FCC CFR47 PART 90, SUBPART I
CERTIFICATION TEST REPORT

FOR

RF POWER AMPLIFIER

MODEL NUMBER: PA8-1AC

FCC: BBD8-1AC

REPORT NUMBER: 10U12123-1

ISSUE DATE: MARCH 24, 2010

Prepared for
TPL COMMUNICATIONS, INC.
3370 SAN FERNANDO ROAD, SUITE 206
LOS ANGELES, CA 90065, USA

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
---	03/24/10	Initial Issue	T. Chan

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: TPL COMMUNICATIONS, INC.
3370 SAN FERNANDO ROAD, SUITE 206
LOS ANGELES, CA 90065 USA

EUT DESCRIPTION: RF POWER AMPLIFIER

MODEL: PA3-1FE

SERIAL NUMBER: 1002

DATE TESTED: MARCH 22-24, 2010

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 90 SUBPART I	**PASS**

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For CCS By:

THU CHAN
ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHIN PANG
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, and FCC CFR 47 Part 90.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

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. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a RF Power Amplifier, the operation frequency range is: 806-869MHz, 50 Watts. The radio module is manufactured by TPL Communications, Inc.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

FCC Part	Frequency Range (MHz)	Modulation	Conducted Output Power (dBm)	Conducted Output Power (W)
90	806-869	CW	47.01	50.2

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 806 MHz low channel.

5.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
DC Power	Xantrex	XHR-60-18	1064	NA
Amplifier, 1000 MHz, 150 W	A-R	150W1000M2	303370	NA
directional Coupler	Werlatone	C6021	8576	CNR
500W 50 Ohm Terminator	Bird Electronic Corp	8201	13288	CNR

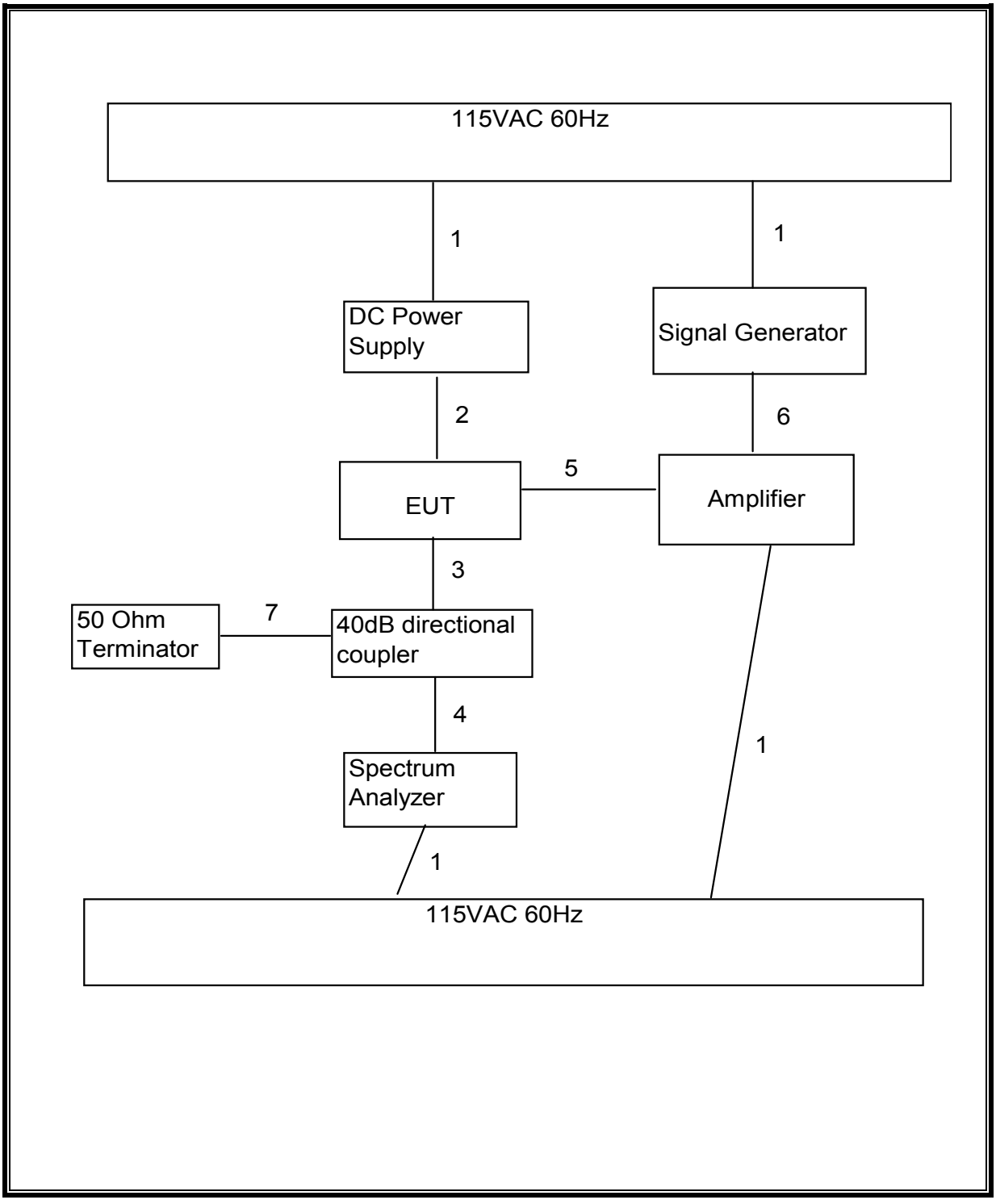
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identica Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	4	US 115V	Un-shielded	2m	NA
2	DC	1	DC	Un-shielded	2m	NA
3	RF In/Out	1	EUT	Un-shielded	2m	NA
4	RF In/Out	1	Spectrum	Un-shielded	2m	NA
5	RF In/Out	1	Amplifier	Un-shielded	1m	NA
6	RF Out	1	Signal	Un-shielded	1m	NA
7	coupler	1	50 Ohm	Un-shielded	2m	No

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**
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00885	07/06/10
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/14/10
Antenna, Horn, 18 GHz	EMCO	3115	C00872	07/29/10
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C00749	08/04/10
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	NA	CNR
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01176	08/24/10
Signal Generator, 1024 MHz	R & S	SMY01	C00979	02/28/11
Amplifier, 1000 MHz, 150 W	A-R	150W1000M2	C00955	CNR

7. LIMITS AND RESULTS

7.1. OCCUPIED BANDWIDTH

LIMIT

None: for reporting purposes only.

TEST PROCEDURE

Measurements were made with the modulating signal at 2.5 KHz with 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

