CURTIS-STRAUS

Test Report

Report No	EJ0250-1 Issue 2
Client	Microwave Radio Communications LLC 101 Billerica Ave, Building 6 North Billerica, MA 01862
Phone	978-671-5778
FRN	0004267712
System Models	908347-03, 907033-03, 908725-03
FCC ID	FC3ODU2ATXADH FC3ODU7ATXAD
Equipment Type Equipment Code	Licensed Non-Broadcast Station Transmitter TNB
Results	As detailed within this report
Prepared by	Evan Gould – Compliance Engineer
Authorized by	Mairaj Hussein – EMC Manager
Issue Date	June 11, 2009
Conditions of Issue	This Test Report is issued subject to the conditions stated in the '*Conditions of Testing*' section on page 40 of this report.

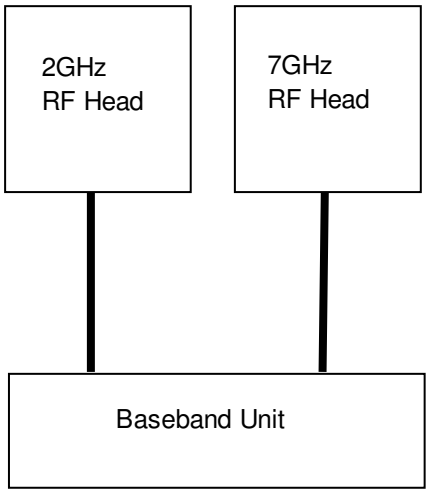
Contents

Summary

The purpose of this report is to support two applications for Certification of licensed devices operating pursuant to Parts 74, 78, and 101. The products are the Microwave Radio 2GHz & 7GHz MTX Radios. Under Part 74, these devices operate as mobile TV Pickup Stations [74.601(a)] within the frequency bands: 2025-2110, 2450-2483.5, 6875-7125, and 6425-6525MHz. The applicability of Rule Parts to Frequency Bands is shown in the following table:

Frequency Band	Rule Parts
2025-2110MHz	74, 78
2450-2483.5	74
6425-6525	74, 78, 101
6875-7125	74, 78

Each product consists of an RF head in combination with the baseband unit. Only one combination can be active at a time, and the FCC ID's will be placed on their respective RF head units. This report contains measurements supporting both Certification applications. A simple block diagram of the product is shown below for clarification.



The channel plans are shown below:

2GHz Band

Channel	Offset -	Center	Offset +
1	2028.5	2031.5	2034.5
2	2040.5	2043.5	2046.5
3	2052.5	2055.5	2058.5
4	2064.5	2067.5	2070.5
5	2076.5	2079.5	2082.5
6	2088.5	2091.5	2094.5
7	2100.5	2103.5	2106.5
8	2454.25	2458.5	2462.75
9	2471	2475.25	2479.5
10	2487.5	2491.75	2496

7GHz Band

Channel	Offset -	Center	Offset +
1	6881.25	6887.5	6893.75
2	6906.25	6912.5	6918.75
3	6931.25	6937.5	6943.75
4	6956.25	6962.5	6968.75
5	6981.25	6987.5	6993.75
6	7006.25	7012.5	7018.75
7	7031.25	7037.5	7043.75
8	7056.25	7062.5	7068.75
9	7081.25	7087.5	7093.75
10	7106.25	7112.5	7118.75
11	6431.25	6437.5	6443.75
12	6456.25	6462.5	6468.75
13	6481.25	6487.5	6493.75
14	6506.25	6512.5	6518.75

As can be seen in the Band Edges section of this report, the channels which are grayed out in the above tables are channel settings which are not allowed to be used as they produce fundamental emissions which lie outside the bands of operation.

Test Methodology

Testing was performed according to ANSI/TIA-603-C-2004.

Frequency range investigated: 30MHz – 75GHz

Testing was performed with the following modulations:

Digital: COFDM QPSK 8MHz FE1/2 GI 1/8
Analog: FM

Product Tested - Configuration Documentation

EUT Configuration

Work Order: J0250
Company: Microwave Radio Communications LLC
Company Address: 101 Billerica Ave., Building 6
North Billerica, MA 01862
Contact: Dwayne Johnson
Person Present: Rob Hart

	MN	SN
EUT		
Baseband:	908347-03	8096287
7GHz High Power RF Head:	907033-03	8104251
2GHz High Power RF Head:	908725-03	809940

EUT Description: MTX Radio - Baseband indoor unit with outdoor RF heads
2GHz TX Frequencies: 2.0 - 2.5 GHz
7GHz TX Frequencies: 6.4 - 7.1 GHz
EUT Max Frequency: same as PTX

Support Equipment:	MN	SN
For Immunity Testing		
iPod (for video in)		
Panasonic Color LCD Monitor	TC-7WMS1	FA3520058

EUT Ports:

Port Label	Port Type	No. of ports	No. Populated	Cable Type	Shielded	Ferrites	Length	Max Length	In/Out NEBS Type	Unpopulated Reason
Baseband										
Firewire	Firewire	1	None	NA	NA	NA	NA	NA	NA	Setup Only
USB	USB	1	None	NA	NA	NA	NA	NA	NA	Setup Only
ETHERNET	RJ45	1	All	Cat5	No	None	1m	100ft	NA	
RTN DATA	RJ45	1	All	Cat5	No	None	1m	100ft	NA	
WAYSIDE	DB9	1	All	Serial	No	None	1m	100ft	NA	
ATPC	DB9	1	All	Serial	No	None	1m	100ft	NA	
AUDIO (1-4) *analog inputs*	Terminal block	4	All	3 wire	No	None	1m	100ft	NA	
SUM ALARM	Terminal block	1	All	2 wire	No	None	1m	100ft	NA	
AES/EBU (1-2) *digital inputs*	Terminal block	2	All	3 wire	No	None	1m	100ft	NA	
BB IN	75Ω Coax	1	All	75Ω Coax	Yes	None	1m	100ft	NA	
IF MON	75Ω Coax	1	All	75Ω Coax	Yes	None	1m	100ft	NA	
ASI 1	75Ω Coax	1	All	75Ω Coax	Yes	None	1m	100ft	NA	
HD-SDI	75Ω Coax	1	All	75Ω Coax	Yes	None	1m	100ft	NA	
ASI 2	75Ω Coax	1	All	75Ω Coax	Yes	None	1m	100ft	NA	
VIDEO IN	75Ω Coax	1	All	75Ω Coax	Yes	None	1m	100ft	NA	
AC-3	75Ω Coax	1	All	75Ω Coax	Yes	None	1m	100ft	NA	
IF IN	75Ω Coax	1	All	75Ω Coax	Yes	None	1m	100ft	NA	
VID MON	75Ω Coax	1	All	75Ω Coax	Yes	None	1m	100ft	NA	
SDI/ASI	75Ω Coax	1	All	75Ω Coax	Yes	None	1m	100ft	NA	
ANT CONTROL	Terminal block	1	All	7 wire	No	None	1m	100ft	NA	
RFU POWER OUT (1-2)	Terminal block	2	All	4 wire	No	None	100ft	100ft	NA	
RFU 1	N-Style	1	All	Coax	Yes	None	6ft	100ft	NA	
RFU 2	N-Style	1	All	Coax	Yes	None	100ft	100ft	NA	
POWER IN	IEC AC Input	1	All	3-wire AC	No	None	6ft	100ft	NA	
6GHz High Power RF Head										
RF OUT	N-Style	1	None (terminated)	Coax	Yes	None	NA	2m	NA	covered by antenna port CE
POWER	Aphenol 12-pin	1	All	4-wire	No	None	100ft	100ft	NA	
IF IN	N-Style	1	All	Coax	Yes	None	100ft	100ft	NA	
2GHz High Power RF Head										
RF OUT	N-Style	1	None (terminated)	Coax	Yes	None	NA	2m	NA	covered by antenna port CE
POWER	Aphenol 12-pin	1	All	4-wire	No	None	100ft	100ft	NA	
IF IN	N-Style	1	All	Coax	Yes	None	6ft	100ft	NA	

Software / Operating Mode Description:

Using touchscreen on baseband unit to choose RF band, channel, and modulation.

Performance Criteria:

Monitor on the LCD color monitor support equipment, audio and video generated by the iPod support equipment.

Band Edges

REQUIREMENT

The lowest and highest available channels in a particular band of operation must reside generally within the prescribed band edges. The out-of-band limit from the emission mask was used for this purpose, which is an absolute limit of -13dBm. The applicable band edges are those described in the Summary section. The limit lines shown on the analyzer plots were calculated as follows:

$$LimitOnAnalyzer = -13dBm - AttenuationFactor$$
$$LimitOnAnalyzer = -13dBm - 30dB = -43dBm$$

EQUIPMENT

GOLD SPECTRUM ANALYZER
HF 30DB 50W ATTENUATOR
EMIR HIGH-13

RESULTS

The analyzer plots shown below show that the lowest and highest channels that meet the band edge limit are:

Allowed Channel Settings

Channel	Frequency (MHz)
(2GHz Band) 1	2031.5
(2GHz Band) 7	2103.5
(2GHz Band) 8-	2454.25
(2GHz Band) 9+	2479.5

Since the emission masks of the above channels fit just within the band edge limits, the following channel settings are excluded from use:

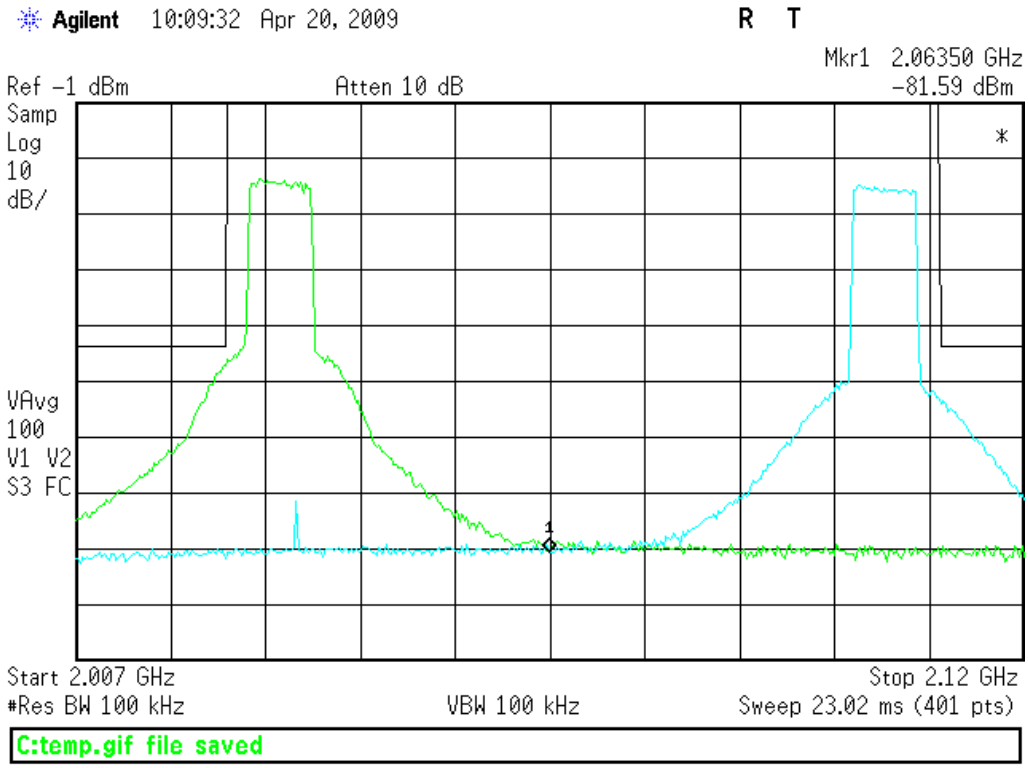
Excluded Channel Settings

Channel	Frequency (MHz)
(2GHz Band) 1-	2028.5
(2GHz Band) 7+	2106.5
(2GHz Band) 10-	2487.5
(2GHz Band) 10	2491.75
(2GHz Band) 10+	2496

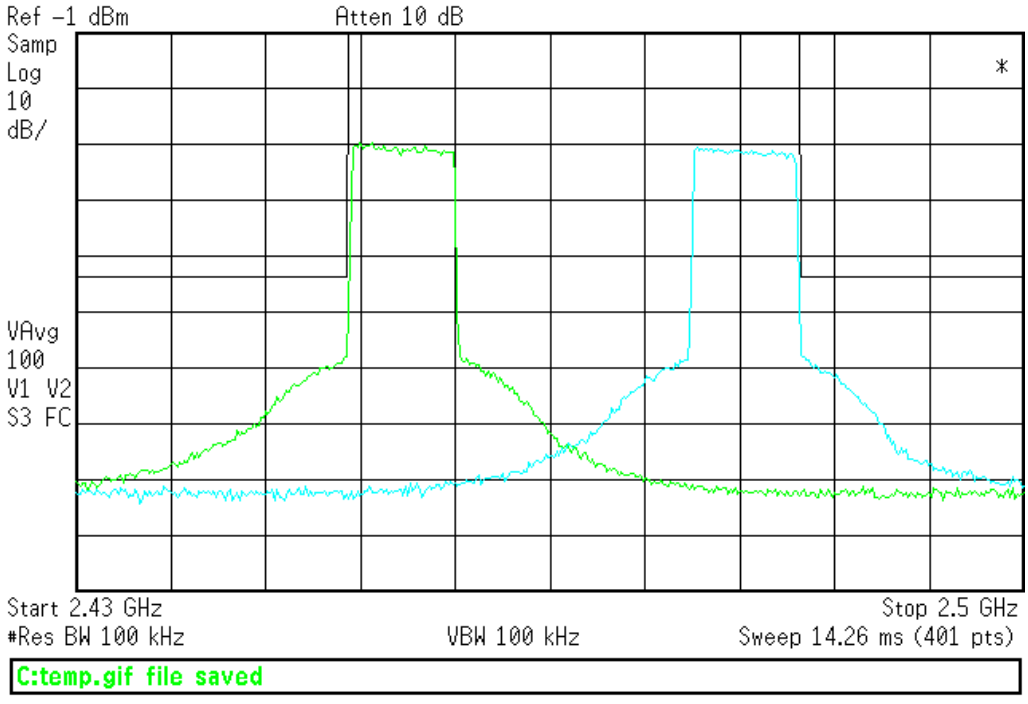
Note: All channels in the 7GHz Band are allowed.

PLOTS

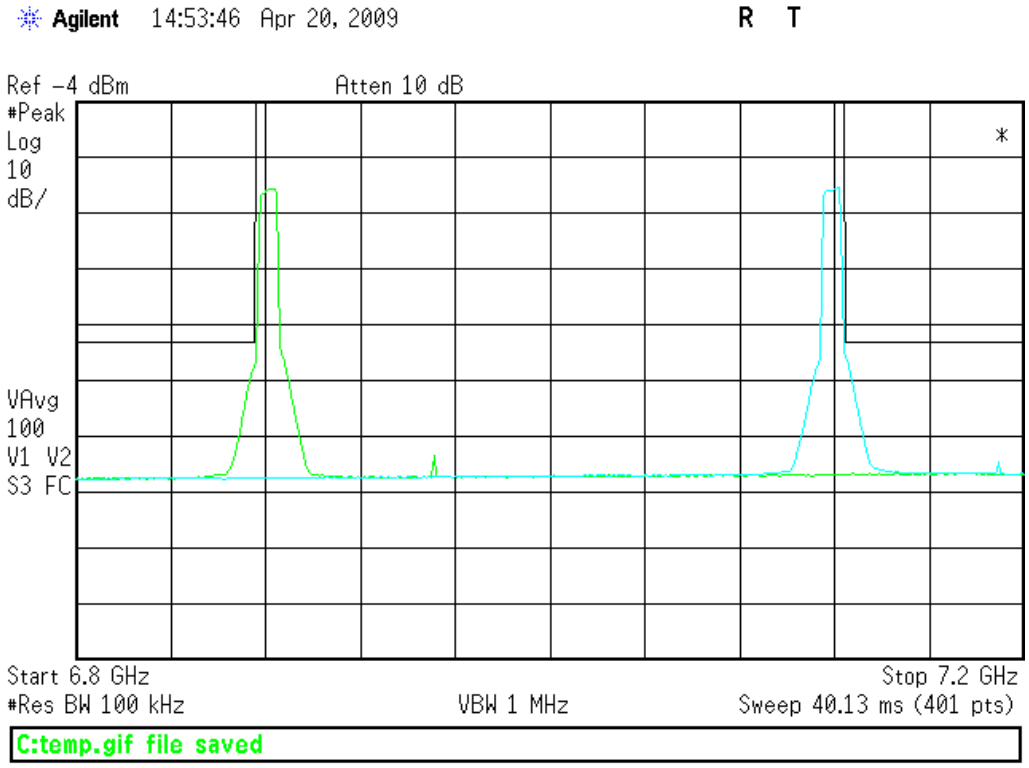
2GHz Band Channels 1 and 7



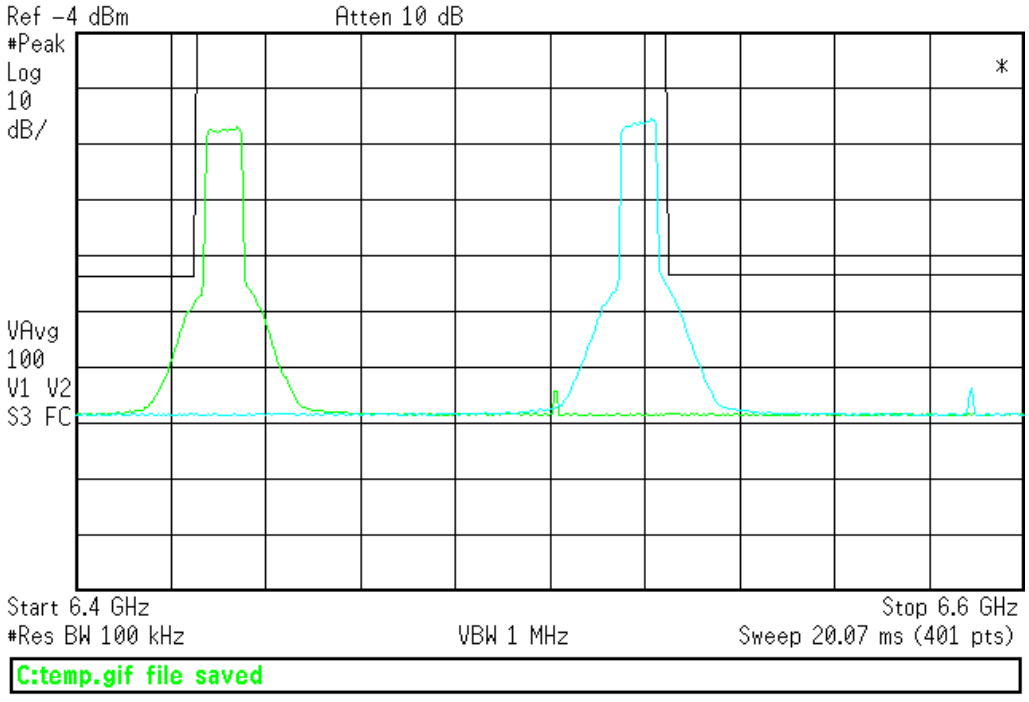
2GHz Band Channels 8- and 9+



7GHz Band Channels 1- and 10+



7GHz Band Channels 11- and 14+



Output Power

LIMIT

"On any authorized frequency…the average power delivered to an antenna in this service…shall not exceed the values listed in the following table." [74.636(a)]

The limit listed in the table referenced above in 74.636(a) for the applicable frequency ranges (2025-2110, 2450-2483.5, 6425-6526, 6875-7125 MHz) is 12 Watts.

