KTL Test Report:	8R01061.2
Applicant:	Allen Telecom Group 140 Vista Centre Drive Forest, Virginia 24551 USA
Equipment Under Test: (E.U.T.)	TFB 815 Booster Amp
FCC ID:	BCR-BCEL-815BA
In Accordance With:	**FCC Part 22, Subpart H** Cellular Band Repeaters
Tested By:	KTL Ottawa Inc. 3325 River Road, R.R. 5 Ottawa, Ontario K1V 1H2
Authorized By:	
	T. Tidwell, Laboratory Manager
Date:	
Total Number of Pages:	108

Table of Contents

Table of Contents, continued

Section 1. Summary of Test Results

Manufacturer: Allen Telecom Group

Model No.: TFB 815

Serial No.: Demo 1

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 22, Subpart H.

☒ New Submission ☒ Production Unit

☐ Class II Permissive Change ☐ Pre-Production Unit

A	M	P

Equipment Code

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.
See " Summary of Test Data".

NVLAP LAB CODE: 100351-0

TESTED BY: _____ DATE: _____
Kevin Carr, Technologist

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	22.913(a)	500W ERP	Plot	Complies
Occupied Bandwidth (Voice & SAT)	22.917(c)	Mask C	Plot	Complies
Occupies Bandwidth (Wideband Data)	22.917(d)	Mask D	Plot	Complies
Occupied Bandwidth (ST)	22.917(d)	Mask D	Plot	Complies
Occupied Bandwidth (Digital)	None	Input vs. Output	Plot	Complies
Spurious Emissions at Antenna Terminals	22.917	-13 dBm	Plot	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm E.I.R.P.	Chart	Complies
Frequency Stability	22.355	1.5 ppm	N/A	N/A

Footnotes For N/A's:

Test Conditions:

Indoor	Temperature:	22 °C
	Humidity:	21 %
Outdoor	Temperature:	15 °C
	Humidity:	21 %

.

Section 2. General Equipment Specification

Supply Voltage Input: 120 VAC, 60 Hz

Frequency Range: **Downlink:** 869.04 – 893.97 MHz

Frequency Range: **Uplink:** 824.04 – 848.97 MHz

20 dB Bandwidth:

Type of Modulation and Designator:

CDMA (F9W)	GSM (GXW)	NADC (DXW)	CDPD (F9W)	AMPS (F8W, F1D)
☒	☒	☒	☐	☒

AGC Threshold: Not Applicable

Output Impedance: 50 ohm

Gain: **Uplink:** 2 dB Nominal

Downlink: 14.5 dB Nominal

Max Input Power: Not Applicable

RF Output (Rated):

	Uplink	Downlink (dBm)
Single:	8.4	18.2
Composite:	5.4 / 2 Carrier	15.2 / 2 Carrier

Frequency Translation:

F1-F1	F1-F2	N/A
☒	☐	☐

Band Selection:

Software	Duplexer Change	Fullband Coverage
☐	☐	☒

Description of Modifications For Class II Permissive Change

NOT APPLICABLE

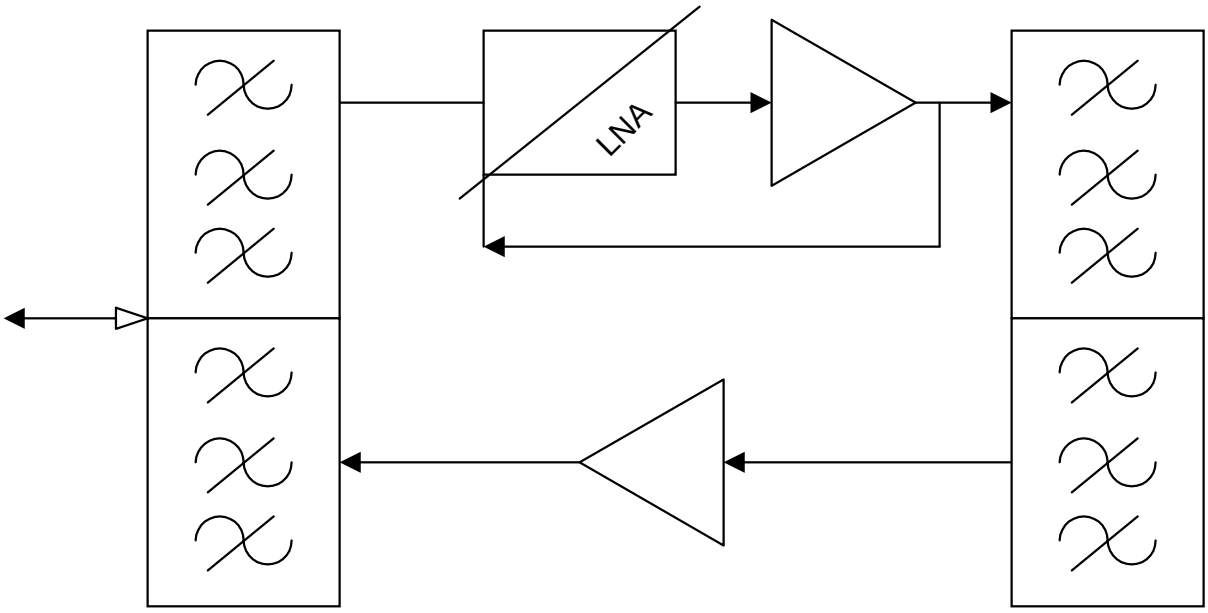
Modifications Made During Testing

NOT APPLICABLE

Theory of Operation

The RF Booster (TFB 815) is intended to enhance the transmit power capabilities of the BriteCell remote transceivers.

System Diagram



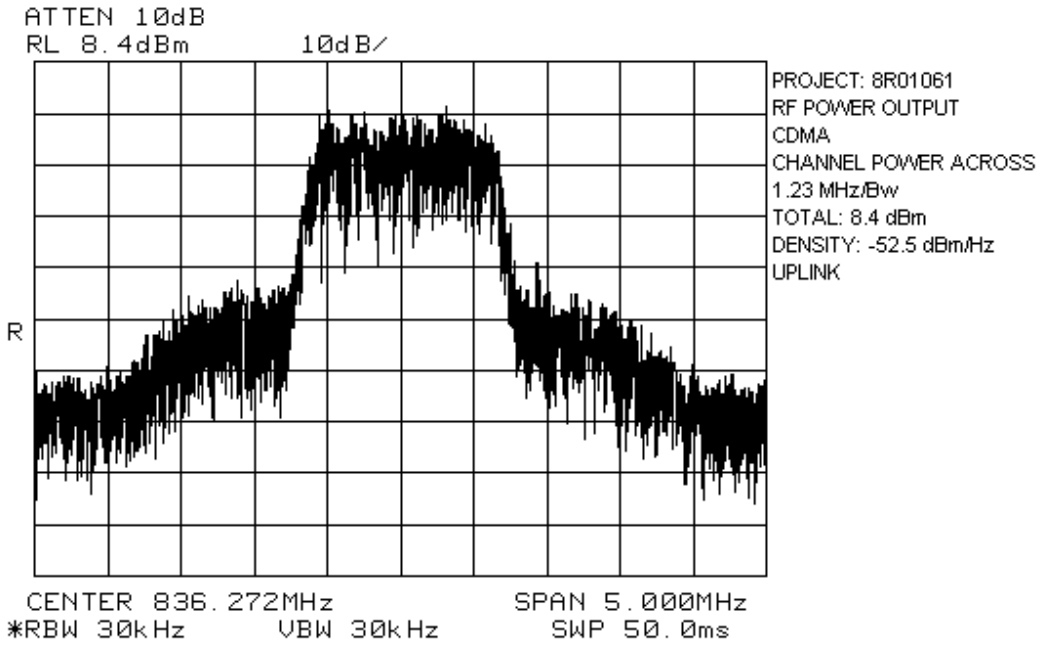
Section 3. RF Power Output

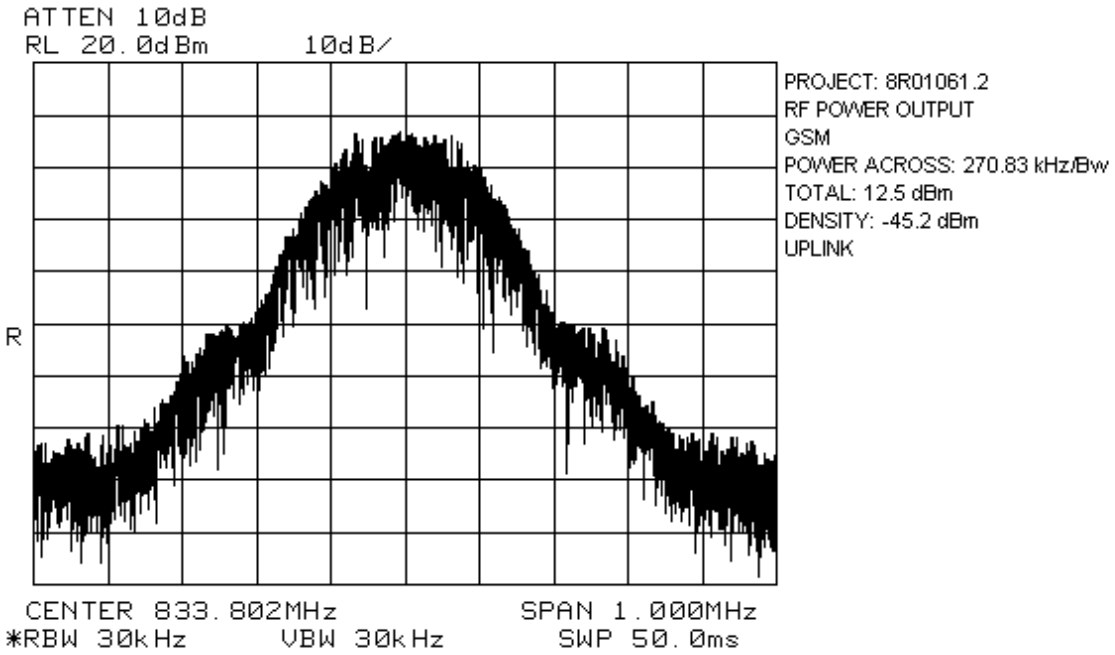
NAME OF TEST: RF Power Output	PARA. NO.: 2.985
TESTED BY: Kevin Carr	DATE: December 12, 1998

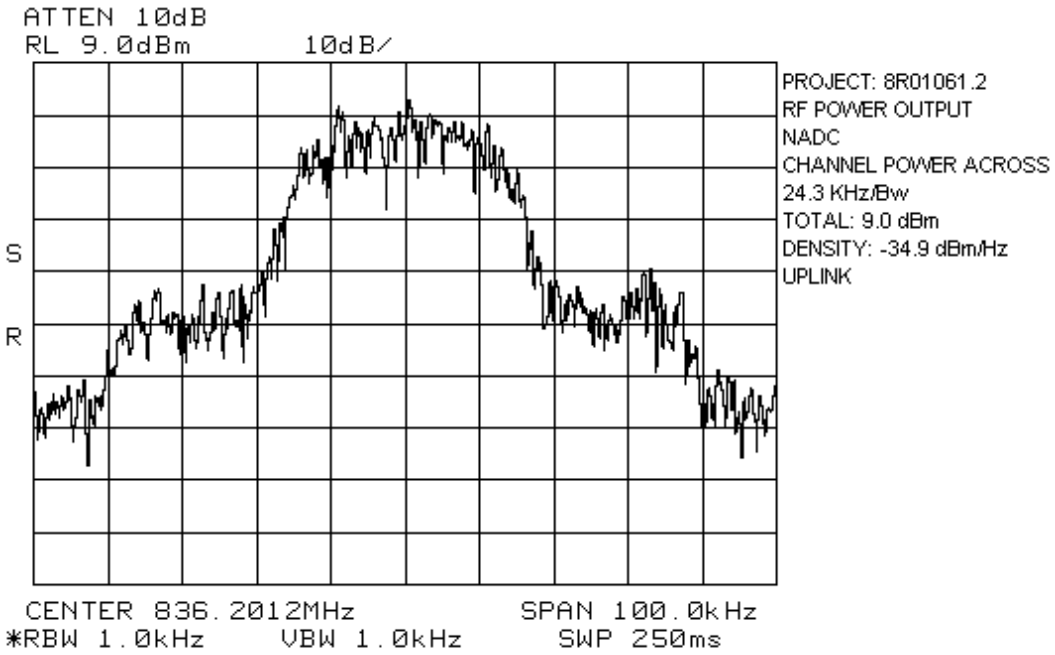
Test Results: Complies.

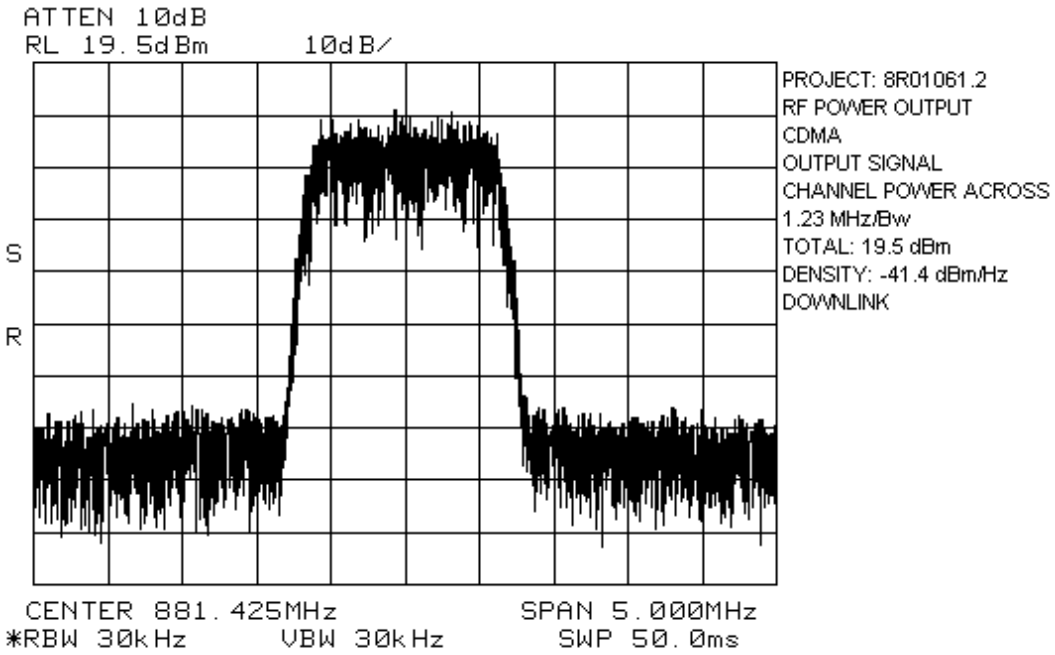
Measurement Data:

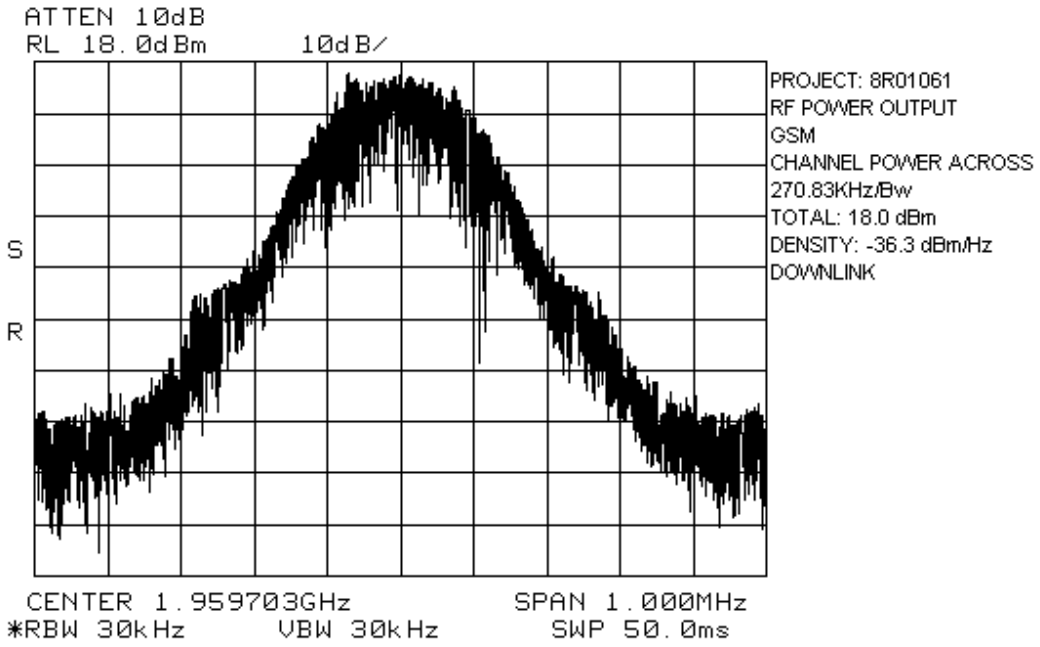
	Modulation Type	Per Channel Power Output (dBm)	Composite Power Output (dBm)
Uplink	AMPS	6.3	9.3
Downlink	AMPS	15.2	18.2
Uplink	CDMA	5.4	8.4
Downlink	CDMA	16.5	19.5
Uplink	GSM	9.4	12.5
Downlink	GSM	18.0	21.0
Uplink	NADC	6.0	9.0
Downlink	NADC	15.2	18.2

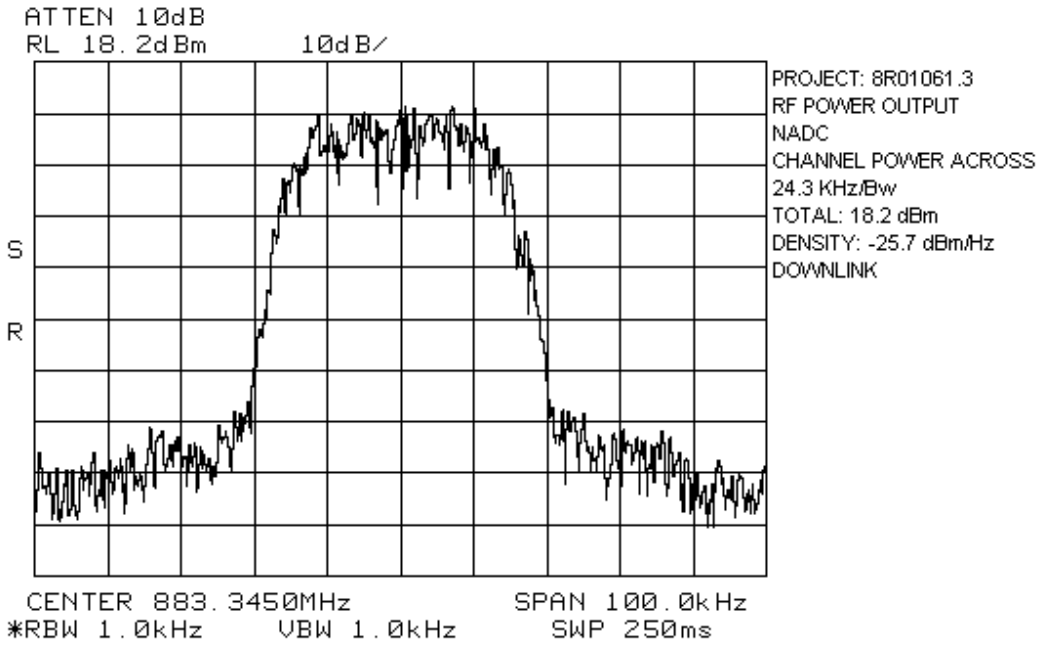

ATTEN 10dB
RL 8.4dBm
10dB/
R
PROJECT: 8R01061
RF POWER OUTPUT
CDMA
CHANNEL POWER ACROSS
1.23 MHz/Bw
TOTAL: 8.4 dBm
DENSITY: -52.5 dBm/Hz
UPLINK
CENTER 836.272MHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 20.0dBm
10dB/
R
PROJECT: 8R01061.2
RF POWER OUTPUT
GSM
POWER ACROSS: 270.83 kHz/Bw
TOTAL: 12.5 dBm
DENSITY: -45.2 dBm
UPLINK
CENTER 833.802MHz
SPAN 1.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 9.0dBm
10dB/
S
R
PROJECT: 8R01061.2
RF POWER OUTPUT
NADC
CHANNEL POWER ACROSS
24.3 KHz/Bw
TOTAL: 9.0 dBm
DENSITY: -34.9 dBm/Hz
UPLINK
CENTER 836.2012MHz
SPAN 100.0kHz
*RBW 1.0kHz
VBW 1.0kHz
SWP 250ms


ATTEN 10dB
RL 19.5dBm
10dB/
S
R
PROJECT: 8R01061.2
RF POWER OUTPUT
CDMA
OUTPUT SIGNAL
CHANNEL POWER ACROSS
1.23 MHz/Bw
TOTAL: 19.5 dBm
DENSITY: -41.4 dBm/Hz
DOWNLINK
CENTER 881.425MHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 18.0dBm
10dB/
S
R
PROJECT: 8R01061
RF POWER OUTPUT
GSM
CHANNEL POWER ACROSS
270.83KHz/Bw
TOTAL: 18.0 dBm
DENSITY: -36.3 dBm/Hz
DOWNLINK
CENTER 1.959703GHz
SPAN 1.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

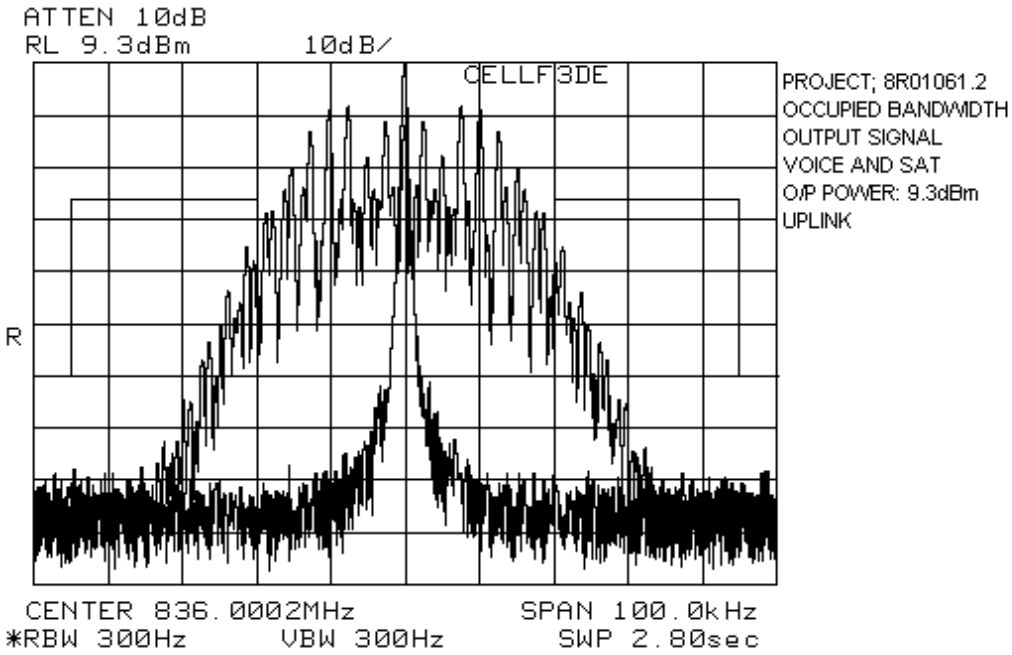

ATTEN 10dB
RL 18.2dBm
10dB/
S
R
PROJECT: 8R01061.3
RF POWER OUTPUT
NADC
CHANNEL POWER ACROSS
24.3 KHz/Bw
TOTAL: 18.2 dBm
DENSITY: -25.7 dBm/Hz
DOWNLINK
CENTER 883.3450MHz
SPAN 100.0kHz
*RBW 1.0kHz
VBW 1.0kHz
SWP 250ms

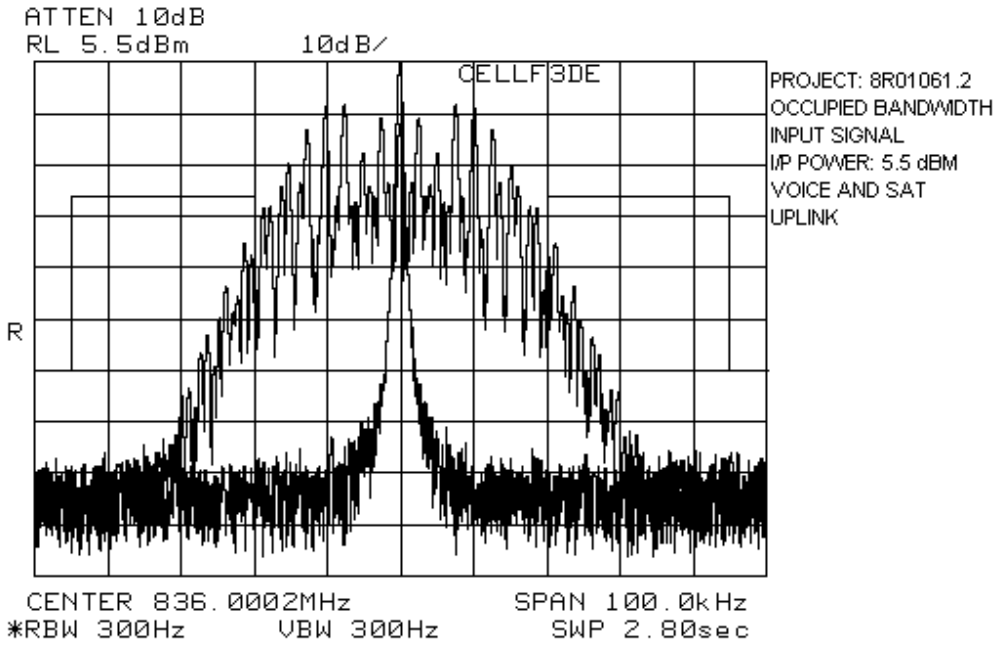
Section 4. Occupied Bandwidth

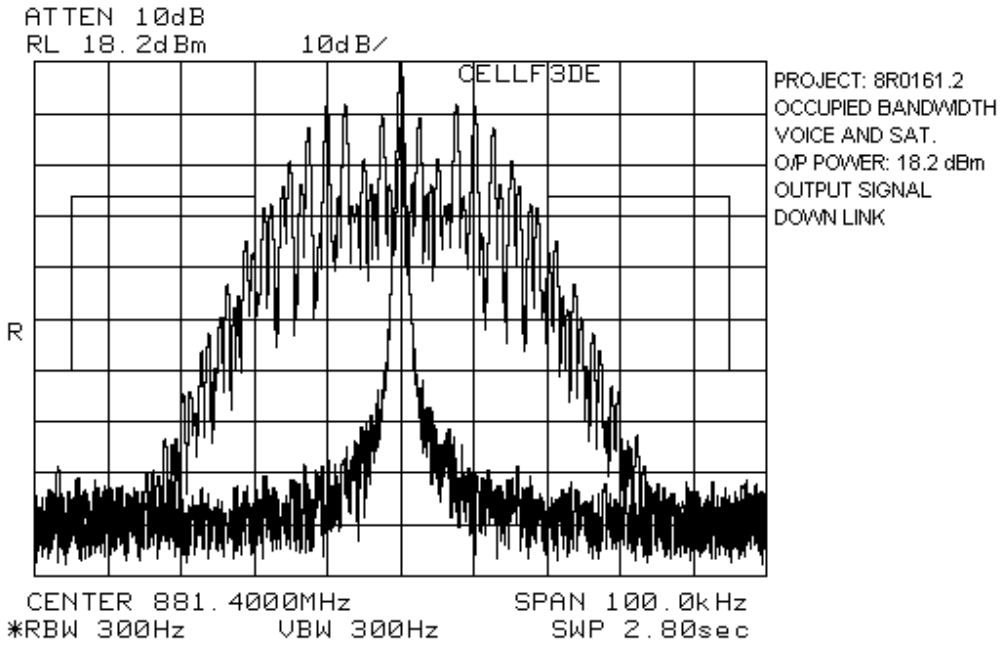
NAME OF TEST: Occupied Bandwidth (Voice + SAT)	PARA. NO.: 2.917(c)
TESTED BY: Kevin Carr	DATE: December 16, 1998

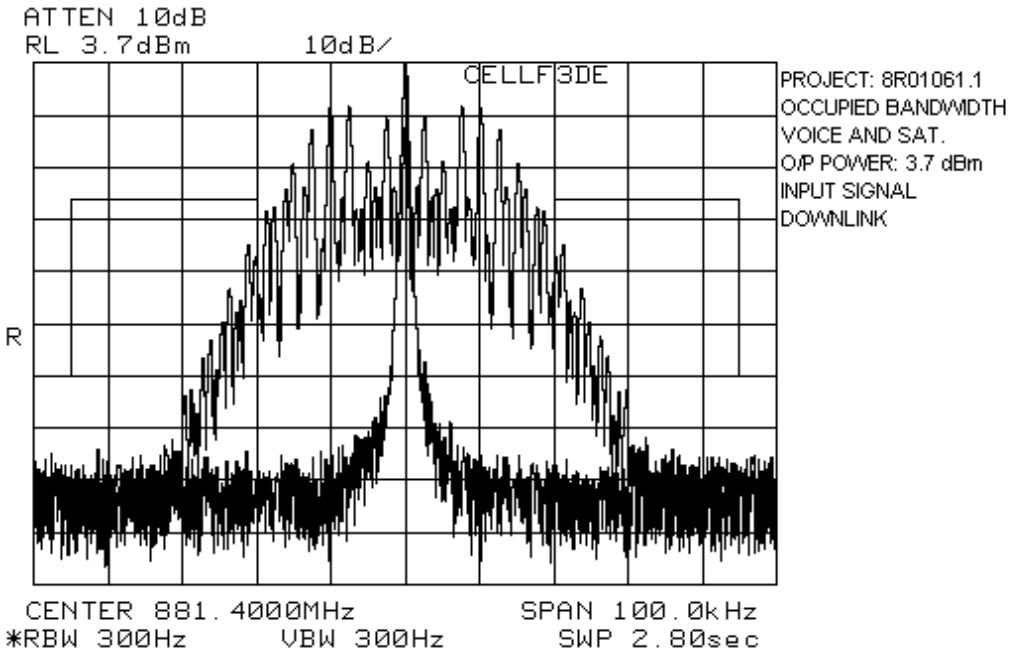
Test Results: Complies.

