FCC CFR47 CERTIFICATION

PART 22H and 24E

TEST REPORT

FOR

800/1900MHZ DUAL BAND CDMA DATA MODEM MODULE TESTED WITH EM DEVELOPMENT PLATFORM

MODEL: EM3420

FCC ID: N7N-EM3420P

REPORT NUMBER: 03U2108-1

ISSUE DATE: Aug. 30, 2003

Prepared for
SIERRA WIRELESS, INC.
13811 WIRELESS WAY
RICHMOND, BC, CANADA V6V 3A4

Prepared by
COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD, ROUTE 2
MORGAN HILL, CA 95037, USA
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TABLE OF CONTENT

1. TEST RESULT CERTIFICATION

COMPANY NAME: SIERRA WIRELESS INC.
13811 WIRELESS WAY
RICHMOND, BC, CANADA V6V 3A4

EUT DESCRIPTION: 800/1900MHz Dual Band CDMA Data Modem Module tested with EM Development Platform

MODEL NAME: EM3420

DATE TESTED: AUGUST 10, 2003 TO AUGUST 22, 2003

TYPE OF EQUIPMENT	INTENTIONAL RADIATOR
EQUIPMENT TYPE	LICENSED TX MODULE IN MOBILE APPLICATION
MEASUREMENT PROCEDURE	ANSI 63.4 / 2001, TIA/EIA 603
PROCEDURE	CERTIFICATION
FCC RULE	CFR 47 PART 22 SUBPART H AND PART 24 SUBPART 24 E

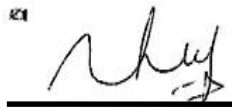
Compliance Certification Services, Inc. tested the above equipment for compliance with the requirement set forth in CFR 47, PART 22 Subpart H and PART 24 Subpart E. The equipment in the configuration described in this report, shows the measured emission levels emanating from the equipment do not exceed the specified limit.

Note : This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Tested By:

VIEN TRAN
EMC TECHNICIAN
COMPLIANCE CERTIFICATION SERVICES

Released For CCS By:



THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The 800/1900MHz Dual Band CDMA Data Modem Module tested with EM Development Platform can operate (transmit) at two different frequency bands.

The 800MHz Cellular Band has:
- an output power 28.1dBm
- a monopole type antenna, 1.5dBi gain
- and the transmitting of frequency range 824 ~ 849MHz

And the 1900MHz PCS Band has:
- an output power 28.0dBm
- a monopole type antenna, 0.5dBi gain
- and the transmitting of frequency range 1851 ~ 1910MHz

3. TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures documented on chapter 13 of ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

4. TEST FACILITY

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT (1300F2))

6. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

7. TEST SETUP, PROCEDURE AND RESULT

7.1. SECTION 2.1046: RF POWER OUTPUT

INSTRUMENTS LIST

TEST EQUIPMENT LIST				
Name of Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Due Date**
LISN, 10 kHz ~ 30 MHz	**FCC**	**50/250-25-2**	**114**	**9/6/2004**
Line Filter	**Lindgren**	**LMF-3489**	**497**	**CNR**
LISN, 10 kHz ~ 30 MHz	**Solar**	**8012-50-R-24-BNC**	**837990**	**9/6/2004**
EMI Test Receiver	**R & S**	**ESHS 20**	**827129/006**	**4/17/2004**
Antenna, Horn 1 ~ 18 GHz	**EMCO**	**3115**	**2238**	**2/4/2004**
Quasi-Peak Adaptor	**HP**	**85650A**	**2811A01155**	**5/16/2004**
SA RF Section, 1.5 GHz	**HP**	**85680B**	**2732A03661**	**5/16/2004**
Preamplifier, 1300 MHz	**HP**	**8447D**	**2944A06589**	**8/22/2004**
Antenna, Bilog	**Chase**	**CBL6112B**	**2586**	**3/6/2004**
SA Display Section 2	**HP**	**85662A**	**2816A16696**	**5/16/2004**
Spectrum Analyzer	**HP**	**E4446A**	**US42070220**	**1/13/2004**
Dipole Antenna	**ETS**	**DB-4**	**1629**	**5/15/2004**
EMI Receiver, 9 kHz ~ 2.9 GHz	**HP**	**8542E**	**3942A00286**	**11/20/2004**
RF Filter Section	**HP**	**85420E**	**3705A00256**	**11/21/2004**
Bilog Antenna	**A.R.A**	**LPB-2520/A**	**1185**	**6/24/2004**
Antenna, Horn 1 ~ 18 GHz	**EMCO**	**3115**	**9001-3245**	**2/4/2004**
Signal Generator, 2 ~ 40 GHz	**R & S**	**SMP04**	**DE 34210**	**05/25/04**

MEASUREMENT PROCEDURE

1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.

2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the frequency of the transmitter.

3). The output of the test antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.

4). The transmitter shall be switched on, if possible, without the modulation and the measurement 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 than be 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 tuned dipole (substitution antenna).

10). The substitution antenna shall be oriented for vertical polarization and the length of the substitution 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). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

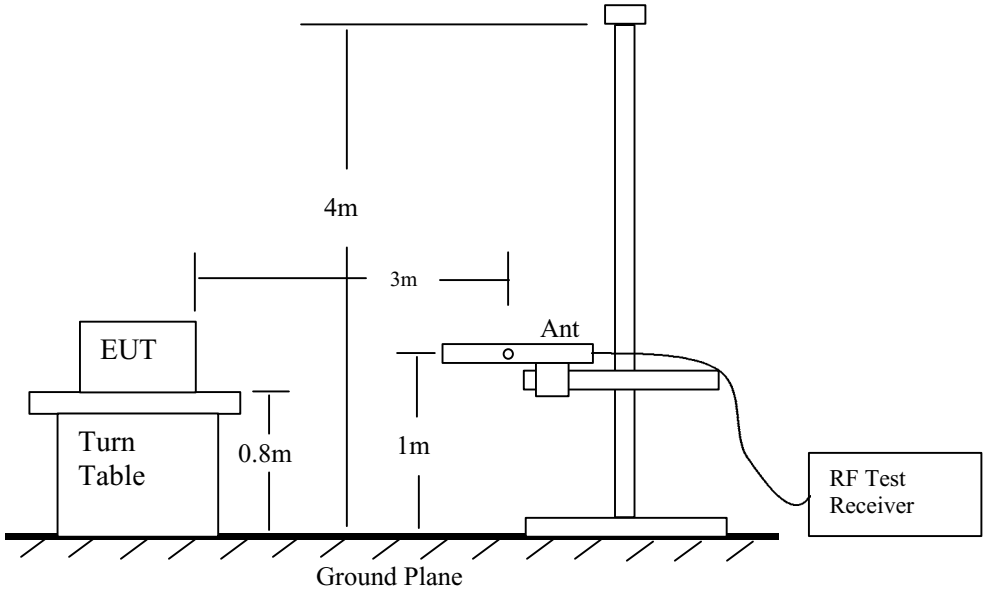
13). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

14). The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.

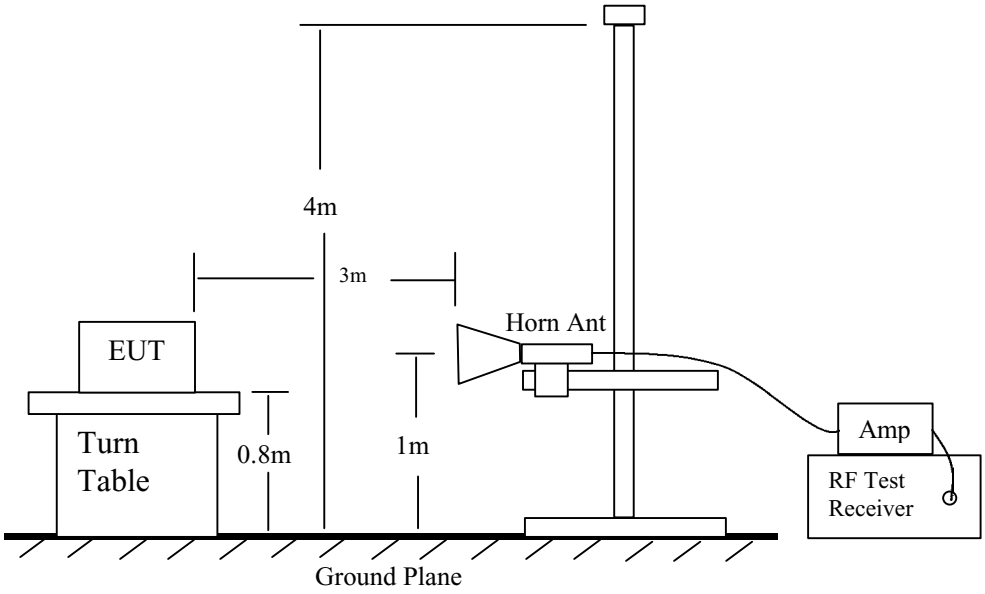
15). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

16). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

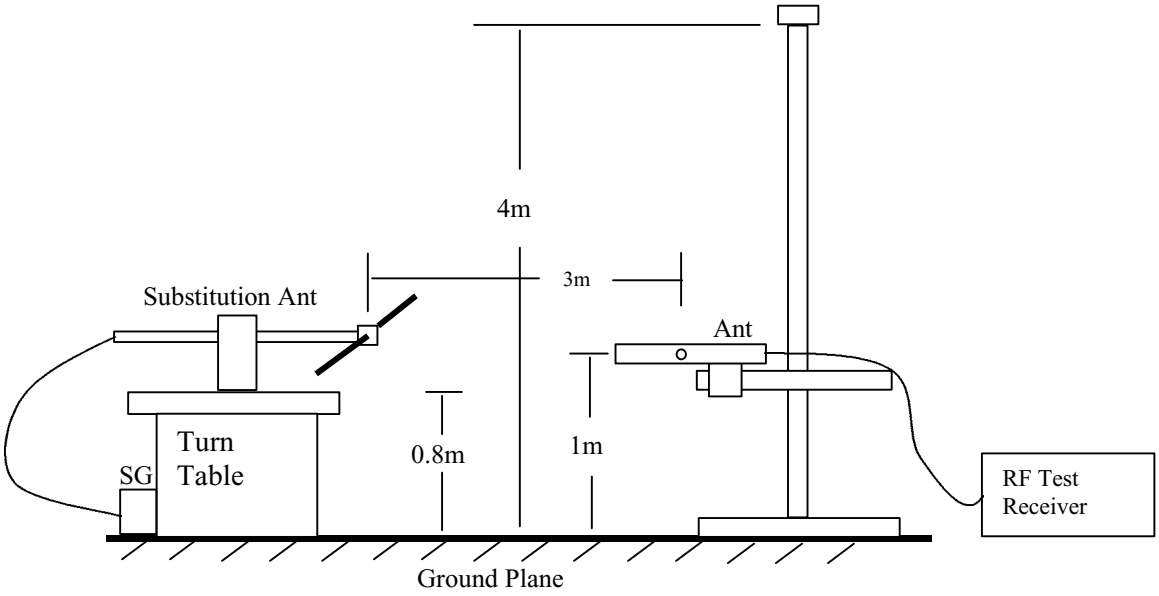
17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.



Radiated Emission Measurement 30 to 1000 MHz



Radiated Emission Above 1000 MHz



Radiated Emission – Substitution Method Set-up

MEASUREMENT RESULT:

800MHz and 1900MHz Output Power Measurement:

		RF CONDUCTED	ERP
	FREQUENCY	AVERAGE	PEAK
800 MHz CELL	(MHz)	(dBm)	(dBm)
LOW	824.70	24.12	25.50
MID	836.52	24.04	28.10
HI	848.31	24.03	24.60

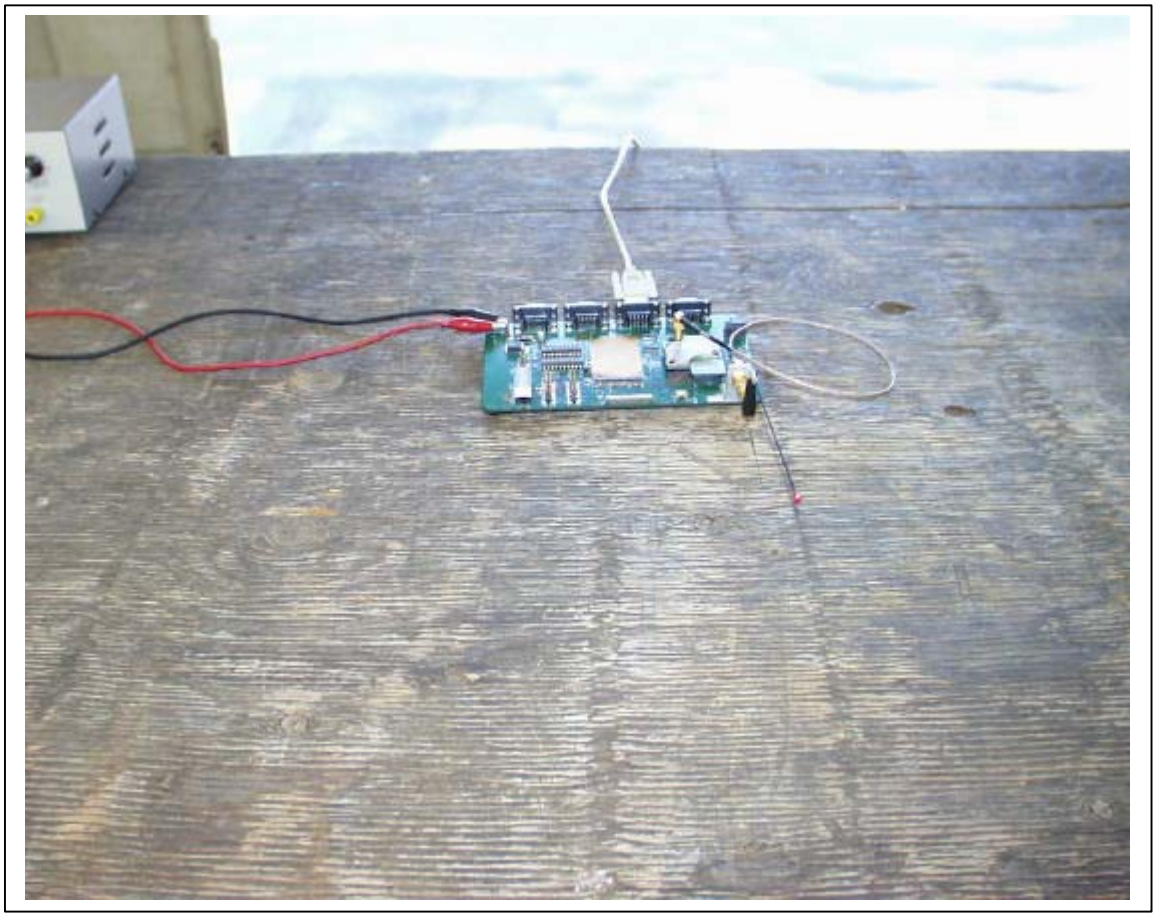
THE ANTENNA GAIN IS 1.5dBi

		RF CONDUCTED	EIRP
	FREQUENCY	AVERAGE	PEAK
1900 MHz PCS	(MHz)	(dBm)	(dBm)
LOW	1851.25	23.90	25.70
MID	1880.00	23.75	28.00
HI	1908.75	23.60	28.00

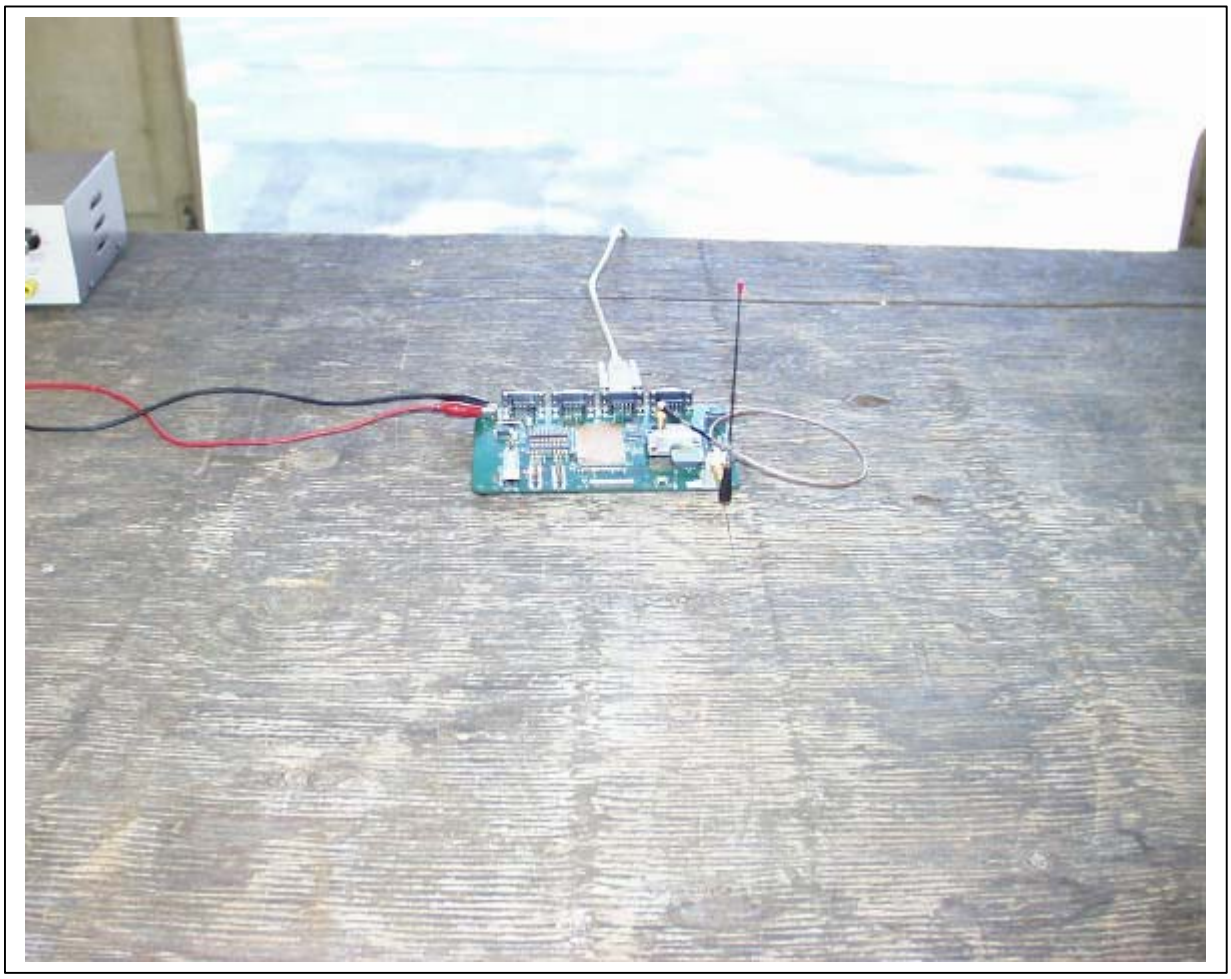
THE ANTENNA GAIN IS 0.5dBi

Radiated Emissions

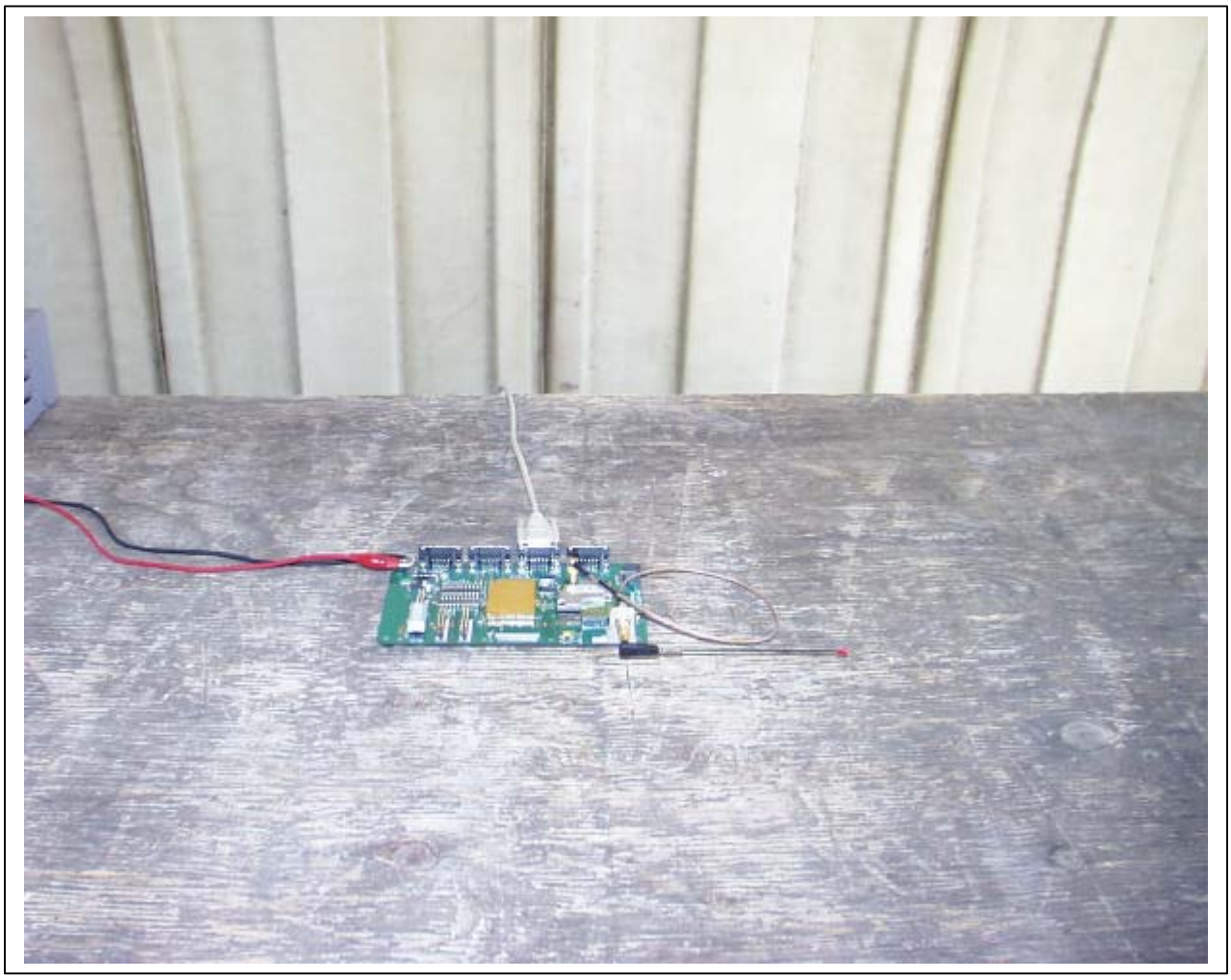
X-Position



Y-Position



Z-Position



Output Power (ERP), 800MHZ - Low / Mid / High Channels:

8/20/2003 Compliance Certification Services, Morgan Hill Open Field Site

Test Engineer: VIEN TRAN
Project #: 03U2108-1
Company: AIRPRIME
EUT Description: 800MHz CELL TRANSMITTER
EUT M/N: TBD
Test Target: FCC PART 22
Mode Operation: Tx- FUNDAMENTAL_LOW/MID/HI CHANNELS_EUT ANTENNA @ Y POSITION (WORST CASE)

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Spectrum Analyzer	Horn > 18GHz	Limit
				ERP

Hi Frequency Cables: ☐ (2 ft) ☐ (2 – 3 ft) ☑ (4 – 6 ft) ☐ (12 ft)

Peak Measurements:
Fundamental: RBW>99% or 26dB Emissions BW, VBW=RBW
Bandedge: RBW=>1% Emissions BW, VBW=> 3*RBW
Spurious: RBW=1MHz, VBW=1MHz

f GHz	SA reading (dBm)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
0.825	94.4	25.7	0.2	0.0	0.0	25.5	38.5	-13.0	V
0.825	86.4	17.4	0.2	0.0	0.0	17.2	38.5	-21.3	H
0.836	97.7	28.3	0.2	0.0	0.0	28.1	38.5	-10.4	V
0.836	92.8	22.2	0.2	0.0	0.0	22.0	38.5	-16.5	H
0.848	93.9	24.8	0.2	0.0	0.0	24.6	38.5	-13.9	V
0.848	90.6	20.1	0.2	0.0	0.0	19.9	38.5	-18.6	H

RBW = VBW = 3MHz

Output Power (EIRP), 1900MHz PCS - Low / Mid / High Channels

8/20/2003 Compliance Certification Services, Morgan Hill Open Field Site

Test Engineer: VIEN TRAN
Project #: 03U2108-2
Company: AIRPRIME
EUT Description: 1900MHz PCS TRANSMITTER
EUT M/N: TBD
Test Target: FCC PART 24
Mode Operation: Tx- FUNDAMENTAL_LOW/MID/HI CHANNELS_EUT ANTENNA @ X POSITION (WORST CASE)

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Spectrum Analyzer	Horn > 18GHz	Limit
T60; S/N: 2238 @3m		Agilent E4446A Analyzer		FCC 24

Hi Frequency Cables: ☐ (2 ft) ☐ (2 ~ 3 ft) ☑ (4 ~ 6 ft) ☐ (12 ft)

Peak Measurements:
Fundamental: RBW>99% or 26dB Emissions BW, VBW=RBW
Bandedge: RBW=>1% Emissions BW, VBW=> 3*RBW
Spurious: RBW=1MHz, VBW=1MHz

f GHz	SA reading (dBuV)	SG reading (dBuV)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
LOW CH									
1.851	125.9	19.0	0.4	7.2	0.0	25.7	33.0	-7.3	V
1.851	123.1	15.2	0.4	7.2	0.0	21.9	33.0	-11.1	H
MID CH									
1.880	126.9	21.2	0.4	7.2	0.0	28.0	33.0	-5.0	V
1.880	124.4	18.1	0.4	7.2	0.0	24.9	33.0	-8.1	H
HI CH									
1.909	126.5	21.2	0.4	7.2	0.0	28.0	33.0	-5.0	V
1.909	122.5	15.2	0.4	7.2	0.0	22.0	33.0	-11.0	H

RBW = VBW = 3MHz

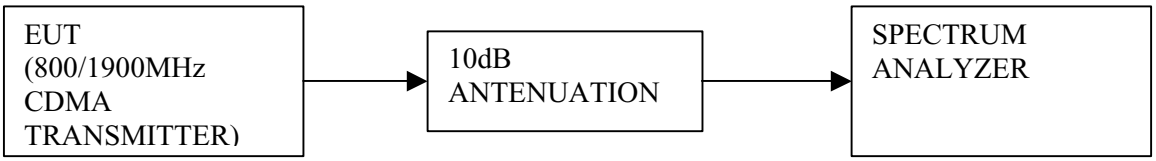
7.2. SECTION 2.1047: MODULATION CHARACTERISTICS

Not Applicable.

