FCC
Electromagnetic Compatibility
Test Report

For

Models
MiY-Card and MiY-Search

FCC ID: DGFSSDCARDSCM
IC: 458A-SSDCARDSCM

Safety and Security Systems Division
St. Paul, MN

December 1, 2011

Report Number: F0911005

Prepared By:
3M Regulatory Engineering and Quality
EMC Laboratory
410 Fillmore Avenue, Building 76
St. Paul, Minnesota 55144-1000

CERTIFICATE OF COMPLIANCE

MANUFACTURER'S NAME:	3M™ Company
NAME OF EQUIPMENT:	MiY Series Readers
MODEL NUMBER:	MiY-Card (RFID) MiY-Search (no RFID)
TEST REPORT NUMBER:	F0911005
DATE:	December 1, 2011

USA (FCC) - Title 47, Code of Federal Regulations (2009)
Industry Canada (IC) – ICES, RSS

EMISSIONS:

Radiated / Conducted	**(FCC Part 15, Subpart B, Class A)** **(IC, ICES-003)**
Radiated / Conducted	**(FCC Part 15, Subpart C)** **(IC, RSS-210, RSS-GEN)**
RF Exposure	**(FCC - Exempt)** **(IC - Complies with RSS-102)**

FCC ID: DGFSSDCARDSCM
IC ID: 458A-SSDCARDSCM

As the responsible EMC Project Engineer, I hereby declare that the equipment tested, as specified in the test report, at the 3M Product Safety EMC Laboratory is in compliance with 47 CFR, Part 15, Subpart B and Subpart C, and Industry Canada RSS & ICES Standards. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics.

Robert E. Heller

Digitally signed by Robert E. Heller
DN: cn=Robert E. Heller, c=US, o=EMC Lab, ou=SEMS, email=reheller@mmm.com
Date: 2011.12.08 10:08:50 -06'00'

Robert E. Heller
Senior EMC Engineer

NVLAP®

Lab Code 200033

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1.0 TEST SUMMARY

Test Report Number:	F0911005
Requester:	Chris Crump
Company:	3M Cogent SSD 639 N Rosemead Blvd, Pasadena, CA 91107
Telephone Number:	626-325-9600
Equipment Under Test:	Models MiY-Card and MiY-Search
Condition upon receipt	Device was in good working condition
Test Environment:	See individual test sheets.
Test Results:	Passed the following tests: Conducted Emissions: FCC Part 15 Subpart B, ICES-003 Radiated Emissions: FCC Part 15 Subpart B, ICES-003 Conducted Emissions: FCC Part 15 Subpart C, IC RSS-210, RSS-Gen Radiated Emissions: FCC Part 15 Subpart C, IC RSS-210, RSS-Gen IC RSS-102
Modifications:	No modifications were required.
Test Location:	3M Product Safety EMC Laboratory Building 76-1-01 410 Fillmore Ave. St. Paul, MN 55144-1000

2.0 INTRODUCTION

2.1 Scope

This report contains results describing the conformance of the Equipment Under Test (EUT) to FCC Part 15, Subpart B and IC ICES-003 rules for unintentional radiators and FCC Part 15, Subpart C and IC RSS rules for intentional radiators.

This report is the confidential property of the client and applies only to the specific item tested under the 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 characteristics. This report shall not be reproduced except in full without the written approval of the testing laboratory. The appropriate testing standards and references that were used are contained in Section 3.0. Worse case test data, test configuration, and photographs (worst case configuration) are provided in Sections 4.0 and 5.0. Equipment information is contained in Section 6.0. Documentation labeling information is contained in Section 7.0.

Subsequent tests are necessary from time to time on equipment taken at random from production. Retesting of the EUT is also required when the EMC profile has been changed or is suspected of being changed.

The 3M Regulatory Engineering and Quality EMC Laboratory is recognized under the United States Department of Commerce National Institute of Standards and Technology's National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 17025 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of test results. Accreditation by the National Voluntary Laboratory Accreditation Program is awarded for specific services, listed on the Scope of Accreditation for: Electromagnetic Compatibility and Telecommunications FCC under Lab Code 200033. A complete copy of the Scope of Accreditation is available upon request.

The FCC Site Registration Number is 93334. The Industry Canada (IC) Site Registration Number is 458A-1.

The NVLAP accreditation or this test report does not in any way constitute or imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

2.2 EUT Descriptions and Operation

The Equipment Under Test (EUT) was the 3M™ Cogent MiY-Card. MiY-Card is 3M Cogent's latest outdoor multi-purpose, multi-factor biometric access control reader. It is a highly sophisticated, accurate, and customizable biometric physical access control terminal that is designed to perform fast authentication and efficient entry. MiY-Card enables multi-factor identification that combines contactless smart card reader (RFID), biometric fingerprint technology, and numerical pin to offer the highest level of access security available. The EUT contains a SCM Contactless reader at 13.56 MHz and a Futronic Sensor. It ships with Cogent GateApp software and supports Time and Attendance. It has a 12 key non-mechanical keypad. The EUT contains an internal antenna that is 27 square cm (6 cm by 4.5 cm). The EUT was tested while exercising all functions. The EUT is powered by 12 VDC which is supplied by the customer.

