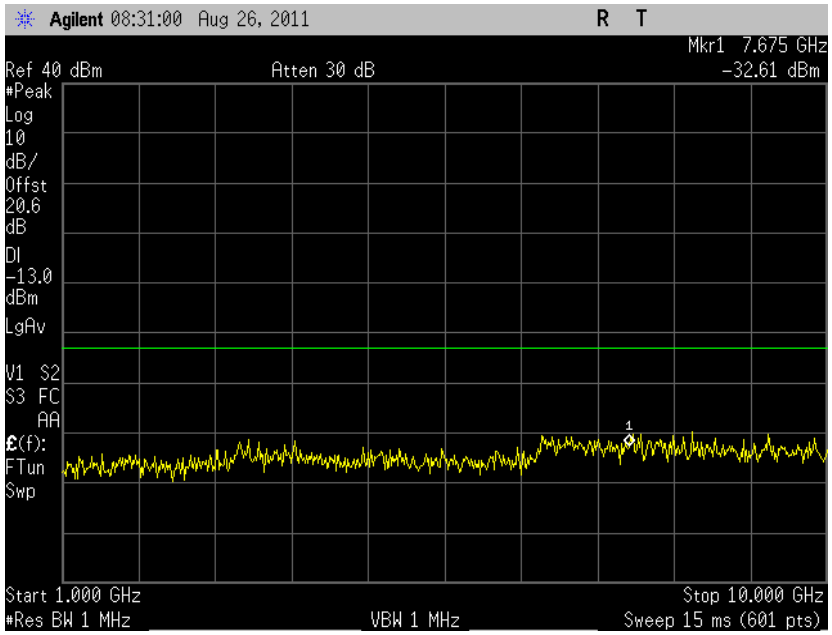


Figure 7-9 (Ch. 777, RC3 SO55)

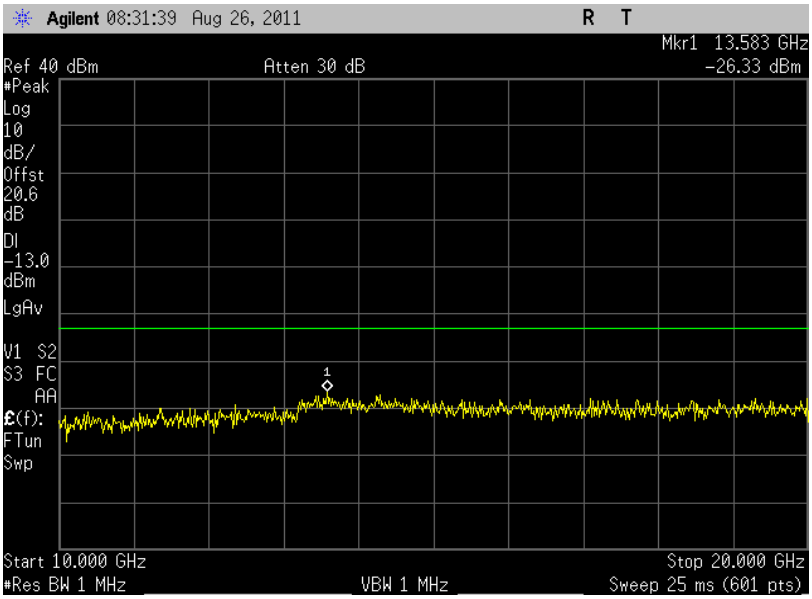


Figure 7-10 (Ch. 25, RC3 SO55)

