



**FCC CFR47 PART 22, SUBPART G
AND
FCC CFR47 PART 90, SUBPART I
CERTIFICATION TEST REPORT
FOR**

POWER AMPLIFIER

MODEL NUMBER: M4-BBDA-8

FCC ID: TCJ-M4BBDA8

REPORT NUMBER: 05U3789-1

ISSUE DATE: DECEMBER 20, 2005

Prepared for
**CANAM TECHNOLOGY
5318 E. SECOND STREET, # 700
LONG BEACH, CA 90803, USA**

Prepared by
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NVLAP[®]
LAB CODE:200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
A	12/08/05	Initial Issue	Thu
A2	12/20/05	Updated EUT info	D.Z.

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: CANAM TECHNOLOGY
5318 E. SECOND STREET, # 700
LONG BEACH, CA 90803 USA

EUT DESCRIPTION: POWER AMPLIFIER

MODEL: M4-BBDA-8

SERIAL NUMBER: 1337

DATE TESTED: OCTOBER 26 ~DECEMBER 07, 2005

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22, SUBPART G	NO NON-COMPLIANCE NOTED
FCC PART 90, SUBPART I	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

Tested By:



THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

WILLIAM ZHUANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA/EIA 603C (2004), FCC CFR 47 Part 2, FCC CFR 47 Part 22, and FCC CFR 47 Part 90.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is Mark-IV Broadband Amplifiers are highly-linear devices suitable for applications in the two-way radio 800 MHz band.

The model number was changed after testing commenced. All data in this report is applicable to the model number documented in Section 1 above.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Modulation	Conducted Output Power (dBm)	Conducted Output Power (W)
806 ~ 896	CW	41.79	15.1

5.3. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 851MHz.

5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Cal Due
Power Attenuator	Tenuline	8343-200	970	CNR
DC power supply, 40 V @ 30 A	HP	6268A	6M1458	CNR
Signal Generator, 10 MHz ~ 20 GHz	HP	83732B	US34490599	10/5/06
Power Sensor, 18 GHz, 300 mW	R&S	NVR-Z51	DE 13013	2/3/07
Peak Power Meter	Agilent	E4416A	GB41291160	2/9/06
Signal Generator, 40 GHz	R & S	SMP04	DE 34210	6/8/06

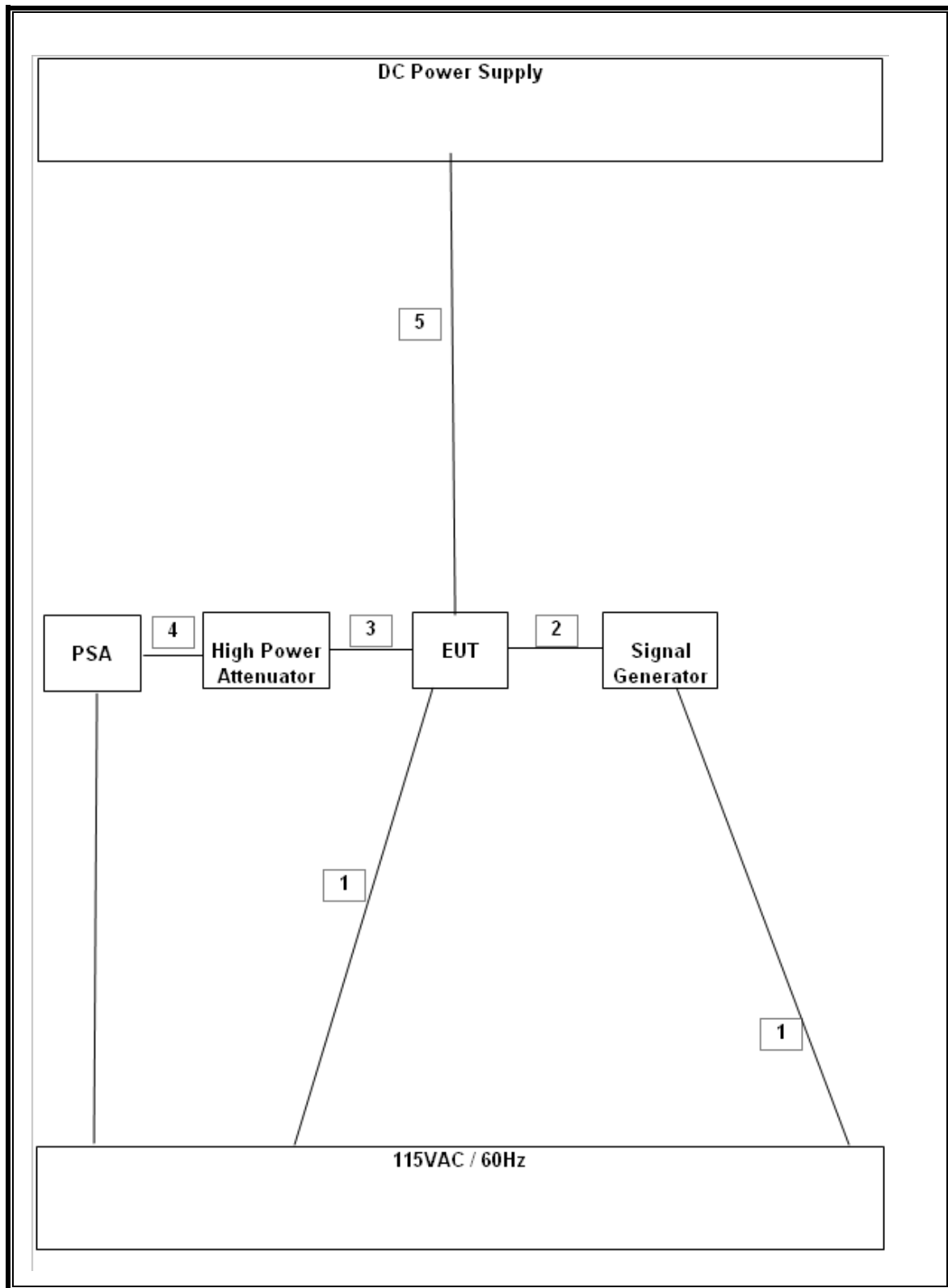
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	3	US115	Unshielded	1.8m	
2 -- 4	Input / Output	4	N-Type	Shilded	1m	
5	DC	1	Din	Unshielded	2m	

TEST SETUP

The EUT is a stand-alone device. The input was given by signal generator as the source modulations of CW and FM during the tests.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Cal Due
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	MY43360112	3/28/2006
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	3/29/2006
RF Filter Section	HP	85420E	3705A00256	3/29/2006
Antenna, Bilog 30MHz ~ 2Ghz	Sunol Sciences	JB1	A121003	3/3/2006
Preamplifier, 1 ~ 26 GHz	Miteq	NSP2600-SP	924342	8/17/2006
Antenna, Horn 1 ~ 18 GHz	ETS	3117	29301	4/22/2006
Signal Generator, 10 MHz ~ 20 GHz	HP	83732B	US34490599	7/7/2006

7. LIMITS AND RESULTS

7.1. OCCUPIED BANDWIDTH

LIMIT

None: for reporting purposes only.

TEST PROCEDURE

Measurements were made with a 2.5 kHz modulating signal adjusted to produce 5 kHz of FM deviation. The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 3% of the 26 dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

RESULTS

No non-compliance noted:

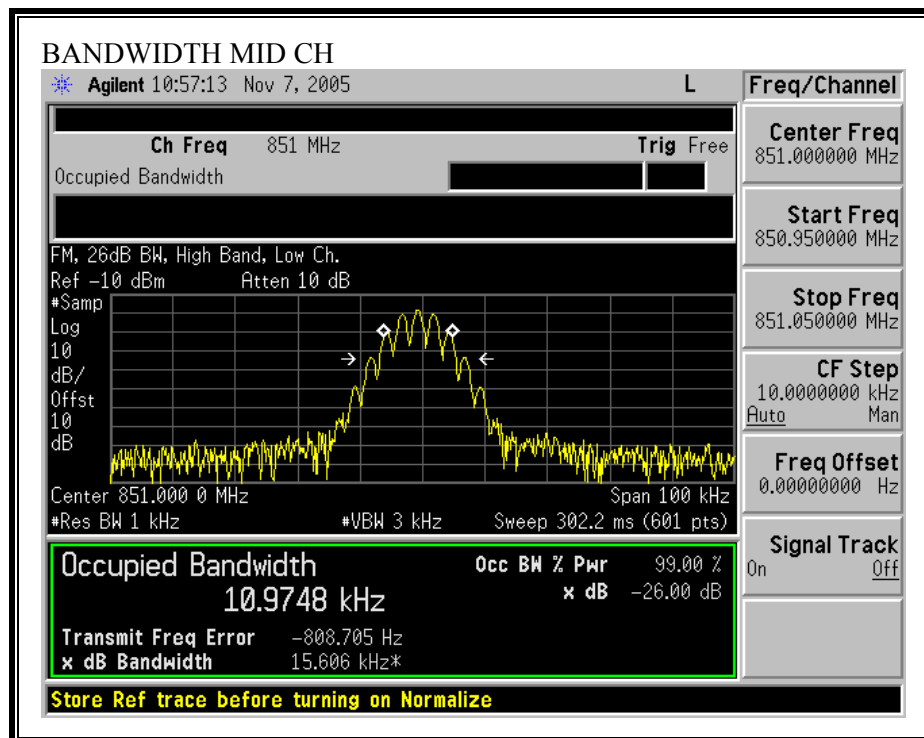
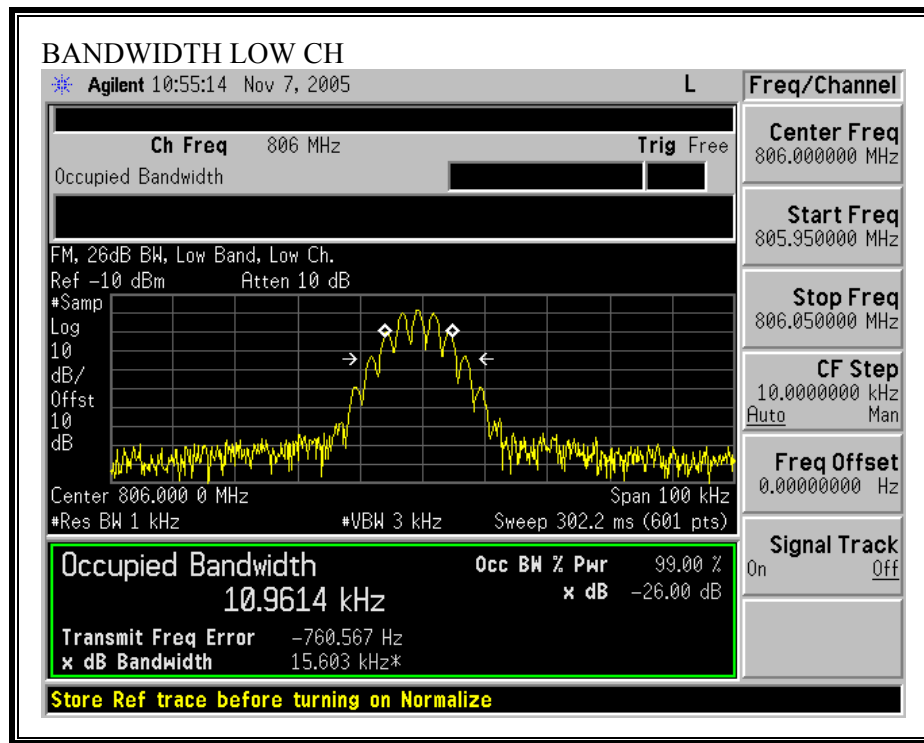
FM Modulation - Input

