



MATRIX SYSTEMS TEST REPORT
FOR THE
KEYPAD PROXIMITY READER, MX-ICLASS
FCC PART 15 SUBPART C SECTIONS 15.207, 15.209, 15.225 AND RSS-210
COMPLIANCE

DATE OF ISSUE: FEBRUARY 8, 2006

PREPARED FOR:

Matrix Systems
7550 Paragon Road
Dayton, OH 45459

P.O. No.: 7872
W.O. No.: 84699

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Date of test: February 2-7, 2006

Report No.: FC06-014

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ADMINISTRATIVE INFORMATION

DATE OF TEST: February 2-7, 2006

DATE OF RECEIPT: February 2, 2006

MANUFACTURER: Matrix Systems
7550 Paragon Road
Dayton, OH 45459

REPRESENTATIVE: Mark Stabler

TEST LOCATION: CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

TEST METHOD: ANSI C63.4 (2003), RSS-210 and RSS-GEN

PURPOSE OF TEST: To demonstrate the compliance of the Keypad Proximity Reader, MX-iCLASS with the requirements for FCC Part 15 Subpart C Sections 15.207, 15.209, 15.225 and RSS-210 devices.

FCC TO CANADA STANDARD CORRELATION MATRIX

Canadian Standard	Canadian Section	FCC Standard	FCC Section	Test Description
RSS 210	5.5	47CFR	15.203	Antenna Connector Requirements
RSS 210	6.2.1	47CFR	15.209	General Radiated Emissions Requirement
RSS 210	6.2.2(e)	47CFR	15.225(a)*	Fundamental Requirements
RSS 210	6.2.2(e)	NA	NA	±150kHz to ±450kHz Emissions Requirement
RSS 210	6.2.2(e)	47CFR	15.225(b)*	Out of band emissions
RSS 210	6.2.2(e)	47CFR	15.225(c)*	Carrier Stability
RSS 210	6.3	47CFR	15.205	Restricted Bands of Operation
RSS 210	6.4	47CFR	15.215(c)	Frequency Stability Recommendation
RSS 210	6.5	47CFR	15.35(c)	Pulsed Operation
RSS 210	6.6	47CFR	15.207	AC Mains Conducted Emissions Requirement
	IC 3082-D		784962	Site File No.

* Indicates that FCC Requirements are more stringent than the Canadian Equivalent.

CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply.

APPROVALS

Steve Behm, Director of Engineering Services

QUALITY ASSURANCE:



Joyce Walker, Quality Assurance Administrative Manager

TEST PERSONNEL:



Randy Clark, EMC Engineer

FCC 15.31(m) Number Of Channels

This device operates on a single channel.

FCC 15.33(a) Frequency Ranges Tested

15.207 Conducted Emissions: 150 kHz – 30 MHz

15.209 Radiated Emissions: 9 kHz – 1000 MHz

15.225 Radiated Emissions: Fundamental

FCC SECTION 15.35: ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz

FCC 15.203 Antenna Requirements

The antenna is an integral part of the EUT and is non-removable; therefore the EUT complies with Section 15.203 of the FCC rules.

EUT Operating Frequency

The EUT was operating at 13.56 MHz.

Temperature And Humidity During Testing

The temperature during testing was within +15°C and + 35°C.

The relative humidity was between 20% and 75%.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The customer declares the EUT tested by CKC Laboratories was representative of a production unit.

EQUIPMENT UNDER TEST

Keypad Proximity Reader

Manuf: Matrix Systems
Model: MX-iCLASS
Serial: A
FCC ID: pending

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Access Controller

Manuf: Matrix Systems
Model: RCM2
Serial: 00058170

Power Supply

Manuf: MeanWell
Model: S-150-15
Serial: CA13061379

REPORT OF MEASUREMENTS

The following tables report the worst case emissions levels recorded during the tests performed on the EUT. All readings taken were peak readings unless otherwise stated. The data sheets from which the emissions tables were compiled are contained in Appendix C.

Table 1: FCC 15.207 Six Highest Conducted Emission Levels

FREQUENCY MHz	METER READING dB μ V	CORRECTION FACTORS				CORRECTED READING dB μ V	SPEC LIMIT dB μ V	MARGIN dB	NOTES
		Cable dB	Lisn dB	HPF dB	Att dB				
0.190670	38.3	0.1	0.3	0.3	10.2	49.2	54.2	-5.0	B
0.770400	28.7	0.1	0.2	0.3	10.3	39.6	46.0	-6.4	B
1.194000	28.5	0.2	0.3	0.2	10.3	39.5	46.0	-6.5	B
1.354000	28.3	0.2	0.3	0.2	10.3	39.3	46.0	-6.7	B
13.560150	47.0	0.4	0.4	0.1	10.3	58.2	60.0	-1.8	BQ
13.560240	45.6	0.4	0.5	0.1	10.3	56.9	60.0	-3.1	WQ

Test Method: ANSI C63.4 (2003)
Spec Limit: FCC Part 15 Subpart C Section 15.207

NOTES: Q = Quasi Peak Reading
B = Black Lead
W = White Lead

COMMENTS: EUT is a keypad proximity reader operating on a frequency of 13.56 MHz. 12VDC power is routed from the support power supply through the access controller to the EUT. Support equipment is located outside of the testing area. EUT is mounted vertically on a non-conductive support to simulate normal installation. Frequency Range Investigated: 150kHz - 30MHz. Temperature: 18°C, Relative Humidity: 36%.

