TEST REPORT

of

FCC Part 22, 24, 2, 1
IC RSS-GEN, RSS-132, RSS-133,RSS-102

FCC ID : PKRNVWE760
IC : 3229B-E760

Equipment Under Test	:	PCI EXPRESS MINI CARD
Model Name	:	E760
Serial No.	:	N/A
Applicant	:	Novatel Wireless Inc.
Manufacturer	:	LG Innotek Co., Ltd.
Date of Test(s)	:	2008-12-15 ~ 2008-12-19
Date of Issue	:	2008-12-22

In the configuration tested, the EUT complied with the standards specified above.

Tested By: **Date:** **2008-12-22**

Feel Jeong

Approved By: **Date:** **2008-12-22**

Charles Kim

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1. General Information

1-1. Testing Laboratory

SGS Testing Korea Co., Ltd.
Wireless Div. 2FL, 18-34, Sanbon-dong, Gunpo-Si, Gyeonggi-do, Korea 435-040
www.electrolab.kr.sgs.com
Telephone : +82 +31 428 5700
FAX : +82 +31 427 2371

1-2. Details of Applicant

Applicant	:	Novatel Wireless Inc.
Address	:	9645 Scranton Road, Suite 205, San Diego, California, United States
Contact Person	:	Todd Gallagher
Phone No.	:	82-1-403-681-8483
Fax No.	:	82-1-403-295-4801

1-3. Manufacturer Information

Applicant	:	LG Innotek Co., Ltd.
Address	:	338-15, Chupal-ri, Pangsung-up, Pyungtaik-si, Gyeonggi-do, 451-805, South Korea

1-4. Description of EUT

Kind of Product	PCI EXPRESS MINI CARD
Model Name	E760
Serial Number	N/A
Power Supply	DC 3.3 V
Frequency Range	TX: 824.70 ~ 848.31 MHz, 1851.25 ~ 1908.75 MHz RX: 869.70 ~ 893.31 MHz, 1931.25 ~ 1988.75 MHz
Transmit Power	CDMA : ERP 27.37 dBm (545.76 mW) US PCS :EIRP 25.50 dBm (354.81 mW)
Modulation Technique	OQPSK, QPSK
Number of Channels	20 CH for CDMA, 48 CH for US PCS
Operating Conditions	-30℃~60 ℃
Antenna Type	Connector type

1-5. Details of modification

-N/A

1-6. Test Equipment List

EQUIPMENT	MANUFACTURER	MODEL	CAL DUE.
Signal Generator	Agilent	E4438C	May 09 2009
Spectrum Analyzer	Agilent	E4440A	May 09 2009
Spectrum Analyzer	H.P	8593E	May 09 2009
Power Meter	Agilent	E4416A	May 09 2009
Power Sensor	Agilent	E9327A	May 09 2009
DC Power Supply	Agilent	6674A	May 09 2009
Test Receiver	Rohde & Schwarz	ESVS10	Mar. 21 2009
Ultra-Broadband Antenna	Rohde & Schwarz	HL562	Oct. 02 2009
Horn Antenna	Rohde & Schwarz	HF906	Nov. 13 2009
Dipole Antenna	VHAP/UHAP	975/958	Jan. 18 2010
Communication Antenna	AR	AT 4002	N/A
Band Reject Filter	Wainwright	WRCG824/849-814/85960/10SS	May 09 2009
Highpass Filter	Wainwright	WHK3.0/18G-10SS	Dec. 01 2009
Mobile Test Unit	Agilent	E5515C	May 09 2009

EQUIPMENT	MANUFACTURER	MODEL	CAL DUE.
Preamplifier	Agilent	8449B	May 09 2009
Preamplifier	Agilent	8447F	Sep. 03 2009
Power Amplifier	Empower RF System, Inc.	2001-BBS3Q7ECK	May 09 2009
Dual Directional Coupler	Agilent	778D	Feb. 04 2009
Anechoic Chamber	SY Corporation	L x W x H 9.6 m x 6.4 m x 6.4 m	Feb. 15 2009

1.7. Summary of Test Results

APPLIED STANDARD: FCC Part 2,22, 24/IC RSS-GEN, RSS-132, RSS-133,RSS-102			
Section in IC RSS-GEN, RSS-132, RSS-133	**Section in FCC Part 2,22,24**	**Test Item**	**Result**
RSS-GEN, Section 4.8 RSS-132, Section 4.4 RSS-133, Section 6.4	§22.913(a) §24.232(c)	RF Radiated Output Power	Complied
RSS-GEN, Section 4.9 RSS-132, Section 4.5 RSS-133, Section 6.5	§22.917(a) §24.238(a)	Field Strength of Spurious Radiation	Complied
RSS-GEN, Section 4.8	§2.1046	Conducted Output Power	Complied
RSS-GEN, Section 4.6.1	§2.1049	Occupied Bandwidth 26dB	Complied
RSS-GEN, Section 4.9 RSS-132 Section 4.5 RSS-133 Section 6.3 and 6.5	§22.917(a) §24.238(a)	Spurious Emission at Antenna Terminal	Complied
RSS-GEN, Section 4.7 RSS-132 Section 4.3 RSS-133 Section 6.3	§2.1055(a)&(d)	Frequency Stability	Complied
-	§22.917(a) §24.238(a)	Band Edge	Complied
RSS-GEN, Section 7.2.2	-	AC Powerline Conducted Emissions	N/A
RSS-GEN, Section 7.2.3	-	Radiated Emissions	Complied
RSS-GEN,RSS-102	1.1307(b)	RF exposure evaluation	Complied

1.9. Test Report Revision

Revision	Report number	Description
0	F690501/RF-RTL002835	Initial

2. RF Radiated Output Power

2.1. Limit

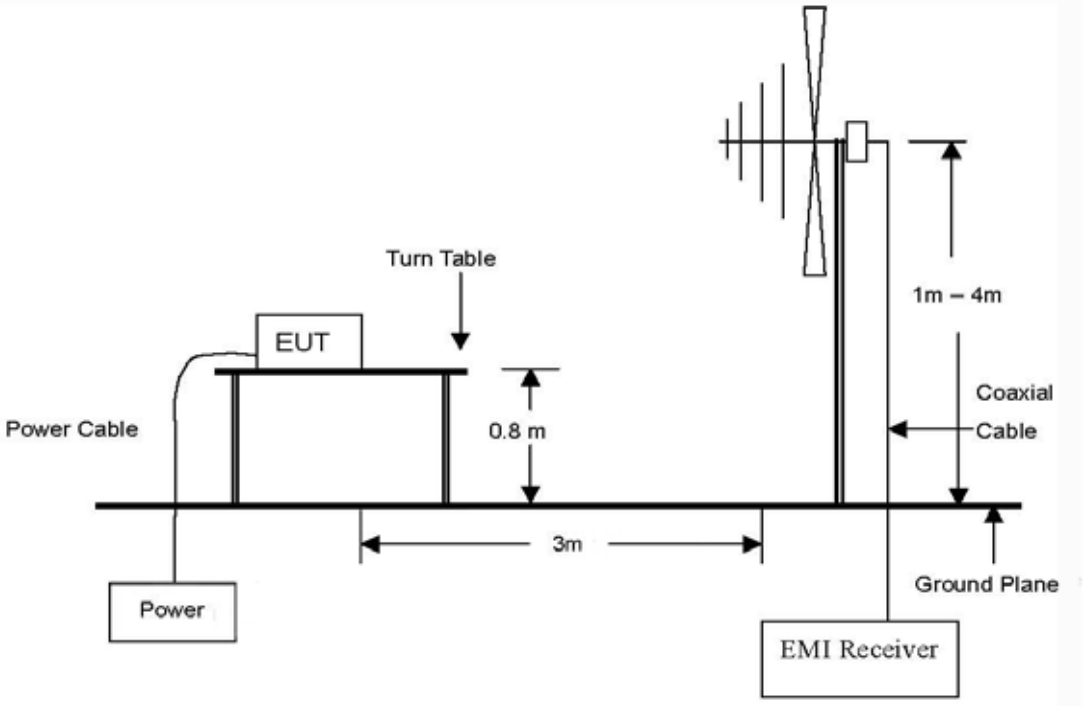
§22.913(a), the ERP of mobile transmitters must not exceed 7 watts.

§24.232(c) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

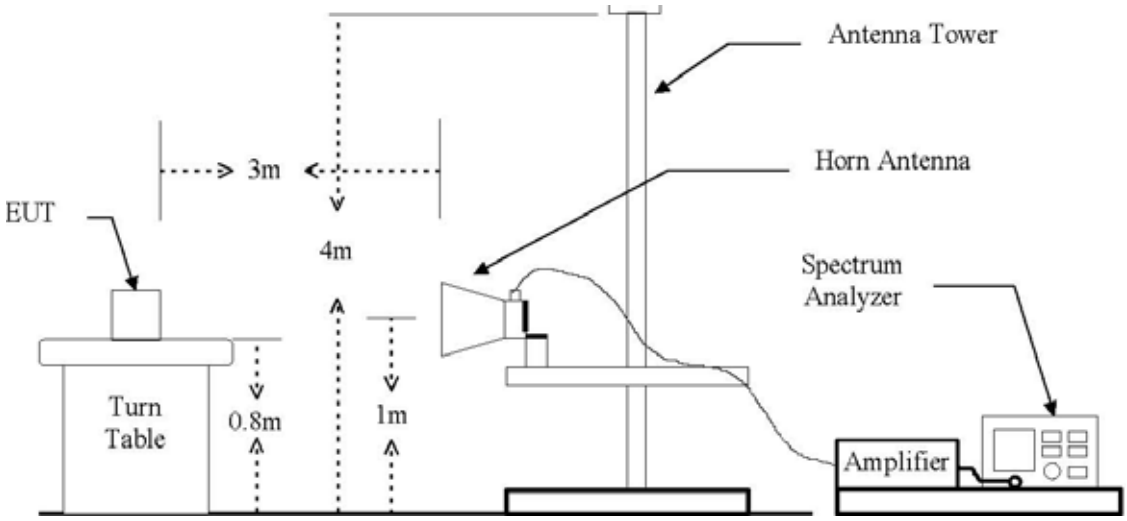
2.2. Test Procedure: Based on ANSI/TIA 603C: 2004

1. On a test site, the EUT shall be placed at 80cm height on a turn table, and in the position closest to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 4m from EUT to correspond to the frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
5. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
6. The transmitter shall then the rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
8. The maximum signal level detected by the measuring receiver shall be noted.
9. The transmitter shall be replaced by a horn (substitution antenna).
10. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna(dipole antenna) shall be adjusted to correspond to the frequency of the transmitter.
11. The substitution antenna shall be connected to a calibrated signal generator.
12. In necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase he sensitivity of the measuring receiver.
13. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
14. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring received, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
15. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
16. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
17. The measure of the effective radiated power is the large of the two levels recorded, at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
18. The ERP/EIRP(Effective Isotropic Radiated Power) test under 1x EVDO, Rev A (CDMA 800), 1x EVDO, Rev A (PCS1900).