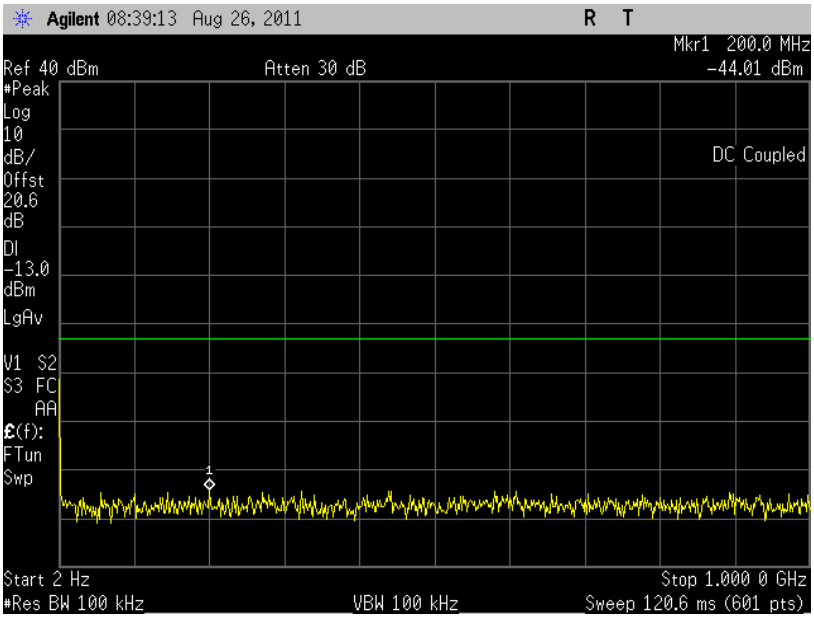


Figure 7-11 (Ch. 25, RC3 SO55)

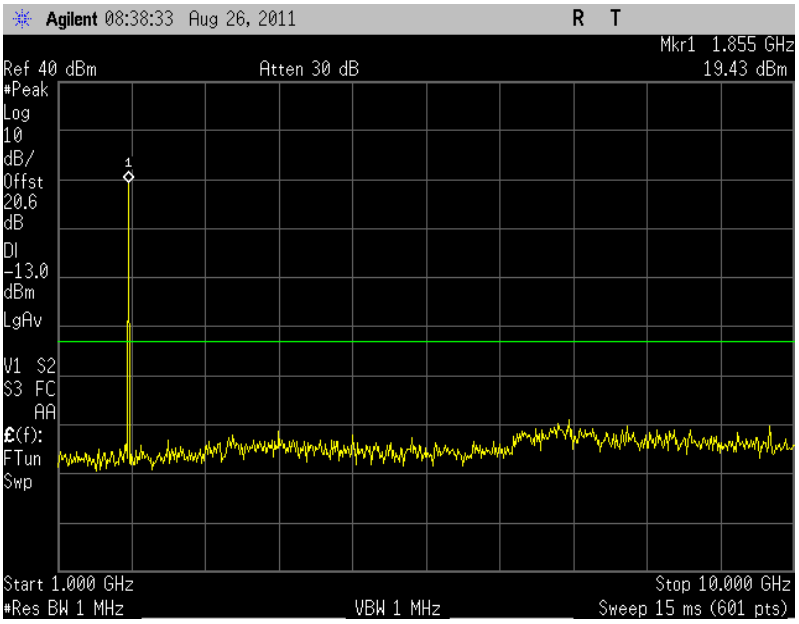


Figure 7-12 (Ch. 25, RC3 SO55)

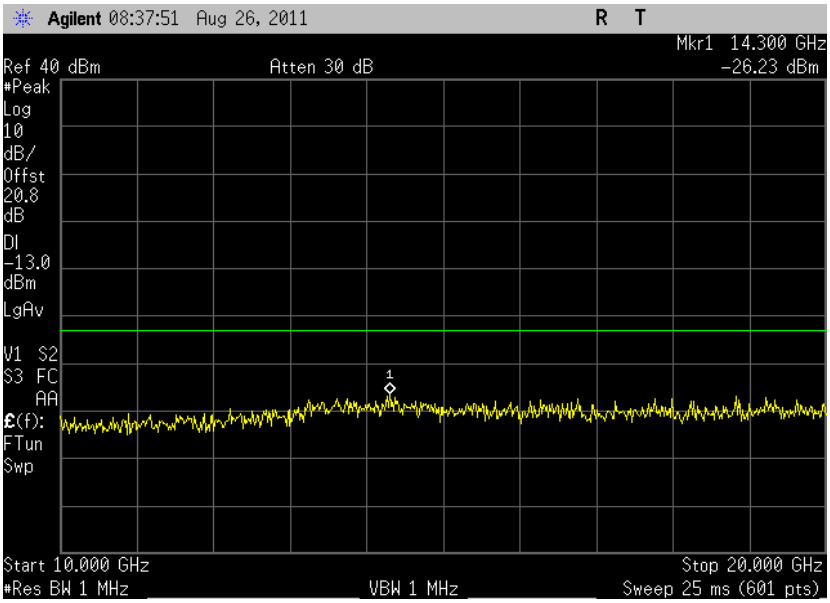


Figure 7-13 (Ch. 600, RC3 SO55)

