Project 08364-10

DLP Design, Inc.
RFID-LP8C

Electromagnetic Compatibility Test Report

Prepared for:

DLP Design, Inc.
1605 Roma Lane
Allen, TX 75013

By

Professional Testing (EMI), Inc.
1601 FM 1460, Suite B
Round Rock, Texas 78664

MARCH 16, 2008

TABLE OF CONTENTS

FIGURES

APPENDICES

NOTICE: (1) This Report must not be used to claim product endorsement, by NVLAP, NIST, the FCC or any other Agency. This report also does not warrant certification by NVLAP or NIST.
This report shall not be reproduced except in full, without the written approval of Professional Testing (EMI), Inc.
The significance of this report is dependent on the representative character of the test sample submitted for evaluation and the results apply only in reference to the sample tested. The manufacturer must continuously implement the changes shown herein to attain and maintain the required degree of compliance.

Certificate Of Compliance

Applicant: DLP Design, Inc.

Applicant's Address: 1605 Roma Lane
Allen, TX 75013

Project Number: 08364-10

Test Dates: February 25-28, 2008

I, Jason Anderson, for Professional Testing (EMI), Inc., being familiar with the FCC and Industry Canada rules and test procedures have reviewed the test setup, measured data and this report. I believe them to be true and accurate.

The **DLP Design, Inc. RFID-LP8C** was tested to and found to be in compliance with FCC Part 15 Subpart C for an Intentional Radiator.

The highest emissions generated by the above equipment are listed below:

Fundamental	Frequency (MHz)	Level (dB µV/m) at 30 m	Limit (dB µV/m) at 30 m	Limit (µV/m) at 30 m	Margin (dB)
Paragraph 15.225(a)	13.56 (peak)	45.2	84	15,848	-38.8

Other	Frequency (MHz)	Level (dB µV/m)	Limit (dB µV/m)	Margin (dB)
Harmonics	67.8 (peak)	35.6	40.0	-4.4
Spurious	531.2	45.8	46.0	-0.2
Conducted	0.180	51.1	55.1	-4.0

Jason Anderson, BSEE
Director of Testing Services

This report has been reviewed and accepted by the applicant. The undersigned is responsible for ensuring that **DLP Design, Inc.'s, RFID-LP8C**will continue to comply with the FCC and IC rules.

1.0 EUT Description

The Equipment Under Test (EUT) is the DLP Design, Inc., RFID-LP8C. The RFID-LP8C is a USB-powered module for reading from and writing to ISO 15693, ISO 18000-3, and Tag-it™ intelligent RFID transponder tags. It has the ability to both read and write up to 256 bytes of data in addition to reading the unique identifier (UID/SID). The RFID-LP8C is an 8 channel transmitter. By design, only a single port may be operated at a time. It is selected by use of a multiplexer turning on a relay associated with each port. The RFID-LP8C will be sold to oems for incorporation into an end user device. The device will be available for use with 3 antennas provided by the manufacturer: a large loop, a small loop, and a ferrite antenna. The antenna will be connected by means of a reverse polarity sma connector. The RFID-LP8C can be operated through the use of a USB port or a serial port with the addition of an external supply.

The system tested consisted of the following:

Manufacturer & Model	FCC ID Number	IC Identifier
DLP Design, Inc. RFID-LP8C	SX90LP8C	5675A-0LP8C

1.1 Applicable Rules

Guidelines	FCC Rules, Part 15	IC Rules	
		RSS-GEN Issue 1	RSS-210 Issue 6
Transmitter Characteristics	15.225	4.1, 4.2, 4.4-4.6, 4.9, 7.2.4	2.2-2.2, 2.5-2.7, Annex 2 A2.6
Spurious Radiated Power*	15.225, 15.209	4.2, 4.7, 7.2.2	2.2-2.2, 2.5-2.7, Annex 2 A2.6
Powerline Conducted Limit	15.207	4.2, 4.7	
Antenna Requirement	15.203	7.1, 7.1.4	

* Exempt from the 13.36 MHz to 14.41 MHz restricted band per FCC 15.205(d) paragraph (7).

1.2 EUT Operation

The RFID-LP8C was operated with the USB and serial connections simultaneously for purposes of testing. A prescan was performed to determine which of the 8 ports emitted the maximum signal. All ports were found to be identical, so testing was performed on port 1. The RFID-LP8C was tested with three available antennas, a large loop, small loop, and a ferrite antenna.

The EUT was operated in continuous transmit mode at maximum power to measure fundamental, harmonics, and spurious radiation.

As an RFID device, the transmitter operates continually and data reception is accomplished by detecting the loading induced on the transmitted field by the RFID tag.

Fundamental frequency EUT emissions were measured in all orthogonal orientations being X, Y and Z.

1.3 Test Facility

Conducted emissions measurements on the mains terminals were performed at Professional Testing Site 45, located in Austin, Texas.

Professional Testing (EMI), Inc. (PTI), follows the guidelines of NIST for all uncertainty calculations, estimates and expressions thereof for EMC testing. A copy of PTI's policy for EMC Measurement Uncertainty is provided in Appendix C.

2.0 Powerline Conducted Emissions

2.1 Test Procedure

The EUT was configured and operated in a manner consistent with typical applications. The EUT power cord in excess of one meter was folded back and forth forming a bundle 30 to 40 cm long in the approximate center of the cable. Power supply cords for the peripheral equipment were powered from an auxiliary LISN. Excess interface cable lengths were separately bundled in a non-inductive arrangement at the approximate center of the cable with the bundle 30 to 40 centimeters in length. The conducted emissions were maximized, by varying the operating states and configuration of the EUT.

The tests were performed in a 12’ x 12’ RayProof modular shielded room. The EUT was placed on a non-metallic table 0.4 meters from a vertical metal reference plane and 0.8 meters from a horizontal metal reference plane.

As an intentional transmitter operating below 30 MHz, emissions were measured with the antenna attached and driven as designed. Since fundamental emissions below 30 MHz usually exceed the conducted limits, the conducted emissions are then measured again with a resistive load substituted for the antenna. Both test conditions are reported for comparison.

2.2 Test Criteria

The FCC Part 15 Class B conduction limits are given below.

Frequency (MHz)	Conducted Limits (dBuV)	
	Average	Quasi-Peak
0.15 – .50	66-56*	56 – 46*
.50 - 5	56	46
5 – 30	60	50

The tighter limit shall apply at the edge between two frequency bands.
*Decreases with the logarithm of the frequency.

2.3 Test Results

The conducted emissions data is included as Appendix A. The conducted emissions generated by the EUT as measured on the mains terminals with the substituted resistive load were found to satisfy the test criteria.

2.4 Test Equipment

Asset #	Manufacturer	Model #	Description	Calibration Due
0239	HP	85650A	Quasi-peak Adapter	Jan 22, 2009
1274	HP	85662A	Spectrum Analyzer Display	NCR
1270	HP	8568B	Spectrum Analyzer	Jan 22, 2009
1086	PTI	PTI-ALF2	Attenuator, Limiter, Filter	March 26, 2008
1153	FCC	8012-50-R-24-BNC	Line Impedance Stablization Network	Aug 8, 2008
81	ELGAR	1751SL	AC Power Supply	NCR

3.0 Carrier Field Strength

3.1 Test Procedure

Tests of the fundamental for the device were performed to determine the worst case polarization of the devices. The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a motorized turntable which allows 360 degree rotation. For measurements of the fundamental signal, a measurement antenna was positioned at a distance of 3 meters as measured from the closest point of the EUT. The radiated emissions were maximized by rotating the EUT.

A drawing showing the test setup is given as Figure 1.

3.2 Test Criteria

The table below shows the relevant FCC radiated limits and measurement distance for the EUT. The actual measurement distance and adjusted limit is determined and applied.

Fundamental Frequency MHz	Fundamental Field Strength at Distance	
	FCC Section 15.225(a) µV/m at 30 m	As Measured dB µV/m at 30 m
13.56	15,848	84

Note: The fundamental limit is expressed in peak field strength.

3.3 Test Results

The radiated test data for the fundamental is included in Appendix A. The radiated emissions satisfy the test criteria.

3.4 Test Equipment

Asset #	Manufacturer	Model #	Description	Calibration Due
0006	EMCO	6502	Active Loop Antenna	December 22, 2008
275	HP	85650A	Quasi-peak Adapter (high band)	June 18, 2008

83	HP	85662A	Spectrum Analyzer Display (high band)	NCR
84	HP	8566B	Spectrum Analyzer (high band)	March 27, 2008
238	HP	85685A	RF Preselector (high band)	June 22, 2008
1277	HP	85650A	Quasi-peak Adapter (low band)	June 18, 2008
45	HP	85662A	Spectrum Analyzer Display (low band)	NCR
1148	HP	8568B	Spectrum Analyzer (low band)	June 18, 2008
990	HP	85685A	RF Preselector (low band)	January 21, 2009
1454	HP	8447D	RF Preamplifier	May 8, 2008
1389	Emco	3108	Biconical Antenna	April 18, 2008
1486	Emco	3147	Log Periodic Dipole Araay Antenna	April 19, 2008
C026	none	none	Coaxial Cable (low band)	June 28, 2008
C027	none	none	Coaxial Cable (high band)	June 28, 2008

4.0 Spurious and Harmonic Radiated Emissions

4.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a motorized turntable which allows 360 degree rotation. For measurements of the spurious/harmonic radiated emissions, a measurement antenna was positioned at a distance of 3 meters as measured from the closest point of the EUT. The radiated emissions were maximized by rotating the EUT.

A Spectrum Analyzer with quasi-peak detection was used to find the maximums of the radiated emissions during the variability testing. A drawing showing the test setup is given as Figure 2.

Note that the 2nd harmonic is measured with the same test equipment as the fundamental as this harmonic is below 30 MHz.

4.2 Test Criteria

The FCC Class B radiated limits are given below.

Frequency MHz	Test Distance (Meters)	Field Strength (uV/m)	(dBuV/m)
1.705 to 30	30	30	29.5
30 to 88	3	100	40.0
88 to 216	3	150	43.5
216 to 960	3	200	46.0
Above 960	3	500	54.0

The lower limit shall apply at the transition frequency.

4.3 Test Results

The radiated test data is included in Appendix B. The emissions identified from the EUT were maximized at each frequency. The radiated emissions generated by EUT were below the FCC Class B maximum criteria.

4.4 Test Equipment

Asset #	Manufacturer	Model #	Description	Calibration Due
0006	EMCO	6502	Active Loop Antenna	December 22, 2008
275	HP	85650A	Quasi-peak Adapter (high band)	June 18, 2008
83	HP	85662A	Spectrum Analyzer Display (high band)	NCR
84	HP	8566B	Spectrum Analyzer (high band)	March 27, 2008
238	HP	85685A	RF Preselector (high band)	June 22, 2008
1277	HP	85650A	Quasi-peak Adapter (low band)	June 18, 2008
45	HP	85662A	Spectrum Analyzer Display (low band)	NCR
1148	HP	8568B	Spectrum Analyzer (low band)	June 18, 2008
990	HP	85685A	RF Preselector (low band)	January 21, 2009
1454	HP	8447D	RF Preamplifier	May 8, 2008
1389	Emco	3108	Biconical Antenna	April 18, 2008
1486	Emco	3147	Log Periodic Dipole Araay Antenna	April 19, 2008
C026	none	none	Coaxial Cable (low band)	June 28, 2008
C027	none	none	Coaxial Cable (high band)	June 28, 2008

5.0 Frequency Tolerance

5.1 Test Procedure

The EUT operating frequency is measured with a frequency counter for the following conditions:

1. At air temperatures of -20 º C to 50 º C with a nominal operating voltage, or if battery operated with a new battery.

2. At an air temperature of 20 º C over a primary supply voltage variation of 85% to 115% of nominal supply voltage.

5.2 Test Criteria

Carrier signal shall remain within +/- 0.01% (+/- 1.356 kHz).

5.3 Test Results

This device is powered exclusively from USB. The primary supply voltage variation procedure does not apply.

The frequency tolerance test data is included in Appendix B of this report. The EUT satisfies the frequency tolerance criteria.

