

19 February 2003

TCB
TÜV America Inc
10040 Mesa Rim Road
San Diego CA 92121

RE: FCC ID: QT5-RFID1 submittal as modular device (Rimage Corporation)

1. The modular transmitter must have its own RF shielding. This is intended to ensure that the module does not have to rely upon the shielding provided by the device into which it is installed in order for all modular transmitter emissions to comply with Part 15 limits. It is also intended to prevent coupling between the RF circuitry of the module and any wires or circuits in the device into which the module is installed. Such coupling may result in non-compliant operation. **The EUT has all of the RF shielding it requires to meet the FCC limits. It does not rely on the shielding of any host unit it will be installed in.**
2. The modular transmitter must have buffered modulation/data inputs (if such inputs are provided) to ensure that the module will comply with Part 15 requirements under conditions of excessive data rates or over-modulation. **All buffering is handled in the TI chip.**
3. The modular transmitter must have its own power supply regulation. This is intended to ensure that the module will comply with Part 15 requirements regardless of the design of the power supplying circuitry in the device into which the module is installed. **All power is regulated in the module.**
4. The modular transmitter must comply with the antenna requirements of Section 15.203 and 15.204(c). The antenna must either be permanently attached or employ a “unique” antenna coupler (at all connections between the module and the antenna, including the cable). Any antenna used with the module must be approved with the module, either at the time of initial authorization or through a Class II permissive change. The “professional installation” provision of Section 15.203 may not be applied to modules. **The antenna is in the pc board.**
5. The modular transmitter must be tested in a stand-alone configuration, i.e., the module must not be inside another device during testing. This is intended to demonstrate that the module is capable of complying with Part 15 emission limits regardless of the device into which it is eventually installed. Unless the transmitter module will be battery powered, it must comply with the AC line conducted requirements found in Section 15.207. AC or DC power lines and data input/output lines connected to the module must not contain ferrites, unless they will be marketed with the module (see Section 15.27(a)). The length of these lines shall be length typical of actual use or, if that length is unknown, at least 10 centimeters to insure that there is no coupling

between the case of the module and supporting equipment. Any accessories, peripherals, or support equipment connected to the module during testing shall be unmodified or commercially available (see Section 15.31(i)). The EUT was tested for radiated emission requirements in a stand-alone configuration and meets the requirements. The AC line conducted emissions were made with the EUT installed in a representative host, as it is a 5 VDC powered device, which would be exempt from the AC line conducted requirements.

6. The modular transmitter must be labeled with its own FCC ID number, and, if the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains Transmitter Module FCC ID: XYZMODEL1” or “Contains FCC ID: XYZMODEL1.” Any similar wording that expresses the same meaning may be used. The Grantee may either provide such a label, an example of which must be included in the application for equipment authorization, or, must provide adequate instructions along with the module which explain this requirement. In the latter case, a copy of these instructions must be included in the application for equipment authorization. The transmitter has its own FCC ID label, + the mfr will put the label on the outside of whatever device it goes into.
7. The modular transmitter must comply with any specific rule or operating requirements applicable to the transmitter and the manufacturer must provide adequate instructions along with the module to explain any such requirements. A copy of these instructions must be included in the application for equipment authorization. For example, there are very strict operational and timing requirements that must be met before a transmitter is authorized for operation under Section 15.231. For instance, data transmission is prohibited, except for operation under Section 15.231(e), in which case there are separate field strength level and timing requirements. Compliance with these requirements must be assured. The test report shows the transmitter meets all the pertinent requirements, 15.225 has no additional specific requirements that need be addressed.
8. The modular transmitter must comply with any applicable RF exposure requirements. For example, FCC Rules in Sections 2.1091, 2.1093 and specific Sections of Part 15, including 15.319(i), 15.407(f), 15.253(f) and 15.255(g), require that Unlicensed PCS, UNII and millimeter wave devices perform routine environmental evaluation for RF Exposure to demonstrate compliance. In addition, spread spectrum transmitters operating under Section 15.247 are required to address RF Exposure compliance in accordance with Section 15.247(b)(4). Modular transmitters approved under other Sections of Part 15, when necessary, may also need to address certain RF Exposure concerns, typically by providing specific installation and operating instructions for users, installers and other interested parties to ensure compliance. The transmitter meets RF exposure requirements.

TEST RESULT SUMMARY

FCC PART 15 SUBPART C

Section 15.225

FCC PART 15 SUBPART C

Section 15.207 Conducted Emission Requirements

MANUFACTURER'S NAME	Rimage Corporation
TYPE OF EQUIPMENT	13.56 MHz RFID Transceiver
MODEL NUMBER	RFID1x
MANUFACTURER'S ADDRESS	7725 Washington Avenue South Minneapolis MN 55439
TEST REPORT NUMBER	NC205878
TEST DATE	22 & 26 November 2002

According to testing performed at TÜV Product Service Inc, the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in FCC Part 15 Subpart C, Sections 15.207 and 15.225.

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

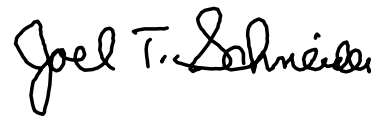
TÜV Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 15 Subpart C, Sections 15.207 and 15.225.

Date: 09 December 2002

Location: Taylors Falls MN
USA



R. M. Johnson
Tested By



J. T. Schneider
Reviewed By

EMC EMISSION - TEST REPORT

Test Report File No. : **NC205878** Date of issue: 09 December 2002

Model No. : **RFID1x**

Product Type : **13.56 MHz RFID Transceiver**

Applicant : **Rimage Corporation**

Manufacturer : **Rimage Corporation**

License holder : **Rimage Corporation**

Address : **7725 Washington Avenue South**

: **Minneapolis MN 55439**

Test Result : ☒ **Positive** ☐ **Negative**

Test Project Number :
Reference(s) **NC205878**

Total pages including
Appendices **41**

TÜV Product Service Inc is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001.

TÜV Product Service Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV Product Service Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service Inc issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval. This report shall not be used by the client to claim product endorsement by NVLAP or any agency of the US government.

TÜV Product Service Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI

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Interference power	30 MHz - 300 MHz <u>N/A</u>
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EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

- | | | |
|--|---|------------------------------------|
| ☐ - EN 50081-1 / 1991 | ☐ - Group 1 | ☐ - Group 2 |
| ☐ - EN 55011 / 1991 | ☐ - Class A | ☐ - Class B |
| ☐ - EN 55013 / 1990 | ☐ - Household appliances and similar | |
| ☐ - EN 55014 / 1987 | ☐ - Portable tools | |
| | ☐ - Semiconductor devices | |
| ☐ - EN 55014 / A2:1990 | ☐ - Household appliances and similar | |
| ☐ - EN 55014 / 1993 | ☐ - Portable tools | |
| | ☐ - Semiconductor devices | |
| ☐ - EN 55015 / 1987 | | |
| ☐ - EN 55015 / A1:1990 | | |
| ☐ - EN 55015 / 1993 | | |
| ☐ - EN 55022 / 1987 | ☐ - Class A | ☐ - Class B |
| ☐ - EN 55022 / 1994 | ☐ - Class A | ☐ - Class B |
| ☐ - BS | | |
| ☐ - VCCI | ☐ - Class A | ☐ - Class B |
| ☒ - FCC Part 15 Subpart C Section 15.225 | | |
| ☒ - FCC Part 15 Subpart C Section 15.207 Conducted Emission Requirements | | |
| ☐ - FCC Part 15 Subpart B | ☐ - Class A | ☐ - Class B |
| ☐ - CISPR 11 (1990) | ☐ - Group 1 | ☐ - Group 2 |
| | ☐ - Class A | ☐ - Class B |
| ☐ - CISPR 22 (1993) | ☐ - Class A | ☐ - Class B |

Environmental conditions in the lab:

	<u>Actual</u>
Temperature	: 22 °C
Relative Humidity	: 40 %
Atmospheric pressure	: 99.0 kPa
Power supply system	: 50/60 Hz – 230/115 VAC – 1 Phase

Sign Explanations:

- ☐ - not applicable
☒ - applicable



Emissions Test Conditions: CONDUCTED EMISSIONS [FCC 15.207]

The **CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)** measurements were performed at the following test location:

☐ - Test not applicable

- ☐ - Wild River Lab Large Test Site (Open Area Test Site)
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☐ - Oakwood Lab (Open Area Test Site)
- ☒ - Wild River Lab Screen Room
- ☐ - New Brighton Lab Shielded Room

Test equipment used:

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	2417	3825/2	Electro-Mechanics (EMCO)	50 Ω LISN	8812-1439	1-23-03
■ -	2420	ESHS-10	Rhode & Schwarz	EMI Receiver	828178/006	4-26-03

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Emissions Test Conditions: RADIATED EMISSIONS [FCC 15.225 (a),(b) 10 kHz - 30 MHz]

The **RADIATED EMISSIONS (MAGNETIC FIELD)** measurements were performed at the following test location:

☐ - Test not applicable

- ☒ - Wild River Lab Large Test Site (Open Area Test Site)
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☐ - Oakwood Lab (Open Area Test Site)

at a test distance of :

- ☐ - 0.3 meters
- ☐ - 1 meter
- ☒ - 3 meter
- ☒ - 10 meters
- ☒ - 30 meters

Test equipment used :

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	2420	ESHS-10	Rhode & Schwarz	EMI Receiver	828178/006	4-26-03
■ -	2517	HFH2-Z2	Polorad	Loop Antenna	879285/036	2-11-03

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Emissions Test Conditions: RADIATED EMISSIONS [FCC 15.225 (b) Electric Field 30 - 1000 MHz]

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz-1000 MHz, were tested in a horizontal and vertical polarization at the following test location:

☐ - Test not applicable

- - Wild River Lab Large Test Site (Open Area Test Site) – NSA measurements made 7-02, due 7-03.
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☐ - Oakwood Lab (Open Area Test Site)

at a test distance of :

- - 3 meters
- ☐ - 10 meters
- ☐ - 30 meters

Test equipment used :

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	2665	ZHL-1042J	Mini-Circuits	Preamplifier	32296	10-15-03
■ -	3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	102	10-04-03
■ -	2690	8566B	Hewlett-Packard	Spectrum Analyzer (Unit F)	2430A00930	11-19-02
■ -	2678	85662A	Hewlett-Packard	Analyzer Display (Unit F)	2403A08134	11-19-02
■ -	2684	85650A	Hewlett-Packard	Quasi-Peak Adapter (Unit F)	2521A01006	11-19-02

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Emissions Test Conditions: INTERFERENCE POWER

The *INTERFERENCE POWER* measurements were performed by using the absorbing clamp on the mains and interface cables in the frequency range 30 MHz - 300 MHz at the following test location:

■ - Test not applicable

- ☐ - Wild River Lab Large Test Site (Open Area Test Site)
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☐ - Oakwood Lab (Open Area Test Site)
- ☐ - Wild River Lab Screen Room
- ☐ - New Brighton Lab Shielded Room

Emissions Test Conditions: RADIATED EMISSIONS Electric Field 1 to 100 GHz

The *EQUIVALENT RADIATED EMISSIONS* measurements in the frequency range 1 GHz - 100 GHz were performed in a horizontal and vertical polarization at the following test location:

☒ - Test not applicable

- ☐ - Wild River Lab Large Test Site (Open Area Test Site)
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☐ - Oakwood Lab (Open Area Test Site)
- ☐ - Wild River Lab Screen Room

at a test distance of:

- ☐ - 1 meters
- ☐ - 3 meters
- ☐ - 10 meters

Emissions Test Conditions: FREQUENCY TOLERANCE OF THE CARRIER SIGNAL [FCC 15.225 (c)]

The *FREQUENCY TOLERANCE* measurements were performed at the following test location:

☐ - Test not applicable

- ☐ - Wild River Lab Large Test Site (Open Area Test Site)
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☐ - Oakwood Lab (Open Area Test Site)
- ☐ - Wild River Lab Screen Room
- ☒ - Specialty Labs

Test equipment used :

	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	8591E	Hewlett-Packard	Spectrum Analyzer	3501A03603	10-25-03
■ -	901	Emco	Near Field Probe	7405-901	N/A
■ -	S1.2	Thermotron	Temperature Chamber	16759-S	N/A
■ -	2165A	Fluke	Digital Thermometer	CQL240-009	2-08-03

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Equipment Under Test (EUT) Test Operation Mode - Emission tests :

The device under test was operated under the following conditions during emissions testing:

- ☐ - Standby
- ☐ - Test program (H - Pattern)
- ☐ - Test program (color bar)
- ☐ - Test program (customer specific)
- ☐ - Practice operation
- ☐ - Normal Operating Mode
- ☒ - Transmitter carrier running continuously. In actual operation the carrier will be present for less than 1-second every 30 seconds.

Configuration of the device under test:

- ☒ - See Constructional Data Form in Appendix B - Page B2
- ☐ - See Product Information Form in Appendix B - beginning on Page B3

The following peripheral devices and interface cables were connected during the measurement:

- | | |
|--|----------------|
| ☐ - _____ | Type : _____ |
| ☐ - _____ | Type : _____ |
| ☐ - _____ | Type : _____ |
| ☐ - _____ | Type : _____ |
| ☐ - _____ | Type : _____ |
| ☒ - unshielded power cable | |
| ☒ - unshielded cables | |
| ☐ - shielded cables | MPS.No.: _____ |
| ☐ - customer specific cables | |
| ☐ - _____ | |
| ☐ - _____ | |

Emission Test Results:

FCC 15.207 - Conducted emissions 450 kHz - 30 MHz

The requirements are ☒ - MET ☐ - NOT MET

Minimum margin of compliance _____ 18 dB at _____ 150.0 kHz

Maximum margin of non-compliance _____ dB at _____ MHz

Remarks: _____

FCC 15.225 (a)(b) - Radiated emissions (magnetic field) 10 kHz - 30 MHz

The requirements are ☒ - MET ☐ - NOT MET

Minimum limit margin for fundamental _____ 43 dB at _____ 13.56 MHz

Minimum limit margin for spurious/harmonics _____ >10 dB at _____ MHz

Remarks: The fundamental was measured to be 37 dBuV/m (70.8 microvolts/meter) in Quasi-Peak mode at 30 meters. The limit is 80 dBuV/m (10000 microvolts/meter) at 30 meters. No spurious emissions or other harmonics were detected within 10 dB of the 30 uV/m limit. For band edge compliance the carrier meets the spurious limits at 13.557 MHz and 13.564 MHz, at all other frequencies the carrier level is >10 dB below the spurious limit (See page A6 for a band edge plot).

FCC 15.225 (b) - Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are ☒ - MET ☐ - NOT MET

Minimum margin of compliance _____ 2 dB at _____ 189.82 MHz

Minimum limit margin for spurious _____ dB at _____ MHz

Remarks: Testing done up to 1000 MHz due to oscillator frequency of Disc printer (non-RF device) RF ID is contained in. This report only addresses emissions from RF ID.

Interference Power at the mains and interface cables 30 MHz - 300 MHz

The requirements are ☐ - MET ☐ - NOT MET ☒ - N/A

Remarks: _____

Equivalent Radiated emissions 1 GHz - 100 GHz

The requirements are ☐ - MET ☐ - NOT MET ☒ - N/A

Remarks: _____

FCC 15.225 (c) - Frequency Tolerance of the Carrier Signal

The requirements are ☒ - MET ☐ - NOT MET

Remarks: Limit is $\pm 0.01\%$ of 13.56 MHz, or ± 1.356 kHz, so allowed band is 13.558644 MHz to 13.561356 MHz. Frequency deviates from 13.56050 MHz to 13.56075 MHz from -20 to 50 degrees C and 102 to 138 VAC.

DEVIATIONS FROM STANDARD:

None.

GENERAL REMARKS:

The radiated measurements from 10 kHz to 30 MHz are made in quasi-peak detection, except for the levels noted between 110-490 kHz, which are made in average detection.

SUMMARY:

The requirements according to the technical regulations are

■ - met

□ - **not** met.

The device under test does

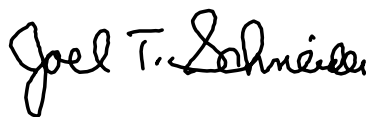
■ - fulfill the general approval requirements mentioned on page 3.

□ - **not** fulfill the general approval requirements mentioned on page 3.

Testing Start Date: 22 November 2002

Testing End Date: 26 November 2002

- TÜV PRODUCT SERVICE INC -



J. T. Schneider
Reviewed By



Tested By:
R. M. Johnson

Test-setup photo(s):
Conducted emission 450 kHz - 30 MHz

See Test Setup Exhibit



Test-setup photo(s):
Radiated emission 10 kHz - 1000 MHz

See Test Setup Exhibit



Appendix A

Test Data Sheets
and
Test Setup Drawing(s)



TEST SETUP FOR EMISSIONS TESTING

WILD RIVER LAB
Screen Room

See Test Setup Exhibit



TEST SETUP FOR EMISSIONS TESTING

WILD RIVER LAB
Large Test Site

See Test Setup Exhibit



TUV AMERICA WILD RIVER LAB									
FCC Part 15.225 Radiated Emissions				Rimage Corporation - RFID1x					
Test Report # NC205878				Test Date: 22 November 2002					
	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dBuV/m	margin
MHz	0.3 m	1 m	3 m	10 m	30 m	30 m Limit	300 m	300 m Limit	dB
0.009								48.5193746	
0.49						53.8003			
0.49						33.8003			
1.705						22.96974			
1.705						29.54243			
13.56			78	57	37	80			43
30						29.54243			
All levels are measured (no extrapolations)									