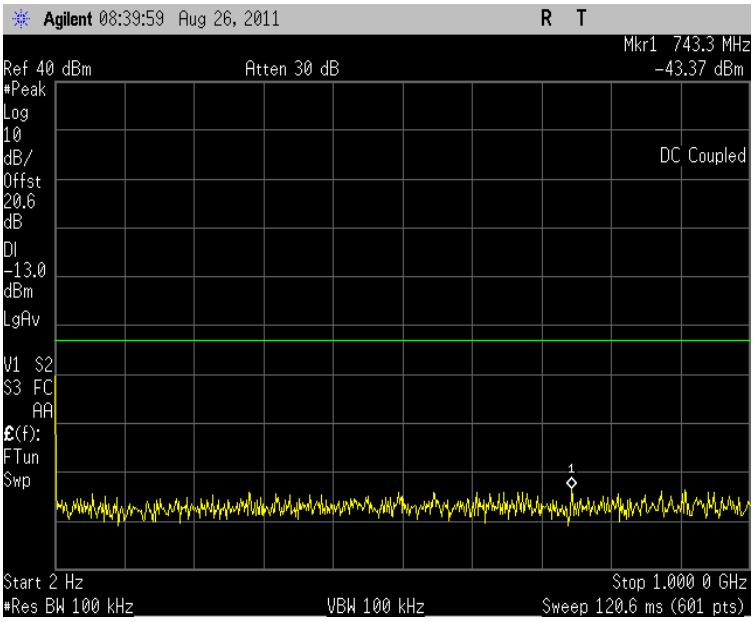


Figure 7-14 (Ch. 600, RC3 SO55)

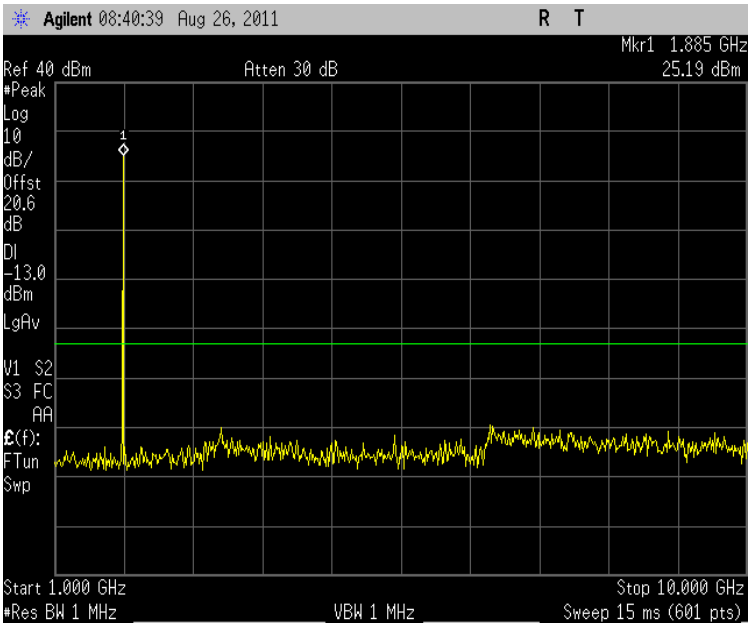


Figure 7-15 (Ch. 600, RC3 SO55)

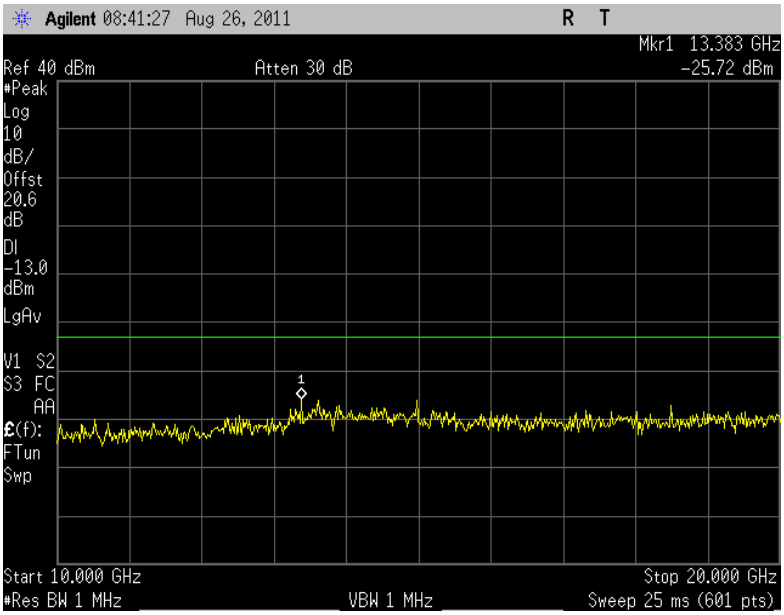


Figure 7-16 (Ch. 1175, RC3 SO55)

