CKC LABORATORIES, INC. Testing the Future

ACCREDITED
Certicate Numbers
803.01, 803.02, 803.03
803.05 - 803.08
EMC

ADDENDUM TO THE TORO COMPANY TEST REPORT FC05-072A

FOR THE

BASE STATION IRRIGATION CONTROL MODULE, NB-BS-01

FCC PART 90, PART 15 SUBPART B SECTIONS 15.107 AND 15.109 CLASS B & RSS-119

TESTING

DATE OF ISSUE: MARCH 5, 2009

PREPARED FOR:

The Toro Company
5825 Jasmine Street
Riverside, CA 92504

W.O. No.: 84317

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Date of test: September 29 - October 15, 2005
and March 2, 2009

Report No.: FC05-072B

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ADMINISTRATIVE INFORMATION

DATE OF TEST:	September 29 - October 15, 2005 and March 2, 2009
DATE OF RECEIPT:	September 29, 2005
FREQUENCY RANGE TESTED:	9kHz-5GHz
MANUFACTURER:	The Toro Company 5825 Jasmine Street Riverside, CA 92504
REPRESENTATIVE:	Nick Nguyen
TEST LOCATION:	CKC Laboratories, Inc. 110 Olinda Place Brea, CA 92621
TEST METHOD:	ANSI C63.4 (2003), ANSI/TIA/EIA-603-B (2002), RSS-Gen and RSS-212
PURPOSE OF TEST:	To demonstrate the compliance of the Base Station Irrigation Control Module, NB-BS-01 with the requirements for FCC Part 90, Part 15 Subpart B Sections 15.107 and 15.109 Class B & RSS-119 devices. **Addendum A** is to correct an error in the RF output power. No new testing was required. **Addendum B** is to replace the RF output power, and add new emissions mask and conducted spurious emissions data with new testing due to a calculation error at the time of the original testing.

FCC TO CANADA STANDARD CORRELATION MATRIX

Canadian Standard	Canadian Section	FCC Standard	FCC Section	Test Description
RSS119	5.5	90	90.209	Bandwidth Limitations
RSS119	5.5.1	NA	NA	Specific Requirements for Channel BW > 12.5kHz
RSS119	5.5.7	90	90.217	Exemption from technical standards
RSS119	5.7	90	90.207	Authorized Modulation Types
RSS119	5.8	NA	NA	Equivalent Channels (>12.5kHz)
RSS119	6.2	90	90.205	Power Output
RSS119	6.3	90	90.210	Spurious Emissions OATS
RSS119	6.3	90	90.210	Spurious Emissions Ant Terminal
RSS119	6.4	90	90.210	Emissions Mask
RSS119	6.5	90	90.214	Transient Freq Behavior
RSS119	6.6	2	2.1047	Modulation Limiting
RSS119	6.9	NA	NA	Data Modem Requirements
RSS119	7	90	90.213	Frequency Stability
RSS119	8	15	Subpart B	Receiver Requirements
RSS119	9	OET	65 Sup. C	RF Exposure Requirements

CONDITIONS DURING TESTING

No modifications to the EUT were necessary during testing.

APPROVALS

QUALITY ASSURANCE:

Steve Behm, Director of Engineering Services

TEST PERSONNEL:

Eddie Wong, EMC Engineer

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The customer declares the EUT tested by CKC Laboratories was representative of a production unit.

The following model was tested by CKC Laboratories: **OSMAC Base Station**

Since the time of testing the manufacturer has chosen to use the following model name in its place. Any differences between the names does not affect their EMC characteristics and therefore complies to the level of testing equivalent to the tested model name shown on the data sheets: **NB-BS-01**

EQUIPMENT UNDER TEST

Base Station Irrigation Control Module

Manuf: The Toro Company
Model: NB-BS-01
Serial: NA
FCC ID: pending

Power Supply

Manuf: UMEC
Model: UP0252A-01P
Serial: NA
FCC ID: NA

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Laptop

Manuf: Toshiba
Model: Satelite Pro
Serial: 3203365P
FCC ID: NA

TEMPERATURE AND HUMIDITY DURING TESTING
The temperature during testing was within +15°C and + 35°C.
The relative humidity was between 20% and 75%.

FCC 2.1033(c)(3) USER'S MANUAL
The necessary information is contained in a separate document.

FCC 2.1033 (c)(4) TYPE OF EMISSIONS
F3W

FCC 2.1033 (c)(5) FREQUENCY RANGE
450MHz-470MHz

FCC 2.1033 (c)(6) OPERATING POWER
2 Watts

FCC 2.1033 (c)(7) MAXIMUM POWER RATING
The maximum allowable station effective radiated power (ERP) is dependent upon the station's antenna HAAT and required service area and will be authorized in accordance with Table 2.

FCC 2.1033 (c)(8) DC VOLTAGES
The necessary information is contained in a separate document.

FCC 2.1033 (c)(9) TUNE-UP PROCEDURE
The necessary information is contained in a separate document.

FCC 2.1033(c)(10) SCHEMATICS AND CIRCUITRY DESCRIPTION
The necessary information is contained in a separate document.

FCC 2.1033(c)(11) LABEL AND PLACEMENT
The necessary information is contained in a separate document.

FCC 2.1033(c)(12) SUBMITTAL PHOTOS
The necessary information is contained in a separate document.

FCC 2.1033 (c)(13) MODULATION INFORMATION
FM

FCC 15.107 – AC CONDUCTED EMISSIONS

ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150kHz	30MHz	9kHz

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **The Toro Company**
Specification: **FCC 15.107 Class B COND [AVE]**
Work Order #: **84317** Date: 9/30/2005
Test Type: **Conducted Emissions** Time: 11:37:16 AM
Equipment: **Paging terminal for Irrigation Control** Sequence#: 5
Manufacturer: The Toro Company Tested By: E. Wong
Model: OSMAC 110V 60Hz
S/N: NA

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Paging terminal for Irrigation Control*	The Toro Company	OSMAC	NA
Power supply	UMEC	UP0252A-01P	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Toshiba	Satelite Pro	3203365P

Test Conditions / Notes:

Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm Port and Telco port are connected sections of unterminated cable. Com Port 2 is left unpopulated and service port external radio and keyboard PS2 ports are left unpopulated. EUT in receiving mode. Antenna is connected to the antenna port. Power = Idle Rx = 460MHz. 26°C, 29% relative humidity.

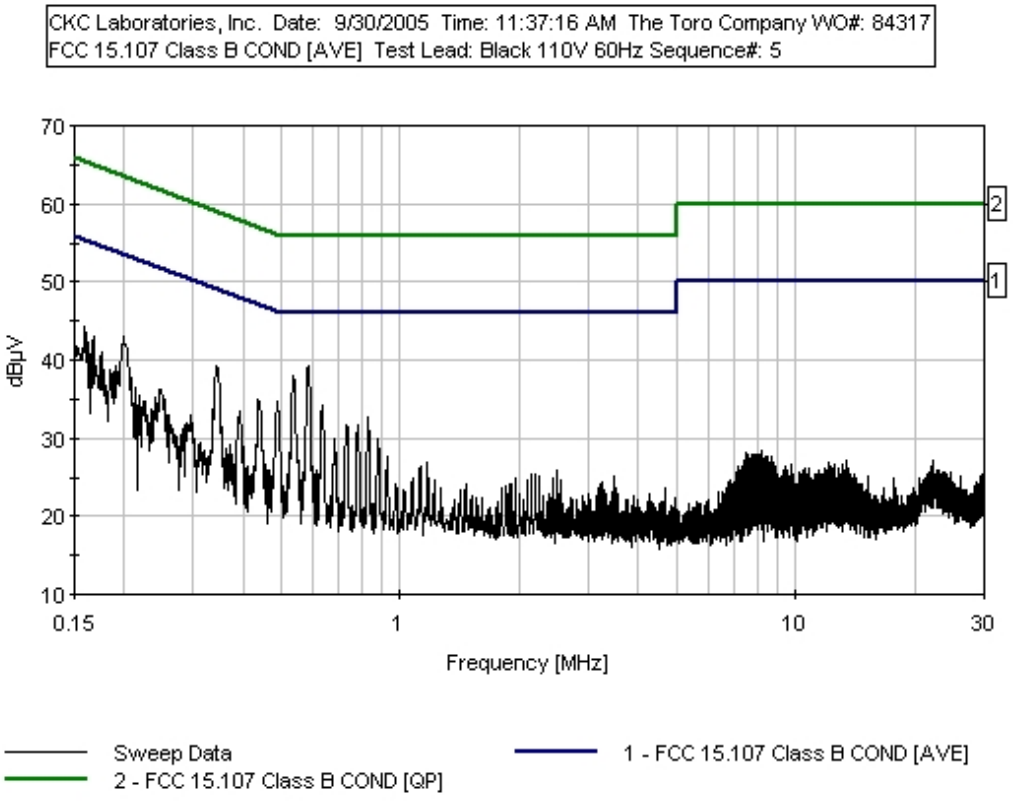
Transducer Legend:

T1=150kHz HPF 041605	T2=Cable #21 Conducted Site A 070206
T3=(L1) Insertion Loss 00847 EMCO 3816/2NM	T4=6dB Attenuator P05267 092807

Measurement Data: Reading listed by margin. Test Lead: Black

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	584.869k	33.2	+0.1	+0.1	+0.0	+5.8	+0.0	39.2	46.0	-6.8	Black
2	537.601k	32.1	+0.1	+0.1	+0.0	+5.8	+0.0	38.1	46.0	-7.9	Black
3	343.437k	33.3	+0.1	+0.0	+0.1	+5.8	+0.0	39.3	49.1	-9.8	Black
4	198.723k	36.8	+0.3	+0.0	+0.0	+5.8	+0.0	42.9	53.7	-10.8	Black

5	159.454k	35.9	+2.5	+0.0	+0.1	+5.8	+0.0	44.3	55.5	-11.2	Black
6	488.878k	28.9	+0.1	+0.0	+0.0	+5.8	+0.0	34.8	46.2	-11.4	Black
7	634.319k	28.3	+0.1	+0.1	+0.0	+5.8	+0.0	34.3	46.0	-11.7	Black
8	167.453k	35.1	+2.0	+0.0	+0.1	+5.8	+0.0	43.0	55.1	-12.1	Black
9	437.974k	28.9	+0.1	+0.0	+0.1	+5.8	+0.0	34.9	47.1	-12.2	Black
10	162.363k	34.0	+2.3	+0.0	+0.1	+5.8	+0.0	42.2	55.3	-13.1	Black
11	829.210k	26.5	+0.2	+0.1	+0.1	+5.8	+0.0	32.7	46.0	-13.3	Black
12	176.179k	33.8	+1.5	+0.0	+0.0	+5.8	+0.0	41.1	54.7	-13.6	Black
13	168.907k	33.1	+1.9	+0.0	+0.1	+5.8	+0.0	40.9	55.0	-14.1	Black
14	779.760k	25.6	+0.2	+0.1	+0.1	+5.8	+0.0	31.8	46.0	-14.2	Black
15	732.492k	25.5	+0.2	+0.1	+0.0	+5.8	+0.0	31.6	46.0	-14.4	Black



Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer:	**The Toro Company**		
Specification:	**FCC 15.107 Class B COND [AVE]**		
Work Order #:	**84317**	Date:	9/30/2005
Test Type:	**Conducted Emissions**	Time:	11:43:04 AM
Equipment:	**Paging terminal for Irrigation Control**	Sequence#:	6
Manufacturer:	The Toro Company	Tested By:	E. Wong
Model:	OSMAC		110V 60Hz
S/N:	NA		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Paging terminal for Irrigation Control*	The Toro Company	OSMAC	NA
Power supply	UMEC	UP0252A-01P	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Toshiba	Satelite Pro	3203365P

Test Conditions / Notes:

Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm port and telco ports are connected sections of unterminated cable. Com port 2 is left unpopulated and service port external radio and keyboard PS2 ports are left unpopulated. EUT in receiving mode. Antenna is connected to the antenna port. Power = Idle Rx = 460MHz. 26°C, 29% relative humidity.

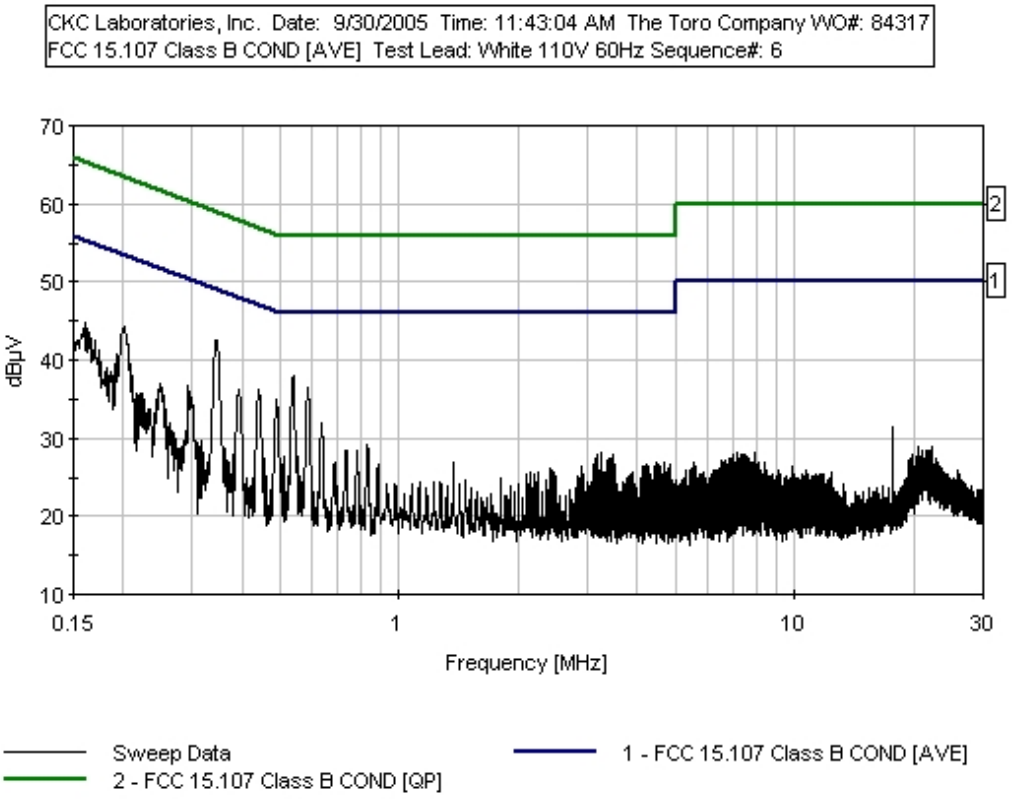
Transducer Legend:

T1=150kHz HPF 041605	T2=Cable #21 Conducted Site A 070206
T3=(L2) Insertion Loss 00847 EMCO 3816/2NM	T4=6dB Attenuator P05267 092807

Measurement Data: Reading listed by margin. Test Lead: White

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	345.618k	36.7	+0.1	+0.0	+0.0	+5.8	+0.0	42.6	49.1	-6.5	White
2	539.055k	31.9	+0.1	+0.1	+0.0	+5.8	+0.0	37.9	46.0	-8.1	White
3	201.632k	38.1	+0.2	+0.0	+0.1	+5.8	+0.0	44.2	53.5	-9.3	White
4	586.324k	30.5	+0.1	+0.1	+0.0	+5.8	+0.0	36.5	46.0	-9.5	White
5	160.181k	36.6	+2.4	+0.0	+0.1	+5.8	+0.0	44.9	55.5	-10.6	White
6	441.610k	30.2	+0.1	+0.0	+0.0	+5.8	+0.0	36.1	47.0	-10.9	White
7	489.605k	29.0	+0.1	+0.0	+0.0	+5.8	+0.0	34.9	46.2	-11.3	White
8	392.160k	30.2	+0.1	+0.0	+0.0	+5.8	+0.0	36.1	48.0	-11.9	White
9	166.726k	34.9	+2.0	+0.0	+0.1	+5.8	+0.0	42.8	55.1	-12.3	White

10	293.260k	30.8	+0.2	+0.0	+0.0	+5.8	+0.0	36.8	50.4	-13.6	White
11	635.774k	25.9	+0.1	+0.1	+0.0	+5.8	+0.0	31.9	46.0	-14.1	White
12	248.900k	30.9	+0.2	+0.0	+0.0	+5.8	+0.0	36.9	51.8	-14.9	White
13	212.540k	31.9	+0.2	+0.0	+0.1	+5.8	+0.0	38.0	53.1	-15.1	White
14	831.392k	23.0	+0.2	+0.1	+0.1	+5.8	+0.0	29.2	46.0	-16.8	White
15	220.539k	29.6	+0.2	+0.0	+0.1	+5.8	+0.0	35.7	52.8	-17.1	White



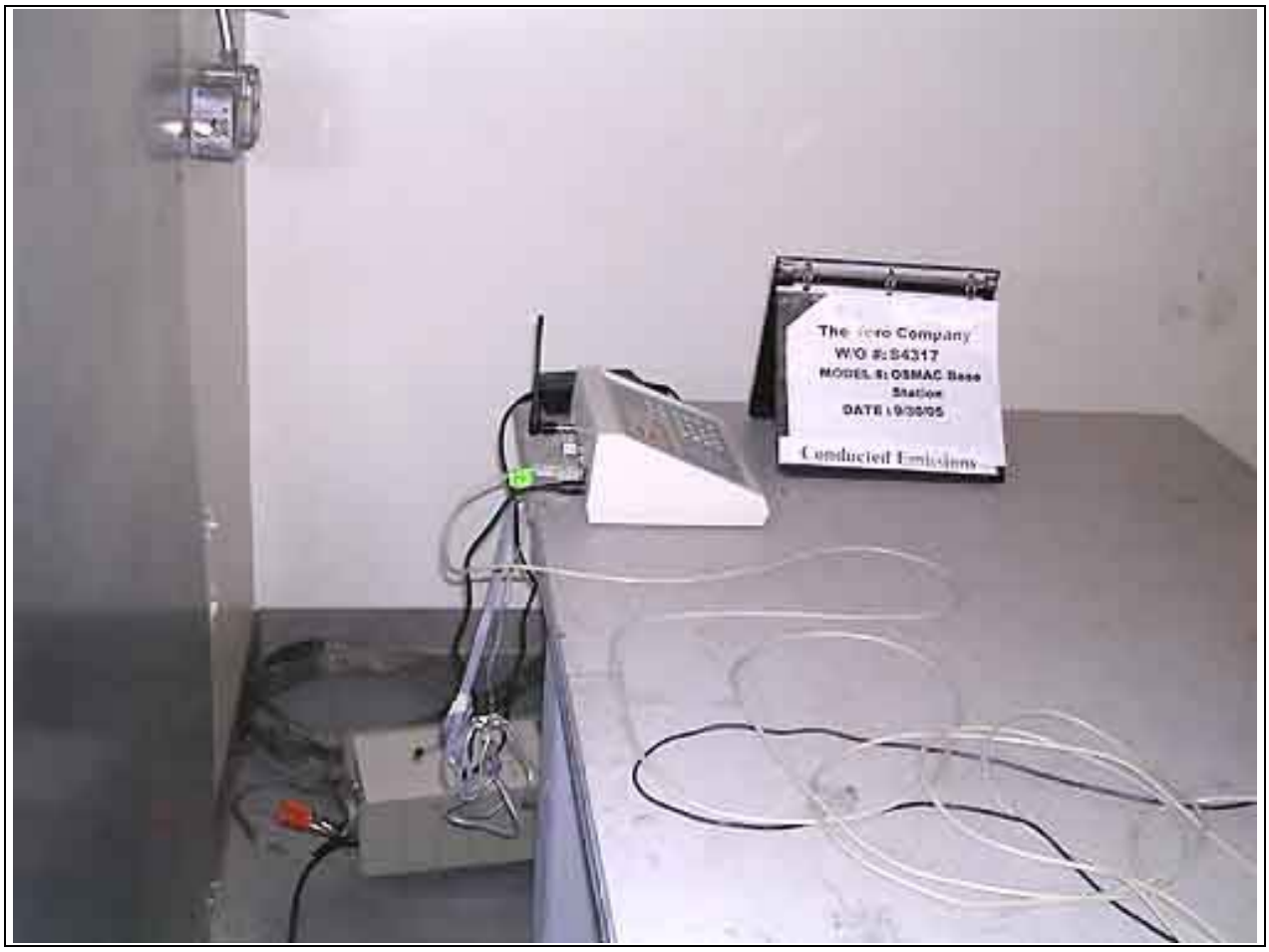
Conducted Emissions

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407
Conducted Cable	04358	Harbour Ind	RG142	Cable # 21	070204	070206
150kHZ HPF	02610	TTE	HB9615-150k-50-720	G7755	041606	041606
LISN	00847	EMCO	3816/2NM	1104	120804	120806
6dB Attenuator	P05267	Weinschel	18W	(none)	092805	092807

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS

Mains Conducted Emissions - Front View

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



Mains Conducted Emissions - Back View

FCC 15.109 – RADIATED EMISSIONS

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer:	**The Toro Company**		
Specification:	**FCC 15.109 Class B**		
Work Order #:	**84317**	Date:	9/30/2005
Test Type:	**Radiated Scan**	Time:	08:45:06
Equipment:	**Paging terminal for Irrigation Control**	Sequence#:	2
Manufacturer:	The Toro Company	Tested By:	E. Wong
Model:	OSMAC		
S/N:	NA		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Paging terminal for Irrigation Control*	The Toro Company	OSMAC	NA
Power supply	UMEC	UP0252A-01P	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Toshiba	Satelite Pro	3203365P

Test Conditions / Notes:

Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm port and telco ports are connected sections of unterminated cable. Com port 2 is left unpopulated and service port External radio and keyboard PS2 ports are left unpopulated. EUT in receiving mode. Antenna is connected to the antenna port. Power = Idle Rx = 450MHz. Frequency range of measurement = 30MHz-5GHz. 30MHz-1000MHz; RBW=120kHz, VBW=120kHz, 1000MHz-5000 MHz; RBW=1MHz, VBW=1MHz. 110VAC, 60 Hz, 26°C, 29% relative humidity.

Transducer Legend:

T1=Bilog 2451 080107	T2=Cable #10 051606
T3=Cable #15, Site A, 010306	T4=Preamp 8447D 071406

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	720.007M	42.6	+21.5	+0.5	+5.3	-26.9	+0.0	43.0	46.0	-3.0	Vert
2	671.990M QP	43.3	+20.4	+0.5	+5.1	-27.0	+0.0	42.3	46.0	-3.7	Vert
^	671.990M	44.3	+20.4	+0.5	+5.1	-27.0	+0.0	43.3	46.0	-2.7	Vert
4	360.010M QP	50.5	+14.8	+0.3	+3.6	-27.6	+0.0	41.6	46.0	-4.4	Horiz
^	360.003M	51.9	+14.8	+0.3	+3.6	-27.6	+0.0	43.0	46.0	-3.0	Horiz
6	551.992M	43.6	+20.7	+0.5	+4.5	-27.8	+0.0	41.5	46.0	-4.5	Vert
7	671.988M	42.1	+20.4	+0.5	+5.1	-27.0	+0.0	41.1	46.0	-4.9	Horiz

8	480.003M	45.4	+17.5	+0.4	+4.2	-27.7	+0.0	39.8	46.0	-6.2	Horiz
9	911.985M	35.5	+24.4	+0.6	+6.0	-27.2	+0.0	39.3	46.0	-6.7	Vert
10	42.104M	47.9	+11.8	+0.1	+1.1	-27.7	+0.0	33.2	40.0	-6.8	Horiz
11	623.973M	40.8	+19.9	+0.5	+4.9	-27.1	+0.0	39.0	46.0	-7.0	Vert
12	503.998M	43.7	+18.2	+0.4	+4.3	-27.6	+0.0	39.0	46.0	-7.0	Vert
13	648.000M QP	40.2	+20.2	+0.5	+5.0	-27.1	+0.0	38.8	46.0	-7.2	Horiz
^	648.000M	45.5	+20.2	+0.5	+5.0	-27.1	+0.0	44.1	46.0	-1.9	Horiz
15	696.012M	38.8	+20.6	+0.5	+5.2	-26.9	+0.0	38.2	46.0	-7.8	Vert
16	456.003M	44.2	+17.0	+0.3	+4.0	-27.8	+0.0	37.7	46.0	-8.3	Horiz
17	791.993M	35.9	+22.2	+0.6	+5.6	-26.9	+0.0	37.4	46.0	-8.6	Vert
18	768.020M	35.7	+22.5	+0.5	+5.5	-26.8	+0.0	37.4	46.0	-8.6	Vert
19	695.993M	37.9	+20.6	+0.5	+5.2	-26.9	+0.0	37.3	46.0	-8.7	Horiz
20	479.980M	42.9	+17.5	+0.4	+4.2	-27.7	+0.0	37.3	46.0	-8.7	Horiz
21	504.000M	41.9	+18.2	+0.4	+4.3	-27.6	+0.0	37.2	46.0	-8.8	Horiz
22	552.019M	38.6	+20.7	+0.5	+4.5	-27.8	+0.0	36.5	46.0	-9.5	Horiz
23	839.988M	33.2	+23.5	+0.6	+5.8	-26.9	+0.0	36.2	46.0	-9.8	Vert
24	121.711M	47.7	+11.1	+0.1	+2.0	-27.6	+0.0	33.3	43.5	-10.2	Horiz
25	703.500M	36.0	+20.8	+0.5	+5.2	-26.9	+0.0	35.6	46.0	-10.4	Horiz
26	799.500M	33.7	+22.1	+0.6	+5.6	-26.9	+0.0	35.1	46.0	-10.9	Horiz
27	120.970M	46.9	+11.1	+0.1	+2.0	-27.6	+0.0	32.5	43.5	-11.0	Horiz
28	703.470M	35.3	+20.8	+0.5	+5.2	-26.9	+0.0	34.9	46.0	-11.1	Horiz
29	432.030M	41.7	+16.6	+0.3	+3.9	-27.7	+0.0	34.8	46.0	-11.2	Vert
30	408.003M	42.0	+16.2	+0.3	+3.8	-27.5	+0.0	34.8	46.0	-11.2	Vert
31	192.000M	48.8	+8.2	+0.2	+2.6	-27.6	+0.0	32.2	43.5	-11.3	Horiz

32	288.007M	45.9	+12.8	+0.3	+3.2	-27.6	+0.0	34.6	46.0	-11.4	Horiz
33	703.520M	34.4	+20.8	+0.5	+5.2	-26.9	+0.0	34.0	46.0	-12.0	Horiz
34	703.480M	34.2	+20.8	+0.5	+5.2	-26.9	+0.0	33.8	46.0	-12.2	Horiz
35	118.720M	45.8	+11.0	+0.1	+2.0	-27.6	+0.0	31.3	43.5	-12.2	Horiz
36	704.321M	34.2	+20.8	+0.5	+5.2	-26.9	+0.0	33.8	46.0	-12.2	Vert
37	239.990M	47.0	+11.2	+0.2	+2.9	-27.5	+0.0	33.8	46.0	-12.2	Vert
38	408.022M	40.9	+16.2	+0.3	+3.8	-27.5	+0.0	33.7	46.0	-12.3	Horiz
39	384.025M	41.3	+15.6	+0.3	+3.7	-27.5	+0.0	33.4	46.0	-12.6	Horiz
40	264.012M	44.9	+12.3	+0.3	+3.1	-27.6	+0.0	33.0	46.0	-13.0	Horiz
41	150.005M	45.1	+10.5	+0.2	+2.2	-27.6	+0.0	30.4	43.5	-13.1	Vert
42	479.990M	38.3	+17.5	+0.4	+4.2	-27.7	+0.0	32.7	46.0	-13.3	Vert
43	432.013M	39.5	+16.6	+0.3	+3.9	-27.7	+0.0	32.6	46.0	-13.4	Horiz
44	122.858M	43.9	+11.2	+0.1	+2.0	-27.6	+0.0	29.6	43.5	-13.9	Vert
45	118.326M	44.0	+11.0	+0.1	+2.0	-27.6	+0.0	29.5	43.5	-14.0	Vert
46	960.012M	34.1	+25.8	+0.6	+6.2	-27.0	+0.0	39.7	54.0	-14.3	Vert
47	377.983M	39.5	+15.4	+0.3	+3.7	-27.5	+0.0	31.4	46.0	-14.6	Horiz
48	192.007M	45.2	+8.2	+0.2	+2.6	-27.6	+0.0	28.6	43.5	-14.9	Vert
49	160.609M	43.0	+10.1	+0.2	+2.3	-27.6	+0.0	28.0	43.5	-15.5	Horiz
50	113.230M	42.9	+10.7	+0.1	+1.9	-27.6	+0.0	28.0	43.5	-15.5	Horiz
51	287.997M	41.7	+12.8	+0.3	+3.2	-27.6	+0.0	30.4	46.0	-15.6	Vert
52	122.110M	42.1	+11.1	+0.1	+2.0	-27.6	+0.0	27.7	43.5	-15.8	Vert
53	128.800M	41.6	+11.2	+0.1	+2.0	-27.6	+0.0	27.3	43.5	-16.2	Horiz
54	336.010M	39.6	+14.0	+0.3	+3.5	-27.6	+0.0	29.8	46.0	-16.2	Vert
55	126.723M	41.5	+11.2	+0.1	+2.0	-27.6	+0.0	27.2	43.5	-16.3	Vert

56	184.453M	43.4	+8.6	+0.2	+2.5	-27.6	+0.0	27.1	43.5	-16.4	Horiz
57	184.317M	43.3	+8.6	+0.2	+2.5	-27.6	+0.0	27.0	43.5	-16.5	Vert
58	109.359M	41.9	+10.5	+0.1	+1.9	-27.6	+0.0	26.8	43.5	-16.7	Vert
59	363.599M	37.9	+14.9	+0.3	+3.6	-27.5	+0.0	29.2	46.0	-16.8	Horiz
60	164.814M	41.9	+9.8	+0.2	+2.4	-27.6	+0.0	26.7	43.5	-16.8	Horiz
61	110.074M	41.7	+10.5	+0.1	+1.9	-27.6	+0.0	26.6	43.5	-16.9	Horiz
62	502.968M	33.7	+18.2	+0.4	+4.3	-27.6	+0.0	29.0	46.0	-17.0	Vert
63	369.689M	37.2	+15.1	+0.3	+3.6	-27.5	+0.0	28.7	46.0	-17.3	Horiz
64	263.992M	40.6	+12.3	+0.3	+3.1	-27.6	+0.0	28.7	46.0	-17.3	Vert
65	272.003M	40.3	+12.5	+0.3	+3.1	-27.7	+0.0	28.5	46.0	-17.5	Horiz
66	263.992M	40.3	+12.3	+0.3	+3.1	-27.6	+0.0	28.4	46.0	-17.6	Vert
67	415.992M	35.3	+16.3	+0.3	+3.8	-27.5	+0.0	28.2	46.0	-17.8	Horiz
68	109.363M	40.8	+10.5	+0.1	+1.9	-27.6	+0.0	25.7	43.5	-17.8	Horiz
69	169.990M	41.3	+9.4	+0.2	+2.4	-27.6	+0.0	25.7	43.5	-17.8	Vert
70	159.185M	40.3	+10.2	+0.2	+2.3	-27.6	+0.0	25.4	43.5	-18.1	Horiz
71	174.829M	41.3	+9.0	+0.2	+2.5	-27.6	+0.0	25.4	43.5	-18.1	Vert
72	205.596M	41.3	+8.2	+0.2	+2.6	-27.6	+0.0	24.7	43.5	-18.8	Vert
73	367.510M	35.7	+15.0	+0.3	+3.6	-27.5	+0.0	27.1	46.0	-18.9	Vert
74	111.693M	39.5	+10.6	+0.1	+1.9	-27.6	+0.0	24.5	43.5	-19.0	Horiz
75	257.034M	38.9	+12.2	+0.2	+3.0	-27.6	+0.0	26.7	46.0	-19.3	Horiz
76	273.908M	38.2	+12.5	+0.3	+3.1	-27.7	+0.0	26.4	46.0	-19.6	Horiz
77	311.985M	36.9	+13.4	+0.3	+3.3	-27.5	+0.0	26.4	46.0	-19.6	Vert
78	213.636M	39.5	+9.0	+0.2	+2.7	-27.6	+0.0	23.8	43.5	-19.7	Vert
79	179.215M	39.4	+8.9	+0.2	+2.5	-27.6	+0.0	23.4	43.5	-20.1	Vert

80	216.005M	41.2	+9.2	+0.2	+2.7	-27.6	+0.0	25.7	46.0	-20.3	Vert
81	208.517M	39.0	+8.5	+0.2	+2.6	-27.6	+0.0	22.7	43.5	-20.8	Vert
82	86.063M	37.0	+8.1	+0.1	+1.6	-27.7	+0.0	19.1	40.0	-20.9	Horiz
83	363.970M	33.8	+14.9	+0.3	+3.6	-27.5	+0.0	25.1	46.0	-20.9	Vert
84	358.361M	34.1	+14.7	+0.3	+3.6	-27.6	+0.0	25.1	46.0	-20.9	Vert
85	169.264M	38.1	+9.4	+0.2	+2.4	-27.6	+0.0	22.5	43.5	-21.0	Horiz
86	308.408M	35.5	+13.3	+0.3	+3.3	-27.5	+0.0	24.9	46.0	-21.1	Horiz
87	302.672M	35.6	+13.1	+0.3	+3.2	-27.5	+0.0	24.7	46.0	-21.3	Horiz
88	347.481M	33.7	+14.3	+0.3	+3.6	-27.6	+0.0	24.3	46.0	-21.7	Horiz
89	315.008M	34.7	+13.4	+0.3	+3.3	-27.5	+0.0	24.2	46.0	-21.8	Horiz
90	247.977M	35.8	+11.8	+0.2	+3.0	-27.5	+0.0	23.3	46.0	-22.7	Horiz
91	293.598M	34.3	+12.9	+0.3	+3.2	-27.5	+0.0	23.2	46.0	-22.8	Horiz
92	195.074M	37.5	+8.0	+0.2	+2.6	-27.6	+0.0	20.7	43.5	-22.8	Vert
93	297.040M	33.6	+12.9	+0.3	+3.2	-27.5	+0.0	22.5	46.0	-23.5	Vert
94	222.548M	35.8	+9.8	+0.2	+2.7	-27.6	+0.0	20.9	46.0	-25.1	Vert

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer: **The Toro Company**
Specification: **FCC 15.109 Class B**
Work Order #: **84317** Date: 9/30/2005
Test Type: **Radiated Scan** Time: 09:41:54
Equipment: **Paging terminal for Irrigation Control** Sequence#: 3
Manufacturer: The Toro Company Tested By: E. Wong
Model: OSMAC
S/N: NA

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Paging terminal for Irrigation Control*	The Toro Company	OSMAC	NA
Power supply	UMEC	UP0252A-01P	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Toshiba	Satelite Pro	3203365P

Test Conditions / Notes:

Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm port and telco ports are connected sections of unterminated cable. Com port 2 is left unpopulated and service port external radio and keyboard PS2 ports are left unpopulated. EUT in Receiving mode. Antenna is connected to the antenna port. Power = Idle Rx = 460MHz. Frequency range of measurement = 30MHz - 5GHz. 30MHz-1000MHz; RBW=120kHz, VBW=120kHz, 1000MHz-5000MHz; RBW=1MHz, VBW=1MHz. 110VAC, 60 Hz, 26°C, 29% relative humidity.

Transducer Legend:

T1=Bilog 2451 080107	T2=Cable #10 051606
T3=Cable #15, Site A, 010306	T4=Preamp 8447D 071406

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	911.998M	36.8	+24.4	+0.6	+6.0	-27.2	+0.0	40.6	46.0	-5.4	Vert
2	815.993M	38.4	+22.7	+0.6	+5.7	-26.9	+0.0	40.5	46.0	-5.5	Horiz
3	109.540M	53.1	+10.5	+0.1	+1.9	-27.6	+0.0	38.0	43.5	-5.5	Vert
4	864.010M QP	37.0	+23.9	+0.6	+5.9	-27.0	+0.0	40.4	46.0	-5.6	Horiz
^	864.010M	38.3	+23.9	+0.6	+5.9	-27.0	+0.0	41.7	46.0	-4.3	Horiz
6	99.686M	53.7	+9.9	+0.1	+1.8	-27.6	+0.0	37.9	43.5	-5.6	Vert
7	791.997M	38.3	+22.2	+0.6	+5.6	-26.9	+0.0	39.8	46.0	-6.2	Horiz
8	696.000M	40.4	+20.6	+0.5	+5.2	-26.9	+0.0	39.8	46.0	-6.2	Horiz

9	959.992M	33.8	+25.8	+0.6	+6.2	-27.0	+0.0	39.4	46.0	-6.6	Vert
10	912.010M QP	35.5	+24.4	+0.6	+6.0	-27.2	+0.0	39.3	46.0	-6.7	Horiz
^	912.010M	37.6	+24.4	+0.6	+6.0	-27.2	+0.0	41.4	46.0	-4.6	Horiz
12	53.343M	52.5	+6.6	+0.1	+1.2	-27.7	+0.0	32.7	40.0	-7.3	Vert
13	46.212M	49.4	+9.7	+0.1	+1.2	-27.7	+0.0	32.7	40.0	-7.3	Vert
14	840.000M	35.0	+23.5	+0.6	+5.8	-26.9	+0.0	38.0	46.0	-8.0	Vert
15	840.015M	34.2	+23.5	+0.6	+5.8	-26.9	+0.0	37.2	46.0	-8.8	Horiz
16	127.591M	48.9	+11.2	+0.1	+2.0	-27.6	+0.0	34.6	43.5	-8.9	Vert
17	87.515M	48.6	+8.3	+0.1	+1.6	-27.7	+0.0	30.9	40.0	-9.1	Vert
18	62.914M	52.0	+4.9	+0.1	+1.4	-27.7	+0.0	30.7	40.0	-9.3	Vert
19	504.017M	40.7	+18.2	+0.4	+4.3	-27.6	+0.0	36.0	46.0	-10.0	Vert
20	64.503M	51.1	+5.0	+0.1	+1.4	-27.7	+0.0	29.9	40.0	-10.1	Vert
21	124.368M	47.6	+11.2	+0.1	+2.0	-27.6	+0.0	33.3	43.5	-10.2	Vert
22	108.703M	48.4	+10.4	+0.1	+1.9	-27.6	+0.0	33.2	43.5	-10.3	Vert
23	791.997M	34.0	+22.2	+0.6	+5.6	-26.9	+0.0	35.5	46.0	-10.5	Vert
24	61.217M	50.8	+4.8	+0.1	+1.3	-27.7	+0.0	29.3	40.0	-10.7	Vert
25	119.353M	46.7	+11.1	+0.1	+2.0	-27.6	+0.0	32.3	43.5	-11.2	Vert
26	408.002M	41.4	+16.2	+0.3	+3.8	-27.5	+0.0	34.2	46.0	-11.8	Horiz
27	960.008M	35.9	+25.8	+0.6	+6.2	-27.0	+0.0	41.5	54.0	-12.5	Horiz
28	960.008M	35.7	+25.8	+0.6	+6.2	-27.0	+0.0	41.3	54.0	-12.7	Horiz
29	122.341M	44.7	+11.1	+0.1	+2.0	-27.6	+0.0	30.3	43.5	-13.2	Vert
30	407.990M	39.9	+16.2	+0.3	+3.8	-27.5	+0.0	32.7	46.0	-13.3	Vert
31	84.780M	43.7	+7.9	+0.1	+1.6	-27.7	+0.0	25.6	40.0	-14.4	Vert

32	111.093M	42.3	+10.6	+0.1	+1.9	-27.6	+0.0	27.3	43.5	-16.2	Vert
33	124.433M	41.1	+11.2	+0.1	+2.0	-27.6	+0.0	26.8	43.5	-16.7	Horiz
34	312.033M	39.0	+13.4	+0.3	+3.3	-27.5	+0.0	28.5	46.0	-17.5	Horiz
35	264.017M	40.3	+12.3	+0.3	+3.1	-27.6	+0.0	28.4	46.0	-17.6	Vert
36	193.275M	40.5	+8.1	+0.2	+2.6	-27.6	+0.0	23.8	43.5	-19.7	Horiz

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer:	**The Toro Company**		
Specification:	**FCC 15.109 Class B**		
Work Order #:	**84317**	Date:	9/30/2005
Test Type:	**Radiated Scan**	Time:	10:19:36
Equipment:	**Paging terminal for Irrigation Control**	Sequence#:	4
Manufacturer:	The Toro Company	Tested By:	E. Wong
Model:	OSMAC		
S/N:	NA		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Paging terminal for Irrigation Control*	The Toro Company	OSMAC	NA
Power supply	UMEC	UP0252A-01P	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Toshiba	Satelite Pro	3203365P

Test Conditions / Notes:

Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm port and telco ports are connected sections of unterminated cable. Com port 2 is left unpopulated and service port External radio and keyboard PS2 ports are left unpopulated. EUT in Receiving mode. Antenna is connected to the antenna port. Power = Idle Rx = 470MHz. Frequency range of measurement = 30MHz-5GHz. 30MHz-1000MHz; RBW=120kHz, VBW=120kHz, 1000MHz-5000MHz; RBW=1MHz, VBW=1MHz. 110VAC, 60 Hz, 26°C, 29% relative humidity.

Transducer Legend:

T1=Bilog 2451 080107	T2=Cable #10 051606
T3=Cable #15, Site A, 010306	T4=Preamp 8447D 071406
T5=----------	T6=Cable #20 48ft Heliax 091606
T7=Horn 6246_072206	T8=HP 83017A 071606
T9=SMA Cable 1-40GHz AN2604_012306	

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	911.991M	36.5	+24.4	+0.6	+6.0	-27.2	+0.0	40.3	46.0	-5.7	Horiz
2	816.008M	36.9	+22.7	+0.6	+5.7	-26.9	+0.0	39.0	46.0	-7.0	Vert
3	791.998M	37.4	+22.2	+0.6	+5.6	-26.9	+0.0	38.9	46.0	-7.1	Horiz

4	552.003M	41.0	+20.7	+0.5	+4.5	-27.8	+0.0	38.9	46.0	-7.1	Vert
5	815.996M	36.7	+22.7	+0.6	+5.7	-26.9	+0.0	38.8	46.0	-7.2	Horiz
6	128.867M	48.4	+11.2	+0.1	+2.0	-27.6	+0.0	34.1	43.5	-9.4	Vert
7	792.017M	34.9	+22.2	+0.6	+5.6	-26.9	+0.0	36.4	46.0	-9.6	Vert
8	839.983M	32.8	+23.5	+0.6	+5.8	-26.9	+0.0	35.8	46.0	-10.2	Horiz
9	288.000M	45.5	+12.8	+0.3	+3.2	-27.6	+0.0	34.2	46.0	-11.8	Horiz
10	182.125M	45.8	+8.8	+0.2	+2.5	-27.6	+0.0	29.7	43.5	-13.8	Horiz
11	432.008M	38.1	+16.6	+0.3	+3.9	-27.7	+0.0	31.2	46.0	-14.8	Vert
12	960.003M	33.5	+25.8	+0.6	+6.2	-27.0	+0.0	39.1	54.0	-14.9	Vert
13	288.017M	40.1	+12.8	+0.3	+3.2	-27.6	+0.0	28.8	46.0	-17.2	Vert
14	312.025M	37.8	+13.4	+0.3	+3.3	-27.5	+0.0	27.3	46.0	-18.7	Vert
15	164.150M	38.0	+9.9	+0.2	+2.4	-27.6	+0.0	22.9	43.5	-20.6	Vert
16	227.383M	33.5	+10.2	+0.2	+2.7	-27.6	+0.0	19.0	46.0	-27.0	Vert

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407
30-1000MHz						
Biconilog Antenna	01995	Chase	CBL6111C	2451	080105	080107
Pre-amp	00309	HP	8447D	1937A02548	071404	071406
Antenna cable	NA	NA	RG214	Cable#15	010305	010306
Pre-amp to SA cable	NA	Pasternack	RG223/U	Cable#10	051605	051606
1000-5000MHz						
Horn Antenna	0849	EMCO	3115	6246	072204	072206
Microwave Pre-amp	00786	HP	83017A	3123A00281	081204	081206
Heliax Antenna cable	NA	Andrew	LDF1-50	Cable#20	091604	091606
24" SMA Cable	2604	Argosy	UFA147A	0-0360-200200	012304	012306

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Back View

PHOTOGRAPH SHOWING RADIATED EMISSIONS

Radiated Emissions - Back View Loop Antenna

FCC 2.1033(c)(14)/2.1046/90.205 - RF POWER OUTPUT

FCC 90.205 RF Power Output.

(h) 450-470 MHz.
(1) The maximum allowable station effective radiated power (ERP) is dependent upon the station's antenna HAAT and required service area and will be authorized in accordance with Table 2. Applicants requesting an ERP in excess of that listed in Table 2 must submit an engineering analysis based upon generally accepted engineering practices and standards that include coverage contours to demonstrate that the requested station parameters will not produce coverage in excess of that which the applicant requires.

ERP

Setup: Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm Port and Telco port are connected sections of unterminated cable. Com Port 2 is left unpopulated and service port External radio is left unpopulated. With Transmitting antenna connected, the ERP was measure.

Frequency	ERP	ERP
450 MHz	16.0 dBm.	0.0398 watt
460 MHz	16.3 dBm	0.0427 watt
470 MHz	16.5 dBm	0.0447 watt

Conducted RF output power

Setup: Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm Port and Telco port are connected sections of unterminated cable. Com Port 2 is left unpopulated and service port External radio is left unpopulated. RF output power measured at the RF output power with a RF Power Meter.

Frequency	RF output power	
450 MHz	33.00 dBm	2.0 W
460MHZ	32.68dBm	1.9 W
470 MHz	32.65dBm	1.8 W

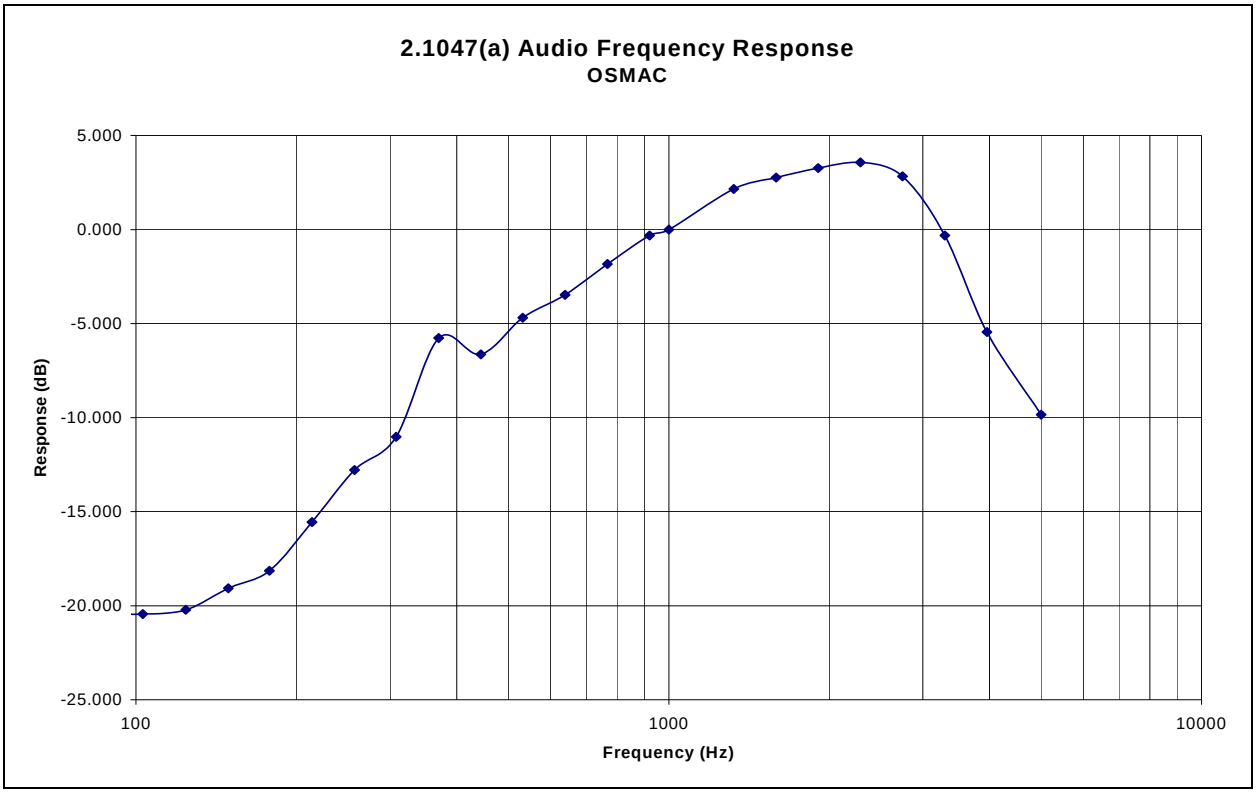
Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
RF Power meter	02778	HP	EPM-441A	GB37170458	021508	021510
Power Sensor	02777	HP	E4412A	MY41499662	021508	021510

Test Setup Photo

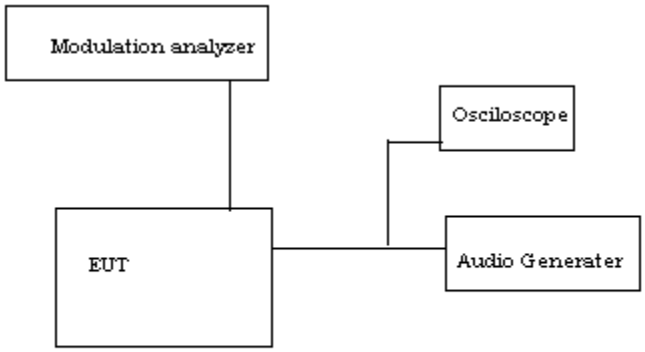
FCC 2.1033(c)(14)/2.1047(a) - MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE

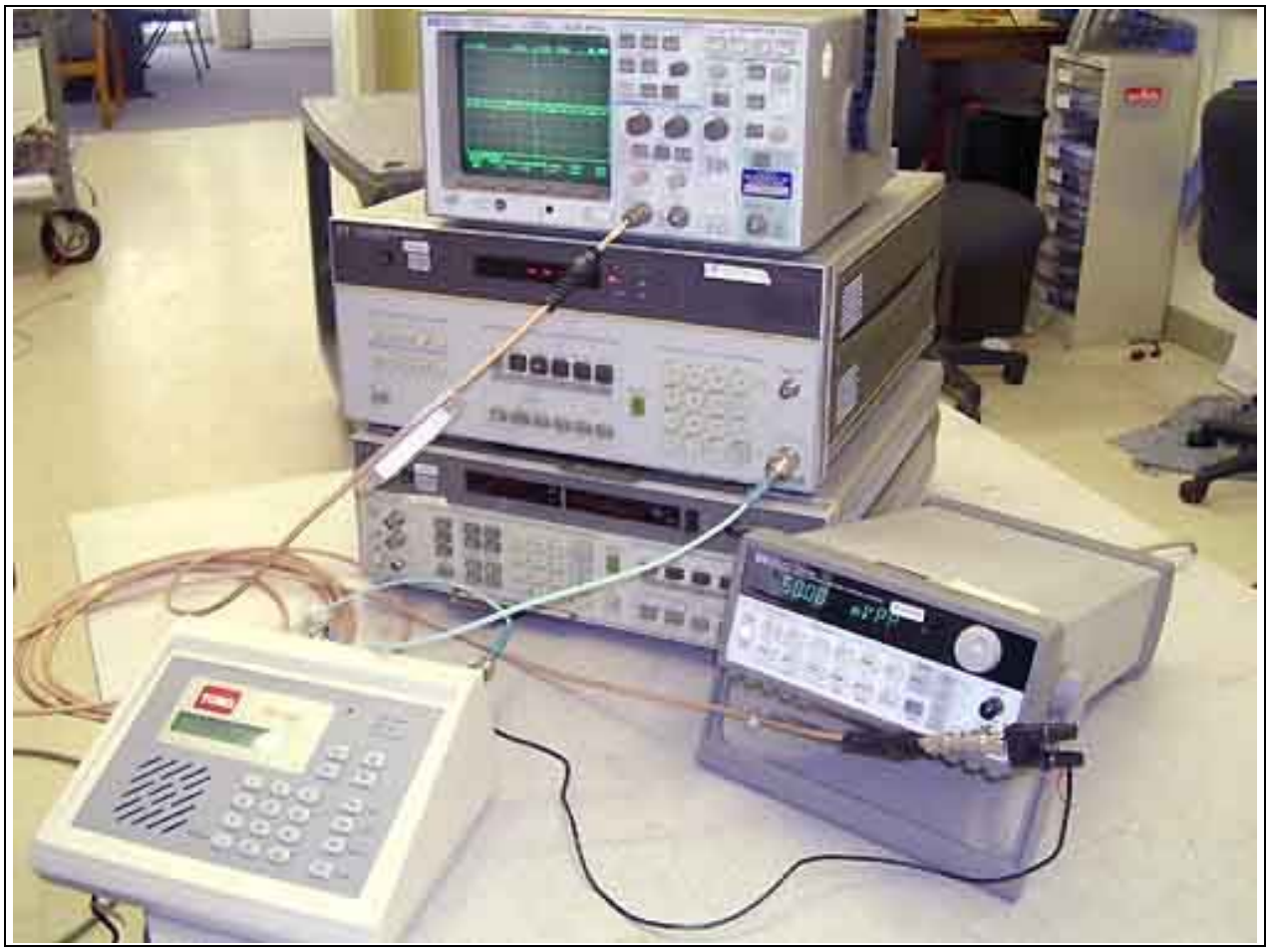
Test Conditions: The test setup is in accordance with TIA/EIA 603 2.2.6.2.2 Constant Input Method. The EUT is functioning normally. EUT is powered by an external DC power source for consistency. The Audio Frequency response curve is plotted from 100 Hz to 5000Hz.



Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Oscilloscope	00320	HP	54615B	US354208264	081204	081206
Function Generator	00838	HP	33120A	US36023090	011905	011907
Analyzer, Modulation	02072	HP	8901A	2751A05181	102504	102506

Test Setup Diagram

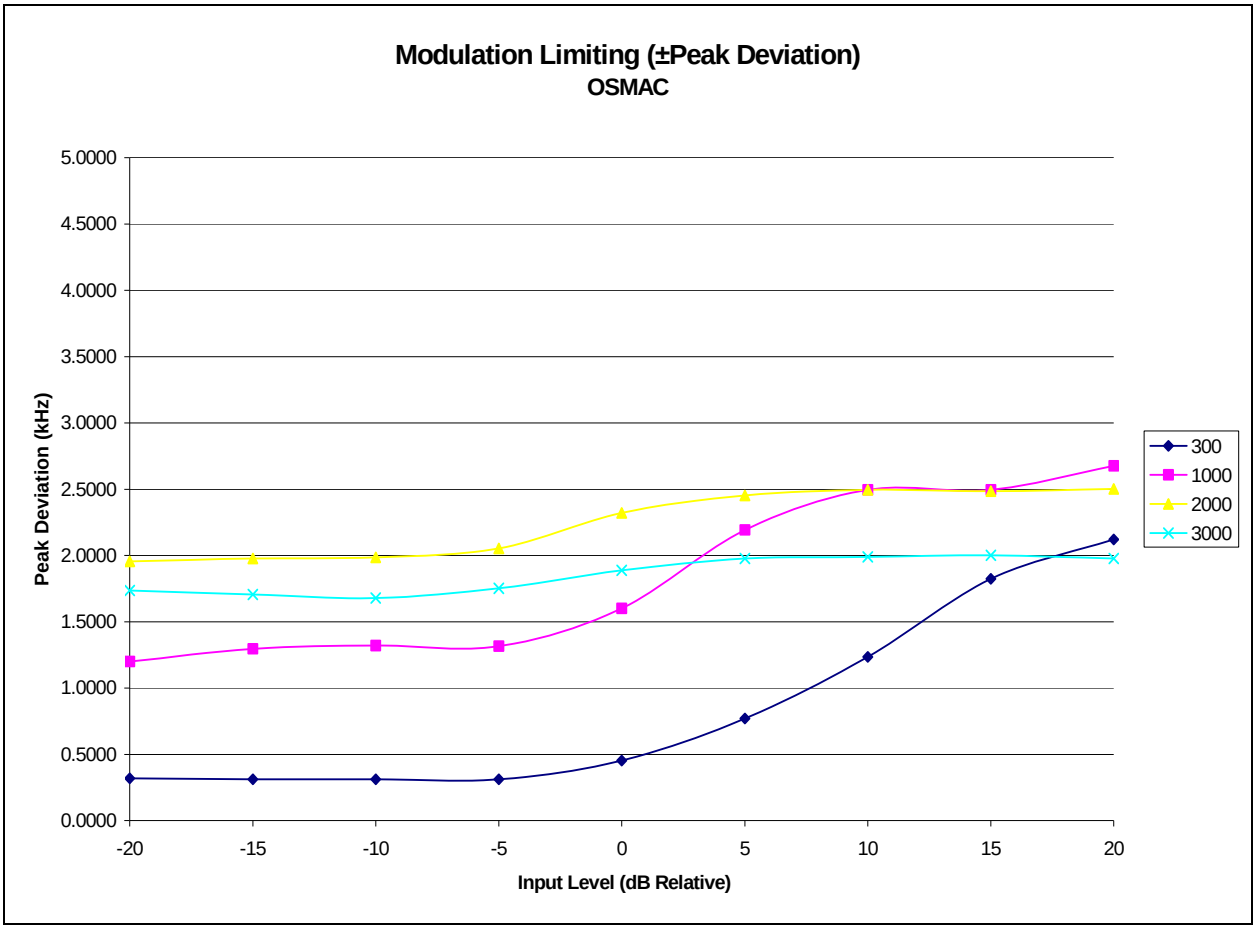




Audio Frequency Response Modulation Limit

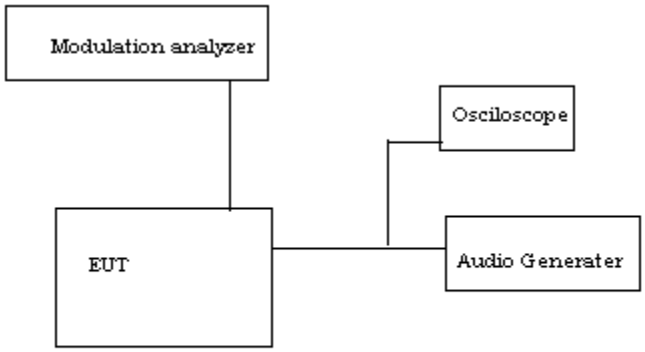
FCC 2.1033(c)(14)/2.1047(b) MODULATION CHARACTERISTICS– Modulation Limiting Response

Test Conditions: The test setup is in accordance with TIA/EIA 603. The EUT is functioning normally. EUT is powered by an external DC power source for consistency. A family of curves is plotted as a function of input modulation relative to 60% of the manufacturer's declared maximum system deviation. The frequencies chosen are 500Hz, 1kHz, 2kHz and 3kHz.



Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Oscilloscope	00320	HP	54615B	US354208264	081204	081206
Function Generator	00838	HP	33120A	US36023090	011905	011907
Analyzer, Modulation	02072	HP	8901A	2751A05181	102504	102506

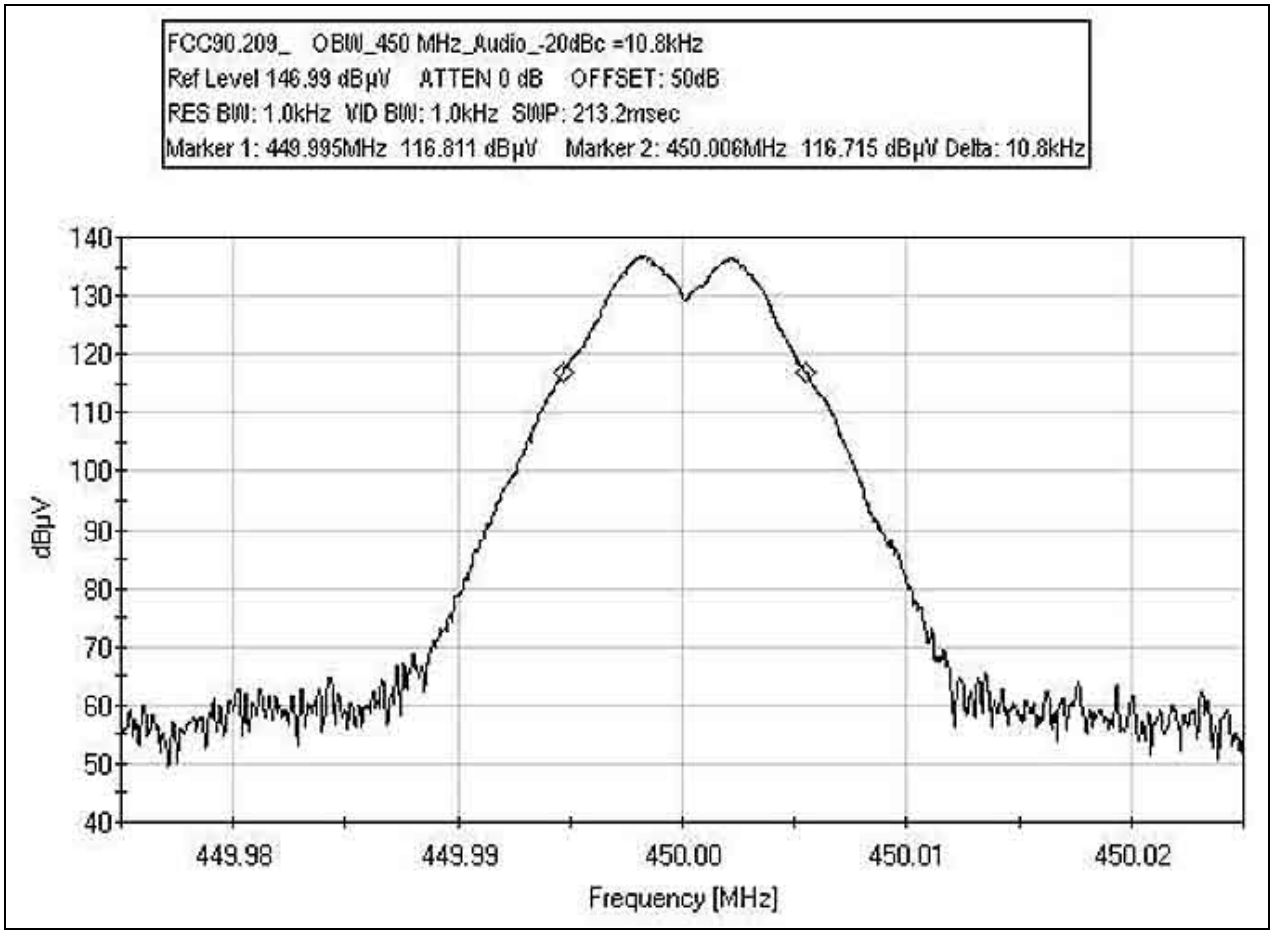
Test Setup Diagram



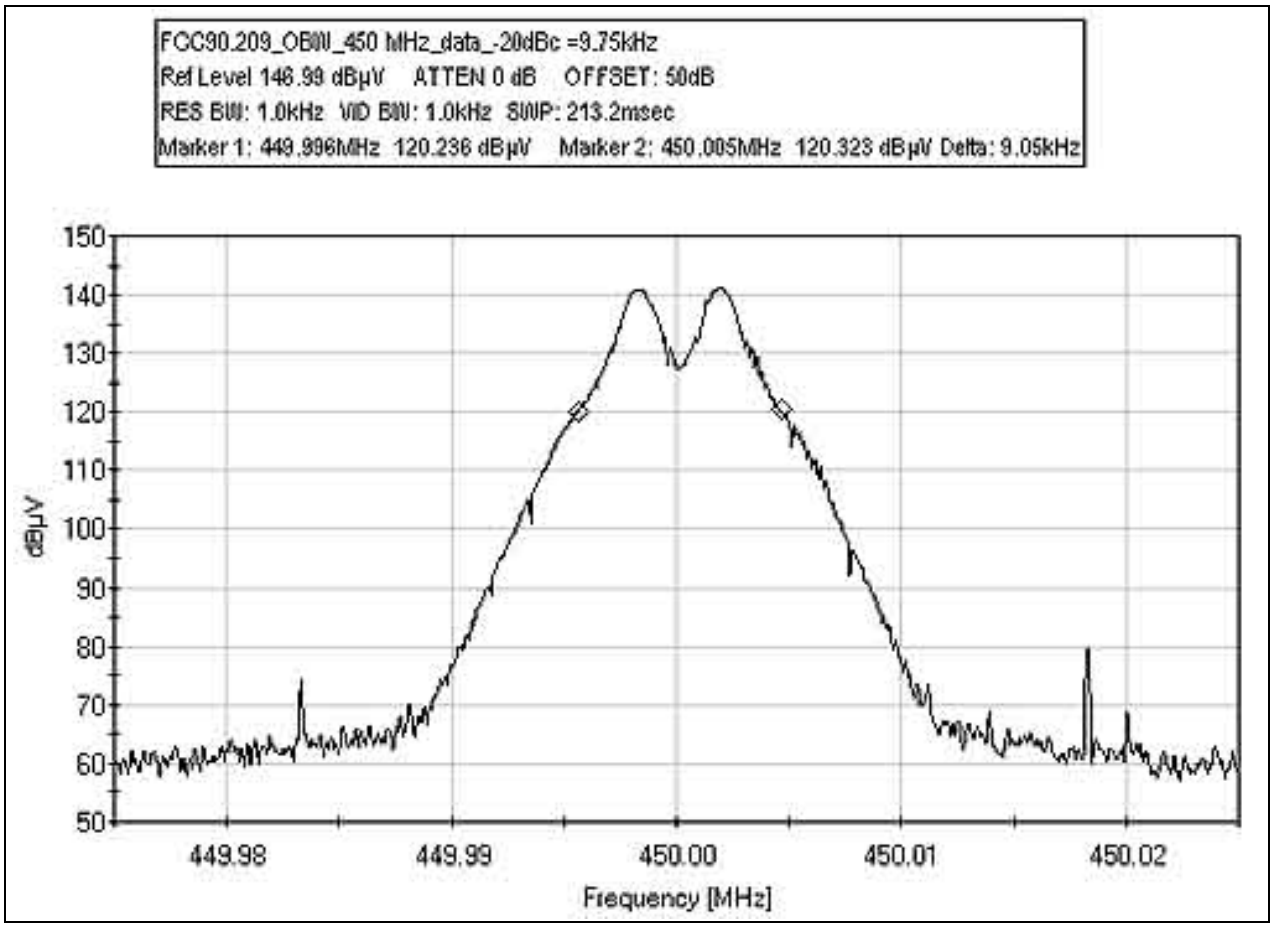
FCC 2.1033(c)(14)/2.1049(i)/90.209- OCCUPIED BANDWIDTH

Test Conditions: Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm port and telco ports are connected to sections of unterminated cable. Com port 2 is left unpopulated and service port external radio and keyboard PS2 ports are left unpopulated. EUT is in transmit mode. Measurement performed at antenna terminal.

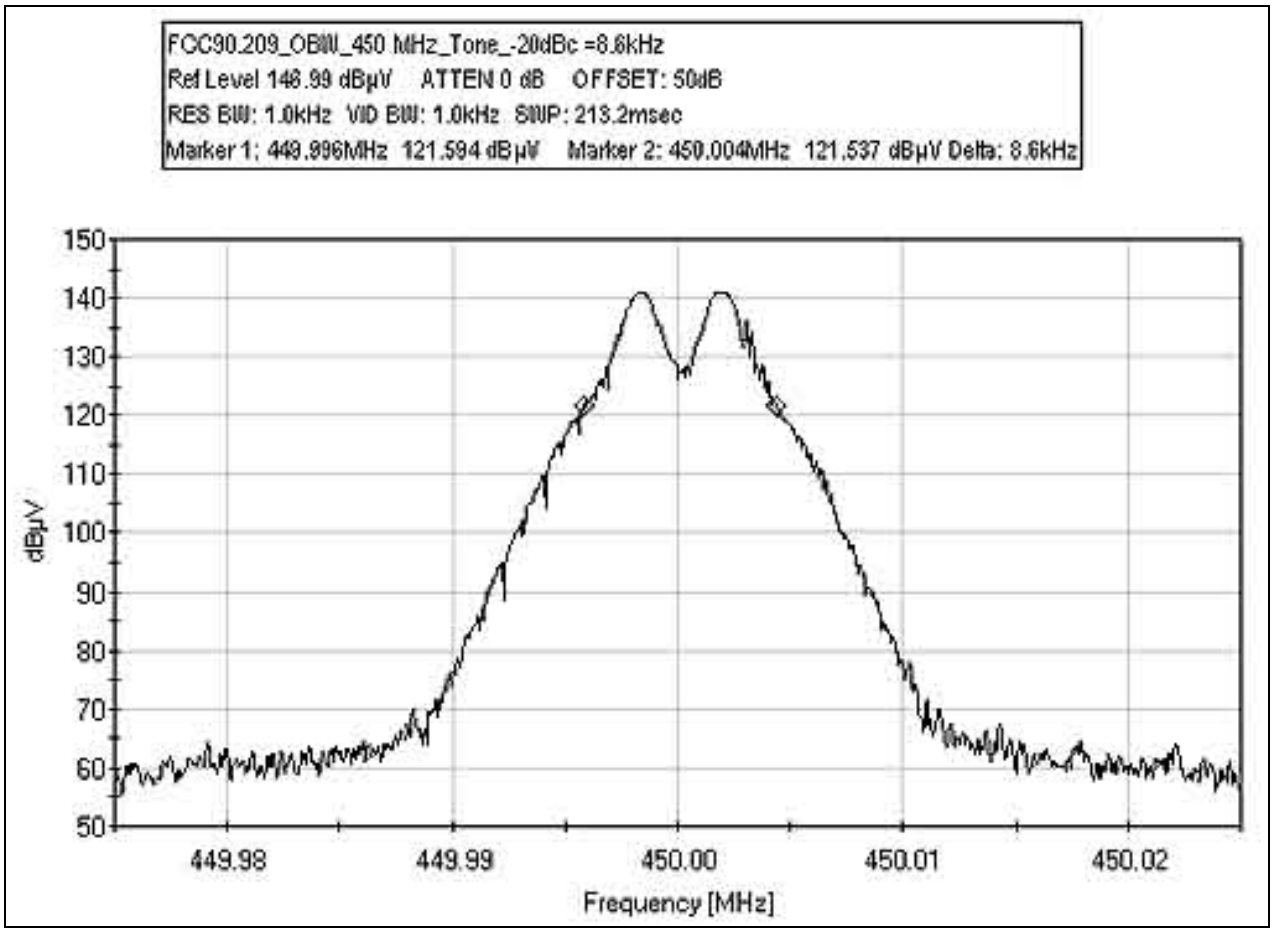
FCC 90.209 OCCUPIED BANDWIDTH 450MHz - AUDIO



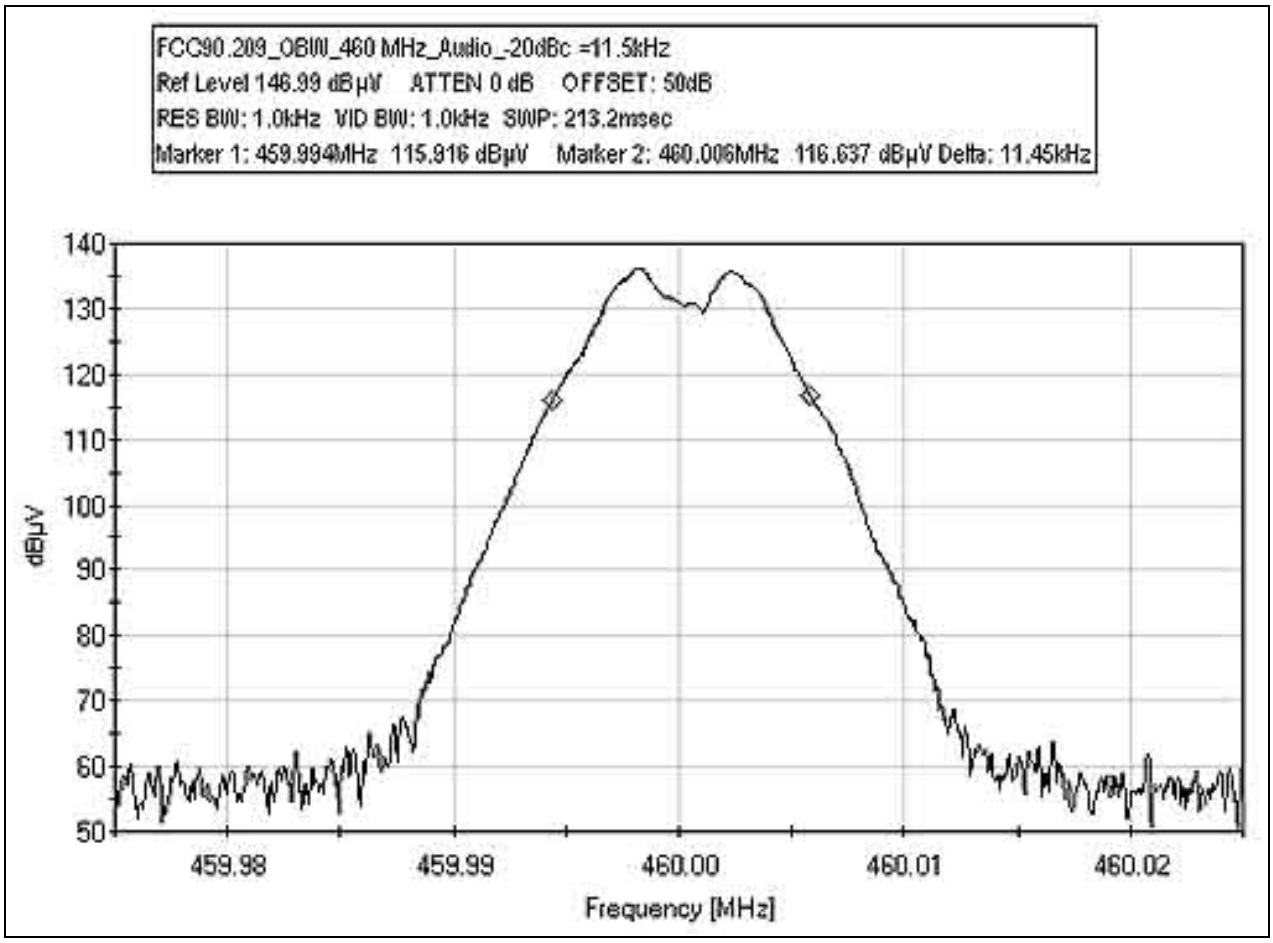
FCC 90.209 OCCUPIED BANDWIDTH 450MHz - DATA



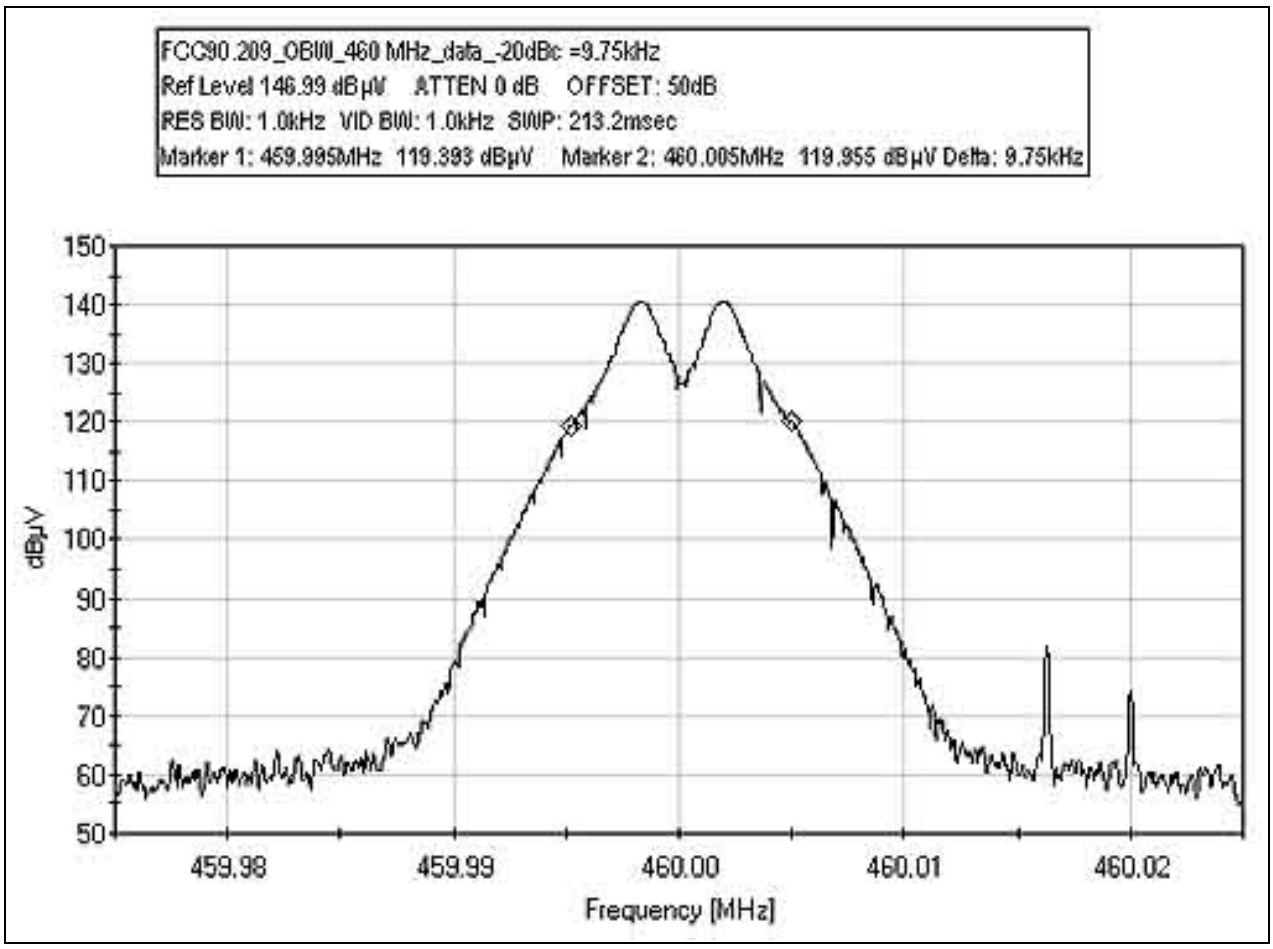
FCC 90.209 OCCUPIED BANDWIDTH 450MHz - TONE



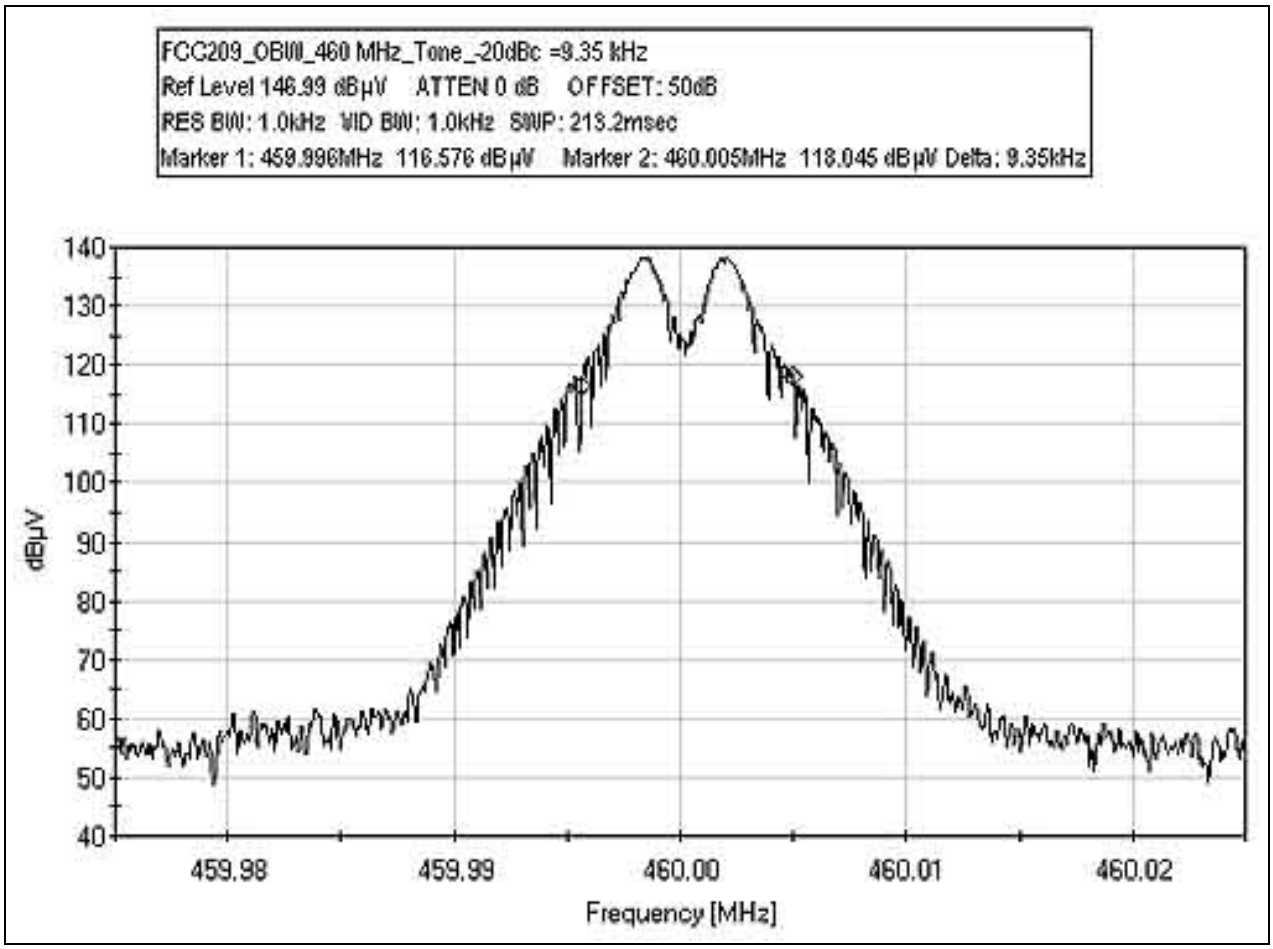
FCC 90.209 OCCUPIED BANDWIDTH 460MHz - AUDIO



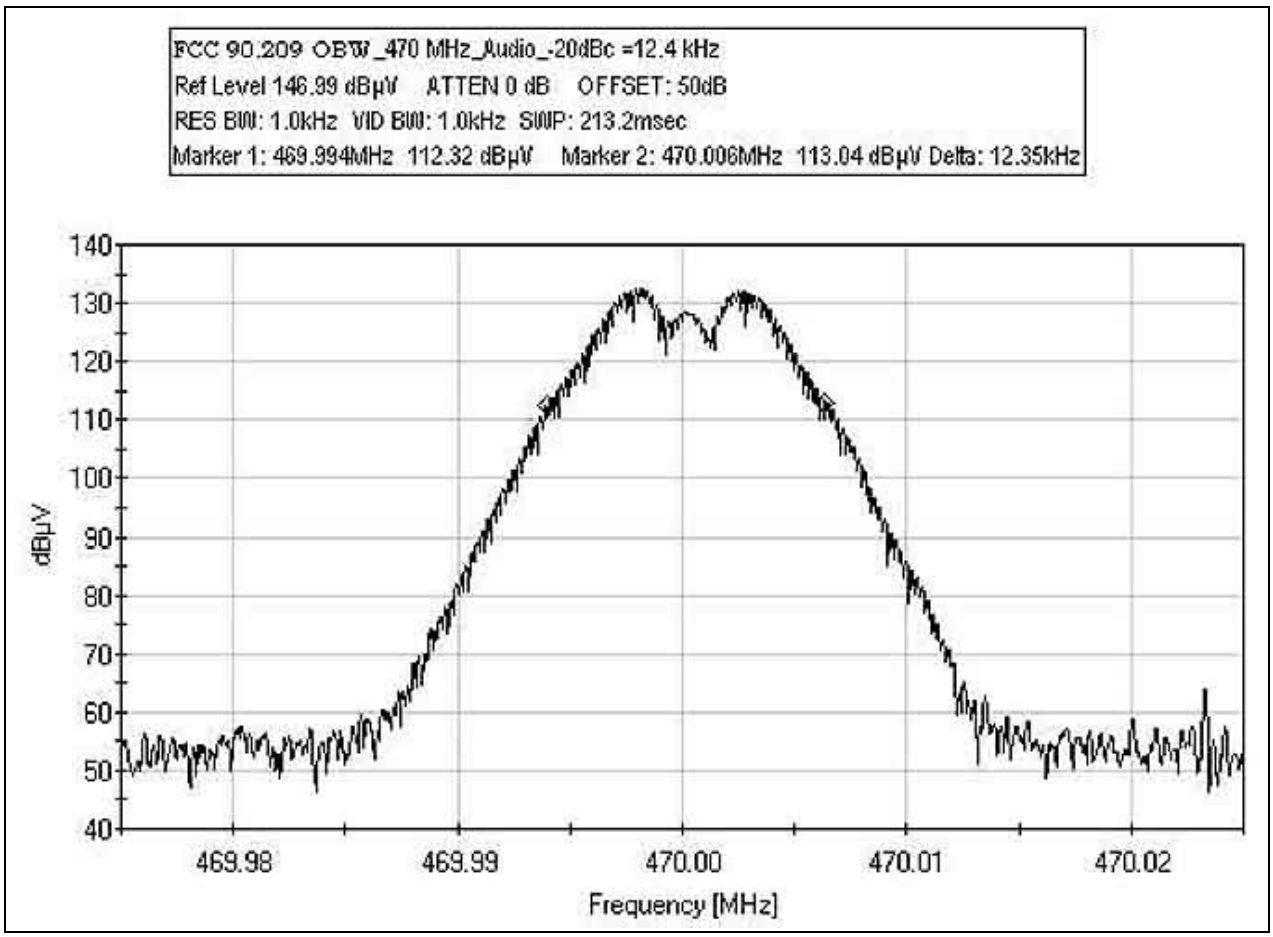
FCC 90.209 OCCUPIED BANDWIDTH 460MHz - DATA



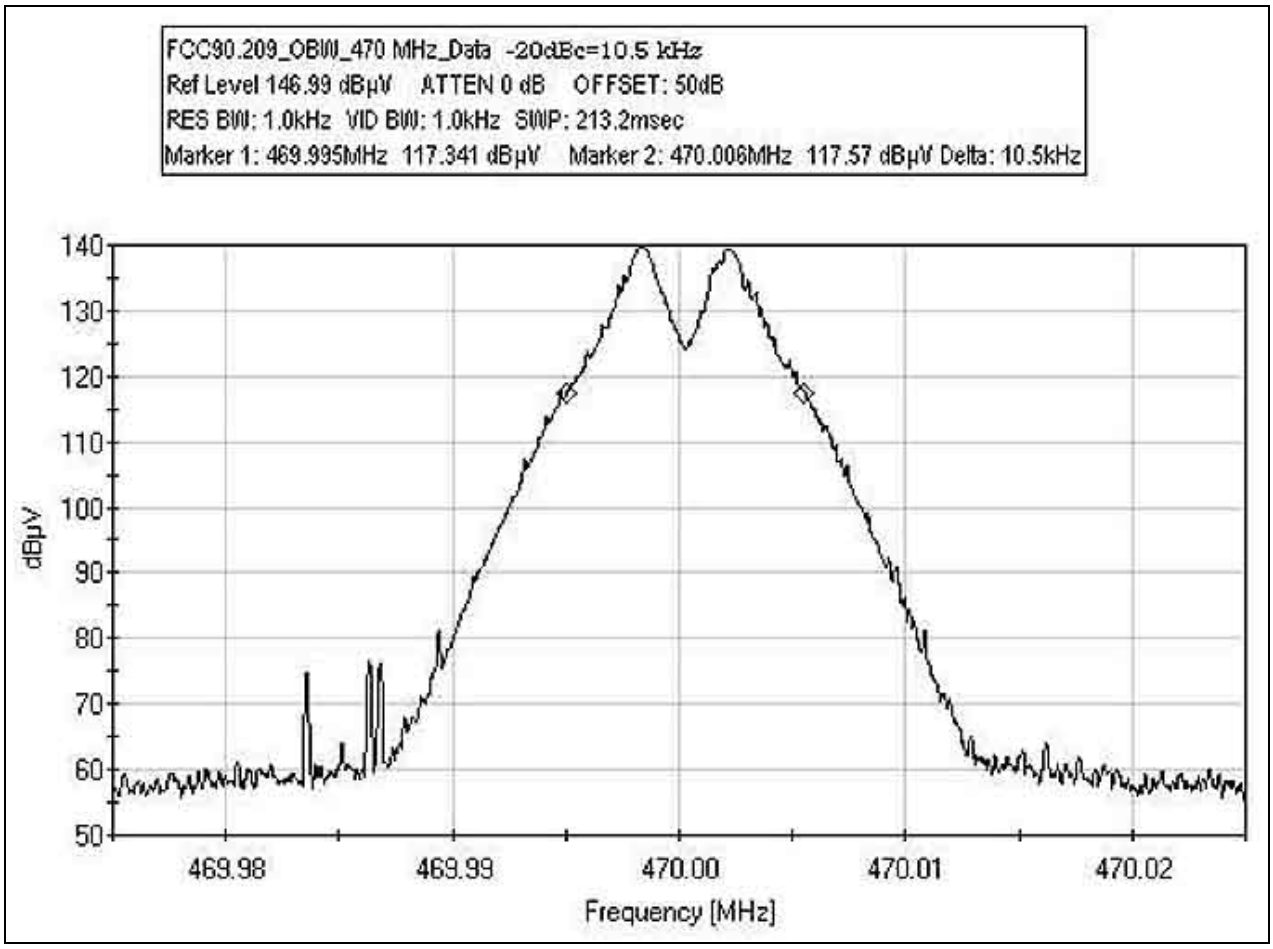
FCC 90.209 OCCUPIED BANDWIDTH 460MHz - TONE



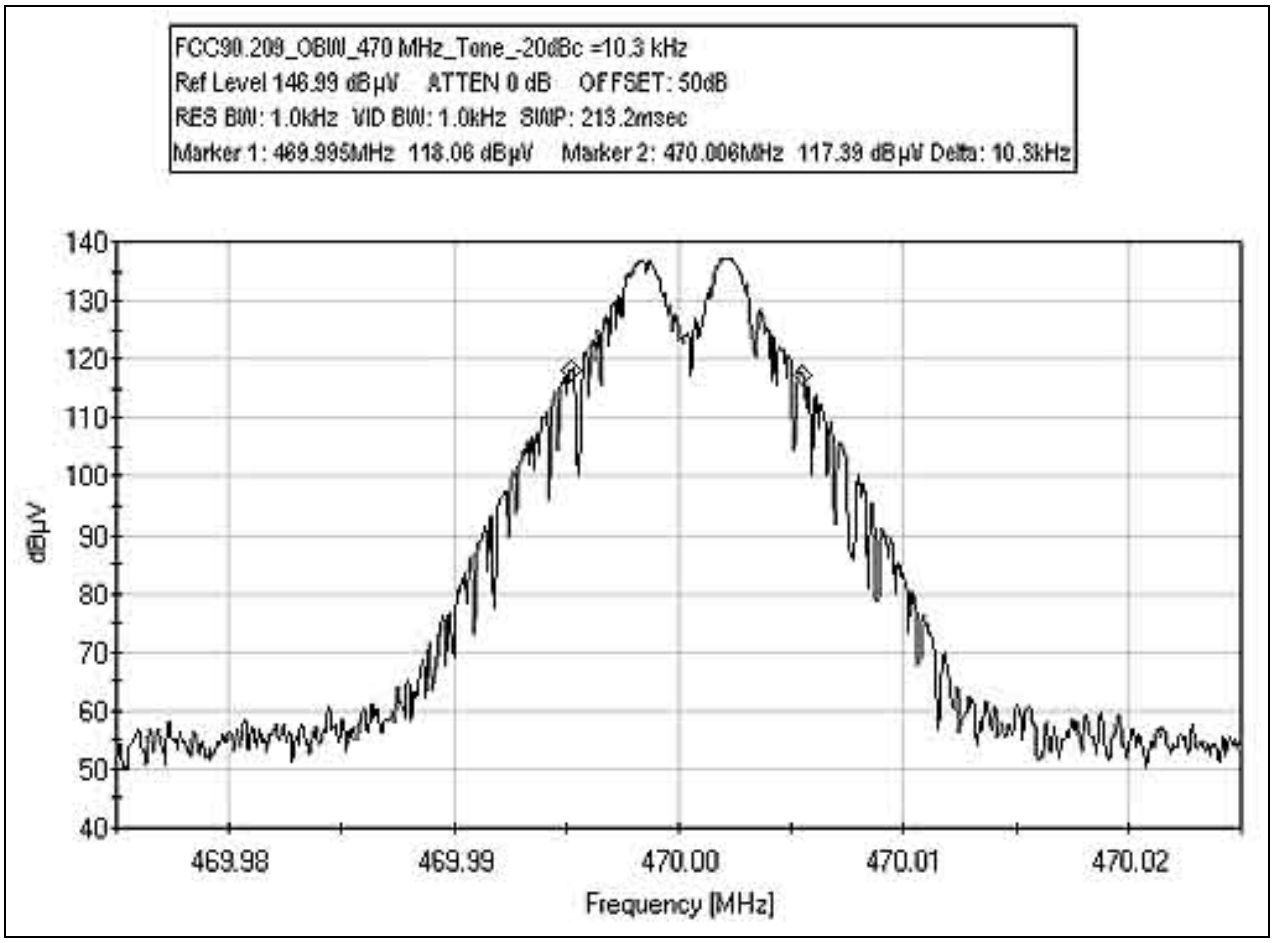
FCC 90.209 OCCUPIED BANDWIDTH 470MHz - AUDIO



FCC 90.209 OCCUPIED BANDWIDTH 470MHz - DATA



FCC 90.209 OCCUPIED BANDWIDTH 470MHz - TONE



Test Equipment

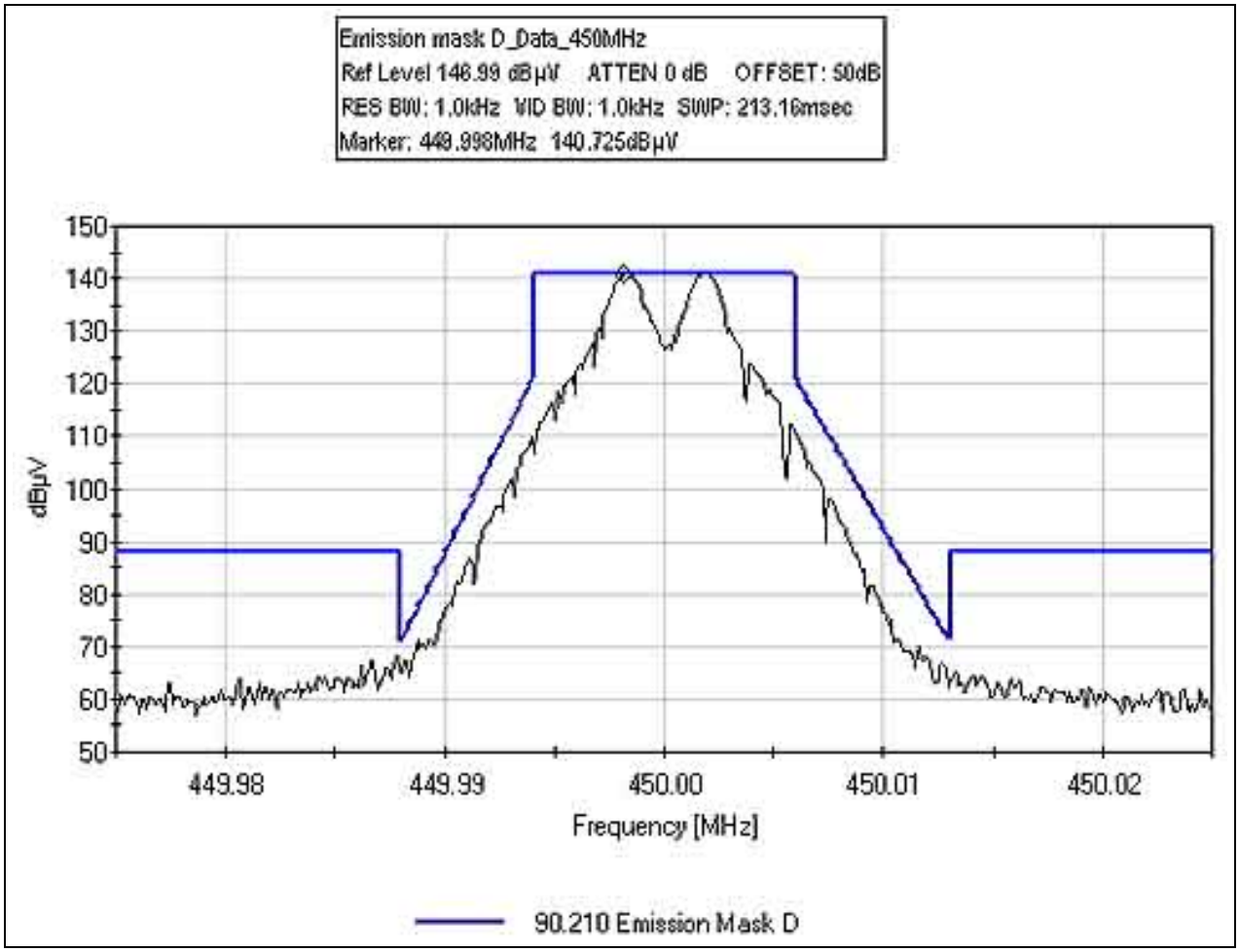
Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407
Oscilloscpoe	00320	HP	54615B	US354208264	081204	081206

Direct Connect Test Setup

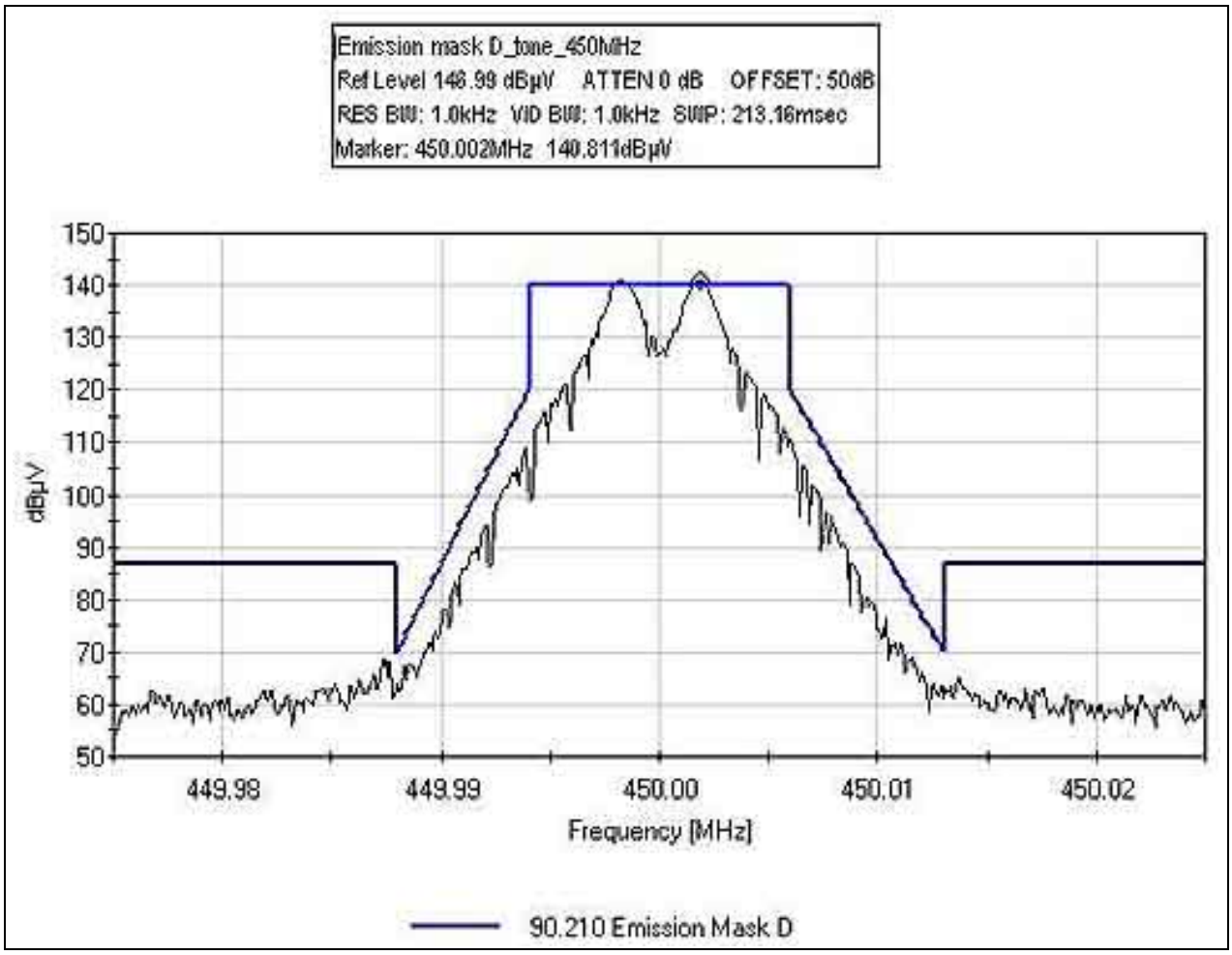
FCC 2.1033(c)(14)/2.1049(i)/90.210 EMISSIONS MASK

Test Conditions: Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm port and telco ports are connected to sections of unterminated cable. Com port 2 is left unpopulated and service port external radio and keyboard PS2 ports are left unpopulated. EUT is in transmit mode. Measurement performed at antenna terminal.

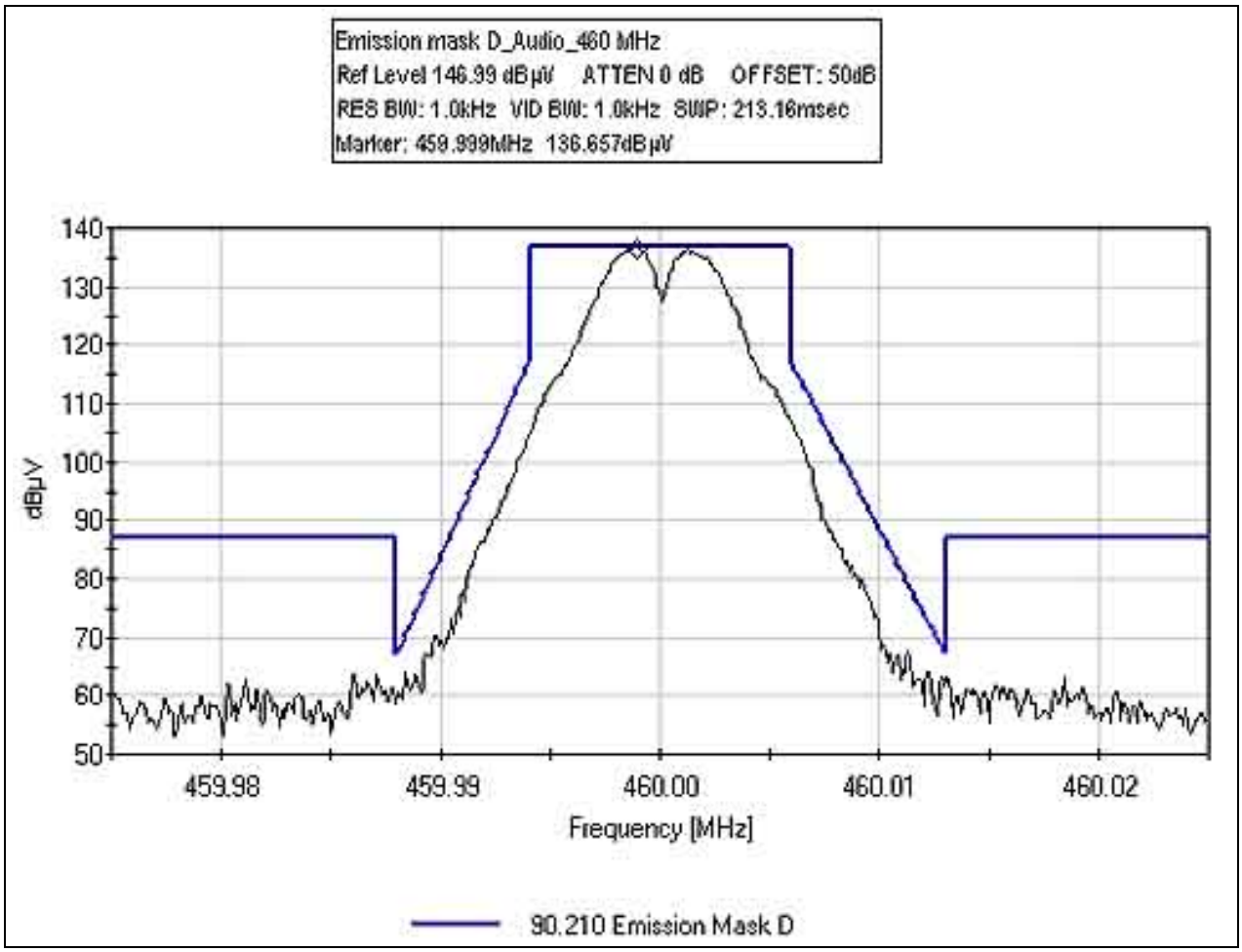
FCC 90.210 EMISSIONS MASK D 450MHz - DATA



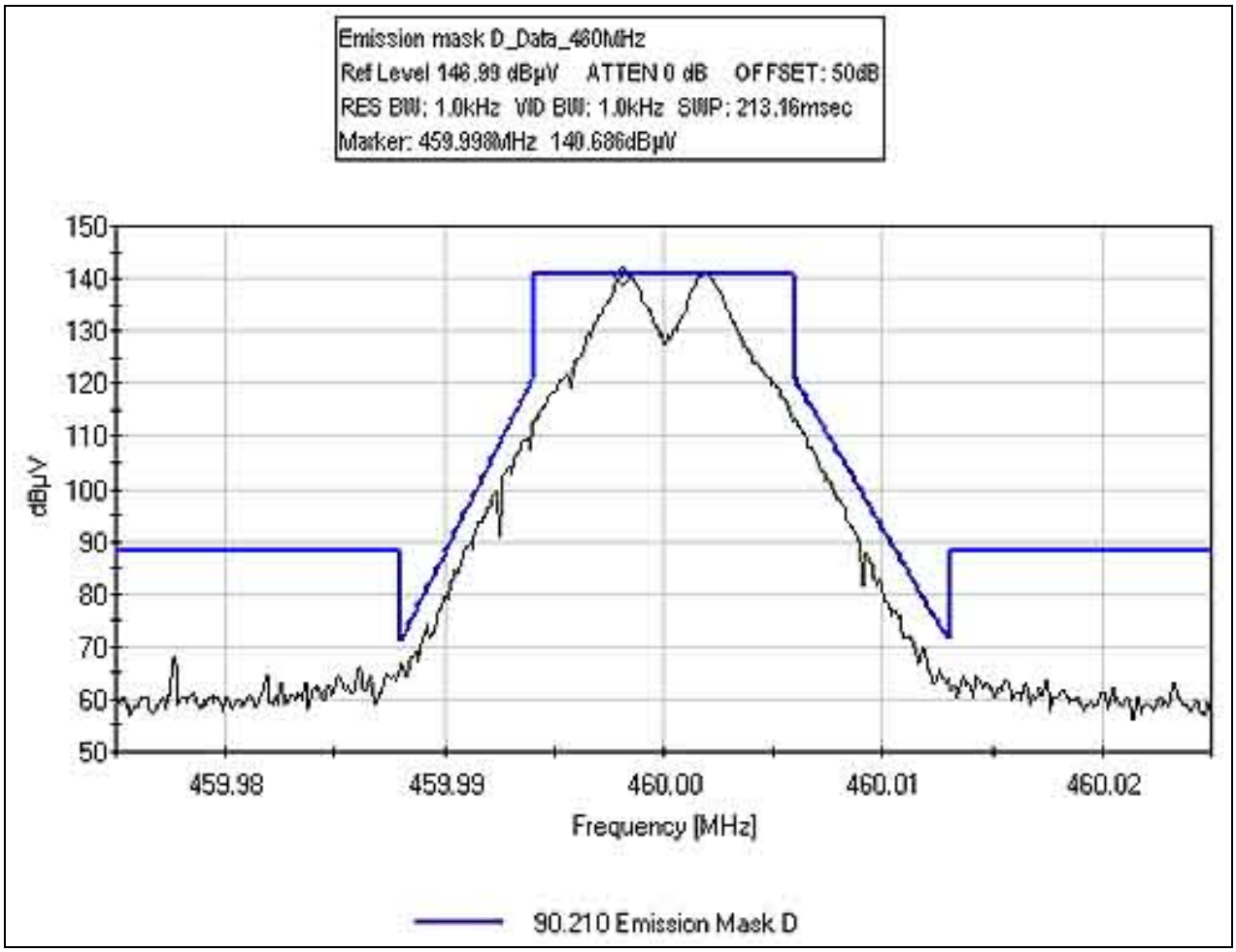
FCC 90.210 EMISSIONS MASK D 450MHz - TONE



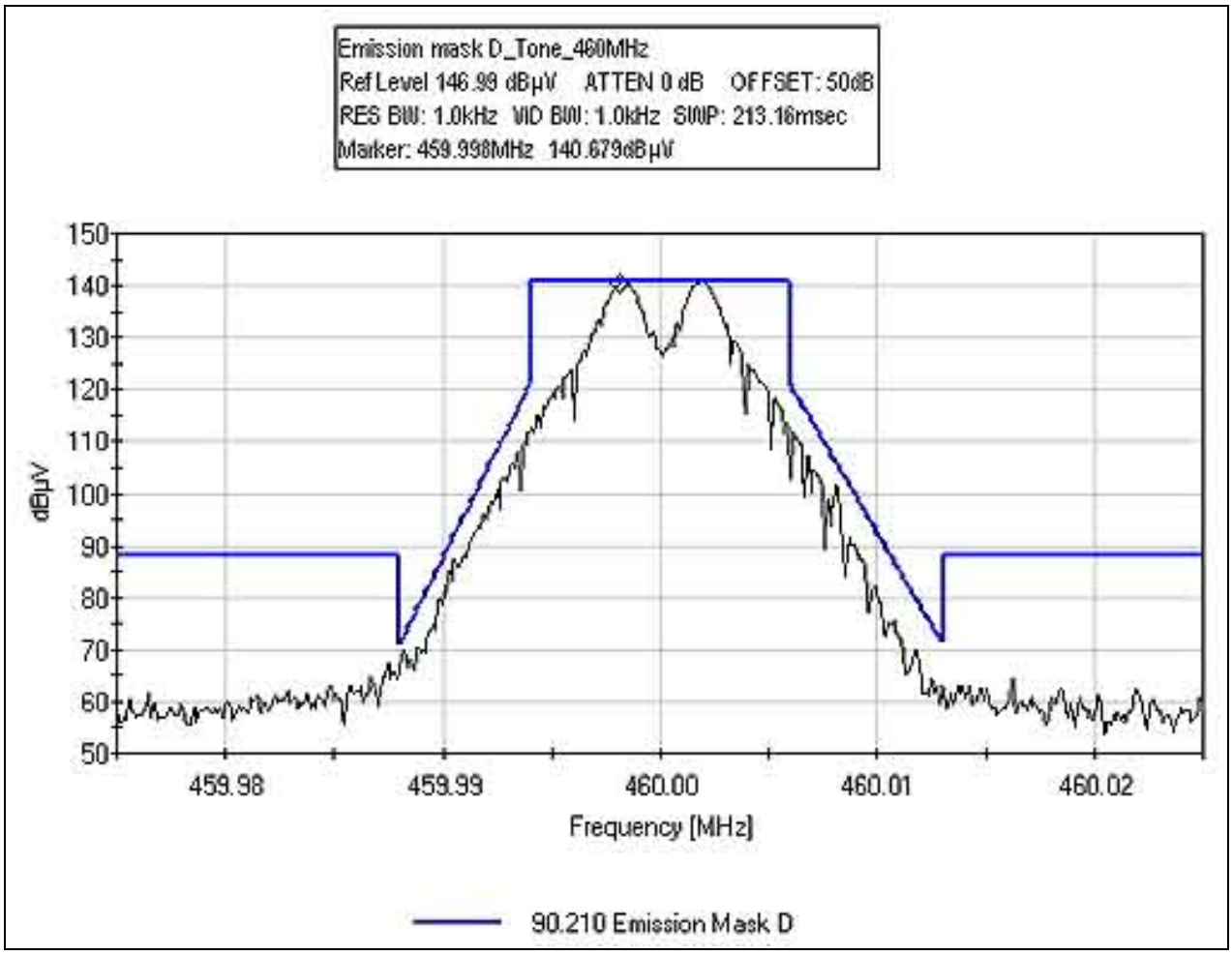
FCC 90.210 EMISSIONS MASK D 460MHz - AUDIO



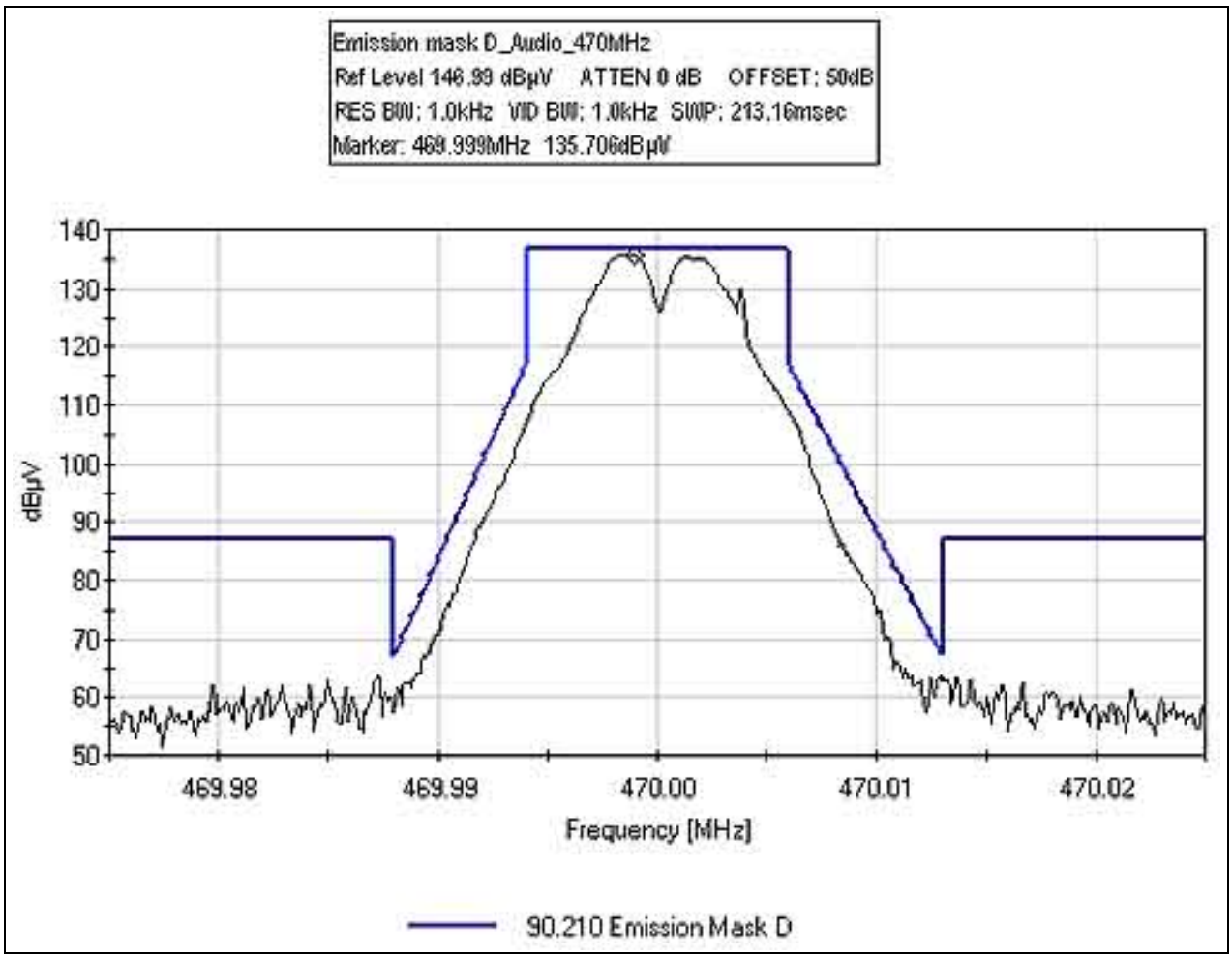
FCC 90.210 EMISSIONS MASK D 460MHz - DATA



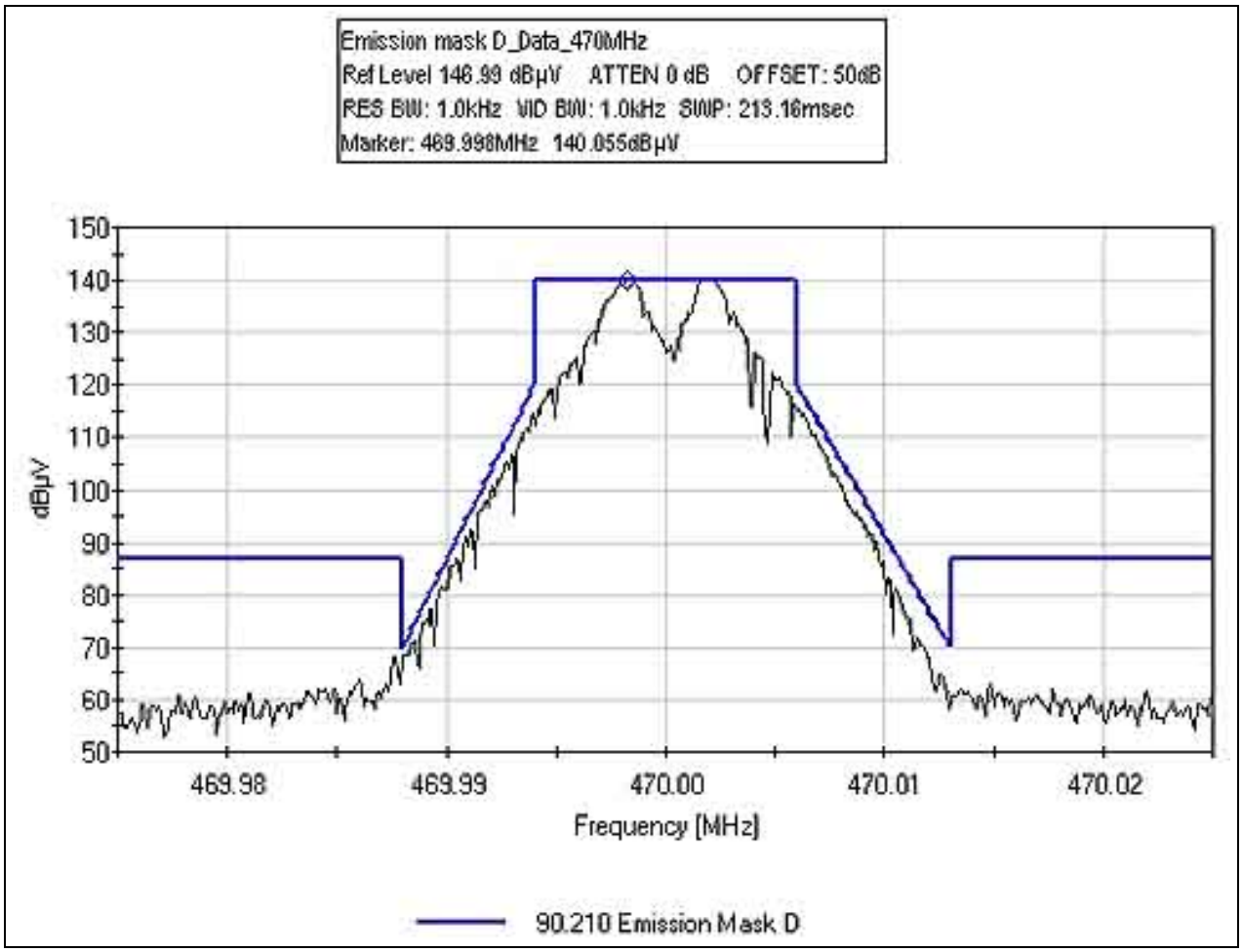
FCC 90.210 EMISSIONS MASK D 460MHz - TONE



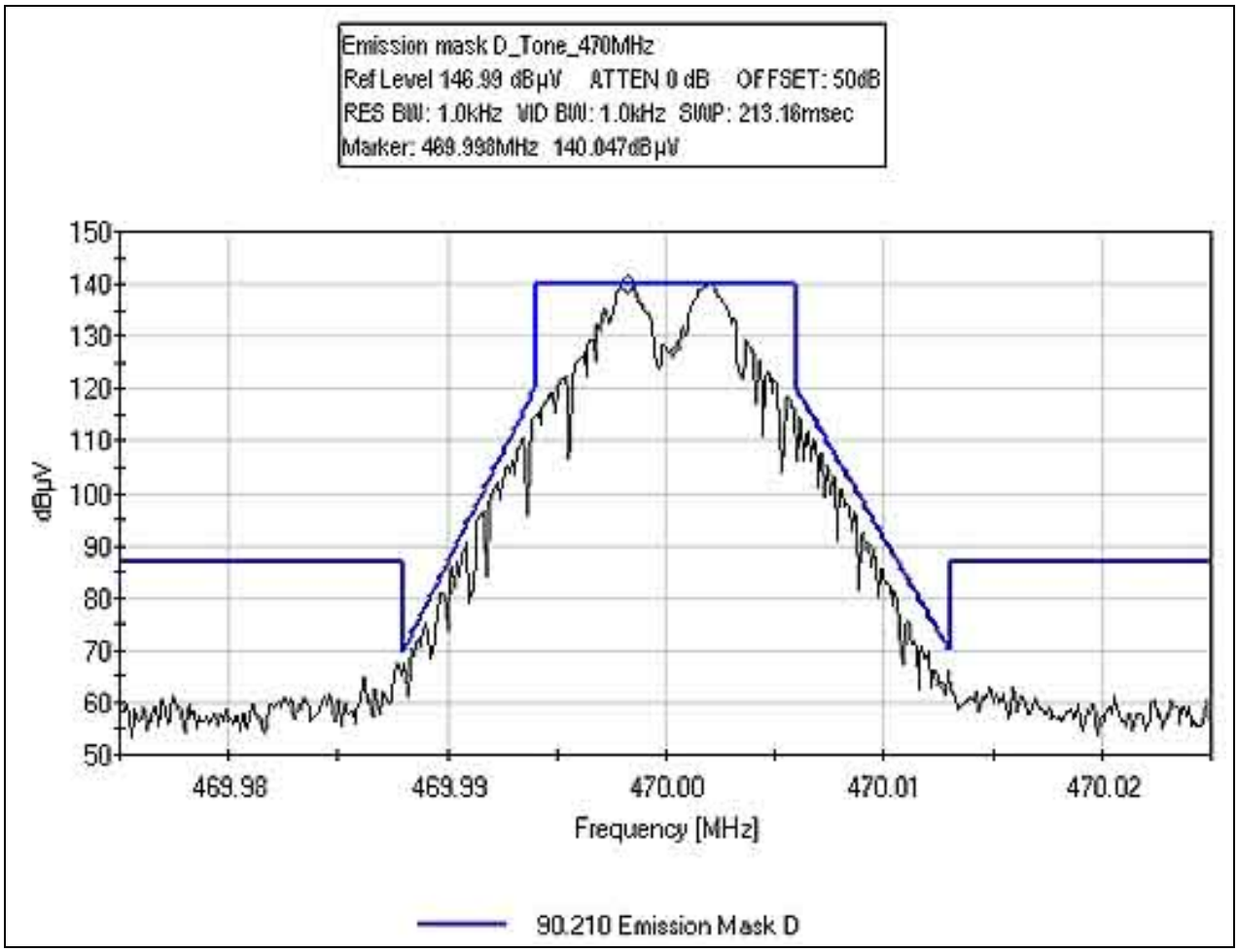
FCC 90.210 EMISSIONS MASK D 470MHz - AUDIO



FCC 90.210 EMISSIONS MASK D 470MHz - DATA



FCC 90.210 EMISSIONS MASK D 470MHz - TONE



Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407
Oscilloscpoe	00320	HP	54615B	US354208264	081204	081206

Direct Connect Test Setup for 2005 Testing

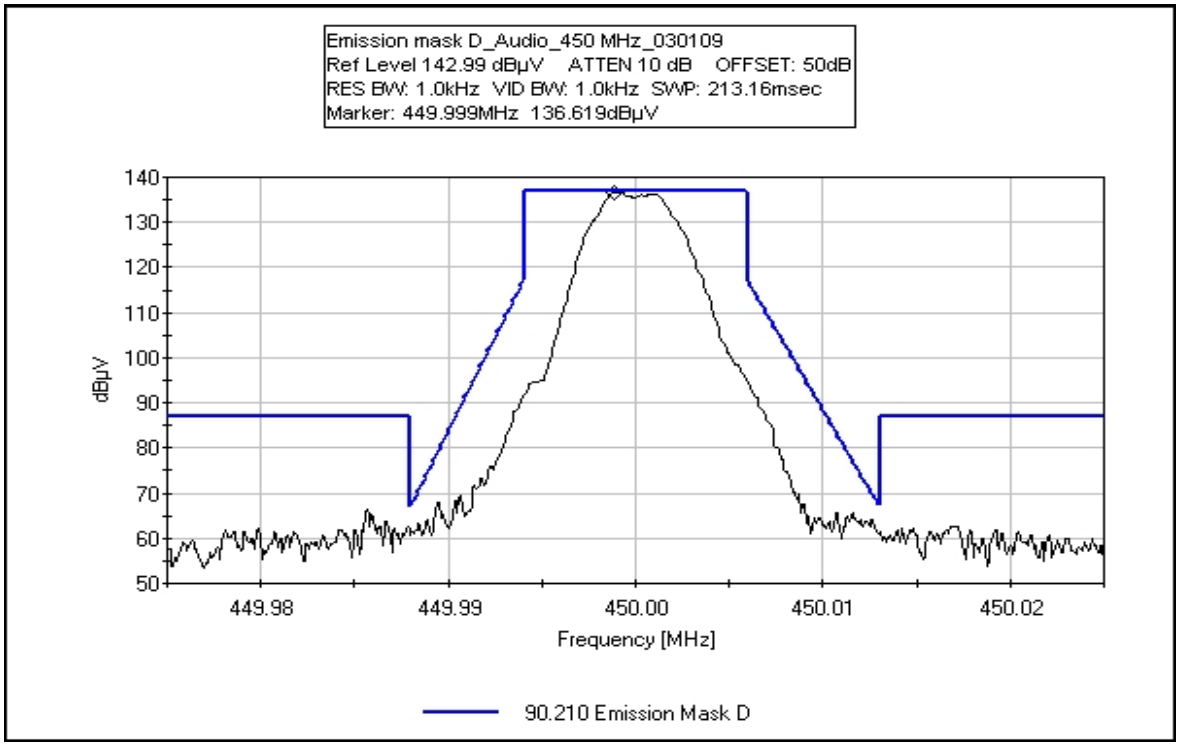
2009 Testing

FCC 90.210 Emission mask
Setup: Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm Port and Telco port are connected sections of unterminated cable. Com Port 2 is left unpopulated and service port External radio and Keyboard PS2 port are left unpopulated. EUT in Transmit mode. Measurement performed at Antenna terminal

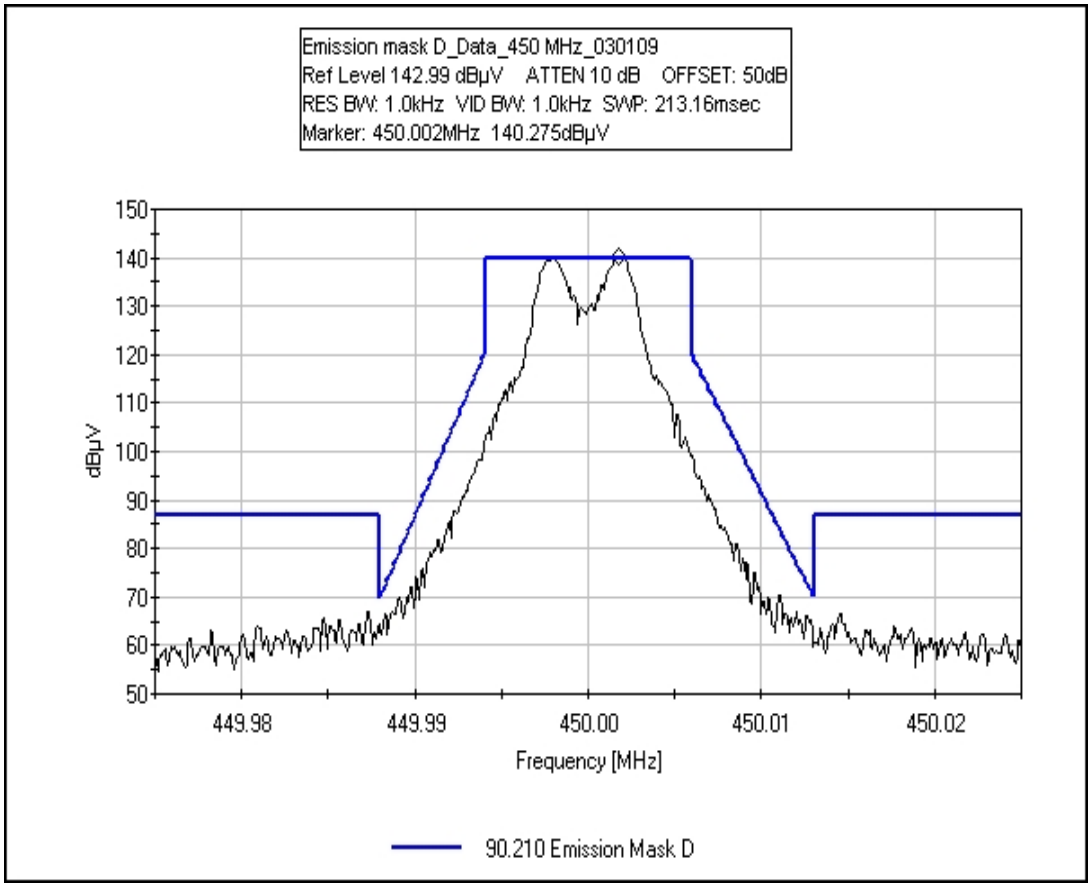
Source: Data, tone, Audio

Power= 2.0 Watt
Tx = 450MHz, 460MHz, 470MHz

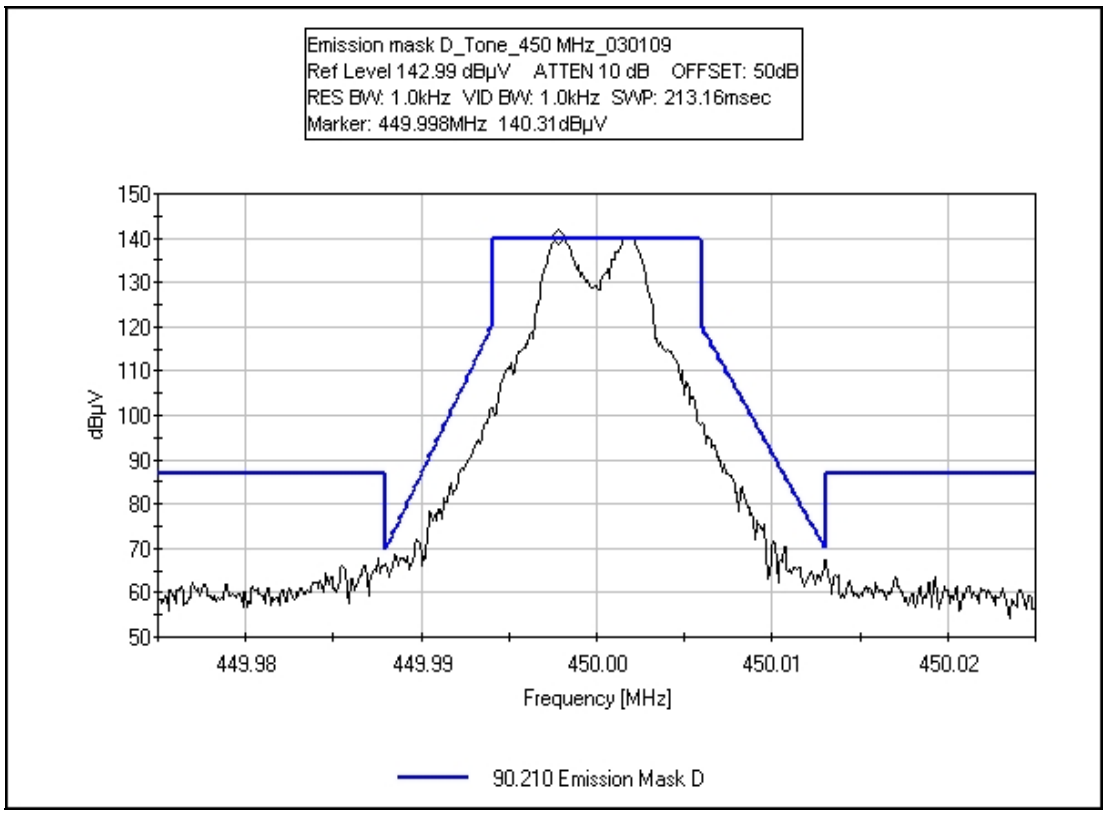
EMISSIONS MASK D - AUDIO - 450 MHz



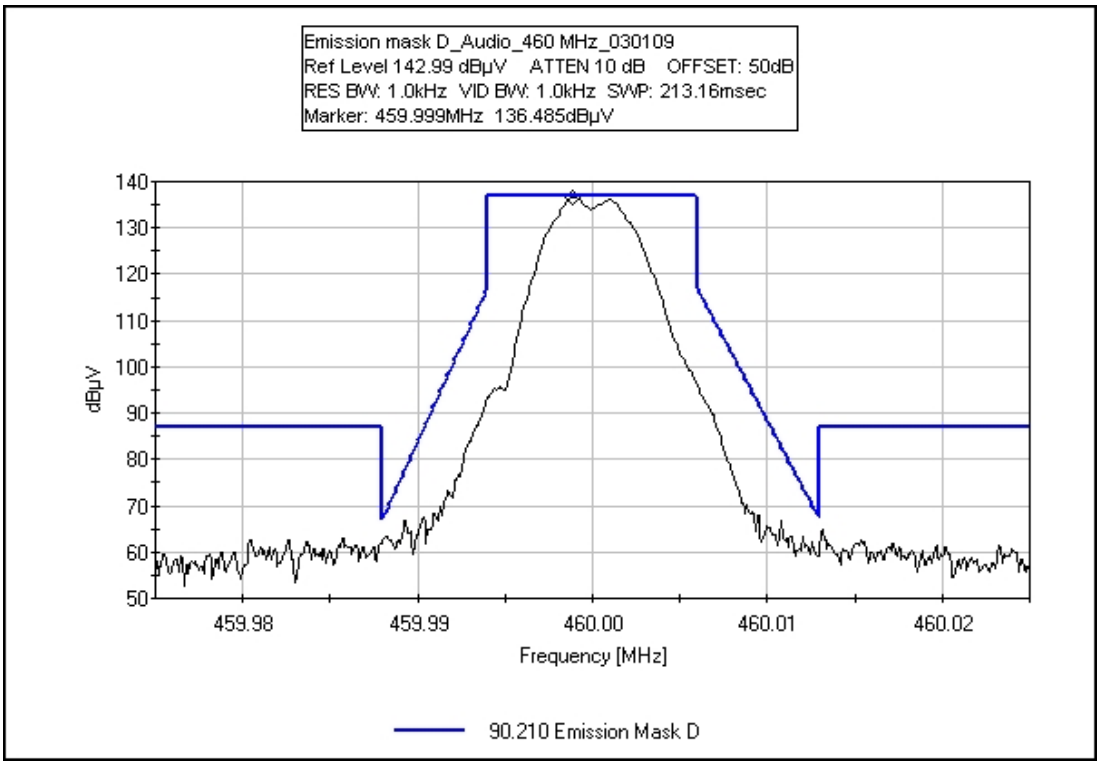
EMISSIONS MASK D - DATA - 450 MHz



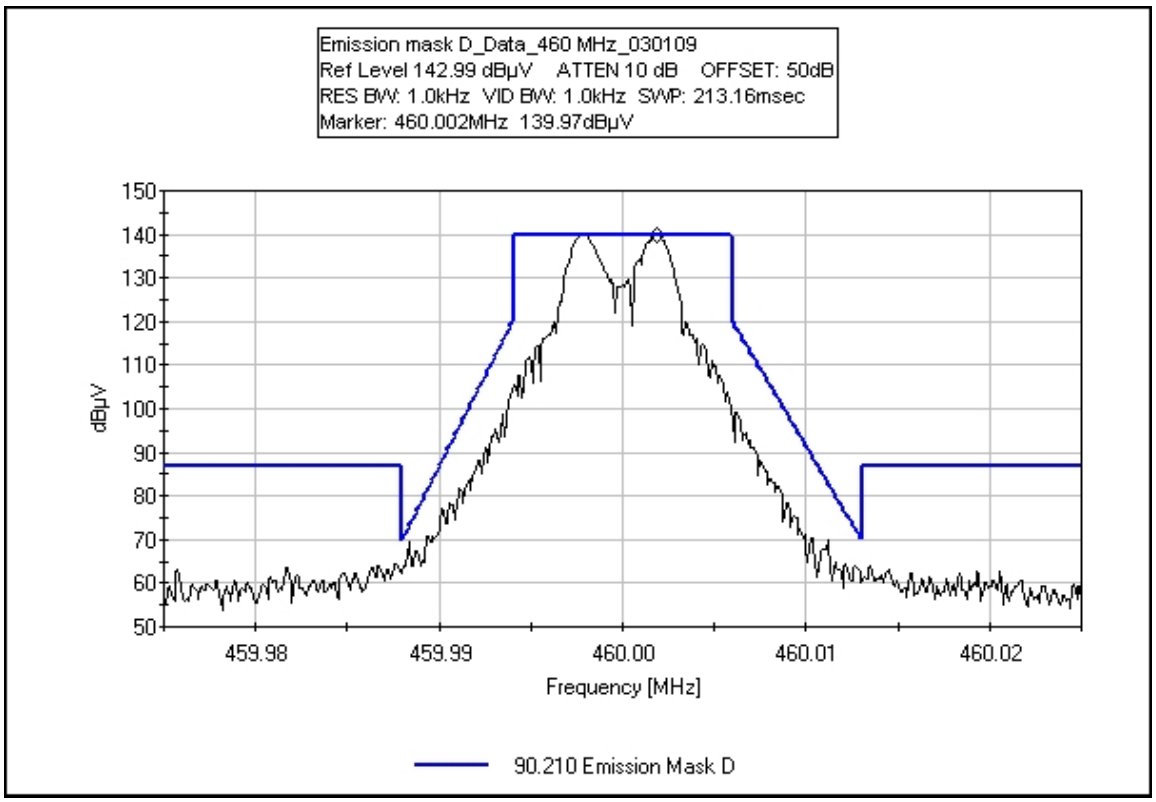
EMISSIONS MASK D - TONE - 450 MHz



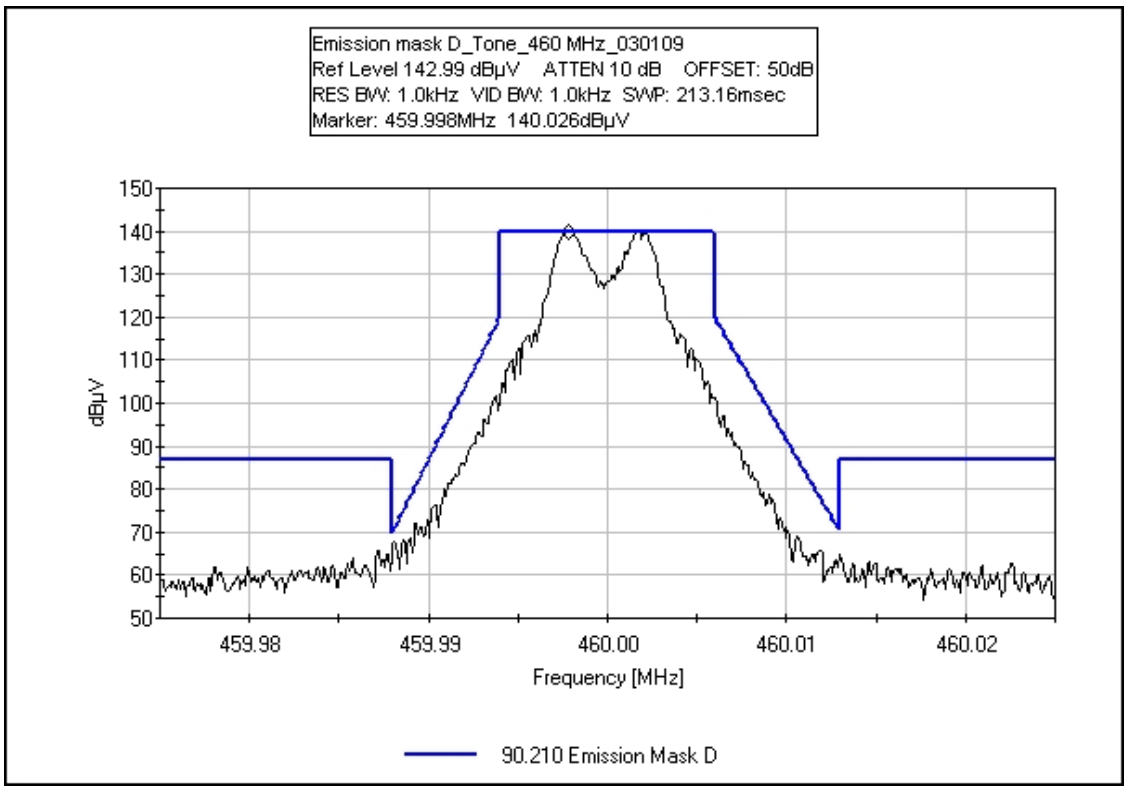
EMISSIONS MASK D - AUDIO - 460 MHz



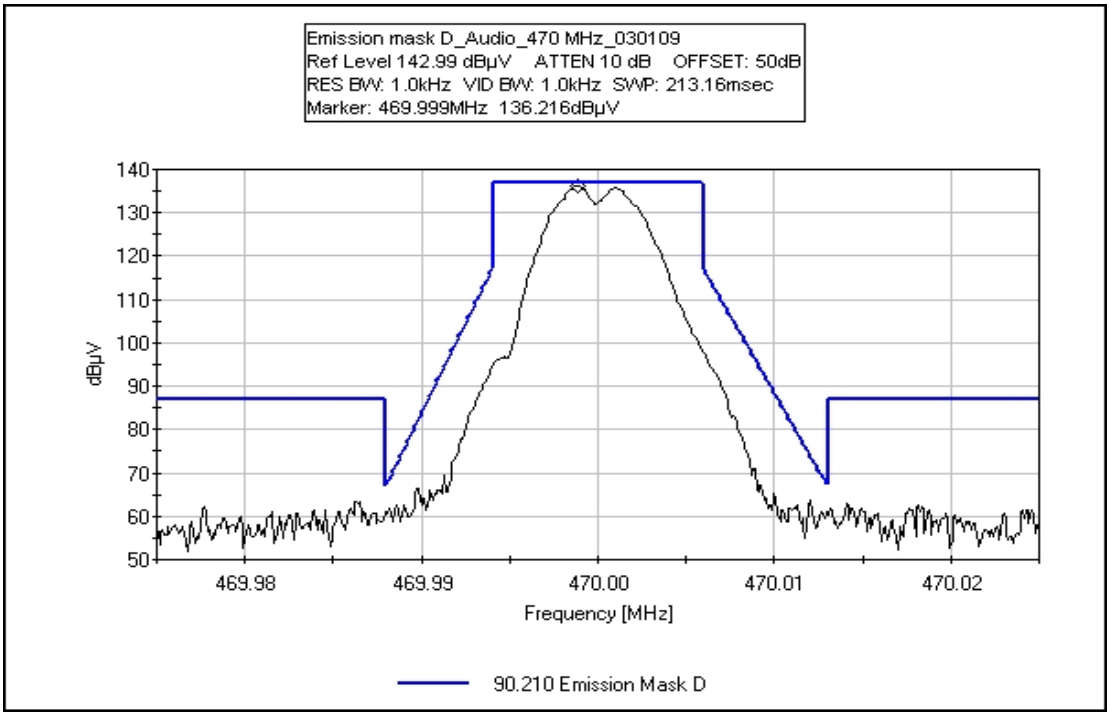
EMISSIONS MASK D - DATA - 460 MHz



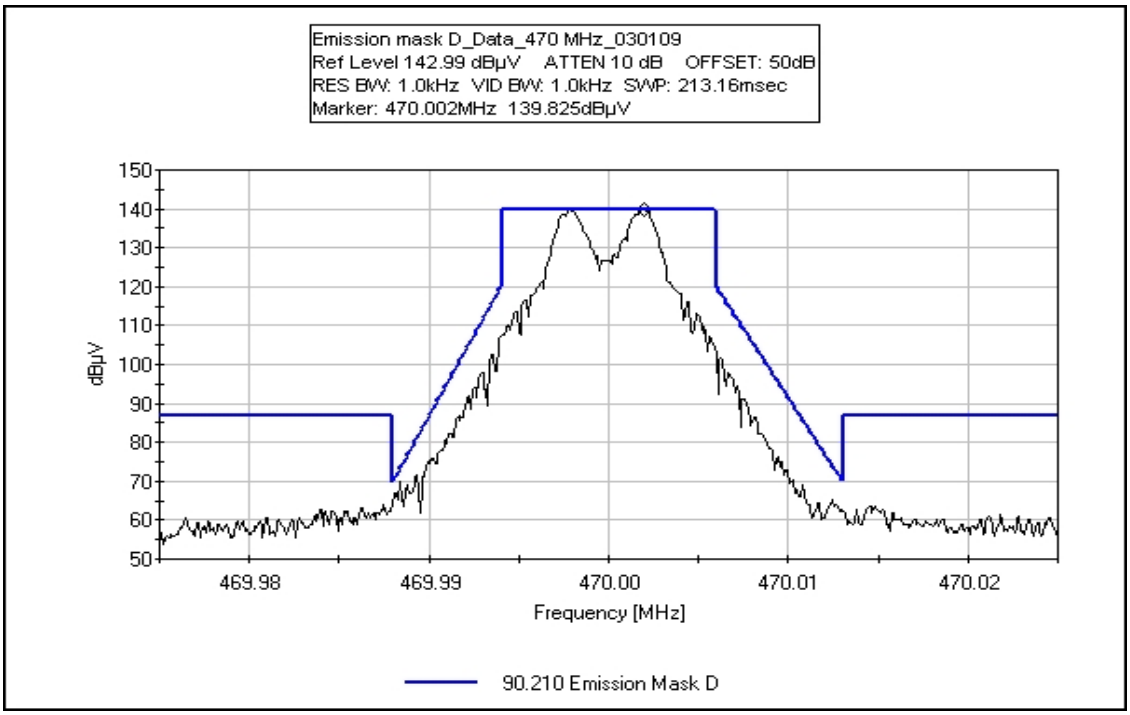
EMISSIONS MASK D - TONE - 460 MHz



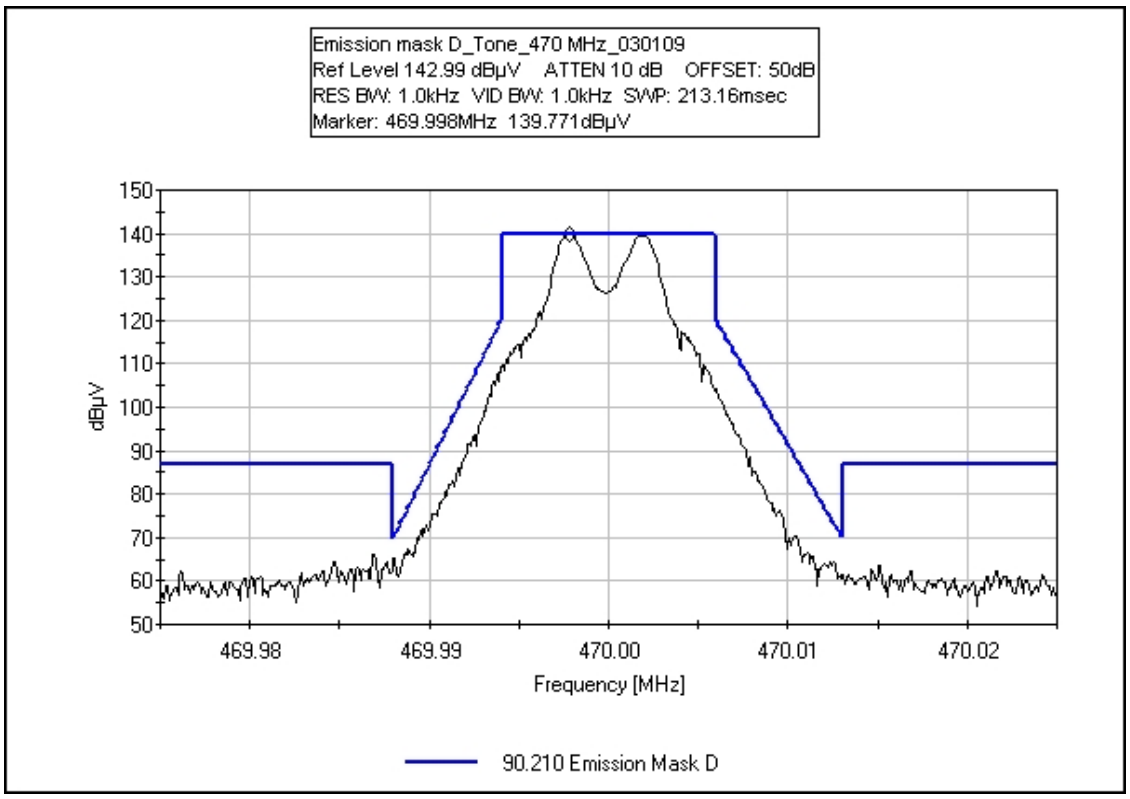
EMISSIONS MASK D - AUDIO - 470 MHz



EMISSIONS MASK D - DATA - 470 MHz



EMISSIONS MASK D - TONE - 470 MHz



Test Equipment for 2009 testing

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	072308	072310

Test Setup for 2009 Testing

FCC 2.1033(c)(14)/2.1051/90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINAL

Limit line for Spurious Conducted Emission

Required Attenuation = 43+10 Log P dB

Limit line (dBuV) = V_{dBuv} - Attenuation

$V_{dBuV} = 20 \text{ Log } \frac{V}{1 \text{ x } 10^{-6}}$

$= 20\left(\text{Log } V - \text{Log } 1 \text{ x } 10^{-6}\right)$

$= 20 \text{ Log } V - 20 \text{ Log} 1 \text{ x } 10^{-6}$

$= 20 \text{ Log } V - 20(-6)$

$= 20 \text{ Log } V + 120$

Attenuation $= 43 + 10 \text{ Log } P$

$= 43 + 10 \text{ Log } \frac{V^2}{R}$

$= 43 + 10\left(\text{Log } V^2 - \text{Log } R\right)$

$= 43 + 10\left(2 \text{ Log } V - \text{Log } R\right)$

$= 43 + 20 \text{ Log } V - 10 \text{ Log } R$

Limit line = V_{dBuv} - Attenuation

= 20 Log V + 120 – (43 + 20 Log V – 10Log R)

= 20 Log V + 120 – 43 – 20 Log V + 10Log R

= 20 Log V + 120 – 43 – 20 Log V + 10Log R

= 120 – 43 + 10 Log 50 Note : R = 50 Ω

= 120 –43 + 16.897

= 94 dBuV at any power level

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer:	**The Toro Company**		
Specification:	**FCC 90.210 (d) Conducted Spurious Emission**		
Work Order #:	**84317**	Date:	9/30/2005
Test Type:	**Conducted Emissions**	Time:	15:52:18
Equipment:	**Paging terminal for Irrigation Control**	Sequence#:	7
Manufacturer:	The Toro Company	Tested By:	E. Wong
Model:	OSMAC		110V 60Hz
S/N:	NA		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Paging terminal for Irrigation Control*	The Toro Company	OSMAC	NA
Power supply	UMEC	UP0252A-01P	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Toshiba	Satelite Pro	3203365P

Test Conditions / Notes:

Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm port and telco ports are connected sections of unterminated cable. Com port 2 is left unpopulated and service port External radio and keyboard PS2 ports are left unpopulated. EUT in Transmit mode. Measurement performed at Antenna terminal Source: Data, Tone (internal), Audio (1000kHz, 2 Vpp). Power = .25 Watts. Rx = 450MHz. Frequency range of measurement = 9kHz - 5GHz. 9kHz-150kHz; RBW=200 Hz, VBW=200 Hz; 150kHz-30MHz; RBW=9kHz, 30MHz-1000MHz; RBW=120kHz, VBW=120kHz, 1000MHz-5000 MHz; RBW=1MHz, VBW=1MHz. 110VAC, 60 Hz, 26°C, 29% relative humidity.

Transducer Legend:

Measurement Data: Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	900.024M	71.1					+0.0	71.1	87.0 data	-15.9	Anten
2	900.007M	71.0					+0.0	71.0	87.0 Audio	-16.0	Anten
3	900.010M	70.3					+0.0	70.3	87.0 tone	-16.7	Anten

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer:	**The Toro Company**		
Specification:	**FCC 90.210 (d) Conducted Spurious Emission**		
Work Order #:	**84317**	Date:	9/30/2005
Test Type:	**Conducted Emissions**	Time:	15:55:32
Equipment:	**Paging terminal for Irrigation Control**	Sequence#:	8
Manufacturer:	The Toro Company	Tested By:	E. Wong
Model:	OSMAC		110V 60Hz
S/N:	NA		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Paging terminal for Irrigation Control*	The Toro Company	OSMAC	NA
Power supply	UMEC	UP0252A-01P	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Toshiba	Satelite Pro	3203365P

Test Conditions / Notes:

Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm port and telco ports are connected sections of unterminated cable. Com Port 2 is left unpopulated and service port External radio and keyboard PS2 ports are left unpopulated. EUT in transmit mode. Measurement performed at antenna terminal Source: Data, Tone (internal), Audio (1000kHz, 2 Vpp). Power = .25 Watts. Rx = 460MHz. Frequency range of measurement = 9kHz - 5GHz. 9kHz-150kHz; RBW=200 Hz, VBW=200 Hz; 150kHz-30MHz; RBW=9kHz, 30MHz-1000MHz; RBW=120kHz, VBW=120kHz, 1000MHz-5000 MHz; RBW=1MHz, VBW=1MHz. 110VAC, 60 Hz, 26°C, 29% relative humidity.