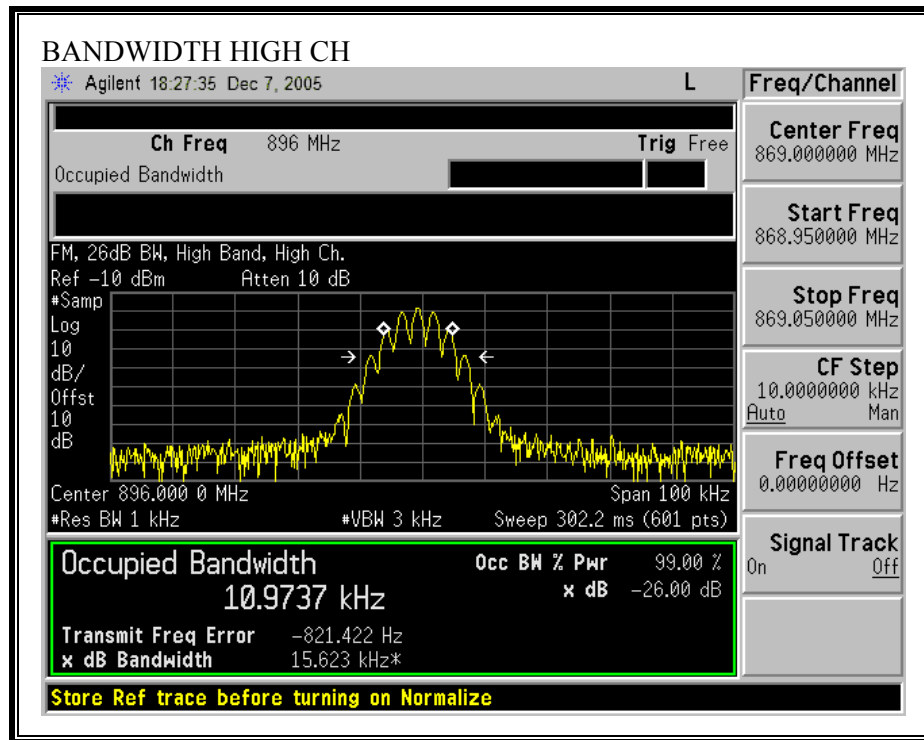
Channel	Frequency (MHz)	Bandwidth (kHz)
Low	806	15.603
Middle	851	15.606
High	896	15.623

FM Modulation - Output

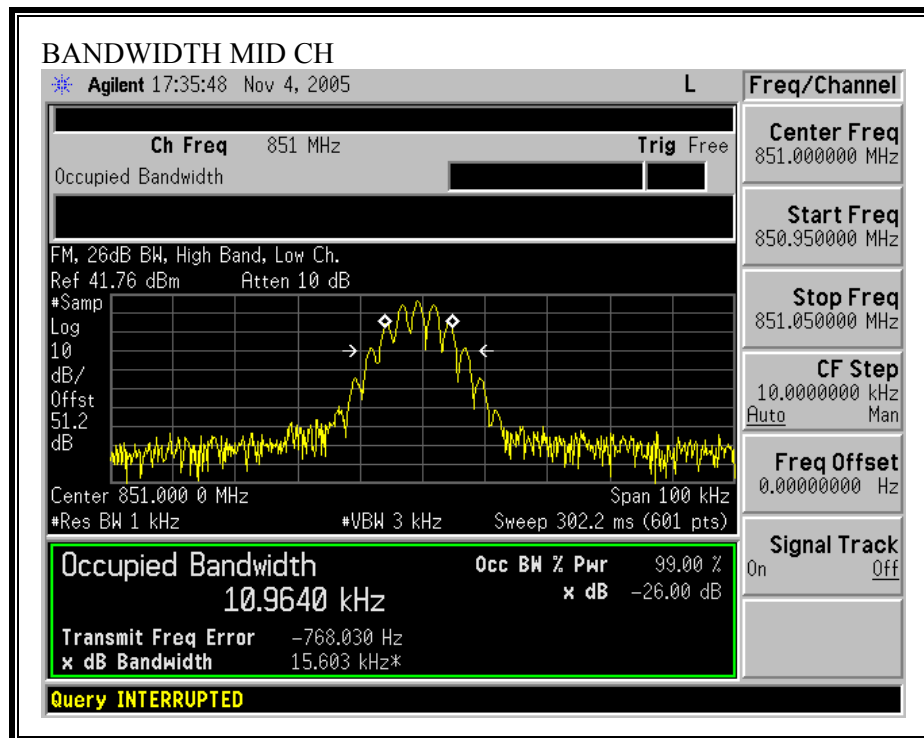
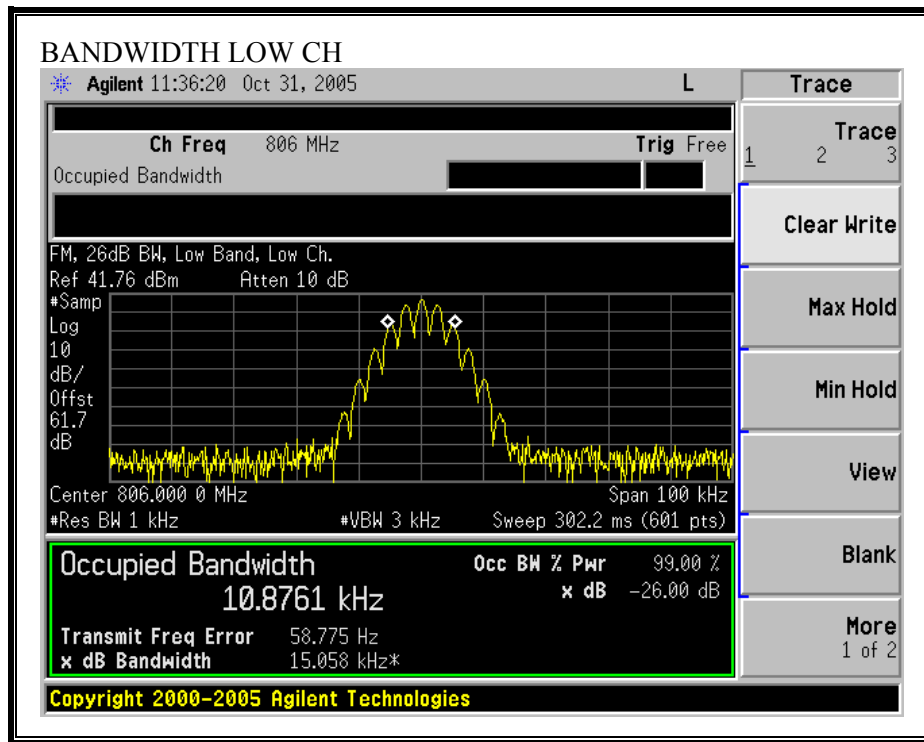
Channel	Frequency (MHz)	Bandwidth (kHz)
Low	806	15.058
Middle	851	15.603
High	896	15.623

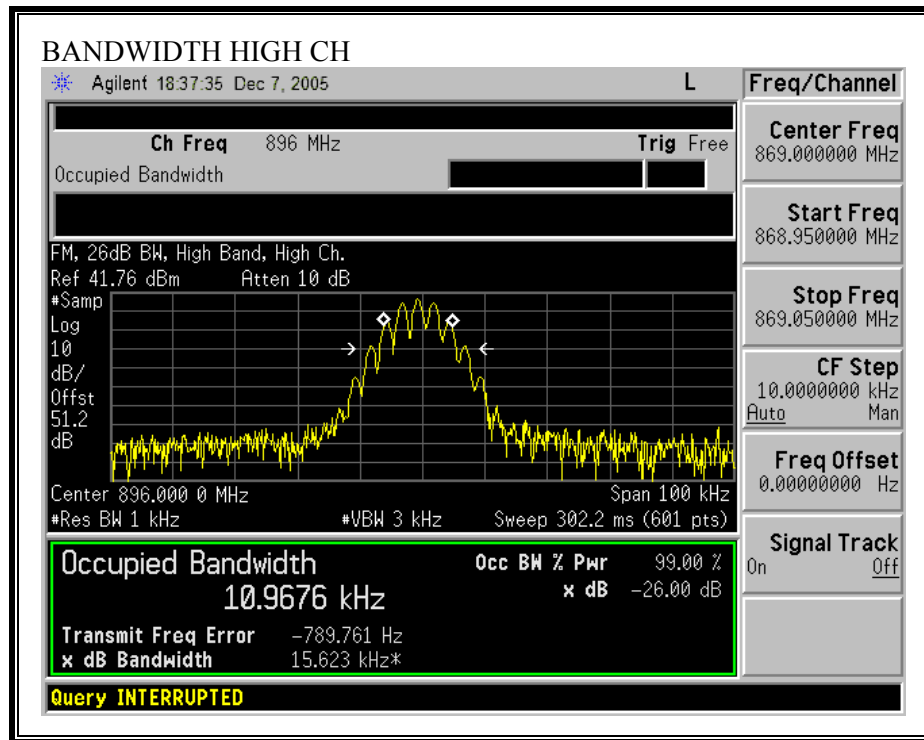
FM 26 dB BANDWIDTH - INPUT





FM 26 dB BANDWIDTH -OUTPUT





7.2. FM EMISSION LIMITATION

LIMIT

§22.861(a): Emissions mask. The power of any emission in each of the adjacent channels must be at least 30dB below the power of the total emission. The power of any emission in any of the channels other than the one being used and adjacent channels must be at least 50 dB below the power of the total emission.

§90.210(c): For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5 kHz, but no more than 10 kHz: At least $83 \log (fd/5)$ dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least $29 \log (fd/11)$ dB or 50 dB, whichever is the lesser attenuation;

(3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log (P)$ dB.

