1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: ZM4e
Report Number: 12629

FCC Rules and Regulations / Intentional Radiators

Operational in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz, Bands

Part 15, Subpart C, Section 15.247

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

Formal Name:	Zebra RFID Multiprotocol Encoder ZM4e
Kind of Equipment:	Multiprotocol RFID Encoder
Test Configuration:	Limited Modular Approval - Tested with 110PAX4 (RF Conducted) and 170XiIII (Radiated) (worst case) printers (Tested at 120 vac, 60 Hz)
Model Number(s):	ZM4e
Model(s) Tested:	ZM4e
Serial Number(s):	NA
Date of Tests:	September 22, 25 & 26, 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.

1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: ZM4e
Report Number: 12629

SIGNATURE PAGE

Report By:

Arnom C. Rowe
Test Engineer
EMC-001375-NE

Reviewed By:

William Stumpf
OATS Manager

Approved By:

Brian Mattson
General Manager

Company Official:

Zebra Technologies Corporation

TABLE OF CONTENTS

TABLE OF CONTENTS

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

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)

1.0 SUMMARY OF TEST REPORT

It was found that the Zebra RFID Multiprotocol Encoder ZM4e, Model Number(s) ZM4e, **''meets''** the radio interference radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.247 for operational in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz, Bands.

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

Text: 64

2.0 INTRODUCTION

On September 22, 25 & 26, 2006, a series of radio frequency interference measurements was performed on Zebra RFID Multiprotocol Encoder ZM4e, Model Number(s) ZM4e, 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 15.205, 15.209 & 15.247 for Intentional Radiators operating in the Bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

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 radiated 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 and 8.

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.

1250 Peterson Dr., Wheeling, IL 60090

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.

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

7.1 Description:

Zebra ZM4e is a RFID multiprotocol encoder used for encoding RFID tags. The encoder is installed in the following Zebra tabletop printers: 110XiIII, 170XiIII, Z4MPlus, and 110PAX4.

7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

Length: 4.63" x Width: 3.00" x Height: 1.1"

7.3 LINE FILTER USED:

DC powered device

7.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

50KHz, 100KHz

Clock Frequencies:

RFID encoder: 20.0000MHz

7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. Reader RFID UHF MP 1W - RoHS	PN: 27086 rev A
2. PCB Adapter 1W MP RFID Rdr	PN: 21160-100 Rev 0B
3. Assy PCB UHF Cplr Arry R110Xi3	PN: 27060 r0101
4. Assy RFID UHF Coupler	PN: 58989 r0101
5. Assy PCB UHF Cplr Arry R170Xi3	PN: 27050 r0101

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

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

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

1250 Peterson Dr., Wheeling, IL 60090

9.0 PHOTO INFORMATION AND TEST SET-UP

Item 0 Zebra RFID Multiprotocol Encoder ZM4e
Model Number: ZM4e Serial Number: NA

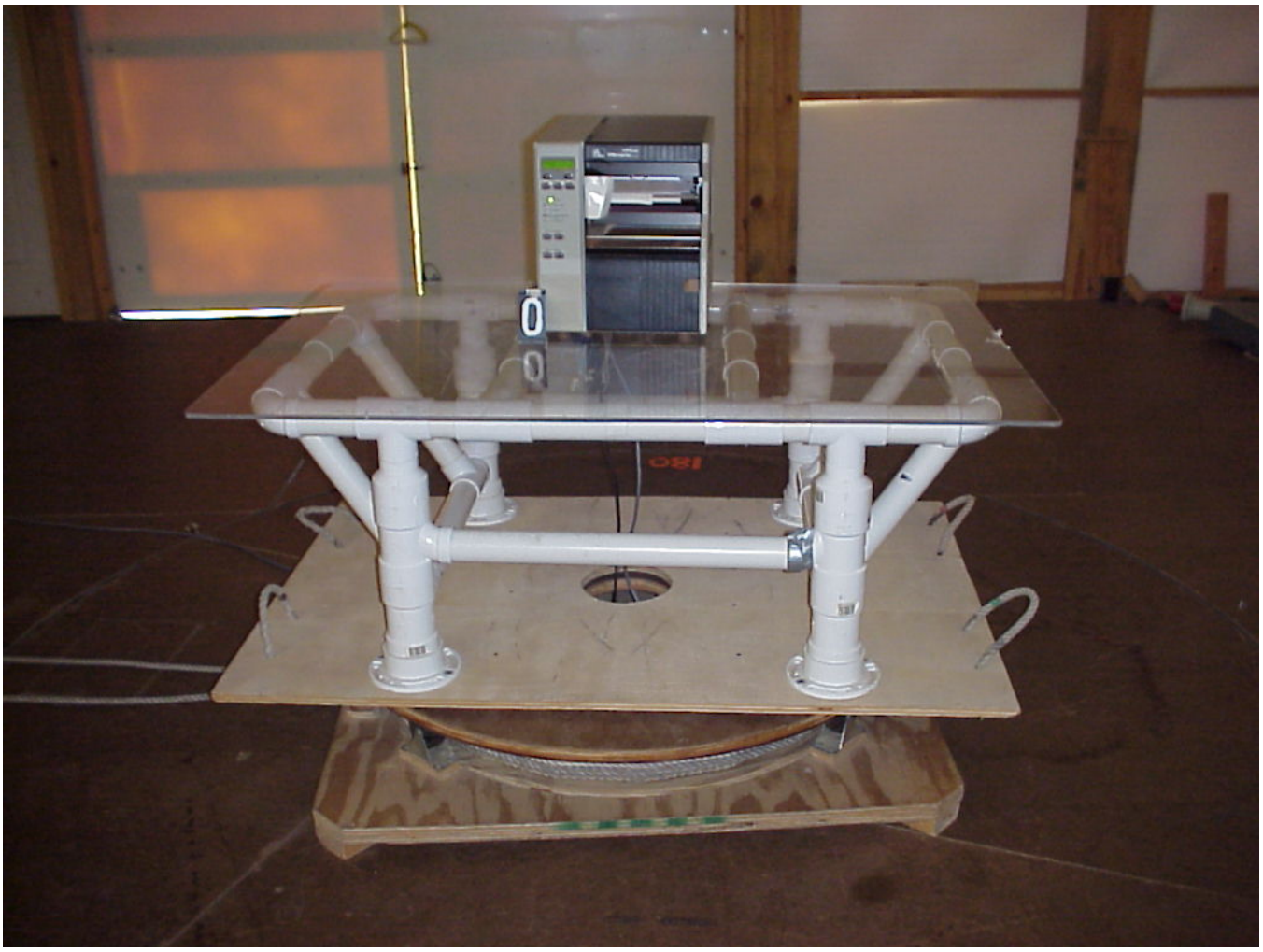
Item 1 Non-shielded AC Power Line Cord. 2m

Item 2 Non-shielded Cat 5 Ethernet Cable run to external computer with plastic shells. 50'

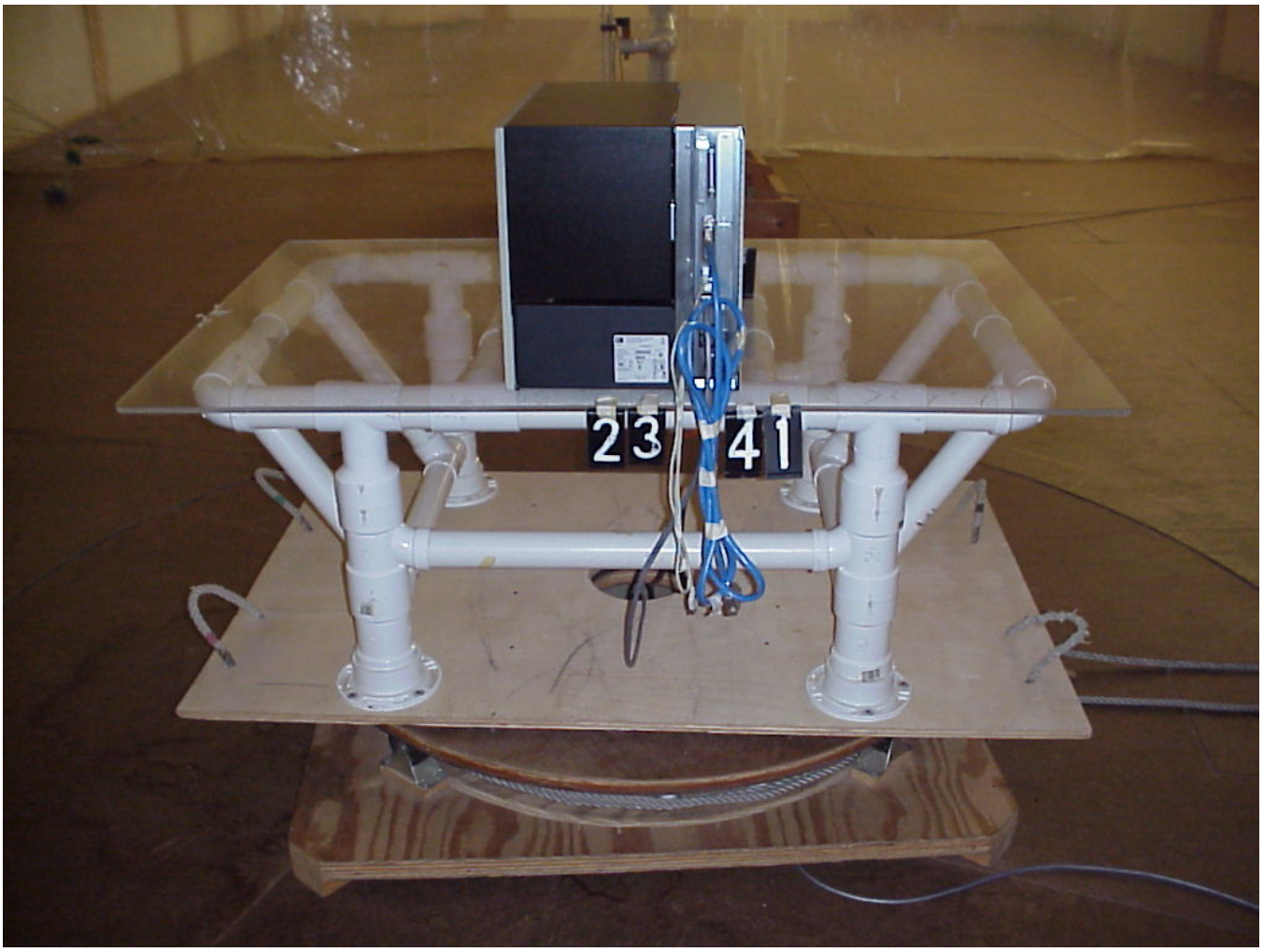
Item 3 Shielded Parallel Cable with Metal Shells. 3m

Item 4 Shielded USB Cable with Metal Shells. 1.5m

10.0 RADIATED PHOTOS TAKEN DURING TESTING



10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)



1250 Peterson Dr., Wheeling, IL 60090

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 RFID Multiprotocol Encoder ZM4e, Model Number(s) ZM4e **''meets''** the radio interference radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.247 for operational in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz, Bands.

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	8/07
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	8/07

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

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	8/07
LISN	Solar	8012-50-R-24-BNC	814548	10 MHz – 30 MHz	8/07
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	10/07
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.

APPENDIX A

TEST PROCEDURE

Part 15, Subpart C, Section 15.247 (a-h)

OPERATION WITHIN THE BAND 902-928 MHz,

2400-2483.5 MHz AND 5725-5857 MHz

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

1.0 SPURIOUS EMISSIONS AT ANTENNA TERMINALS – PART 15.247(c)

Spurious conducted emissions were measured at the antenna terminals. Plots were made showing the amplitude of each harmonic emission with the equipment operated. As shown by the radiated charts there was no reason to believe that there were any spurious emissions other than the harmonics that were than individually investigated when doing the conducted test at the antenna terminals. Measurements were made up to the 10^{th} harmonic of the fundamental.

The allowed emissions for transmitters operating in the 902 MHz to 928 MHz bands for Zebra RFID Multiprotocol Encoder ZM4e equipment are found under Part 15, Section 15.247(c). This paragraph states that in any 100 kHz bandwidth outside the frequency band which the spread spectrum intentional radiator is operating, the radio frequency power produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

NOTE: See the following pages for the data ad graphs of the actual measurements made:

APPENDIX A

CONDUCTED EMISSION DATA AND GRAPH(S)

TAKEN FOR

SPURIOUS EMISSION MEASUREMENTS MADE

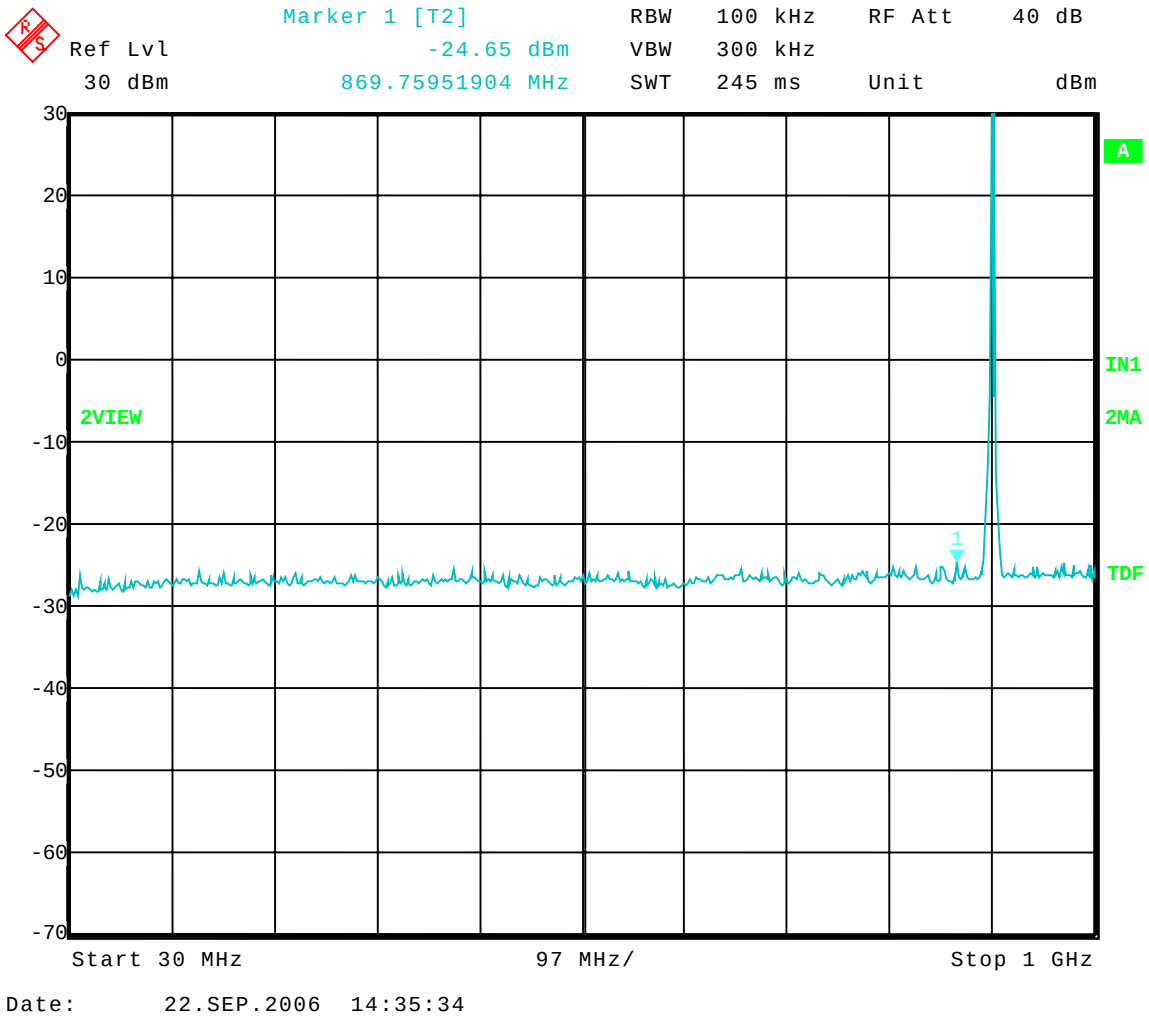
AT THE ANTENNA TERMINALS

PART 15.247(c)

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

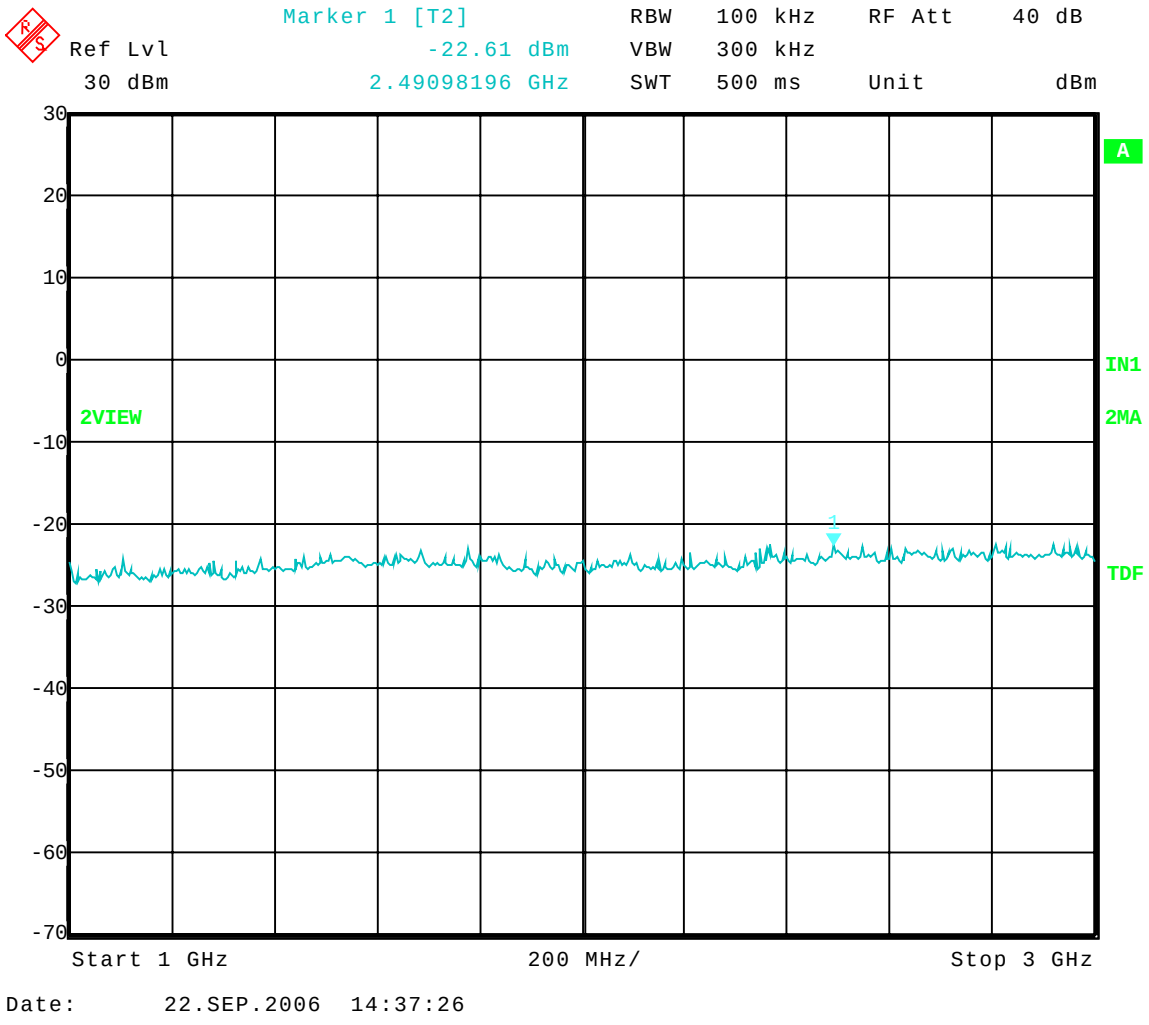
Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: Spurious Emissions - Conducted
Operator: Jason Lauer
Comment: Low Channel; High Power: Frequency – 902.99 MHz
Comment: Modulation – Gen 2 Class 1
Frequency Range: 30 to 1000 MHz
Limit = 10.12 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

