REV	Δ	Description	Sheet Effected	Date	Drawn	Checked
A				20.05.05	D.Lanuel	S.Cohen

EMC Laboratory

TXL-700-2

FCCID: LSQ-TXL-700-2
Manufactured by
Elmotech Ltd.

EMC Test Report

According FCC Part 15 Requirements

May 2005

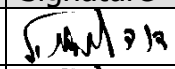
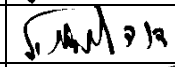
	Function/Title	Name	Signature	Date
Prepared by	Test Engineer	D.Lanuel		20.05.05
Checked by	Test Engineer	D.Lanuel		20.05.05
Approved by	EMC Lab. Manager	S.Cohen		20.05.05

Table of Contents

Para Page No

1 Introduction

a. Scope

This document describes the measurement procedures and tests for FCC part 15 of the TXL-700-2 Manufactured by Elmotech Ltd.

Equipment Under Test:	TXL-700-2
FCCID	LSQ-TXL-700-2 Horizontal Antenna
Manufacturer:	Elmotech System Ltd.
Serial Numbers:	1000
Mode of Operation:	TX MODE
Receiver operating frequency:	433.92MHZ
Year of Manufacture:	2005

b. Applicant Information:

Applicant:	Elmotech System Ltd.
Applicant Address	2, Habarzel Street Tel-Aviv
Telephone:	+972-3-6478871
FAX:	+972-3-6478872
The testing was observed by: Following applicant's personnel:	LEV ROSMAN

c. Test Performance:

Date of reception for testing:	08.06.05
Dates of testing	08.06.05
Test Laboratory Location	TADIRAN EMC LAB, Hashoftim 26 Holon 5810-42 ISRAEL Tel: 972-3-5574476 Fax: 972-3-5575320
Applicable EMC Specification:	Federal Communication Commission (FCC), Code of Federal Regulations 47, FCC Docket 89-103,Part 15: Radio Frequency Devices, Sections 15.109, 15.209,15.107, 15.207 & 15.231.
Applicable EMC Specification:	**F**ederal **C**ommunication **C**ommission (FCC), FCC Part 15: Radio Frequency Devices, Sections 15.109, 15.209 & 15.231.15.207

2 Test Summary and Signatures.

TADIRAN EMC Laboratory has completed testing of E.U.T in accordance with the requirements of the FCC Part 15 Regulations for Class B equipment.

The E.U.T was found to comply with the requirements of the FCC Part 15 Regulations given below

Test	Test Description	Section	PASS/FAIL
1	Bandwidth of the emission	15.231	PASS
2	Field strength of fundamental	15.231	PASS
3	Radiation emission	15.109	PASS
4	Radiation emission	15.231 & 15.205	PASS

a. **Test performed by:**

Mr. D. Lanuel Test Engineer

b. **Test Report prepared by:**

Mr. D. Lanuel Test Engineer

c. **Test Report Approved by:**

Mr. Samuel Cohen EMC Lab. Manager

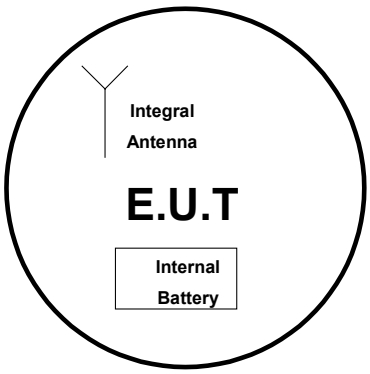
3 E.U.T information

a. **E.U.T description**

(1) The EUT is an Ankle watch which contain an integral transmitter. It is used to monitor offender status within an area covered by a local positioning system. The device in active mode transmits 5msec identification & status signal with interval to be a random time of 18-22sec

b. **E.U.T Test Configuration**

E.UT test configuration is shown in figure bellow



c. **E.U.T Mode of Operation description**

(1) 433.92MHz TX Mode

4 BANDWIDTH OF THE EMISSION part 15.231.c—TEST RESULTS

E.U.T:	TXL-700-2 S/N 1000
Test Method:	ANSI C63.4
Date:	08/06/05
Relative Humidity:	37%
Ambient Temperature:	22c
Air Pressure:	1042hpa
Test Setup:	Figure 11

Testing Engineer: D.Lanuel **Date** 15/06/05

a. **Test Results Summary & Conclusions**

The E.U.T was found in compliance with Bandwidth of Radiated Emission fundamental frequency requirement according to section 15.231.c

b. **Limits of bandwidth**

The test unit shall meet the limits of Table 4.b

Table 4.b Limits For Bandwidth

Frequency (MHz)	Bandwidth Max Limits (%)	Bandwidth Max Limits (KHz)
433.92	0.25	1085

c. **Test Instrumentation and Equipment**

Table 4.c Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/06
Broadband Antenna	BTA-L	FRANKONIA	10.04.06

d. **Results**

Table 4.d Bandwidth Test Result

Frequency (MHz)	Bandwidth (KHz)	Bandwidth Max Limit (KHz)	Plot No	PASS/FAIL
433.92.00	225	1085	1	PASS

e. **Procedure**

The Bandwidth is determined at the point 20db down from the modulated carrier, while the spectrum analyzer was set to "max hold" and VBW –10KHz.

5 Field strength of fundamental part 15.231-TEST RESULTS

E.U.T:	TXL-700-2 S/N 1000
Test Method:	ANSI C63.4
Date:	08/06/05
Relative Humidity:	37%
Ambient Temperature:	22c
Air Pressure:	1042hpa
Test Setup:	Figure 11

Testing Engineer: D.Lanuel **Date** 15/06/05

a. **Test Results Summary & Conclusions**

The E.U.T was found in compliance with fundamental frequency requirement

b. **Limits of Field Strength for fundamental according 15.231**

The test unit shall meet the limits of Table 5.b.

Table 5.b Limits For Fundamental

Frequency (MHz)	Average Max Limits (dBμV/m)	Peak Max Limits (dBμV/m)
433.92	81	101

c. **Test Instrumentation and Equipment**

Table 5.c Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/06
Broadband Antenna	BTA-L	FRANKONIA	10.04.06

d. **Test Results**

Table 5.d Average Factor

TX Period(min)	Duty Cycle (min)	Average Factor (db)	Plot Reference
7ms	7/100=0.07	20log0.0.7=-23	11,12

Table 5.d.1 Peak Result of Fundamental

Frequency (MHz)	Peak Result (dBμV/m)	Peak Limits (dBμV/m)	Margin (DB)	Plot No	Pass/ Fail
433.92	94.1	100.8	6.7	Plot-2	PASS

Table 5.d.2 Average Result of Fundamental

Peak Result (dBμV/m)	Average Factor	Calculation Results	Average Limits (dBμV/m)	Margin (dB)	Pass/ Fail
94.1	-23	71.1	81	9.9	PASS

e. **Test Procedure**

The EUT was placed on the top of rotating table 0.8 meters above the ground and the table was rotated 360°, the height of antenna is varied from one to 4 meters (vertical and horizontal polarization) to determine the max field strength of fundamental

6 Radiated emission part 15.231 & 15.205-test results

E.U.T:	TXL-700-2 S/N 1000
Test Method:	ANSI C63.4
Date:	08/06/05
Relative Humidity:	37%
Ambient Temperature:	22c
Air Pressure:	1042hpa
Test Setup:	Figure 11

Testing Engineer: D.Lanuel **Date** 15//06/05

a. **Test Results Summary & Conclusions**

The E.U.T was found in compliance with 15.231

b. **Limits of Radiated Interference Field Strength according 15.231**

The test unit shall meet the limits of Table 6.b.

