



**FCC CFR47 PART 90 SUBPART R AND S
IC RSS-119
CERTIFICATION TEST REPORT**

FOR

MOBILE RADIO

MODEL NUMBER: JHM-875S35J

FCC ID: CKE-875S35J-A

REPORT NUMBER: 09U12340-1A

ISSUE DATE: MARCH 04, 2009

Prepared for

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NVLAP LAB CODE 200065-0

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
---	02/18/09	Initial Issue	T. Chan
A	03/04/09	Added additional calculations to section 7.2 Results	A. Zaffar

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: JAPAN RADIO CO., LTD.
1021 SW KCLICKITAT WAY, BLDG. D, SUITE 101
SEATTLE, WA 98134, U.S.A.

EUT DESCRIPTION: MOBILE RADIO

MODEL: JHM-875S35J

SERIAL NUMBER: 02259

DATE TESTED: JANUARY 25 - FEBRUARY 12, 2009

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 90 SUBPART R & S	Pass
IC RSS-119	Pass

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All expressions of Pass/Fail in this report are opinions expressed by CCS based on interpretations of the test results. 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

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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 90, and IC RSS-119.

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. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The JHM-875S35J mobile is a state of the art radio that operates seamlessly between the 800 MHz frequency band and the 700nMHz frequency band. The JHM-875S35J is designed to meet the critical communications demands of public service users and complies with MIL-STD-810F specifications.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Frequency (MHz)	Conducted High Output Power (dBm)	Conducted High Output Power (W)
763 - 775	769.00625	42.20	16.596
793 - 805	799.00625	42.06	16.069
793 - 805	804.99375	42.10	16.218
806 - 824	816.0125	45.39	34.594
851 - 869	860.0125	45.07	32.137

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Whipped, Omni-directional antenna, with a maximum gain of 4.65dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

The EUT with antenna at upright position is determined to be the worst case.

5.5. DESCRIPTION OF TEST SETUP

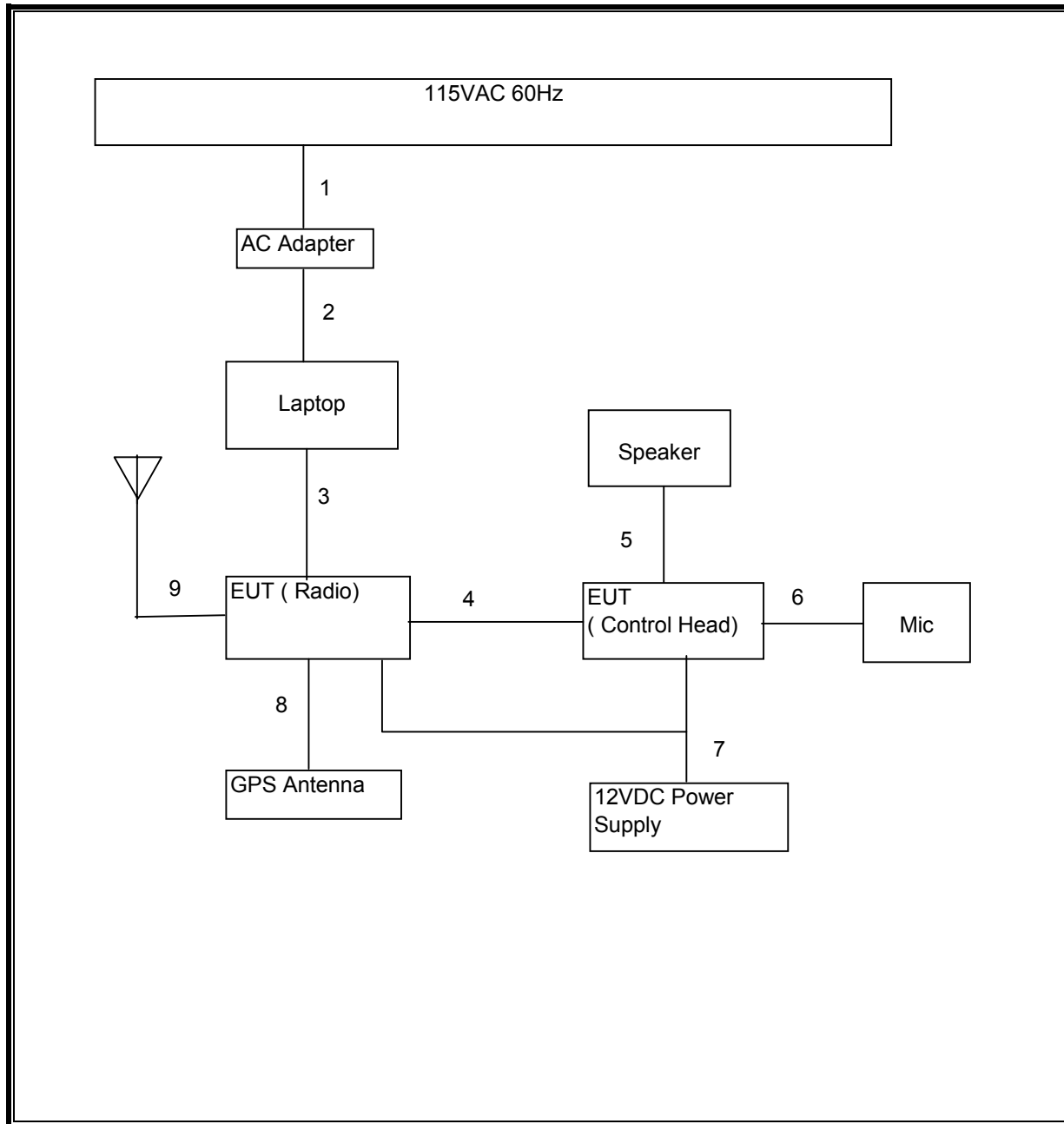
SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	D520	0706-04-1675	DoC
AC Adapter	Dell	LA65NSO-00	CN-ODF-263-71615-73L-4BE6	DoC
50 Ohm Terminator	Bird Electronic Corp	8201	13288	NCR
40 dB Directional Coupler	Warlatone	C6021	907	NCR
Speaker	NA	NA	NA	NCR
Whipped Antenna	NA	HSB-900B-1-9	NA	NA
GPS Antenna	NA	NA	NA	NA

I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US 115V	Un-shielded	2m	
2	DC	1	DC	Un-shielded	1m	
3	Serial	1	DB9	Shielded	0.9m	
4	CAN	1	CAN Cable	Un-shielded	4,5m	
5	Audio	1	Speaker	Un-shielded	0.7m	
6	Mic	1	Mic	Un-shielded	0.7m	
7	DC	1	12 Battery	Un-shielded	1.4m	
8	GPS	1	GPS Antenna	Un-shielded	5m	
8	Antenna	1	Whipped Antenna	Un-shielded	5m	

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
Modulation Analyzer	Agilent / HP	8901B	C00925	10/08/10
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00996	11/14/09
Function Generator	Agilent / HP	3325A	C00866	05/10/09
EMI Receiver, 2.9 GHz	Agilent / HP	8542E	C00957	09/19/09
RF Filter Section, 2.9 GHz	Agilent / HP	85420E	C00958	09/19/09
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	02/11/10
Preamp, 1000MHz	Sonoma	310N	N02891	03/31/09
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	12/01/09
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	05/13/09
Antenna, Horn, 18 GHz	EMCO	3115	C00945	04/22/09
Signal Generator, 40 GHz	R & S	SMP04	C00953	02/16/09
Antenna, Tuned Dipole 400~1000 MHz	ETS	3121CDB4	C00993	06/28/09

7. LIMITS AND RESULTS

7.1. RF POWER OUTPUT

LIMIT

FCC 90.541(b), 90.542(a), 90.635(b), 2.146(a) & RSS-119 5.4

TEST PROCEDURE

ANSI / TIA / EIA 603C & RSS-119

RESULTS

Conducted Output Power

Frequency (MHz)	Conducted High Output Power (dBm)	Conducted High Output Power (W)	Conducted Low Output Power (dBm)	Conducted Low Output Power (W)
769.00625	42.20	16.596	32.00	1.585
799.00625	42.06	16.069	31.80	1.514
804.99375	42.10	16.218	31.78	1.507
816.0125	45.39	34.594	37.15	5.188
860.0125	45.07	32.137	37.25	5.309

7.2. OCCUPIED BANDWIDTH

LIMITS

N/one; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99% bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

763-767/773-776 Talkaround; 794-797/803-805 MHz Trunked/Conventional

Calculation:

Data rate in bps (R) = 9,600

Peak deviation of carrier (D) = 1,800 Hz

Number of state in each symbol (S) = 4

$B_n = [R/\log_2(4) + 2(D)(1)] = 8,400$ KHz

Emission designator: 8K4F1D, 8K4F1E

806-824, 851-869 MHz Trunked or Conventional, Talkaround

Calculation:

Data rate in bps (R) = 9,600

Peak deviation of carrier (D) = 1,800 Hz

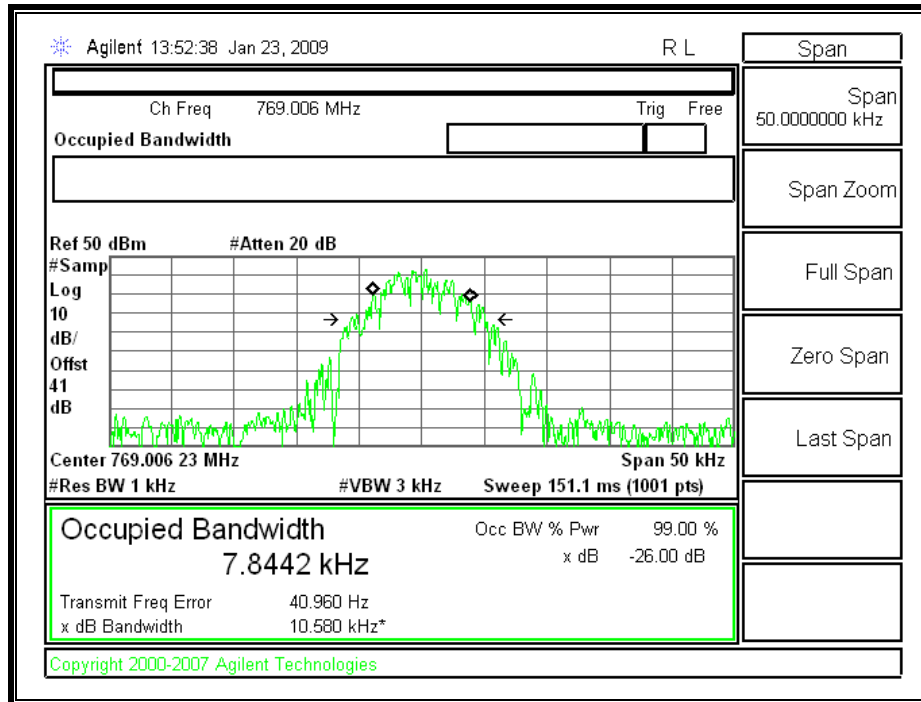
Number of state in each symbol (S) = 4

$B_n = [R/\log_2(4) + 2(D)(1)] = 8,400$ KHz

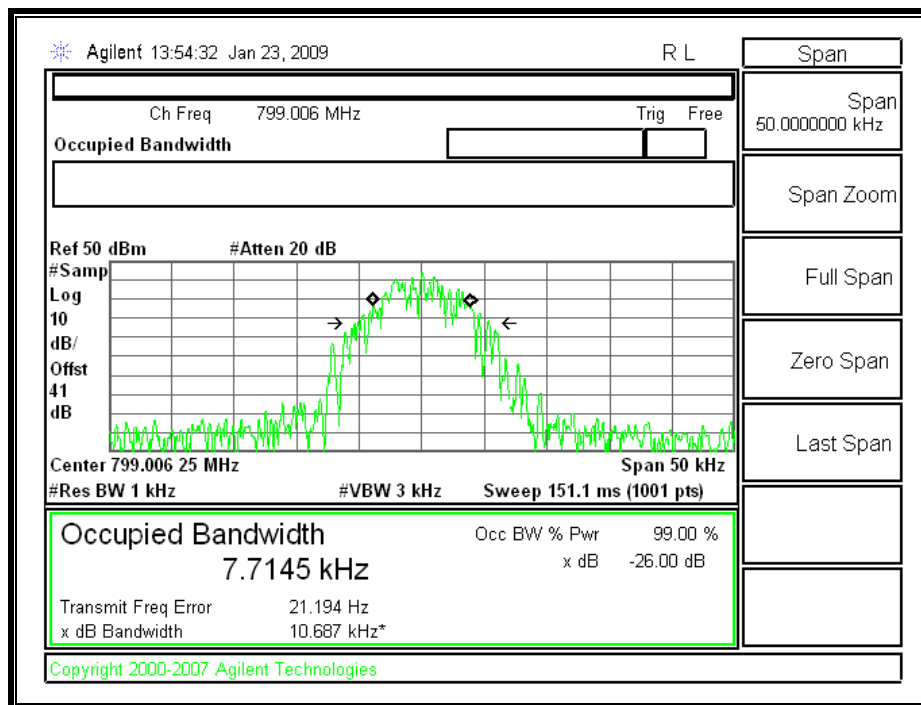
Emission designator: 8K4F1D, 8K4F1E

Frequency (MHz)	99% Bandwidth (kHz)	26 dB Bandwidth (kHz)
769.006	7.844	10.580
799.006	7.715	10.687
804.994	7.468	9.273
816.013	7.711	9.796
860.013	7.368	10.382

