

REV	Δ	Description	Sheet Effectuated	Date	Drawn	Checked
A				13.09.04	D.Lanuel	S.Cohen

EMC Laboratory

IDEU 810

FCCID: **QUX-IDEU-810**

Manufactured by
HomeFree System Ltd.

EMC Test Report

According FCC Part 15 Requirements

Feb 2004


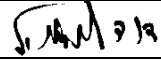

	Function/Title	Name	Signature	Date
Prepared by	Test Engineer	D.Lanuel		13.09.04
Checked by	Test Engineer	D.Lanuel		13.09.04
Approved by	EMC Lab. Manager	S.Cohen		13.09.04

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1 Introduction

a. Scope

This document describes the measurement procedures and tests for FCC part 15 of the IDEU 810-1 Manufactured by HomeFree System Ltd.

Equipment Under Test:	IDEU-810
FCCID	QUX-IDEU-810
Manufacturer:	HomeFree System Ltd.
Serial Numbers:	0001
Mode of Operation:	TX & RX MODE
Receiver operating frequency:	318MHZ
Year of Manufacture:	2004

b. Applicant Information:

Applicant:	HomeFree 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:	22.06.04
Dates of testing	24.06.04
Test Laboratory Location	TADIRAN EMC LAB , Hashoftim 26 Holon 58102 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.

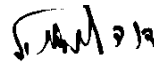
TADIRAN EMC Laboratory has completed testing of E.U.T in accordance with the requirements of the FCC Part 15 Regulations for Class B equipment.

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
5	Conducted emission	15.207	PASS

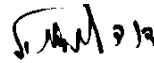
a. **Test performed by:**

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

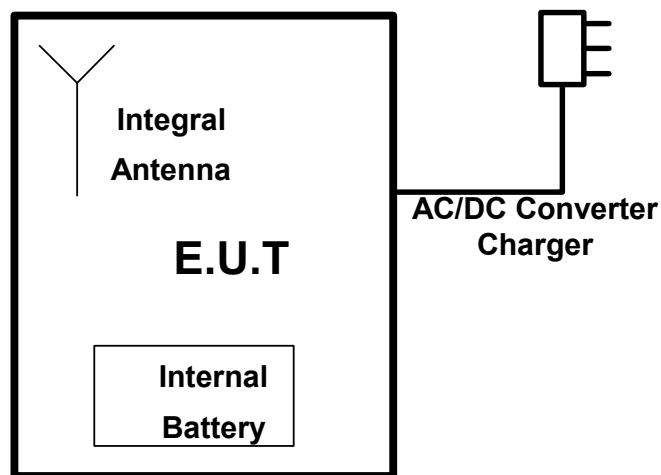
a. E.U.T description

The EUT, Wireless Monitoring Unit (iDEU-810), is a wall mounted microprocessor transceiver, operating at 318MHz. It is a part of wandering prevention system. The iDEU extends the reception range of an electronic monitoring receiver by receiving and re-transmitting data. It utilized single antenna.

The EUT powered from mains via AC/DC adapter 7.5V and includes a 3.6V back-up battery.

b. E.U.T Test Configuration

E.UT. Test configuration is shown in figure bellow



c. E.U.T Mode of Operation description

- (1) 318MHz TX Mode operated by battery
- (2) 318MHz TX Mode operated by AC/DC Adapter
- (3) 318MHz RX Mode operated by battery
- (4) 318MHz RX Mode operated by AC/DC Adapter

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

E.U.T: IDEU 810-1 S/N 64028
Test Method: ANSI C63.4
Date: 24/06/04
Relative Humidity: 37%
Ambient Temperature: 22c
Air Pressure: 1042hpa
Test Setup: Figure 5f

Testing Engineer: D.Lanuel



Date 01/07/04

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 8.b

Table 4.b Limits For Bandwidth

Frequency (MHz)	Bandwidth Max Limits (%)	Bandwidth Max Limits (KHz)
318.01000	0.25	795

c. Test Instrumentation and Equipment

Table 4.c Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/05
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
318.00	234.5	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: IDEU 810-1 S/N 64028
 Test Method: ANSI C63.4
 Date: 24/06/04
 Relative Humidity: 37%
 Ambient Temperature: 22c
 Air Pressure: 1042hpa
 Test Setup: Figure 5f

Testing Engineer: D.Lanuel



Date 01/07/04

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 8.b.

Table 5.b Limits For Fundamental

Frequency (MHz)	Average Max Limits (dB μ V/m)	Peak Max Limits (dB μ V/m)
318.01000	75.8	95.8

c. Test Instrumentation and Equipment

Table 5.c Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/05
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)
8.3ms	16.6/100=0.166	20log0.16.6=-24.4

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
318.02	95.4	95.8	-0.4	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
95.4	-24.4	71	75.8	4.8	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: IDEU 810-1 S/N 64028
Test Method: ANSI C63.4
Date: 24/06/04
Relative Humidity: 37%
Ambient Temperature: 22c
Air Pressure: 1042hpa
Test Setup: Figure 5f

Testing Engineer: D.Lanuel



Date 02/07/04

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 9.b.

Table 6.b Limits For 15.231(b)

Frequency range(MHz)	Average Limits (dB μ V/m)	peak Limits (dB μ V/m)
0.009 – 3500	55.8	75.8

c. Test Instrumentation and Equipment

Table 9.c Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/05
Rode Antenna(10KHz-30MHz)	95010-1	ETN	13.11.05
Double Ridge Guide Antenna(1-18GHz)	3105	EMCO	24.04.05
Broadband Antenna	BTA-L	FRANKONIA	10.04.05
Low Noise Amplifier (0-1GHz)	AM-1300-N	MITEQ	14.01.05
Low Noise Amplifier (1-2GHz)	SMC-09	MITEQ	14.01.05
Low Noise Amplifier (2-6GHz)	SMC-09	MITEQ	14.01.05

d. Preliminary Results

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

Test Condition	Antenna Polarization	Freq. Range MHz	Res. BW (kHz)	Plot No.	Pass/Fail
TX AC/DC Adapter	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
TX Battery	Vertical	0.009 – 0.15	0.2	Plot-10	Pass
	Horizontal			Plot-11	Pass
	Vertical	0.15 - 30	9	Plot-12	Pass
	Horizontal			Plot-13	Pass
	Both Hor.& Ver	30-1000	120	Plot-14	Pass
		1000-2.800	1000	-	Pass
		2.800-3,200	1000	-	Pass

e. Final Results

Table 6.e Six Highest Peak Emission Test Results

Mode Of Operation	Freq. (MHz)	peak Reading (*) (dB μ V/m)	Limit dB μ V/m	Margin (dB)	Pass/Fail
TX AC/DC Adapter	1271.783	48.7	75.8	-27.1	PASS
	1589.79*	49.4	54	-4.6	PASS
	2226.119*	49.2	54	-4.8	PASS

*Restricted band

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

Mode Of Operation	Freq. (MHz)	Calculated (dB μ V/m)	Limit dB μ V/m	Margin (dB)	Pass/Fail
TX AC/DC Adapter	1271.783	24.3	55.8	-31.5	PASS
	1589.79*	25	34	-9	PASS
	2226.119*	24.8	34	-9.2	PASS

Average Emission Calculate: Peak value + Average Factor(-24.4)

Table 6.e.2 Six Highest Peak Emission Test Results

Mode Of Operation	Freq. (MHz)	peak Reading (*) (dB μ V/m)	Limit dB μ V/m	Margin (dB)	Pass/Fail
TX Battery	The Emission at least 15db below the intentional limit				

*Restricted band

Table 6.e.3 Six Highest Average Emission Test Results

Mode Of Operation	Freq. (MHz)	Calculated (dB μ V/m)	Limit dB μ V/m	Margin (dB)	Pass/Fail
TX Battery	The Emission at least 15db below the intentional limit				

Average Emission Calculate: Peak value + Average Factor(-24.4)