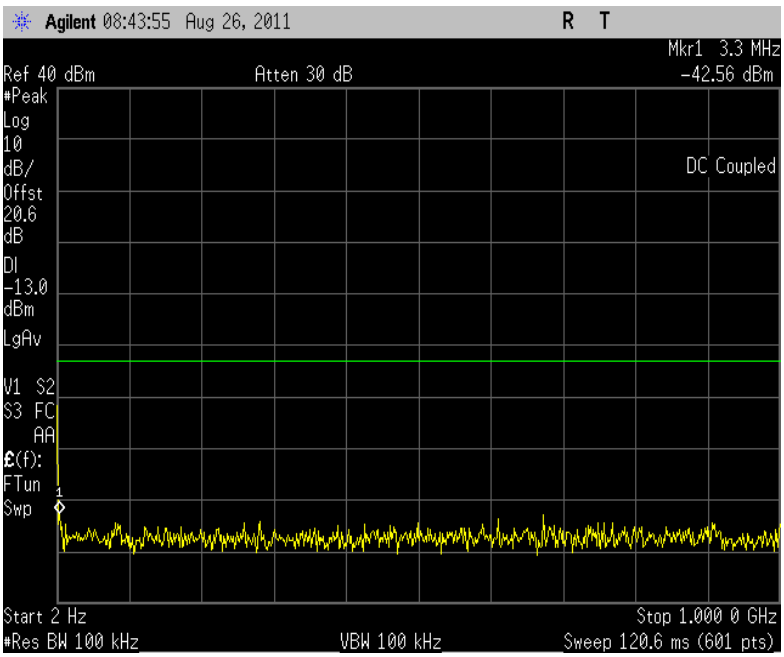


Figure 7-17 (Ch. 1175, RC3 SO55)

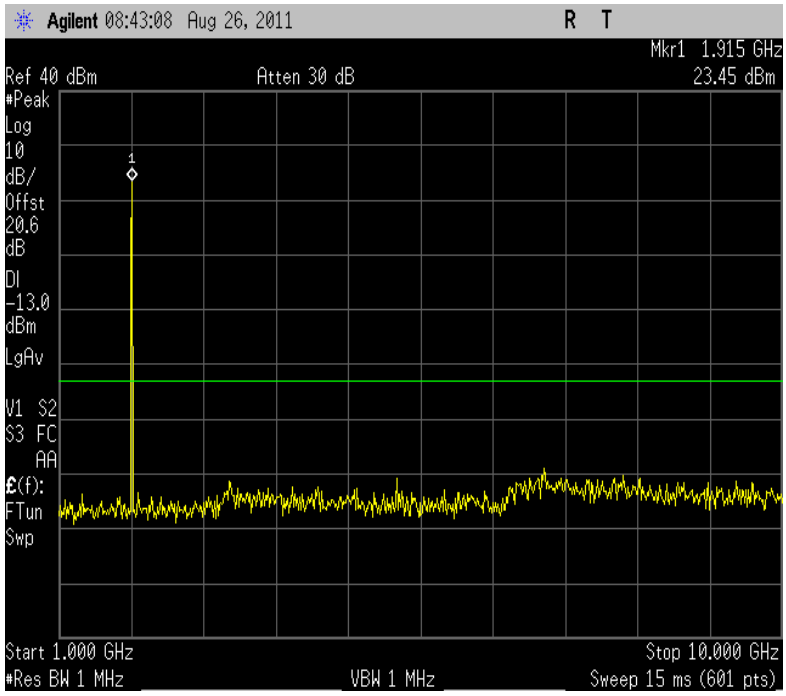
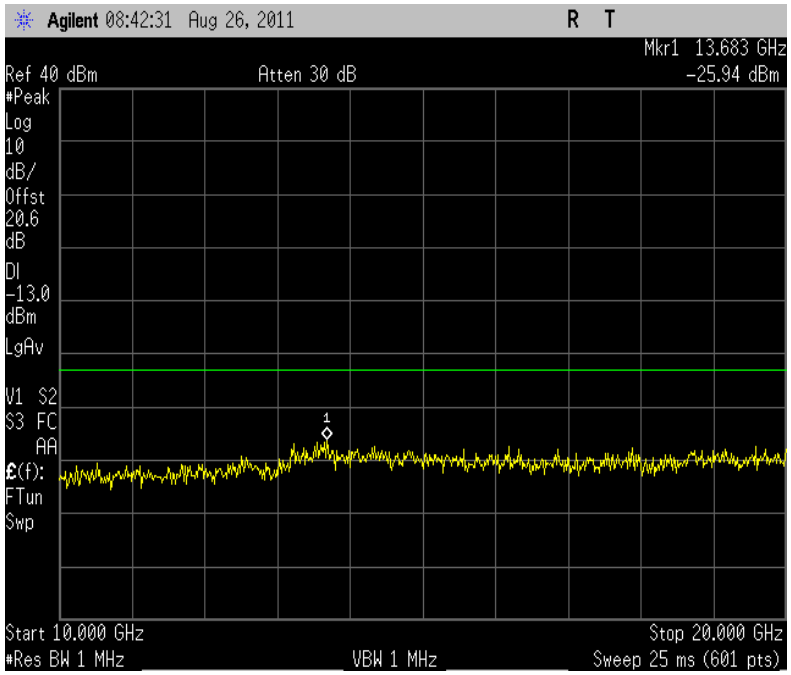


