



1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

FCC Rules and Regulations / Intentional Radiators

Operational in the Band 13.553-13.567 MHz

Part 15, Subpart C, Section 15.225

THE FOLLOWING "**MEETS**" THE ABOVE TEST SPECIFICATION

Formal Name: Zebra M2
Kind of Equipment: RFID Encoder for use in Zebra printers
Test Configuration: Limited Modular Approval (Tested at 120 vac, 60 Hz)
Model Number(s): M2
Model(s) Tested: M2
Serial Number(s): NA
Date of Tests: June 30 and July 5 & 6, 2006
Test Conducted For: Zebra Technologies Corporation
333 Corporate Woods Parkway
Vernon Hills, Illinois 60061

NOTICE: "This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government". Please see the "Additional Description of Equipment Under Test" page listed inside of this report. This report must not be reproduced (except in full), without the approval of D.L.S. Electronic Systems.



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SIGNATURE PAGE

Report By:

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Test Engineer
EMC-001375-NE

Reviewed By:

William Stumpf
OATS Manager

Approved By:

Brian Mattson
General Manager

Company Official:

Zebra Technologies Corporation



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United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:1999

NVLAP LAB CODE: 100276-0

D.L.S. Electronic Systems, Inc.
Wheeling, IL

is recognized by the National Voluntary Laboratory Accreditation Program for conformance with criteria set forth in
NIST Handbook 150:2001 and all requirements of ISO/IEC Guide 17025:1999.
Accreditation is granted for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

2005-10-01 through 2006-09-30

Effective dates



For the National Institute of Standards and Technology

NVLAP-01C (REV. 2005-05-19)



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1.0 SUMMARY OF TEST REPORT

It was found that the Zebra M2, Model Number(s) M2, "meets" the radio interference conducted and radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.225 for operational in the 13.553-13.567 MHz Band.

This test report relates only to the items tested and contains the following number of pages.

Text: 113

2.0 INTRODUCTION

On June 30 and July 5 & 6, 2006, a series of radio frequency interference measurements was performed on Zebra M2, Model Number(s) M2, Serial Number: NA. The tests were performed according to the procedures of the FCC as stated in the "Methods of Measurement of Radio-Noise Emissions for Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" found in the American National Standards Institute, ANSI C63.4-2003. Tests were performed by personnel of D.L.S. Electronic Systems, Inc. who are responsible to Donald L. Sweeney, Senior EMC Engineer.

D.L.S. Electronic Systems, Inc. is a full service EMC/Safety Testing Laboratory accredited to ISO 17025. NVLAP Certificate and Scope can be viewed at <http://www.dlsemc.com/certificate>. Our facilities are registered with the FCC, Industry Canada, and VCCI.

3.0 OBJECT

The purpose of this series of tests was to determine if the test sample could meet the radio frequency interference emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Sections 15.209 & 15.225 for Intentional Radiators operating in the Band 13.553-13.567 MHz.



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4.0 TEST SET-UP

All emission tests were performed at D.L.S. Electronic Systems, Inc. and set up according to the American National Standards Institute, ANSI C63.4-2003, Section 8, (Figures 11a and 11b).

All emissions tests were performed with the test item placed on a 80 cm high rotating non-conductive table, located in the test room. Equipment normally operated on the floor was placed on a metal covered turntable which is flush with the surrounding conducting ground plane. The ground plane has an electrical isolation layer over its surface approximately 7 mm thick. The EUT is separated from the turntable ground plane by a non-conductive layer. The equipment under test was set up according to ANSI C63.4-2003, Sections 6, 7 and 8.



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5.0 TEST EQUIPMENT (Bandwidths and Detector Function)

All preliminary data below 1000 MHz was automatically plotted using the HP Spectrum Analyzer or ESI 26/40 Fixed Tuned Receiver. The data was taken using Peak, Quasi-Peak or the Average Detector Functions as required. This information was then used to determine the frequencies of maximum emissions. Above 1000 MHz, final data was taken using the Average Detector.

Below 1000 MHz, final data was taken using the HP Spectrum Analyzer and/or ESI 26/40 Fixed Tuned Receiver. These plots were made using the Peak or Quasi-Peak Detector functions, with manual measurements performed on the questionable frequencies using the Quasi-Peak or the Average Detector Function of the Analyzer or ESI 26/40 Fixed Tuned Receiver as required. Above 1000 MHz, final data was taken using the Average Detector on the Spectrum Analyzer.

The bandwidths shown below are specified by ANSI C63.4-2003, Section 4.2.

Frequency Range	Bandwidth (-6 dB)
10 to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz
Above 1 GHz	1 MHz

A list of the equipment used can be found in Table 1. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.



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6.0 AMBIENT MEASUREMENTS

For emissions measurements, broadband antennas and an EMI Test Receiver with a panoramic spectrum display are used. First the frequency range is scanned and displayed on the test receiver display. Next the scanned frequency range is divided into smaller ranges, and then it is manually tuned through to determine the emissions from the EUT. A headset or loudspeaker is connected to the test receiver's AM/FM demodulated output as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT. If there is any doubt as to the source of the emission, it is further investigated by rotating the EUT, or by disconnecting the power from the EUT.

The EUT is set up in its typical configuration and operated in its various modes. For tabletop systems, cables are manipulated within the range of likely configurations. For floor-standing equipment, the cables are located in the same manner as the user would install them and no further manipulation is made. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions. For each mode of operation, the frequency spectrum is monitored. Variations in antenna height, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) are explored to produce the emissions that have the highest amplitude relative to the limit. These methods are performed to the specifications in MP-5 or ANSI C63.4-2003, as appropriate.



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7.0 DESCRIPTION OF TEST SAMPLE: (See also Paragraph 8.0)

7.1 Description:

Zebra M2 is a RFID encoder used for encoding RFID tags. The encoder is installed in Zebra printers. The RFID encoder operates at 13.56 MHz. It has the ability to switch between two magnetic loop antennas, depending on the tag type used.

7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

Length: 2 inches x Width: 2.7 inches x Height: .06 inches

7.3 LINE FILTER USED:

5 Volts DC Powered Device

7.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

NA

Clock Frequencies:

RFID Reader: 13.56 MHz & 12 MHz

7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. MP UHF RFID Encoder RF Board

PN: M2-MH



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8.0 ADDITIONAL DESCRIPTION OF TEST SAMPLE:
(See also Paragraph 7.0)

1: There were no additional descriptions noted at the time of test.

This Zebra M2 was tested with two different sized Magnetic Loop Antennas. The printer was tested with the "Cutter Option" and tested without the "Cutter Option". The Zebra M2 was tested in "Continuous Transmit", "Continuous Receive/Standby" and "Printing".

I certify that the above, as described in paragraph 7.0, describes the equipment tested and will be manufactured as stated.

By: _____
Signature

Title

For: _____
Company

Date



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9.0 PHOTO INFORMATION AND TEST SET-UP

Item 0 Zebra M2

Model Number: M2 Serial Number: NA

Item 1 Dell Latitude D610 PC

Model Number: PP11L; Serial Number: 0M7181-48643-644-2052

Item 2 Non-shielded AC Power Line Cord. 2m

Item 3 Non-shielded Ethernet Cable with Plastic Shells. 7'

Item 4 Shielded USB Cable with Metal Shells. 1.5m

Item 5 Shielded Serial Cable with Metal Shells. 1.5m



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10.0 RADIATED PHOTOS TAKEN DURING TESTING

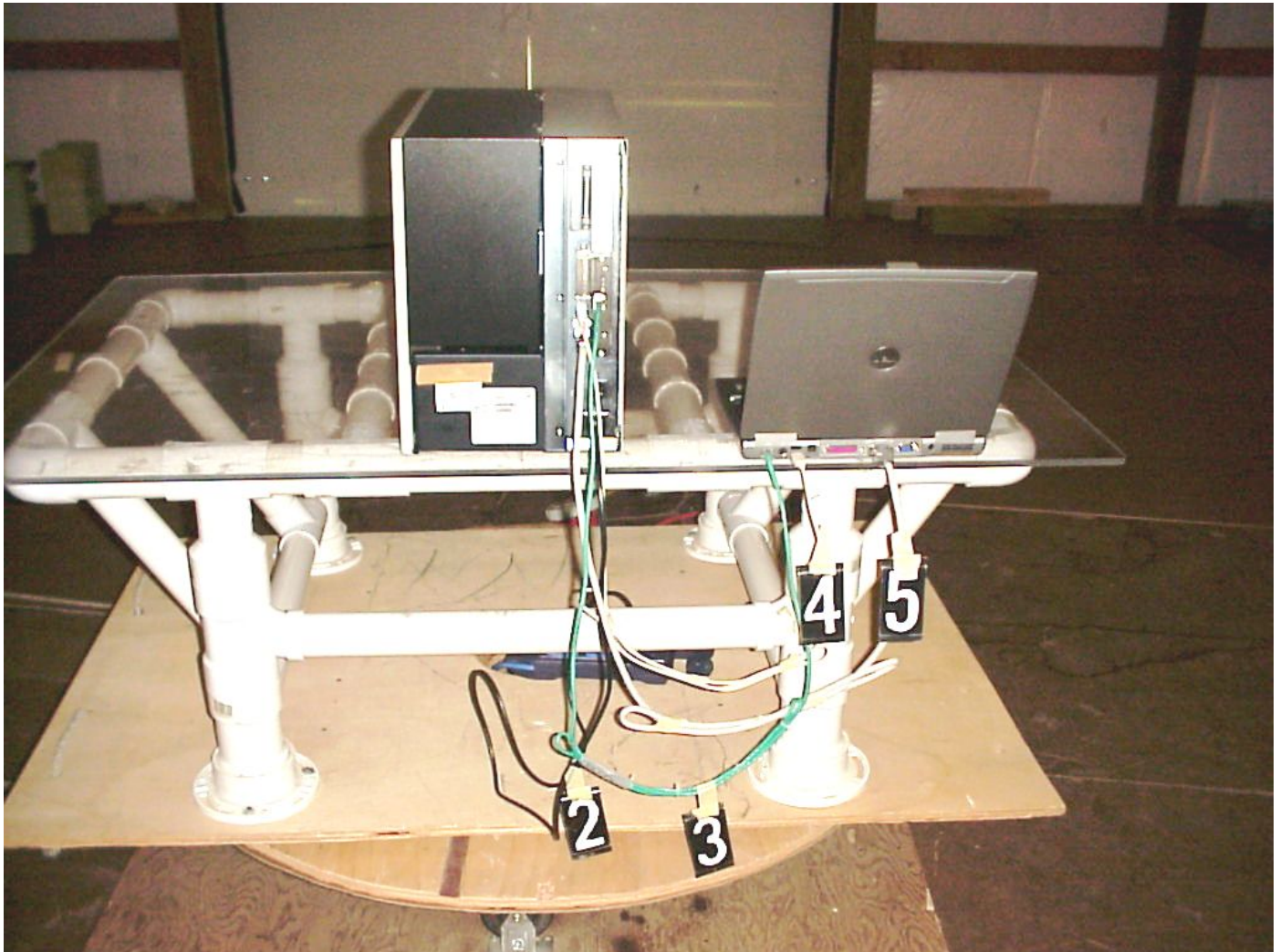




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10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)

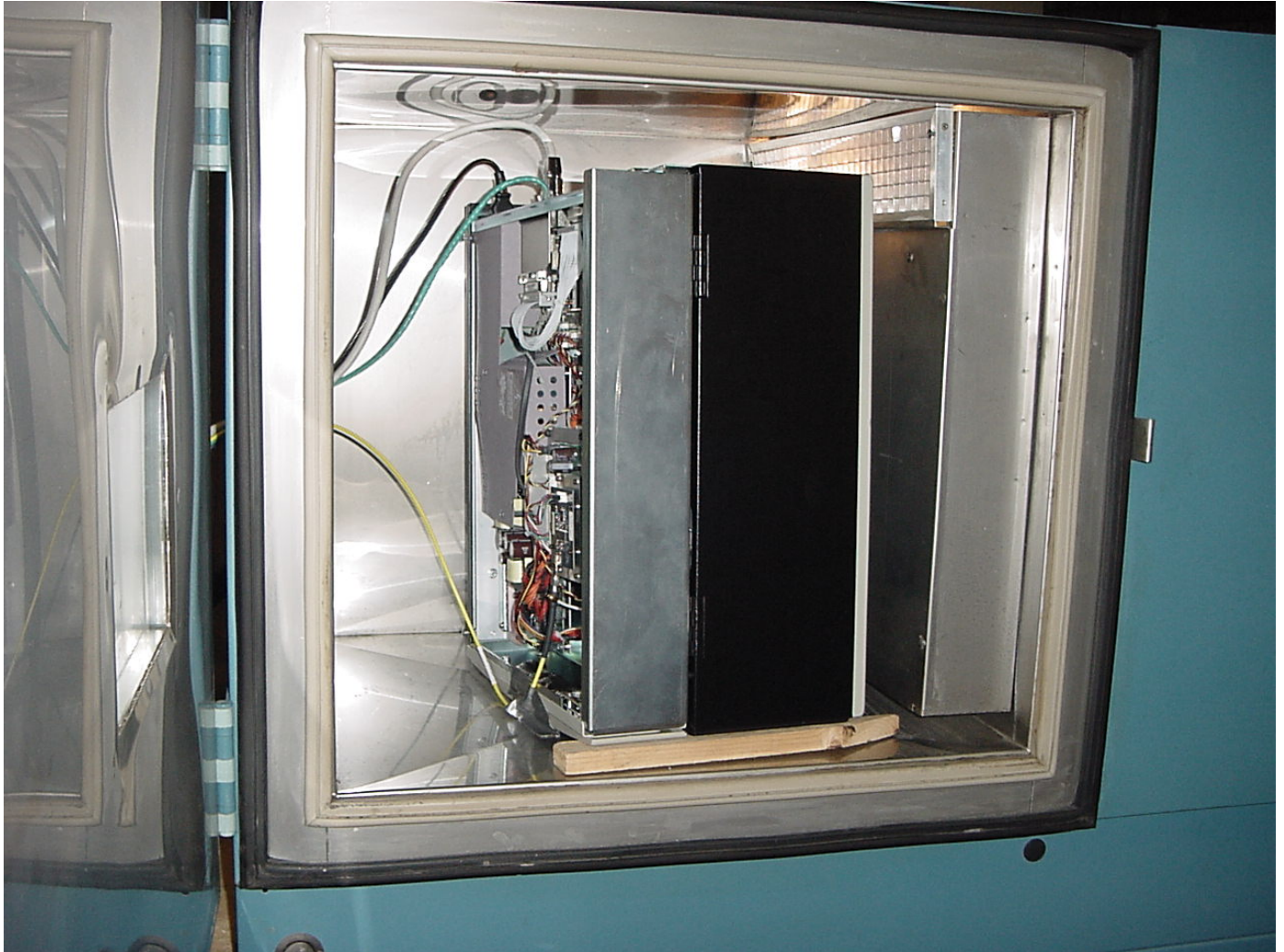




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10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)





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10.0 POWER LINE CONDUCTED PHOTOS TAKEN DURING TESTING





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11.0 RESULTS OF TESTS

The radio interference emission charts results can be seen on the pages at the end of this report. Data sheets indicating the test measurements taken during testing can also be found at the end of this report. Points on the emission charts shown with a yellow mark are background frequencies that were verified during testing.

12.0 CONCLUSION

It was found that the Zebra M2, Model Number(s) M2 "meets" the radio interference conducted and radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.225 for operational in the 13.553-13.567 MHz Band.



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TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 26	837491/010	20 Hz – 26 GHz	11/06
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	12/06
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	12/06
Antenna	EMCO	3104C	00054891	20 MHz – 200 MHz	2/07
Antenna	Electrometrics	LPA-25	1114	200 MHz – 1 GHz	3/07
Antenna	EMCO	3104C	00054892	20 MHz – 200 MHz	3/07
Antenna	Electrometrics	3146	1205	200 MHz – 1 GHz	3/07
Antenna	EMCO	3104C	97014785	20 MHz – 200 MHz	2/07
Antenna	EMCO	3146	97024895	200 MHz – 1 GHz	3/07
Antenna	EMCO	3115	2479	1 GHz – 18 GHz	8/06
Antenna	EMCO	3115	99035731	1 GHz – 18 GHz	4/07
Antenna	Rohde & Schwarz	HUF-Z1	829381001	20 MHz – 1 GHz	2/07
Antenna	Rohde & Schwarz	HUF-Z1	829381005	20 MHz – 1 GHz	8/06

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.



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TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
LISN	Solar	8012-50-R-24-BNC	8305116	10 MHz – 30 MHz	8/06
LISN	Solar	8012-50-R-24-BNC	814548	10 MHz – 30 MHz	8/06
LISN	Solar	9252-50-R-24-BNC	961019	10 MHz – 30 MHz	12/06
LISN	Solar	9252-50-R-24-BNC	971612	10 MHz – 30 MHz	10/06
LISN	Solar	9252-50-R-24-BNC	92710620	10 MHz – 30 MHz	7/07

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.



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APPENDIX A

TEST PROCEDURE

Part 15, Subpart C, Section 15.225a-c

OPERATION WITHIN THE BAND 13.553-13.567 MHz



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APPENDIX A

1.0 CONDUCTED EMISSION MEASUREMENTS

The conducted emissions were measured over the frequency range from 150 kHz to 30 MHz in accordance with the power line measurements, as specified in ANSI C63.4-2003. Since the device is operated from the public utility lines, the 120 Vac, 60 Hz power leads, high and low sides were measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. All signals were then recorded. The allowed levels for Intentional Radiators cannot exceed 250 μ V (47.96 dBuV) at any frequency between 150 kHz and 30 MHz, as stated in Section 15.207a.



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APPENDIX A

CONDUCTED DATA AND GRAPHS

TAKEN DURING TESTING

PART 15.207

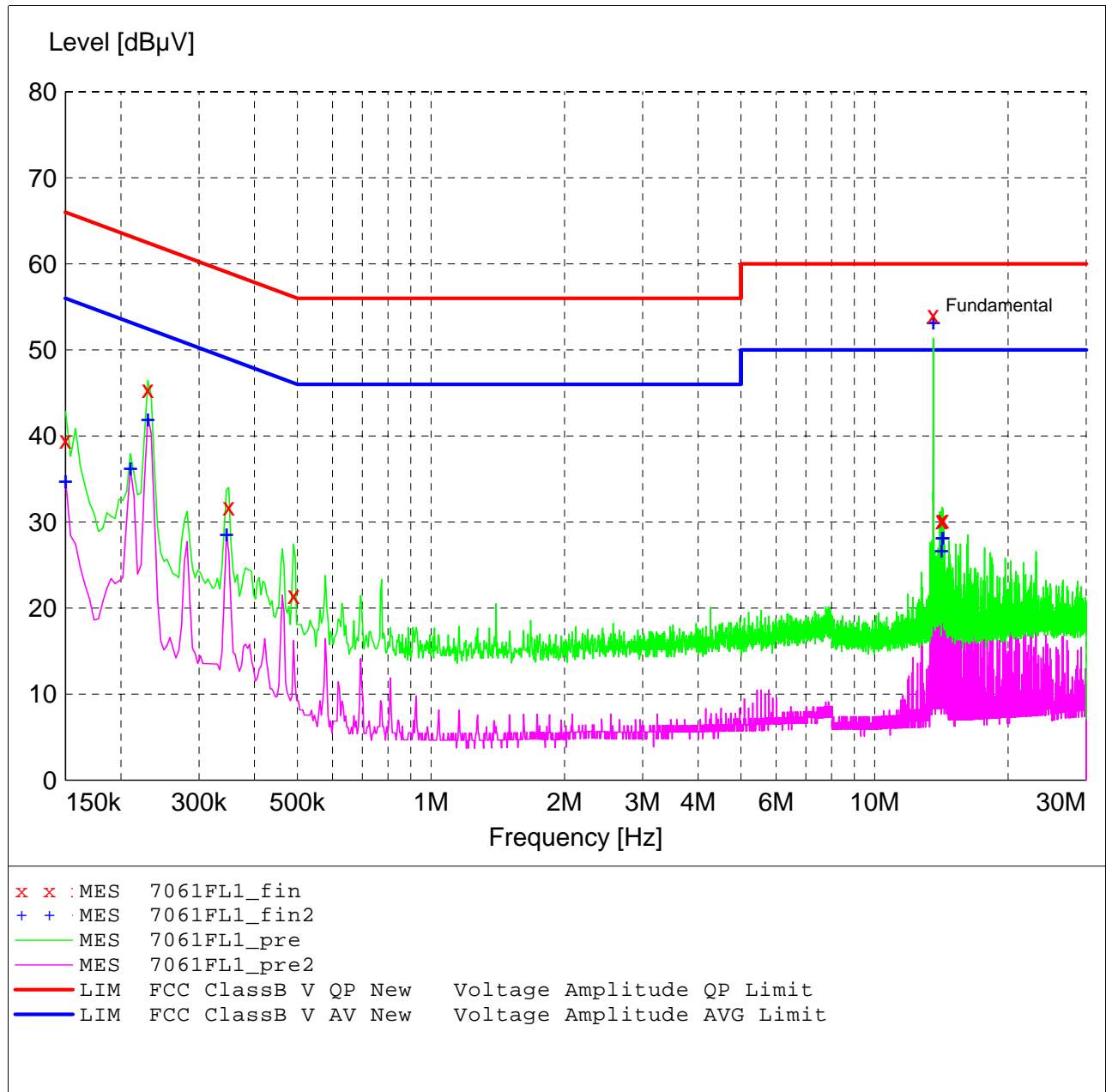
FCC Part 15 Class B

Voltage Mains Test

EUT: Model 110XiIII
 Manufacturer: Zebra
 Operating Condition: 72 deg. F, 51% R.H.
 Test Site: DLS O.F. Site 1 (Screenroom)
 Operator: Craig Brandt
 Test Specification: 120 V 60 Hz Line 1
 Comment: Continuous Transmit and Printing
 Date: 07-06-2006

SCAN TABLE: "Line Cond Scrn RmFin"

Short Description:		Line Conducted Emissions					Transducer
Start	Stop	Step	Detector	Meas. Time	IF Bandw.		
150.0 kHz	30.0 MHz	4.0 kHz	QuasiPeak	10.0 s	9 kHz	LISN DLS#128	
CISPR AV							



MEASUREMENT RESULT: "7061FL1_fin"

7/6/2006 8:45AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Note
0.150000	39.50	11.5	66	26.5	QP	---
0.230000	45.40	10.7	62	17.0	QP	---
0.350000	31.80	10.4	59	27.2	QP	---
0.490000	21.50	10.2	56	34.7	QP	---
13.562000	54.10	10.9	60	5.9	QP	Fundamental
14.150000	30.20	11.0	60	29.8	QP	---
14.214000	30.30	11.0	60	29.7	QP	---
14.274000	30.30	11.0	60	29.7	QP	---

MEASUREMENT RESULT: "7061FL1_fin2"

7/6/2006 8:45AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Note
0.150000	34.90	11.5	56	21.1	CAV	---
0.210000	36.40	10.8	53	16.8	CAV	---
0.230000	42.00	10.7	52	10.4	CAV	---
0.346000	28.70	10.4	49	20.4	CAV	---
13.562000	53.30	10.9	50	-3.3	CAV	Fundamental
14.154000	26.80	11.0	50	23.2	CAV	---
14.214000	28.30	11.0	50	21.7	CAV	---
14.274000	28.30	11.0	50	21.7	CAV	---

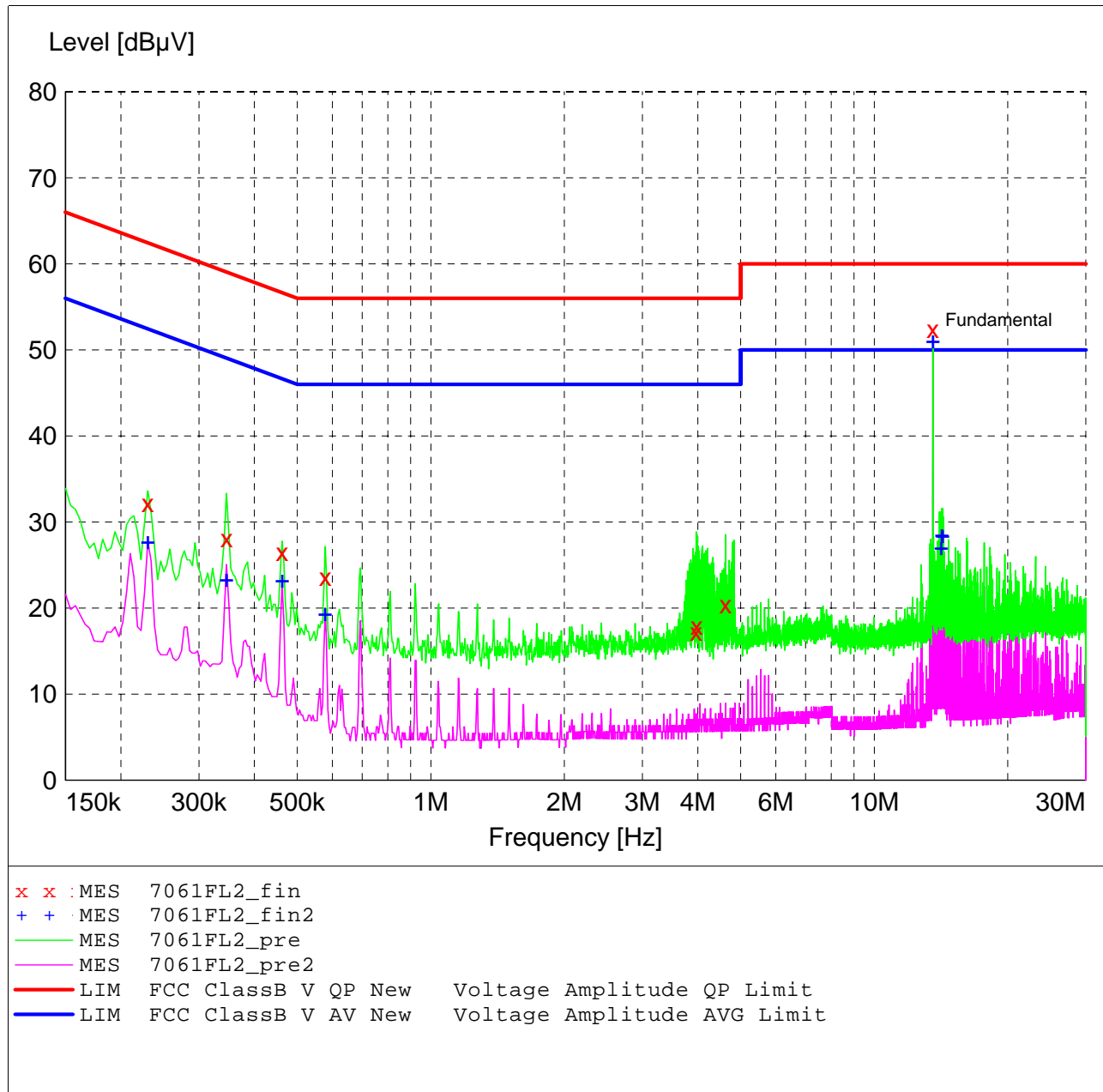
FCC Part 15 Class B

Voltage Mains Test

EUT: Model 110XiIII
 Manufacturer: Zebra
 Operating Condition: 72 deg. F, 51% R.H.
 Test Site: DLS O.F. Site 1 (Screenroom)
 Operator: Craig Brandt
 Test Specification: 120 V 60 Hz Line 2
 Comment: Continuous Transmit and Printing
 Date: 07-06-2006

SCAN TABLE: "Line Cond Scrn RmFin"

Short Description:		Line Conducted Emissions				Transducer
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	
150.0 kHz	30.0 MHz	4.0 kHz	QuasiPeak	10.0 s	9 kHz	LISN DLS#128
CISPR AV						



MEASUREMENT RESULT: "7061FL2_fin"

7/6/2006 8:55AM

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Note
0.230000	32.20	10.7	62	30.2	QP	---
0.346000	28.10	10.4	59	31.0	QP	---
0.462000	26.50	10.2	57	30.2	QP	---
0.578000	23.60	10.2	56	32.4	QP	---
3.966000	17.20	10.3	56	38.8	QP	---
3.978000	17.90	10.4	56	38.1	QP	---
4.622000	20.40	10.4	56	35.6	QP	---
13.562000	52.40	10.9	60	7.6	QP	Fundamental

MEASUREMENT RESULT: "7061FL2_fin2"

7/6/2006 8:55AM

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Note
0.230000	27.80	10.7	52	24.6	CAV	---
0.346000	23.40	10.4	49	25.7	CAV	---
0.462000	23.30	10.2	47	23.4	CAV	---
0.578000	19.40	10.2	46	26.6	CAV	---
13.562000	51.10	10.9	50	-1.1	CAV	Fundamental
14.154000	27.10	11.0	50	22.9	CAV	---
14.214000	28.60	11.0	50	21.4	CAV	---
14.274000	28.50	11.0	50	21.5	CAV	---



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APPENDIX A

2.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS (SECTION 15.225a & b)

The radiated measurements made at D.L.S. Electronic Systems, Inc., for the Zebra M2, Model Number: M2, are shown in tabulated and graph form. Preliminary radiation measurements were performed at a 3 meter test distance with the limits adjusted linearly when required. The frequency range from 9 kHz to over 960 MHz, depending upon the fundamental frequency as stated in Part 15.33a, was automatically scanned and plotted at various angles.