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**

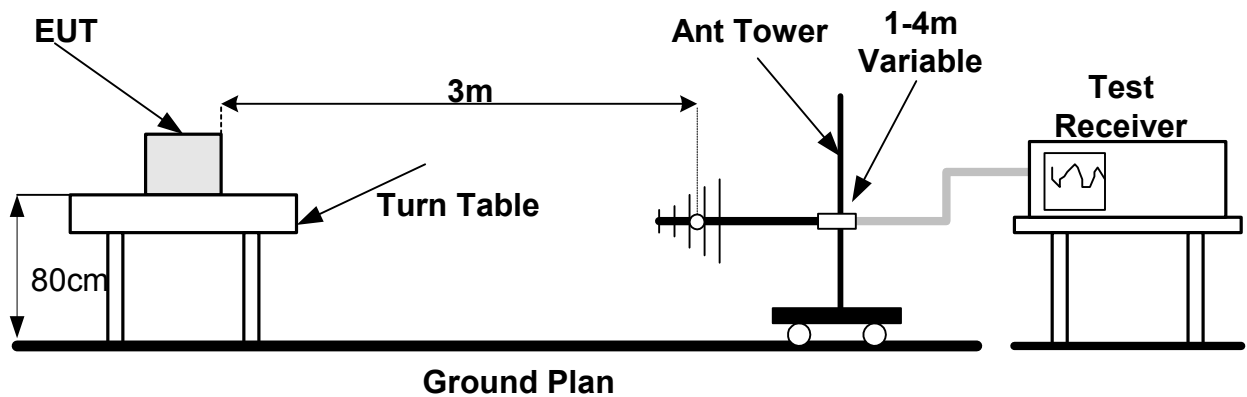


Figure 11 Radiated Emission Set up

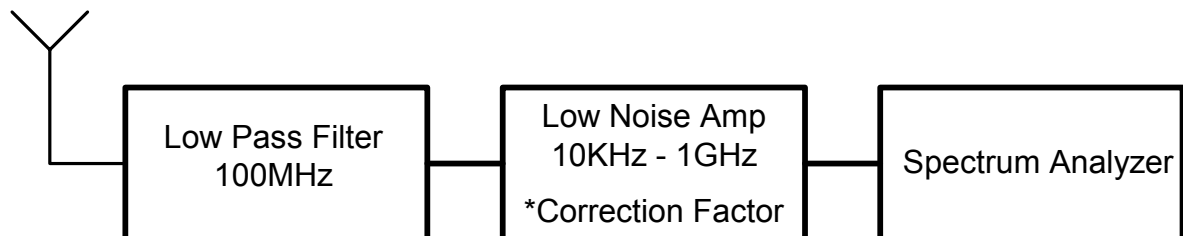


Figure 12 Radiated Emission test 10KHz – 30MHz

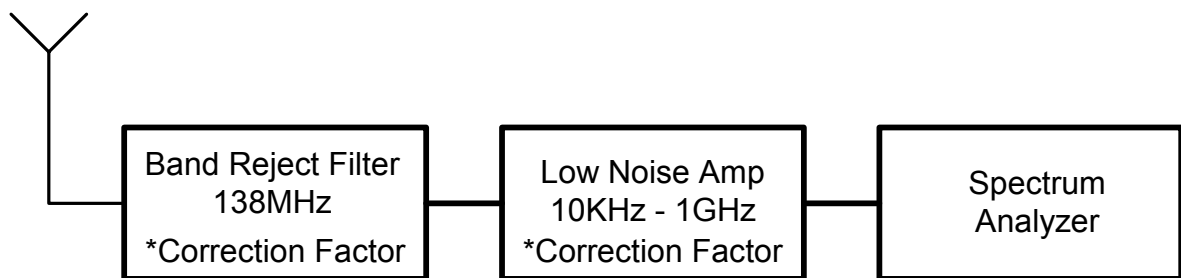


Figure 13 Radiated Emission test 30MHz – 1GHz

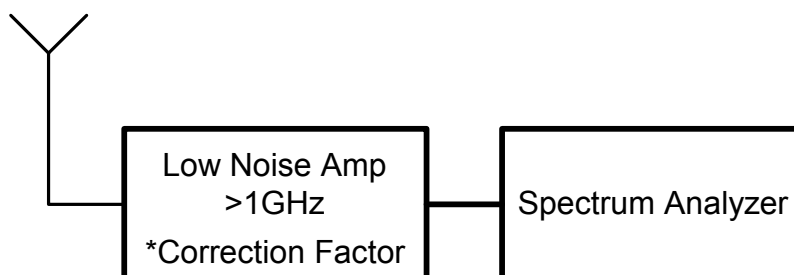



Figure 14 Radiated Emission test above 1GHz

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

a. Preliminary Radiated emission Test Result According Part 15.109

E.U.T: IDEU 810-1 S/N 64028
Test Method: ANSI C63.4
Date: 24/06/04
Relative Humidity: 37%
Ambient Temperature: 22c
Air Pressure: 1042hpa
Test Setup: Figure 5f

Testing Engineer: D.Lanuel



Date 02/07/04

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 10.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	31/01/05
Double Ridge Guide Antenna(1-18GHz)	3105	EMCO	24.04.05
Broadband Antenna(30-1000MHz)	BTA-L	FRANKONIA	10.04.05
Low Noise Amplifier (0-1GHz)	AM-1300-N	MITEQ	14.01.05
Low Noise Amplifier (1-2GHz)	SMC-09	MITEQ	14.01.05
Low Noise Amplifier (2-6GHz)	SMC-09	MITEQ	14.01.05

e. Results

(1) Preliminary Test Results

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

Configuratiion	Antenna Polarization	Freq. Range MHz	Res. BW (kHz)	Plot No.	PASS/F AIL
TX	Both	30-1000	120	Plot-15	PASS
		1000-2.800	120	Plot-16	PASS
		2800-3,200	1000	Plot-17	PASS

(2) Final Test Results

Table 7.f Six Highest RX Mode 15.109

Mode Of Operatio n	Freq. (MHz)	peak Reading (*) (dB μ V/m)	Limit dB μ V/m	Margin (dB)	Polarity Ver/Hor	Height (m)
TX	30-1000	The Emissions are at least 20db below the unintentional limits				
	1000-3,200	No Emission-Background noise only				

f. Test Procedure

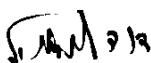
See paragraph 7.f

8 Conducted Emission, AC Power Leads According to FCC 15.107

Frequency Range: 150 kHz – 30 MHz

E.U.T: IDEU 810-1 S/N 64028
 Test Method: ANSI C63.4
 Date: 24/06/04
 Relative Humidity: 37%
 Ambient Temperature: 22c
 Air Pressure: 1042hpa
 Test Setup: Figure 5f

Testing Engineer: D.Lanuel



Date : 02/07/04

a. Test Results Summary & Conclusions

The QUX-LPU-800 complies with FCC, Part 15.107 conducted emissions requirement.

b. Limits of Conducted Emission at Mains Terminals

The test unit shall meet the limits of Table CE-1 for FCC Part 15 Para 15.107 equipment.

Table 8.b Limits for intentional radiator according 15.107

Frequency Range MHz	Quasi-peak Limits dB μ V
0.15 – 0.50	66 to 56*
0.50 - 5	56
5 - 30	60

*Decreases with the logarithm of the frequency

c. Test Instrumentation and Equipment

Table 8.c – Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/05
Signal Generator	2017	Marconi	21/06/05
LISN	FCC-LISN-3B	FISCHER	31/08/04

d. **Results**

Table 8.d Test Results 15.207

Lead P/N	Mode of Operation	Frequency Range (MHz)	Resolution BW (kHz)	Plot No.	Comply. Y/N
Neutral	TX	0.15 – 0.5	9	Plot 18	Y
		0.5 - 30		Plot 19	Y
Phase	TX	0.15 – 0.5	9	Plot 20	Y
		0.5 - 30		Plot 21	Y

e. **Test Procedure**

- The EUT was placed on the top of table 1m by 1.5m, raised 0.8 meters above the conducting ground plane
- The rear panel of the EUT was located 40cm to the vertical wall of the screen room
- Each EUT power leads were individually connected through an LISN to the input power source. Unused 50 ohm connector of the LISN was terminated in 50ohm and other was connected to the spectrum analyzer through 20db attenuator for maximum conducted interference