Figure 7-18 (Ch. 1175, RC3 SO55)



8. Frequency Stability

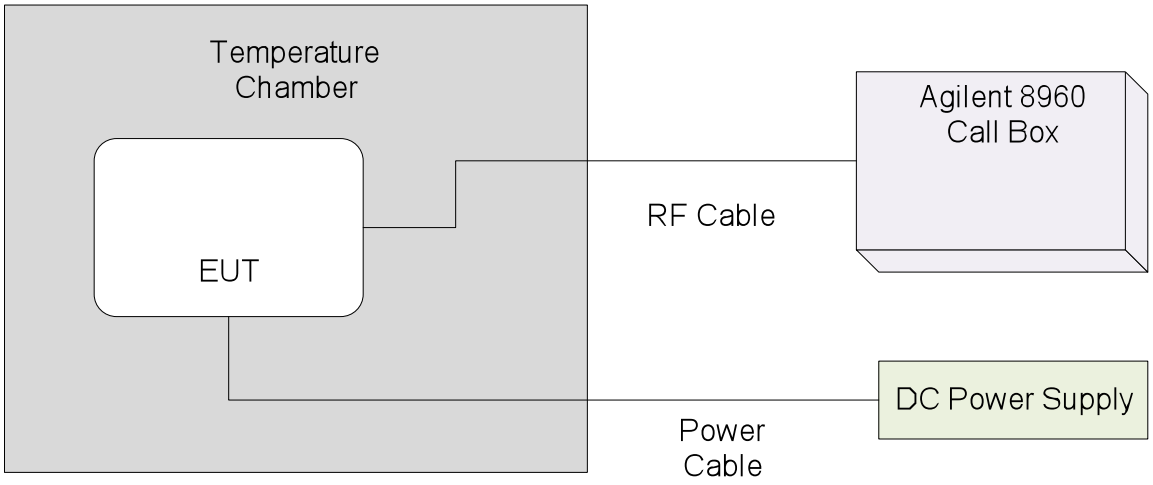
FCC:	§2.1055, 22.355, 24.235, 27.54
Limit:	±2.5ppm
DUT SN	4

8.1 Test Procedure

As the test setup indicates, placed the MPERS device inside the temperature chamber. Measured the transmitting frequency error at 20 degrees C with DC voltage varying from 3.0 volts to 3.6 volts, and then set the temperature to -30 degrees C and allow it to stabilize. After 1 hour soak time, take the measurement on transmitting frequency error at -30 degrees in the same manner. As an incremental of 10 degrees C, repeat the same process until +60 degrees C is completed.

An 8960 call box was used for all testing.