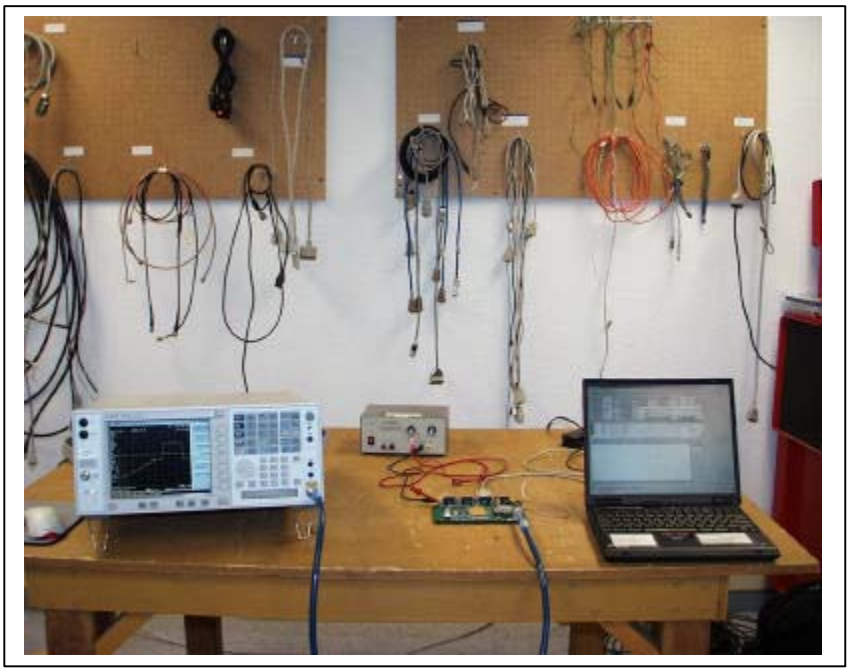
7.3. SECTION 2.1049: EMISSION MASK & OCCUPIED BANDWIDTH

PROVISIONS APPLICABLE
According to CFR 47 section 22.917.

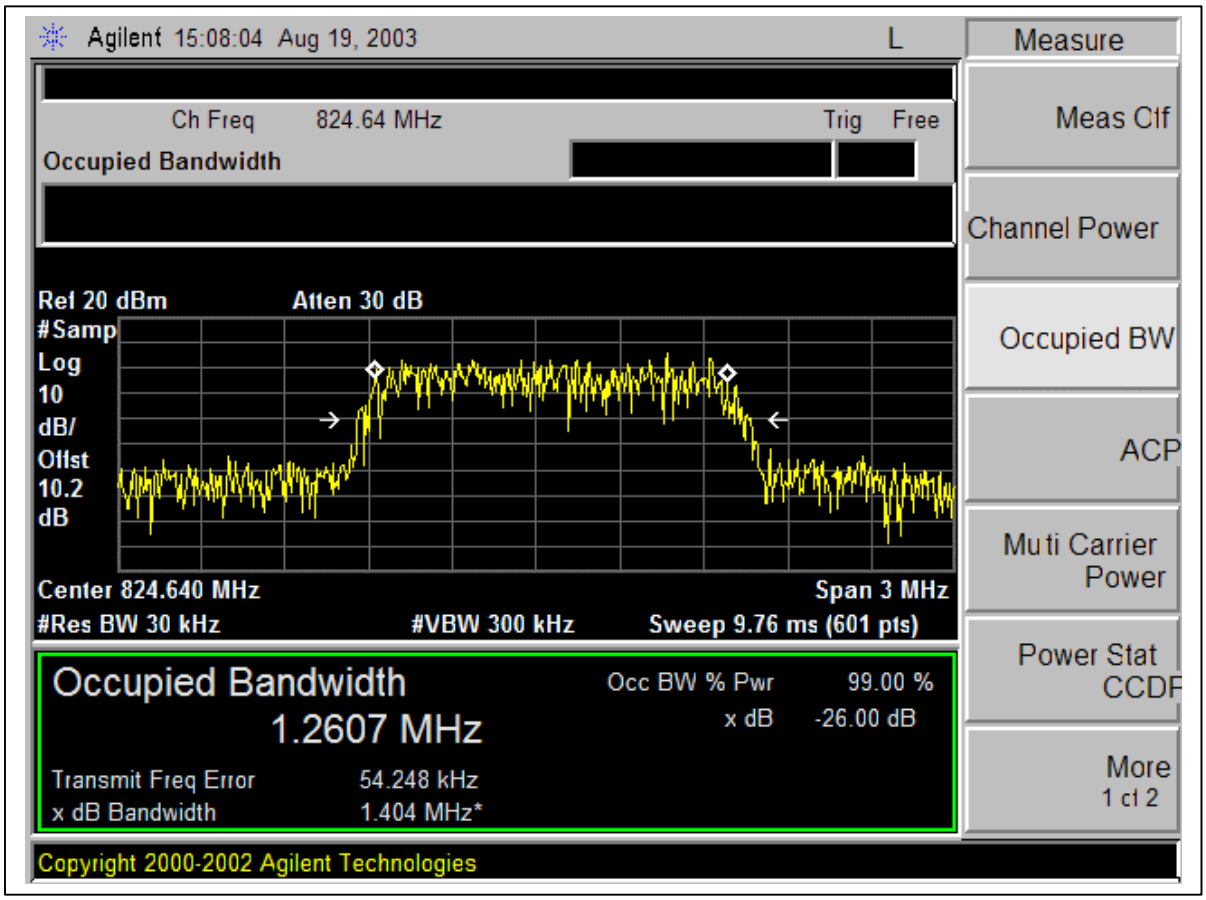
TEST SETUP



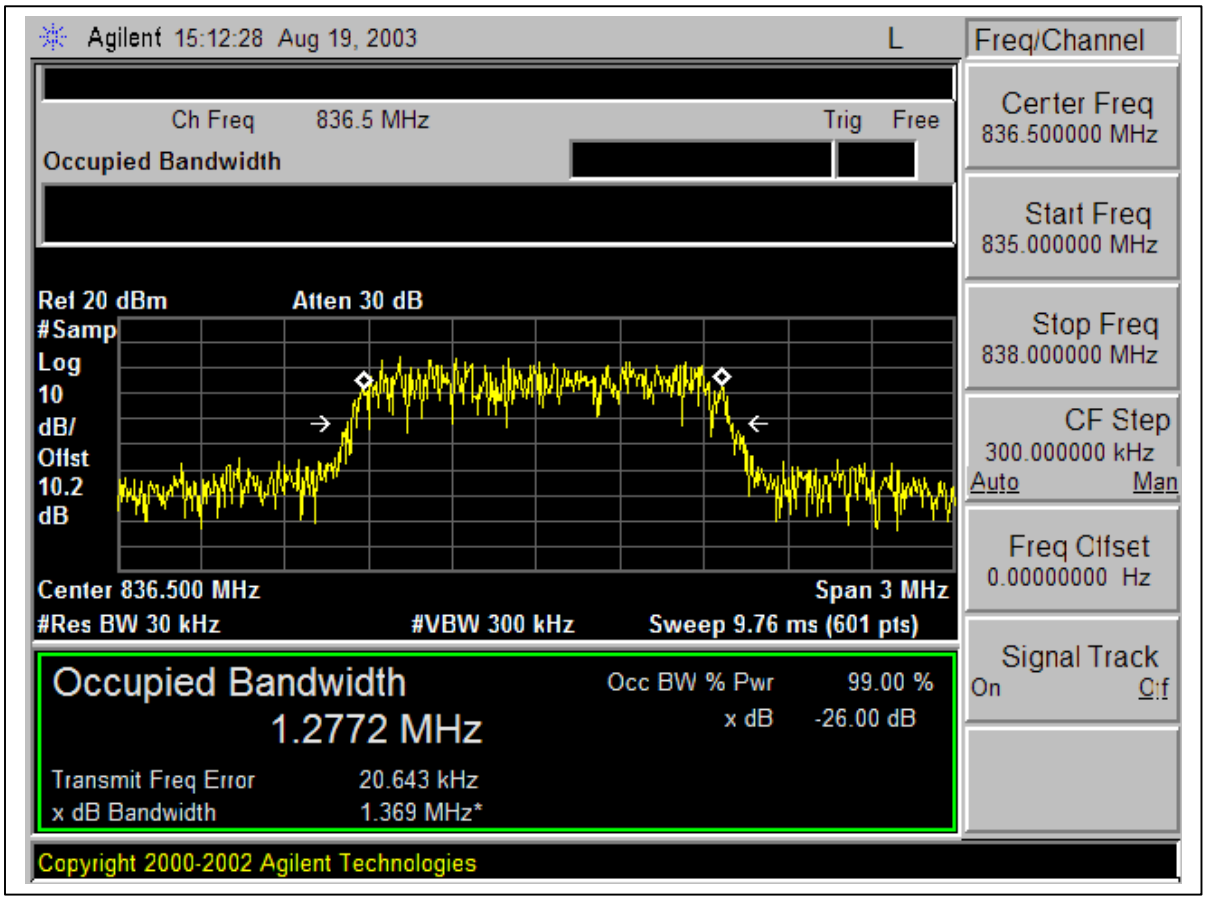
Set-up Configuration



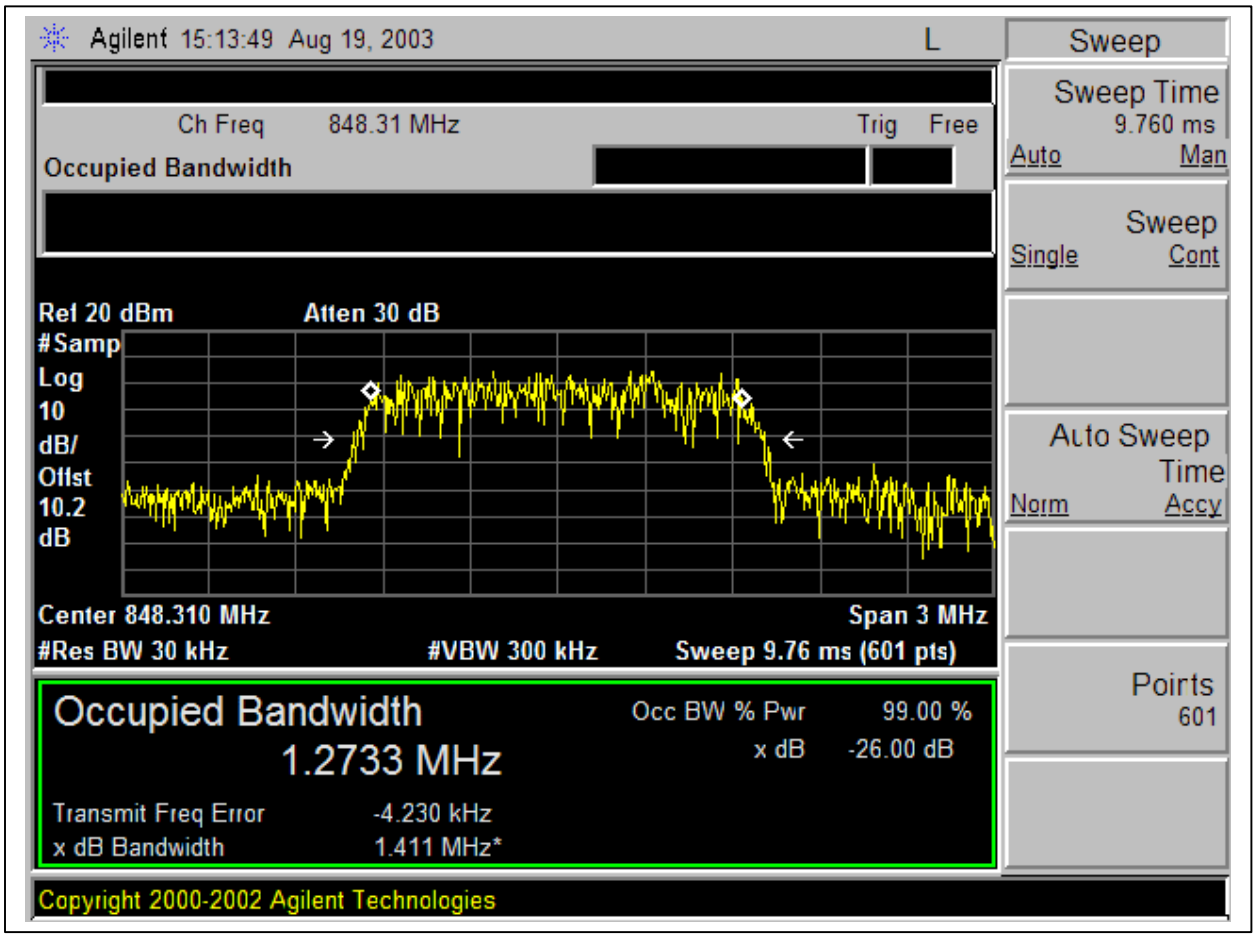
800MHz CELLULAR - Low Channel Occupied Bandwidth:



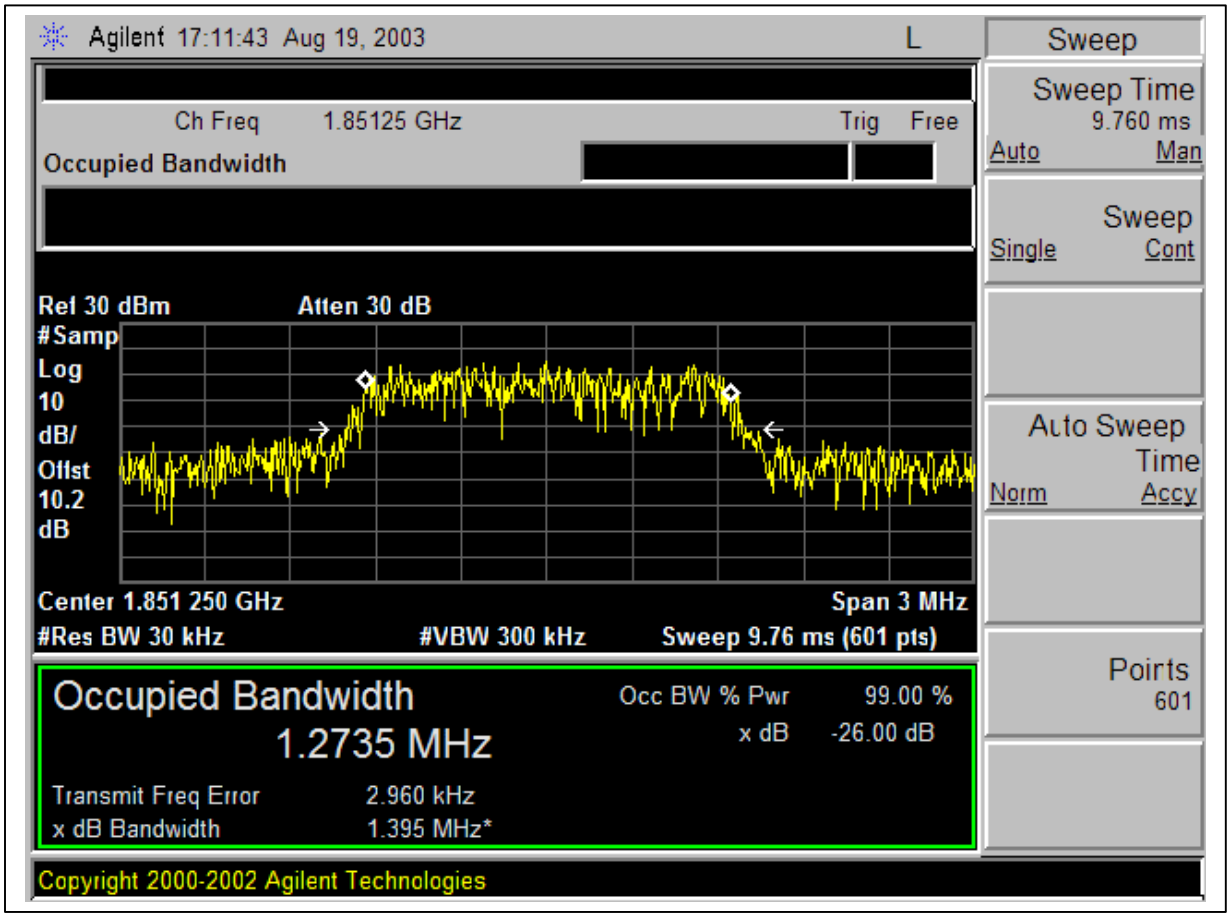
800MHz CELLULAR - Mid Channel Occupied Bandwidth:



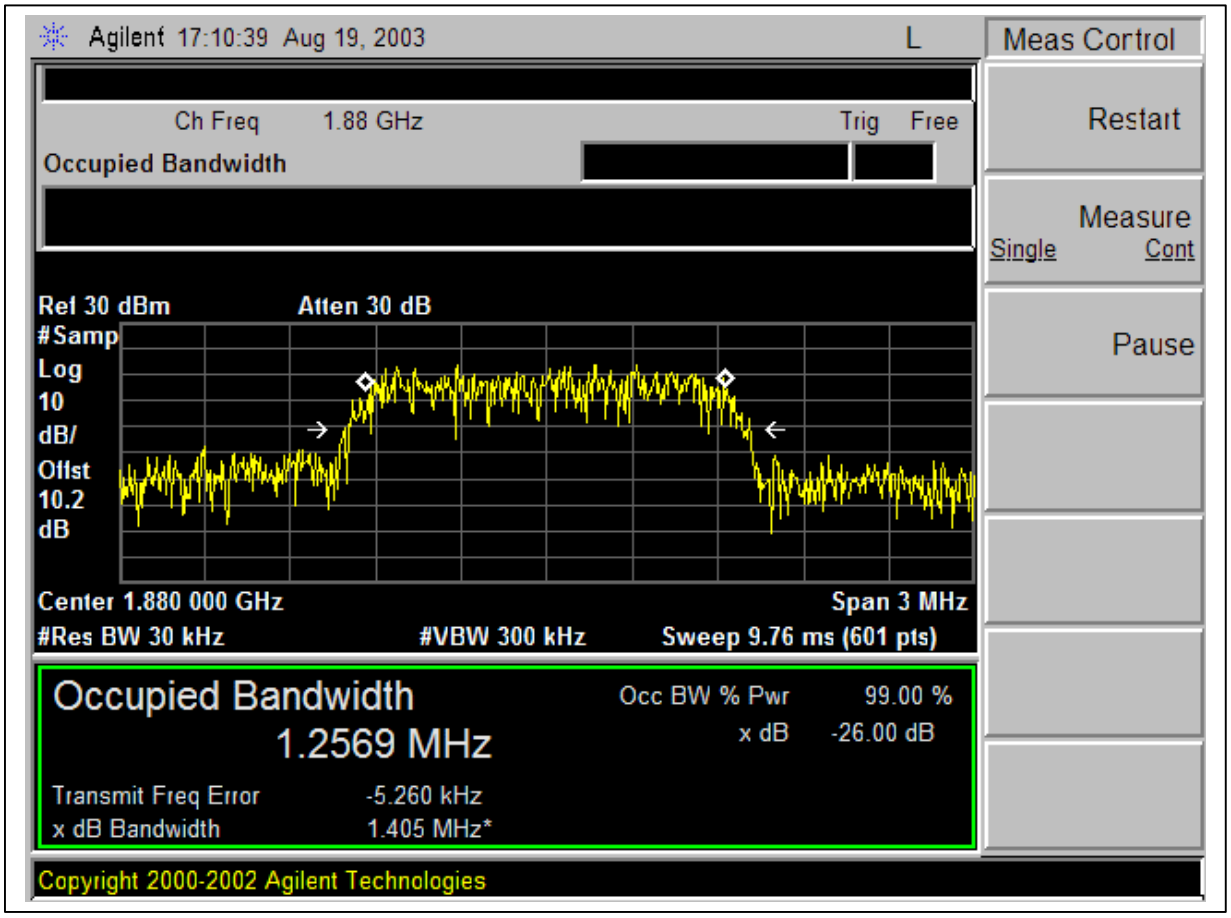
800MHz CELLULAR - High Channel Occupied Bandwidth:



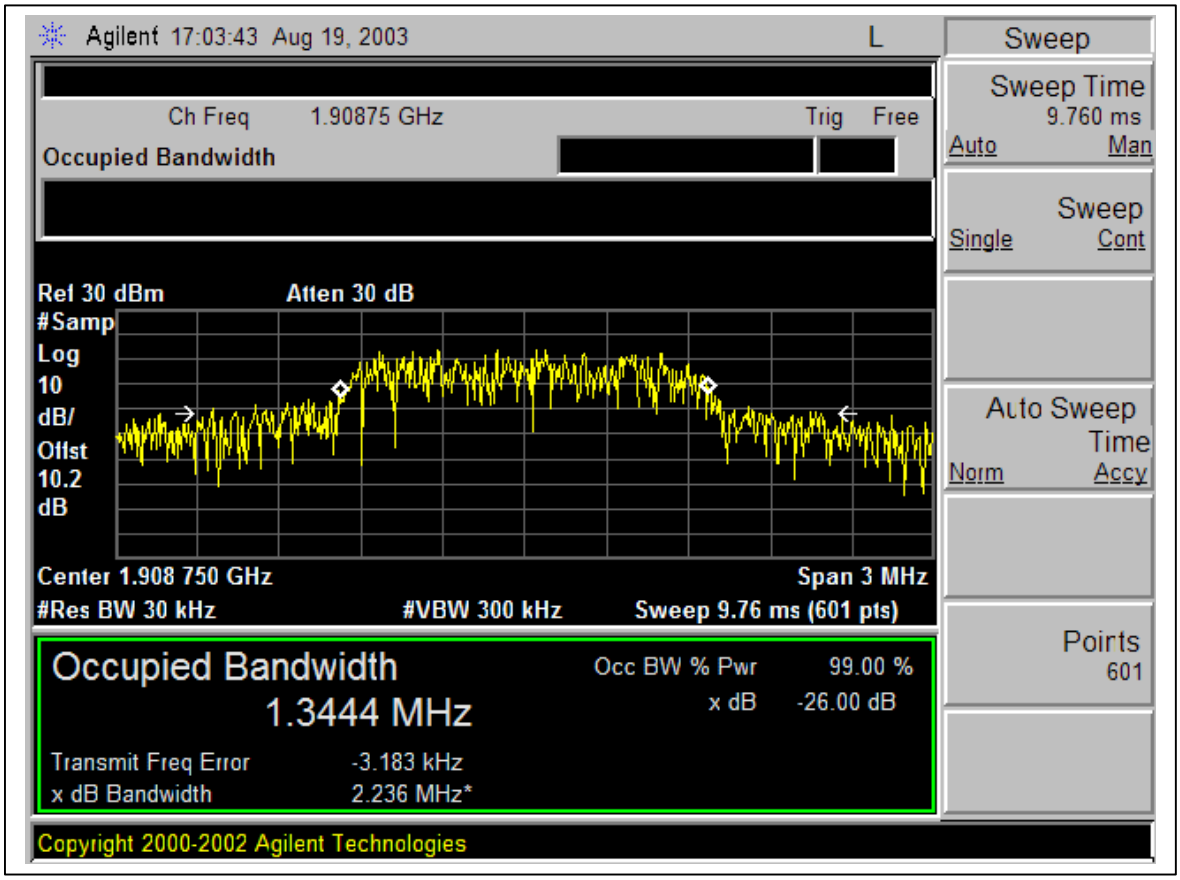
1900MHz PCS - Low Channel Occupied Bandwidth:



1900MHz PCS - Mid Channel Occupied Bandwidth:



1900MHz PCS - Hi Channel Occupied Bandwidth

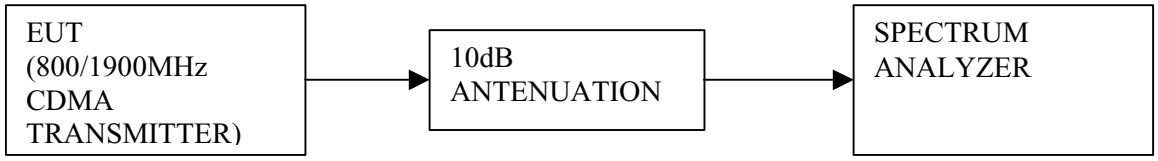


7.4. SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL

INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
PSA Analyzer	Agilent	E446A	US42070220	1/13/04
10dB Attenuator	Agilent	8493C	59028	N/A

TEST SETUP



Set-up Configuration

TEST PROCEDURE

1) EUT's RF output connector (made solely for the purpose of the test) is connected to the spectrum analyzer, and set as close as possible to the bottom of the block edge and one set as close as possible to the top of the block edge. Set the RES BW to 1% of the emission bandwidth to show compliance with the –13dBm limit, in the 1 MHz bands immediately outside and adjacent to the top and bottom edges of the frequency block.

2) For the Out-of-Band measurements a 1 MHz RES BW was used to scan from 15 MHz to 10xfo of the fundamental carrier for all frequency block. A display line was placed at –13dBm to show compliance for spurious, and harmonics.

3) 22.917(f): Mobile emissions in base frequency range. The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitter operated must be attenuated to a level not to exceed –80dBm at the transmit antenna connector.