Data for Rimage RFID1x transmitter
Project NC205878
11/26/02

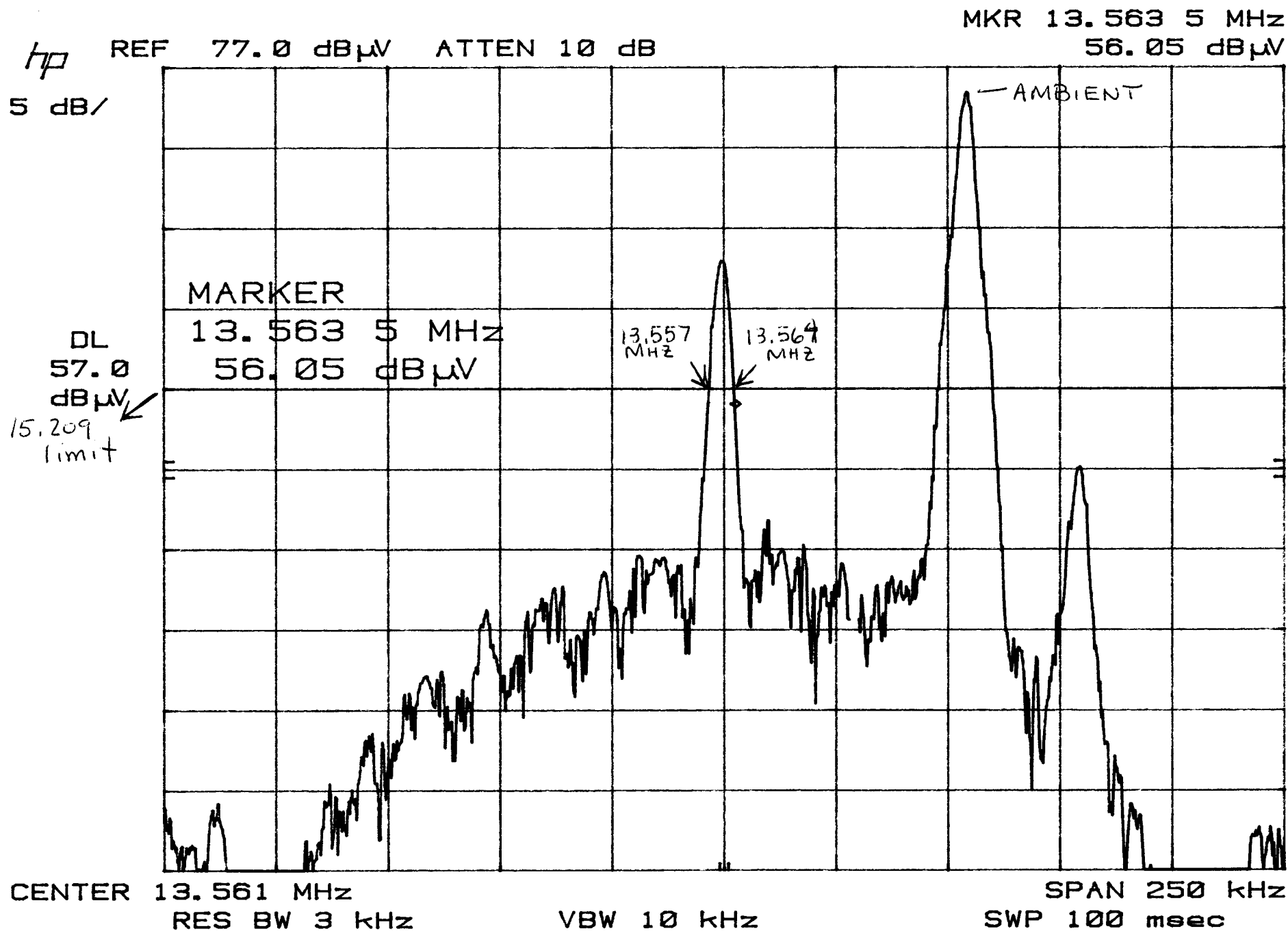
FCC 15.225 (c) frequency stability

Limit is $\pm 0.01\%$ of 13.56 MHz, or ± 1.356 kHz, so allowed band is 13.558644 MHz to 13.561356 MHz.

-20 degrees C	13.56075 MHz
-10 degrees C	13.56063 MHz
0 degrees C	13.56063 MHz
10 degrees C	13.56063 MHz
20 degrees C	13.56063 MHz
30 degrees C	13.56063 MHz
40 degrees C	13.56050 MHz
50 degrees C	13.56050 MHz
102 VAC	13.56050 MHz
138 VAC	13.56050 MHz

ant. @ 3m
uncorrected levels

BAND EDGE COMPLIANCE
TO 13.553 - 13.567 MHz BAND



Conducted Electromagnetic Emissions



Test Report #:	5878 Run 01	Test Area:	SCREEN ROOM	
Test Method:	EN55022	Test Date:	22-Nov-2002	
EUT Model #:	CDPR3x (WITH RFID1x TRANSCIVER)	EUT Power:	230vac/50hz, 110vac/60, 220vac/60hz	
EUT Serial #:		Temperature:	22	°C
Manufacturer:	RIMAGE	Relative Humidity:	40	%
EUT Description:	COLOR INKJET DISC PRINTER	Air Pressure:	99	kPa
Notes:			Page:	1 of 5

FREQ (MHz)	LEVEL (dBuV)	CABLE / LISN / ATTEN (dB)	FINAL (dBuV)	TEST POINT	DELTA1 EN55022 B QP	DELTA2 EN55022 B Avg
230vac / 50hz						
0.150	47.0 Qp	0.0 / 0.1 / 0.0	47.1	Neutral	-18.9	N/A
0.150	22.2 Av	0.0 / 0.1 / 0.0	22.3	Neutral	N/A	-33.7
0.254	36.8 Qp	0.0 / 0.0 / 0.0	36.8	Neutral	-24.8	N/A
0.254	21.4 Av	0.0 / 0.0 / 0.0	21.4	Neutral	N/A	-30.2
1.56	13.0 Qp	0.2 / 0.0 / 0.0	13.2	Neutral	-42.8	N/A
1.56	5.3 Av	0.2 / 0.0 / 0.0	5.5	Neutral	N/A	-40.5
1.78	11.8 Qp	0.1 / 0.0 / 0.0	11.9	Neutral	-44.1	N/A
1.78	9.3 Av	0.1 / 0.0 / 0.0	9.4	Neutral	N/A	-36.6
7.81	25.2 Qp	0.1 / 0.0 / 0.0	25.4	Neutral	-34.6	N/A
7.81	14.1 Av	0.1 / 0.0 / 0.0	14.2	Neutral	N/A	-35.8
9.55	28.5 Qp	0.1 / 0.1 / 0.0	28.7	Neutral	-31.3	N/A
9.55	23.2 Av	0.1 / 0.1 / 0.0	23.4	Neutral	N/A	-26.6
0.150	46.7 Qp	0.0 / 0.1 / 0.0	46.8	Line 1	-19.2	N/A
0.150	22.0 Av	0.0 / 0.1 / 0.0	22.1	Line 1	N/A	-33.9
0.254	36.8 Qp	0.0 / 0.0 / 0.0	36.8	Line 1	-24.8	N/A
0.254	15.7 Av	0.0 / 0.0 / 0.0	15.7	Line 1	N/A	-35.9
1.56	7.1 Qp	0.2 / 0.0 / 0.0	7.3	Line 1	-48.7	N/A
1.56	-4.2 Av	0.2 / 0.0 / 0.0	-4.0	Line 1	N/A	-50.0
1.78	12.6 Qp	0.1 / 0.0 / 0.0	12.7	Line 1	-43.3	N/A
1.78	6.9 Av	0.1 / 0.0 / 0.0	7.0	Line 1	N/A	-39.0
7.81	26.1 Qp	0.1 / 0.0 / 0.0	26.2	Line 1	-33.8	N/A
7.81	20.6 Av	0.1 / 0.0 / 0.0	20.7	Line 1	N/A	-29.3

Tested by: GSJ

Printed

Signature

Reviewed by: TKS

Printed

Signature

Conducted Electromagnetic Emissions



Test Report #:	5878 Run 01	Test Area:	SCREEN ROOM		
Test Method:	EN55022	Test Date:	22-Nov-2002		
EUT Model #:	CDPR3x (WITH RFID1x TRANSCIVER)	EUT Power:	230vac/50hz, 110vac/60, 220vac/60hz		
EUT Serial #:		Temperature:	22	°C	
Manufacturer:	RIMAGE	Relative Humidity:	40	%	
EUT Description:	COLOR INKJET DISC PRINTER	Air Pressure:	99	kPa	
Notes:				Page:	2 of 5

