

***Electromagnetic Emissions Test Report  
In Accordance With Industry Canada  
Radio Standards Specification 210  
And FCC Part 15 Sections 15.245  
on the  
Zelocity Corporation  
Model: ZPL01***

UPN: 5217A-ZPL01

FCC ID: R8W-ZPL01

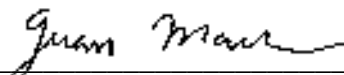
GRANTEE: Zelocity Corporation  
14500 N. Northsight Blvd, Ste 205  
Scottsdale, AZ 85260

TEST SITE: Elliott Laboratories, Inc.  
684 W. Maude Avenue  
Sunnyvale, CA 94086

REPORT DATE: June 16, 2004

FINAL TEST DATE: May 29 and June 8, 2004

AUTHORIZED SIGNATORY:

  
\_\_\_\_\_  
Juan Martinez  
Senior EMC Engineer



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Equipment Name and Model:

ZPL01

Manufacturer:

Zelocity Corporation  
14500 N. Northsight Blvd, Ste 205  
Scottsdale, AZ 85260

Tested to applicable standard:

RSS210, Issue 5, November 2002  
Low Power License-Exempt Radio Communication Devices  
CFR 47 FCC Part 15 (August 26, 2003)

Test Report Prepared For:

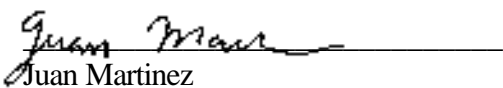
Joe Sykes  
Zelocity Corporation  
14500 N. Northsight Blvd, Ste 205  
Scottsdale, AZ 85260

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC4549 3, Dated July 3, 1997

### Declaration of Compliance

I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above mentioned departmental standards (through the use of ANSI C63.4 as detailed in section 5.3 of RSS-210, Issue 5); and that the equipment performed in accordance with the data submitted in this report.

Signature	
Name	Juan Martinez
Title	Senior EMC Engineer Elliott Laboratories Inc.
Address	684 W. Maude Ave Sunnyvale, CA 94086 USA

Date: June 16, 2004

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**SCOPE**

An electromagnetic emissions test has been performed on the Zelosity Corporation model ZPL01 pursuant to Subpart C of Part 15 of FCC Rules for intentional radiators and Industry Canada Radio Standards Specification RSS-210 for Low Power, License-Exempt Radio Communication Devices. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4-1992 as outlined in Elliott Laboratories test procedures.

The transceiver above has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the Zelosity Corporation model ZPL01 and therefore apply only to the tested sample. The sample was selected and prepared by Terry Precht of Technology Driven Products.

**OBJECTIVE**

The primary objective of the manufacturer is compliance with Subparts B and C of Part 15 of FCC Rules for the radiated and conducted emissions of intentional radiators and receivers. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

**STATEMENT OF COMPLIANCE**

The tested sample of Zelosity Corporation model ZPL01 complied with the requirements of Subpart C of Part 15 of the FCC Rules for low power intentional radiators and Industry Canada specification RSS 210 for Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands).

Maintenance of FCC compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

**TEST RESULTS SUMMARY****15.245 / RSS 210**

FCC Part 15 Section	RSS 210 Section	Description	Comments	Result
15.207 / 15.107		AC Conducted Emissions, 0.15 – 30 MHz	-3.3 dB @ 2.005 MHz	Complies
	6.6 / 7.4	AC Conducted emissions 0.45 – 30 MHz	-0.7 dB @ 2.005 MHz	Complies
15.245 (b)	6.2.2 (n)	Transmitter Fundamental Signal Emissions, 24,123 MHz	-22.3 dB @ 24,123 MHz	Complies
15.245(b)(1)	6.2.2 (n)(1)	Transmitter Radiated Spurious Emissions, 30 MHz - 100 GHz	-9.9 dB @ 96,500 MHz	Complies
15.245(b)(3)	6.2.2 (n)(3)	Bandedge Measurement	All emission < 50dB (Refer to data for plots)	Complies

**MEASUREMENT UNCERTAINTIES**

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	30 to 1000	± 3.6

**EQUIPMENT UNDER TEST (EUT) DETAILS****GENERAL**

The Zelosity Corporation model ZPL01 is a wireless launch monitor which is designed to be used for golf swing data gathering. Normally, the EUT would be floor-standing during operation. The EUT was, therefore, treated as floor-standing equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 120, 60 Hz, 1 Amps.

The sample was received on May 29, 2004 and tested on May 29 and June 8, 2004. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Zelosity Corporation	ZPL01	PureLaunch Monitor	N/A	TBD
Condor	MD481810	Power Supply	N/A	N/A

**OTHER EUT DETAILS**

The EUT has two transmitters that operate simultaneously in the 24.125 GHz band. One on the top of the stand and one at the bottom, 50 cm apart.

**ENCLOSURE**

The EUT enclosure is primarily constructed of hard plastic. It measures approximately 45.7 cm wide by 63.5 cm deep by 76.2 cm high.

**MODIFICATIONS**

The EUT required the following modifications in order to comply with the specifications:

Mod. #	Test	Date	Modification
1	RE	5/29/2004	Added a ferrite on the USB cable, EUT end, 3 turns.