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 18 GHz Emissions.



2.3. Test Results

Ambient temperature : 48 ℃
Relative humidity : 50 %R.H.

ERP: CDMA 800

Frequency (MHz)	Ant. Pol. (H/V)	C.L (dB)	S.G. Reading +Amp (dBm)	Antenna Gain (dBd)	E. R. P.	
					(dBm)	(mW)
824.700	H	0.62	27.94	-10.44	16.88	48.75
	V	0.62	37.64	-10.44	26.58	454.99
836.520	H	0.64	27.98	-10.45	16.89	48.87
	V	0.64	38.46	-10.45	27.37	545.76
848.310	H	0.56	26.62	-10.53	15.53	35.73
	V	0.56	37.74	-10.53	26.65	462.38

EIRP: PCS 1900

Frequency (MHz)	Ant. Pol. (H/V)	C.L (dB)	S.G. Reading +Amp (dBm)	Antenna Gain (dBi)	E. I. R. P.	
					(dBm)	(mW)
1851.25	H	0.99	6.88	8.79	14.68	29.38
	V	0.99	16.28	8.79	24.08	255.86
1880.00	H	0.97	4.71	8.90	12.64	18.37
	V	0.97	15.48	8.90	23.41	219.28
1908.75	H	1.14	7.06	9.00	16.92	31.05
	V	1.14	17.64	9.00	25.50	354.81

Remake: 1. ERP/EIRP= SG Reading +Amp-C.L. +Gain

3. Field Strength of Spurious Radiation

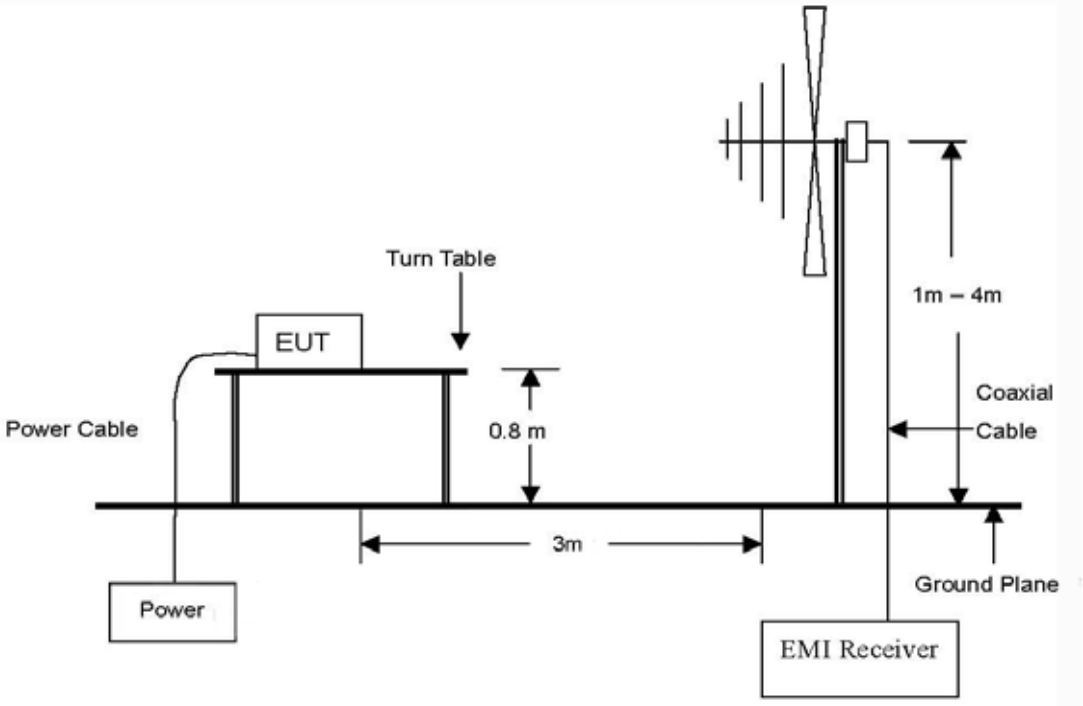
3.1. Limit

§ 22.917(a) and §24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency must be attenuated below the transmitting (P) by a factor of at least 43+10log(P)dB.

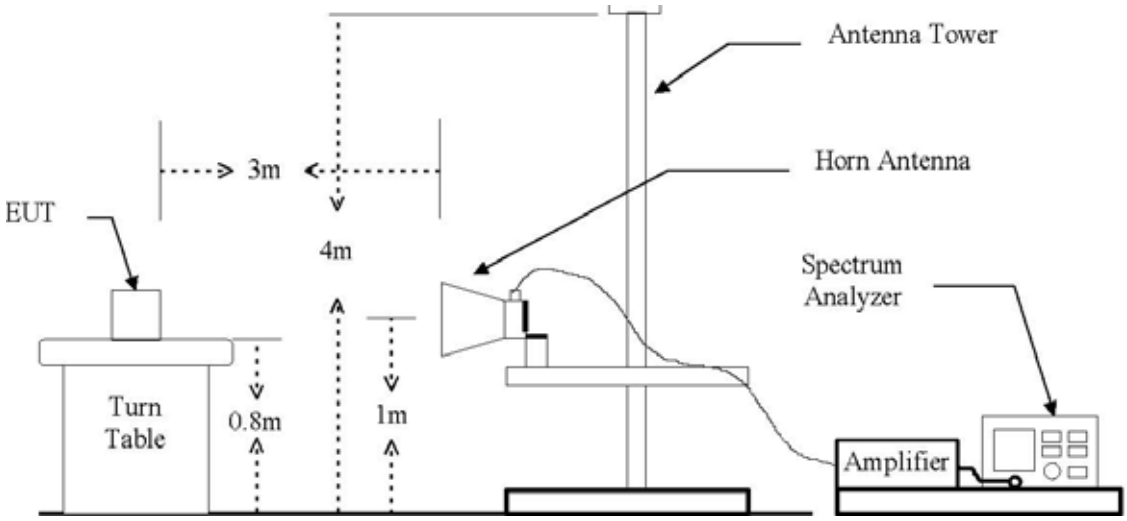
3.2. Test Procedure

1. On a test site, the EUT shall be placed at 0.8cm height on a turn table, and in the position closest to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3m from EUT to correspond to the frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
5. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
6. The transmitter shall then the rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
8. The maximum signal level detected by the measuring receiver shall be noted.
9. The transmitter shall be replaced by a horn (substitution antenna).
10. The substitution antenna(dipole antenna) shall be orientated for vertical polarization and the length of the substitution antenna(dipole antenna) shall be adjusted to correspond to the frequency of the transmitter.
11. The substitution antenna shall be connected to a calibrated signal generator.
12. In necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase he sensitivity of the measuring receiver.
13. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
14. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring received, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
15. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
16. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
17. The measure of the effective radiated power is the large of the two levels recorded, at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary
18. Spurious radiated emission was tested under 1x EVDO, Rev A (CDMA 800), 1x EVDO, Rev A (PCS1900).

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 18 GHz Emissions.



3.3. Test Result

Ambient temperature : 48 ℃
Relative humidity : 50 %R.H.

CDMA 800

Frequency (MHz)	Ant.Pol. (H/V)	S.G. reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
TX LOW channel (824.70 MHz)								
1649.40	H	-56.22	1.03	8.08	5.93	-51.32	-13.00	38.32
	V	-48.34	1.03	8.08	5.93	-43.44	-13.00	30.44
2474.10	H	-60.31	1.16	9.91	7.76	-53.71	-13.00	40.71
	V	-58.06	1.16	9.91	7.76	-51.46	-13.00	38.46
TX MID Channel (836.52 MHz)								
1673.04	H	-57.94	0.98	8.10	5.95	-52.97	-13.00	39.97
	V	-51.47	0.98	8.10	5.95	-46.50	-13.00	33.50
2509.56	H	-60.47	1.19	9.92	7.77	-53.89	-13.00	40.89
	V	-57.75	1.19	9.92	7.77	-50.24	-13.00	37.24
TX HIGH Channel (848.31 MHz)								
1696.62	H	-53.60	0.91	8.25	6.10	-48.41	-13.00	35.41
	V	-45.55	0.91	8.25	6.10	-40.36	-13.00	27.36
2544.93	H	-59.61	1.24	10.00	7.85	-53.00	-13.00	40.00
	V	-57.37	1.24	10.00	7.85	-50.76	-13.00	35.61

Remake: 1. No more harmonic above 3th harmonic for all channel.
2. ERP= SG Reading –Cable Loss +Gain

