Electromagnetic Compatibility Test Report

Tests Performed on a RF IDeas, Inc.

13.56 MHz Card Reader, Model RDR-7081AKU & RDR-7081AK2

Radiometrics Document RP-5608A

ACCREDITED
Certification # 1495.01

Product Detail: FCC ID: M9MRDR7081 IC: 6571A-RDR7081 Equipment type: Low Power Intentional Radiator
Test Standards: US CFR Title 47, Chapter I, FCC Part 15 Subpart C FCC Part 15 CFR Title 47: 2006 Industry Canada RSS-210, Issue 6 as required for Category I Equipment This report concerns: Original Grant for Certification FCC Part 15.209 Canada RSS-210 General Limits

Tests Performed For:	*Test Facility:*
RF IDeas, Inc. 1250 South Grove Av. Barrington, IL 60010	**Radiometrics Midwest Corporation** 12 East Devonwood Romeoville, IL 60446

Test Date(s): (Month-Day-Year)
May 31, to June 2, 2006

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0	June 19, 2006		

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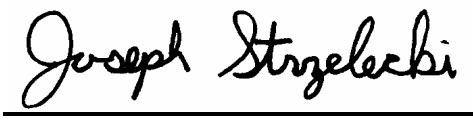
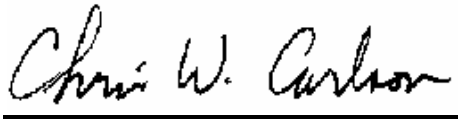
1 ADMINISTRATIVE DATA

Equipment Under Test: A RF IDeas, Inc., 13.56 MHz Card Reader Model: RDR-7081AKU & RDR-7081AK2 Serial Number: none This will be referred to as the EUT in this Report	
Date EUT Received at Radiometrics: (Month-Day-Year) April 7, 2006	*Test Date(s): (Month-Day-Year)* May 31, to June 2, 2006
Test Report Written By: Joseph Strzelecki Senior EMC Engineer	*Test Witnessed By:* The tests were not witnessed by RF IDeas, Inc. RF IDeas, Inc.
Radiometrics' Personnel Responsible for Test:  Joseph Strzelecki Senior EMC Engineer NARTE EMC-000877-NE	*Test Report Approved By*  Chris W. Carlson Director of Engineering NARTE EMC-000921-NE

2 TEST SUMMARY AND RESULTS

The EUT (Equipment Under Test) is a 13.56 MHz Card Reader, Model RDR-7081AKU & RDR-7081AK2, manufactured by RF IDeas, Inc. The detailed test results are presented in a separate section. The following is a summary of the test results.

Emissions Tests Results

Environmental Phenomena	Frequency Range	Basic Standard	Test Result
RF Radiated Emissions	30-1000 MHz	RSS-210 & FCC Part 15	Pass
RF Radiated Emissions H-Field	0.009 – 30 MHz	RSS-210 & FCC Part 15	Pass

2.1 RF Exposure Compliance Requirements

The equivalent radiated power output is less than 1 mW, The EUT meets the FCC requirement for RF exposure. Since the EUT is less than 200 mW, it is exempt from RSS-102. There are no power level adjustments and the antenna is permanently attached. The detailed calculations for RF Exposure are presented in a separate document.

3 EQUIPMENT UNDER TEST (EUT) DETAILS

3.1 EUT Description

The EUT is a 13.56 MHz Card Reader, Model RDR-7081AKU & RDR-7081AK2, manufactured by RF IDeas, Inc. The EUT was in good working condition during the tests, with no known defects.

The same 13.56 MHz RF Section is used on both the serial and USB versions of the EUT.

3.1.1 FCC Section 15.203 Antenna Requirements

The antenna is permanently attached to the PCB. The antenna is internal to the EUT and it is not readily available to be modified by the end user. Therefore it meets the 15.203 Requirement.

3.2 Related Submittals

RF IDeas, Inc. is not submitting any other products simultaneously for equipment authorization related to the EUT.

4 TESTED SYSTEM DETAILS

4.1 Tested System Configuration

The system was configured for testing in a typical fashion. The EUT was placed on an 80-cm high, nonconductive test stand. The testing was performed in conditions as close as possible to installed conditions. Wiring was consistent with manufacturer's recommendations.