MEASUREMENT RESULT:

BAND EDGE - 800MHz CELLULAR

LOW_BAND EDGE LOW CH 1013 – 824.7MHz (CH BLOCK A 824.04 – 834.99MHz)

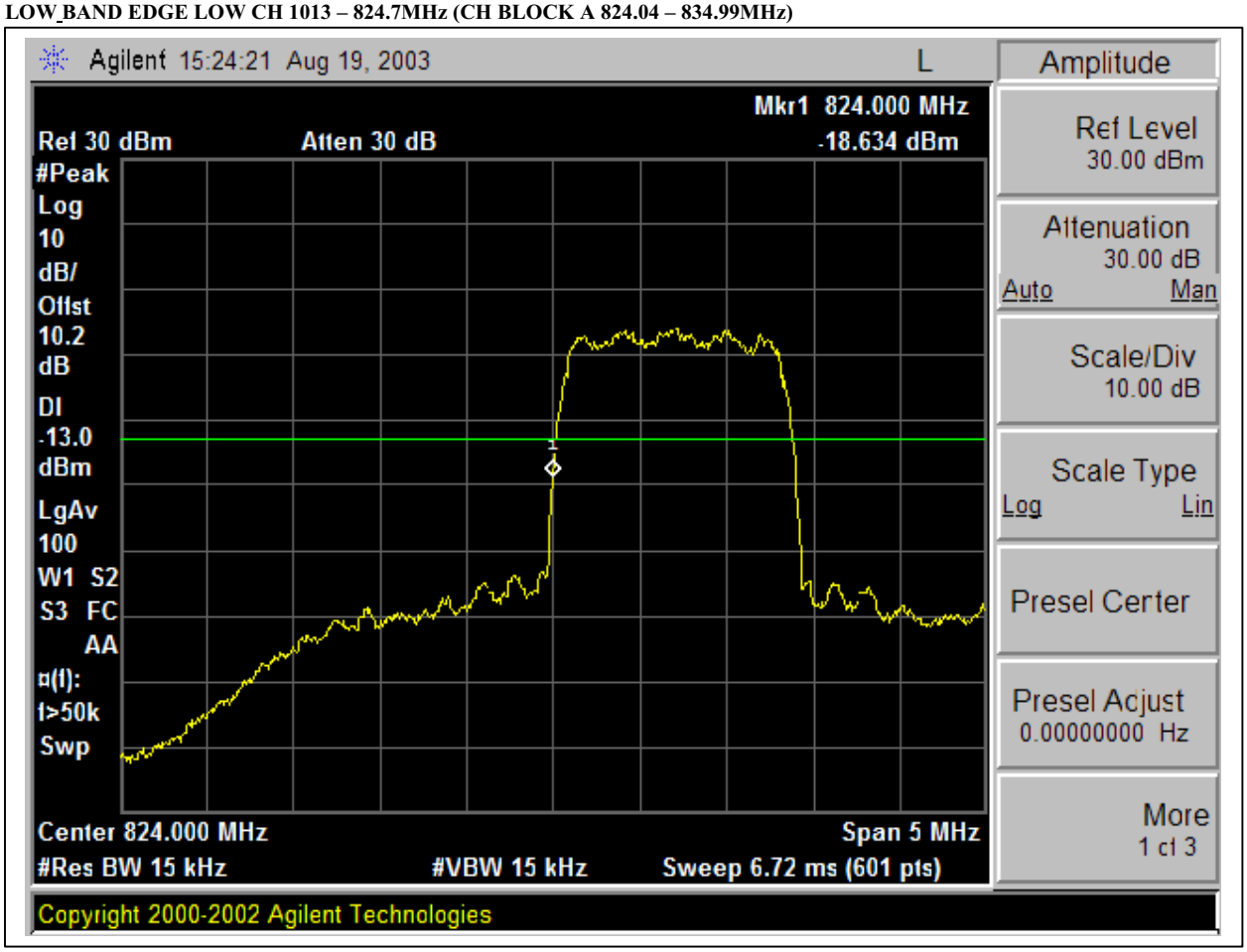


Fig. a-1

LOW_BAND EDGE CH 357 (CH BLOCK B 835.02 – 844.98MHz)

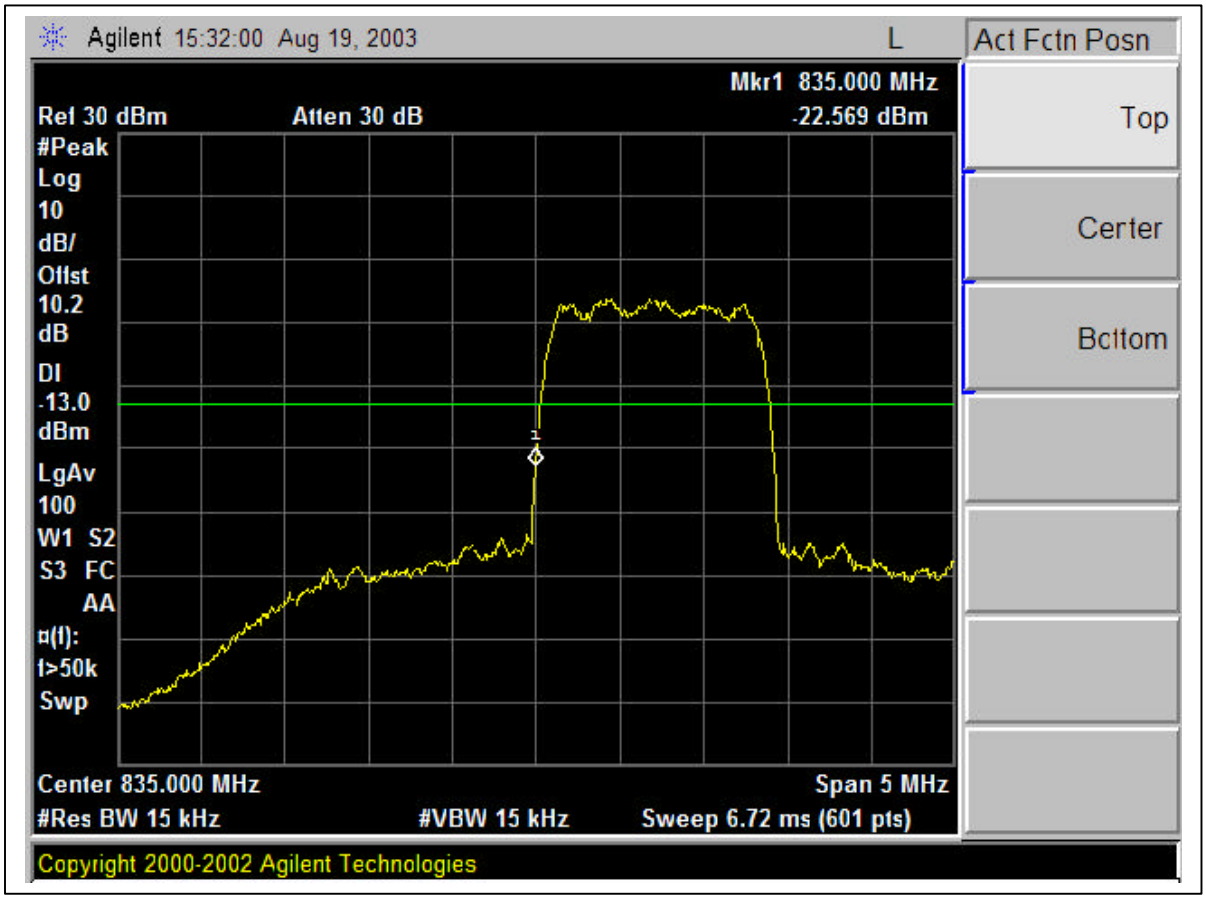


Fig. a-2

LOW_BAND EDGE LOW CH 690 (CH BLOCK A 845.01 – 846.48MHz)

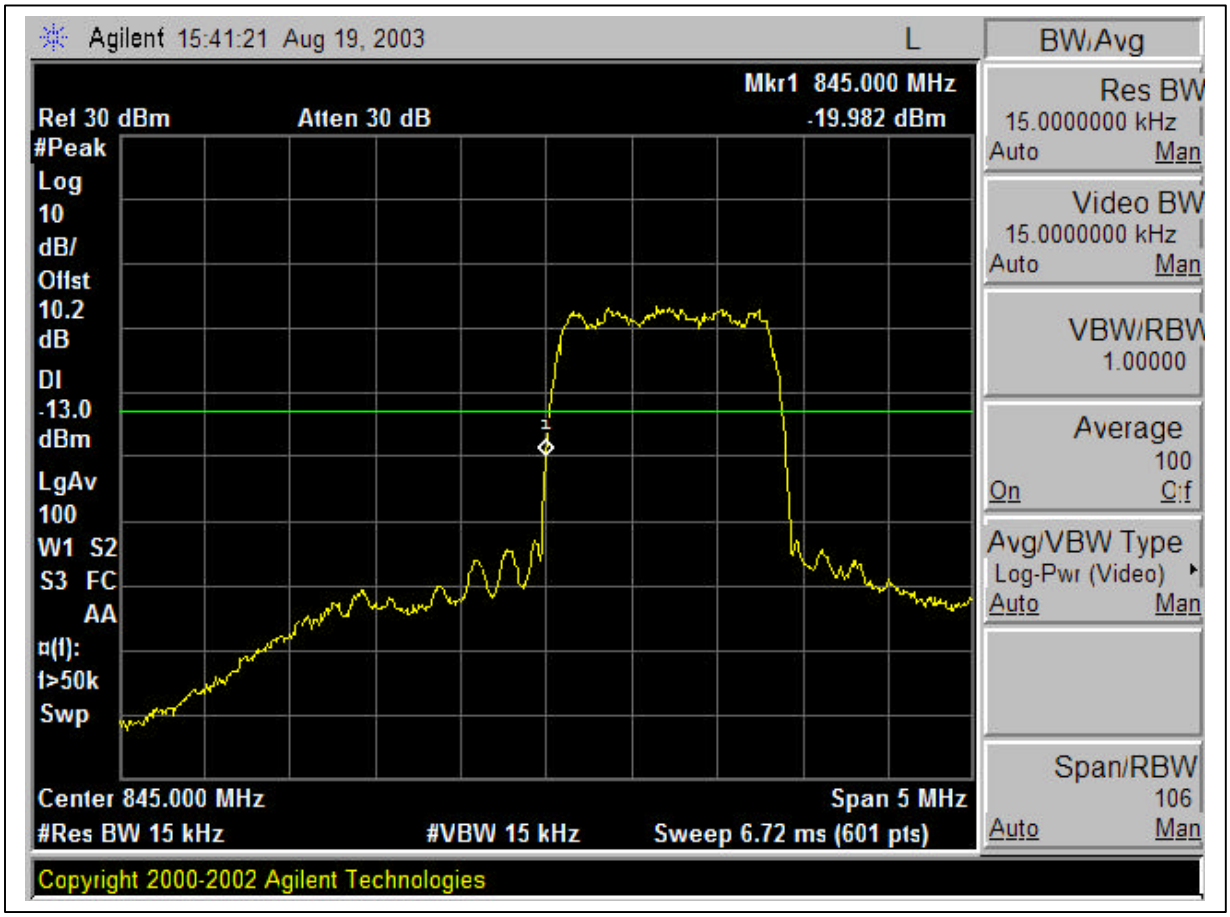


Fig. a-3

LOW_BAND EDGE CH 740 (CH BLOCK B 846.51 – 848.97MHz)

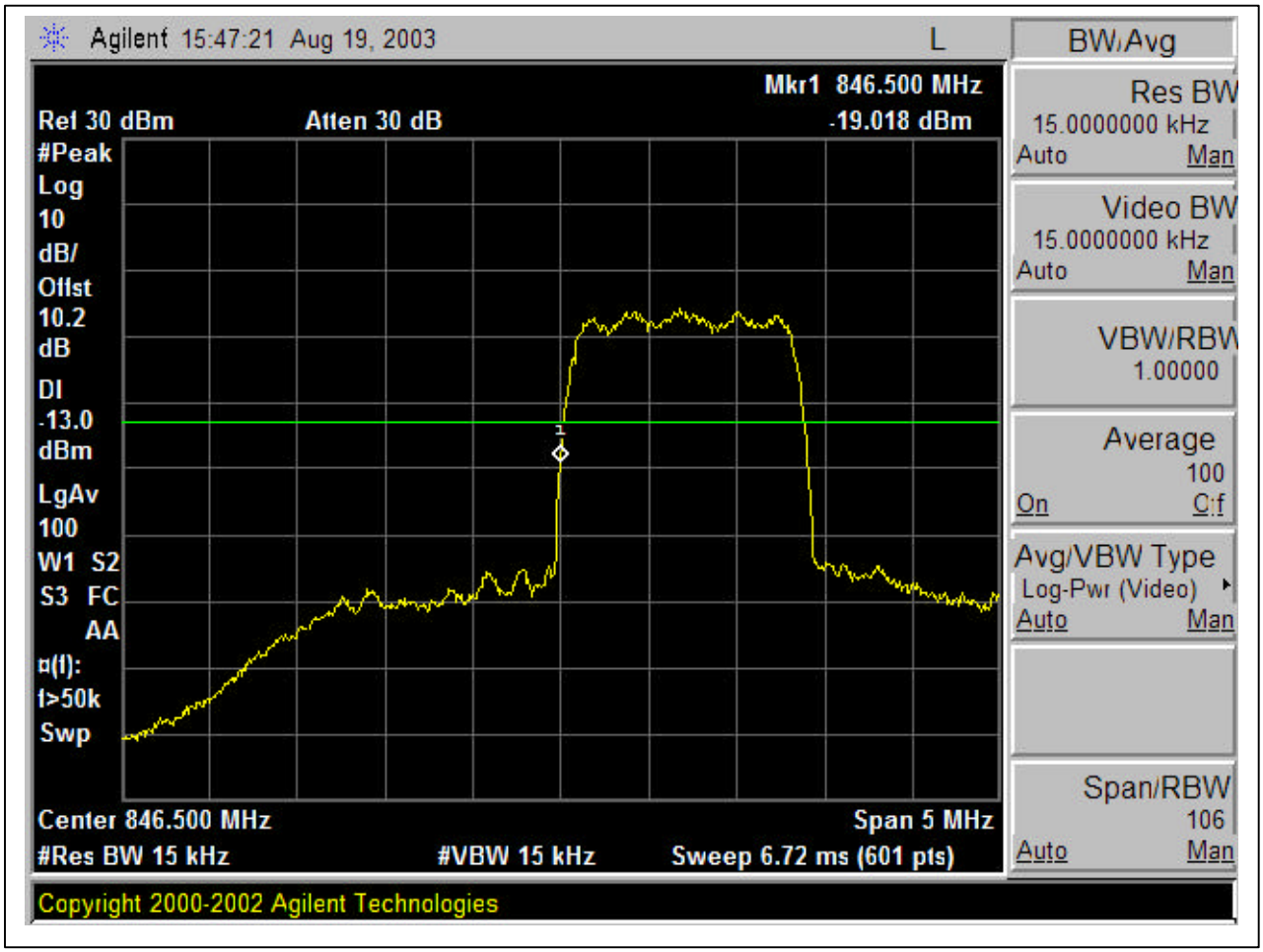


Fig. a-4

LOW BAND EDGE - CH 310 (CH BLOCK A 824.04 – 834.99MHz)

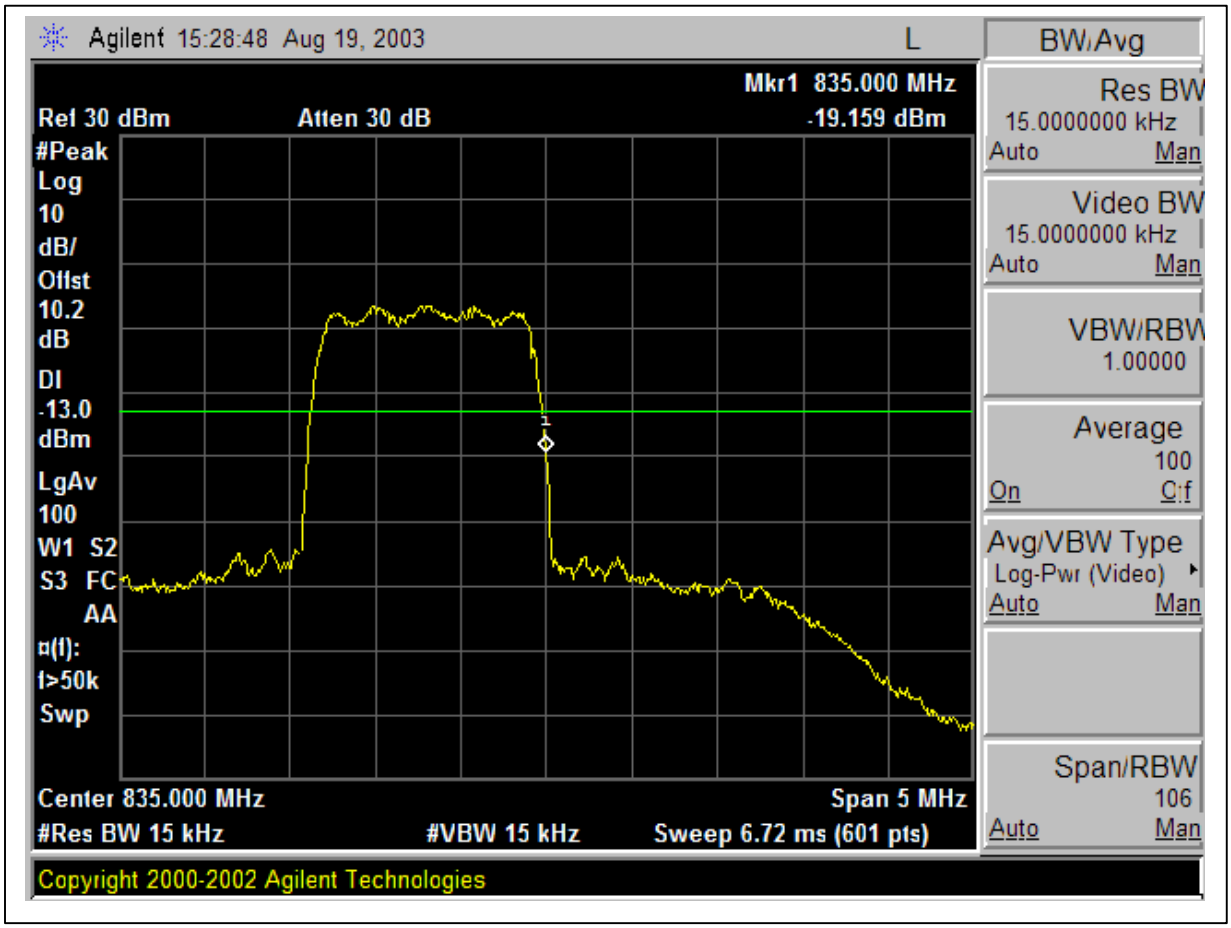


Fig. a-5

LOW BAND EDGE - CH 643 (CH BLOCK B 835.02 – 844.98MHz)

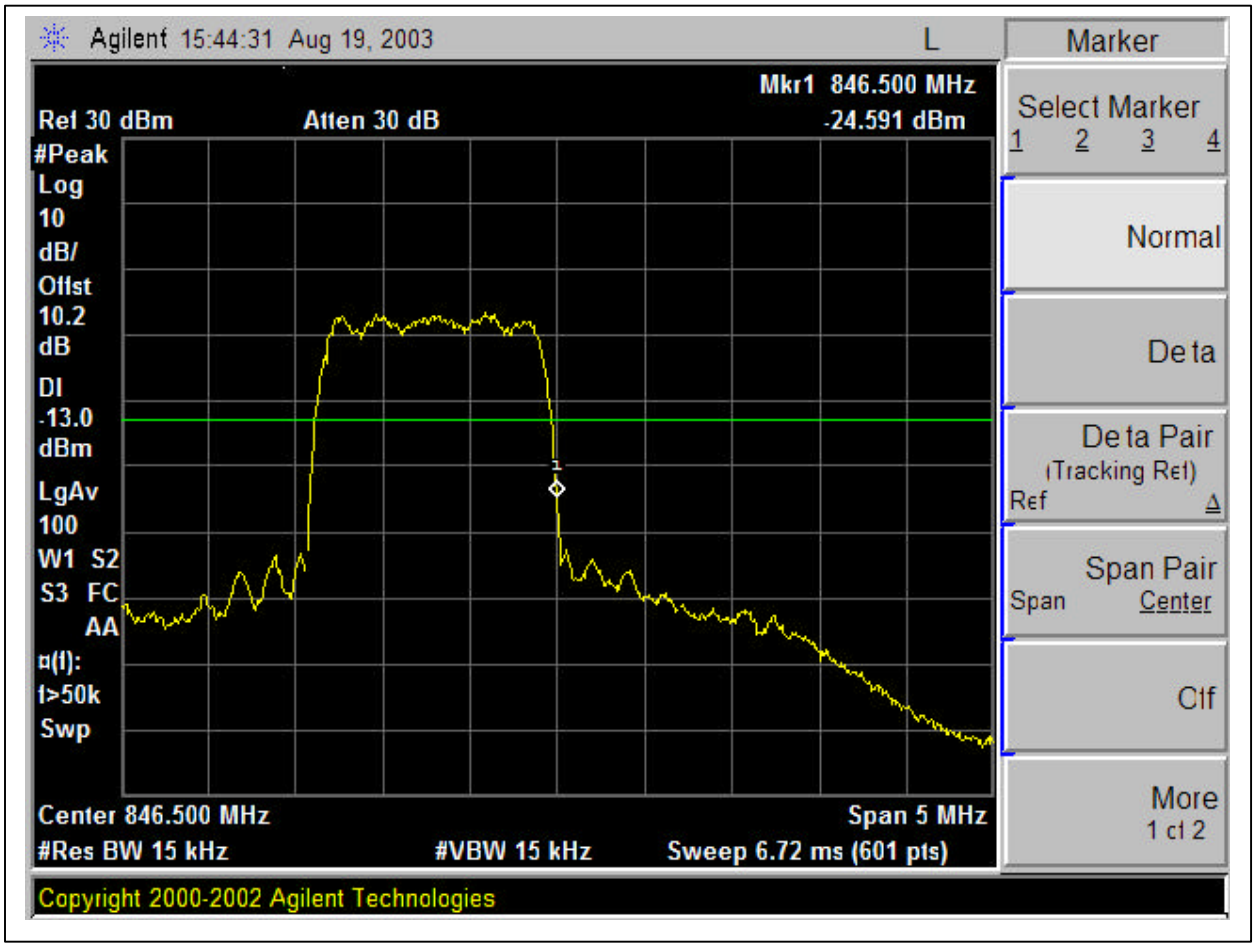


Fig. a-6

LOW BAND EDGE - CH 693 (CH BLOCK A 845.01 – 846.48MHz)

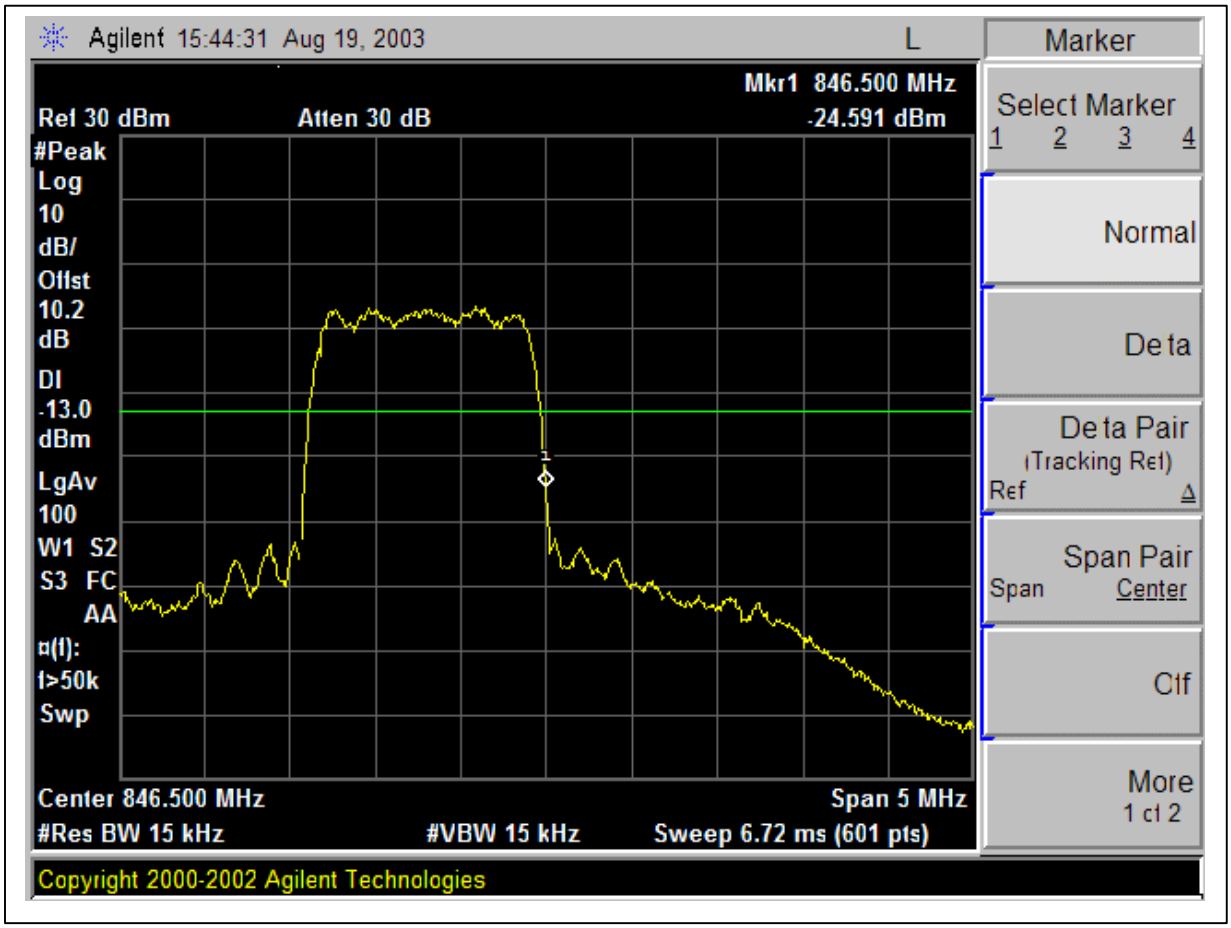


Fig. a-7

HI BAND EDGE - CH 777 – 848.31MHz (CH BLOCK B 846.51 – 848.97MHz)