Table 6.b Limits For 15.231(b)

Frequency range (MHz)	Average Limits (dBμV/m)	Peak Limits (dBμV/m)
0.009 – 4000	61	81

c. **Test Instrumentation and Equipment**

Table 6.c Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/06
Loop Antenna	HFH2-Z2	Rohde&Schwarz	N.P.C.R
Double Ridge Guide Antenna (1-18GHz)	3105	EMCO	24.04.06
Broadband Antenna	BTA-L	FRANKONIA	10.04.06
Low Noise Amplifier (0-1GHz)	AM-1300-N	MITEQ	14.01.06
Low Noise Amplifier (1-2GHz)	SMC-09	MITEQ	14.01.06
Low Noise Amplifier (2-6GHz)	SMC-09	MITEQ	14.01.06

d. **Preliminary Results**

Table 6.d Preliminary Test Results for intentional Emissions in TX Mode 15.231

Antenna Polarization	Freq. Range MHz	Res. BW (kHz)	Plot No.	Pass/Fail
Vertical	0.009 – 0.15	0.2	Plot-3	Pass
Horizontal			Plot-4	Pass
Vertical	0.15 - 30	9	Plot-5	Pass
Horizontal			Plot-6	Pass
Both Hor.& Ver	30-1000	120	Plot-7	Pass
	1,000-2.800	1000	Plot-8	Pass
	2.800-3,200	1000	Plot-9	Pass

e. **Final Results**

Table 6.e Six Highest Peak Emission Test Results

Freq. (MHz)	Peak Reading (*) (dBμV/m)	Limit dBμV/m	Margin (dB)	Pass/Fail
419	62	81	19	PASS
1735.565	58.6	81	22.4	PASS
2169	52.6	81	28.4	PASS
2603.89	52.5	81	28.5	PASS

*Restricted band

Table 6.e.1 Six Highest Average Emission Test Results

Freq. (MHz)	Calculated (dBμV/m)	Limit dBμV/m	Margin (dB)	Pass/Fail
419	39	61	22	Pass
1735.565	35.6	61	25.4	Pass
2169	29.6	61	31.4	Pass
2603.89	29.5	61	31.5	Pass

Average Emission Calculate: Peak value + Average Factor (-23)

f. **Test Procedure**

(1) **Preliminary Test Procedure**

a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a chamber shielded

b) The E.U.T was set 3 meters away from the receiving antenna, which was mounted on the top of a variable-height antenna tower.

c) The Antenna height varied from one meter above the ground over its full-allowed range of travel and the table was rotated 360°to determine the maximum value of the field strength

d) The antenna was set both horizontal and vertical polarization.

(2) **Final Test Procedure**

a) The EUT was tested at open area for each suspected emission

b) The test procedure was performed according paragraph (1) and figure 11

g. **Final Test Setup**

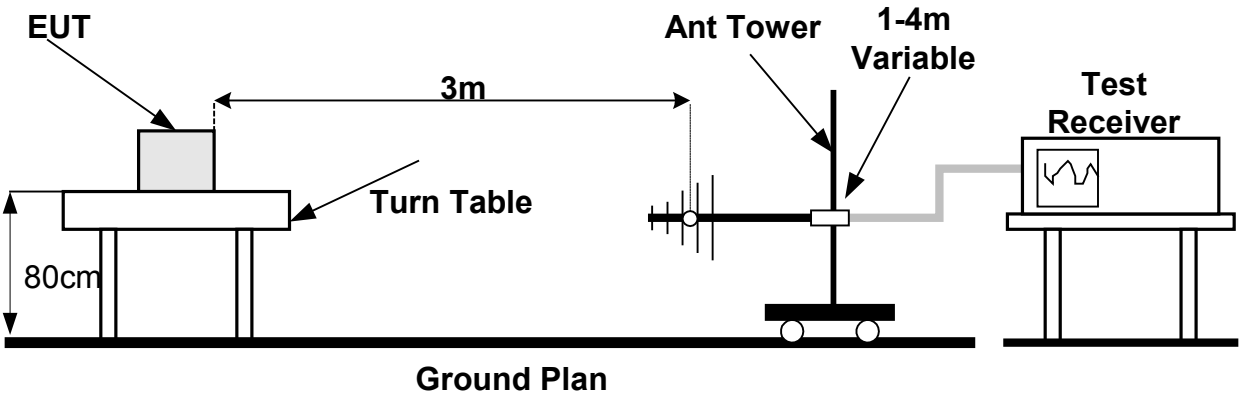


Figure 11 Radiated Emission Set up

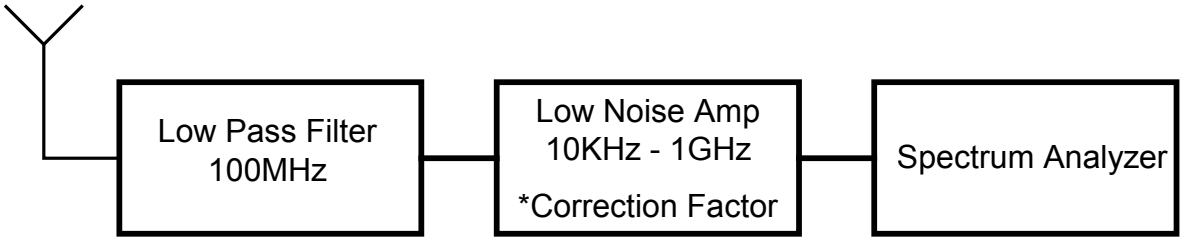


Figure 12 Radiated Emission test 10KHz – 30MHz

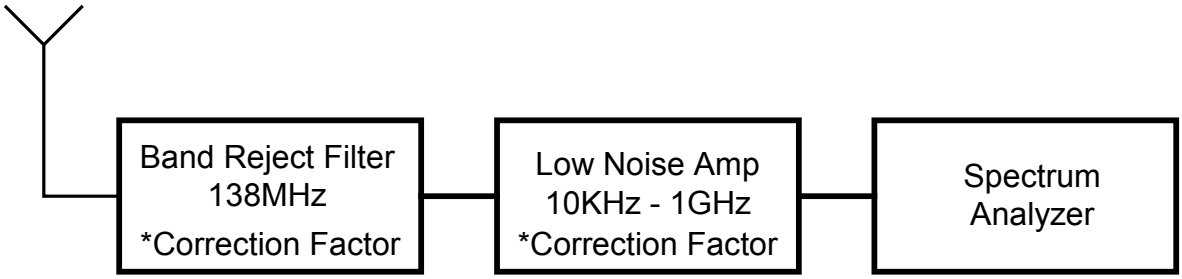


Figure 13 Radiated Emission test 30MHz – 1GHz

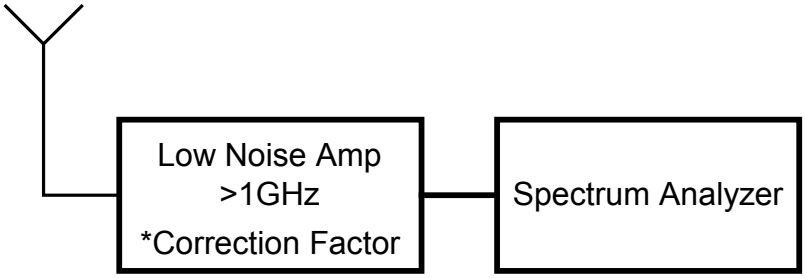
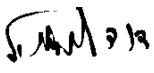


Figure 14 Radiated Emission test above 1GHz

7 Radiated emission part 15.109-test results (for STBY mode).

a. Preliminary Radiated emission Test Result According Part 15.109

E.U.T:	TXL-700-2 S/N 1000
Test Method:	ANSI C63.4
Date:	08/06/05
Relative Humidity:	37%
Ambient Temperature:	22c
Air Pressure:	1042hpa
Test Setup:	Figure 11

Testing Engineer: D.Lanuel  **Date** 15/06/05

b. Test Results Summary & Conclusions

The E.U.T was found in compliance with 15.109

c. Limits of Radiated Interference Field Strength according 15.109

The test unit shall meet the limits of Table 7.c for Class B equipment.

