Certification Test Report
FCC Part 22, Subpart H
Part 24, Subpart E

Sendum Wireless
ET300

FCC ID: TS5-6055M-ET300

Project Code CG-1253
(Report CG-1253-RA-1-1)
Revision: 1

July 10, 2009

Prepared for:	Sendum Wireless
Author:	Deniz Demirci Senior Wireless/EMC Technologist
Approved by:	Nick Kobrosly Director of Canadian Operations

Test Facility:	**National Technical Systems, Canada** Product Integrity Laboratory 5151-47th Street, N.E. Calgary Alberta T3J 3R2
Accreditation Numbers:	0214.22 Electrical 0214.23 Mechanical Accredited by A2LA The American Association for Laboratory Accreditation CLIENTS SERVED: All interested parties FIELDS OF TESTING: Electrical/Electronic, Mechanical/Physical ACCREDITATION DATE:: May 14, 2009 VALID TO: December 31, 2009
Applicant:	Sendum Wireless 4500 Beedie Street Burnaby, BC Canada V5J 5L2
Customer Representative:	Mr. Henry Seto Ph: (604)454-3774 E Mail: henry.seto@sendum.com

Test Summary

Appendix	Test / Requirement Description	Deviations* from:			Status	Applicable Rule Parts	
		Base Standard	Test Basis	NTS Procedure		Mode	FCC
A	Occupied BW	No	No	No	PASS	Cell	2.1049/22.905
						PCS	2.1049/24.238
B	Radiated Peak Power Output	No	No	No	PASS	Cell	2.1046/22.913
						PCS	2.1046/24.232
C	Peak to Average Ratio	No	No	No	PASS	PCS	24.232(d)
D	TX Frequency Stability	No	No	No	PASS	Cell	2.1055/22.335
						PCS	2.1055/24.235
E	TX Conducted Spurious Emissions	No	No	No	PASS	Cell	2.1051/22.917
						PCS	2.1051/24.238
F	Field Strength of Spurious Emissions	No	No	No	PASS	Cell	2.1053/22.917
						PCS	2.1053/24.238

Deniz Demirci
2009.07.10 17:39:15
-06'00'

Prepared By: _____
Deniz Demirci
Senior Wireless/EMC Technologist

Glen Moore
2009.07.10 17:41:27
-06'00'

Reviewed By: _____
Glen Moore
Wireless/EMC Manager

Digitally signed by Nick Kobrosly
Reason: on behalf of
Date: 2009.07.10 17:44:13
-06'00'

Approved By: _____
Alex Mathews
Quality Management Representative

Table of Contents

Register of revisions

Revision	Date	Description of Revisions
0	July 10, 2009	Initial release

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to describe the tests applied by NTS Canada to demonstrate compliance of the ET300 from Sendum Wireless to the following specifications:

FCC Part 22, Subpart H Public Mobile Services
FCC Part 24, Subpart E Personal Communications Services

2.0 EUT DESCRIPTION

2.1 CONFIGURATION

Description of EUT

	Name	Model	Revision	Serial Number
EUT	ET300	ET300	N/A	N/A
Classification	Mobile			
TX Operating Frequency Range	Cell 824.7-848.31 MHz PCS 1851.25 -1908.75 MHz			
RX Operating Frequency Range	Cell 869-894 MHz PCS 1930-1990 MHz			
Maximum Output Power	Cell band: 21.95 dBm or 0.16 watts PCS band: 24.89 dBm or 0.31 Watts			
Antenna Type/Gain	Manufacturer: Sendum Wireless Peak Gain: Cell band: 0 dBi PCS band: +2 dBi			
Functional description	GPS tracking device			
Dimensions	1.4x2.5x3.7 inches (without strap)			
Weight	½ lbs (with strap)			
Voltage/Power source	AC Power Adaptor Input: 100-240VAC 50/60 Hz Output: 4.75 V 1.8 Amps DC Power (Battery) : 3.7 VDC Nominal, Power Consumption: 2.4 Watts maximum			
Emission Designators	GSM 824.7MHz – 848.31 MHz 1M34F9W PCS 1851.25 MHz - 1908.75 MHz 1M23F9W			

2.2 MODE OF OPERATION DURING TESTS

The EUT was tested in all configurations to determine worst case results. See test appendices for specific EUT operating modes and conditions

3.0 SUPPORT EQUIPMENT

Sendum Core300 Transmitter Control Tool V1.1 software was used for configuring the device

APPENDICES

APPENDIX A: OCCUPIED BANDWIDTH

A.1. Base Standard & Test Basis

Base Standards	FCC Part 2.1049
Test Basis	FCC PART 2.1049
Test Method	FCC PART 2.1049 or TIA 603-C-2004

A.2. Specifications

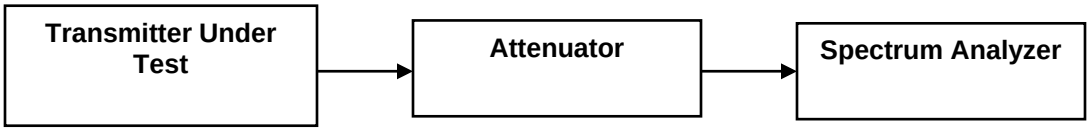
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency llimits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission

A.3. Test Method

FCC 2.1049 or TIA 603-C-2004.

The marker delta function was used to determine the 26 dB bandwidth (OBW)

A.4. Test Setup diagram



A.5. Operating Mode During Test

The EUT was tested while in a continuous transmit mode operating at maximum rated RF output for all bands and operating modes.

A.6. Test Results

The EUT is in compliance with the limits as specified above. The high, mid and low channel bandwidths are provided below:

A.6.1 Cell Mode

Channel	Frequency (MHz)	Occupied Bandwidth
1013	824.07	1.333 MHz
384	836.52	1.343 MHz
777	848.31	1.333 MHz

A.6.2 PCS Mode

Channel	Frequency (MHz)	Occupied Bandwidth
25	1851.25	1.232 MHz
600	1880.00	1.232 MHz
1175	1908.75	1.232 MHz

A.7. Tested By

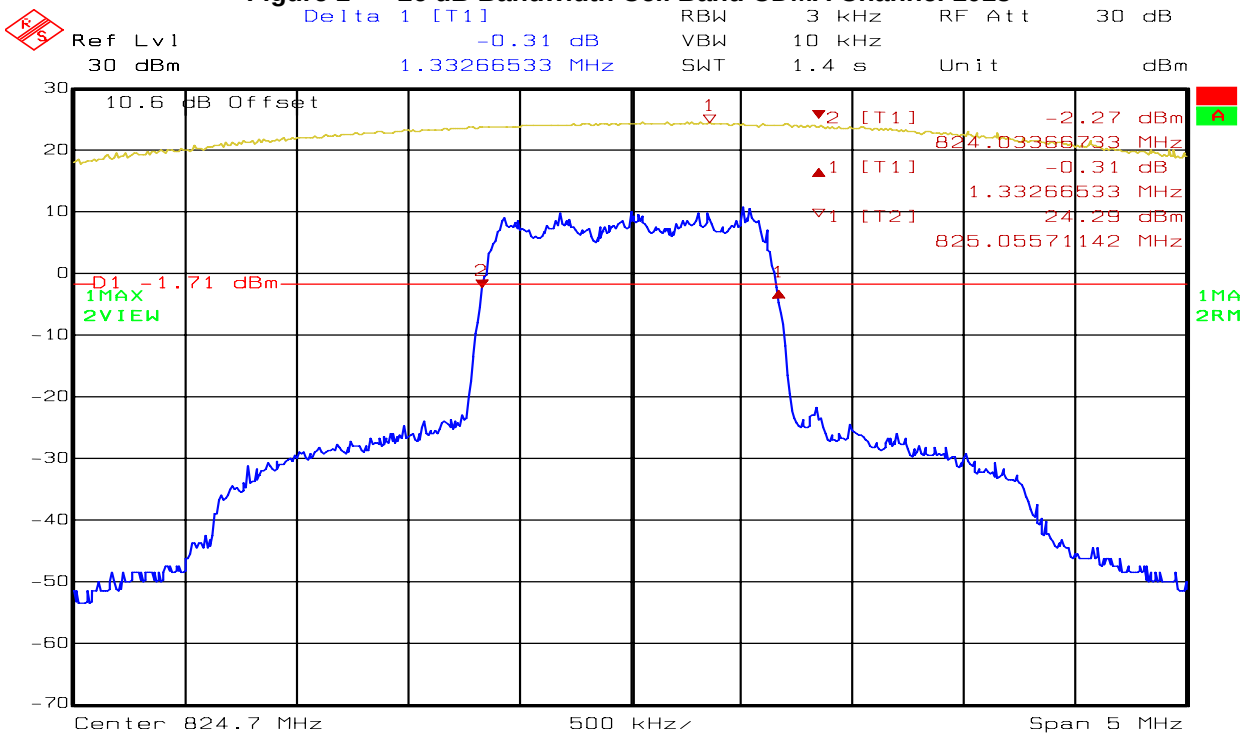
This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Deniz Demirci
Function: Senior Wireless/EMC Technologist

A.8. Test date

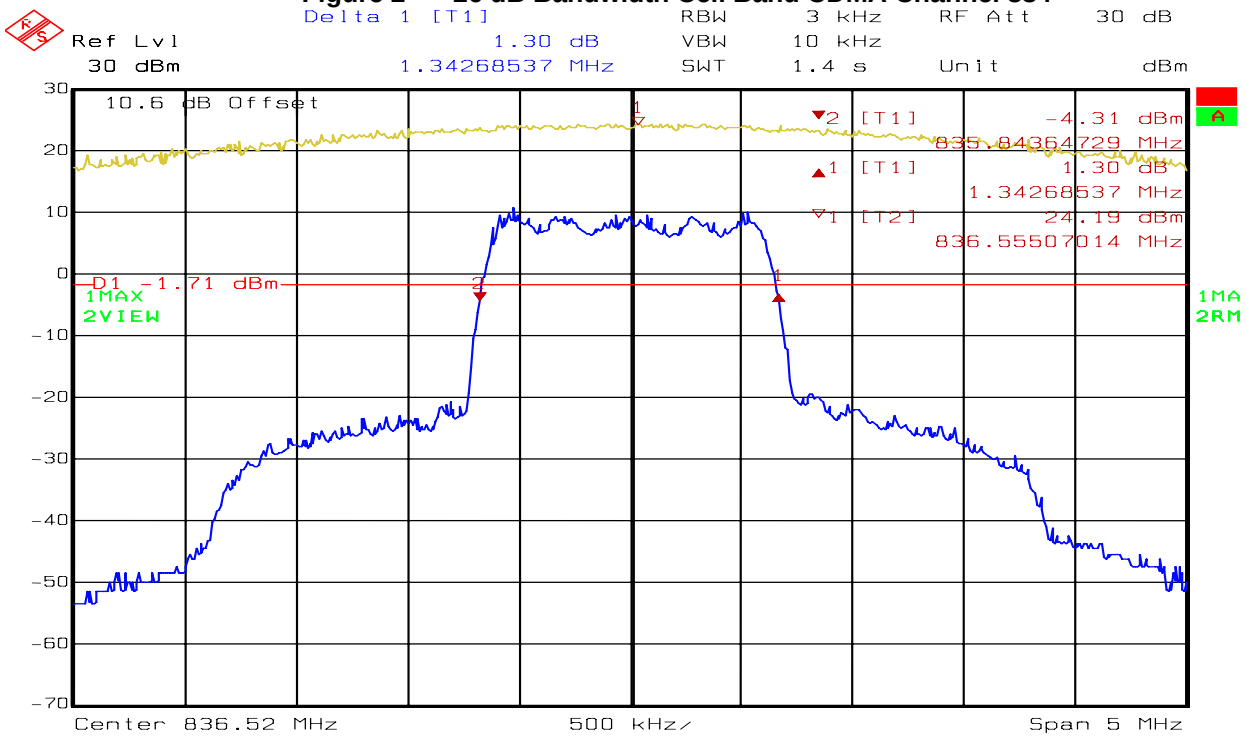
July 9, 2009

Figure 1 26 dB Bandwidth Cell Band CDMA Channel 1013



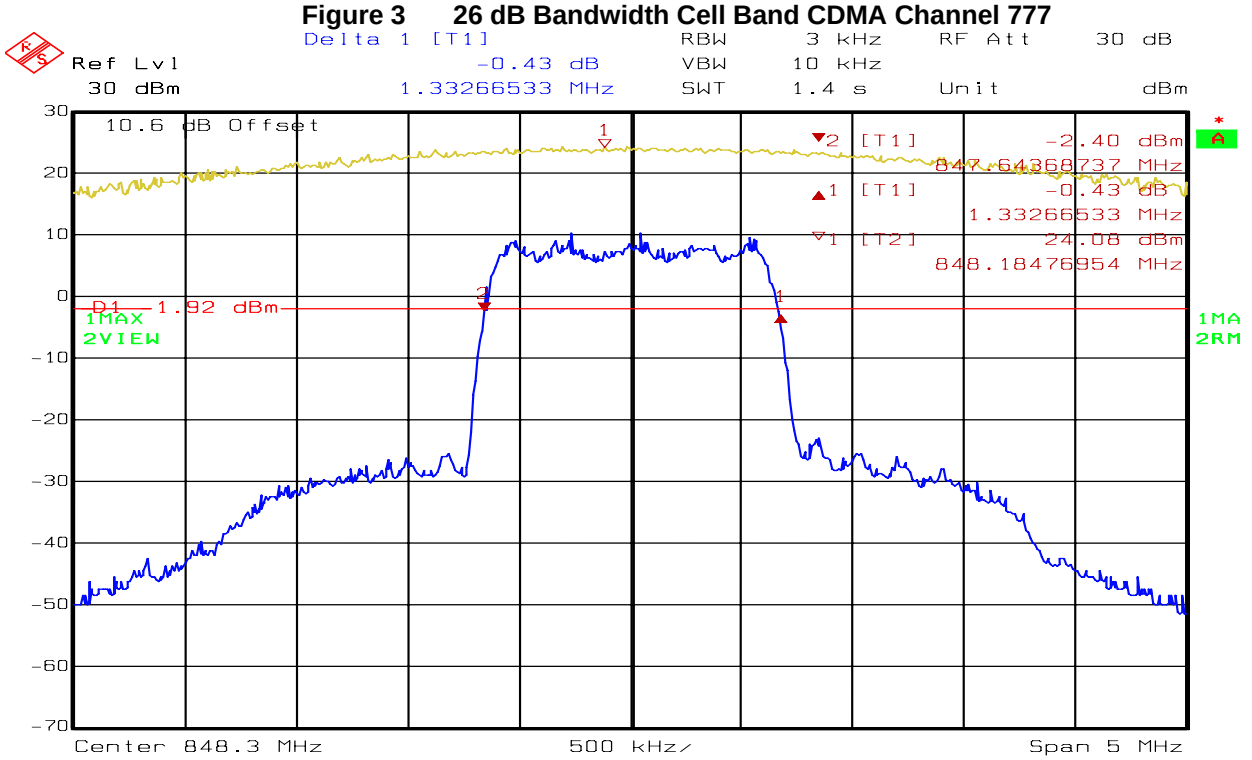
Title: CG-1253 Sendum Wireless ET300
Comment A: Cell Ch1013 CDMA 824.7MHz Rated max power
Date: 9.JUL.2009 17:37:20