5.4 Test Equipment

Asset #	Manufacturer	Model #	Description	Calibration Due
0717	EIP	548A	Frequency Counter	Cal Before Use - WWV
0881	Thermotron	S-1.2C	Temperature Chamber	September 27, 2008

6.0 Emissions Mask

6.1 Test Procedure

Radiated emissions are measured in the RFID allocated band as stipulated in the relevant FCC rules. The emission mask is determined from the FCC rules and sections applicable to the EUT.

6.2 Test Criteria

Per FCC Rules, Section 15.225 Operation within the band 13.110 – 14.010 MHz. The following limits apply forming an emission mask around the carrier.

Frequency (MHz)	13.110-13.410	13.410-13.553	13.553-13.567	13.567-13.710	13.710-14.010
Limit Level (µV/m)	106	334	15,848	334	106

The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

6.3 Test Results

A graphical mask was overlaid with the measured fundamental emissions. A tabular summary was derived of the highest emissions in each sub-band around the fundamental. This data is presented in Appendix B. The EUT emissions met the emission mask criteria.

6.4 Test Equipment

Asset #	Manufacturer	Model #	Description	Calibration Due
0006	EMCO	6502	Active Loop Antenna	December 22, 2008
275	HP	85650A	Quasi-peak Adapter (high band)	June 18, 2008
83	HP	85662A	Spectrum Analyzer Display (high band)	NCR
84	HP	8566B	Spectrum Analyzer (high band)	March 27, 2008
238	HP	85685A	RF Preselector (high band)	June 22, 2008
C027	none	none	Coaxial Cable (high band)	June 28, 2008

7.0 Occupied Bandwidth

7.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the floor. The occupied bandwidth was based on a 20 dB or a 26 dB criteria (20 dB or 26 dB down either side of the emission from the peak emission).

7.2 Test Criteria

Measure the 20 dB and 26 dB bandwidth to verify emissions are within the allocated band by comparing bandwidth to the allocated band within the edges of 13.110 MHz to 14.010 MHz.

7.3 Test Results

The occupied bandwidth and band edge test data is included in Appendix B of this report. The EUT satisfies the criteria.

7.4 Test Equipment

Asset #	Manufacturer	Model #	Description	Calibration Due
0006	EMCO	6502	Active Loop Antenna	December 22, 2008
275	HP	85650A	Quasi-peak Adapter (high band)	June 18, 2008
83	HP	85662A	Spectrum Analyzer Display (high band)	NCR
84	HP	8566B	Spectrum Analyzer (high band)	March 27, 2008
238	HP	85685A	RF Preselector (high band)	June 22, 2008
C027	none	none	Coaxial Cable (high band)	June 28, 2008

8.0 Modifications

No modifications were made to the EUT during the performance of the test program.

Appendix A Test Setup Figures

FIGURE 1: Conducted Emissions Mains Terminal Measurements

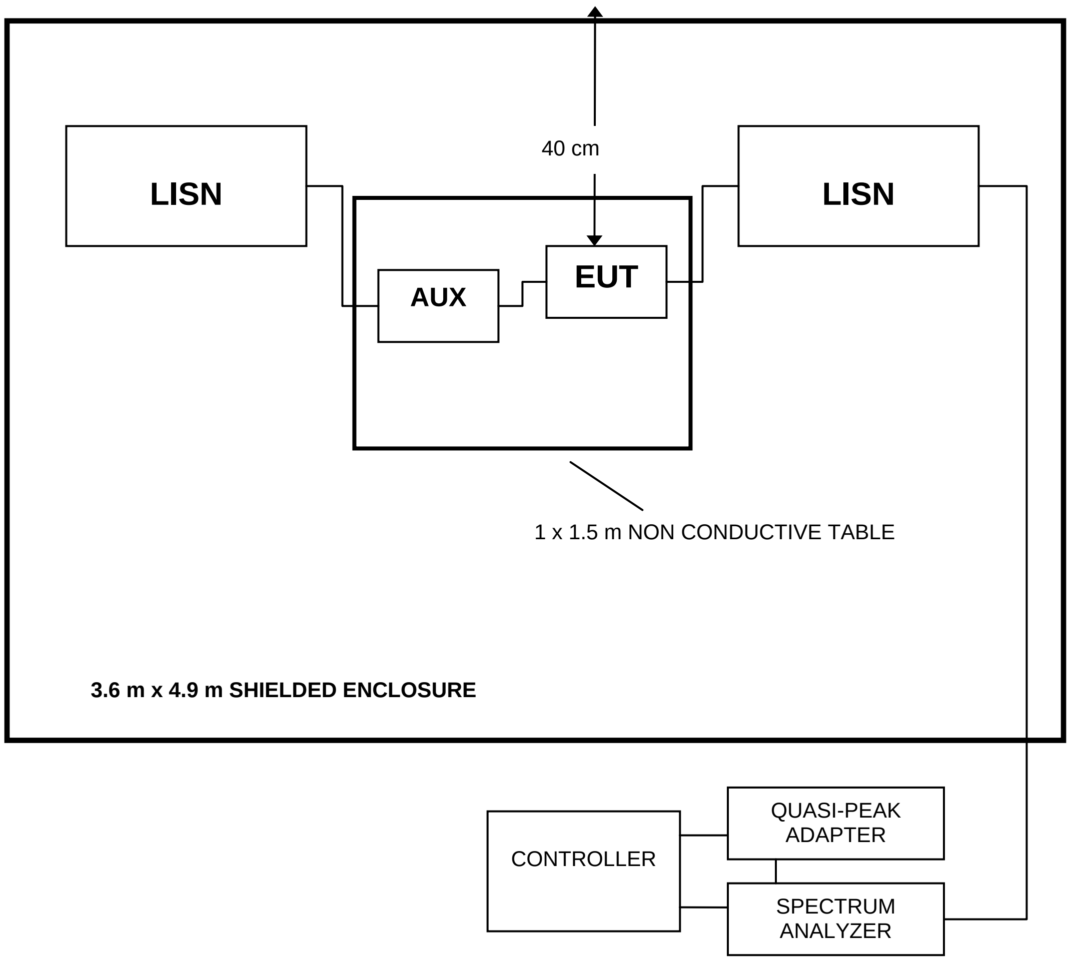
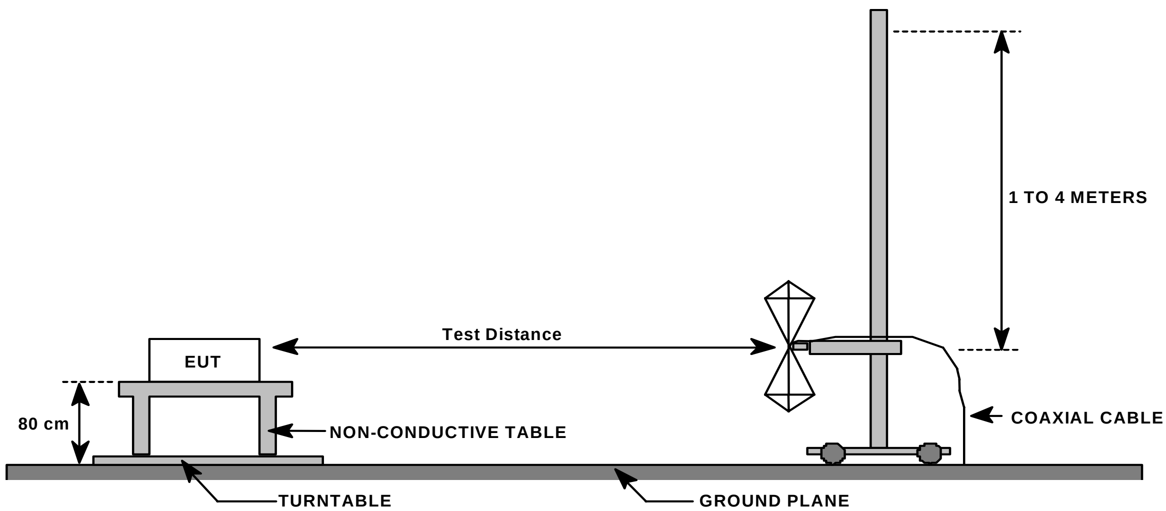


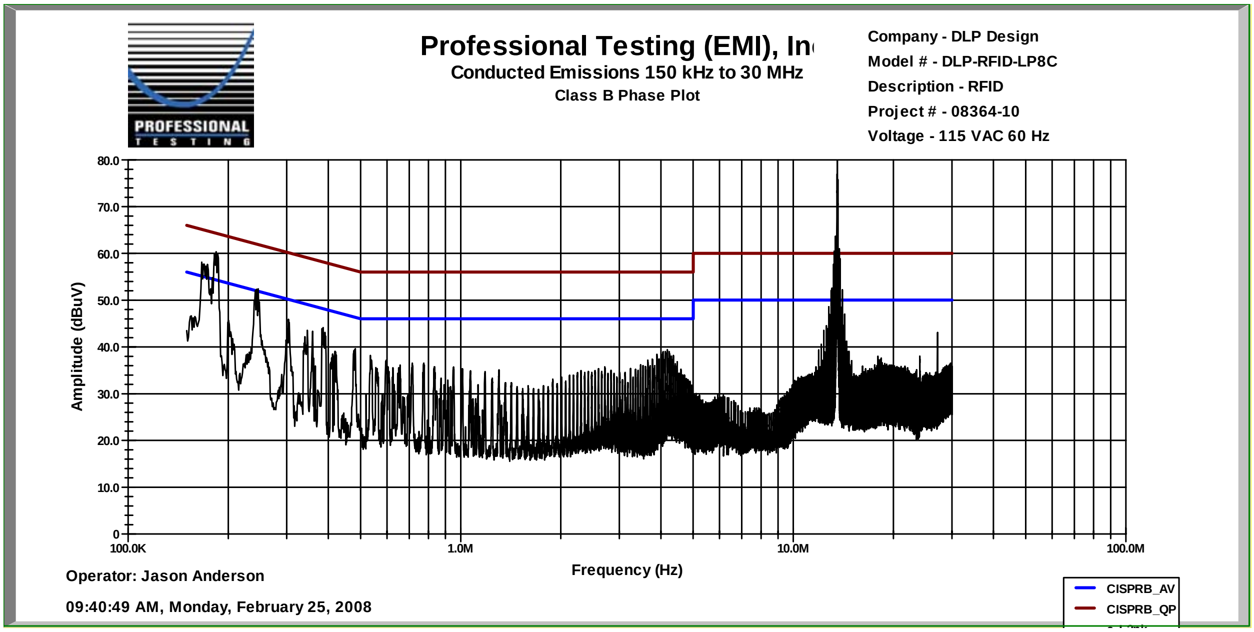
FIGURE 2: Radiated Emissions Test Setup



Appendix B Test Results

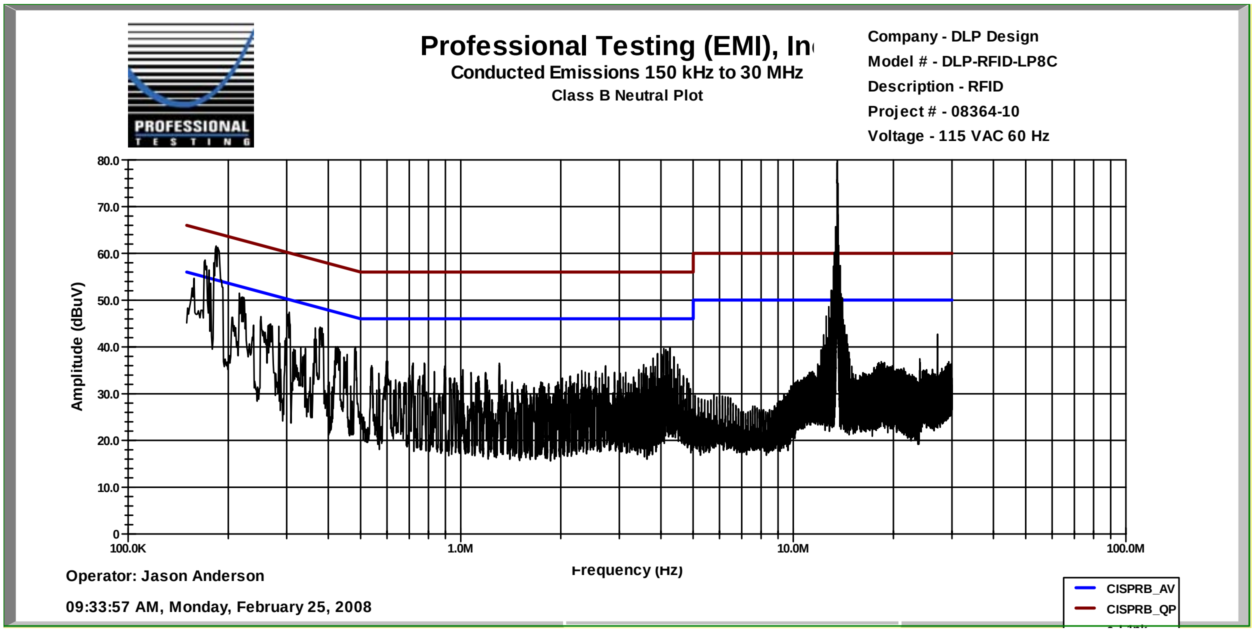
Conducted Emissions Data Sheet
Transmitting w/ Loop Antenna
DLP Design, Inc.
RFID-LP8C