PCS 1900

Frequency (MHz)	Ant.Pol. (H/V)	S.G. reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)
TX LOW channel (1851.25 MHz)								
3702.50	H	-55.25	2.37	11.20	9.05	-46.42	-13.00	33.42
	V	-50.58	2.37	11.20	9.05	-41.75	-13.00	28.75
5553.75	H	-52.63	2.96	11.50	9.35	-44.09	-13.00	31.09
	V	-53.36	2.96	11.50	9.35	-44.82	-13.00	31.82
TX MID Channel (1880.00 MHz)								
3760.00	H	-50.19	2.33	11.25	9.10	-41.27	-13.00	28.27
	V	-47.77	2.33	11.25	9.10	-38.85	-13.00	25.85
5640.00	H	-53.07	3.06	11.56	9.41	-44.57	-13.00	31.57
	V	-53.19	3.06	11.56	9.41	-44.69	-13.00	31.69
TX HIGH Channel (1908.75 MHz)								
3817.50	H	-48.90	2.36	11.31	9.16	-39.95	-13.00	26.95
	V	-45.89	2.36	11.31	9.16	-36.94	-13.00	23.94
5726.25	H	-53.28	3.16	11.63	9.48	-44.81	-13.00	31.81
	V	-53.10	3.16	11.63	9.48	-44.63	-13.00	31.63

Remake: 1. No more harmonic above 3th harmonic for all channel.
2. EIRP= SG Reading –Cable Loss +Gain

4. Conducted Output Power

4.1. Limit

FCC §22.913(a), the ERP of mobile transmitters must not exceed 7 watts. FCC §24.232(c) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

4.2. Test Procedure

1xRTT

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

2. The Agilent 8960 Test Set has the following procedure.
 - Call Setup >Shift & Preset - Protocol Rev >6 (IS-2000-0)
 - Radio Config.(RC)>RC 1(Fwd1, Rvs1)
 - Traffic Data Rate > Full - Cell Info > Cell Parameters >Primary Ch (357:CDMA, 27:PCS 1900)

3. Once “Active Cell” show “ Connected” then change “Rvs. Power Ctrl” from “ Active bits” to "All Up bits” to get the maximum power**.**

1xEV-DO Release 0

FTAP

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

2. The Agilent 8960 Test Set has the following procedure.
 - Call Setup >Shift & Preset - Protocol Rev >0 (1xEV-DO)
 - Application Config > Enhanced Test Application Protocol > FTAP
 -FTAP Rate > 307.2 kbps (2 Slot, QPSK)
 - Cell Info > Cell Parameters >Primary Ch (357:CDMA, 27:PCS 1900)

3.Once “Section open” show “ Connected” then change “Rvs. Power Ctrl” from “ Active bits” to "All Up bits” to get the maximum power**.**

RTAP

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

2. The Agilent 8960 Test Set has the following procedure.
- Call Setup >Shift & Preset - Protocol Rev >0 (1xEV-DO)
- Application Config > Enhanced Test Application Protocol > RTAP
-RTAP Rate > 153.6
- Cell Info > Cell Parameters >Primary Ch (357:CDMA, 27:PCS 1900)

3.Once “Section open” show “ Connected” then change “Rvs. Power Ctrl” from “ Active bits” to "All Up bits” to get the maximum power**.**

1xEV-DO Release 0

FETAP

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

2. The Agilent 8960 Test Set has the following procedure.
- Call Setup >Shift & Preset - Protocol Rev >A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > FETAP
-FTAP Rate > 307.2 kbps (2 Slot, QPSK)
- Cell Info > Cell Parameters >Primary Ch (357:CDMA, 27:PCS 1900)

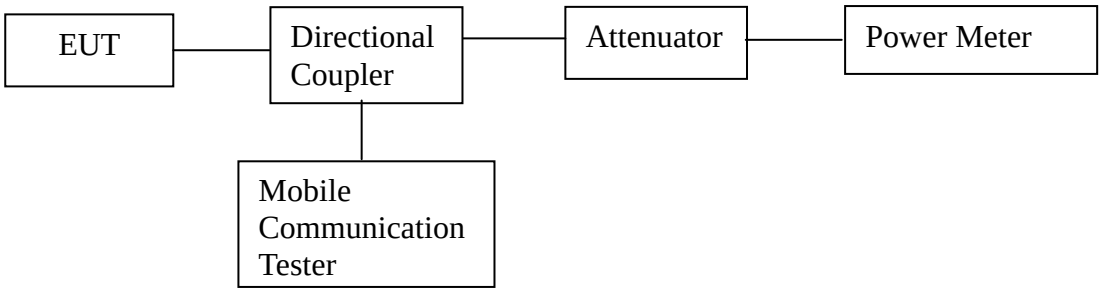
3.Once “Section open” show “ Connected” then change “Rvs. Power Ctrl” from “ Active bits” to "All Up bits” to get the maximum power**.**

RETAP

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

2. The Agilent 8960 Test Set has the following procedure.
- Call Setup >Shift & Preset - Protocol Rev > A (1xEV-DO-A)
- Application Config > Enhanced Test Application Protocol > RETAP
- F-Traffic Format > 4 (1024,2,2,128) Canonical(307.2k, QPSK)
- R-Data Pkt Size > 4096 (for PCS band), 12288(for Cellular band)
- Cell Info > Cell Parameters >Primary Ch (357:CDMA, 27:PCS 1900)

3.Once “Section open” show “ Connected” then change “Rvs. Power Ctrl” from “ Active bits” to "All Up bits” to get the maximum power**.**



4.3. Test Results

Ambient temperature : 26 ℃
Relative humidity : 51 %R.H.

CDMA2000 1XRTT

Radio configuration	Service option	Output power (dBm)			
		Cellular band @ Middle ch		PCS band @ Middle ch	
		av	peak	av	peak
RC1 (Fwd1, Rvs1)	1(Voice)				
	2(Loopback)	24.24	28.83	23.75	27.54
	3(Voice)				
	55(Loopback)	24.17	28.81	23.68	27.52
RC2 (Fwd2, Rvs2)	9(Loopback)	24.08	28.70	23.75	27.56
	17(Voice)				
	55(Loopback)	24.33	28.86	23.69	27.54
RC3 (Fwd3, Rvs3)	1(Voice)				
	2(Loopback)	24.17	28.23	23.70	27.40
	3(Voice)				
	55(Loopback)	24.16	28.31	23.70	27.23
	32(+F-SCH)	24.16	28.31	23.65	27.41
	32(+SCH)	24.22	28.42	23.69	27.35
RC4 (Fwd4, Rvs4)	1(Voice)				
	2(Loopback)	24.19	28.45	23.74	27.31
	3(Voice)				
	55(Loopback)	24.16	28.26	23.58	27.24
	32(+F-SCH)	24.07	28.38	23.82	27.59
	32(+SCH)	24.18	28.42	23.73	27.44
RC5 (Fwd5, Rvs5)	9(Loopback)	24.23	28.42	23.46	27.20
	17(Voice)				
	55(Loopback)	24.21	28.37	23.78	27.40

Release 0 Cellular Band - RTAP

Channel	F(MHz)	RTAP rate	Conducted power (dBm)	
			Average	Peak
384	836.52	9.6	24.03	29.09
		19.2	24.02	28.90
		38.4	23.99	28.88
		76.8	23.98	28.99
		153.6	24.01	28.72

Release 0 Cellular Band - FTAP

Channel	F(MHz)	FTAP rate	Conducted power (dBm)	
			Average	Peak
384	836.52	307.2 kbps (2 slot, QPSK)	23.92	29.00

Release 0 PCS Band - RTAP

Channel	F(MHz)	RTAP rate	Conducted power (dBm)	
			Average	Peak
600	1880	9.6	23.66	27.52
		19.2	23.80	27.51
		38.4	23.81	27.52
		76.8	23.82	27.52
		153.6	23.83	27.53

Release 0 PCS Band - FTAP

Channel	F(MHz)	FTAP rate	Conducted power (dBm)	
			Average	Peak
600	1880	307.2 kbps (2 slot, QPSK)	23.68	27.54

Release A Cellular Band - RTAP

Channel	F(MHz)	RTAP rate	Conducted power (dBm)	
			Average	Peak
384	836.52	128	23.90	29.05
		256	24.11	29.07
		512	24.11	29.07
		768	24.15	29.14
		1024	24.13	29.05
		1536	24.11	29.09
		2048	24.11	29.01
		3072	24.17	29.25
		4096	24.18	29.28
		6144	24.17	29.38
		8192	**24.19**	**29.43**
		12288	24.15	29.25

Release A Cellular Band - FTAP

Channel	F(MHz)	FTAP rate	Conducted power (dBm)	
			Average	Peak
384	836.52	307.2 kbps (2 slot, QPSK)	24.08	29.17
		307.2 kbps (2 slot, QPSK)	24.03	29.09

Release A PCS Band - RTAP

Channel	F(MHz)	RTAP rate	Conducted power (dBm)	
			Average	Peak
600	1880	128	23.59	27.65
		256	23.63	27.66
		512	23.79	27.67
		768	23.84	27.63
		1024	23.79	27.52
		1536	23.78	27.56
		2048	23.76	27.50
		3072	23.73	27.68
		4096	23.88	27.66
		6144	23.96	27.70
		8192	23.96	27.70
		12288	**23.97**	**27.72**

Release A PCS Band - FTAP

Channel	F(MHz)	FTAP rate	Conducted power (dBm)	
			Average	Peak
600	1880	307.2 kbps (2 slot, QPSK)	23.85	27.70
		307.2 kbps (2 slot, QPSK)	23.73	27.53

The transmitter has a maximum peak conducted output

CDMA 800

Channel	Modulation	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (W)
LOW	1x EVDO, Rev A	824.70	28.73	747	7
MIDDLE		836.52	29.43	877	7
HIGH		848.31	28.87	770	7

PCS 1900

Channel	Modulation	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (mW)	Limit (W)
LOW	1x EVDO, Rev A	1851.25	27.04	506	2
MIDDLE		1880.00	27.72	592	2
HIGH		1908.75	27.98	628	2

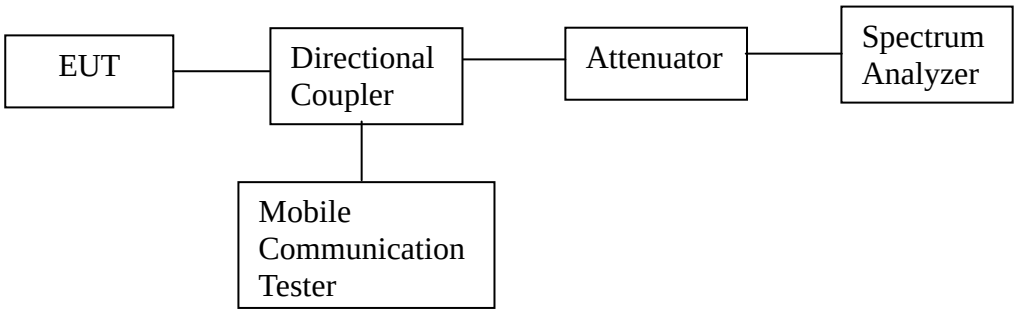
5. Occupied Bandwidth 26 dB

5.1. Limit

Requirements: CFR 47, Section §2.1049.