The 3M™ Cogent MiY-Search is identical to the MiY-Card except that the MiY-Search does not contain a RFID reader. Except for the transmitter data, this report includes compliance data for the MiY-Search as well as the MiY-Card.

The full part numbers for the devices are: MiY-Card-2-0103-XXXX and MiY-Search-2-0100-XXXX. The XXXX represents the available software options.

MiY-Card (MiY-Search)

2.3 Modifications to EUT

No modifications were required.

2.4 Measurement Uncertainty

The data and test results referenced in this report are true and accurate. However, there may be deviations within the calibration limits of the test equipment and facilities that can account for deviations. The following table lists the measurement uncertainty for the emissions testing. Furthermore, EUT component and manufacturing process variables may result in additional deviation.

Emission test	Confidence (95%)	Measurement Uncertainty	CISPR Limit
Radiated Emissions (30 MHz – 5 GHz)	k=2.0	4.11 dB	5.20 dB
Conducted Emissions (150 kHz – 30 MHz)	k=2.0	3.29 dB	3.60 dB

3.0 APPLICABLE DOCUMENTS

The following documents were used as references. The dates that are referenced are the dates of the latest amendments. All 3M Test Procedures can be found in the Document Center of the SEMS QDS System.

CFR 47: 2009	Part 15 Radio Frequency Devices, Subpart B Unintentional Radiators and Subpart C, Intentional Radiators.	
CISPR 16-1	Specification for radio disturbance and immunity measuring apparatus and methods	
	-1 Measuring Apparatus	2006
	-2 Ancillary Equipment – Conducted Disturbance	2004
	-3 Ancillary Equipment – Disturbance Power	2004
	-4 Ancillary Equipment – Radiated Disturbance	2004
CISPR 16-2	Specification for radio disturbance and immunity measuring apparatus and methods	
	-1 Conducted Disturbance Measurements	2003
	-2 Measurements of Disturbance Power	2004
	-3 Radiated Disturbance Measurements	2003
CISPR 16-4	-1 Uncertainties in Standardized EMC Tests	2005
ANSI C63.4:2009	American National Standard for Methods of Measurement of Radio Noise Emissions from Low Voltage Electrical and Electronic Equipment in the range of 9 KHz to 40 GHz.	
ICES-003	Industry Canada, Interference-Causing Equipment Standard, 2004 Issue 4	
RSS-GEN	Industry Canada, Radio Standards Specification Issue 3 2010	
RSS-210	Industry Canada, Radio Standards Specification Issue 8 2010	
RSS-102	Industry Canada, Radio Frequency Exposure Compliance, Issue 4, 2010	

3M Test Procedure: Radiated Emissions Test (30 MHz – 1 GHz), PBLI-6SHLK2:
3M Test Procedure: Radiated Emissions Test (1 GHz – 5 GHz), PBLI-6SNHFY:
3M Test Procedure: Conducted Emissions Test (150 kHz – 30 MHz), PBLI-S8LR2
3M Test Procedure: 13.56 MHz RFID Emissions Test, PBLI-6WHLEM
3M Test Procedure: 99% Power Bandwidth Test, PBLI-7C9JVN

4.0 CONDUCTED EMISSIONS TESTING

Conducted emissions testing was performed in accordance with ANSI C63.4, FCC Part 15 and 3M Test Procedures: Conducted Emissions Test (150 kHz – 30 MHz), PBLI-6S8LR2 and 13.56 MHz RFID Emissions Test, PBLI-6WHLEM. Conducted emissions tests were made to determine the level of electromagnetic noise that is conducted onto the power mains from the EUT.

4.1 Test Procedure:

A Line Impedance Stabilization Network (LISN) with 50Ω /50μH characteristic was used to isolate the EUT and give accurate and repeatable readings. An EMI test receiver was used for the emissions measurements in the range from 150 KHz to 30 MHz. Initial measurements were taken with the receiver in continuous frequency overview mode utilizing peak level signal detection. Initial results were measured at discrete frequencies utilizing quasi-peak detection. Measurement results were automatically calculated via software running the EMI receiver. The final quasi-peak and average measurements recorded were determined by the following: Result (dBμV) = receiver reading (μV) + LISN (dB) + cable loss (dB)

4.2 Test Criteria:

The FCC Class 'B' conducted limits are given below. The lower limit shall apply at the transition frequency.