LINE MEASURED: Phase DATE: February 25, 2008
PROJECT: 08364-10
DETECTOR FUNCTION: Peak
RBW: CISPR 9 kHz
VBW: 100 kHz



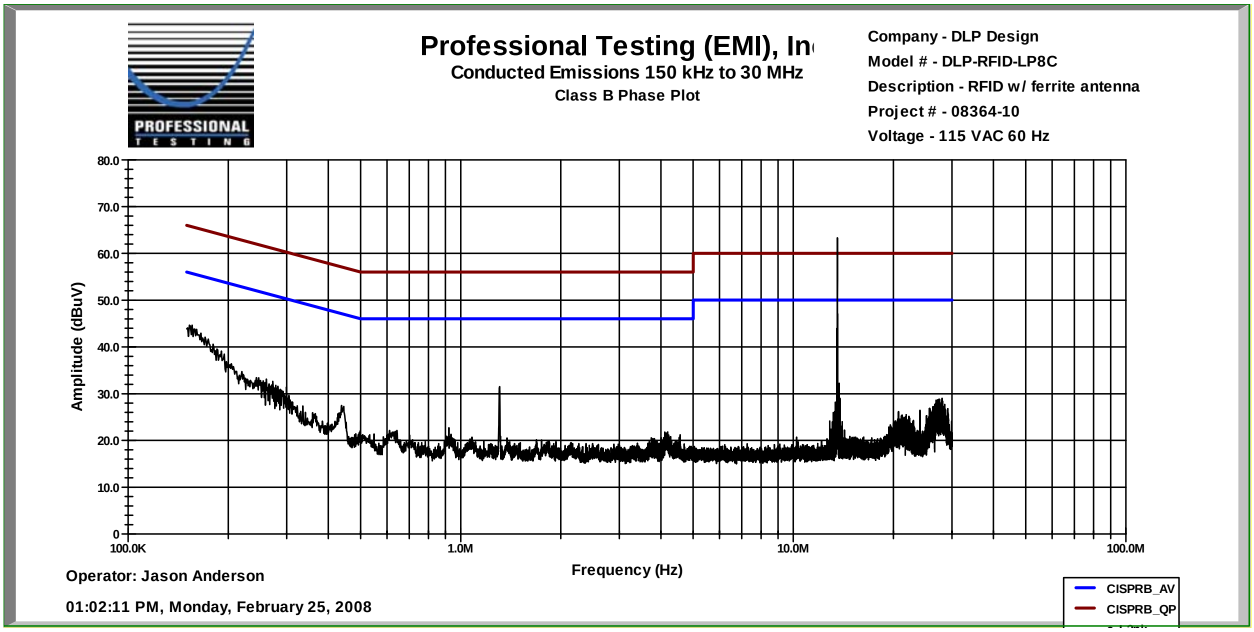
Conducted Emissions Data Sheet
Transmitting w/ Loop Antenna
DLP Design, Inc.
RFID-LP8C

LINE MEASURED: Neutral DATE: February 25, 2008
PROJECT: 08364-10
DETECTOR FUNCTION: Peak
RBW: CISPR 9 kHz
VBW: 100 kHz



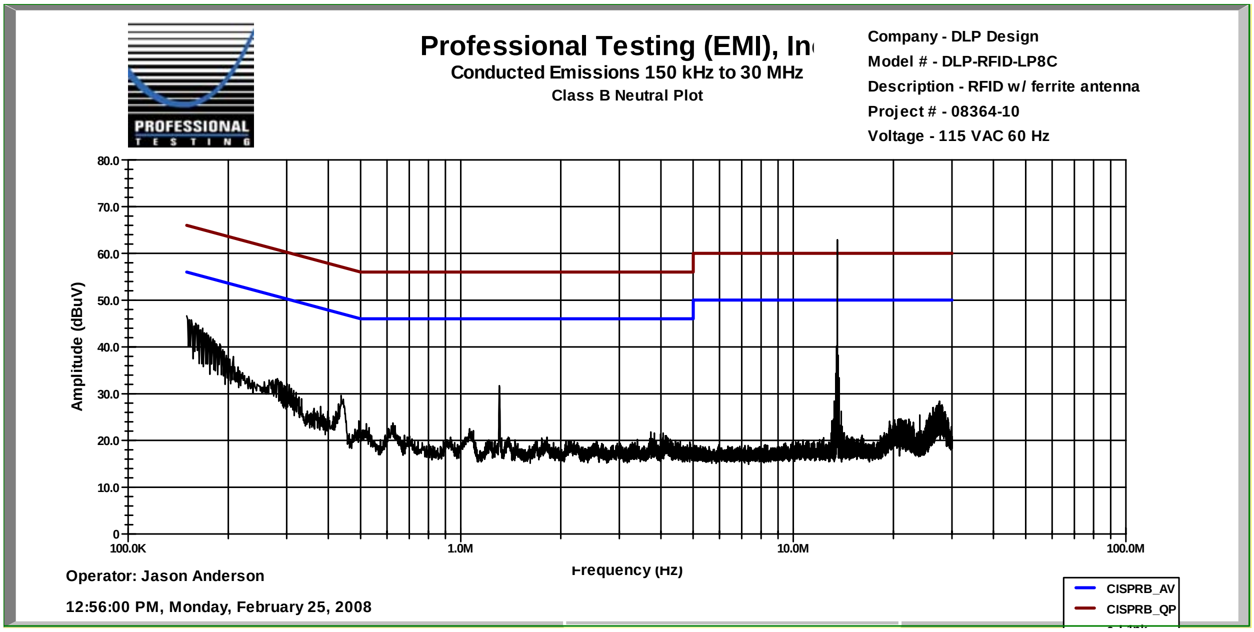
Conducted Emissions Data Sheet
Transmitting w/ Ferrite Antenna
DLP Design, Inc.
RFID-LP8C

LINE MEASURED: Phase DATE: February 25, 2008
PROJECT: 08364-10
DETECTOR FUNCTION: Peak
RBW: CISPR 9 kHz
VBW: 100 kHz



Conducted Emissions Data Sheet
Transmitting w/ Ferrite Antenna
DLP Design, Inc.
RFID-LP8C

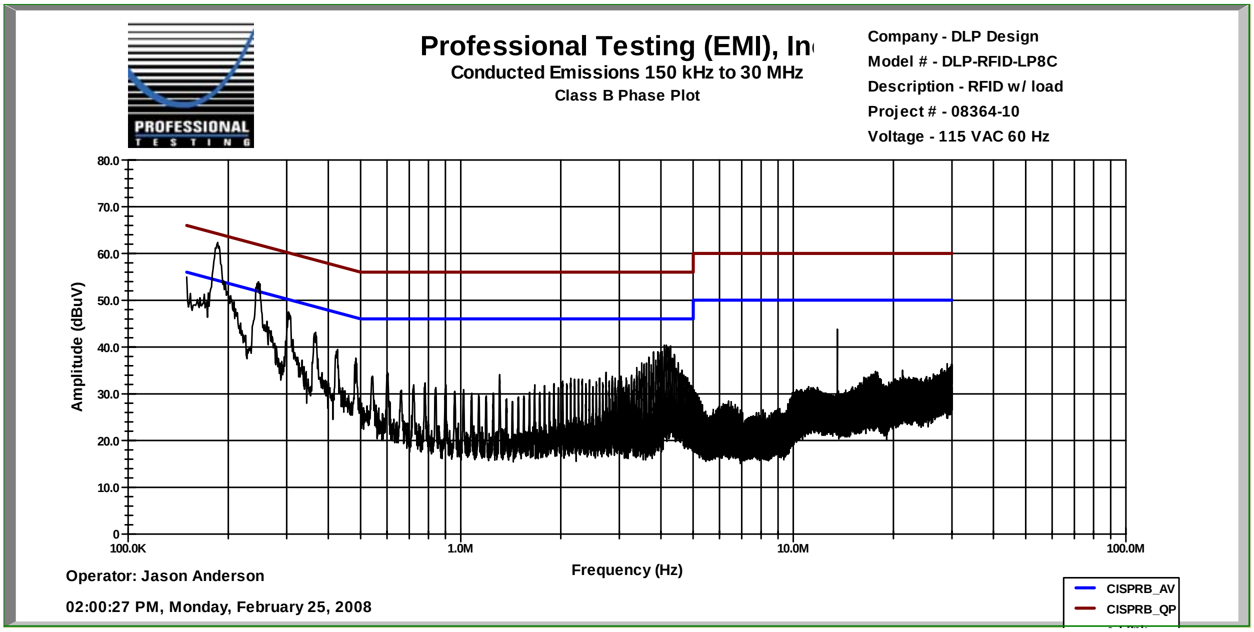
LINE MEASURED: Neutral DATE: February 25, 2008
PROJECT: 08364-10
DETECTOR FUNCTION: Peak
RBW: CISPR 9 kHz
VBW: 100 kHz



Conducted Emissions Data Sheet
Transmitting w/ Load
DLP Design, Inc.
RFID-LP8C

LINE MEASURED: Phase DATE: February 25, 2008
PROJECT: 08364-10
DETECTOR FUNCTION: Quasi-Peak and Average
RBW: CISPR 9 kHz
VBW: 100 kHz (QP) 10 Hz (Avg)

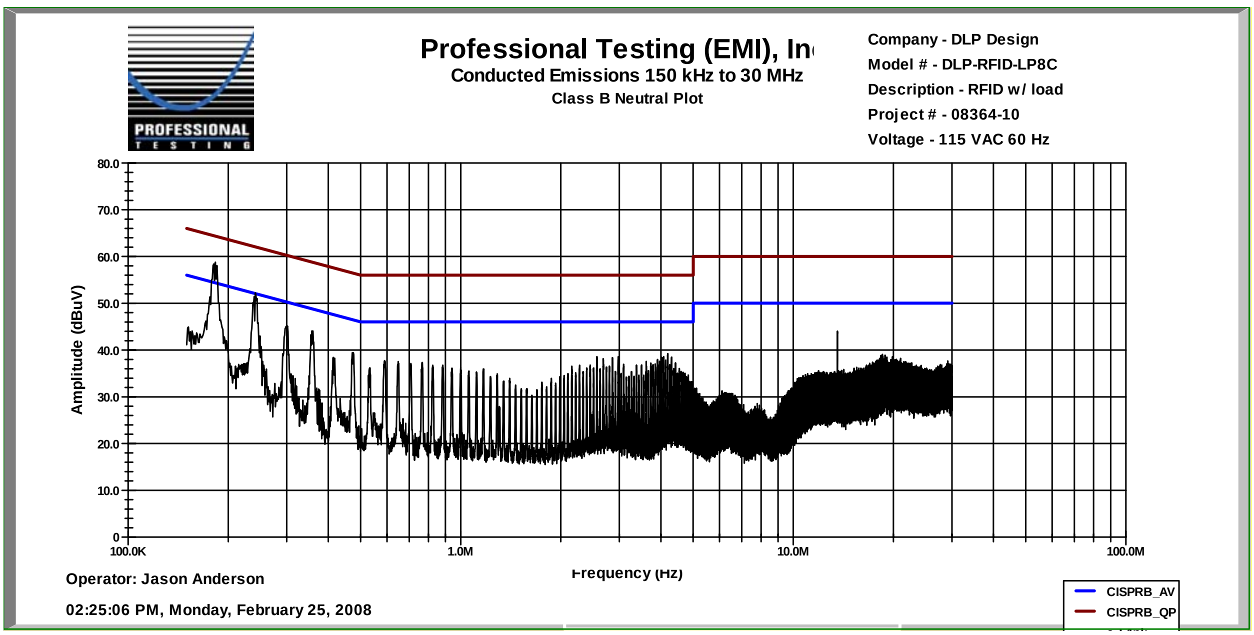
Frequency Reading (MHz)	Quasi-peak Reading (dBuV)	Average Reading (dBuV)	Quasi-peak Limit (dBuV)	Quasi-peak Margin (dB)	Average Limit (dBuV)	Average Margin (dB)
0.18064	58.1	51.1	65.1	-7.1	55.1	-4
0.18184	57	51.3	65.1	-8.1	55.1	-3.8
0.23983	49.8	43.9	63.4	-13.6	53.4	-9.5
0.29751	43.5	39	61.8	-18.3	51.8	-12.8
0.35561	40.4	34.8	60.1	-19.7	50.1	-15.3
13.5645	43.5	43.2	60	-16.5	50	-6.8
17.6852	32.8	28.5	60	-27.2	50	-21.5
21.2796	32.2	28.6	60	-27.8	50	-21.4
29.0012	33	28.1	60	-27	50	-21.9
29.8573	33.1	27.6	60	-26.9	50	-22.4