Measurements for the Zebra M2 were made up to 1000 MHz, in accordance with Section 15.33a for Intentional Radiators with a fundamental frequency of 13.56 MHz. For intentional radiators, the frequency range to be investigated is determined by the lowest radio frequency generated by the device without going below 9 kHz, up to at least the tenth harmonic of the highest fundamental frequency or 1000 MHz, whichever is lower. At those frequencies where significant signals were detected, measurements were made at an open field test site, located at Genoa City, Wisconsin, FCC file number **31040/SIT**, to determine the actual radiation levels.

All signals in the frequency range of 9 kHz to 30 MHz were measured with a low frequency Loop Antenna as a pickup device. From 30 to 200 MHz, a Biconical Antenna or tuned dipoles were used and from 200 MHz to 1000 MHz, a Log Periodic or Tuned Dipoles were used. During the test the equipment was rotated and the antenna was raised and lowered from 1 meter to 4 meters to find the maximum level. In order to find maximum emissions, the cables were moved through all the positions the equipment would be expected to experience in the field. Tests were made in the vertical polarization with the Loop Antenna, rotated 360° around its vertical axis. Tests were also made in both the horizontal and vertical planes of polarization with the Biconical and Log Periodic. In each case, the table was rotated to find the maximum emissions.

When the equipment is out of limit at 3 meters, and the signals from the equipment at 30 meters cannot be recorded due to the background, a representative sample of these frequencies were re-measured at various distances such as 4, 5, 6, 8, 15 meters and the greatest distance that can be measured to demonstrate graphically that the emissions are dropping off and will be under the limit at the specified distance. All signals were then recorded. The allowed levels for Intentional Radiators in the 13.553 MHz to 13.567 MHz band shall not exceed 10,000 uV measured at 30 meters. The field strength of any emissions appearing outside of this band shall not exceed the radiated emissions limits shown in Section 15.209.



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RADIATED DATA

AND CHARTS TAKEN OF THE

FUNDAMENTAL EMISSIONS

PART 15.225

Antenna #1 / Without Cutter

FCC Part 15.225

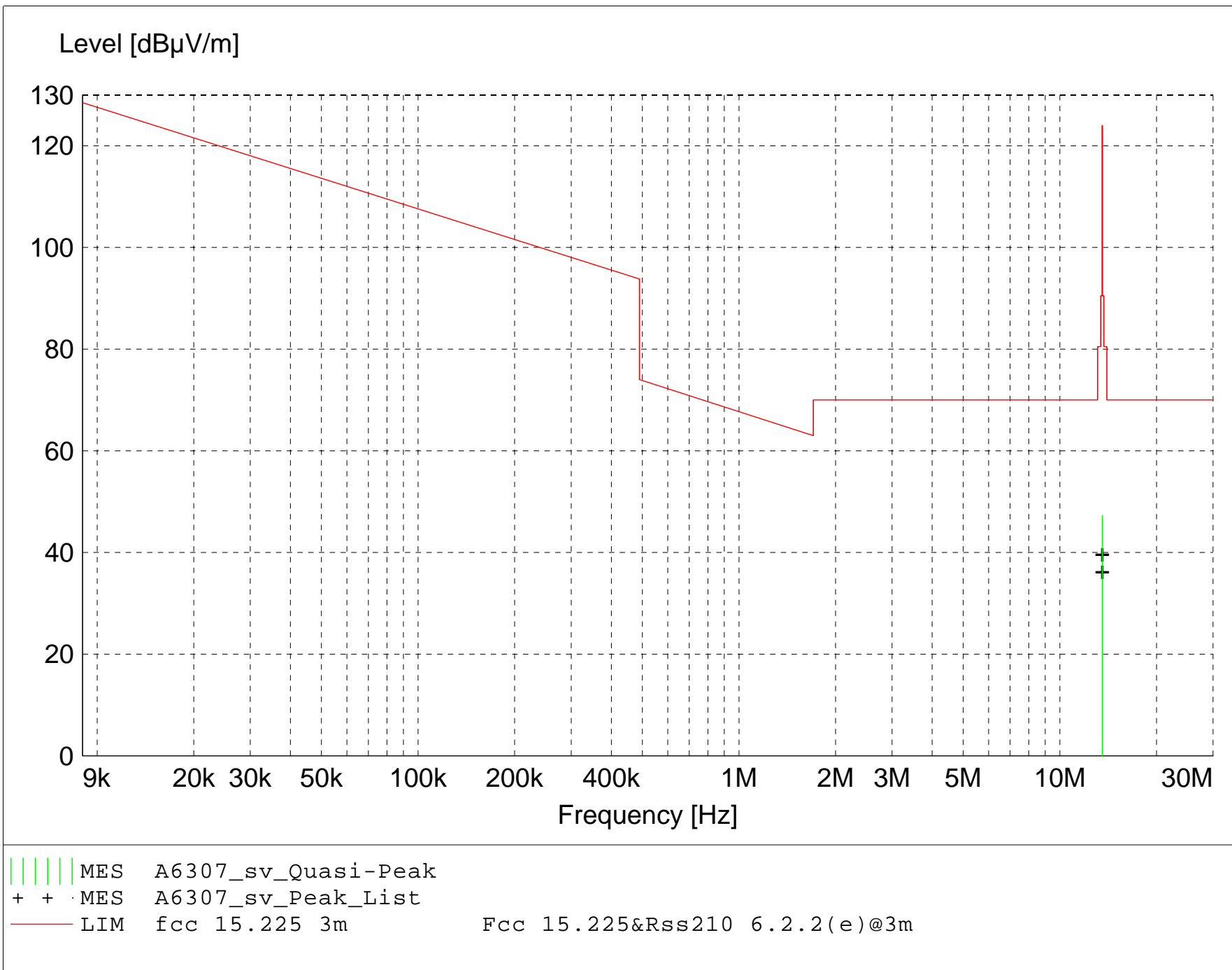
Radiated Emissions

EUT: Model 110XiIII with Antenna 1
Manufacturer: Zebra
Operating Condition: 68 degF ; 59%R.H.
Test Site: D.L.S. O.F. Site 2
Operator: Craig Brandt
Test Specification: 120 VAC; 60 Hz
Comment: Tx Freq 13.56 MHz
Date: 06/30/2006

TEXT: "Site 2 LowH 3M Act"

Short Description: Test Set-up 9kHz to 30MHz H
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/005
Antennas --- EMCO Active Loop Model: 6502 SN: 1027

TEST SET-UP: EuT Measured at 3 Meters with Loop Antenna



MEASUREMENT RESULT: "A6307_sv_Final"

6/30/2006 11:12AM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dB μ V	dB μ V/m	dB	dB μ V/m	dB μ V/m	dB	m	deg		
13.560000	36.10	10.41	0.7	47.3	124.0	76.7	1.00	180	QUASI-PEAK	Fundamental



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RADIATED DATA

AND CHARTS TAKEN OF THE

FUNDAMENTAL EMISSIONS

PART 15.225

Antenna #2 / Without Cutter

FCC Part 15.225

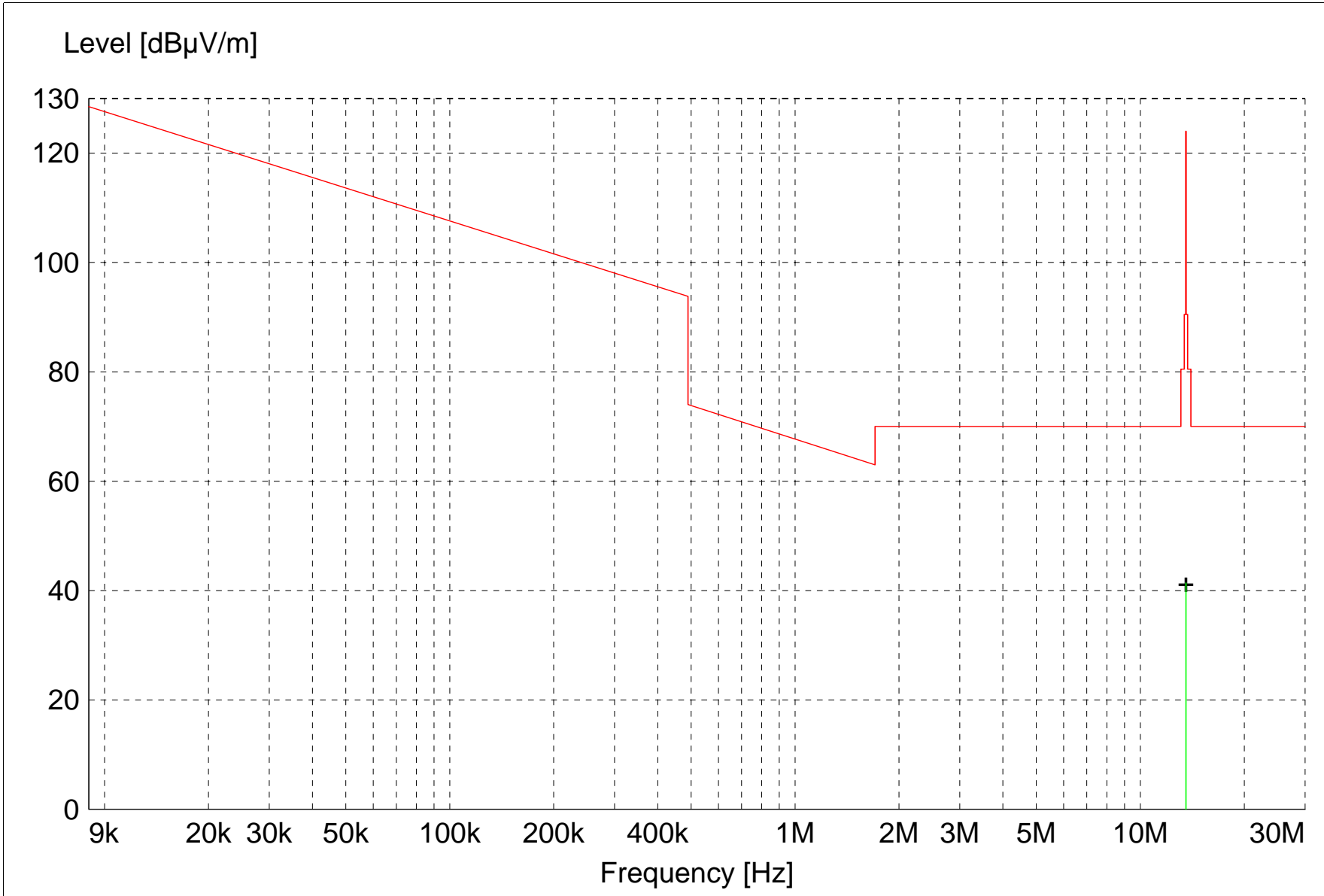
Radiated Emissions

EUT: Model 110XiIII with Antenna 2
Manufacturer: Zebra
Operating Condition: 66 degF ; 60%R.H.
Test Site: D.L.S. O.F. Site 2
Operator: Craig Brandt
Test Specification: 120 VAC; 60 Hz
Comment: Tx Freq 13.56 MHz
Date: 07/05/2006

TEXT: "Site 2 LowH 3M Act"

Short Description: Test Set-up 9kHz to 30MHz H
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/005
Antennas --- EMCO Active Loop Model: 6502 SN: 1027

TEST SET-UP: EuT Measured at 3 Meters with Loop Antenna



```

||||| MES A6308_sv_Quasi-Peak
+ + + MES A6308_sv_Peak_List
— LIM fcc 15.225 3m          Fcc 15.225&Rss210 6.2.2(e)@3m

```

MEASUREMENT RESULT: "A6308_sv_Final"

7/7/2006 1:52PM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dB μ V	Factor	Loss	Level	dB μ V/m	dB	Ant.	Angle	Detector	
		dB μ V/m	dB	dB μ V/m			m	deg		
13.560000	30.23	10.41	0.7	41.4	124.0	82.6	1.00	180	QUASI-PEAK	Fundamental



1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

RADIATED DATA

AND CHARTS TAKEN OF THE

FUNDAMENTAL EMISSIONS

PART 15.225

Antenna #1 / With Cutter

FCC Part 15.225

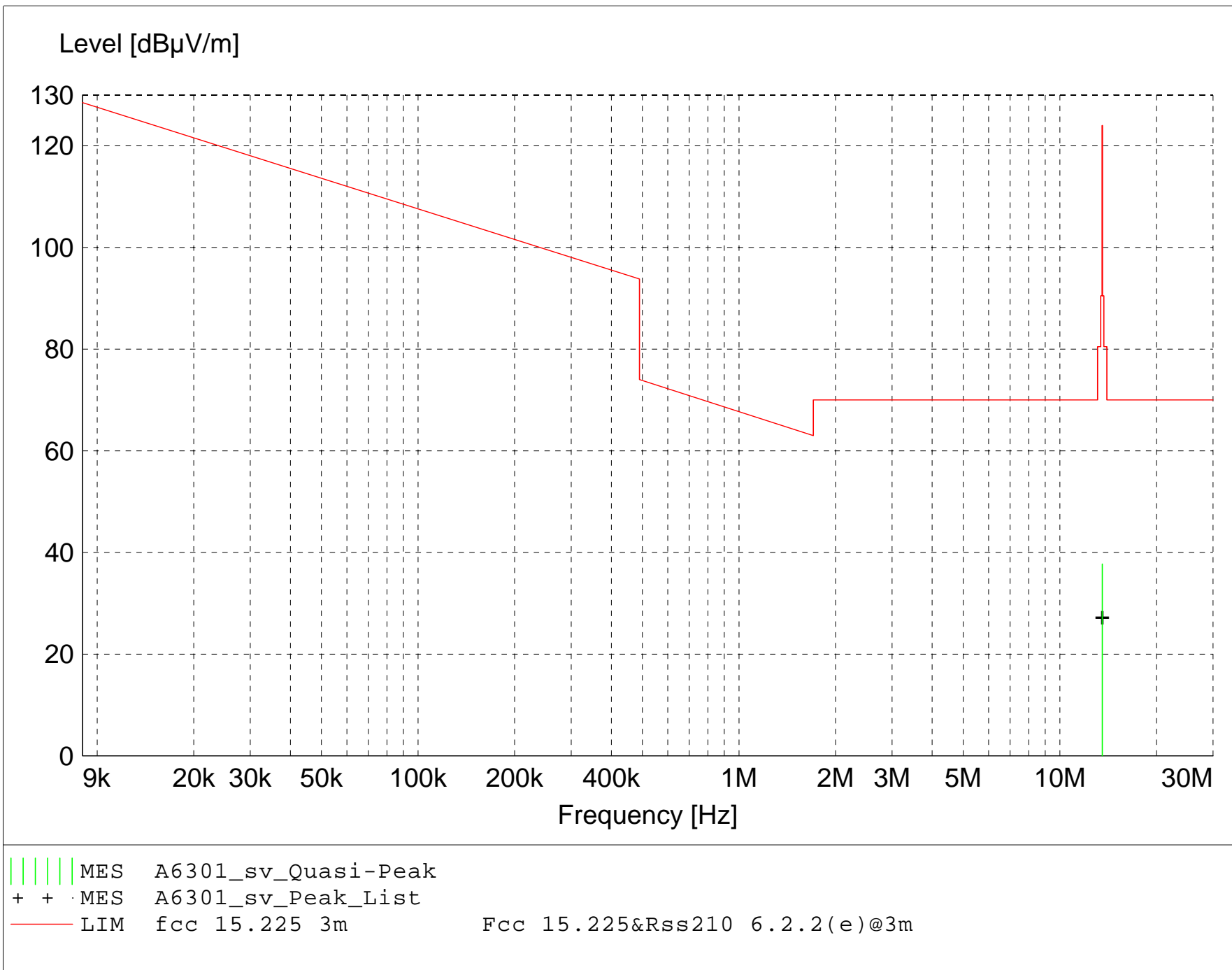
Radiated Emissions

EUT: Model 110XiIII with cutter
Manufacturer: Zebra
Operating Condition: 68 degF ; 59%R.H.
Test Site: D.L.S. O.F. Site 2
Operator: Craig Brandt
Test Specification: 120 VAC; 60 Hz
Comment: Tx Freq 13.56 MHz
Date: 06/30/2006

TEXT: "Site 2 LowH 3M Act"

Short Description: Test Set-up 9kHz to 30MHz H
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/005
Antennas --- EMCO Active Loop Model: 6502 SN: 1027

TEST SET-UP: EuT Measured at 3 Meters with Loop Antenna



MEASUREMENT RESULT: "A6301_sv_Final"

6/30/2006 9:13AM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
		Factor	Loss	Level			Ant.	Angle	Detector	
MHz	dB μ V	dB μ V/m	dB	dB μ V/m	dB μ V/m	dB	m	deg		
13.560000	26.60	10.41	0.7	37.8	124.0	86.2	1.00	150	QUASI-PEAK	Fundamental



1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

RADIATED DATA

AND CHARTS TAKEN OF THE

FUNDAMENTAL EMISSIONS

PART 15.225

Antenna #2 / With Cutter

FCC Part 15.225

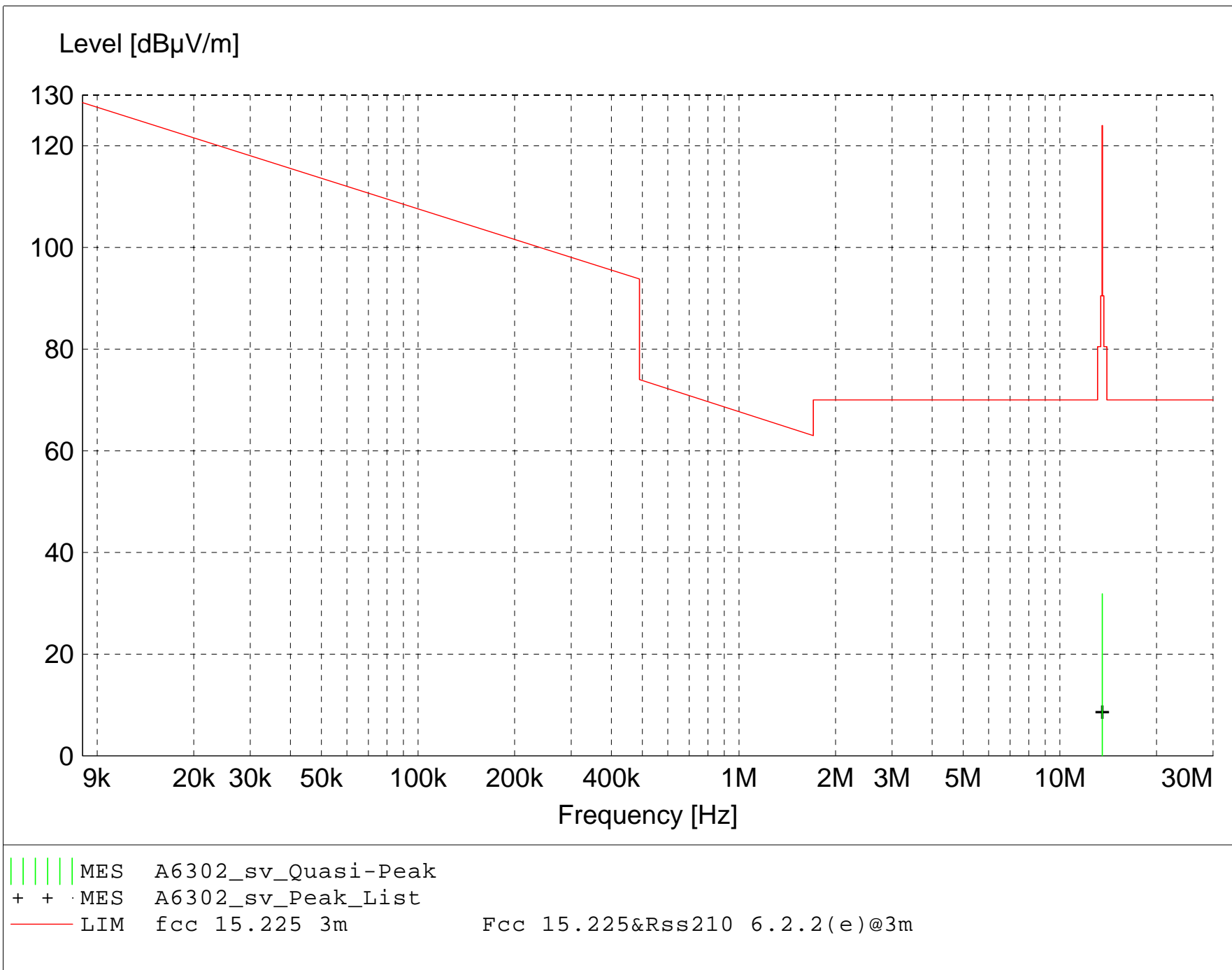
Radiated Emissions

EUT: Model 110XiIII with cutter and Antenna 2
Manufacturer: Zebra
Operating Condition: 68 degF ; 59%R.H.
Test Site: D.L.S. O.F. Site 2
Operator: Craig Brandt
Test Specification: 120 VAC; 60 Hz
Comment: Tx Freq 13.56 MHz
Date: 06/30/2006

TEXT: "Site 2 LowH 3M Act"

Short Description: Test Set-up 9kHz to 30MHz H
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/005
Antennas --- EMCO Active Loop Model: 6502 SN: 1027

TEST SET-UP: EuT Measured at 3 Meters with Loop Antenna



MEASUREMENT RESULT: "A6302_sv_Final"

6/30/2006 9:23AM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dB μ V	Factor	Loss	Level	dB μ V/m	dB	Ant.	Angle	Detector	
		dB μ V/m	dB	dB μ V/m			m	deg		
13.560000	20.74	10.41	0.7	31.9	124.0	92.1	1.00	150	QUASI-PEAK	Fundamental



1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

RADIATED DATA AND CHARTS TAKEN
DURING TESTING FOR FIELD STRENGTH
SPURIOUS EMISSION MEASUREMENTS

PART 15.209

Antenna #1 / Without Cutter

FCC Part 15.225

Radiated Emissions

EUT: Model 110XiIII with Antenna 1
Manufacturer: Zebra
Operating Condition: 68 degF ; 59%R.H.
Test Site: D.L.S. O.F. Site 2
Operator: Craig Brandt
Test Specification: 120 VAC; 60 Hz
Comment: Continuous Transmit, Continuous Receive, Freq 13.56 MHz
Date: 06/30/2006

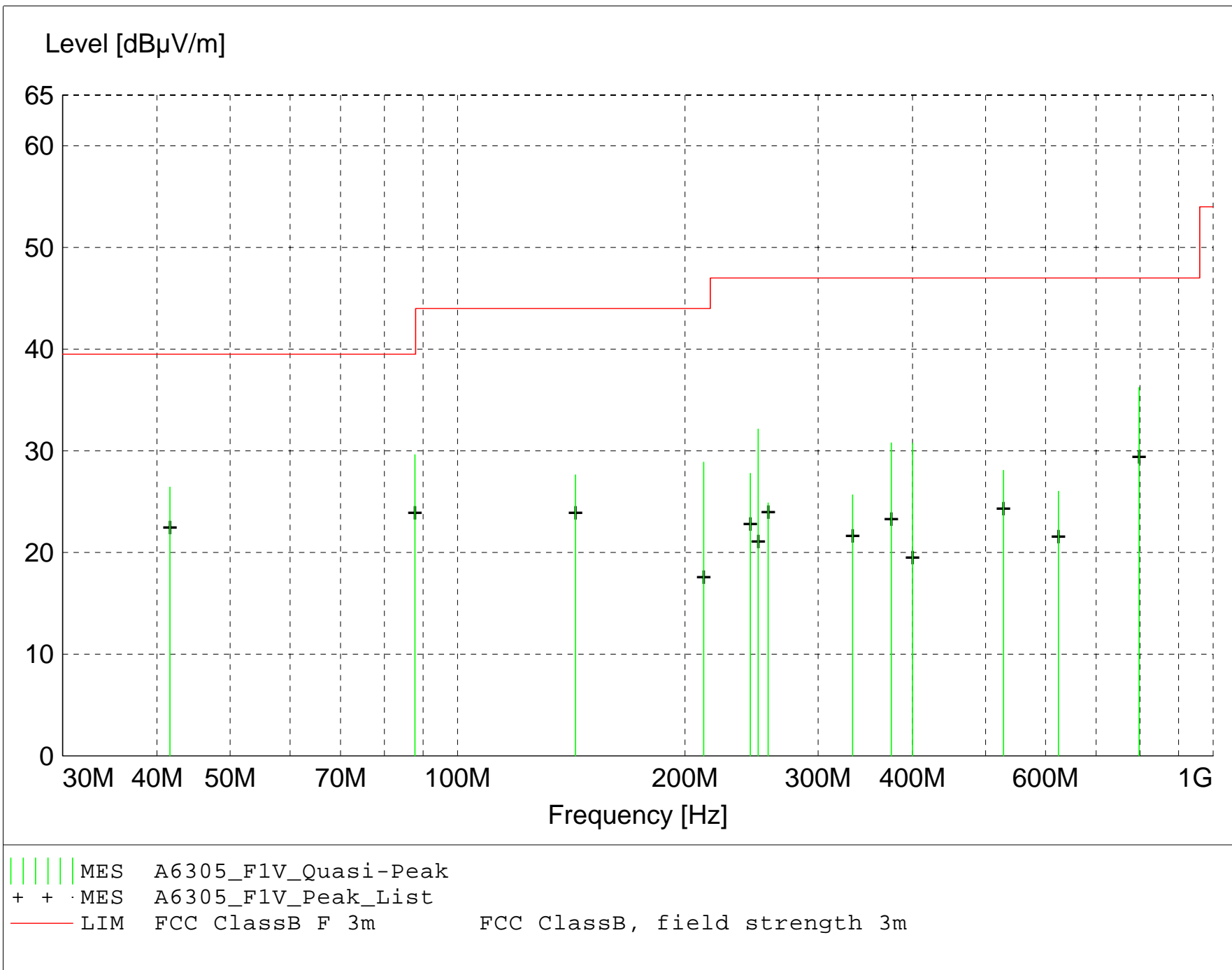
TEXT: "Site 2 MidV 3M"

Short Description: Test Set-up Vert30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 26 SN: 837460/002

Antennas ---
Biconical -- EMCO 3104C SN: 0005-4892
Log Periodic -- Electro Metrics LPA-25 SN: 1205

Pre-Amp --- Rohde&Schwarz TS-PR10 SN: 032001/004

TEST SET-UP: EUT Measured at 3 Meters with VERTICAL Antenna Polarization



MEASUREMENT RESULT: "A6305_F1V_Final"

6/30/2006 1:28PM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level	dBμV/m	dB	Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m			m	deg		
87.805000	45.11	7.87	-23.4	29.6	39.5	9.9	1.00	300	QUASI-PEAK	Broadband
798.010000	33.22	21.04	-18.0	36.2	47.0	10.8	1.00	270	QUASI-PEAK	None
41.610000	39.15	11.42	-24.1	26.4	39.5	13.1	1.00	45	QUASI-PEAK	Broadband
249.990000	42.49	11.59	-21.9	32.1	47.0	14.9	1.00	225	QUASI-PEAK	None
211.670000	40.08	11.16	-22.4	28.9	44.0	15.1	1.00	225	QUASI-PEAK	Broadband
374.980000	37.48	14.59	-21.3	30.8	47.0	16.2	1.00	180	QUASI-PEAK	None
399.980000	36.40	15.50	-21.1	30.8	47.0	16.2	1.00	225	QUASI-PEAK	None
143.215000	38.59	11.92	-22.9	27.6	44.0	16.4	1.00	45	QUASI-PEAK	Broadband
528.000000	30.82	17.59	-20.3	28.1	47.0	18.9	1.00	270	QUASI-PEAK	None
244.050000	38.30	11.45	-22.0	27.8	47.0	19.2	1.00	45	QUASI-PEAK	18th harm.
623.980000	26.50	19.22	-19.7	26.0	47.0	21.0	1.00	135	QUASI-PEAK	46th harm.
333.310000	33.62	13.82	-21.8	25.7	47.0	21.3	1.40	225	QUASI-PEAK	None
257.640000	34.79	12.03	-21.9	24.9	47.0	22.1	1.00	45	QUASI-PEAK	19th harm.