Mains Terminal Disturbance Limits		
Frequency (MHz)	Quasi-Peak (dBμV)	Average (dBμV)
0.15 to 0.50	66 to 56 Decreasing with	56 to 46 log of frequency
0.50 to 5.0	56	46
5.0 to 30.0	60	50

4.3 Test Results

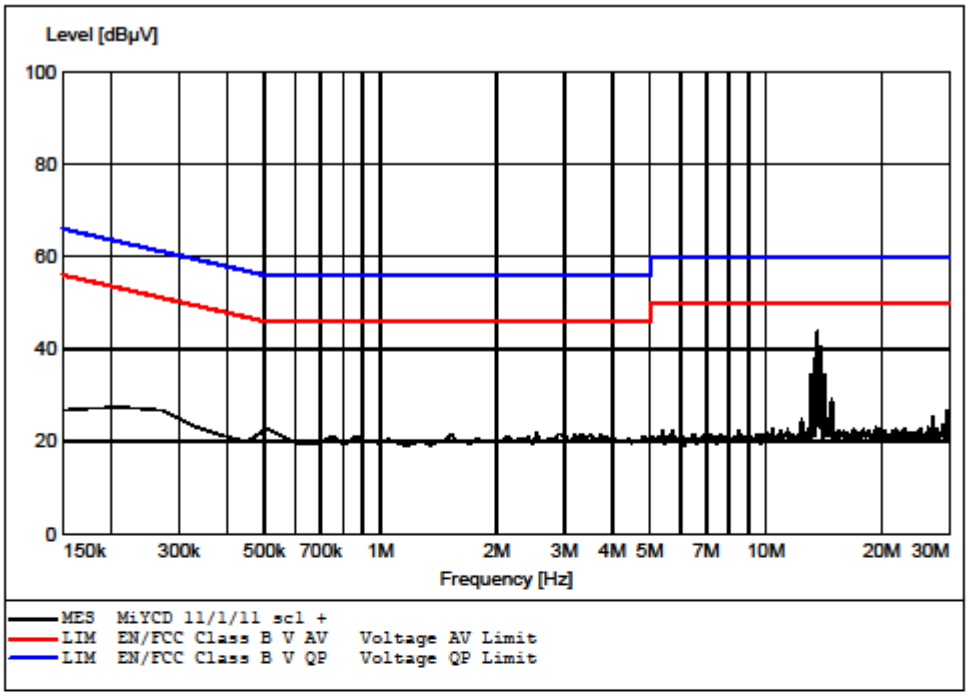
The EUT met the conducted emission and discontinuous requirements.

Report Number	F0911005	**Date**	1 Nov 2011
EUT Name	MiY Series Readers	**EUT Power**	12 volt DC
EUT Model	MiY-Card (MiY-Search)	**Test Std**	FCC
EUT Serial #	MiY-Card-2-0103-XXXX	**Temperature (°C)**	22
EUT Description	Access System	**Humidity (%)**	23
		Air Pressure (kPa)	98.7

MAXIMIZED FILES MiYCD 11/1/11 sc1 + - VOLTAGE/HERTZ 12 VDC

	PEAK (dBµV)		QUASI-PEAK (dBµV)				AVERAGE (dBµV)			
FREQUENCY (MHz)	L1 +	L2 -	L1 +	L2 -	Limit	Passing Margin	L1 +	L2 -	Limit	Passing Margin
.154	26.8	27.6	-	-	65.8	38.2	-	-	55.8	28.2
.300	25.0	24.3	-	-	60.2	35.2	-	-	50.2	25.2
1.0	19.9	18.5	-	-	56	36.1	-	-	46	26.1
5.0	21.0	20.1	-	-	56	35.0	-	-	46	25.0
13.56	-	-	40.7	42.4	60	17.6	40.0	38.5	50	10.0
27.12	-	-	25.4	30.3	60	29.7	24.7	30.2	50	19.8

