

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

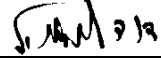
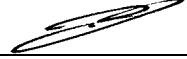
	Function/Title	Name	Signature	Date
Prepared by	Test Engineer	D.Lanuel		20.05.05
Checked by	Test Engineer	D.Lanuel		20.05.05
Approved by	EMC Lab. Manager	S.Cohen		20.05.05

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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:	LEV ROSMAN
Following applicant's personnel:	

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.
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Applicable EMC Specification:	Federal Communication Commission (FCC), FCC Part 15: Radio Frequency Devices, Sections 15.109, 15.209 & 15.231.15.207
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2 Test Summary and Signatures.

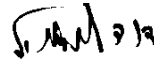
TADIRAN EMC Laboratory has completed testing of E.U.T in accordance with the requirements of the FCC Part 15 Regulations for Class B equipment.

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

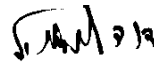
a. **Test performed by:**

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



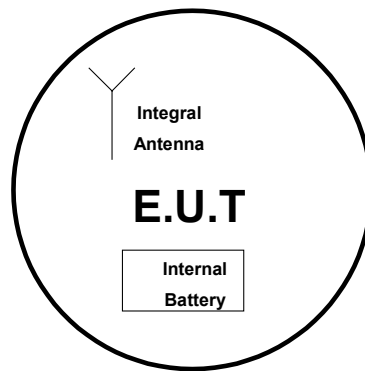
3 E.U.T information

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 (dB μ V/m)	Peak Max Limits (dB μ V/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	20log0.07=-23	11,12

Table 5.d.1 Peak Result of Fundamental

Frequency (MHz)	Peak Result (dB μ V/m)	Peak Limits (dB μ V/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 (dB μ V/m)	Average Factor	Calculation Results	Average Limits (dB μ V/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 (*) (dB μ V/m)	Limit dB μ V/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 (dB μ V/m)	Limit dB μ V/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**