FCC Part 15.225

Radiated Emissions

EUT: Model 110XiIII with Antenna 1
Manufacturer: Zebra
Operating Condition: 68 degF ; 59%R.H.
Test Site: D.L.S. O.F. Site 2
Operator: Craig Brandt
Test Specification: 120 VAC; 60 Hz
Comment: Continuous Transmit, Continuous Receive, Freq 13.56 MHz
Date: 06/30/2006

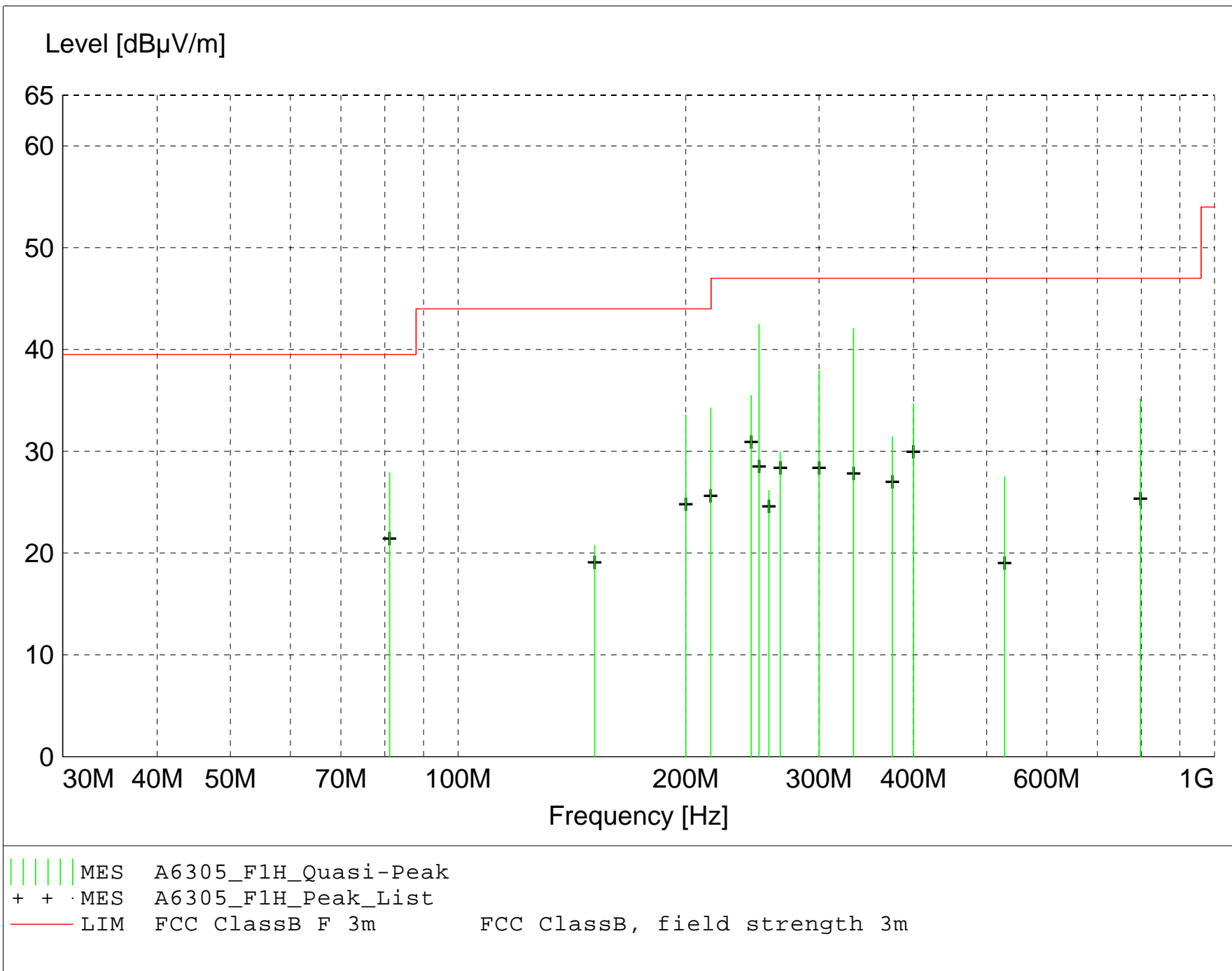
TEXT: "Site 2 MidH 3M"

Short Description: Test Set-up Horz30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 26 SN: 837460/002

Antennas ---
Biconical -- EMCO 3104C SN: 0005-4892
Log Periodic -- Electro Metrics LPA-25 SN: 1205

Pre-Amp --- Rohde&Schwarz TS-PR10 SN: 032001/004

TEST SET-UP: EUT Measured at 3 Meters with HORIZONTAL Antenna Polarization



MEASUREMENT RESULT: "A6305_F1H_Final"

6/30/2006 1:17PM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level	dBμV/m	dB	Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m			m	deg		
249.970000	52.82	11.59	-21.9	42.5	47.0	4.5	1.50	225	QUASI-PEAK	None
333.310000	50.01	13.82	-21.8	42.1	47.0	4.9	1.00	180	QUASI-PEAK	None
299.980000	45.46	14.23	-21.8	37.9	47.0	9.1	1.00	180	QUASI-PEAK	None
215.750000	45.56	11.04	-22.4	34.2	44.0	9.8	1.00	225	QUASI-PEAK	Broadband
199.985000	40.01	15.75	-22.2	33.6	44.0	10.4	1.40	270	QUASI-PEAK	None
244.050000	45.99	11.45	-22.0	35.5	47.0	11.5	1.20	180	QUASI-PEAK	18th harm.
81.170000	44.82	6.50	-23.4	27.9	39.5	11.6	2.20	135	QUASI-PEAK	Broadband
798.010000	32.11	21.04	-18.0	35.1	47.0	11.9	2.30	250	QUASI-PEAK	None
399.970000	40.34	15.50	-21.1	34.7	47.0	12.3	1.00	180	QUASI-PEAK	None
374.970000	38.10	14.59	-21.3	31.4	47.0	15.6	1.00	180	QUASI-PEAK	None
266.650000	39.63	12.32	-22.0	30.0	47.0	17.0	1.00	300	QUASI-PEAK	None
527.980000	30.25	17.59	-20.3	27.5	47.0	19.5	2.30	180	QUASI-PEAK	None
257.610000	36.08	12.03	-21.9	26.2	47.0	20.8	1.00	270	QUASI-PEAK	19th harm.
151.540000	31.25	12.39	-22.9	20.8	44.0	23.2	2.60	90	QUASI-PEAK	None



1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

RADIATED DATA AND CHARTS TAKEN
DURING TESTING FOR FIELD STRENGTH
SPURIOUS EMISSION MEASUREMENTS

PART 15.209

Antenna #2 / Without Cutter

FCC Part 15.225

Radiated Emissions

EUT: Model 110XiIII with Antenna 2
Manufacturer: Zebra
Operating Condition: 68 degF ; 59%R.H.
Test Site: D.L.S. O.F. Site 2
Operator: Craig Brandt
Test Specification: 120 VAC; 60 Hz
Comment: Continuous Transmit, Continuous Receive, Freq 13.56 MHz
Date: 06/30/2006

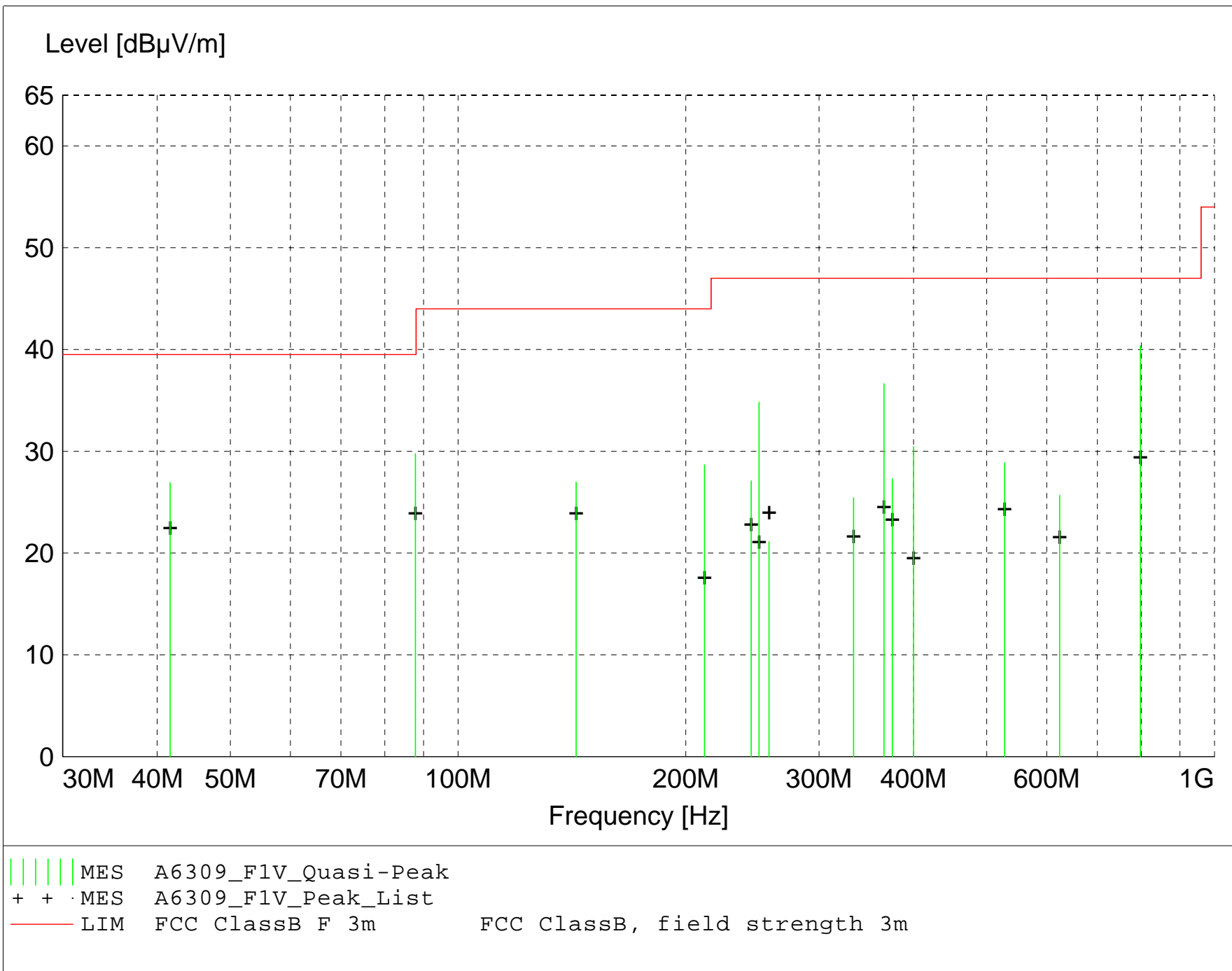
TEXT: "Site 2 MidV 3M"

Short Description: Test Set-up Vert30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 26 SN: 837460/002

Antennas ---
Biconical -- EMCO 3104C SN: 0005-4892
Log Periodic -- Electro Metrics LPA-25 SN: 1205

Pre-Amp --- Rohde&Schwarz TS-PR10 SN: 032001/004

TEST SET-UP: EUT Measured at 3 Meters with VERTICAL Antenna Polarization



MEASUREMENT RESULT: "A6309_F1V_Final"

6/30/2006 4:02PM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level	dBμV/m	dB	Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m			m	deg		
798.010000	37.34	21.04	-18.0	40.4	47.0	6.6	1.00	80	QUASI-PEAK	None
87.805000	45.26	7.87	-23.4	29.8	39.5	9.7	1.00	90	QUASI-PEAK	Broadband
365.610000	43.43	14.55	-21.3	36.6	47.0	10.4	1.60	190	QUASI-PEAK	27th harm.
249.990000	45.16	11.59	-21.9	34.8	47.0	12.2	1.00	180	QUASI-PEAK	None
41.610000	39.65	11.42	-24.1	26.9	39.5	12.6	1.00	60	QUASI-PEAK	Broadband
211.670000	39.86	11.16	-22.4	28.7	44.0	15.3	1.00	225	QUASI-PEAK	Broadband
399.980000	36.10	15.50	-21.1	30.5	47.0	16.5	1.00	225	QUASI-PEAK	None
143.215000	37.94	11.92	-22.9	27.0	44.0	17.0	1.00	45	QUASI-PEAK	Broadband
528.000000	31.60	17.59	-20.3	28.9	47.0	18.1	1.10	225	QUASI-PEAK	None
374.980000	33.99	14.59	-21.3	27.3	47.0	19.7	1.00	180	QUASI-PEAK	None
244.050000	37.60	11.45	-22.0	27.1	47.0	19.9	1.00	45	QUASI-PEAK	18th harm.
623.980000	26.15	19.22	-19.7	25.7	47.0	21.3	1.10	350	QUASI-PEAK	46th harm.
333.310000	33.37	13.82	-21.8	25.4	47.0	21.6	1.00	225	QUASI-PEAK	None
257.640000	31.03	12.03	-21.9	21.1	47.0	25.9	1.00	45	QUASI-PEAK	19th harm.

FCC Part 15.225

Radiated Emissions

EUT: Model 110XiIII with Antenna 2
Manufacturer: Zebra
Operating Condition: 68 degF ; 59%R.H.
Test Site: D.L.S. O.F. Site 2
Operator: Craig Brandt
Test Specification: 120 VAC; 60 Hz
Comment: Continuous Transmit, Continuous Receive, Freq 13.56 MHz
Date: 06/30/2006

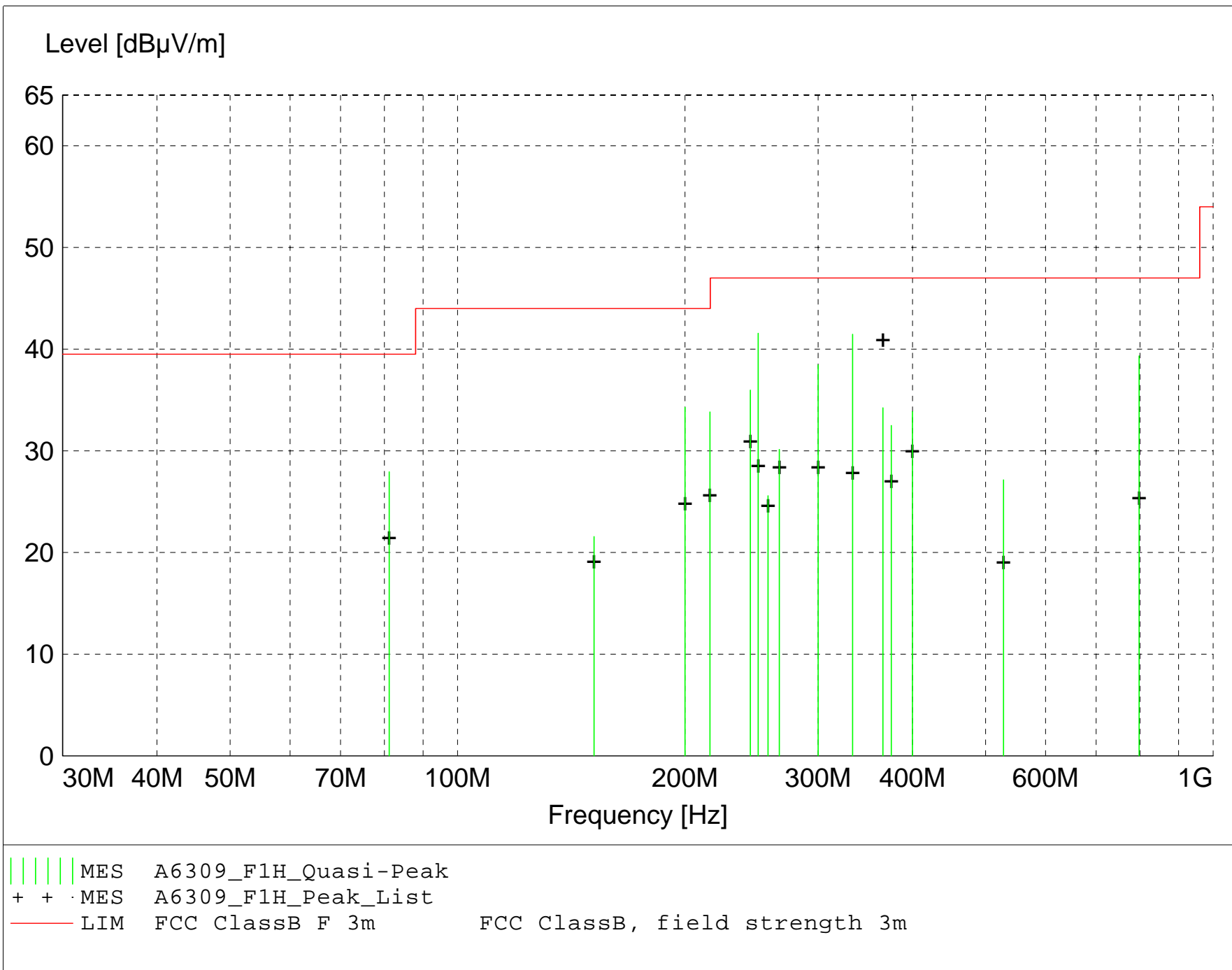
TEXT: "Site 2 MidH 3M"

Short Description: Test Set-up Horz30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 26 SN: 837460/002

Antennas ---
Biconical -- EMCO 3104C SN: 0005-4892
Log Periodic -- Electro Metrics LPA-25 SN: 1205

Pre-Amp --- Rohde&Schwarz TS-PR10 SN: 032001/004

TEST SET-UP: EUT Measured at 3 Meters with HORIZONTAL Antenna Polarization



MEASUREMENT RESULT: "A6309_F1H_Final"

6/30/2006 2:44PM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level	dBμV/m	dB	Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m			m	deg		
249.970000	51.92	11.59	-21.9	41.6	47.0	5.4	1.10	135	QUASI-PEAK	None
333.310000	49.41	13.82	-21.8	41.5	47.0	5.5	1.00	180	QUASI-PEAK	None
798.010000	36.32	21.04	-18.0	39.3	47.0	7.7	1.20	170	QUASI-PEAK	None
299.980000	45.99	14.23	-21.8	38.4	47.0	8.6	1.00	180	QUASI-PEAK	None
199.985000	40.70	15.75	-22.2	34.3	44.0	9.7	1.60	270	QUASI-PEAK	None
215.750000	45.14	11.04	-22.4	33.8	44.0	10.2	1.00	225	QUASI-PEAK	Broadband
244.050000	46.48	11.45	-22.0	36.0	47.0	11.0	1.00	180	QUASI-PEAK	18th harm.
81.170000	44.86	6.50	-23.4	27.9	39.5	11.6	3.00	160	QUASI-PEAK	Broadband
365.480000	41.02	14.55	-21.3	34.2	47.0	12.8	1.00	180	QUASI-PEAK	27th harm.
399.970000	39.51	15.50	-21.1	33.9	47.0	13.1	1.00	200	QUASI-PEAK	None
374.970000	39.18	14.59	-21.3	32.5	47.0	14.5	1.00	315	QUASI-PEAK	None
266.650000	39.81	12.32	-22.0	30.1	47.0	16.9	1.10	270	QUASI-PEAK	None
527.980000	29.89	17.59	-20.3	27.2	47.0	19.8	1.70	225	QUASI-PEAK	None
257.610000	35.50	12.03	-21.9	25.6	47.0	21.4	1.00	270	QUASI-PEAK	19th harm.
151.540000	32.06	12.39	-22.9	21.6	44.0	22.4	2.20	90	QUASI-PEAK	None



1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

RADIATED DATA AND CHARTS TAKEN
DURING TESTING FOR FIELD STRENGTH
SPURIOUS EMISSION MEASUREMENTS

PART 15.209

Antenna #1 / With Cutter

FCC Part 15.225

Radiated Emissions

EUT: Model 110XiIII with Cutter and Antenna 1
Manufacturer: Zebra
Operating Condition: 68 degF ; 59%R.H.
Test Site: D.L.S. O.F. Site 2
Operator: Craig Brandt
Test Specification: 120 VAC; 60 Hz
Comment: Continuous Transmit, Continuous Receive, Freq 13.56 MHz
Date: 06/30/2006

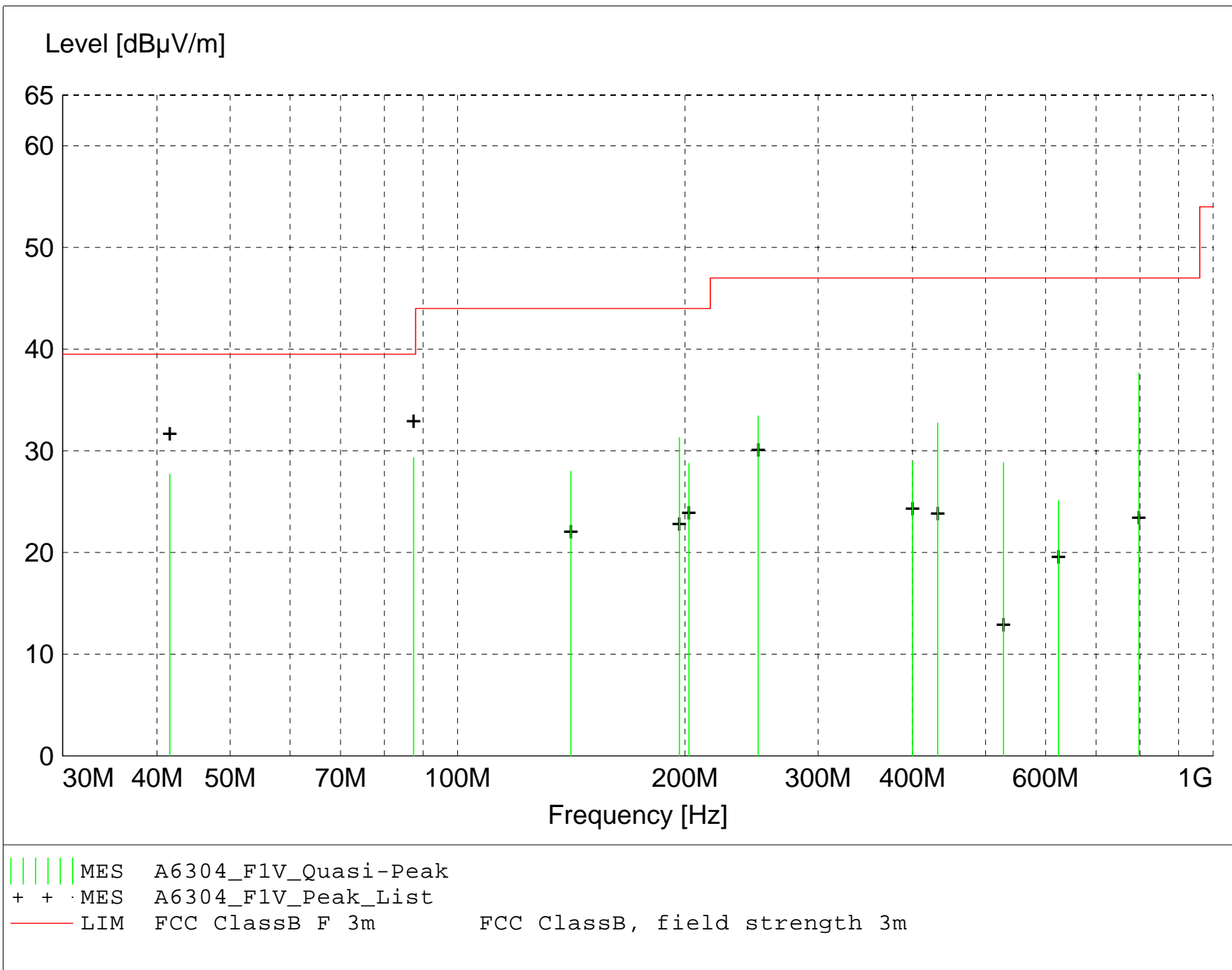
TEXT: "Site 2 MidV 3M"

Short Description: Test Set-up Vert30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 26 SN: 837460/002

Antennas ---
Biconical -- EMCO 3104C SN: 0005-4892
Log Periodic -- Electro Metrics LPA-25 SN: 1205

Pre-Amp --- Rohde&Schwarz TS-PR10 SN: 032001/004

TEST SET-UP: EUT Measured at 3 Meters with VERTICAL Antenna Polarization



MEASUREMENT RESULT: "A6304_F1V_Final"

6/30/2006 4:00PM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBμV	Factor	Loss	Level	dBμV/m	dB	Ant.	Angle	Detector	
		dBμV/m	dB	dBμV/m			m	deg		
797.780000	34.63	21.04	-18.0	37.6	47.0	9.4	1.50	0	QUASI-PEAK	None
87.465000	44.90	7.80	-23.4	29.3	39.5	10.2	1.00	270	QUASI-PEAK	Broadband
41.595000	40.43	11.42	-24.1	27.7	39.5	11.8	1.00	100	QUASI-PEAK	Broadband
196.565000	37.74	15.99	-22.4	31.3	44.0	12.7	1.00	225	QUASI-PEAK	Broadband
249.990000	43.79	11.59	-21.9	33.4	47.0	13.6	1.00	180	QUASI-PEAK	None
431.990000	37.81	15.75	-20.8	32.7	47.0	14.3	1.10	180	QUASI-PEAK	None
202.380000	39.85	11.10	-22.2	28.7	44.0	15.3	1.00	225	QUASI-PEAK	Broadband
141.230000	39.25	11.64	-22.9	28.0	44.0	16.0	1.00	135	QUASI-PEAK	Broadband
399.980000	34.57	15.50	-21.1	28.9	47.0	18.1	1.00	280	QUASI-PEAK	None
527.980000	31.57	17.59	-20.3	28.8	47.0	18.2	1.50	260	QUASI-PEAK	None
623.980000	25.58	19.22	-19.7	25.1	47.0	21.9	1.50	260	QUASI-PEAK	46th harm.

