

*FCC PART 15.225
TEST REPORT*

for

CARD PRINTER with RFID & HID
Model: P330I
FCC ID: I28-P330I

Prepared for

ZEBRA TECHNOLOGIES CORP.
1001 FLYNN RD
CAMARILLO, CA 93012

Prepared by: _____

REYNALD O. RAMIREZ

Approved by: _____

RUBY A. HALL

COMPATIBLE ELECTRONICS INC.
2337 TROUTDALE DRIVE
AGOURA, CALIFORNIA 91301
(818) 597-0600

DATE: OCTOBER 24, 2006

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
PAGES	18	2	2	2	12	23	59

This report shall not be reproduced except in full, without the written approval of Compatible Electronics.

TABLE OF CONTENTS

Section / Title	PAGE
GENERAL REPORT SUMMARY	4
SUMMARY OF TEST RESULTS	4
1. PURPOSE	5
2. ADMINISTRATIVE DATA	6
2.1 Location of Testing	6
2.2 Traceability Statement	6
2.3 Cognizant Personnel	6
2.4 Date Test Sample was Received	6
2.5 Disposition of the Test Sample	6
2.6 Abbreviations and Acronyms	6
3. APPLICABLE DOCUMENTS	7
4. Description of Test Configuration	8
4.1 Description of Test Configuration - EMI	8
4.1.1 Photograph of Test Configuration – EMI	9
4.1.2 Cable Construction and Termination	10
5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT	11
5.1 EUT and Accessory List	11
5.2 EMI Test Equipment	12
6. TEST SITE DESCRIPTION	14
6.1 Test Facility Description	14
6.2 EUT Mounting, Bonding and Grounding	14
7. Test Procedures	15
7.1 RF Emissions	15
7.1.1 Conducted Emissions Test	15
7.1.2 Radiated Emissions Test	16
7.1.3 Radiated Emissions – Frequency Tolerance	17
8. TEST PROCEDURE DEVIATIONS	18
9. CONCLUSIONS	18

LIST OF APPENDICES

APPENDIX	TITLE
A	Laboratory Accreditations
B	Modifications to the EUT
C	Additional Models Covered Under This Report
D	Diagrams, Charts and Photos <ul style="list-style-type: none">• Test Setup Diagrams• Antenna and Amplifier Gain Factors• Radiated and Conducted Emissions Photos
E	Data Sheets

LIST OF FIGURES

FIGURE	TITLE
1	Conducted Test Setup
2	Plot Map And Layout of Test Site

GENERAL REPORT SUMMARY

This electromagnetic emission report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form except in full, without the written permission of Compatible Electronics.

This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Device Tested: Card Printer with RFID & HID
Model: P330I
S/N: P330013903

Product Description: This is a card printer that can print on one side of a PVC card in one pass through the printer.

Modifications: The EUT was not modified during the testing.

Manufacturer: Zebra Technologies, Corp.
1001 Flynn Rd.
Camarillo, CA 93012

Test Dates: October 11, 12 & 19, 2006

Test Specifications: EMI requirements
FCC CFR Title 47, Part 15 Subpart C
Test Procedure: ANSI C63.4: 2003.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Radiated RF Emissions, 9kHz to 1GHz	The RFID & HID Complies with the limits of FCC CFR Title 47, Part 15 Subpart C 15.209, 15.225 and 15.205 Subpart A 15.31(e)
2	Conducted RF Emissions, 150 kHz – 30 MHz	The RFID & HID Complies with the limits of FCC CFR Title 47, Part 15 Subpart C 15.207 (a).

1. PURPOSE

This document is a Qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Card Printer with RFID & HID Model: P330I. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 2003. The tests were performed in order to determine whether the electromagnetic emissions from the RFID portion of the equipment under test, referred to as EUT hereafter, are within the specification limits defined in FCC CFR Title 47, Subpart C 15.207 (a), 15.209, 15.205 and 15.225 and Subpart A 15.31(e)

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 2337 Troutdale Drive, Agoura, California 91301. The temperature cycle testing was performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Zebra Technologies, Corp.

Bernard Ryan Electrical Engineer

Compatible Electronics Inc.

Kyle Fujimoto Test Engineer
Reynald O. Ramirez Senior Test Engineer
Ruby A. Hall Lab Manager

2.4 Date Test Sample was Received

The test sample was received on October 12, 2006.

2.5 Disposition of the Test Sample

The test sample remains at does not Compatible Electronics, Inc.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network
RFID	Radio Frequency Identification

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

SPEC	TITLE
FCC CFR Title 47, Subpart C. Subpart B	FCC Rules – Intentional Radiators. FCC Rules - Unintentional Radiators
CISPR 16 1993	Specification for radio disturbance and immunity measuring apparatus and methods.
ANSI C63.4 2003	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

The Card Printer with RFID & HID was setup in a tabletop configuration. The EUT was connected to the laptop computer via the USB port. An Ethernet option was also tested but was determined that the USB option emitted the highest emissions. An accessory and a modem were also connected to the laptop computer via their respective ports. The Zebra P330I uses color dye-sublimation ribbons or thermal transfer ribbons to transfer digital images to a PVC card. Ribbon recognition and security is maintained through RFID technology within the printer. The RFID board and the contactless smartcards use separate transmitters each operating at a frequency of 13.56 MHz in the ISM band. The RFID system uses an I CODE1 format. The EUT was continuously printing & transmitting throughout the test.

The HID I-Class system use HID OEM50 modules. The iClass OEM50 exciter modulates a 13.56 MHz carrier signal in accordance with ISO/IEC 15693-2. The modulated carrier is then filtered to suppress harmonics before driving the antenna. The output impedance of the exciter is 50 ohms for driving remote antennas through a coax cable and the impedance matching network of the antenna matches the impedance for maximum power transfer.

The highest emissions were found when the EUT was running in the above configuration. The final radiated and conducted data was taken in this mode of operation. All initial investigations were performed with the spectrum analyzer in manual mode scanning the frequency range continuously. The EUT was setup and tested as shown in the photographs in Appendix D.

4.1.1 Photograph of Test Configuration – EMI



4.1.2 Cable Construction and Termination

Cable 1 This is a 1.5 meter, foil shielded, round USB cable connecting the EUT to the laptop computer. There is a USB connector at both ends of the cable. The cable was bundled to a length of 1 meter. The shield of the cable was grounded to the chassis via the connectors.

Cable 2 This is a 2 meter, braid and foil shielded, round parallel cable connecting the accessory printer to the laptop computer. There is a metallic 36 pin Centronics type connector at the printer end and a metallic DB-25 pin connector at the computer end of the cable. The shield of the cable was grounded to the chassis via the connectors.

Cable 3 This is a 2 meter, unshielded, round, RS232 cable that connects the modem to the Laptop computer. The cable has a D-25 pin serial connector at the modem end and a D-9 pin serial connector at the laptop end. The cable was bundled to a length of 1 meter.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT**5.1 EUT and Accessory List**

#	EQUIPMENT TYPE	MANUFACTURER	MODEL	SERIAL NUMBER
1	CARD PRINTER with RFID & HID (EUT)	ZEBRA TECHNOLOGIES CORP.	P330I	FCC ID: I28-P330I
2	MODEM	HAYES	231AA	A05031083453
3	LAPTOP COMPUTER	DELL	PP17L	NONE
4	ACCESSORY PRINTER	HEWLETT PACKARD	C2162A	SG49R130MP

5.2 EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Spectrum Analyzer	Hewlett Packard	8566B	2729A04566	Jan. 10, 2006	Jan. 10, 2007
Quasi-Peak Adapter	Hewlett Packard	85650A	2521A00682	Jan. 10, 2006	Jan. 10, 2007
Preamplifier	Com Power	PA-103	0161068	Dec. 8, 2005	Dec. 8, 2006
LISN	Com Power	LI-215	12037	Oct. 13, 2006	Oct. 13, 2007
LISN (Accessory)	Com Power	LI-115	02030	Oct. 13, 2006	Oct. 13, 2007
Transient Limiter	Com Power	HZ560	3549	Dec. 5, 2005	Dec. 5, 2006
Biconical Antenna	Com Power	AB-900	2819	Dec. 29, 2005	Dec. 29, 2006
Log Periodic Antenna	Com Power	AL-100	01116	Dec. 28, 2005	Dec. 28, 2006
EM Loop Antenna Active	Com-Power	AL-130	17067	Aug. 1, 2006	Aug. 1, 2007
Antenna Mast	Com Power	AM-400	N/A	N/A	N/A
Turntable	Com Power	TTW-595	N/A	N/A	N/A
Computer	Hewlett Packard	Pavilion 4530	US91912022	N/A	N/A
Printer	Hewlett Packard	C6427B	MY066160TW	N/A	N/A
Conducted Emissions Test Software	Compatible Electronics	SR21	N/A	N/A	N/A
Radiated Emissions Test Software	Compatible Electronics	VCAP1A	N/A	N/A	N/A
Harmonic Flicker Meter	Hewlett Packard	6842A	3531A00180	Mar. 03, 2006	Mar. 03, 2007

5.2.1 EMI Test Equipment (continued)

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Temperature Chamber	Despatch	MIC 6000	149857	May 4, 2006	May 4, 2007
Variable Autotransformer	Staco Energy Products	3PN1010	N/A	N/A	N/A
Multimeter	Fluke	87	956410240	Dec. 15, 2005	Dec. 15, 2006
EMI Receiver	Rohde & Schwarz	ESIB40	100172	Oct. 28, 2004	Oct. 28, 2006
Temperature Chamber	Despatch	MIC 6000	149857	May 4, 2006	May 4, 2007

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 7.1.2 of this report for EMI test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was grounded through the AC power cord.

