DLS ELECTRONIC SYSTEMS, INC.
NVLAP 100276-0

1250 Peterson Dr., Wheeling, IL 60090

Company: Zebra Technologies Corporation
Model Tested: Z4M
Report Number: 10533

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:	R4Mplus
Kind of Equipment:	Thermal Transfer on demand bar code printer
Test Configuration:	Ethernet connection (Tested at 120 vac, 60 Hz)
Model Number(s):	Z4M
Model(s) Tested:	Z4M
Serial Number(s):	02C04039999
Date of Tests:	January 21 & 22, 2004
Test Conducted For:	Zebra Technologies Corporation 333 Corporate Woods Parkway Vernon Hills, Illinois 60061

1250 Peterson Dr., Wheeling, IL 60090

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

1250 Peterson Dr., Wheeling, IL 6009

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation

ISO/IEC 17025:1999
ISO 9002:1994

D.L.S. ELECTRONIC SYSTEMS, INC.
WHEELING, IL

is recognized by the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria set forth in NIST Handbook 150:2001, all requirements of ISO/IEC 17025:1999, and relevant requirements of ISO 9002:1994. Accreditation is awarded for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

September 30, 2004
Effective through

For the National Institute of Standards and Technology
NVLAP Lab Code: 100276-0

NVLAP-01C (06-01)

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D.L.S. ELECTRONIC SYSTEMS, INC.
1250 Peterson Drive
Wheeling, IL 60090-6454
Mr. Brian J. Mattson
Phone: 847-537-6400 Fax: 847-537-6488
E-Mail: bmattson@dlsemc.com
URL: http://www.dlsemc.com

NVLAP Code	*Designation / Description*
Emissions Test Methods:	
12/160D21	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 21 - Emission of Radio Frequency Energy
12/300220a	EN 300 220-1 V1.3.1 (2000-09): Electromagnetic compatibility and Radio spectrum Matters; Short Range Devices; Radio equipment to be used in the 25 MHz to 1000 MHz frequency range with power levels ranging up to 500 mW; Part 1: Technical characteristics and test methods
12/300386a	EN 300 386 V.1.2.1: Electromagnetic compatibility and radio spectrum matter (ERM); Telecommunication network equipment; Electromagnetic compatibility (EMC) requirements
12/C63.17	ANSI C63.17-1998: American National Standard for Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices

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NVLAP Code	*Designation / Description*
12/C6317a	ANSI C63.17-1998: American National Standard for Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices
12/CIS11	IEC/CISPR 11 + A1 (1997), EN 55011 (1998), AS/NZS 2064 (1997), and CNS 137803 (1997): Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific, and Medical Radio-Frequency Equipment
12/CIS13	IEC/CISPR 13 (2001-04), EN 55013 (2001), AS/NZS 1053 (2001), and CNS 13439 (2001): Sound and television broadcast receivers and associated equipment - Radio disturbance characteristics - Limits and methods of measurement
12/CIS14	CISPR 14-1 (March 30, 2000): Limits and methods of measurement of radio interference characteristics of household electrical appliances, portable tools and similar electrical apparatus - Part 1: Emissions
12/CIS14a	EN 55014-1 (1993) with Amendments A1 (1997) & A2 (1999)
12/CIS14d	IEC/CISPR 14-1 (2001) and A1 (2001): Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emissions
12/CIS14e	EN 55014-1 (2001) and A1 (2001): Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission

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NVLAP Code	*Designation / Description*
12/CIS14f	AS/NZS 1044 (2001) and A1 (2001): Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission
12/CIS14g	CNS 13783-1 (2001) and A1 (2001): Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission
12/CIS15	IEC/CISPR 15 (2000) + A1 (2001): Limits and methods of measurements of radio disturbance characteristics of electrical lighting and similar equipment
12/CIS15a	AS/NZS CISPR (2002): Limits and methods of measurements of radio disturbance characteristics of electrical lighting and similar equipment
12/CIS15b	CNS 13439 (2000) + A1 (2001): Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
12/CIS15c	EN 55015 (2000) + A1 (2001): Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
12/CIS22	IEC/CISPR 22 (1997) and EN 55022 (1998): Limits and methods of measurement of radio disturbance characteristics of information technology equipment
12/CIS22a	IEC/CISPR 22 (1993): Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Amendment 1:1995, and Amendment 2:1996.

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NVLAP Code	*Designation / Description*
12/CIS22b	CNS 13438 (1997): Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment
12/EM02a	IEC 61000-3-2, Edition 2.1 (2001-10), EN 61000-3-2 (2000), and AS/NZS 2279.1 (2000): Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A)
12/EM03	EN 61000-3-3 (1995), IEC 61000-3-3 (1995), and AS/NZS 2279.3 (1995): EMC - Part 3: Limits - Section 3. Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current up to 16A
12/F18	FCC OST/MP-5 (1986): FCC Methods of Measurement of Radio Noise Emissions for ISM Equipment (cited in FCC Method 47 CFR Part 18 - Industrial, Scientific, and Medical Equipment)
12/FCC15b	ANSI C63.4 (2001) with FCC Method - 47 CFR Part 15, Subpart B: Unintentional Radiators
12/FCC15c	ANSI C63.4 (2001) with FCC Method - 47 CFR Part 15, Subpart C: Intentional Radiators
12/FCC15d	ANSI C63.4 (2001) with FCC Method - 47 CFR Part 15, Subpart D: Unlicensed Personal Communications Service Devices

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NVLAP Code	*Designation / Description*
12/FCC15e	ANSI C63.4 (2001) with FCC Method - CFR Part 15, Subpart E: Unlicensed National Information Infrastructure Service Devices
12/T51	AS/NZS CISPR 22 (2002) and AS/NZS 3548 (1997): Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment
12/VCCIa	Agreement of Voluntary Control Council for Interference by Information Technology Equipment - Technical Requirements: V-3/02.04

Immunity Test Methods:

12/1089a	GR-1089-CORE, Issue 3, October 2002: Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment (sections 2, 3.3, and 3.5)
12/160D16	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 16 - Power Input
12/160D17	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 17 - Voltage Spike
12/160D18	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 18 - Audio Frequency Conducted Susceptibility - Power Inputs

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NVLAP Code	*Designation / Description*
12/160D19	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 19 - Induced Signal Susceptibility
12/160D20	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 20 - Radio Frequency Susceptibility (Radiated and Conducted)
12/160D22	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 22 - Lightning Induced Transient Susceptibility
12/160D25	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 25 - Electrostatic Dischare (ESD)
12/I01	IEC 61000-4-2 (1995) and Amendment 1 (1998) and EN 61000-4-2: Electrostatic Discharge Immunity Test
12/I02	IEC 61000-4-3 (1995) and Amendment 1 (1998) and EN 61000-4-3: Radiated, Radio-Frequency Electromagnetic Field Immunity Test
12/I03	IEC 61000-4-4 (1995) and EN 61000-4-4: Electrical Fast Transient/Burst Immunity Test
12/I04	IEC 61000-4-5 (1995) and EN 61000-4-5: Surge Immunity Test

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NVLAP Code	*Designation / Description*
12/I05	IEC 61000-4-6 (1996) and EN 61000-4-6: Immunity to Conducted Disturbances, Induced Radio-Frequency Fields
12/I06	IEC 61000-4-8 (1993): Power Frequency Magnetic Field Immunity Test
12/I07	IEC 61000-4-11 (1994): Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests
12/J111324	SAE J1113/24: Immunity to radiated electromagnetic fields; 10 kHz to 200 MHz - Crawford TEM cell and 10 kHz to 5 GHz - Wideband TEM cell
12/J111341	SAE J1113/41 (1995-07): Limits and methods of measurement of radio disturbance characteristics of components and modules for the protection of receivers used on board vehicles

Radio Test Methods

12/RSS119	RSS-119, Issue 6 (March 25, 2000): Land Mobile and Fixed Radio Transmitters and Receivers, 27.41 to 960 MHz
12/RSS123	RSS-123, Issue 1, Rev. 2 (November 6, 1999): Low Power Licensed Radiocommunication Devices
12/RSS137	RSS-137, Issue 1, Rev. 1 (September 25, 1999): Location and Monitoring Service (902 - 928 MHz)

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NVLAP Code	*Designation / Description*
12/RSS139	RSS-139, Isssue 1 (February 5, 2000): Licensed Radiocommunications Devices in the Band 2400 - 2483.5 MHz
12/CIS15c	EN 55015 (2000) + A1 (2001): Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
MIL-STD-462 : Conducted Emissions:	
12/A18	MIL-STD-461 Version E Method CE106
MIL-STD-462 : Conducted Susceptibility:	
12/B12	MIL-STD-462 Version D Method CS101
12/B13	MIL-STD-462 Version D Method CS103
12/B25	MIL-STD-461 Version E Method CS114
12/B26	MIL-STD-461 Version E Method CS115
12/B27	MIL-STD-461 Version E Method CS116
MIL-STD-462 : Radiated Emissions:	
12/D04	MIL-STD-462 Version D Method RE101

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NVLAP Code	*Designation / Description*
12/D05	MIL-STD-462 Version D Method RE102
12/D06	MIL-STD-462 Version D Method RE103

MIL-STD-462 : Radiated Susceptibility:

12/E08	MIL-STD-462 Version D Method RS101
12/E09	MIL-STD-462 Version D Method RS103

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1.0 SUMMARY OF TEST REPORT

It was found that the R4Mplus, Model Number(s) Z4M, **"meets"** the radio interference conducted and 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: 99

2.0 INTRODUCTION

On January 21 & 22, 2004, a series of radio frequency interference measurements was performed on R4Mplus, Model Number(s) Z4M, Serial Number: 02C04039999. 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 C63.4-2001. Tests were performed by personnel of D.L.S. Electronic Systems, Inc. who are responsible to Donald L. Sweeney, Senior EMC Engineer.

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.

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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 C63.4-2001, 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 C63.4-2001, Sections 6 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 C63.4-2001, 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 emission that have the highest amplitude relative to the limit. These methods are performed to the specifications in ANSI C63.4: 2001.

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

7.1 Description:

Zebra brand on demand thermal transfer bar code printer. Capable of printing labels up to 4" wide and 39" long. Powered through an IEC 320 connector at from 90 volts to 264 volts, 47 thru 63 Hz. This printer, for testing purposes, is equipped with a PCMCIA card slot adapter, and an operating Printserver adapter. Communications will be through the print server adapter via a cat 5 Ethernet cable. Label packets are sent in ZPL with alpha, numeric and graphic information. The ZPL commands instruct the printer to read and write to an Alien EPC Class 1 generation 1 RFID transponder. The label prints after the RFID transaction is complete.

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7.0 DESCRIPTION OF TEST SAMPLE: (CON'T)

7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

Length: 44.5 cm Width: 25 cm Height: 32.4 cm

7.3 LINE FILTER USED:

Yunpen PN: YA06P

7.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

122 kHz, 72 kHz & 68 kHz

Clock Frequencies:

66.66 MHz, 40 MHz, 20 MHz, 16.66 MHz, 5.5555 MHz & 32.768 kHz

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7.0 DESCRIPTION OF TEST SAMPLE: (CON'T)

7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. MLB Assy, W/RTC	PN: 79000 Rev. 2
2. Power supply board Assy.	PN: 77715 Rev. 6
3. Front panel PCBA	PN: 77667 Rev. 8
4. Internal Print Server PCBA	PN: 34101 Rev. D
5. PCMCIA Option PCBA	PN: 33037 Rev. 5
6. Media Sensor	PN: 77957 Rev. 1
7. Head Open/Ribbon Sensor	PN: 77766 Rev. 1
8. PA UHF RFID Encoder Alien	PN: 21055 Rev. 1
9. ASM Antenna UHF Type 1 SMT	PN: 21052 Rev. A
10. ASM PCB INTF RFID R4M	PN: 21050 Rev. A

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

1: There were no changes made at D.L.S. Electronic Systems, Inc.

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 R4Mplus
Model Number: Z4M Serial Number: 02C04039999

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

Item 2 ..... Non-shielded Category 5 Ethernet Cable with Plastic Shells. 50'

Item 3 Shielded RS-232 Serial Cable with Metal Shells. 2m

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10.0 RADIATED PHOTOS TAKEN DURING TESTING

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10.0 RADIATED PHOTOS TAKEN DURING TESTING

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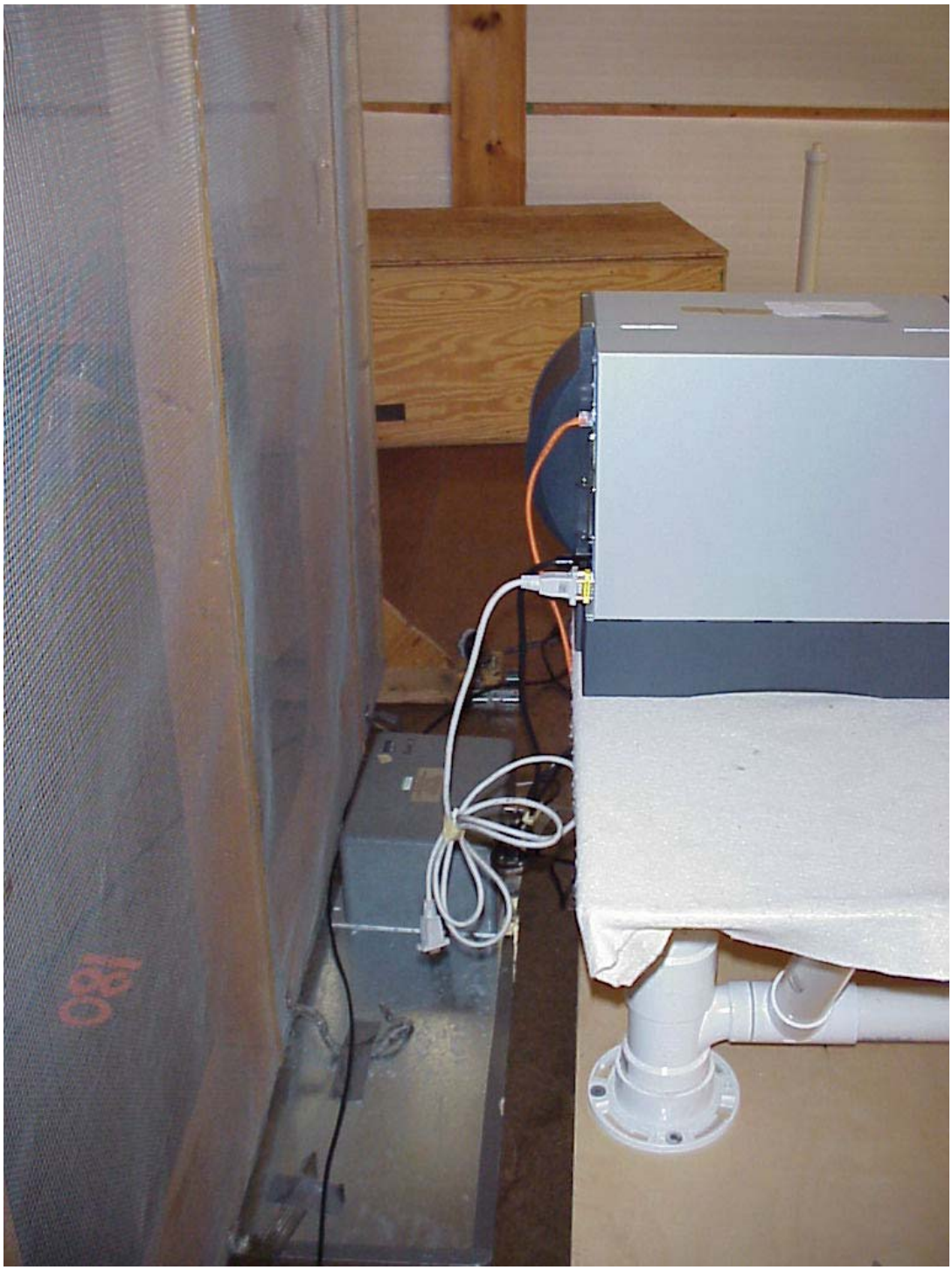
10.0 CONDUCTED PHOTOS TAKEN DURING TESTING



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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. Those points on the emission charts shown with a yellow mark are background frequencies which were verified during testing.

12.0 CONCLUSION

It was found that the R4Mplus, Model Number(s) Z4M **"meets"** the radio interference conducted and 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.

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TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Spectrum Analyzer	Hewlett/ Packard	8566B	2240A002041	100 Hz – 22 GHz	10/04
Quasi-Peak Adapter	Hewlett/ Packard	85650A	2043A00121	10 kHz – 1 GHz	10/04
Spectrum Analyzer	Hewlett/ Packard	8566B	2421A00452	100 Hz – 22 GHz	2/04
Quasi-Peak Adapter	Hewlett/ Packard	85650A	2043A00450	10 kHz – 1 GHz	2/04
Spectrum Analyzer	Hewlett/ Packard	8591A	3009A00700	9 kHz – 1.8 GHz	3/04
Receiver	Electrometrics	EMC-30	44168	10 kHz – 1 GHz	9/04
Receiver	Rohde & Schwarz	ESI 26	837491/010	20 Hz – 26 GHz	11/04
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	12/04
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	12/04
Antenna	EMCO	3104C	00054891	20 MHz – 200 MHz	2/04
Antenna	Electrometrics	LPA-25	1114	200 MHz – 1 GHz	3/04
Antenna	EMCO	3104C	00054892	20 MHz – 200 MHz	3/04

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
Antenna	Electrometrics	3146	1205	200 MHz – 1 GHz	3/04
Antenna	EMCO	3104C	97014785	20 MHz – 200 MHz	2/04
Antenna	EMCO	3146	97024895	200 MHz – 1 GHz	3/04
Antenna	EMCO	3115	2479	1 GHz – 18 GHz	8/04
Antenna	EMCO	3115	99035731	1 GHz – 18 GHz	4/04
Antenna	Rohde & Schwarz	HUF-Z1	829381001	20 MHz – 1 GHz	2/04
Antenna	Rohde & Schwarz	HUF-Z1	829381005	20 MHz – 1 GHz	8/04
LISN	Solar	8012-50-R-24-BNC	8305116	10 MHz – 30 MHz	8/04
LISN	Solar	8012-50-R-24-BNC	814548	10 MHz – 30 MHz	8/04
LISN	Solar	9252-50-R-24-BNC	961019	10 MHz – 30 MHz	12/04
LISN	Solar	9252-50-R-24-BNC	971612	10 MHz – 30 MHz	10/04
LISN	Solar	9252-50-R-24-BNC	92710620	10 MHz – 30 MHz	7/04

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 15.247 (a-h)

OPERATION WITHIN THE BAND 902-928 MHz, 2400-2483.5 MHz
AND 5725-5857 MHz

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APPENDIX A

1.0 CONDUCTED EMISSION MEASUREMENTS

If applicable, the conducted emissions were measured over the frequency range from 0.45 MHz to 30 MHz in accordance with the power line measurements as specified in the American National Standards Institute, ANSI C63.4-2001, Section 12. Since the device is operated from the public utility lines, the 115 Vac 60 Hz power leads, high and low sides, were to be 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 uV (47.96 dBuV) at any frequency between 450 kHz and 30 MHz, as stated in Section 15.207a.

All conducted emissions measurements were made at a test room temperature of **72°F** at **24%** relative humidity.

ELECTRONIC SYSTEMS, INC.
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APPENDIX A

DATA AND GRAPH(S) TAKEN DURING TESTING

PART 15.207

FCC Part 15 Class B

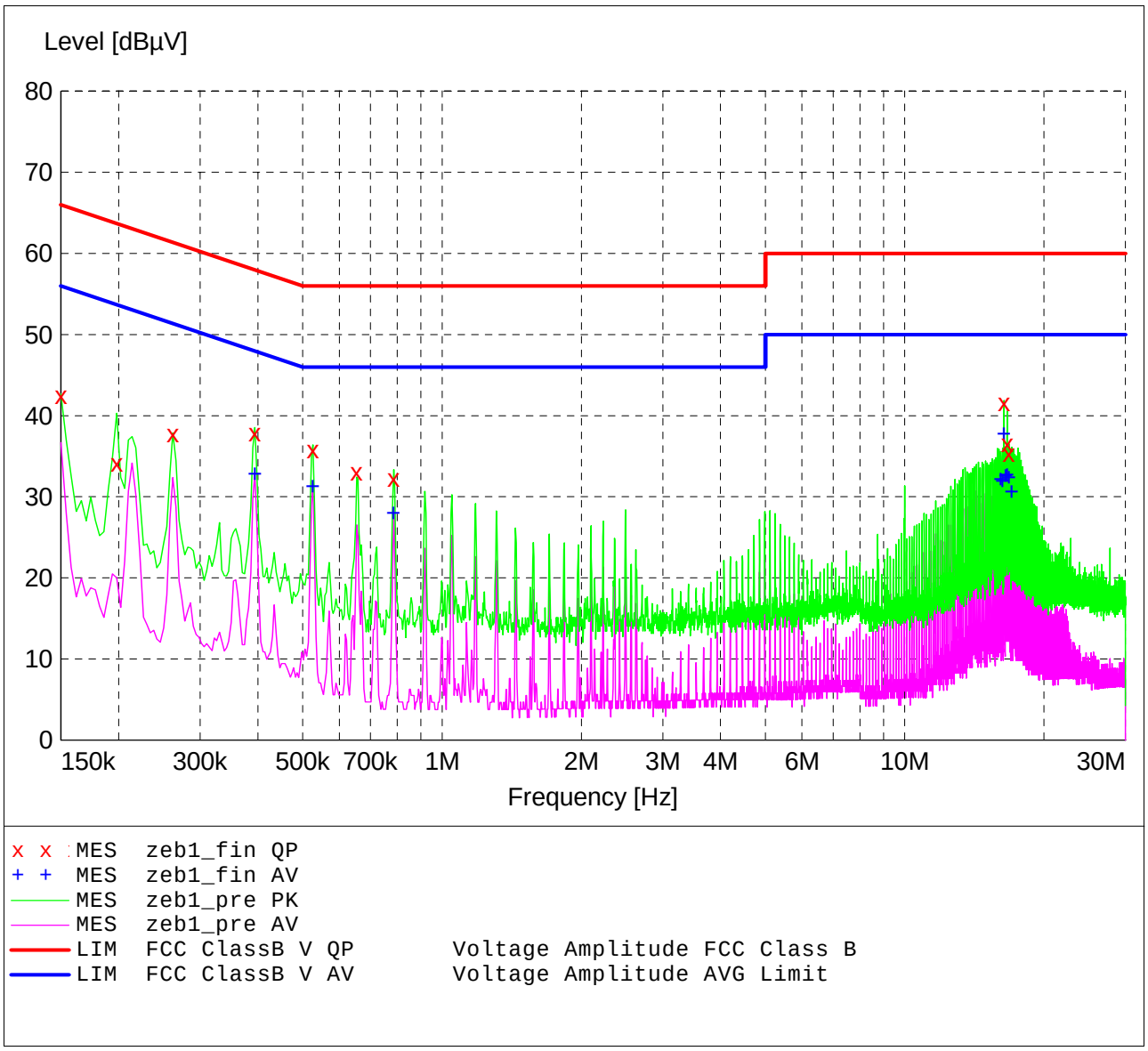
Voltage Mains Test

EUT:	R4M+
Manufacturer:	Zebra
Operating Condition:	72 deg. F, 24 % R.H.
Test Site:	Site 3 (OF)
Operator:	Jason L
Test Specification:	120 VAC, 60 Hz
Comment:	Line 1
Start of Test:	1/22/2004 / 2:09:17PM

SCAN TABLE: "FCC ClassB Voltage"

Short Description: FCC Class B Voltage

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.0 kHz	MaxPeak Average	10.0 ms	9 kHz	LISN DLS#126



MEASUREMENT RESULT: "zeb1_fin QP"

