Standards Council of Canada
Accredited Laboratory
Scope of Accreditation 75

Conseil canadien des normes
Laboratoire accrédité
Portée d'accréditation 75

TM

Test Report:	4W29269, Issue 4
Applicant:	Spotwave Wireless Inc. 1 Hines Rd. Ottawa, Ontario K2K 3C7
Equipment Under Test: **(EUT)**	Spotcell 141/142 Dual Band CU Spotcell 111/112 Split Band CU
FCC ID:	**P3YSPOTCELL0012**
In Accordance With:	**FCC Part 24** **FCC Part 22**
Tested By:	Nemko Canada Inc. 303 River Road, R.R. 5 Ottawa, Ontario K1V 1H2
Authorized By:	Sim Jagpal, Resource Manager
Date:	3 November 2004
Total Number of Pages:	37

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Section 1. Summary of Test Results

General

All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 24 & 22.

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

TESTED BY: _____ DATE: 3 November 2004
Glen Westwell, Wireless Specialist.

Summary Of Test Data

Name Of Test	Para. No.	Result
RF Power Output	2.1046	Complied
Occupied Bandwidth	2.1049	Complied
Spurious Emissions at Antenna Terminals	2.1051	Complied
Field Strength of Spurious Emissions	2.1053	Complied
Out of Band Rejection	EAB/RF-2-11-04	Complied
Frequency Stability	2.1055	Complied

Note:
This certification submission is for a split band and dual band model for the downlink CU.

(1) The Spotcell 111/112 Split Band CU contains two downlink radio modules in the 1900MHz PCS band.
(2) The Spotcell 141/142 Dual Band CU contains two downlink radio modules, one 1900MHz PCS band and one 800MHz cellular band.
Both of the units are identical except for the radio module configuration.

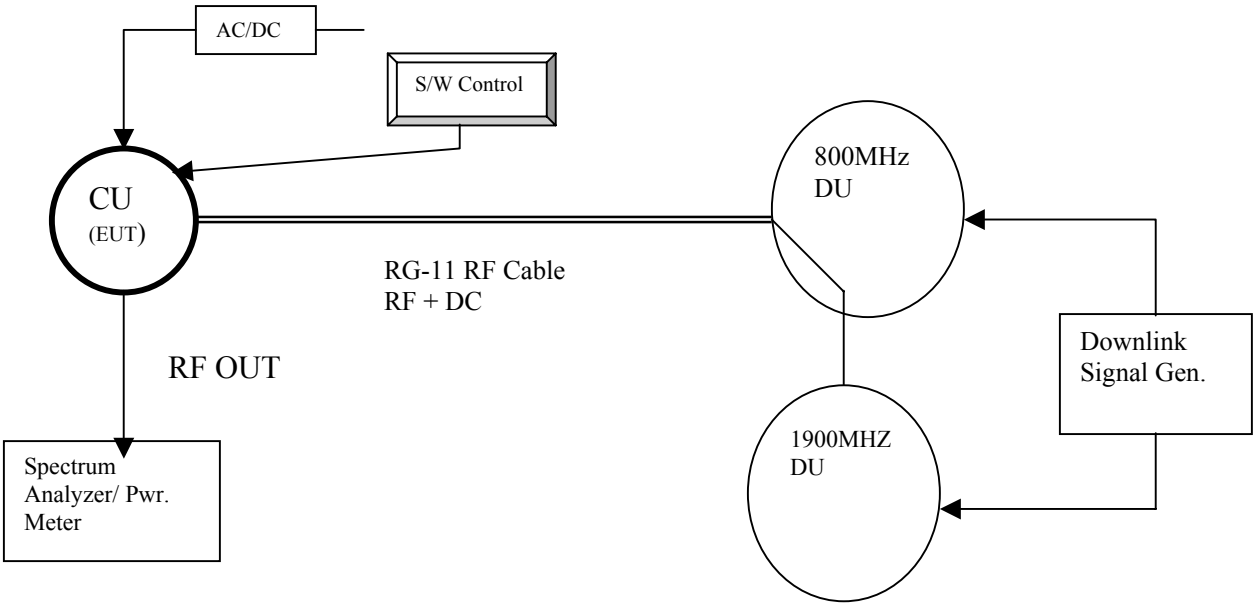
The test data in this report was obtained using the Spotcell 141/142 Dual Band CU to provide test data for both radio modules, one in the PCS band and one in the cellular band.
The Spotcell 111/112 Split Band CU will contain two co-located PCS band radio modules. As such the PCS band data in this report substantiates compliance for certification of the Spotcell 111/112 Split Band CU configuration.

MPE data has been provided with this application filing to validate the RF safety requirement for co-location of both configurations.

Indoor Temperature: 25°C
Humidity: 44%

Outdoor Temperature: 18°C
Humidity: 45%

Test Sep Up Configuration of EUT



Section 2. General Equipment Specification

Manufacturer:	Spotwave Wireless Inc.
Model No.:	Spotcell 111/112 Split Band CU Spotcell 141/142 Dual Band CU
Serial No.:	None.
Date Received In Laboratory:	15 Sept 2004
Nemko Identification No.:	#1
Supply Input Voltage:	110 VAC
Frequency Range:	Downlink: 1930-1990MHz Downlink: 869-894MHz
Rated Output Power (conducted composite):	Downlink: +7.0dBm, 0.005W
Antenna Gain (maximum):	3dBi
Emission Designator	GXW (GSM) F9W (CDMA) F9W (WCDMA)

Section 3. RF Safety for Co-Located Transmitters

Co-location Compliance Table for Spotcell 141/142 Dual Band CU General Population				
800MHz Band Radio Power Density (mW/cm^2)	1900MHz Band Radio Power Density (mW/cm^2)	Total Density for co-located radios (mW/cm^2)	General Exposure Limit (mW/cm^2)	
10dBm EIRP	10dBm EIRP			
0.002	0.002	0.00575	0.533	Complies

Co-location Compliance Table for Spotcell 111/112 Split Band CU General Population				
1900MHz Band Radio Power Density (mW/cm^2)	1900MHz Band Radio Power Density (mW/cm^2)	Total Density for co-located radios (mW/cm^2)	General Exposure Limit (mW/cm^2)	
10dBm EIRP	10dBm EIRP			
0.002	0.002	0.00575	1.0	Complies

MPE for Co-Located Antennas, Fractional Summation
800MHz: 0.002/0.533 = 0.00575
1900MHz: 0.002/1 = 0.002
Therefore: 0.00575 + 0.002 = 0.00575 <1

Section 4. RF Power Output

Para. No.: 2.1046

Test Performed By: Glen Westwell	**Date of Test: 13 Sept. 2004**

Minimum Standard: 24.232

Test Results: Complied.

Measurement Data:
The maximum RF output power is within +1dB of the manufacturer's rating. The Composite RF output power is de-rated according to the number of channels via AGC and is equal to Pmax –10LogN.

Pmax = Maximum Composite RF Output Power
N = Number Of Channels

The power levels were measured at maximum input drive and gain. This device uses AGC to prevent saturation or over-modulation.

Downlink

Channel Frequency (MHZ)	**Measured Power (dBm)**		**Rated Max. Power (dBm)**
	Primary Integral Antenna	Auxiliary External Antenna	
1931	6.7	3.0	7.0
1940	7.1	4.0	7.0
1949	6.0	2.7	7.0
1951	6.9	3.4	7.0
1960	7.0	3.1	7.0
1969	7.3	3.7	7.0
1971	7.1	3.3	7.0
1980	7.1	3.6	7.0
1989	5.5	2.0	7.0

Note:
(1) Power measurements are shown across all three 20MHz band selections to cover the complete 60MHz downlink. Band edge attenuation due to the filter characteristics can be seen in the table above.
(2) The auxiliary antenna port is fed by a passive splitter typically rated at 4dB down from the primary antenna feed. Characteristics are recorded in this table. The auxiliary antenna is not co-located within 20cm of any of the radiating elements.

Para. No.: 2.1046

Test Performed By: Glen Westwell	**Date of Test: 24 Sept. 2004**

Minimum Standard: 22.913

Test Results: Complied.

Measurement Data:

The maximum RF output power is within +1dB of the manufacturer's rating. The Composite RF output power is de-rated according to the number of channels via AGC and is equal to Pmax –10LogN.

Pmax = Maximum Composite RF Output Power
N = Number Of Channels

The power levels were measured at maximum input drive and gain. This device uses AGC to prevent saturation or over-modulation.

Downlink

Channel Frequency (MHZ)	**Measured Power (dBm)**		**Rated Max. Power (dBm)**
	Primary Integral Antenna	Auxiliary External Antenna	
869.8	7.0	3.0	7.0
881	7.0	2.9	7.0
893.2	4.2	1.8	7.0

Note:

(1) The auxiliary antenna port is fed by a passive splitter typically rated at 4dB down from the primary antenna feed. Characteristics are recorded in this table. The auxiliary antenna is not co-located within 20cm of any of the radiating elements.

(2) Power measurements are shown across the downlink band. Band edge attenuation due to the filter characteristics can be seen in the table above.