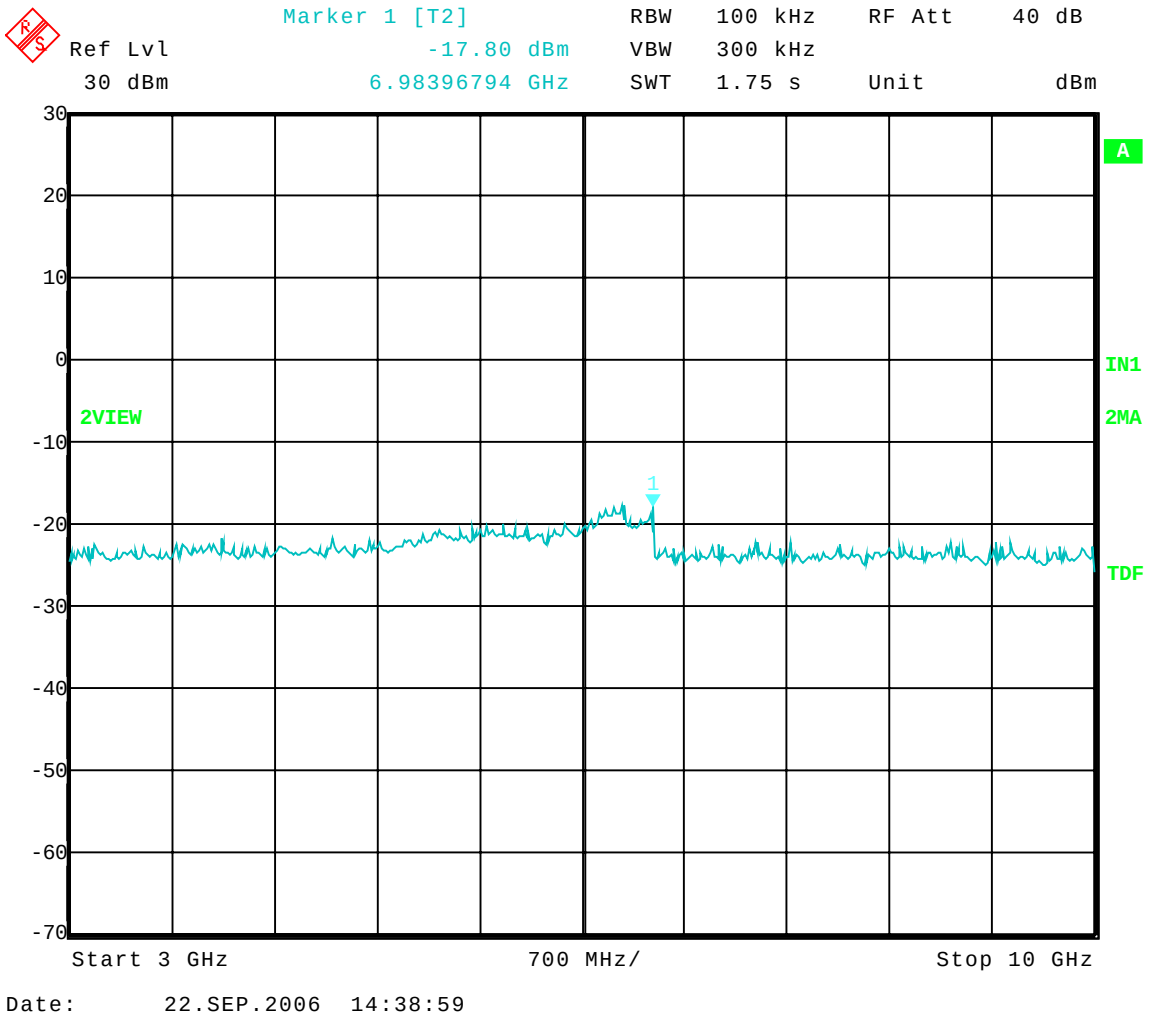
Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: Spurious Emissions - Conducted
Operator: Jason Lauer
Comment: Low Channel; High Power: Frequency – 902.99 MHz
Comment: Modulation – Gen 2 Class 1
Frequency Range: 1 to 3 GHz
Limit = 10.12 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

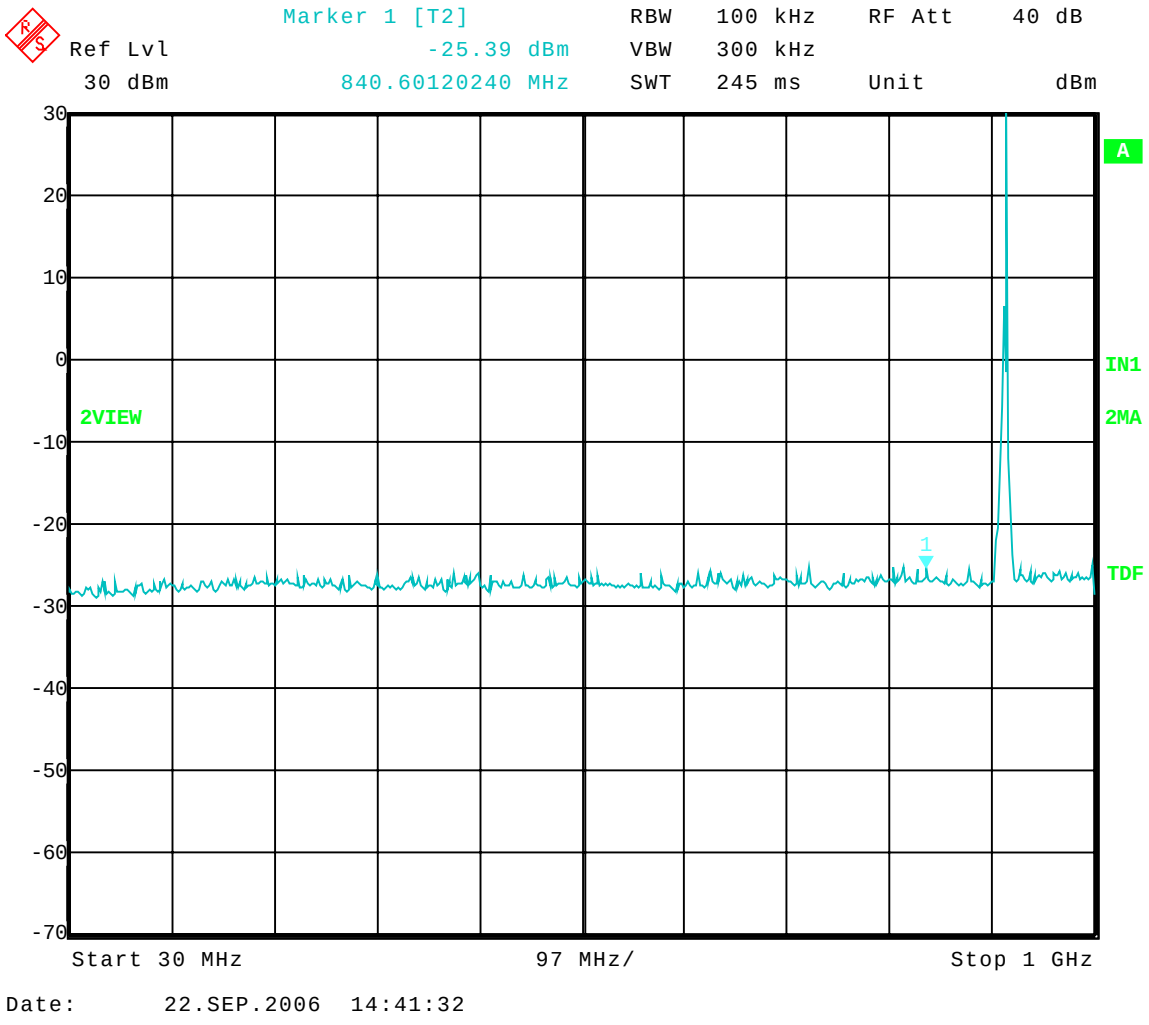
Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: Spurious Emissions - Conducted
Operator: Jason Lauer
Comment: Low Channel; High Power: Frequency – 902.99 MHz
Comment: Modulation – Gen 2 Class 1
Frequency Range: 3 to 10 GHz
Limit = 10.12 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: Spurious Emissions - Conducted
Operator: Jason Lauer
Comment: Middle Channel; High Power: Frequency – 915.13 MHz
Comment: Modulation – Gen 2 Class 1
Frequency Range: 30 to 1000 MHz
Limit = 9.85 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



1250 Peterson Dr., Wheeling, IL 60090

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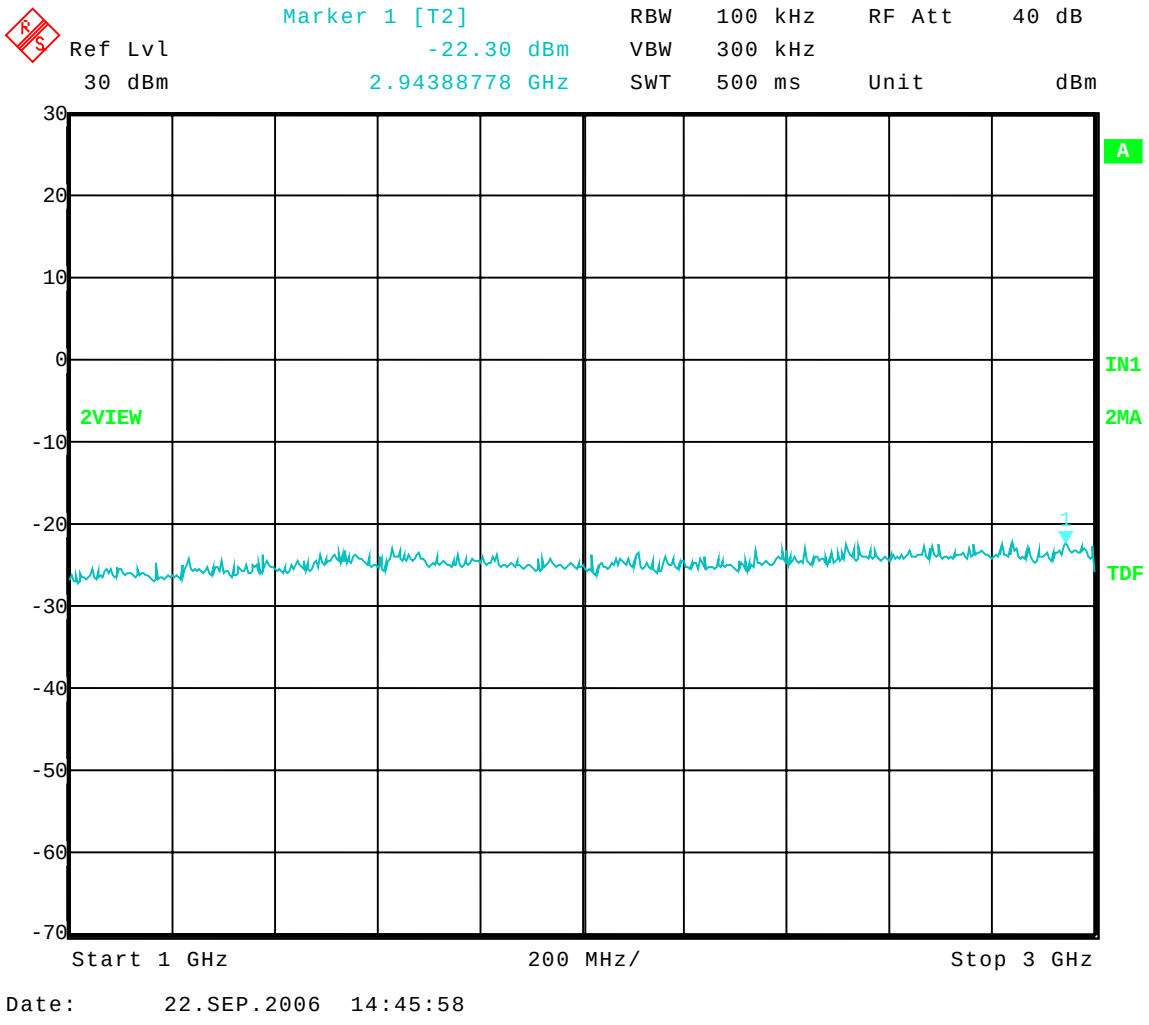

1250 Peterson Dr., Wheeling, IL 60090

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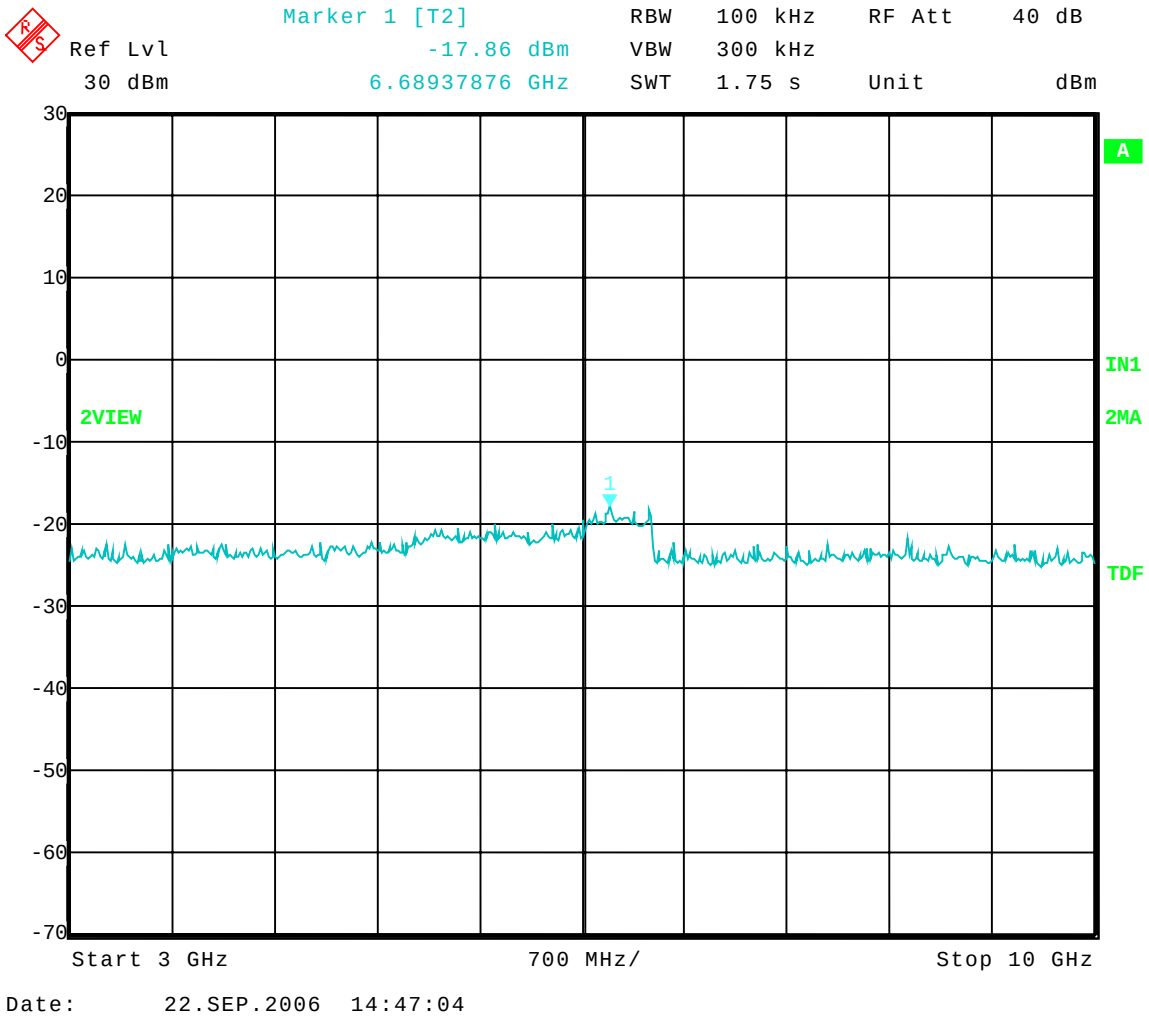