Figure 8-1 Frequency Stability Test Setup



8.2 Test Results

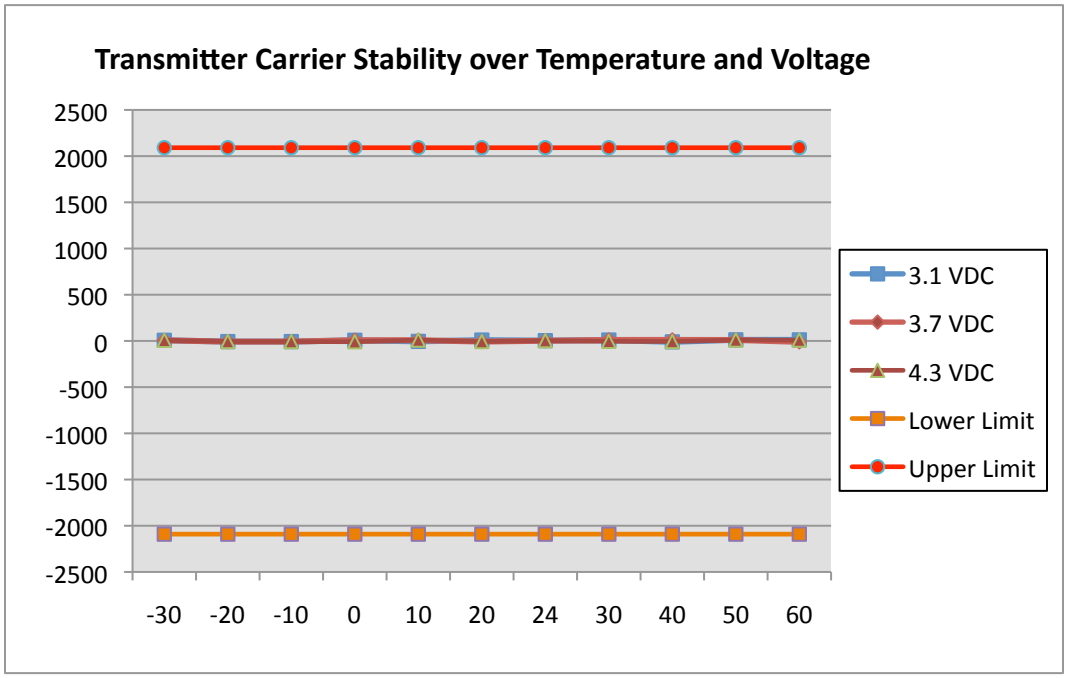
The test was conducted at mid channel in each band.

Operation Mode:	RC3 SO55	**Channel:**	384
Tx Frequency:	836.52MHz	**Voltage:**	3.3v (3.0v ~ 3.6v)
Limit:	±2.5ppm (±2091Hz)		

Table 8-1 BC0 Frequency Stability

Temperature (°C)	Deviation of Carrier (Hz)			Specification (Hz)	
	3.1V	3.7V	4.3V	Lower limit	Upper limit
-30	6.9	6.4	6.5	2091	-2091
-20	-7.3	-7.5	-6.4	2091	-2091
-10	-7.1	-7.4	-6.8	2091	-2091
0	7	7.3	-8.7	2091	-2091
10	-4.7	7.8	9.3	2091	-2091
20	9.2	-7.1	-6.8	2091	-2091
24	3.1	1.9	3.2	2091	-2091
30	9.5	10.6	-4.4	2091	-2091
40	-9.8	11.1	-5.9	2091	-2091
50	11.8	10.2	10.0	2091	-2091
60	11.3	-10.1	8.8	2091	-2091