The serial EUT was connected to the Host computer's serial port and keyboard connector with pass-through connector.

The USB EUT was connected to the Host computer's USB port.

Power was supplied at 115 VAC, 60 Hz single-phase to the host computer. The identification for all equipment, plus descriptions of all cables used in the tested system, are:

Tested System Configuration List

Item	Description	Type*	Manufacturer	Model Number	Serial Number
1	USB Card Reader	E	RF Ideas, Inc.	RDR-6881AKU	none
2	Serial Card Reader	E	RF Ideas, Inc.	RDR-6881AK2	none
3	Note Book PC	H	Dell	PP01L	TW04E641-12800-1A9-5632
4	Printer	P	Star	NX-1001	510010542390
5	Mouse	P	Logitech	CC-93-9F	LU119008761

* Type: E = EUT, P = Peripheral, S = Support Equipment; H = Host Computer

List of System Cables

QTY	Length (m)	Cable Description	Connected to (Item #)	Shielded?
1	1.7	DB9 Serial Cable	#1 and #3	Yes
1	0.3	Keyboard Jumper Cable	#2 and #3	Yes
1	1.8	USB Cable	#1 and #3	Yes
1	1.9	AC Power Cord	#3	No
1	1.8	Printer Cable	#4 and #5	Yes
1	2.0	Mouse Cable	#3 and #5	Yes

4.2 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

4.3 Equipment Modifications

No modifications were made to the EUT at Radiometrics' test facility in order to comply with the standards listed in this report.

5 TEST SPECIFICATIONS AND RELATED DOCUMENTS

Document	Date	Title
FCC CFR Title 47	2006	Code of Federal Regulations Title 47, Chapter 1, Federal Communications Commission, Part 15 - Radio Frequency Devices
ANSI C63.4-2003	2003	Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
IC RSS-210 Issue 6	2005	Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands) Category I Equipment
IC RSS-212 Issue 1	1999	Test Methods For Radio Equipment
IC RSS-Gen Issue 1	2005	General Requirements and Information for the Certification of Radiocommunication Equipment (RSS-Gen)

The test procedures used are in accordance with the Industry Canada RSS-212 and ANSI document C63.4-2003, "Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The specific procedures are described herein. Radiated testing was performed at an antenna to EUT distance of 3 meters. The antenna was raised and lowered from 1 to 4 meters.

6 RADIOMETRICS' TEST FACILITIES

The results of these tests were obtained at Radiometrics Midwest Corp. in Romeoville, Illinois, USA. Radiometrics is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025: 1999 "General Requirements for the Competence of Calibration and Testing Laboratories". Radiometrics' Lab Code is 121191 and Certification Number is 1495.01. Radiometrics' scope of accreditation includes all of the test methods listed herein. A copy of the accreditation can be accessed on our web site (www.radiomet.com). Radiometrics accreditation status can be verified at A2LA's web site (www.a2la2.org).

The following is a list of shielded enclosures located in Romeoville, Illinois, that were for the tests herein:

Chamber E: Is a custom made anechoic chamber that measures 52' L X 30' W X 18' H. The walls and ceiling are fully lined with RF absorber. Pro-shield of Collinsville, Oklahoma manufactured the chamber.

Test Station F: Is an area that measures 10' D X 12' W X 10' H. The floor and back wall are metal shielded. This area is used for conducted emissions measurements.

A separate ten-foot long, brass plated, steel ground rod attached via a 6 inch copper braid grounds each of the above chambers. Each enclosure is also equipped with low-pass power line filters.

Open Area Test Site (OATS): Is located on 8625 Helmar Road in Newark, Illinois, USA and measures 56' L X 24' W X 17' H. The entire open field test site has a metal ground screen. The FCC has accepted these sites as test site number US1065. The FCC test site Registration Number is 732175. Details of the site characteristics are on file with the Industry Canada as file number IC3124.

A complete list of the test equipment is provided herein. The calibration due dates are indicated on the equipment list. The equipment is calibrated in accordance to ANSI/NCSL Z540-1 with traceability to the National Institute of Standards and Technology (NIST).

7 DEVIATIONS AND EXCLUSIONS FROM THE TEST SPECIFICATIONS

There were no deviations or exclusions from the test specifications.

