TEST REPORT

Report Number: 3123261LEX-001
Project Number: 3123261

Evaluation of the LCT08.2 Module
Model Number: LC82DC0405
FCC ID: LHJLCT8201
Industry Canada ID: 2807E-LCT8201

FCC Part 22 Subpart H
FCC Part 24 Subpart E
RSS-129
RSS-133

For

Continental Automotive Systems

Test Performed by:	Test Authorized by:
Intertek 731 Enterprise Drive Lexington, KY 40510	Continental Automotive Systems 21440 West Lake Cook Road Deer Park, IL 60010

Prepared By:_____**Date:**____5/4/2007_____

Jason Centers, Senior Project Engineer

Approved By:_____**Date:**____5/4/2007_____

Bryan C. Taylor, EMC Team Leader

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1 JOB DESCRIPTION

1.1 Company Information

Company Information	
Manufacturer:	Continental Automotive Systems
Address:	21440 West Lake Cook Road Deer Park IL 60010
Contact Name:	Mark Lachiw
Telephone Number:	(847) 862-1264

1.2 Test Sample Information

The LCT08.2 Module is an in-vehicle monitoring system.

Test sample			
Model Number:	LC82DC0405		
Serial Number:	PE10000045		
FCC ID:	LHJLCT8201		
Device Category:	Mobile		
RF Exposure Category:	General Population/Uncontrolled Environment		
Transmission Modes:	**AMPS**	**CDMA Cell**	**CDMA PCS**
Frequency Range, MHz:	824 MHz-849 MHz	824 MHz-849 MHz	1850 – 1910 MHz
Maximum Conducted RF Output Power:	28.5 dBm	25.33 dBm	25.24 dBm
Antenna Type:	Not Supplied	Not Supplied	Not Supplied
Antenna Location:	Externally Mounted	Externally Mounted	Externally Mounted
Antenna Gain:	2.96 dBd[1]	2.96 dBd[1]	11.53 dBi[1]

[1] The antenna is not supplied with the LCT08.2 Module. The maximum allowed gain of the antenna connected is calculated from the maximum measured conducted output power.

1.3 System Support Equipment

Table 1-1 contains the details of the support equipment associated with the Equipment Under Test during the testing.

Table 1-1: System Support Equipment

Description	Manufacturer	Model Number	Serial Number
Laptop	Compaq	EVO N410c	3902A783
Power Supply	Hewlett Packard	6226B	6M0366

1.4 Cables Used During Testing

Table 1-2 contains the details of the cables used during the testing.

Table 1-2: Interconnecting Cables Used During Testing

Cables					
Description	Length	Shielding	Ferrites	Connection	
				From	To
Multi-Conductor Wiring Harness (Data/Audio)	1.2m	Yes	No	EUT	Laptop/Test Equipment
Twisted Pair – DC Power	1.2m	No	No	EUT	DC Power Supply
Twisted Pair – RS232 Signal	1.2m	No	No	EUT	Laptop
Colman Cable 50 Ohm Coax (M17/28 RG058)	1m	Yes	No	EUT	Base Station Simulator
Colman Cable 50 Ohm Coax (M17/28 RG058)	1m	Yes	No	EUT	Resistive Termination

1.5 System Block Diagram(s)

The diagrams below detail the interconnection of the EUT and its accessories during the testing.

Figure 1-1: Radiated Test Configuration

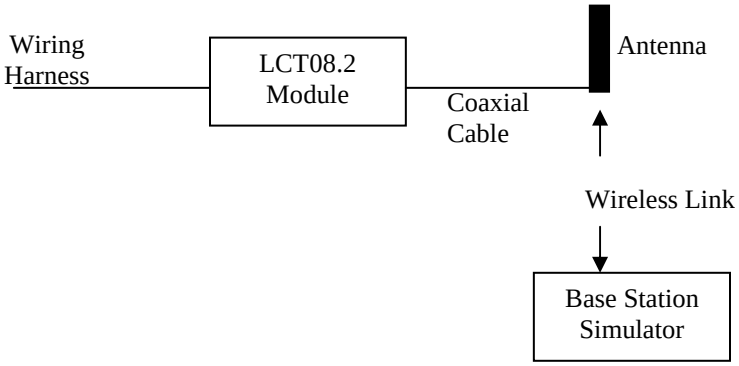
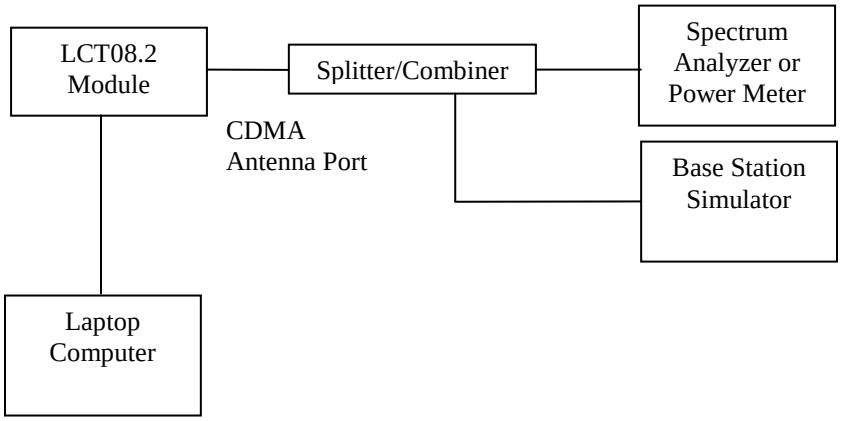


Figure 1-2: Conducted Test Configuration



1.6 Mode(s) of operation / Engineering Judgments

The LCT08.2 Module was powered by a 13VDC laboratory power supply.

The LCT08.2 Module comes equipped with a CDMA antenna port (SMA connector) and a removable CDMA antenna. For radiated testing, the CDMA antenna was connected to the LCT08.2 Module. For conducted measurements the antenna was removed and a calibrated coaxial cable inserted between the CDMA port and the measuring equipment (spectrum analyzer or power meter). A base station simulator was used to force the LCT08.2 Module to transmit at maximum output power.

2 EXECUTIVE SUMMARY

Testing performed for: Continental Automotive Systems

Equipment Under Test: LC82DC0405

Receipt of Test Sample: 4/23/2007

Test Start Date: 4/25/2007

Test End Date: 5/2/2007

The LC82DC0405 was compliant with the requirements of FCC Part §22, Part §24, RSS-129, and RSS-133.

FCC RULE	IC RULE	DESCRIPTION OF TEST	RESULT	PAGE
§2.1046	RSS-129 (9.2.2)	RF Power Output	**Compliant**	9
§22.913, §24.232	RSS-129 (9.1) RSS-133 (6.4)	ERP, EIRP	**Compliant**	10
§ 1.1310	NA	Maximum Permissable Exposure (MPE) Calculations	**Compliant**	11
§2.1049 §22.917(b)(d) §24.238(a)	NA	Occupied Bandwidth, Emissions Limitations	**Compliant**	12
§2.1051 §22.917(a) §24.238(a)	RSS-129 (8.1.1) RSS-133 (6.5.1)	Out of Band Emissions at Antenna Terminals	**Compliant**	17
§2.1053 §22.917(a) §24.238(a)	RSS-129 (8.1.1) RSS-133 (6.5.1)	Field Strength of Spurious Radiation	**Compliant**	23
§2.1047	RSS-129 (6.1) RSS-129 (6.2) RSS-129 (6.3)	Modulation Limiting, Tx Audio Frequency Response, Sideband Power Attenuation	**Compliant**	29
§15.107	RSS-Gen [7.2.2]	Power Line Conducted Emissions	**NA**[2]	-
§15.109	RSS-129 (10) RSS-133 (6.7)	Receiver Spurious Emission	**Compliant**	36
§2.1055, §22.355, §24.235	RSS-129 (9.2.1) RSS-133 (6.3)	Frequency Stability vs. Temperature	**Compliant**	38
§2.1055, §22.355, §24.235	RSS-129 (9.2.1) RSS-133 (6.3)	Frequency Stability vs. Voltage	**Compliant**	39

2.1 Modifications required for compliance

No modifications were implemented by Intertek. All results in this report pertain to the un-modified sample provided to Intertek.

[2] The LCT08.2 Module is DC powered.

3 TEST FACILITY

All testing was completed at the INTERTEK-Lexington location at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1: 1993 and ANSI C63.4: 1992. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters.

For radiated immunity testing, removable ferrite tiles are positioned between the transmitting antenna and the area occupied by the equipment under test. The remaining tests typically are performed outside the chamber on the conducting ground reference plane.

The Industry Canada filing number for this site is 2055A-1. The FCC registration number is 485103. The VCCI registration numbers are R-2056, C-2214, and T-195.

3.1 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Environmental Chamber	Thermotron	SM-8C	32692	1/24/2008
Signal Generator	HP	83620B	3614A00199	8/15/2007
Horn Antenna	EMCO	3115	6556	7/28/2007
Horn Antenna	Antenna Research	DRG-118/A	1086	7/20/2007
EMI Receiver	Rohde & Schwarz	ESI 26	1088.7490	9/6/2007
Bilog Antenna	EMCO	3142C	00051864	11/14/2007
Preamplifier	Miteq	AFS44-00102000-30-10P-44	987410	6/15/2007
Digital Multimeter	Fluke	87	1280	3/18/2008
Base Station Simulator	Rhode & Schwarz	CMU200	1100.0008.02	3/29/2008
Base Station Simulator	HP	8920B	US37423763	3/13/2008
Function Generator	HP	3325B	2801A0216	2/21/2008
Modulator Analyzer	HP	8901B	2142A01663	3/22/2008

4 CONDUCTED RF POWER

FCC Rule: §2.1046

IC Rule: RSS-129 §7.1, §9.1 and RSS-133 §6.2

4.1 Test Procedure

The transmitter output was connected to a calibrated coaxial cable, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The EUT was placed into a call and the transmitter output was read off the base station simulator in dBm. The power output at the transmitter antenna port was determined by adding the value of the cable insertion loss to the base station simulator power reading.

Tests were performed at three frequencies (low, middle, and high channels) and on the highest power levels, which can be setup on the transmitters.

4.2 Test Results

The LCT08.2 Module met the RF power output requirements of FCC Part 22 Subpart H and FCC Part FCC Part 24 Subpart E. The test results are shown Table 4-1.

Table 4-1 RF Power Variation with Temperature

	CDMA Cell Band			**CDMA PCS Band**			**AMPS**		
Temp	**Channel 1013**	**Channel 384**	**Channel 777**	**Channel 25**	**Channel 600**	**Channel 1175**	**Channel 991**	**Channel 384**	**Channel 799**
-30	24.72	24.89	**25.33**	24.79	24.67	24.94	28.1	27.9	27.7
-20	24.87	24.87	25.06	24.76	24.5	24.67	28.1	28	27.8
-10	24.85	25.08	24.99	24.9	24.92	24.94	28.2	28.1	27.9
0	24.96	24.94	24.64	24.95	24.92	24.86	28.3	28.2	28.1
10	24.99	25.06	24.72	25.1	25.04	25.01	28.4	28.2	28.1
20	25.11	25.04	24.89	25.17	25.18	25.01	28.3	28.3	28.1
30	25.19	25.2	24.83	25.23	25.07	25.05	**28.5**	28.4	28.2
40	25.18	**25.22**	24.94	**25.24**	**25.19**	**25.08**	28.5	28.3	28.1
50	**25.26**	25.2	24.87	25.23	24.84	24.79	28.5	28.4	28.2
60	24.76	25.09	24.72	24.79	24.54	24.27	28.3	**28.5**	**28.3**

5 RADIATED RF POWER

FCC Rule §22.913: The Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

FCC Rule §24.232; RSS-133 §6.2: The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

RSS-129 §7.1, §9.1

5.1 Test Procedure

Since the device is not supplied with an antenna, the maximum allowed antenna gain is calculated using the maximum measured conducted output power.

Gain (dBd) = ERP - Conducted Output Power (dBm)

Gain (dBd) = 31.46 dBm – 28.5dBm = 2.96 dBd

Gain (dBi) = EIRP - Conducted Output Power (dBm)

Gain (dBi) = 36.77 dBm – 25.24dBm = 11.53 dBi

5.2 Test Results

The LCT08.2 Module meets the radiated power requirements of FCC §22.913 and §24.232 when an antenna of no more than 2.96 dBd of gain in the cell band and no more than 11.53 dBi of gain in the pcs band is used.

6 MAXIMUM PERMISSIBLE EXPOSURE (MPE) CALCULATIONS

The § 1.1310 Radiofrequency radiation exposure limits are listed in the table below.

	Frequency Range (MHz)	Power Density Limit (mW/cm^2)
Limits for Occupational/Controlled Exposures	0.3-3.0	100
	3.0-30	900/ Frequency2
	30-300	1.0
	300-1500	Frequency/300
	1500-100,000	5.0
Limits for General Population/Uncontrolled Exposure	0.3-1.34	100
	1.34-30	180/Frequency2
	30-300	0.2
	300-1500	Frequency/1500
	1500-100,000	1.0

6.1 Calculations

The radiated RF power (calculated using the stated antenna gain and the measured conducted output power) was used to calculate the maximum RF exposure at a 20 cm distance using the formula:

$$\text{Maximum RF Exposure at 20cm} = (\text{EIRP in mW})/(4\text{Pi}(20\text{cm})^2)$$

Cell Band:

The maximum measured EIRP for the cell band was 33.61 dBm.

Substituting this into the equation above, we get a Maximum RF Exposure (MPE) at 20cm of:

$$\text{MPE at 20cm} = 2296.15\ \text{mW} / (4\text{Pi}(20\text{cm})^2)$$

$$\text{MPE at 20cm} = 0.4568\ \text{mW/cm}^2$$

PCS Band:

The maximum measured EIRP for the PCS band was 36.77 dBm.

Substituting this into the equation above, we get a Maximum RF Exposure (MPE) at 20cm of:

$$\text{MPE at 20cm} = 4753.35\text{mW} / (4\text{Pi}(20\text{cm})^2)$$

$$\text{MPE at 20cm} = 0.9457\ \text{mW/cm}^2$$

6.2 Test Results

The worst case MPE at 20cm of 0.4568 mW/cm^2 is less than the 0.55 mW/cm^2 limit for general population/uncontrolled exposure shown in the table above for the cell band. For the PCS band, the worst case MPE at 20cm of 0.9457 mW/cm^2 is less than the 1 mW/cm^2 limit.

7 EMISSION LIMITATIONS, OCCUPIED BANDWIDTH

CFR 47 §2.1049: The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

RSS-129 (6.3.2)

7.1 Test Procedure

In both CDMA 800 and 1900 modes the antenna port of the EUT was connected to a spectrum analyzer using a calibrated coaxial cable and power divider. The EUT was placed into a call using base station simulator. The base station simulator was set to force the EUT to its maximum power setting. The occupied bandwidth function of the analyzer was used to automatically generate the occupied bandwidth plots below.