Test Data: See attached graph(s).


ATTEN 10dB
RL 9.3dBm
10dB/
CELLF3DE
PROJECT; 8R01061.2
OCCUPIED BANDWIDTH
OUTPUT SIGNAL
VOICE AND SAT
O/P POWER: 9.3dBm
UPLINK
R
CENTER 836.0002MHz
SPAN 100.0kHz
*RBW 300Hz
VBW 300Hz
SWP 2.80sec


ATTEN 10dB
RL 5.5dBm
10dB/
CELLF3DE
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
INPUT SIGNAL
I/P POWER: 5.5 dBM
VOICE AND SAT
UPLINK
R
CENTER 836.0002MHz
SPAN 100.0kHz
*RBW 300Hz
VBW 300Hz
SWP 2.80sec

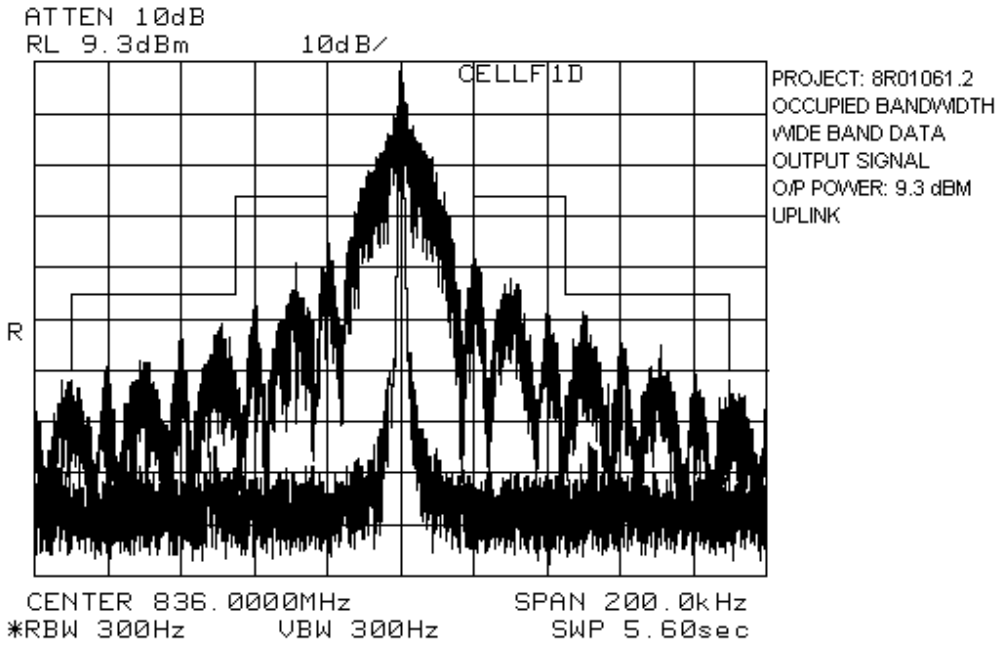

ATTEN 10dB
RL 18.2dBm
10dB/
CELLF3DE
PROJECT: 8R0161.2
OCCUPIED BANDWIDTH
VOICE AND SAT.
O/P POWER: 18.2 dBm
OUTPUT SIGNAL
DOWN LINK
R
CENTER 881.4000MHz
SPAN 100.0kHz
*RBW 300Hz
VBW 300Hz
SWP 2.80sec

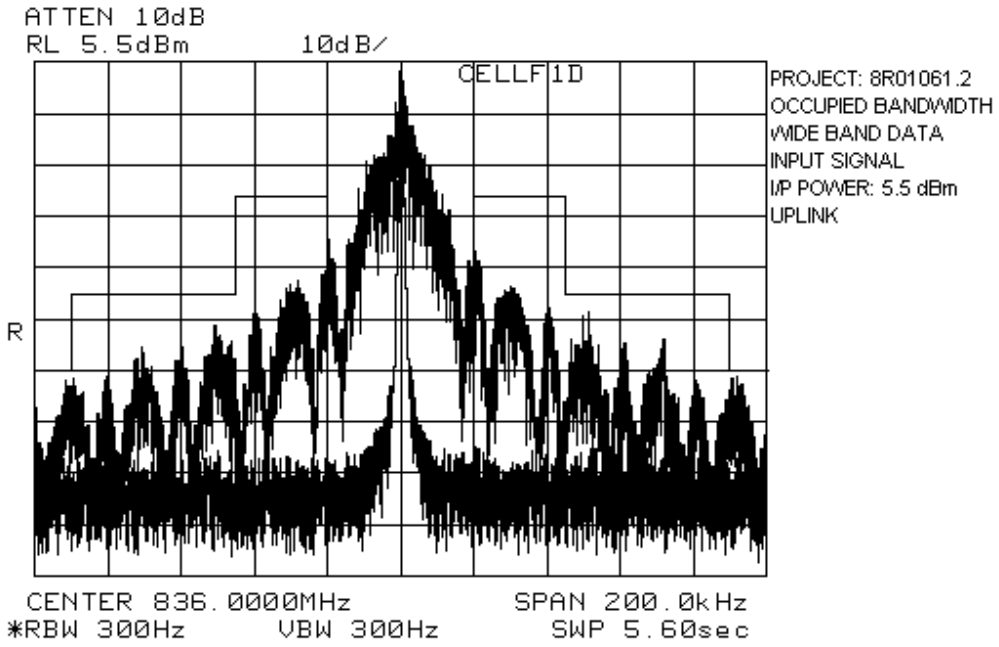

ATTEN 10dB
RL 3.7dBm
10dB/
CELLF3DE
PROJECT: 8R01061.1
OCCUPIED BANDWIDTH
VOICE AND SAT.
O/P POWER: 3.7 dBm
INPUT SIGNAL
DOWNLINK
R
CENTER 881.4000MHz
SPAN 100.0kHz
*RBW 300Hz
VBW 300Hz
SWP 2.80sec

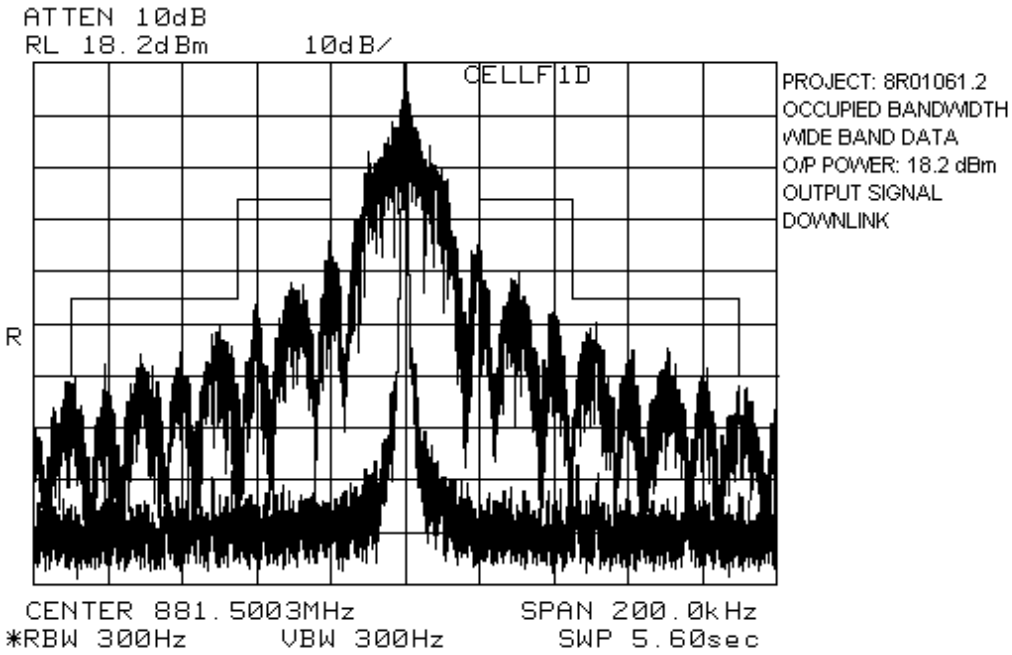
NAME OF TEST: Occupied Bandwidth (WB Data)	PARA. NO.: 2.917 (d)
TESTED BY: Kevin Carr	DATE: December 16, 1998

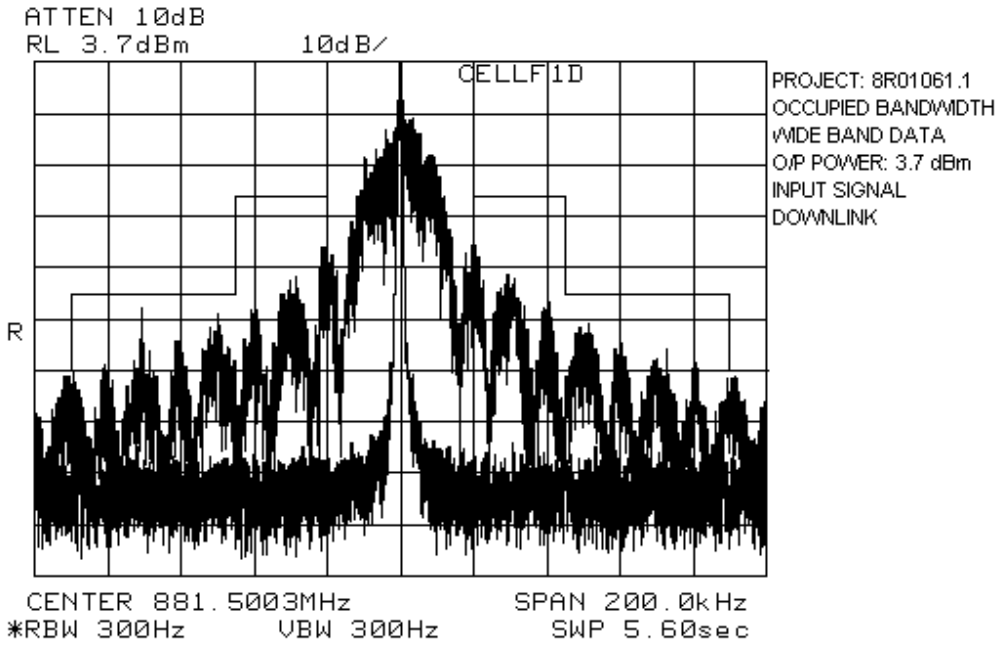
Test Results: Complies.

Test Data: See attached graph(s).


ATTEN 10dB
RL 9.3dBm
10dB/
CELLF1D
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
WIDE BAND DATA
OUTPUT SIGNAL
O/P POWER: 9.3 dBM
UPLINK
R
CENTER 836.0000MHz
SPAN 200.0kHz
*RBW 300Hz
VBW 300Hz
SWP 5.60sec


ATTEN 10dB
RL 5.5dBm
10dB/
CELLF1D
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
WIDE BAND DATA
INPUT SIGNAL
I/P POWER: 5.5 dBm
UPLINK
R
CENTER 836.0000MHz
SPAN 200.0kHz
*RBW 300Hz
VBW 300Hz
SWP 5.60sec

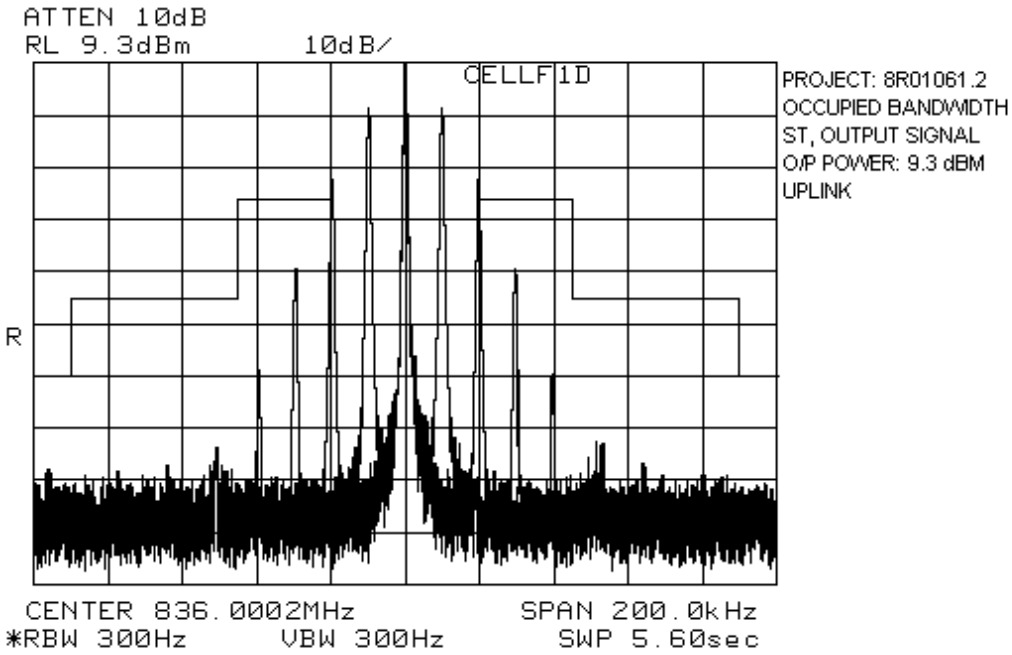

ATTEN 10dB
RL 18.2dBm
10dB/
CELLF1D
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
WIDE BAND DATA
O/P POWER: 18.2 dBm
OUTPUT SIGNAL
DOWNLINK
R
CENTER 881.5003MHz
SPAN 200.0kHz
*RBW 300Hz
VBW 300Hz
SWP 5.60sec

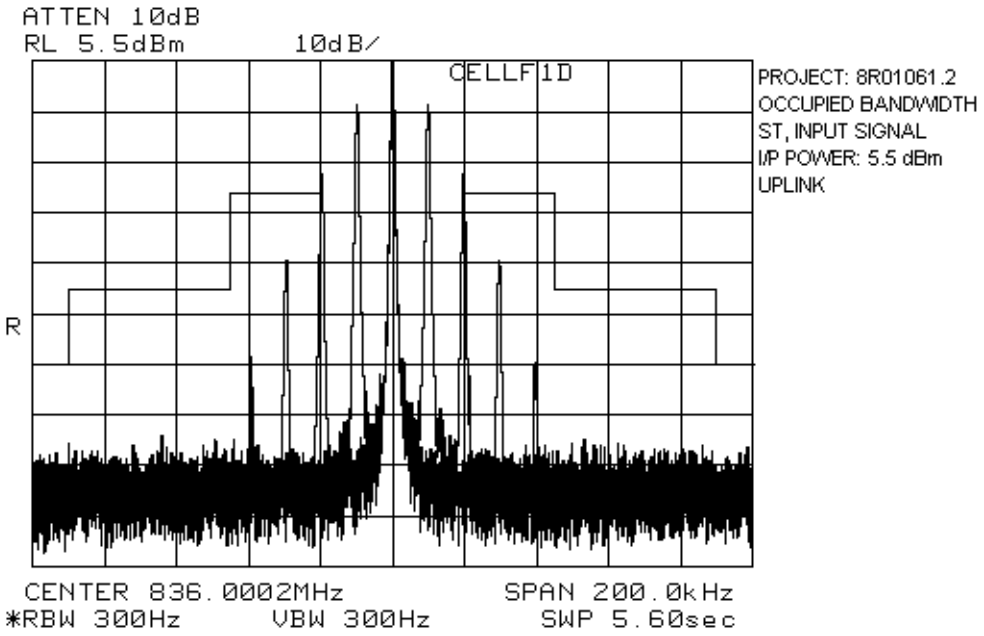

ATTEN 10dB
RL 3.7dBm
10dB/
CELLF1D
PROJECT: 8R01061.1
OCCUPIED BANDWIDTH
WIDE BAND DATA
O/P POWER: 3.7 dBm
INPUT SIGNAL
DOWNLINK
R
CENTER 881.5003MHz
SPAN 200.0kHz
*RBW 300Hz
VBW 300Hz
SWP 5.60sec

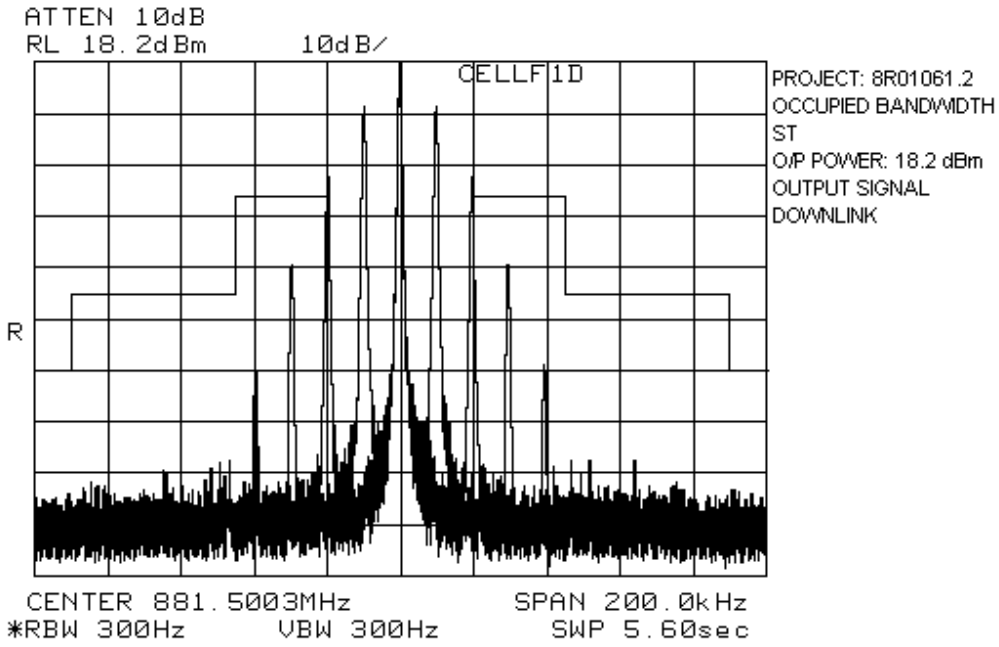
NAME OF TEST: Occupied Bandwidth (ST)	PARA. NO.: 2.917(d)
TESTED BY: Kevin Carr	DATE: December 16, 1998

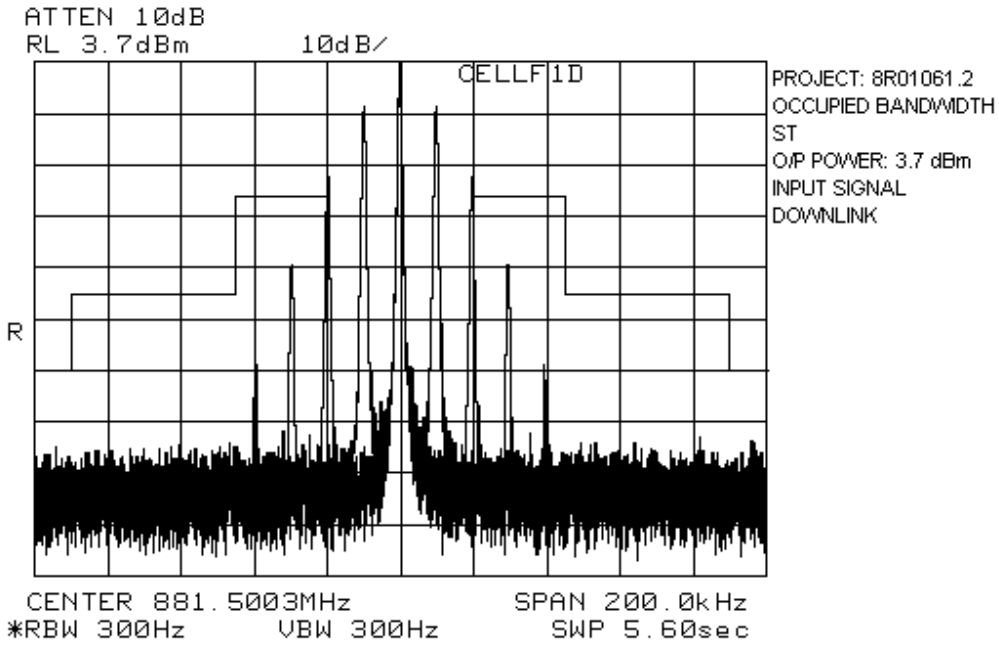
Test Results: Complies.

Test Data: See attached graph(s).