FREQ (MHz)	LEVEL (dBuV)	CABLE / LISN / ATTEN (dB)	FINAL (dBuV)	TEST POINT	DELTA1 EN55022 B QP	DELTA2 EN55022 B Avg
9.55	23.8 Qp	0.1 / 0.1 / 0.0	24.0	Line 1	-36.0	N/A
9.55	20.3 Av	0.1 / 0.1 / 0.0	20.5	Line 1	N/A	-29.5
110vac / 60hz						
0.179	41.0 Qp	0.0 / 0.1 / 0.0	41.1	Line 1	-23.4	N/A
0.179	25.3 Av	0.0 / 0.1 / 0.0	25.4	Line 1	N/A	-29.1
0.716	14.4 Qp	0.1 / 0.0 / 0.0	14.5	Line 1	-41.5	N/A
0.716	11.0 Av	0.1 / 0.0 / 0.0	11.1	Line 1	N/A	-34.9
1.26	6.5 Qp	0.1 / 0.0 / 0.0	6.7	Line 1	-49.3	N/A
1.26	3.0 Av	0.1 / 0.0 / 0.0	3.1	Line 1	N/A	-42.9
7.20	25.6 Qp	0.2 / 0.0 / 0.0	25.8	Line 1	-34.2	N/A
7.20	20.6 Av	0.2 / 0.0 / 0.0	20.8	Line 1	N/A	-29.2
10.43	27.0 Qp	0.2 / 0.1 / 0.0	27.3	Line 1	-32.7	N/A
10.43	20.1 Av	0.2 / 0.1 / 0.0	20.4	Line 1	N/A	-29.6
30.00	17.4 Qp	0.5 / 0.3 / 0.0	18.2	Line 1	-41.8	N/A
30.00	12.1 Av	0.5 / 0.3 / 0.0	12.9	Line 1	N/A	-37.1
0.179	42.3 Qp	0.0 / 0.1 / 0.0	42.4	Neutral	-22.1	N/A
0.179	25.1 Av	0.0 / 0.1 / 0.0	25.2	Neutral	N/A	-29.3
0.716	15.6 Qp	0.1 / 0.0 / 0.0	15.7	Neutral	-40.3	N/A
0.716	4.6 Av	0.1 / 0.0 / 0.0	4.7	Neutral	N/A	-41.3
1.26	10.0 Qp	0.1 / 0.0 / 0.0	10.1	Neutral	-45.9	N/A
1.26	-0.9 Av	0.1 / 0.0 / 0.0	-0.8	Neutral	N/A	-46.8

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Test Report #:	5878 Run 01	Test Area:	SCREEN ROOM		
Test Method:	EN55022	Test Date:	22-Nov-2002		
EUT Model #:	CDPR3x (WITH RFID1x TRANSCIVER)	EUT Power:	230vac/50hz, 110vac/60, 220vac/60hz		
EUT Serial #:		Temperature:	22	°C	
Manufacturer:	RIMAGE	Relative Humidity:	40	%	
EUT Description:	COLOR INKJET DISC PRINTER	Air Pressure:	99	kPa	
Notes:				Page:	3 of 5

FREQ (MHz)	LEVEL (dBuV)	CABLE / LISN / ATTEN (dB)	FINAL (dBuV)	TEST POINT	DELTA1 EN55022 B QP	DELTA2 EN55022 B Avg
7.20	21.9 Qp	0.2 / 0.0 / 0.0	22.1	Neutral	-37.9	N/A
7.20	18.9 Av	0.2 / 0.0 / 0.0	19.1	Neutral	N/A	-30.9
10.43	29.7 Qp	0.2 / 0.1 / 0.0	30.0	Neutral	-30.0	N/A
10.43	21.3 Av	0.2 / 0.1 / 0.0	21.6	Neutral	N/A	-28.4
30.00	18.5 Qp	0.5 / 0.3 / 0.0	19.3	Neutral	-40.7	N/A
30.00	13.0 Av	0.5 / 0.3 / 0.0	13.8	Neutral	N/A	-36.2
220vac / 60hz						
0.150	46.2 Qp	0.0 / 0.1 / 0.0	46.3	Neutral	-19.7	N/A
0.150	21.4 Av	0.0 / 0.1 / 0.0	21.5	Neutral	N/A	-34.5
0.270	32.5 Qp	0.0 / 0.0 / 0.0	32.5	Neutral	-28.6	N/A
0.270	13.6 Av	0.0 / 0.0 / 0.0	13.6	Neutral	N/A	-37.5
0.751	11.2 Qp	0.1 / 0.0 / 0.0	11.3	Neutral	-44.7	N/A
0.751	2.4 Av	0.1 / 0.0 / 0.0	2.5	Neutral	N/A	-43.5
3.79	15.3 Qp	0.1 / 0.0 / 0.0	15.5	Neutral	-40.5	N/A
3.79	8.1 Av	0.1 / 0.0 / 0.0	8.2	Neutral	N/A	-37.8
8.02	28.1 Qp	0.1 / 0.0 / 0.0	28.3	Neutral	-31.7	N/A
8.02	25.5 Av	0.1 / 0.0 / 0.0	25.7	Neutral	N/A	-24.3
12.07	27.3 Qp	0.2 / 0.1 / 0.0	27.6	Neutral	-32.4	N/A
12.07	22.3 Av	0.2 / 0.1 / 0.0	22.6	Neutral	N/A	-27.4
0.150	47.2 Qp	0.0 / 0.1 / 0.0	47.3	Line 1	-18.7	N/A
0.150	23.5 Av	0.0 / 0.1 / 0.0	23.6	Line 1	N/A	-32.4

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Test Report #:	5878 Run 01	Test Area:	SCREEN ROOM		
Test Method:	EN55022	Test Date:	22-Nov-2002		
EUT Model #:	CDPR3x (WITH RFID1x TRANSCIVER)	EUT Power:	230vac/50hz, 110vac/60, 220vac/60hz		
EUT Serial #:		Temperature:	22	°C	
Manufacturer:	RIMAGE	Relative Humidity:	40	%	
EUT Description:	COLOR INKJET DISC PRINTER	Air Pressure:	99	kPa	
Notes:				Page:	4 of 5

FREQ (MHz)	LEVEL (dBuV)	CABLE / LISN / ATTEN (dB)	FINAL (dBuV)	TEST POINT	DELTA1 EN55022 B QP	DELTA2 EN55022 B Avg
0.270	34.3 Qp	0.0 / 0.0 / 0.0	34.3	Line 1	-26.8	N/A
0.270	12.9 Av	0.0 / 0.0 / 0.0	12.9	Line 1	N/A	-38.2
0.751	12.6 Qp	0.1 / 0.0 / 0.0	12.7	Line 1	-43.3	N/A
0.751	2.3 Av	0.1 / 0.0 / 0.0	2.4	Line 1	N/A	-43.6
3.79	14.5 Qp	0.1 / 0.0 / 0.0	14.7	Line 1	-41.3	N/A
3.79	10.4 Av	0.1 / 0.0 / 0.0	10.6	Line 1	N/A	-35.4
8.02	29.8 Qp	0.1 / 0.0 / 0.0	30.0	Line 1	-30.0	N/A
8.02	23.5 Av	0.1 / 0.0 / 0.0	23.7	Line 1	N/A	-26.3
12.07	26.5 Qp	0.2 / 0.1 / 0.0	26.8	Line 1	-33.2	N/A
12.07	22.6 Av	0.2 / 0.1 / 0.0	22.9	Line 1	N/A	-27.1

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Test Report #:	5878 Run 01	Test Area:	SCREEN ROOM		
Test Method:	EN55022	Test Date:	22-Nov-2002		
EUT Model #:	CDPR3x (WITH RFID1x TRANSCIVER)	EUT Power:	230vac/50hz, 110vac/60, 220vac/60hz		
EUT Serial #:		Temperature:	22	°C	
Manufacturer:	RIMAGE	Relative Humidity:	40	%	
EUT Description:	COLOR INKJET DISC PRINTER	Air Pressure:	99	kPa	
Notes:				Page:	5 of 5

FREQ (MHz)	LEVEL (dBuV)	CABLE / LISN / ATTEN (dB)	FINAL (dBuV)	TEST POINT	DELTA1 EN55022 B QP	DELTA2 EN55022 B Avg
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***** MEASUREMENT SUMMARY *****						
0.150	47.2 Qp	0.0 / 0.1 / 0.0	47.3	Line 1	-18.7	N/A
0.179	42.3 Qp	0.0 / 0.1 / 0.0	42.4	Neutral	-22.1	N/A
8.02	25.5 Av	0.1 / 0.0 / 0.0	25.7	Neutral	N/A	-24.3
0.254	36.8 Qp	0.0 / 0.0 / 0.0	36.8	Neutral	-24.8	N/A
9.55	23.2 Av	0.1 / 0.1 / 0.0	23.4	Neutral	N/A	-26.6
0.270	34.3 Qp	0.0 / 0.0 / 0.0	34.3	Line 1	-26.8	N/A
12.07	22.6 Av	0.2 / 0.1 / 0.0	22.9	Line 1	N/A	-27.1
10.43	21.3 Av	0.2 / 0.1 / 0.0	21.6	Neutral	N/A	-28.4
7.20	20.6 Av	0.2 / 0.0 / 0.0	20.8	Line 1	N/A	-29.2
7.81	20.6 Av	0.1 / 0.0 / 0.0	20.7	Line 1	N/A	-29.3
0.716	11.0 Av	0.1 / 0.0 / 0.0	11.1	Line 1	N/A	-34.9
3.79	10.4 Av	0.1 / 0.0 / 0.0	10.6	Line 1	N/A	-35.4
30.00	13.0 Av	0.5 / 0.3 / 0.0	13.8	Neutral	N/A	-36.2
1.78	9.3 Av	0.1 / 0.0 / 0.0	9.4	Neutral	N/A	-36.6
1.56	5.3 Av	0.2 / 0.0 / 0.0	5.5	Neutral	N/A	-40.5
1.26	3.0 Av	0.1 / 0.0 / 0.0	3.1	Line 1	N/A	-42.9
0.751	12.6 Qp	0.1 / 0.0 / 0.0	12.7	Line 1	-43.3	N/A