f. **Test setup**

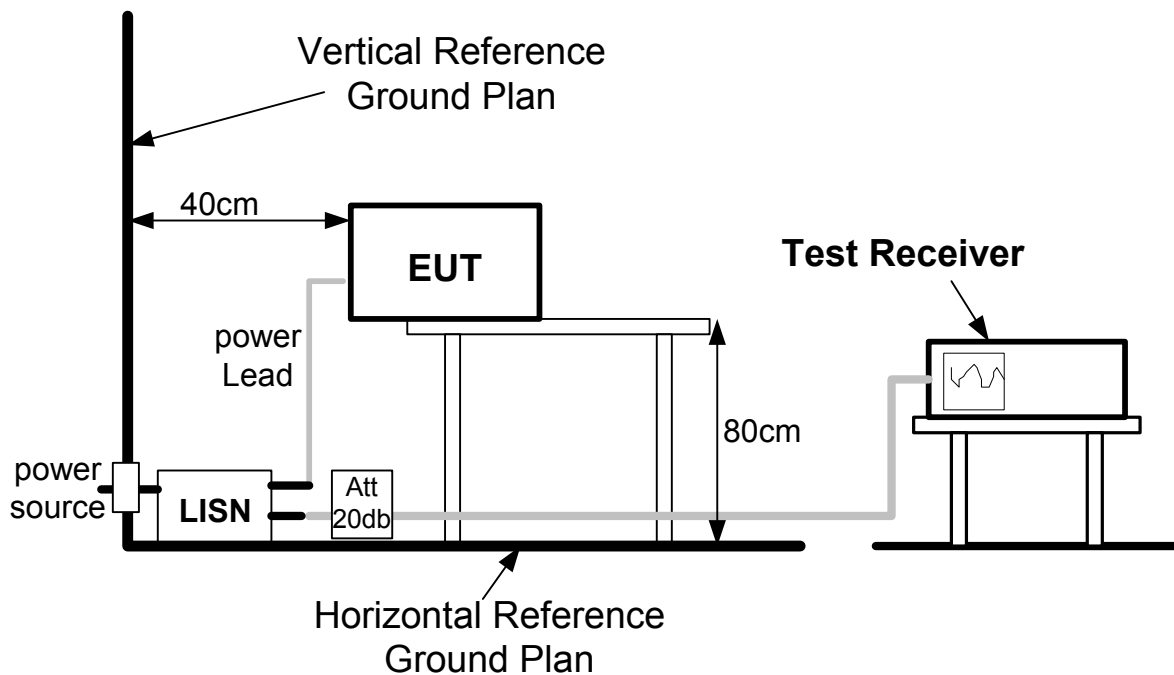


Figure 8.f Conducted emission Test Configuration

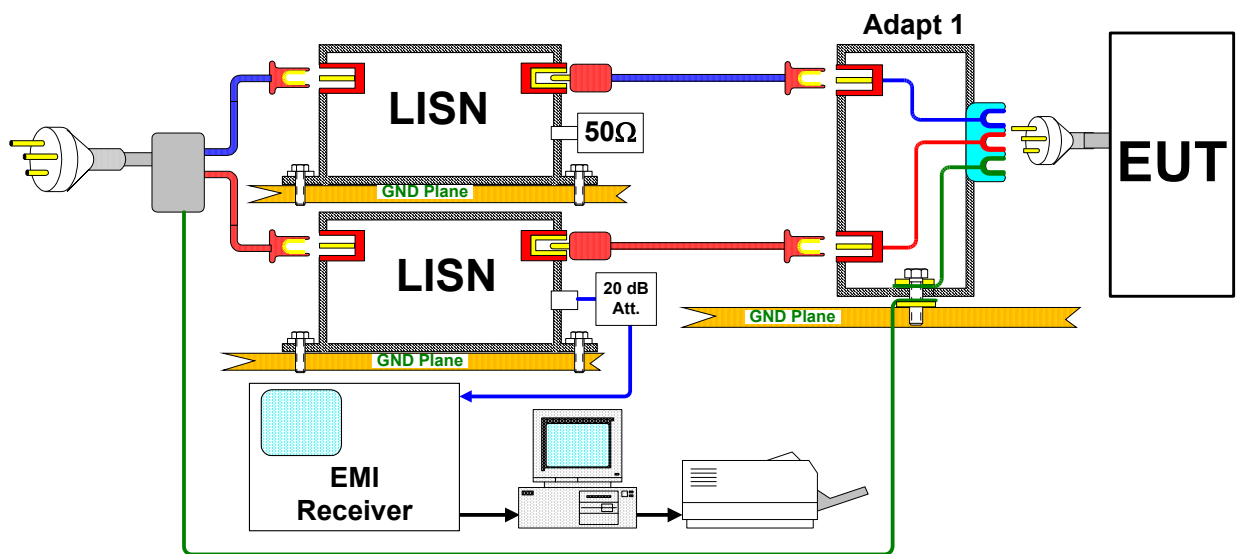
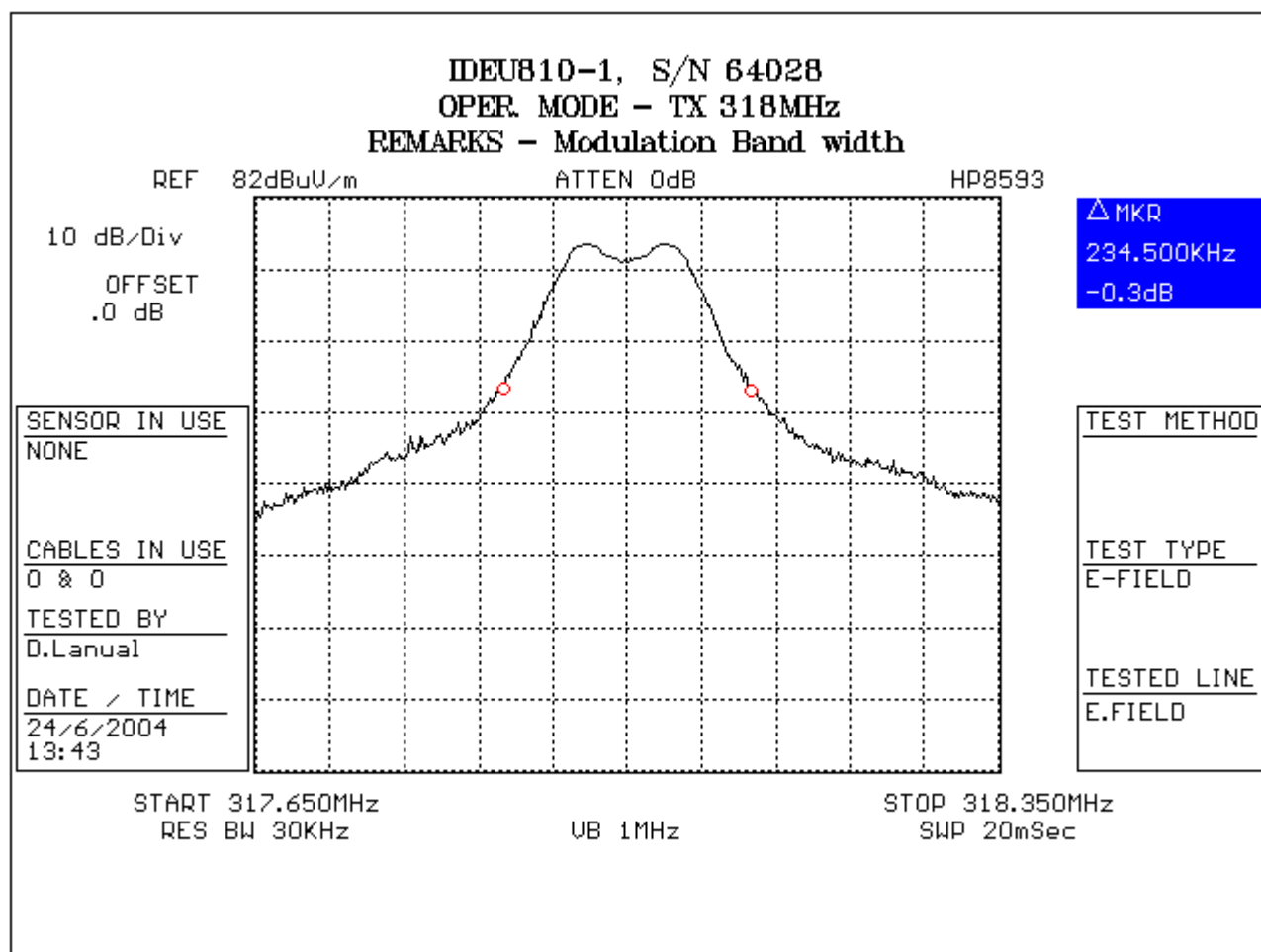


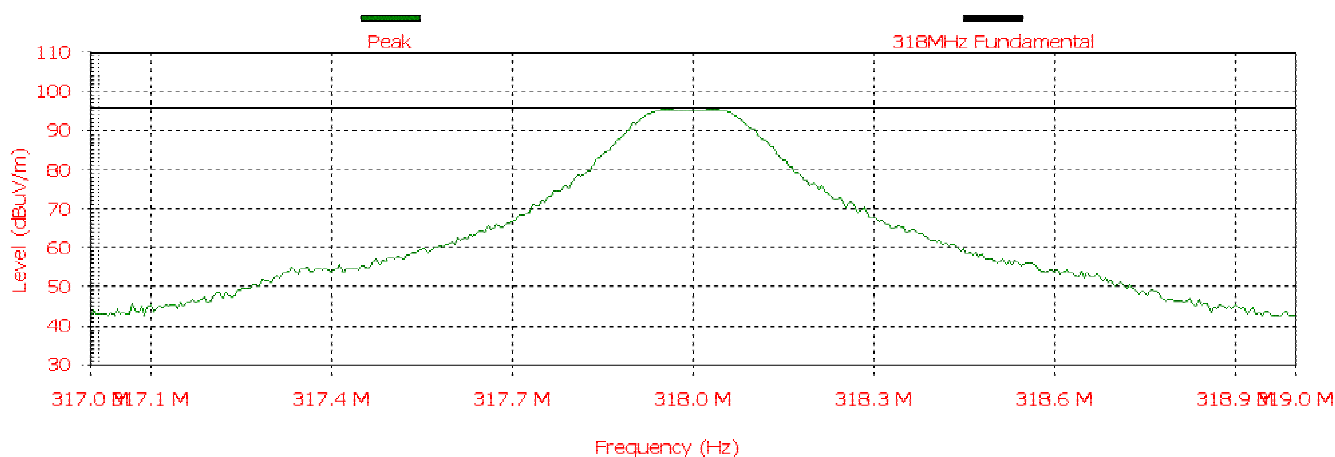
Figure 8f1 Conducted emission Test setup