Figure 2 26 dB Bandwidth Cell Band CDMA Channel 384



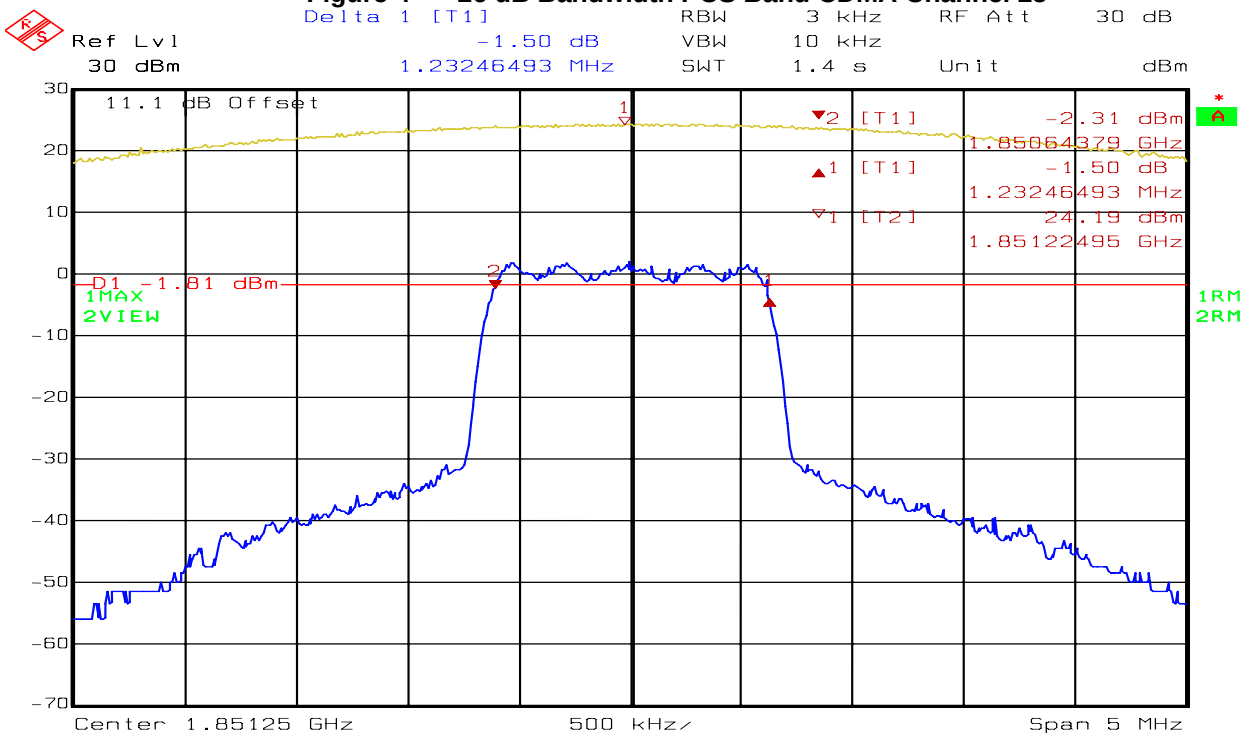
Title: CG-1253 Sendum Wireless ET300
Comment A: Cell Ch384 CDMA 836.52MHz Rated max power
Date: 9.JUL.2009 17:46:06

Figure 3 26 dB Bandwidth Cell Band CDMA Channel 777



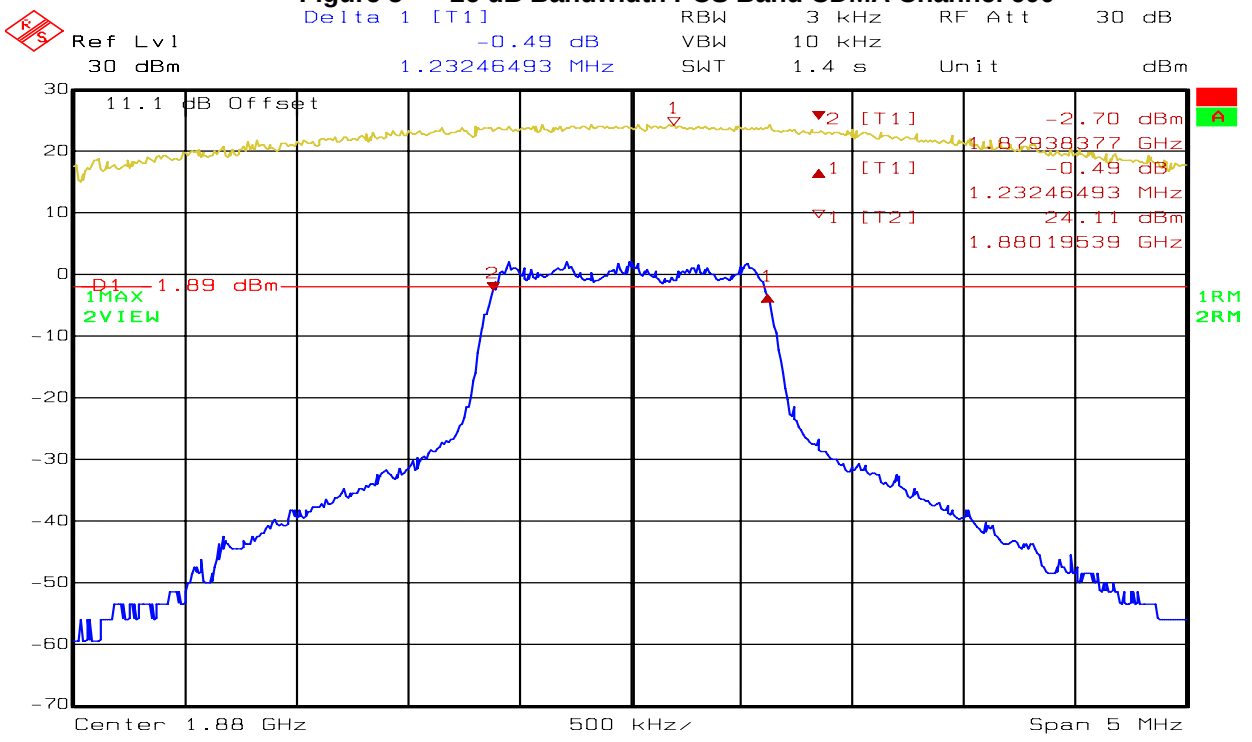
Title: CG-1253 Sendum Wireless ET300
Comment A: Cell Ch777 CDMA 848.31MHz Rated max power
Date: 9.JUL.2009 17:54:50

Figure 4 26 dB Bandwidth PCS Band CDMA Channel 25



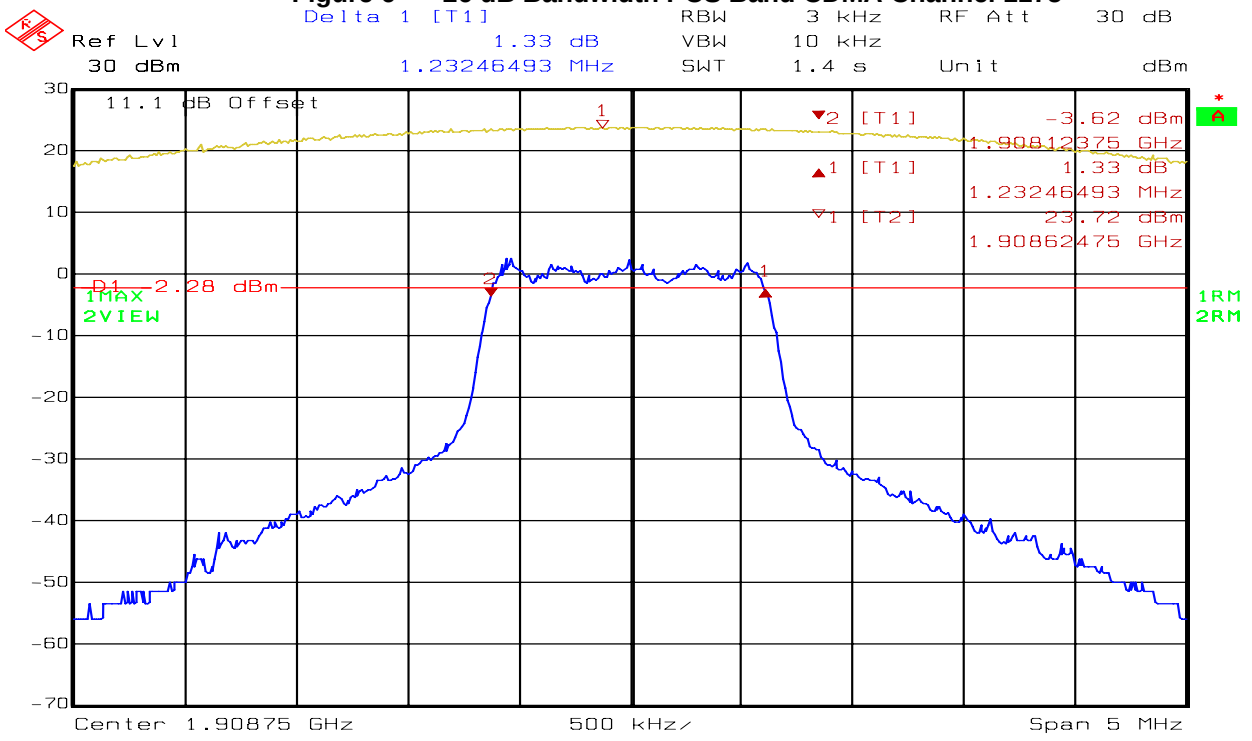
Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch25 CDMA 1851.25MHz Rated max power
Date: 9.JUL.2009 17:14:56

Figure 5 26 dB Bandwidth PCS Band CDMA Channel 600



Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch600 CDMA 1880MHz Rated max power
Date: 9.JUL.2009 19:53:21

Figure 6 26 dB Bandwidth PCS Band CDMA Channel 1175



Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch1175 CDMA 1908.75MHz Rated max power
Date: 9.JUL.2009 20:08:15

APPENDIX B: RADIATED PEAK POWER OUTPUT

B.1. Base Standard & Test Basis

Base Standards	FCC 2.1046; Cell Mode: FCC Part 22.913 PCS Mode: FCC Part 24.232
Test Basis	FCC 2.1046
Test Method	TIA/EIA 603 C

B.2. Specifications

Cell Mode

22.913 Effective radiated power limits.

(2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in §22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

PCS Mode

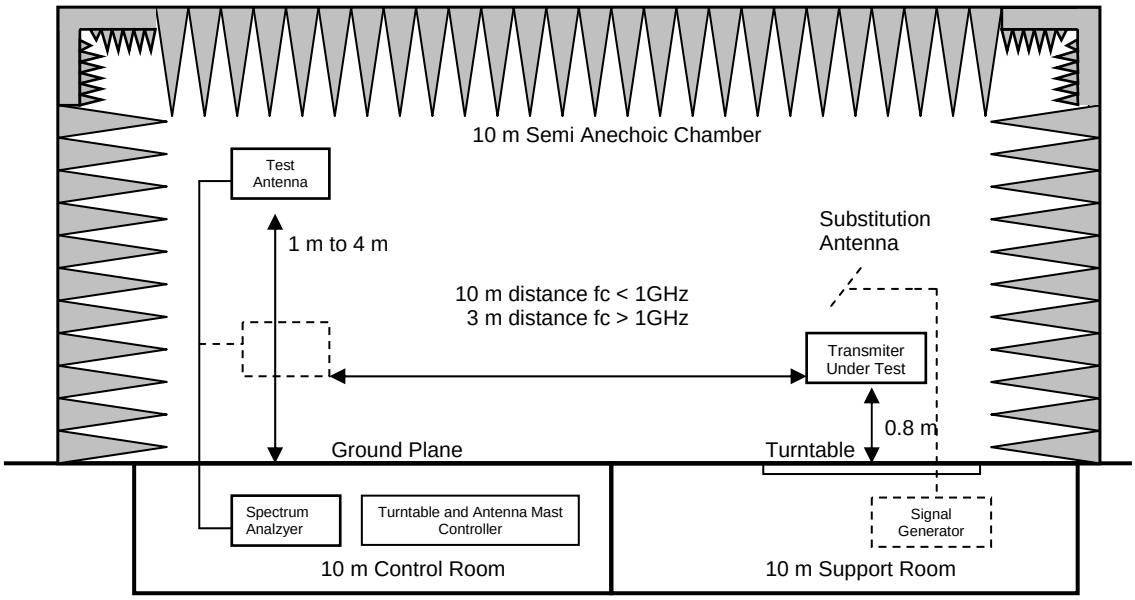
24.232 Power and antenna height limits.

(c) Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

B.3. Test Method

TIA 603-C-2004 using signal substitution. The carrier signal is maximized for worst case power level and the maximum field strength is recorded. The EUT is replaced with a ½ wave dipole tuned to the frequency of interest driven by a signal source. The signal generator level is adjusted until the field strength level is equal to the field strength measured from the EUT. The signal generator level is recorded and corrected for cable losses and antenna gain to arrive at the final ERP/EIRP value. For all radiated measurements the peak power was reported using the following instrument settings:

B.4. Test Setup Diagram



B.5. Operating Mode During Test

The EUT was tested to determine worst case operating modes to produce maximum peak power for the high, mid and low channels and three orthogonal positions.

B.6. Test Results

Results are indicated for each channel in the table below

B.6.1 Cell Band (FCC Part 22) Radiated Power Measurement Test Results

Compliant – The maximum ERP is 21.95 dBm or 0.16 watts on channel 777

Channel #		Frequency (MHz)	Measured Field strength @ 10m (dBµV/m)	Substitution Signal generator level (dBm)	Tx Antenna gain (dBd)	Cable Loss (dB)	Measured ERP (dBm)
CDMA	1013	824.12	116.43	23.10	-0.10	1.45	21.55
	384	835.98	116.00	23.00	-0.10	1.45	21.45
	777	847.71	117.07	23.50	-0.10	1.45	21.95

B.6.2 PCS Band (FCC Part 24) Radiated Power Measurement Test Results

Compliant – The maximum EIRP is 24.89 dBm or 0.31 Watts on channel 600
Results for each channel are indicated in the table below

	Channel #	Frequency (MHz)	Measured Field strength @ 3m (dBµV/m)	Substitution Signal generator level (dBm)	Tx Antenna gain (dBi)	Cable loss (dB)	Measured EIRP (dBm)
CDMA	25	1852.15	126.22	17.27	8.78	1.31	24.74
	600	1880.18	126.10	17.40	8.81	1.32	24.89
	1175	1908.54	122.60	14.09	8.84	1.33	21.60

B.7. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name:	Deniz Demirci	Lixin Wang
Function:	Senior Wireless/EMC Technologist	EMC Technologist

B.8. Test date

Started: June 29, 2009 Ended: July 2, 2009

APPENDIX C: PEAK TO AVERAGE RATIO

C.1. Base Standard & Test Basis

Base Standards	PCS Mode: FCC Part 24.232
Test Basis	FCC Part 24.232 (d)
Test Method	FCC Part 24.232 (d)

C.2. Specifications

PCS Mode

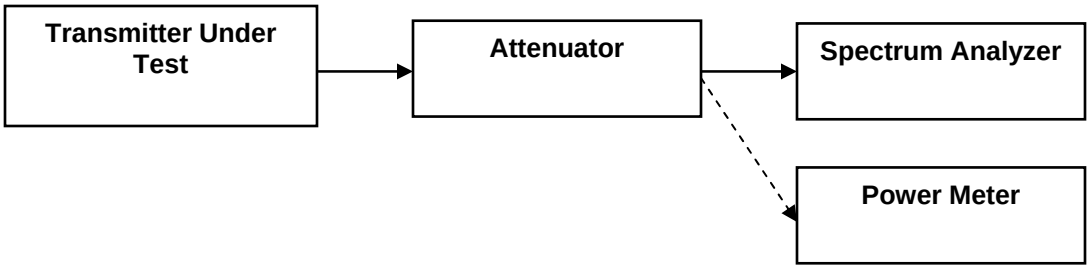
24.232 Power and antenna height limits.

