



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

Table of Contents

Section 1.	Summary of Test Results	3
Section 2.	General Equipment Specification.....	6
Section 3.	RF Safety for Co-Located Transmitters	7
Section 4.	RF Power Output.....	8
Section 5.	Occupied Bandwidth	10
Section 6.	Spurious Emissions at Antenna Terminals	17
Section 7.	Field Strength of Spurious Emissions	28
Section 8.	Out of Band Rejection	30
Section 9.	Frequency Stability	33
Section 10.	Block Diagrams	34
Section 11.	Test Equipment List	37

EQUIPMENT: Spotcell 141/142, 111/112

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: _____
Glen Westwell, Wireless Specialist.

DATE: 3 November 2004

Nemko Canada Inc. authorizes the above named company to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report applies only to the items tested.

EQUIPMENT: Spotcell 141/142, 111/112

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.

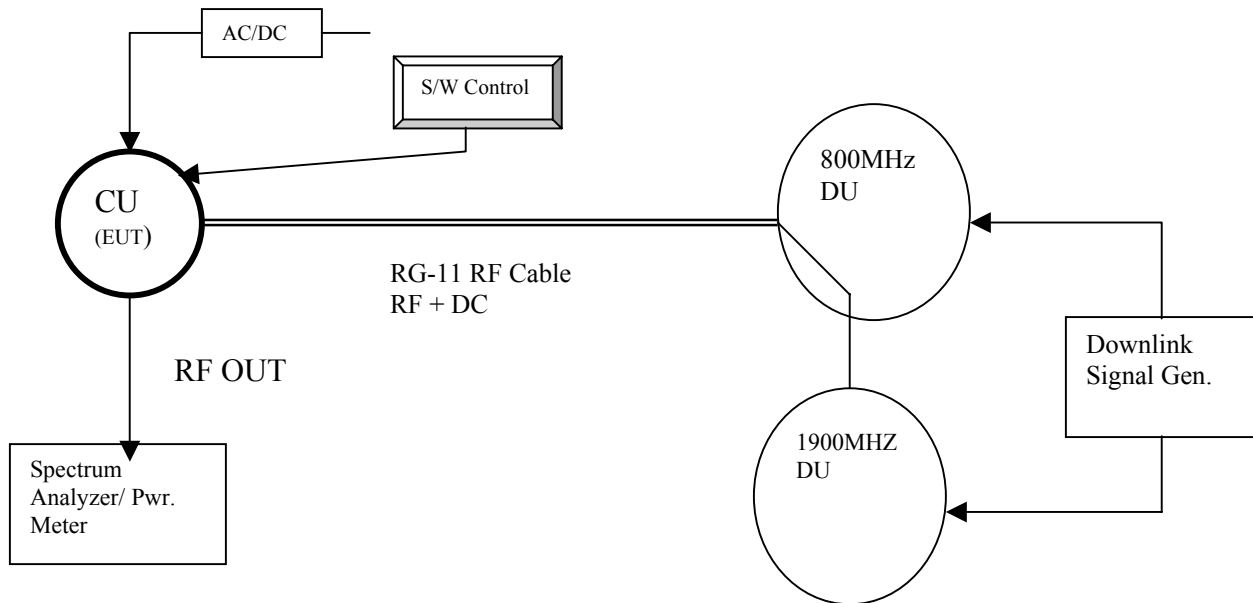
MPE data has been provided with this application filing to validate the RF safety requirement for co-location of both configurations.

Indoor Temperature: 25°C
 Humidity: 44%

Outdoor Temperature: 18°C
 Humidity: 45%

EQUIPMENT: Spotcell 141/142, 111/112

Test Sep Up Configuration of EUT



EQUIPMENT: Spotcell 141/142, 111/112

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)

*EQUIPMENT: Spotcell 141/142, 111/112***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 Summation800MHz: $0.002/0.533 = 0.00575$ 1900MHz: $0.002/1 = 0.002$ Therefore: $0.00575 + 0.002 = 0.00575 < 1$

*EQUIPMENT: Spotcell 141/142, 111/112***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 $P_{max} - 10\log N$.

P_{max} = 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.

EQUIPMENT: Spotcell 141/142, 111/112

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 $P_{max} - 10\log N$.

P_{max} = 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.

EQUIPMENT: Spotcell 141/142, 111/112

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

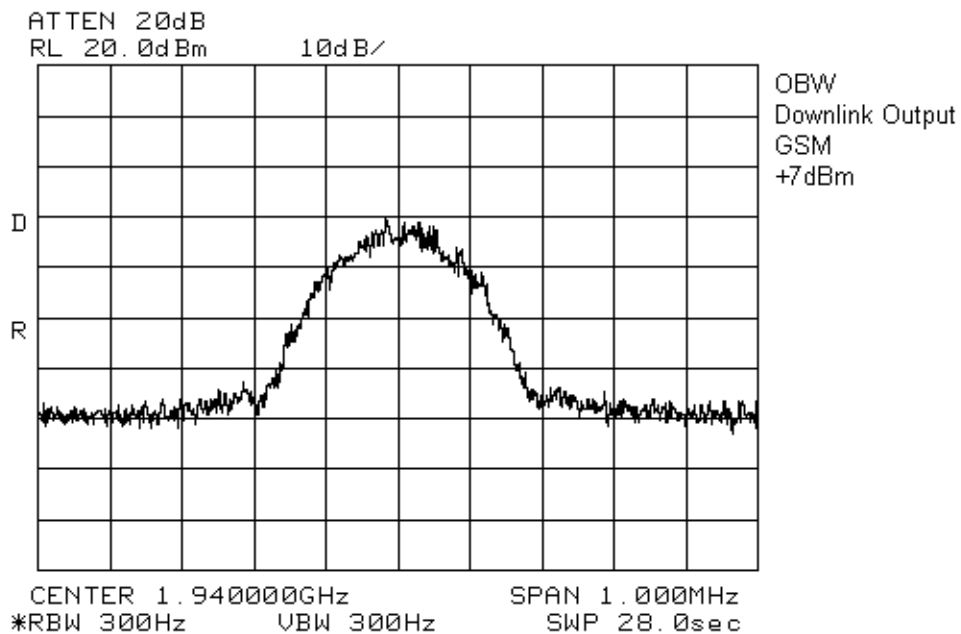
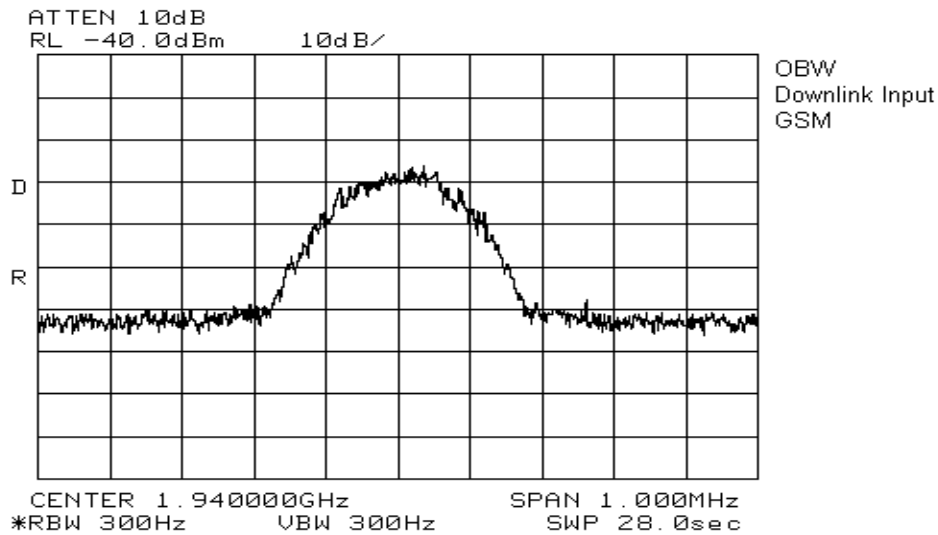
Test Results: Complies.

Measurement Data: See attached graphs.