9 Plots

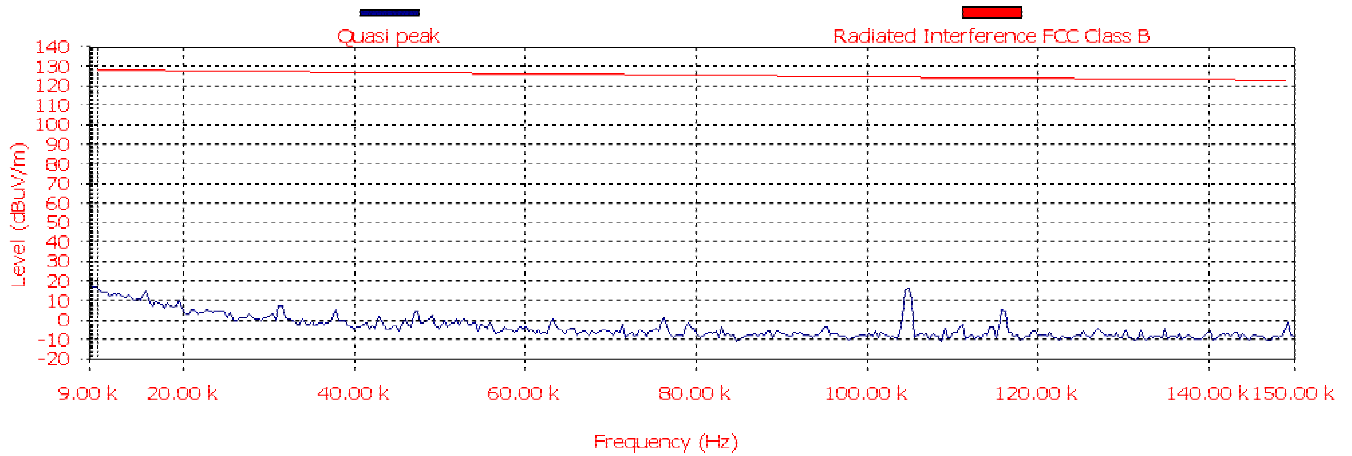


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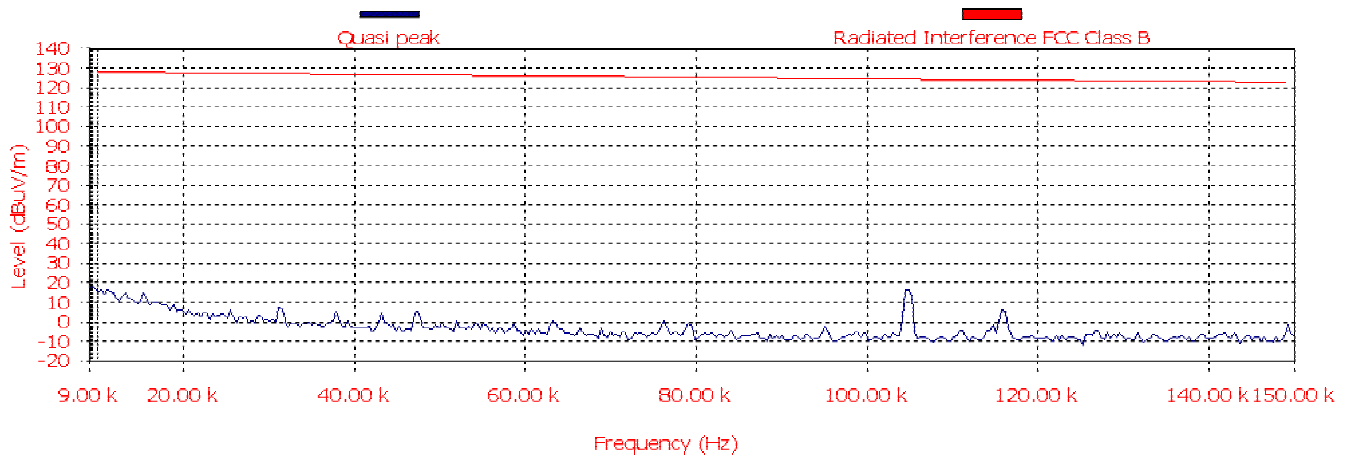
Freq(MHz)	PK	PIK Limit	PK Diff	Pass/Fail	Angle	Height	H/V
318.002	95.4	95.8	-0.4	PASS	149	1	V



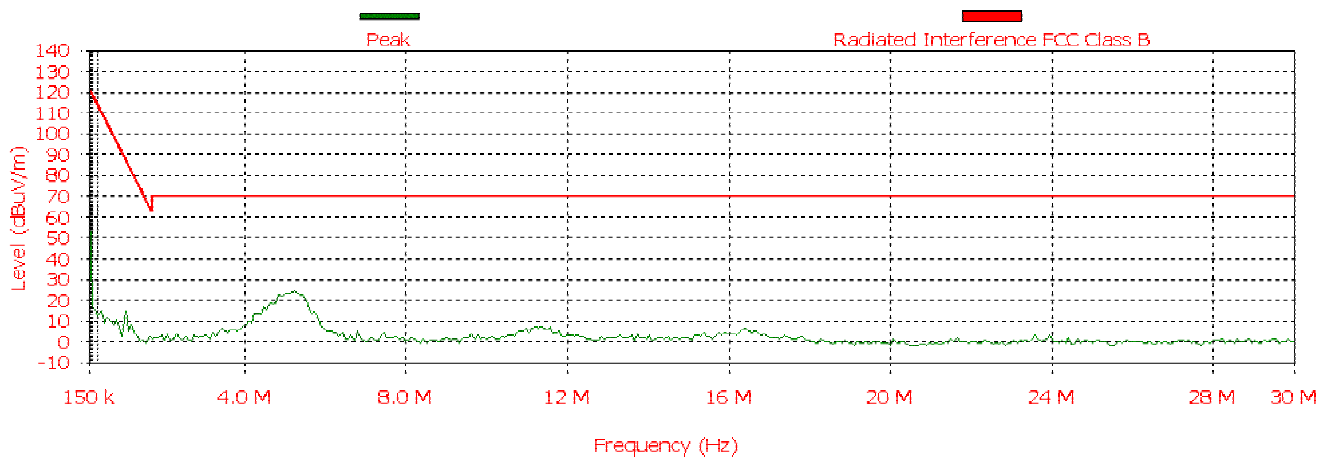
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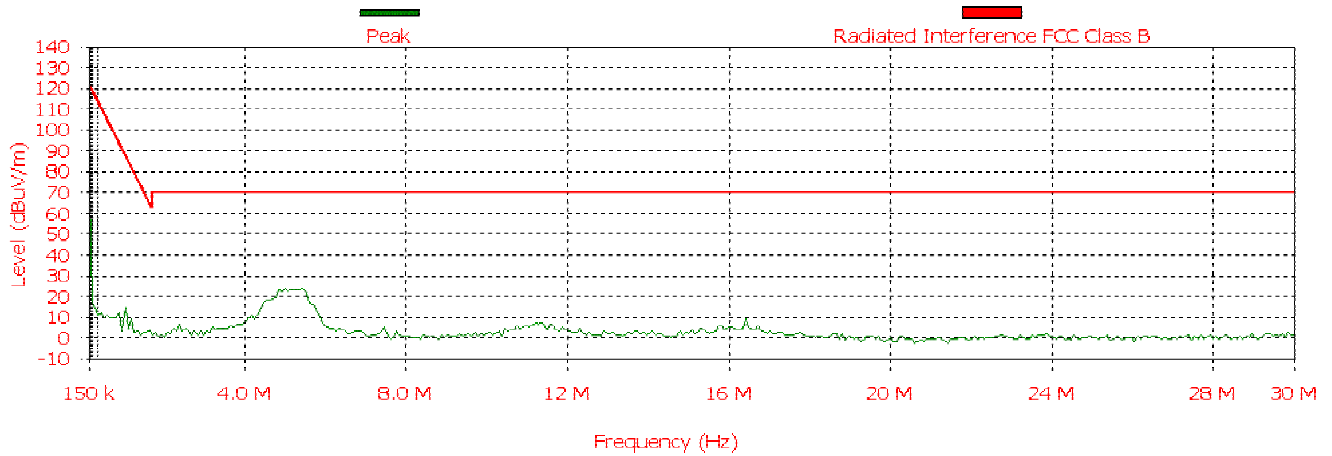
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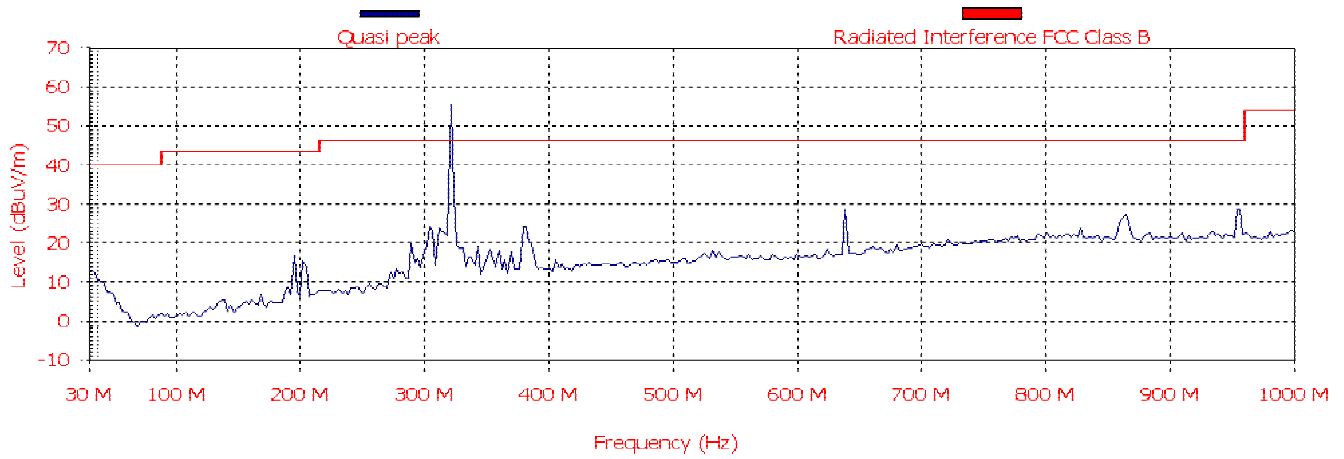
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Plot/ 5