Section 5. Occupied Bandwidth

Para. No.: 2.1049

Test Performed By: Glen Westwell	**Date of Test: 15 Sept 2004**

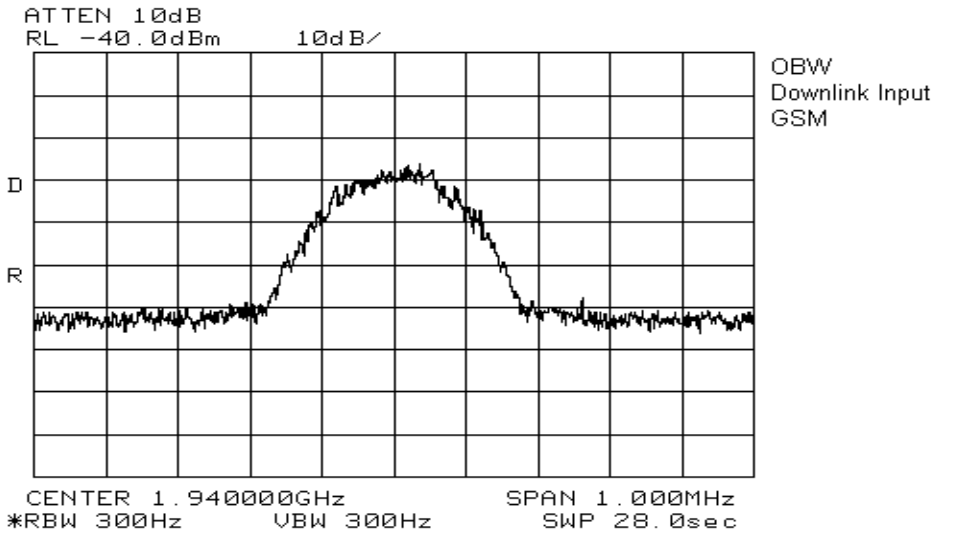
Minimum Standard: 24.238, 22.917

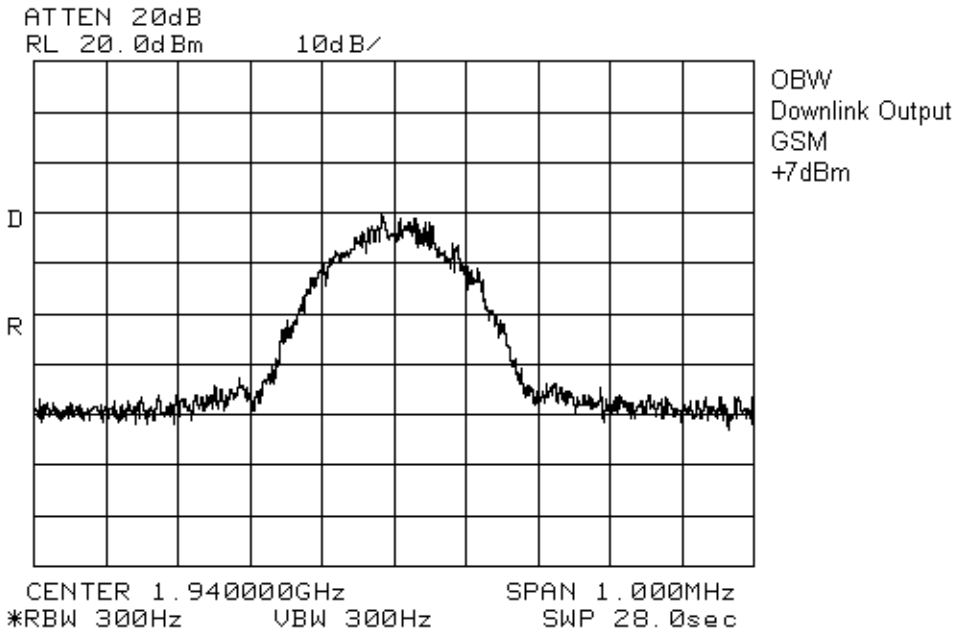
Test Results: Complies.

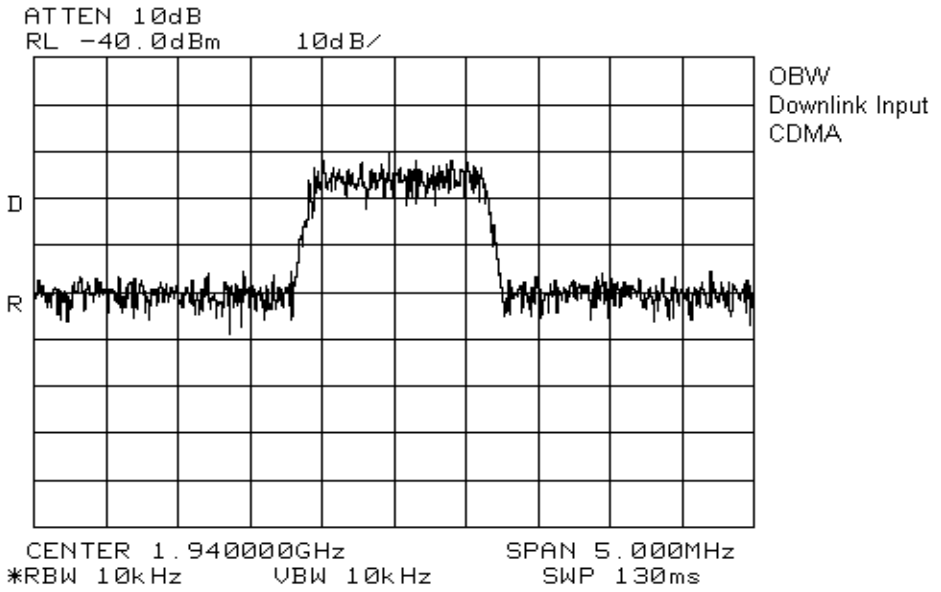
Measurement Data: See attached graphs.

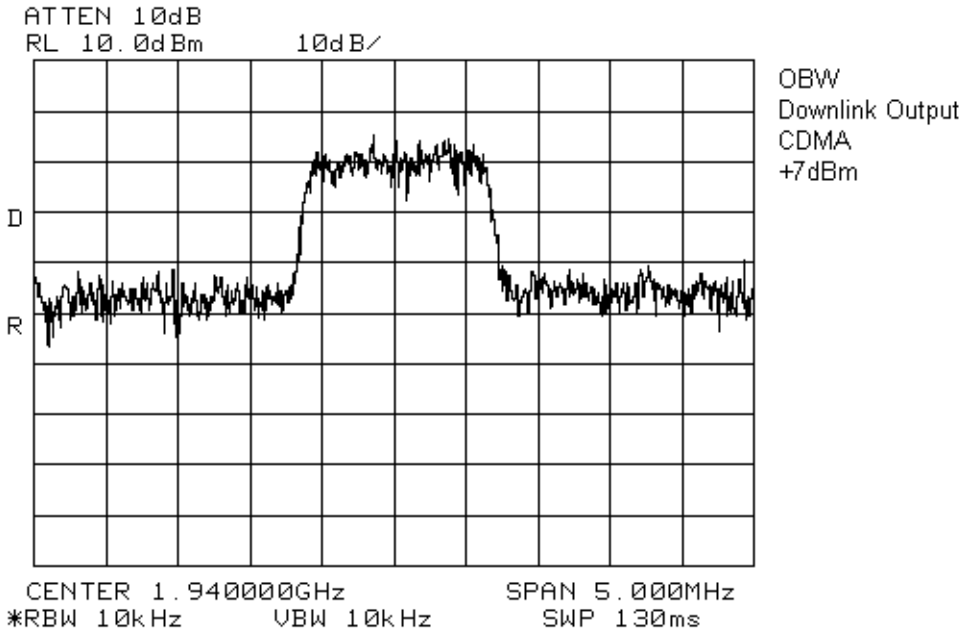
The occupied bandwidth was measured by comparison of input from the signal generator to the output signal from the amplifier. This was done in order to determine if there was any degradation to the output signal due to the amplification and conversion through the repeater.

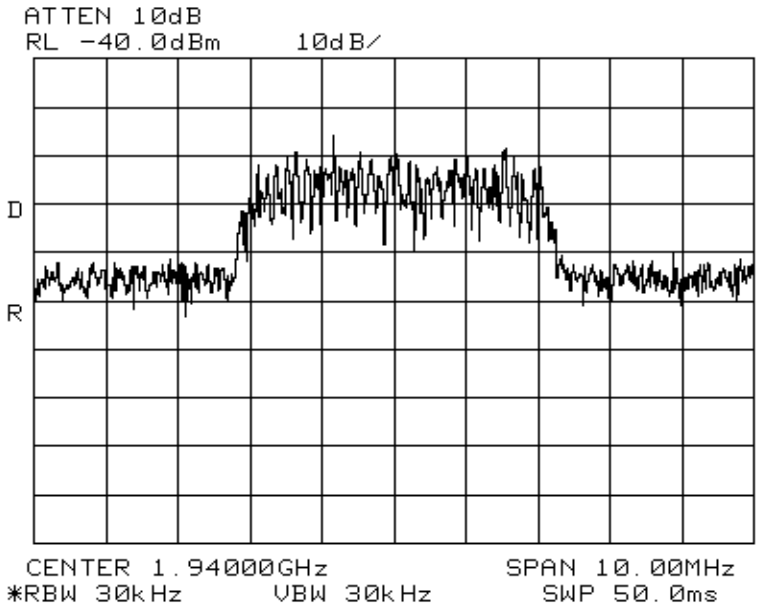
Downlink, Input vs Output
PCS Band



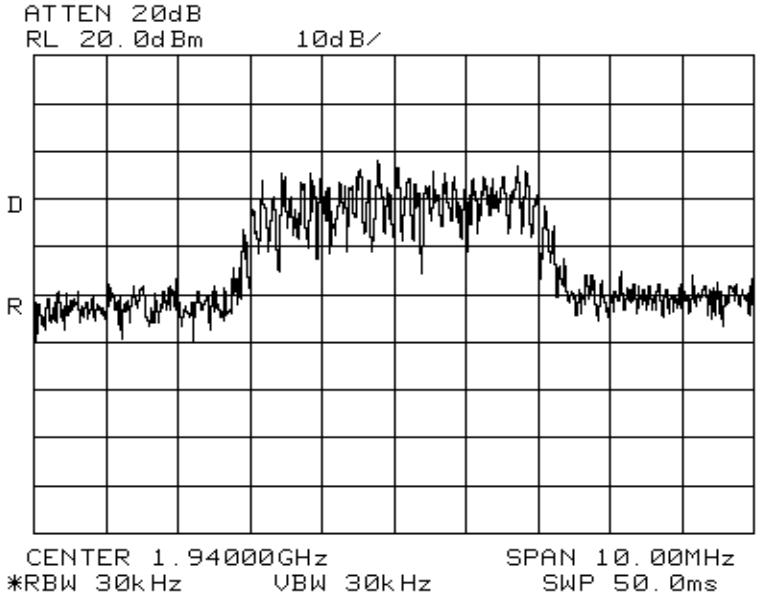



ATTEN 10dB
RL -40.0dBm
10dB/
D
R
OBW
Downlink Input
CDMA
CENTER 1.940000GHz
SPAN 5.000MHz
*RBW 10kHz
VBW 10kHz
SWP 130ms


ATTEN 10dB
RL 10.0dBm
10dB/
D
R
OBW
Downlink Output
CDMA
+7dBm
CENTER 1.940000GHz
SPAN 5.000MHz
*RBW 10kHz
VBW 10kHz
SWP 130ms