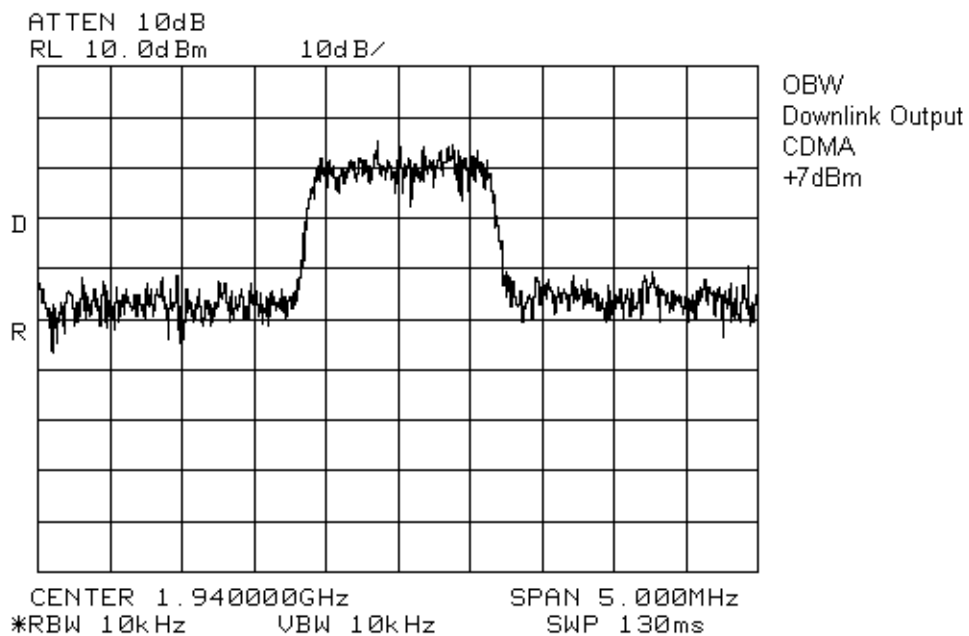
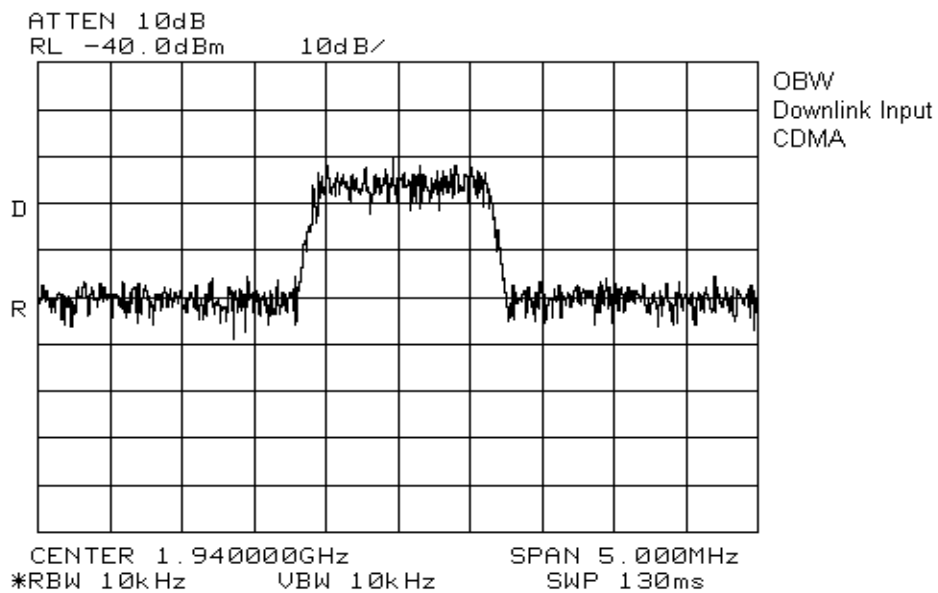
The occupied bandwidth was measured by comparison of input from the signal generator to the output signal from the amplifier. This was done in order to determine if there was any degradation to the output signal due to the amplification and conversion through the repeater.

EQUIPMENT: Spotcell 141/142, 111/112

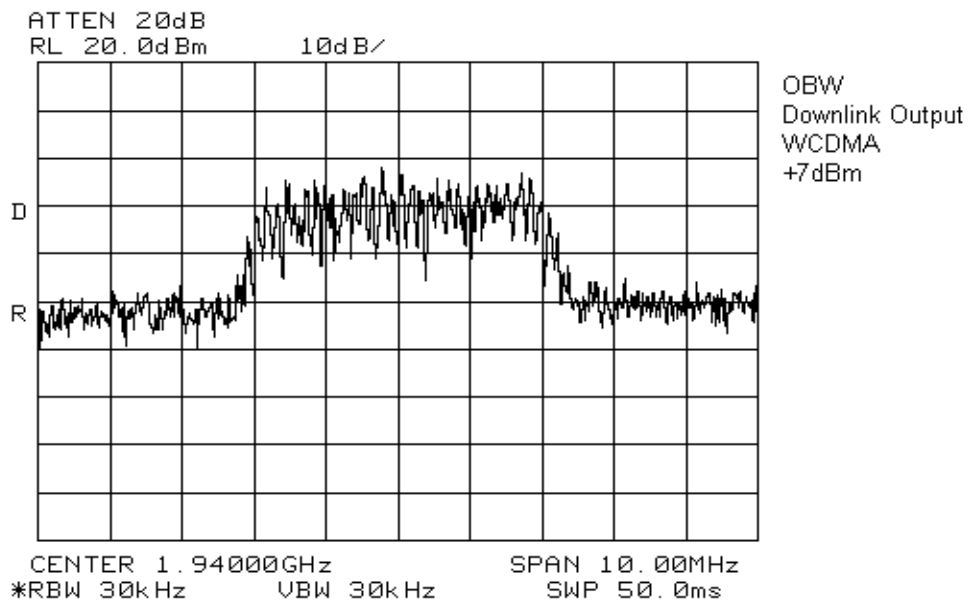
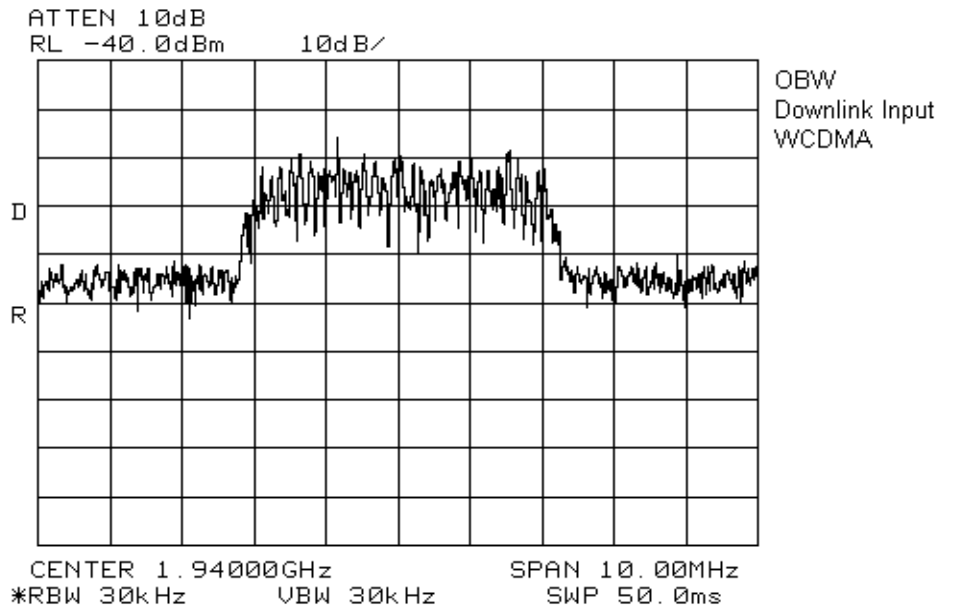
Downlink, Input vs Output
PCS Band



EQUIPMENT: Spotcell 141/142, 111/112

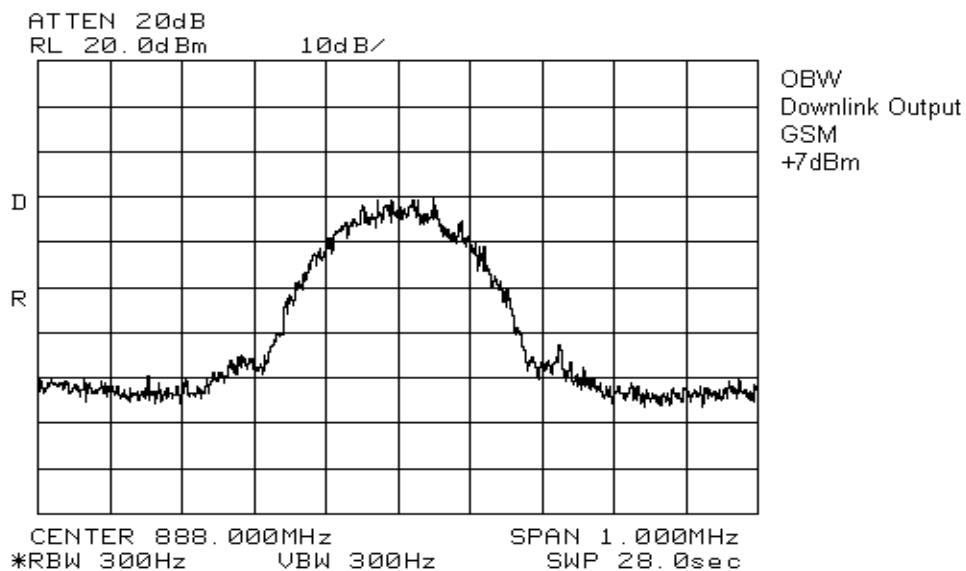
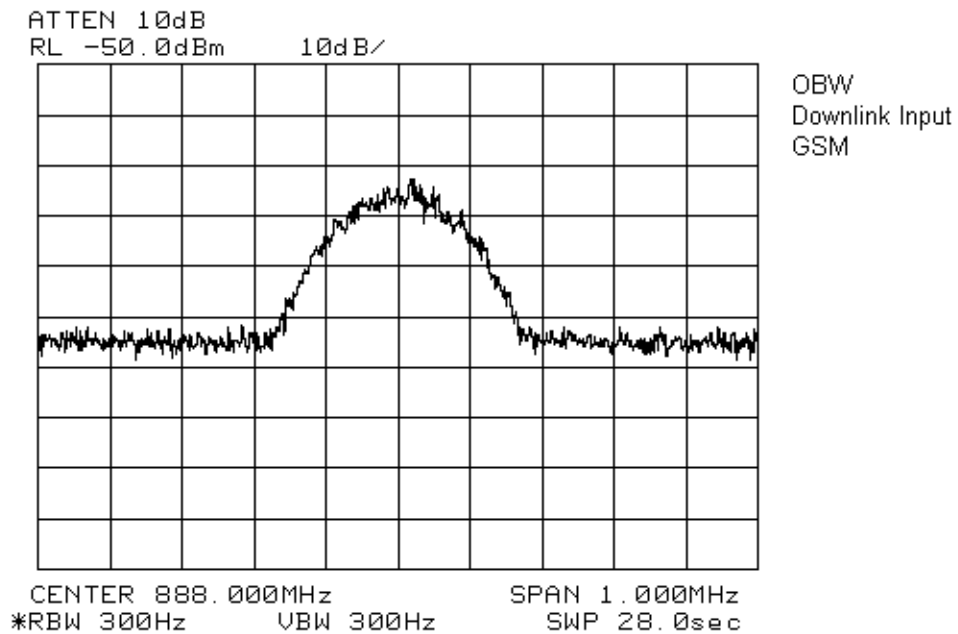