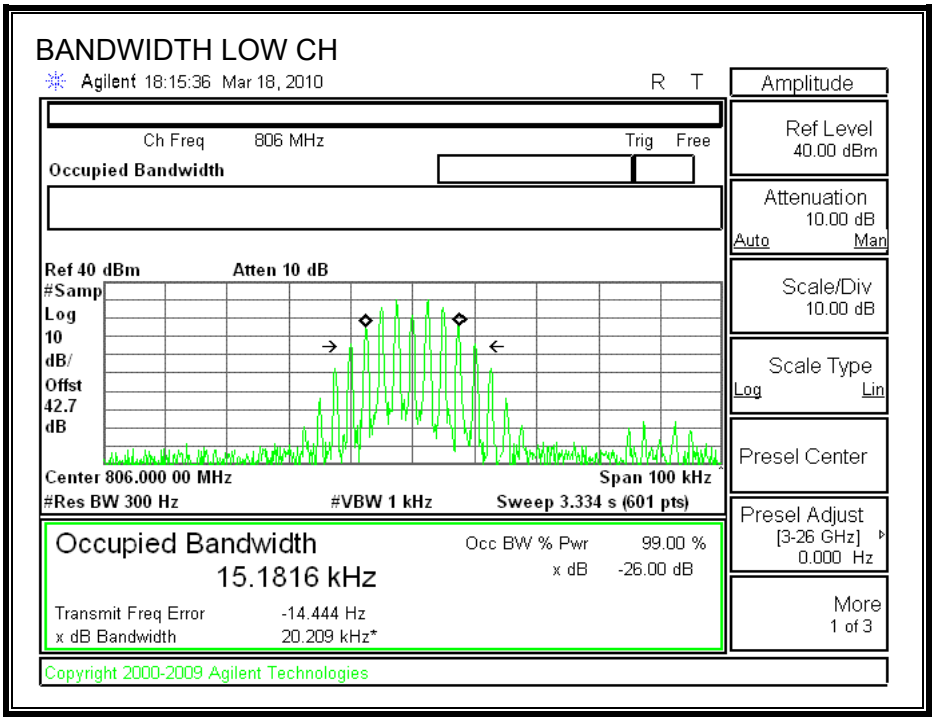
FM Modulation - Input

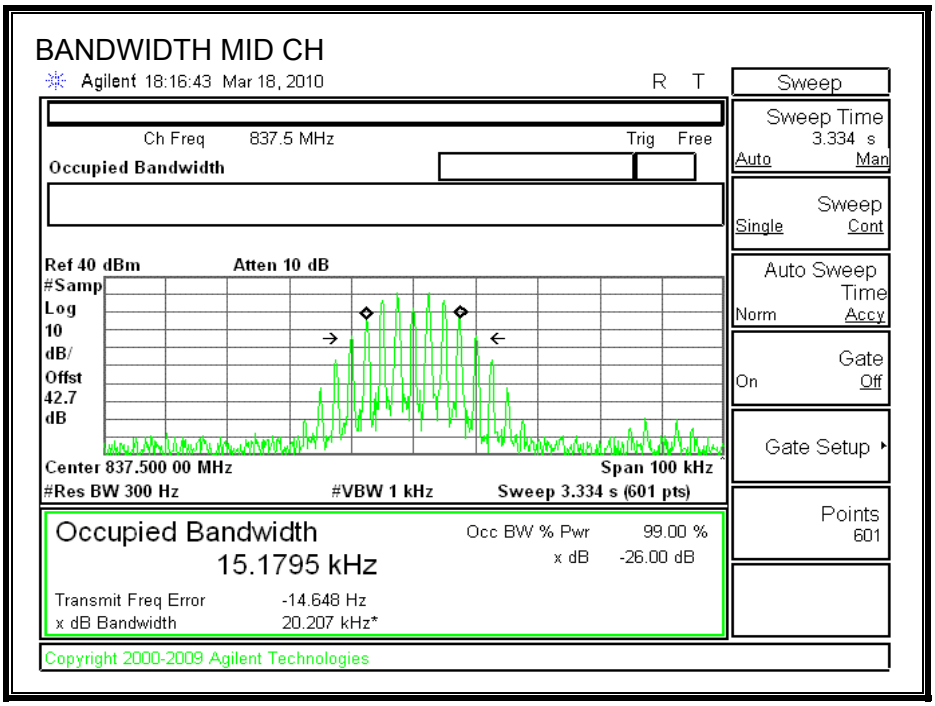
Channel	Frequency (MHz)	26dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	806	20.209	15.182
Mid	837.5	20.207	15.180
High	869	20.209	15.181

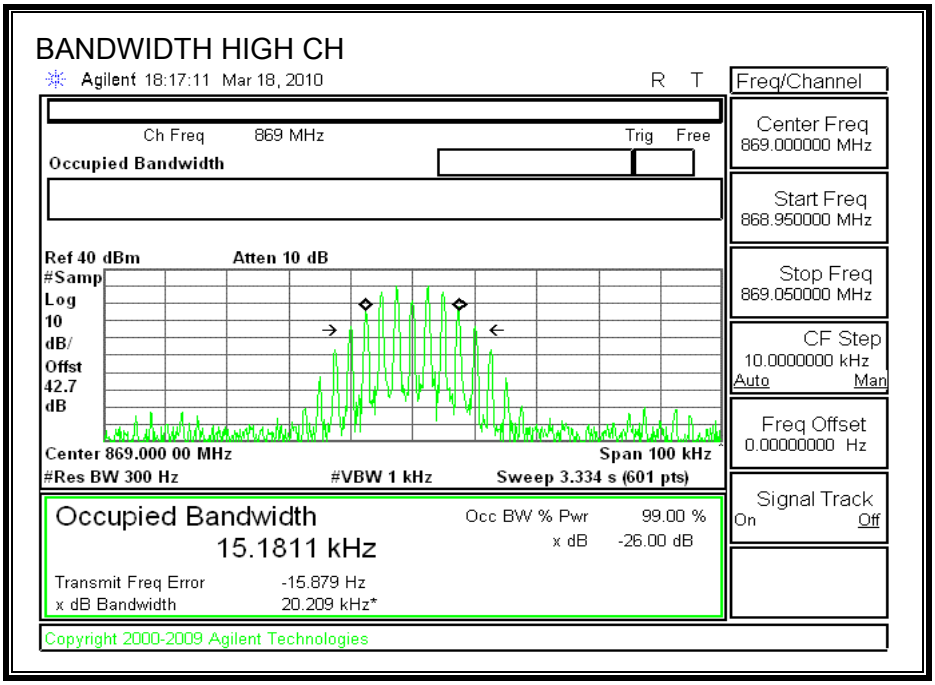
FM Modulation - Output

Channel	Frequency (MHz)	26dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	806	20.212	15.184
Mid	837.5	20.205	15.183
High	869	20.210	15.183