Transducer Legend:

Measurement Data: Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	919.990M	68.3					+0.0	68.3	87.0 Tone	-18.7	Anten
2	919.990M	68.3					+0.0	68.3	87.0 Data	-18.7	Anten
3	920.025M	68.0					+0.0	68.0	87.0 Audio	-19.0	Anten

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer:	**The Toro Company**		
Specification:	**FCC 90.210 (d) Conducted Spurious Emission**		
Work Order #:	**84317**	Date:	9/30/2005
Test Type:	**Conducted Emissions**	Time:	16:04:13
Equipment:	**Paging terminal for Irrigation Control**	Sequence#:	9
Manufacturer:	The Toro Company	Tested By:	E. Wong
Model:	OSMAC		110V 60Hz
S/N:	NA		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Paging terminal for Irrigation Control*	The Toro Company	OSMAC	NA
Power supply	UMEC	UP0252A-01P	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Toshiba	Satelite Pro	3203365P

Test Conditions / Notes:

Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm port and telco ports are connected sections of unterminated cable. Com Port 2 is left unpopulated and service port External radio and keyboard PS2 ports are left unpopulated. EUT in transmit mode. Measurement performed at antenna terminal Source: Data, Tone (internal), Audio (1000kHz, 2 Vpp). Power = 2.1 Watts Rx = 470MHz. Frequency range of measurement = 9kHz - 5GHz. 9kHz-150kHz; RBW=200 Hz, VBW=200 Hz; 150kHz-30MHz; RBW=9kHz, 30MHz-1000MHz; RBW=120kHz, VBW=120kHz, 1000MHz-5000 MHz; RBW=1MHz, VBW=1MHz. 110VAC, 60 Hz, 26°C, 29% relative humidity.

Transducer Legend:

Measurement Data: Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	940.026M	68.6					+0.0	68.6	87.0 Data	-18.4	Anten
2	940.007M	67.5					+0.0	67.5	87.0 Tone	-19.5	Anten
3	940.007M	66.4					+0.0	66.4	87.0 Audio	-20.6	Anten

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer:	**The Toro Company**		
Specification:	**FCC 90.210 (d) Conducted Spurious Emission**		
Work Order #:	**84317**	Date:	3/2/2009
Test Type:	**Conducted Emissions**	Time:	15:45:08
Equipment:	**Paging terminal for Irrigation Control**	Sequence#:	8
Manufacturer:	The Toro Company	Tested By:	E. Wong
Model:	OSMAC		110V 60Hz
S/N:	NA		

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer	US44300438	07/23/2008	07/23/2010	02672
3'-40GHz cable	NA	09/18/2007	09/18/2009	P02945

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Paging terminal for Irrigation Control*	The Toro Company	OSMAC	NA
Power supply	UMEC	UP0252A-01P	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Toshiba	Satelite Pro	3203365P

Test Conditions / Notes:

FCC Part 90
Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm Port and Telco ports are connected sections of unterminated cable. Com Port 2 is left unpopulated and service port External radio and Keyboard PS2 port are left unpopulated.
EUT in Transmit mode. Measurement performed at Antenna terminal
Frequency range = 450-470MHz
Source: Audio (1000kHz, 2 Vpp)
Power= 2.0 Watts
Tx = 450MHz, 460MHz, 470 MHz.
Frequency range of measurement = 9kHz - 5GHz.
9 kHz - 150 kHz; RBW=200 Hz, VBW=200 Hz; 150 kHz - 30 MHz; RBW=9 kHz, 30 MHz - 1000 MHz; RBW=120 kHz, VBW=120 kHz,1000 MHz - 5000 MHz; RBW=1 MHz, VBW=1 MHz.
110Vac, 60 Hz, 21°C, 43% relative humidity.

Transducer Legend:

T1=Hi Freq_40GHz_3ft_CAB-ANP02945-091809

Measurement Data: Reading listed by margin. Test Lead: Antenna Terminal

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1380.000M	70.0	+0.4				+0.0	70.4	87.0	-16.6	Anten
2	920.000M	69.6	+0.3				+0.0	69.9	87.0	-17.1	Anten

3	900.000M	69.1	+0.3	+0.0	69.4	87.0	-17.6	Anten
4	1409.964M	68.7	+0.4	+0.0	69.1	87.0	-17.9	Anten
5	1350.000M	68.3	+0.4	+0.0	68.7	87.0	-18.3	Anten
6	939.997M	68.2	+0.3	+0.0	68.5	87.0	-18.5	Anten

Test Equipment for 2005 testing

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407
Oscilloscpoe	00320	HP	54615B	US354208264	081204	081206

Direct Connect Test Setup for 2005 Testing

Test Setup for 2009 Testing

FCC 2.1033(c)(14)/2.1053/90.210 - FIELD STRENGTH OF SPURIOUS RADIATION

Test Location: CKC Laboratories, Inc. •110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer:	**The Toro Company**		
Specification:	**FCC 90.210 Radiated Spurious Emissions**		
Work Order #:	**84317**	Date:	10/15/2005
Test Type:	**Radiated Scan**	Time:	08:39:21
Equipment:	**Paging terminal for Irrigation Control**	Sequence#:	10
Manufacturer:	The Toro Company	Tested By:	E. Wong
Model:	OSMAC		
S/N:	NA		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Paging terminal for Irrigation Control*	The Toro Company	OSMAC	NA
Power supply	UMEC	UP0252A-01P	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	Toshiba	Satelite Pro	3203365P

Test Conditions / Notes:

Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm port and telco ports are connected sections of unterminated cable. Com port 2 is left unpopulated and service port external radio and keyboard PS2 ports are left unpopulated. EUT in transmit mode. Source: Data (worst case conducted emissions). Power = 2.1 Watts. Tx = 450MHz, 460MHz and 470MHz. Antenna terminated into a 50 ohm load. Frequency range of measurement = 9kHz - 5GHz. 9kHz-150kHz; RBW=200 Hz, VBW=200 Hz; 150kHz-30MHz; RBW=9kHz, 30MHz-1000MHz; RBW=120kHz, VBW=120kHz, 1000MHz-5000 MHz; RBW=1MHz, VBW=1MHz. 110VAC, 60 Hz, 26°C, 29% relative humidity.

Operating Frequency: 450MHz -470 MHz
Channels: Low, Mid and High
Highest Measured Output Power: 26.50 ERP(dBm)= 0.447 ERP(Watts)
Distance: 3 meters
Limit: 43+10Log(P) 39.50 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
900.00	-26	Vert	52.50
900.00	-27.5	Horiz	54.00
1,350.00	-29.8	Horiz	56.30
1,350.00	-30.4	Vert	56.90
2,250.00	-44.6	Horiz	71.10
1,800.00	-44.6	Vert	71.10
1,800.00	-44.9	Horiz	71.40
2,250.00	-45.4	Vert	71.90
4,500.00	-50.4	Vert	76.90
4,050.00	-51.2	Vert	77.70
4,050.00	-52.9	Horiz	79.40
3,150.00	-53.7	Vert	80.20
2,700.00	-54.3	Vert	80.80
2,700.00	-54.9	Horiz	81.40
3,600.00	-55.3	Vert	81.80
3,150.00	-56	Horiz	82.50
920.00	-35.7	Vert	62.20
920.00	-36	Horiz	62.50
1,380.00	-40.5	Horiz	67.00
1,380.00	-42.5	Vert	69.00
1,840.00	-44.1	Vert	70.60
1,840.00	-46.6	Horiz	73.10
4,140.00	-54.7	Vert	81.20
2,300.00	-56.4	Vert	82.90
2,760.00	-56.4	Horiz	82.90
2,300.00	-56.4	Horiz	82.90
2,760.00	-57.4	Vert	83.90
940.00	-32.3	Vert	58.80
940.00	-36.6	Horiz	63.10
1,410.00	-41.2	Vert	67.70
1,410.00	-44.9	Horiz	71.40
1,880.00	-50.6	Vert	77.10
1,880.00	-51.8	Horiz	78.30
2,350.00	-56.2	Vert	82.70
2,350.00	-57.7	Horiz	84.20
469.70	-92.2	Vert	118.70

Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407
9kHz-30MHz						
Loop Antenna	00314	EMCO	6502	2014	062804	062806
30-1000MHz						
Biconilog Antenna	01995	Chase	CBL6111C	2451	080105	080107
Pre-amp	00309	HP	8447D	1937A02548	071404	071406
Antenna cable	NA	NA	RG214	Cable#15	010305	010306
Pre-amp to SA cable	NA	Pasternack	RG223/U	Cable#10	051605	051606
1000-5000MHz						
Horn Antenna	0849	EMCO	3115	6246	072204	072206
Microwave Pre-amp	00786	HP	83017A	3123A00281	081204	081206
Heliax Antenna cable	NA	Andrew	LDF1-50	Cable#20	091604	091606
24" SMA Cable	2604	Argosy	UFA147A	0-0360-200200	012304	012306

Radiated Emissions - Front View

Radiated Emissions - Back View

Radiated Emissions - Back View Loop Antenna

FCC 2.1033(c)(14)/2.1055/90.213- FREQUENCY STABILITY

Test Conditions: The EUT is placed in the temperature chamber. RF signal is monitored from the antenna port. A spectrum analyzer is employed to measure the frequency stability of the EUT.

Customer: **The Toro Company**
WO#: **84317**
Test Engineer: **E. Wong**

Device Model #: EUT
Operating Voltage: 110 **Vac**

Frequency Limit: 2.50E+00 **ppm**

Temperature Variations

Channel Frequency:		Channel 1 (MHz) 449.998117000	Dev (ppm)	Channel 2 (MHz) 459.997975000	Dev (ppm)	Channel 3 (MHz) 469.997767000	Dev (ppm)
Temp (C)	Voltage						
-30	110	449.999092000	-2.166676	459.999025000	-2.282619	469.998817000	-2.234053
-20	110	449.998742000	-1.388895	459.998500000	-1.141309	469.998358000	-1.257453
-10	110	449.998225000	-0.240001	459.998159000	-0.400002	469.998075000	-0.655322
0	110	449.998158000	-0.091111	459.998050000	-0.163044	469.998025000	-0.548939
10	110	449.998108000	0.020000	459.998016000	-0.089131	469.997983000	-0.459577
20	110	449.998117000	0.000000	459.997975000	0.000000	469.997767000	0.000000
30	110	449.998233000	-0.257779	459.997766000	0.454350	469.998433000	-1.417028
40	110	449.998291000	-0.386668	459.998500000	-1.141309	469.998433000	-1.417028
50	110	449.998458000	-0.757781	459.998417000	-0.960874	469.998290000	-1.112771

Voltage Variations (±15%)

Temp (C)	Voltage	Channel 1 (MHz)	Dev. (ppm)	Channel 2 (MHz)	Dev. (ppm)	Channel 3 (MHz)	Dev. (ppm)
20	93.5	449.998033000	0.186667	459.997950	0.054348	469.997808	-0.087234
20	110.0	449.998117000	0.000000	459.997975	0.000000	469.997767	0.000000
20	126.5	449.998075000	0.093334	459.997925	0.108696	469.997867	-0.212767

Max Deviation (ppm)	+	**0.18667**		+	**0.45435**	+	**0.00000**
Max Deviation (ppm)	-	**2.16668**		-	**2.28262**	-	**2.23405**
		PASS			**PASS**		**PASS**

Test Equipment Frequency Stability : Temperature Variation

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Temperature Chamber	01878	Thermaltron	S1.2	NA	071904	071906
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407
Temperature Data logger	01620	HP	34970A	US70131892	05/09/05	05/09/06
20 Ch Thermalcouple module	01849	HP	34901A	US37603966	05/09/05	05/09/06

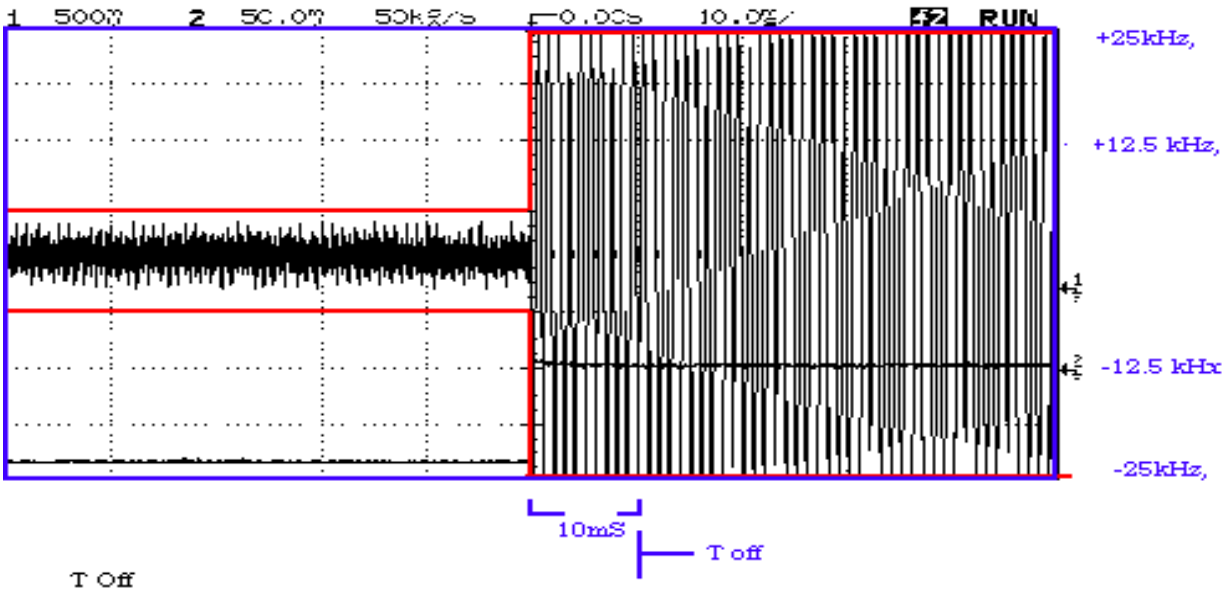
Test Equipment Temperature stability: Voltage Variation

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
AC Power Source	01695 / 01696	Pacific Power	345AMX / UPC32	250 / 245	052305	052307
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407

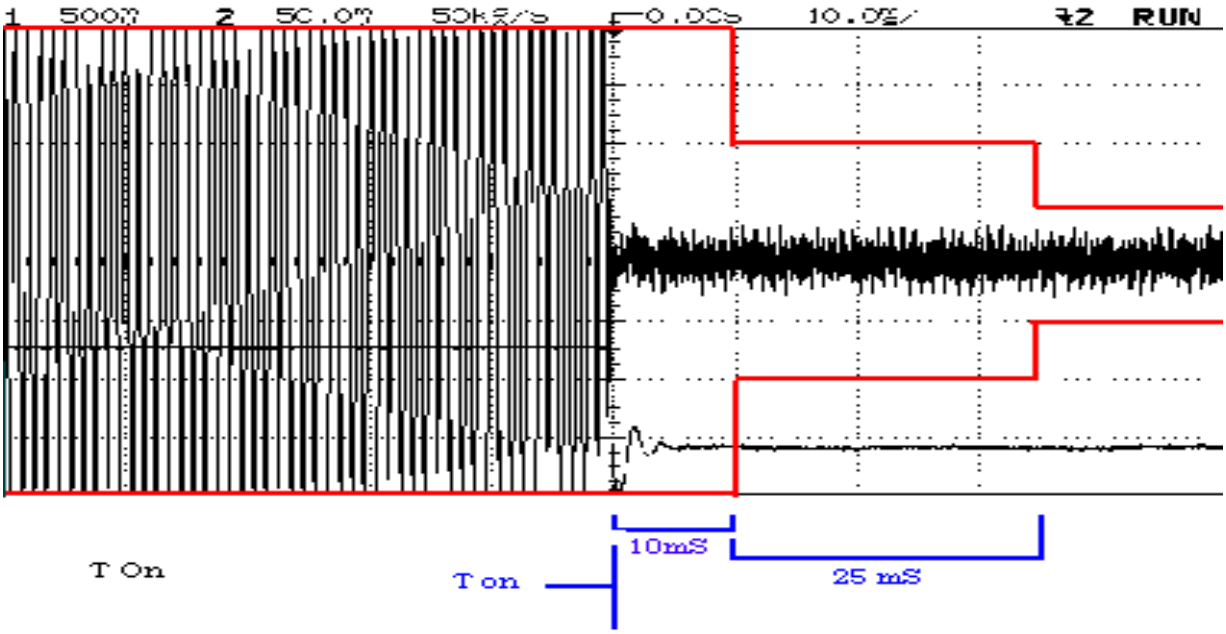
Frequency Stability

FCC 90.214 - Transient Frequency Behavior

Test Conditions: Test was performed IAW TIA/EIA 603. The TX port is connected to a modulation analyzer via directional coupler and port 1 of a combiner. A FM signal is injected to port 2 of the combiner. The modulation out of the modulation analyzer is connected to Ch1 of the oscilloscope. Ch2 of the oscilloscope is connected to the output port of the directional coupler. Oscilloscope triggers on CH2. Plots were captured for Key on and Key off. The result satisfied the FCC requirements.



Key Off (10 mS/Div)



Key On (10 mS/Sec)

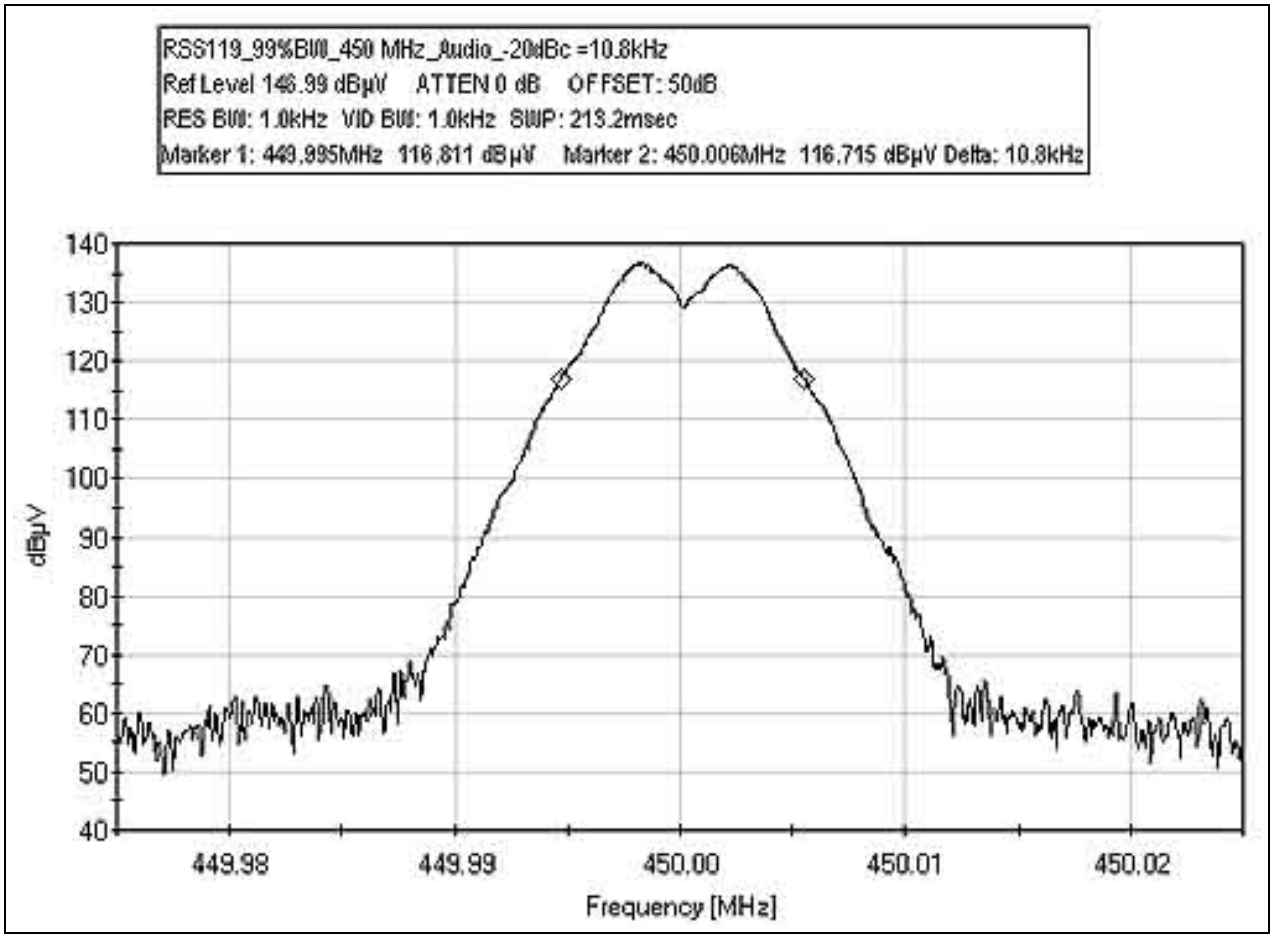
Test Equipment Transient Frequency Response

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Oscilloscpoe	00320	HP	54615B	US354208264	081204	081206
Analyzer, Modulation	02072	HP	8901A	2751A05181	102504	102506
Signal Generator	02351	Marconi	2022D	119158/054	081805	081807
Directional Coupler	00714	Werlatone	C2630	3806	042005	042007

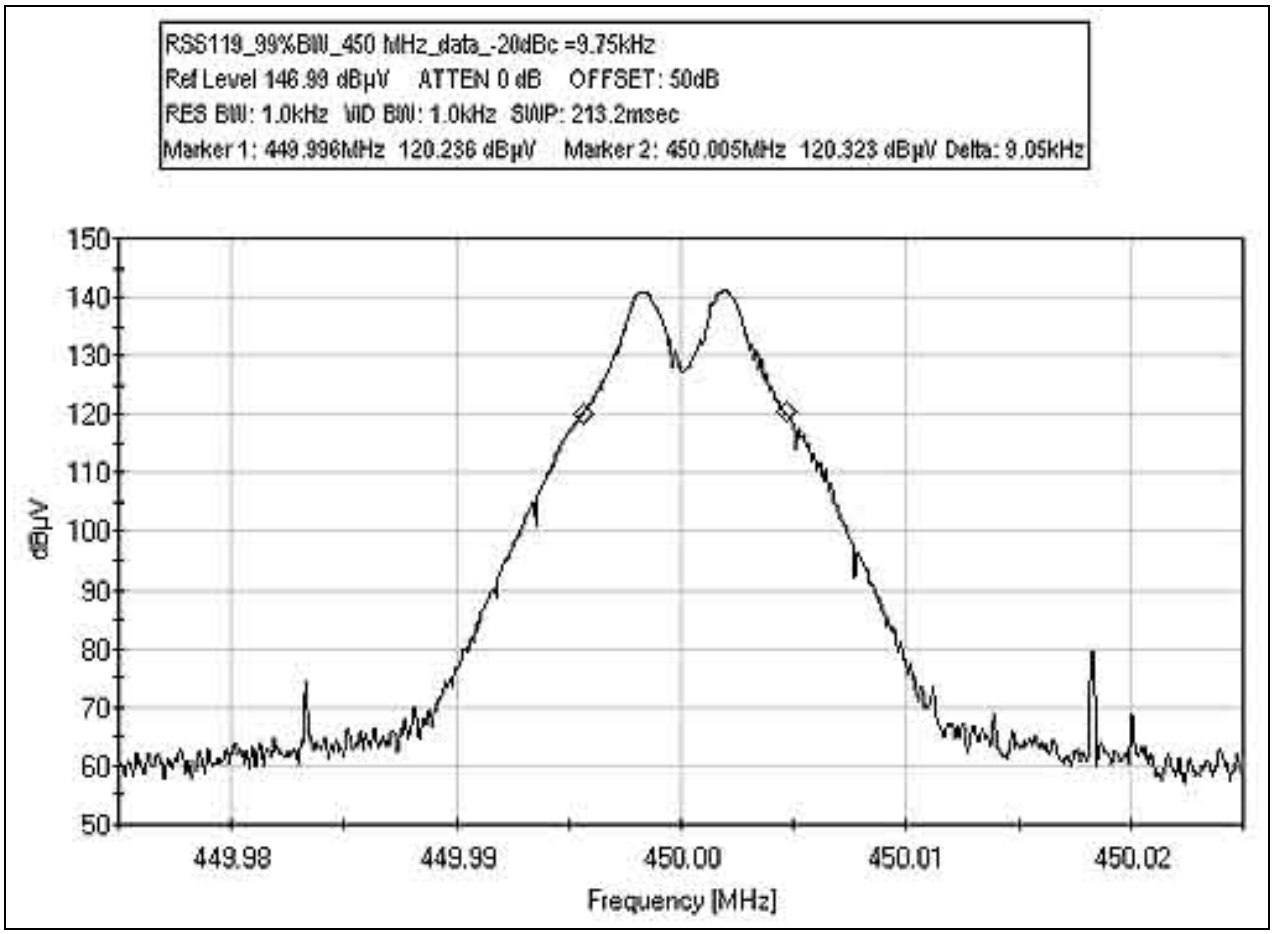
Transient Frequency Behavior

RSS-119 99% BANDWIDTH 450MHz - AUDIO

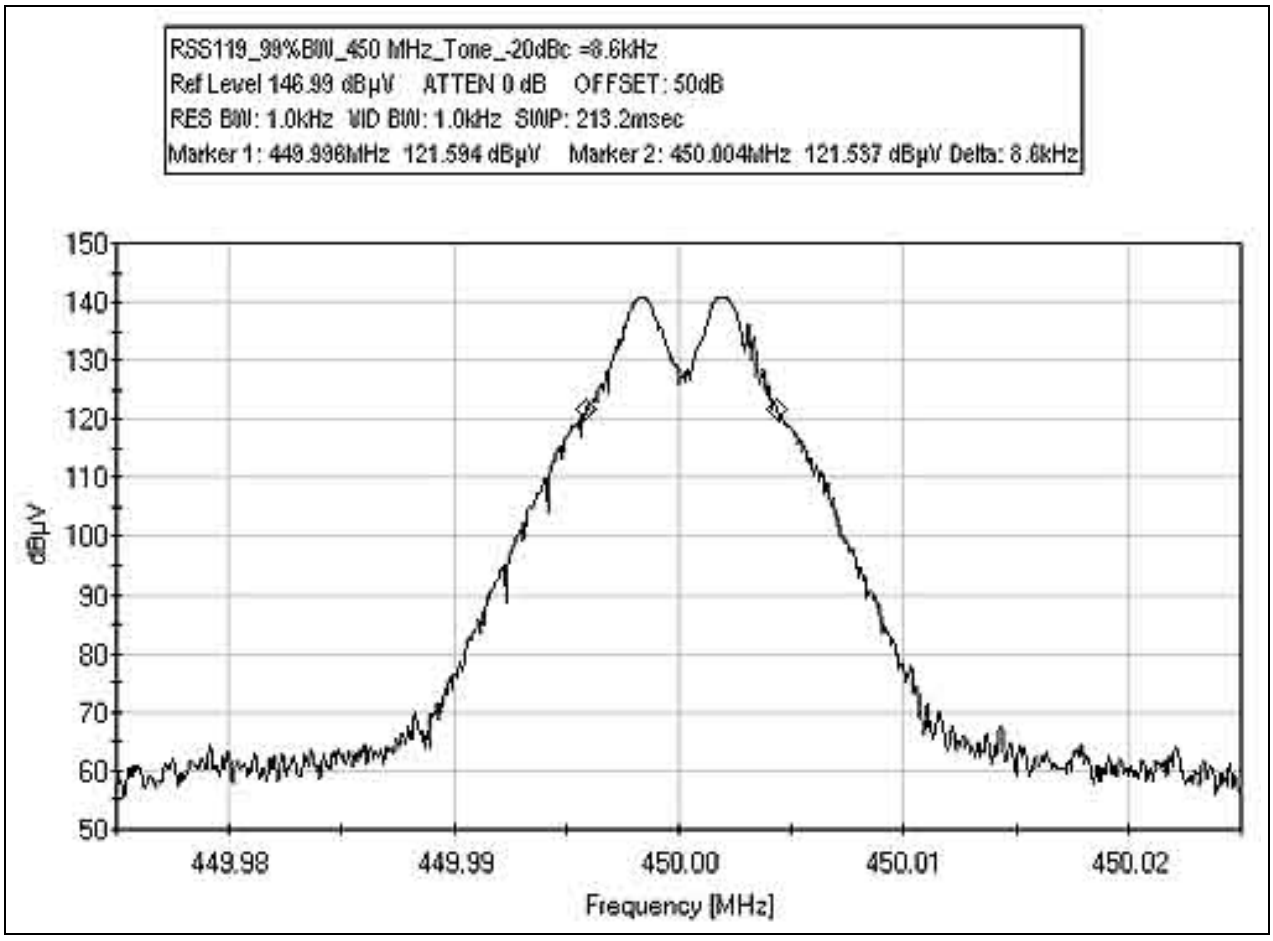
Test Conditions: Table top EUT is placed on the wooden table. Com port 1 is connected to remote laptop. Alarm port and telco ports are connected sections of unterminated cable. Com port 2 is left unpopulated and service port external radio and keyboard PS2 ports are left unpopulated. EUT in Transmit mode. Measurement performed at antenna terminal.