Table 2: FCC 15.209 Radiated Emission Levels: 9 kHz - 30 MHz

FREQUENCY MHz	METER READING dB μ V	CORRECTION FACTORS				CORRECTED READING dB μ V/m	SPEC LIMIT dB μ V/m	MARGIN dB	NOTES
		Cable dB	Corr dB	Ant dB					
27.120	7.5	1.1	-20.0	6.6		-4.8	29.5	-34.3	H*
27.121	7.6	1.1	-20.0	6.6		-4.7	29.5	-34.2	V*

Test Method: ANSI C63.4 (2003)
Spec Limit: FCC Part 15 Subpart C Section 15.209
Test Distance: 10 Meters

NOTES: H = Horizontal Polarization
V = Vertical Polarization
* = Ambient Reading

COMMENTS: EUT is a keypad proximity reader operating on a frequency of 13.56 MHz. 12VDC power is routed from the support power supply through the access controller to the EUT. Support equipment is located outside of the testing area. EUT is mounted vertically on a non-conductive support to simulate normal installation. Test distance correction factor used in accordance with 15.31 to correct test data for comparison to the limit. Frequency Range Investigated: 9kHz - 30MHz. Temperature: 18°C, Relative Humidity: 36%. **No EUT emissions detected within 20dB of the limit.**

Table 3: FCC 15.209 Six Highest Radiated Emission Levels: 30-1000 MHz

FREQUENCY MHz	METER READING dB μ V	CORRECTION FACTORS				CORRECTED READING dB μ V/m	SPEC LIMIT dB μ V/m	MARGIN dB	NOTES
		Ant dB	Amp dB	Cable dB	Dist dB				
39.177	51.5	12.9	-27.0	1.4		38.8	40.0	-1.2	VQ
40.684	49.9	12.0	-27.0	1.4		36.3	40.0	-3.7	VQ
46.518	50.7	9.3	-26.9	1.5		34.6	40.0	-5.4	V
46.918	51.1	9.1	-26.9	1.5		34.8	40.0	-5.2	V
47.193	50.5	9.1	-26.9	1.5		34.2	40.0	-5.8	V
81.362	54.1	6.9	-27.0	2.0		36.0	40.0	-4.0	V

Test Method: ANSI C63.4 (2003)
Spec Limit: FCC Part 15 Subpart C Section 15.209
Test Distance: 3 Meters

NOTES: Q = Quasi Peak Reading
V = Vertical Polarization

COMMENTS: EUT is a keypad proximity reader operating on a frequency of 13.56 MHz. 12VDC power is routed from the support power supply through the access controller to the EUT. Support equipment is located outside of the testing area. EUT is mounted vertically on a non-conductive support to simulate normal installation. Frequency Range Investigated: 30-1000MHz. Temperature: 18°C, Relative Humidity: 36%.

Table 4: FCC 15.225(a) Fundamental Emission Levels

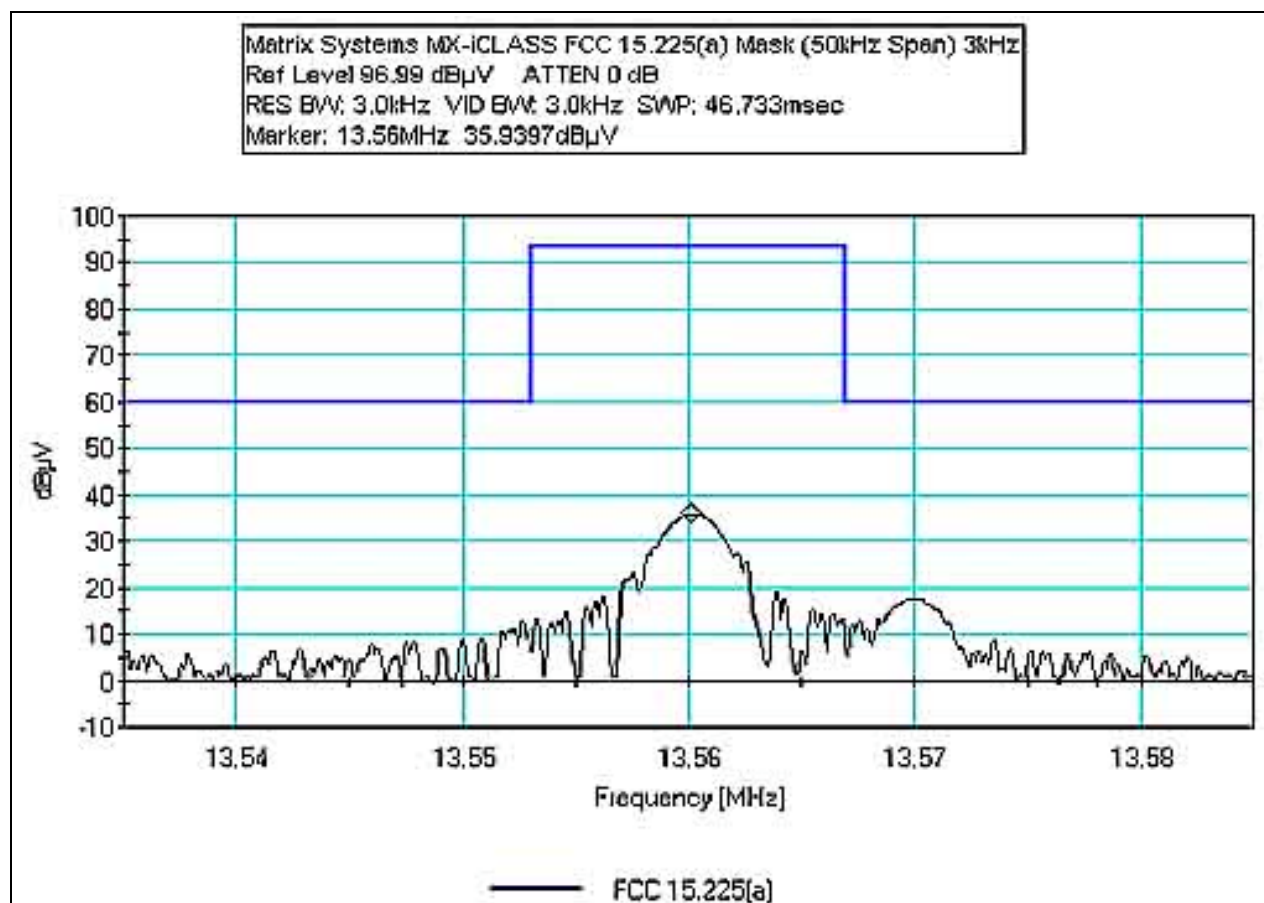
FREQUENCY MHz	METER READING dB μ V	CORRECTION FACTORS				CORRECTED READING dB μ V/m	SPEC LIMIT dB μ V/m	MARGIN dB	NOTES
		Cable dB	Corr dB	Ant dB					
13.560	36.1	0.8	-20.0	9.6		26.5	84.0	-57.5	H
13.560	33.4	0.8	-20.0	9.6		23.8	84.0	-60.2	V