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 9-22-06
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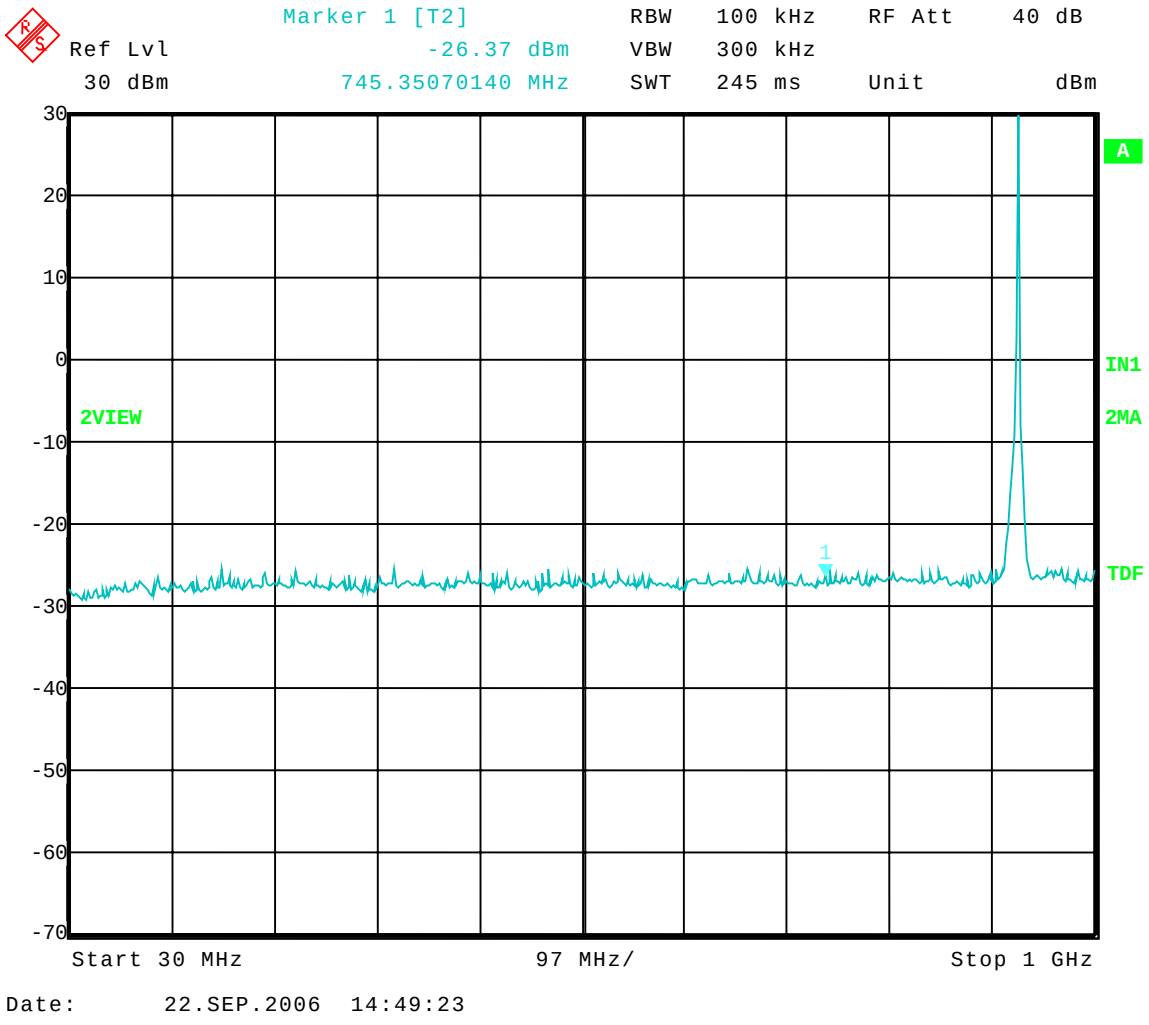
Operator: Jason Lauer
Comment: High Channel; High Power: Frequency – 927.19 MHz
Comment: Modulation – Gen 2 Class 1
Frequency Range: 30 to 1000 MHz
Limit = 9.52 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



1250 Peterson Dr., Wheeling, IL 60090

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Company: Zebra Technologies
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Comment: Modulation – Gen 2 Class 1
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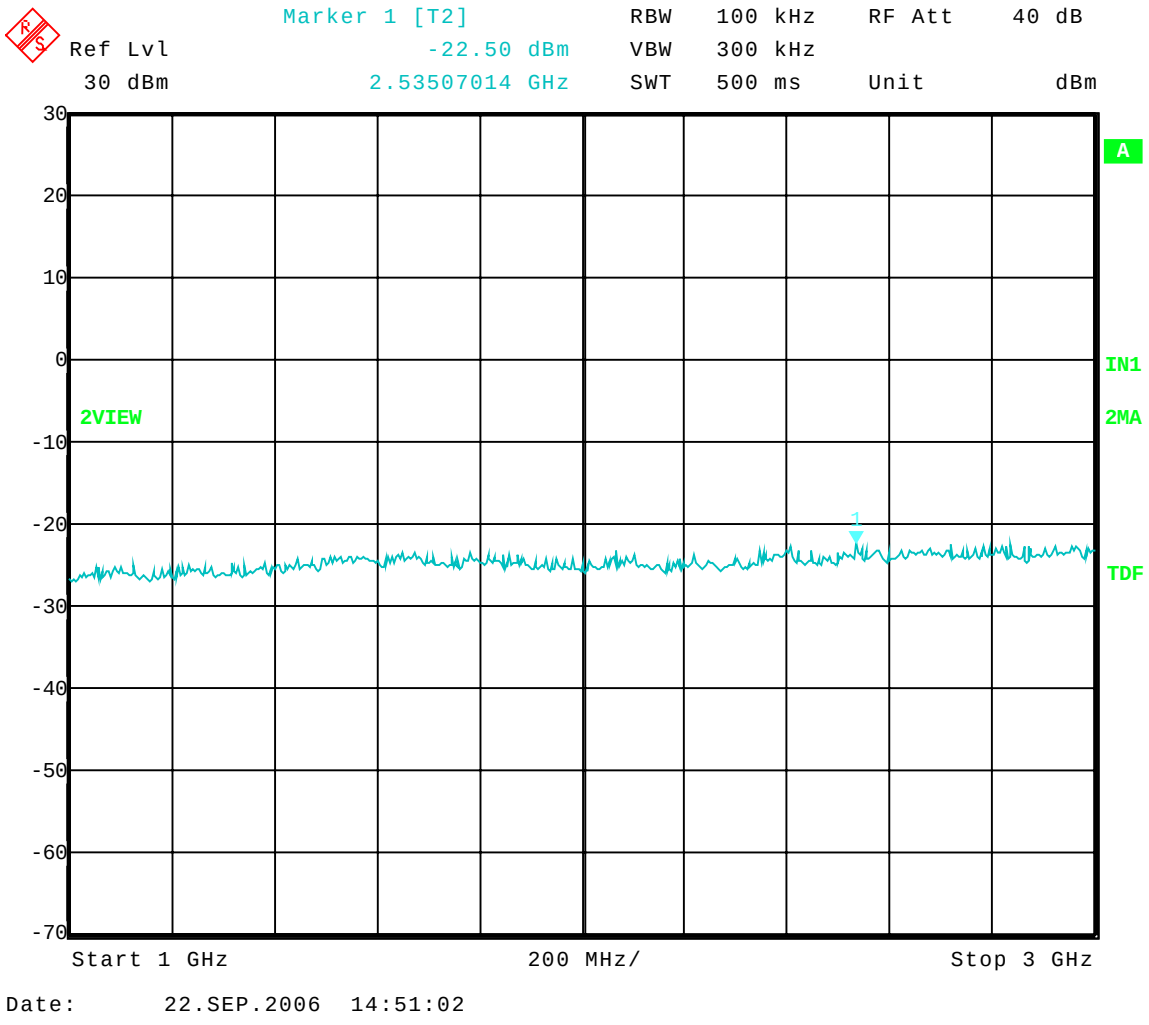

1250 Peterson Dr., Wheeling, IL 60090

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Comment: Modulation – Gen 2 Class 1
Frequency Range: 3 to 10 GHz
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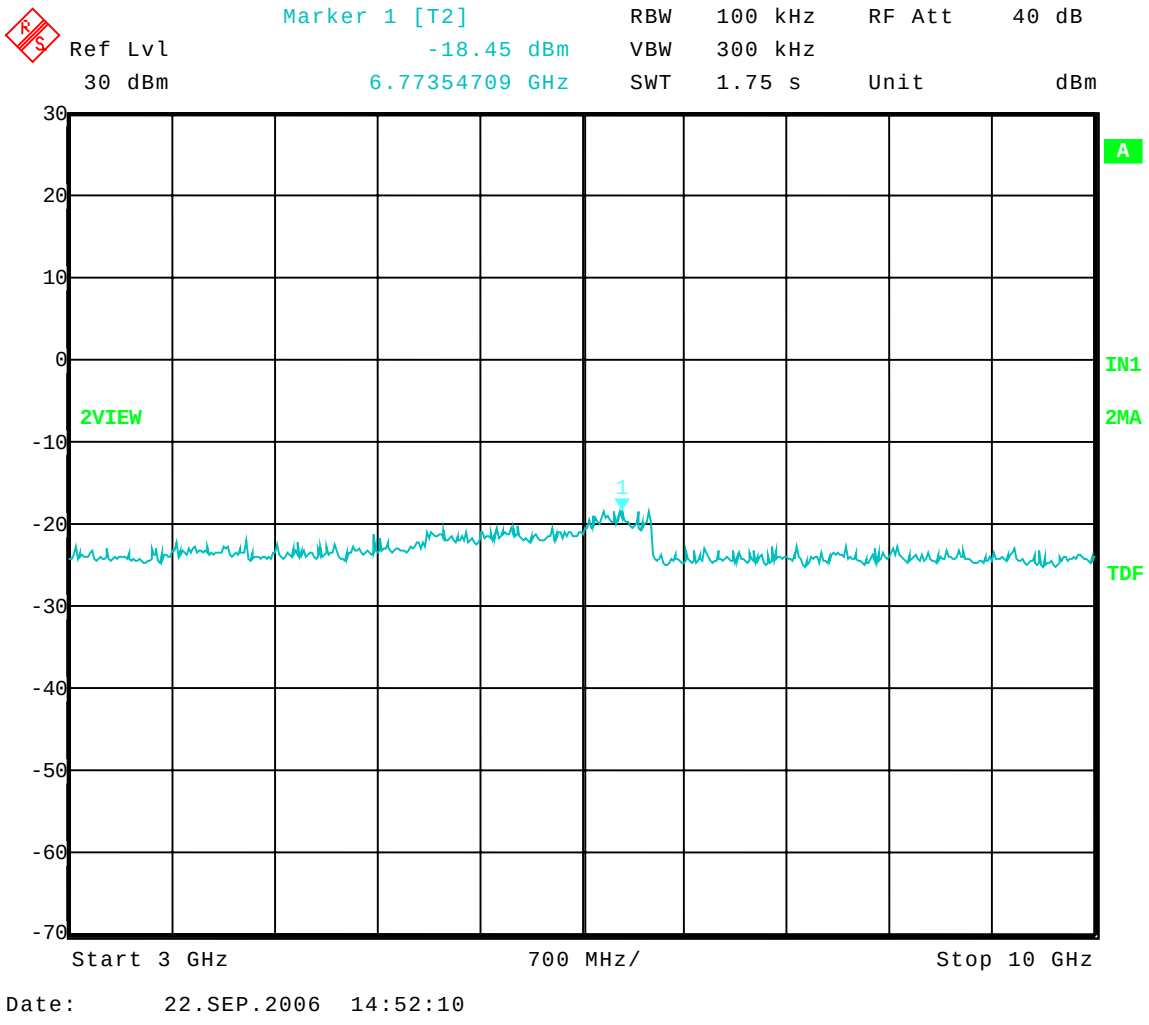
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

CONDUCTED EMISSION DATA AND GRAPH(S)

TAKEN FOR

SPURIOUS EMISSION MEASUREMENTS MADE

AT THE ANTENNA TERMINALS

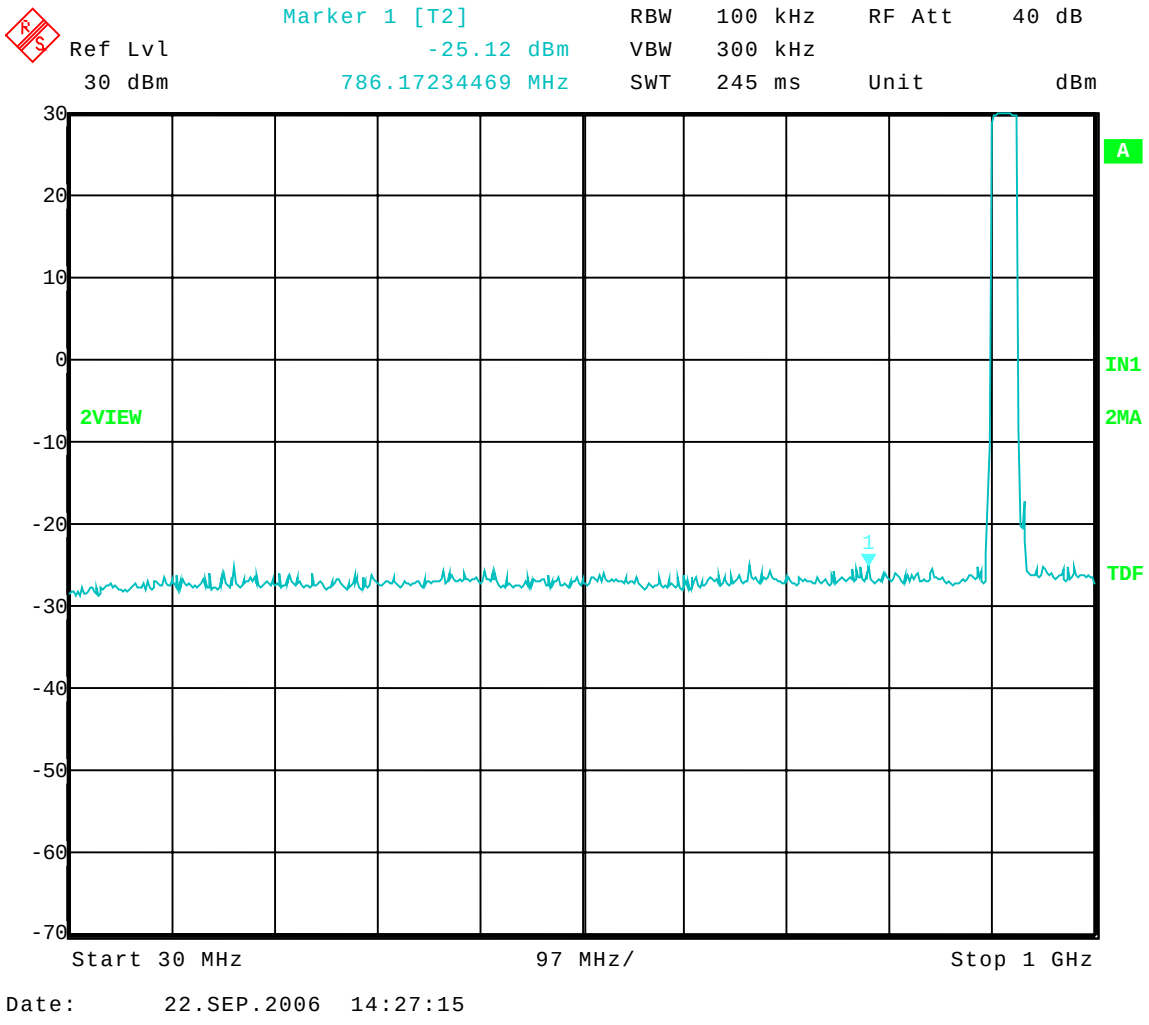
FREQUENCY HOPPING ON

PART 15.247(c)

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

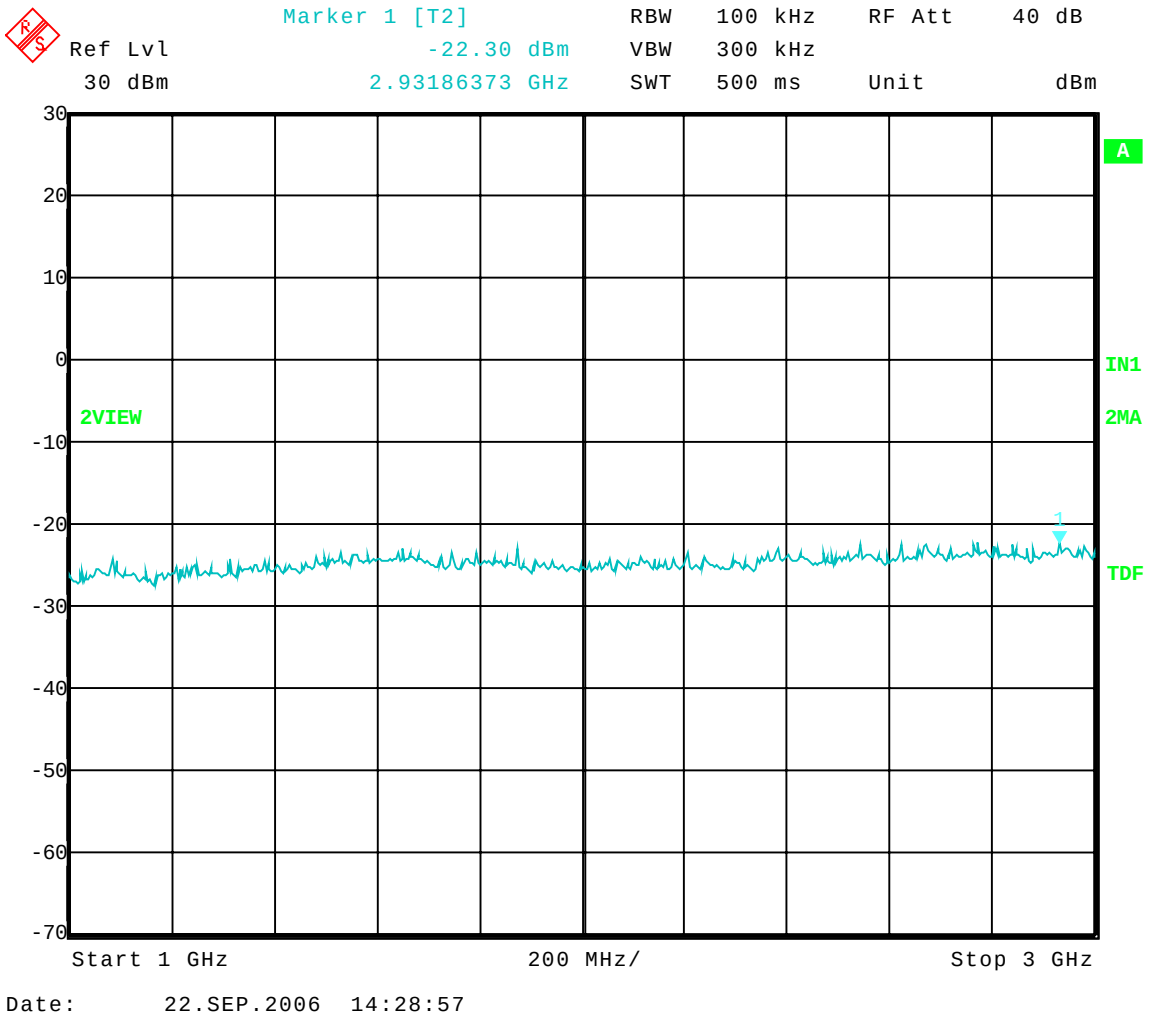
Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: Spurious Emissions - Conducted
Operator: Jason Lauer
Comment: Spread Spectrum - Hopping On
Comment: Modulation – Gen 2 Class 1
Frequency Range: 30 to 1000 MHz
Limit = 9.85 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: Spurious Emissions - Conducted
Operator: Jason Lauer
Comment: Spread Spectrum - Hopping On
Comment: Modulation – Gen 2 Class 1
Frequency Range: 1 to 3 GHz
Limit = 9.85 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