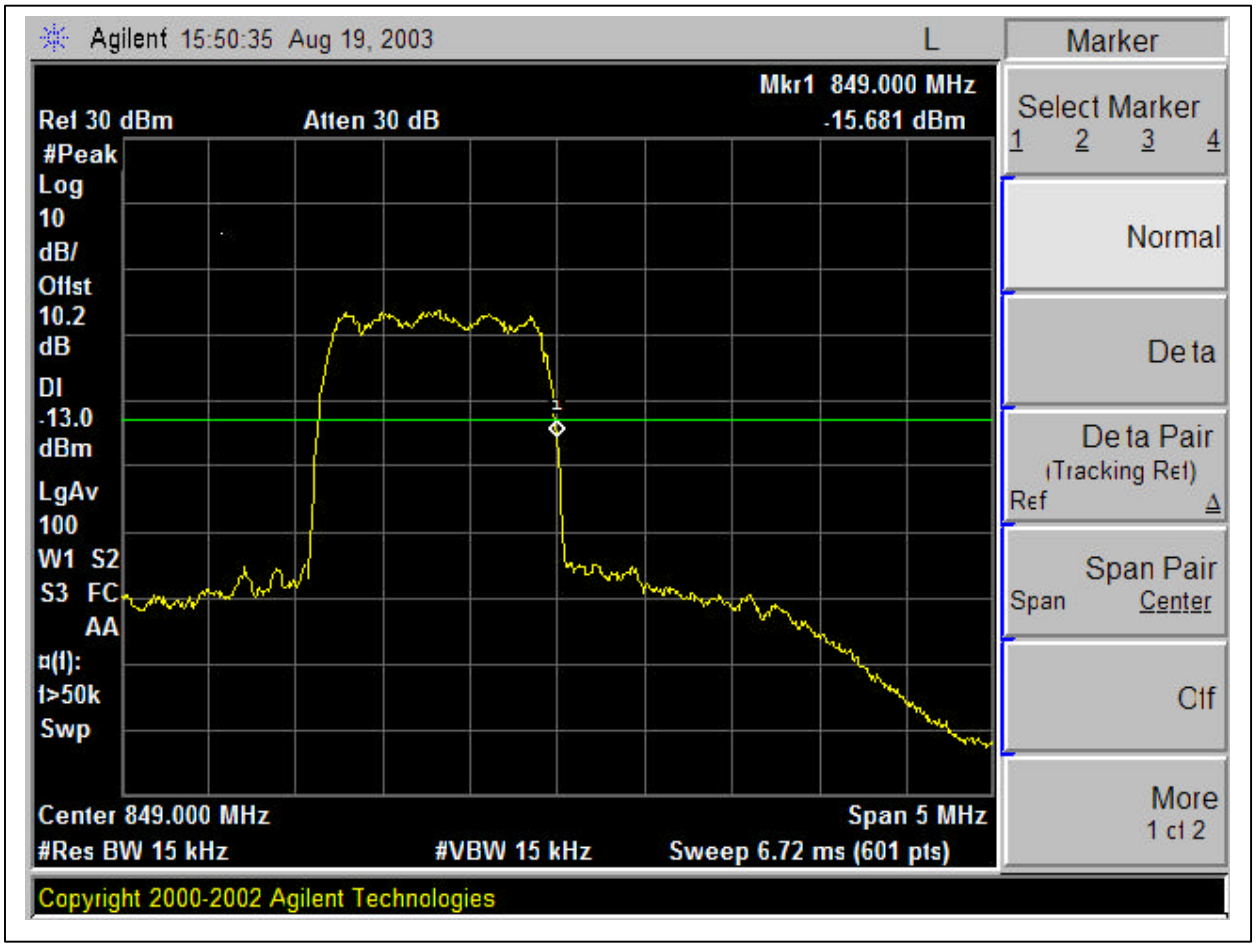
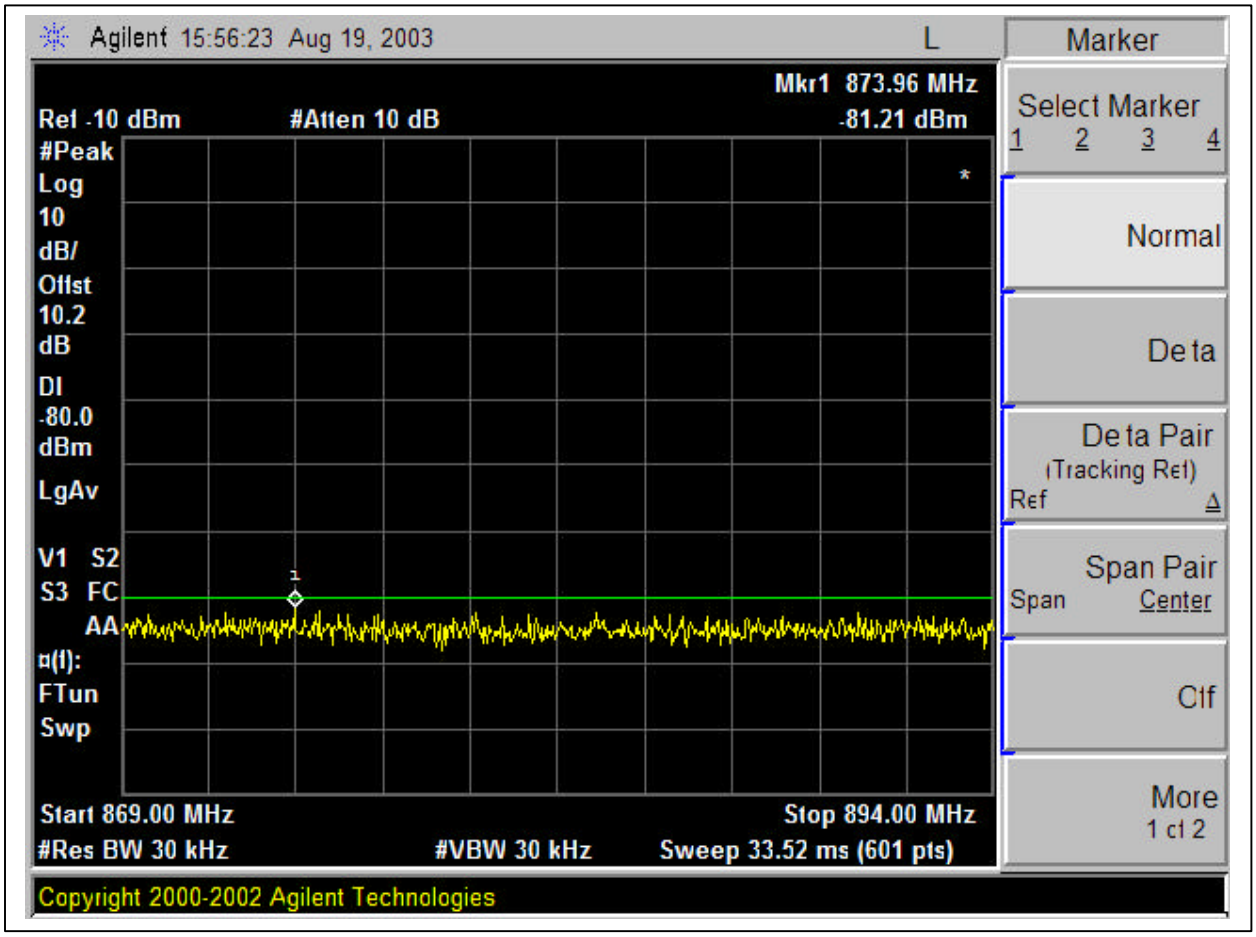


Fig. a-8

800MHz – CELL MOBILE EMISSION IN BASE FREQUENCY RANGE



BAND EDGE – 1900 MHz PCS

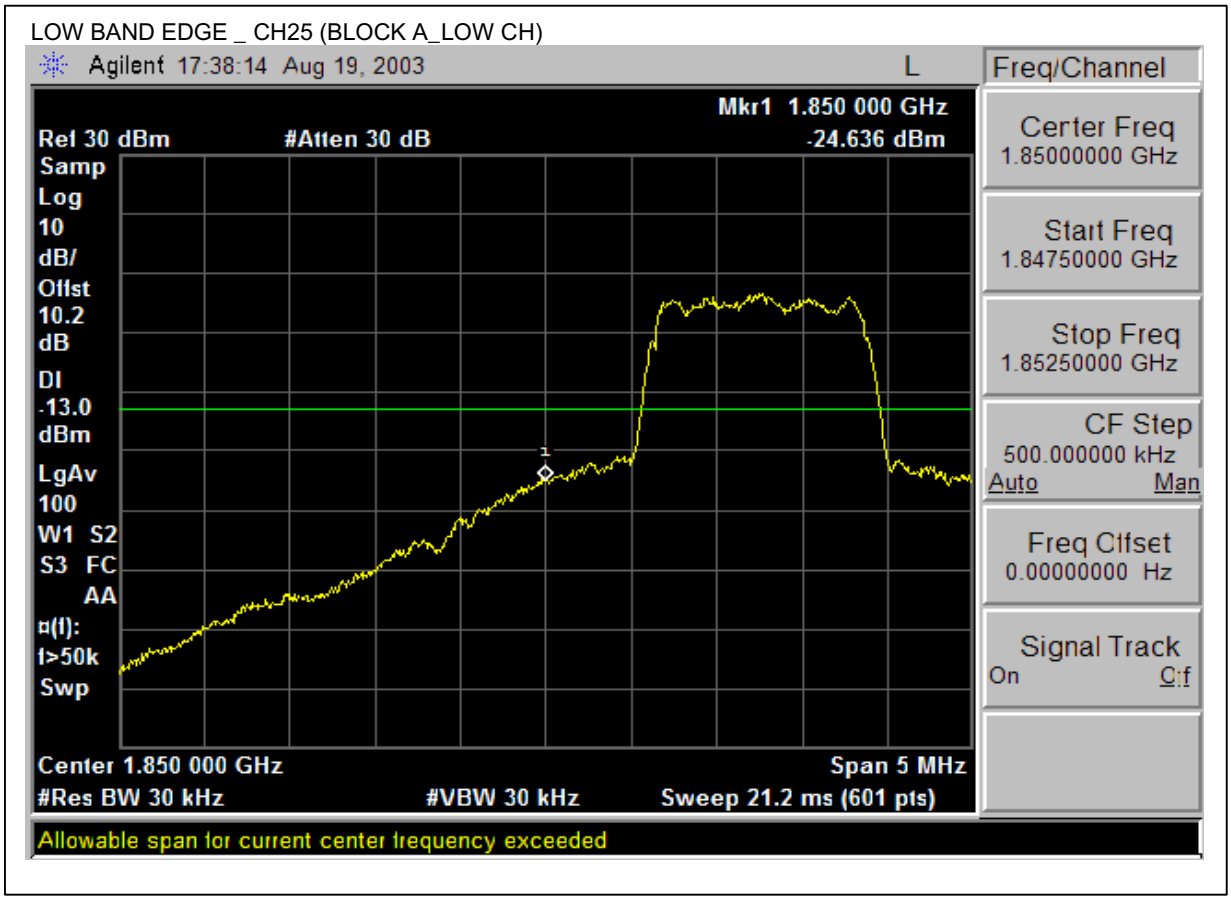


Fig. b - 1

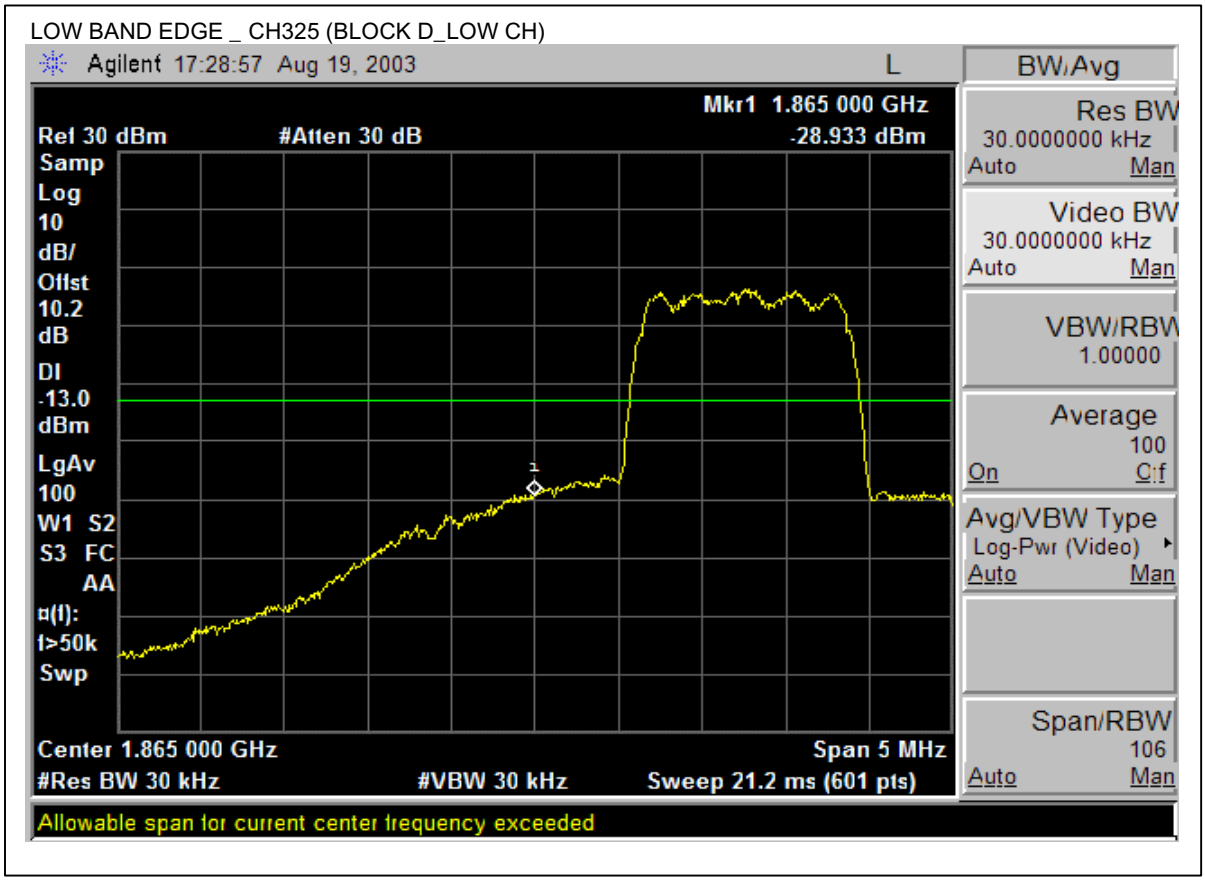


Fig. b-2

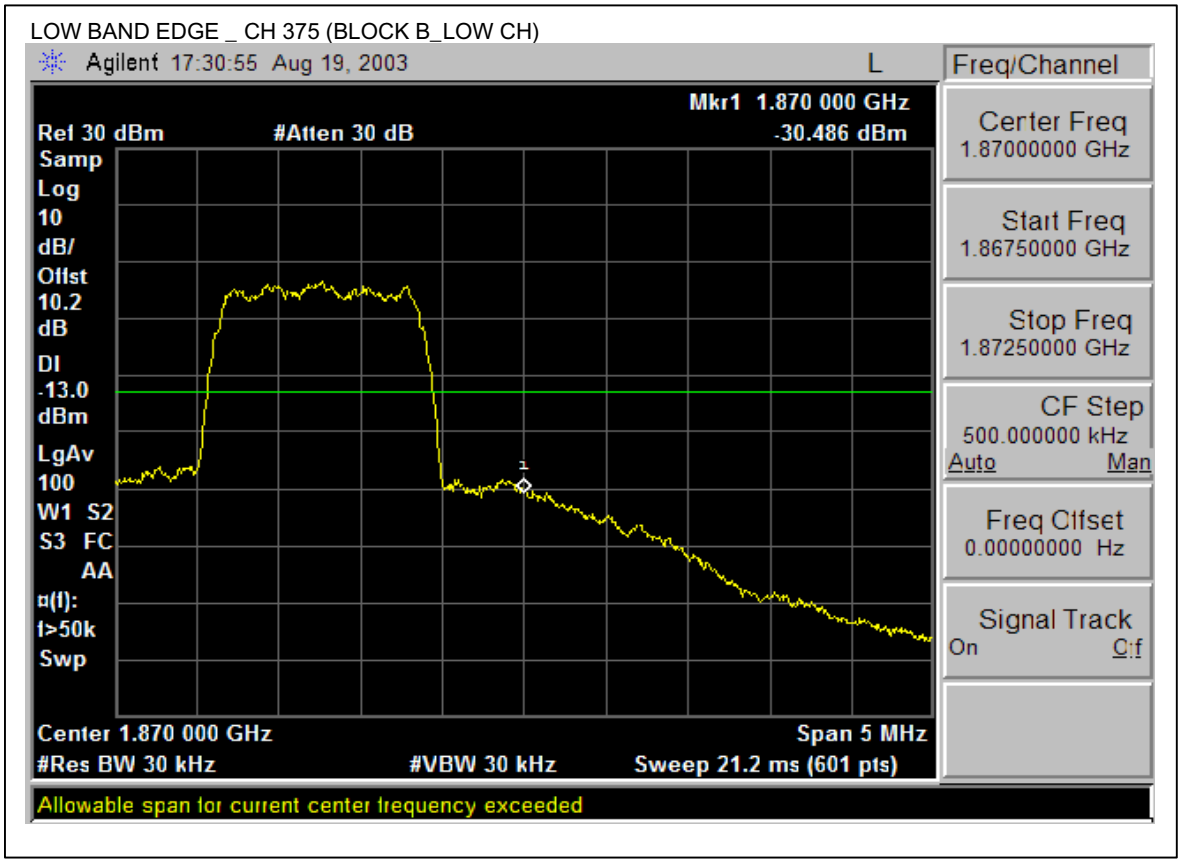


Fig. b - 3

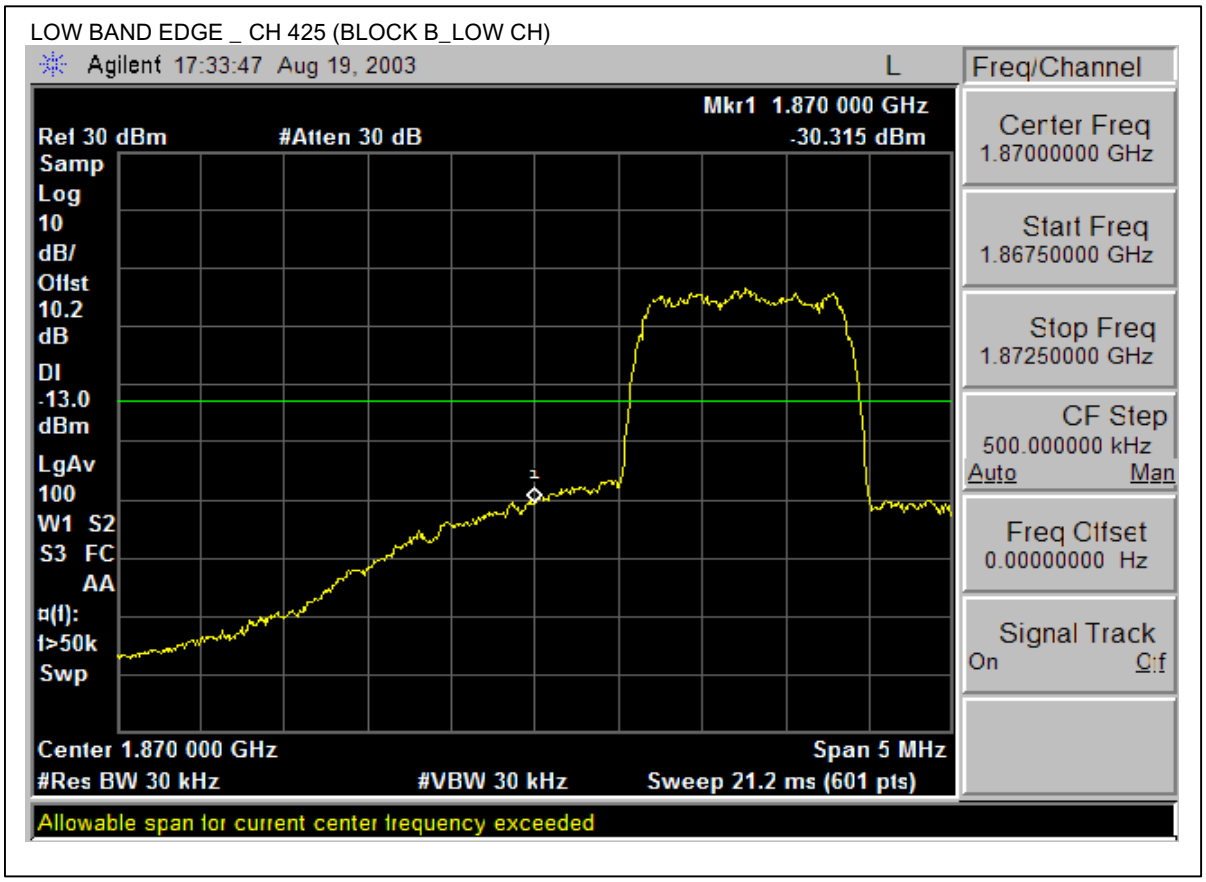


Fig. b - 4

LOW BAND EDGE _ CH 725 (BLOCK E_LOW CH)

Fig. b - 5

LOW BAND EDGE _ CH 825 (BLOCK F_LOW CH)