7.2 Test Results

The following is the occupied bandwidth data for the LCT08.2 Module .

Table 7-1: Occupied bandwidth measurements for CDMA modes

Mode	Channel	Resolution Bandwidth	Video Bandwidth	Sweep time	Measured Bandwidth (MHz)
CDMA800	1013	30 kHz	100 kHz	20s	1.281
CDMA800	384	30 kHz	100 kHz	20s	1.281
CDMA800	777	30 kHz	100 kHz	20s	1.275
CDMA1900	25	30 kHz	100 kHz	20s	1.281
CDMA1900	600	30 kHz	100 kHz	20s	1.281
CDMA1900	1175	30 kHz	100 kHz	20s	1.281

Figure 7-1: Occupied Bandwidth – Cell Channel 1013

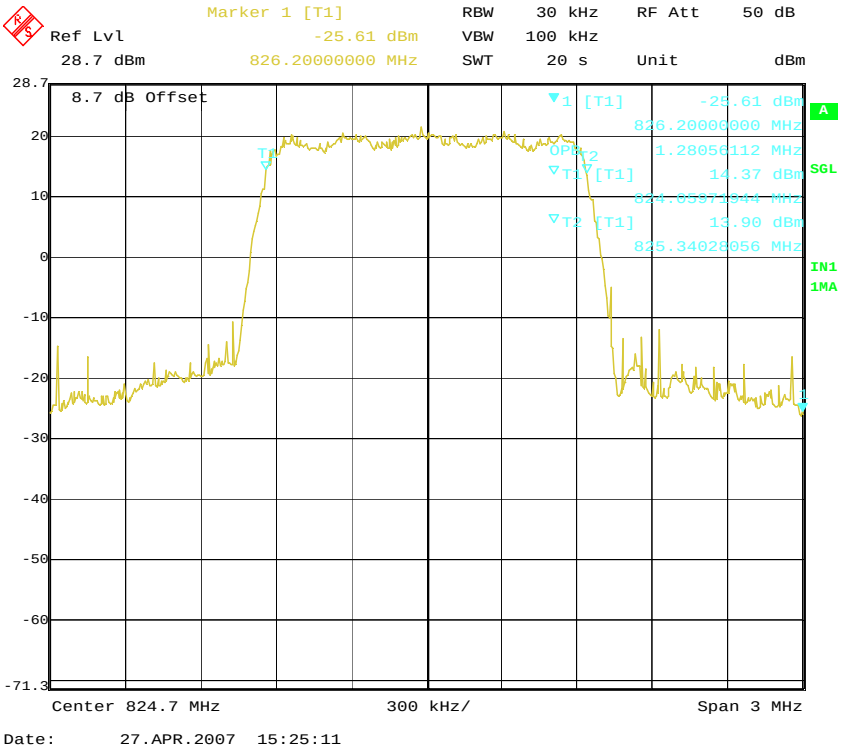


Figure 7-2: Occupied Bandwidth – Cell Channel 384

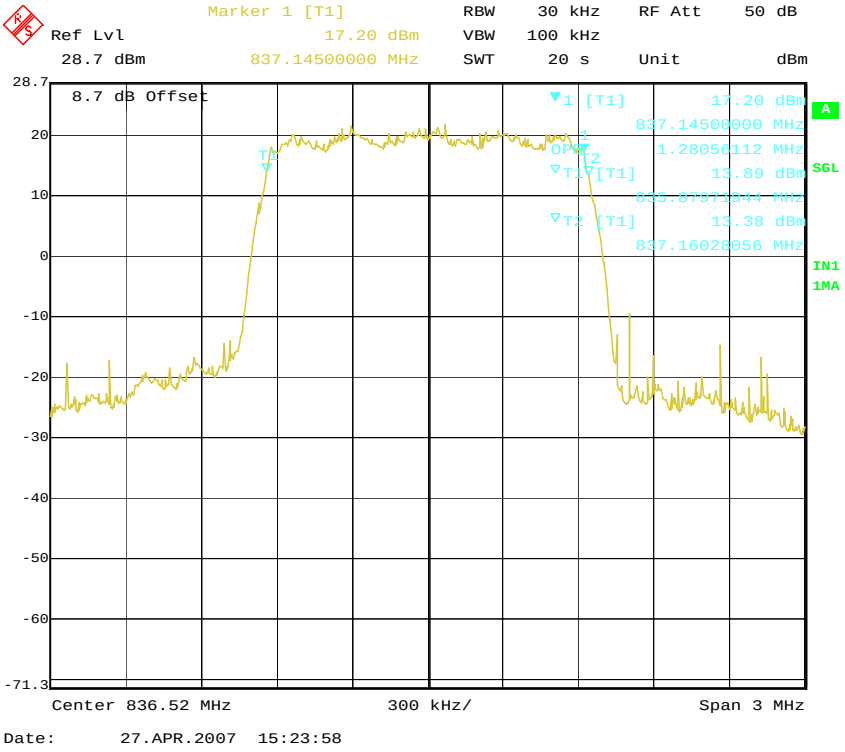


Figure 7-3: Occupied Bandwidth – Cell Channel 777

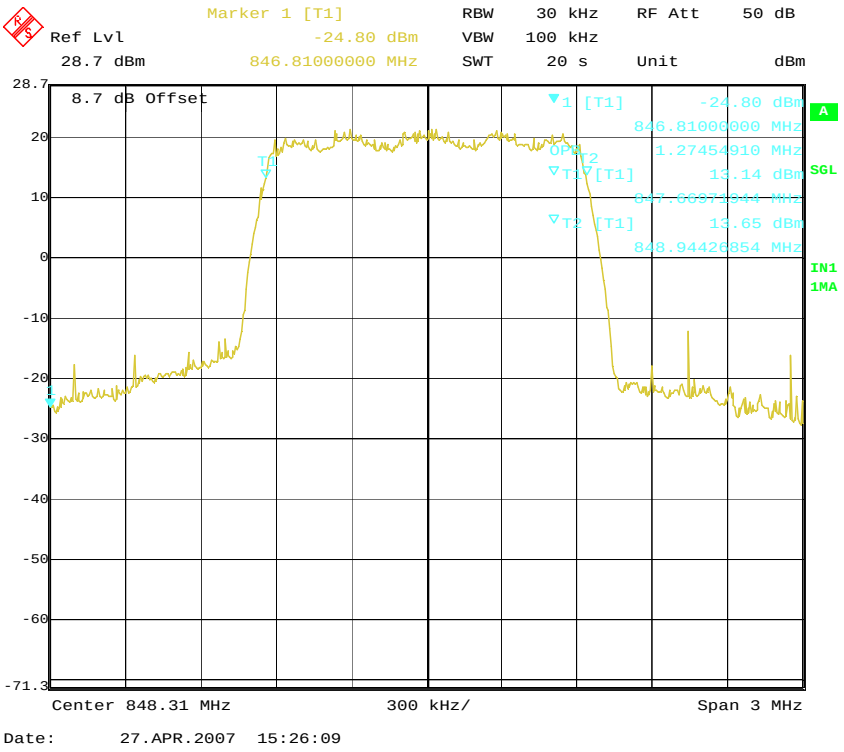


Figure 7-4: Occupied Bandwidth – PCS Channel 25

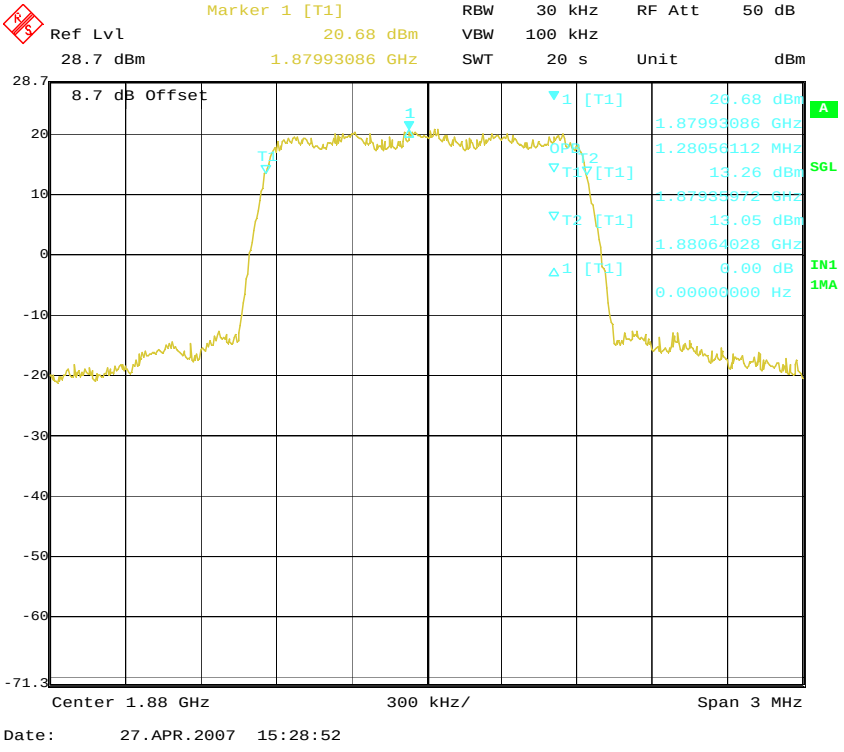


Figure 7-5: Occupied Bandwidth – PCS Channel 600

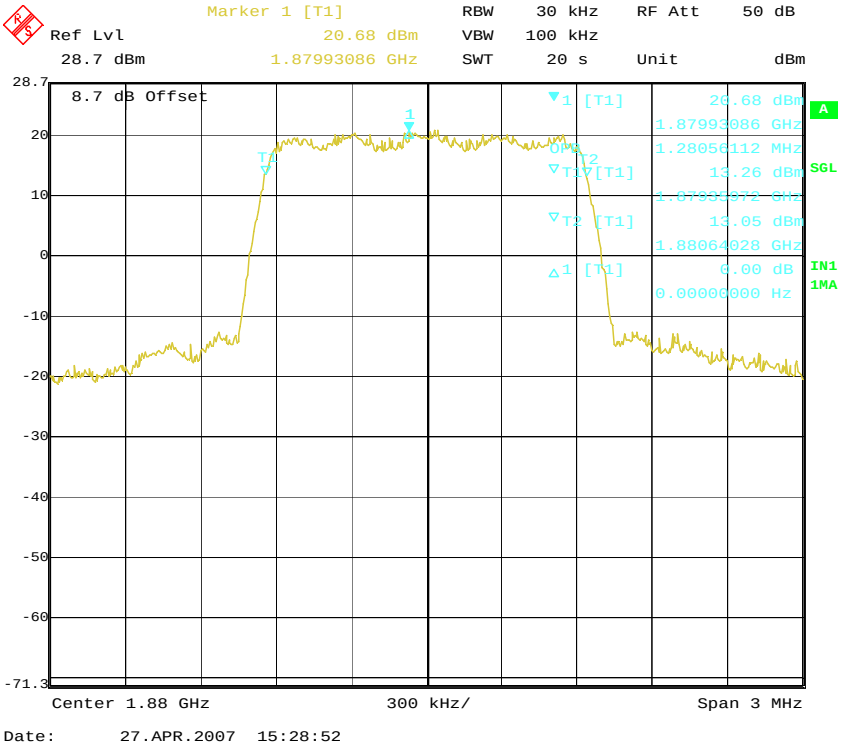
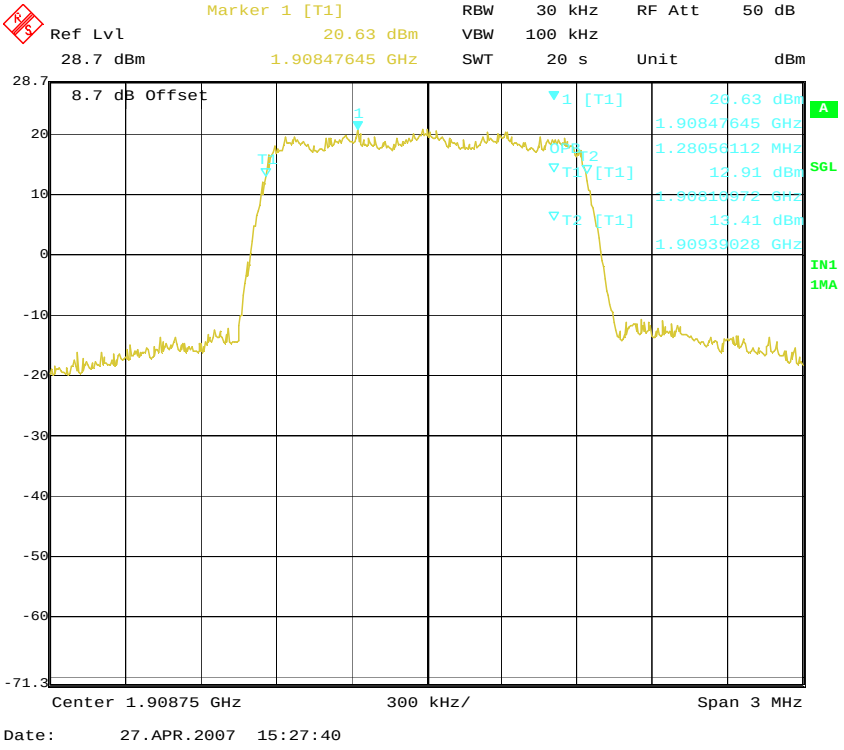


Figure 7-6: Occupied Bandwidth – PCS Channel 1175



8 OUT OF BAND EMISSION AT ANTENNA TERMINALS

FCC §2.1049, FCC §2.1051, §22.917(a), FCC §24.238(a)

RSS-129 §6.3, §7.2.2, §8.1.1, §10

RSS-133 §6.3

Out of Band Emissions: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

8.1 Test Procedure

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for the Cellular band and 1 MHz or greater in the PCS band. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The Base Station Simulator was set to force the EUT to its maximum power setting. The resolution bandwidth of the spectrum analyzer was set at 1 MHz. Sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

8.2 Test Results

The LCT08.2 Module met the out of band emission at antenna terminal requirements.