7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1 RF Emissions

7.1.1 Conducted Emissions Test

The Spectrum Analyzer was used as a measuring meter along with the quasi-peak adapter. The data was collected with the Spectrum Analyzer in the peak detect mode with the "Max Hold" feature activated. The quasi-peak was used only where indicated in the data sheets. A 10 dB attenuation pad was used for the protection of the Spectrum Analyzer input stage, and the Spectrum Analyzer offset was adjusted accordingly to read the actual data measured. The LISN output was read by the Spectrum Analyzer. The output of the second LISN was terminated by a 50 ohm termination. The effective measurement bandwidth used for the conducted emissions test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4: 2003. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The initial test data was taken in manual mode while scanning the frequency ranges of 0.15 MHz to 1.6 MHz, 1.6 MHz to 5 MHz and 5 MHz to 30 MHz. The conducted emissions from the EUT were maximized for operating mode as well as cable placement. Once a predominant frequency (within 12 dB of the limit) was found, it was more closely examined with the spectrum analyzer span adjusted to 1 MHz.

The final data was collected under program control by the computer in several overlapping sweeps by running the spectrum analyzer at a minimum scan rate of 10 seconds per octave. The test data is located in Appendix E.

7.1.2 Radiated Emissions Test

The spectrum analyzer was used as a measuring meter along with a quasi-peak adapter. A Preamplifier was used to increase the sensitivity of the instrument. The Spectrum Analyzer was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps. This final reading is then recorded into the a Computer data recording program, which takes into account the cable loss, amplifier gain and antenna factors, so that a true reading is compared to the true limit. The quasi-peak was used only for those readings, which are marked accordingly on the data sheets. The effective measurement bandwidth used for the radiated emissions test was according to the frequency measured (200 Hz for 10kHz-150kHz, 9 kHz for 0.150kHz-30MHz and 120 kHz for 30-1000MHz).

Broadband loop, biconical and log periodic antennas were used as transducers during the measurement. The loop antenna was used from 9 kHz to 30 MHz the biconical antenna was used from 30 MHz to 300 MHz and the log periodic antenna was used from 300 MHz to 1 GHz. The final data was taken with a frequency span of 1 MHz. Furthermore, the frequency span was reduced during the preliminary investigations as deemed necessary.

In the frequency range of 9kHz to 30MHz, a calibrated loop antenna was used and positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The loop antenna was also positioned horizontally at the specified distance from the EUT. The center of the loop shall be 1 m above the ground.

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4: 2003. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength).

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a test distance of 3 meters to obtain final test data. The test data is located in Appendix E.

Preliminary Testing and Monitoring:

Preliminary testing was done at a distance of 1 meter instead of 3 meters to determine the predominant harmonics and spurious emission frequencies. An open field test site was used for the preliminary investigations. Broadband antennas were used to scan large frequency bands while manipulating the unit. If and when any frequency was found to be above 30 microvolts/meter level (at a 1 meter distance), this frequency was recorded as a significant frequency. All significant frequencies were further examined carefully at a frequency span on the spectrum analyzer while changing the antenna height and EUT orientation. The EUT was tested again at a test distance of 3 meters to obtain the final test data. The bandwidth of the spectrum analyzer was varied to ensure that pulse desensitization did not occur.

7.1.3 Radiated Emissions – Frequency Tolerance

The EUT was placed in a temperature cycling chamber. The chamber was set for –20 degrees and the EUT was exposed to this temperature for a period of 30 minutes. The temperature was subsequently increased in 10 degree steps up to + 50 degrees with a 30 minute acclimation periods between each temperature. At each temperature step the EUT was checked with a Spectrum Analyzer to determine whether the carrier signal remained within 0.01% of the fundamental frequency at startup, 2 minutes, 5 minutes and 10 minutes after removal from the temperature chamber. The frequency tolerance of the carrier signal was maintained within 0.01% of the operating temperature variation testing –20 degrees to + 50 degrees C at normal voltage and variations at 85% to 100% at 20 degrees C.

8. TEST PROCEDURE DEVIATIONS

There were no deviations from the test procedures.

9. CONCLUSIONS

The Card Printer meets all of the requirements of the FCC CFR, Title 47, Part 15 Subpart A, Section 15.31(e), Subpart B 15.109, Subpart C 15.205, 15.207, 15.209, 15.225 and 15.31(e).

APPENDIX A

LABORATORY ACCREDITATIONS

LABORATORY ACCREDITATIONS AND RECOGNITIONS



For US, Canada, Australia/New Zealand, Taiwan and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025 an ISO 9002 equivalent. Please follow the link to the NIST site for each of our facilities NVLAP certificate and scope of accreditation.

Silverado/Lake Forest Division: <http://ts.nist.gov/ts/hdocs/210/214/scopes/2005270.htm>
Brea Division: <http://ts.nist.gov/ts/hdocs/210/214/scopes/2005280.htm>
Agoura Division: <http://ts.nist.gov/ts/hdocs/210/214/scopes/2000630.htm>



Compatible Electronics has been accredited by ANSI and appointed by the FCC to serve as a Telecommunications Certification Body (TCB). Compatible Electronics ANSI TCB listing can be found at: http://www.ansi.org/public/ca/ansi_cp.html



Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for EMC under the US/EU Mutual Recognition Agreement (MRA). Compatible Electronics NIST US/EU CAB listing can be found at: <http://ts.nist.gov/ts/hdocs/210/gsig/emc-cabs-mar02.pdf>



Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for Taiwan/BSMI under the US/APEC (Asia-Pacific Economic Cooperation) Mutual Recognition Agreement (MRA). Compatible Electronics NIST US/APEC CAB listing can be found at: <http://ts.nist.gov/ts/hdocs/210/gsig/apec/bsmi-cabs-may02.pdf>



World Wide Market Access with
Compatible Electronics has been validated by NEMKO against ISO/IEC 17025 under the NEMKO EMC Laboratory Authorization (ELA) program to all EN standards required by the European Union (EU) EMC Directive 89/336/EEC. Please follow the link to the Compatible Electronics' web site for each of our facilities NEMKO ELA certificate and scope of accreditation. <http://www.celectronics.com/certs.htm>

We are also certified/listed for IT products by the following country/agency:



Compatible Electronics VCCI listing can be found at:
http://www.vcci.or.jp/vcci_e/member/tekigo/setsubi_index_id.html

Just type "Compatible Electronics" into the Keyword search box.



Compatible Electronics FCC listing can be found at:
https://gullfoss2.fcc.gov/prod/oet/index_ie.html

Just type "Compatible Electronics" into the Test Firms search box.



Compatible Electronics IC listing can be found at:
http://spectrum.ic.gc.ca/~cert/labs/oats_lab_c_e.html

APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

There were no modifications made to the EUT during the test.

APPENDIX C

***ADDITIONAL MODELS COVERED
UNDER THIS REPORT***

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

CARD PRINTER WITH RFID & HID
Model: P330I

There were no additional models covered under this report.