**SUPPORT EQUIPMENT**

The following equipment was used as local support equipment for emissions testing:

Manufacturer/Model/Description	Serial Number	FCC ID Number
HP Pavilion ze4500 Laptop	CNF3451617	DoC
HP Pavilion C6490A Printer	My3883K42P	DoC

No equipment was used as remote support equipment for emissions testing:

**EUT INTERFACE PORTS**

The I/O cabling configuration during emissions testing was as follows:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length (m)
USB	Laptop	Multiwire	Shielded	2
DC input	AC adapter	2 wire	Unshielded	1.8

**EUT OPERATION DURING TESTING**

The EUT was commanded to transmit for 30 seconds repeatedly during testing from the control program running on the laptop.

**ANTENNA REQUIREMENTS**

The antenna is installed internal to the device. User will not have access to the antenna, per requirement of the FCC section 15.203.

**TEST SITE****GENERAL INFORMATION**

Final test measurements were taken on May 29 and June 8, 2004 at the Elliott Laboratories Open Area Test Site #3 located at 684 West Maude Avenue, Sunnyvale, California and Chamber # 3 located at 41039 Boyce Road, Fremont, CA. 94538.. The test site contains separate areas for radiated and conducted emissions testing. Pursuant to section 2.948 of the Rules, construction, calibration, and equipment data has been filed with the Commission.

The FCC recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent FCC requirements.

**RADIATED EMISSIONS CONSIDERATIONS**

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines.



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**MEASUREMENT INSTRUMENTATION****RECEIVER SYSTEM**

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

**INSTRUMENT CONTROL COMPUTER**

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

**LINE IMPEDANCE STABILIZATION NETWORK (LISN)**

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

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**FILTERS/ATTENUATORS**

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

**ANTENNAS**

A biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the entire 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers.

**ANTENNA MAST AND EQUIPMENT TURNTABLE**

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height.

ANSI C63.4 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

**INSTRUMENT CALIBRATION**

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

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**TEST PROCEDURES****EUT AND CABLE PLACEMENT**

The FCC requires that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4, and the worst-case orientation is used for final measurements.

**RADIATED EMISSIONS**

Radiated emissions measurements are performed in two phases as well. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from 30 MHz up to the frequency required by the regulation specified on page 1. One or more of these is with the antenna polarized vertically while the one or more of these is with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit.

A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions, which have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

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**SPECIFICATION LIMITS AND SAMPLE CALCULATIONS**

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

**FUNDAMENTAL AND HARMONIC LIMITS 15.231 (e)**

The table below shows the limits for both the Fundamental and Harmonic emissions (that do not fall in restricted bands) for each frequency band of operation detailed in Section 15.231 (e) for data signals.

Operating Frequency (MHz)	Field strength (microvolts/m)	Harmonics (microvolts/m)
70 - 130	500	50
130 - 174	500 - 1500	50 - 150
174 - 260	1500	150
260 - 470	1500 - 5000	150 - 500
Above 470	5000	500

**RADIATED EMISSIONS SPECIFICATION LIMITS, SECTION 15.209**

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands.

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
0.009-0.490	$2400/F_{\text{KHz}} @ 300\text{m}$	$67.6-20*\log_{10}(F_{\text{KHz}}) @ 300\text{m}$
0.490-1.705	$24000/F_{\text{KHz}} @ 30\text{m}$	$87.6-20*\log_{10}(F_{\text{KHz}}) @ 30\text{m}$
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

**RADIATED EMISSIONS SPECIFICATION LIMITS, SECTION 15.109(a) (RECEIVER)**

The table below shows the limits for emissions from the receiver.

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

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**SAMPLE CALCULATIONS - RADIATED EMISSIONS**

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements. A distance factor, when used for electric field measurements, is calculated by using the following formula:

$$F_d = 20 * \text{LOG}_{10} (D_m/D_s)$$

where:

$$F_d = \text{Distance Factor in dB}$$

$$D_m = \text{Measurement Distance in meters}$$

$$D_s = \text{Specification Distance in meters}$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

$$R_r = \text{Receiver Reading in dBuV/m}$$

$$F_d = \text{Distance Factor in dB}$$

$$R_c = \text{Corrected Reading in dBuV/m}$$

$$L_s = \text{Specification Limit in dBuV/m}$$

$$M = \text{Margin in dB Relative to Spec}$$

***EXHIBIT 1: Test Equipment Calibration Data***

1 Page

**Radiated Emissions, 30 - 1,000 MHz, 29-May-04****Engineer: Juan Martinez**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Com-Power	Pre Amplifier, 30-1000MHz	PA-103	1543	26-Nov-04
Rohde & Schwarz	EMI Test Receiver, 20Hz-7GHz	ESIB7	1630	05-Jan-05
Sunol Sciences	Biconilog, 30-3000MHz	JB3	1657	24-Feb-05

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**Conducted Emissions - AC Power Ports, 29-May-04****Engineer: Juan Martinez**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
EMCO	LISN, 10kHz-100MHz	3825/2	1292	01-Jul-04
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1401	27-Feb-05
Fischer Custom Comm.	LISN, 25A	FCC-LISN-50/250-25-2-01	1575	22-Jan-05
Rohde & Schwarz	EMI Test Receiver, 20Hz-7GHz	ESIB7	1630	05-Jan-05