Conducted Emissions Data Sheet
Transmitting w/ Load
DLP Design, Inc.
RFID-LP8C

LINE MEASURED: Neutral DATE: February 25, 2008
PROJECT: 08364-10
DETECTOR FUNCTION: Quasi-Peak and Average
RBW: CISPR 9 kHz
VBW: 100 kHz (QP) 10 Hz (Avg)

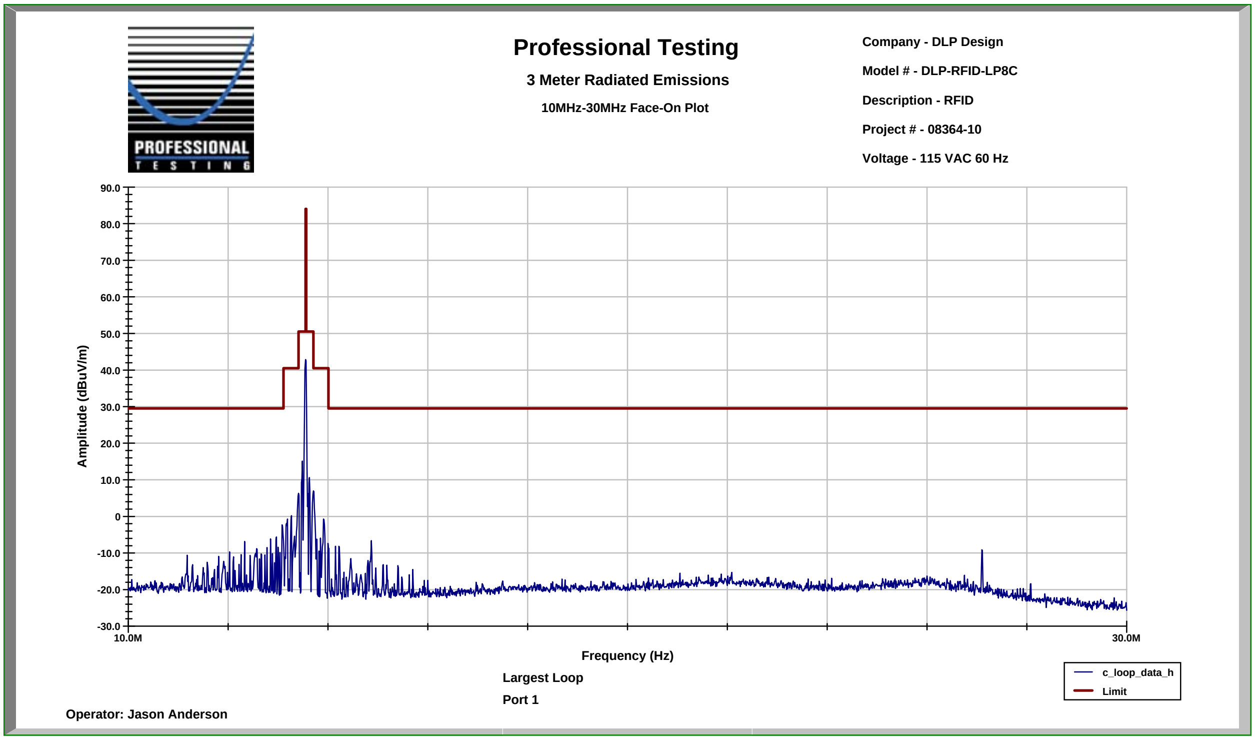
Frequency Reading (MHz)	Quasi-peak Reading (dBuV)	Average Reading (dBuV)	Quasi-peak Limit (dBuV)	Quasi-peak Margin (dB)	Average Limit (dBuV)	Average Margin (dB)
0.17858	56.2	50.3	65.2	-9	55.2	-4.8
0.23658	50.1	44.7	63.5	-13.4	53.5	-8.8
0.29667	43.9	38	61.8	-17.9	51.8	-13.8
0.35311	43.2	38.8	60.2	-17	50.2	-11.4
0.46634	38.1	35.1	57	-18.9	47	-11.9
13.566	43.4	43.1	60	-16.6	50	-6.9
18.3288	34.4	30.1	60	-25.6	50	-19.9
18.5096	34.7	30.7	60	-25.3	50	-19.3
18.5819	34	29.3	60	-26	50	-20.7
18.881	34	29.3	60	-26	50	-20.7



<30 MHz Radiated Emissions Data Sheet
Transmitting w/ Large Loop
DLP Design
RFID Product

MEASUREMENT DISTANCE (m): 3
DETECTOR FUNCTION: Peak
ANTENNA ORIENTATION: Face On
RBW: CISPR 9 kHz
VBW: 100 kHz

DATE: February 28, 2008
PROJECT #: 08364-10

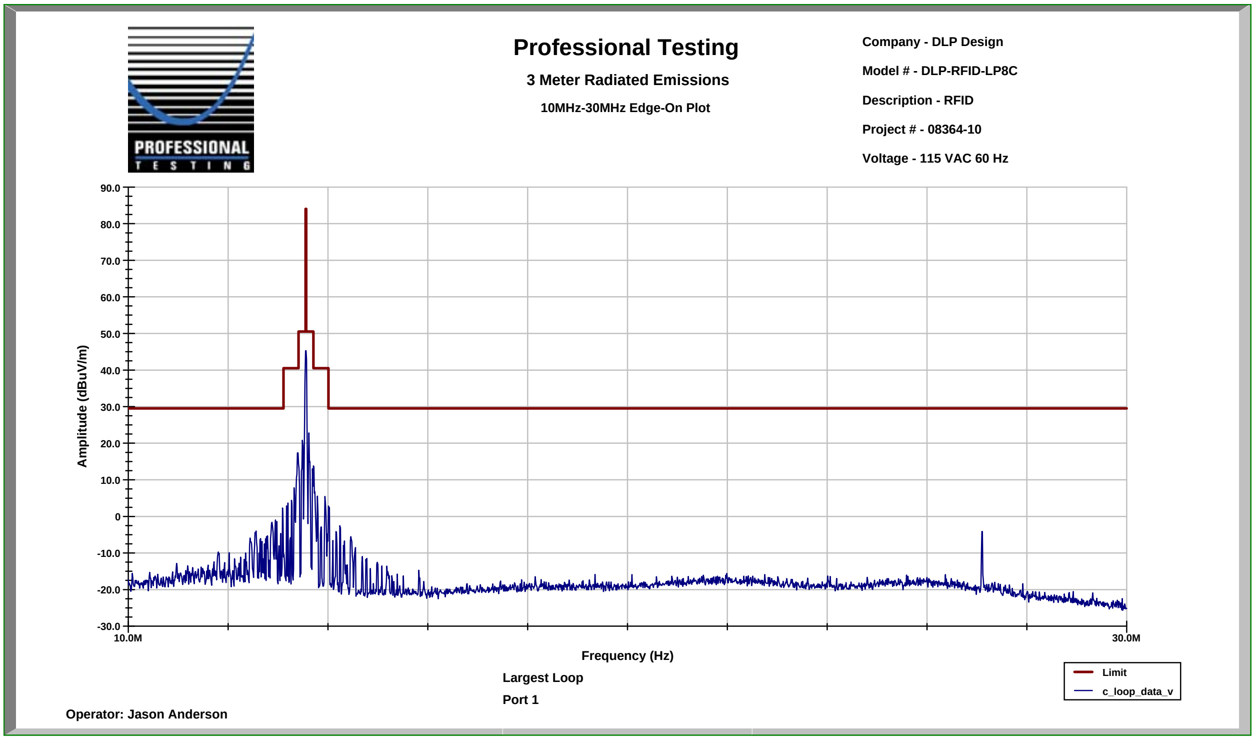


Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dB uV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Distance Factor (dB)	Corrected Level (dB uV/m)	Limit (dB uV/m)	Margin (dB)
13.56	0	1	75	0.0	7.6	0.2	-40.0	42.8	84	-41.2
27.12	0	1	22.1	0.0	8.2	0.3	-40.0	-9.4	29.5	-38.9

<30 MHz Radiated Emissions Data Sheet
Transmitting w/ Large Loop
DLP Design
RFID Product

MEASUREMENT DISTANCE (m): 3
DETECTOR FUNCTION: Peak
ANTENNA ORIENTATION: Edge On
RBW: CISPR 9 kHz
VBW: 100 kHz

DATE: February 28, 2008
PROJECT #: 08364-10

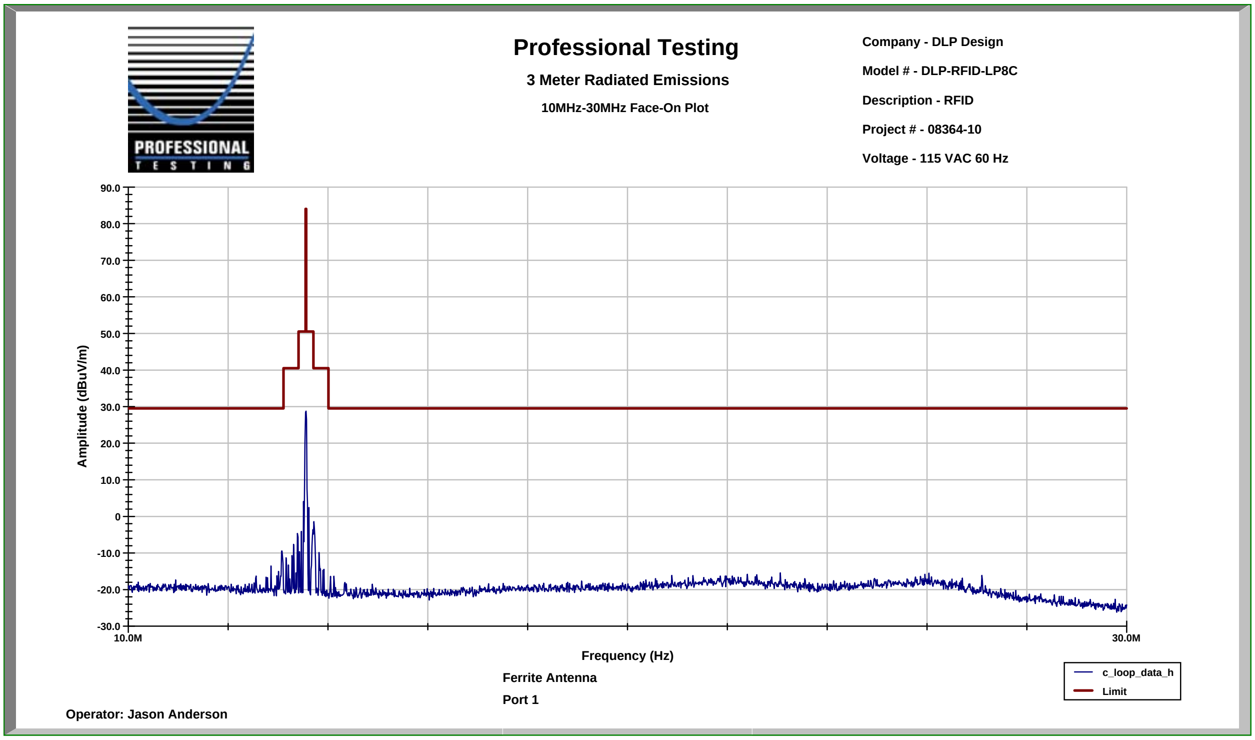


Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dB uV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Distance Factor (dB)	Corrected Level (dB uV/m)	Limit (dB uV/m)	Margin (dB)
13.56	270	1	77.4	0.0	7.6	0.2	-40.0	45.2	84	-38.8
27.12	90	1	27.3	0.0	8.2	0.3	-40.0	-4.2	29.5	-33.7

