KTL Test Report:	8R01061
Applicant:	Allen Telecom Group 140 Vista Centre Drive Forest, Virginia 24551
Equipment Under Test: (E.U.T.)	TFB 1915 Booster Amp
FCC ID:	BCR-BCEL-1915BA
In Accordance With:	**FCC Part 24, Subpart E** Broadband PCS Base Station
Tested By:	KTL Ottawa Inc. 3325 River Road, R.R. 5 Ottawa, Ontario K1V 1H2
Authorized By:	_____ T. Tidwell, Wireless Group Manager
Date:	_____
Total Number of Pages:	86

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Section 1. Summary of Test Results

Manufacturer: Allen Telecom Group

Model No.: TFB 1915

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 24, Subpart E.

☒ New Submission ☐ Production Unit

☐ Class II Permissive Change ☒ Pre-Production Unit

T	N	B

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

TECHNICAL REVIEW:_____ DATE:_____

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	24.232	100W	0.012W	Complies
Occupied Bandwidth (CDMA)	24.238	N/A	Plot	Complies
Occupied Bandwidth (GSM)	24.238	N/A	Plot	Complies
Occupied Bandwidth (NADC)	24.238	N/A	Plot	Complies
Spurious Emissions at Antenna Terminals	24.238(a)	-13 dBm	-13.0 dBm	Complies
Field Strength of Spurious Emissions	24.238(a)	-13 dBm E.I.R.P.	-30.3 dBm	Complies
Frequency Stability	24.235	± 0.05 ppm	N/A	N/A

Footnotes For N/A's:

Test Conditions: **LAB:** Temperature: 19 °C
Humidity: 27 %

OATS: Temperature: -10 °C
Humidity: 20 %

Section 2. General Equipment Specification

Supply Voltage Input:	120 VAC, 60 Hz
Frequency Range(s):	1850 – 1910 MHz / 1930 – 1990 MHz
Type of Modulation and Designator:	**CDMA (F9W)** ☒ **GSM (GXW)** ☒ **NADC (DXW)** ☒
Emission & Bandwidth Designator:	Not Applicable
Output Impedance:	50 ohm
RF Output (Rated):	0.012 W
Band Selection:	**Software** ☐ **Duplexer Change** ☐ **Fullband Coverage** ☒

Description of Modifications For Class II Permissive Change

NOT APPLICABLE

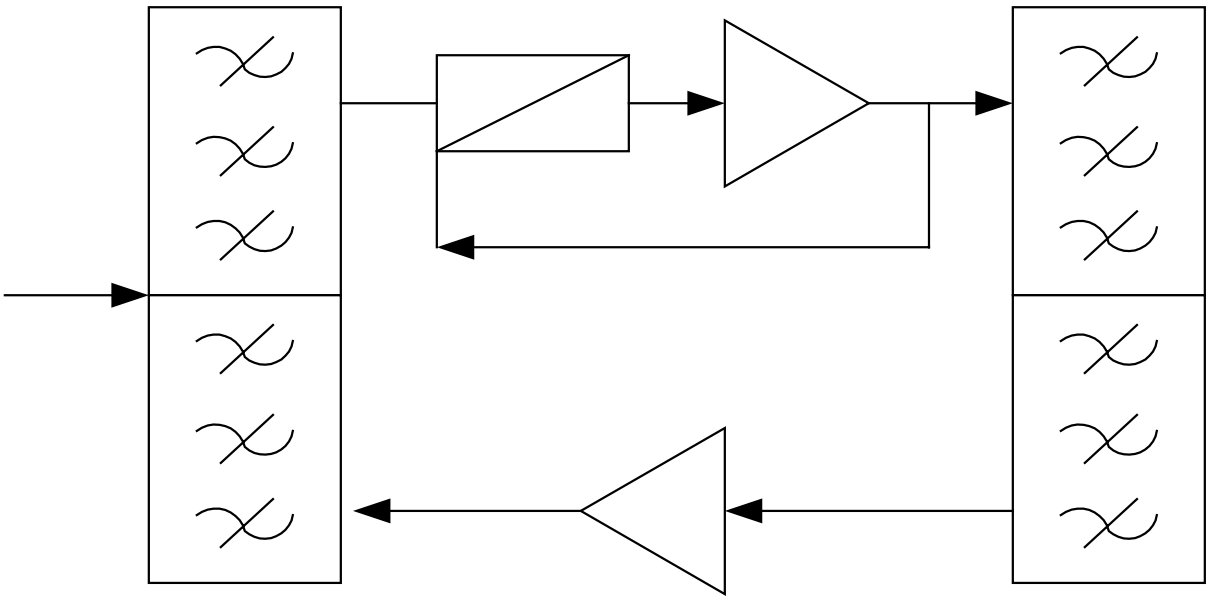
Modifications Made During Testing

NOT APPLICABLE

System Description

The RF Booster Units TFB are intended to enhance the transmit power capabilities of the Brite Cell 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 7, 1998

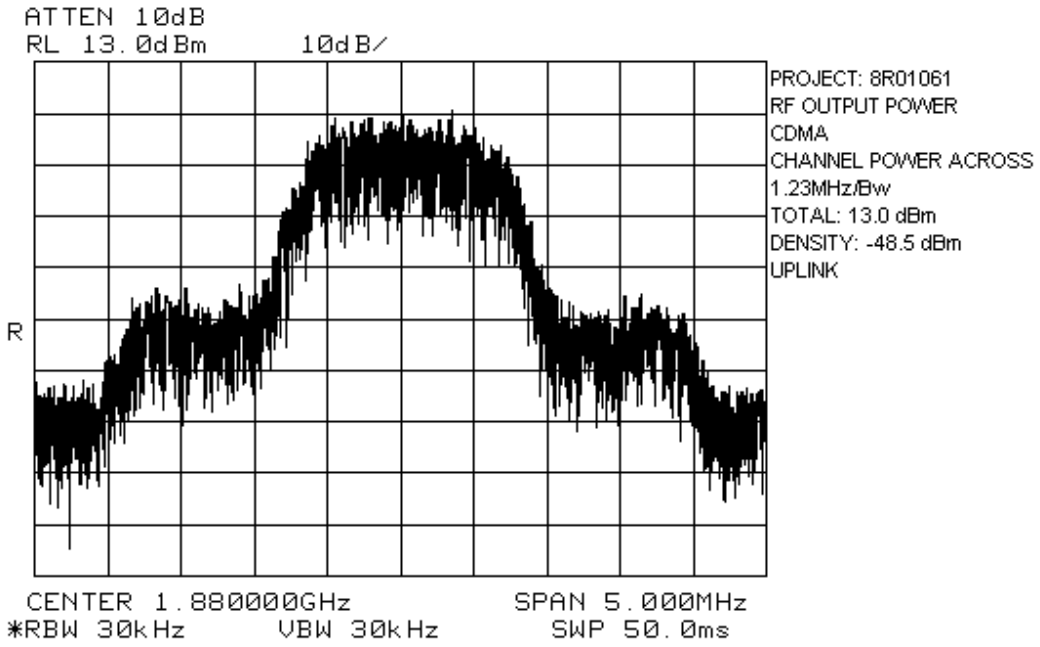
Test Results: Complies.

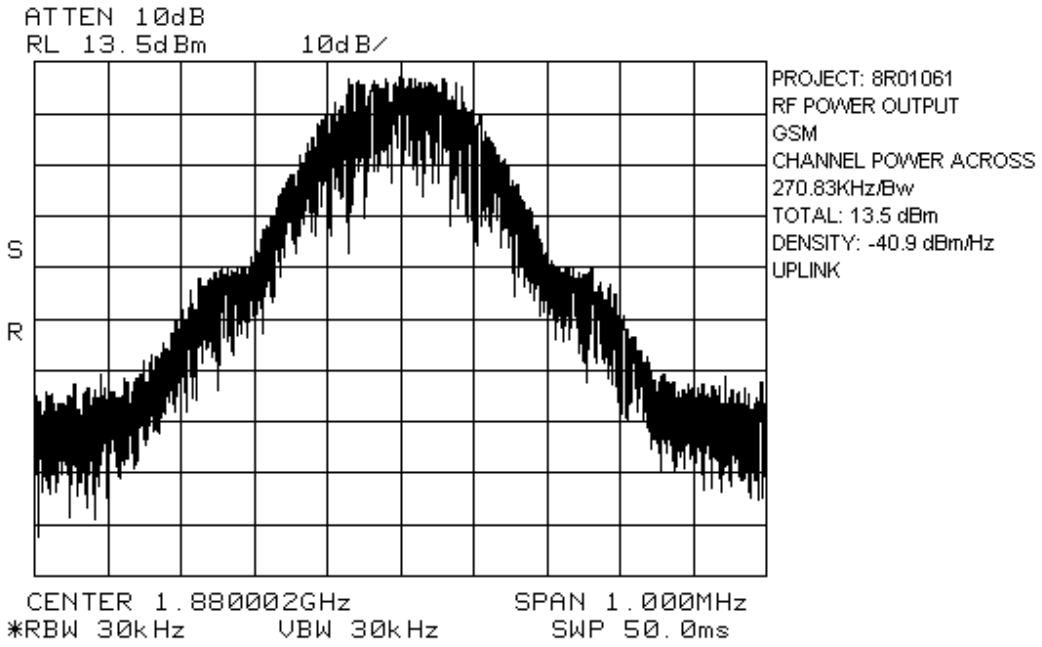
Measurement Data: **Uplink**

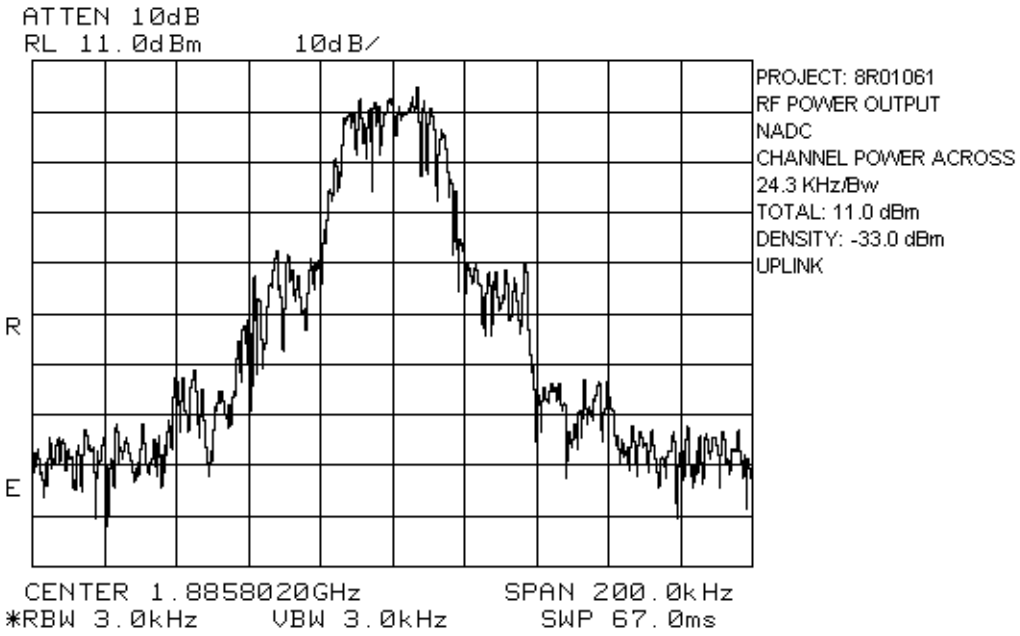
Modulation Type	Output Power (dBm)	Output Power (w)
CDMA	13.0	0.0200
GSM	13.5	0.0224
NADC	11.0	0.0126

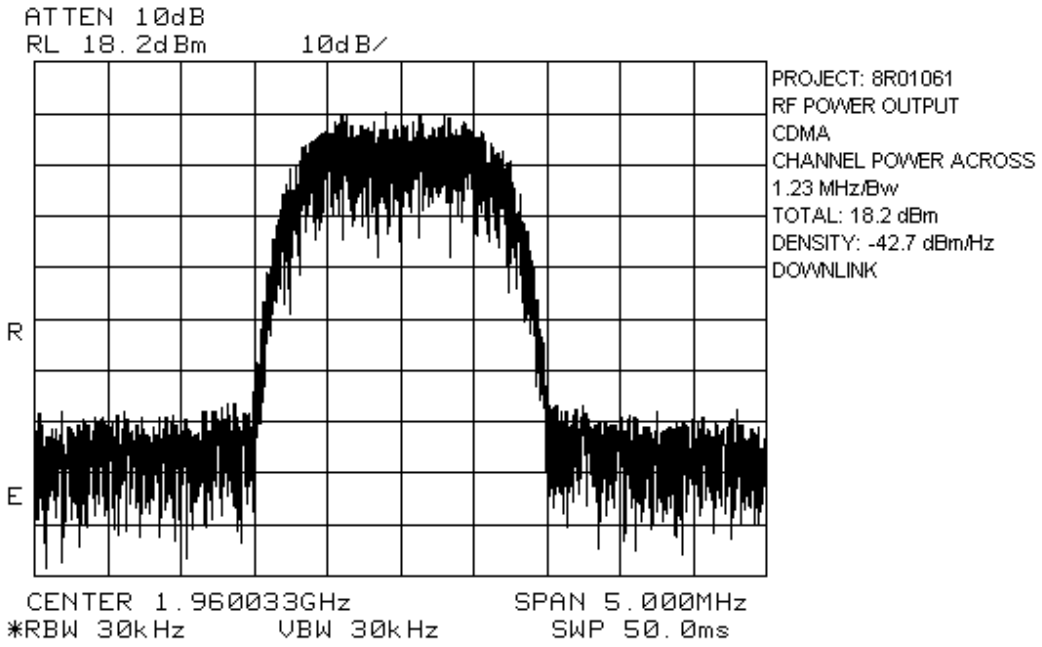
Downlink

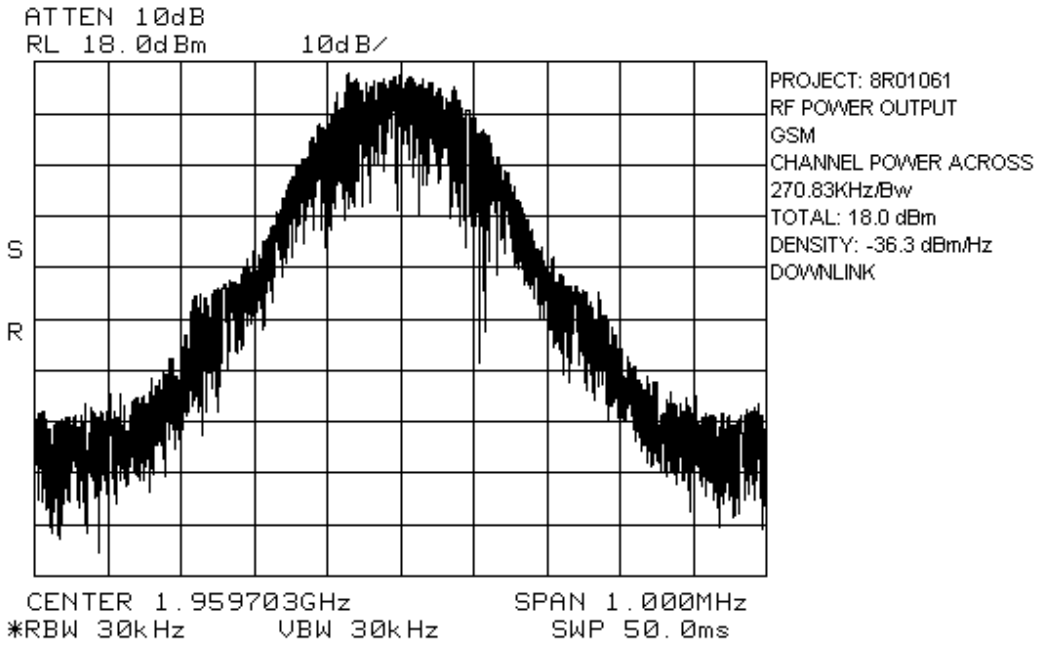
Modulation Type	Output Power (dBm)	Output Power (w)
CDMA	18.2	0.0661
GSM	18.0	0.0631
NADC	17.7	0.0589

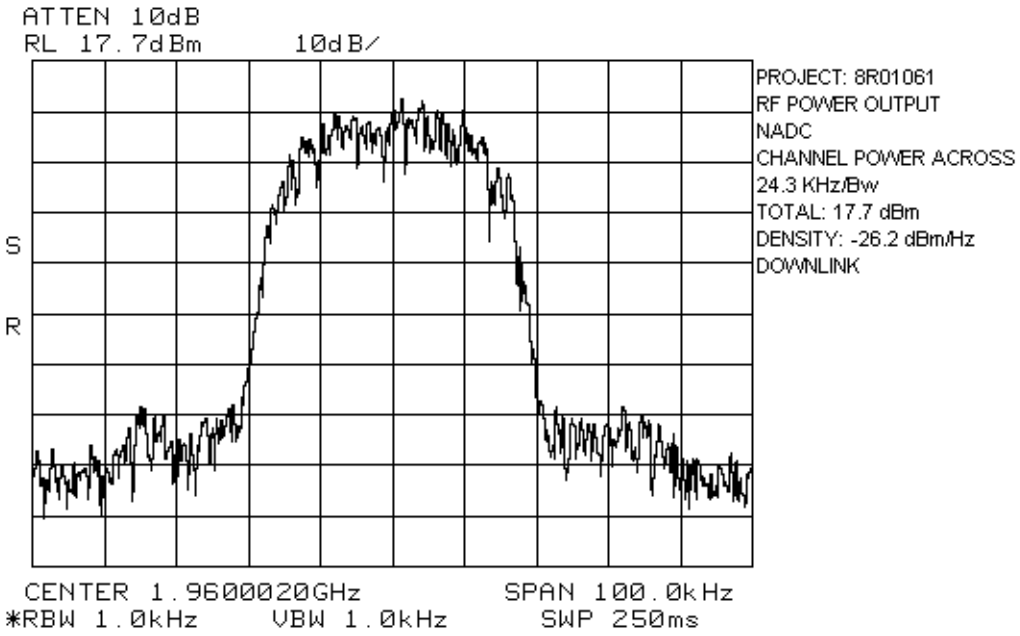

ATTEN 10dB
RL 13.0dBm
10dB/
R
PROJECT: 8R01061
RF OUTPUT POWER
CDMA
CHANNEL POWER ACROSS
1.23MHz/Bw
TOTAL: 13.0 dBm
DENSITY: -48.5 dBm
UPLINK
CENTER 1.880000GHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 13.5dBm
10dB/
S
R
PROJECT: 8R01061
RF POWER OUTPUT
GSM
CHANNEL POWER ACROSS
270.83KHz/Bw
TOTAL: 13.5 dBm
DENSITY: -40.9 dBm/Hz
UPLINK
CENTER 1.880002GHz
SPAN 1.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 11.0dBm
10dB/
PROJECT: 8R01061
RF POWER OUTPUT
NADC
CHANNEL POWER ACROSS
24.3 KHz/Bw
TOTAL: 11.0 dBm
DENSITY: -33.0 dBm
UPLINK
R
E
CENTER 1.8858020GHz
SPAN 200.0kHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 67.0ms


ATTEN 10dB
RL 18.2dBm
10dB/
PROJECT: 8R01061
RF POWER OUTPUT
CDMA
CHANNEL POWER ACROSS
1.23 MHz/Bw
TOTAL: 18.2 dBm
DENSITY: -42.7 dBm/Hz
DOWNLINK
R
E
CENTER 1.960033GHz
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