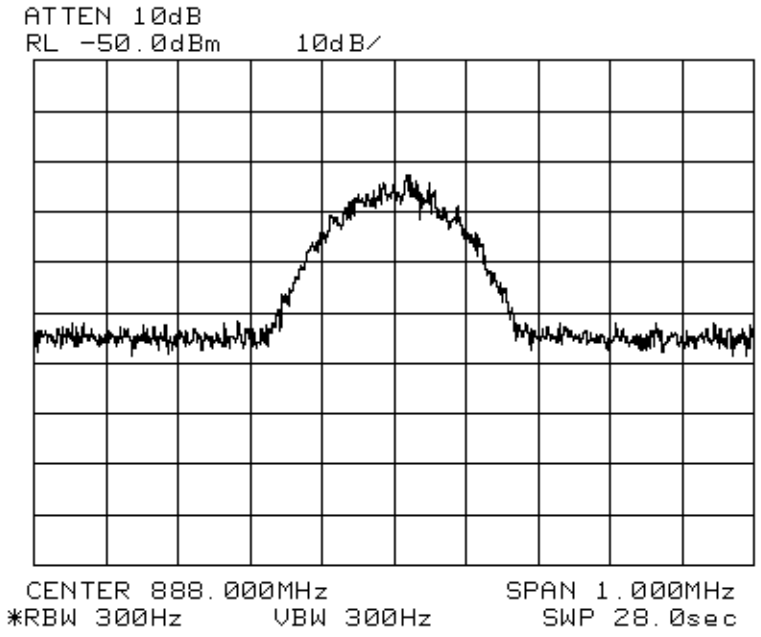


OBW
Downlink Input
WCDMA

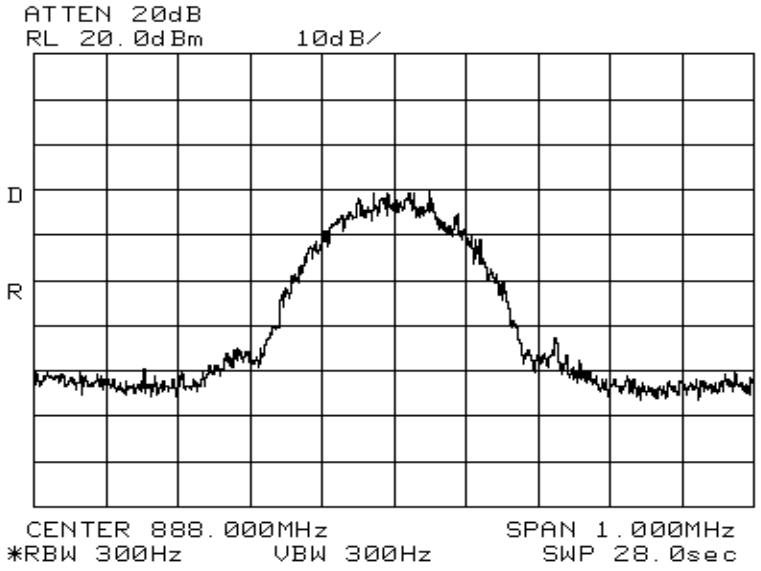


OBW
Downlink Output
WCDMA
+7dBm

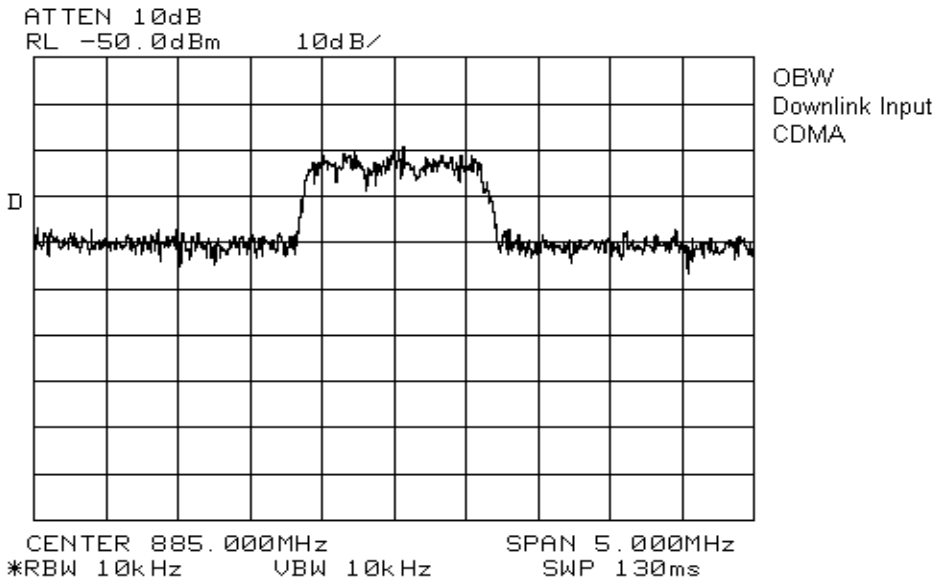
Downlink, Input vs Output
Cellular Band

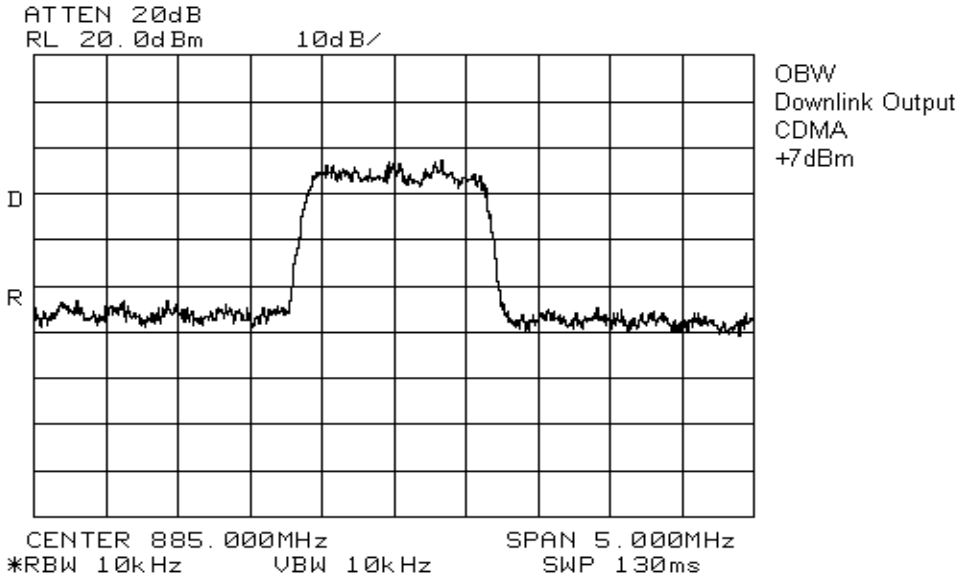


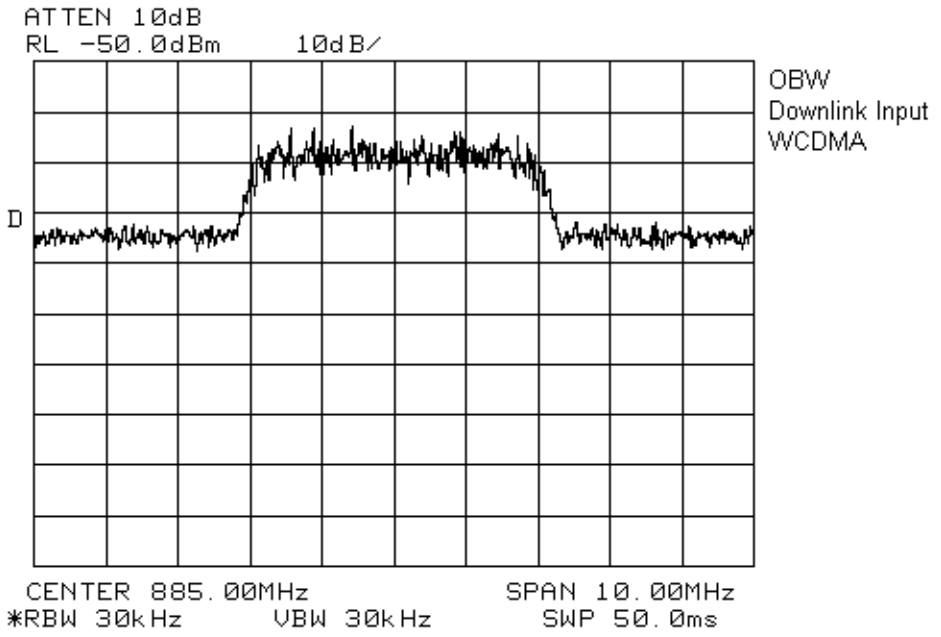
OBW
Downlink Input
GSM

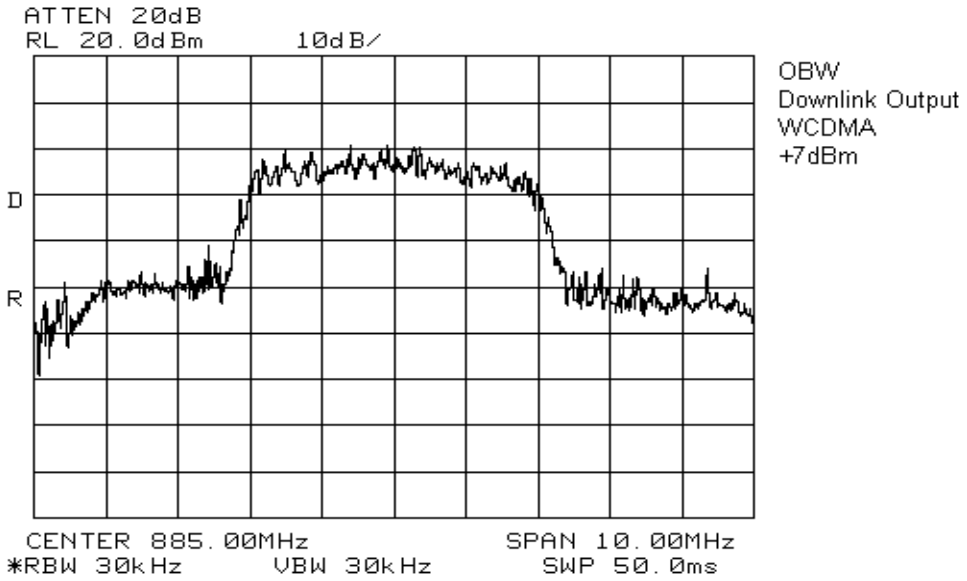


OBW
Downlink Output
GSM
+7dBm


ATTEN 10dB
RL -50.0dBm
10dB/
D
OBW
Downlink Input
CDMA
CENTER 885.000MHz
SPAN 5.000MHz
*RBW 10kHz
VBW 10kHz
SWP 130ms


ATTEN 20dB
RL 20.0dBm
10dB/
D
R
OBW
Downlink Output
CDMA
+7dBm
CENTER 885.000MHz
SPAN 5.000MHz
*RBW 10kHz
VBW 10kHz
SWP 130ms


ATTEN 10dB
RL -50.0dBm
10dB/
D
OBW
Downlink Input
WCDMA
CENTER 885.00MHz
SPAN 10.00MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 20dB
RL 20.0dBm
10dB/
D
R
OBW
Downlink Output
WCDMA
+7dBm
CENTER 885.00MHz
SPAN 10.00MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

Section 6. Spurious Emissions at Antenna Terminals

Para. No.: 2.1051

Test Performed By: Glen Westwell	**Date of Test: 17 Sept 2004**

Minimum Standard: 24.238, 22.917, -13dBm

Test Results: Complies.