Test Engineer: Bruce Jungwirth	Date: 1 Nov 2011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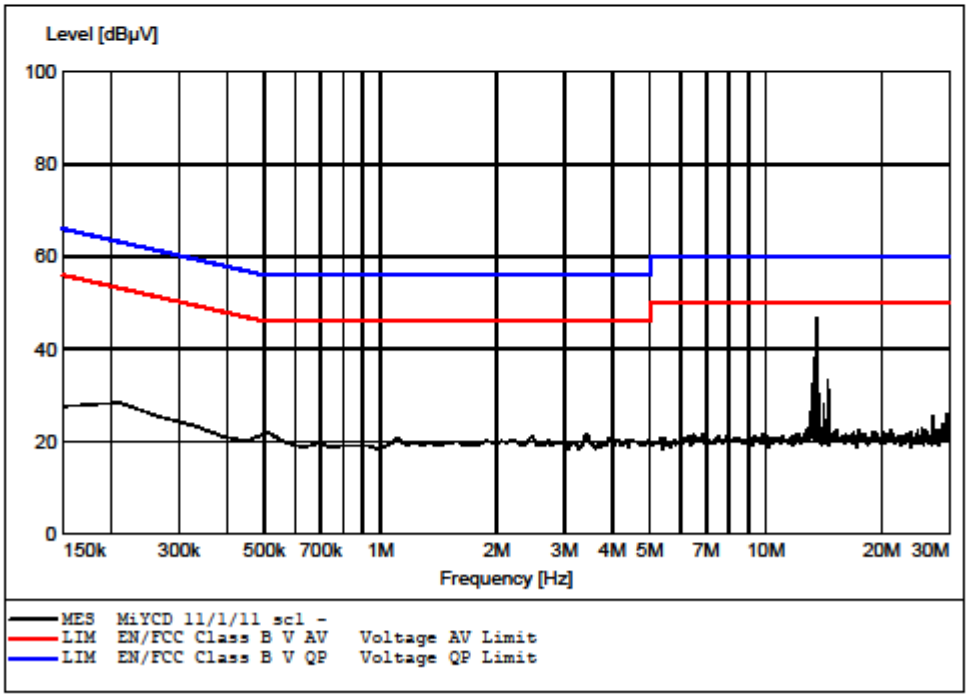
60
40
20
0
150k
300k
500k
700k
1M
2M
3M
4M
5M
7M
10M
20M
30M
Frequency [Hz]
MES MiYCD 11/1/11 scl +
LIM EN/FCC Class B V AV Voltage AV Limit
LIM EN/FCC Class B V QP Voltage QP Limit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60
40
20
0
150k
300k
500k
700k
1M
2M
3M
4M
5M
7M
10M
20M
30M
Frequency [Hz]
MES MiYCD 11/1/11 scl -
LIM EN/FCC Class B V AV Voltage AV Limit
LIM EN/FCC Class B V QP Voltage QP Limit

4.4 Test Setup Photo

Conducted Emissions

5.0 Radiated Emissions Testing

The EUT was placed in an anechoic chamber and radiated emissions testing was performed in accordance with FCC Part 15.225 and 3M Test Procedures: Radiated Emissions Test (30 MHz – 1 GHz), PBLI-6SHLK2, Radiated Emissions Test (1 GHz – 5 GHz), PBLI-6SNHFY and 13.56 MHz RFID Emissions Test, PBLI-6WHLEM. Radiated emissions measurements were made to determine the level of electromagnetic energy radiating from the EUT.

5.1 Frequency Stability

The Frequency Stability testing was preformed in accordance with ANSI C63.4 and FCC Part 15.225 (e) to insure that the intentional radiator frequency stability was within the allowable limits for input power and temperature variations.

5.1.1 Test Procedure

The Frequency Stability was measured using the radiated signals from the EUT so that the measurement equipment would not load the radio frequency circuits. A frequency counter was used for the frequency stability measurements. A close field probe was attached to the counter and placed near the antenna of the reader for measurement. The Reader was put into a continuous output mode through instructions from the host computer (test mode of operation). 1) The frequency was measured while the input DC power to the Intentional Radiator (RFID Reader) was varied over the required input voltage range. 2) The frequency was also measured while the ambient air temperature was varied over the required ambient temperature range (measurements are taken within 1 minute of startup, and after 10 minutes of operation at each test condition).

5.1.2 Test Criteria

The FCC Part 15, Subpart C for Frequency Stability Limits versus Supply Voltage are given as:

Carrier Frequency (MHz)	Voltage Range % of Nominal Supply (±15%)	Max. Frequency Change (%)
13.56	10.2 DC to 13.8 DC	+/- 0.01 %

The FCC Part 15, Subpart C for Frequency Stability Limits versus Temperature is given as:

Carrier Frequency (MHz)	Temperature Range (degrees C)	Max. Frequency Change (%)
13.56	-20 to +50	+/- 0.01 %

5.1.3 Test Results

The EUT met all FCC Part 15, Subpart C Frequency Stability requirements. The worst case for voltage and temperature is as follows:

Frequency Stability Data Sheet

Measurement	Startup	2 Minutes	5 Minutes	10 Minutes
12 Vdc (+20°C)	13.5601	13.5601	13.5601	13.5601
+50°C (12 Vdc)	13.5601	13.5601	13.5601	13.5601
-20°C (12 Vdc)	13.5601	13.5601	13.5601	13.5601

Note: For 13.56 MHz RFID transmitters, the carrier signal shall be maintained within ±0.01% of the operating frequency (±135.6 kHz).