(d) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

C.3. Test Method

FCC Part 24.232 using Power Meter and Spectrum analyzer.
EUT was set to max rated power in low, mid and high channels

C.4. Test Setup Diagram



Operating Mode During Test
The EUT was set to rated maximum peak power for the high, mid and low channels

C.5. Test Results

Results are indicated for each channel in the table below

Channel #		Frequency (MHz)	Measured Peak Power (dBm)	Measured Average Power (dBm)	Peak to average ratio (dB)
CDMA	25	1852.15	28.61	24.27	4.34
	600	1880.00	28.00	24.00	4.00
	1175	1908.75	28.31	24.10	4.21

C.6. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Deniz Demirci
Function: Senior Wireless/EMC Technologist

C.7. Test date

July 10, 2009

Figure 7 PCS Band CDMA Channel25 Peak Power

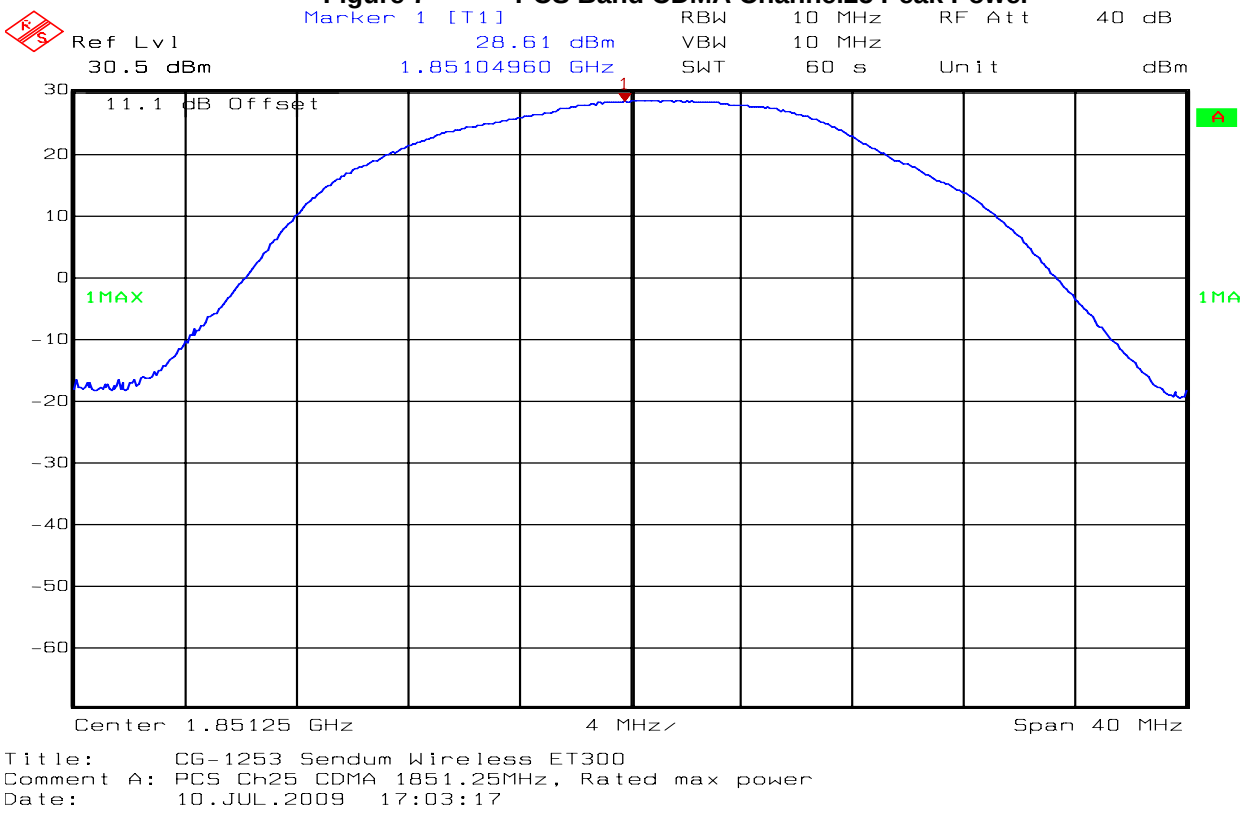
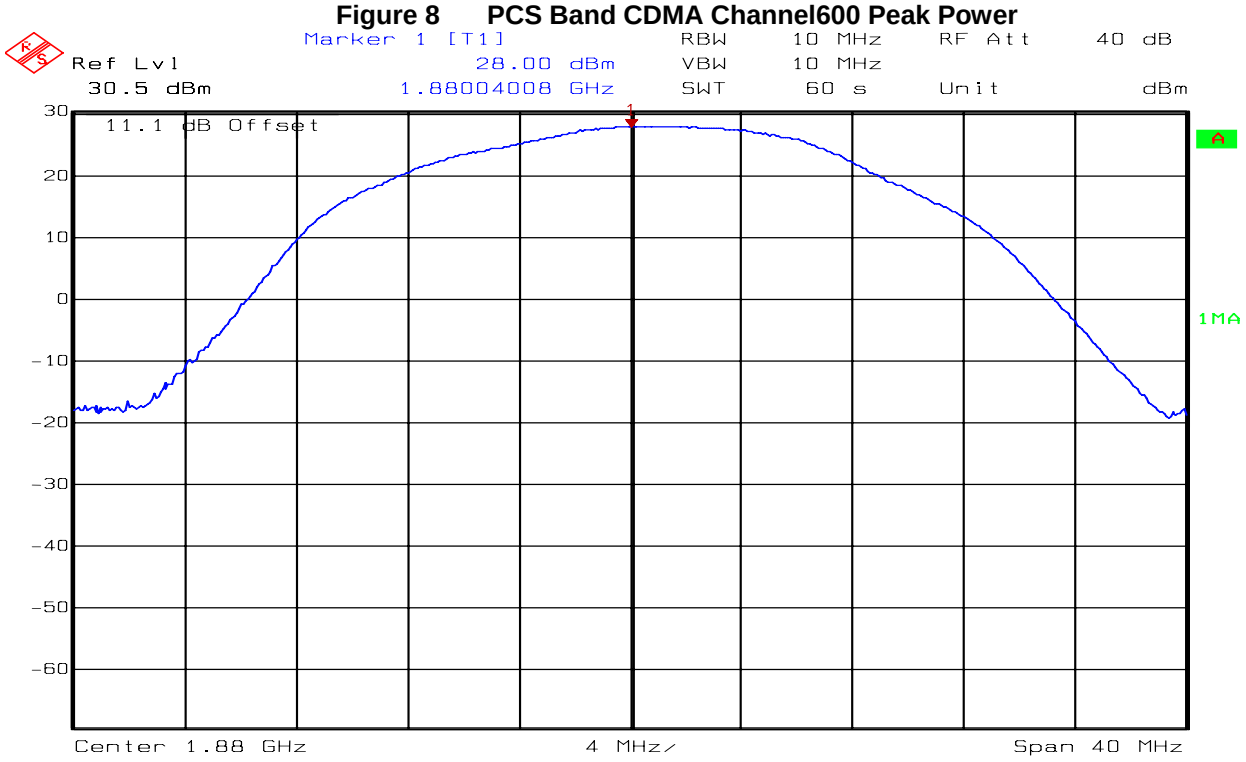
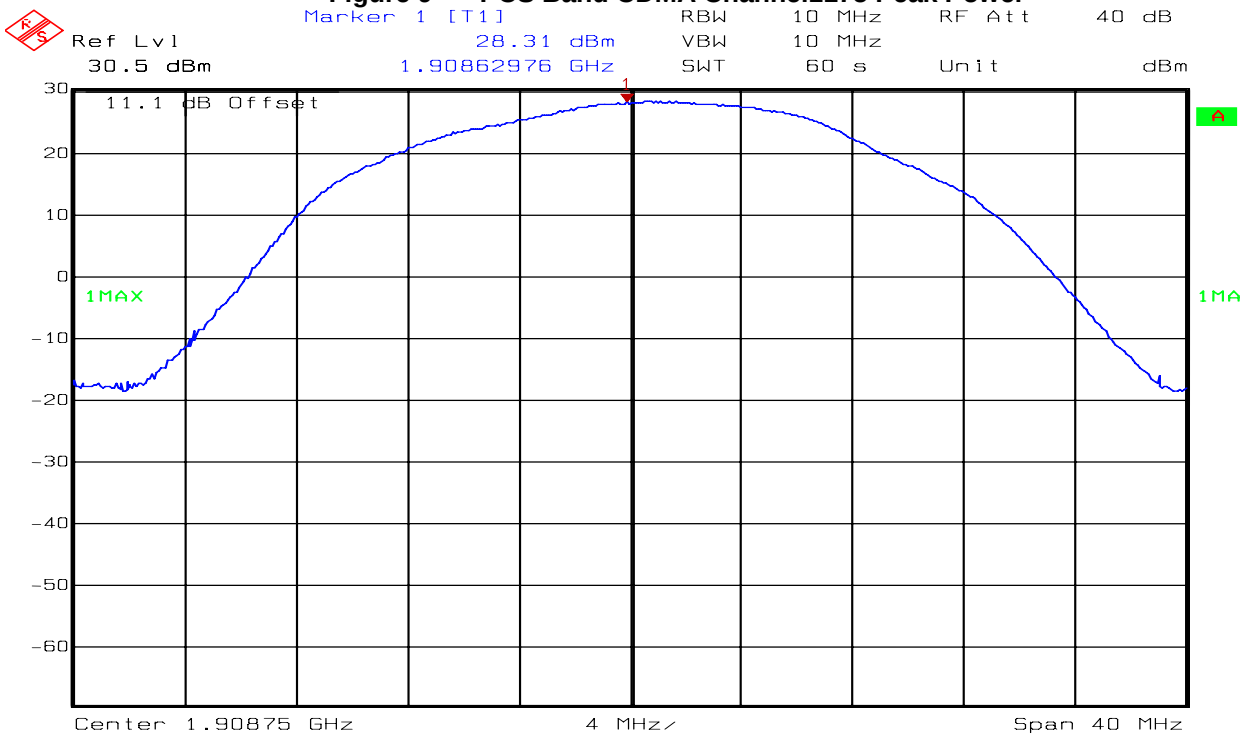


Figure 8 PCS Band CDMA Channel600 Peak Power



Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch600 CDMA 1880MHz, Rated max power
Date: 10.JUL.2009 15:02:12

Figure 9 PCS Band CDMA Channel1175 Peak Power



Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch1175 CDMA 1908.75MHz, Rated max power
Date: 10.JUL.2009 16:58:37

APPENDIX D: FREQUENCY STABILITY

D.1. Base Standard & Test Basis

Base Standard	Cell Mode: FCC 22.335 PCS Mode: FCC 24.235
Test Basis	FCC Part 2.1055
Test Method	FCC Part 2.1055

D.2. Specifications

Cell Mode

22.355

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in the table below.

D.3. Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency Range (MHz)	Base, Fixed (ppm)	Mobile, > 3 watts (ppm)	Mobile, ≤ 3 watts (ppm)
25 to 50	20	20	50
50 to 450	5	5	50
450 to 512	2.5	5	5
821 to 896	1.5	2.5	2.5
928 to 929	5	N/A	N/A
929 to 960	1.5	N/A	N/A
2110 to 2220	10	N/A	N/A

PCS Mode

Sec. 24.235 Frequency stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

D.4. Test Method

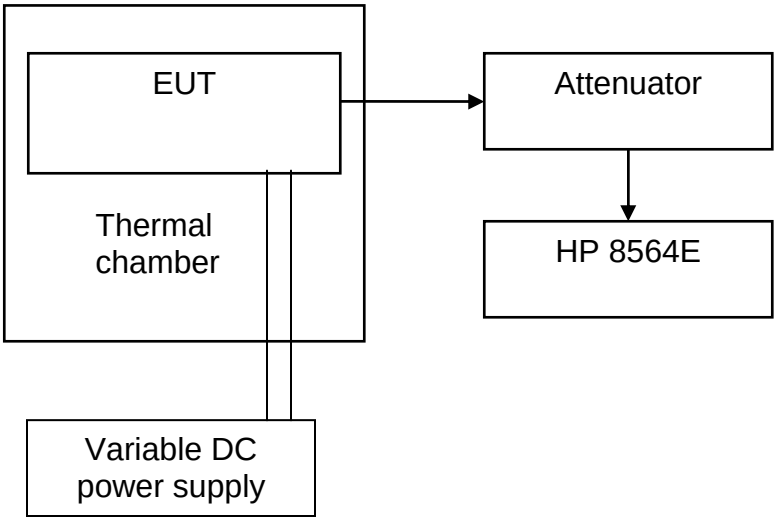
The EUT was placed in the thermal chamber and tested at 20°C and 3.7Vdc. The ambient temperature was then increased in 10°C increments over the temperature range of 50°C to -20°C. After a sufficient time of temperature stabilization the EUT transmitter was turned ON. To verify the stability of the frequency determining components the 800 MHz cellular and 1900 MHz PCS carriers were set to transmit in CW mode.

Measurements were taken at startup and at 1 minute intervals for 10 minutes. Note that only the maximum frequency error reading is listed in the table.

The equipment under test would not operate below -10°C. At - 10 °C there was no data communication, the transmitter would not turn ON, and all EUT LEDs were dark.

Frequency error measurements were also made at 115% of nominal and at 3.5Vdc (3.2Vdc is the battery end operating point stated by the manufacturer, however the EUT would not communicate reliably below 3.5Vdc).

D.5. Test Setup diagram



D.6. Operating Mode During Test

In the 800 MHz cellular and 1900 MHz PCS modes of operation, the carriers were set to transmit in CW mode at maximum RF Power output.

D.7. Test Results

Compliant. The maximum measured frequency drift in cell mode (Part 22 Subpart H – 2.5ppm limit) was -970 Hz. The maximum measured drift in PCS mode was -2155 Hz (Part 24 subpart E), sufficient to stay within the frequency block.