FCC Part 15.225

Radiated Emissions

EUT: Model 110XiIII with Cutter and Antenna 1
Manufacturer: Zebra
Operating Condition: 68 degF ; 59%R.H.
Test Site: D.L.S. O.F. Site 2
Operator: Craig Brandt
Test Specification: 120 VAC; 60 Hz
Comment: Continuous Transmit, Continuous Receive, Freq 13.56 MHz
Date: 06/30/2006

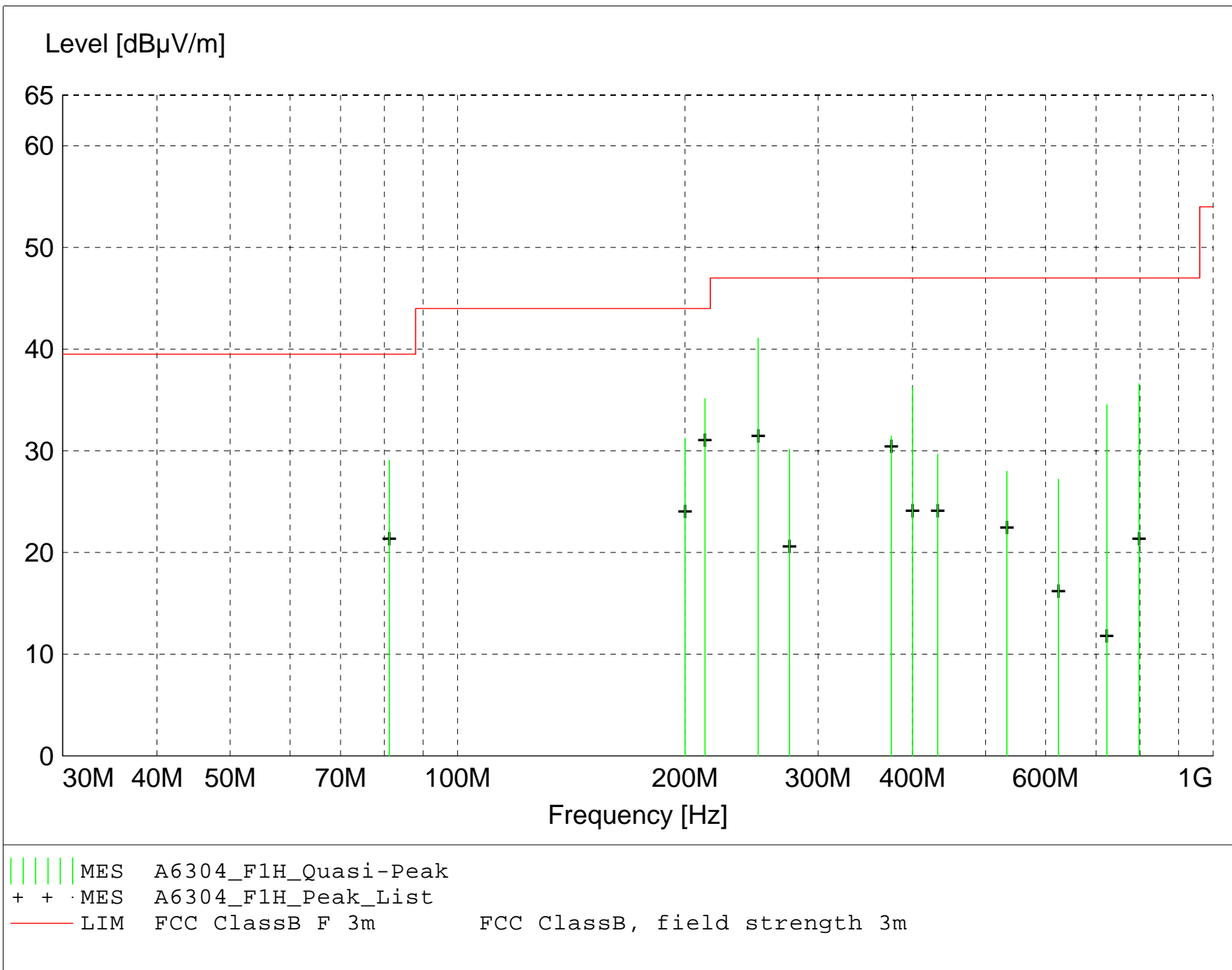
TEXT: "Site 2 MidH 3M"

Short Description: Test Set-up Horz30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 26 SN: 837460/002

Antennas ---
Biconical -- EMCO 3104C SN: 0005-4892
Log Periodic -- Electro Metrics LPA-25 SN: 1205

Pre-Amp --- Rohde&Schwarz TS-PR10 SN: 032001/004

TEST SET-UP: EUT Measured at 3 Meters with HORIZONTAL Antenna Polarization



MEASUREMENT RESULT: "A6304_F1H_Final"

6/30/2006 3:53PM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBµV	Factor	Loss	Level	dBµV/m	dB	Ant.	Angle	Detector	
		dBµV/m	dB	dBµV/m	dBµV/m		m	deg		
250.000000	51.43	11.59	-21.9	41.1	47.0	5.9	1.60	180	QUASI-PEAK	None
212.590000	46.33	11.17	-22.4	35.1	44.0	8.9	1.30	225	QUASI-PEAK	Broadband
798.110000	33.57	21.05	-18.0	36.6	47.0	10.4	1.10	170	QUASI-PEAK	None
81.200000	45.99	6.51	-23.4	29.1	39.5	10.4	2.50	135	QUASI-PEAK	Broadband
399.990000	41.87	15.50	-21.1	36.2	47.0	10.8	3.20	160	QUASI-PEAK	None
723.360000	32.63	21.10	-19.2	34.5	47.0	12.5	1.00	135	QUASI-PEAK	BB Cutter
199.980000	37.67	15.75	-22.2	31.3	44.0	12.7	2.10	135	QUASI-PEAK	None
374.990000	38.14	14.59	-21.3	31.4	47.0	15.6	1.00	315	QUASI-PEAK	None
274.990000	39.18	12.94	-22.0	30.1	47.0	16.9	2.20	135	QUASI-PEAK	None
432.000000	34.75	15.75	-20.8	29.7	47.0	17.3	1.00	0	QUASI-PEAK	None
533.370000	30.67	17.64	-20.3	28.0	47.0	19.0	1.00	170	QUASI-PEAK	None
623.980000	27.70	19.22	-19.7	27.2	47.0	19.8	1.40	200	QUASI-PEAK	46th harm.



1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

RADIATED DATA AND CHARTS TAKEN
DURING TESTING FOR FIELD STRENGTH
SPURIOUS EMISSION MEASUREMENTS

PART 15.209

Antenna #2 / With Cutter

FCC Part 15.225

Radiated Emissions

EUT: Model 110XiIII with Cutter and Antenna 2
Manufacturer: Zebra
Operating Condition: 66 degF ; 60%R.H.
Test Site: D.L.S. O.F. Site 2
Operator: Craig Brandt
Test Specification: 120 VAC; 60 Hz
Comment: Continuous Transmit, Continuous Receive, Freq 13.56 MHz
Date: 07/05/2006

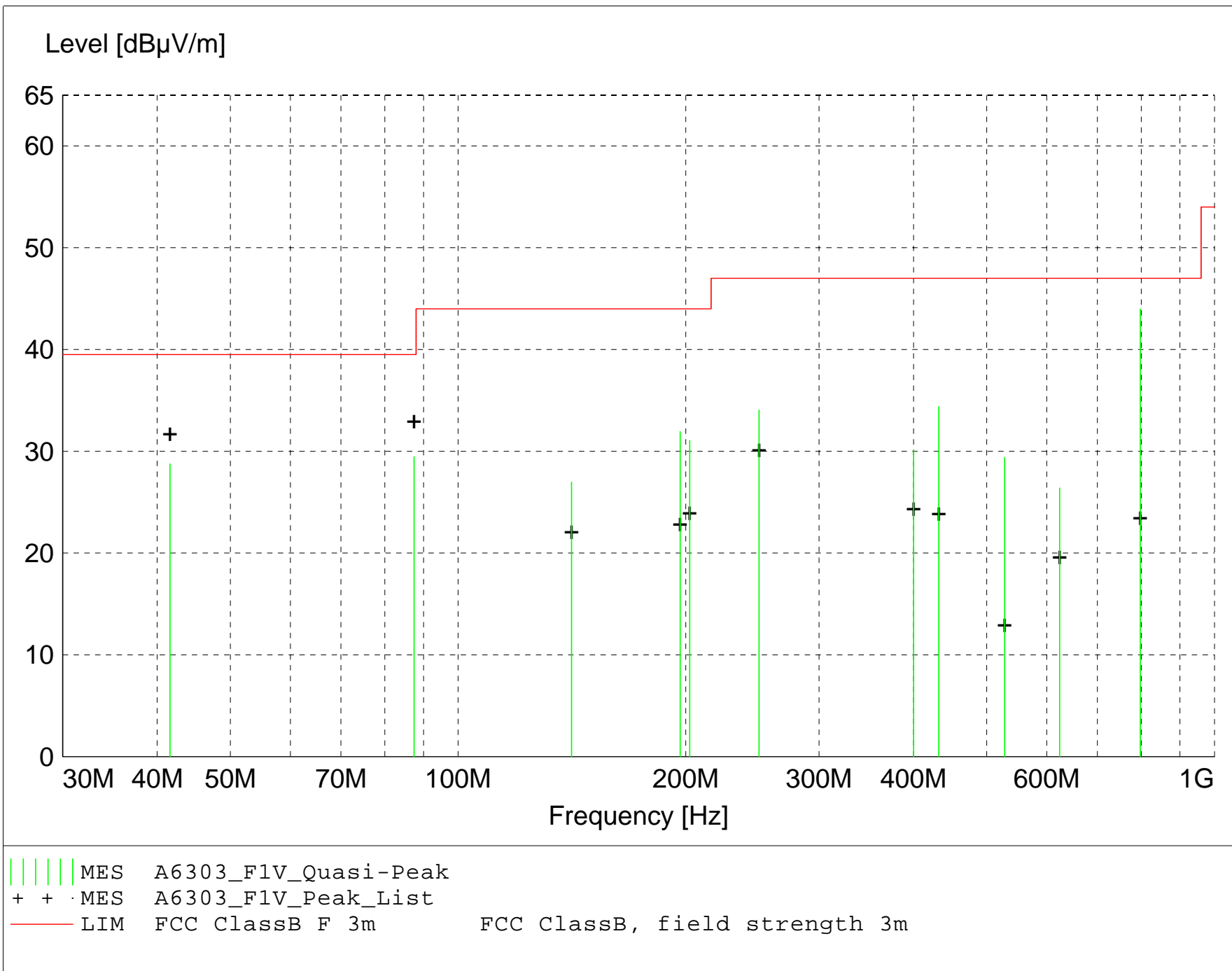
TEXT: "Site 2 MidV 3M"

Short Description: Test Set-up Vert30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 26 SN: 837460/002

Antennas ---
Biconical -- EMCO 3104C SN: 0005-4892
Log Periodic -- Electro Metrics LPA-25 SN: 1205

Pre-Amp --- Rohde&Schwarz TS-PR10 SN: 032001/004

TEST SET-UP: EUT Measured at 3 Meters with VERTICAL Antenna Polarization



MEASUREMENT RESULT: "A6303_F1V_Final"

7/5/2006 8:47AM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dB μ V	Factor	Loss	Level	dB μ V/m	dB	Ant.	Angle	Detector	
		dB μ V/m	dB	dB μ V/m			m	deg		
797.780000	40.98	21.04	-18.0	44.0	47.0	3.0	1.00	90	QUASI-PEAK	None
87.465000	45.04	7.80	-23.4	29.5	39.5	10.0	1.00	180	QUASI-PEAK	Broadband
41.595000	41.47	11.42	-24.1	28.8	39.5	10.7	1.00	90	QUASI-PEAK	Broadband
196.565000	38.39	15.99	-22.4	31.9	44.0	12.1	1.00	225	QUASI-PEAK	Broadband
431.990000	39.48	15.75	-20.8	34.4	47.0	12.6	1.50	180	QUASI-PEAK	None
202.380000	42.16	11.10	-22.2	31.1	44.0	12.9	1.00	225	QUASI-PEAK	Broadband
249.990000	44.39	11.59	-21.9	34.0	47.0	13.0	1.50	180	QUASI-PEAK	None
399.980000	35.78	15.50	-21.1	30.1	47.0	16.9	1.00	225	QUASI-PEAK	None
141.230000	38.22	11.64	-22.9	27.0	44.0	17.0	1.00	135	QUASI-PEAK	Broadband
527.980000	32.14	17.59	-20.3	29.4	47.0	17.6	1.10	270	QUASI-PEAK	None
623.980000	26.89	19.22	-19.7	26.4	47.0	20.6	1.00	225	QUASI-PEAK	46th harm.

FCC Part 15.225

Radiated Emissions

EUT: Model 110XiIII with Cutter and Antenna 2
Manufacturer: Zebra
Operating Condition: 66 degF ; 60%R.H.
Test Site: D.L.S. O.F. Site 2
Operator: Craig Brandt
Test Specification: 120 VAC; 60 Hz
Comment: Continuous Transmit, Continuous Receive, Freq 13.56 MHz
Date: 07/05/2006

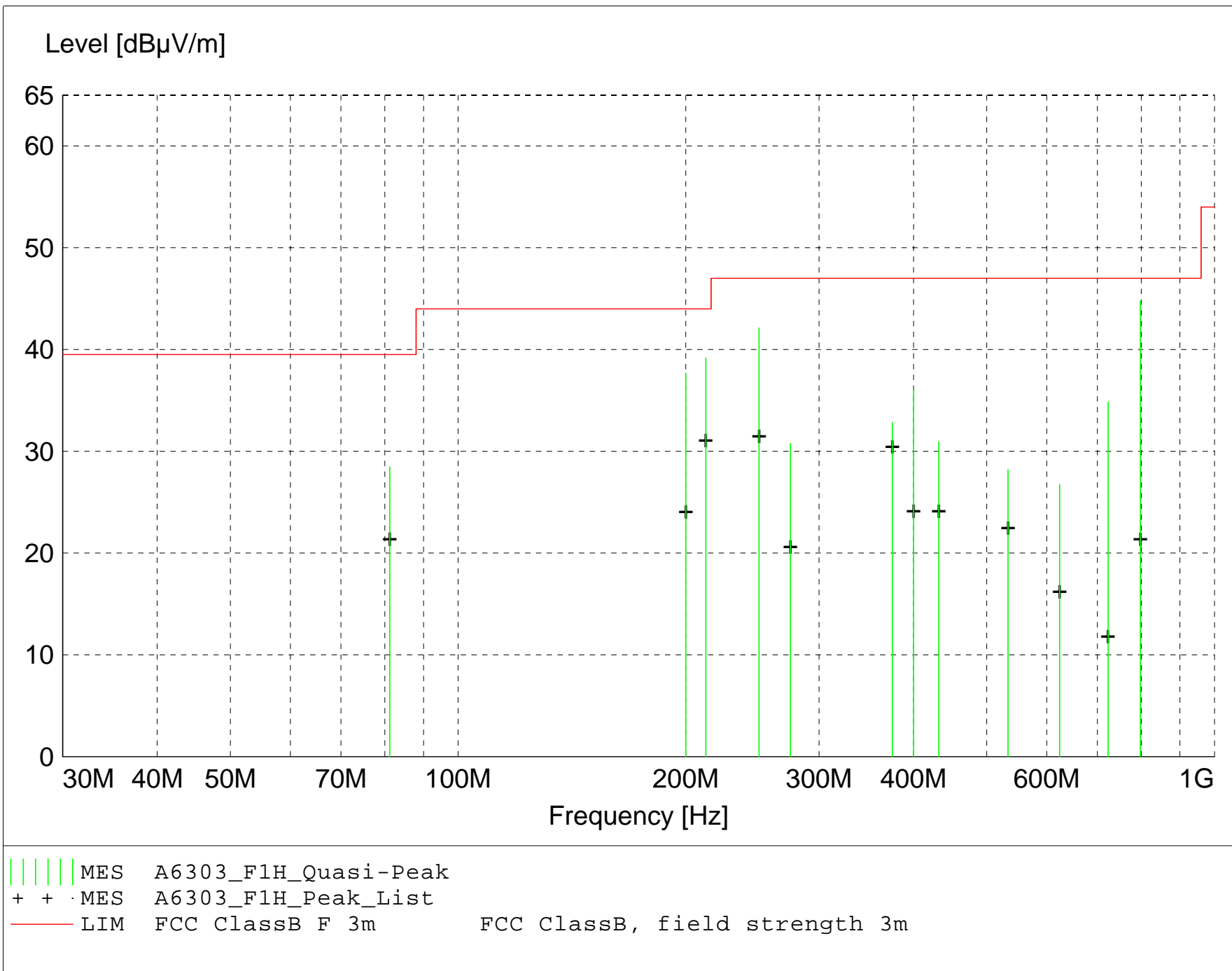
TEXT: "Site 2 MidH 3M"

Short Description: Test Set-up Horz30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 26 SN: 837460/002

Antennas ---
Biconical -- EMCO 3104C SN: 0005-4892
Log Periodic -- Electro Metrics LPA-25 SN: 1205

Pre-Amp --- Rohde&Schwarz TS-PR10 SN: 032001/004

TEST SET-UP: EUT Measured at 3 Meters with HORIZONTAL Antenna Polarization



MEASUREMENT RESULT: "A6303_F1H_Final"

7/5/2006 8:43AM

Frequency	Level	Antenna	System	Total	Limit	Margin	Height	EuT	Final	Comment
MHz	dBµV	Factor	Loss	Level	dBµV/m	dB	Ant.	Angle	Detector	
		dBµV/m	dB	dBµV/m	dBµV/m		m	deg		
798.110000	41.73	21.05	-18.0	44.8	47.0	2.2	1.30	180	QUASI-PEAK	From PC;not EUT
212.590000	50.37	11.17	-22.4	39.2	44.0	4.8	1.50	250	QUASI-PEAK	Broadband
250.000000	52.46	11.59	-21.9	42.1	47.0	4.9	1.50	135	QUASI-PEAK	None
199.980000	44.09	15.75	-22.2	37.7	44.0	6.3	1.60	270	QUASI-PEAK	None
399.990000	41.62	15.50	-21.1	36.0	47.0	11.0	2.80	170	QUASI-PEAK	None
81.200000	45.40	6.51	-23.4	28.5	39.5	11.0	2.80	125	QUASI-PEAK	Broadband
723.360000	32.94	21.10	-19.2	34.9	47.0	12.1	1.00	135	QUASI-PEAK	BB cutter
374.990000	39.52	14.59	-21.3	32.8	47.0	14.2	1.00	180	QUASI-PEAK	None
432.000000	36.02	15.75	-20.8	30.9	47.0	16.1	1.00	135	QUASI-PEAK	None
274.990000	39.82	12.94	-22.0	30.8	47.0	16.2	1.60	135	QUASI-PEAK	None
533.370000	30.86	17.64	-20.3	28.2	47.0	18.8	1.30	180	QUASI-PEAK	None
623.980000	27.22	19.22	-19.7	26.7	47.0	20.3	1.70	225	QUASI-PEAK	46th harm.



Company: Zebra Technologies Corporation
 Model Tested: M2
 Report Number: 12352

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

3.0 FREQUENCY STABILITY (Temperature) - (PART 2.1055a)

The frequency stability was measured from -20° to +50° centigrade at intervals of 10° centigrade throughout the range. Prior to each frequency measurement, the equipment was left alone for a sufficient period of time (approximately 30 minutes or more) to allow the components of the Zebra M2 oscillator circuitry to stabilize. The following information was taken:

ISO15693 EMISSION MASK

FREQUENCY STABILITY FOR TEMPERATURE VARIATION IN MHz (Section 4.5):

-20°	13.5609018
-10°	13.5609018
0°	13.5609018
+10°	13.5609018
+20°	13.5609018
+30°	13.56078557
+40°	13.56078557
+50°	13.56078557

Worst Case Variance: = 116.23 Hz

As stated in RSS-GEN, Issue 1, Section 4.5, the Frequency Tolerance for this frequency range are as follows:

Frequency Tolerance:	=	<u>.01%</u>
Ambient Frequency:	=	13.5609018 MHz
Limit = 13560901.8 * .01%	=	<u>1356.1 Hz</u>

This is well within the specified limits.

NOTE:

See the following page(s) for the graph(s) of the actual measurement made:



1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

GRAPHS TAKEN FOR FREQUENCY

STABILITY WHEN VARYING THE

TEMPERATURE

PART 2.1055a

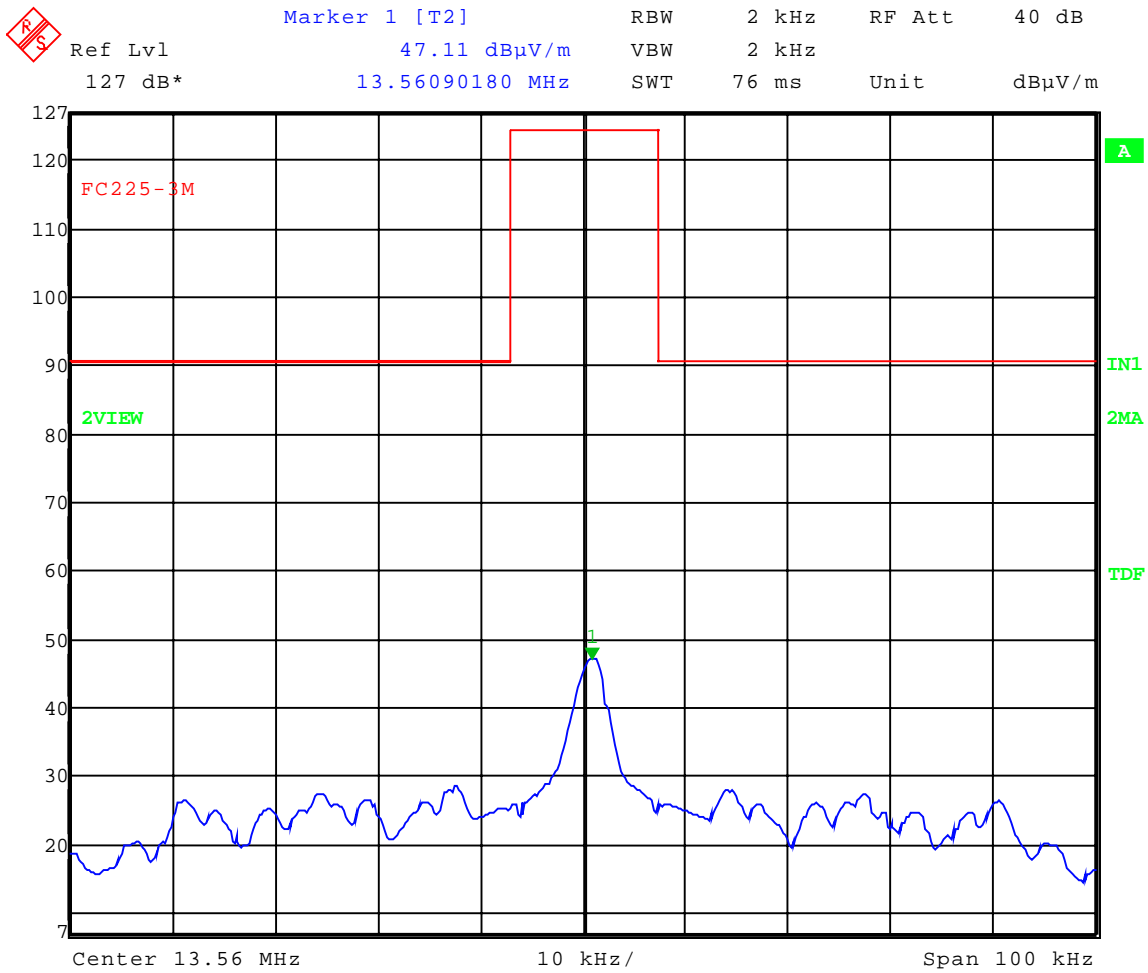
ISO15693 EMISSION MASK



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: ISO 15693
Comment: -20 deg. C
Comment: 120 V



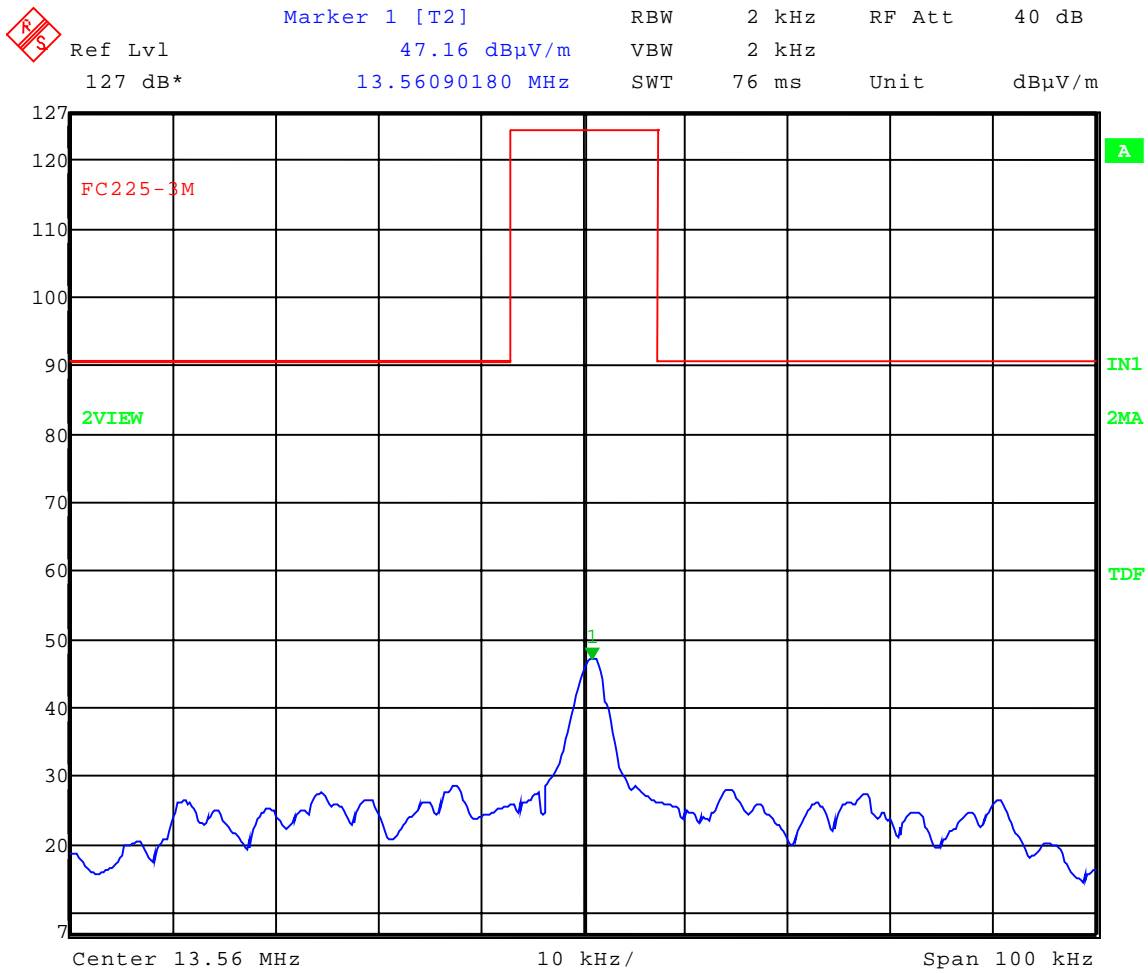
Date: 7.JUL.2006 14:51:36



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: ISO 15693
Comment: -10 deg. C
Comment: 120 V