P[dBm] = 10*log(P[mW]) = 10*log(12000) = 40.7dBm

EQUIPMENT

HP 437B POWER METER
HP 8481A POWER SENSOR
EMIR HIGH-13
HF 30DB 50W ATTENUATOR

Tested by EG on 4/20/09 thru 4/22/09

MEASUREMENTS

2GHz Band RF Head

Modulation	Channel	Frequency (MHz)	Power Meter Reading (dBm)	Cable Factor (dB)	Attenuator (dB)	Adjusted Output Power (dBm)
QPSK	1	2031.5	4.5	1.8	32.6	38.9
QPSK	4	2067.5	6.5	1.8	30.5	38.8
QPSK	7	2103.5	6.5	1.8	30.5	38.8
QPSK	8 -	2454.25	6	1.8	31.1	38.9
QPSK	9+	2479.5	5.7	1.8	31.1	38.6
FM	1	2031.5	5.5	1.8	32.6	39.9
FM	4	2067.5	4	1.8	30.5	36.3
FM	7	2103.5	4.3	1.8	30.5	36.6
FM	8 -	2454.25	3.5	1.8	31.1	36.4
FM	9+	2479.5	2.5	1.8	31.1	35.4

7GHz Band RF Head

Modulation	Channel	Frequency (MHz)	Power Meter Reading (dBm)	Cable Factor (dB)	Attenuator (dB)	Adjusted Output Power (dBm)
QPSK	1 -	6881.25	-4.7	3.7	30.5	29.5
QPSK	5	6987.5	-3.8	3.8	30.5	30.5
QPSK	10+	7118.75	-5.2	3.6	30.5	28.9
QPSK	11 -	6431.25	-5.5	3.7	30.9	29.1
QPSK	14+	6518.75	-4.2	3.5	30.9	30.2
FM	1 -	6881.25	4.29	3.7	30.5	38.49
FM	5	6987.5	4.88	3.8	30.5	39.18
FM	10+	7118.75	4.18	3.6	30.5	38.28
FM	11 -	6431.25	3.06	3.7	30.9	37.66
FM	14+	6518.75	4.15	3.5	30.9	38.55

Emission Masks – Digital Modulation

LIMIT

Mask specified in 74.637(a)(2)

The emission mask is drawn in reference to the mean transmitter power. Since the output power reported above was measured with the same external attenuator and cable, the values used for the amplitude reference levels in the plots below come from the unadjusted power meter readings above.

The emission masks in the plots below are corrected (as per 74.637(c)(3)) for the difference between the Resolution Bandwidth used to capture the trace, and the Reference Bandwidth specified in the mask description. See the following calculation:

$$CorrectionFactor = 10\log\frac{Bref(MHz)}{Bres(MHz)} = 10\log\frac{0.004}{0.100} = -14.0dB$$

The negative value indicates that the *attenuation* required below the reference level must be *decreased*. Therefore the limit *increases* by 14dB.

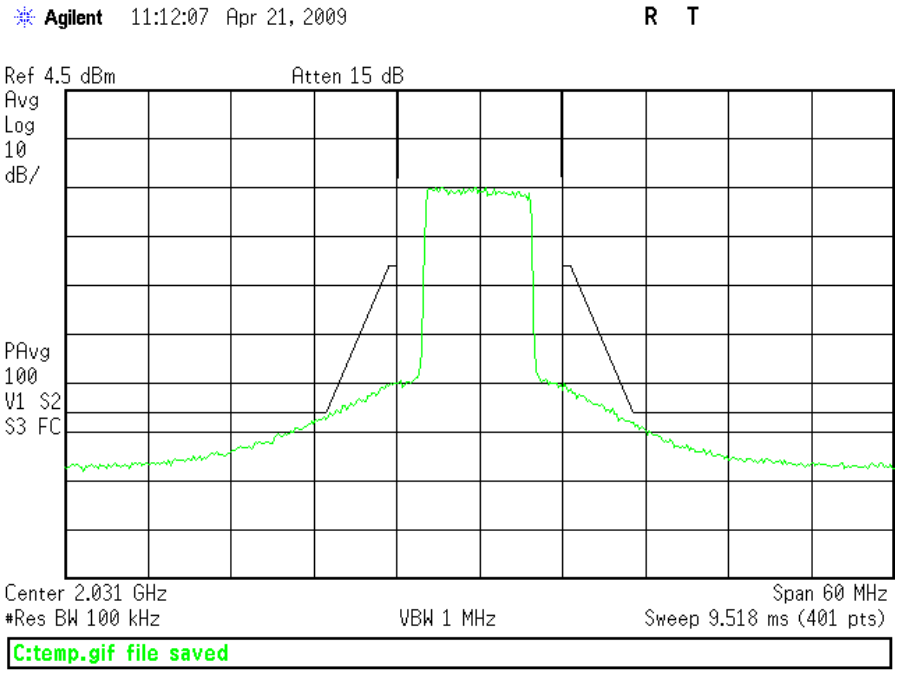
EQUIPMENT

GOLD SPECTRUM ANALYZER
HF 30DB 50W ATTENUATOR
EMIR HIGH-13

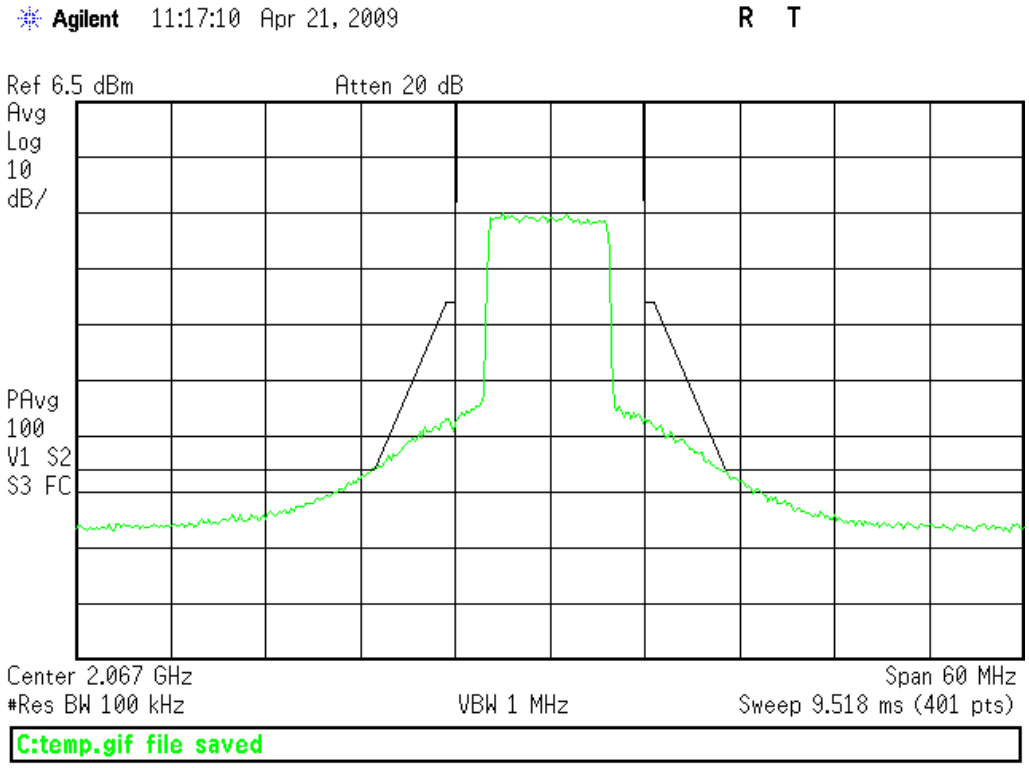
Tested by EG on 4/21/09 thru 4/22/09

PLOTS

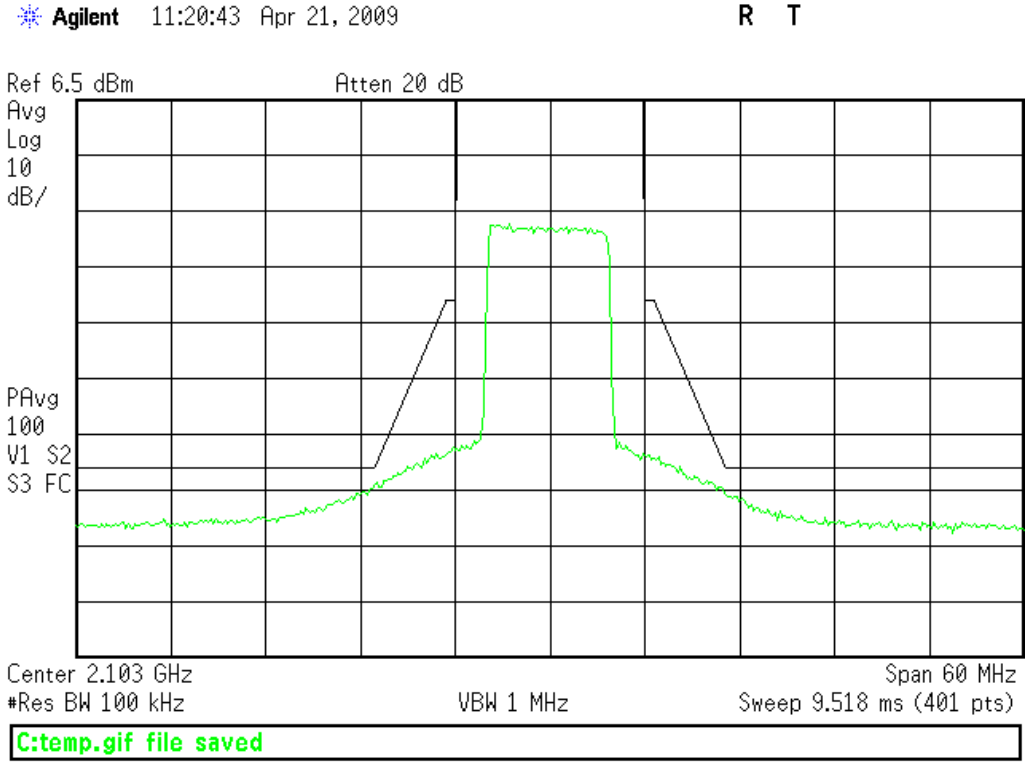
2GHz Band QPSK Ch1 12MHz BW Emission Mask



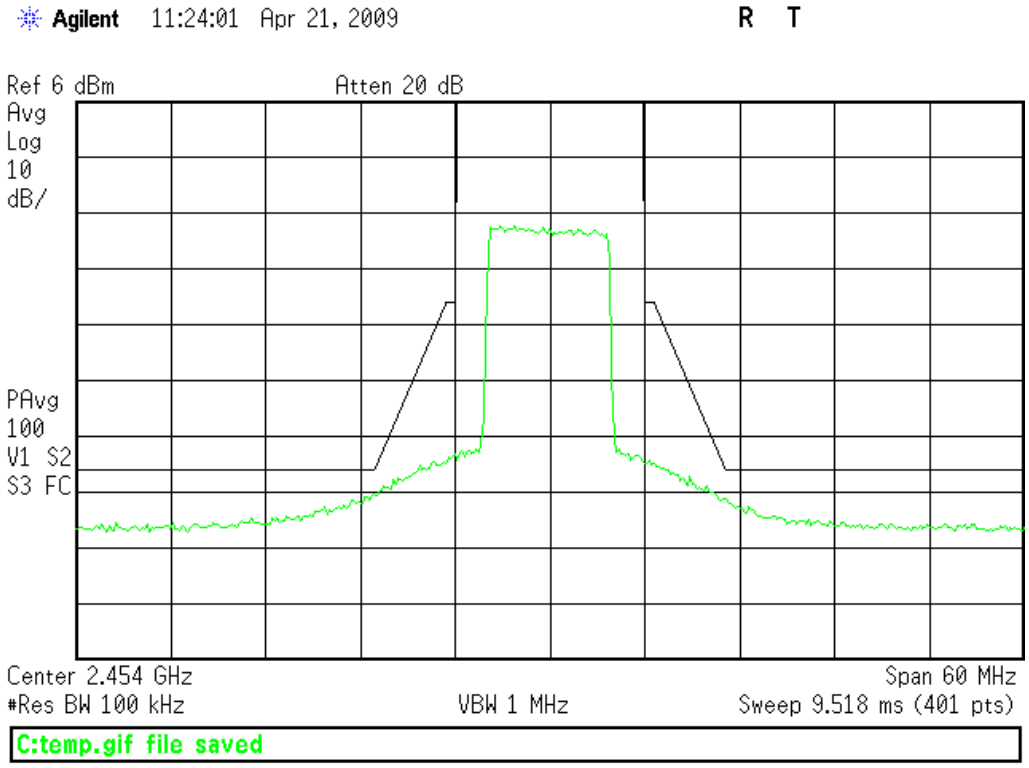
2GHz Band QPSK Channel 4 12MHz BW Emission Mask



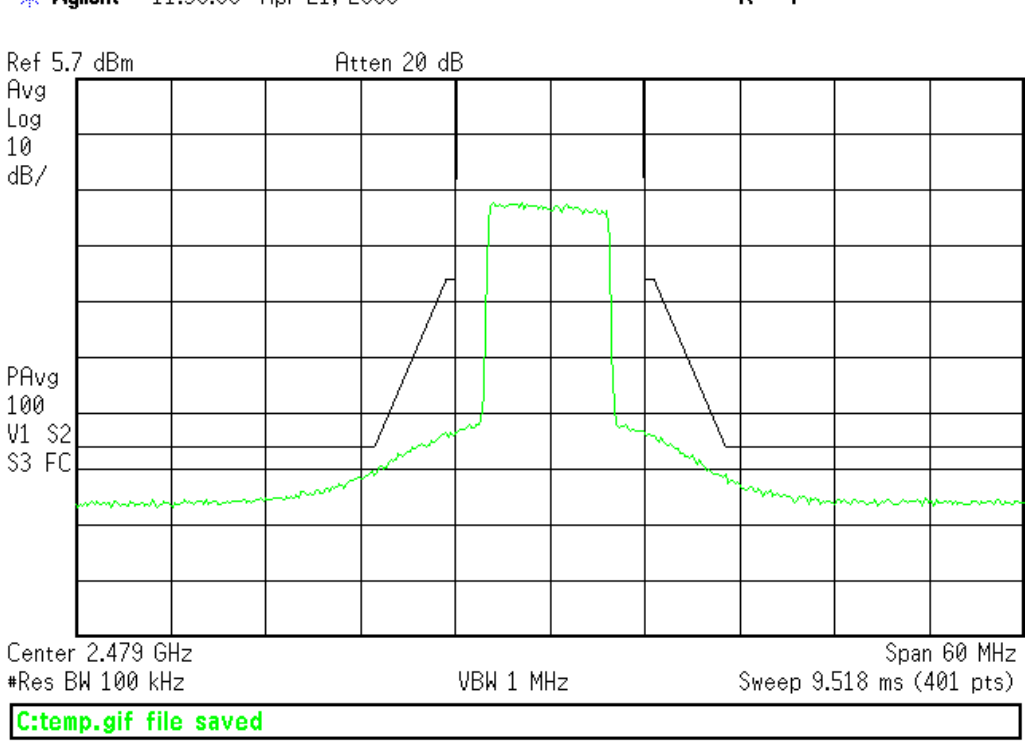
2GHz Band QPSK Channel 7 12MHz BW Emission Mask



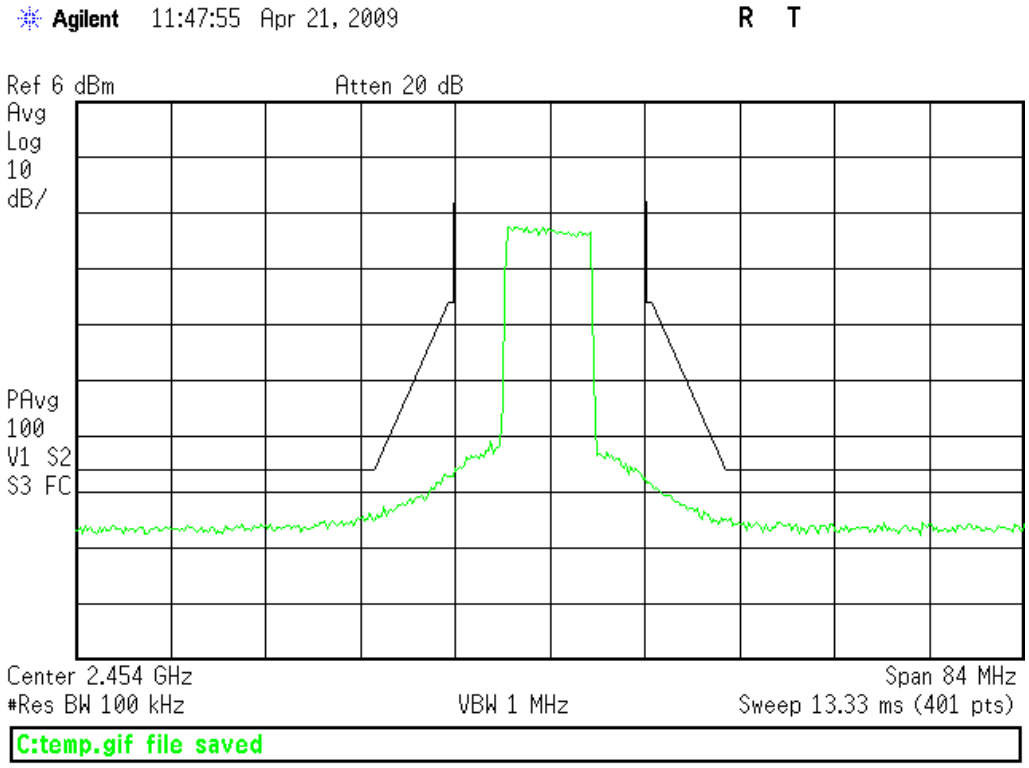
2GHz Band QPSK Channel 8- 12MHz BW Emission Mask



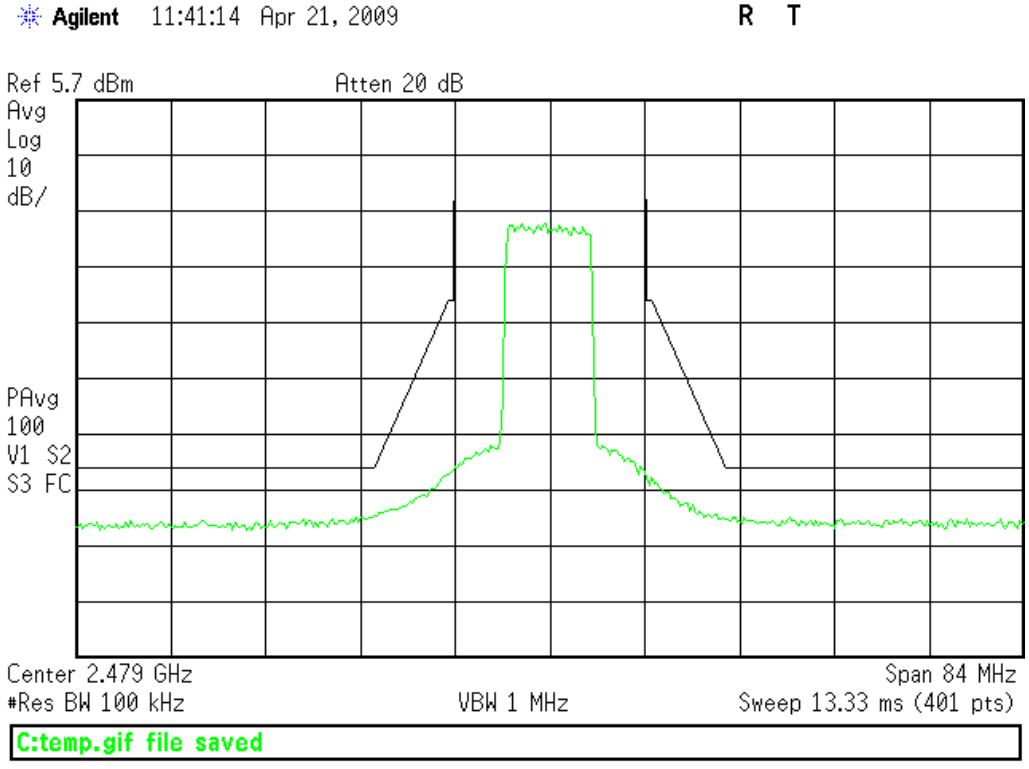
2GHz Band QPSK Channel 9+ 12MHz BW Emission Mask