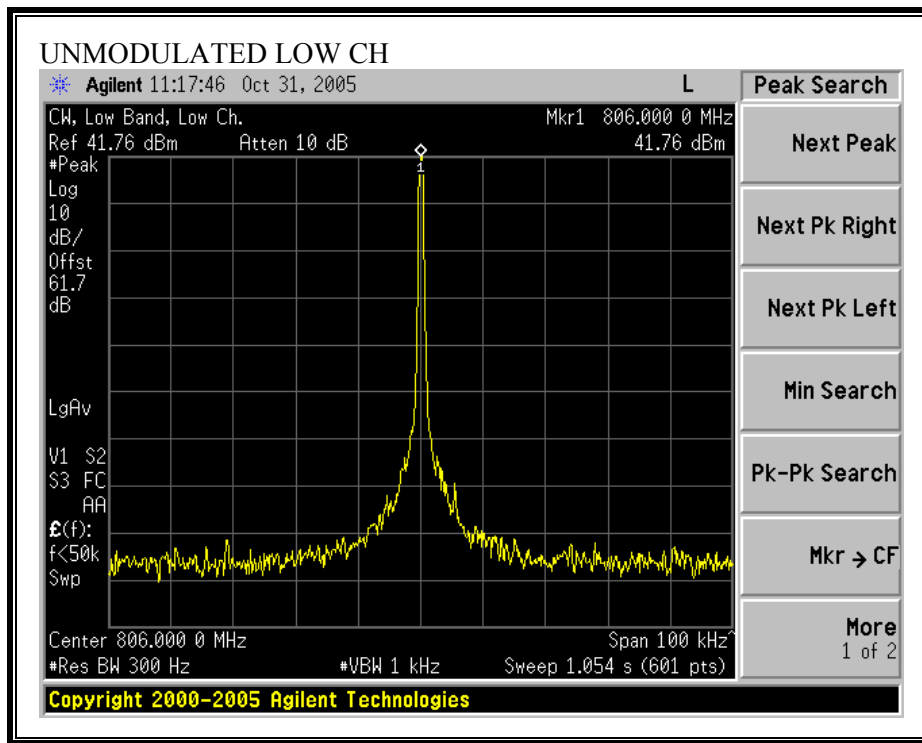
TEST PROCEDURE

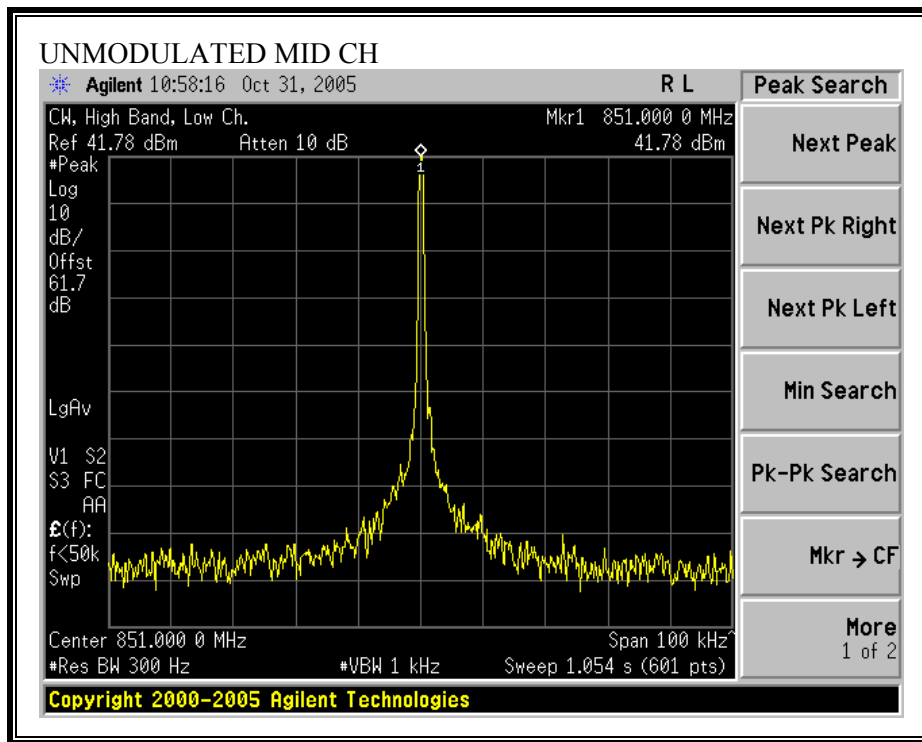
ANSI / TIA / EIA 603 Clause 3.2.11

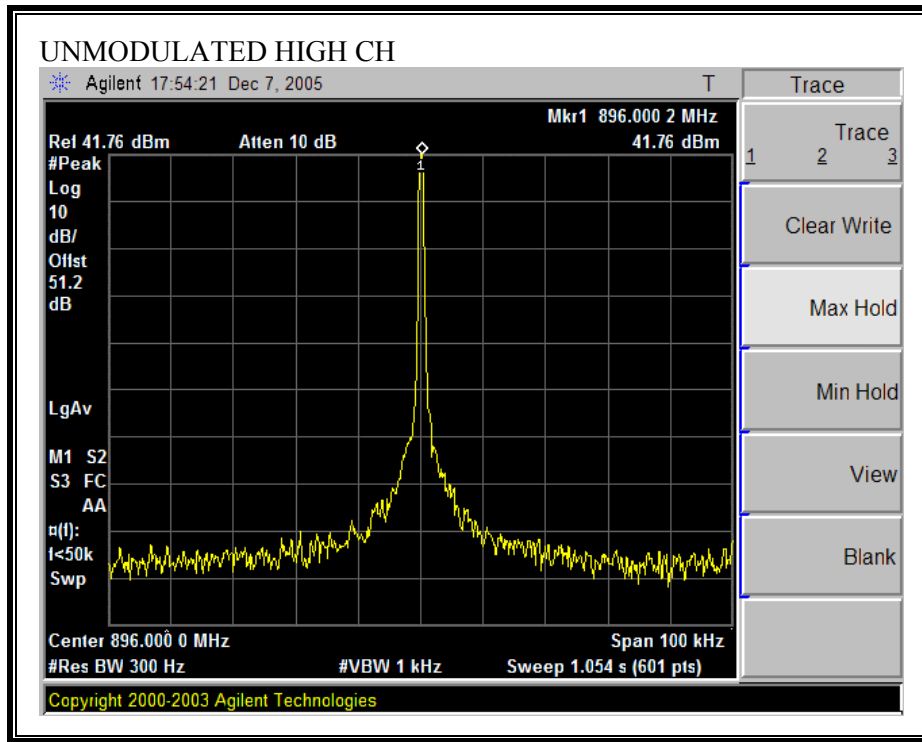
RESULTS

No non-compliance noted:

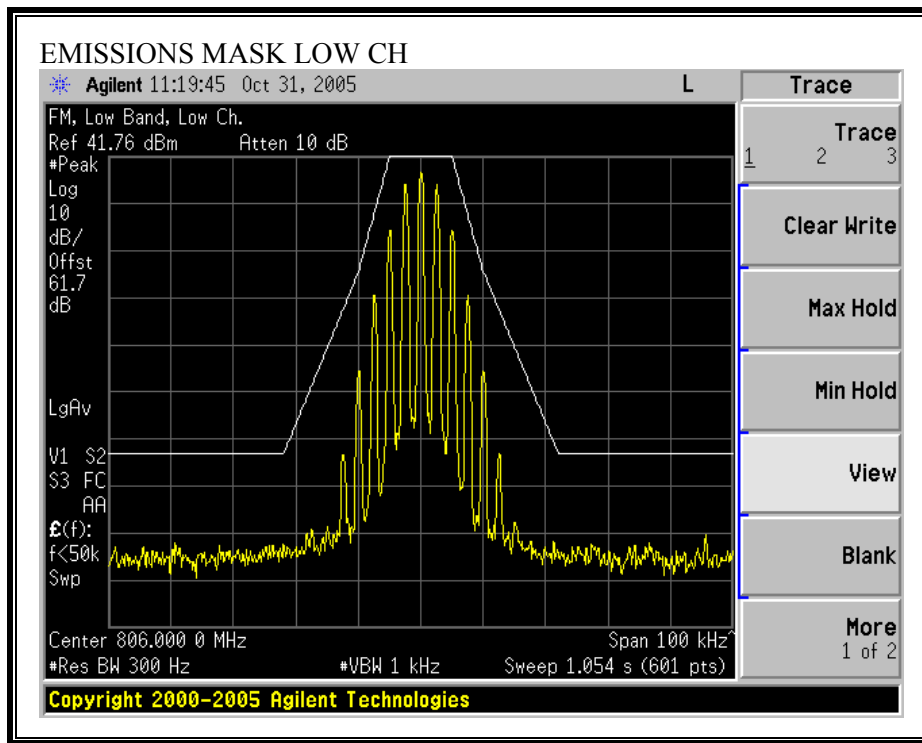
Unmodulated Signal:

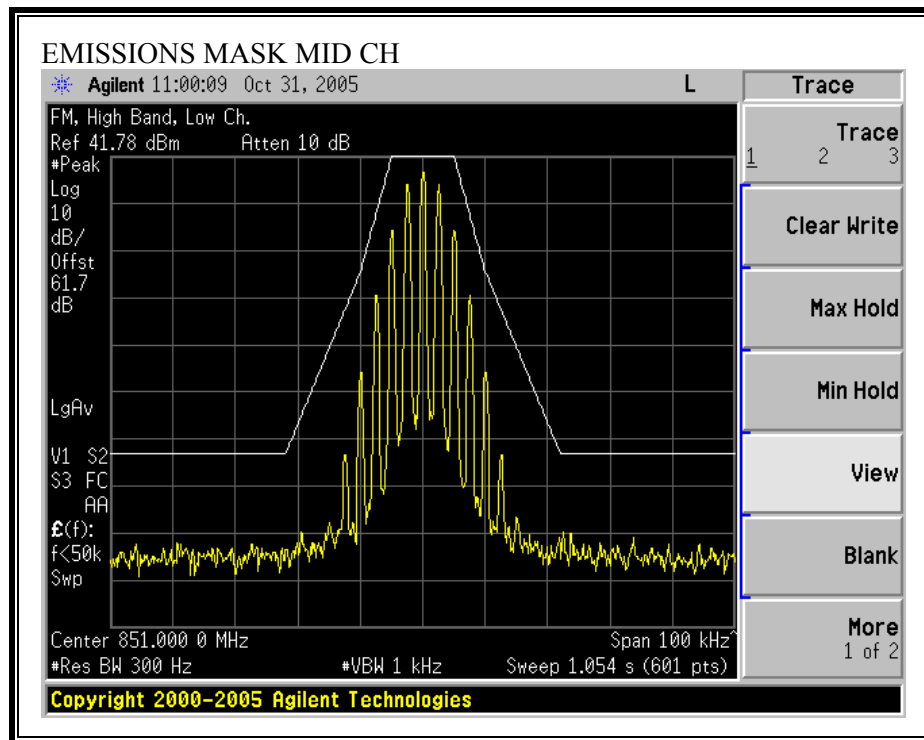


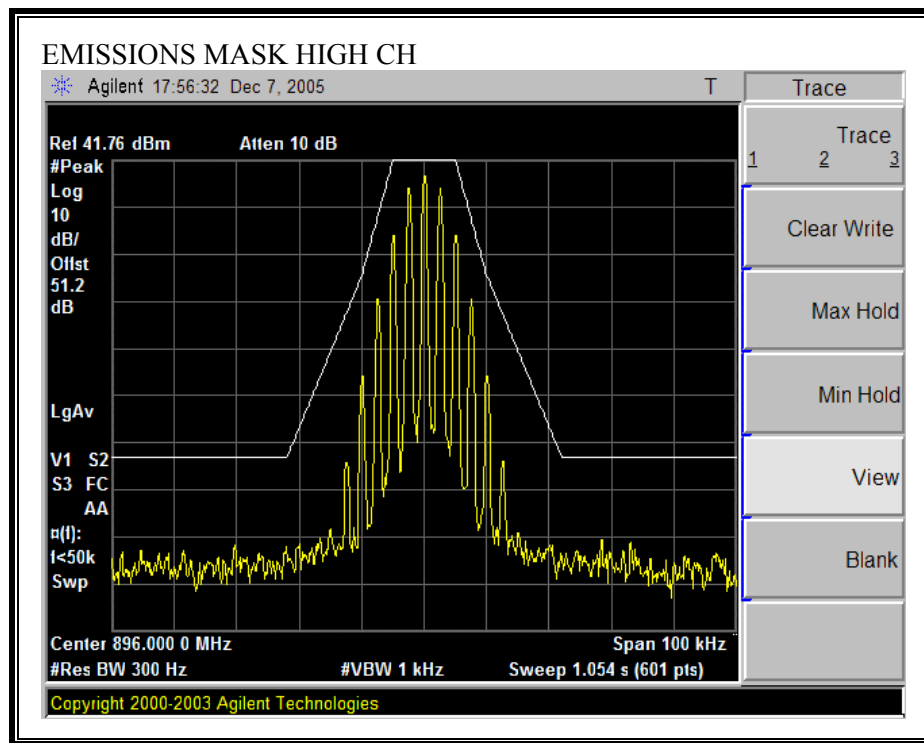




FM EMISSIONS MASK







7.3. MODULATION CHARACTERISTICS

Not Applicable. Due to this EUT is a power amplifier and has no Mix circuitry to modulate the RF signal.

7.4. RF POWER OUTPUT

LIMIT

§22.809(b) airborne mobile transmitters 894 – 896MHz:

The transmitter power output of airborne mobile transmitters must not exceed 25 Watts and must not be less than 4 Watts.

§90.205(n) All other frequency bands. Requested transmitter power will be considered and authorized on a case by case basis.

§90.205(o) The output power shall not exceed by more than 20 percent either the output power shown in the Radio Equipment List or when not so listed, the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 3.2.1

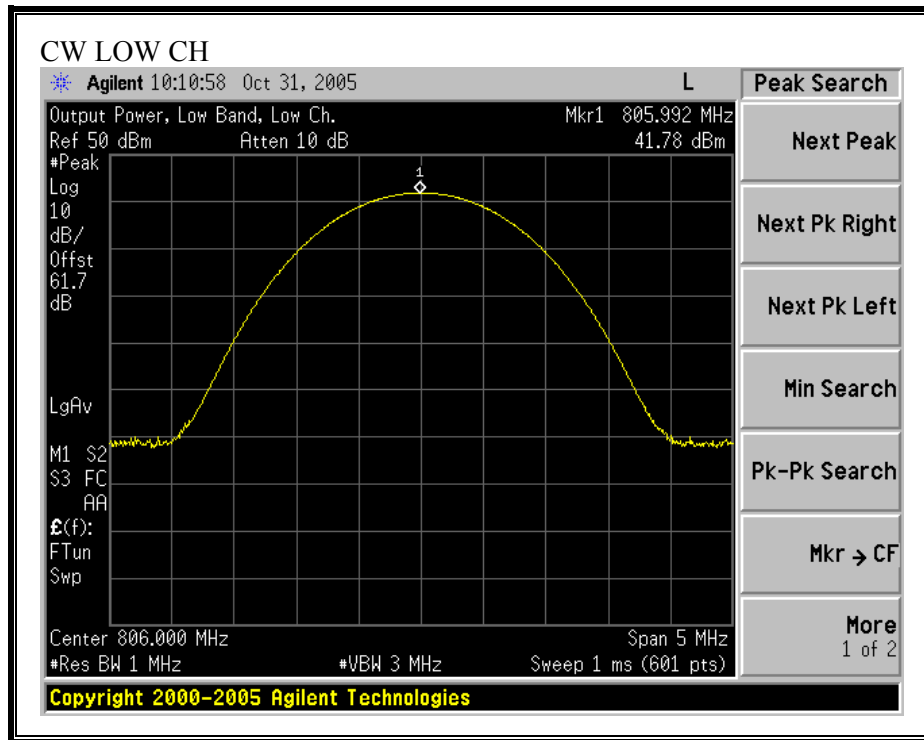
RESULTS

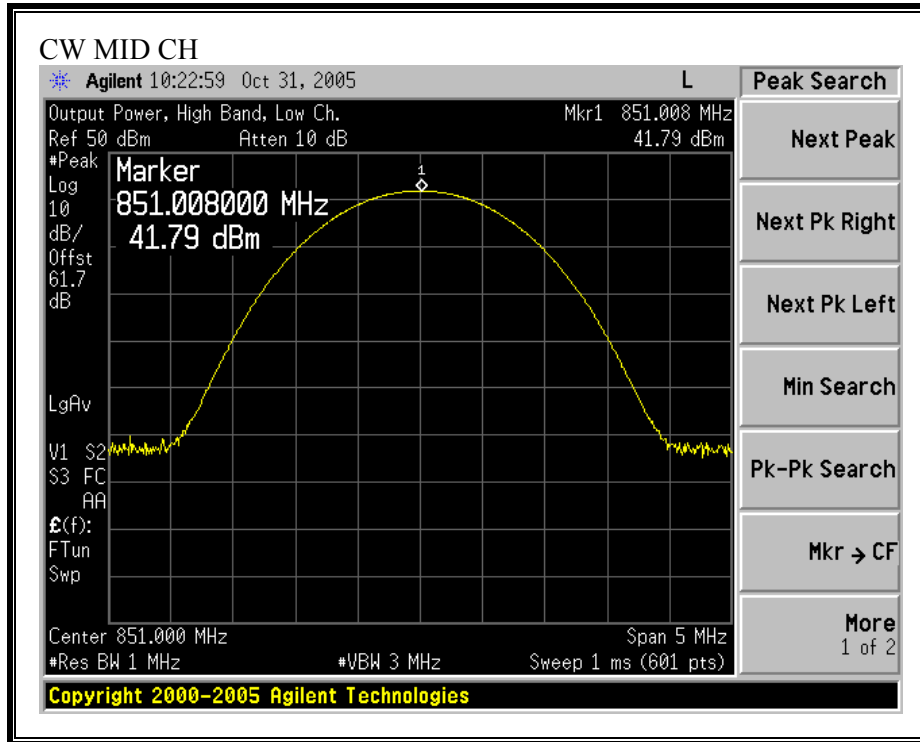
No non-compliance noted.