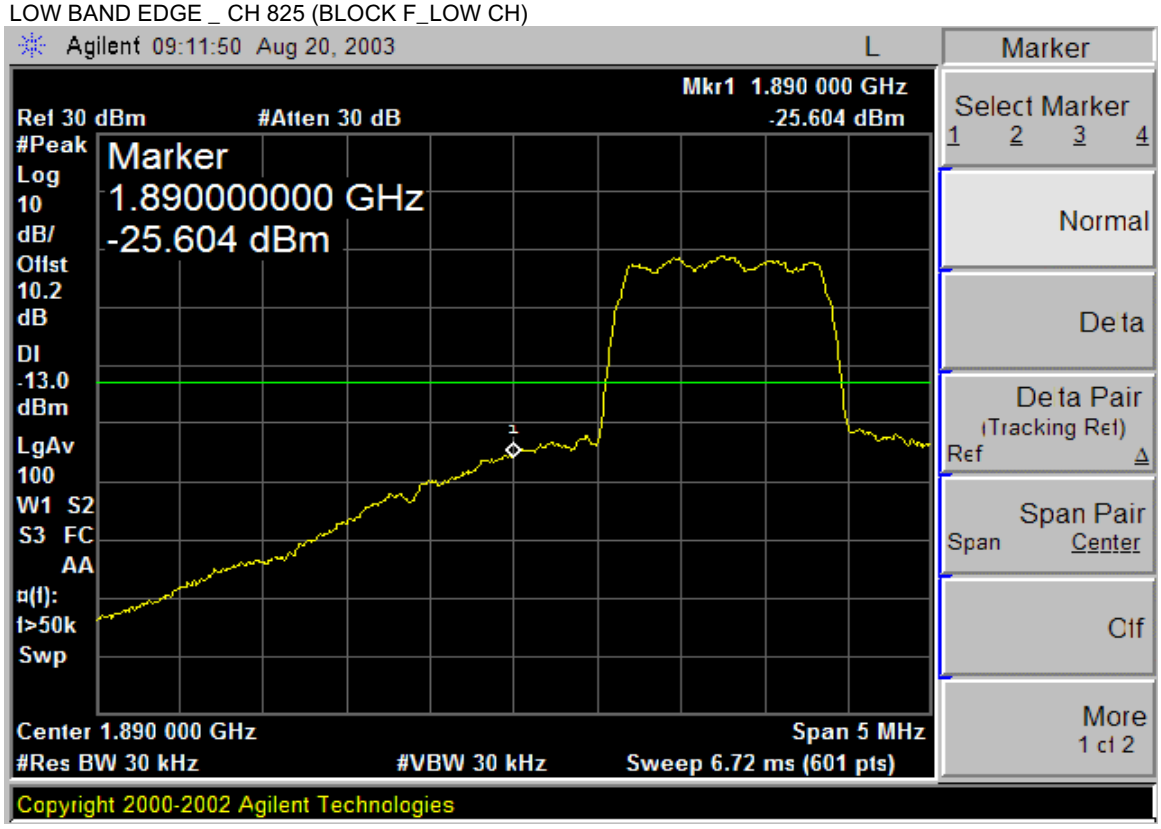


Fig. b - 6

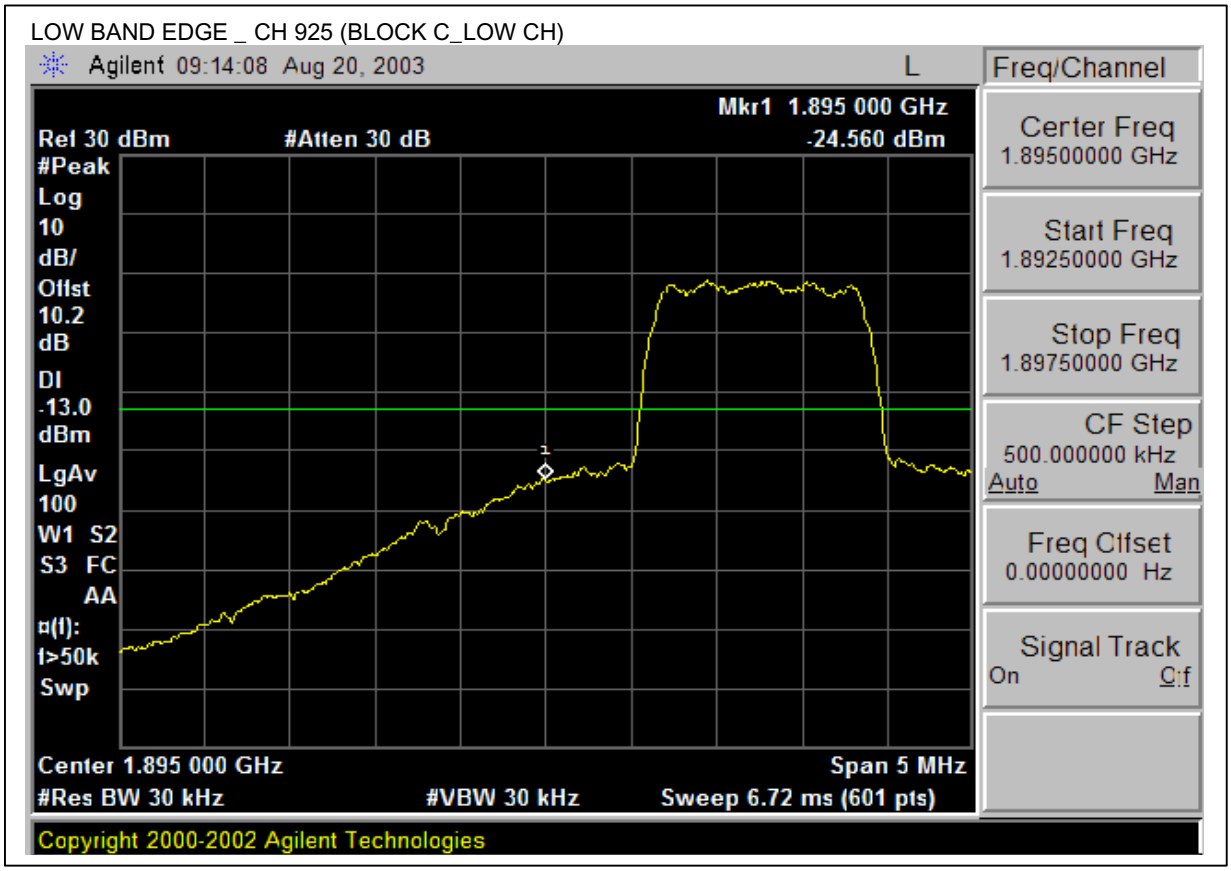


Fig. b - 7

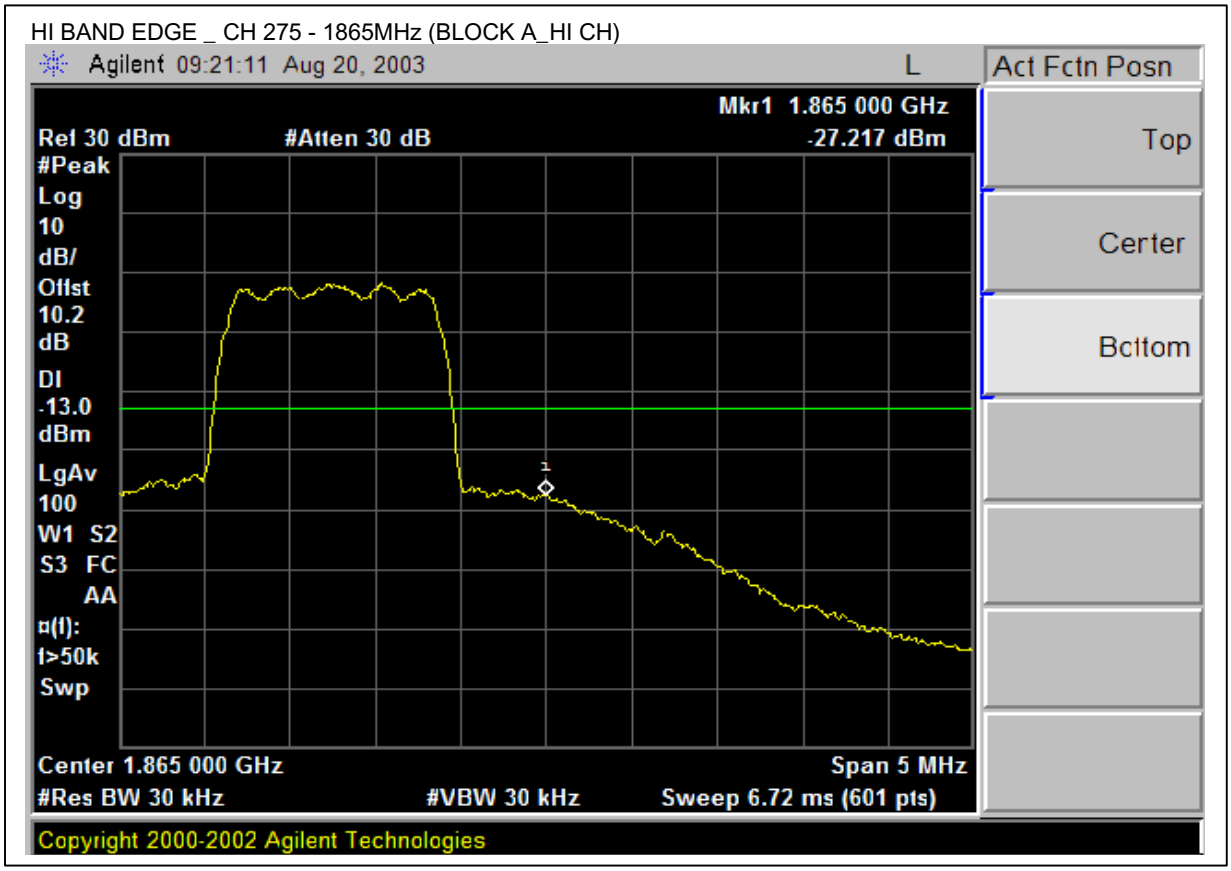


Fig. b - 8

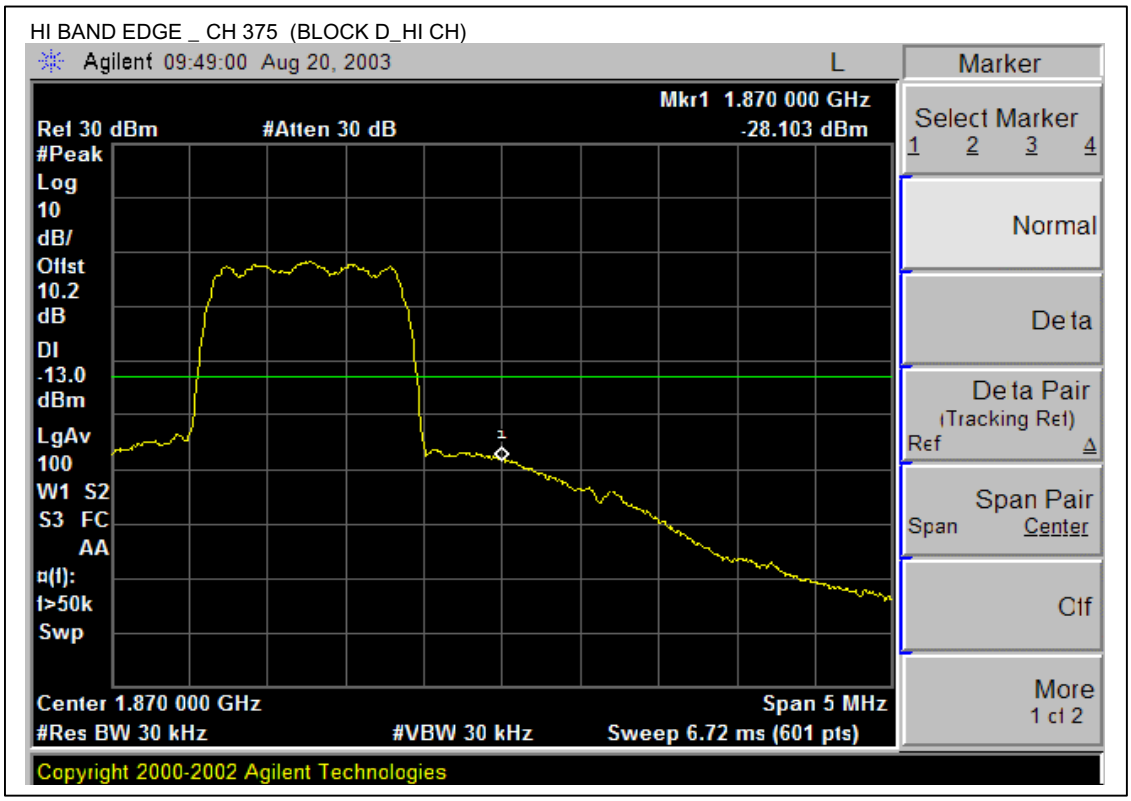


Fig. b - 9

HI BAND EDGE _ CH 675 (BLOCK B_HI CH)

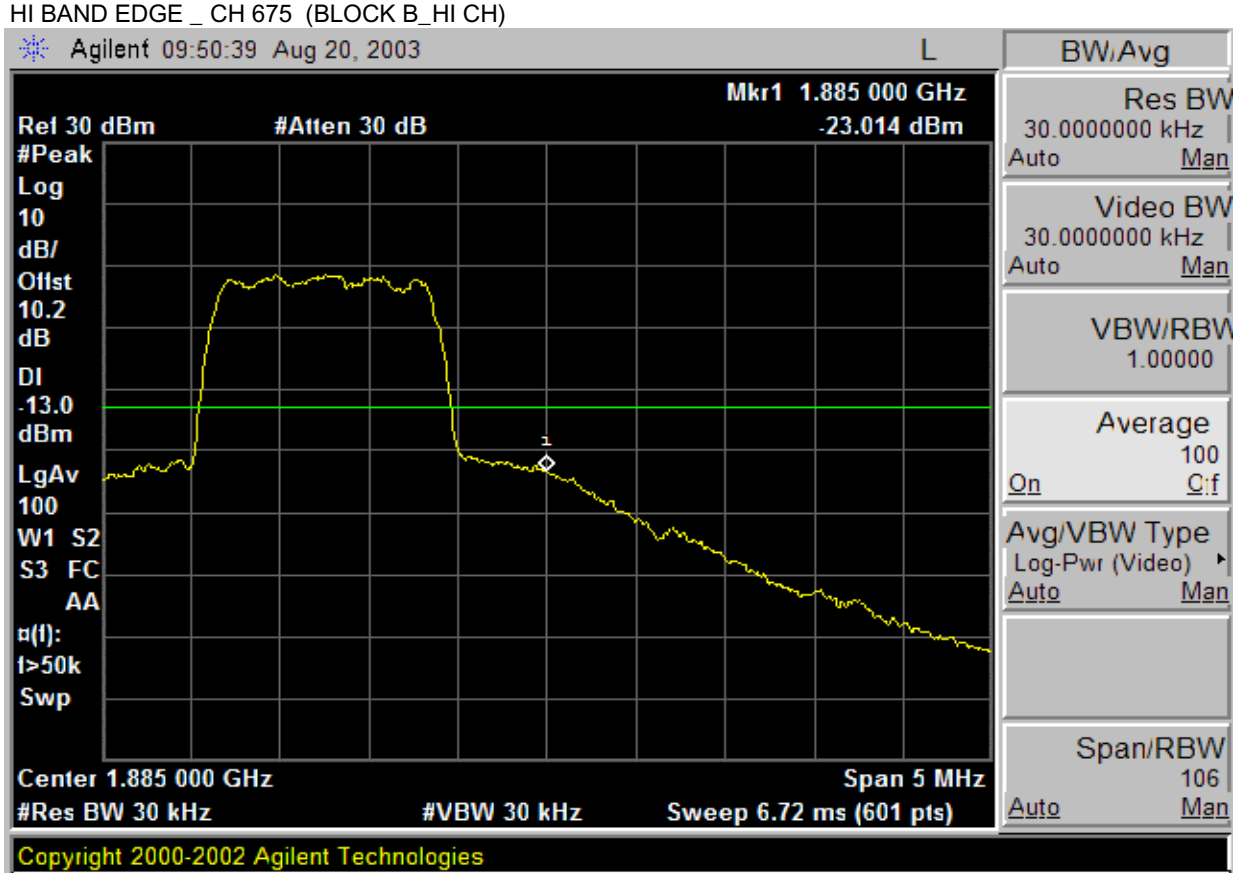


Fig. b - 10

HI BAND EDGE _ CH 775 (BLOCK E_HI CH)

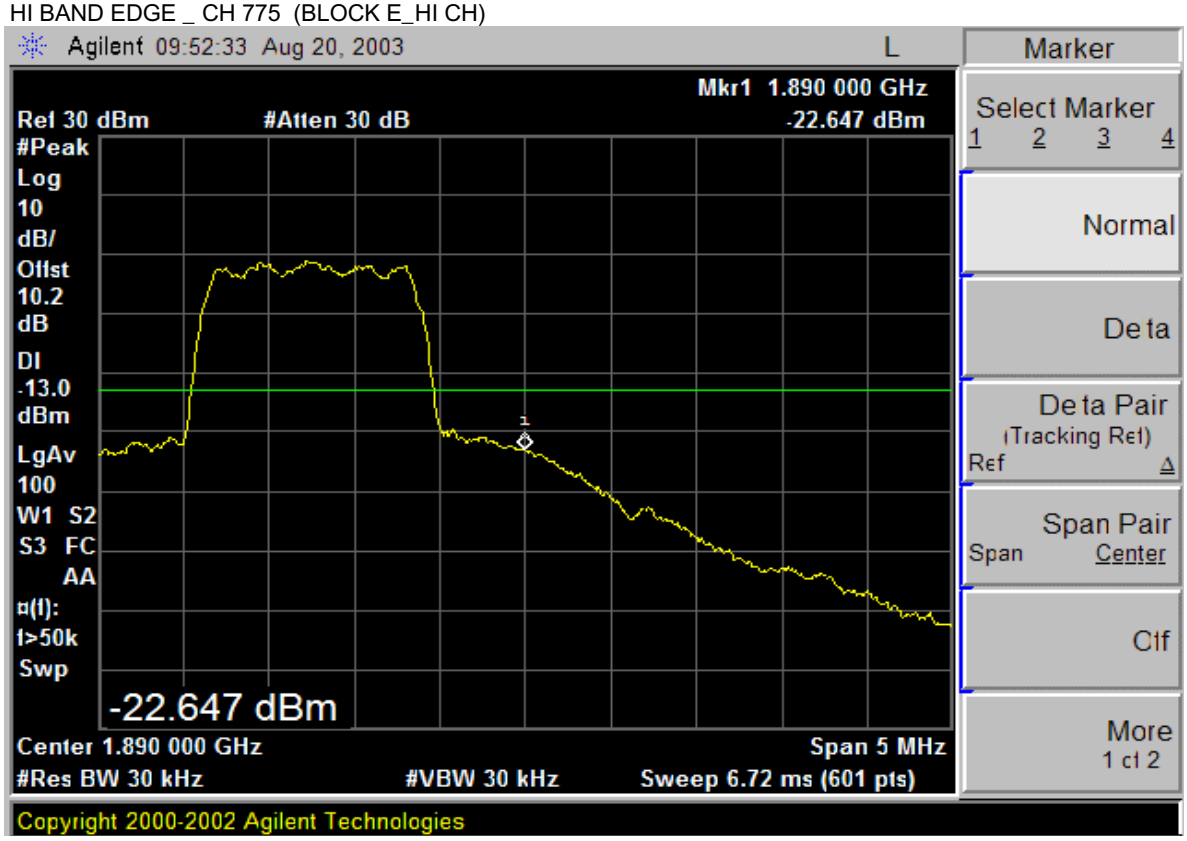


Fig. b - 11

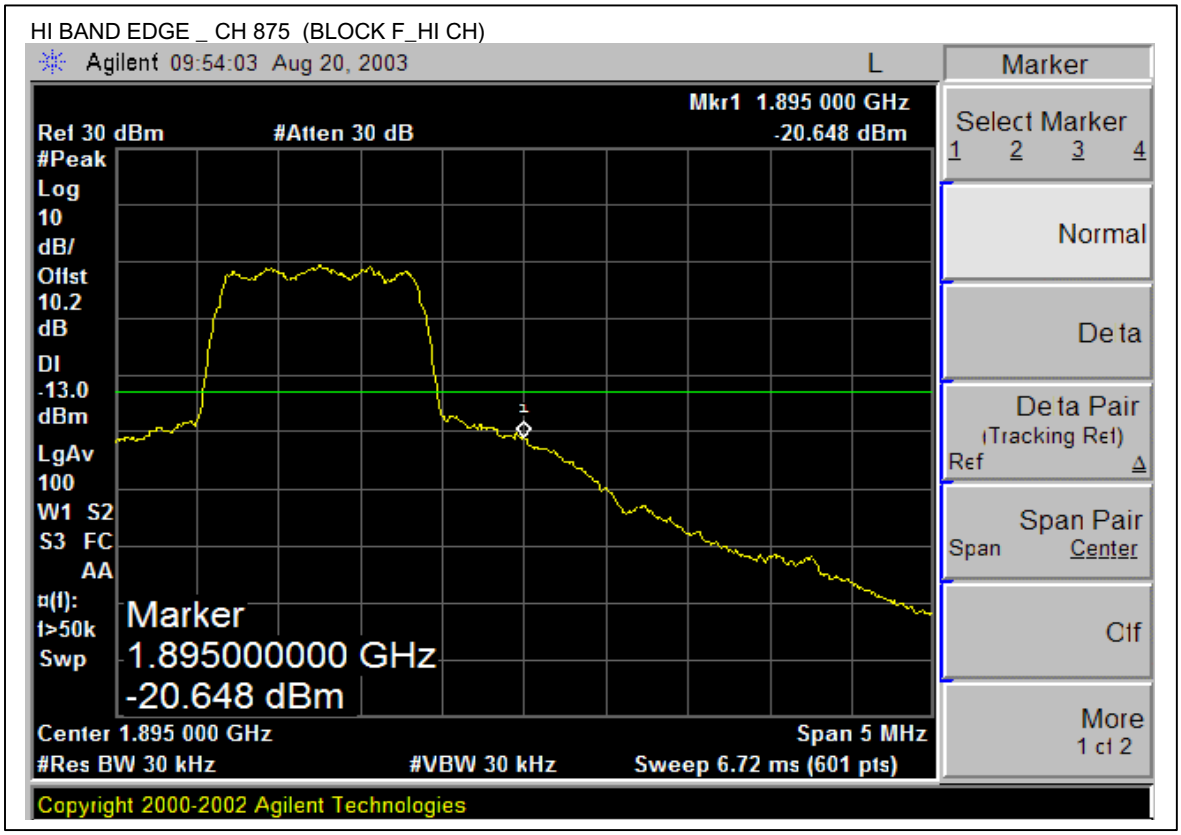


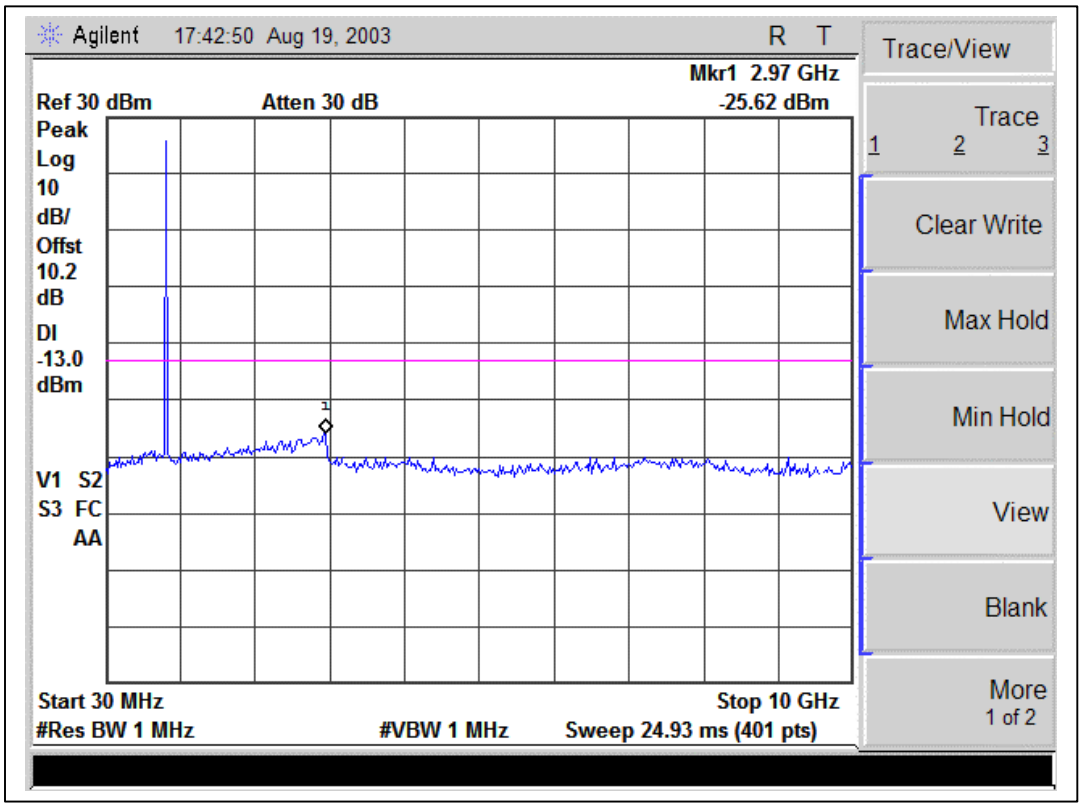
Fig. b - 12

HI BAND EDGE _ CH 1175 (BLOCK C_HI CH)