<30 MHz Radiated Emissions Data Sheet
Transmitting w/ Small Loop
DLP Design
RFID Product

MEASUREMENT DISTANCE (m): 3
DETECTOR FUNCTION: Peak
ANTENNA ORIENTATION: Face On
RBW: CISPR 9 kHz
VBW: 100 kHz

DATE: February 28, 2008
PROJECT #: 08364-10

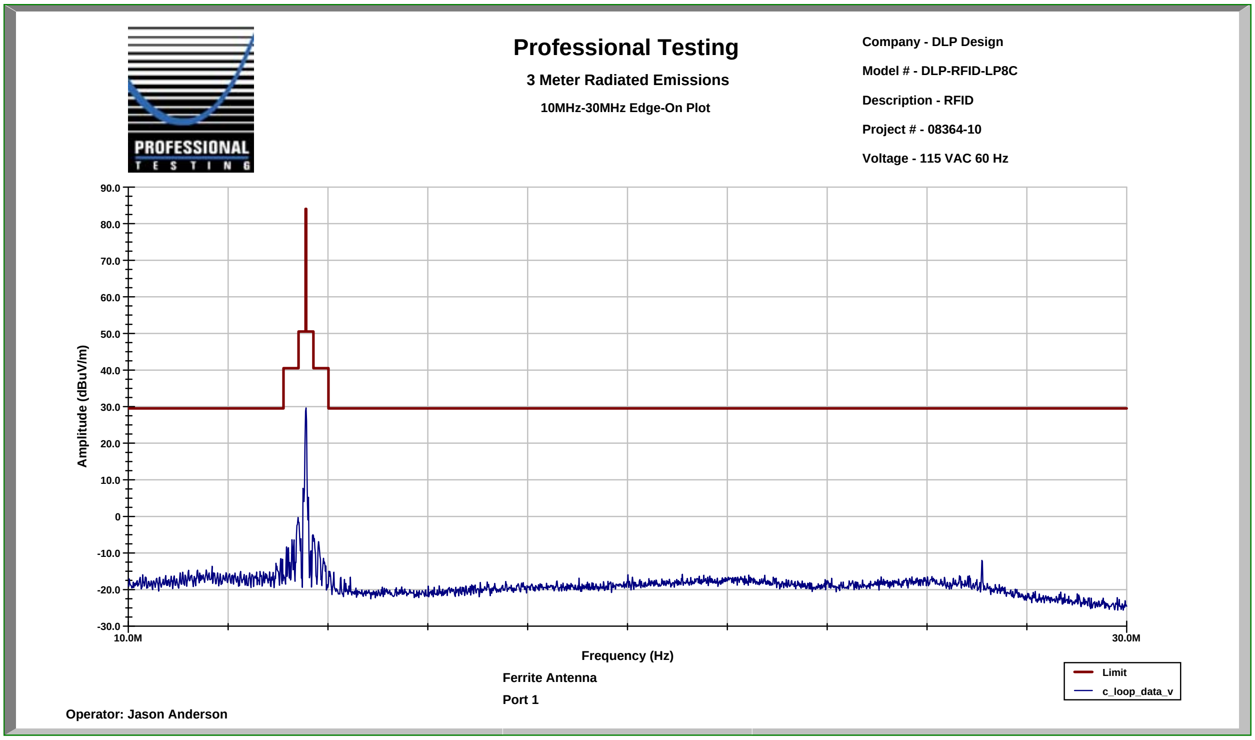


Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dB uV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Distance Factor (dB)	Corrected Level (dB uV/m)	Limit (dB uV/m)	Margin (dB)
13.56	0	1	60.9	0.0	7.6	0.2	-40.0	28.7	84	-55.3
27.12	0	1	15.3	0.0	8.2	0.3	-40.0	-16.2	29.5	-45.7

<30 MHz Radiated Emissions Data Sheet
Transmitting w/ Small Loop
DLP Design
RFID Product

MEASUREMENT DISTANCE (m): 3
DETECTOR FUNCTION: Peak
ANTENNA ORIENTATION: Edge On
RBW: CISPR 9 kHz
VBW: 100 kHz

DATE: February 28, 2008
PROJECT #: 08364-10

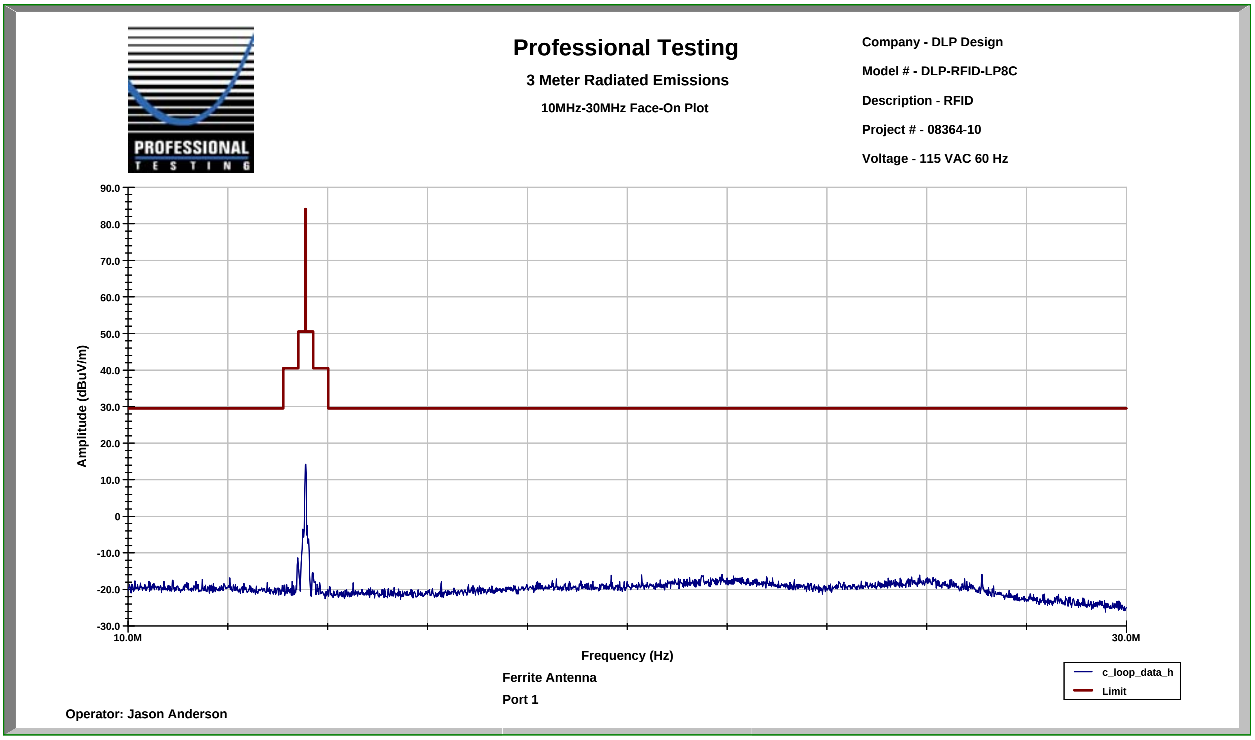


Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dB uV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Distance Factor (dB)	Corrected Level (dB uV/m)	Limit (dB uV/m)	Margin (dB)
13.56	270	1	61.8	0.0	7.6	0.2	-40.0	29.6	84	-54.4
27.12	90	1	19.2	0.0	8.2	0.3	-40.0	-12.3	29.5	-41.8

<30 MHz Radiated Emissions Data Sheet
Transmitting w/ Ferrite Antenna
DLP Design
RFID Product

MEASUREMENT DISTANCE (m): 3
DETECTOR FUNCTION: Peak
ANTENNA ORIENTATION: Face On
RBW: CISPR 9 kHz
VBW: 100 kHz

DATE: February 28, 2008
PROJECT #: 08364-10

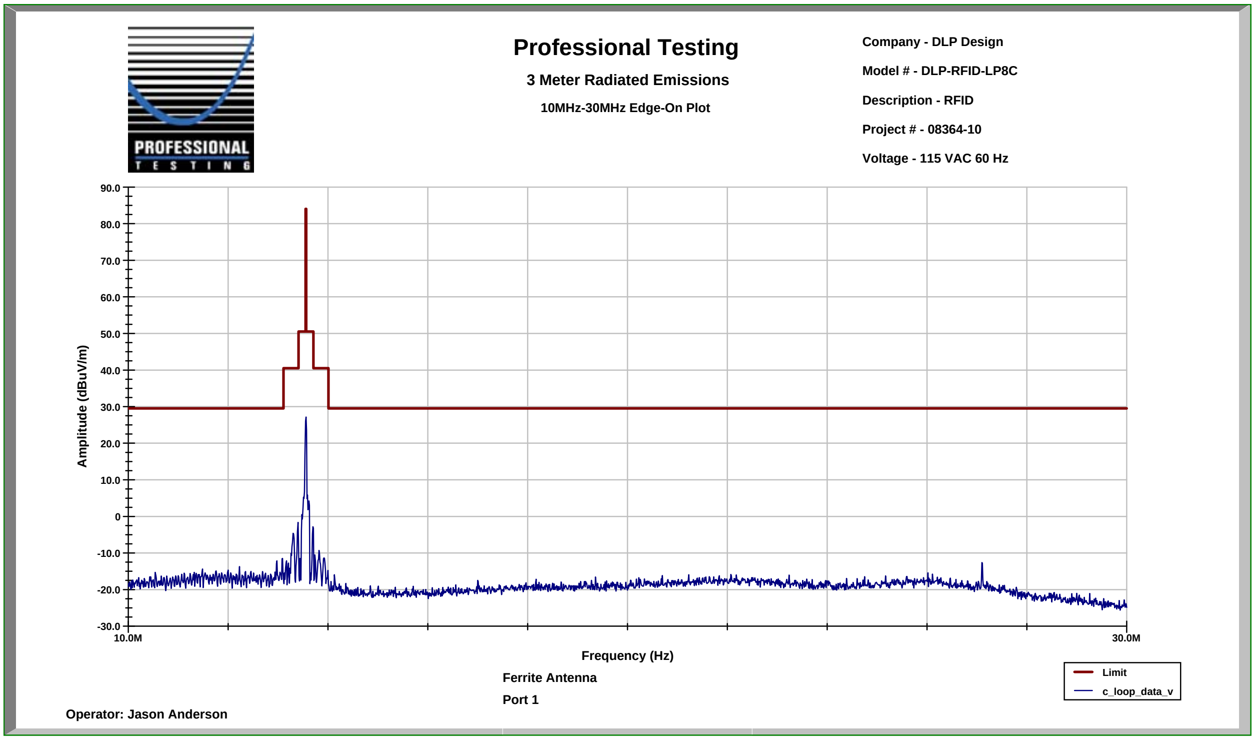


Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dB uV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Distance Factor (dB)	Corrected Level (dB uV/m)	Limit (dB uV/m)	Margin (dB)
13.56	0	1	46.4	0.0	7.6	0.2	-40.0	14.2	84	-69.8
27.12	0	1	15.6	0.0	8.2	0.3	-40.0	-15.9	29.5	-45.4