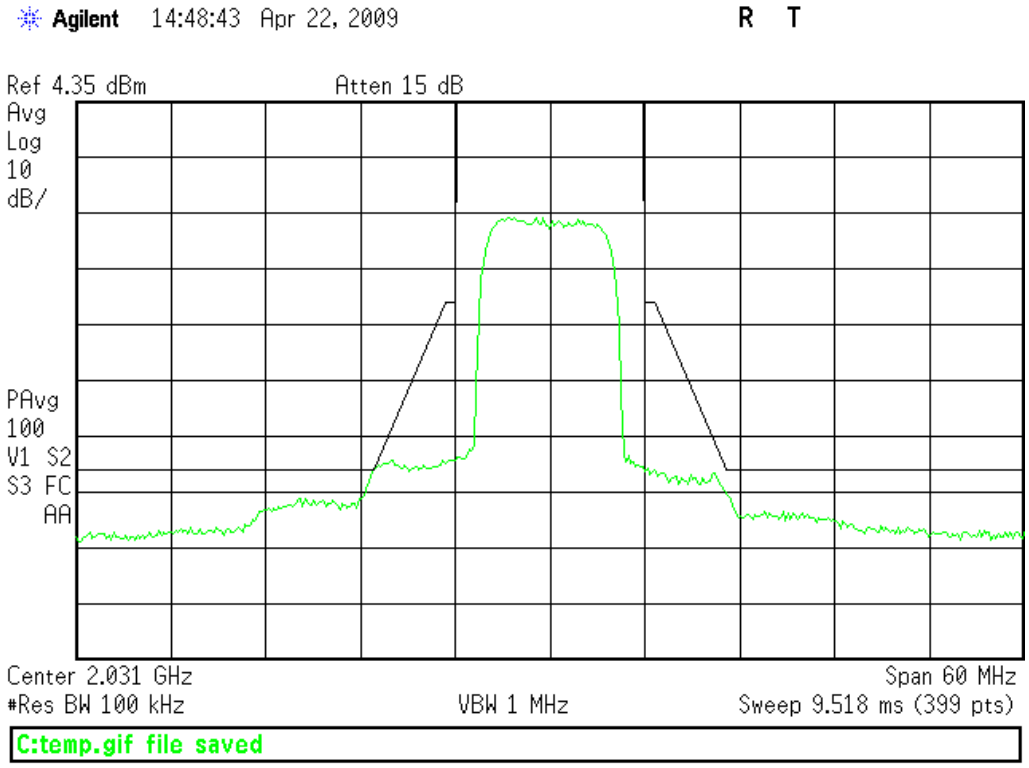
2GHz Band QPSK Channel 8- 17MHz BW Emission Mask



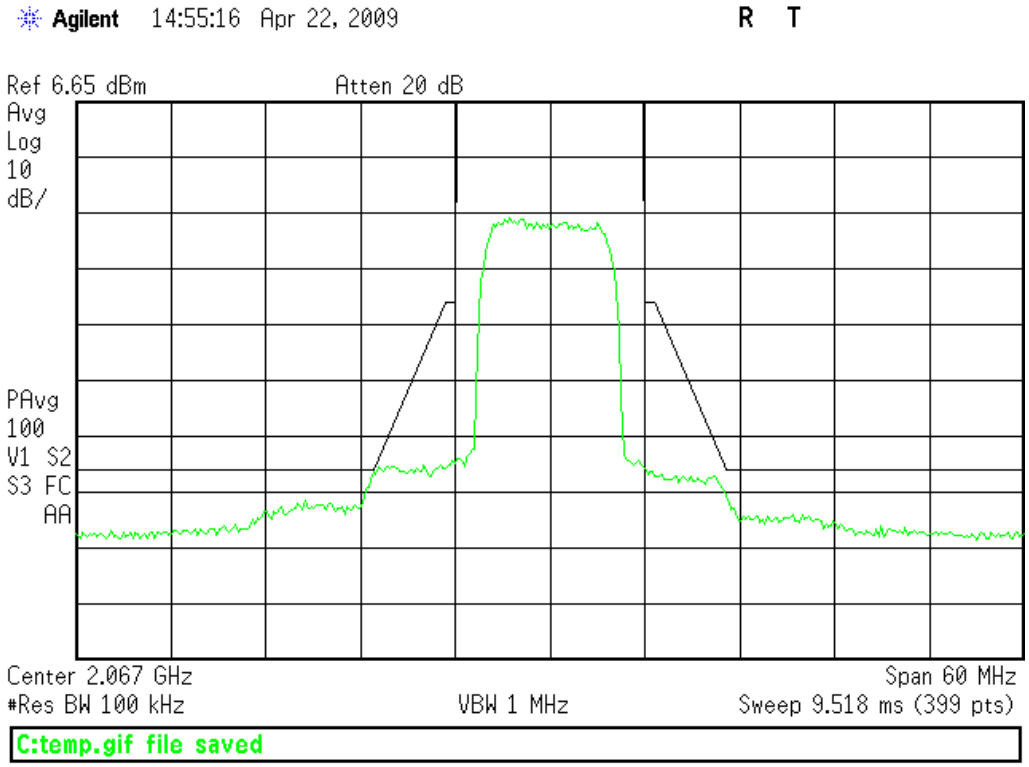
2GHz Band QPSK Channel 9+ 17MHz BW Emission Mask



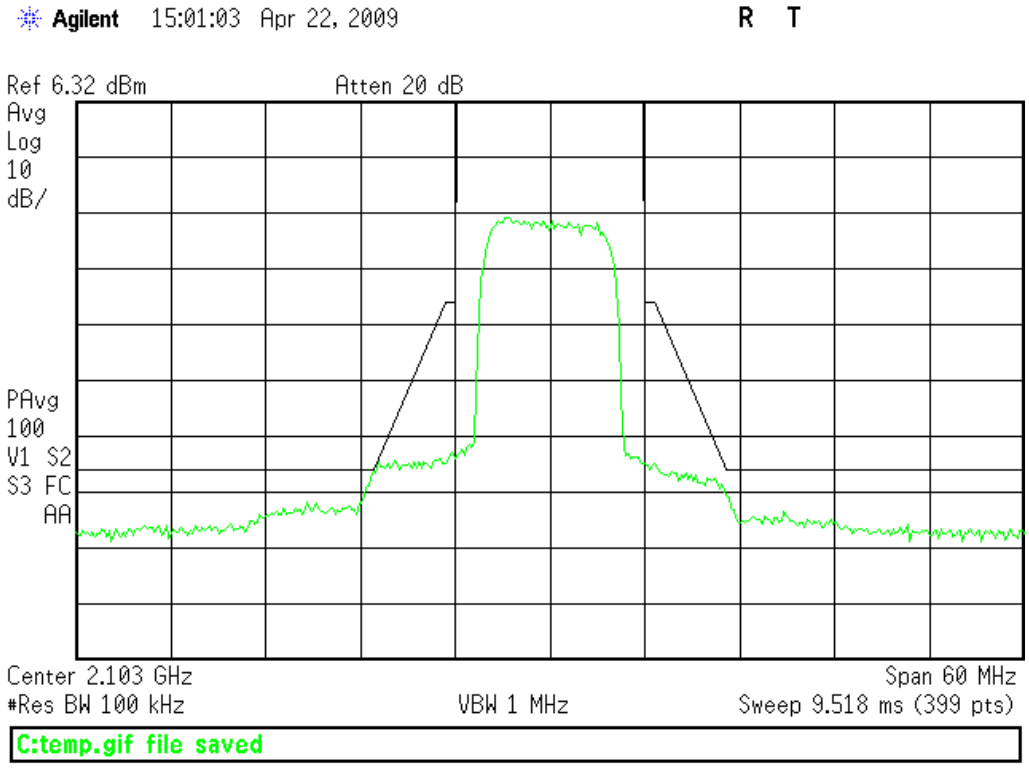
2GHz Band; Single Carrier Digital; Ch.1 12MHz BW Mask



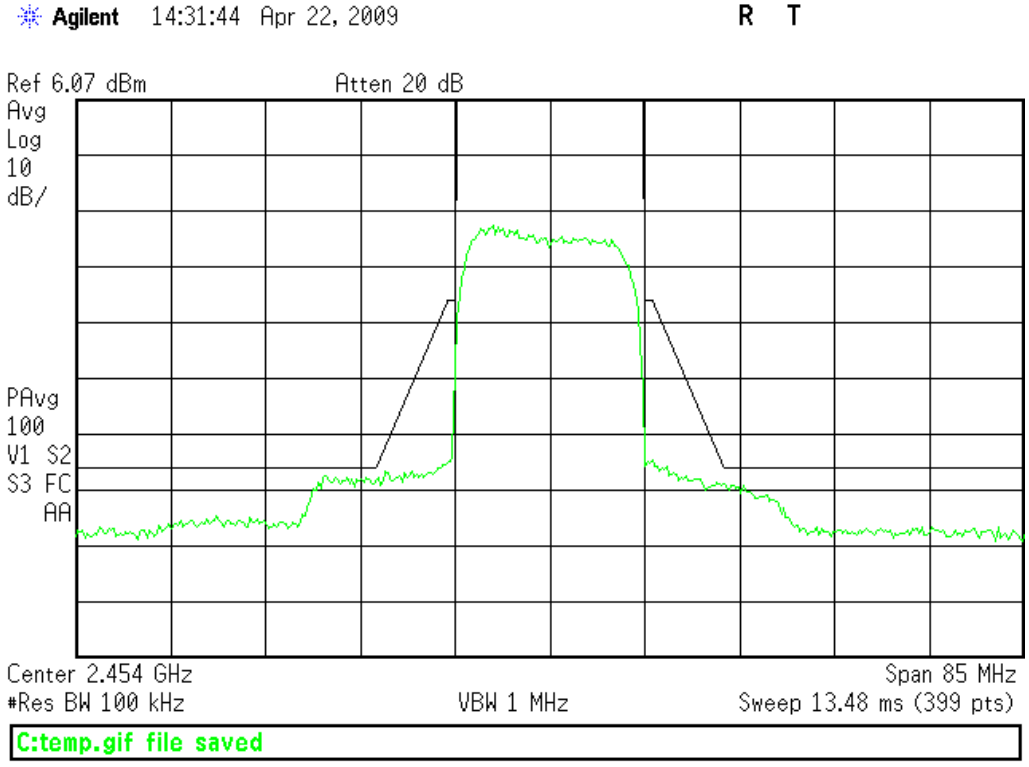
2GHz Band; Single Carrier Digital; Ch.4 12MHz BW Mask



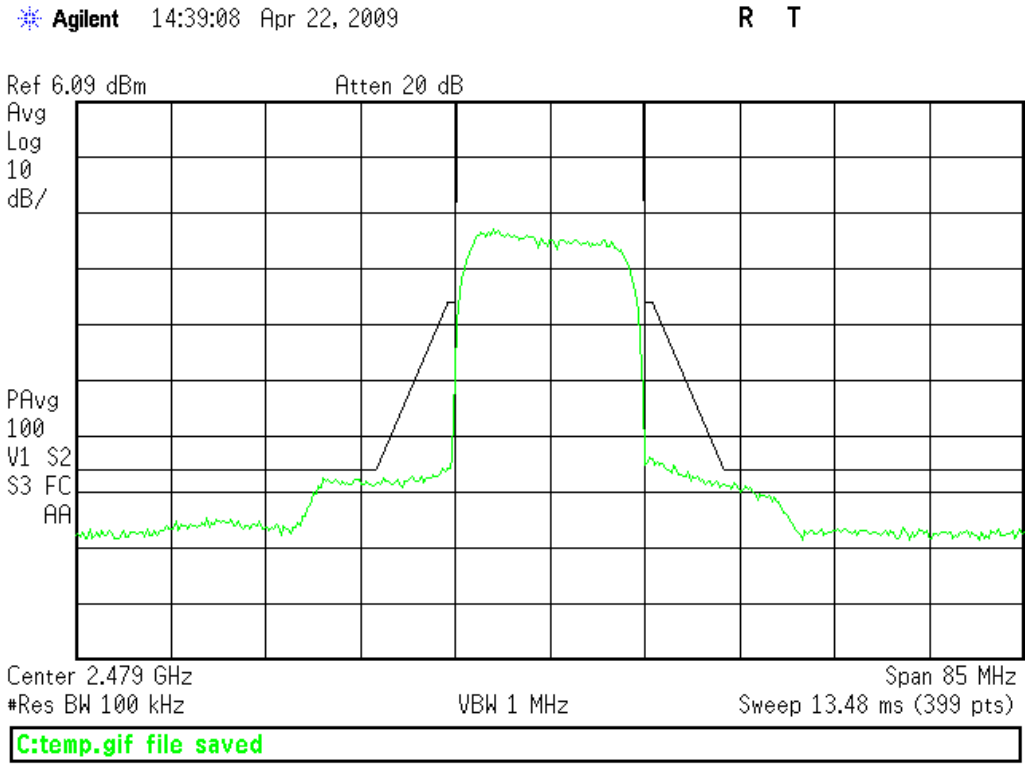
2GHz Band; Single Carrier Digital; Ch.7 12MHz BW Mask



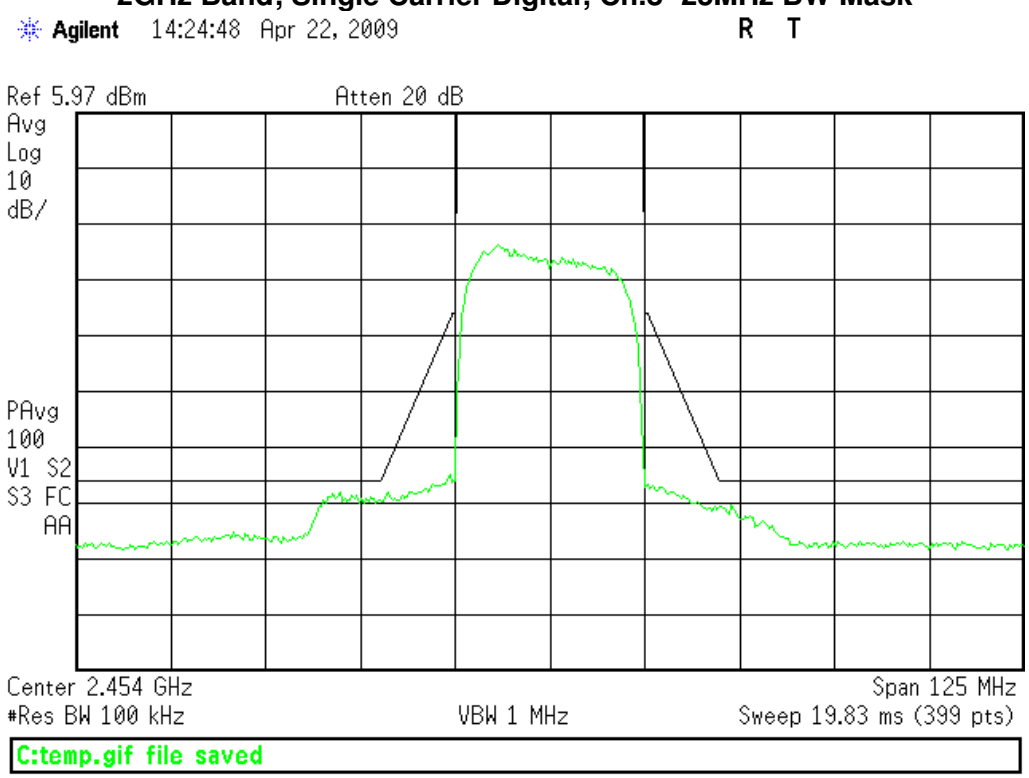
2GHz Band; Single Carrier Digital; Ch.8- 17MHz BW Mask



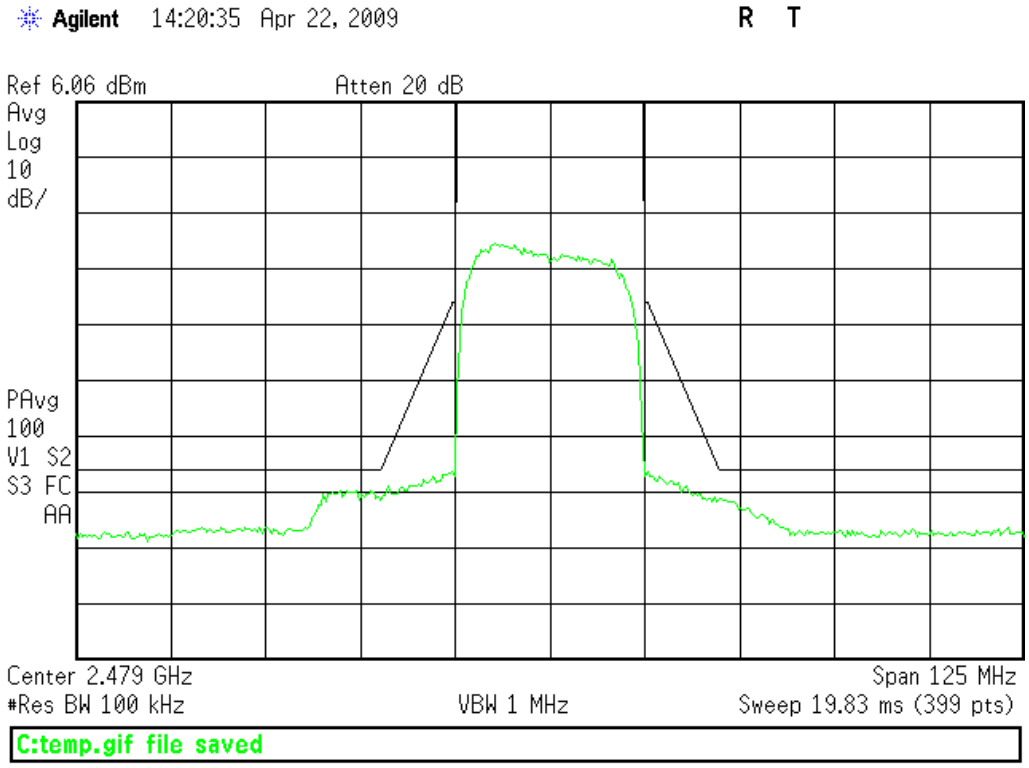
2GHz Band; Single Carrier Digital; Ch.9+ 17MHz BW Mask



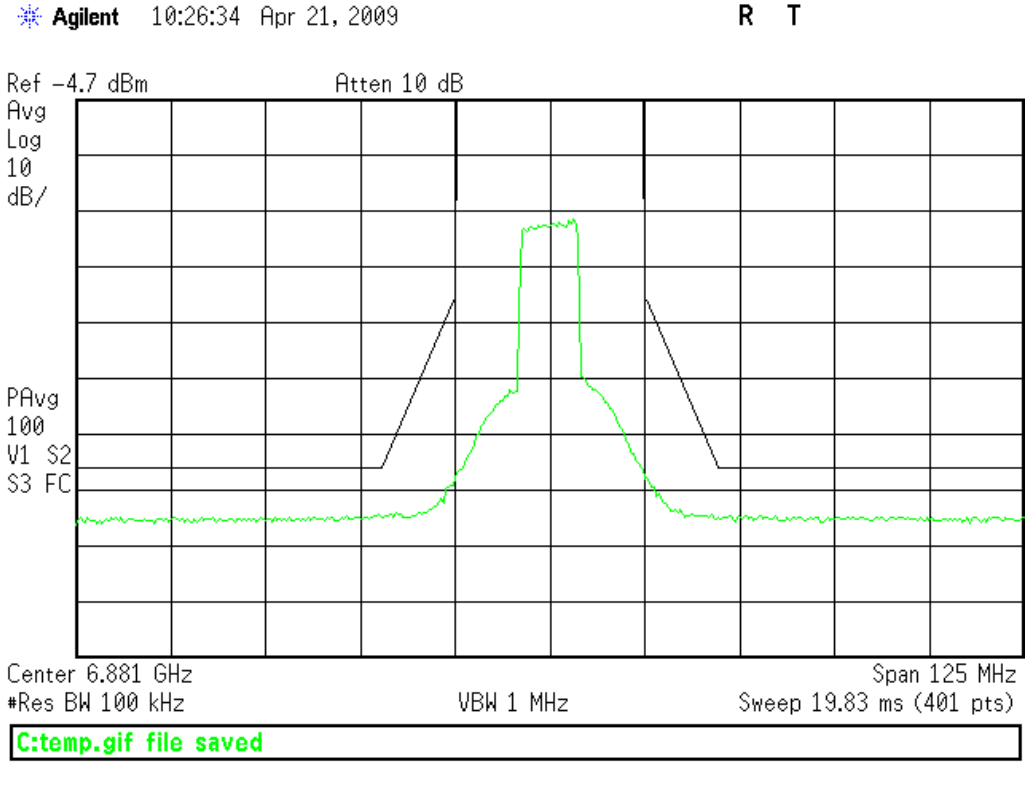
2GHz Band; Single Carrier Digital; Ch.8- 25MHz BW Mask



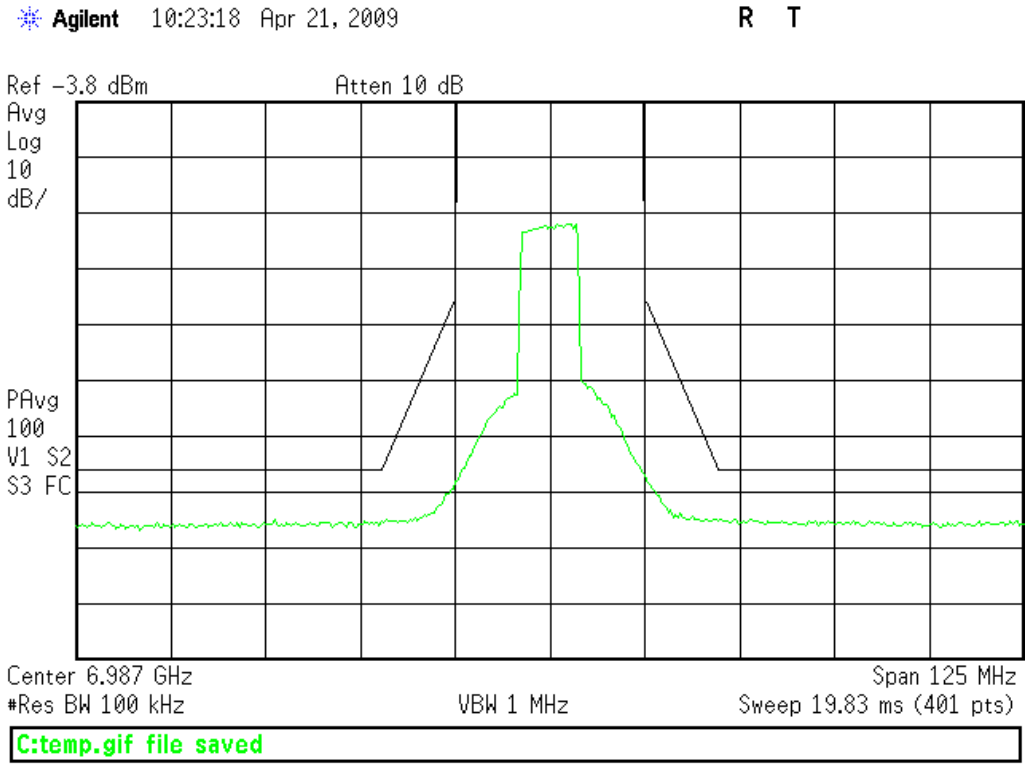
2GHz Band; Single Carrier Digital; Ch.9+ 25MHz BW Mask



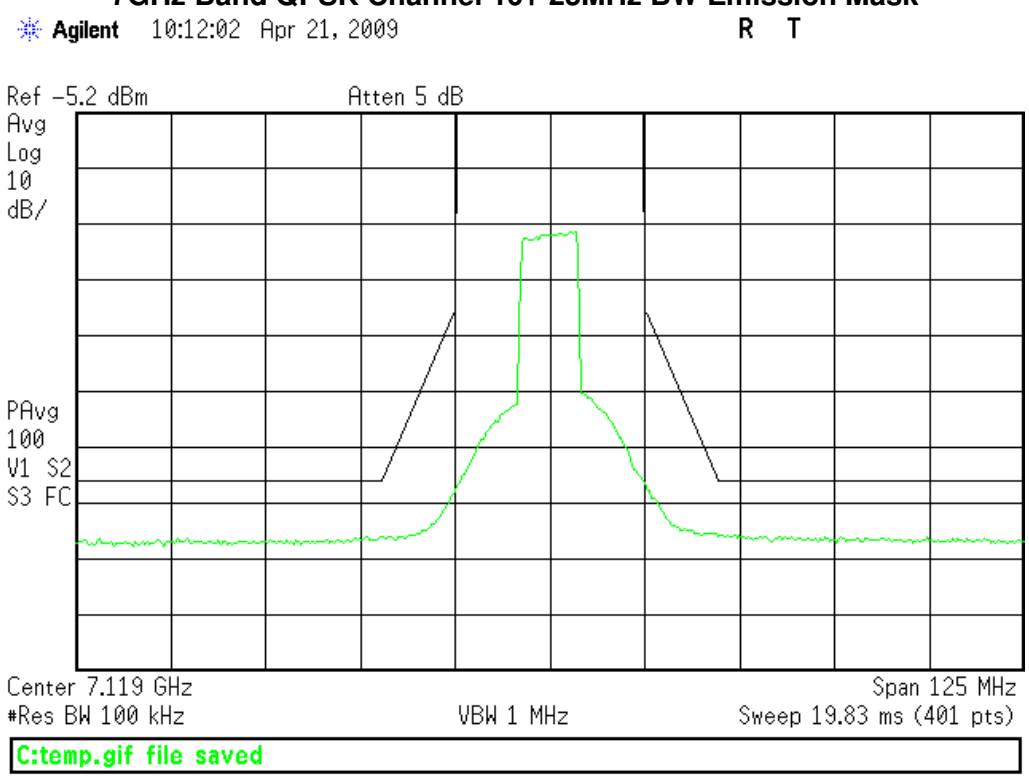
7GHz Band QPSK Channel 1- 25MHz BW Emission Mask



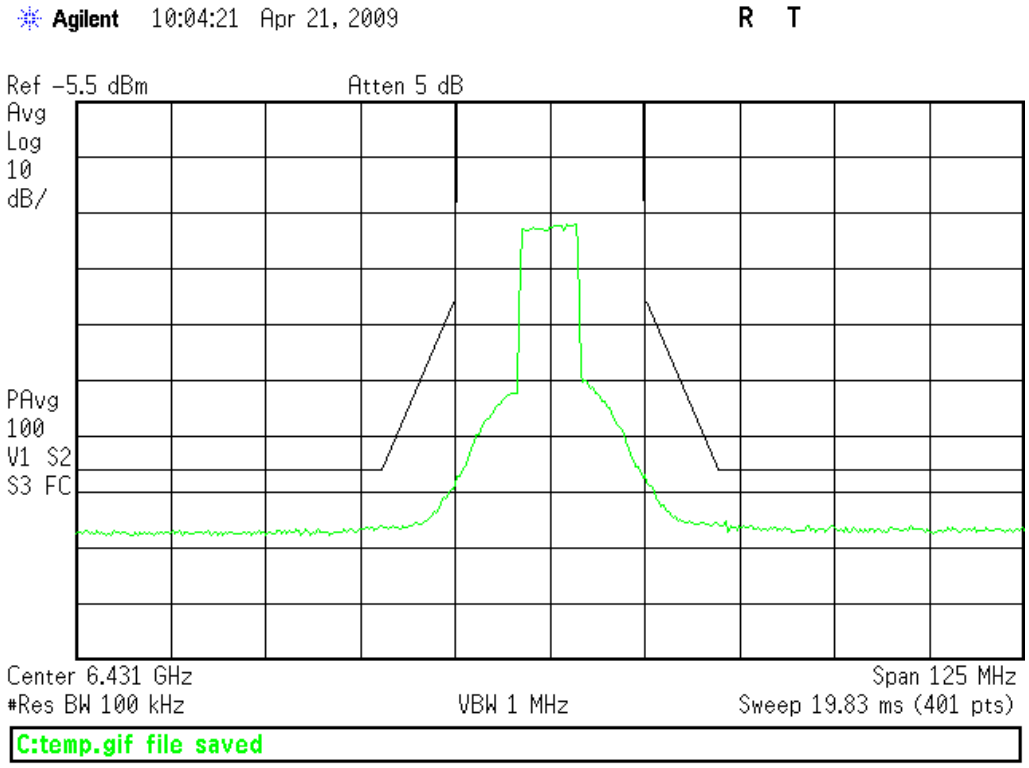
7GHz Band QPSK Channel 5 25MHz BW Emission Mask



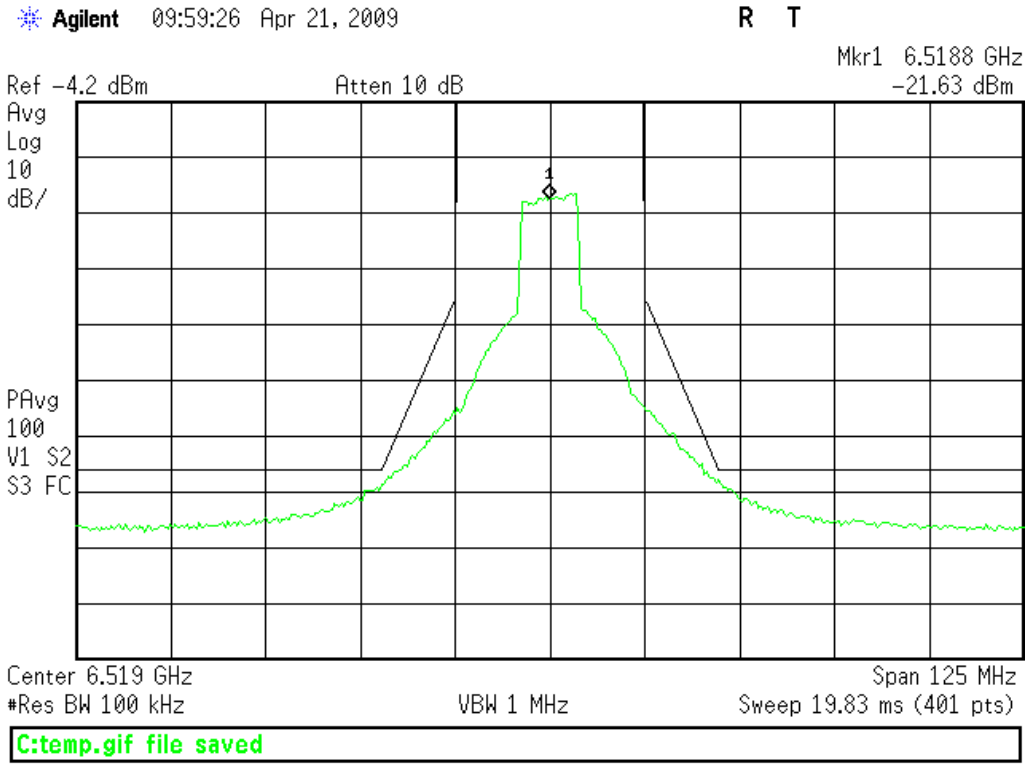
7GHz Band QPSK Channel 10+ 25MHz BW Emission Mask



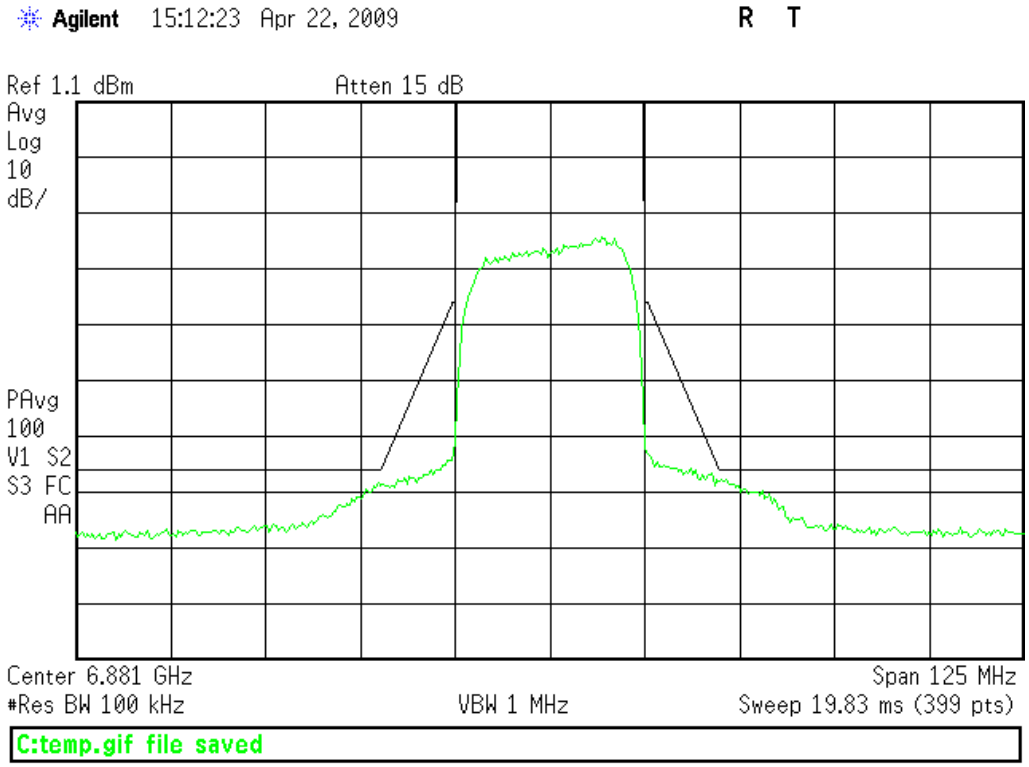
7GHz Band QPSK Channel 11- 25MHz BW Emission Mask



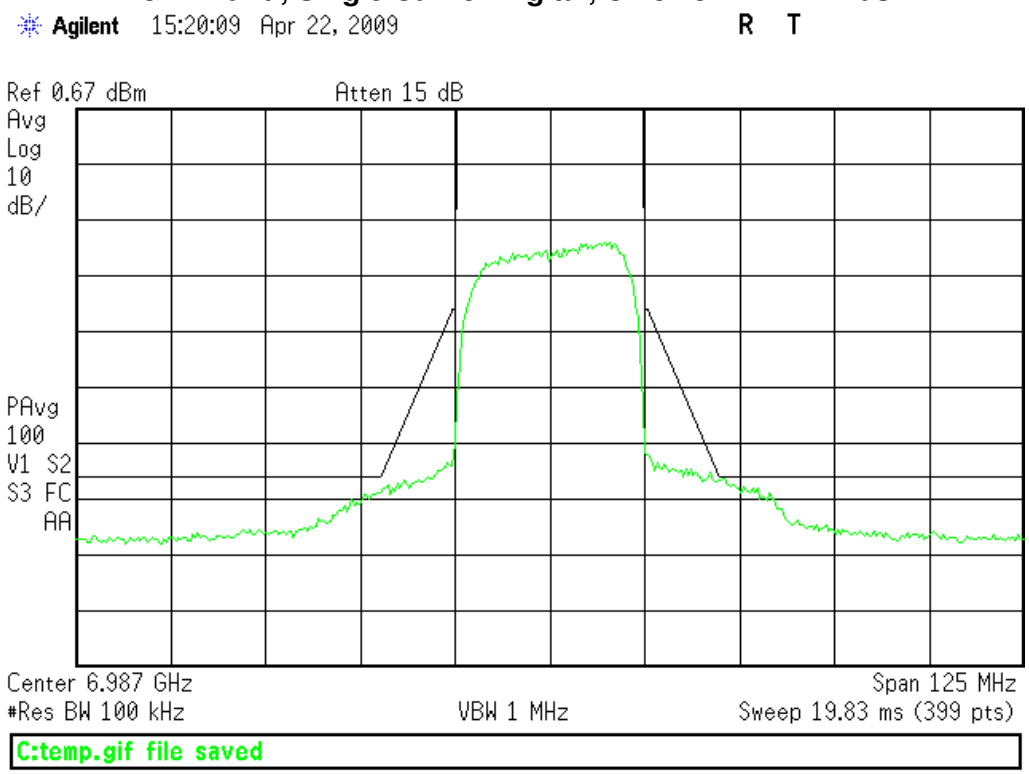
7GHz Band QPSK Channel 14+ 25MHz BW Emission Mask



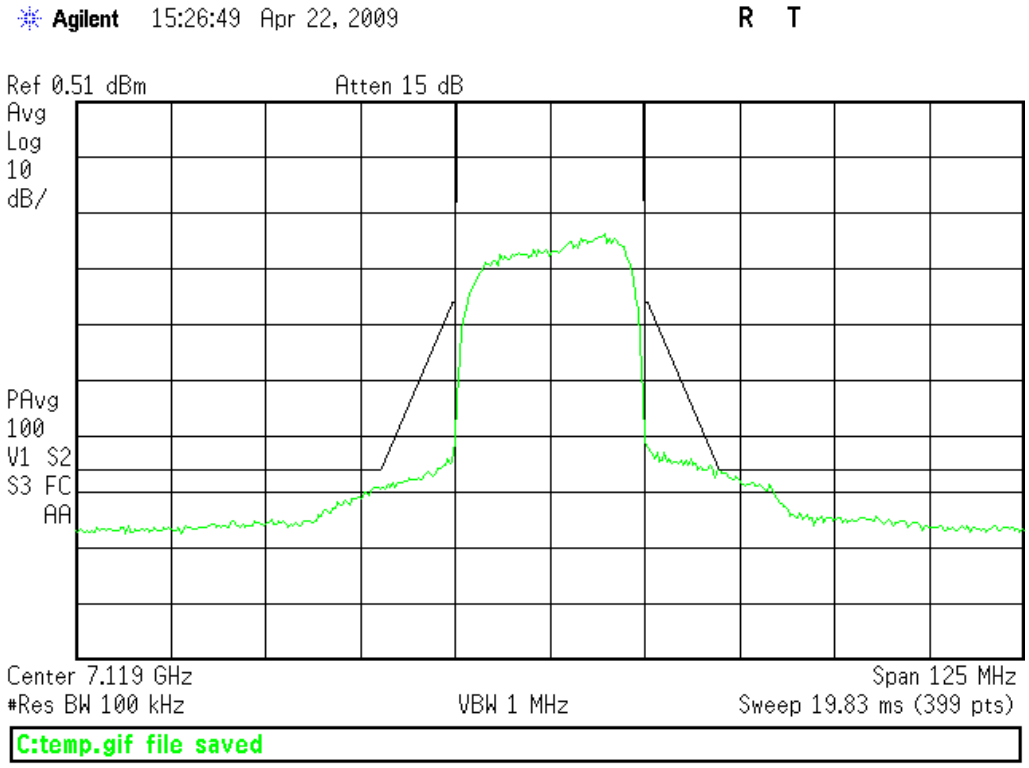
7GHz Band; Single Carrier Digital; Ch.1- 25MHz BW Mask



7GHz Band; Single Carrier Digital; Ch.5 25MHz BW Mask



7GHz Band; Single Carrier Digital; Ch.10+ 25MHz BW Mask



Emission Masks – Analog Modulation

LIMIT

Mask specified in 74.637(a)(1)

The emission mask is drawn in reference to the mean transmitter power. Since the output power reported above was measured with the same external attenuator and cable, the values used for the amplitude reference levels in the plots below come from the unadjusted power meter readings above.

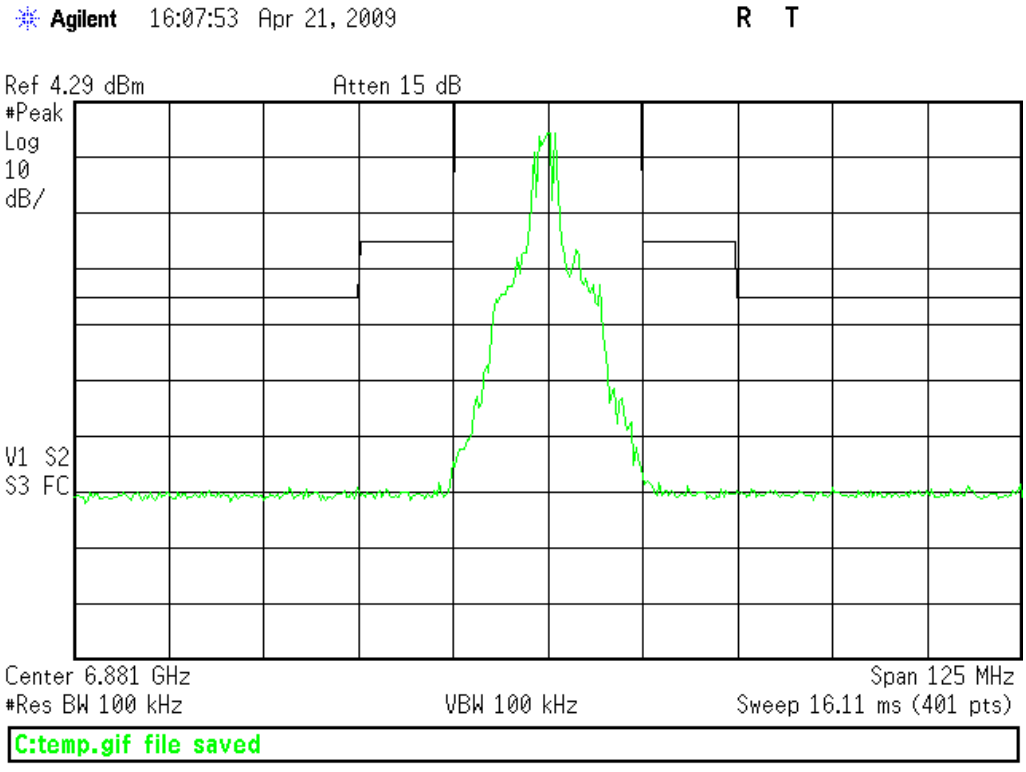
EQUIPMENT

GOLD SPECTRUM ANALYZER
HF 30DB 50W ATTENUATOR
EMIR HIGH-13

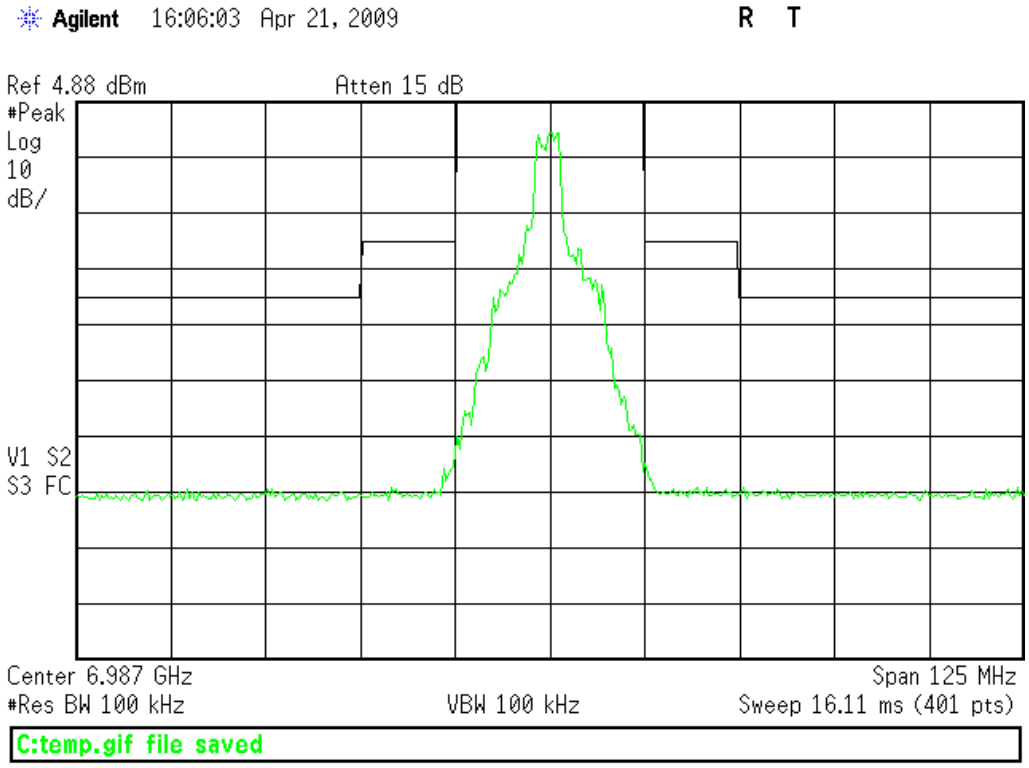
Tested by EG on 4/21/09 thru 4/22/09

PLOTS

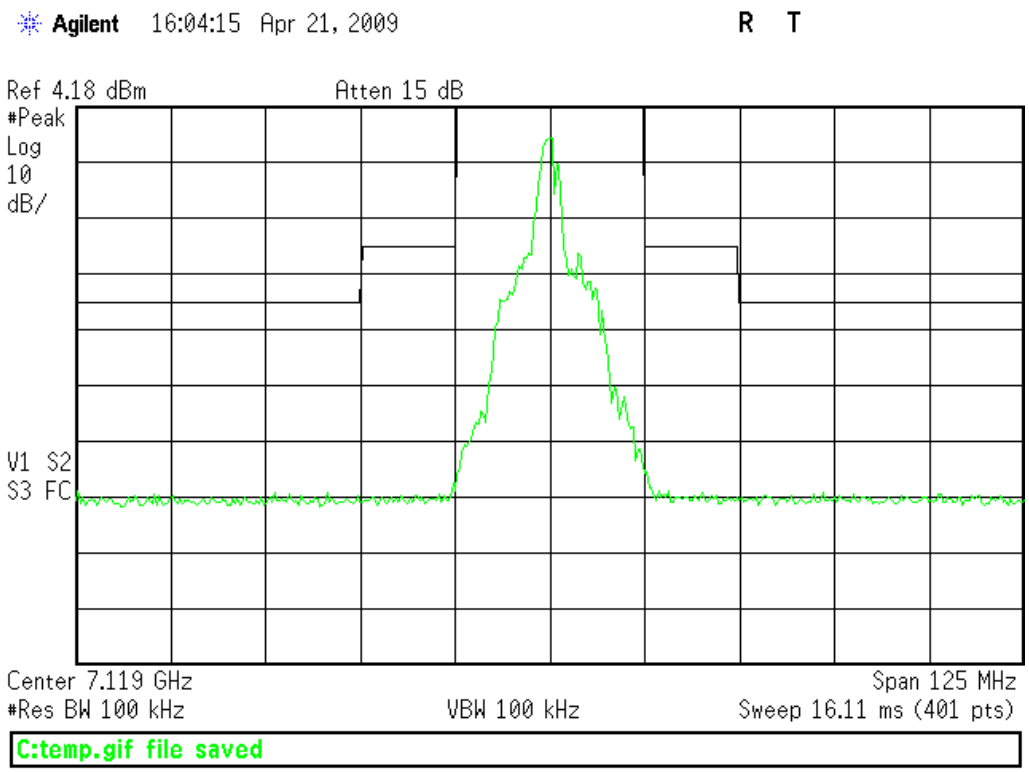
7GHz Band FM Channel 1- 25MHz BW Emission Mask



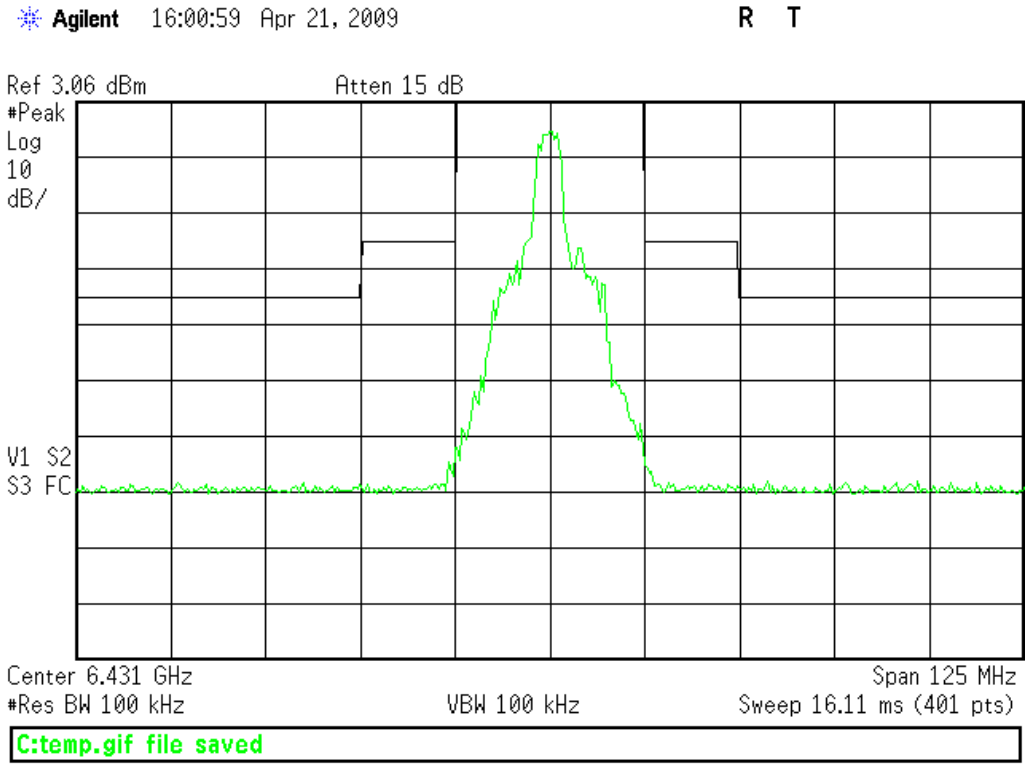
7GHz Band FM Channel 5 25MHz BW Emission Mask



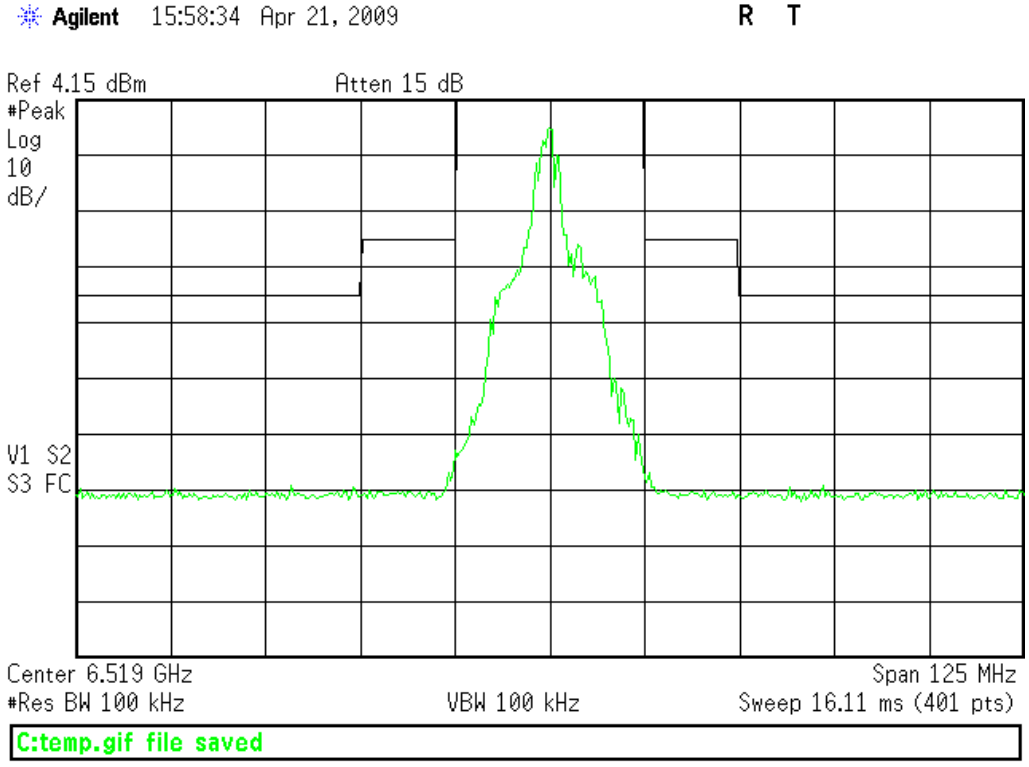
7GHz Band FM Channel 10+ 25MHz BW Emission Mask



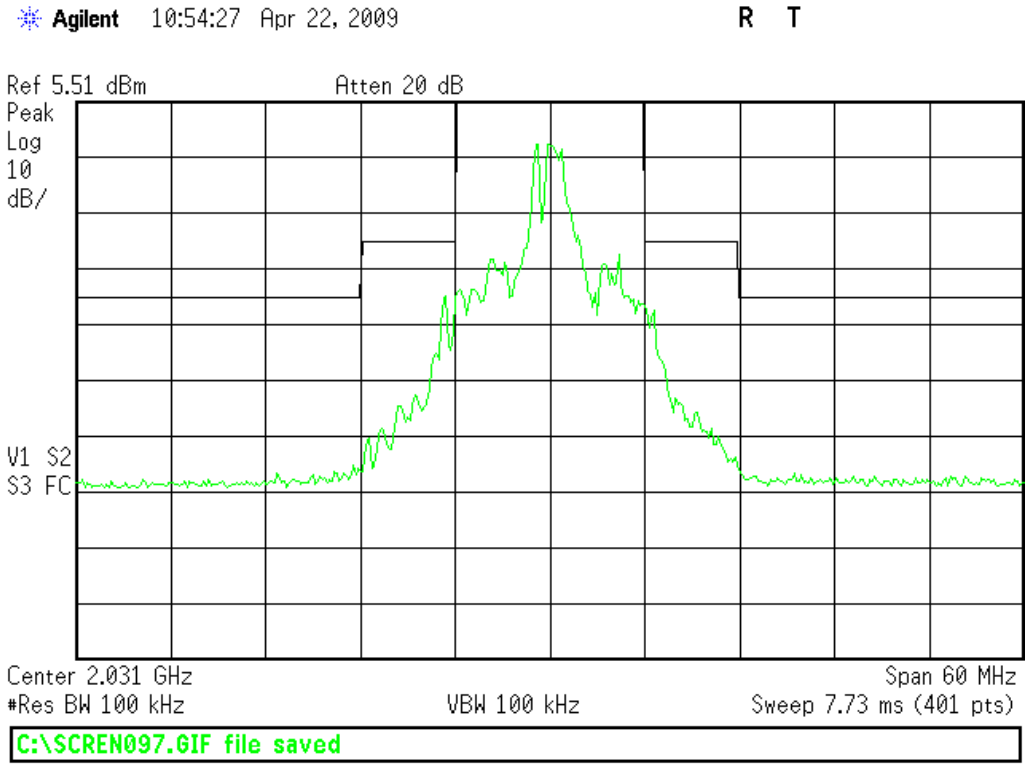
7GHz Band FM Channel 11- 25MHz BW Emission Mask



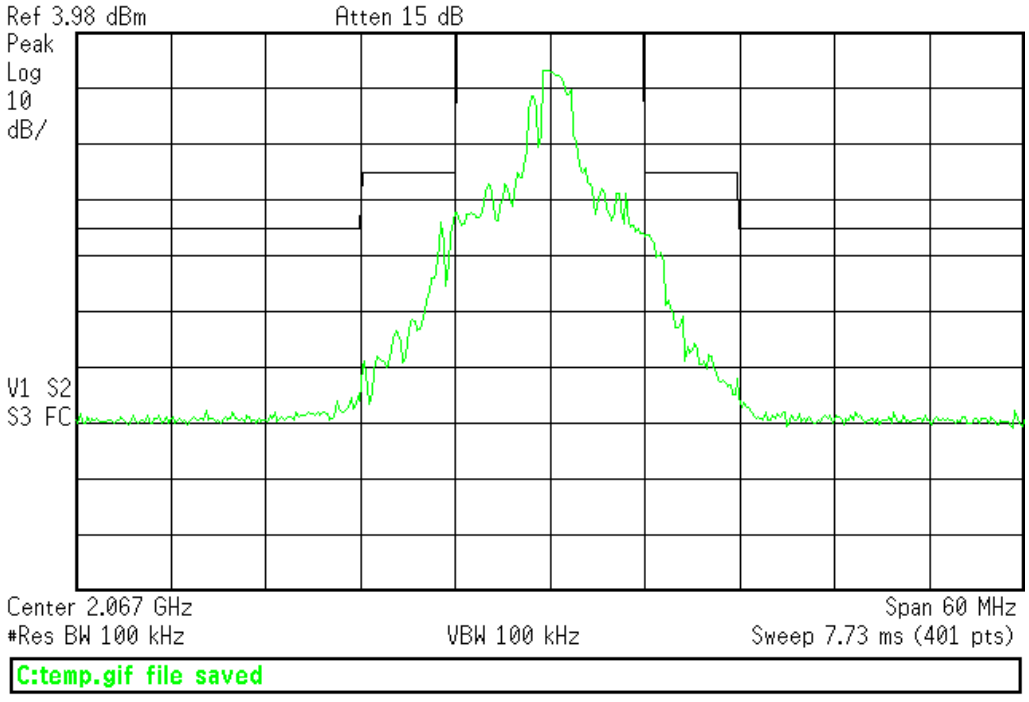
7GHz Band FM Channel 14+ 25MHz BW Emission Mask



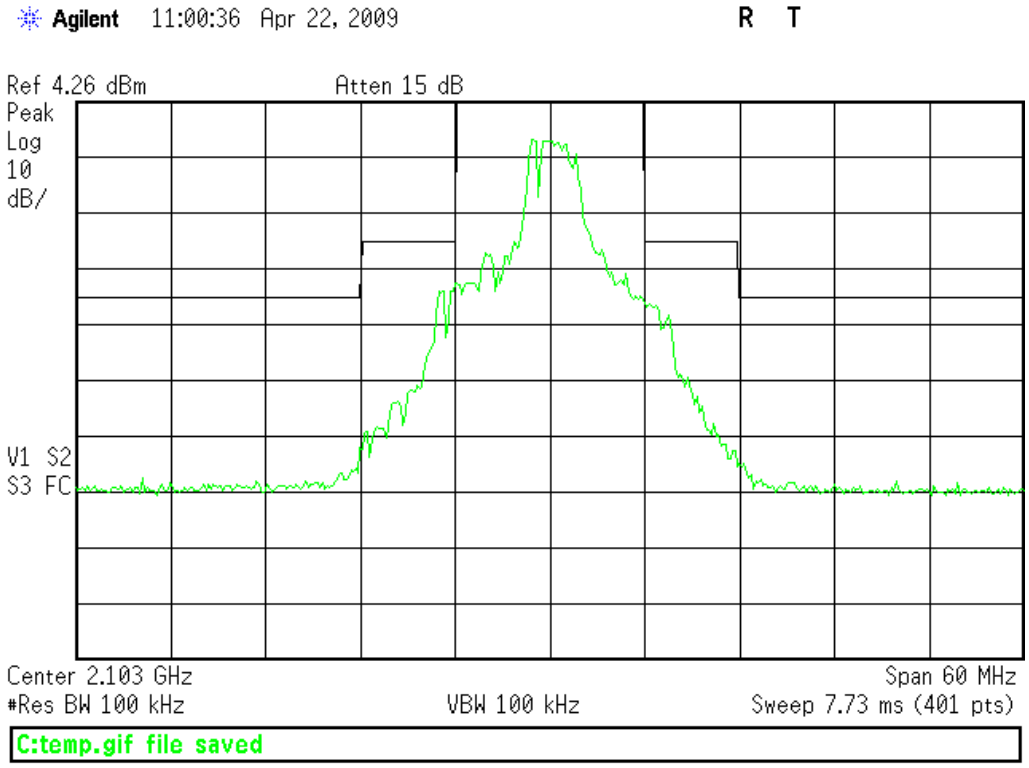
2GHz Band FM Channel 1 12MHz BW Emission Mask