APPENDIX D

DIAGRAMS, CHARTS AND PHOTOS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP (LAB F)

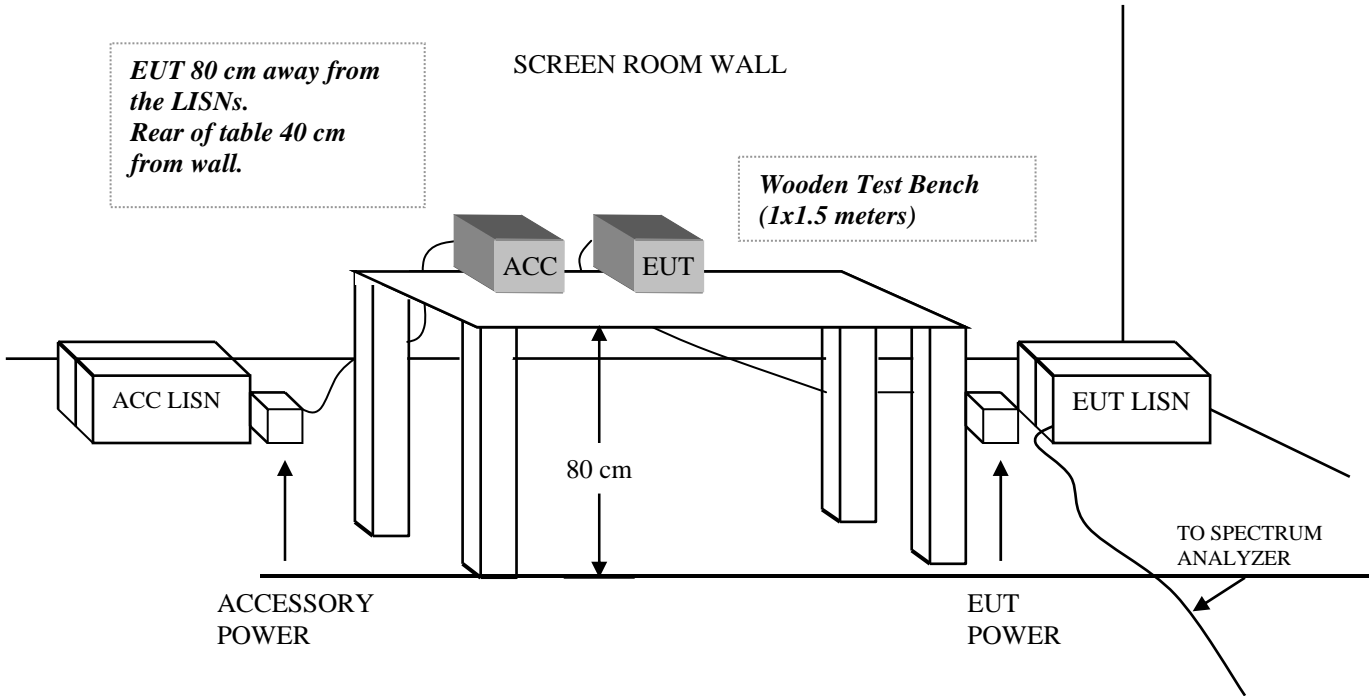
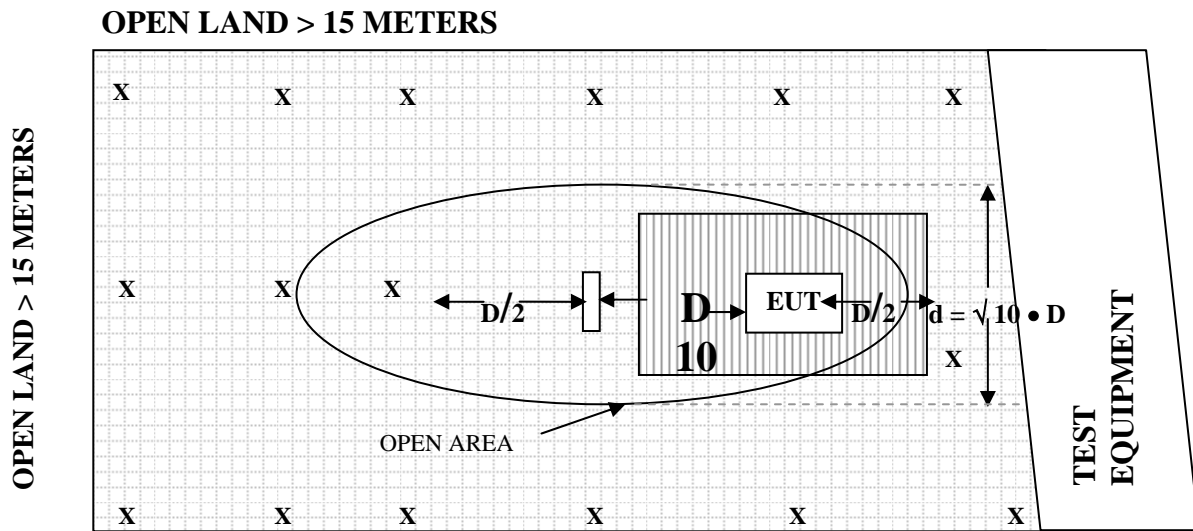
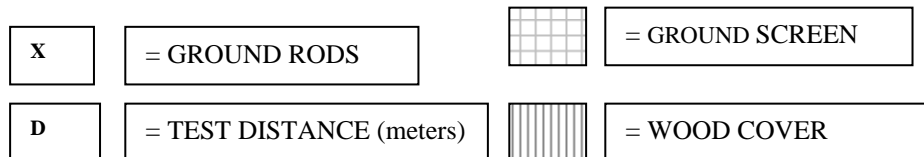


FIGURE 2: PLOT MAP AND LAYOUT OF RADIATED SITE (LAB F)



OPEN LAND > 15 METERS



COM-POWER AL-130
ACTIVE LOOP ANTENNA

S/N: 17067

CALIBRATION DATE: AUGUST 1, 2006

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
0.009	11.8	1	11.0
0.01	11.2	2	11.4
0.02	10.5	3	11.2
0.03	12.2	4	11.1
0.04	11.6	5	11.7
0.05	10.3	6	11.7
0.06	10.7	7	11.3
0.07	10.5	8	11.3
0.08	10.4	9	11.6
0.09	10.7	10	11.3
0.1	10.7	15	10.2
0.2	7.9	20	10.4
0.3	10.4	25	9.8
0.4	10.4	30	10.4
0.5	10.4		
0.6	11.0		
0.7	10.8		
0.8	10.6		
0.9	10.7		

COM-POWER AB-900
BICONICAL ANTENNA

S/N: 2819

CALIBRATION DATE: DEC. 29, 2005

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	11.51	120	13.31
35	10.59	125	13.59
40	10.46	140	11.58
45	11.77	150	11.87
50	11.64	160	12.61
55	10.86	175	14.79
60	9.88	180	15.92
65	8.71	200	16.81
70	7.67	225	14.51
80	6.21	250	15.21
90	8.38	275	19.08
100	10.71	300	19.54

COM-POWER AL-100
LOG PERIODIC ANTENNA

S/N: 01116

CALIBRATION DATE: DEC. 28, 2005

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
300	14.80	650	17.37
330	19.70	700	19.33
340	15.03	725	19.22
350	16.47	750	22.96
360	15.12	800	20.17
370	14.65	850	21.91
400	13.75	900	22.02
425	15.51	925	22.67
450	15.54	950	23.38
500	17.20	975	23.45
550	15.28	1000	23.58
600	18.12		

COM-POWER PA-103**PREAMPLIFIER**

S/N: 161068

CALIBRATION DATE: DEC. 8, 2005

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	32.7	300	32.1
40	32.5	350	32.0
50	32.4	400	32.1
60	32.5	450	31.8
70	32.5	500	31.4
80	32.4	550	32.0
90	32.4	600	31.6
100	32.3	650	31.4
125	32.4	700	31.5
150	32.2	750	32.1
175	32.4	800	31.0
200	32.2	850	31.3
225	32.4	900	31.5
250	32.3	950	31.2
275	32.1	1000	29.7



FRONT VIEW

ZEBRA TECHNOLOGIES CORP.
CARD PRINTER with RFID & HID
Model: P330I

FCC PART 15 SUBPART C - RADIATED EMISSIONS – 10-12-06

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



REAR VIEW

ZEBRA TECHNOLOGIES CORP.
CARD PRINTER with RFID & HID
Model: P330I

FCC PART 15 SUBPART C - RADIATED EMISSIONS – 10-12-06

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



FRONT VIEW

ZEBRA TECHNOLOGIES CORP.
CARD PRINTER with RFID & HID
Model: P330I

FCC PART 15 SUBPART C - CONDUCTED EMISSIONS – 10-12-06

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



REAR VIEW

ZEBRA TECHNOLOGIES CORP.
CARD PRINTER with RFID & HID
Model: P330I

FCC PART 15 SUBPART C - CONDUCTED EMISSIONS – 10-12-06

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



ZEBRA TECHNOLOGIES CORP.
CARD PRINTER with RFID & HID
Model: P330I

FCC PART 15 SUBPART C – FREQUENCY TOLERANCE EMISSIONS –
10-20-06

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

APPENDIX E

DATA SHEETS

CALCULATION OF LIMIT:

Spec limit: $15,848 \text{ uV/m} = 15,848 \log_{10} 20 = 83.99 \text{ dBuV/m}$

$30\text{m to } 3\text{m} = 30/3 = 10 \log_{10} 40 = 40$

LIMIT = 123.99

COMPATIBLE ELECTRONICS

Test Location : Compatible Electronics
Customer : Bernie Ryan
Manufacturer : Zebra Technologies Corp
Eut name : Card Printer
Model : P330I
Serial # : none
Specification : FCC pt. 15.225 fund.
Distance correction factor (20 * log(test/spec)) : 0.00
Test Mode : Qualification
Fundamental 13.56 MHz
Test Engineer: R. Ramirez
RFID

Page : 1/1
Date : 10/11/2006
Time : 11:51:35 AM
Lab : F
Test Distance : 3.00 Meters