Table 7.c Limits For 15.109 Class B equipment

Frequency Range (MHz)	Quasi-peak Limits (dBμV/m)
30 - 88	40
88 - 216	43
216 - 960	46
960 - 2000	54

d. **Test Instrumentation and Equipment**

Table 7.d Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/06
Double Ridge Guide Antenna (1-18GHz)	3105	EMCO	24.04.06
Broadband Antenna (30-1000MHz)	BTA-L	FRANKONIA	10.04.06
Low Noise Amplifier (0-1GHz)	AM-1300-N	MITEQ	14.01.06
Low Noise Amplifier (1-2GHz)	SMC-09	MITEQ	14.01.06
Low Noise Amplifier (2-6GHz)	SMC-09	MITEQ	14.01.06

e. **Results**

(1) **Preliminary Test Results**

Table 7.e Preliminary Test Results for Unintentional Emissions in RX Mode 15.109

Antenna Polarization	Freq. Range MHz	Res. BW (kHz)	Plot No.	PASS/FAIL
Both	30-1000	120	Plot-10	Pass
	1000-2.800	120	-	Pass
	2,800-4,400	1000	-	Pass

(2) **Final Test Results**

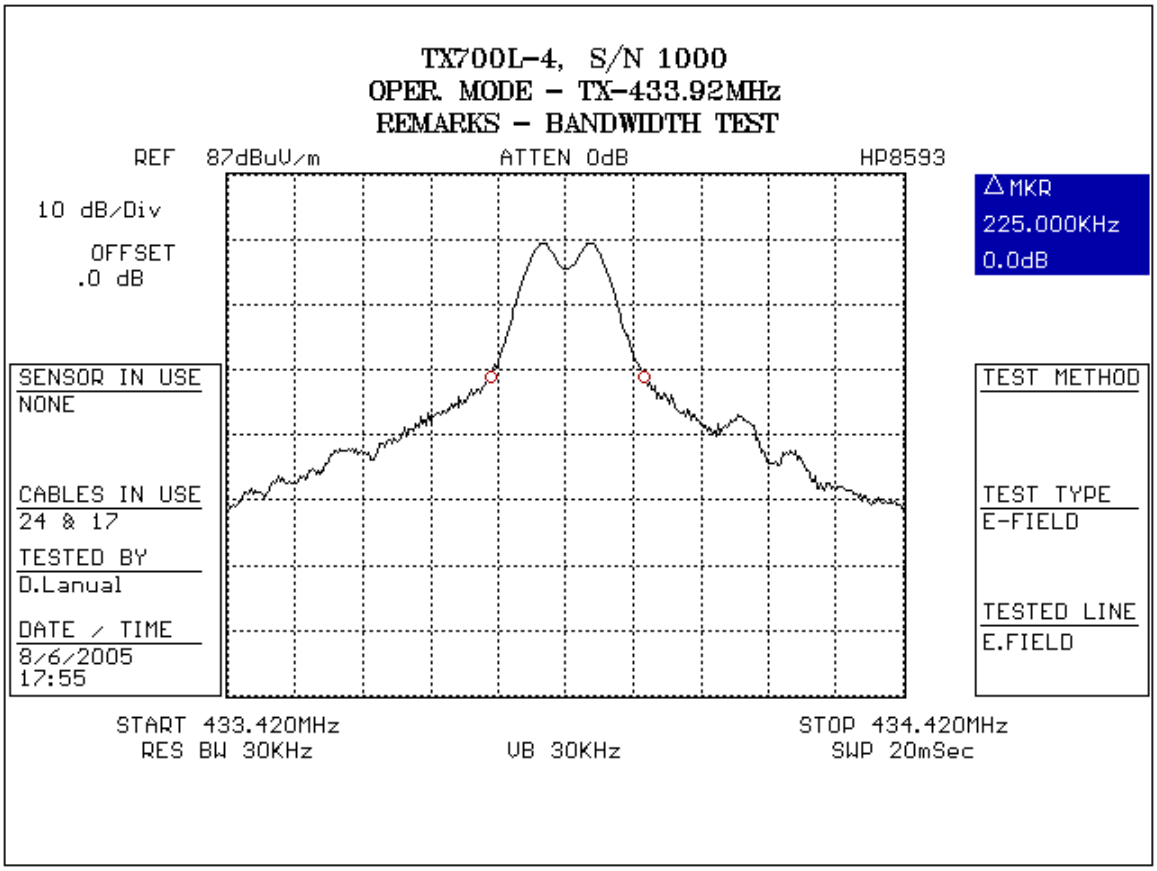
Table 7.f Six Highest RX Mode 15.109

Freq. (MHz)	Peak Reading (*) (dBμV/m)	Limit dBμV/m	Margin (dB)	Polarity Ver/Hor	Height (m)
30-1000	The Emissions are at least 20db below the unintentional limits				
1000-4,400	No Emission-Background noise only				