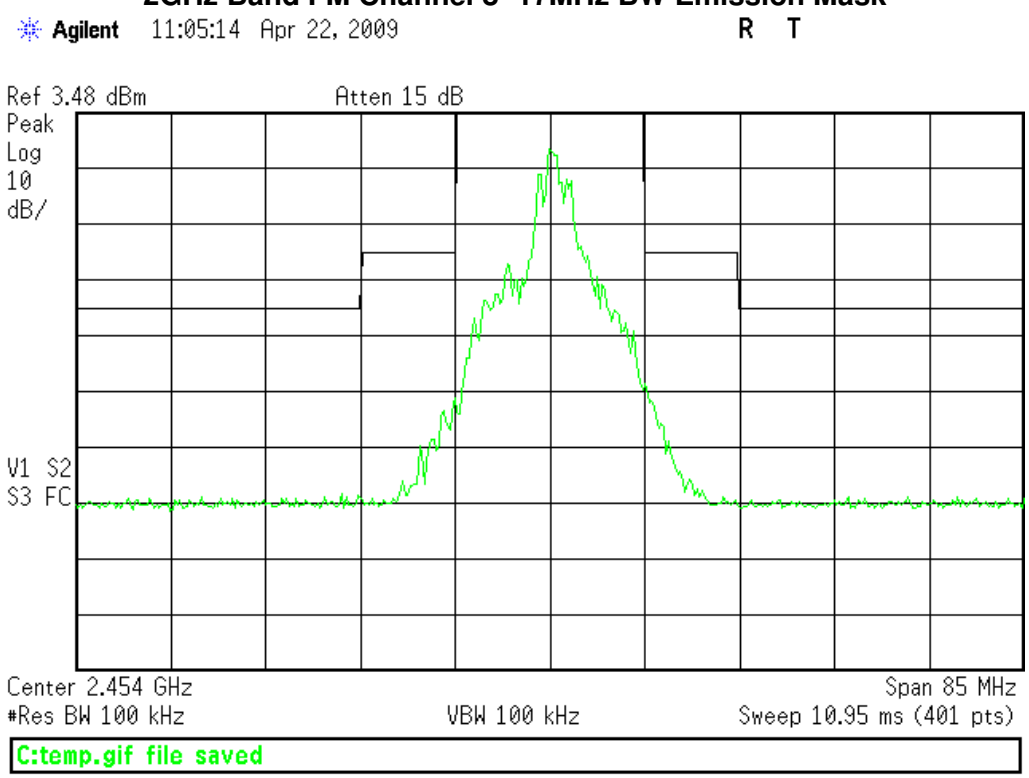
2GHz Band FM Channel 4 12MHz BW Emission Mask



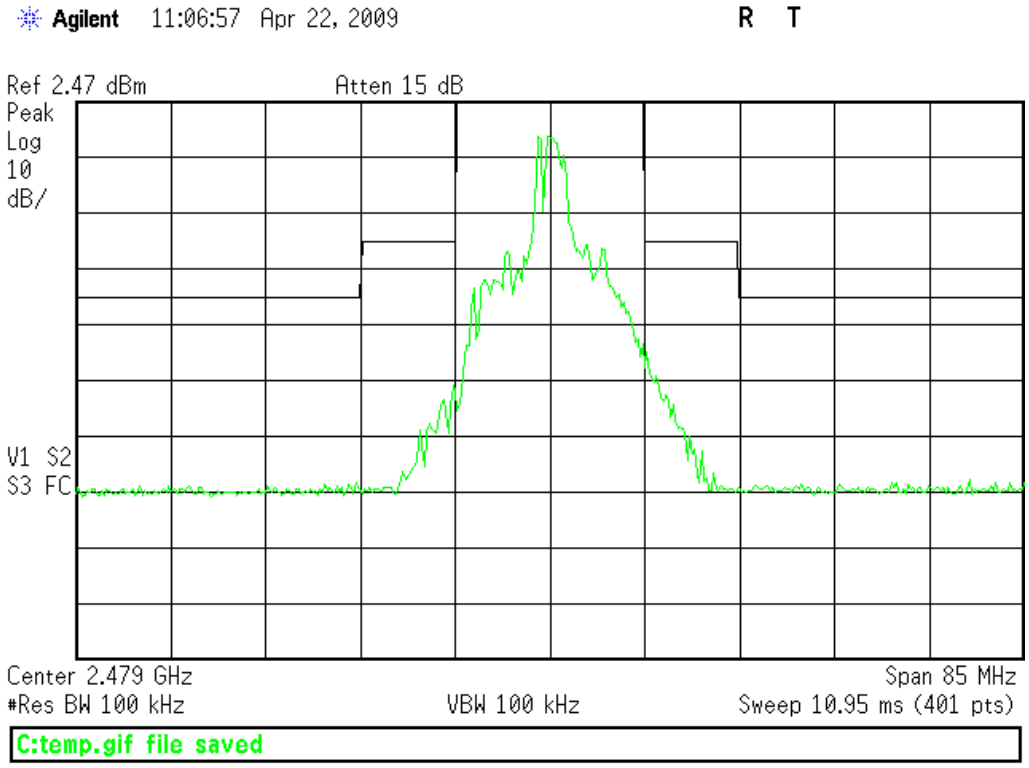
2GHz Band FM Channel 7 12MHz BW Emission Mask



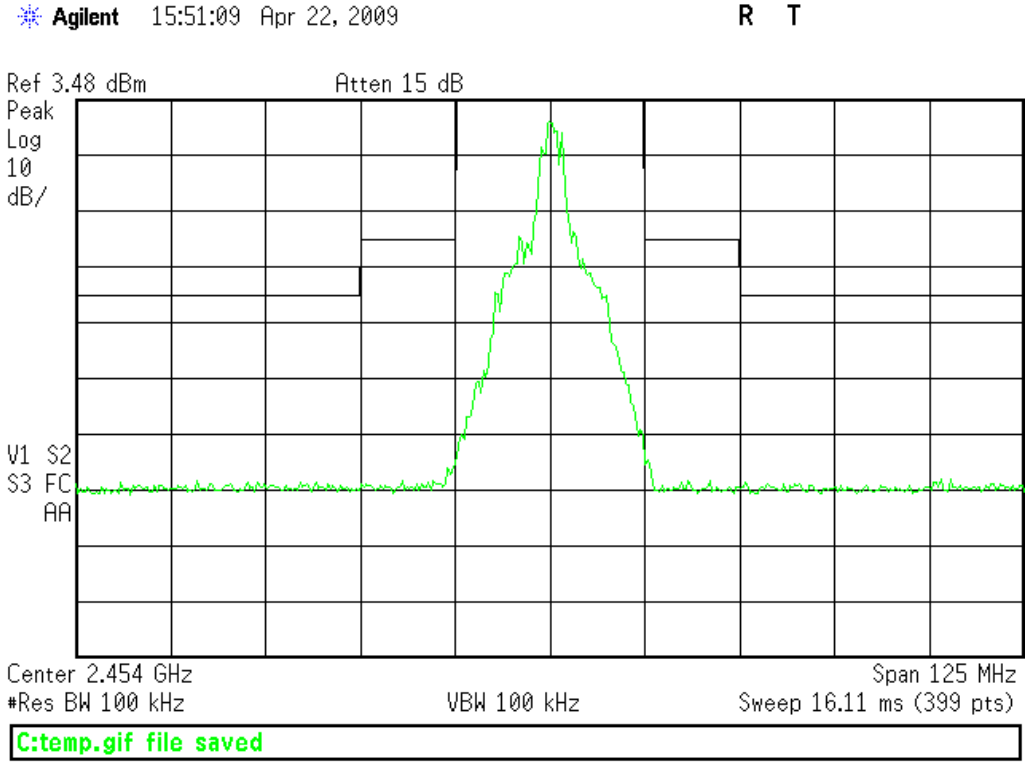
2GHz Band FM Channel 8- 17MHz BW Emission Mask



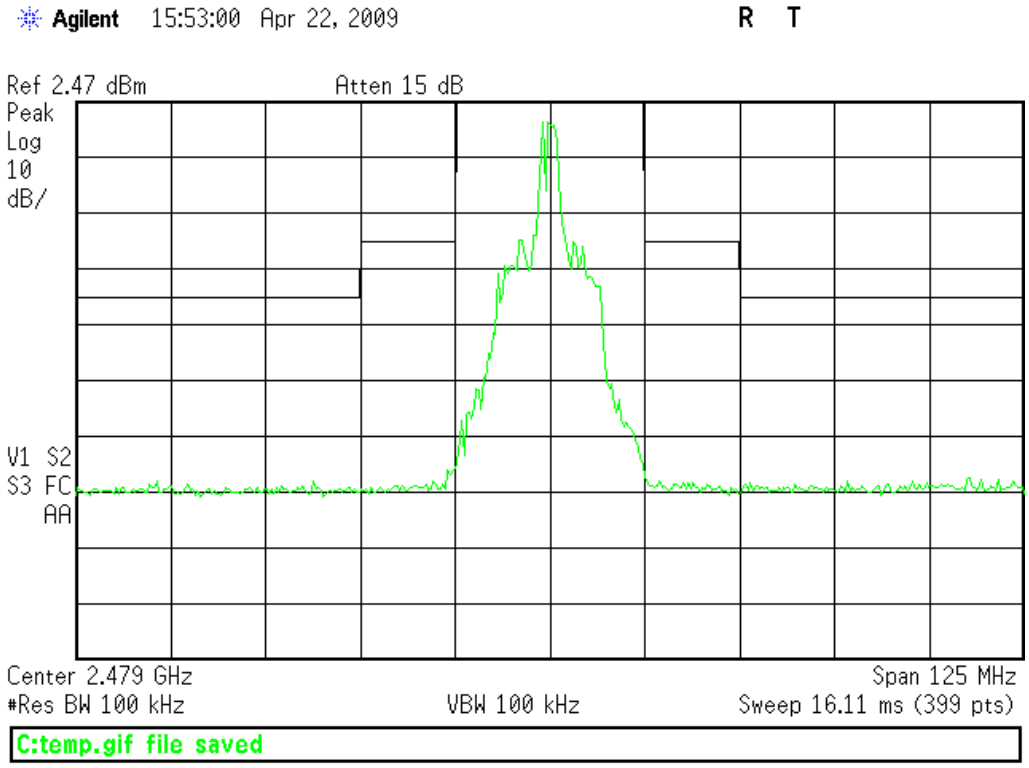
2GHz Band FM Channel 9+ 17MHz BW Emission Mask



2GHz Band FM Channel 8- 25MHz BW Emission Mask



2GHz Band FM Channel 9+ 25MHz BW Emission Mask



Out-of-Band Emissions – Conducted

LIMIT

"…the peak power of emissions shall be attenuated below the peak envelope transmitter power (Ppeak)…On any frequency removed from the channel edge by more than 2500 Hz: At least 43 + 10 Log$_{10}$ (Ppeak in watts) dB" [74.637(b) & (b)(2)]

The equation above yields an absolute limit of -13dBm.

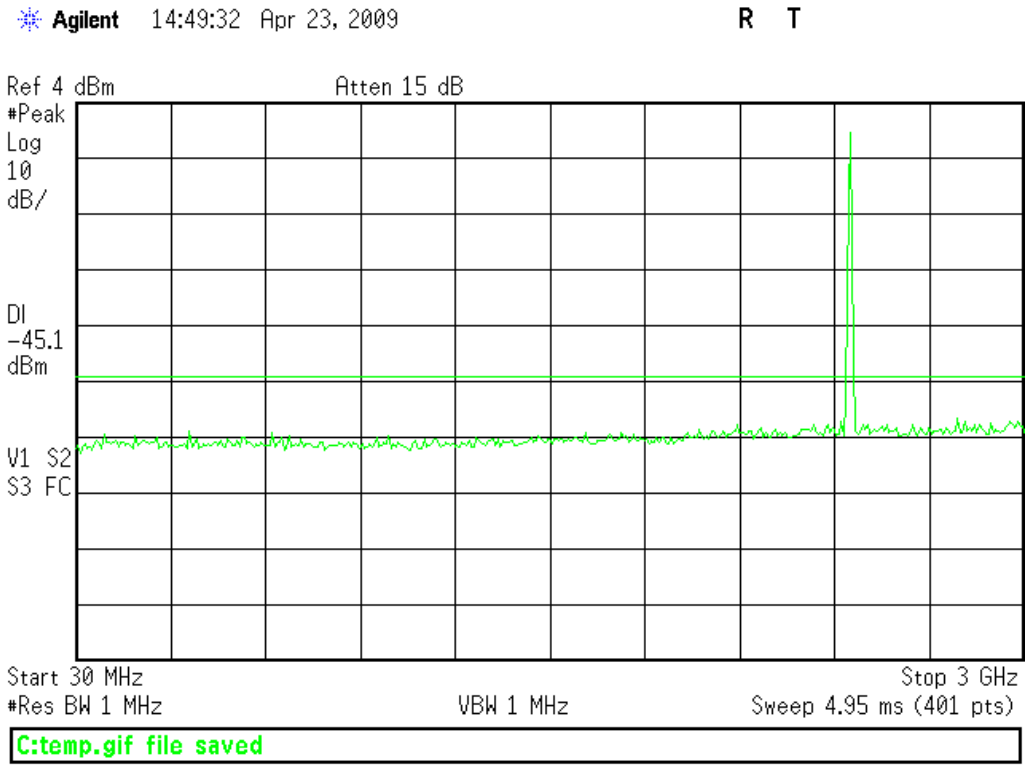
EQUIPMENT

GOLD SPECTRUM ANALYZER
EMIR HIGH-13

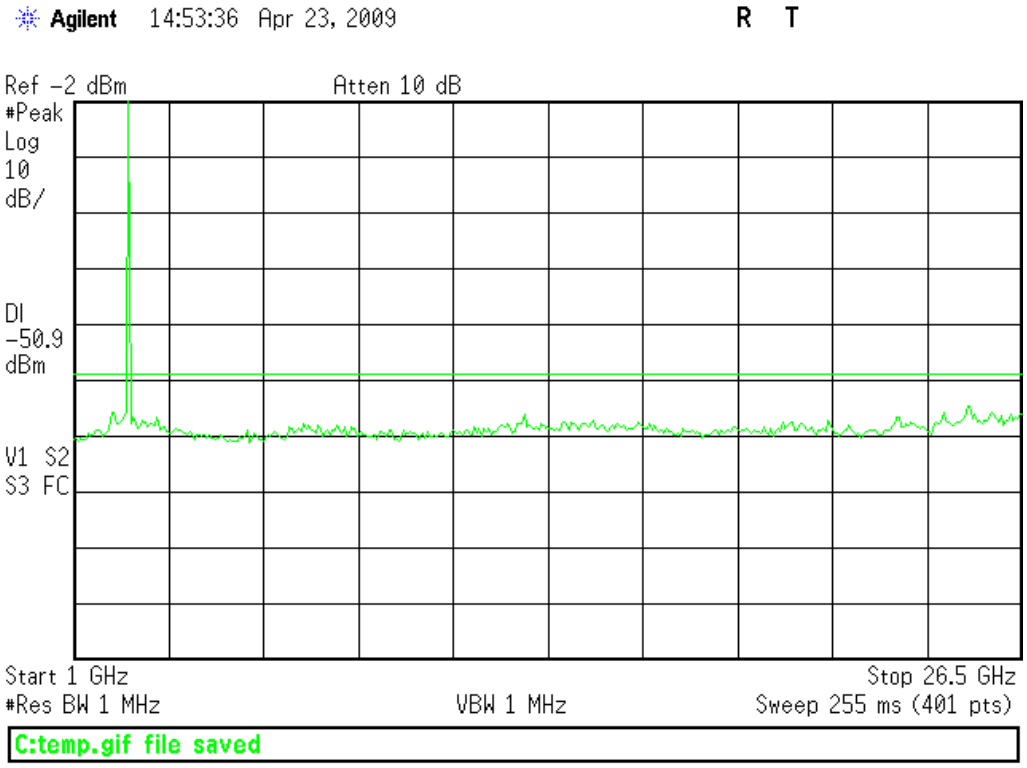
Tested by EG on 4/23/09

PLOTS

30 – 3000MHz



1 – 26.5GHz


Agilent 14:53:36 Apr 23, 2009
R T
Ref -2 dBm
Atten 10 dB
#Peak
Log
10
dB/
Dl
-50.9
dBm
V1 S2
S3 FC
Start 1 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 26.5 GHz
Sweep 255 ms (401 pts)
C:temp.gif file saved

Out-of-Band Emissions – Radiated

LIMIT

"…the peak power of emissions shall be attenuated below the peak envelope transmitter power (Ppeak)…On any frequency removed from the channel edge by more than 2500 Hz: At least 43 + 10 Log_{10} (Ppeak in watts) dB" [74.637(b) & (b)(2)]

The equation above yields an absolute limit of -13dBm.

MEASUREMENTS

Radiated Emissions Table — *Bureau Veritas Consumer Products Services*

Date: 22-May-09 **Company:** Microwave Radio Communications, LLC **Work Order:** J0250
Engineer: TT **EUT Desc:** MTX Radio **EUT Operating Voltage/Frequency:** 120Vac, 60Hz

Frequency Range: 1 to 75GHz **Measurement Distance:** 3 m

Notes: RBW = 1MHz, VBW = 3MHz **Test Site:** EMI Chamber 1 **Analyzer:** Rental SA#5

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted EIRP (dBm)	47 CFR 74.637(b) Limit (dBm)	Margin (dB)	Result (Pass/Fail)
7GHz Band										
h	1052.5	64.2	37.7	24.6	1.9	53.0	-42.3	-13.0	-29.3	Pass
h	1106.9	60.3	38.3	24.6	2.0	48.6	-46.7	-13.0	-33.7	Pass
h	1330.0	59.2	38.5	24.8	2.2	47.7	-47.6	-13.0	-34.6	Pass
h	1400.0	58.8	38.3	24.9	2.2	47.6	-47.7	-13.0	-34.7	Pass
h	1600.0	56.6	38.3	25.3	2.4	46.0	-49.3	-13.0	-36.3	Pass
h	6940.0	47.8	36.1	35.4	5.4	52.5	-42.8	-13.0	-29.8	Pass
v	6940.0	53.44	36.1	35.4	5.4	58.1	-37.1	-13.0	-24.1	Pass
v	1330.0	58.84	38.5	24.8	2.2	47.3	-47.9	-13.0	-34.9	Pass
2GHz Band										
h	1053.0	63.54	37.7	24.6	1.9	52.3	-42.9	-13.0	-29.9	Pass
h	1330.0	61.2	38.5	24.8	2.2	49.7	-45.6	-13.0	-32.6	Pass
h	1400.0	59.3	38.3	24.9	2.2	48.1	-47.2	-13.0	-34.2	Pass
h	2057.0	66.4	37.9	26.9	2.7	58.1	-37.2	-13.0	-24.2	Pass

Table Result: by -2.8 dB ***Worst Freq:*** 1052.5 MHz

Pre-Amp: Brown **Cable:** EMIR-HIGH-22 **Antenna:** Orange Horn
Pre-Amp: 18-26.5GHz **Cable:** EMIR-HIGH-22 **Antenna:** 18-26.5GHz Horn
Pre-Amp: 40GHz Mixer **Cable:** 40GHz Mixer/18-26.5GHz no cable **Antenna:** 40GHz Mixer
Pre-Amp: 60GHz Mixer **Cable:** 60GHz Mixer/18-26.5GHz no cable **Antenna:** 60GHz Mixer
Pre-Amp: 75GHz Mixer **Cable:** 75GHz Mixer/18-26.5GHz no cable **Antenna:** 75GHz Mixer

No other transmitter related spurious emissions were detected in the frequency range.

Frequency Tolerance

LIMIT

The frequency tolerance limit is 0.005%. [74.661]

EQUIPMENT

BROWN ANALYZER
FLUKE 179 TRUE RMS MULTIMETER
ECL5 ENVIRONMENTAL CHAMBER

Tested by JL on 5/14/09

MEASUREMENTS

The value used for the nominal frequency was the measurement taken at 30°C and 120VAC. The limit used for the 2GHz band is the tighter of two limits covering the 2GHz range.