Table 8-1: Summary of test result locations

Location	Mode (Band)	Channel	Description
Figure 8-1	AMPS	381, 799, 991	Conducted spurious emissions, 30MHz to 20 GHz
Figure 8-2	AMPS	381, 799, 991	Zoom Graph of the Carrier Frequencies
Figure *8-3*	CDMA Cell	384, 777, 1013	Conducted spurious emissions, 30MHz to 20 GHz
Figure 8-4	CDMA Cell	384, 777, 1013	Zoom Graph of the Carrier Frequencies
Figure *8-5*	CDMA PCS	25, 600, 1175	Conducted spurious emissions, 30MHz to 20 GHz
Figure 8-6	CDMA PCS	25, 600, 1175	Zoom Graph of the Carrier Frequencies
Figure *8-7*	CDMA Cell	1013	Emissions within 1 MHz of band edge
Figure 8-8	CDMA Cell	777	Emissions within 1 MHz of band edge
Figure *8-9*	CDMA PCS	25	Emissions within 1 MHz of band edge
Figure 8-10	CDMA PCS	1175	Emissions within 1 MHz of band edge

Table 8-2: Spurious Emissions at Antenna Terminals

EUT Mode	TX Channel	Spurious Emission Frequency (GHz)	Device Reading (dBm)	Cable Loss (dB)	Conducted Power (dBm)	Limit (dBm)	Margin (dB)
CDMA Cell	777	1.69653	-37.64	8.7	-28.94	-13	-15.94
AMPS	991	1.648	-42.39	8.7	-33.69	-13	-20.69
AMPS	991	1.673	-36.6	8.7	-27.9	-13	-14.9
AMPS	991	1.698	-31.4	8.7	-22.7	-13	-9.7

Figure 8-1: Out of band emissions at antenna terminals – AMPS Channel 384, 799, and 991

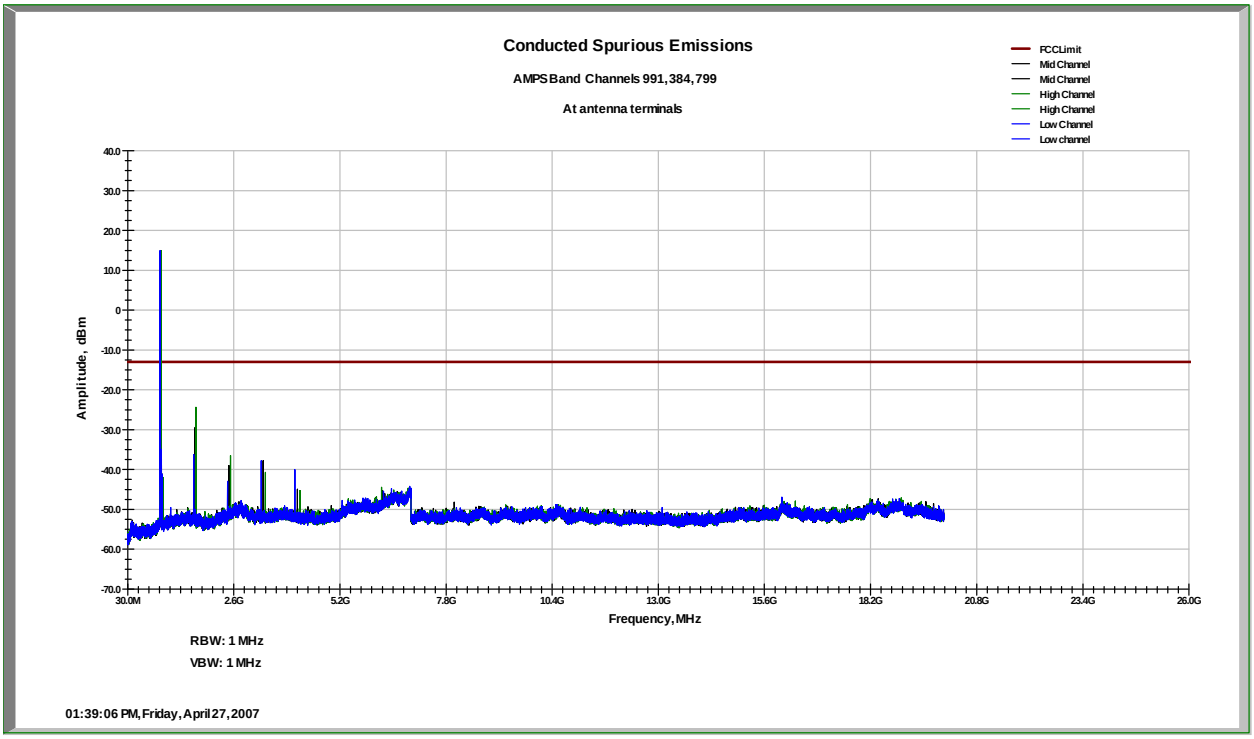


Figure 8-2: Out of band emissions at antenna terminals – AMPS Channel 384, 799, and 991 (Zoomed Around Carrier Frequencies)

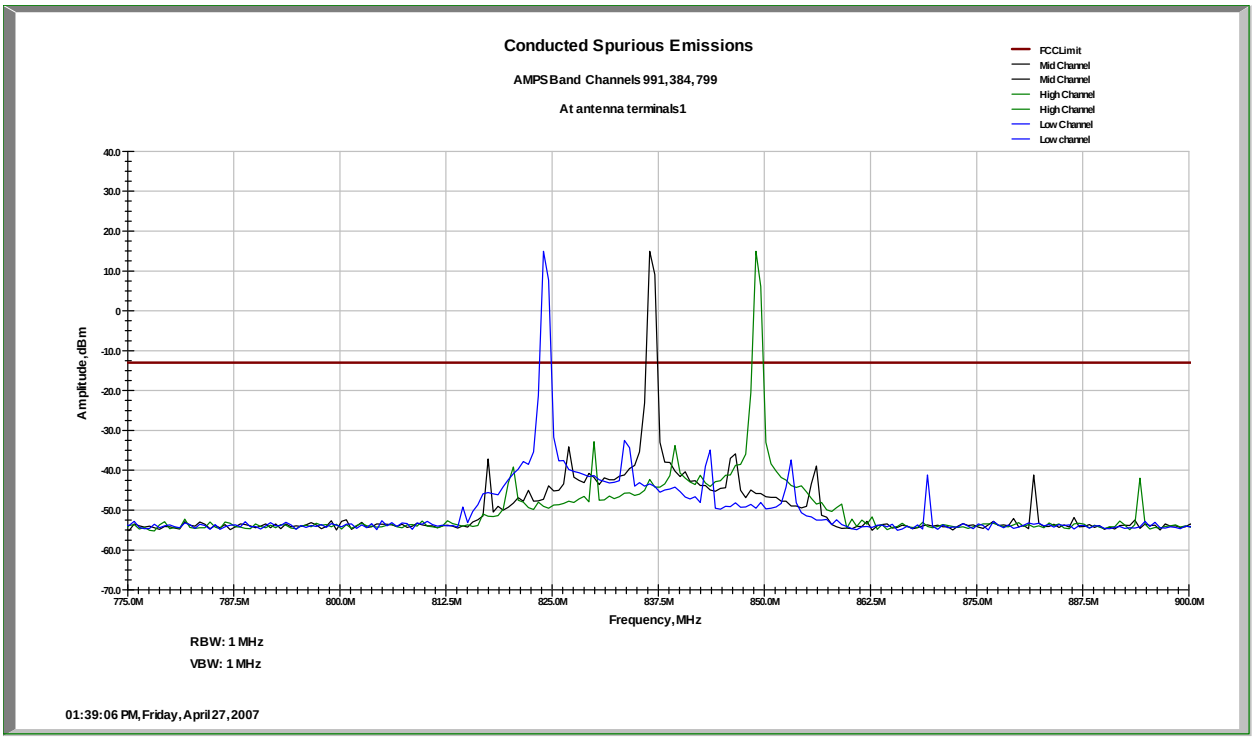


Figure 8-3: Out of band emissions at antenna terminals – CDMA 800 Channel 384, 777, and 1013

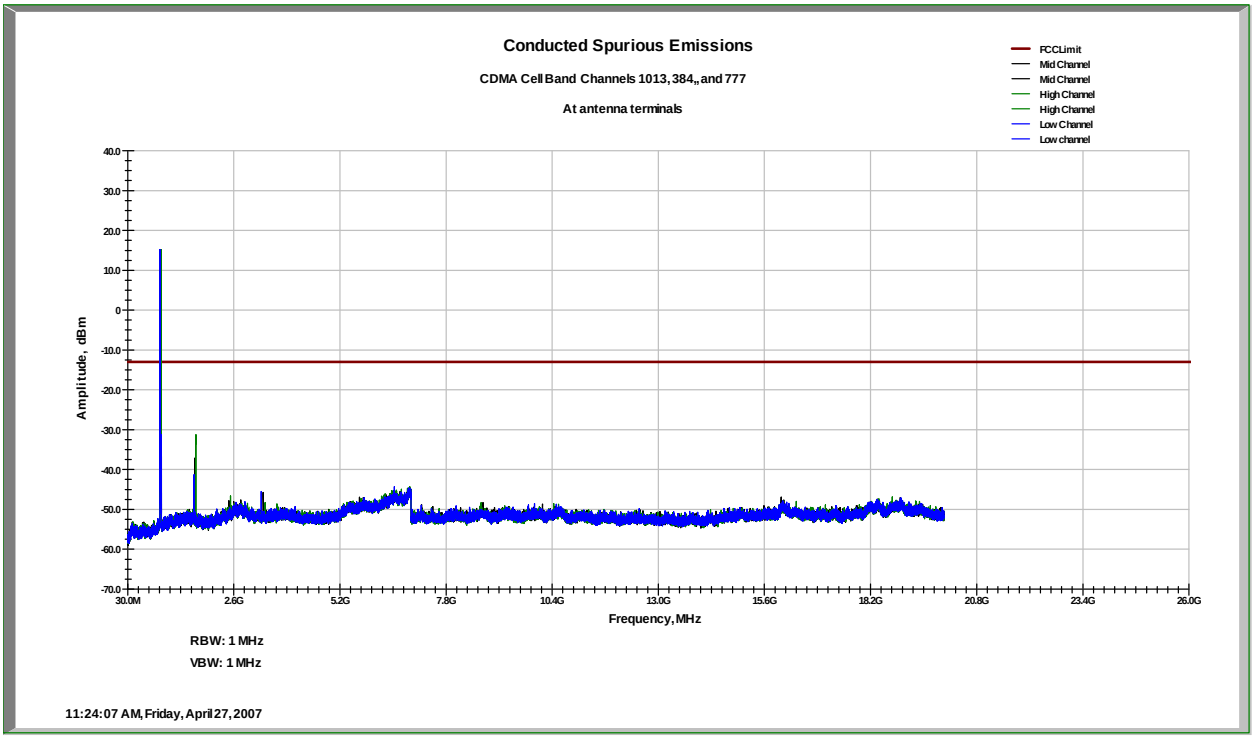


Figure 8-4: Out of band emissions at antenna terminals – CDMA 800 Channel 384, 777, and 1013 (Zoomed Around Carrier Frequencies)

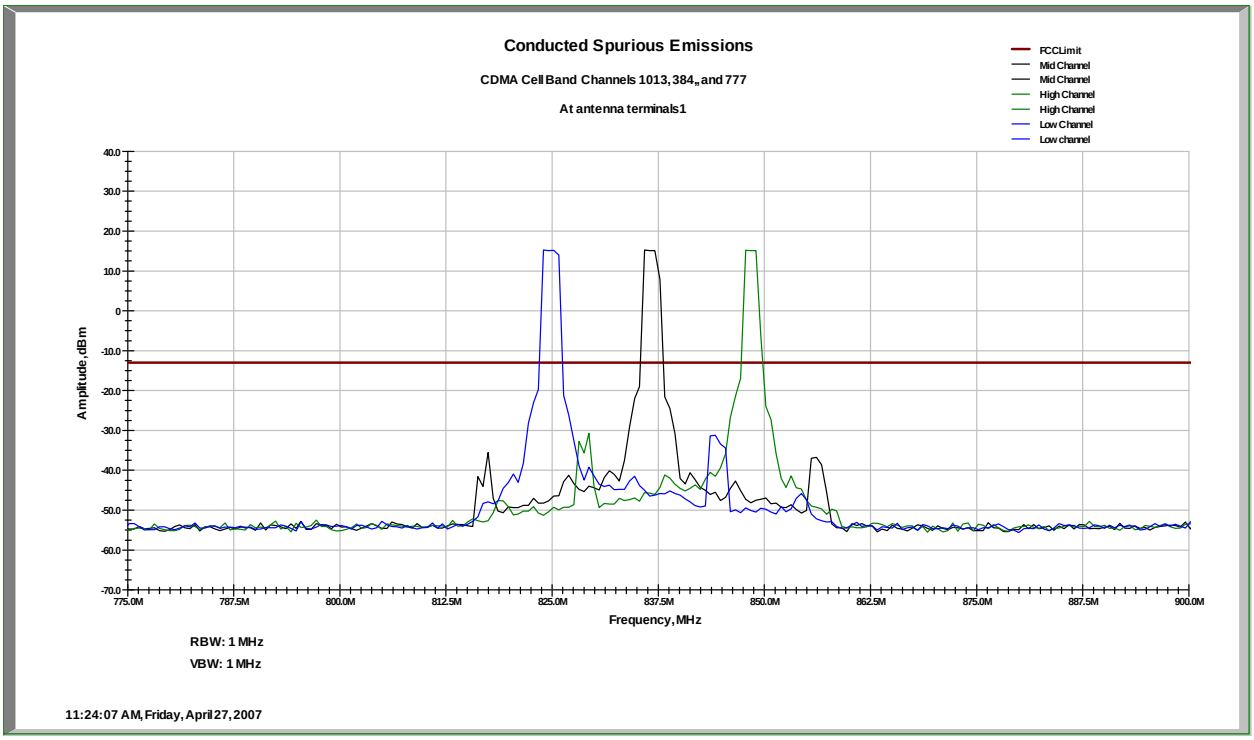


Figure 8-5: Out of band emissions at antenna terminals – CDMA1900 Channel 25, 600, 1175

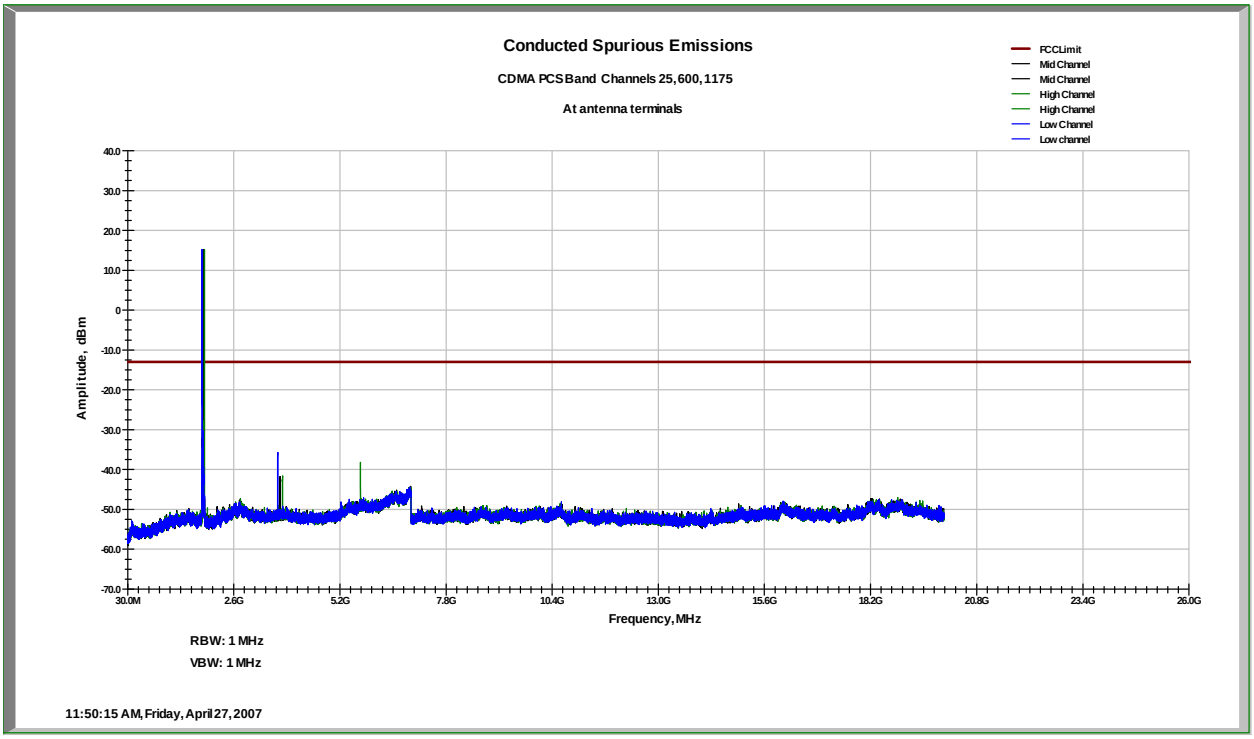


Figure 8-6: Out of band emissions at antenna terminals – CDMA1900 Channel 25, 600, 1175 (Zoomed In on Carrier Frequencies)