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**Radiated Emissions, 1000 - 100,000 MHz, 08-Jun-04****Engineer: dbare**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	Microwave EMI test system (SA40, 9kHz - 40GHz)	84125C	1410	26-Mar-05
	Fremont			
Hewlett Packard	Harmonic Mixer, 75-100 GHz	11970W	RFI	17-Jul-04
Hewlett Packard	Harmonic Mixer, 40-60 GHz	11970U	RFI	18-Jul-04
Hewlett Packard	Harmonic Mixer, 50-75 GHz	11970V	RFI	19-Jul-04
Dorado	Horn, 75 -100 GHz	GH-10-25	RFI	N/A
Dorado	Horn, 60-90 GHz	12-GH-12-2	RFI	N/A
Dorado	Horn, 40-60 GHz	GH-19-20	RFI	N/A



***EXHIBIT 2: Test Data Log Sheets***

***ELECTROMAGNETIC EMISSIONS***

***TEST LOG SHEETS***

***AND***

***MEASUREMENT DATA***

T55810\_Digital 11 Pages  
T55810\_Radio 7 Pages



## ***EMC Test Data***

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
		Account Manager:	Christine Vu
Contact:	Terry Precht		
Emissions Spec:	FCC Part 15 & 15.245	Class:	B / Radio
Immunity Spec:	-	Environment:	-

# **EMC Test Data**

For The

## **Technology Driven Products**

Model

**ZPL01**

Date of Last Test: 6/8/2004



## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
		Account Manager:	Christine Vu
Contact:	Terry Precht		
Emissions Spec:	FCC Part 15 & 15.245	Class:	B / Radio
Immunity Spec:	-	Environment:	-

### EUT INFORMATION

#### General Description

The EUT is a wireless launch monitor which is designed to be used for golf swing data gathering. Normally, the EUT would be floor-standing during operation. The EUT was, therefore, treated as floor-standing equipment during testing to simulate the end user environment. The electrical rating of the EUT is 120, 60 Hz, 1 Amps.

#### Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Technology Driven Products	ZPL01	PureLaunch Monitor	N/A	TBD
Condor	MD481810	Power Supply	N/A	N/A

#### Other EUT Details

The EUT has two transmitters that operate simultaneously in the 24.125 GHz band. One on the top of the stand and one at the bottom, 50 cm apart.

#### EUT Enclosure

The EUT enclosure is primarily constructed of hard plastic. It measures approximately 45.7 cm wide by 63.5 cm deep by 76.2 cm high.

#### Modification History

Mod. #	Test	Date	Modification
1	Radiated Emissions	5/29/2004	Added a ferrite on the USB cable, EUT end, 3 turns.

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.



## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
		Account Manager:	Christine Vu
Contact:	Terry Precht		
Emissions Spec:	FCC Part 15 & 15.245	Class:	B / Radio
Immunity Spec:	-	Environment:	-

### Test Configuration #1

#### Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
HP	Pavilion ze4500	Laptop	CNF3451617	DoC
HP	C6490A	Printer	My3883K42P	DoC

#### Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

#### Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
USB	Laptop	Multiwire	Shielded	2
Laptop Parallel	Printer	Multiwire	Shielded	2
DC input	AC adapter	2 wire	Unshielded	1.8

#### EUT Operation During Emissions

The EUT was set to transmit for 30 seconds, then it was left idling for the remainder of the test.



## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
Contact:	Terry Precht	Account Manager:	Christine Vu
Spec:	FCC Part 15 & 15.245	Class:	B / Radio

### Conducted Emissions

*(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)*

#### Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 5/29/2004	Config. Used: 1
Test Engineer: Juan Martinez	Config Change: None
Test Location: Fremont Chamber #3	EUT Voltage: 120V/60Hz

#### General Test Configuration

For floor-standing equipment, the EUT was located above a ground plane inside the semi-anechoic chamber, 80 cm from the LISN. A second LISN was used for any local support equipment. Local support equipment was placed on top of the table.

<b>Ambient Conditions:</b>	Temperature:	14 °C
	Rel. Humidity:	70 %

#### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 120V/60Hz	EN55022 B	Pass	-3.3dB @ 2.005MHz
2	CE, AC Power, 120V/60Hz	RSS-210	Pass	-0.7dB @ 2.005MHz