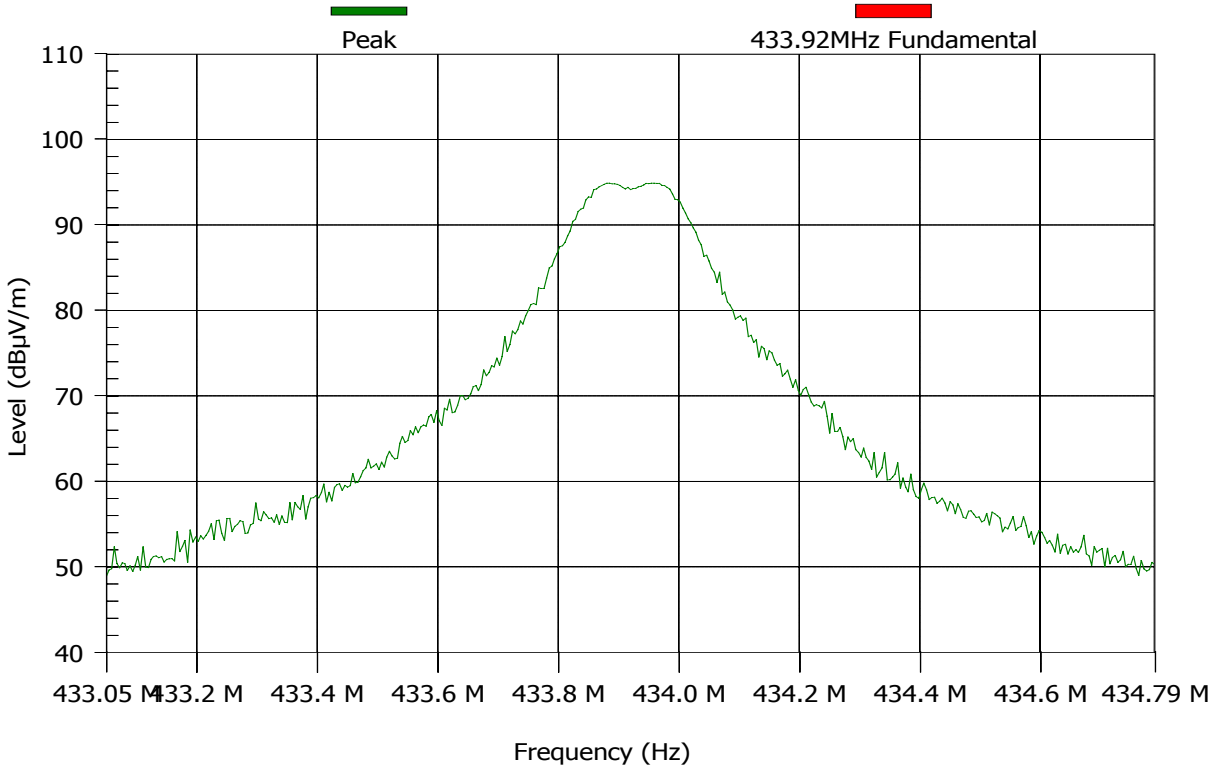
f. **Test Procedure**

See paragraph 7.f

8 Plots



Plot/ 1

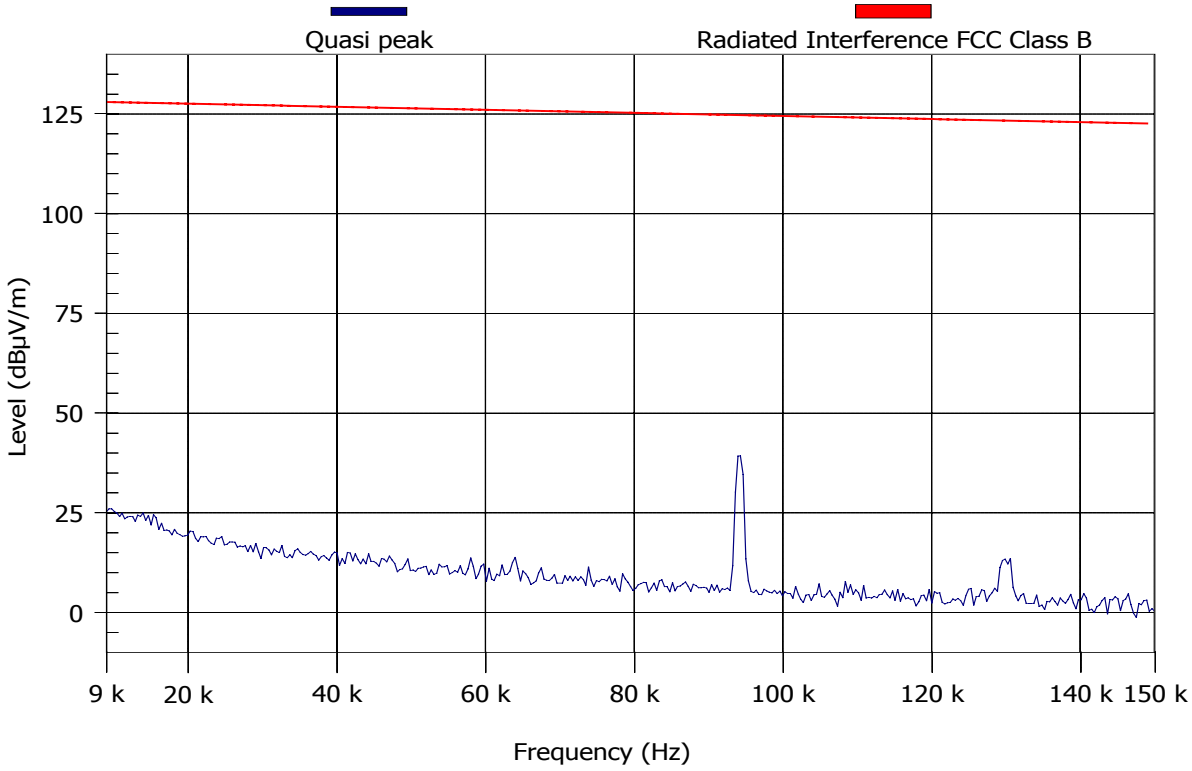


Plot/ 2

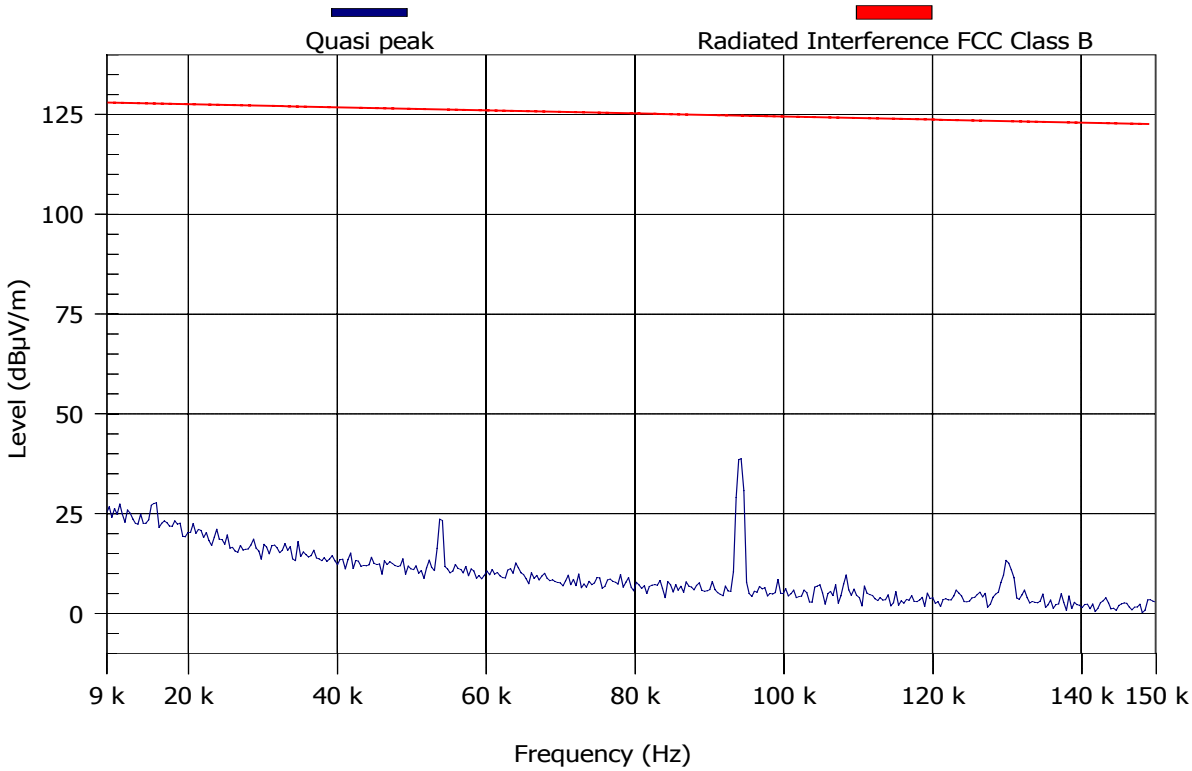
MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

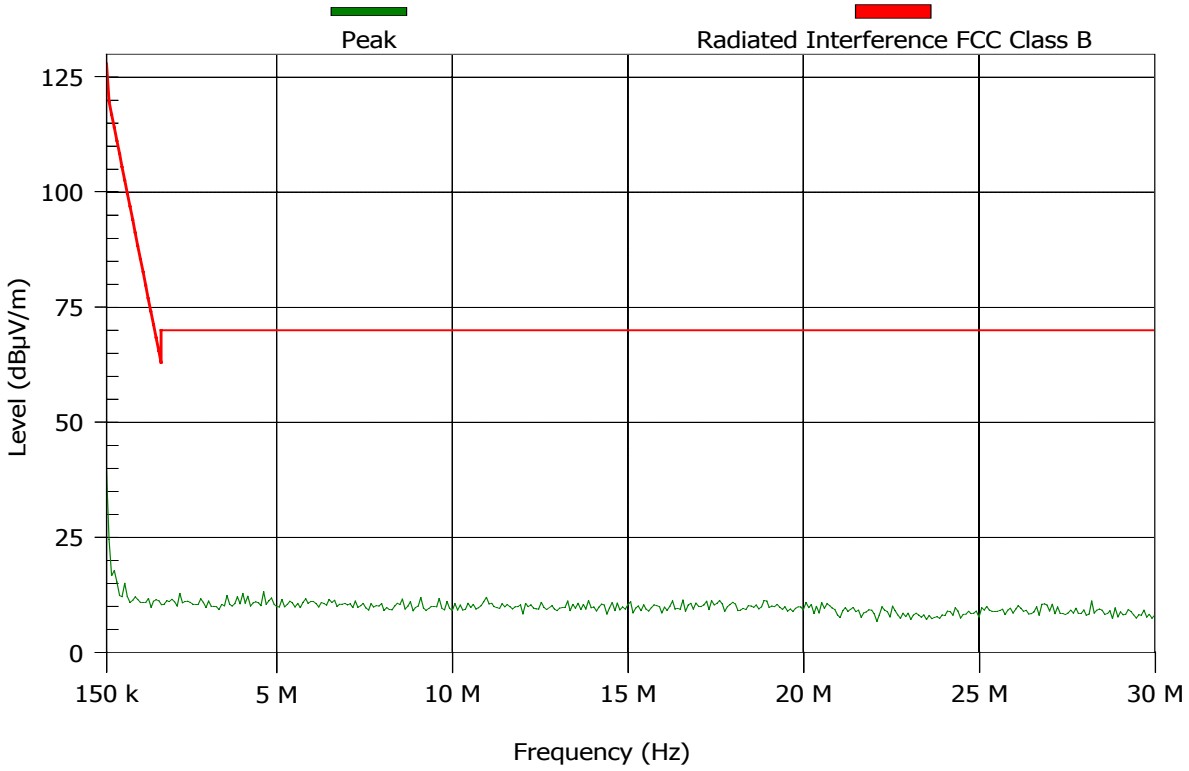
Nr	Frequency (MHz)	PK MaxHold (dBµV/m)	PK Limit (dBµV/m)	Result	Angle (degrees)	Height (m)	H/V
1	433.959	94.1	100.8	Pass	300	1	H