5.2. Test Procedure

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 30 kHz.
   Occupied Bandwidth 26dB was tested under



6.3 Test Results

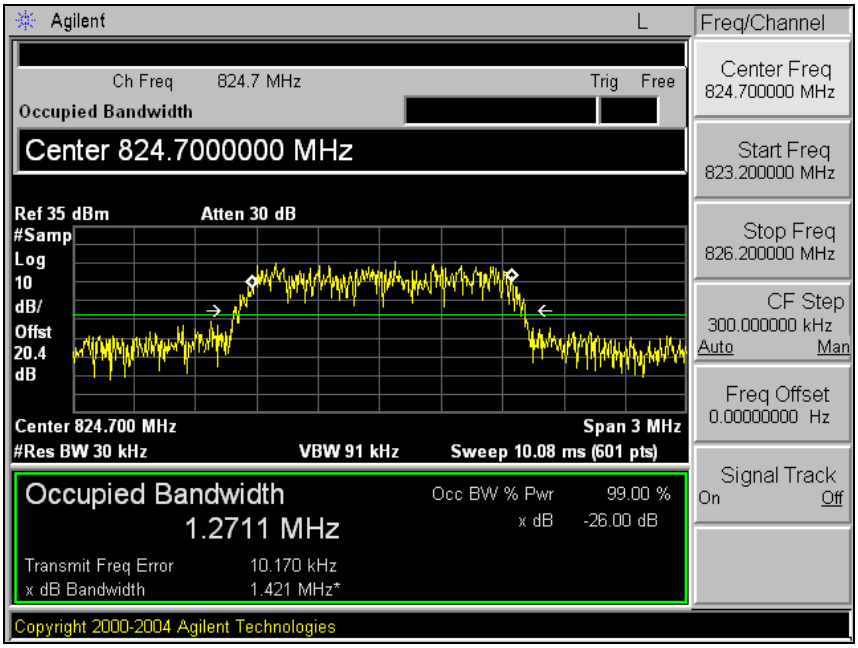
Ambient temperature	:	26	℃
Relative humidity	:	51	%R.H.

CDMA 800

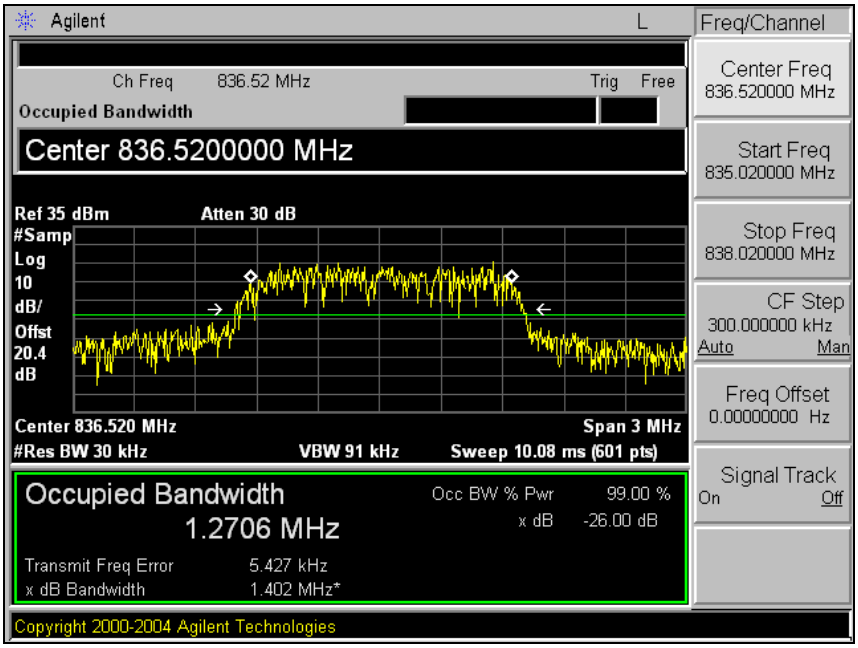
Channel	Frequency(MHz)	-26 dB Bandwidth(MHz)
Low(1013)	824.70	1.421
Middle(384)	836.52	1.402
High(777)	848.31	1.381

Please refer to the following plots.

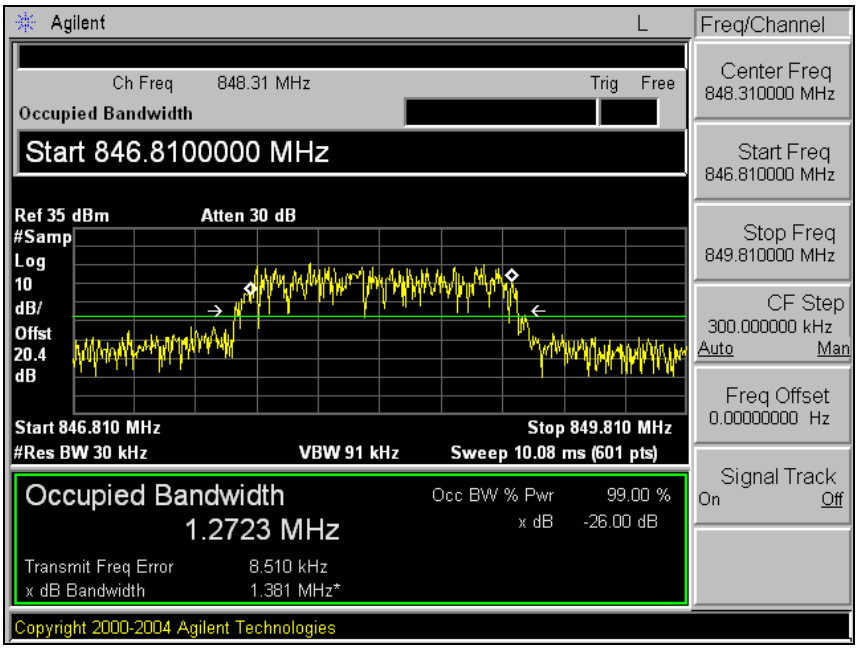
Low Channel



Middle Channel



High Channel

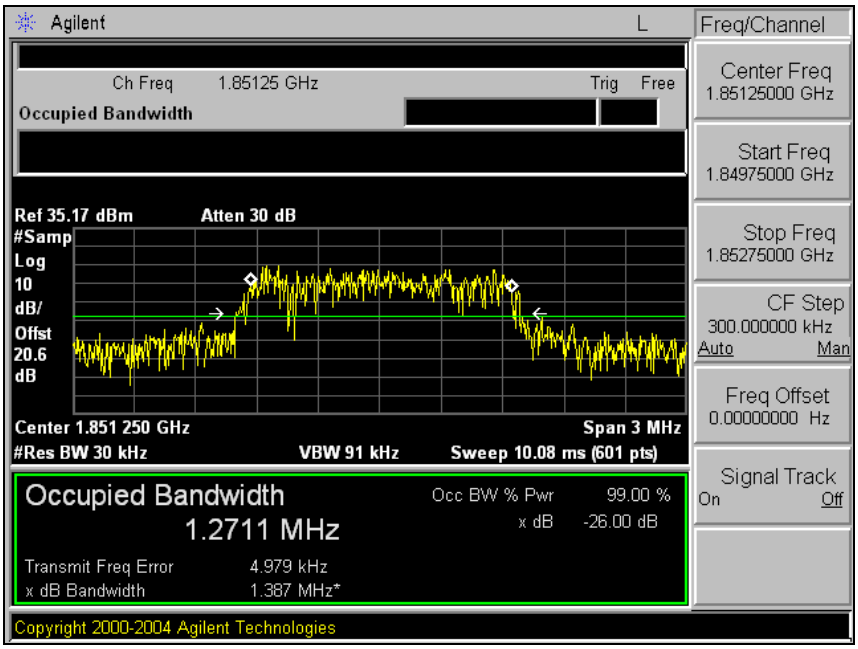


PCS 1900

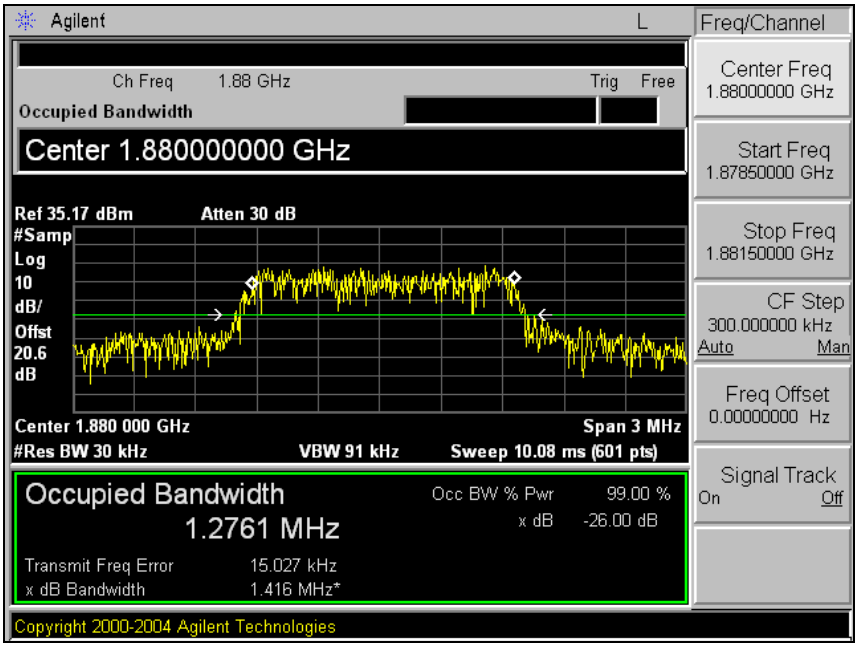
Channel	Frequency(MHz)	-26 dB Bandwidth(MHz)
LOW	1851.25	1.387
MIDDLE	1880.00	1.416
HIGH	1908.75	1.419

Please refer to the following plots.