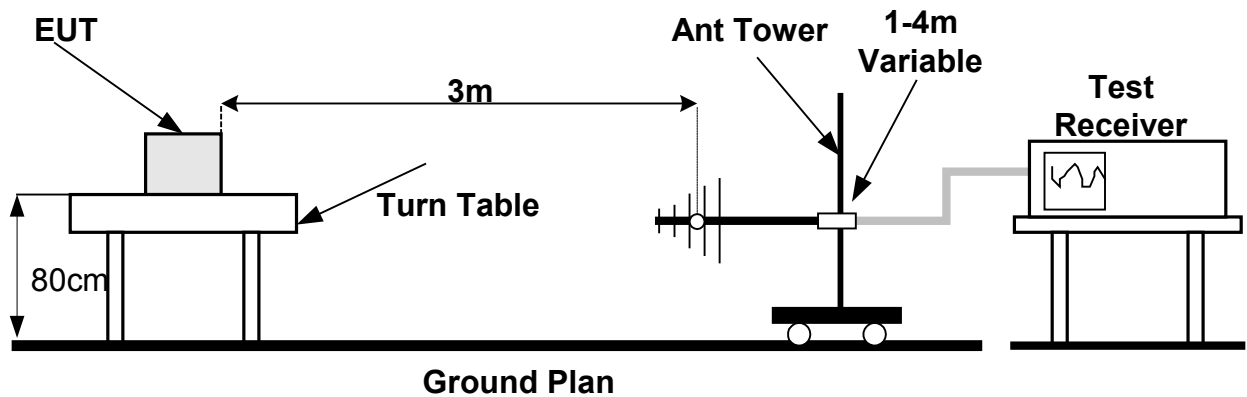


Figure 11 Radiated Emission Set up

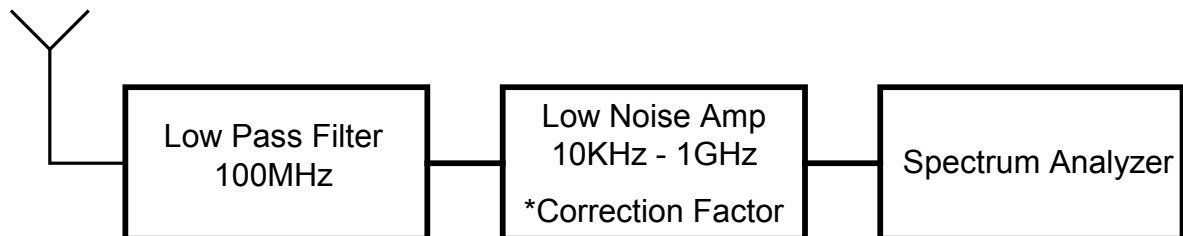


Figure 12 Radiated Emission test 10KHz – 30MHz

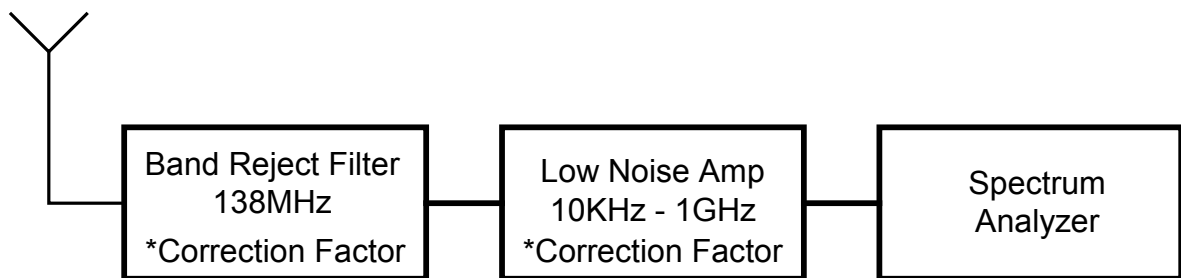


Figure 13 Radiated Emission test 30MHz – 1GHz

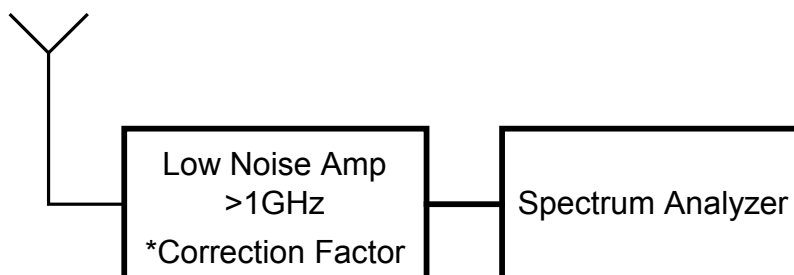


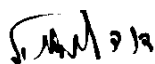
Figure 14 Radiated Emission test above 1GHz

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 (dB μ V/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/F AIL
Both	30-1000	120	Plot-10	Pass
	1000-2.800	120	-	Pass
	2,800-4,400	1000	-	Pass

(2) Final Test Results

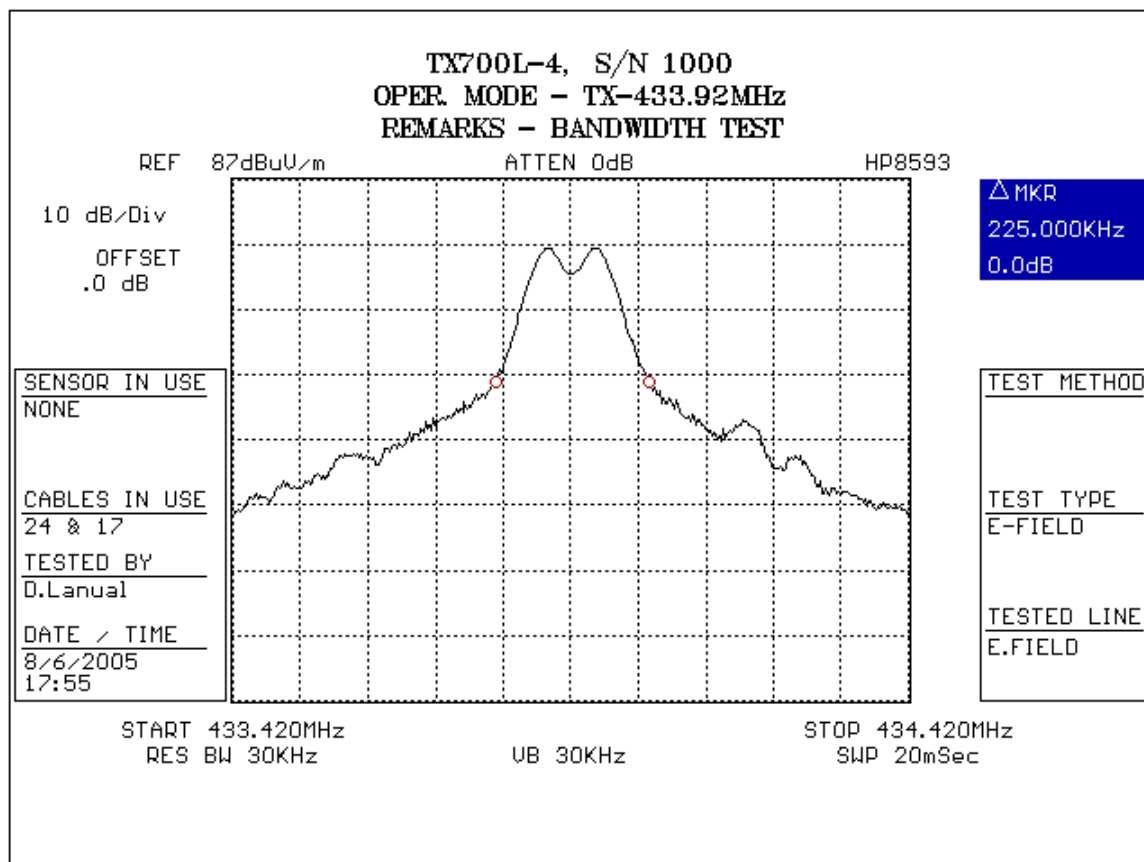
Table 7.f Six Highest RX Mode 15.109

Freq. (MHz)	Peak Reading (*) (dB μ V/m)	Limit dB μ V/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				