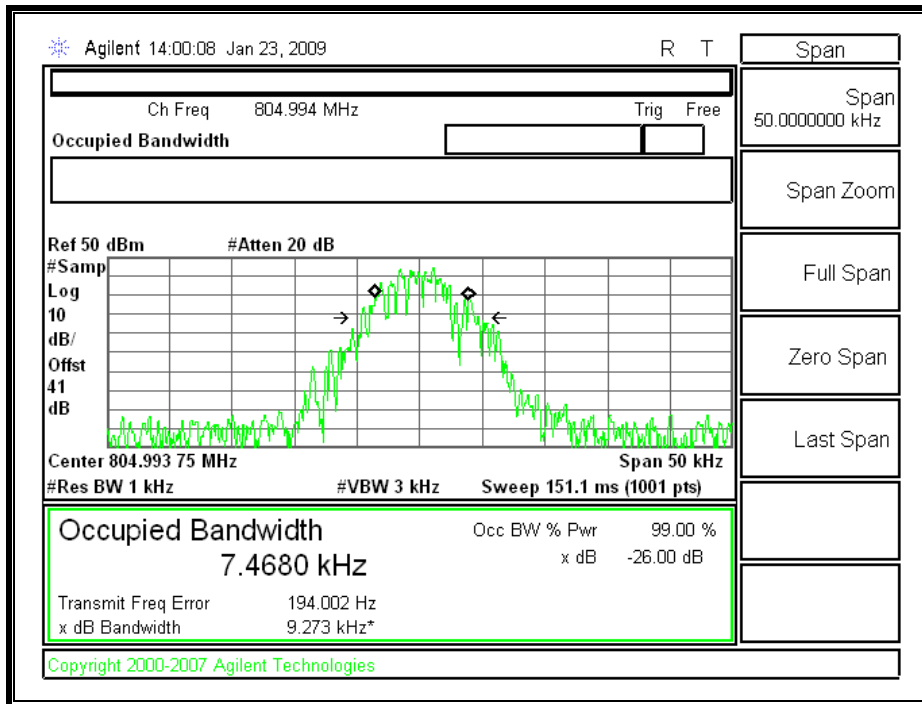
99% BANDWIDTH, 769.00625MHz



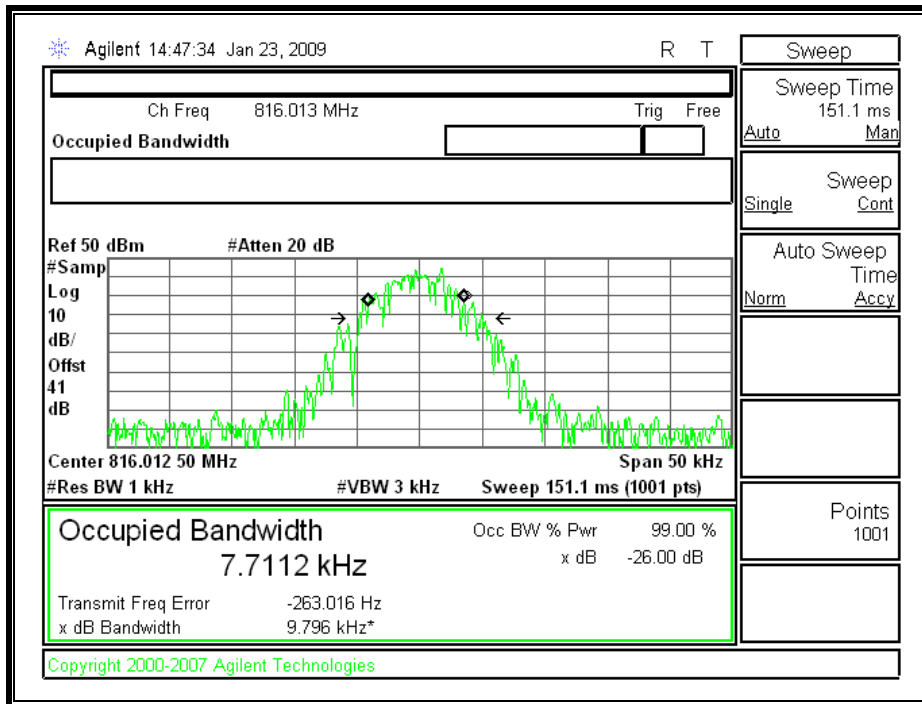
99% BANDWIDTH, 799.00625MHz



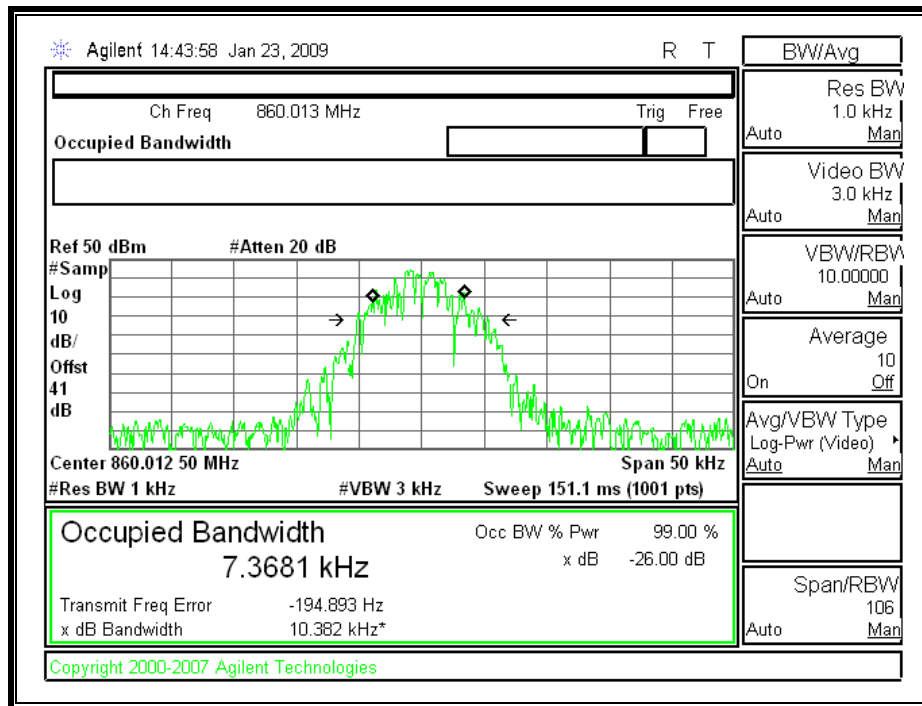
99% BANDWIDTH, 804.99375MHz



99% BANDWIDTH, 816.0125MHz



99% BANDWIDTH, 860.0125MHz



7.3. EMISSION MASK & SPURIOUS EMISSIONS

LIMIT

§ 90.210, 90.543(c) & (f), 2.1046(a) & RSS-119 5.8

Applicable Emission Masks

Frequency band (MHz)	Mask for equipment with Audio low pass filter	Mask for equipment without audio low pass filter
Below 25 ¹	A or B	A or C
25–50	B	C
72–76	B	C
150–174 ²	B, D, or E	C, D, or E
150 Paging-only	B	C
220–222	F	F
421–512 ²	B, D, or E	C, D, or E
450 Paging-only	B	G
806–809/851–854	B	H
809–824/854–869 ³	B	G
896–901/935–940	I	J
902–928	K	K
929–930	B	G
4940–4990 MHz	L or M	L or M.
5850–5925 ⁴		
All other bands	B	C

¹Equipment using single sideband J3E emission must meet the requirements of Emission Mask A. Equipment using other emissions must meet the requirements of Emission Mask B or C, as applicable.

²Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements

of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth Must meet the requirements of Emission Mask E.

³Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of §90.691.

⁴DSRCS Roadside Units equipment in the 5850–5925 MHz band is governed under subpart M of this part.

(b) *Emission Mask B.* For transmitters that are 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 assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

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

(g) *Emission Mask G.* 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 (f_d in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least $116 \log (f_d/6.1)$ dB, or $50 + 10 \log (P)$ dB, or 70 dB, whichever is the lesser attenuation;

(2) 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.

(h) *Emission Mask H.* 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 (f_d in kHz) of 4 kHz or less: Zero dB.

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 4 kHz, but no more than 8.5 kHz: At least $107 \log (f_d/4)$ dB;

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 8.5 kHz, but no more than 15 kHz: At least $40.5 \log (f_d/1.16)$ dB;

(4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 15 kHz, but no more than 25 kHz: At least $116 \log (f_d/6.1)$ dB;

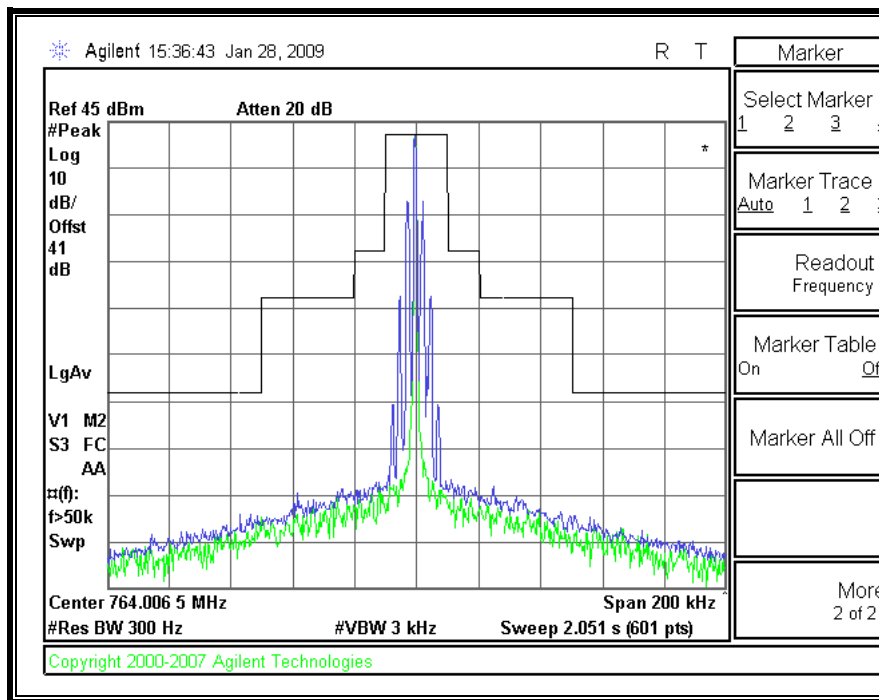
(5) On any frequency removed from the center of the authorized bandwidth by more than 25 kHz: At least $43 + \log (P)$ dB.

TEST PROCEDURE

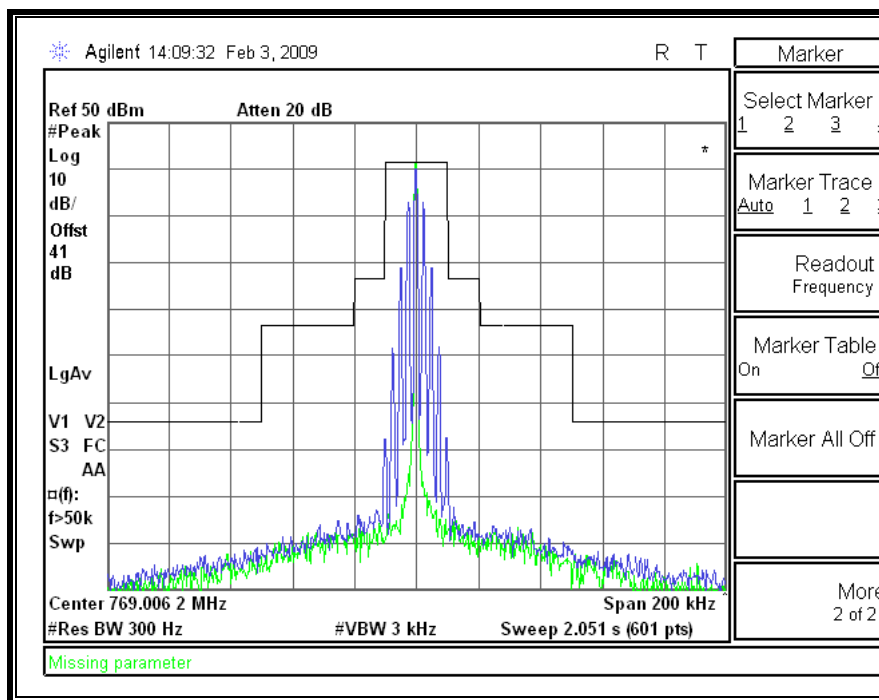
ANSI / TIA / EIA 603C and IC RSS-119

RESULTS

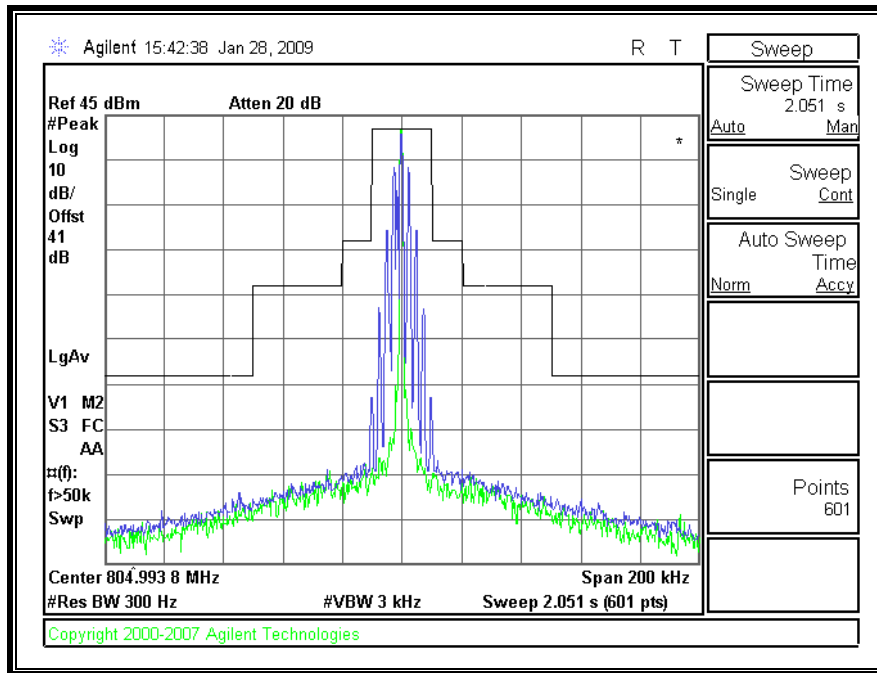
B MASK, Analog (764.0065MHz)



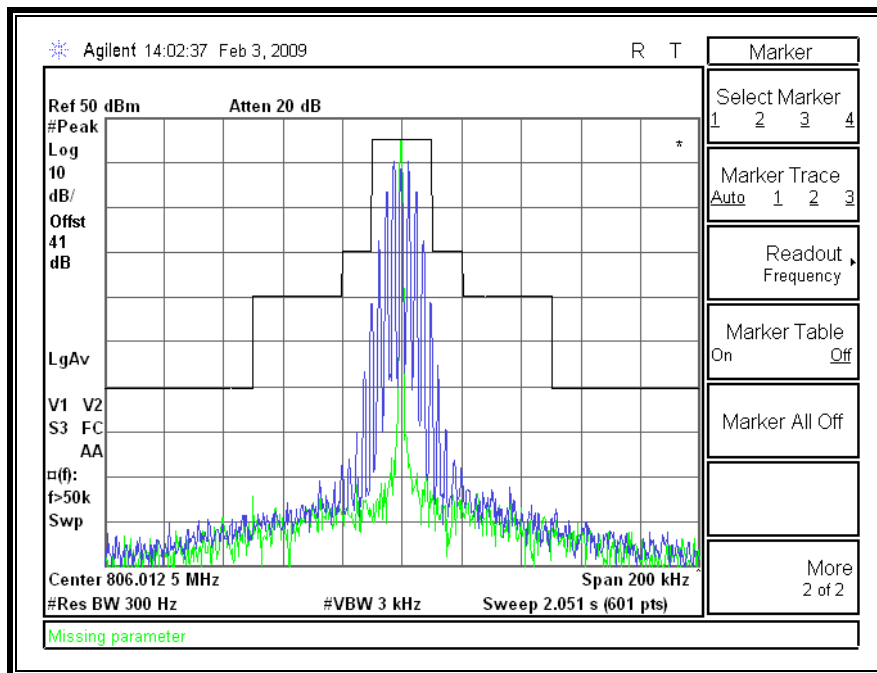
B MASK, Analog (769.00625MHz)