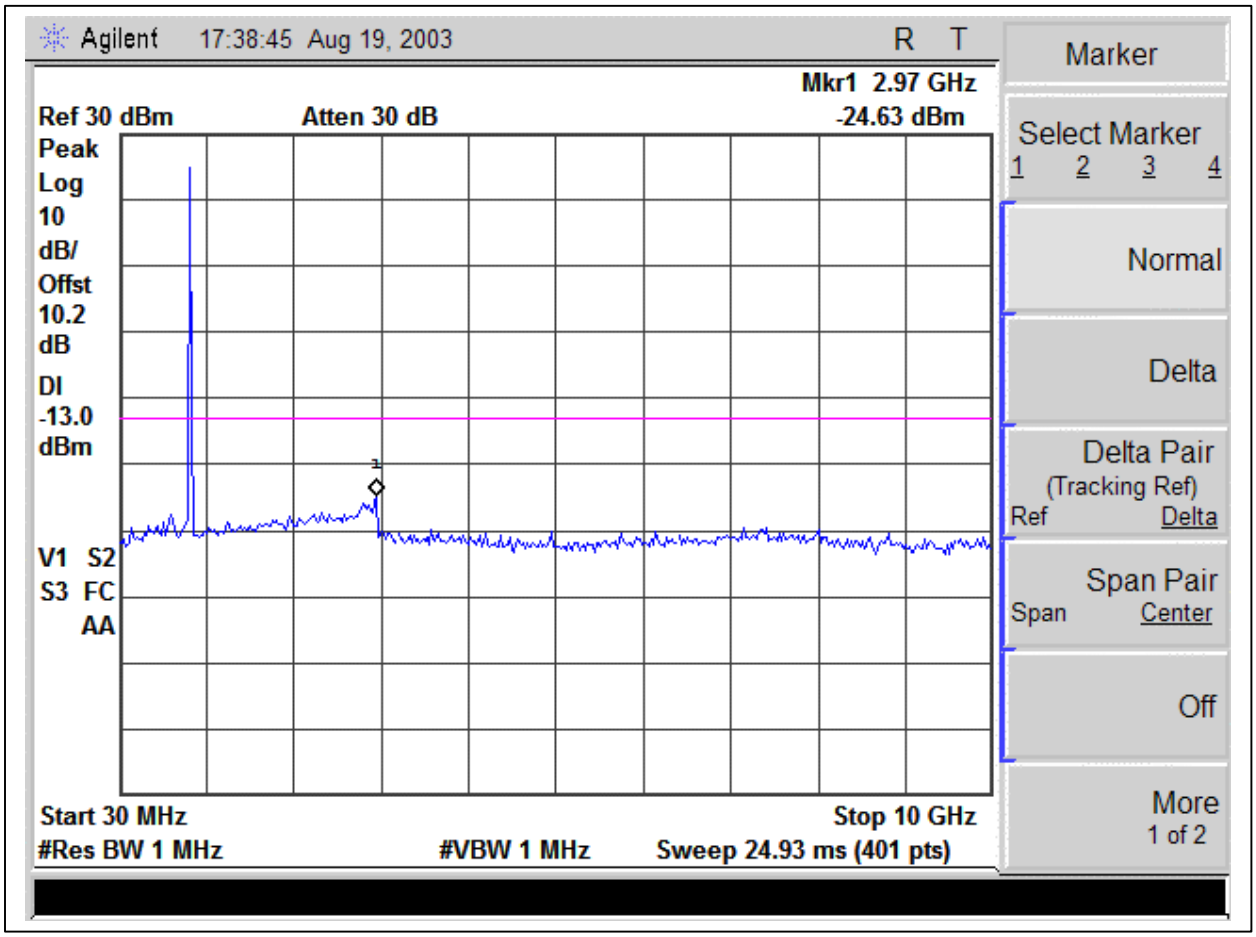
Fig. b - 13

SPURIOUS – 800MHz CELLULAR

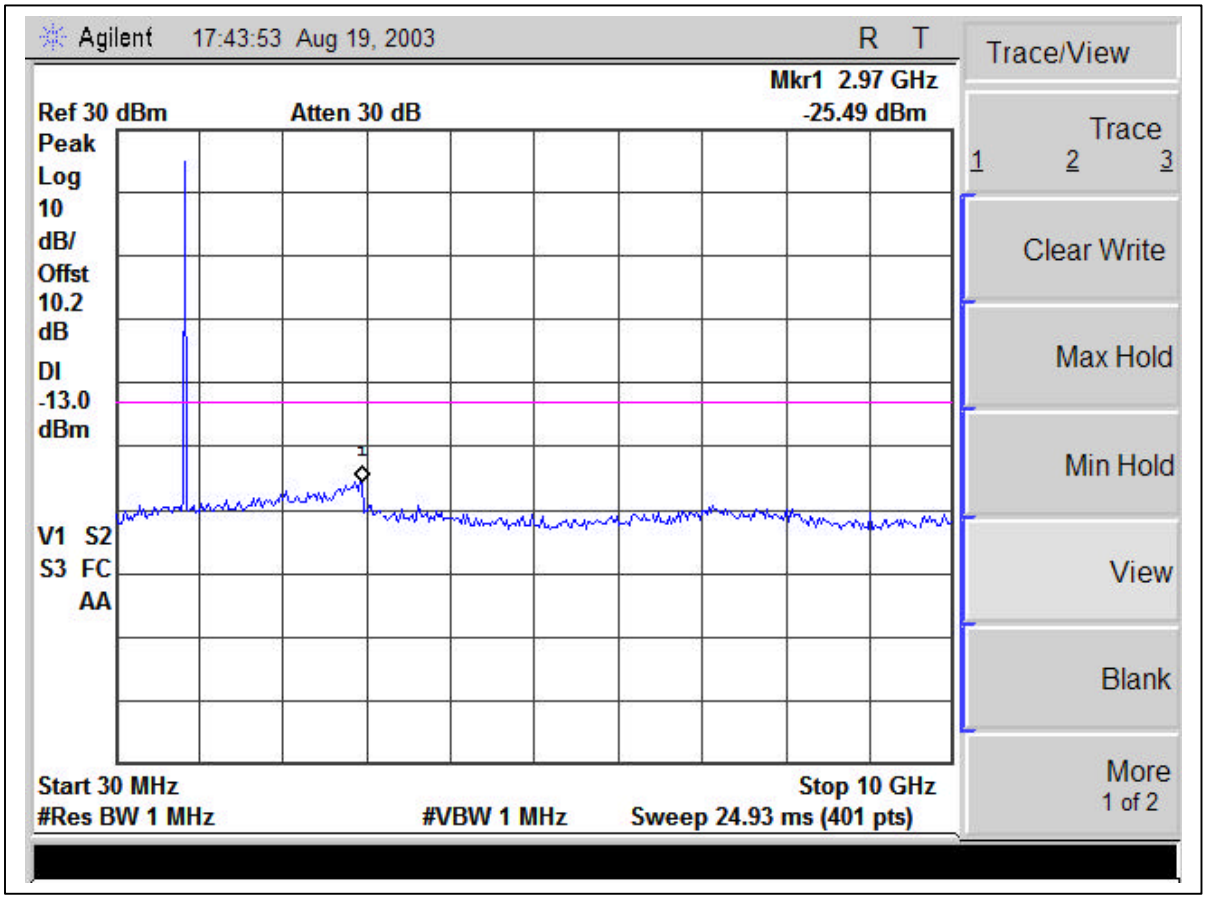
OUT OF BAND EMISSON – LOW CHANNEL



OUT OF BAND EMISSON – MID CHANNEL

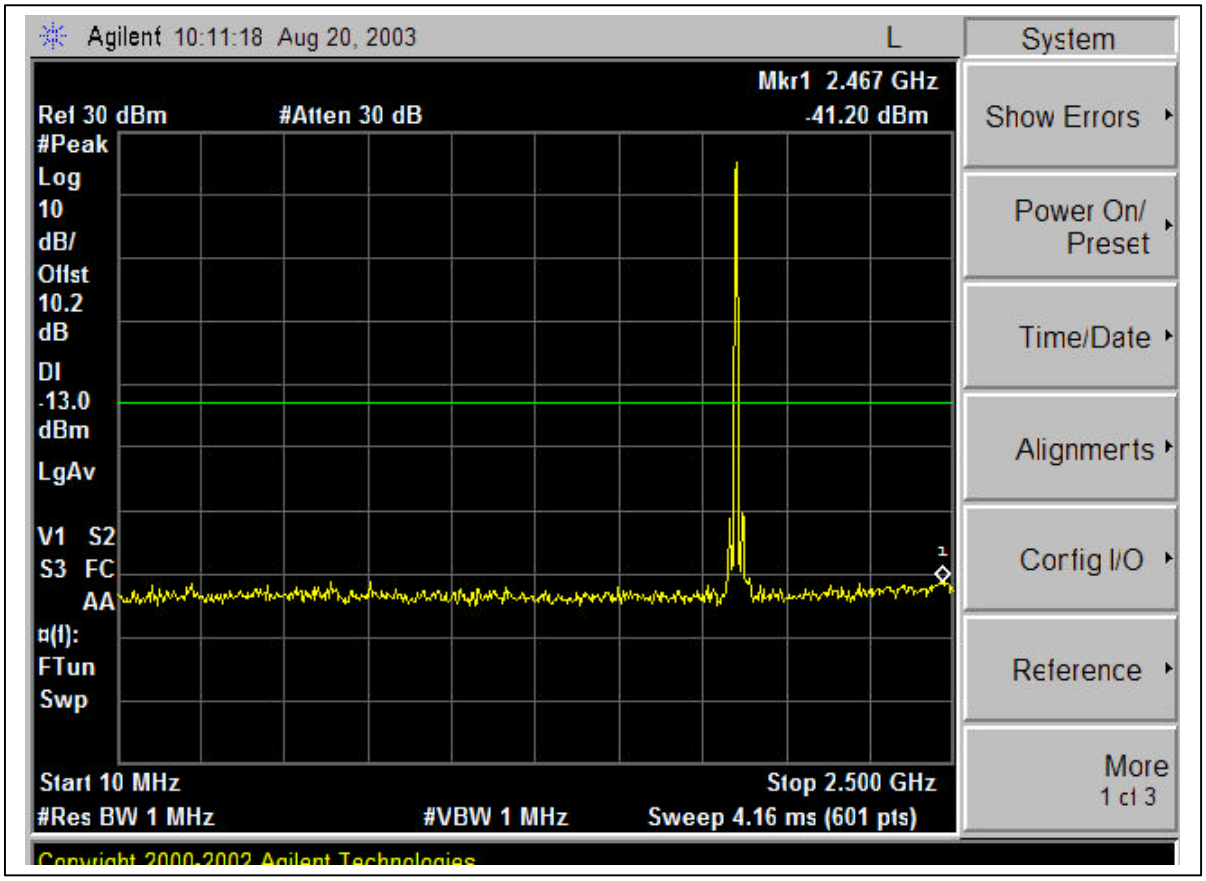


OUT OF BAND EMISSON – HI CHANNEL

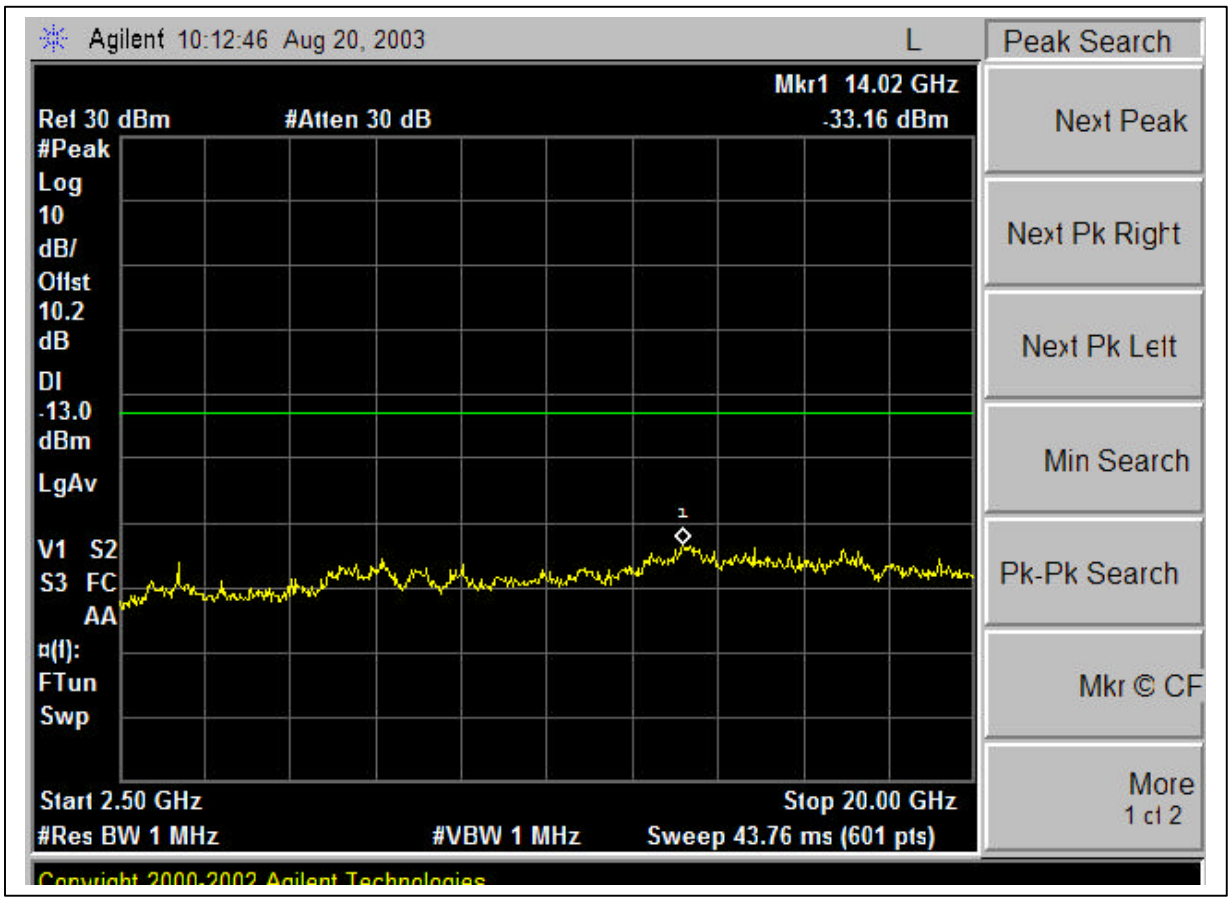


SPURIOUS – 1900MHz PCS

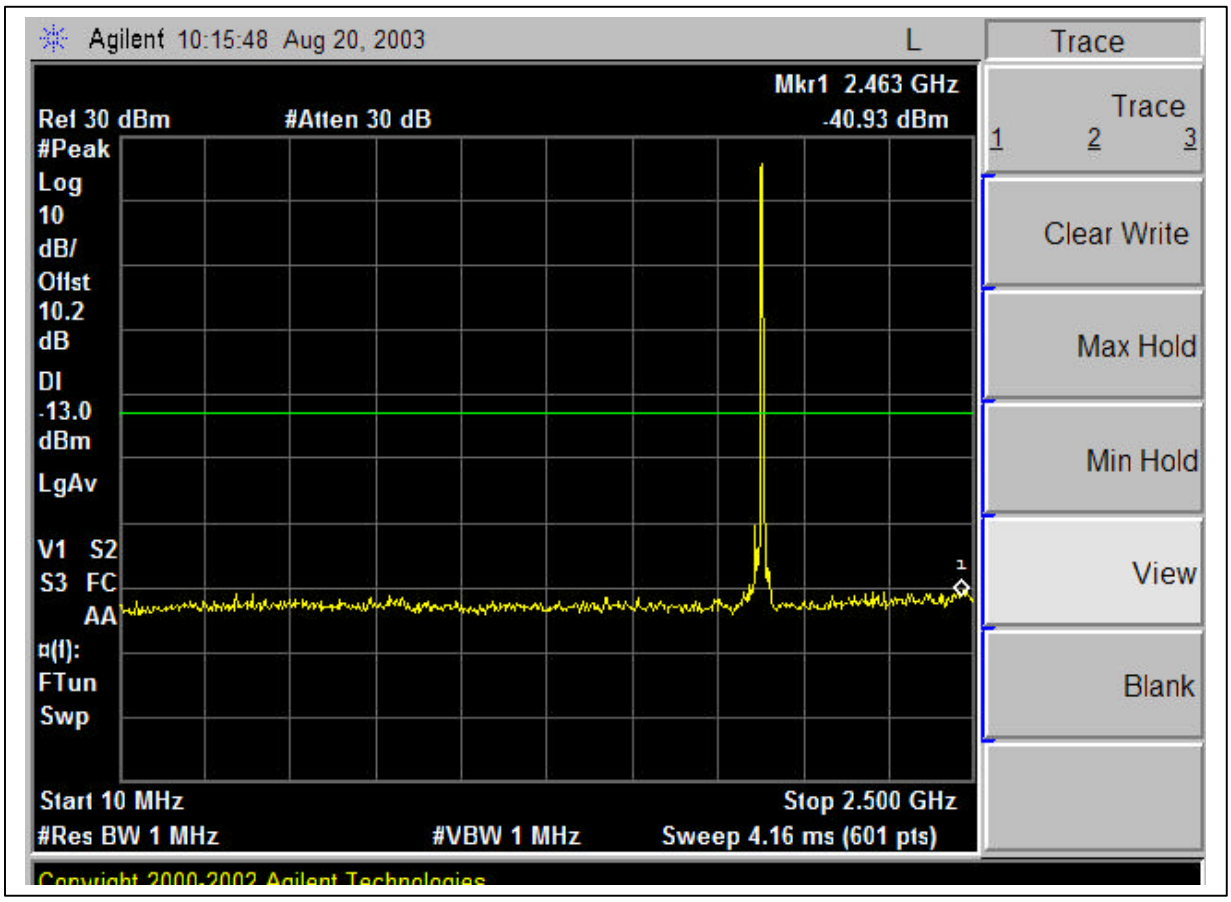
OUT OF BAND EMISSON – LOW CHANNEL #1



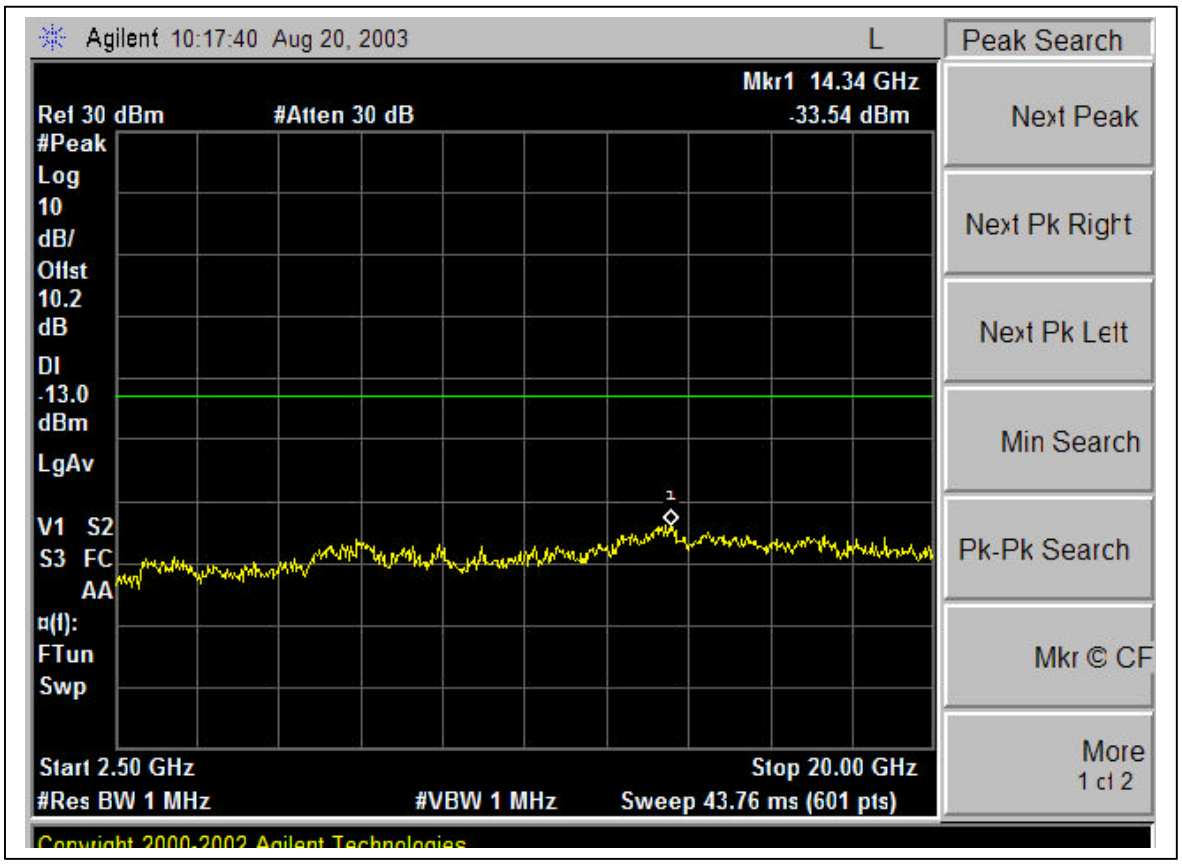
OUT OF BAND EMISSON – LOW CHANNEL #2



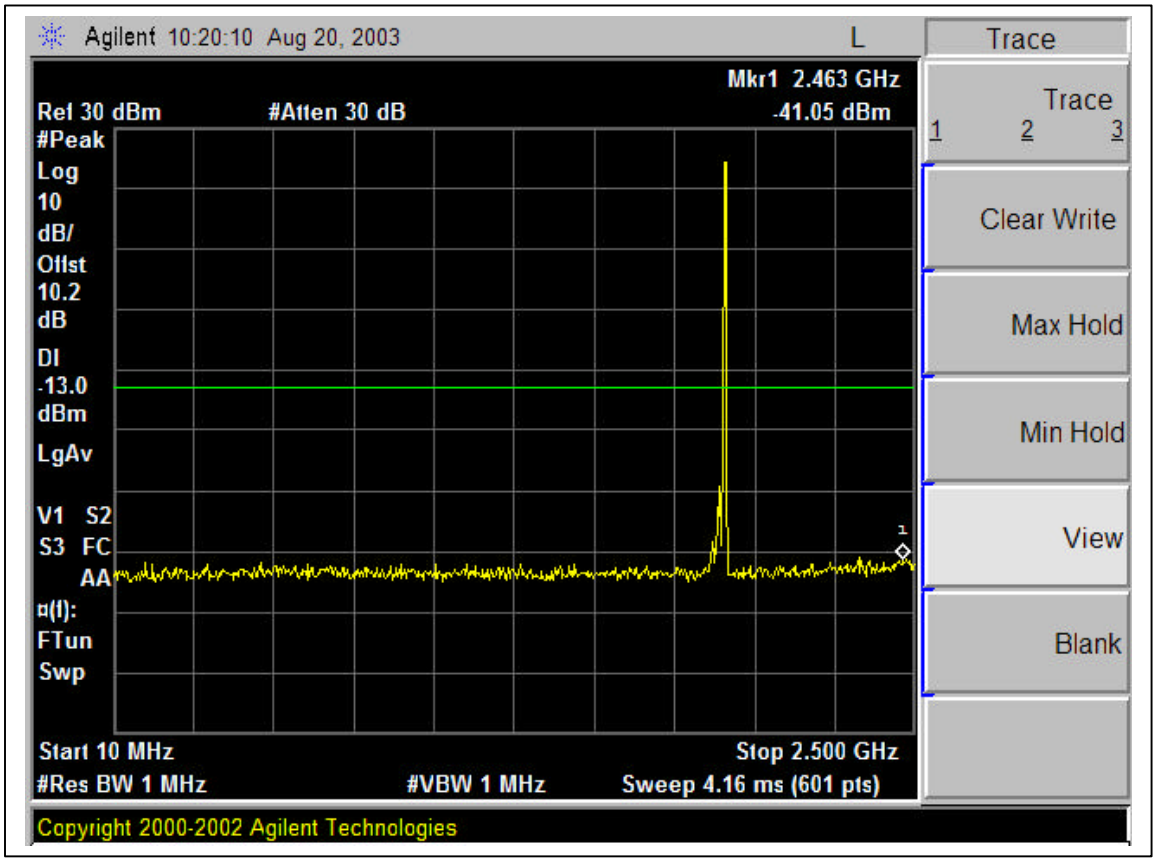
OUT OF BAND EMISSON – MID CHANNEL #1



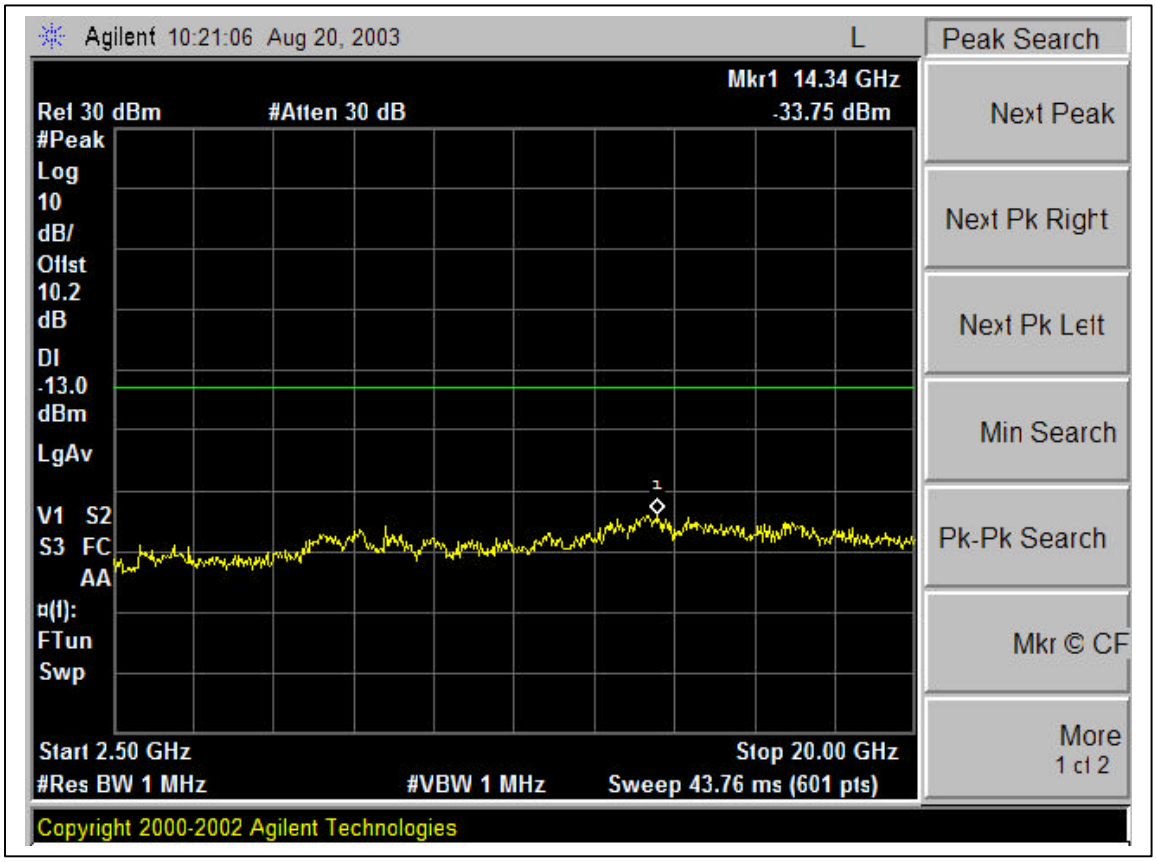
OUT OF BAND EMISSON – MID CHANNEL #2



OUT OF BAND EMISSON – HI CHANNEL #1



OUT OF BAND EMISSON – HI CHANNEL #2



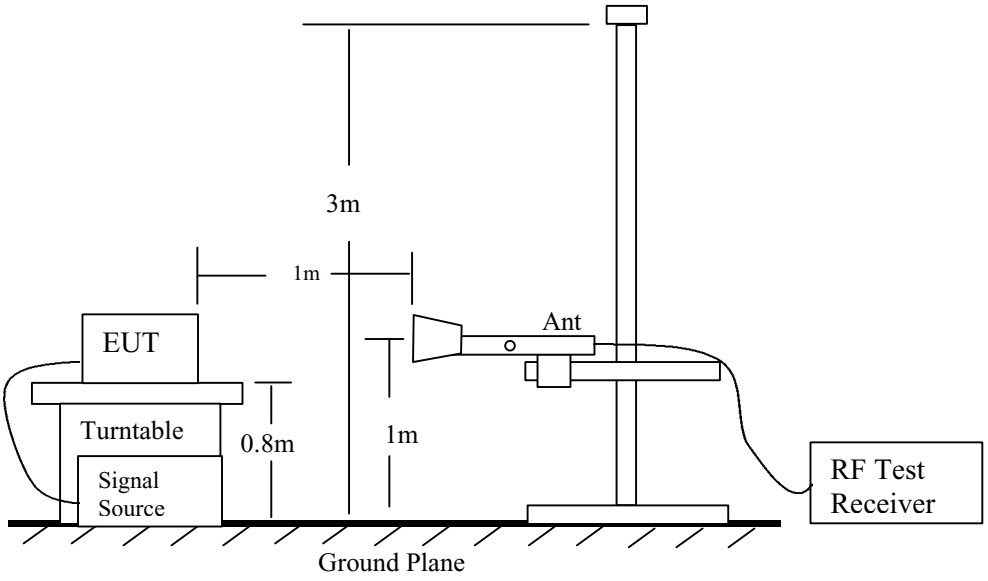
7.5. SECTION 2.1053: FIELD STRENGTH OF SPURIOUS RADIATION