ATTEN 10dB
RL 9.3dBm
10dB/
CELLF 1D
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
ST, OUTPUT SIGNAL
O/P POWER: 9.3 dBM
UPLINK
R
CENTER 836.0002MHz
SPAN 200.0kHz
*RBW 300Hz
VBW 300Hz
SWP 5.60sec


ATTEN 10dB
RL 5.5dBm
10dB/
CELLF1D
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
ST, INPUT SIGNAL
I/P POWER: 5.5 dBm
UPLINK
R
CENTER 836.0002MHz
SPAN 200.0kHz
*RBW 300Hz
VBW 300Hz
SWP 5.60sec

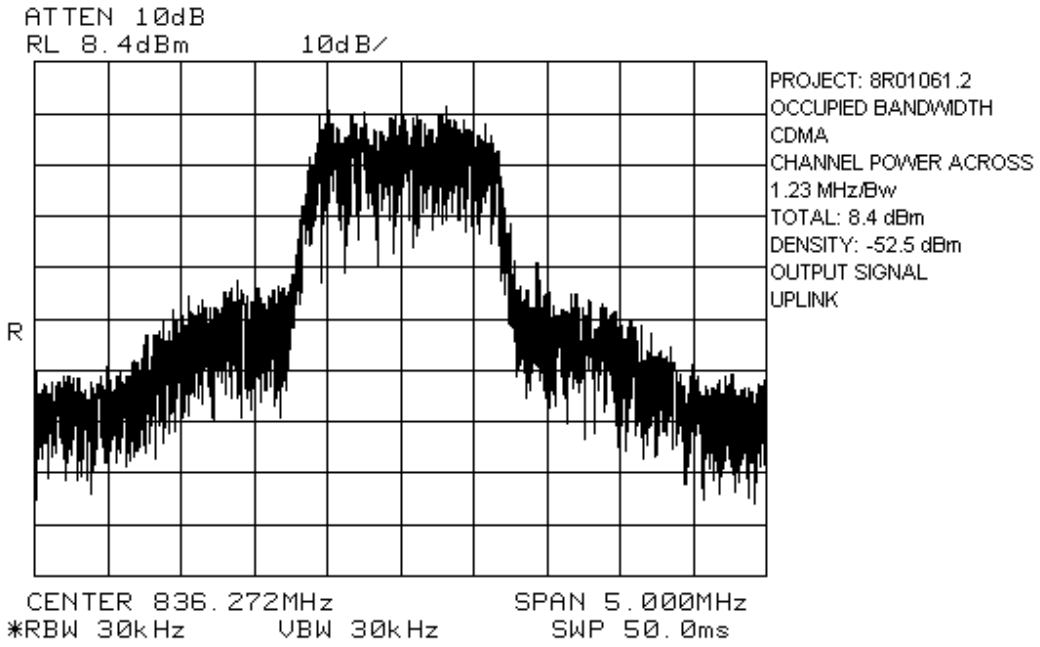

ATTEN 10dB
RL 18.2dBm
10dB/
CELLF1D
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
ST
O/P POWER: 18.2 dBm
OUTPUT SIGNAL
DOWNLINK
R
CENTER 881.5003MHz
SPAN 200.0kHz
*RBW 300Hz
VBW 300Hz
SWP 5.60sec

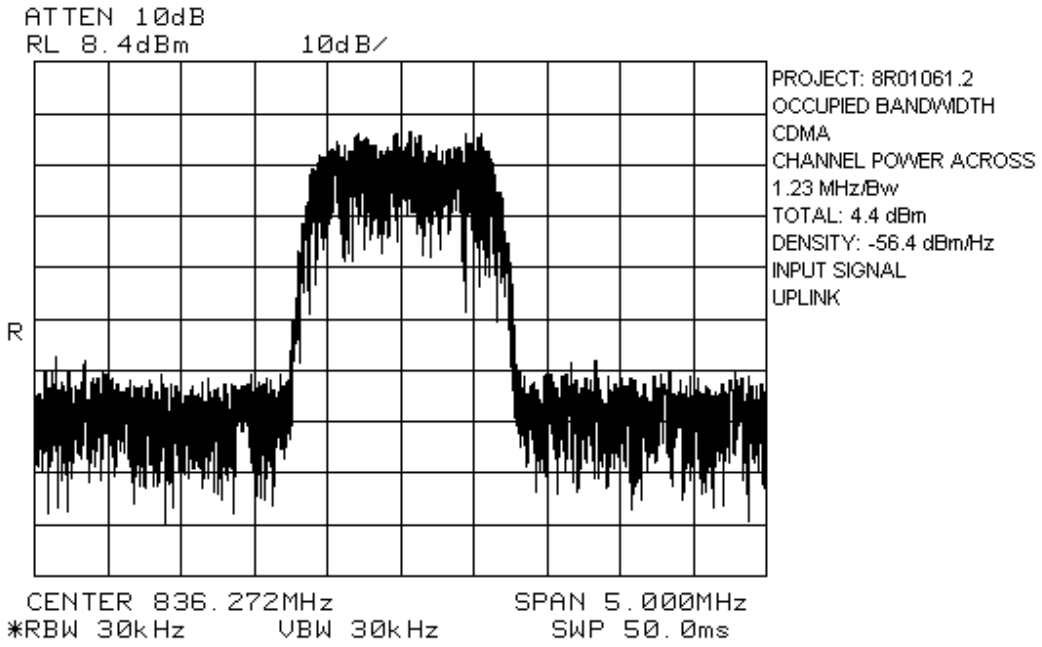

ATTEN 10dB
RL 3.7dBm
10dB/
CELLF1D
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
ST
O/P POWER: 3.7 dBm
INPUT SIGNAL
DOWNLINK
R
CENTER 881.5003MHz
SPAN 200.0kHz
*RBW 300Hz
VBW 300Hz
SWP 5.60sec

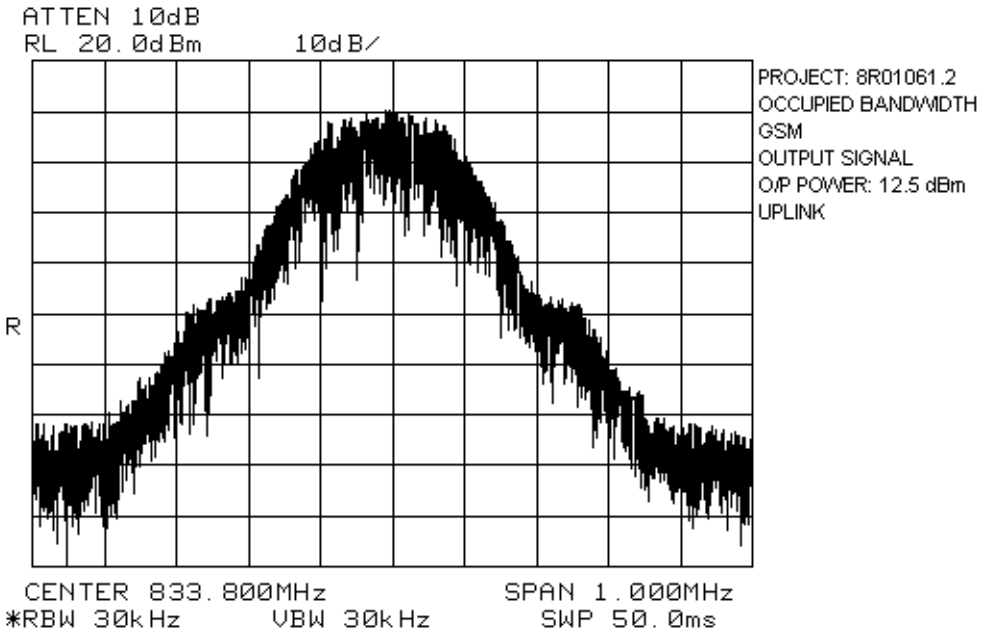
NAME OF TEST: Occupied Bandwidth (Digital Mod.)	PARA. NO.: 2.917(e)
TESTED BY: Kevin Carr	DATE: December 16, 1998

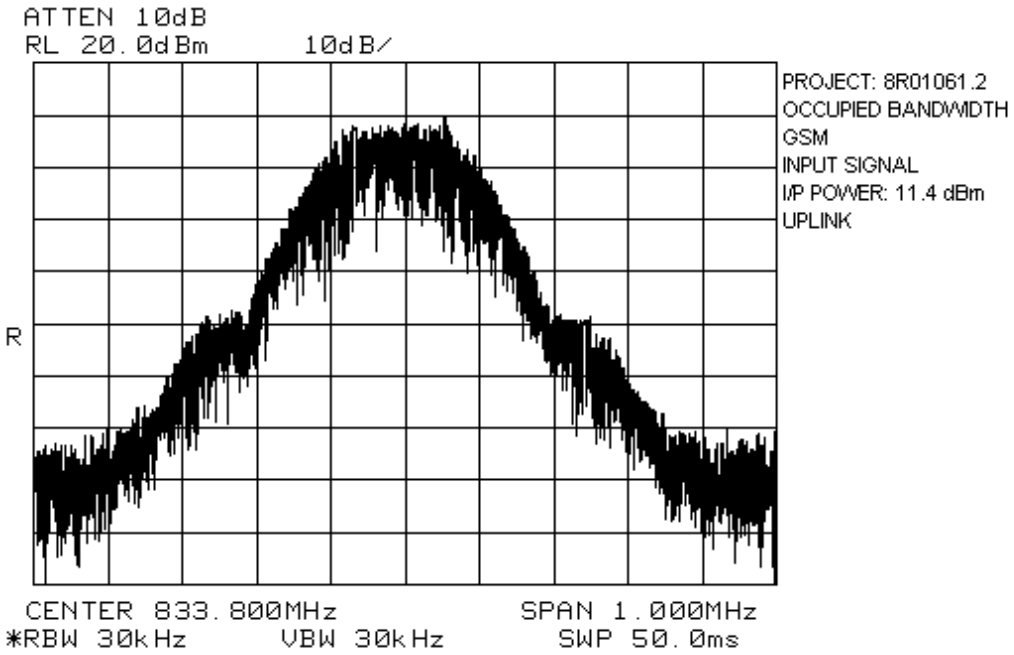
Test Results: Complies.

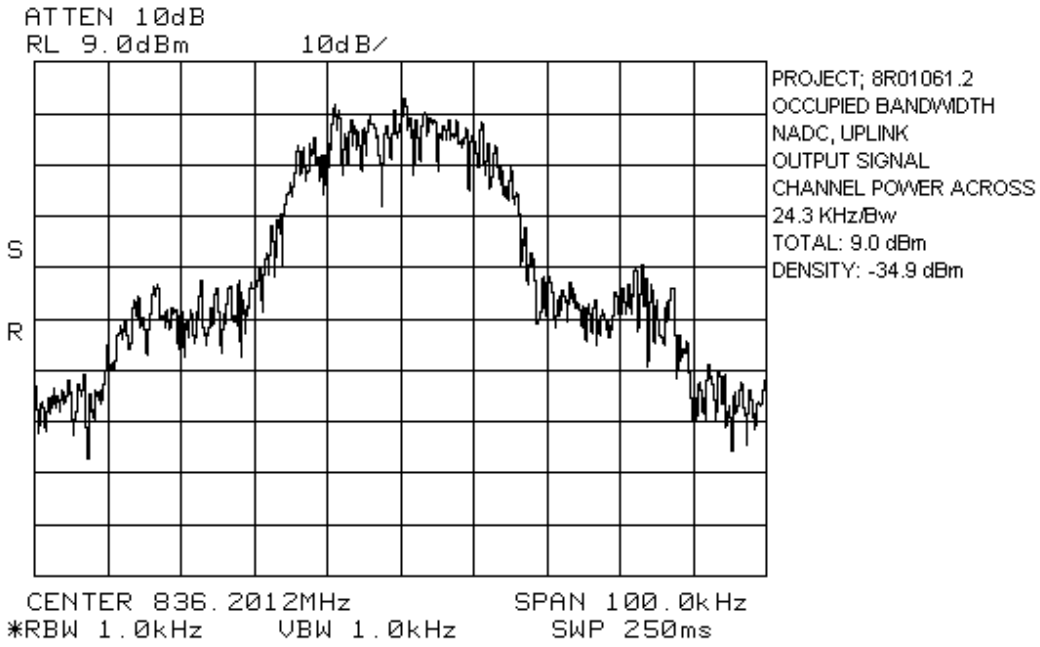
Test Data: See attached graph(s).

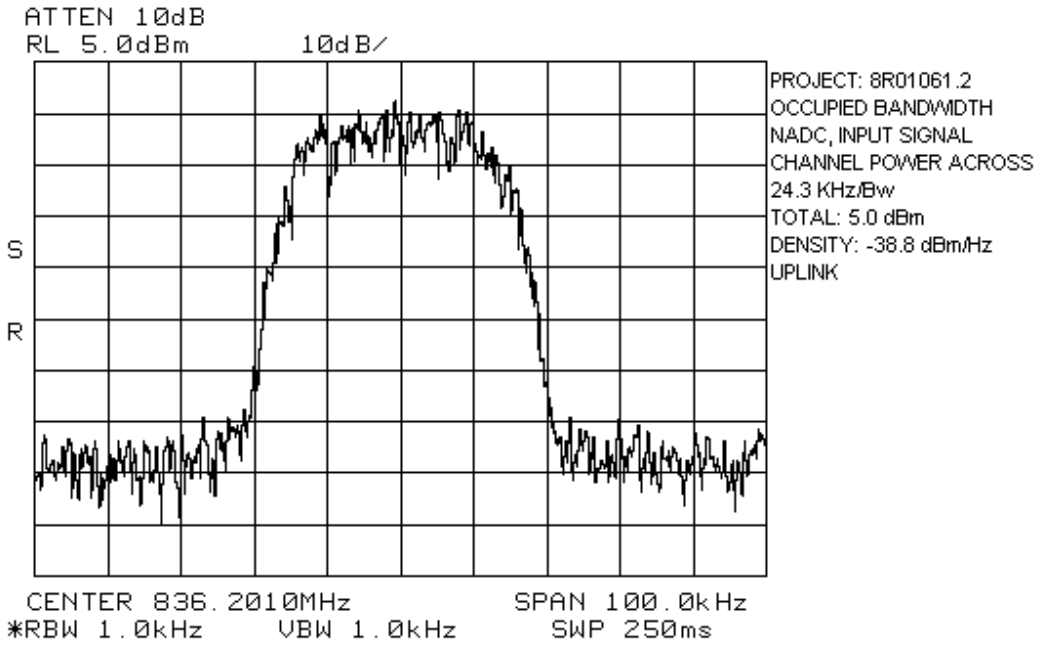

ATTEN 10dB
RL 8.4dBm
10dB/
R
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
CDMA
CHANNEL POWER ACROSS
1.23 MHz/Bw
TOTAL: 8.4 dBm
DENSITY: -52.5 dBm
OUTPUT SIGNAL
UPLINK
CENTER 836.272MHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

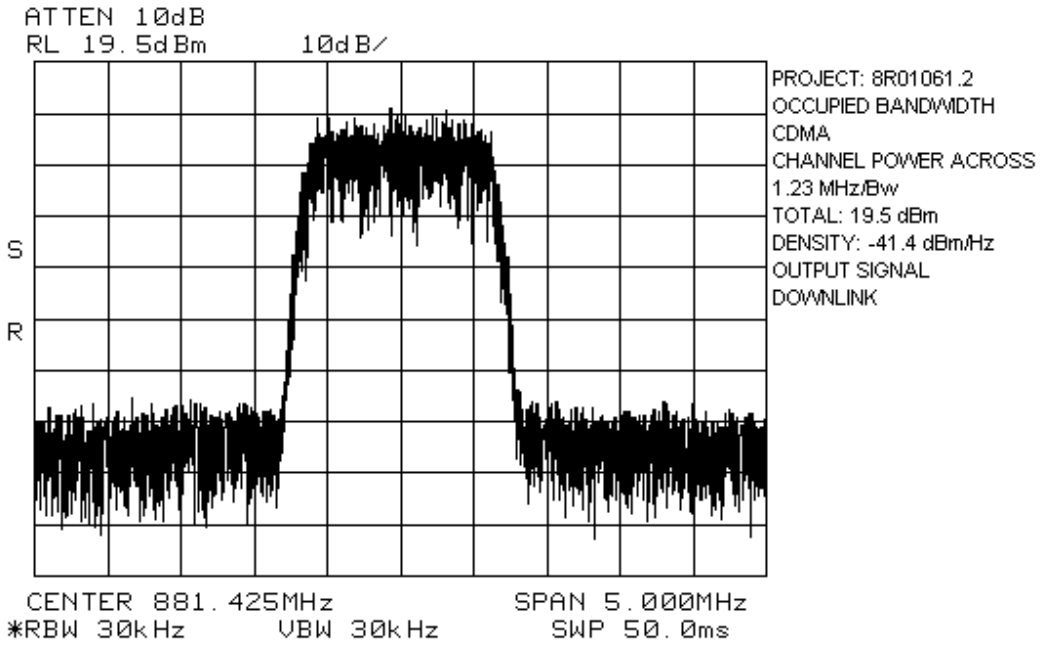

ATTEN 10dB
RL 8.4dBm
10dB/
R
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
CDMA
CHANNEL POWER ACROSS
1.23 MHz/Bw
TOTAL: 4.4 dBm
DENSITY: -56.4 dBm/Hz
INPUT SIGNAL
UPLINK
CENTER 836.272MHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

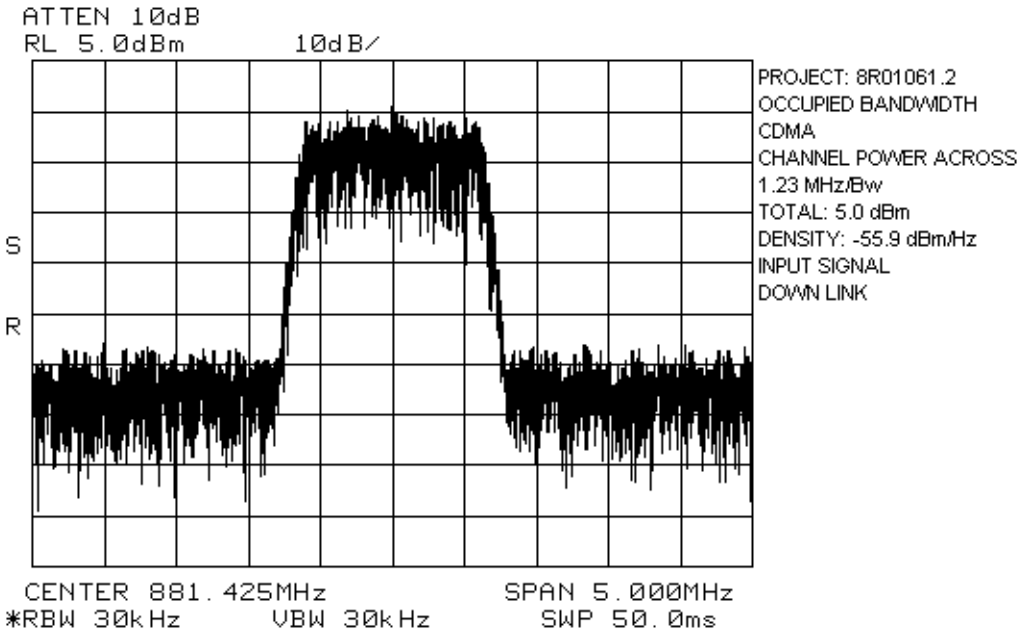

ATTEN 10dB
RL 20.0dBm
10dB/
R
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
GSM
OUTPUT SIGNAL
O/P POWER: 12.5 dBm
UPLINK
CENTER 833.800MHz
SPAN 1.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

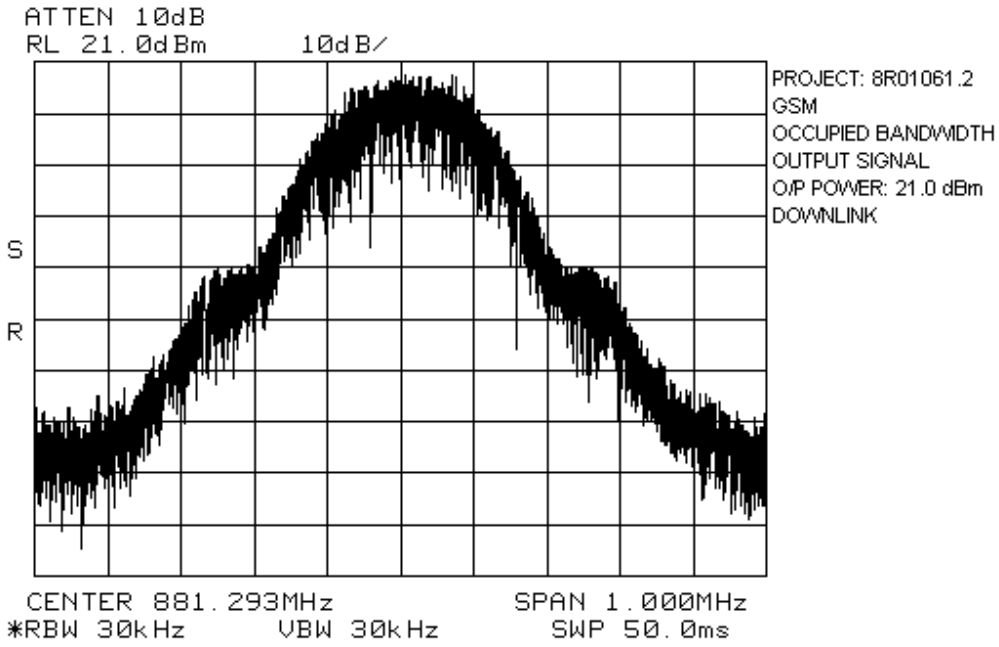

ATTEN 10dB
RL 20.0dBm
10dB/
R
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
GSM
INPUT SIGNAL
I/P POWER: 11.4 dBm
UPLINK
CENTER 833.800MHz
SPAN 1.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

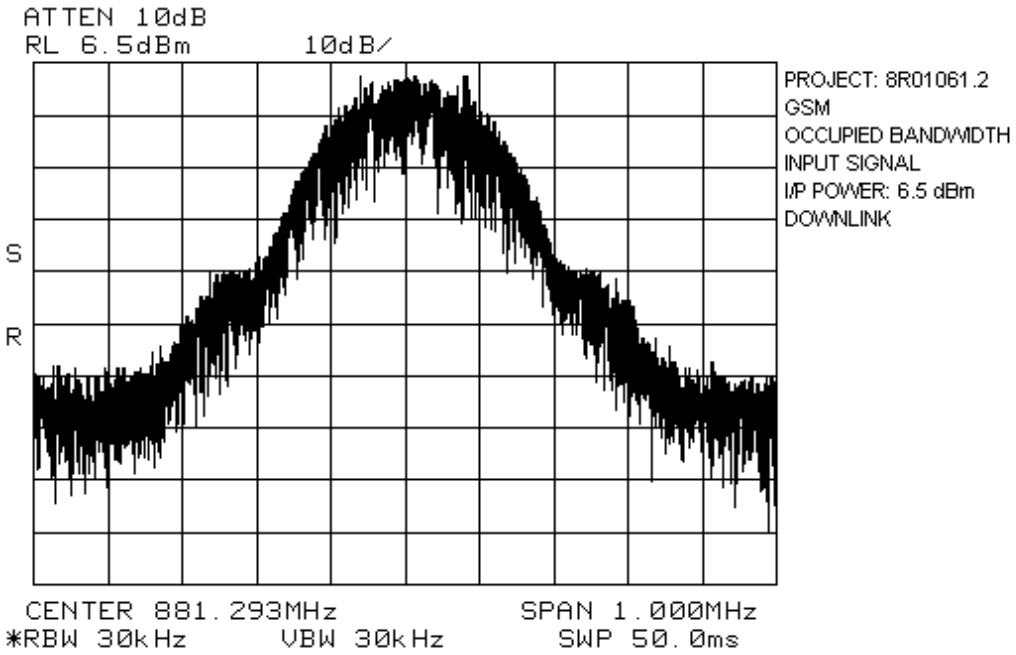

ATTEN 10dB
RL 9.0dBm
10dB/
S
R
PROJECT; 8R01061.2
OCCUPIED BANDWIDTH
NADC, UPLINK
OUTPUT SIGNAL
CHANNEL POWER ACROSS
24.3 KHz/Bw
TOTAL: 9.0 dBm
DENSITY: -34.9 dBm
CENTER 836.2012MHz
SPAN 100.0kHz
*RBW 1.0kHz
VBW 1.0kHz
SWP 250ms

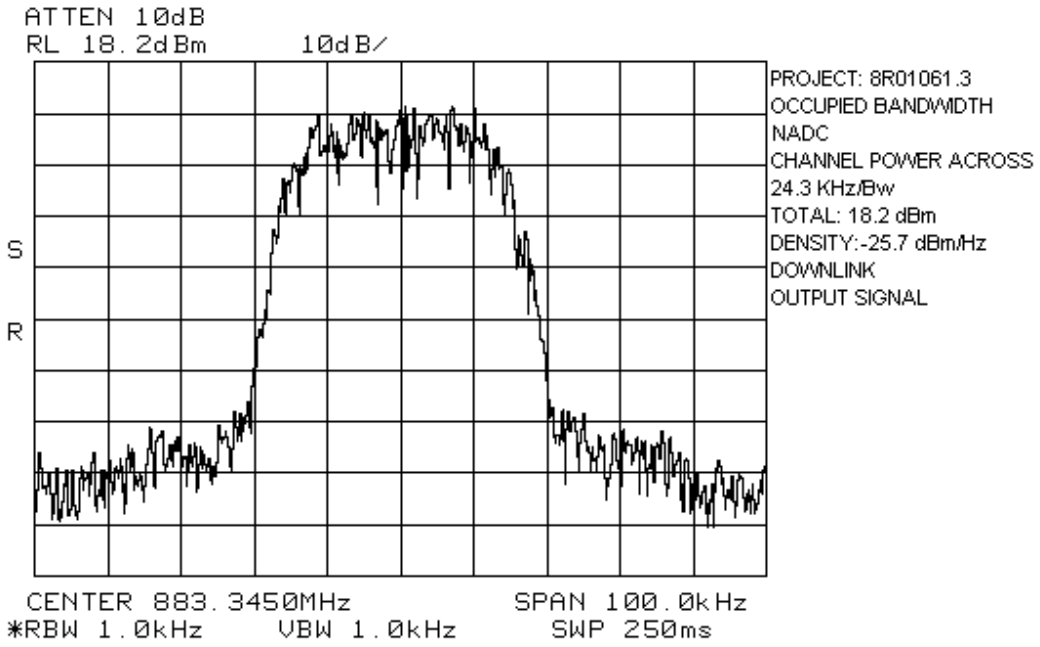

ATTEN 10dB
RL 5.0dBm
10dB/
S
R
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
NADC, INPUT SIGNAL
CHANNEL POWER ACROSS
24.3 KHz/Bw
TOTAL: 5.0 dBm
DENSITY: -38.8 dBm/Hz
UPLINK
CENTER 836.2010MHz
SPAN 100.0kHz
*RBW 1.0kHz
VBW 1.0kHz
SWP 250ms

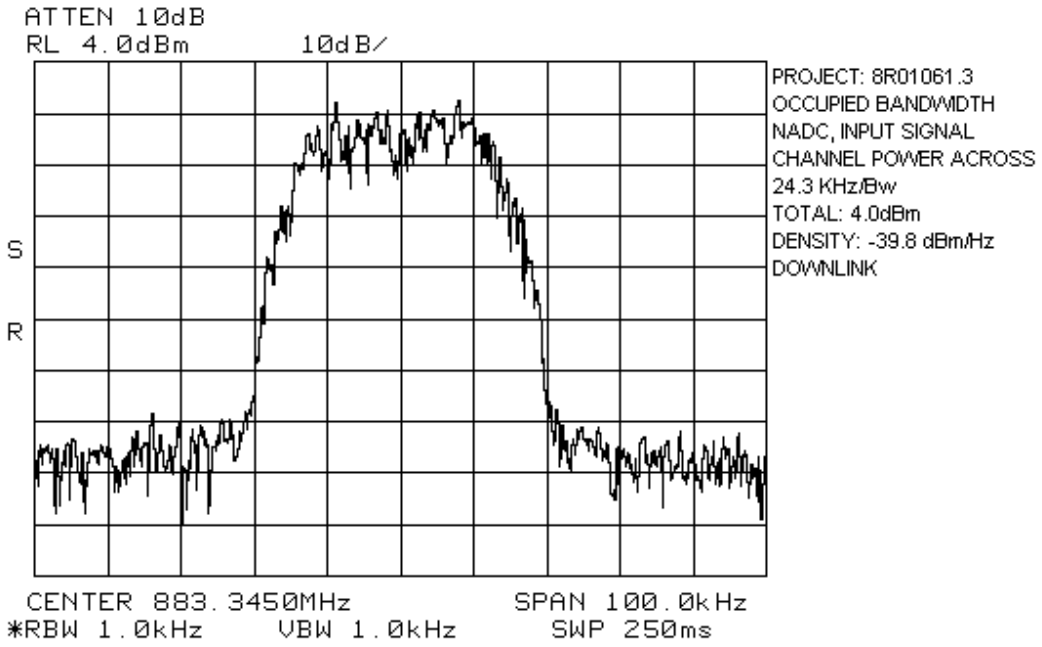

ATTEN 10dB
RL 19.5dBm
10dB/
S
R
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
CDMA
CHANNEL POWER ACROSS
1.23 MHz/Bw
TOTAL: 19.5 dBm
DENSITY: -41.4 dBm/Hz
OUTPUT SIGNAL
DOWNLINK
CENTER 881.425MHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 5.0dBm
10dB/
S
R
PROJECT: 8R01061.2
OCCUPIED BANDWIDTH
CDMA
CHANNEL POWER ACROSS
1.23 MHz/Bw
TOTAL: 5.0 dBm
DENSITY: -55.9 dBm/Hz
INPUT SIGNAL
DOWN LINK
CENTER 881.425MHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 21.0dBm
10dB/
PROJECT: 8R01061.2
GSM
OCCUPIED BANDWIDTH
OUTPUT SIGNAL
O/P POWER: 21.0 dBm
DOWNLINK
S
R
CENTER 881.293MHz
SPAN 1.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 6.5dBm
10dB/
PROJECT: 8R01061.2
GSM
OCCUPIED BANDWIDTH
INPUT SIGNAL
I/P POWER: 6.5 dBm
DOWNLINK
S
R
CENTER 881.293MHz
SPAN 1.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 18.2dBm
10dB/
S
R
PROJECT: 8R01061.3
OCCUPIED BANDWIDTH
NADC
CHANNEL POWER ACROSS
24.3 KHz/Bw
TOTAL: 18.2 dBm
DENSITY:-25.7 dBm/Hz
DOWNLINK
OUTPUT SIGNAL
CENTER 883.3450MHz
SPAN 100.0kHz
*RBW 1.0kHz
VBW 1.0kHz
SWP 250ms