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Test Report #:	5878 Run 02	Test Area:	LTS 3m	
Test Method:	FCC Part 15	Test Date:	22-Nov-2002	
EUT Model #:	RFID1x	EUT Power:	50HZ/230VAC	
EUT Serial #:		Temperature:	22	°C
Manufacturer:	RIMAGE	Relative Humidity:	40	%
EUT Description:	RF TAG (TRANSCIVER)	Air Pressure:	99	kPa
Notes:			Page:	1 of 8

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 N/A
40.68	35.6 Qp	0.5 / 17.0 / 27.8	25.3	V / 1.0 / 0.0	-14.7	N/A
54.22	43.4 Qp	0.6 / 13.4 / 27.8	29.6	V / 1.0 / 0.0	-10.4	N/A
67.78	39.6 Qp	0.7 / 10.0 / 27.8	22.4	V / 1.0 / 0.0	-17.6	N/A
81.33	45.2 Qp	0.8 / 7.5 / 27.9	25.6	V / 1.0 / 0.0	-14.4	N/A
108.45	33.2 Qp	0.9 / 9.4 / 27.9	15.6	V / 1.0 / 0.0	-27.9	N/A
122.02	39.0 Qp	0.9 / 9.3 / 28.0	21.3	V / 1.0 / 0.0	-22.2	N/A
135.58	48.5 Qp	1.0 / 8.4 / 28.0	30.0	V / 1.0 / 0.0	-13.5	N/A
149.14	43.0 Qp	1.0 / 10.1 / 27.9	26.2	V / 1.0 / 0.0	-17.3	N/A
162.70	37.5 Qp	1.1 / 8.8 / 27.9	19.5	V / 1.0 / 0.0	-24.0	N/A
176.26	36.1 Qp	1.1 / 9.3 / 27.9	18.5	V / 1.0 / 0.0	-25.0	N/A
189.82	46.6 Qp	1.1 / 10.5 / 27.9	30.4	V / 1.0 / 0.0	-13.1	N/A
203.38	42.0 Qp	1.3 / 10.9 / 27.8	26.4	V / 1.0 / 0.0	-17.1	N/A
216.94	35.5 Qp	1.4 / 11.0 / 27.7	20.2	V / 1.0 / 0.0	-25.8	N/A
230.50	36.3 Qp	1.4 / 11.3 / 27.7	21.3	V / 1.0 / 0.0	-24.7	N/A
244.06	30.7 Qp	1.3 / 11.6 / 27.8	15.8	V / 1.0 / 0.0	-30.2	N/A
257.62	34.6 Qp	1.3 / 12.6 / 27.8	20.7	V / 1.0 / 0.0	-25.3	N/A
271.18	29.5 Qp	1.4 / 12.5 / 27.9	15.5	V / 1.0 / 0.0	-30.5	N/A
393.22	31.8 Qp	1.7 / 16.0 / 27.7	21.8	V / 1.0 / 0.0	-24.2	N/A
420.34	32.4 Qp	1.8 / 16.7 / 27.7	23.1	V / 1.0 / 0.0	-22.9	N/A
461.02	32.4 Qp	2.0 / 16.8 / 27.6	23.5	V / 1.0 / 0.0	-22.5	N/A
474.58	30.4 Qp	2.1 / 17.3 / 27.6	22.3	V / 1.0 / 0.0	-23.7	N/A
488.14	36.5 Qp	2.2 / 17.3 / 27.5	28.4	V / 1.0 / 0.0	-17.6	N/A
501.70	30.7 Qp	2.1 / 17.7 / 27.6	22.8	V / 1.0 / 0.0	-23.2	N/A
515.26	34.5 Qp	1.9 / 17.8 / 27.6	26.6	V / 1.0 / 0.0	-19.4	N/A
528.82	33.8 Qp	1.9 / 18.7 / 27.6	26.9	V / 1.0 / 0.0	-19.1	N/A

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Test Report #:	5878 Run 02	Test Area:	LTS 3m	
Test Method:	FCC Part 15	Test Date:	22-Nov-2002	
EUT Model #:	RFID1x	EUT Power:	50HZ/230VAC	
EUT Serial #:		Temperature:	22	°C
Manufacturer:	RIMAGE	Relative Humidity:	40	%
EUT Description:	RF TAG (TRANSCIVER)	Air Pressure:	99	kPa
Notes:	Page:		2	of 8

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 N/A
555.94	32.3 Qp	2.1 / 19.1 / 27.5	26.0	V / 1.0 / 0.0	-20.0	N/A
569.50	29.4 Qp	2.1 / 18.7 / 27.5	22.7	V / 1.0 / 0.0	-23.3	N/A
623.74	28.9 Qp	2.3 / 20.1 / 27.5	23.7	V / 1.0 / 0.0	-22.3	N/A
637.30	28.8 Qp	2.3 / 19.8 / 27.6	23.3	V / 1.0 / 0.0	-22.7	N/A
650.86	29.7 Qp	2.3 / 19.8 / 27.5	24.3	V / 1.0 / 0.0	-21.7	N/A
677.98	28.6 Qp	2.4 / 20.2 / 27.5	23.7	V / 1.0 / 0.0	-22.3	N/A
705.10	28.2 Qp	2.4 / 20.4 / 27.4	23.6	V / 1.0 / 0.0	-22.4	N/A
718.66	27.9 Qp	2.4 / 20.6 / 27.5	23.5	V / 1.0 / 0.0	-22.5	N/A
732.22	27.6 Qp	2.4 / 21.1 / 27.5	23.6	V / 1.0 / 0.0	-22.4	N/A
81.33	46.4 Qp	0.8 / 7.5 / 27.9	26.7	V / 1.0 / 90.0	-13.3	N/A
108.45	39.4 Qp	0.9 / 9.4 / 27.9	21.7	V / 1.0 / 90.0	-21.8	N/A
162.70	42.4 Qp	1.1 / 8.8 / 27.9	24.4	V / 1.0 / 90.0	-19.1	N/A
176.26	39.2 Qp	1.1 / 9.3 / 27.9	21.7	V / 1.0 / 90.0	-21.8	N/A
203.38	43.9 Qp	1.3 / 10.9 / 27.8	28.3	V / 1.0 / 90.0	-15.2	N/A
244.06	32.0 Qp	1.3 / 11.6 / 27.8	17.2	V / 1.0 / 90.0	-28.8	N/A
257.62	38.5 Qp	1.3 / 12.6 / 27.8	24.6	V / 1.0 / 90.0	-21.4	N/A
271.18	32.0 Qp	1.4 / 12.5 / 27.9	18.0	V / 1.0 / 90.0	-28.0	N/A
40.68	36.8 Qp	0.5 / 17.0 / 27.8	26.5	V / 1.0 / 180.0	-13.5	N/A
108.45	41.8 Qp	0.9 / 9.4 / 27.9	24.2	V / 1.0 / 180.0	-19.3	N/A
230.50	37.1 Qp	1.4 / 11.3 / 27.7	22.2	V / 1.0 / 180.0	-23.8	N/A
244.06	33.4 Qp	1.3 / 11.6 / 27.8	18.5	V / 1.0 / 180.0	-27.5	N/A
393.22	33.6 Qp	1.7 / 16.0 / 27.7	23.7	V / 1.0 / 180.0	-22.3	N/A
461.02	33.5 Qp	2.0 / 16.8 / 27.6	24.7	V / 1.0 / 180.0	-21.3	N/A

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Test Report #:	5878 Run 02	Test Area:	LTS 3m	
Test Method:	FCC Part 15	Test Date:	22-Nov-2002	
EUT Model #:	RFID1x	EUT Power:	50HZ/230VAC	
EUT Serial #:		Temperature:	22	°C
Manufacturer:	RIMAGE	Relative Humidity:	40	%
EUT Description:	RF TAG (TRANSCIVER)	Air Pressure:	99	kPa
Notes:			Page:	3 of 8