#### Modifications Made During Testing:

No modifications were made to the EUT during testing

#### Deviations From The Standard

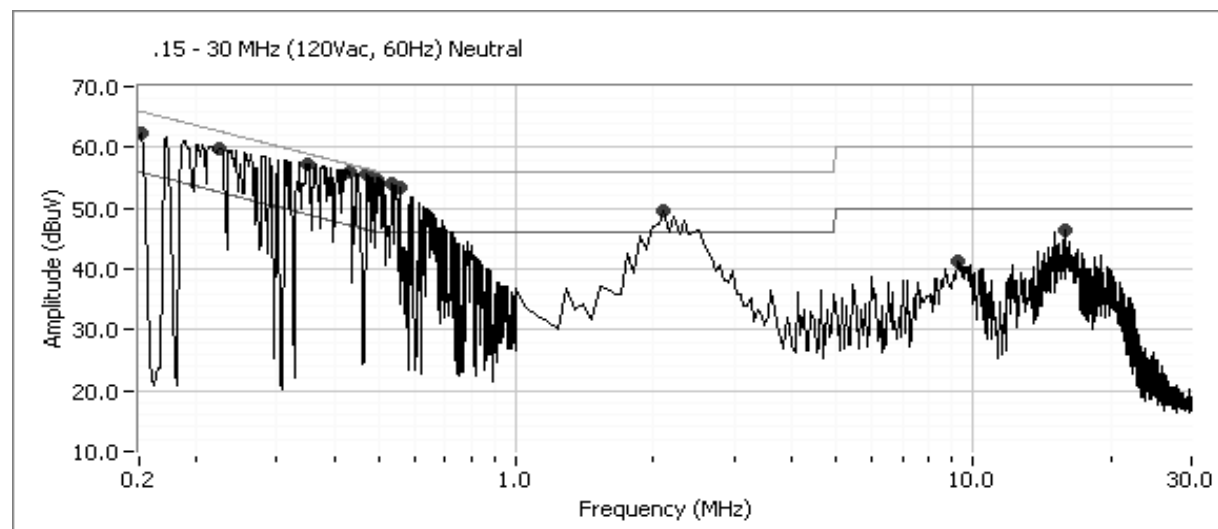
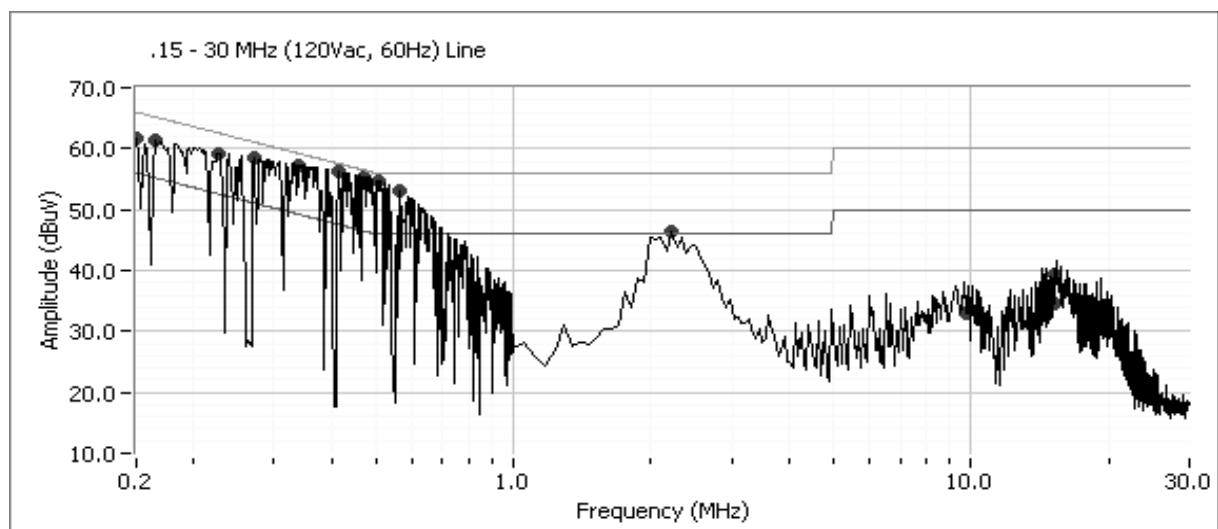
No deviations were made from the requirements of the standard.



## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
Contact:	Terry Precht	Account Manager:	Christine Vu
Spec:	FCC Part 15 & 15.245	Class:	B / Radio

### Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz





## EMC Test Data

Client:	Technology Driven Products				Job Number:	J55552
Model:	ZPL01				T-Log Number:	T55810
Contact:	Terry Precht				Account Manager:	Christine Vu
Spec:	FCC Part 15 & 15.245				Class:	B / Radio
Frequency	Level	AC	EN55022 Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
<b>Preliminary peak readings captured during pre-scan (peak readings vs. average limit)</b>						
0.472	55.5	Line 1	46.5	9.0	Peak	
0.508	54.7	Line 1	46.0	8.7	Peak	
0.414	56.3	Line 1	47.6	8.8	Peak	
0.341	57.4	Line 1	49.2	8.2	Peak	
0.271	58.5	Line 1	51.1	7.4	Peak	
0.227	59.0	Line 1	52.6	6.4	Peak	
0.165	61.4	Line 1	55.2	6.2	Peak	
0.150	61.6	Line 1	56.0	5.6	Peak	
0.566	53.0	Line 1	46.0	7.0	Peak	
2.220	46.4	Line 1	46.0	0.4	Peak	
9.717	32.9	Line 1	50.0	-17.1	Peak	
15.297	39.4	Line 1	50.0	-10.6	Peak	
0.152	62.2	Neutral	55.9	6.3	Peak	
0.225	59.7	Neutral	52.6	7.1	Peak	
0.354	57.4	Neutral	49.0	8.4	Peak	
0.432	56.1	Neutral	47.2	8.9	Peak	
0.472	55.6	Neutral	46.5	9.2	Peak	
0.493	54.7	Neutral	46.1	8.6	Peak	
0.534	54.1	Neutral	46.0	8.1	Peak	
0.550	53.3	Neutral	46.0	7.3	Peak	
2.005	49.4	Neutral	46.0	3.4	Peak	
9.277	41.3	Neutral	50.0	-8.7	Peak	
15.892	46.3	Neutral	50.0	-3.7	Peak	
<b>Final quasi-peak and average readings</b>						
2.005	42.7	Line 1	46.0	-3.3	AVG	
2.005	47.3	Line 1	56.0	-8.7	QP	
0.493	45.4	Line 1	56.1	-10.7	QP	
0.472	45.7	Line 1	56.5	-10.8	QP	
0.432	46.2	Line 1	57.2	-11.0	QP	
0.354	47.6	Line 1	58.9	-11.2	QP	
0.472	45.0	Line 1	56.5	-11.5	QP	
0.534	44.4	Line 1	56.0	-11.6	QP	
0.508	44.2	Line 1	56.0	-11.8	QP	
0.414	45.8	Line 1	57.6	-11.8	QP	
15.892	37.9	Line 1	50.0	-12.1	AVG	
0.550	43.9	Line 1	56.0	-12.1	QP	
<b>Continue on next page...</b>						