EQUIPMENT: Spotcell 141/142, 111/112

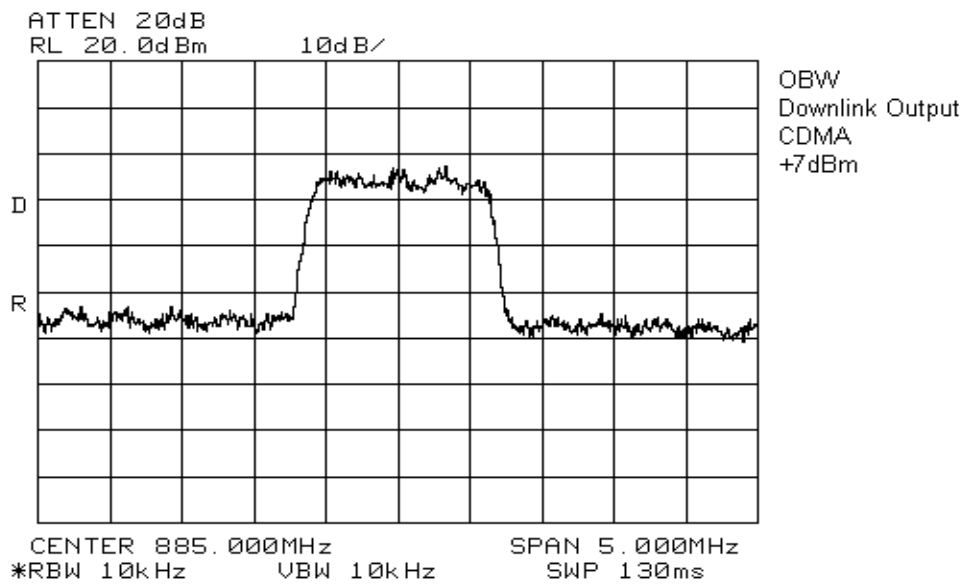
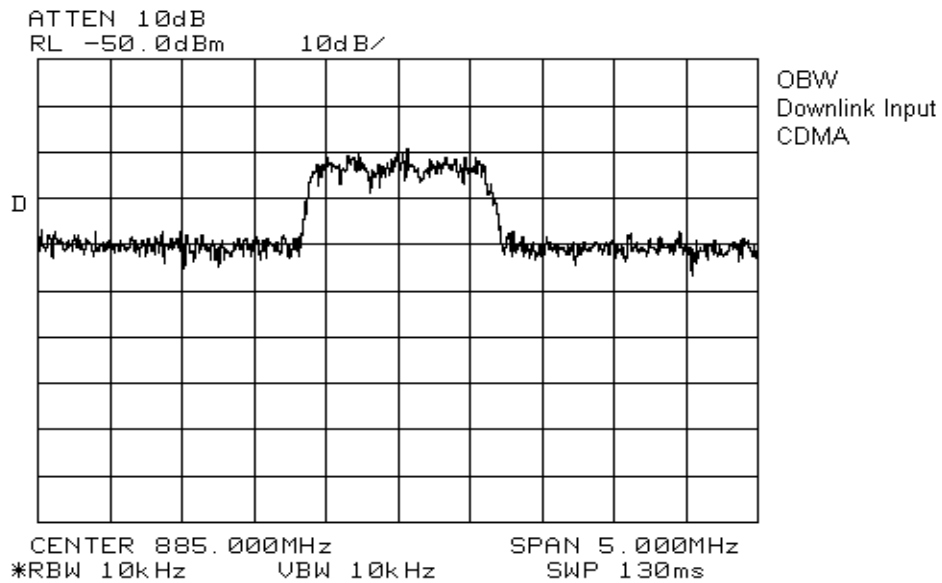


EQUIPMENT: Spotcell 141/142, 111/112

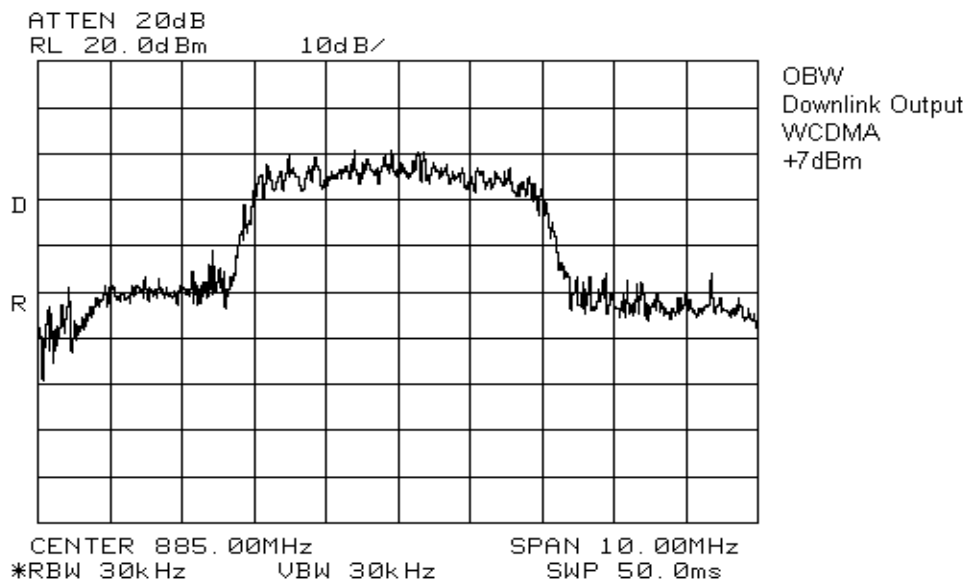
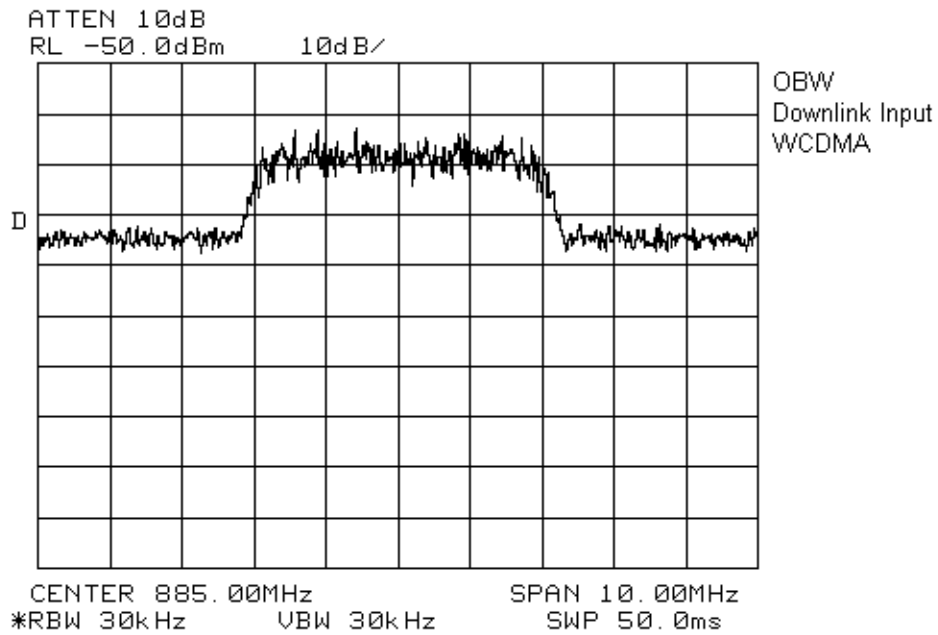
Downlink, Input vs Output
Cellular Band



EQUIPMENT: Spotcell 141/142, 111/112



EQUIPMENT: Spotcell 141/142, 111/112



EQUIPMENT: Spotcell 141/142, 111/112

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 searched at low, mid & high ends of the band. Worst case plots have been included.

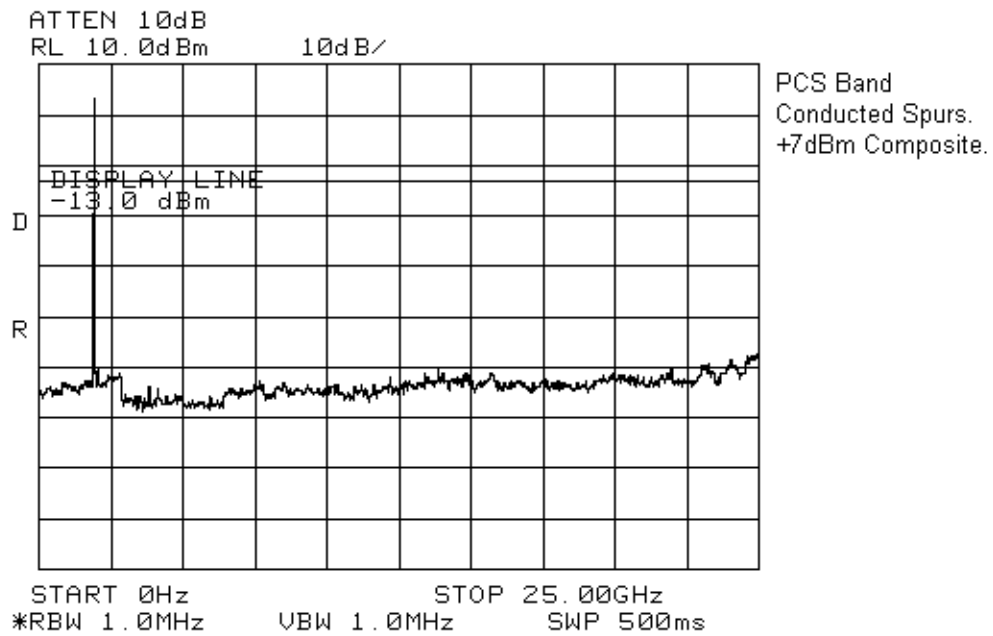
(2) See section 7, Out-of-Band rejection.

(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.