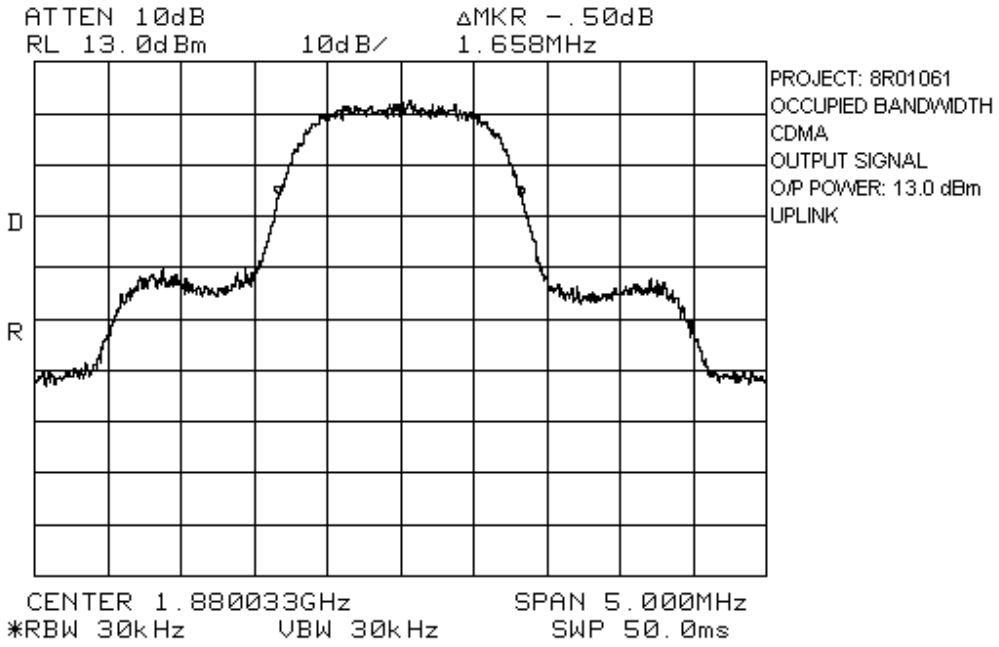

ATTEN 10dB
RL 17.7dBm
10dB/
S
R
PROJECT: 8R01061
RF POWER OUTPUT
NADC
CHANNEL POWER ACROSS
24.3 KHz/Bw
TOTAL: 17.7 dBm
DENSITY: -26.2 dBm/Hz
DOWNLINK
CENTER 1.9600020GHz
SPAN 100.0kHz
*RBW 1.0kHz
VBW 1.0kHz
SWP 250ms

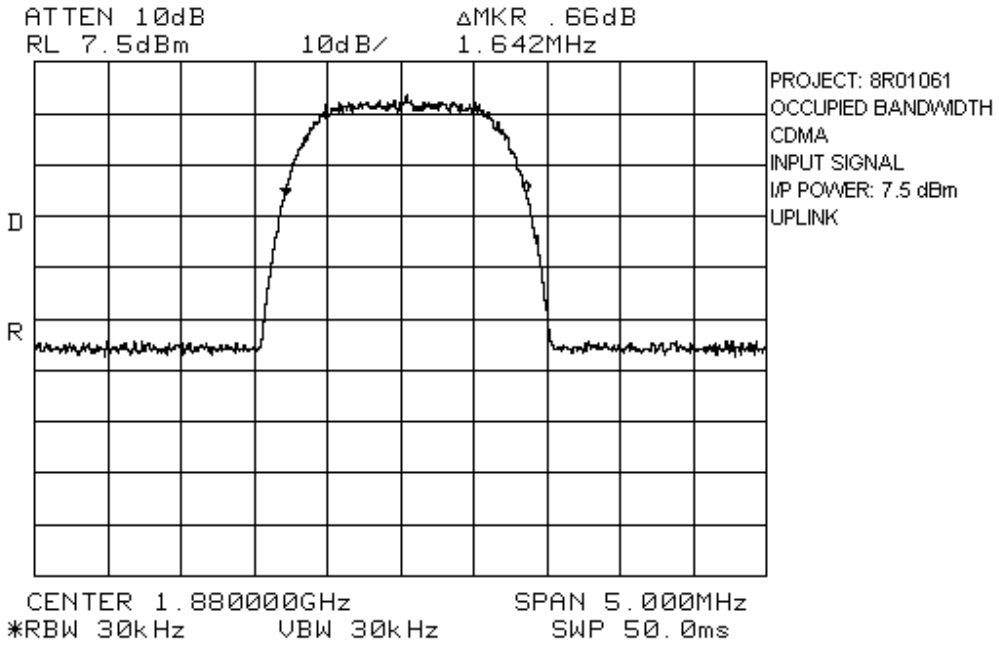
Section 4. Occupied Bandwidth

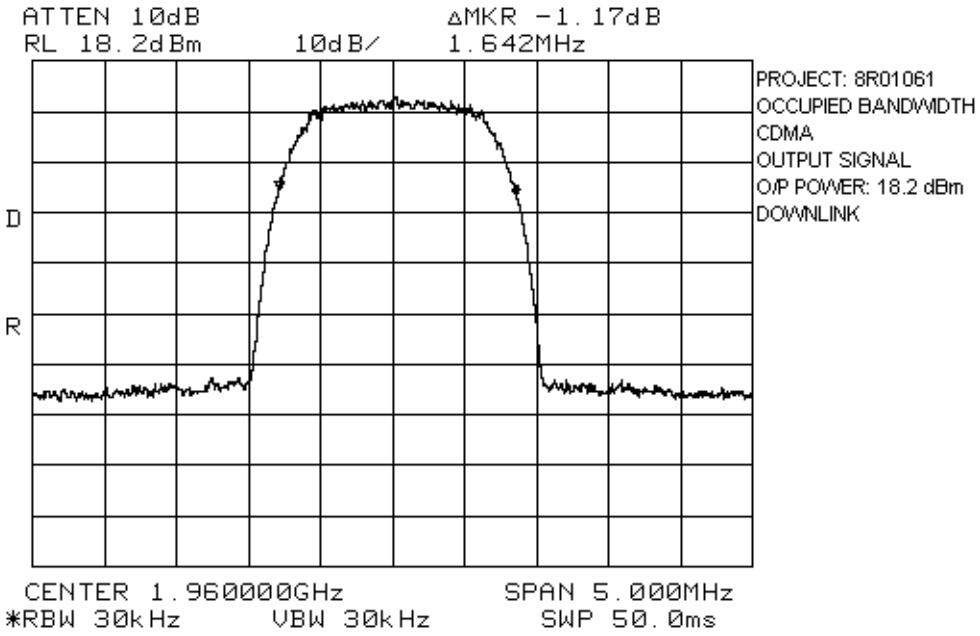
NAME OF TEST: Occupied Bandwidth (CDMA)	PARA. NO.: 2.917(c)
TESTED BY: Kevin Carr	DATE: December 7, 1998

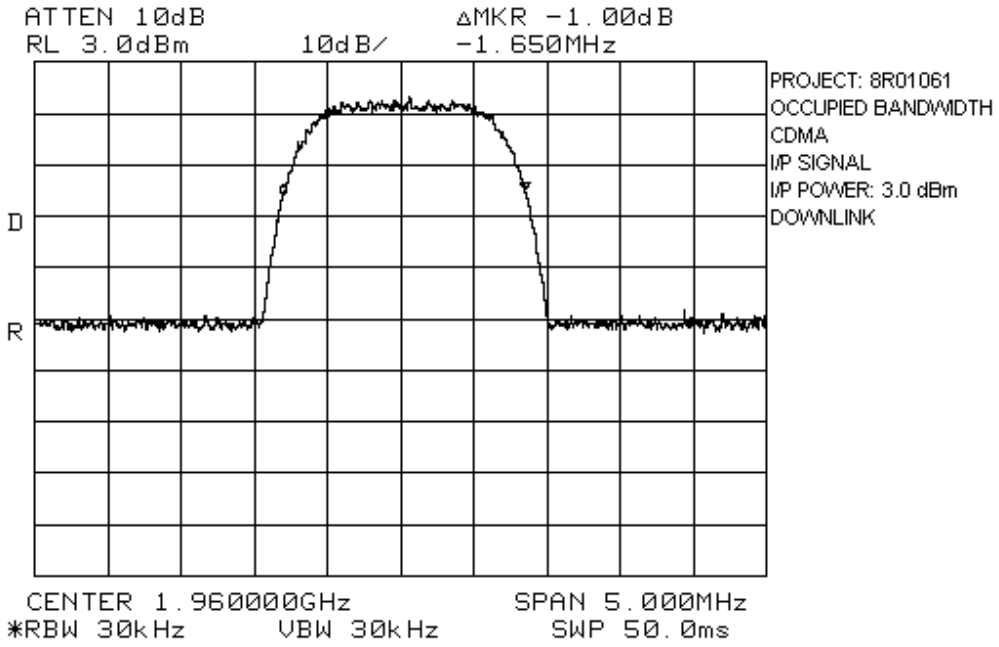
Test Results: Complies.

Test Data: See attached graph(s).


ATTEN 10dB
RL 13.0dBm
10dB/
ΔMKR -.50dB
1.658MHz
PROJECT: 8R01061
OCCUPIED BANDWIDTH
CDMA
OUTPUT SIGNAL
O/P POWER: 13.0 dBm
UPLINK
D
R
CENTER 1.880033GHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 7.5dBm
10dB/
ΔMKR .66dB
1.642MHz
PROJECT: 8R01061
OCCUPIED BANDWIDTH
CDMA
INPUT SIGNAL
I/P POWER: 7.5 dBm
UPLINK
D
R
CENTER 1.880000GHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

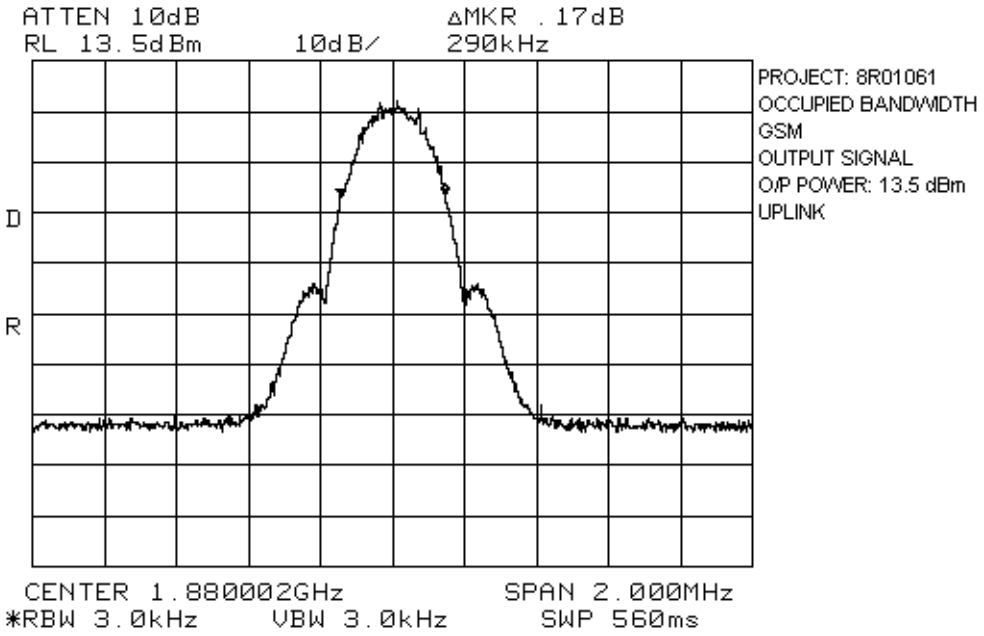

ATTEN 10dB
RL 18.2dBm
10dB/
ΔMKR -1.17dB
1.642MHz
PROJECT: 8R01061
OCCUPIED BANDWIDTH
CDMA
OUTPUT SIGNAL
O/P POWER: 18.2 dBm
DOWNLINK
D
R
CENTER 1.960000GHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

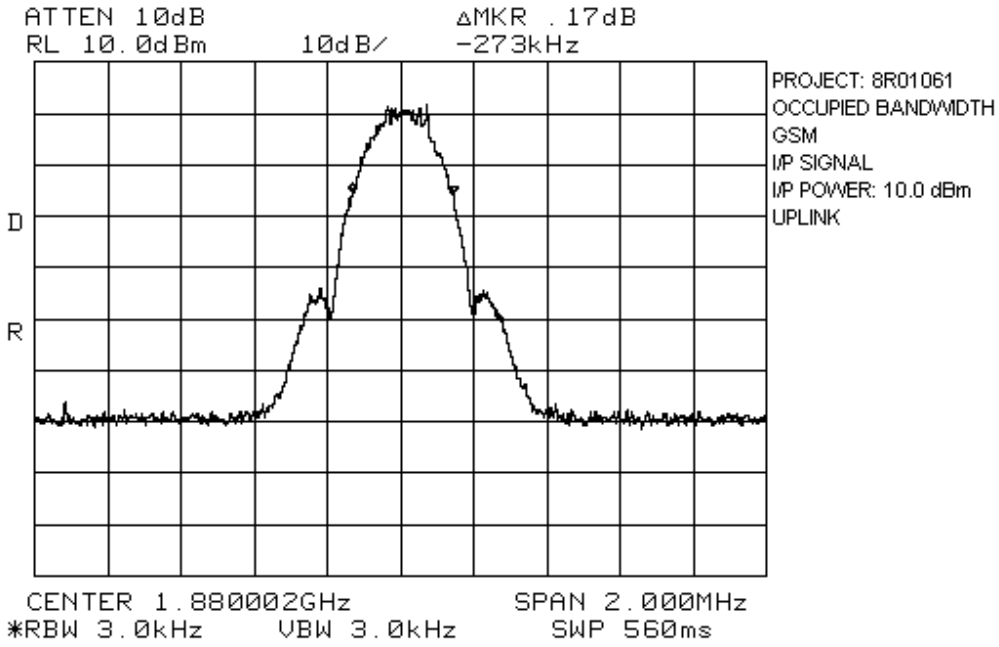

ATTEN 10dB
RL 3.0dBm
10dB/
ΔMKR -1.00dB
-1.650MHz
PROJECT: 8R01061
OCCUPIED BANDWIDTH
CDMA
I/P SIGNAL
I/P POWER: 3.0 dBm
DOWNLINK
D
R
CENTER 1.960000GHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

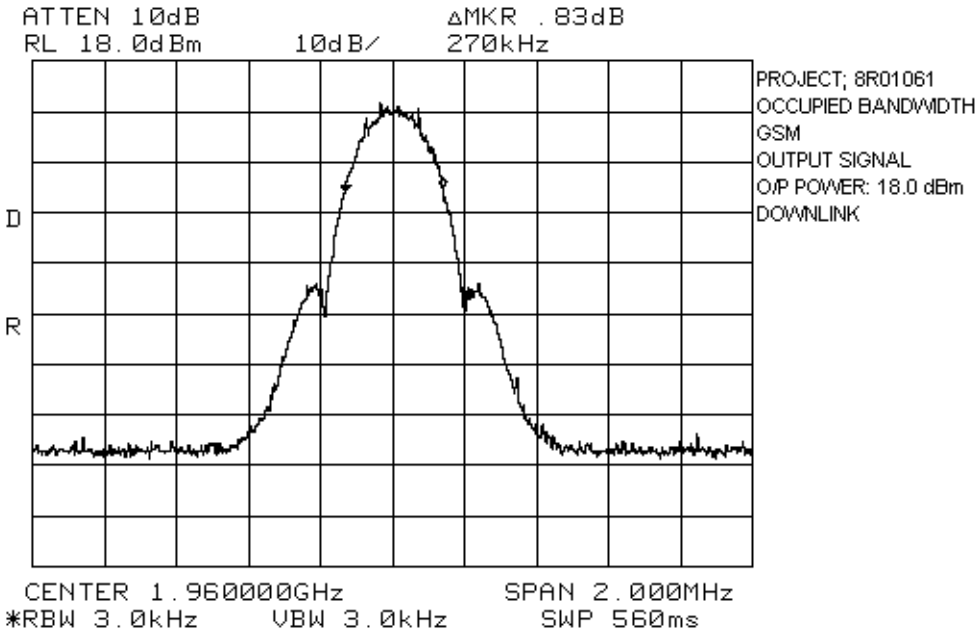
NAME OF TEST: Occupied Bandwidth (GSM)	PARA. NO.: 2.917(c)
TESTED BY: Kevin Carr	DATE: December 22, 1998

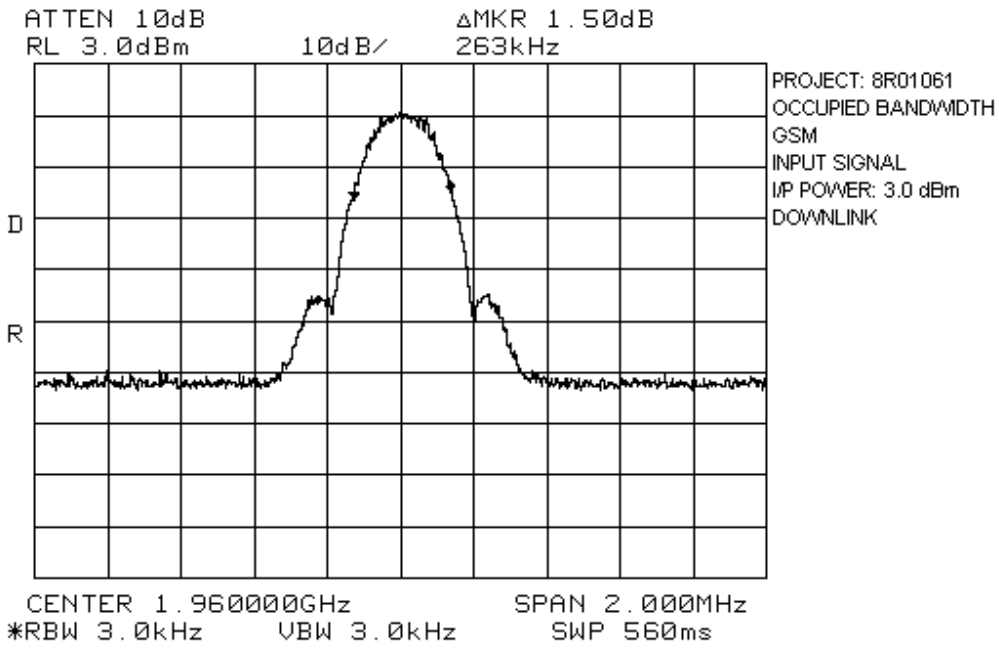
Test Results: Complies.

Test Data: See attached graph(s).