1/22/2004 2:12PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.150000	42.50	11.6	66	23.5	1	---
0.198000	34.10	11.1	64	29.6	1	---
0.262000	37.80	10.7	61	23.6	1	---
0.394000	37.90	10.5	58	20.1	1	---
0.526000	35.80	10.4	56	20.2	1	---
0.654000	33.10	10.3	56	22.9	1	---
0.786000	32.30	10.3	56	23.7	1	---
16.394000	41.60	11.3	60	18.4	1	---
16.666000	36.60	11.3	60	23.4	1	---
16.790000	35.40	11.3	60	24.6	1	---

MEASUREMENT RESULT: "zeb1_fin AV"

1/22/2004 2:12PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.394000	32.80	10.5	48	15.2	1	---
0.526000	31.30	10.4	46	14.7	1	---
0.786000	28.00	10.3	46	18.0	1	---
16.134000	32.20	11.3	50	17.8	1	---
16.266000	32.00	11.3	50	18.0	1	---
16.394000	37.80	11.3	50	12.2	1	---
16.526000	32.60	11.3	50	17.4	1	---
16.658000	32.70	11.3	50	17.3	1	---
16.790000	32.40	11.3	50	17.6	1	---
17.054000	30.70	11.3	50	19.3	1	---

FCC Part 15 Class B

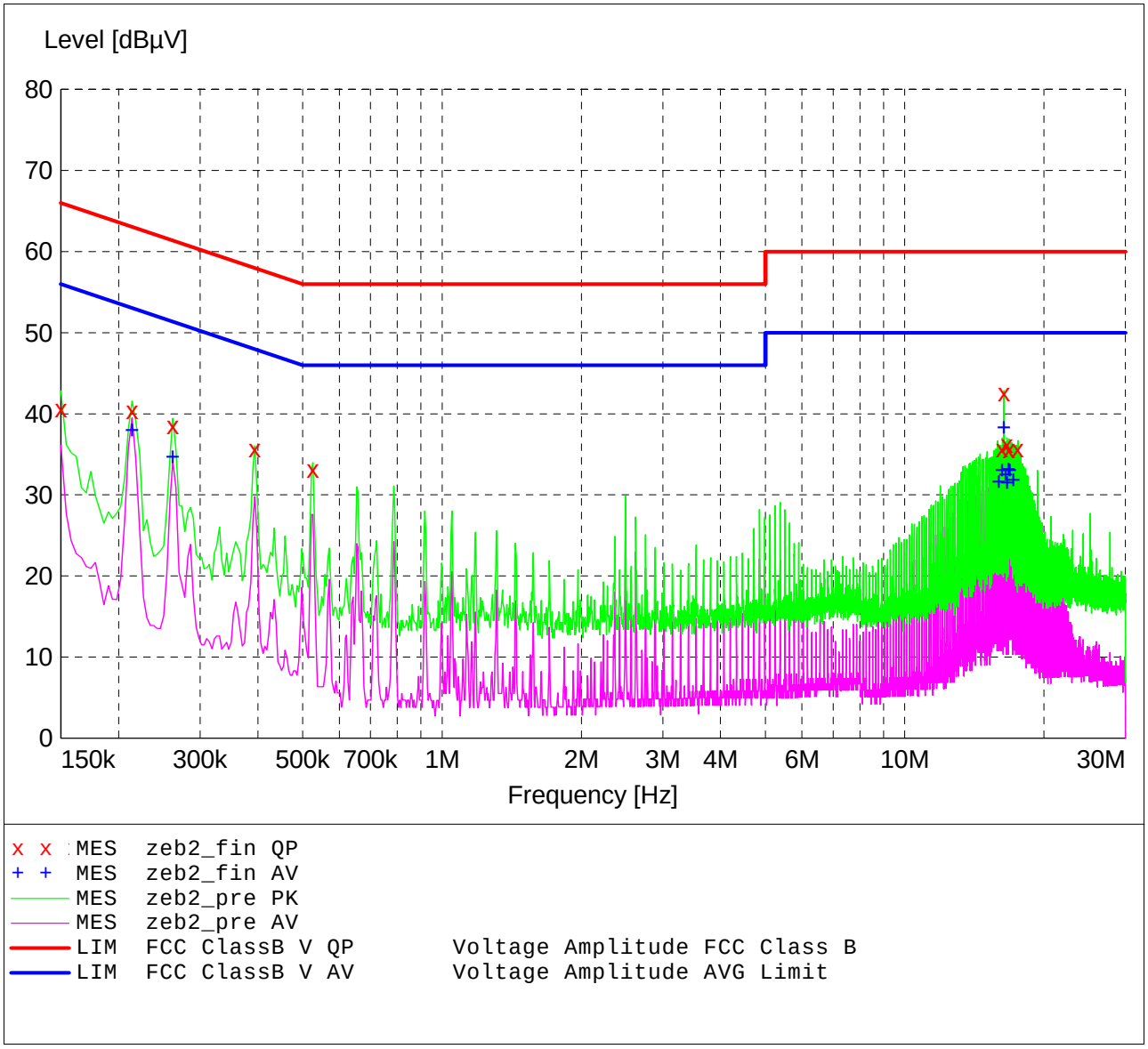
Voltage Mains Test

EUT:	R4M+
Manufacturer:	Zebra
Operating Condition:	72 deg. F, 24 % R.H.
Test Site:	Site 3 (OF)
Operator:	Jason L
Test Specification:	120 VAC, 60 Hz
Comment:	Line 2
Start of Test:	1/22/2004 / 2:14:01PM

SCAN TABLE: "FCC ClassB Voltage"

Short Description: FCC Class B Voltage

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.0 kHz	MaxPeak Average	10.0 ms	9 kHz	LISN DLS#126



MEASUREMENT RESULT: "zeb2_fin QP"

1/22/2004 2:18PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.150000	40.60	11.6	66	25.4	1	---
0.214000	40.40	11.0	63	22.6	1	---
0.262000	38.50	10.7	61	22.8	1	---
0.394000	35.70	10.5	58	22.3	1	---
0.526000	33.20	10.4	56	22.8	1	---
16.262000	35.70	11.3	60	24.3	1	---
16.394000	42.60	11.3	60	17.4	1	---
16.654000	36.20	11.3	60	23.8	1	---
16.790000	35.60	11.3	60	24.4	1	---
17.574000	35.70	11.3	60	24.3	1	---

MEASUREMENT RESULT: "zeb2_fin AV"

1/22/2004 2:18PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.214000	38.00	11.0	53	15.0	1	---
0.262000	34.70	10.7	51	16.6	1	---
16.002000	31.60	11.3	50	18.4	1	---
16.262000	33.10	11.3	50	16.9	1	---
16.394000	38.30	11.3	50	11.7	1	---
16.526000	32.50	11.3	50	17.5	1	---
16.658000	31.50	11.3	50	18.5	1	---
16.786000	33.20	11.3	50	16.8	1	---
16.918000	33.10	11.3	50	16.9	1	---
17.182000	31.80	11.3	50	18.2	1	---

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APPENDIX A

2.0 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 R4Mplus 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:

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APPENDIX A

CONDUCTED EMISSION DATA AND GRAPH(S) TAKEN FOR

SPURIOUS EMISSION MEASUREMENTS MADE

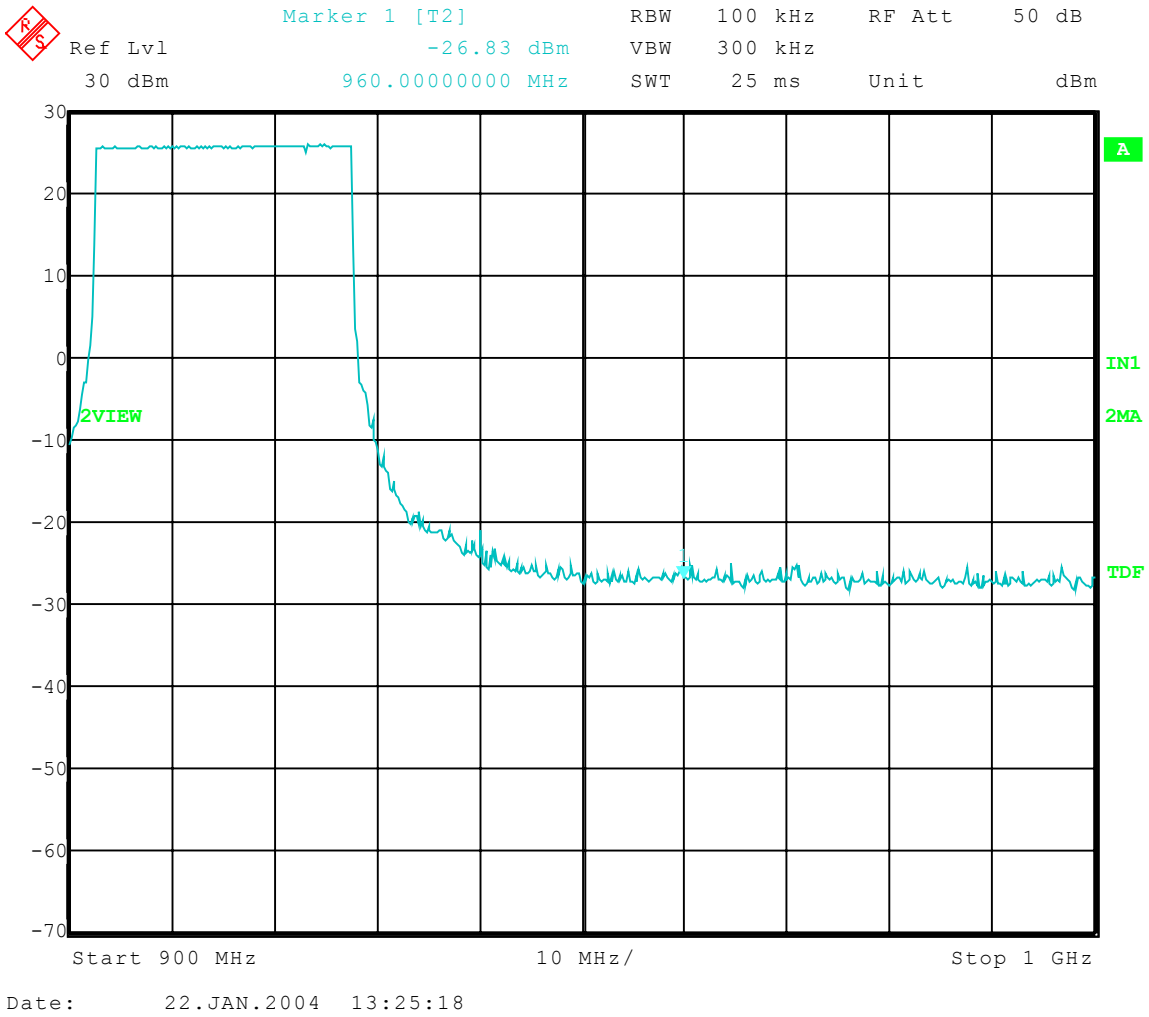
AT THE ANTENNA TERMINALS

PART 15.247(c)

