TEST REPORT

FOR FCC TYPE ACCEPTANCE

MODEL A289

DUAL BAND

BIDIRECTIONAL AMPLIFIER

FCC ID: P6T81902

TEST REPORT

P. G. Electronics, Ltd. is pleased to submit this technical report on tests performed on the Model A289 dual band bidirectional amplifier (FCC ID: P6T81902) to demonstrate compliance with the requirements for Type Acceptance by the FCC.

The undersigned personnel verify that the tests were performed as described herein and the results given were measured on the production unit.

Model Number A289 Serial Number 100554

_____ Date _____
Paul Liber – Test Engineer

_____ Date _____
Gerry Graham – P. Eng. President

1.0 NAMES AND ADDRESSES

1.1 Manufacturer

The Model A289 bidirectional amplifier (FCC ID: P6T81902) is manufactured by:

P. G. Electronics, Ltd.
800 Arrow Rd., Unit 8,
Toronto, Ontario M9M 2Z8
Canada

1.2 Applicant

The applicant for the acceptance of the amplifier is:

P. G. Electronics, Ltd.
800 Arrow Rd., Unit 8,
Toronto, Ontario M9M 2Z8
Canada

2.0 COMPLIANCE

The equipment has been tested in accordance with the following performance tests and the results provided below demonstrate compliance with FCC regulations. Please refer to section 3.0 for the list of test equipment used.

Note: For all tests, the internal attenuators have been set to 0 dB which makes the overall unit gain equal to 20 dB.

2.1 Gain

The gain was measured using the test arrangement as shown in Figure 2.1-1 below. Measurements were made over typical customer's bands.

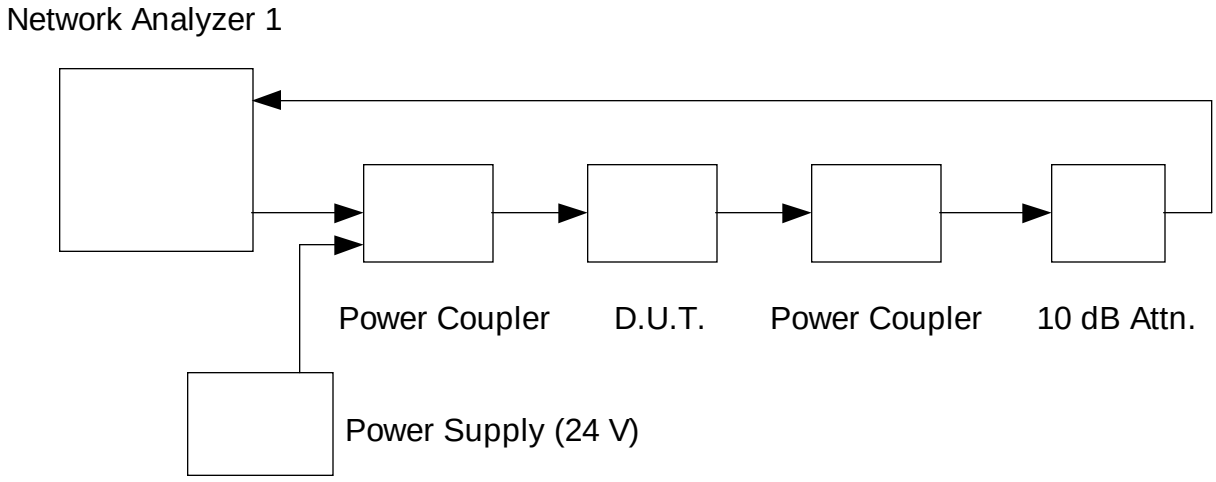
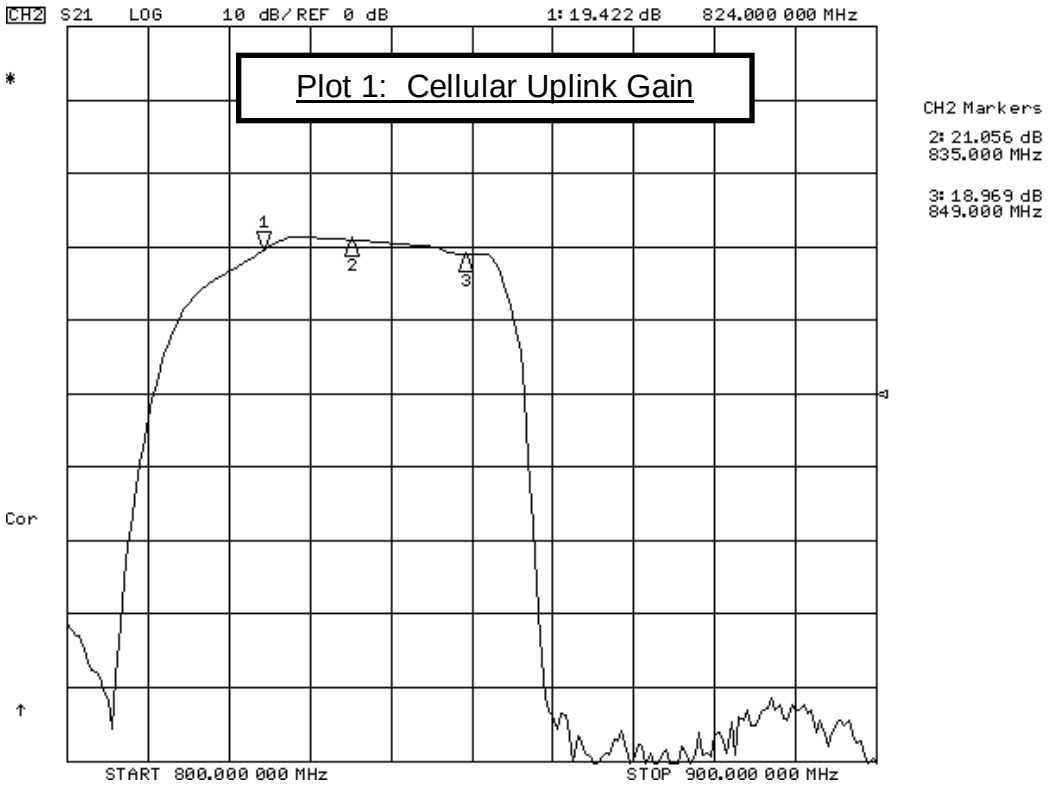
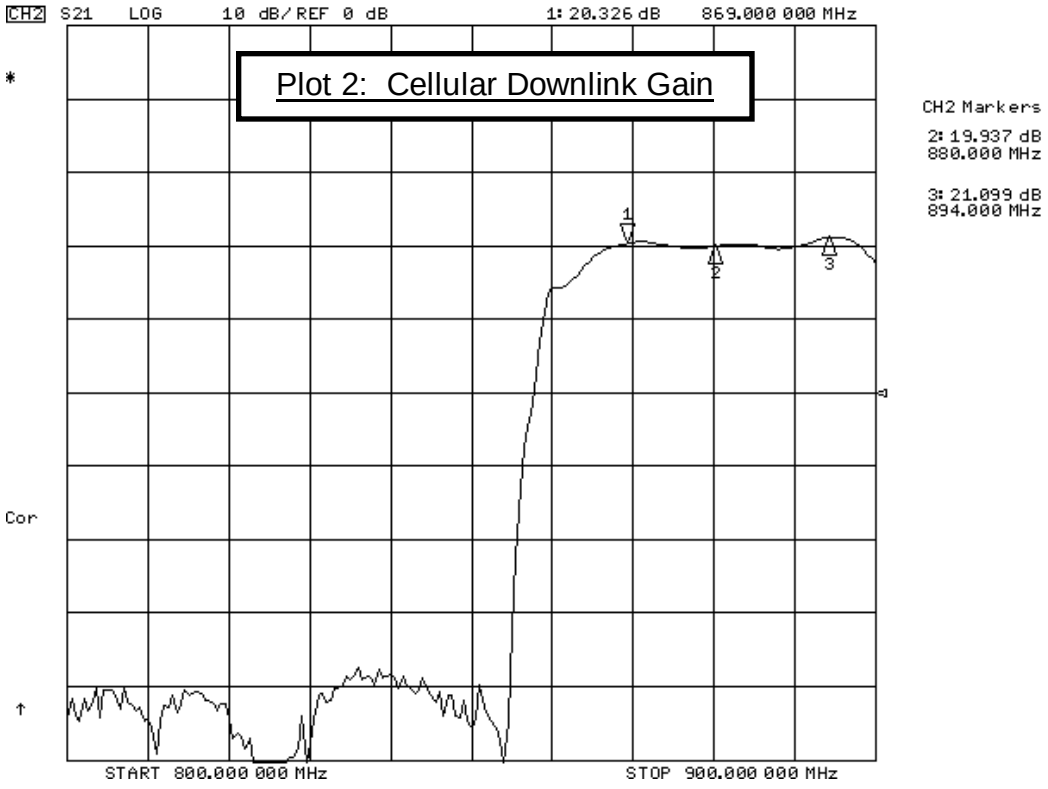
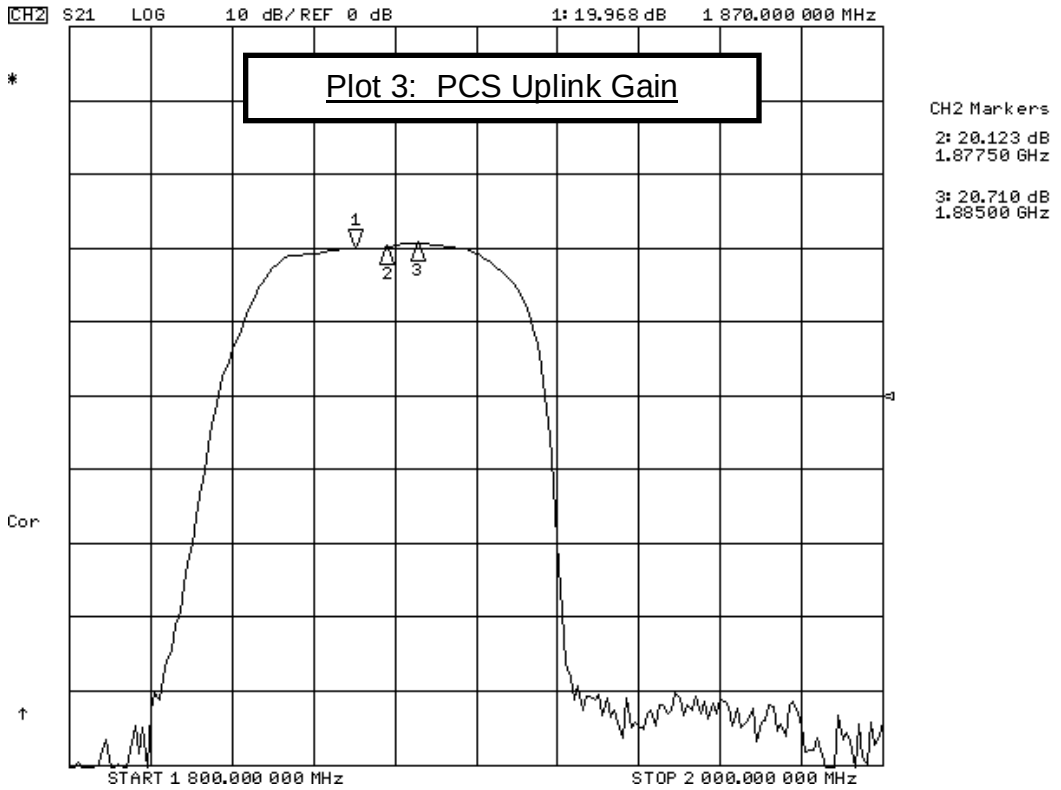


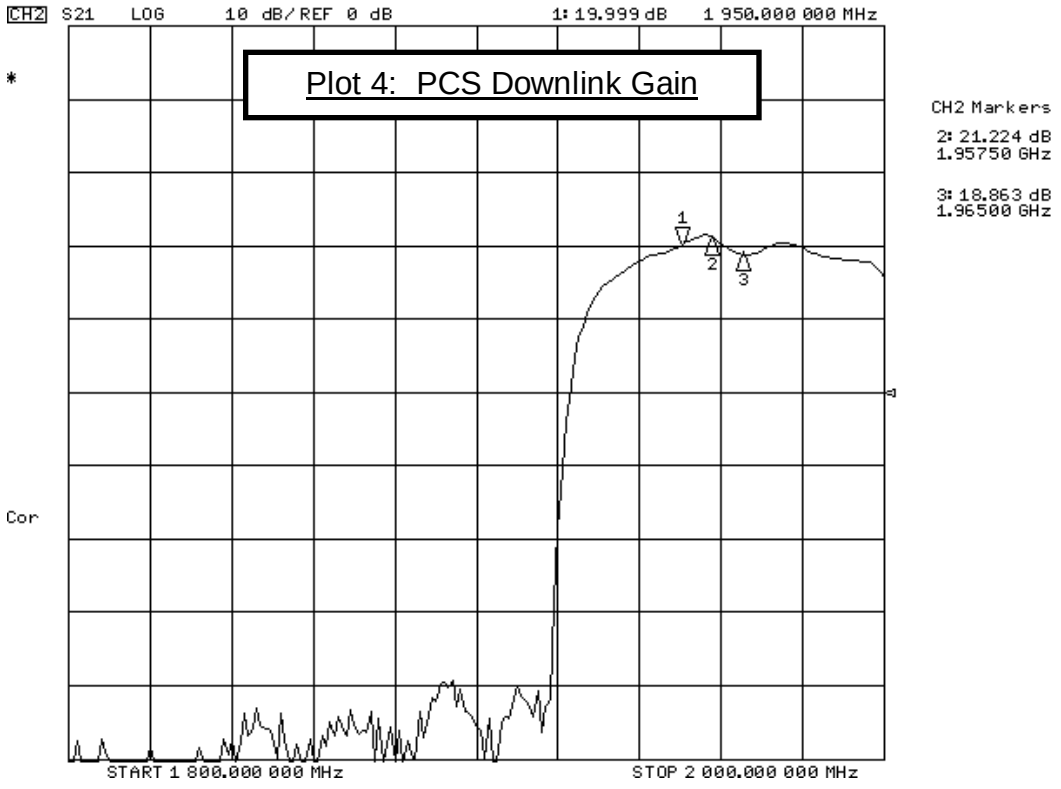
Figure 2.1-1

The unit gain was measured for both the cellular and PCS bands in both uplink and downlink directions. These results are shown in Plots 1 through 4 that follow. Plot 1 and Plot 2 show the cellular uplink and downlink gains respectively. Plot 3 and Plot 4 show the PCS uplink and downlink gains respectively.


CH2 S21 LOG 10 dB/ REF 0 dB 1: 19.422 dB 824.000 000 MHz
Plot 1: Cellular Uplink Gain
CH2 Markers
2: 21.056 dB
835.000 MHz
3: 18.969 dB
849.000 MHz
Cor
START 800.000 000 MHz
STOP 900.000 000 MHz

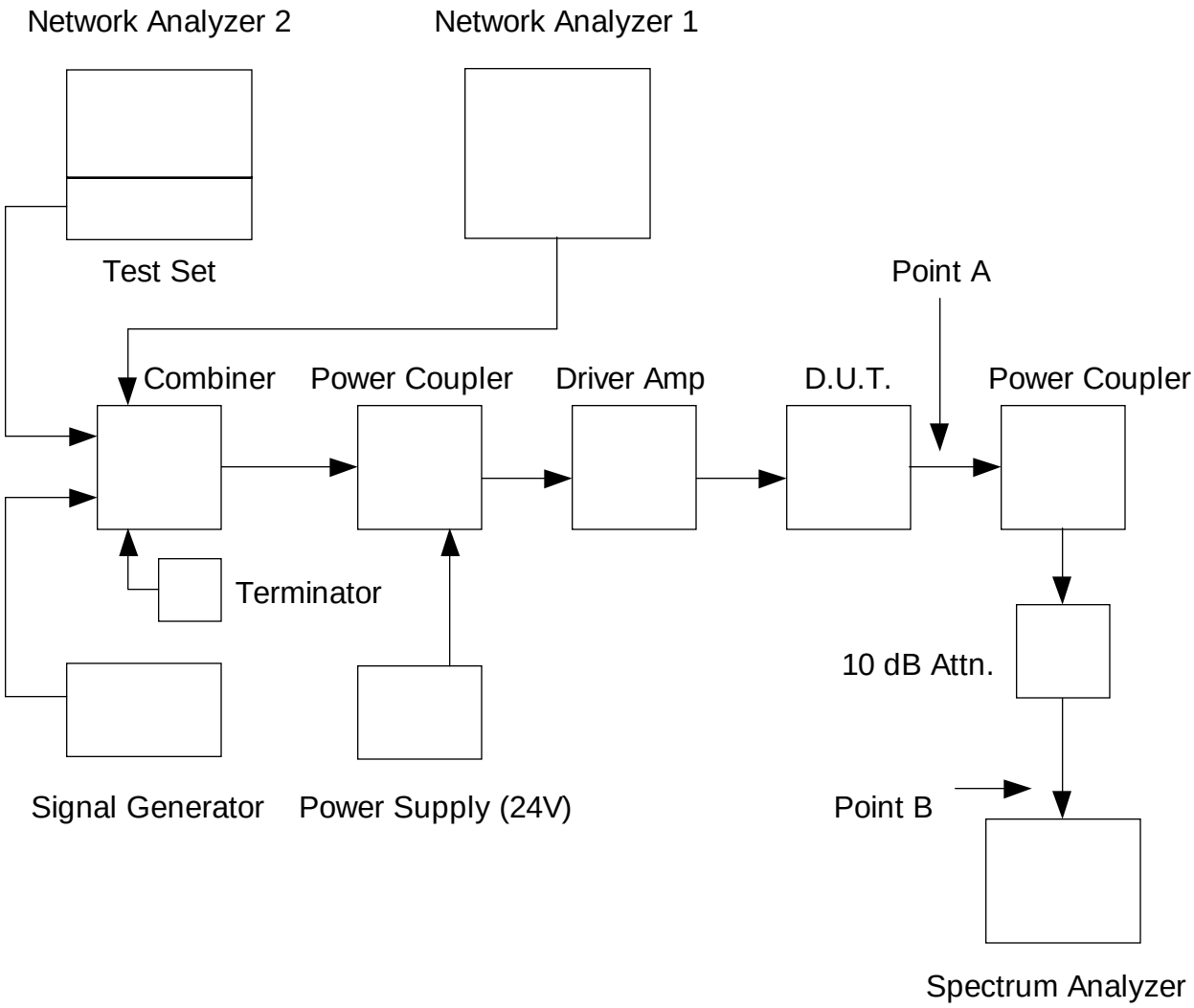

CH2 S21 LOG 10 dB/ REF 0 dB 1: 20.326 dB 869.000 000 MHz
Plot 2: Cellular Downlink Gain
CH2 Markers
2: 19.937 dB
880.000 MHz
3: 21.099 dB
894.000 MHz
Cor
START 800.000 000 MHz
STOP 900.000 000 MHz


CH2 S21 LOG 10 dB/ REF 0 dB 1: 19.968 dB 1 870.000 000 MHz
Plot 3: PCS Uplink Gain
CH2 Markers
2: 20.123 dB
1.87750 GHz
3: 20.710 dB
1.88500 GHz
Cor
START 1 800.000 000 MHz
STOP 2 000.000 000 MHz


CH2 S21 LOG 10 dB/ REF 0 dB 1: 19.999 dB 1 950.000 000 MHz
Plot 4: PCS Downlink Gain
CH2 Markers
2: 21.224 dB
1.95750 GHz
3: 18.863 dB
1.96500 GHz
Cor
START 1 800.000 000 MHz
STOP 2 000.000 000 MHz

2.2 Intermodulation and Spurious

Intermodulation and spurious products were measured with the amplifier operating at the maximum rated total inband power level as specified in the Operator's Manual. Three tone intermodulation tests were performed using the equipment test arrangement in Figure 2.2-1 below.



***Notes**: Model A211 driver amp was used for testing.

Loss from Point A (D.U.T. output) to Point B (Spectrum Analyzer input) was 10.7 dB at cellular and 11.2 dB at PCS. This includes the loss of the 10 dB attenuator, Power Coupler and cables.

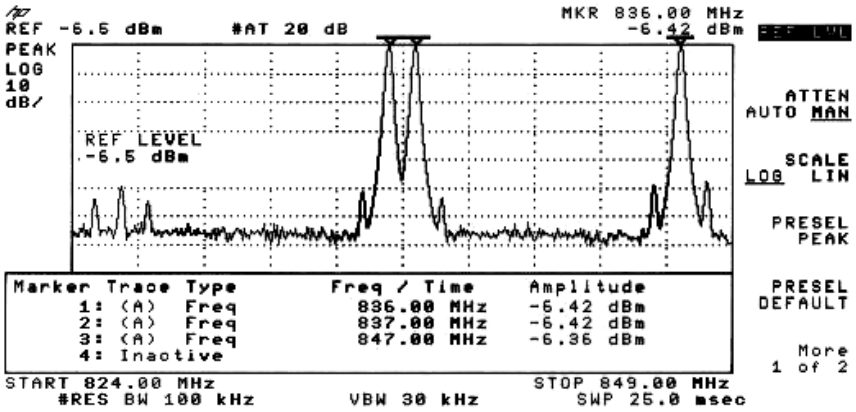
Figure 2.2-1

A three tone test was performed on the unit in the cellular uplink band with the input set to give the output power of +4.2 dBm for each uplink tone (+9 dBm maximum rated total inband power). The Network Analyzers were used as signal sources. The 10.7 dB loss to the spectrum analyzer results in tone levels of –6.5 dBm into the instrument. Plots 5 and 6 show the results of the test. In Plot 5, the narrower sweep setting shows in-band intermodulation products, while in Plot 6 the spectrum outside the cellular band is displayed on a broad sweep to show harmonics and spurious. The spectrum analyzer reference level was set to –6.5 dBm.

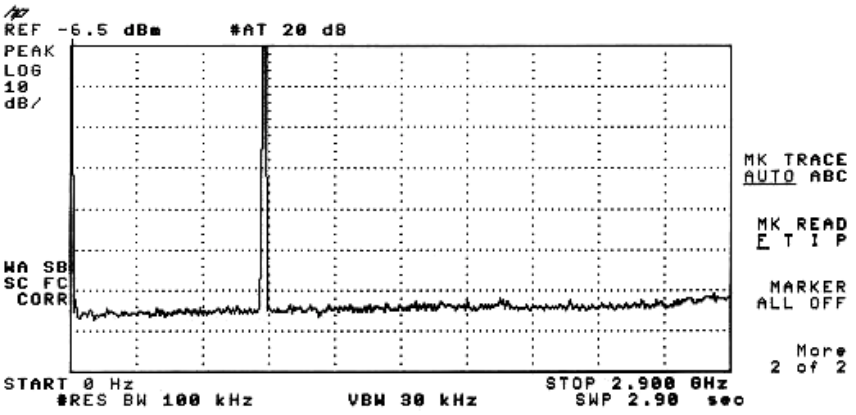
A three tone test was also performed in the cellular downlink band with the input power levels adjusted to give the output power of +19.2 dBm for each downlink tone (+24 dBm maximum rated total inband power). The 10.7 dB loss to the spectrum analyzer results in tone levels of +8.5 dBm into the instrument. Plots 7 and 8 show the results of the test for both narrow and broad sweeps with the spectrum analyzer reference level set to +8.5 dBm.

A three tone test was also performed in the PCS uplink band with the input power levels adjusted to give the output power of –0.8 dBm for each uplink tone (+4 dBm maximum rated total inband power). The 11.2 dB loss to the spectrum analyzer results in tone levels of –12 dBm into the instrument. Plots 9, 10A and 10B show the results of the test for both narrow and broad sweeps with the spectrum analyzer reference level set to –12 dBm.

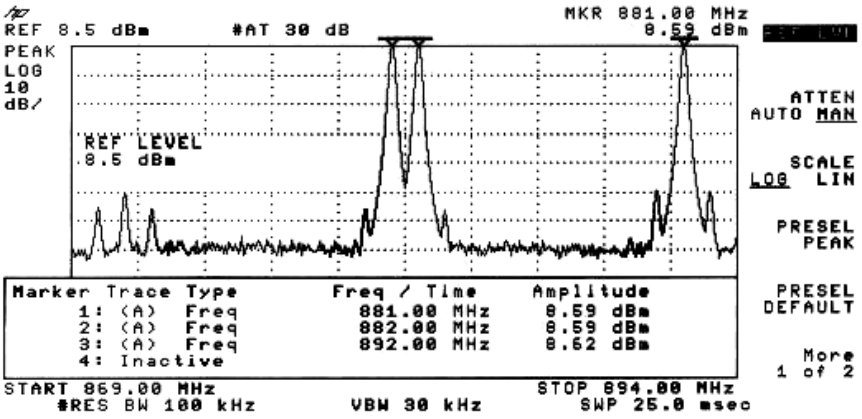
A three tone test was also performed in the PCS downlink band with the input power levels adjusted to give the output power of +19.2 dBm for each downlink tone (+24 dBm maximum rated total inband power). The 11.2 dB loss to the spectrum analyzer results in tone levels of +8 dBm into the instrument. Plots 11, 12A and 12B show the results of the test for both narrow and broad sweeps with the spectrum analyzer reference level set to +8 dBm.



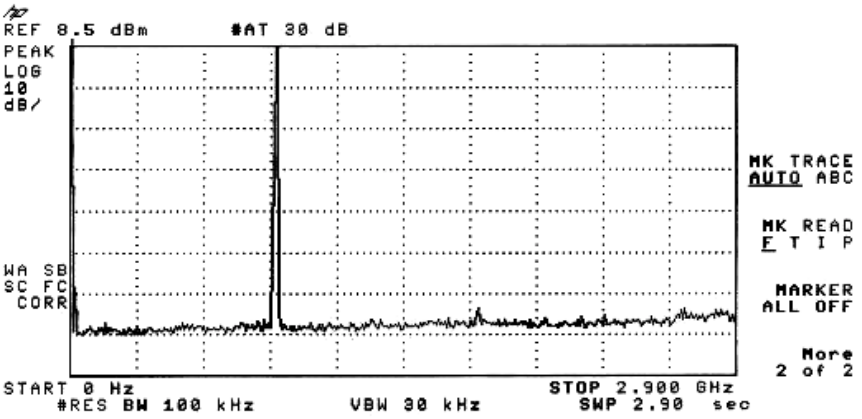
Plot 5: Cellular Uplink 3-tone Intermodulation (Narrow Sweep)



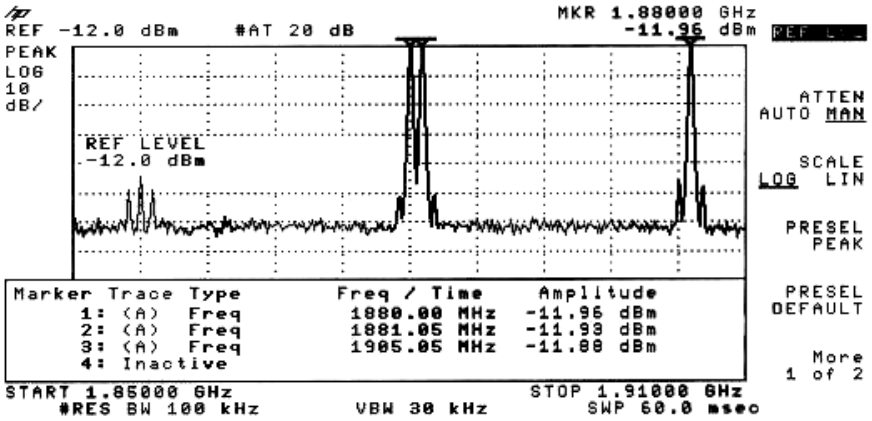
Plot 6: Cellular Uplink 3-tone Intermodulation (Broad Sweep)



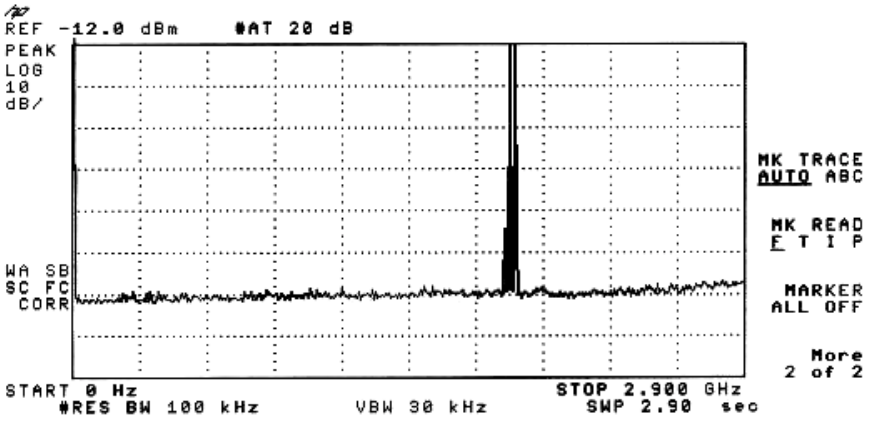
Plot 7: Cellular Downlink 3-tone Intermodulation (Narrow Sweep)



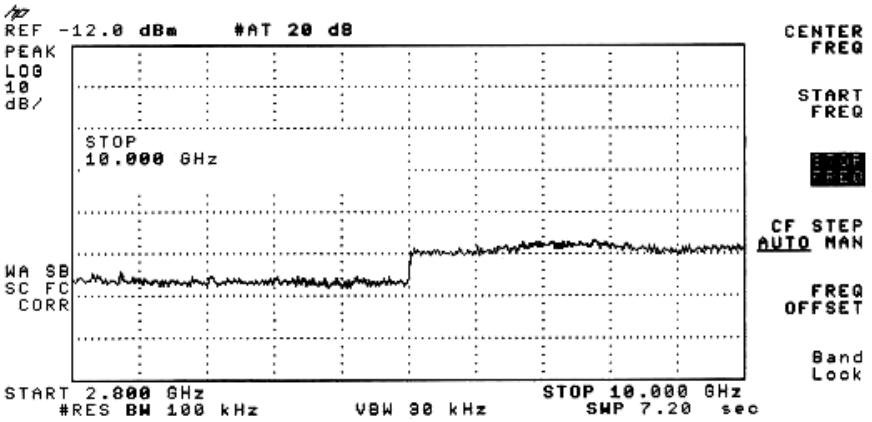
Plot 8: Cellular Downlink 3-tone Intermodulation (Broad Sweep)



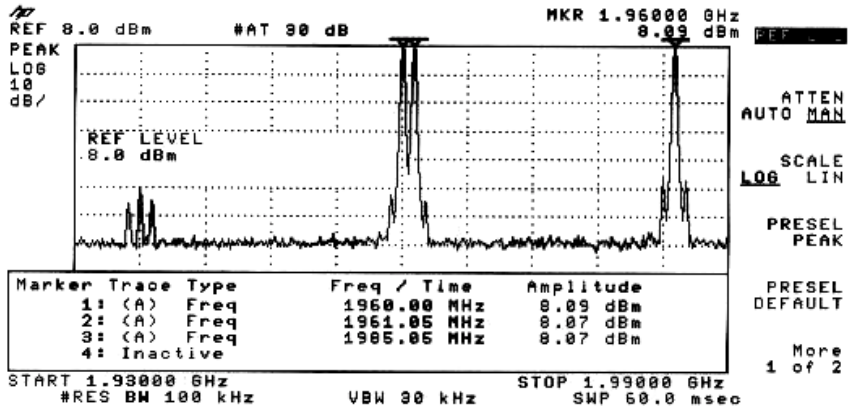
Plot 9: PCS Uplink 3-tone Intermodulation (Narrow Sweep)



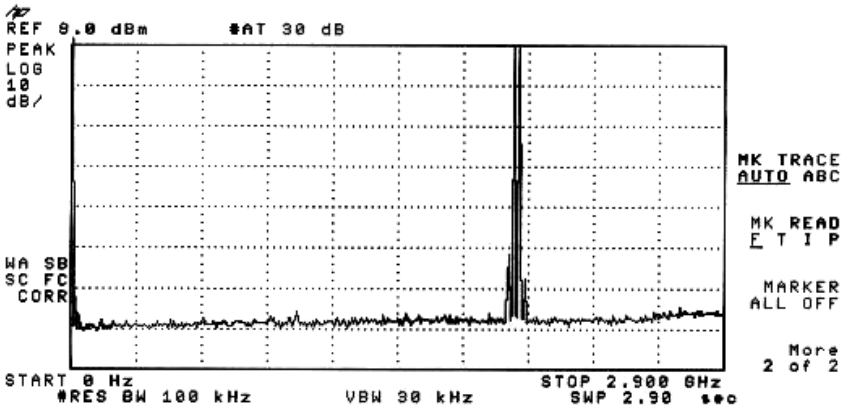
Plot 10A: PCS Uplink 3-tone Intermodulation (Sweep 0 – 2.9 GHz)



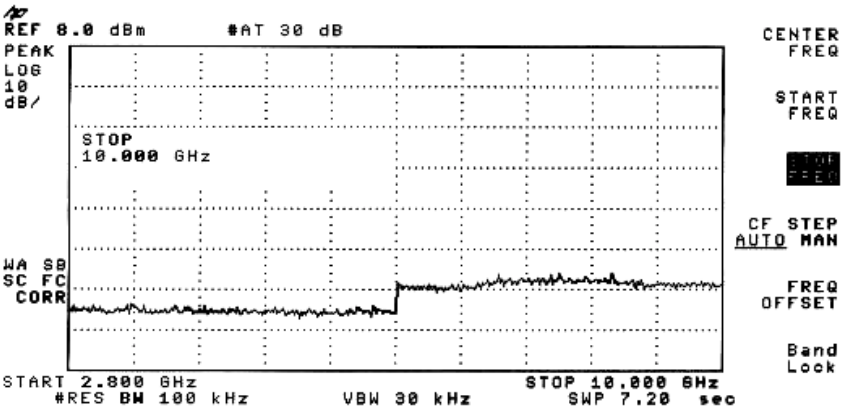
Plot 10B: PCS Uplink 3-tone Intermodulation (Sweep 2.8 – 10 GHz)



Plot 11: PCS Downlink 3-tone Intermodulation (Narrow Sweep)



Plot 12A: PCS Downlink 3-tone Intermodulation (Sweep 0 – 2.9 GHz)



Plot 12B: PCS Downlink 3-tone Intermodulation (Sweep 2.8 – 10 GHz)

Examination of the above results shows that all products are at least 45 dB down.

2.3 Modulated Channel Tests

These tests show a comparison of the input and output signals for operation with a single modulated signal at the maximum rated RF input drive level of the amplifier.

Figure 2.3-1 below shows the test arrangement used for the tests. All the test results display the input level and the output level with sufficient attenuation to display it as an overlay on the same screen.

Tests were performed for both the uplink and downlink directions. Cellular tests were performed for both FM (AMPS) and digital (NADC) modulations. PCS tests were performed for each of NADC, GSM and CDMA modulations.

The CDMA test signal was generated by using an external CDMA baseband modulation source connected to the signal generator as shown in the diagram. The CDMA baseband source was not connected to the signal generator for other modulation tests.

The input signal is displayed on the spectrum analyzer using the reference bypass. The output signal is displayed on the spectrum analyzer with the equipment connected as shown in the diagram.

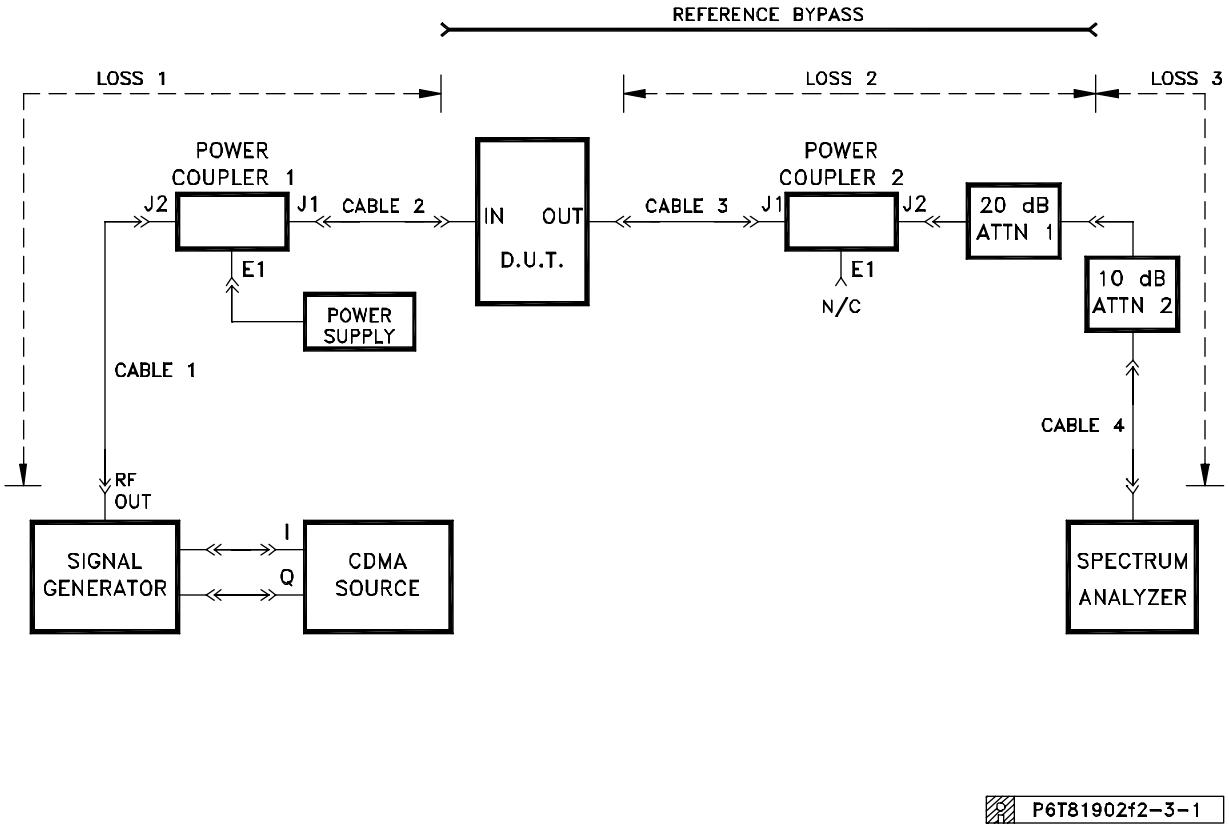


Figure 2.3-1

Notes For Cellular Tests:

a. Loss 1, loss 2 and loss 3 measured at cellular frequencies:

   Loss 1 = 0.8 dB (Cable 1 + Power Coupler 1 + Cable 2)
   Loss 2 = 20.7 dB (Cable 3 + Power Coupler 2 + 20 dB Attn.)
   Loss 3 = 10.5 dB at cellular (10 dB Attn. + Cable 4)

b. Cable 1 and Cable 4 loss measured 0.6 dB each at cellular.

c. Signal generator set to test frequency and desired modulation. Amplitude set to DUT maximum rated output level minus 20 dB (DUT gain) plus Loss 1. Therefore, to obtain +9 dBm at the output of the DUT requires a Generator level of: +9 dBm (test level) – 20 dB (DUT gain) + 0.8 dB (Loss 1) = -10.2 dBm. Similarly, to obtain +24 dBm at the output of the DUT requires a Generator level of: +24 dBm (test level) - 20 dB (DUT gain) + 0.8 dB (Loss 1) = +4.8 dBm.

d. The DUT output level is equal to the displayed spectrum analyzer level + Loss 2 + Loss 3; which is the spectrum analyzer level + 31.2 dB.

Notes For PCS Tests:

a. Loss 1, loss 2 and loss 3 measured at PCS frequencies.

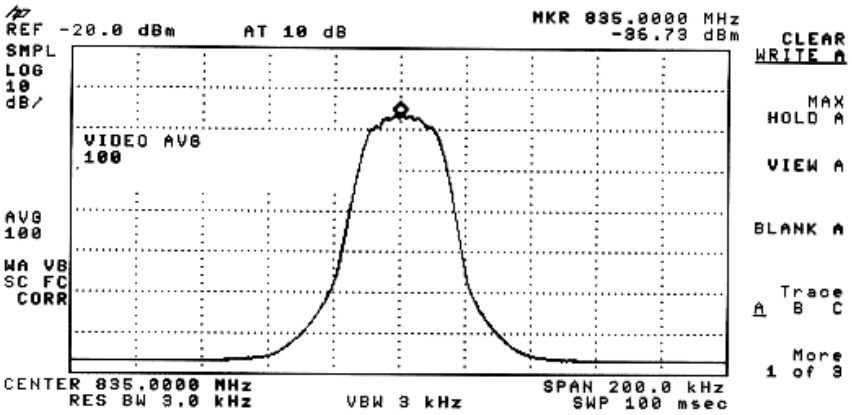
   Loss 1 = 1.5 dB (Cable 1 + Power Coupler 1 + Cable 2)
   Loss 2 = 20.8 dB (Cable 3 + Power Coupler 2 + 20 dB Attn.)
   Loss 3 = 10.8 dB at PCS (10 dB Attn. + Cable 4)

b. Cable 1 and Cable 4 loss measured 1.0 dB each.

c. Signal generator set to test frequency and desired modulation. Amplitude set to DUT maximum rated output level minus 20 dB (DUT gain) plus Loss 1. Therefore, to obtain +4 dBm at the output of the DUT requires a Generator level of: +4 dBm (test level) – 20 dB (DUT gain) + 1.5 dB (Loss 1) = -14.5 dBm. Similarly, to obtain +24 dBm at the output of the DUT requires a Generator level of: +24 dBm (test level) - 20 dB (DUT gain) + 1.5dB (Loss 1) = +5.5 dBm.

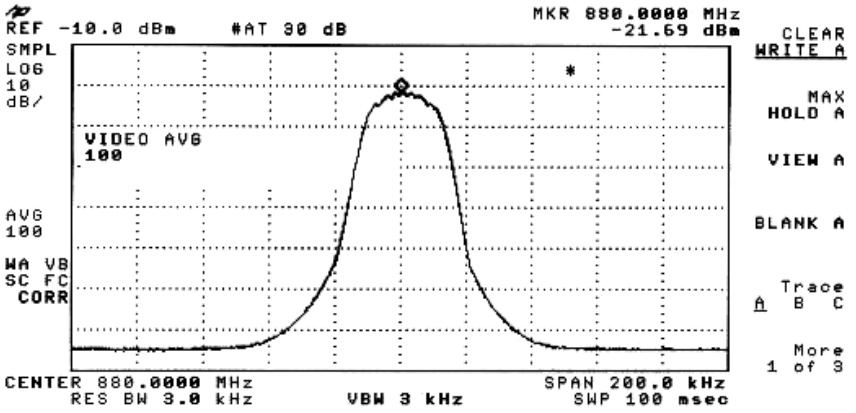
d. The DUT output level is equal to the displayed spectrum analyzer level + Loss 2 + Loss 3; which is the spectrum analyzer level + 31.6 dB.

The results of these tests are shown in Plots 13 through 22 that follow. Plots 13 and 14 show results for cellular FM modulation (AMPS); Plots 15 and 16 show results for cellular Digital Modulation (NADC). Plots 17 and 18 show results for PCS NADC modulation; Plots 19 and 20 show results for PCS GSM modulation; Plots 21 and 22 show results for PCS CDMA modulation



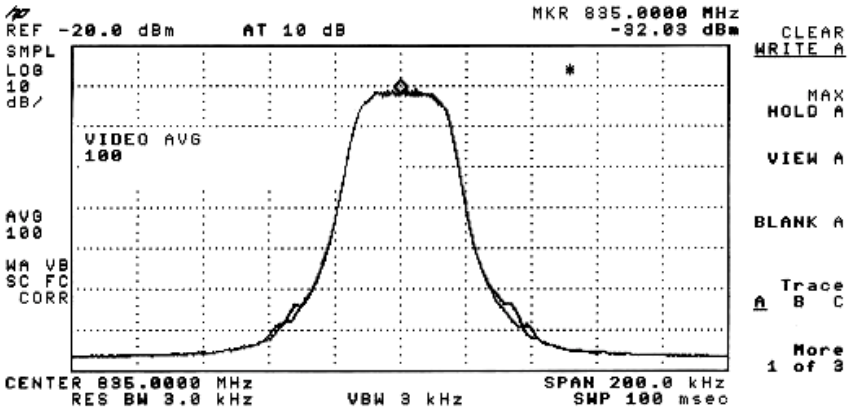
Plot 13: Cellular Uplink FM Modulated Channel Test

Generator Level = -10.2 dBm Modulation = 1KHz
Deviation = 12KHz Span = 200 KHz
Video Averaging = ON



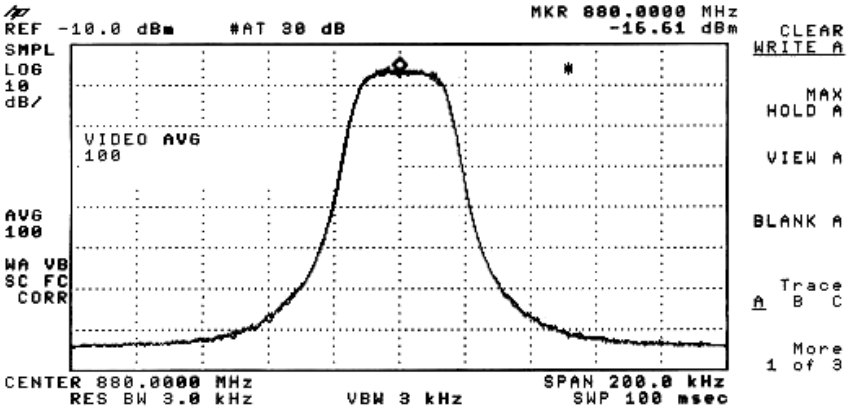
Plot 14: Cellular Downlink FM Modulated Channel Test

Generator Level = +4.8 dBm Modulation = 1KHz
Deviation = 12KHz Span = 200 KHz
Video Averaging = ON



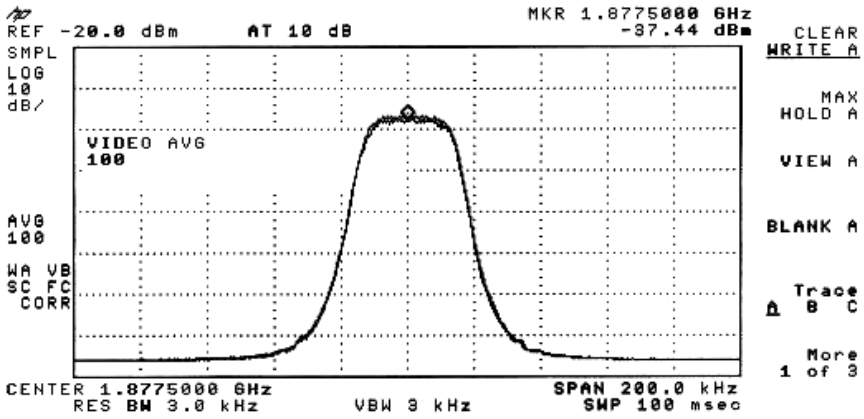
Plot 15: Cellular Uplink NADC Modulated Channel Test

Generator Level = -10.2 dBm Modulation = NADC
Span = 200 KHz Video Averaging = ON



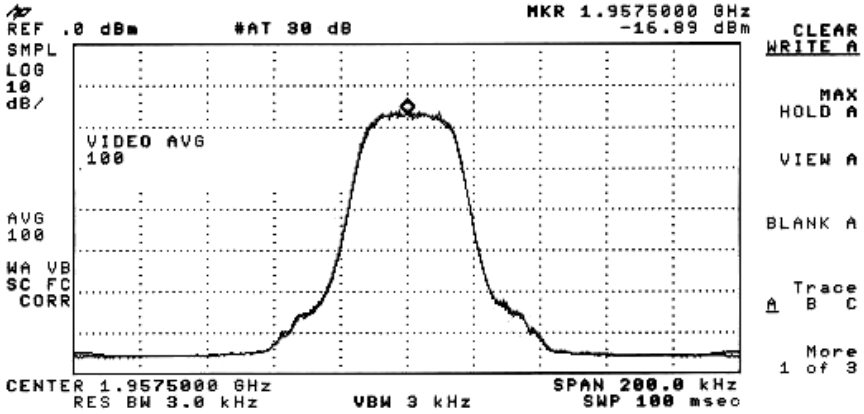
Plot 16: Cellular Downlink NADC Modulated Channel Test

Generator Level = +4.8 dBm Modulation = 1KHz
Span = 200 KHz Video Averaging = ON



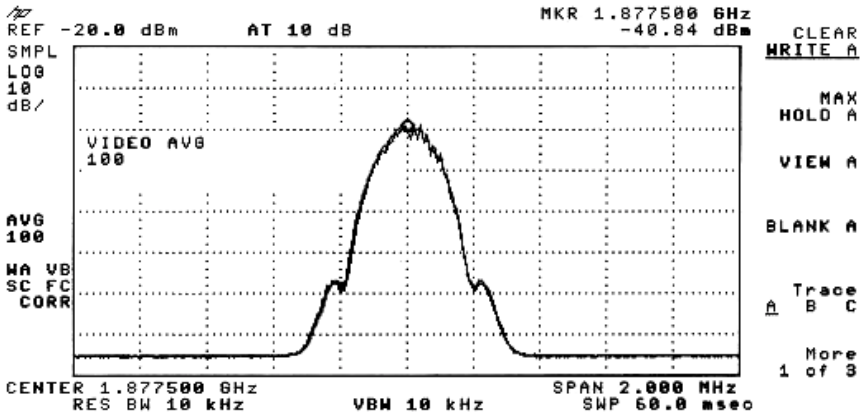
Plot 17: PCS Uplink NADC Modulated Channel Test

Generator Level = -14.5 dBm Modulation = NADC
Span = 200 KHz Video Averaging = ON



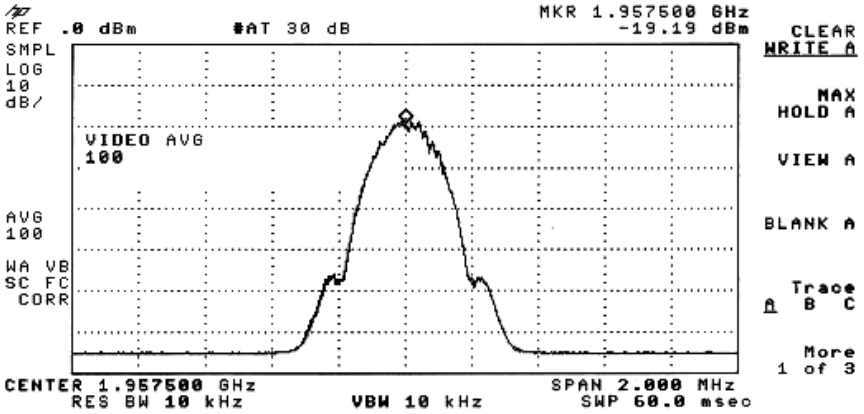
Plot 18: PCS Downlink NADC Modulated Channel Test

Generator Level = +5.5 dBm Modulation = NADC
Span = 200 KHz Video Averaging = ON



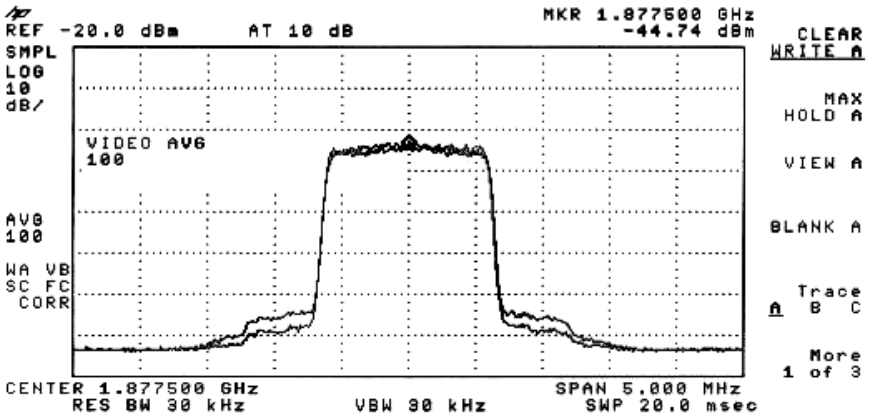
Plot 19: PCS Uplink GSM Modulated Channel Test

Generator Level = -14.5 dBm Modulation = GSM
Span = 2 MHz Video Averaging = ON



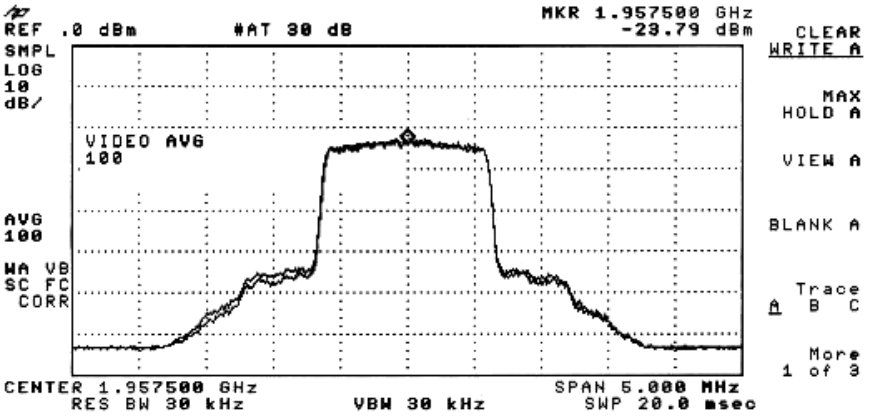
Plot 20: PCS Downlink GSM Modulated Channel Test

Generator Level = +5.5 dBm Modulation = NADC
Span = 2 MHz Video Averaging = ON



Plot 21: PCS Uplink CDMA Modulated Channel Test

Generator Level = -14.5 dBm Modulation = CDMA
Span = 5 MHz Video Averaging = ON



Plot 22: PCS Downlink CDMA Modulated Channel Test

Generator Level = +5.5 dBm Modulation = CDMA
Span = 5 MHz Video Averaging = ON

The uplink and downlink cellular results for FM modulation at the rated output level (Plots 13 and 14) show no measurable distortion visible on the spectrum analyzer.

The uplink cellular result for NADC modulation at the rated output level (Plot 15) shows that the adjacent channel distortion produced is at least 50 dB below the level of the carrier. The requirement is that the attenuation be 43 dB + 10 log (P); where P is the signal power in watts. Since the output power is -21 dBW (+ 9 dBm), then the required attenuation is 43 dB – 21 = 22 dB. Thus the DUT is compliant.

The downlink cellular result for NADC modulation at the rated output level (Plot 16) shows no measurable distortion.

The uplink and downlink PCS results for NADC modulation at the rated output level (Plots 17 and 18) show no measurable distortion visible on the spectrum analyzer.

The uplink and downlink PCS results for GSM modulation at the rated output level (Plots 19 and 20) show no measurable distortion visible on the spectrum analyzer.

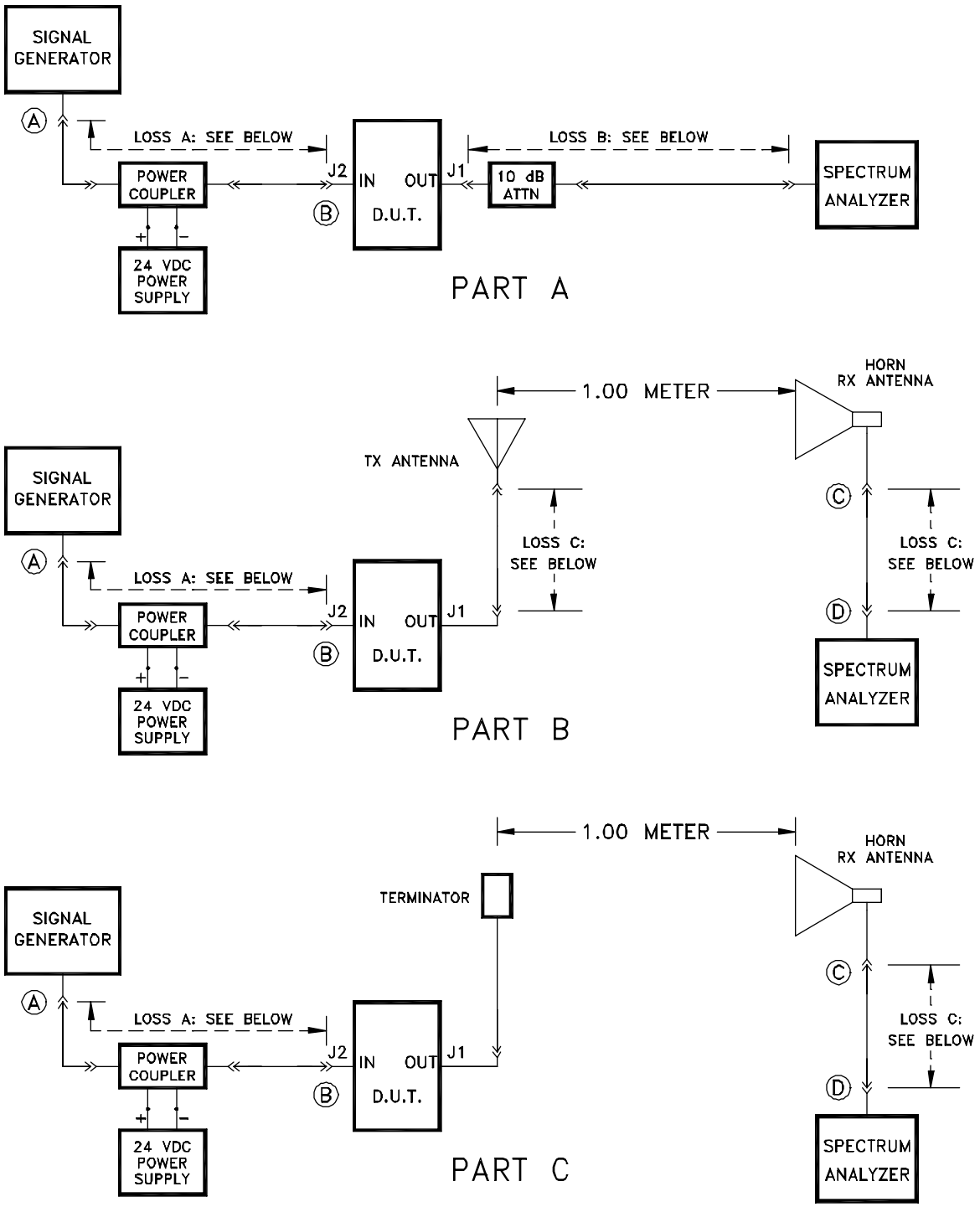
The PCS uplink result for CDMA modulation at the rated output level (Plot 21) shows that the maximum uplink adjacent channel distortion is at a level of –52.4 dBm (spectrum analyzer level plus Loss 2 plus Loss 3, which is –84 dBm + 20.8 dB + 10.8 dB = -52.4 dBm.) Since the carrier output level is +4 dBm, the adjacent channel distortion is +4 dBm – (–52.4 dBm) = 56.4 dB below the carrier. The requirement is that the attenuation be 43 dB + 10 log (P); where P is the signal power in watts. Since the output power is -26 dBW (+ 4 dBm), then the required attenuation is 43 dB – 26 = 17 dB. Thus the DUT is compliant.

The PCS downlink result for CDMA modulation at the rated output level (Plot 22) shows that the maximum downlink adjacent channel distortion is at a level of –22.4 dBm (spectrum analyzer level plus Loss 2 plus Loss 3, which is –54 dBm + 20.8 dB + 10.8 dB = -22.4 dBm.) Since the carrier output level is +24 dBm, the adjacent channel distortion is +24 dBm – (–22.4 dBm) = 46.4 dB below the carrier. The requirement is that the attenuation be 43 dB + 10 log (P); where P is the signal power in watts. Since the output power is -6 dBW (+ 24 dBm), then the required attenuation is 43 dB – 6 = 37 dB. Thus the DUT is compliant.

2.4 Radiated Spurious Emissions

These tests address the requirements for spurious emissions as specified in Sections 2.991 and 2.997 of the FCC R&Rs.

The testing was performed in three parts using the equipment arrangements shown in Figure 2.4-1 parts A, B, and C as shown below. Note that for these tests, DC was blocked to the DUT output by removing an internal jumper as would be done in a typical application in which DC is blocked to a connected antenna.



NOTES:

LOSS A = 0.8 dB AT CELLULAR, 1.5 dB AT PCS
LOSS B = 10.5 dB AT CELLULAR, 10.8 dB AT PCS
LOSS C = 0.6 dB AT CELLULAR, 1.0 dB AT PCS
DC BLOCKED INTERNALLY WITHIN DUT

P6T81902F2-4-1

Figure 2.4-1

Part A: Antenna Terminal Emissions

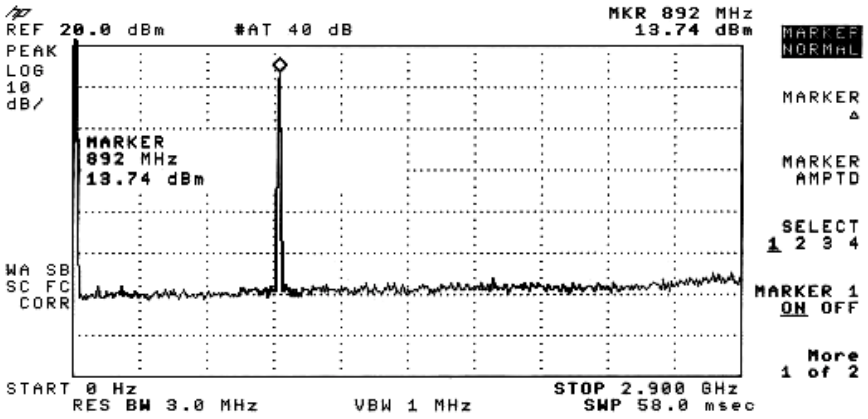
In these tests, the generator fed the maximum rated input signal into the DUT and the spectrum analyzer was connected to the output of the DUT through a 10 dB attenuator as per Figure 2.4.-1 Part A. The maximum rated input level is the maximum rated output level minus the DUT gain (20dB).

The output spectrum was recorded in the cellular downlink direction for both FM and NADC type modulations. The output spectrum was recorded in the PCS downlink direction for each of NADC, GSM and CDMA type modulations.

For cellular tests, the signal generator was set to the maximum rated DUT output level minus 20 dB (DUT gain) plus Loss A at cellular. Therefore to obtain +24 dBm at the output of the DUT required a Generator level of: +24 dBm (test level) - 20 dB (DUT gain) + 0.8 dB (Loss A) = +4.8 dBm.

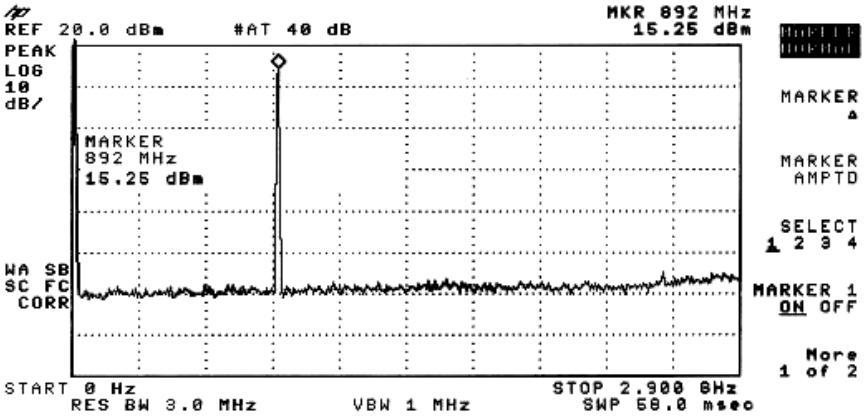
For PCS tests, the signal generator was set to the maximum rated DUT output level minus 20 dB (DUT gain) plus Loss A at PCS. Therefore to obtain +24 dBm at the output of the DUT required a Generator level of: +24 dBm (test level) - 20 dB (DUT gain) + 1.5 dB (Loss A) = +5.5 dBm.

In each test, the results are plotted with two overlapping sweeps. Cellular results are plotted with sweeps of 0 – 2.9 GHz and 2.8 – 10 GHz. PCS results are plotted with sweeps of 0 – 2.9 GHz and 2.8 – 20 GHz. The results are shown in Plots 23 through 36 on the following pages. For clarity, the second and third harmonics for cellular NADC modulation are also shown on an expanded sweep in Plots 27 and 28. In addition, the second and third harmonics for PCS NADC modulation are also shown on an expanded sweep in Plots 35 and 36.



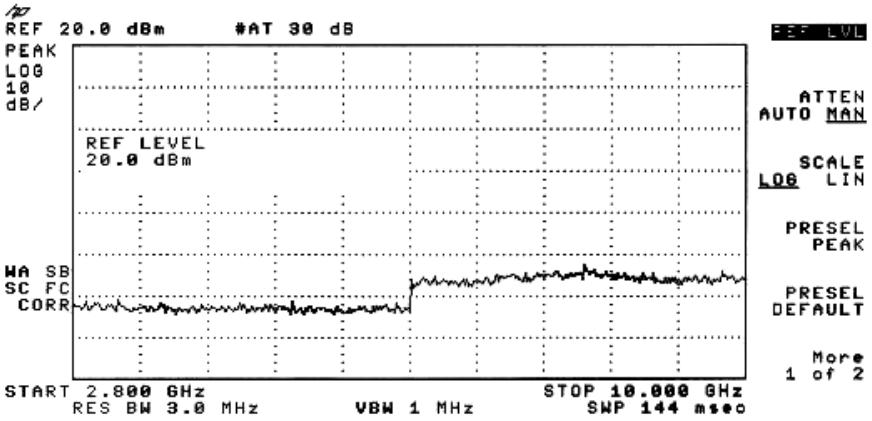
Plot 23 Antenna Terminal Emissions - Cellular AMPS Modulation

Input Level = +4 dBm Modulation = AMPS
Span = 0 – 2.9 GHz Generator Level = +4.8 dBm



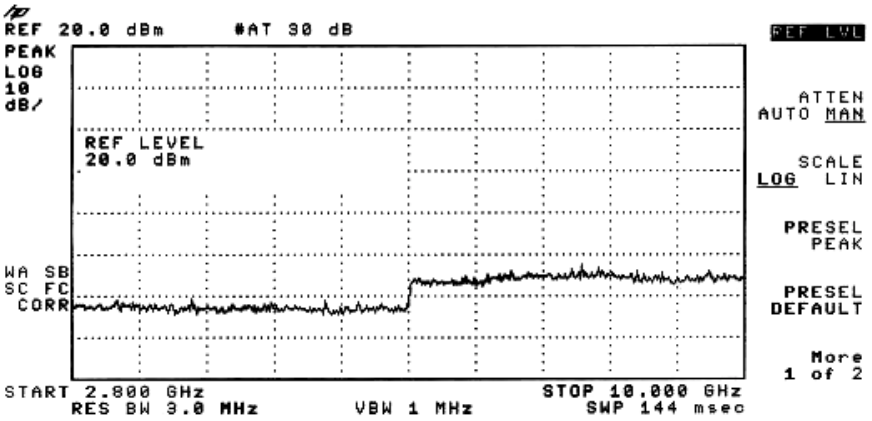
Plot 24 Antenna Terminal Emissions - Cellular NADC Modulation

Input Level = +4 dBm Modulation = NADC
Span = 0 – 2.9 GHz Generator Level = +4.8 dBm



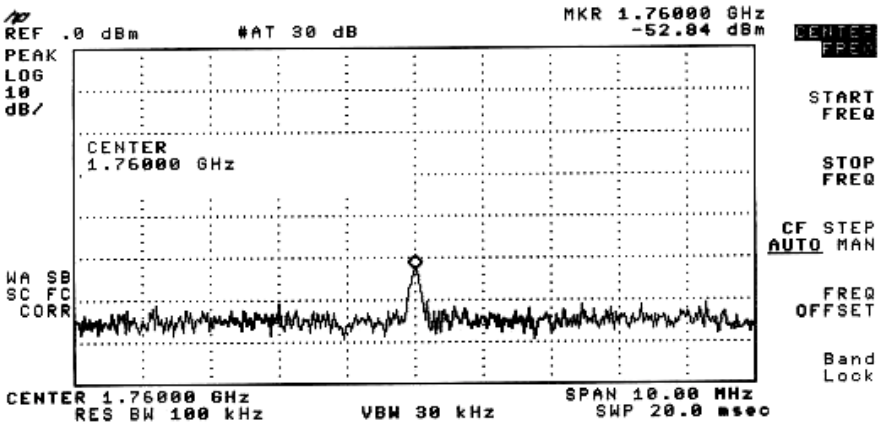
Plot 25 Antenna Terminal Emissions - Cellular AMPS Modulation

Input Level = +4 dBm Modulation = AMPS
Span = 2.8 - 10 GHz Generator Level = +4.8 dBm



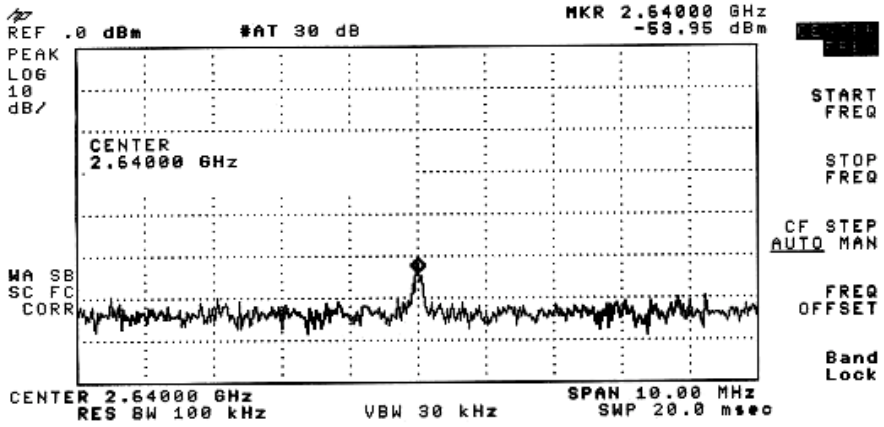
Plot 26 Antenna Terminal Emissions - Cellular NADC Modulation

Input Level = +4 dBm Modulation = NADC
Span = 2.8 - 10 GHz Generator Level = +4.8 dBm



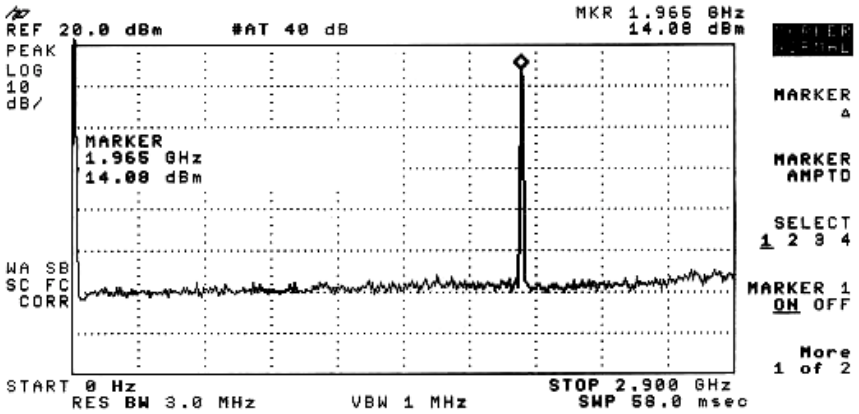
Plot 27 Antenna Terminal Emissions - Cellular NADC Modulation

Input Level = +4 dBm Modulation = NADC
2nd Harmonic Generator Level = +4.8 dBm



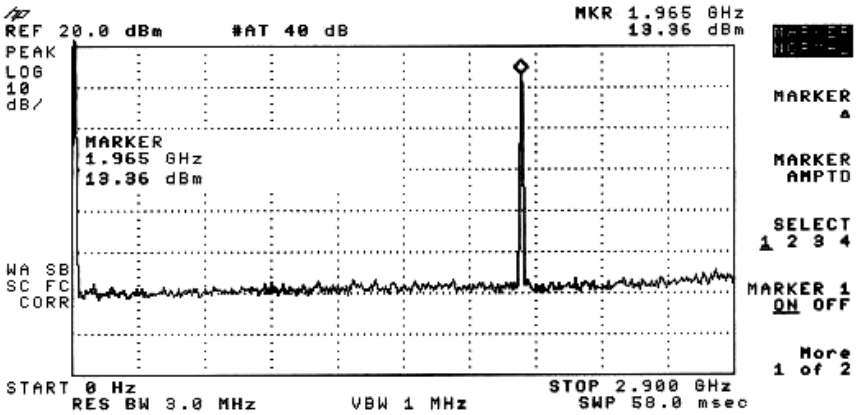
Plot 28 Antenna Terminal Emissions - Cellular NADC Modulation

Input Level = +4 dBm Modulation = NADC
3rd Harmonic Generator Level = +4.8 dBm



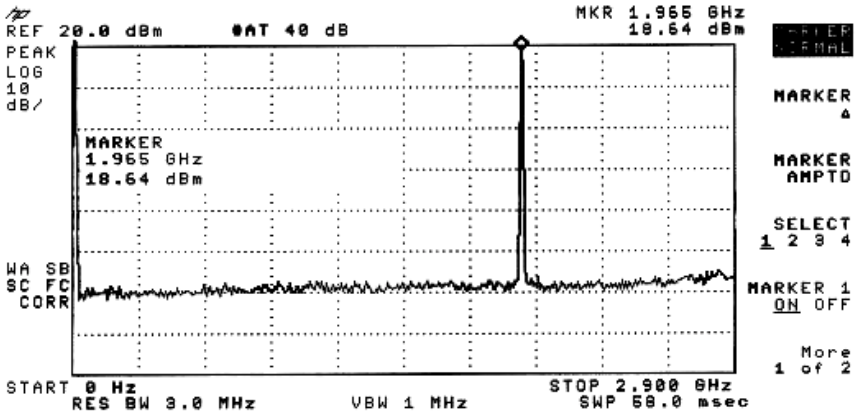
Plot 29 Antenna Terminal Emissions - PCS NADC Modulation

Input Level = +4 dBm Modulation = NADC
Span = 0 – 2.9 GHz Generator Level = +5.5 dBm



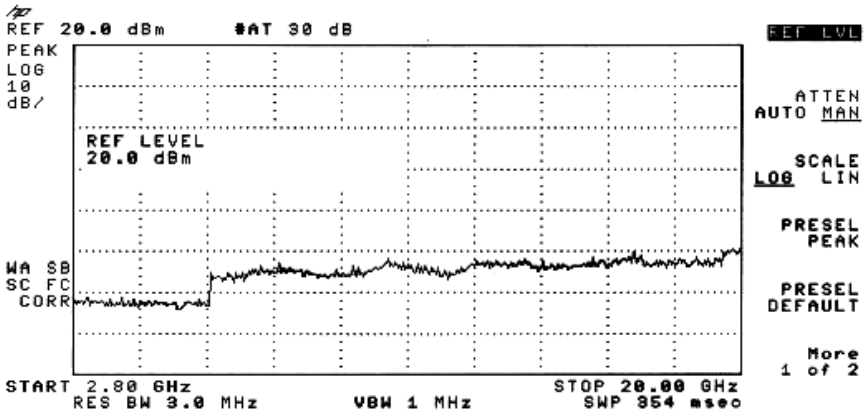
Plot 30 Antenna Terminal Emissions - PCS GSM Modulation

Input Level = +4 dBm Modulation = GSM
Span = 0 – 2.9 GHz Generator Level = +5.5 dBm



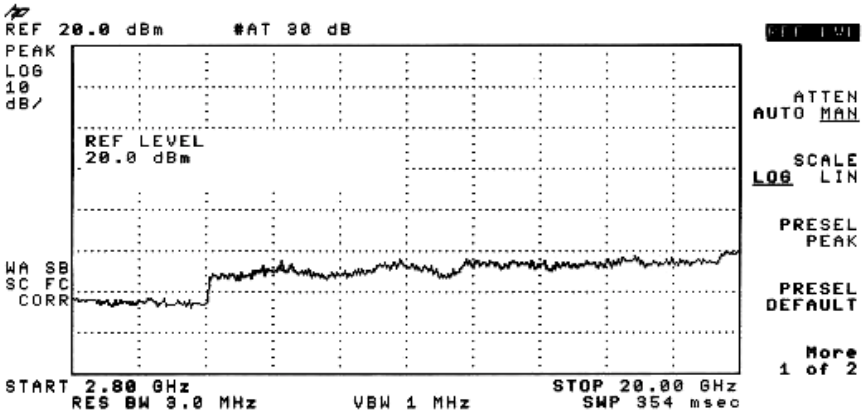
Plot 31 Antenna Terminal Emissions - PCS CDMA Modulation

Input Level = +4 dBm Modulation = CDMA
Span = 0 – 2.9 GHz Generator Level = +5.5 dBm



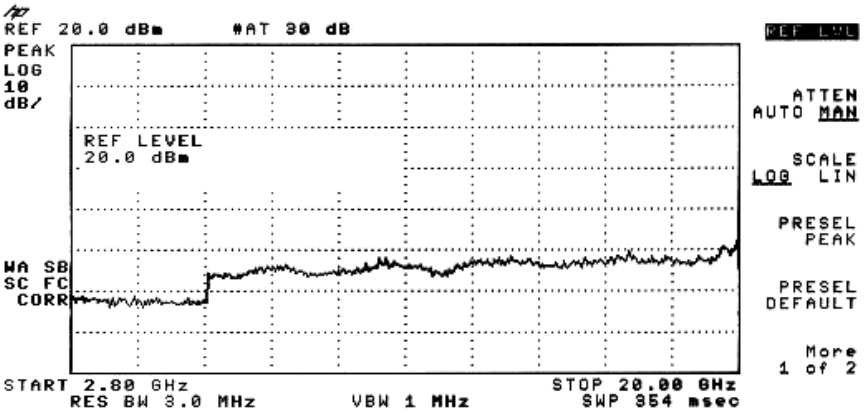
Plot 32 Antenna Terminal Emissions - PCS NADC Modulation

Input Level = +4 dBm Modulation = NADC
Span = 2.8 - 20 GHz Generator Level = +5.5 dBm



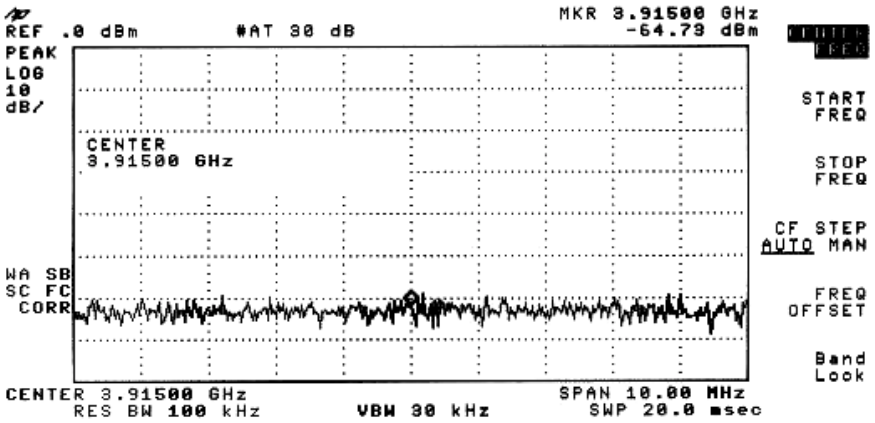
Plot 33 Antenna Terminal Emissions - PCS GSM Modulation

Input Level = +4 dBm Modulation = GSM
Span = 2.8 - 20 GHz Generator Level = +5.5 dBm



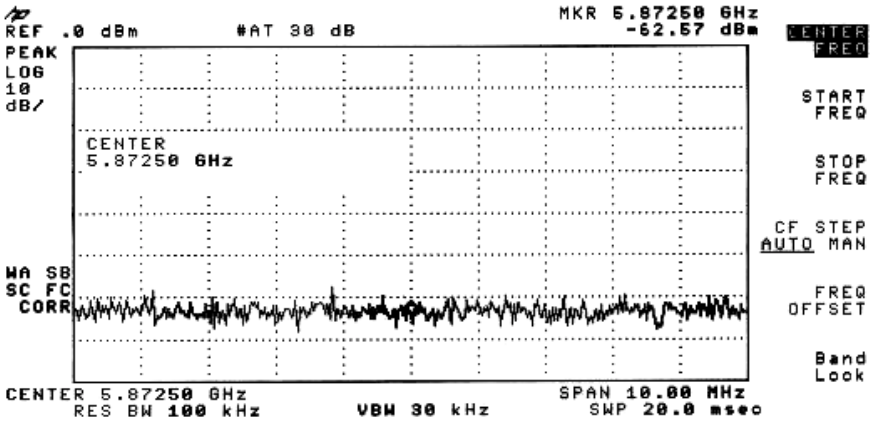
Plot 34 Antenna Terminal Emissions - PCS CDMA Modulation

Input Level = +4 dBm Modulation = CDMA
Span = 2.8 - 20 GHz Generator Level = +5.5 dBm



Plot 35 Antenna Terminal Emissions - PCS NADC Modulation

Input Level = +4 dBm Modulation = NADC
2nd Harmonic Generator Level = +5.5 dBm



Plot 36 Antenna Terminal Emissions - PCS NADC Modulation

Input Level = +4 dBm Modulation = NADC
3rd Harmonic Generator Level = +5.5 dBm

The specification limit for spurious signals is 43 dB + 10 log (P); where P is in watts. For an output signal of +24 dBm, the required spurious to carrier ratio is 37 dB. The worst measured individual spurious is for cellular NADC modulation shown on Plot 27. The spurious at 1760 MHz measures –42.3 dBm (spectrum analyzer level plus Loss B in Figure 2.4-1, which is –52.8 dBm + 10.5 dB = -42.3 dBm). The carrier output level as shown in Plot 24 is +25.7 dBm (spectrum analyzer level plus Loss B in Figure 2.4-1, which is 15.2 dBm + 10.5 dB = +25.7 dBm). Thus, the spurious is down by +25.7 dBm – (-42.3 dBm) = 68 dB which is compliant with the specification.

Another spurious appears on Plot 28 at 2640 MHz but this is below the level of the spurious discussed above.

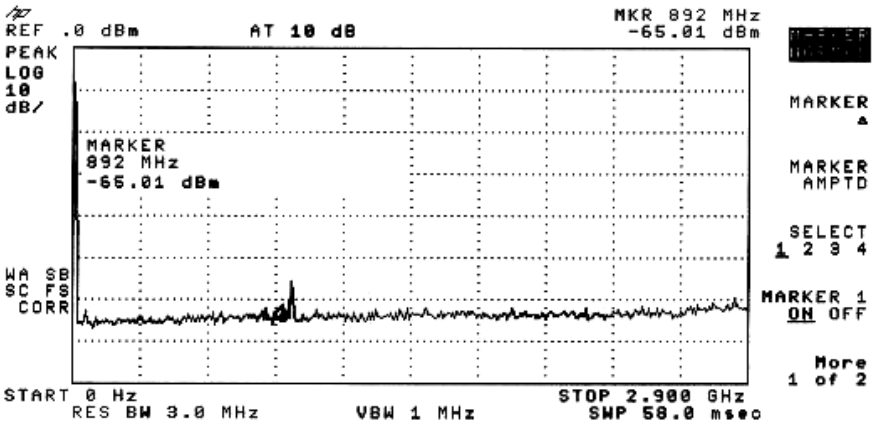
No other spurious signals appear above the analyzer noise floor.

Part B: Radiated Spurious Emissions – DUT Connected to Radiating Antenna

To check radiated spurious emissions, the (DUT) was located in an open test area and emissions were measured with a radiating antenna connected to the output connector. The receiving horn antenna was placed at a distance of 1 meter from the radiating antenna. Figure 2.4-1 part B shows the test arrangement. Tests were performed at cellular for both AMPS and NADC type modulations. Tests were performed at PCS for each of NADC, GSM and CDMA type modulations.

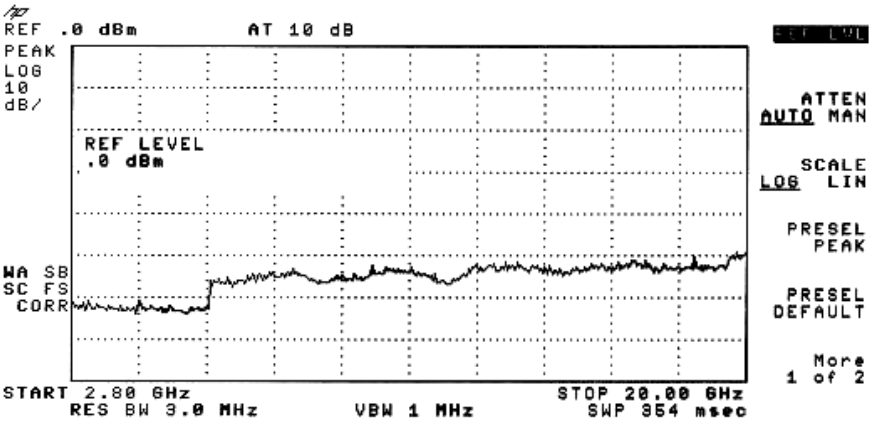
Plots 37 through 48 that follow show the results of the above tests. Plots 37 and 38 show the site background noise. Plots 39 and 40 show the measured cellular radiated signals with the DUT connected to a cellular ¼-wave ceiling mount omnidirectional antenna over a 0 – 2.9 GHz sweep for AMPS and NADC type modulations. Plots 41 and 42 show the measured cellular radiated signals over a 2.8 - 20 GHz sweep.

Similarly, plots 43 through 45 show the measured PCS radiated signals with the DUT connected to PCS ¼-wave ceiling mount omnidirectional antenna over a 0 – 2.9 GHz sweep for NADC, GSM and CDMA type modulations. Plots 46 through 48 show the measured PCS radiated signals over a 2.8 - 20 GHz sweep.



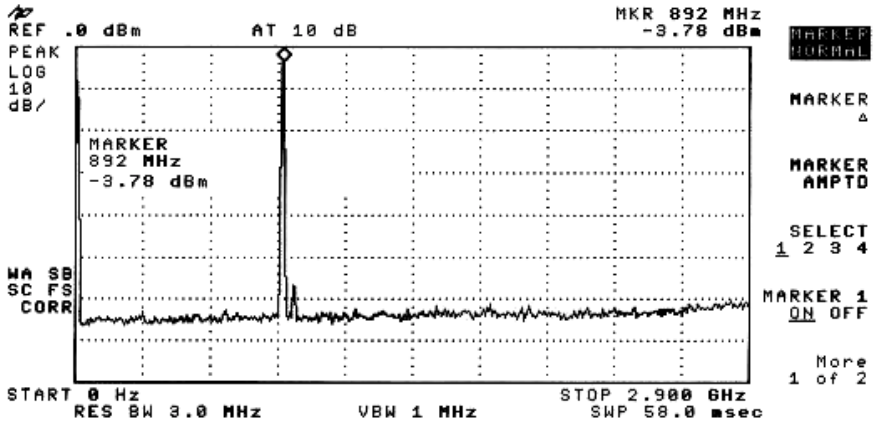
Plot 37 Radiated Spurious – Site Noise (DUT Unpowered)

Span = 0 – 2.9 GHz



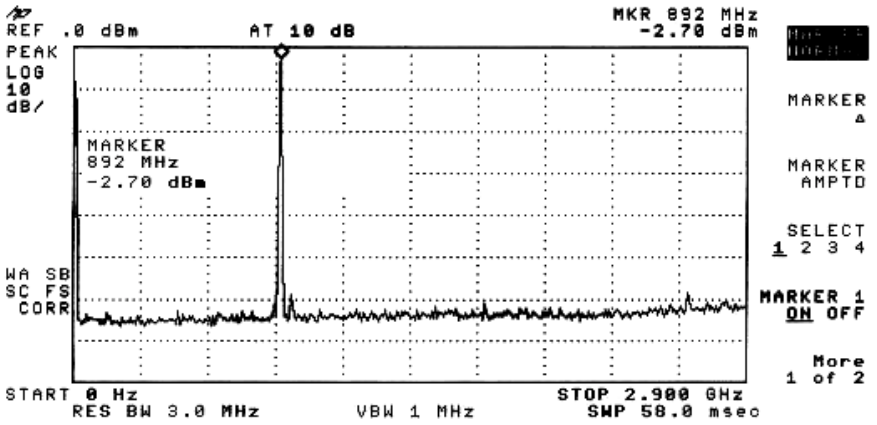
Plot 38 Radiated Spurious – Site Noise (DUT Unpowered)

Span = 2.8 – 20 GHz



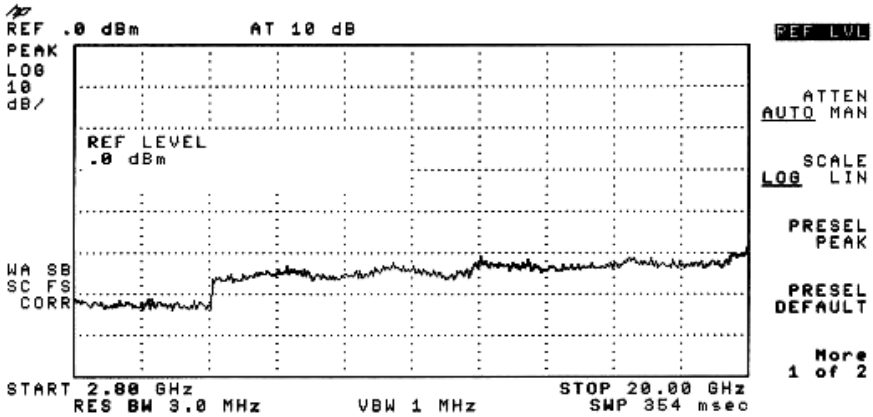
Plot 39 Radiated Spurious – Cellular AMPS Modulation

Input Level = +4 dBm Modulation = AMPS
Span = 0 – 2.9 GHz Generator Level = +4.8 dBm



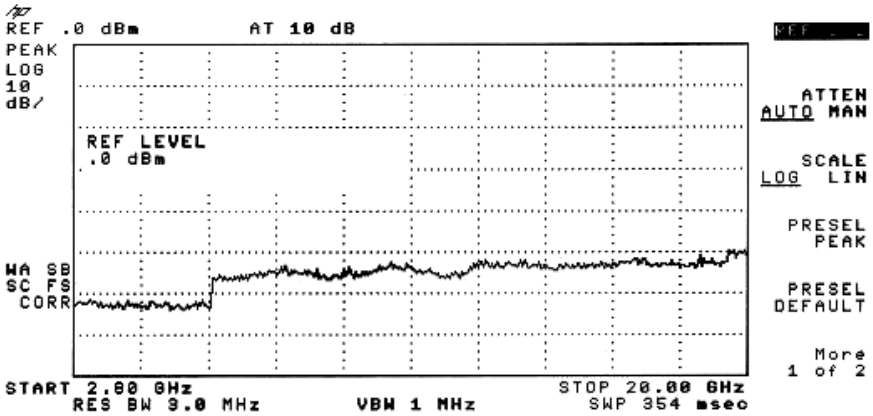
Plot 40 Radiated Spurious – Cellular NADC Modulation

Input Level = +4 dBm Modulation = NADC
Span = 0 – 2.9 GHz Generator Level = +4.8 dBm



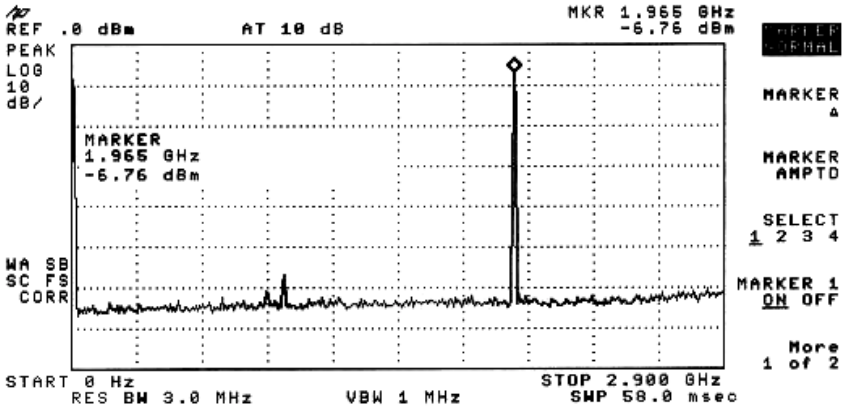
Plot 41 Radiated Spurious – Cellular AMPS Modulation

Input Level = +4 dBm Modulation = AMPS
Span = 2.8 - 20 GHz Generator Level = +4.8 dBm



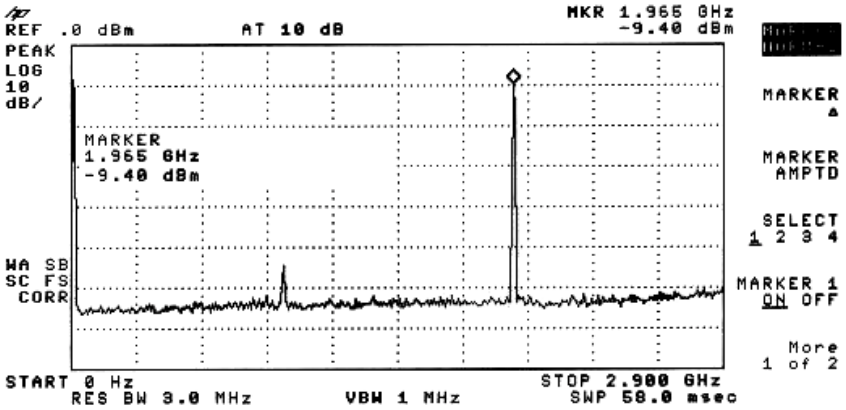
Plot 42 Radiated Spurious – Cellular NADC Modulation

Input Level = +4 dBm Modulation = NADC
Span = 2.8 - 20 GHz Generator Level = +4.8 dBm



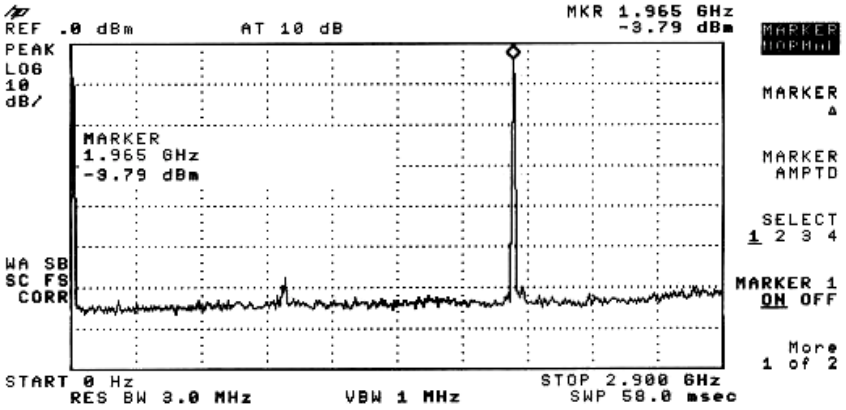
Plot 43 Radiated Spurious – PCS NADC Modulation

Input Level = +4 dBm Modulation = NADC
Span = 0 – 2.9 GHz Generator Level = +5.5 dBm



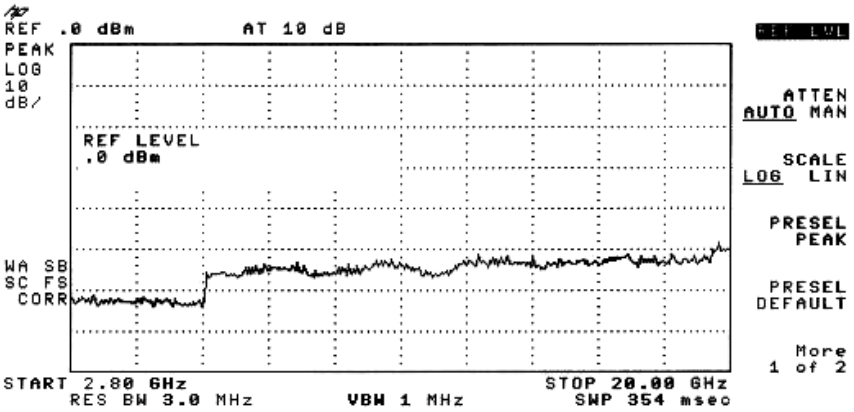
Plot 44 Radiated Spurious – PCS GSM Modulation

Input Level = +4 dBm Modulation = GSM
Span = 0 – 2.9 GHz Generator Level = +5.5 dBm



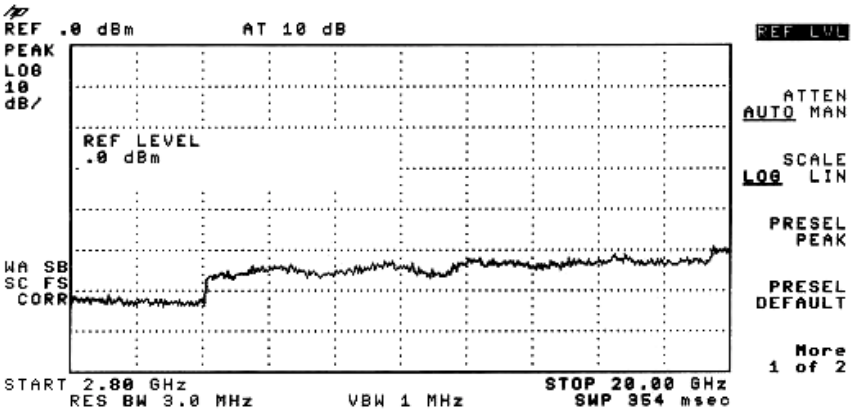
Plot 45 Radiated Spurious – PCS CDMA Modulation

Input Level = +4 dBm Modulation = CDMA
Span = 0 – 2.9 GHz Generator Level = +5.5 dBm



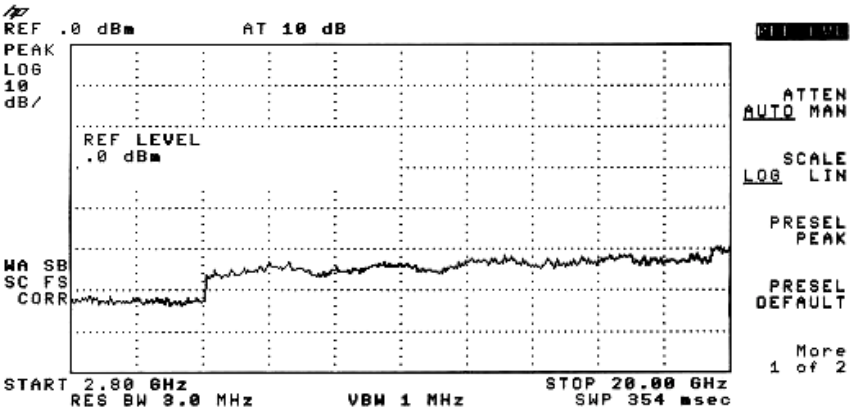
Plot 46 Radiated Spurious – PCS NADC Modulation

Input Level = +4 dBm Modulation = NADC
Span = 2.8 - 20 GHz Generator Level = +5.5 dBm



Plot 47 Radiated Spurious – PCS GSM Modulation

Input Level = +4 dBm Modulation = GSM
Span = 2.8 - 20 GHz Generator Level = +5.5 dBm



Plot 48 Radiated Spurious – PCS CDMA Modulation

Input Level = +4 dBm Modulation = CDMA
Span = 2.8 - 20 GHz Generator Level = -+5.5 dBm

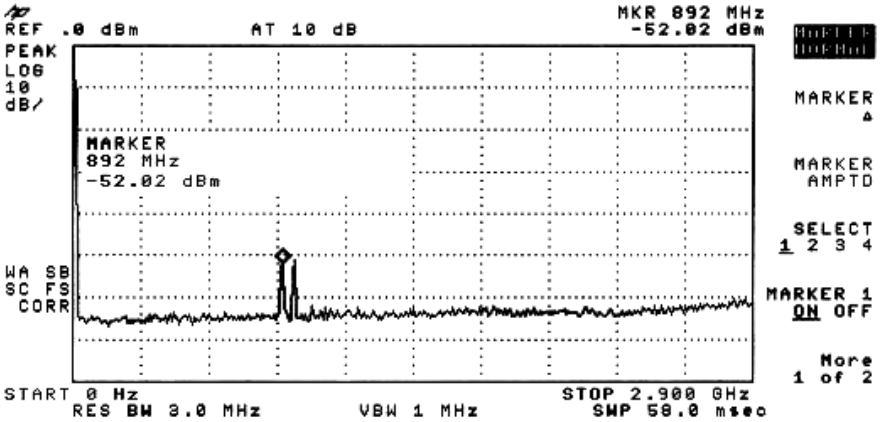
The only spurious signals found are shown on Plot 40. Of the two spurious visible, the highest is at a level of –58 dBm. No further spurious signals are measurable above the noise level in this or any of the other plots. Thus the DUT is compliant with radiated spurious emissions requirements.

Part C: Radiated Spurious Emissions – DUT Terminated

The tests of Part B were repeated with the DUT connected to a 50 ohm termination instead of a radiating antenna. Figure 2.4-1 part C shows the test arrangement.

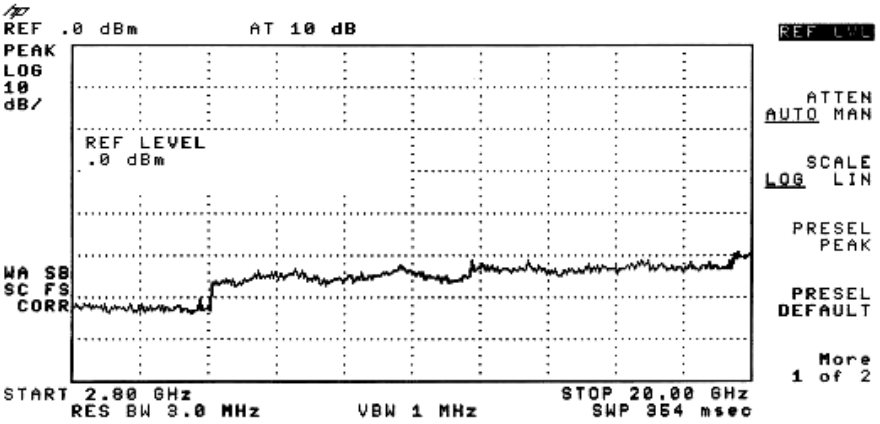
The orientation of the terminated enclosure was varied in various planes in order to find the highest radiated signals.

Results are shown for cellular and PCS frequencies in plots 49 through 52 that follow.



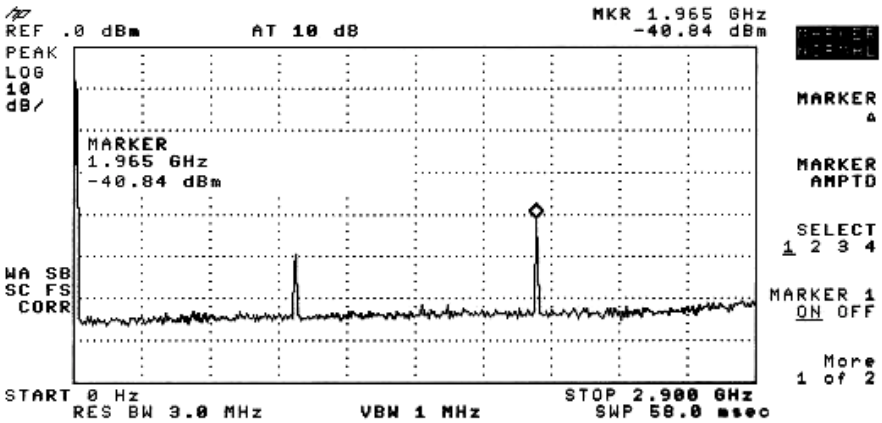
Plot 49 Cellular Radiated Spurious – DUT Terminated

Input Level = +4 dBm Modulation = NADC
Span = 0 – 2.9 GHz Generator Level = +4.8 dBm



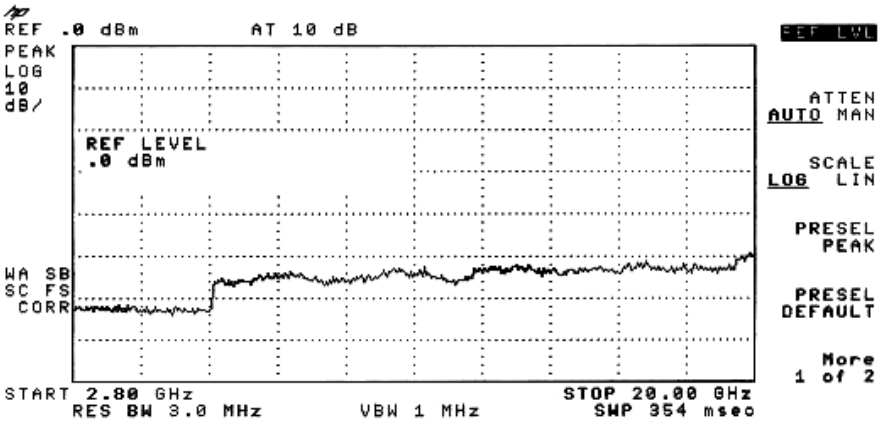
Plot 50 Cellular Radiated Spurious – DUT Terminated

Input Level = +4 dBm Modulation = NADC
Span = 2.8 - 20 GHz Generator Level = +4.8 dBm



Plot 51 PCS Radiated Spurious – DUT Terminated

Input Level = +4 dBm Modulation = CDMA
Span = 0 – 2.9 GHz Generator Level = +5.5 dBm



Plot 52 PCS Radiated Spurious – DUT Terminated

Input Level = +4 dBm Modulation = CDMA
Span = 2.8 - 20 GHz Generator Level = +5.5 dBm

The cellular tests show no measurable spurious signals from the DUT. The only signal measurable is the fundamental leakage from the enclosure as shown on Plot 49. This is the same desired signal that is intentionally radiated from the antenna normally connected to the unit and thus does not impact system performance and is not considered a radiated spurious signal

Similarly, the PCS tests show no measurable spurious signals from the DUT. The only signal measurable is the fundamental leakage from the enclosure as shown on Plot 51. This is the same desired signal that is intentionally radiated from the antenna normally connected to the unit and thus does not impact system performance and is not considered a radiated spurious signal

3.0 TEST EQUIPMENT LIST

The test equipment used in performing the tests is listed below:

REFERENCE	PART NUMBER	MANUFACTURER	SERIAL NO.	DESCRIPTION
DUT	001-0289-001	P. G. Electronics	100554	A289 Device Under Test
Network Analyzer 1	HP8753ES	Hewlett-Packard	MY40002281	3 GHz Network Analyzer
Network Analyzer 2	HP8753C	Hewlett-Packard	3029A01161	3 GHz Network Analyzer
Test Set	HP85044A	Hewlett-Packard	2542A02097	Test set used with HP8753C
Spectrum Analyzer	HP8592L	Hewlett-Packard	3801A01119	22 GHz Spectrum Analyzer
Signal Generator	HP ESG-D3000A	Hewlett-Packard	US36260112	3 GHz Signal Generator
CDMA Source	Zebra (P/N 0032-G)	Berkeley Varitronics	987083	CDMA Baseband Source
Power Supply	PS-5030D	Circuit-Test	--------	Power Supply (set to 24 V)
Combiner	2089-6406-00	M/A-COM	--------	Power Divider/Combiner
Terminator	NTRM-50G	Mini-Circuits	--------	50 Ohm Terminator
10 dB Attn.	771-10	Narda	--------	10dB Attenuator
20 dB Attn.	RFA-60-NFF	RES-NET	--------	20dB Attenuator
Driver Amp	001-0211-002	P. G. Electronics	--------	A211 Amp used as driver
Power Coupler	193-0001-034	P. G. Electronics	--------	Used to couple DC to DUT
Horn Antenna	SAS-299/571	AH Systems	289	Horn Antenna
Cellular Tx Antenna	SEXC	Sinclabs	--------	1/4 Wave Cellular Tx Ant
PCS Tx Antenna	DB794SM5N-M	Decibel Products	--------	1/4 Wave PCS Tx Ant

4.0 TEST FACILITY DESCRIPTION

The testing in this exhibit was performed at the factory of the manufacturer:

P. G. Electronics, Ltd.
800 Arrow Rd., Unit 8,
Toronto, Ontario M9M 2Z8
Canada

P. G. Electronics has recently been granted equipment authorization on the Model A211 by the FCC (FCC ID: P6T81901, Grant Date: April 26, 2002). The Model A289 is similar to the A211 but with a higher downlink output capability.

Both units use diplexers which are fixed-tuned and neither unit requires any tuning. The units contain no oscillators or frequency translation circuitry.

All tests described herein were performed in the company laboratory using the same test arrangements as for the A211 (FCC ID: P6T81901).

5.0 CONCLUSIONS

Testing has demonstrated that the unit meets the requirements for FCC Type Acceptance.