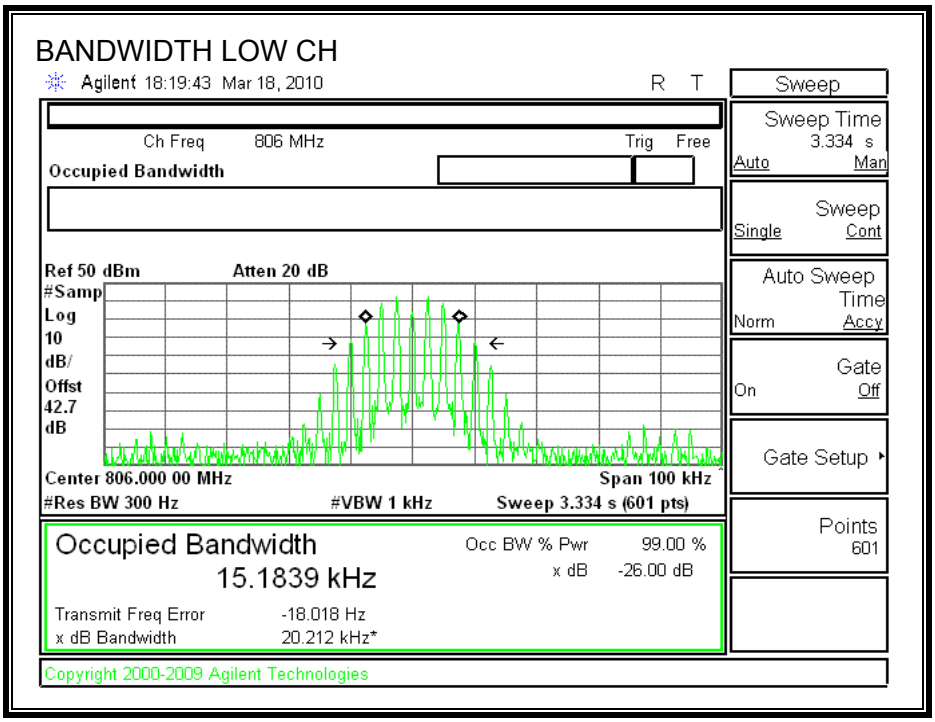
FM 26 dB BANDWIDTH - INPUT



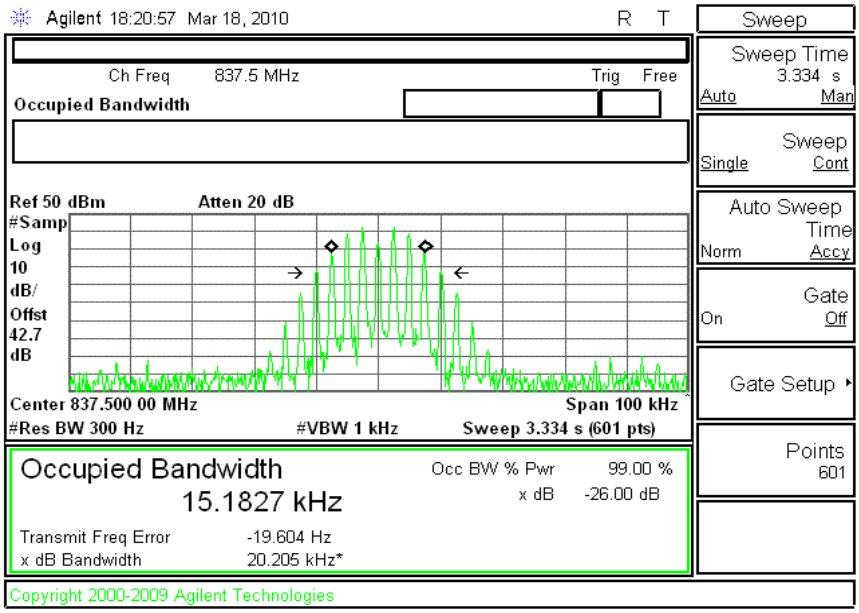




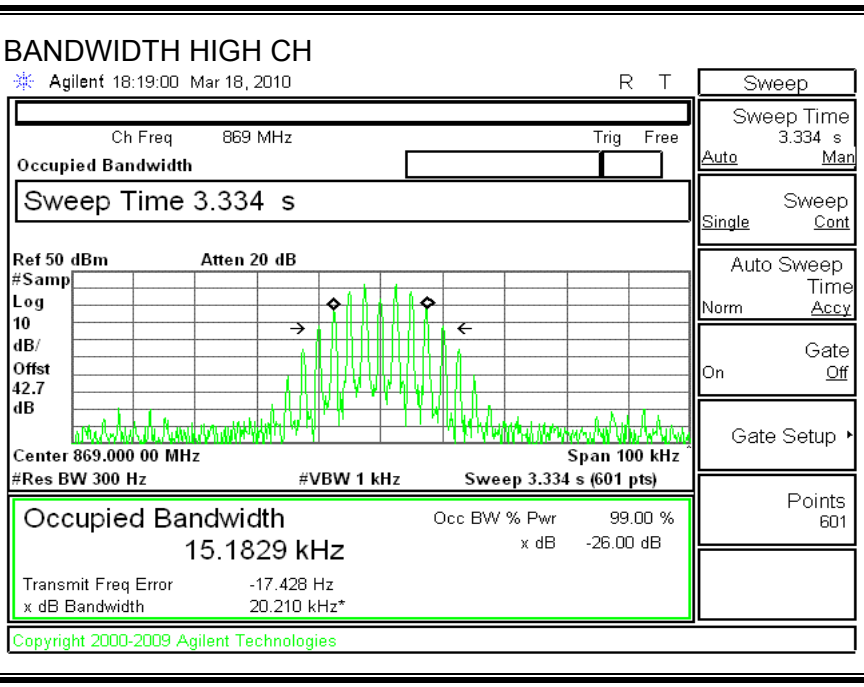
FM 26 dB BANDWIDTH -OUTPUT



BANDWIDTH MID CH



BANDWIDTH HIGH CH



7.2. FM EMISSION LIMITATION

LIMIT

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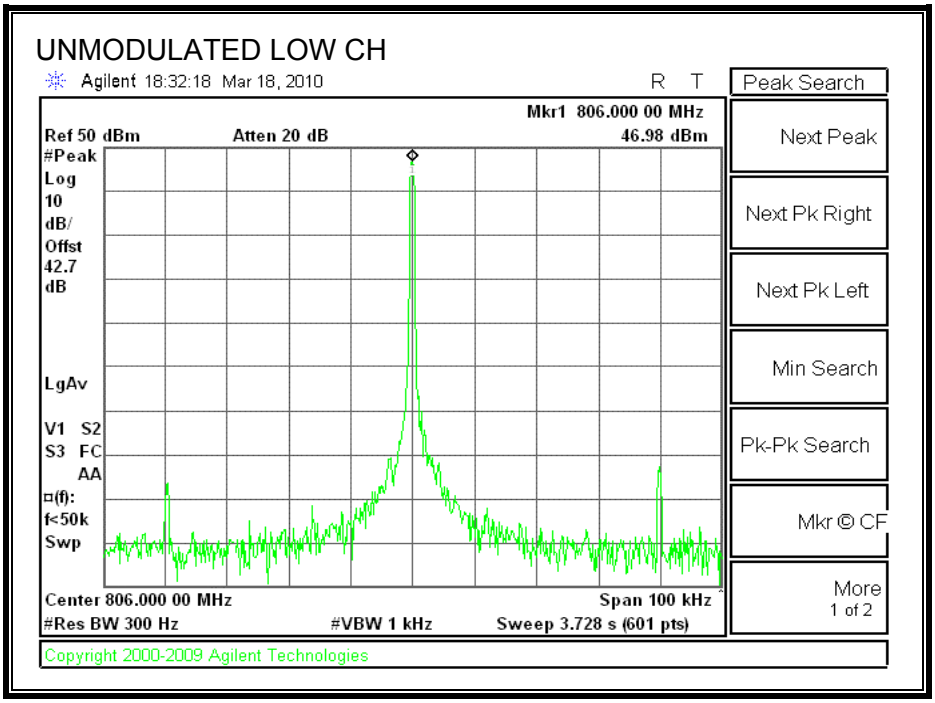
§90.210(c): For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:
(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 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 2/11) 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.

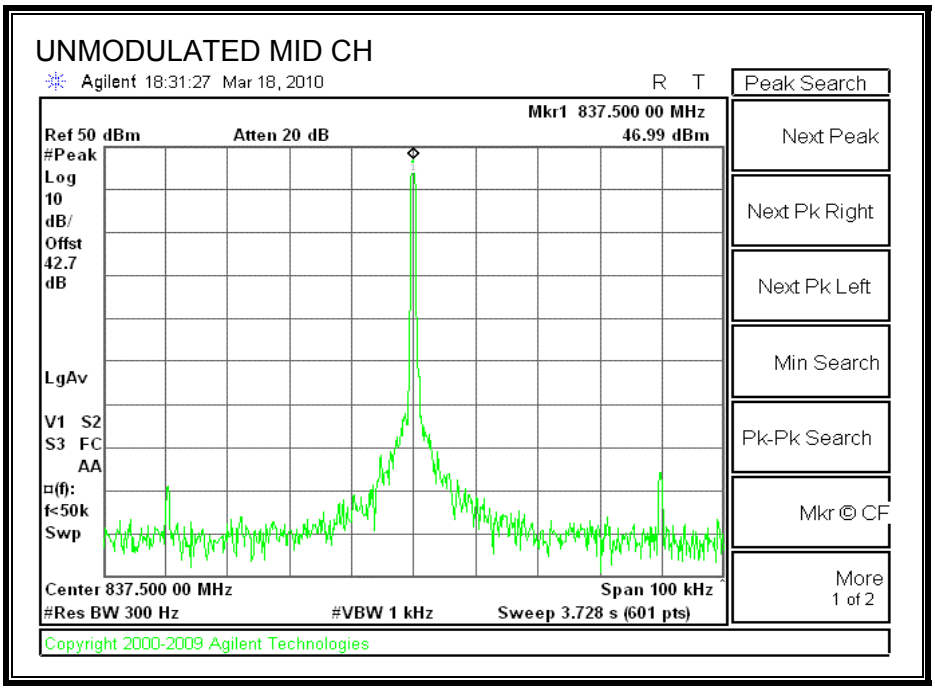
TEST PROCEDURE

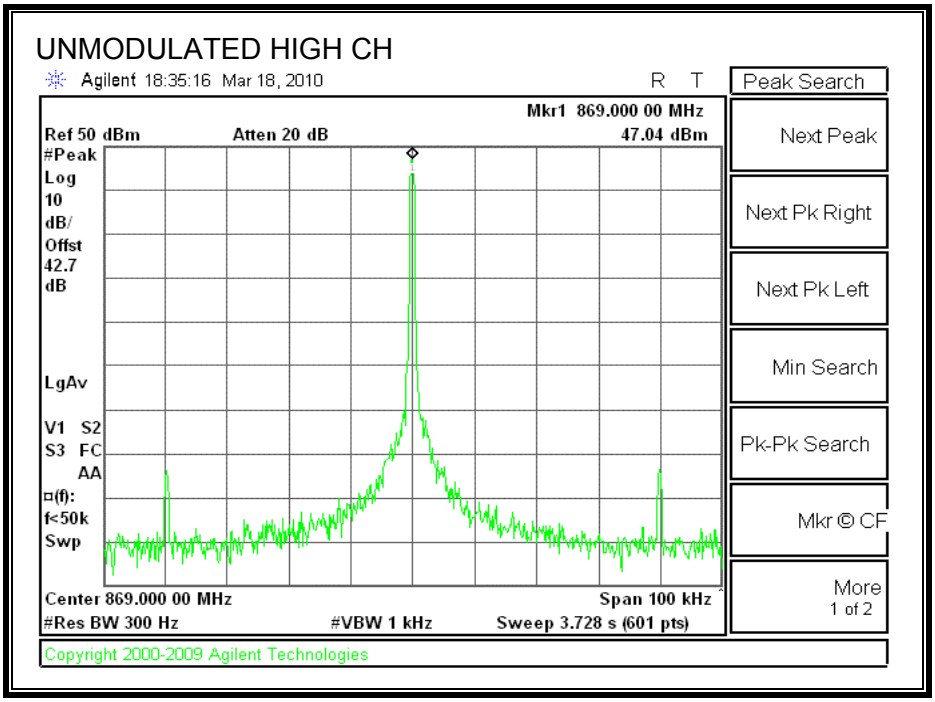
ANSI / TIA / EIA 603 Clause 3.2.11

RESULTS

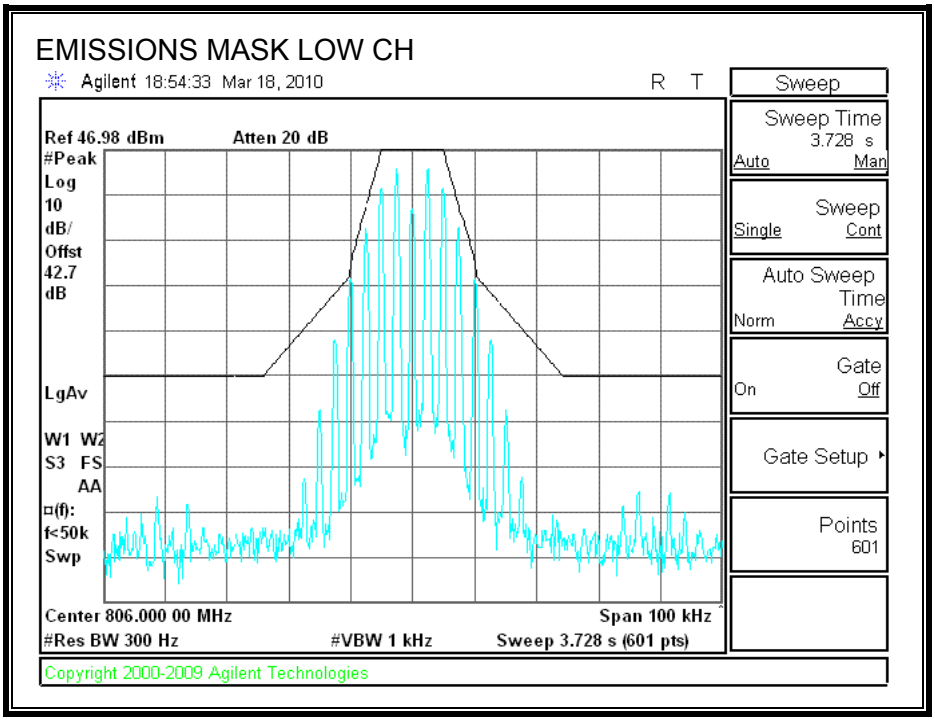
Un-modulated Signal:



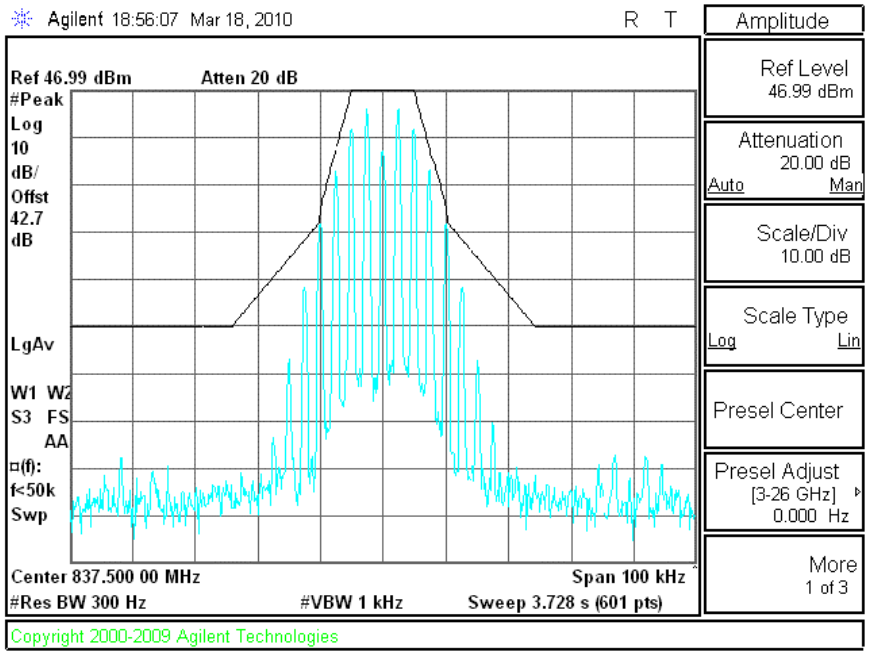




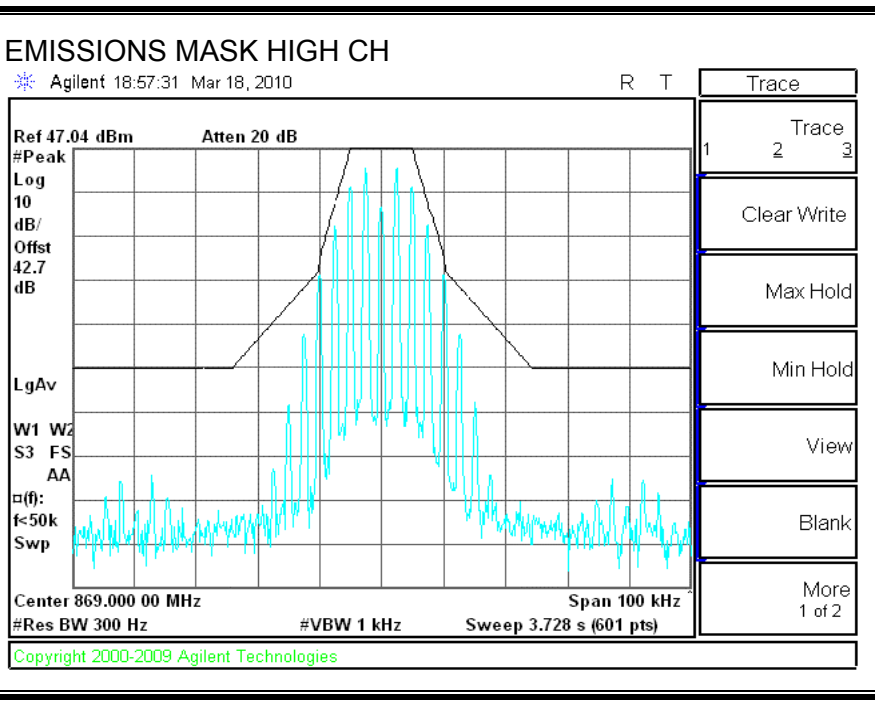
FM EMISSIONS MASK



EMISSIONS MASK MID CH



EMISSIONS MASK HIGH CH



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

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

§90.205(0) 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

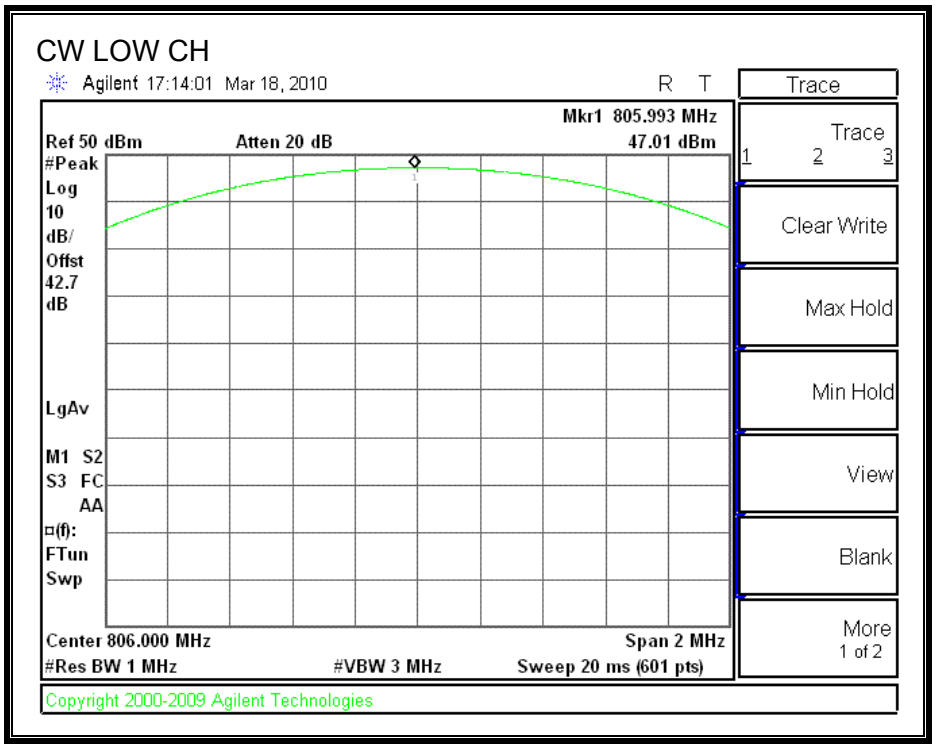
RESULTS

CW Output Power

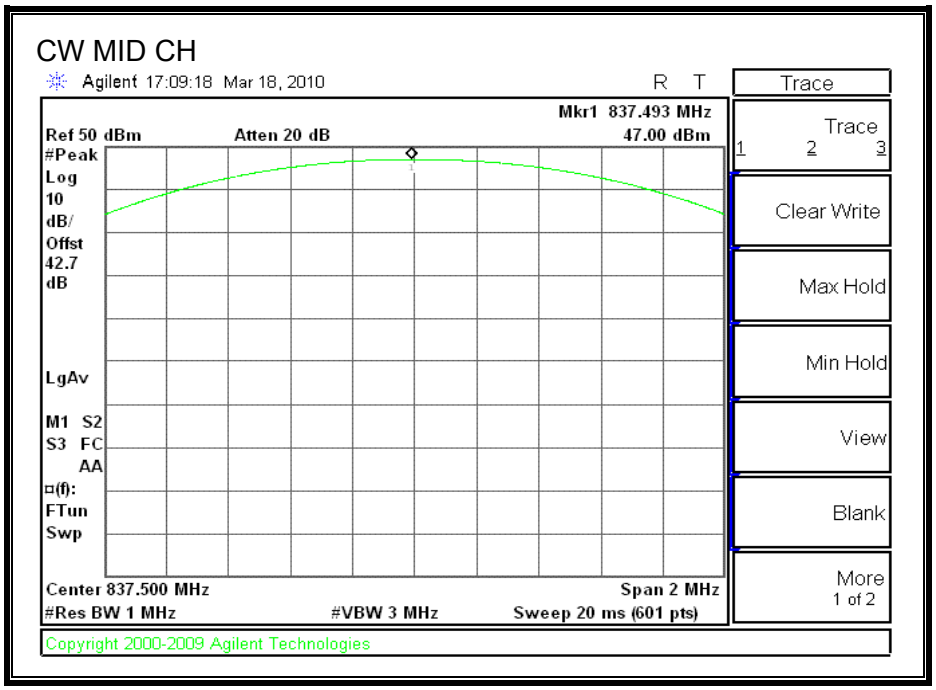
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	806	47.01	50.23
Mid	837.5	47.00	50.12
High	869	46.99	50.00

Conducted Output Power

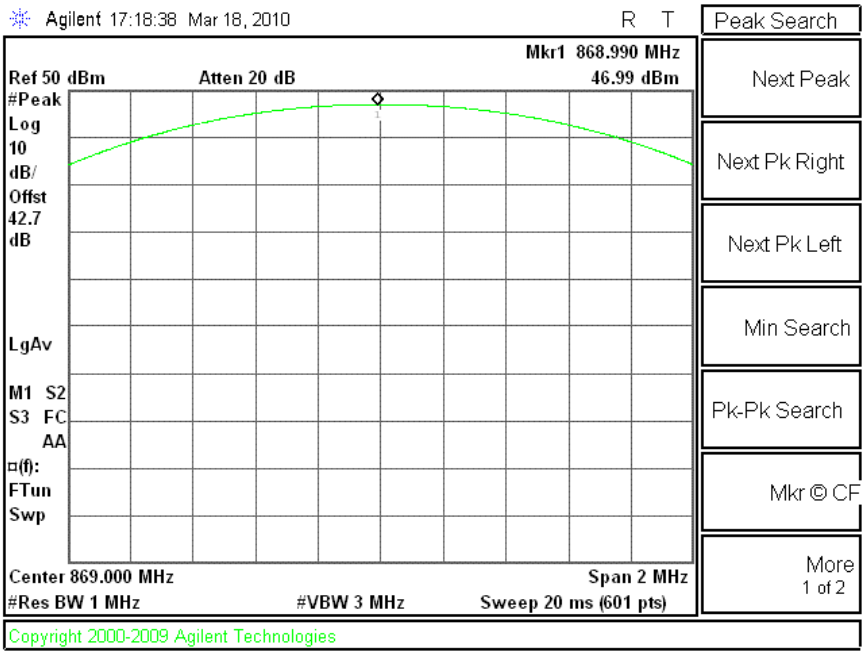
CW LOW CH



CW MID CH



CW HIGH CH



7.5. VOLTAGE STABILITY

LIMIT

§90.205(n) All other frequency bands. Requested transmitter power will be considered and authorized on a case by case basis.
§90.205(0) 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

Conducted Output Power vs Voltage

CW Output Power vs Voltage

Channel Frequency (MHz)	Output Power at DC Normal Voltage 13.8		Output Power at 85% Voltage 11.73		Output Power at 115% Voltage 15.87	
	dBm	Watt	dBm	Watt	dBm	Watt
806	47.01	50.23	46.12	40.93	47.89	61.52
837.5	47.00	50.12	46.50	44.67	47.58	57.28
869	46.99	50.00	46.21	41.78	47.13	51.64

7.6. SPURIOUS EMISSION AT ANTENNA TERMINAL

LIMIT

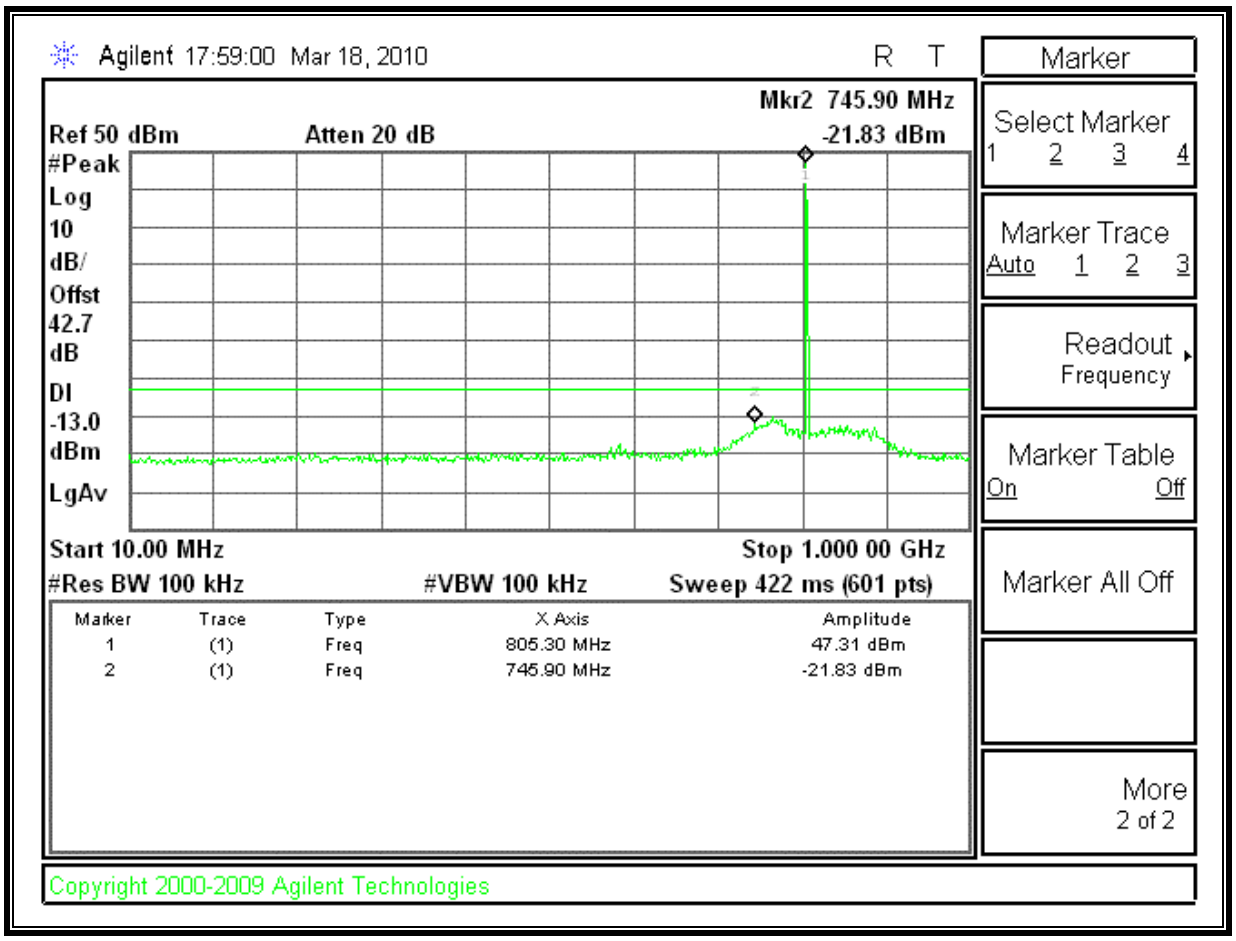
§90.210 Out of band emissions, The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