<30 MHz Radiated Emissions Data Sheet
Transmitting w/ Ferrite Antenna
DLP Design
RFID Product

MEASUREMENT DISTANCE (m): 3
DETECTOR FUNCTION: Peak
ANTENNA ORIENTATION: Edge On
RBW: CISPR 9 kHz
VBW: 100 kHz

DATE: February 28, 2008
PROJECT #: 08364-10

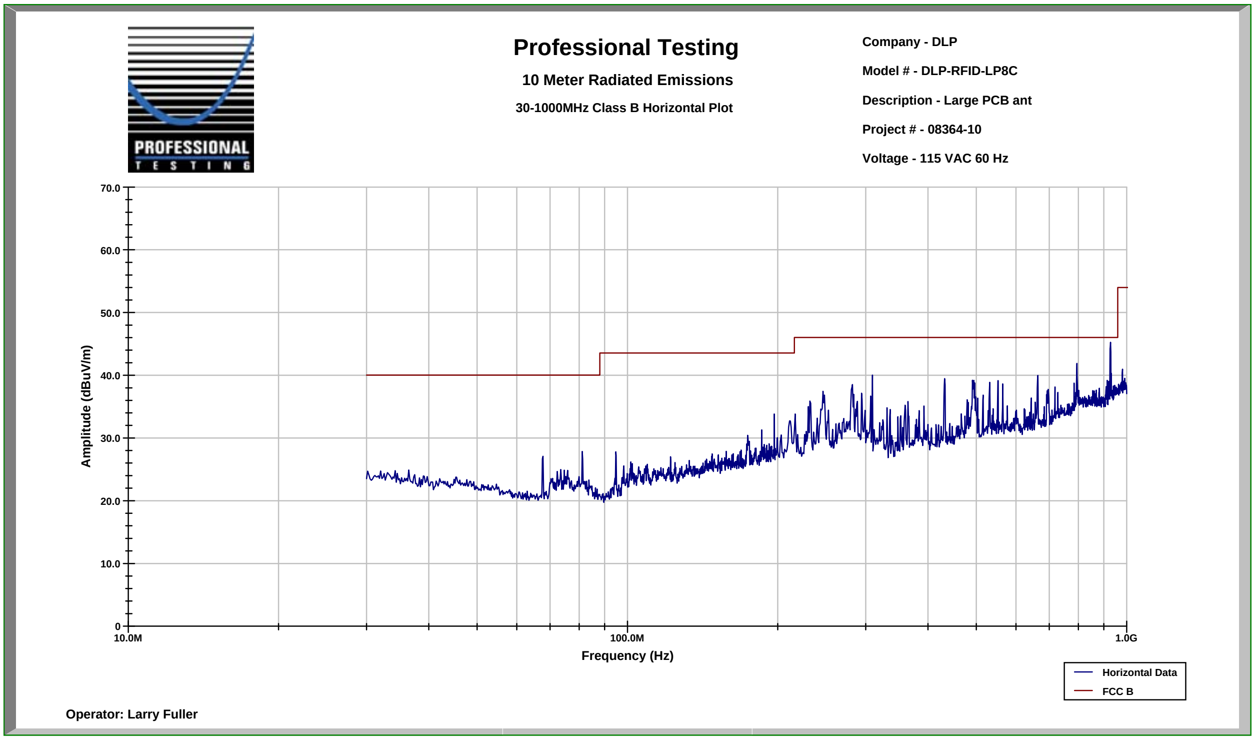


Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dB uV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Distance Factor (dB)	Corrected Level (dB uV/m)	Limit (dB uV/m)	Margin (dB)
13.56	270	1	59.3	0.0	7.6	0.2	-40.0	27.1	84	-56.9
27.12	90	1	18.8	0.0	8.2	0.3	-40.0	-12.7	29.5	-42.2

30-1000 MHz Radiated Emissions Data Sheet
Transmitting w/ Large Loop
DLP Design
RFID Product

MEASUREMENT DISTANCE (m): 10
DETECTOR FUNCTION: Quasi-Peak
ANTENNA ORIENTATION: Horizontal
RBW: CISPR 120 kHz
VBW: 1 MHz

DATE: February 28, 2008
PROJECT #: 08364-10

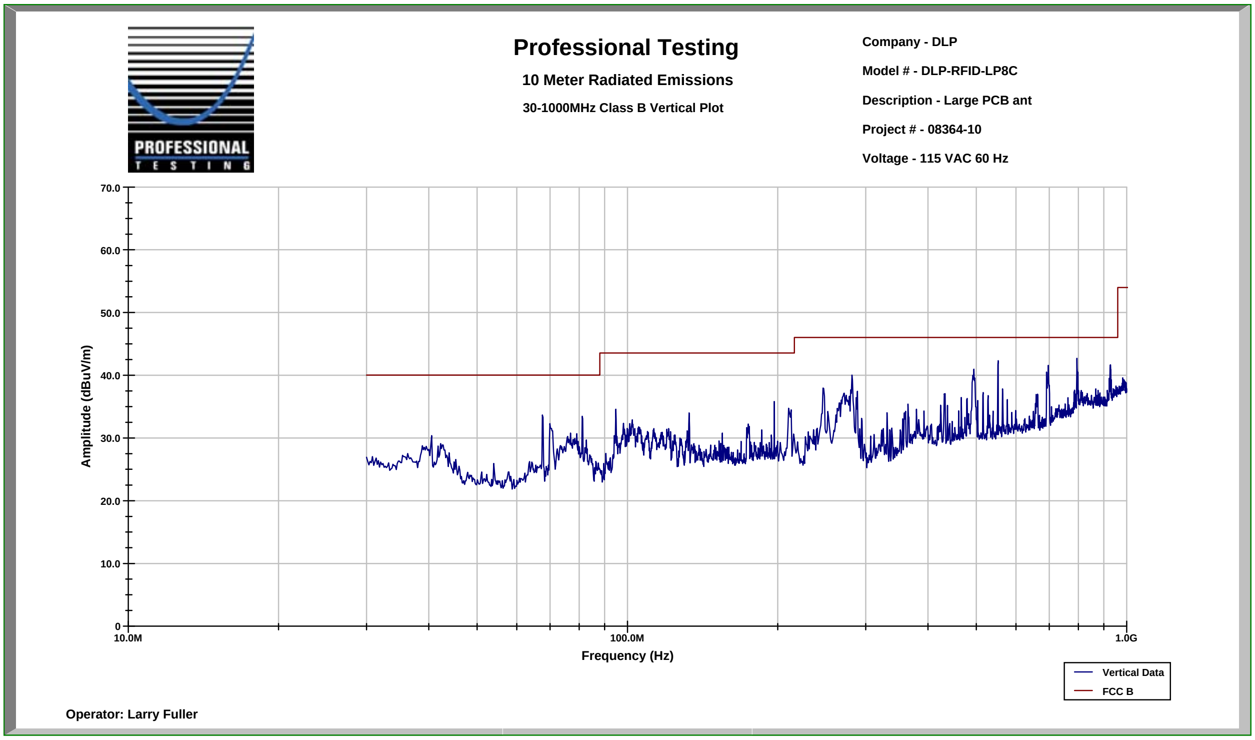


Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dB uV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Distance Factor (dB)	Corrected Level (dB uV/m)	Limit (dB uV/m)	Margin (dB)
40.65	60	4	24.5	26.1	12.2	0.4	10.5	21.6	40	-18.4
67.8	160	2.9	32.9	26.0	9.7	0.7	10.5	27.8	40	-12.2
400.045	1	2	38	36.6	16.6	3.0	10.5	31.5	46	-14.5
491.58	267	1.9	41	36.6	19.0	3.4	10.5	37.2	46	-8.8
796	266	1	33.2	36.5	23.0	4.7	10.5	34.9	46	-11.1
927.2	170	3.5	28.9	36.4	23.8	5.3	10.5	32.0	46	-14.0

30-1000 MHz Radiated Emissions Data Sheet
Transmitting w/ Large Loop
DLP Design
RFID Product

MEASUREMENT DISTANCE (m): 10
DETECTOR FUNCTION: Quasi-Peak
ANTENNA ORIENTATION: Vertical
RBW: CISPR 120 kHz
VBW: 1 MHz

DATE: February 28, 2008
PROJECT #: 08364-10

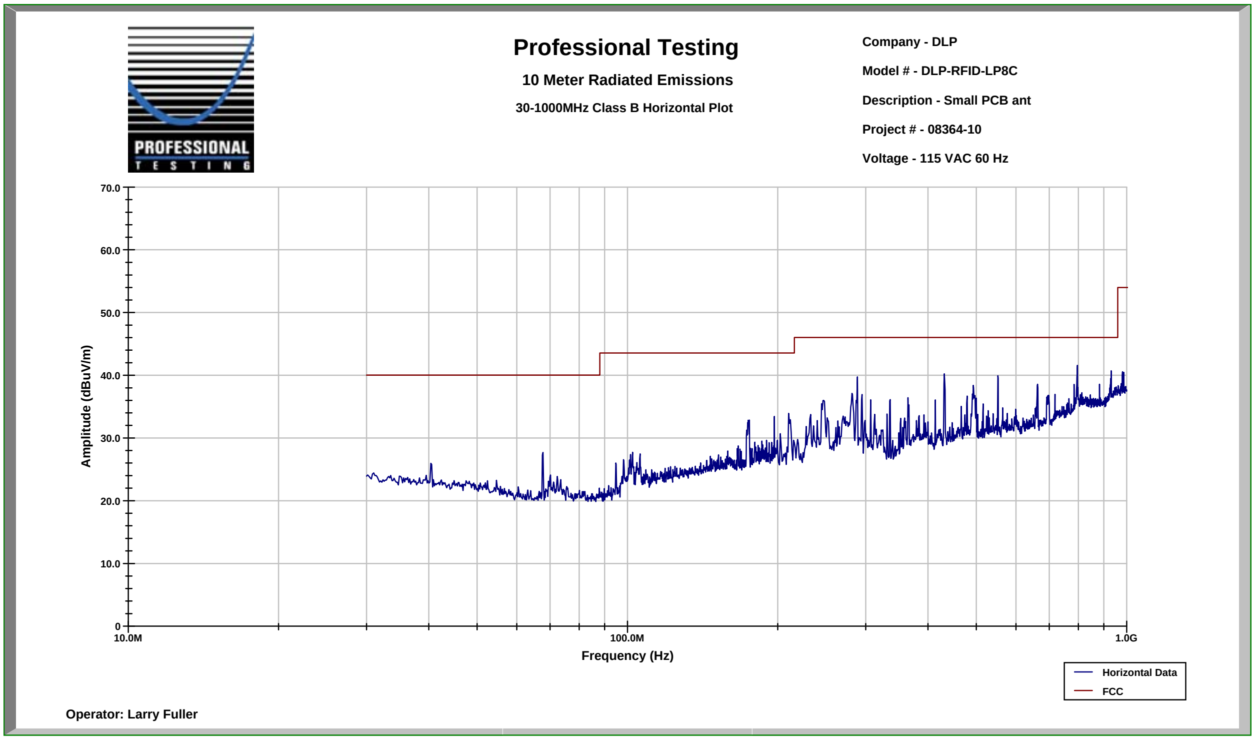


Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dB uV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Distance Factor (dB)	Corrected Level (dB uV/m)	Limit (dB uV/m)	Margin (dB)
40.65	20	1	34.2	26.1	12.2	0.4	10.5	31.3	40	-8.7
67.8	0	2	40.7	26.0	9.7	0.7	10.5	35.6	40	-4.4
400.045	200	1	36.1	36.6	16.6	3.0	10.5	29.6	46	-16.4
491.58	193	1	41.2	36.6	19.0	3.4	10.5	37.4	46	-8.6
796	300	2.8	29.7	36.5	23.0	4.7	10.5	31.4	46	-14.6
927.2	170	1	29.1	36.4	23.8	5.3	10.5	32.2	46	-13.8

30-1000 MHz Radiated Emissions Data Sheet
Transmitting w/ Small Loop
DLP Design
RFID Product