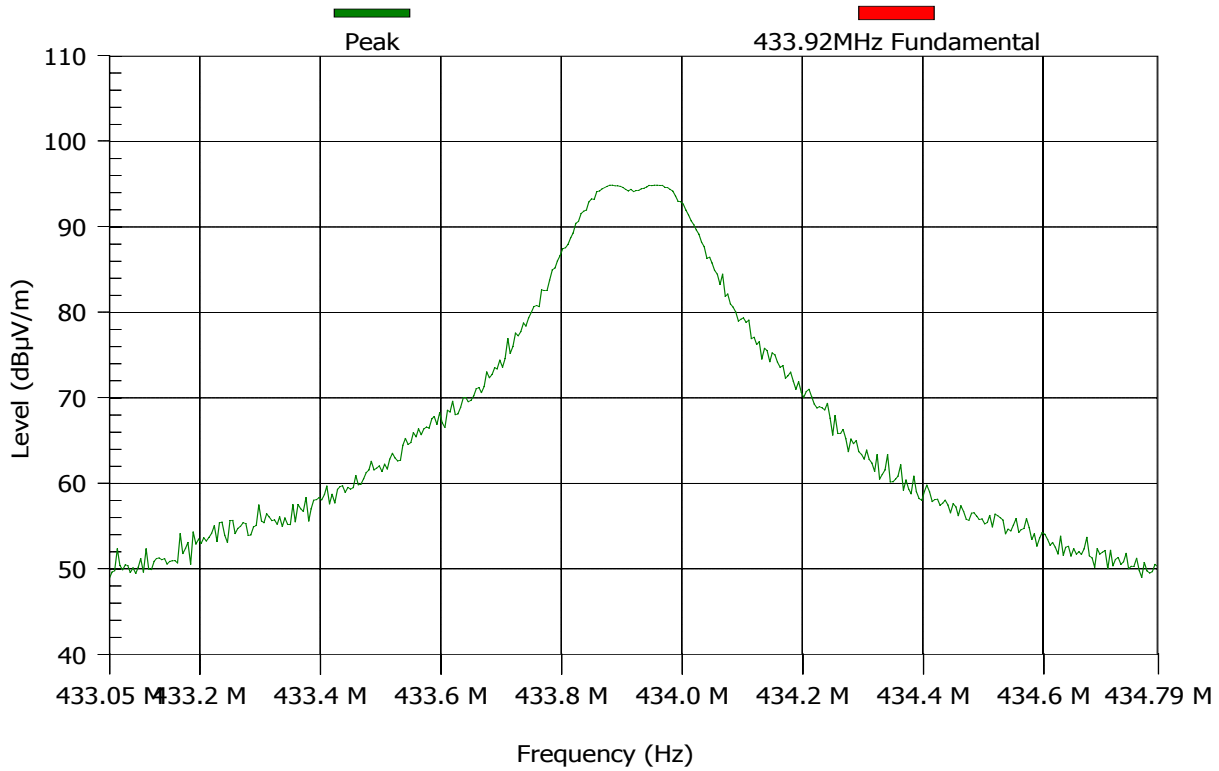
f. Test Procedure

See paragraph 7.f

8 Plots



Plot/ 1

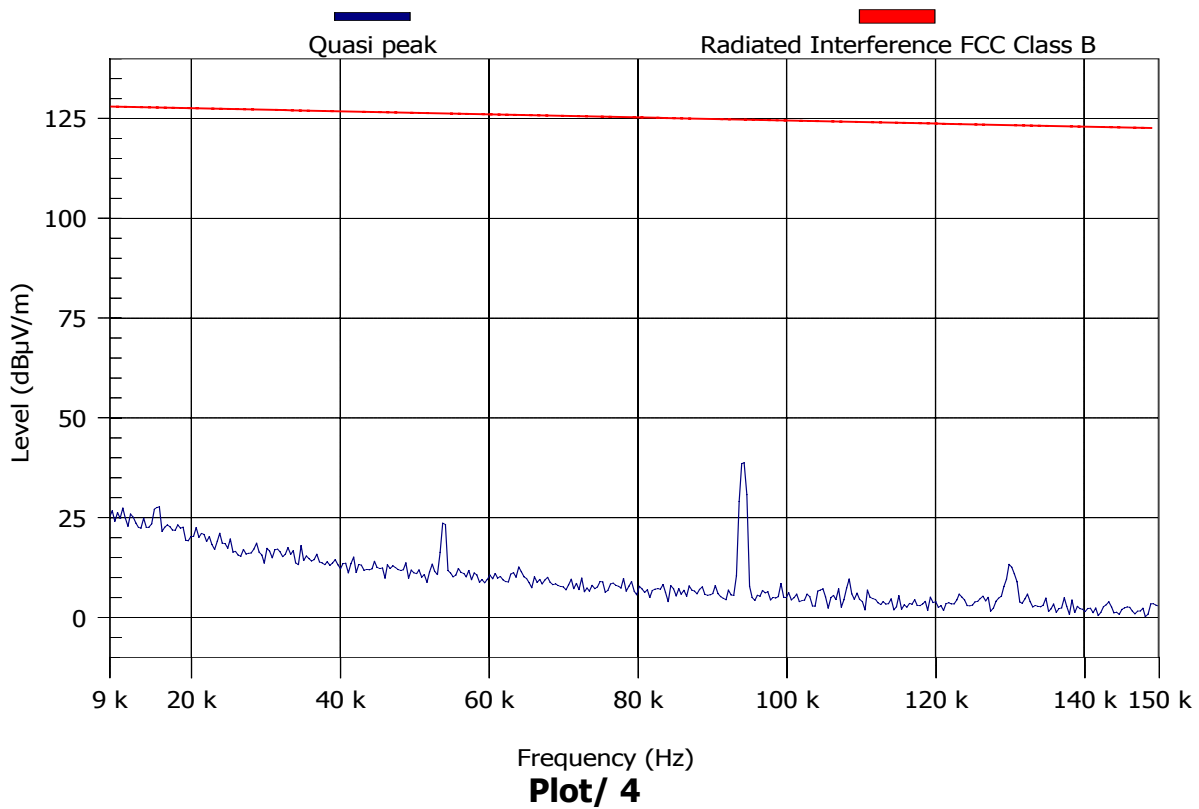
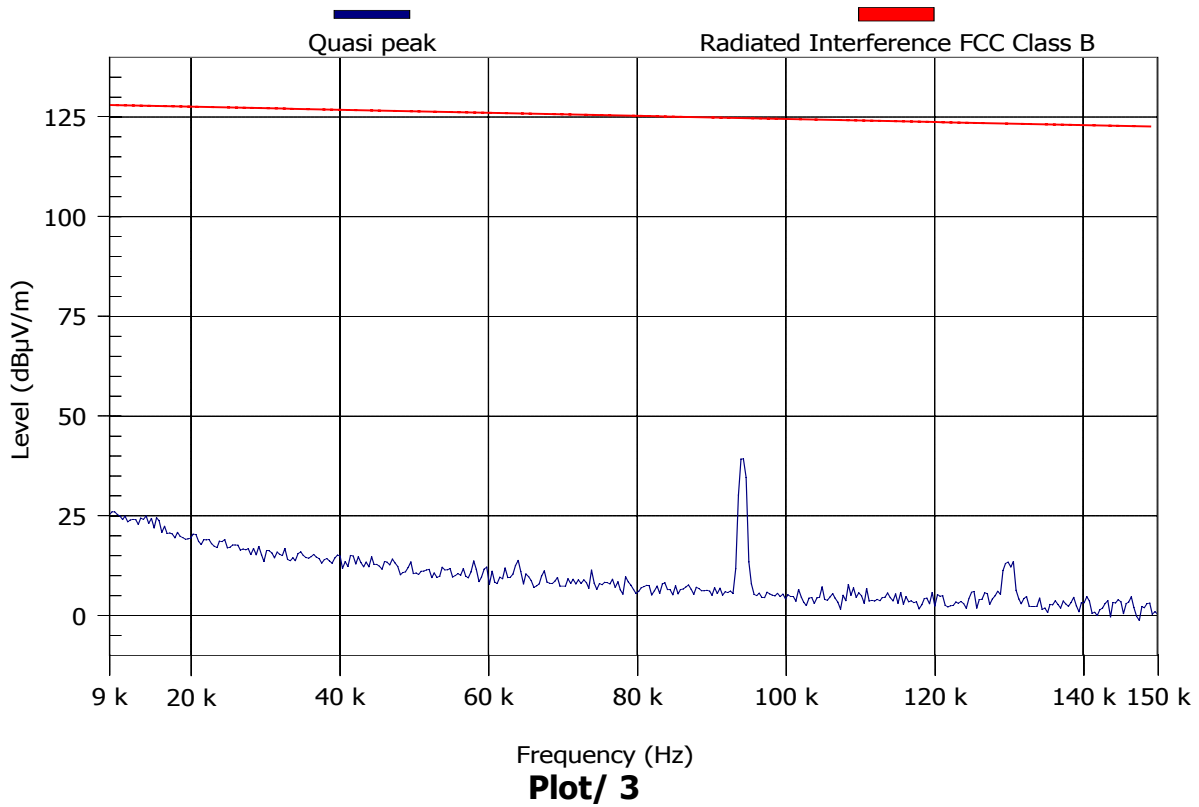