ATTEN 10dB
RL 4.0dBm
10dB/
S
R
PROJECT: 8R01061.3
OCCUPIED BANDWIDTH
NADC, INPUT SIGNAL
CHANNEL POWER ACROSS
24.3 KHz/Bw
TOTAL: 4.0dBm
DENSITY: -39.8 dBm/Hz
DOWNLINK
CENTER 883.3450MHz
SPAN 100.0kHz
*RBW 1.0kHz
VBW 1.0kHz
SWP 250ms

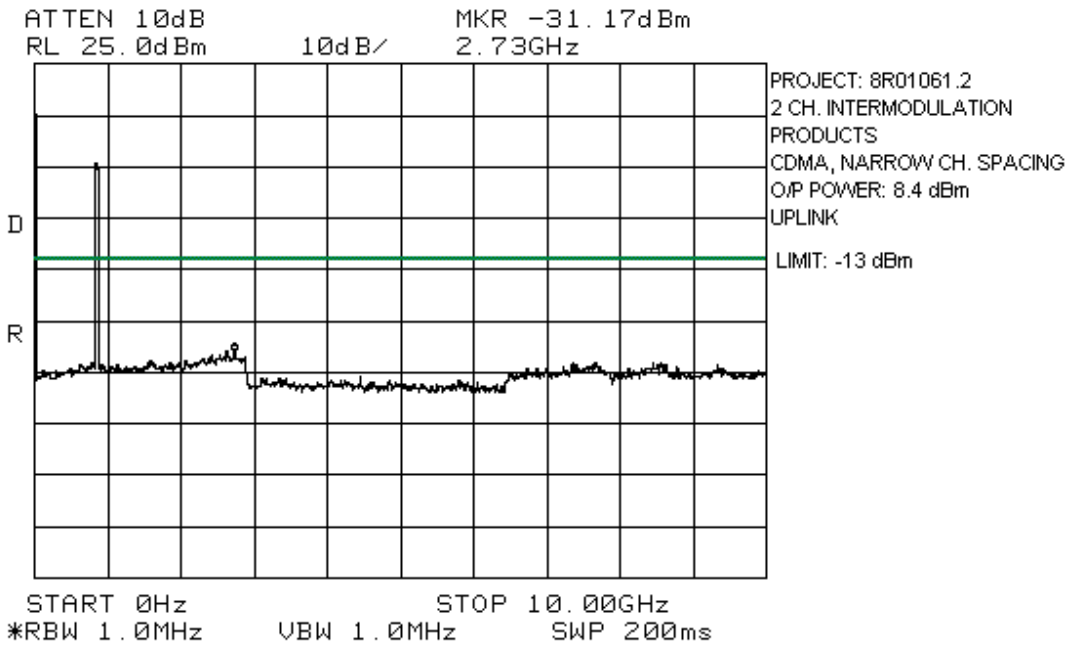
Section 5. Spurious Emissions at Antenna Terminals

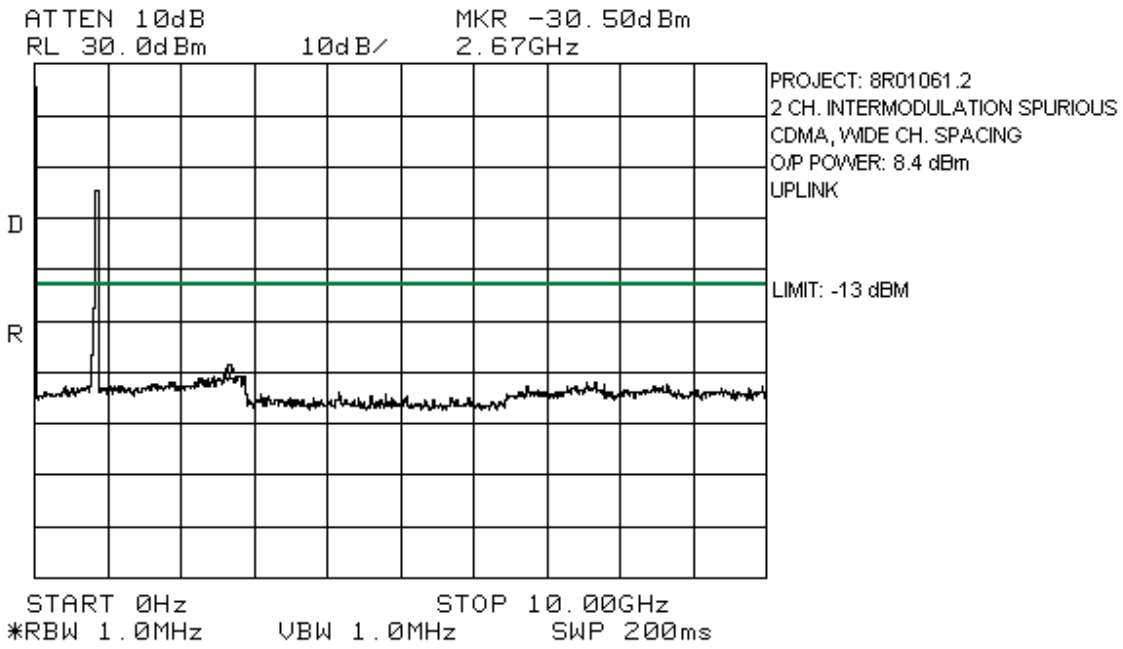
NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.917(e)
TESTED BY: Kevin Carr	DATE: December 22, 1998

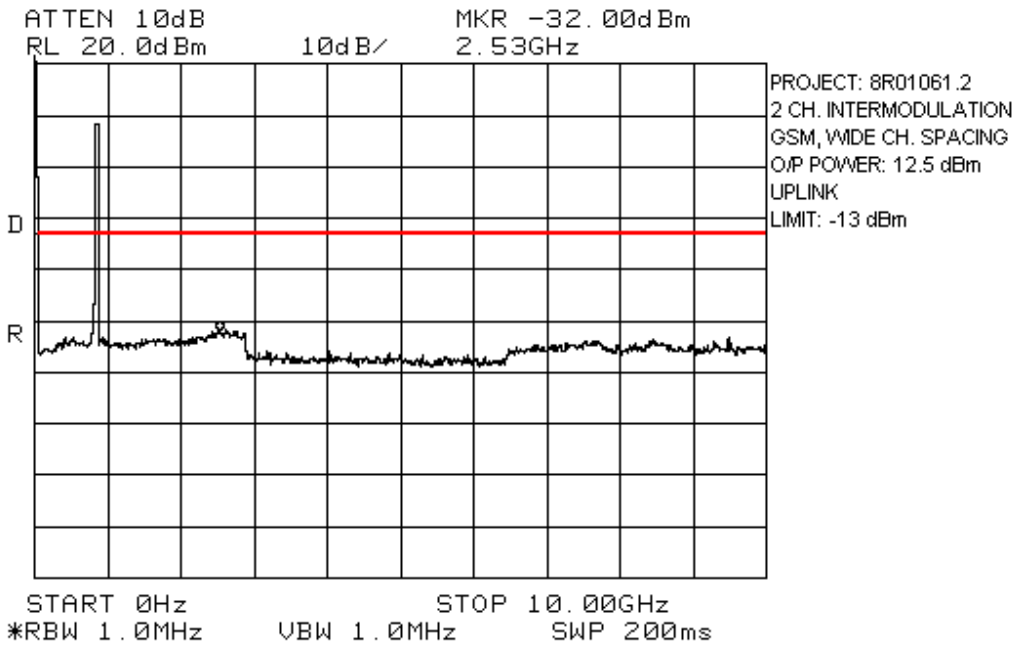
Test Results: Complies.

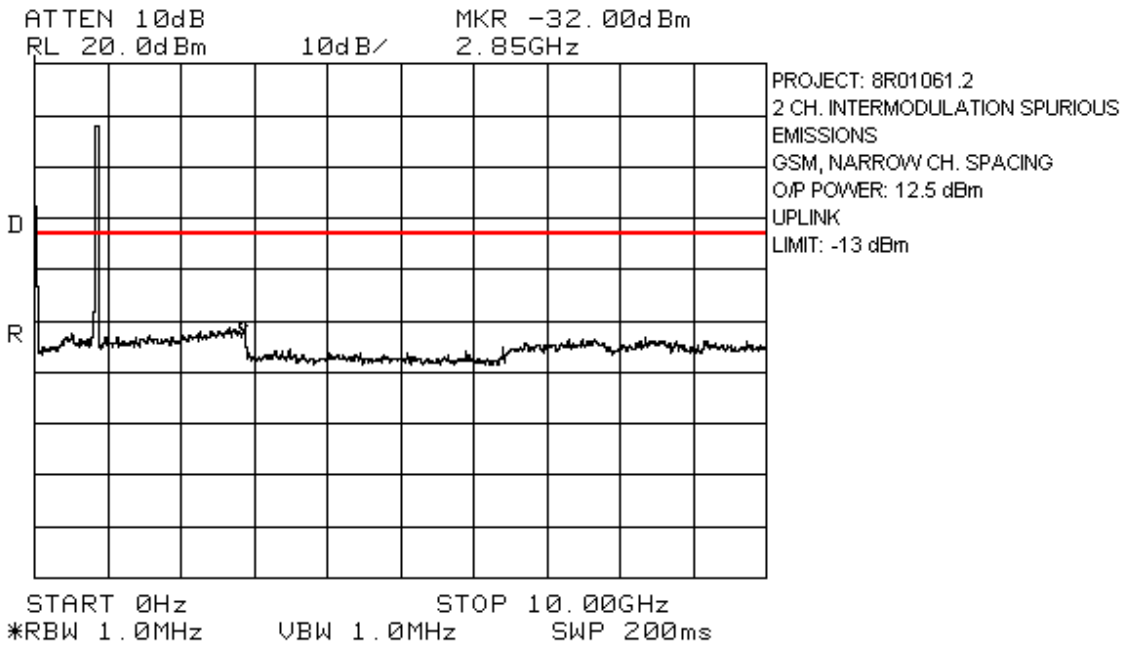
Test Data:

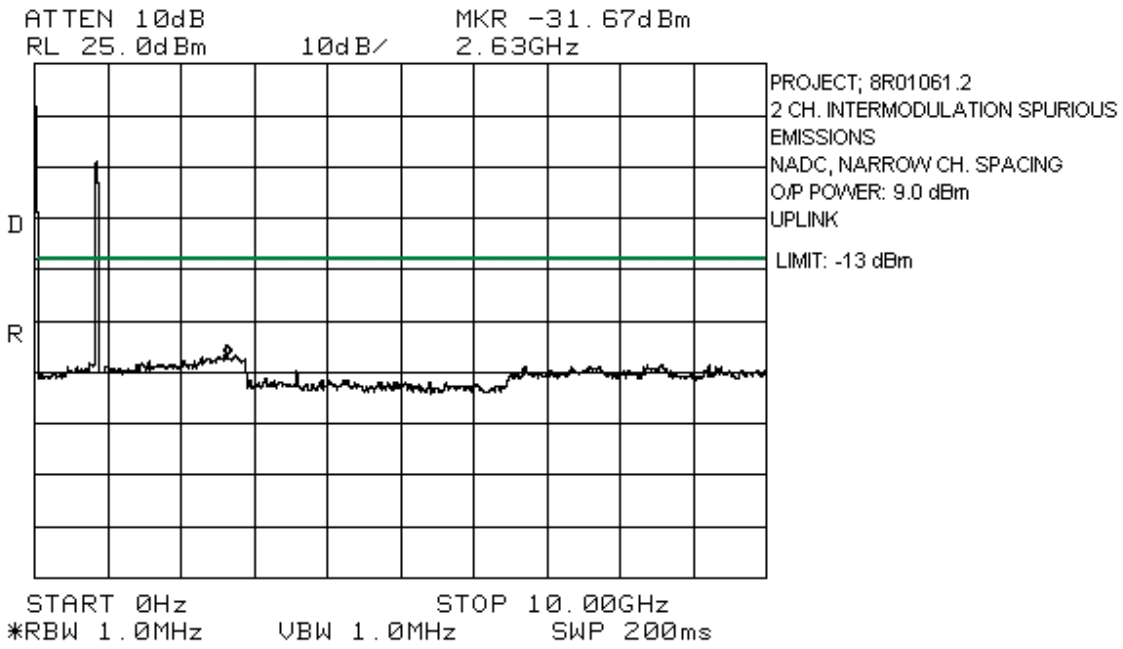
NAME OF TEST	WORST-CASE SPURIOUS LEVEL(dBm)
0 to 10 GHz spurious (Uplink)	-30.5
0 to 10 GHz spurious (Downlink)	-30.67
2 - signal intermodulation (Uplink)	-13.0
2 - signal intermodulation (Downlink)	-22.8
Lower band edge spurious (Uplink)	-20.83
Lower band edge spurious (Downlink)	-19.5
Upper band edge spurious (Uplink)	-14.0
Upper band edge spurious (Downlink)	-17.0

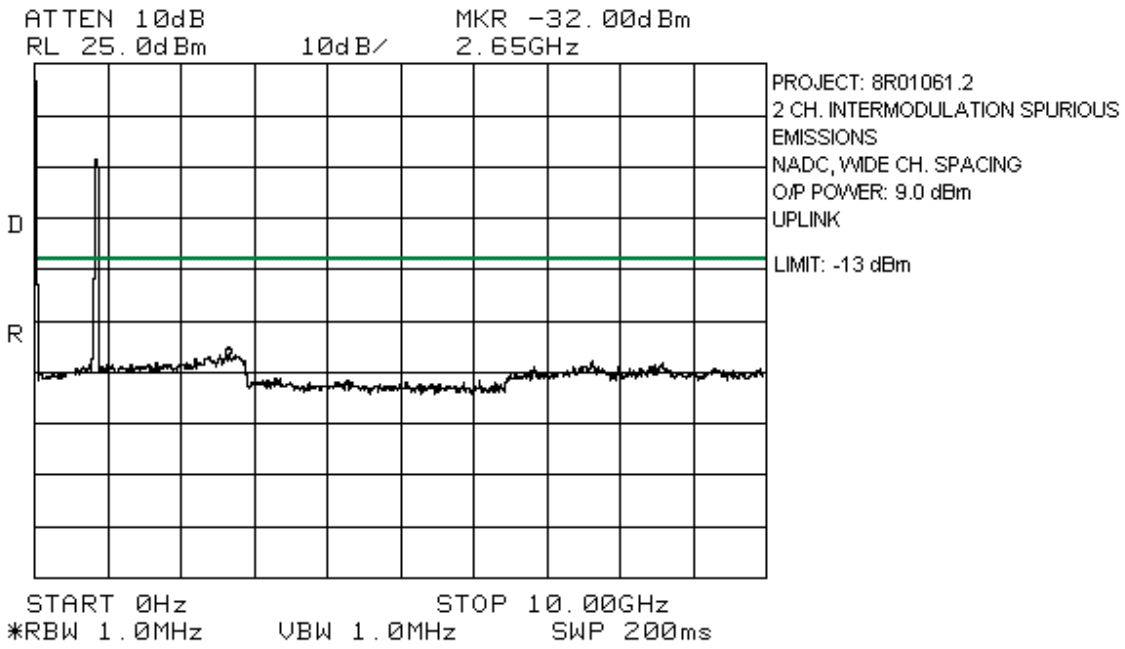

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -31.17dBm
2.73GHz
PROJECT: 8R01061.2
2 CH. INTERMODULATION
PRODUCTS
CDMA, NARROW CH. SPACING
O/P POWER: 8.4 dBm
UPLINK
LIMIT: -13 dBm
D
R
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

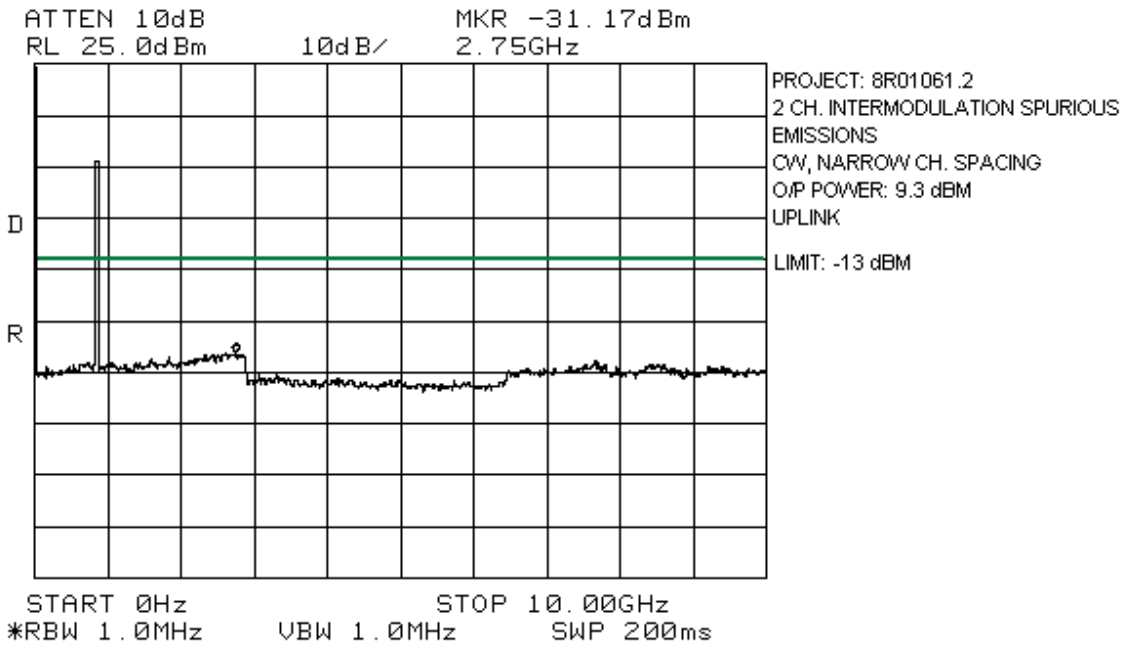

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -30.50dBm
2.67GHz
PROJECT: 8R01061.2
2 CH. INTERMODULATION SPURIOUS
CDMA, WIDE CH. SPACING
O/P POWER: 8.4 dBm
UPLINK
LIMIT: -13 dBM
D
R
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

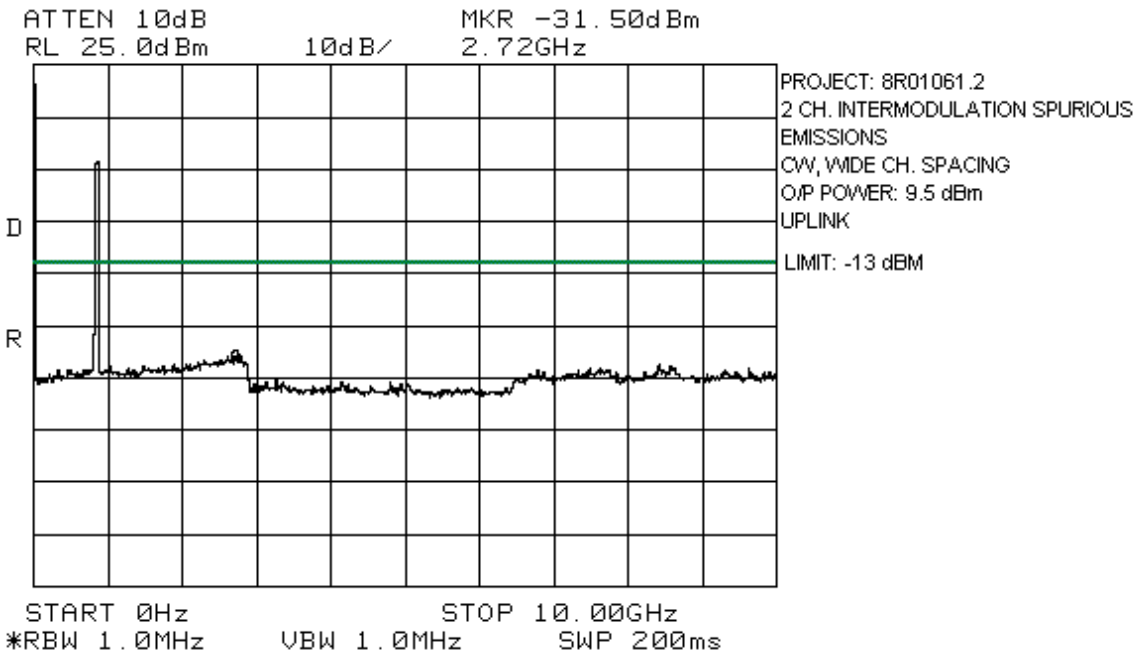

ATTEN 10dB
RL 20.0dBm
10dB/
MKR -32.00dBm
2.53GHz
PROJECT: 8R01061.2
2 CH. INTERMODULATION
GSM, WIDE CH. SPACING
O/P POWER: 12.5 dBm
UPLINK
LIMIT: -13 dBm
D
R
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

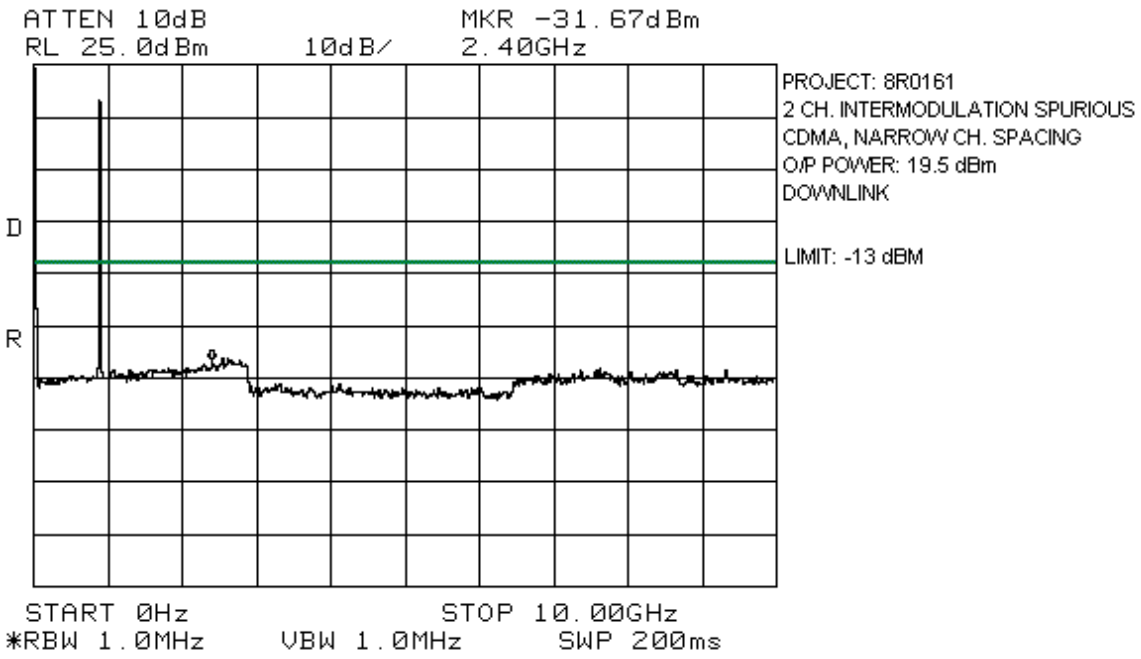

ATTEN 10dB
RL 20.0dBm
10dB/
MKR -32.00dBm
2.85GHz
D
R
PROJECT: 8R01061.2
2 CH. INTERMODULATION SPURIOUS EMISSIONS
GSM, NARROW CH. SPACING
O/P POWER: 12.5 dBm
UPLINK
LIMIT: -13 dBm
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

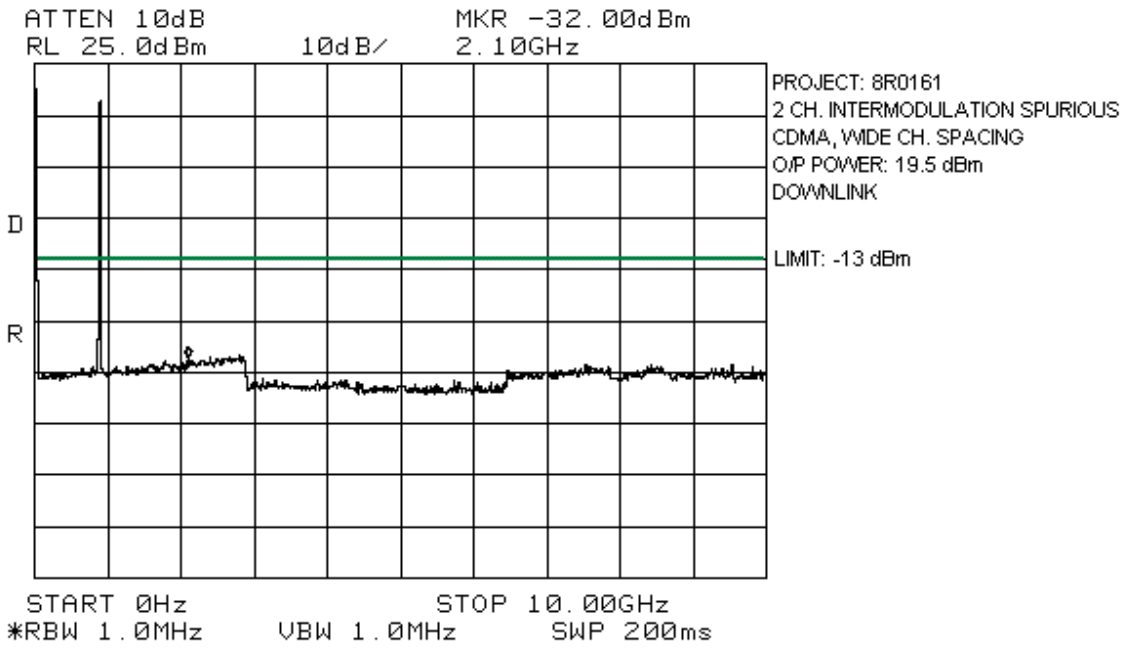

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -31.67dBm
2.63GHz
D
R
PROJECT; 8R01061.2
2 CH. INTERMODULATION SPURIOUS EMISSIONS
NADC, NARROW CH. SPACING
O/P POWER: 9.0 dBm
UPLINK
LIMIT: -13 dBm
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