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 N/A
67.78	41.1 Qp	0.7 / 10.0 / 27.8	24.0	V / 1.0 / 270.0	-16.0	N/A
81.33	48.0 Qp	0.8 / 7.5 / 27.9	28.4	V / 1.0 / 270.0	-11.6	N/A
216.94	36.6 Qp	1.4 / 11.0 / 27.7	21.3	V / 1.0 / 270.0	-24.7	N/A
230.50	38.5 Qp	1.4 / 11.3 / 27.7	23.5	V / 1.0 / 270.0	-22.5	N/A
461.02	34.5 Qp	2.0 / 16.8 / 27.6	25.7	V / 1.0 / 270.0	-20.3	N/A
623.74	31.0 Qp	2.3 / 20.1 / 27.5	25.8	V / 1.0 / 270.0	-20.2	N/A
637.30	30.0 Qp	2.3 / 19.8 / 27.6	24.5	V / 1.0 / 270.0	-21.5	N/A
650.86	31.9 Qp	2.3 / 19.8 / 27.5	26.5	V / 1.0 / 270.0	-19.5	N/A
677.98	31.1 Qp	2.4 / 20.2 / 27.5	26.2	V / 1.0 / 270.0	-19.8	N/A
705.10	30.1 Qp	2.4 / 20.4 / 27.4	25.4	V / 1.0 / 270.0	-20.6	N/A
718.66	29.4 Qp	2.4 / 20.6 / 27.5	25.0	V / 1.0 / 270.0	-21.0	N/A
732.22	28.4 Qp	2.4 / 21.1 / 27.5	24.4	V / 1.0 / 270.0	-21.6	N/A
MAXIMIZED.						
54.22	44.5 Qp	0.6 / 13.4 / 27.8	30.7	V / 1.0 / 16.0	-9.3	N/A
81.33	48.1 Qp	0.8 / 7.5 / 27.9	28.5	V / 1.0 / 300.0	-11.5	N/A
MAXED ANTENNA AND ROTATED EUT 360 DEGREES.						
67.78	42.1 Qp	0.7 / 10.0 / 27.8	25.0	H / 3.0 / 0.0	-15.0	N/A
81.33	52.4 Qp	0.8 / 7.5 / 27.9	32.8	H / 3.0 / 0.0	-7.2	N/A
108.45	52.1 Qp	0.9 / 9.4 / 27.9	34.5	H / 3.0 / 0.0	-9.0	N/A
122.02	48.8 Qp	0.9 / 9.3 / 28.0	31.1	H / 3.0 / 0.0	-12.4	N/A
135.58	51.6 Qp	1.0 / 8.4 / 28.0	33.0	H / 3.0 / 0.0	-10.5	N/A

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Test Report #:	5878 Run 02	Test Area:	LTS 3m	
Test Method:	FCC Part 15	Test Date:	22-Nov-2002	
EUT Model #:	RFID1x	EUT Power:	50HZ/230VAC	
EUT Serial #:		Temperature:	22	°C
Manufacturer:	RIMAGE	Relative Humidity:	40	%
EUT Description:	RF TAG (TRANSCIVER)	Air Pressure:	99	kPa
Notes:			Page:	4 of 8

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 N/A
149.14	46.6 Qp	1.0 / 10.1 / 27.9	29.9	H / 3.0 / 0.0	-13.6	N/A
230.50	40.4 Qp	1.4 / 11.3 / 27.7	25.4	H / 3.0 / 0.0	-20.6	N/A
244.06	34.9 Qp	1.3 / 11.6 / 27.8	20.0	H / 3.0 / 0.0	-26.0	N/A
257.62	39.8 Qp	1.3 / 12.6 / 27.8	25.8	H / 3.0 / 0.0	-20.2	N/A
515.26	36.5 Qp	1.9 / 17.8 / 27.6	28.7	H / 3.0 / 0.0	-17.3	N/A
650.86	32.5 Qp	2.3 / 19.8 / 27.5	27.0	H / 3.0 / 0.0	-19.0	N/A
162.70	43.2 Qp	1.1 / 8.8 / 27.9	25.3	H / 3.0 / 90.0	-18.2	N/A
176.26	40.5 Qp	1.1 / 9.3 / 27.9	22.9	H / 3.0 / 90.0	-20.6	N/A
189.82	47.0 Qp	1.1 / 10.5 / 27.9	30.7	H / 3.0 / 90.0	-12.8	N/A
515.26	37.6 Qp	1.9 / 17.8 / 27.6	29.8	H / 3.0 / 90.0	-16.2	N/A
135.58	53.1 Qp	1.0 / 8.4 / 28.0	34.5	H / 3.0 / 180.0	-9.0	N/A
149.14	47.6 Qp	1.0 / 10.1 / 27.9	30.8	H / 3.0 / 180.0	-12.7	N/A
162.70	45.5 Qp	1.1 / 8.8 / 27.9	27.5	H / 3.0 / 180.0	-16.0	N/A
189.82	53.2 Qp	1.1 / 10.5 / 27.9	36.9	H / 3.0 / 180.0	-6.6	N/A
203.38	47.8 Qp	1.3 / 10.9 / 27.8	32.2	H / 3.0 / 180.0	-11.3	N/A
216.94	43.5 Qp	1.4 / 11.0 / 27.7	28.2	H / 3.0 / 180.0	-17.8	N/A
230.50	42.8 Qp	1.4 / 11.3 / 27.7	27.8	H / 3.0 / 180.0	-18.2	N/A
244.06	35.7 Qp	1.3 / 11.6 / 27.8	20.8	H / 3.0 / 180.0	-25.2	N/A
257.62	44.7 Qp	1.3 / 12.6 / 27.8	30.8	H / 3.0 / 180.0	-15.2	N/A
271.18	36.1 Qp	1.4 / 12.5 / 27.9	22.1	H / 3.0 / 180.0	-23.9	N/A
81.33	54.8 Qp	0.8 / 7.5 / 27.9	35.2	H / 3.0 / 270.0	-4.8	N/A
244.06	36.3 Qp	1.3 / 11.6 / 27.8	21.4	H / 3.0 / 270.0	-24.6	N/A

Tested by: RMJ

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Radiated Electromagnetic Emissions



Test Report #:	5878 Run 02	Test Area:	LTS 3m	
Test Method:	FCC Part 15	Test Date:	22-Nov-2002	
EUT Model #:	RFID1x	EUT Power:	50HZ/230VAC	
EUT Serial #:		Temperature:	22	°C
Manufacturer:	RIMAGE	Relative Humidity:	40	%
EUT Description:	RF TAG (TRANSCIVER)	Air Pressure:	99	kPa
Notes:				Page: 5 of 8

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 N/A
393.22	37.0 Qp	1.7 / 16.0 / 27.7	27.0	H / 3.0 / 270.0	-19.0	N/A
MAXIMIZED.						
81.33	56.1 Qp	0.8 / 7.5 / 27.9	36.5	H / 4.0 / 325.0	-3.5	N/A
189.82	57.1 Qp	1.1 / 10.5 / 27.9	40.9	H / 1.5 / 165.0	-2.6	N/A
108.45	53.1 Qp	0.9 / 9.4 / 27.9	35.4	H / 4.0 / 0.0	-8.1	N/A
135.58	54.6 Qp	1.0 / 8.4 / 28.0	36.0	H / 2.6 / 160.0	-7.5	N/A
203.38	53.3 Qp	1.3 / 10.9 / 27.8	37.7	H / 1.3 / 160.0	-5.8	N/A
122.02	49.4 Qp	0.9 / 9.3 / 28.0	31.6	H / 3.0 / 0.0	-11.9	N/A
MAXED ANTENNA AND ROTATED EUT 360 DEGREES.						
END OF SCAN 30 - 1000MHZ.						