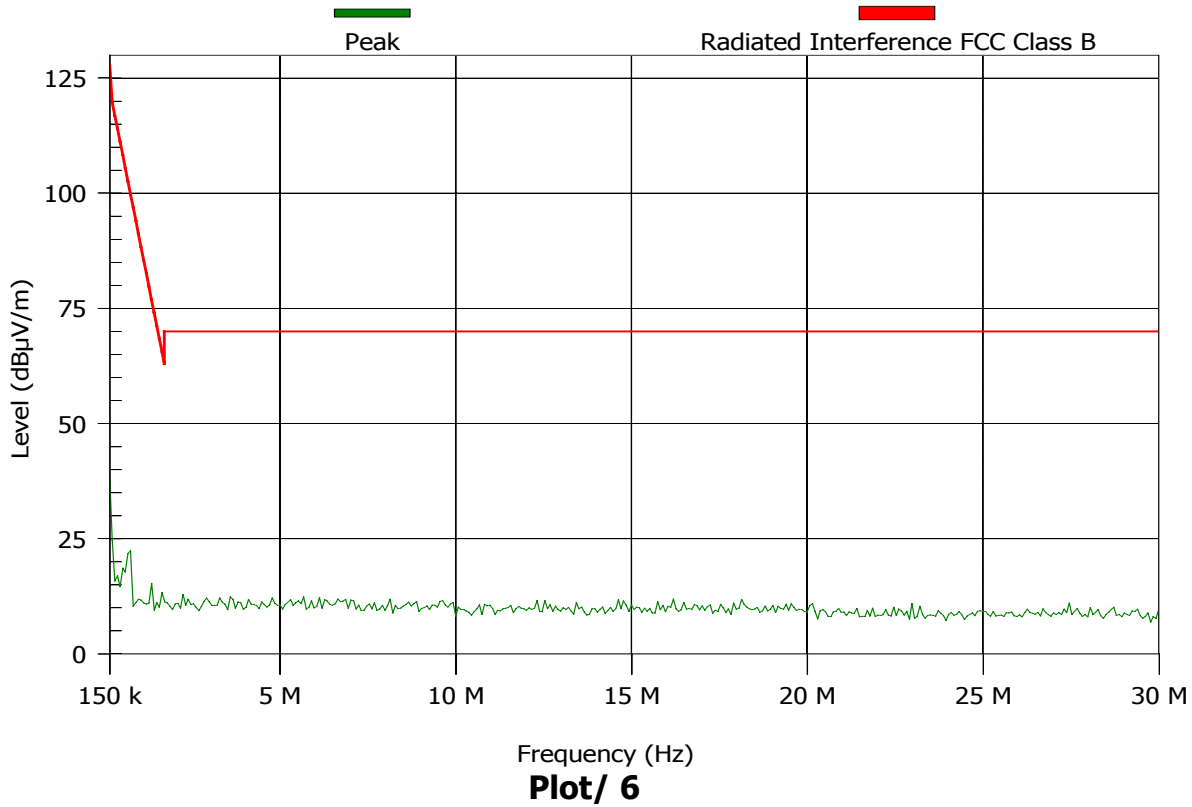
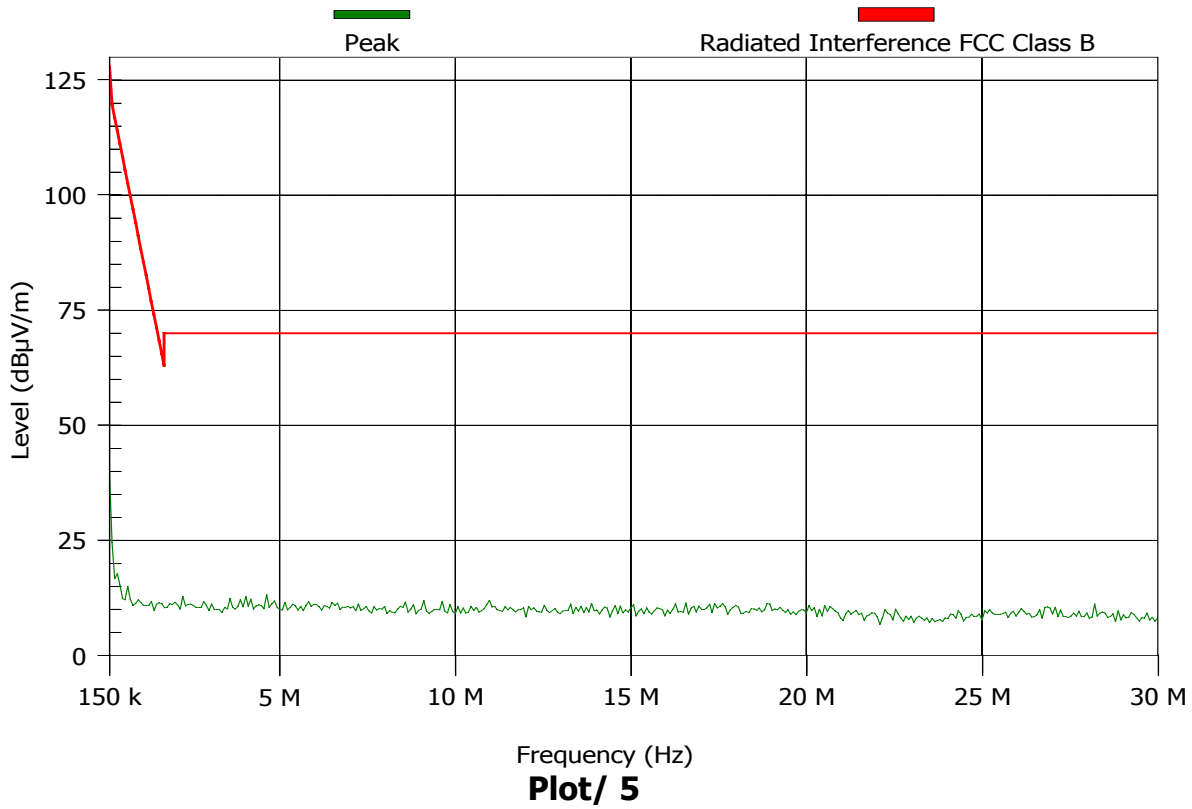
Plot/ 2