Pol	Freq MHz	Reading dBuV	Cable loss dB	Antenna factor dB	Amplifier gain dB	Corr'd rdg = R dBuV/m	Limit = L dBuV/m	Delta R-L dB
1V	13.560	39.20	1.53	10.20	0.00	50.91	124.00	-73.07
2H	13.563	35.40	1.53	10.20	0.00	47.11	124.00	-76.87

COMPATIBLE ELECTRONICS

Test Location : Compatible Electronics
Customer : Bernie Ryan
Manufacturer : Zebra Technologies Corp
Eut name : Card Printer
Model : P330I
Serial # : none
Specification : 15.225 2nd Harmonic
Distance correction factor (20 * log(test/spec)) : 0.00
Test Mode : Qualification
2nd Harmonic
Test Engineer: R. Ramirez
RFID

Page : 1/1
Date : 10/11/2006
Time : 12:02:09 PM
Lab : F
Test Distance : 3.00 Meters

Pol	Freq MHz	Reading dBuV	Cable loss dB	Antenna factor dB	Amplifier gain dB	Corr'd rdg = R dBuV/m	Limit = L dBuV/m	Delta R-L dB
1V	27.121	21.30	2.08	9.80	0.00	33.18	69.54	-36.36
2H	27.121	19.20	2.08	9.80	0.00	31.08	69.54	-38.46

COMPATIBLE ELECTRONICS

Test Location : Compatible Electronics	Page : 1/1
Customer : Bernie Ryan	Date : 10/11/2006
Manufacturer : Zebra Technologies Corp	Time : 01:24:15 PM
Eut name : Card Printer	Lab : F
Model : P330I	Test Distance : 3.00 Meters
Serial # : none	
Specification : FCC Pt. 15- Class B	
Distance correction factor (20 * log(test/spec))	: 0.00
Test Mode : Qualification	
Harmonics	
Test Engineer: R. Ramirez	
RFID	

Pol	Freq MHz	Reading dBuV	Cable loss dB	Antenna factor dB	Amplifier gain dB	Corr'd rdg = R dBuV/m	Limit = L dBuV/m	Delta R-L dB
1V	40.680	50.20	2.31	10.65	32.49	30.66	40.00	-9.34
2V	54.240	55.00	2.49	10.97	32.44	36.02	40.00	-3.98
3V	67.800	51.30	2.68	8.12	32.50	29.60	40.00	-10.40
4V	81.360	49.30	2.91	6.52	32.40	26.33	40.00	-13.67
5V	94.920	56.50	3.05	9.56	32.35	36.76	43.50	-6.74
6V	108.480	46.20	3.14	11.87	32.34	28.87	43.50	-14.63
7V	122.040	43.40	3.19	13.43	32.39	27.63	43.50	-15.87
8V	135.600	46.30	3.24	12.15	32.31	29.38	43.50	-14.12
9H	40.680	46.90	2.31	10.65	32.49	27.36	40.00	-12.64
10H	54.240	49.20	2.49	10.97	32.44	30.22	40.00	-9.78
11H	67.800	48.00	2.68	8.12	32.50	26.30	40.00	-13.70
12H	81.360	48.70	2.91	6.52	32.40	25.73	40.00	-14.27
13H	94.920	57.30	3.05	9.56	32.35	37.56	43.50	-5.94
14H	108.480	44.60	3.14	11.87	32.34	27.27	43.50	-16.23
15H	122.040	44.40	3.19	13.43	32.39	28.63	43.50	-14.87
16H	135.600	47.70	3.24	12.15	32.31	30.78	43.50	-12.72

COMPATIBLE ELECTRONICS

Test Location : Compatible Electronics Page : 1/1
Customer : Bernie Ryan Date : 10/11/2006
Manufacturer : Zebra Technologies Corp Time : 09:16:17 AM
Eut name : Card Printer Lab : F
Model : P330I Test Distance : 3.00 Meters
Serial # : none
Specification : FCC pt. 15.225 fund.
Distance correction factor (20 * log(test/spec)) : 0.00
Test Mode : Qualification
Fundamental 13.56 MHz
Test Engineer: R. Ramirez
HID

Pol	Freq MHz	Reading dBuV	Cable loss dB	Antenna factor dB	Amplifier gain dB	Corr'd rdg = R dBuV/m	Limit = L dBuV/m	Delta R-L dB
1V	13.560	41.80	1.53	10.20	0.00	53.53	124.00	-70.47
2H	13.560	42.40	1.53	10.20	0.00	54.11	124.00	-69.87

COMPATIBLE ELECTRONICS

Test Location : Compatible Electronics Page : 1/1
Customer : Bernie Ryan Date : 10/11/2006
Manufacturer : Zebra Technologies Corp Time : 09:48:49 AM
Eut name : Card Printer Lab : F
Model : P330I Test Distance : 3.00 Meters
Serial # : none
Specification : 15.225 2nd Harmonic
Distance correction factor (20 * log(test/spec)) : 0.00
Test Mode : Qualification
2nd Harmonic
Test Engineer: R. Ramirez
HID

Pol	Freq MHz	Reading dBuV	Cable loss dB	Antenna factor dB	Amplifier gain dB	Corr'd rdg = R dBuV/m	Limit = L dBuV/m	Delta R-L dB
1V	27.117	23.20	2.08	9.80	0.00	35.08	69.54	-34.46
2H	27.118	19.50	2.08	9.80	0.00	31.38	69.54	-38.16

COMPATIBLE ELECTRONICS

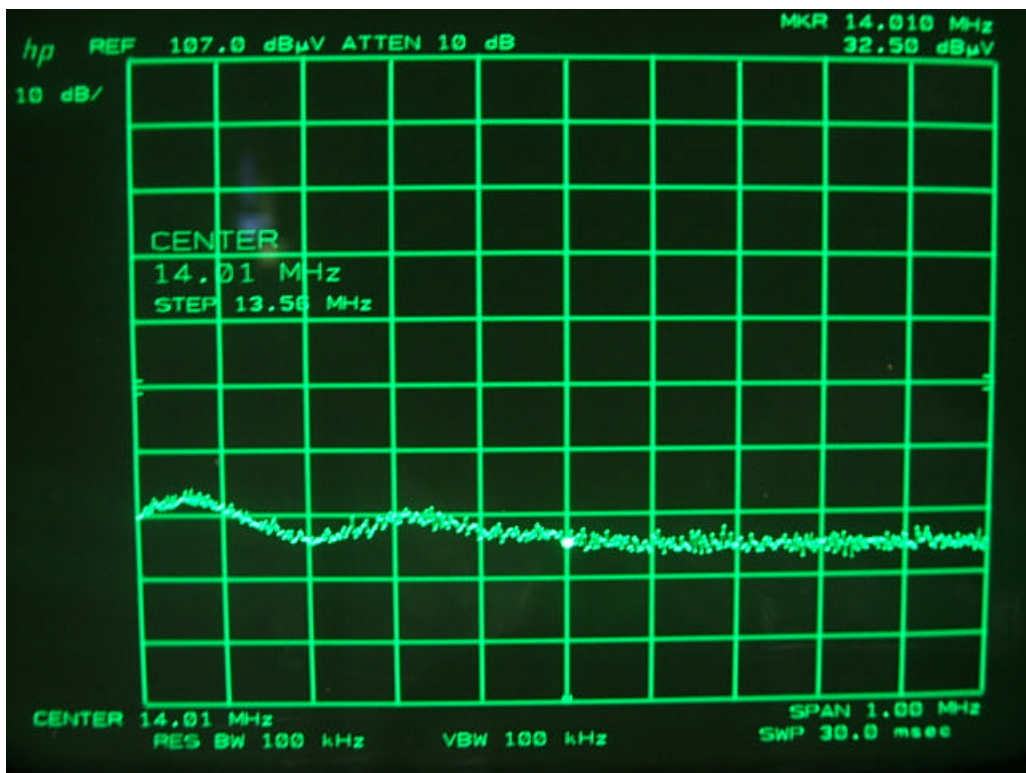
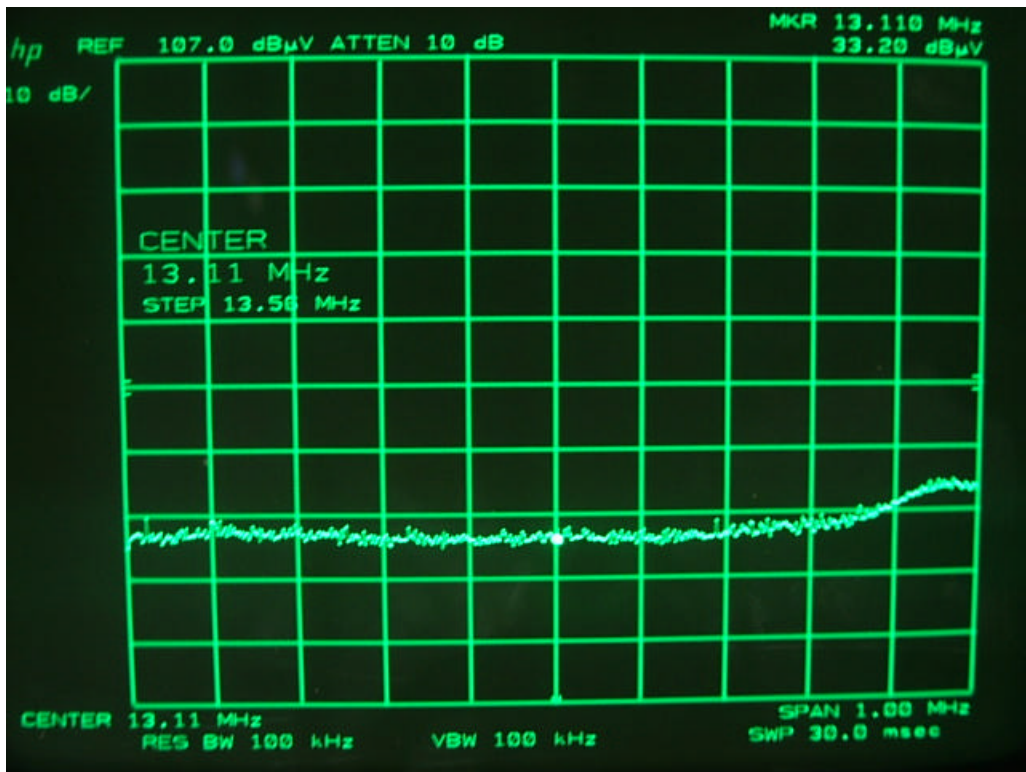
Test Location : Compatible Electronics	Page : 1/1
Customer : Bernie Ryan	Date : 10/11/2006
Manufacturer : Zebra Technologies Corp	Time : 10:00:10 AM
Eut name : Card Printer	Lab : F
Model : P330I	Test Distance : 3.00 Meters
Serial # : none	
Specification : FCC Pt. 15- Class B	
Distance correction factor (20 * log(test/spec)) : 0.00	
Test Mode : Qualification	
Harmonics	
Test Engineer: R. Ramirez	
HID	