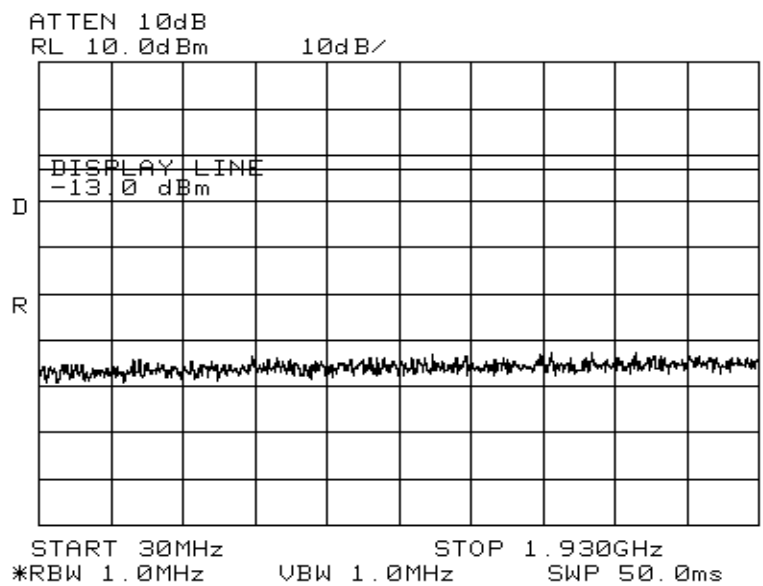
Measurement Data: See Attached Graphs.

EQUIPMENT: Spotcell 141/142, 111/112

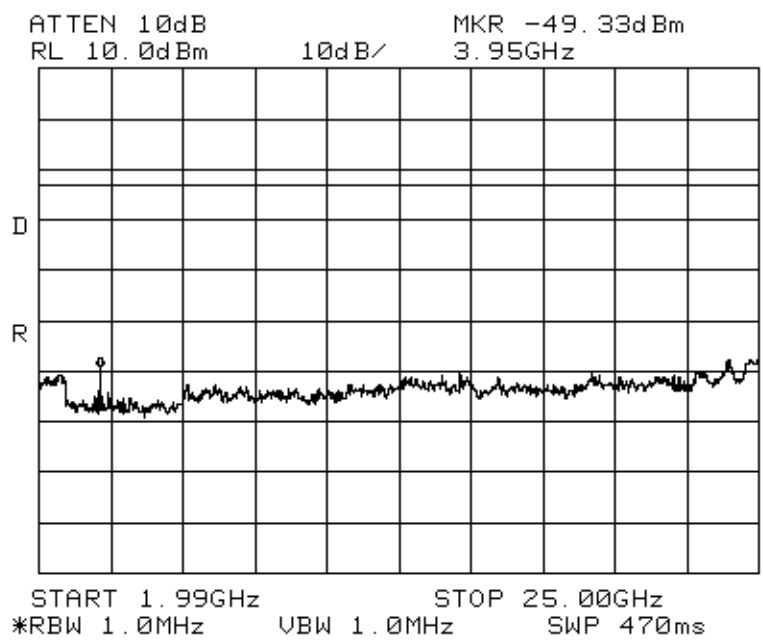
PCS Band



EQUIPMENT: Spotcell 141/142, 111/112

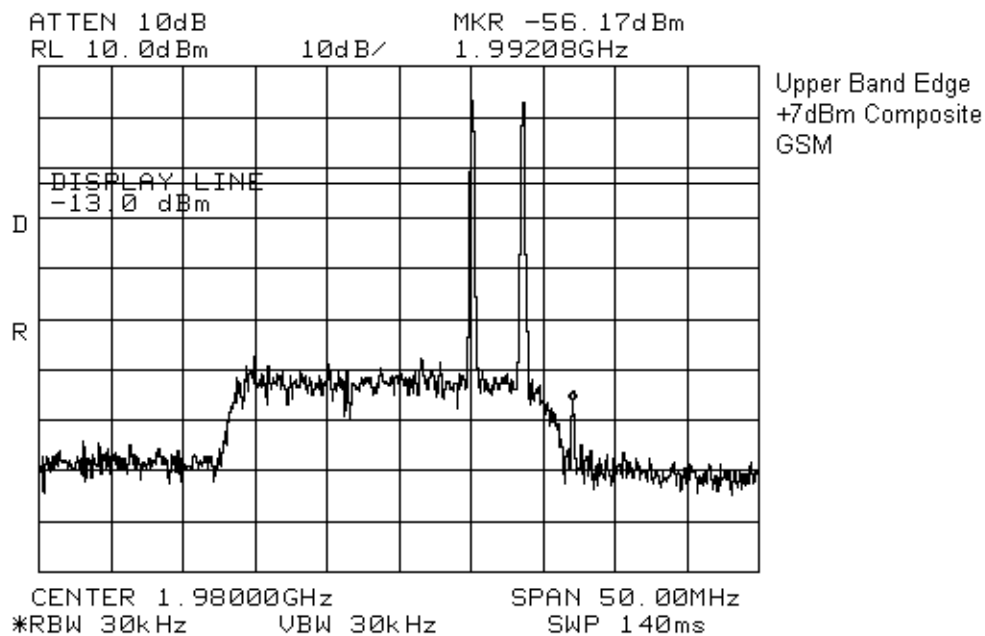
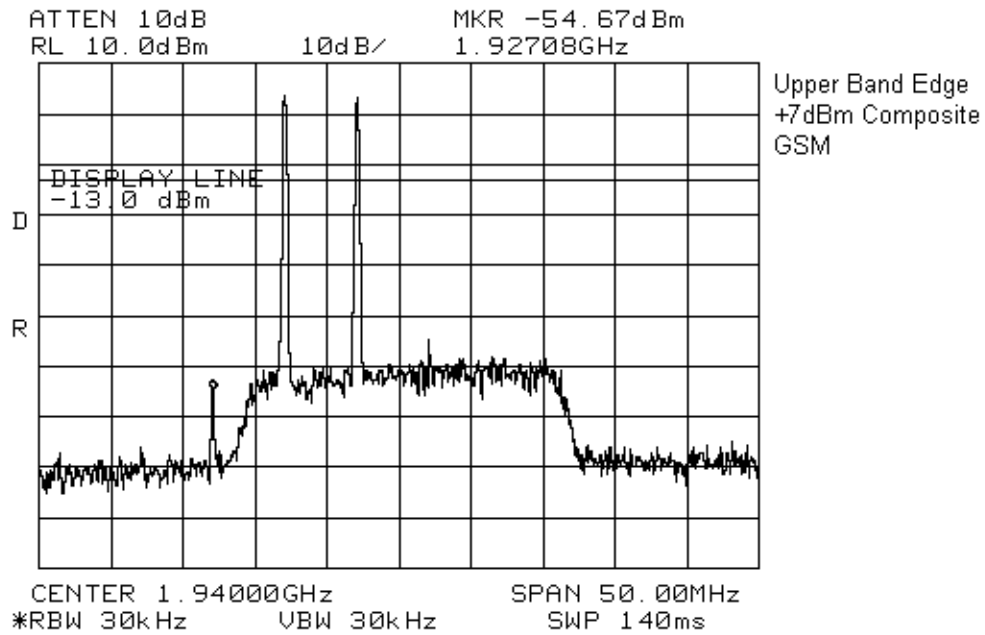


PCS Band
Conducted Spur.
Low Band.

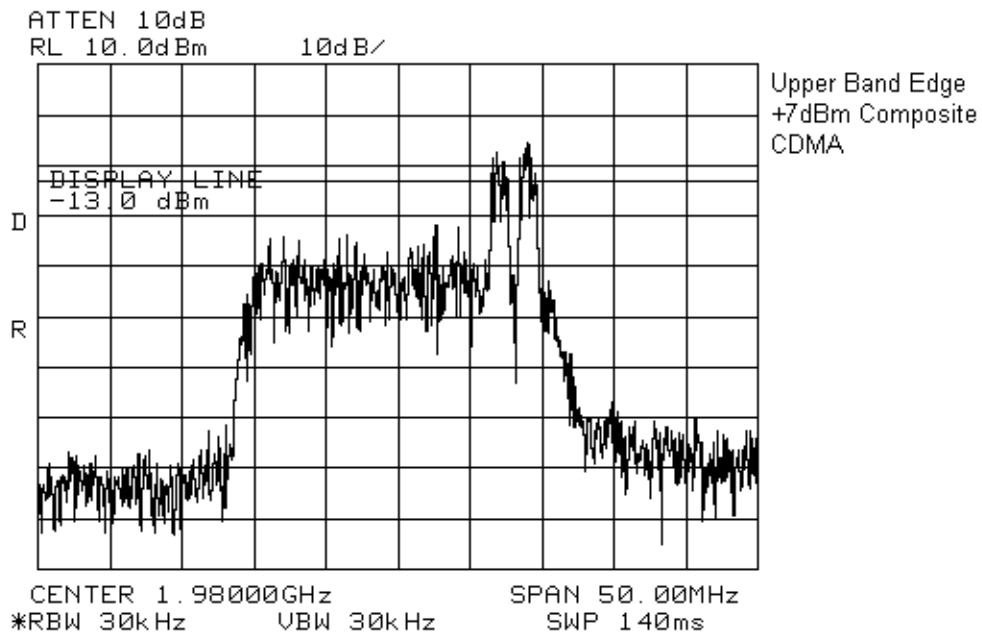
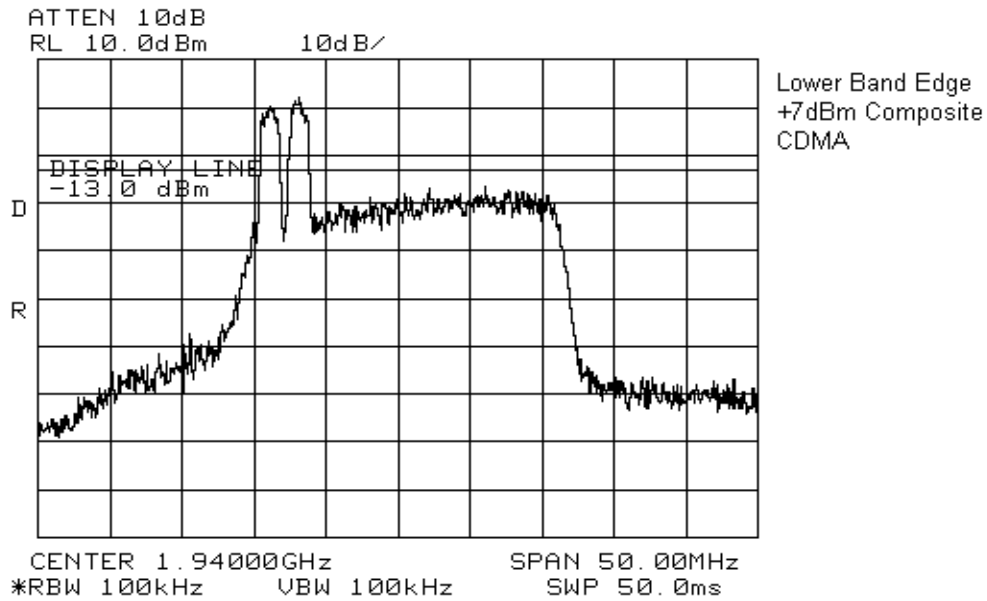


PCS Band
Conducted Spurious
High Band.