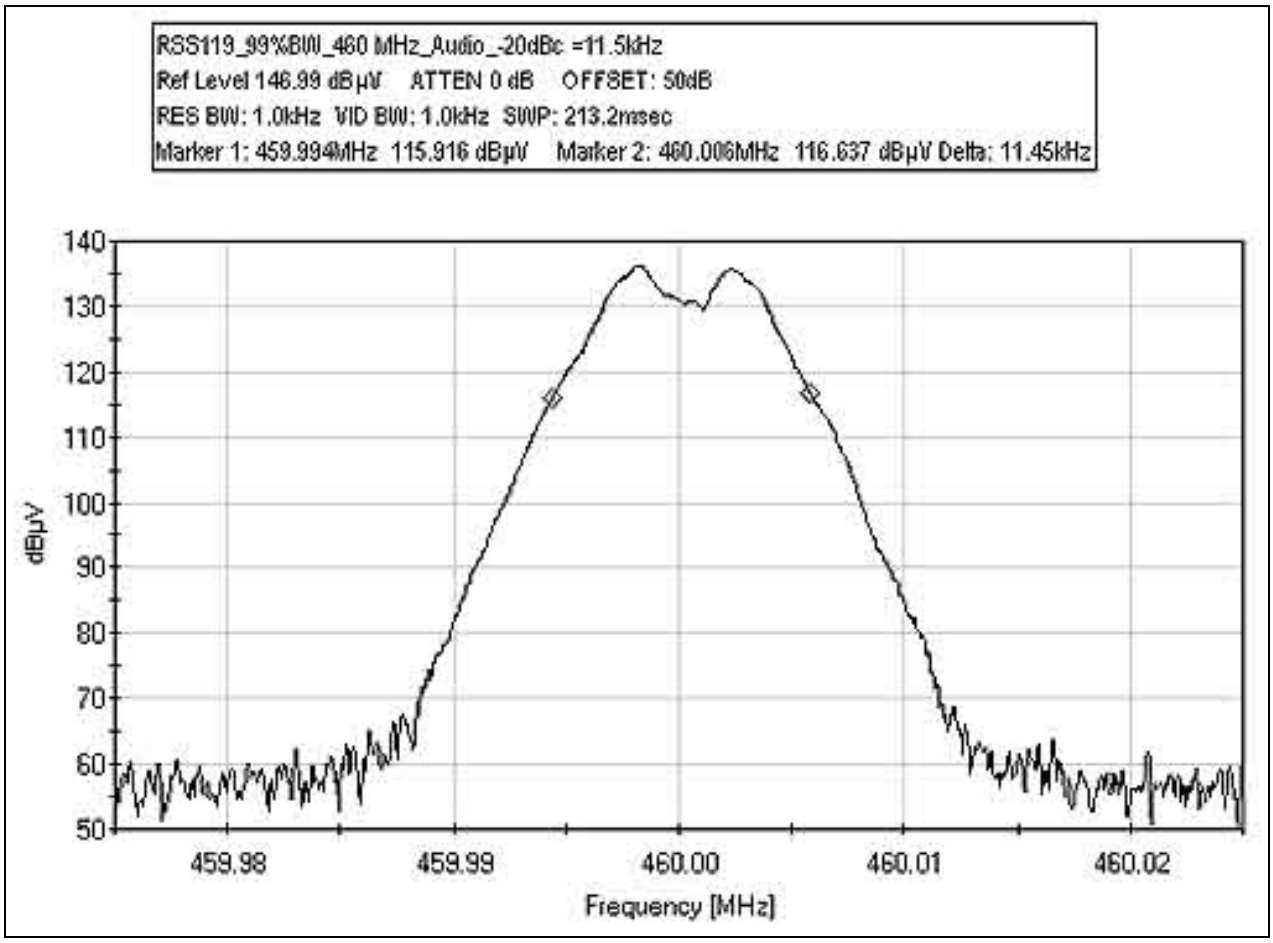
RSS-119 99% BANDWIDTH 450MHz - DATA



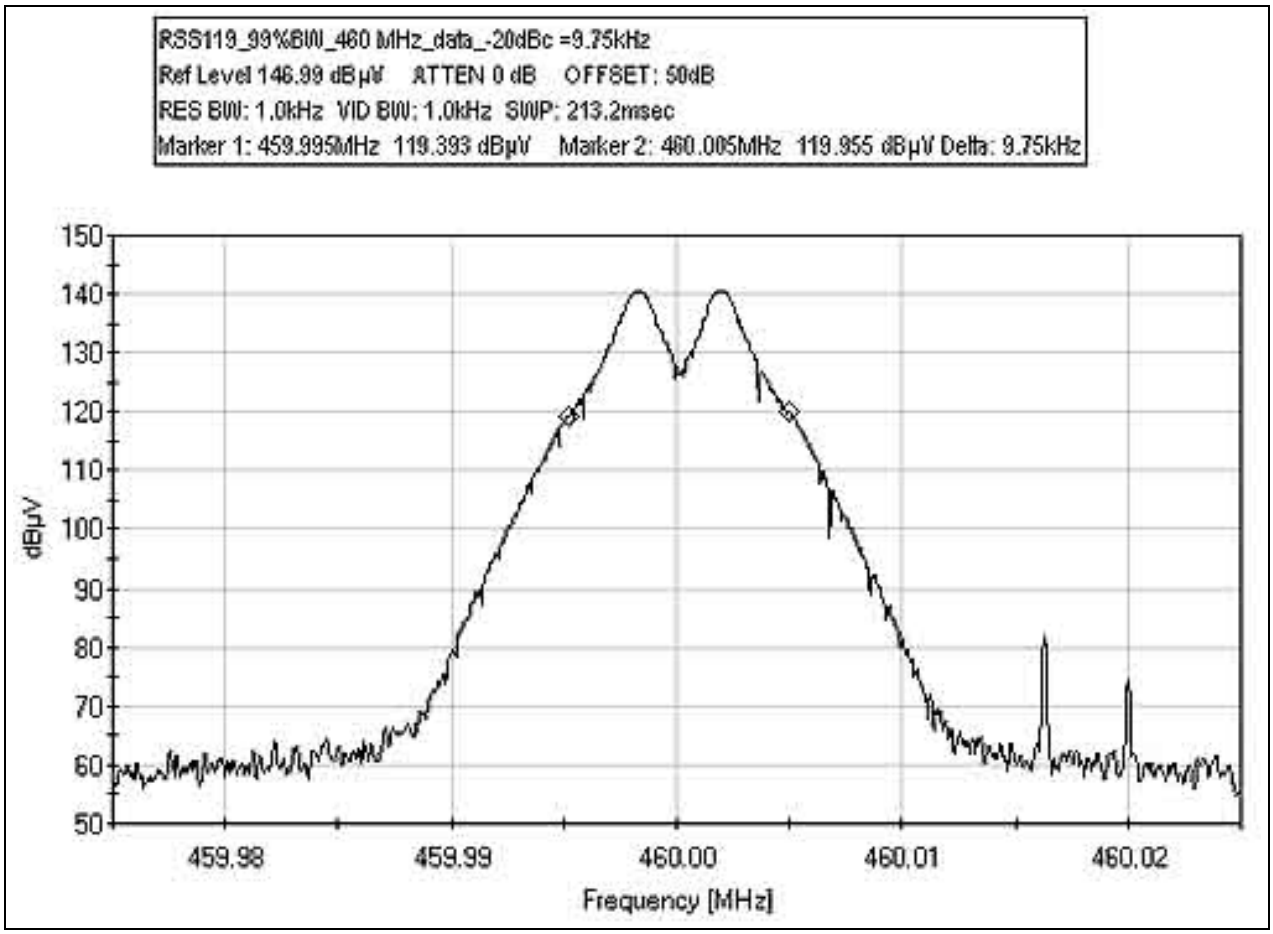
RSS-119 99% BANDWIDTH 450MHz - TONE



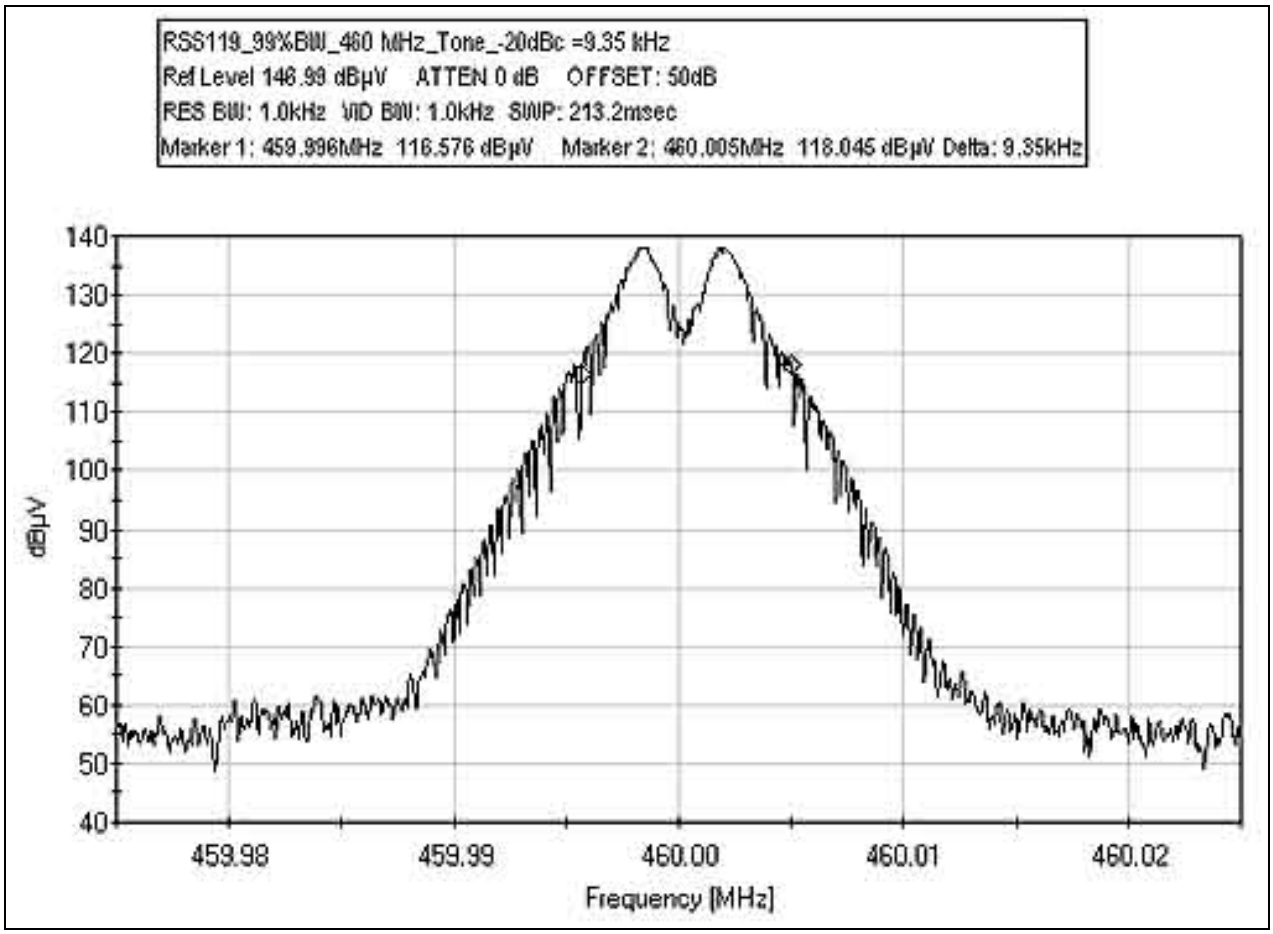
RSS-119 99% BANDWIDTH 460MHz - AUDIO



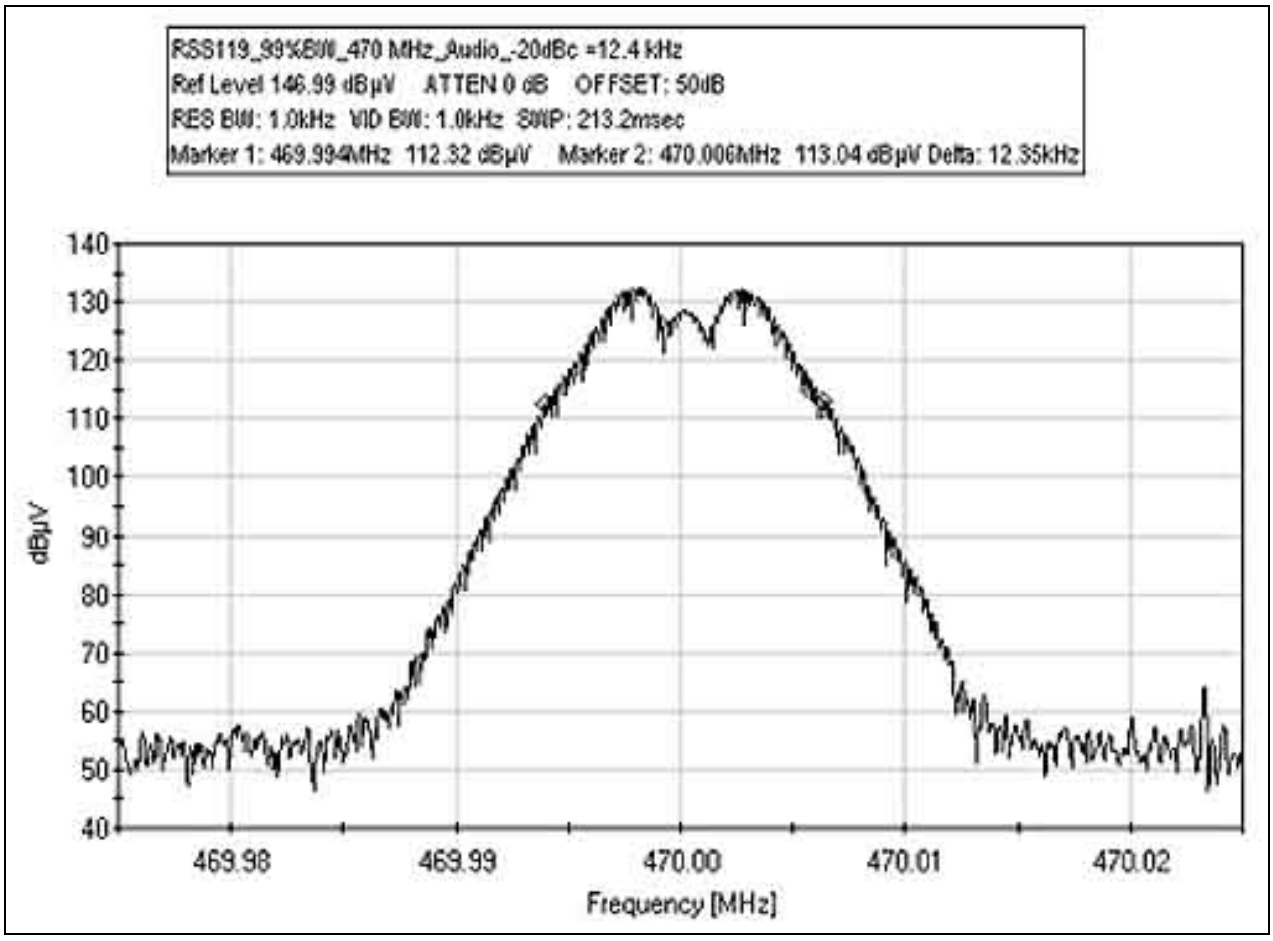
RSS-119 99% BANDWIDTH 460MHz - DATA



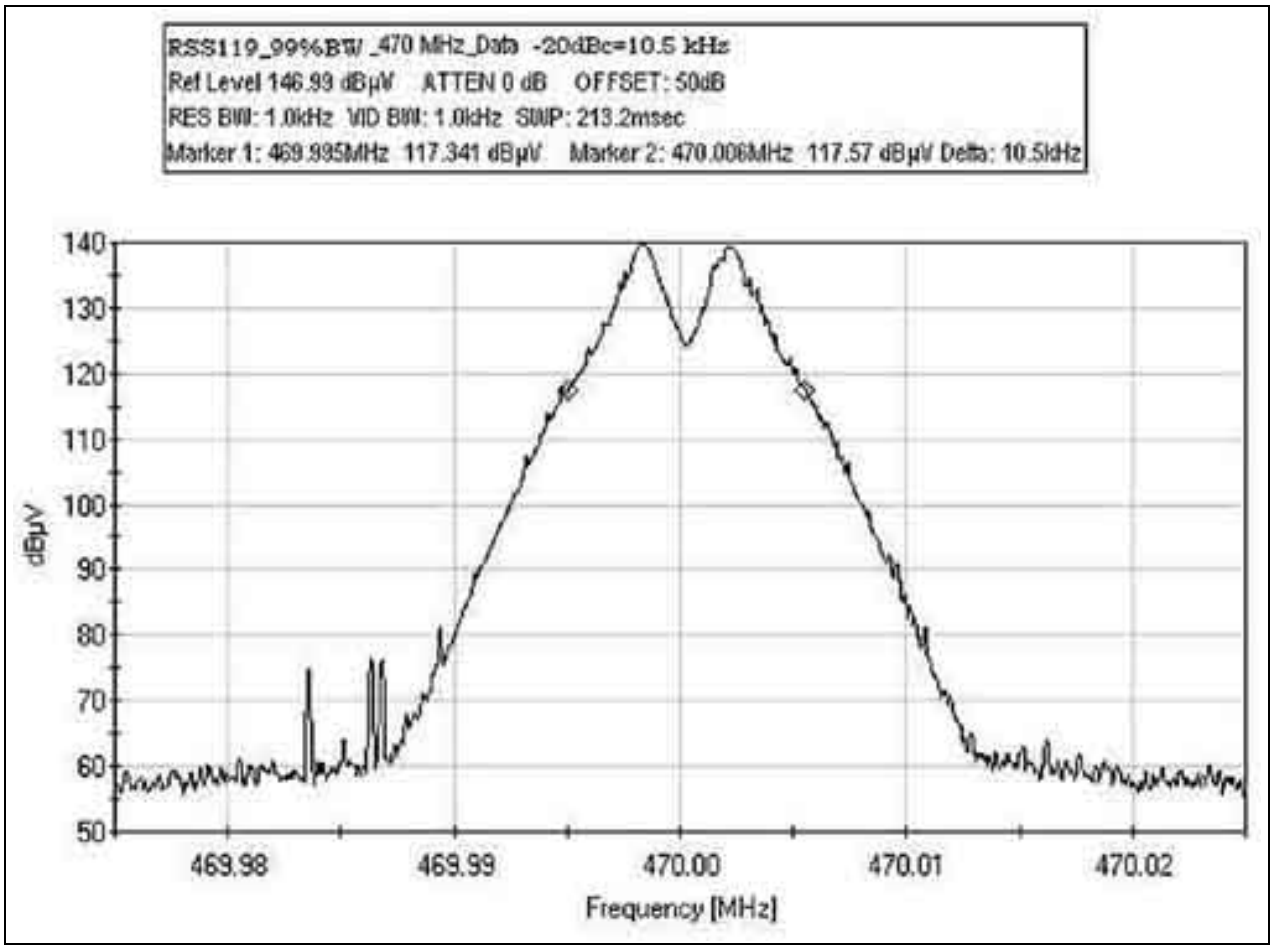
RSS-119 99% BANDWIDTH 460MHz - TONE



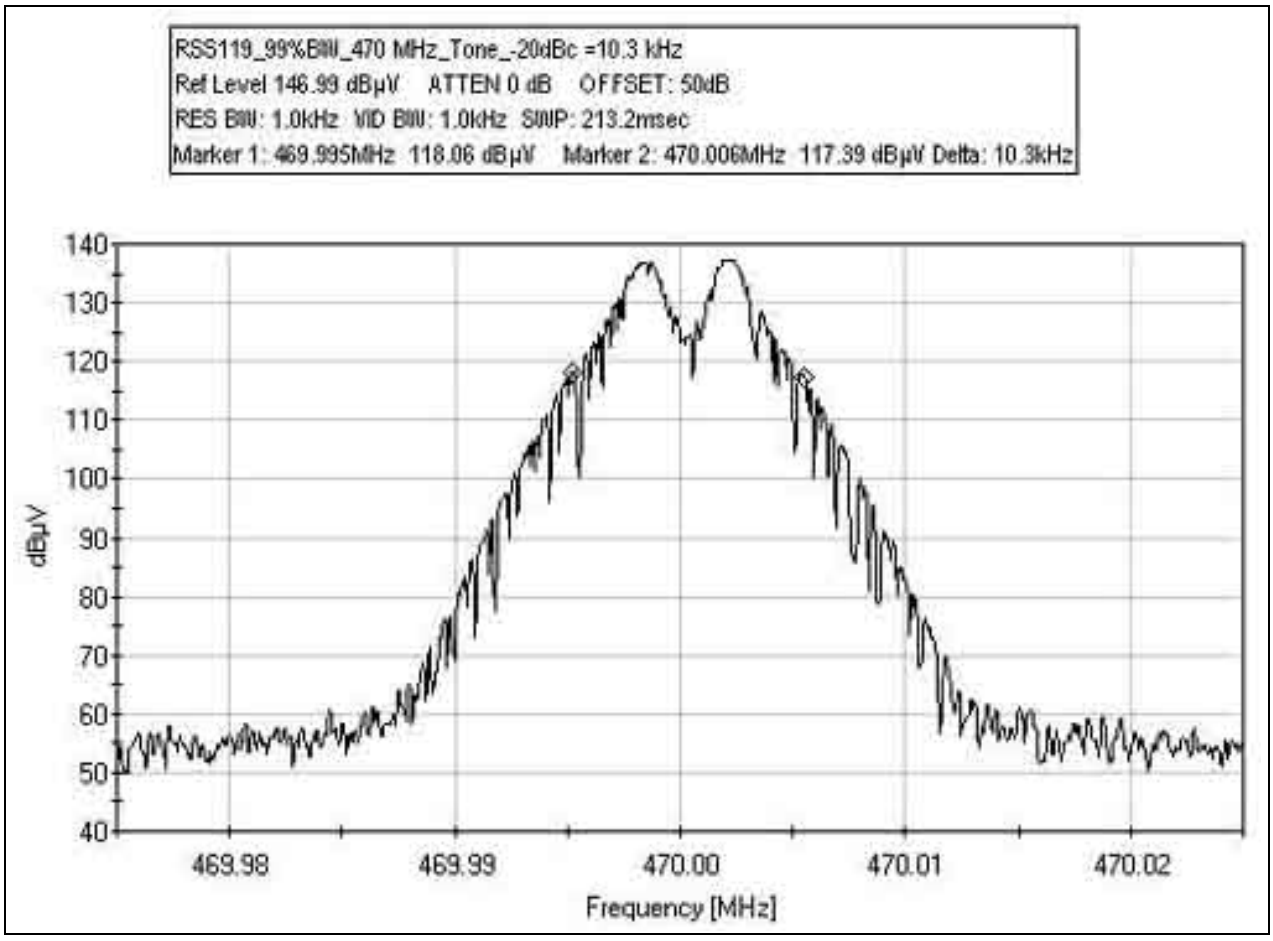
RSS-119 99% BANDWIDTH 470MHz - AUDIO



RSS-119 99% BANDWIDTH 470MHz - DATA



RSS-119 99% BANDWIDTH 470MHz - TONE



Test Equipment

Equipment	Asset #	Manufacturer	Model #	Serial #	Cal Date	Cal Due
Spectrum Analyzer	02672	Agilent	E4446A	US44300438	011405	011407
Oscilloscpoe	00320	HP	54615B	US354208264	081204	081206

Direct Connect Test Setup