Quasi peak
Radiated Interference FCC Class B
Level (dBµV/m)
125
100
75
50
25
0
9 k
20 k
40 k
60 k
80 k
100 k
120 k
140 k
150 k
Frequency (Hz)

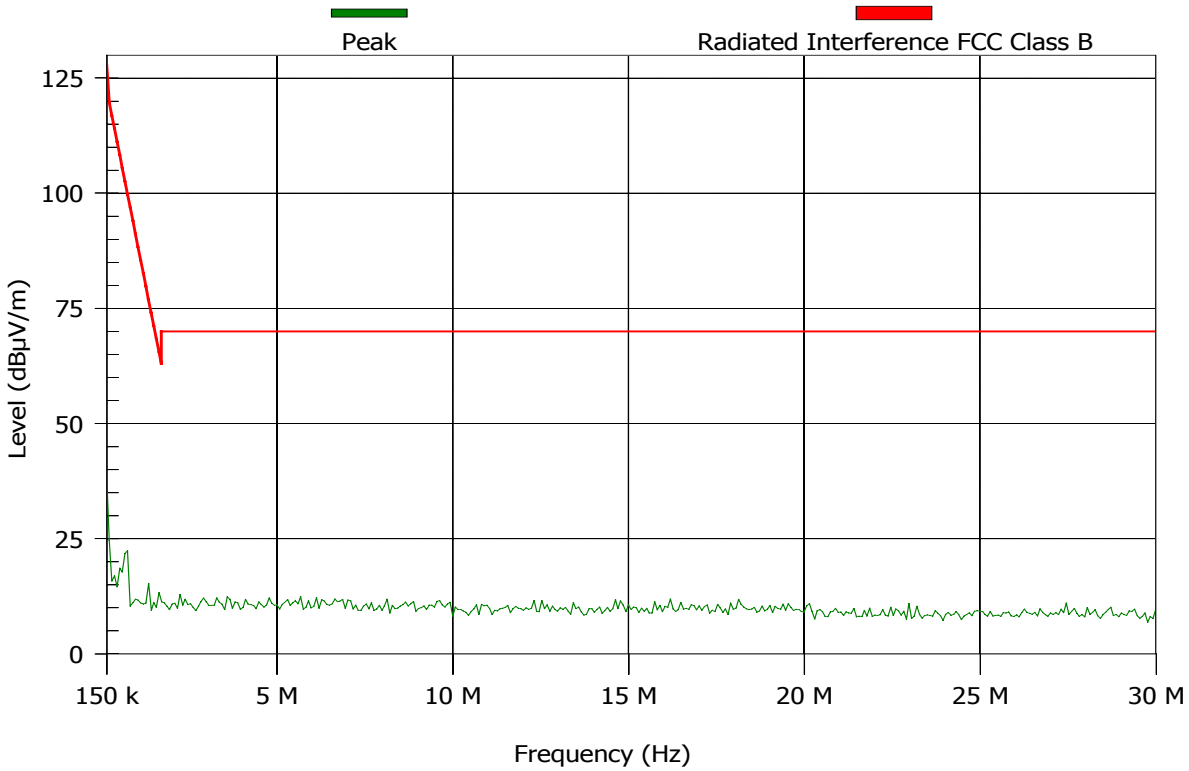
Plot/ 3


Quasi peak
Radiated Interference FCC Class B
Level (dBµV/m)
125
100
75
50
25
0
9 k
20 k
40 k
60 k
80 k
100 k
120 k
140 k
150 k
Frequency (Hz)

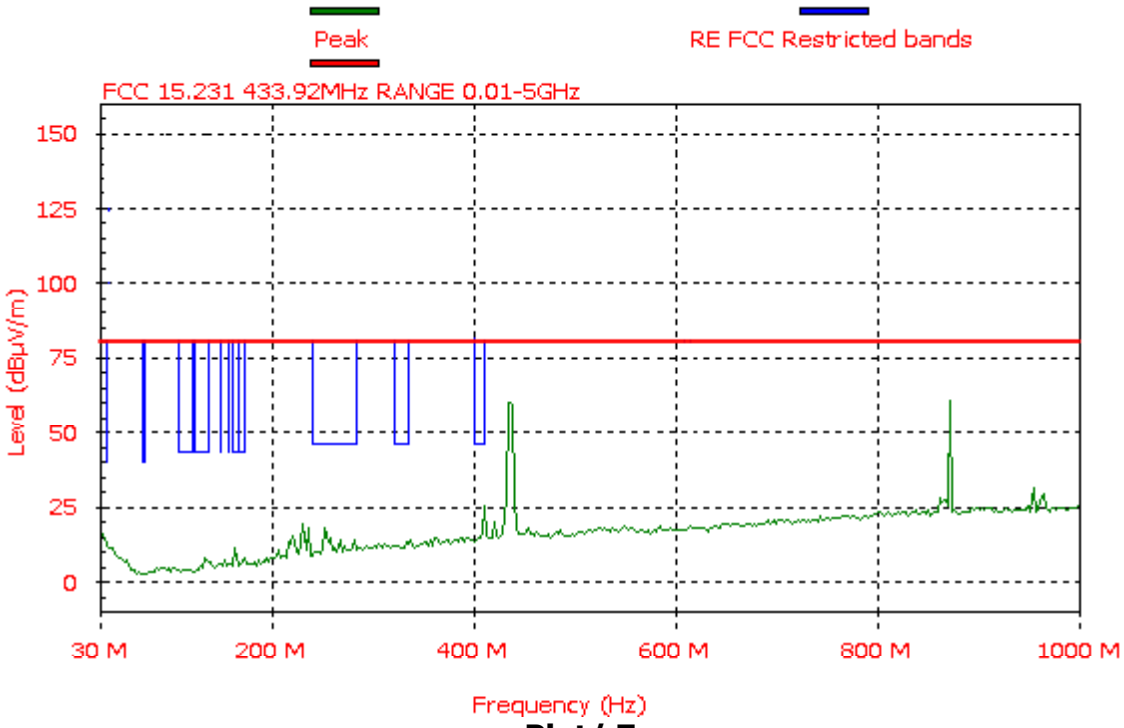
Plot/ 4


Peak
Radiated Interference FCC Class B
125
100
75
50
25
0
Level (dBµV/m)
150 k
5 M
10 M
15 M
20 M
25 M
30 M
Frequency (Hz)