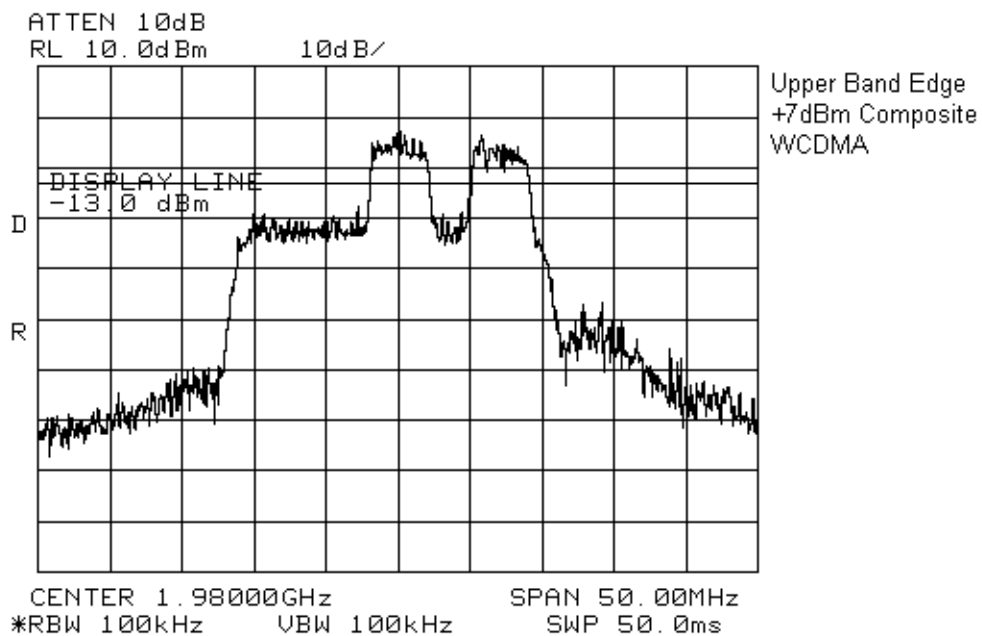
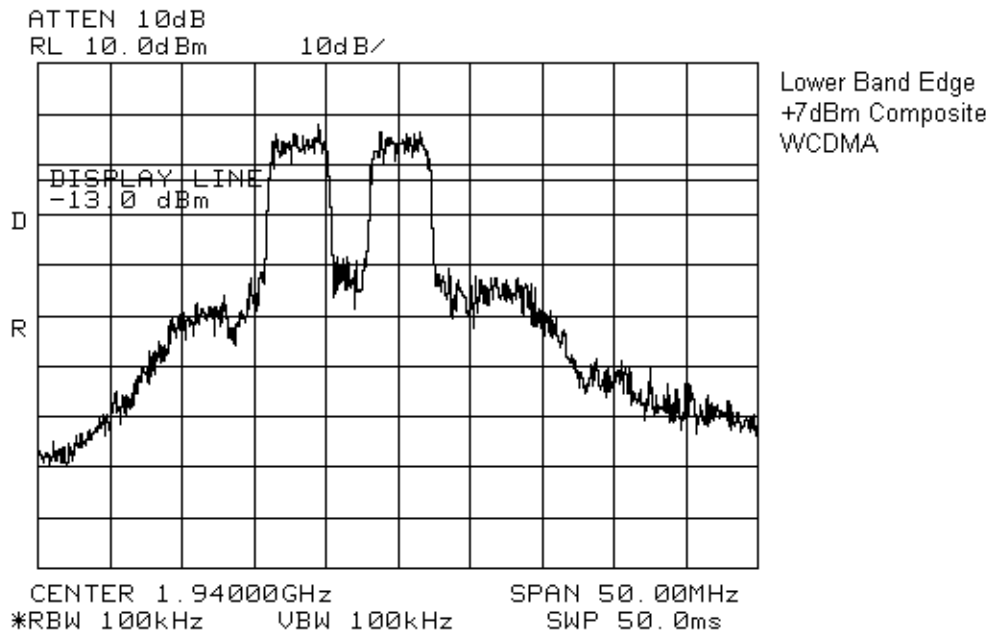
EQUIPMENT: Spotcell 141/142, 111/112



EQUIPMENT: Spotcell 141/142, 111/112

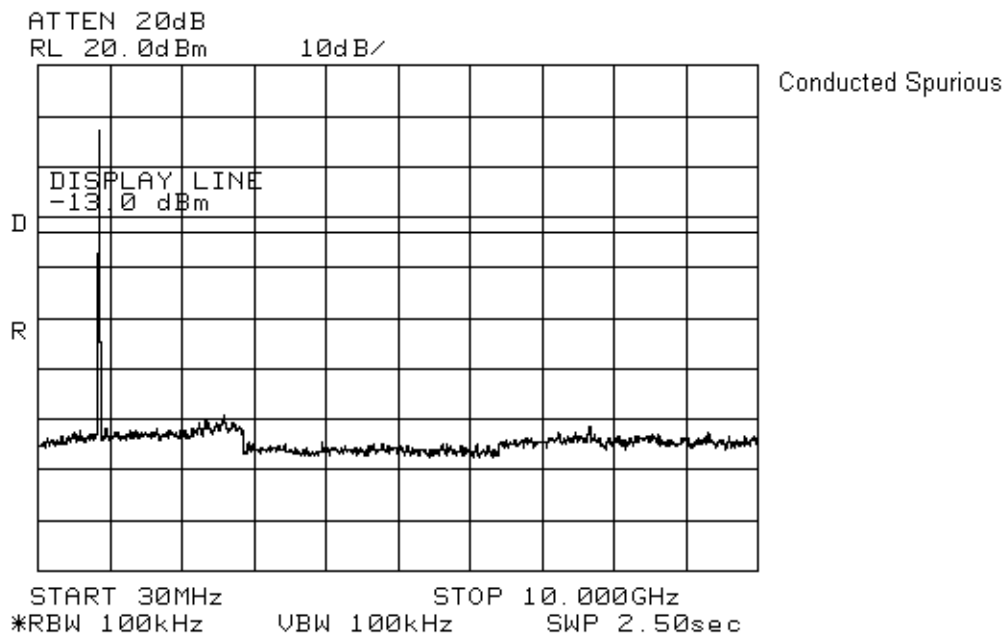


EQUIPMENT: Spotcell 141/142, 111/112

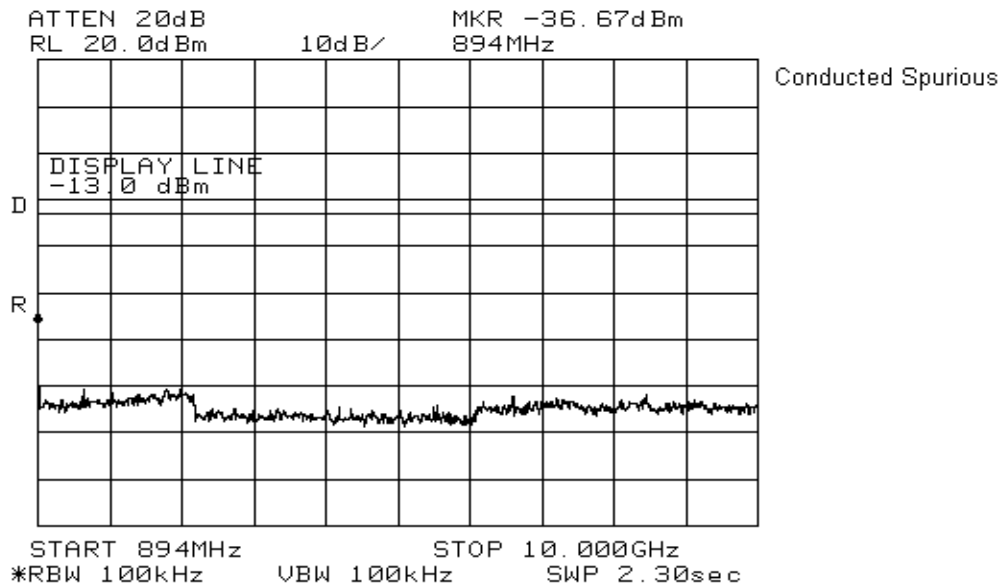
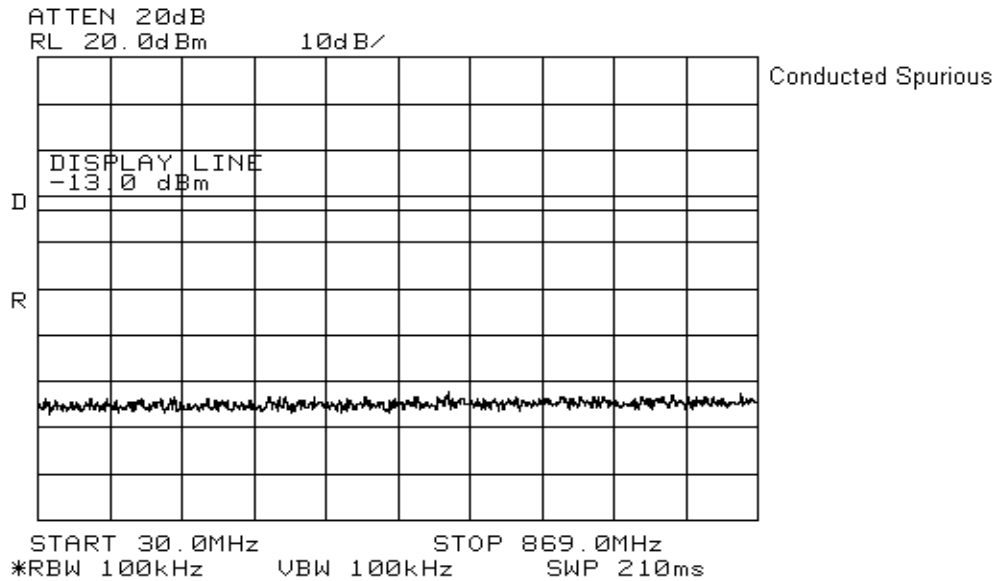