Pol	Freq MHz	Reading dBuV	Cable loss dB	Antenna factor dB	Amplifier gain dB	Corr'd rdg = R dBuV/m	Limit = L dBuV/m	Delta R-L dB
1V	40.660	55.70	2.31	10.64	32.49	36.16	40.00	-3.84
2V	54.216	55.30	2.49	10.98	32.44	36.32	40.00	-3.68
3V	67.788	55.60	2.68	8.12	32.50	33.90	40.00	-6.10
4V	81.348	56.60	2.91	6.52	32.40	33.63	40.00	-6.37
5V	94.908	55.50	3.05	9.55	32.35	35.76	43.50	-7.74
6V	108.468	44.20	3.14	11.87	32.34	26.87	43.50	-16.63
7H	40.670	44.90	2.31	10.64	32.49	25.36	40.00	-14.64
8V	122.028	38.90	3.19	13.42	32.39	23.12	43.50	-20.38
9H	54.216	49.30	2.49	10.98	32.44	30.32	40.00	-9.68
10V	135.588	43.10	3.24	12.15	32.31	26.18	43.50	-17.32
11H	67.794	52.40	2.68	8.12	32.50	30.70	40.00	-9.30
12H	81.342	57.40	2.91	6.52	32.40	34.43	40.00	-5.57
13H	94.902	56.90	3.05	9.55	32.35	37.15	43.50	-6.35
14H	108.462	42.50	3.14	11.87	32.34	25.17	43.50	-18.33
15H	122.031	40.70	3.19	13.43	32.39	24.93	43.50	-18.57
16H	135.591	42.00	3.24	12.15	32.31	25.08	43.50	-18.42

COMPATIBLE ELECTRONICS

Test Location	: Compatible Electronics	Page	: 1/1
Customer	: Bernie Ryan	Date	: 10/11/2006
Manufacturer	: Zebra Technologies Corp	Time	: 01:10:59 PM
Eut name	: Card Printer	Lab	: F
Model	: P330I	Test Distance	: 3.00 Meters
Serial #	: none		
Specification	: fcc 15.225 bandedge		
Distance correction factor (20 * log(test/spec))			: 0.00
Test Mode	: Qualification		
	Bandedge 13.110-14.010 MHz		
	Test Engineer: R. Ramirez		
	RFID		

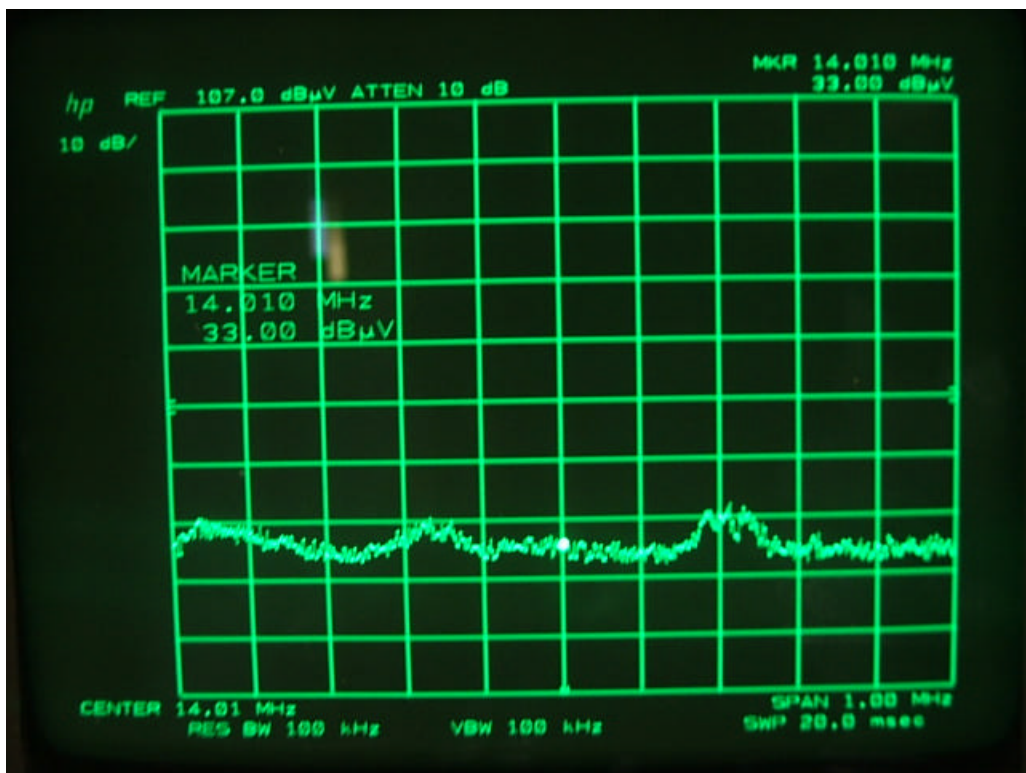
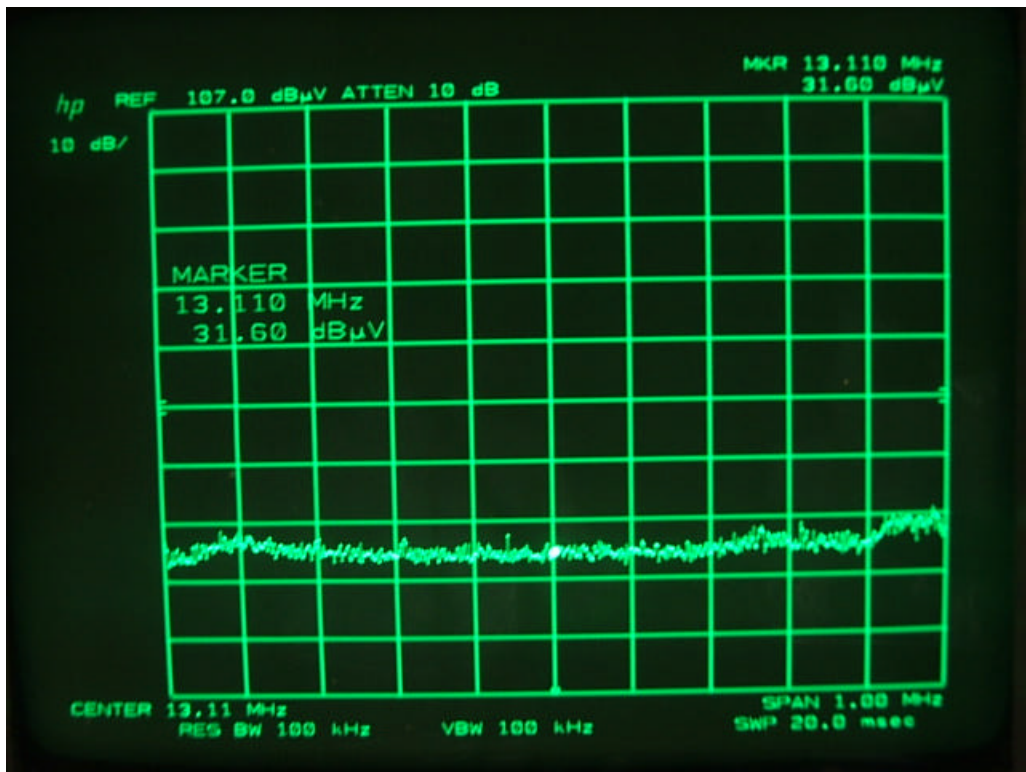
Pol	Freq MHz	Reading dBuV	Cable loss dB	Antenna factor dB	Amplifier gain dB	Corr'd rdg = R dBuV/m	Limit = L dBuV/m	Delta R-L dB
1V	13.110	33.20	1.52	10.20	0.00	44.92	69.54	-24.62
2V	14.010	32.50	1.55	10.20	0.00	44.25	69.54	-25.29