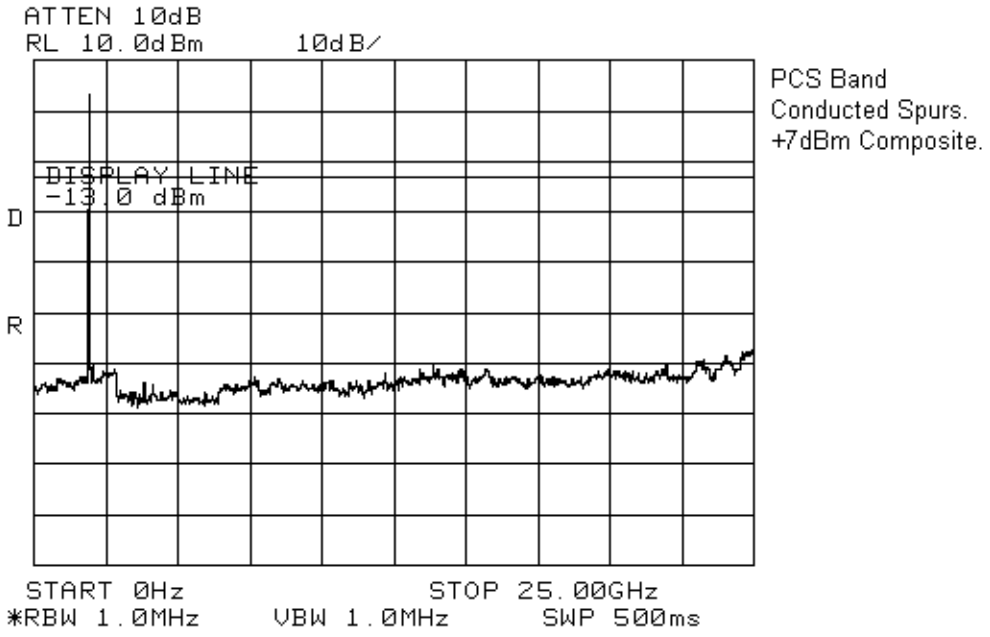
(1) Spurious emissions were searches at low, mid & high ends of the band. Worst case plots have been included.

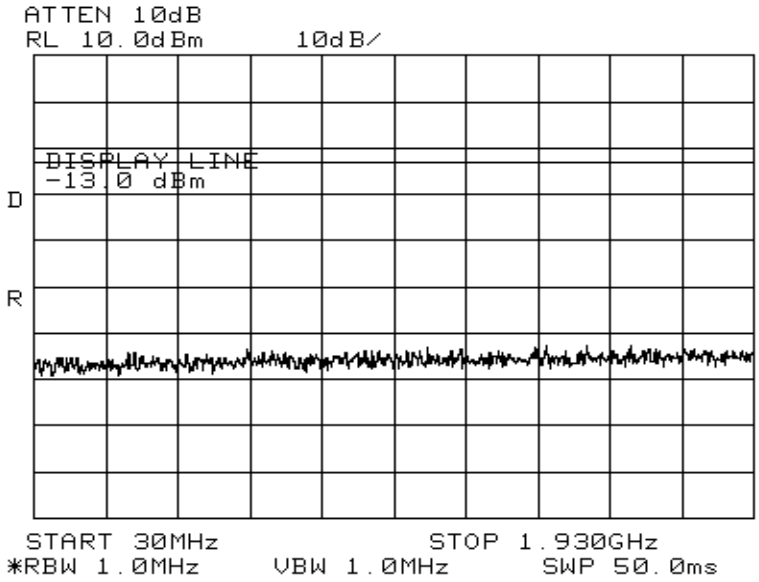
(2) See section 7, Out-of-Band rejection.

(3) Carriers for inter-modulation plots were placed to produce worst case results for the third order out of band emission. No emissions breached the absolute limit of –13dBm.

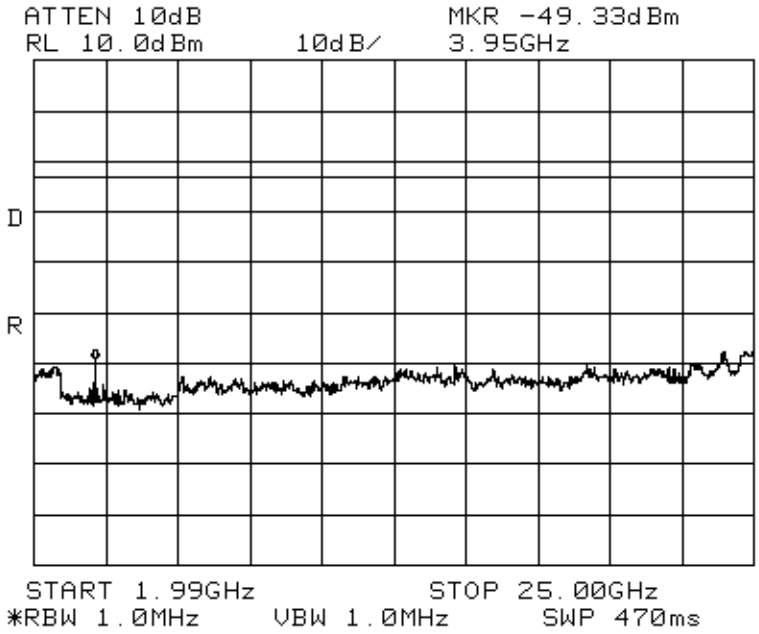
Measurement Data: See Attached Graphs.

PCS Band

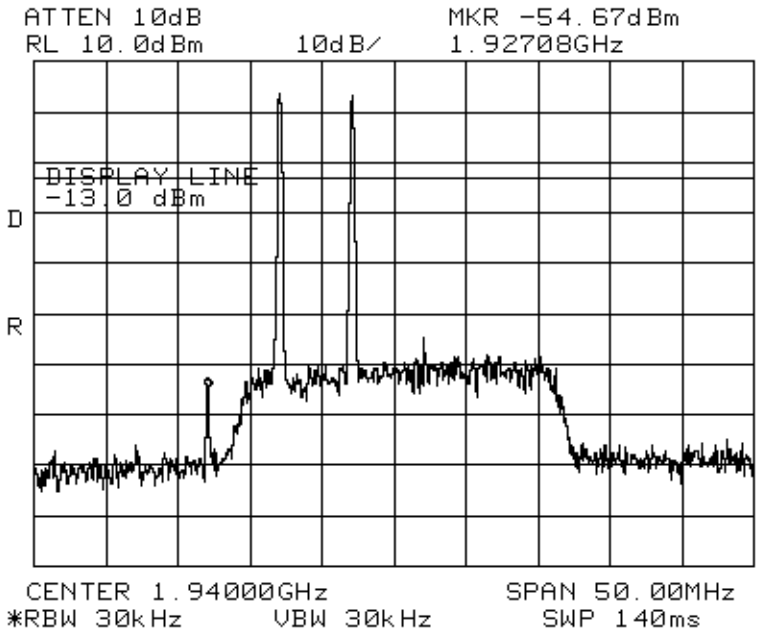

ATTEN 10dB
RL 10.0dBm
10dB/
DISPLAY LINE
-13.0 dBm
D
R
START 0Hz
STOP 25.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 500ms
PCS Band
Conducted Spurs.
+7dBm Composite.



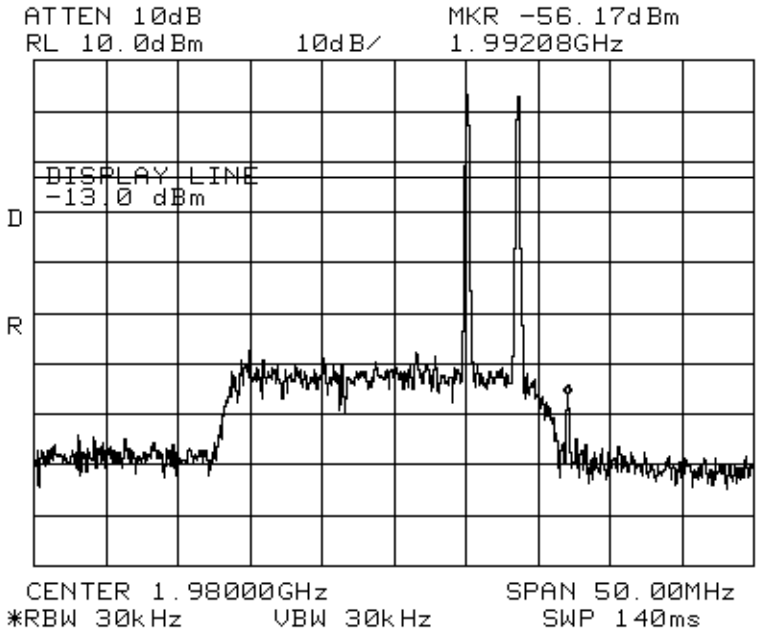
PCS Band
Conducted Spur.
Low Band.



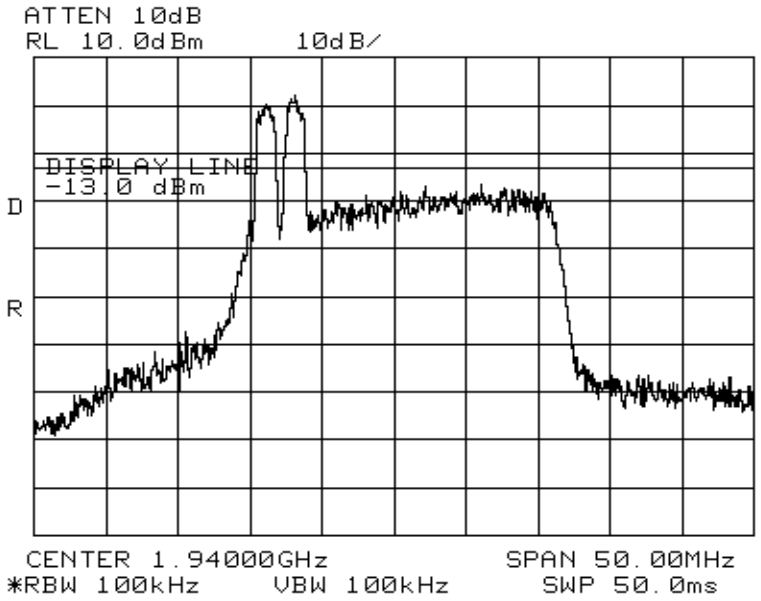
PCS Band
Conducted Spurious
High Band.