EQUIPMENT: Spotcell 141/142, 111/112

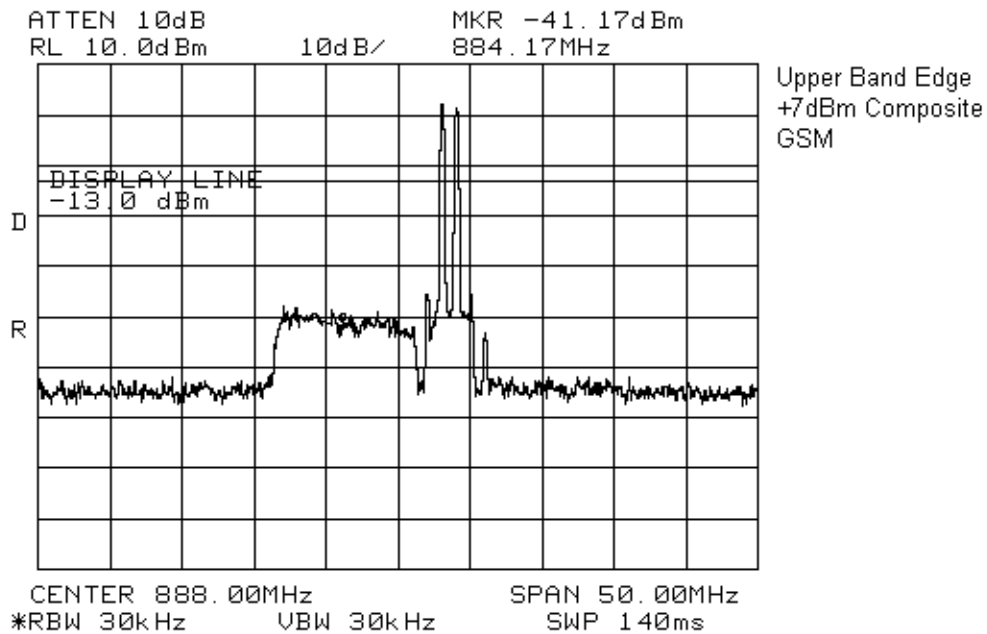
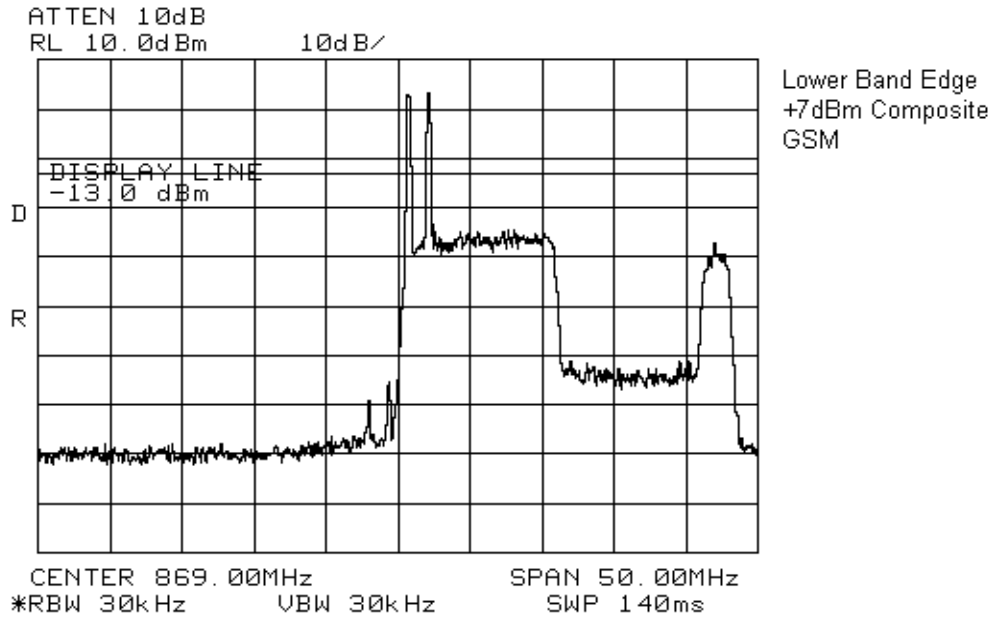
Cellular Band



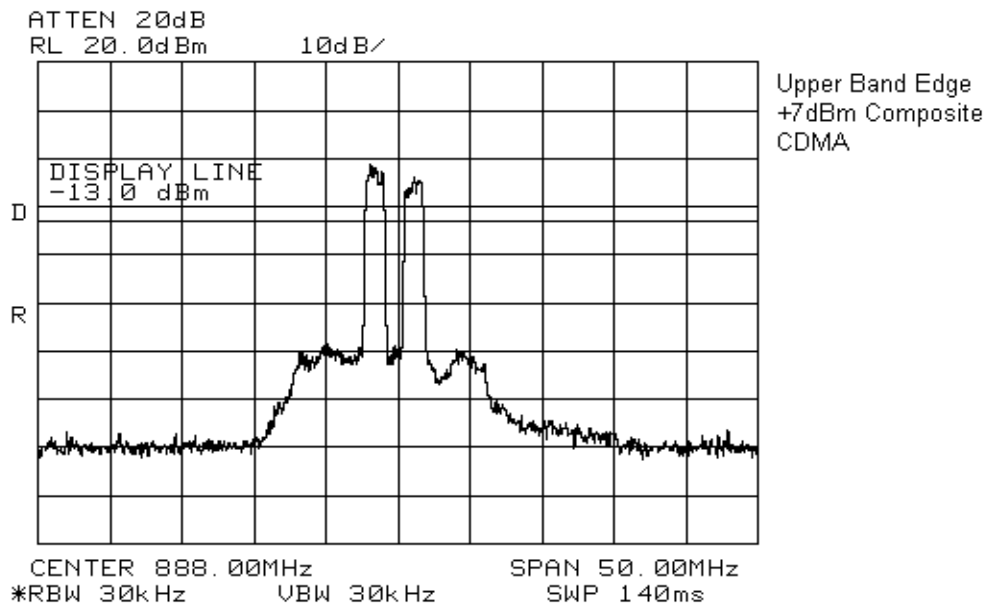
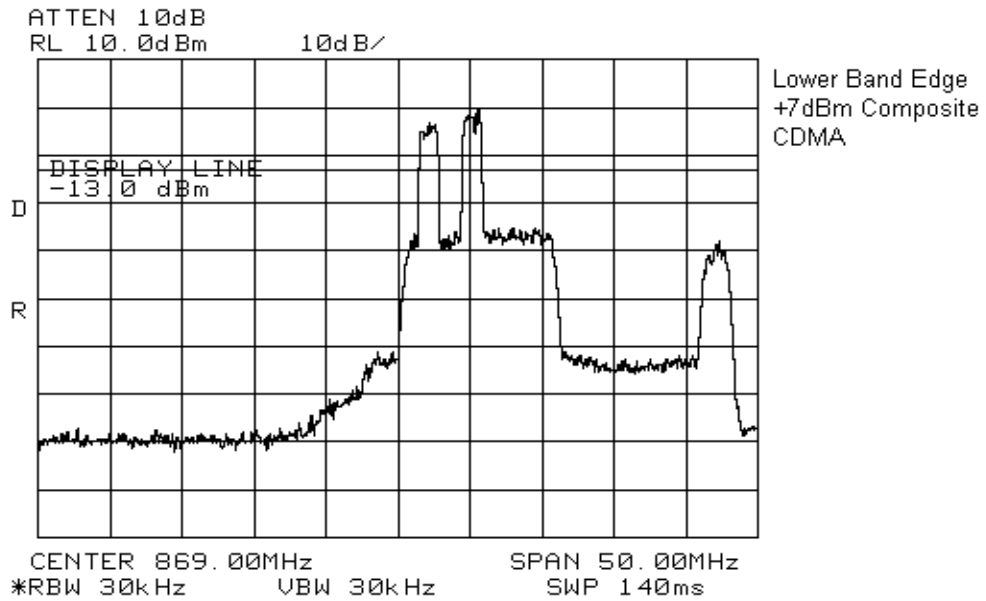
EQUIPMENT: Spotcell 141/142, 111/112