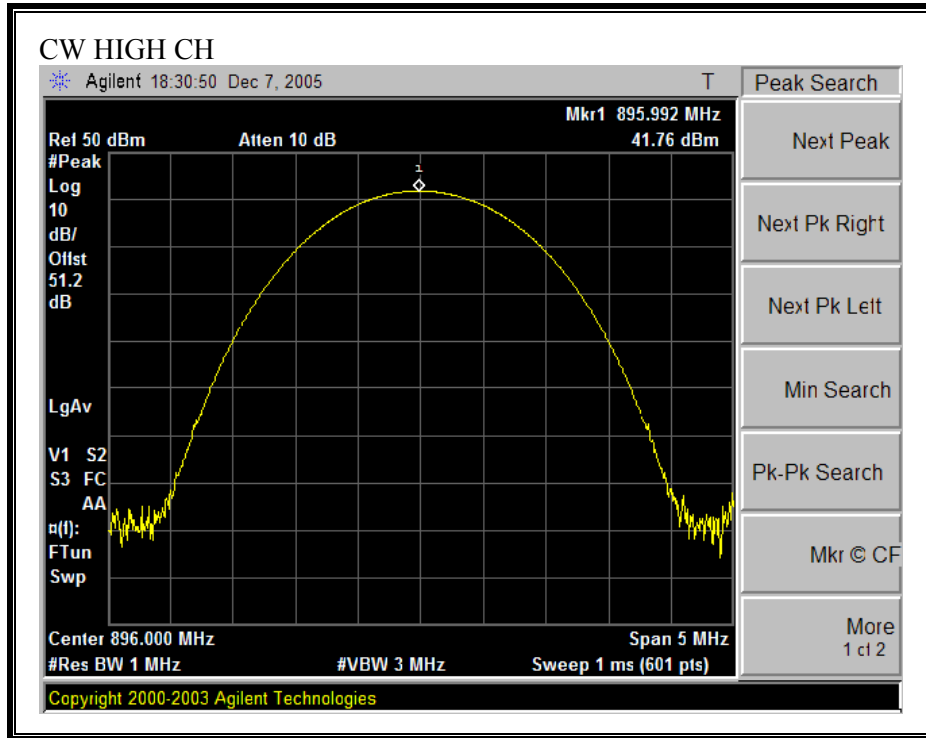
CW Output Power

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	806	41.78	15.07
Middle	851	41.79	15.10
High	896	41.76	15.00

Conducted Output Power







7.5. VOLTAGE STABILITY

LIMIT

§22.809(b) airborne mobile transmitters 894 – 896MHz:

The transmitter power output of airborne mobile transmitters must not exceed 25 Watts and must not be less than 4 Watts.

§90.205(n) All other frequency bands. Requested transmitter power will be considered and authorized on a case by case basis.

§90.205(o) The output power shall not exceed by more than 20 percent either the output power shown in the Radio Equipment List or when not so listed, the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 3.2.1

RESULTS

No non-compliance noted.

Conducted Output Power vs Voltage

CW Output Power vs Voltage

Channel Frequency (MHz)	Output Power at normal voltage 28 VDC	Output Power at 85% voltage 23.8 VDC	Output Power at 115% voltage 32.2 VDC
806	41.76 dBm / 15.00 W	41.59 dBm / 14.42 W	41.72 dBm / 14.86 W
851	41.79 dBm / 15.10 W	41.66 dBm / 14.66 W	41.76 dBm / 15.00 W
869	41.76 dBm / 15.00 W	41.47 dBm / 14.03 W	41.74 dBm / 14.93 W

7.6. SPURIOUS EMISSION AT ANTENNA TERMINAL

LIMIT

§22.917(a) and §90.210 Out of band emissions, The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

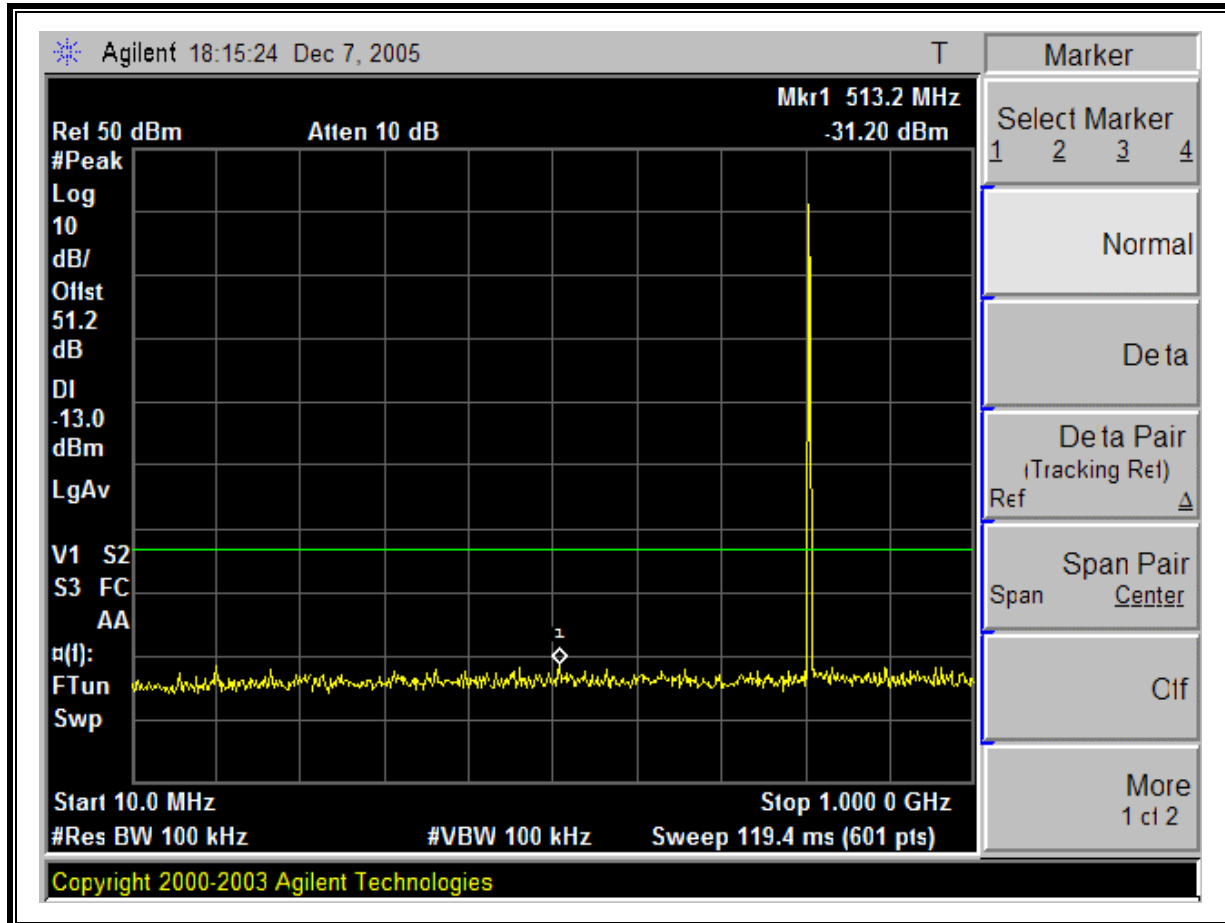
TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 3.2.1.3, FCC 22.917 (a) & FCC 90.210

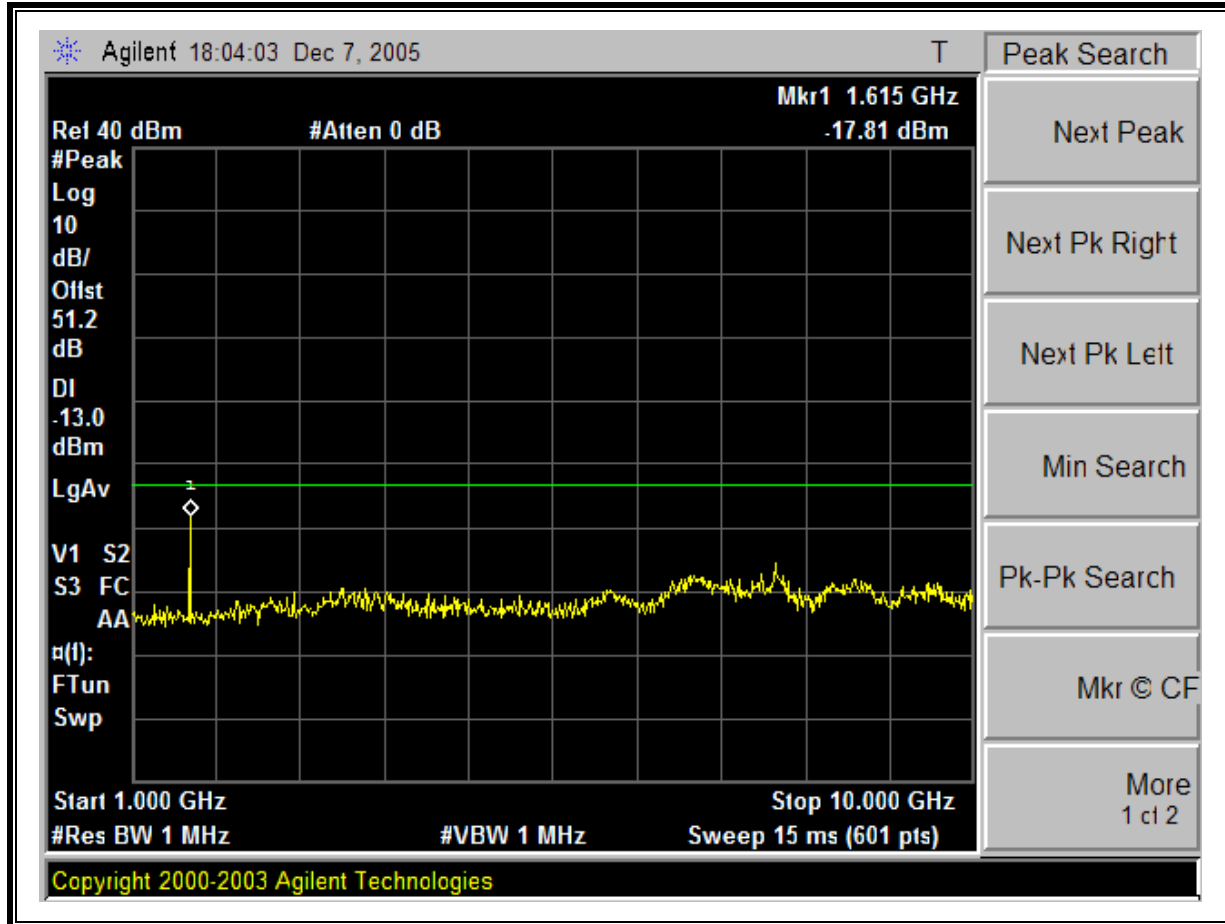
RESULTS

No non-compliance noted.