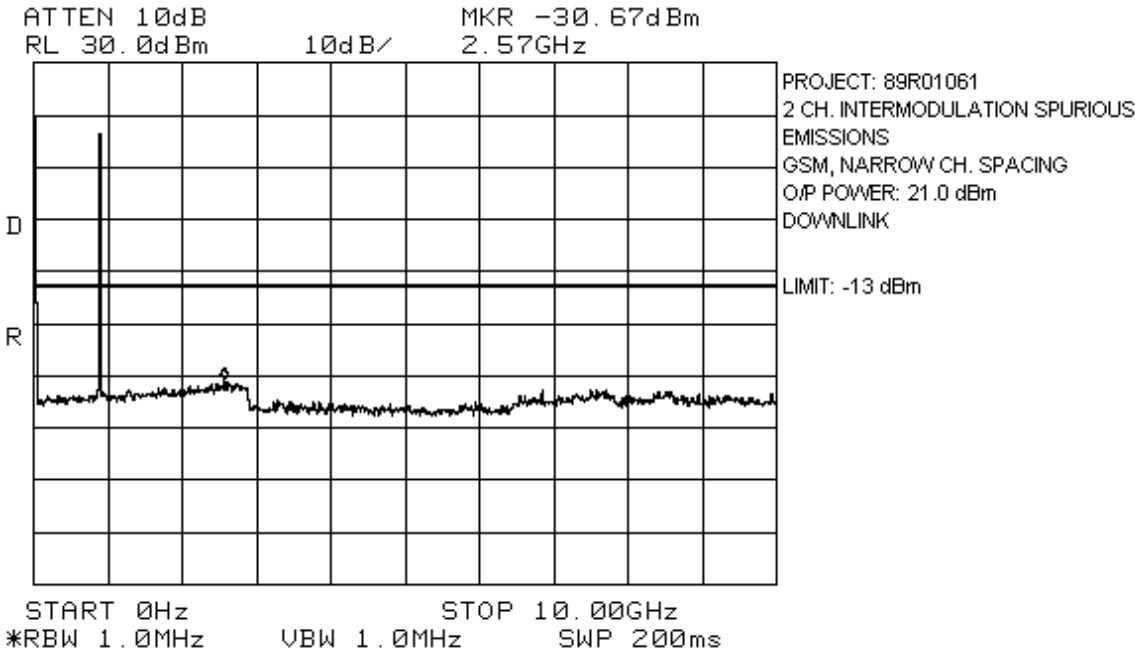

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -32.00dBm
2.65GHz
D
R
PROJECT: 8R01061.2
2 CH. INTERMODULATION SPURIOUS EMISSIONS
NADC, WIDE CH. SPACING
O/P POWER: 9.0 dBm
UPLINK
LIMIT: -13 dBm
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

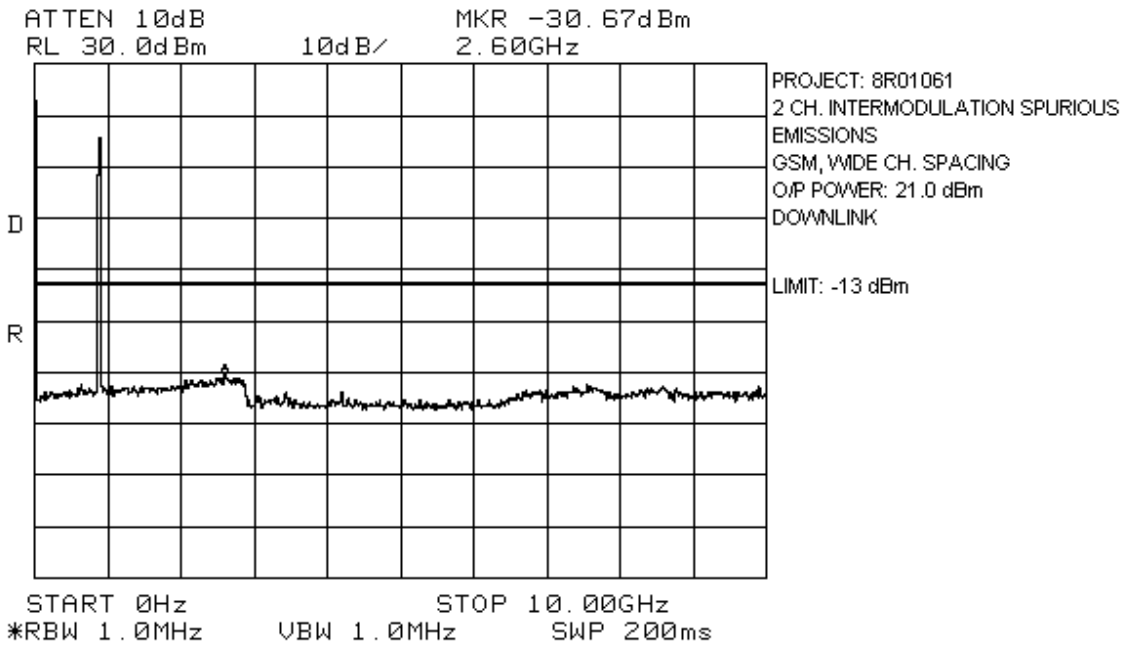

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -31.17dBm
2.75GHz
D
R
PROJECT: 8R01061.2
2 CH. INTERMODULATION SPURIOUS EMISSIONS
CW, NARROW CH. SPACING
O/P POWER: 9.3 dBM
UPLINK
LIMIT: -13 dBM
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

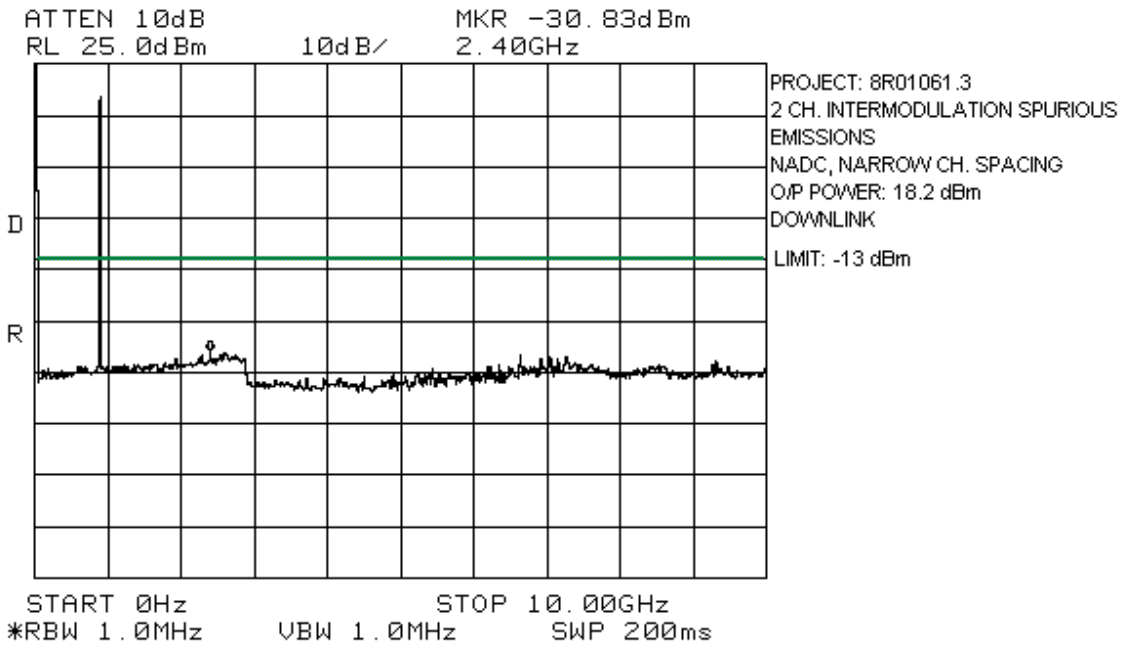

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -31.50dBm
2.72GHz
D
R
PROJECT: 8R01061.2
2 CH. INTERMODULATION SPURIOUS EMISSIONS
CW, WIDE CH. SPACING
O/P POWER: 9.5 dBm
UPLINK
LIMIT: -13 dBM
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

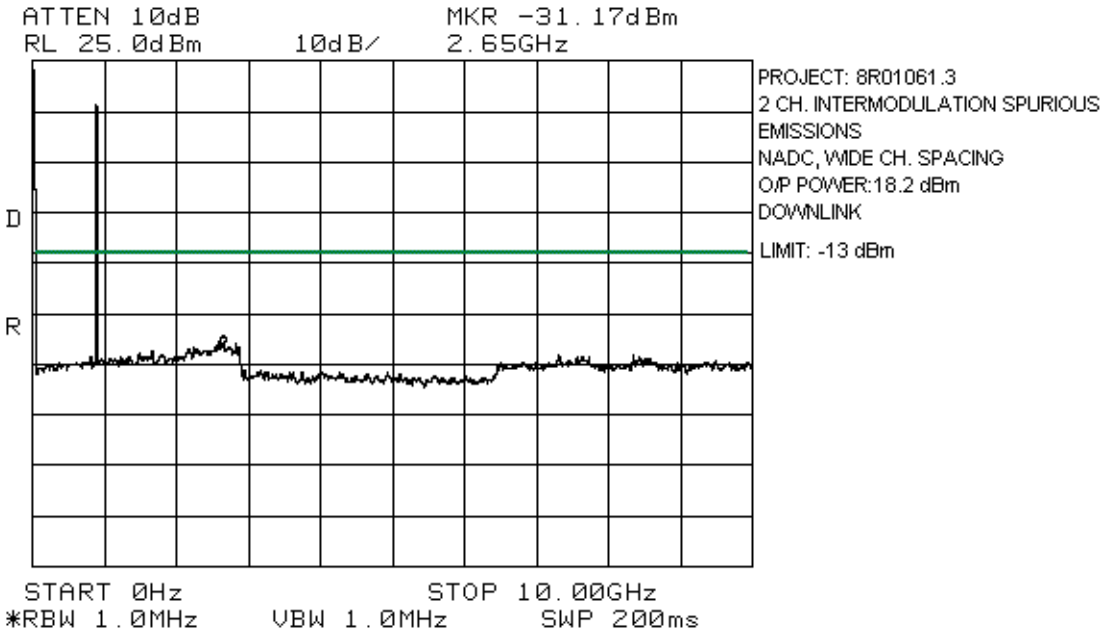

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -31.67dBm
2.40GHz
PROJECT: 8R0161
2 CH. INTERMODULATION SPURIOUS
CDMA, NARROW CH. SPACING
O/P POWER: 19.5 dBm
DOWNLINK
LIMIT: -13 dBM
D
R
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

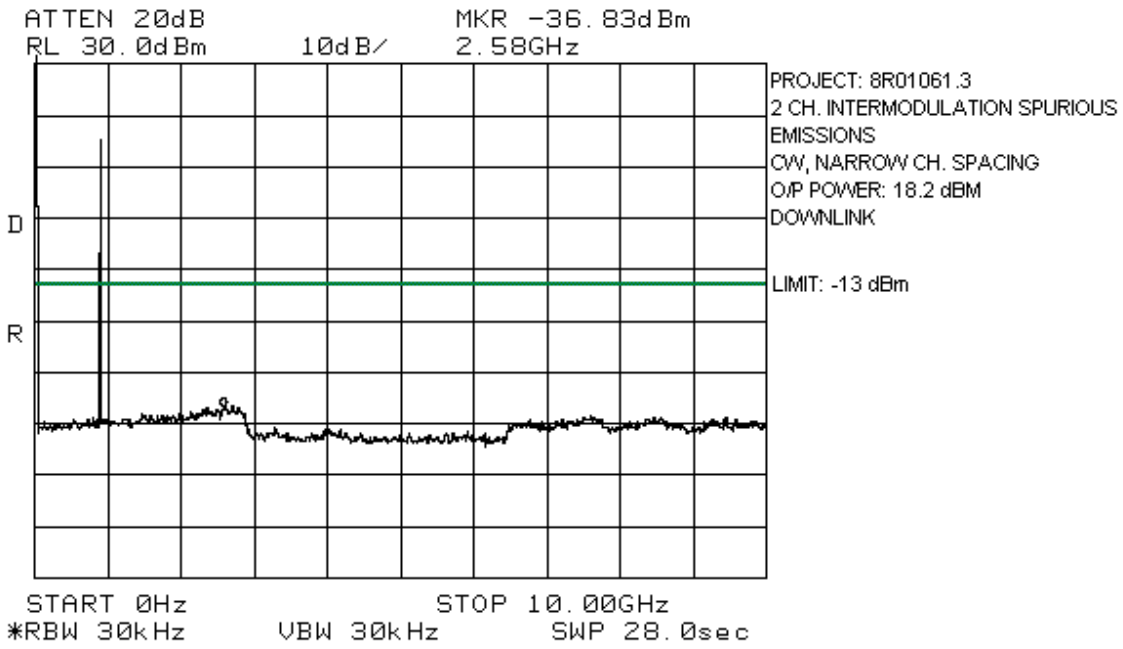

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -32.00dBm
2.10GHz
PROJECT: 8R0161
2 CH. INTERMODULATION SPURIOUS
CDMA, WIDE CH. SPACING
O/P POWER: 19.5 dBm
DOWNLINK
LIMIT: -13 dBm
D
R
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

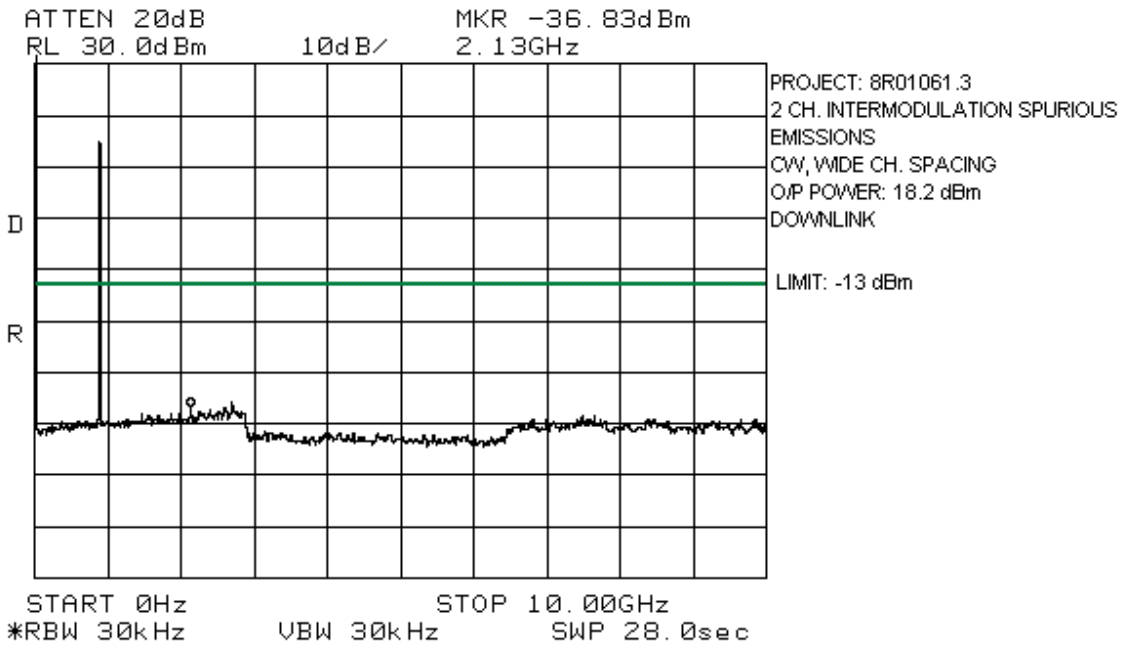

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -30.67dBm
2.57GHz
PROJECT: 89R01061
2 CH. INTERMODULATION SPURIOUS EMISSIONS
GSM, NARROW CH. SPACING
O/P POWER: 21.0 dBm
DOWNLINK
LIMIT: -13 dBm
D
R
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

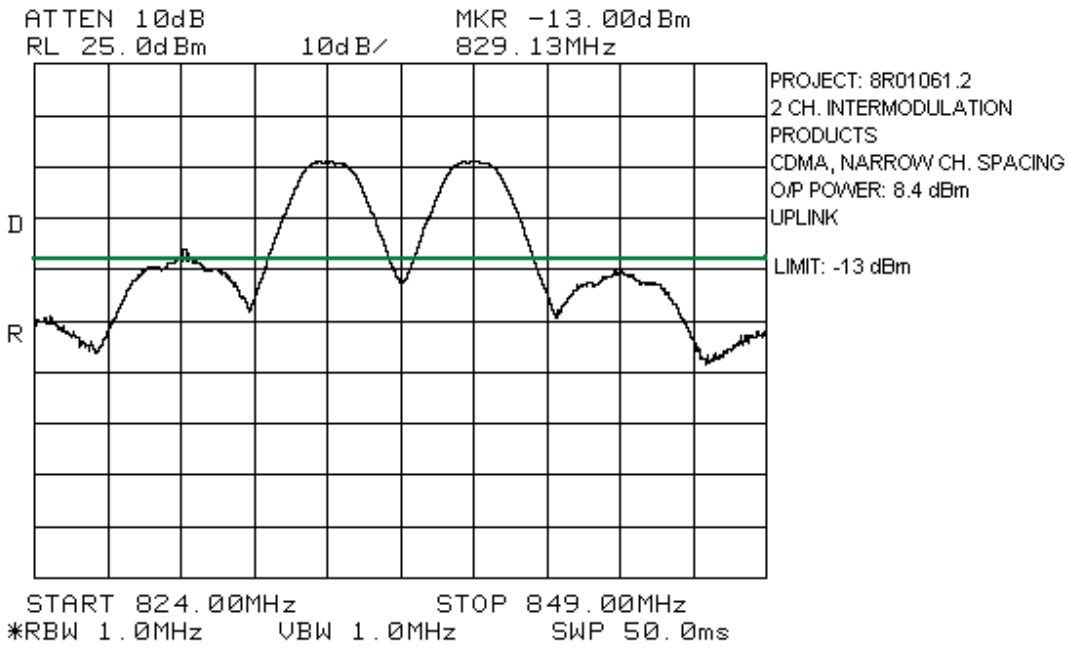

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -30.67dBm
2.60GHz
PROJECT: 8R01061
2 CH. INTERMODULATION SPURIOUS EMISSIONS
GSM, WIDE CH. SPACING
O/P POWER: 21.0 dBm
DOWNLINK
LIMIT: -13 dBm
D
R
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

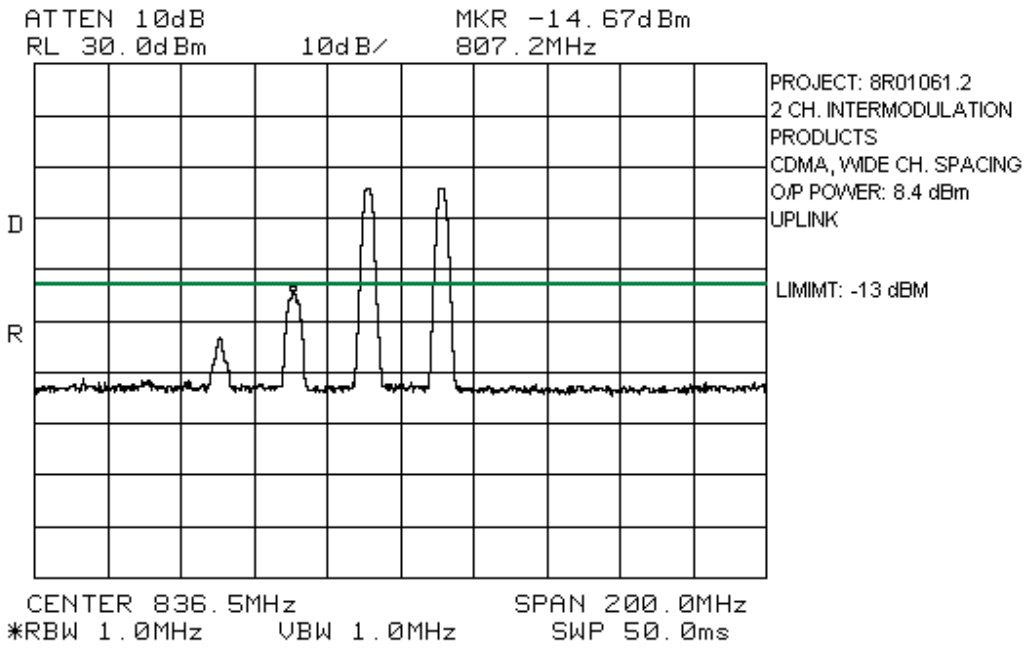

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -30.83dBm
2.40GHz
PROJECT: 8R01061.3
2 CH. INTERMODULATION SPURIOUS EMISSIONS
NADC, NARROW CH. SPACING
O/P POWER: 18.2 dBm
DOWNLINK
LIMIT: -13 dBm
D
R
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

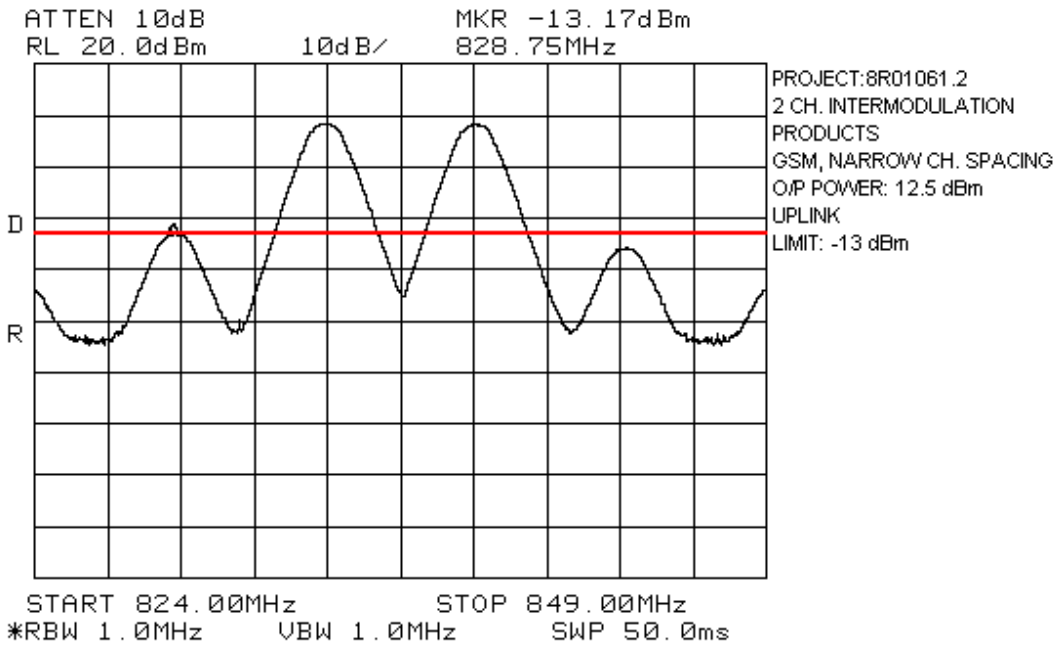

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -31.17dBm
2.65GHz
D
R
PROJECT: 8R01061.3
2 CH. INTERMODULATION SPURIOUS EMISSIONS
NADC, WIDE CH. SPACING
O/P POWER:18.2 dBm
DOWNLINK
LIMIT: -13 dBm
START 0Hz
STOP 10.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 200ms

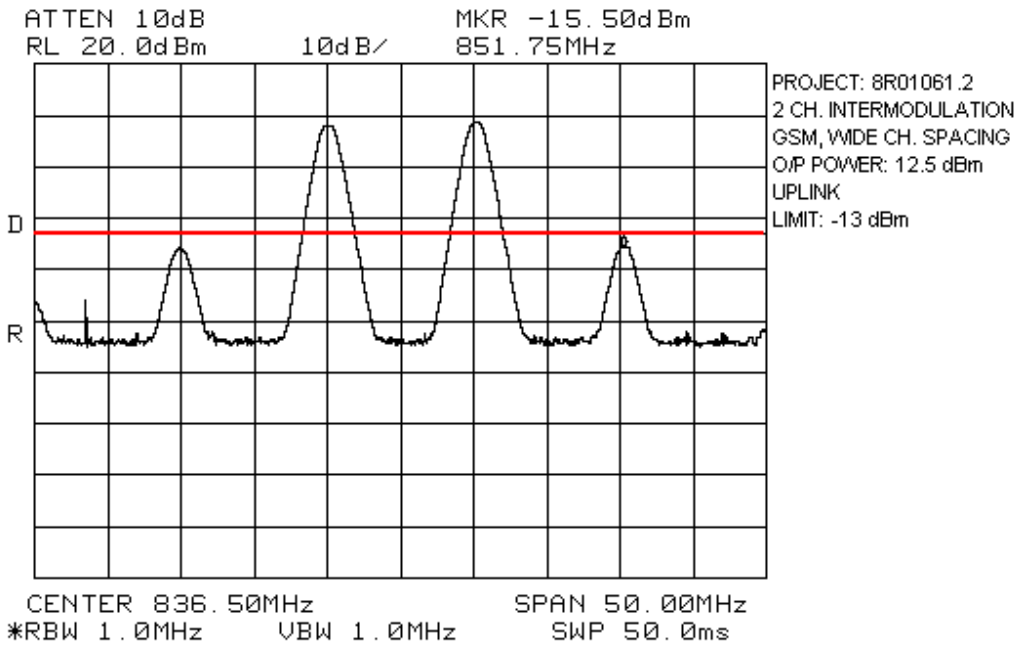

ATTEN 20dB
RL 30.0dBm
10dB/
MKR -36.83dBm
2.58GHz
PROJECT: 8R01061.3
2 CH. INTERMODULATION SPURIOUS EMISSIONS
CW, NARROW CH. SPACING
O/P POWER: 18.2 dBM
DOWNLINK
LIMIT: -13 dBm
D
R
START 0Hz
STOP 10.00GHz
*RBW 30kHz
VBW 30kHz
SWP 28.0sec

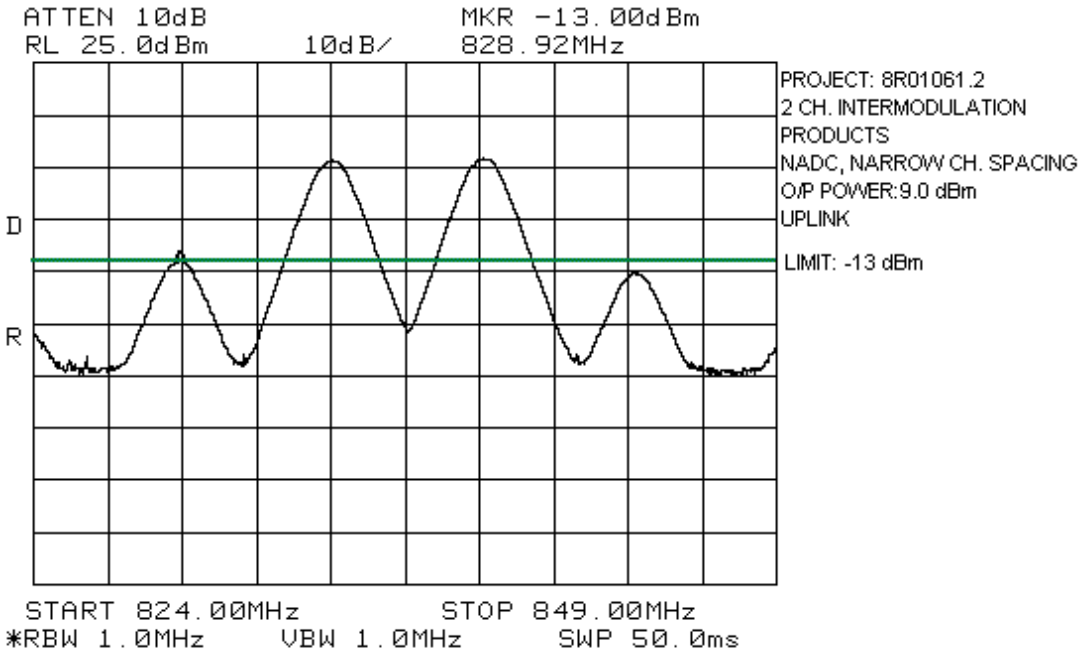

ATTEN 20dB
RL 30.0dBm
10dB/
MKR -36.83dBm
2.13GHz
D
R
PROJECT: 8R01061.3
2 CH. INTERMODULATION SPURIOUS EMISSIONS
CW, WIDE CH. SPACING
O/P POWER: 18.2 dBm
DOWNLINK
LIMIT: -13 dBm
START 0Hz
STOP 10.00GHz
*RBW 30kHz
VBW 30kHz
SWP 28.0sec