Tested by____Mike Schultz_____

Date_____23 September 2011 _____

Report #___0911005_____

MiY Card with SCM Reader

5.1.3 Test Setup Photo

5.2 Emission Bandwidth

The EUT was placed in a semi-anechoic chamber and the Emission Bandwidth testing was performed in accordance with ANSI C63.4, FCC Part 15.225 and 3M Test Procedure: 13.56 MHz RFID Emissions Test, PBLI-6WHLEM The Emission Bandwidth measurements were made to determine the intentional radiator frequency and determine the level of electromagnetic energy radiated at that frequency and at the band edges from the EUT.

5.2.1 Test Procedure

A measurement antenna (loop) was positioned at a distance of 5 meters (to insure far field measurements) from the center of the EUT. An EMI receiver was used for the emissions measurements. Initial sweep measurements were taken with the receiver in continuous frequency overview mode utilizing peak level signal detection. The intentional radiator frequency and band edge frequencies utilizing quasi-peak detection were then maximized. Maximizing a frequency involves finding the angle of the highest emission levels by rotating the EUT 360 degrees (sampling at least every 4 degrees). Then the antenna, which was fixed at 1-meter height, was rotated until the highest emissions levels found. Measurement results were automatically calculated via software running the EMI receiver. The final quasi-peak measurements recorded were determined by the following formula:

Result (dBμV/m) = receiver level (μV) + antenna factor (dB/m) + cable loss (dB) - preamp gain (dB) + lineal conversion (dB).

5.2.2 Test Criteria

The FCC Part 15 Subpart C, Paragraph 15.225 Carrier Frequency Limits are given as:

Lower Band Edge: 13.553 MHz
Upper Band Edge: 13.567 MHz

The FCC Part 15, Subpart C radiated limits are given as:

Frequency (MHz)	Distance (Meters)	Field Strength (dBμV/m)
1.705 to 13.110	10	48.62
13.110 to 13.410	10	59.58
13.410 to 13.553	10	69.55
13.553 to 13.567	10	103.00
13.567 to 13.710	10	69.55
13.710 to 14.010	10	59.58
14.010 to 30.000	10	48.62

Note: 40 dB/decade extrapolation factor was used per 15.31.

5.2.3 Test Results

The EUT met the FCC Part 15, Subpart C Emission Bandwidth requirements. The intentional radiator frequencies were within the allowed band and all maximized quasi-peak measurements for the EUT were below the quasi-peak limits.

Report Number	F0911005	**Date**	7 October 2011
EUT Name	MiY Series Readers	**EUT Power**	12 VDC
EUT Model	MiY-Card (MiY-Search)	**Test Std**	FCC
EUT Serial #	MiY-Card-2-0103-XXXX	**Temperature (°C)**	23
EUT Description	Access System	**Humidity (%)**	33
		Air Pressure (kPa)	98.7

Product Model: MiY-Card Report Number: F0911005

Carrier Frequency 13.5601 Turntable Degrees 100°

Loop Angle Y -15°

MODULATION SPECTRUM MASK (To convert to dBµA/m, subtract 51.5)