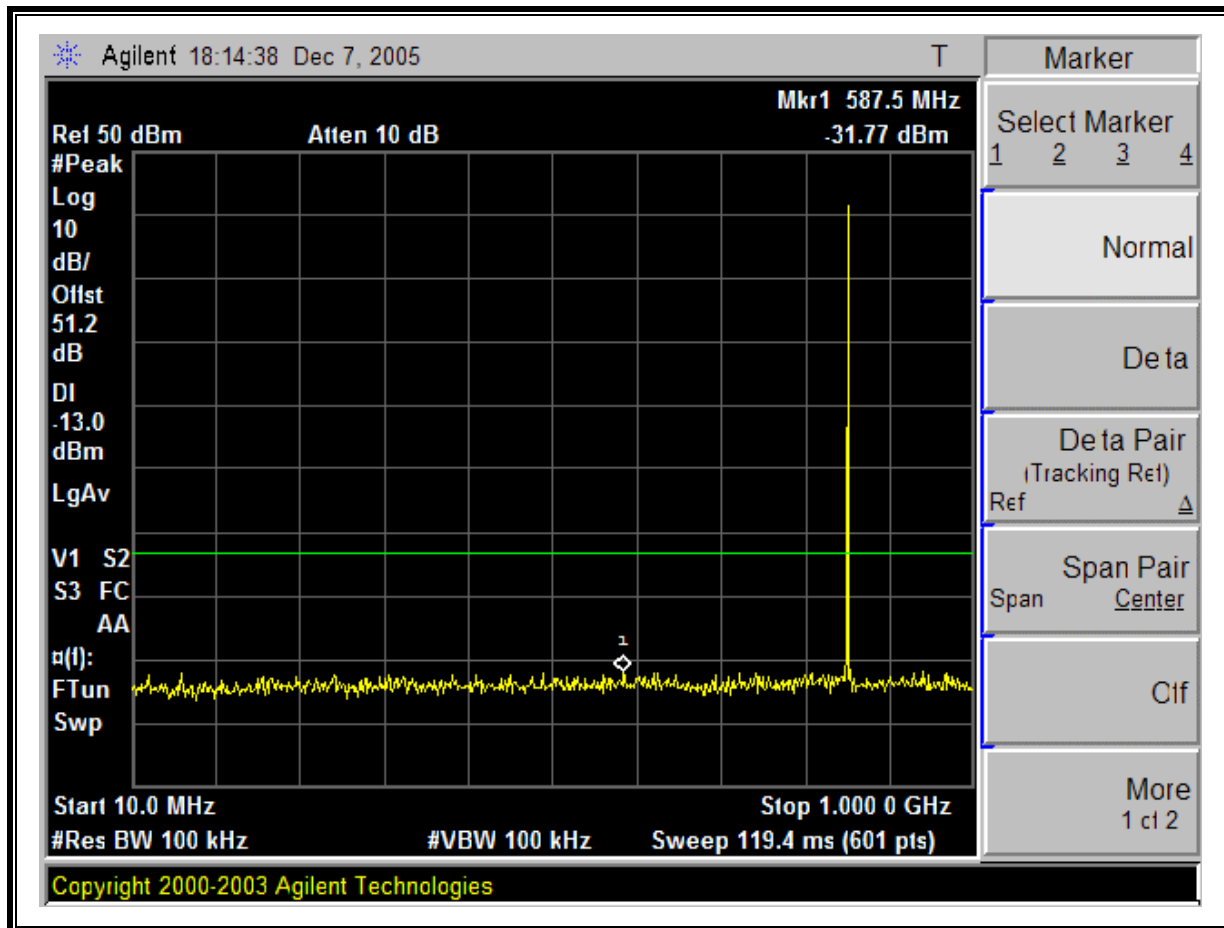
Low Channel, CW, 10Mz to 1000MHz



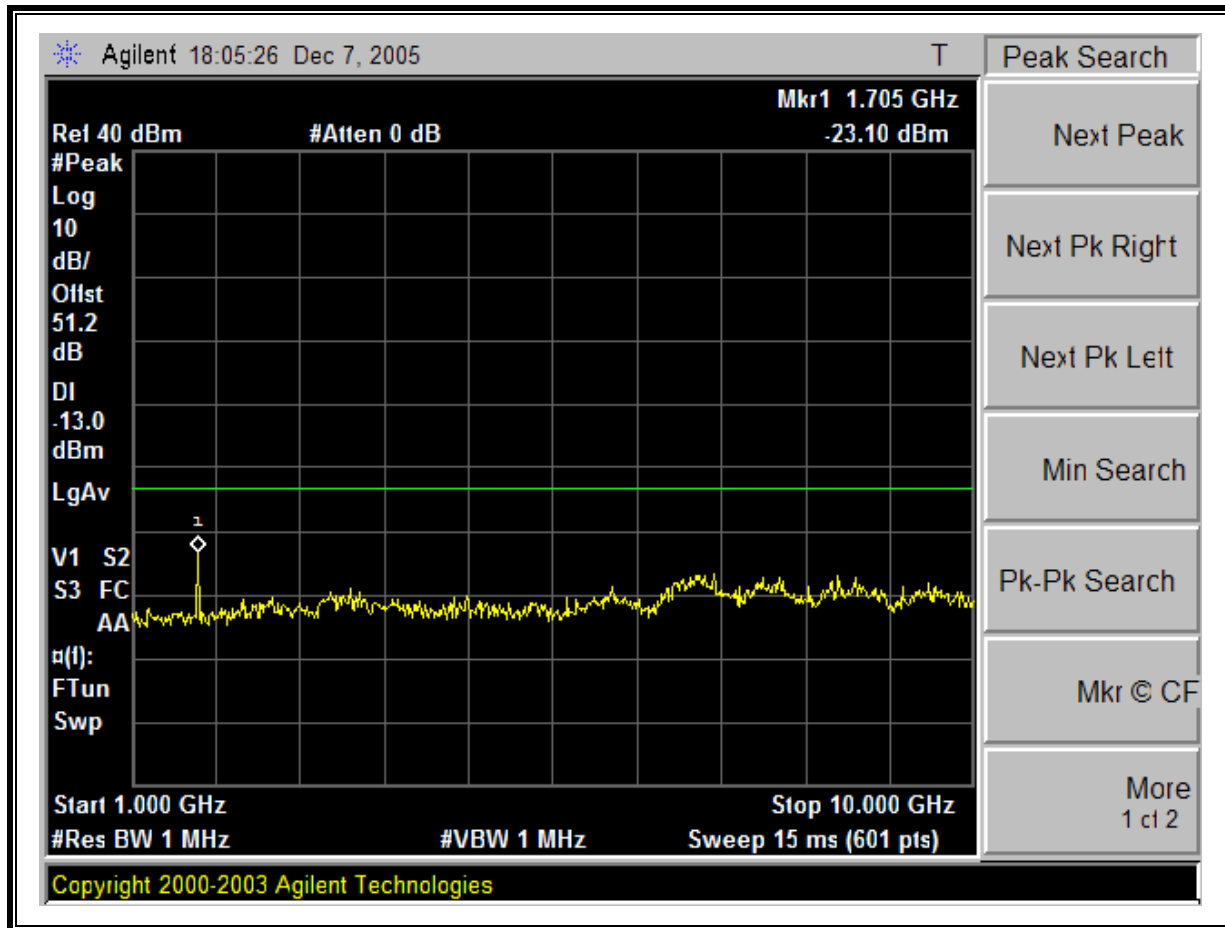
Low Channel, CW, 1GHz to 10GHz



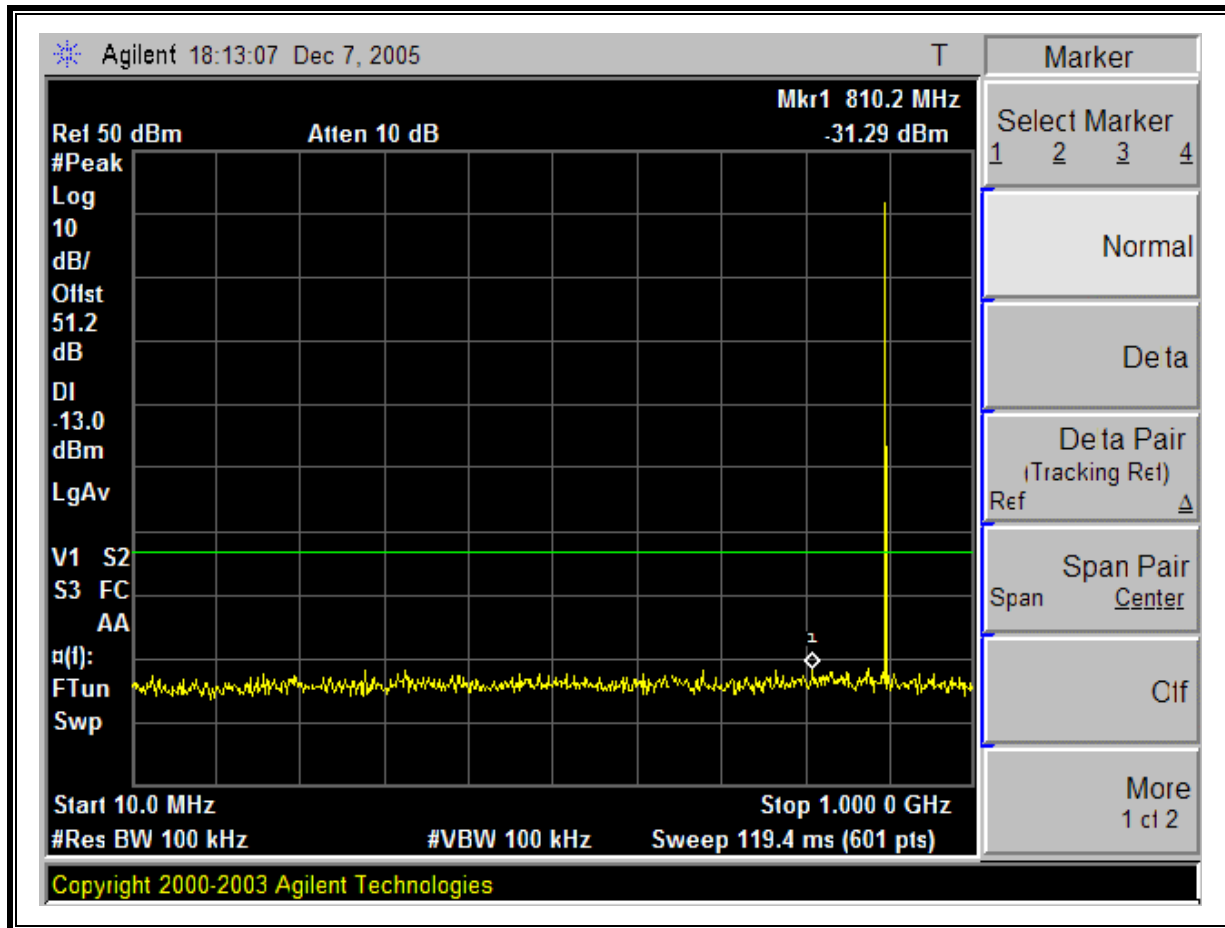
Mid Channel, CW, 10MHz to 1000MHz



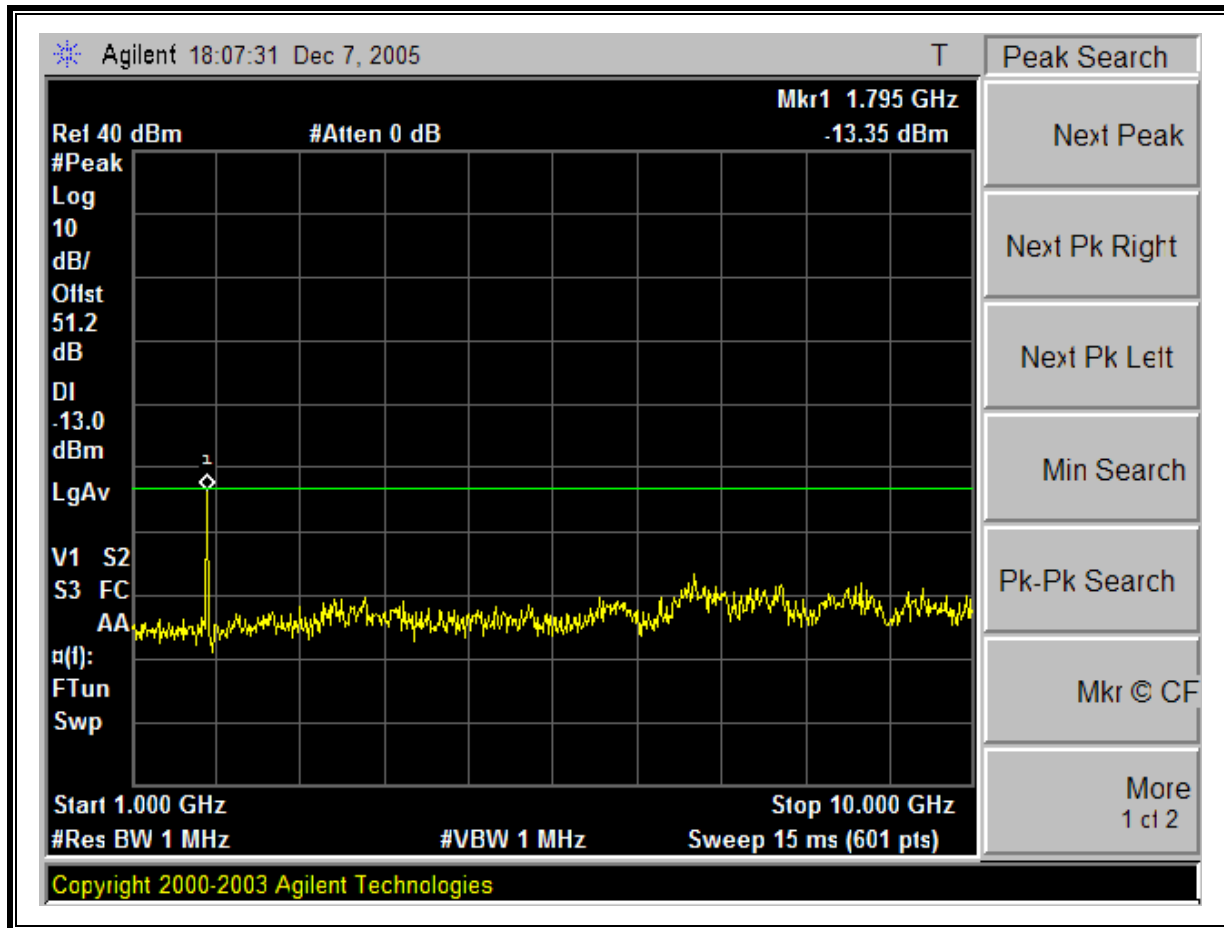
Mid Channel, CW, 1GHz to 10GHz



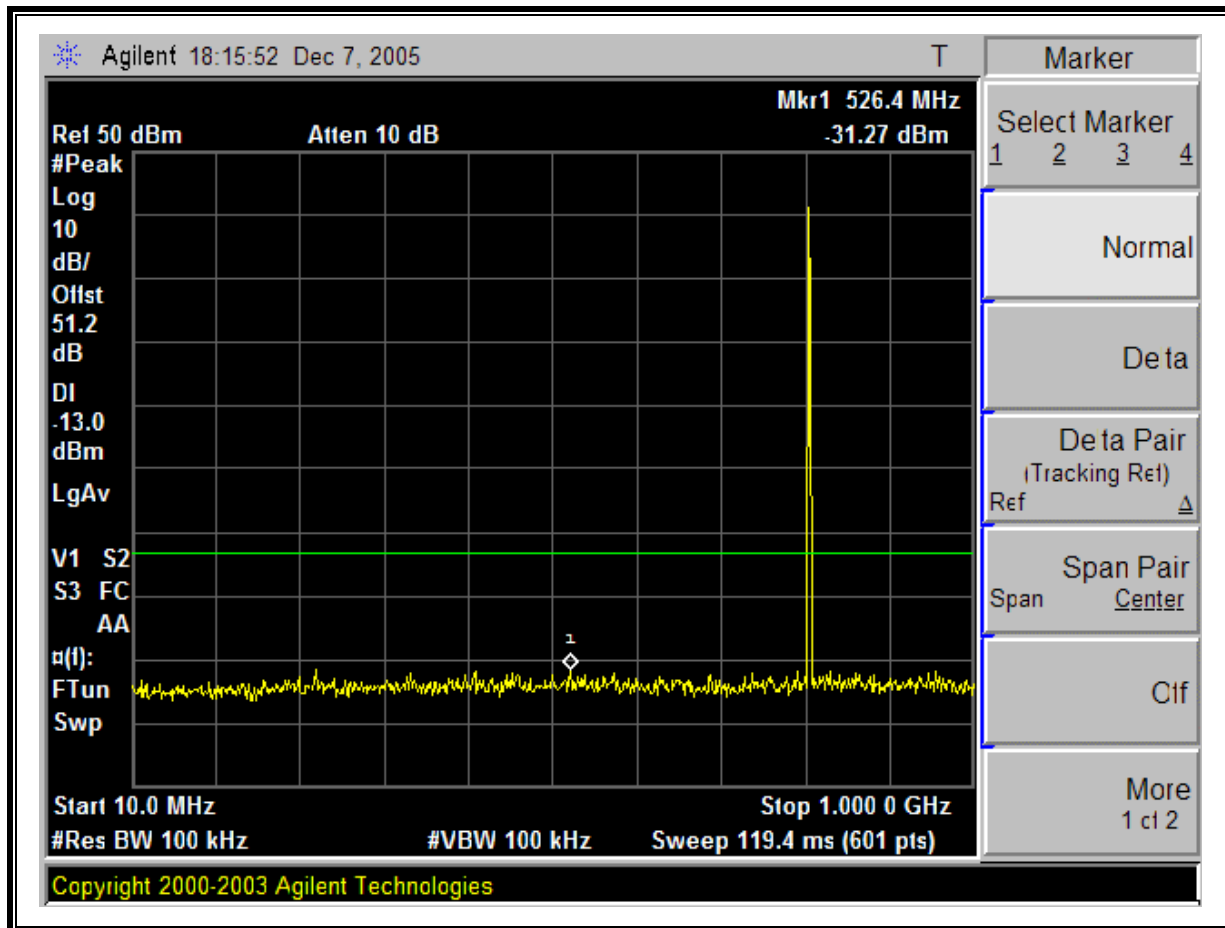