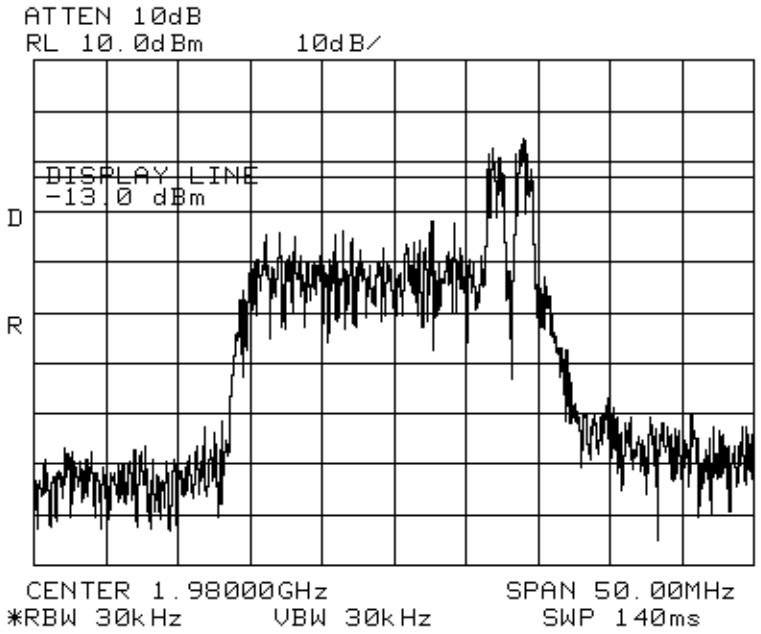
Upper Band Edge
+7dBm Composite
GSM



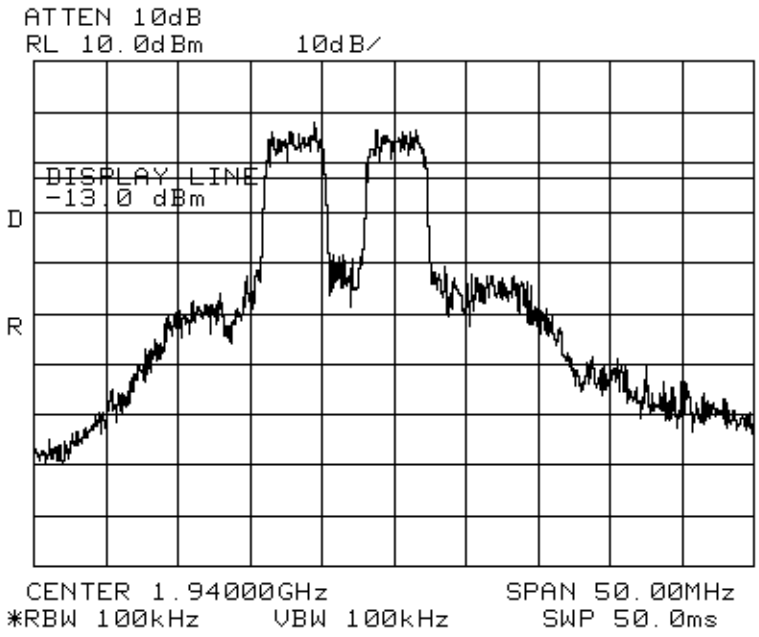
Upper Band Edge
+7dBm Composite
GSM



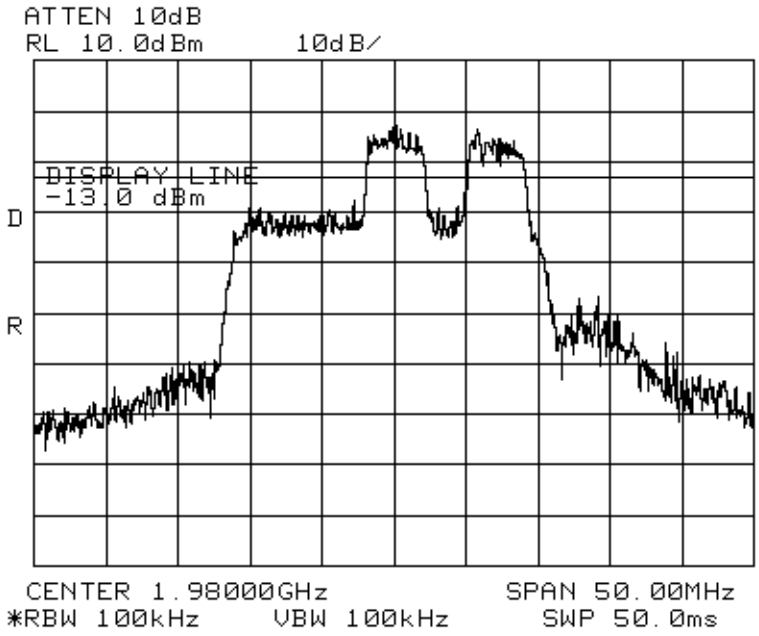
Lower Band Edge
+7dBm Composite
CDMA



Upper Band Edge
+7dBm Composite
CDMA

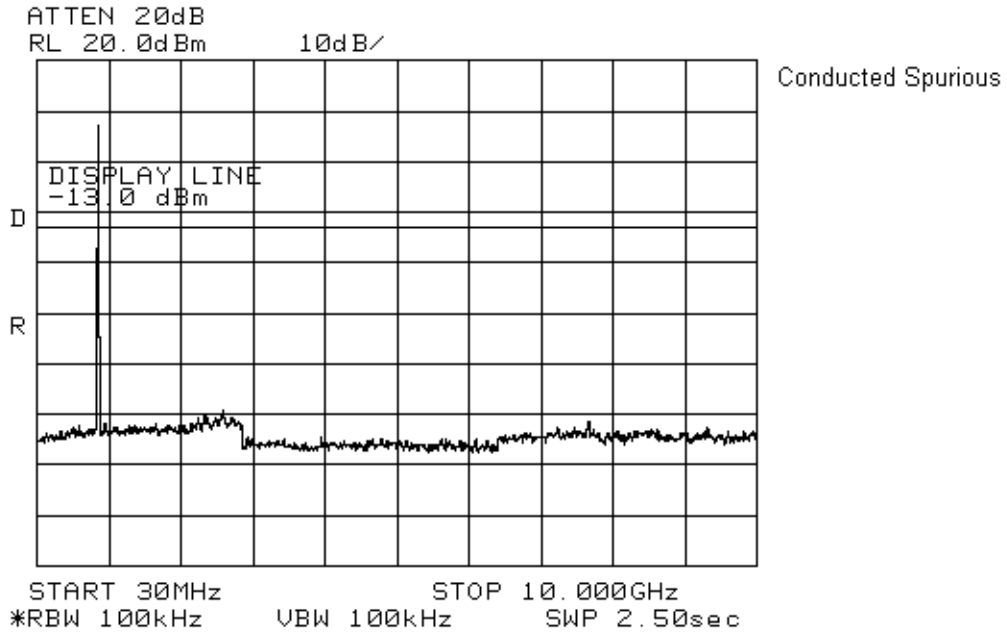


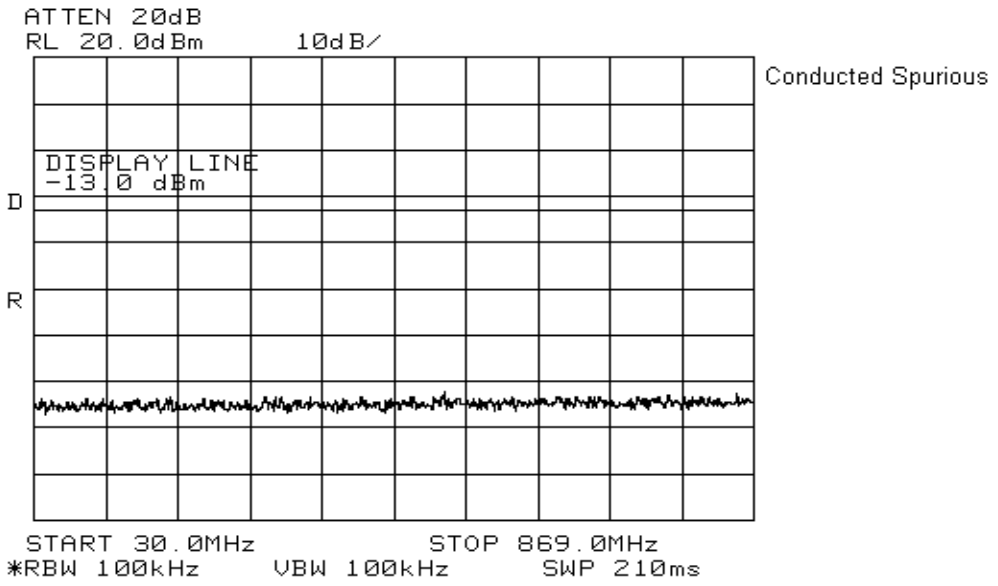
Lower Band Edge
+7dBm Composite
WCDMA

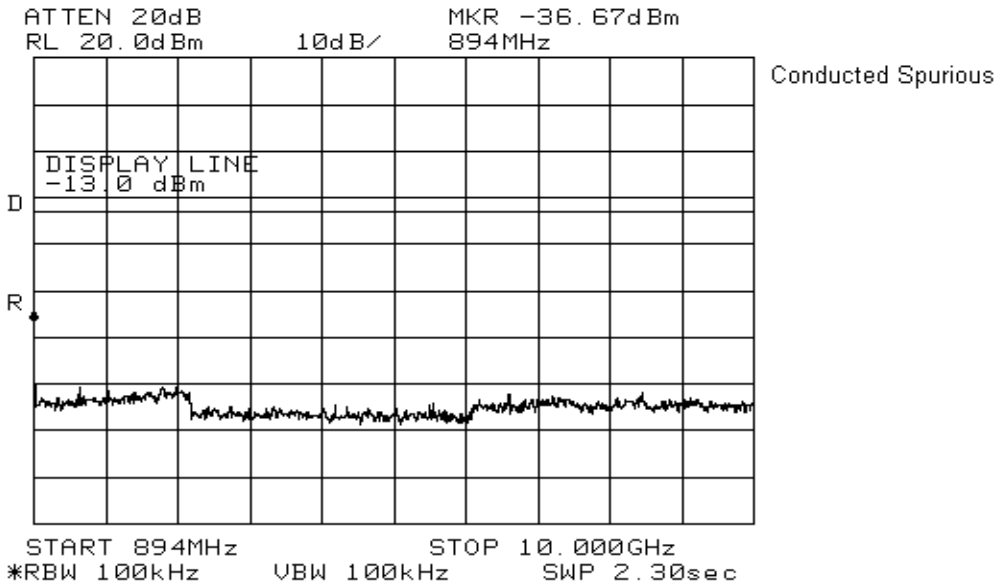


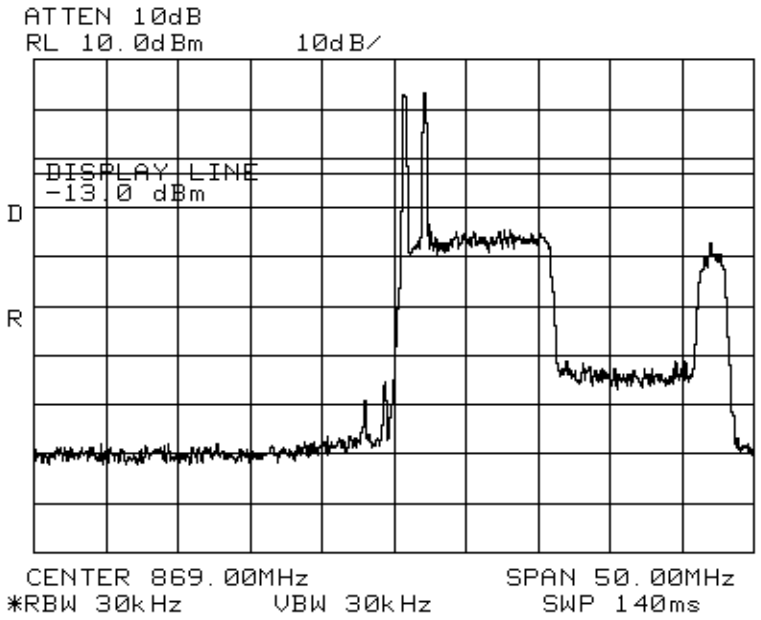
Upper Band Edge
+7dBm Composite
WCDMA

Cellular Band

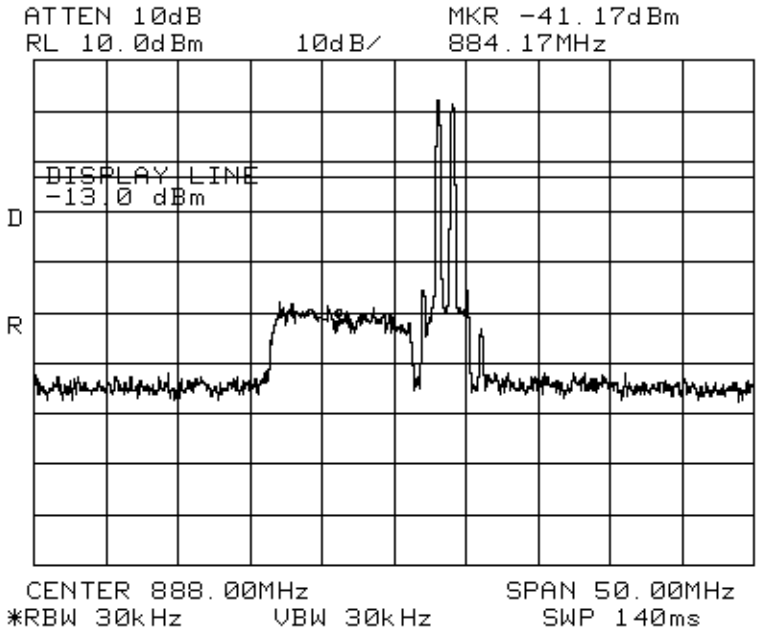



ATTEN 20dB
RL 20.0dBm
10dB/
Conducted Spurious
DISPLAY LINE
-13.0 dBm
D
R
START 30.0MHz
STOP 869.0MHz
*RBW 100kHz
VBW 100kHz
SWP 210ms

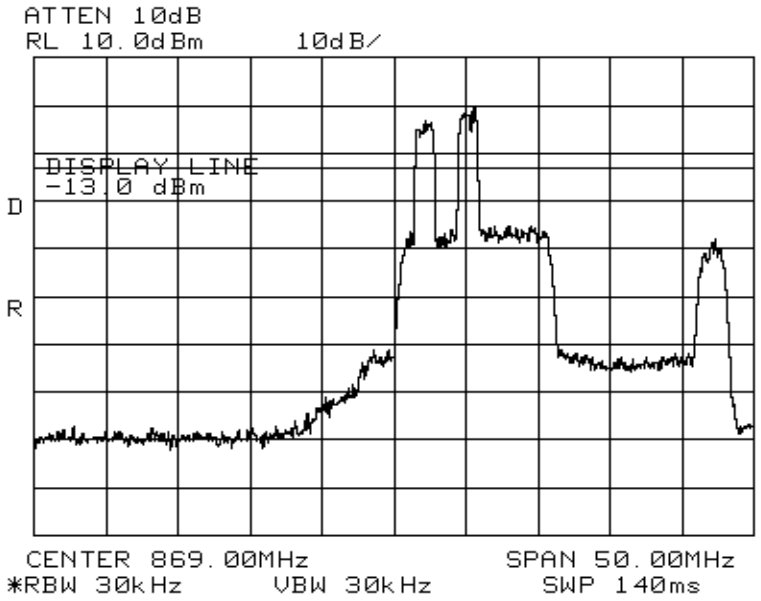

ATTEN 20dB
MKR -36.67dBm
RL 20.0dBm
10dB/
894MHz
Conducted Spurious
DISPLAY LINE
-13.0 dBm
D
R
START 894MHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
SWP 2.30sec