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Spread Spectrum Hopping On
Frequency Range: 900 to 1000 MHz
Limit = 5.69 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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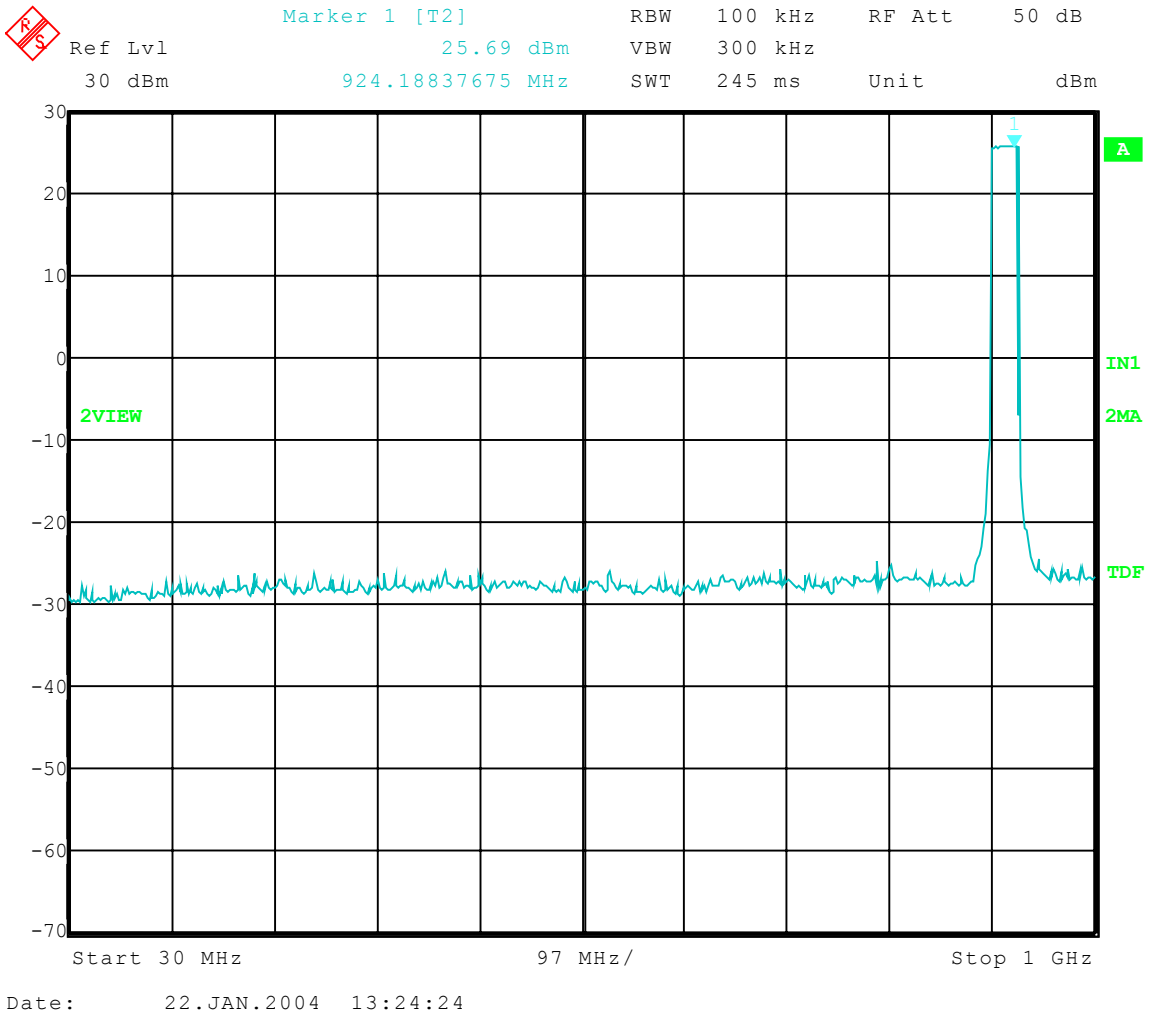
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Spread Spectrum Hopping On
Frequency Range: 30 to 1000 MHz
Limit = 5.69 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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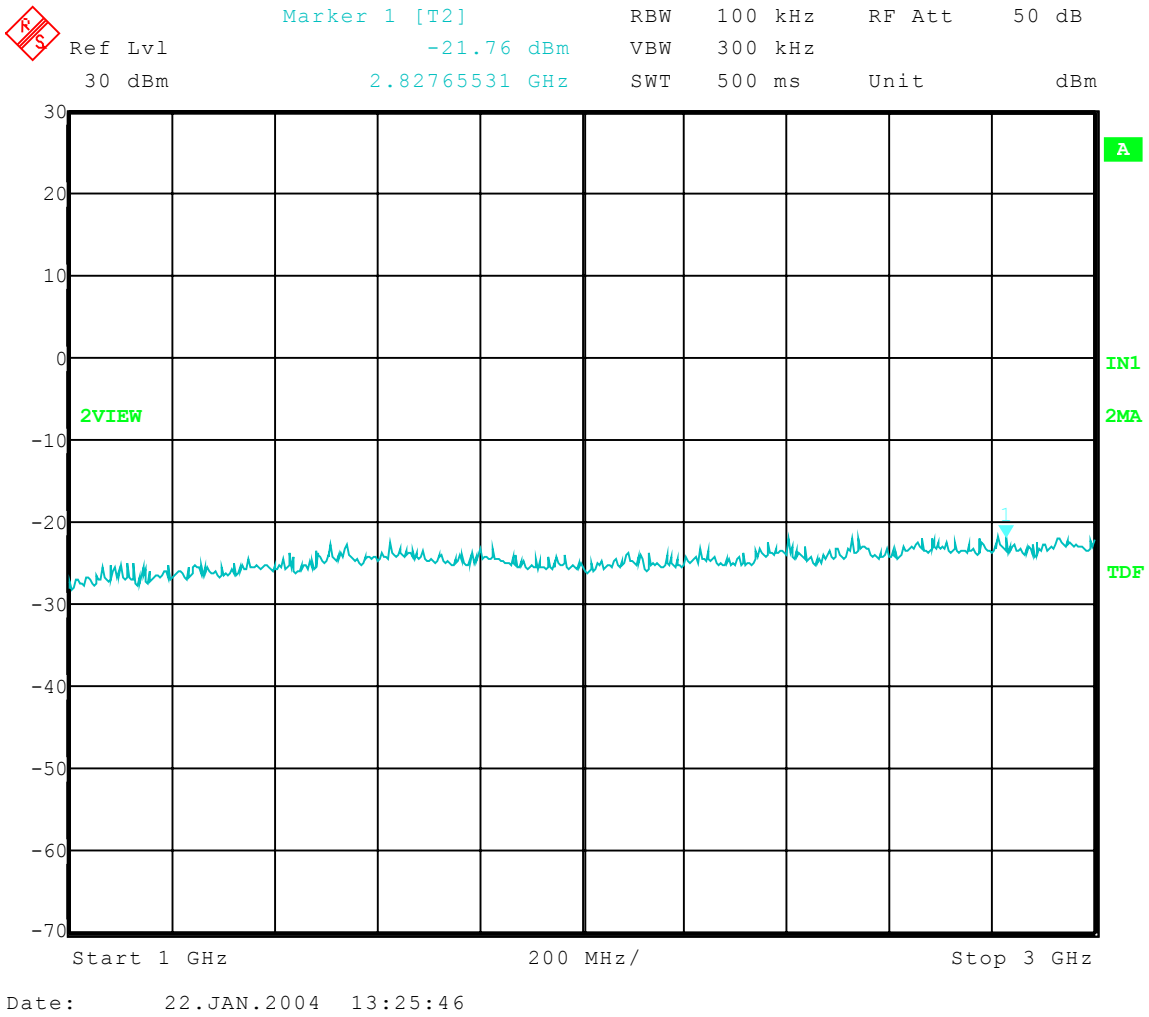
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Spread Spectrum Hopping On
Frequency Range: 1 to 3 GHz
Limit = 5.69 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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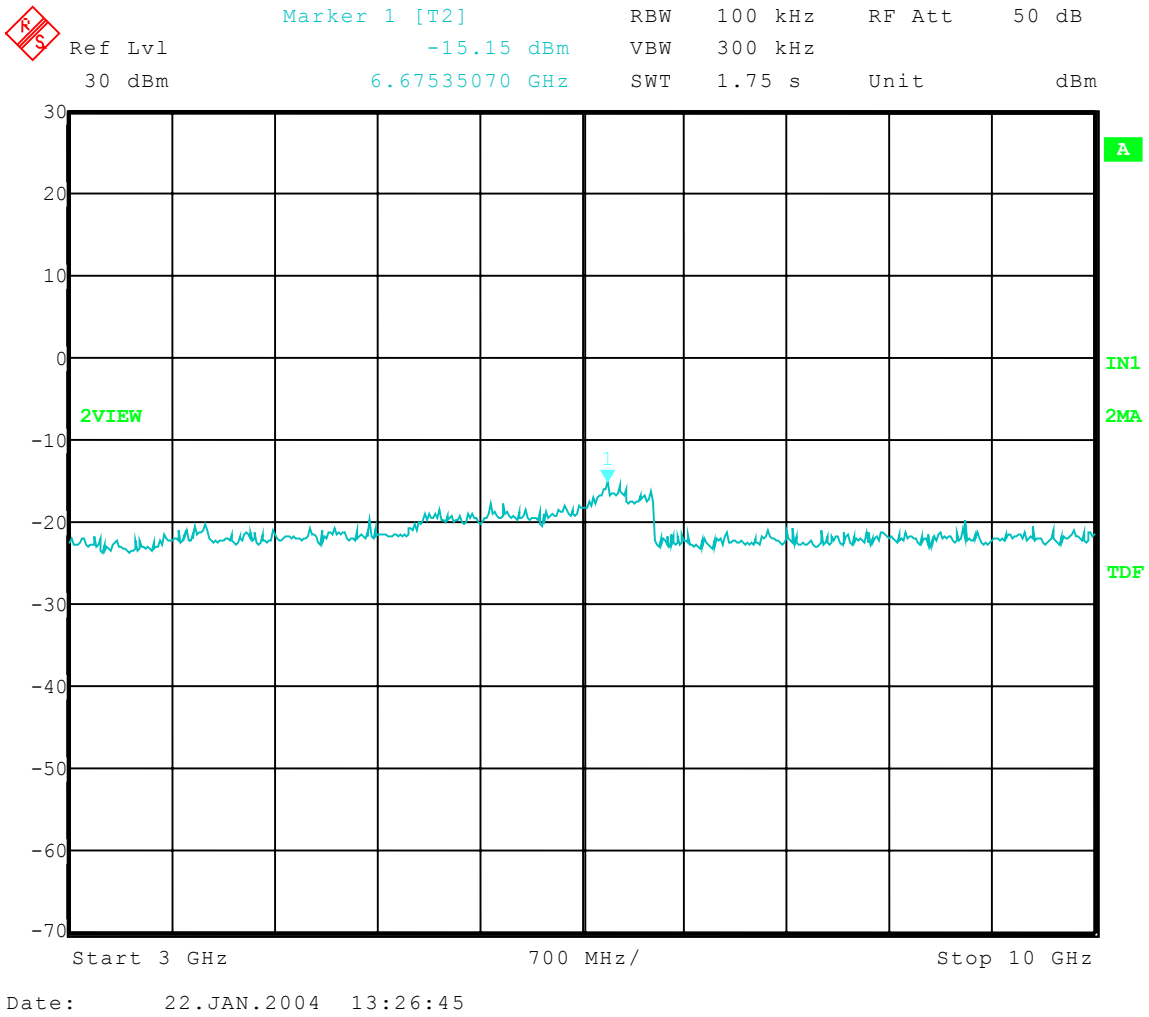
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Spread Spectrum Hopping On
Frequency Range: 3 to 10 GHz
Limit = 5.69 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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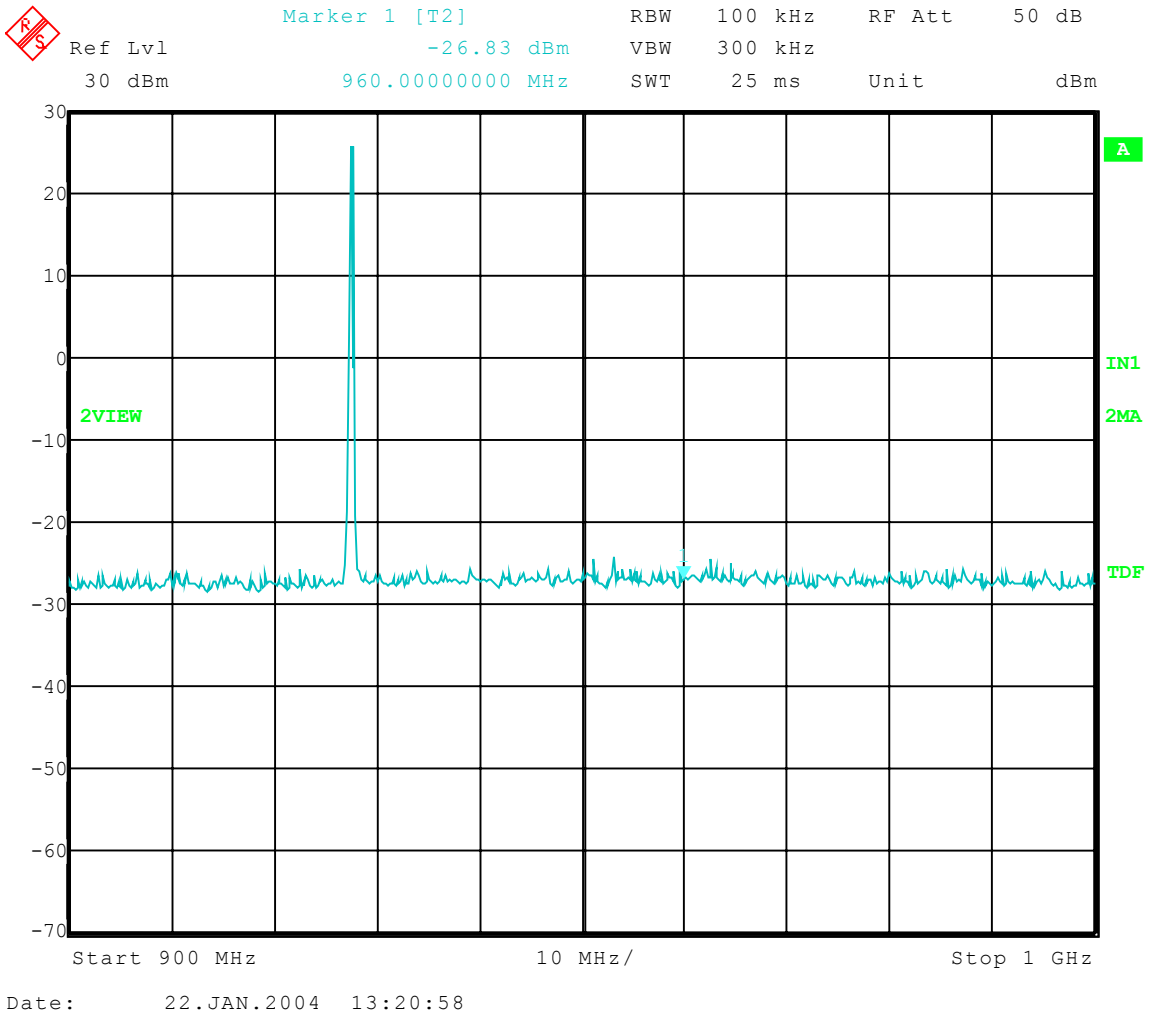
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: High Channel Transmit = 927.60 MHz
Frequency Range: 900 to 1000 MHz
Limit = 5.58 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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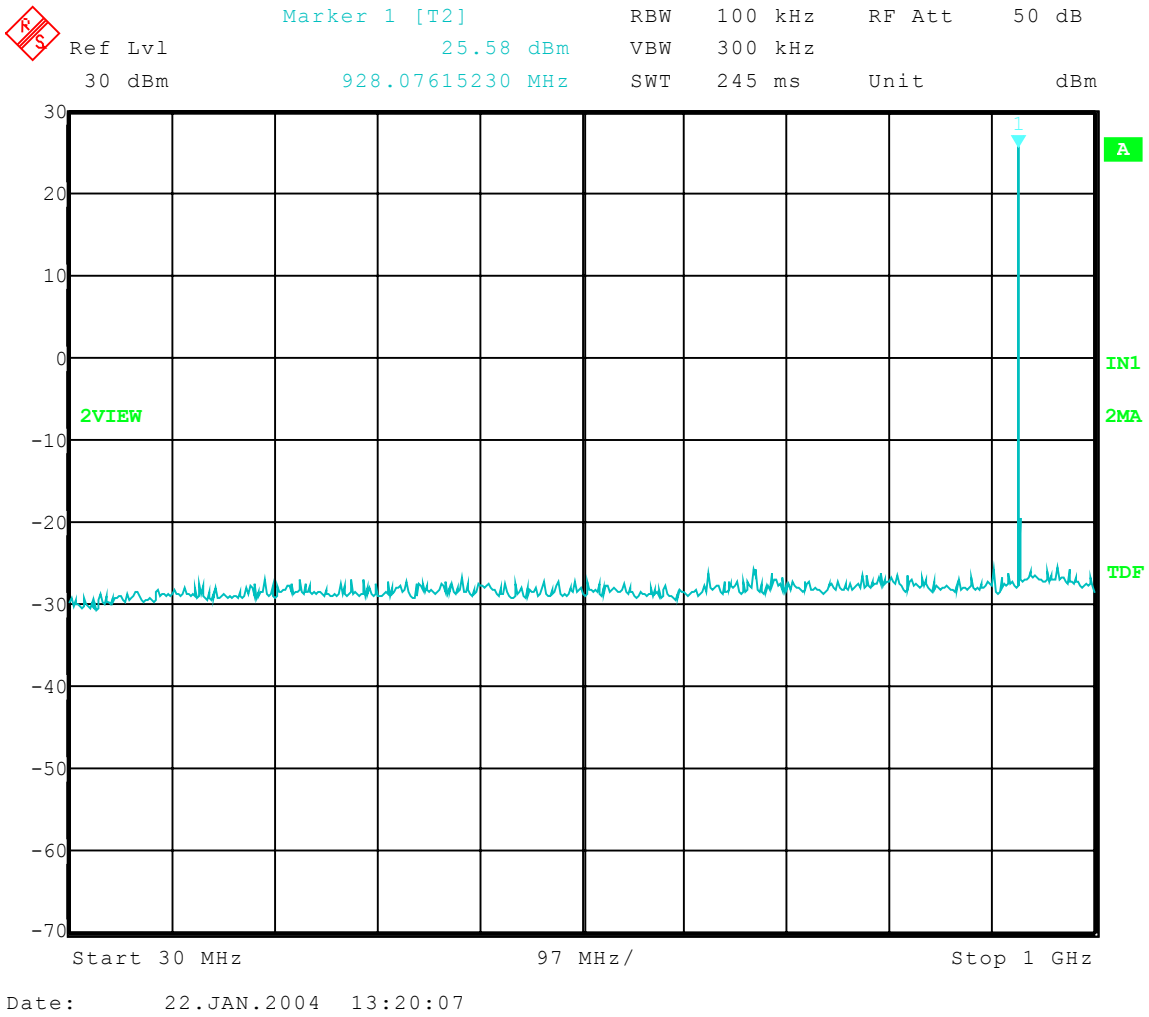
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: High Channel Transmit = 927.60 MHz
Frequency Range: 30 to 1000 MHz
Limit = 5.58 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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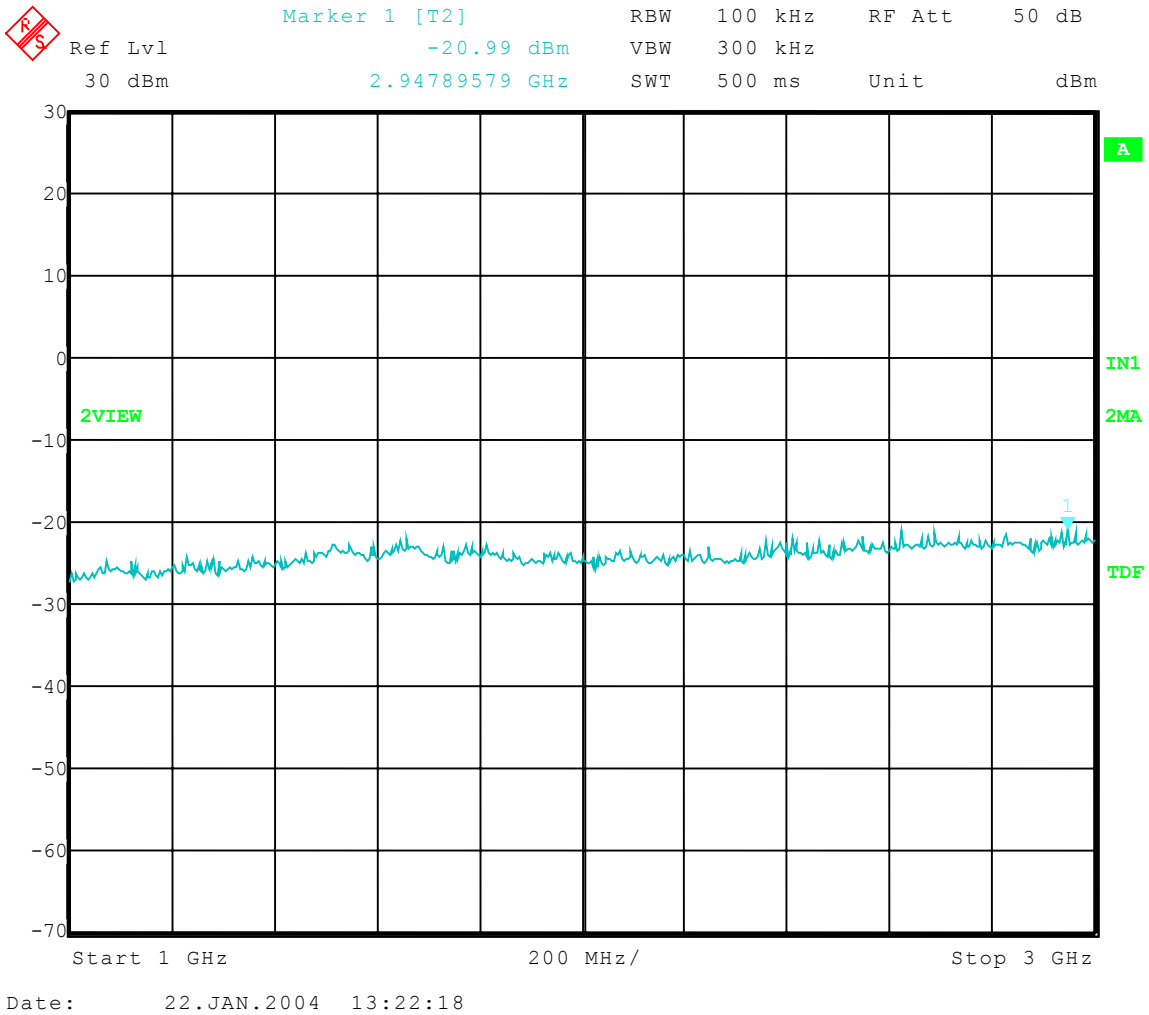
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: High Channel Transmit = 927.60 MHz
Frequency Range: 1 to 3 GHz
Limit = 5.58 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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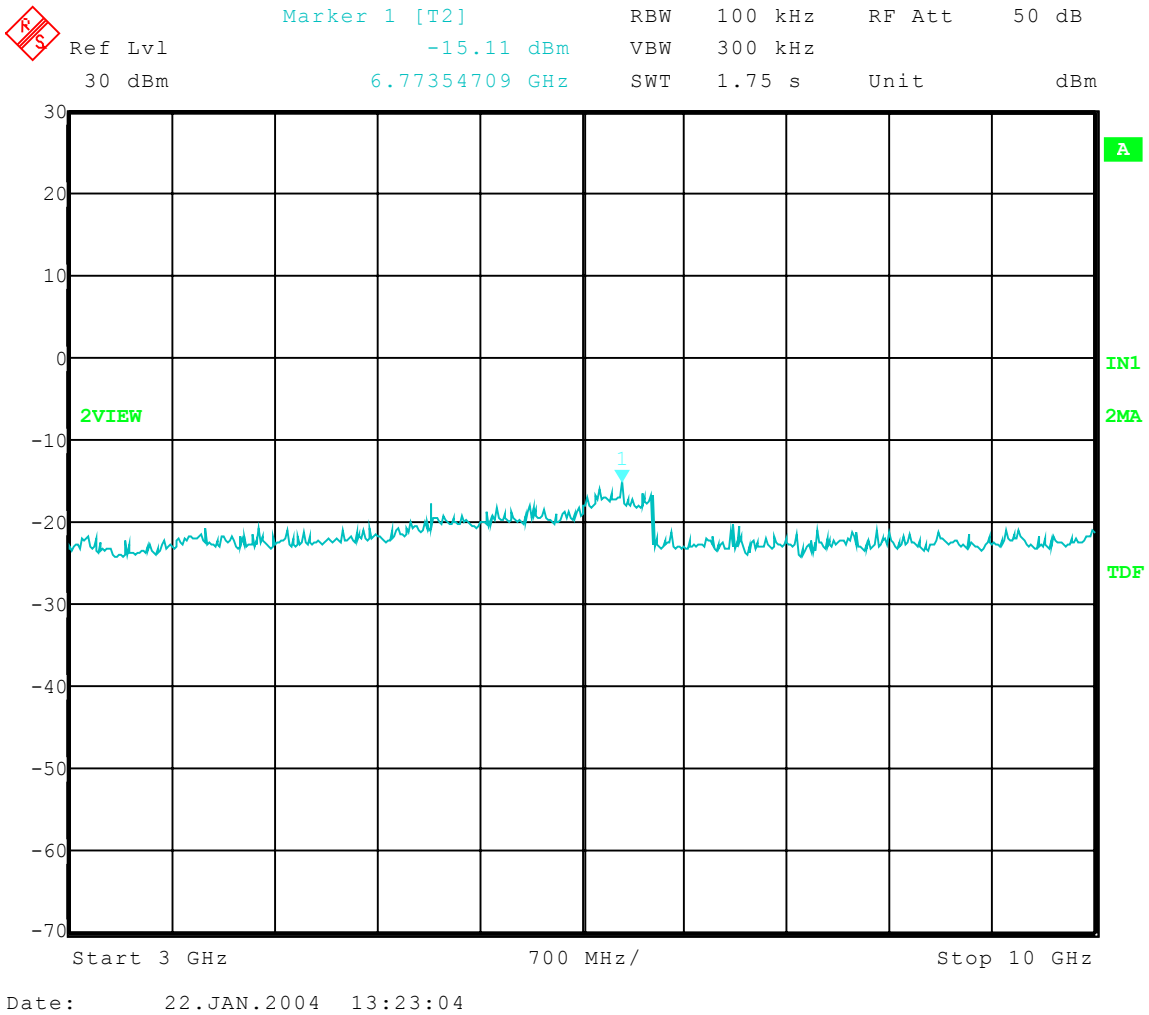
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: High Channel Transmit = 927.60 MHz
Frequency Range: 3 to 10 GHz
Limit = 5.58 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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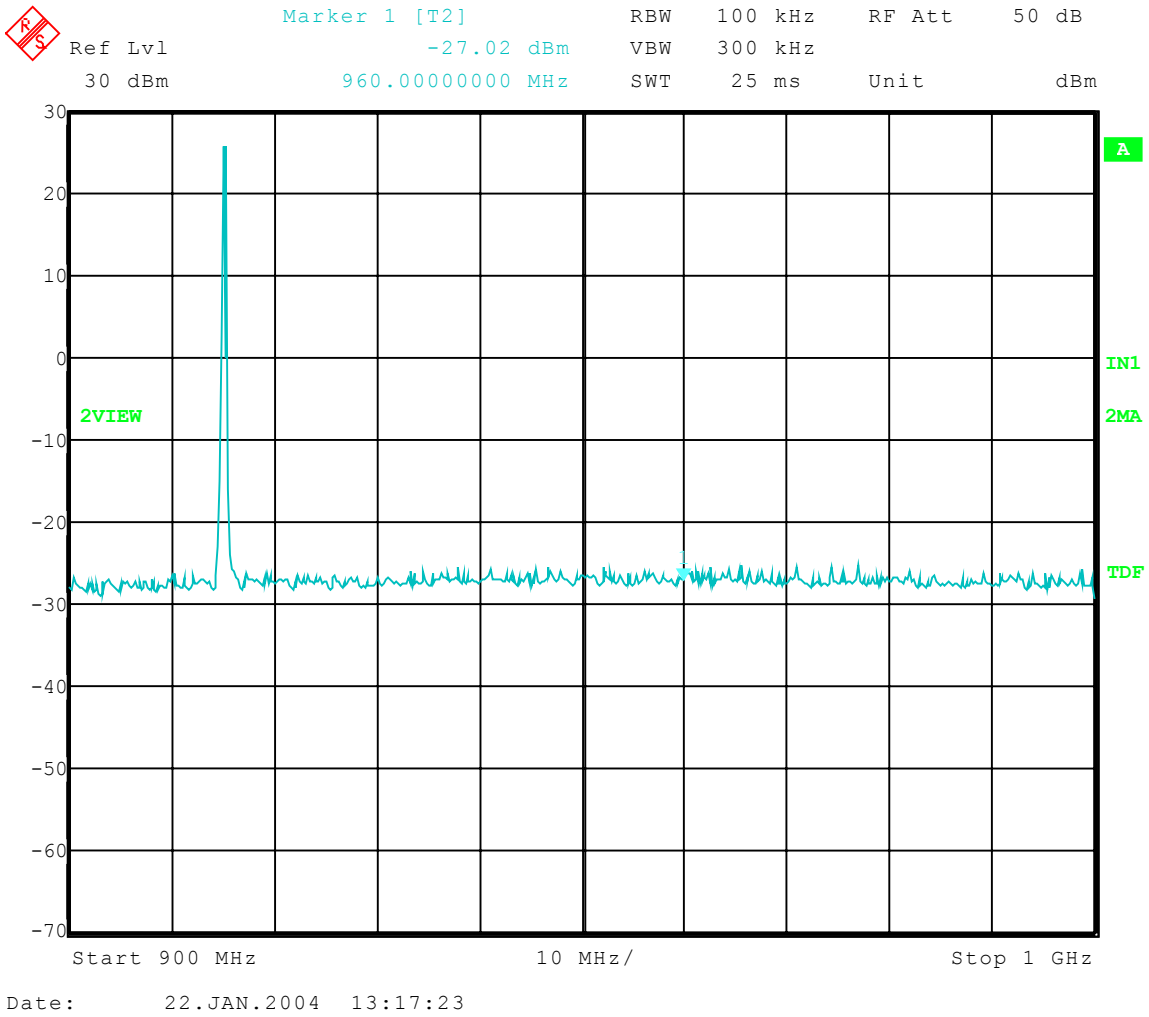
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Middle Channel Transmit = 915.2 MHz
Frequency Range: 900 to 1000 MHz
Limit = 5.62 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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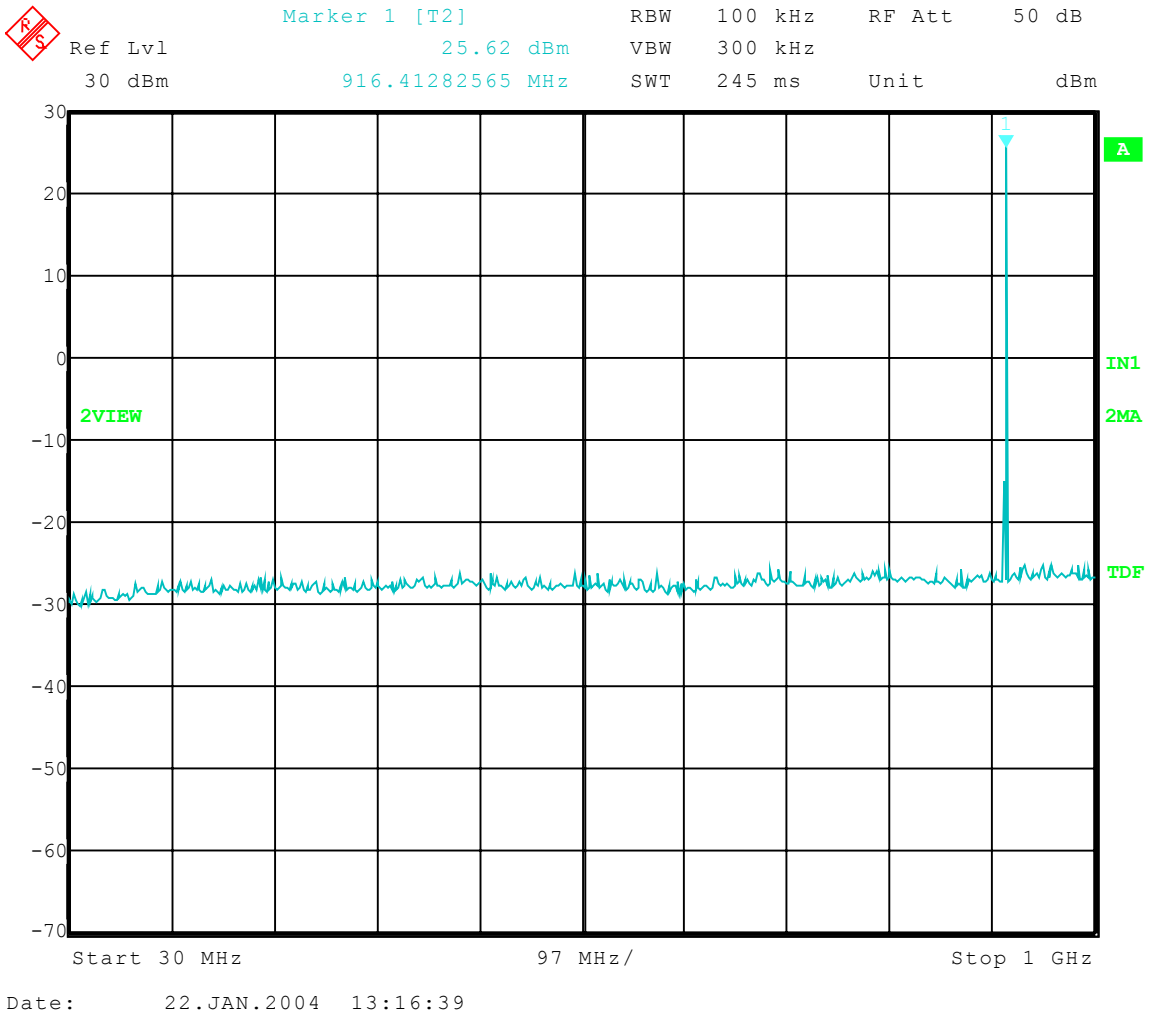
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Middle Channel Transmit = 915.2 MHz
Frequency Range: 30 to 1000 MHz
Limit = 5.62 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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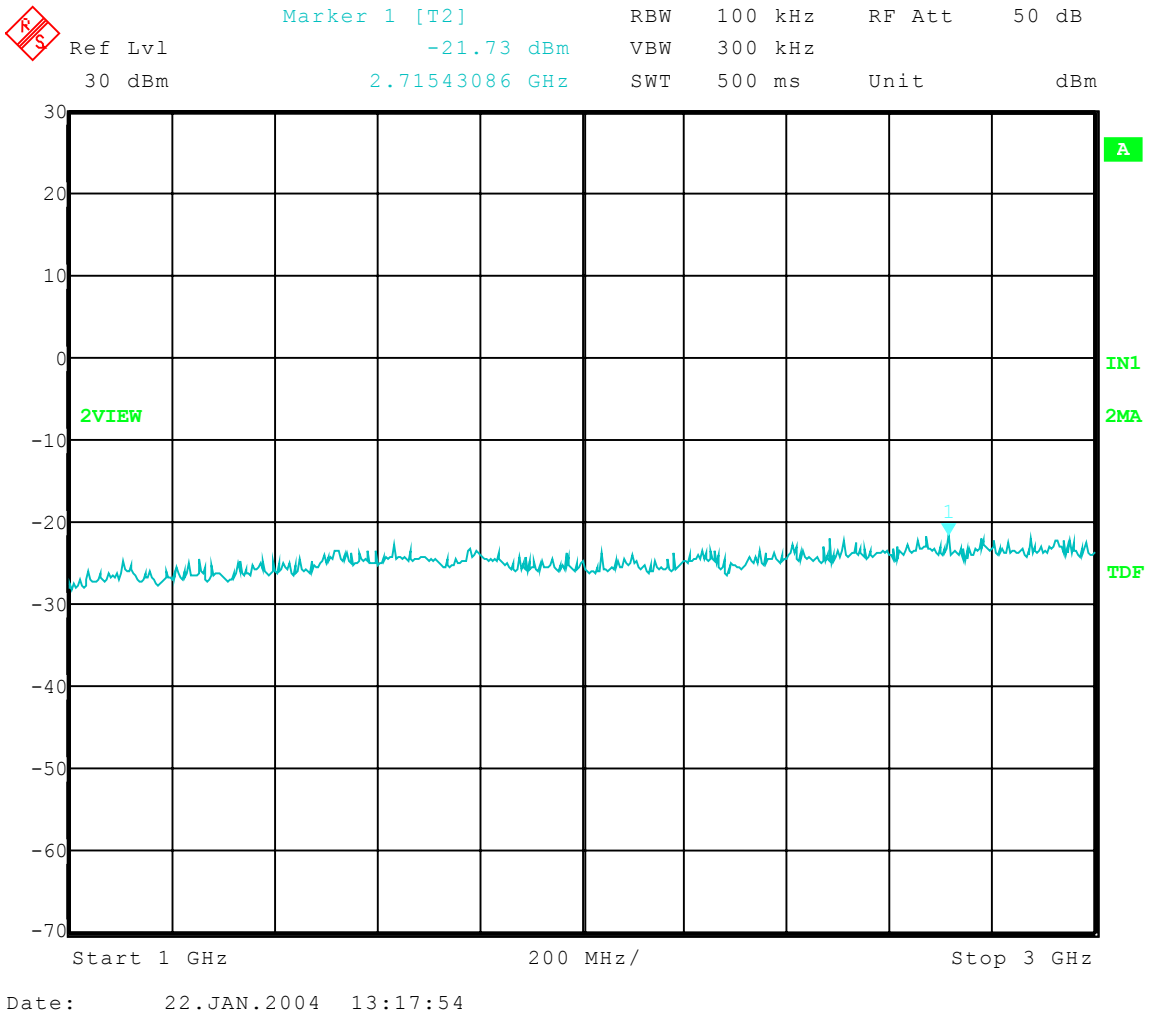
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Middle Channel Transmit = 915.2 MHz
Frequency Range: 1 to 3 GHz
Limit = 5.62 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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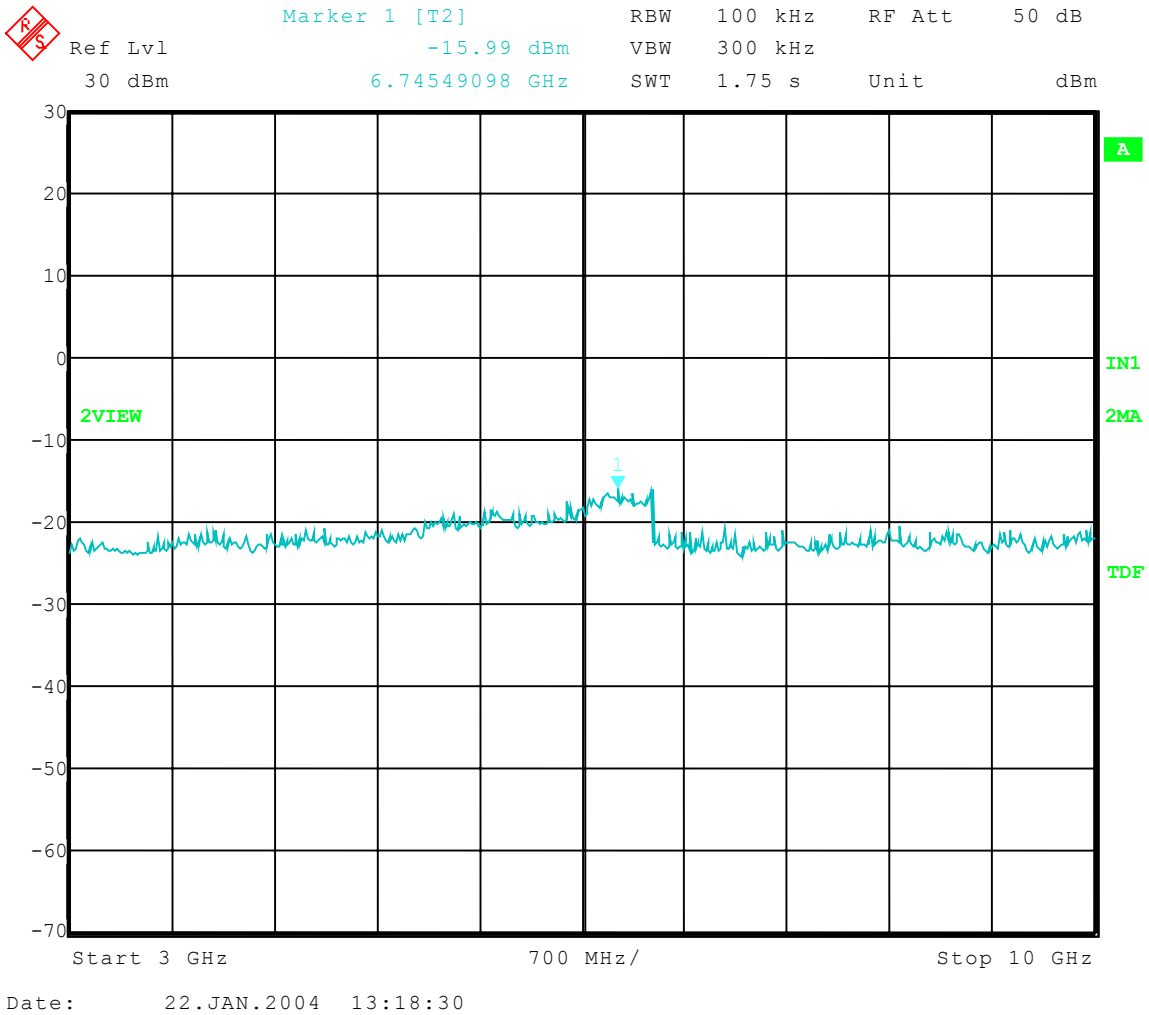
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Middle Channel Transmit = 915.2 MHz
Frequency Range: 3 to 10 GHz
Limit = 5.62 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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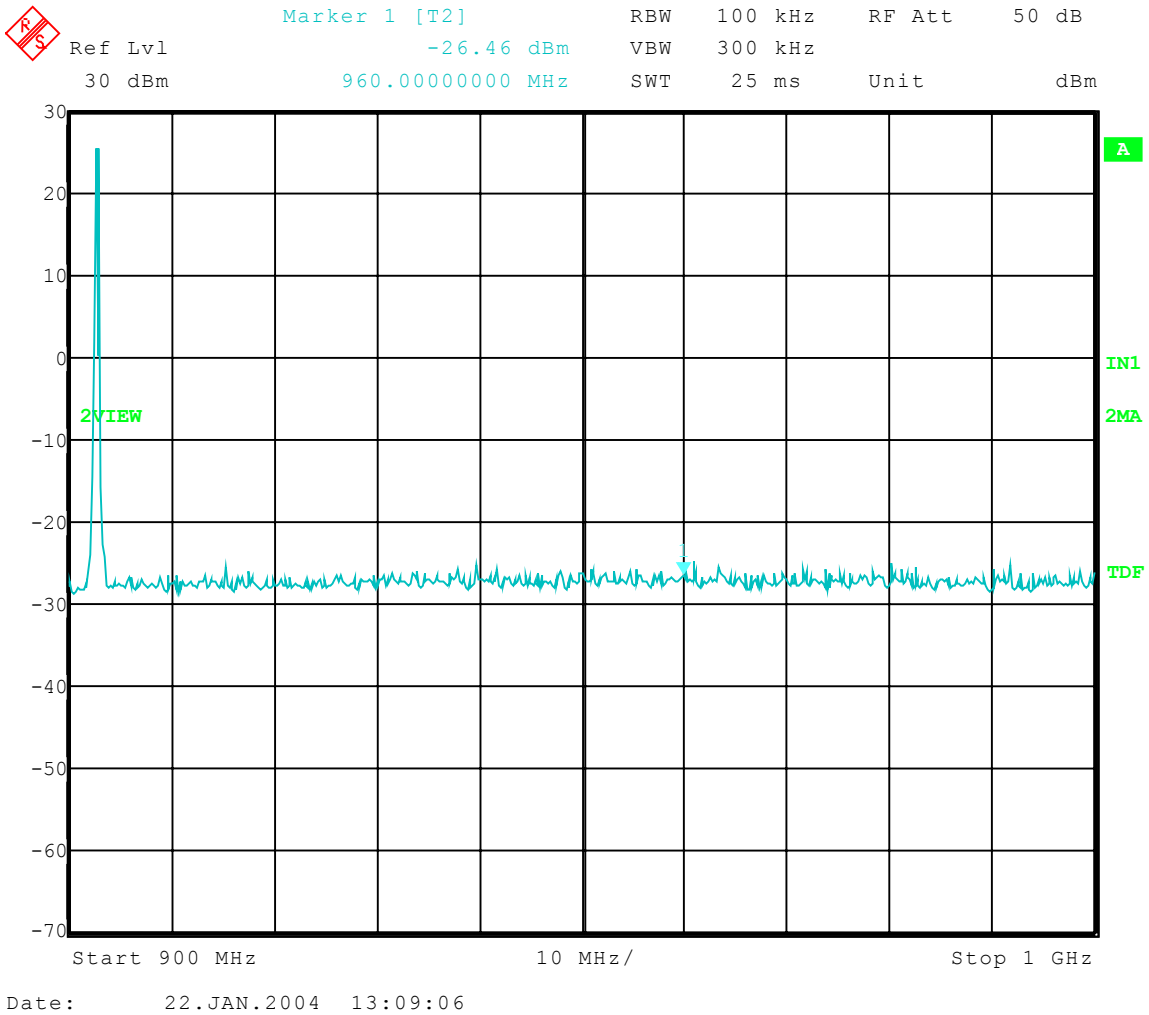
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Low Channel Transmit = 902.8 MHz
Frequency Range: 900 to 1000 MHz
Limit = 5.52 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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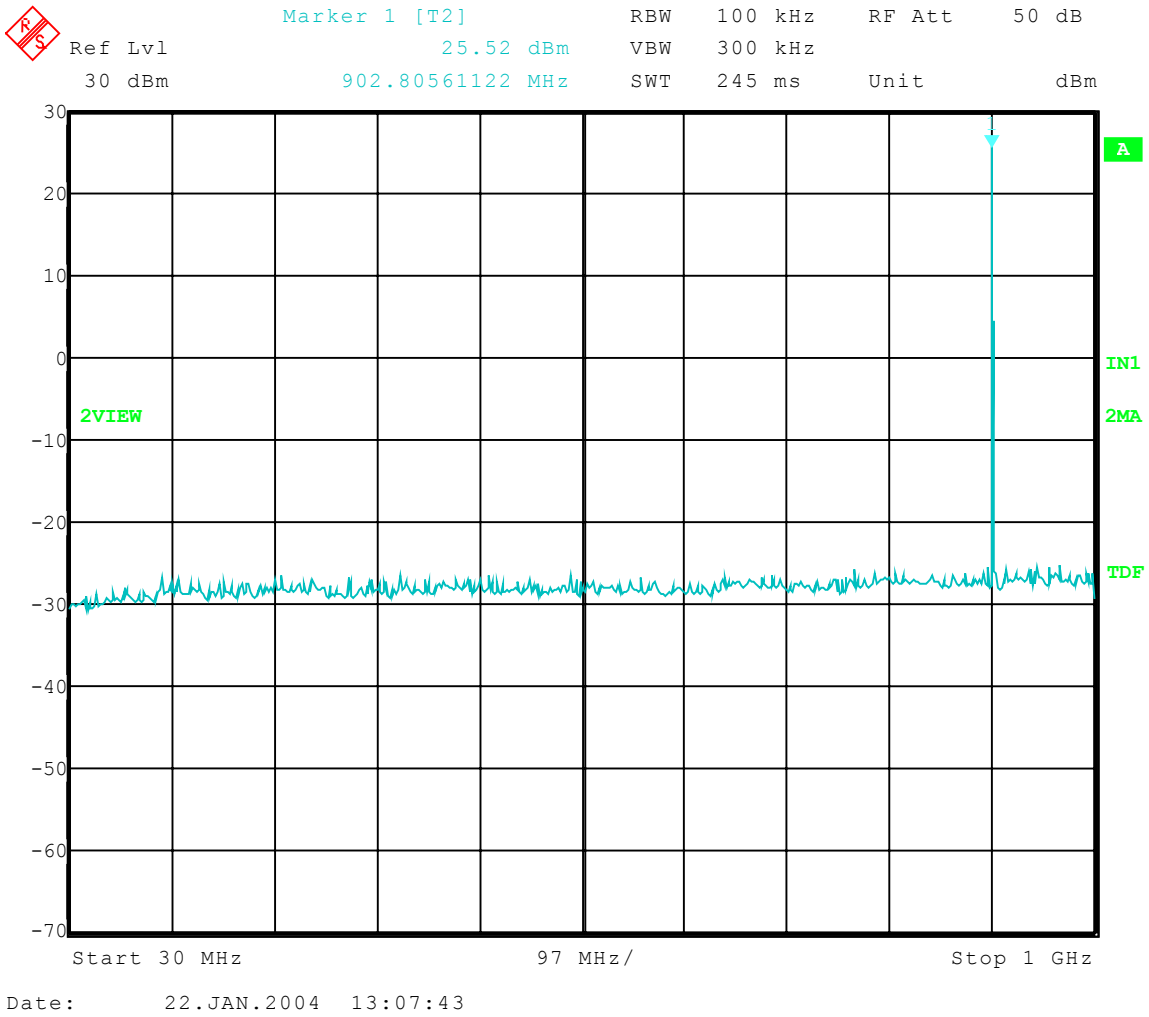
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Low Channel Transmit = 902.8 MHz
Frequency Range: 30 to 1000 MHz
Limit = 5.52 dBm