ATTEN 10dB
RL 13.5dBm
10dB/
ΔMKR .17dB
290kHz
PROJECT: 8R01061
OCCUPIED BANDWIDTH
GSM
OUTPUT SIGNAL
O/P POWER: 13.5 dBm
UPLINK
D
R
CENTER 1.880002GHz
SPAN 2.000MHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 560ms


ATTEN 10dB
RL 10.0dBm
10dB/
ΔMKR .17dB
-273kHz
PROJECT: 8R01061
OCCUPIED BANDWIDTH
GSM
I/P SIGNAL
I/P POWER: 10.0 dBm
UPLINK
D
R
CENTER 1.880002GHz
SPAN 2.000MHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 560ms

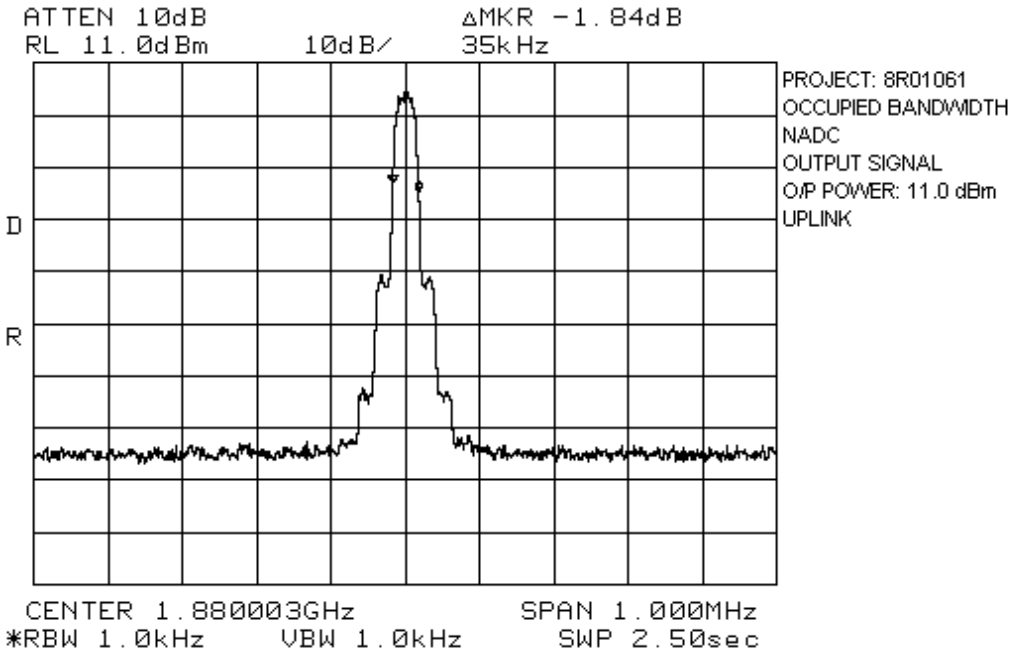

ATTEN 10dB
RL 18.0dBm
10dB/
ΔMKR .83dB
270kHz
PROJECT; 8R01061
OCCUPIED BANDWIDTH
GSM
OUTPUT SIGNAL
O/P POWER: 18.0 dBm
DOWNLINK
D
R
CENTER 1.960000GHz
SPAN 2.000MHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 560ms

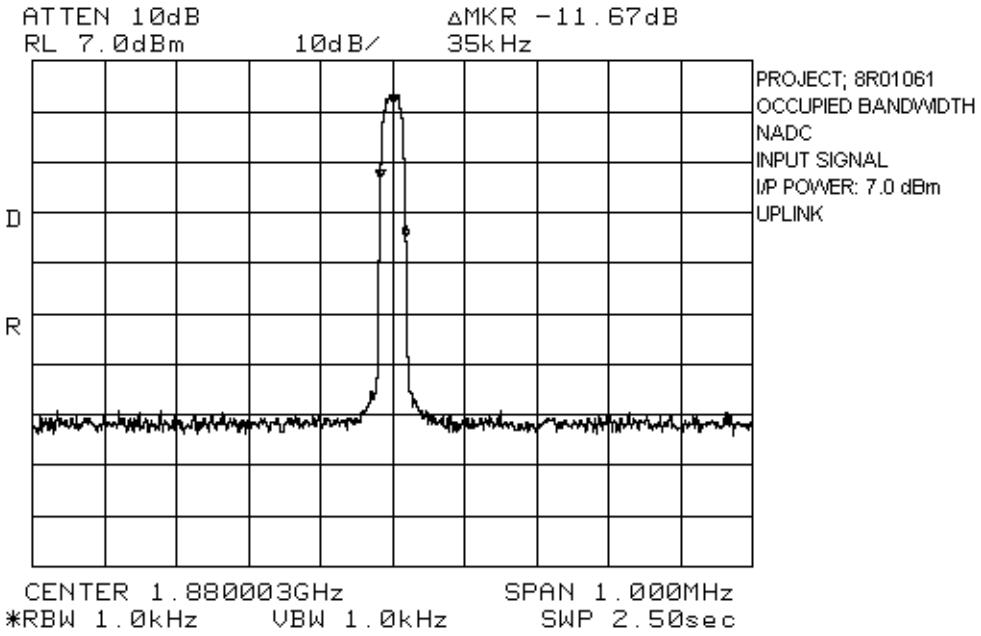

ATTEN 10dB
RL 3.0dBm
10dB/
ΔMKR 1.50dB
263kHz
PROJECT: 8R01061
OCCUPIED BANDWIDTH
GSM
INPUT SIGNAL
I/P POWER: 3.0 dBm
DOWNLINK
D
R
CENTER 1.960000GHz
SPAN 2.000MHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 560ms

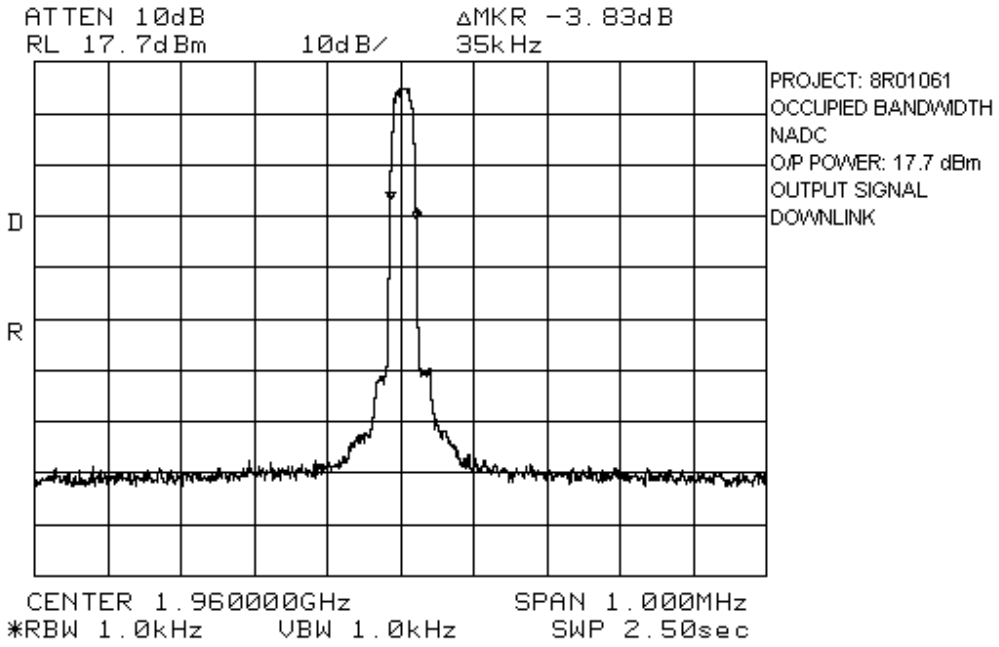
NAME OF TEST: Occupied Bandwidth (NADC)	PARA. NO.: 2.917(c)
TESTED BY: Kevin Carr	DATE: December 22, 1998

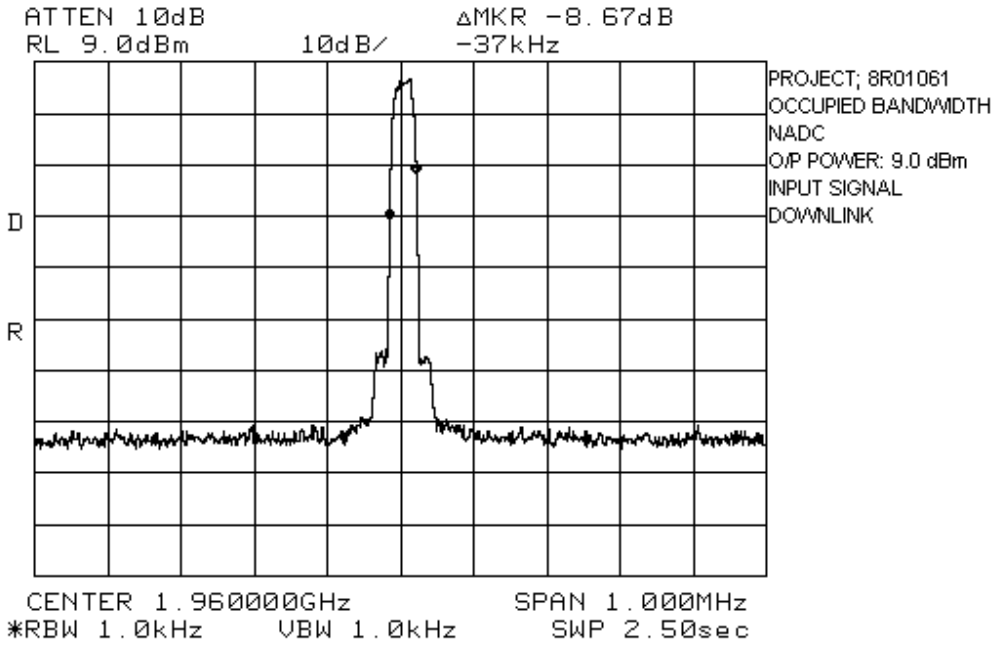
Test Results: Complies.

Test Data: See attached graph(s).


ATTEN 10dB
RL 11.0dBm
10dB/
ΔMKR -1.84dB
35kHz
PROJECT: 8R01061
OCCUPIED BANDWIDTH
NADC
OUTPUT SIGNAL
O/P POWER: 11.0 dBm
UPLINK
D
R
CENTER 1.880003GHz
SPAN 1.000MHz
*RBW 1.0kHz
VBW 1.0kHz
SWP 2.50sec


ATTEN 10dB
RL 7.0dBm
10dB/
ΔMKR -11.67dB
35kHz
PROJECT; 8R01061
OCCUPIED BANDWIDTH
NADC
INPUT SIGNAL
I/P POWER: 7.0 dBm
UPLINK
D
R
CENTER 1.880003GHz
SPAN 1.000MHz
*RBW 1.0kHz
VBW 1.0kHz
SWP 2.50sec


ATTEN 10dB
RL 17.7dBm
10dB/
ΔMKR -3.83dB
35kHz
PROJECT: 8R01061
OCCUPIED BANDWIDTH
NADC
O/P POWER: 17.7 dBm
OUTPUT SIGNAL
DOWNLINK
D
R
CENTER 1.960000GHz
SPAN 1.000MHz
*RBW 1.0kHz
VBW 1.0kHz
SWP 2.50sec


ATTEN 10dB
RL 9.0dBm
10dB/
ΔMKR -8.67dB
-37kHz
PROJECT; 8R01061
OCCUPIED BANDWIDTH
NADC
O/P POWER: 9.0 dBm
INPUT SIGNAL
DOWNLINK
D
R
CENTER 1.960000GHz
SPAN 1.000MHz
*RBW 1.0kHz
VBW 1.0kHz
SWP 2.50sec

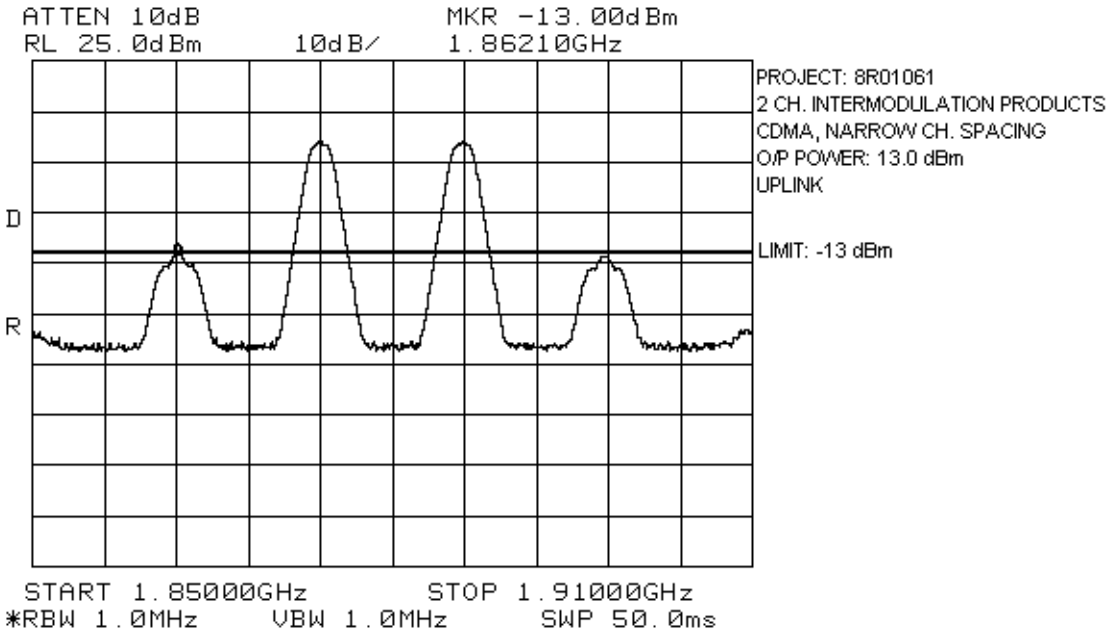
Section 5. Spurious Emissions at Antenna Terminals

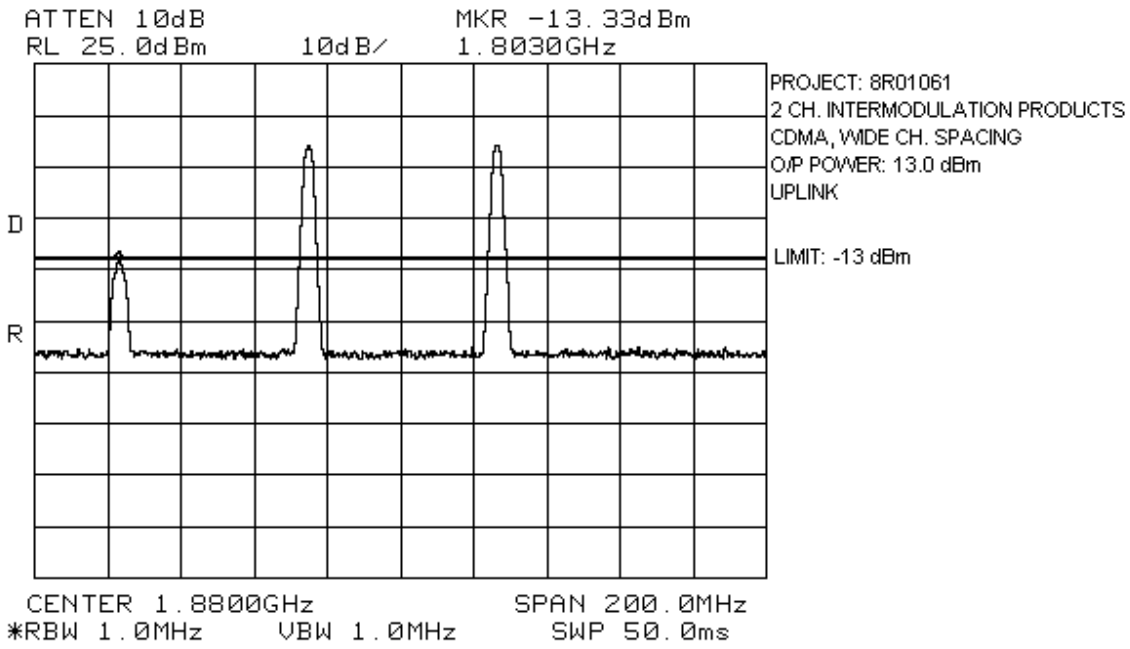
NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA. NO.: 2.917(e)
TESTED BY: Kevin Carr	DATE: December 22, 1998

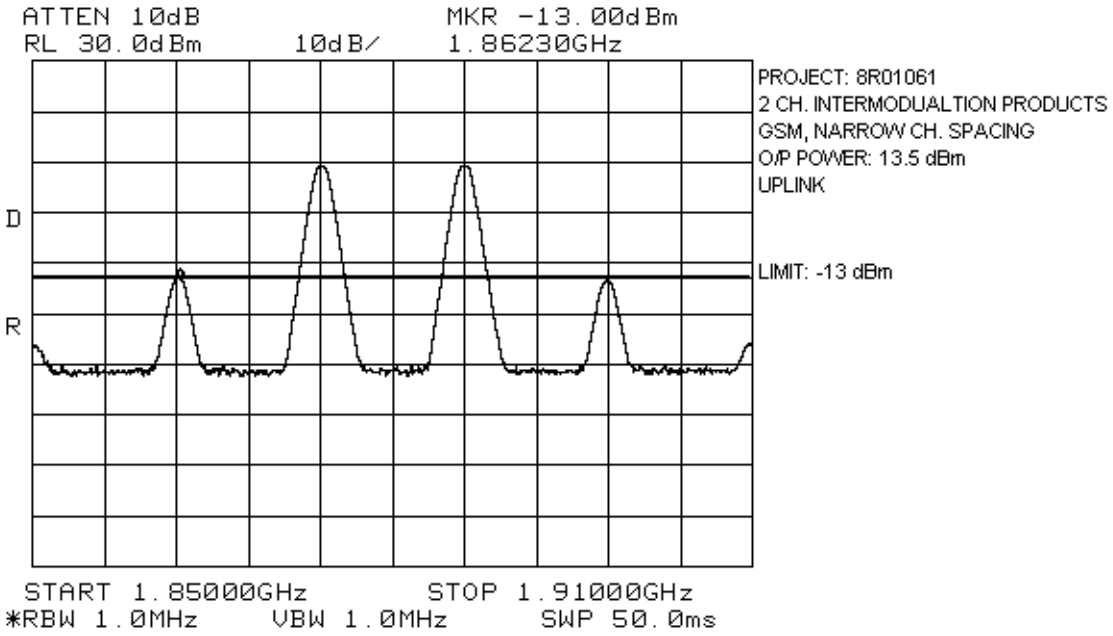
Test Results: Complies.