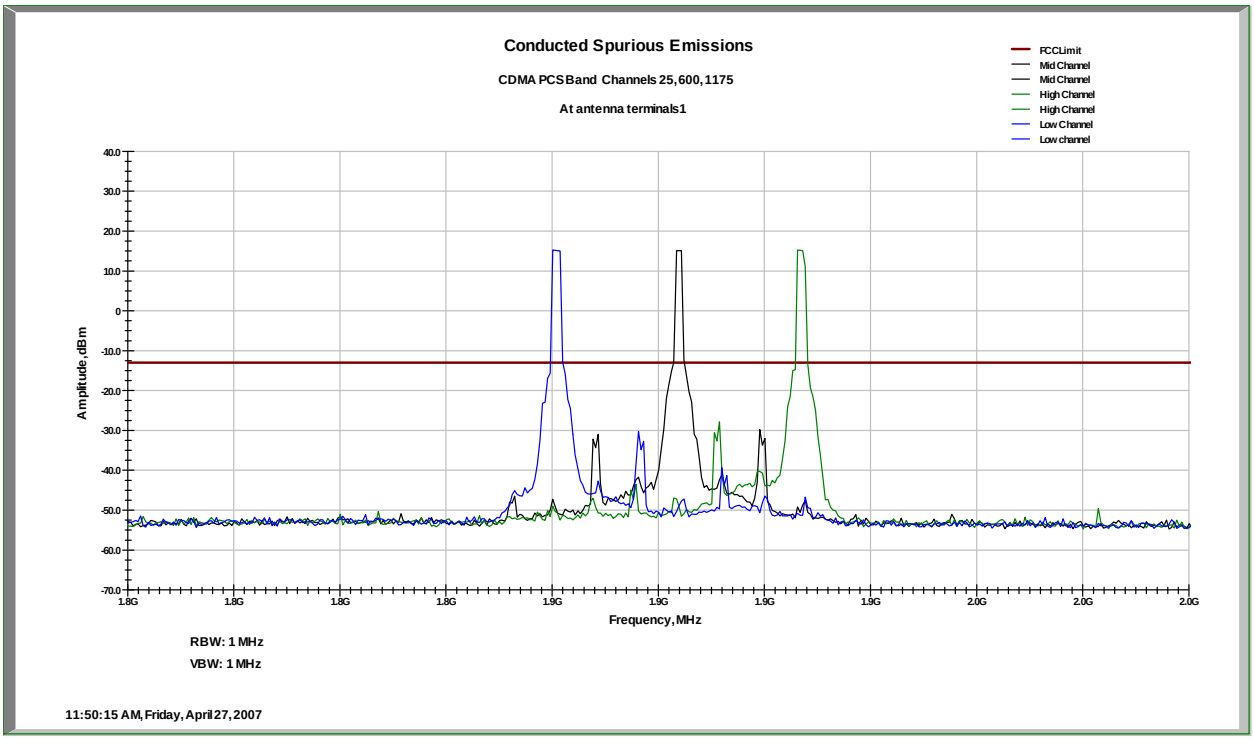


Figure 8-7: Emissions within 1 MHz of band edge, CDMA 800 Channel 1013

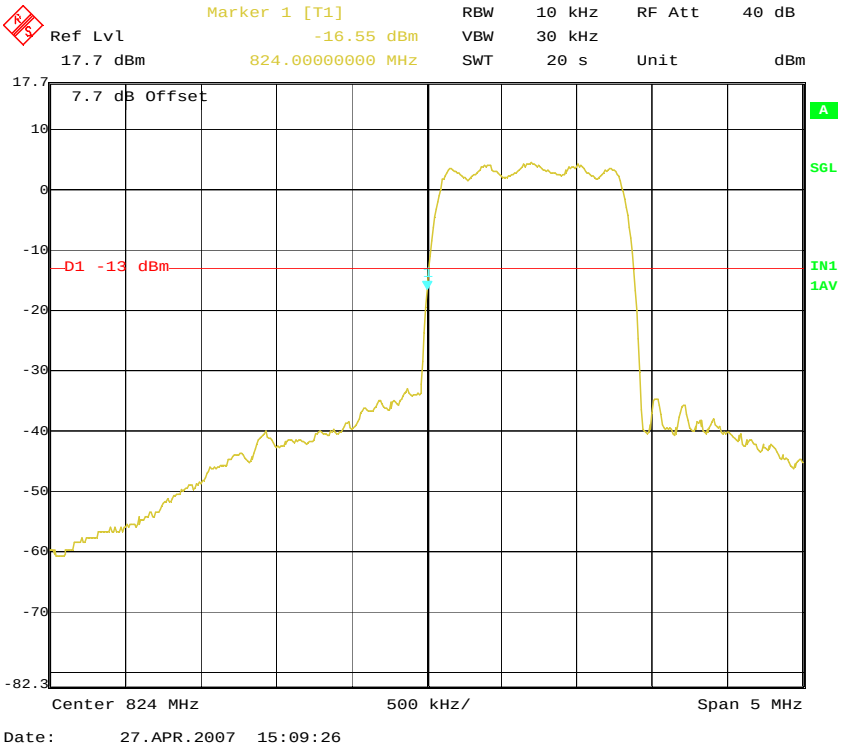


Figure 8-8: Emissions within 1 MHz of band edge, CDMA 800 Channel 777

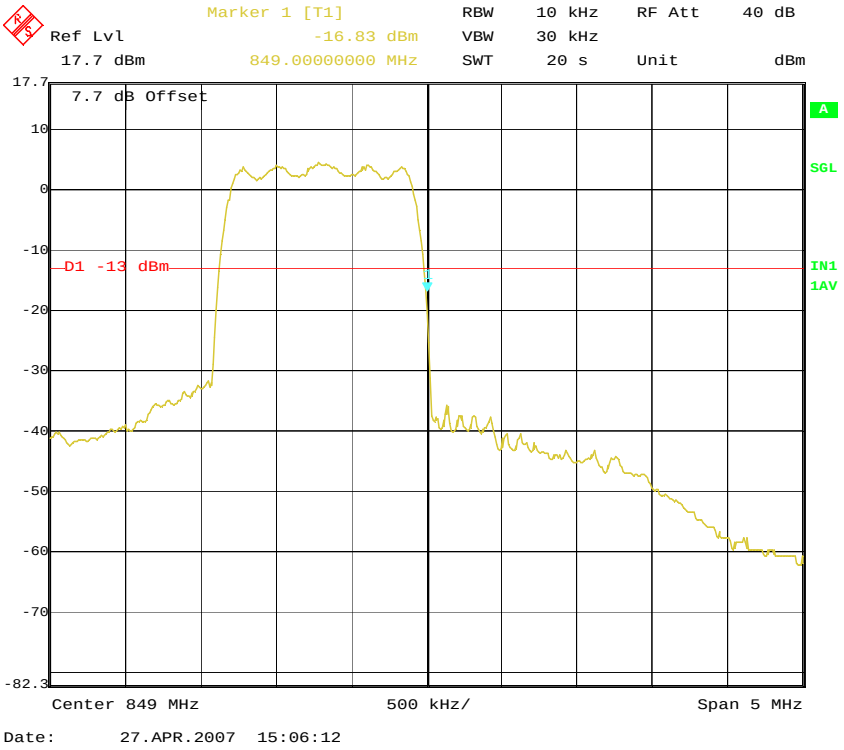


Figure 8-9: Emissions within 1 MHz of band edge, CDMA 1900 Channel 25

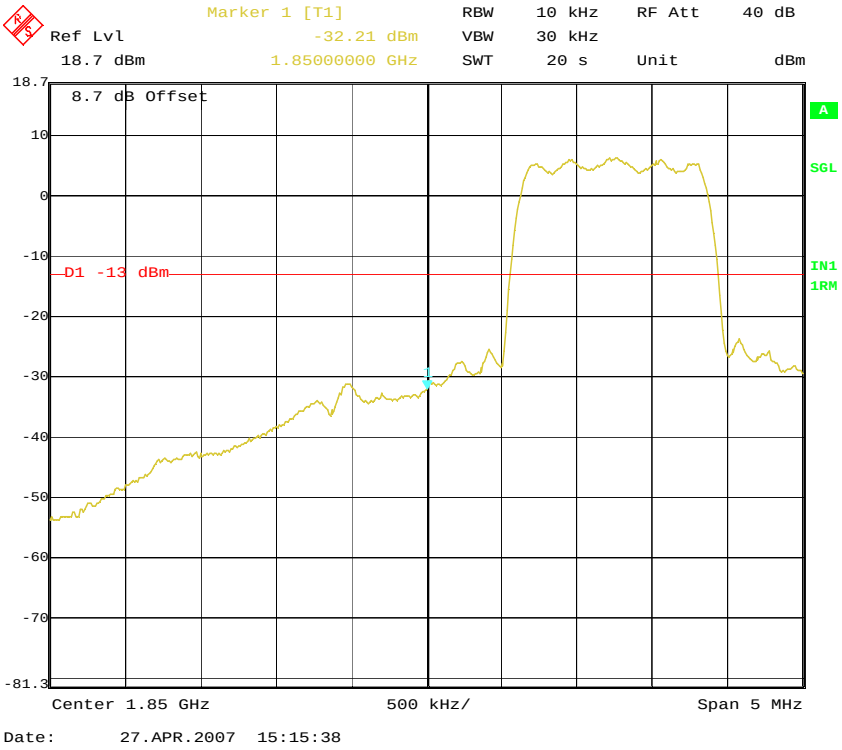
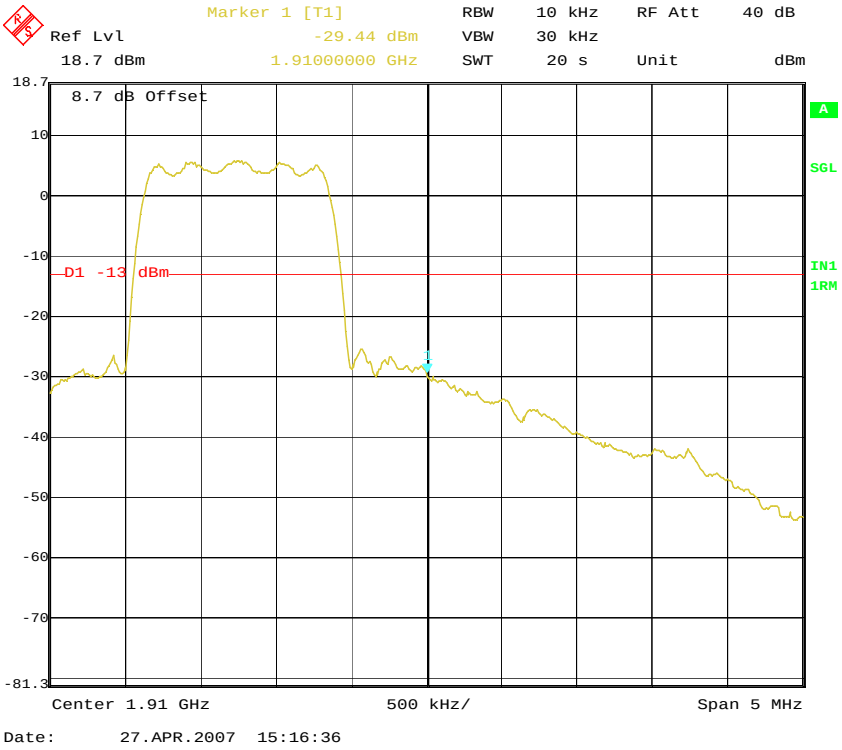


Figure 8-10: Emissions within 1 MHz of band edge, CDMA 1900 Channel 1175



9 FIELD STRENGTH OF SPURIOUS RADIATION

FCC §2.1053

RSS-129 §8.1

9.1 Test Procedure

The EUT was placed on a non-conductive turntable. The measurement antenna was placed at a distance of 3 meters from the EUT. The Base Station Simulator was set to force the EUT to its maximum power setting. During the tests, the antenna height and EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle, and high channels) in each operating band. Once spurious emissions were identified, the power of the emission was determined using the substitution method described in TIA-603-B section 2.2.12 (Radiated Spurious Emissions).

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and at the spurious emissions frequency.

9.2 Test Results

The LCT08.2 Module met the field strength of spurious radiation requirements of FCC §2.1053. See Figure 9-1 through Figure 9-9 for the graphical test data.