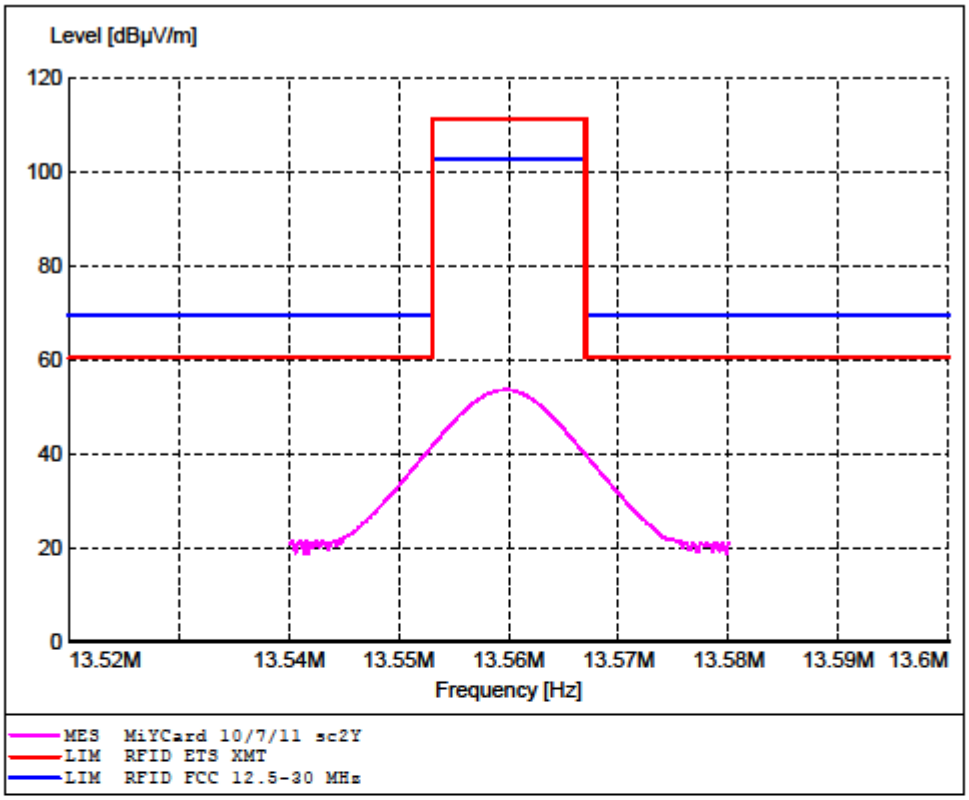
Frequency	B/W	QP H-Field FCC and EU Limits @ 10 m		QP Level
13.5601 MHz	9 kHz	FCC 103 dBµV/m	EU 60 dBµA/m or111.5 dBµV/m	**53.87**
13.553 MHz	1 kHz	FCC 69.6 dBµV/m	EU 9 dBµA/m or 60.5 dBµV/m	**5.47**
13.567 MHz	1 kHz	FCC 69.6 dBµV/m	EU 9 dBµA/m or 60.5 dBµV/m	**3.46**
13.5485 MHz	9 kHz	FCC 69.6 dBµV/m	EU 9 dBµA/m or 60.5 dBµV/m	**29.42**
13.5715 MHz	9 kHz	FCC 69.6 dBµV/m	EU 9 dBµA/m or 60.5 dBµV/m	**27.95**
13.41 MHz	1 kHz	FCC 59.6 dBµV/m	EU -3.5 dBµA/m or 48 dBµV/m	**0.74**
13.71 MHz	1 kHz	FCC 59.6 dBµV/m	EU -3.5 dBµA/m or 48 dBµV/m	**0.63**
13.4055 MHz	9 kHz	FCC 59.6 dBµV/m	EU -3.5 dBµA/m or 48 dBµV/m	**16.66**
13.7141 MHz	9 kHz	FCC 59.6 dBµV/m	EU -3.5 dBµA/m or 48 dBµV/m	**16.87**
13.11 MHz	1 kHz	FCC 48.6 dBµV/m		**0.78**
14.01 MHz	1 kHz	FCC 48.6 dBµV/m		**0.01**
13.1055 MHz	9 kHz	FCC 48.6 dBµV/m		**14.81**
14.0145 MHz	9 kHz	FCC 48.6 dBµV/m		**14.02**

Notes: Band edges measured with a receiver bandwidth setting of 1 KHz. Per ANSI C63.4, 13.1.7.

HARMONICS

		Measured Frequency	Limit	QP Level
2nd	27.12 MHz	27.1194	EU -3.5 dBµA/m or 48 dBµV/m	**16.22**
3rd	40.68 MHz		250 nW or 52.8 dBµV/m	

Test Engineer: Mike Schultz Date: 7 October 2011



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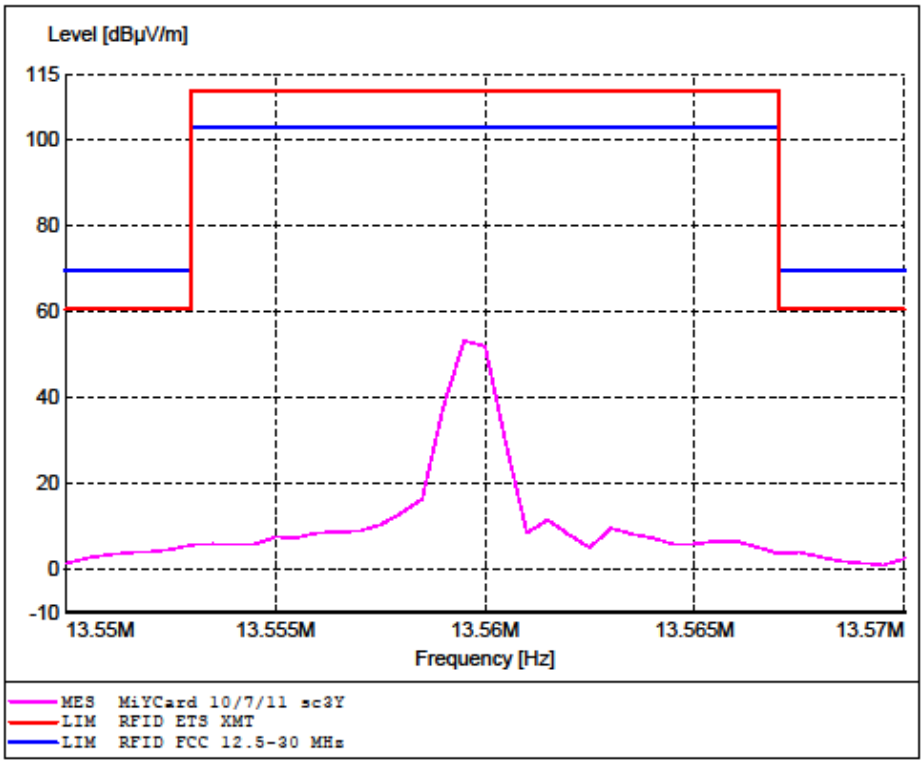
RF Carrier Output (9 kHz)