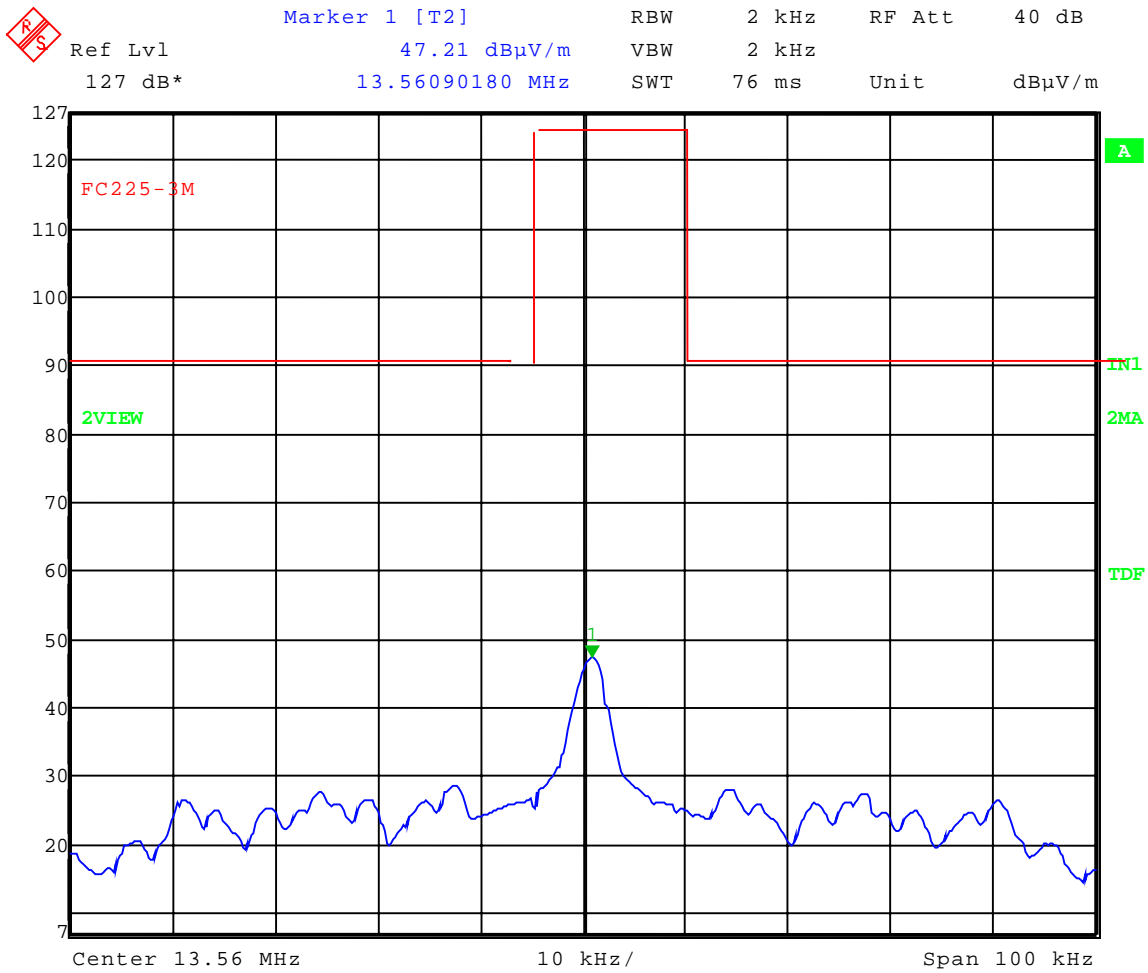
Date: 7.JUL.2006 14:20:36



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: ISO 15693
Comment: 0 deg. C
Comment: 120 V



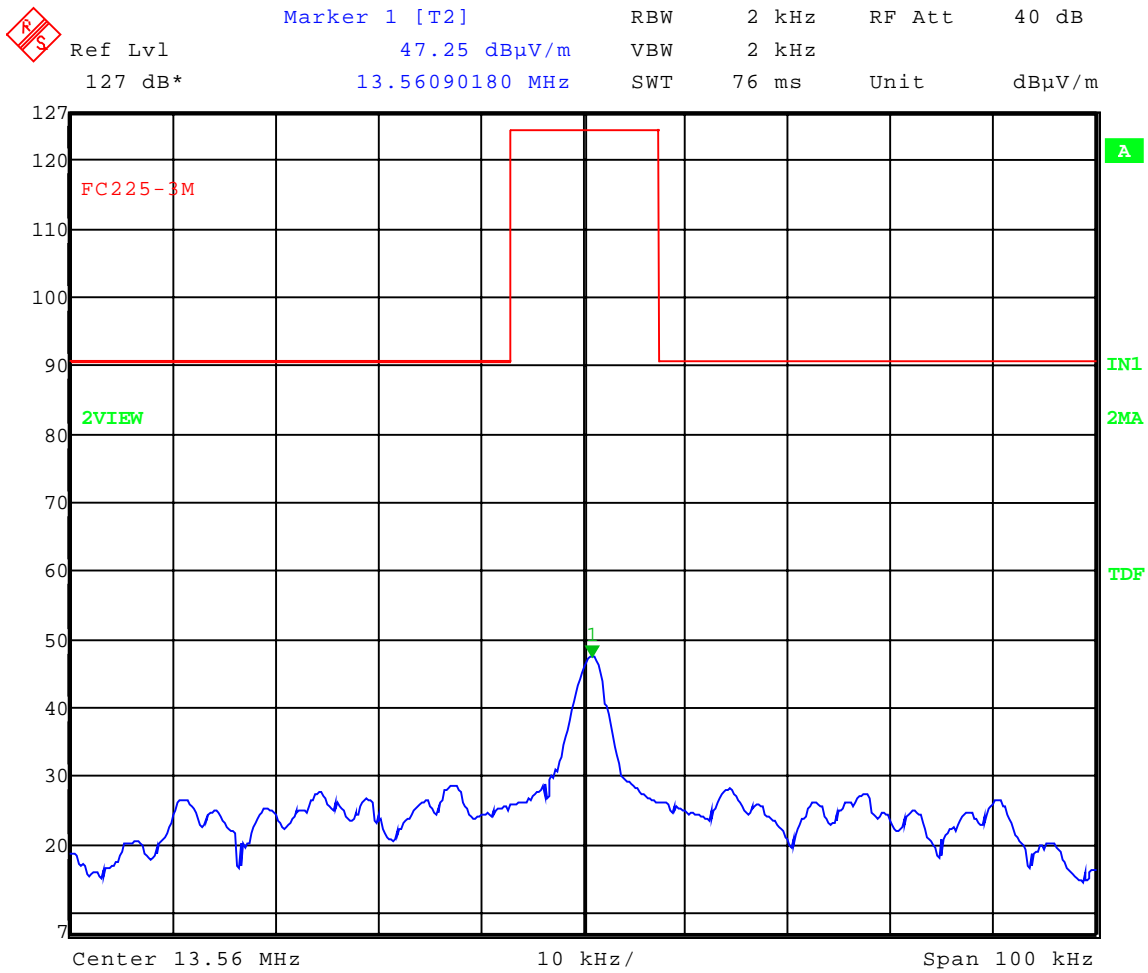
Date: 7.JUL.2006 13:48:24



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: ISO 15693
Comment: +10 deg. C
Comment: 120 V



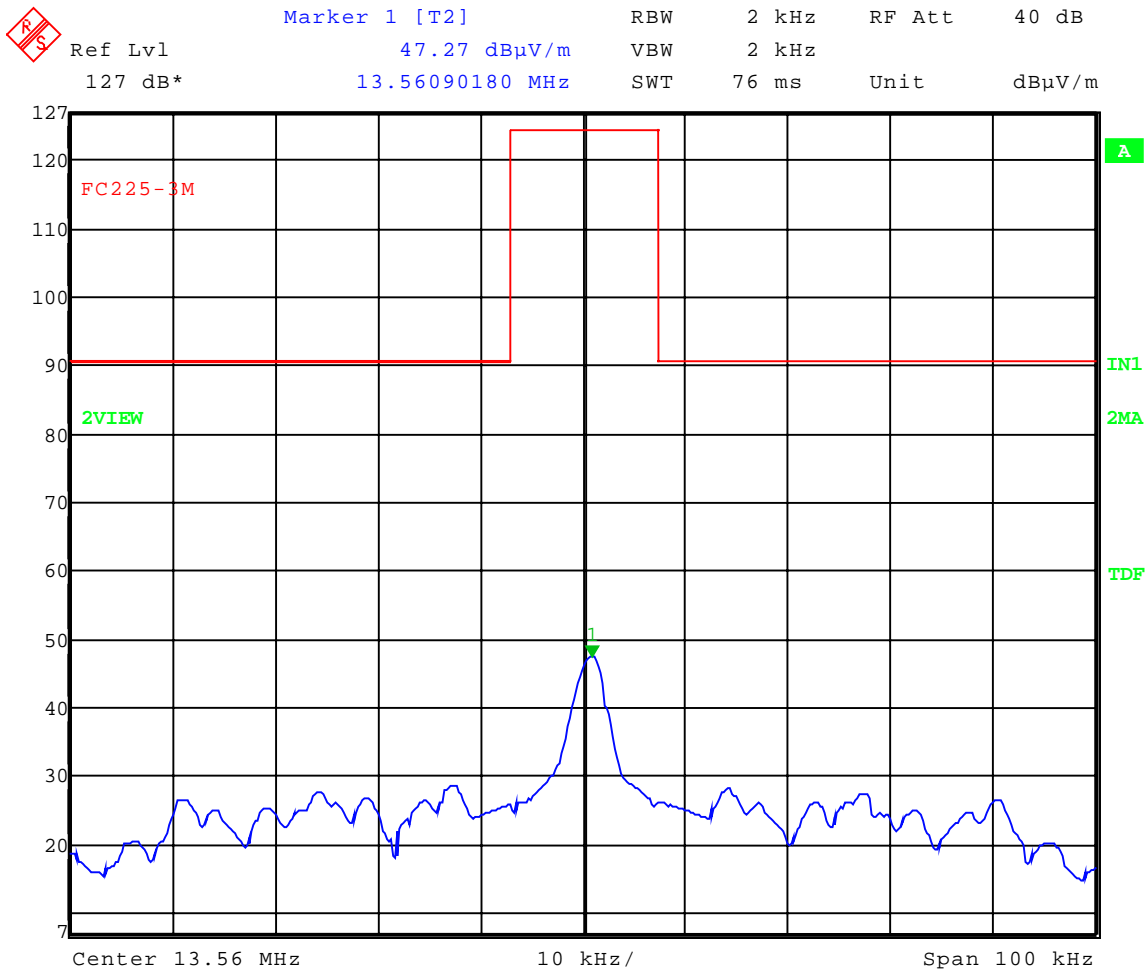
Date: 7.JUL.2006 13:16:44



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: ISO 15693
Comment: +20 deg. C
Comment: 120 V



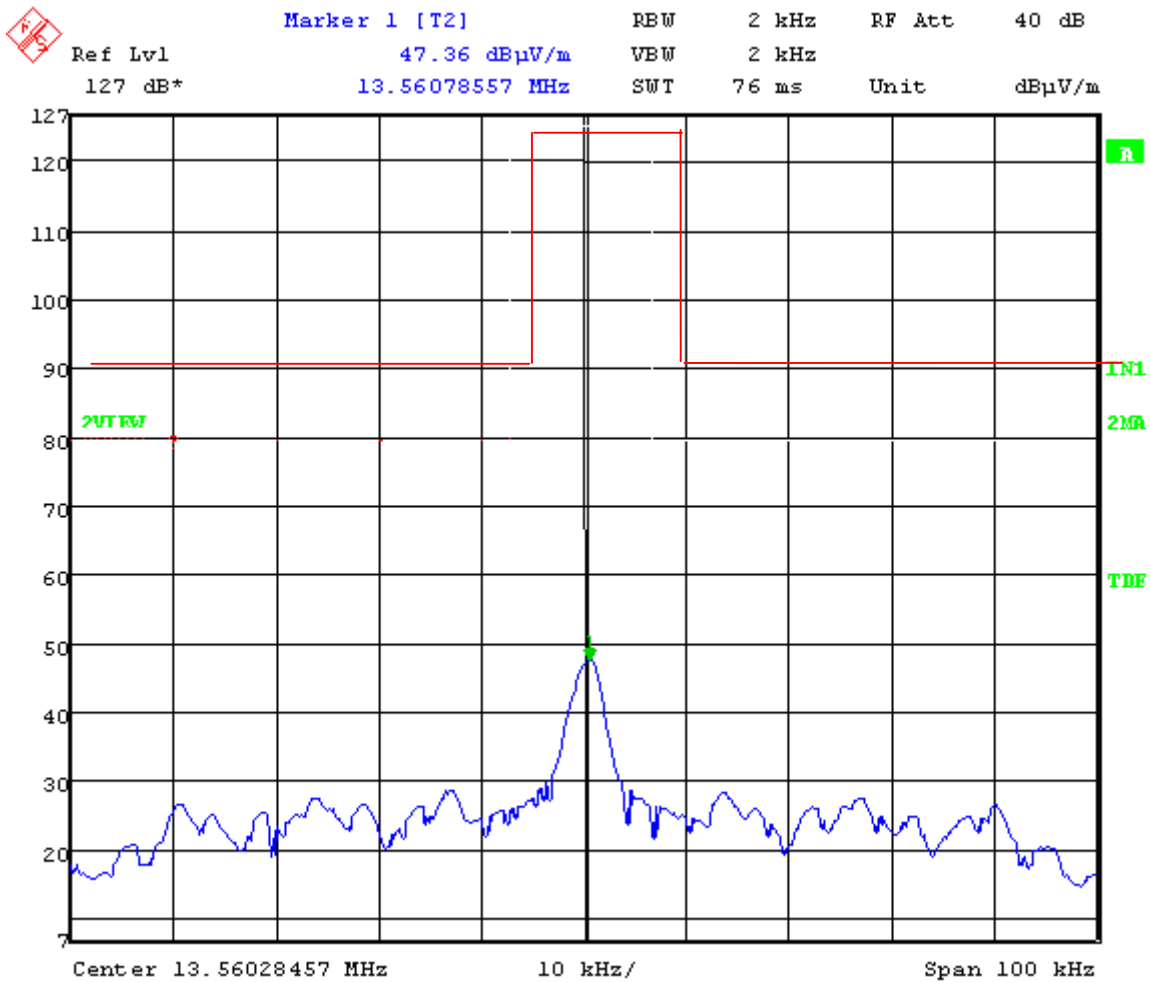
Date: 7.JUL.2006 12:40:52



Company: Zebra Technologies Corporation
 Model Tested: M2
 Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
 Company: Zebra
 EUT: 110XiIII
 Test: Bandwidth / Band Edges
 Operator: Craig Brandt
 Comment: Modulation: ISO 15693
 Comment: +30 deg. C
 Comment: 120 V



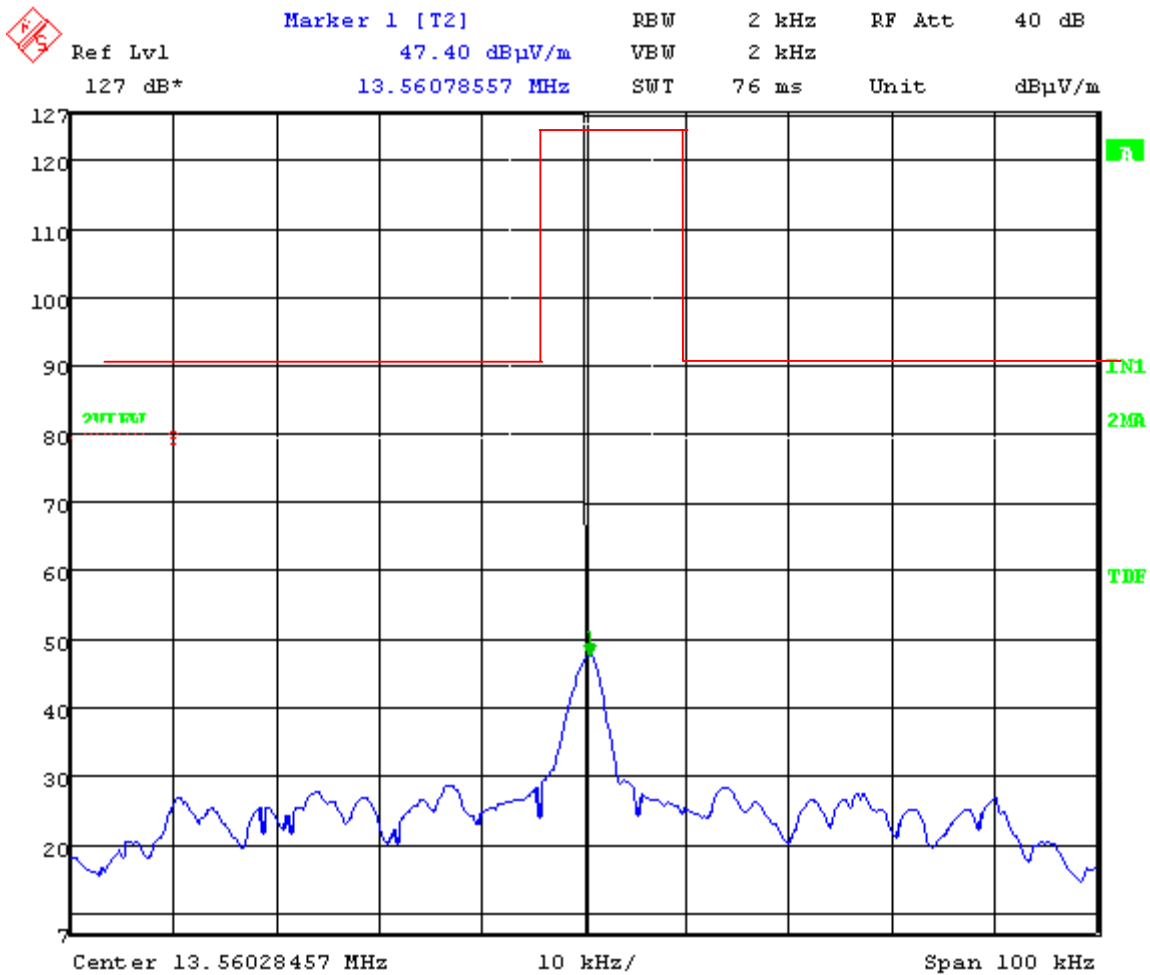
Date: 7.JUL.2006 10:35:58



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: ISO 15693
Comment: +40 deg. C
Comment: 120 V



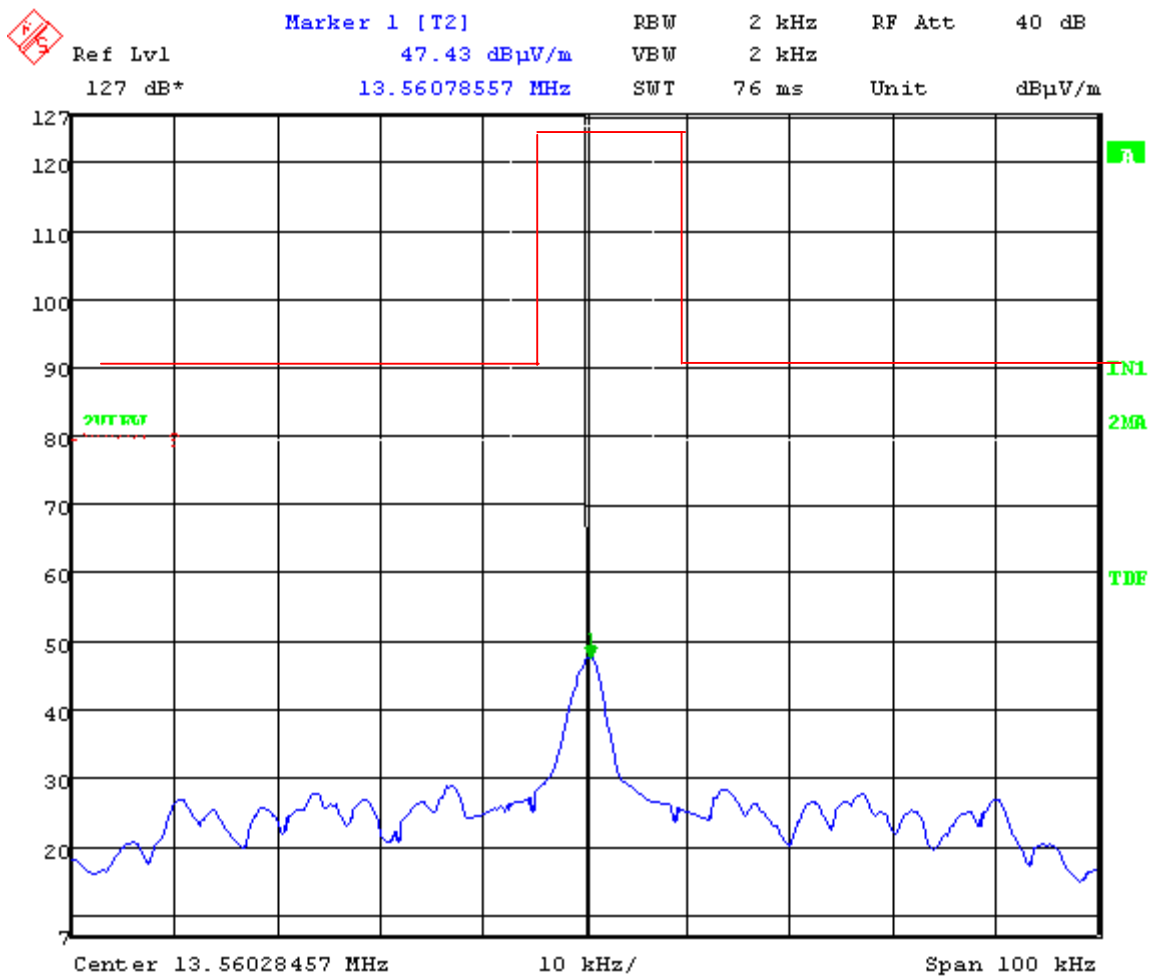
Date: 7 JUL 2006 11:22:05



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: ISO 15693
Comment: +50 deg. C
Comment: 120 V



Date: 7 JUL 2006 11:54:35



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

8.0 FREQUENCY STABILITY (Voltage Variation) – (PART 2.1055d)

The frequency stability was measured at +20° centigrade by varying the primary supply voltage from 85% to 115% of nominal value for all equipment other than hand carried battery equipment.

ISO15693 EMISSION MASK

FREQUENCY STABILITY FOR VOLTAGE VARIATION (Section 4.5):

85% 13.5609018
100%
115% 13.5609018

This is well within the specified limits.

FREQUENCY STABILITY FOR HAND HELD DEVICES:

For handheld battery operated equipment (cannot be plugged into the power mains), the frequency stability tests were made using a new battery, eliminating the need to vary the power supply by $\pm 15\%$.

Fresh Battery verses Battery end point:

Frequency #1 NA
Frequency #2 NA
Frequency #3 NA

NOTE:

This test as not performed.