Figure 8-2 BC0 Frequency Stability Graph

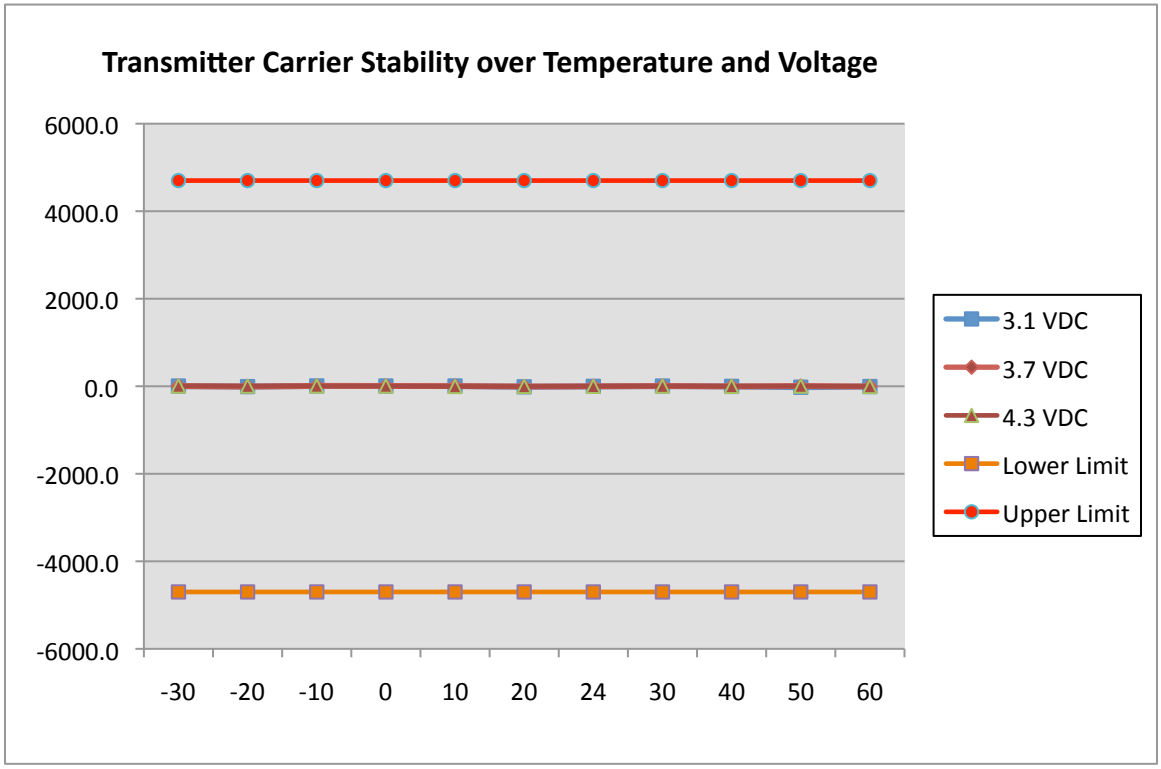


Operation Mode:	RC3 SO55	**Channel:**	600
Tx Frequency:	1880MHz	**Voltage:**	3.3v (3.0v ~ 3.6v)
Limit:	±2.5ppm (±4700Hz)		

Table 8-2 BC1 Frequency Stability

Temperature (oC)	Deviation of Carrier (Hz)			Specification (Hz)	
	3.1 VDC	3.7 VDC	4.3 VDC	Lower limit	Upper limit
-30	4.6	4.2	4.9	-4700	4700
-20	-7.8	-6.5	3.1	-4700	4700
-10	7.5	7.1	6.3	-4700	4700
0	5.8	6.4	5.3	-4700	4700
10	7.0	4.9	-4.6	-4700	4700
20	-12.6	-5.2	-3.9	-4700	4700
24	-1.8	-1.2	-1.5	-4700	4700
30	4.9	5.6	2.6	-4700	4700
40	-2.8	-2.5	-2.6	-4700	4700
50	-21.0	5.2	4.1	-4700	4700
60	-6.1	-4.5	-5.0	-4700	4700

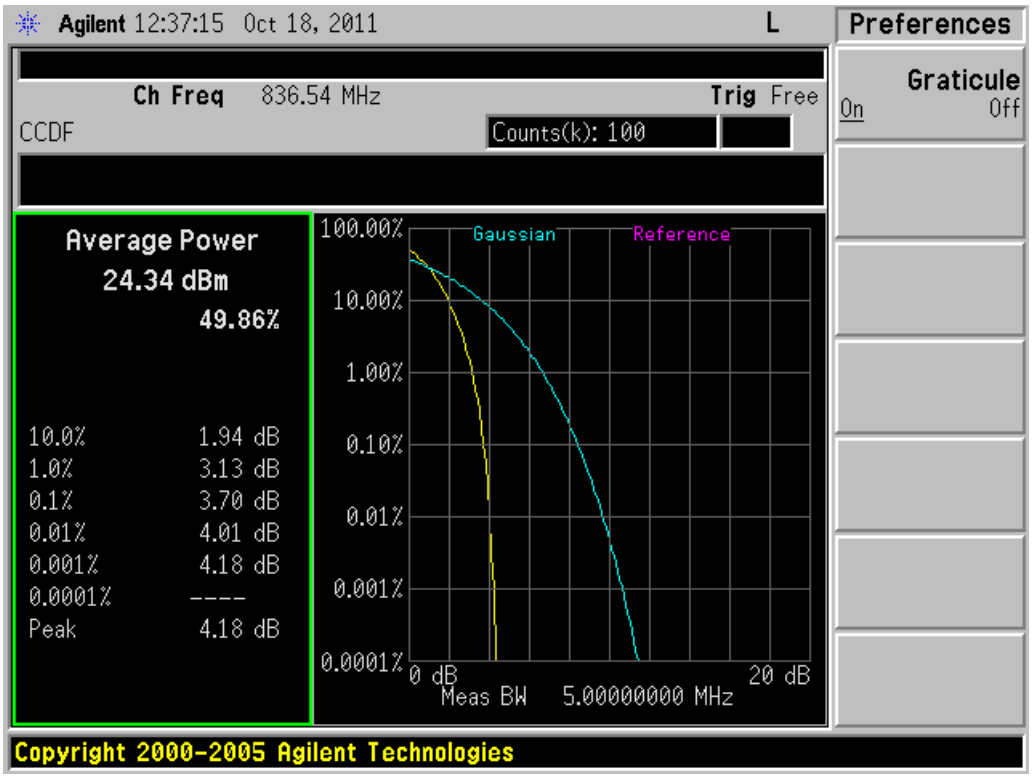
Figure 8-3 BC1 Frequency Stability Graph