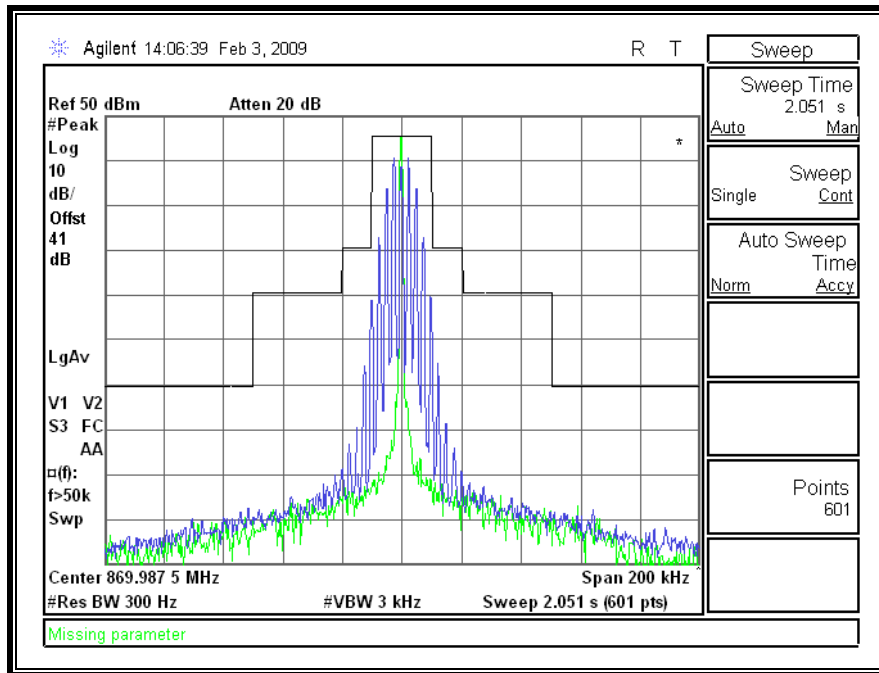
B MASK, Analog (804.99375MHz)



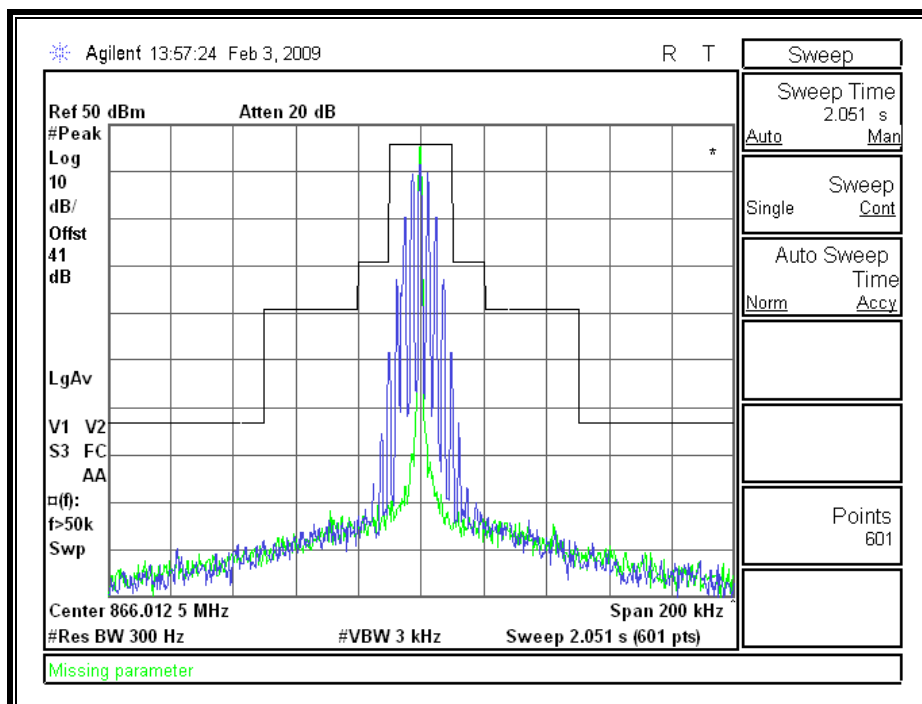
B MASK, Analog (806.01250MHz)



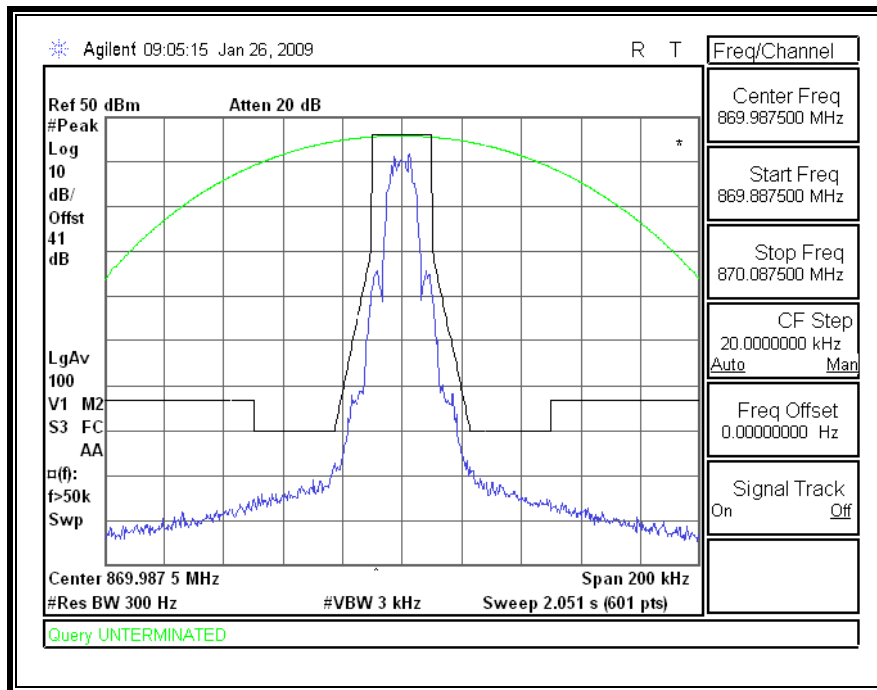
B MASK, Analog (869.9875065MHz)



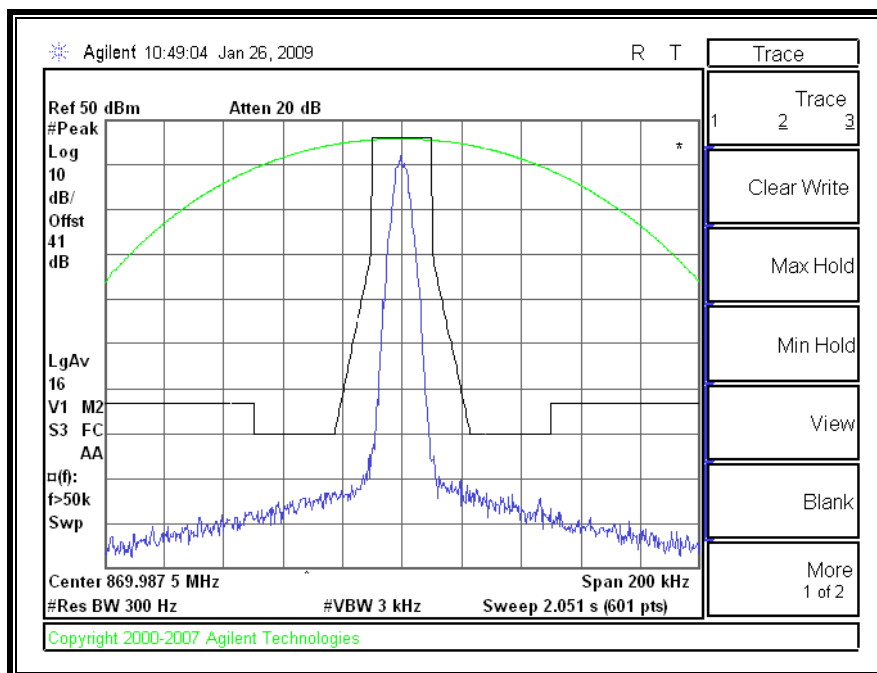
B MASK, NPSPAC (866.0125MHz)



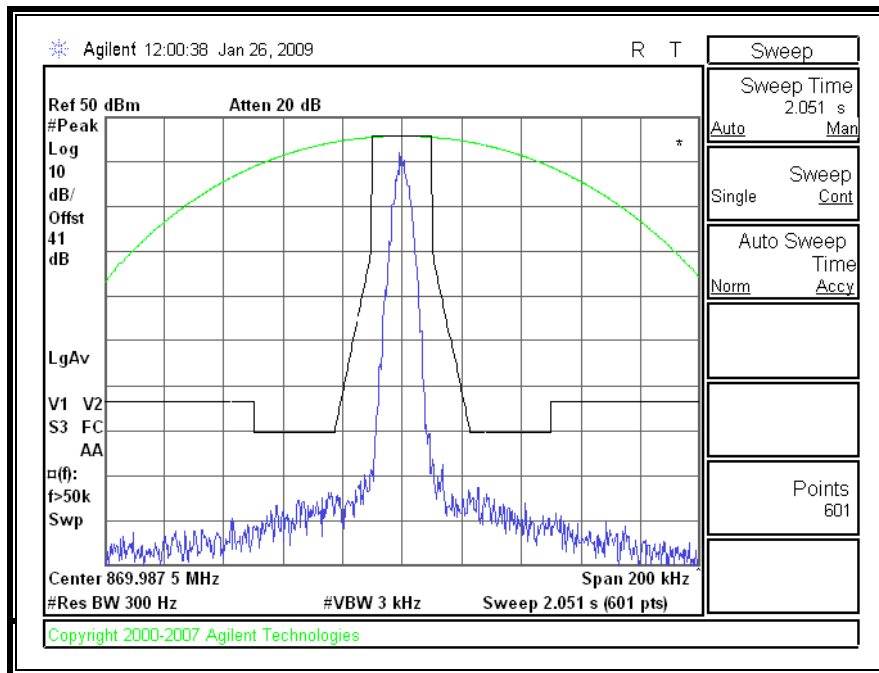
G MASK, 9600WB (869.98750MHz)



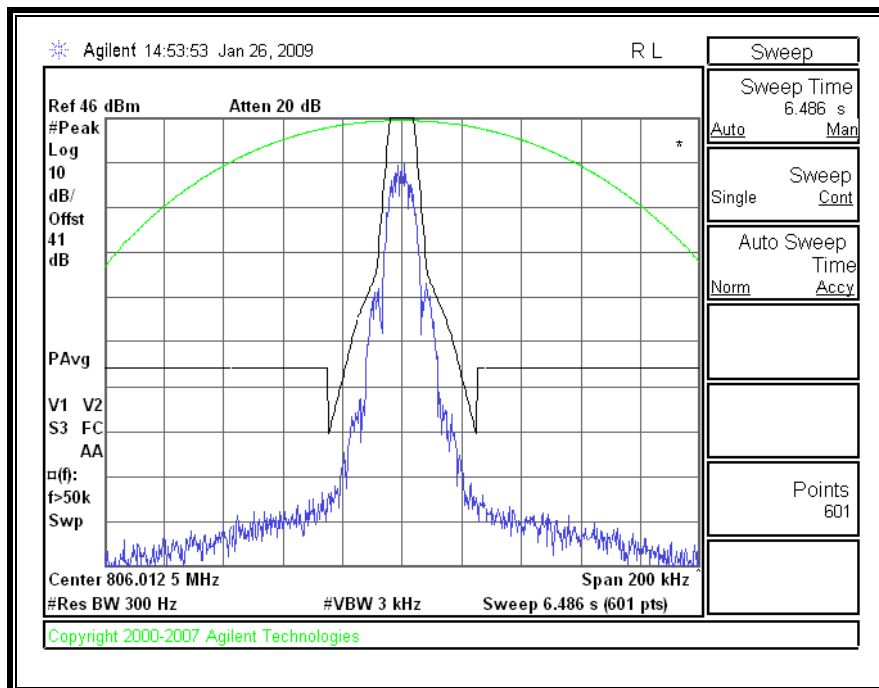
G MASK, P25 (869.98750MHz)



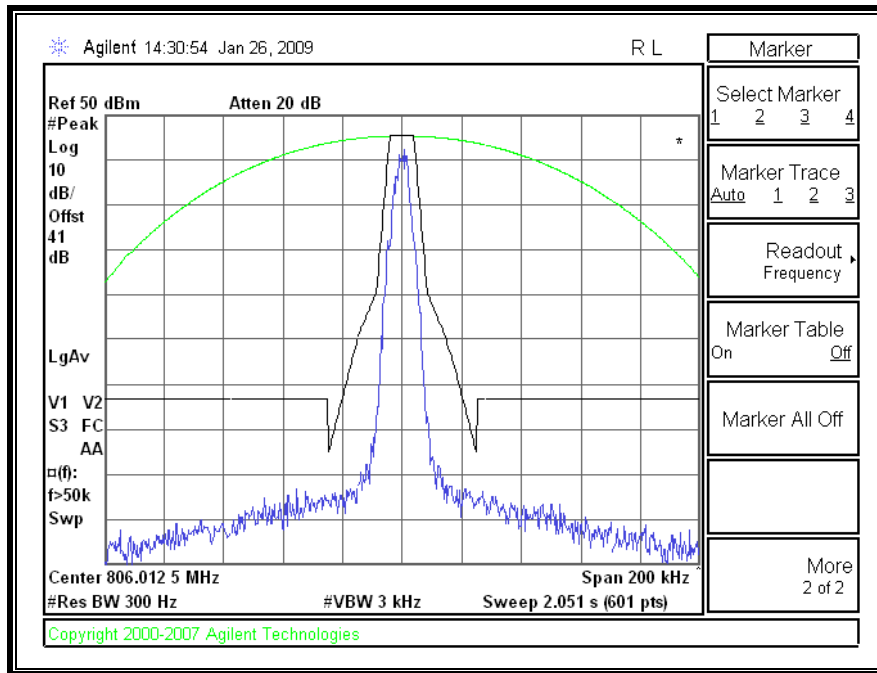
G MASK, CPM (806.01250MHz)



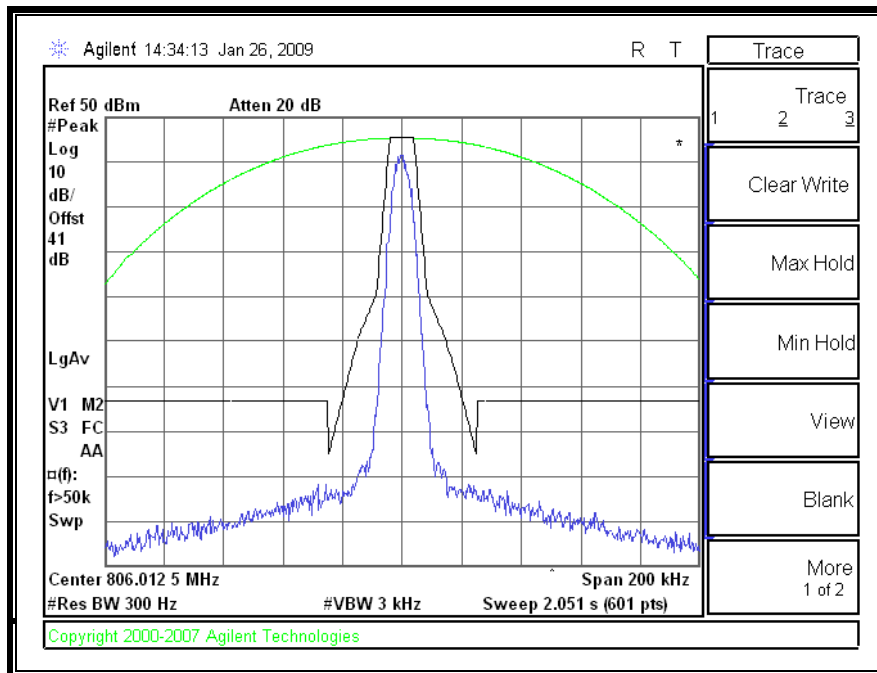
H MASK, 9600WB (806.01250MHz)



H MASK, P25 (806.01250MHz)

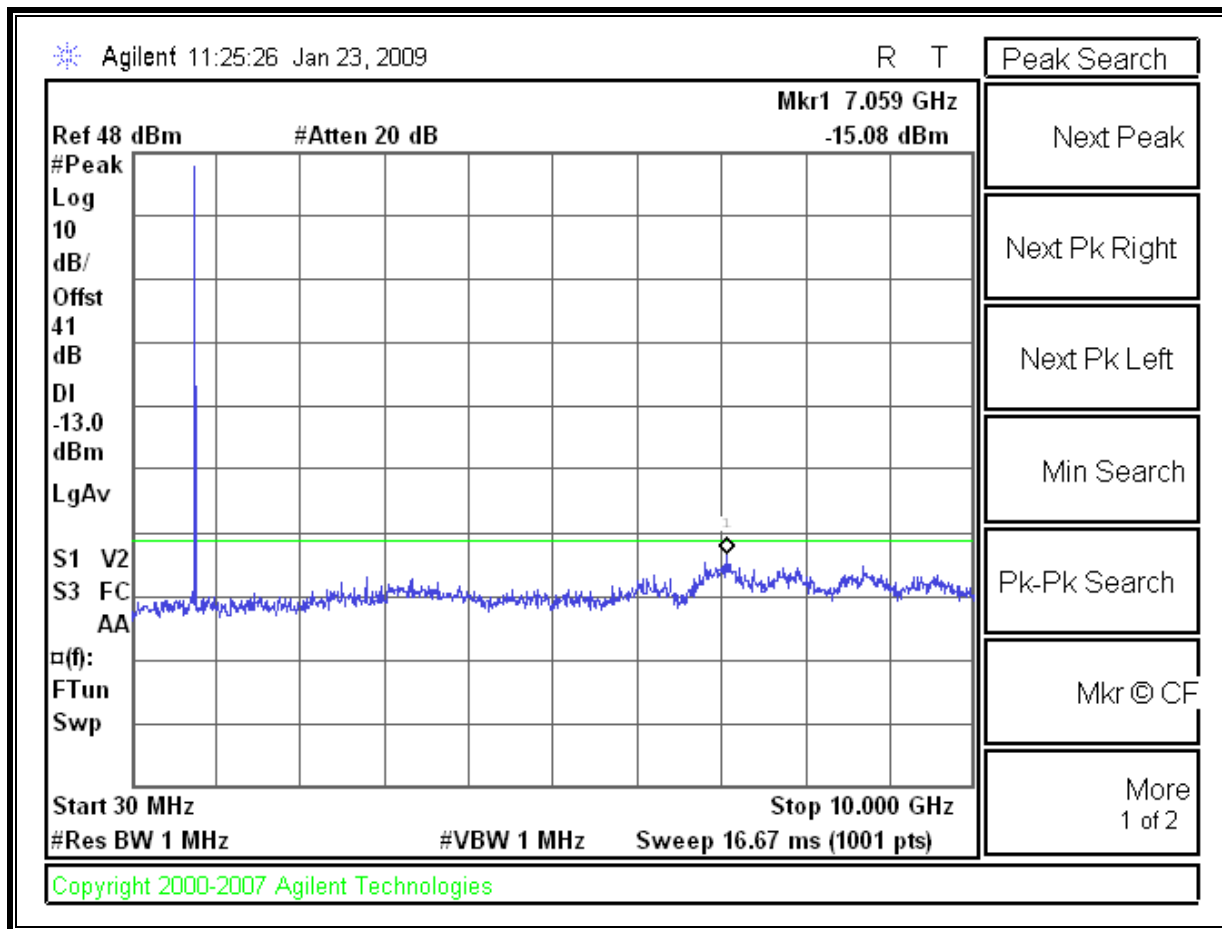


H MASK, CPM (806.01250MHz)

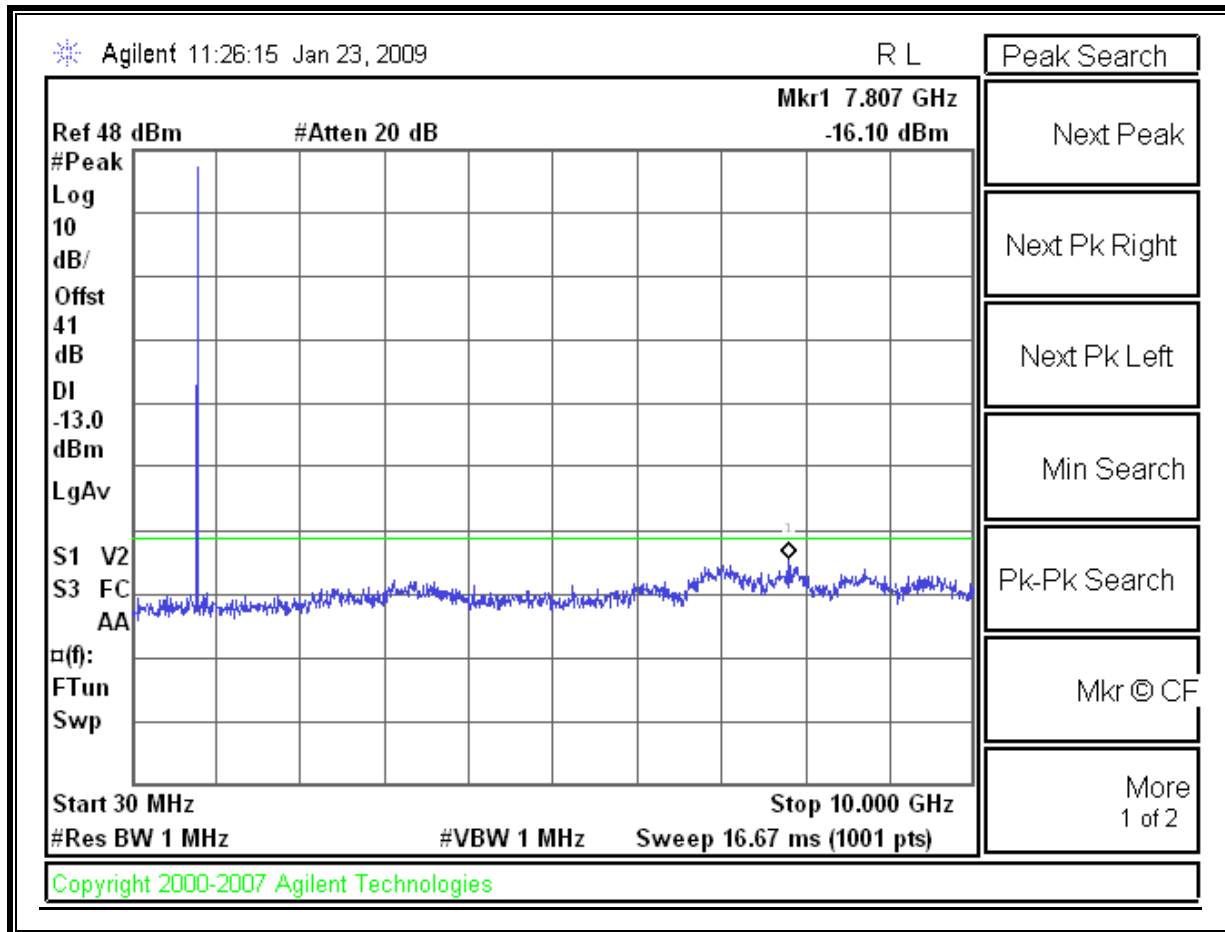


CONDUCTED SPURIOUS, 30MHz – 10GHz

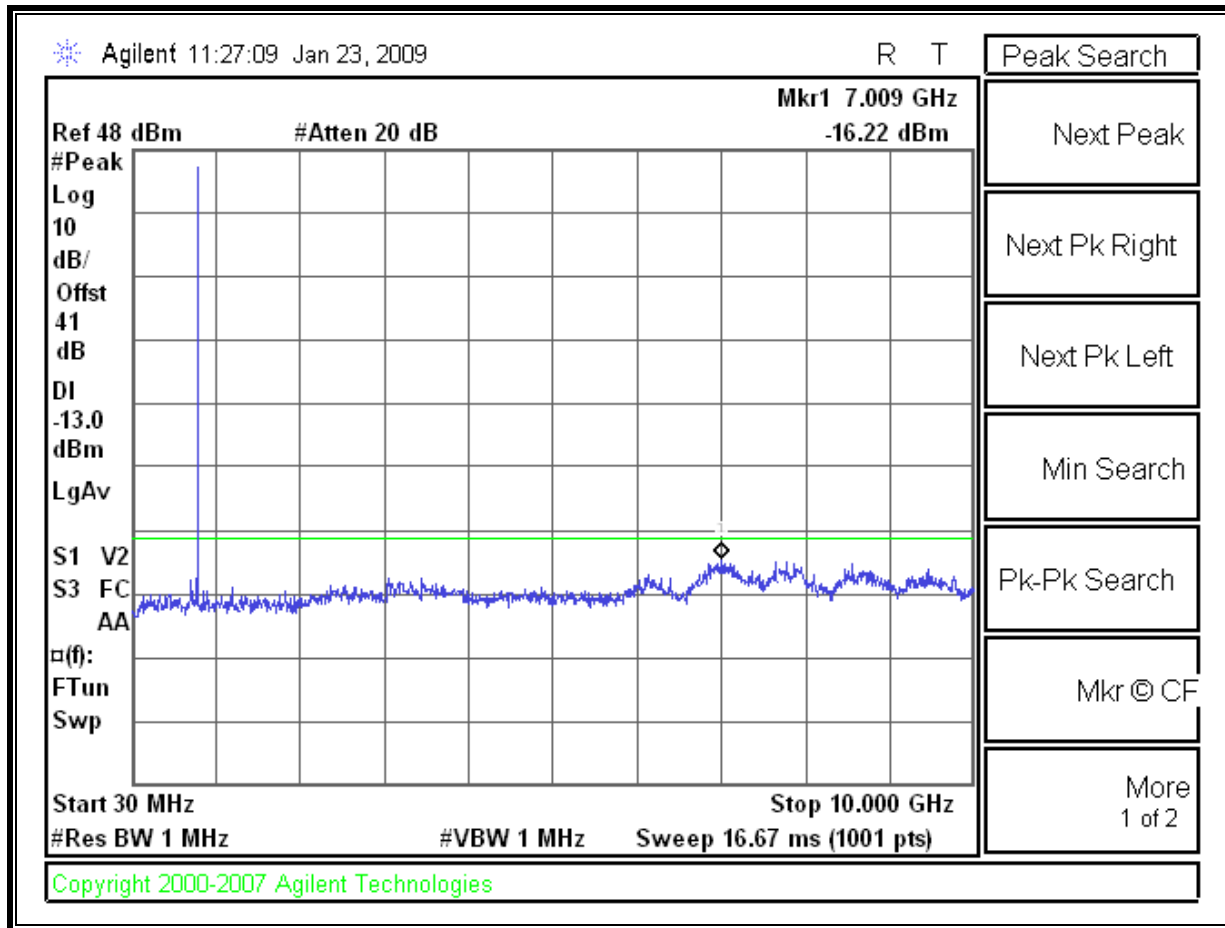
769.00625MHz RND



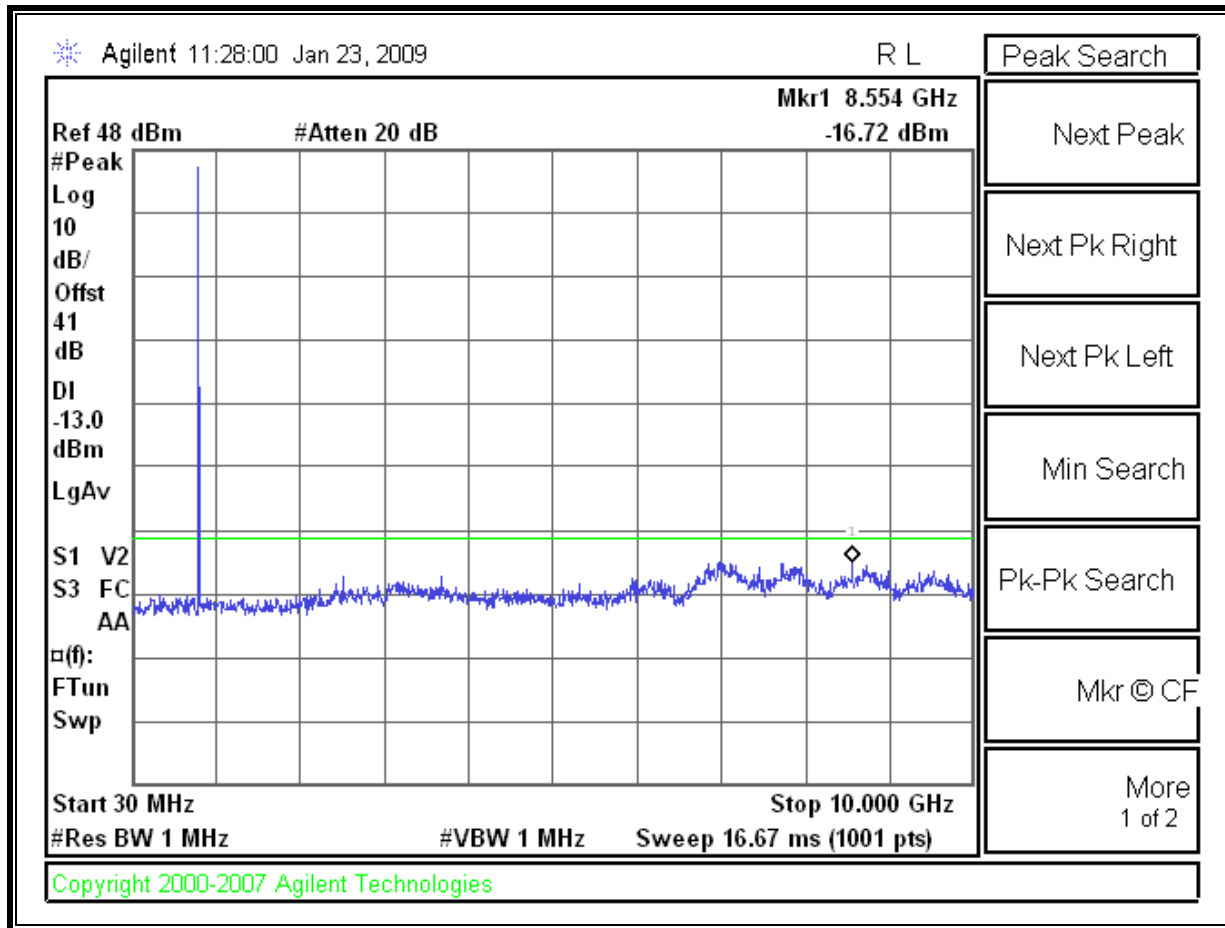
799.00625MHz RND



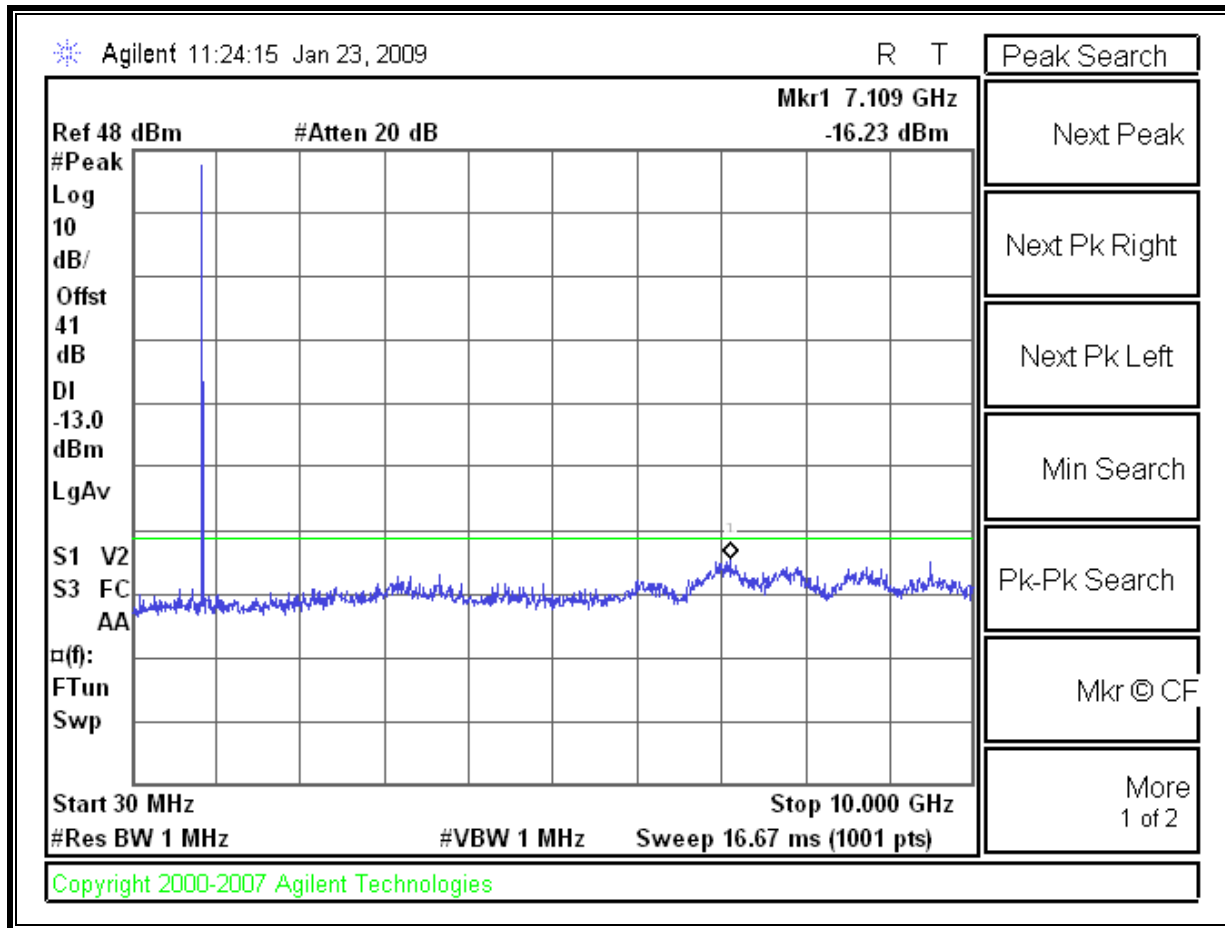
804.99375MHz RND



816.0125MHz RND



860.0125MHz RND



7.4. EMISSION LIMITATION: ACP REQUIREMENT

LIMIT

§ 90.543 & RSS-119 5.8.10

Transmitters designed to operate in 769–775 MHz and 799–805 MHz frequency bands must meet the emission limitations in paragraphs (a) through (d) of this section. Transmitters operating in 763–768 MHz and 793–798 MHz bands must meet the emission limitations in (e) of this section.

(a) The adjacent channel power (ACP) requirements for transmitters designed for various channel sizes are shown in the following tables. Mobile station requirements apply to handheld, car mounted and control station units. The tables specify a value for the ACP as a function of the displacement from the channel center frequency and measurement bandwidth. In the following tables, “(s)” indicates a swept measurement may be used.

12.5 kHz Mobile Transmitter ACP Requirements

Offset from center frequency (kHz)	Measurement bandwidth (kHz)	Maximum ACP relative (dBc)
9.375	6.25	-40
15.625	6.25	-60
21.875	6.25	-60
37.50	25.00	-60
62.50	25.00	-65
87.50	25.00	-65
150.00	100	-65
250.00	100	-65
350.00	100	-65
>400 to 12 MHz	30 (s)	-75
12 MHz to paired receive band	30 (s)	-75
In the paired receive band	30 (s)	-100

25 kHz Mobile Transmitter ACP Requirements

Offset from center frequency (kHz)	Measurement bandwidth (kHz)	Maximum ACP relative (dBc)
15.625	6.25	-40
21.875	6.25	-60
37.50	25	-60
62.50	25	-65
87.50	25	-65
150.00	100	-65
250.00	100	-65
350.00	100	-65
>400 kHz to 12 MHz	30 (s)	-75
12 MHz to paired receive band	30 (s)	-75
In the paired receive band	30 (s)	-100

TEST DATA

P25 NB 769.00625MHz, 12.5 KHz Channel Spacing

Offset from Center Frequency (KHz)	Measurement BW (KHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-) 9.375	6.25	-40	-39.94	-46.85
(+/-) 15.625	6.25	-60	-72.65	-72.10
(+/-) 21.875	6.25	-60	-72.95	-71.67
(+/-) 37.5	25	-60	-68.92	-69.19
(+/-) 62.5	25	-65	-73.49	-73.90
(+/-) 87.5	25	-65	-77.02	-77.25
(+/-) 150	100	-65	-75.48	-77.38
(+/-) 250	100	-65	-82.81	-81.76
(+/-) 350	100	-65	-83.76	-84.39

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP (dBc)
>400 to 12MHz	30 (s)	-75	-77.6
12MHz to receive band	30 (s)	-75	-83
In received band	30 (s)	-100	<-100

P25 NB 799.00625MHz, 12.5 KHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-) 9.375	6.25	-40	-42.5	-41.73
(+/-) 15.625	6.25	-60	-72.75	-72.11
(+/-) 21.875	6.25	-60	-74.20	-73.30
(+/-) 37.5	25	-60	-69.85	-69.71
(+/-) 62.5	25	-65	-74.22	-73.84
(+/-) 87.5	25	-65	-77.71	-77.21
(+/-) 150	100	-65	-75.77	-75.47
(+/-) 250	100	-65	-80.46	-80.56
(+/-) 350	100	-65	-84.34	-83.96

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP (dBc)
>400 to 12MHz	30 (s)	-75	-78
12MHz to receive band	30 (s)	-75	-77
In received band	30 (s)	-100	<-100

OTP NB, 769.00625MHz-12.5 KHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-) 9.375	6.25	-40	-57.61	-59.93
(+/-) 15.625	6.25	-60	-73.14	-71.44
(+/-) 21.875	6.25	-60	-72.95	-72.92
(+/-) 37.5	25	-60	-69.94	-70.27
(+/-) 62.5	25	-65	-73.96	-73.65
(+/-) 87.5	25	-65	-77.70	-76.93
(+/-) 150	100	-65	-76.38	-75.86
(+/-) 250	100	-65	-80.30	-80.40
(+/-) 350	100	-65	-81.44	-82.05

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP (dBc)
>400 to 12MHz	30 (s)	-75	-78.4
12MHz to receive band	30 (s)	-75	--77.2
In received band	30 (s)	-100	<-100

OTP NB 799.00625MHz, 12.5 KHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-) 9.375	6.25	-40	-59.58	-56.11
(+/-) 15.625	6.25	-60	-71.46	-72.40
(+/-) 21.875	6.25	-60	-73.63	-72.20
(+/-) 37.5	25	-60	-69.25	-68.31
(+/-) 62.5	25	-65	-73.13	-73.23
(+/-) 87.5	25	-65	-77.27	-76.69
(+/-) 150	100	-65	-69.81	-68.26
(+/-) 250	100	-65	-69.46	-69.64
(+/-) 350	100	-65	-70.10	-72.01

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP (dBc)
>400 to 12MHz	30 (s)	-75	-77.5
12MHz to receive band	30 (s)	-75	-77.3
In received band	30 (s)	-100	<-100

7.5. FIELD STRENGTH OF SPURIOUS RADIATION

LIMIT

§ 90.210, 90.543(c) & (f), 2.1053(a) & RSS-119 5.8

TEST PROCEDURE

ANSI / TIA / EIA 603C and IC RSS-119

RESULTS

SPURIOUS EMISSIONS 30 – 1000MHz (ERP)

30 - 1000MHz Substitution Measurement										
Compliance Certification Services, Fremont 5m B-Chamber										
Company: Zacta										
Project #: 09U12340										
Date: 2/11/2009										
Test Engineer: Chin Pang										
Configuration: EUT with External Antenna										
Mode: 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
769.00625MHz										
226.04	56.0	H	-54.0	1.9	5.9	3.7	-52.1	-13.0	-39.1	
427.98	51.7	H	-52.7	2.5	6.1	3.9	-51.2	-13.0	-38.2	
457.46	54.0	H	-49.9	2.5	6.1	4.0	-48.5	-13.0	-35.5	
767.00	48.3	H	-50.2	3.3	6.7	4.6	-48.9	-13.0	-35.9	
881.50	44.5	H	-53.4	3.6	6.7	4.6	-52.4	-13.0	-39.4	
902.39	40.0	H	-57.6	3.6	6.8	4.6	-56.6	-13.0	-43.6	
457.61	49.0	V	-54.8	2.5	6.1	4.0	-53.3	-13.0	-40.3	
656.33	47.0	V	-54.2	3.0	6.8	4.7	-52.6	-13.0	-39.6	
754.96	49.0	V	-51.1	3.3	6.7	4.6	-49.7	-13.0	-36.7	
783.40	48.5	V	-51.0	3.3	6.7	4.6	-49.8	-13.0	-36.8	
785.50	44.0	V	-55.5	3.3	6.7	4.6	-54.3	-13.0	-41.3	
799.00625MHz										
112.69	63.0	H	-45.1	1.4	-2.1	-4.2	-50.7	-13.0	-37.7	
280.32	59.0	H	-48.7	2.0	6.0	3.9	-46.9	-13.0	-33.9	
618.50	52.0	H	-50.5	2.9	6.9	4.7	-48.7	-13.0	-35.7	
911.50	56.2	H	-41.3	3.6	6.8	4.6	-40.3	-13.0	-27.3	
931.95	44.0	H	-53.2	3.7	6.8	4.7	-52.2	-13.0	-39.2	
132.60	54.0	V	-53.5	1.5	-1.6	-3.8	-58.8	-13.0	-45.8	
687.40	52.0	V	-48.7	3.1	6.8	4.6	-47.1	-13.0	-34.1	
911.38	51.0	V	-46.2	3.6	6.8	4.6	-45.3	-13.0	-32.3	
932.00	45.0	V	-52.0	3.7	6.8	4.7	-51.0	-13.0	-38.0	
804.0125MHz										
113.20	62.0	H	-46.0	1.4	-2.1	-4.2	-51.6	-13.0	-38.6	
132.40	60.0	H	-47.5	1.5	-1.6	-3.8	-52.8	-13.0	-39.8	
672.90	50.0	H	-51.5	3.1	6.8	4.6	-50.0	-13.0	-37.0	
692.90	60.0	H	-41.2	3.1	6.8	4.6	-39.7	-13.0	-26.7	
917.50	65.5	H	-31.9	3.7	6.8	4.6	-30.9	-13.0	-17.9	
938.25	47.0	H	-50.1	3.7	6.8	4.7	-49.1	-13.0	-36.1	
113.16	53.0	V	-55.0	1.4	-2.1	-4.2	-60.6	-13.0	-47.6	
692.90	51.5	V	-49.1	3.1	6.8	4.6	-47.6	-13.0	-34.6	
819.50	45.0	V	-53.2	3.4	6.7	4.6	-52.1	-13.0	-39.1	
917.50	50.0	V	-47.2	3.7	6.8	4.6	-46.2	-13.0	-33.2	

Rev. 4.29.7

30 - 1000MHz Substitution Measurement
 Compliance Certification Services, Fremont 5m B-Chamber

Company: Zacta
 Project #: 09U12340
 Date: 2/11/2009
 Test Engineer: Chun Pang
 Configuration: EUT with External Antenna
 Mode: 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
816.0125MHz										
229.95	60.0	H	-49.9	1.9	5.9	3.8	-48.0	-13.0	-35.0	
499.65	52.0	H	-51.3	2.7	6.2	4.0	-49.9	-13.0	-36.9	
625.00	54.0	H	-48.4	3.0	6.9	4.7	-46.6	-13.0	-33.6	
689.50	61.0	H	-40.2	3.1	6.8	4.6	-38.7	-13.0	-25.7	
830.44	53.5	H	-45.0	3.5	6.7	4.6	-43.9	-13.0	-30.9	
943.50	65.0	H	-32.1	3.7	6.9	4.7	-31.1	-13.0	-18.1	
127.60	58.0	V	-49.4	1.4	-2.1	-4.2	-55.1	-13.0	-42.1	
689.50	57.0	V	-43.6	3.1	6.8	4.6	-42.1	-13.0	-29.1	
830.40	47.0	V	-51.1	3.5	6.7	4.6	-50.0	-13.0	-37.0	
783.40	48.5	V	-51.0	3.3	6.7	4.6	-49.8	-13.0	-36.8	
943.50	54.0	V	-42.9	3.7	6.9	4.7	-41.9	-13.0	-28.9	
860.0125MHz										
224.50	63.0	H	-47.0	1.9	5.9	3.7	-45.2	-13.0	-32.2	
500.50	55.0	H	-48.5	2.7	6.2	4.0	-47.1	-13.0	-34.1	
572.20	54.6	H	-48.3	2.8	6.7	4.6	-46.6	-13.0	-33.6	
749.30	56.0	H	-42.9	3.3	6.7	4.6	-41.5	-13.0	-28.5	
967.00	71.7	H	-25.1	3.8	6.9	4.8	-24.1	-13.0	-11.1	
112.30	60.0	V	-48.1	1.4	-2.0	-4.2	-53.7	-13.0	-40.7	
640.40	50.0	V	-51.5	3.0	6.8	4.7	-49.8	-13.0	-36.8	
747.00	59.5	V	-40.7	3.2	6.7	4.6	-39.4	-13.0	-26.4	
955.00	45.0	V	-51.7	3.7	6.9	4.7	-50.7	-13.0	-37.7	
965.00	64.0	V	-32.6	3.8	6.9	4.8	-31.6	-13.0	-18.6	

Rev. 4.29.7

SPURIOUS EMISSIONS ABOVE 1GHz (ERP)

High Frequency Substitution Measurement										
Compliance Certification Services, Fremont 5m A-Chamber										
Company:		ZACTA TECHNOLOGY CORPORATION								
Project #:		09U12340								
Date:		02/27/209								
Test Engineer:		MENGISTU MEKURIA								
Configuration:		EUT AND SUPPORT EQUIPMENT								
Mode:		TXMODE								
Test Equipment:										
EMCO Horn 1-18GHz			Horn > 18GHz			Limit		High Pass Filter		
T60; S/N: 2238 @3m						FCC 90		<input checked="" type="checkbox"/>		
Hi Frequency Cables				Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz				
<input type="checkbox"/> (2 ft) <input checked="" type="checkbox"/> (2~3 ft) <input checked="" type="checkbox"/> (4~6 ft) <input checked="" type="checkbox"/> (12 ft)				T144 Miteq 3008A00						
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
769.006250 MHz										
1.538	72.7	V	-32.5	4.8	6.7	4.5	-32.8	-13.0	-19.8	
2.307	63.1	V	-39.3	6.0	9.0	6.9	-38.4	-13.0	-25.4	
3.076	65.5	V	-32.8	6.9	9.3	7.2	-32.5	-13.0	-19.5	
3.845	52.3	V	-42.5	7.8	9.7	7.6	-42.7	-13.0	-29.7	
4.614	51.4	V	-41.5	8.7	10.6	8.4	-41.7	-13.0	-28.7	
5.383	54.9	V	-34.3	9.5	11.0	8.8	-34.9	-13.0	-21.9	
6.152	59.8	V	-28.3	10.1	11.8	9.6	-28.8	-13.0	-15.8	
6.921	49.2	V	-37.3	10.6	12.0	9.8	-38.1	-13.0	-25.1	
7.690	44.7	V	-40.1	11.0	12.0	9.8	-41.3	-13.0	-28.3	
1.538	69.8	H	-34.7	4.8	6.7	4.5	-35.0	-13.0	-22.0	
2.307	66.4	H	-35.8	6.0	9.0	6.9	-34.8	-13.0	-21.8	
3.076	66.7	H	-31.6	6.9	9.3	7.2	-31.3	-13.0	-18.3	
3.845	53.5	H	-41.2	7.8	9.7	7.6	-41.4	-13.0	-28.4	
4.614	51.4	H	-41.1	8.7	10.6	8.4	-41.4	-13.0	-28.4	
5.383	54.5	H	-33.7	9.5	11.0	8.8	-34.4	-13.0	-21.4	
6.152	59.1	H	-28.4	10.1	11.8	9.6	-28.8	-13.0	-15.8	
6.921	48.2	H	-37.7	10.6	12.0	9.8	-38.4	-13.0	-25.4	
7.690	46.2	H	-37.8	11.0	12.0	9.8	-39.0	-13.0	-26.0	
799.006250 MHz										
1.598	79.7	V	-25.2	4.9	6.9	4.7	-25.4	-13.0	-12.4	
2.397	67.6	V	-34.4	6.1	9.3	7.1	-33.4	-13.0	-20.4	
3.196	62.4	V	-35.4	7.0	9.4	7.2	-35.2	-13.0	-22.2	
3.995	58.6	V	-35.5	8.0	9.8	7.7	-35.8	-13.0	-22.8	
5.593	45.6	V	-43.3	9.7	11.1	8.9	-44.0	-13.0	-31.0	
6.392	43.9	V	-43.7	10.2	11.8	9.7	-44.3	-13.0	-31.3	
7.990	46.0	V	-38.0	11.2	12.0	9.8	-39.4	-13.0	-26.4	
1.598	77.8	H	-26.4	4.9	6.9	4.7	-26.6	-13.0	-13.6	
2.397	70.0	H	-31.9	6.1	9.3	7.1	-30.9	-13.0	-17.9	
3.196	65.2	H	-32.5	7.0	9.4	7.2	-32.3	-13.0	-19.3	
3.995	60.8	H	-33.2	8.0	9.8	7.7	-33.5	-13.0	-20.5	
6.392	43.8	H	-43.2	10.2	11.8	9.7	-43.7	-13.0	-30.7	
7.990	45.6	H	-37.6	11.2	12.0	9.8	-39.0	-13.0	-26.0	
Rev. 4.12.7										

High Frequency Substitution Measurement
 Compliance Certification Services, Fremont 5m A-Chamber

Company: ZACTA TECHNOLOGY CORPORATION
 Project #: 09U12340
 Date: 2/7/2009
 Test Engineer: MENGISTU MEKURIA
 Configuration: EUT AND SUPPORT EQUIPMENT
 Mode: TX MODE

Test Equipment:

EMCO Horn 1-18 GHz Horn > 18GHz Limit High Pass Filter
 T60; S/N: 2238 @3m FCC 90

Hi Frequency Cables Pre-amplifier 1-26GHz Pre-amplifier 26-40GHz
 (2 ft) (2~3 ft) (4~6 ft) (12 ft) T144 Miteq 3008A00

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
804.9937500 MHz										
1.610	77.5	V	-27.4	4.9	6.9	4.8	-27.6	-13.0	-14.6	
2.415	69.2	V	-32.7	6.1	9.3	7.1	-31.7	-13.0	-18.7	
3.220	68.4	V	-29.3	7.1	9.4	7.3	-29.1	-13.0	-16.1	
4.025	54.4	V	-39.6	8.0	9.8	7.7	-39.9	-13.0	-26.9	
5.635	47.5	V	-41.3	9.7	11.2	9.0	-42.1	-13.0	-29.1	
8.050	45.0	V	-39.7	11.3	12.0	9.9	-41.1	-13.0	-28.1	
1.610	78.2	H	-26.0	4.9	6.9	4.8	-26.2	-13.0	-13.2	
2.415	74.0	H	-27.7	6.1	9.3	7.1	-26.7	-13.0	-13.7	
3.220	72.4	H	-25.2	7.1	9.4	7.3	-25.0	-13.0	-12.0	
4.025	55.2	H	-38.5	8.0	9.8	7.7	-38.8	-13.0	-25.8	
8.050	46.5	H	-37.0	11.3	12.0	9.9	-38.4	-13.0	-25.4	
816.012500 MHz										
1.632	78.1	V	-26.8	5.0	7.0	4.9	-26.9	-13.0	-13.9	
2.448	74.3	V	-27.5	6.2	9.3	7.1	-26.5	-13.0	-13.5	
3.264	63.1	V	-34.4	7.1	9.4	7.3	-34.2	-13.0	-21.2	
4.080	58.7	V	-35.2	8.1	9.9	7.8	-35.5	-13.0	-22.5	
4.896	51.8	V	-40.6	9.0	10.9	8.8	-40.8	-13.0	-27.8	
8.160	44.5	V	-40.2	11.3	12.1	10.0	-41.6	-13.0	-28.6	
1.632	84.0	H	-20.1	5.0	7.0	4.9	-20.2	-13.0	-7.2	
2.448	77.0	H	-24.6	6.2	9.3	7.1	-23.6	-13.0	-10.6	
3.264	70.2	H	-27.2	7.1	9.4	7.3	-27.0	-13.0	-14.0	
4.080	58.7	H	-34.9	8.1	9.9	7.8	-35.2	-13.0	-22.2	
4.896	51.4	H	-40.6	9.0	10.9	8.8	-40.8	-13.0	-27.8	
8.160	46.6	H	-36.9	11.3	12.1	10.0	-38.3	-13.0	-25.3	

Rev. 412.7

High Frequency Substitution Measurement
 Compliance Certification Services, Fremont 5m A-Chamber

Company: ZACTA TECHNOLOGY CORPORATION
 Project #: 09U12340
 Date: 02/27/2009
 Test Engineer: MENGISTU MEKURIA
 Configuration: EUT AND SUPPORT EQUIPMENT
 Mode: TX MODE

Test Equipment:

EMCO Horn 1-18 GHz Horn > 18GHz Limit High Pass Filter
 T60; S/N: 2238 @3m FCC 90

Hi Frequency Cables Pre-amplifier 1-26GHz Pre-amplifier 26-40GHz
 (2 ft) (2~3 ft) (4~6 ft) (12 ft) T144 Miteq 3008A00

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
860.012500 MHz										
1.720	84.8	V	-19.7	5.1	7.3	5.2	-19.7	-13.0	-6.7	
2.580	77.7	V	-23.3	6.3	9.3	7.1	-22.5	-13.0	-9.5	
3.440	69.7	V	-26.9	7.3	9.5	7.4	-26.9	-13.0	-13.9	
4.300	54.5	V	-38.9	8.3	10.2	8.0	-39.2	-13.0	-26.2	
5.160	46.8	V	-43.2	9.3	11.0	8.9	-43.6	-13.0	-30.6	
6.020	45.7	V	-42.8	10.0	11.7	9.6	-43.2	-13.0	-30.2	
6.880	46.9	V	-39.7	10.5	12.0	9.8	-40.4	-13.0	-27.4	
7.740	46.1	V	-38.6	11.1	12.0	9.8	-39.8	-13.0	-26.8	
8.600	46.0	V	-38.4	11.6	12.4	10.2	-39.8	-13.0	-26.8	
1.720	82.8	H	-21.0	5.1	7.3	5.2	-21.0	-13.0	-8.0	
2.580	81.4	H	-19.4	6.3	9.3	7.1	-18.6	-13.0	-5.6	
3.440	71.4	H	-25.1	7.3	9.5	7.4	-25.1	-13.0	-12.1	
4.300	58.0	H	-35.1	8.3	10.2	8.0	-35.4	-13.0	-22.4	
5.160	46.5	H	-42.5	9.3	11.0	8.9	-43.0	-13.0	-30.0	
6.020	45.3	H	-42.5	10.0	11.7	9.6	-42.9	-13.0	-29.9	
6.880	46.1	H	-39.8	10.5	12.0	9.8	-40.5	-13.0	-27.5	
7.740	42.5	H	-41.4	11.1	12.0	9.8	-42.6	-13.0	-29.6	
8.600	45.7	H	-37.5	11.6	12.4	10.2	-38.9	-13.0	-25.9	

Rev. 4.12.7

7.6. RECEIVER SPURIOUS EMISSIONS

LIMIT

Spurious Emission Limits for Receivers:

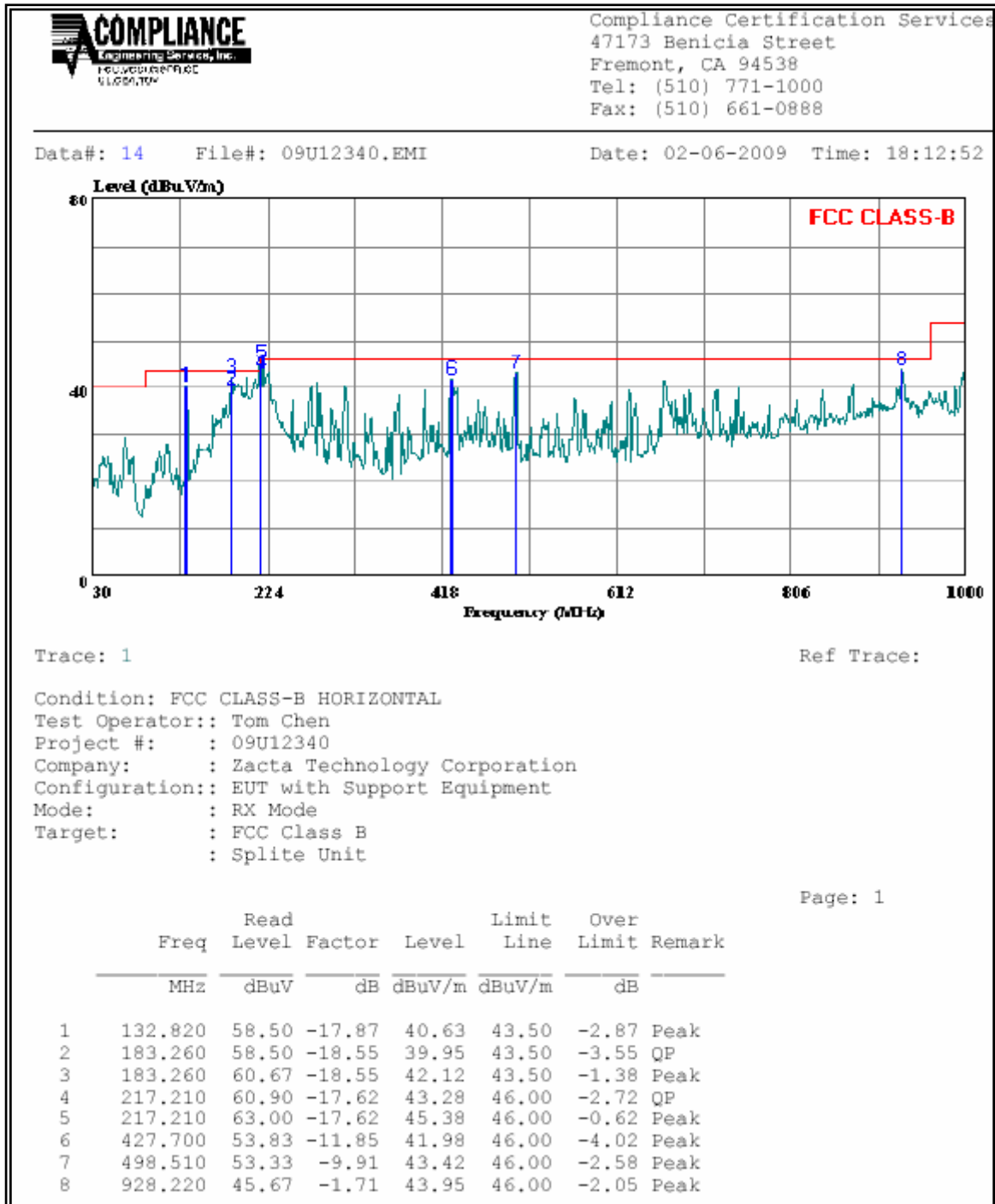
Spurious Frequency (MHz)	Field Strength (microvolts/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960	500

TEST PROCEDURE

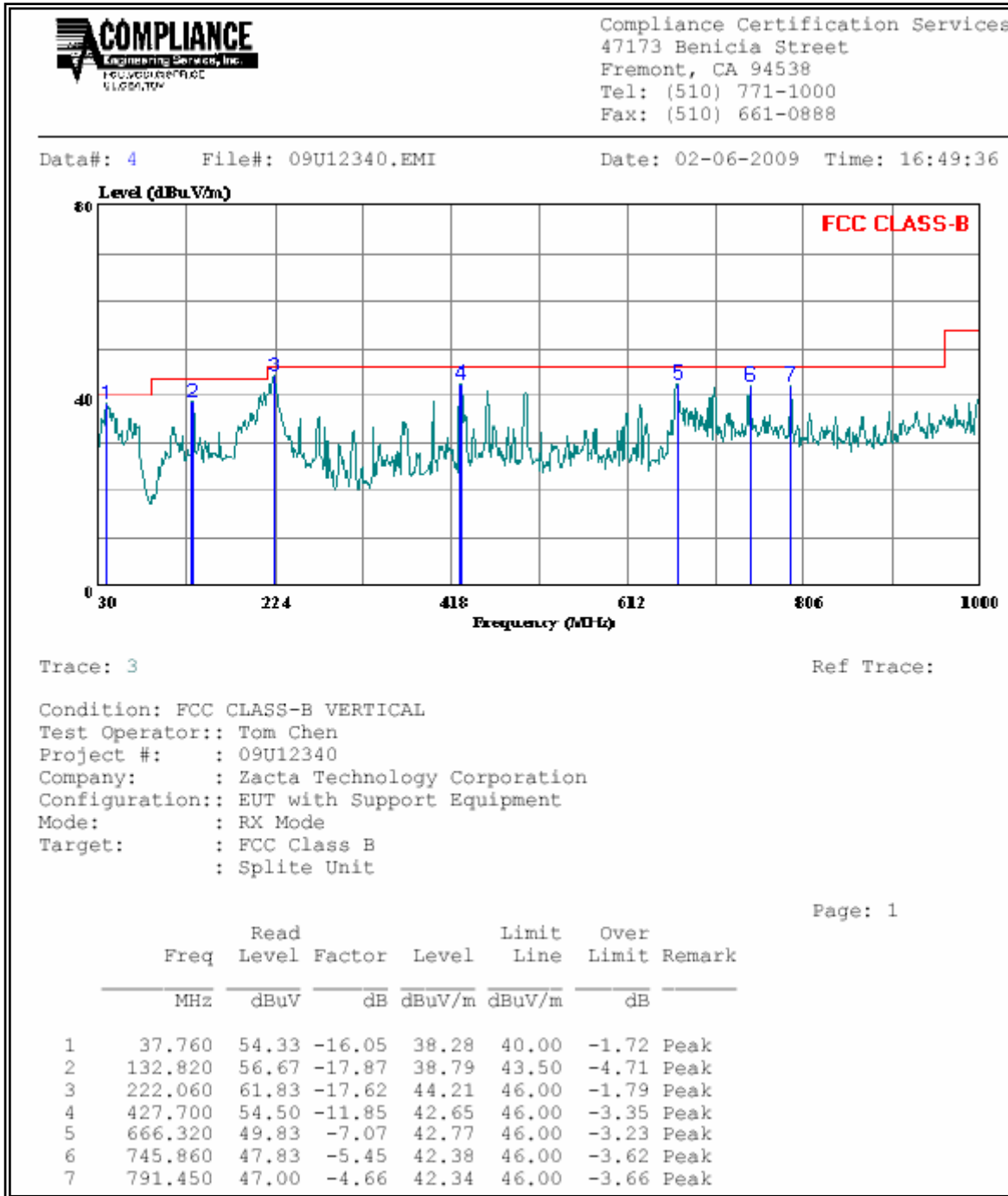
The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (local oscillator frequency, intermediate frequency or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tunable and local oscillator frequencies.

RESULTS

RECEIVER SPURIOUS EMISSIONS FOR 30 TO 1000 MHz, HORIZONTAL



RECEIVER SPURIOUS EMISSIONS FOR 30 TO 1000 MHz, VERTICAL



RECEIVER SPURIOUS EMISSIONS FOR ABOVE 1GHz

High Frequency Measurement																	
Compliance Certification Services, Fremont 5m Chamber																	
Company:		Zacta Technology Corporation															
Project #:		09U12340															
Date:		2/6/2009															
Test Engineer:		Tom Chen															
Configuration:		EUT with Support Equipment															
Mode:		RX mode (Worst Case)															
Test Equipment:																	
Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit					
T73; S/N: 6717 @3m			T144 Miteq 3008A00931									FCC Class B					
Hi Frequency Cables																	
3' cable 22807700			12' cable 22807600			20' cable 22807500			HPF			Reject Filter			Peak Measurements		
3' cable 22807700			12' cable 22807600			20' cable 22807500									RBW=VBW=1MHz		
Average Measurements																	
RBW=1MHz ; VBW=10Hz																	
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Ftr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes		
GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)		
1.892	3.0	56.0	41.0	28.1	3.3	-38.2	0.0	0.0	49.2	34.2	74	54	-24.8	-19.8	H		
2.438	3.0	53.8	39.6	29.4	3.9	-37.5	0.0	0.0	49.6	35.4	74	54	-24.4	-18.6	H		
1.850	3.0	60.4	54.5	28.0	3.3	-38.3	0.0	0.0	53.4	47.5	74	54	-20.6	-6.5	V		
1.892	3.0	61.2	55.1	28.1	3.3	-38.2	0.0	0.0	54.4	48.3	74	54	-19.6	-5.7	V		
2.425	3.0	57.3	42.8	29.4	3.9	-37.5	0.0	0.0	53.1	38.6	74	54	-20.9	-15.4	V		
Rev. 10.15.08																	
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit				
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit				
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit				
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit				
CL	Cable Loss					HPF	High Pass Filter										

7.7. FREQUENCY STABILITY

LIMIT

§90.213, 90.539, 2.1055, & RSS 119 5.3

700MHz:

§90.539(c) The frequency stability of mobile, portable, and control transmitters operating in the narrowband segment must be 400 parts per billion or better when AFC is locked to the base station. When AFC is not locked to the base station, the frequency stability must be at least 1.0 ppm for 6.25 kHz, 1.5 ppm for 12.5 kHz (2 channel aggregate), and 2.5 ppm for 25 kHz (4 channel aggregate).

800MHz

§90.213: Mobile stations over 2 W operating powers 1.5 ppm.

TEST PROCEDURE

ANSI / TIA / EIA 603C, IC RSS-119

RESULTS

FREQUENCY (769.00625MHz)

Reference Frequency: Cellular Mid Channel 769.00625MHz @ 20°C Limit: to stay +/- 0.4 ppm = 307.6025 Hz				
DC Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
12.00	60	769.006163	0.113	0.4
12.00	50	769.006109	0.183	0.4
12.00	40	769.006125	0.163	0.4
12.00	30	769.006249	0.001	0.4
12.00	20	769.006250	0	0.4
12.00	10	769.006215	0.046	0.4
12.00	0	769.006205	0.059	0.4
12.00	-10	769.006241	0.012	0.4
12.00	-20	769.006345	-0.124	0.4
12.00	-30	769.006478	-0.296	0.4
Reference Frequency: Cellular Mid Channel 769.00625MHz @ 20°C Limit: to stay +/- 0.4 ppm = 307.602 Hz				
DC Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
100%	20	769.006204	0	0.4
85%	20	769.006207	-0.004	0.4
115%	20	769.006203	0.001	0.4

FREQUENCY (816.0125MHz)

Reference Frequency: 816.0125MHz @ 20°C Limit: to stay +/- 1.5 ppm = 1224.0188 Hz				
DC Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
12.00	60	816.012390	0.135	1.5
12.00	50	816.012373	0.156	1.5
12.00	40	816.012396	0.127	1.5
12.00	30	816.012475	0.031	1.5
12.00	20	816.012500	0.000	1.5
12.00	10	816.012469	0.038	1.5
12.00	0	816.012408	0.113	1.5
12.00	-10	816.012510	-0.012	1.5
12.00	-20	816.012566	-0.081	1.5
12.00	-30	816.012733	-0.286	1.5
Reference Frequency: 816.0125MHz @ 20°C Limit: to stay +/- 1.5 ppm = 1224.019 Hz				
DC Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
100%	20	816.012462	0	1.5
85%	20	816.012465	-0.004	1.5
115%	20	816.012470	-0.010	1.5

7.8. MODULATION CHARACTERISTICS

7.8.1. AUDIO FREQUENCY RESPONSE

LIMIT

FCC 2.1047 (a) & (b)

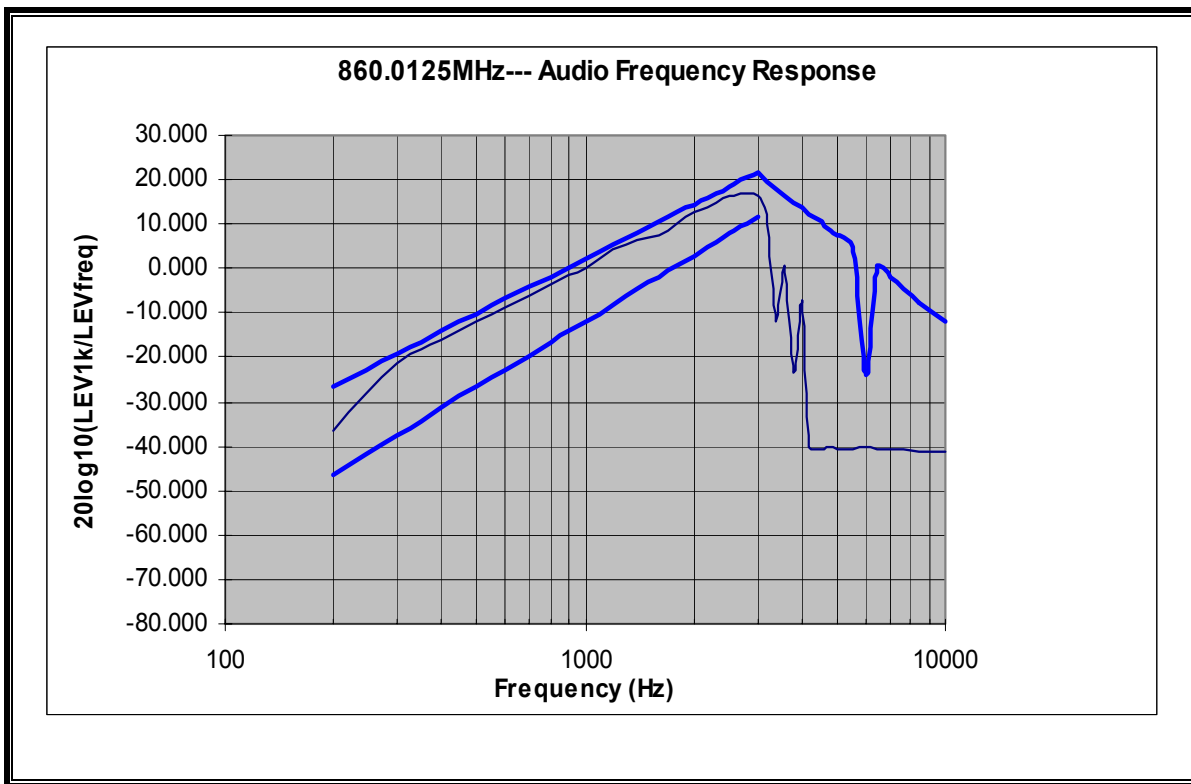
(a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

b) Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed

TEST PROCEDURE

ANSI / TIA / EIA 603C, IC RSS-119

RESULTS:



7.8.2. AUDIO LOW PASS FILTER

LIMIT

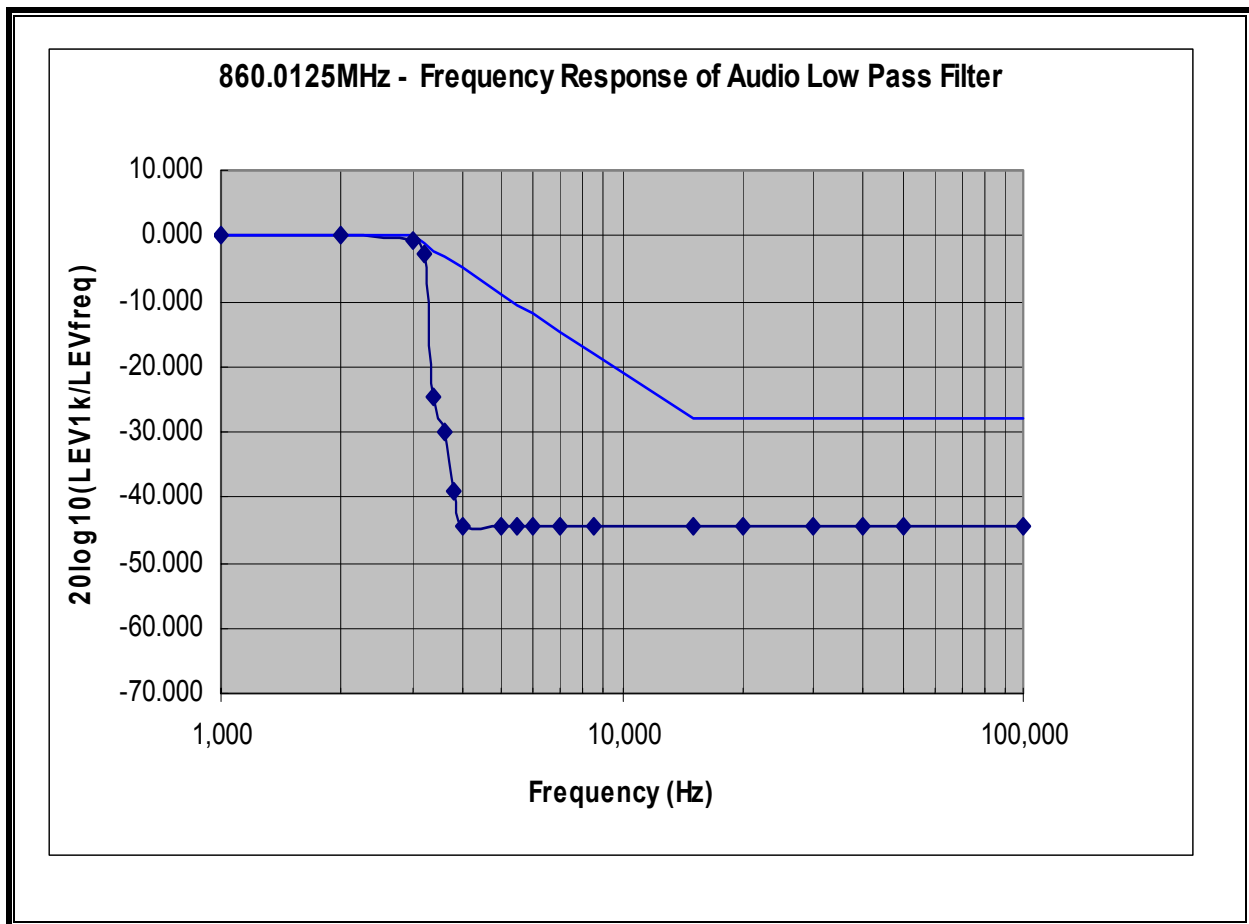
FCC 2.1047 (a) & (b)

The Audio Low Pass Filter Response is the frequency response of the post limiter low pass filter Circuit above 3000Hz

TEST PROCEDURE

ANSI / TIA / EIA 603C, IC RSS-119

RESULTS



7.8.3. MODULATION LIMITING

LIMIT

FCC 2.1047 (a) & (b)