Table 9-1: Spurious Emissions

EUT Mode	TX Channel	Polarity	Spurious Emission Frequency	Device Reading (dBuV)	Signal Generator Output (dBm)	Cable Loss (dB)	Tx Antenna Gain (dBi)	Tx Antenna Gain (dBd)	Radiated Power (dBm)	Limit (dBm)	Margin (dB)
CDMA PCS	25	V	3.7025	54.12	-46	5.6	10	7.86	-43.74	-13	-30.74
AMPS	799	V	3.3959	49.69	-52.8	5.4	9.2	7.06	-51.14	-13	-38.14
AMPS	799	V	1.6979	33.43	-35.6	3.8	8.4	6.26	-33.14	-13	-20.14
AMPS	384	V	3.346	49.24	-52.6	5.3	5.4	3.26	-54.64	-13	-41.64
AMPS	991	V	3.296	50.39	-51.3	5.2	5.4	3.26	-53.24	-13	-40.24
AMPS	991	V	4.1202	47.63	-55.1	6	11.2	9.06	-52.04	-13	-39.04

Figure 9-1: Field Strength of Spurious Radiation (30 MHz – 20 GHz), AMPS Channel 991

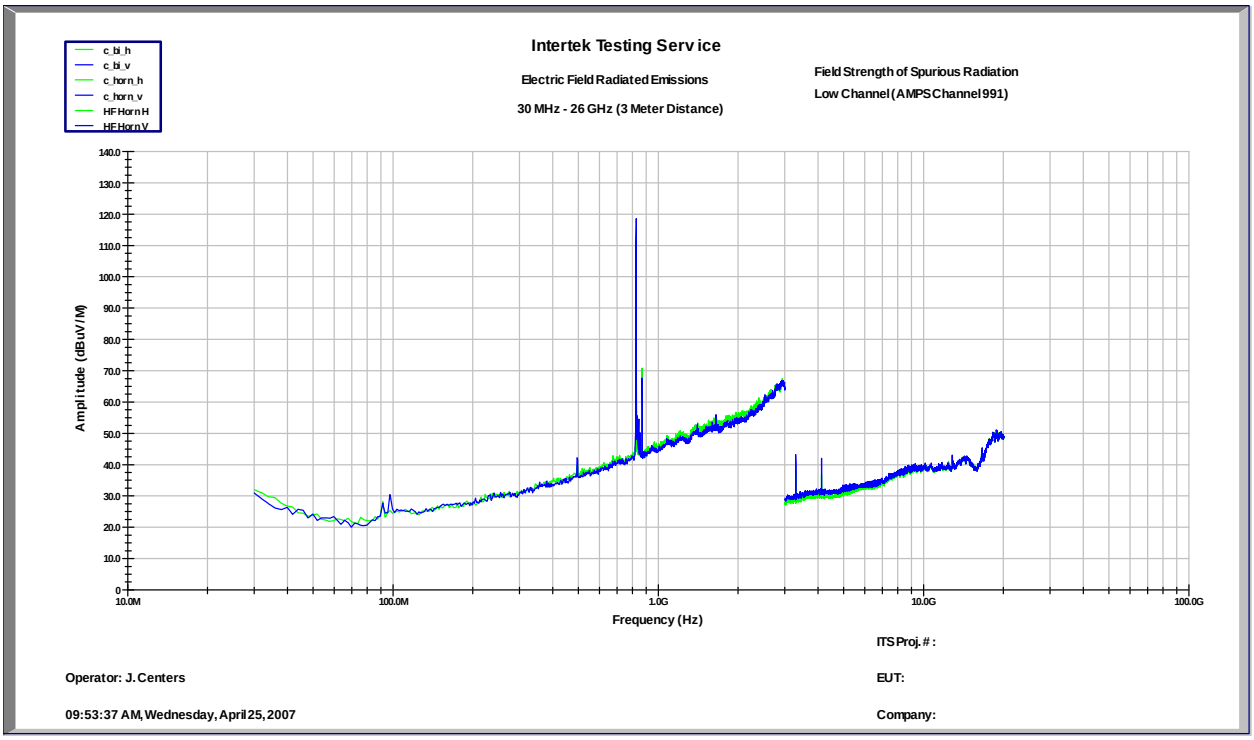


Figure 9-2: Field Strength of Spurious Radiation (30 MHz – 20 GHz), AMPS Channel 384

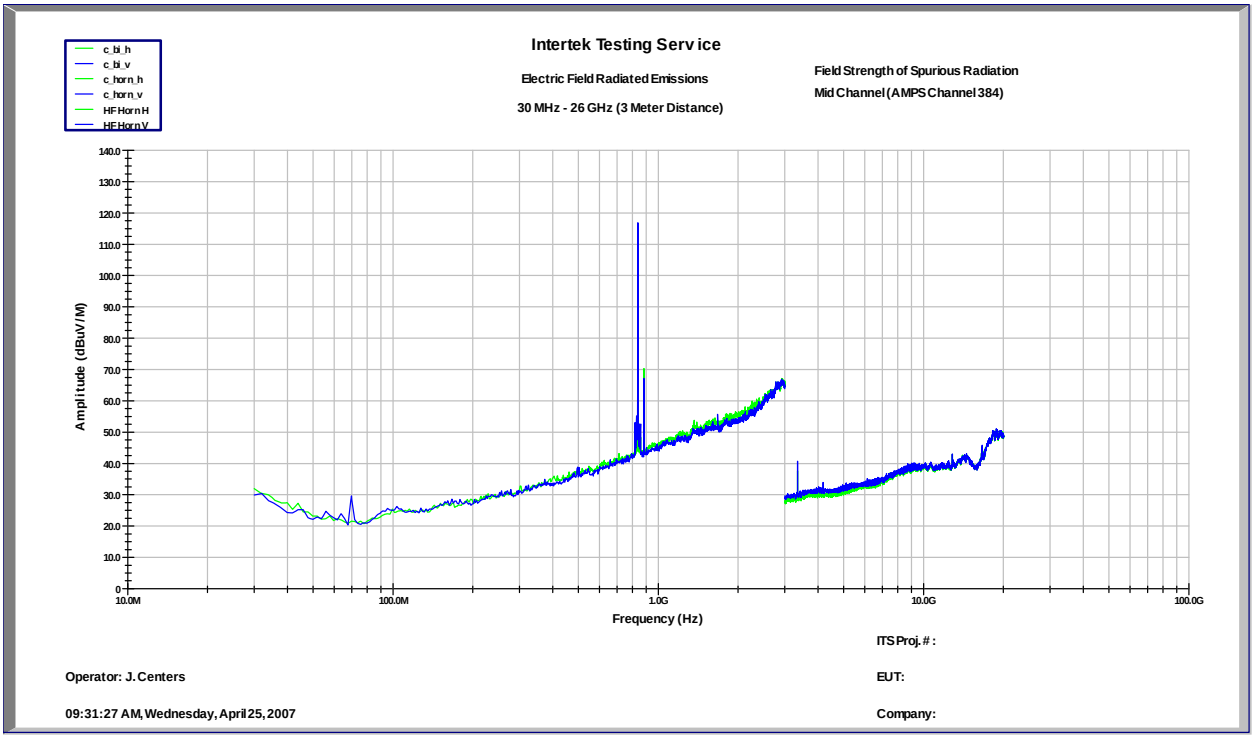


Figure 9-3: Field Strength of Spurious Radiation (30 MHz – 20 GHz), AMPS Channel 799

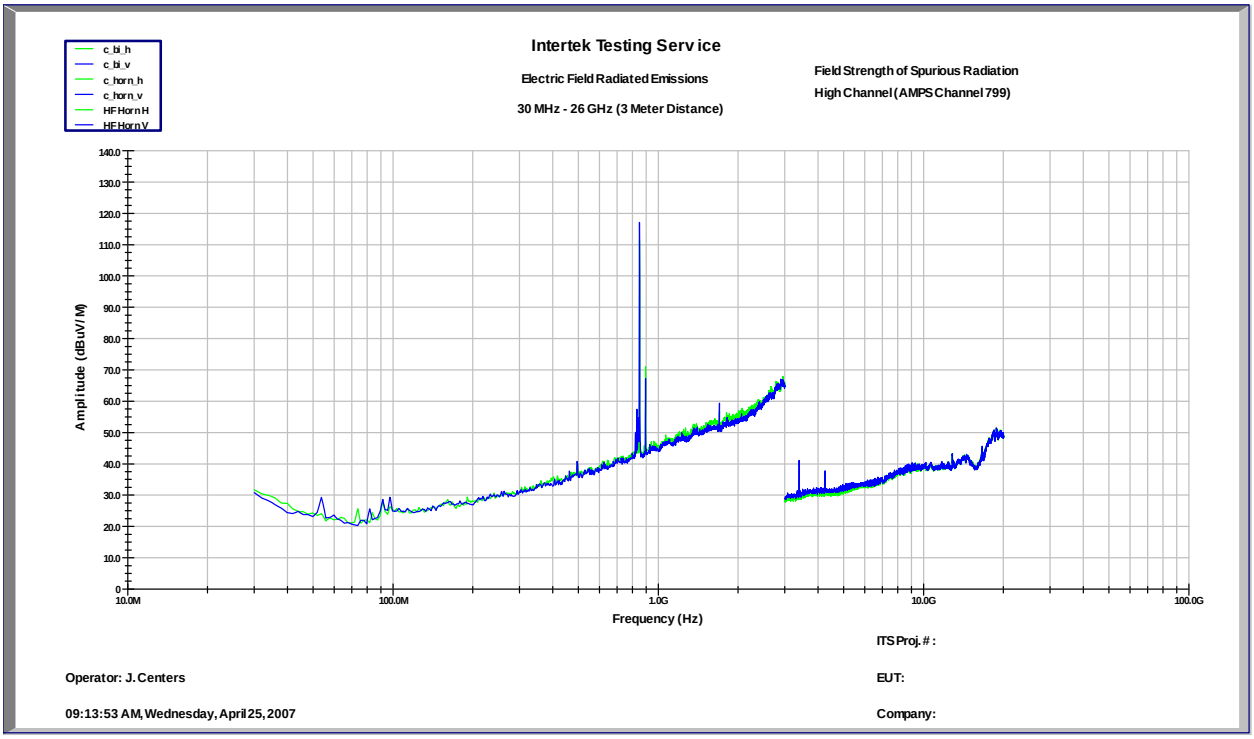


Figure 9-4: Field Strength of Spurious Radiation (30 MHz – 20 GHz), CDMA Cell Channel 1013

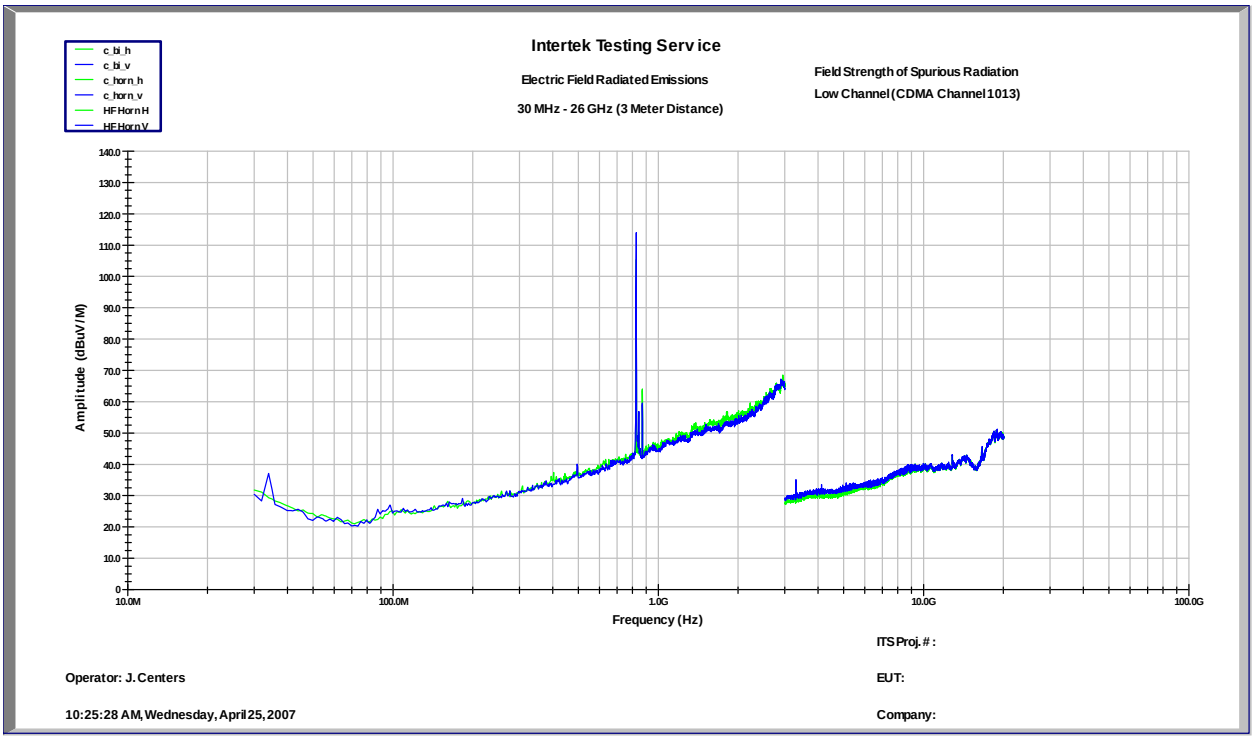


Figure 9-5: Field Strength of Spurious Radiation (30 MHz – 20 GHz), CDMA Cell Channel 384

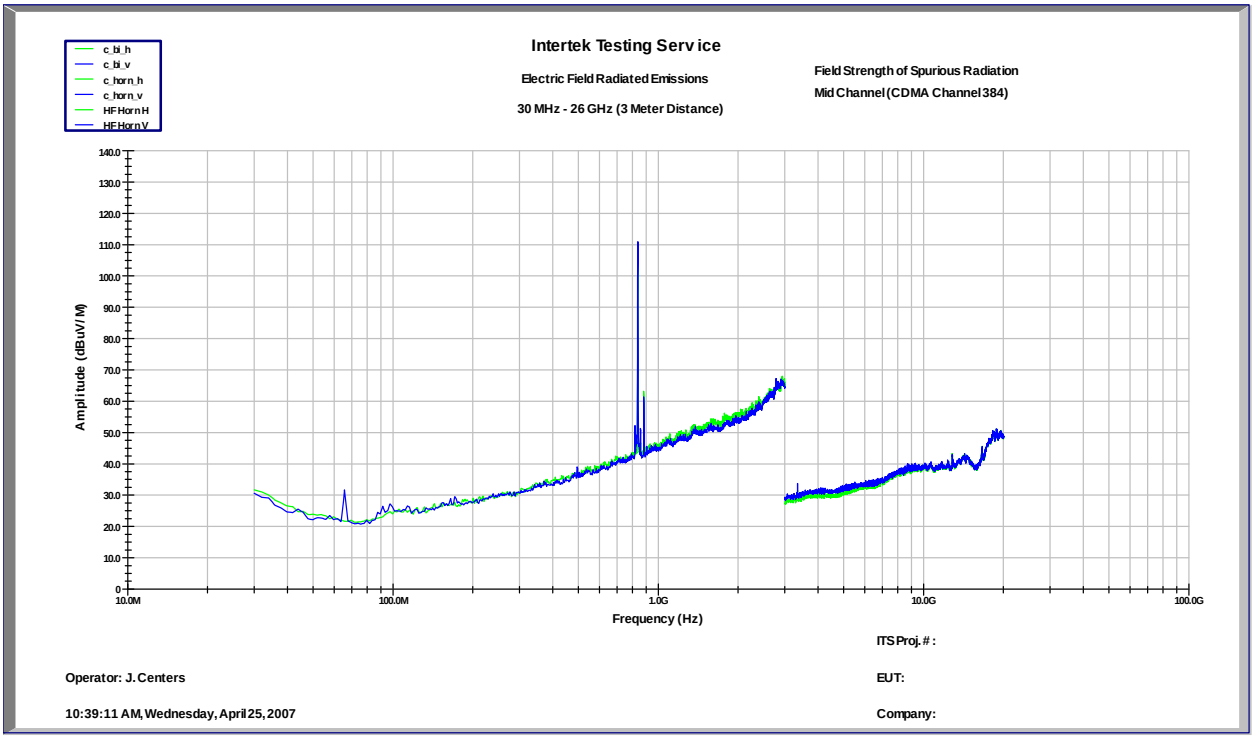


Figure 9-6: Field Strength of Spurious Radiation (30 MHz – 20 GHz), CDMA Cell Channel 777