TEST PROCEDURE

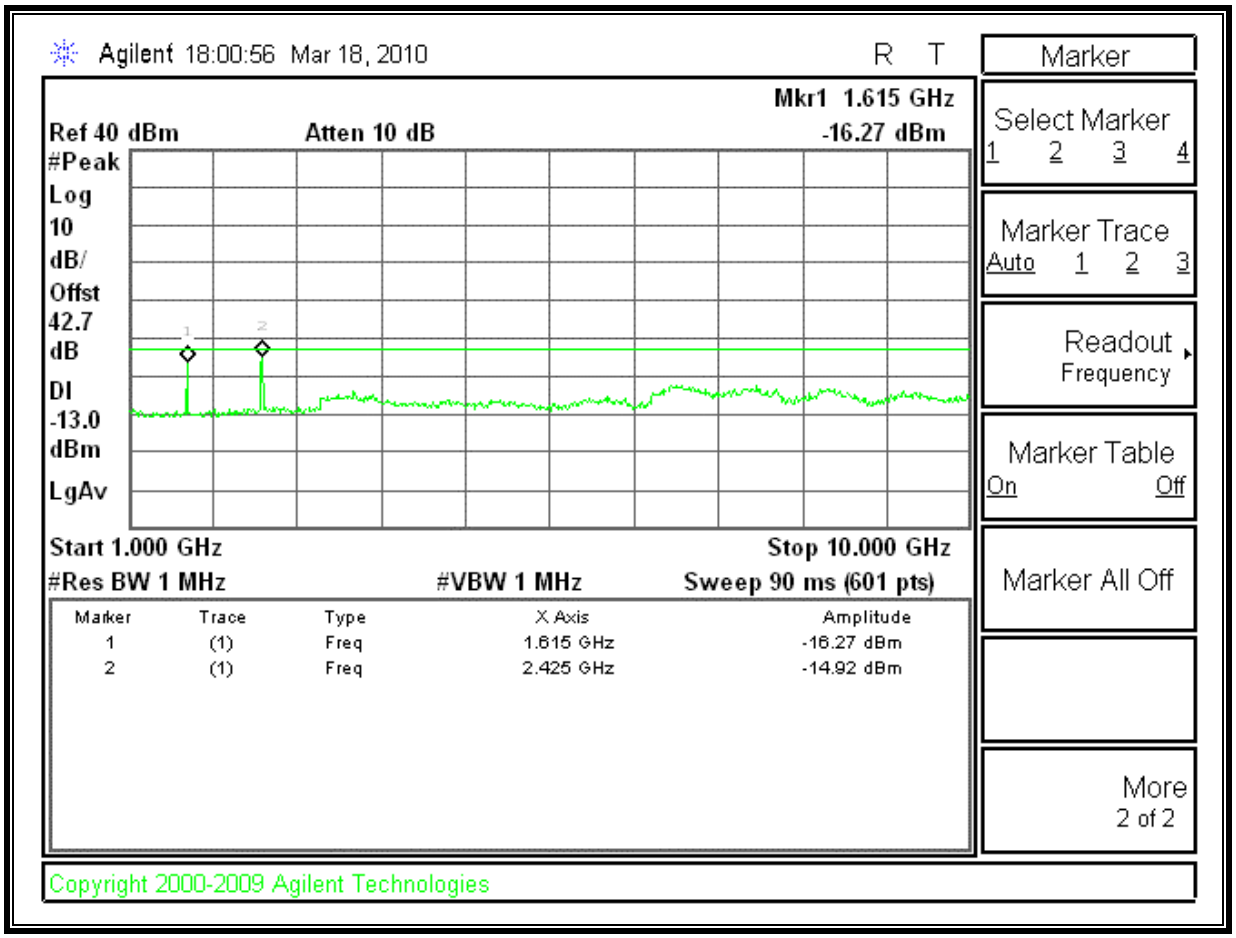
ANSI / TIA / EIA 603 Clause 3.2.1.3, & FCC 90.210