INSTRUMENTS LIST

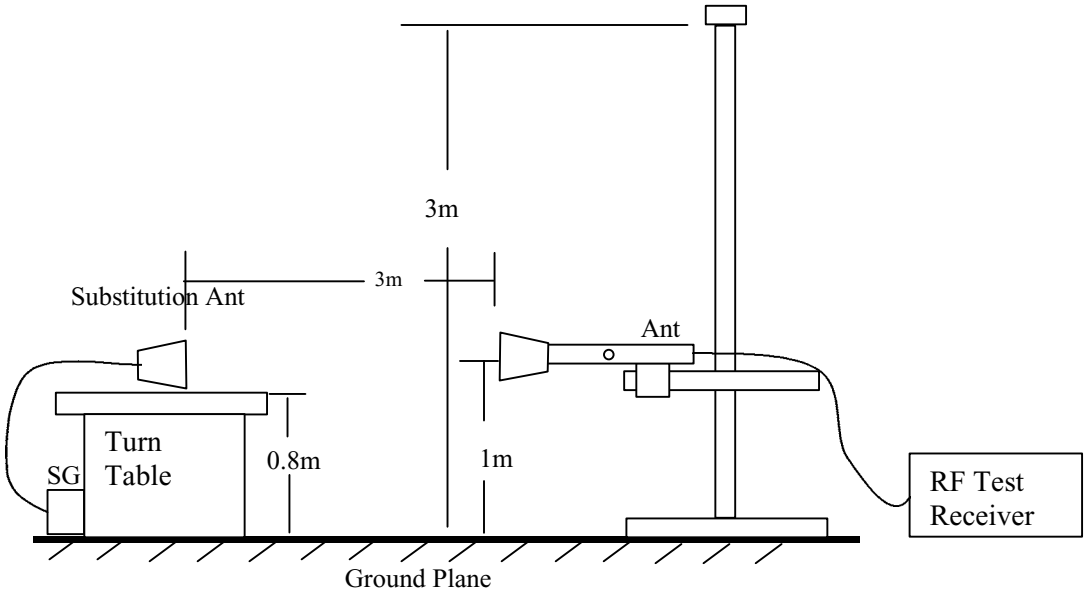
TEST EQUIPMENT LIST				
Name of Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Due Date**
LISN, 10 kHz ~ 30 MHz	**FCC**	**50/250-25-2**	**114**	**9/6/2003**
Line Filter	**Lindgren**	**LMF-3489**	**497**	**CNR**
LISN, 10 kHz ~ 30 MHz	**Solar**	**012-50-R-24-BN**	**837990**	**9/6/2003**
EMI Test Receiver	**R & S**	**ESHS 20**	**827129/006**	**4/17/2004**
Antenna, Horn 1 ~ 18 GHz	**EMCO**	**3115**	**2238**	**2/4/2004**
Quasi-Peak Adaptor	**HP**	**85650A**	**2811A01155**	**5/16/2004**
SA RF Section, 1.5 GHz	**HP**	**85680B**	**2732A03661**	**5/16/2004**
Preamplifier, 1300 MHz	**HP**	**8447D**	**2944A06589**	**8/22/2004**
Antenna, Bilog	**Chase**	**CBL6112B**	**2586**	**3/6/2004**
SA Display Section 2	**HP**	**85662A**	**2816A16696**	**5/16/2004**
Spectrum Analyzer	**HP**	**E4446A**	**US42070220**	**1/13/2004**
Dipole Antenna	**ETS**	**DB-4**	**1629**	**5/15/2004**
EMI Receiver, 9 kHz ~ 2.9 GHz	**HP**	**8542E**	**3942A00286**	**11/20/2004**
RF Filter Section	**HP**	**85420E**	**3705A00256**	**11/21/2004**
Bilog Antenna	**A.R.A**	**LPB-2520/A**	**1185**	**6/24/2004**
Antenna, Horn 1 ~ 18 GHz	**EMCO**	**3115**	**9001-3245**	**2/4/2004**

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak ☐ Average	☒ 1 MHz ☐ 1 MHz	☒ 1 MHz ☐ 10 Hz



Radiated Emission Measurement



Radiated Emission – Substitution Method set-up

TEST PROCEDURE

1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.
2). The test antenna shall be oriented initially for vertical polarization located 1m from the EUT to correspond to the frequency of the transmitter.
3). The output of the test antenna shall be connected to the measuring receiver and either a peak or average detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
4). The transmitter shall be switched on, if possible, without the modulation and the measurement 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 than be 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 substitution antenna.
10). The substitution antenna shall be oriented for vertical polarization.
11). The substitution antenna shall be connected to a calibrated signal generator.
12). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
13). The test antenna shall be raised and lowered through the specified range of the 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 receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation 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 oriented for horizontal polarization.
17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

MEASUREMENT RESULT

No non-compliance noted, as shown below

800MHz CELLULAR - Harmonics / Spurious and Substitution Emissions, Low / Mid / High Channels:

08/21/03 **High Frequency Substitution Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: VIEN TRAN
Project #: 03U2108-1
Company: AIRPRIME
EUT Descrip.: 800MHz/1900MHz CDMA TRANSMITTER MODULE IN FIXED OR MOBILE APPLICATION
EUT M/N: TBD
Test Target: FCC PART 22
Mode Oper: Tx_SUBSTITUTION LOW/MID/HIGH CHANNELS_EUT ANTENNA AT Y POSITION (WORST CASE)

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Spectrum Analyzer	Horn > 18GHz	Limit
T60; S/N: 2238 @3n	T34 HP 8449B	Agilent E4446A Analyzer		FCC 22

Hi Frequency Cables: ☐ (2 ft) ☐ (2 ~ 3 ft) ☑ (4 ~ 6 ft) ☐ (12 ft)

Peak Measurements:
Fundamental: RBW>99% or 26dB Emissions BW, VBW=RBW
Bandedge: RBW=>1% Emissions BW, VBW=> 3*RBW
Spurious: RBW=1MHz, VBW=1MHz

f GHz	SA reading (dBuV)	SG reading (dBuV)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
LOW CH=824.64MHz									
1.649	66.7	-42.1	0.4	7.0	4.8	-37.7	-13.0	-24.7	V
2.474	63.4	-40.0	0.6	8.2	6.0	-34.5	-13.0	-21.5	V
3.299	66.4	-36.4	0.7	9.3	7.1	-30.0	-13.0	-17.0	V
4.124	43.6	-55.0	0.8	9.8	7.6	-48.2	-13.0	-35.2	V
4.947	46.2	-52.0	1.0	10.9	8.8	-44.2	-13.0	-31.2	V
1.649	63.6	-48.1	0.4	7.0	4.8	-43.6	-13.0	-30.6	H
2.474	59.1	-43.0	0.6	8.2	6.0	-37.5	-13.0	-24.5	H
3.299	63.8	-38.3	0.7	9.3	7.1	-31.9	-13.0	-18.9	H
4.124	42.5	-57.0	0.8	9.8	7.6	-50.2	-13.0	-37.2	H
4.947	54.3	-45.2	1.0	10.9	8.8	-37.4	-13.0	-24.4	H
NO OTHER EMISSION FOUND AFTER 6TH HARMONIC									
MID CH=836.52MHz									
1.673	66.2	-42.4	0.4	7.0	4.8	-37.9	-13.0	-24.9	V
2.510	64.9	-39.4	0.6	8.3	6.1	-33.9	-13.0	-20.9	V
3.346	64.7	-37.1	0.8	9.3	7.2	-30.7	-13.0	-17.7	V
4.183	42.1	-57.3	0.9	9.9	7.7	-50.4	-13.0	-37.4	V
5.019	46.1	-53.2	1.0	11.0	8.8	-45.3	-13.0	-32.3	V
1.673	62.2	-44.5	0.4	7.0	4.8	-40.0	-13.0	-27.0	H
2.510	60.6	-43.0	0.6	8.3	6.1	-37.5	-13.0	-24.5	H
3.346	59.8	-43.2	0.8	9.3	7.2	-36.8	-13.0	-23.8	H
4.183	42.0	-57.0	0.9	9.9	7.7	-50.1	-13.0	-37.1	H
5.019	46.6	-45.2	1.0	11.0	8.8	-37.3	-13.0	-24.3	H
NO OTHER EMISSION FOUND AFTER 6TH HARMONIC									
HI CH=848.31									
1.697	65.7	-42.2	0.4	7.0	4.9	-37.7	-13.0	-24.7	V
2.545	64.1	-39.6	0.6	8.3	6.2	-34.0	-13.0	-21.0	V
3.393	63.0	-37.7	0.8	9.3	7.2	-31.3	-13.0	-18.3	V
4.242	42.5	-57.3	0.9	10.0	7.8	-50.4	-13.0	-37.4	V
5.089	50.0	-49.6	1.0	11.0	8.9	-41.7	-13.0	-28.7	V
1.697	65.7	-41.1	0.4	7.0	4.9	-36.6	-13.0	-23.6	H
2.545	63.0	-41.7	0.6	8.3	6.2	-36.1	-13.0	-23.1	H
3.393	62.3	-39.3	0.8	9.3	7.2	-32.9	-13.0	-19.9	H
4.242	41.2	-58.1	0.9	10.0	7.8	-51.2	-13.0	-38.2	H
5.089	48.5	-52.2	1.0	11.0	8.9	-44.3	-13.0	-31.3	H

1900MHz PCS - Harmonics / Spurious and Substitution Emissions, Low / Mid / High Channels:

8/21/2003 Compliance Certification Services, Morgan Hill Open Field Site

Test Engineer: VIEN TRAN
Project #: 03U2108-2
Company: AIRPRIME
EUT Description: 1900MHz PCS TRANSMITTER
EUT M/N: TBD
Test Target: FCC PART 24
Mode Operation: Tx- HARMONIC & SPUR_SUBSTITUTION LOW/MID/HI CHANNELS_EUT @ X POSITION (WORST CASE)

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Spectrum Analyzer	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B	Agilent E4446A Analyzer		FCC 24

Hi Frequency Cables: ☐ (2 ft) ☐ (2 ~ 3 ft) ☑ (4 ~ 6 ft) ☐ (12 ft)

Peak Measurements:

Fundamental:	Bandedge:	Spurious
RBW>99% or 26dB Emissions BW	RBW=>1% Emissions BW	RBW=1MHz
VBW=RBW	VBW=> 3*RBW	VBW=1MHz

f GHz	SA reading (dBuV)	SG reading (dBuV)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes
LOW CH=1851.25MHz									
3.704	67.1	-36.0	0.8	9.5	7.3	-27.3	-13.0	-14.3	V
5.553	71.3	-29.4	1.0	11.1	9.0	-19.3	-13.0	-6.3	V
7.405	56.9	-40.0	1.2	11.2	9.1	-30.0	-13.0	-17.0	V
9.527	52.0	-43.3	1.4	11.2	9.0	-33.5	-13.0	-20.5	V
11.107	51.4	-45.0	1.6	12.9	10.7	-33.7	-13.0	-20.7	V
12.595	42.0	-49.2	1.7	12.7	10.6	-38.2	-13.0	-25.2	V, NOISE FLOOR
3.704	63.8	-39.4	0.8	9.5	7.3	-30.7	-13.0	-17.7	H
5.553	68.5	-31.8	1.0	11.1	9.0	-21.7	-13.0	-8.7	H
7.405	48.1	-49.4	1.2	11.2	9.1	-39.4	-13.0	-26.4	H
9.527	52.8	-43.0	1.4	11.2	9.0	-33.2	-13.0	-20.2	H
11.107	51.5	-45.0	1.6	12.9	10.7	-33.7	-13.0	-20.7	H
12.595	41.5	-51.9	1.7	12.7	10.6	-40.9	-13.0	-27.9	H, NOISE FLOOR
NO OTHER EMISSION FOUND AFTER 7TH HARMONIC									
MID CH=1880MHz									
3.760	68.4	-35.4	0.8	9.5	7.4	-26.7	-13.0	-13.7	V
5.640	70.5	-30.3	1.0	11.2	9.0	-20.2	-13.0	-7.2	V
7.520	53.0	-44.8	1.2	11.2	9.1	-34.8	-13.0	-21.8	V
9.400	51.9	-43.3	1.4	11.0	8.9	-33.7	-13.0	-20.7	V
11.280	46.5	-48.5	1.6	12.8	10.7	-37.3	-13.0	-24.3	V
13.160	44.0	-49.2	1.7	12.9	10.7	-38.1	-13.0	-25.1	V, NOISE FLOOR
3.760	66.5	-36.6	0.8	9.5	7.4	-27.9	-13.0	-14.9	H
5.640	68.2	-32.3	1.0	11.2	9.0	-22.2	-13.0	-9.2	H
7.520	52.7	-43.3	1.2	11.2	9.1	-33.3	-13.0	-20.3	H
9.400	51.2	-45.0	1.4	11.0	8.9	-35.4	-13.0	-22.4	H
11.280	51.4	-43.0	1.6	12.8	10.7	-31.8	-13.0	-18.8	H
13.160	41.7	-51.1	1.7	12.9	10.7	-40.0	-13.0	-27.0	H, NOISE FLOOR
NO OTHER EMISSION FOUND AFTER 7TH HARMONIC									
HI CH=1908.75MHZ									
3.818	69.7	-33.0	0.8	9.5	7.4	-24.3	-13.0	-11.3	V
5.726	66.1	-36.0	1.0	11.2	9.0	-25.8	-13.0	-12.8	V
7.635	48.5	-47.8	1.2	11.2	9.1	-37.8	-13.0	-24.8	V
9.544	46.0	-47.5	1.4	11.2	9.1	-37.7	-13.0	-24.7	V
11.453	43.0	-51.1	1.6	12.7	10.6	-39.9	-13.0	-26.9	V, NOISE FLOOR
3.818	71.4	-31.2	0.8	9.5	7.4	-22.5	-13.0	-9.5	H
5.726	66.7	-33.0	1.0	11.2	9.0	-22.8	-13.0	-9.8	H
7.635	45.5	-53.4	1.2	11.2	9.1	-43.4	-13.0	-30.4	H
9.544	44.0	-52.2	1.4	11.2	9.1	-42.4	-13.0	-29.4	H
11.453	40.0	-56.6	1.6	12.7	10.6	-45.4	-13.0	-32.4	H, NOISE FLOOR

7.6. SECTION 2.1055: FREQUENCY STABILITY

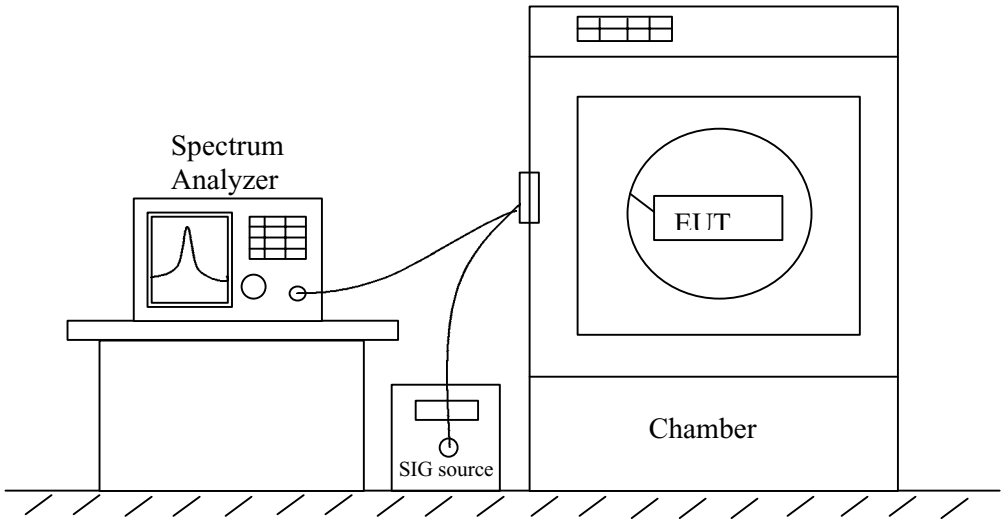
INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
PSA Analyzer	Agilent	E446A	US42070220	1/13/04
Environmental Chamber	Thermotron	SE 600-10-10	2980	4/23/04
10dB Attenuator	Agilent	8493C	59028	N/A
DC Power Supply	Kenwood	PA36-3A	7060074	N/A

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	Peak	300 Hz	300 Hz

TEST SETUP



TEST PROCEDURE

- **Frequency stability versus environmental temperature**

1). Setup the configuration per figure 6 for frequencies measurement inside the environmental chamber. Set the temperature of the chamber to 25°C. Set SA Resolution Bandwidth low enough to obtain the desired frequency resolution and measure the EUT 25°C operating frequency as reference frequency.
2). Turn EUT off and set Chamber temperature to -30°C.
3). Allow sufficient time (approximately 20 to 30 minus after chamber reach the assigned temperature) for EUT to stabilize. Turn on EUT and measure the EUT operating frequency. Turn off EUT after the measurement.
4). Repeat step 3 with a 10°C increased per stage until the highest temperature of +50°C reached, record all measured frequencies on each temperature step.

- **Frequency stability versus AC input voltage**

1). Setup the configuration per figure 6 and set chamber temperature to 25°C. Use a variable AC power supply to power the EUT and set AC output voltage to EUT nominal input AC voltage. Set SA Resolution Bandwidth low enough to obtain the desired frequency resolution and measure the EUT 25°C operating frequency as reference frequency.
2). Slowly reduce the EUT input voltage to specified extreme voltage variation (±15%) and record the maximum frequency change.

MEASUREMENT RESULT

No non-compliance noted, as shown below.

FREQUENCY STABILITY

800MHz CELLULAR – MID CHANNEL

Reference Frequency: CELLULAR Mid Channel 836.520110MHz @ 25˚C				
Limit: to stay ± 2.5 ppm =		2091.300	Hz	
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (˚C)	(MHz)	Delta (ppm)	Limit (ppm)
4.00	50	836.520189	-0.094	± 2.5
4.00	40	836.520145	-0.042	± 2.5
4.00	30	836.520126	-0.019	± 2.5
4.00	***25***	***836.520110***	***0***	***± 2.5***
4.00	20	836.520068	0.050	± 2.5
4.00	10	836.520106	0.005	± 2.5
4.00	0	836.520140	-0.036	± 2.5
4.00	-10	836.520191	-0.097	± 2.5
4.00	-20	836.520233	-0.147	± 2.5
4.00	-30	836.520273	-0.195	± 2.5

Reference Frequency: CDMA Mid Channel 836.520110MHz @ 25˚C				
Limit: to stay ± 2.5 ppm =		2091.300	Hz	
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (˚C)	(MHz)	Delta (ppm)	Limit (ppm)
4.00	***25***	***836.520110***	***0***	***± 2.5***
3.00 (end point)	25	836.520215	*-0.126*	± 2.5
3.4	25	836.520242	*-0.158*	± 2.5
4.6	25	836.520314	*-0.244*	± 2.5

Reference Frequency: CDMA Mid Channel 836.520006MHz @ 25˚C				
Limit: to stay ± 2.5 ppm =		2091.300	Hz	
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vac)	Temperature (˚C)	(MHz)	Delta (ppm)	Limit (ppm)
120.00	***25***	***836.520006***	***0***	***± 2.5***
102	25	836.520109	*-0.123*	± 2.5
138	25	836.519900	*0.127*	± 2.5

1900MHz PCS – MID CHANNEL

Reference Frequency: PCS Mid Channel 1880.0100MHz @ 25˚C Limit: to stay ± 2.5 ppm = 4700.025 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (˚C)	(MHz)	Delta (ppm)	Limit (ppm)
4.00	50	1880.010235	-0.125	± 2.5
4.00	40	1880.010146	-0.078	± 2.5
4.00	25	1880.010123	-0.065	± 2.5
4.00	***25***	***1880.010000***	***0***	***± 2.5***
4.00	20	1880.009750	0.133	± 2.5
4.00	10	1880.010158	-0.084	± 2.5
4.00	0	1880.010920	-0.489	± 2.5
4.00	-10	1880.010171	-0.091	± 2.5
4.00	-20	1880.010201	-0.107	± 2.5
4.00	-30	1880.010233	-0.124	± 2.5

Reference Frequency: CDMA Mid Channel 1880.0010MHz @ 25˚C Limit: to stay ± 2.5 ppm = 4700.025 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vdc)	Temperature (˚C)	(MHz)	Delta (ppm)	Limit (ppm)
4.00	***25***	***1880.010000***	***0***	***± 2.5***
3.00 (end point)	25	1880.010122	*-0.065*	± 2.5
3.4	25	1880.010143	*-0.076*	± 2.5
4.6	25	1880.010255	*-0.136*	± 2.5

NO AC/DC ADAPTER

Reference Frequency: CDMA Mid Channel 1880.010MHz @ 25˚C Limit: to stay ± 2.5 ppm = 4700.025 Hz				
Power Supply	Environment	Frequency Deviation Measureed with Time Elapse		
(Vac)	Temperature (˚C)	(MHz)	Delta (ppm)	Limit (ppm)
120.00	***25***	***1880.010000***	***0***	***± 2.5***
102	25	1880.010202	*-0.107*	± 2.5
138	25	1880.009690	*0.165*	± 2.5

7.7. RADIATED EMISSION

TEST EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	9/6/2004
Line Filter	Lindgren	LMF-3489	497	CNR
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	837990	9/6/2004
EMI Test Receiver	R & S	ESHS 20	827129/006	4/17/2004
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	2/4/2004
Quasi-Peak Adaptor	HP	85650A	2811A01155	5/16/2004
SA RF Section, 1.5 GHz	HP	85680B	2732A03661	5/16/2004
Preamplifier, 1300 MHz	HP	8447D	2944A06589	8/22/2004
Antenna, Bilog	Chase	CBL6112B	2586	3/6/2004
SA Display Section 2	HP	85662A	2816A16696	5/16/2004
Spectrum Analyzer	HP	E4446A	US42070220	1/13/2004
Dipole Antenna	ETS	DB-4	1629	5/15/2004
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	11/20/2004
RF Filter Section	HP	85420E	3705A00256	11/21/2004
Bilog Antenna	A.R.A	LPB-2520/A	1185	6/24/2004
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	9001-3245	2/4/2004
Signal Generator, 2 ~ 40 GHz	R & S	SMP04	DE 34210	05/25/04

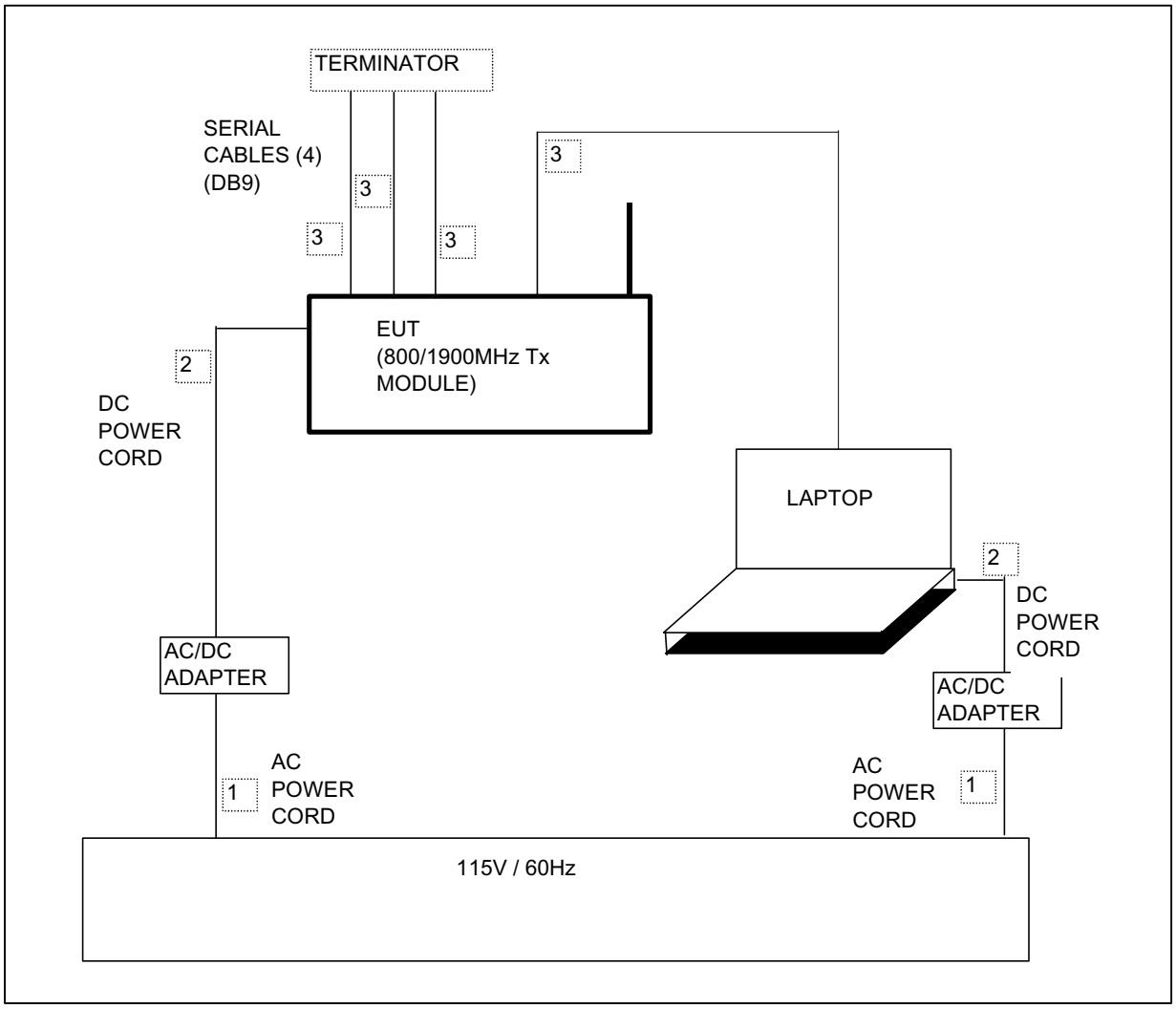
TEST PERIPHERALS				
Device Type	Manufacturer	Model Number	Serial Number	FCC ID
LAPTOP	IBM	N/A	P/N 02K026657	DOC
AC ADAPTER	IBM	THINPAD	78-ZGZR6	DOC
AC ADAPTER	ELPAC	WP1205	N/A	DOC

TEST I / O CABLES								
Cable No	I/O Port	# of I/O Port	Connector Type	Type of Cable	Cable Length	Data Traffic	Bundled	Remark
1	AC	2	US115V	SHIELED	2m	NO	NO	
2	DC	2	DC	SHIELED	2m	NO	NO	
3	SERIAL	4	DB9	SHIELED	1m	YES	YES	

Detector Setting of Spectrum Analyzer

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	☒ Peak ☒ Quasi Peak	☒ 100 KHz ☒ 1 MHz	☒ 100 KHz ☒ 1 MHz

TEST SETUP



TEST PROCEDURE

1. The EUT was placed on the turn table 0.8 meter above ground inside 3 meter Anechoic Chamber.
2. Set the resolution bandwidth to 120KHz in the test receiver and select Peak function to scan the frequency below 1 GHz.
3. Shift the interference-receiving antenna located in antenna tower upwards and downwards between 1 and 4 meters above ground and find out the local peak emission on frequency domain.
4. Locate the interference-receiving antenna at the position where the local peak reach the maximum emission.
5. Rotate the turn table and stop at the angle where the measurement device has maximum reading
6. Shift the interference-receiving antenna again to detect the maximum emission of the local peak
7. If the reading of the local peak under Peak function is lower than limit by 6dB, then Quasi Peak detection is not needed and this reading should be recorded. And if it is higher than Peak limit, then the test is fail. Others, switch the receiver to Quasi Peak function, set the resolution bandwidth to 100kHz and repeat the procedures (3)~(6). If the reading is lower than limit, this reading should be recorded, otherwise, the test is fail.