Test Method: ANSI C63.4 (2003)
Spec Limit: FCC Part 15 Subpart C Section 15.225
Test Distance: 10 Meters

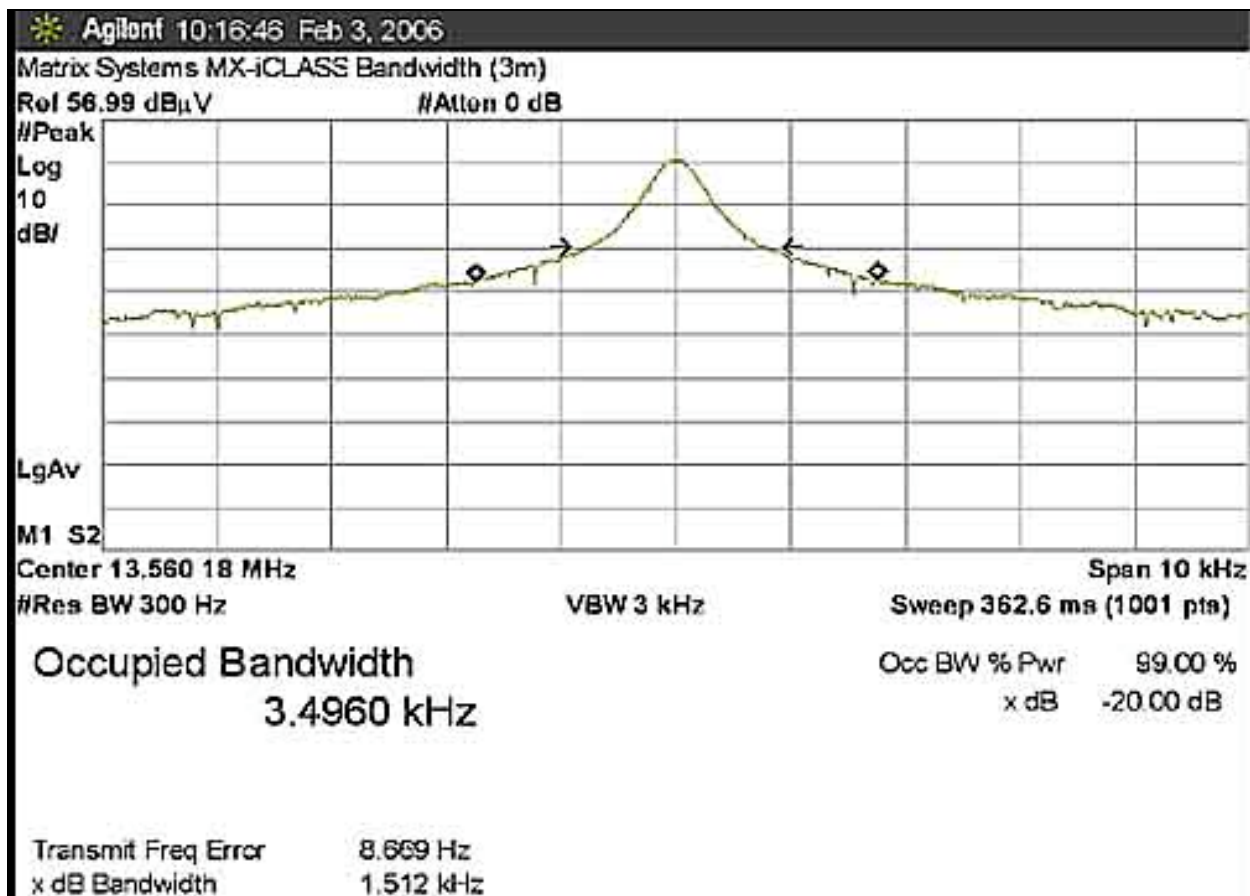
NOTES: H = Horizontal Polarization
V = Vertical Polarization

COMMENTS: EUT is a keypad proximity reader operating on a frequency of 13.56 MHz. 12VDC power is routed from the support power supply through the access controller to the EUT. Support equipment is located outside of the testing area. EUT is mounted vertically on a non-conductive support to simulate normal installation. Test distance correction factor used in accordance with 15.31 to correct test data for comparison to the limit. Frequency Range Investigated: Carrier. Temperature: 18°C, Relative Humidity: 36%.

FCC 15.225(a) EMISSIONS MASK



FCC 15.225(a) AND RSS-210 OCCUPIED BANDWIDTH PLOT



FCC 15.31(e) VOLTAGE VARIATIONS AND 15.225(e) FREQUENCY STABILITY

Test Conditions: EUT is a keypad proximity reader operating on a frequency of 13.56 MHz. 12VDC power is routed from the support power supply through the access controller to the EUT. Support equipment is located outside of the temperature chamber. Voltage variations are performed at the AC input to the power supply.

Customer: Matrix Systems
WO#: 84699
Date: 6-Feb-06
Test Engineer: Randal Clark

Device Model #: MX-iCLASS
Operating Voltage: 120.0 VAC
Frequency Limit: 0.01 %

Temperature Variations

Channel Frequency:		Channel 1 (MHz)	Dev. (MHz)
		13.56	
Temp (C)	Voltage		
-30	120.0	NA	NA
-20	120.0	13.56020	0.00020
-10	120.0	13.56019	0.00019
0	120.0	13.56021	0.00021
10	120.0	13.56021	0.00021
20	120.0	13.56018	0.00018
30	120.0	13.56015	0.00015
40	120.0	13.56015	0.00015
50	120.0	13.56016	0.00016

Voltage Variations (±15%)

20	102.0	13.56018	0.00018
20	120.0	13.56018	0.00018
20	138.0	13.56018	0.00018

Max Deviation (MHz)	0.00021
Max Deviation (%)	0.00156
PASS	

EUT SETUP

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the photographs in Appendix A. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables. The corrected data was then compared to the applicable emission limits to determine compliance.

The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available I/O ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. I/O cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The radiated and conducted emissions data of the EUT was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in Table A.

Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dB μ V/m, the spectrum analyzer reading in dB μ V was corrected by using the following formula in Table A. This reading was then compared to the applicable specification limit to determine compliance.