MEASUREMENT DISTANCE (m): 10
DETECTOR FUNCTION: Quasi-Peak
ANTENNA ORIENTATION: Horizontal
RBW: CISPR 120 kHz
VBW: 1 MHz

DATE: February 28, 2008
PROJECT #: 08364-10

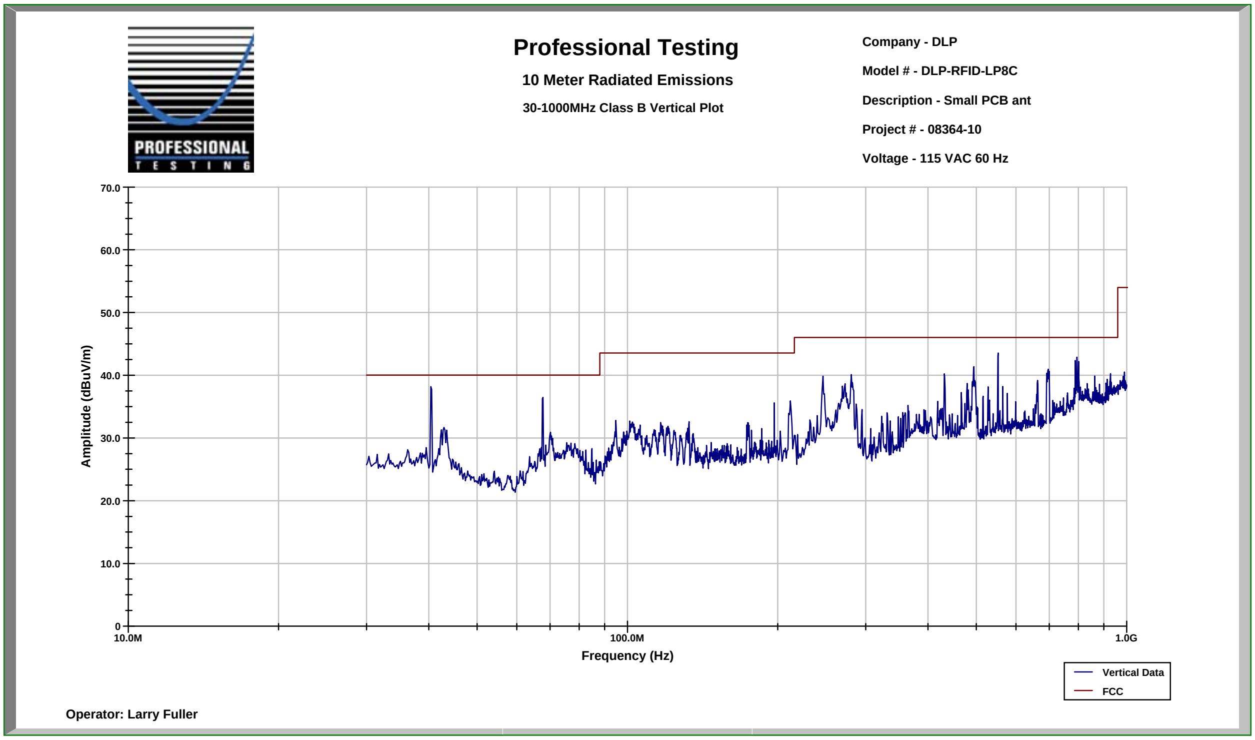


Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dB uV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Distance Factor (dB)	Corrected Level (dB uV/m)	Limit (dB uV/m)	Margin (dB)
40.672	1	4	26.2	26.1	12.2	0.4	10.5	23.3	40	-16.7
67.794	341	4	32.4	26.0	9.7	0.7	10.5	27.3	40	-12.7

30-1000 MHz Radiated Emissions Data Sheet
Transmitting w/ Small Loop
DLP Design
RFID Product

MEASUREMENT DISTANCE (m): 10
DETECTOR FUNCTION: Quasi-Peak
ANTENNA ORIENTATION: Vertical
RBW: CISPR 120 kHz
VBW: 1 MHz

DATE: February 28, 2008
PROJECT #: 08364-10

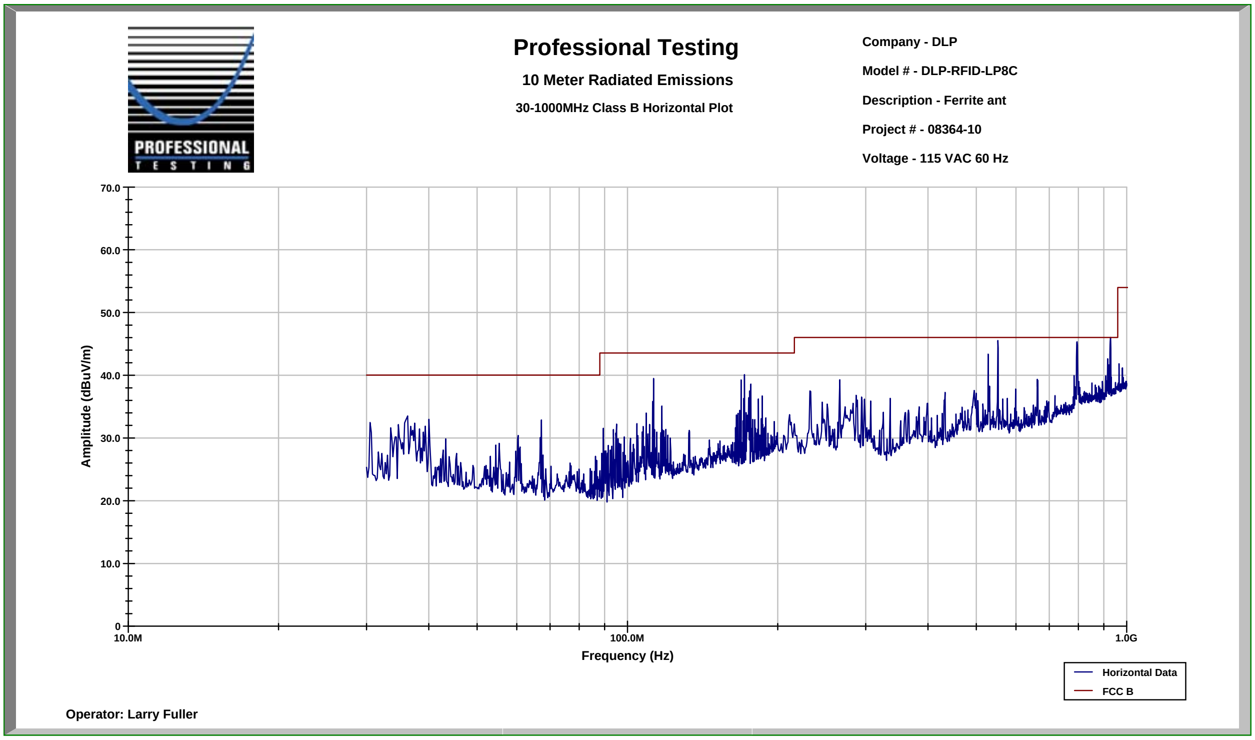


Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dB uV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Distance Factor (dB)	Corrected Level (dB uV/m)	Limit (dB uV/m)	Margin (dB)
40.672	1	1	41.5	26.1	12.2	0.4	10.5	38.6	40	-1.4
67.794	300	1.7	42.4	26.0	9.7	0.7	10.5	37.3	40	-2.7

30-1000 MHz Radiated Emissions Data Sheet
Transmitting w/ Ferrite Antenna
DLP Design
RFID Product

MEASUREMENT DISTANCE (m): 10
DETECTOR FUNCTION: Quasi-Peak
ANTENNA ORIENTATION: Horizontal
RBW: CISPR 120 kHz
VBW: 1 MHz

DATE: February 28, 2008
PROJECT #: 08364-10

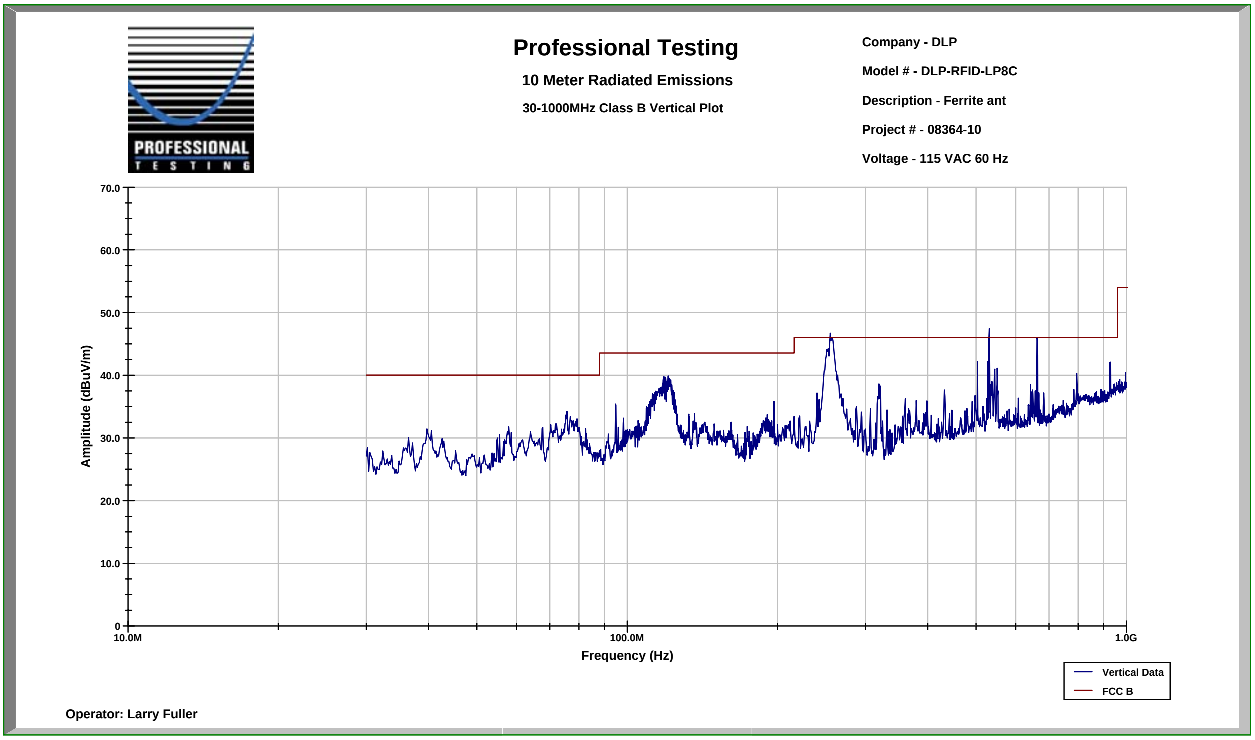


Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dB uV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Distance Factor (dB)	Corrected Level (dB uV/m)	Limit (dB uV/m)	Margin (dB)
40.672	1	4	21.9	26.1	12.2	0.4	10.5	19.0	40	-21.0
67.794	170	3	27.9	26.0	9.7	0.7	10.5	22.8	40	-17.2
112.8	60	3.5	33.2	25.6	10.2	1.3	10.5	29.5	43.5	-14.0
171.6	30	3.5	39.8	25.6	12.6	1.7	10.5	38.9	43.5	-4.6
552	225	3	47.3	36.6	19.3	3.7	10.5	44.3	46	-1.7
928	300	2.5	41.7	36.4	23.8	5.3	10.5	44.8	46	-1.2

30-1000 MHz Radiated Emissions Data Sheet
Transmitting w/ Ferrite Antenna
DLP Design
RFID Product

MEASUREMENT DISTANCE (m): 10
DETECTOR FUNCTION: Quasi-Peak
ANTENNA ORIENTATION: Vertical
RBW: CISPR 120 kHz
VBW: 1 MHz

DATE: February 28, 2008
PROJECT #: 08364-10



Frequency (MHz)	EUT Direction (degrees)	Antenna Elevation (Meters)	Recorded Level (dB uV)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Distance Factor (dB)	Corrected Level (dB uV/m)	Limit (dB uV/m)	Margin (dB)
40.669	270	1	28.9	26.1	12.2	0.4	10.5	26.0	40	-14.0
67.794	300	1	34.7	26.0	9.7	0.7	10.5	29.6	40	-10.4
120.8	75	1	39.4	25.8	11.1	1.1	10.5	36.4	43.5	-7.1
255	180	1	54.4	36.3	12.8	2.3	10.5	43.7	46	-2.3
531.2	60	1	49.1	36.6	19.2	3.5	10.5	45.8	46	-0.2
662.4	330	1	46.4	36.5	20.2	4.0	10.5	44.7	46	-1.3