## EMC Test Data

Client:	Technology Driven Products					Job Number:	J55552
Model:	ZPL01					T-Log Number:	T55810
Contact:	Terry Precht					Account Manager:	Christine Vu
Spec:	FCC Part 15 & 15.245					Class:	B / Radio
0.341	47.1	Line 1	59.2	-12.1	QP		
0.225	50.5	Line 1	62.6	-12.1	QP		
0.271	48.6	Line 1	61.1	-12.5	QP		
0.152	53.3	Line 1	65.9	-12.6	QP		
0.227	49.7	Line 1	62.6	-12.8	QP		
0.165	52.1	Line 1	65.2	-13.1	QP		
0.150	52.4	Line 1	66.0	-13.6	QP		
0.566	42.3	Line 1	56.0	-13.7	QP		
9.277	35.2	Line 1	50.0	-14.8	AVG		
15.892	43.3	Line 1	60.0	-16.7	QP		
2.220	36.9	Line 1	56.0	-19.1	QP		
15.297	29.9	Line 1	50.0	-20.1	AVG		
9.277	39.9	Line 1	60.0	-20.1	QP		
2.220	25.0	Line 1	46.0	-21.1	AVG		
0.472	24.4	Line 1	46.5	-22.1	AVG		
0.472	22.8	Line 1	46.5	-23.6	AVG		
15.297	36.3	Line 1	60.0	-23.7	QP		
0.534	18.0	Line 1	46.0	-28.0	AVG		
0.354	20.7	Line 1	48.9	-28.2	AVG		
9.717	21.3	Line 1	50.0	-28.7	AVG		
0.493	17.2	Line 1	46.1	-28.9	AVG		
0.432	18.1	Line 1	47.2	-29.1	AVG		
0.566	16.1	Line 1	46.0	-29.9	AVG		
0.550	15.9	Line 1	46.0	-30.1	AVG		
0.508	15.7	Line 1	46.0	-30.3	AVG		
0.271	20.6	Line 1	51.1	-30.5	AVG		
0.414	16.7	Line 1	47.6	-30.8	AVG		
0.225	21.7	Line 1	52.6	-30.9	AVG		
0.341	18.2	Line 1	49.2	-31.0	AVG		
0.227	21.2	Line 1	52.6	-31.4	AVG		
0.152	23.6	Line 1	55.9	-32.3	AVG		
0.165	22.8	Line 1	55.2	-32.4	AVG		
0.150	22.9	Line 1	56.0	-33.1	AVG		
9.717	26.5	Line 1	60.0	-33.5	QP		





## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
Contact:	Terry Precht	Account Manager:	Christine Vu
Spec:	FCC Part 15 & 15.245	Class:	B / Radio

### Run #2: AC Power Port Conducted Emissions, 0.45 - 30MHz, 120V/60Hz

Frequency	Level	AC	RSS-210		Detector	Comments
MHz	dB $\mu$ V	Line	Limit	Margin	QP/Ave	
2.005	47.3	Line 1	48.0	-0.7	QP	
0.472	45.7	Line 1	48.0	-2.3	QP	
0.493	45.4	Line 1	48.0	-2.6	QP	
0.472	45.0	Netural	48.0	-3.0	QP	
0.534	44.4	Line 1	48.0	-3.6	QP	
0.508	44.2	Line 1	48.0	-3.8	QP	
0.550	43.9	Line 1	48.0	-4.1	QP	
15.892	43.3	Line 1	48.0	-4.7	QP	
0.566	42.3	Line 1	48.0	-5.7	QP	
9.277	39.9	Line 1	48.0	-8.1	QP	
2.220	36.9	Neutral	48.0	-11.1	QP	
15.297	36.3	Neutral	48.0	-11.7	QP	
9.717	26.5	Neutral	48.0	-21.5	QP	



## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
Contact:	Terry Precht	Account Manager:	Christine Vu
Spec:	FCC Part 15 & 15.245	Class:	B / Radio

### Radiated Emissions

*(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)*

#### Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 5/29/2004	Config. Used: 1
Test Engineer: Juan Martinez	Config Change: None
Test Location: Fremont Chamber #3	EUT Voltage: 120V/60Hz

#### General Test Configuration

The EUT was located on the floor. A 12mm insulation was used between the EUT and ground plane. All other local support equipment were located on the table for radiated emissions testing.