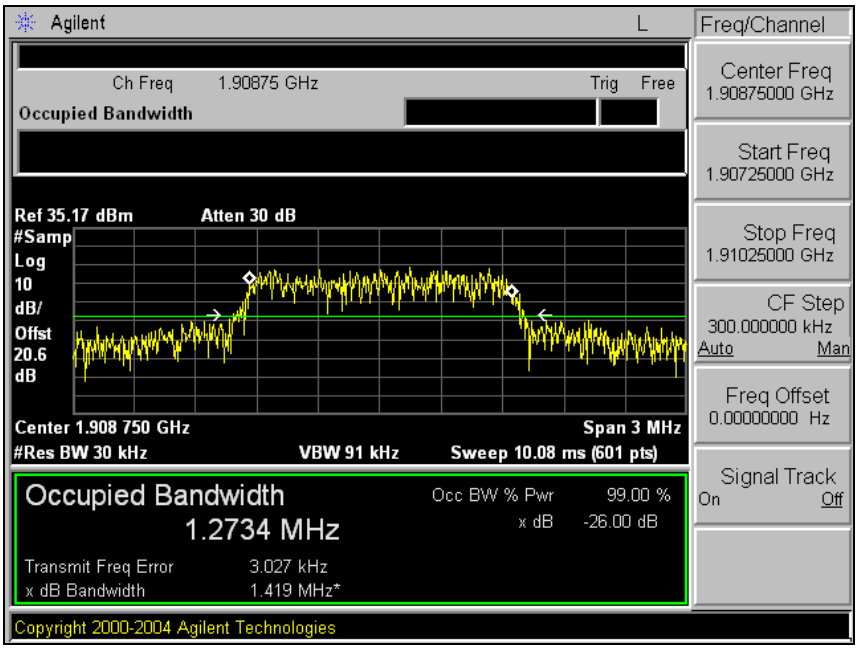
Low Channel



Middle Channel



High Channel



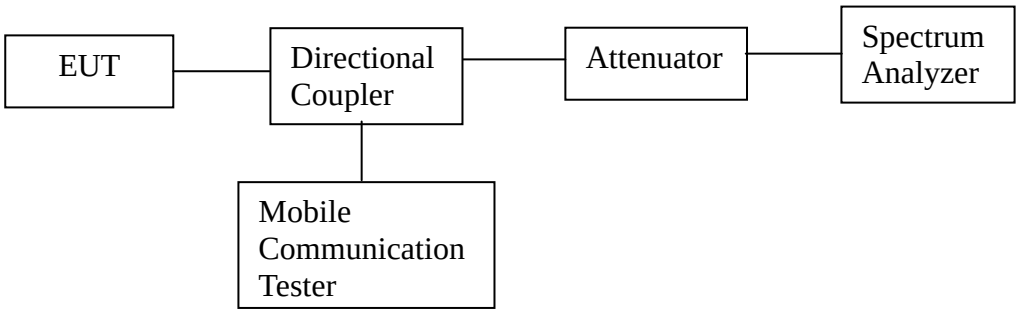
6. Spurious Emissions at Antenna Terminal

6.1. Limit

§ 22.917(a) and §24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency must be attenuated below the transmitting (P) by a factor of at least 43+10log(P)dB.

6.2. Test Procedure

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 1 MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.
3. Spurious Emission was tested under 1x EVDO, Rev A



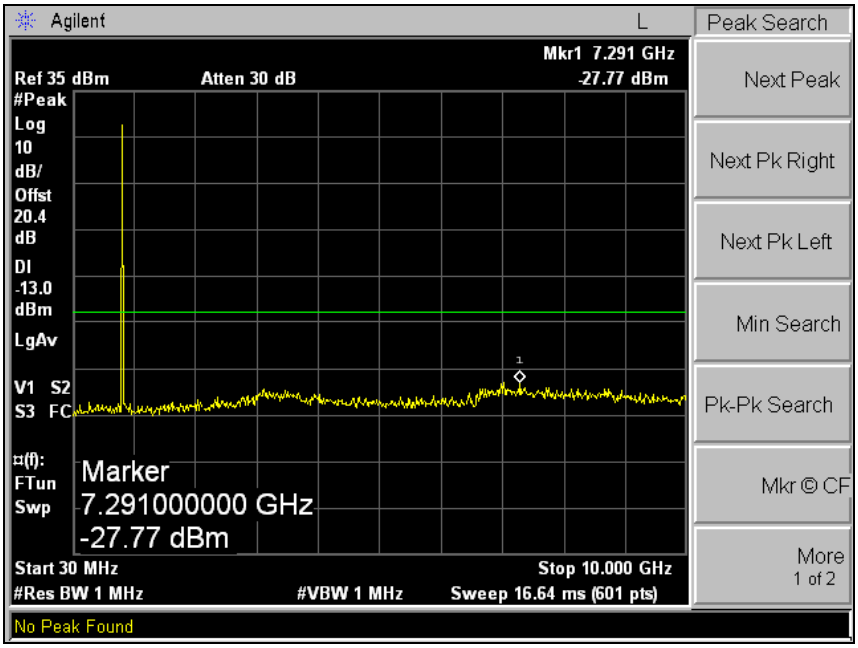
6.3. Test Results

Ambient temperature	:	26	℃
Relative humidity	:	51	%R.H.

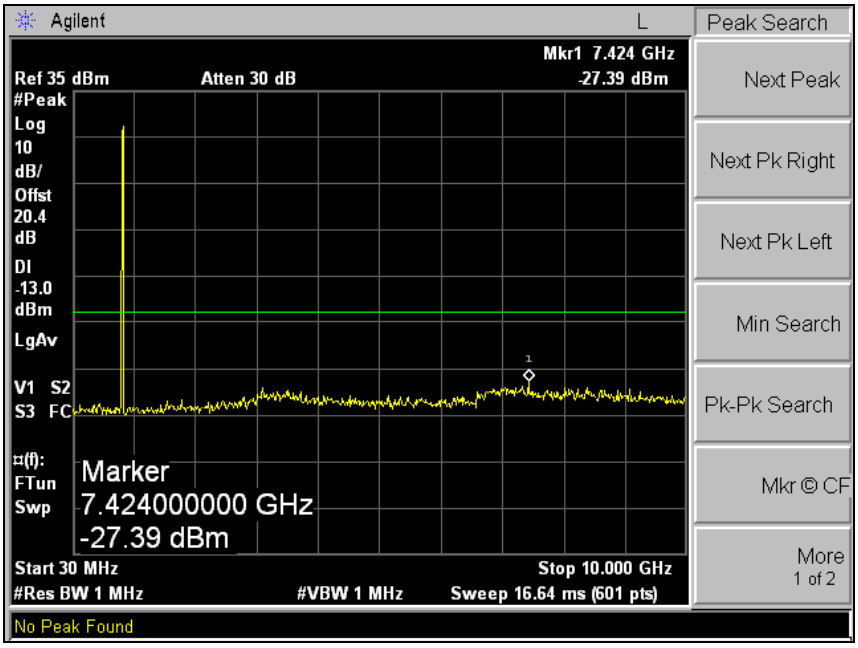
Please refer to the following plots.