All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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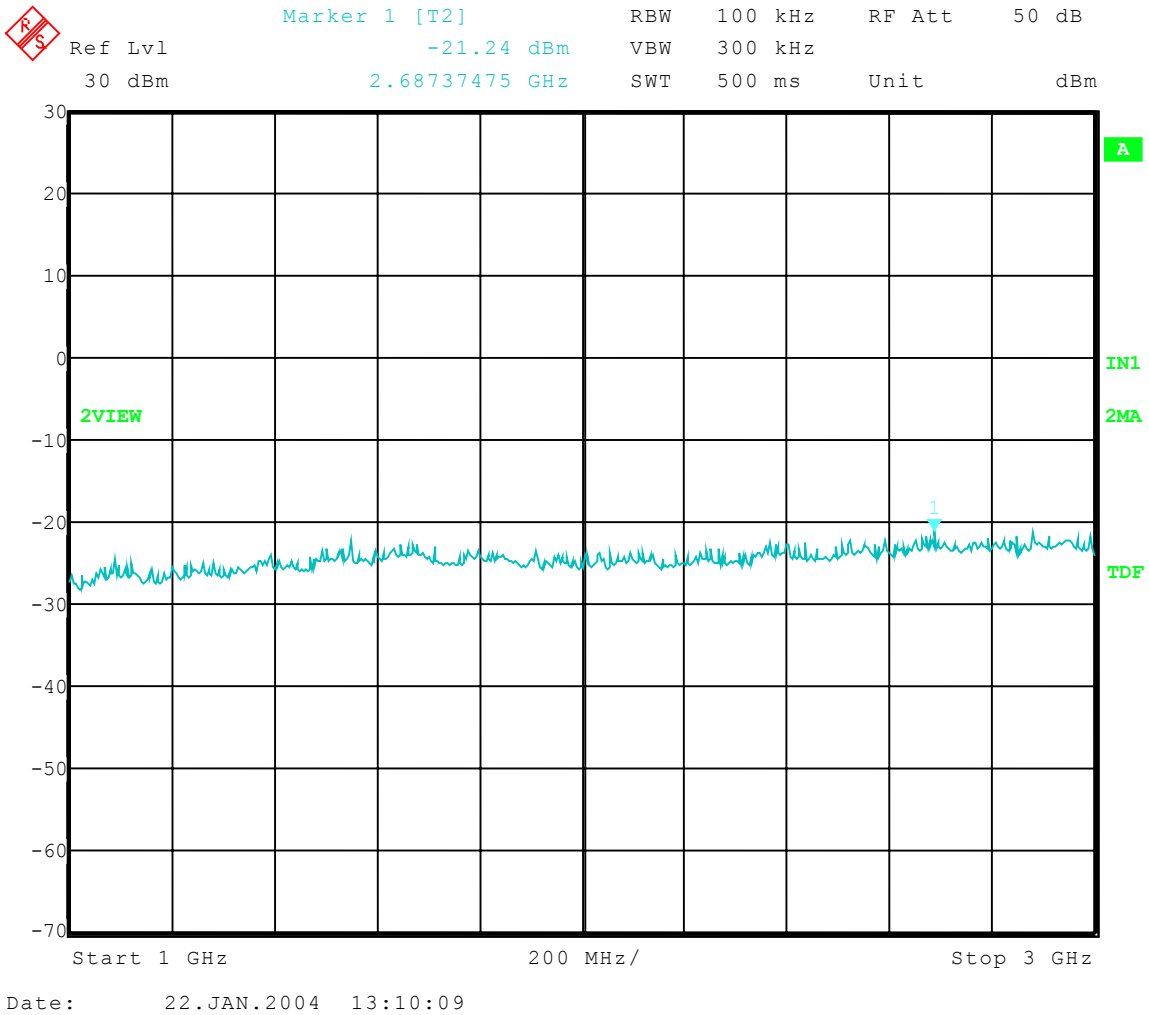
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Low Channel Transmit = 902.8 MHz
Frequency Range: 1 to 3 GHz
Limit = 5.52 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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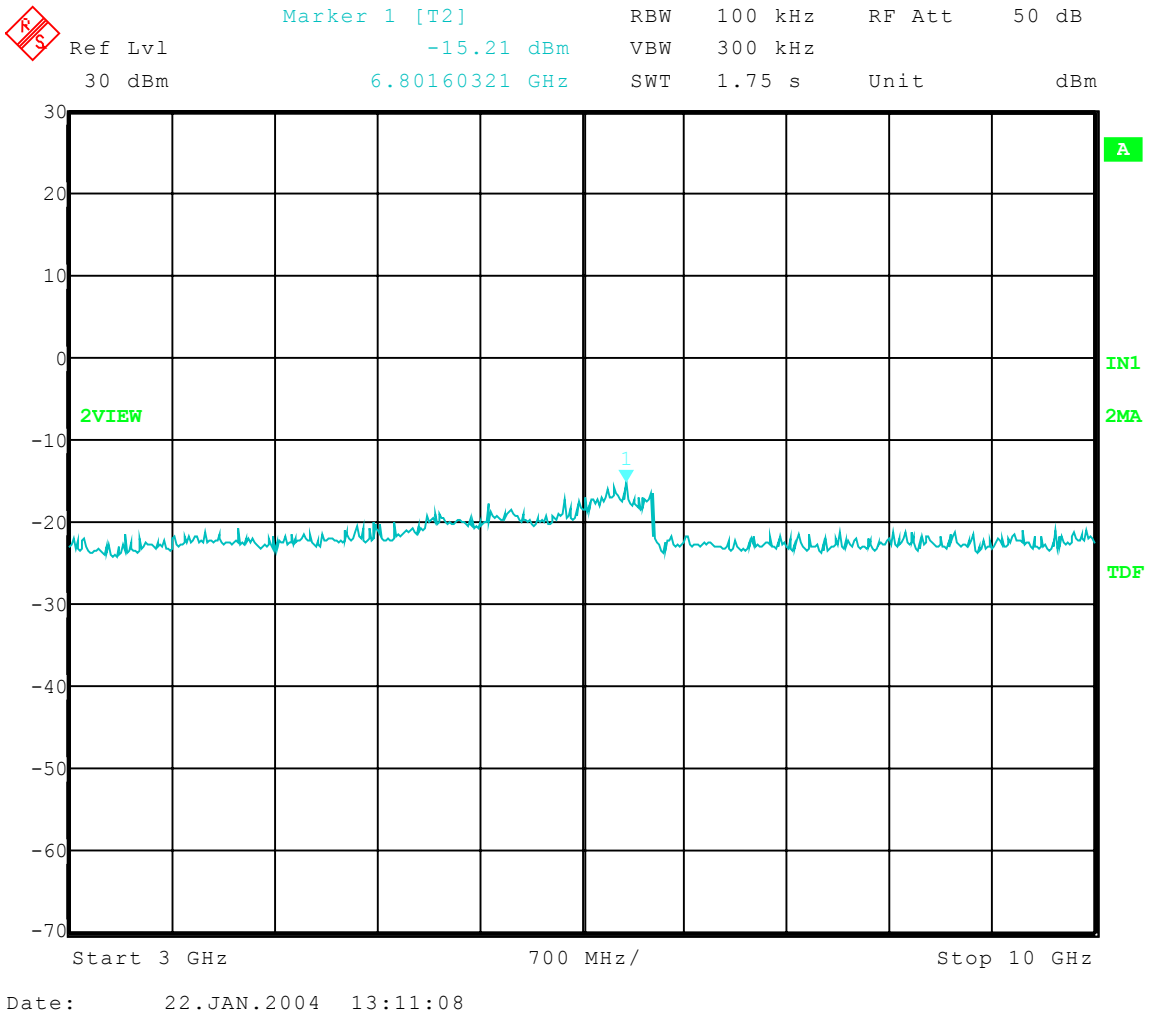
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Low Channel Transmit = 902.8 MHz
Frequency Range: 3 to 10 GHz
Limit = 5.52 dBm
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



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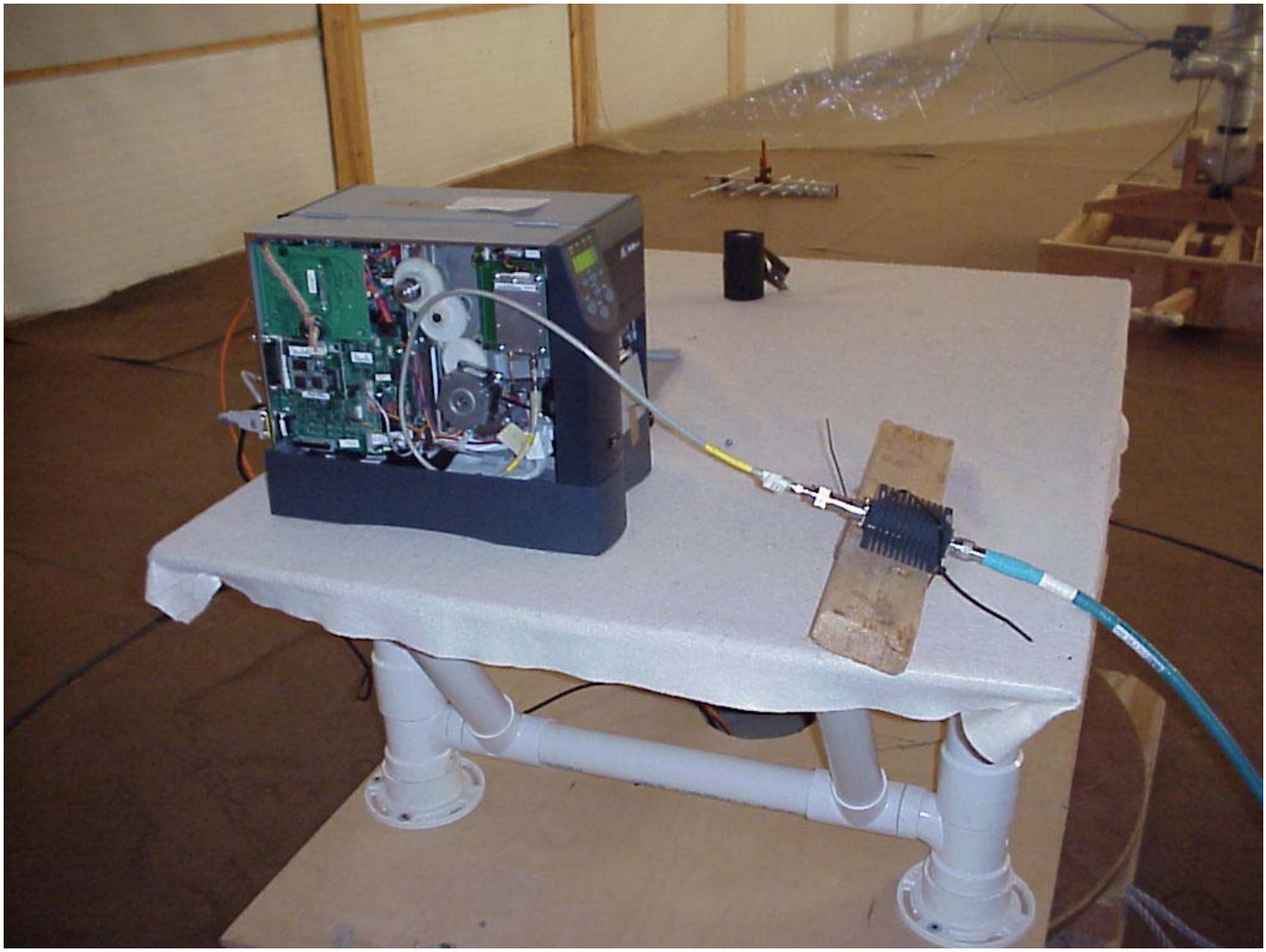
APPENDIX A