1250 Peterson Dr., Wheeling, IL 60090

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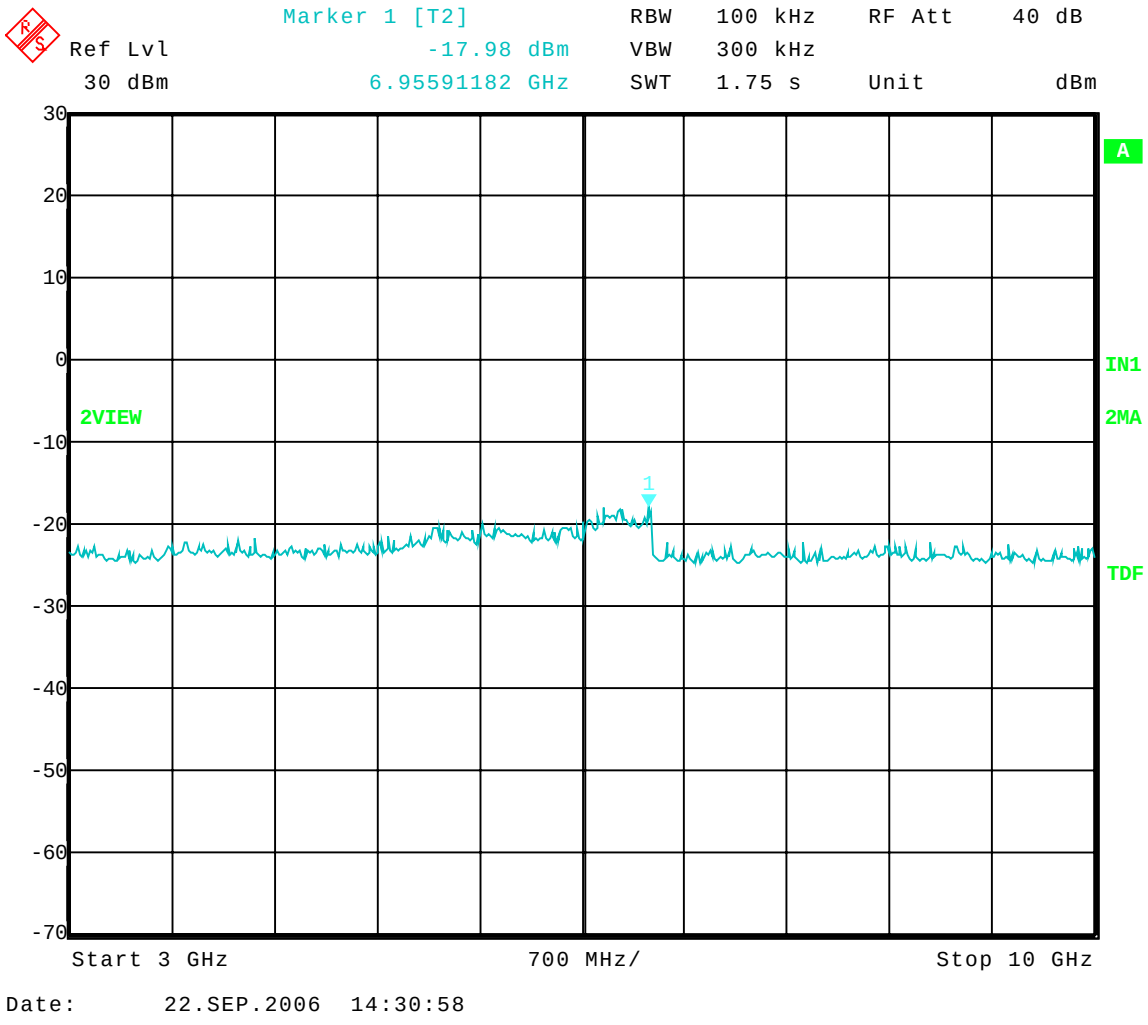
Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: Spurious Emissions - Conducted
Operator: Jason Lauer
Comment: Spread Spectrum - Hopping On
Comment: Modulation – Gen 2 Class 1
Frequency Range: 3 to 10 GHz
Limit = 9.85 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



APPENDIX A

RF CONDUCTED

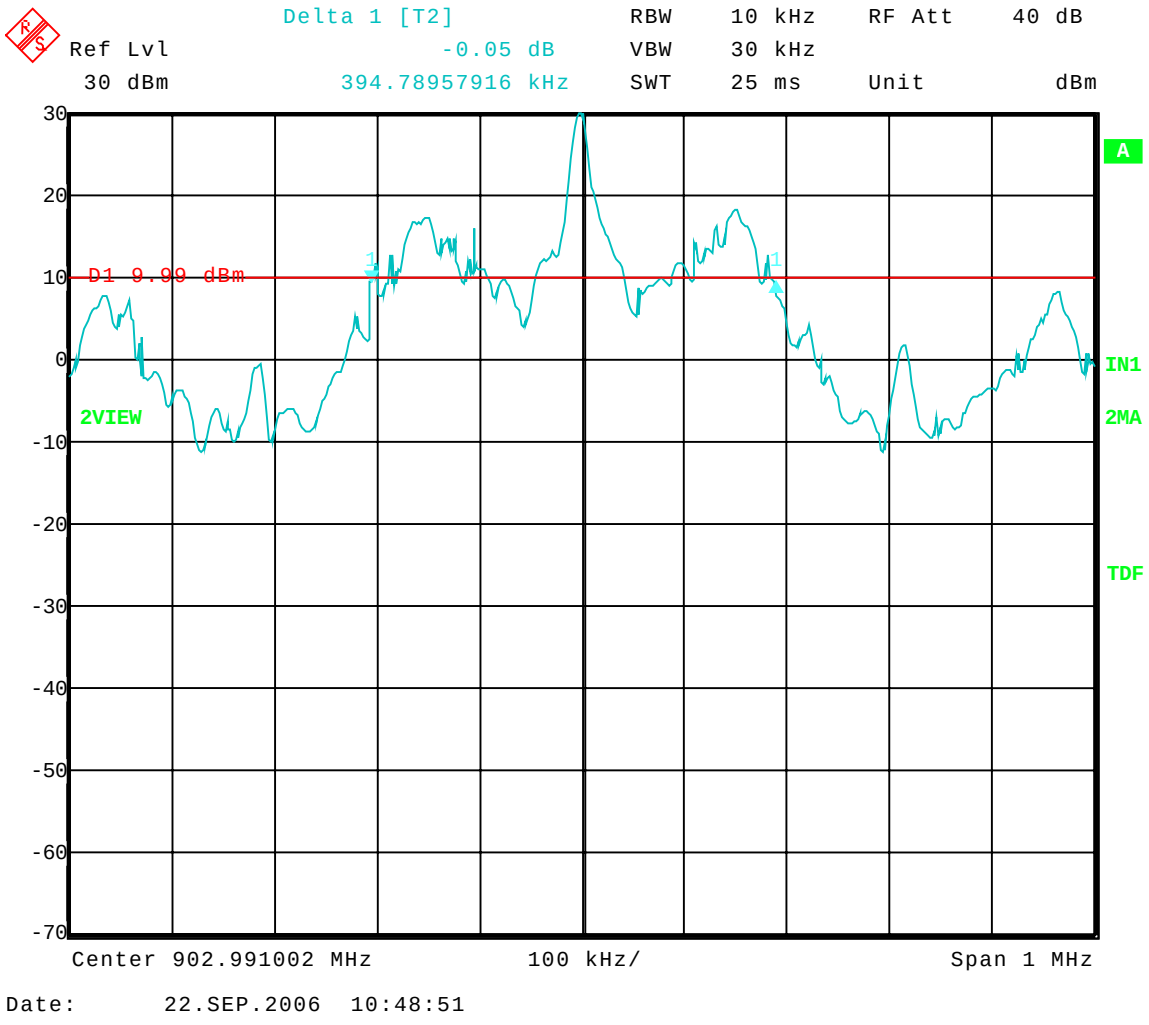
20 dB BANDWIDTH

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: 20 dB Bandwidth - Conducted
Operator: Jason Lauer
Comment: Low Channel; High Power: Frequency – 902.99 MHz
Comment: Modulation – Gen 2 Class 1

20 dB Bandwidth = 394.79 kHz

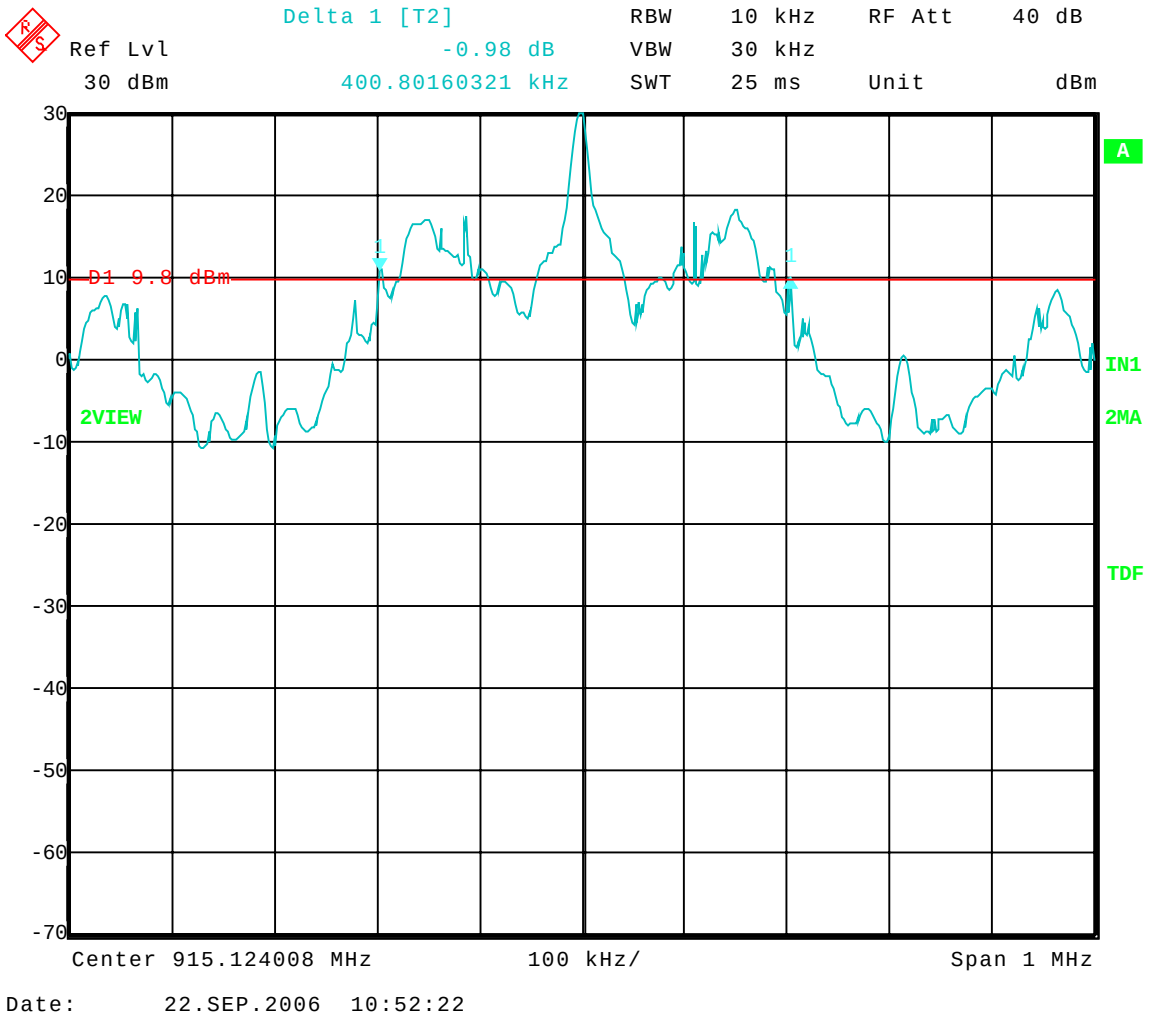


1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: 20 dB Bandwidth - Conducted
Operator: Jason Lauer
Comment: Middle Channel; High Power: Frequency – 915.13 MHz
Comment: Modulation – Gen 2 Class 1

20 dB Bandwidth = 400.80 kHz

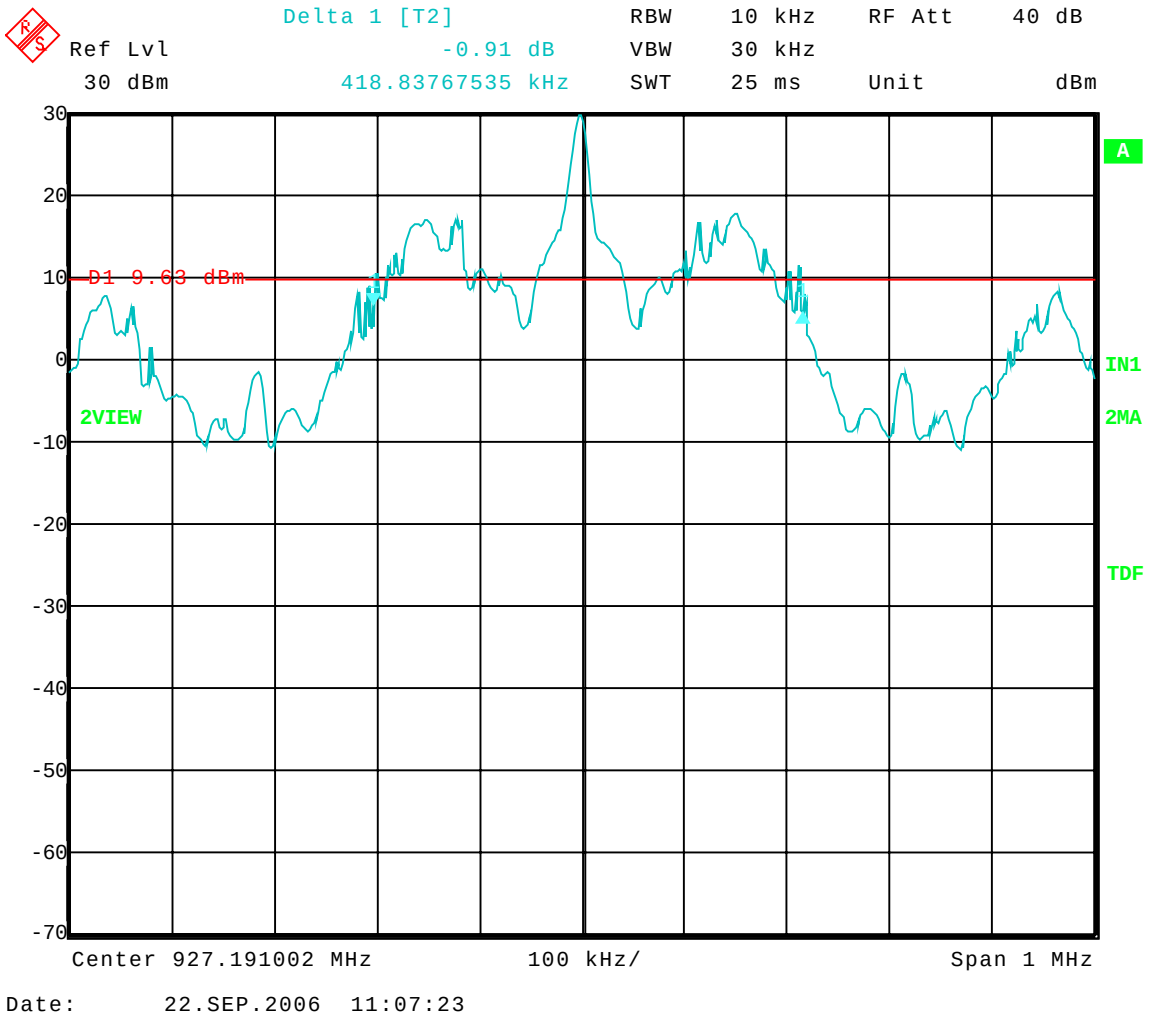


1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: 20 dB Bandwidth - Conducted
Operator: Jason Lauer
Comment: High Channel; High Power: Frequency – 927.19 MHz
Comment: Modulation – Gen 2 Class 1