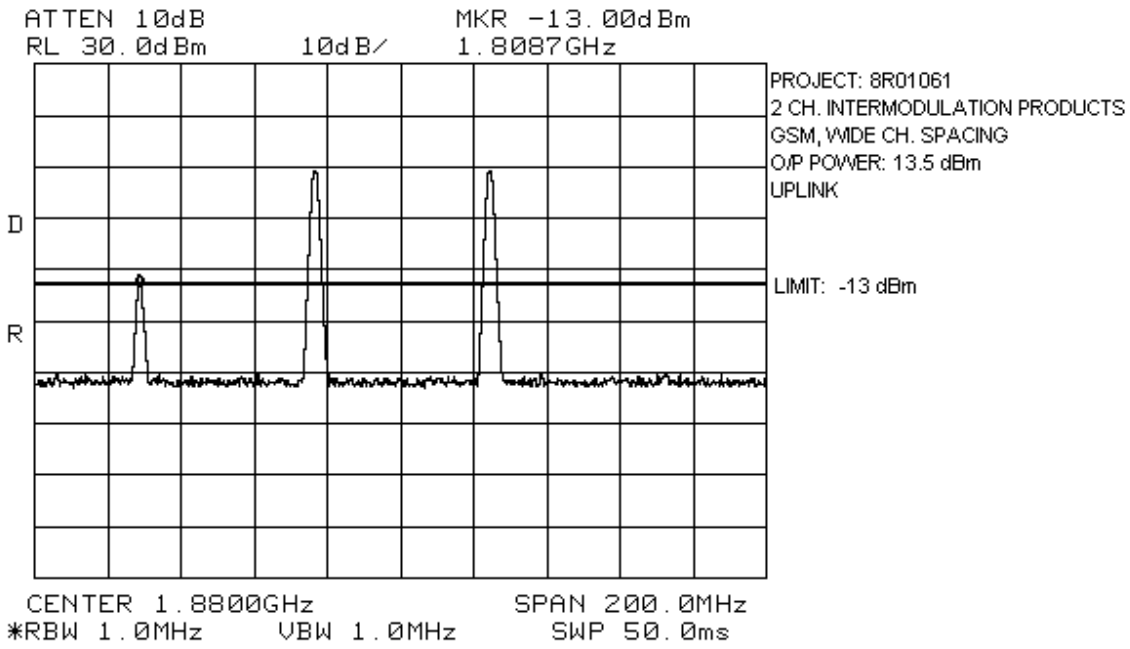
Test Data:

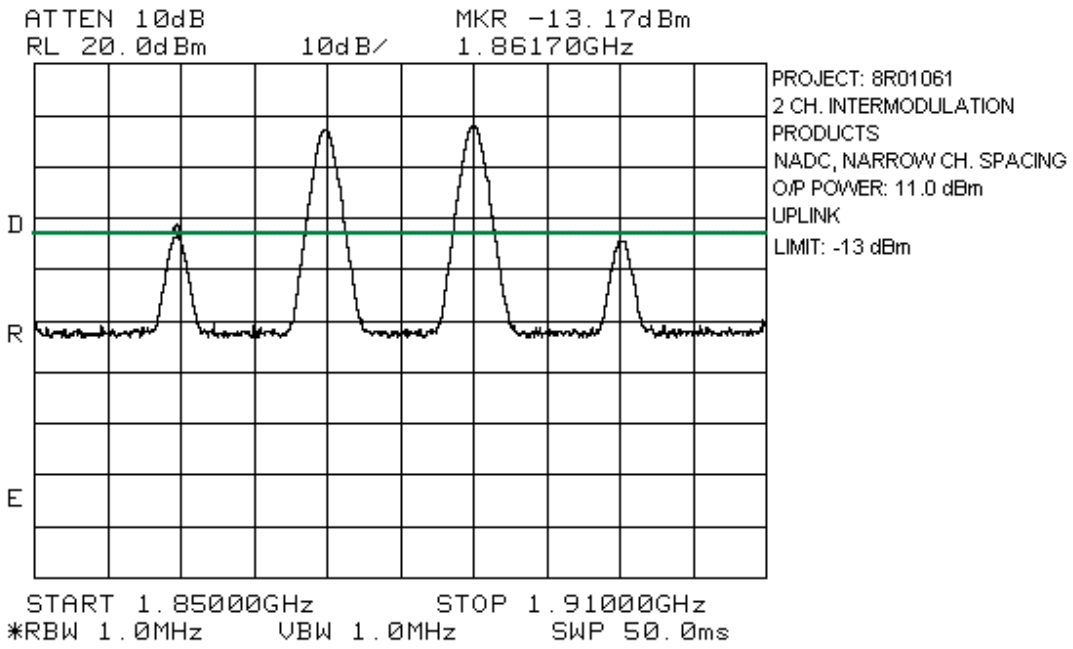
NAME OF TEST	WORST-CASE SPURIOUS LEVEL(dBm)
0 to 20 GHz Spurious	-13.0
Lower Band Edge	-26.8
Upper Band Edge	-18.5

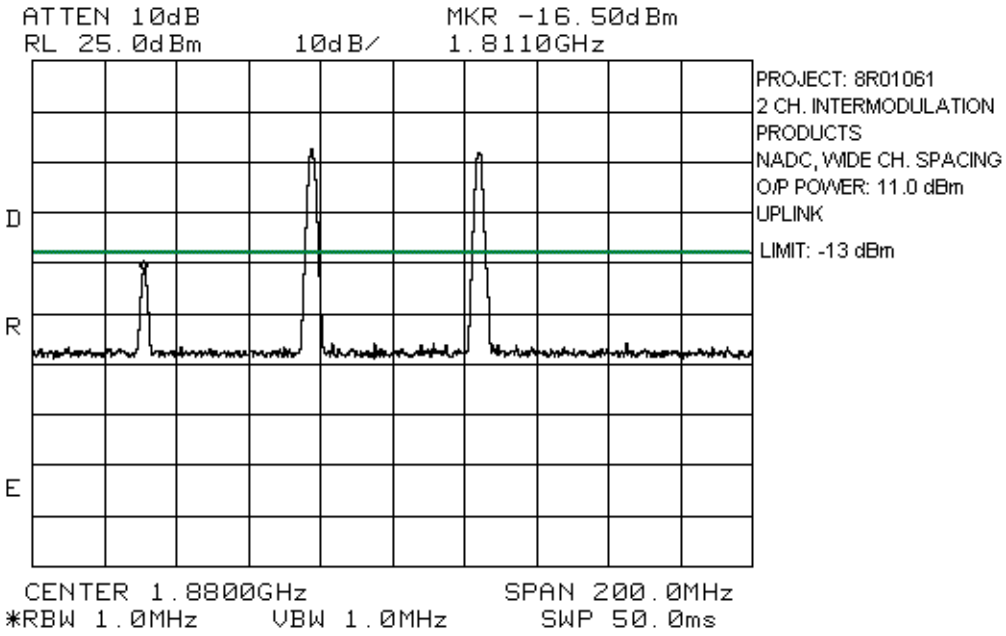

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -13.00dBm
1.86210GHz
PROJECT: 8R01061
2 CH. INTERMODULATION PRODUCTS
CDMA, NARROW CH. SPACING
O/P POWER: 13.0 dBm
UPLINK
LIMIT: -13 dBm
D
R
START 1.85000GHz
STOP 1.91000GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

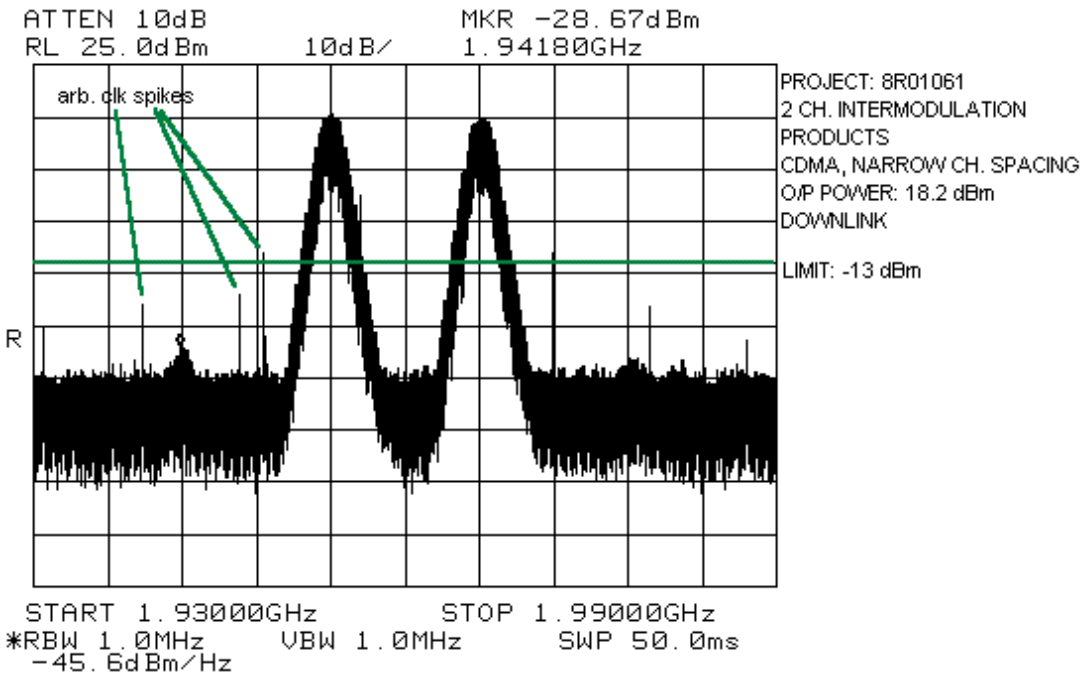

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -13.33dBm
1.8030GHz
PROJECT: 8R01061
2 CH. INTERMODULATION PRODUCTS
CDMA, WIDE CH. SPACING
O/P POWER: 13.0 dBm
UPLINK
D
LIMIT: -13 dBm
R
CENTER 1.8800GHz
SPAN 200.0MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

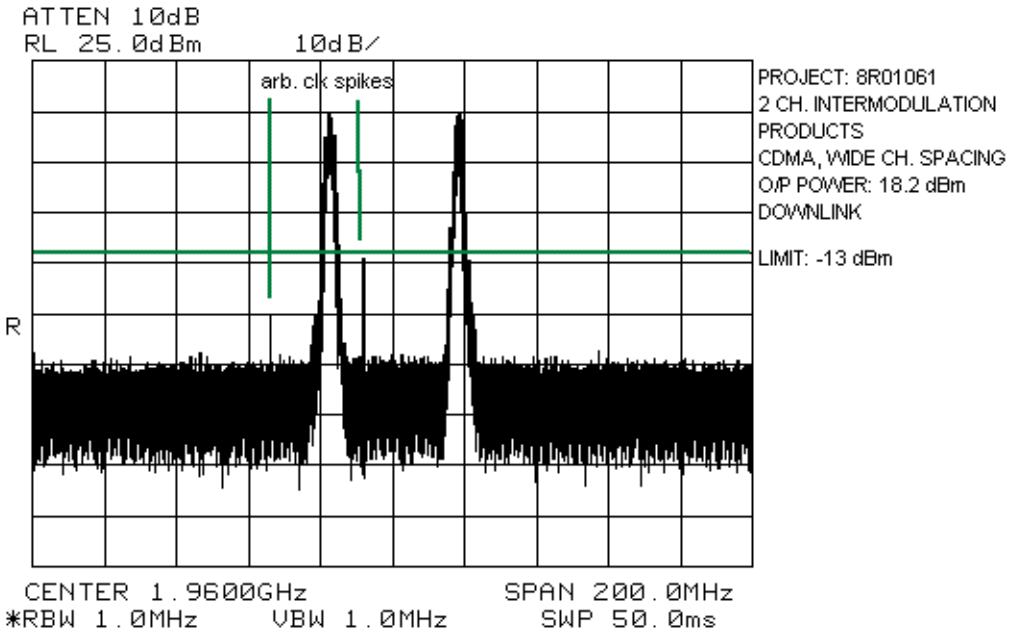

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -13.00dBm
1.86230GHz
PROJECT: 8R01061
2 CH. INTERMODUALTION PRODUCTS
GSM, NARROW CH. SPACING
O/P POWER: 13.5 dBm
UPLINK
LIMIT: -13 dBm
D
R
START 1.85000GHz
STOP 1.91000GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

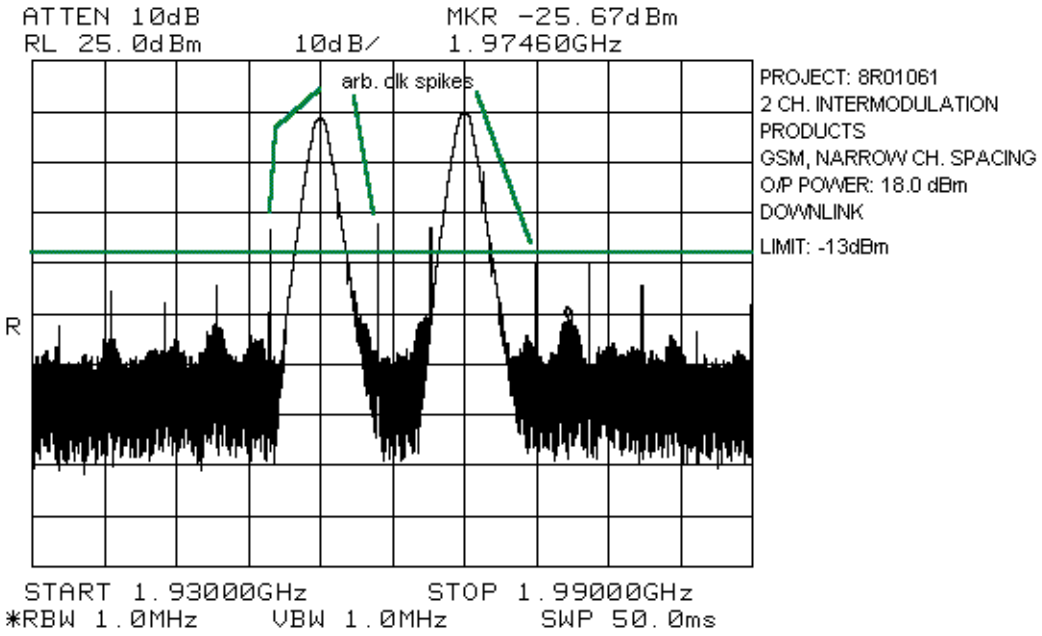

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -13.00dBm
1.8087GHz
PROJECT: 8R01061
2 CH. INTERMODULATION PRODUCTS
GSM, WIDE CH. SPACING
O/P POWER: 13.5 dBm
UPLINK
D
LIMIT: -13 dBm
R
CENTER 1.8800GHz
SPAN 200.0MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

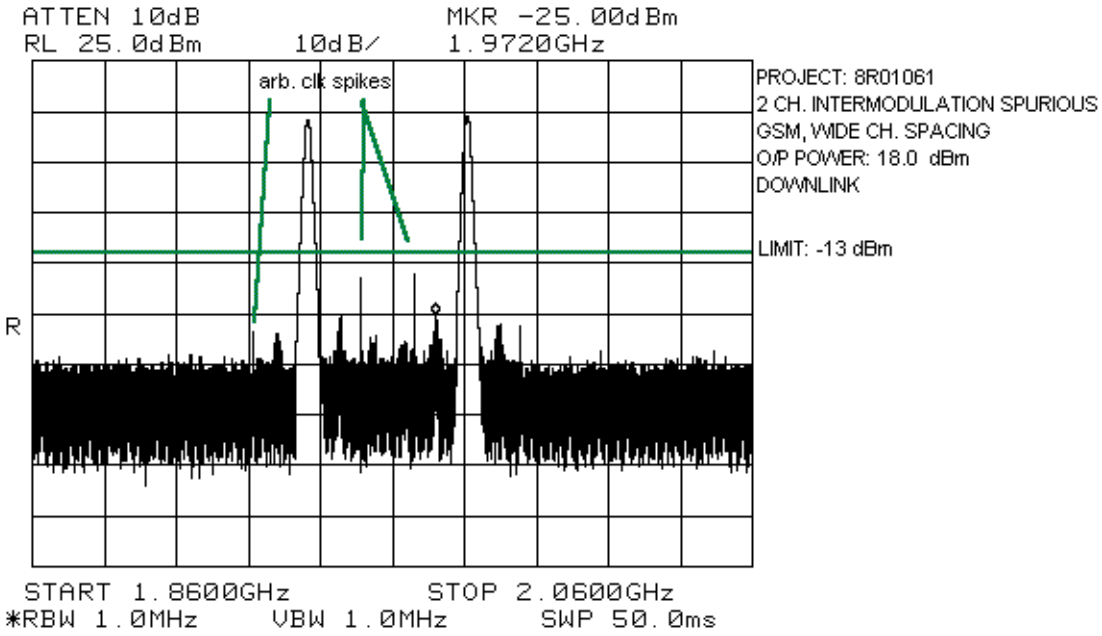

ATTEN 10dB
RL 20.0dBm
10dB/
MKR -13.17dBm
1.86170GHz
PROJECT: 8R01061
2 CH. INTERMODULATION
PRODUCTS
NADC, NARROW CH. SPACING
O/P POWER: 11.0 dBm
UPLINK
LIMIT: -13 dBm
D
R
E
START 1.85000GHz
STOP 1.91000GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

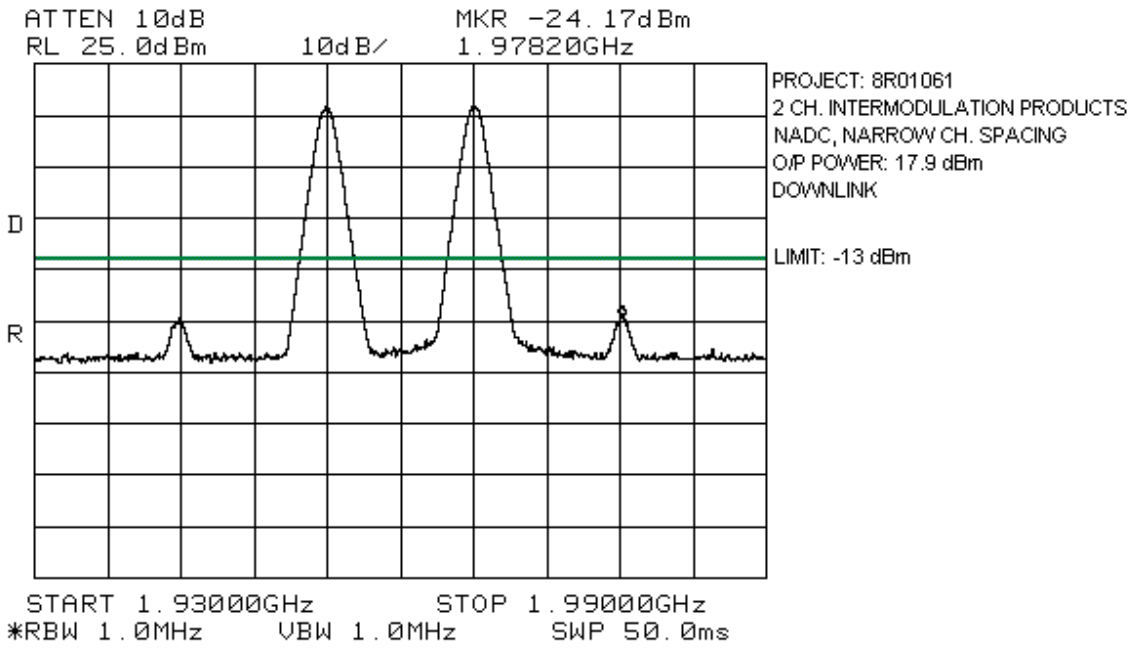

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -16.50dBm
1.8110GHz
PROJECT: 8R01061
2 CH. INTERMODULATION
PRODUCTS
NADC, WIDE CH. SPACING
O/P POWER: 11.0 dBm
UPLINK
LIMIT: -13 dBm
D
R
E
CENTER 1.8800GHz
SPAN 200.0MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

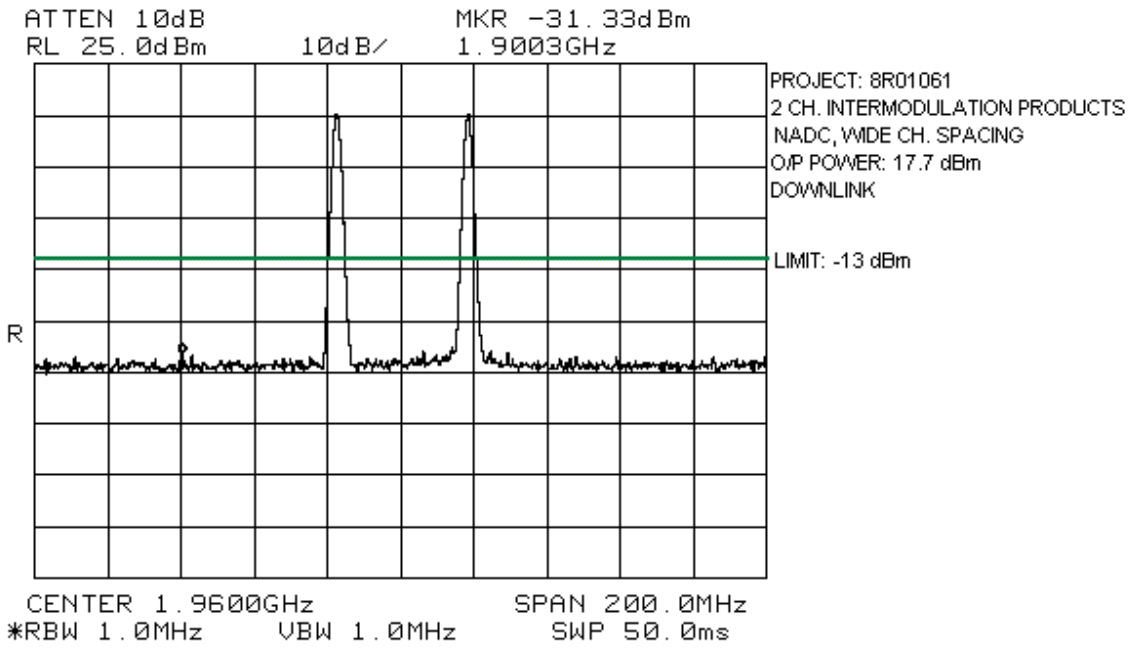

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -28.67dBm
1.94180GHz
arb. clk spikes
PROJECT: 8R01061
2 CH. INTERMODULATION
PRODUCTS
CDMA, NARROW CH. SPACING
O/P POWER: 18.2 dBm
DOWNLINK
LIMIT: -13 dBm
R
START 1.93000GHz
STOP 1.99000GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms
-45.6dBm/Hz