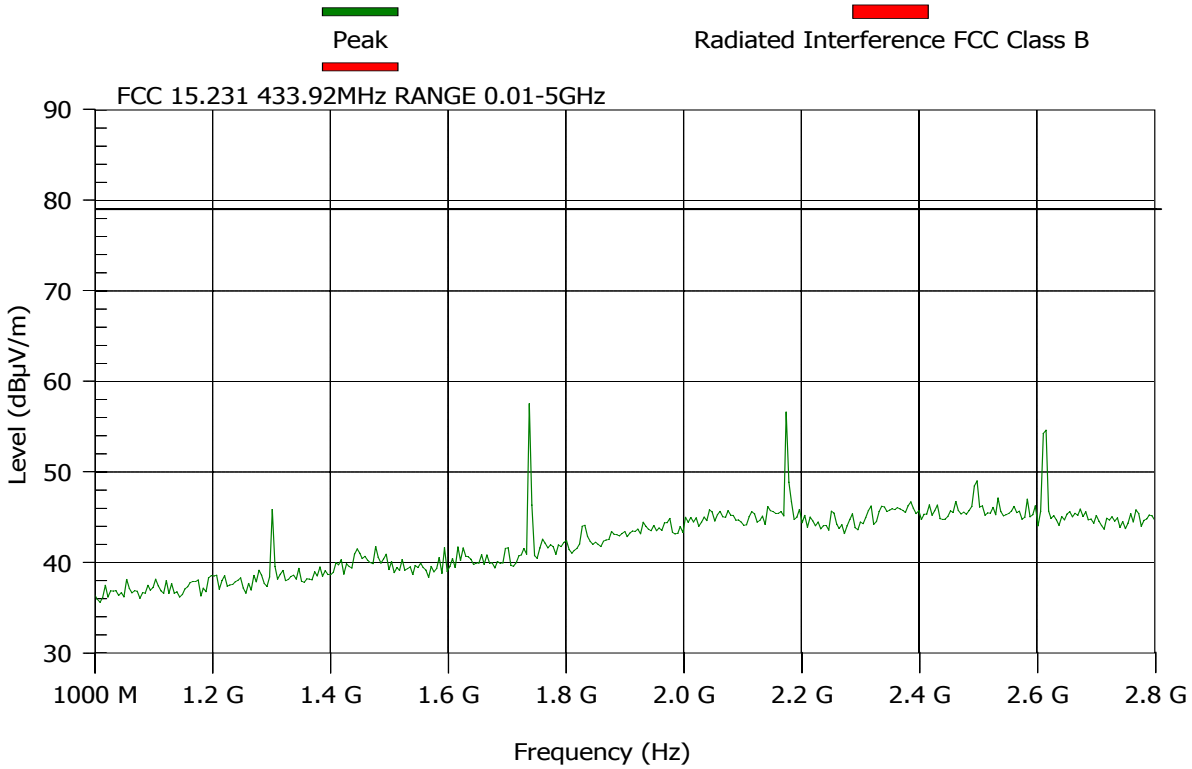
Plot/ 5


Peak
Radiated Interference FCC Class B
125
100
75
50
25
0
Level (dBµV/m)
150 k
5 M
10 M
15 M
20 M
25 M
30 M
Frequency (Hz)

Plot/ 6


Peak
RE FCC Restricted bands
FCC 15.231 433.92MHz RANGE 0.01-5GHz
150
125
100
75
50
25
0
Level (dBµV/m)
30 M
200 M
400 M
600 M
800 M
1000 M
Frequency (Hz)

Plot/ 7

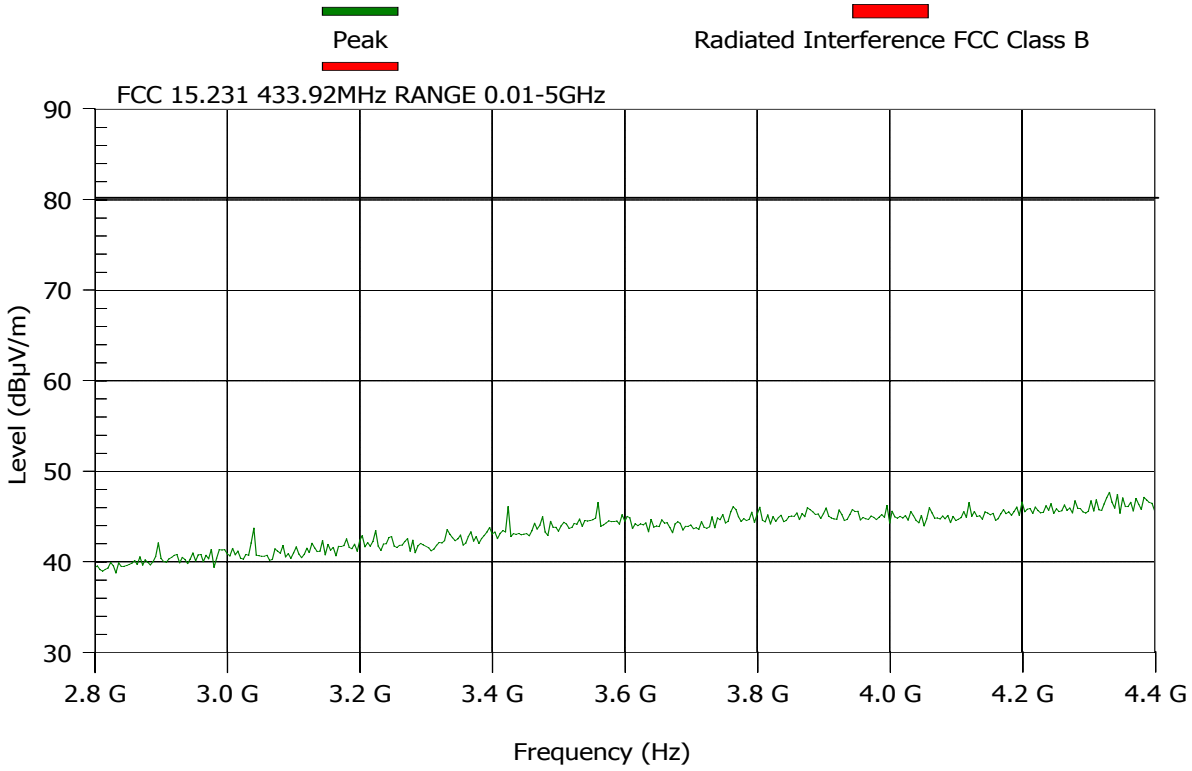


Plot/ 8

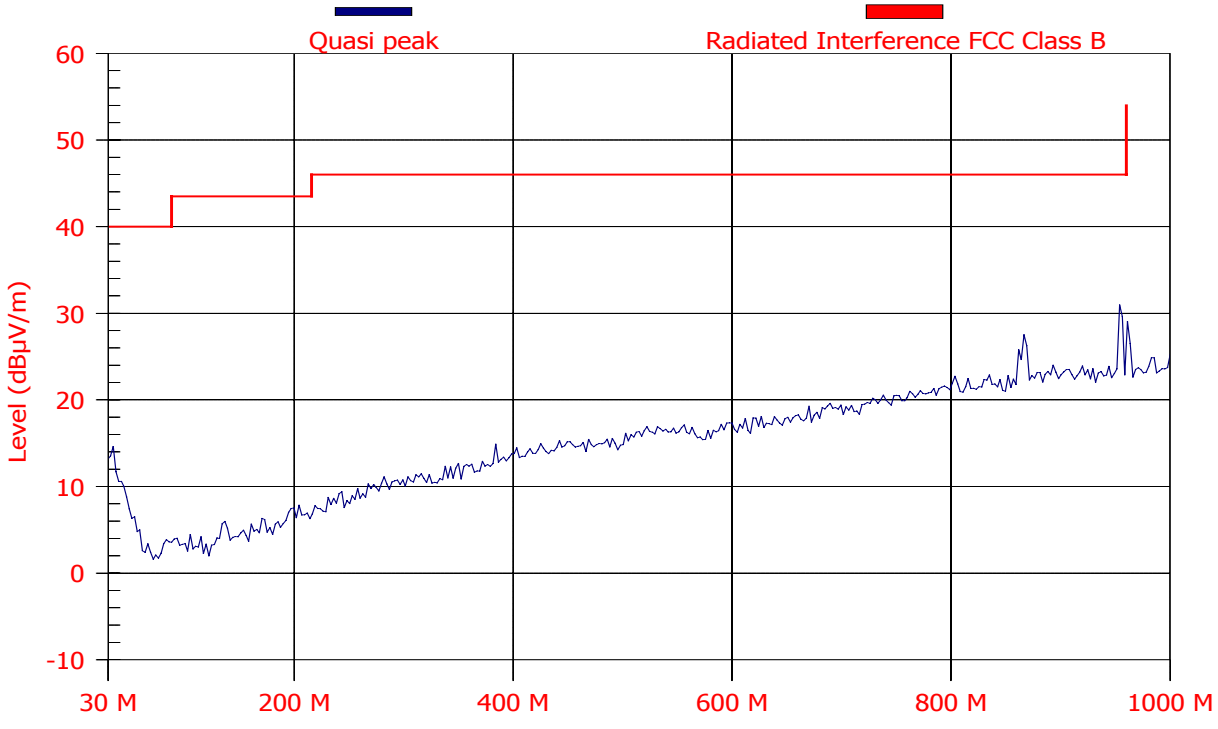
MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