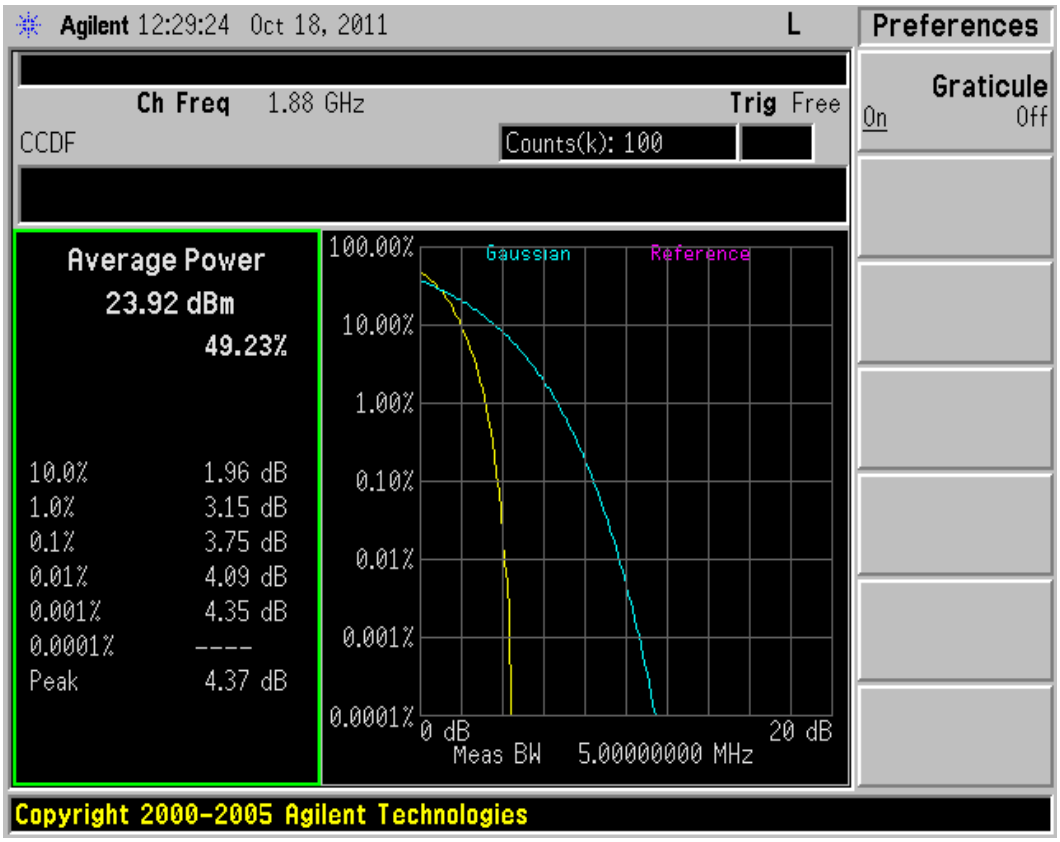
9. CCDF Measurement

The following CCDF measurements were performed in order to determine the peak-to-average ratio of the transmitter signal. The CCDF measurements were performed at midband (channel 384 for band class 0 and channel 600 for band class 1) and the measurements were performed at maximum transmit power.

BC0 Channel 384



BC1 Channel 600



10. Test Equipment and Firmware

The following test equipment was used.

Model	Manufacturer	Description	S/N	Cal Date	Cal Due Date
8960 Series 10 E5515C	Agilent	Wireless Communication Set	K119302	9/14/2010	09/14/2011
E4440A PSA Series	Agilent	Spectrum Analyzer	K159342	10/08/2010	10/08/2011
Model 105	Test Equity	Temperature Chamber	K162535	09/17/2010	09/17/2011

The firmware built in the 8960 and 8820B are as follows, and have been validated to support the testing for all technologies implemented in GOBI2000.

Call Box	Technology	Firmware Rev
8960	EVDO	A.07.21
	1x	B.12.21
	UMTS	A.09.21