CDMA 800

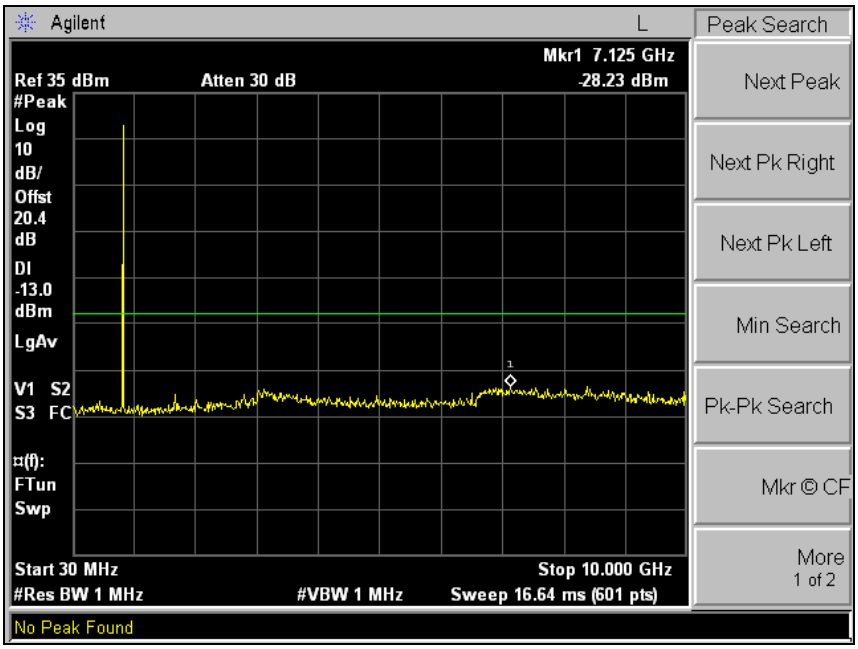
Low Channel



Middle Channel

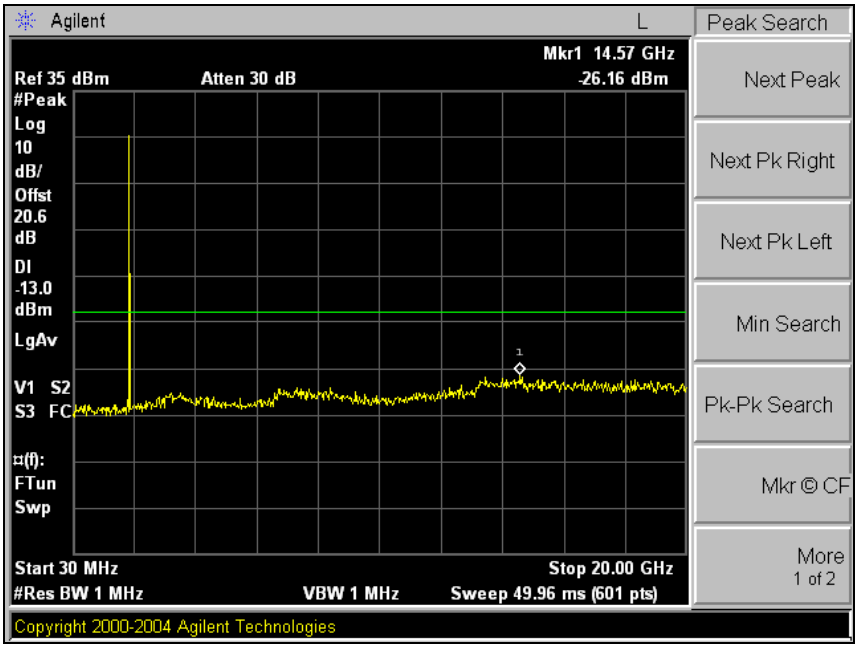


High Channel

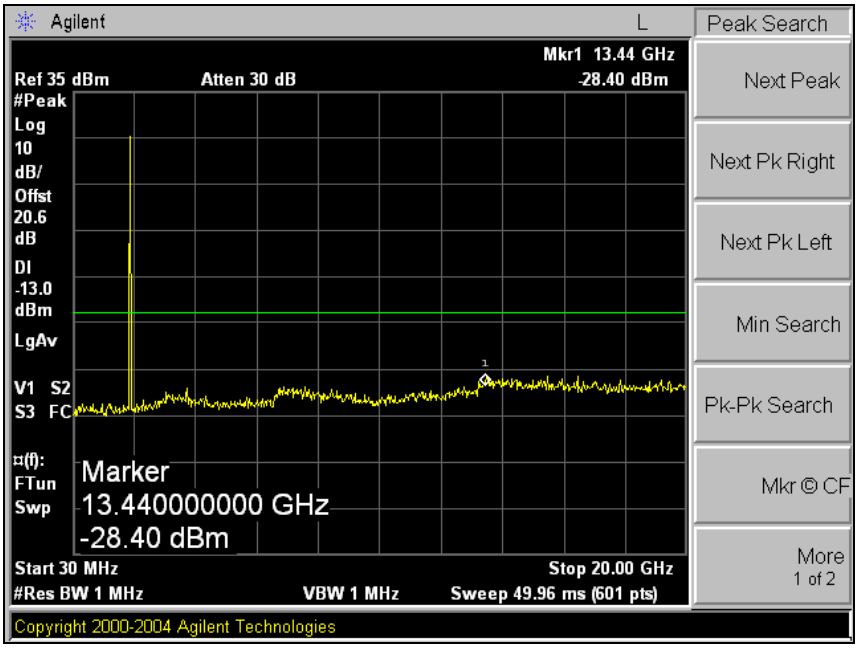


PCS 1900

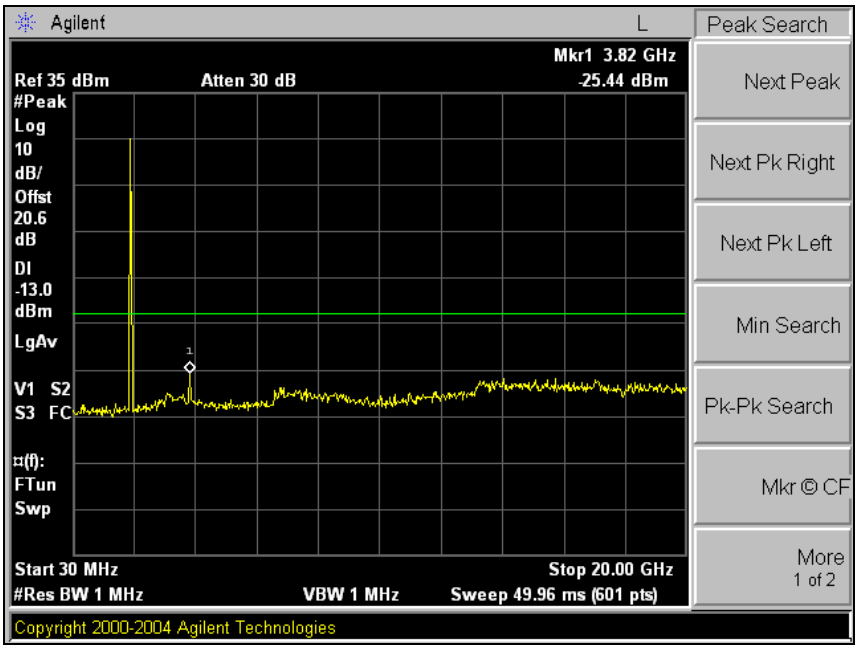
Low Channel



Middle Channel



High Channel



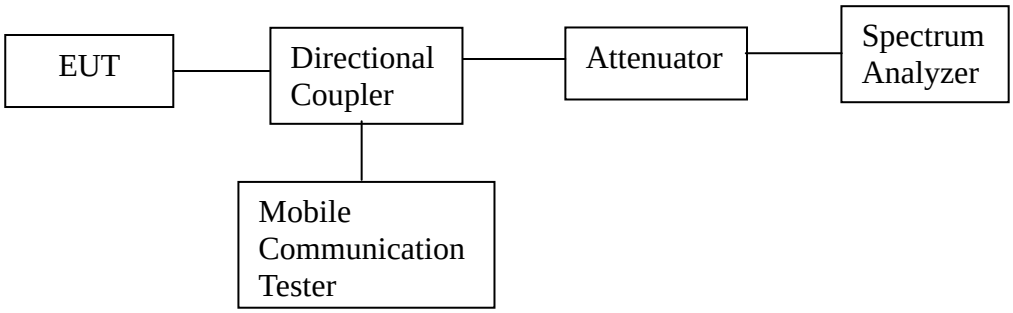
7. Band Edge

7.1. Limit

§ 22.917(a) and §24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency must be attenuated below the transmitting (P) by a factor of at least 43+10log(P)dB.

7.2. Test Procedure

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.
2. The center of the spectrum analyzer was set to block edge frequency, RBW set to 15 kHz.



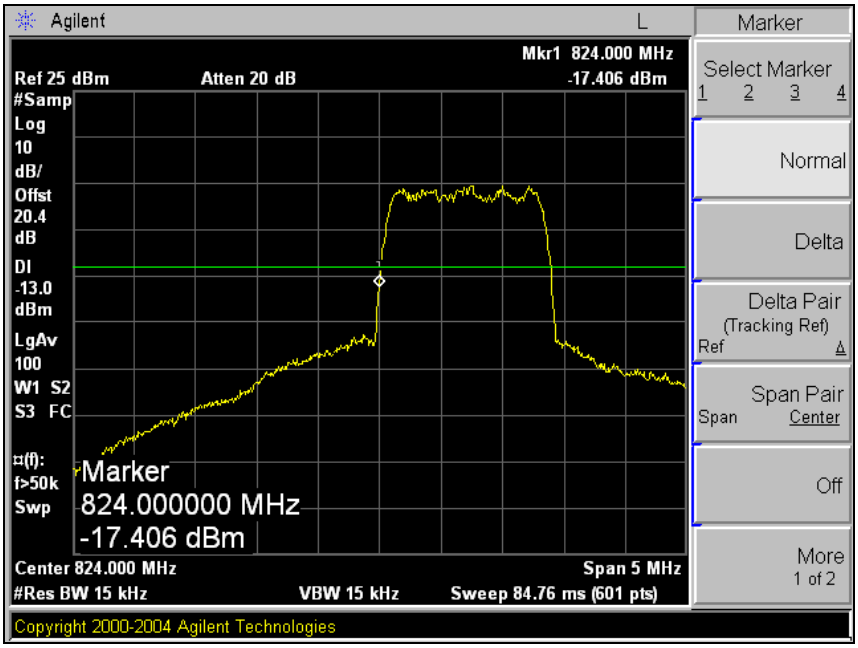
7.3. Test Results

Ambient temperature	:	26	℃
Relative humidity	:	51	%R.H.

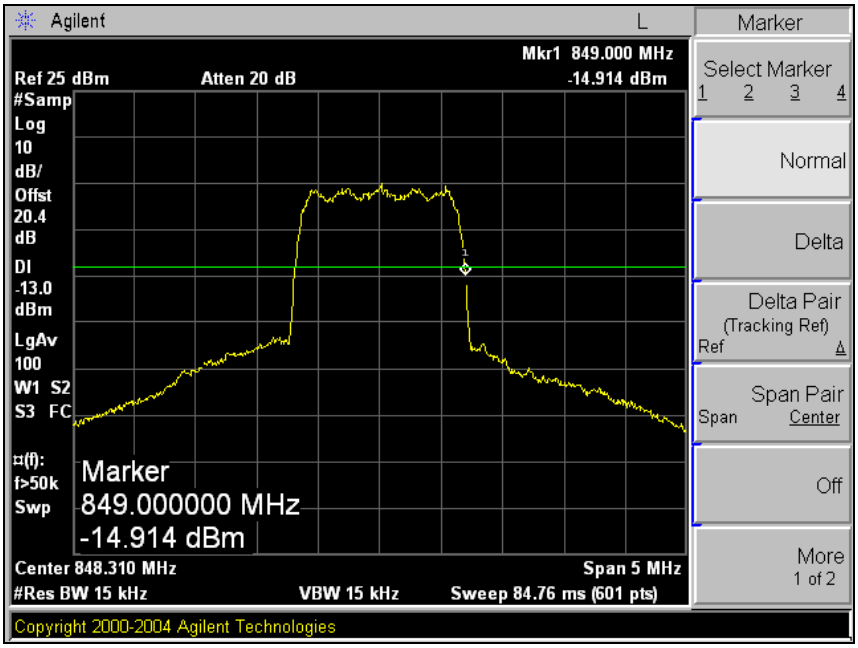
Please refer to the following plots.