20 dB Bandwidth = 418.84 kHz



APPENDIX A

RF CONDUCTED

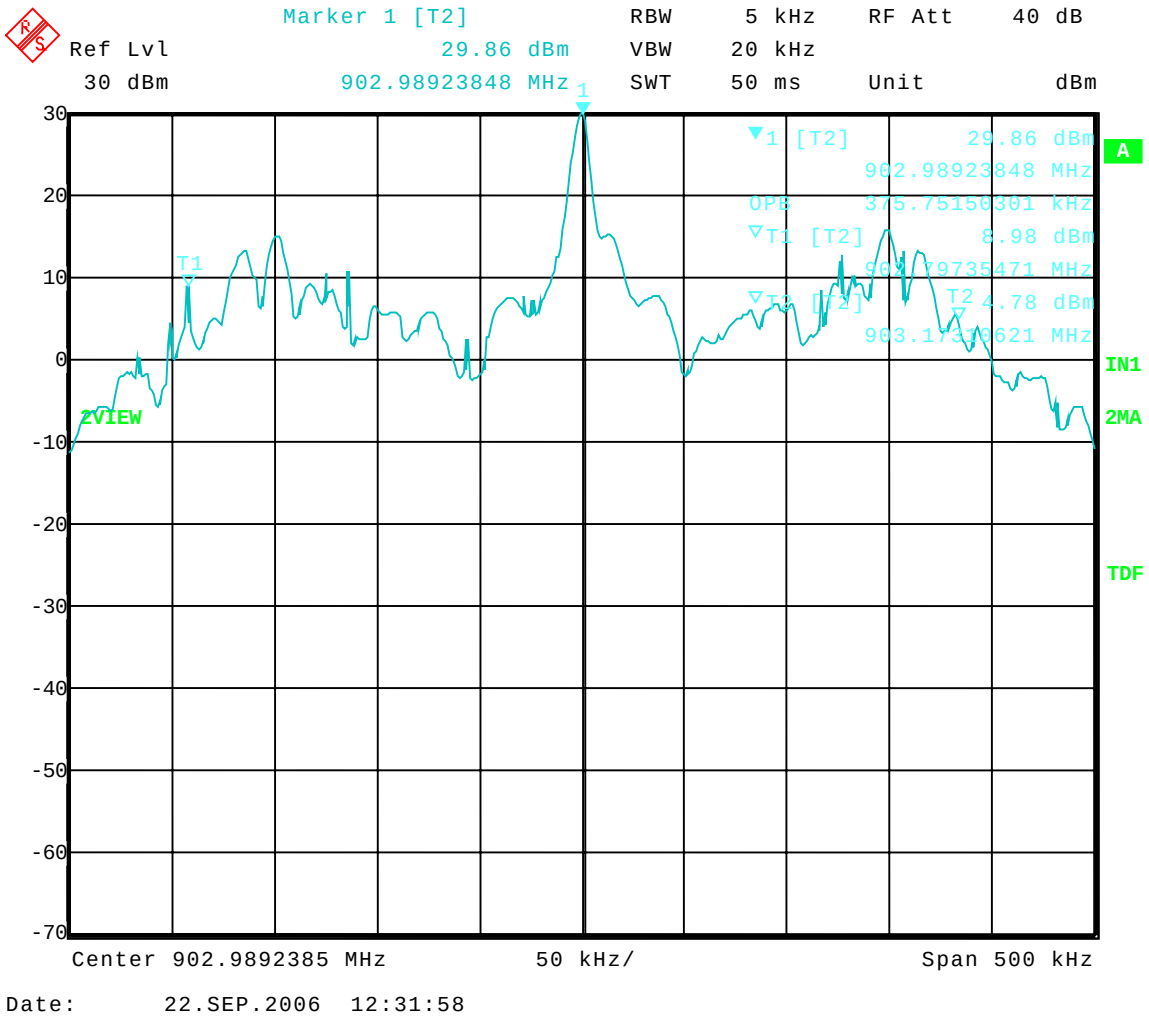
99% BANDWIDTH

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: 99 % Bandwidth - Conducted
Operator: Jason Lauer
Comment: Low Channel; High Power: Frequency – 902.99 MHz
Comment: Modulation – Gen 2 Class 1

99 % Bandwidth = 375.75 kHz

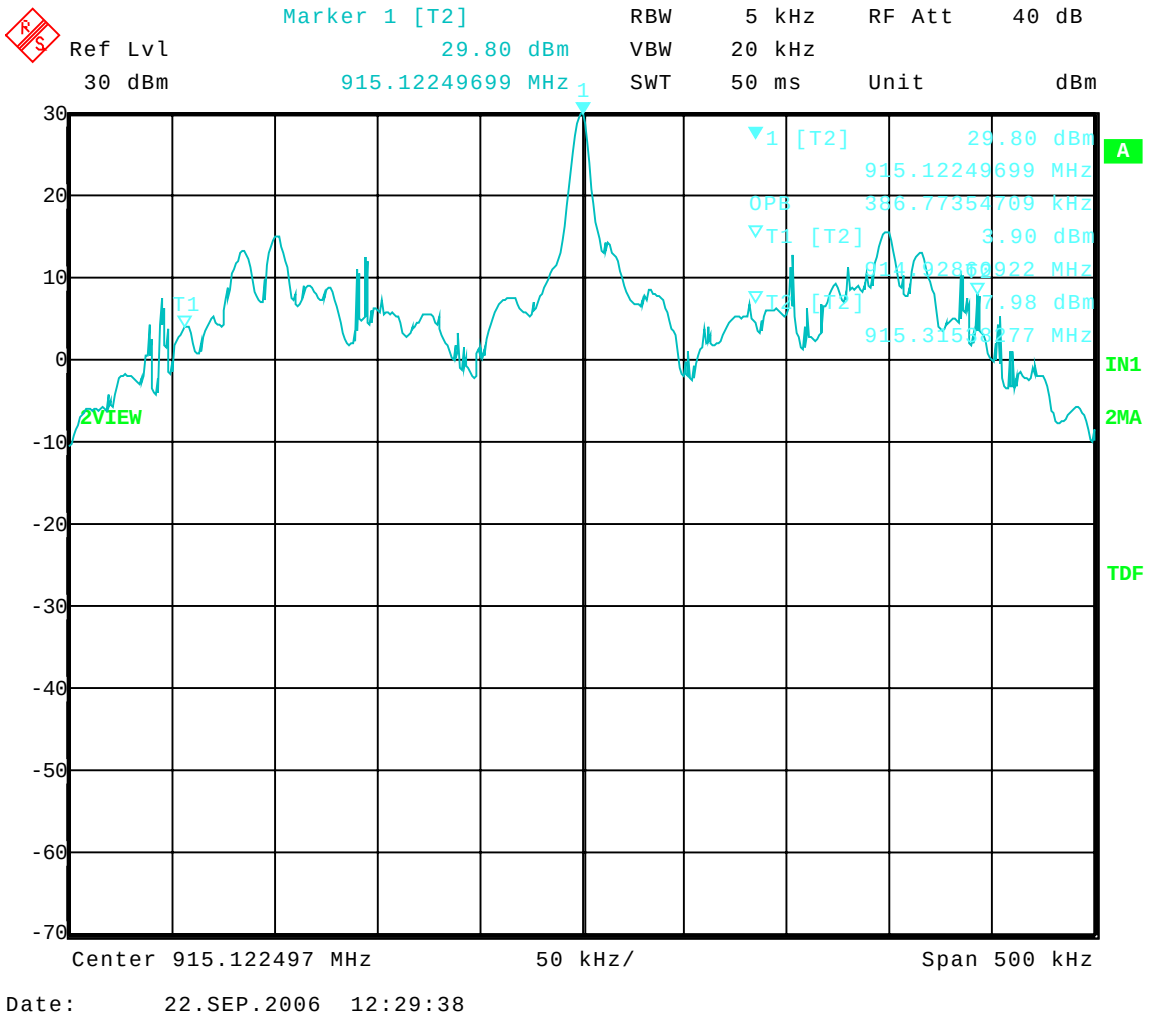


1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: 99 % Bandwidth - Conducted
Operator: Jason Lauer
Comment: Middle Channel; High Power: Frequency – 915.13 MHz
Comment: Modulation – Gen 2 Class 1

99 % Bandwidth = 386.77 kHz

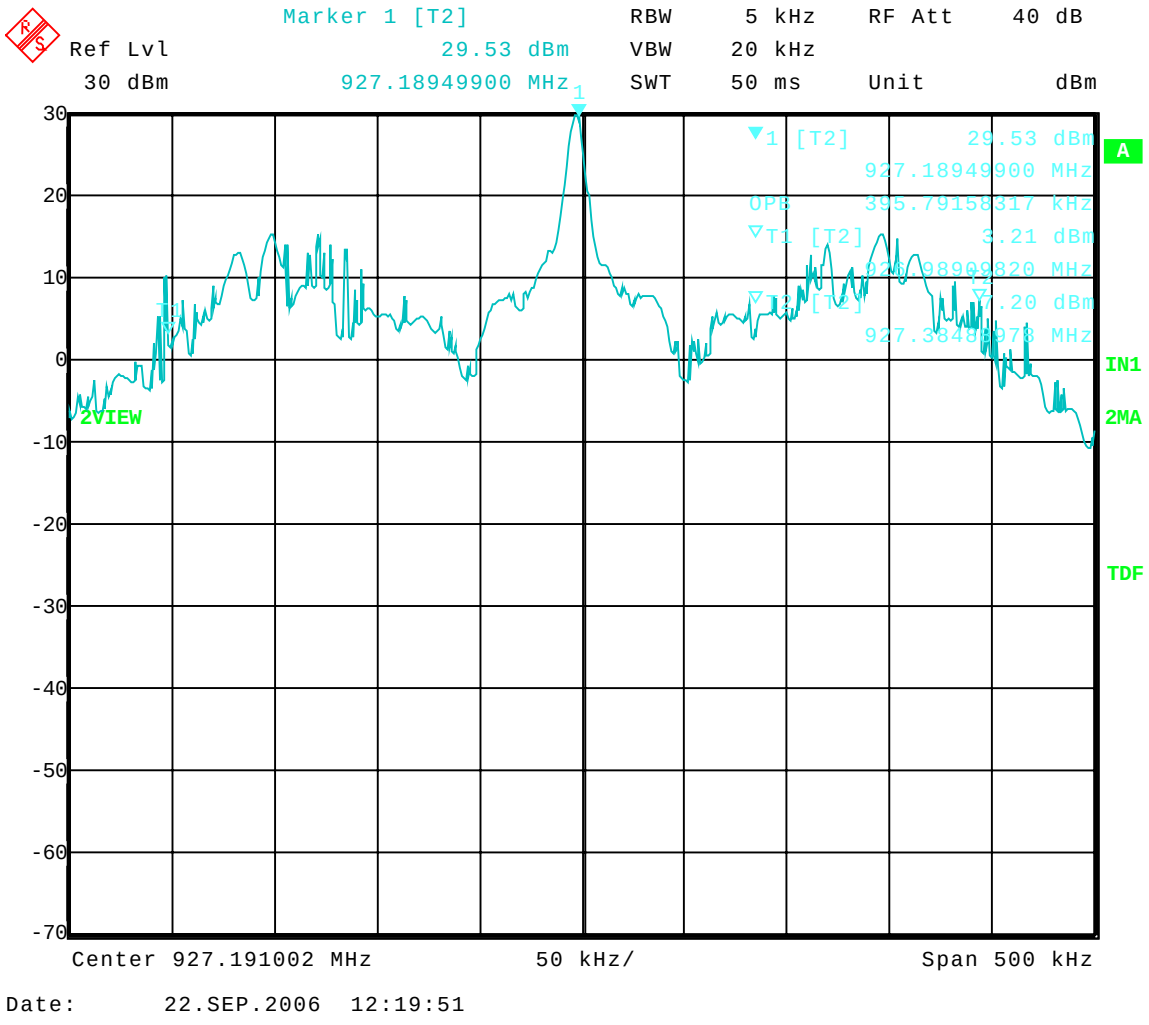


1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: 99 % Bandwidth - Conducted
Operator: Jason Lauer
Comment: High Channel; High Power: Frequency – 927.19 MHz
Comment: Modulation – Gen 2 Class 1

99 % Bandwidth = 395.79 kHz

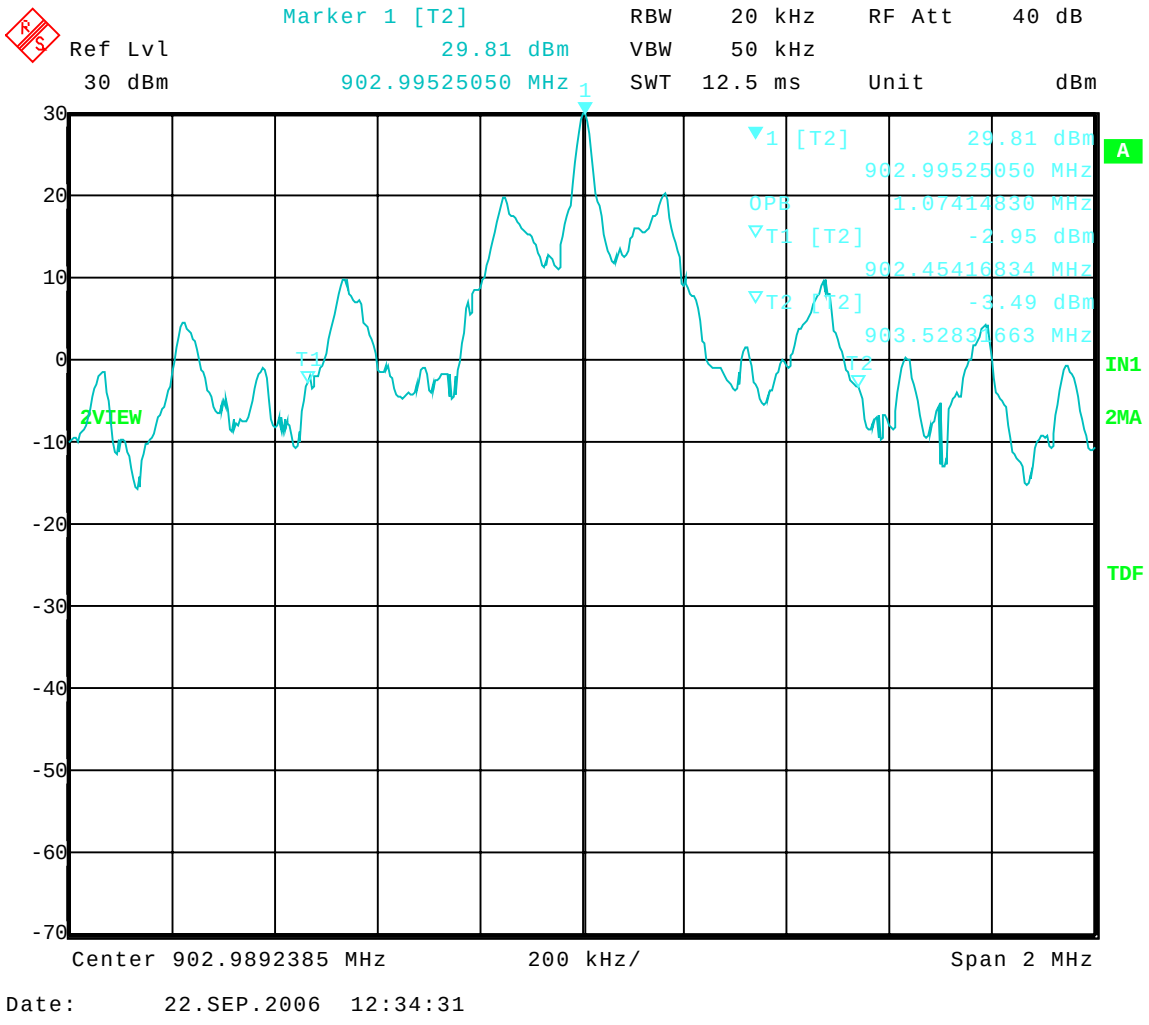


1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: 99 % Bandwidth - Conducted
Operator: Jason Lauer
Comment: Low Channel; High Power: Frequency – 902.99 MHz
Comment: Modulation – Gen 2 Class 1

99 % Bandwidth = 1.074 MHz (wide)

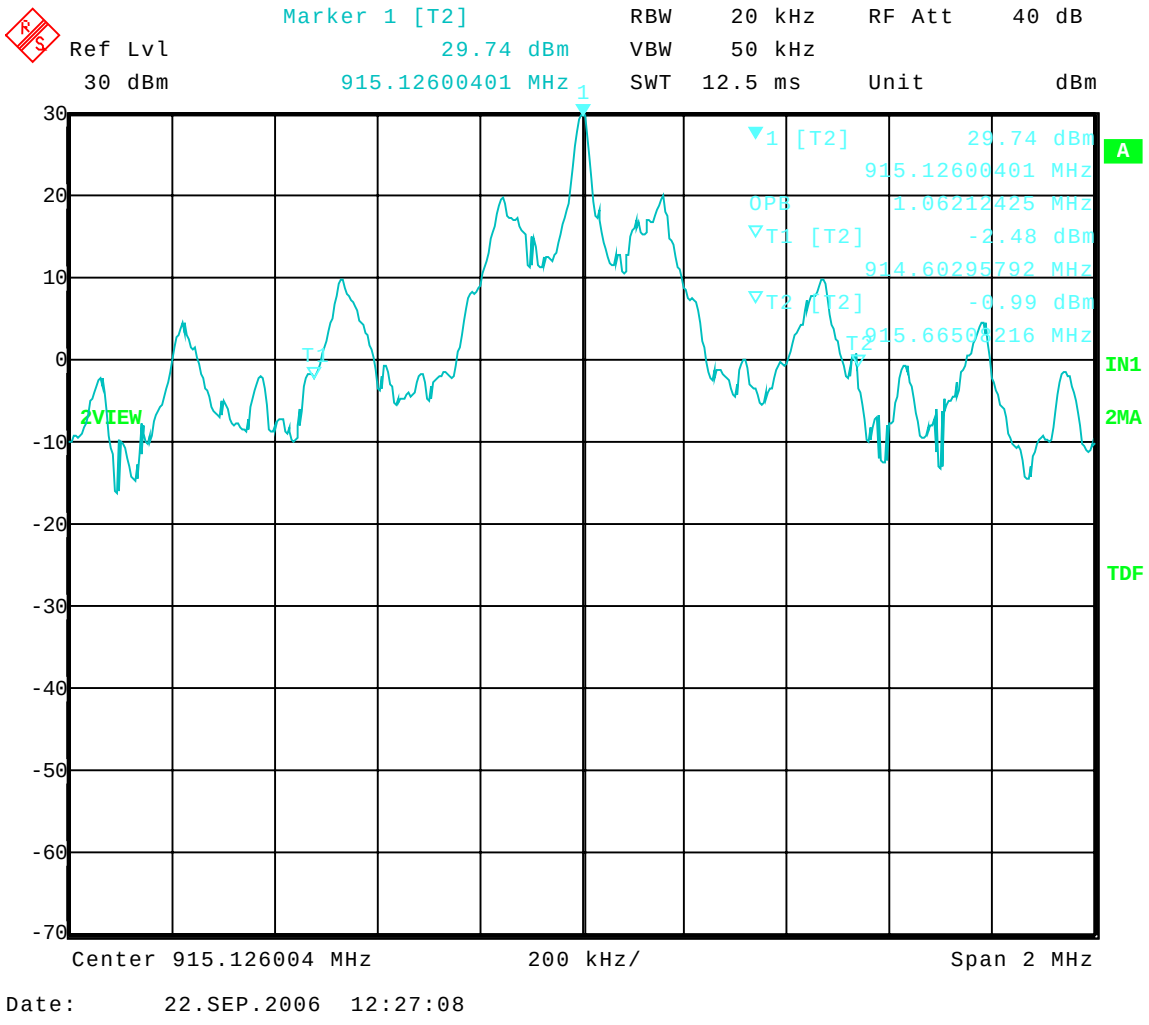


1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: 99 % Bandwidth - Conducted
Operator: Jason Lauer
Comment: Middle Channel; High Power: Frequency – 915.13 MHz
Comment: Modulation – Gen 2 Class 1