COMPATIBLE ELECTRONICS

Test Location	: Compatible Electronics	Page	: 1/1
Customer	: Bernie Ryan	Date	: 10/11/2006
Manufacturer	: Zebra Technologies Corp	Time	: 11:24:21 AM
Eut name	: Card Printer	Lab	: F
Model	: P330I	Test Distance	: 3.00 Meters
Serial #	: none		
Specification	: fcc 15.225 bandedge		
Distance correction factor (20 * log(test/spec))			: 0.00
Test Mode	: Qualification		
	Bandedge 13.110-14.010 MHz		
	Test Engineer: R. Ramirez		
	HID		

Pol	Freq MHz	Reading dBuV	Cable loss dB	Antenna factor dB	Amplifier gain dB	Corr'd rdg = R dBuV/m	Limit = L dBuV/m	Delta R-L dB
1V	13.110	31.60	1.52	10.20	0.00	43.32	69.54	-26.22
2V	14.010	33.00	1.55	10.20	0.00	44.70	69.54	-24.84



CALCULATION OF LIMIT: (9 KHz-30 MHz)

Spec limit: $30 \text{ uV/m} = 30 \log_{10} 20 = 29.54 \text{ dBuV/m} + 40$

LIMIT=69.54

COMPATIBLE ELECTRONICS

Test Location : Compatible Electronics	Page : 1/1
Customer : Bernie Ryan	Date : 10/11/2006
Manufacturer : Zebra Technologies Corp	Time : 01:55:51 PM
Eut name : Card Printer	Lab : F
Model : P330I	Test Distance : 3.00 Meters
Serial # : none	
Specification : FCC Pt. 15- Class B	
Distance correction factor (20 * log(test/spec))	: 0.00
Test Mode : Qualification	
9 KHz-30 MHz spurious emissions	
Test Engineer: R. Ramirez	
Clocks: 10, 24, 32, 25, 13.56, 14.74, 1.8432 MHz	

Pol	Freq MHz	Reading dBuV	Cable loss dB	Antenna factor dB	Amplifier gain dB	Corr'd rdg = R dBuV/m	Limit = L dBuV/m	Delta R-L dB
1V	16.588	23.40	1.62	10.40	0.00	35.42	69.54	-34.12
2V	18.432	24.30	1.66	10.40	0.00	36.36	69.54	-33.18
3V	20.266	25.30	1.72	10.40	0.00	37.42	69.54	-32.12
4V	25.000	20.70	1.98	9.80	0.00	32.48	69.54	-37.06
5V	29.480	21.40	2.18	10.40	0.00	33.98	69.54	-35.56
6H	16.588	19.30	1.62	10.40	0.00	31.32	69.54	-38.22
7H	18.432	19.20	1.66	10.40	0.00	31.26	69.54	-38.28
8H	20.266	16.60	1.72	10.40	0.00	28.72	69.54	-40.82
9H	25.000	19.80	1.98	9.80	0.00	31.58	69.54	-37.96
10H	29.480	19.00	2.18	10.40	0.00	31.58	69.54	-37.96

COMPATIBLE ELECTRONICS

Test Location : Compatible Electronics	Page : 1/1
Customer : Bernie Ryan	Date : 10/11/2006
Manufacturer : Zebra Technologies Corp	Time : 03:31:50 PM
Eut name : Card Printer	Lab : F
Model : P330I	Test Distance : 10.00 Meters
Serial # : none	
Specification : FCC Pt 15 Class A	
Distance correction factor (20 * log(test/spec)) : 0.00	
Test Mode : Qualification	
30-1000 MHz spurious emissions	
Test Engineer: R. Ramirez	
Clocks: 10, 24, 32, 25, 13.56, 14.74, 1.8432 MHz	

Pol	Freq MHz	Reading dBuV	Cable loss dB	Antenna factor dB	Amplifier gain dB	Corr'd rdg = R dBuV/m	Limit = L dBuV/m	Delta R-L dB
1V	48.002	41.20	1.88	11.69	32.42	22.35	39.00	-16.65
2V	96.002	39.30	2.42	9.81	32.34	19.19	43.50	-24.31
3V	103.220	52.10	2.54	11.16	32.31	33.49	43.50	-10.01
4V	127.982	38.80	2.83	13.17	32.37	22.42	43.50	-21.08
5V	132.702	36.30	2.87	12.53	32.33	19.36	43.50	-24.14
6V	147.442	39.10	2.98	11.80	32.22	21.66	43.50	-21.84
7V	160.002	35.10	3.17	12.61	32.28	18.59	43.50	-24.91
8V	200.002	42.30	3.30	16.81	32.20	30.21	43.50	-13.29
9V	235.842	36.00	3.54	14.82	32.36	22.01	46.40	-24.39
10V	240.002	35.30	3.56	14.94	32.34	21.46	46.40	-24.94
11V	249.987	46.30	3.60	15.21	32.30	32.81	46.40	-13.59
12H	47.987	46.70	1.88	11.69	32.42	27.85	39.00	-11.15
13H	95.985	42.00	2.42	9.80	32.34	21.89	43.50	-21.61
14H	127.969	43.80	2.83	13.17	32.37	27.43	43.50	-16.07
15H	132.708	40.70	2.87	12.53	32.33	23.76	43.50	-19.74
16H	103.208	45.90	2.54	11.16	32.31	27.29	43.50	-16.21
17H	147.439	43.00	2.98	11.80	32.22	25.56	43.50	-17.94
18H	160.008	38.40	3.17	12.61	32.28	21.90	43.50	-21.60
19H	200.008	37.40	3.30	16.81	32.20	25.31	43.50	-18.19
20H	235.908	39.00	3.54	14.82	32.36	25.01	46.40	-21.39
21H	240.011	36.30	3.56	14.94	32.34	22.46	46.40	-23.94
22H	249.983	45.00	3.60	15.21	32.30	31.51	46.40	-14.89
23V	374.980	44.00	4.65	14.50	32.05	31.10	46.40	-15.30
24V	338.953	41.20	4.62	15.51	32.02	29.31	46.40	-17.09
25V	400.024	40.60	4.70	13.75	32.10	26.95	46.40	-19.45
26V	431.943	41.80	5.42	15.52	31.90	30.83	46.40	-15.57
27V	500.012	38.50	5.50	17.20	31.40	29.80	46.40	-16.60
28H	338.978	38.20	4.62	15.50	32.02	26.30	46.40	-20.10
29H	374.984	44.30	4.65	14.50	32.05	31.40	46.40	-15.00
30H	399.988	47.20	4.70	13.75	32.10	33.55	46.40	-12.85
31H	432.013	43.10	5.42	15.52	31.90	32.13	46.40	-14.27
32H	480.005	38.10	5.62	16.56	31.55	28.72	46.40	-17.68
33H	500.028	41.40	5.50	17.20	31.40	32.70	46.40	-13.70



**COMPATIBLE
ELECTRONICS**

10/12/2006 8:04:12

EN 55022 Conducted Emissions

Zebra Technologies Corp.