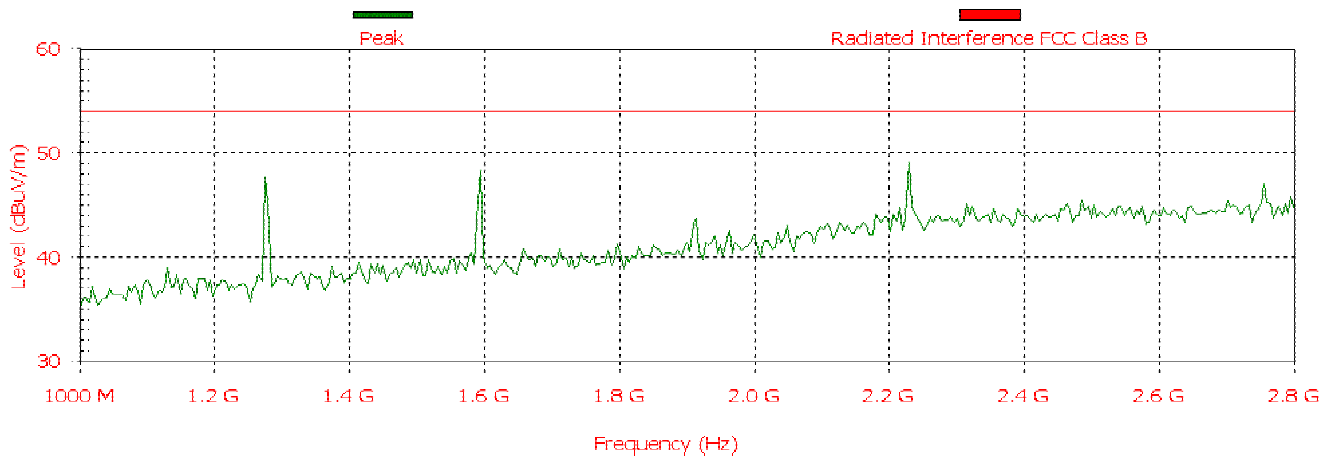


Plot/ 6

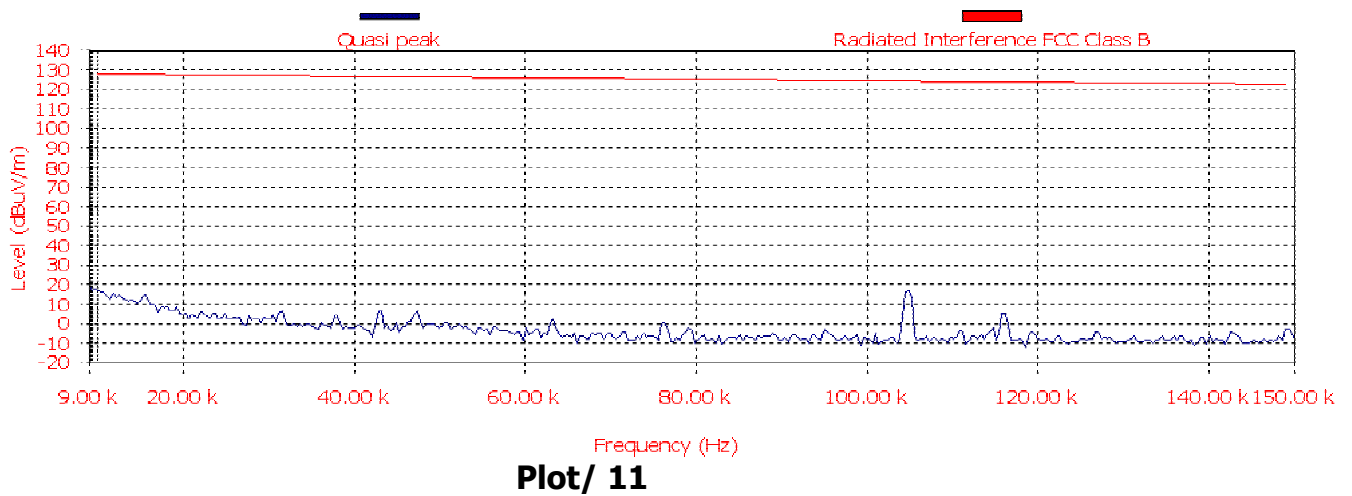
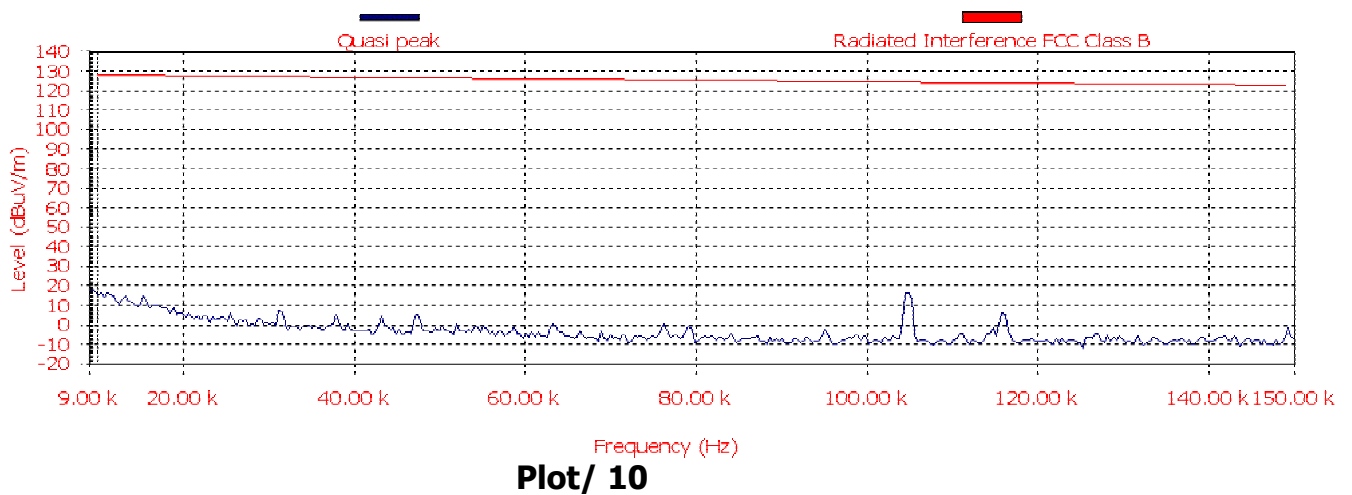
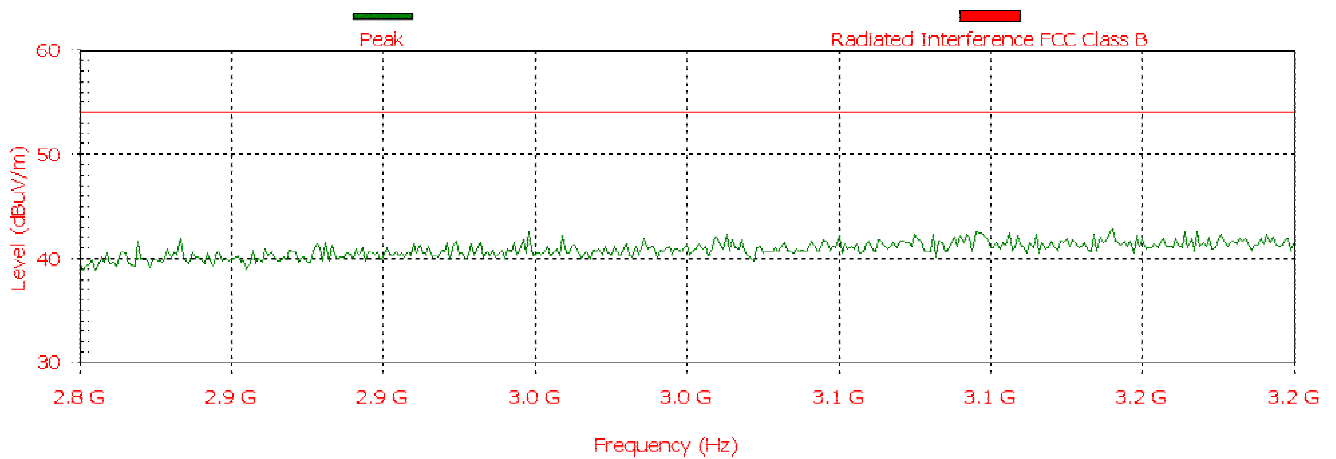