8 CERTIFICATION

Radiometrics Midwest Corporation certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specification. The results relate only to the EUT listed herein. Any modifications made to the EUT subsequent to the indicated test date will invalidate the data and void this certification.

9 TEST EQUIPMENT TABLE

RMC ID	Manufacturer	Description	Model No.	Serial No.	Frequency Range	Cal Period	Cal Date
AMP-12	MITEQ	Pre-amplifier	AM-1431	530935	0.01-1000MHz	12 Mo.	02/06/06
AMP-22	Anritsu	Pre-amplifier	MH648A	M23969	0.1-1200MHz	12 Mo.	12/21/05
ANT-06	EMCO	Log-Periodic Ant.	3146	1248	200-1000MHz	24 mo	01/31/06
ANT-12	RMC	Dipole Antenna Set	HW1010	202	25-1000MHz	24 Mo.	07/12/04
ANT-42	EMCO	Bicon Antenna	3104C	9512-4713	25-300MHz	24 Mo.	01/26/06
ANT-44	Impossible Machine	Super Log Antenna	SL-20M2G	1002	20-2000MHz	24 Mo.	06/15/04
ATT-02	KDI	Attenuator	A710N	RMC1	DC-10GHz	24 Mo.	04/20/05
REC-03	Anritsu	Spectrum Analyzer	MS2601B	MT94589	0.01-2200MHz	12 Mo.	12/07/05
REC-07	Anritsu	Spectrum Analyzer	MS2601A	MT53067	0.01-2200MHz	12 Mo.	02/07/06

Note: All calibrated equipment is subject to periodic checks.

10 TEST SECTIONS

10.1 Radiated RF Emissions

Radiated emission measurements were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna.

The radiated emission measurements were performed with a spectrum analyzer. The bandwidth used from 450 kHz to 30 MHz is 9 or 10 kHz and the bandwidth from 30 MHz to 1000 MHz is 100 or 120 kHz. Above 1 GHz, a 1 MHz bandwidth is used. A 10 dB linearity check is performed prior to start of testing in order to determine if an overload condition exists.

From 30 to 1000 MHz, an Anritsu Spectrum analyzer and an amplifier with a 10 dB attenuator connected to the input was used for the measurement. The out of band emissions and the ambient emissions were below the level of input overload (80 dBuV).

Final radiated emissions measurements were performed inside of an anechoic chamber at a test distance of 3 meters. The anechoic chamber is designated as Chamber E. This Chamber meets the Site Attenuation requirements CISPR 16-1 and ANSI C63.4. Chamber E is located at 12 East Devonwood Ave. Romeoville, Illinois EMI test lab.

The entire frequency range from 0.1 to 1000 MHz was slowly scanned with particular attention paid to those frequency ranges which appeared high. Measurements were performed using two antenna polarizations, (vertical and horizontal). The worst case emissions were recorded. All measurements may be performed using either the peak or the quasi-peak detector functions. If the peak detector data exceeds or is marginally close to the limits, the measurements are repeated using a quasi-peak detector function as required by the specification for final determination of compliance.

The detected emission levels were maximized by rotating the EUT, and by scanning the measurement antenna from 1 to 4 meters above the ground.

The field strength is calculated by adding the antenna factor, distance correction factor, cable loss, and subtracting the amplifier gain from the measured reading. Each antenna, cable and amplifier has individual factors across its usable frequency range. The antenna factor converts the voltage reading in dBuV to field strength in dBuV/meter.

10.1.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and by subtracting the Amplifier Gain from the measured reading. The basic equation is as follows:

FS = RA + AF + CF - AG + PKA

Where: FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain

10.1.2 Radiated Emissions Test Results

Test Date	June 1, 2006
Test Distance	3 Meters
Specification	FCC Part 15 Subpart C & RSS-210
Notes	
Abbreviations	Pol = Antenna Polarization; V = Vertical; H = Horizontal; BC = Biconical (ANT-3); LP = Log-Periodic (ANT-6); HN = Horn (ANT-13) P = peak; Q = QP