99 % Bandwidth = 1.062 MHz (wide)

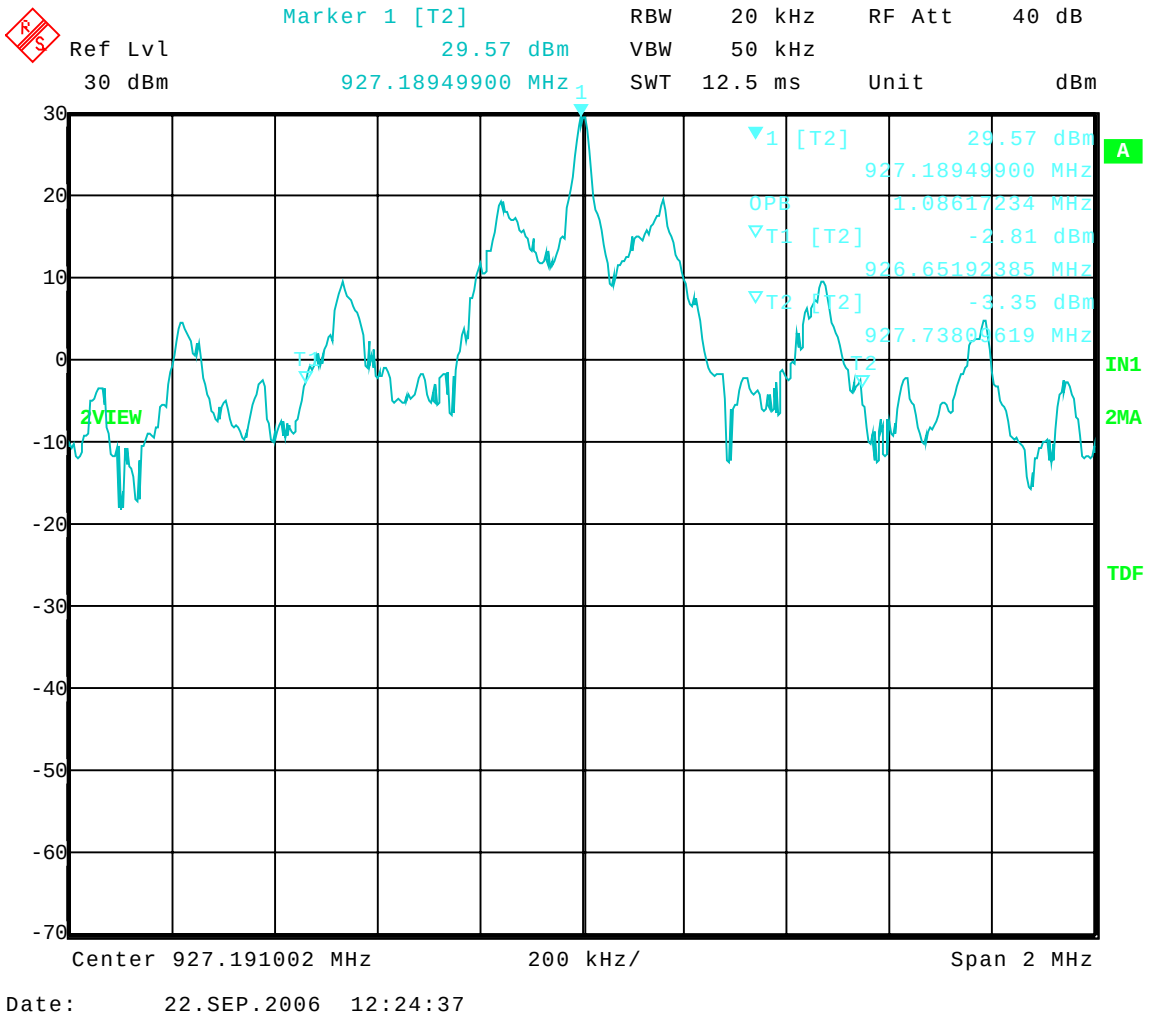


1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: 20 dB Bandwidth - Conducted
Operator: Jason Lauer
Comment: High Channel; High Power: Frequency – 927.19 MHz
Comment: Modulation – Gen 2 Class 1

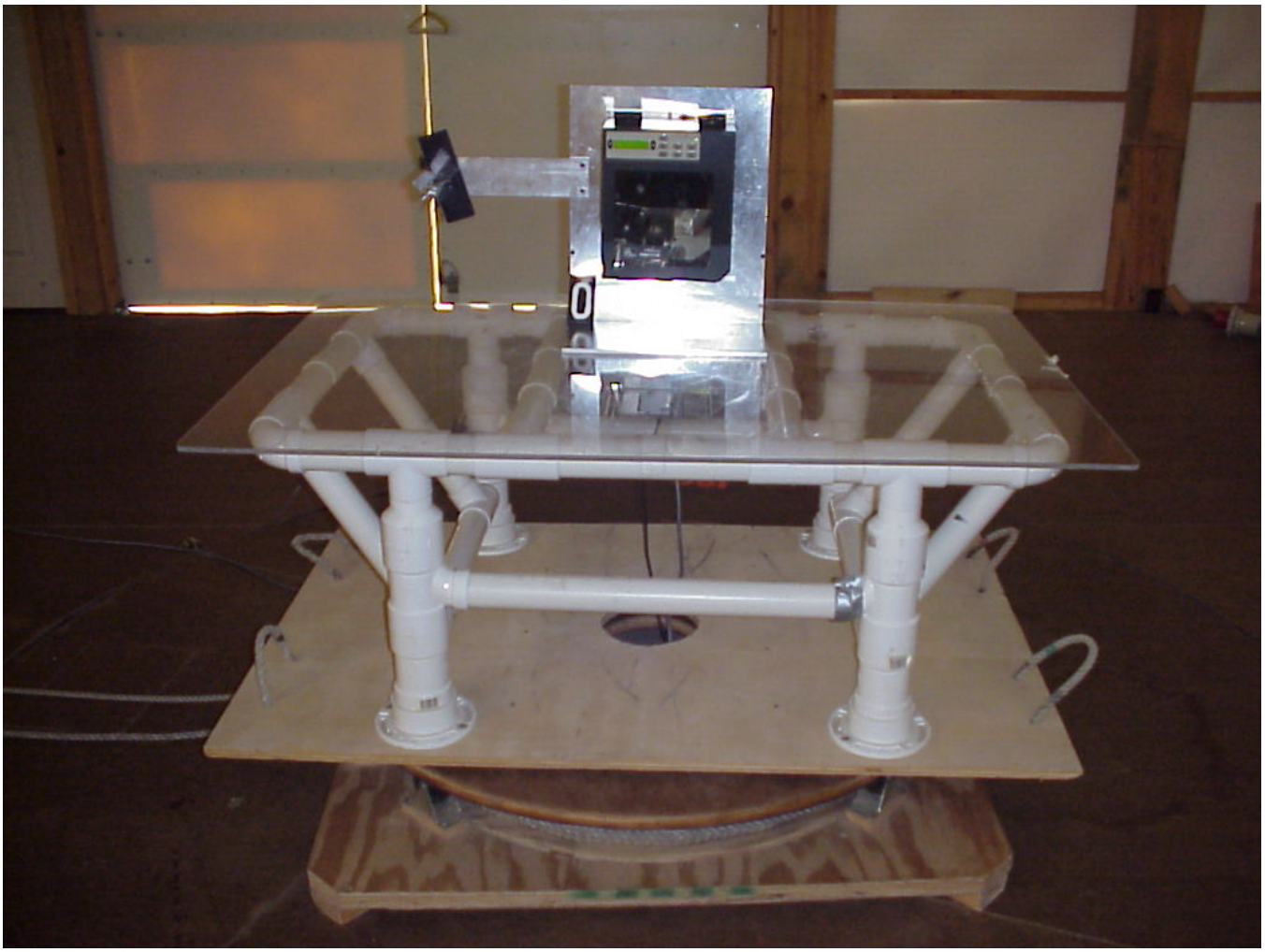
99 % Bandwidth = 1.086 MHz (Wide)



1250 Peterson Dr., Wheeling, IL 60090

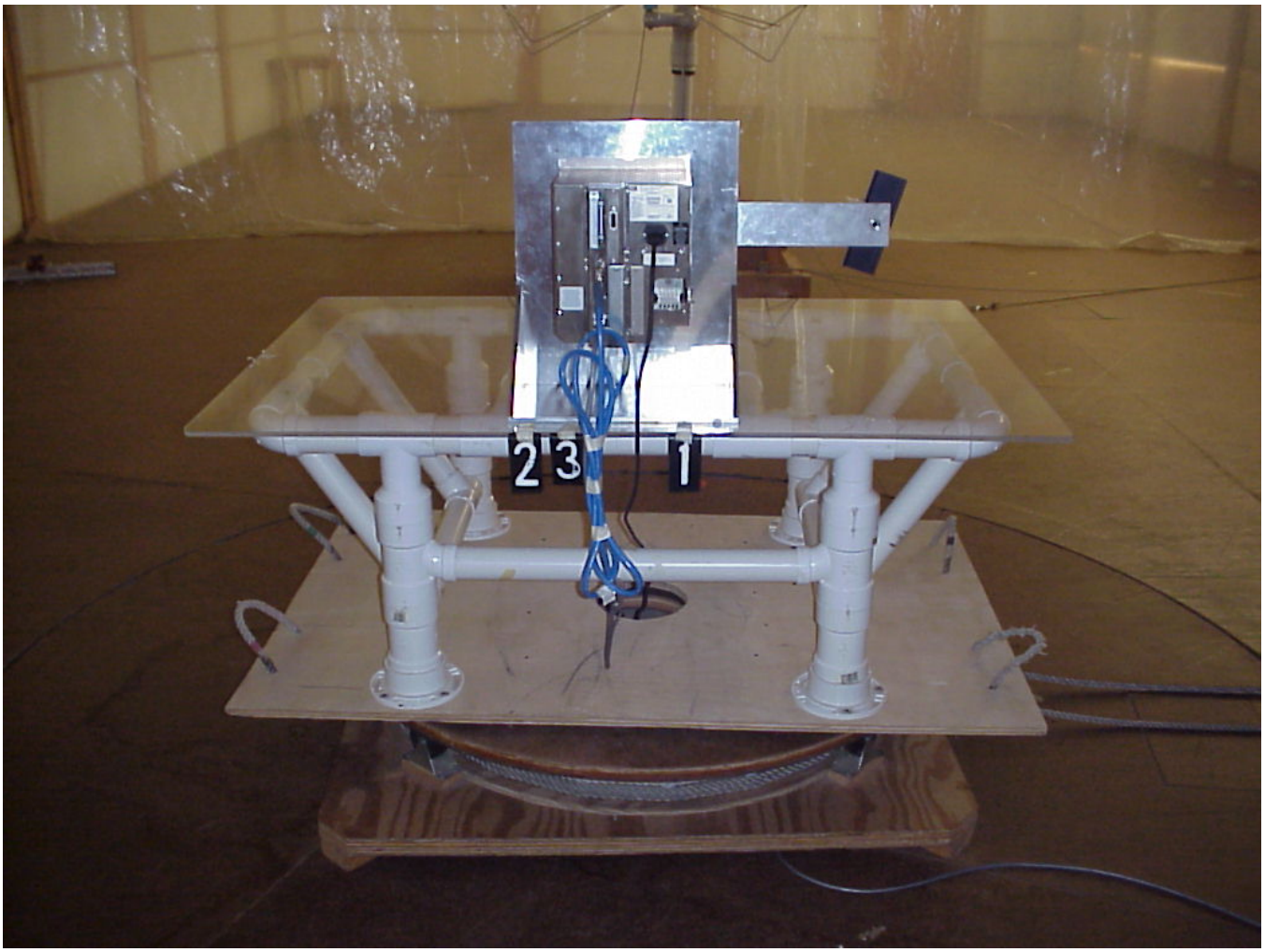
APPENDIX A

3.0 CONDUCTED EMISSIONS (ANTENNA TERMINAL) PHOTOS TAKEN DURING TESTING



APPENDIX A

3.0 CONDUCTED EMISSIONS (ANTENNA TERMINAL) PHOTOS TAKEN DURING TESTING



1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

4.0 RESTRICTED BANDS

As stated in Section 15.205a, the fundamental emission from the ZM4e shall not fall within any of the bands listed below:

Frequency in MHz	Frequency in MHz	Frequency in MHz	Frequency in GHz
.0900 to .1100	162.0125 to 167.17	2310.0 to 2390	9.30 to 9.50
.4900 to .5100	167.7200 to 173.20	2483.5 to 2500	10.60 to 12.70
2.1735 to 2.1905	240.000 to 285.00	2655.0 to 2900	13.25 to 13.40
8.362 to 8.3660	322.200 to 335.40	3260.0 to 3267	14.47 to 14.50
13.36 to 13.410	399.900 to 410.00	3332.0 to 3339	15.35 to 16.20
25.50 to 25.670	608.000 to 614.00	3345.8 to 3358	17.70 to 21.40
37.50 to 38.250	960.000 to 1240.00	3600.0 to 4400	22.01 to 23.13
73.00 to 75.500	1300.000 to 1427.00	4500.0 to 5250	23.60 to 24.00
108.00 to 121.94	1435.000 to 1626.50	5350.0 to 5450	31.20 to 31.80
123.00 to 138.00	1660.000 to 1710.00	7250.0 to 7750	36.43 to 36.50
149.90 to 150.00	1718.800 to 1722.20	8025.0 to 8500	ABOVE 38.60
156.70 to 156.90	2200.000 to 2300.00	9000.0 to 9200	

NOTE:

The noise floor within the Restricted Bands for the EMC Receiver and HP Spectrum Analyzer will typically lay 20 dB below the limit.

5.0 BAND EDGE AND RESTRICT BAND COMPLIANCE

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the attenuation below the general limits specified in 15.209 is not required.

The field strength of any **radiated emissions** which fall within the restricted bands shall not exceed the general radiated emissions limits as stated Section 15.209.

NOTE: See the following page(s) for the graph(s) made showing compliance for Band Edge and Restrict Band:

APPENDIX A

DATA AND GRAPH(S) TAKEN SHOWING

THE BAND EDGE AND

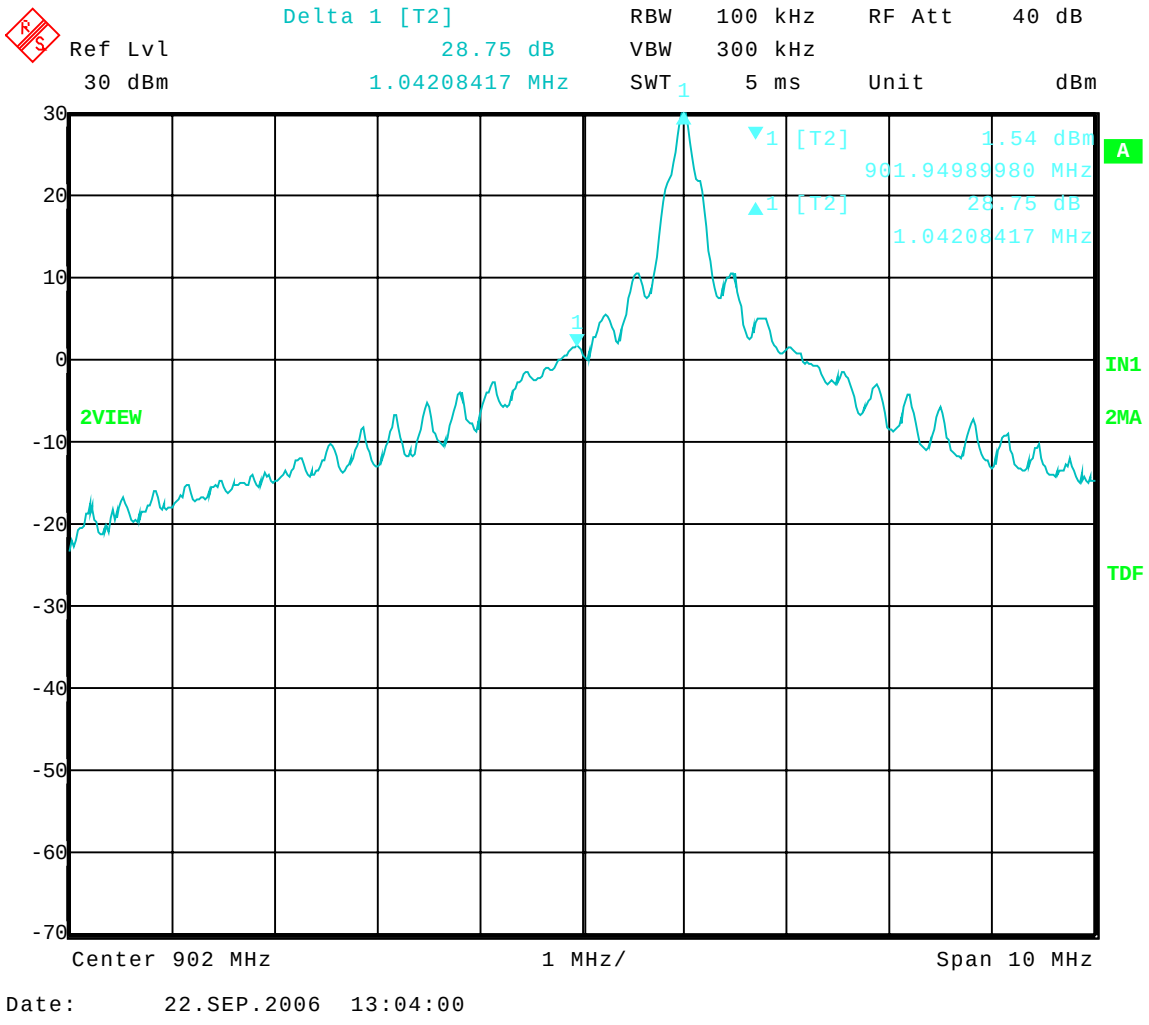
RESTRICT BAND COMPLIANCE

PART 15.247(c)