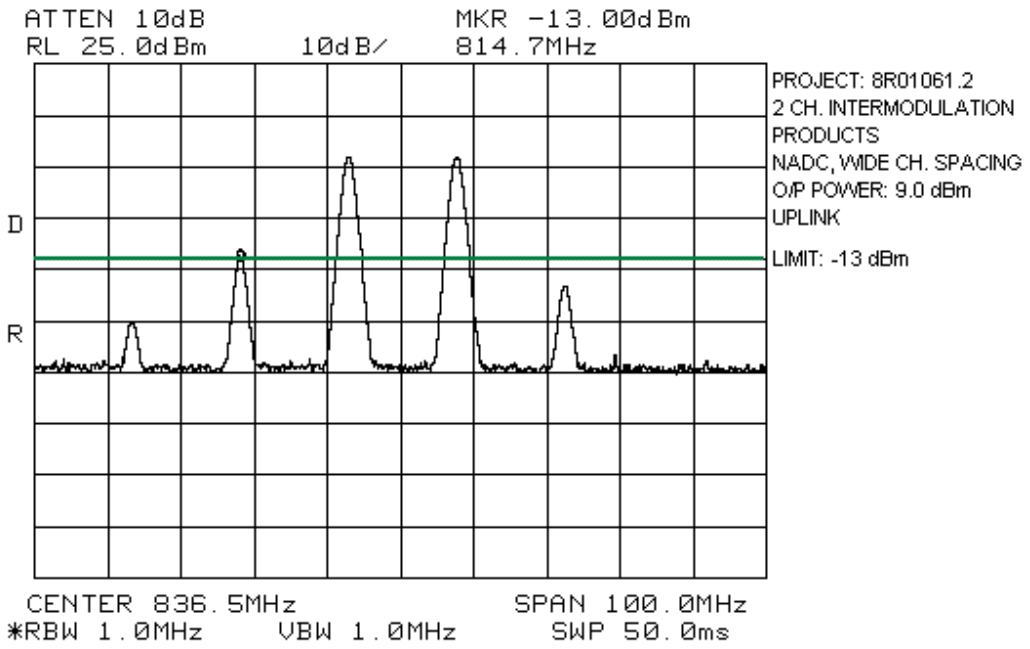

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -13.00dBm
829.13MHz
PROJECT: 8R01061.2
2 CH. INTERMODULATION
PRODUCTS
CDMA, NARROW CH. SPACING
O/P POWER: 8.4 dBm
UPLINK
LIMIT: -13 dBm
D
R
START 824.00MHz
STOP 849.00MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

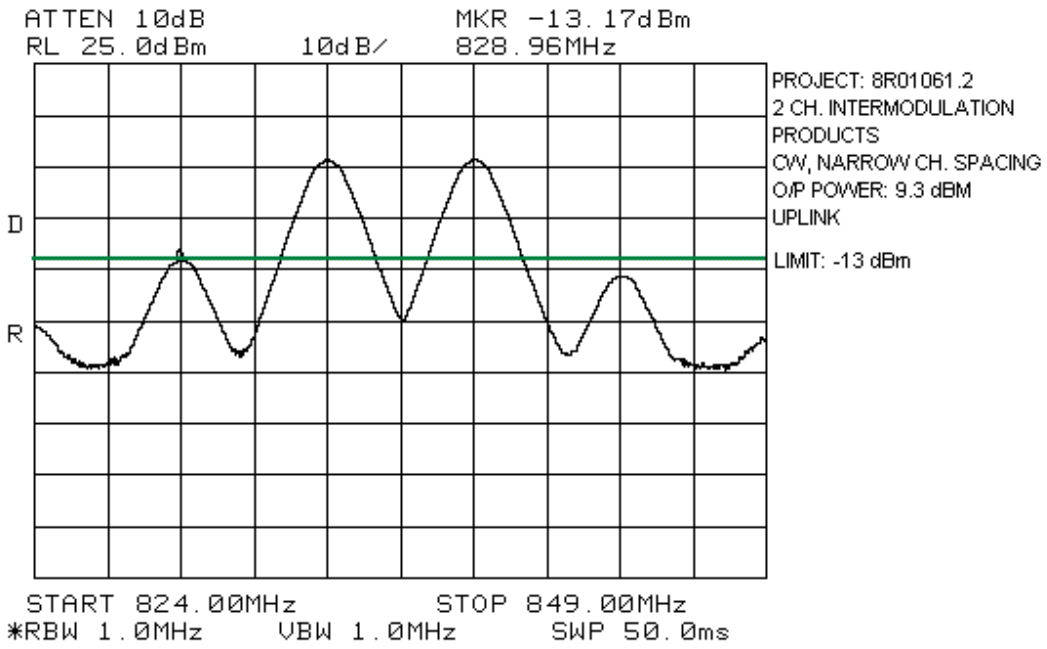

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -14.67dBm
807.2MHz
PROJECT: 8R01061.2
2 CH. INTERMODULATION
PRODUCTS
CDMA, WIDE CH. SPACING
O/P POWER: 8.4 dBm
UPLINK
LIMIMT: -13 dBM
D
R
CENTER 836.5MHz
SPAN 200.0MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

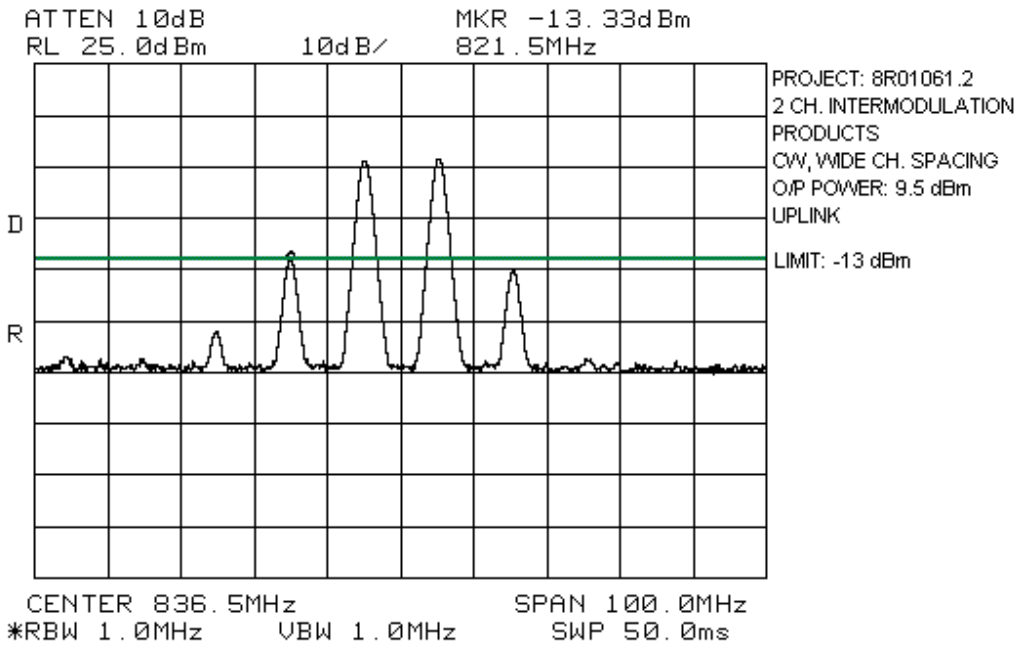

ATTEN 10dB
RL 20.0dBm
10dB/
MKR -13.17dBm
828.75MHz
D
R
PROJECT:8R01061.2
2 CH. INTERMODULATION
PRODUCTS
GSM, NARROW CH. SPACING
O/P POWER: 12.5 dBm
UPLINK
LIMIT: -13 dBm
START 824.00MHz
STOP 849.00MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

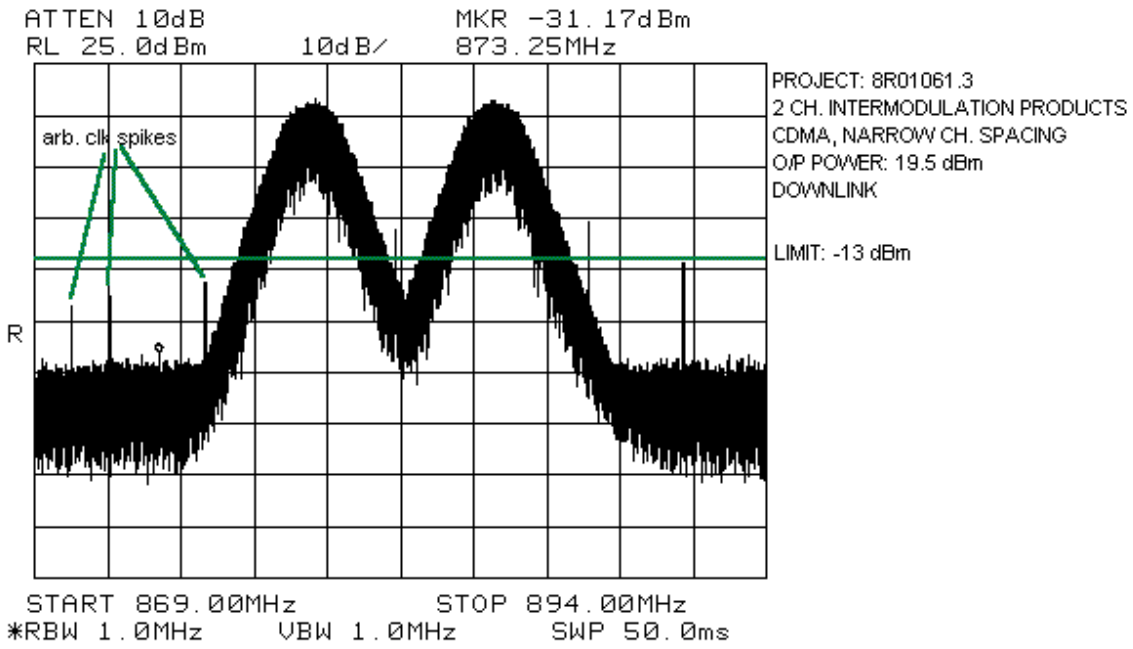

ATTEN 10dB
RL 20.0dBm
10dB/
MKR -15.50dBm
851.75MHz
D
R
PROJECT: 8R01061.2
2 CH. INTERMODULATION
GSM, WIDE CH. SPACING
O/P POWER: 12.5 dBm
UPLINK
LIMIT: -13 dBm
CENTER 836.50MHz
SPAN 50.00MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

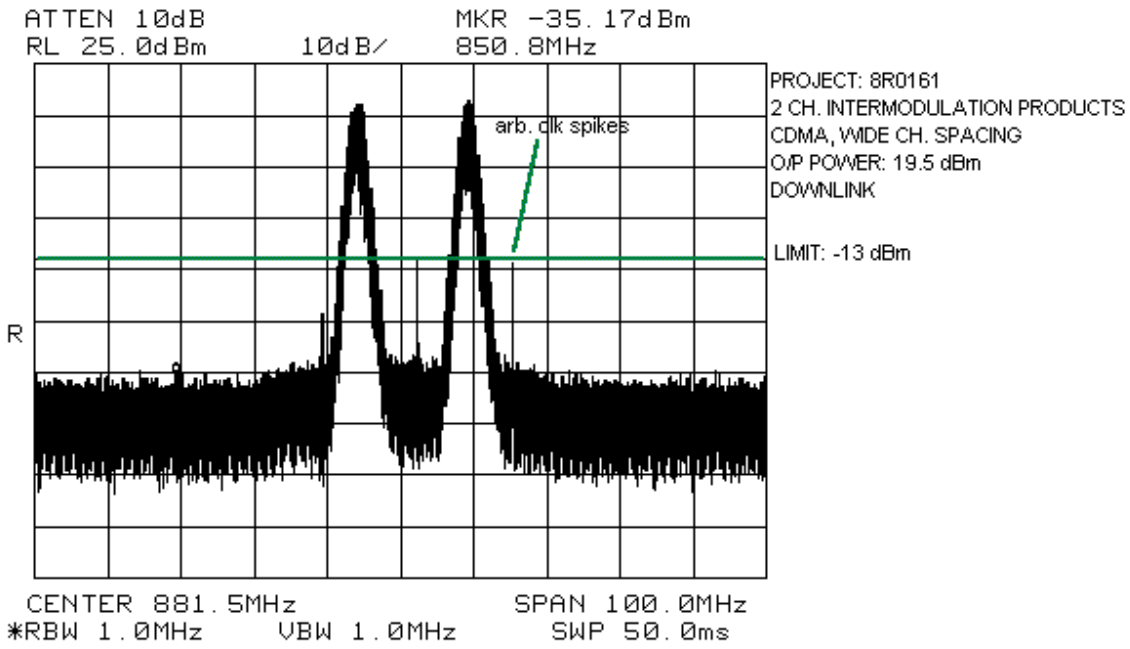

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -13.00dBm
828.92MHz
PROJECT: 8R01061.2
2 CH. INTERMODULATION
PRODUCTS
NADC, NARROW CH. SPACING
O/P POWER:9.0 dBm
UPLINK
LIMIT: -13 dBm
D
R
START 824.00MHz
STOP 849.00MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

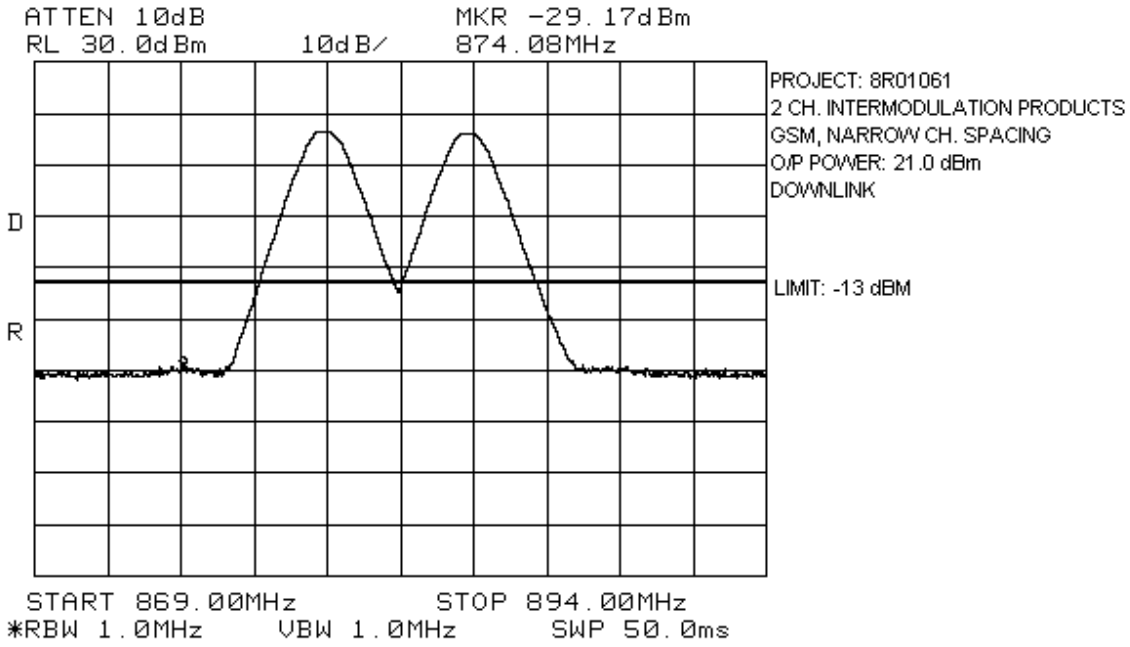

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -13.00dBm
814.7MHz
PROJECT: 8R01061.2
2 CH. INTERMODULATION
PRODUCTS
NADC, WIDE CH. SPACING
O/P POWER: 9.0 dBm
UPLINK
LIMIT: -13 dBm
D
R
CENTER 836.5MHz
SPAN 100.0MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

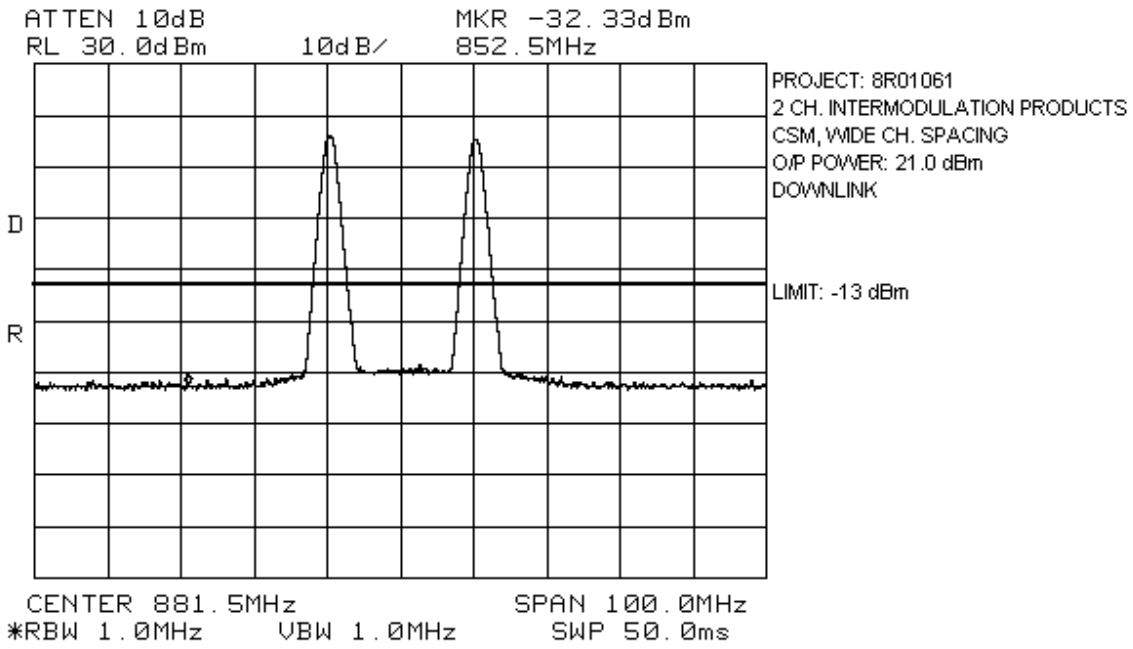

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -13.17dBm
828.96MHz
PROJECT: 8R01061.2
2 CH. INTERMODULATION
PRODUCTS
CW, NARROW CH. SPACING
O/P POWER: 9.3 dBM
UPLINK
LIMIT: -13 dBm
D
R
START 824.00MHz
STOP 849.00MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

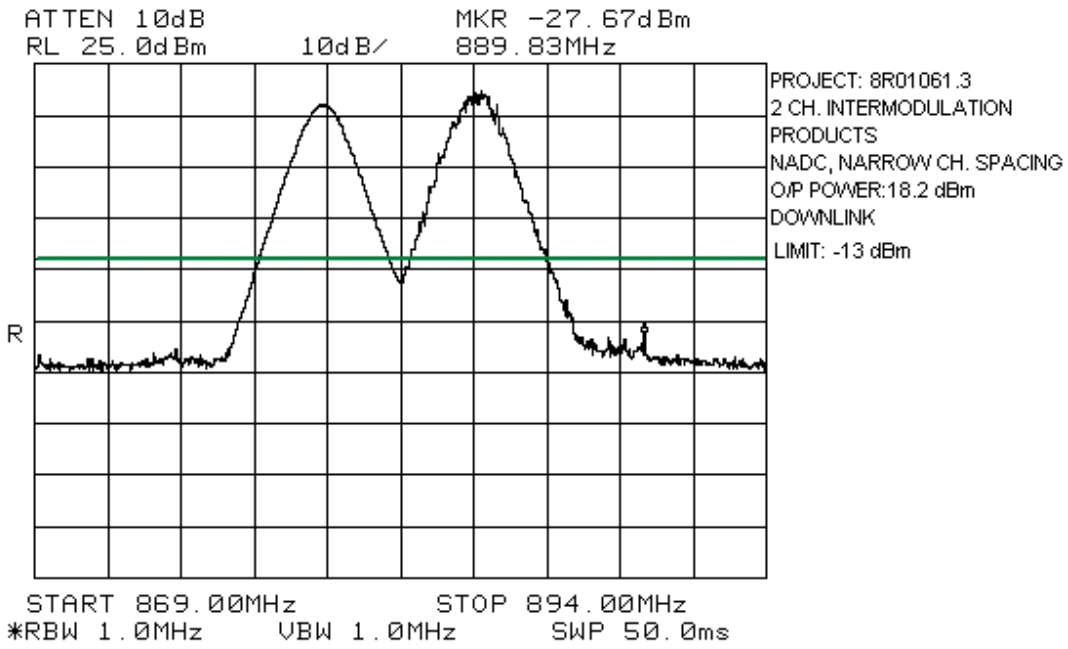

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -13.33dBm
821.5MHz
D
R
PROJECT: 8R01061.2
2 CH. INTERMODULATION
PRODUCTS
CW, WIDE CH. SPACING
O/P POWER: 9.5 dBm
UPLINK
LIMIT: -13 dBm
CENTER 836.5MHz
SPAN 100.0MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

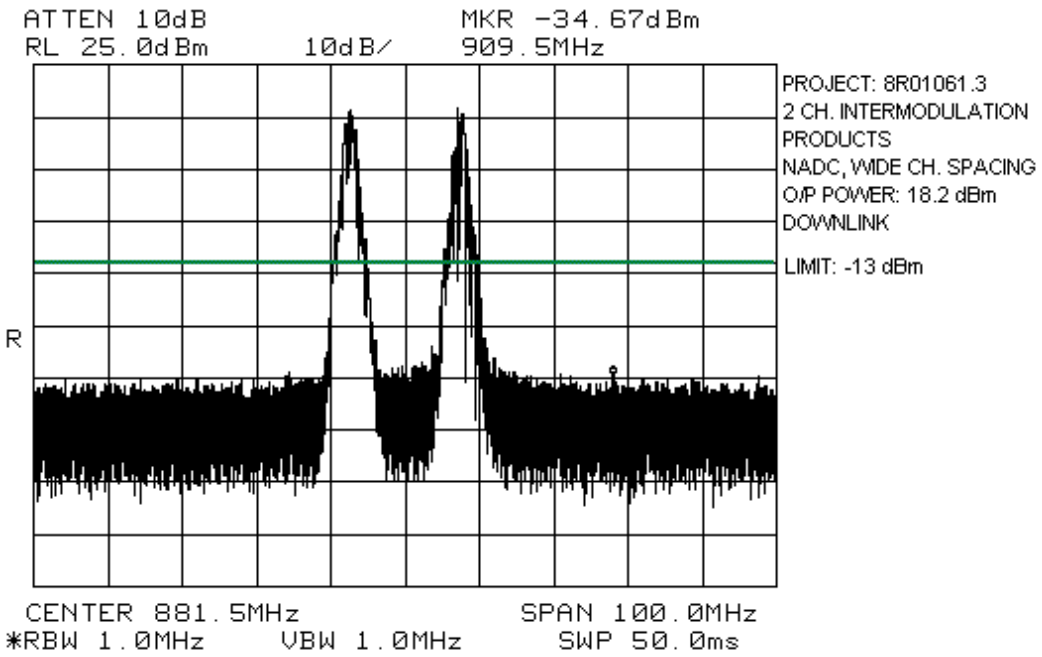

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -31.17dBm
873.25MHz
arb. clk spikes
R
PROJECT: 8R01061.3
2 CH. INTERMODULATION PRODUCTS
CDMA, NARROW CH. SPACING
O/P POWER: 19.5 dBm
DOWNLINK
LIMIT: -13 dBm
START 869.00MHz
STOP 894.00MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

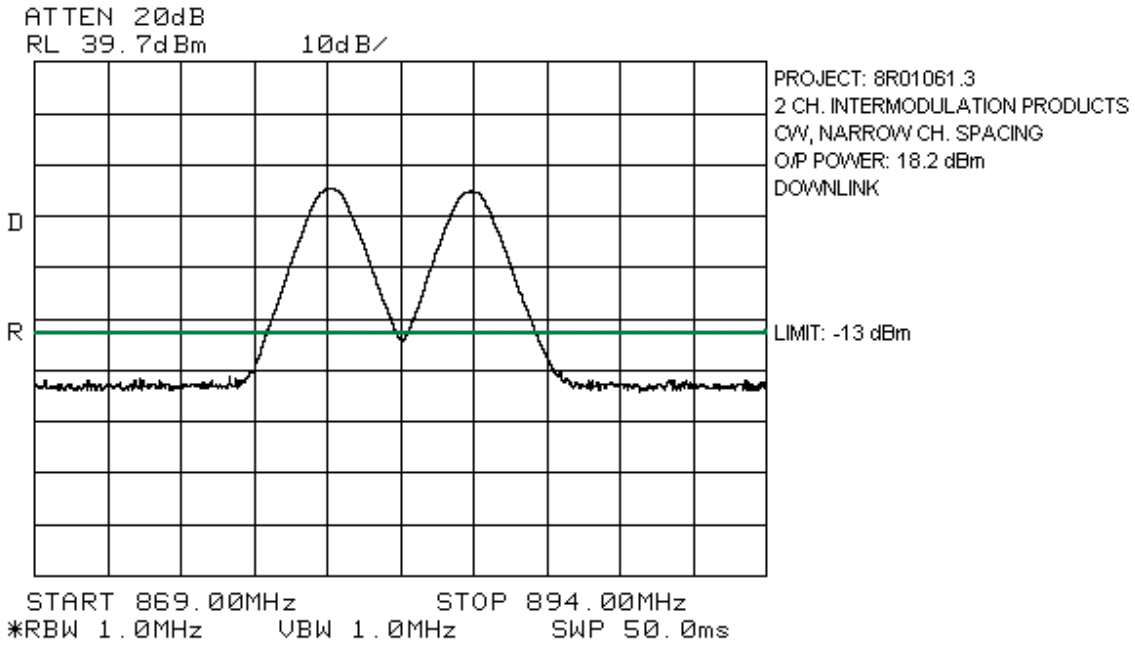

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -35.17dBm
850.8MHz
arb. clk spikes
PROJECT: 8R0161
2 CH. INTERMODULATION PRODUCTS
CDMA, WIDE CH. SPACING
O/P POWER: 19.5 dBm
DOWNLINK
LIMIT: -13 dBm
R
CENTER 881.5MHz
SPAN 100.0MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