CDMA 800

Low Channel

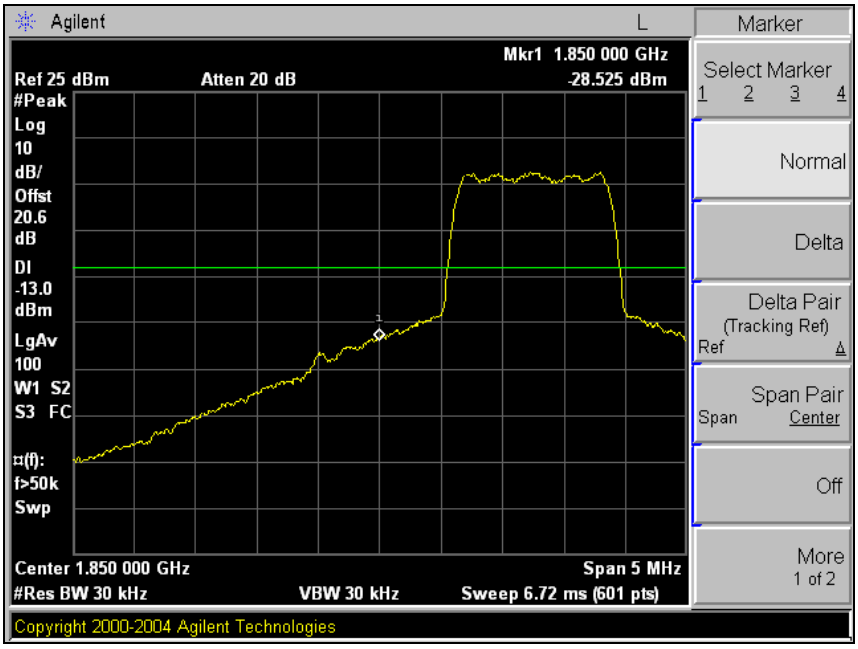


High Channel

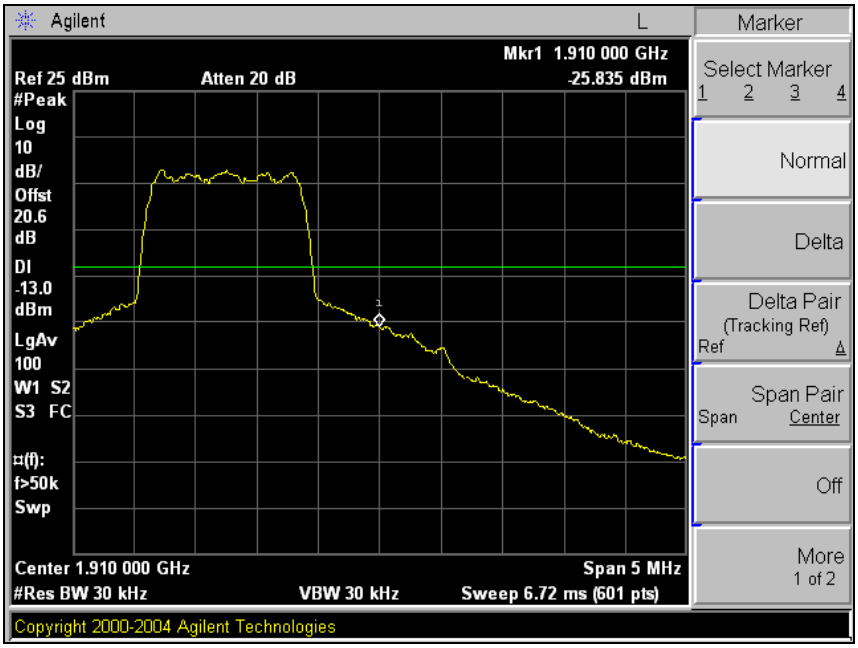


PCS 1900

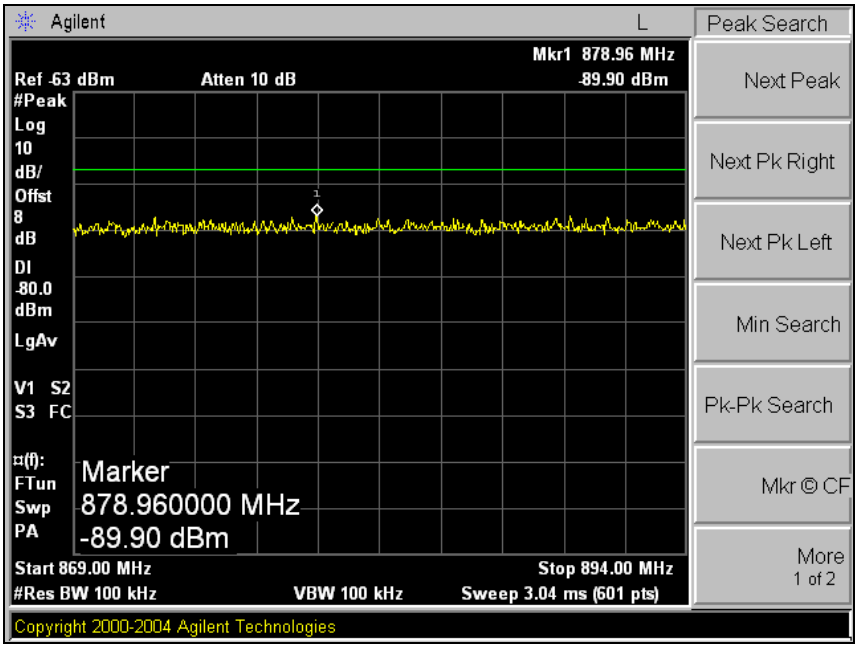
Low Channel



High Channel



CDMA 800 Emission in Base Frequency Range



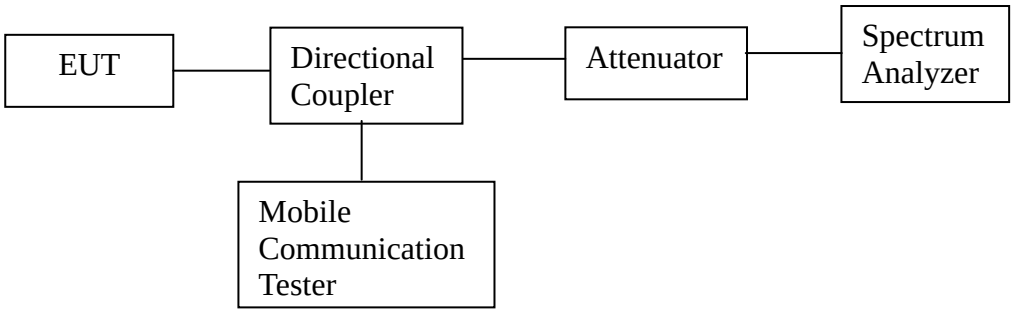
8. Frequency Stability

8.1. Limit

Requirements: FCC § 2.1055 (a), § 2.1055 (d) & following:
According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table of this section.
For Mobile devices operating in the 824 to 849 MHz band at a power level less than or equal to 3 Watts, the limit specified in Table C-1 is +/- 2.5 ppm.
§24.235 The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

8.2. Test Procedure

1. Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators.
2. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.
3. After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.
4. Frequency Stability vs. Voltage: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.



8.3. Test Results

Ambient temperature : 25 ℃
Relative humidity : 51 %R.H.

Frequency Stability versus Temperature

CDMA 800

Reference Frequency: 836.52 MHz, Limit: 2.5 ppm			
Environment Temperature (℃)	Power Supplied (Vdc)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
20(Ref.)	3.3	-5	-0.006
60	3.3	-3	-0.004
50	3.3	2	0.002
40	3.3	-3	-0.004
30	3.3	-3	-0.004
20	3.3	-1	-0.001
10	3.3	6	0.007
0	3.3	7	0.008
-10	3.3	4	0.005
-20	3.3	-5	-0.006
-30	3.3	-8	-0.010

PCS 1900

Reference Frequency: 1880.00 MHz, Limit: 2.5 ppm			
Environment Temperature (℃)	Power Supplied (Vdc)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
20(Ref.)	3.3	-4	-0.002
60	3.3	-7	-0.004
50	3.3	-10	-0.005
40	3.3	-5	-0.003
30	3.3	-2	-0.001
20	3.3	4	0.002
10	3.3	8	0.004
0	3.3	10	0.005
-10	3.3	12	0.006
-20	3.3	18	0.010
-30	3.3	18	0.010

Frequency Stability

CDMA 800

Reference Frequency:836.52 MHz, Limit: 2.5ppm			
Power Supplied (Vdc)	**Environment Temperature (℃)**	**Frequency Error (Hz)**	**ppm**
2.80	20	2	0.002
4.95	20	3	0.004