1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

GRAPH(S) TAKEN FOR FREQUENCY

STABILITY WHEN VARYING THE

PRIMARY SUPPLY VOLTAGE

(PART 2.1055d)

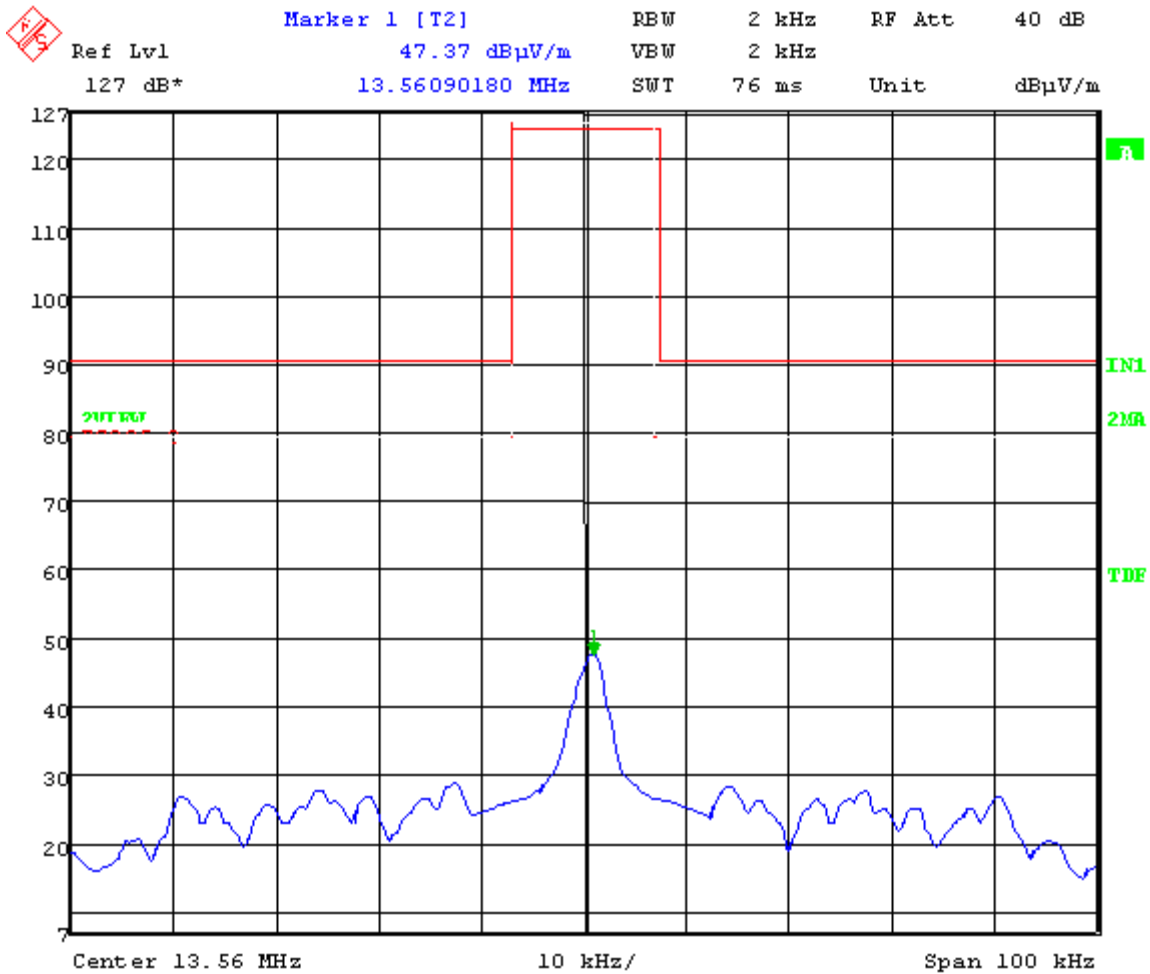
ISO15693 EMISSION MASK



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: ISO 15693
Comment: +30 deg. C
Comment: 102 V



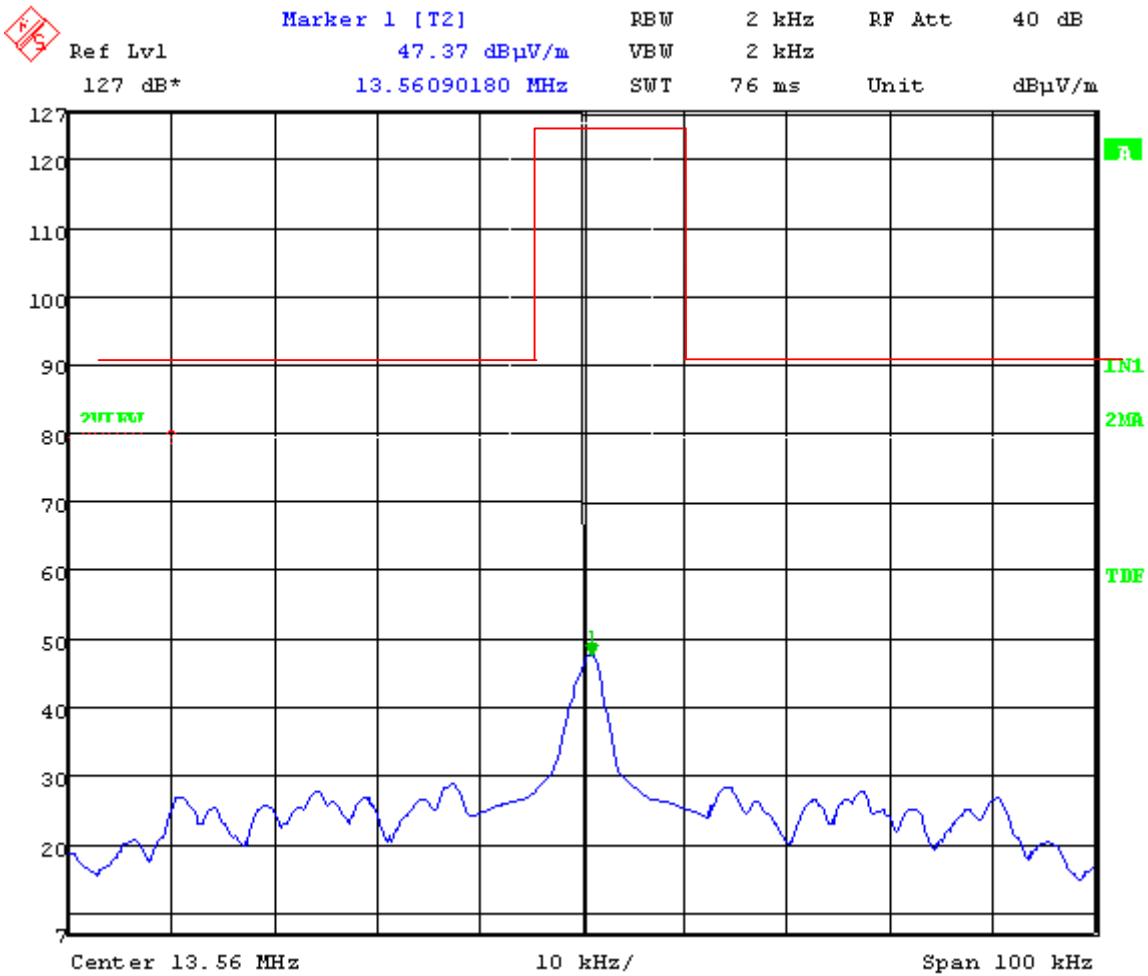
Date: 7 JUL 2006 10:33:02



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: ISO 15693
Comment: +30 deg. C
Comment: 138 V



Date: 7:JUL:2006 10:38:34



1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

9.0 FREQUENCY STABILITY (Temperature) - (PART 2.1055a)

The frequency stability was measured from -20° to +50° centigrade at intervals of 10° centigrade throughout the range. Prior to each frequency measurement, the equipment was left alone for a sufficient period of time (approximately 30 minutes or more) to allow the components of the Zebra M2 oscillator circuitry to stabilize. The following information was taken:

MIFARE EMISSION MASK

FREQUENCY STABILITY FOR TEMPERATURE VARIATION IN MHz (Section 4.5):

-20°	13.5609018
-10°	13.5609018
0°	13.5609018
+10°	13.5609018
+20°	13.5609018
+30°	13.5609018
+40°	13.56078557
+50°	13.56078557

Worst Case Variance: = 116.23 Hz

As stated in RSS-GEN, Issue 1, Section 4.5, the Frequency Tolerance for this frequency range are as follows:

Frequency Tolerance:	=	<u>.01%</u>
Ambient Frequency:	=	13.5609018 MHz
Limit = 13560901.8 * .01%	=	<u>1356.1 Hz</u>

This is well within the specified limits.

NOTE:

See the following page(s) for the graph(s) of the actual measurement made:



1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

GRAPH(S) TAKEN FOR FREQUENCY

STABILITY WHEN VARYING THE TEMPERATURE

(PART 2.1055a)


MIFARE EMISSION MASK

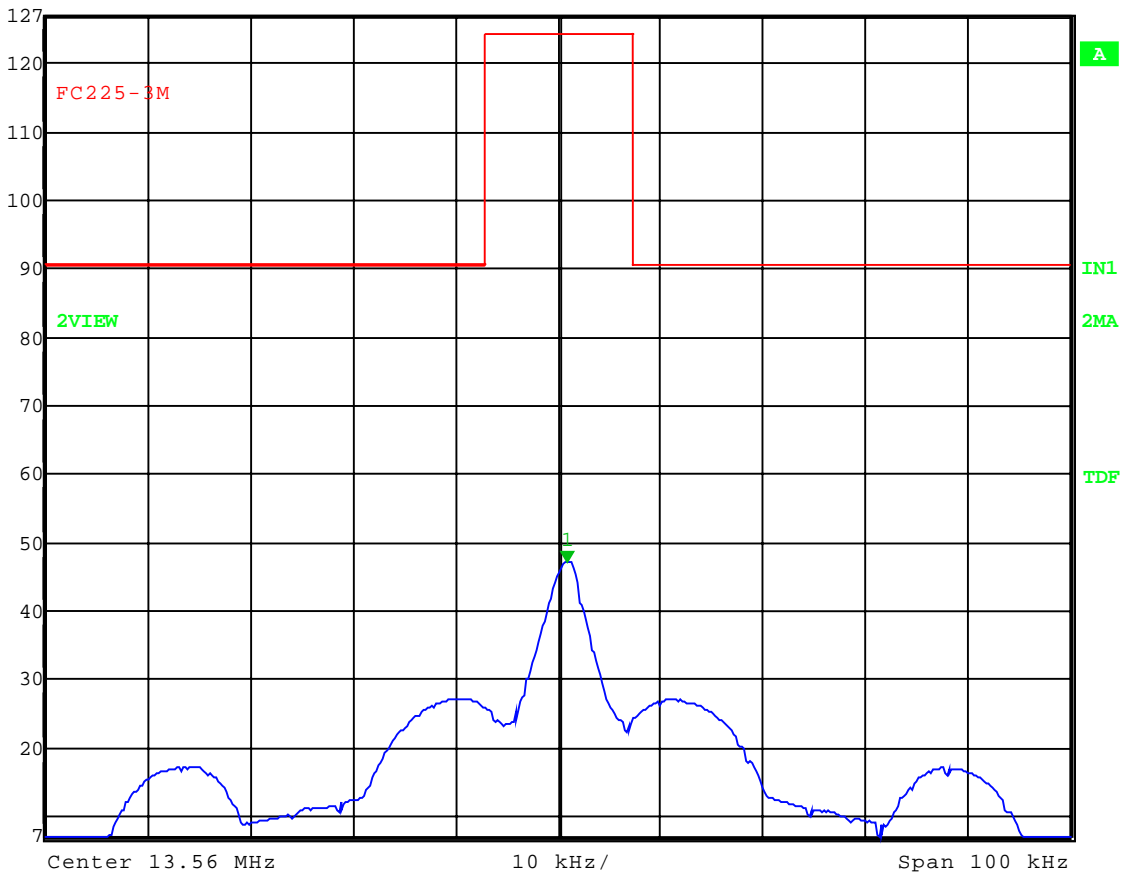


Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: MIFAREULTRALIGHT
Comment: -20 deg. C
Comment: 120 V

 Marker 1 [T2] RBW 2 kHz RF Att 40 dB
Ref Lvl 47.10 dB μ V/m VBW 2 kHz
127 dB* 13.56090180 MHz SWT 76 ms Unit dB μ V/m



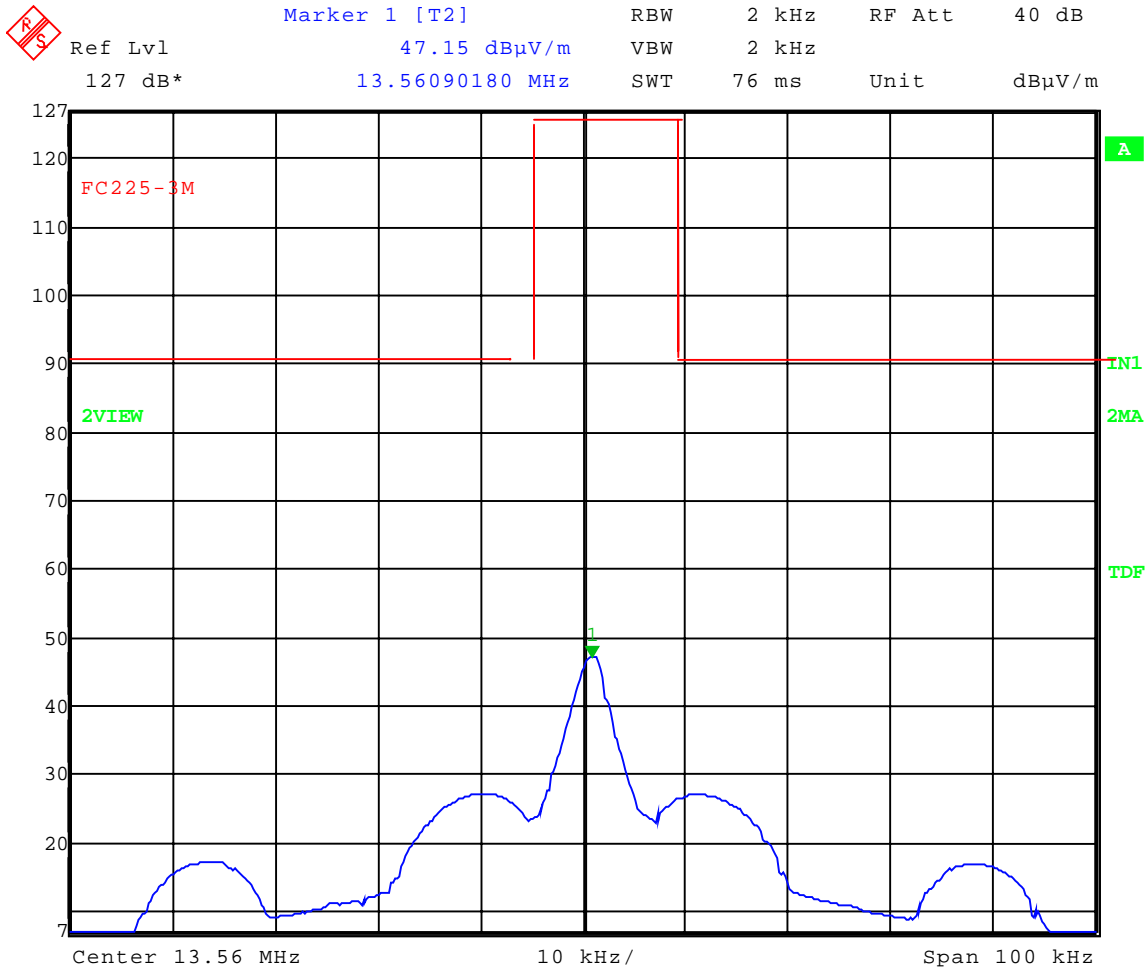
Date: 7.JUL.2006 14:50:43



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: MIFAREULTRALIGHT
Comment: -10 deg. C
Comment: 120 V




Date: 7.JUL.2006 14:19:29

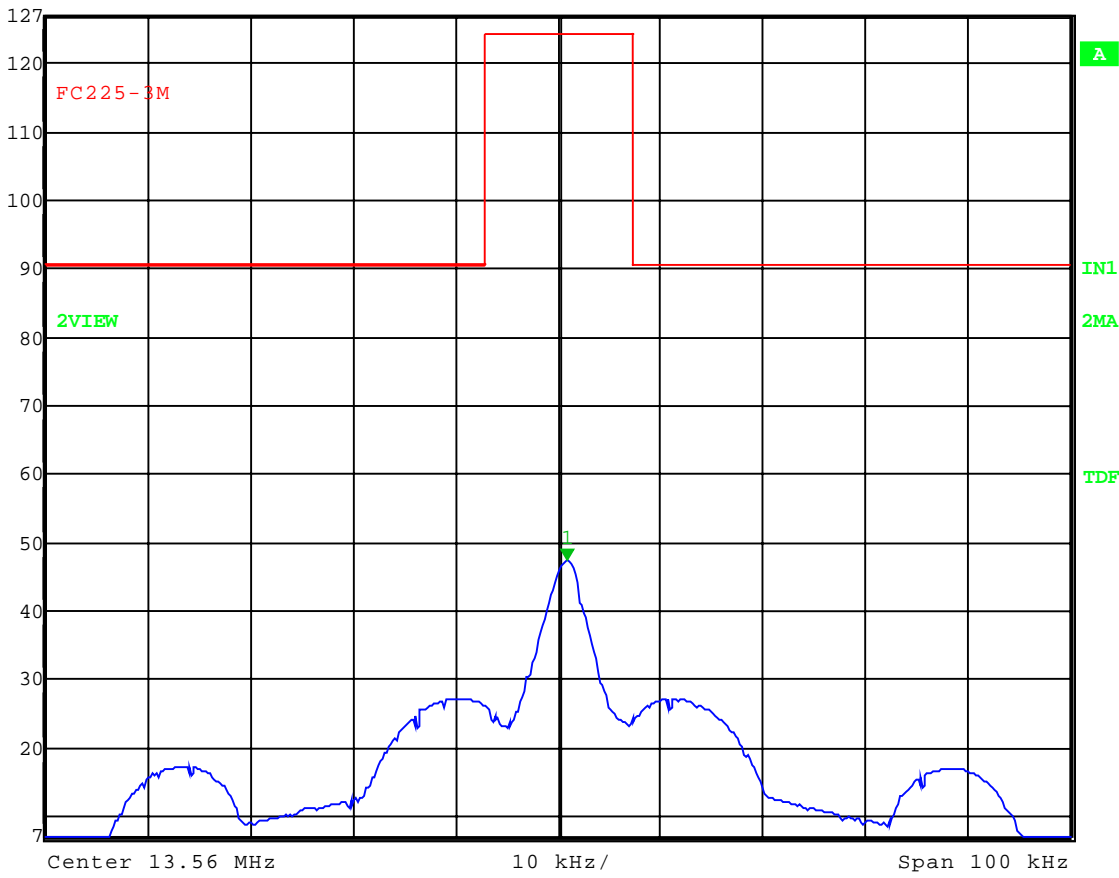


Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: MIFAREULTRALIGHT
Comment: 0 deg. C
Comment: 120 V

 Marker 1 [T2] RBW 2 kHz RF Att 40 dB
Ref Lvl 127 dB* 47.21 dB μ V/m VBW 2 kHz
13.56090180 MHz SWT 76 ms Unit dB μ V/m




Date: 7.JUL.2006 13:47:31

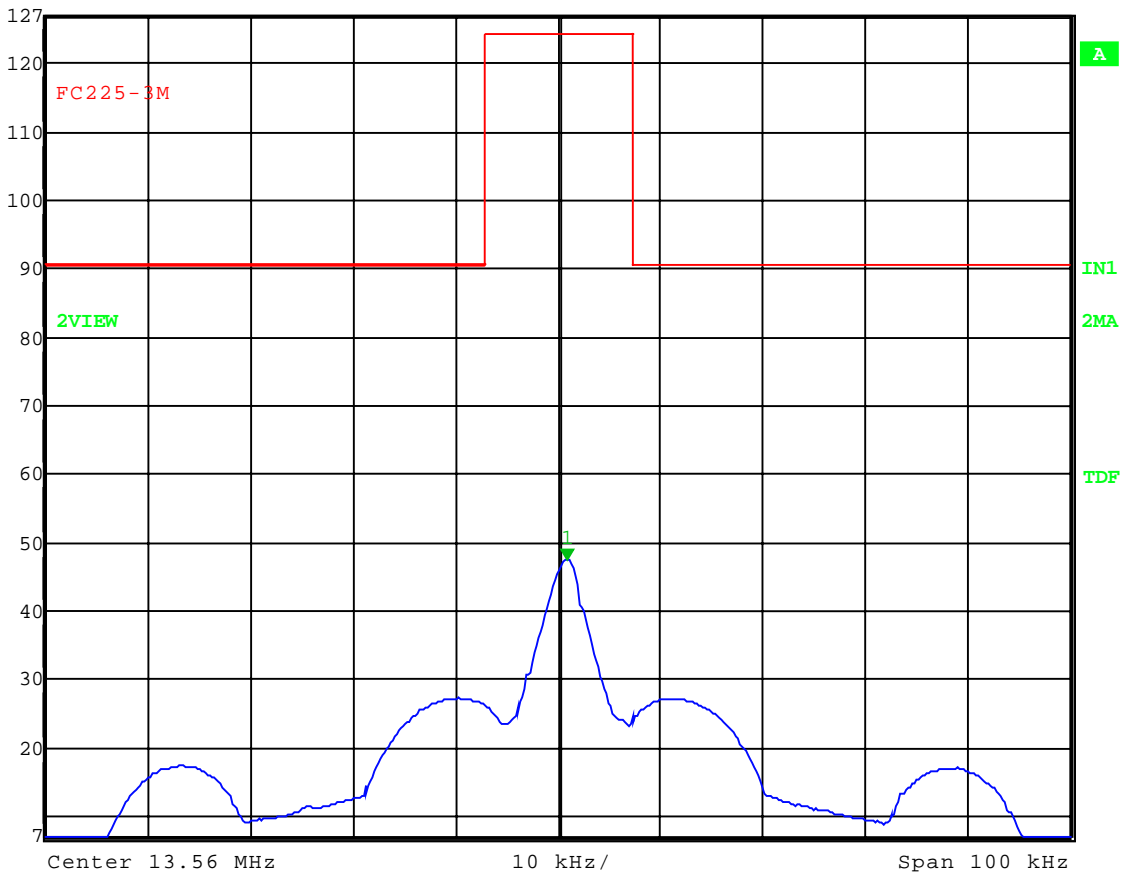


Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: MIFAREULTRALIGHT
Comment: +10 deg. C
Comment: 120 V

 Marker 1 [T2] RBW 2 kHz RF Att 40 dB
Ref Lvl 127 dB* 47.25 dB μ V/m VBW 2 kHz
13.56090180 MHz SWT 76 ms Unit dB μ V/m




Date: 7.JUL.2006 13:15:30

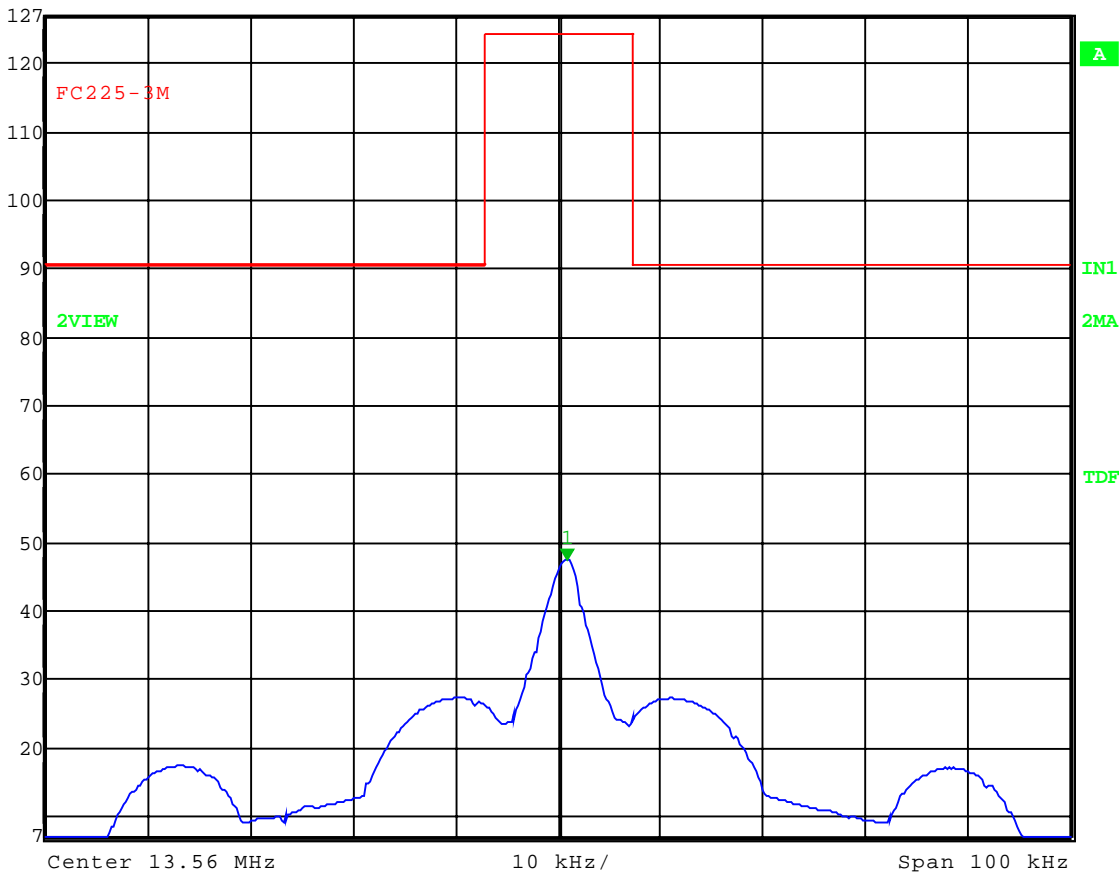


Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: MIFAREULTRALIGHT
Comment: +20 deg. C
Comment: 120 V

 Marker 1 [T2] RBW 2 kHz RF Att 40 dB
Ref Lvl 127 dB* 47.27 dB μ V/m VBW 2 kHz
13.56090180 MHz SWT 76 ms Unit dB μ V/m



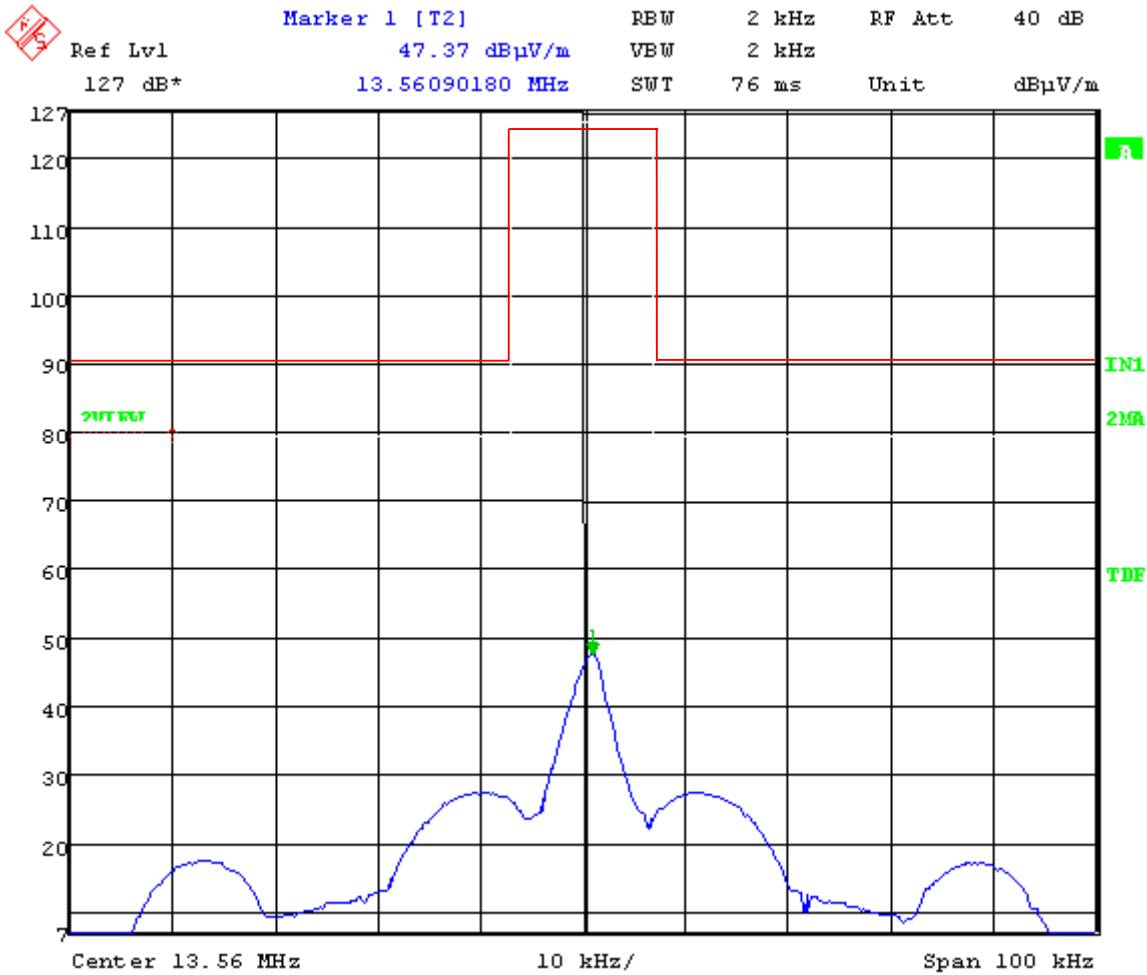
Date: 7.JUL.2006 12:39:20



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: MIFAREULTRALIGHT
Comment: +30 deg. C
Comment: 120 V