TABLE A: SAMPLE CALCULATIONS		
	Meter reading	(dB μ V)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dB μ V/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Appendix B were used to collect both the radiated and conducted emissions data. For radiated measurements from 9 kHz to 30 MHz, the magnetic loop antenna was used. For frequencies from 30 to 1000 MHz, the biconilog antenna was used. The horn antenna was used for frequencies above 1000 MHz. Conducted emissions tests required the use of the FCC type LISNs.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. For conducted emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used. A 10 dB external attenuator was also used during conducted tests, with internal offset correction in the analyzer. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dB μ V, and a vertical scale of 10 dB per division.

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the Tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the six highest readings, this is indicated as a "Q" or an "A" in the appropriate table. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP Quasi-Peak Adapter for the HP Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

Average

For certain frequencies, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

EUT TESTING

Mains Conducted Emissions

During conducted emissions testing, the EUT was located on a wooden table measuring approximately 80 cm high, 1 meter deep, and 1.5 meters in length. One wall of the room where the EUT was located has a minimum 2 meter by 2 meter conductive plane. The EUT was mounted on the wooden table 40 cm away from the conductive plane, and 80 cm from any other conductive surface.

The vertical metal plane used for conducted emissions was grounded to the earth. Power to the EUT was provided through a LISN. The LISN was grounded to the ground plane. All other objects were kept a minimum of 80 cm away from the EUT during the conducted test.

The LISNs used were 50 μ H/+50 ohms. A 30 to 50 second sweep time was used for automated measurements in the frequency bands of 150 kHz to 500 kHz, and 500 kHz to 30 MHz. All readings within 20 dB of the limit were recorded, and those within 6 dB of the limit were examined with additional measurements using a slower sweep time.

Radiated Emissions

The EUT was mounted on a nonconductive, rotating table 80 cm above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters.

During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode. For radiated measurements from 9 kHz to 30 MHz, the magnetic loop antenna was used. The frequency range of 30 MHz to 1000 MHz was scanned with the biconilog antenna located about 1.5 meter above the ground plane in the vertical polarity. During this scan, the turntable was rotated and all peaks at or near the limit were recorded. A scan of the FM band from 88 to 110 MHz was then made using a reduced resolution bandwidth and frequency span. The biconilog antenna was changed to the horizontal polarity and the above steps were repeated. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

A thorough scan of all frequencies was made manually using a small frequency span, rotating the turntable and raising and lowering the antenna from one to four meters as needed. The test engineer maximized the readings with respect to the table rotation, antenna height, and configuration of EUT. Maximizing of the EUT was achieved by monitoring the spectrum analyzer on a closed circuit television monitor.

APPENDIX A

TEST SETUP PHOTOGRAPHS

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



Mains Conducted Emissions - Front View

PHOTOGRAPH SHOWING MAINS CONDUCTED EMISSIONS



Mains Conducted Emissions - Side View

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Front View

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Back View

PHOTOGRAPH SHOWING TEMPERATURE TESTING



APPENDIX B

TEST EQUIPMENT LIST

FCC 15.207

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/12/2005	01/12/2007	02660
150kHz HP Filter TTE	G7754	04/20/2004	04/20/2006	02608
LISN, 8028-50-TS-24-BNC	8379276, 280	06/03/2005	06/03/2007	1248 & 1249
10 dB Attenuator 10W	None	08/18/2005	08/18/2007	P04255

FCC 15.225(a) and 15.209: 9kHz – 30 MHz

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/12/2005	01/12/2007	02660
EMCO Loop Antenna	1074	05/13/2005	05/13/2007	00226

FCC 15.209: 30-1000 MHz

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/12/2005	01/12/2007	02660
Chase CBL6111C Bilog	2456	06/07/2005	06/07/2007	01991
HP 8447D Preamp	1937A02604	03/11/2005	03/11/2007	00099

FCC 15.225(e) and 15.31(e)

Function	S/N	Calibration Date	Cal Due Date	Asset #
Spectrum Analyzer-AF	US44300407	1/12/2005	1/12/2007	02660
Temp Chamber	11899	1/24/2005	1/24/2007	01879
Thermometer	T-202884	1/18/2005	1/18/2007	02242

APPENDIX C:
MEASUREMENT DATA SHEETS

Test Location: CKC Laboratories • 4933 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)

Customer: **Matrix Systems**

Specification: **FCC 15.207 - AVE**

Work Order #: **84699**

Date: 2/3/2006

Test Type: **Conducted Emissions**

Time: 15:55:05

Equipment: **Keypad Proximity Reader**

Sequence#: 6

Manufacturer: Matrix Systems

Tested By: Randal Clark

Model: MX-iCLASS

120V 60Hz

S/N: A

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Keypad Proximity Reader*	Matrix Systems	MX-iCLASS	A

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	MeanWell	S-150-15	CA13061379
Access Controller	Matrix Systems	RCM2	00058170

Test Conditions / Notes:

EUT is a keypad proximity reader operating on a frequency of 13.56 MHz. 12VDC power is routed from the support power supply through the access controller to the EUT. Support equipment is located outside of the testing area. EUT is mounted vertically on a non-conductive support to simulate normal installation. Frequency Range Investigated: 150kHz - 30MHz. Temperature: 18°C, Relative Humidity: 36%.

Transducer Legend:

T1=Cable - Internal + cab	T2=LISN Insertion Loss s/n280
T3=HP Filter AN02608	T4=ATT 10d B Site D Conducted

Measurement Data:

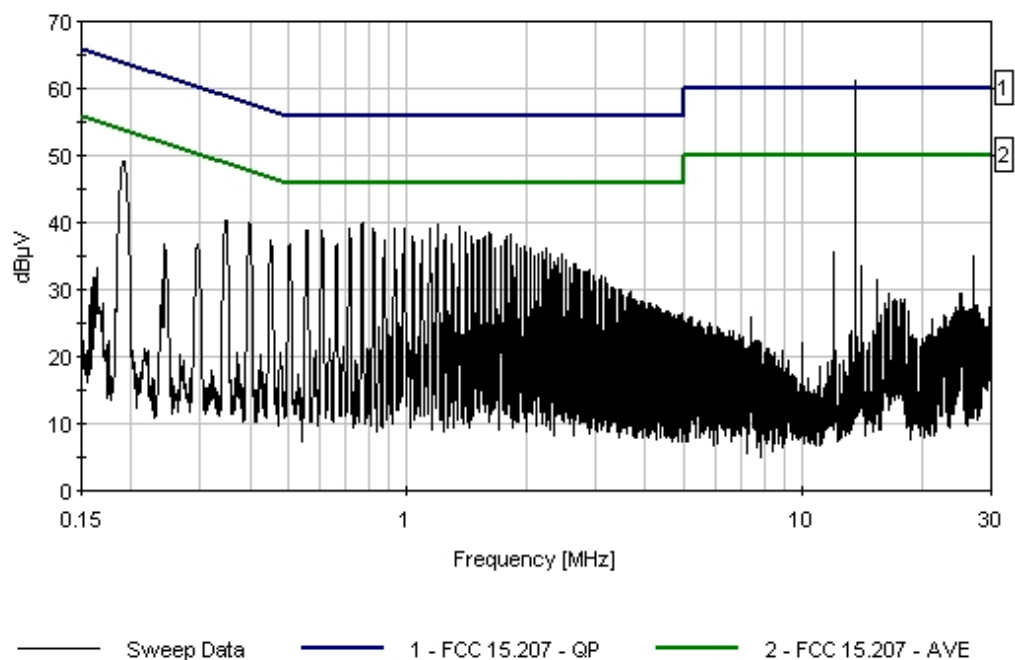
Reading listed by margin.

Test Lead: Black

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	13.560M	47.0	+0.4	+0.4	+0.1	+10.3	+0.0	58.2	60.0	-1.8	Black
	QP										
2	190.670k	38.3	+0.1	+0.3	+0.3	+10.2	+0.0	49.2	54.2	-5.0	Black
3	770.400k	28.7	+0.1	+0.2	+0.3	+10.3	+0.0	39.6	46.0	-6.4	Black
4	1.194M	28.5	+0.2	+0.3	+0.2	+10.3	+0.0	39.5	46.0	-6.5	Black
5	1.354M	28.3	+0.2	+0.3	+0.2	+10.3	+0.0	39.3	46.0	-6.7	Black
6	824.000k	28.3	+0.1	+0.2	+0.3	+10.3	+0.0	39.2	46.0	-6.8	Black
7	1.248M	28.1	+0.2	+0.3	+0.2	+10.3	+0.0	39.1	46.0	-6.9	Black
8	982.000k	28.0	+0.2	+0.3	+0.2	+10.3	+0.0	39.0	46.0	-7.0	Black
9	1.142M	27.9	+0.2	+0.3	+0.2	+10.3	+0.0	38.9	46.0	-7.1	Black

10	398.700k	28.6	+0.1	+0.3	+0.1	+10.3	+0.0	39.4	47.9	-8.5	Black
11	13.560M	30.1	+0.4	+0.4	+0.1	+10.3	+0.0	41.3	50.0	-8.7	Black
Ave											
12	27.121M	23.2	+0.5	+0.5	+0.2	+10.3	+0.0	34.7	50.0	-15.3	Black

CKC Laboratories Date: 2/3/2006 Time: 15:55:05 Matrix Systems WVO#: 84699
FCC 15.207 - AVE Test Lead: Black 120V 60Hz Sequence#: 6
Matrix Systems M/N MX-iCLASS



Test Location: CKC Laboratories • 4933 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)

Customer: **Matrix Systems**

Specification: **FCC 15.207 - AVE**

Work Order #: **84699**

Date: 2/3/2006

Test Type: **Conducted Emissions**

Time: 16:01:51

Equipment: **Keypad Proximity Reader**

Sequence#: 7

Manufacturer: Matrix Systems

Tested By: Randal Clark

Model: MX-iCLASS

120V 60Hz

S/N: A

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Keypad Proximity Reader*	Matrix Systems	MX-iCLASS	A

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	MeanWell	S-150-15	CA13061379
Access Controller	Matrix Systems	RCM2	00058170

Test Conditions / Notes:

EUT is a keypad proximity reader operating on a frequency of 13.56 MHz. 12VDC power is routed from the support power supply through the access controller to the EUT. Support equipment is located outside of the testing area. EUT is mounted vertically on a non-conductive support to simulate normal installation. Frequency Range Investigated: 150kHz - 30MHz. Temperature: 18°C, Relative Humidity: 36%.

Transducer Legend:

T1=Cable - Internal + cab	T2=LISN Insertion Loss s/n276
T3=HP Filter AN02608	T4=ATT 10d B Site D Conducted

Measurement Data:

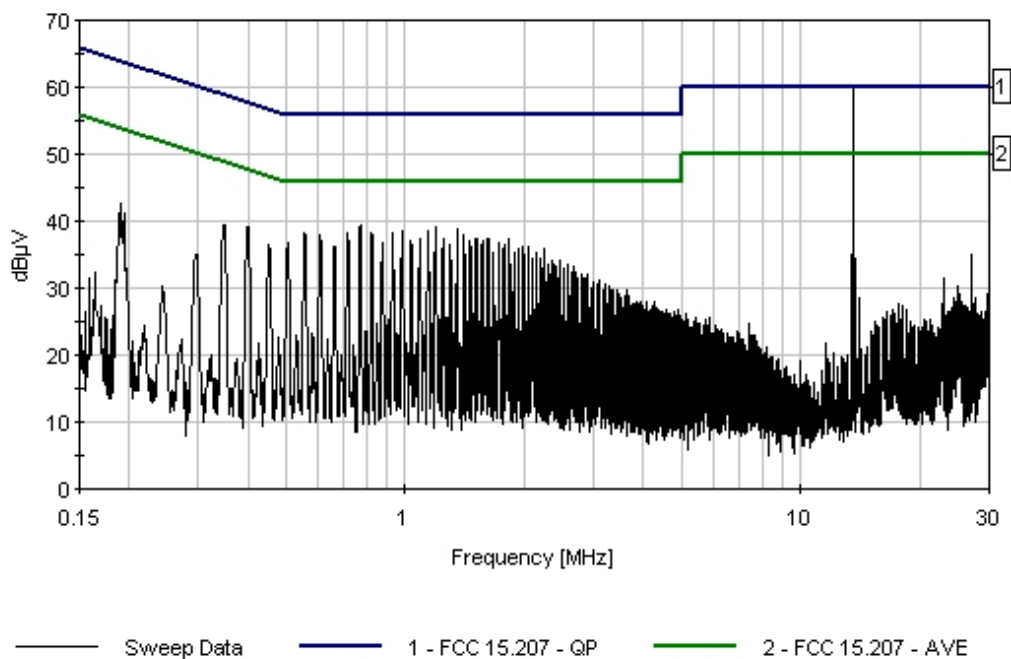
Reading listed by margin.