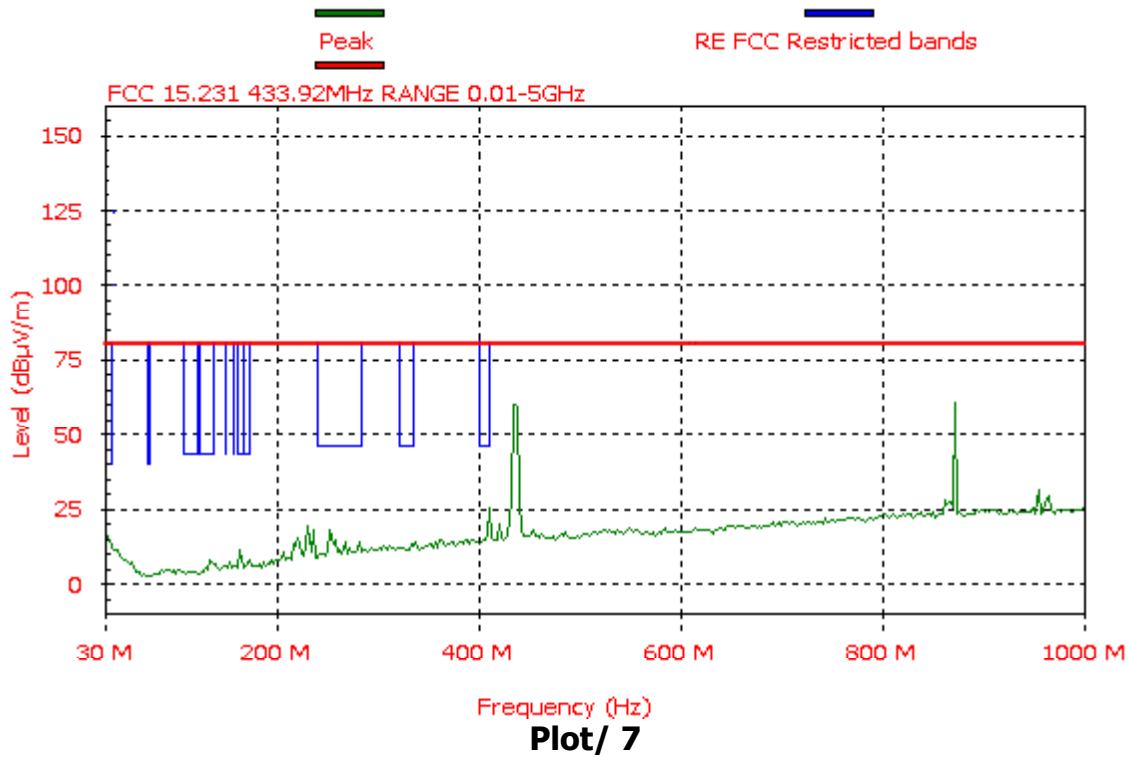
MAXIMUM RESULT DEVIATION:

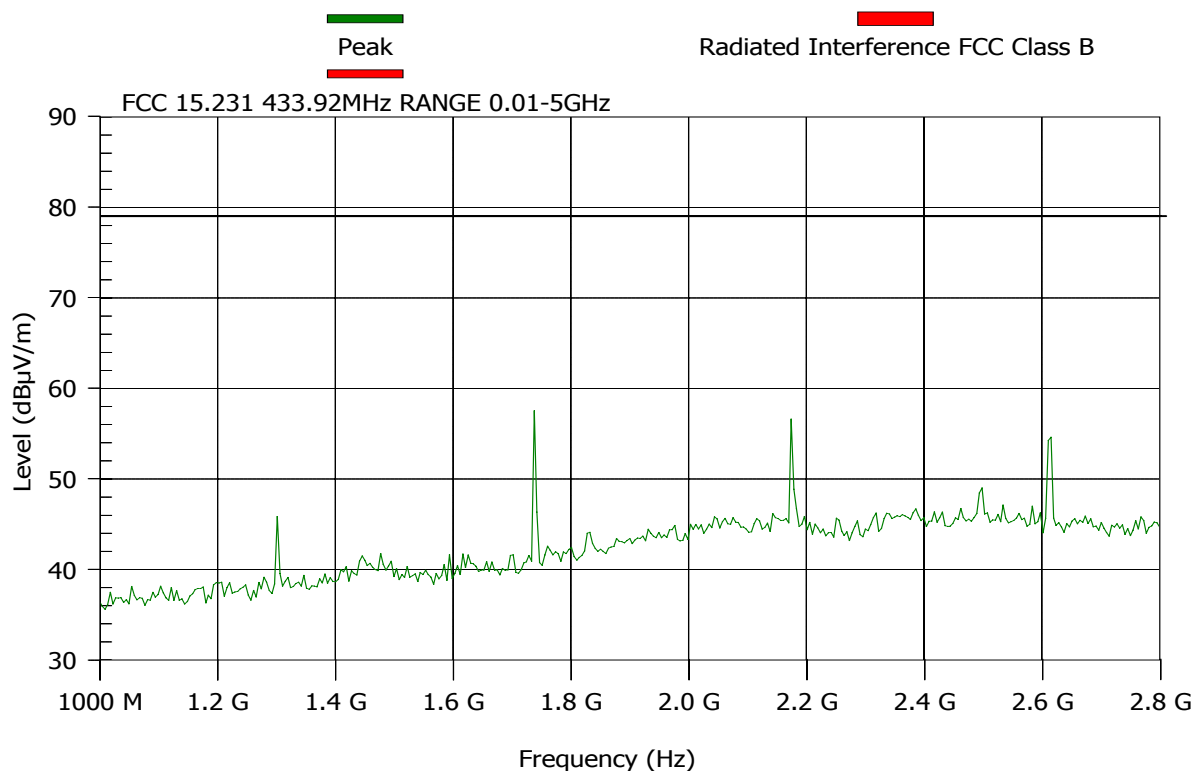
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