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Radiated Electromagnetic Emissions



Test Report #:	5878 Run 02	Test Area:	LTS 3m	
Test Method:	FCC Part 15	Test Date:	22-Nov-2002	
EUT Model #:	RFID1x	EUT Power:	50HZ/230VAC	
EUT Serial #:		Temperature:	22	°C
Manufacturer:	RIMAGE	Relative Humidity:	40	%
EUT Description:	RF TAG (TRANSCIVER)	Air Pressure:	99	kPa
Notes:			Page:	6 of 8

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 N/A
---------------	-----------------	--	-------------------	-----------------------------	--------------------------	---------------

***** MEASUREMENT SUMMARY *****						
189.82	57.1 Qp	1.1 / 10.5 / 27.9	40.9	H / 1.5 / 165.0	-2.6	N/A
81.33	56.1 Qp	0.8 / 7.5 / 27.9	36.5	H / 4.0 / 325.0	-3.5	N/A
203.38	53.3 Qp	1.3 / 10.9 / 27.8	37.7	H / 1.3 / 160.0	-5.8	N/A
135.58	54.6 Qp	1.0 / 8.4 / 28.0	36.0	H / 2.6 / 160.0	-7.5	N/A
108.45	53.1 Qp	0.9 / 9.4 / 27.9	35.4	H / 4.0 / 0.0	-8.1	N/A
54.22	44.5 Qp	0.6 / 13.4 / 27.8	30.7	V / 1.0 / 16.0	-9.3	N/A
122.02	49.4 Qp	0.9 / 9.3 / 28.0	31.6	H / 3.0 / 0.0	-11.9	N/A
149.14	47.6 Qp	1.0 / 10.1 / 27.9	30.8	H / 3.0 / 180.0	-12.7	N/A
40.68	36.8 Qp	0.5 / 17.0 / 27.8	26.5	V / 1.0 / 180.0	-13.5	N/A
67.78	42.1 Qp	0.7 / 10.0 / 27.8	25.0	H / 3.0 / 0.0	-15.0	N/A
257.62	44.7 Qp	1.3 / 12.6 / 27.8	30.8	H / 3.0 / 180.0	-15.2	N/A
162.70	45.5 Qp	1.1 / 8.8 / 27.9	27.5	H / 3.0 / 180.0	-16.0	N/A
515.26	37.6 Qp	1.9 / 17.8 / 27.6	29.8	H / 3.0 / 90.0	-16.2	N/A
488.14	36.5 Qp	2.2 / 17.3 / 27.5	28.4	V / 1.0 / 0.0	-17.6	N/A
216.94	43.5 Qp	1.4 / 11.0 / 27.7	28.2	H / 3.0 / 180.0	-17.8	N/A
230.50	42.8 Qp	1.4 / 11.3 / 27.7	27.8	H / 3.0 / 180.0	-18.2	N/A
393.22	37.0 Qp	1.7 / 16.0 / 27.7	27.0	H / 3.0 / 270.0	-19.0	N/A
650.86	32.5 Qp	2.3 / 19.8 / 27.5	27.0	H / 3.0 / 0.0	-19.0	N/A
528.82	33.8 Qp	1.9 / 18.7 / 27.6	26.9	V / 1.0 / 0.0	-19.1	N/A
677.98	31.1 Qp	2.4 / 20.2 / 27.5	26.2	V / 1.0 / 270.0	-19.8	N/A
555.94	32.3 Qp	2.1 / 19.1 / 27.5	26.0	V / 1.0 / 0.0	-20.0	N/A
623.74	31.0 Qp	2.3 / 20.1 / 27.5	25.8	V / 1.0 / 270.0	-20.2	N/A
461.02	34.5 Qp	2.0 / 16.8 / 27.6	25.7	V / 1.0 / 270.0	-20.3	N/A

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Radiated Electromagnetic Emissions



Test Report #:	5878 Run 02	Test Area:	LTS 3m	
Test Method:	FCC Part 15	Test Date:	22-Nov-2002	
EUT Model #:	RFID1x	EUT Power:	50HZ/230VAC	
EUT Serial #:		Temperature:	22	°C
Manufacturer:	RIMAGE	Relative Humidity:	40	%
EUT Description:	RF TAG (TRANSCIVER)	Air Pressure:	99	kPa
Notes:			Page:	7 of 8

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 N/A
***** MEASUREMENT SUMMARY *****						
176.26	40.5 Qp	1.1 / 9.3 / 27.9	22.9	H / 3.0 / 90.0	-20.6	N/A
705.10	30.1 Qp	2.4 / 20.4 / 27.4	25.4	V / 1.0 / 270.0	-20.6	N/A
718.66	29.4 Qp	2.4 / 20.6 / 27.5	25.0	V / 1.0 / 270.0	-21.0	N/A
637.30	30.0 Qp	2.3 / 19.8 / 27.6	24.5	V / 1.0 / 270.0	-21.5	N/A
732.22	28.4 Qp	2.4 / 21.1 / 27.5	24.4	V / 1.0 / 270.0	-21.6	N/A
420.34	32.4 Qp	1.8 / 16.7 / 27.7	23.1	V / 1.0 / 0.0	-22.9	N/A
501.70	30.7 Qp	2.1 / 17.7 / 27.6	22.8	V / 1.0 / 0.0	-23.2	N/A
569.50	29.4 Qp	2.1 / 18.7 / 27.5	22.7	V / 1.0 / 0.0	-23.3	N/A
474.58	30.4 Qp	2.1 / 17.3 / 27.6	22.3	V / 1.0 / 0.0	-23.7	N/A
271.18	36.1 Qp	1.4 / 12.5 / 27.9	22.1	H / 3.0 / 180.0	-23.9	N/A
244.06	36.3 Qp	1.3 / 11.6 / 27.8	21.4	H / 3.0 / 270.0	-24.6	N/A

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Reviewed by: TKS

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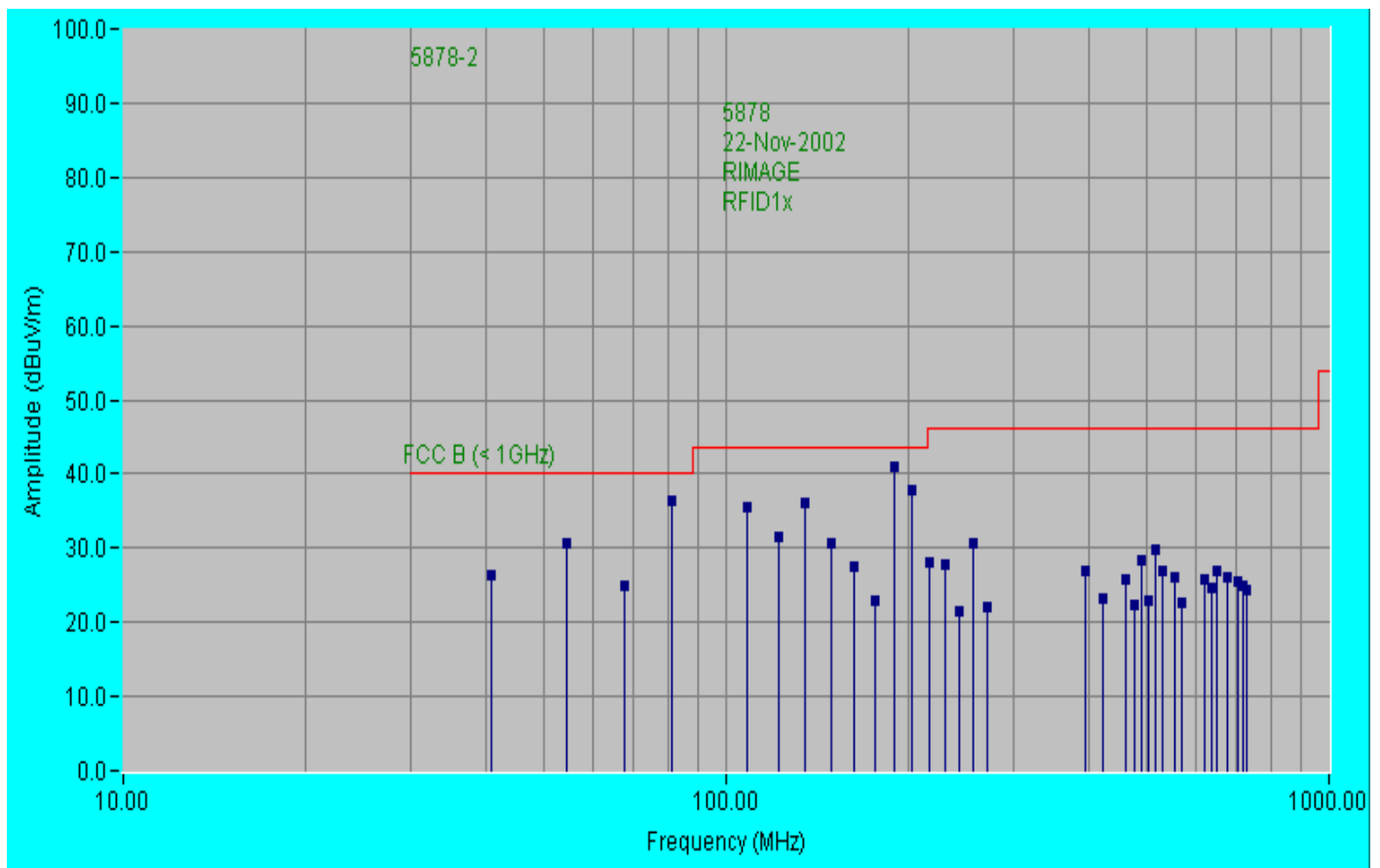
Signature

Radiated Electromagnetic Emissions



Test Report #:	5878 Run 02	Test Area:	LTS 3m	
Test Method:	FCC Part 15	Test Date:	22-Nov-2002	
EUT Model #:	RFID1x	EUT Power:	50HZ/230VAC	
EUT Serial #:		Temperature:	22	°C
Manufacturer:	RIMAGE	Relative Humidity:	40	%
EUT Description:	RF TAG (TRANSCIEVER)	Air Pressure:	99	kPa
Notes:			Page:	8 of 8

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 N/A
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Appendix B

Constructional Data Form

and/or

Product Information Form(s)



EMC Test Plan and Constructional Data Form

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE.