3.0 CONDUCTED EMISSIONS (ANTENNA TERMINAL) PHOTOS TAKEN DURING TESTING



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APPENDIX A

4.0 RESTRICTED BANDS

As stated in Section 15.205a, the fundamental emission from the R4Mplus 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:

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APPENDIX A

DATA AND GRAPH(S) TAKEN SHOWING THE BAND EDGE AND RESTRICT BAND COMPLIANCE

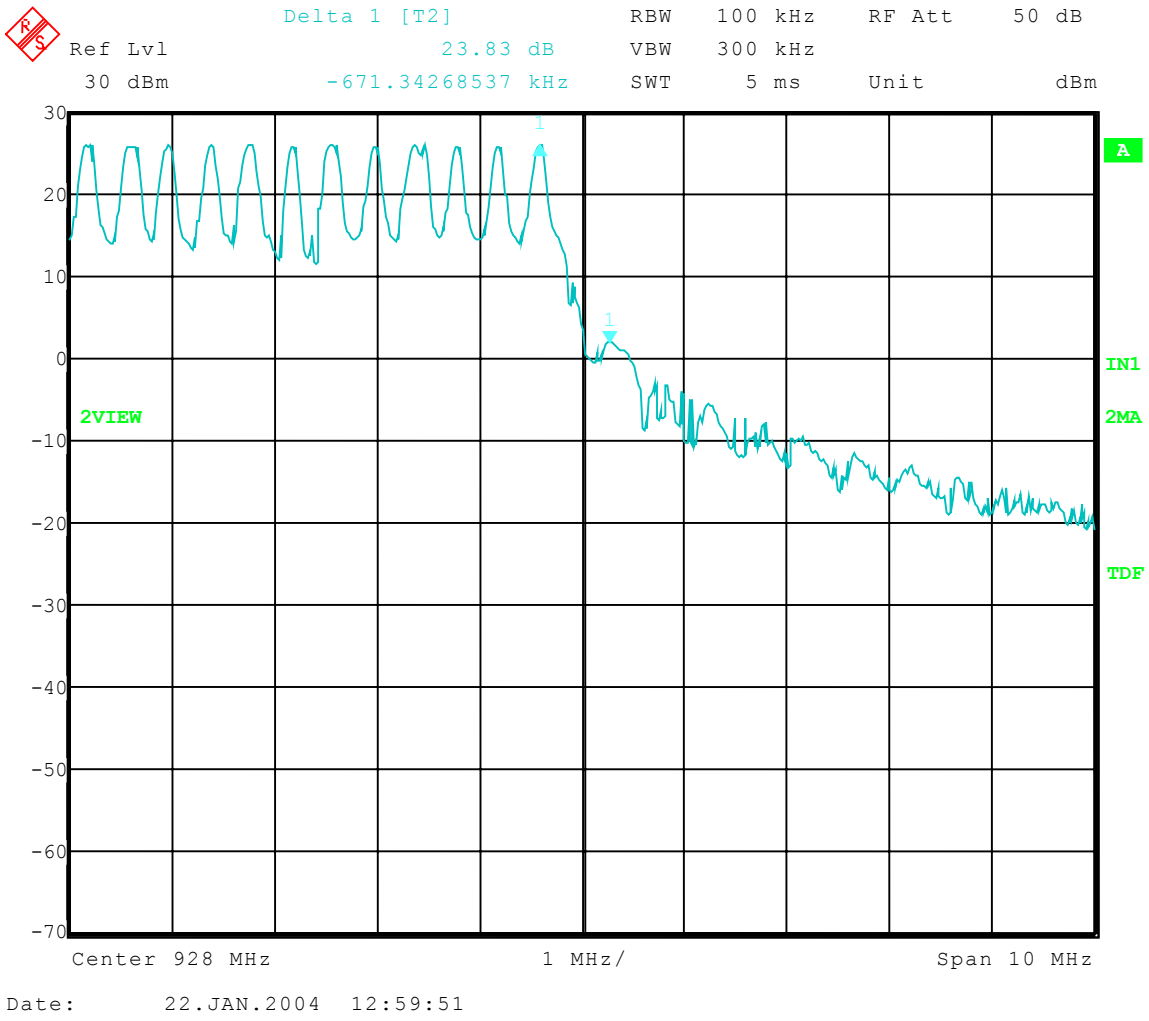
PART 15.247(c)

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: High Band-Edge Compliance - Conducted
Operator: Jason L.
Comment: Spread Spectrum Frequency Hopping On

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



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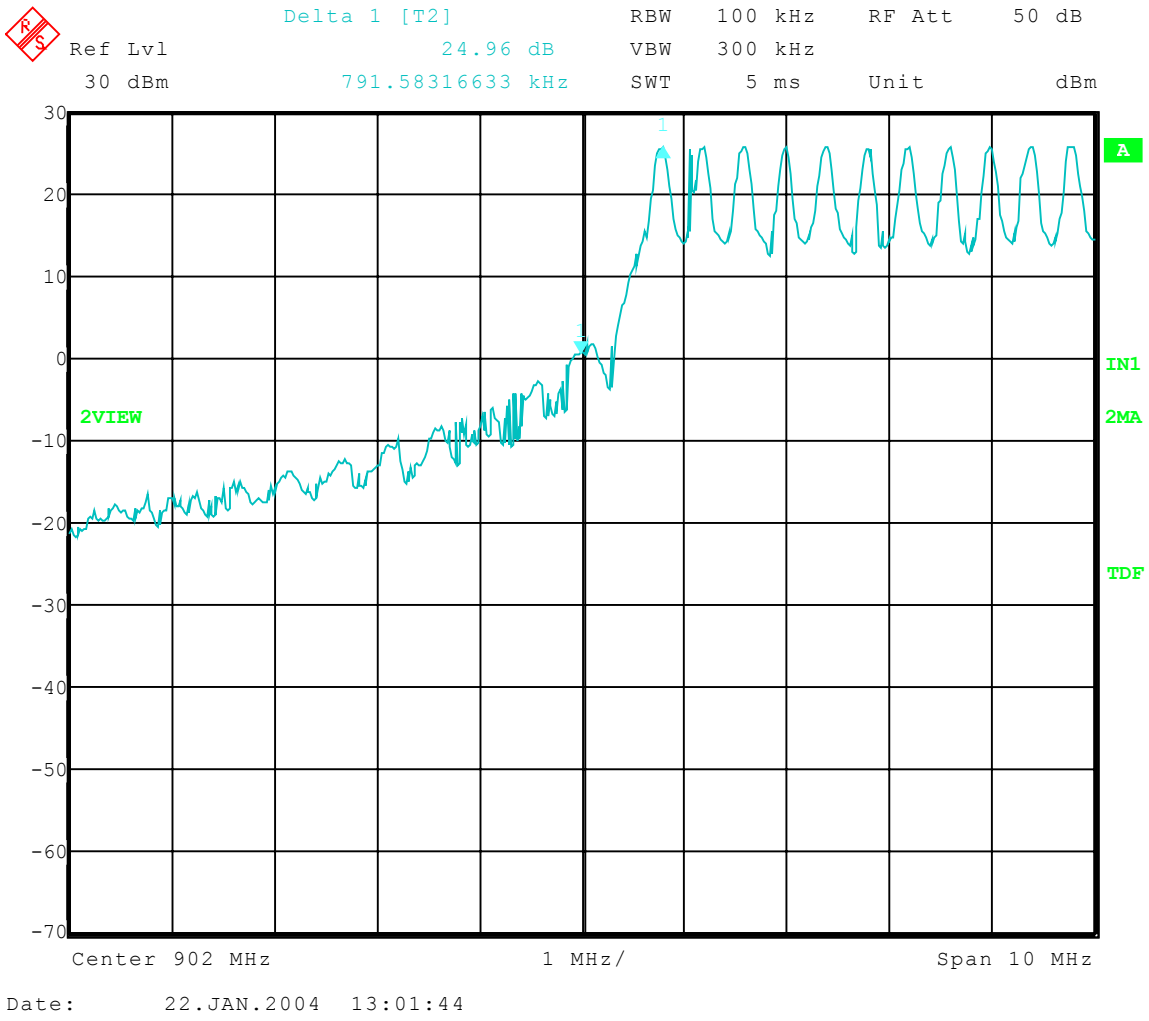
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Low Band-Edge Compliance - Conducted
Operator: Jason L.
Comment: Spread Spectrum Frequency Hopping On

Band-Edge Frequency = 902 MHz
Band-Edge > 20 dB Below Peak In-Band Emission



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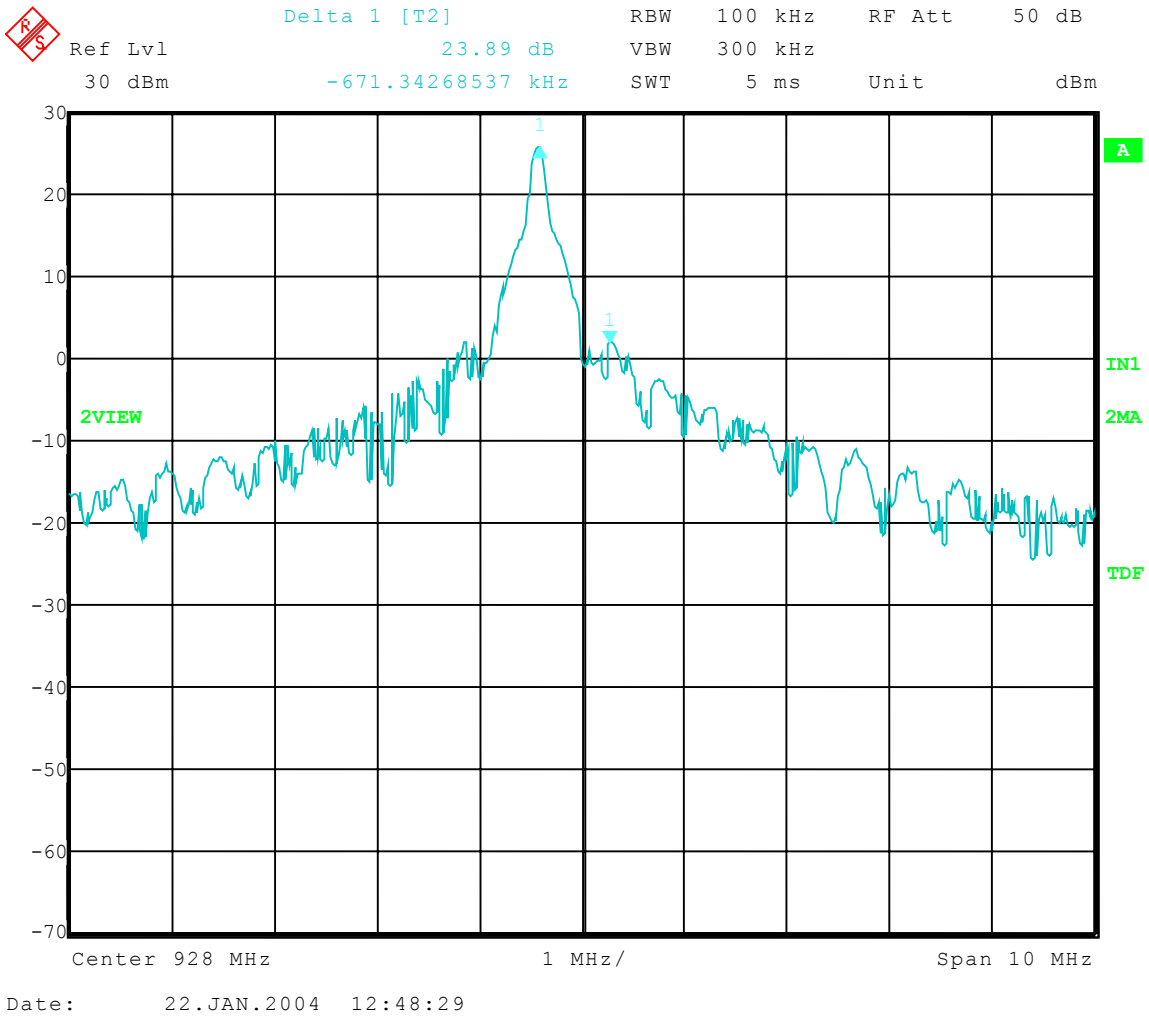
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: High Band-Edge Compliance - Conducted
Operator: Jason L.
Comment: High Channel: Frequency – 927.60 MHz

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



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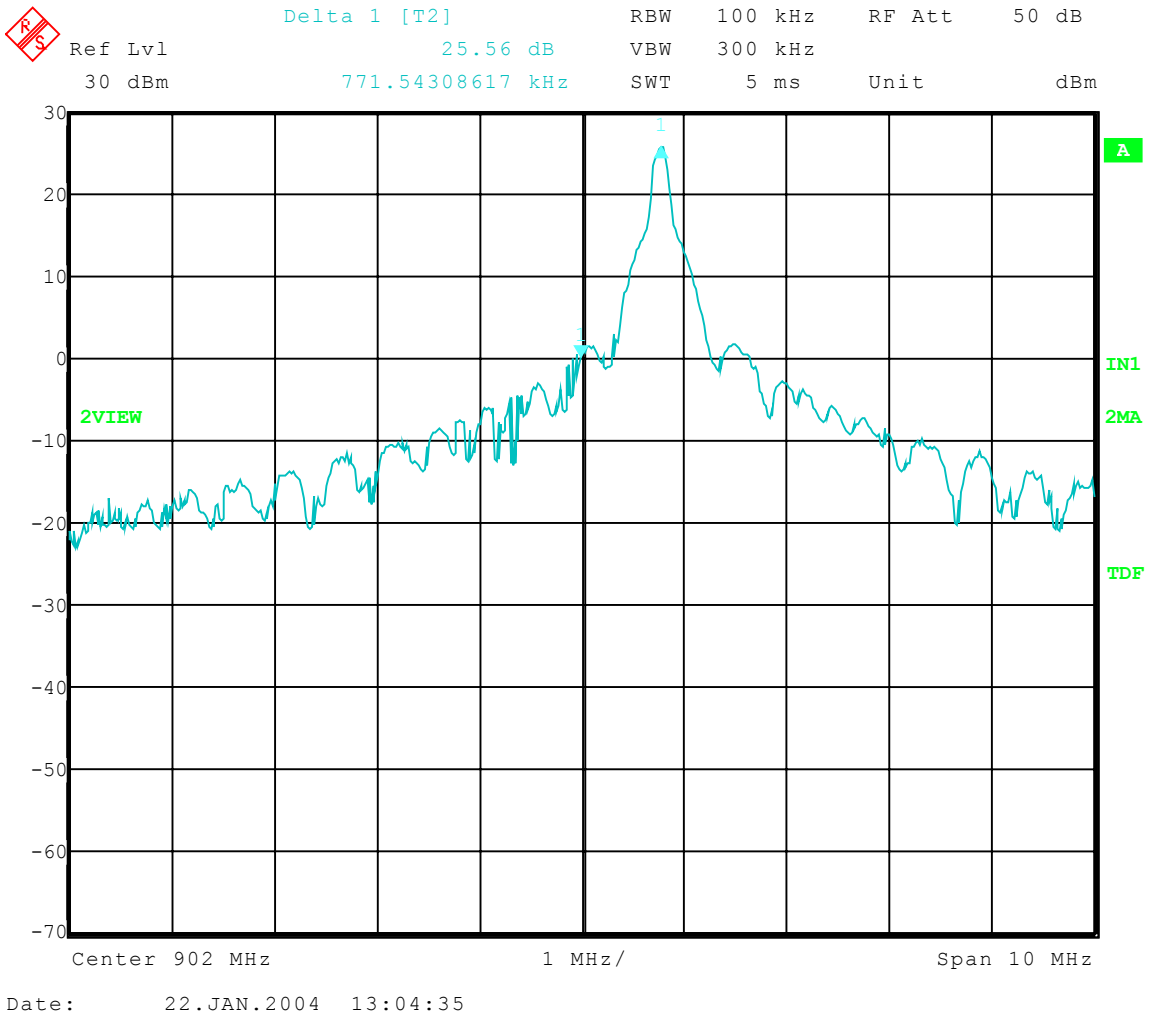
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Low Band-Edge Compliance - Conducted
Operator: Jason L.
Comment: Low Channel: Frequency – 902.8 MHz

Band-Edge Frequency = 902 MHz
Band-Edge > 20 dB Below Peak In-Band Emission



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APPENDIX A

6.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS

The radiated measurements made at D.L.S. Electronic Systems, Inc., for the R4Mplus, Model Number: Z4M, 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 R4Mplus were made up to 10000 MHz, in accordance with Section 15.33a for Intentional Radiators with a fundamental frequency of 927 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 C63.4-2001, 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 **70°F** at **25%** relative humidity.

ELECTRONIC SYSTEMS, INC.
1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

RADIATED DATA AND GRAPH(S) TAKEN FOR

FIELD STRENGTH

SPURIOUS EMISSION MEASUREMENTS

PART 15.247

FCC Part 15 Class B

Electric Field Strength

```
EUT:                 R4M+
Manufacturer:        Zebra
Operating Condition: 72 deg. F; 25% R.H.
Test Site:           DLS OF Site 3
Operator:            Jason L
Test Specification:  120 V; 60 Hz
Comment:             Hopping Mode On - Printer Printing
                     Date: 1/21/04
```

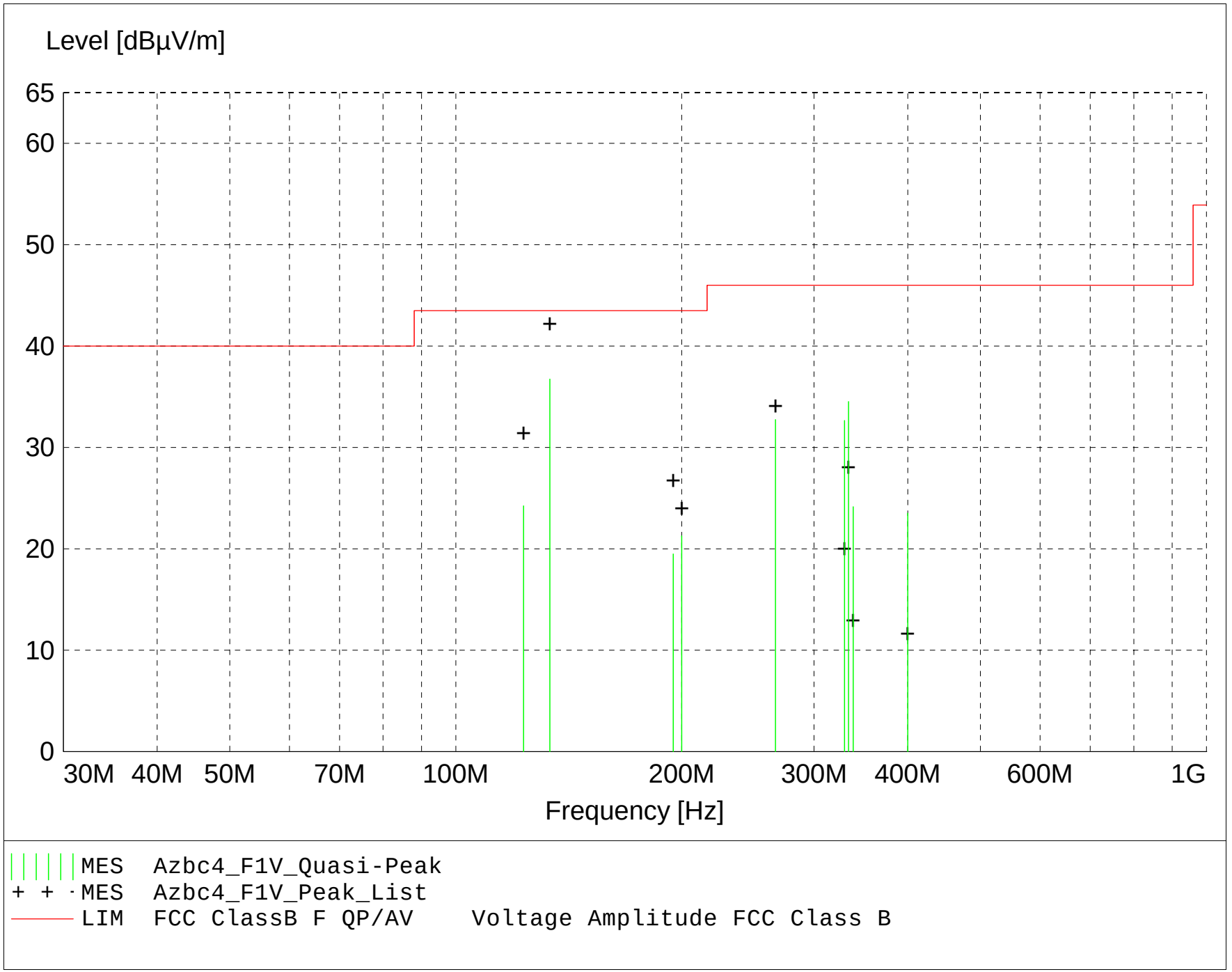
TEXT: "Site 3 MidV 3M"

```
  Short Description:            Test Set-up Vert30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 26 SN: 837491/010

                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 Polarisation
```


Level [dBµV/m]
65
60
50
40
30
20
10
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
MES Azbc4_F1V_Quasi-Peak
MES Azbc4_F1V_Peak_List
LIM FCC ClassB F QP/AV Voltage Amplitude FCC Class B

MEASUREMENT RESULT: "Azbc4_F1V_Final"

1/21/2004 2:13PM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
133.330000	47.63	12.23	-23.1	36.7	43.5	6.8	1.00	0	QUASI-PEAK	None
333.330000	41.15	14.89	-21.5	34.5	46.0	11.5	1.50	270	QUASI-PEAK	None
266.690000	41.45	13.30	-22.0	32.7	46.0	13.3	2.00	355	QUASI-PEAK	None
329.340000	39.16	15.04	-21.5	32.7	46.0	13.3	2.50	300	QUASI-PEAK	None
123.090000	34.73	12.71	-23.2	24.2	43.5	19.3	1.00	0	QUASI-PEAK	None
338.450000	30.80	14.85	-21.5	24.2	46.0	21.8	2.00	0	QUASI-PEAK	None
200.000000	27.11	16.67	-22.5	21.3	43.5	22.2	1.00	90	QUASI-PEAK	None
399.990000	28.86	15.82	-21.2	23.5	46.0	22.5	1.50	75	QUASI-PEAK	None
194.840000	25.46	16.63	-22.6	19.5	43.5	24.0	1.00	0	QUASI-PEAK	None

FCC Part 15 Class B

Electric Field Strength

```
EUT:                  R4M+
Manufacturer:         Zebra
Operating Condition:  72 deg. F; 25% R.H.
Test Site:            DLS OF Site 3
Operator:             Jason L
Test Specification:   120 V; 60 Hz
Comment:              Hopping Mode On - Printer Printing
                      Date: 1/21/04
```