EUT RDR-7081AKU

Freq. MHz	Meter Reading dBuV	Antenna Factor dB	Antenna Pol/ Type	Corr. Factors dB	Field Strength dBuV/m EUT	Field Strength dBuV/m Limit	Margin Under Limit dB
46.7	29.8	18.3	H/44	-17.5	30.7	40.0	9.4
48.0	30.6	17.1	H/44	-17.5	30.3	40.0	9.8
56.2	30.6	13.8	H/44	-17.3	27.2	40.0	12.9
59.9	32.8	11.6	H/44	-17.2	27.3	40.0	12.8
96.0	38.4	9.5	H/44	-16.7	31.3	43.5	12.3
132.3	34.0	9.9	H/44	-16.3	27.7	43.5	15.9
149.3	34.8	11.3	H/44	-16.2	30.0	43.5	13.6
155.5	31.2	8.9	H/44	-16.1	24.1	43.5	19.5
165.7	40.4	9.6	H/44	-16.0	34.1	43.5	9.5
196.9	33.0	10.5	H/44	-15.8	27.8	43.5	15.8
229.5	36.2	11.9	H/44	-15.5	32.7	46.0	13.4
232.1	32.6	12.0	H/44	-15.5	29.2	46.0	16.9
298.1	32.2	14.2	H/44	-15.1	31.4	46.0	14.7
332.4	33.6	14.6	H/44	-14.8	33.5	46.0	12.6
364.1	31.3	15.2	H/44	-14.7	31.9	46.0	14.2
398.0	33.0	16.0	H/44	-14.5	34.6	46.0	11.5
48.0	34.3	14.5	V/44	-17.5	31.4	40.0	8.7
56.2	35.4	11.6	V/44	-17.3	29.8	40.0	10.3

59.9	38.9	11.6	V/44	-17.2	33.4	40.0	6.7
95.6	38.3	9.4	V/44	-16.7	31.1	43.5	12.5
101.7	33.2	11.7	V/44	-16.7	28.3	43.5	15.3
125.5	34.1	10.5	V/44	-16.4	28.3	43.5	15.3
132.7	33.8	10.1	V/44	-16.3	27.7	43.5	15.9
149.3	38.0	7.2	V/44	-16.2	29.1	43.5	14.5
155.5	34.8	11.3	V/44	-16.1	30.1	43.5	13.5
165.3	36.1	12.3	V/44	-16.0	32.5	43.5	11.1
196.9	34.3	10.7	V/44	-15.8	29.3	43.5	14.3
204.0	31.4	10.5	V/44	-15.7	26.3	43.5	17.3
332.4	33.1	14.4	V/44	-14.8	32.8	46.0	13.3
398.4	32.8	15.7	V/44	-14.5	34.1	46.0	12.0
Transmitter Harmonics							
40.7	35.4	14.9	V/44	-17.6	32.7	40.0	7.3
54.2	39.5	13.1	V/44	-17.3	35.3	40.0	4.7
67.8	38.7	8.8	V/44	-17.1	30.4	40.0	9.6
81.4	31.5	6.7	V/44	-16.9	21.3	40.0	18.7
108.5	31.3	12.8	V/44	-16.6	27.5	43.5	16.0
135.6	32.9	13.2	V/44	-16.3	29.8	43.5	13.7
149.2	31.8	11.0	V/44	-16.2	26.6	43.5	16.9
40.7	27.9	16.5	H/44	-17.6	26.8	40.0	13.2
54.2	30.1	13.7	H/44	-17.3	26.5	40.0	13.5
67.8	29.5	8.0	H/44	-17.1	20.4	40.0	19.6
108.5	31.8	12.2	H/44	-16.6	27.4	43.5	16.1
135.6	34.9	12.7	H/44	-16.3	31.3	43.5	12.2
149.2	37.8	10.0	H/44	-16.2	31.6	43.5	11.9