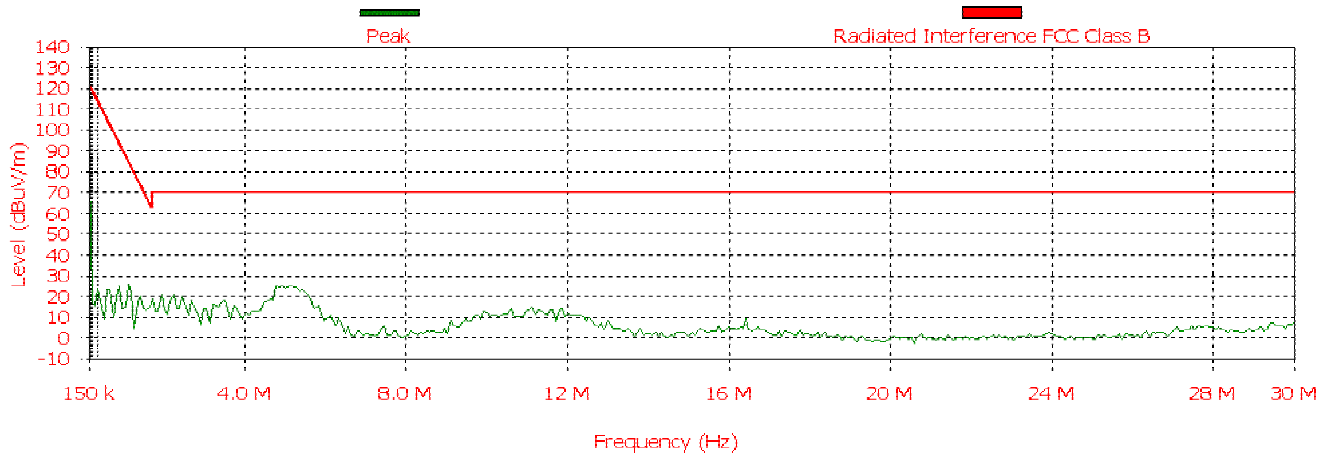
Plot/ 7

Freq(MHz)	PK	PIK Limit	PK Diff	Pass/Fail	Angle	Height	H/V
1271.783	48.7	54	-5.3	PASS	265	1.65	V
1589.79	49.4	54	-4.6	PASS	310	1.65	V
2226.119	49.2	54	-4.8	PASS	320	1.65	V

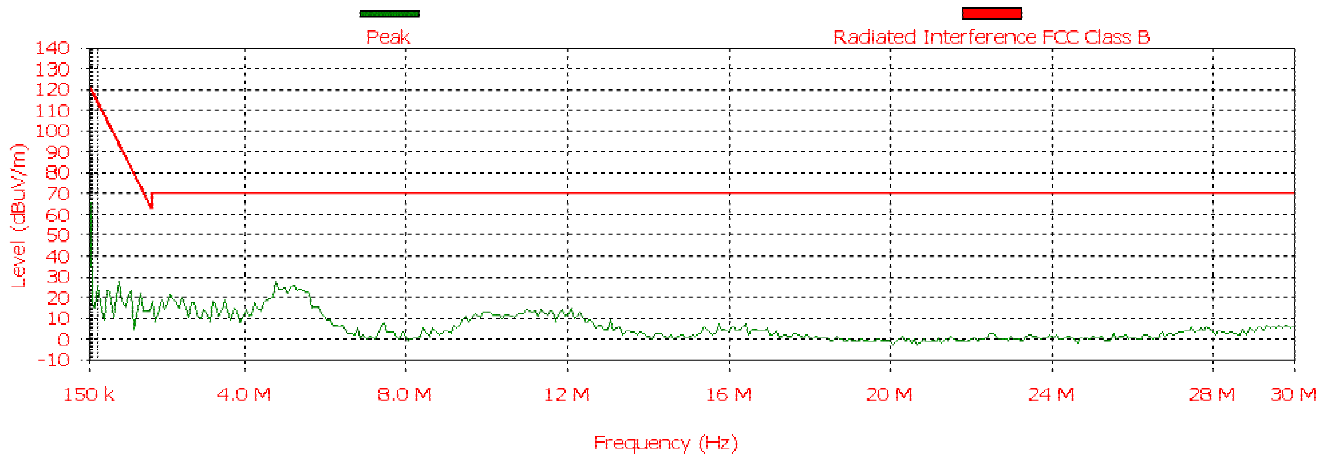


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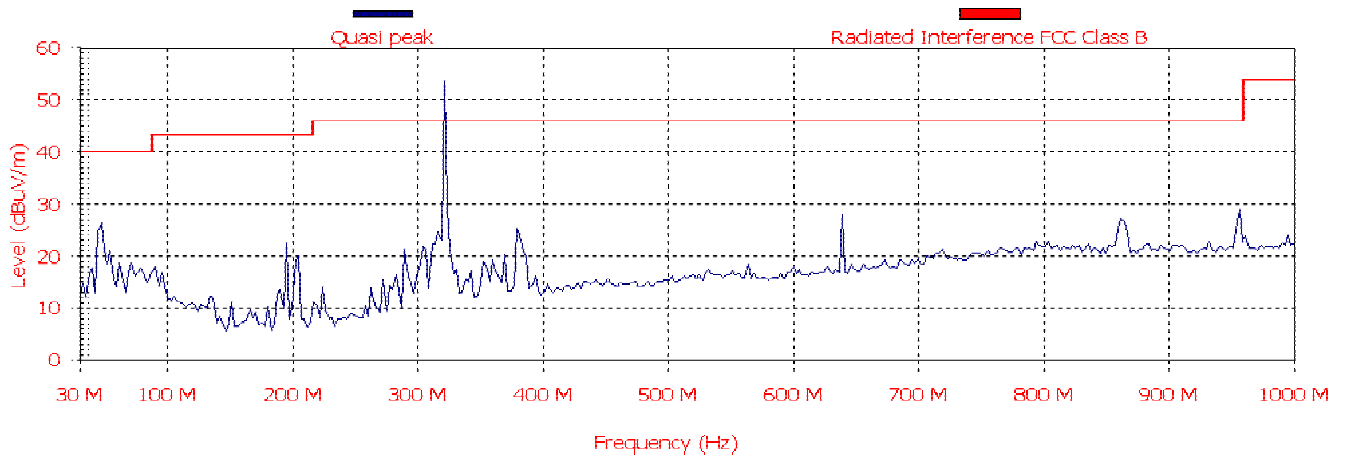