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

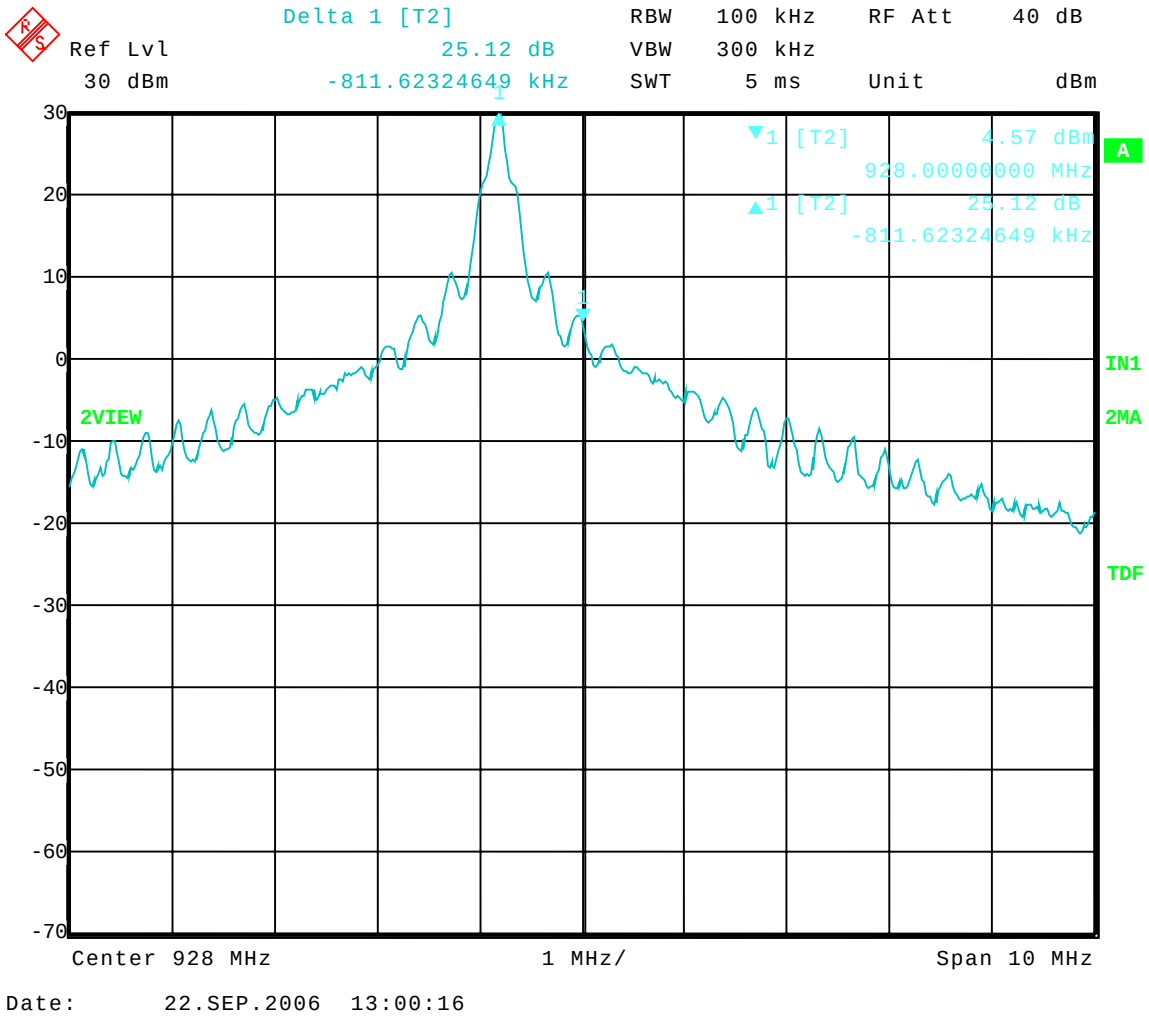
Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: Low Band-Edge Compliance - Conducted
Operator: Jason Lauer
Comment: Low Channel: Frequency – 902.99 MHz
Comment: Modulation – Gen 2 Class 1
Band-Edge Frequency = 902 MHz
Band-Edge > 20 dB Below Peak In-Band Emission



1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

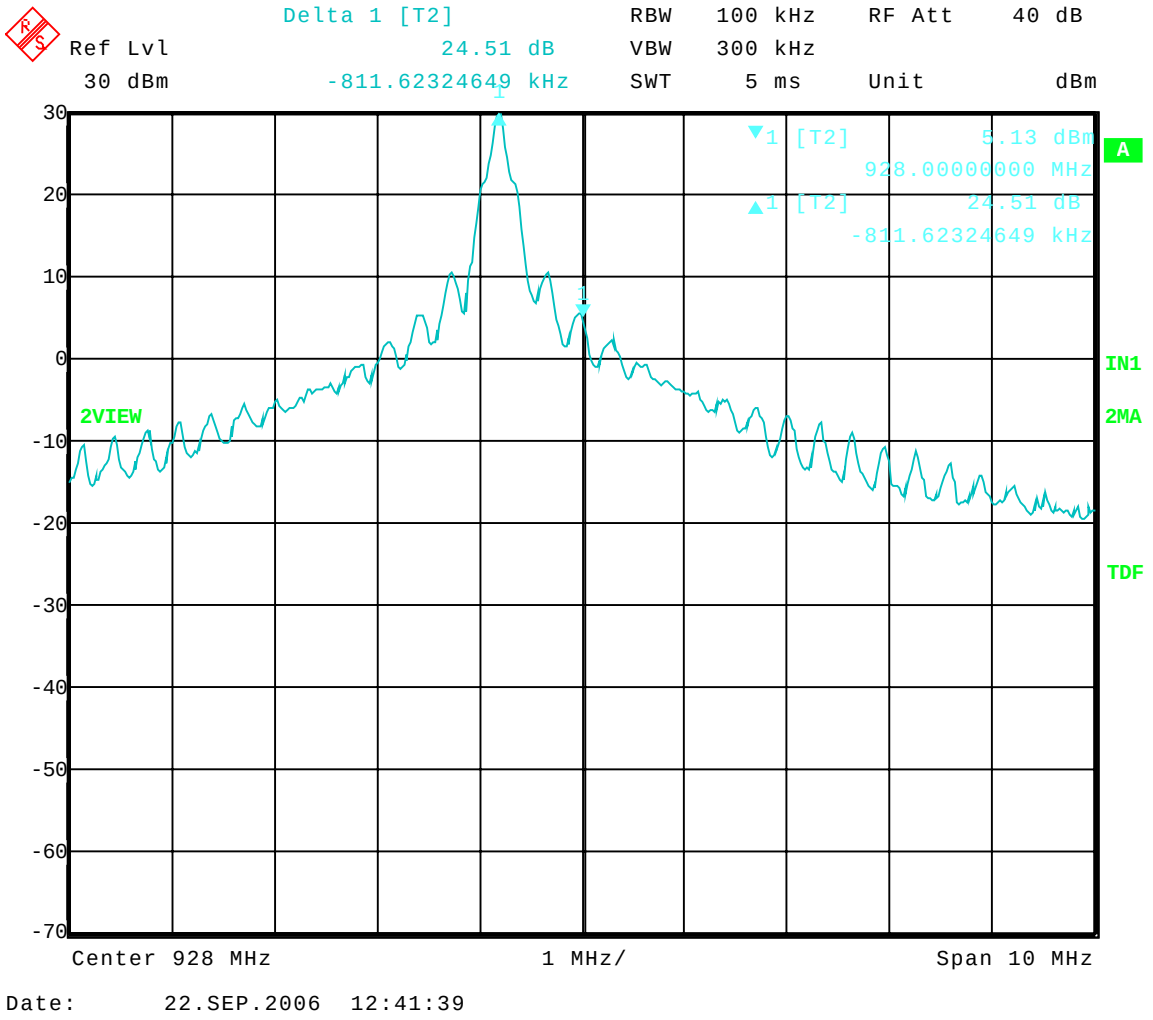
Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: High Band-Edge Compliance - Conducted
Operator: Jason Lauer
Comment: High Channel; High Power: Frequency – 927.19 MHz
Comment: Modulation – Gen 2 Class 1
Band-Edge Frequency = 928 MHz
Band-Edge > 20 dB Below Peak In-Band Emission



1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Band-Edge Frequency = 928 MHz
Band-Edge > 20 dB Below Peak In-Band Emission



1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

RF CONDUCTED 20 dBm

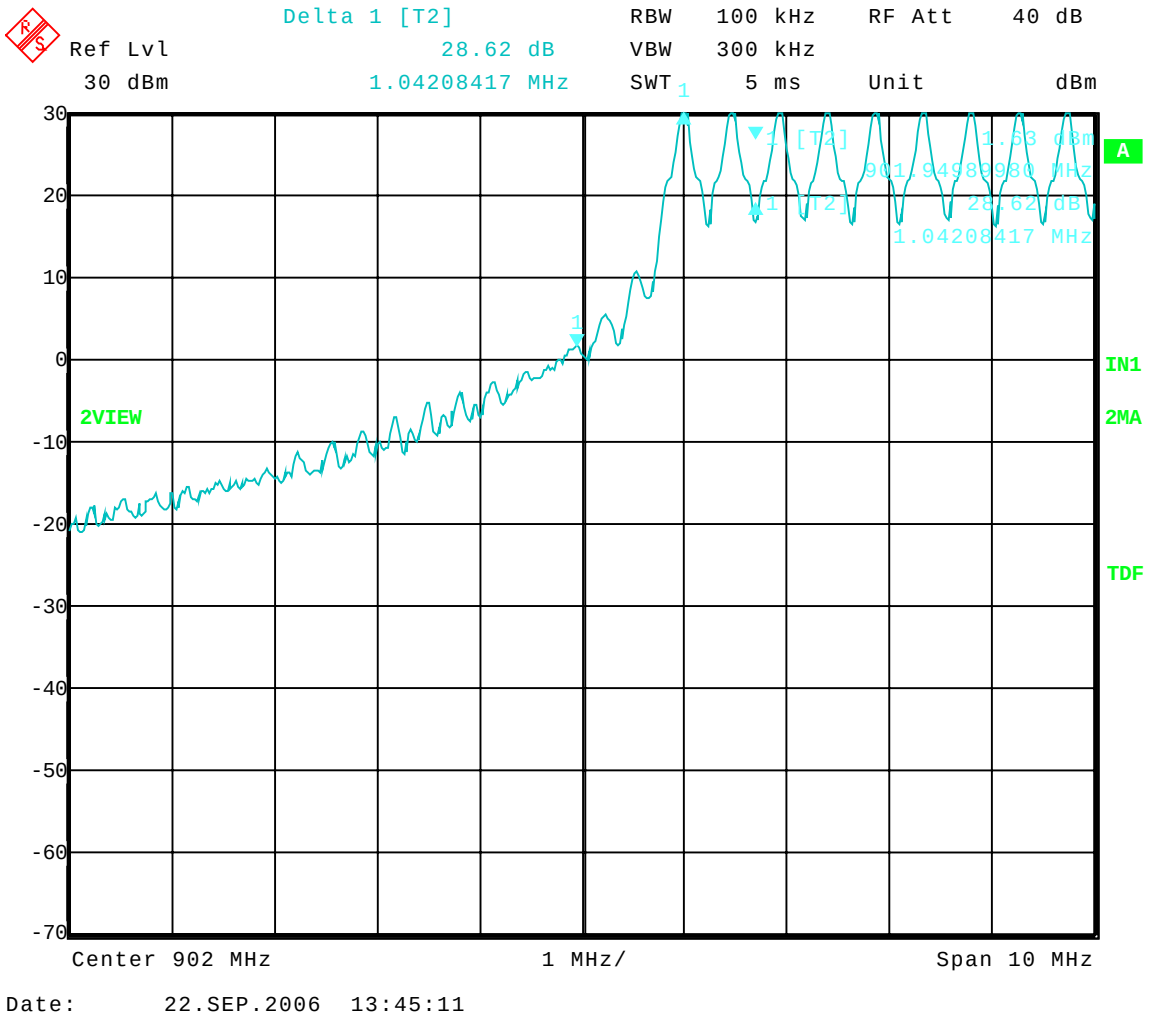
BAND EDGE COMPLIANCE

FREQUENCY HOPPING ON

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

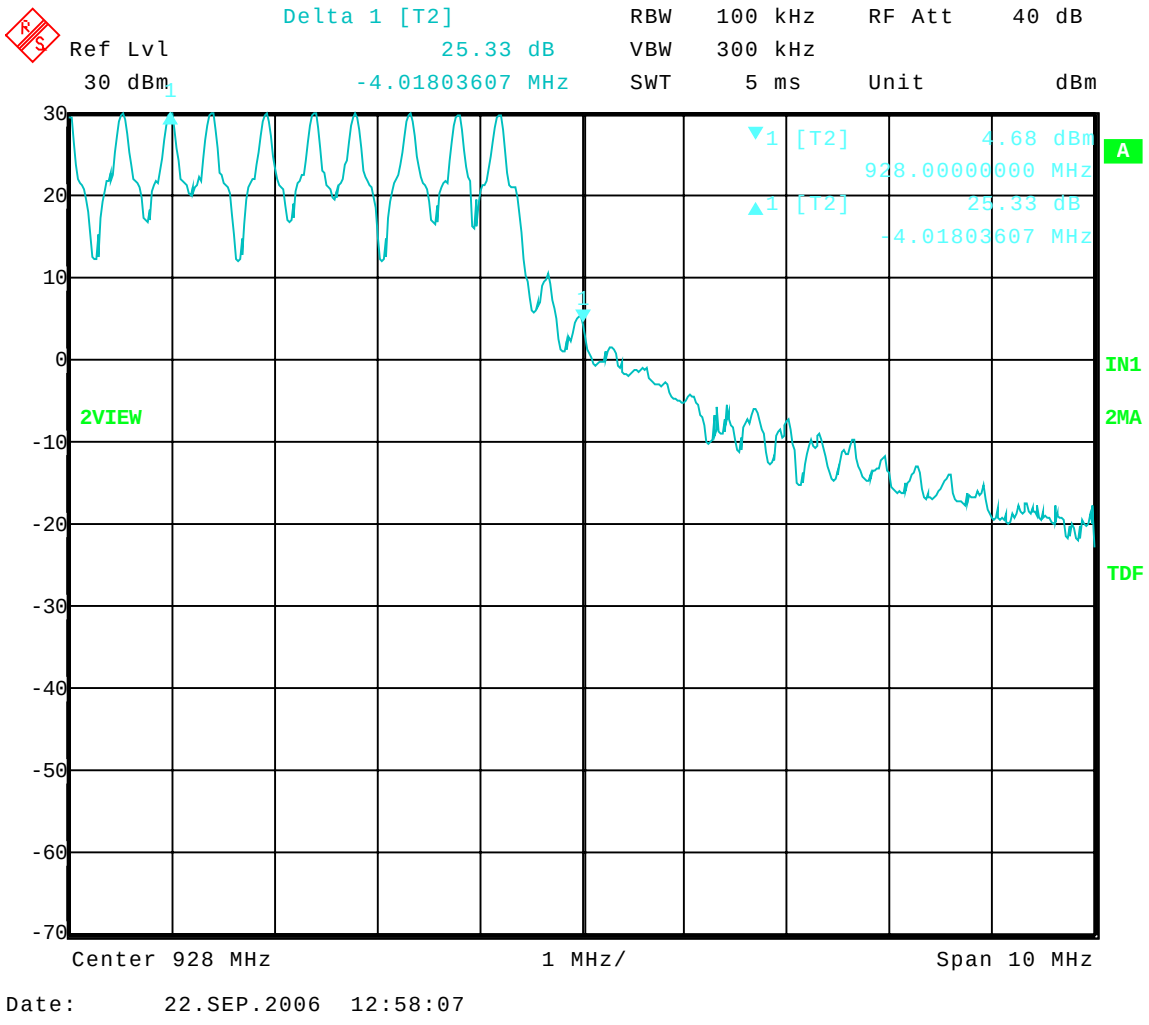
Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: Low Band-Edge Compliance - Conducted
Operator: Jason Lauer
Comment: Spread Spectrum Frequency Hopping On
Comment: Modulation – Gen 2 Class 1
Band-Edge Frequency = 902 MHz
Band-Edge > 20 dB Below Peak In-Band Emission



1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 9-22-06
Company: Zebra Technologies
EUT: ZM4e Reader #2 - Rev. C – Firmware Version: 20060913
Test: High Band-Edge Compliance - Conducted
Operator: Jason Lauer
Comment: Spread Spectrum Frequency Hopping On
Comment: Modulation – Gen 2 Class 1
Band-Edge Frequency = 928 MHz
Band-Edge > 20 dB Below Peak In-Band Emission



1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

6.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS

The radiated measurements made at D.L.S. Electronic Systems, Inc., for the Zebra RFID Multiprotocol Encoder ZM4e, Model Number: ZM4e, 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 30 MHz 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 RFID Multiprotocol Encoder ZM4e were made up to 10000 MHz, in accordance with Section 15.33a for Intentional Radiators with a fundamental frequency of 928 MHz. For intentional radiators, the frequency range to be investigated is determined by the lowest radio frequency generated by the device without going below 30 MHz, up to at least the tenth harmonic of the highest fundamental frequency or 10 GHz, whichever is lower. At those frequencies where significant signals were detected, measurements were made over the entire frequency range specified in FCC Part 15, Subpart C, Section 15.247 at the open field test site, located at Genoa City, Wisconsin, FCC file number **31040/SIT**. When required, levels were extrapolated from 10 meters to 3 meters using a linear extrapolation.

All signals in the frequency range of 30 MHz to 2000 MHz were measured with a Biconical Antenna or tuned dipoles and from 200 MHz to 1000 MHz, a Log Periodic or Tuned Dipoles were used. From 1000 MHz to 25 GHz Horn Antennas 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 of emissions. In order to find maximum emissions, the cables were moved through all the positions the equipment would be expected to experience in the field. The EUT, peripheral equipment and cables were configured to meet the conditions in ANSI C63.4-2003, Clauses 6 & 8. Tests were made with the receive antenna(s) in both the horizontal and vertical planes of polarization. In each case, the table was rotated to find the maximum emissions.

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

6.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS (CON'T)

As stated in Section 15.247(b) the allowed maximum peak output power of the transmitter shall not exceed 1 Watt. In any 100 kHz bandwidth outside these frequency bands (the power that is produced by the modulation products of the spreading sequence), the information sequence and the carrier frequency shall be either at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Attenuation below the general limits specified in 15.209 is not required.