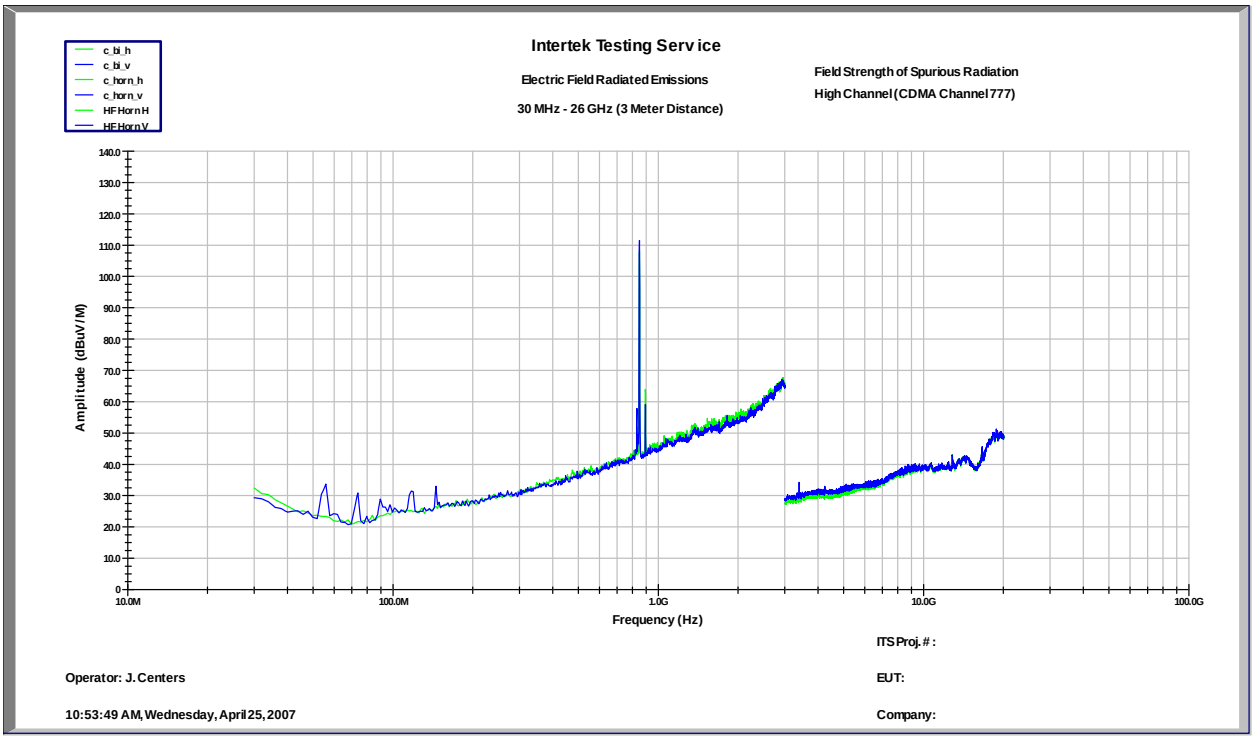


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Figure 9-7: Field Strength of Spurious Radiation (30 MHz – 20 GHz), CDMA PCS Channel 25

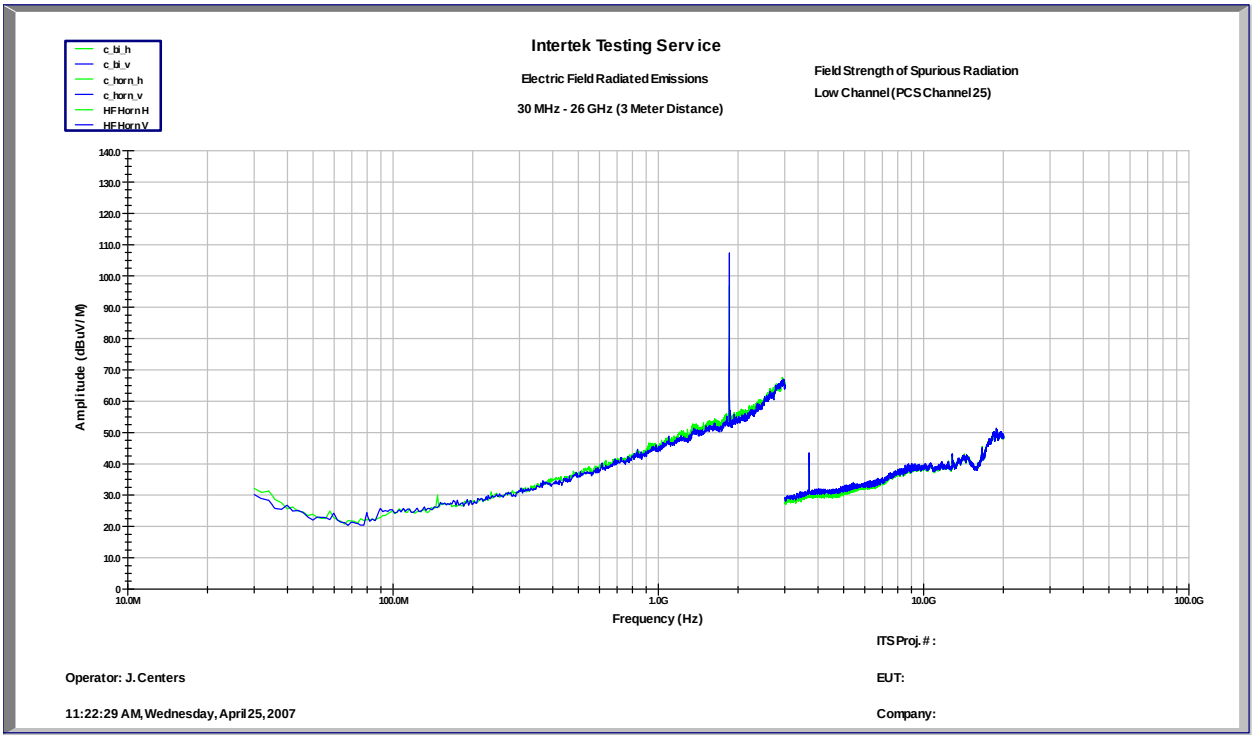


Figure 9-8: Field Strength of Spurious Radiation (30 MHz – 20 GHz), CDMA PCS Channel 600

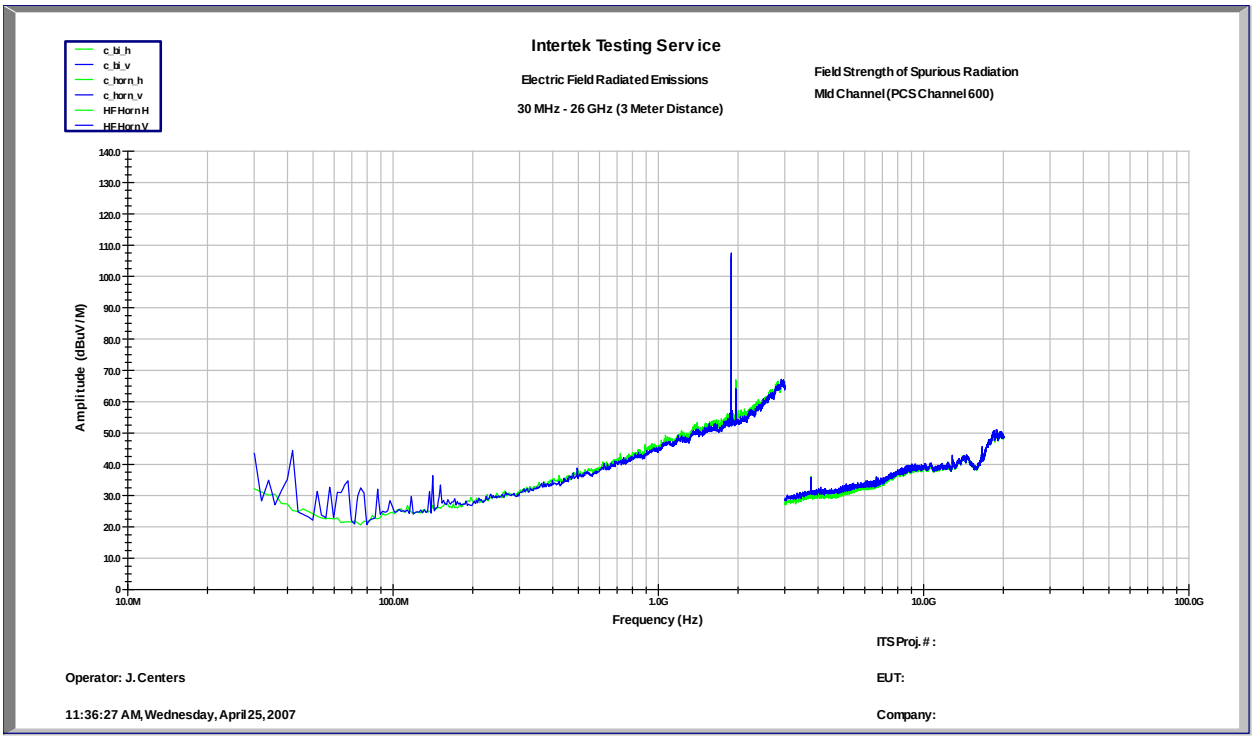
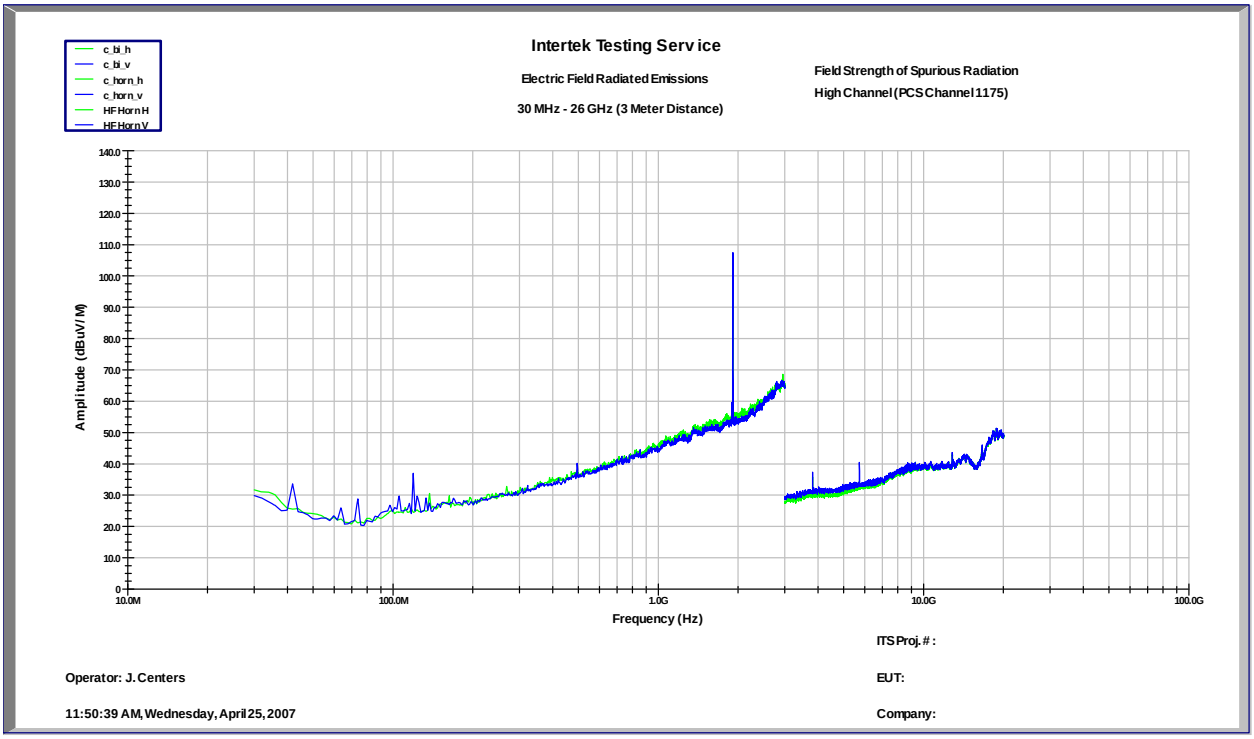


Figure 9-9: Field Strength of Spurious Radiation (30 MHz – 20 GHz), CDMA PCS Channel 1175



10 MODULATION LIMITING, TX AUDIO FREQUENCY RESPONSE, SIDEBAND POWER ATTENUATION

FCC §2.1047

RSS-129 (6.1), RSS-129 (6.2), RSS-129 (6.3)

10.1 Test Procedure

Modulation Deviation Limiting:

The device under test was connected to a base station simulator and placed into a call. The audio path was setup using test commands provided by the customer. The output of the transmitter was connected to a modulation analyzer set to measure the peak deviation of the carrier frequency. A function generator was connected to the microphone input of the device under test. The audio input frequency was set to 1kHz and the level was adjusted to obtain a peak deviation of ±8kHz. This level was increased by 20dB in one step and the input frequency was adjusted between 300Hz and 3kHz. A plot of peak deviation versus frequency was constructed.

The device was setup as described above. A function generator was used to provide variable amplitude input at 300Hz, 1kHz, and 3kHz. The input was adjusted from 1mV to 10V at each of the three discrete frequencies while recording the peak deviation of the carrier at each step. A family of curves was constructed to show modulation limiting of the device.

Transmitter Audio Frequency Response:

The frequency response of the audio modulating circuit over the frequency range of 100Hz – 5kHz was measured. The device was setup as described above. The audio signal input was adjusted to obtain 50% modulation at 1kHz and this point was taken to be the 0dB reference point. With the input level held constant, the frequency was varied over the range of 100Hz – 5kHz and the peak deviation was measured. The deviation response was calculated as 20*log(measured deviation/reference deviation). The transmitter audio frequency response referenced to 1kHz was plotted.

Audio Low Pass Filter Response:

The transmitter shall employ a low pass filter between the deviation limiter and the modulator. A plot of the low pass filter response was provided by the client.

Sideband Power Attenuation Limits:

The device was setup as described above. A measurement was performed with the carrier unmodulated. The peak level of the unmodulated carrier is used as the reference level. For voice, the carrier was modulated with a 2.5kHz sine wave 13.5dB greater than that required to produce ±8kHz deviation at 1kHz. For voice and SAT, the carrier was modulated with a 2.5kHz sine wave 13.5dB greater than that required to produce ±8kHz deviation at 1kHz and a 6kHz SAT with ±2kHz deviation. For SAT and Signaling Tone, carrier was modulated with a 10kHz ST with ±8kHz peak deviation and a 6kHz SAT with ±2kHz deviation. For wideband data, the carrier was modulated with a quasi-random 10kbps data pattern with ±8kHz peak deviation.