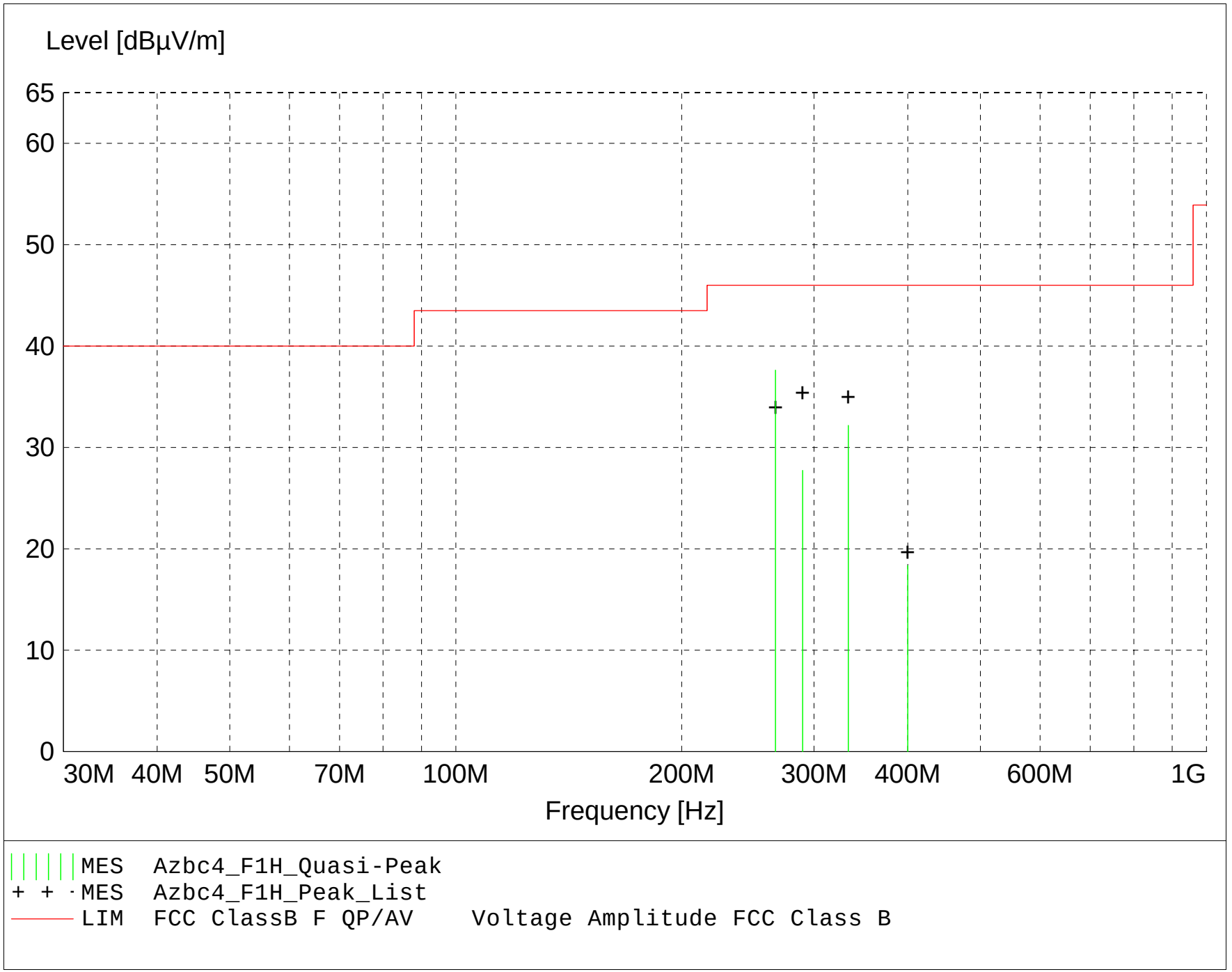
TEXT: "Site 3 MidH 3M"

```
  Short Description:            Test Set-up Horz30-1000MHz
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/006

                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 Polarisation
```


Level [dBµV/m]
65
60
50
40
30
20
10
0
30M
40M
50M
70M
100M
200M
300M
400M
600M
1G
Frequency [Hz]
MES Azbc4_F1H_Quasi-Peak
MES Azbc4_F1H_Peak_List
LIM FCC ClassB F QP/AV Voltage Amplitude FCC Class B

MEASUREMENT RESULT: "Azbc4_F1H_Final"

1/21/2004 2:22PM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
266.670000	46.33	13.30	-22.0	37.6	46.0	8.4	1.00	340	QUASI-PEAK	None
333.300000	38.80	14.89	-21.5	32.2	46.0	13.8	1.00	340	QUASI-PEAK	None
289.620000	35.33	14.26	-21.9	27.7	46.0	18.3	1.00	340	QUASI-PEAK	None
400.020000	23.70	15.82	-21.2	18.4	46.0	27.6	1.00	140	QUASI-PEAK	None

FCC Part 15.247

Electric Field Strength

```
EUT:                  R4M+
Manufacturer:         Zebra
Operating Condition: 70 deg F; 25% R.H.
Test Site:            Site 3
Operator:             Jason L
Test Specification:   120 V; 60 Hz
Comment:              High Channel  927.4 MHz
                      Date: 1/21/2004
```

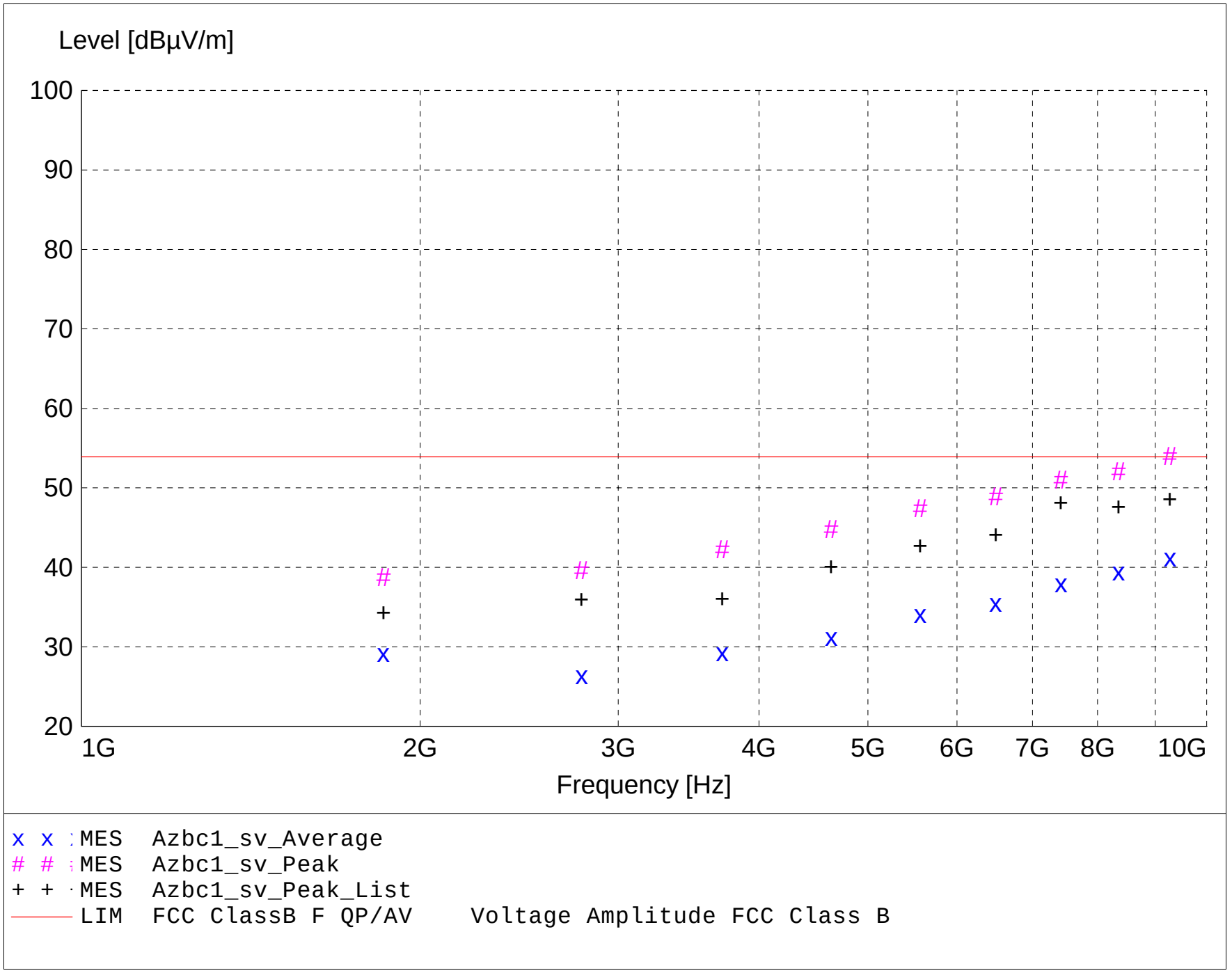
TEXT: "Site 3 5731&184 V3M"

```
  Short Description:            Test Set-up Vert1GHz-
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/006

                Horn Antenna --- EMCO 3115 SN: 9903-5731

                Pre-Amps ---
                               1 - 10 GHz  -- Miteq AMF-6D-010100-50 SN: 682425
                               10 - 18 GHz -- Miteq AMF-6F-100200-50-10P SN: 668382

TEST SET-UP:    EuT Measured at 3 Meters with VERTICAL Antenna Polarisation
```


Level [dBµV/m]
100
90
80
70
60
50
40
30
20
1G
2G
3G
4G
5G
6G
7G
8G
10G
Frequency [Hz]
x x : MES Azbc1_sv_Average
: MES Azbc1_sv_Peak
+ + : MES Azbc1_sv_Peak_List
——— LIM FCC ClassB F QP/AV Voltage Amplitude FCC Class B

MEASUREMENT RESULT: "Azbc1_sv_Final"

1/21/2004 10:01AM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
9275.600000	48.13	38.38	-32.5	54.0	53.9	-0.1	1.00	0	MAX PEAK	None
8348.100000	47.05	38.07	-33.1	52.0	53.9	1.9	1.00	0	MAX PEAK	None
7420.500000	47.32	36.52	-32.8	51.0	53.9	2.9	1.00	0	MAX PEAK	None
6493.000000	49.05	35.19	-35.4	48.9	53.9	5.0	1.00	0	MAX PEAK	None
5565.400000	48.00	34.63	-35.3	47.4	53.9	6.5	1.00	0	MAX PEAK	None
4637.800000	47.32	33.30	-35.8	44.8	53.9	9.1	1.00	0	MAX PEAK	None
3710.200000	47.32	31.97	-37.0	42.3	53.9	11.6	1.00	0	MAX PEAK	None
9275.600000	35.35	38.38	-32.5	41.2	53.9	12.7	1.00	0	AVERAGE	None
2782.700000	48.00	29.88	-38.3	39.6	53.9	14.3	1.00	270	MAX PEAK	None
8348.100000	34.42	38.07	-33.1	39.4	53.9	14.5	1.00	0	AVERAGE	None
1855.200000	49.33	28.17	-38.7	38.8	53.9	15.1	1.50	270	MAX PEAK	None
7420.500000	34.28	36.52	-32.8	38.0	53.9	15.9	1.00	0	AVERAGE	None
6493.000000	35.65	35.19	-35.4	35.5	53.9	18.4	1.00	0	AVERAGE	None
5565.400000	34.73	34.63	-35.3	34.1	53.9	19.8	1.00	0	AVERAGE	None
4637.800000	33.76	33.30	-35.8	31.3	53.9	22.6	1.00	0	AVERAGE	None
3710.200000	34.35	31.97	-37.0	29.3	53.9	24.6	1.00	0	AVERAGE	None
1855.200000	39.77	28.17	-38.7	29.2	53.9	24.7	1.50	270	AVERAGE	None
2782.700000	34.84	29.88	-38.3	26.4	53.9	27.5	1.00	270	AVERAGE	None

FCC Part 15.247

Electric Field Strength

```
EUT:                  R4M+
Manufacturer:         Zebra
Operating Condition:  70 deg F; 25% R.H.
Test Site:            Site 3
Operator:             Jason L
Test Specification:   120 V; 60 Hz
Comment:              High Channel  927.4 MHz
                      Date: 1/21/2004
```

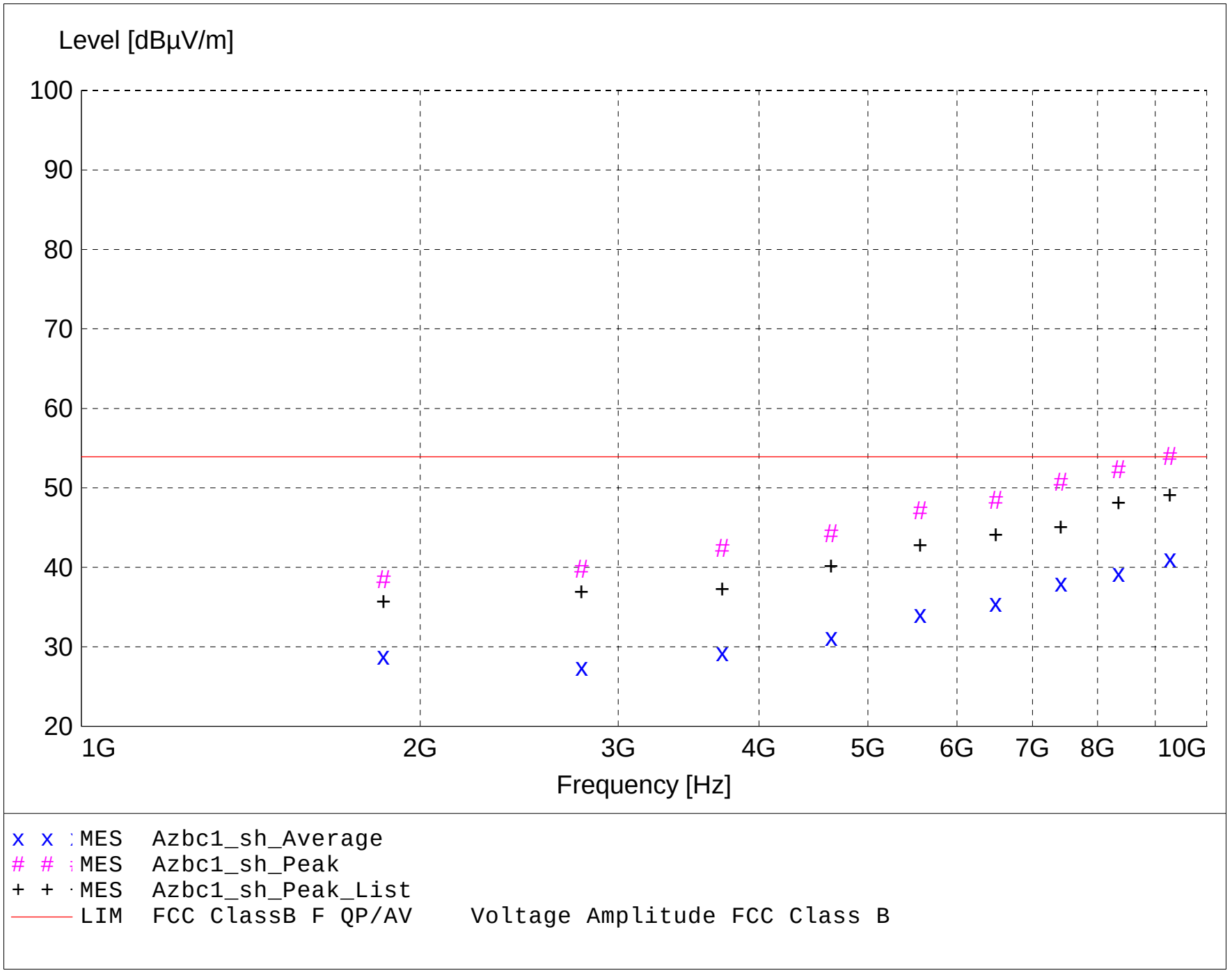
TEXT: "Site 3 5731&184 H3M"

```
  Short Description:            Test Set-up Horz1GHz-
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/006

                Horn Antenna --- EMCO 3115 SN: 9903-5731

                Pre-Amps ---
                                1 - 10 GHz  -- Miteq AMF-6D-010100-50 SN: 682425
                                10 - 18 GHz -- Miteq AMF-6F-100200-50-10P SN: 668382

TEST SET-UP:    EuT Measured at 3 Meters with HORIZONTAL Antenna Polarisation
```


Level [dBµV/m]
100
90
80
70
60
50
40
30
20
1G
2G
3G
4G
5G
6G
7G
8G
10G
Frequency [Hz]
x x : MES Azbc1_sh_Average
: MES Azbc1_sh_Peak
+ + : MES Azbc1_sh_Peak_List
——— LIM FCC ClassB F QP/AV Voltage Amplitude FCC Class B

MEASUREMENT RESULT: "Azbc1_sh_Final"

1/21/2004 10:20AM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
9275.600000	48.13	38.38	-32.5	54.0	53.9	-0.1	1.00	270	MAX PEAK	None
8348.100000	47.32	38.07	-33.1	52.3	53.9	1.6	1.00	270	MAX PEAK	None
7420.500000	47.05	36.52	-32.8	50.8	53.9	3.1	1.00	0	MAX PEAK	None
6493.000000	48.66	35.19	-35.4	48.5	53.9	5.4	1.00	0	MAX PEAK	None
5565.400000	47.73	34.63	-35.3	47.1	53.9	6.8	1.00	0	MAX PEAK	None
4637.800000	46.76	33.30	-35.8	44.2	53.9	9.7	1.00	0	MAX PEAK	None
3710.300000	47.45	31.97	-37.0	42.4	53.9	11.5	1.00	0	MAX PEAK	None
9275.600000	35.24	38.38	-32.5	41.1	53.9	12.8	1.00	270	AVERAGE	None
2782.700000	48.26	29.88	-38.3	39.8	53.9	14.1	1.00	45	MAX PEAK	None
8348.100000	34.32	38.07	-33.1	39.3	53.9	14.6	1.00	270	AVERAGE	None
1855.200000	49.05	28.17	-38.7	38.5	53.9	15.4	1.00	90	MAX PEAK	None
7420.500000	34.34	36.52	-32.8	38.1	53.9	15.8	1.00	0	AVERAGE	None
6493.000000	35.69	35.19	-35.4	35.5	53.9	18.4	1.00	0	AVERAGE	None
5565.400000	34.73	34.63	-35.3	34.1	53.9	19.8	1.00	0	AVERAGE	None
4637.800000	33.76	33.30	-35.8	31.2	53.9	22.7	1.00	0	AVERAGE	None
3710.300000	34.32	31.97	-37.0	29.3	53.9	24.6	1.00	0	AVERAGE	None
1855.200000	39.39	28.17	-38.7	28.8	53.9	25.1	1.00	90	AVERAGE	None
2782.700000	35.87	29.88	-38.3	27.4	53.9	26.5	1.00	45	AVERAGE	None

FCC Part 15.247

Electric Field Strength

EUT: R4M+
Manufacturer: Zebra
Operating Condition: 70 deg F; 25% R.H.
Test Site: Site 3
Operator: Jason L
Test Specification: 120 V; 60 Hz
Comment: Mid Channel 915 MHz
Date: 1/21/2004

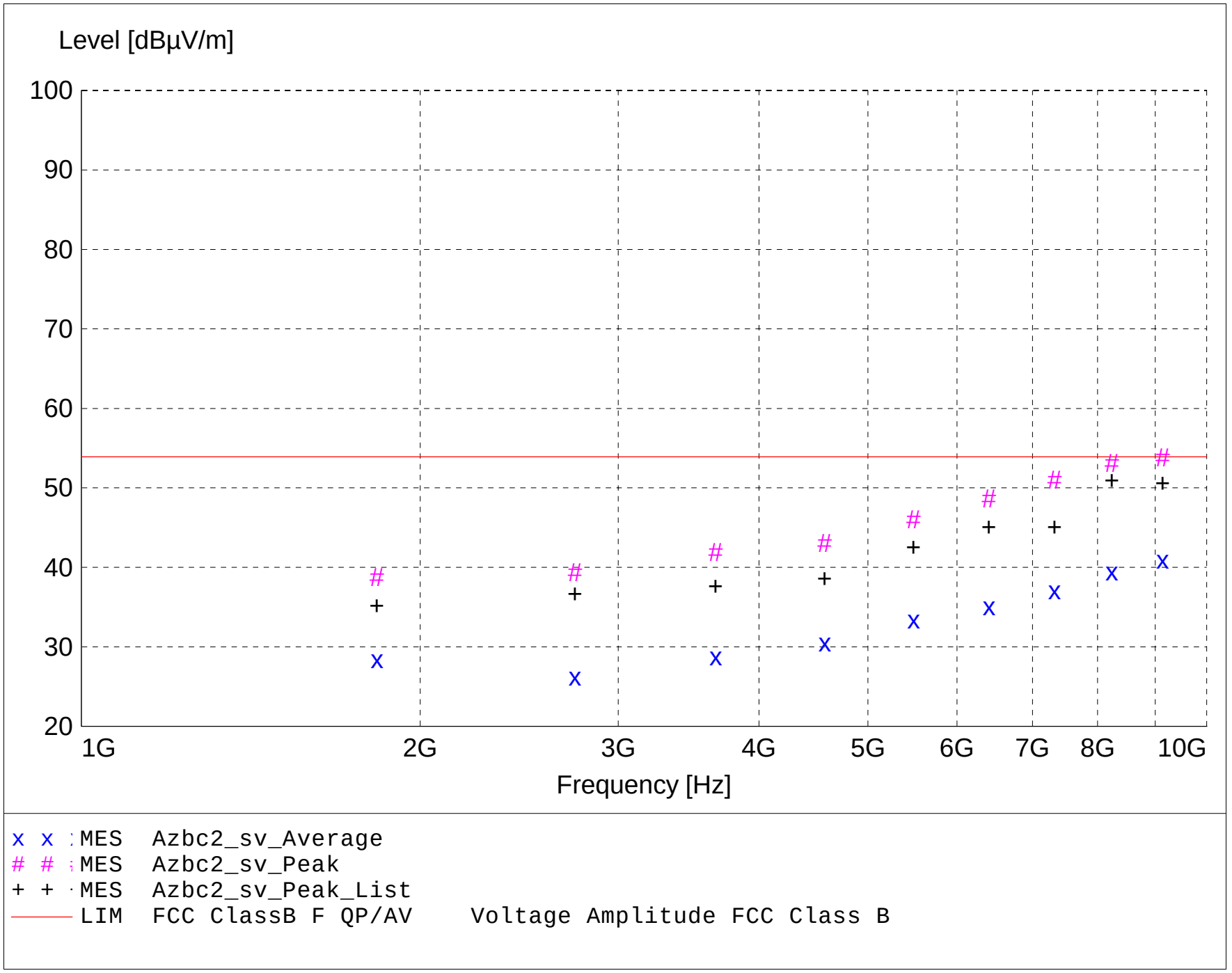
TEXT: "Site 3 5731&184 V3M"

Short Description: Test Set-up Vert1GHz-
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/006

Horn Antenna --- EMCO 3115 SN: 9903-5731

Pre-Amps ---
1 - 10 GHz -- Miteq AMF-6D-010100-50 SN: 682425
10 - 18 GHz -- Miteq AMF-6F-100200-50-10P SN: 668382

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


Level [dBµV/m]
100
90
80
70
60
50
40
30
20
1G
2G
3G
4G
5G
6G
7G
8G
10G
Frequency [Hz]
x x : MES Azbc2_sv_Average
: MES Azbc2_sv_Peak
+ + : MES Azbc2_sv_Peak_List
——— LIM FCC ClassB F QP/AV Voltage Amplitude FCC Class B

MEASUREMENT RESULT: "Azbc2_sv_Final"