2GHz radio Frequency Tolerance Measurements						
Temperture (°C)	Voltage (VAC)	Frequency (GHz)	Delta (Hz)	Delta (%)	Limit (%)	Result (Pass/Fail)
-30	120	2.0555	5000	0.0000024	0.001	Pass
-20	120	2.055505	0	0.0000000	0.001	Pass
-10	120	2.055505	0	0.0000000	0.001	Pass
0	120	2.055505	0	0.0000000	0.001	Pass
10	120	2.0555075	2500	0.0000012	0.001	Pass
20	120	2.0555025	2500	0.0000012	0.001	Pass
30	102	2.055505	0	0.0000000	0.001	Pass
30	120	2.055505	0	0.0000000	0.001	Pass
30	138	2.0555075	2500	0.0000012	0.001	Pass
40	120	2.055505	0	0.0000000	0.001	Pass
50	120	2.0555075	2500	0.0000012	0.001	Pass

7GHz radio Frequency Tolerance Measurements						
Temperture (°C)	Voltage (VAC)	Frequency (GHz)	Delta (Hz)	Delta (%)	Limit (%)	Result (Pass/Fail)
-30	120	6.9375025	0	0	0.005	Pass
-20	120	6.9375025	0	0	0.005	Pass
-10	120	6.9375025	0	0	0.005	Pass
0	120	6.9375025	0	0	0.005	Pass
10	120	6.9375025	0	0	0.005	Pass
20	120	6.9375025	0	0	0.005	Pass
30	102	6.9375025	0	0	0.005	Pass
30	120	6.9375025	0	0	0.005	Pass
30	138	6.9375025	0	0	0.005	Pass
40	120	6.9375025	0	0	0.005	Pass
50	120	6.9375025	0	0	0.005	Pass

Measurement Uncertainty

Measurement	Expanded Uncertainty k=2	Maximum allowable uncertainty (ETSI)
Radiated Emissions (30-1000MHz)	5.6dB	N/A
Radiated Emissions (1-26.5GHz)	4.6dB	N/A
Radiated Emissions (above 26.5GHz)	4.9dB	N/A
Magnetic Radiated Emissions	5.6dB	N/A
Conducted Emissions	3.9dB	N/A
Telco Conducted Emissions (Current)	2.9dB	N/A
Telco Conducted Emissions (Voltage)	4.4dB	N/A
Electrostatic Discharge	11.5%	N/A
Radiated RF Immunity (Uniform Field)	1.6dB	N/A
Electrical Fast Transients	23.1%	N/A
Surge	23.1%	N/A
Conducted RF Immunity	3dB	N/A
Magnetic Immunity	12.8%	N/A
Dips and Interrupts	2.3V	N/A
Harmonics	3.5%	N/A
Flicker	3.5%	N/A
Radio frequency	8.2×10^{-8}	1×10^{-7}
RF power, conducted	0.7dB	0.75dB
Maximum frequency deviation: • Within 300Hz and 6kHz of audio frequency • Within 6kHz and 25kHz of audio frequency	• 1.2% • 0.1dB	• 5% • 3dB
Adjacent channel power	1.9dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	0.7dB	3dB
Conducted emission of receivers	0.7dB	1dB
Radiated emission of transmitter, valid up to 26.5GHz	5.6dB	6dB
Radiated emission of transmitter, valid up to 80GHz	5.6dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	5.6dB	6dB
Radiated emission of receiver, valid up to 80GHz	5.6dB	6dB
RF level uncertainty for a given BER	0.7dB	1dB
Humidity	2.31%	5%
Temperature	0.6℃	1.0℃
Time	0.8%	10%
RF Power Density, Conducted	2.2dB	3dB
DC and low frequency voltages	1.29%	3%
Voltage (AC, <10kHz)	1.29%	2%
Voltage (DC)	0.23%	1%
The above reflects a 95% confidence level		

Test Equipment Used

REV. 13-MAY-2009

SPECTRUM ANALYZERS / RECEIVERS /PRESELECTORS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	9kHz-1.8GHz	8591E	Agilent	3441A03559	00024	I	03-MAR-2010
WHITE	9kHz-22GHz	8593E	Agilent	3547U01252	00022	I	10-DEC-2009
BLUE	9kHz-1.8GHz	8591E	Agilent	3223A00227	00070	I	Out of Cal
YELLOW	9kHz-2.9GHz	8594E	Agilent	3523A01958	00100	I	19-JAN-2010
GREEN	9kHz-26.5GHz	8593E	Agilent	3829A03618	00143	I	02-JUN-2009
BLACK	9kHz-12.8GHz	8596E	Agilent	3710A00944	00337	I	05-SEP-2009
GOLD	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	06-AUG-2009
SA EMI CHAMBER (1327)	9kHz-13.2 GHz	E4405B	Agilent	MY45103416	1327	I	06-FEB-2010
SA EMI CHAMBER (1328)	9kHz-13.2 GHz	E4405B	Agilent	MY44210241	1328	I	06-FEB-2010
REFERENCE EMI TEST RECEIVER	20-1000MHz	ESVS30	R&S	827957/001	01098	I	Cal Before Use
RENTAL SA #1 (BROWN)	9kHz-26.5GHz	E4407B	Agilent	SG44210511	1510	I	10-FEB-2010
RENTAL SA #5	9kHz-26.5 GHz	E4407B	Agilent	MY44220066	1491	I	02-FEB-2010
EMI CHAMBER PRESELECTOR	9kHz-1.8GHz	EM-2701	Electro-Metrics	539	1511	I	27-FEB-2010
EMI CHAMBER PRESLEECTOR	9kHz-1.8GHz	EM-2701	Electro-Metrics	540	1512	I	27-FEB-2010

LISNS/MEASUREMENT PROBES	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED LISN	9KHZ-50MHZ	8012-50-R-24-BNC	SOLAR	956348	00753	I	16-JUN-2009
BLUE LISN (DC)	50KHZ-50MHZ	8012-50-R-24-BNC	SOLAR	956349	00752	I	29-JUL-2009
YELLOW-BLACK LISN	30KHZ-50MHZ	8012-50-R-24-BNC	SOLAR	0411657	00248	I	28-MAY-2009
ORANGE LISN	9KHZ-50MHZ	8012-50-R-24-BNC	SOLAR	903707	00754	I	OUT OF CAL
GOLD LISN (DC)	9KHZ-50MHZ	8012-50-R-24-BNC	SOLAR	984734	00247	I	15-JUL-2009
BROWN LISN	9KHZ-50MHZ	8012-50-R-24-BNC	SOLAR	0411656	00986	I	15-JUL-2009
GREEN LISN	9KHZ-50MHZ	8012-50-R-24-BNC	SOLAR	984735	00987	I	11-FEB-2010
YELLOW LISN	9KHZ-50MHZ	8012-50-R-24-BNC	SOLAR	0411658	1080	I	15-DEC-2009
RENTAL SILVER LISN	9KHZ-34MHZ	8012-50-R-24-BNC	SOLAR	8379440	RENTAL	I	28-JUL-2009
WHITE-BLACK LISN	10KHZ-30MHZ	8610-50-TS-100-N	SOLAR	972019	00678	I	14-MAY-2009
BLACK LISN	10KHZ-30MHZ	8610-50-TS-100-N	SOLAR	972017	00675	I	30-JUN-2009
RED-BLACK LISN	10KHZ-30MHZ	8610-50-TS-100-N	SOLAR	972016	00677	I	30-JUN-2009
BLUE-BLACK LISN	10KHZ-30MHZ	8610-50-TS-100-N	SOLAR	972018	00676	I	14-MAY-2009
230VAC LISN ASSET 1492	10KHZ-50MHZ	9252-50-R-24-BNC	SOLAR	084713	1492	I	23-MAR-2010
230VAC LISN ASSET 1493	10KHZ-50MHZ	9252-50-R-24-BNC	SOLAR	084714	1493	I	23-MAR-2010
230VAC LISN ASSET 1494	10KHZ-50MHZ	9252-50-R-24-BNC	SOLAR	084715	1494	I	23-MAR-2010
230VAC LISN ASSET 1495	10KHZ-50MHZ	9252-50-R-24-BNC	SOLAR	084716	1495	I	23-MAR-2010
BLUE MONITORING PROBE	10KHZ -150MHZ	91550-2	TEGAM	12350	00807	I	31-MAY-2009
YELLOW MONITORING PROBE	10KHZ -150MHZ	91550-2	ETS	50972	00493	I	29-JAN-2010
BROWN MONITORING PROBE	10KHZ -250MHZ	F-33-1	FISCHER	425	1110	I	23-JAN-2010
WHITE MONITORING PROBE	10KHZ -250MHZ	CSP-8423-1	SCHAFFNER	510	1112	I	23-JAN-2010
GREEN CURRENT TRANSFORMER	40HZ-20MHZ	150	PEARSON	10226	00793	I	06-MAY-2011
SURGE CURRENT PROBE	NA	CM-1-L	ION PHYSICS	896730	1265	I	08-OCT-2010
SURGE CURRENT PROBE	NA	CM-1-L	ION PHYSICS	NA	1276	I	06-MAY-2011
BLUE CISPR LINE PROBE	10KHZ-50MHZ	N/A	C-S	N/A	00805	II	08-JUN-2009
BLACK CISPR LINE PROBE	10KHZ-50MHZ	N/A	C-S	N/A	1254	II	08-JUN-2009
CISPR TELCO VOLTAGE PROBE	10KHZ-30MHZ	CS A/C-10	C-S	CS01	00296	II	11-AUG-2009
CISPR 22 TELCO ISN	9KHZ-30MHZ	FCC-TLISN-T4	FISCHER	20115	00746	I	14-JAN-2011

RADIATED EMISSIONS SITES	FCC CODE	IC CODE	VCCI CODE	CAT	CALIBRATION DUE
SITE F OATS	93448	2762A-1	R-1688	II	27-JUL-2010
SITE T OATS	93448	2762A-2	R-905	II	06-DEC-2009
SITE A OATS	93448	2762A-4	R-903	II	04-DEC-2009
SITE M OATS	93448	2762A-5	R-904	II	25-JUN-2010
SITE J OATS	93448	2762A-3	R-2377	II	06-MAY-2010
EMI CHAMBER 1	719150	2762A-6	R-3032	I	15-FEB-2011
EMI CHAMBER 2	719150	2762A-7	R-3033	I	15-FEB-2011

CONDUCTED TEST SITES (MAINS / TELCO)	FCC CODE	VCCI CODE	CAT	CALIBRATION DUE
EMI 1	93448	C-1801, T-268	III	NA
EMI 2	93448	C-1802, T-269	III	NA
EMI 3	93448	C-1803, T-270	III	NA
EMI 4	93448	C-3013, T-391	III	NA
CEMI 1	719150	C-3360	III	NA
CEMI 2	719150	C-3361	III	NA
CEMI 3	719150	C-3362	III	NA

CEMI 4	719150	C-3363	III	NA
CEMI 5	719150	C-3364	III	NA
CEMI 6	719150	C-3365	III	NA

MIXERS/DIPLEXERS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
MIXER / HORN	26.5-40 GHz	11970A/28-442-6	HP/ATM	2332A01695/A046903-01	1087	I	01-OCT-2009
MIXER / HORN	26.5-40 GHz	11970A/28-442-6	HP/ATM	3003A07825/A046903-01	1086	I	OUT OF CAL
MIXER / HORN	40-60 GHz	M19HW/A	OML	U30110-1	00821	I	29-JUN-2009
MIXER	33-50 GHz	11970Q	HP	3003A03155	00104	I	28-NOV-2009
MIXER / HORN	50-75 GHz	11970V /QWH-VPRROO	HP/QUINSTAR	2521A01197/8794001	1179	I	28-NOV-2009
MIXER	75-110 GHz	11970W	HP	2521A01334	00105	I	28-NOV-2009
MIXER / HORN	60-90 GHz	M12HW/A	OML	E30110-1	00822	I	29-JUN-2009
MIXER / HORN	90-140 GHz	MO8HW/A	OML	F21206-1	00811	I	29-JUN-2009
MIXER / HORN	140-220 GHz	MO5HW/A	OML	G21206-1	00812	I	29-JUN-2009
DIPLEXER	40-220 GHz	DPL.26	OML	N/A	00813	I	29-JUN-2009

ABSORBING CLAMPS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
FISCHER CLAMP	30-1000MHz	F-201-23MM	FISCHER	10	00081	I	29-JAN-2010

HARMONIC & FLICKER ANALYZER	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
10001I/2 AC POWER SYSTEM	(2) 500I	CALIFORNIA INSTRUMENTS	HK53687/HK53688	00376	II	

PREAMPS /COUPLERS ATTENUATORS / FILTERS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	0.009-2000MHz	ZFL-1000-LN	C-S	N/A	00798	II	07-APR-2010
BLUE	0.009-2000MHz	ZFL-1000-LN	C-S	N/A	00759	II	07-APR-2010
BLUE-BLACK	0.009-2000MHz	ZFL-1000-LN	C-S	N/A	00800	II	08-APR-2010
GREEN	0.009-2000MHz	ZFL-1000-LN	C-S	N/A	00802	II	07-APR-2010
BLACK	0.009-2000MHz	ZFL-1000-LN	C-S	N/A	00799	II	14-AUG-2009
ORANGE	0.009-2000MHz	ZFL-1000-LN	C-S	N/A	00765	II	19-DEC-2009
RED-WHITE	0.009-2000MHz	ZFL-1000-LN	C-S	N/A	1258	II	07-APR-2010
WHITE	1-18GHz	SMC-12A	C-S	426643	00760	II	08-JUL-2009
BROWN	1-20GHz	PM2-38-218-4R5-17-15-SFF	C-S	PL1655	1132	II	16-OCT-2009
RED-GREEN	1-20GHz	PM2-38-218-4R5-17-15-SFF	C-S	N/A	1256	II	18-AUG-2009
RED-BLUE	1-20GHz	PE2-38-218-4R5-17-15-SFF	C-S	NA	1257	II	08-MAY-2010
HF (YELLOW)	18-26.5GHz	AFS4-18002650-60-8P-4	C-S	467559	1266	I	01-OCT-2009
HIGH PASS FILTER	0.03-20 GHz	SPA-F-55204	K&L	36	00817	II	08-JAN-2010
LOW PASS FILTER	0.03-18 GHz	11SL10-4100/X4400-O/O	K&L	4	00816	II	08-JAN-2010
HIGH PASS FILTER	0.03-6.5 GHz	11SH10-1000/T3000-0/0	K&L	1	1310	II	08-JAN-2010
HIGH PASS FILTER	0.03-14.5 GHz	11SH10-3000/T9000-0/0	K&L	1	1311	II	08-JAN-2010
HIGH PASS FILTER	0.03-8 GHz	VHP-19	MINI-CIRCUITS	NA	1287	II	08-JAN-2010
HIGH PASS FILTER	0.03-9 GHz	VHP-16	MINI-CIRCUITS	NA	1288	II	08-JAN-2010
HF 20DB 50W ATTENUATOR	0.009-18 GHz	PE 7019-20	PASTERNACK	01	00791	II	08-MAY-2011
HF 30DB 50W ATTENUATOR	0.009-18 GHz	PE 7019-30	PASTERNACK	02	1168	II	08-MAY-2011
HF 40DB 50W ATTENUATOR	0.009-18 GHz	PE 7017-40	PASTERNACK	NA	1513	II	08-MAY-2011
40DB 100W ATTENUATOR	0.09-2000MHz	BW-40N100W+	MINI-CIRCUITS	V N014900638	1231	II	08-JAN-2010
RFI-LOW 130 KHZ LPF	10-100KHZ PASS	130 KHZ LPF	KIWA	NA	1235	II	08-MAY-2011
50W HF DIRECT. COUPLER	1-20GHz	DC7420	AR	0325960	1307	II	06-NOV-2009
500W DIRECT. COUPLER	0.009-2000MHz	C6277-10	WERLATONE	41911	1264	II	03-DEC-2009
200W DIRECT. COUPLER	0.009-2000MHz	C5571-10	WERLATONE	23098	1185	II	03-DEC-2009

ANTENNAS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
GREEN BILOG	30-2000MHz	CBL6112B	CHASE	2742	00620	I	17-DEC-2010
GREEN-BLACK BILOG	30-2000MHz	CBL6112B	CHASE	2412	00127	I	13-FEB-2010
GREEN-RED BILOG	30-2000MHz	CBL6112B	CHASE	2435	00990	I	22-APR-2010
BLUE BILOG	30-1000MHz	3143	EMCO	1271	00803	II	06-MAY-2009
GRAY BILOG	20-2000MHz	3141	EMCO	9703-1038	00066	II	07-MAY-2009(EMI)
YELLOW-BLACK BILOG	20-2000MHz	CBL6140A	CHASE	1112	00126	II	07-MAY-2009(EMI) / 14-AUG-2009(RFI1)
RED-WHITE BILOG	30-2000MHz	JB1	SUNOL	A091604-1	01105	I	17 DEC-2010
RED-BLACK BILOG	30-2000MHz	JB1	SUNOL	A091604-2	01106	I	28-OCT-2010
RED-BROWN BILOG	30-2000MHz	JB1	SUNOL	A0032406	1218	I	11-AUG-2010
YELLOW HORN	1-18GHz	3115	EMCO	9608-4898	00037	I	31-MAY-2009(EMI) / 22-MAY-2009 (RFI)
BLACK HORN	1-18GHz	3115	EMCO	9703-5148	00056	I	22-JUN-2009(EMI) / 22-MAY-2009 (RFI)
ORANGE HORN	1-18GHz	3115	EMCO	0004-6123	00390	I	12-JUN-2009 (EMI) / 16-MAY-2009 (RFI)
HF (WHITE) HORN	18-26.5GHz	801-WLM	WAVELINE	00758	00758	I	INSPECT BEFORE USE
SMALL LOOP	10KHZ-30MHZ	PLA-130/A	ARA	1024	00755	I	05-MAR-2010

LARGE LOOP	20HZ-5MHZ	6511	EMCO	9704-1154	00067	I	20-FEB-2010
RENTAL 6509 LOOP	1KHZ-30MHZ	6509	EMCO	1503	RENTAL	I	04-FEB-2010
ACTIVE MONOPOLE	30HZ-30MHZ	3301B	EMCO	3824	00068	II	06-JUN-2009
INDUCTION COIL	50-60HZ	1000-4-8	C-S	N/A	00778	II	08-MAY-2010
INDUCTION COIL	50-60HZ	1000-4-8	C-S	N/A	1314	II	08-MAY-2010
ADJUSTABLE DIPOLE	30-1000MHZ	3121C	EMCO	1370	00757	I	03-DEC-2010
ADJUSTABLE DIPOLE	30-1000MHZ	3121C	EMCO	1371	00756	I	03-DEC-2010
RE101 LOOP SENSOR	30HZ-100KHZ	RE101-13.3CM	C-S	N/A	00818	II	CAL BEFORE USE
RS101 RADIATING LOOP	30HZ-100KHZ	RS101-12CM	C-S	N/A	00819	II	CAL BEFORE USE
RS101 LOOP SENSOR	30HZ-100KHZ	RS101-4CM	C-S	N/A	00820	II	CAL BEFORE USE
EMI CHAMBER BILOG	26MHZ-6GHZ	3142D	ETS	00102060	1503	I	17-MAR-2011
EMI CHAMBER BILOG	26MHZ-6GHZ	3142D	ETS	00102052	1504	I	17-MAR-2011

EFT	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
CAS 3025 BURST VERIFICATION ATTENUATORS	INA 265A/266	SCHAFFNER	20096	00947	II	31-JUL-2010
EFT DIRECT COUPLING CAP	N/A	C-S	01	00794	II	03-OCT-2009
MODULA6150	MODULA6150	TESEQ	34525	1268	I	24-NOV-2009
RED BESTEMC-2	711-1100	SCHAFFNER	200122-074SC	00623	II	

ESD GENERATORS	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
GREEN	NSG435	SCHAFFNER	000839	00763	I	18-DEC-2009
RED	NSG435	SCHAFFNER	001625	00762	I	27-MAR-2010
YELLOW	930D	ETS	201	00673	I	27-SEP-2009