Unless otherwise specified, the measurement antenna was located 3 meters from the EUT for the measurement range 30 - 1000 MHz.

Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

<b>Ambient Conditions:</b>	Temperature:	14 °C
	Rel. Humidity:	70 %

#### Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	RE, 30 - 1000 MHz, Maximized Emissions	FCC B	Pass	-1.0dB @ 503.995MHz

#### Modifications Made During Testing

Modifications are detailed under each run description.

#### Deviations From The Standard

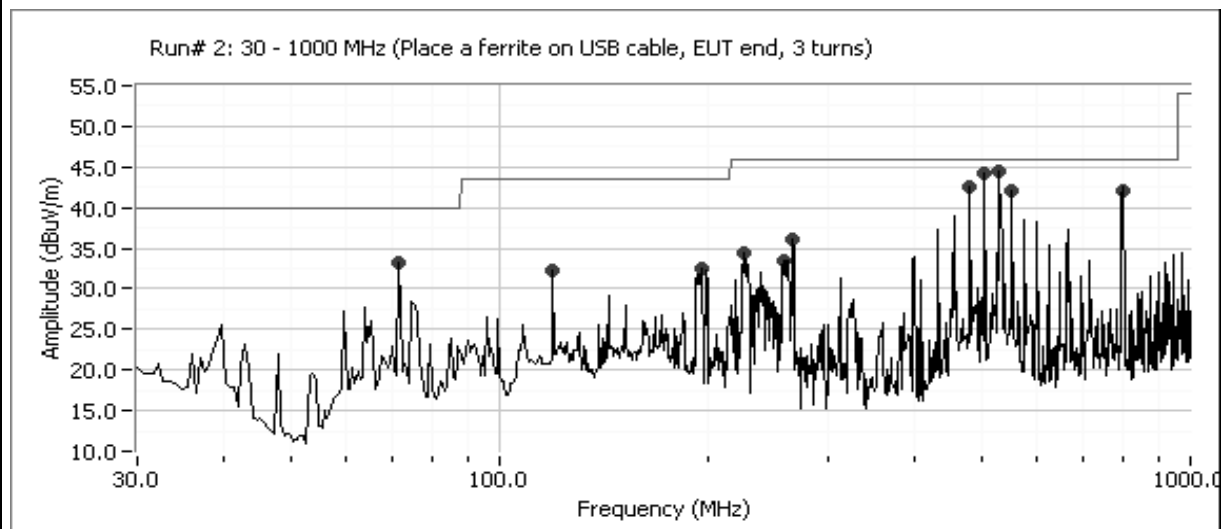
No deviations were made from the requirements of the standard.



## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
Contact:	Terry Precht	Account Manager:	Christine Vu
Spec:	FCC Part 15 & 15.245	Class:	B / Radio

**Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz [Added ferrite on USB cable (EUT side) three turns]**  
**Steward Ferrite (Part# F5-NF-130B-02)**



Frequency	Level	Pol	FCC B		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
<b>Preliminary peak readings captured during pre-scan</b>								
551.984	42.1	H	46.0	-3.9	Peak	2	1.0	
527.994	44.4	H	46.0	-1.6	Peak	18	1.0	
225.214	34.3	H	46.0	-11.7	Peak	71	1.5	
479.996	42.6	H	46.0	-3.4	Peak	117	1.0	
72.000	33.3	V	40.0	-6.8	Peak	191	1.0	
120.001	32.2	V	43.5	-11.3	Peak	238	1.0	
196.556	32.6	H	43.5	-10.9	Peak	241	1.0	
798.492	42.2	H	46.0	-3.8	Peak	247	2.5	
258.035	33.5	H	46.0	-12.5	Peak	255	1.0	
265.837	36.0	H	46.0	-10.0	Peak	283	1.0	
503.995	44.3	H	46.0	-1.7	Peak	301	1.0	
<b>Preliminary quasi-peak readings (no manipulation of EUT interface cables)</b>								
527.994	44.8	H	46.0	-1.2	QP	18	1.0	
503.995	44.5	H	46.0	-1.5	QP	301	1.0	
479.996	42.8	H	46.0	-3.2	QP	117	1.0	
551.984	42.1	H	46.0	-3.9	QP	1	1.0	
72.000	33.2	V	40.0	-6.8	QP	191	1.0	
798.492	38.3	H	46.0	-7.7	QP	247	2.5	
120.001	31.5	V	43.5	-12.0	QP	237	1.0	
<i>Continue on next page...</i>								



## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
Contact:	Terry Precht	Account Manager:	Christine Vu
Spec:	FCC Part 15 & 15.245	Class:	B / Radio

265.837	31.9	H	46.0	-14.1	QP	282	1.0	
258.035	31.1	H	46.0	-15.0	QP	255	1.0	
196.556	28.3	H	43.5	-15.2	QP	240	1.0	
225.214	29.9	H	46.0	-16.1	QP	71	1.5	

### Run #2: Maximized Readings From Run #1

Frequency	Level	Pol	FCC B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Maximized quasi-peak readings (includes manipulation of EUT interface cables)								
503.995	45.0	H	46.0	-1.0	QP	301	1.0	
527.994	44.9	H	46.0	-1.1	QP	18	1.0	
479.996	43.0	H	46.0	-3.0	QP	117	1.0	
551.984	42.5	H	46.0	-3.5	QP	1	1.0	
72.000	33.8	V	40.0	-6.2	QP	191	1.0	
798.492	38.7	H	46.0	-7.3	QP	247	2.5	



## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
		Account Manager:	Christine Vu
Contact:	Terry Precht		
Emissions Spec:	FCC Part 15 & 15.245	Class:	B / Radio
Immunity Spec:	-	Environment:	-

## EMC Test Data

For The

### Technology Driven Products

Model

**ZPL01**

Date of Last Test: 6/8/04



## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
		Account Manager:	Christine Vu
Contact:	Terry Precht		
Emissions Spec:	FCC Part 15 & 15.245	Class:	B / Radio
Immunity Spec:	-	Environment:	-

### EUT INFORMATION

#### General Description

The EUT is a wireless launch monitor which is designed to be used for golf swing data gathering. Normally, the EUT would be floor-standing during operation. The EUT was, therefore, treated as floor-standing equipment during testing to simulate the end user environment. The electrical rating of the EUT is 120, 60 Hz, 1 Amps.

#### Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Technology Driven Products	ZPL01	PureLaunch Monitor	N/A	TBD
Condor	MD481810	Power Supply	N/A	N/A

#### Other EUT Details

The EUT has two transmitters that operate simultaneously in the 24.125 GHz band. One on the top of the stand and one at the bottom, 50 cm apart.

#### EUT Enclosure

The EUT enclosure is primarily constructed of hard plastic. It measures approximately 45.7 cm wide by 63.5 cm deep by 76.2 cm high.

#### Modification History

Mod. #	Test	Date	Modification
1	Radiated Emissions	5/29/04	Added a ferrite on the USB cable, EUT end, 3 turns.

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.



## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
		Account Manager:	Christine Vu
Contact:	Terry Precht		
Emissions Spec:	FCC Part 15 & 15.245	Class:	B / Radio
Immunity Spec:	-	Environment:	-

### Test Configuration #2

#### Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
HP	Pavilion ze4500	Laptop	CNF3451617	DoC

#### Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

#### Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
USB	Laptop	Multiwire	Shielded	2
DC input	AC adapter	2 wire	Unshielded	1.8

#### EUT Operation During Emissions

The EUT was commanded to transmit for 30 seconds repeatedly during testing from the control program running on the laptop.



## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
Contact:	Terry Precht	Account Manager:	Christine Vu
Spec:	FCC Part 15 & 15.245	Class:	B / Radio

### 15.245 Tx Radiated Emissions

#### Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 6/8/04

Test Engineer: David Bare

Test Location: SVOATS #3

Config. Used: 2

Config Change: None

EUT Voltage: 120V/60Hz

#### General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated emissions testing.

Unless otherwise specified, the measurement antenna was located 3 meters from the EUT for the frequency range 1 - 100 GHz.

Note, for testing above 1 GHz, the FCC specifies the limit as an average measurement. In addition, the FCC states that the peak reading of any emission above 1 GHz, can not exceed the average limit by more than 20 dB.

**Ambient Conditions:**

Temperature:	19.5 °C
Rel. Humidity:	43 %

#### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Fundamental Measurement	15.245 (b)	Pass	Refer to individual runs
2	RE, 1000 - 100000 MHz - Spurious Emissions	15.245 (b)(1)	Pass	Refer to individual runs
3	Bandedge Measurement	15.245 (b)(3)	Pass	Refer to individual runs

#### Modifications Made During Testing:

No modifications were made to the EUT during testing

#### Deviations From The Standard

No deviations were made from the requirements of the standard.





## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
Contact:	Terry Precht	Account Manager:	Christine Vu
Spec:	FCC Part 15 & 15.245	Class:	B / Radio

### Run #1: Fundamental Frequency Measurement.

Frequency	Level	Pol	FCC 15.245(b)		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
24123.090	97.7	H	128.0	-30.4	PK	345	1.0	Peak reading, Average limit
24123.090	105.7	V	128.0	-22.3	PK	5	1.0	Peak reading, Average limit

Note 1: Limit for spurious emissions in non restricted bands under 17.7 GHz = 105.3-50 or 55.3 dB $\mu$ V/m

### Run #2: Radiated Spurious Emissions, 1000-100000 MHz. Operating Frequency 24125 MHz

Measurements made at 1 or 0.3 meter and corrected to 3 meters using 9.5 or 20 dB factor

Frequency	Level	Pol	FCC 15.245(b)		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
48250.000	77.8	v	88.0	-10.2	Pk	0	1.0	Peak reading, Average limit
48250.000	68.1	h	88.0	-19.9	Pk	0	1.0	Peak reading, Average limit
72375.000	77.6	v	88.0	-10.4	Pk	0	1.0	Peak reading, Average limit
72375.000	77.3	h	88.0	-10.7	Pk	0	1.0	Peak reading, Average limit
96500.000	78.1	v	88.0	-9.9	Pk	0	1.0	Peak reading, Average limit
96500.000	78.3	h	88.0	-9.7	Pk	0	1.0	Peak reading, Average limit

Note 1: For emissions in restricted bands below 17.7 GHz, the limit of 15.209 was used. For emissions in restricted bands at and above 17.7 GHz, the appropriate limits specified in 15.245(b)(1)(i)(ii)(iii) was used.