1/21/2004 10:46AM

Frequency MHz	Level dBµV	Antenna Factor dBµV/m	System Loss dB	Total Level dBµV/m	Limit dBµV/m	Margin dB	Height Ant. m	EuT Angle deg	Final Detector	Comment
9138.400000	49.33	38.49	-34.0	53.8	53.9	0.1	1.00	0	MAX PEAK	None
8236.100000	47.05	38.28	-32.2	53.1	53.9	0.8	1.00	0	MAX PEAK	None
7323.700000	48.66	36.54	-34.2	51.0	53.9	2.9	1.00	0	MAX PEAK	None
6405.600000	49.05	35.12	-35.5	48.6	53.9	5.3	1.00	0	MAX PEAK	None
5491.200000	47.05	34.60	-35.7	46.0	53.9	7.9	1.00	0	MAX PEAK	None
4576.900000	45.89	33.08	-36.0	43.0	53.9	10.9	1.00	0	MAX PEAK	None
3660.900000	47.18	31.81	-37.1	41.9	53.9	12.0	1.00	0	MAX PEAK	None
9138.400000	36.45	38.49	-34.0	40.9	53.9	13.0	1.00	0	AVERAGE	None
8236.100000	33.43	38.28	-32.2	39.5	53.9	14.4	1.00	0	AVERAGE	None
2745.000000	48.00	29.79	-38.5	39.3	53.9	14.6	1.00	0	MAX PEAK	None
1830.300000	49.47	28.09	-38.8	38.7	53.9	15.2	1.50	200	MAX PEAK	None
7323.700000	34.71	36.54	-34.2	37.1	53.9	16.8	1.00	0	AVERAGE	None
6405.600000	35.52	35.12	-35.5	35.1	53.9	18.8	1.00	0	AVERAGE	None
5491.200000	34.45	34.60	-35.7	33.4	53.9	20.5	1.00	0	AVERAGE	None
4576.900000	33.39	33.08	-36.0	30.5	53.9	23.4	1.00	0	AVERAGE	None
3660.900000	34.03	31.81	-37.1	28.8	53.9	25.1	1.00	0	AVERAGE	None
1830.300000	39.16	28.09	-38.8	28.4	53.9	25.5	1.50	200	AVERAGE	None
2745.000000	34.90	29.79	-38.5	26.2	53.9	27.7	1.00	0	AVERAGE	None

FCC Part 15.247

Electric Field Strength

```
EUT:                  R4M+
Manufacturer:         Zebra
Operating Condition:  70 deg F; 25% R.H.
Test Site:            Site 3
Operator:             Jason L
Test Specification:   120 V; 60 Hz
Comment:              Mid Channel  915 MHz
                      Date: 1/21/2004
```

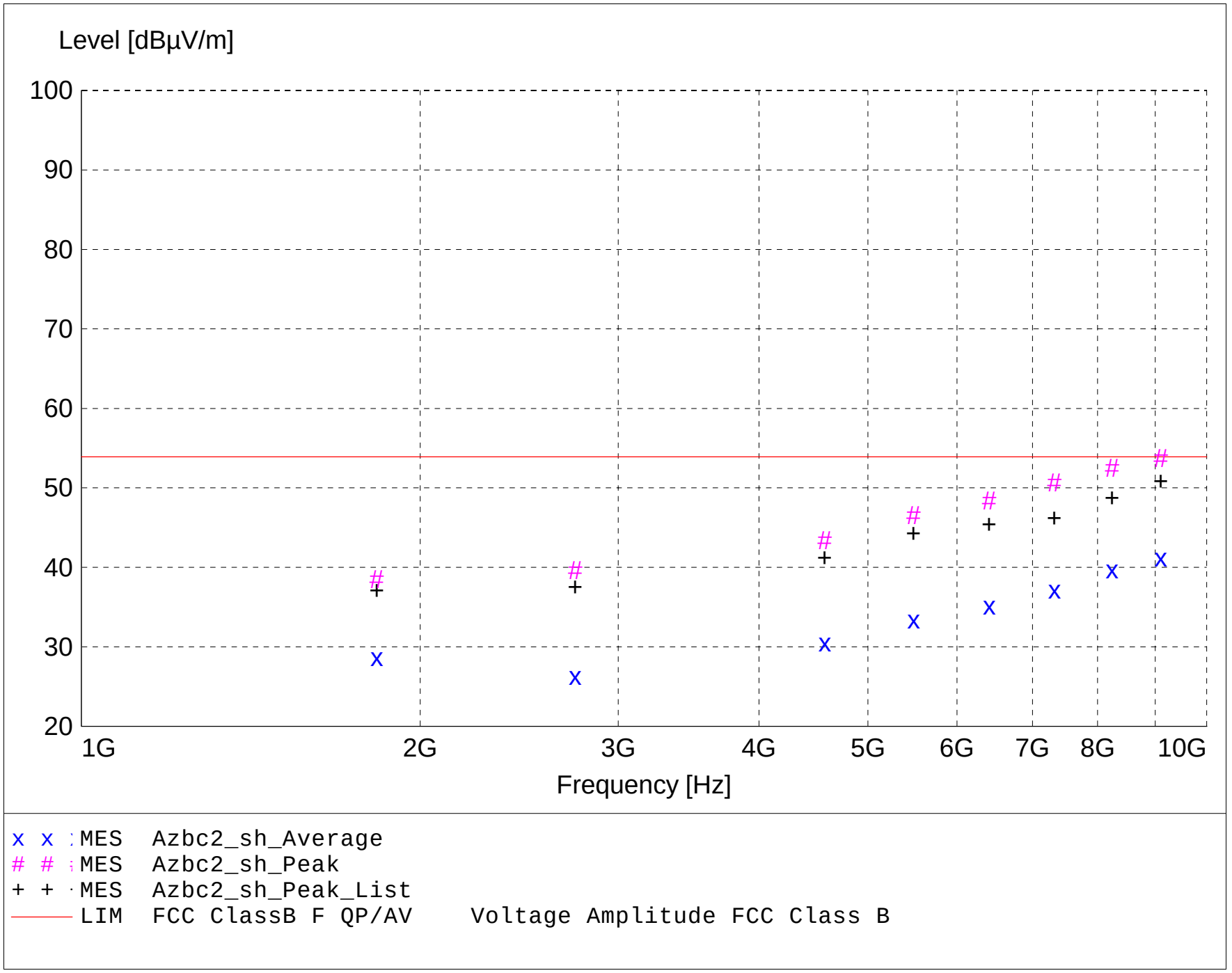
TEXT: "Site 3 5731&184 H3M"

```
  Short Description:            Test Set-up Horz1GHz-
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/006

                Horn Antenna --- EMCO 3115 SN: 9903-5731

                Pre-Amps ---
                                1 - 10 GHz  -- Miteq AMF-6D-010100-50 SN: 682425
                                10 - 18 GHz -- Miteq AMF-6F-100200-50-10P SN: 668382

TEST SET-UP:    EuT Measured at 3 Meters with HORIZONTAL Antenna Polarisation
```


Level [dBµV/m]
100
90
80
70
60
50
40
30
20
1G
2G
3G
4G
5G
6G
7G
8G
10G
Frequency [Hz]
x x : MES Azbc2_sh_Average
: MES Azbc2_sh_Peak
+ + : MES Azbc2_sh_Peak_List
——— LIM FCC ClassB F QP/AV Voltage Amplitude FCC Class B

MEASUREMENT RESULT: "Azbc2_sh_Final"

1/21/2004 10:34AM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
9102.000000	49.05	38.52	-33.8	53.7	53.9	0.2	1.00	0	MAX PEAK	None
8237.300000	46.47	38.27	-32.2	52.5	53.9	1.4	1.00	0	MAX PEAK	None
7322.100000	48.26	36.54	-34.2	50.6	53.9	3.3	1.00	0	MAX PEAK	None
6406.700000	48.79	35.13	-35.5	48.4	53.9	5.5	1.00	0	MAX PEAK	None
5490.600000	47.59	34.60	-35.7	46.5	53.9	7.4	1.00	0	MAX PEAK	None
4576.400000	46.32	33.08	-36.0	43.4	53.9	10.5	1.00	0	MAX PEAK	None
9102.000000	36.50	38.52	-33.8	41.2	53.9	12.7	1.00	0	AVERAGE	None
8237.300000	33.65	38.27	-32.2	39.7	53.9	14.2	1.00	0	AVERAGE	None
2745.900000	48.26	29.79	-38.5	39.6	53.9	14.3	1.00	0	MAX PEAK	None
1830.100000	49.19	28.09	-38.8	38.5	53.9	15.4	1.00	90	MAX PEAK	None
7322.100000	34.75	36.54	-34.2	37.1	53.9	16.8	1.00	0	AVERAGE	None
6406.700000	35.55	35.13	-35.5	35.1	53.9	18.8	1.00	0	AVERAGE	None
5490.600000	34.45	34.60	-35.7	33.4	53.9	20.5	1.00	0	AVERAGE	None
4576.400000	33.40	33.08	-36.0	30.5	53.9	23.4	1.00	0	AVERAGE	None
1830.100000	39.42	28.09	-38.8	28.7	53.9	25.2	1.00	90	AVERAGE	None
2745.900000	34.98	29.79	-38.5	26.3	53.9	27.6	1.00	0	AVERAGE	None

FCC Part 15.247

Electric Field Strength

```
EUT:                  R4M+
Manufacturer:         Zebra
Operating Condition: 70 deg F; 25% R.H.
Test Site:            Site 3
Operator:             Jason L
Test Specification:   120 V; 60 Hz
Comment:              Low Channel  902.6 MHz
                      Date: 1/21/2004
```

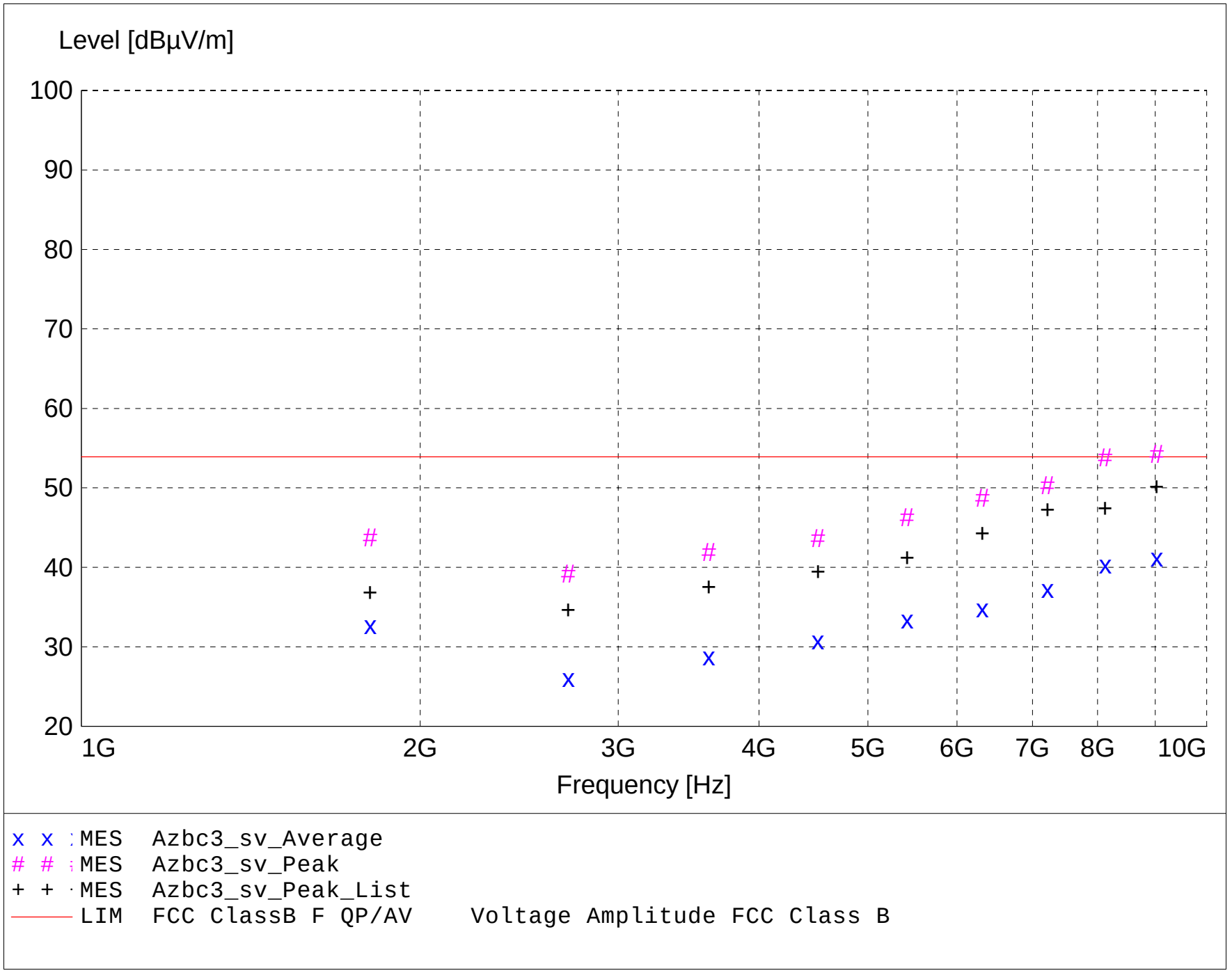
TEXT: "Site 3 5731&184 V3M"

```
  Short Description:            Test Set-up Vert1GHz-
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/006

                Horn Antenna --- EMCO 3115 SN: 9903-5731

                Pre-Amps ---
                                1 - 10 GHz  -- Miteq AMF-6D-010100-50 SN: 682425
                                10 - 18 GHz -- Miteq AMF-6F-100200-50-10P SN: 668382

TEST SET-UP:    EuT Measured at 3 Meters with VERTICAL Antenna Polarisation
```


Level [dBµV/m]
100
90
80
70
60
50
40
30
20
1G
2G
3G
4G
5G
6G
7G
8G
10G
Frequency [Hz]
x x MES Azbc3_sv_Average
MES Azbc3_sv_Peak
+ + MES Azbc3_sv_Peak_List
LIM FCC ClassB F QP/AV Voltage Amplitude FCC Class B

MEASUREMENT RESULT: "Azbc3_sv_Final"

1/21/2004 10:58AM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
9027.800000	49.33	38.58	-33.7	54.2	53.9	-0.3	1.00	0	MAX PEAK	None
8125.100000	46.76	38.47	-31.4	53.8	53.9	0.1	1.00	0	MAX PEAK	None
7222.300000	47.57	36.56	-33.8	50.3	53.9	3.6	1.00	0	MAX PEAK	None
6319.500000	49.05	35.06	-35.4	48.7	53.9	5.2	1.00	0	MAX PEAK	None
5416.700000	47.18	34.60	-35.5	46.3	53.9	7.6	1.00	0	MAX PEAK	None
1805.500000	54.61	28.02	-38.9	43.7	53.9	10.2	1.20	200	MAX PEAK	None
4513.900000	46.47	32.85	-35.7	43.6	53.9	10.3	1.00	0	MAX PEAK	None
3611.200000	47.32	31.66	-37.1	41.9	53.9	12.0	1.00	0	MAX PEAK	None
9027.800000	36.23	38.58	-33.7	41.1	53.9	12.8	1.00	0	AVERAGE	None
8125.100000	33.28	38.47	-31.4	40.3	53.9	13.6	1.00	0	AVERAGE	None
2708.400000	48.00	29.70	-38.5	39.2	53.9	14.7	1.00	0	MAX PEAK	None
7222.300000	34.49	36.56	-33.8	37.3	53.9	16.6	1.00	0	AVERAGE	None
6319.500000	35.20	35.06	-35.4	34.8	53.9	19.1	1.00	0	AVERAGE	None
5416.700000	34.31	34.60	-35.5	33.4	53.9	20.5	1.00	0	AVERAGE	None
1805.500000	43.63	28.02	-38.9	32.7	53.9	21.2	1.20	200	AVERAGE	None
4513.900000	33.60	32.85	-35.7	30.8	53.9	23.1	1.00	0	AVERAGE	None
3611.200000	34.21	31.66	-37.1	28.8	53.9	25.1	1.00	0	AVERAGE	None
2708.400000	34.86	29.70	-38.5	26.1	53.9	27.8	1.00	0	AVERAGE	None

FCC Part 15.247

Electric Field Strength

EUT: R4M+
Manufacturer: Zebra
Operating Condition: 70 deg F; 25% R.H.
Test Site: Site 3
Operator: Jason L
Test Specification: 120 V; 60 Hz
Comment: Low Channel 902.6 MHz
Date: 1/21/2004

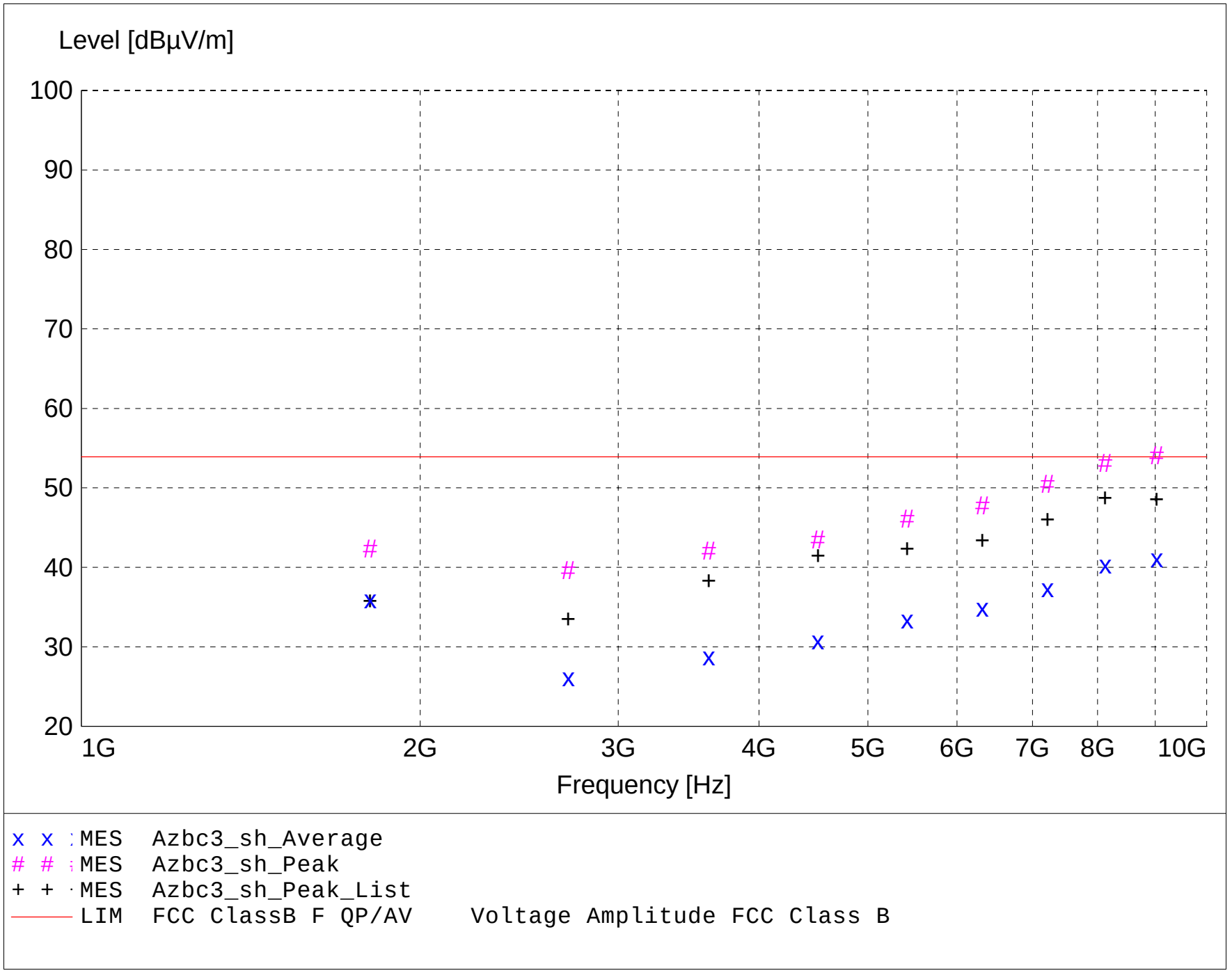
TEXT: "Site 3 5731&184 H3M"

Short Description: Test Set-up Horz1GHz-
TEST EQUIPMENT: Receiver --- Rohde&Schwarz ESI 40 SN: 837808/006

Horn Antenna --- EMCO 3115 SN: 9903-5731

Pre-Amps ---
1 - 10 GHz -- Miteq AMF-6D-010100-50 SN: 682425
10 - 18 GHz -- Miteq AMF-6F-100200-50-10P SN: 668382

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


Level [dBµV/m]
100
90
80
70
60
50
40
30
20
1G
2G
3G
4G
5G
6G
7G
8G
10G
Frequency [Hz]
x x : MES Azbc3_sh_Average
: MES Azbc3_sh_Peak
+ + : MES Azbc3_sh_Peak_List
——— LIM FCC ClassB F QP/AV Voltage Amplitude FCC Class B

MEASUREMENT RESULT: "Azbc3_sh_Final"

1/21/2004 11:11AM

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Angle	Final Detector	Comment
MHz	dBµV	dBµV/m	dB	dBµV/m	dBµV/m	dB	m	deg		
9027.800000	49.19	38.58	-33.7	54.1	53.9	-0.2	1.00	0	MAX PEAK	None
8125.100000	46.03	38.47	-31.4	53.1	53.9	0.8	1.00	0	MAX PEAK	None
7222.300000	47.71	36.56	-33.8	50.5	53.9	3.4	1.00	0	MAX PEAK	None
6319.500000	48.13	35.06	-35.4	47.8	53.9	6.1	1.00	0	MAX PEAK	None
5416.700000	47.05	34.60	-35.5	46.1	53.9	7.8	1.00	0	MAX PEAK	None
4513.900000	46.32	32.85	-35.7	43.5	53.9	10.4	1.00	0	MAX PEAK	None
1805.600000	53.21	28.02	-38.9	42.3	53.9	11.6	1.00	90	MAX PEAK	None
3611.200000	47.45	31.66	-37.1	42.1	53.9	11.8	1.00	0	MAX PEAK	None
9027.800000	36.19	38.58	-33.7	41.1	53.9	12.8	1.00	0	AVERAGE	None
8125.100000	33.26	38.47	-31.4	40.3	53.9	13.6	1.00	0	AVERAGE	None
2708.400000	48.39	29.70	-38.5	39.6	53.9	14.3	1.00	0	MAX PEAK	None
7222.300000	34.54	36.56	-33.8	37.3	53.9	16.6	1.00	0	AVERAGE	None
1805.600000	46.88	28.02	-38.9	36.0	53.9	17.9	1.00	90	AVERAGE	None
6319.500000	35.21	35.06	-35.4	34.8	53.9	19.1	1.00	0	AVERAGE	None
5416.700000	34.28	34.60	-35.5	33.4	53.9	20.5	1.00	0	AVERAGE	None
4513.900000	33.61	32.85	-35.7	30.8	53.9	23.1	1.00	0	AVERAGE	None
3611.200000	34.20	31.66	-37.1	28.8	53.9	25.1	1.00	0	AVERAGE	None
2708.400000	34.93	29.70	-38.5	26.1	53.9	27.8	1.00	0	AVERAGE	None