Applicant -- NOTE: This information will be input into your test report as shown below.
Press the F1 key at any time to get HELP for the current field selected.

Company: Rimage Corporation

Address: 7725 Washington Avenue South
Minneapolis, Minnesota 55439

Contact: Phil Salisbury Position: Manager, Electrical Engineering

Phone: (952) 946-4545 Fax: (952) 944-7808

E-mail Address: phil@rimage.com

General Equipment Description -- NOTE: This information will be input into your test report as shown below.

EUT Description RFID transceiver, to be tested as an intentional radiator

EUT Name NA

Model No.: RFID1x Serial No.: NA

Product Options: _____

Configurations to be tested: Transceiver to be tested as an intentional radiator without a case

Test Objective

- | | |
|---|--|
| ☒ EMC Directive 89/336/EEC (EMC)
Std: _____ | ☒ FCC: Class ☐ A ☒ B Part _____ |
| ☐ Machinery Directive 89/392/EEC (EMC)
Std: _____ | ☒ VCCI: Class ☐ A ☒ B |
| ☐ Medical Device Directive 93/42/EEC (EMC)
Std: _____ | ☒ BSMI: Class ☐ A ☒ B |
| ☐ Vehicle Directive 72/245/EEC (EMC)
Std: _____ | ☒ Canada: Class ☐ A ☒ B |
| ☐ FDA Reviewers Guidance for Premarket
Notification Submissions (EMC) | ☒ Australia: Class ☐ A ☒ B |
| | ☐ Other: _____ |

TÜV Product Service Certification Requested

- | | |
|--|---|
| ☐ Attestation of Conformity (AoC) | ☐ EMC Certification (used with Octagon Mark) |
| ☐ Certificate of Conformity (CoC) | ☐ Compliance Document |
| Protection Class (N/A for vehicles) | ☐ Class I ☐ Class II ☐ Class III |
- (Press F1 when field is selected to show additional information on Protection Class.)

Attendance

Test will be: ☒ Attended by the customer ☐ Unattended by the customer

EMC Test Plan and Constructional Data Form**Failure - Complete this section if testing will not be attended by the customer.**

If a failure occurs, TUV Product Service should:

- ☐ Call contact listed above, if not available then stop testing. (After hrs phone): _____
- ☐ Continue testing to complete test series.
- ☒ Continue testing to define corrective action.
- ☐ Stop testing.

EUT Specifications and RequirementsLength: 12-inch Width: 6-inch Height: 6=inch Weight: 1-lb**Power Requirements**

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 100-240 (If battery powered, make sure battery life is sufficient to complete testing.)# of Phases: 1Current (Amps/phase(max)): 1 Current (Amps/phase(nominal)): .3

Other _____

Other Special Requirements**Typical Installation and/or Operating Environment**

(ie. Hospital, Small Business, Industrial/Factory, etc.)

RFID1x is intended as a subsystem to be included as part of a larger systems and is not marketed as a stand-alone product. The systems that will use RFID1x are used in commercial, industrial environments.

EUT Power Cable

- ☐ Permanent OR ☒ Removable Length (in meters): 1
- ☐ Shielded OR ☐ Unshielded
- ☐ Not Applicable

EMC Test Plan and Constructional Data Form

EUT Interface Ports and Cables												
Interface			Shielding									
Type	Analog	Digital	Qty	Yes	No	Type	Termination	Connector Type	Port Termination	Length (in meters)	Removable	Permanent
EXAMPLE:												
RS232	☐	☒	2	☒	☐	Foil over braid	Coaxial	Metallized 9-pin D-Sub	Characteristic Impedance	6	☒	☐
Proprietary Control Interface	☐	☒	1	☐	☒					0	☒	☐
	☐	☐		☐	☐						☐	☐
	☐	☐		☐	☐						☐	☐
	☐	☐		☐	☐						☐	☐
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	☐	☐		☐	☐						☐	☐
	☐	☐		☐	☐						☐	☐
	☐	☐		☐	☐						☐	☐

EUT Software.

Description: Firmware specifically set up to turn on carrier for testing.

Equipment Under Test (EUT) Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1. Transmitter carrier running continuously. In actual operation the carrier will be present for lesst that 1-second every 30-seconds.
- 2.
- 3.

Equipment Under Test (EUT) System Components -- List and describe all components which are part of the EUT. For FCC testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc.)

Description	Model #	Serial #	FCC ID #
RFID tranceiver printed circuit	RFID1x		

EMC Test Plan and Constructional Data Form

Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)			
<i>Description</i>	<i>Model #</i>	<i>Serial #</i>	<i>FCC ID #</i>
Disc Color Printer	CDPR3x		
Computer	Dell 1400SC		
CRT	CTX		
Keyboard			
Mouse			

Oscillator Frequencies			
<i>Frequency</i>	<i>Derived Frequency</i>	<i>Component # / Location</i>	<i>Description of Use</i>
13.56MHz		On RFID1x PCB	Fundamental tranceiver oscillator

Power Supply			
<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Type</i>
			☒ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____
			☐ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____

Power Line Filters		
<i>Manufacturer</i>	<i>Model #</i>	<i>Location in EUT</i>

EMC Test Plan and Constructional Data Form**Critical EMI Components (Capacitors, ferrites, etc.)**

<i>Description</i>	<i>Manufacturer</i>	<i>Part # or Value</i>	<i>Qty</i>	<i>Component # / Location</i>

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

(PLEASE INSERT "ELECTRONIC SIGNATURE" BELOW IF POSSIBLE)

Authorization Signatures

Phil Salisbury

20-Nov-2002

Customer authorization to perform tests
according to this test plan._____
Date

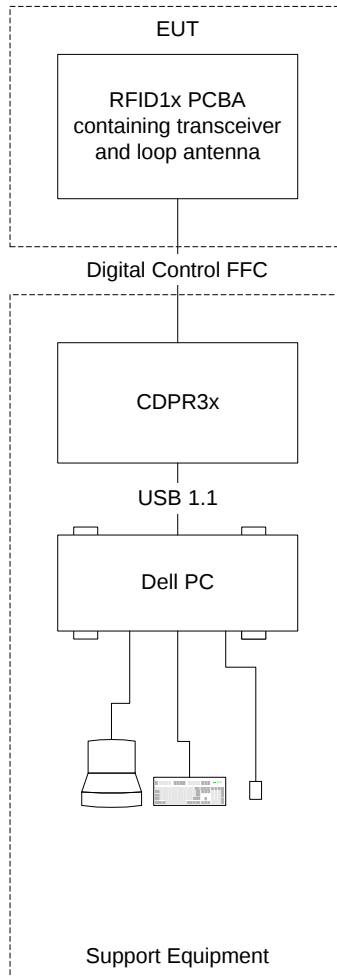
Phil Salisbury

20-Nov-2002

Test Plan/CDF Prepared By (please print)_____
Date_____
Reviewed by TÜV Product Service Associate_____
Date

EMC Block Diagram Form

System Configuration Block Diagram -- Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.

**Authorization Signatures**

Customer authorization to perform tests
according to this test plan.

Phil Salisbury

Test Plan/CDF Prepared By (please print)

Reviewed by TÜV Product Service Associate

Date

20-Nov-2002

Date

Date

Appendix C

MEASUREMENT PROTOCOL FOR FCC

GENERAL INFORMATION

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. These test systems have a measurement uncertainty of ± 4.5 dB. The equipment comprising the test systems are calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into it's characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

CONDUCTED EMISSIONS

The final level, expressed in dB μ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

RADIATED EMISSIONS

The final level, expressed in dB μ V/m, is arrived at by taking the reading from the spectrum analyzer (Level dB μ V), adding the antenna correction factor and cable loss factor (Factor dB) to it, then subtracting the preamp gain. This result then has the FCC limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment A.

Example:

FREQ (MHz)	LEVEL (dB μ V)	CABLE/ANT/PREAMP				FINAL	POL/HGT/AZ			DELTA1
		(dB)	(dB/m)	(dB)		(dB μ V/m)	(m)	(deg)		FCC B
60.80	42.5Qp	+ 1.2	+ 10.9	- 25.5	=	29.1	V	1.0	0.0	-10.9

DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

Conducted Emissions

Conducted emissions on the 60 Hz power interface of the EUT are measured in the frequency range of 450 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω /50 μ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 1000 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. Intentional radiators are rotated through three orthogonal axes to determine the attitude that maximizes the emissions.

In the frequency range of 9 kHz to 30 MHz, measurements are made with quasi-peak or average detection with a loop antenna. The antenna is positioned 1 meter above the ground plane and rotated about its vertical axis for maximum response at each azimuth about the EUT. The antenna is also positioned horizontally at the specified distances.