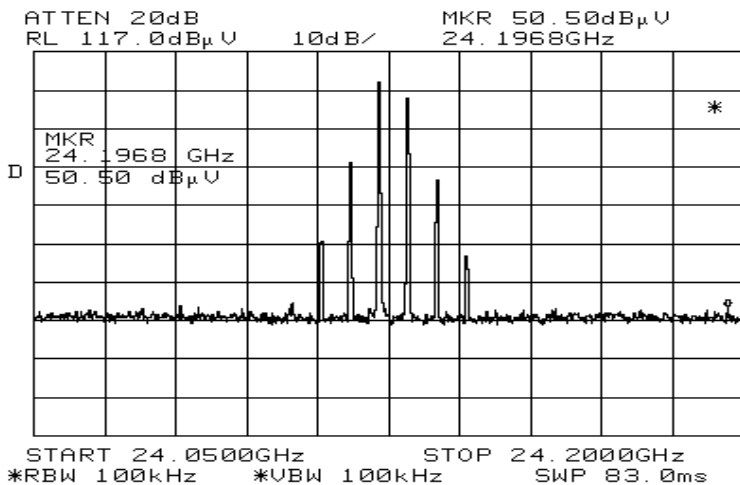
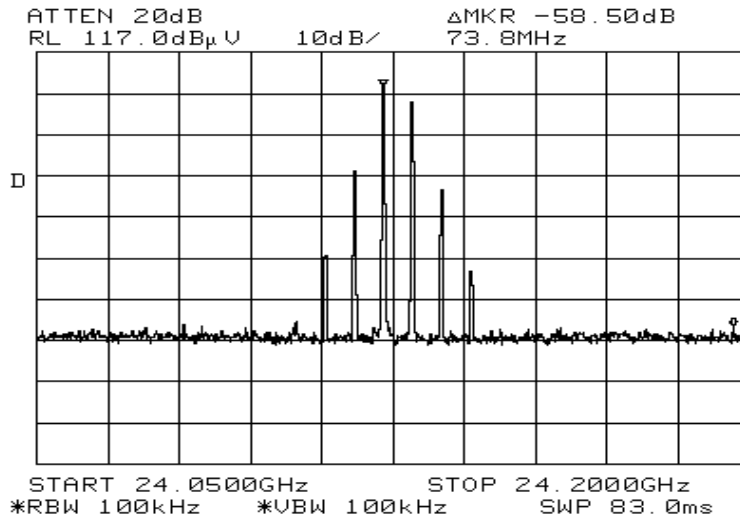
Note 2: The emissions at 72.375 and 96.500 GHz were at the noise floor 0.3 meters from the EUT



## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
Contact:	Terry Precht	Account Manager:	Christine Vu
Spec:	FCC Part 15 & 15.245	Class:	B / Radio

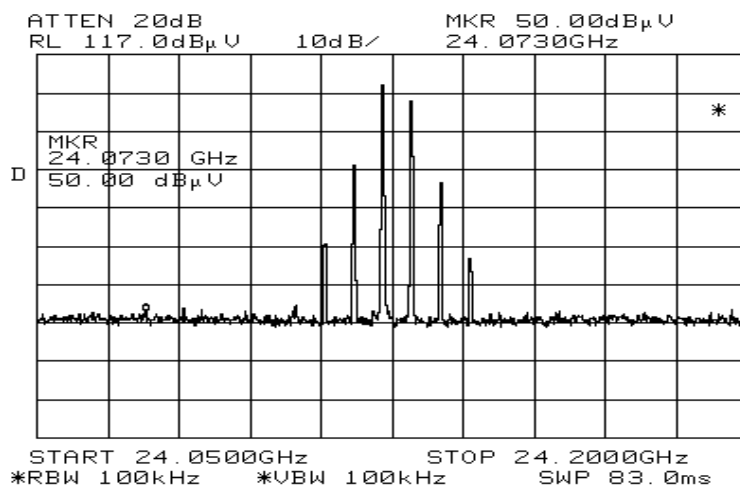
### Run #3: Bandedge Measurement.





## EMC Test Data

Client:	Technology Driven Products	Job Number:	J55552
Model:	ZPL01	T-Log Number:	T55810
Contact:	Terry Precht	Account Manager:	Christine Vu
Spec:	FCC Part 15 & 15.245	Class:	B / Radio



### ***EXHIBIT 3: Test Configuration Photographs***

Uploaded as A Separate Attachment

## ***EXHIBIT 4: Theory of Operation***

Uploaded as A Separate Attachment

***EXHIBIT 5: Proposed FCC ID Label & Label Location***

Uploaded as A Separate Attachment

***EXHIBIT 6: Detailed Photographs Zelosity Corporation Model ZPL01***

Uploaded as A Separate Attachment

***EXHIBIT 7: Installation Guide Zelosity Corporation Model ZPL01***

Uploaded as A Separate Attachment



***EXHIBIT 8: Block Diagram Zelosity Corporation Model ZPL01***

Uploaded as A Separate Attachment

***EXHIBIT 9: Schematic Diagrams Zelosity Corporation Model ZPL01***

Uploaded as A Separate Attachment

## ***EXHIBIT 10: Advertising Literature***

Uploaded as A Separate Attachment