10.2 Test Results

The LCT08.2 Module was compliant with requirements of FCC §2.1047, RSS-129 (6.1), RSS-129 (6.2), and RSS-129 (6.3). The modulation was limited to less than ±12kHz peak deviation. The sideband power was attenuated below the limits of RSS-129 (6.3).

Figure 10-1: Modulation Limiting – Deviation vs. Frequency

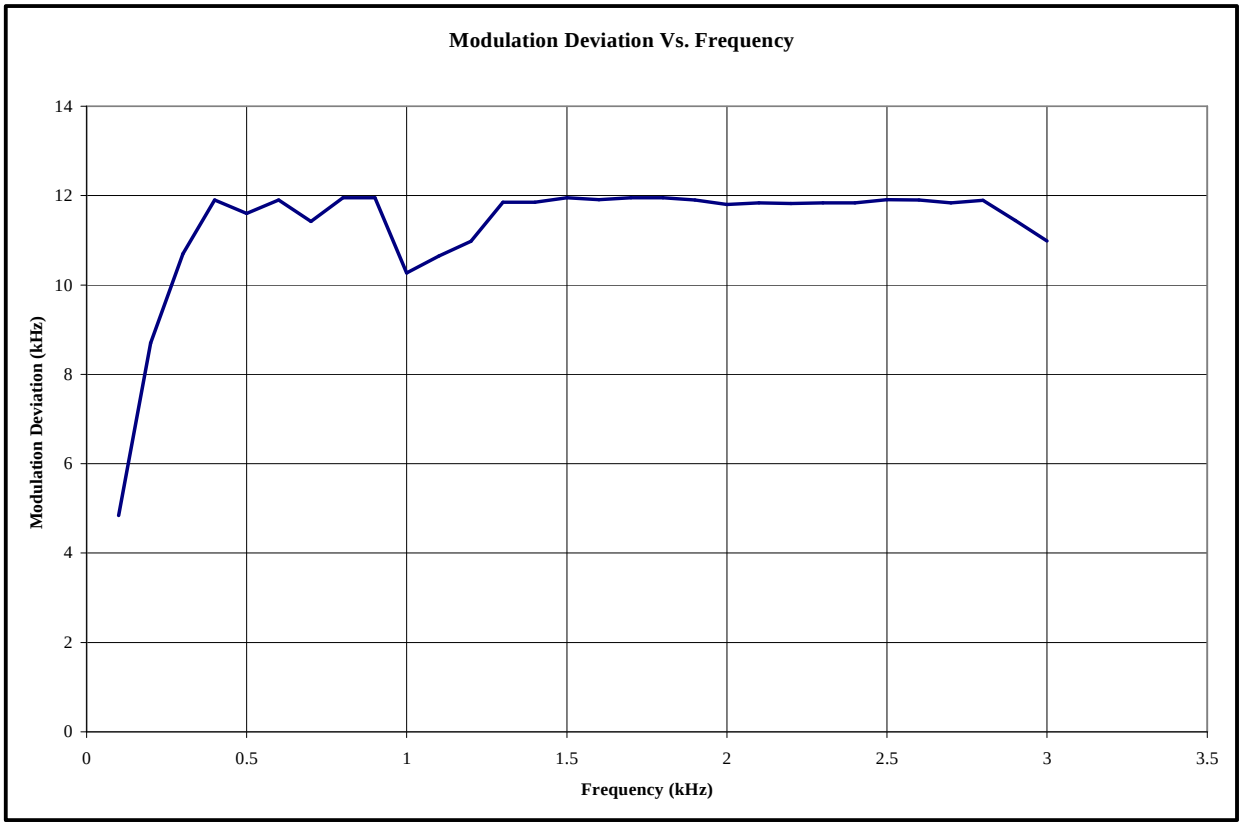


Figure 10-2: Modulation Limiting – Deviation vs. Input Voltage

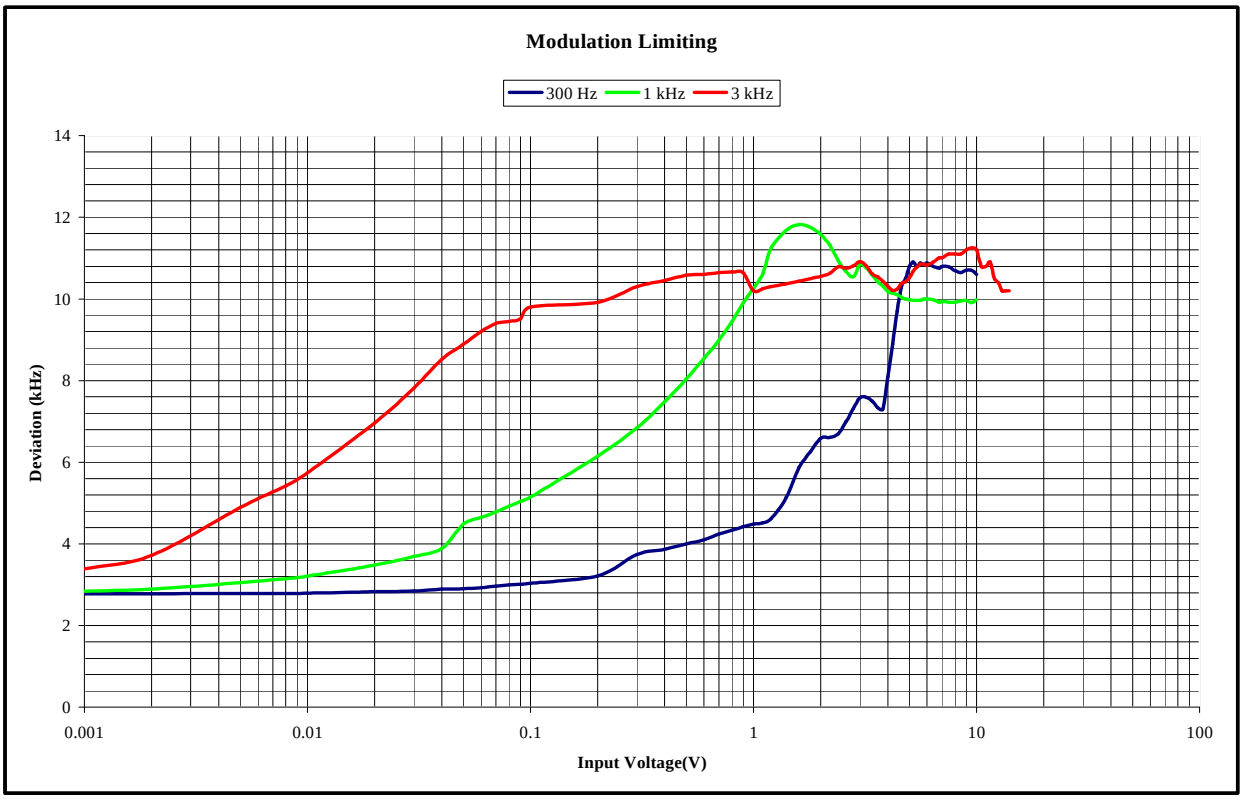


Figure 10-3: Transmitter Audio Frequency Response

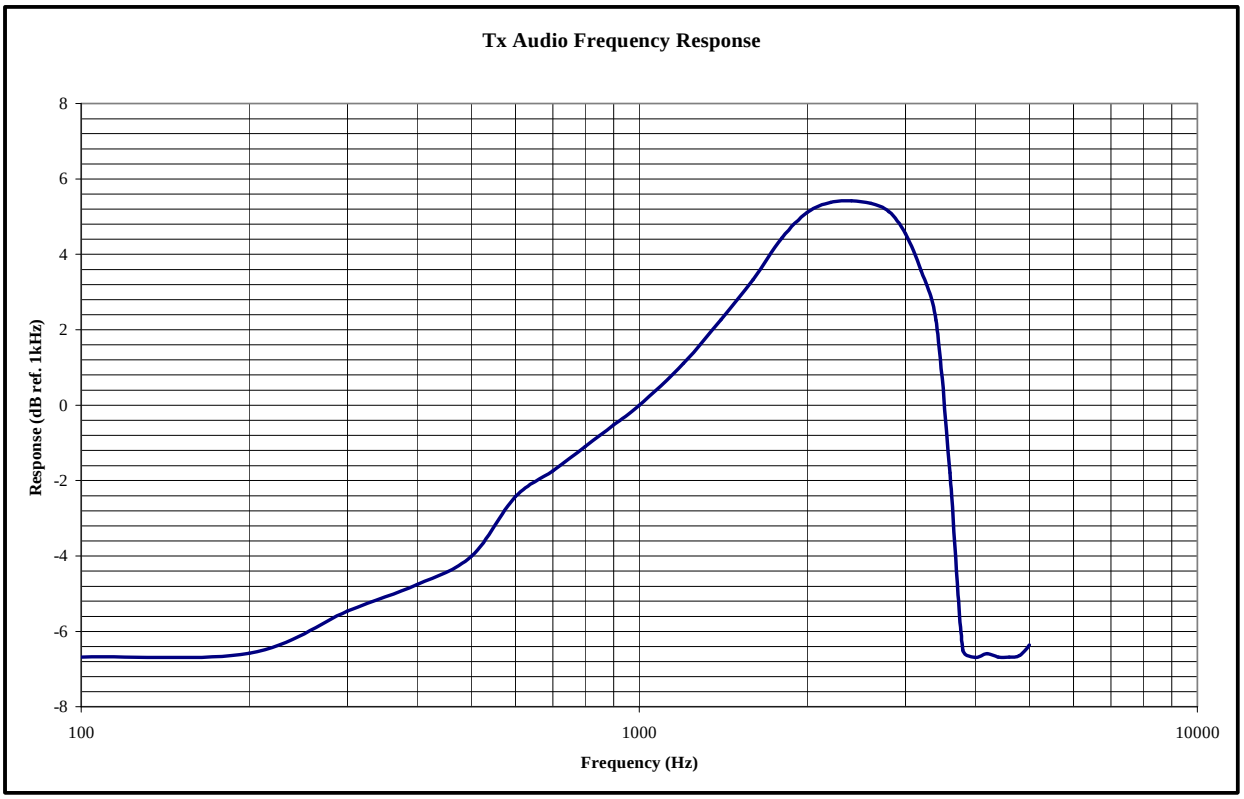


Figure 10-4: Audio Low Pass Filter Frequency Response

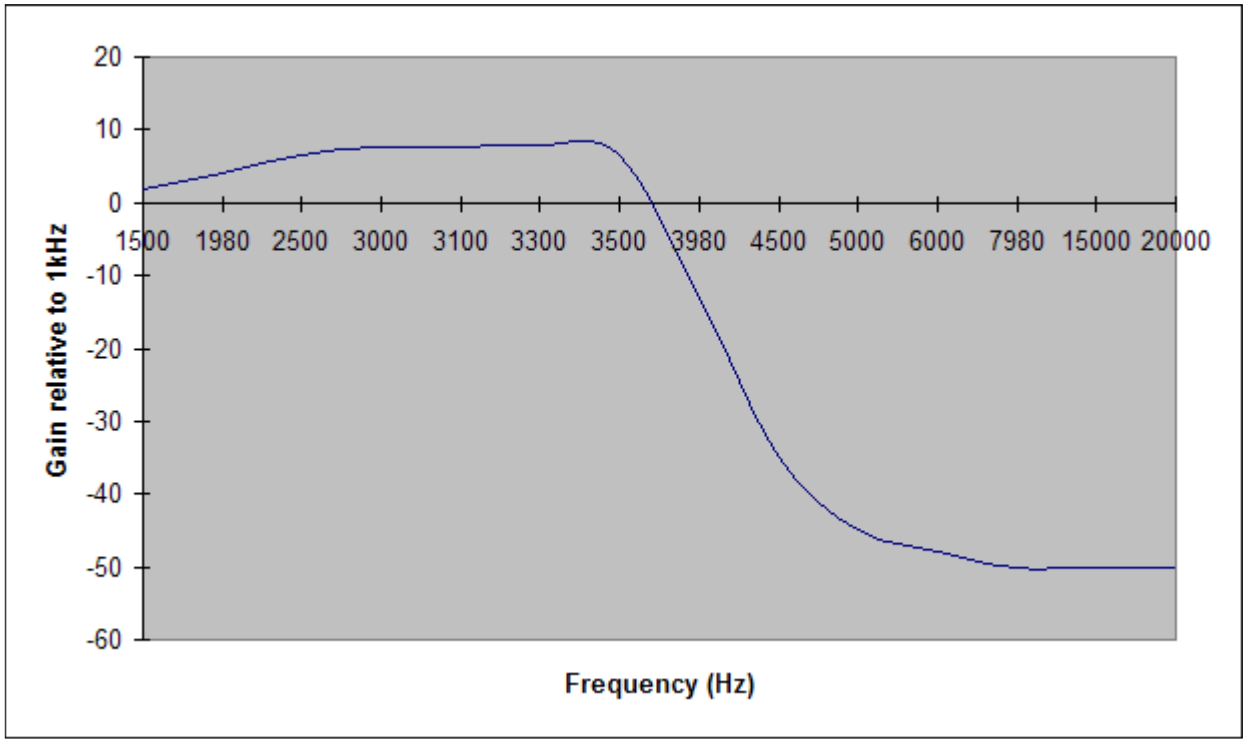
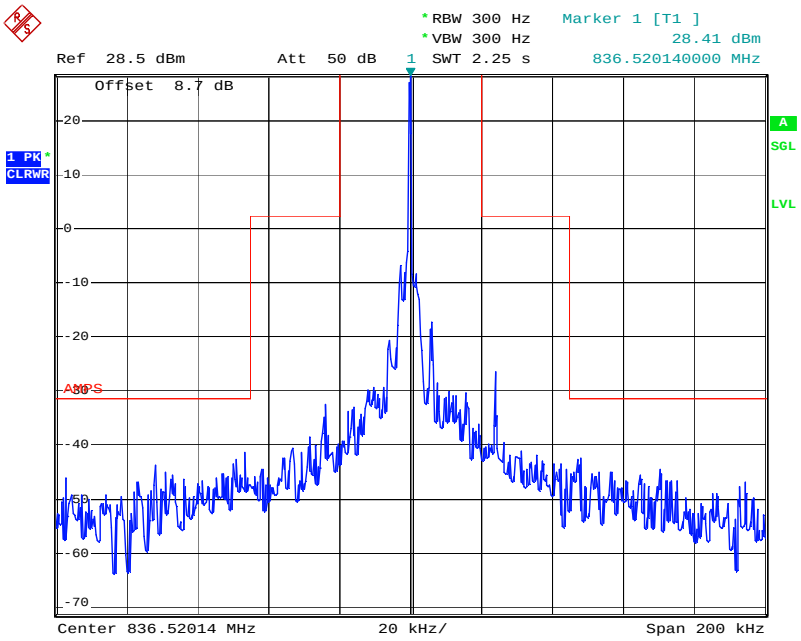
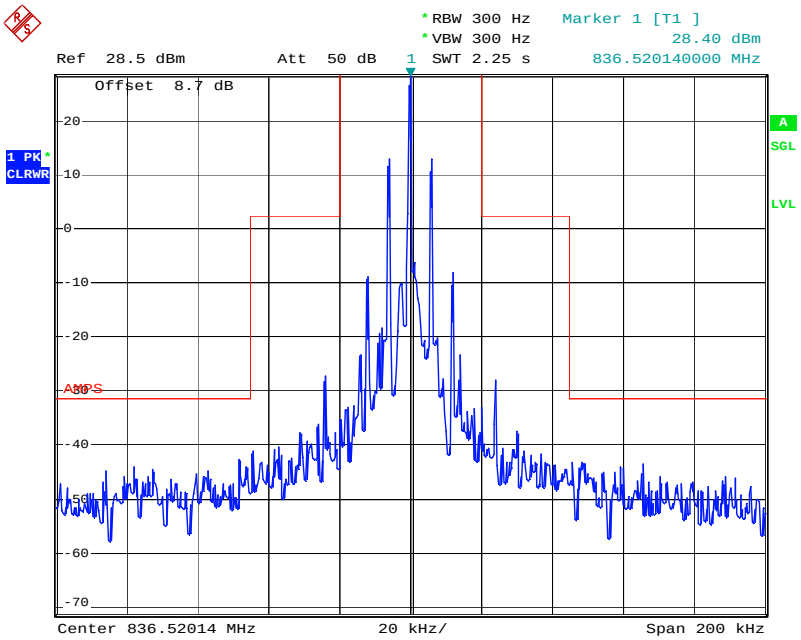