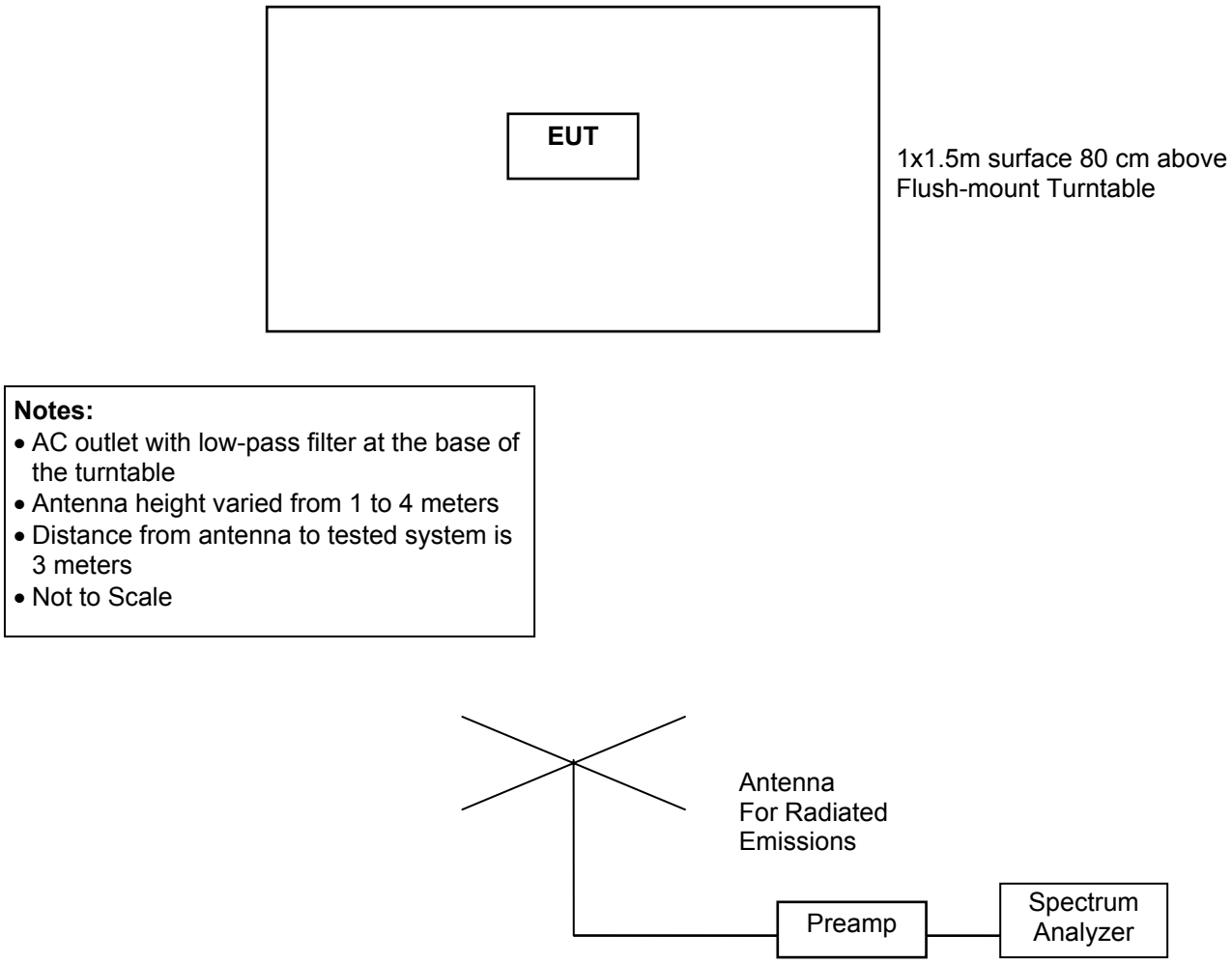
EUT RDR-7081AK2

Freq. MHz	Meter Reading dBuV	Antenna Factor dB	Antenna Pol/ Type	Corr. Factors dB	Field Strength dBuV/m EUT	Field Strength dBuV/m Limit	Margin Under Limit dB
48.0	30.6	17.1	H/44	-17.5	30.3	40.0	9.8
59.9	33.5	11.6	H/44	-17.2	28.0	40.0	12.1
96.0	38.7	9.5	H/44	-16.7	31.6	43.5	12.0
155.5	32.5	8.9	H/44	-16.1	25.4	43.5	18.2
165.3	42.1	9.6	H/44	-16.0	35.8	43.5	7.8
205.7	34.6	10.6	H/44	-15.7	29.6	43.5	14.0
229.5	36.2	11.9	H/44	-15.5	32.7	46.0	13.4
232.1	32.6	12.0	H/44	-15.5	29.2	46.0	16.9
298.1	32.1	14.2	H/44	-15.1	31.3	46.0	14.8
332.4	33.6	14.6	H/44	-14.8	33.5	46.0	12.6
364.1	32.8	15.2	H/44	-14.7	33.4	46.0	12.7
398.0	38.0	16.0	H/44	-14.5	39.6	46.0	6.5
48.0	34.3	14.5	V/44	-17.5	31.4	40.0	8.7
59.9	38.9	11.6	V/44	-17.2	33.4	40.0	6.7
67.7	32.5	8.9	V/44	-17.1	24.4	40.0	15.7
95.6	38.3	9.4	V/44	-16.7	31.1	43.5	12.5