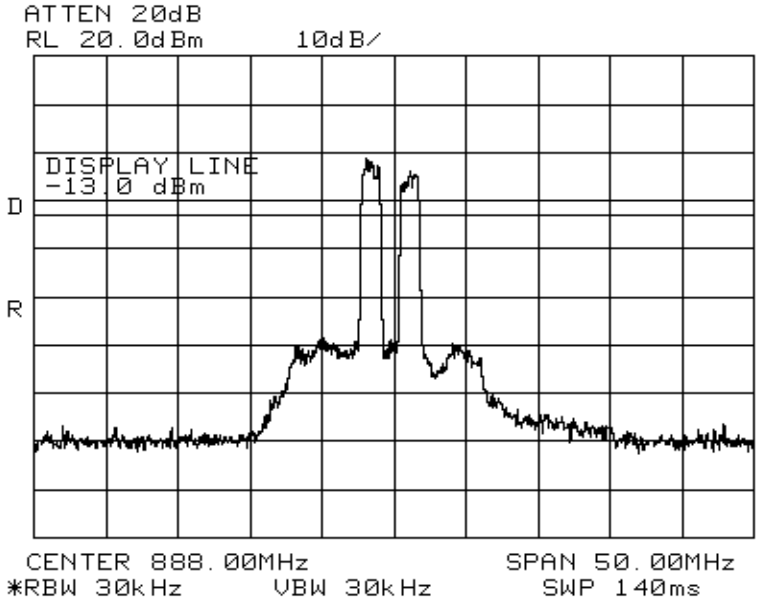
Lower Band Edge
+7dBm Composite
GSM



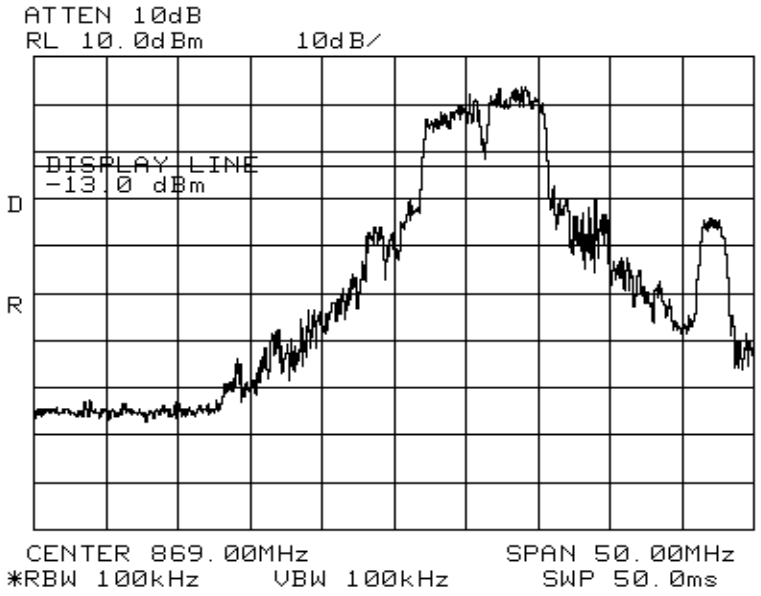
Upper Band Edge
+7dBm Composite
GSM



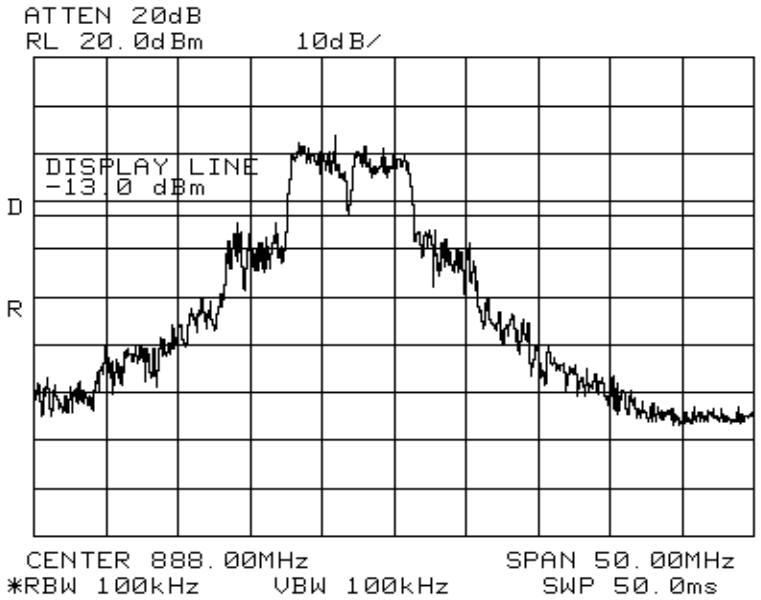
Lower Band Edge
+7dBm Composite
CDMA



Upper Band Edge
+7dBm Composite
CDMA



Lower Band Edge
+7dBm Composite
WCDMA



Upper Band Edge
+7dBm Composite
WCDMA

Section 7. Field Strength of Spurious Emissions

Para. No.: 2.1053

Test Performed By: Glen Westwell	**Date of Test: 29 Sept. 2004**

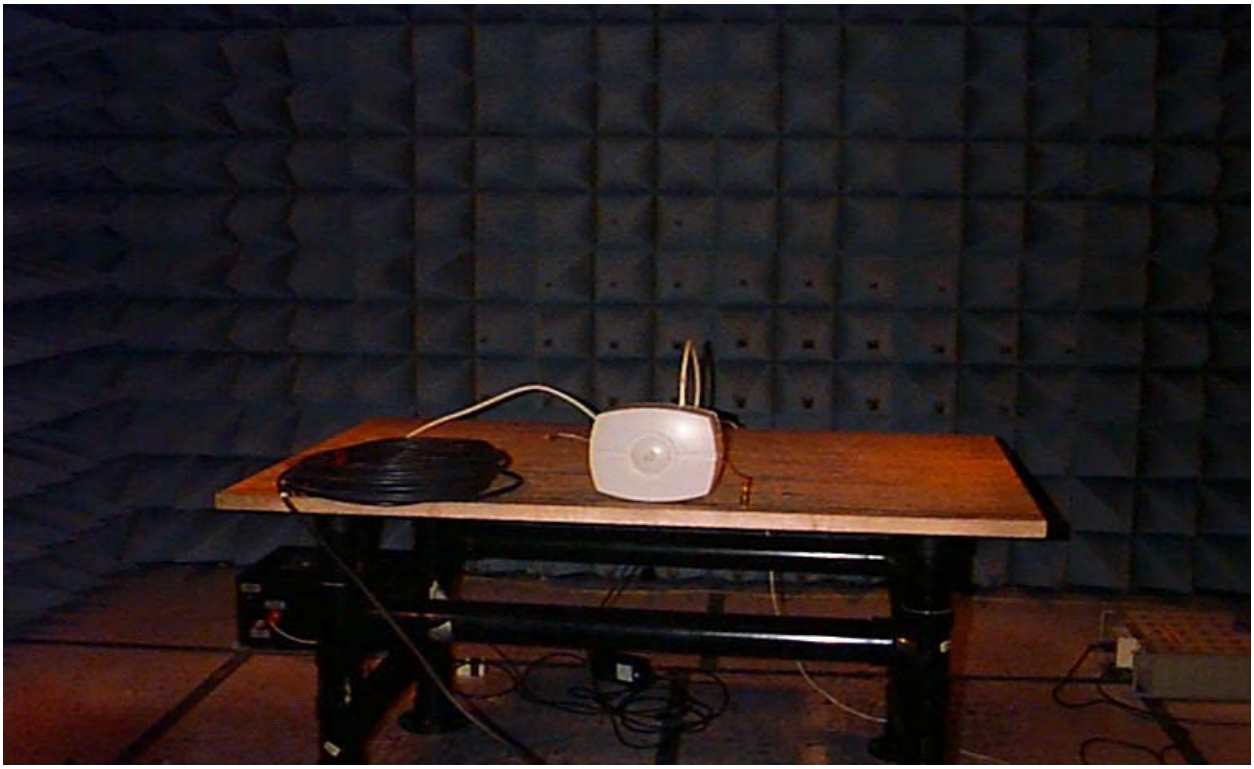
Minimum Standard: 24.238, 22.917 -13dBm

Test Results: Complied.

Measurement Data: No Emissions Detected.

The EUT was searched in the downlink direction for both the Cellular and PCS bands. Note: Radiated spurious and harmonic emissions were searched from 30MHz to the 10th harmonic. None were detected.

Emissions Search Photos



Section 8. Out of Band Rejection

Para. No.: EAB/RF-2-11-04

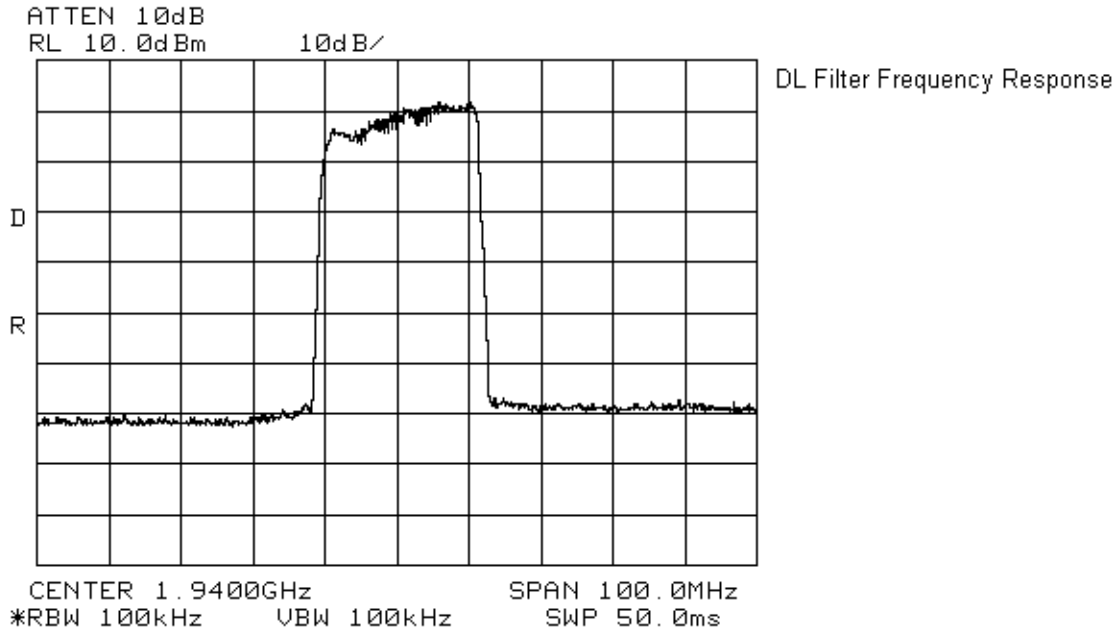
Test Performed By: Glen Westwell	**Date of Test: 17 Sept. 2004**

Limit: -13dBm

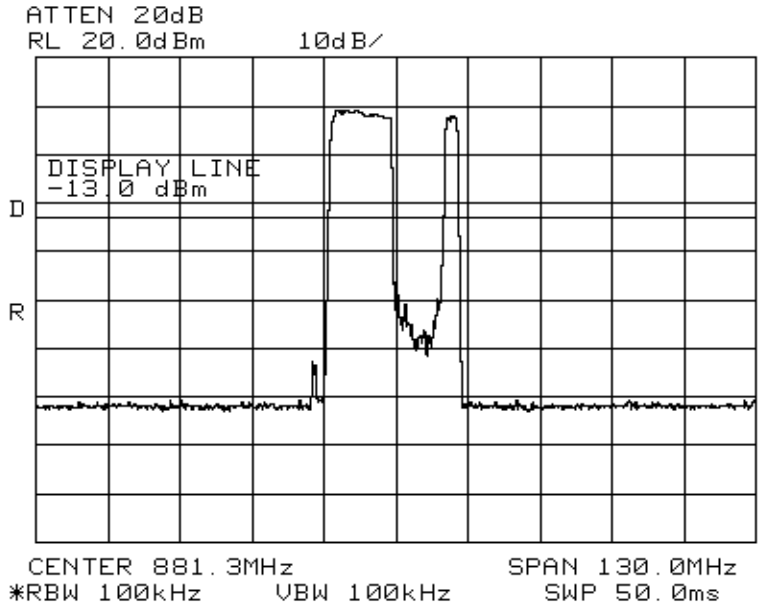
Test Results: Complied.

Measurement Data: See attached plots.

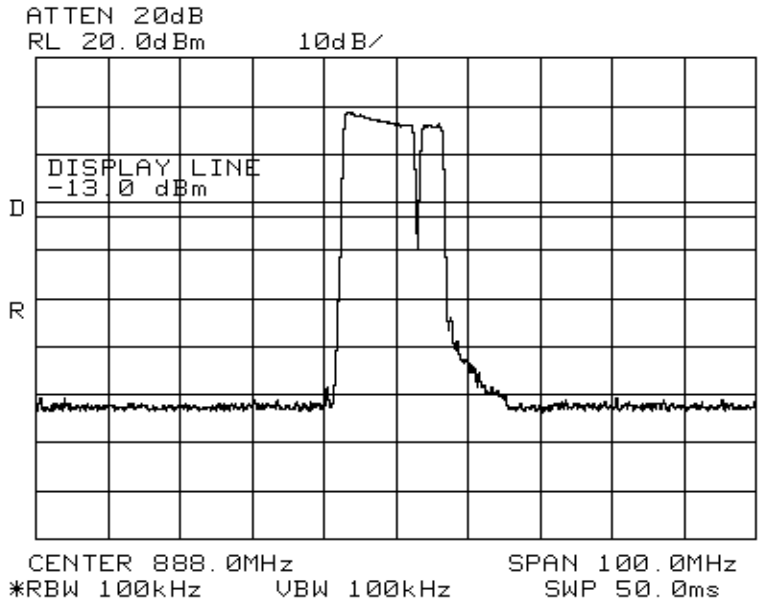
PCS Band


ATTEN 10dB
RL 10.0dBm
10dB/
DL Filter Frequency Response
D
R
CENTER 1.9400GHz
SPAN 100.0MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

Cellular Band



Frequency Responce
Band A



Frequency Response
Band B

Section 9. Frequency Stability

Para. No.: 2.1055

Test Performed By: Glen Westwell	**Date of Test: 29 Sept. 2004**

Minimum Standard: 22.355, 24.235

Test Results: Complies. The maximum frequency drift is 0 Hz.