Test Lead: White

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	13.560M	45.6	+0.4	+0.5	+0.1	+10.3	+0.0	56.9	60.0	-3.1	White
	QP										
2	771.000k	28.4	+0.1	+0.2	+0.3	+10.3	+0.0	39.3	46.0	-6.7	White
3	1.143M	27.9	+0.2	+0.3	+0.2	+10.3	+0.0	38.9	46.0	-7.1	White
4	717.000k	27.7	+0.1	+0.3	+0.3	+10.3	+0.0	38.7	46.0	-7.3	White
5	1.355M	27.6	+0.2	+0.3	+0.2	+10.3	+0.0	38.6	46.0	-7.4	White
6	1.301M	27.3	+0.2	+0.3	+0.2	+10.3	+0.0	38.3	46.0	-7.7	White
7	559.000k	27.1	+0.1	+0.3	+0.3	+10.3	+0.0	38.1	46.0	-7.9	White
8	1.567M	27.0	+0.2	+0.4	+0.1	+10.3	+0.0	38.0	46.0	-8.0	White
9	1.779M	26.7	+0.2	+0.4	+0.1	+10.3	+0.0	37.7	46.0	-8.3	White
10	1.407M	26.7	+0.2	+0.3	+0.2	+10.3	+0.0	37.7	46.0	-8.3	White

11	345.000k	29.2	+0.1	+0.3	+0.1	+10.3	+0.0	40.0	49.1	-9.1	White
12	399.000k	27.8	+0.1	+0.4	+0.1	+10.3	+0.0	38.7	47.9	-9.2	White
13	13.560M	28.7	+0.4	+0.5	+0.1	+10.3	+0.0	40.0	50.0	-10.0	White
	Ave										
^	13.560M	48.4	+0.4	+0.5	+0.1	+10.3	+0.0	59.7	50.0	+9.7	White
15	185.810k	33.0	+0.1	+0.4	+0.3	+10.2	+0.0	44.0	54.2	-10.2	White
16	293.000k	27.3	+0.1	+0.3	+0.2	+10.3	+0.0	38.2	50.4	-12.2	White
17	27.120M	23.6	+0.5	+0.4	+0.2	+10.3	+0.0	35.0	50.0	-15.0	White

CKC Laboratories Date: 2/3/2006 Time: 16:01:51 Matrix Systems VVO#: 84699
FCC 15.207 - AVE Test Lead: White 120V 60Hz Sequence#: 7
Matrix Systems MN MX-iCLASS



Test Location: CKC Laboratories • 4933 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)

Customer: **Matrix Systems**

Specification: **FCC 15.209**

Work Order #: **84699**

Date: 2/3/2006

Test Type: **Maximized Emissions**

Time: 10:41:27

Equipment: **Keypad Proximity Reader**

Sequence#: 3

Manufacturer: Matrix Systems

Tested By: Randal Clark

Model: MX-iCLASS

S/N: A

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Keypad Proximity Reader*	Matrix Systems	MX-iCLASS	A

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	MeanWell	S-150-15	CA13061379
Access Controller	Matrix Systems	RCM2	00058170

Test Conditions / Notes:

EUT is a keypad proximity reader operating on a frequency of 13.56 MHz. 12VDC power is routed from the support power supply through the access controller to the EUT. Support equipment is located outside of the testing area. EUT is mounted vertically on a non-conductive support to simulate normal installation. Test distance correction factor used in accordance with 15.31 to correct test data for comparison to the limit. Frequency Range Investigated: 9kHz - 30MHz. Temperature: 18°C, Relative Humidity: 36%. **No EUT emissions detected within 20dB of the limit.**

Transducer Legend:

T1=Cable - 10 Meter	T2=15.31 10m 40dB/Dec Correction
T3=Mag Loop - AN 00226 - 9kHz-30M	

Measurement Data:

Reading listed by margin.

Test Distance: 10 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	27.121M	7.6	+1.1	-20.0	+6.6	+0.0	-4.7	29.5 Ambient Noise Floor	-34.2	Verti 100
2	27.120M	7.5	+1.1	-20.0	+6.6	+0.0	-4.8	29.5 Ambient Noise Floor	-34.3	Horiz 100

Test Location: CKC Laboratories • 4933 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)

Customer: **Matrix Systems**

Specification: **FCC 15.209**

Work Order #: **84699**

Date: 2/3/2006

Test Type: **Maximized Emissions**

Time: 15:20:41

Equipment: **Keypad Proximity Reader**

Sequence#: 2

Manufacturer: Matrix Systems

Tested By: Randal Clark

Model: MX-iCLASS

S/N: A

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Keypad Proximity Reader*	Matrix Systems	MX-iCLASS	A

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	MeanWell	S-150-15	CA13061379
Access Controller	Matrix Systems	RCM2	00058170

Test Conditions / Notes:

EUT is a keypad proximity reader operating on a frequency of 13.56 MHz. 12VDC power is routed from the support power supply through the access controller to the EUT. Support equipment is located outside of the testing area. EUT is mounted vertically on a non-conductive support to simulate normal installation. Frequency Range Investigated: 30-1000MHz. Temperature: 18°C, Relative Humidity: 36%.