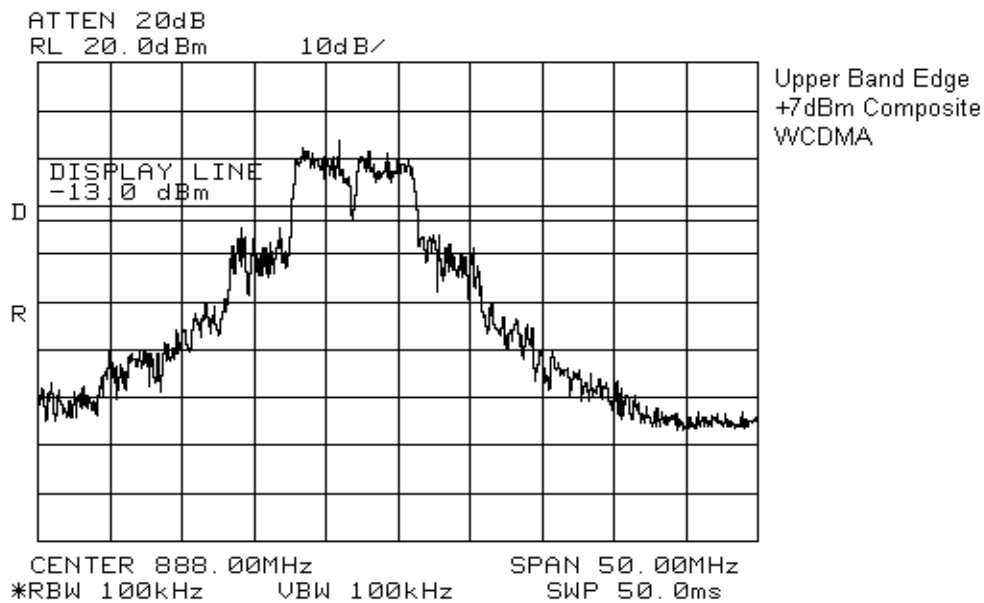
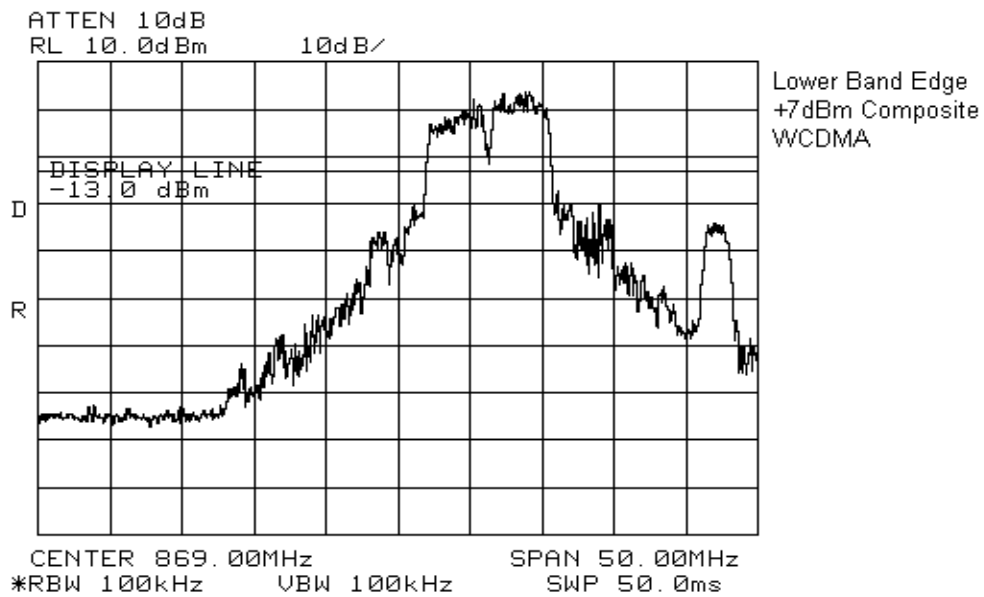
EQUIPMENT: Spotcell 141/142, 111/112



EQUIPMENT: Spotcell 141/142, 111/112



EQUIPMENT: Spotcell 141/142, 111/112



EQUIPMENT: Spotcell 141/142, 111/112

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.

EQUIPMENT: Spotcell 141/142, 111/112

Emissions Search Photos



EQUIPMENT: Spotcell 141/142, 111/112

Section 8. Out of Band Rejection

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

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

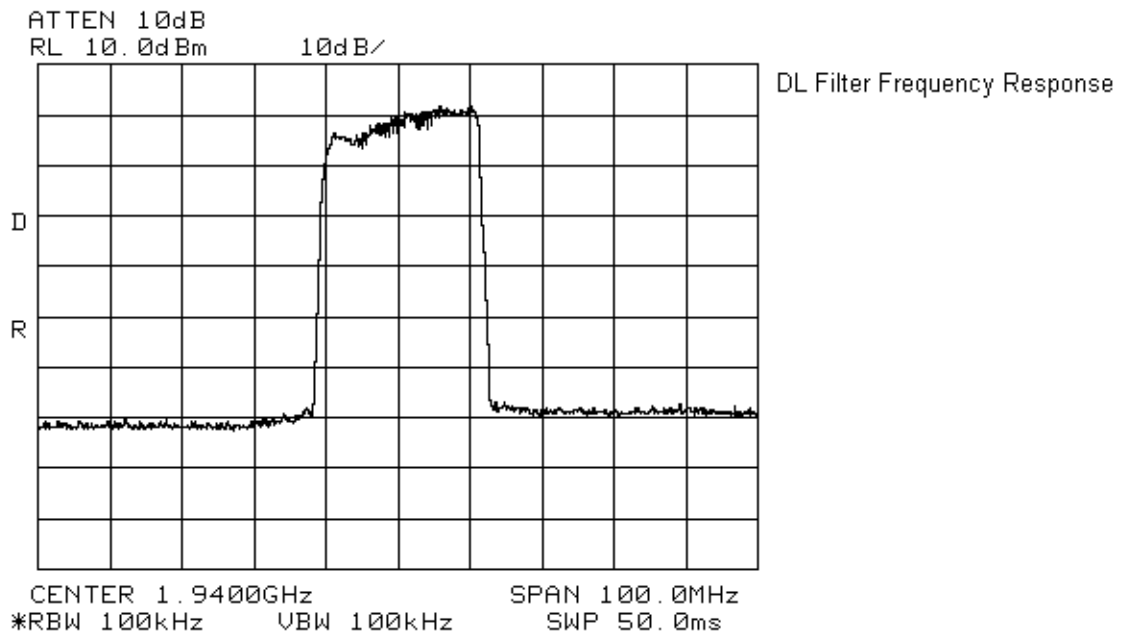
Limit: -13dBm

Test Results: Complied.

Measurement Data: See attached plots.

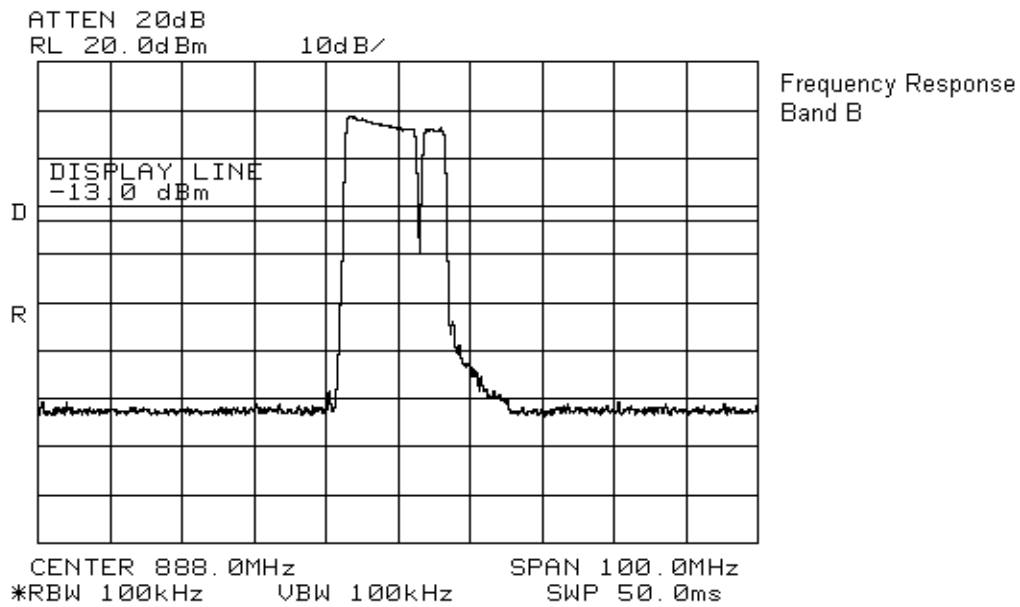
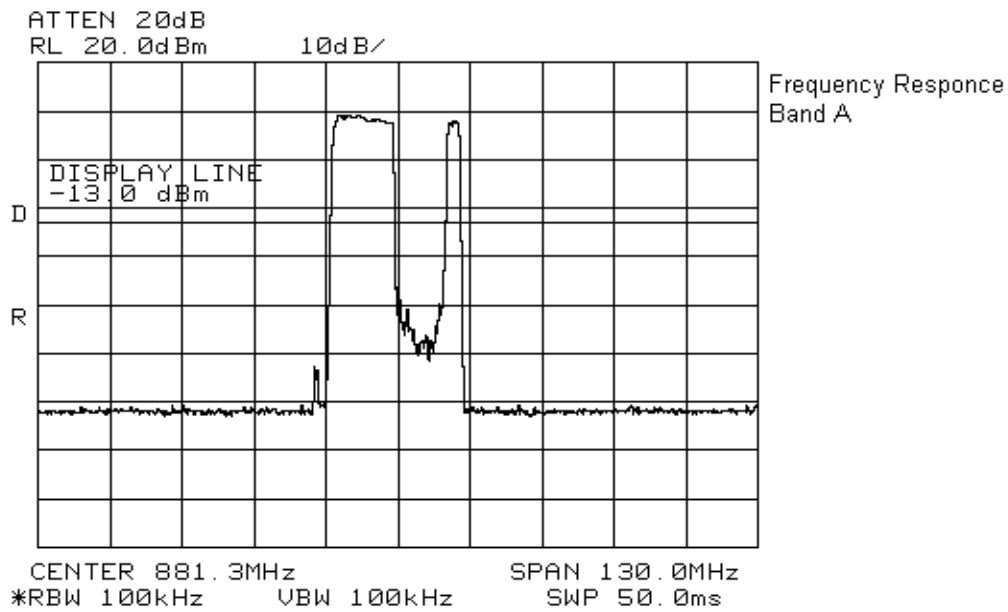
EQUIPMENT: Spotcell 141/142, 111/112