RESULTS

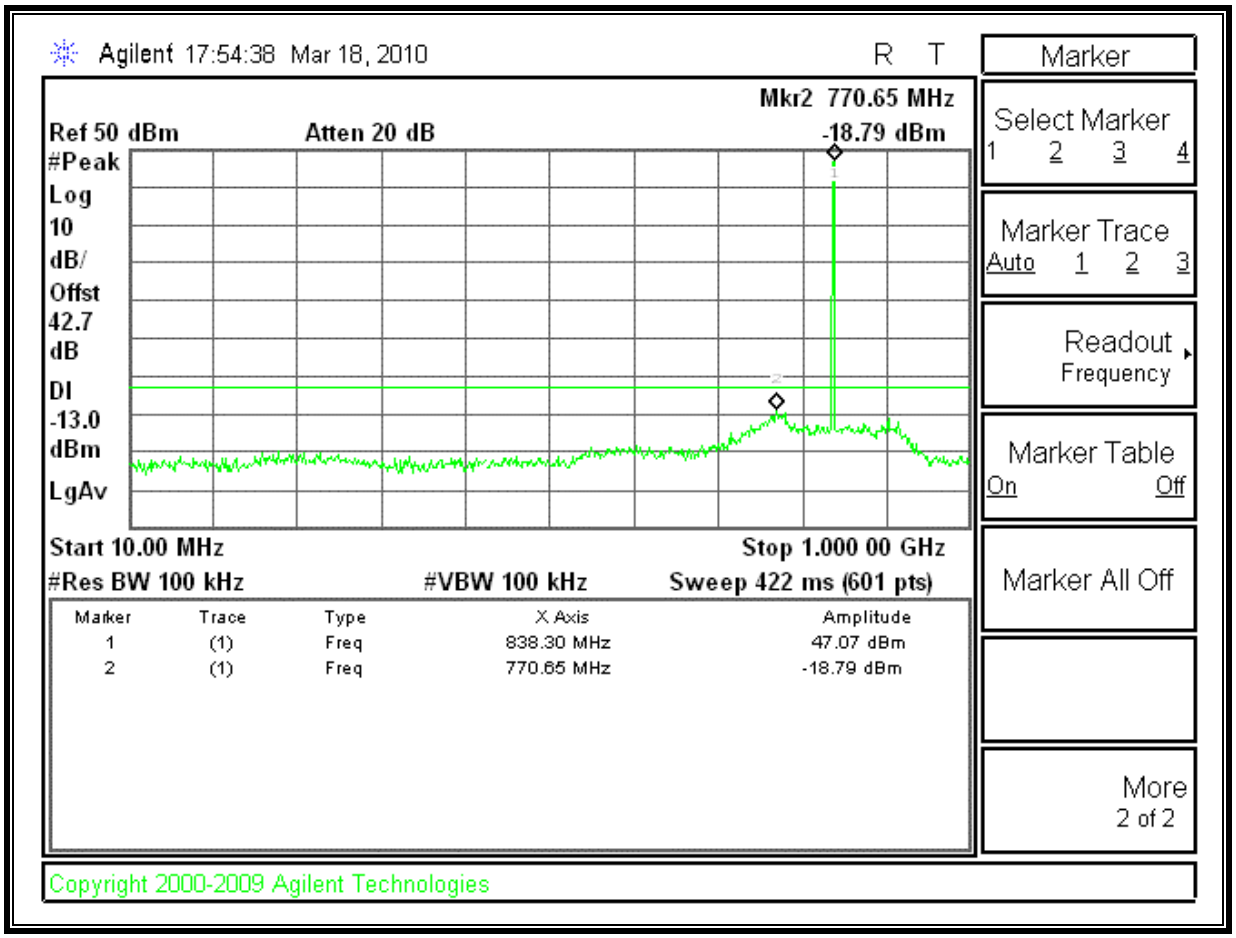
Low Channel, 10MHz to 1000MHz



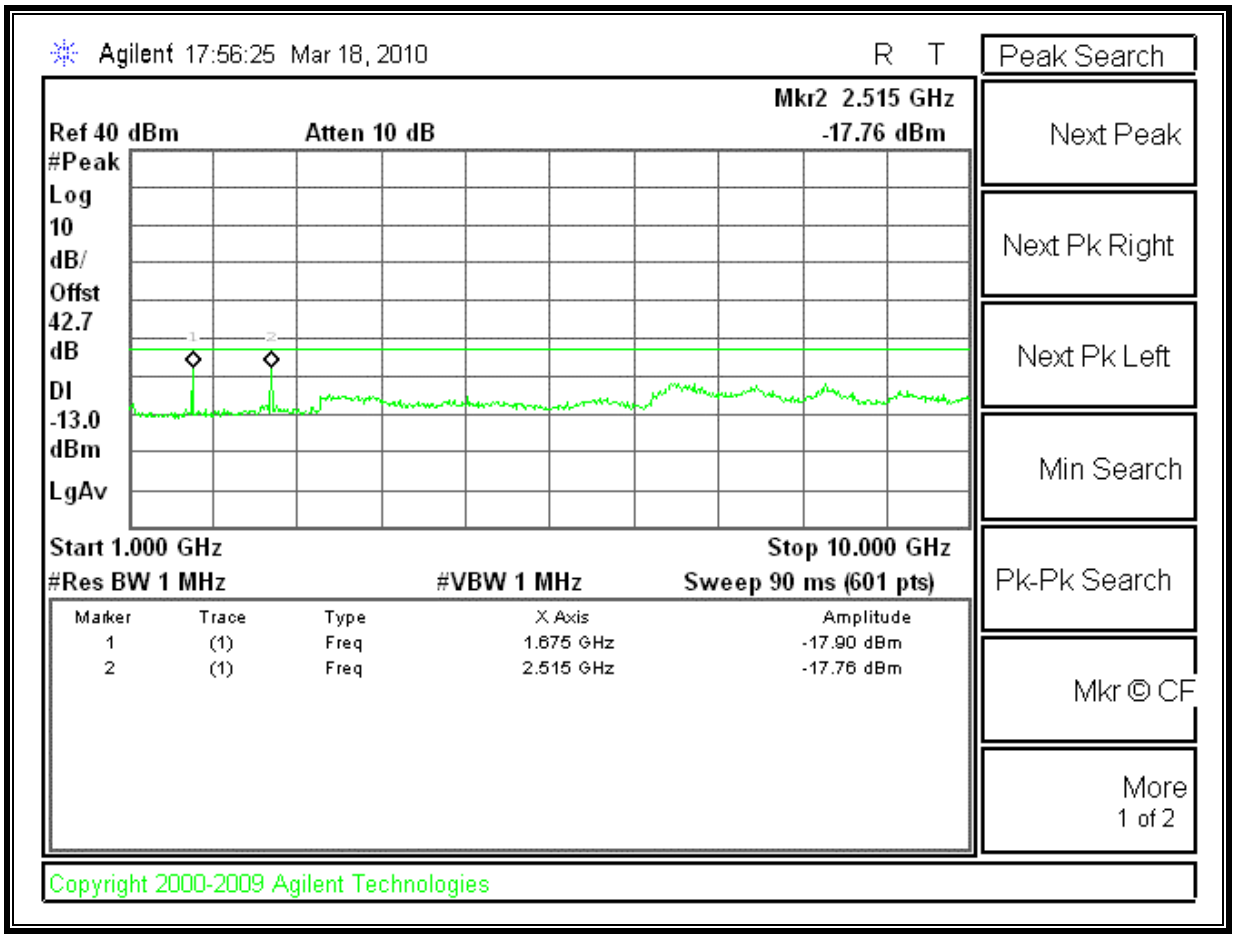
Low Channel, 1000MHz to 10000MHz



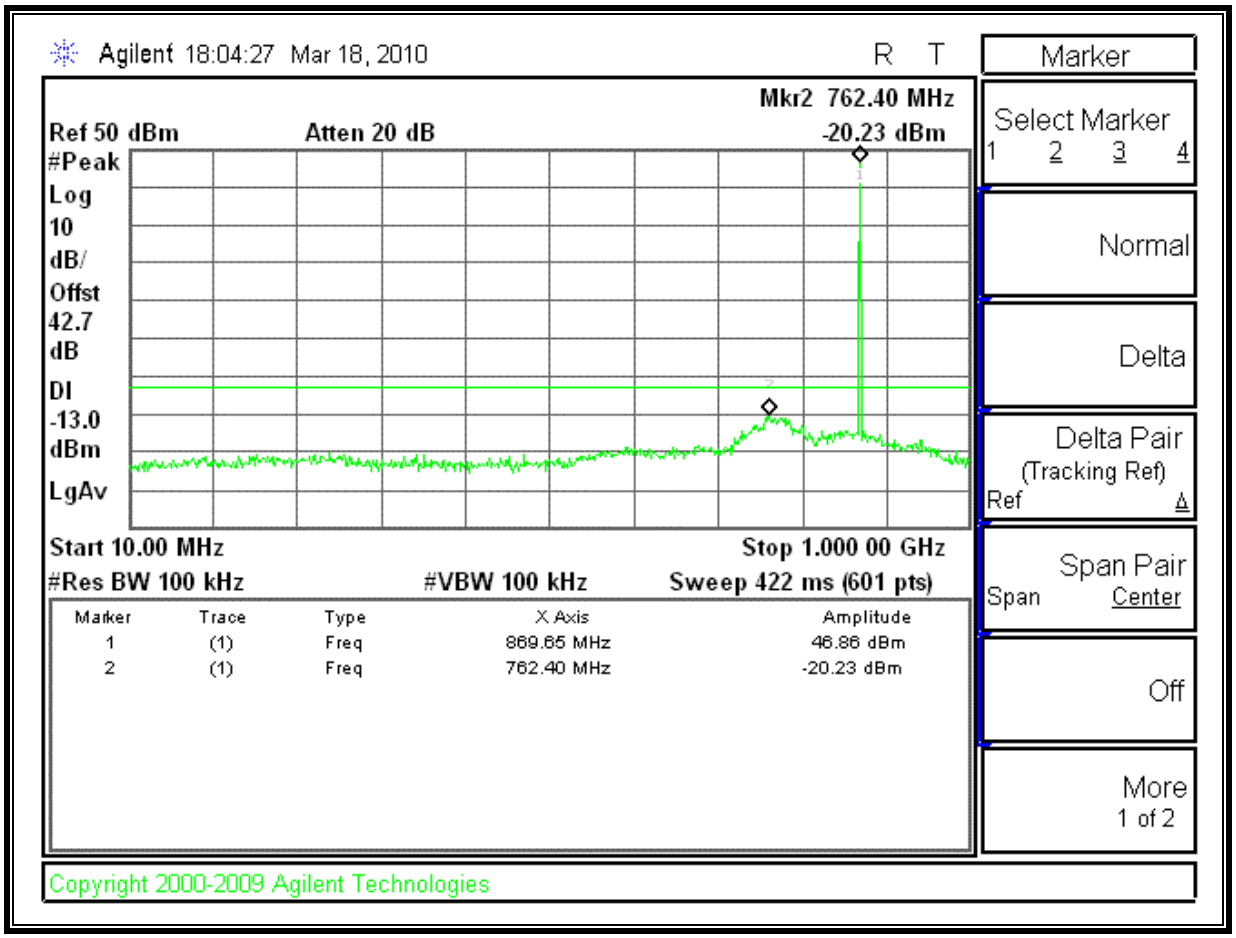
Mid Channel, 10MHz to 1000MHz



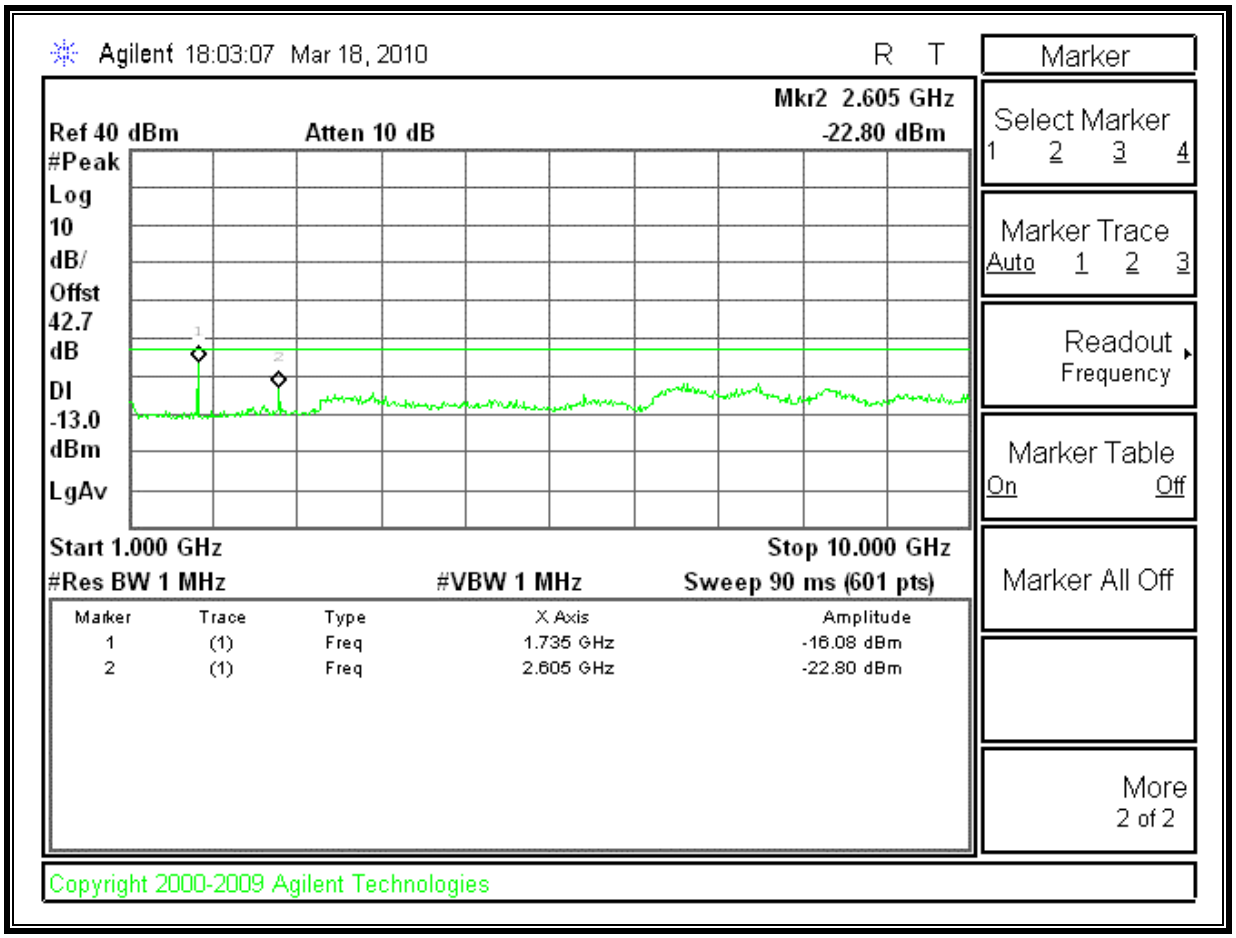
Mid Channel, 1000MHz to 10000MHz



High Channel, 10MHz to 1000MHz



High Channel, 1000MHz to 10000MHz



7.7. FIELD STRENGTH OF SPURIOUS RADIATION

LIMIT

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 90.210

RESULTS

7.7.1. SPURIOUS RADIATION 30 – 1000 MHz

Spurious & Harmonic (ERP)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:TPL
Project #:10U13123
Date:3/24/2010
Test Engineer:Chin Pang
Configuration:EUT with support equipment
Mode:EUT with 50 Ohm Load

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T34 8449B	Filter 1	ETSI 300 328 Tx

f GHz	SA reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Path Loss (dB)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 806MHz										
1.62	-40.1	H	3.0	36.3	37.4	1.0	-42.4	-13.0	-29.4	
2.43	-19.6	H	3.0	39.8	36.4	1.0	-17.4	-13.0	-4.4	
3.22	-33.8	H	3.0	43.2	35.9	1.0	-27.6	-13.0	-14.6	
1.62	-46.0	V	3.0	36.5	37.4	1.0	-48.1	-13.0	-35.1	
2.43	-19.2	V	3.0	41.3	36.4	1.0	-15.5	-13.0	-2.5	
3.22	-37.3	V	3.0	43.4	35.9	1.0	-30.9	-13.0	-17.9	
Mid Ch, 837.5MHz										
1.68	-49.1	H	3.0	36.9	37.3	1.0	-50.7	-13.0	-37.7	
2.52	-23.6	H	3.0	40.2	36.4	1.0	-20.9	-13.0	-7.9	
3.36	-43.2	H	3.0	43.6	35.7	1.0	-36.5	-13.0	-23.5	
1.68	-50.0	V	3.0	37.2	37.3	1.0	-51.3	-13.0	-38.3	
2.52	-24.6	V	3.0	41.8	36.4	1.0	-20.3	-13.0	-7.3	
3.36	-39.4	V	3.0	43.8	35.7	1.0	-32.5	-13.0	-19.5	
High Ch, 869MHz										
1.74	-46.2	H	3.0	37.5	37.2	1.0	-47.1	-13.0	-34.1	
2.61	-21.5	H	3.0	40.7	36.3	1.0	-18.3	-13.0	-5.3	
3.48	-41.0	H	3.0	44.0	35.6	1.0	-33.8	-13.0	-20.8	
1.74	-45.2	V	3.0	37.8	37.2	1.0	-45.8	-13.0	-32.8	