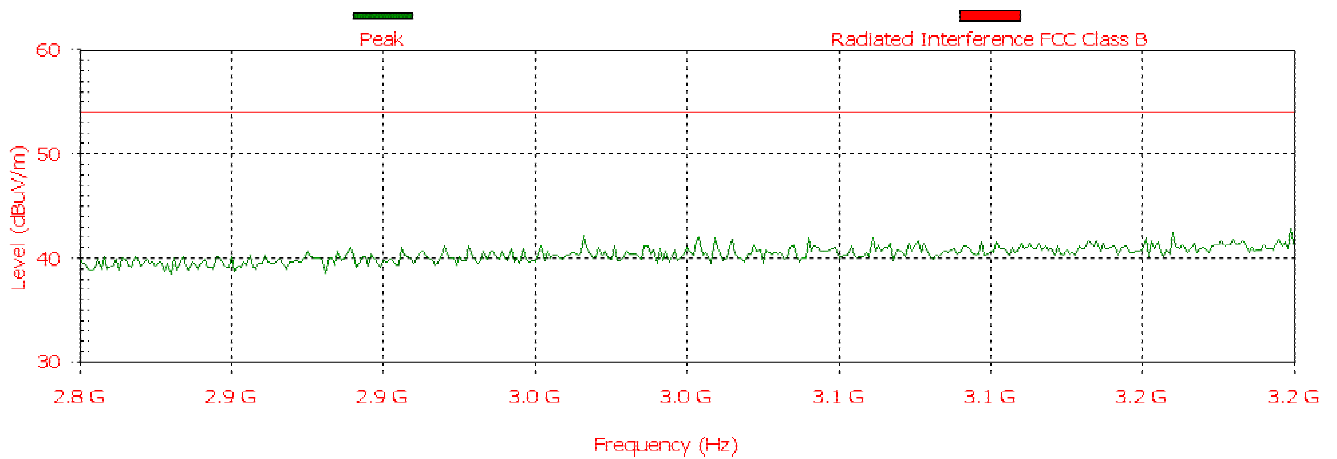
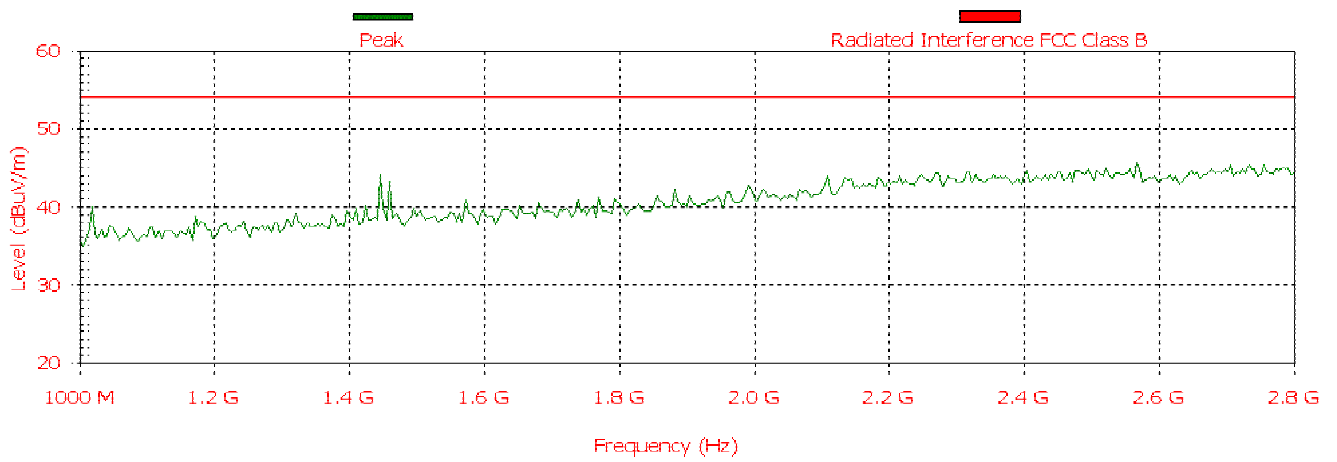
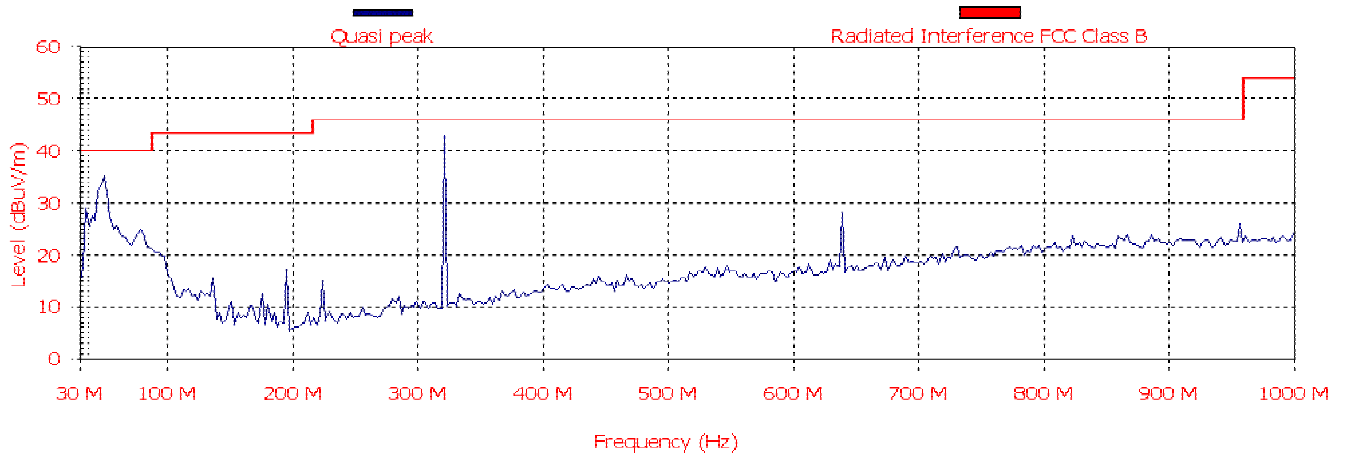
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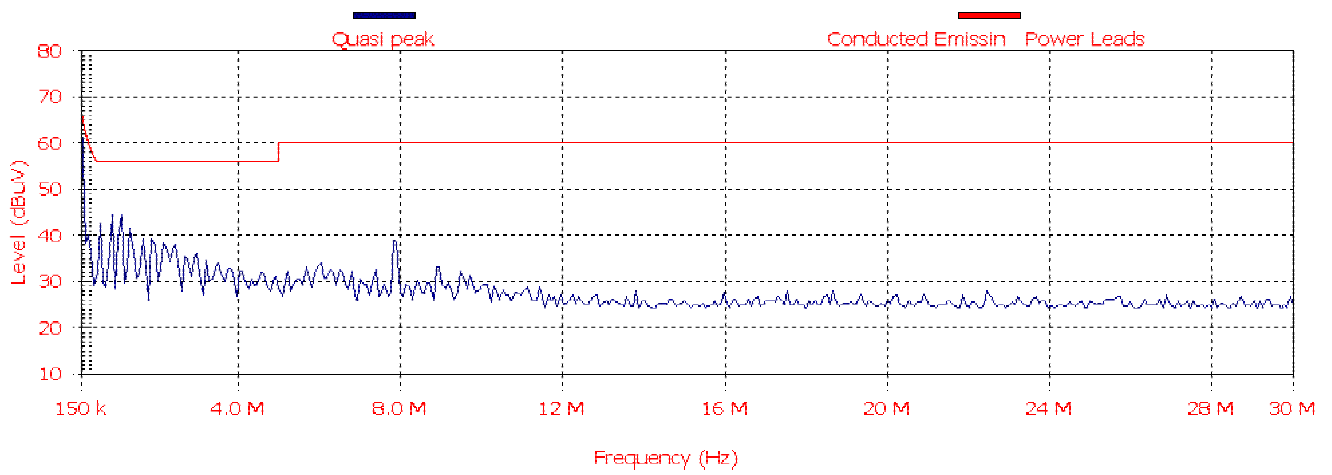