High Channel, CW, 10MHz to 1000MHz



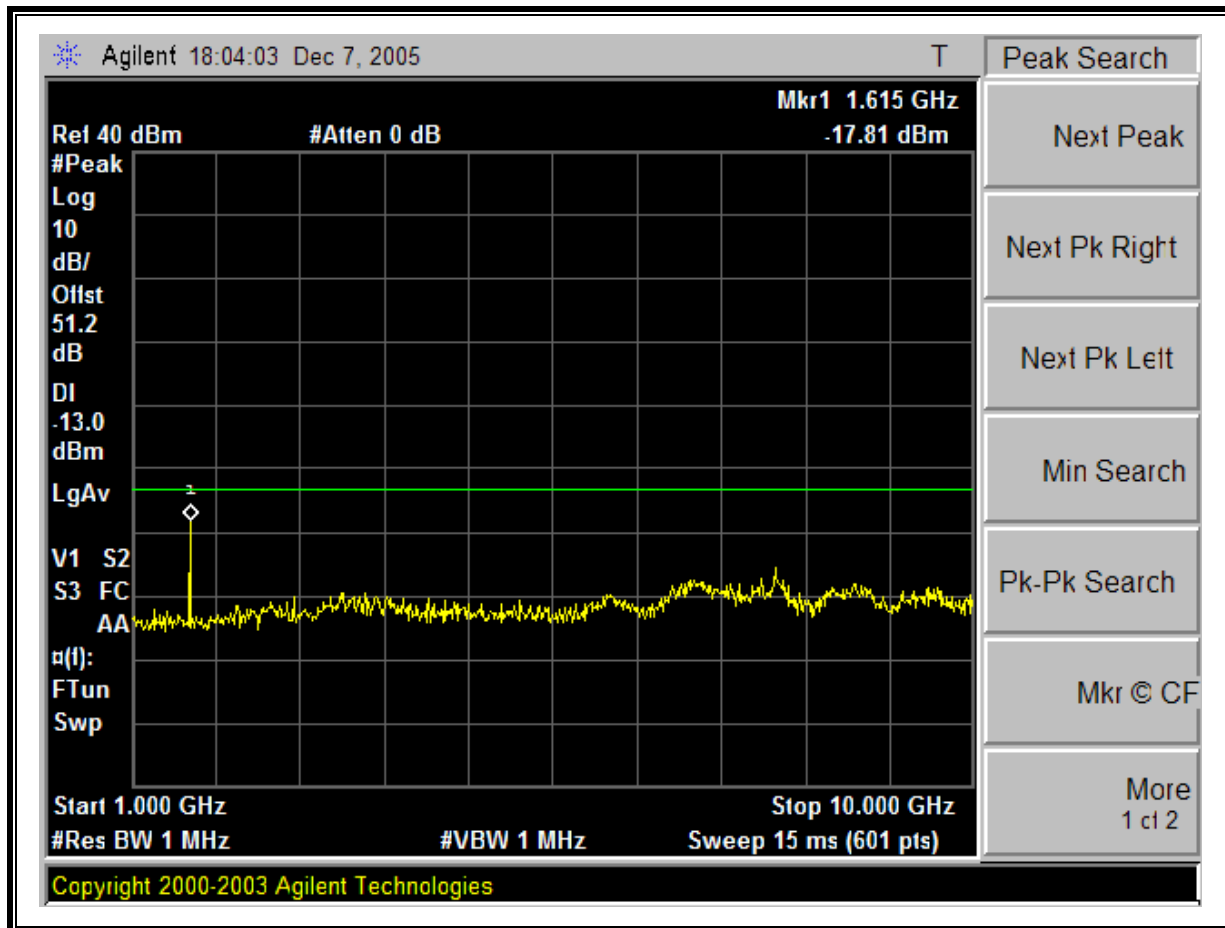
High Channel, CW, 1GHz to 10GHz



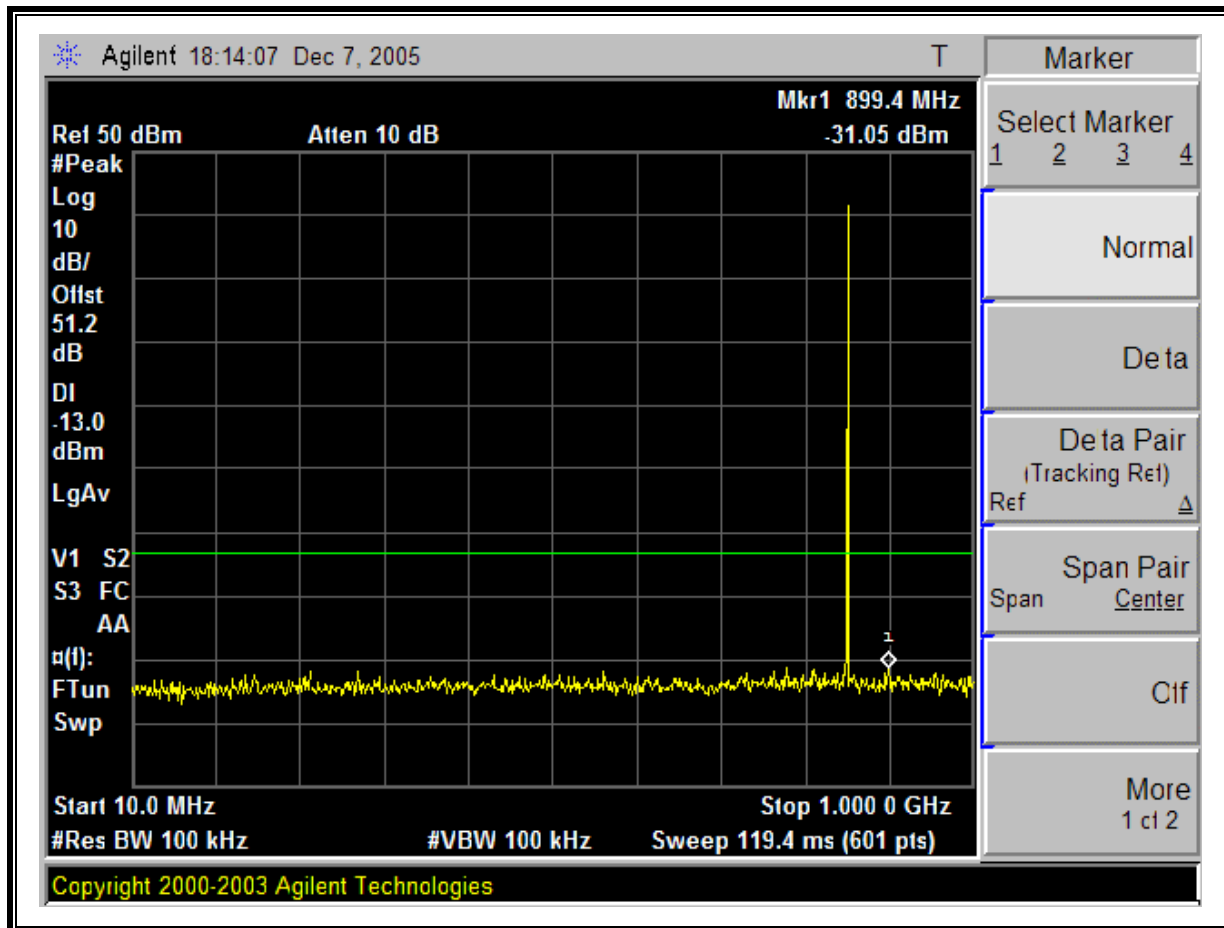
Low Channel, FM, 10Mz to 1000MHz



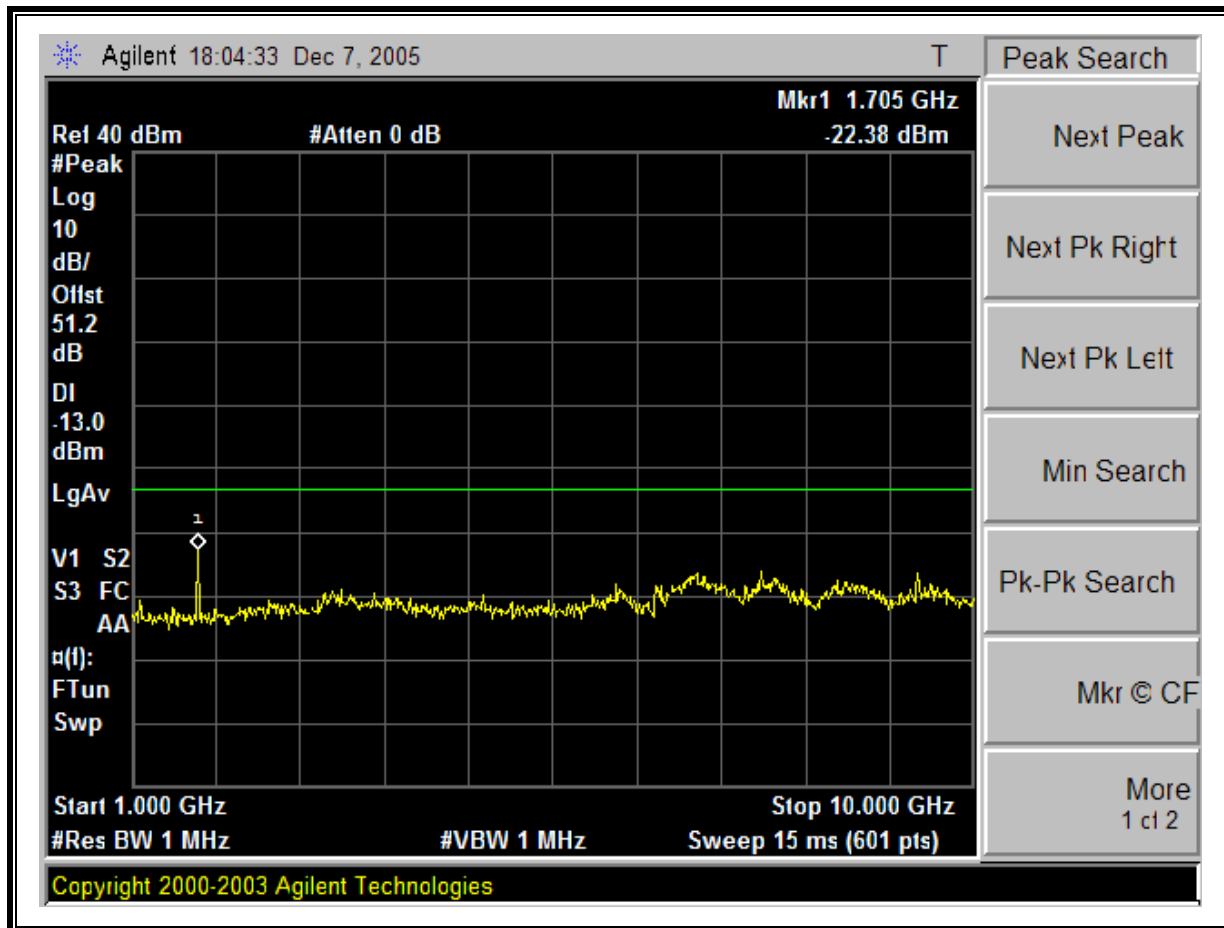
Low Channel, FM, 1GHz to 10GHz



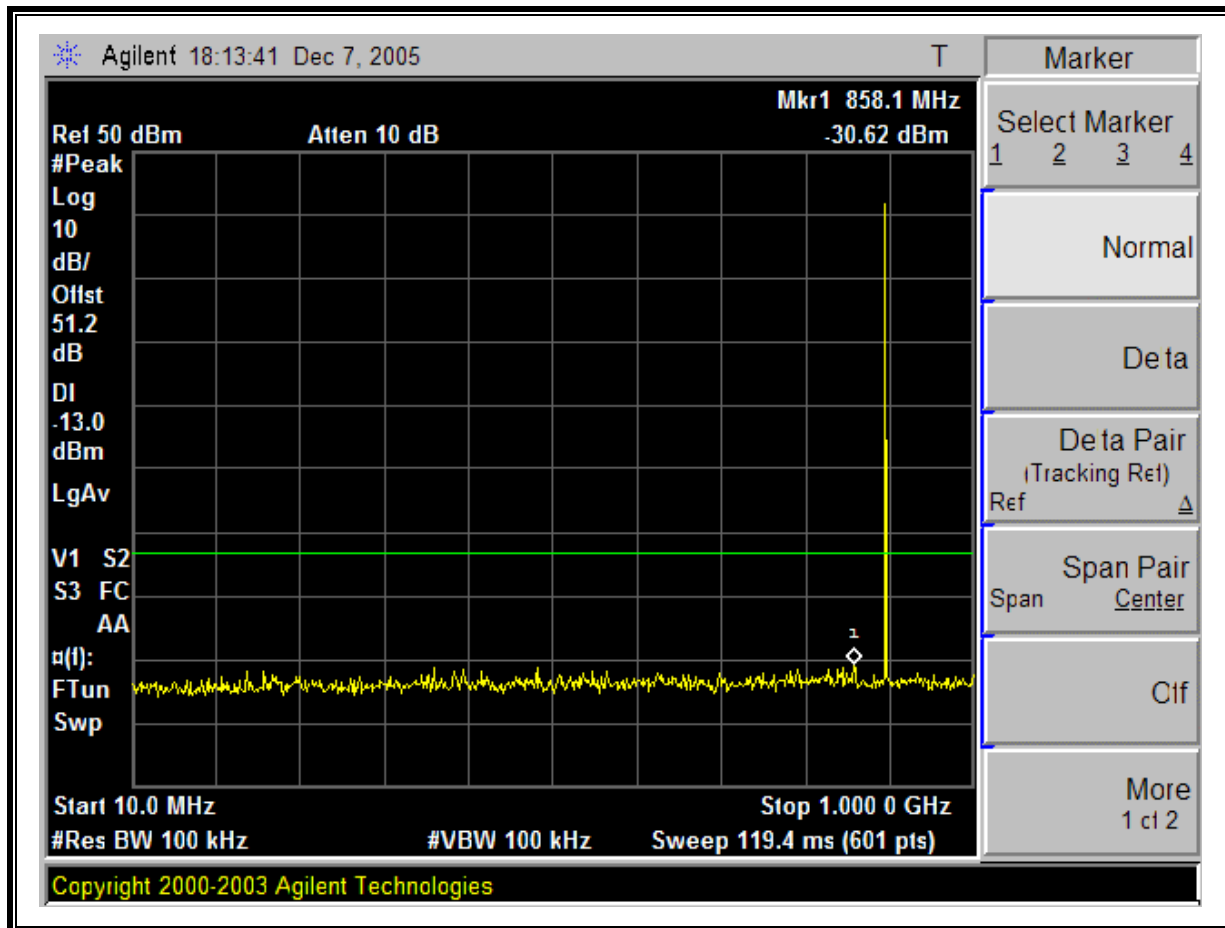
Mid Channel, FM, 10Mz to 1000MHz



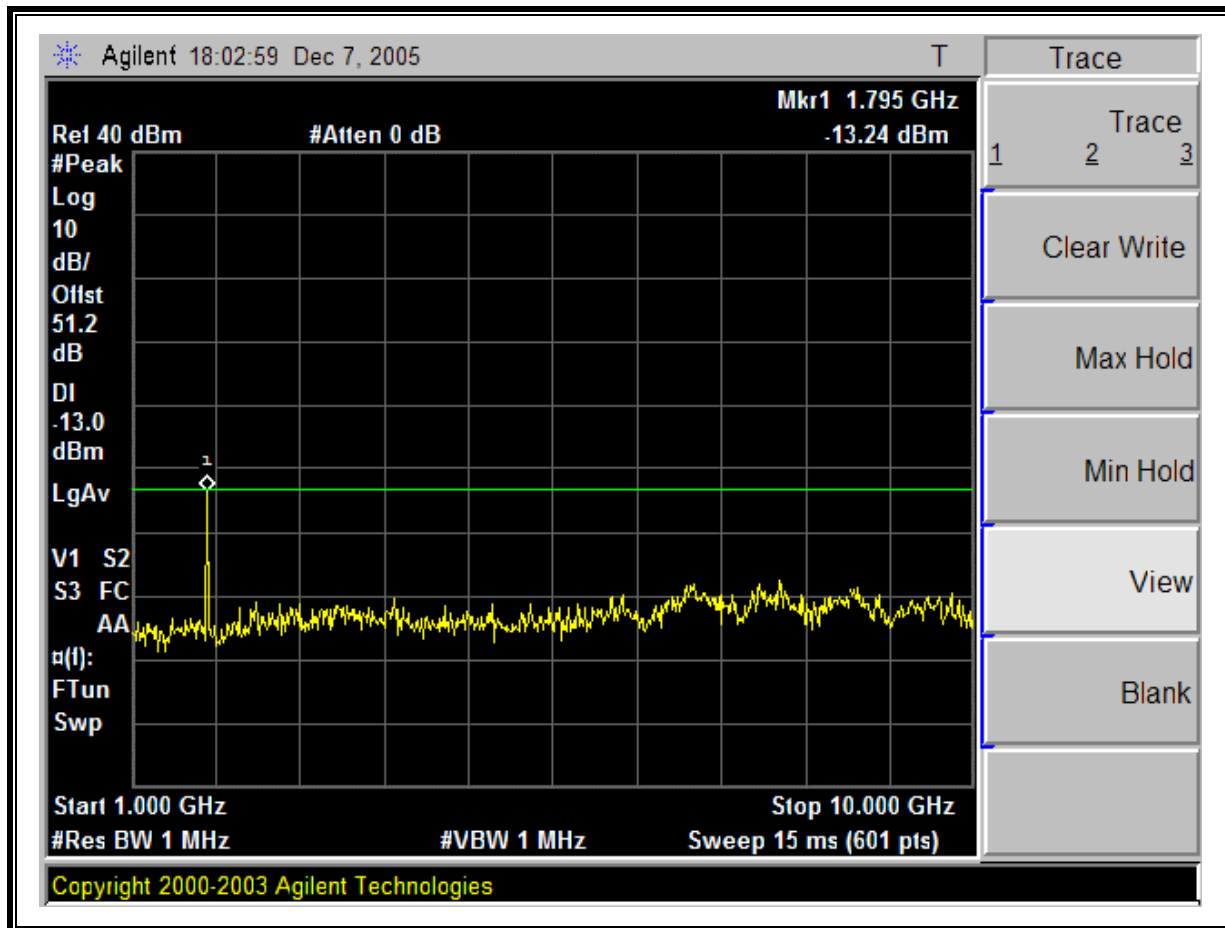
Mid Channel, FM, 1GHz to 10GHz



High Channel, FM, 10Mz to 1000MHz



High Channel, FM, 1GHz to 10GHz



7.7. FIELD STRENGTH OF SPURIOUS RADIATION

LIMIT

§22.917 (a) & FCC 90.210 Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB.

TEST PROCEDURE

ANSI / TIA / EIA 603 Clause 3.2.1.2, FCC 22.917 (a) & FCC 90.210

RESULTS

No non-compliance noted.