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

CARRIER FREQUENCY SEPARATION GRAPHS

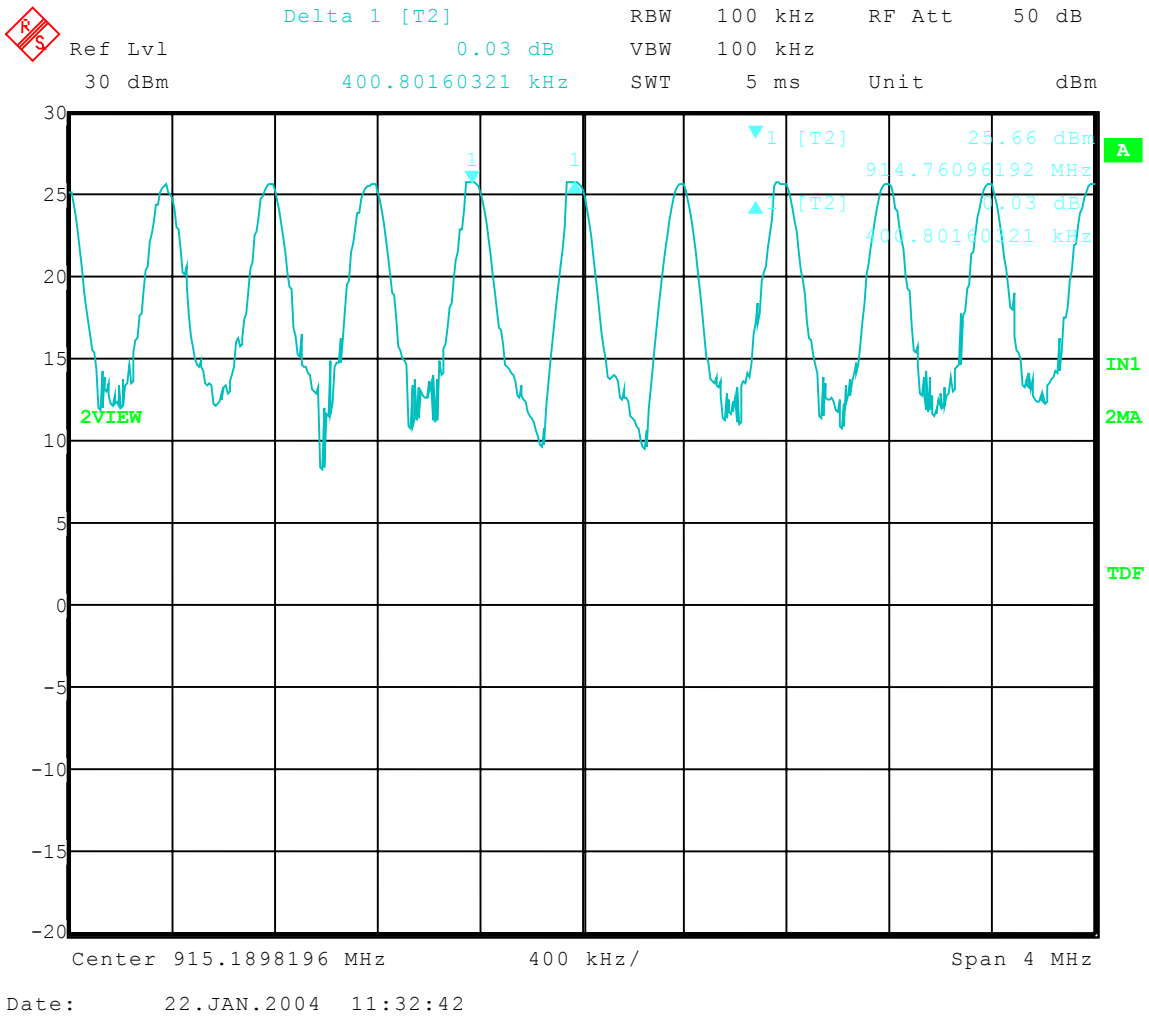
PART 15.247

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Carrier Frequency Separation - Conducted
Operator: Jason L.
Comment: Frequency Hopping On

Carrier Freq Separation = 400.8 kHz



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APPENDIX A

NUMBER OF HOPPING FREQUENCIES GRAPHS

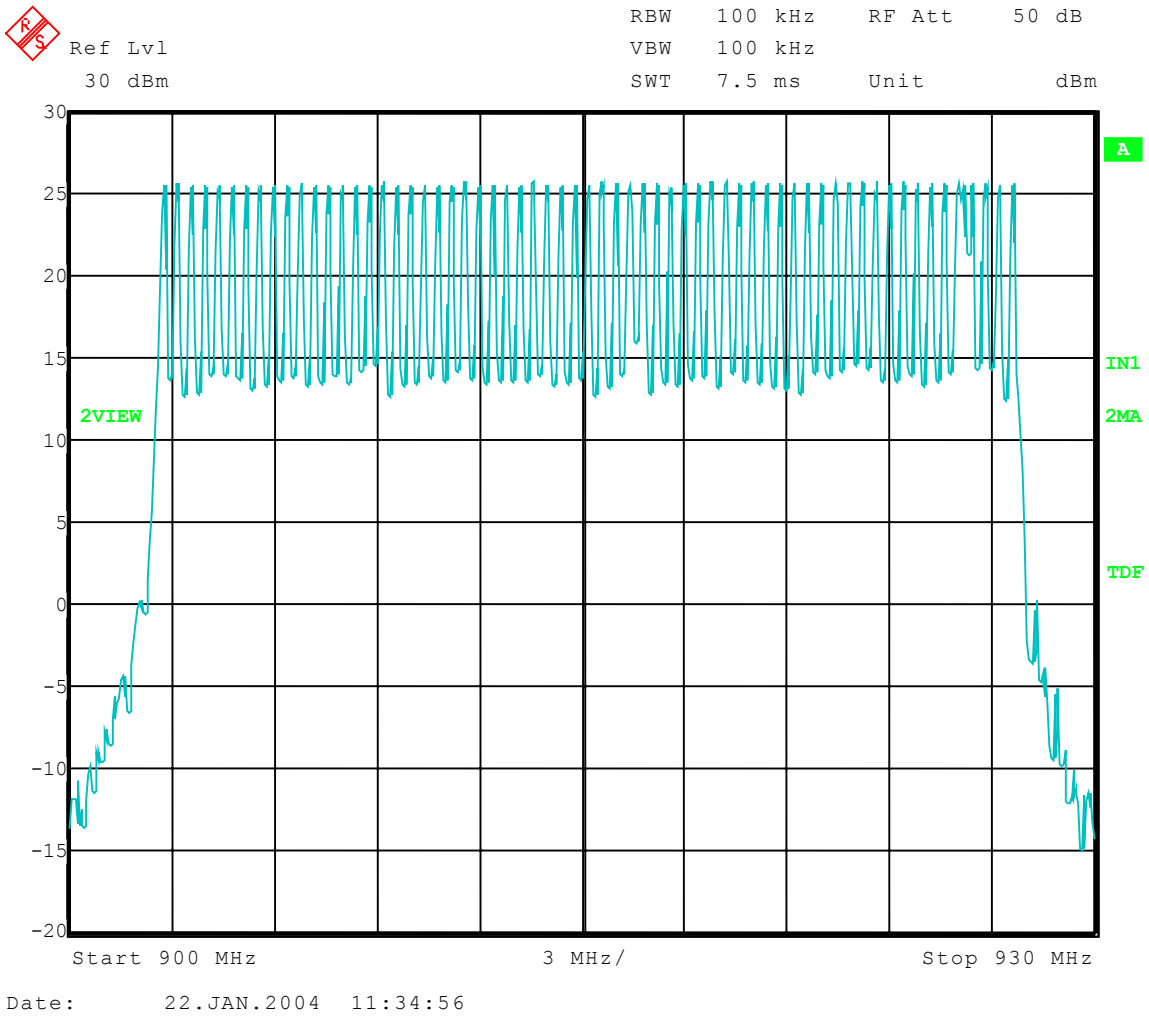
PART 15.247

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4m+
Test: Number of Hopping Frequencies - Conducted
Operator: Jason L.
Comment: Hopping Mode

Frequency Range = 902 MHz to 928 MHz
Number of Frequencies in Range = 63



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APPENDIX A

TIME OF OCCUPANCY GRAPHS

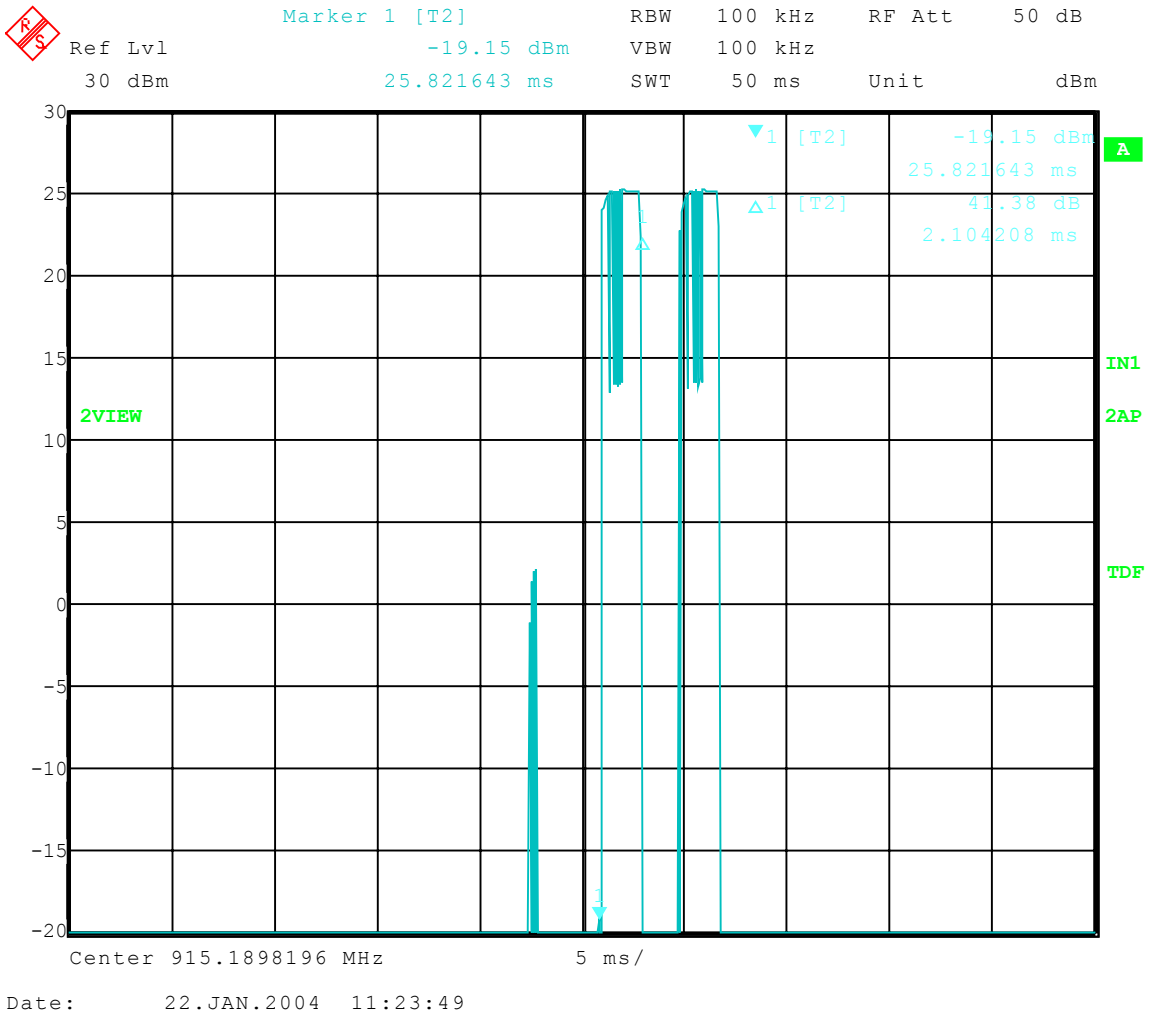
PART 15.247

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Dwell Time - Conducted
Operator: Jason L.
Comment: Middle Channel - Hopping Mode On

Dwell Time = 2.104 mS



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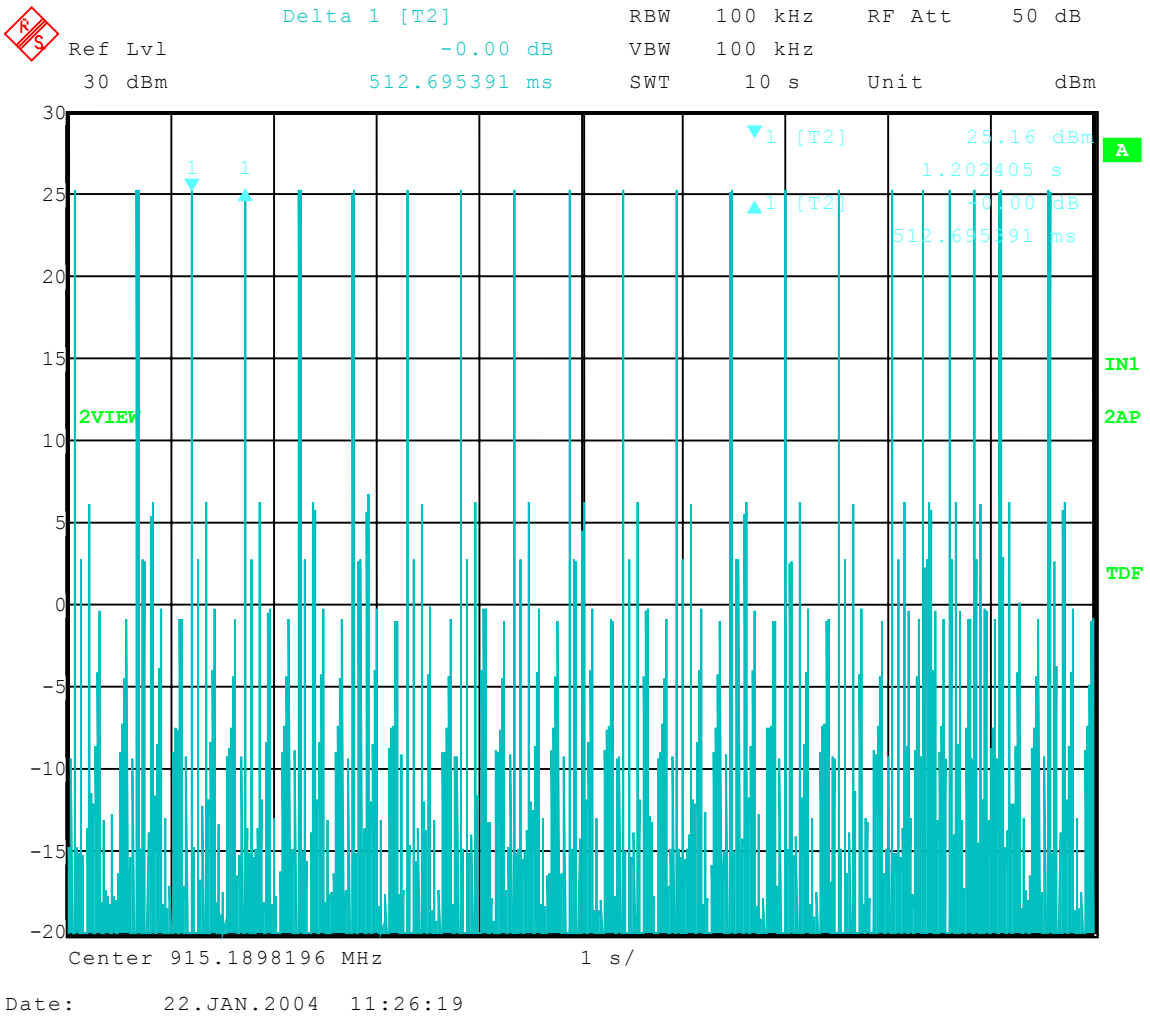
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Dwell Time in 10 Seconds - Conducted
Operator: Jason L.
Comment: Middle Channel – Hopping Mode On
Dwell Time Limit = 0.4 Seconds
Times ON = 42
Dwell Time in 10 Sec = Time Slot Length X Times On / Hopping Channels X 10 Sec
0.140 Seconds = 2.104 ms X 42 / 63 X 10 Sec



1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

CONDUCTED PEAK OUTPUT POWER GRAPHS

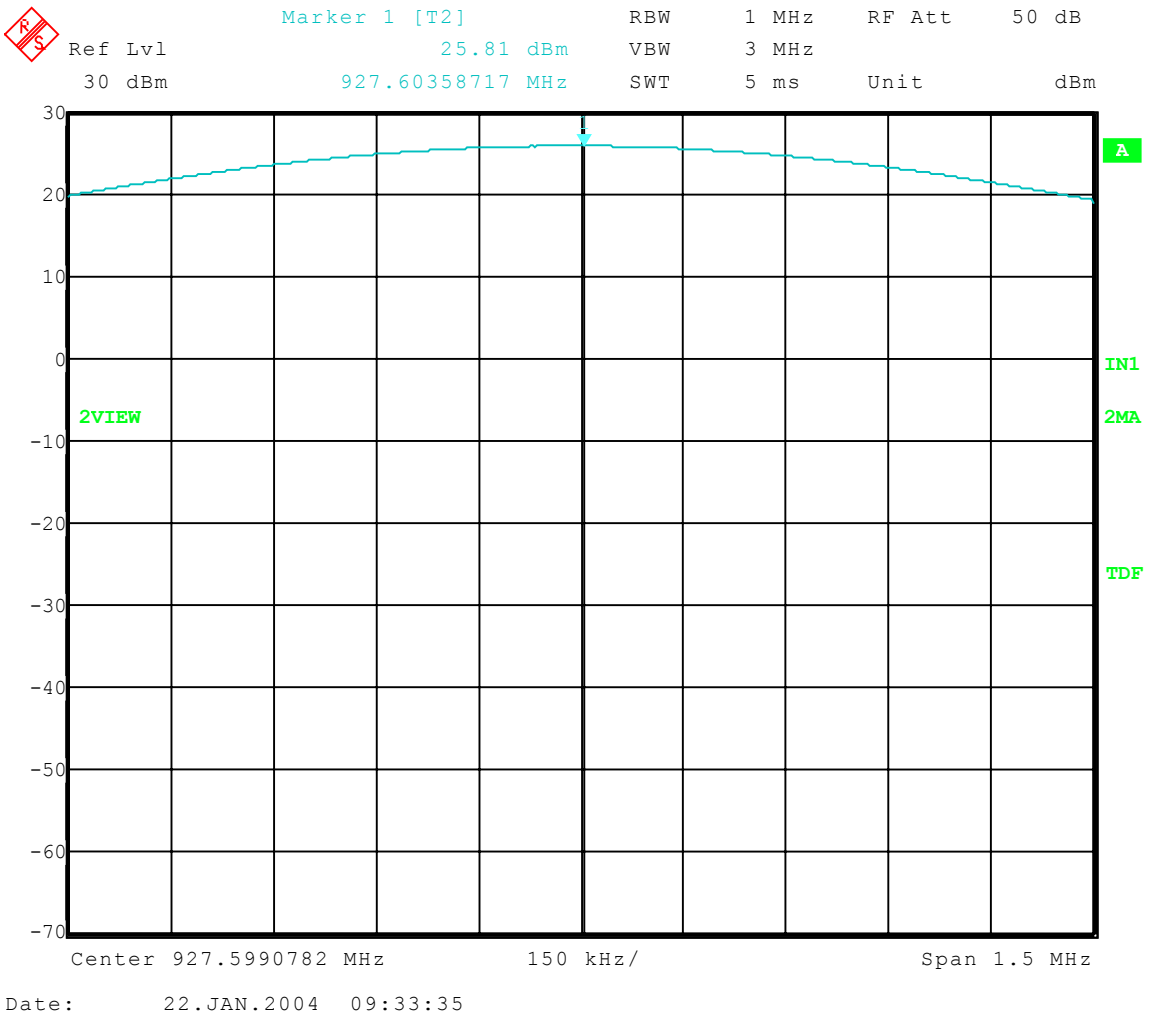
PART 15.247

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Peak Output Power - Conducted
Operator: Jason L.
Comment: High Channel: Frequency – 927.6 MHz

Peak Output Power = 25.81 dBm = 381 mW



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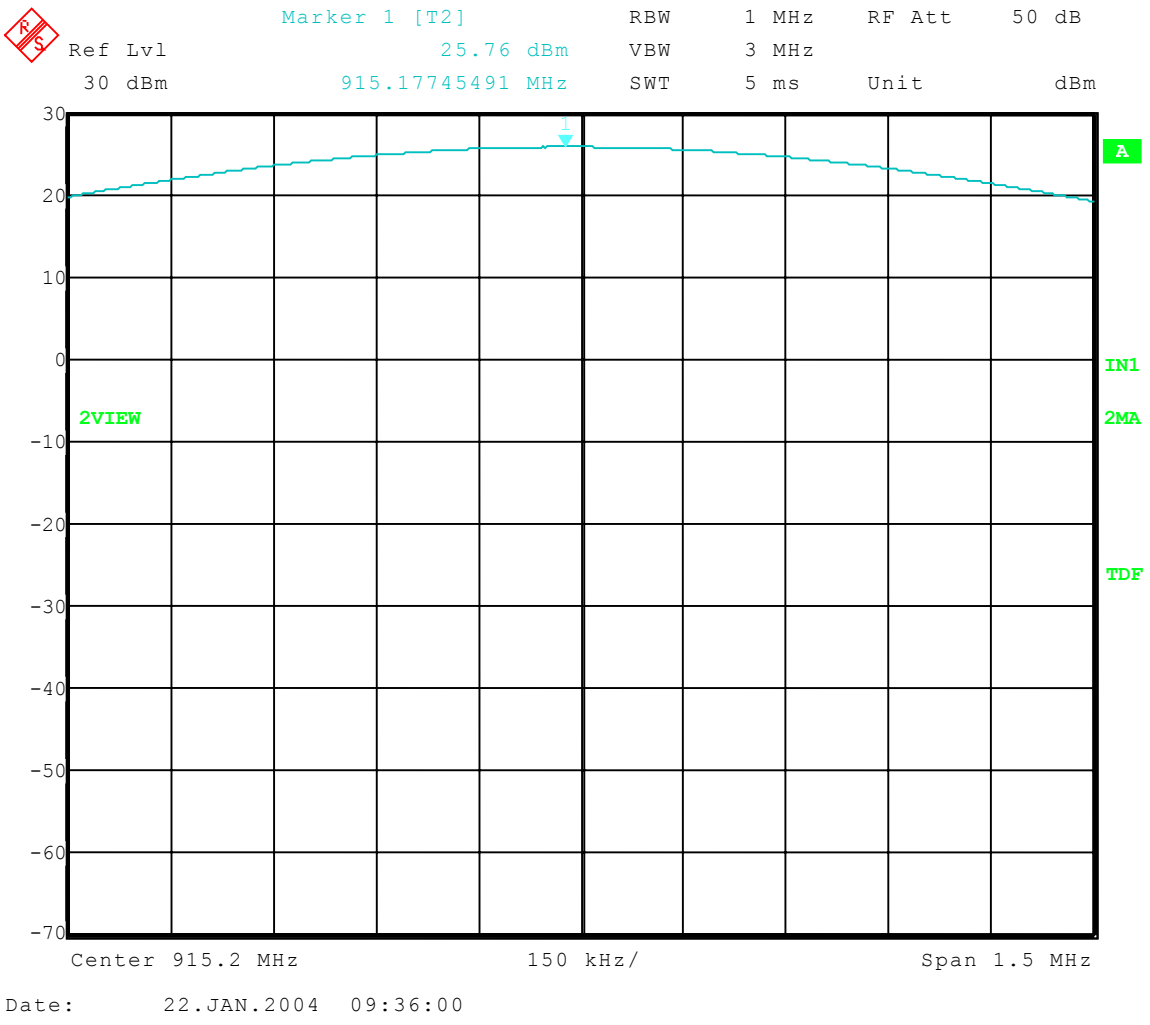
APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Peak Output Power - Conducted
Operator: Jason L.
Comment: Middle Channel: Frequency – 915.2 MHz

Peak Output Power = 25.76 dBm = 376 mW



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APPENDIX A

Test Date: 1-22-04
Company: Zebra Technologies
EUT: R4M+
Test: Peak Output Power - Conducted
Operator: Jason L.
Comment: Low Channel: Frequency – 902.80 MHz

Peak Output Power = 25.69 dBm = 371 mW