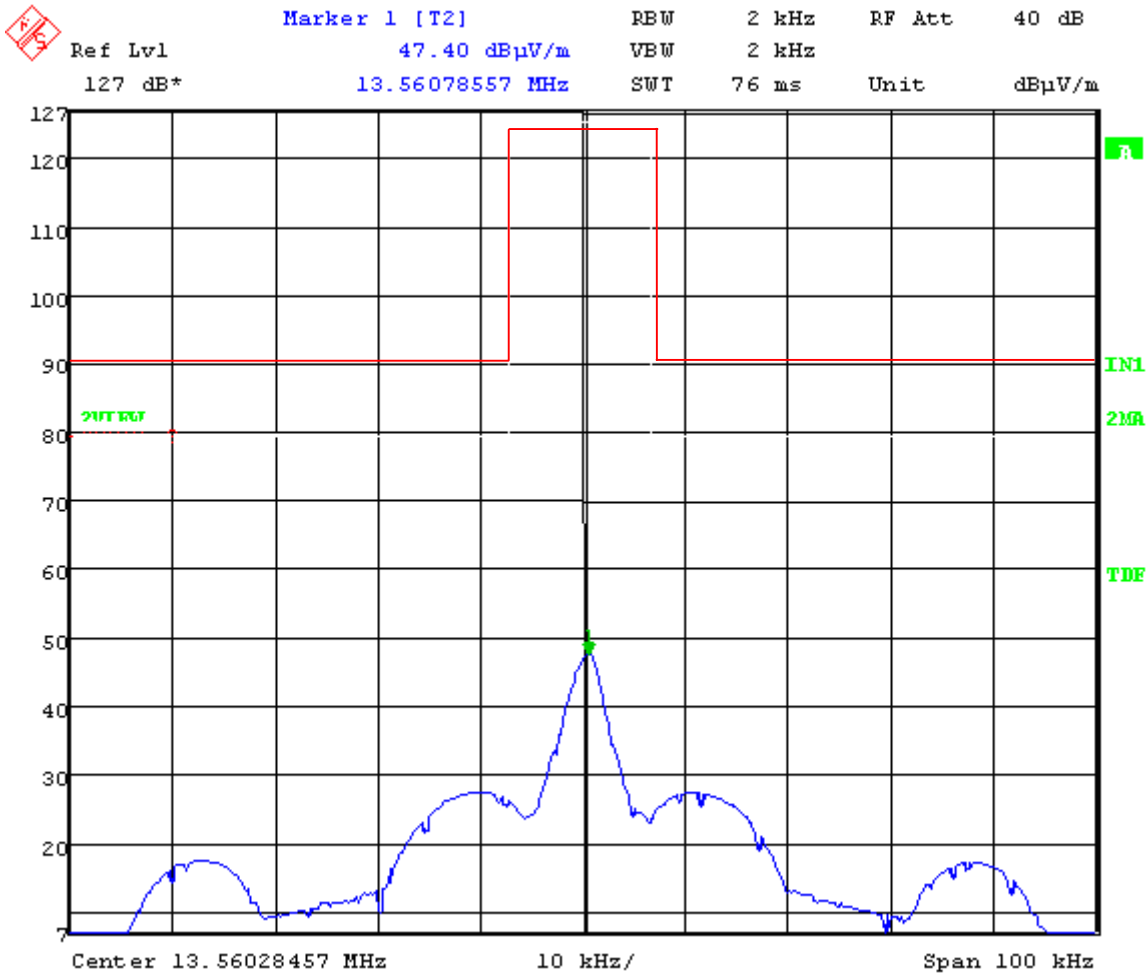
Date: 7.JUL.2006 10:28:03



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: MIFAREULTRALIGHT
Comment: +40 deg. C
Comment: 120 V



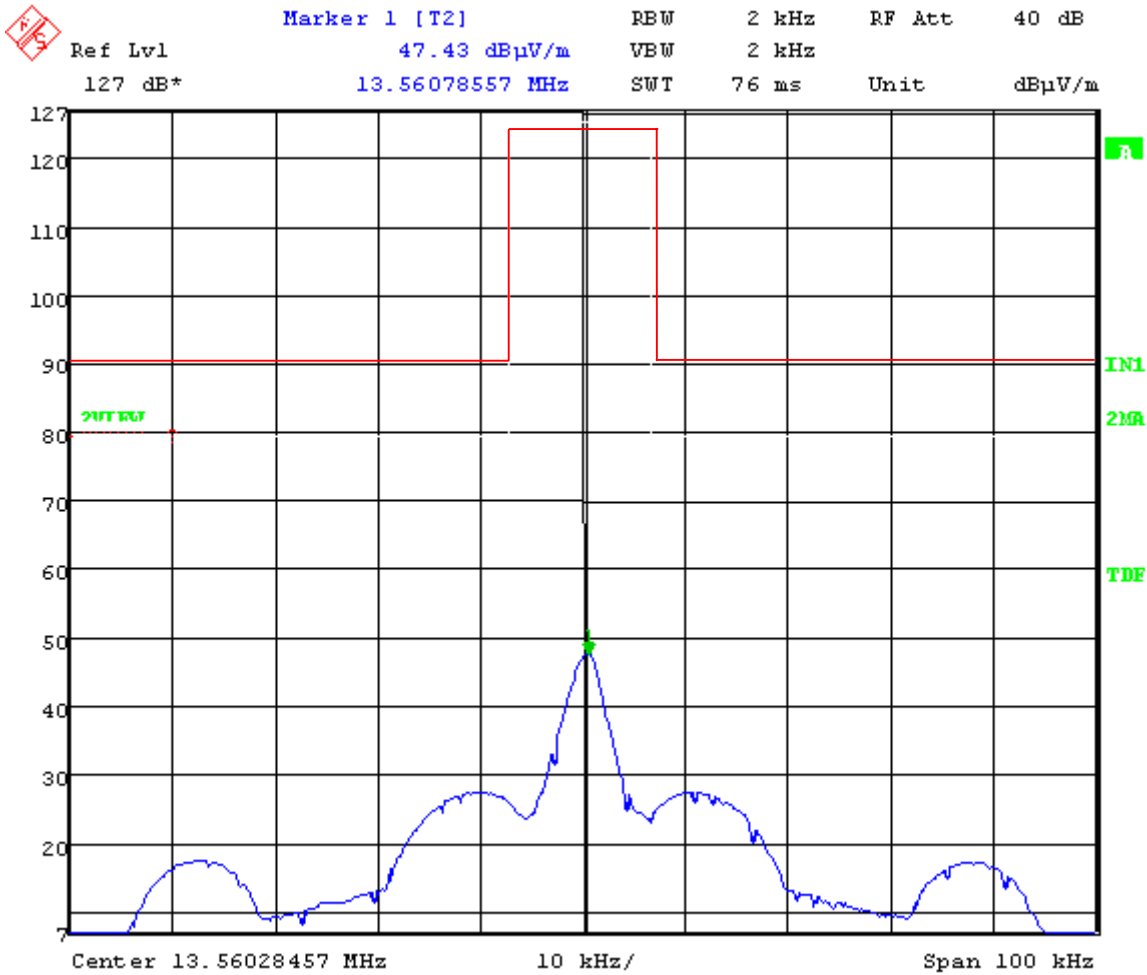
Date: 7.JUL.2006 11:21:02



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: MIFAREULTRALIGHT
Comment: +50 deg. C
Comment: 120 V



Date: 7.JUL.2006 11:53:36



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

10.0 FREQUENCY STABILITY (Voltage Variation) – (PART 2.1055d)

The frequency stability was measured at +20° centigrade by varying the primary supply voltage from 85% to 115% of nominal value for all equipment other than hand carried battery equipment.

MIFARE EMISSION MASK

FREQUENCY STABILITY FOR VOLTAGE VARIATION (Section 4.5):

85% 13.5609018
100%
115% 13.5609018

This is well within the specified limits.

FREQUENCY STABILITY FOR HAND HELD DEVICES:

For handheld battery operated equipment (cannot be plugged into the power mains), the frequency stability tests were made using a new battery, eliminating the need to vary the power supply by $\pm 15\%$.

Fresh Battery verses Battery end point:

Frequency #1 NA
Frequency #2 NA
Frequency #3 NA

NOTE:

This test as not performed.



1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

GRAPH(S) TAKEN FOR FREQUENCY

STABILITY WHEN VARYING THE

PRIMARY SUPPLY VOLTAGE

(PART 2.1055d)

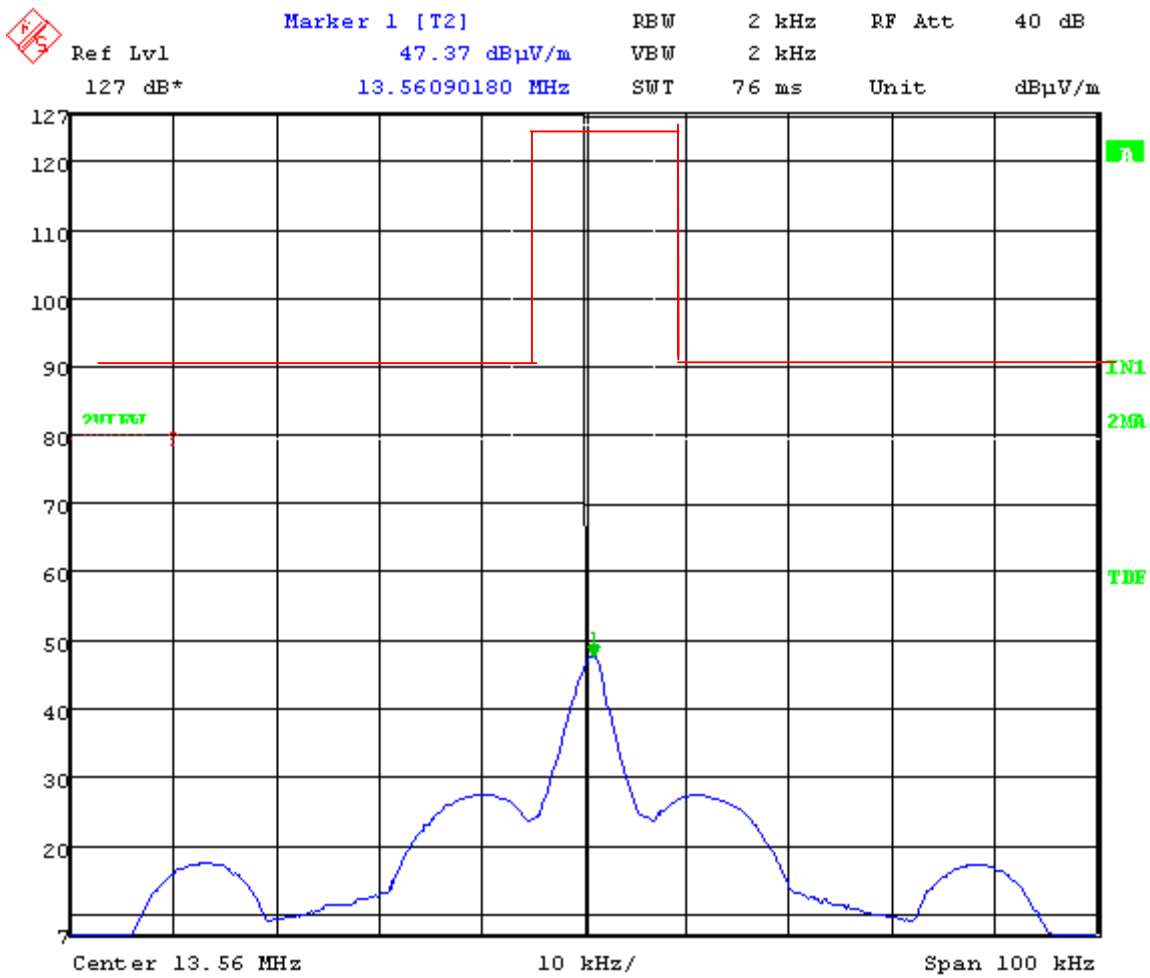
MIFARE EMISSION MASK



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: MIFAREULTRALIGHT
Comment: +30 deg. C
Comment: 102 V



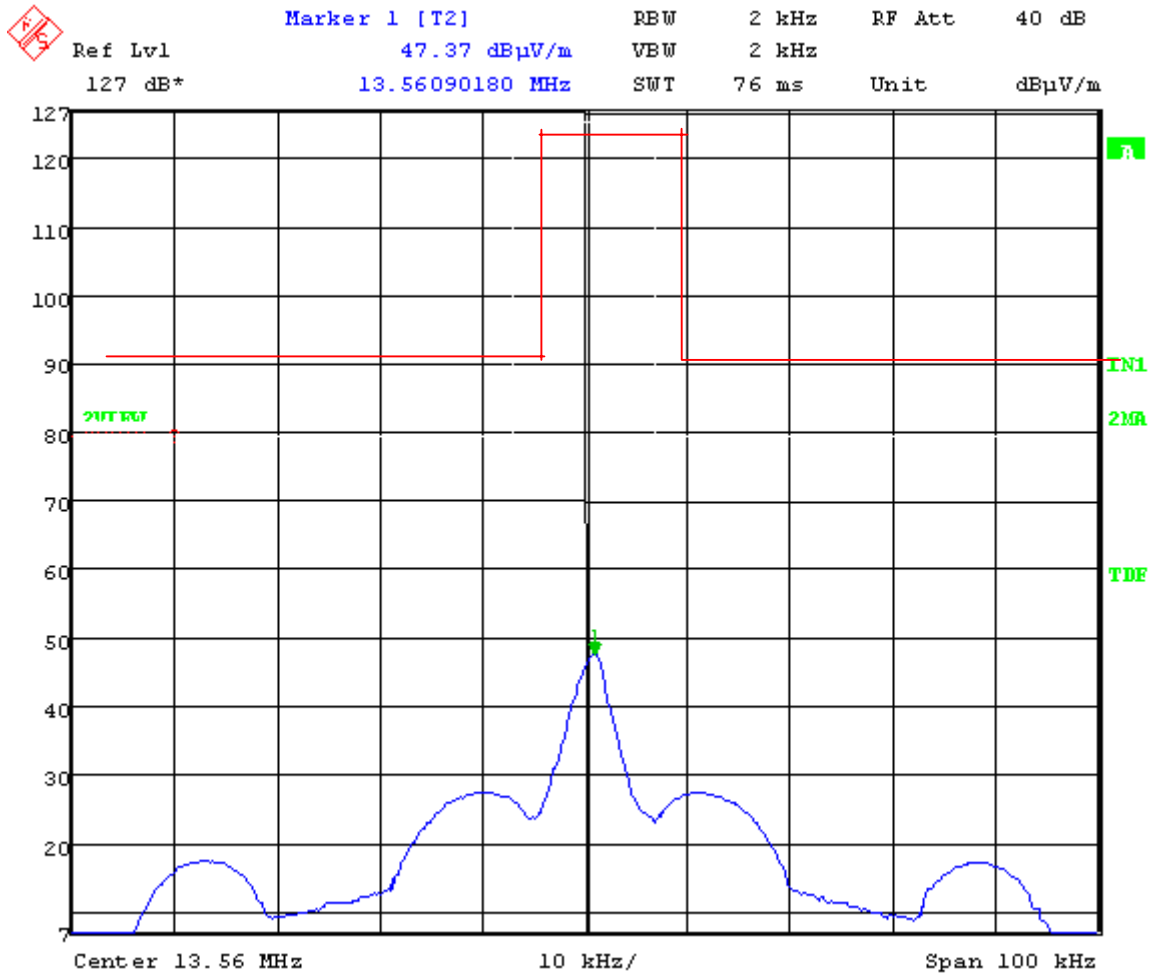
Date: 7 JUL 2006 10:34:34



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Bandwidth / Band Edges
Operator: Craig Brandt
Comment: Modulation: MIFAREULTRALIGHT
Comment: +30 deg. C
Comment: 138 V



Date: 7.JUL.2006 10:36:56



1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

11.0 FREQUENCY STABILITY (Temperature) - (PART 2.1055a)

The frequency stability was measured from -20° to +50° centigrade at intervals of 10° centigrade throughout the range. Prior to each frequency measurement, the equipment was left alone for a sufficient period of time (approximately 30 minutes or more) to allow the components of the Zebra M2 oscillator circuitry to stabilize. The following information was taken:

FREQUENCY STABILITY

FREQUENCY STABILITY FOR TEMPERATURE VARIATION IN MHz (Section 4.5):

-20°	13.560403
-10°	13.560427
0°	13.560423
+10°	13.560391
+20°	13.560331
+30°	13.560287
+40°	13.560267
+50°	13.560210

Worst Case Variance: = 217 Hz

As stated in RSS-GEN, Issue 1, Section 4.5, the Frequency Tolerance for this frequency range are as follows:

$$\begin{aligned} \text{Frequency Tolerance:} &= \underline{.01\%} \\ \text{Ambient Frequency:} &= 13.560330.55 \text{ MHz} \\ \text{Limit} = 13560330.55 * \underline{.01\%} &= \underline{\underline{1356.03 \text{ Hz}}} \end{aligned}$$

This is well within the specified limits.

NOTE:

See the following page(s) for the graph(s) of the actual measurement made:



1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

GRAPH(S) TAKEN FOR FREQUENCY

STABILITY WHEN VARYING THE TEMPERATURE

(PART 2.1055a)

FREQUENCY STABILITY



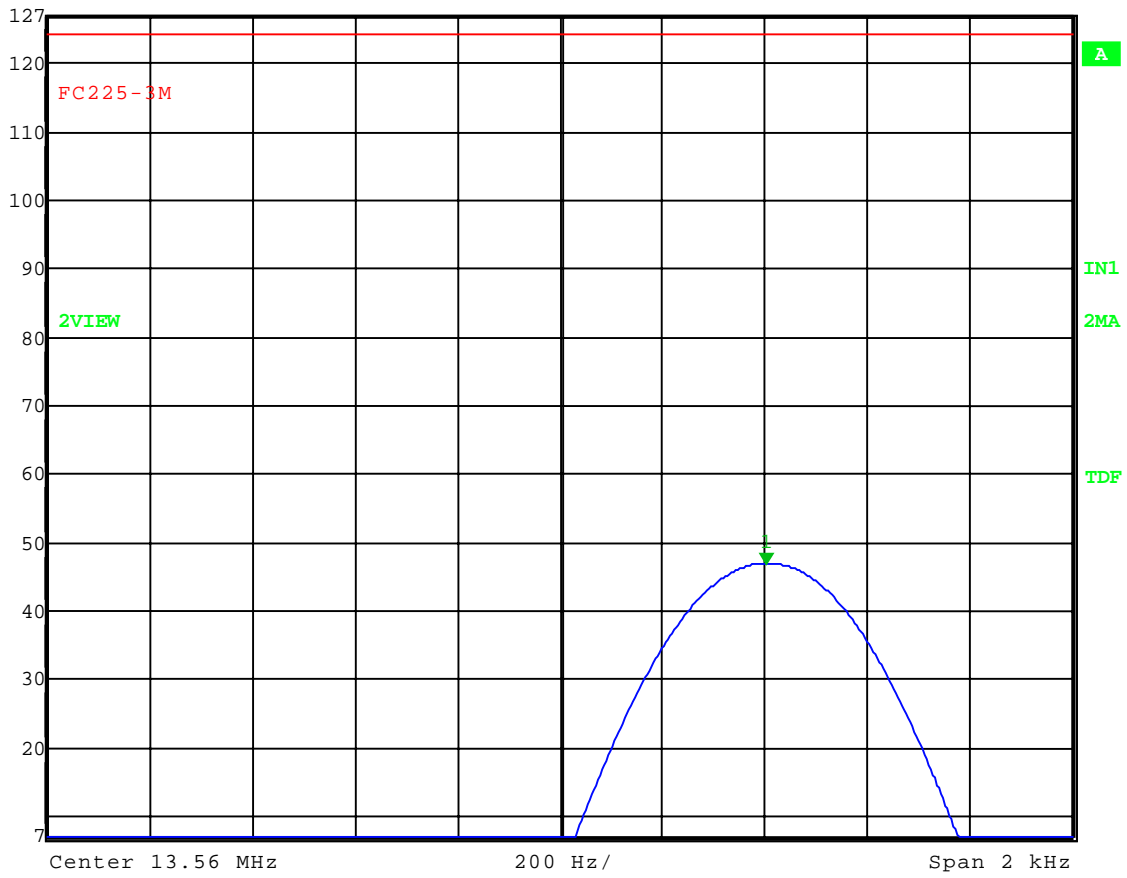
Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Frequency Stability
Operator: Craig Brandt
Comment: Limit: + or - 1,356 Hz
Comment: -20 deg. C
Comment: 120 V



Marker 1 [T2] RBW 200 Hz RF Att 40 dB
Ref Lvl 46.83 dB μ V/m VBW 200 Hz
127 dB* 13.56040281 MHz SWT 760 ms Unit dB μ V/m



Date: 7.JUL.2006 14:49:19



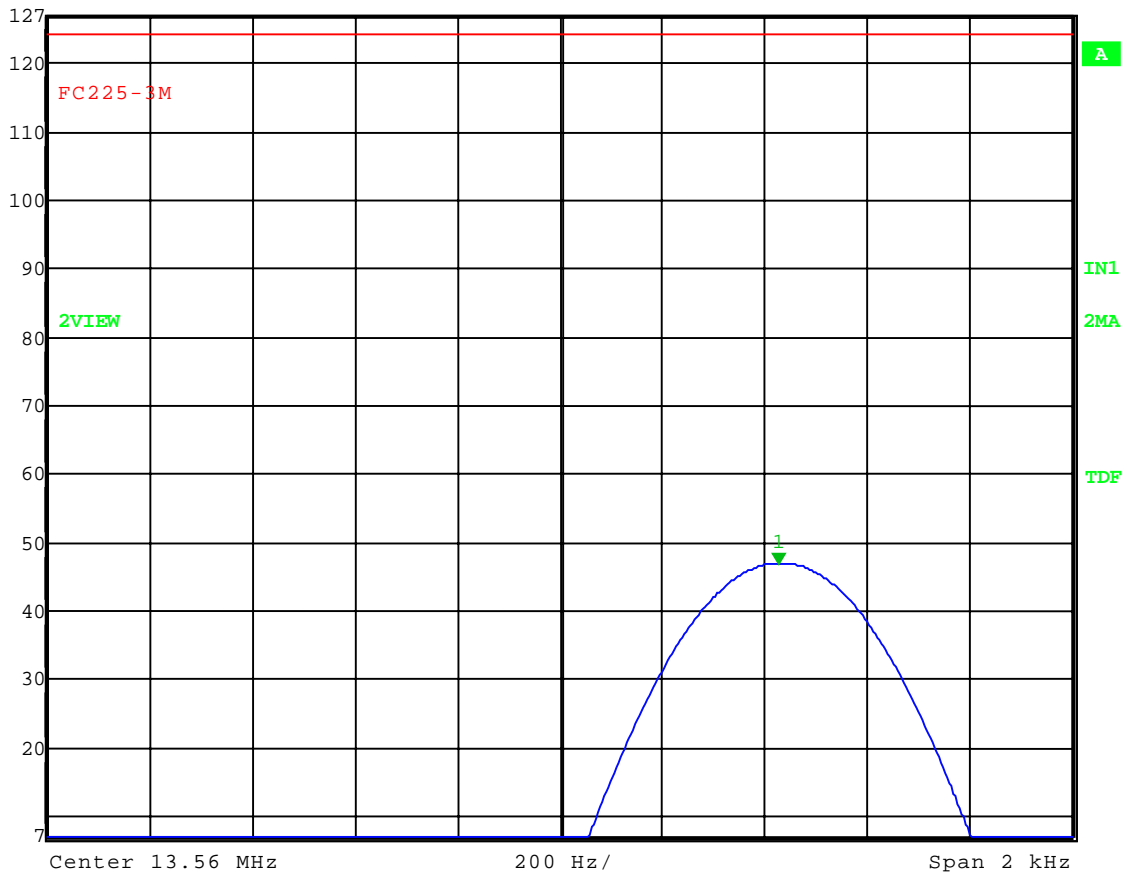
Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Frequency Stability
Operator: Craig Brandt
Comment: Limit: + or - 1,356 Hz
Comment: -10 deg. C
Comment: 120 V



Marker 1 [T2] RBW 200 Hz RF Att 40 dB
Ref Lvl 46.86 dB μ V/m VBW 200 Hz
127 dB* 13.56042685 MHz SWT 760 ms Unit dB μ V/m



Date: 7.JUL.2006 14:18:15



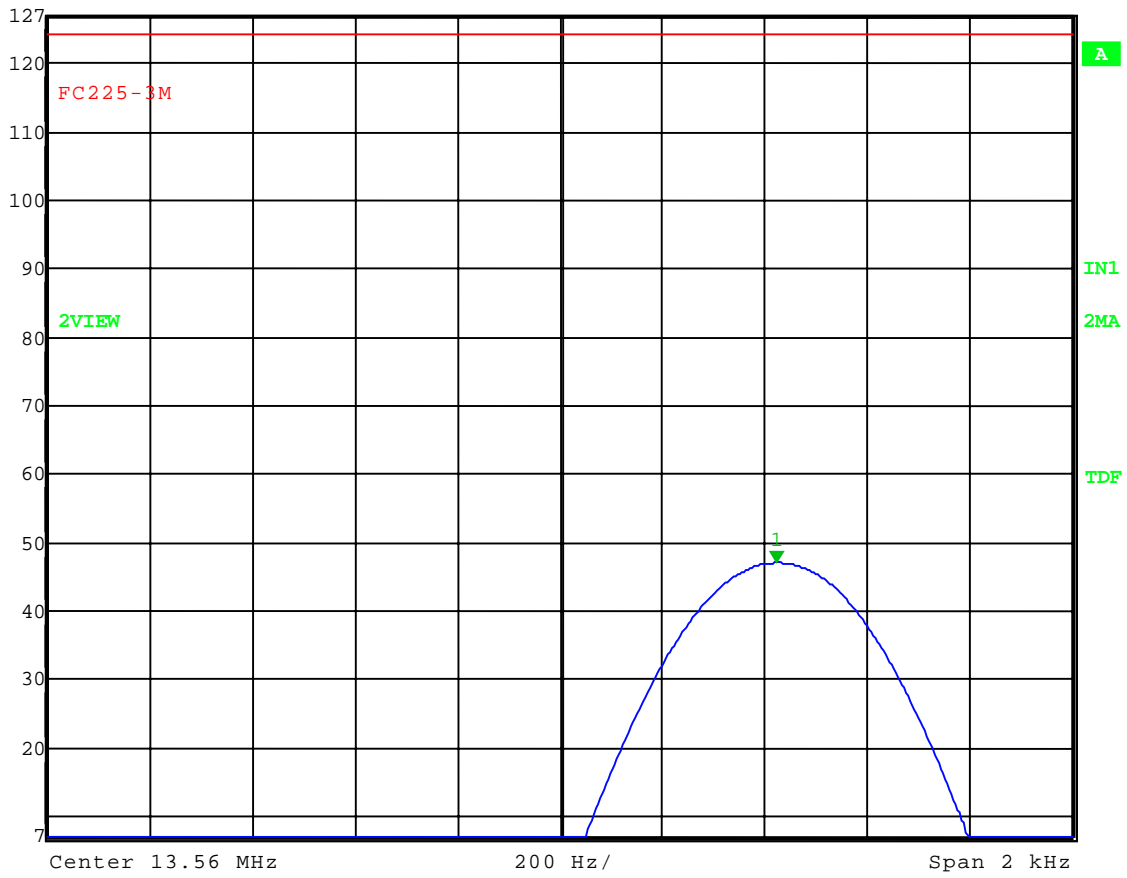
Company: Zebra Technologies Corporation
 Model Tested: M2
 Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
 Company: Zebra
 EUT: 110XiIII
 Test: Frequency Stability
 Operator: Craig Brandt
 Comment: Limit: + or - 1,356 Hz
 Comment: 0 deg. C
 Comment: 120 V



Marker 1 [T2] RBW 200 Hz RF Att 40 dB
 Ref Lvl 46.91 dB μ V/m VBW 200 Hz
 127 dB* 13.56042285 MHz SWT 760 ms Unit dB μ V/m