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







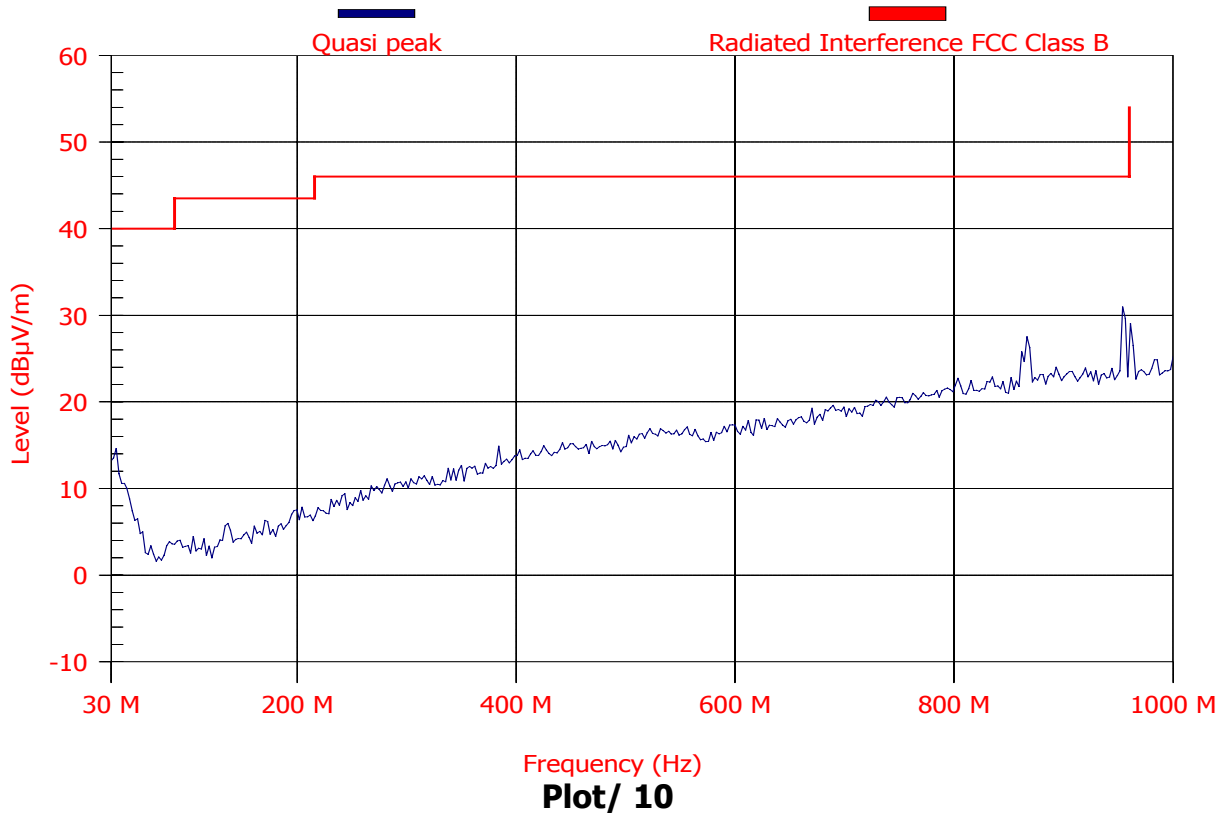
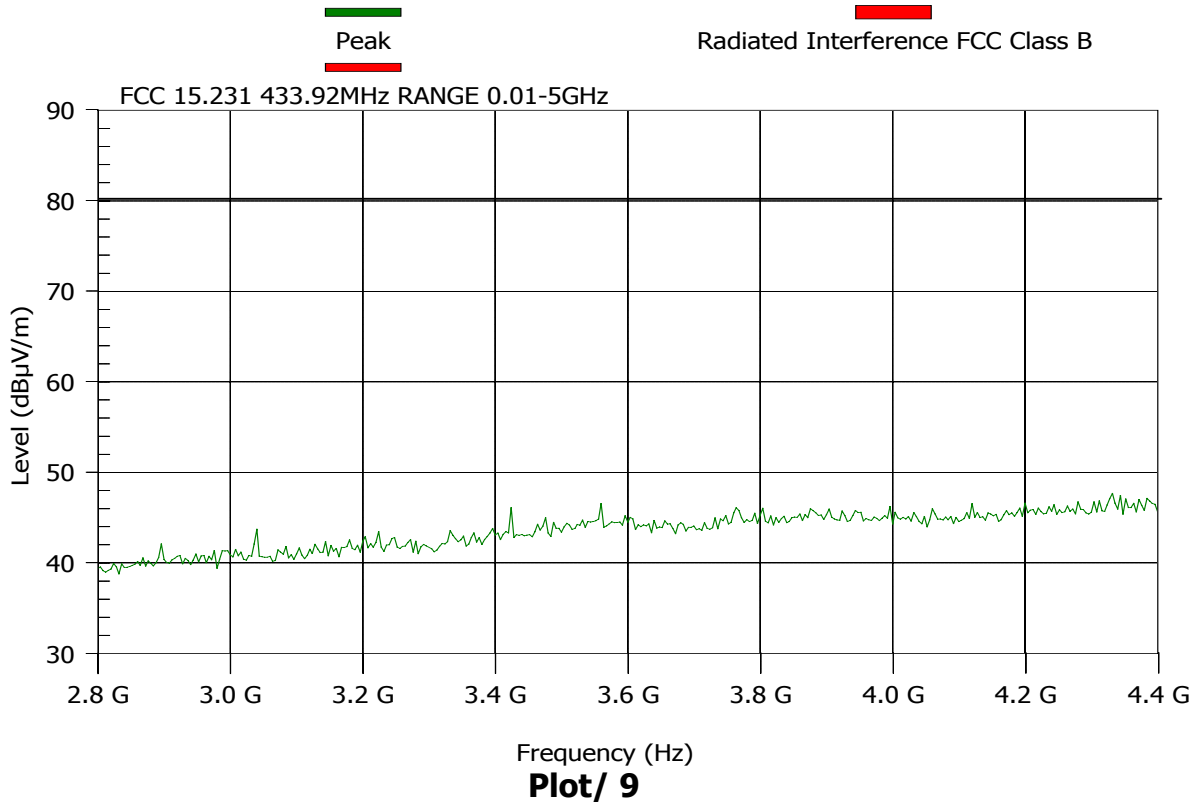