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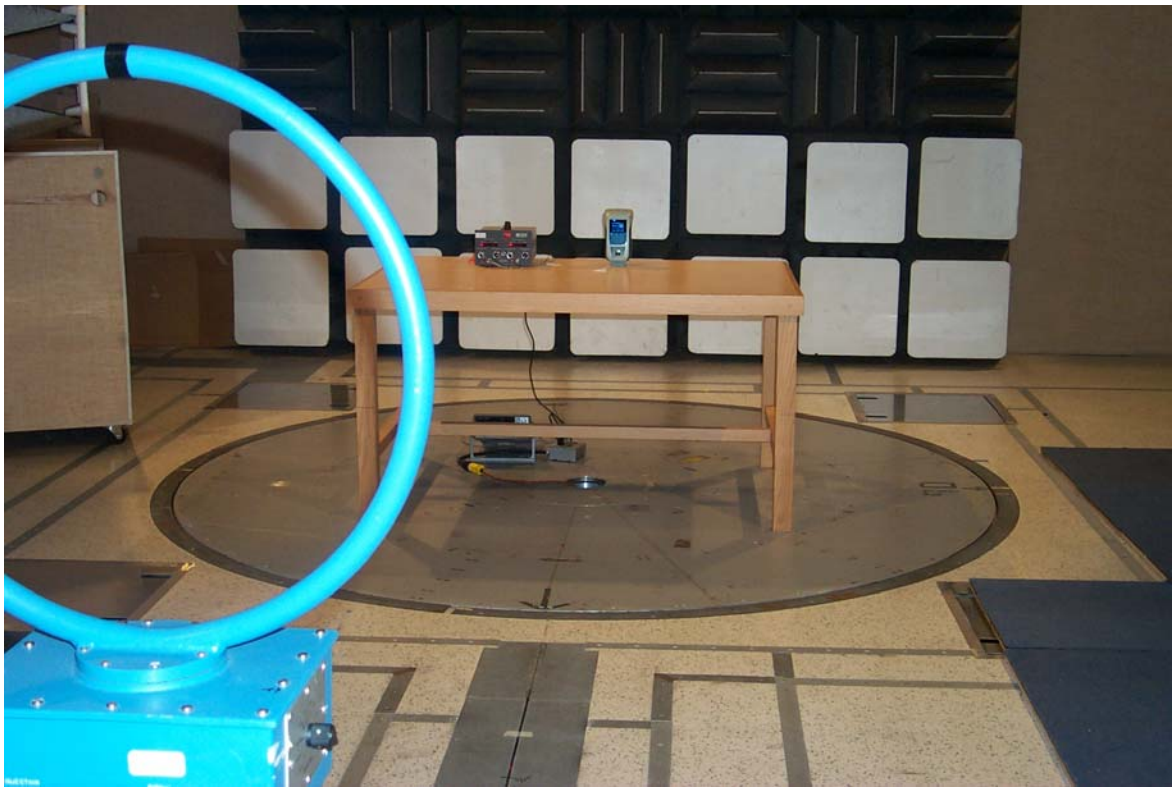
1 KHz BW QP Scan