MEASUREMENT RESULT

No non-compliance noted, as shown below.

RADIATED EMISSION - 800MHz CELLULAR FROM 30MHz TO 1000MHz

COMPLIANCE Certification Services
FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001
PHONE: (408) 463-0885 FAX: (408) 463-0888

Project #:	03U2108-1
Report #:	03U2108-1
Date& Time:	08/26/03 9:59 AM
Test Engr:	VIEN TRAN
Company:	AIRPRIME
EUT Description:	800/1900MHz CDMA TRANSMITTER
Test Configuration :	EUT / LAPTOP
Type of Test:	FCC CLASS B
Mode of Operation:	Tx @ WORST CASE_800MHz CELL_EUT ANTENNA @ Y POSITION

<< Main Sheet

Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
127.86	52.10	12.49	1.89	27.06	39.43	43.50	-4.07	3mV	0.00	1.00	P
38.10	48.30	13.45	0.97	27.32	35.41	40.00	-4.59	3mV	0.00	1.00	P
300.00	47.50	15.68	3.00	26.42	39.76	46.00	-6.24	3mV	0.00	1.00	P
116.14	51.20	10.98	1.77	27.11	36.85	43.50	-6.65	3mV	0.00	1.00	P
142.00	45.70	15.60	2.00	27.01	36.30	43.50	-7.20	3mV	0.00	1.00	P
212.97	47.20	12.22	2.50	26.64	35.27	43.50	-8.23	3mH	0.00	1.00	P
6 Worst Data											

RADIATED EMISSION - 1900MHz PCS FROM 30MHz TO 1000MHz

COMPLIANCE Certification Services
FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP
561F MONTEREY ROAD, SAN JOSE, CA 95037-9001
PHONE: (408) 463-0885 FAX: (408) 463-0888

Project #: 03U2108-2
Report #: 03U2108-2
Date& Time: 08/26/03 12:17 PM
Test Engr: VIEN TRAN

Company: AIRPRIME
EUT Description: 800/1900MHz CDMA TRANSMITTER MODULE
Test Configuration : EUT/LAPTOP
Type of Test: FCC CLASS B
Mode of Operation: Tx @ WORST CASE _1900MHz PCS_EUT ANTENNA @ X POSITION

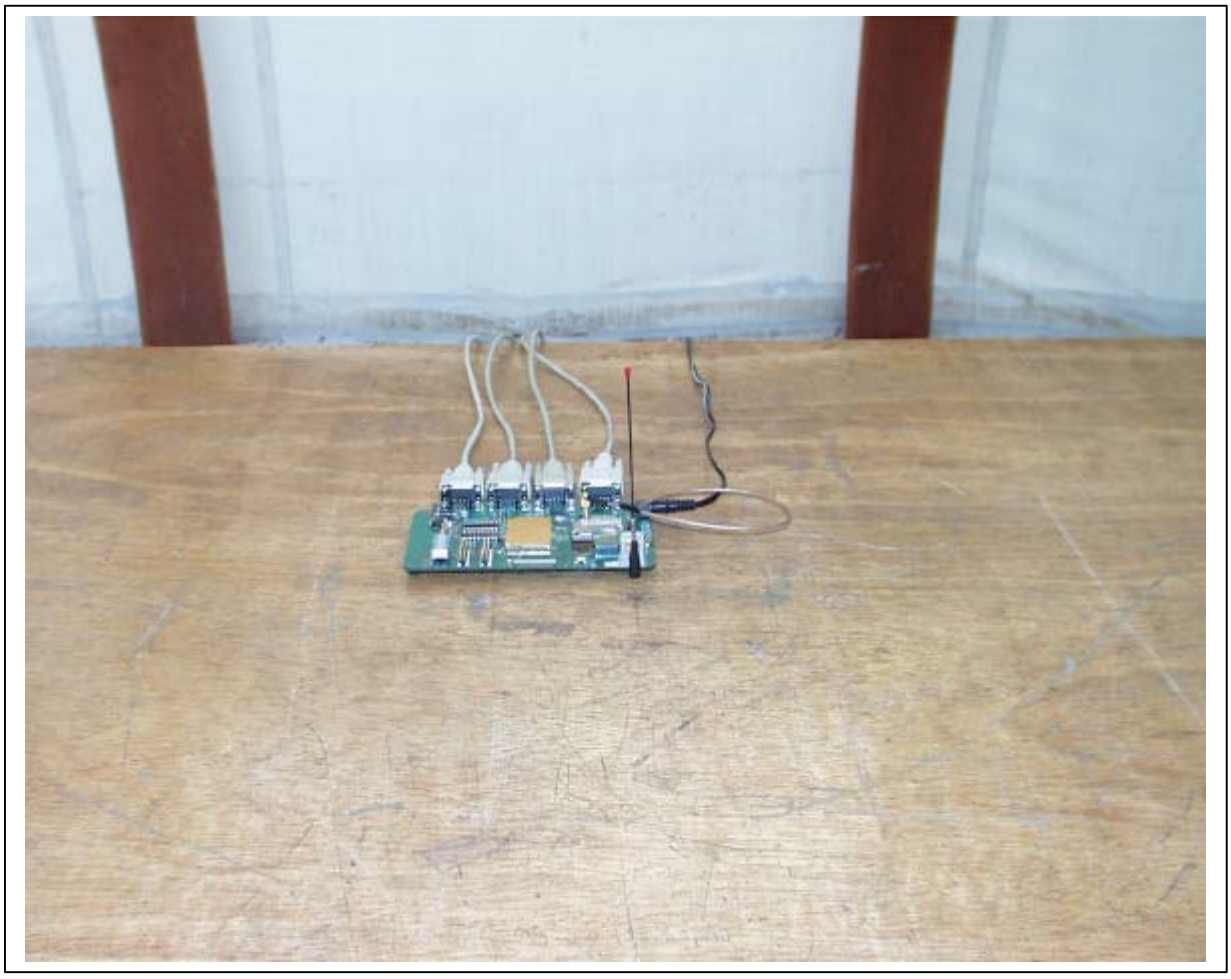
<< Main Sheet

Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
620.20	45.20	19.60	4.64	27.79	41.65	46.00	-4.35	3mV	0.00	1.00	P
286.00	50.00	14.80	2.92	26.44	41.28	46.00	-4.72	3mV	0.00	1.00	P
128.60	51.20	12.66	1.90	27.06	38.71	43.50	-4.79	3mV	0.00	1.00	P
316.82	48.50	15.77	3.09	26.54	40.83	46.00	-5.17	3mH	0.00	1.00	P
304.31	48.50	15.70	3.02	26.45	40.77	46.00	-5.23	3mV	0.00	1.00	P
38.40	47.60	13.44	0.98	27.32	34.69	40.00	-5.31	3mV	0.00	1.00	P
6 Worst Data											

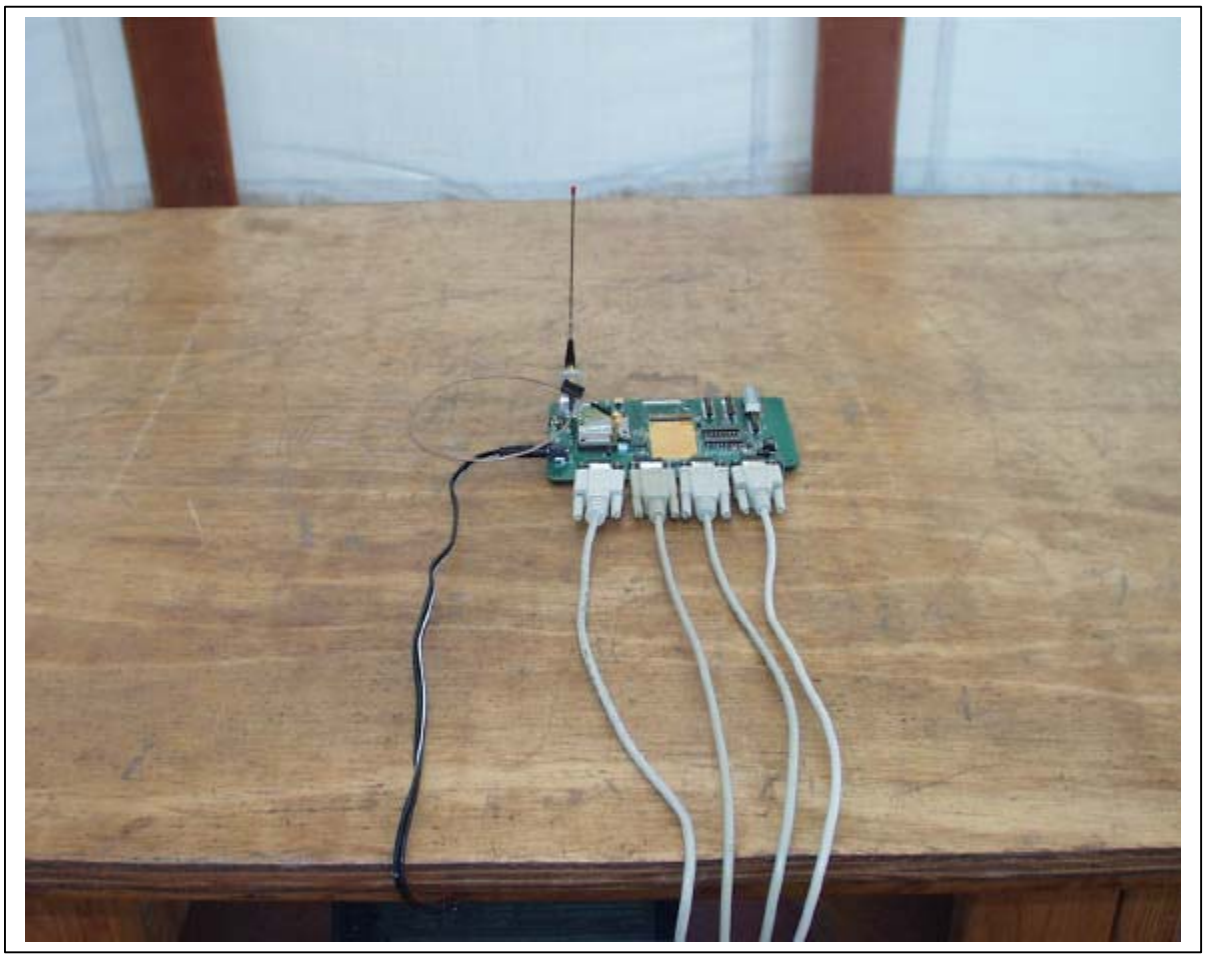
Radiated Emission photos

800MHz CELLULAR - EUT ANTENNA AT Y POSITION

Configuration 1, front view:

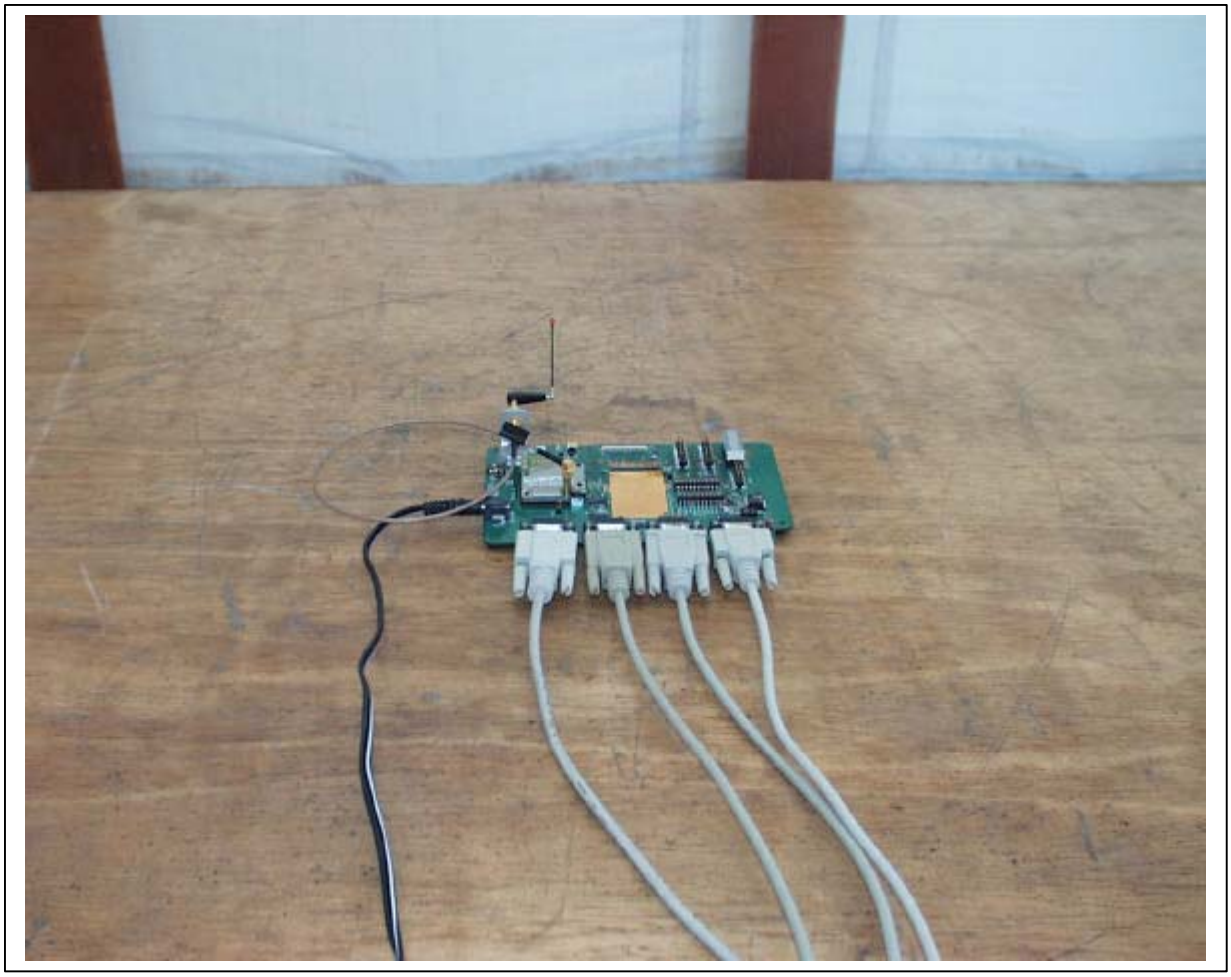


Configuration 1, rear view:

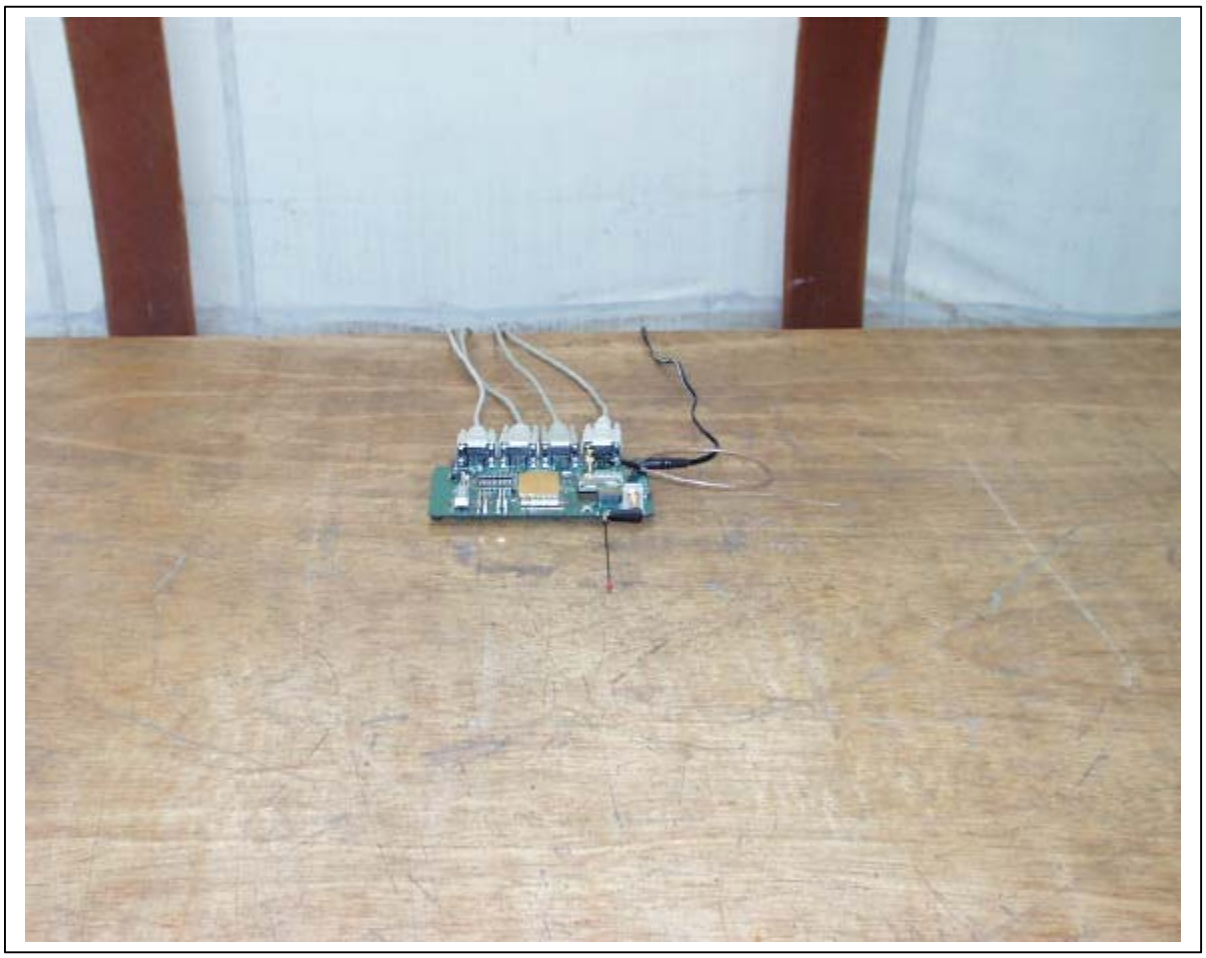


1900MHz CELLULAR - EUT ANTENNA AT X POSITION

Configuration 1, front view:



Configuration 1, rear view:

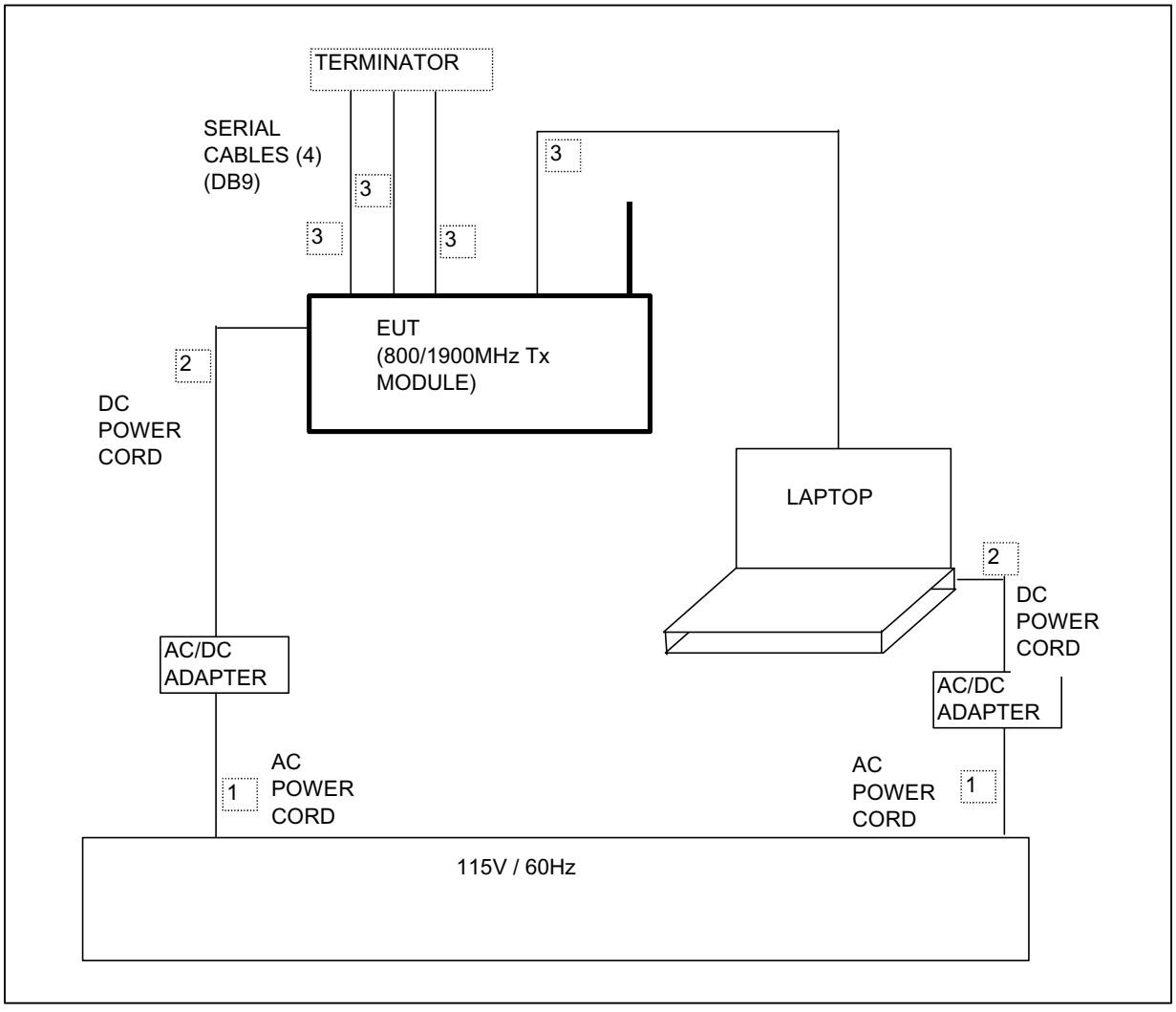


7.8. POWERLINE CONDUCTED EMISSION

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
150 KHz to 30 MHz	☒ Peak ☐ CISPR Quasi Peak	☒ 9 KHz	☒ 9 KHz

TEST SETUP



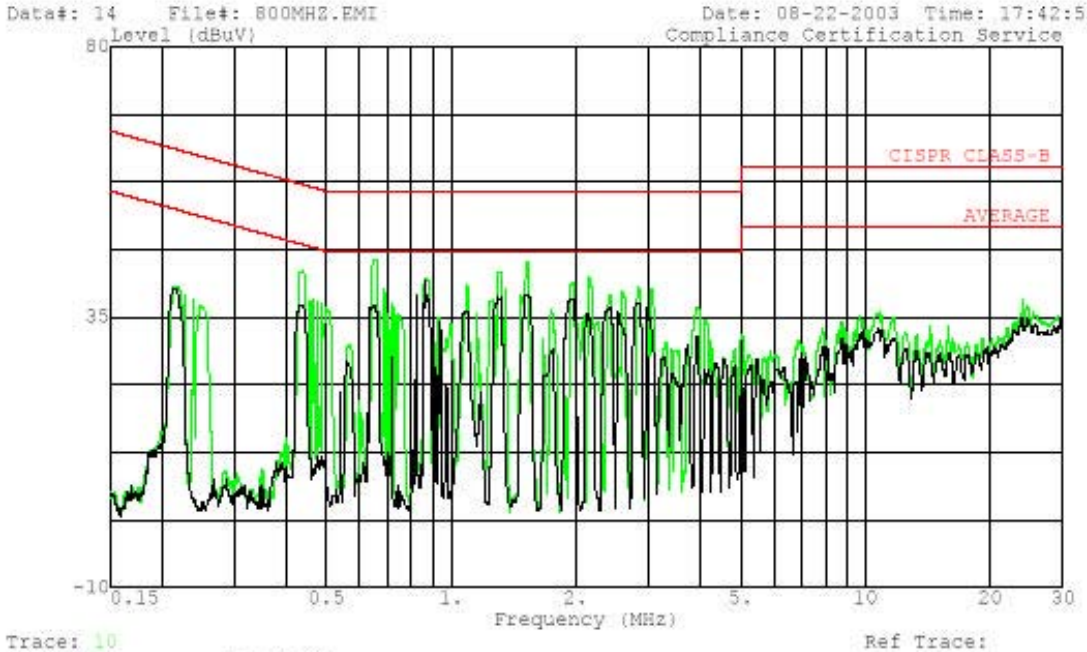
TEST PROCEDURE

1. The EUT was placed on a wooden table 40 cm from a vertical ground plane and approximately 80 cm above the horizontal ground plane on the floor. The EUT was set to transmit in a continuous mode.

2. Line conducted data was recorded for both NEUTRAL and HOT lines.

MEASUREMENT RESULT

COMPLIANCE Engineering Services, Inc.
561F Monterey Road,
San Jose, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888



Trace: 10 Ref Trace:
Project # : 03U2108
Test Engineer : VIEN TRAN
Company : AIRPRIME
EUT : 800MHz/1900MHz CDMA TRANSMITTER
Model : TBD
Configuration : EUT / AC ADAPTER / LAPTOP
Mode of Operation: TX (WORST CASE)
Target of Test : CISPR-B
: 115VAC/60Hz
: L1: PEAK(GREEN); L2: PEAK (BLACK)

CONDUCTED EMISSIONS DATA (115VAC 60Hz)

Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.65	44.58	--	--	0.00	56.00	46.00	-11.42	-1.42	L1
0.44	42.70	--	--	0.00	57.71	47.71	-15.01	-5.01	L1
1.10	36.00	--	--	0.00	56.00	46.00	-20.00	-10.00	L1
0.87	41.33	--	--	0.00	56.00	46.00	-14.67	-4.67	L2
0.44	37.00	--	--	0.00	57.71	47.71	-20.71	-10.71	L2
1.10	36.00	--	--	0.00	56.00	46.00	-20.00	-10.00	L2
6 Worst Data									

LINE CONDUCTION - FRONT

LINE CONDUCTION - BACK

8. APENDIX

8.1. EXTERNAL & INTERNAL PHOTOS

8.2. SCHEMATICS

8.3. BLOCK DIAGRAM

8.4. USER MANUAL

END OF REPORT