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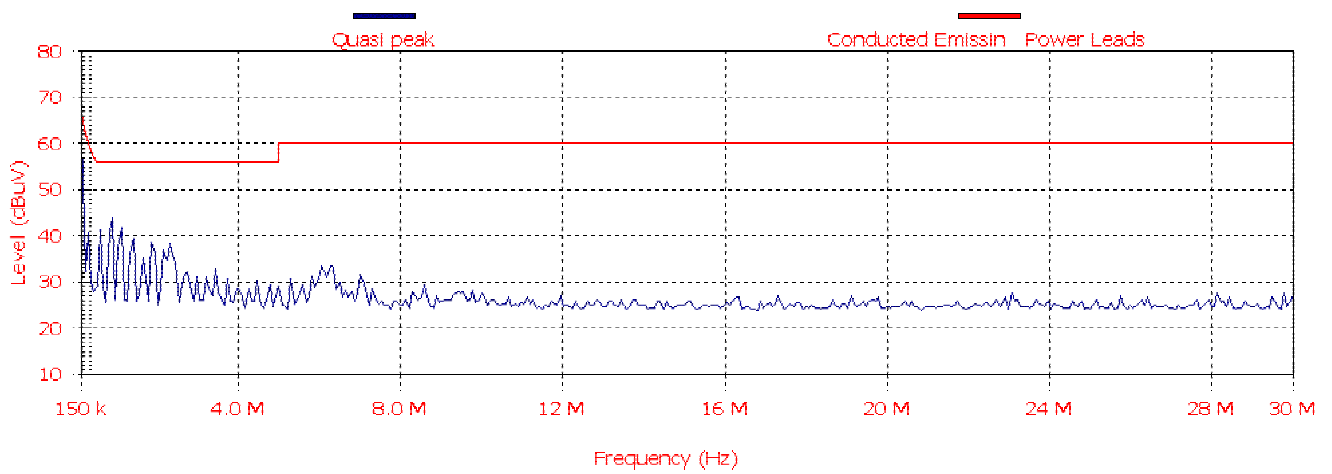


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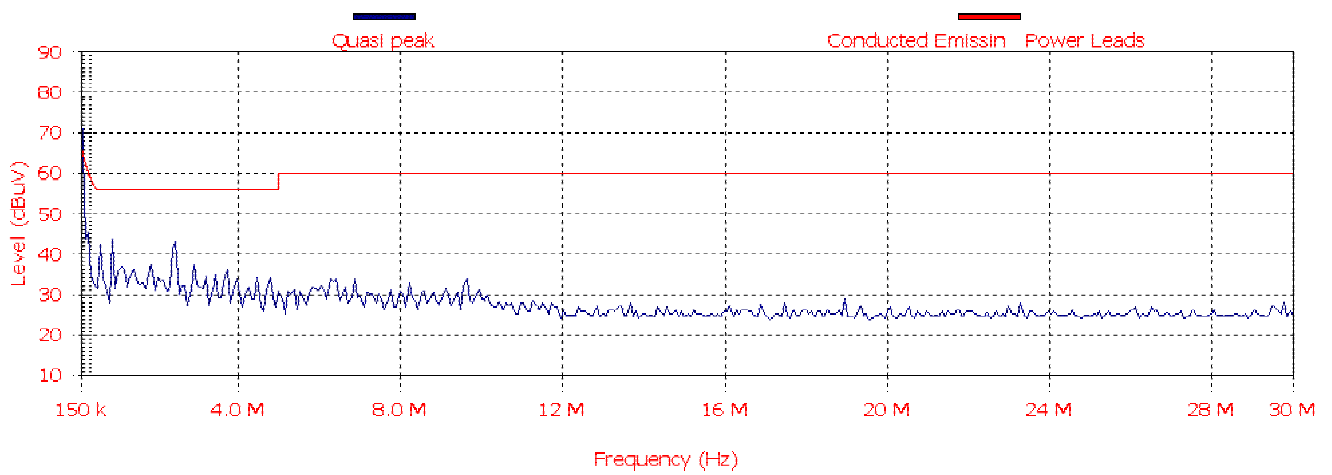




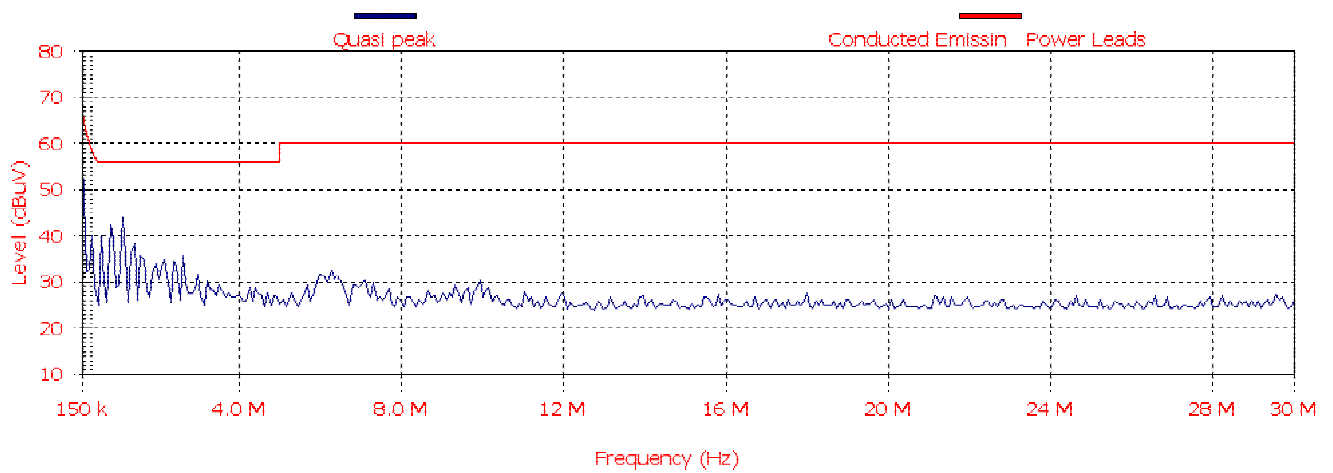
Plot/ 18



Plot/ 19



Plot/ 20



Plot/ 21



Radiated Emission Test Setup up to 30MHz



Radiated Emission Test Setup 30MHz-1GHz



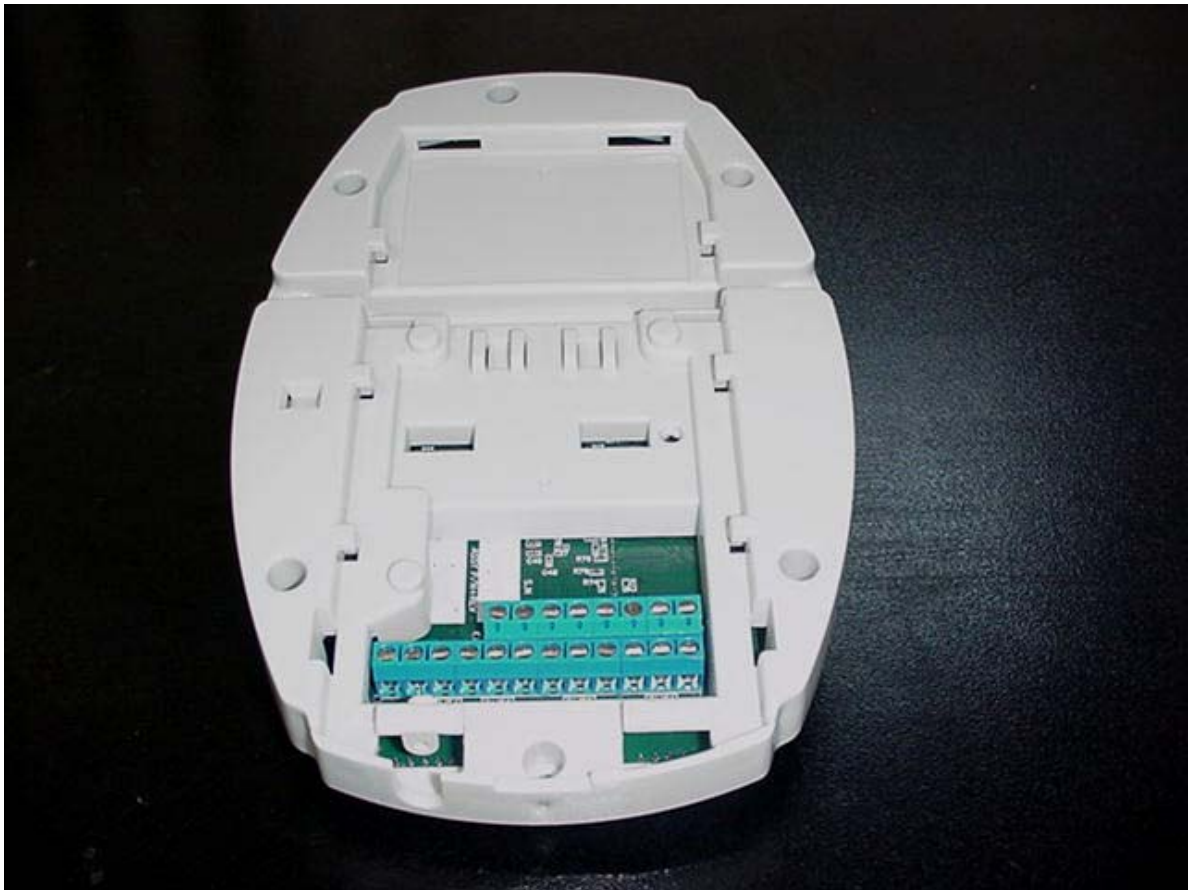
Radiated Emission Test Setup 1GHz-18GHz



conducted Emission Set Up



EUT



EUT



EUT