Field strength limits are at a distance of 3 meters. The emission limits shown are based on measurement instrumentation employing an average detector.

Emissions radiated outside of the specified frequency bands, except for harmonics are attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Preliminary radiated emission measurements were performed at a 3 meter test distance. The frequency range from 30 MHz to 1000 MHz was automatically scanned and plotted at various angles.

NOTE:

All radiated emissions measurements were made at a test room temperature of **72°F** at **44%** relative humidity.

APPENDIX A

RADIATED DATA AND GRAPH(S) TAKEN FOR

FIELD STRENGTH

SPURIOUS EMISSION MEASUREMENTS

PART 15.247

30 MHz – 1000 MHz

FCC Part 15 Class B

Electric Field Strength

```
EUT:                 R170XiIII - Z4M (27086) Firmware: 20060913
Manufacturer:        Zebra Technologies
Operating Condition: 72 deg. F; 44% R.H.
Test Site:           DLS O.F. Site 3
Operator:            Jason Lauer
Test Specification:  120 VAC @ 60 Hz
Comment:             Tx mode; Rx mode; Low, Mid, High Channels
                     Date:  09-26-2006
```

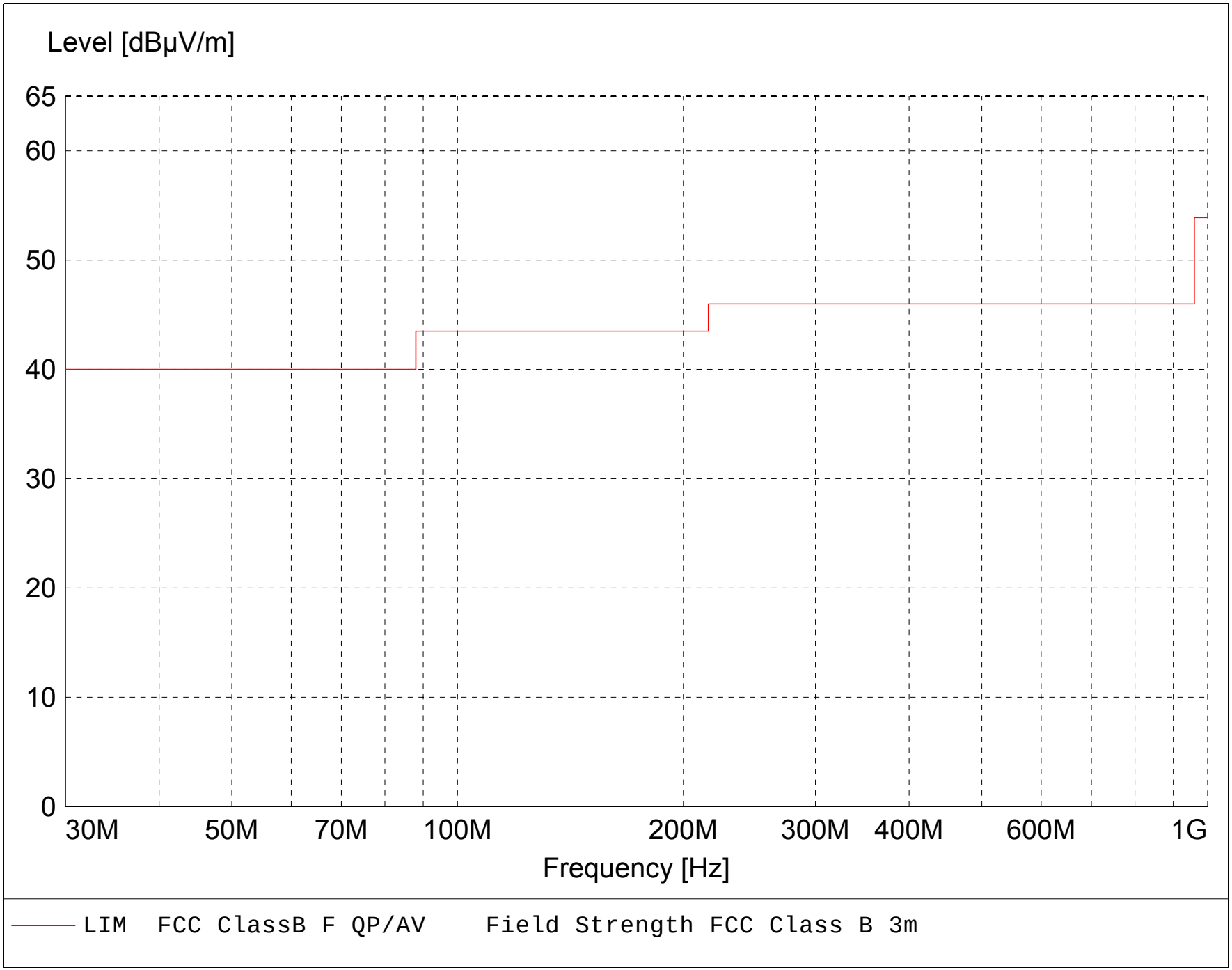
TEXT: "Site 3 MidV 3M"

```
  Short Description:            Test Set-up Vert30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/005

                Antennas ---
                Biconical    -- EMCO 3104C SN: 9701-4785
                Log Periodic -- EMCO 3146  SN: 9702-4895

                Pre-Amp  --- Rohde&Schwarz TS-PR10 SN: 032001/005

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


Level [dBµV/m]
65
60
50
40
30
20
10
0
30M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
LIM FCC ClassB F QP/AV Field Strength FCC Class B 3m

FCC Part 15 Class B

Electric Field Strength

```
EUT:                 R170XiIII - Z4M (27086) Firmware: 20060913
Manufacturer:        Zebra Technologies
Operating Condition: 72 deg. F; 44% R.H.
Test Site:           DLS O.F. Site 3
Operator:            Jason Lauer
Test Specification:  120 VAC @ 60 Hz
Comment:             Tx mode; Rx mode; Low, Mid, High Channels
                     Date:  09-26-2006
```

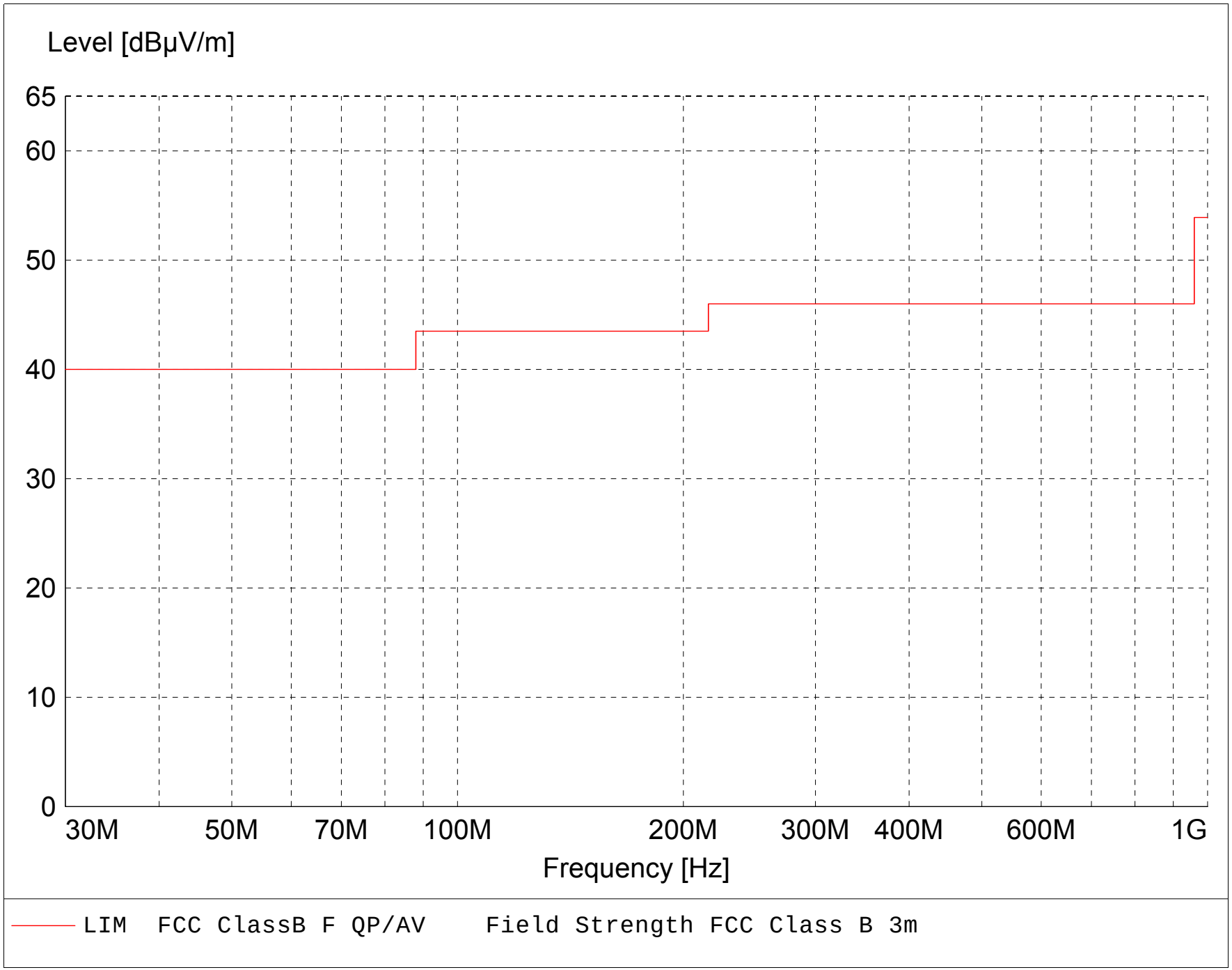
TEXT: "Site 3 MidH 3M"

```
  Short Description:            Test Set-up Horz30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/005

                Antennas ---
                Biconical    -- EMCO 3104C SN: 9701-4785
                Log Periodic -- EMCO 3146  SN: 9702-4895

                Pre-Amp  --- Rohde&Schwarz TS-PR10 SN: 032001/005

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


Level [dBµV/m]
65
60
50
40
30
20
10
0
30M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
LIM FCC ClassB F QP/AV Field Strength FCC Class B 3m

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

RADIATED DATA AND GRAPH(S) TAKEN FOR

FIELD STRENGTH SPURIOUS EMISSION

RESTRICTED BAND MEASUREMENTS

PART 15.247

1 GHz – 10 GHz

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Radiated Spurious Emissions in Restricted Bands (1 GHz to 10 GHz) ./ Tested at a 3 Meter Distance

EUT: R170XiIII - ZM4e (27086) Firmware: 20060913
Manufacturer: Zebra Technologies
Operating Condition: 70 deg F; 48% R.H.
Operating Voltage: 120 VAC; 60 Hz
Test Site: Site 3
Operator: Jason Lauer
Test Specification: FCC Part 15.247(d) and FCC Part 15.205
Comment: Continuous Transmit - Gen 2 Class 1 Protocol
Date: 09/25/2006

Notes: **(1)** Peak measurements taken with RBW = 1 MHz, VBW = 3 MHz, Sweep: Auto
(2) Average measurements taken with RBW = 1 MHz, VBW = 10 Hz, Sweep: Auto
(3) All other restricted band emissions at least 20 dB under the limit.

Low Channel: 902.99 MHz

Frequency (GHz)	Measurement Detector	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
2.709	Peak	Vert	51.07	29.61	-38.4	42.3	N/A	42.3	74	31.7	Res. Band
2.709	Average	Vert	39.52	29.61	-38.4	30.7	N/A	30.7	54	23.3	Res. Band
2.709	Peak	Horz	51.21	29.61	-38.4	42.4	N/A	42.4	74	31.6	Res. Band
2.709	Average	Horz	40.18	29.61	-38.4	31.4	N/A	31.4	54	22.6	Res. Band
3.612	Peak	Vert	51.21	32.09	-37.5	45.8	N/A	45.8	74	28.2	Res. Band
3.612	Average	Vert	40.77	32.09	-37.5	35.3	N/A	35.3	54	18.7	Res. Band
3.612	Peak	Horz	51.47	32.09	-37.5	46.0	N/A	46.0	74	28.0	Res. Band
3.612	Average	Horz	40.67	32.09	-37.5	35.2	N/A	35.2	54	18.8	Res. Band
4.515	Peak	Vert	48.66	32.73	-36.3	45.1	N/A	45.1	74	28.9	Res. Band
4.515	Average	Vert	36.46	32.73	-36.3	32.9	N/A	32.9	54	21.1	Res. Band
4.515	Peak	Horz	50.94	32.73	-36.3	47.4	N/A	47.4	74	26.6	Res. Band
4.515	Average	Horz	35.58	32.73	-36.3	32.1	N/A	32.1	54	21.9	Res. Band

1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: ZM4e
Report Number: 12629

APPENDIX A

Radiated Spurious Emissions in Restricted Bands (1 GHz to 10 GHz) / Tested at a 3 Meter Distance

EUT: R710XiIII - ZM4e (27086) Firmware: 20060913
Manufacturer: Zebra Technologies
Operating Condition: 70 deg F; 48% R.H.
Operating Voltage: 120 VAC; 60 Hz
Test Site: Site 3
Operator: Jason Lauer
Test Specification: FCC Part 15.247(d) and FCC Part 15.205
Comment: Continuous Transmit - Gen 2 Class 1 Protocol
Date: 09/25/2006

Notes: **(1)** Peak measurements taken with RBW = 1 MHz, VBW = 3 MHz, Sweep: Auto
(2) Average measurements taken with RBW = 1 MHz, VBW = 10 Hz, Sweep: Auto
(3) All other restricted band emissions at least 20 dB under the limit.

Middle Channel: 915.13 MHz

Frequency (GHz)	Measurement Detector	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
2.7454	Peak	Vert	52.15	29.73	-38.5	43.4	N/A	43.4	74	30.6	Res. Band
2.7454	Average	Vert	42.38	29.73	-38.5	33.6	N/A	33.6	54	20.4	Res. Band
2.7454	Peak	Horz	52.15	29.73	-38.5	43.4	N/A	43.4	74	30.6	Res. Band
2.7454	Average	Horz	42.53	29.73	-38.5	33.7	N/A	33.7	54	20.3	Res. Band
3.6604	Peak	Vert	52.70	32.22	-37.4	47.5	N/A	47.5	74	26.5	Res. Band
3.6604	Average	Vert	43.60	32.22	-37.4	38.4	N/A	38.4	54	15.6	Res. Band
3.6604	Peak	Horz	51.74	32.22	-37.4	46.5	N/A	46.5	74	27.5	Res. Band
3.6604	Average	Horz	41.49	32.22	-37.4	36.3	N/A	36.3	54	17.7	Res. Band
4.5758	Peak	Vert	48.93	32.85	-36.0	45.8	N/A	45.8	74	28.2	Res. Band
4.5758	Average	Vert	37.01	32.85	-36.0	33.9	N/A	33.9	54	20.1	Res. Band
4.5758	Peak	Horz	48.26	32.85	-36.0	45.1	N/A	45.1	74	28.9	Res. Band
4.5758	Average	Horz	35.13	32.85	-36.0	32.0	N/A	32.0	54	22.0	Res. Band
7.3210	Peak	Vert	49.48	36.30	-32.2	53.6	N/A	53.6	74	20.4	Res. Band
7.3210	Average	Vert	39.65	36.30	-32.2	43.7	N/A	43.7	54	10.3	Res. Band
7.3210	Peak	Horz	49.06	36.30	-32.2	53.2	N/A	53.2	74	20.8	Res. Band
7.3210	Average	Horz	38.52	36.30	-32.2	42.6	N/A	42.6	54	11.4	Res. Band

1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: ZM4e
Report Number: 12629

APPENDIX A

Radiated Spurious Emissions in Restricted Bands (1 GHz to 10 GHz) / Tested at a 3 Meter Distance

EUT: R170XiIII - ZM4e (27086) Firmware: 20060913
Manufacturer: Zebra Technologies
Operating Condition: 70 deg F; 48% R.H.
Operating Voltage: 120 VAC; 60 Hz
Test Site: Site 3
Operator: Jason Lauer
Test Specification: FCC Part 15.247(d) and FCC Part 15.205
Comment: Continuous Transmit - Gen 2 Class 1 Protocol
Date: 09/25/2006

Notes: **(1)** Peak measurements taken with RBW = 1 MHz, VBW = 3 MHz, Sweep: Auto
(2) Average measurements taken with RBW = 1 MHz, VBW = 10 Hz, Sweep: Auto
(3) All other restricted band emissions at least 20 dB under the limit.

High Channel: 927.19 MHz

Frequency (GHz)	Measurement Detector	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
2.7816	Peak	Vert	53.36	29.86	-38.7	44.5	N/A	44.5	74	29.5	Res. Band
2.7816	Average	Vert	45.21	29.86	-38.7	36.4	N/A	36.4	54	17.6	Res. Band
2.7816	Peak	Horz	52.15	29.86	-38.7	43.3	N/A	43.3	74	30.7	Res. Band
2.7816	Average	Horz	43.43	29.86	-38.7	34.6	N/A	34.6	54	19.4	Res. Band
3.7088	Peak	Vert	51.88	32.34	-37.3	46.9	N/A	46.9	74	27.1	Res. Band
3.7088	Average	Vert	42.06	32.34	-37.3	37.1	N/A	37.1	54	16.9	Res. Band
3.7088	Peak	Horz	54.15	32.34	-37.3	49.2	N/A	49.2	74	24.8	Res. Band
3.7088	Average	Horz	46.33	32.34	-37.3	41.4	N/A	41.4	54	12.6	Res. Band
4.6360	Peak	Vert	49.76	32.97	-35.7	47.0	N/A	47.0	74	27.0	Res. Band
4.6360	Average	Vert	38.07	32.97	-35.7	35.3	N/A	35.3	54	18.7	Res. Band
4.6360	Peak	Horz	49.06	32.97	-35.7	46.3	N/A	46.3	74	27.7	Res. Band
4.6360	Average	Horz	36.34	32.97	-35.7	33.6	N/A	33.6	54	20.4	Res. Band
7.4175	Peak	Vert	51.34	36.57	-32.0	55.9	N/A	55.9	74	18.1	Res. Band
7.4175	Average	Vert	42.85	36.57	-32.0	47.5	N/A	47.5	54	6.5	Res. Band
7.4175	Peak	Horz	50.68	36.57	-32.0	55.3	N/A	55.3	74	18.7	Res. Band
7.4175	Average	Horz	41.60	36.57	-32.0	46.2	N/A	46.2	54	7.8	Res. Band