Frequency Tolerance Datasheet
DLP Design, Inc.
RFID-LP8C

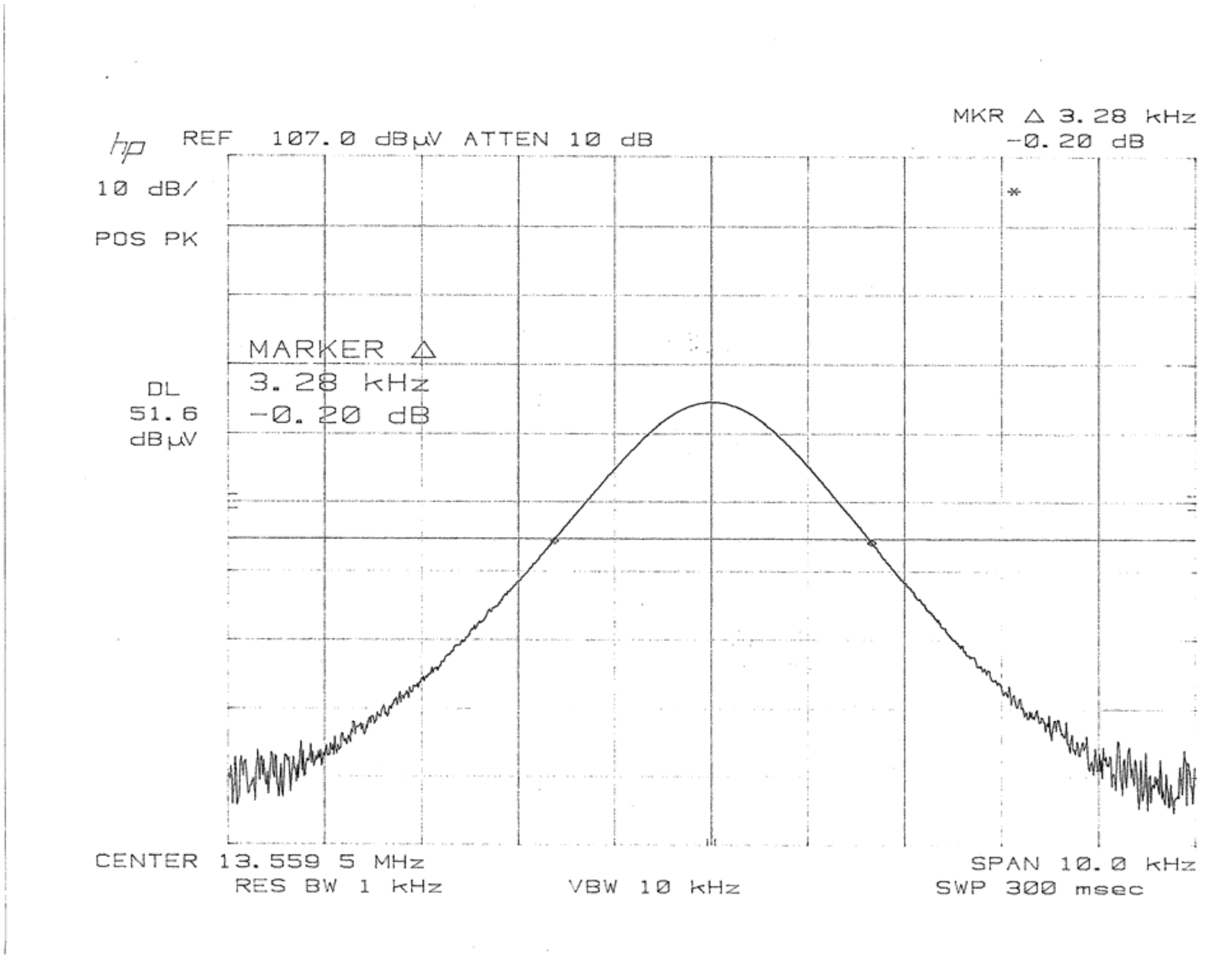
Test Date: February 26, 2008

Temperature °C	Frequency MHz	Error Hz
55	13.559437	563
50	13.559439	561
40	13.559456	544
30	13.559485	515
20	13.559521	479
10	13.559552	448
0	13.559574	426
-10	13.559570	430
-20	13.559559	441

Note: During the voltage adjustment from 85% to 115% no change in frequency was noted.

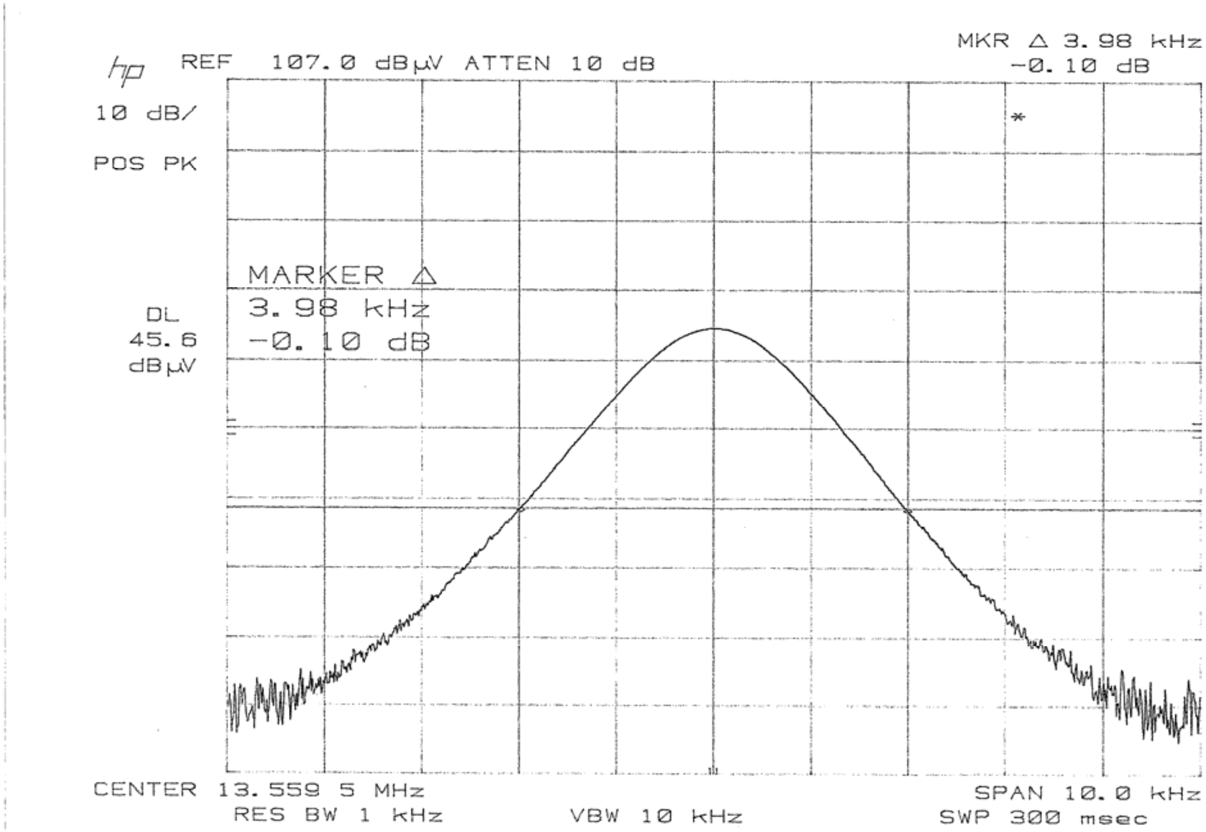
20 dB Occupied Bandwidth Datasheet
DLP Design, Inc.
RFID-LP8C

Test Date: February 28, 2008



26 dB Occupied Bandwidth Datasheet
DLP Design, Inc.
RFID-LP8C

Test Date: February 28, 2008



Appendix C Policy, Rationale and Evaluation of EMC Measurement Uncertainty

Professional Testing (EMI) Inc. (PTI) Policy, Rationale and Evaluation of EMC Measurement Uncertainty

All uncertainty calculations, estimates and expressions thereof shall be in accordance with NIST policy stated in Appendix E to NIST Technical Communications Program, Subchapter 4.09 of the Administrative Manual, as reproduced in Appendix C of NIST Technical Note (TN) 1297, 1994 Edition [1]1. The NIST policy is based on ISO Guide to the Expression of Uncertainty in Measurement [2] (herein after called the Guide), which shall take precedence in the event of disputes. The Guide is explained in TN 1297. Other notable explanations for the Guide are NAMAS Publications NIS 80 [3] and NIS 81 [4]; the latter being specifically for EMC measurements, and the easiest to understand. Since PTI operates in accordance with NIST (NVLAP) Handbook 150-11 [5], all instrumentation having an effect on the accuracy or validity of tests shall be periodically calibrated or verified traceable to national standards by a competent calibration laboratory. The certificates of calibration or verification on this instrumentation shall include estimates of uncertainty as required by NIST Handbook 150-11.

1. Rationale and Summary of Expanded Uncertainty.

Each piece of instrumentation at PTI that is used in making measurements for determining conformance to a standard (or limit), shall be assessed to evaluate its contribution to the overall uncertainty of the measurement in which it is used. The assessment of each item will be based on either a type A evaluation or a type B evaluation. Most of the evaluations will be type B, since they will be based on the manufacture's statements or specifications of the calibration tolerances or uncertainty will be stated along with a brief rationale for the type of evaluation and the resulting state uncertainties.

The individual uncertainties included in the combined standard uncertainty for a specific test result will depend on the configuration in which the item of instrumentation is used. The combination will always be based on the law of propagation of uncertainty discussed in TN 1297, NIS 81, and the Guide. Any systematic effects will be accommodated by including their uncertainties, in the calculation of the combined standard uncertainty; except that if the direction and amount of the systematic effect cannot be determined and separated from its uncertainty, the whole effect will be treated as uncertainty and combined along with the other elements of the test setup.

Type A evaluations of standard uncertainty will usually be based on calculating the standard deviation of the mean of a series of independent observations, but may be based on a least-squares curve fit or the analysis of variance for unusual situations. Type B evaluations of standard uncertainty will usually be based on manufacturer's specifications, data provided in calibration reports, and experience. The type of probability distribution used (normal, rectangular, a-priori, or u-shaped) will be stated for each Type B evaluation.

[1] Numbers in square brackets identify documents listed in the reference section.

In the evaluation of the uncertainty of each type of measurement, the uncertainty caused by the operator will be estimated. One notable operator contribution to measurement uncertainty is the manipulation of cables to maximize the measured values of radiated emissions. The operator contribution to measurement uncertainty is evaluated by having several operators independently repeat the same test. This results in a Type A evaluation of operator-contributed measurement uncertainty.

A summary of the expanded uncertainties of PTI measurements if shown is Table 1. These are the worst-case uncertainties considering all operative influence factors.

Table 1-1
Summary of Measurement Uncertainties

Type of Measurement	Frequency Range	Meas. Dist.	Expanded Uncertainty U, dB (k=2)
Conducted Emissions	150 kHz to 30 MHz	N/A	2.9
Radiated Emissions, Site #1	30 to 200 MHz	3 m	4.7
		10 m	4.4
	200 to 1000 MHz	3 m	4.6
		10 m	4.0
	1 to 2.5 GHz	1 m	2.5
	2.5 to 12.5 GHz	1 m	3.6
	12.5 to 18 GHz	1 m	4.0
Radiated Emissions, Site #2	30 to 200 MHz	3 m	3.5
		10 m	3.7
	200 to 500 MHz	3 m	3.5
		10 m	3.1
	500 to 1000 MHz	3 m	4.0
		10 m	3.9
Radiated Emissions, Site #3	30 to 200 MHz	3 m	3.9
	200 to 500 MHz	3 m	4.0
	500 to 1000 MHz	3 m	4.3