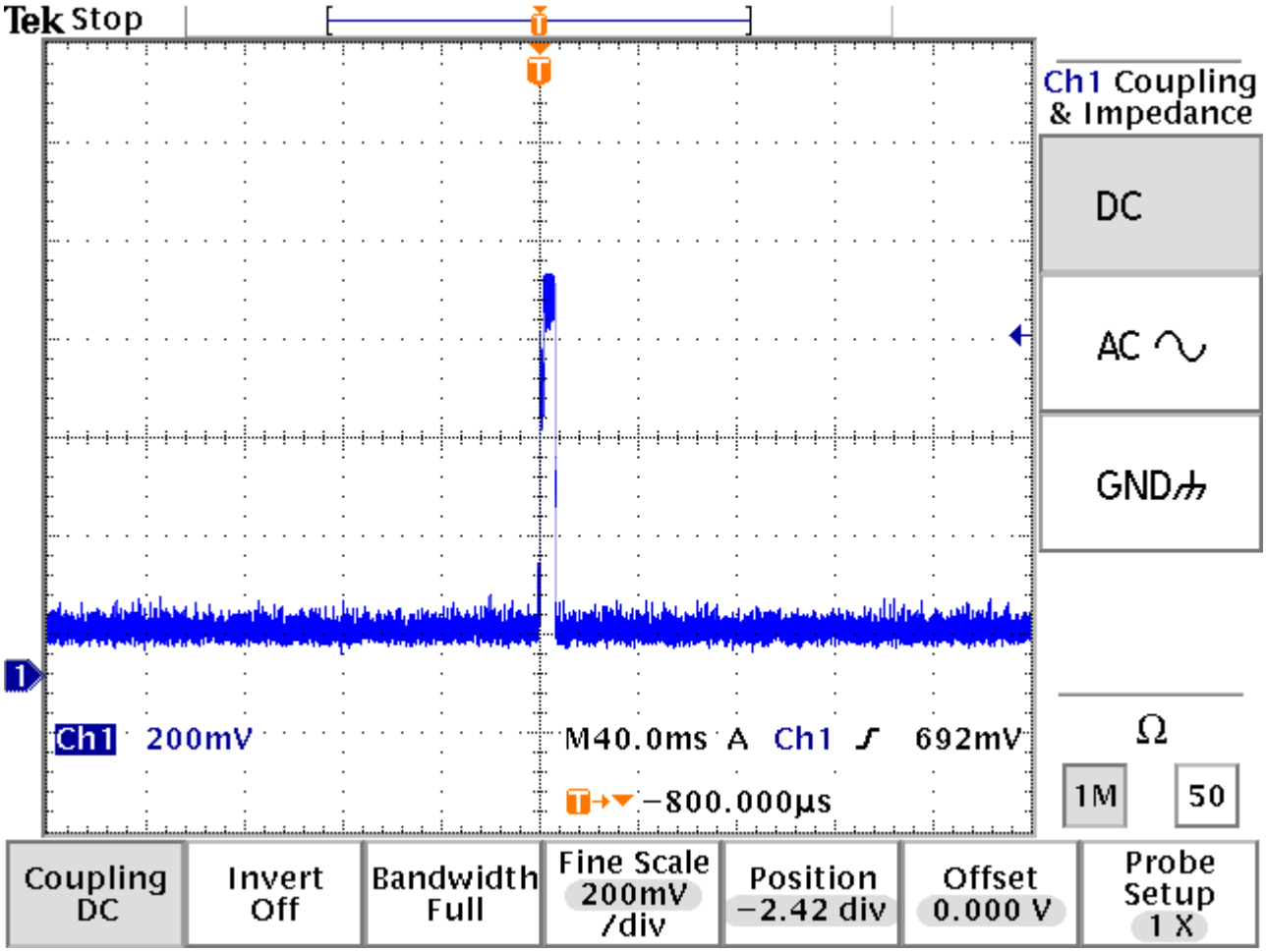
Nr	Frequency (MHz)	PK MaxHold (dBµV/m)	PK Limit (dBµV/m)	Result	Angle (degrees)	Height (m)	H/V
1	1301.838	47.8	80		0	1.3	H
2	1735.565	58.6	80		175	1	H
3	2062.944	45.8	80		245	1	V
4	2146.593	46.7	80		300	1.6	H
5	2169.476	52.6	80		295	1.6	H
6	2169.668	58.3	80		185	1.6	H
7	2482.29	46.8	80		355	1	H
8	2488.056	48.8	80		300	1.6	V
9	2570.833	46.4	80		300	1.6	V
10	2603.894	52.5	80		305	1.6	V



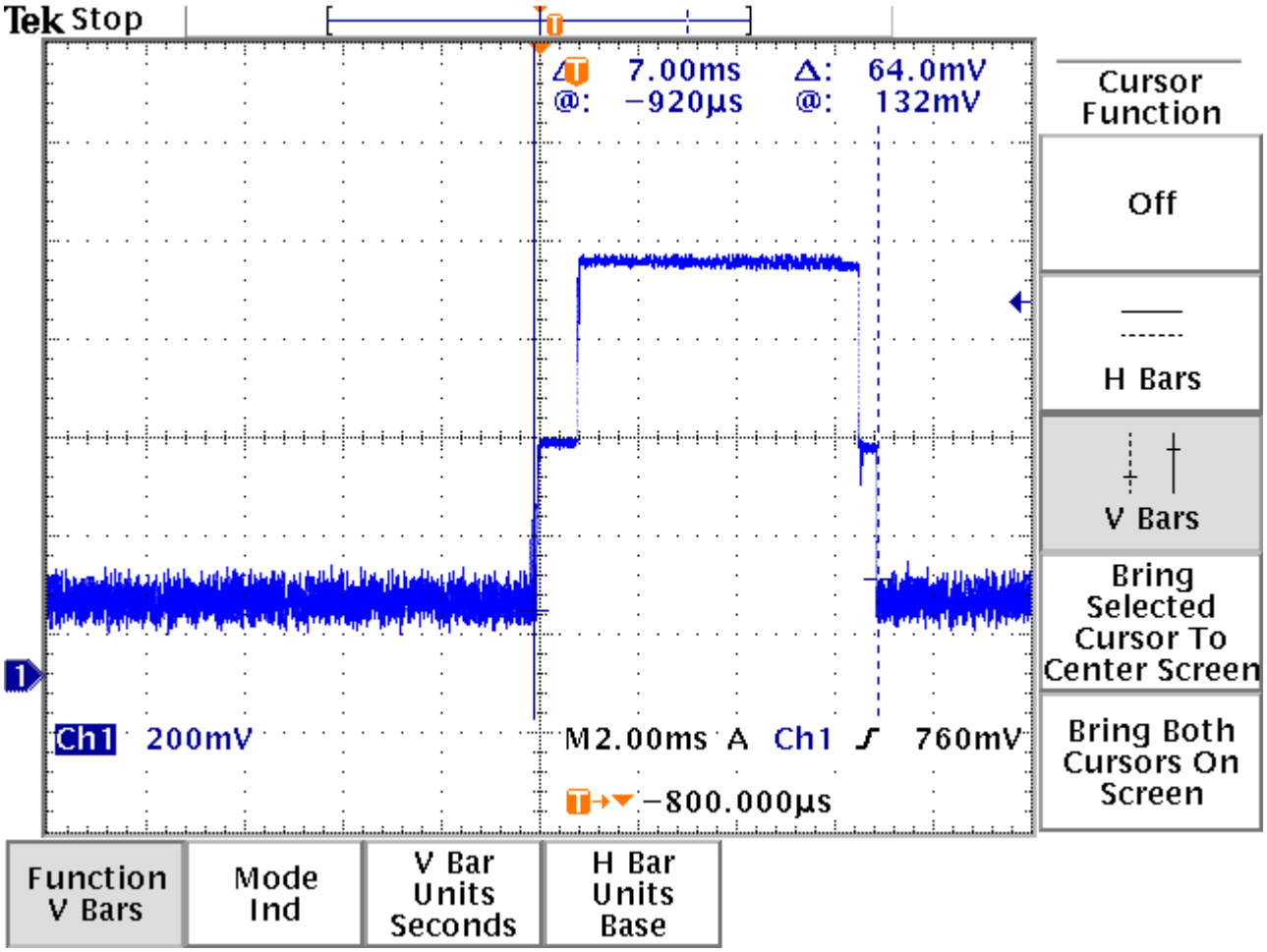
Plot/ 9



Plot/ 10


Tek Stop
Ch1 Coupling & Impedance
DC
AC
GND
Ch1 200mV
M40.0ms A Ch1 692mV
−800.000µs
Ω
1M
50
Coupling DC
Invert Off
Bandwidth Full
Fine Scale 200mV /div
Position −2.42 div
Offset 0.000 V
Probe Setup 1 X