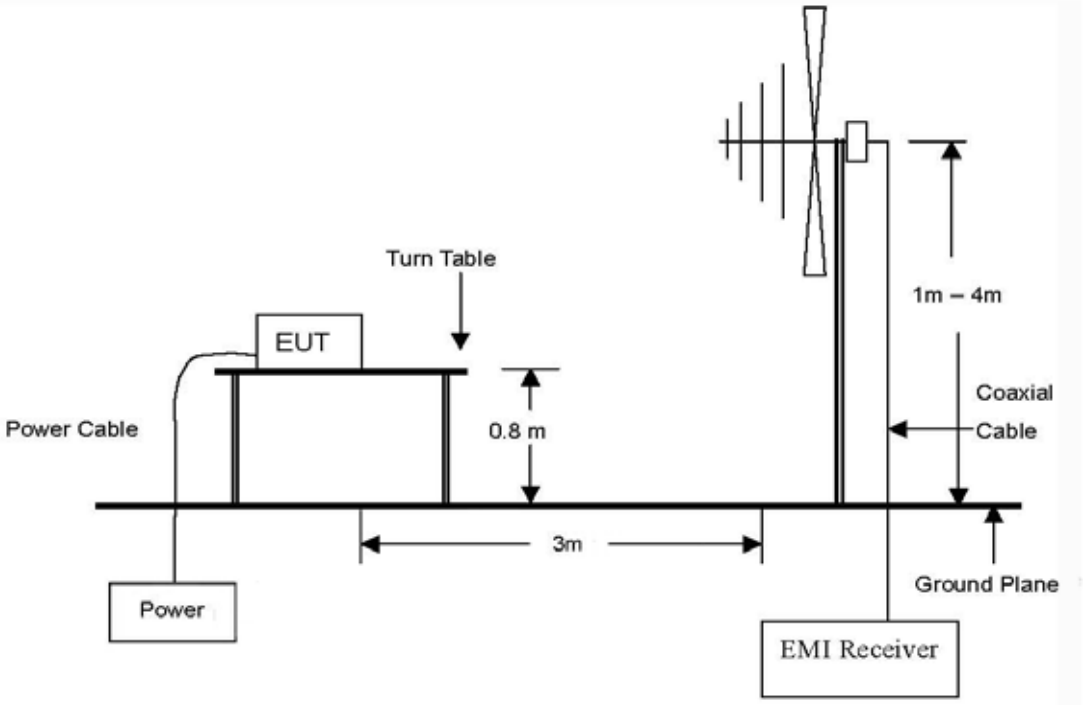
PCS 1900

Reference Frequency:1880.00 MHz, Limit:2.5ppm			
Power Supplied (Vdc)	**Environment Temperature (℃)**	**Frequency Error (Hz)**	**ppm**
2.80	20	-2	-0.001
4.95	20	-5	-0.003

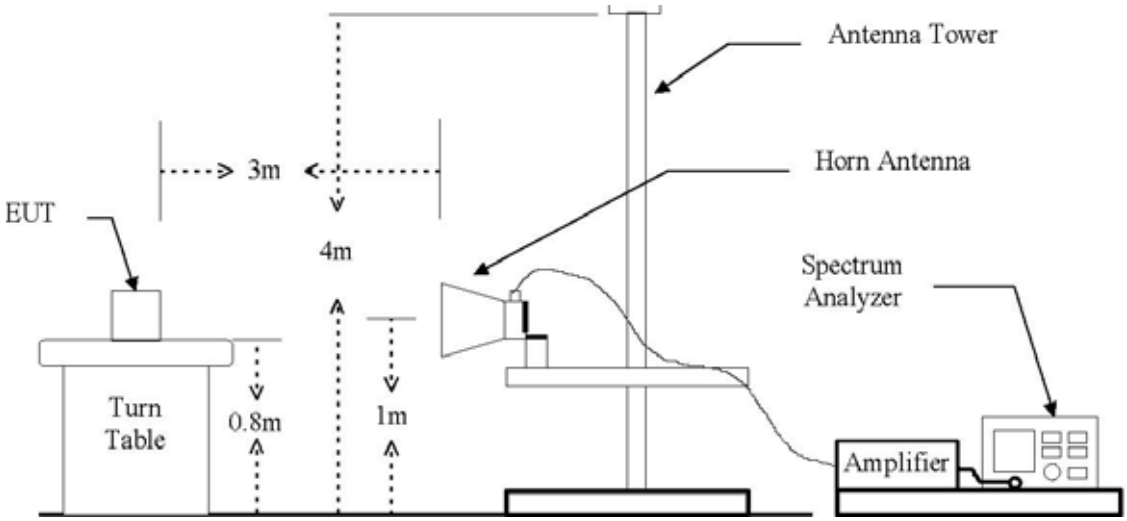
9. Receiver Radiated Spurious Emissions

8.1. Test Setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 24 GHz Emissions.



9.2. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 3 meter away from the interference-receiving antenna.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE ;

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz for Peak detection and frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1 GHz.

9.3. Test Results(Worst case configuration_CDMA 800)

Ambient temperature : 26 ℃
Relative humidity : 51 %R.H.

All emissions are not reported much lower than the prescribed limits. All reading values are quasi-peak values.

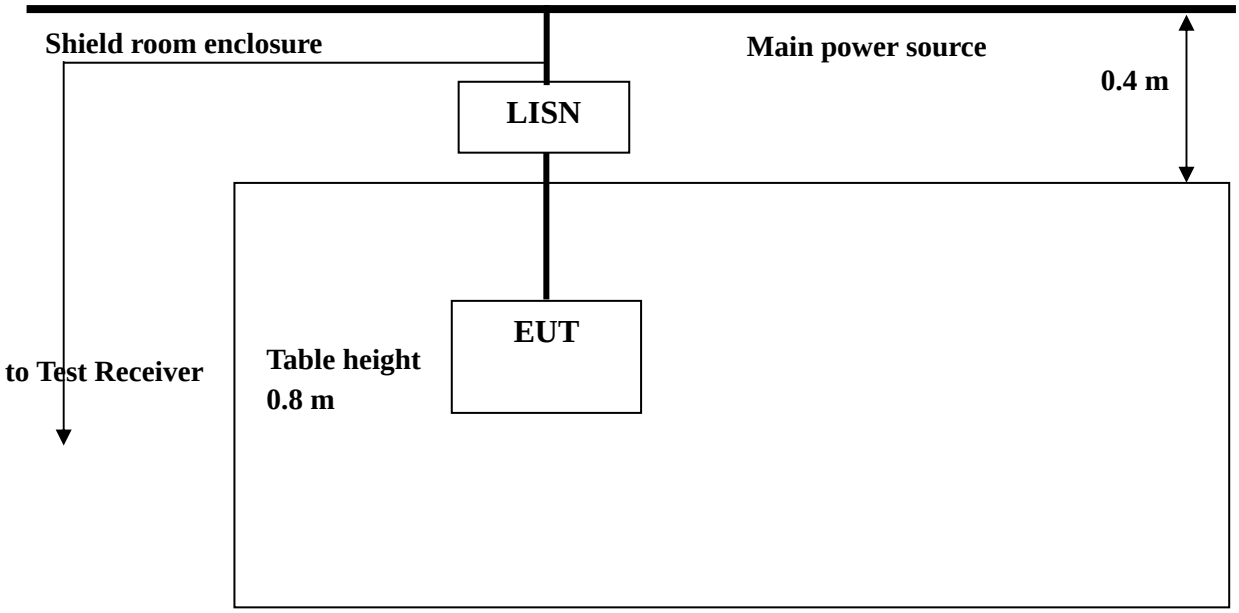
Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
44.95	21.30	Q.P.	V	11.12	0.75	33.17	40.00	6.83
68.80	23.90	Q.P.	V	6.11	0.92	30.92	40.00	9.08
129.43	20.80	Q.P.	V	9.13	1.28	31.21	43.50	12.29
209.83	23.00	Q.P.	V	7.82	1.60	32.42	43.50	11.08
260.38	28.40	Q.P.	V	9.81	1.81	40.02	46.00	5.98
>270.00	Not detected	-	-	-	-	-	-	-

Remark:

1. All spurious emission at channels are almost the same below 1 GHz, so that the channel was chosen at representative in final test.
2. "*" means the restricted band.
3. Actual = Reading + AF + CL

10. Receiver AC Power Line Conducted Emission (Not applied)

10.1. Test Setup



9.2. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

1. The test procedure is performed in a 6.5m × 3.6m× 3.6m (L×W×H) shielded room. The EUT along with its peripherals were placed on a 1.0m(W)× 1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

10.3. Test Results (Worst case configuration)

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line.

Ambient temperature : ℃
Relative humidity : %R.H.

Frequency range : 0.15 MHz – 30 MHz
Measured Bandwidth : 9 kHz

FREQ.	LEVEL(dBuV)		LINE	LIMIT(dBuV)		MARGIN(dB)	
(MHz)	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average

Note ;
Line (H) : Hot
Line (N) : Neutral

11. RF exposure evaluation

According to FCC 1.1310 : The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in § 1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength(V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Average time
(A) Limits for Occupational /Control Exposures				
300 – 1500	--	--	F/300	6
1500 - 100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300 – 1500	--	--	F/1500	6
1500 - 100000	--	--	1	30

11.1 Friis transmission formula : Pd = (Pout*G)/(4*pi*R^2)

Where
Pd = power density in mW/cm^2
Pout = output power to antenna in mW
G = gain of antenna in linear scale
Pi = 3.1416
R = distance between observation point and center of the radiator in cm
Pd the limit of MPE, 1 mW/cm^2. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

11.1 Test result of RF exposure evaluation

Test Item : RF Exposure evaluation data
Test Mode : Normal operation

11.1.1 Output power into antenna & RF exposure evaluation distance

Operating mode	Channel	Frequency (MHz)	Peak output power (dBm)	Antenna gain (dBi)	Power density at 20cm (mW/cm^2)	Limit (mW/cm^2)
800 MHz Cellular	Low	824.70	28.73	3	0.29645	0.55
	Middle	836.52	29.43	3	0.34830	0.56
	High	848.31	28.87	3	0.30616	0.57
1900 MHz PCS	Low	1851.25	27.04	3	0.20089	1
	Middle	1880.00	27.72	3	0.23494	
	High	1908.75	27.98	3	0.24943	

▣Note
For mobile or fixed location transmitter, the minimum separation distance is 20 cm, even if calculation indicate that the MPE distance would be less