Transducer Legend:

T1=Bilog Site D	T2=Amp - S/N 604
T3=Cable - 10 Meter	

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB		Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	39.177M	51.5	+12.9	-27.0	+1.4		+0.0	38.8	40.0	-1.2	Verti
	QP										123
^	39.178M	56.5	+12.9	-27.0	+1.4		+0.0	43.8	40.0	+3.8	Verti
											123
3	40.684M	49.9	+12.0	-27.0	+1.4		+0.0	36.3	40.0	-3.7	Verti
	QP										
^	40.687M	52.4	+12.0	-27.0	+1.4		+0.0	38.8	40.0	-1.2	Verti
5	81.362M	54.1	+6.9	-27.0	+2.0		+0.0	36.0	40.0	-4.0	Verti
6	46.918M	51.1	+9.1	-26.9	+1.5		+0.0	34.8	40.0	-5.2	Verti
											123
7	46.518M	50.7	+9.3	-26.9	+1.5		+0.0	34.6	40.0	-5.4	Verti
											123
8	47.193M	50.5	+9.1	-26.9	+1.5		+0.0	34.2	40.0	-5.8	Verti
											123
9	46.758M	49.6	+9.2	-26.9	+1.5		+0.0	33.4	40.0	-6.6	Verti
											123
10	47.383M	47.3	+9.0	-26.8	+1.6		+0.0	31.1	40.0	-8.9	Verti
											123

11	45.958M	46.9	+9.4	-26.9	+1.5	+0.0	30.9	40.0	-9.1	Verti 123
12	41.298M	44.3	+11.7	-27.0	+1.4	+0.0	30.4	40.0	-9.6	Verti 123
13	81.360M	48.0	+6.9	-27.0	+2.0	+0.0	29.9	40.0	-10.1	Horiz 151
14	44.993M	44.8	+9.7	-26.9	+1.5	+0.0	29.1	40.0	-10.9	Verti 123
15	44.983M	44.2	+9.7	-26.9	+1.5	+0.0	28.5	40.0	-11.5	Verti 123
16	41.733M	42.4	+11.4	-27.0	+1.4	+0.0	28.2	40.0	-11.8	Verti 123
17	43.963M	42.6	+10.2	-26.9	+1.5	+0.0	27.4	40.0	-12.6	Verti 123
18	48.008M	43.1	+8.8	-26.8	+1.6	+0.0	26.7	40.0	-13.3	Verti 123
19	54.248M	42.4	+7.3	-26.8	+1.6	+0.0	24.5	40.0	-15.5	Verti
20	67.809M	43.4	+5.8	-26.8	+1.9	+0.0	24.3	40.0	-15.7	Verti
21	43.293M	38.7	+10.6	-26.9	+1.5	+0.0	23.9	40.0	-16.1	Verti 123
22	65.483M	42.9	+5.9	-26.8	+1.8	+0.0	23.8	40.0	-16.2	Verti 123
23	67.783M	42.2	+5.8	-26.8	+1.9	+0.0	23.1	40.0	-16.9	Verti 123
24	65.078M	42.1	+5.9	-26.8	+1.8	+0.0	23.0	40.0	-17.0	Verti 123
25	54.248M	40.7	+7.3	-26.8	+1.6	+0.0	22.8	40.0	-17.2	Horiz 151
26	64.708M	41.1	+5.9	-26.8	+1.8	+0.0	22.0	40.0	-18.0	Verti 123
27	122.045M	38.5	+11.0	-26.7	+2.5	+0.0	25.3	43.5	-18.2	Horiz 163
28	66.018M	40.8	+5.9	-26.8	+1.8	+0.0	21.7	40.0	-18.3	Verti 123
29	67.488M	40.7	+5.8	-26.8	+1.9	+0.0	21.6	40.0	-18.4	Verti 123
30	66.453M	40.4	+5.8	-26.8	+1.8	+0.0	21.2	40.0	-18.8	Verti 123
31	40.691M	34.6	+12.0	-27.0	+1.4	+0.0	21.0	40.0	-19.0	Horiz 151
32	66.878M	40.0	+5.8	-26.8	+1.8	+0.0	20.8	40.0	-19.2	Verti 123
33	122.040M	37.5	+11.0	-26.7	+2.5	+0.0	24.3	43.5	-19.2	Verti
34	108.484M	38.3	+10.1	-26.8	+2.4	+0.0	24.0	43.5	-19.5	Verti
35	68.173M	38.9	+5.8	-26.8	+1.9	+0.0	19.8	40.0	-20.2	Verti 123

36	108.479M	37.3	+10.1	-26.8	+2.4	+0.0	23.0	43.5	-20.5	Verti
37	190.880M	37.5	+8.3	-26.6	+3.2	+0.0	22.4	43.5	-21.1	Verti 135
38	191.163M	37.0	+8.3	-26.6	+3.2	+0.0	21.9	43.5	-21.6	Verti 135
39	196.190M	36.8	+8.3	-26.5	+3.3	+0.0	21.9	43.5	-21.6	Verti 151
40	196.750M	36.7	+8.3	-26.5	+3.3	+0.0	21.8	43.5	-21.7	Verti 151
41	197.220M	36.6	+8.3	-26.5	+3.3	+0.0	21.7	43.5	-21.8	Verti 135
42	196.460M	36.4	+8.3	-26.5	+3.3	+0.0	21.5	43.5	-22.0	Verti 135
43	67.808M	37.1	+5.8	-26.8	+1.9	+0.0	18.0	40.0	-22.0	Horiz 151
44	230.507M	36.1	+10.7	-26.2	+3.4	+0.0	24.0	46.0	-22.0	Horiz 151
45	197.250M	36.1	+8.3	-26.5	+3.3	+0.0	21.2	43.5	-22.3	Verti 151
46	149.120M	34.7	+10.4	-26.7	+2.8	+0.0	21.2	43.5	-22.3	Verti
47	198.055M	35.7	+8.3	-26.5	+3.3	+0.0	20.8	43.5	-22.7	Verti 151
48	195.680M	35.7	+8.3	-26.5	+3.3	+0.0	20.8	43.5	-22.7	Verti 151
49	189.847M	35.9	+8.3	-26.6	+3.2	+0.0	20.8	43.5	-22.7	Verti 100
50	195.640M	35.6	+8.3	-26.5	+3.3	+0.0	20.7	43.5	-22.8	Verti 135
51	198.580M	35.3	+8.3	-26.5	+3.3	+0.0	20.4	43.5	-23.1	Verti 135
52	198.610M	35.3	+8.3	-26.5	+3.3	+0.0	20.4	43.5	-23.1	Verti 151
53	151.103M	33.8	+10.4	-26.7	+2.8	+0.0	20.3	43.5	-23.2	Verti 123
54	187.515M	35.5	+8.2	-26.6	+3.2	+0.0	20.3	43.5	-23.2	Verti 135
55	108.478M	34.6	+10.1	-26.8	+2.4	+0.0	20.3	43.5	-23.2	Horiz 151
56	195.130M	35.2	+8.3	-26.5	+3.2	+0.0	20.2	43.5	-23.3	Verti 151
57	135.576M	33.0	+11.0	-26.7	+2.6	+0.0	19.9	43.5	-23.6	Horiz 163
58	189.878M	34.7	+8.3	-26.6	+3.2	+0.0	19.6	43.5	-23.9	Verti 135
59	200.160M	34.4	+8.3	-26.5	+3.3	+0.0	19.5	43.5	-24.0	Verti 135
60	393.227M	28.6	+15.2	-26.8	+5.0	+0.0	22.0	46.0	-24.0	Verti 104