Plot/ 11

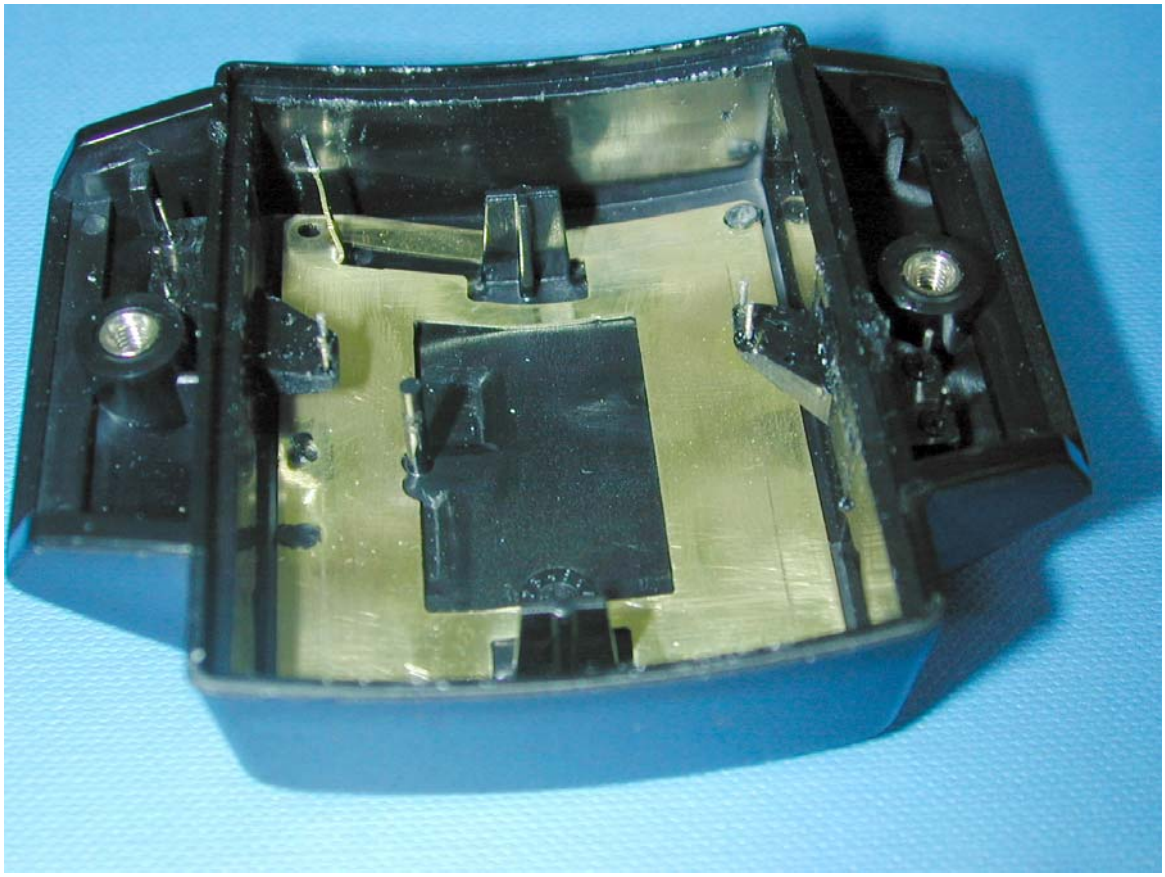

Tek Stop
Δ: 7.00ms Δ: 64.0mV
@: −920µs @: 132mV
Cursor Function
Off
H Bars
V Bars
Bring Selected Cursor To Center Screen
Bring Both Cursors On Screen
Ch1 200mV
M2.00ms A Ch1 760mV
−800.000µs
Function V Bars
Mode Ind
V Bar Units Seconds
H Bar Units Base

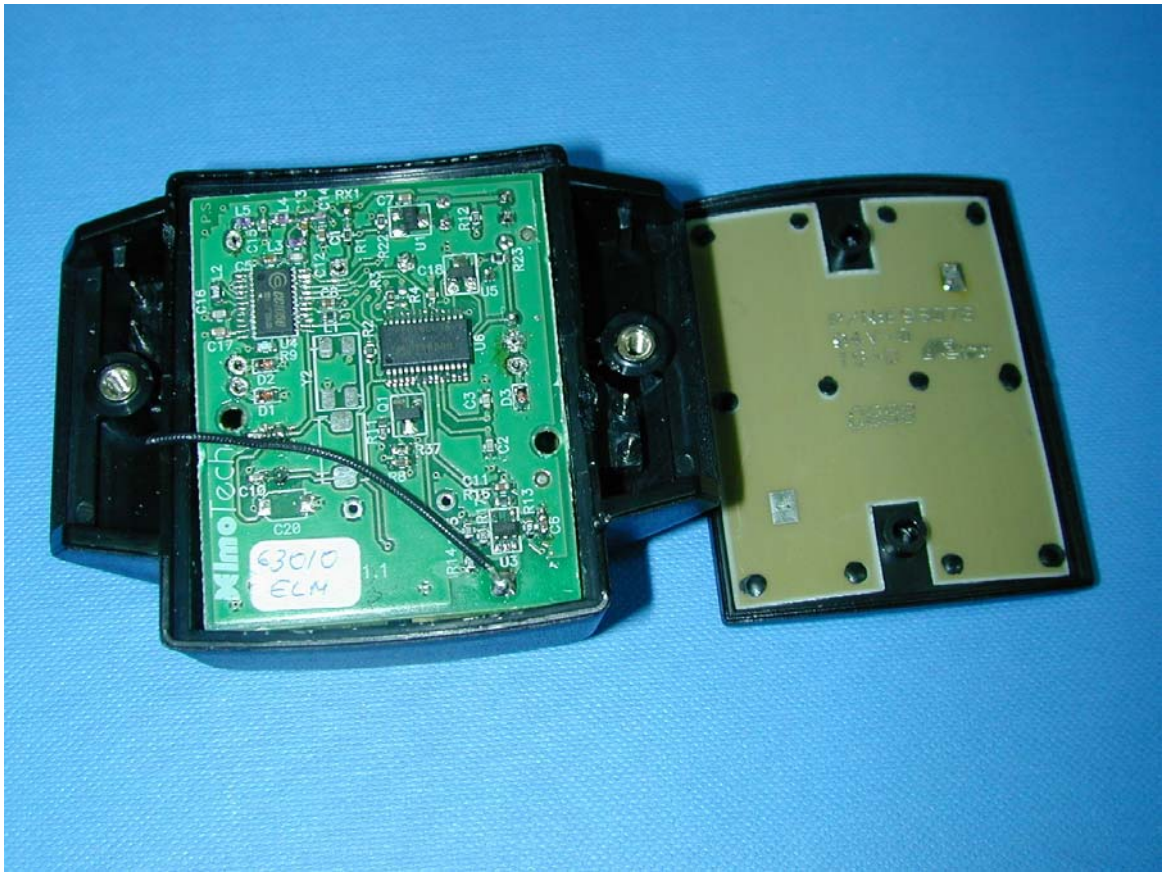
Plot/ 12

Radiated Emission Test Setup up to 30MHz

Radiated Emission Test Setup 30MHz-1GHz

Radiated Emission Test Setup 1GHz-18GHz




XimoTech
63010
ELM