7.7.1. 30MHz TO 1000MHz SPURIOUS RADIATION

10/27/05
30 - 1000MHz Substitution Measurement

Compliance Certification Services, Morgan Hill 5m Chamber Site

Test Engr: Chin Pang
Project #: 05U3796-1
Company: Canam Technology
EUT Descrip.: RF Power Amplifier, 806 - 896MHz, DC Powered
EUT M/N: CT-M4-PA-8
Test Target: FCC Part 22 & 90
Mode Oper: Tx

Test Equipment:

Bilog Antenna

Cable

Pre-amplifier 8447D

Limit

5m Chamber Sunol Bilog

5m Chamber Cable

T5 8447D

ERP

f MHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
Low ch										
251.20	60.9	H	-48.1	1.9	6.1	3.9	-46.1	-13.0	-33.1	
420.60	54.8	H	-49.7	2.4	6.1	3.9	-48.2	-13.0	-35.2	
665.00	53.6	H	-48.1	3.0	6.8	4.7	-46.5	-13.0	-33.5	
325.00	47.0	V	-59.7	2.2	6.0	3.9	-58.0	-13.0	-45.0	
398.00	48.9	V	-56.2	2.4	6.0	3.9	-54.7	-13.0	-41.7	
671.48	41.0	V	-60.0	3.1	6.8	4.6	-58.4	-13.0	-45.4	
Mid Ch										
94.50	62.9	H	-49.7	1.3	-0.5	-2.7	-53.7	-13.0	-40.7	
237.70	45.6	H	-64.0	1.9	6.0	3.8	-62.1	-13.0	-49.1	
382.10	48.2	H	-56.4	2.3	6.0	3.9	-54.8	-13.0	-41.8	
140.50	52.8	V	-55.6	1.5	-0.9	-3.0	-60.1	-13.0	-47.1	
230.00	51.0	V	-58.8	1.9	5.9	3.8	-56.9	-13.0	-43.9	
330.01	52.2	V	-54.4	2.2	6.0	3.9	-52.7	-13.0	-39.7	
High Ch										
212.50	45.3	H	-65.2	1.9	5.8	3.6	-63.4	-13.0	-50.4	
401.30	47.9	H	-56.8	2.4	6.0	3.9	-55.3	-13.0	-42.3	
330.10	41.2	H	-64.5	2.2	6.0	3.9	-62.8	-13.0	-49.8	
140.50	52.5	V	-55.9	1.5	-0.9	-3.0	-60.4	-13.0	-47.4	
230.00	54.5	V	-55.3	1.9	5.9	3.8	-53.4	-13.0	-40.4	
291.60	55.4	V	-52.4	2.1	6.0	3.9	-50.6	-13.0	-37.6	

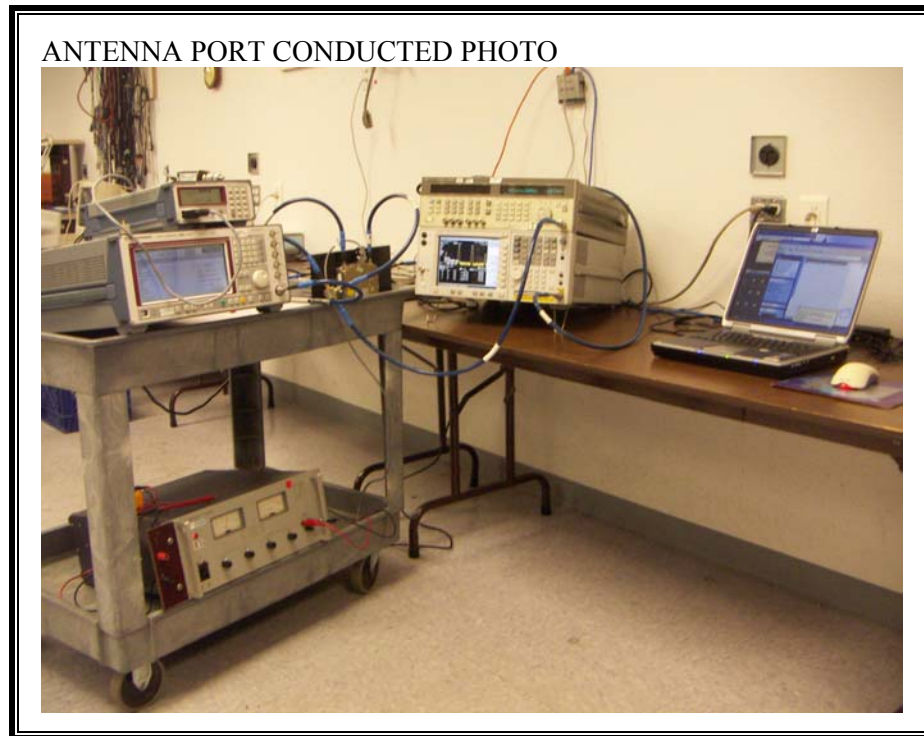
7.7.2. ABOVE 1000MHz SPURIOUS RADIATION

Spurious & Harmonic (ERP)

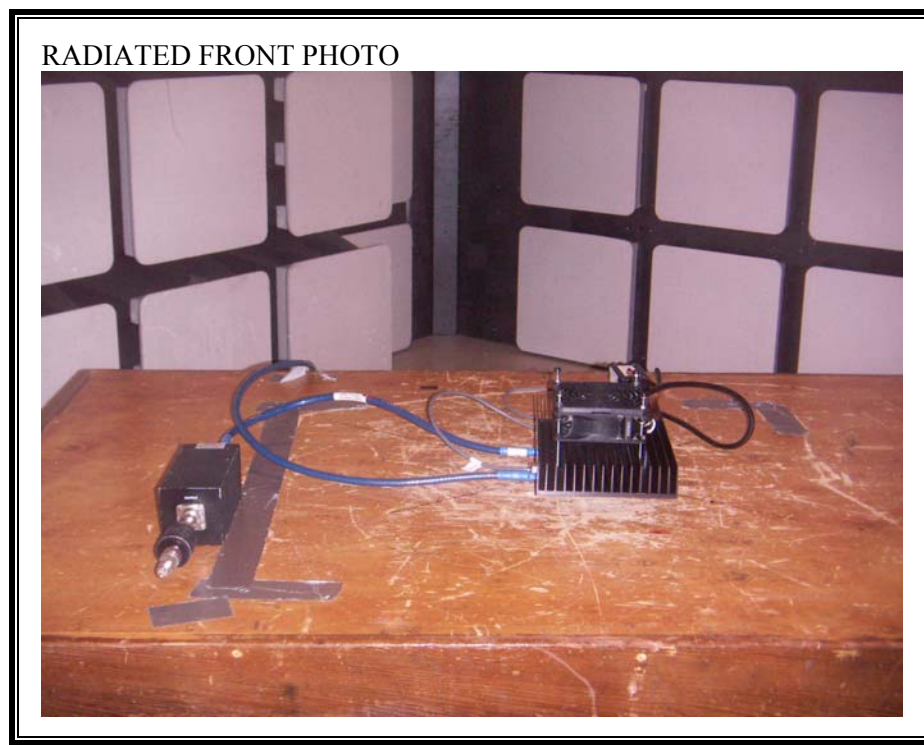
10/27/05 High Frequency Substitution Measurement Compliance Certification Services, Morgan Hill 5m Chamber Site											
Test Engr: Chin Pang Project #:06U3789-1 Company: Canam Technology EUT Descrip.:RF Power Amplifier 806 - 896MHz, DC Powered EUT M/N:M4-PA-8 Test Target:FCC Part 22 & 90 Mode Oper:TX s/n: 1337 Test Equipment:											
EMCO Horn 1-18GHz T119; S/N: 29301 @3m		Horn > 18GHz		Limit FCC 22		☒ High Pass Filter					
Hi Frequency Cables ☐ (2 ft) ☒ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☒ (12 ft)				Pre-amplifier 1-26GHz T87 Miteq 924342		Pre-amplifier 26-40GHz					
f GHz	SA reading (dBuV/m)	Ant. Pol. (H/V)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes	
Low Ch. 806MHz											
1.616	74.0	H	-29.7	1.6	3.9	1.8	-29.5	-13.0	-16.5		
2.424	65.0	H	-36.7	1.9	6.6	4.4	-34.2	-13.0	-21.2		
3.228	60.0	H	-39.4	2.2	7.6	5.4	-36.3	-13.0	-23.3		
1.613	75.0	V	-29.4	1.6	3.9	1.7	-29.2	-13.0	-16.2		
1.870	60.0	V	-42.9	1.7	4.2	2.1	-42.4	-13.0	-29.4		
2.418	61.5	V	-40.4	1.9	6.6	4.4	-37.9	-13.0	-24.9		
3.229	59.1	V	-40.4	2.2	7.6	5.4	-37.3	-13.0	-24.3		
Mid Ch. 851MHz											
1.702	76.8	H	-26.4	1.6	4.0	1.9	-26.1	-13.0	-13.1		
2.553	67.5	H	-33.7	2.0	6.7	4.5	-31.1	-13.0	-18.1		
3.404	62.4	H	-36.8	2.3	7.9	5.8	-33.3	-13.0	-20.3		
4.255	58.2	H	-40.2	2.7	9.6	7.4	-35.4	-13.0	-22.4		
1.702	74.1	V	-29.8	1.6	4.0	1.9	-29.5	-13.0	-16.5		
2.553	61.7	V	-39.7	2.0	6.7	4.5	-37.1	-13.0	-24.1		
3.404	60.6	V	-38.7	2.3	7.9	5.8	-35.2	-13.0	-22.2		
4.255	56.8	V	-41.9	2.7	9.6	7.4	-37.1	-13.0	-24.1		
High Ch. 896MHz											
1.792	86.0	H	-16.6	1.7	4.1	2.0	-16.3	-13.0	-3.3		
2.688	65.1	H	-35.6	2.0	6.8	4.6	-33.0	-13.0	-20.0		
3.584	60.0	H	-39.0	2.4	8.3	6.2	-35.2	-13.0	-22.2		
4.480	57.4	H	-41.1	2.8	9.8	7.7	-36.2	-13.0	-23.2		
1.792	84.0	V	-19.3	1.7	4.1	2.0	-19.0	-13.0	-6.0		
2.688	63.2	V	-37.7	2.0	6.8	4.6	-35.1	-13.0	-22.1		
3.584	58.4	V	-40.7	2.4	8.3	6.2	-36.9	-13.0	-23.9		
4.480	55.0	V	-43.8	2.8	9.8	7.7	-38.9	-13.0	-25.9		
Note: No other emissions were detected above the system noise floor up to 10th harmonic.											

8. SETUP PHOTOS

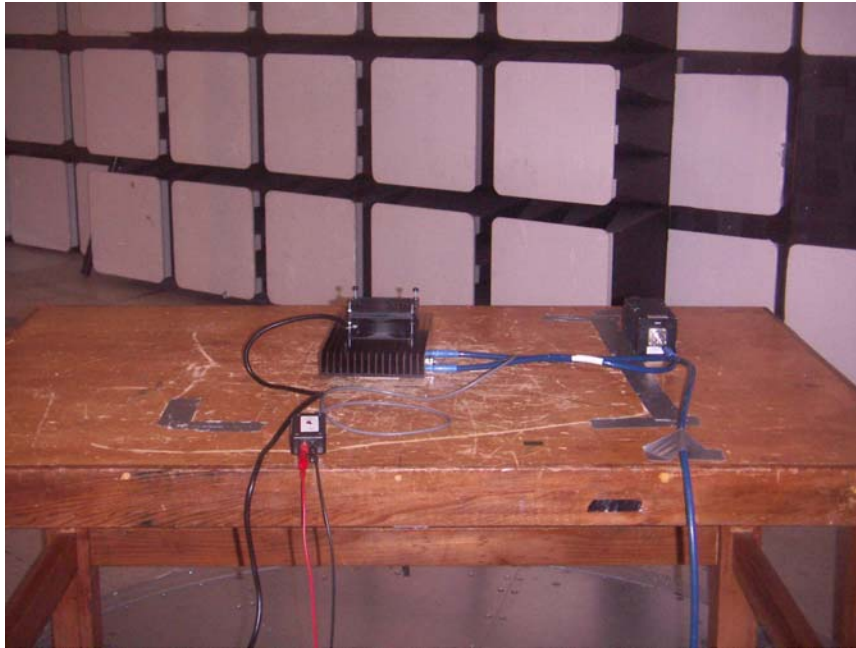
ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



RADIATED RF MEASUREMENT SETUP



RADIATED BACK PHOTO



END OF REPORT