61	203.407M	34.0	+8.6	-26.5	+3.3	+0.0	19.4	43.5	-24.1	Verti 100
62	194.340M	34.3	+8.3	-26.5	+3.2	+0.0	19.3	43.5	-24.2	Verti 135
63	194.060M	34.1	+8.3	-26.5	+3.2	+0.0	19.1	43.5	-24.4	Verti 135
64	154.518M	32.6	+10.3	-26.7	+2.8	+0.0	19.0	43.5	-24.5	Verti 123
65	223.395M	34.2	+10.1	-26.2	+3.4	+0.0	21.5	46.0	-24.5	Verti 135
66	153.743M	32.4	+10.3	-26.7	+2.8	+0.0	18.8	43.5	-24.7	Verti 123
67	339.010M	29.2	+13.9	-26.4	+4.4	+0.0	21.1	46.0	-24.9	Verti 104
68	200.940M	33.2	+8.4	-26.5	+3.3	+0.0	18.4	43.5	-25.1	Verti 135
69	225.750M	33.4	+10.3	-26.2	+3.4	+0.0	20.9	46.0	-25.1	Verti 135
70	221.005M	33.6	+10.0	-26.2	+3.4	+0.0	20.8	46.0	-25.2	Verti 135
71	352.562M	28.5	+14.3	-26.5	+4.5	+0.0	20.8	46.0	-25.2	Verti 104
72	325.429M	29.4	+13.5	-26.4	+4.3	+0.0	20.8	46.0	-25.2	Verti 104
73	215.195M	31.5	+9.5	-26.3	+3.4	+0.0	18.1	43.5	-25.4	Verti 135
74	189.067M	33.1	+8.2	-26.6	+3.2	+0.0	17.9	43.5	-25.6	Verti 135
75	227.815M	32.5	+10.5	-26.2	+3.4	+0.0	20.2	46.0	-25.8	Verti 135
76	212.820M	31.1	+9.3	-26.3	+3.4	+0.0	17.5	43.5	-26.0	Verti 151
77	222.070M	32.7	+10.0	-26.2	+3.4	+0.0	19.9	46.0	-26.1	Verti 135
78	214.685M	30.8	+9.5	-26.3	+3.4	+0.0	17.4	43.5	-26.1	Verti 151
79	217.755M	32.8	+9.7	-26.3	+3.4	+0.0	19.6	46.0	-26.4	Verti 135
80	221.530M	32.4	+10.0	-26.2	+3.4	+0.0	19.6	46.0	-26.4	Verti 135
81	222.575M	32.2	+10.1	-26.2	+3.4	+0.0	19.5	46.0	-26.5	Verti 135
82	218.880M	32.5	+9.8	-26.3	+3.4	+0.0	19.4	46.0	-26.6	Verti 135
83	224.430M	31.8	+10.2	-26.2	+3.4	+0.0	19.2	46.0	-26.8	Verti 135
84	213.850M	30.0	+9.4	-26.3	+3.4	+0.0	16.5	43.5	-27.0	Verti 151
85	220.455M	31.9	+9.9	-26.3	+3.4	+0.0	18.9	46.0	-27.1	Verti 135

86	219.675M	31.6	+9.9	-26.3	+3.4	+0.0	18.6	46.0	-27.4	Verti 135
87	216.250M	31.8	+9.6	-26.3	+3.4	+0.0	18.5	46.0	-27.5	Verti 135
88	230.527M	30.3	+10.7	-26.2	+3.4	+0.0	18.2	46.0	-27.8	Verti 100
89	257.647M	28.2	+12.1	-26.0	+3.7	+0.0	18.0	46.0	-28.0	Verti 100
90	149.147M	28.7	+10.4	-26.7	+2.8	+0.0	15.2	43.5	-28.3	Horiz 163
91	217.010M	30.5	+9.7	-26.3	+3.4	+0.0	17.3	46.0	-28.7	Verti 135
92	216.967M	29.6	+9.7	-26.3	+3.4	+0.0	16.4	46.0	-29.6	Verti 100

Test Location: CKC Laboratories • 4933 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)

Customer: **Matrix Systems**

Specification: **FCC 15.225(a)**

Work Order #: **84699**

Date: 2/3/2006

Test Type: **Maximized Emissions**

Time: 10:41:27

Equipment: **Keypad Proximity Reader**

Sequence#: 4

Manufacturer: Matrix Systems

Tested By: Randal Clark

Model: MX-iCLASS

S/N: A

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Keypad Proximity Reader*	Matrix Systems	MX-iCLASS	A

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	MeanWell	S-150-15	CA13061379
Access Controller	Matrix Systems	RCM2	00058170

Test Conditions / Notes:

EUT is a keypad proximity reader operating on a frequency of 13.56 MHz. 12VDC power is routed from the support power supply through the access controller to the EUT. Support equipment is located outside of the testing area. EUT is mounted vertically on a non-conductive support to simulate normal installation. Test distance correction factor used in accordance with 15.31 to correct test data for comparison to the limit. Frequency Range Investigated: Carrier. Temperature: 18°C, Relative Humidity: 36%.

Transducer Legend:

T1=Cable - 10 Meter	T2=15.31 10m 40dB/Dec Correction
T3=Mag Loop - AN 00226 - 9kHz-30M	

Measurement Data:

Reading listed by margin.

Test Distance: 10 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	Dist dB	Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	13.560M	36.1	+0.8	-20.0	+9.6	+0.0		26.5	84.0	-57.5	Horiz 100
2	13.560M	33.4	+0.8	-20.0	+9.6	+0.0		23.8	84.0	-60.2	Verti 100