101.7	33.2	11.7	V/44	-16.7	28.3	43.5	15.3
125.5	34.1	10.5	V/44	-16.4	28.3	43.5	15.3
155.5	35.8	11.3	V/44	-16.1	31.1	43.5	12.5
165.3	36.1	12.3	V/44	-16.0	32.5	43.5	11.1
173.1	34.7	10.5	V/44	-16.0	29.3	43.5	14.3
196.9	34.9	10.7	V/44	-15.8	29.9	43.5	13.7
398.4	33.8	15.7	V/44	-14.5	35.1	46.0	11.0
Transmitter Harmonics							
40.7	36.4	14.9	V/44	-17.6	33.7	40.0	6.3
54.2	40.0	13.1	V/44	-17.3	35.8	40.0	4.2
67.8	38.7	8.8	V/44	-17.1	30.4	40.0	9.6
81.4	32.8	6.7	V/44	-16.9	22.6	40.0	17.4
108.5	32.5	12.8	V/44	-16.6	28.7	43.5	14.8
135.6	33.6	13.2	V/44	-16.3	30.5	43.5	13.0
149.2	32.8	11.0	V/44	-16.2	27.6	43.5	15.9
40.7	29.0	16.5	H/44	-17.6	27.9	40.0	12.1
54.2	29.8	13.7	H/44	-17.3	26.2	40.0	13.8
67.8	28.7	8.0	H/44	-17.1	19.6	40.0	20.4
81.4	35.6	6.8	H/44	-16.9	25.5	40.0	14.5
108.5	33.4	12.2	H/44	-16.6	29.0	43.5	14.5
135.6	35.7	12.7	H/44	-16.3	32.1	43.5	11.4
149.2	38.9	10.0	H/44	-16.2	32.7	43.5	10.8

Judgment: Passed by 4.2 dB

Figure 1. Drawing of Radiated Emissions Setup



10.2 Magnetic Field Measurements and Decay Factor Calculations

Radiated emission measurements are performed with shielded loop antennas. An Empire LG-105 and an Empire LP-105 antenna were used. The antennas were rotated in order to find the maximize readings.

The decay exponent used is 3. The distance correction factor is calculated as follows:

Distance factor (dB) = 40*Log(TD/SD)

TD is the actual test distance in meters. SD meters is the specification distance.

10.2.1 Magnetic Field Radiated Emissions Results (0.009 to 30 MHz)

Test Date	June 2, 2006
Test Distance	3 Meters
Specification	FCC 15 & RSS-210
Notes	Corr. Factors = cable loss - preamp gain - distance factor. Decay Exponent = 2 Shielded Loop Antennas were used for this test.
Abbreviations	P = peak; Q = QP

EUT RDR-7081AK2

Freq (kHz)	Peak meter reading dBuV	Amb. Y/N	Loop Ant Factor	Dist (m)	Decay exp	Cable Loss dB	Distance factor dB	Amp Gain Db	Field Strength dBuV/m	15.209 Limit dBuV/m	Margin under limit
13560.0	40.5	N	41.0	5.0	2.0	0.4	-31.1	29.0	21.4	29.5	8.13
13560.0	52.7	N	41.0	3.0	2.0	0.4	-40.0	29.0	24.7	29.5	4.80