Date: 7.JUL.2006 13:46:16



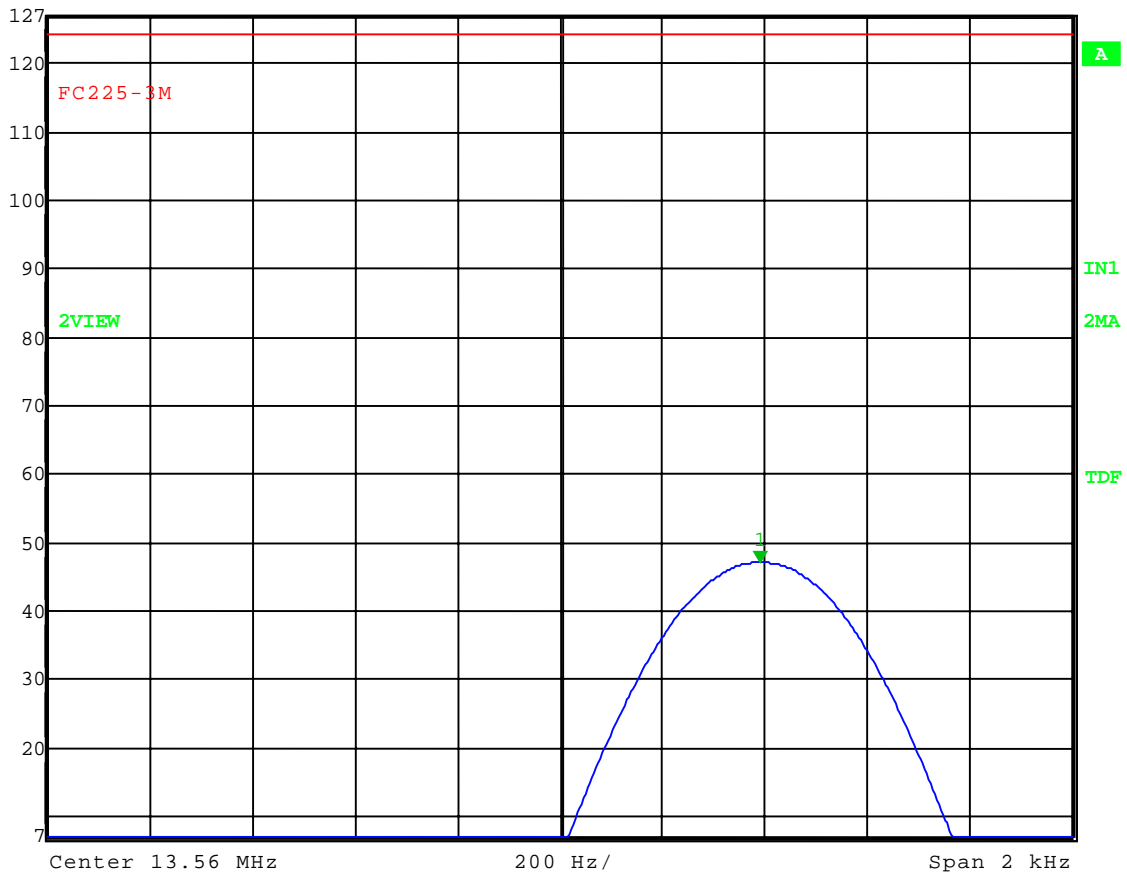
Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Frequency Stability
Operator: Craig Brandt
Comment: Limit: + or - 1,356 Hz
Comment: +10 deg. C
Comment: 120 V



Marker 1 [T2] RBW 200 Hz RF Att 40 dB
Ref Lvl 46.98 dB μ V/m VBW 200 Hz
127 dB* 13.56039078 MHz SWT 760 ms Unit dB μ V/m



Date: 7.JUL.2006 13:13:21



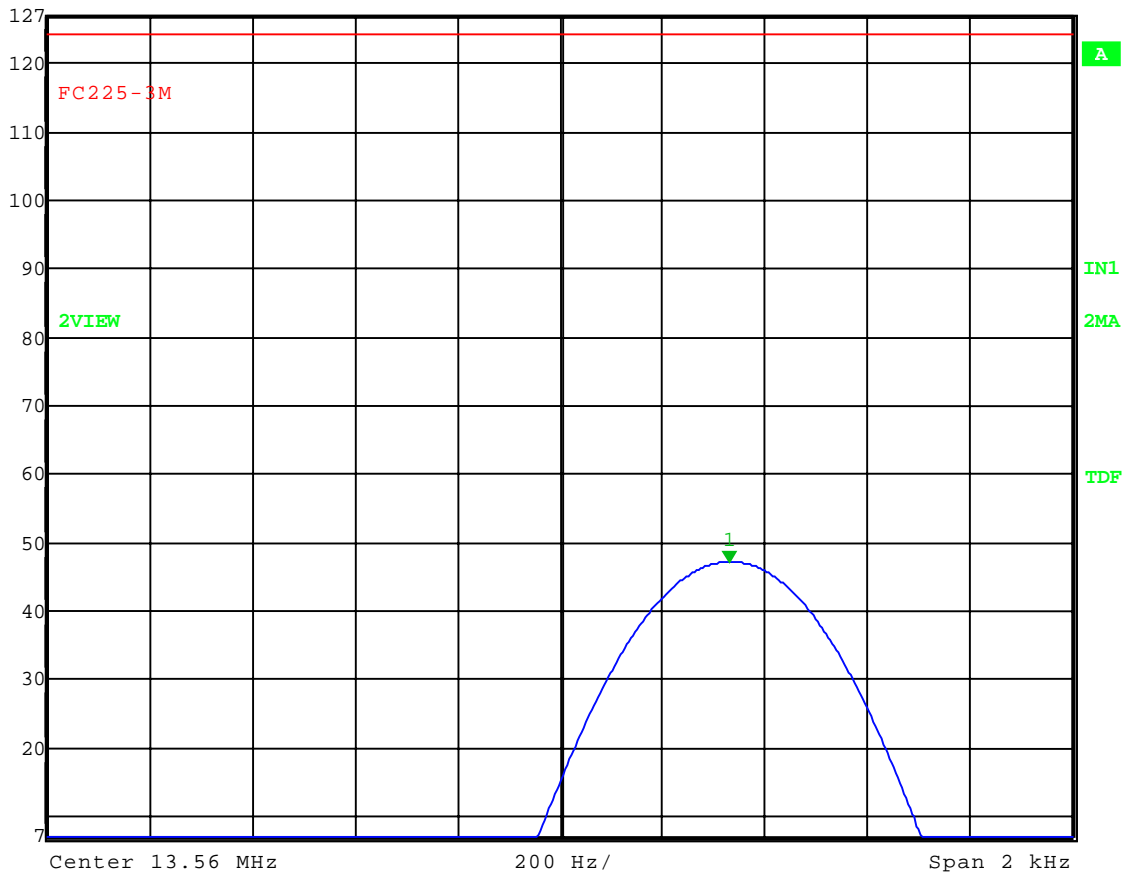
Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Frequency Stability
Operator: Craig Brandt
Comment: Limit: + or - 1,356 Hz
Comment: +20 deg. C
Comment: 120 V



Marker 1 [T2] RBW 200 Hz RF Att 40 dB
Ref Lvl 47.02 dB μ V/m VBW 200 Hz
127 dB* 13.56033066 MHz SWT 760 ms Unit dB μ V/m



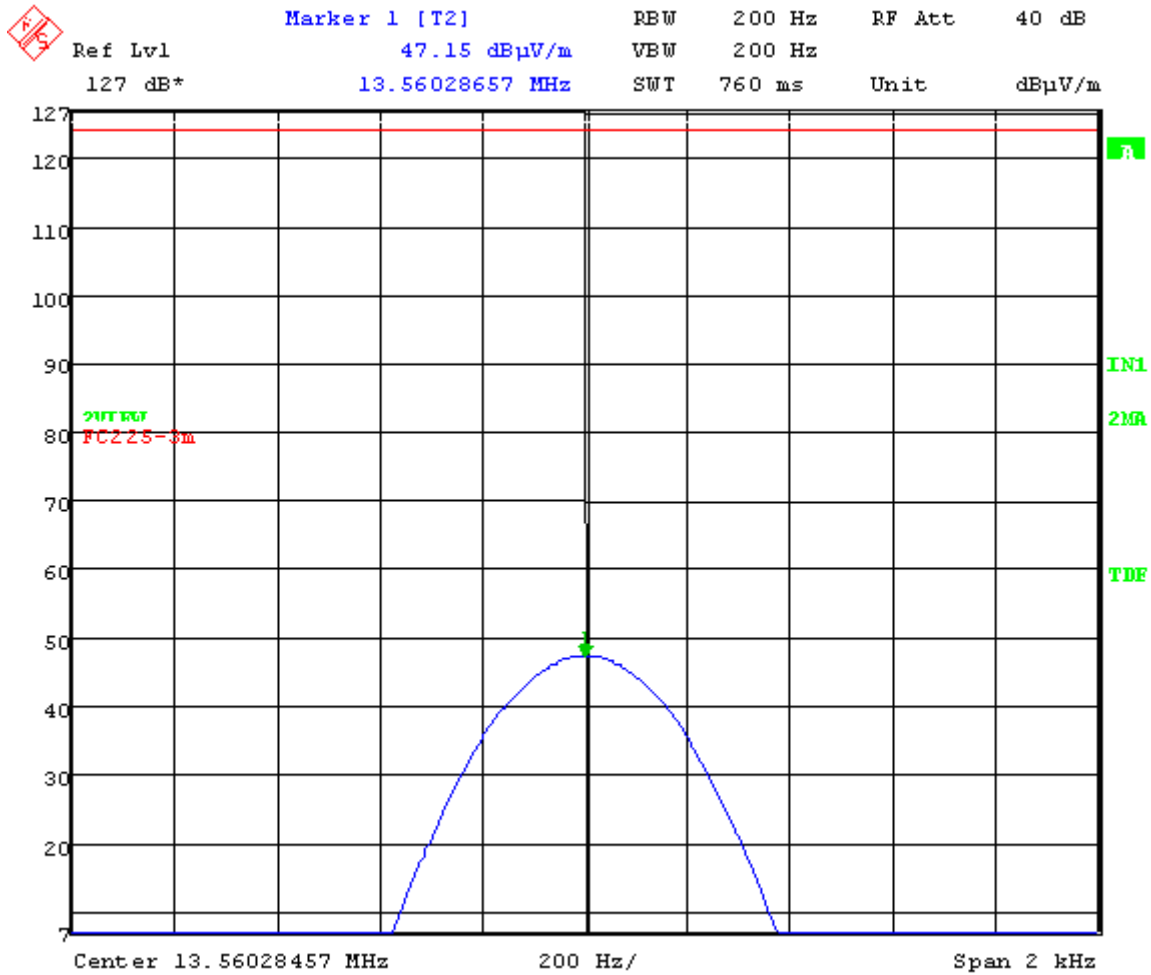
Date: 7.JUL.2006 12:37:29



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Frequency Stability
Operator: Craig Brandt
Comment: Limit: + or - 1,356 Hz
Comment: +30 deg. C
Comment: 120 V



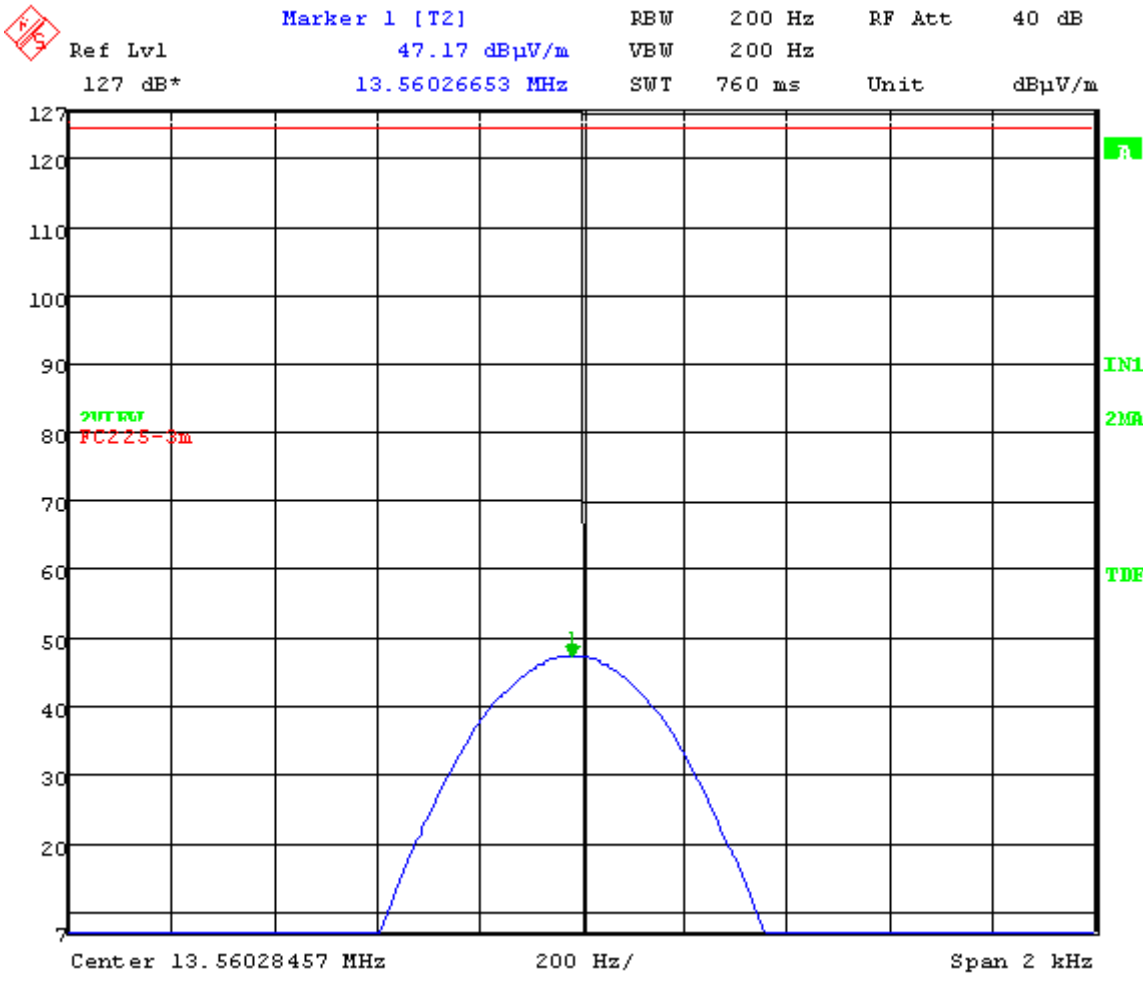
Date: 7.JUL.2006 10:47:29



Company: Zebra Technologies Corporation
 Model Tested: M2
 Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
 Company: Zebra
 EUT: 110XiIII
 Test: Frequency Stability
 Operator: Craig Brandt
 Comment: Limit: + or - 1,356 Hz
 Comment: +40 deg. C
 Comment: 120 V



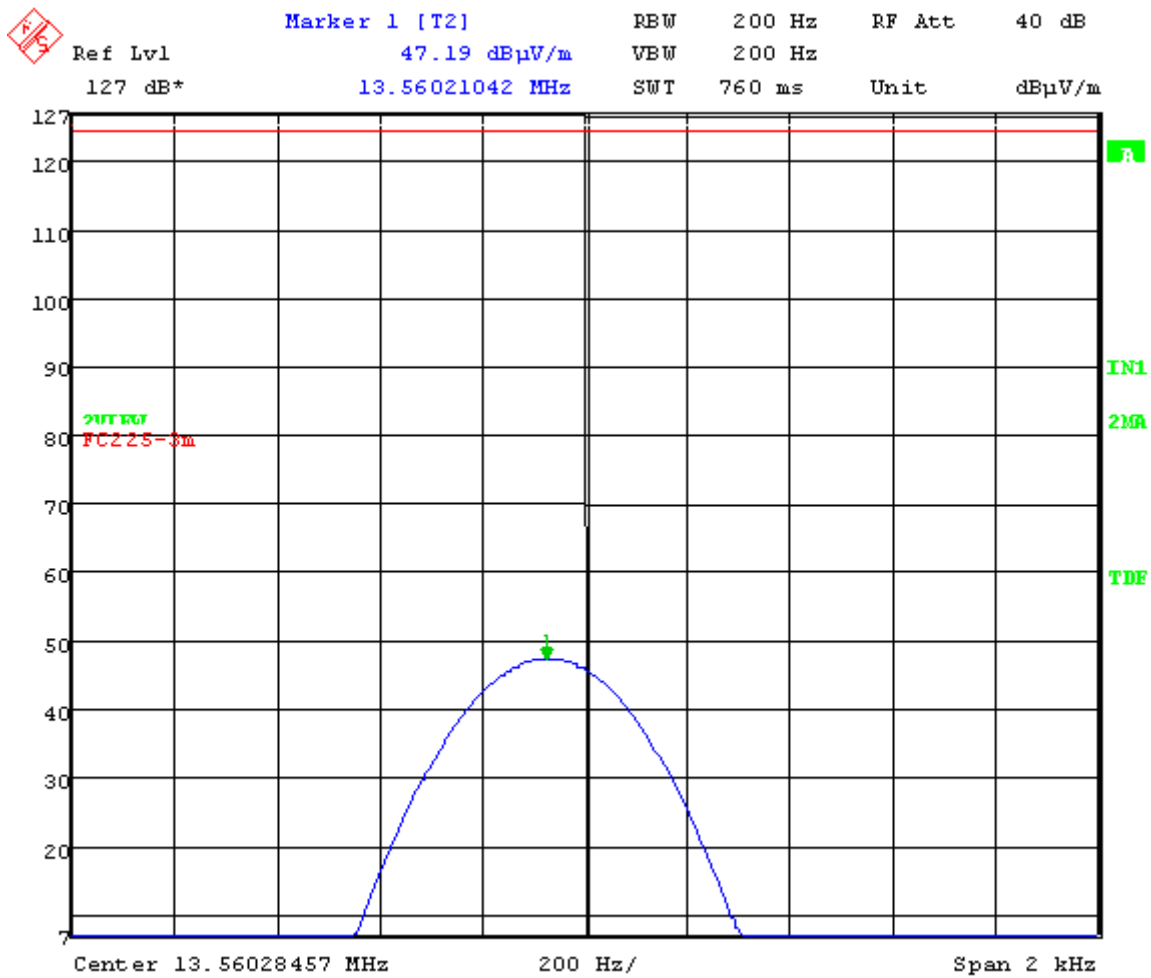
Date: 7.JUL.2006 11:19:14



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Frequency Stability
Operator: Craig Brandt
Comment: Limit: + or - 1,356 Hz
Comment: +50 deg. C
Comment: 120 V



Date: 7.JUL.2006 11:50:09



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

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12.0 FREQUENCY STABILITY (Voltage Variation) – (PART 2.1055d)

The frequency stability was measured at +20° centigrade by varying the primary supply voltage from 85% to 115% of nominal value for all equipment other than hand carried battery equipment.

FREQUENCY STABILITY

FREQUENCY STABILITY FOR VOLTAGE VARIATION (Section 4.5):

85%	13.56030261
100%	
115%	13.56030261

This is well within the specified limits.

FREQUENCY STABILITY FOR HAND HELD DEVICES:

For handheld battery operated equipment (cannot be plugged into the power mains), the frequency stability tests were made using a new battery, eliminating the need to vary the power supply by $\pm 15\%$.

Fresh Battery verses Battery end point:

Frequency #1	NA
Frequency #2	NA
Frequency #3	NA

NOTE:

This test as not performed.



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Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

GRAPH(S) TAKEN FOR FREQUENCY

STABILITY WHEN VARYING THE

PRIMARY SUPPLY VOLTAGE

(PART 2.1055d)

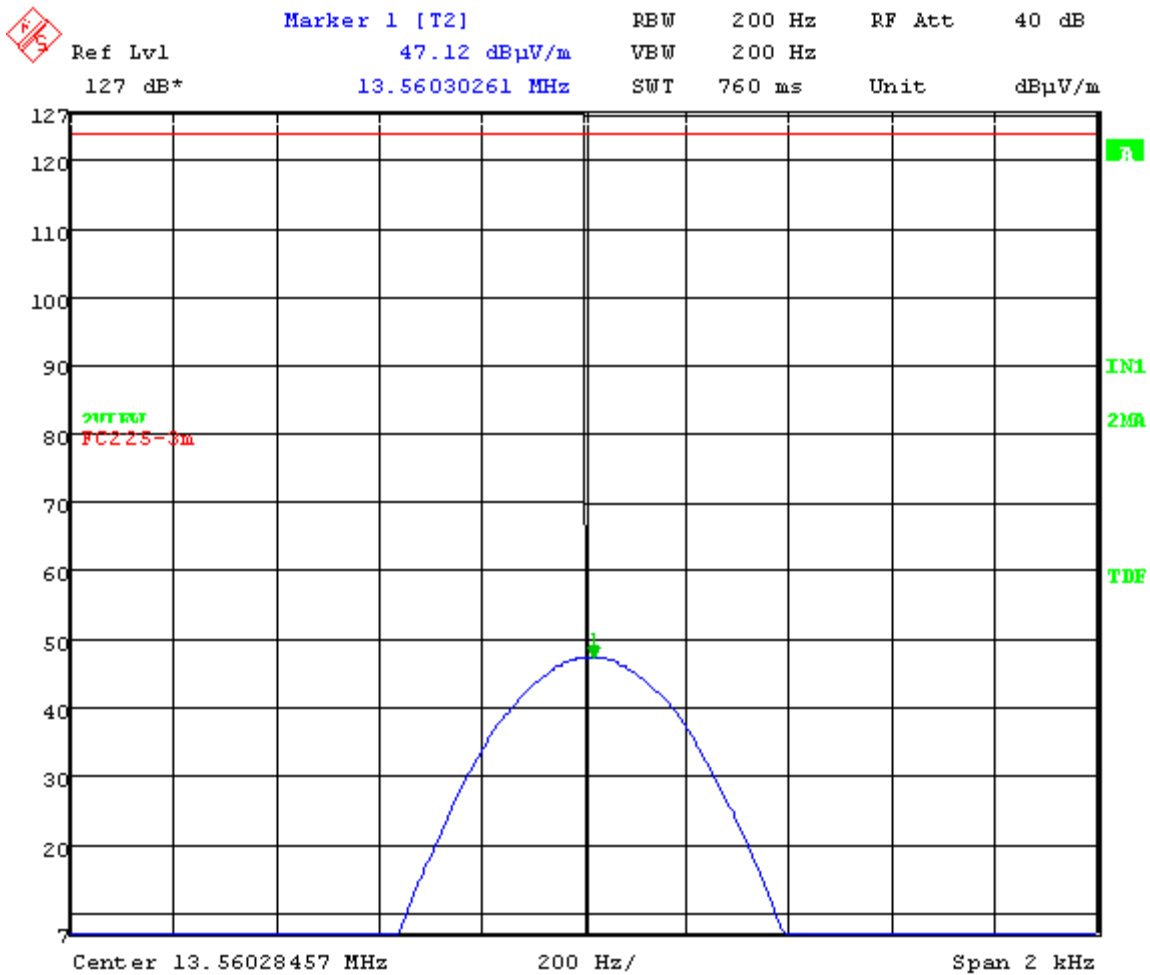
FREQUENCY STABILITY



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Frequency Stability
Operator: Craig Brandt
Comment: Limit: + or - 1,356 Hz
Comment: +30 deg. C
Comment: 102 V



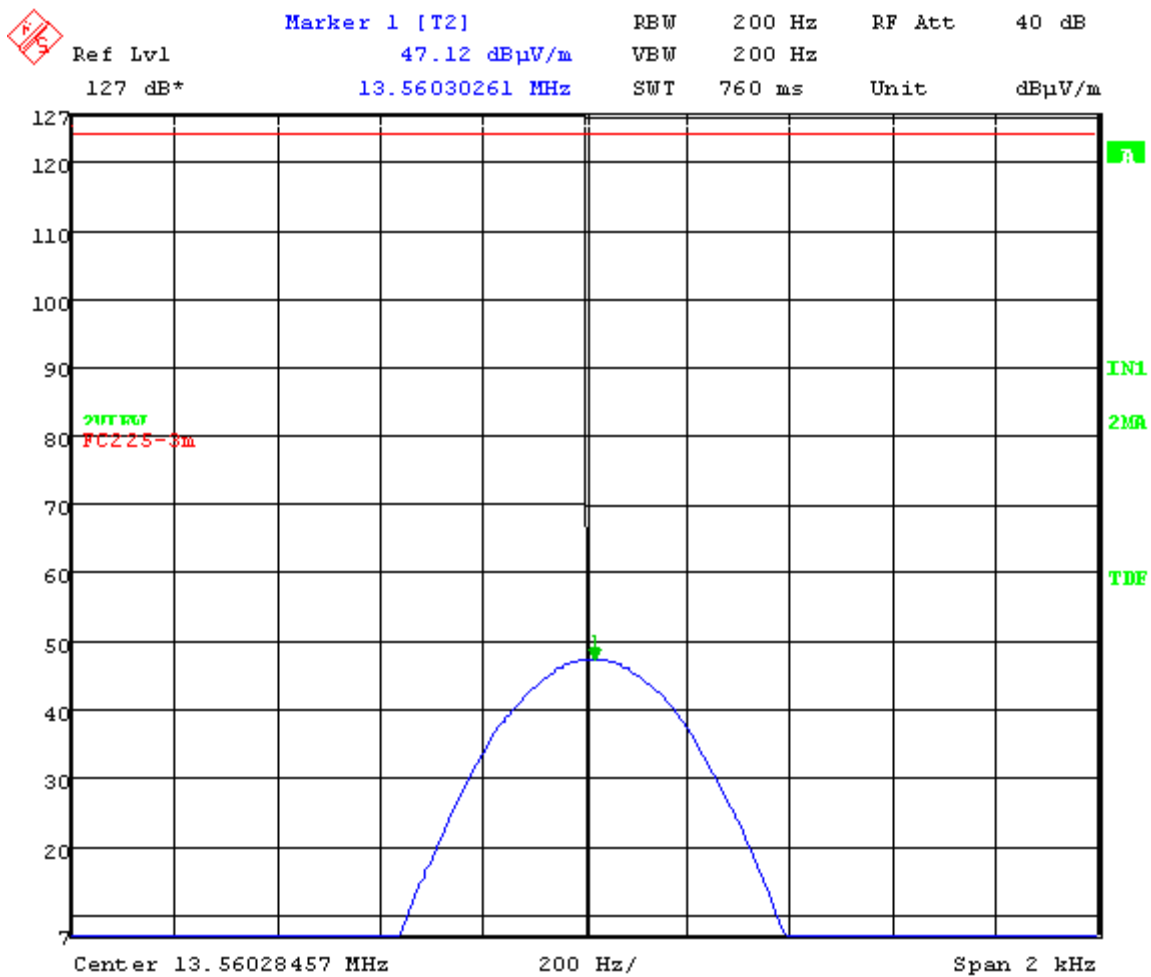
Date: 7 JUL 2006 10:49:43



Company: Zebra Technologies Corporation
Model Tested: M2
Report Number: 12350

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 07-07-2006
Company: Zebra
EUT: 110XiIII
Test: Frequency Stability
Operator: Craig Brandt
Comment: Limit: + or - 1,356 Hz
Comment: +30 deg. C
Comment: 138 V



Date: 7 JUL 2006 10:51:29