Card Printer

P330I

120V

Line LI-215 Due 10-14-06

TEST ENGINEER : R. Ramirez

7 highest peaks above -50.00 dB of New FCC Class B (Avg) limit line

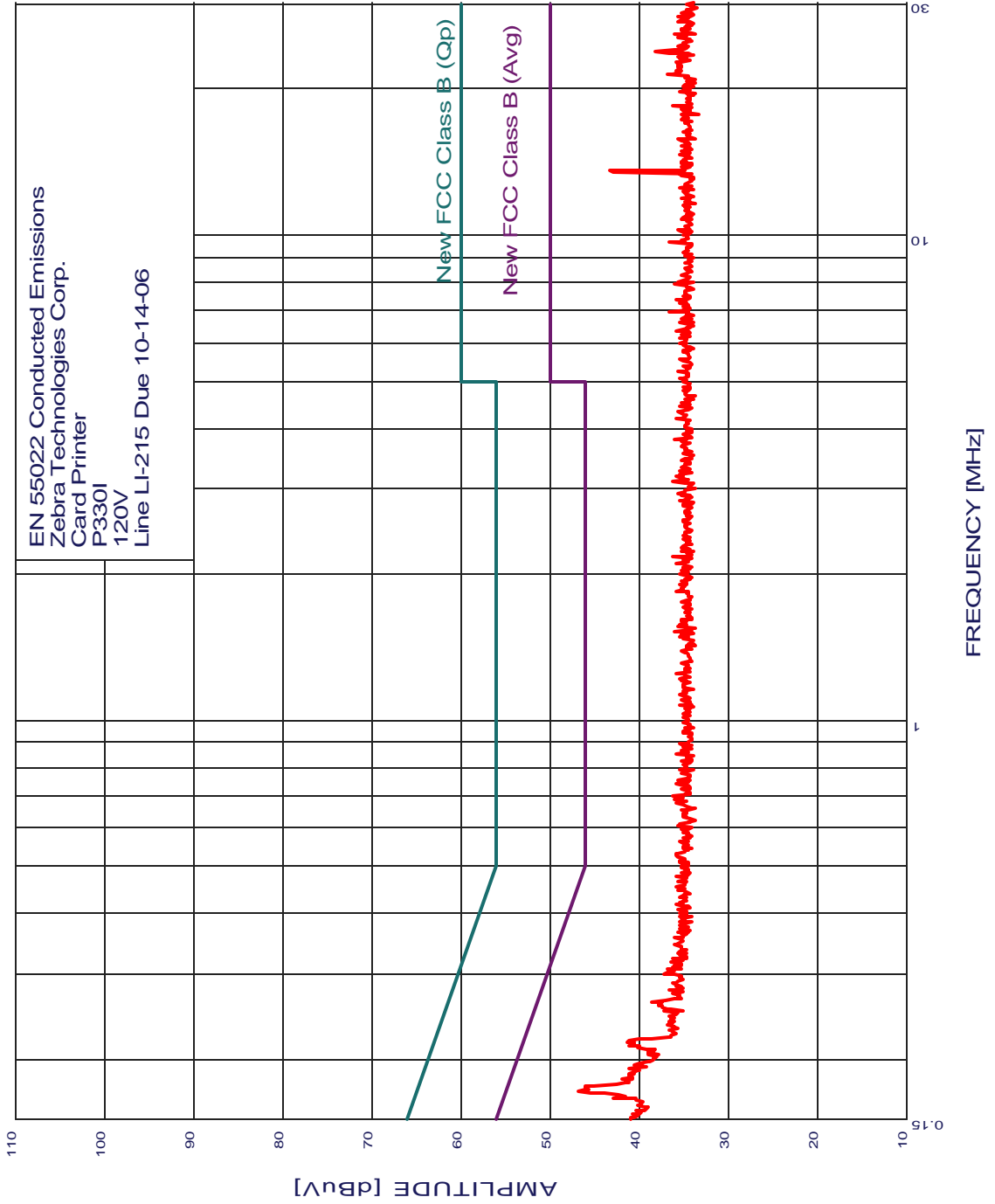
Peak criteria : 3.00 dB, Curve : Peak

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	13.559	43.25	50.00	-6.75
2	0.172	46.74	54.86	-8.12
3	0.217	41.24	52.91	-11.68
4	23.901	38.05	50.00	-11.95
5	0.263	38.54	51.33	-12.80
6	21.373	36.78	50.00	-13.22
7	0.150	40.94	56.00	-15.06



10/12/2006 8:04:12

EMISSION LEVEL [dBuV] PEAK
Graph for Peak





**COMPATIBLE
ELECTRONICS**

10/12/2006 8:12:06

EN 55022 Conducted Emissions

Zebra Technologies Corp.

Card Printer

P330I

120V

Neut LI-215 Due 10-14-06

TEST ENGINEER : R. Ramirez

7 highest peaks above -50.00 dB of New FCC Class B (Avg) limit line

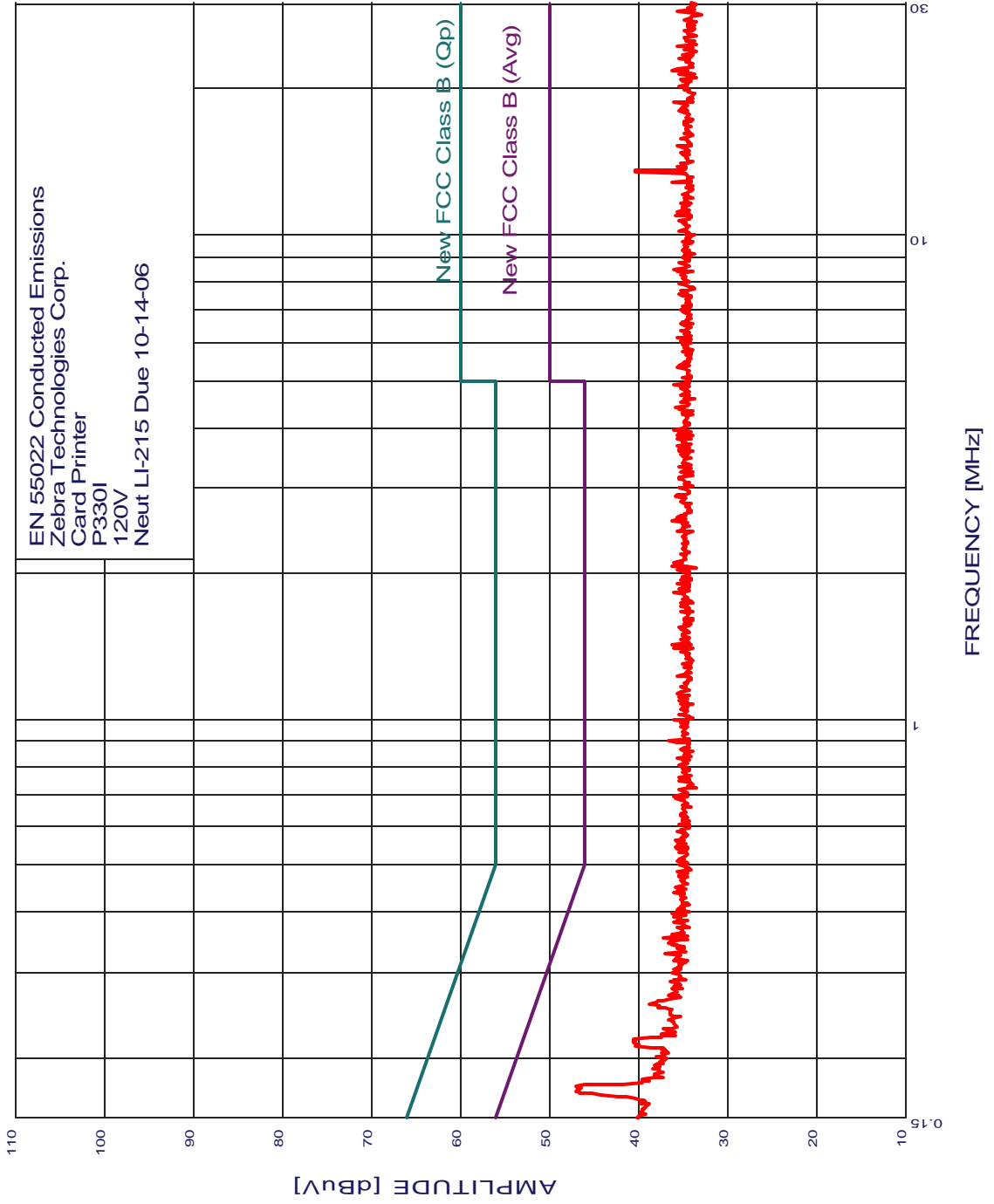
Peak criteria : 0.00 dB, Curve : Peak

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.175	46.88	54.72	-7.84
2	0.171	46.88	54.90	-8.02
3	0.170	46.58	54.98	-8.41
4	0.904	36.49	46.00	-9.51
5	13.559	40.30	50.00	-9.70
6	2.568	36.24	46.00	-9.76
7	0.150	40.18	56.00	-15.82