2.61	-27.0	V	3.0	42.0	36.3	1.0	-22.5	-13.0	-9.5	
3.48	-40.8	V	3.0	44.2	35.6	1.0	-33.4	-13.0	-20.4	
No other emissions were detected within 20dB below the system noise.										

Rev. 03.03.09

7.7.2. SPURIOUS RADIATION ABOVE 1GHz

Spurious & Harmonic (ERP)

Compliance Certification Services
Above 1GHz High Frequency Substitution Measurement

Company:
Project #:
Date:
Test Engineer:
Configuration:
Mode:

Chamber	Pre-amplifer	Filter	Limit
3m Chamber	T34 8449B	Filter 1	ETSI 300 328 Tx

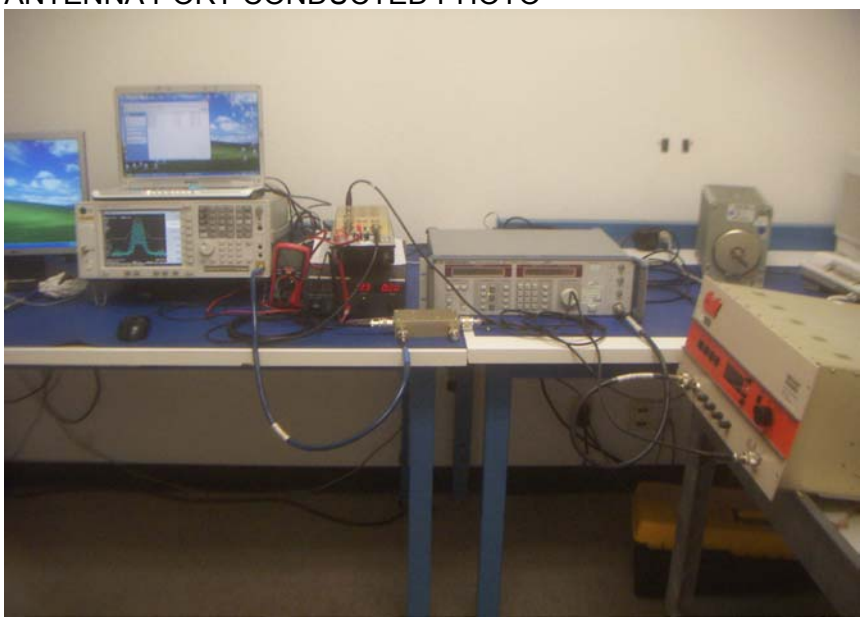
f GHz	SA reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Path Loss (dB)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 806MHz										
1.62	-40.1	H	3.0	36.3	37.4	1.0	-42.4	-13.0	-29.4	
2.43	-19.6	H	3.0	39.8	36.4	1.0	-17.4	-13.0	-4.4	
3.22	-33.8	H	3.0	43.2	35.9	1.0	-27.6	-13.0	-14.6	
1.62	-46.0	V	3.0	36.5	37.4	1.0	-48.1	-13.0	-35.1	
2.43	-19.2	V	3.0	41.3	36.4	1.0	-15.5	-13.0	-2.5	
3.22	-37.3	V	3.0	43.4	35.9	1.0	-30.9	-13.0	-17.9	
Mid Ch, 837.5MHz										
1.68	-49.1	H	3.0	36.9	37.3	1.0	-50.7	-13.0	-37.7	
2.52	-23.6	H	3.0	40.2	36.4	1.0	-20.9	-13.0	-7.9	
3.36	-43.2	H	3.0	43.6	35.7	1.0	-36.5	-13.0	-23.5	
1.68	-50.0	V	3.0	37.2	37.3	1.0	-51.3	-13.0	-38.3	
2.52	-24.6	V	3.0	41.8	36.4	1.0	-20.3	-13.0	-7.3	
3.36	-39.4	V	3.0	43.8	35.7	1.0	-32.5	-13.0	-19.5	
High Ch, 869MHz										
1.74	-46.2	H	3.0	37.5	37.2	1.0	-47.1	-13.0	-34.1	
2.61	-21.5	H	3.0	40.7	36.3	1.0	-18.3	-13.0	-5.3	
3.48	-41.0	H	3.0	44.0	35.6	1.0	-33.8	-13.0	-20.8	
1.74	-45.2	V	3.0	37.8	37.2	1.0	-45.8	-13.0	-32.8	
2.61	-27.0	V	3.0	42.0	36.3	1.0	-22.5	-13.0	-9.5	
3.48	-40.8	V	3.0	44.2	35.6	1.0	-33.4	-13.0	-20.4	

Rev. 03.03.09

8. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO



RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO

RADIATED BACK PHOTO

END OF REPORT