EUT RDR-7081AKU

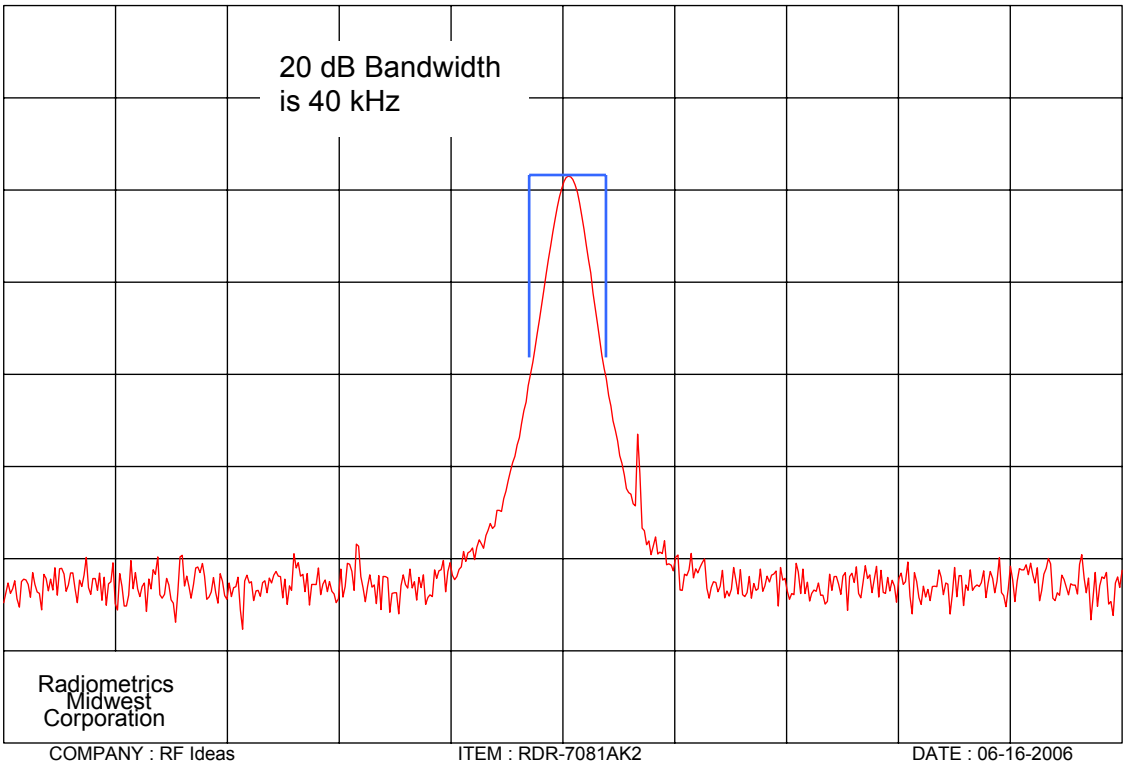
Freq (kHz)	Peak meter reading dBuV	Amb Y/N	Loop Ant Factor	Dist (m)	Decay exp	Cable Loss dB	Distance factor dB	Amp Gain Db	Field Strength dBuV/m	15.209 Limit dBuV/m	Margin under limit
13560.0	51.9	N	41.0	3.0	2.0	0.4	-40.0	29.0	23.9	29.5	5.60
27120.0	37.5	N	39.5	3.0	2.0	0.5	-40.0	29.0	8.0	29.5	21.50

Judgement: Passed by 4.8 dB.

10.3 Occupied Bandwidth (20 dB)

The spectrum analyzer was set to the MAX HOLD mode to record the worst case of the modulation. The EUT was transmitting at its maximum data rate. The trace was allowed to stabilize.

The marker-to-peak function was set to the peak of the emission. Then the marker-delta function was used to measure 20 dB down one side of the emission. The marker-delta function was reset and then moved to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.



COMPANY : RF Ideas
START FREQ. = 13.31 MHz
RBW = 10 kHz
10 dB/div
NOTES : Bandwidth Test, Serial Version

ITEM : RDR-7081AK2
REF. LEVEL = 080.0 dBuV
VBW = 100 kHz
TIME = 13:52

DATE : 06-16-2006
SPAN = .5 MHz
ATTEN = 0 dB
SWP TIME = 50 mSec
PAGE: RP- 5608

Maximum Signal Amplitude = 61.5 dBuV at 13.56019 MHz.