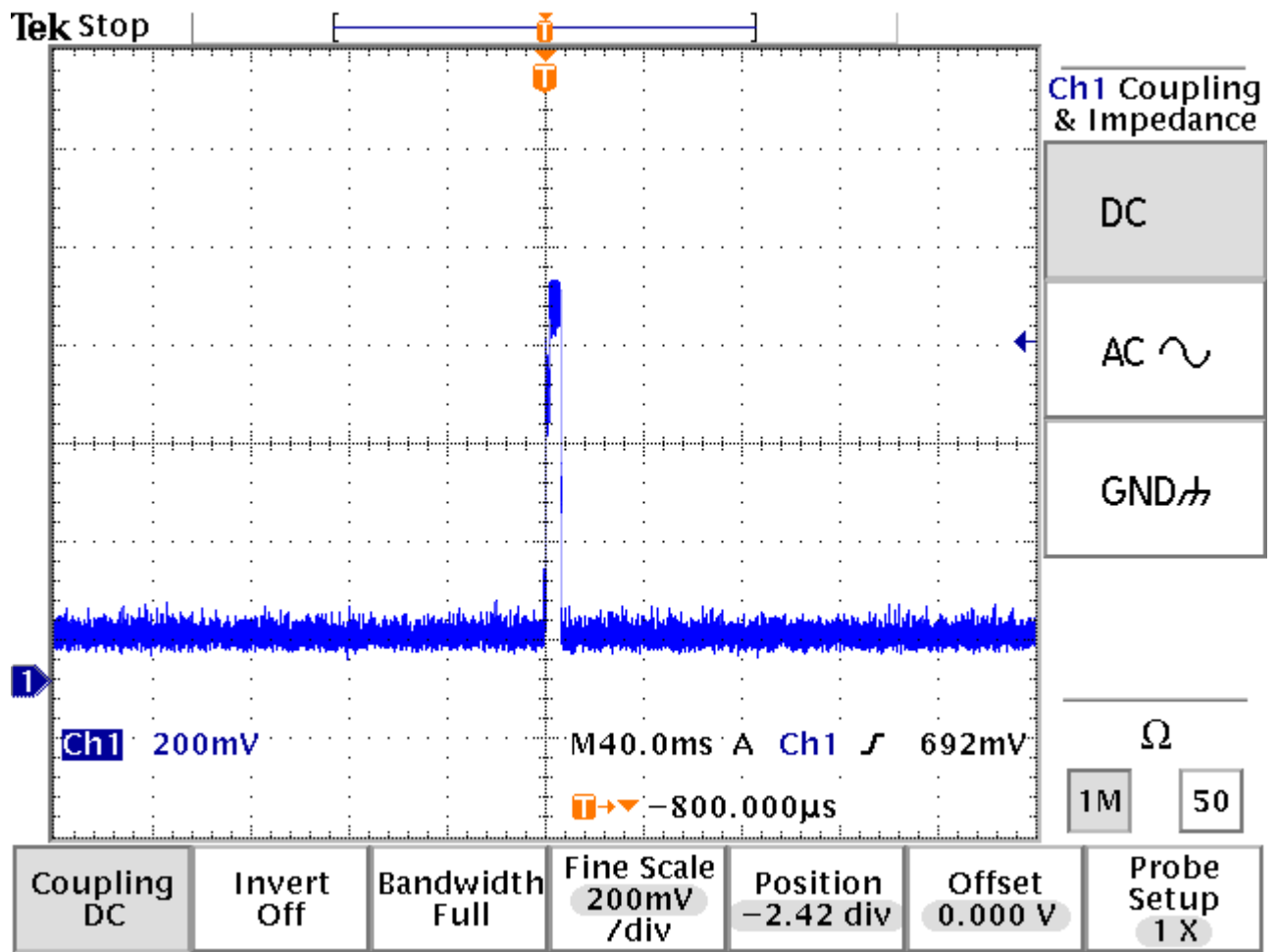
Plot/ 8

MAXIMUM RESULT DEVIATION:

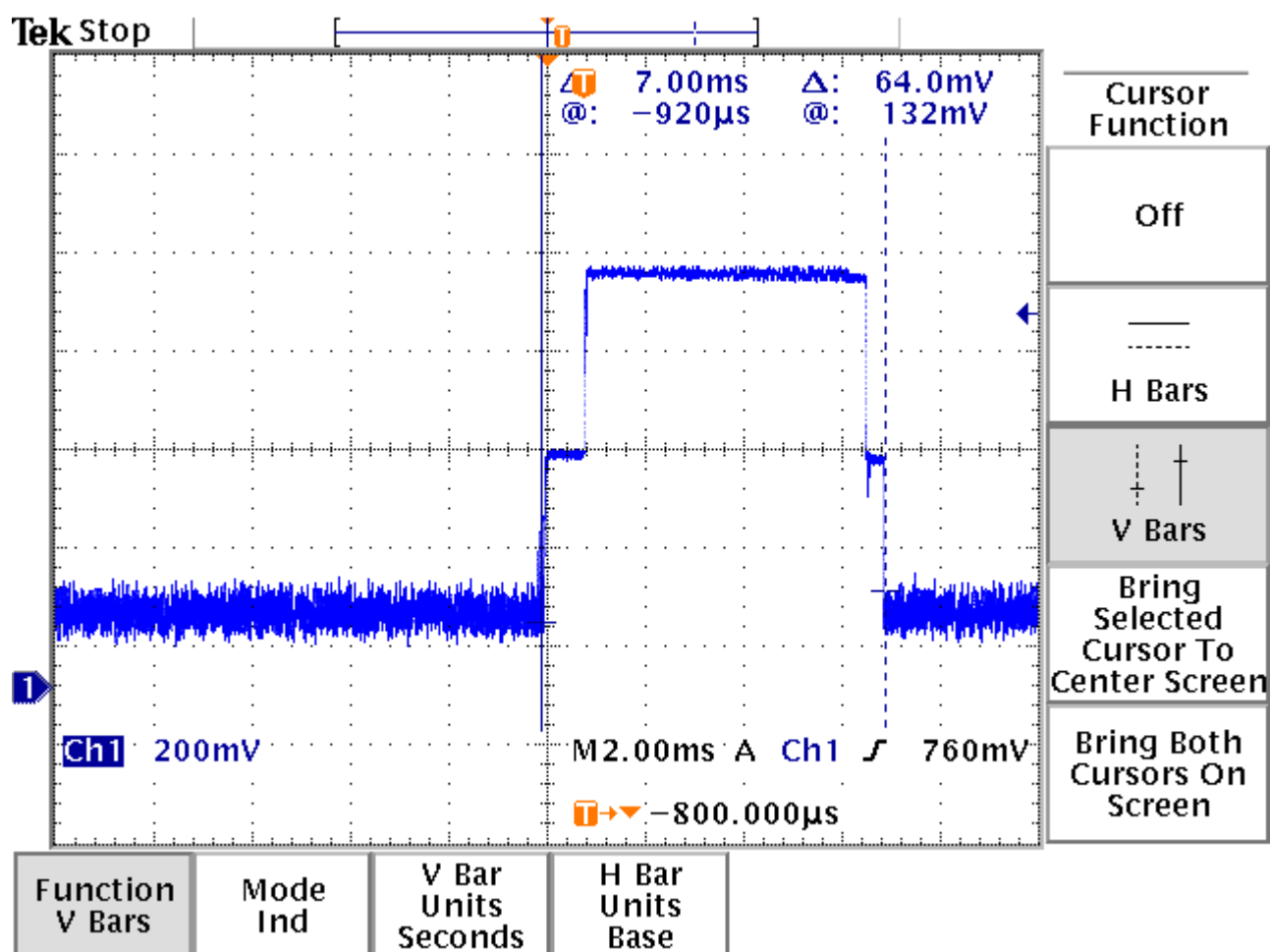
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

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/ 11



Plot/ 12



Radiated Emission Test Setup up to 30MHz



Radiated Emission Test Setup 30MHz-1GHz



Radiated Emission Test Setup 1GHz-18GHz