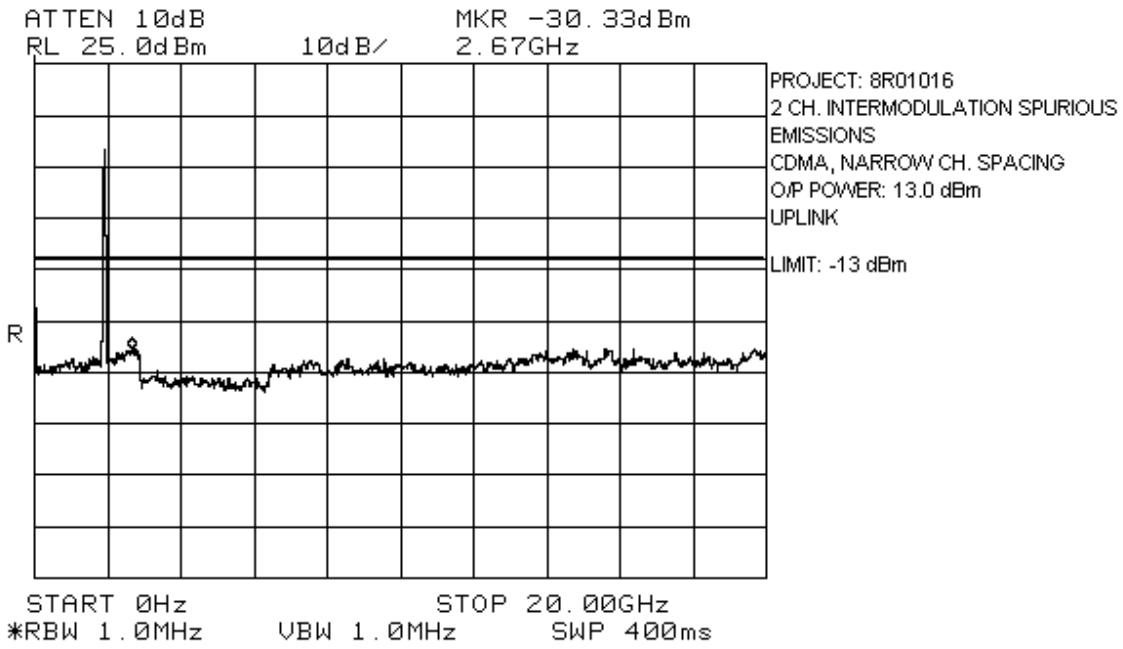

ATTEN 10dB
RL 25.0dBm
10dB/
arb. clk spikes
PROJECT: 8R01061
2 CH. INTERMODULATION
PRODUCTS
CDMA, WIDE CH. SPACING
O/P POWER: 18.2 dBm
DOWNLINK
LIMIT: -13 dBm
R
CENTER 1.9600GHz
SPAN 200.0MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

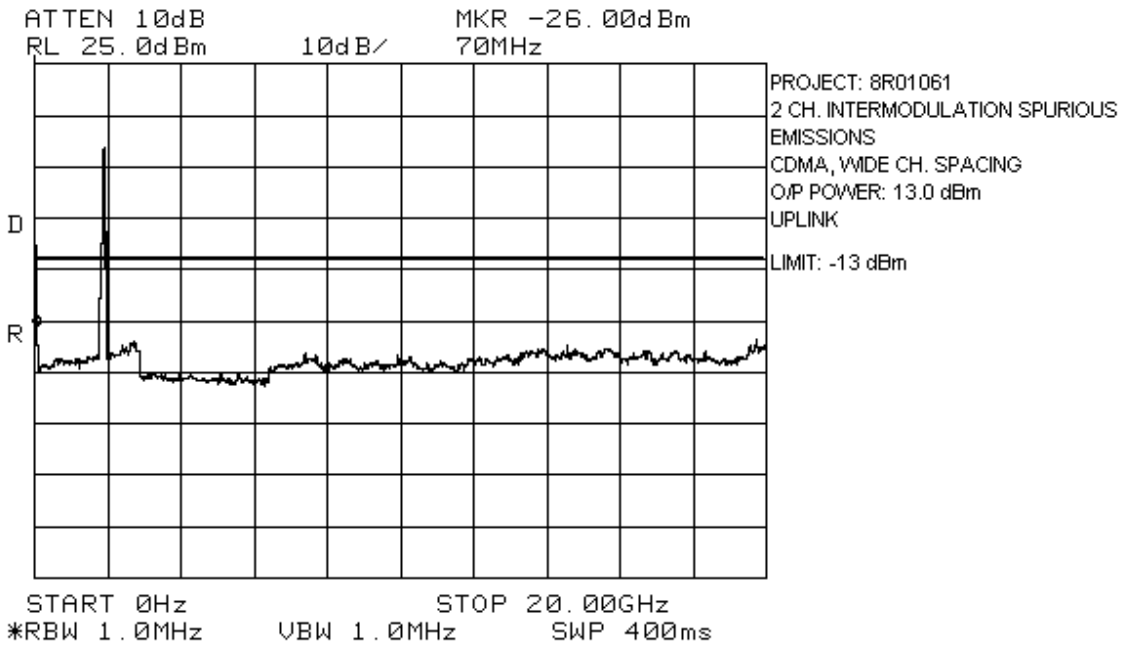

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -25.67dBm
1.97460GHz
arb. clk spikes
PROJECT: 8R01061
2 CH. INTERMODULATION
PRODUCTS
GSM, NARROW CH. SPACING
O/P POWER: 18.0 dBm
DOWNLINK
LIMIT: -13dBm
R
START 1.93000GHz
STOP 1.99000GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

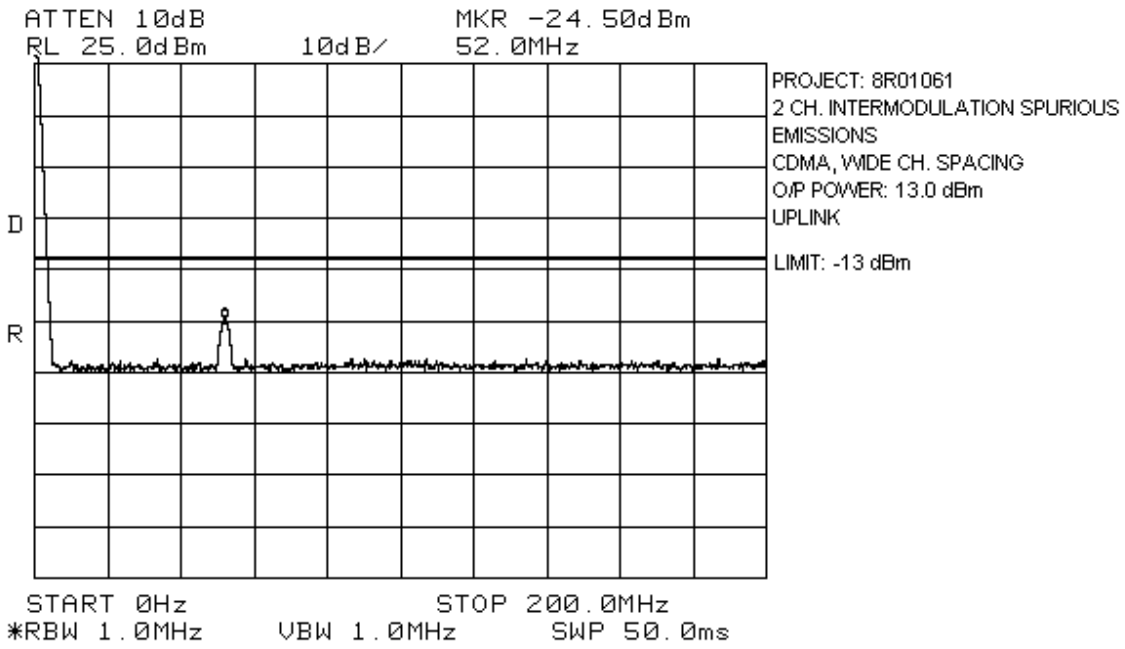

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -25.00dBm
1.9720GHz
arb. clk spikes
PROJECT: 8R01061
2 CH. INTERMODULATION SPURIOUS
GSM, WIDE CH. SPACING
O/P POWER: 18.0 dBm
DOWNLINK
LIMIT: -13 dBm
R
START 1.8600GHz
STOP 2.0600GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

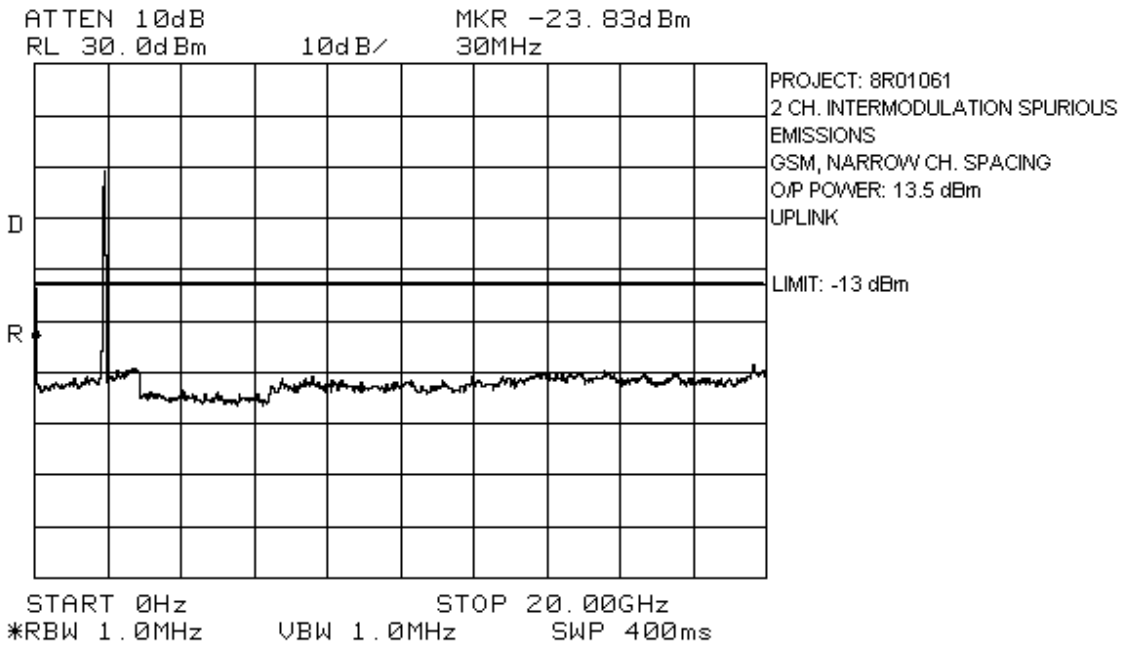

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -24.17dBm
1.97820GHz
D
R
PROJECT: 8R01061
2 CH. INTERMODULATION PRODUCTS
NADC, NARROW CH. SPACING
O/P POWER: 17.9 dBm
DOWNLINK
LIMIT: -13 dBm
START 1.93000GHz
STOP 1.99000GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

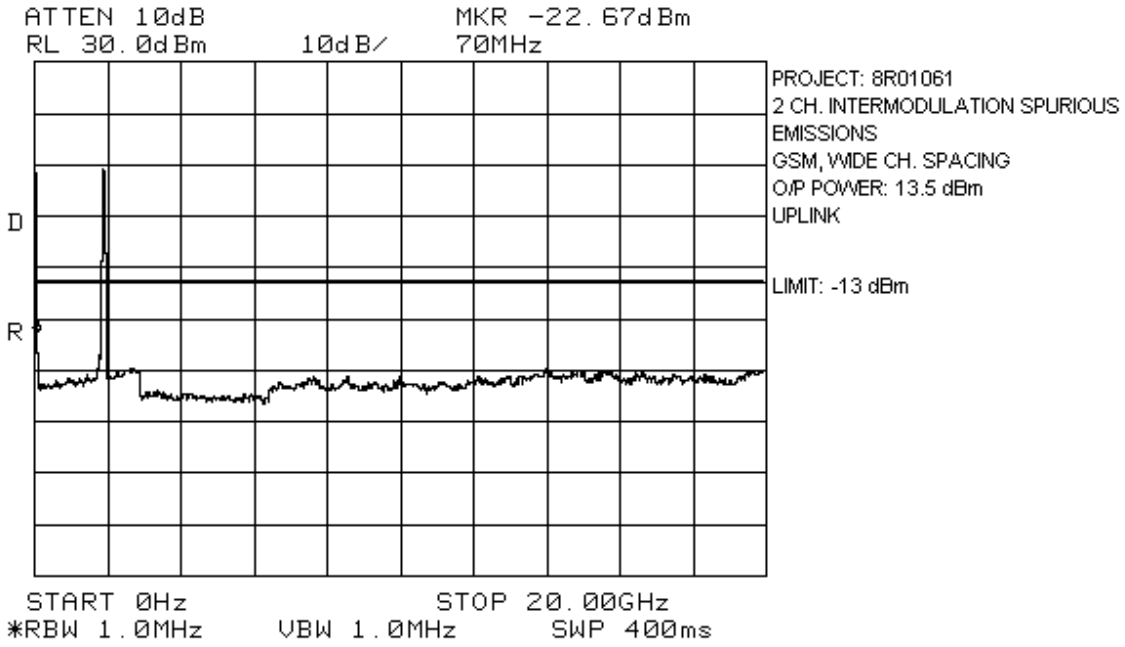

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -31.33dBm
1.9003GHz
PROJECT: 8R01061
2 CH. INTERMODULATION PRODUCTS
NADC, WIDE CH. SPACING
O/P POWER: 17.7 dBm
DOWNLINK
LIMIT: -13 dBm
R
CENTER 1.9600GHz
SPAN 200.0MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

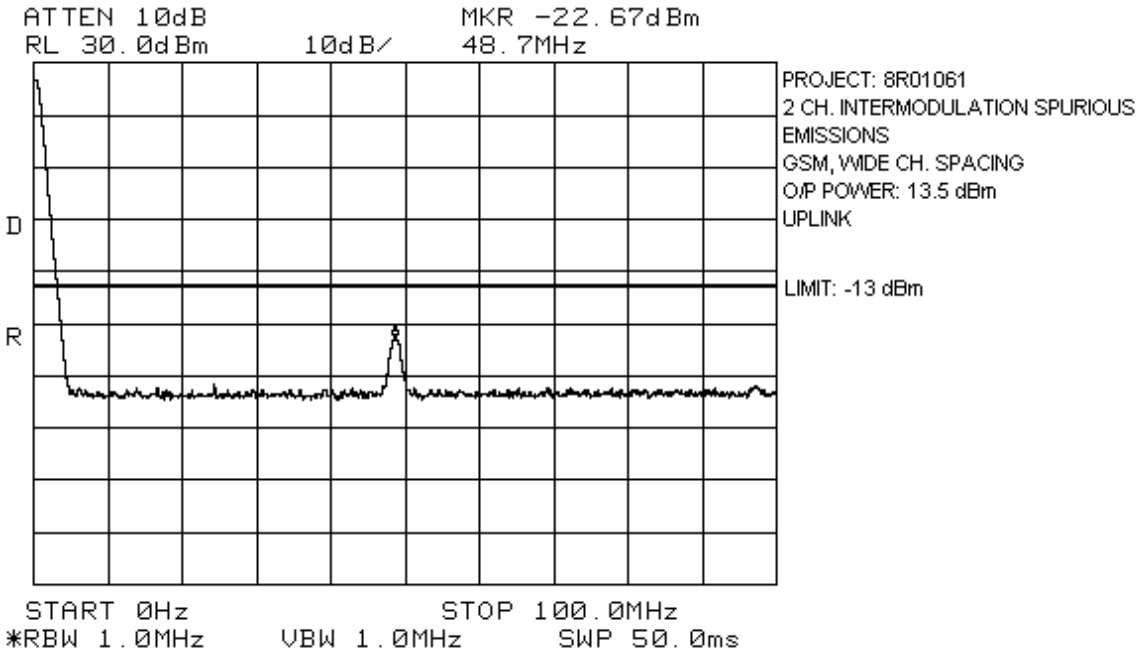

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -30.33dBm
2.67GHz
PROJECT: 8R01016
2 CH. INTERMODULATION SPURIOUS EMISSIONS
CDMA, NARROW CH. SPACING
O/P POWER: 13.0 dBm
UPLINK
LIMIT: -13 dBm
R
START 0Hz
STOP 20.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 400ms

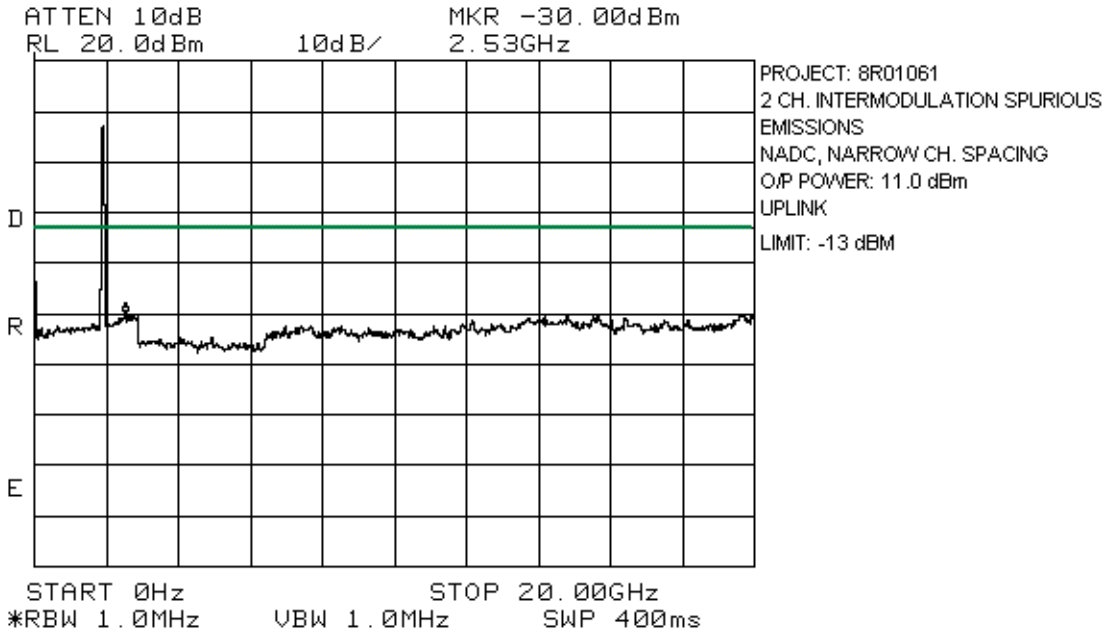

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -26.00dBm
70MHz
D
R
PROJECT: 8R01061
2 CH. INTERMODULATION SPURIOUS EMISSIONS
CDMA, WIDE CH. SPACING
O/P POWER: 13.0 dBm
UPLINK
LIMIT: -13 dBm
START 0Hz
STOP 20.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 400ms

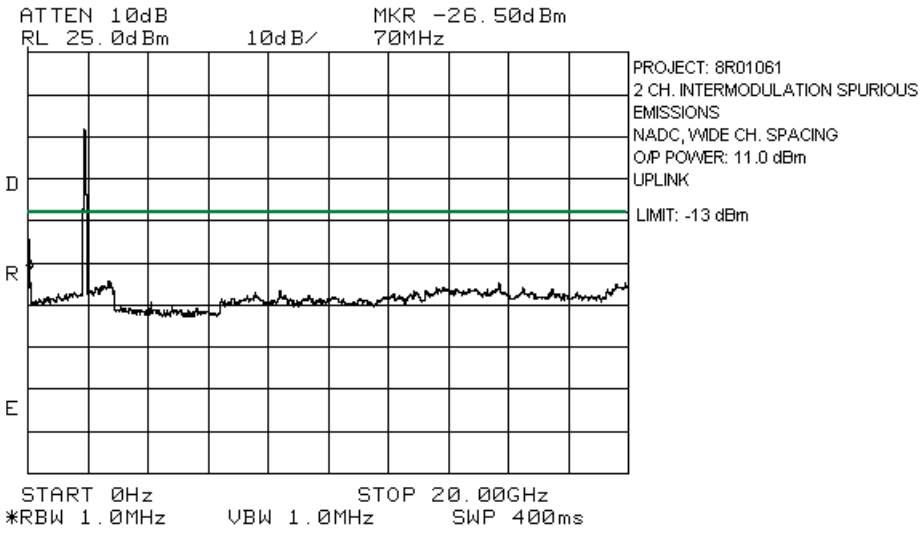

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -24.50dBm
52.0MHz
D
R
PROJECT: 8R01061
2 CH. INTERMODULATION SPURIOUS EMISSIONS
CDMA, WIDE CH. SPACING
O/P POWER: 13.0 dBm
UPLINK
LIMIT: -13 dBm
START 0Hz
STOP 200.0MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

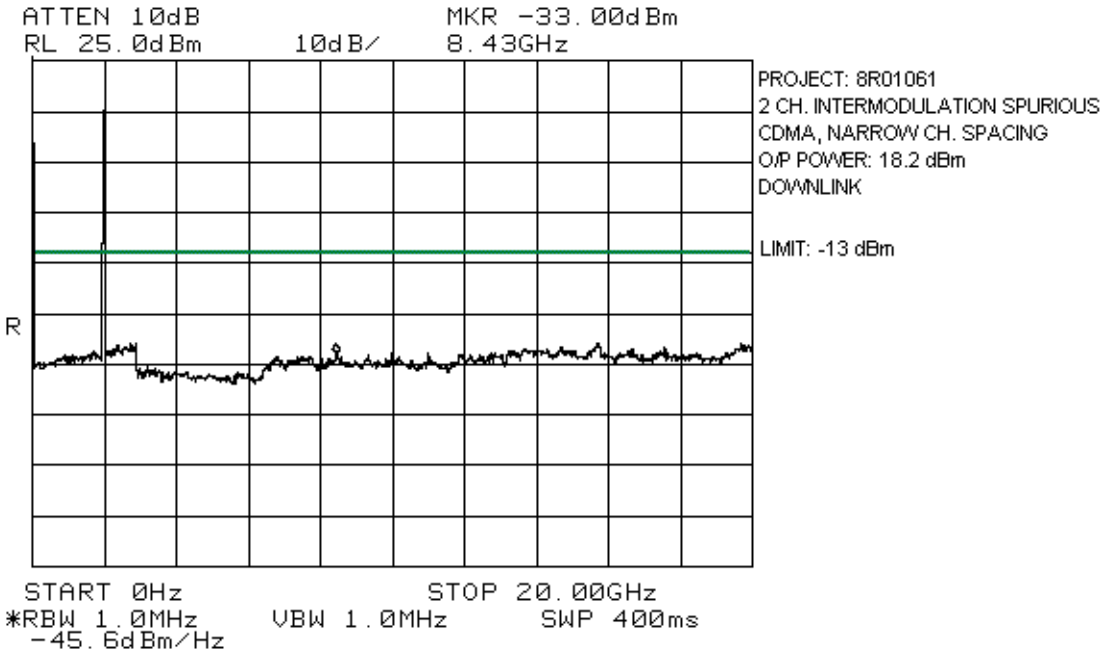

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -23.83dBm
30MHz
PROJECT: 8R01061
2 CH. INTERMODULATION SPURIOUS EMISSIONS
GSM, NARROW CH. SPACING
O/P POWER: 13.5 dBm
UPLINK
LIMIT: -13 dBm
D
R
START 0Hz
STOP 20.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 400ms

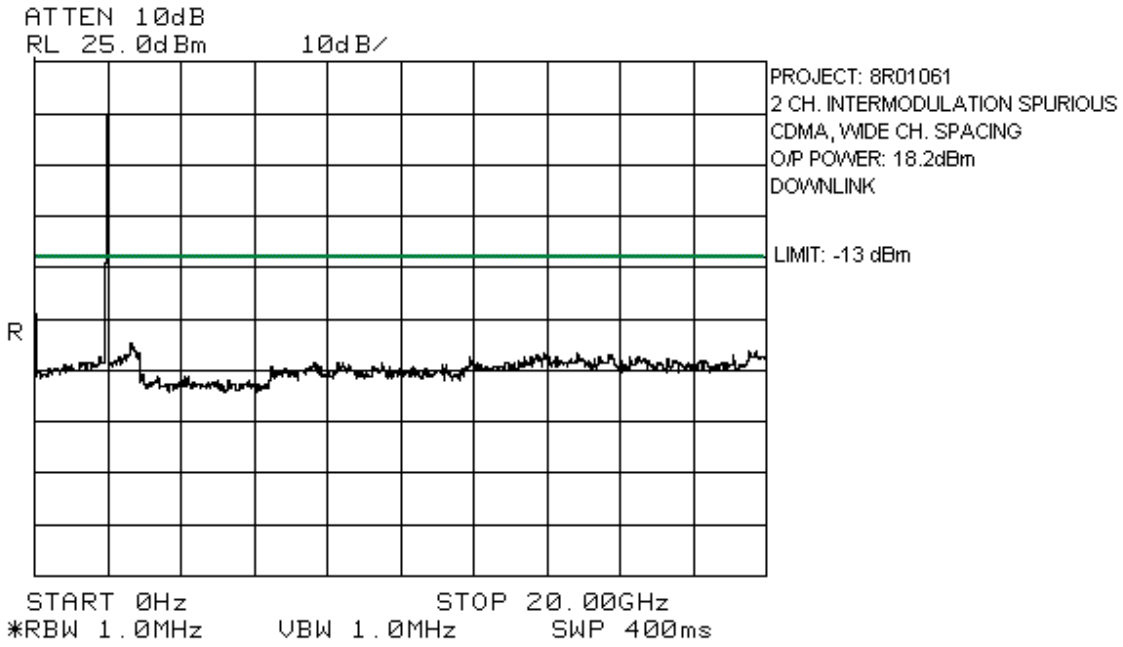

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -22.67dBm
70MHz
PROJECT: 8R01061
2 CH. INTERMODULATION SPURIOUS EMISSIONS
GSM, WIDE CH. SPACING
O/P POWER: 13.5 dBm
UPLINK
LIMIT: -13 dBm
D
R
START 0Hz
STOP 20.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 400ms

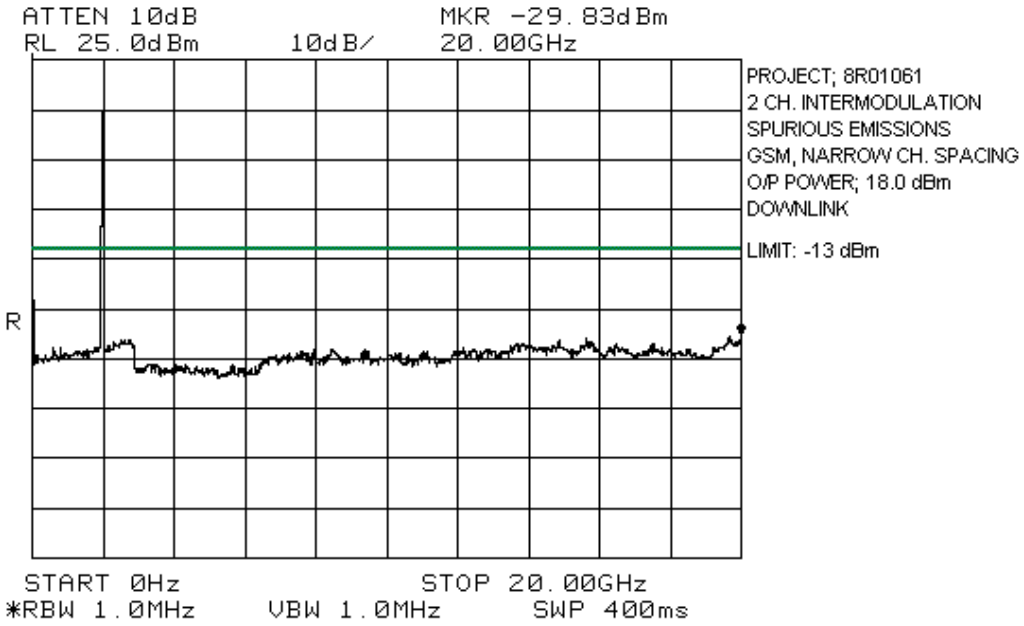

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -22.67dBm
48.7MHz
D
R
PROJECT: 8R01061
2 CH. INTERMODULATION SPURIOUS EMISSIONS
GSM, WIDE CH. SPACING
O/P POWER: 13.5 dBm
UPLINK
LIMIT: -13 dBm
START 0Hz
STOP 100.0MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms

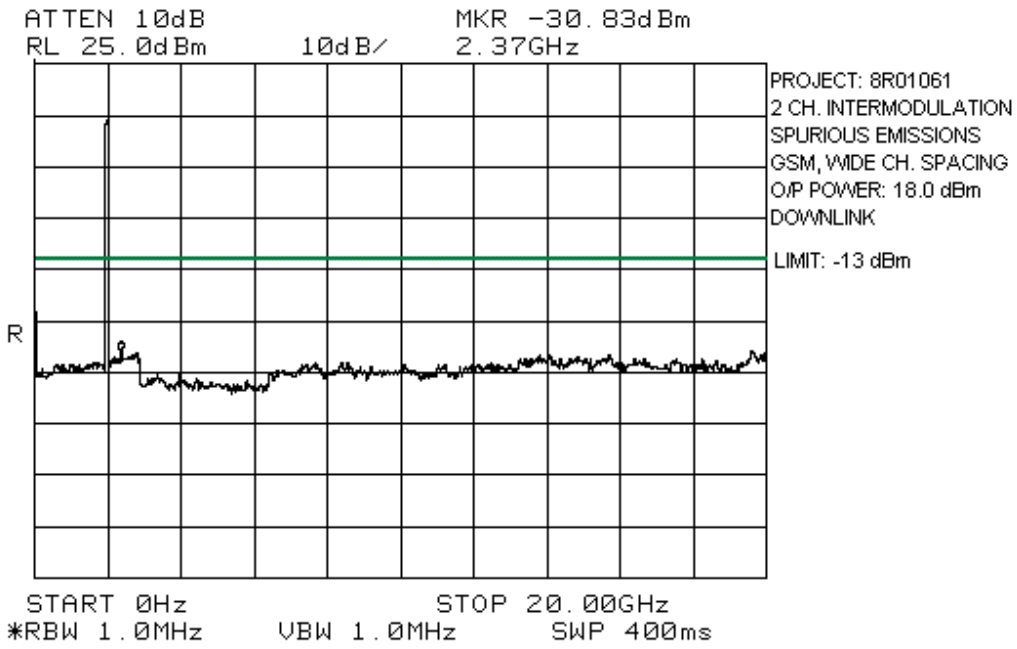

ATTEN 10dB
RL 20.0dBm
10dB/
MKR -30.00dBm
2.53GHz
PROJECT: 8R01061
2 CH. INTERMODULATION SPURIOUS EMISSIONS
NADC, NARROW CH. SPACING
O/P POWER: 11.0 dBm
UPLINK
LIMIT: -13 dBM
D
R
E
START 0Hz
STOP 20.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 400ms

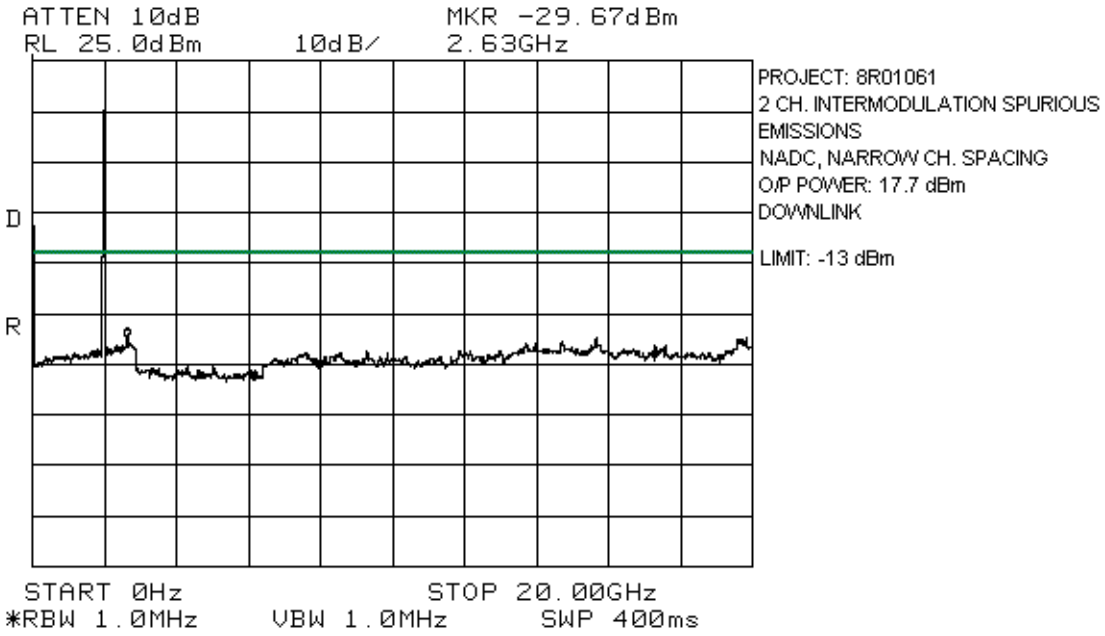

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -26.50dBm
70MHz
PROJECT: 8R01061
2 CH. INTERMODULATION SPURIOUS EMISSIONS
NADC, WIDE CH. SPACING
O/P POWER: 11.0 dBm
UPLINK
LIMIT: -13 dBm
D
R
E
START 0Hz
STOP 20.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 400ms

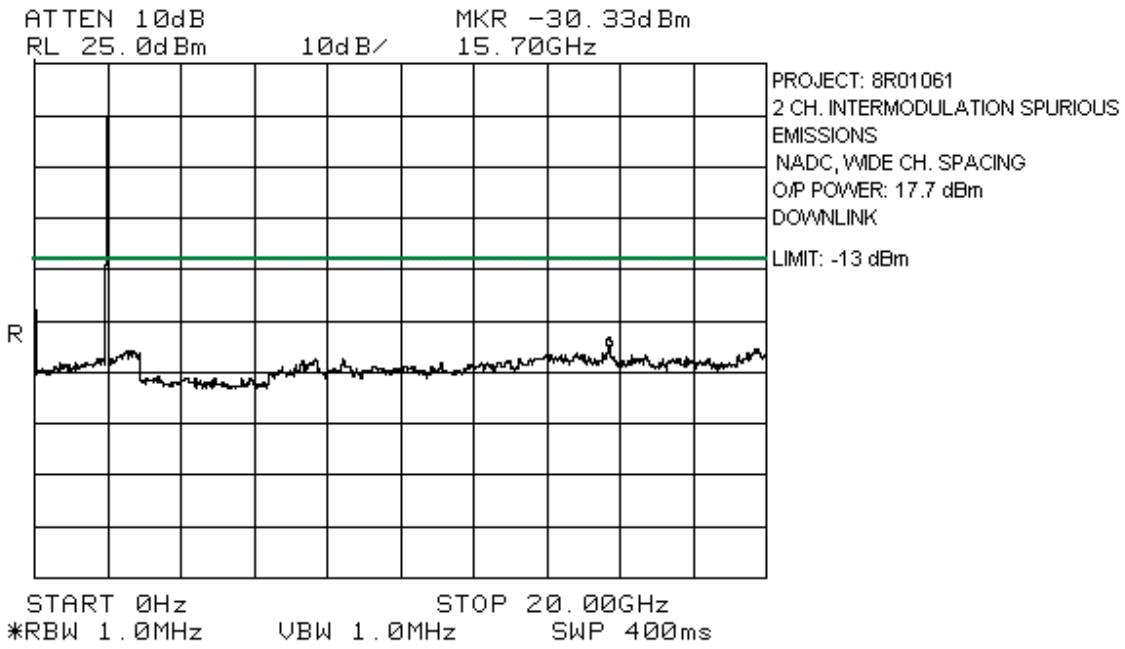

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -33.00dBm
8.43GHz
PROJECT: 8R01061
2 CH. INTERMODULATION SPURIOUS
CDMA, NARROW CH. SPACING
O/P POWER: 18.2 dBm
DOWNLINK
LIMIT: -13 dBm
R
START 0Hz
STOP 20.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 400ms
-45.6dBm/Hz

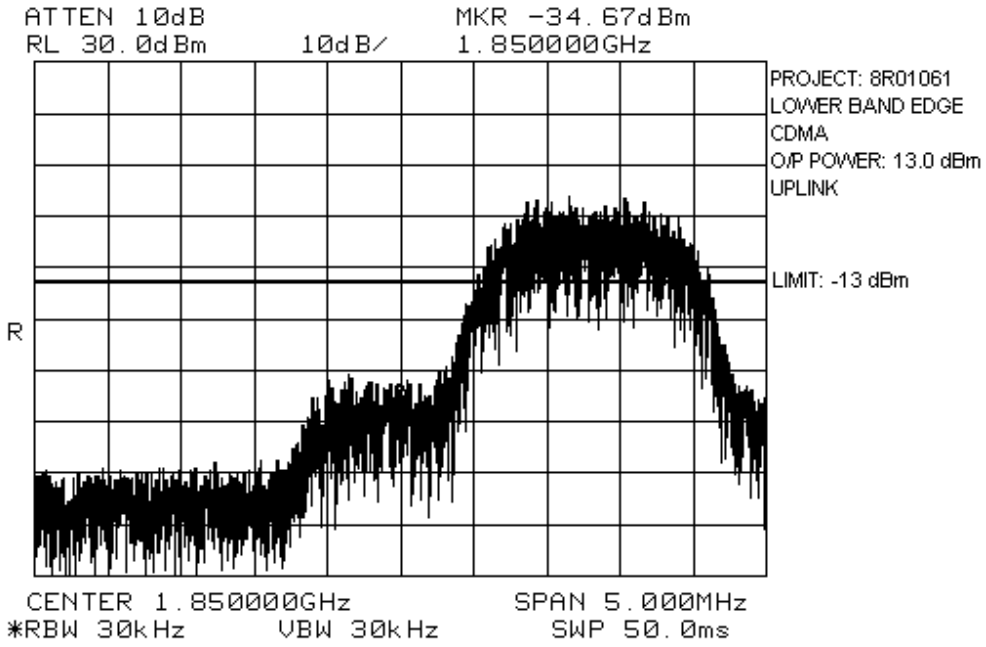

ATTEN 10dB
RL 25.0dBm
10dB/
PROJECT: 8R01061
2 CH. INTERMODULATION SPURIOUS
CDMA, WIDE CH. SPACING
O/P POWER: 18.2dBm
DOWNLINK
LIMIT: -13 dBm
R
START 0Hz
STOP 20.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 400ms

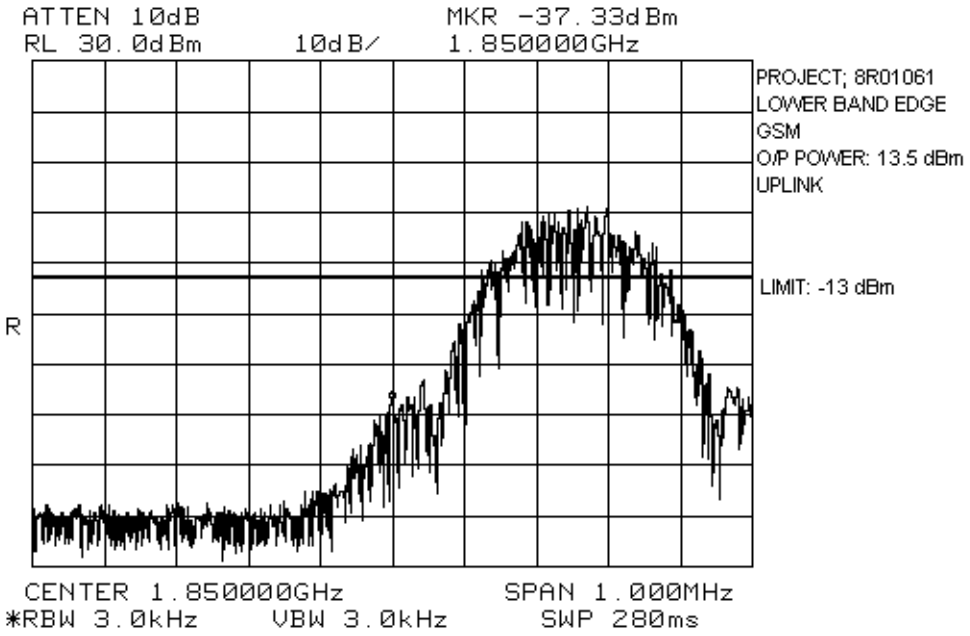

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -29.83dBm
20.00GHz
PROJECT; 8R01061
2 CH. INTERMODULATION
SPURIOUS EMISSIONS
GSM, NARROW CH. SPACING
O/P POWER; 18.0 dBm
DOWNLINK
LIMIT: -13 dBm
R
START 0Hz
STOP 20.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 400ms

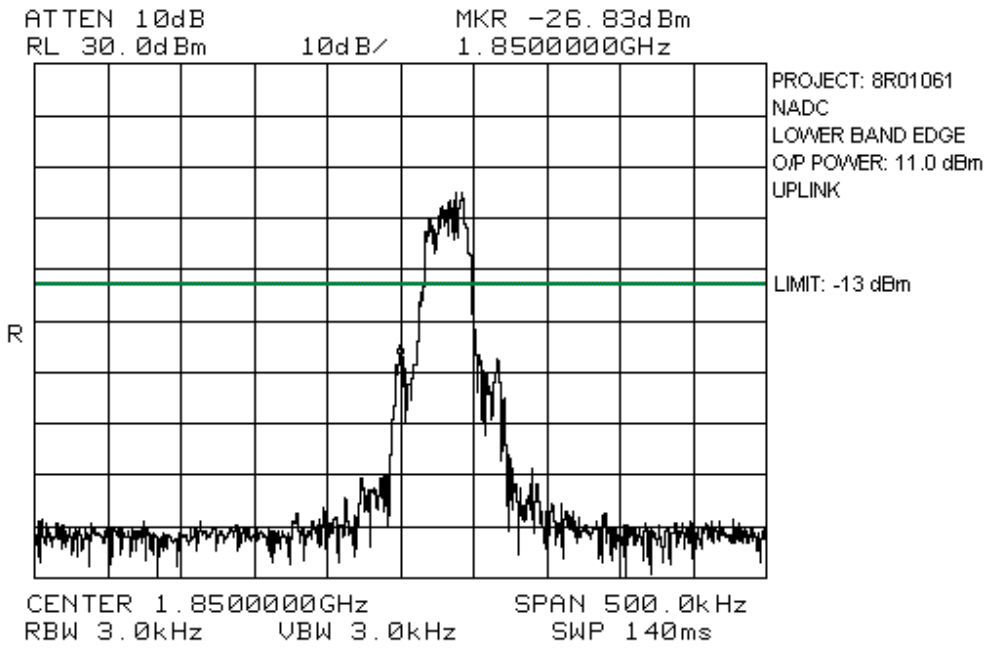

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -30.83dBm
2.37GHz
PROJECT: 8R01061
2 CH. INTERMODULATION
SPURIOUS EMISSIONS
GSM, WIDE CH. SPACING
O/P POWER: 18.0 dBm
DOWNLINK
LIMIT: -13 dBm
R
START 0Hz
STOP 20.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 400ms

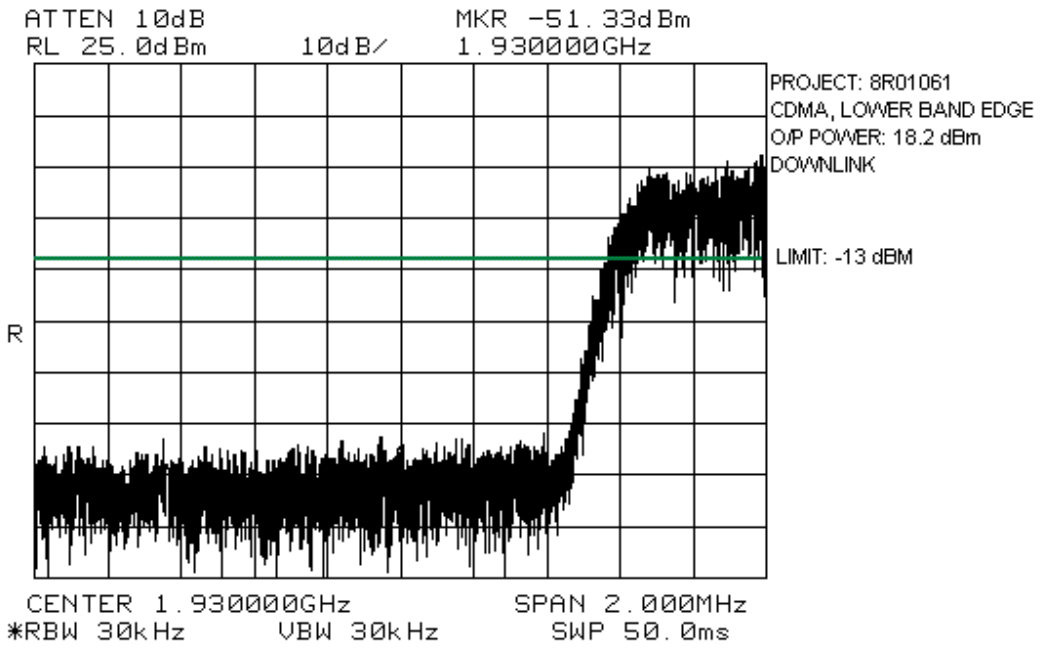

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -29.67dBm
2.63GHz
D
R
PROJECT: 8R01061
2 CH. INTERMODULATION SPURIOUS EMISSIONS
NADC, NARROW CH. SPACING
O/P POWER: 17.7 dBm
DOWNLINK
LIMIT: -13 dBm
START 0Hz
STOP 20.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 400ms

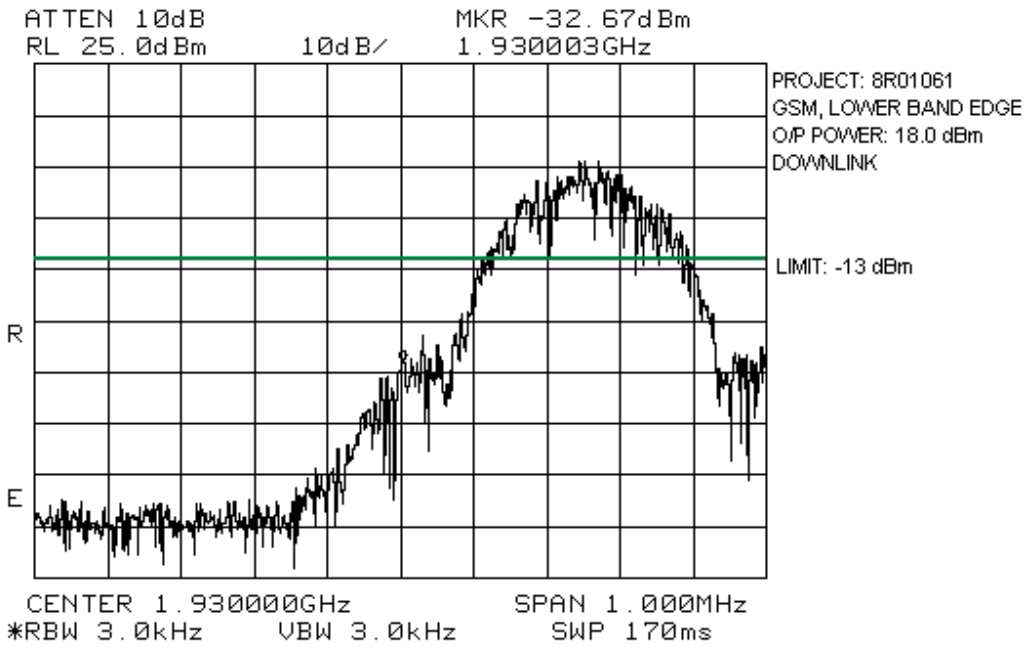

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -30.33dBm
15.70GHz
PROJECT: 8R01061
2 CH. INTERMODULATION SPURIOUS EMISSIONS
NADC, WIDE CH. SPACING
O/P POWER: 17.7 dBm
DOWNLINK
LIMIT: -13 dBm
R
START 0Hz
STOP 20.00GHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 400ms

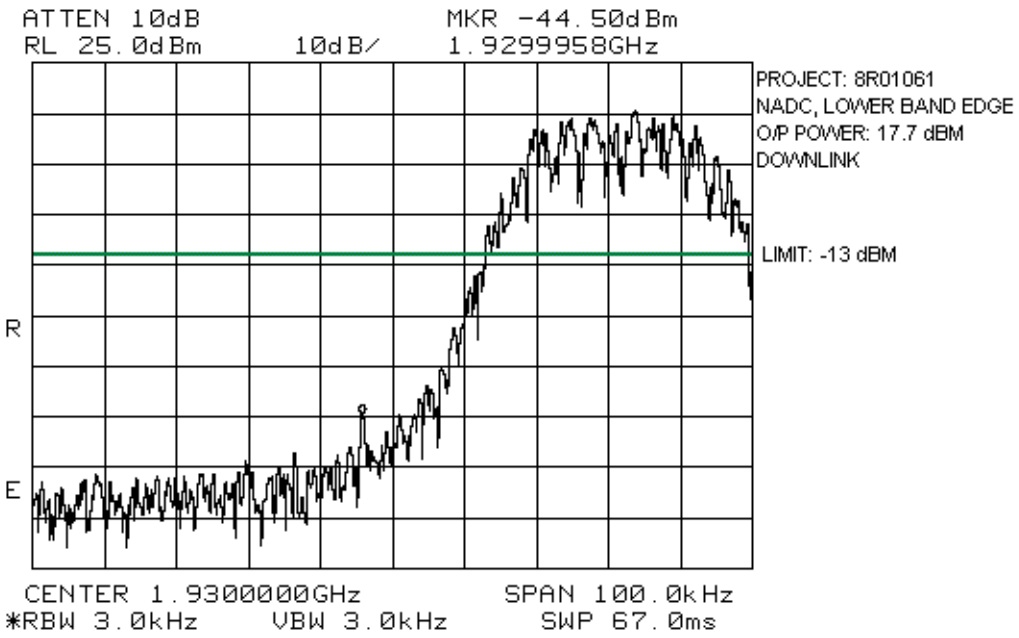

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -34.67dBm
1.850000GHz
PROJECT: 8R01061
LOWER BAND EDGE
CDMA
O/P POWER: 13.0 dBm
UPLINK
LIMIT: -13 dBm
R
CENTER 1.850000GHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

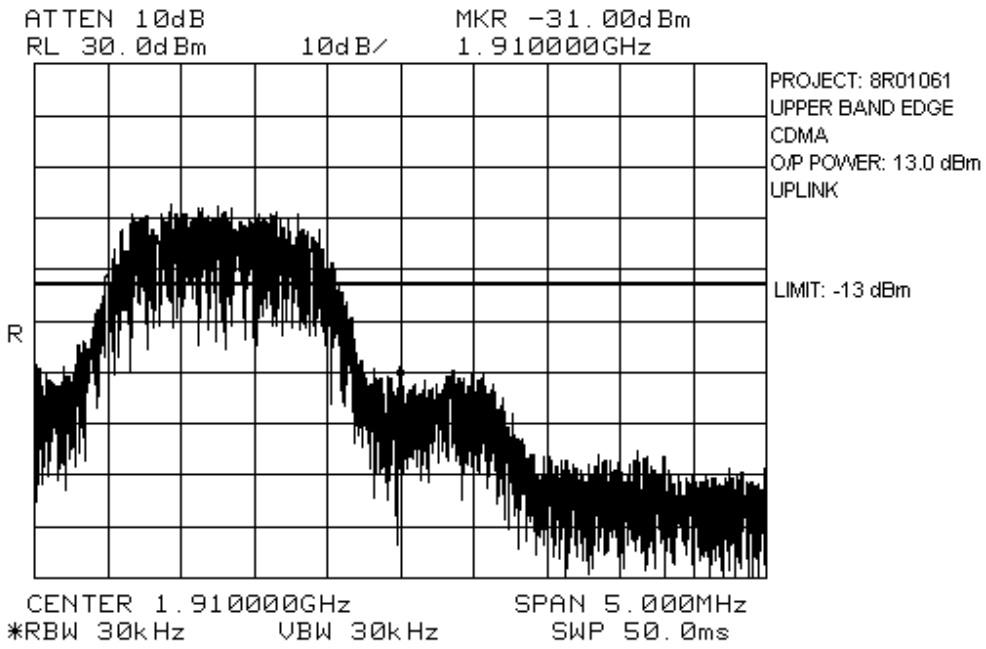

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -37.33dBm
1.850000GHz
PROJECT; 8R01061
LOWER BAND EDGE
GSM
O/P POWER: 13.5 dBm
UPLINK
LIMIT: -13 dBm
R
CENTER 1.850000GHz
SPAN 1.000MHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 280ms

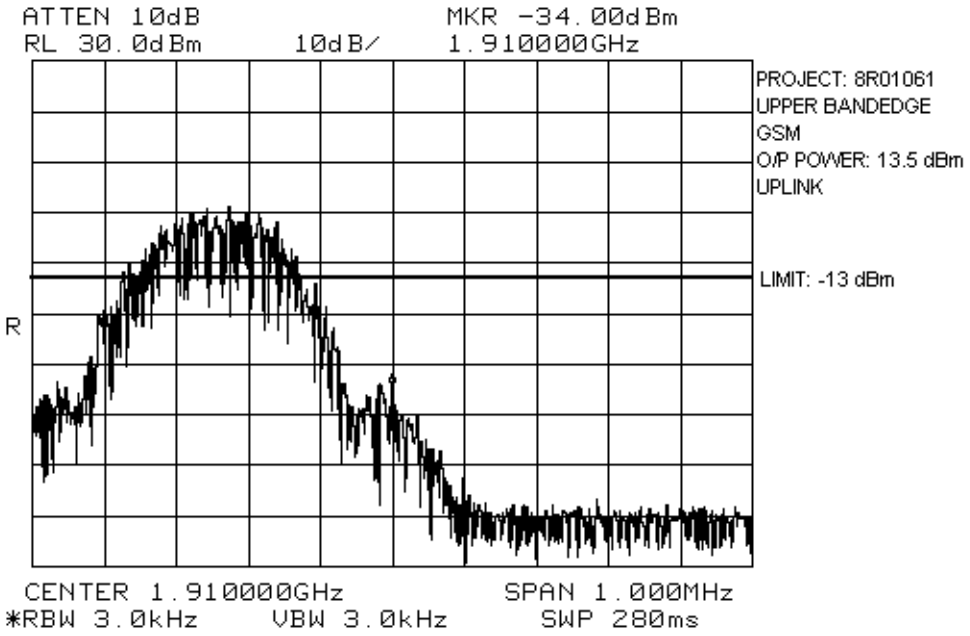

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -26.83dBm
1.8500000GHz
PROJECT: 8R01061
NADC
LOWER BAND EDGE
O/P POWER: 11.0 dBm
UPLINK
LIMIT: -13 dBm
R
CENTER 1.8500000GHz
SPAN 500.0kHz
RBW 3.0kHz
VBW 3.0kHz
SWP 140ms

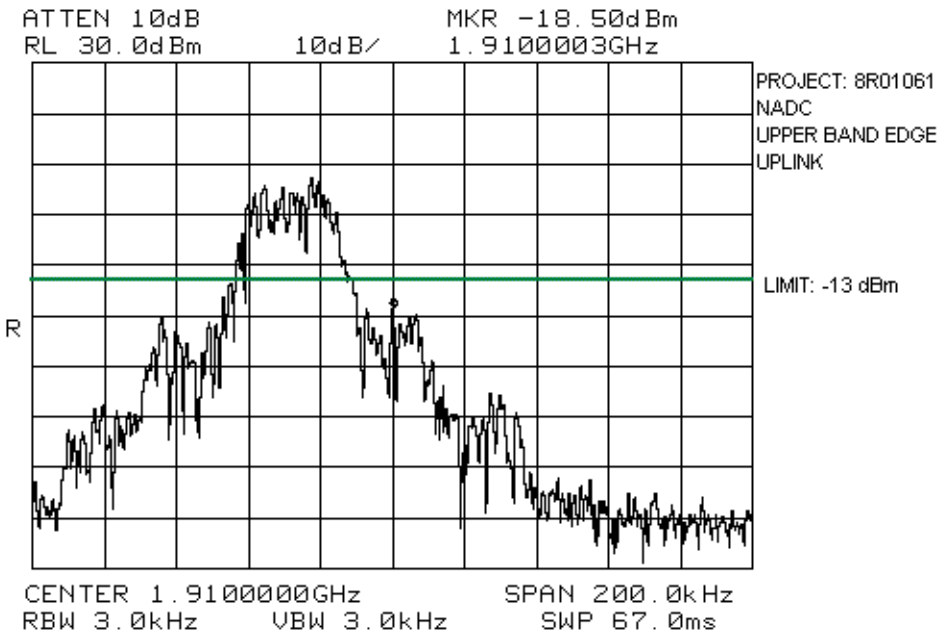

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -51.33dBm
1.930000GHz
PROJECT: 8R01061
CDMA, LOWER BAND EDGE
O/P POWER: 18.2 dBm
DOWNLINK
LIMIT: -13 dBM
R
CENTER 1.930000GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

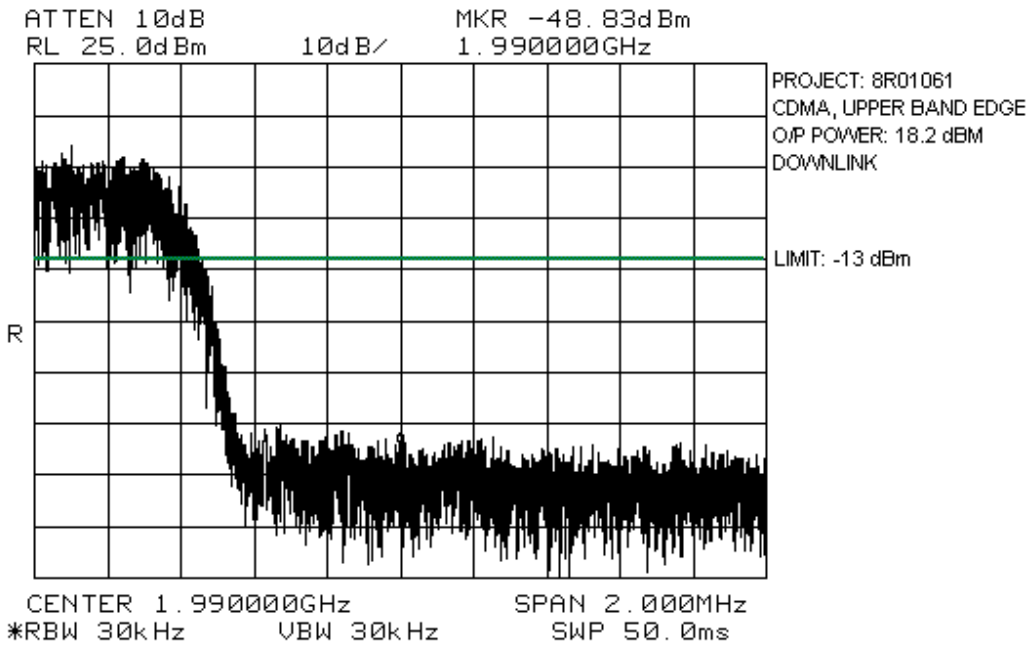

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -32.67dBm
1.930003GHz
PROJECT: 8R01061
GSM, LOWER BAND EDGE
O/P POWER: 18.0 dBm
DOWNLINK
LIMIT: -13 dBm
R
E
CENTER 1.930000GHz
SPAN 1.000MHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 170ms

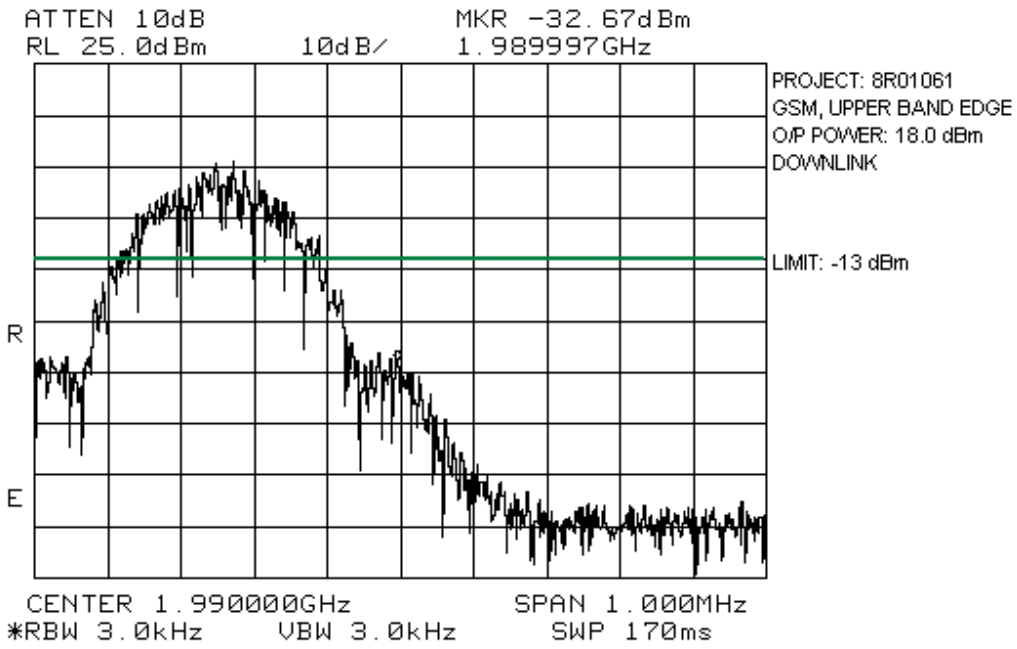

ATTEN 10dB
RL 25.0dBm
10dB/
MKR -44.50dBm
1.9299958GHz
PROJECT: 8R01061
NADC, LOWER BAND EDGE
O/P POWER: 17.7 dBM
DOWNLINK
LIMIT: -13 dBM
R
E
CENTER 1.9300000GHz
SPAN 100.0kHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 67.0ms

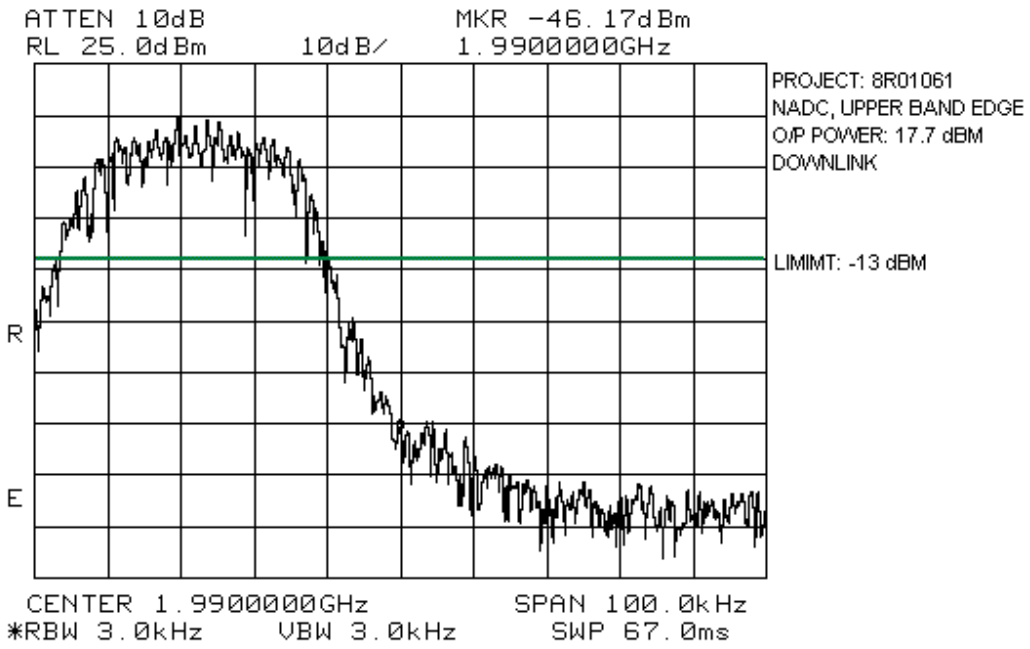

ATTEN 10dB
RL 30.0dBm
10dB/
MKR -31.00dBm
1.910000GHz
PROJECT: 8R01061
UPPER BAND EDGE
CDMA
O/P POWER: 13.0 dBm
UPLINK
LIMIT: -13 dBm
R
CENTER 1.910000GHz
SPAN 5.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 30.0dBm
10dB/
MKR -34.00dBm
1.910000GHz
PROJECT: 8R01061
UPPER BANDEDGE
GSM
O/P POWER: 13.5 dBm
UPLINK
LIMIT: -13 dBm
R
CENTER 1.910000GHz
SPAN 1.000MHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 280ms


ATTEN 10dB
RL 30.0dBm
10dB/
MKR -18.50dBm
1.9100003GHz
PROJECT: 8R01061
NADC
UPPER BAND EDGE
UPLINK
LIMIT: -13 dBm
R
CENTER 1.9100000GHz
SPAN 200.0kHz
RBW 3.0kHz
VBW 3.0kHz
SWP 67.0ms


ATTEN 10dB
RL 25.0dBm
10dB/
MKR -48.83dBm
1.990000GHz
PROJECT: 8R01061
CDMA, UPPER BAND EDGE
O/P POWER: 18.2 dBM
DOWNLINK
LIMIT: -13 dBm
R
CENTER 1.990000GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms


ATTEN 10dB
RL 25.0dBm
10dB/
MKR -32.67dBm
1.989997GHz
PROJECT: 8R01061
GSM, UPPER BAND EDGE
O/P POWER: 18.0 dBm
DOWNLINK
LIMIT: -13 dBm
R
E
CENTER 1.990000GHz
SPAN 1.000MHz
*RBW 3.0kHz
VBW 3.0kHz
SWP 170ms


ATTEN 10dB
RL 25.0dBm
10dB/
MKR -46.17dBm
1.9900000GHz
PROJECT: 8R01061
NADC, UPPER BAND EDGE
O/P POWER: 17.7 dBM
DOWNLINK
LIMIMT: -13 dBM
R
E
CENTER 1.9900000GHz
SPAN 100.0kHz
*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: January 4, 1999

Test Results: Complies.
The maximum field strength is 64.96 dBµV/m @ 3m.

Test Data:

Test Data - Radiated Emissions: Uplink

Test Distance (meters) : 3		Range:		Receiver: HP 8565 E		RBW(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)
3760.0	H2	V			74.7	32.6	42.4		64.9	82.3	17.4
3760.0	H2	H			72.3	32.6	42.4		62.5	82.3	19.8
5640.0	H2	V			70.3	35.0	44.4		58.5	82.3	23.8
5640.0	H2	H			67.8	35.0	44.4		58.4	82.3	23.9
7520.0	H2	V			62.0	36.8	43.6		55.2	82.3	27.1
7520.0	H2	H			62.3	36.8	43.6		55.5	82.3	26.8
9400.0	H2	V			63.7	38.3	43.4		58.6	82.3	23.7
9400.0	H2	H			63.8	38.3	43.4		58.7	82.3	23.6
11280.0	H2	V			54.3	38.7	43.5		49.5	82.3	32.8
11280.0	H2	H			54.0	38.7	43.5		49.2	82.3	33.1
13160.0	H2	V			27.5	40.3		-9.54	58.3	82.3	24.0
13160.0	H2	H			29.0	40.3		-9.54	59.76	82.3	22.5
15040.0	H2	V			29.2	39.0		-9.54	58.66	82.3	23.6
15040.0	H2	H			28.0	39.0		-9.54	57.46	82.3	24.8
16920.0	H2	V			27.2	41.9		-9.54	59.56	82.3	22.7
16920.0	H2	H			27.3	41.9		-9.54	59.66	82.3	22.6
18800.0	SH50-1	V			27.8	40.37		-9.54	58.63	82.3	23.7
18800.0	SH50-1	H			27.0	40.37		-9.54	57.86	82.3	24.4

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.
Measurements incorporating Dist. Connection were taken at 1 meter.

Test Data - Radiated Emissions: Downlink

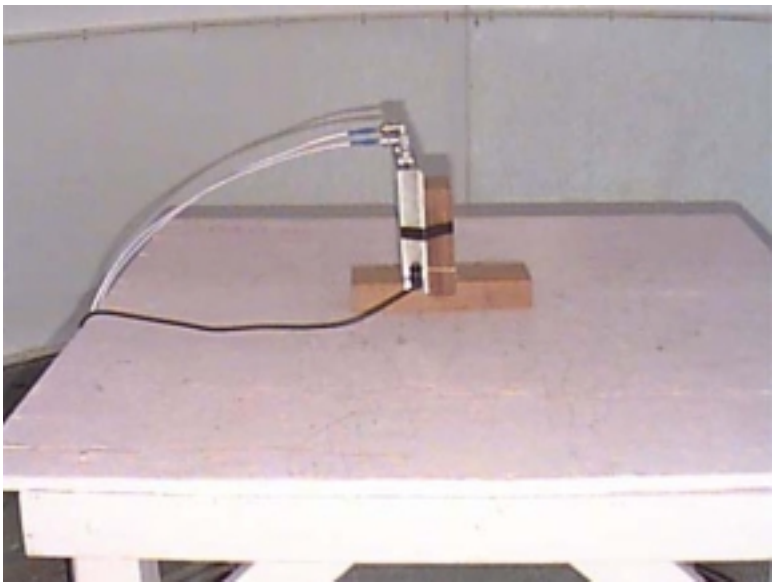
Test Distance (meters) : 3		Range:		Receiver: HP 8565 E		RBW(1 MHz):		Detector: Peak			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Table (deg.)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
3920.0	H2	V			62.0	33.7	42.6		53.1	82.3	29.2
3920.0	H2	H			63.7	33.7	42.6		54.8	82.3	27.5
5880.0	H2	V			48.5	36.3	44.5		40.3	82.3	42.0
5880.0	H2	H			48.7	36.3	44.5		40.5	82.3	41.8
7840.0	H2	V			47.2	38.4	43.7		41.9	82.3	40.4
7840.0	H2	H			45.7	38.4	43.7		40.4	82.3	41.9
9800.0	H2	V			47.2	39.8	44.3		42.7	82.3	39.6
9800.0	H2	H			49.0	39.8	44.3		44.5	82.3	37.8
11760.0	H2	V			45.7	39.9	43.8		41.8	82.3	40.5
11760.0	H2	H			46.0	39.9	43.8		42.1	82.3	40.2
13720.0	H2	V			24.33	41.5		-9.54	56.29	82.3	26.0
13720.0	H2	H			25.0	41.5		-9.54	56.96	82.3	25.3
15680.0	H2	V			25.83	39.5		-9.54	55.79	82.3	26.5
15680.0	H2	H			25.7	39.5		-9.54	55.66	82.3	26.6
17640.0	H2	V			30.0	44.5		-9.54	64.96	82.3	17.3
17640.0	H2	H			28.8	44.5		-9.54	63.76	82.3	18.5
19600.0	SH50-1	V			30.6	40.46		-9.54	61.52	82.3	20.8
19600.0	SH50-1	H			30.7	40.46		-9.54	61.62	82.3	20.7

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.
Measurements incorporating Dist. Connection were taken at 1 meter.

Photographs of Test Setup

Front View

Rear View



Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 24.235
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.24.232. Base stations are limited to 1640 watts peak E.I.R.P. with an antenna height up to 300 meters HAAT. In no case may the peak output power of a base station transmitter exceed 100 watts.

Method Of Measurement: CDMA Per ANSI/J-STD-014
TDMA Per ANSI/J-STD-010

Detachable Antenna:
The peak power at antenna terminals is measured using an in-line peak power meter or a spectrum analyzer.

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	**PARA. NO.: 2.989**

Minimum Standard: Para. No. 24.238(b). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB.

Method Of Measurement:

CDMA Per ANSI/J-STD-014

Spectrum analyzer settings:
RBW: 30 kHz
VBW: ≥ RBW
Span: 5 MHz
Sweep: Auto

GSM Per ANSI/J-STD-010

RBW: 3 kHz
VBW: ≥ RBW
Span: 2 MHz
Sweep: Auto

NADC Per IS-136

RBW: 1 kHz
VBW: ≥ RBW
Span: 1 MHz
Sweep: Auto

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

Minimum Standard: Para. No.24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least 43 + 10 log (P) dB.

Method Of Measurement:

Spectrum analyzer settings:

CDMA Per ANSI/J-STD-014

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 30 kHz (< 1MHz from Band Edge)
VBW: ≥ RBW
Sweep: Auto
Video Avg: 6 Sweeps

GSM Per ANSI/J-STD-010

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 3 kHz (< 1 MHz from Band Edge)
VBW: ≥ RBW
Sweep: Auto
Video Avg: Disabled

NADC Per IS-136

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 3 kHz (< 1 MHz from Band Edge)
VBW: ≥ RBW
Sweep: Auto
Video Avg: Disabled

To demonstrate compliance at band edges the frequency of the input signal is set to the lowest and highest assigned channel and the center frequency of the spectrum analyzer is set to the upper and lower edges of the appropriate frequency block.

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

Minimum Standard: Para. No.24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least 43 + 10 log (P) dB.

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)

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

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

For emissions > 1 GHz:

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

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

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

Minimum Standard: Para. No. 24.235. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Method Of Measurement: CDMA Per ANSI/J-STD-014
TDMA Per ANSI/J-STD-010
NADC Per IS-136

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. 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.

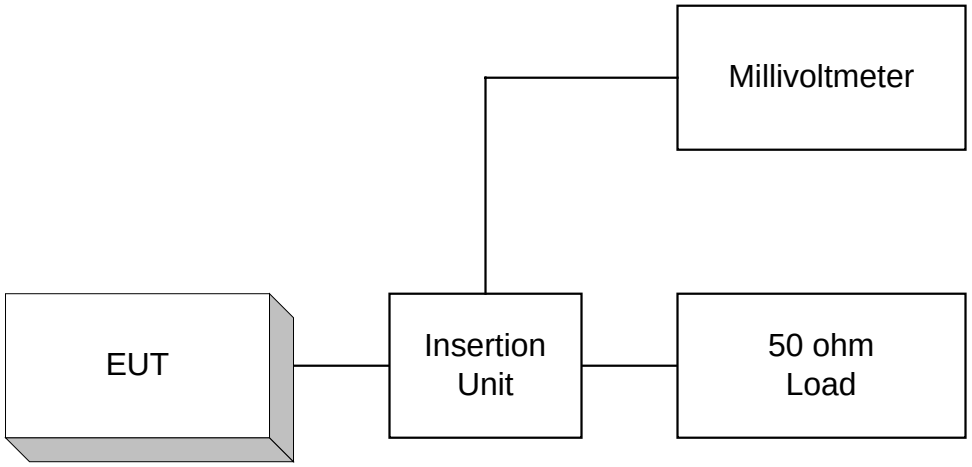
Frequency Stability With Temperature Variation

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.

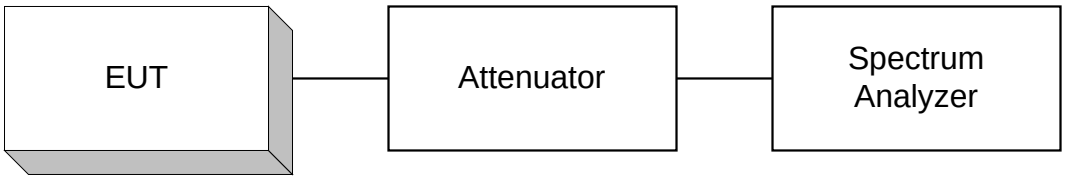
ANNEX B

TEST DIAGRAMS

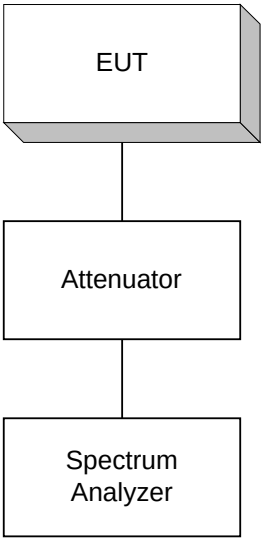
Para. No. 2.985 - R.F. Power Output



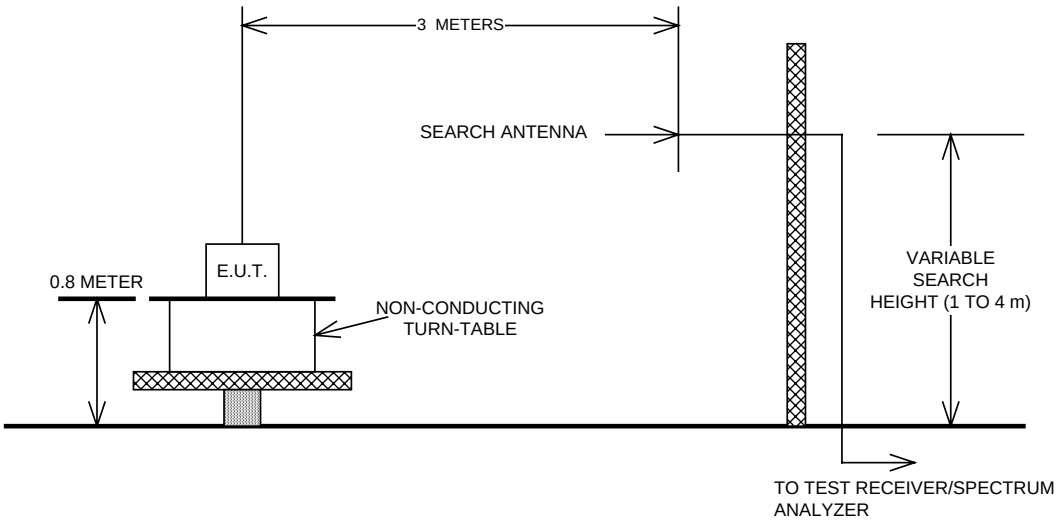
Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability