Advanced
Compliance Laboratory

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Electromagnetic Emission Compliance Test Report

Equipment Under Test (EUT)	Single Channel Power Amplifier HePA850
Applicant	Andrew Corporation
In Accordance With	FCC Part 22, Subpart H
Test by	Advanced Compliance Laboratory, Inc. 6 Randolph Way Hillsborough, New Jersey 08844
Authorized by	Wei Li Lab Manager Signature
Date	December 5, 2005
AC Lab Report Number	0048-051121-01-FCC

Lab Code:200101-0

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

Index

Section 1. Summary of Test Results

Manufacturer: Andrew Corporation

Model Name: Single Channel Power Amplifier HePA850

Parts No.: RF100306 (NTQA50UA)

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 22, Subpart H.

☒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

Summary of Test Data

RF Power Output	22.913(a)	500W ERP	Complies
	24.232(a)	100W EIRP	N/A*
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	Complies
	24.238	-13 dBm	N/A*
Field Strength of Spurious Emissions	22.917	-13 dBm	Complies
	24.238	-13 dBm E.I.R.P.	N/A*
Frequency Stability	22.355	1.5 ppm	N/A*
	24.235	0.05 ppm	N/A*

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

Wei Li
Lab Manager
Advanced Compliance Lab

Date: December 5, 2005

Section 2. General Equipment Specification

Supply Voltage	48VDC				
Frequency Range	Cellular	DL/ 869-894MHz			
	PCS	N/A			
Modulation	☐ CDMA 2000	☐ WCDMA	☒ GSM	☒ EDGE	☐ TDMA
Type of Emissions	F9W	F9W	GXW	G7W	DXW
Rated Power	45W w/Edge and 60W w/GSM average				
Operating Power	45W for Edge 60W for GSM				
Output Impedance	50ohm				
Frequency Translation	F1-F1 ☒	F1-F2 ☐	N/A ☐		
	Software ☐	Duplexer Change ☐	Full Band Coverage ☒		

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

The input supply to the transmitter was set at 27 Volts DC. The RF power output was measured with the indicated voltage and current applied into the final RF amplifying device(s).

HEPA850 Amplifier

RF Output, DC Current and RF Input Power are all average values.
Measured Maximum Overdrive RF output: 50.89dBm
Measured DC voltage: 48.0V
Measured DC current: 5.93A.
Measured Rated RF output: 47.75dBm (60W) w/ GSM and 46.50dBm (45W) w/ EDGE
Measured DC voltage: 48.0V
Measured DC current: 4,20A.(GSM) & 3.53A (EDGE)
Measured Minimum RF output: -2.67dBm
Measured DC voltage: 48.0V
Measured DC current: 1.25A

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.

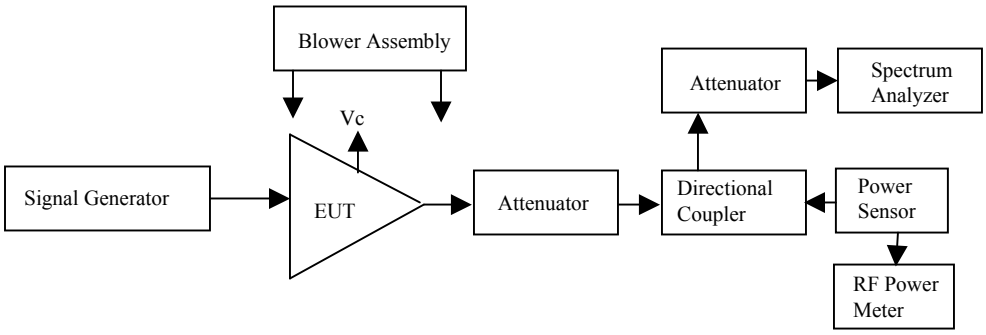
Description of Operation

This device is a Single Channel power amplifier used in BTS in downlink spectrum of 800MHz Cellular 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:	*RF Output Power*	Test Standard:	*22.913(a)* *24.232(a)*
Tested By:	WEI LI	Test Date:	11/21/2005-12/05/2005

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: The EUT is a RF amplifier. The manufacturer does not provide an antenna for sale with the product, hence ERP/EIRP is not measured nor calculated.

Per 2.1046: The RF Power Output shall be measured at the output connector of the EUT. The output level shall be +47.75dBm(60W) for GSM and +46.50dBm(45W) for EDGE with ±0.75 dB over the Cellular frequency band: 869 to 894 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 all modulations listed on Page 5.

Test Result: **Complies**

Test Data:

Rated Output Power – Normal Condition

The inputs are set to generate rated average output power for the Single Channel signals intended.

Cellular Band	Channel	Modulation	Power Output (dBm)	Rated Power (dBm)	Tolerance
Downlink	Low	GSM	47.17	47.75	-0.58
	Mid	GSM	47.75	47.75	0
	High	GSM	47.54	47.75	-0.21
	Low	EDGE	46.05	46.50	-0.45
	Mid	EDGE	46.50	46.50	0
	High	EDGE	46.36	46.50	-0.14
Total Power at Amplifier RF Input (dBm)	-0.48 (GSM) & -1.71(EDGE) (Maximum gain)				
Ref Offset	Ref offset=Cable&Attenuator&Coupler Attenuation=56.3dB				

Maximum Output Power – Overdrive Condition

The intended Single Channel inputs are set to a level that generates maximum limited output power without causing abnormal operation/shutdown of the amplifier output. The output level shall be recorded.

Cellular Band	Channel	Modulation	Power Output (dBm)	Part 22 Limit (dBm)	Margin
Downlink	Mid	GSM	50.89	57.00	-6.11
	Mid	EDGE	50.15	57.00	-6.85
Total Power at Amplifier RF Input (dBm)	2.94 (GSM) /2.20 (EDGE)				
Ref Offset	Ref offset=Cable&Attenuator&Coupler Attenuation=56.3dB				

Section 4. Occupied Bandwidth

Name of Test:	*Occupied Bandwidth*	Test Standard:	*2.1049(i)*
Tested By:	WEI LI	Test Date:	11/21/2005-12/05/2005

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

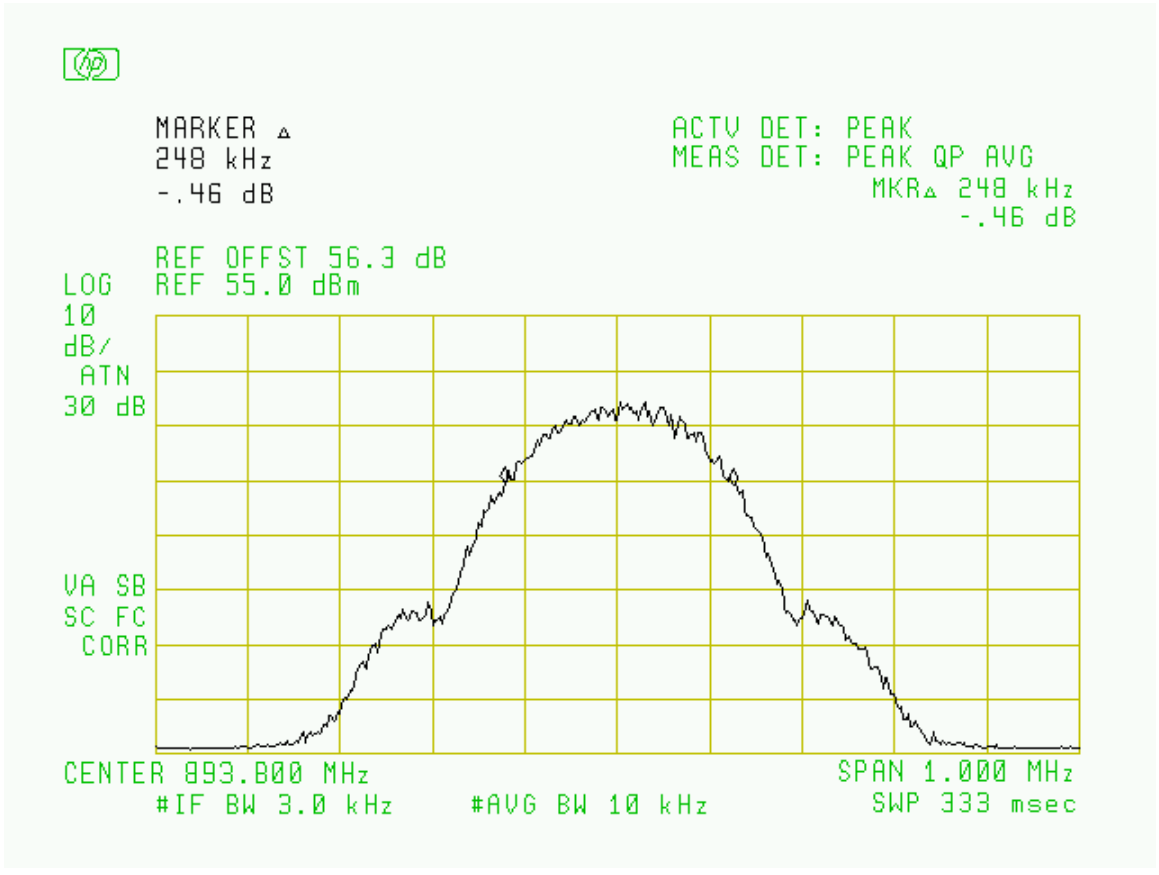
Method of Measurement: Spectrum Analyzer Settings:
RBW: CDMA2000 (30 kHz),WCDMA (100KHz), CDMA(30KHz), GSM (3 kHz), EDGE (3KHz), NADC (1 kHz) and CDPD (1 kHz)
VBW: ≥RBW
Span: As required
Sweep: Auto
Input Signal Characteristics: Generated from Signal Generator
RF level: Rated, recommended by manufacturer

Test Result: **Complies**

Test Data: Attached Plots

Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Occupied Bandwidth: CELLULAR Bands**
Plot Name:	**Downlink, Hi-Channel, GSM Modulation**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



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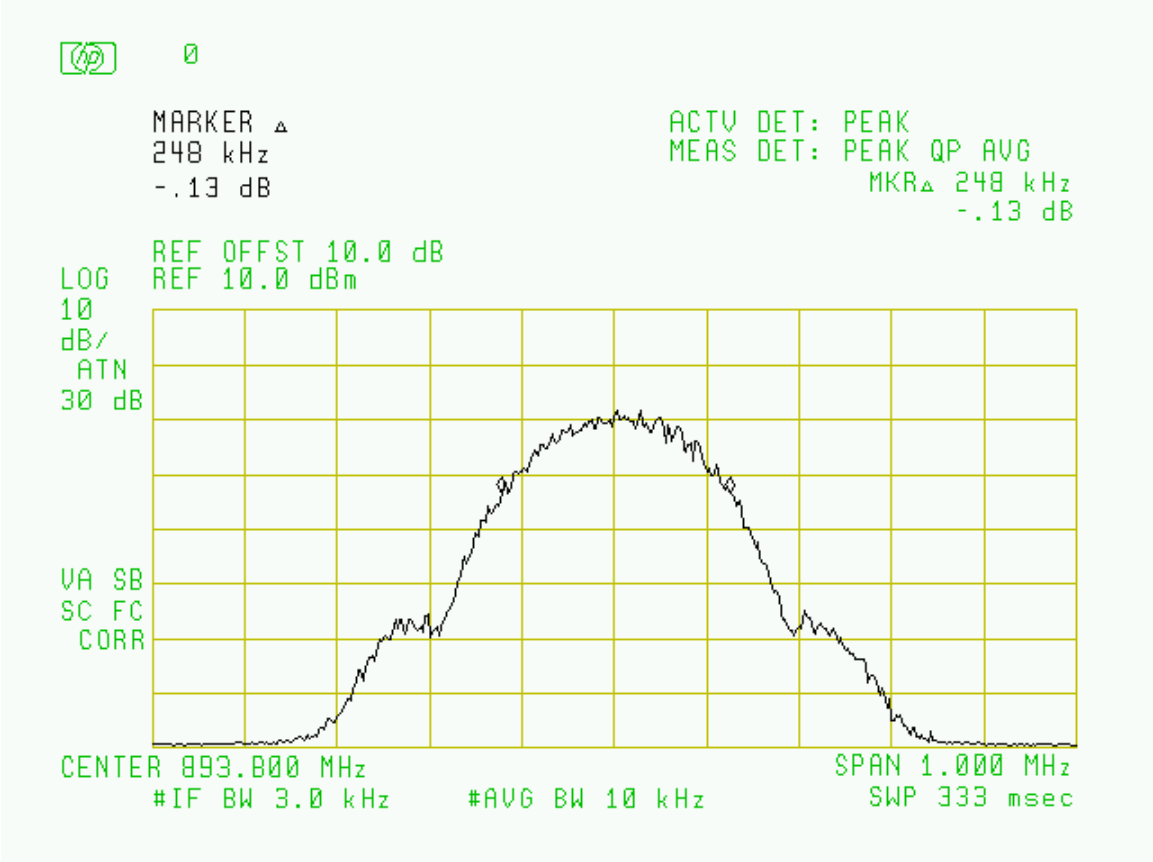
Section:	**Occupied Bandwidth: CELLULAR Bands**
Plot Name:	**Downlink, Hi-Channel, GSM Modulation**
Configuration:	Input: SG



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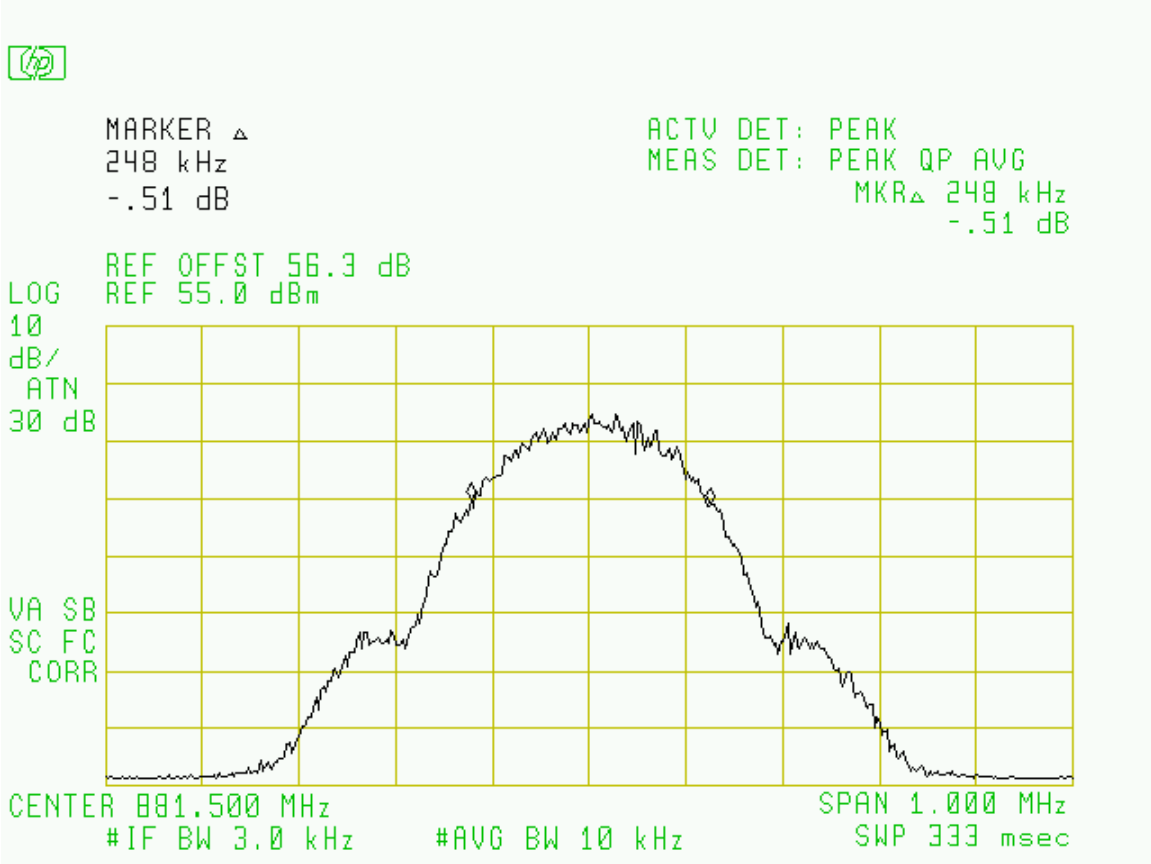
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Occupied Bandwidth: CELLULAR Bands**
Plot Name:	**Downlink, Mid-Channel, GSM Modulation**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



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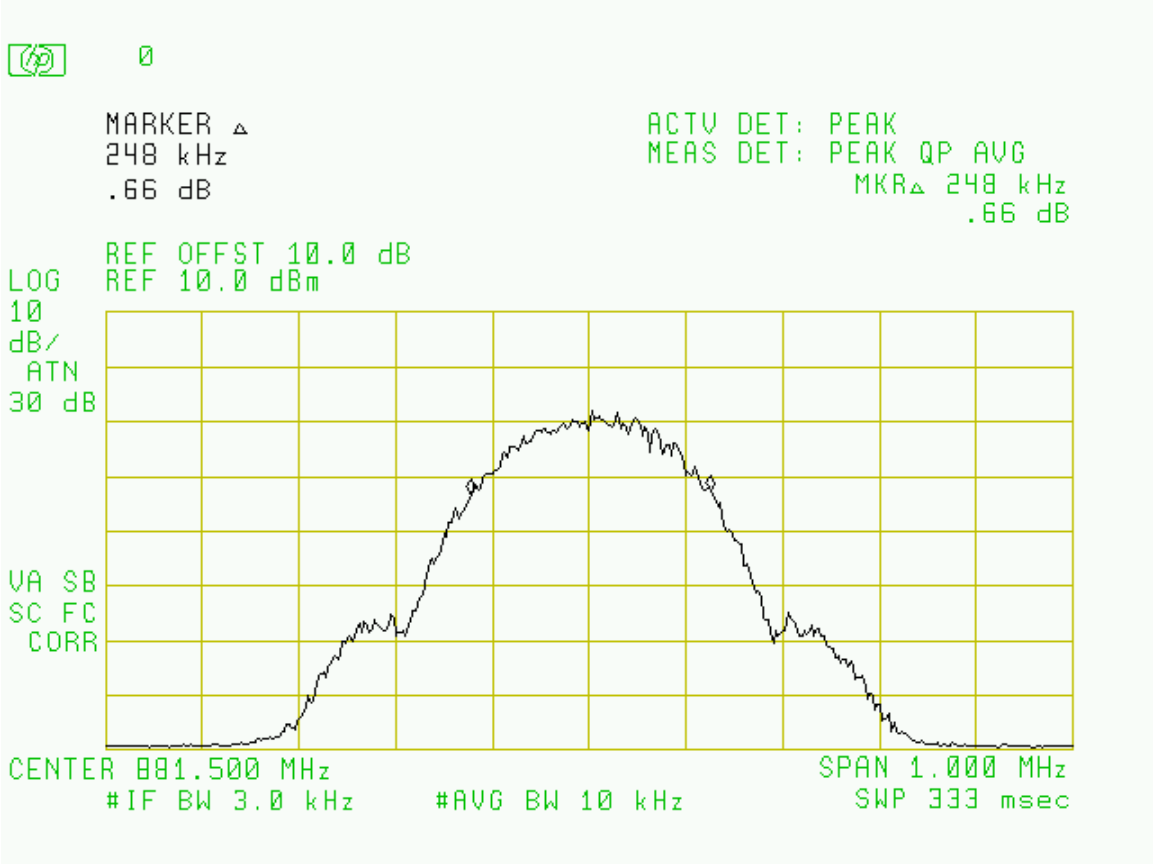
Section:	**Occupied Bandwidth: CELLULAR Bands**
Plot Name:	**Downlink, Mid-Channel, GSM Modulation**
Configuration:	Input: SG



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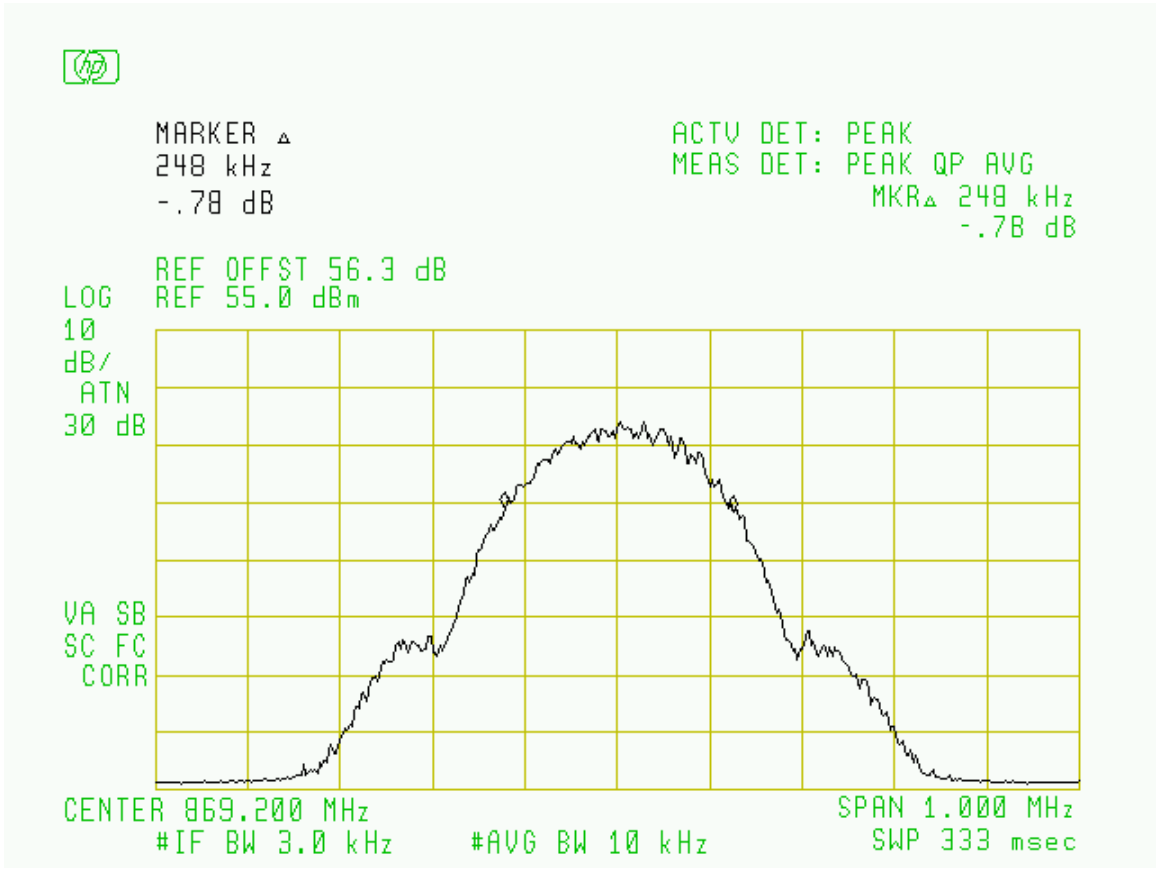
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Occupied Bandwidth: CELLULAR Bands**
Plot Name:	**Downlink, Low-Channel, GSM Modulation**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



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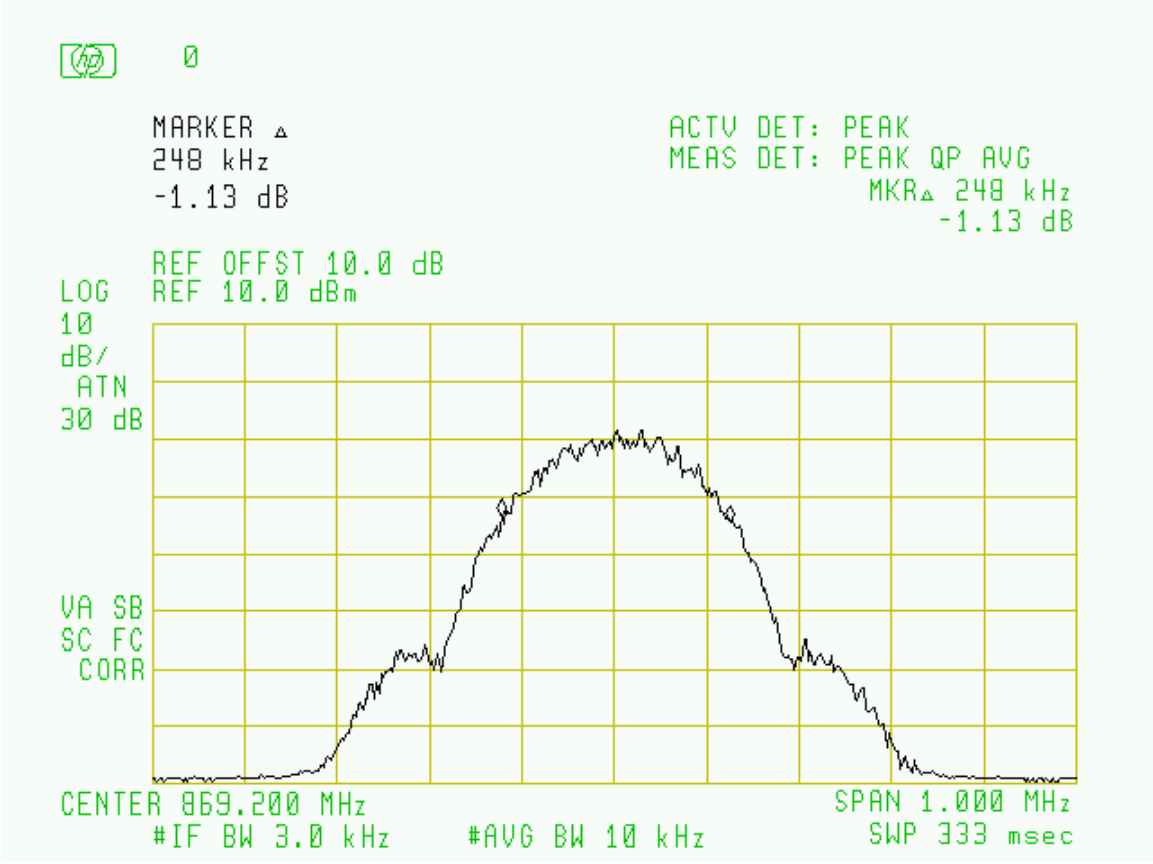
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Occupied Bandwidth: CELLULAR Bands**
Plot Name:	**Downlink, Low-Channel, GSM Modulation**
Configuration:	Input: SG



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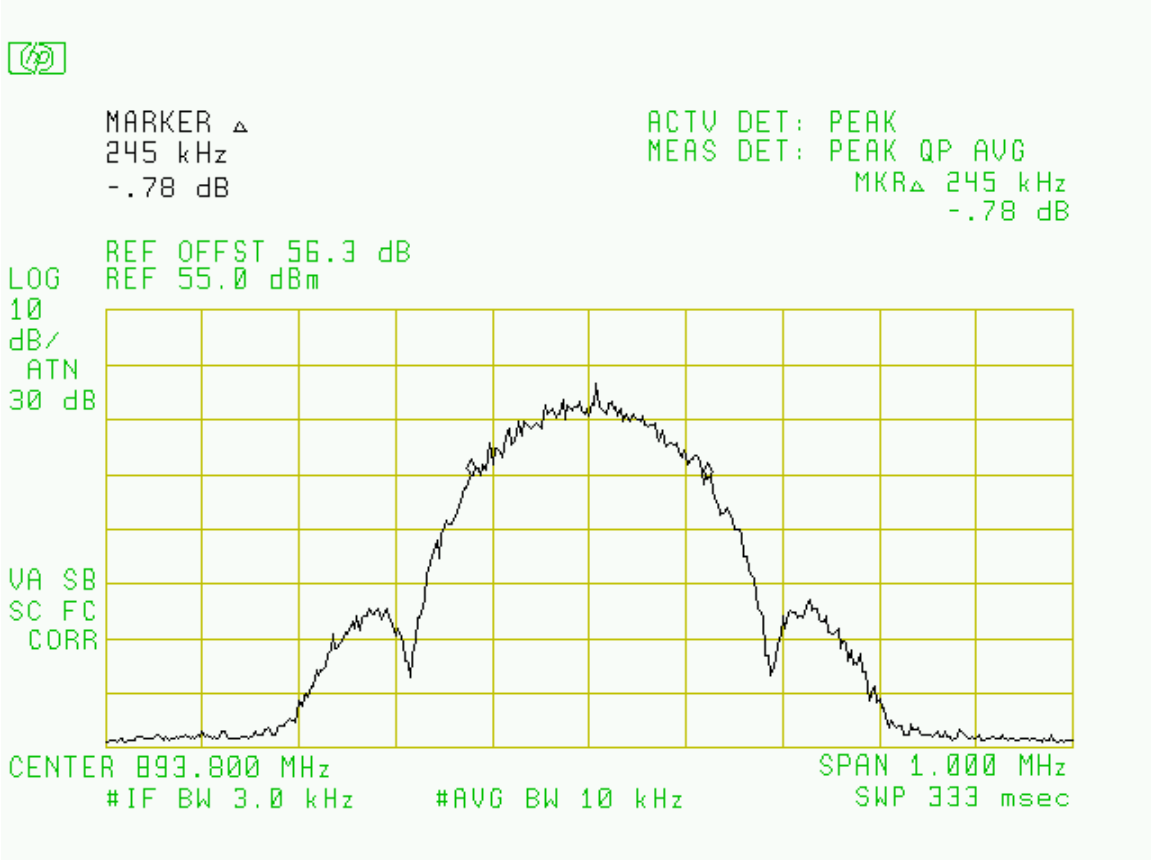
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Occupied Bandwidth: CELLULAR Bands**
Plot Name:	**Downlink, Hi-Channel, EDGE Modulation**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



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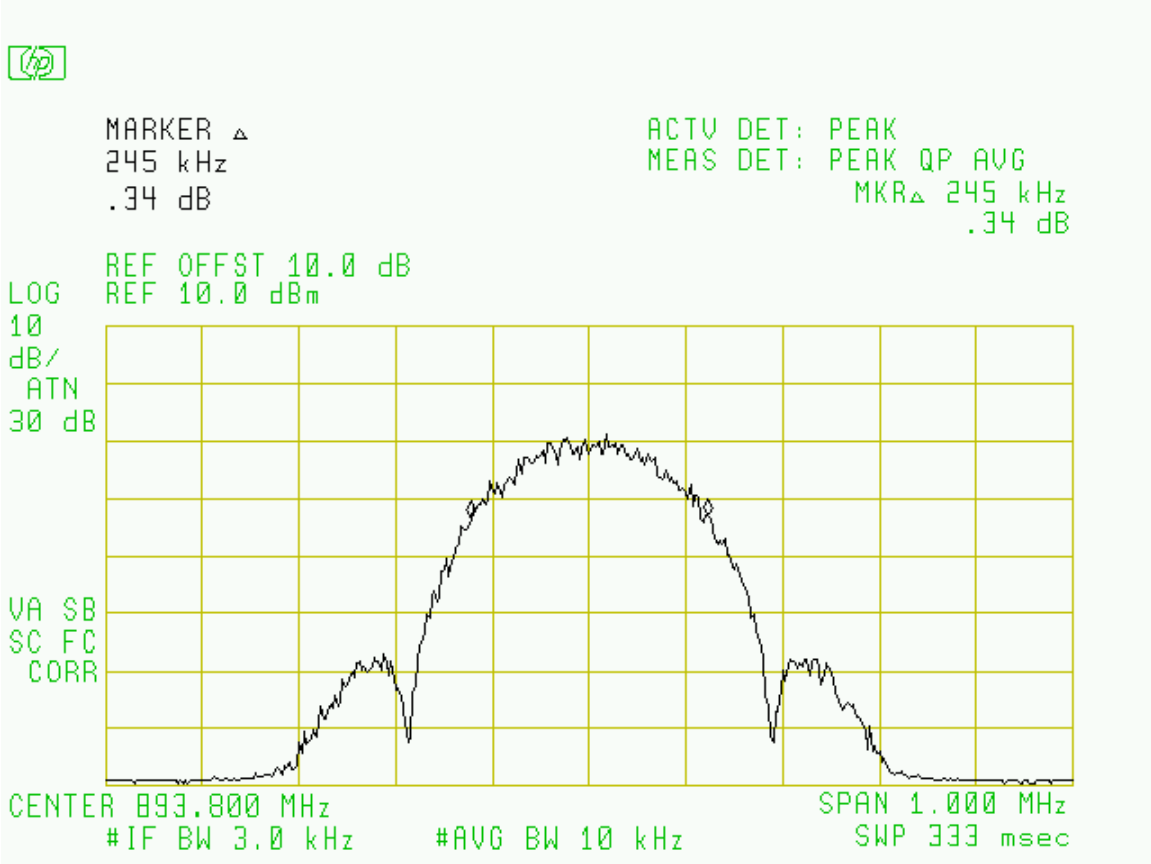
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Occupied Bandwidth: CELLULAR Bands**
Plot Name:	**Downlink, Hi-Channel, EDGE Modulation**
Configuration:	Input: SG



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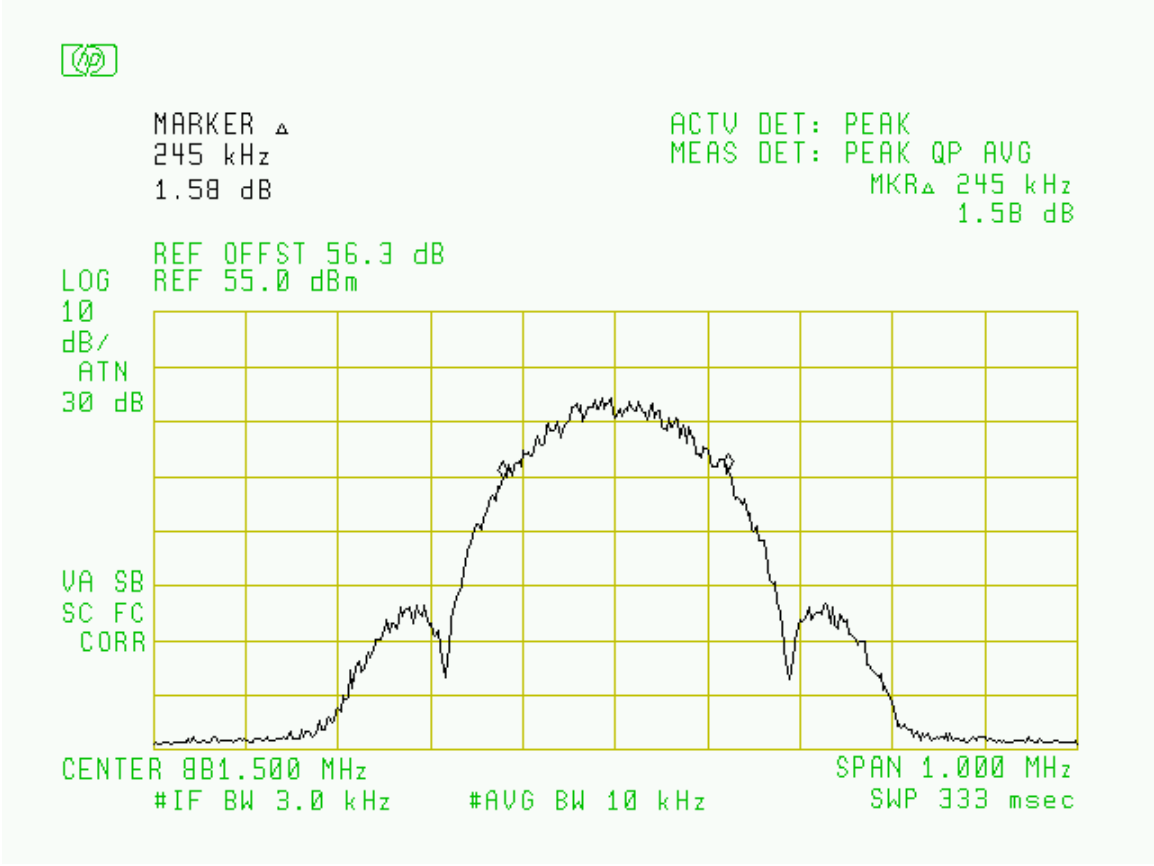
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Occupied Bandwidth: CELLULAR Bands**
Plot Name:	**Downlink, Mid-Channel, EDGE Modulation**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



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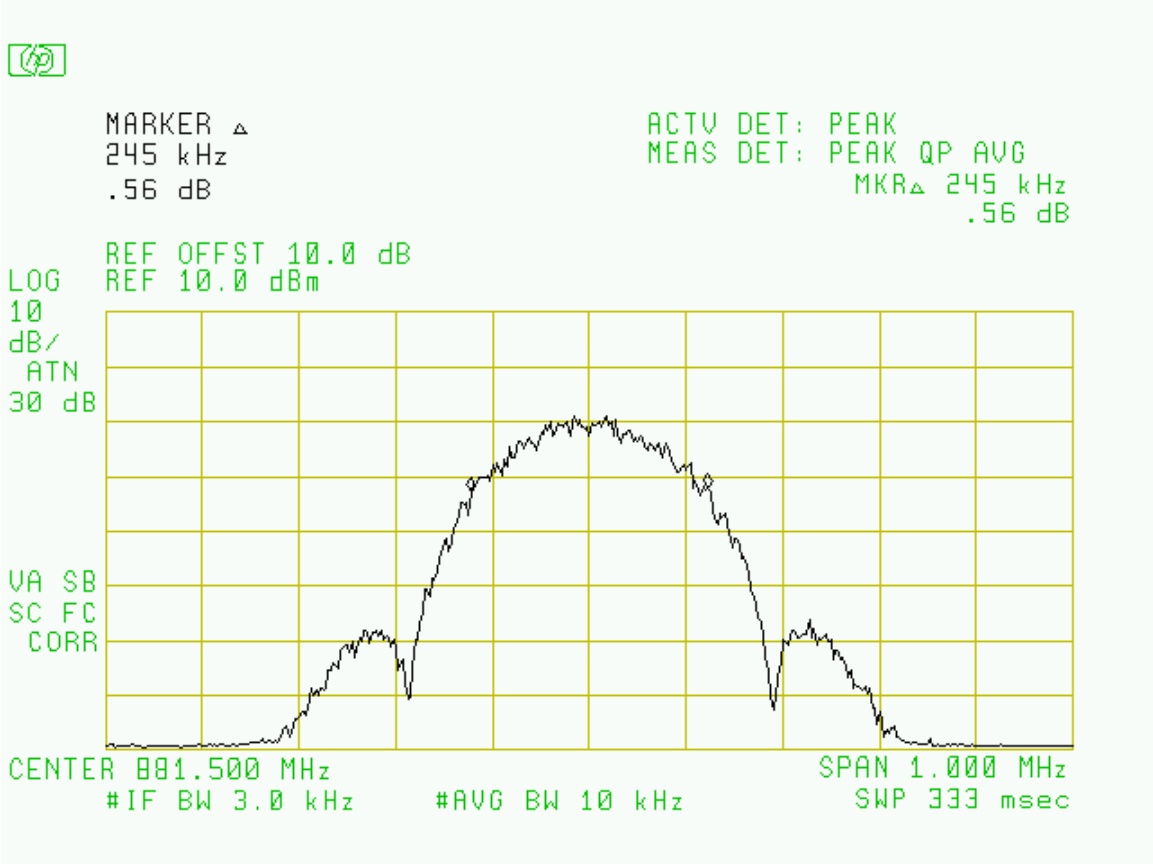
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Occupied Bandwidth: CELLULAR Bands**
Plot Name:	**Downlink, Mid-Channel, EDGE Modulation**
Configuration:	Input: SG



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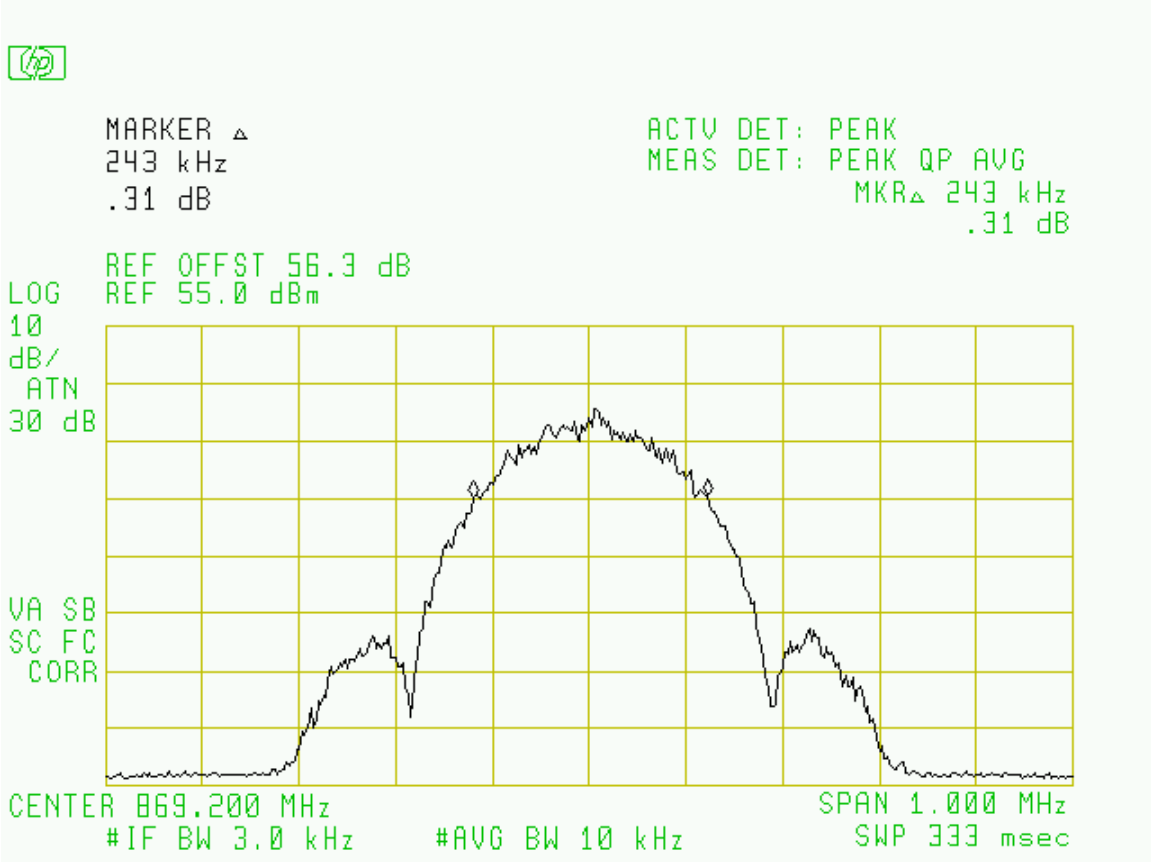
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Occupied Bandwidth: CELLULAR Bands**
Plot Name:	**Downlink, Low-Channel, EDGE Modulation**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



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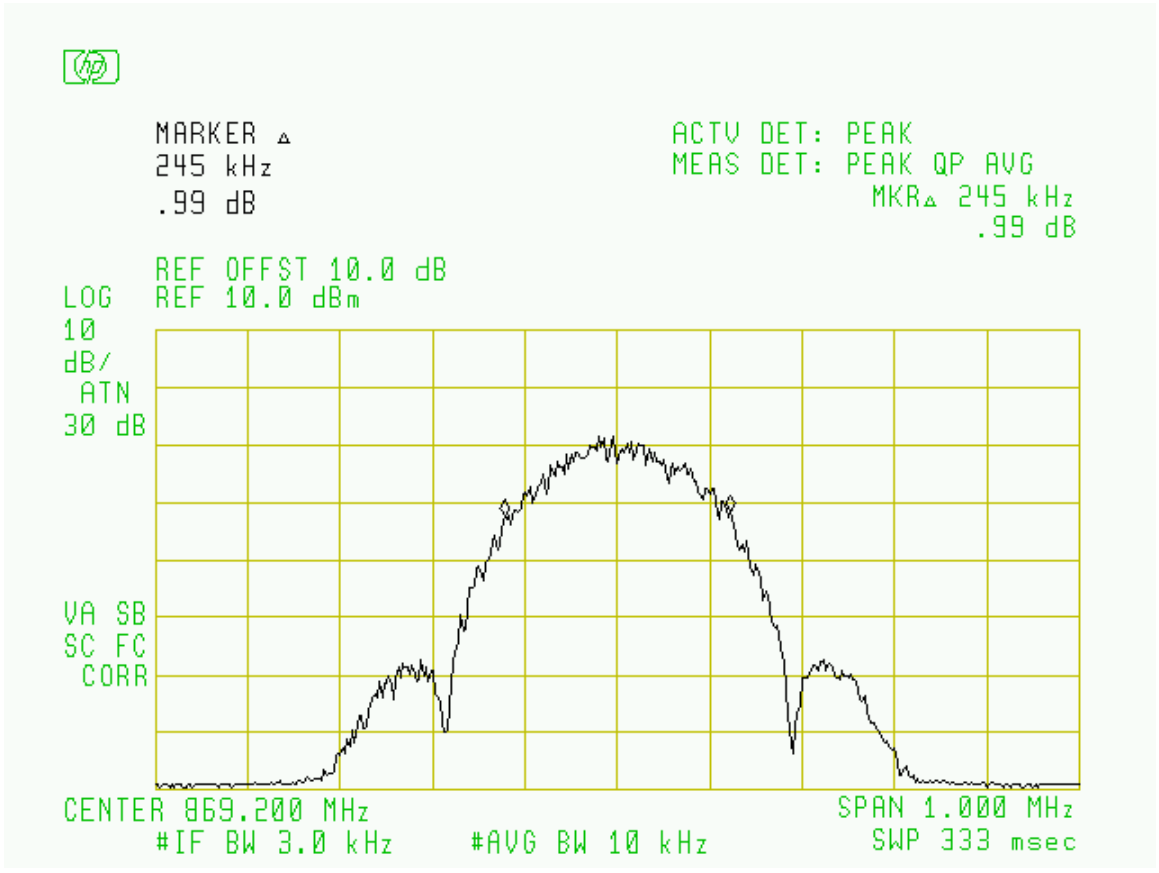
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Occupied Bandwidth: CELLULAR Bands**
Plot Name:	**Downlink, Low-Channel, EDGE Modulation**
Configuration:	Input: SG



Section 5. Spurious Emissions at Antenna Terminals

Name of Test:	*Spurious Emissions at Antenna Terminals*	Test Standard:	*22.917 24.238(a)*
Tested By:	WEI LI EDWARD LEE	Test Date:	11/21/2005-12/05/2005

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).

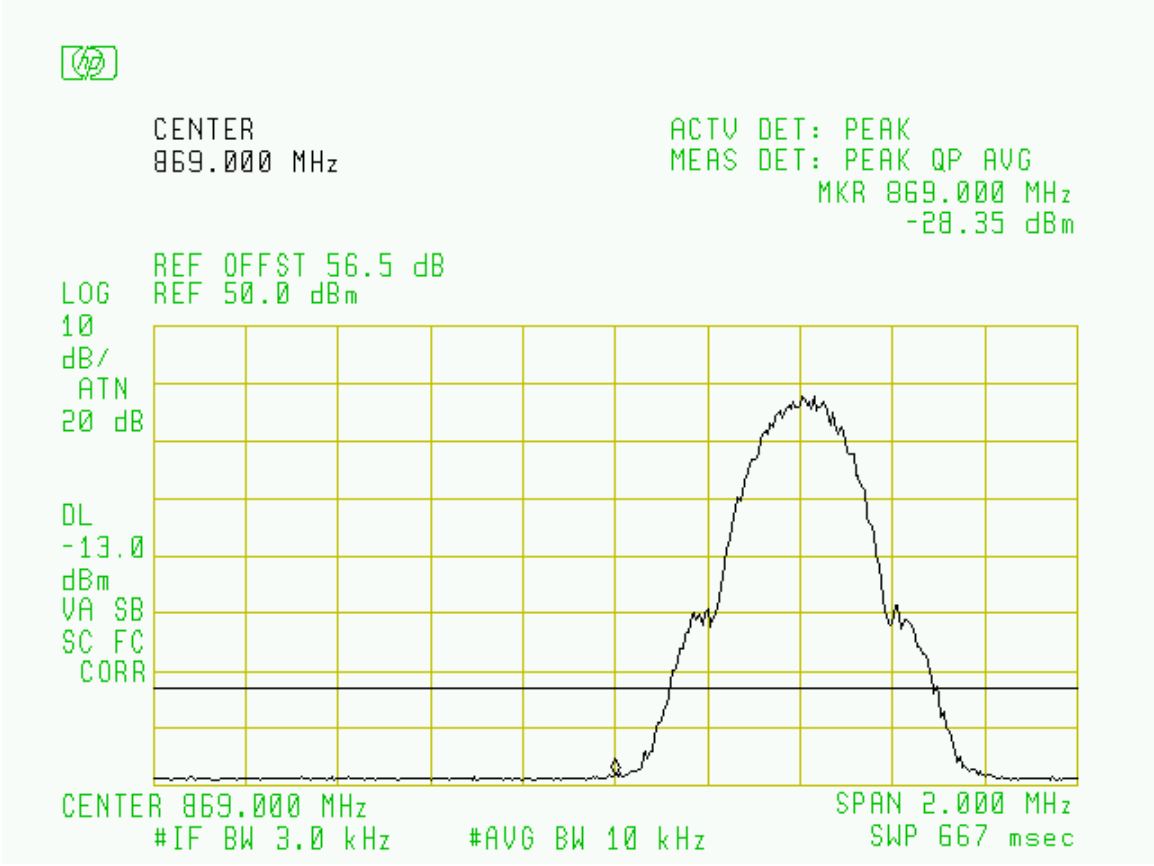
Method of Measurement: Spectrum Analyzer Settings:
RBW: 100 kHz. As required for digital modulations.
RBW: 1MHz. When frequency is located above 1GHz.
VBW: >=RBW
Alternative RBW Setting: 100kHz (Cellular), 1MHz (PCS)
Start Frequency: 9KHz or Lowest Clock Frequency
Stop Frequency: 10 GHz (Cellular), 20GHz (PCS)
Sweep: Auto
Using in-band filter if needed.
For Inter-modulation measurement if applicable: Three RF signals set as inputs. The frequencies of RF signals shall be within the repeater's operating band: two signals will close to each other at the lower band edge; the third will be close to upper band edge. 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.

Test Result: **Complies**

Test Data: Attached Plots

Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / GSM Modulation**
Plot Name:	**Downlink, Low-Chn, Lower Bandedge**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



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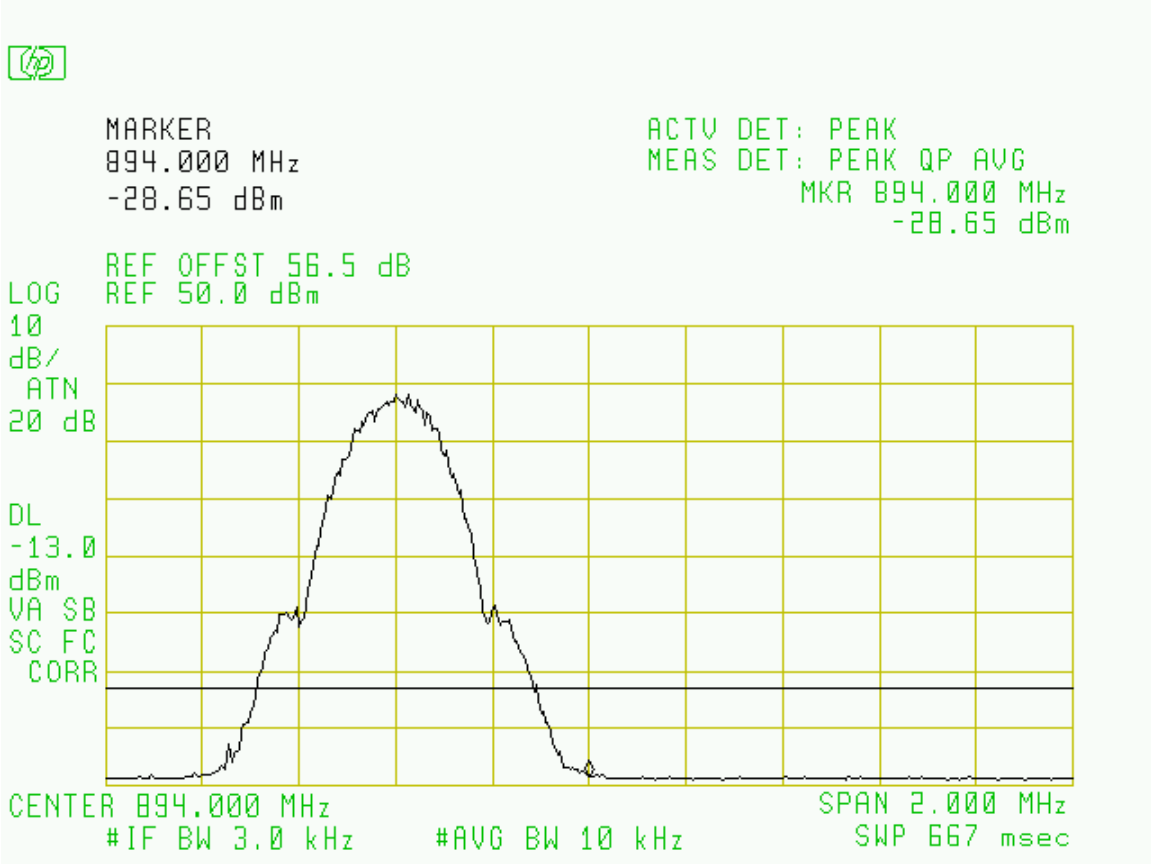
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / GSM Modulation**
Plot Name:	**Downlink, Hi-Chn, Upper Bandedge**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



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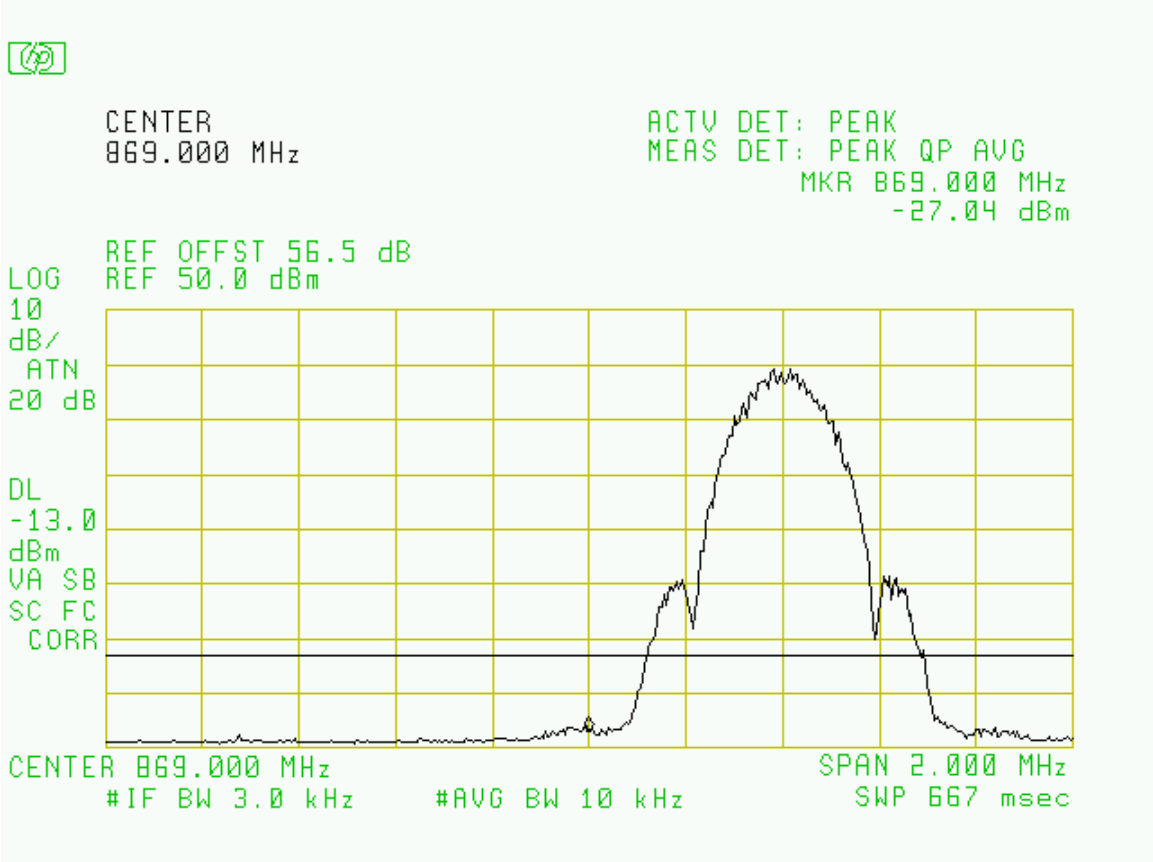
Plot Name:	**Downlink, Low-Chn, Lower Bandedge**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



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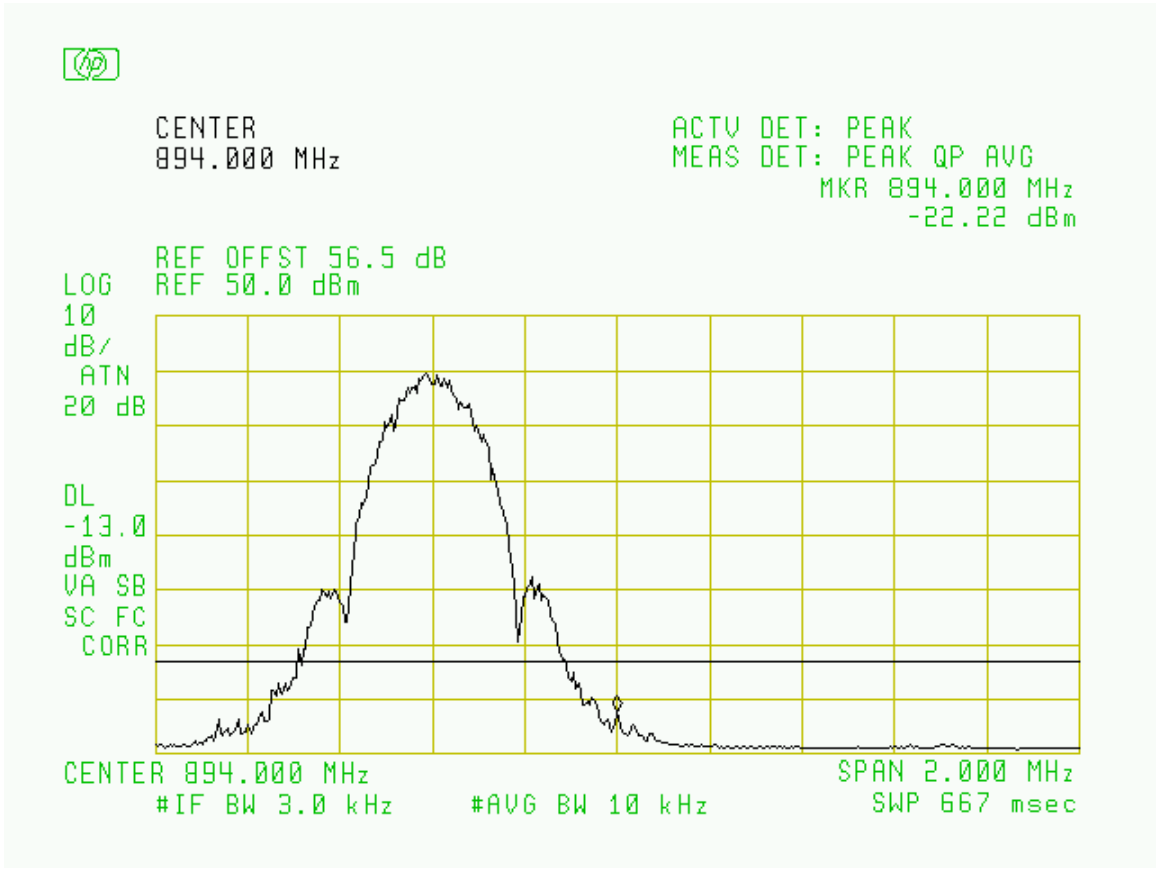
Plot Name:	**Downlink, Hi-Chn, Upper Bandedge**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



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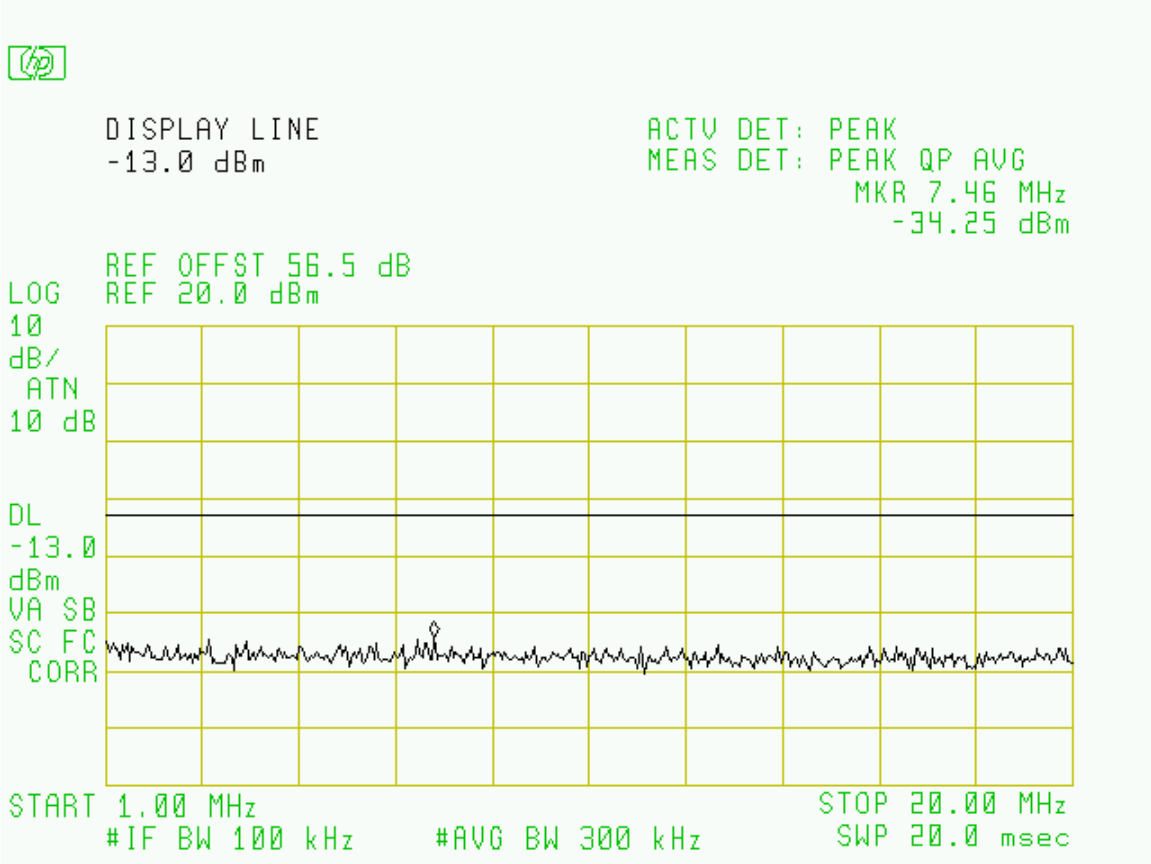
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / GSM Modulation**
Plot Name:	**Downlink, Hi-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



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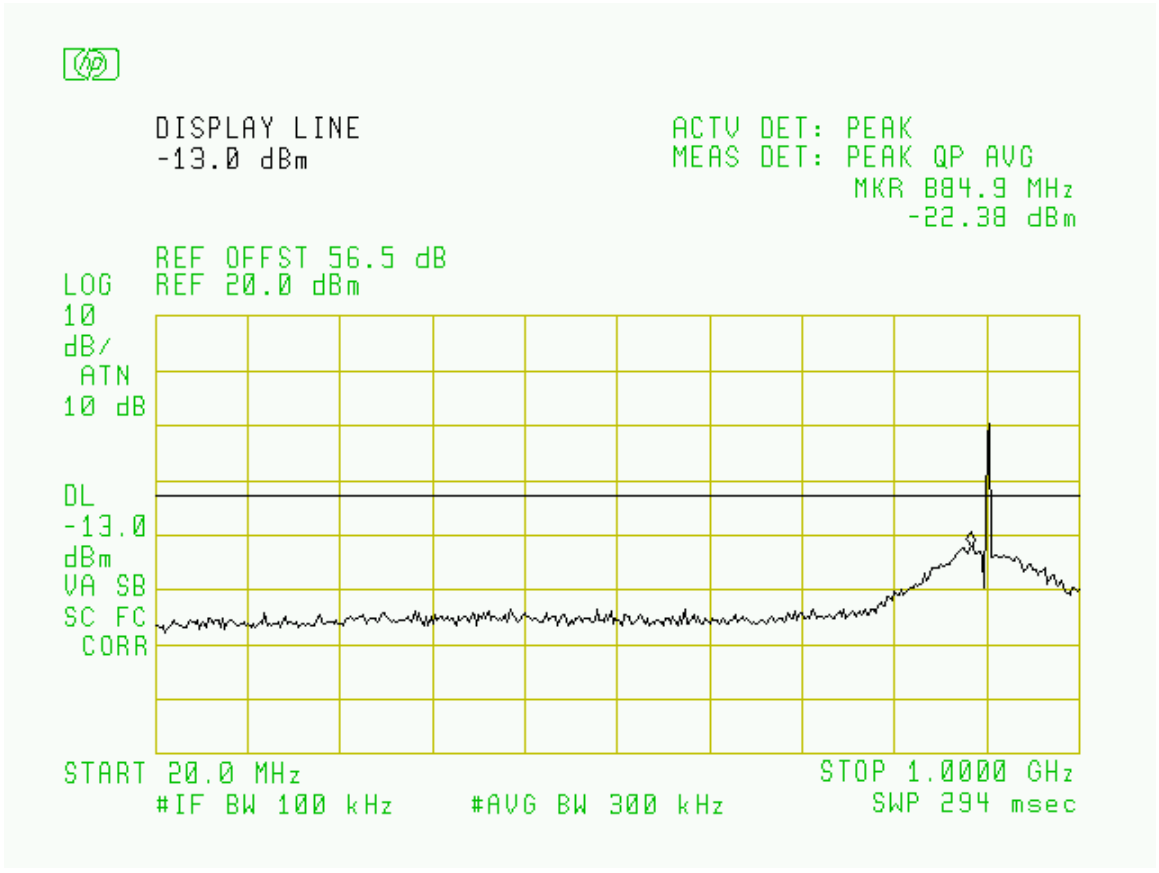
Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / GSM Modulation**
Plot Name:	**Downlink, Hi-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



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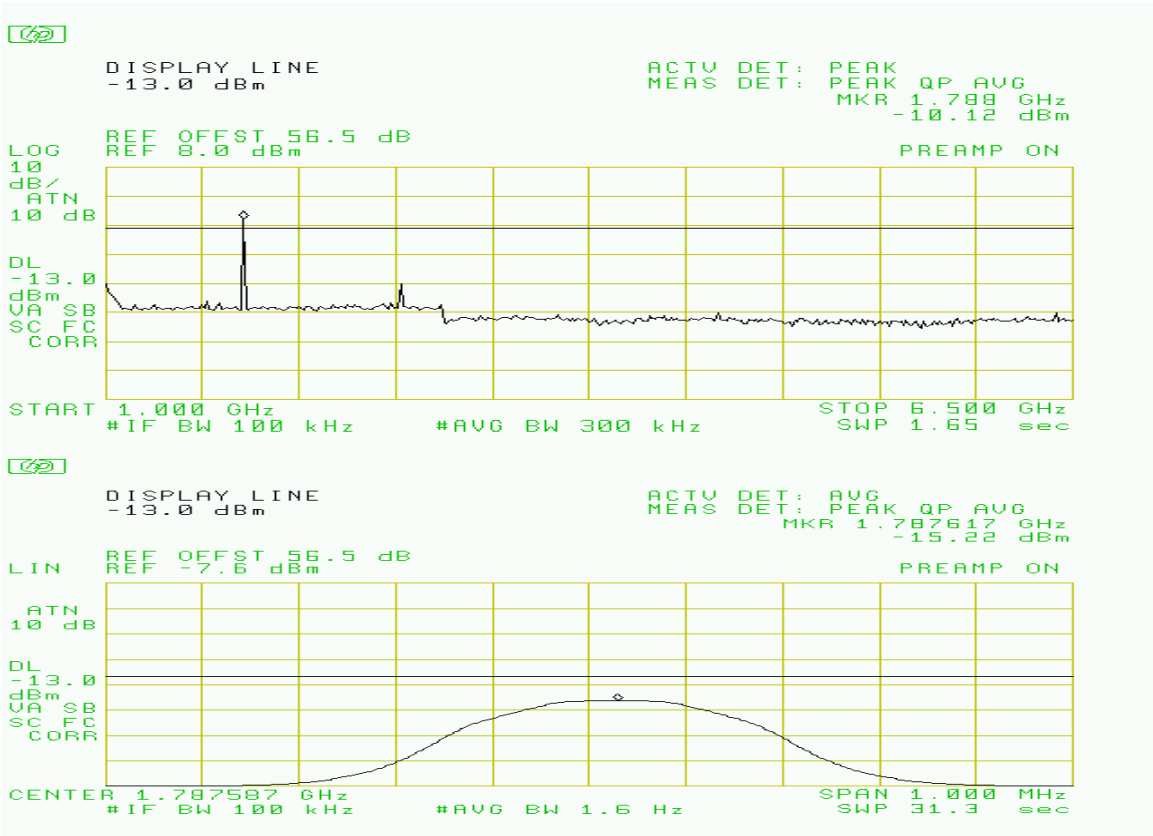

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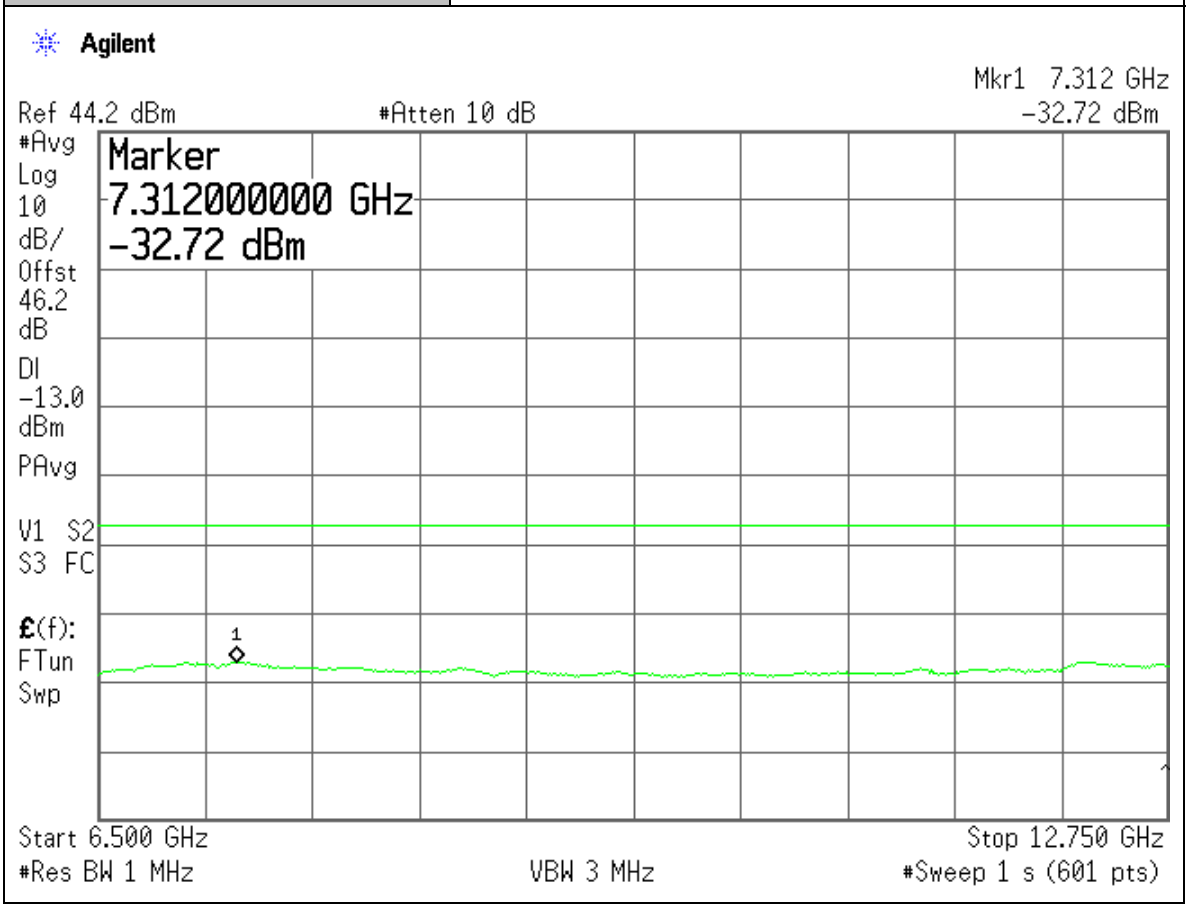
Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / GSM Modulation**
Plot Name:	**Downlink, Hi-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



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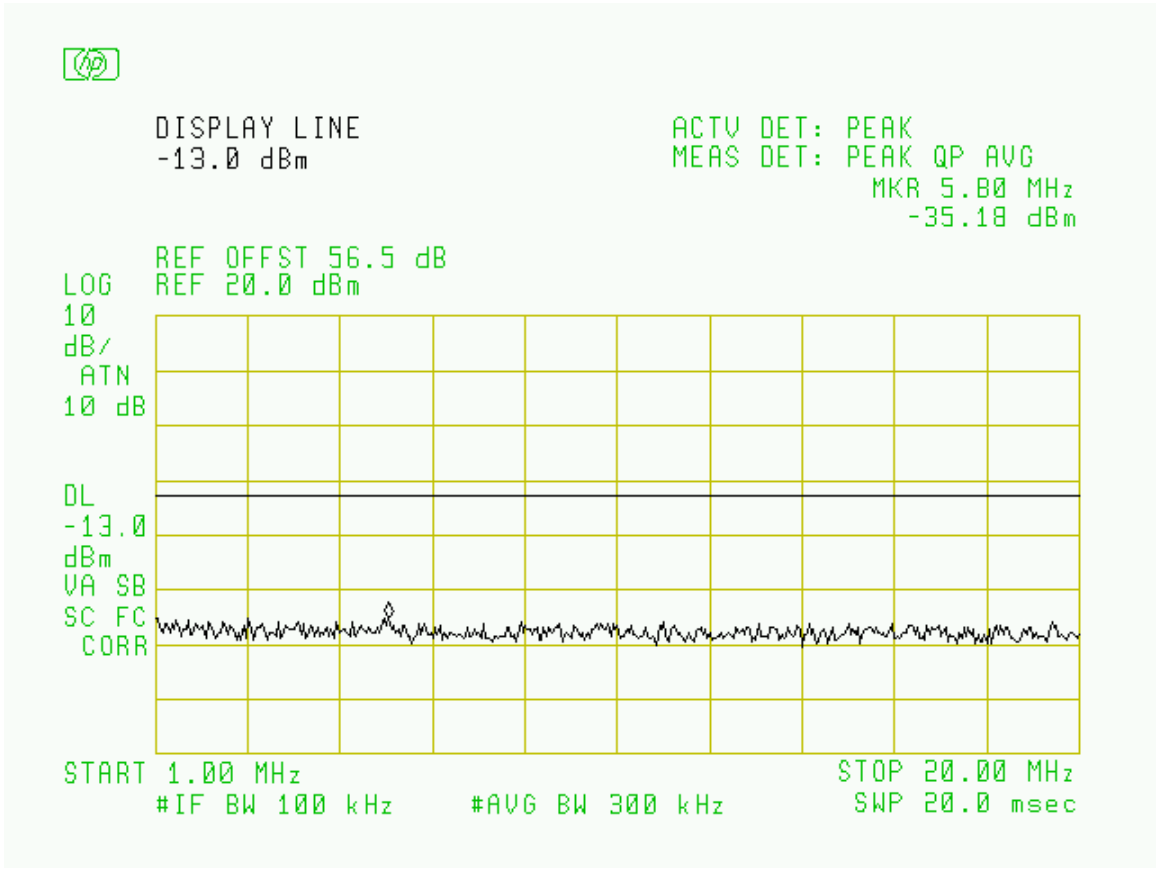
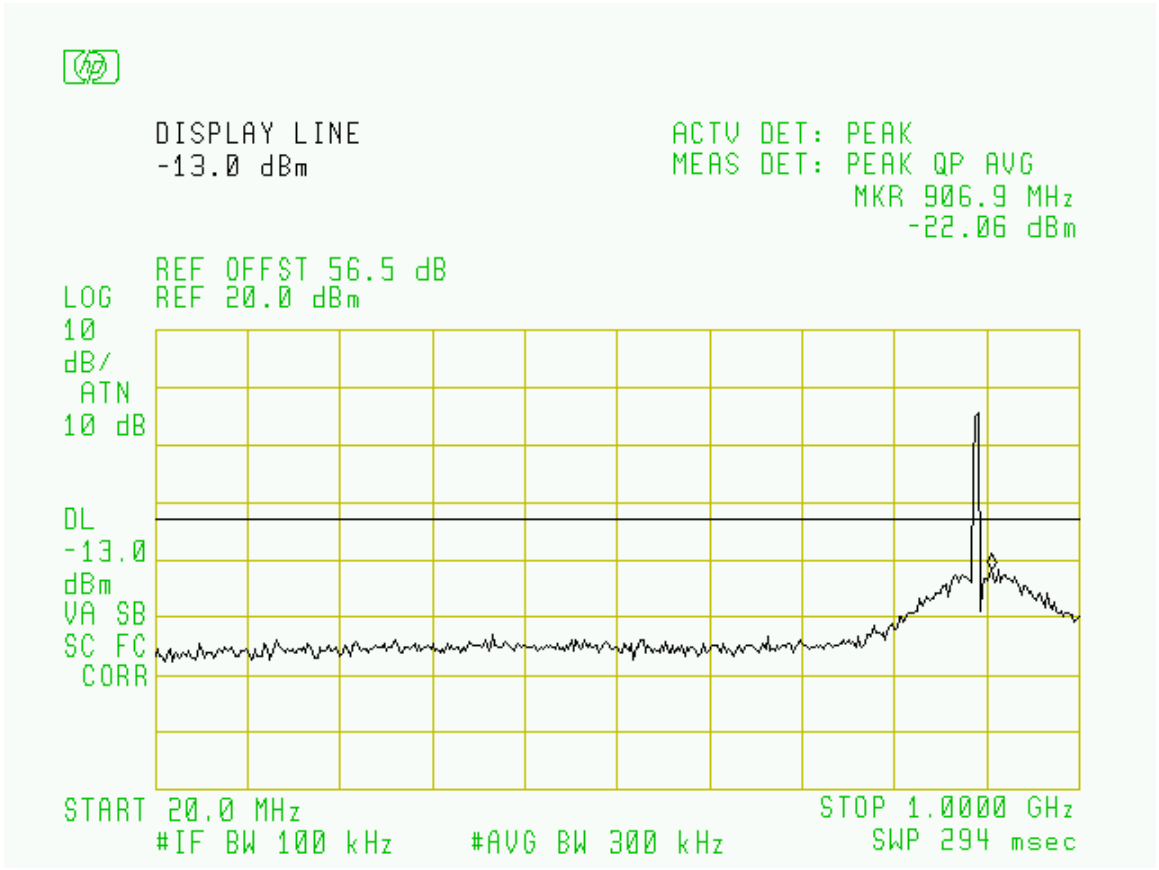
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / GSM Modulation**
Plot Name:	**Downlink, Mid-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



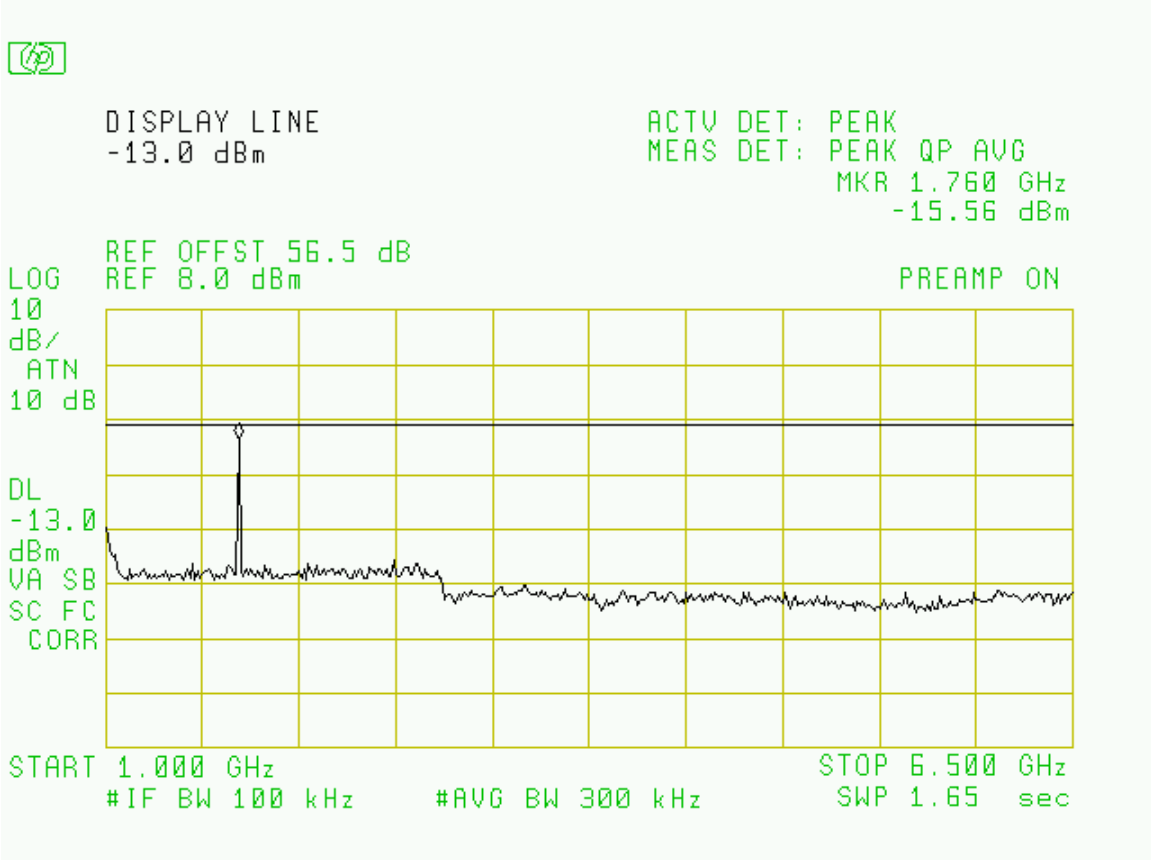
Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / GSM Modulation**
Plot Name:	**Downlink, Mid-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / GSM Modulation**
Plot Name:	**Downlink, Mid-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
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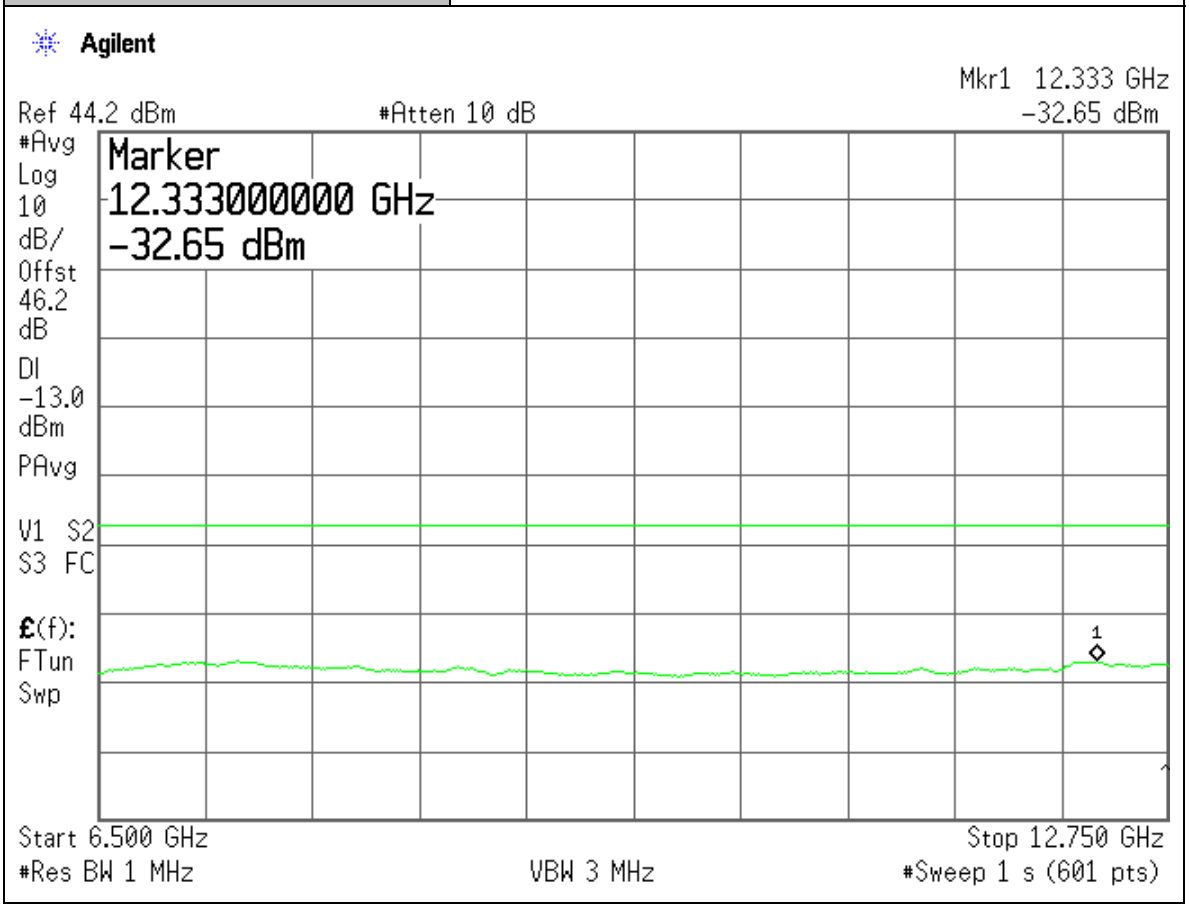
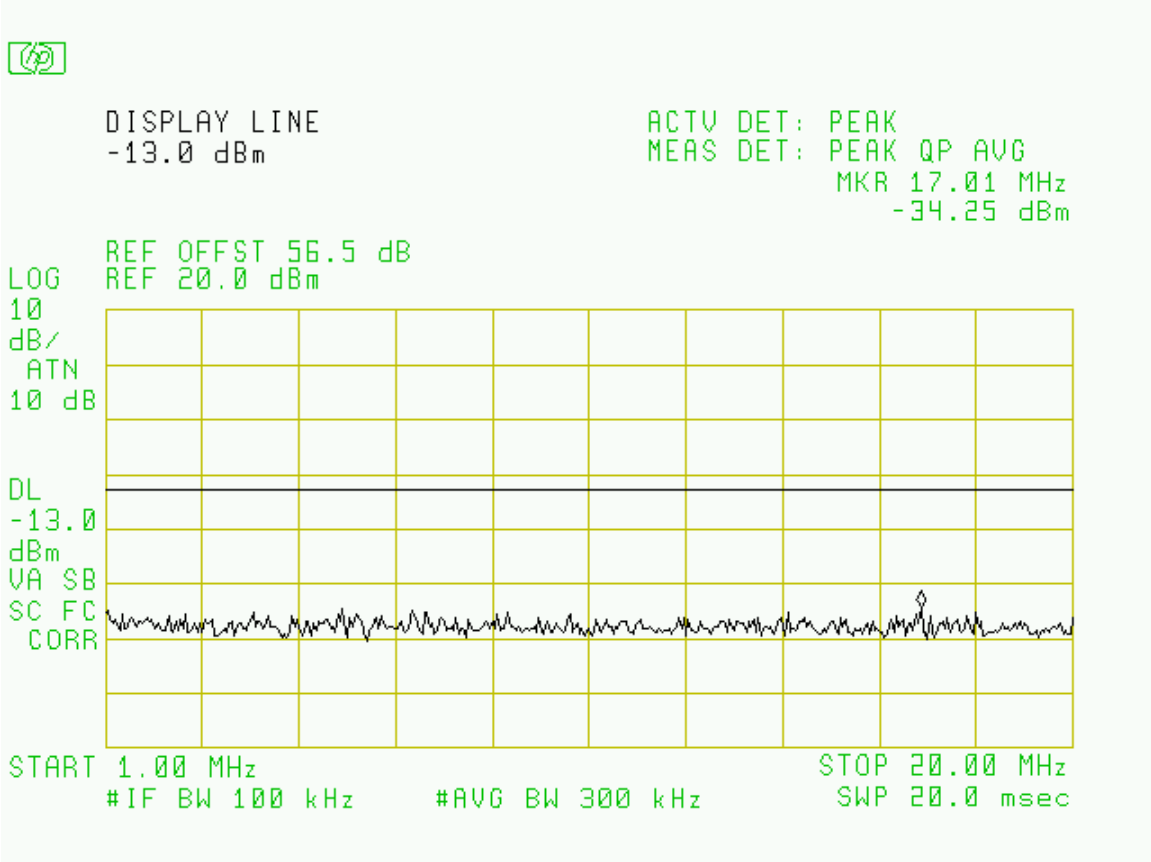
Plot Name:	**Downlink, Mid-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / GSM Modulation**
Plot Name:	**Downlink, Low-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
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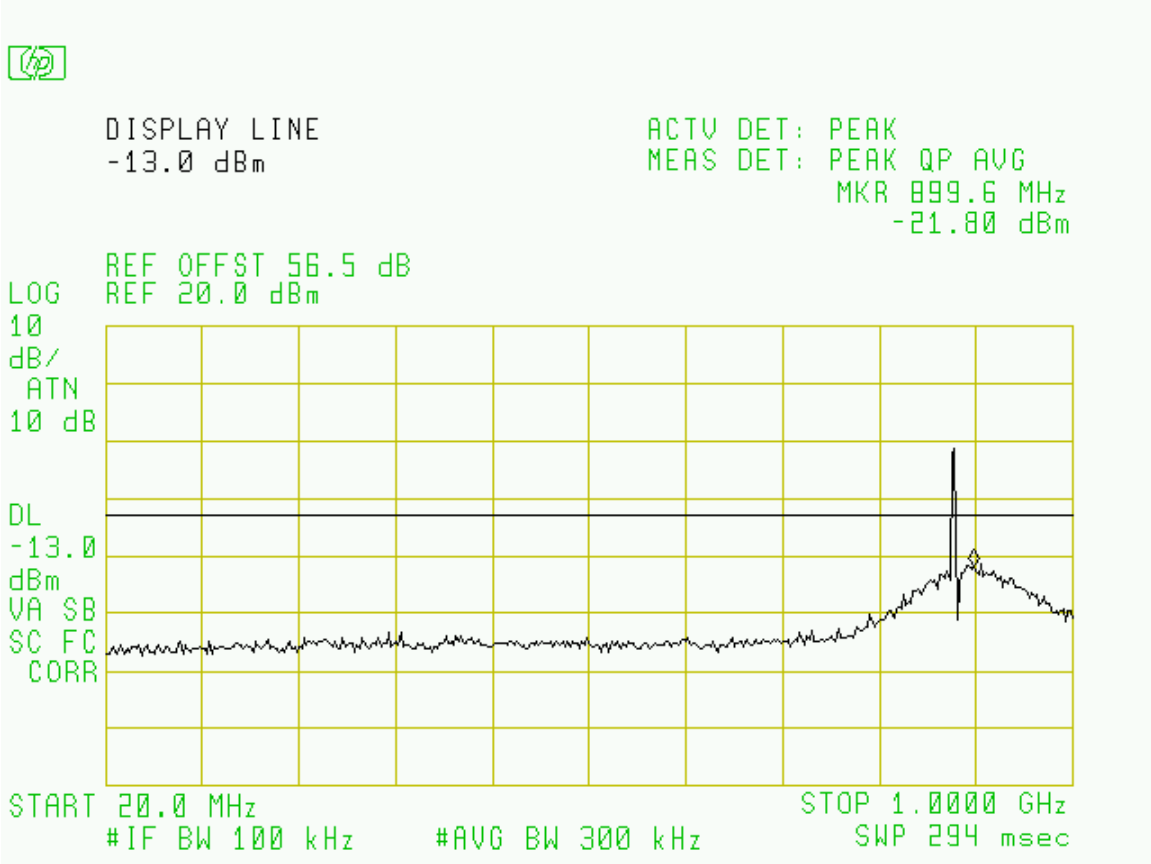
Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / GSM Modulation**
Plot Name:	**Downlink, Low-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70°F
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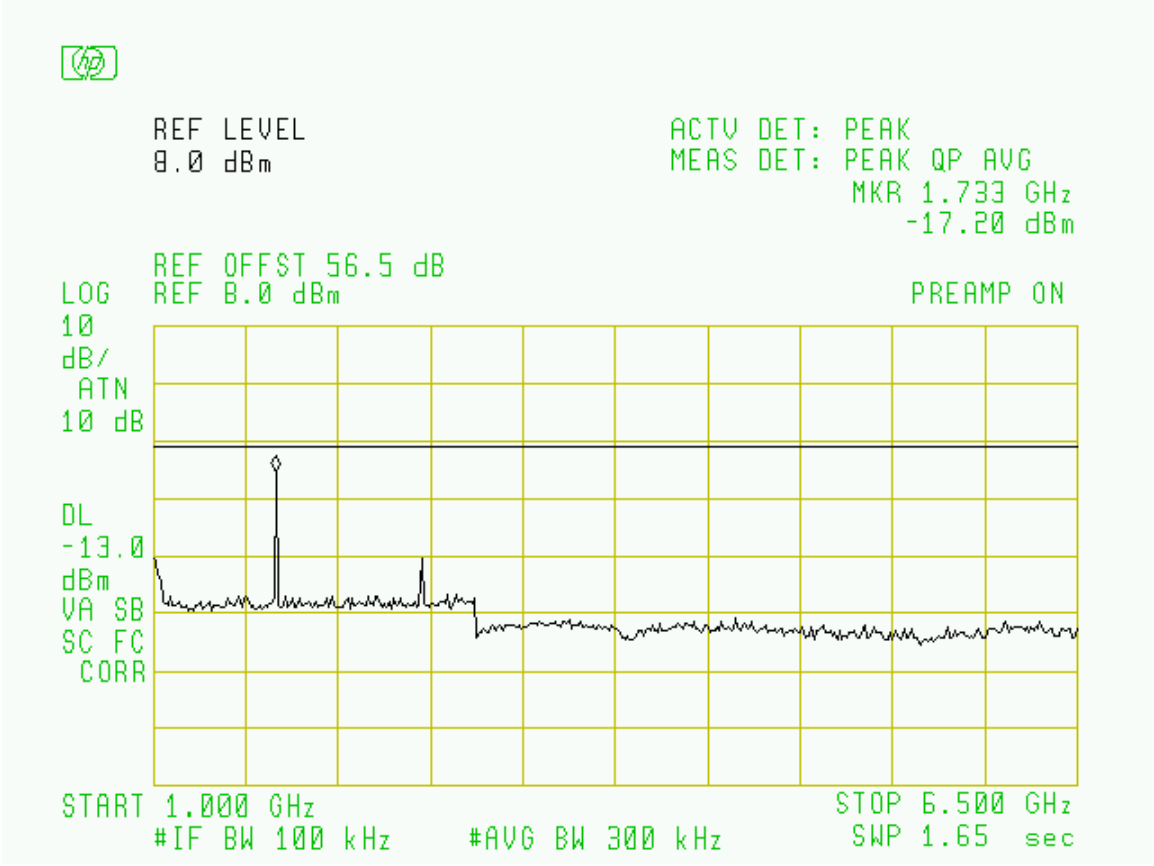
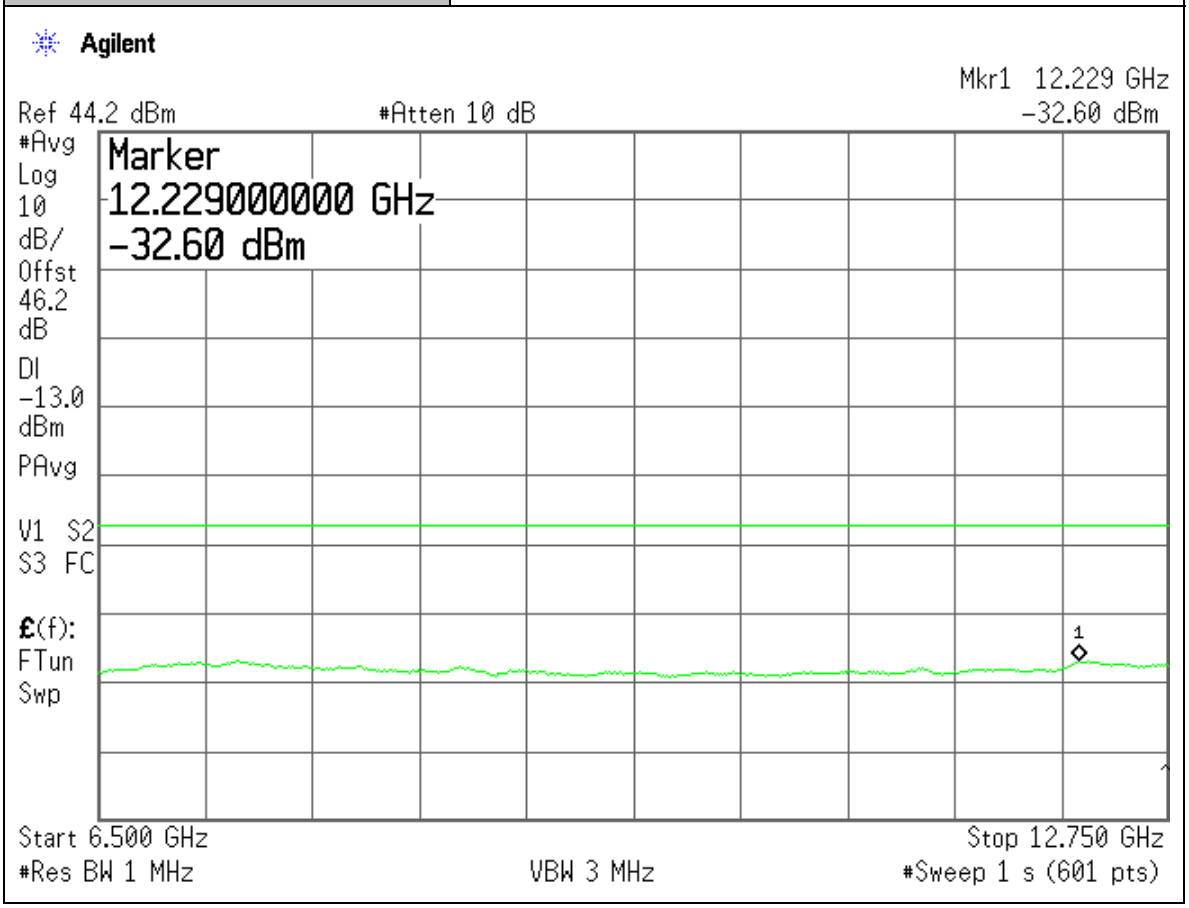
Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / GSM Modulation**
Plot Name:	**Downlink, Low-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



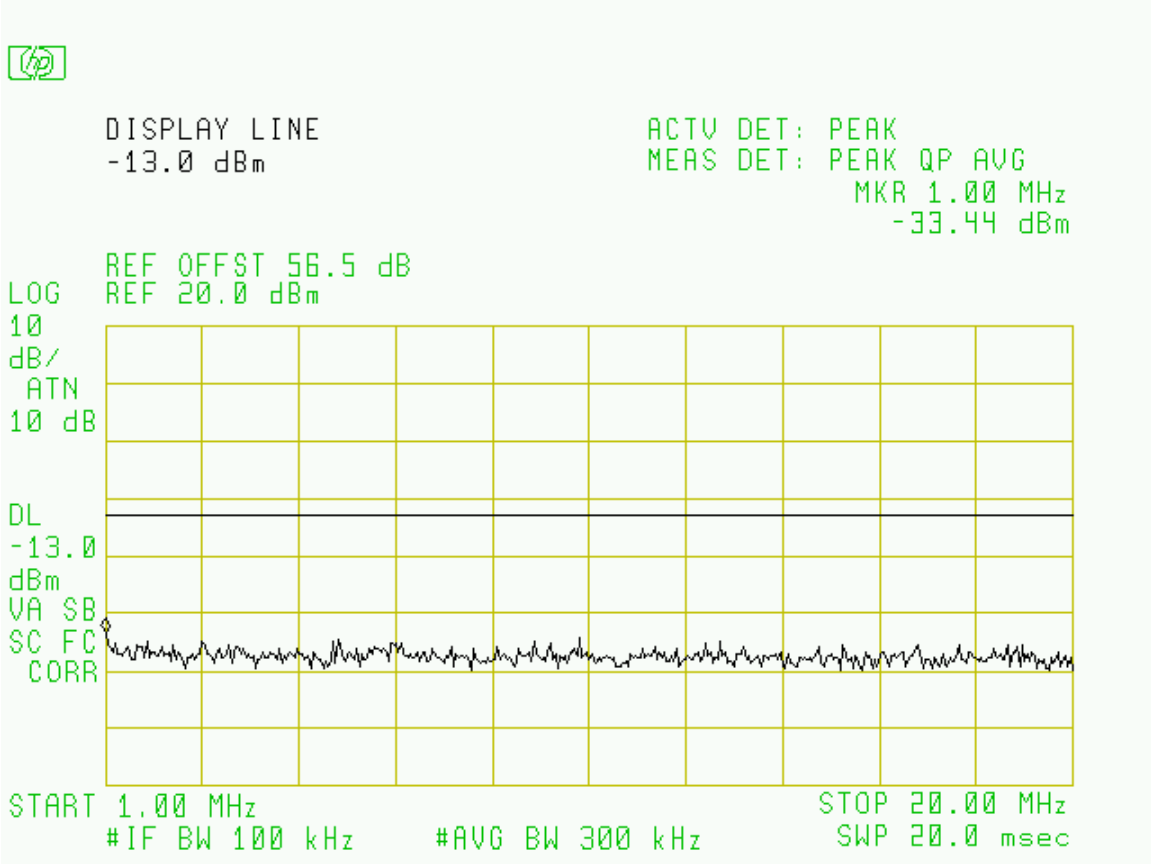
Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / GSM Modulation**
Plot Name:	**Downlink, Low-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



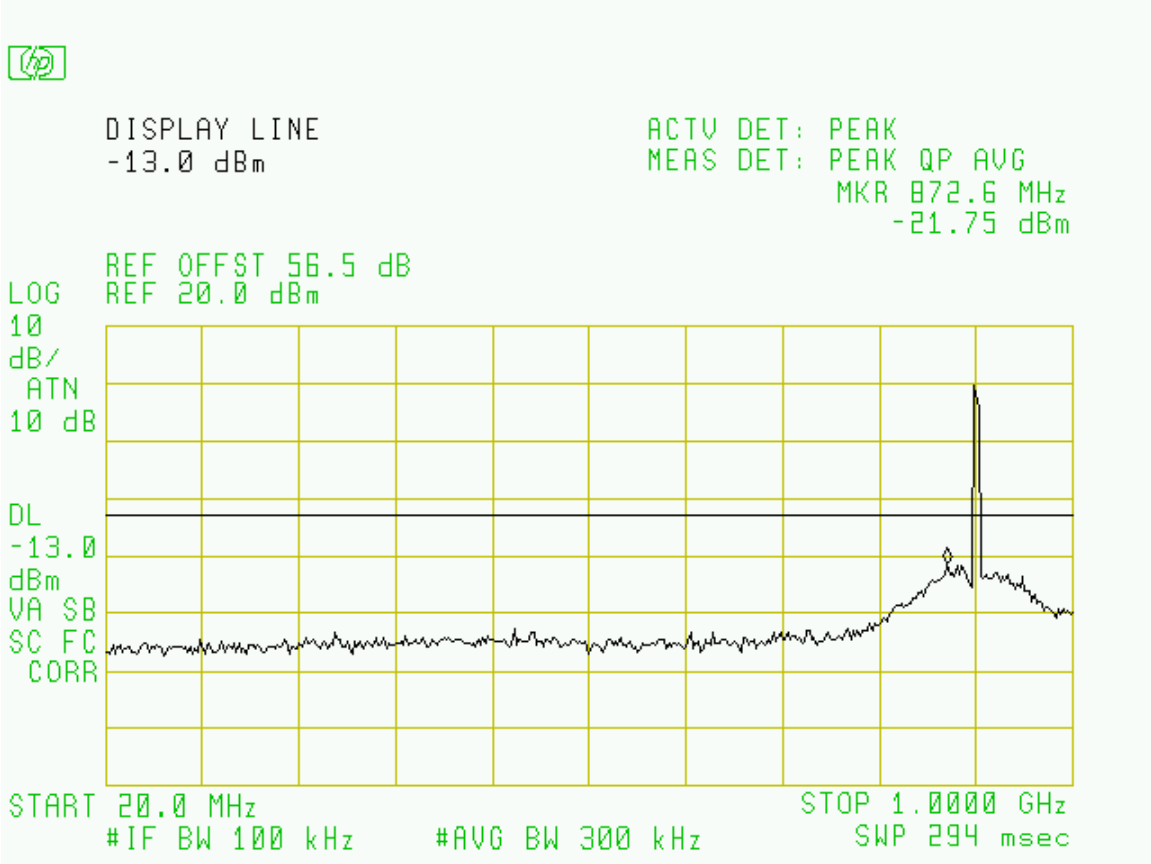
Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / EDGE Modulation**
Plot Name:	**Downlink, Hi-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / EDGE Modulation**
Plot Name:	**Downlink, Hi-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



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EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70°F
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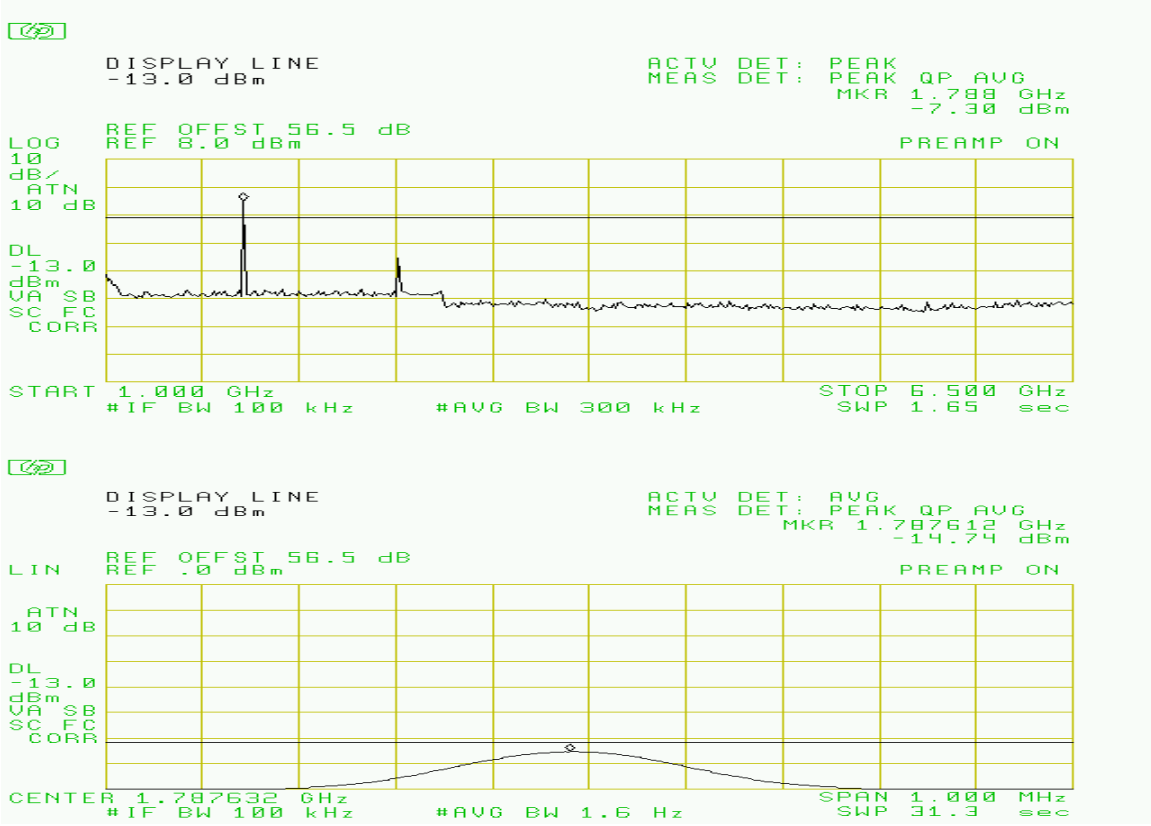
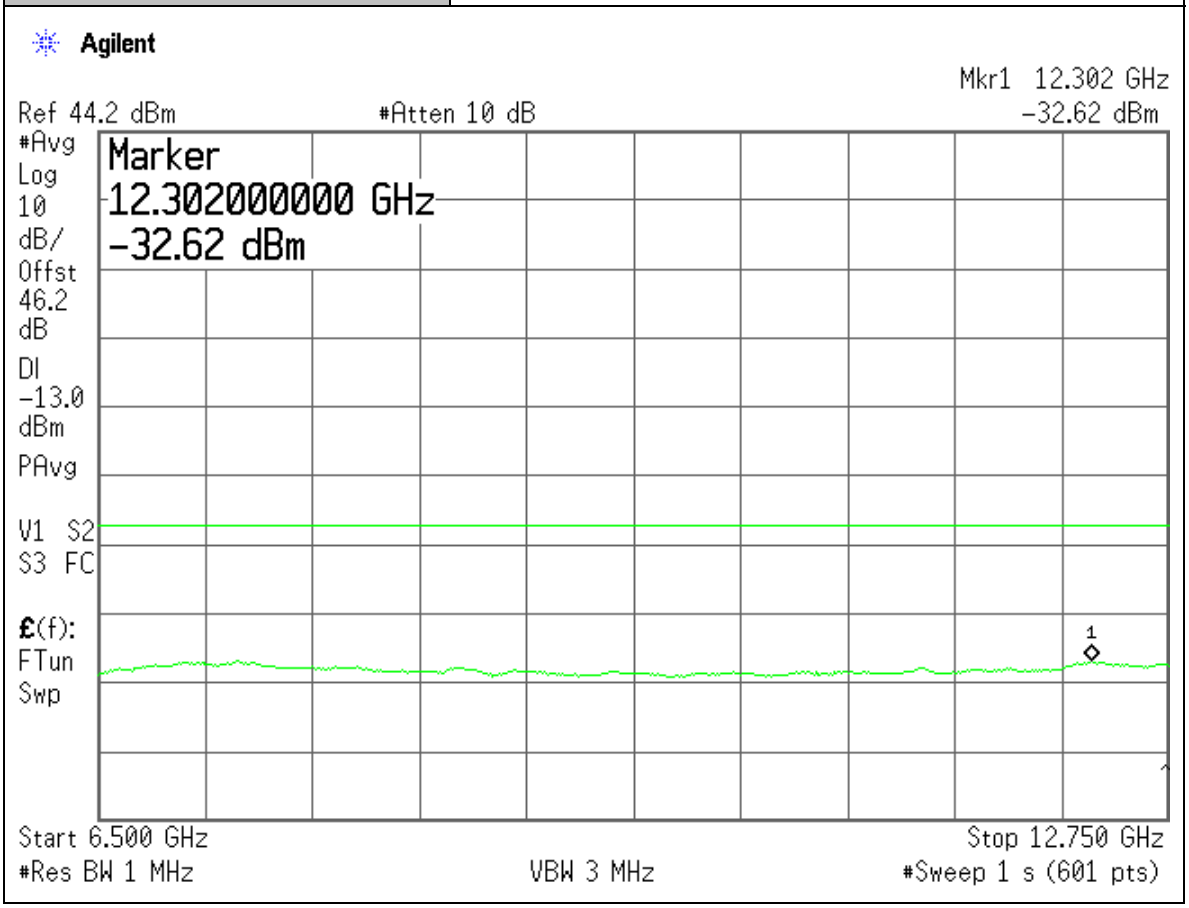
Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / EDGE Modulation**
Plot Name:	**Downlink, Hi-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / EDGE Modulation**
Plot Name:	**Downlink, Hi-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
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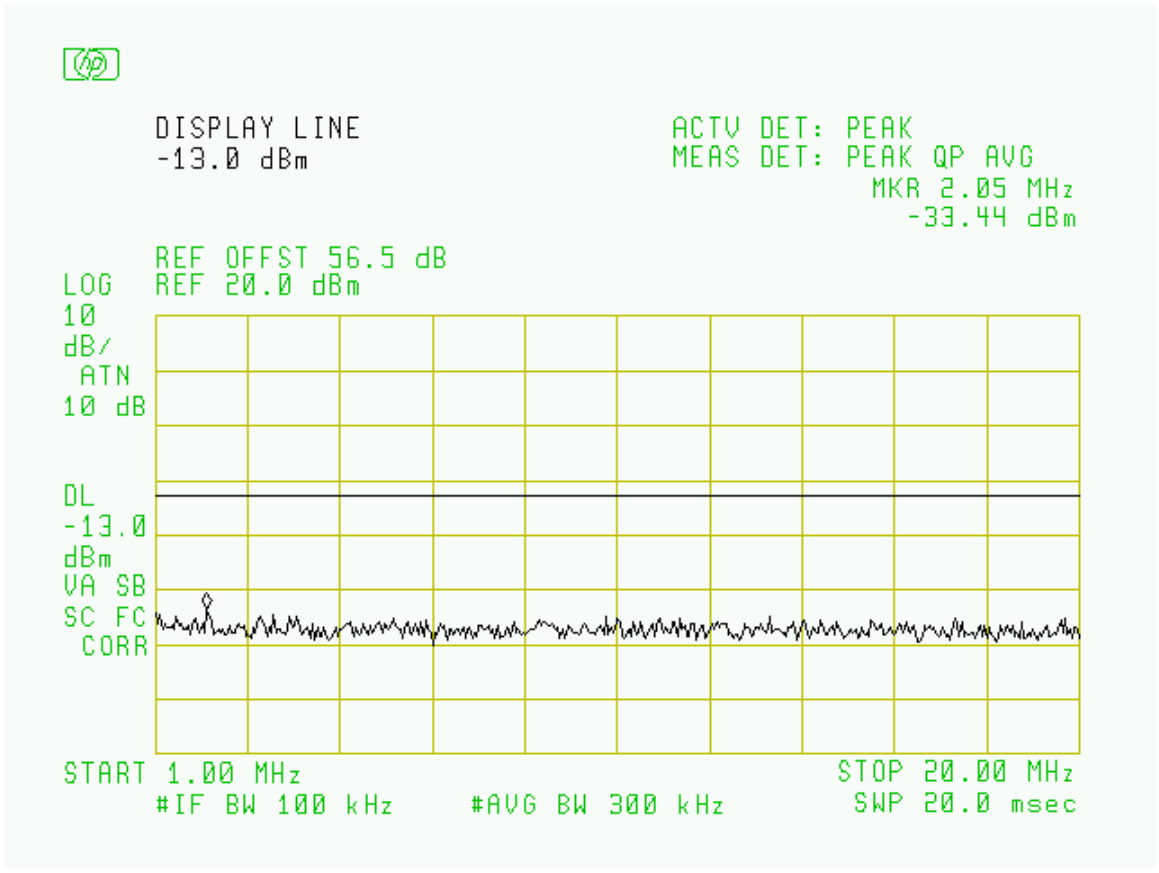
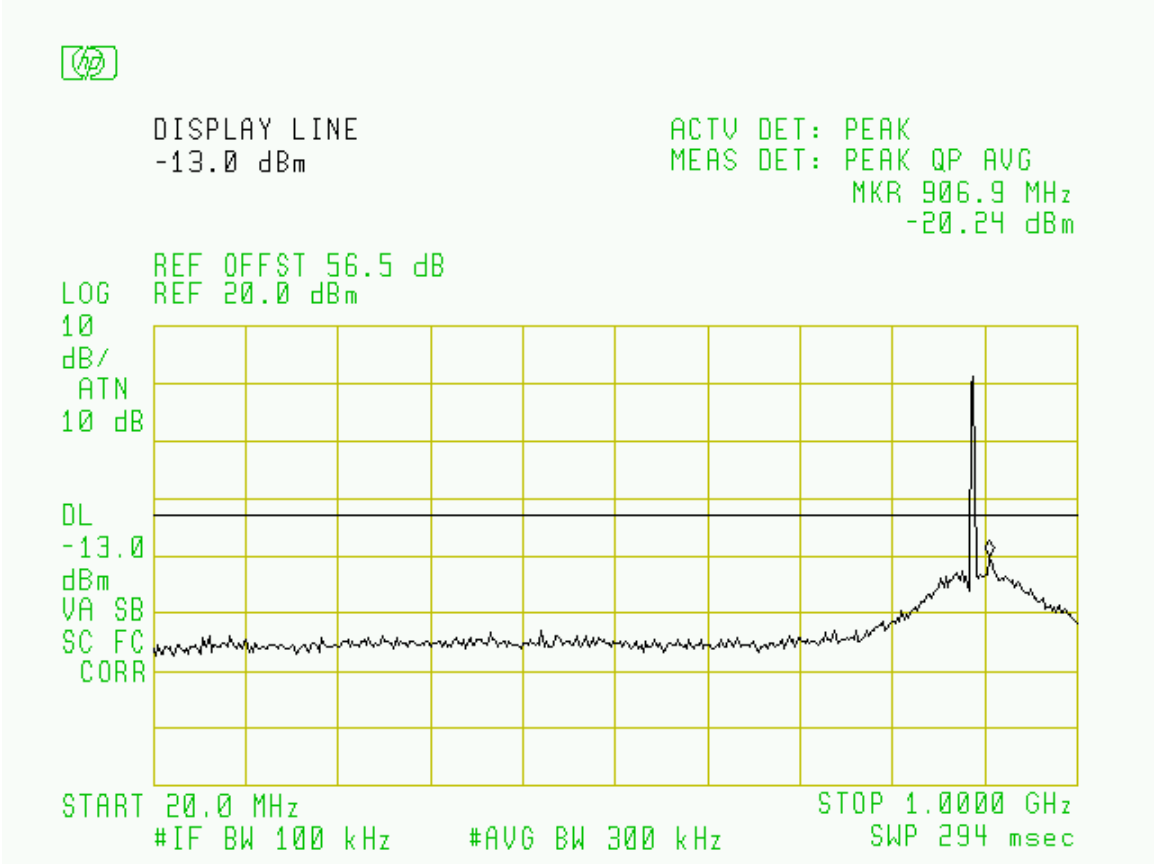
Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / EDGE Modulation**
Plot Name:	**Downlink, Mid-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / EDGE Modulation**
Plot Name:	**Downlink, Mid-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70°F
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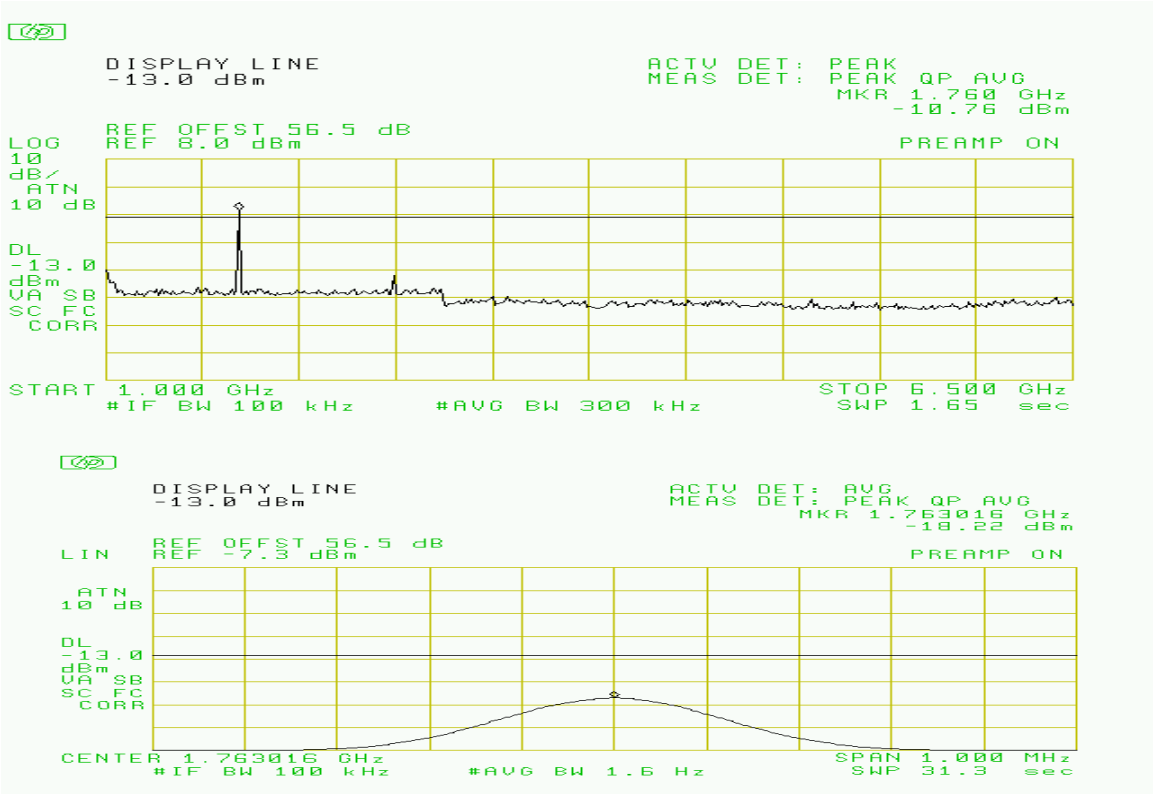
Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / EDGE Modulation**
Plot Name:	**Downlink, Mid-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



Project Number:	0048-051121-01-FCC
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PARTS NO.:	RF100306
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Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / EDGE Modulation**
Plot Name:	**Downlink, Mid-Channel**
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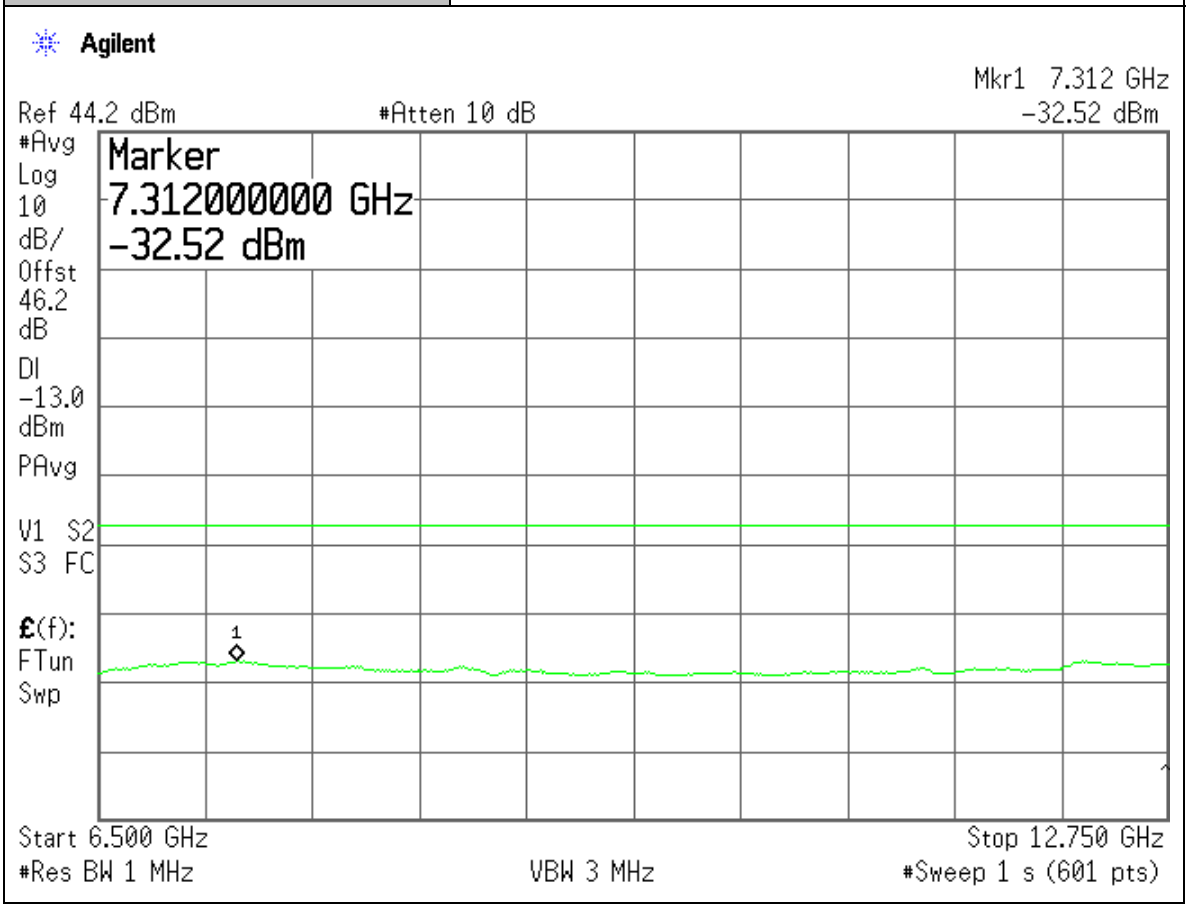

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EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
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Temperature:	70˚F
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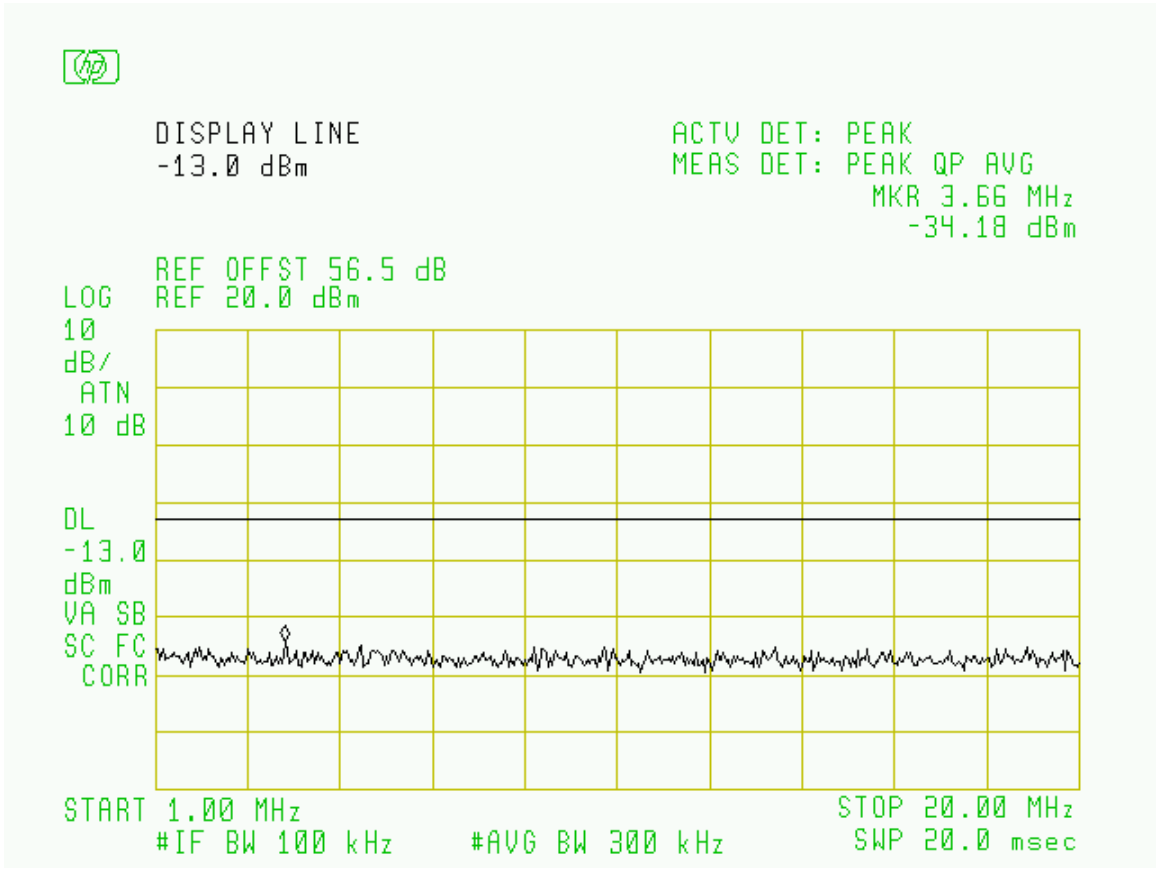
Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / EDGE Modulation**
Plot Name:	**Downlink, Low-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
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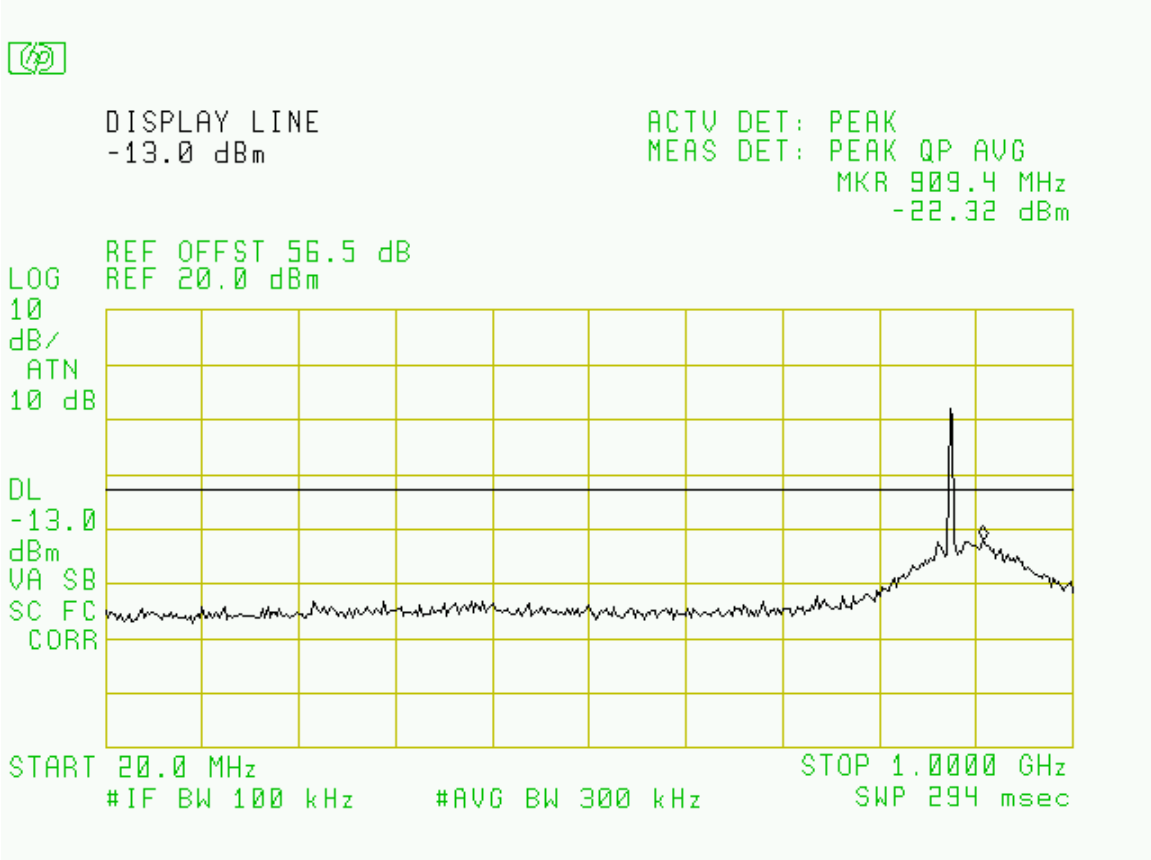
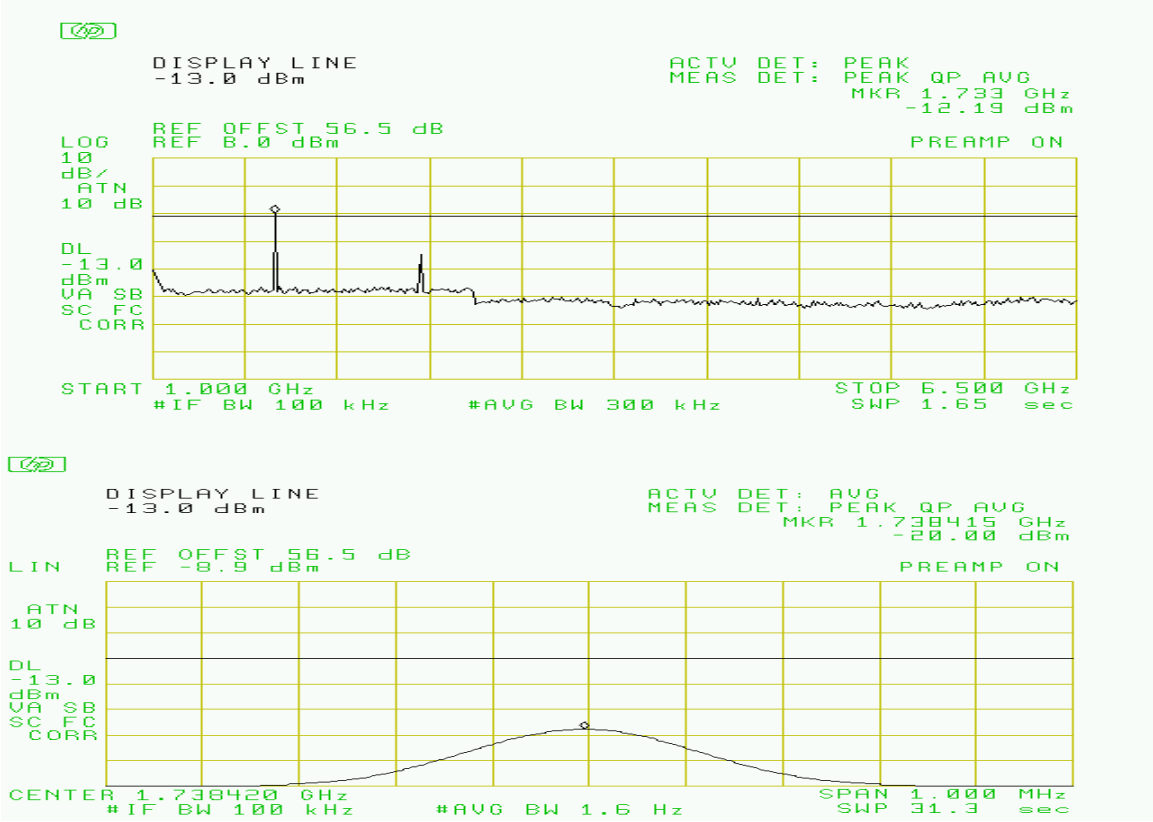
Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / EDGE Modulation**
Plot Name:	**Downlink, Low-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



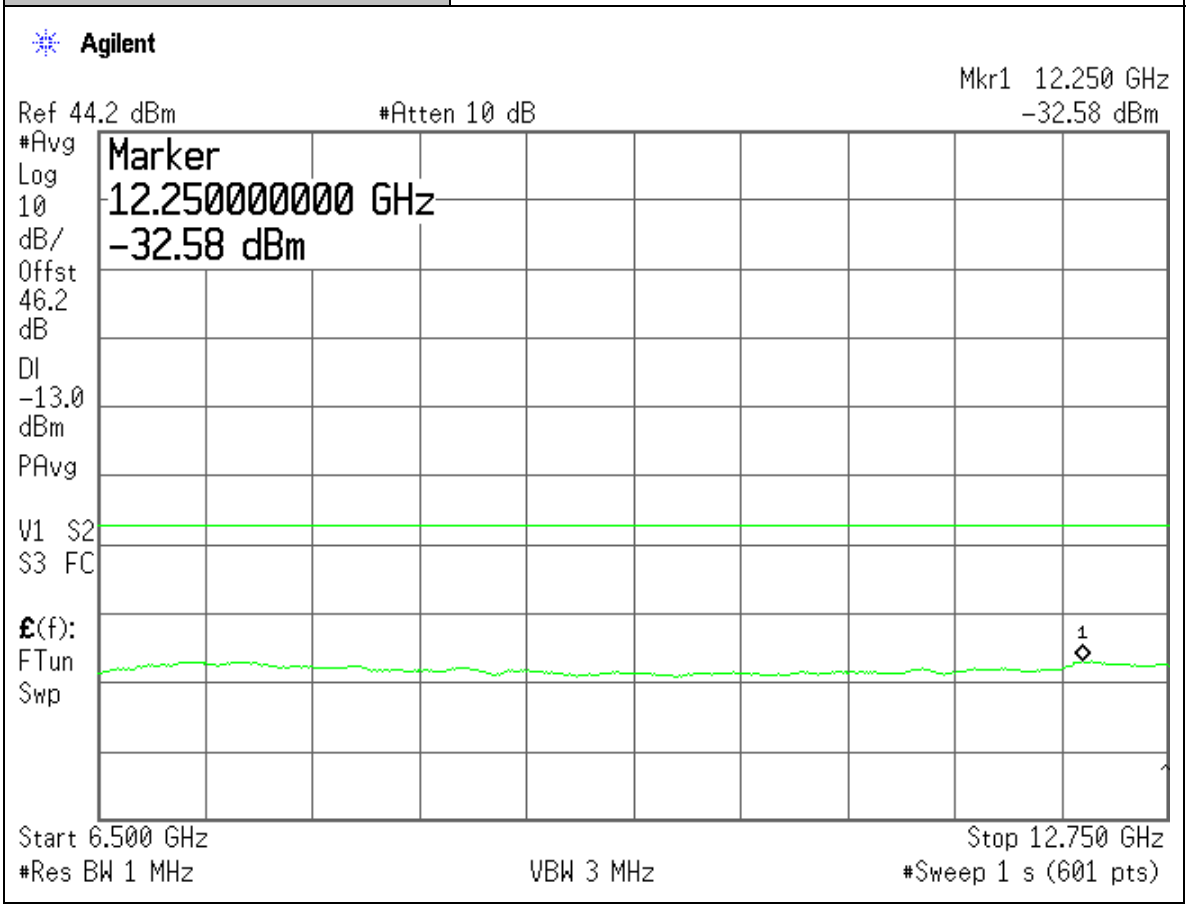
Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / EDGE Modulation**
Plot Name:	**Downlink, Low-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



Project Number:	0048-051121-01-FCC
EUT:	ANDREW Single Channel Power Amplifier HePA850
PARTS NO.:	RF100306
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at RF Output Port: CELLULAR Bands / EDGE Modulation**
Plot Name:	**Downlink, Low-Channel**
Configuration:	Input: SG, Output Port: EUT RF OUTPUT



Section 6. Field Strength of Spurious

Name of Test:	*Field Strength of Spurious*	Test Standard:	*22.917* *24.238*
Tested By:	EDWARD LEE	Test Date:	11/21/2005-12/05/2005

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 instrction 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 far below the limit.

Calculation for Required Emission Limit Per 2.1053

With the amplifier RF output level set to rated output power, Radiated Emissions between 10 MHz and 10 GHz(Cellular) or 20GHz (PCS) 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 22.917 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:

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

Where:

E = Field intensity in Volts/meter of carrier
P = transmitted power in Watts (rated W)
R = Distance from antenna to UUT in meters (3 meters)

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

$$20 \log (E * 10^6) \quad [\text{dBuV/m}]$$

Attenuation requirement (Atten): $43 + 10 \log P$ [dBc]

Thus, the required limit:

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

For HEPA: P(GSM)=60W and P(EDGE)=45W

Then, **E_{lim} = 84.38 dBuV/m**

Note: Emissions less than 54.38 dBuV/m (84.38 - 30 dB) may not be reported.

Test Result: **Complies**

Test Data: See Attached Table(s)

Configuration	CELLULAR w/ RF Output Port Terminated
Band	CELLULAR 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)
GSM 60W								
1738.4	H	53.0	1.4	10	84.38	-31.38	-13	-41
2607.6	H	63.6	1.5	30	84.38	-20.78	-13	-30.4
3476.8	H				84.38		-13	
4346.0	H	51.1	1.2	0	84.38	-33.28	-13	-42.9
5215.2	H				84.38		-13	
1738.4	V	52.5	1.2	10	84.38	-31.88	-13	-41.5
2607.6	V	65.1	1.2	20	84.38	-19.28	-13	-28.9
3476.8	V				84.38		-13	
4346.0	V	50.2	1.2	0	84.38	-34.18	-13	-43.8
5215.2	V				84.38		-13	
EDGE 45W								
1738.4	H	54.1	1.4	10	84.38	-30.28	-13	-39.9
2607.6	H	67.0	1.3	20	84.38	-17.38	-13	-27
3476.8	H				84.38		-13	
4346.0	H	54.4	1.2	0	84.38	-29.98	-13	-39.6
5215.2	H	51.0	1.2	0	84.38	-33.38	-13	-43
1738.4	V	55.0	1.2	10	84.38	-29.38	-13	-39
2607.6	V	68.6	1.2	30	84.38	-15.78	-13	-25.4
3476.8	V	55.3	1.2	10	84.38	-29.08	-13	-38.7
4346.0	V	52.5	1.2	0	84.38	-31.88	-13	-41.5
5215.2	V				84.38		-13	

NOTE:
* Measured with Average Detector
SA: Spectrum Analyzer
EUT's input.: GSM & EDGE with rated P
H=horizontal and V=vertical
SA Reading: Peak Reading unless otherwise specified

Configuration	CELLULAR w/ RF Output Port Terminated
Band	CELLULAR 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)
GSM 60W								
1763.0	H	55.0	1.4	10	84.38	-29.38	-13	-39
2644.5	H	65.0	1.3	30	84.38	-19.38	-13	-29
3526.0	H	54.2	1.2	0	84.38	-30.18	-13	-39.8
4407.5	H	58.1	1.2	0	84.38	-26.28	-13	-35.9
5289.0	H				84.38		-13	
1763.0	V	57.2	1.2	10	84.38	-27.18	-13	-36.8
2644.5	V	67.8	1.2	20	84.38	-16.58	-13	-26.2
3526.0	V	54.6	1.1	10	84.38	-29.78	-13	-39.4
4407.5	V	58.6	1.2	10	84.38	-25.78	-13	-35.4
5289.0	V	49.9	1.1	0	84.38	-34.48	-13	-44.1
EDGE 45W								
1763.0	H	56.7	1.3	0	84.38	-27.68	-13	-37.3
2644.5	H	64.3*	1.3	30	84.38	-20.08	-13	-29.7
3526.0	H	56.4	1.2	10	84.38	-27.98	-13	-37.6
4407.5	H	59.8	1.2	0	84.38	-24.58	-13	-34.2
5289.0	H				84.38		-13	
1763.0	V	52.7	1.2	10	84.38	-31.68	-13	-41.3
2644.5	V	66.4*	1.2	20	84.38	-17.98	-13	-27.6
3526.0	V	51.8	1.1	0	84.38	-32.58	-13	-42.2
4407.5	V	58.8	1.2	0	84.38	-25.58	-13	-35.2
5289.0	V	52.1	1.2	0	84.38	-32.28	-13	-41.9

NOTE:
* Measured with Average Detector
SA: Spectrum Analyzer
EUT's input.: GSM & EDGE with rated P
H=horizontal and V=vertical
SA Reading: Peak Reading unless otherwise specified

Configuration	CELLULAR w/ RF Output Port Terminated
Band	CELLULAR 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)
GSM 60W								
1787.6	H	54.6	1.3	0	84.38	-29.78	-13	-39.4
2681.4	H	66.8	1.4	10	84.38	-17.58	-13	-27.2
3575.2	H	52.0	1.2	10	84.38	-32.38	-13	-42
4469.0	H	51.4	1.2	10	84.38	-32.98	-13	-42.6
5362.8	H				84.38		-13	
1787.6	V	53.5	1.2	10	84.38	-30.88	-13	-40.5
2681.4	V	67.7	1.2	20	84.38	-16.68	-13	-26.3
3575.2	V				84.38		-13	
4469.0	V	54.6	1.1	0	84.38	-29.78	-13	-39.4
5362.8	V	54.0	1.2	10	84.38	-30.38	-13	-40
EDGE 45W								
1787.6	H	55.5	1.3	0	84.38	-28.88	-13	-38.5
2681.4	H	65.0*	1.4	330	84.38	-19.38	-13	-29
3575.2	H	54.1	1.2	10	84.38	-30.28	-13	-39.9
4469.0	H	54.6	1.3	0	84.38	-29.78	-13	-39.4
5362.8	H				84.38		-13	
1787.6	V	56.7	1.2	10	84.38	-27.68	-13	-37.3
2681.4	V	67.6*	1.3	20	84.38	-16.78	-13	-26.4
3575.2	V				84.38		-13	
4469.0	V	55.3	1.2	0	84.38	-29.08	-13	-38.7
5362.8	V	54.2	1.2	10	84.38	-30.18	-13	-39.8

NOTE:
* Measured with Average Detector
SA: Spectrum Analyzer
EUT's input.: GSM & EDGE with rated P
H=horizontal and V=vertical
SA Reading: Peak Reading unless otherwise specified

Section 7. Frequency Stability

Name of Test:	*Frequency Stability*	Test Standard:	*2.1055 22.355&24.235*
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)

Not Applicable

Section 8. 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	17/09/05	17/09/07
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	15/09/05	15/09/06
Fischer Custom	LIPARTS NO.-2	900-4-0009	Line Impedance Stabilization Networks	23/08/05	23/08/06
EMCO	6502	2665	10KHz-30MHz Active Loop Antenna	27/02/05	27/02/06
EMCO	3115	4945	Double Ridge Guide Horn Antenna	15/09/05	15/09/06
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	13/09/05	13/09/06
HP	4419A	US37292112	RF Power Meter w/ Sensor Probe	20/07/05	20/07/07
HP	6032A	3323A-09526	System Power Supply	07/01/05	07/01/06
Agilent	E4438C	US41460731	ESG Vector Signal Generator	07/01/05	07/01/07
Agilent	E4438C	US41460771	ESG Vector Signal Generator	07/01/05	07/01/07
Agilent	E4438C	US41460400	ESG Vector Signal Generator	07/01/05	07/01/07
Lorch Microwave	5NF-800/1000-S	AC3	Notch Filter		
RES-NET	RFA500NFF30	0108	30dB in-line Power Attenuator		
Narda	3022	80986	Directional Coupler		
General Purpose			0-60V, 50A DC Power Supply		