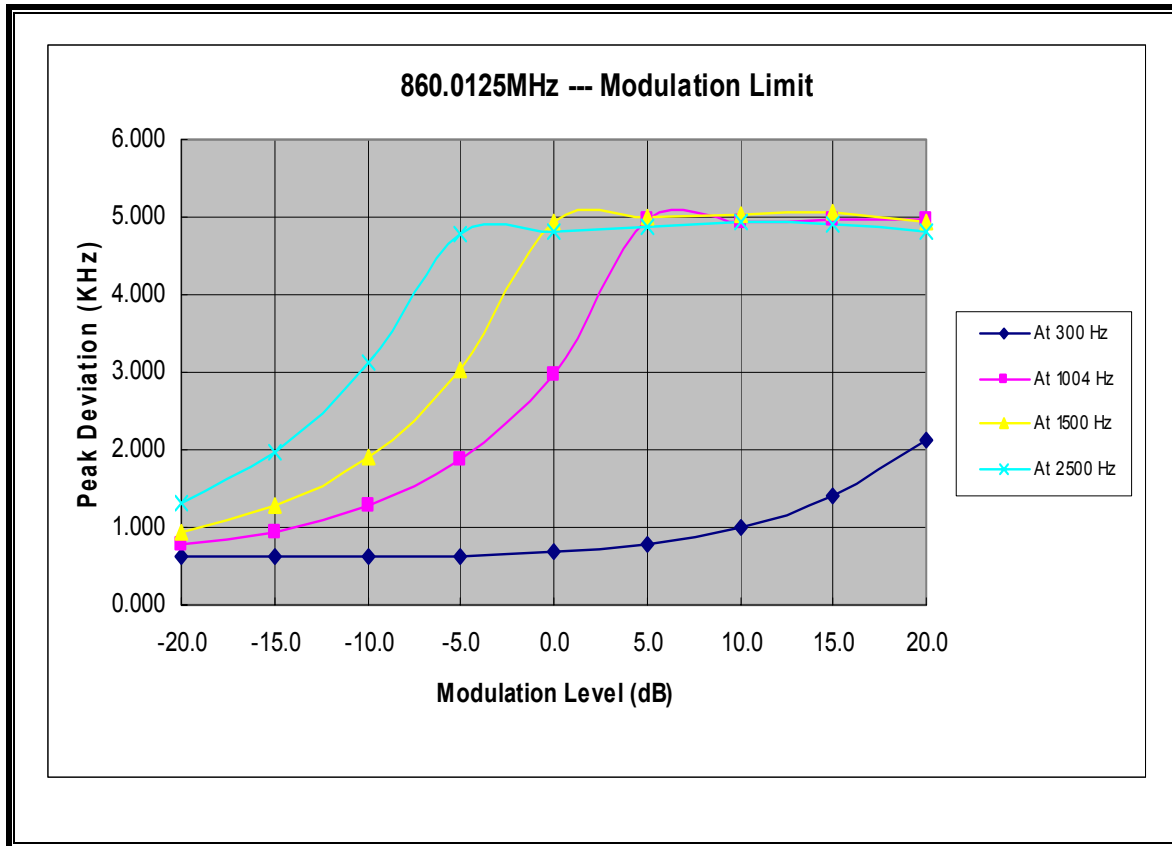
The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000Hz. Using this level (0 dB) as a reference, the audio input level was varied from the reference +/-20dB for modulation frequencies of 300Hz, 1000Hz and 2500Hz. The system deviation obtained as a function of the input level was recorded. Both positive and negative peak deviations were recorded.

TEST PROCEDURE

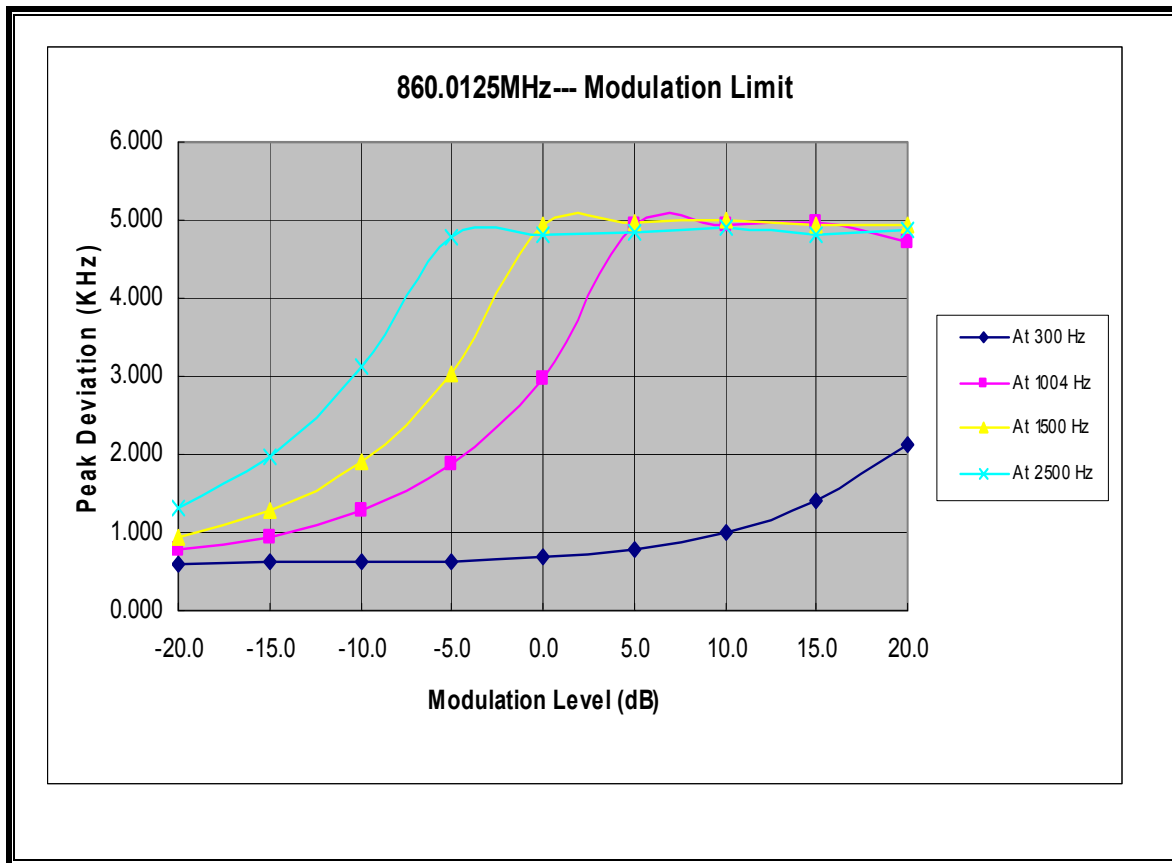
ANSI/TIA/EIA-603C

RESULTS

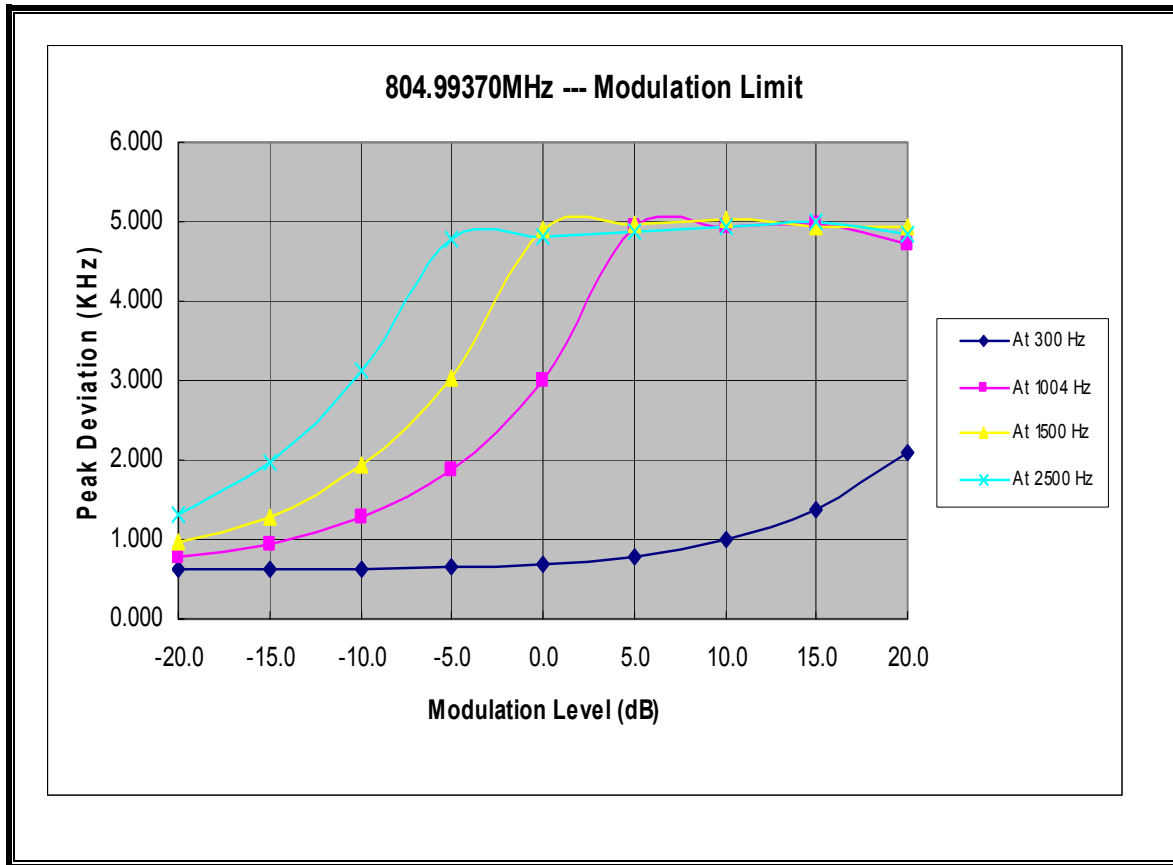
Positive Peak: Wideband



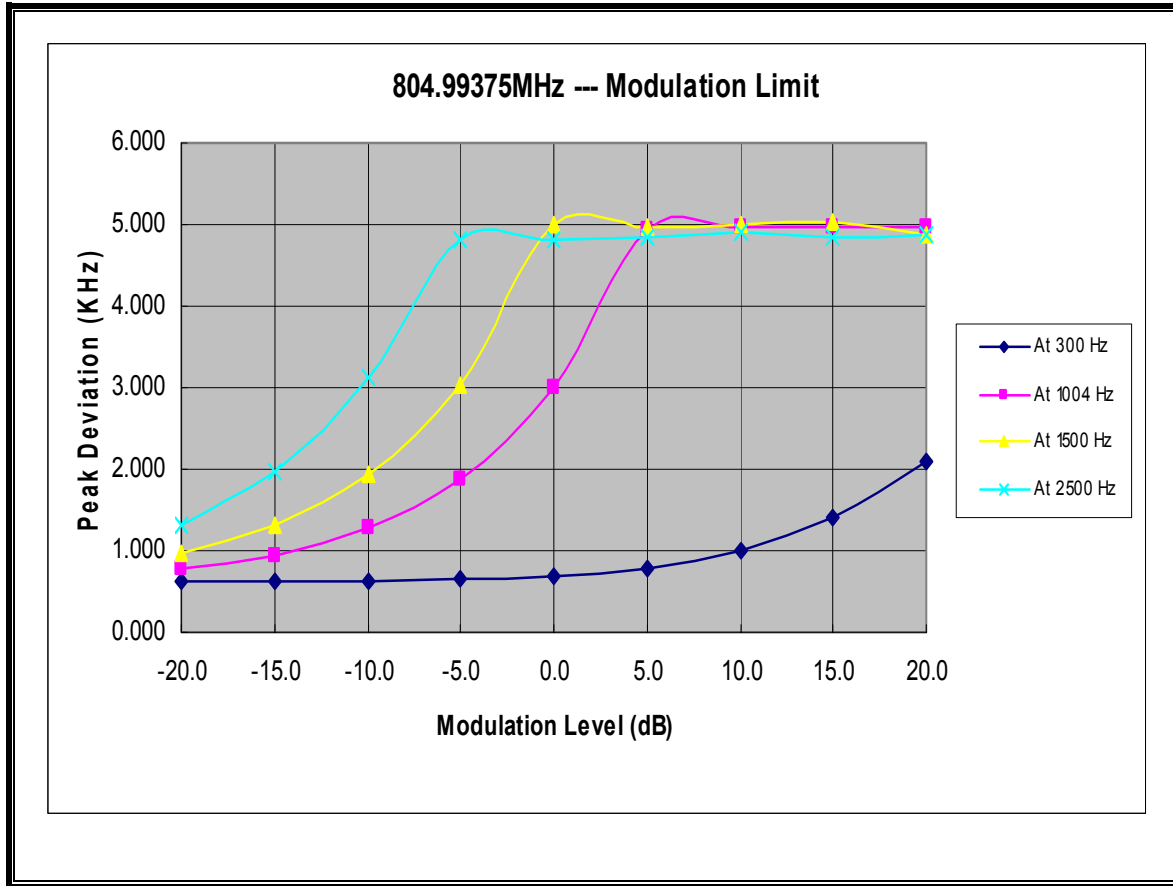
Negative Peak: Wideband



Positive Peak: Narrowband



Negative Peak: Narrowband



8. MAXIMUM PERMISSIBLE EXPOSURE

LIMIT

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

$$E = \sqrt{(30 * P * G) / d}$$

and

$$S = E^2 / 3770$$

where

E = Field Strength in Volts/meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power Density in milliwatts/square centimeter

Combining equations, rearranging the terms to express the distance as a function of the remaining variables, changing to units of Power to mW and Distance to cm, and substituting the logarithmic form of power and gain yields:

$$d = 0.282 * 10^{((P + G) / 20)} / \sqrt{S}$$

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm²

Rearranging terms to calculate the power density at a specific distance yields

$$S = 0.0795 * 10^{((P + G) / 10)} / (d^2)$$

The power density in units of mW/cm² is converted to units of W/m² by multiplying by a factor of 10.

LIMITS

Controlled Exposure Limit:

From FCC §1.1310 Table 1 (A), the maximum value of S = 2.563354 mW/cm² (769.00625MHz) & 2.720042 mW/cm² (816.0125MHz)

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 25.633542 mW/cm² (769.00625MHz) & 27.200417 mW/cm² (816.0125MHz)

Uncontrolled Exposure Limit:

From FCC §1.1310 Table 1 (B), the maximum value of S = 0.512671 mW/cm² (769.00625MHz) & 0.5440083 mW/cm² (816.0125MHz)

From IC Safety Code 6, Section 2.2 Table 5 Column 4, S = 5.126708 mW/cm² (769.00625MHz) & 5.4400833 mW/cm² (816.0125MHz)

RESULTS

Band (MHz)	Frequency (MHz)	FCC Limit (mW/cm ²)	IC Limit (W/m ²)	Output (dBm)	Antenna (dBi)	MPE Distance (cm)
R(Safe) Controlled Environment						
700.0	769.00625	2.56	25.6	42.20	4.65	38.76
800.0	816.01250	2.72	27.2	45.39	4.65	54.32
R(Safe) Uncontrolled Environment						
700.0	769.00625	0.51	5.13	42.20	4.65	86.66
800.0	816.01250	0.54	5.44	45.39	4.65	121.46