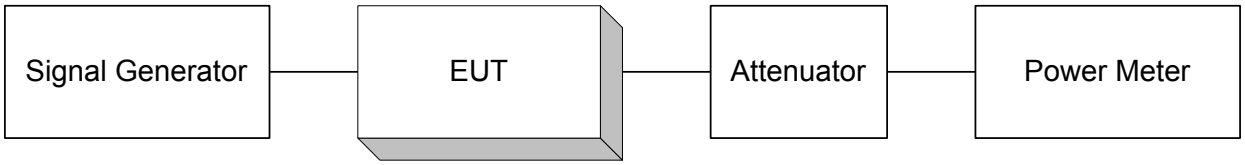
Measurement Data: Standard Test Frequency: (-30°C to +50°C)

PCS Downlink CU radio: 1940.000 000 MHz
Cellular Downlink CU radio: 885.000 000 MHz

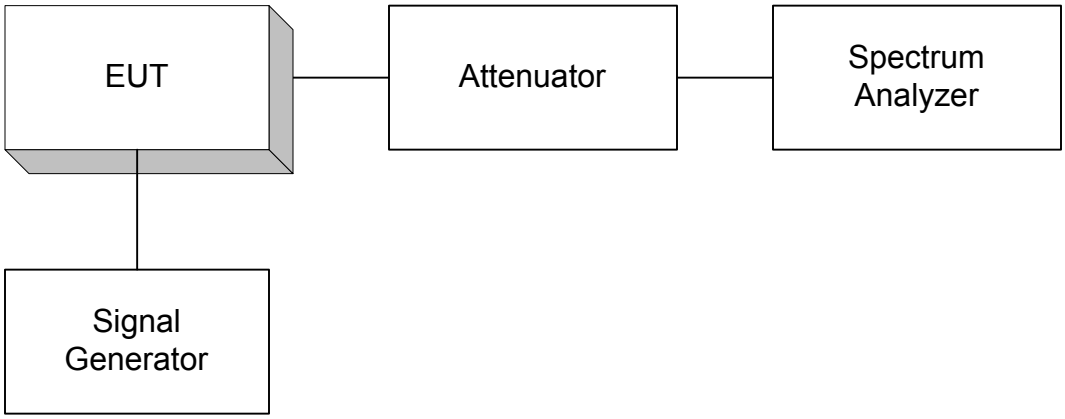
▪Frequency deviation was verified every 10°C from -30°C to +50°C, as well as at voltage variation of +/- 15% of supply voltage.

Section 10. Block Diagrams

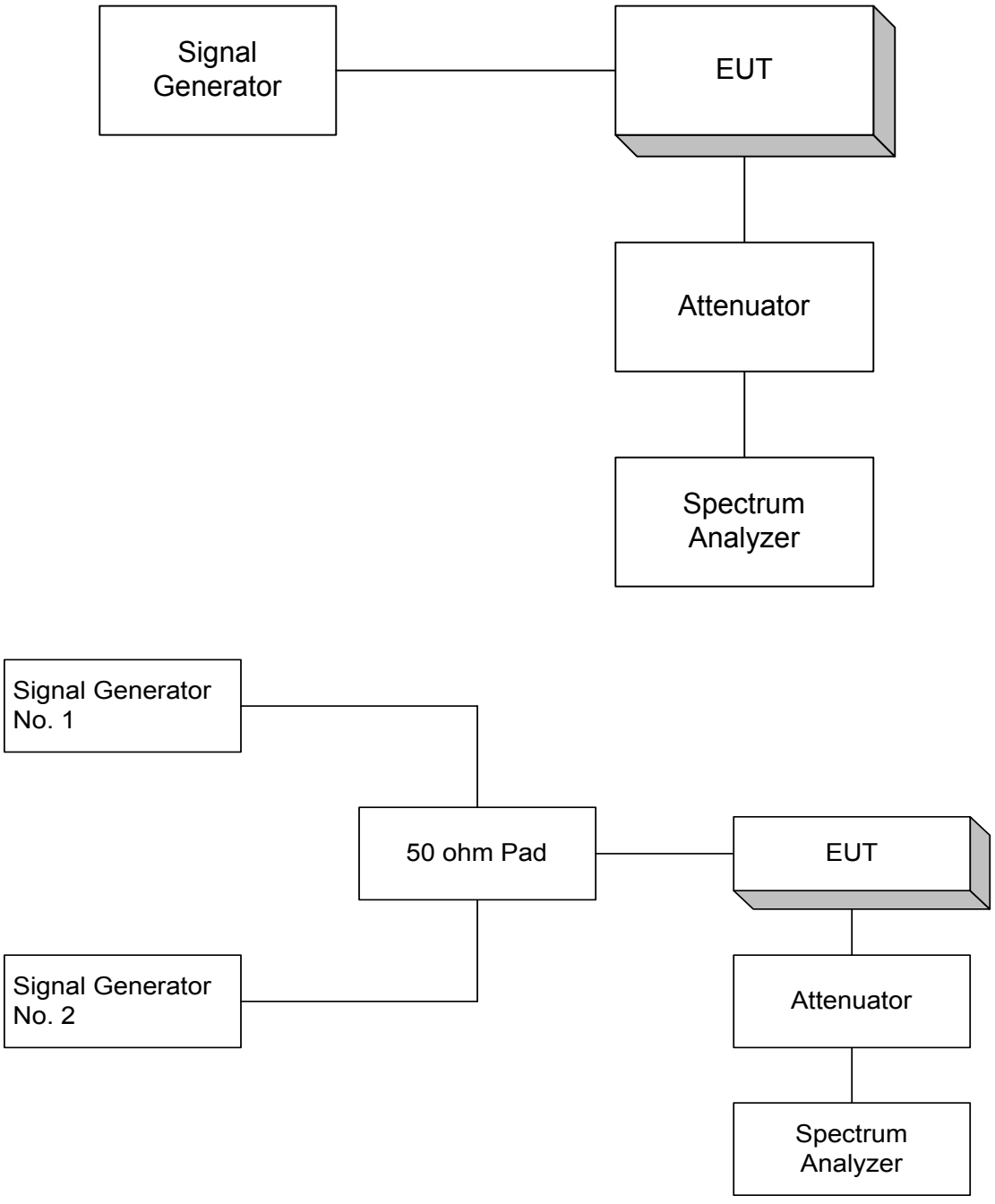
Para. No. 2.1046 - R.F. Power Output



Para. No. 2.1049 - Occupied Bandwidth

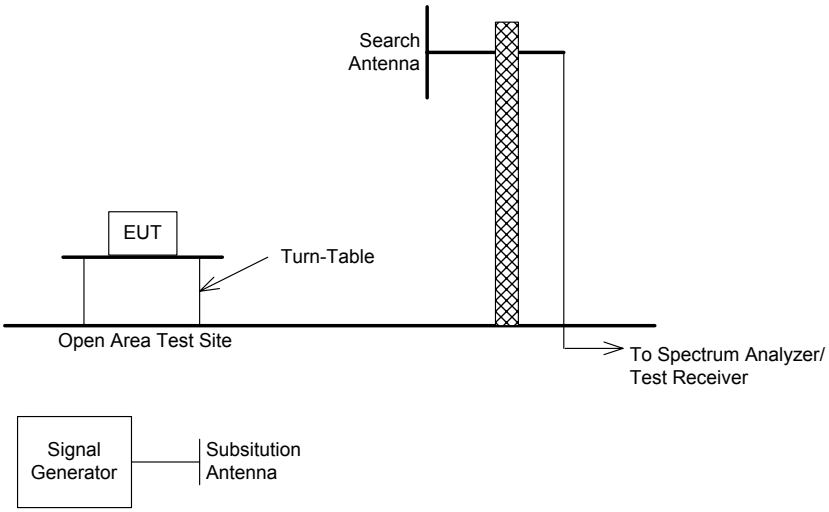


Para. No. 2.1051 - Spurious Emissions at Antenna Terminals

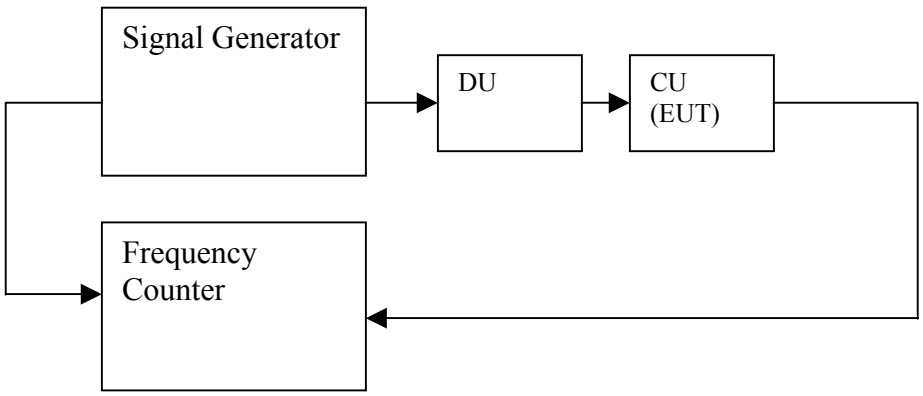


Para. No. 2.1053 - Field Strength of Spurious Radiation

TIA/EIA 603, Signal Substitution Method



Para. No. 2.1055 Frequency Stability



Section 11. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	31 May 04	31 May 05
3 Year	Signal Generator	Rohde & Schwarz	SM1Q03	FA001091	25 Sep 03	25 Sep 06
1 Year	Signal Generator	Rohde & Schwarz	SM1Q06B	FA001878	18 May 04	18 May 05
1 Year	Power Meter	Hewlett Packard	E4418B	FA001413	26 May 04	26 May 05
1 Year	Power Sensor	Hewlett Packard	8487A	FA001741	09 Jun 04	09 Jun 05
1 Year	RF AMP	JCA	4-8 GHz	FA001497	18 June 04	18 June 05
1 Year	RF AMP	JCA	2-4 GHz	FA001496	18 June 04	18 June 05
1 Year	RF AMP	JCA	1-2 GHz	FA001498	18 June 04	18 June 05
1 Year	Climate Chamber	Thermotron	SM-16C	15649-S	COU	COU
1 Year	Frequency Counter	Hewlett Packard	HP5350A	FA000086	19 Feb 04	19 Feb 05
1 Year	Spectrum Analyzer	Hewlett-Packard	8566B	FA001309	May 28/04	May 28/05
1 Year	Spectrum Analyzer Display	Hewlett-Packard	85662A	FA001309	May 28/04	May 28/05
NCR	Bilog	Schaffner	CBL6112B	FA001504	NCR	NCR
1 Year	Horn Antenna	EMCO #1	3115	FA000649	18 Dec 03	18 Dec 04
1 Year	Receiver	Rohde & Schwarz	ESVP	FA000871	Jan. 16/04	Jan. 16/05
1 Year	Log Periodic Antenna #2	EMCO	3148	FA001355	May 05/04	May 05/05
1 Year	Biconical (2) Antenna	EMCO	3109	FA000904	Aug 3/04	Aug 3/05

NA: Not Applicable
NCR: No Cal Required
COU: CAL On Use