Figure 10-5: Sideband Power Attenuation – Unmodulated



Date: 2.MAY.2007 16:07:53

Figure 10-6: Sideband Power Attenuation – SAT



Date: 2.MAY.2007 16:08:51

Figure 10-7: Sideband Power Attenuation – SAT & ST

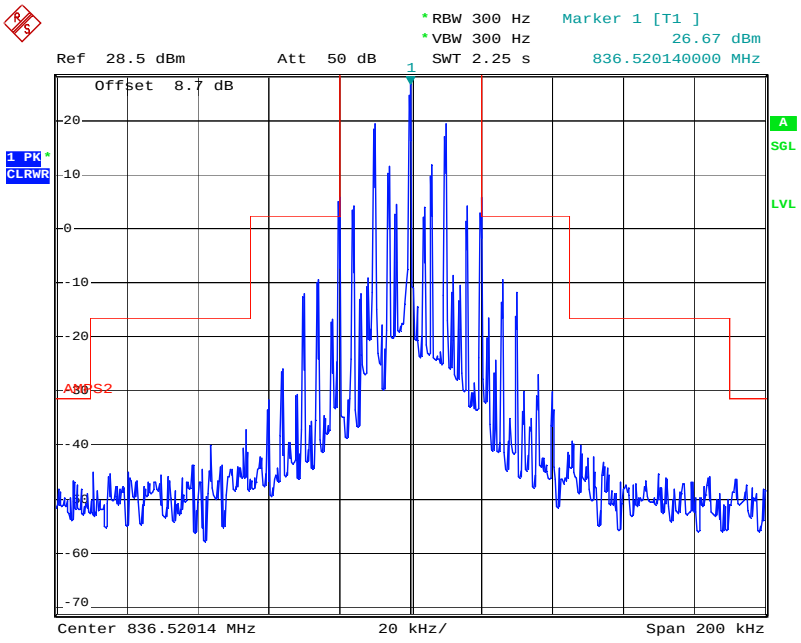


Figure 10-8: Sideband Power Attenuation – Voice & SAT

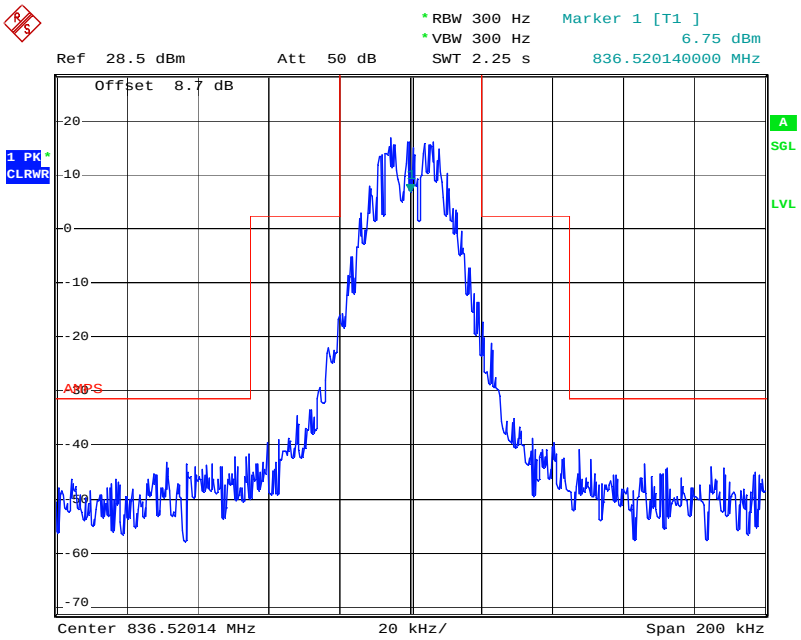
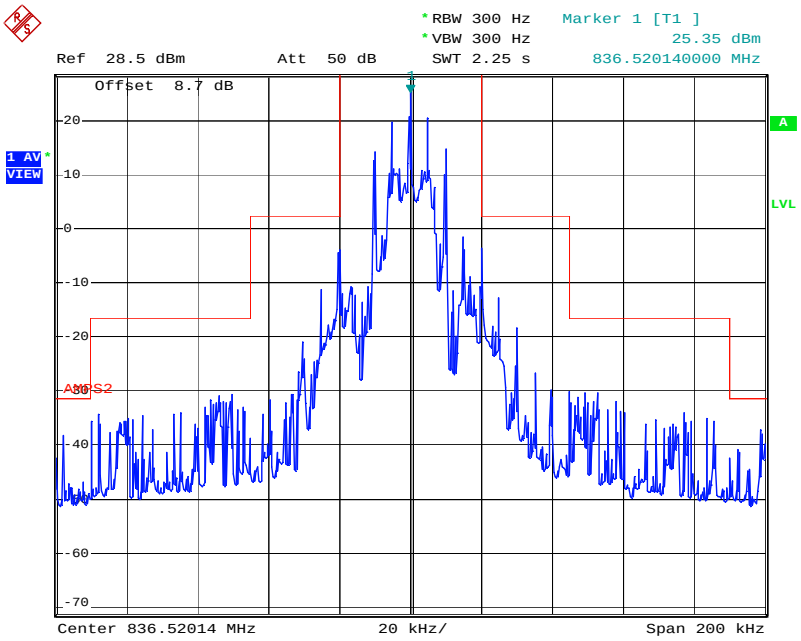


Figure 10-9: Sideband Power Attenuation – Wideband Data



11 RECEIVER SPURIOUS EMISSIONS

FCC §15.109

ICES-003, RSS-129 §10, RSS-133 §9

11.1 Test Limits

Table 11-1 Radiated Emission Limit for FCC §15.109

Radiated Emission Limits at 3 meters	
Frequency (MHz)	**Quasi-Peak limits, dB (µV/m)**
30 to 88	40.0
88 to 216	43.5
216 to 960	46.0
960 and up	54.0

11.2 Test Procedure

Measurements are made over the frequency range of 30 MHz to five times the highest frequency operating within the device. The measuring receiver meets the requirements of Section One of CISPR 16 and the measuring antenna correlates to a balanced dipole. From 30 to 1000 MHz, a quasi-peak detector was used for measurement. Above 1000 MHz, average measurements were performed.

Measurements of the radiated field are made with the antenna located at a distance of 3 meters from the EUT. If the field-strength measurements at 3m cannot be made because of high ambient noise level or for other reasons, measurements may be made at a closer distance, for example 1m. An inverse proportionality factor of 20 dB per decade should be used to normalize the measured data to the specified distance for determining compliance.

The antenna is adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth is varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) is varied during the measurements to find the maximum field-strength readings.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Equipment setup for radiated disturbance tests followed the guidelines of ANSI C63.4: 2003.

11.3 Test Results

The LCT08.2 Module is **compliant** with the radiated disturbance requirements of FCC §15.109 for a class B device. The maximized quasi peak data can be found in Figure 11-2.

Figure 11-1 FCC §15.109 Receiver Spurious Emissions Graphical Data

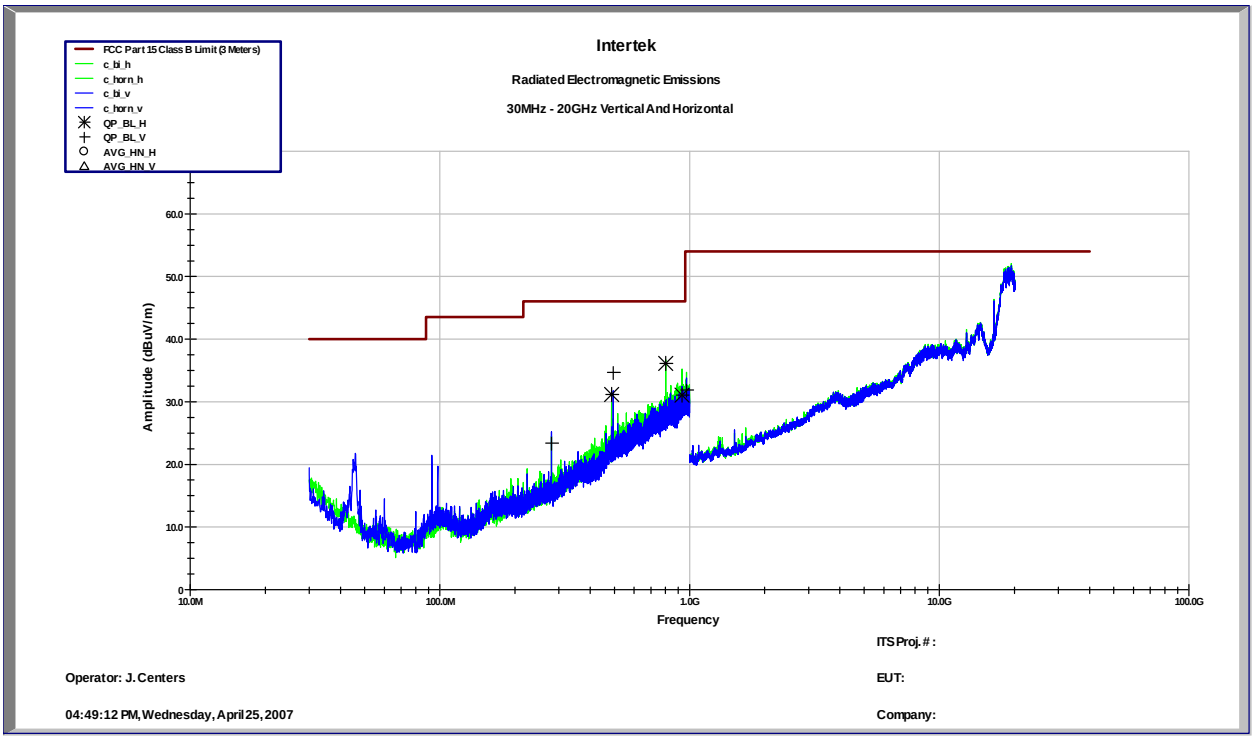


Figure 11-2 FCC §15.109 Maximized Quasi Peak and Average Emissions

Frequency (MHz)	Polarity (H/V)	Cab. (dB)	Ant. (dB)	Corr. Reading. (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Results
486.8 MHz	H	3.36	18.53	31.18	46.02	-14.84	**Compliant**
801.81 MHz	H	4.35	22.04	36.12	46.02	-9.9	**Compliant**
933.26 MHz	H	4.67	23.73	31.03	46.02	-14.99	**Compliant**
279.99 MHz	V	2.5	12.9	23.39	46.02	-22.63	**Compliant**
495.26 MHz	V	3.36	17.69	34.67	46.02	-11.35	**Compliant**
973.63 MHz	H	4.8	22.87	31.88	53.98	-22.1	**Compliant**

12 FREQUENCY STABILITY VS TEMPERATURE

FCC §2.1055, FCC §22.355, FCC §24.235

RSS-133 §7

Frequency tolerance: 2.5ppm

12.1 Test Procedure

The equipment under test was connected to an external DC power supply and the RF output was connected to a CMU-200 Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for that purpose. After the temperature stabilized for approximately 30 minutes, the frequency error was read from the base station simulator.

12.2 Test Results

The LCT08.2 Module met the frequency stability requirements of FCC §2.1055, FCC §22.355 and FCC §24.235. The test results are located in Table 12-1.

Table 12-1: Frequency Error (Hz) vs. Temperature

	CDMA Cell Band			CDMA PCS Band			AMPS		
Temp	Channel 1013	Channel 384	Channel 777	Channel 25	Channel 600	Channel 1175	Channel 991	Channel 384	Channel 799
-30	23	15	14	31	29	37	57	57	56
-20	13	13	14	31	31	31	56	57	57
-10	15	13	14	39	37	30	56	58	56
0	15	11	12	30	40	32	56	57	57
10	13	13	13	33	32	32	57	57	57
20	15	13	14	24	31	30	57	58	57
30	14	12	13	38	32	30	57	58	56
40	14	12	13	30	27	25	57	56	57
50	12	13	15	30	33	29	56	56	57
60	13	14	16	33	34	28	56	55	57

13 FREQUENCY STABILITY VS VOLTAGE

FCC §2.1055, FCC §22.355

Frequency tolerance: 2.5ppm

13.1 Test Procedure

An external DC power supply was connected to the battery terminals of the equipment under test. The Base Station Simulator was set to force the EUT to its maximum power setting. The voltage was set to 115% of the nominal value and was then decreased to 85% of the nominal value. The output frequency error was recorded for each battery voltage.

13.2 Test Results

The LCT08.2 Module met the frequency stability requirements of FCC §2.1055 and FCC §22.355. The test results are located in Table 13-1.

Table 13-1: Frequency Error (Hz) vs. Input Voltage

	CDMA Cell Band			CDMA PCS Band			AMPS		
Battery Voltage	**Channel 1013**	**Channel 384**	**Channel 777**	**Channel 25**	**Channel 600**	**Channel 1175**	**Channel 991**	**Channel 384**	**Channel 799**
9VDC	12	13	13	24	25	29	56	55	57
16VDC	11	11	10	29	32	30	55	56	56