10/12/2006 8:12:06

EMISSION LEVEL [dBuV] PEAK
Graph for Peak



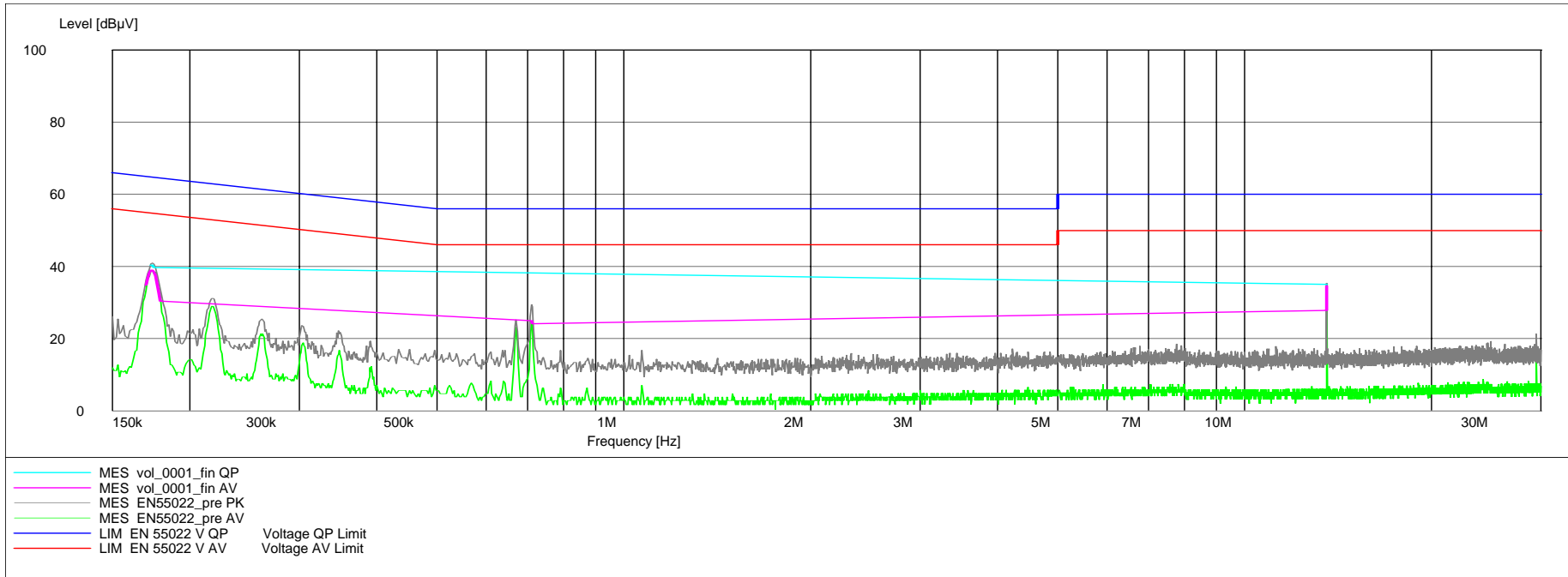
AC Conducted

Line

EUT: Card Printer
Manufacturer: Zebra Technologies
Operating Condition: 120V
Test Site: Lab E
Operator: R. Ramirez
Test Specification: EN55022B
Comment: P330I
Start of Test: HID

SCAN TABLE: "EN 55022 VoltageFin"

Short Description:	EN 55022 Voltage					
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	30.0 MHz	4.0 kHz	QuasiPeak CISPR AV	1.0 s	9 kHz	LI-215



MEASUREMENT RESULT: "vol_0001_fin QP"

12/19/06 4:01PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.173000	40.30	10.3	65	24.5	1	---
0.174000	40.40	10.3	65	24.4	1	---
0.175000	39.70	10.3	65	25.0	1	---
13.560000	35.00	10.8	60	25.0	1	---

MEASUREMENT RESULT: "vol_0001_fin AV"

12/19/06 4:01PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.170000	34.90	10.3	55	20.1	1	---
0.171000	36.80	10.3	55	18.1	1	---
0.172000	38.20	10.3	55	16.6	1	---
0.173000	39.00	10.3	55	15.8	1	---
0.174000	39.00	10.3	55	15.7	1	---
0.175000	38.50	10.3	55	16.2	1	---
0.176000	37.40	10.3	55	17.3	1	---
0.177000	35.20	10.3	55	19.5	1	---
0.178000	32.90	10.3	55	21.7	1	---
0.179000	30.40	10.3	55	24.2	1	---
0.709000	25.00	10.3	46	21.0	1	---
0.712000	24.10	10.3	46	21.9	1	---
13.556000	31.40	10.8	50	18.6	1	---
13.560000	34.60	10.8	50	15.4	1	---
13.564000	27.80	10.8	50	22.2	1	---

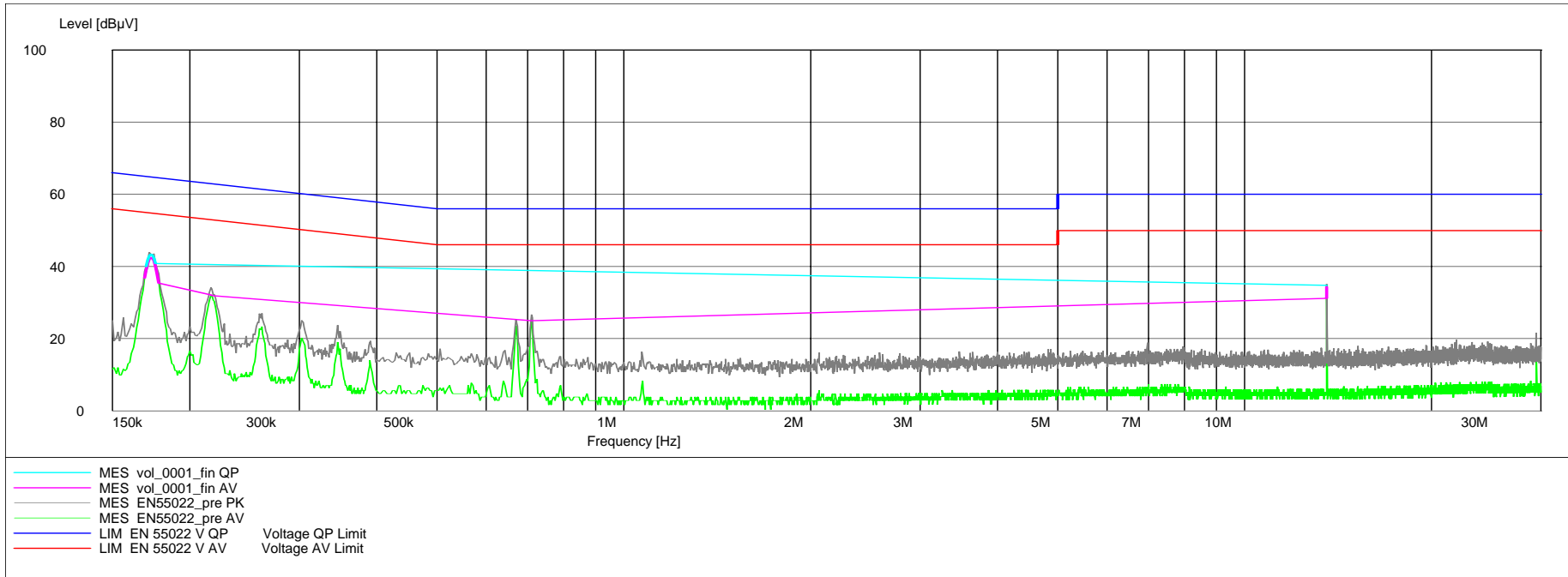
AC Conducted

Neutral

EUT: Card Printer
Manufacturer: Zebra Technologies
Operating Condition: 120V
Test Site: Lab E
Operator: R. Ramirez
Test Specification: EN55022B
Comment: P330I
Start of Test: HID

SCAN TABLE: "EN 55022 VoltageFin"

Short Description:		EN 55022 Voltage				
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	30.0 MHz	4.0 kHz	QuasiPeak CISPR AV	1.0 s	9 kHz	LI-215



MEASUREMENT RESULT: "vol_0001_fin QP"

12/19/06 4:06PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.170000	40.00	10.3	65	25.0	1	---
0.171000	41.80	10.3	65	23.2	1	---
0.172000	42.90	10.3	65	21.9	1	---
0.173000	43.40	10.3	65	21.4	1	---
0.174000	43.20	10.3	65	21.5	1	---
0.175000	42.30	10.3	65	22.4	1	---
0.176000	40.80	10.3	65	23.9	1	---
13.560000	34.80	10.8	60	25.2	1	---

MEASUREMENT RESULT: "vol_0001_fin AV"

12/19/06 4:06PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.169000	36.80	10.3	55	18.2	1	---
0.170000	39.00	10.3	55	16.0	1	---
0.171000	40.80	10.3	55	14.1	1	---
0.172000	42.00	10.3	55	12.9	1	---
0.173000	42.50	10.3	55	12.3	1	---
0.174000	42.30	10.3	55	12.4	1	---
0.175000	41.60	10.3	55	13.1	1	---
0.176000	39.90	10.3	55	14.8	1	---
0.177000	37.80	10.3	55	16.9	1	---
0.178000	35.40	10.3	55	19.2	1	---
0.216000	32.10	10.3	53	20.9	1	---
0.217000	31.90	10.3	53	21.0	1	---
0.709000	25.00	10.3	46	21.0	1	---
13.556000	31.20	10.8	50	18.8	1	---
13.560000	34.40	10.8	50	15.6	1	---