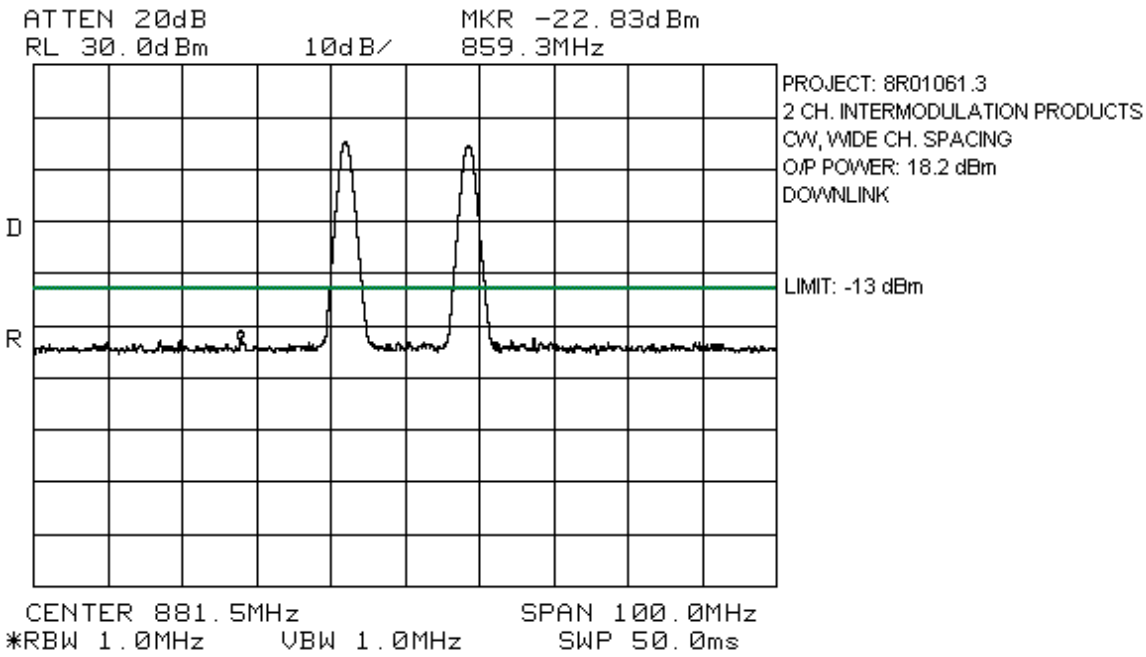

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -29.17dBm
874.08MHz
PROJECT: 8R01061
2 CH. INTERMODULATION PRODUCTS
GSM, NARROW CH. SPACING
O/P POWER: 21.0 dBm
DOWNLINK
D
LIMIT: -13 dBM
R
START 869.00MHz
STOP 894.00MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

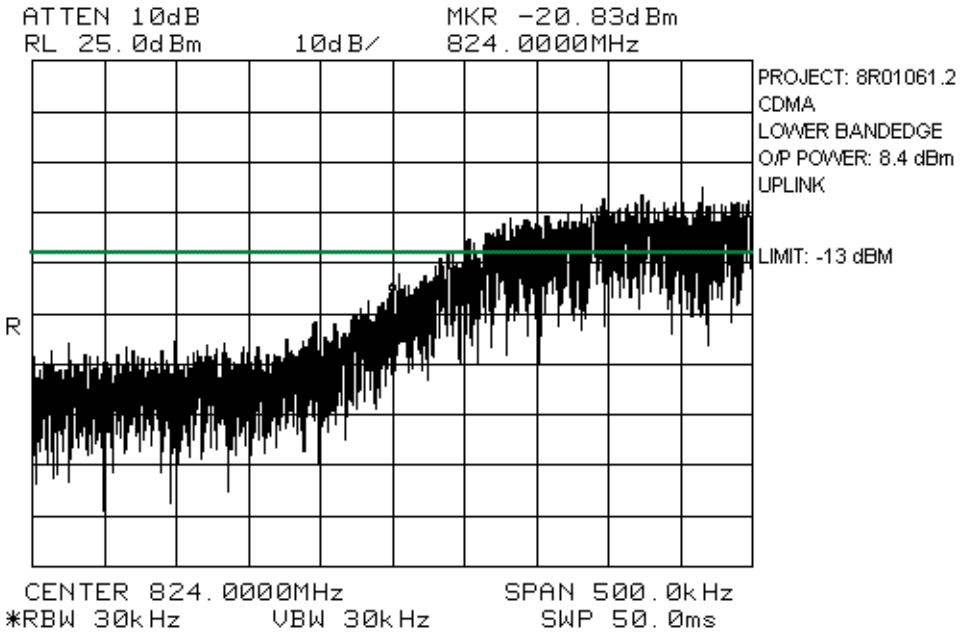

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -32.33dBm
852.5MHz
PROJECT: 8R01061
2 CH. INTERMODULATION PRODUCTS
CSM, WIDE CH. SPACING
O/P POWER: 21.0 dBm
DOWNLINK
D
LIMIT: -13 dBm
R
CENTER 881.5MHz
SPAN 100.0MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

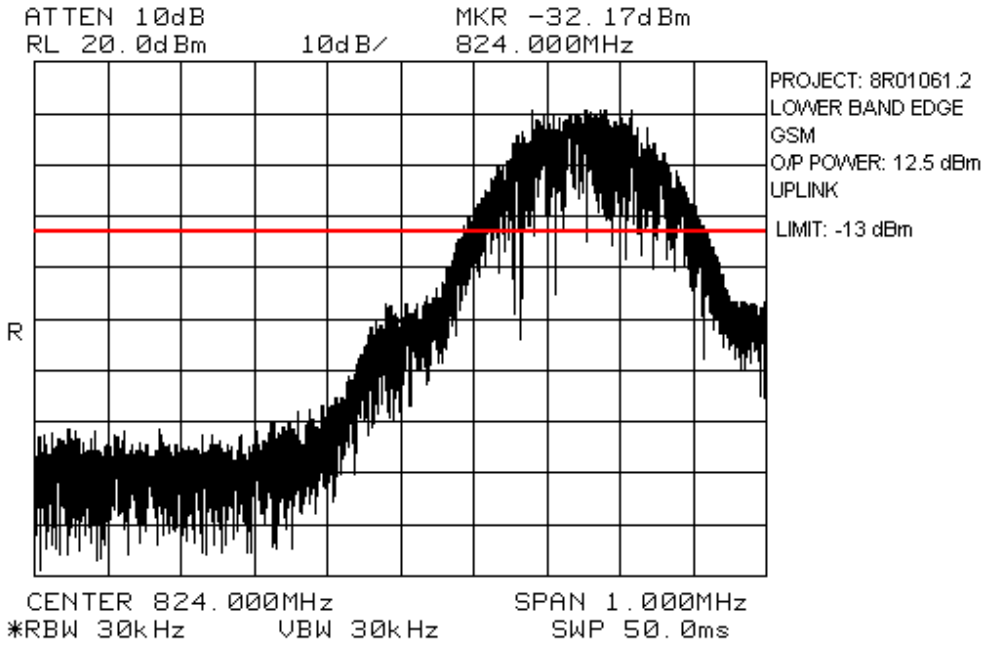

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -27.67dBm
889.83MHz
PROJECT: 8R01061.3
2 CH. INTERMODULATION
PRODUCTS
NADC, NARROW CH. SPACING
O/P POWER:18.2 dBm
DOWNLINK
LIMIT: -13 dBm
R
START 869.00MHz
STOP 894.00MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

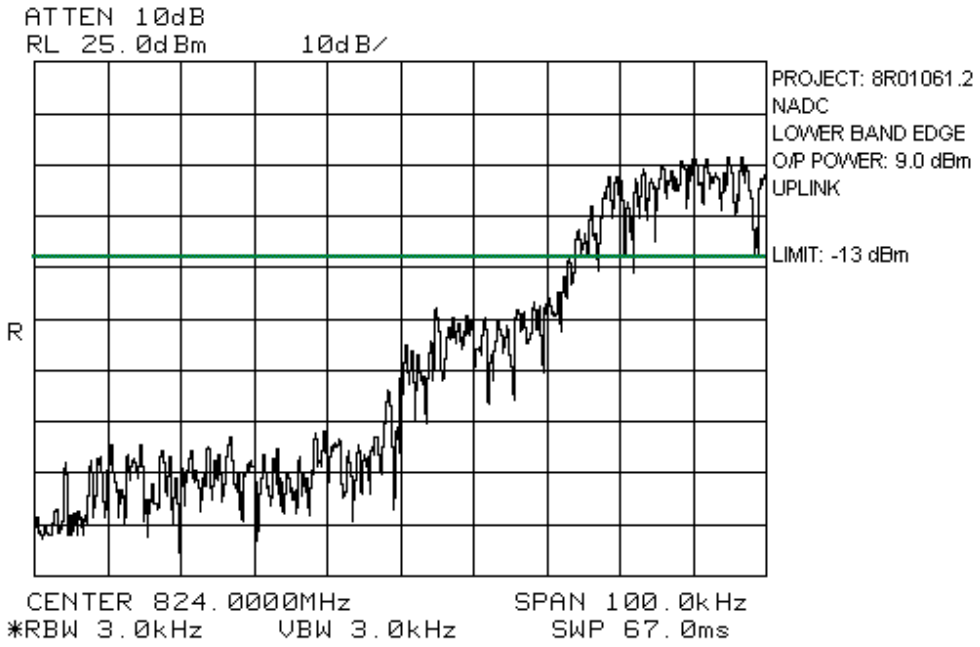

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -34.67dBm
909.5MHz
PROJECT: 8R01061.3
2 CH. INTERMODULATION
PRODUCTS
NADC, WIDE CH. SPACING
O/P POWER: 18.2 dBm
DOWNLINK
LIMIT: -13 dBm
R
CENTER 881.5MHz
SPAN 100.0MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

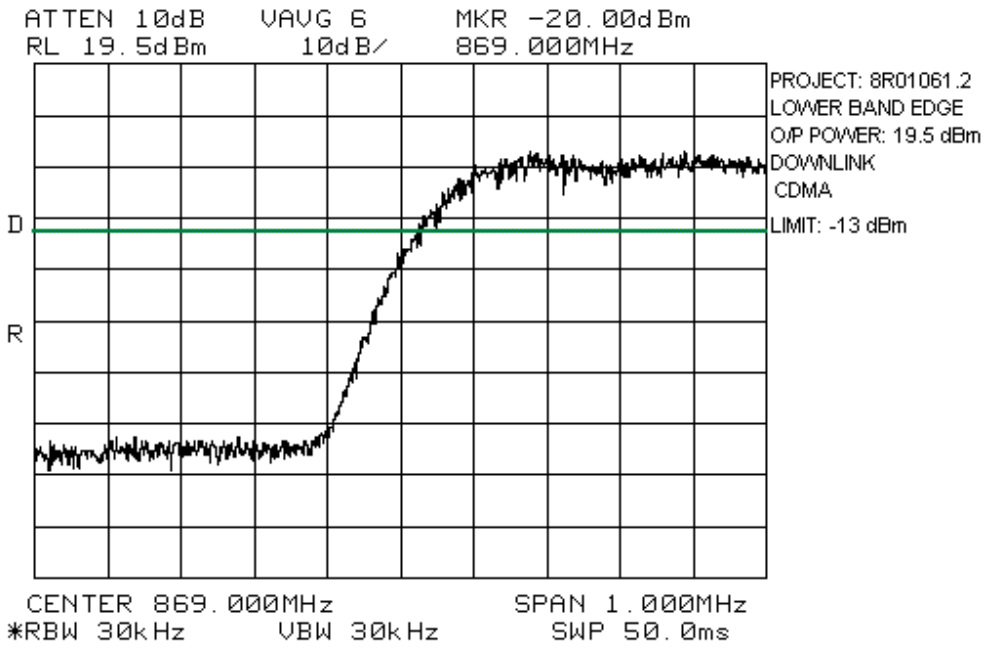

ATTEN 20dB
RL 39.7dBm
10dB/
D
R
PROJECT: 8R01061.3
2 CH. INTERMODULATION PRODUCTS
CW, NARROW CH. SPACING
O/P POWER: 18.2 dBm
DOWNLINK
LIMIT: -13 dBm
START 869.00MHz
STOP 894.00MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

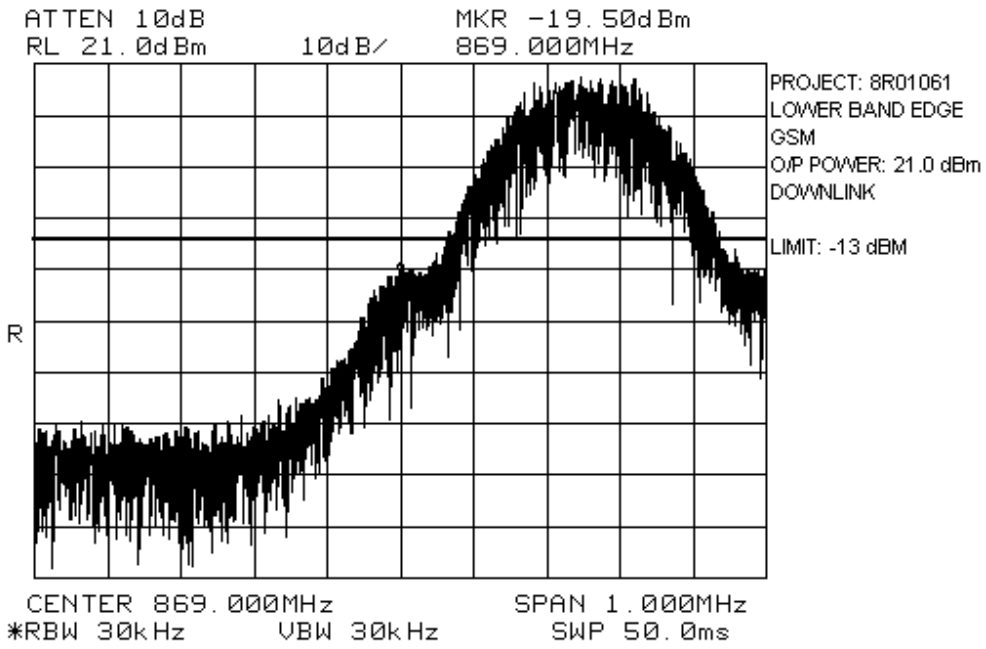

ATTEN 20dB
RL 30.0dBm
10dB/
MKR -22.83dBm
859.3MHz
PROJECT: 8R01061.3
2 CH. INTERMODULATION PRODUCTS
CW, WIDE CH. SPACING
O/P POWER: 18.2 dBm
DOWNLINK
D
LIMIT: -13 dBm
R
CENTER 881.5MHz
SPAN 100.0MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

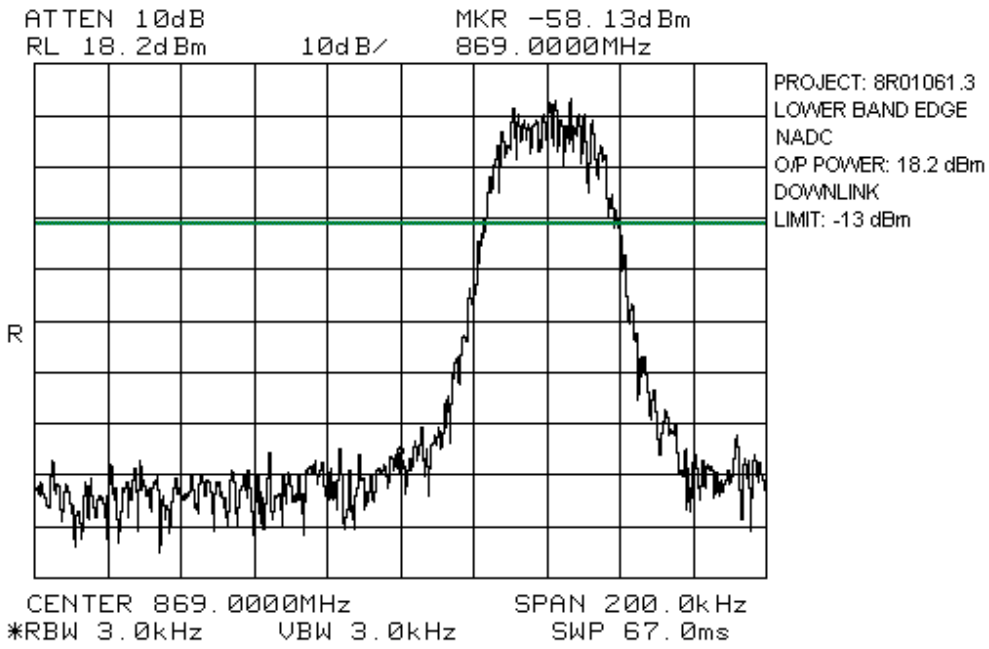

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -20.83dBm
824.0000MHz
PROJECT: 8R01061.2
CDMA
LOWER BANDEDGE
O/P POWER: 8.4 dBm
UPLINK
LIMIT: -13 dBM
R
CENTER 824.0000MHz
SPAN 500.0kHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

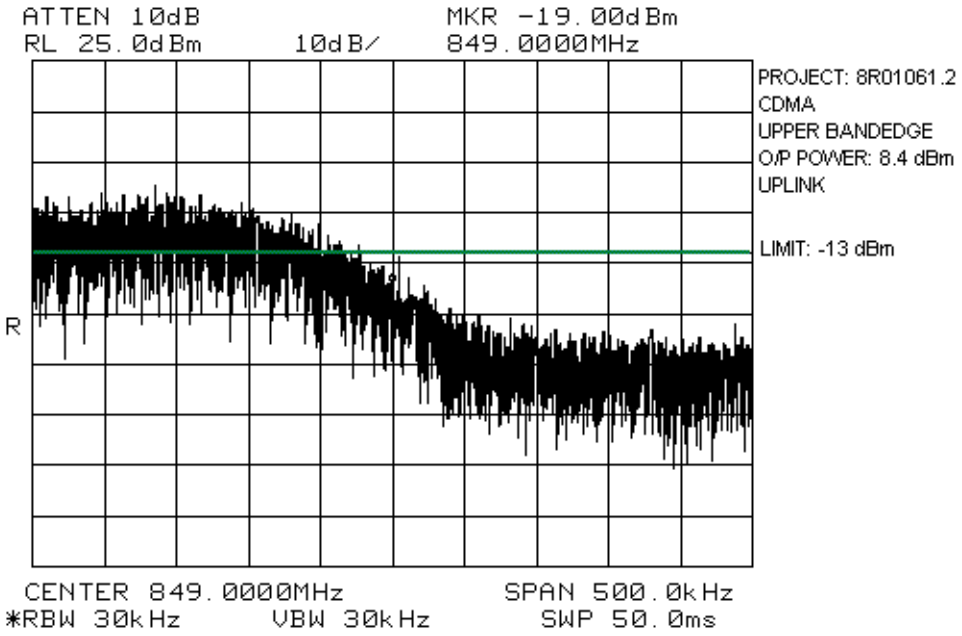

ATTEN 10dB
RL 20.0dBm
10dB/
MKR -32.17dBm
824.000MHz
PROJECT: 8R01061.2
LOWER BAND EDGE
GSM
O/P POWER: 12.5 dBm
UPLINK
LIMIT: -13 dBm
R
CENTER 824.000MHz
SPAN 1.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

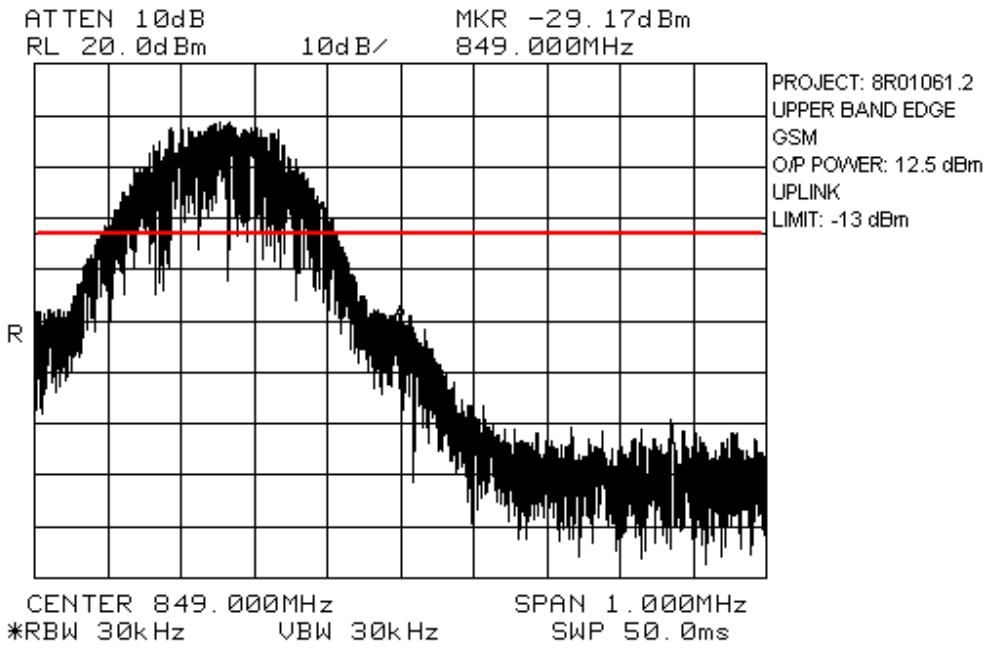

ATTEN 10dB
RL 25.0dBm
10dB/
PROJECT: 8R01061.2
NADC
LOWER BAND EDGE
O/P POWER: 9.0 dBm
UPLINK
LIMIT: -13 dBm
R
CENTER 824.0000MHz
SPAN 100.0kHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 67.0ms

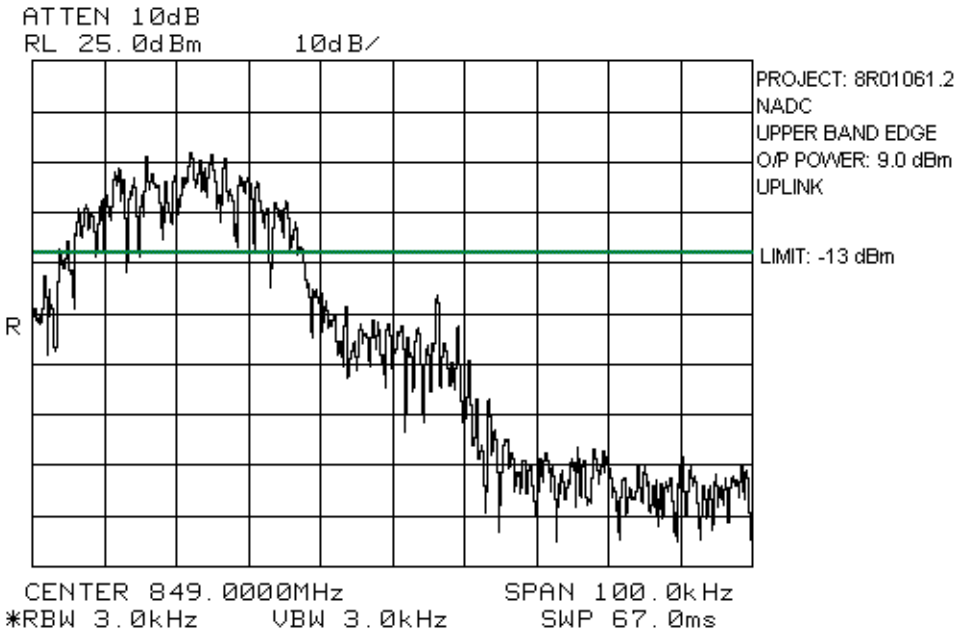

ATTEN 10dB
RL 19.5dBm
VAVG 6
10dB/
MKR -20.00dBm
869.000MHz
PROJECT: 8R01061.2
LOWER BAND EDGE
O/P POWER: 19.5 dBm
DOWNLINK
CDMA
LIMIT: -13 dBm
D
R
CENTER 869.000MHz
SPAN 1.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

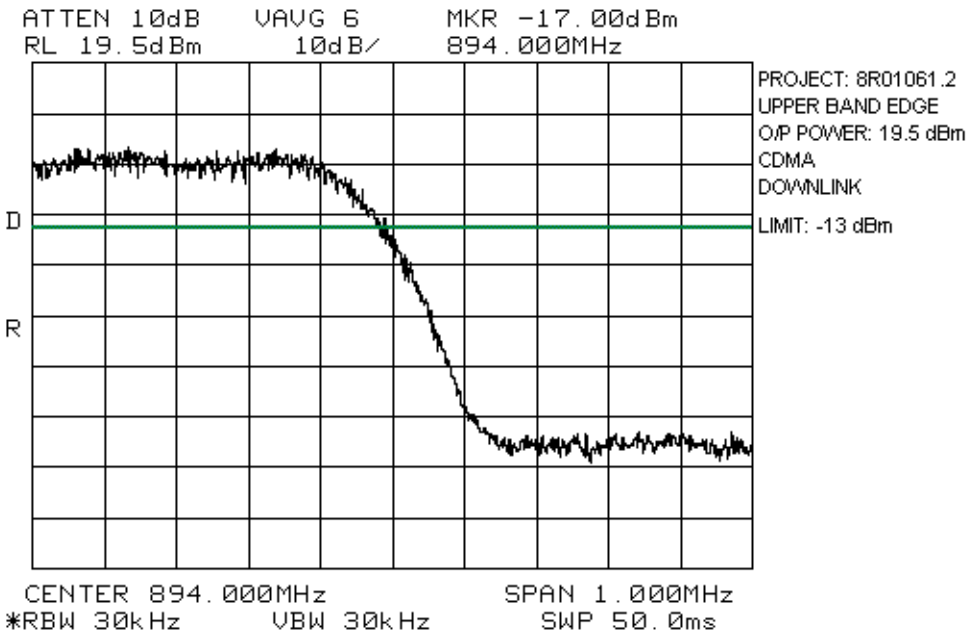

ATTEN 10dB
RL 21.0dBm
10dB/
MKR -19.50dBm
869.000MHz
PROJECT: 8R01061
LOWER BAND EDGE
GSM
O/P POWER: 21.0 dBm
DOWNLINK
LIMIT: -13 dBM
R
CENTER 869.000MHz
SPAN 1.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

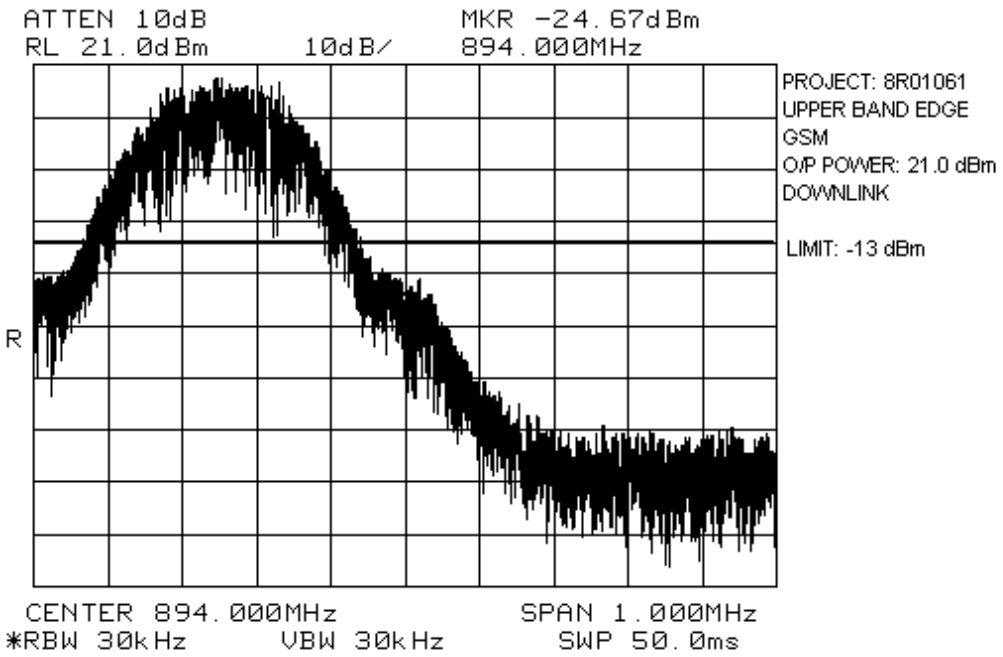

ATTEN 10dB
RL 18.2dBm
10dB/
MKR -58.13dBm
869.0000MHz
PROJECT: 8R01061.3
LOWER BAND EDGE
NADC
O/P POWER: 18.2 dBm
DOWNLINK
LIMIT: -13 dBm
R
CENTER 869.0000MHz
SPAN 200.0kHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 67.0ms