PCS Band



EQUIPMENT: Spotcell 141/142, 111/112

Cellular Band



EQUIPMENT: Spotcell 141/142, 111/112

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)

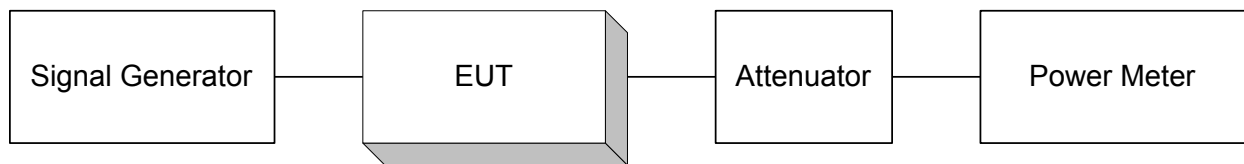
PCS Downlink CU radio: 1940.000 000 MHz

Cellular Downlink CU radio: 885.000 000 MHz

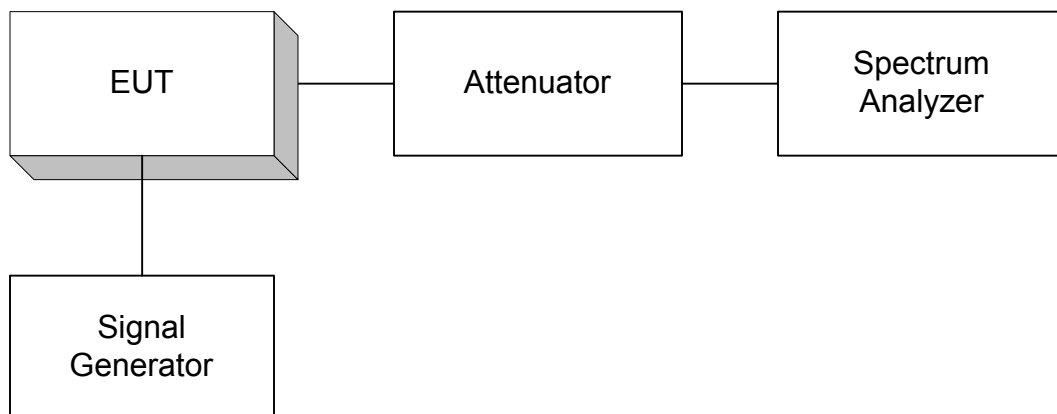
▪Frequency deviation was verified every 10°C from -30°C to +50°C, as well as at voltage variation of +/- 15% of supply voltage.

Section 10. Block Diagrams

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

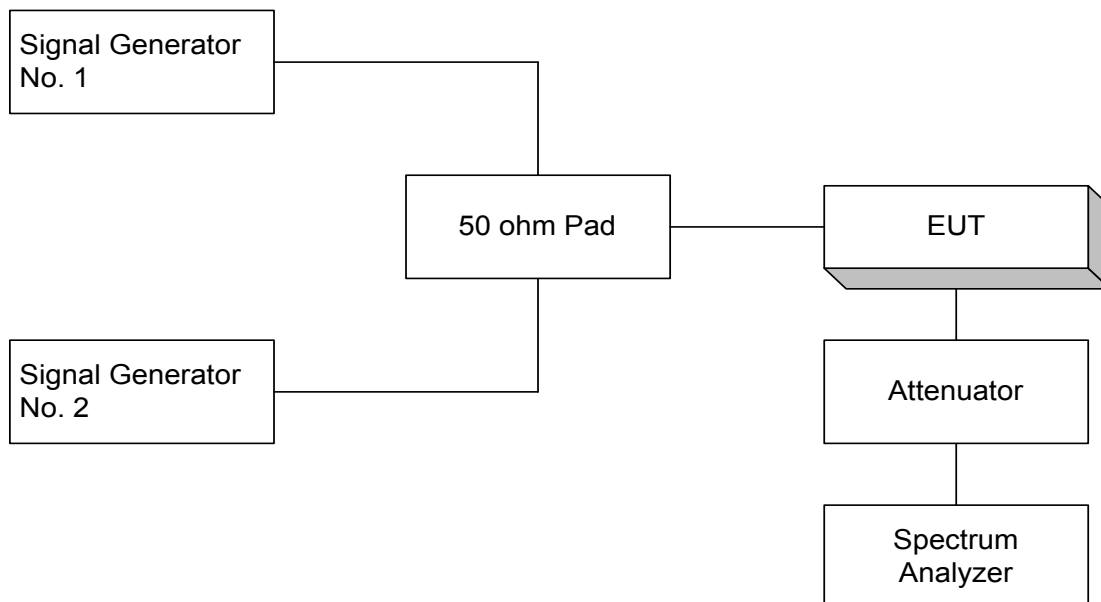
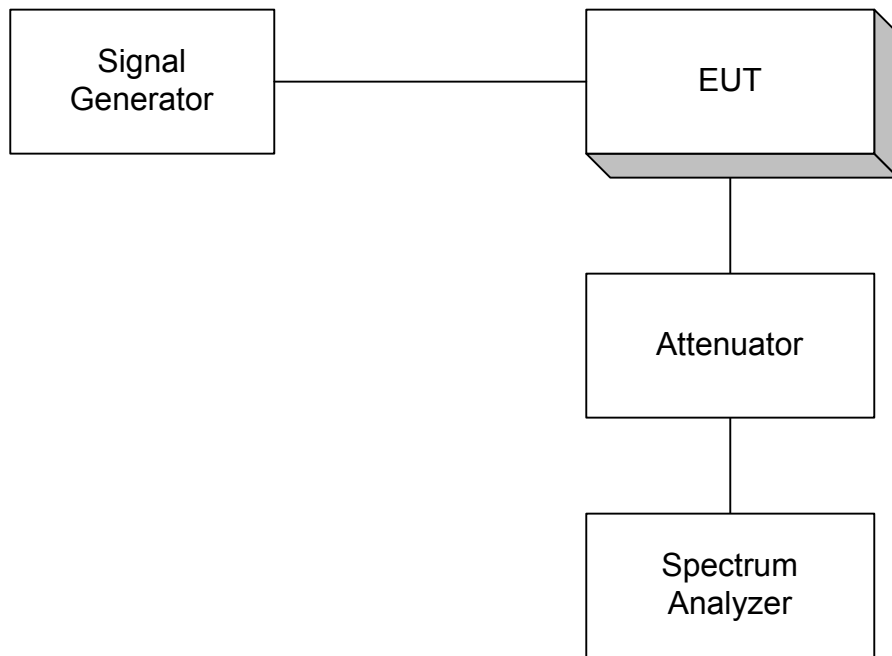


Para. No. 2.1049 - Occupied Bandwidth



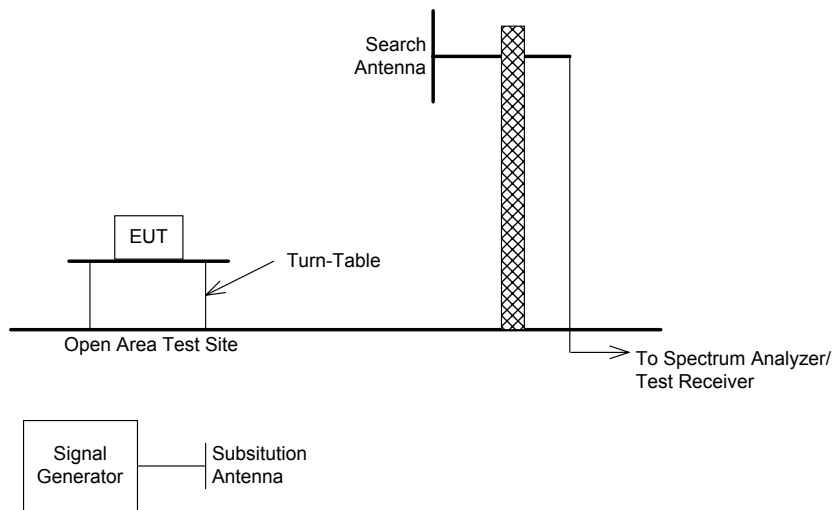
EQUIPMENT: Spotcell 141/142, 111/112

Para. No. 2.1051 - Spurious Emissions at Antenna Terminals

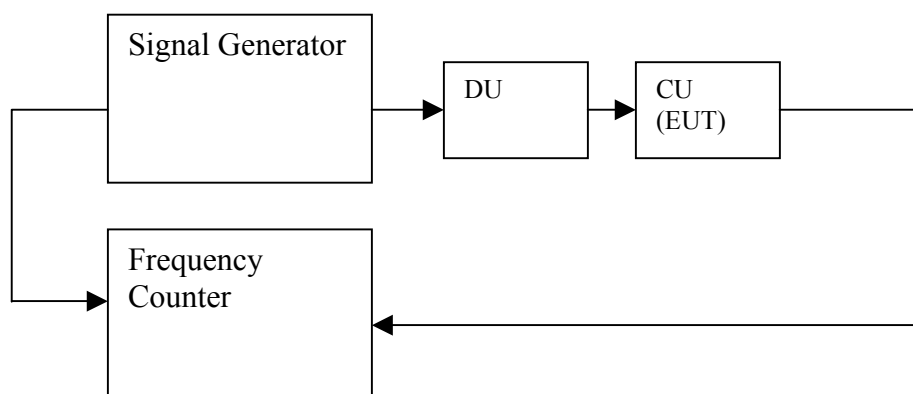


EQUIPMENT: Spotcell 141/142, 111/112

Para. No. 2.1053 - Field Strength of Spurious Radiation
TIA/EIA 603, Signal Substitution Method



Para. No. 2.1055 Frequency Stability



*EQUIPMENT: Spotcell 141/142, 111/112***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