DIPS AND INTERRUPTS	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
MODULA6150	MODULA6150	TESEQ	34525	1268	I	24-NOV-2009
INA 6502 AUTOMATIC STEPTRANSFORMER	INA 6502	TESEQ	105	1269	I	13-FEB-2010
RED BESTEMC-2	711-1100	SCHAFFNER	200122-074SC	00623	II	
ECOMPACT4	ECOMPACT4	HAEFELY	155858	RENTAL	II	OUT OF SERVICE

CHAMBERS AND STRIPLINE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RFI 1 CHAMBER	3 METER COMPACT	PANASHIELD	N/A	00797	II	OUT OF SERVICE
RFI 2 CHAMBER	04' X 07' SHIELDING SYSTEM	LINDGREN	13329	00795	II	05-JAN-2010
RFI 3 STRIPLINE	N/A	C-S	N/A	00796	III	NA
ENVIRONMENTAL (SAFETY)	ECL5	B-M-A INC.	2041	00029	I	23-APR-2010
ENVIRONMENTAL (SAFETY)	SGTH-31S	B-M-A INC.	2245	00321	I	23-APR-2010

AMPLIFIERS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	0.5-1000MHZ	10W1000B	AR	18708	00032	II	OUT OF CAL / FEEDBACK ONLY
GREEN	0.5-1000MHZ	10W1000B	AR	23423	00123	II	OUT OF CAL / FEEDBACK ONLY
BLUE	0.01-100MHZ	75A250	AR	19165	00039	II	09-JUN-09 (NEBS CRFI) / 24-JUN-2009 (EU CRFI)
BLACK	0.01-100MHZ	75A250	AR	23411	00122	II	09-JUN-09 (NEBS CRFI) / 24-JUN-2009 (EU CRFI)
ORANGE	0.01-100MHZ	75A250	AR	26827	00367	II	09-JUN-09 (NEBS CRFI) / 24-JUN-2009 (EU CRFI)
BROWN 150W	0.1-250MHZ	150A250	AR	313454	1255	II	OUT OF CAL / FEEDBACK ONLY
YELLOW 150W	80-1000MHZ	150W1000	AR	0324607	1253	II	05-JAN-2010 (RFI2)
500W AMP	0.1-250MHZ	500A250	AR	0326385	1297	II	05-JAN-2010 (RFI2)
GTC 1-2.6	1.0-2.6 GHZ	GRF5016A	GTC	1221	RENTAL	II	16-MAY-2009 (ORANGE HORN) / 22-MAY-2009 (BLK AND YELLOW)
HUGHES 10W	2.0-4.0GHZ	1177H01	HUGHES	055	RENTAL	II	16-MAY-2009 (ORANGE HORN) / 22-MAY-2009 (BLK AND YELLOW)
HUGHES 10W	4.0-8.0 GHZ	8010H02F	HUGHES	197	RENTAL	II	11-AUG-2009 (ORANGE, BLACK AND YELLOW HORNS)
HUGHES 10W	8-10.0GHZ	80108	HUGHES	138	RENTAL	II	16-MAY-2009 (ORANGE HORN) / 22-MAY-2009 (BLK AND YELLOW)
HP495A	7.0-10.0GHZ	HP495A	HP	304-00237	00086	II	OUT OF SERVICE (SPARE)
AUDIO AMP	AUDIO FREQ	MPA-200	RADIO SHACK	700438	NONE	III	NA
AUDIO AMP	AUDIO FREQ	MPA-200	RADIO SHACK	708545	00862	III	NA

FIELD PROBES	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	0.01-1000MHZ	HI-4422	HOLADAY	90369	00031	I	26-APR-2010
GREEN	0.01-1000MHZ	HI-4422	HOLADAY	97363	00136	I	03-DEC-2009
BLUE	0.01-1000MHZ	HI-4422	HOLADAY	95696	01100	I	17-APR-2010
Reference Laser Field Probe	0.1-6000MHZ	FL7006 Star Probe	AR	321700	1252	I	31-JAN-2010
MICROWAVE SURVEY METER	2450MHZ	HI-1501	HOLADAY	00075464	1244	|	Calibrate Before Use
GAUSSMETER (ELF METER)	25HZ–1KHZ	4080	SYPRIS	114173	1305	I	02-MAY-2009

SIGNAL GENERATORS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
RED	0.09-2000MHZ	HP8648B	Agilent	3847U02192	00366	I	07-JUN-2009
BLUE	0.1-1000MHZ	HP8648A	Agilent	3426A00548	00034	I	01-OCT-2009

GREEN	0.09-2000MHZ	HP8648B	Agilent	3623A02072	00125	I	24-OCT-2009
ORANGE	0.1-1000MHZ	HP8648B	Agilent	3537A01210	00025	I	12-JUN-2009
WHITE	0.01HZ-15MHZ	HP33120A	Agilent	US36048143	1219	I	22-MAY-2009
BROWN-WHITE	0.01HZ-15MHZ	HP33120A	Agilent	SG40019842	1232	I	17-DEC-2009
BLUE-WHITE	0.1HZ-13MHZ	HP3312A	Agilent	1432A07632	00775	I	06-MAY-2010
RFI-HIGH SWEEPER	0.01-20.0GHZ	HP83752A	Agilent	3610A01133	00087	II	15-MAY-2009
REFERENCE SWEEPER	0.01-26.5GHZ	HP8673D	Agilent	3146A01212	1317	I	22-MAY-2009
AM/FM STEREO SIG. GEN.	0.1-170MHZ	LG3236	LEADER	3687301	00959	I	Cal Before Use
IMPULSE GENERATOR	1-100HZ	CIG-25	ELECTRO-METRICS	290	00942	I	Cal Before Use

BULK INJECTION CLAMPS	RANGE	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
GREEN (NEBS CRFI)	0.01-30MHZ	95236-1	ETS	50215	00118	II	09-JUN-09 (BLUE, BLACK & ORANGE AMP)
GREEN (EU CRFI)	0.10-100MHZ	95236-1	ETS	50215	00118	II	24-JUN-09 (BLUE, BLACK & ORANGE AMP)
RED (NEBS CRFI)	0.01-30MHZ	95236-1	ETS	34026	1020	II	09-JUN-09 (BLUE, BLACK & ORANGE AMP)
RED (EU CRFI)	0.10-100MHZ	95236-1	ETS	34026	1020	II	24-JUN-09 (BLUE, BLACK & ORANGE AMP)
RED (RTCA/DO-160E)	0.01-2MHZ	95236-1	ETS	34026	1020	II	10-JAN-2010 (BLACK)
BLUE (RTCA/DO-160E)	2-450MHZ	9142-1N	SOLAR	063824	1237	II	10-JAN-2010 (RED)

ANSI T1.315	MFR	ASSET	CAT	CALIBRATION DUE
SBC NOISE CART	C-S	1285	III	CALIBRATION NOT REQUIRED
SBC TRANSIENT CART	C-S	1286	III	WAVESHAPE VERIFIED BEFORE USE

OSCILLOSCOPES AND PROBES	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
EMC 100MHZ	TDS 220	TEKTRONIX	C036986	1166	I	15-MAY-2009
ESD REFERENCE 1GHZ	TDS 684B	TEKTRONIX	B011287	RENTAL	I	07-JUN-2009
400MHZ E*SCOPE	TDS 3044B	TEKTRONIX	C010074	1275	I	18-FEB-2010
PRODUCT SAFETY 100 MHZ	TDS 340	TEKTRONIX	B012357	00737	I	17-OCT-2009
DIFFERENTIAL PROBE	4222	PROBEMASTER	07-134	1296	I	29-SEP-2009
500MHZ 10X PROBE	P6139A	TEKTRONIX	NA	1280	I	19-JUL-2009
500MHZ 10X PROBE	P6139A	TEKTRONIX	NA	1281	I	19-JUL-2009
REFERENCE 500MHZ 10X PROBE	P6139A	TEKTRONIX	NA	1282	I	11-JUL-2009
REFERENCE 500MHZ 10X PROBE	P6139A	TEKTRONIX	NA	1319	I	11-JUL-2009
500MHZ 10X PROBE	P6139A	TEKTRONIX	NA	1283	I	19-JUL-2009
REFERENCE HV 1000X PROBE	P6015A	TEKTRONIX	B056555	1277	I	11-JUL-2009
REFERENCE HV 1000X PROBE	P6015A	TEKTRONIX	B056590	1278	I	11-JUL-2009

CDN NETWORKS	RANGE	MN	MFR	ASSET	CAT	CALIBRATION DUE
BLUE	0.10-100MHZ	20A M-3	C-S	00806	II	24-JUN-09 (BLUE, BLACK & ORANGE AMP)
RED	0.10-100MHZ	15A M-3	C-S	00780	II	24-JUN-09 (BLUE, BLACK & ORANGE AMP)
YELLOW-BLACK	0.10-100MHZ	15A M-3	C-S	00784	II	24-JUN-09 (BLUE, BLACK & ORANGE AMP)
GREEN	0.10-100MHZ	30A M-3	C-S	00779	II	24-JUN-09 (BLUE, BLACK & ORANGE AMP)
YELLOW	0.10-100MHZ	30A M-5	C-S	00804	II	14-AUG-2009 (BLK AMP) 15-AUG-2009 (BLE & ORNGE)
BROWN	0.10-100MHZ	M-3	C-S	1169	II	24-JUN-09 (BLUE, BLACK & ORANGE AMP)
BROWN-WHITE	0.10-100MHZ	M-3	C-S	1170	II	24-JUN-09 (BLUE, BLACK & ORANGE AMP)
BROWN-BLACK	0.10-100MHZ	M-2 (DC)	C-S	1171	II	24-JUN-09 (BLUE, BLACK & ORANGE AMP)
RED-BLACK	0.10-100MHZ	M-2 (DC)	C-S	1177	II	24-JUN-09 (BLUE, BLACK & ORANGE AMP)
GREEN-WHITE	0.10-100MHZ	M-2 (DC)	C-S	1259	II	24-JUN-09 (BLUE, BLACK & ORANGE AMP)
YELLOW (RES)	0.10-100MHZ	100Ω RESISTOR	C-S	00810	II	24-JUN-09 (BLUE, BLACK & ORANGE AMP)
GREEN (RES)	0.10-100MHZ	100Ω RESISTOR	C-S	1172	II	24-JUN-09 (BLUE, BLACK & ORANGE AMP)
ARTIFICIAL HAND	510Ω / 220PF	CS-AH	C-S	1262	II	26-JUN-2009
ARTIFICIAL HAND	510Ω / 220PF	CS-AH	C-S	1263	II	26-JUN-2009

RMS VOLTMETERS/CURRENT CLAMP	MN	MNFR	SN	ASSET	CAT	CALIBRATION DUE
TRUE-RMS MULTIMETER (REFERENCE)	79III	FLUKE	71700298	00769	I	02-APR-2010
TRUE RMS MULTIMETER	179	FLUKE	89280616	1228	I	29-SEP-2009
TRUE-RMS MULTIMETER	177	FLUKE	83390024	00973	I	
TRUE-RMS MULTIMETER	177	FLUKE	83390025	00974	I	11-MAR-2010
TRUE-RMS MULTIMETER (D RAND)	177	FLUKE	91320460	1226	I	03-APR-2010
TRUE-RMS MULTIMETER	177	FLUKE	83430419	00975	I	
TRUE RMS MULTIMETER	87III	FLUKE	70920208	00828	I	02-APR-2010
AC/DC CURRENT PROBE	A622	TEKTRONIX	08DD 6275DV	1246	I	03-APR-2010
CURRENT SHUNT	200A50MV	SIMPSON	NA	1290	I	25-AUG-2010

POWER/NOISE METERS	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
POWER METER	435B	HP	2445A11012	00773	I	OUT OF SERVICE
POWER METER	437B	HP	2912A01367	01099	I	06-MAY-2010
POWER SENSOR	8481A	HP	2702A61351	00774	I	06-MAY-2010

POWER METER	4232A	BOONTON	11000	1260	I	29-AUG-2009
POWER SENSOR	51013-4E	BOONTON	34457	1261	I	29-AUG-2009
PSOPHOMETER	2429	BRUEL & KJAER	1237642	00585	II	OUT OF CAL
TRANSMISSION LINE TESTER (DBRNC)	185T	AMREL	18507030010	1236	II	23-APR-2010
TRANSMISSION LINE TESTER (DBRNC)	185T	AMREL	998658	00823	II	23-APR-2010
THD, POWER &HARMONIC ANALYZER	NANOVIP PLUS	ELCONTROL ENERGY	15925	00250	I	04-SEP-2009
CURRENT CLAMP FOR NANOVIP	MN 13-EL	ELCONTROL ENERGY	NA	1293	I	04-SEP-2009

TAPE MEASURES	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
DIPOLE 26FT TAPE #1	2338CME	LUFKIN	C3166-1	00776	II	12-MAY-2011
DIPOLE 26FT TAPE #2	2338CME	LUFKIN	C3166-2	00777	II	12-MAY-2011
25FT/7.5M TAPE	4925IM	KOMELON	NA	1502	II	12-MAY-2011
25FT/7.5M TAPE	4925IM	KOMELON	NA	1514	II	12-MAY-2011
25FT TAPE		WORKFORCE	NA	1515	II	12-MAY-2011
25FT/7.5M TAPE	4925IM	KOMELON	NA	1516	II	12-MAY-2011

SURGE GENERATORS	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
TRANSIENT WAVEFORM MONITOR	TWM-5	CDI	003982	00323	II	OUT OF SERVICE
UNIVERSAL SURGE GENERATOR	M5	CDI	003966	00324	II	CAL BEFORE USE
THREE PHASE COUPLING NWK	3CN	CDI	003455	00325	II	CAL BEFORE USE
1.2X50US PLUGIN MODULE	1.2X50US PLUGIN	CDI	N/A	00842	II	CAL BEFORE USE
10X160US PLUGIN MODULE	10X160US PLUGIN	C-S	N/A	00843	II	CAL BEFORE USE
10X560US PLUGIN MODULE	10X560US PLUGIN	C-S	N/A	00841	II	CAL BEFORE USE
PSURGE CONTROLLER MODULE	PSURGE 8000	HAEFELY	150267	00879	II	01-JUL-2009
COUPLING/DECOUPLING MODULE	PCD 900	HAEFELY	149213	00880	II	01-JUL-2009
IMPULSE MODULE	PIM 900	HAEFELY	149202	00881	II	01-JUL-2009
HIGH VOLTAGE CAP NWK 5KVDC, 18µF	CS-HVCC	C-S	01	00772	II	OUT OF CAL
NEBS SURGE GENERATOR (LIMITED CAL)	N/A	C-S	N/A	00088	II	17-JUN-2009
2X10US SURGE GENERATOR	2X10US	C-S	N/A	00846	II	CAL BEFORE USE
10X700US SURGE GENERATOR	10X700US	C-S	N/A	00847	II	CAL BEFORE USE
12 PAIR SURGE RESISTOR MODULE	N/A	C-S	N/A	00768	II	17-JUN-2009
VSS 500-M	TSS 500 M12 S2	EMTEST	V0502100032	1155	II	CAL BEFORE USE
TSS 500-M	TSS500 M10	EMTEST	V0502100031	1156	II	CAL BEFORE USE
NSG 2050 SURGE GENERATOR	NSG 2050	TESEQ	200720-605LU	1273	II	30-JUL-2009
PNW 2050 1.2X50 IMPULSE NETWORK	PNW 2050	TESEQ	200711-604LU	1279	II	30-JUL-2009
CDN 133 3 PHASE COUPLING NETWORK	CDN 133	TESEQ	34416	1274	II	OUT OF CAL
MODULA6150	MODULA6150	TESEQ	34525	1268	I	24-NOV-2009
RED BESTEMC-2	711-1100	SCHAFFNER	200122-074SC	00623	II	26-FEB-2010
ECOMPACT4	ECOMPACT4	HAEFELY	155858	RENTAL	II	OUT OF SERVICE

METEOROLOGICAL METERS	MN	MFR	SN	ASSET	CAT	CALIBRATION DUE
TEMP./HUMIDITY/ATM. PRESSURE GAUGE	7400 PERCEPTION II	DAVIS	N/A	00965	I	06-APR-2011
TEMPERATURE /HUMIDITY GAUGE	THG-912	HUGER	4000562	00789	I	17-MAR-2011
WEATHER CLOCK (PRESSURE ONLY)	BA928	OREGON SCIENTIFIC	C3166-1	00831	I	17-MAR-2011
OFFICE HYGRO/THERMOMETER	35519-044	CONTROL COMPANY	72436083	1336	I	07-AUG-2009
HYGRO/THERMOMETER (SITE A)	35519-044	CONTROL COMPANY	72457628	1337	I	14-AUG-2009
HYGRO/THERMOMETER (EMI3)	35519-044	CONTROL COMPANY	72457729	1338	I	14-AUG-2009
HYGRO/THERMOMETER (EMI4)	35519-044	CONTROL COMPANY	72457728	1339	I	14-AUG-2009
HYGRO/THERMOMETER (EMI2)	35519-044	CONTROL COMPANY	72457719	1340	I	14-AUG-2009
HYGRO/THERMOMETER (OV1)	35519-044	CONTROL COMPANY	72457633	1341	I	14-AUG-2009
HYGRO/THERMOMETER (SITE F)	35519-044	CONTROL COMPANY	72457631	1342	I	14-AUG-2009
HYGRO/THERMOMETER (SITE M)	35519-044	CONTROL COMPANY	72457758	1343	I	14-AUG-2009
HYGRO/THERMOMETER (EMI1)	35519-044	CONTROL COMPANY	72457730	1344	I	14-AUG-2009
HYGRO/THERMOMETER (RFI1)	35519-044	CONTROL COMPANY	72457635	1334	I	26-NOV-2009
HYGRO/THERMOMETER (RFI2)	35519-044	CONTROL COMPANY	72457738	1335	I	26-NOV-2009
HYGRO/THERMOMETER (RFI3)	35519-044	CONTROL COMPANY	72457642	1345	I	14-AUG-2009
HYGRO/THERMOMETER (EMC 1-2)	35519-044	CONTROL COMPANY	72457636	1346	I	14-AUG-2009
HYGRO/THERMOMETER (SITE T)	35519-044	CONTROL COMPANY	72457639	1347	I	14-AUG-2009
HYGRO/THERMOMETER (EMC 3-4)	35519-044	CONTROL COMPANY	72457647	1348	I	14-AUG-2009
HYGRO/THERMOMETER	35519-044	CONTROL COMPANY	90823028	1496	I	20-MAR-2011
HYGRO/THERMOMETER	35519-044	CONTROL COMPANY	90823030	1497	I	20-MAR-2011
HYGRO/THERMOMETER	35519-044	CONTROL COMPANY	90823031	1498	I	20-MAR-2011
HYGRO/THERMOMETER	35519-044	CONTROL COMPANY	90823034	1499	I	20-MAR-2011
HYGRO/THERMOMETER	35519-044	CONTROL COMPANY	90823035	1500	I	20-MAR-2011
HYGRO/THERMOMETER	35519-044	CONTROL COMPANY	90823036	1501	I	20-MAR-2011
THERMOCOUPLE MODULE(FOR DMM)	80TK	FLUKE	93410013	1308	I	08-DEC-2009
THERMOCOUPLE MODULE (FOR DMM)	80TK	FLUKE	93410017	1309	I	08-DEC-2009

CONSUMABLES	SPEC.	MFR	STOCK/MN	ASSET	CAT	CALIBRATION DUE
NEBS CHEESECLOTH	26-28M/KG	ED&D	ACC-01	N/A	III	N/A
NEBS CARBON BLOCK	3-MIL-GAP 1KV SURGE	RELIABLE	3AB	N/A	III	N/A

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("**Client**"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "**Conditions**"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("**Test Report**") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "**BUREAU VERITAS**," "**BUREAU VERITAS CONSUMER PRODUCTS SERVICES**," "**BVCPS**", "**MTL**", "**ACTS**", "**MTL-ACTS**" and **CURTIS-STRAUS** (collectively, the "**Marks**") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only were such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.
13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS

AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.

14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.

15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B)NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.$10,000, WHICHEVER IS THE LESSER AMOUNT.

16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.

17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder.

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