CDMA 800 MHz		PCS CDMA 1880 MHz	
Temp (°C) and 3.7Vdc	**Error (Hz)**	**Temp (°C) And 3.7Vdc**	**Error (Hz)**
-30	N/A	-30	N/A
-20		-20	
-10	-878	-10	-1667
0	-922	0	-2155
10	-970	10	-2121
20	-958		-2110
30	-836	30	-1736
40	-723	40	-1643
50	-767	50	-1426
Voltage (Vdc) and 20°C	**Error (Hz)**	**Voltage (Vdc) and 20°C**	**Error (Hz)**
3.5	-925	3.5	-2109
4.2	-915	4.2	-2117

D.8. Observations

This unit does not operate below -10°C

D.9. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Daryl Therens,
Test Systems Engineering / PI Support Specialist

D.10. Test date

Started: July 7, 2009 Ended: July 8, 2009

APPENDIX E: TX CONDUCTED SPURIOUS EMISSIONS

E.1. Base Standard & Test Basis

Base Standard	Cell Mode: FCC Part 22.917 PCS Mode: FCC Part 24.238
Test Basis	FCC 2.1051
Test Method	FCC 2.1051

E.2. Specifications

Cell Mode:

a) *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.

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. 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.

PCS Mode:

24.238 Emission limitations for Broadband PCS equipment.

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

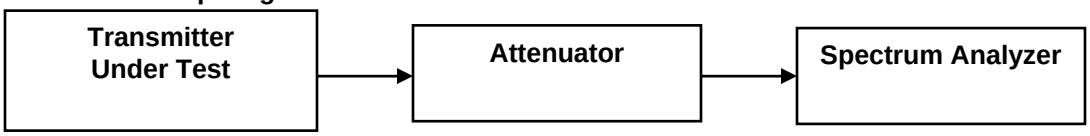
(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, 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.* 1 MHz 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

E.3. Test Method

The EUT was connected to a spectrum analyzer via a calibrated cable and attenuator assembly. Testing was done with the EUT operating in all modes at highest power level available and on low, mid and high channels with the worst case configurations being reported. All reported emissions are corrected for cable and attenuator losses.

E.4. Test Setup diagram



E.5. Test Results Summary

Compliant see plots on following pages and summary tables below

D.5.1 Cell Band

Channel	Mode	Note	Emission Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
1013	CDMA	Lower band edge	824.00	-13.61	-13.00	0.61
777	CDMA	Upper band edge	849.00	-13.82	-13.00	0.82
Note: The above are the worst case measurements, no other reportable emissions were detected within 20 dB to the limit in any of the modes.						

D.5.2 PCS Band

Channel	Mode	Note	Emission Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
25	CDMA	Lower band edge	1849.89	-28.38	-13.00	15.38
1175	CDMA	Upper band edge	1910.01	-28.23	-13.00	15.23
25	CDMA	Carrier 2nd Harmonic	3702.39	-26.98	-13.00	13.98
600	CDMA	Carrier 2nd Harmonic	3759.99	-23.42	-13.00	10.42
1175	CDMA	Carrier 2nd Harmonic	3818.45	-16.64	-13.00	3.64
1175	CDMA	Carrier 3rd Harmonic	5726.48	-35.60	-13.00	22.60
Note: 30 MHz to 1GHz sweeps were performed with 1GHz correction factor including cable and attenuator (worst case offset value), 1 GHz to 20 GHz sweeps were performed with 20 GHz offset value (worst case). Final measurements were performed with the offset values of the frequencies respectively.						

E.6. Test Data

See following pages for plots of band edge for all modes and spurious data to the 10th harmonic.

E.7. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Deniz Demirci
Function: Senior Wireless/EMC Technologist

E.8. Test date

Started: July 8, 2009 Ended: July 9, 2009

Figure 10 **Cell Band CDMA Channel 1013, 30 MHz to 1 GHz Conducted Spurious emissions**

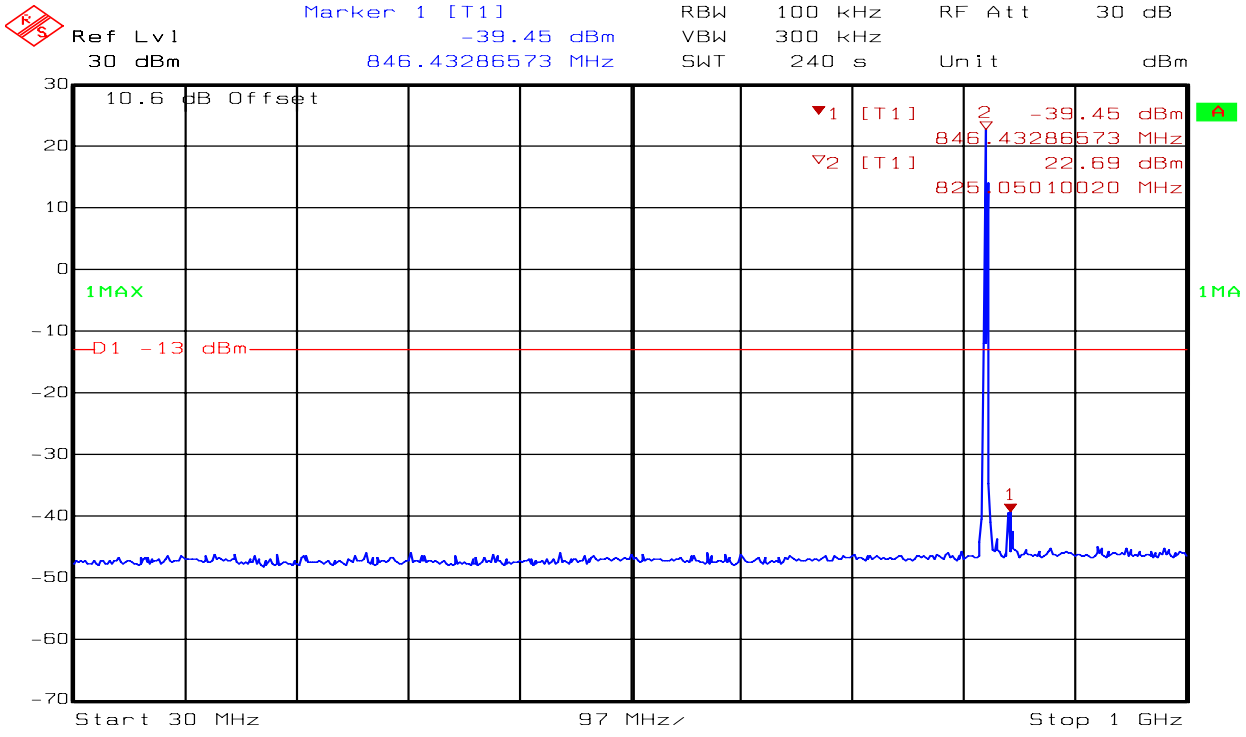


Figure 11 **Cell Band CDMA Channel 1013, 1 GHz to 10 GHz Conducted Spurious emissions**

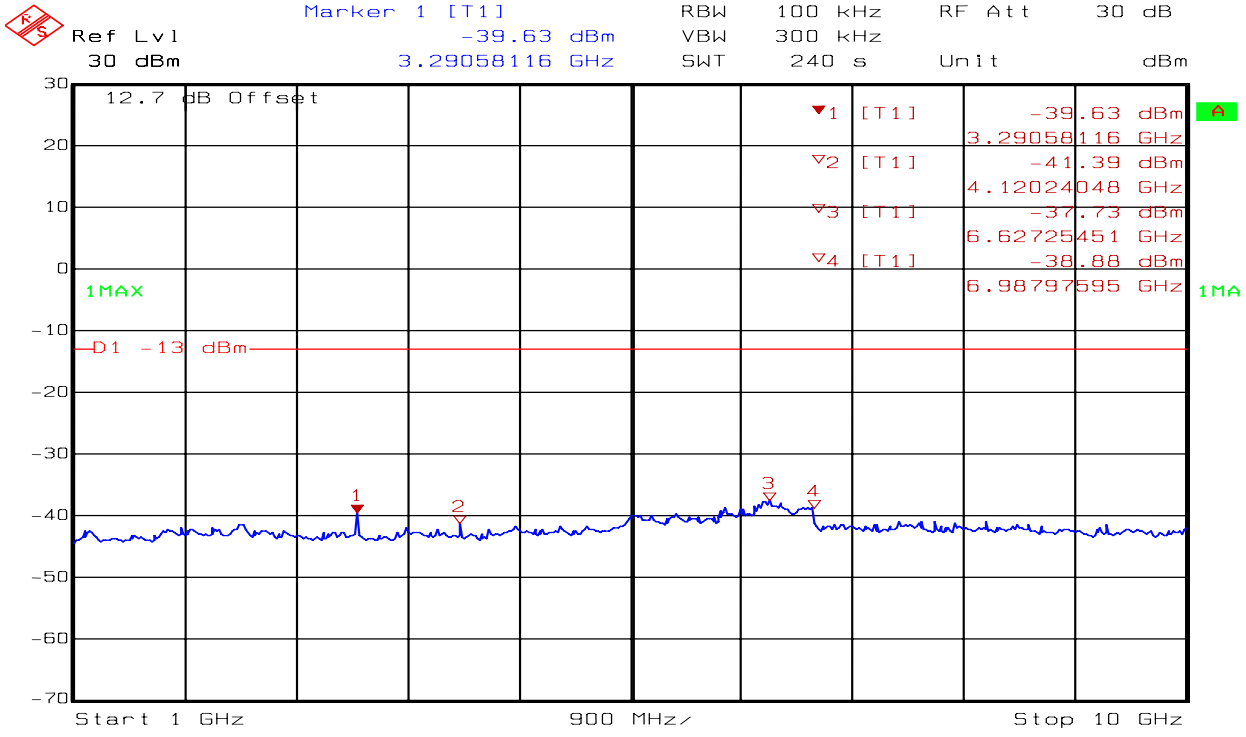
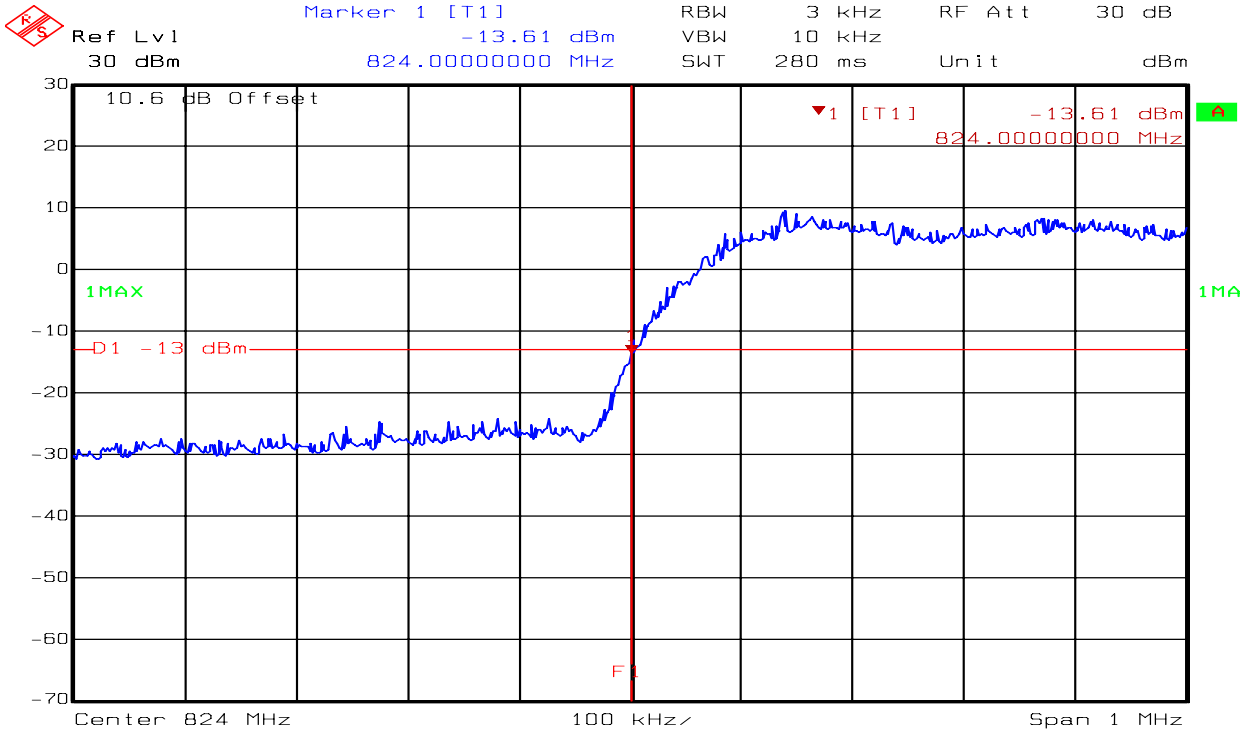
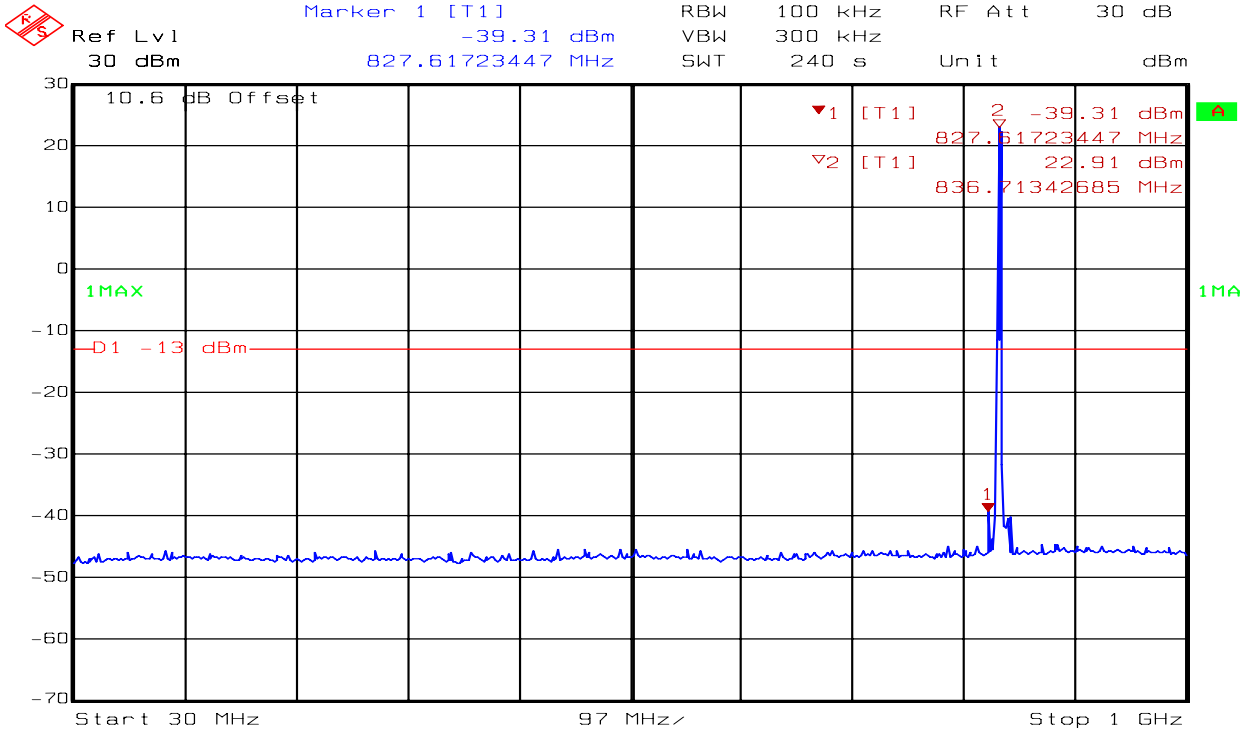