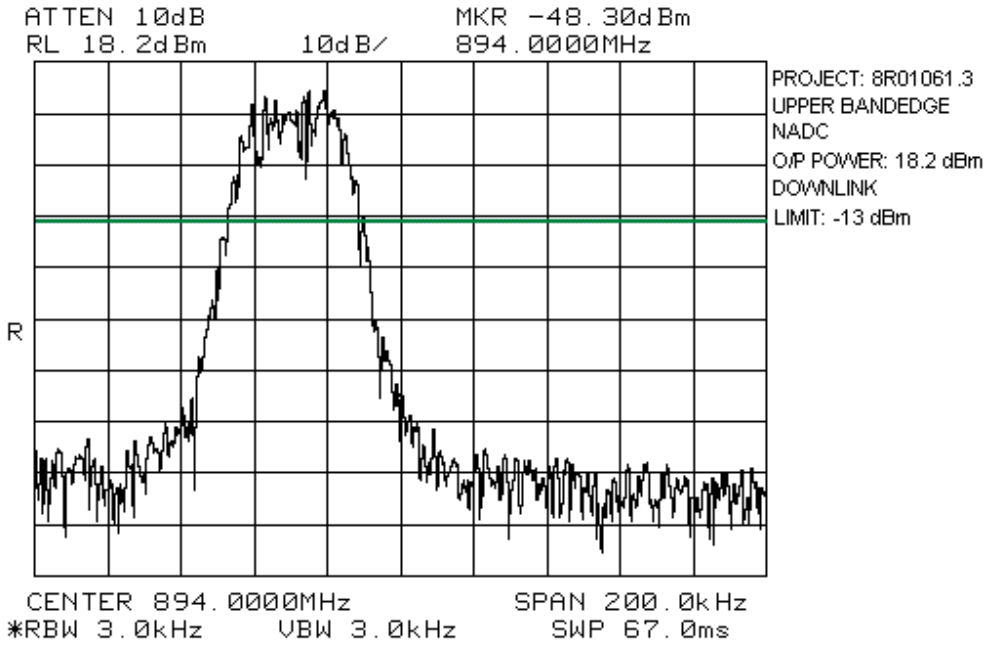

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -19.00dBm
849.0000MHz
PROJECT: 8R01061.2
CDMA
UPPER BANDEDGE
O/P POWER: 8.4 dBm
UPLINK
LIMIT: -13 dBm
R
CENTER 849.0000MHz
SPAN 500.0kHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 20.0dBm
10dB/
MKR -29.17dBm
849.000MHz
PROJECT: 8R01061.2
UPPER BAND EDGE
GSM
O/P POWER: 12.5 dBm
UPLINK
LIMIT: -13 dBm
R
CENTER 849.000MHz
SPAN 1.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 25.0dBm
10dB/
PROJECT: 8R01061.2
NADC
UPPER BAND EDGE
O/P POWER: 9.0 dBm
UPLINK
LIMIT: -13 dBm
R
CENTER 849.0000MHz
SPAN 100.0kHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 67.0ms


ATTEN 10dB
VAVG 6
MKR -17.00dBm
RL 19.5dBm
10dB/
894.000MHz
PROJECT: 8R01061.2
UPPER BAND EDGE
O/P POWER: 19.5 dBm
CDMA
DOWNLINK
D
LIMIT: -13 dBm
R
CENTER 894.000MHz
SPAN 1.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 21.0dBm
10dB/
MKR -24.67dBm
894.000MHz
PROJECT: 8R01061
UPPER BAND EDGE
GSM
O/P POWER: 21.0 dBm
DOWNLINK
LIMIT: -13 dBm
R
CENTER 894.000MHz
SPAN 1.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 18.2dBm
10dB/
MKR -48.30dBm
894.0000MHz
PROJECT: 8R01061.3
UPPER BANDEDGE
NADC
O/P POWER: 18.2 dBm
DOWNLINK
LIMIT: -13 dBm
R
CENTER 894.0000MHz
SPAN 200.0kHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 67.0ms

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious	PARA. NO.: 2.917(e)
TESTED BY: Kevin Carr	DATE: March 31, 1999

Test Results: Complies. The maximum field strength is 69.4 dBµV/m @ 1666 @ 3m below the specified limit by 12.9 dB.

Test Data: See attached table.

Test Data - Radiated Emissions – Uplink

Test Distance (meters) : 3		Range: A Tower		Receiver: HP8565E		RBW(1 MHz): 1 MHz		Detector: PEAK			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Table (deg.)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1666.0	Hrn2	V			75.8	29.3	-41.6		63.5	82.3	18.8
1666.0	Hrn2	H			81.7	29.3	-41.6		69.4	82.3	12.9
2499.1	Hrn2	V			73.7	31.2	-46.0		58.9	82.3	23.4
2499.2	Hrn2	H			70.3	31.2	-46.0		55.5	82.3	26.8
3332.0	Hrn2	V			45.5	34.3	-42.9		36.9	82.3	45.4
3332.0	Hrn2	H			52.2	34.3	-42.9		43.6	82.3	38.7
4165.0	Hrn2	V			58.5	36.5	-42.9		52.1	82.3	30.2
4165.0	Hrn2	H			58.0	36.5	-42.9		51.6	82.3	30.7
4998.0	Hrn2	V			62.7	39.1	-44.5		57.3	82.3	25.0
4998.0	Hrn2	H			61.8	39.1	-44.5		56.4	82.3	25.9
5831.0	Hrn2	V			51.3	41.5	-41.8		51.0	82.3	31.3
5831.0	Hrn2	H			54.3	41.5	-41.8		54.0	82.3	28.3
6663.8	Hrn2	V			49.2	43.3	-41.4		51.1	82.3	31.2
6664.0	Hrn2	H			52.5	43.3	-41.4		54.4	82.3	27.9
7497.1	Hrn2	V			50.2	44.8	-42.0		53.0	82.3	29.3
7497.0	Hrn2	H			47.7	44.8	-42.0		50.5	82.3	31.8
8333.0	Hrn2	V			46.0	48.5	-44.0		50.5	82.3	31.8
8333.0	Hrn2	H			46.5	48.5	-44.0		51.0	82.3	31.3

Notes:
The spectrum was search up to the 10th harmonic of the fundamental frequency.
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole
* Includes cable loss when amplifier is not used.
** Includes cable loss.
( ) Denotes failing emission level.

Test Data - Radiated Emissions – Downlink

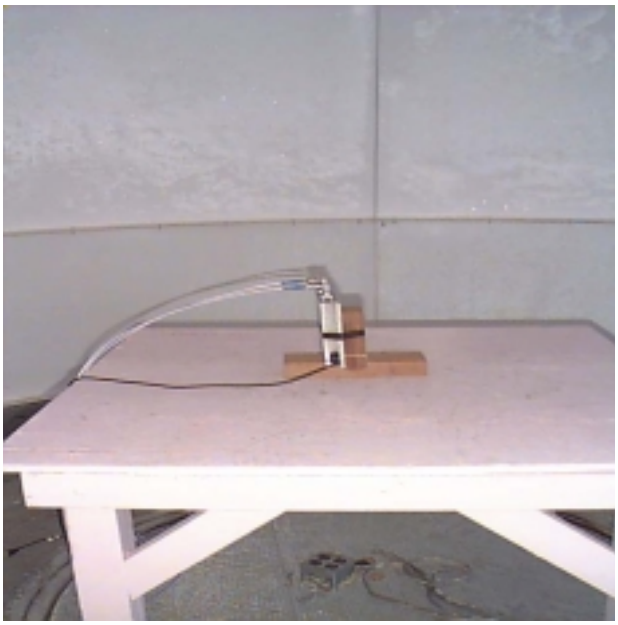
Test Distance (meters) : 3		Range: A Tower		Receiver: HP8565E		RBW(1 MHz): 1 MHz		Detector: PEAK			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Table (deg.)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1760.0	Hrn2	V			46.4	29.8	-43.1		33.1	82.3	49.2
1760.0	Hrn2	H			47.4	29.8	-43.1		34.1	82.3	48.2
2460.0	Hrn2	V			40.7	31.6	-45.5		26.8	82.3	55.5
2460.0	Hrn2	H			41.1	31.6	-45.5		27.2	82.3	55.1
3519.0	Hrn2	V			40.8	35.3	-42.2		33.9	82.3	48.4
3519.0	Hrn2	H			40.8	35.3	-42.2		33.9	82.3	48.4
4400.0	Hrn2	V			43.0	37.0	-43.2		36.8	82.3	45.5
4400.0	Hrn2	H			42.8	37.0	-43.2		36.6	82.3	45.7
5280.0	Hrn2	V			39.6	39.7	-44.0		35.3	82.3	47.0
5280.0	Hrn2	H			41.5	39.7	-44.0		37.2	82.3	45.1
6160.0	Hrn2	V			42.0	42.5	-40.8		43.7	82.3	38.6
6160.0	Hrn2	H			41.7	42.5	-40.8		43.4	82.3	38.9
7040.0	Hrn2	V			42.0	44.1	-42.6		43.5	82.3	38.8
7040.0	Hrn2	H			45.5	44.1	-42.6		47.0	82.3	35.3
7920.0	Hrn2	V			41.0	45.8	-40.6		46.2	82.3	36.1
7920.0	Hrn2	H			40.0	45.8	-40.6		45.2	82.3	37.1
8800.0	Hrn2	V			40.4	49.9	-43.1		47.2	82.3	35.1
8800.0	Hrn2	H			40.6	49.9	-43.1		47.4	82.3	34.9

Notes:
The spectrum was search up to the 10th harmonic of the fundamental frequency.
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole
* Includes cable loss when amplifier is not used.
** Includes cable loss.
( ) Denotes failing emission level.

Photographs of Test Setup

Front View

Rear View



Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 22.355
TESTED BY:	DATE:

Test Results: Complies/Does Not Comply.

Measurement Data: Standard Test Frequency: _____ MHz
Standard Test Voltage: _____ Vdc

NOT APPLICABLE

Section 8. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.	
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	May 20/98	May 20/99	
1 Year	Spectrum Analyzer-**2**	Hewlett Packard	8566B	1950A00400	July 22/98	July 22/99	
1 Year	Spectrum Analyzer Display-**2**	Hewlett Packard	85662A	1950A01177	July 22/98	July 22/99	
1 Year	Quasi Peak Adaptor-**2**	Hewlett Packard	85650A	2251A00620	July 22/98	July 22/99	
	Power Supply	Astron	VS-50M	8405071	NCR	NCR	
1 Year	Attenuator	Narda	768-20	9507	July 24/98	July 24/99	
1 Year	Attenuator	Narda	765-20	9510	July 24/98	July 24/99	
1 Year	RF Millivoltmeter	Rohde & Schwarz	URV5	FA000420	July 23/98	July 23/99	
1 Year	Insertion Unit	Rohde & Schwarz	URV5-Z4	FA000905	July 23/98	July 23/99	
2 Year	Horn Antenna	EMCO #2	3115	4336	Oct. 30/97	Oct. 30/99	
1 Year	50 ohm Combiner Pad	Mini Circuits	ZA3PD-2	9746	July 23/98	July 23/99	
1 Year	Low Noise Amplifier	Avantek	AWT-8035	1005	Aug. 4/98	Aug. 4/99	
1 Year	Low Noise Amplifier	DBS Microwave	DWT-13035	9623	Aug. 4/98	Aug. 4/99	
1 Year	Signal Generator	Rohde & Schwarz	SM1Q03	1084-8004-03	July 23/98	July 23/99	
1 Year	Arbitrary Waveform Gen.	Sony/Tektronix	AWG2021	J310495	NCR	NCR	
3 Year	Standard Gain Horn	Electro-Metrics	SH-50/60-1	FA000479	July 29/97	July 29/00	
3 Year	RF Generator	Rohde & Schwarz	SME3	DE14439	June 29/96	June 29/99	
1 Year	RF AMP	Comtest	GPA301	BCS320-1040	NCR	NCR	

NA: Not Applicable
NCR: No Cal Required

ANNEX A

TEST METHODOLOGIES

NAME OF TEST: RF Power Output	**PARA. NO.: 2.985**

Minimum Standard: Para. No. 22.913(a). The maximum effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 watts.

Method Of Measurement:

Detachable Antenna:
The peak power at antenna terminals is measured using an in-line peak power meter. Power output is measured with the maximum rated input level.

Integral Antenna:
If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts
E = the maximum measured field strength in V/m
R = the measurement range (3 meters)
G = the numeric gain of the transmit antenna in relation to an isotropic radiator

NAME OF TEST: Occupied Bandwidth (Voice & SAT) PARA. NO.: 2.989

Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

(i) On any frequency removed from the carrier frequency by more than 12 kHz but not more than 20 kHz:

at least 117 log (f_d/12)

(ii) On any frequency removed from the carrier frequency by more than 20 kHz, up to the first multiple of the carrier frequency:

at least 100 log (f_d/11) dB or 43 + 10 log (P) dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:

RBW: 300 Hz
VBW: ≥ RBW
Span: 100 kHz
Sweep: Auto
Mask: CELLF3E

Input Signal Characteristics (F3E/F3D):

RF level: Maximum recommended by manufacturer
AF1 frequency: 6 kHz
AF1 level: sufficient to produce 2 kHz deviation
AF2 frequency: 2.5 kHz
AF2 level: sufficient to produce 12 kHz deviation.

NAME OF TEST: Occupied Bandwidth (WB Data) PARA. NO.: 2.989

Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz:

at least 26 dB

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:

at least 45 dB

(3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or 43 + 10 log (P) dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:
RBW: 300 Hz
VBW: ≥ RBW
Span: 200 kHz
Sweep: Auto
Mask: CELLF1D

Input Signal Characteristics:
RF level: Maximum recommended by manufacturer
AF1 frequency: 10 kHz, random bit sequence
AF1 level: sufficient to produce 8 kHz deviation

NAME OF TEST: Occupied Bandwidth (ST)	**PARA. NO.: 2.989**

Minimum Standard: 22.917(c) The mean power of any emission removed from the carrier frequency by a displacement frequency (f_d in kHz) must be attenuated below the mean power of the unmodulated carrier (P) as follows:

(1) On any frequency removed from the carrier frequency by more than 20 kHz but not more than 45 kHz:

at least 26 dB

(2) On any frequency removed from the carrier frequency by more than 45 kHz but not more than 90 kHz:

at least 45 dB

(3) On any frequency removed from the carrier frequency by more than 90 kHz, up to the first multiple of the carrier frequency:

at least 60 dB or 43 + 10 log (P) dB, whichever is the lesser attenuation.

Method Of Measurement:

Spectrum Analyzer Settings:
RBW: 300 Hz
VBW: ≥ RBW
Span: 200 kHz
Sweep: Auto
Mask: CELLF1D

Input Signal Characteristics:
RF level: Maximum recommended by manufacturer
AF1 frequency: 10 kHz tone
AF1 level: sufficient to produce 8 kHz deviation

NAME OF TEST: Occupied Bandwidth (Digital Modulation) PARA. NO.: 2.989

Minimum Standard: Not defined by FCC. Input vs. Output.

Method Of Measurement:

Spectrum Analyzer Settings:
RBW: CDMA (30 kHz), GSM (30 kHz), NADC (1 kHz) and CDPD (1 kHz)
VBW: ≥ RBW
Span: As required
Sweep: Auto
Mask:

Input Signal Characteristics:
RF level: Maximum recommended by manufacturer

NAME OF TEST: Spurious Emission at Antenna Terminals PARA. NO.: 2.991

Minimum Standard: Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least 43 + 10 log P. This is equivalent to -13 dBm absolute power.

Method Of Measurement:

Spectrum Analyzer Settings:
RBW: 30 kHz (AMPS). As required for digital modulations.
VBW: ≥ RBW
Start Frequency: 0 MHz
Stop Frequency: 10 GHz
Sweep: Auto

NAME OF TEST: Field Strength of Spurious Radiation PARA. NO.: 2.993

Minimum Standard: Para. No. 22.917(e). The mean power of emissions must be attenuated below the mean power of the unmodulated carrier on any frequency twice or more than twice the fundamental emission by at least 43 + 10 log P. This is equivalent to -13 dBm absolute power.

Calculation Of Field Strength Limit:

An example of attenuation requirement of 43 + 10 Log P is equivalent to -13 dBm (5×10^{-5} Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

$GP/4\pi R^2 = E^2/120\pi$

For emissions ≤ 1 GHz:

G = 1.64 (Dipole Gain)
P = 10^{-5} Watts (Maximum spurious output power)
R = 3m (Measurement Distance)

$$E = \frac{\sqrt{30GP}}{R}$$

$$E = \frac{\sqrt{30 \times 1.64 \times 5 \times 10^{-5}}}{3} = 0.016533 \text{ V/m} = 84.4 \text{ dB}\mu\text{V/m}$$

For emissions > 1 GHz:

G = 1 (Isotropic Gain)
P = 1×10^{-5} Watts (Maximum spurious output power)
R = 3m (Measurement Distance)

$$E = 84.4 - 20Log\sqrt{1.64} = 82.3 dB\mu V / m@3m$$

The spectrum is searched to 10 GHz.

NAME OF TEST: Frequency Stability **PARA. NO.: 2.995**

Minimum Standard: Para. No. 22.355. The transmitter carrier frequency shall remain within the tolerances given in Table C-1.

Freq. Range (MHz)	Base, fixed	Mobile > 3 W	Mobile ≤ 3 W
821 to 896	1.5	2.5	2.5

Table C-1

Method Of Measurement:

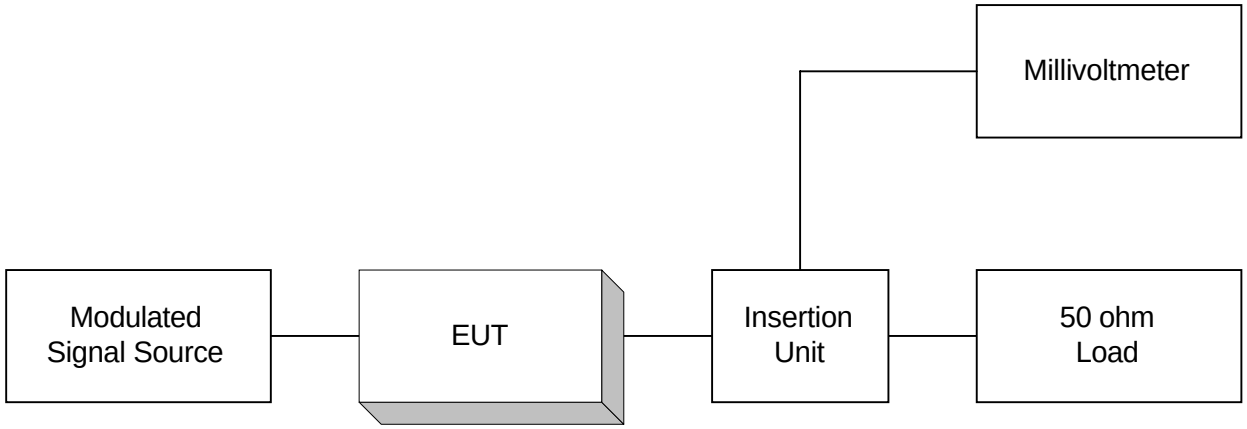
Frequency Stability With Voltage Variation:
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation:
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

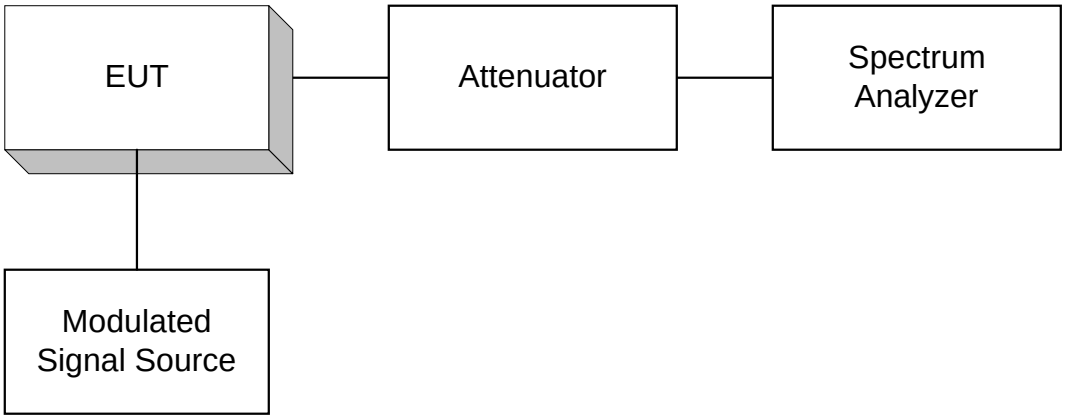
ANNEX B

TEST DIAGRAMS

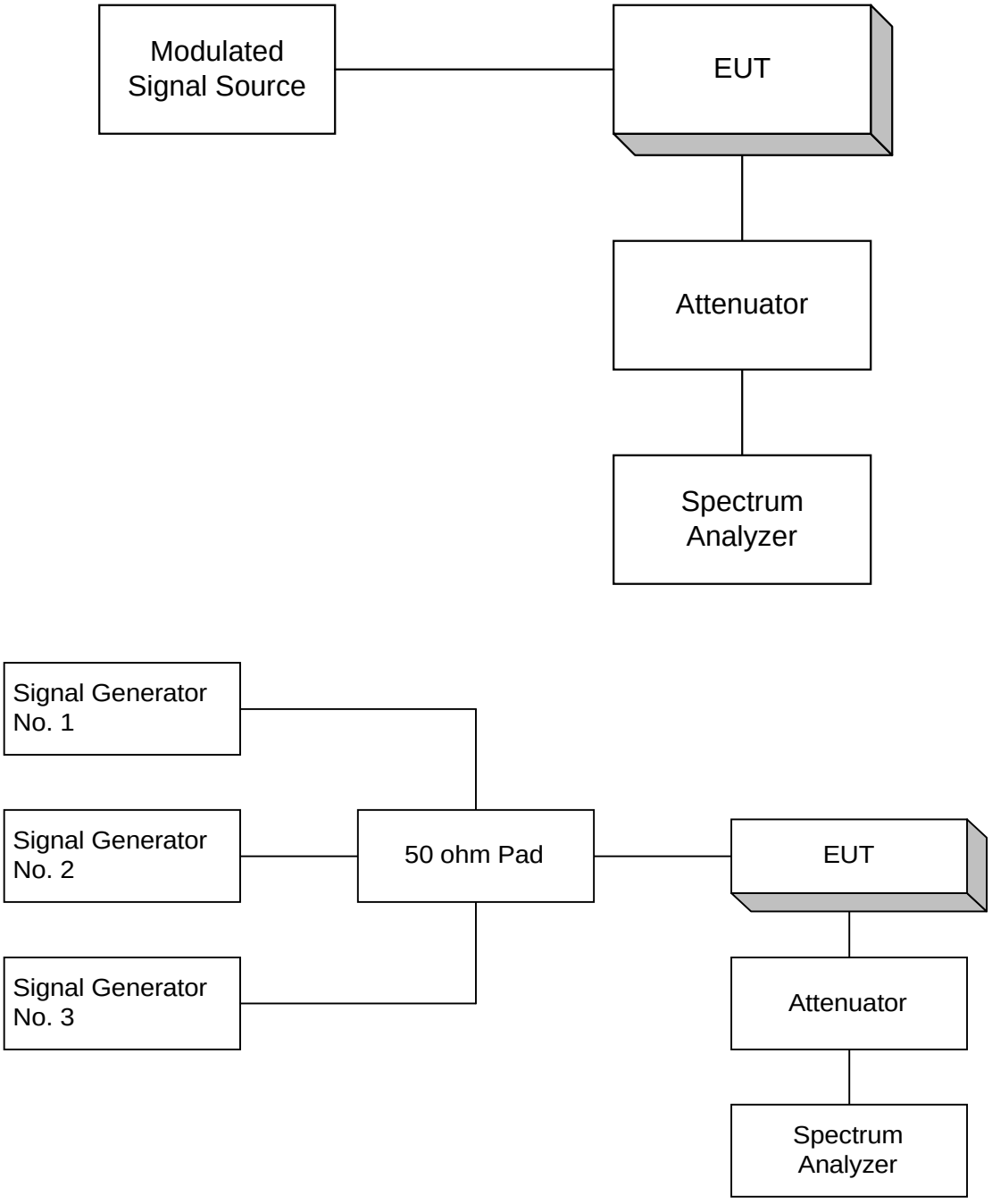
Para. No. 2.985 - R.F. Power Output



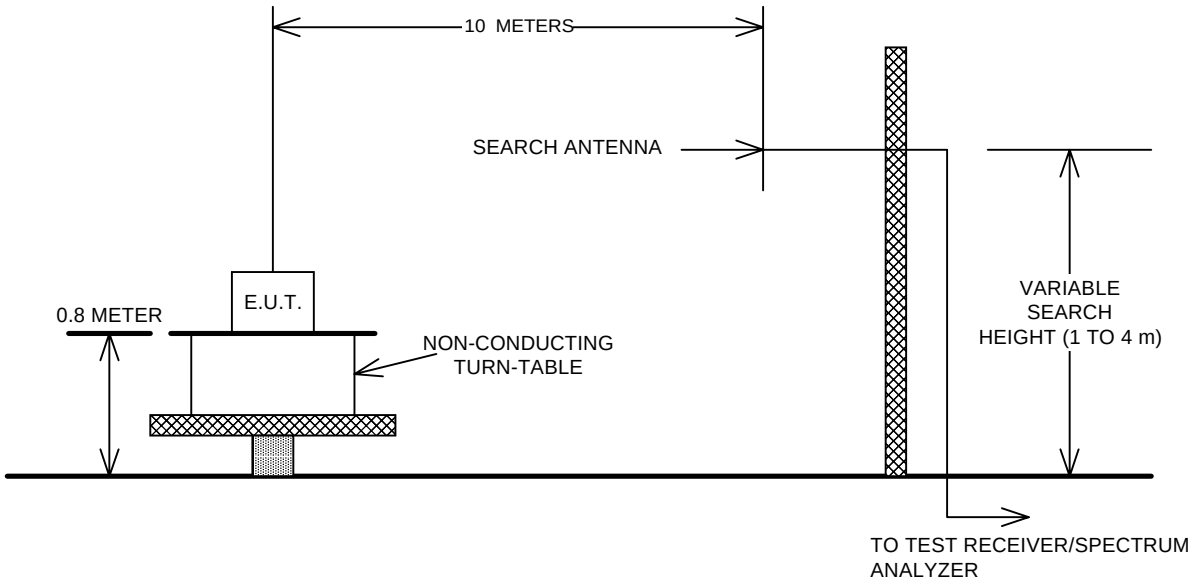
Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability