

**Advanced
Compliance Laboratory**

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**Electromagnetic
Emission
Compliance
Test Report**



**Equipment Under Test
(EUT)
Applicant** Digital Multi-Carrier Amplifier DMAU-U
Andrew Corporation

In Accordance With FCC Part 24, Subpart E

Test by Advanced Compliance Laboratory, Inc.
6 Randolph Way
Hillsborough, New Jersey 08844

Authorized by Wei Li
Lab Manager

Signature

Date June 16, 2005

**AC Lab Report
Number** 0048-050606-01



Lab Code:200101-0

The test result in this report is supported and covered by the NVLAP accreditation.

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Section 1. Summary of Test Results

Manufacturer: Andrew Corporation
Model No.: Digital Multi-Carrier Amplifier DMAU-U
Parts No.: RF100154

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 Part 24, Subpart E.

New Submission Production Unit
 Class II Permissive Change Pre-Production Unit

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: 200101-0

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Summary of Test Data

RF Power Output	22.913(a)	500W ERP	N/A*
	24.232(a)	100W EIRP	Complies
Occupied Bandwidth (Voice & SAT)	2.1049(i)	Mask	N/A*
Occupies Bandwidth (Wideband Data)	2.1049(i)	Mask	N/A*
Occupied Bandwidth (Digital)	2.1049(i)	Mask	Complies
Spurious Emissions at Antenna Terminals	22.917	-13 dBm	N/A*
	24.238	-13 dBm	Complies
Field Strength of Spurious Emissions	22.917	-13 dBm	N/A*
	24.238	-13 dBm E.I.R.P.	Complies
Frequency Stability	22.355	1.5 ppm	N/A*
	24.235	0.05 ppm	Complies

* These items are NOT applied to the EUT.

The estimated uncertainty of the test result is given as following. The method of uncertainty calculation is provided in Advanced Compliance Lab. Doc. No. 0048-01-01.

	Prob. Dist.	Uncertainty(dB) 30-1000MHz	Uncertainty(dB) 1-6.5GHz	Uncertainty(dB) Conducted
Combined Std. Uncertainty u_c	norm.	± 2.36	± 2.99	± 1.83



Wei Li
Lab Manager
Advanced Compliance Lab

Date: June 16, 2005

Section 2. General Equipment Specification

Supply Voltage		26VDC		
Frequency Range	Cellular	N/A		
	PCS	DL/1930-1990MHz		
	Modulation	CDMA2000 <input checked="" type="checkbox"/>	WCDMA <input checked="" type="checkbox"/>	GSM (GXW) <input type="checkbox"/>
Output Impedance		50ohm		
Frequency Translation		F1-F1 <input checked="" type="checkbox"/>	F1-F2 <input type="checkbox"/>	N/A <input type="checkbox"/>
		Software <input type="checkbox"/>	Duplexer Change <input type="checkbox"/>	Full Band Coverage <input checked="" type="checkbox"/>

DC voltages and DC currents per 2.1033(c)(8)

The input supply to the transmitter was set at 26 Volts DC. The RF power output was measured with the indicated voltage and current applied into the final RF amplifying device(s).

1900 MHz Digital Modulation Amplifier

RF Output, DC Current and RF Input Power are all average values.

Measured Maximum Overdrive RF output: 48.52dBm (71.1W)

Measured DC voltage: 27.5V

Measured DC current: 16.4A.

Measured Rated RF output: 47.78dBm (60W)

Measured DC voltage: 27.5V

Measured DC current: 15.1A.

Measured Minimum RF output: 20.81dBm (0.12W)

Measured DC voltage: 27.5V

Measured DC current: 5.9A

Tune-up procedure per 2.1033(c) (9)

There are no user accessible adjustments or tuning in this amplifier. All necessary adjustments and tuning are performed during manufacture of the product. Any adjustments or tuning after service or repair are done as part of that process as special equipment is required to perform such adjustments.

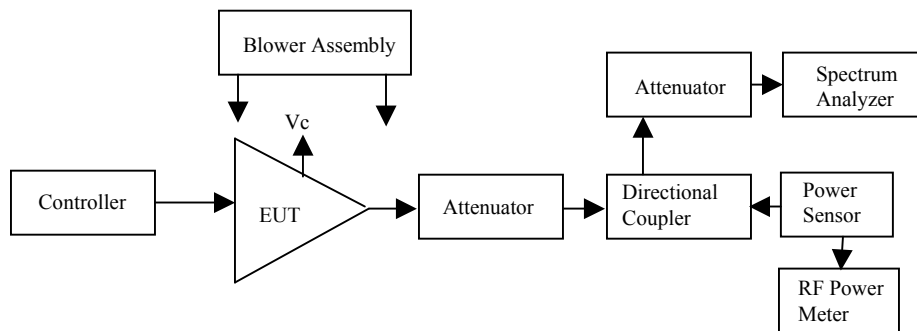
Description of Operation

This device is a digital multi-carrier amplifier used in BTS in downlink spectrum of 1.9GHz PCS band. All measurements shall be made at room temperature and at nominal DC input voltage.

System Diagram

See Attachment.

General EUT Setup



Section 3. RF Output Power

Name of Test:	<i>RF Output Power</i>	Test Standard:	22.913(a) 24.232(a)
Tested By:	WEI LI	Test Date:	06/02/2005-06/14/2005

Minimum Standard: Para. No. 22.913(a). The maximum effective radiated power (ERP) of base station transmitters and cellular repeaters must not exceed 500 Watts (57dBm).

Para. No. 24.232(a). The maximum peak output power of base transmitters should not exceed 100 Watts EIRP (50dBm).

Method of Measurement: Per 2.1046: The RF Power Output shall be measured at the output connector of the DMAU. The output level shall be +47.78 dBm (60 watts) +2 dB, -4 dB over the PCS frequency band: 1930 to 1990 MHz. The tolerance range is per TIA/EIA-97-D, Section 4.3.1.3.

Using power meter, power measurements shall be taken at the low band edge, mid, and high band edge frequencies for CDMA2000 and WCDMA modulations.

Test Result:

Complies

Test Data:

Rated Output Power – Normal Condition

PCS Band	Channel	Modulation	Power Output (dBm)	Rated Power (dBm)	Tolerance
Downlink	Low	CDMA2000	48.09	47.78	0.31
	Mid	CDMA2000	48.05	47.78	0.27
	High	CDMA2000	47.98	47.78	0.20
	Low	WCDMA	48.11	47.78	0.33
	Mid	WCDMA	48.04	47.78	0.26
	High	WCDMA	48.00	47.78	0.22
Power at Amplifier RF Input (dBm)	-15 (Maximum gain)				
Ref Offset	Ref offset=Cable&Attenuator&Coupler Attenuation=50.05dB				

Maximum Output Power – Overdrive Condition

The input is set to a level that generates maximum limited output power without causing shutdown of the amplifier output. The output level shall be recorded.

PCS Band	Channel	Modulation	Power Output (dBm)	Rated Power (dBm)	Tolerance
Downlink	Low	CDMA2000	48.43	47.78	0.65
	Mid	CDMA2000	48.39	47.78	0.61
	High	CDMA2000	48.32	47.78	0.54
	Low	WCDMA	48.52	47.78	0.74
	Mid	WCDMA	48.48	47.78	0.70
	High	WCDMA	48.43	47.78	0.65
Power at Amplifier RF Input (dBm)	-15+5.9=-9.1				
Ref Offset	Ref offset=Cable&Attenuator&Coupler Attenuation=50.05dB				

Section 4. Occupied Bandwidth

Name of Test:	<i>Occupied Bandwidth</i>	Test Standard:	<i>2.1049(i)</i>
Tested By:	WEI LI	Test Date:	06/02/2005-06/14/2005

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

Method of Measurement: Spectrum Analyzer Settings:
 RBW: CDMA2000 (30 kHz), WCDMA (100KHz), CDMA(30KHz),
 GSM (30 kHz), NADC (1 kHz) and CDPD (1 kHz)
 VBW: \geq RBW
 Span: As required
 Sweep: Auto
 Input Signal Characteristics: Generated Waveform by Digital Inputs
 RF level: Rated, recommended by manufacturer

Test Result:

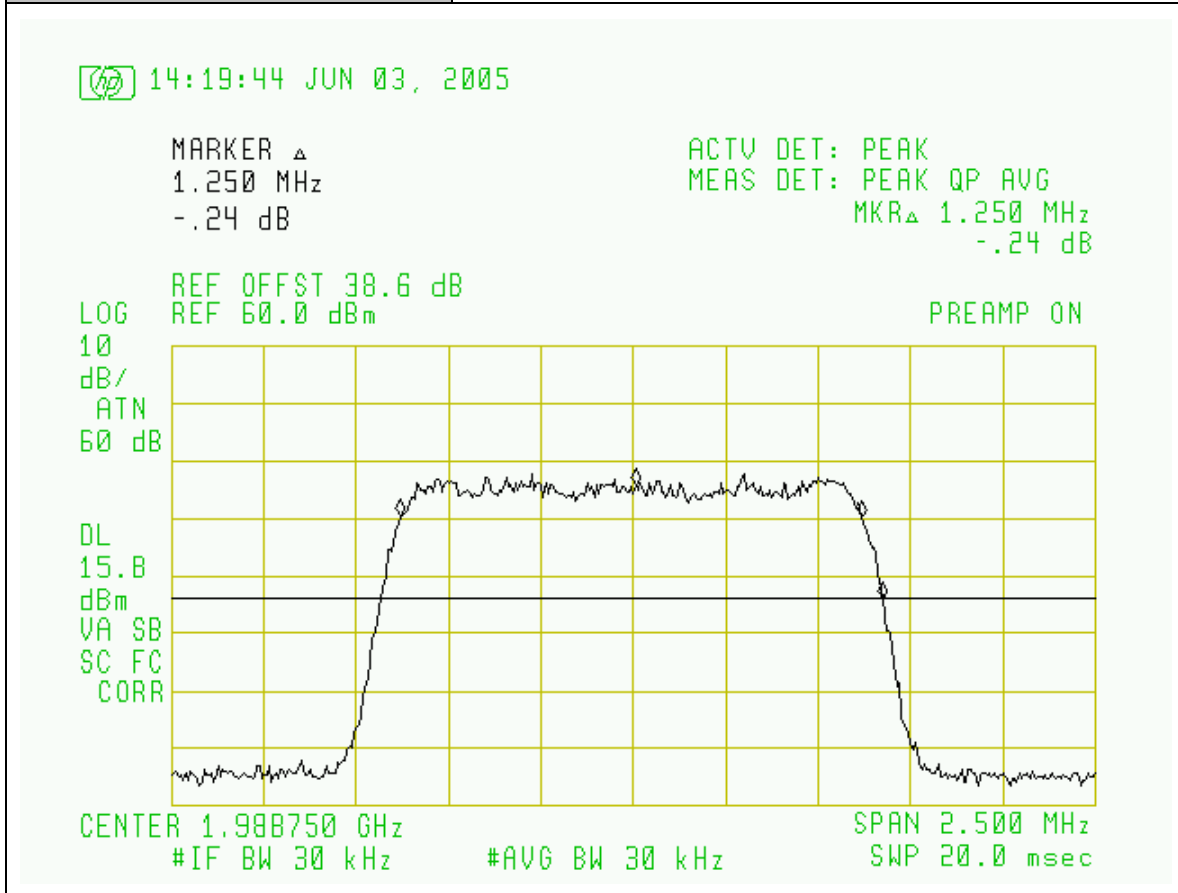
Complies

Test Data:

Attached Plots

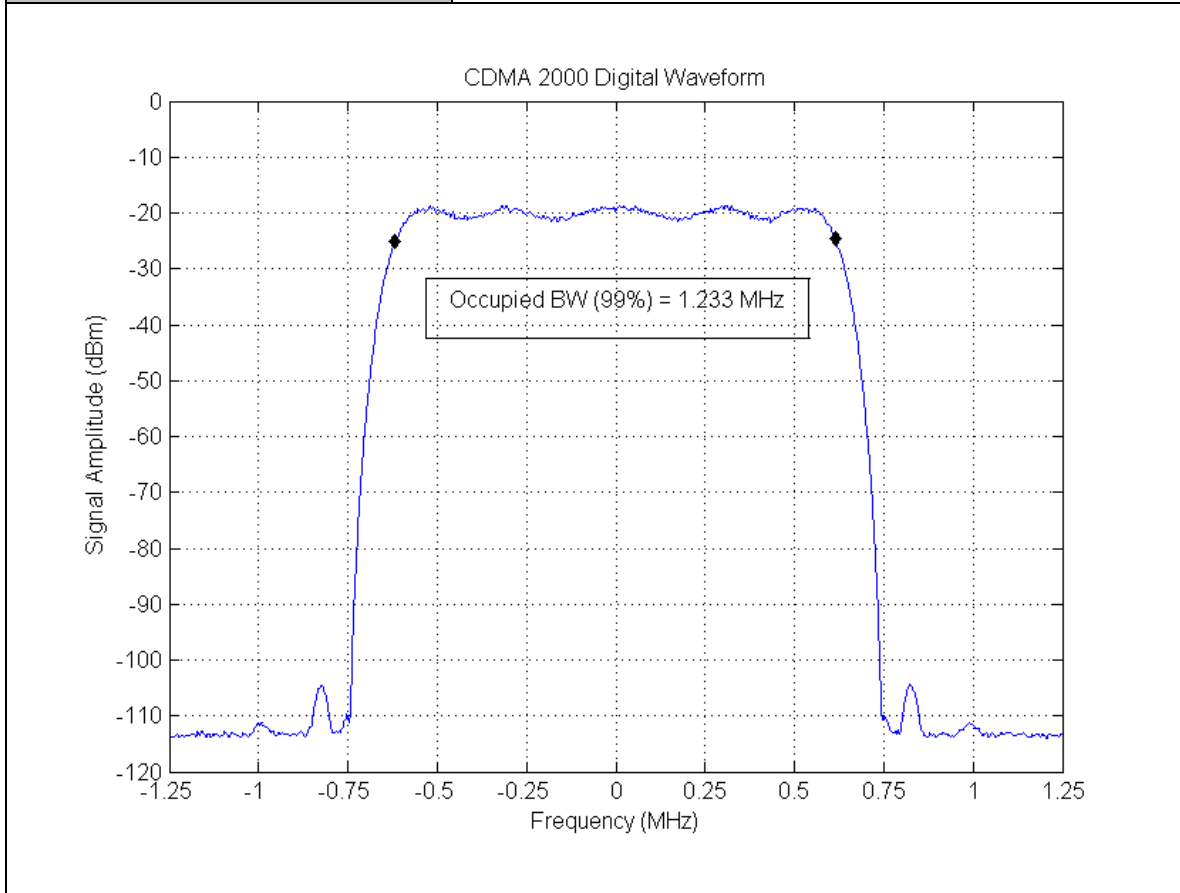
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	Occupied Bandwidth: PCS Bands
Plot Name:	Downlink, Hi-Channel, CDMA2000 Modulation
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



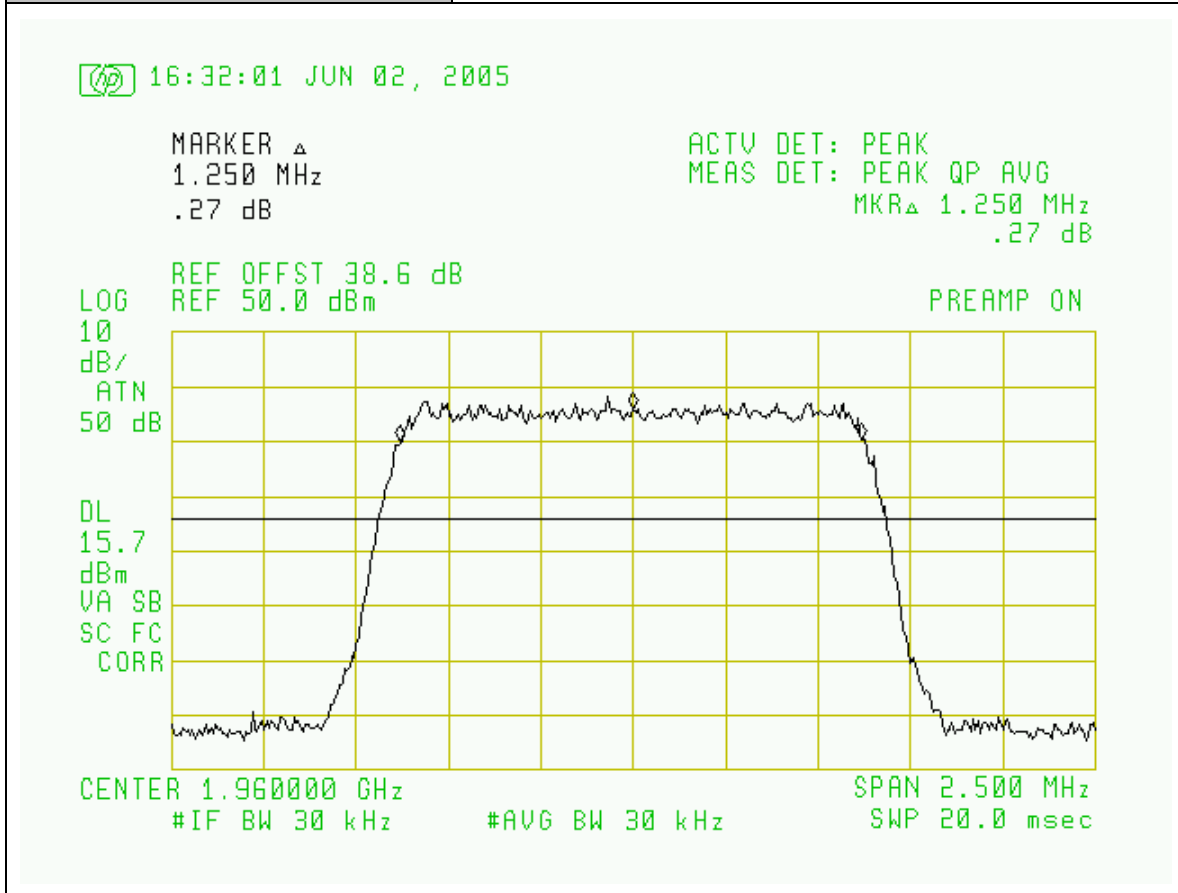
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PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Occupied Bandwidth: PCS Bands
Plot Name:	Downlink, Hi-Channel, CDMA2000 Modulation
Configuration:	Digital Input: -15dBm



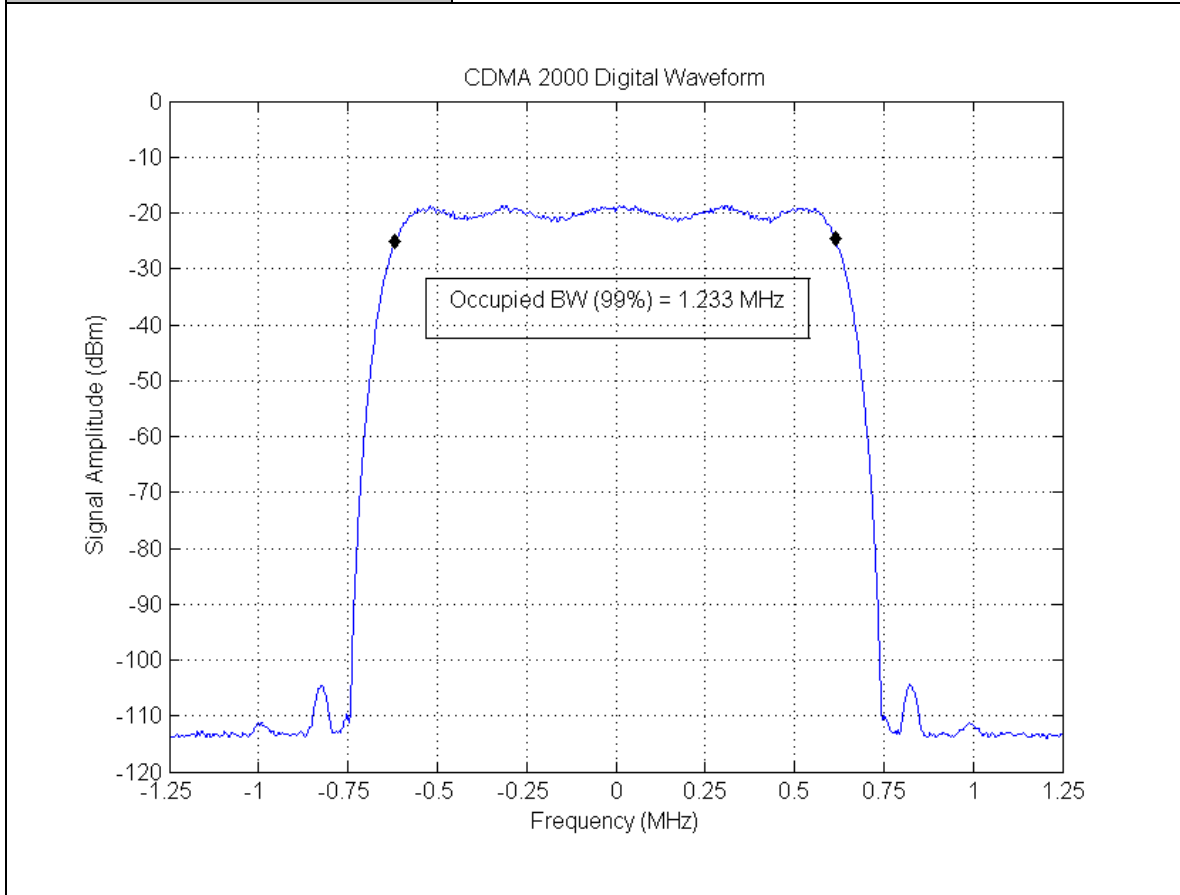
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	Occupied Bandwidth: PCS Bands
Plot Name:	Downlink, Mid-Channel, CDMA2000 Modulation
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



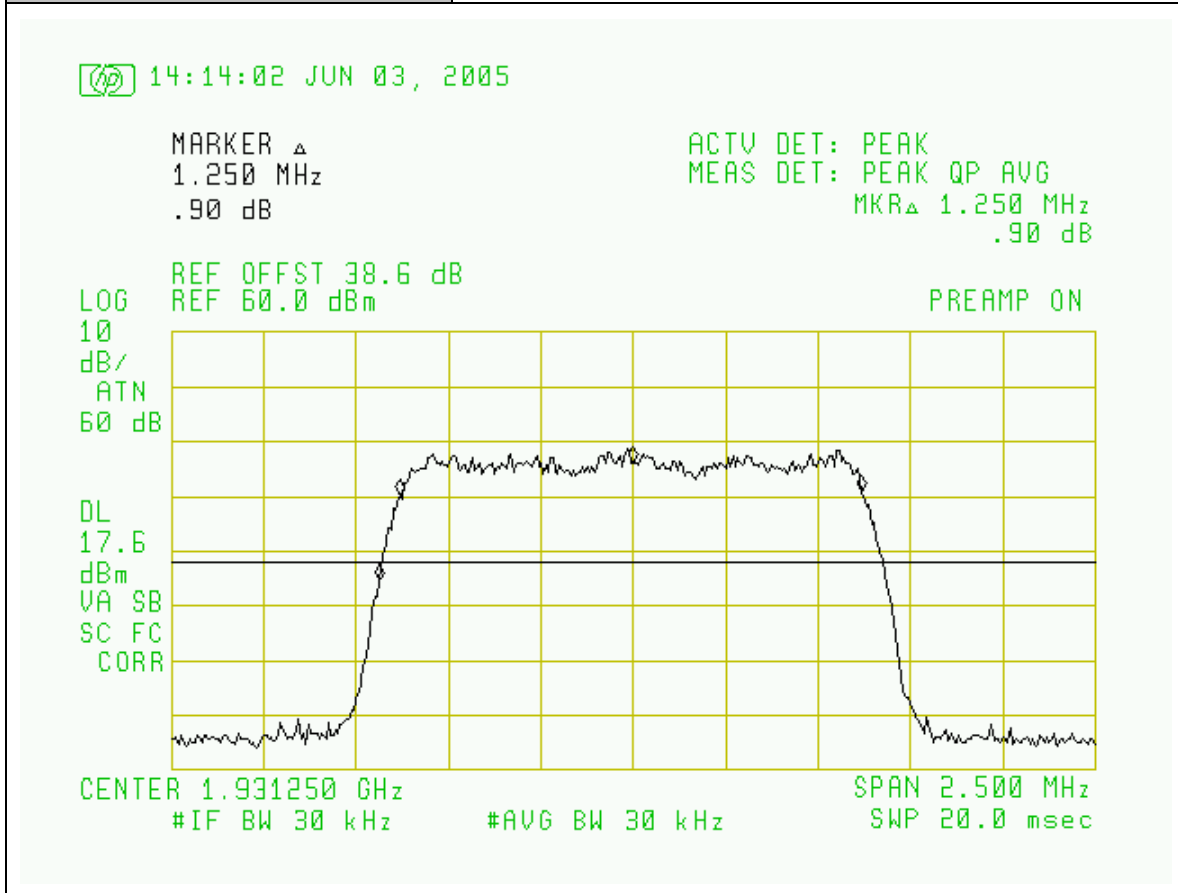
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PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Occupied Bandwidth: PCS Bands
Plot Name:	Downlink, Mid-Channel, CDMA2000 Modulation
Configuration:	Digital Input: -15dBm



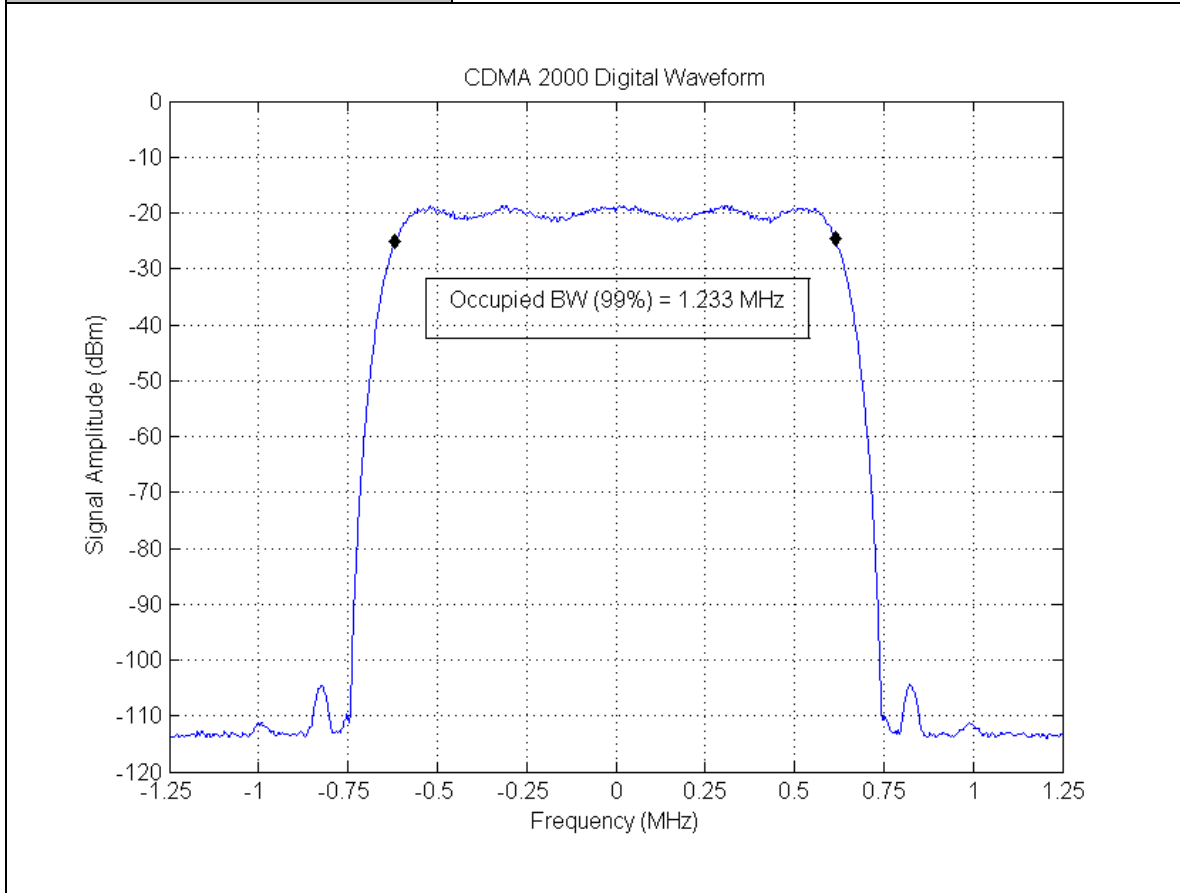
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Occupied Bandwidth: PCS Bands
Plot Name:	Downlink, Low-Channel, CDMA2000 Modulation
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



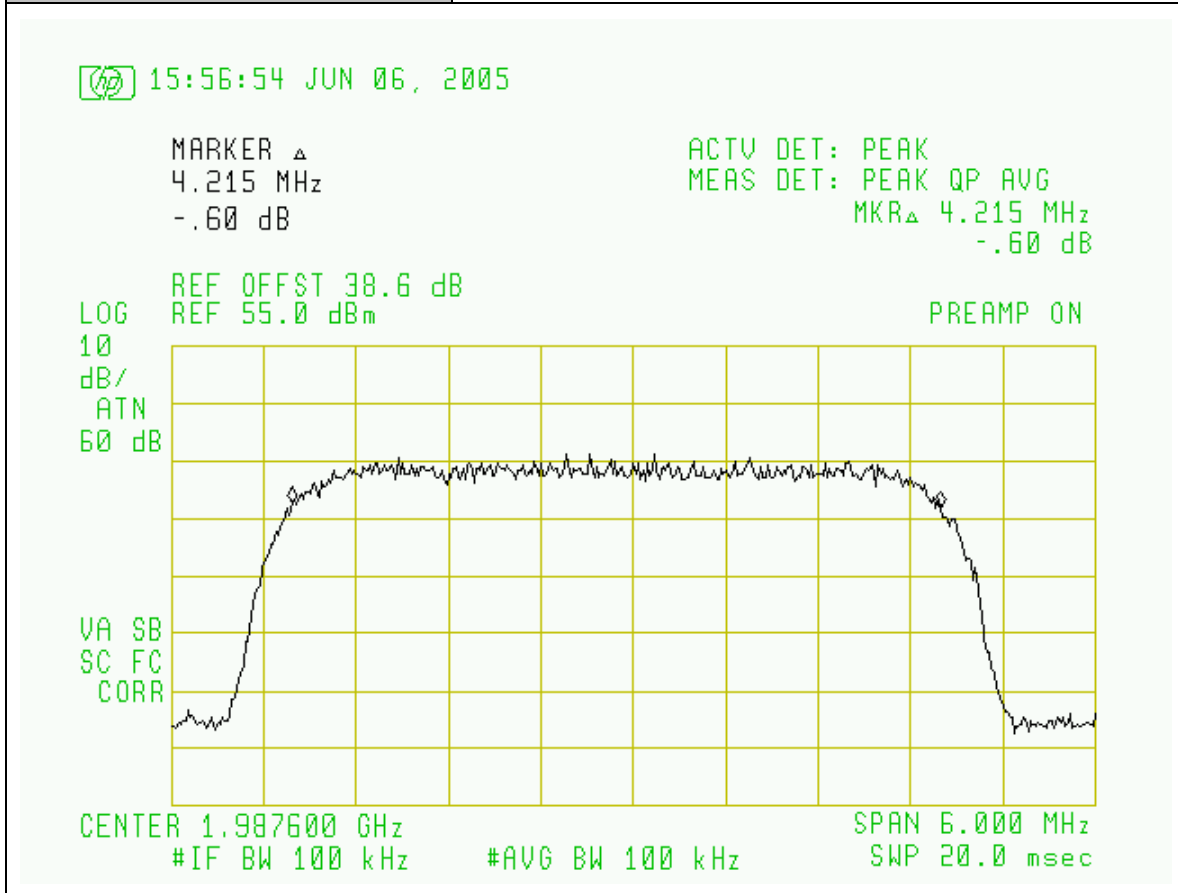
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Occupied Bandwidth: PCS Bands
Plot Name:	Downlink, Low-Channel, CDMA Modulation
Configuration:	Digital Input: -15dBm



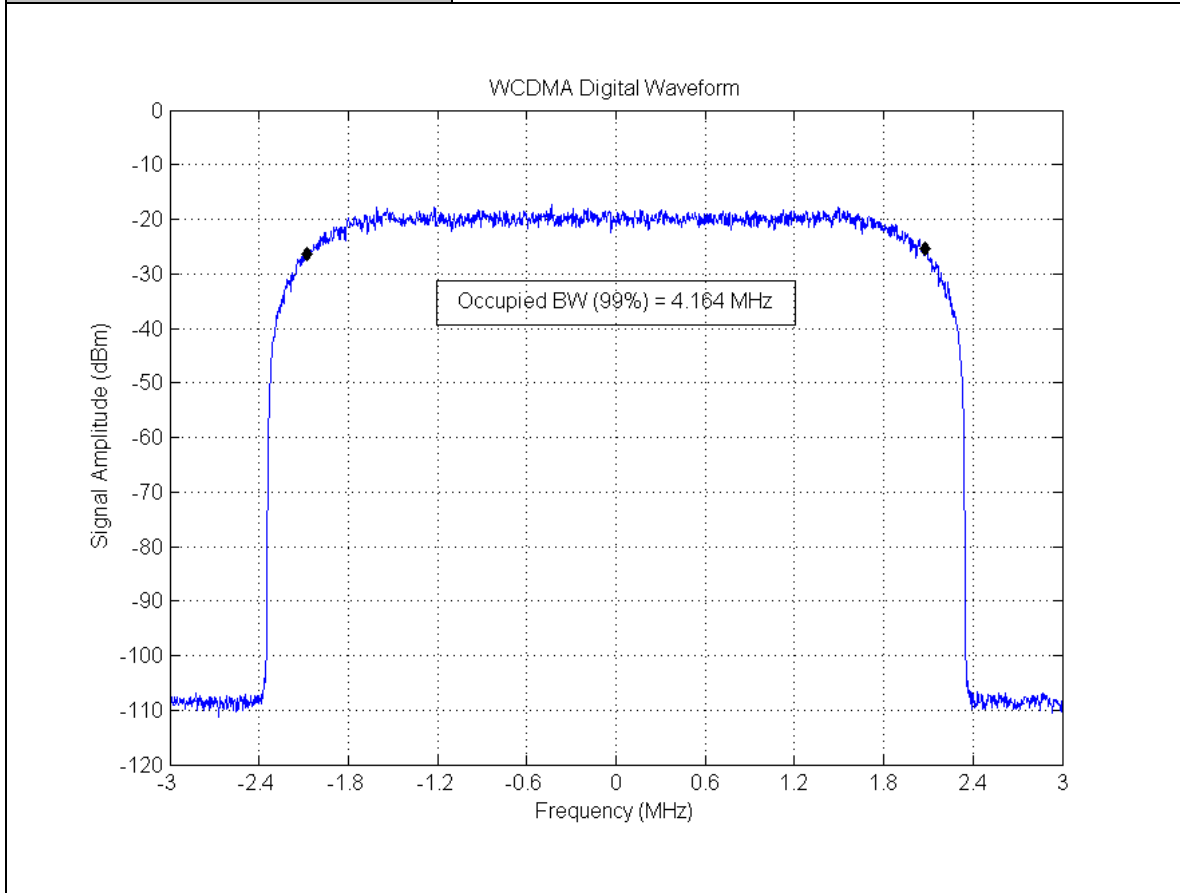
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PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Occupied Bandwidth: PCS Bands
Plot Name:	Downlink, Hi-Channel, WCDMA Modulation
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



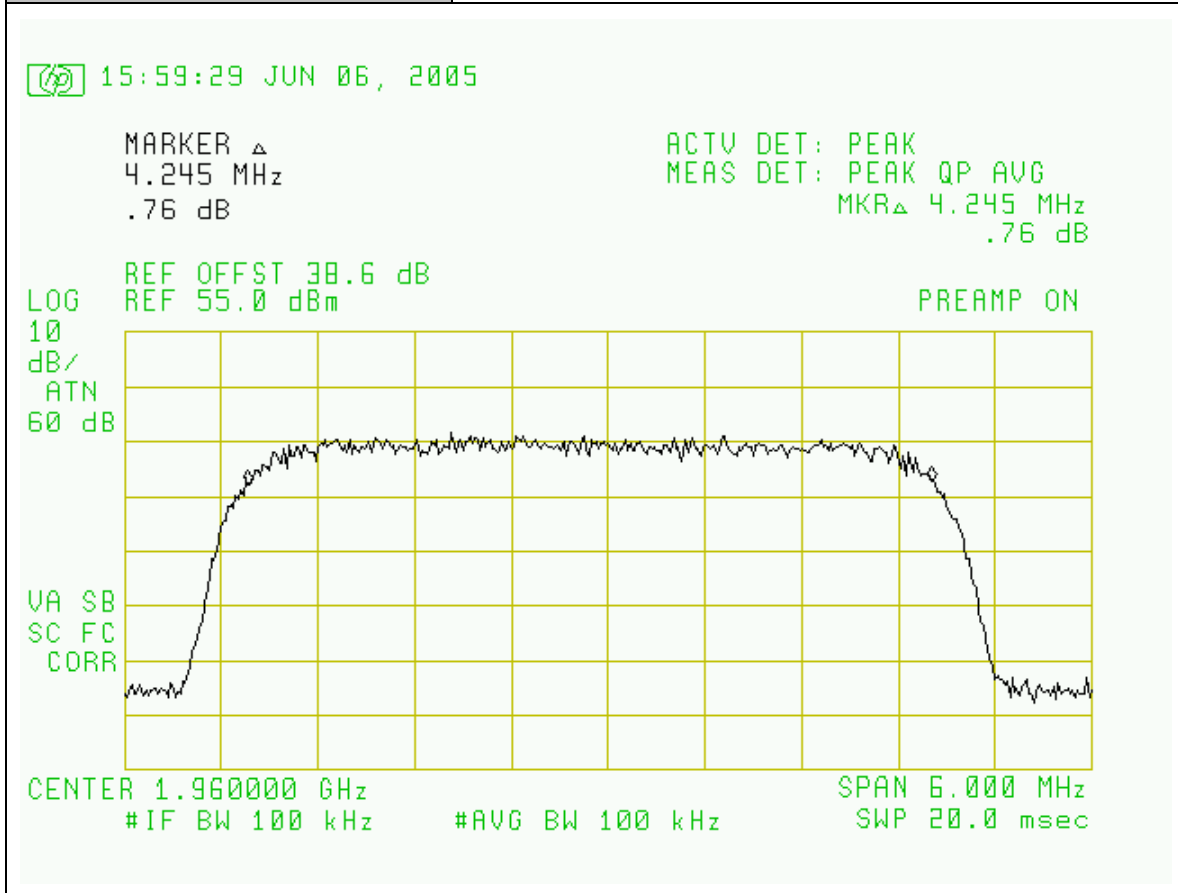
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Occupied Bandwidth: PCS Bands
Plot Name:	Downlink, Hi-Channel, WCDMA Modulation
Configuration:	Digital Input: -15dBm



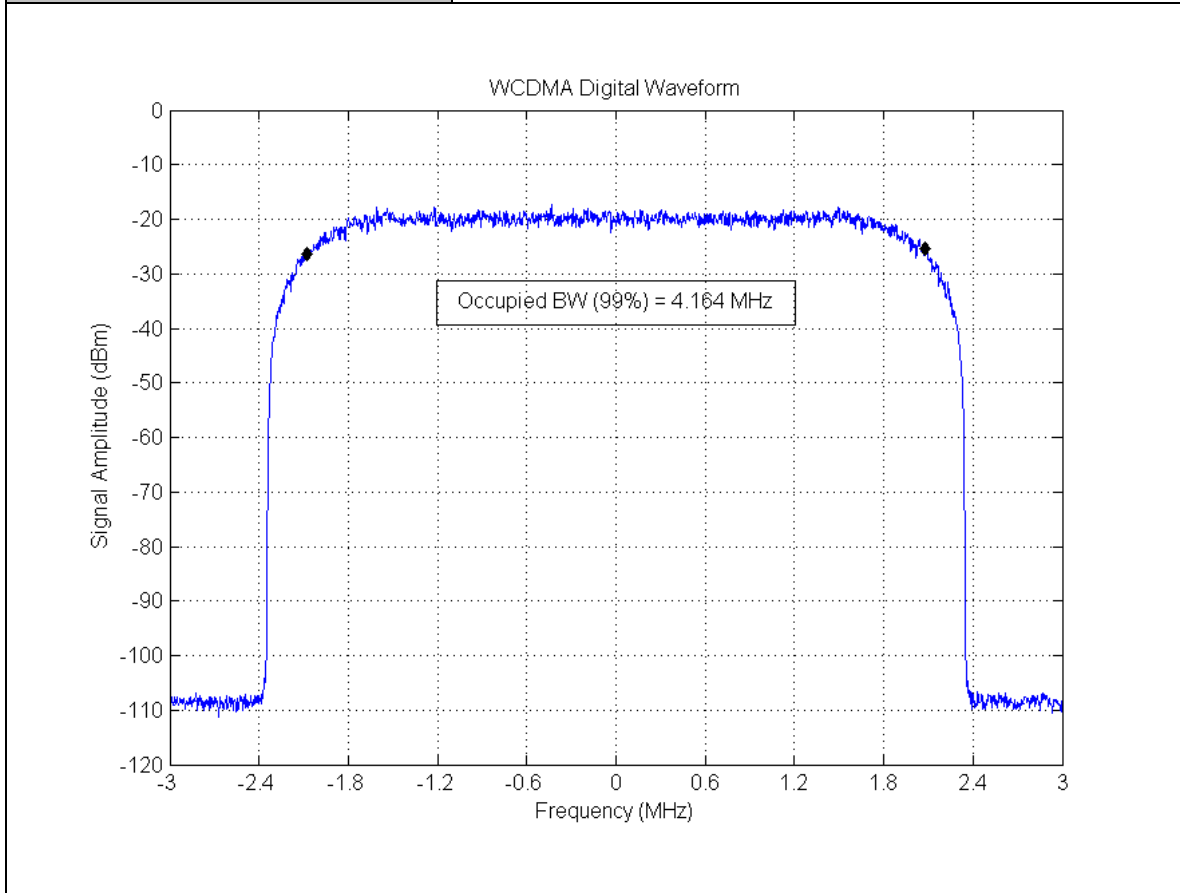
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PARTS NO.:	RF100154
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Temperature:	70°F
Humidity:	30%

Section:	Occupied Bandwidth: PCS Bands
Plot Name:	Downlink, Mid-Channel, WCDMA Modulation
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



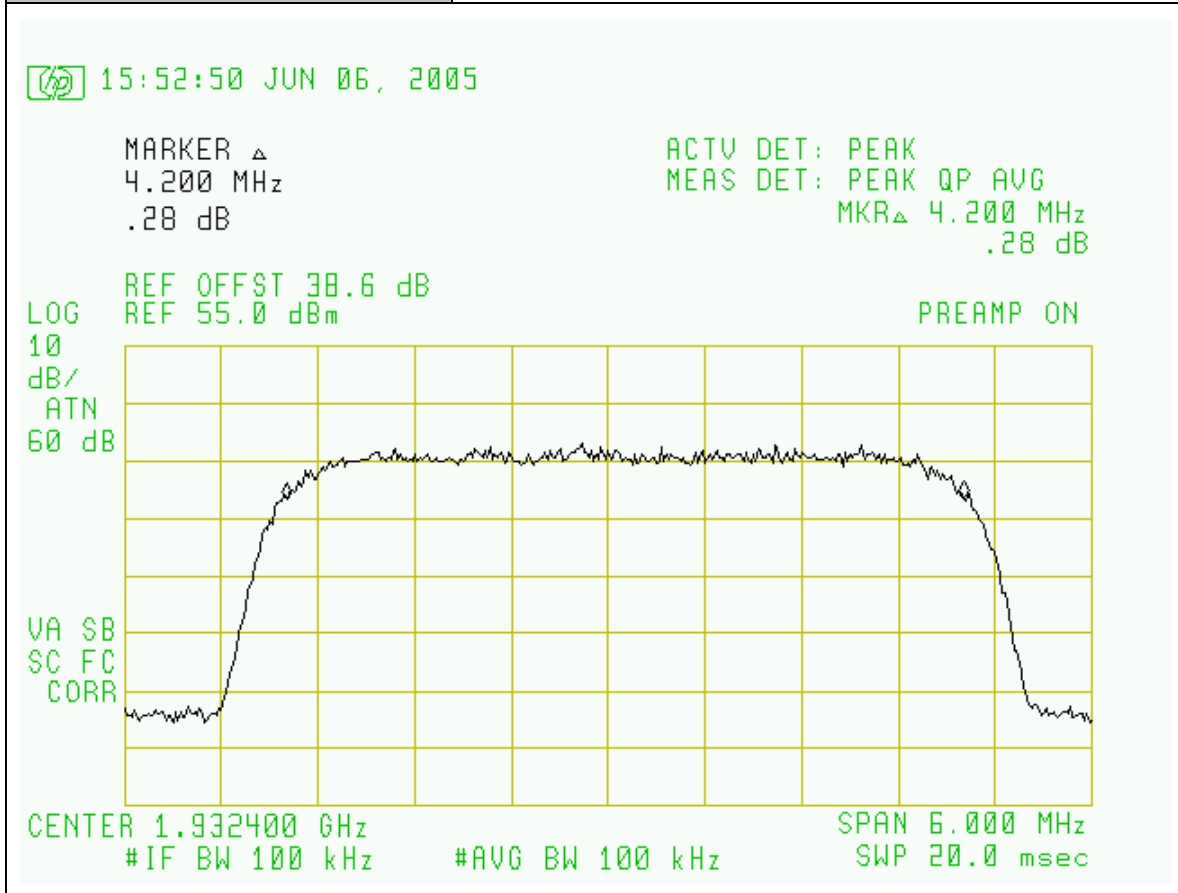
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Occupied Bandwidth: PCS Bands
Plot Name:	Downlink, Mid-Channel, WCDMA Modulation
Configuration:	Digital Input: -15dBm



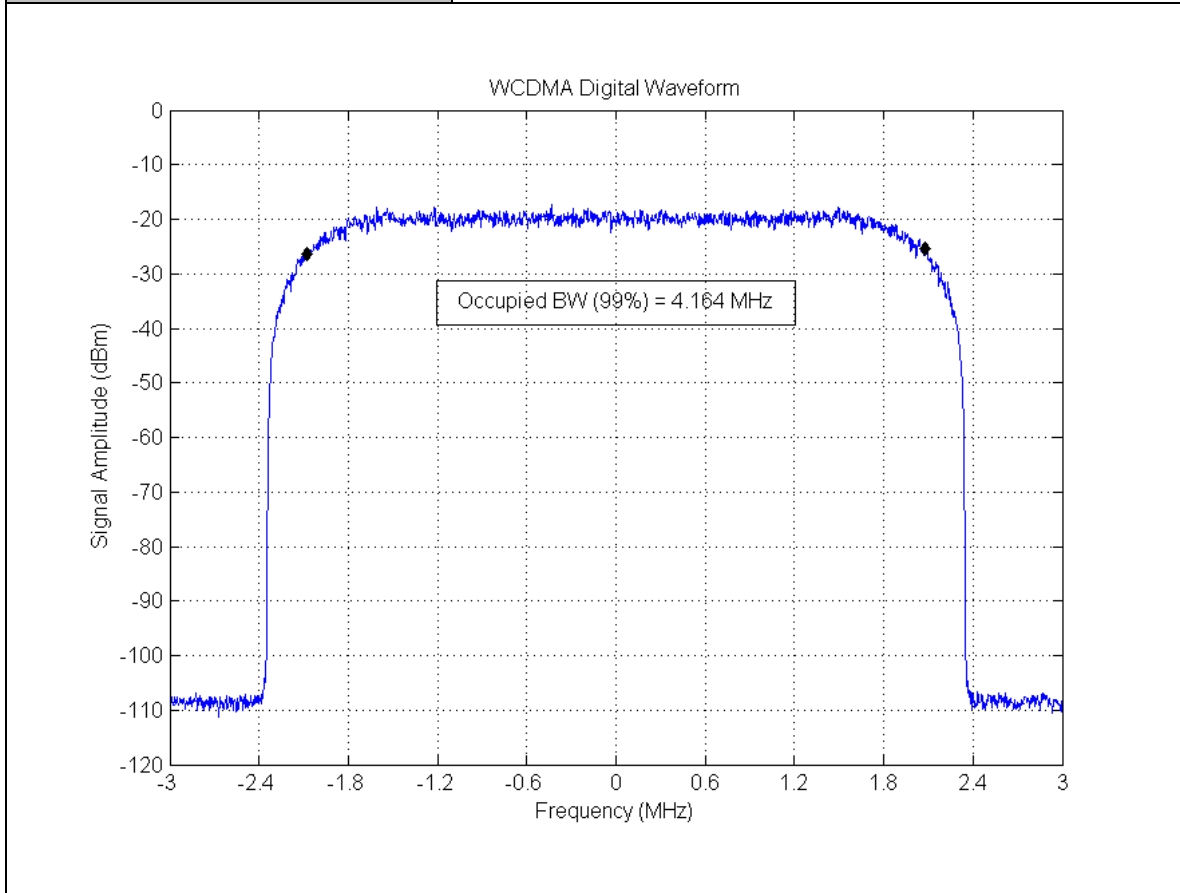
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Occupied Bandwidth: PCS Bands
Plot Name:	Downlink, Low-Channel, WCDMA Modulation
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



Project Number:	0048-050606-01
EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Occupied Bandwidth: PCS Bands
Plot Name:	Downlink, Low-Channel, WCDMA Modulation
Configuration:	Digital Input: -15dBm



Section 5. Spurious Emissions at Antenna Terminals

Name of Test:	<i>Spurious Emissions at Antenna Terminals</i>	Test Standard:	22.917 24.238(a)
Tested By:	WEI LI EDWARD LEE	Test Date:	06/02/2005-06/14/2005

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.

Para. No. 24.238(a). The magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under conditions specified in the instruction manual and/or alignment procedure, shall not less than $43+10 \log$ (mean output power in watts) dBc below the mean power output outside a licensee's frequency block (-13dBm).

Method of Measurement: Spectrum Analyzer Settings:
 RBW: 100 kHz. As required for digital modulations.
 RBW: 1MHz. When frequency is located above 1GHz.
 VBW: \geq RBW
 Start Frequency: 9KHz or Lowest Clock Frequency
 Stop Frequency: 10 GHz (Cellular), 20GHz (PCS)
 Sweep: Auto
 Using in-band filter if needed.
 For Inter-modulation measurement: Two RF signals set as inputs. The frequencies of both RF signals shall be within the repeater's operating band. The level of both RF input signals shall be increased, until the maximum rated output power per channel, as declared by the manufacturer, is reached.
 Frequencies: $f1=F_{(Low\ CH/Mid\ CH/High\ CH)}$, $f2=f1 \pm \Delta$ (Spacing)
 Each RF Input Level: about -3dB comparing to the max. input level of single RF Input test

Test Result:

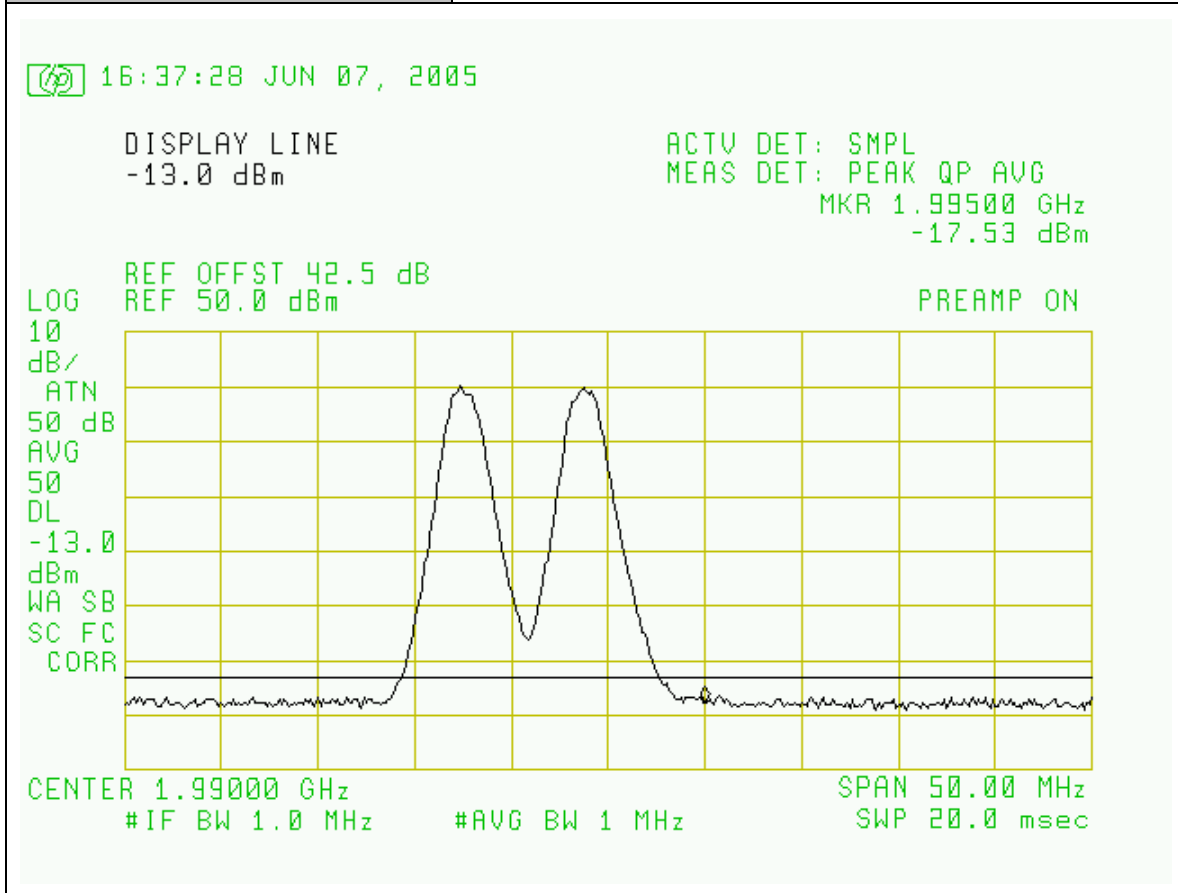
Complies

Test Data:

Attached Plots

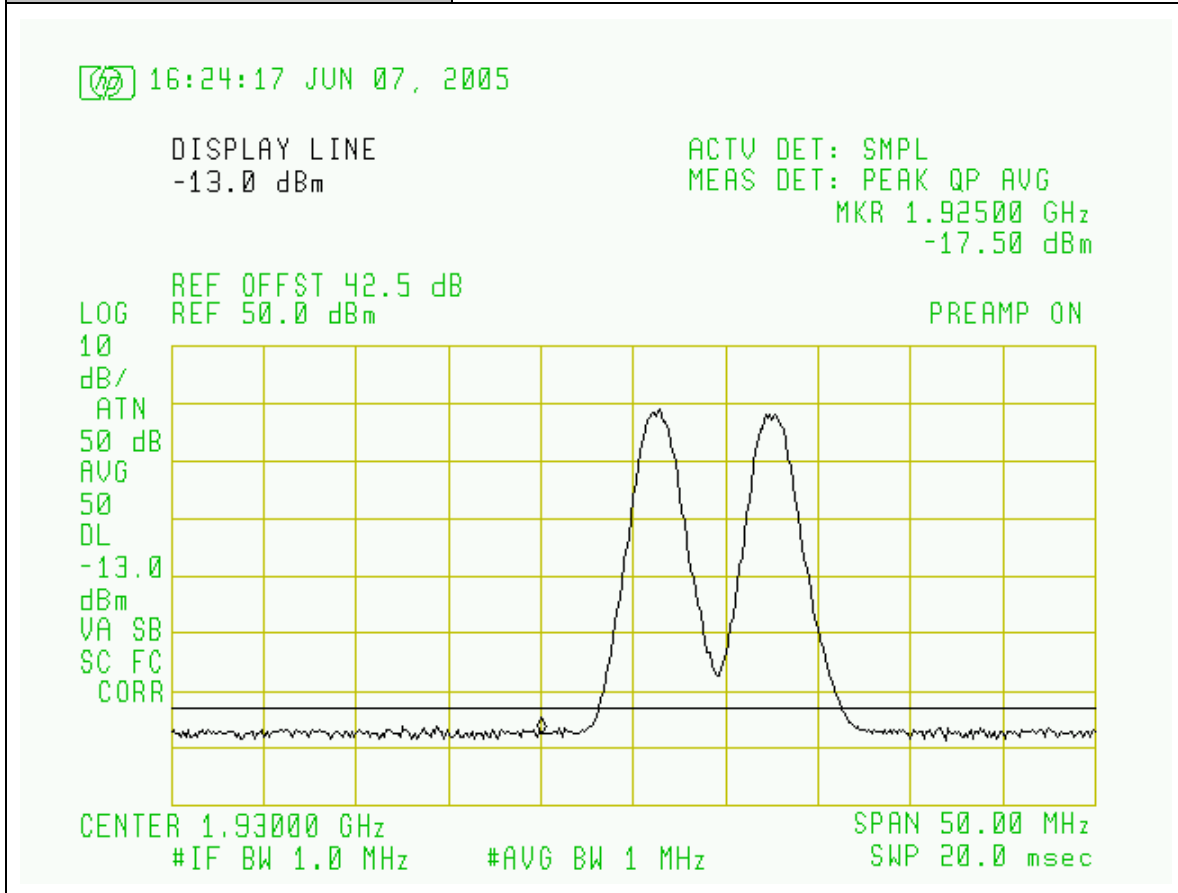
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Hi-Chn, Inter-modulation
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



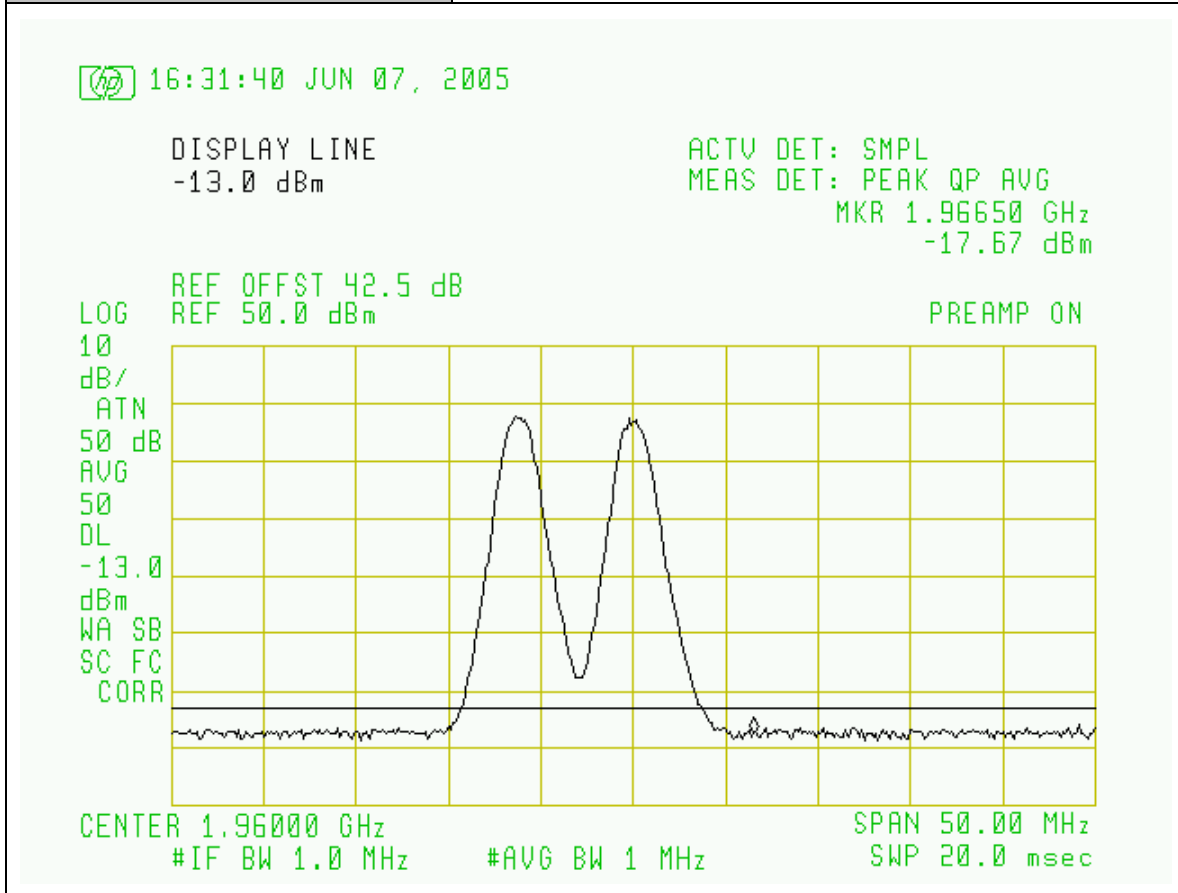
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Low-Chn, Inter-modulation
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



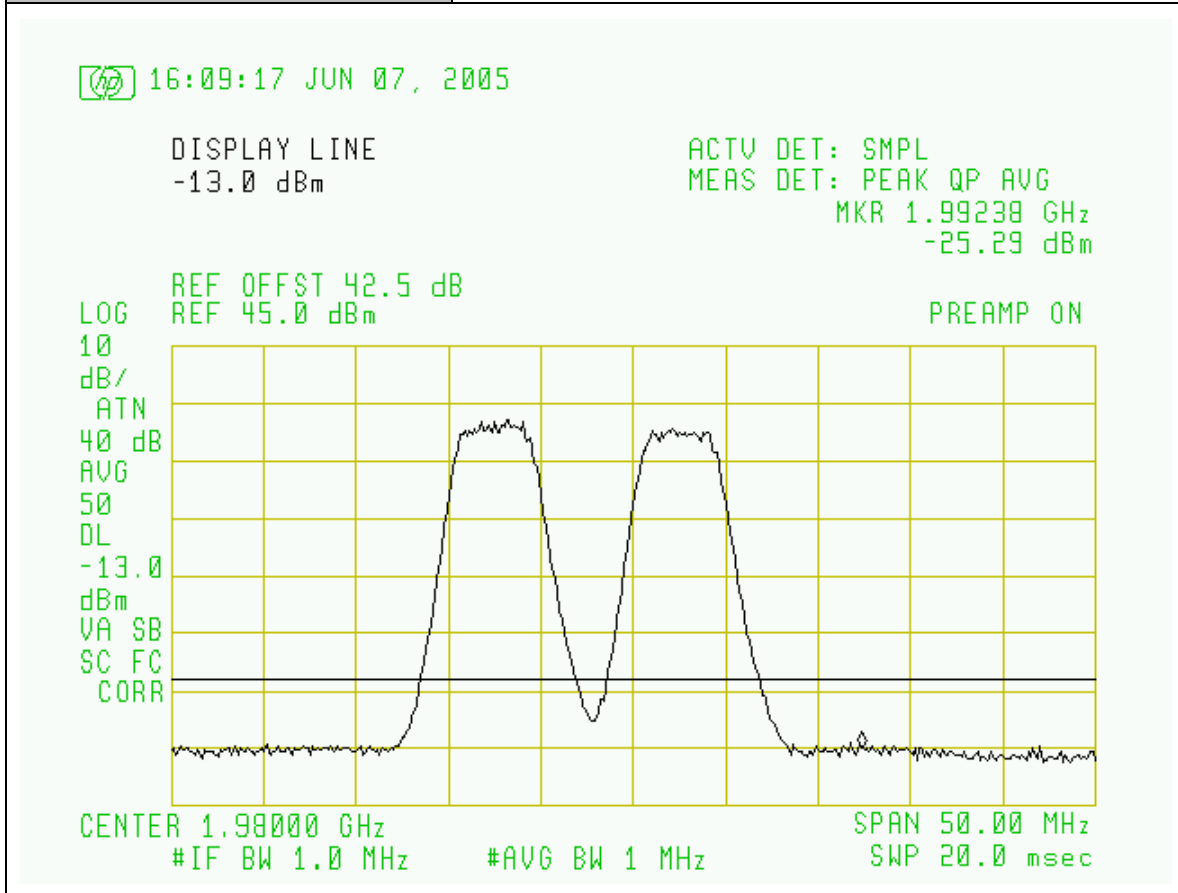
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Mid-Chn, Inter-modulation
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



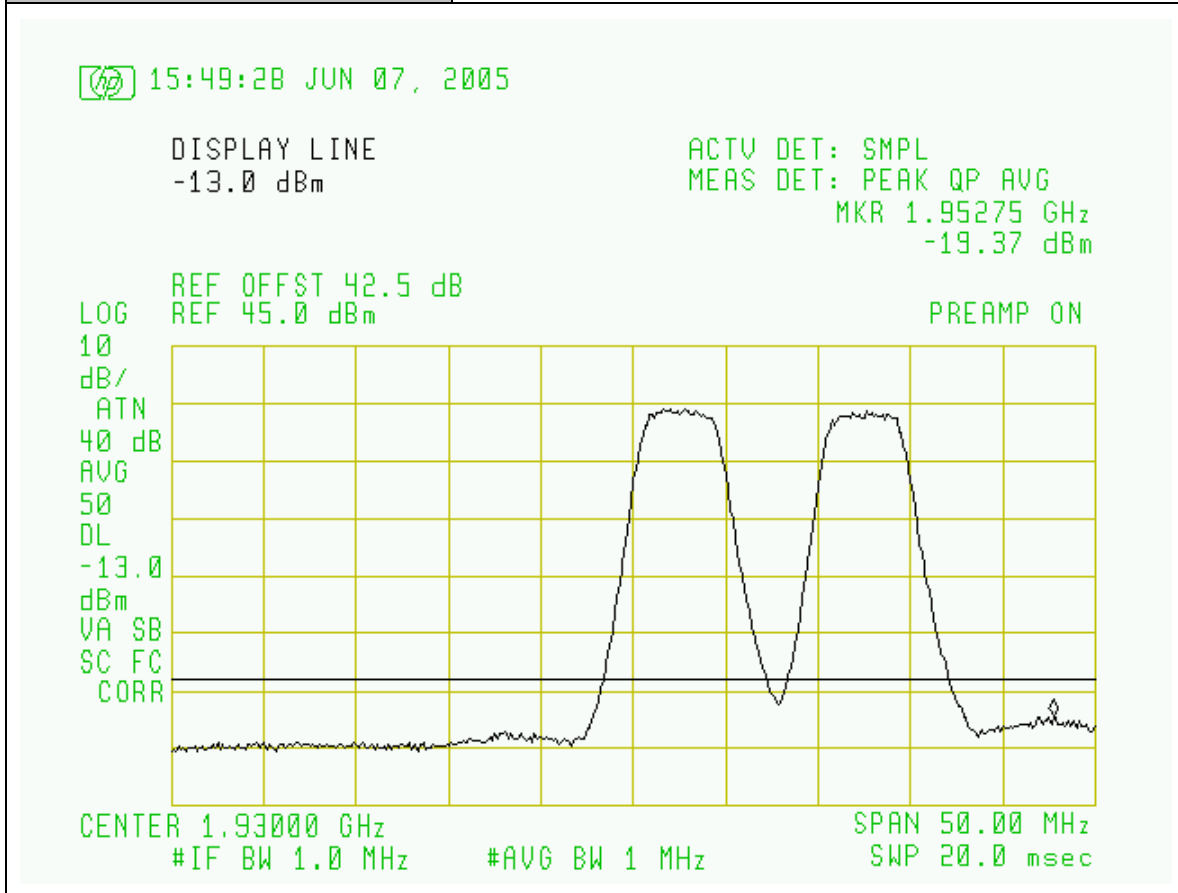
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Hi-Chn, Inter-modulation
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



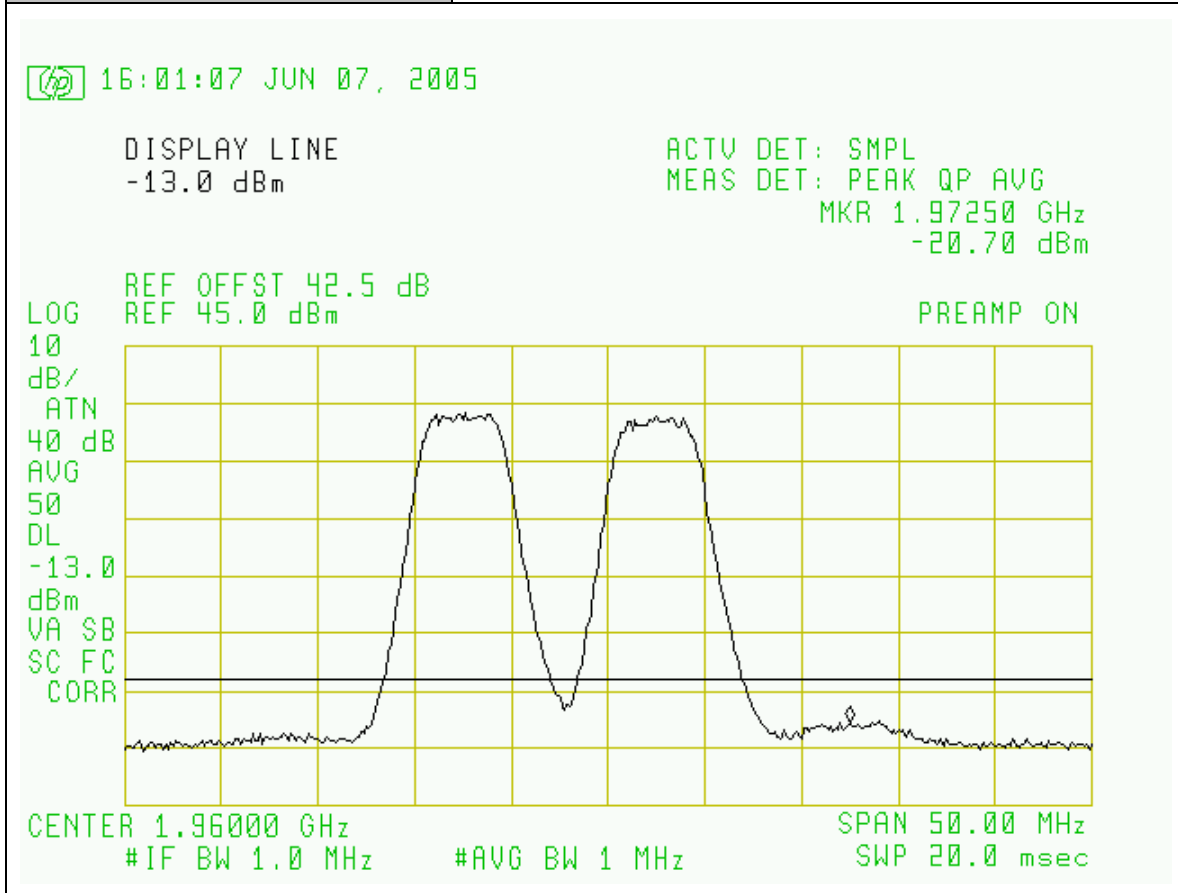
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Low-Chn, Inter-modulation
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



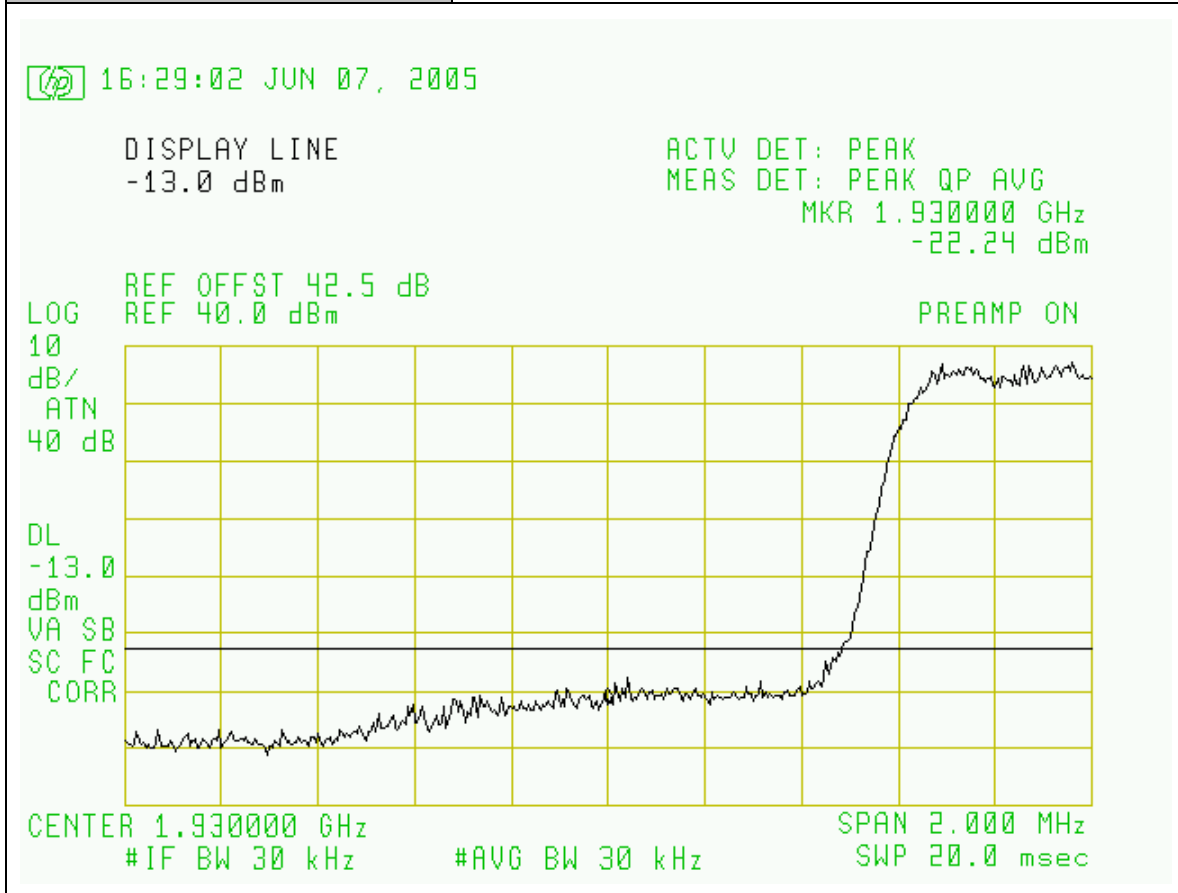
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Mid-Chn, Inter-modulation
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



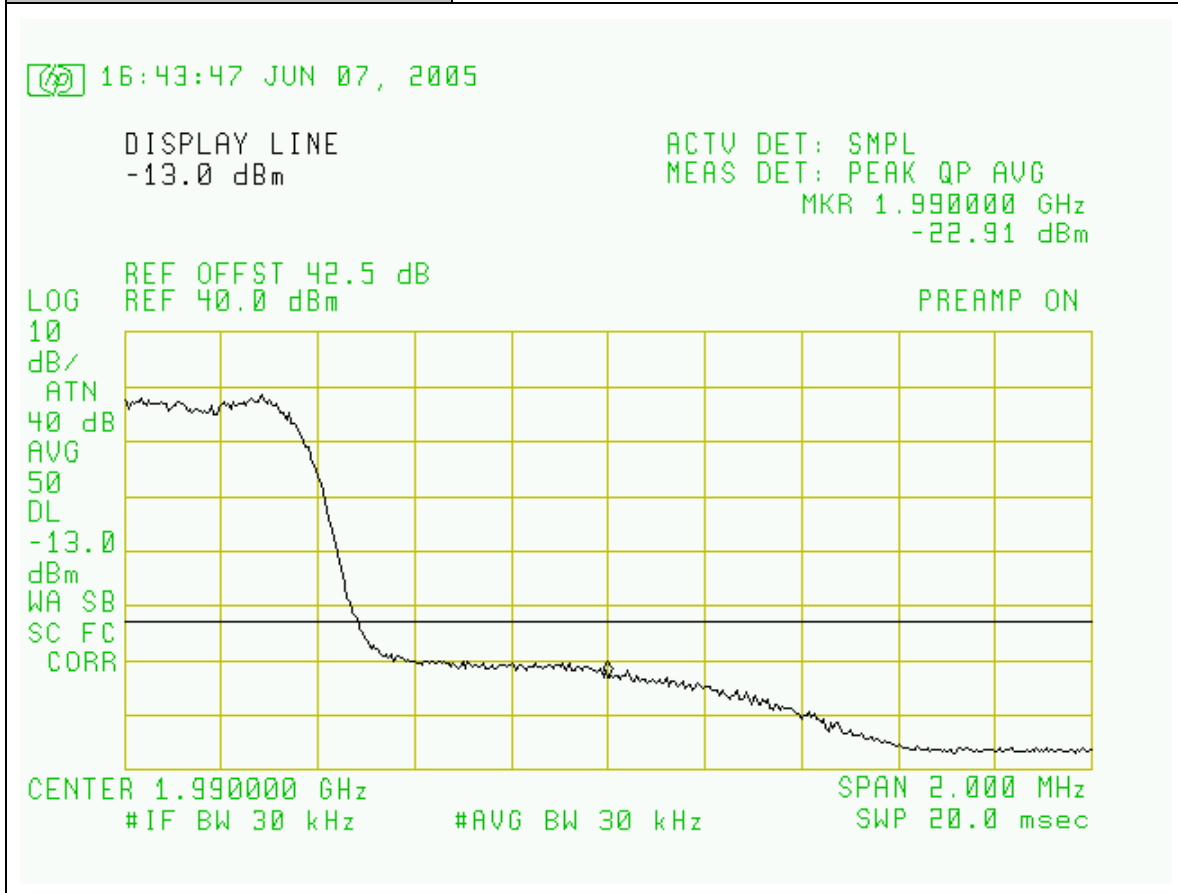
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Low-Chn, Lower Bandedge
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



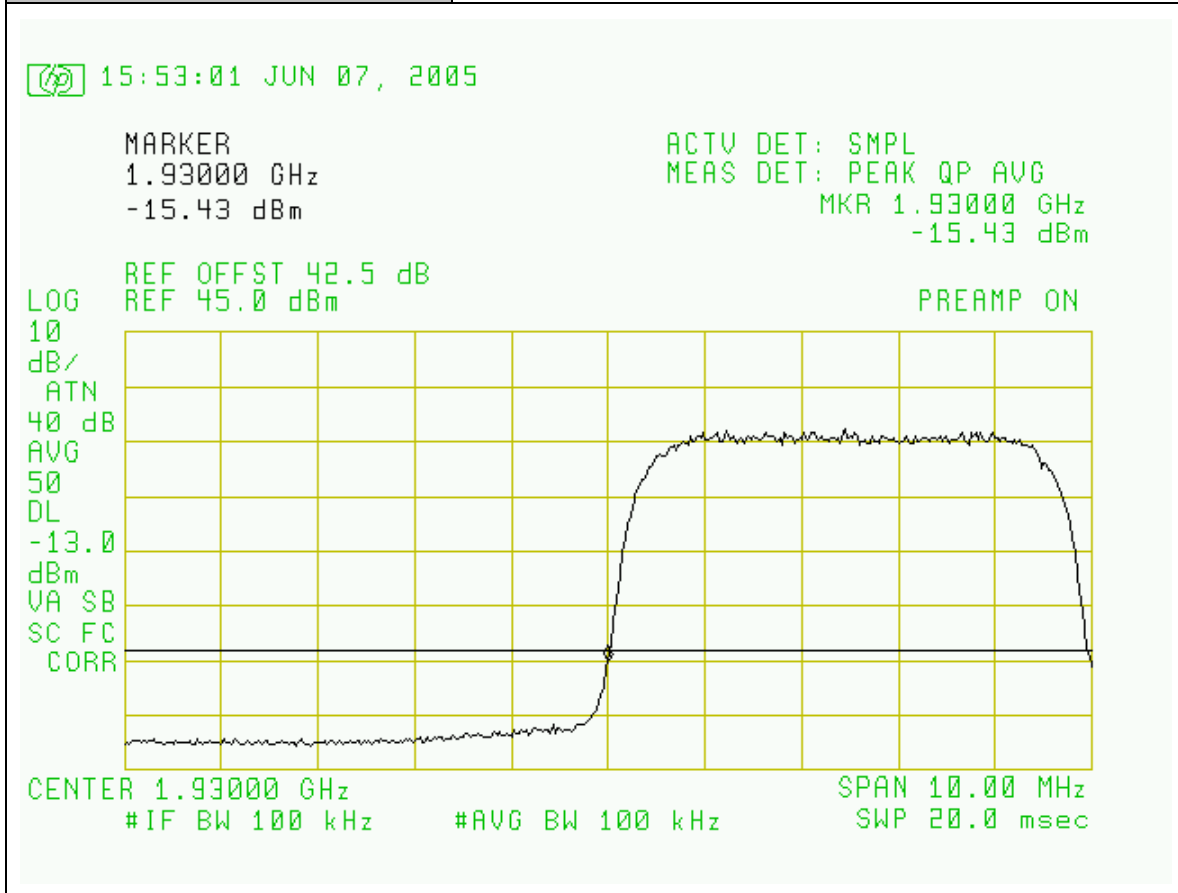
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Hi-Chn, Upper Bandedge
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



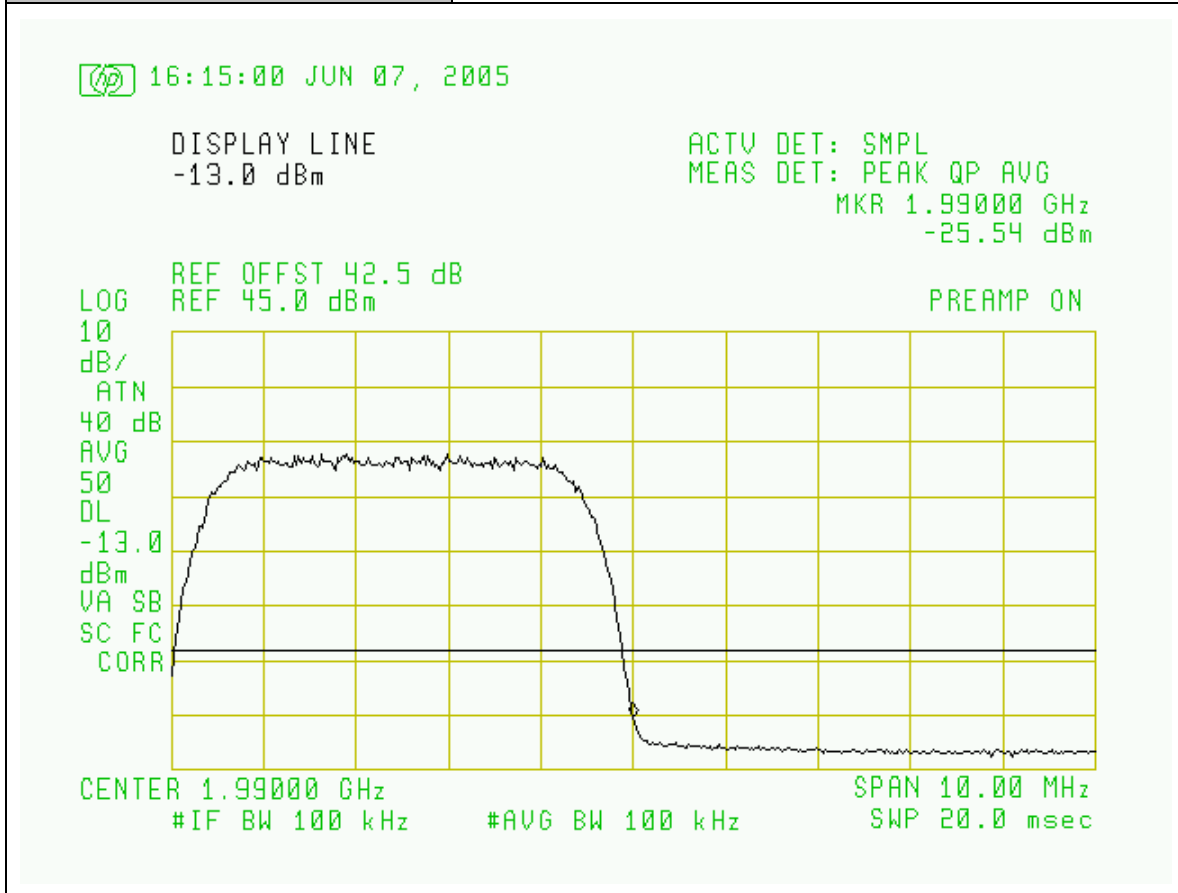
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Low-Chn, Lower Bandedge
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



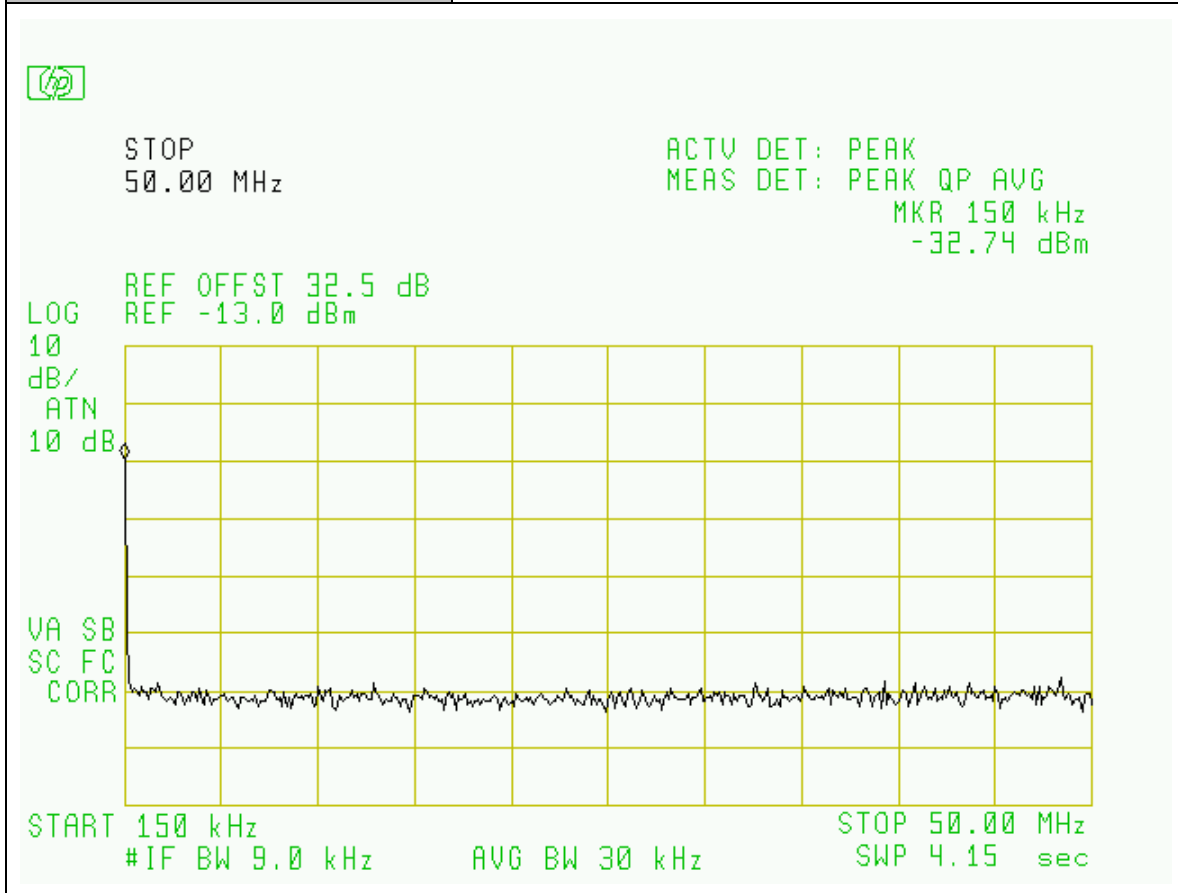
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Hi-Chn, Upper Bandedge
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



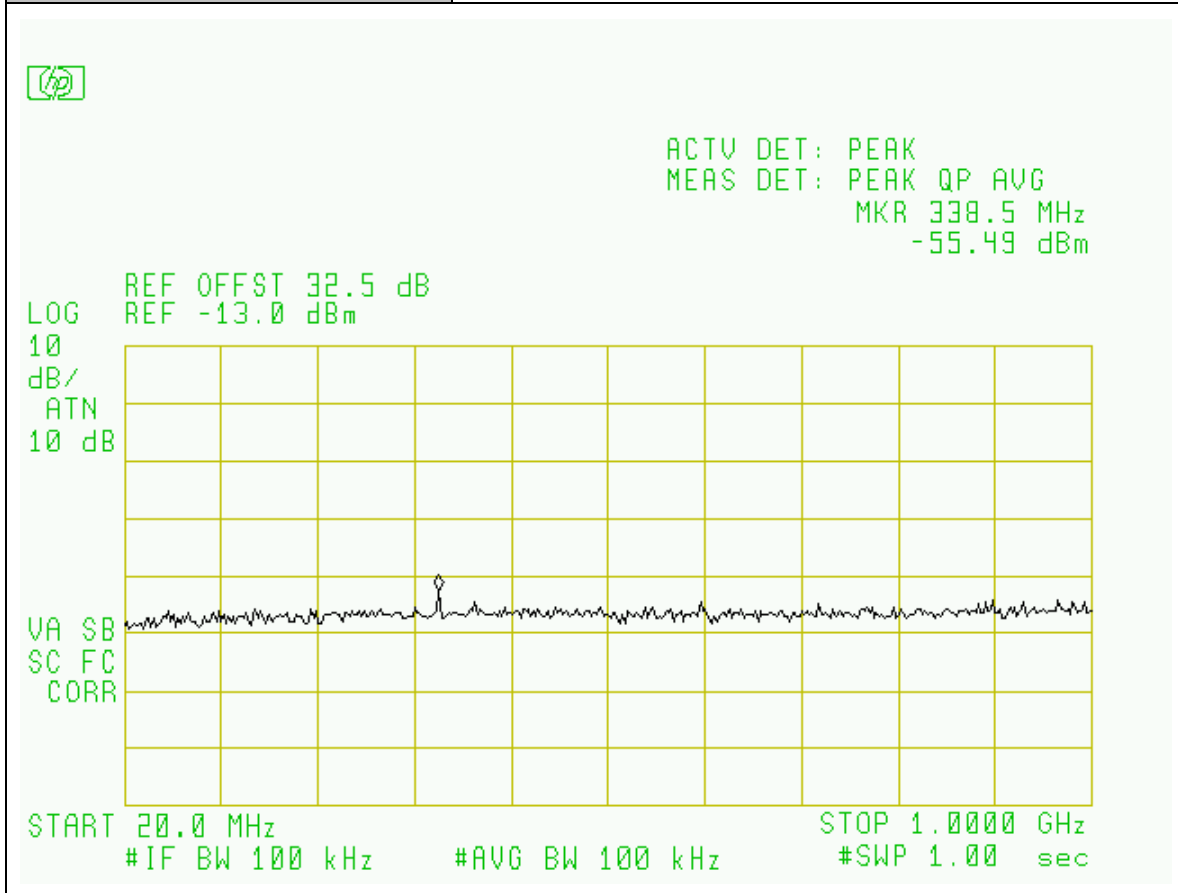
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PARTS NO.:	RF100154
Tested By:	Wei Li
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Humidity:	30%

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Plot Name:	Downlink, Hi-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



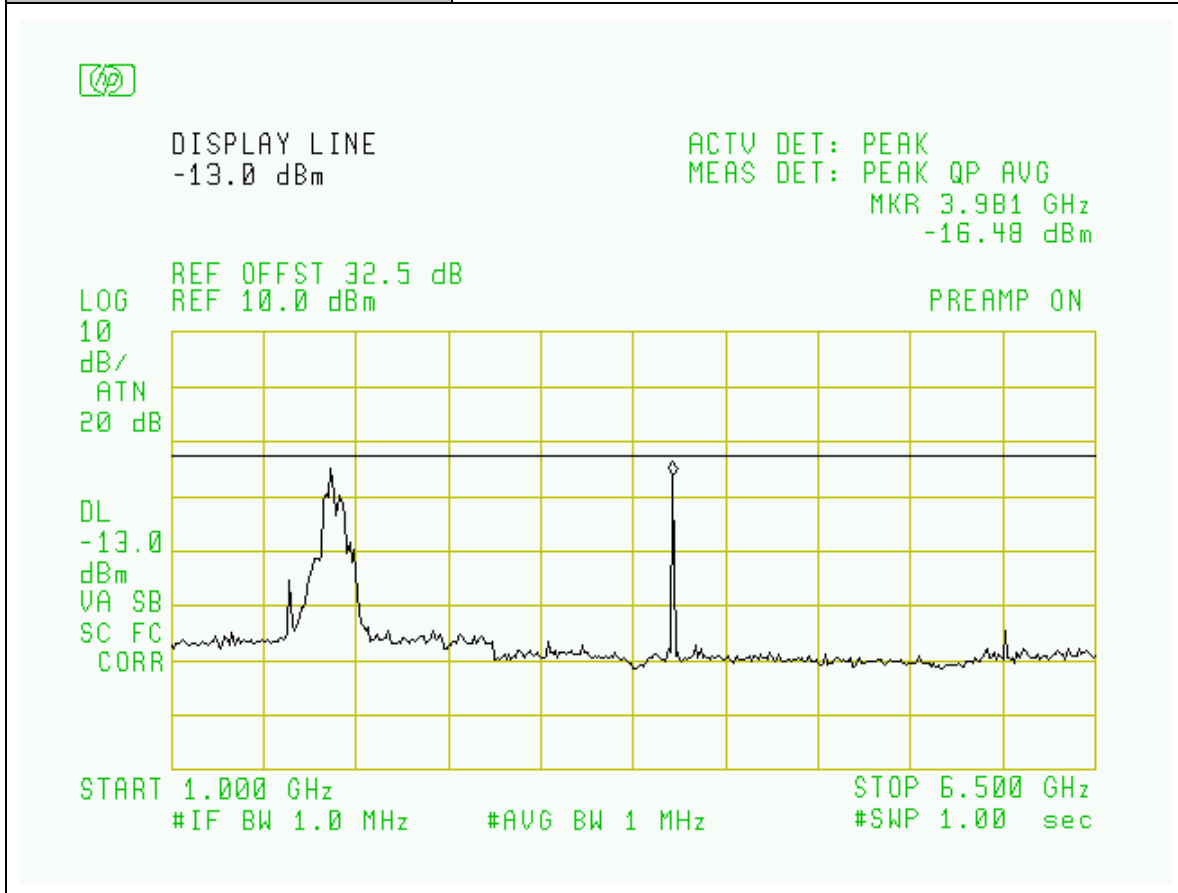
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PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Hi-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



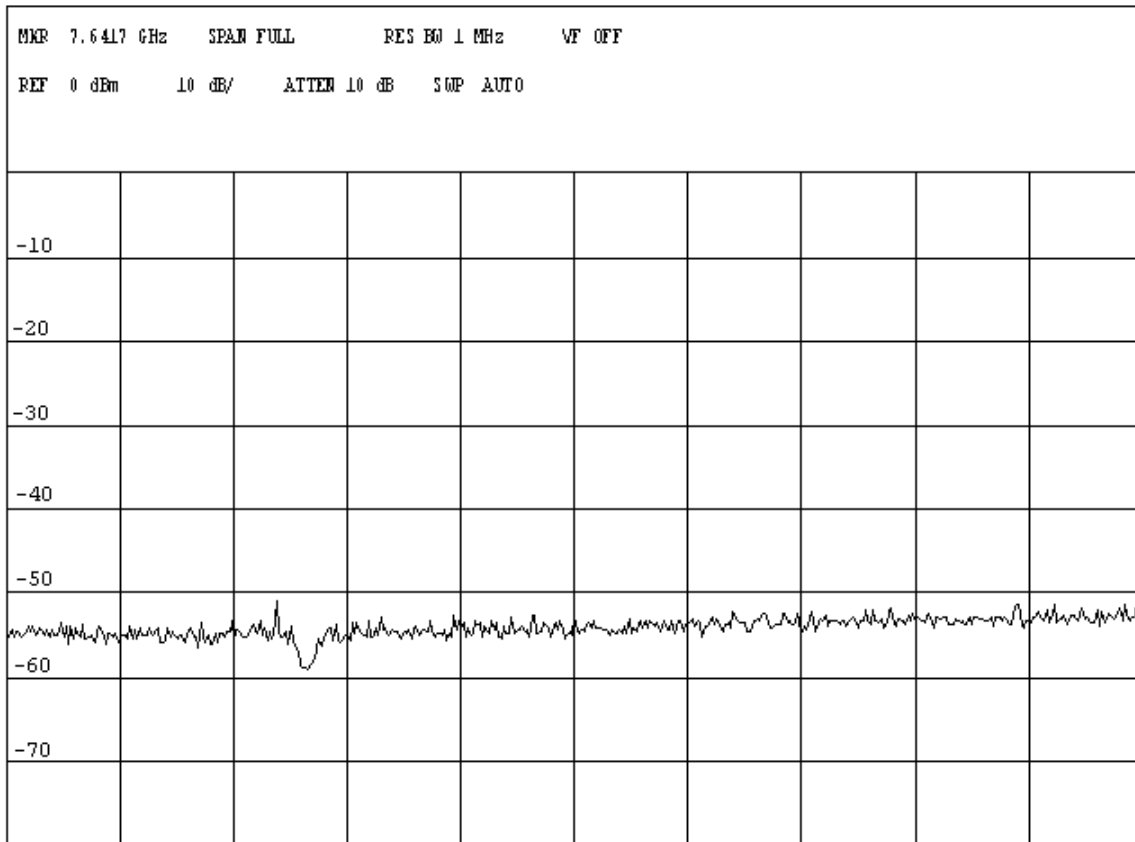
Project Number:	0048-050606-01
EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Hi-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



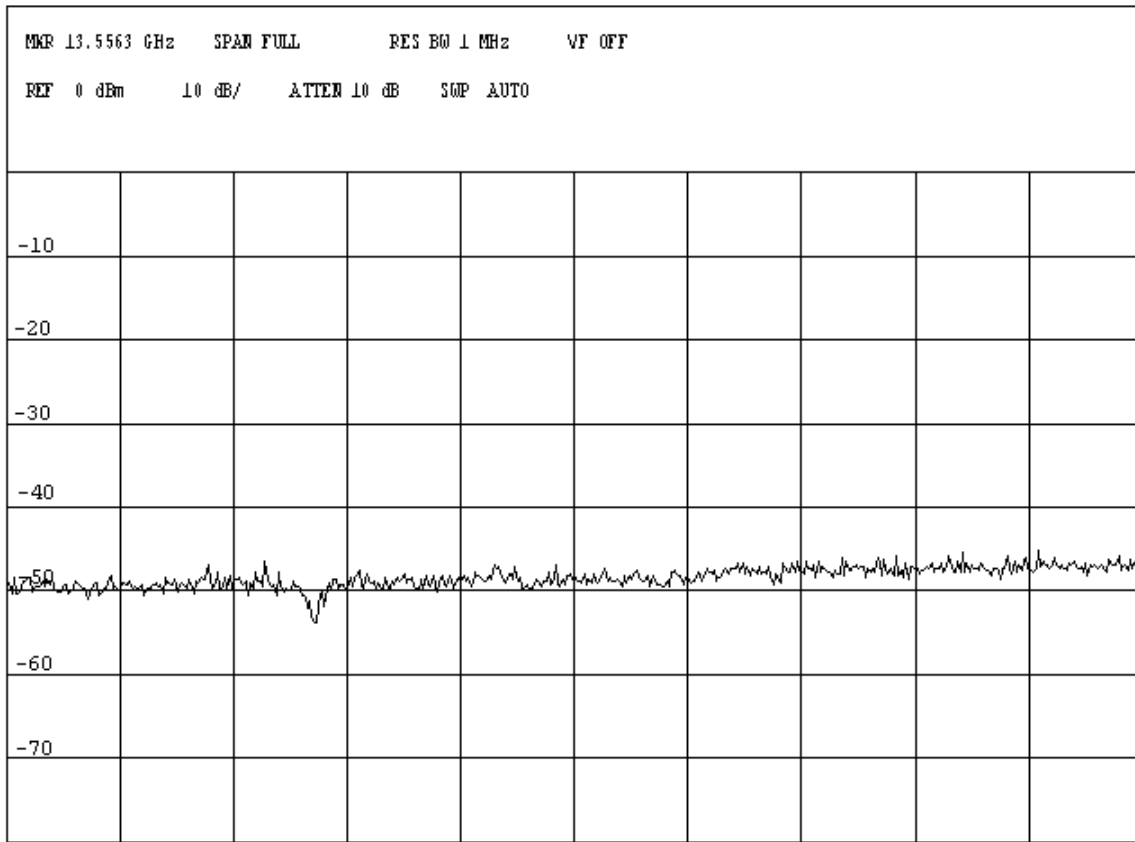
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Hi-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



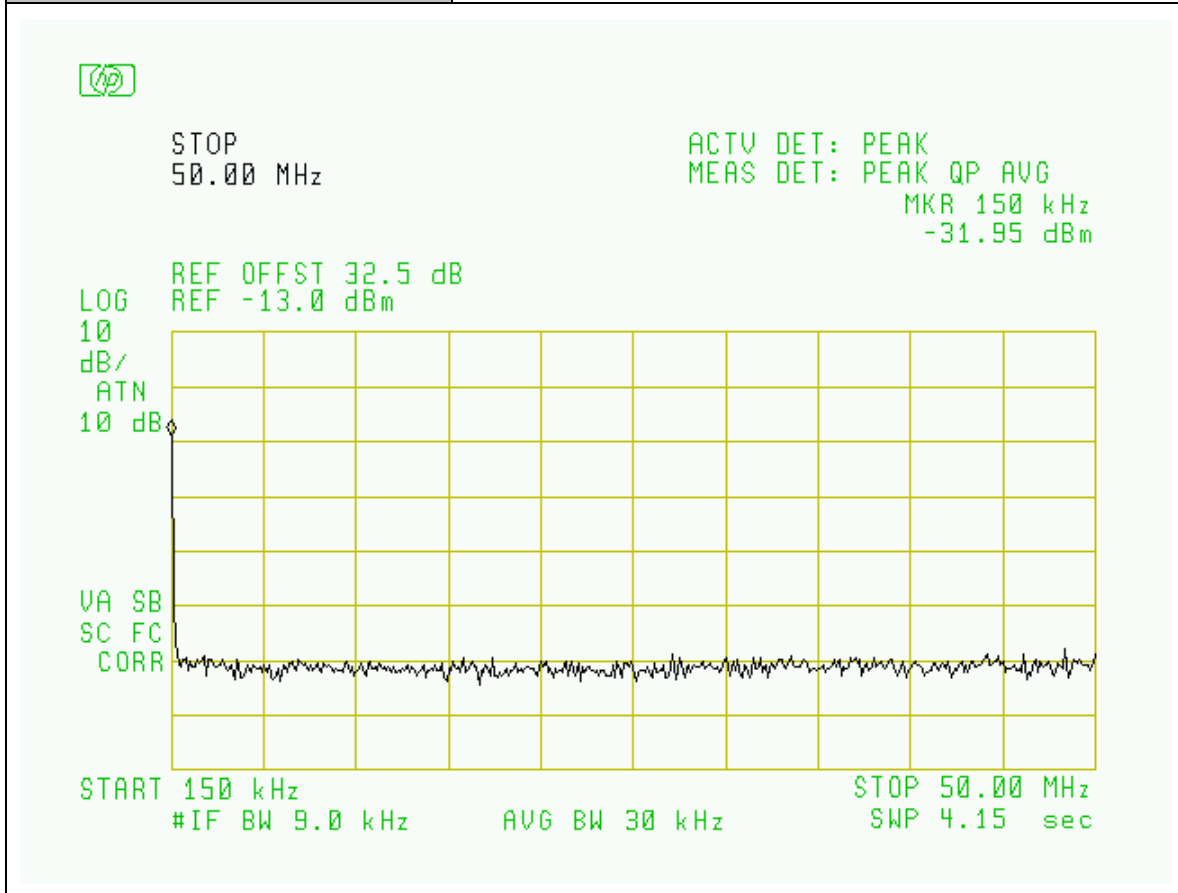
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Hi-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



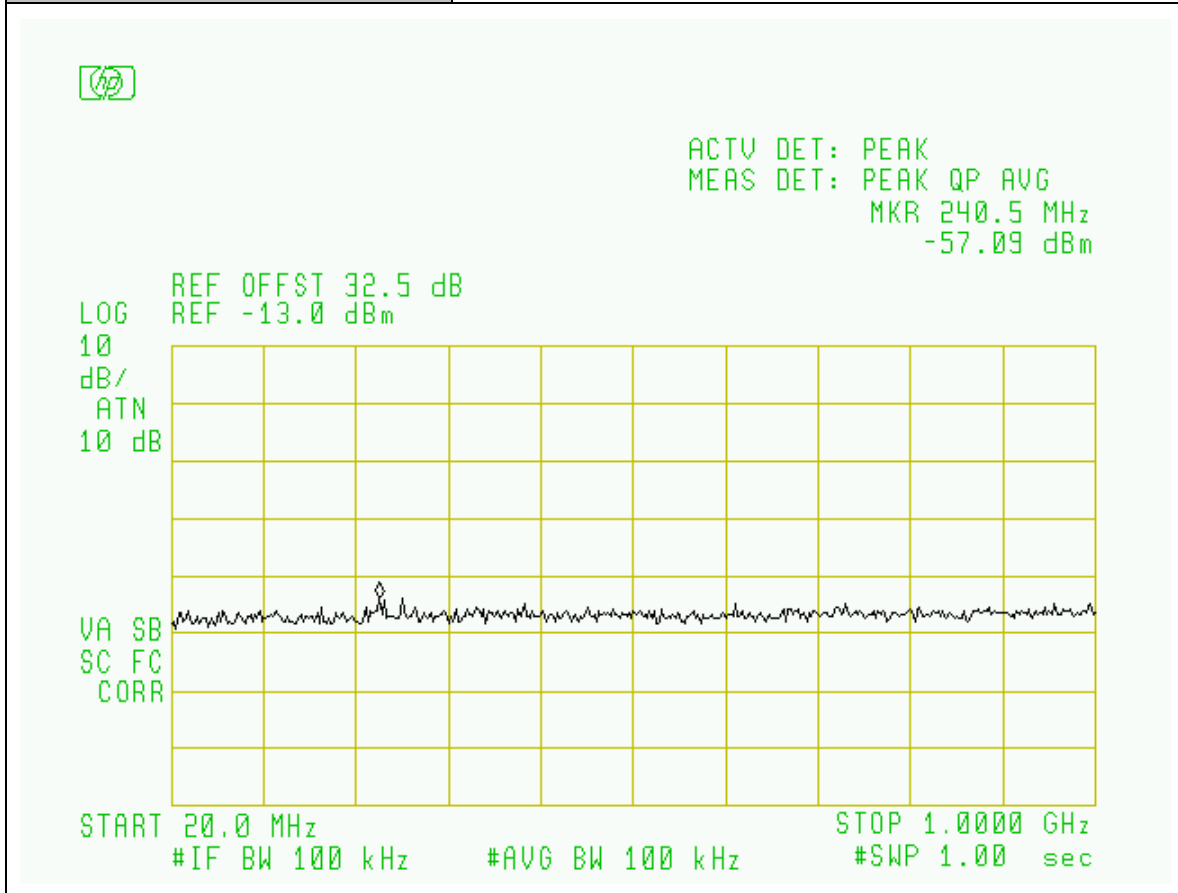
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PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Mid-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



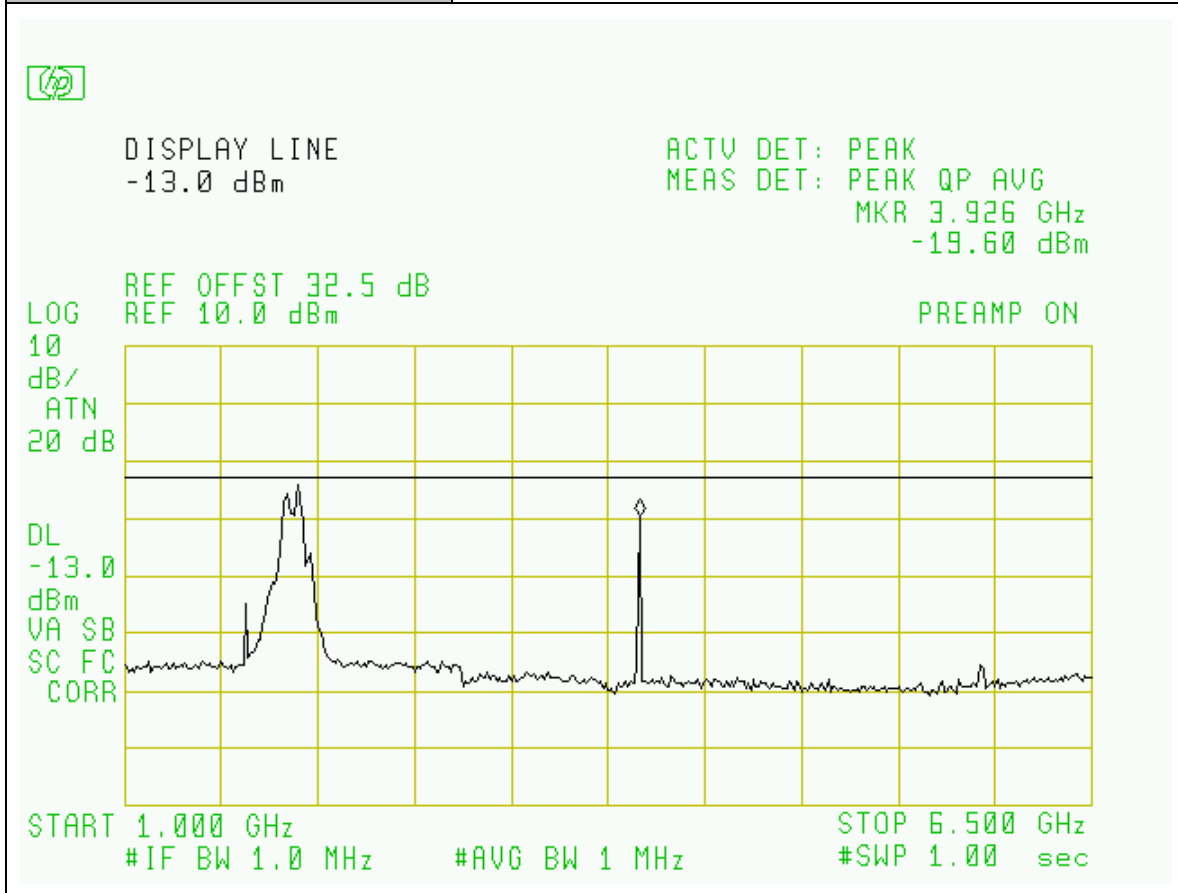
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Mid-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



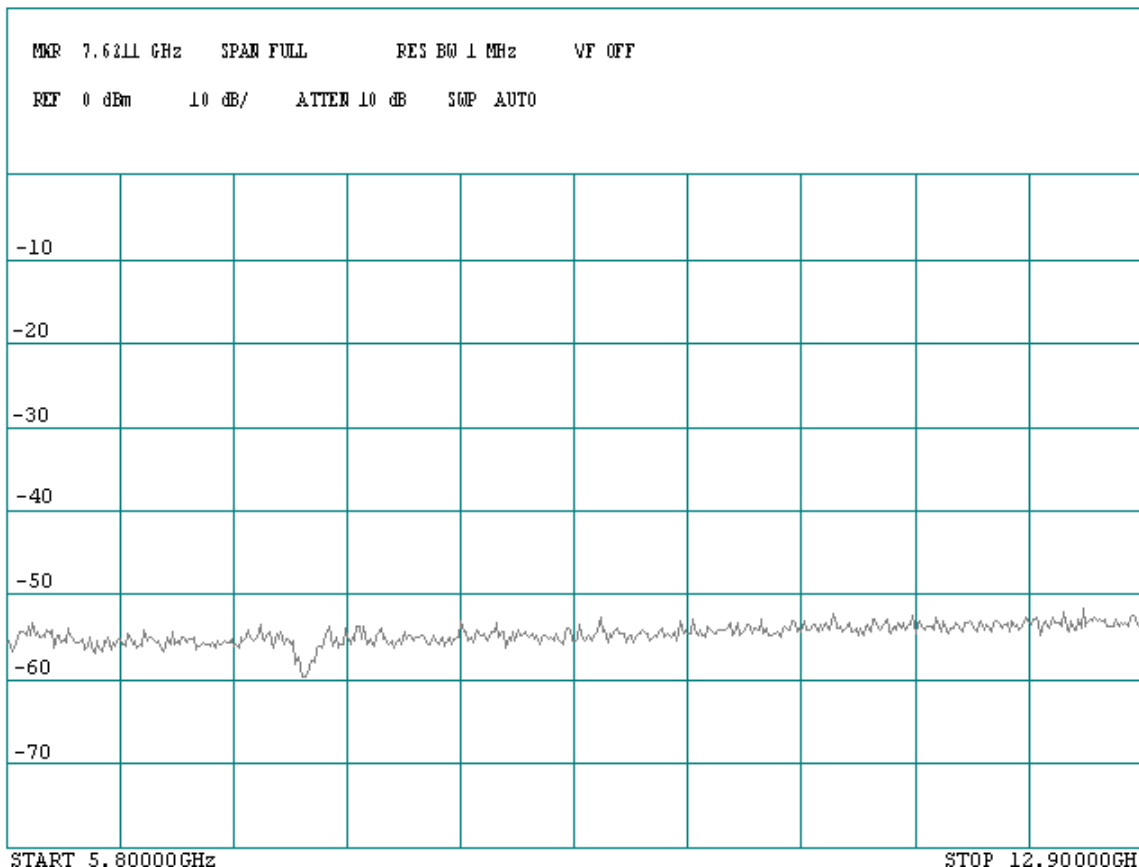
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Mid-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



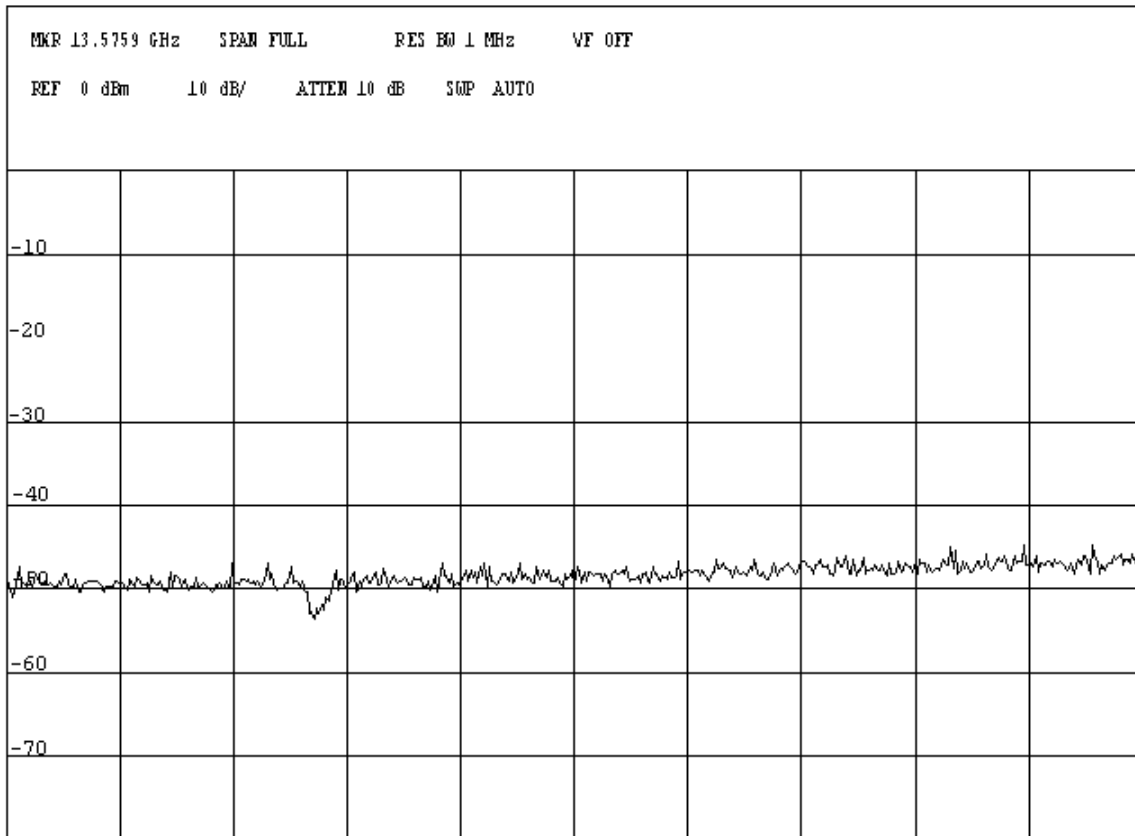
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PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Mid-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



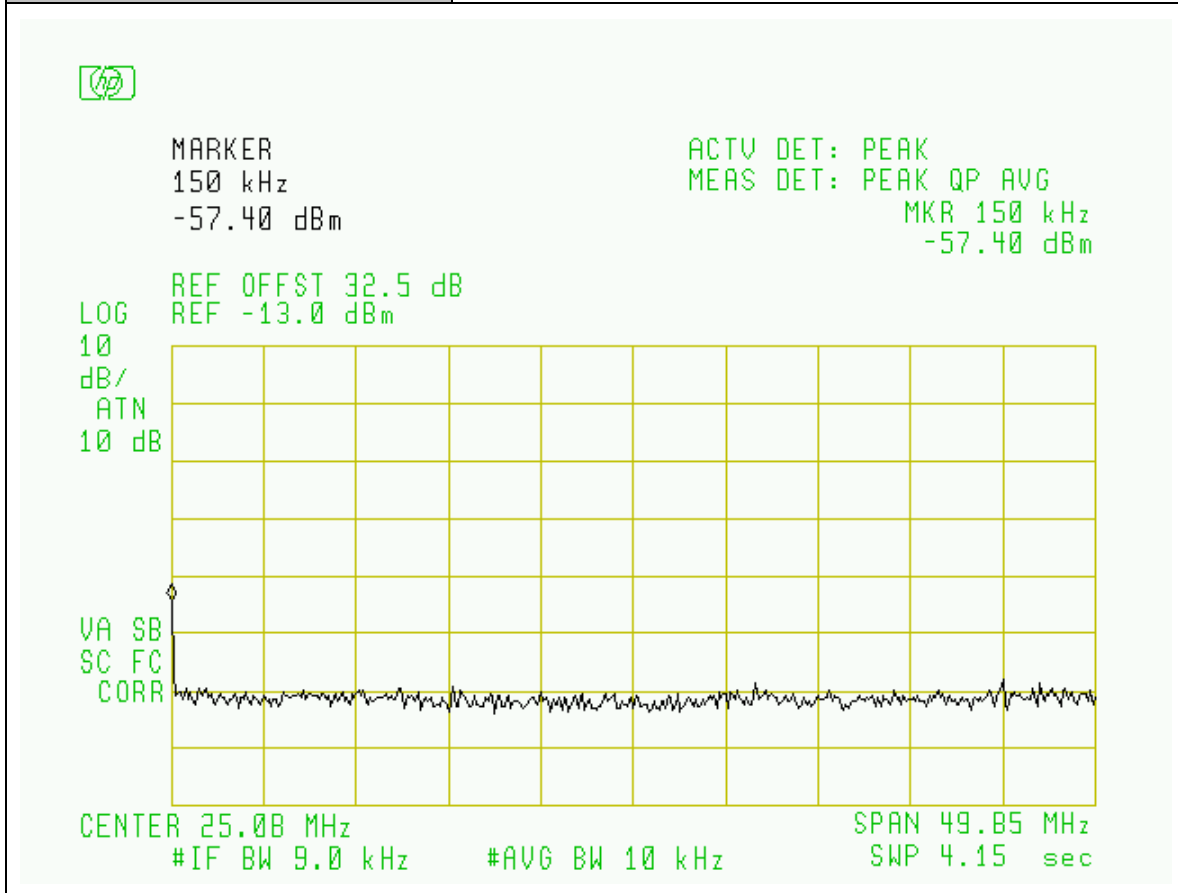
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Mid-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



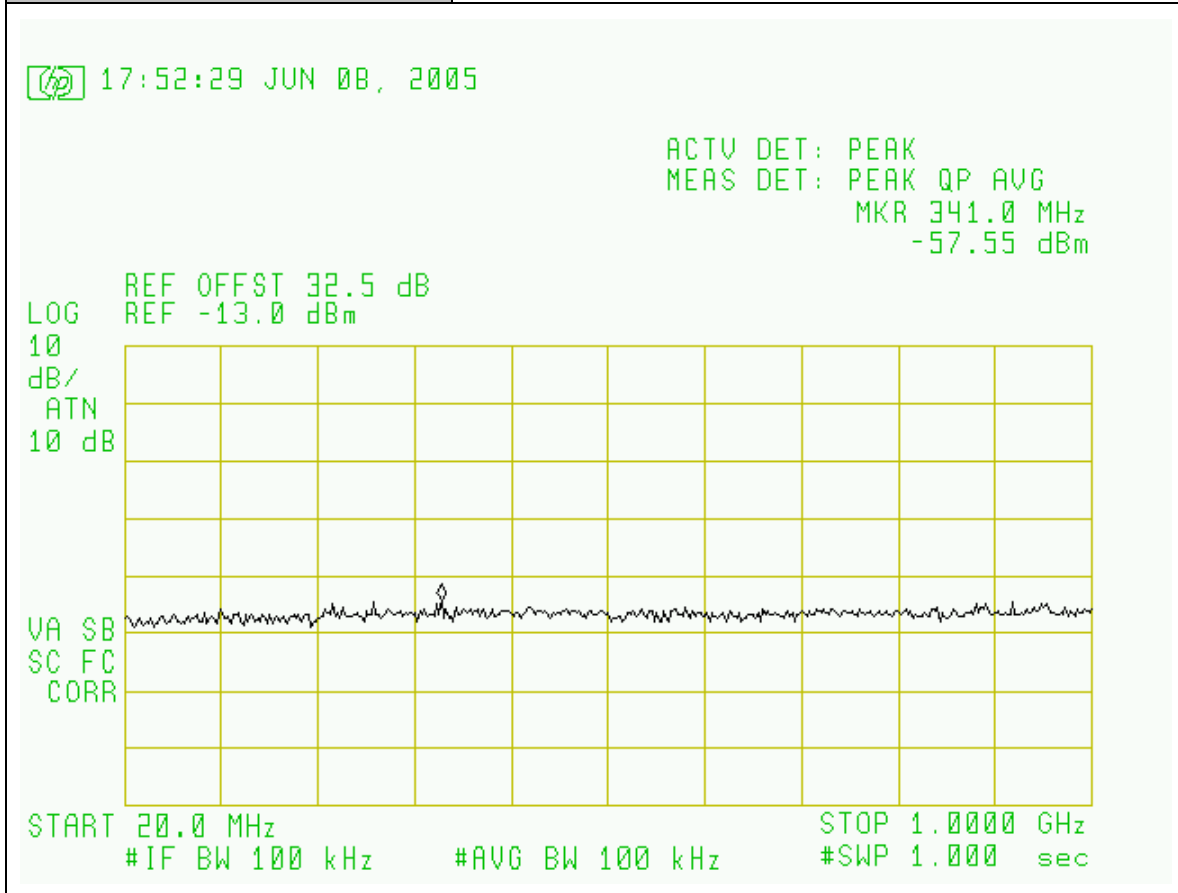
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PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Low-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



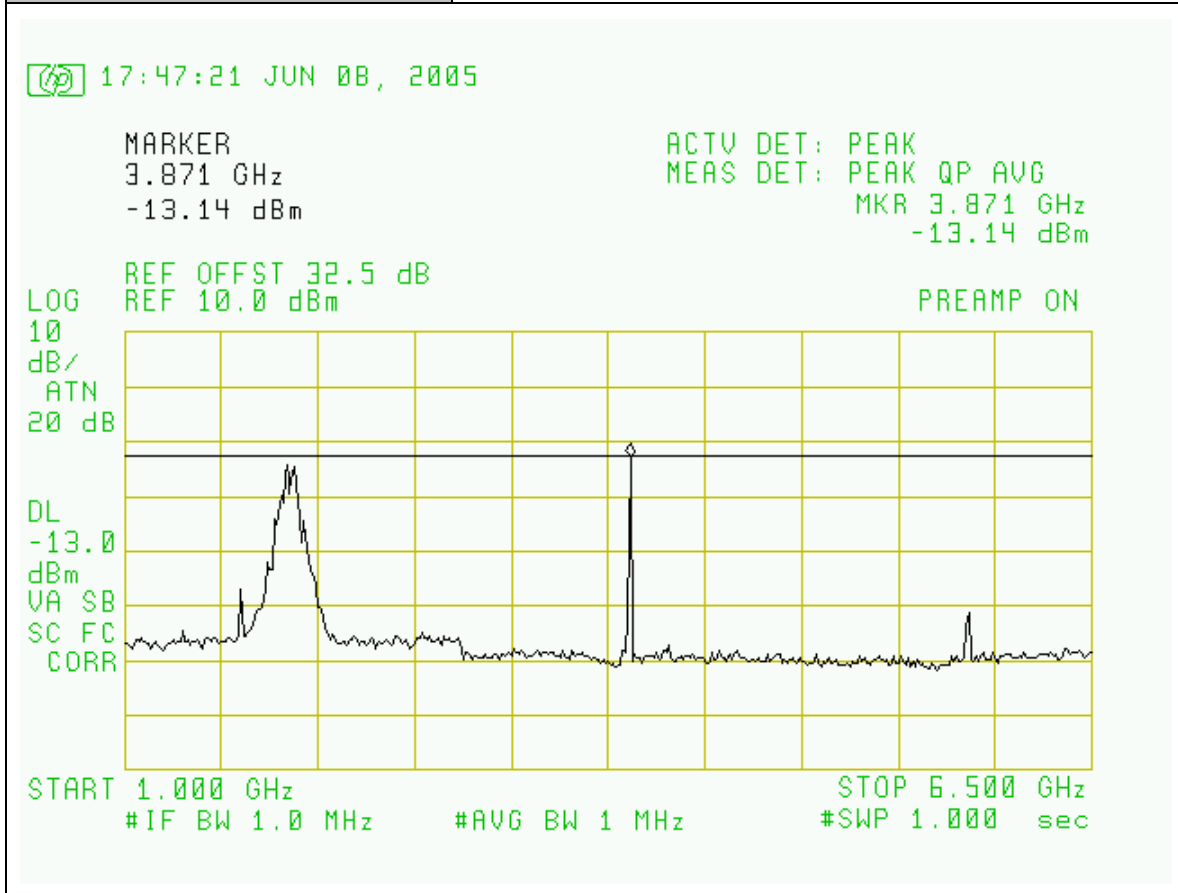
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Low-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



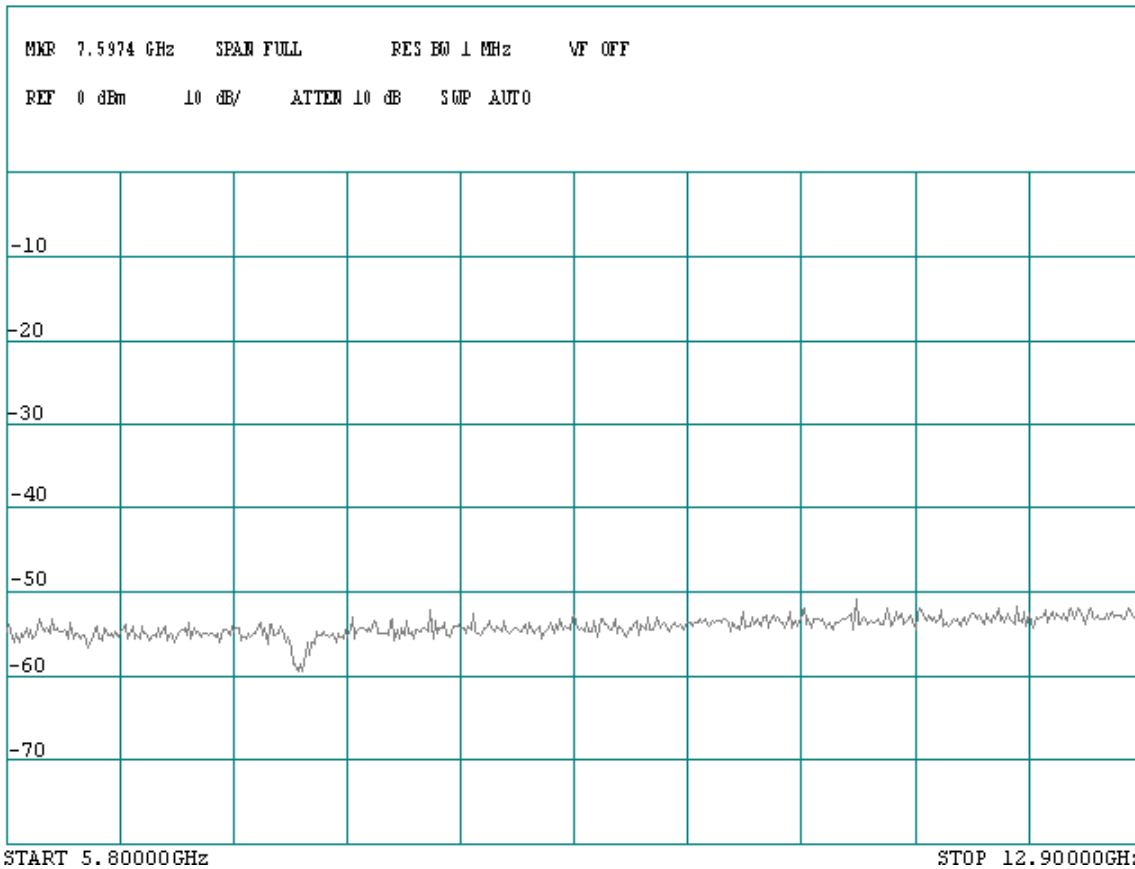
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Low-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT * 2 nd Harmonic Average Reading =-21.72dBm



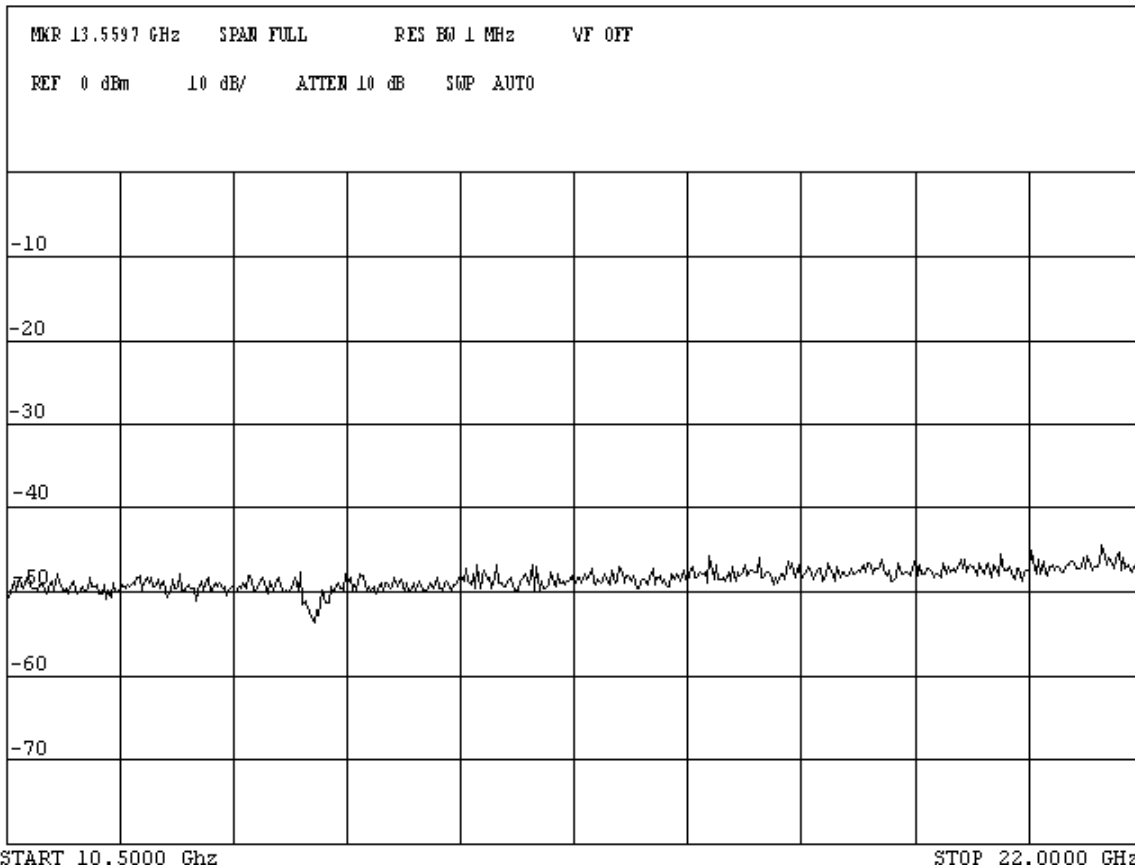
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Low-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



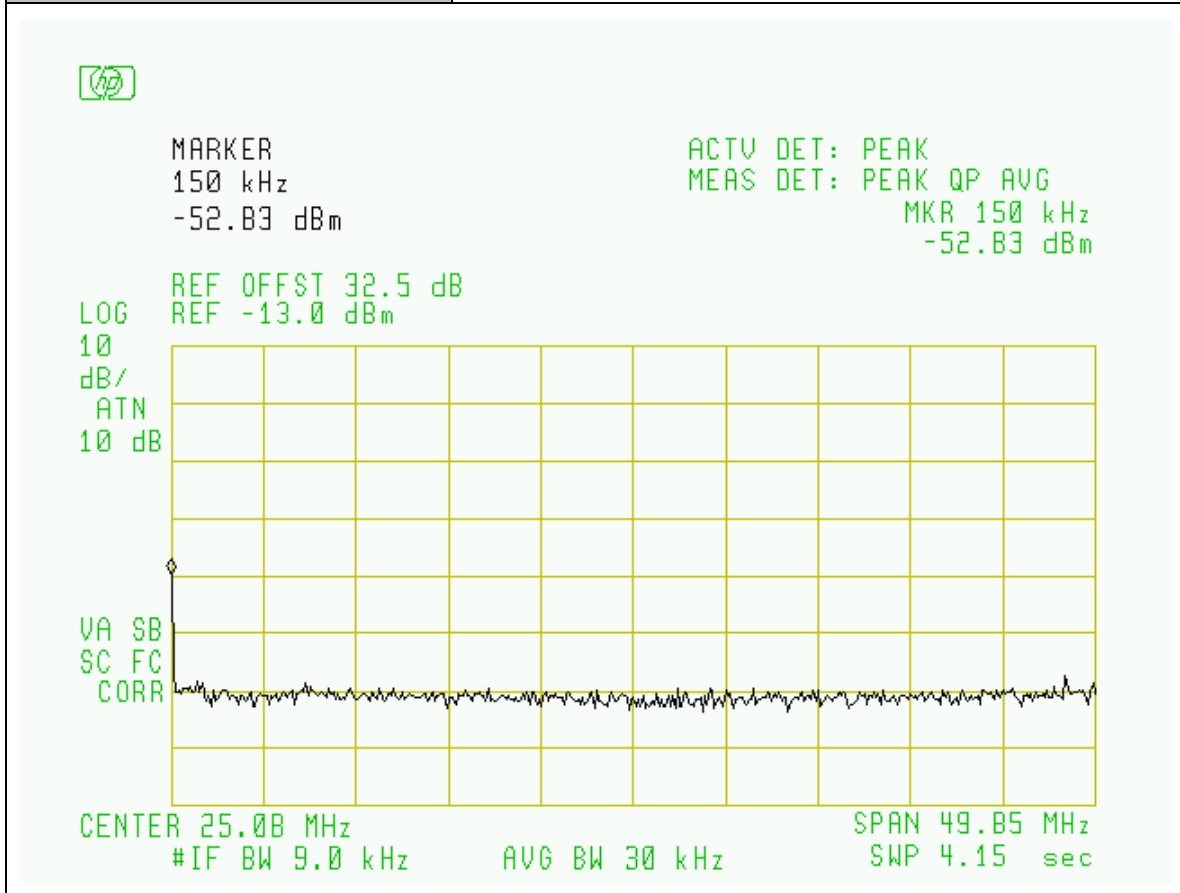
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Wei Li
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / CDMA2000 Modulation
Plot Name:	Downlink, Low-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



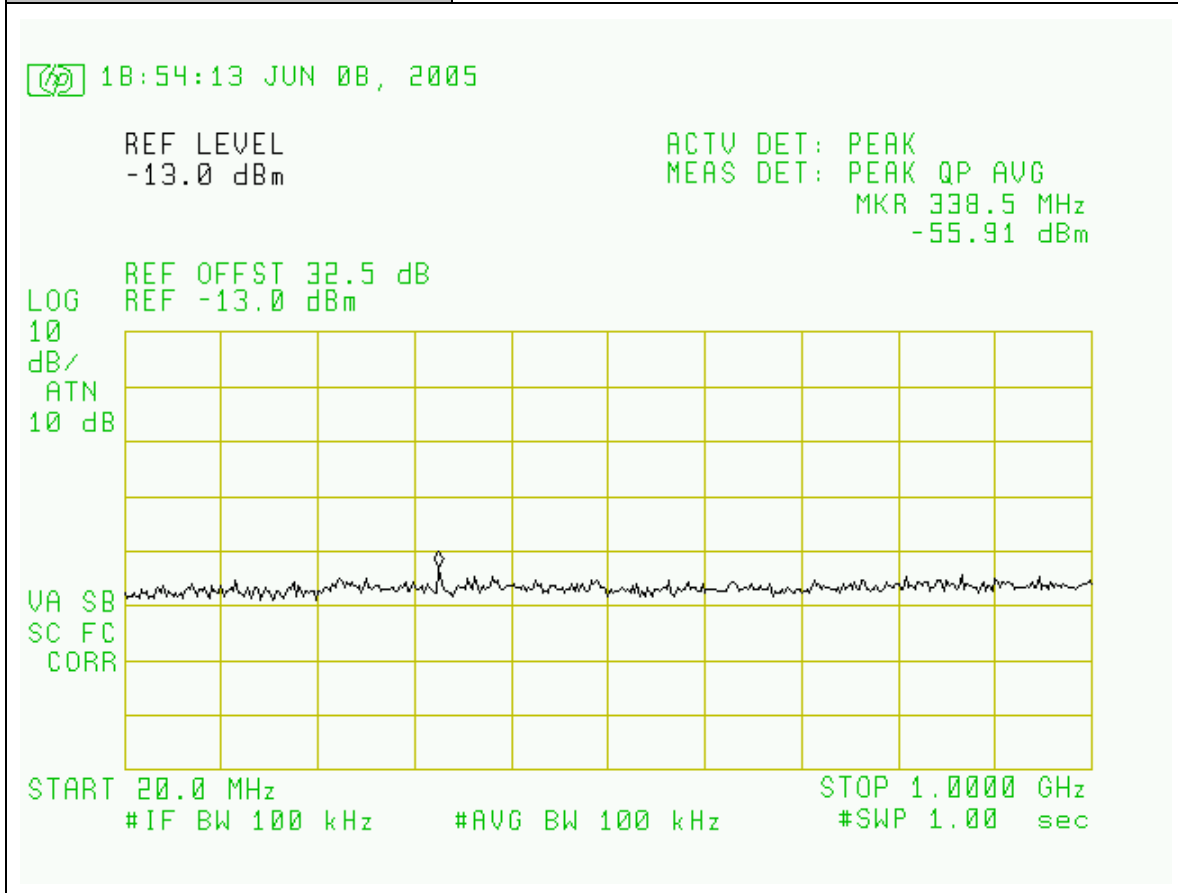
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Hi-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



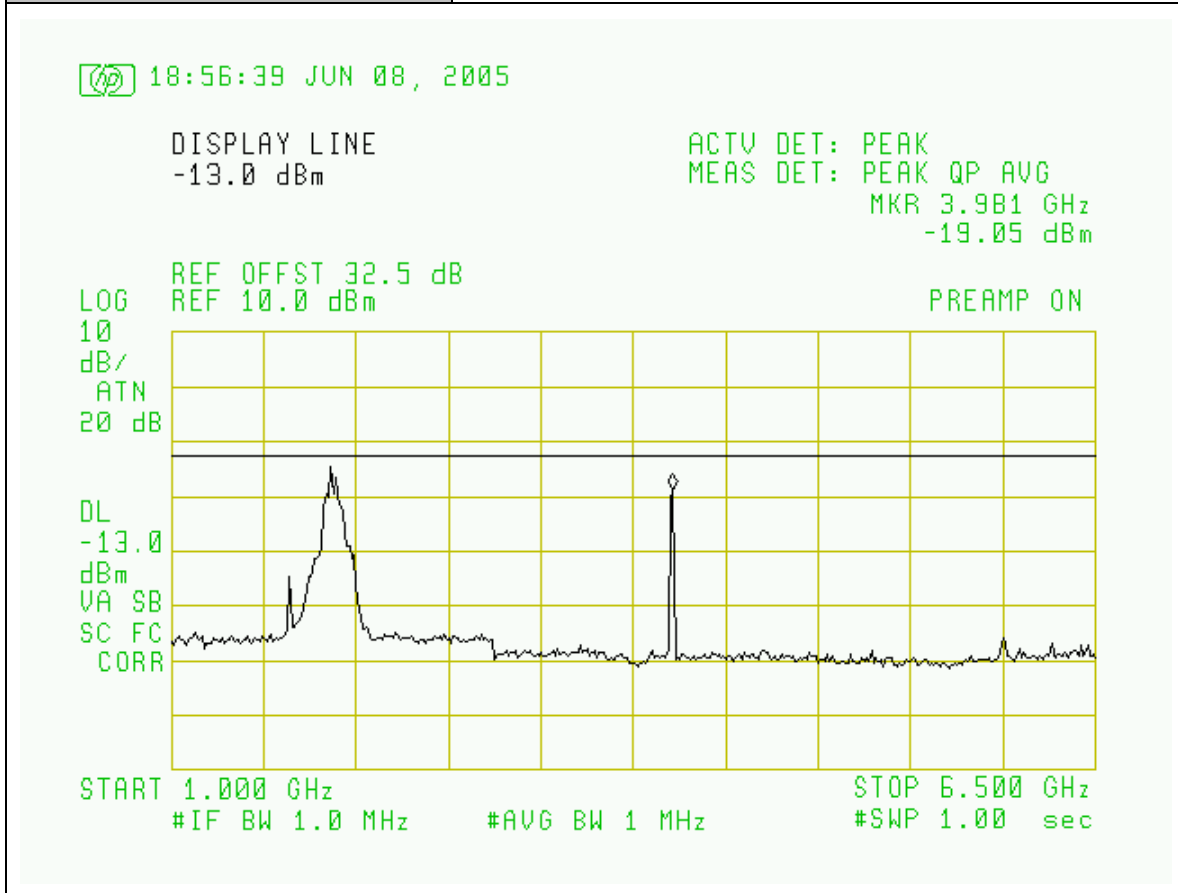
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Hi-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



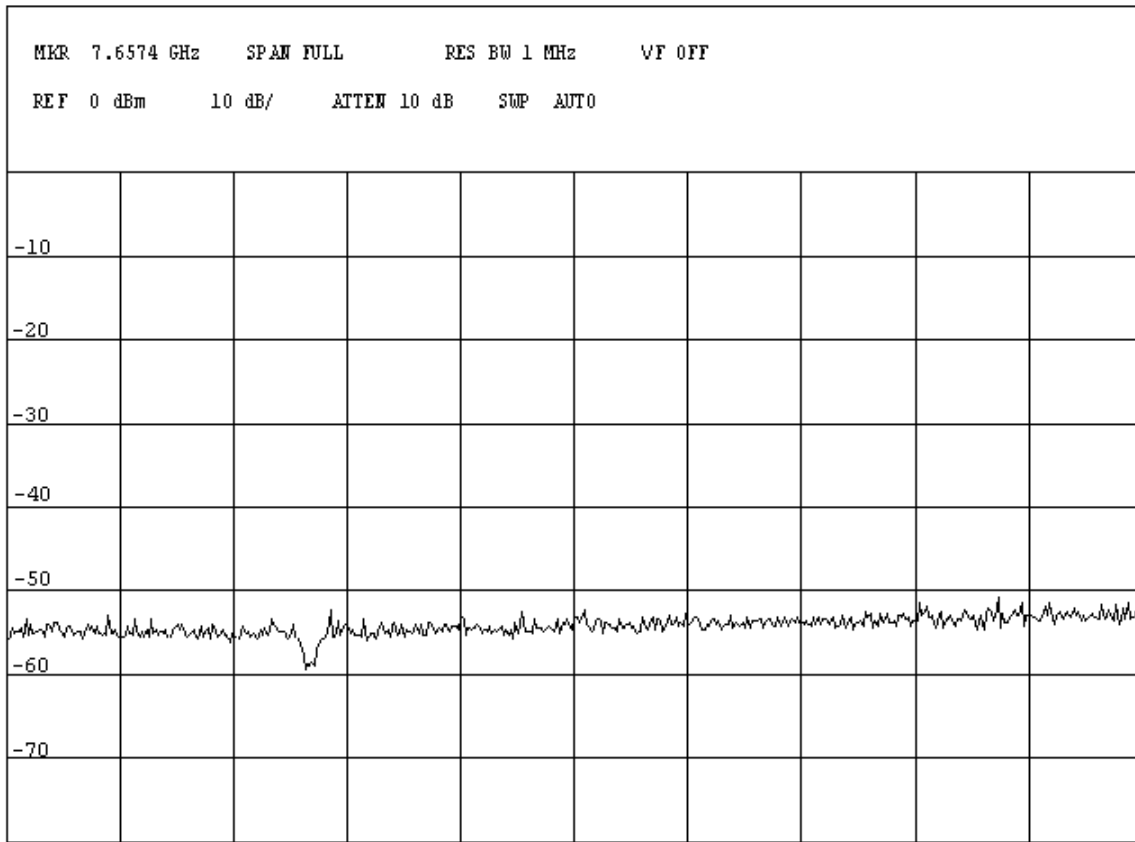
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70°F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Hi-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



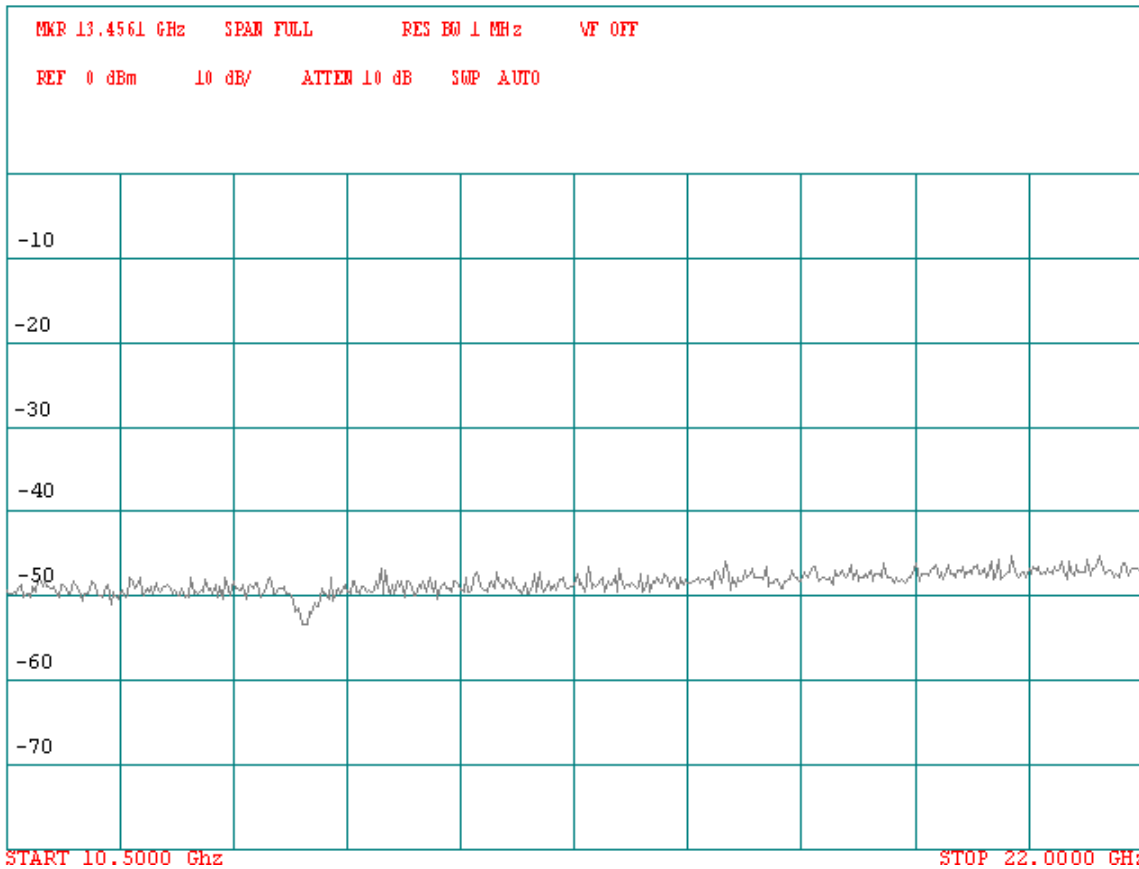
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Hi-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



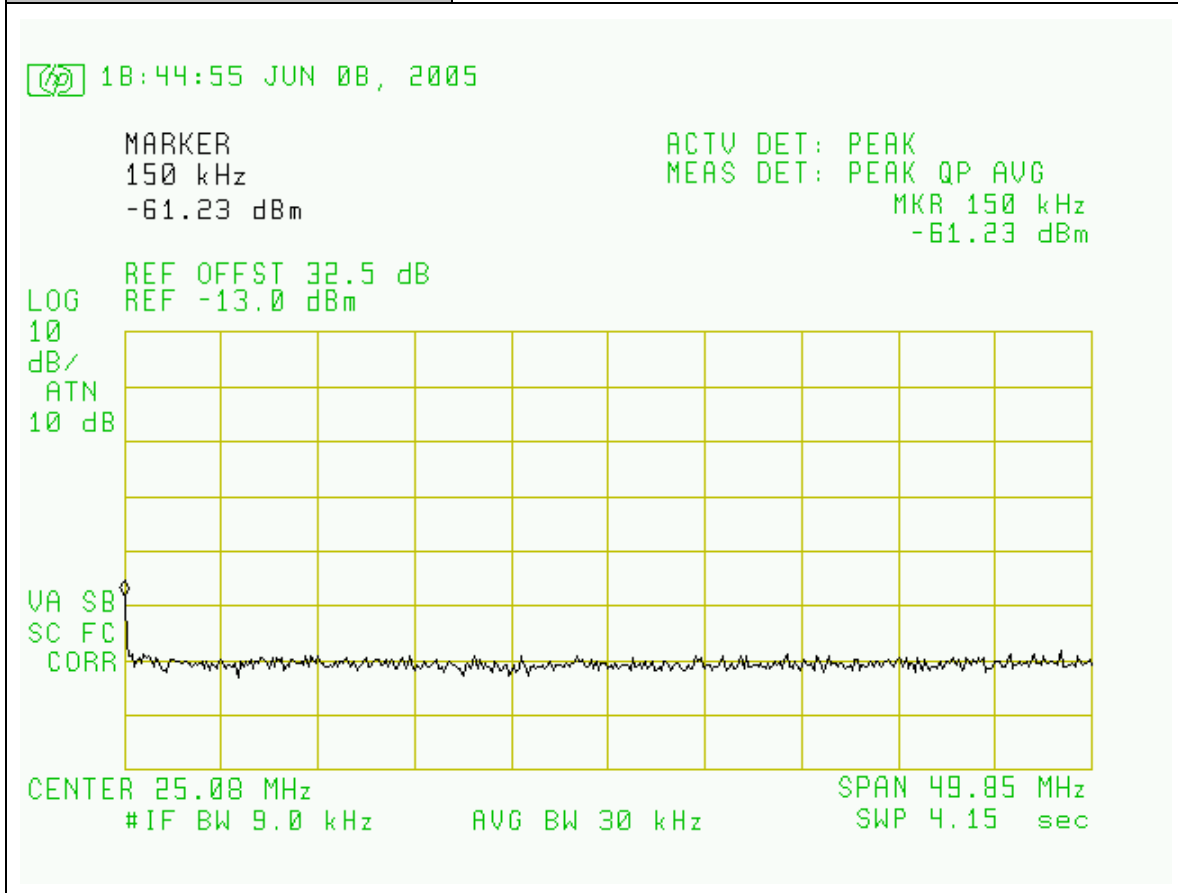
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Hi-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



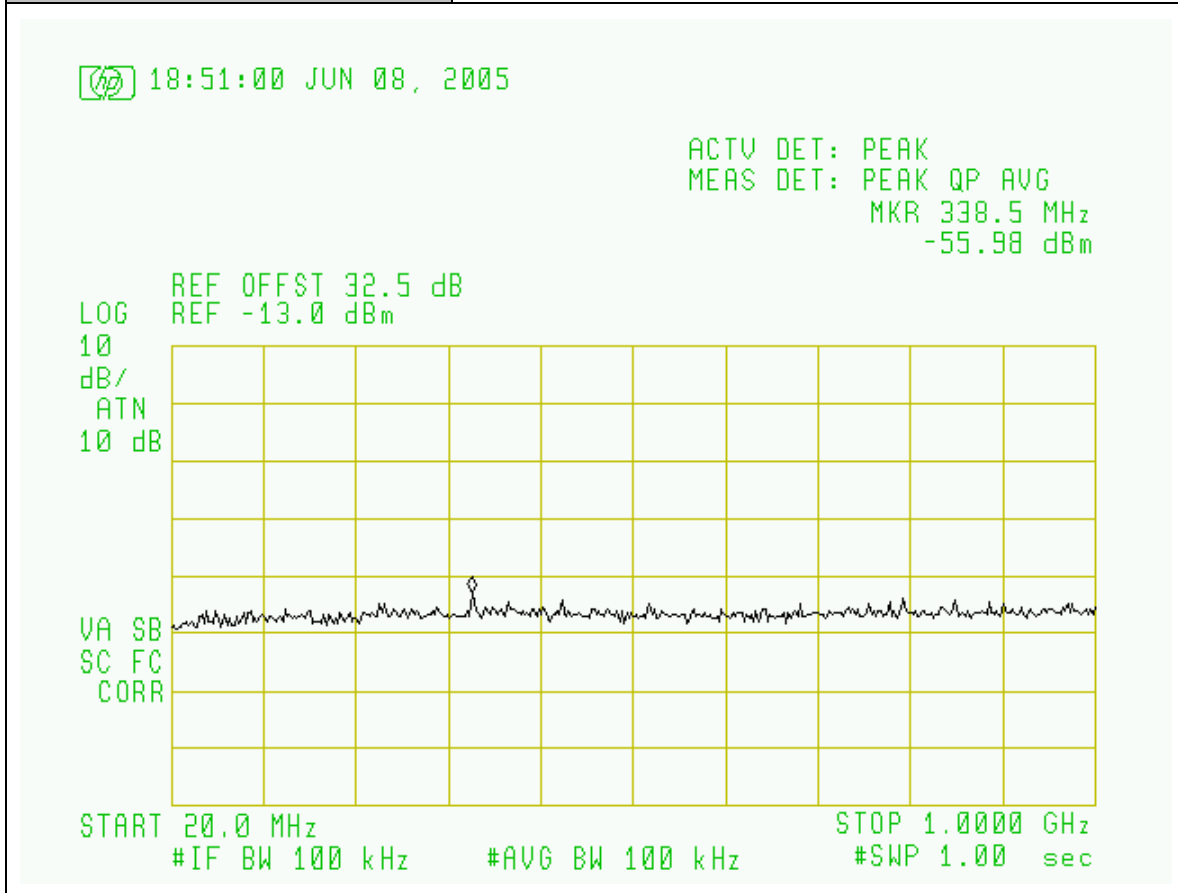
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Mid-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



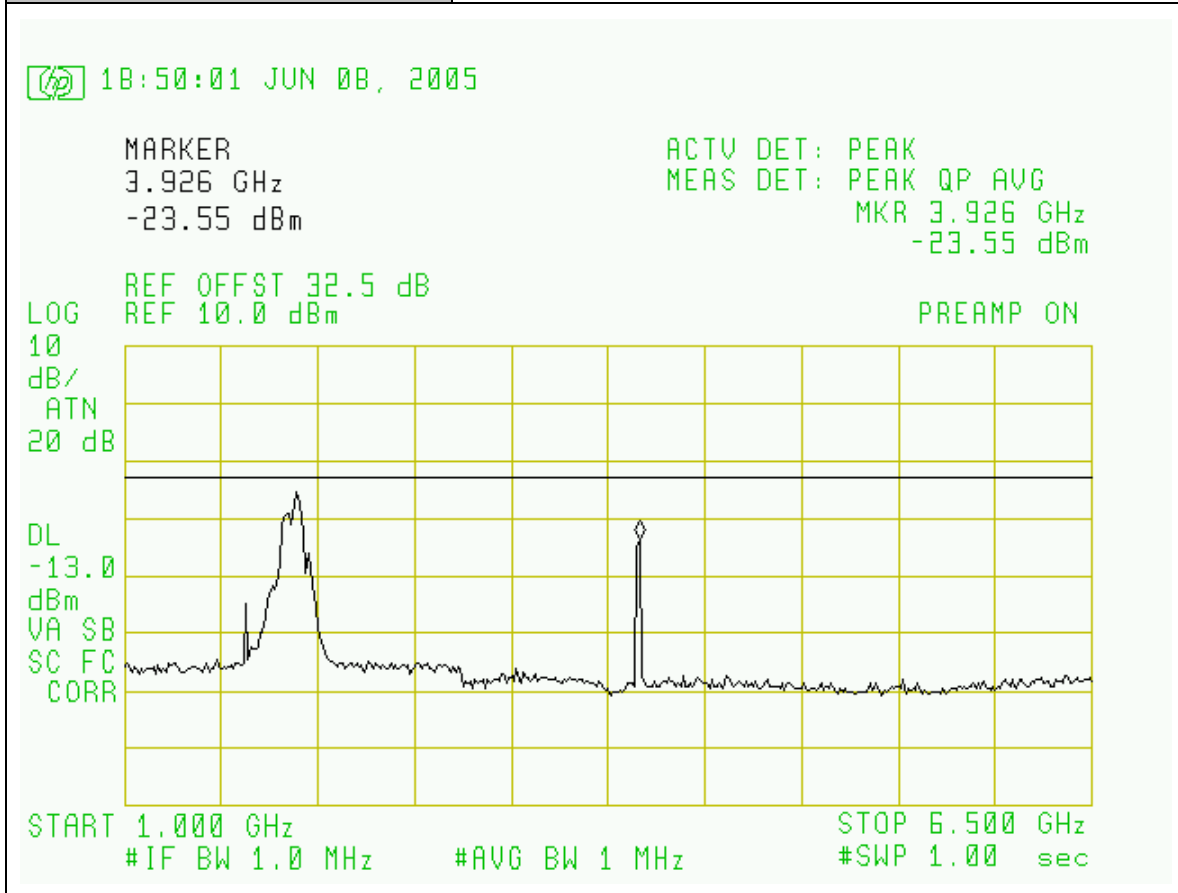
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Mid-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



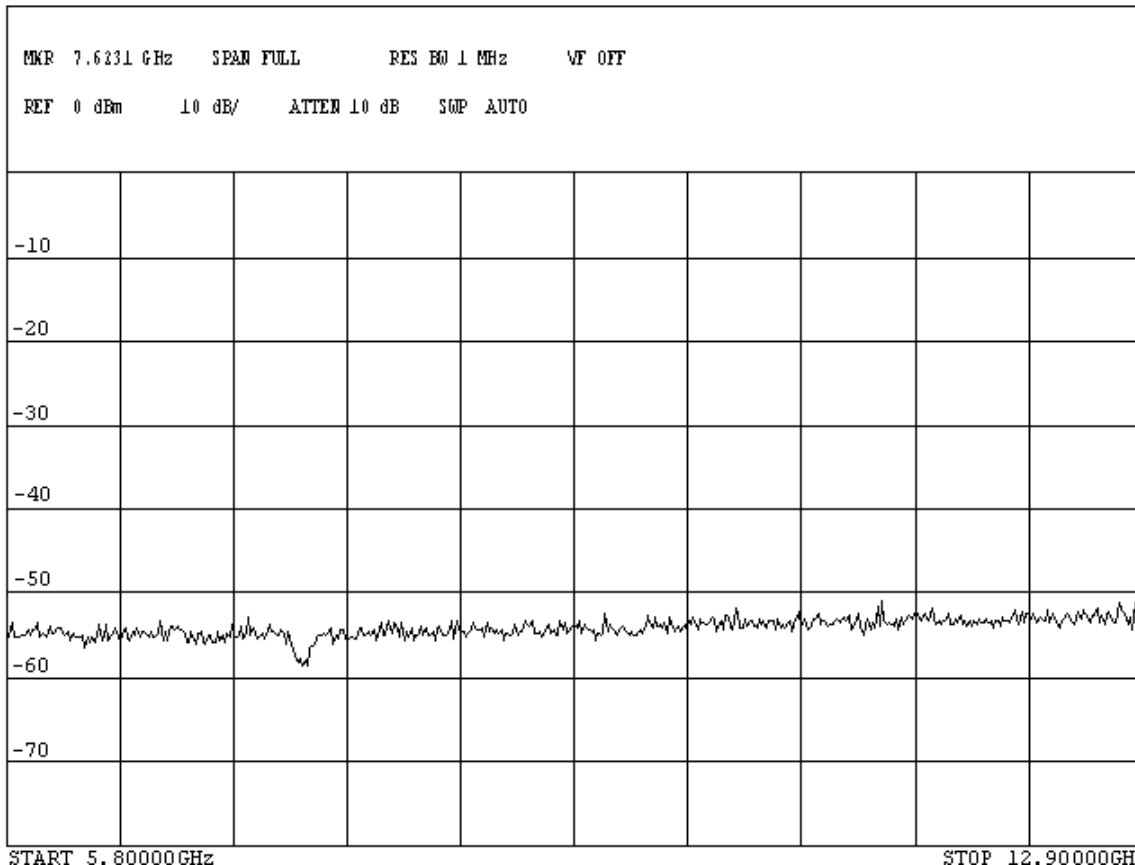
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Mid-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



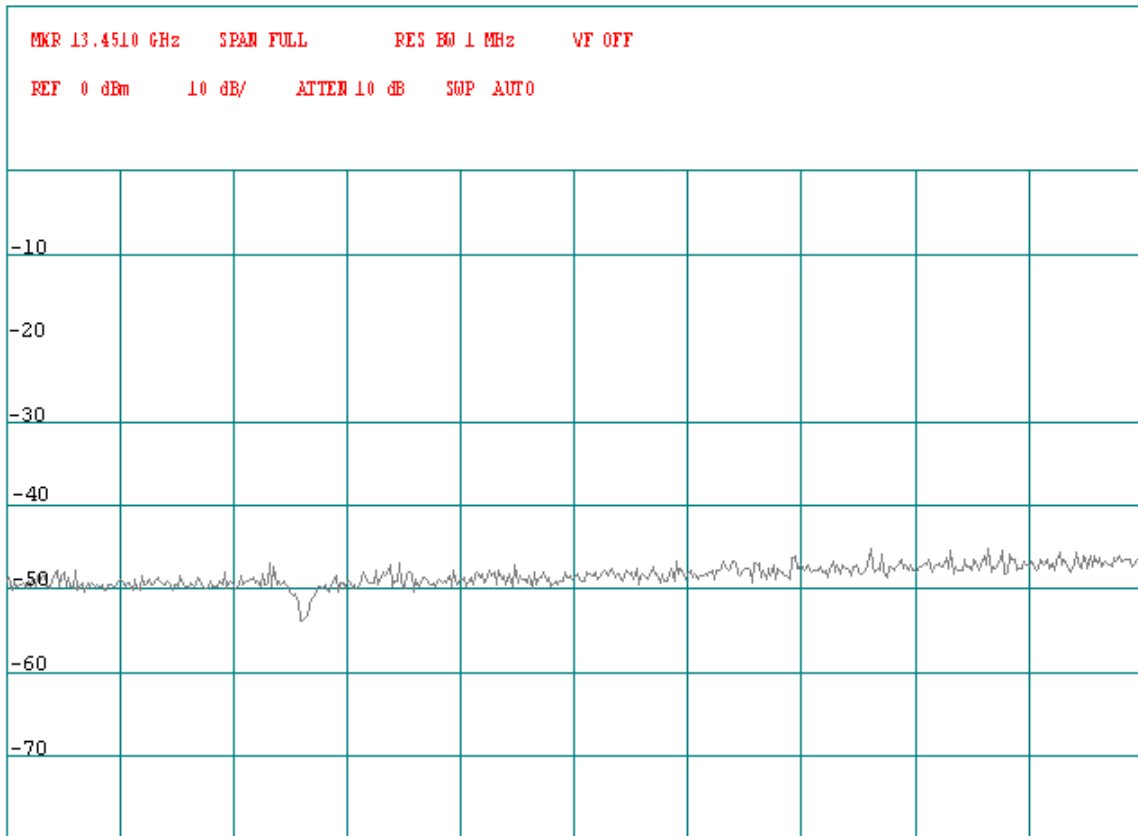
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Mid-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



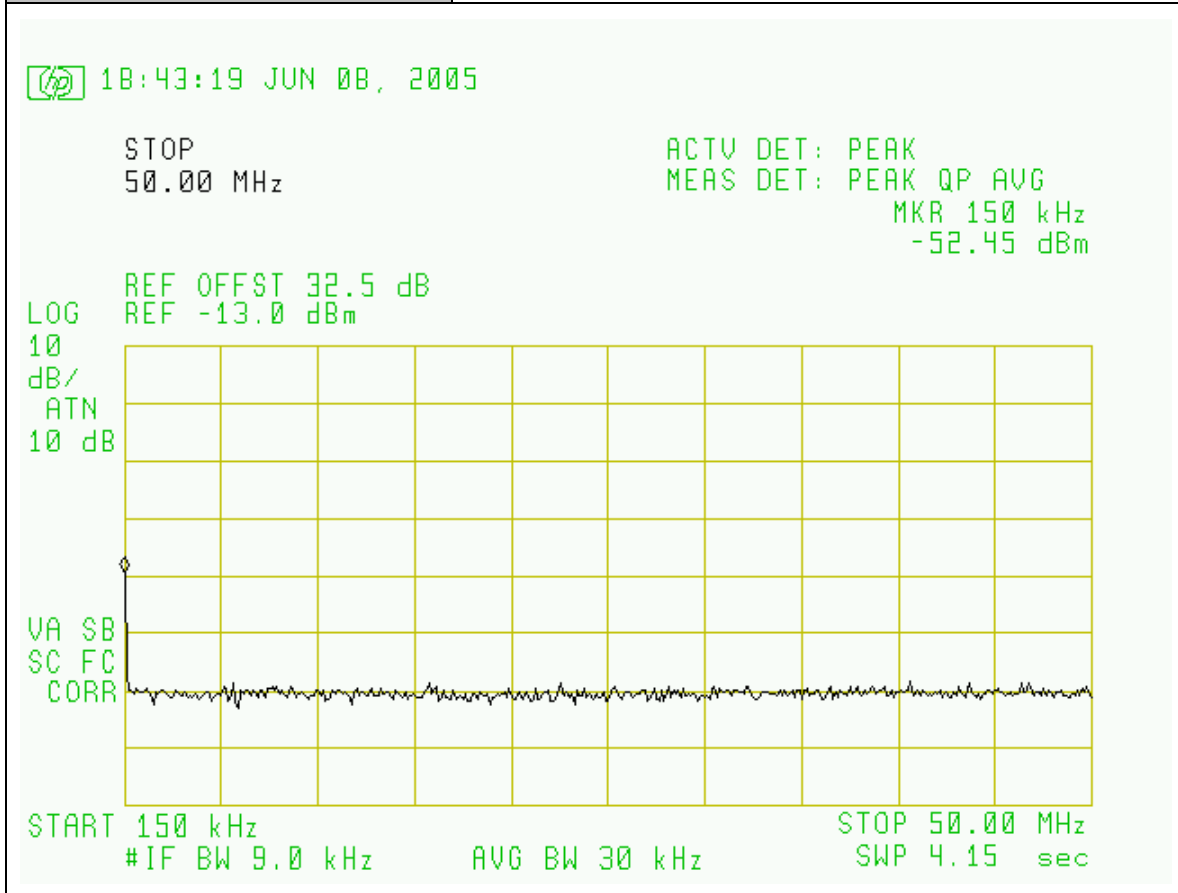
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Mid-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



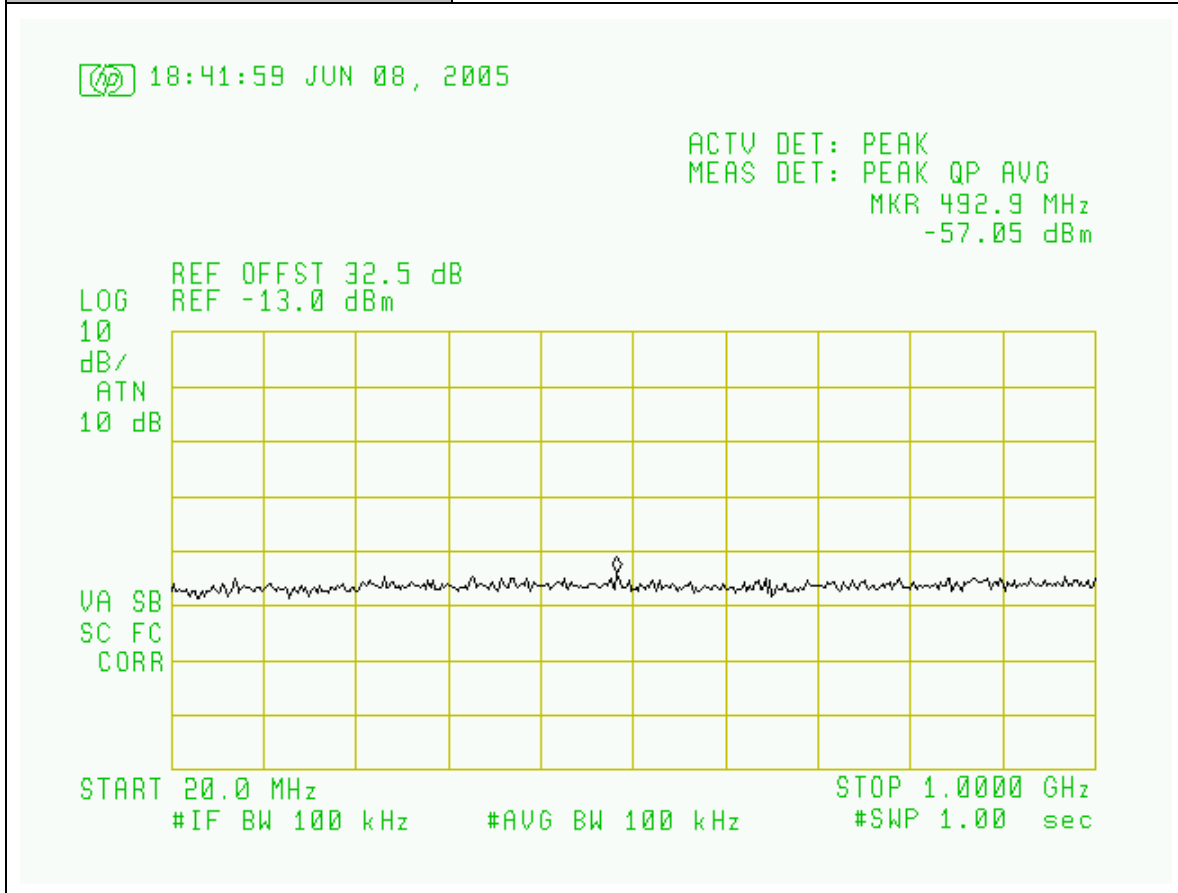
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Low-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



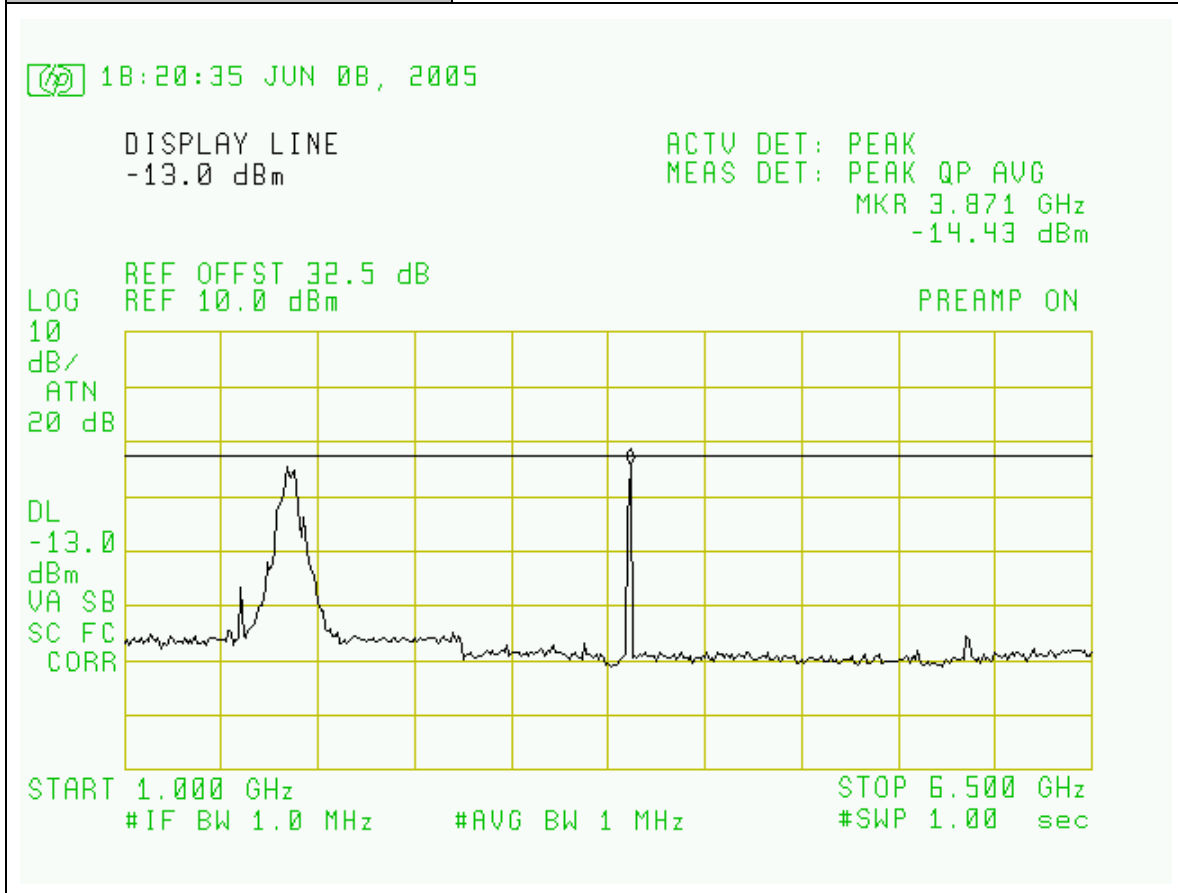
Project Number:	0048-050606-01
EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Low-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



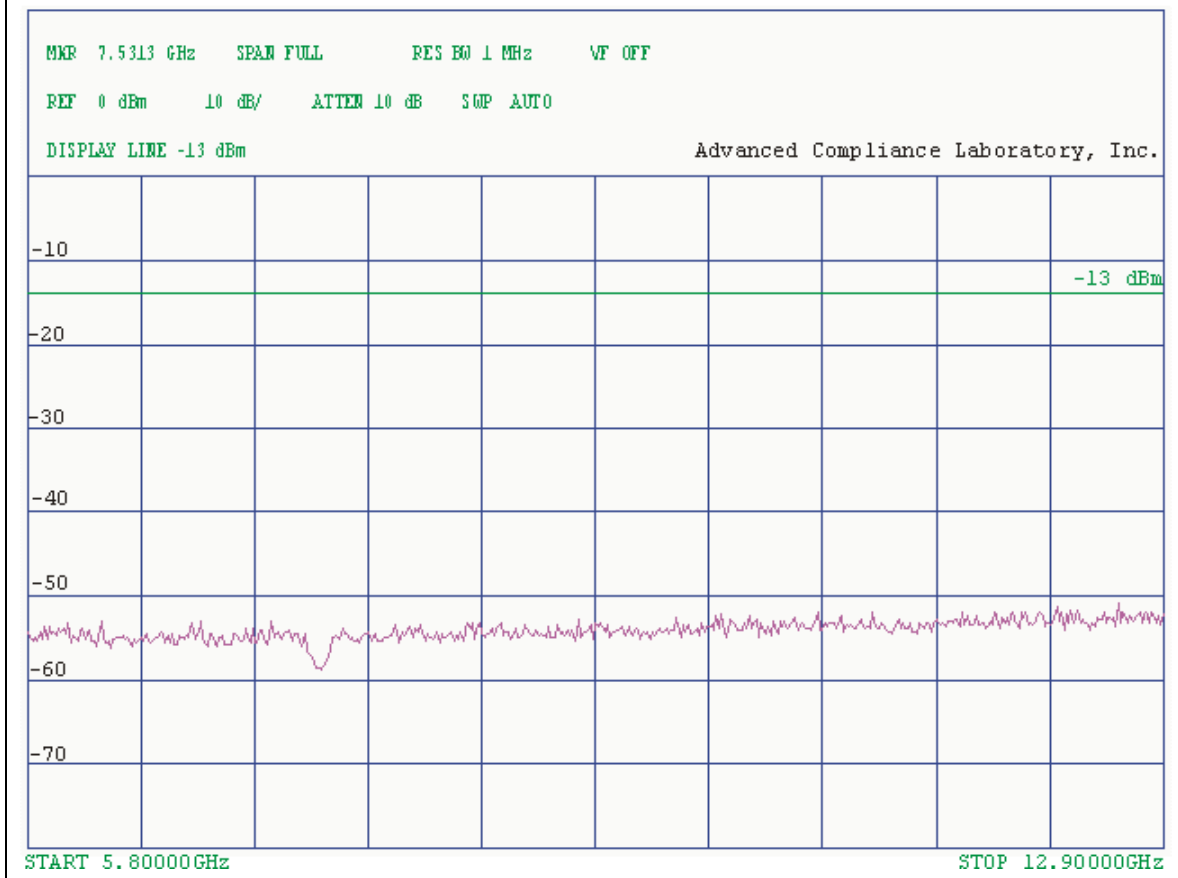
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Low-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



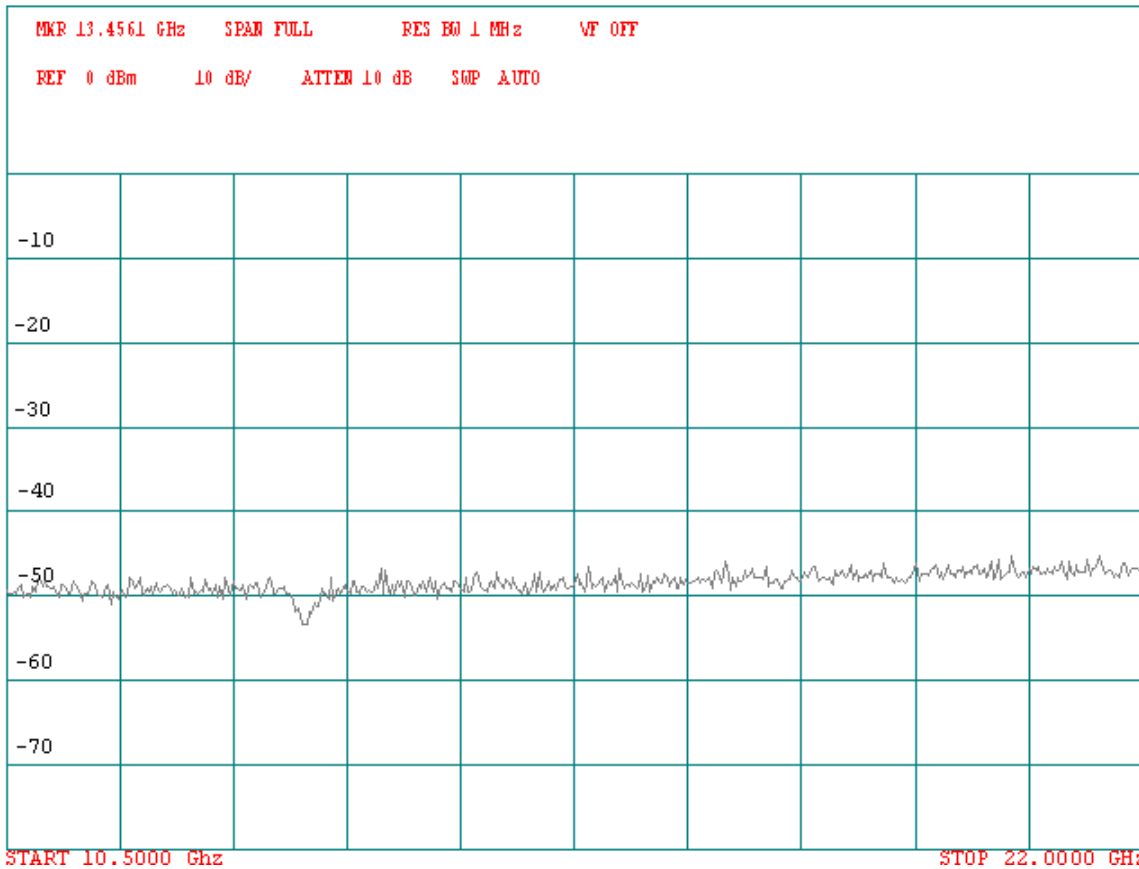
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EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Low-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



Project Number:	0048-050606-01
EUT:	ANDREW Digital Multi-Carrier Amplifier DMAU-U
PARTS NO.:	RF100154
Tested By:	Edward Lee
Temperature:	70° F
Humidity:	30%

Section:	Spurious Emissions at RF Output Port: PCS Bands / WCDMA Modulation
Plot Name:	Downlink, Low-Channel
Configuration:	Digital Input: -15dBm, Output Port: EUT RF OUTPUT



Section 6. Field Strength of Spurious

Name of Test:	<i>Field Strength of Spurious</i>	Test Standard:	22.917 24.238
Tested By:	EDWARD LEE	Test Date:	06/02/2005-06/14/2005

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.
Para. No. 24.238(a). The magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under conditions specified in the instruction manual and/or alignment procedure, shall not less than $43+10 \log$ (mean output power in watts) dBc below the mean power output outside a licensee's frequency block (-13dBm).

Method of Measurement: TIA/EIA-603-1992, Section 2.2.12
The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with a signal at the spurious frequency. The level of the signal was adjusted to repeat the previously measured level. The resulting ERP is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

Per FCC Requirements, the antenna substitution method can be replaced by using following calculation to yield the required limit criteria WHEN the max. level of measured spurious emissions is 30dB below the limit.

Calculation for Required Emission Limit Per 2.1053

With the DMAU RF output level set to 60 watts (47.78 dBm), Radiated Emissions between 10 MHz and 20 GHz shall be observed. The “Low, Mid, and High” frequencies shall be used for this test.

The Emission Limits and measuring instrumentation settings established in FCC Part 24.238 shall be followed. Emissions shall be less than $43 + 10 \log (P)$ dBc. Per FCC Part 2.1053(a), “Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter (*amplifier*), assuming all emissions are radiated from half-wave dipole antennas.” The following relationships yield the required limit criteria.

For a half-wave dipole antenna in free space:

$$E = (49.2 * P)^{1/2} / R \quad [18.11 \text{ V/m}]$$

Where:

E = Field intensity in Volts/meter of carrier

P = transmitted power in Watts (60 W)

R = Distance from antenna to UUT in meters (3 meters)

Conversion of E, Volts/meter to dBuV/m:

$$20 \log (E * 10^6) \quad [145.16 \times 10^6]$$

$$\text{Attenuation requirement (Atten): } 43 + 10 \log P \quad [60.78]$$

Thus, the required limit:

$$E_{\text{lim}} = E - \text{Atten} \quad \text{dBuV/m}$$

For DMAU:

$$E = 145.16 \text{ dBuV/m (at 3 meters)}$$

$$\text{Atten} = 60.78 \text{ dBc}$$

Then, $E_{\text{lim}} = \mathbf{84.38 \text{ dBuV/m}}$

Note: Emissions less than 64.38 dBuV/m (84.38 - 20 dB) may not be reported.

Test Result:

Complies

Test Data:

See Attached Table(s)

Configuration	PCS w/ RF Output Port Terminated
Band	PCS Downlink
Channel	Low

Freq. (MHz)	H,V	SA Reading (dBuV)	Height (m)	Angle (degree)	Calculated 3m Limit (dBuV)	Margin (dB)	Absolute Limit (dBm)	Margin (dB)
CDMA2000								
3862.5	H	60.9	1.0	200	84.38	-23.48	-13	-33.1
57937.5	H	48.0	1.0	200	84.38	-36.38	-13	-46
3862.5	V	61.0	1.1	190	84.38	-23.38	-13	-33
57937.5	V	46.2*	1.1	190	84.38	-38.18	-13	-47.8
WCDMA								
3864.8	H	63.0	1.0	200	84.38	-21.38	-13	-31
5797.2	H	49.2	1.0	200	84.38	-35.18	-13	-44.8
3864.8	V	59.5	1.1	190	84.38	-24.88	-13	-34.5
5797.2	V	47.0	1.1	190	84.38	-37.38	-13	-47

NOTE:

* Measured noise floor

SA: Spectrum Analyzer

H=horizontal and V=vertical

SA Reading: Peak Reading

Configuration	PCS w/ RF Output Port Terminated
Band	PCS Downlink
Channel	Mid

Freq. (MHz)	H,V	SA Reading (dBuV)	Height (m)	Angle (degree)	Calculated 3m Limit (dBuV)	Margin (dB)	Absolute Limit (dBm)	Margin (dB)
CDMA2000								
3920	H	63.6	1.0	190	84.38	-20.78	-13	-30.4
5880	H	56.7	1.0	190	84.38	-27.68	-13	-37.3
3920	V	63.5	1.1	190	84.38	-20.88	-13	-30.5
5880	V	54.0	1.1	190	84.38	-30.38	-13	-40
WCDMA								
3920	H	62.5	1.0	190	84.38	-21.88	-13	-31.5
5880	H	53.3	1.0	190	84.38	-31.08	-13	-40.7
3920	V	61.7	1.1	190	84.38	-22.68	-13	-32.3
5880	V	47.8	1.1	190	84.38	-36.58	-13	-46.2

NOTE:

* Measured noise floor

SA: Spectrum Analyzer

H=horizontal and V=vertical

SA Reading: Peak Reading

Configuration	PCS w/ RF Output Port Terminated
Band	PCS Downlink
Channel	High

Freq. (MHz)	H,V	SA Reading (dBuV)	Height (m)	Angle (degree)	Calculated 3m Limit (dBuV)	Margin (dB)	Absolute Limit (dBm)	Margin (dB)
CDMA2000								
3977.5	H	59.7	1.0	200	84.38	-24.68	-13	-34.3
5966.3	H	44.0*	1.0	200	84.38	-40.38	-13	-50
3975.2	V	55.3	1.1	190	84.38	-29.08	-13	-38.7
5962.8	V	43.9*	1.1	190	84.38	-40.48	-13	-50.1
WCDMA								
3977.5	H	60.0	1.0	200	84.38	-24.38	-13	-34
5966.3	H	47.9	1.0	200	84.38	-36.48	-13	-46.1
3975.2	V	54.5	1.1	190	84.38	-29.88	-13	-39.5
5962.8	V	46.8*	1.1	190	84.38	-37.58	-13	-47.2

NOTE:

* Measured noise floor

SA: Spectrum Analyzer

H=horizontal and V=vertical

SA Reading: Peak Reading

Section 7. Frequency Stability

Name of Test:	<i>Frequency Stability</i>	Test Standard:	<i>2.1055 22.355&24.235</i>
Tested By:	WEI LI	Test Date:	06/02-06/14/2005

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

TABLE C-1.—FREQUENCY TOLERANCE FOR TRANSMITTERS IN THE PUBLIC MOBILE SERVICES

Frequency range (MHz)	Base, fixed (ppm)	Mobile ≤3 watts (ppm)	Mobile ≤=3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	n/a	n/a
929 to 960	1.5	n/a	n/a
2110 to 2220	10.0	n/a	n/a

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: Frequency Stability With Voltage Variation:
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +25 degrees Celsius for at least 15 minutes. Set SA resolution bandwidth low enough (30Hz) to obtain the desired frequency resolution. (Using frequency counter method: 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 10MHz 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.

Test Result:

Complies

Test Data:

See Attached Table(s)

PCS Bands

Frequency Tolerance Specification: 0.05ppm (98Hz)

Frequency Stability versus Environmental Temperature

Reference Frequency @ 26V & +25°C: Downlink: <u>1.960001</u> GHz		
Temperature & Direction (°C)		Deviation * (Hz)
-40		1.19
-30		2.11
-20		0.81
-10		0.78
0		0.38
+10		1.85
+20		1.22
+30		0.95
+40		0.84
+50		1.12

*10 samples per temp plateau to achieve max.

Frequency Stability versus DC Voltage (EUT +25°C operating frequency as reference)

Reference Frequency @ 26VDC & +25°C: Downlink: <u>1.960001</u> GHz		
Voltage & Direction (DC)		Deviation (Hz)
22.1		0.95
29.9		0.95

Section 8. Out of Band Rejection

Name of Test:	<i>Out of Band Rejection</i>	Test Standard:	
Tested By:	Edward Lee	Test Date:	06/02/2005-06/14/2005

Minimum Standard: The passband gain shall not exceed the nominal gain by more than 1.0 dB. The 20 dB bandwidth shall not exceed the nominal bandwidth that is stated by the manufacturer. Outside of the 20 dB bandwidth, the gain shall not exceed the gain at the 20 dB point.

Method of Measurement: Adjust the internal gain control of the equipment under test to the nominal gain for which equipment certification is sought. With the aid of a signal generator and spectrum analyzer, measure the 20 dB bandwidth of the amplifier (i.e. at the point where the gain has fallen by 20 dB). Measure the gain-versus-frequency response of the amplifier from the midband frequency f_0 of the passband up to at least $f_0 \pm 250\%$ of the 20 dB bandwidth.

Test Result:

Complies

Test Data:

See Attached Table(s)

PER PRODUCT DESIGN & OPERATION CRITERIA ON DIGITAL INPUTS, THIS SYSTEM HAS NO AMPLIFYING FUNCTION FOR OUT-BAND SIGNALS.

Section 9. Test Equipment List

Manufacture	Model	Serial No.	Description	Last Cal dd/mm/ yy	Cal Due dd/mm/ yy
HP	HP8546A	3448A00290	EMI Receiver	12/01/05	12/01/06
HP	E4432B	US38220355	250K-3GHz Signal Generator	17/09/03	17/09/05
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	12/02/05	12/02/06
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	09/02/05	09/02/06
Fischer Custom	LIPARTS NO.-2	900-4-0008	Line Impedance Stabilization Networks	23/08/04	23/08/05
Fischer Custom	LIPARTS NO.-2	900-4-0009	Line Impedance Stabilization Networks	23/08/04	23/08/05
EMCO	6502	2665	10KHz-30MHz Active Loop Antenna	27/02/05	27/02/06
EMCO	3115	4945	Double Ridge Guide Horn Antenna	11/08/04	11/08/05
HP	8569B	2607A02802	1GHz-22GHz Spectrum Analyzer	10/02/05	10/02/06
Delta Design	5900C	0-67-26	Temperature Chamber	24/03/05	24/03/06
HP	E8254A	US42110367	Signal Generator	23/03/05	23/03/06
Electro-Metrics	RGA-15	8-95	Double Ridge Guide Horn Antenna	10/02/05	10/02/06
EMCO	3116	4943	Double Ridge Guide Horn Antenna	11/01/05	11/01/06
Scientific-Atlanta	12A-18	441	Wave Guide Horn Antenna	04/08/04	04/08/05
HP	4419A	US37292112	RF Power Meter w/ Sensor Probe	20/07/04	20/07/05
Chamber	GD-32-33	LN2	Temperature Chamber	20/07/04	20/07/05
RES-NET	RFA500NFF 30	0108	30dB in-line Power Attenuator		
Narda	3022	80986	Directional Coupler		
General Purpose			0-60V, 50A DC Power Supply		