Figure 12 Cell Band CDMA Channel 1013, Lower Band Edge



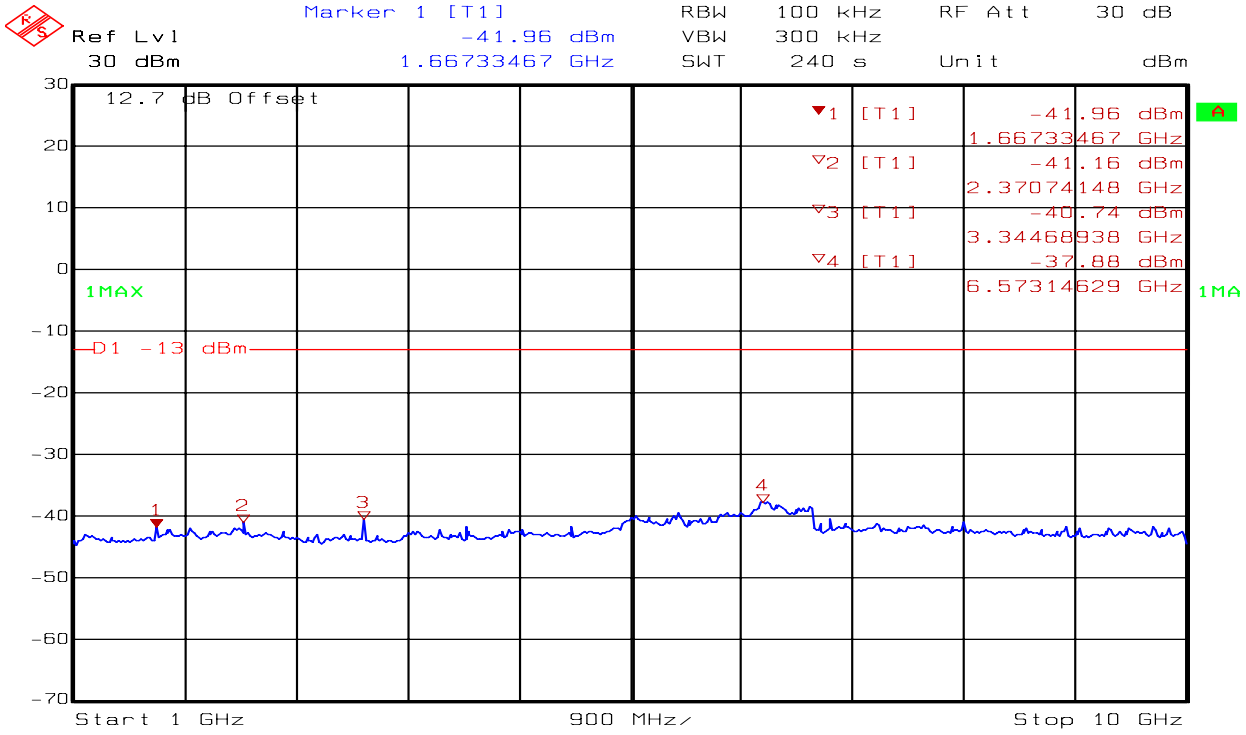
Title: CG-1253 Sendum Wireless ET300
Comment A: Cell Ch1013 CDMA 824.7MHz Rated max power
Date: 8.JUL.2009 14:33:16

Figure 13 Cell Band CDMA Channel 384, 30 MHz to 1 GHz Conducted Spurious emissions



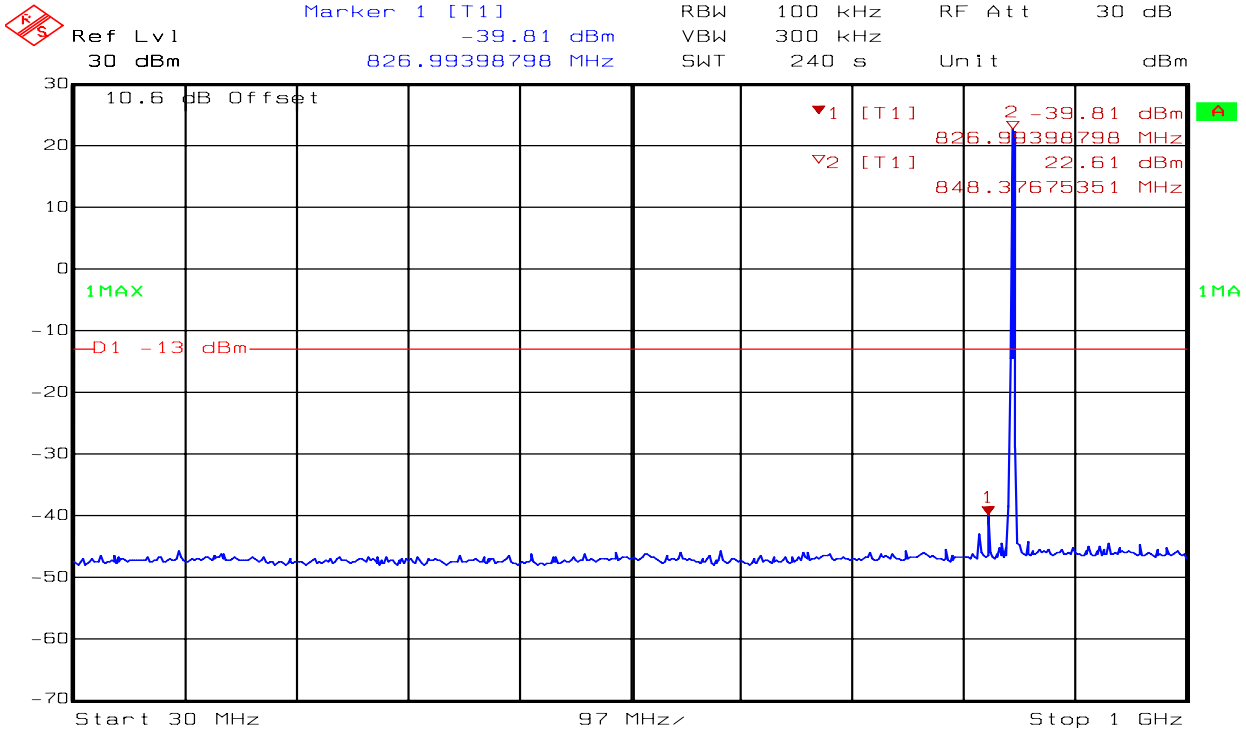
Title: CG-1253 Sendum Wireless ET300
Comment A: Cell Ch384 CDMA 836.52MHz Rated max power
Date: 9.JUL.2009 14:28:08

Figure 14 **Cell Band CDMA Channel 384, 1 GHz to 10 GHz Conducted Spurious emissions**



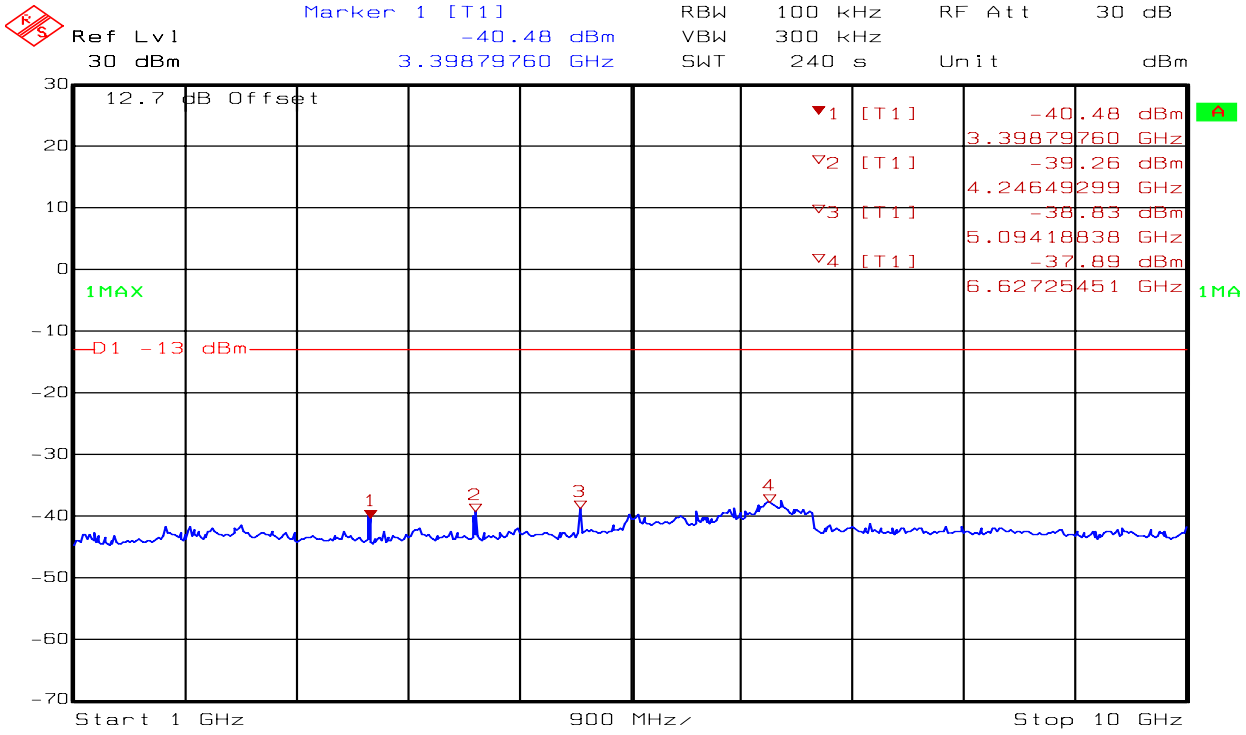
Title: CG-1253 Sendum Wireless ET300
Comment A: Cell Ch384 CDMA 836.52MHz Rated max power
Date: 9.JUL.2009 14:40:46

Figure 15 **Cell Band CDMA Channel 777, 30 MHz to 1 GHz Conducted Spurious emissions**



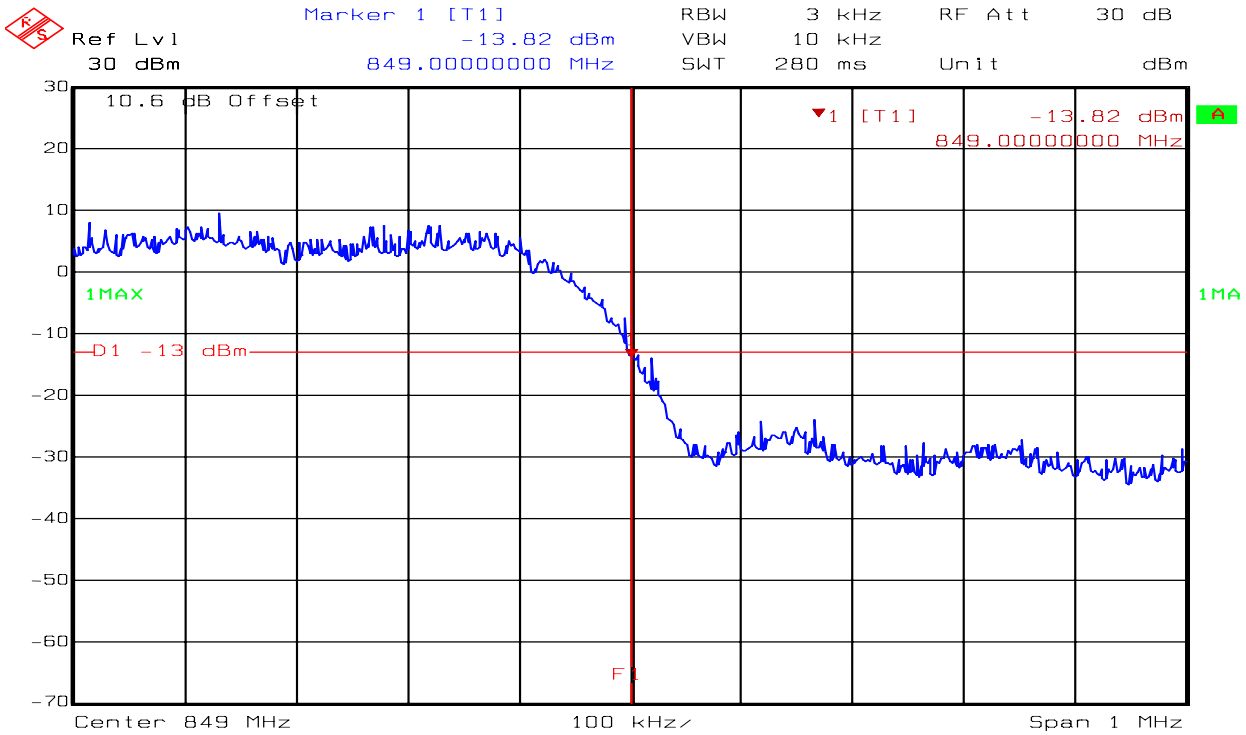
Title: CG-1253 Sendum Wireless ET300
Comment A: Cell Ch777 CDMA 848.31MHz Rated max power
Date: 9.JUL.2009 13:23:26

Figure 16 Cell Band CDMA Channel 777, 1 GHz to 10 GHz Conducted Spurious emissions



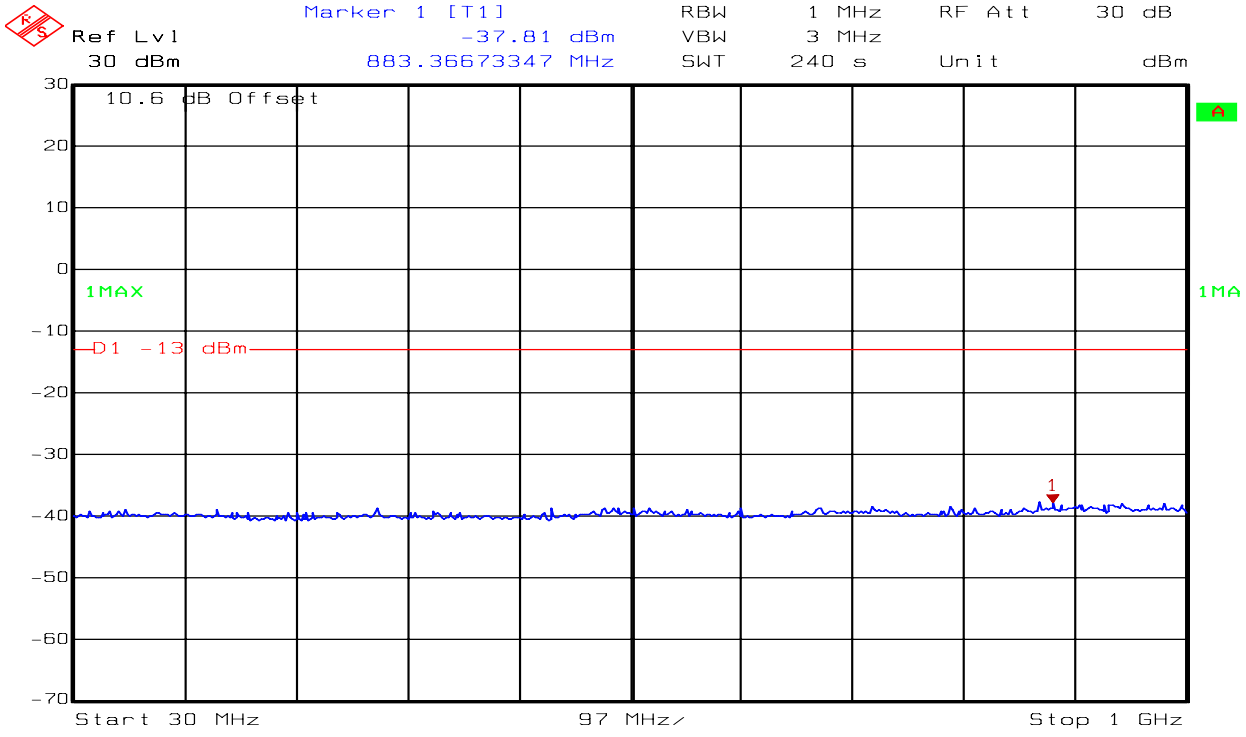
Title: CG-1253 Sendum Wireless ET300
Comment A: Cell Ch777 CDMA 848.31MHz Rated max power
Date: 9.JUL.2009 13:37:48

Figure 17 Cell Band CDMA Channel 777, Upper Band Edge



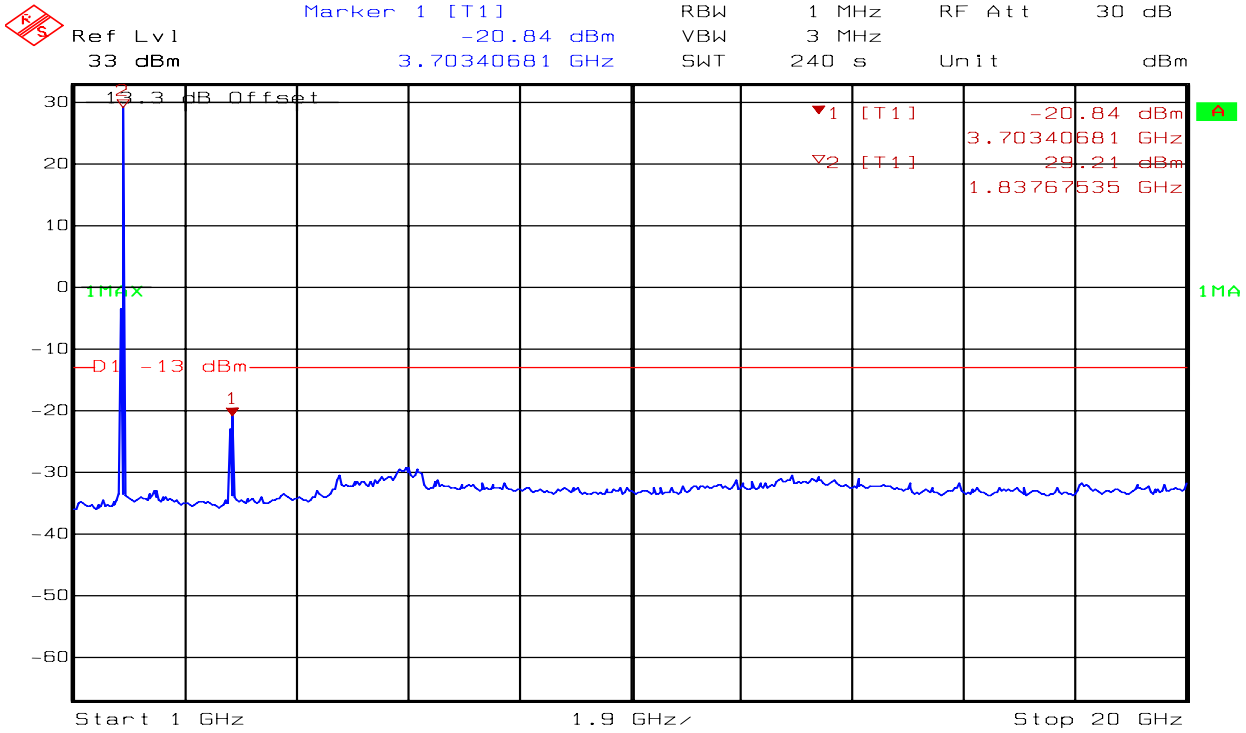
Title: CG-1253 Sendum Wireless ET300
Comment A: Cell Ch777 CDMA 848.31MHz Rated max power
Date: 9.JUL.2009 14:06:38

Figure 18 PCS Band CDMA Channel25, 30 MHz to 1 GHz Conducted Spurious emissions



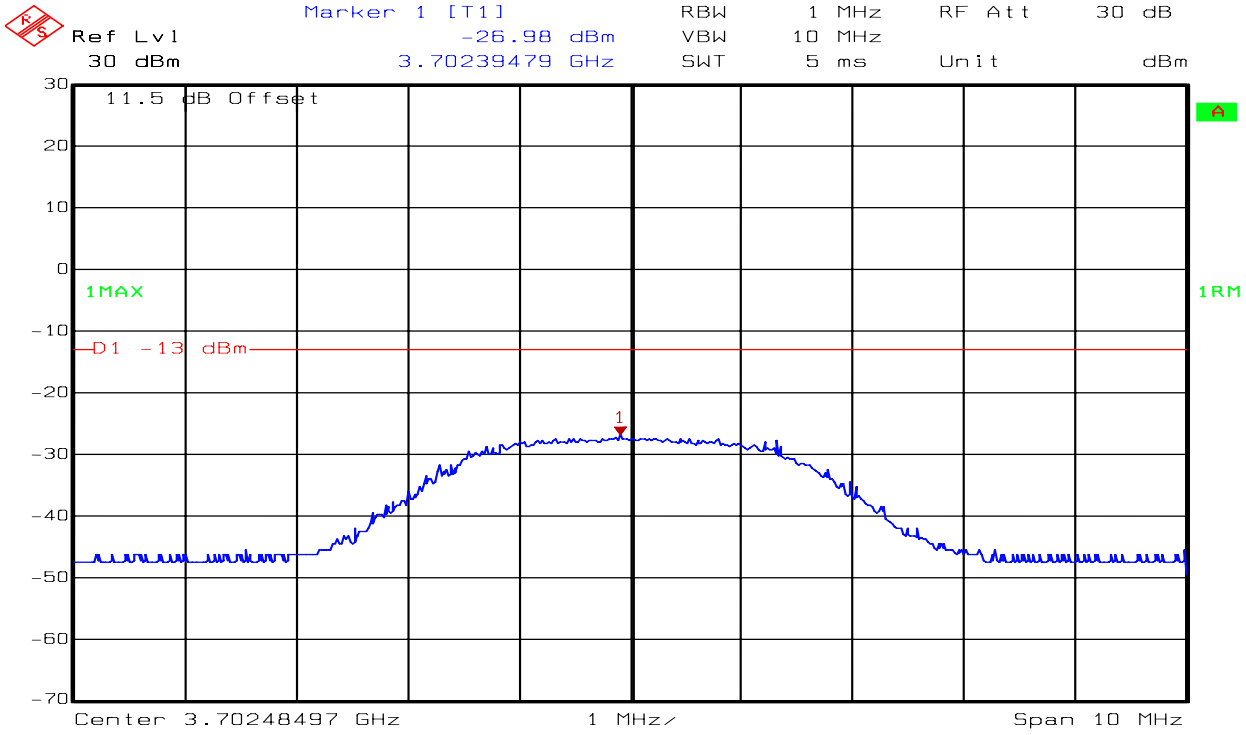
Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch25 CDMA 1851.25MHz Rated max power
Date: 9.JUL.2009 15:22:52

Figure 19 PCS Band CDMA Channel25, 1 GHz to 20 GHz Conducted Spurious emissions



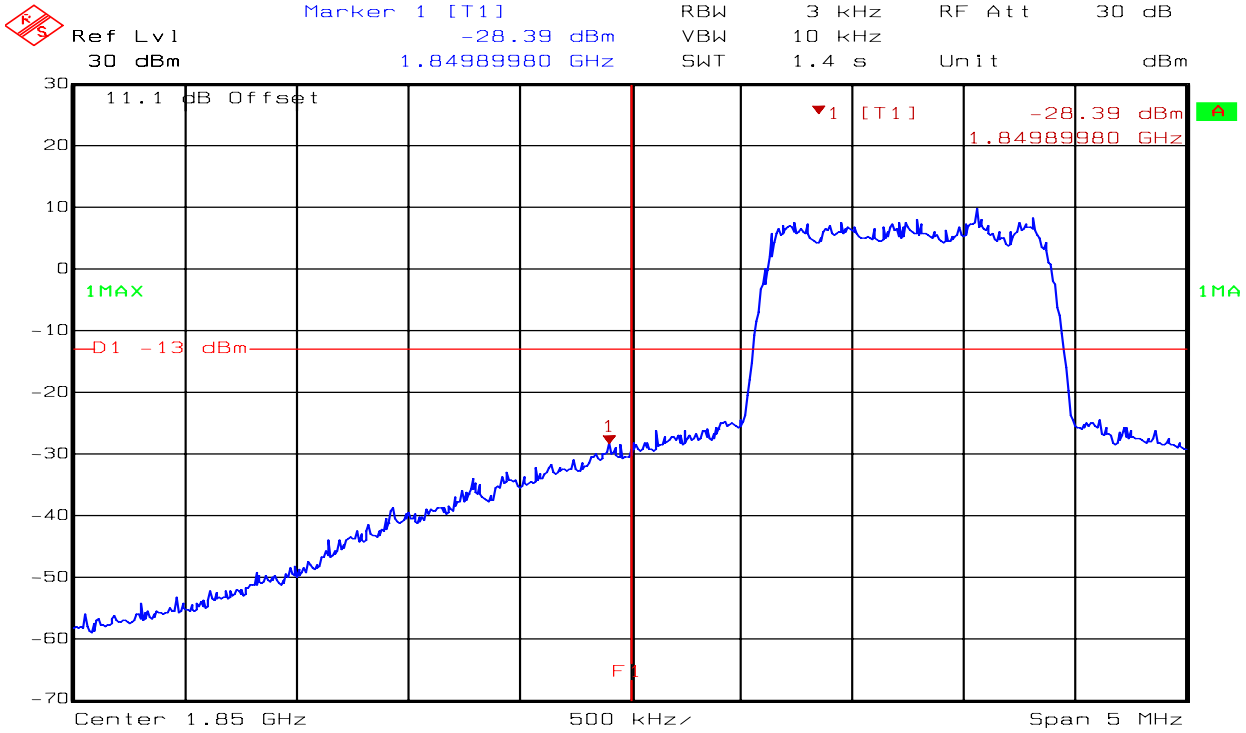
Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch25 CDMA 1851.25MHz Rated max power
Date: 9.JUL.2009 15:49:15

Figure 20 PCS Band CDMA Channel25, 3702 MHz Conducted Spurious emission



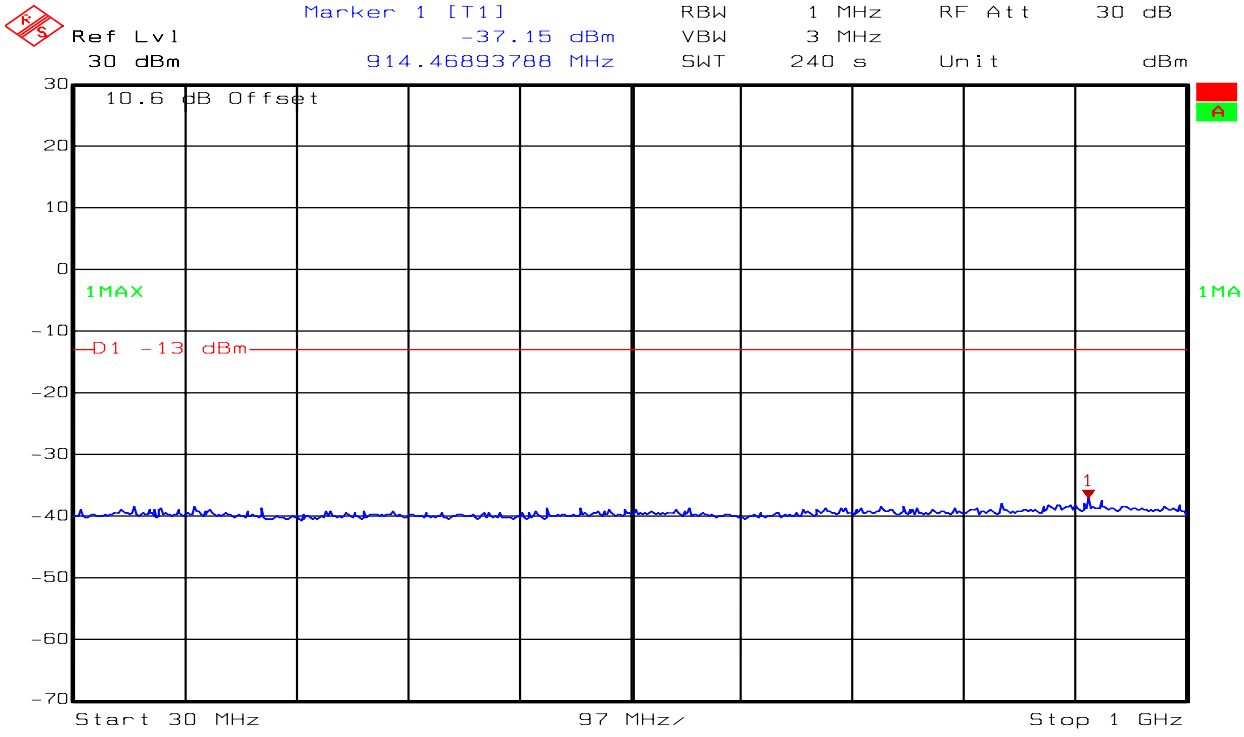
Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch25 CDMA 1851.25MHz Rated max power
Date: 9.JUL.2009 16:22:08

Figure 21 PCS Band CDMA Channel25, Lower Band Edge



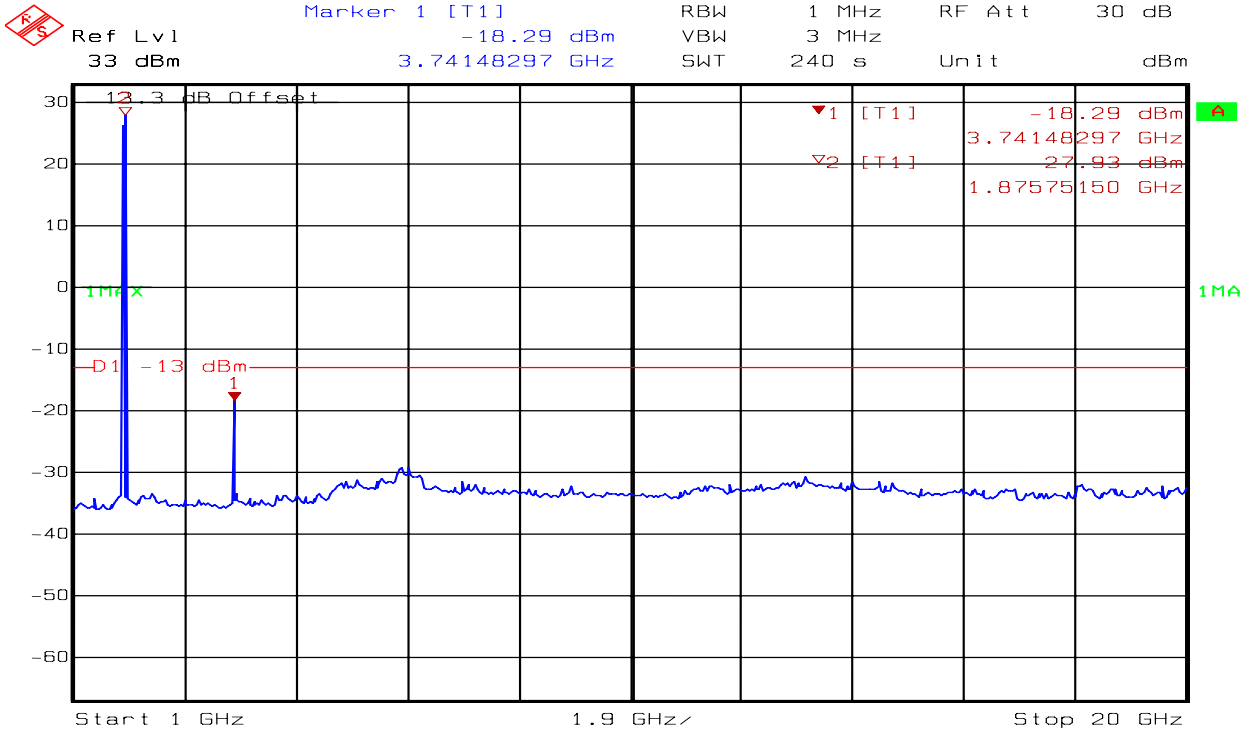
Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch25 CDMA 1851.25MHz Rated max power
Date: 9.JUL.2009 16:42:41

Figure 22 **PCS Band CDMA Channel600, 30 MHz to 1 GHz Conducted Spurious emissions**



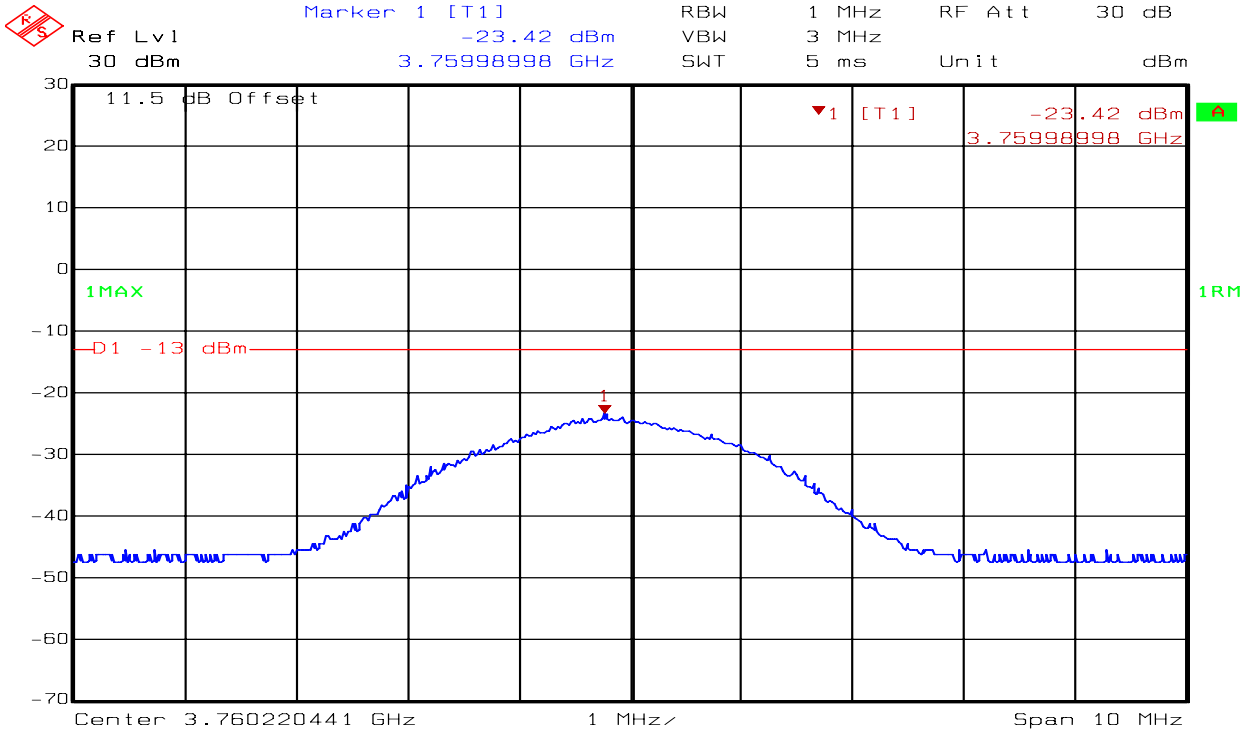
Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch600 CDMA 1880MHz Rated max power
Date: 9.JUL.2009 18:19:26

Figure 23 **PCS Band CDMA Channel600, 1 GHz to 20 GHz Conducted Spurious emissions**



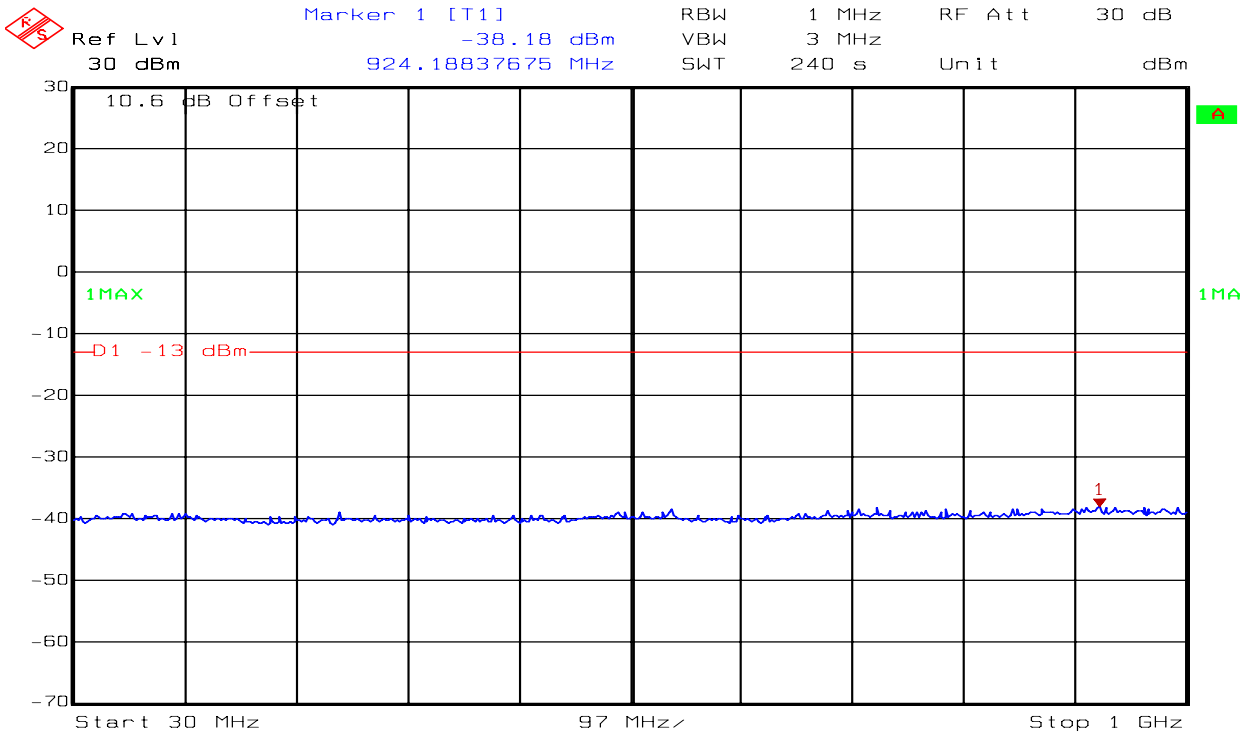
Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch600 CDMA 1880MHz Rated max power
Date: 9.JUL.2009 18:26:06

Figure 24 PCS Band CDMA Channel600, 3760 MHz Conducted Spurious emission



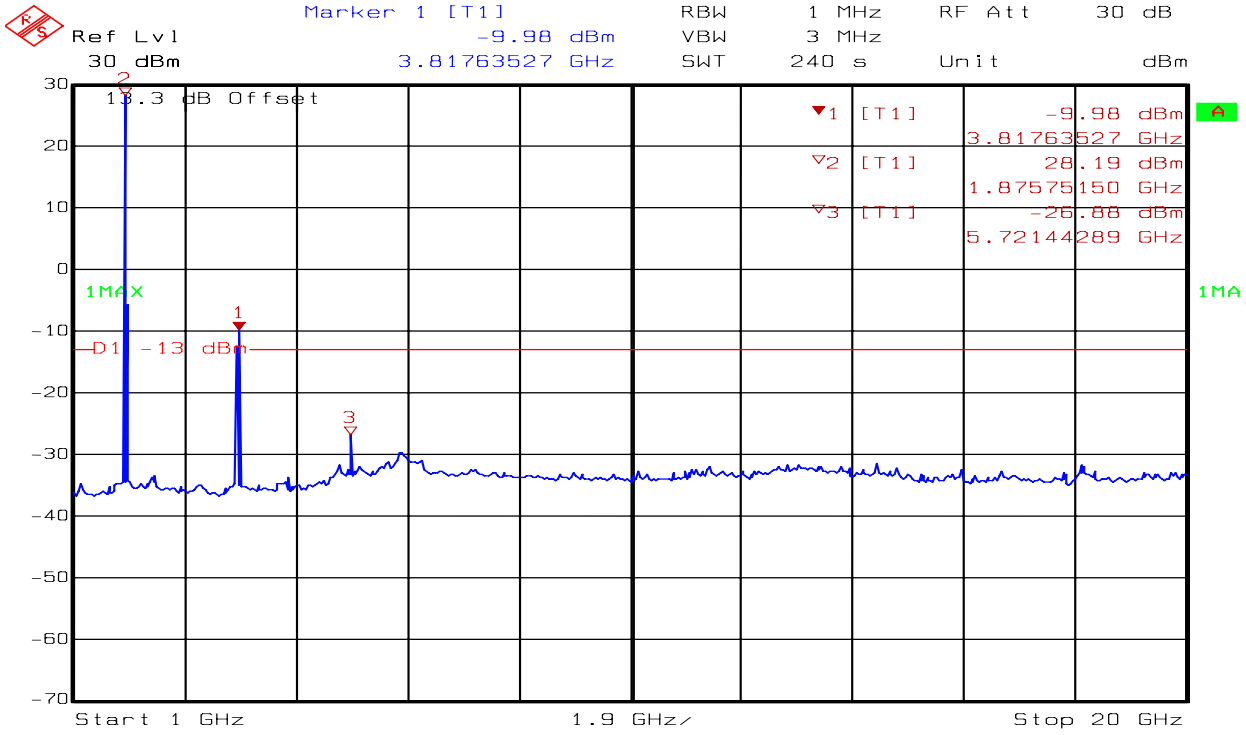
Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch600 CDMA 1880MHz Rated max power
Date: 9.JUL.2009 18:31:05

Figure 25 PCS Band CDMA Channel1175, 30 MHz to 1 GHz Conducted Spurious emissions



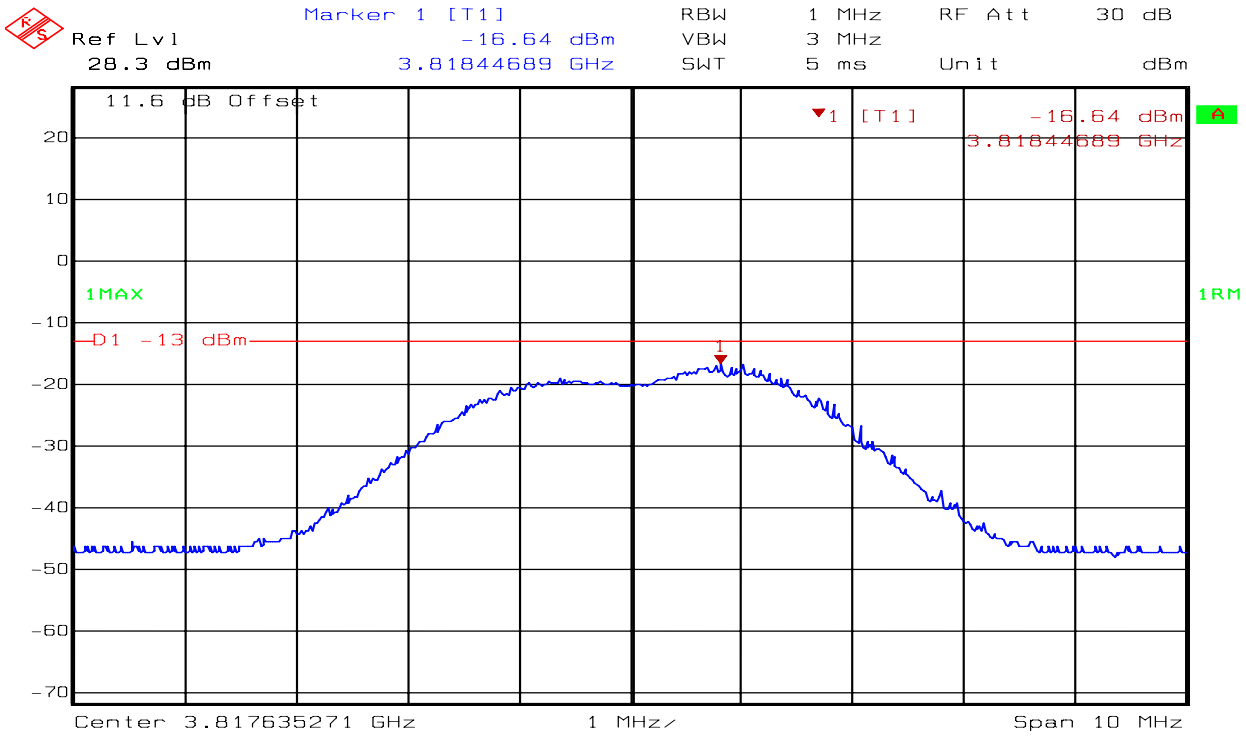
Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch1175 CDMA 1908.75MHz Rated max power
Date: 9.JUL.2009 20:41:58

Figure 26 PCS Band CDMA Channel1175, 1 GHz to 20 GHz Conducted Spurious emissions



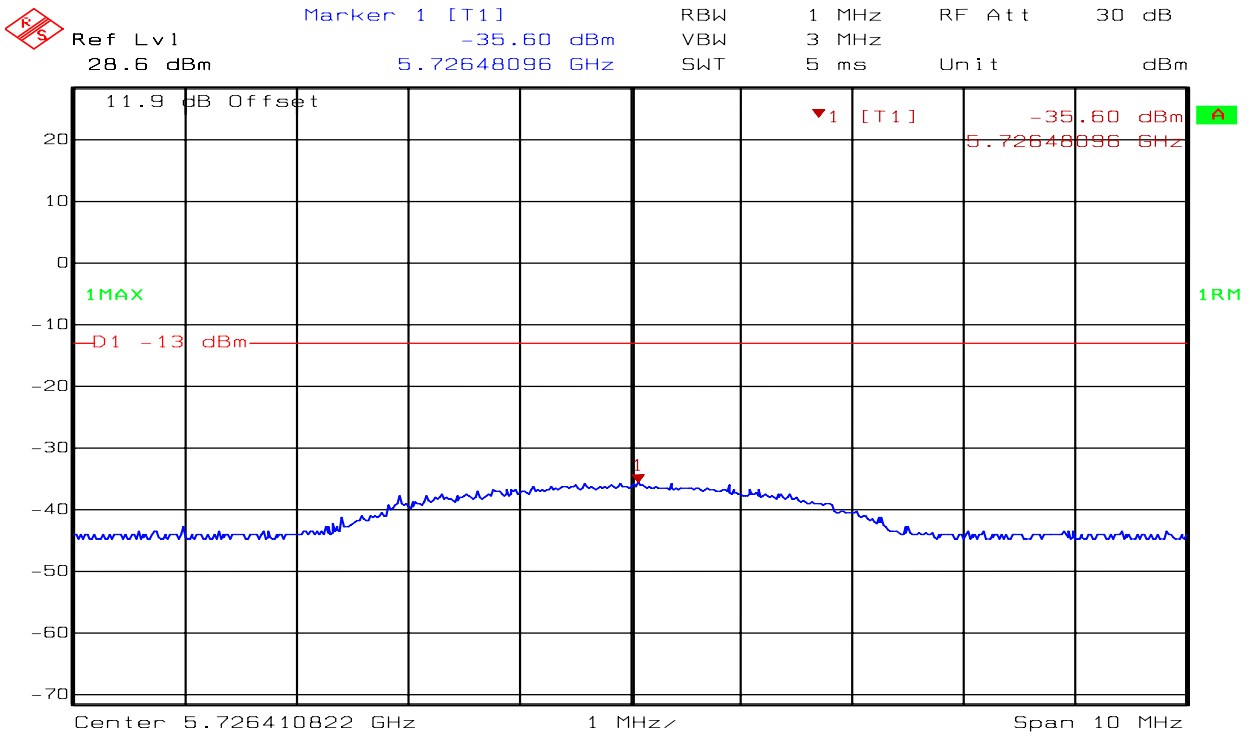
Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch1175 CDMA 1908.75MHz Rated max power
Date: 9.JUL.2009 20:26:24

Figure 27 PCS Band CDMA Channel1175, 3818 MHz Conducted Spurious emission



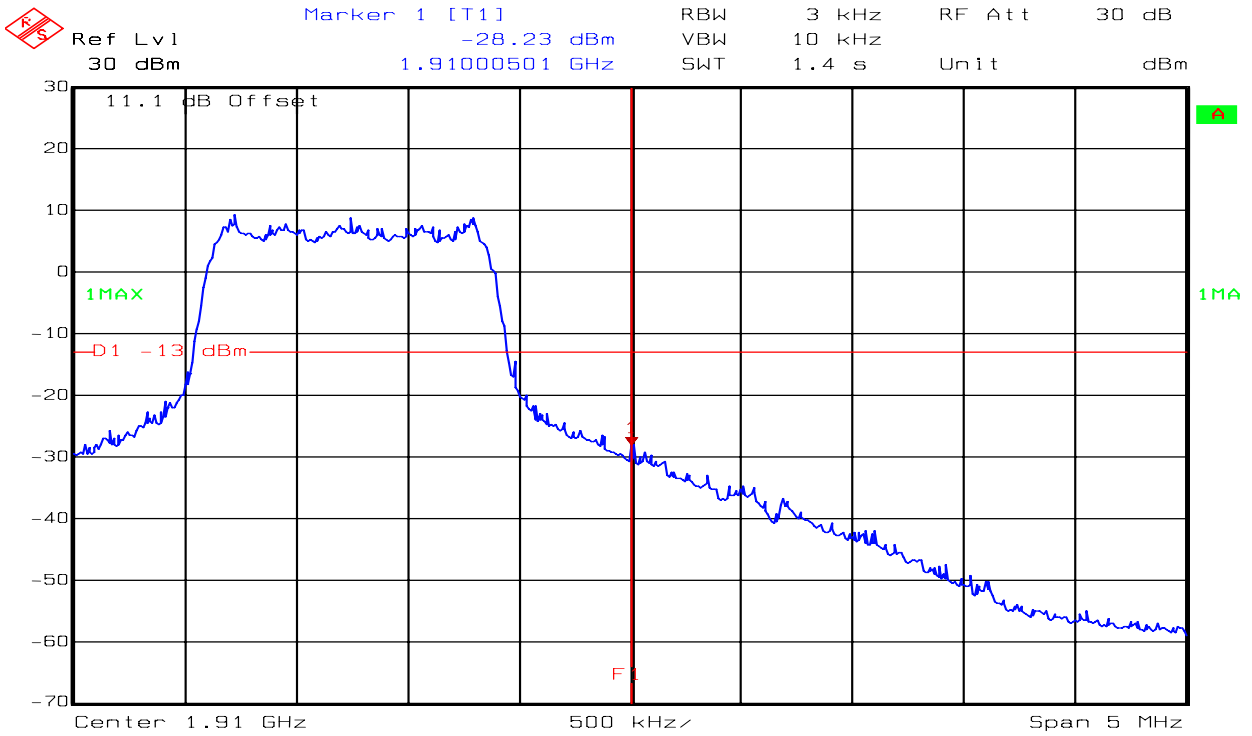
Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch1175 CDMA 1908.75MHz Rated max power
Date: 9.JUL.2009 20:29:11

Figure 28 PCS Band CDMA Channel1175, 5726 MHz Conducted Spurious emission



Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch1175 CDMA 1908.75MHz Rated max power
Date: 9.JUL.2009 20:35:27

Figure 29 PCS Band CDMA Channel1175 Upper Band Edge



Title: CG-1253 Sendum Wireless ET300
Comment A: PCS Ch1175 CDMA 1908.75MHz Rated max power
Date: 9.JUL.2009 20:14:30

APPENDIX F: RADIATED SPURIOUS EMISSIONS 30 MHZ – 20 GHZ

F.1. Base Standard & Test Basis

Base Standard	Cell Mode: FCC Part 22.917 PCS Mode: FCC Part 24.238,
Test Basis	FCC 2.1053
Test Method	TIA/EIA 603-C

F.2. Specifications

TX Spurious emissions

Cell Mode:

a) *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.

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. 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.

PCS Mode:

24.238 Emission limitations for Broadband PCS equipment.

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

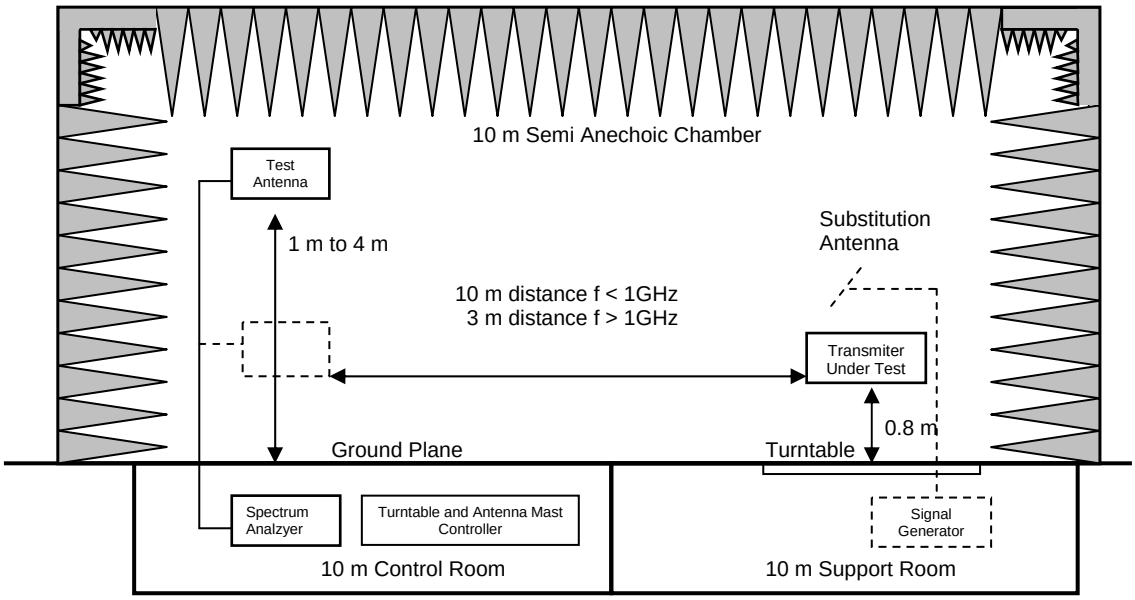
(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, 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.* 1 MHz 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

F.3. Test Method

TIA 603-C-2004 using signal substitution. The carrier signal is maximized for worst case power level and the maximum field strength is recorded. The EUT is replaced with a ½ wave dipole tuned to the frequency of interest driven by a signal source. The signal generator level is adjusted until the field strength level is equal to the field strength measured from the EUT. The signal generator level is recorded and corrected for cable losses and antenna gain to arrive at the final ERP/EIRP value. For all radiated measurements the peak power was reported using the following instrument settings:
SA Settings: RBW: 1 MHz, VBW: 3 MHz, Detector: Peak

F.4. Test Setup Diagram



F.5. Operating Mode During Test

The EUT was tested to determine worst case operating modes to produce maximum peak spurious emissions for the 3 orientations and high, mid, low channels of Cell band and PCS bands in CDMA mode The worst case results are reported in tables in section E.7

F.6. Test Results

Detected emissions in transmit mode are reported below.

E.6.1 Cell Band CDMA

Worst case spurious emission was detected at 4238.55 MHz vertical polarization which is the 5th harmonic of the carrier frequency of channel 777. It has 15.69 dB margin to the limit.

Channel	Frequency	Polarization	Measured Level (dBuV/m)	Substitution signal generator level (dBm)	Tx Antenna Gain (dBi)	Cable loss (dB)	ERP level (dBm)	Limit (dB)	Margin (dB)
1013	4123.54	H-pol	62.49	-42.70	10.13	2.13	-34.70	-13.00	21.70
	4123.52	V-pol	65.62	-39.50	10.13	2.13	-31.50	-13.00	18.50
	3298.84	H-pol	54.42	-51.50	9.90	1.86	-43.46	-13.00	30.46
	3298.83	V-pol	56.95	-49.50	9.90	1.86	-41.46	-13.00	28.46
	4951.88	H-pol	51.66	-54.30	11.05	2.36	-45.61	-13.00	32.61
	4951.79	V-pol	52.42	-53.30	11.05	2.36	-44.61	-13.00	31.61
384	4185.51	H-pol	57.82	-47.50	10.21	2.15	-39.44	-13.00	26.44
	4185.45	V-pol	59.89	-45.50	10.21	2.15	-37.44	-13.00	24.44
777	4241.53	H-pol	68.00	-37.50	10.28	2.17	-29.39	-13.00	16.39
	4238.55	V-pol	68.42	-36.80	10.28	2.17	-28.69	-13.00	15.69
	3393.28	H-pol	57.81	-47.20	9.43	1.89	-39.66	-13.00	26.66
	3392.43	V-pol	58.75	-46.80	9.43	1.89	-39.26	-13.00	26.26
	5086.38	H-pol	57.49	-47.50	11.16	2.39	-38.73	-13.00	25.73
	5086.44	V-pol	61.56	-44.50	11.16	2.38	-35.72	-13.00	22.72

E.6.2 PCS Band CDMA

Worst case spurious emission was detected at 3817.73 MHz vertical polarization which is the 2nd harmonic of the carrier frequency of channel 1175. It has 0.16 dB margin to the limit.

Channel	Frequency	Polarization	Measured Level(dBµV/m)	Substitution signal generator level (dBm)	Tx Antenna Gain (dBi)	Cable loss (dB)	EIRP level (dBm)	Limit (dB)	Margin (dB)
25	3702.30	H-Pol	73.05	-33.90	9.97	2.00	-25.93	-13.00	12.93
	3702.47	V-pol	72.56	-33.60	9.97	2.00	-25.63	-13.00	12.63
600	3760.52	H-pol	66.89	-39.90	9.98	2.02	-31.94	-13.00	18.94
	3759.47	V-pol	69.24	-37.50	9.98	2.02	-29.54	-13.00	16.54
1175	3818.16	H-pol	84.53	-21.30	9.98	2.04	-13.36	-13.00	0.36
	3817.73	V-pol	85.26	-21.10	9.98	2.04	-13.16	-13.00	0.16

F.7. Tested By

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name:	Deniz Demirci	Lixin Wang
Function:	Senior Wireless/EMC Technologist	EMC Technologist

F.8. Test date

Started: June 29, 2009 Ended: July 9, 2009

APPENDIX G: TEST EQUIPMENT LIST

Manufacturer	Type/Model		Serial #	Cal Due	Cal Date
Test Receiver	Rohde & Schwarz	ESMI	CG0433 CG0434	02APR09	02APR08
Bilog Antenna	Teseq	CBL 6112D	CG1177	10OCT09	10OCT07
HPIB Extender	HP	37204	CG0181	N/A	N/A
Mast Controller	EMCO	2090	CG0179		
Turntable Controller	EMCO	2090	CG0178		
Power Meter	Agilent	E4418B	CG0119	29JUL09	29JUL08
Power Meter Sensor	HP	8481A	CG0264	29JUL09	29JUL08
Temperature Chamber	Thermotron	SM-8C	CG0836	N/A	N/A
DC Power Supply	HP	6296A	CG0218		
Multimeter	Fluke	Fluke 87	CG0383	12FEB10	12FEB09
Attenuator	Weinschel	30 dB	CG0751	N/A	N/A
Horn Antenna (RX) 1 GHz – 18 GHz	EMCO	3115	CG0368	23AUG09	23AUG07
Horn Antenna (TX) 1 GHz – 18 GHz	EMCO	3115	CG0103	06MAR11	06MAR09
Standard Gain Horn (Rx) 18 GHz – 26.5 GHz	EMCO	3160-09	CG0075	N/A	N/A
High pass filter F > 1000 MHz	MicroTronics	HPM14576	CG0963		
High pass filter F > 2800 MHz	MicroTronics	HPM50111	CG0964		
LNA 1 GHz - 18 GHz	Miteq	JSD00121	CG0317		
LNA 18 GHz - 26.5 GHz	Miteq	JSD00119	CG0482		
Spectrum Analyzer 9 kHz – 40 GHz	Rohde & Schwarz	FSEK-20	CG0118	01AUG09	01JUL08
LNA DC Power Supply	Xantrex	LXO 30-2	CG0493	N/A	N/A
HPIB Extender	HP	37204	CG0110		
Turntable and Mast Controller	EMCO	2090	CG0161		
Dipole Antenna Set	EMCO	3121C	CG-0104	18FEB10	18FEB09

END OF DOCUMENT