5.2.4 Test Setup Photo

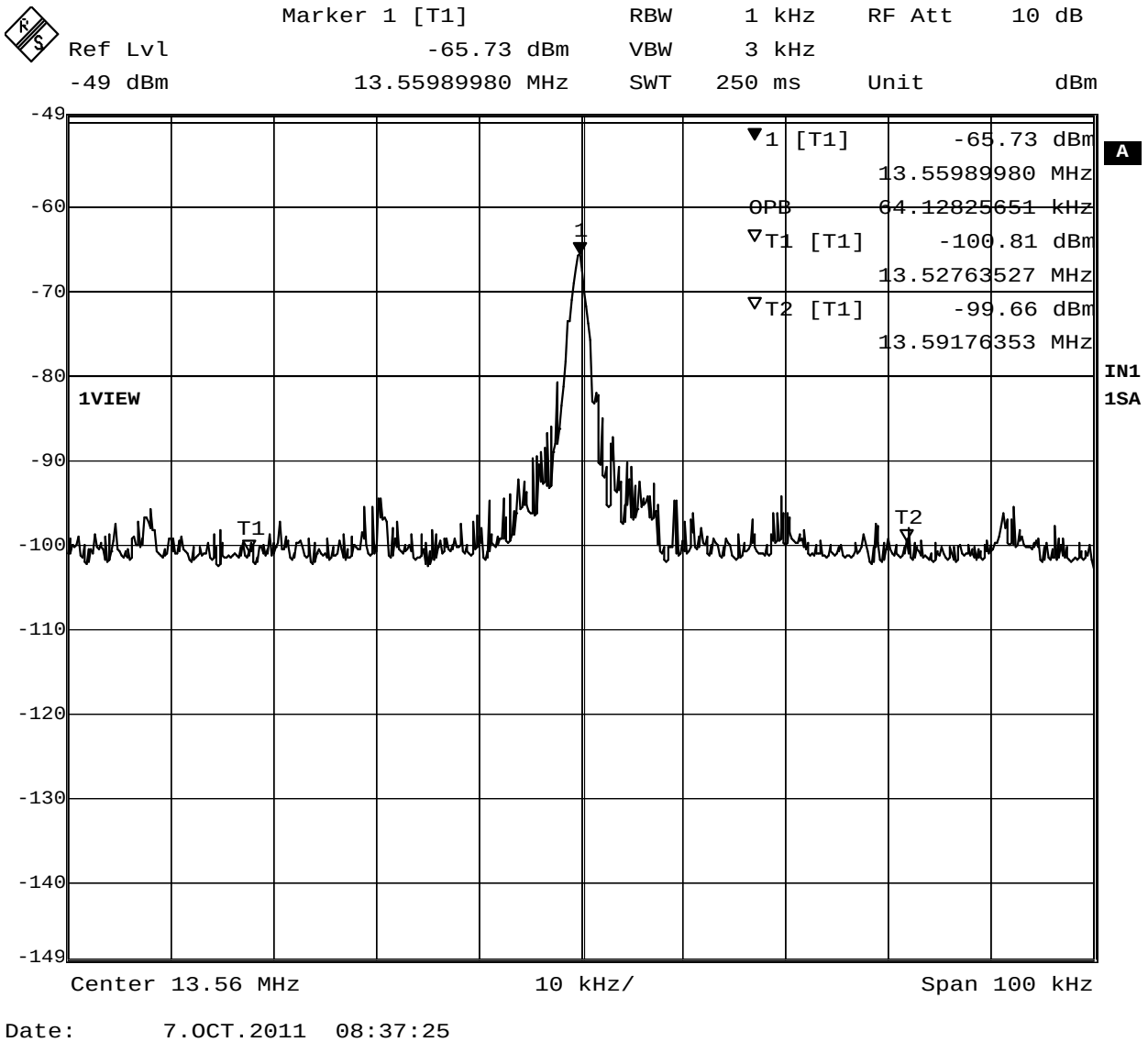


Carrier Frequency / Emissions Bandwidth / Spurious Emissions 9KHz to 30 MHz

5.2.5 Power Bandwidth Test Procedure (99%)

The EUT was placed in a shielded room and connected directly to the input of an EMI Receiver. The receiver was operated in the analyzer mode with a center frequency of 13.56 MHz. The transmitter was operated at its maximum carrier output with modulation applied under normal test conditions. The receiver's span and bandwidths were set in accordance with Industry Canada RSS-GEN (section 4.6.1). The receiver has an internal function that can be selected for the measurement of the 99% Bandwidth, and automatic placement of the markers. 3M Test Procedure: 13.56 MHz RFID Emissions Test, PBLI-6WHLEM contains the procedure for selecting the Bandwidth function and output of the result plot.

The EUT had a measured occupied bandwidth of: **64.1283 kHz.**



5.3 Spurious Emissions (12 kHz to 30 MHz.)

The EUT was placed in a semi-anechoic chamber and the Spurious Emissions testing was preformed in accordance with ANSI C63.4, FCC Part 15, Subpart C and 3M Test Procedure: 13.56 MHz RFID Emissions Test, PBLI-6WHLEM.The Spurious Emission measurements were made to determine the level of spurious electromagnetic energy radiated from the EUT.

5.3.1 Test Procedure

A measurement antenna (loop) was positioned at a distance of 5 meters (to insure far field measurements) from the center of the EUT. An EMI receiver was used for the emissions measurements. Initial sweep measurements were taken with the receiver in continuous frequency overview mode utilizing peak level signal detection. Acceptance analysis of these sweeps was used to determine which discrete frequencies, other than the intentional radiator frequency and band edge frequencies were to be maximized. Maximizing a frequency involves finding the angle of the highest emission levels by rotating the EUT 360 degrees (sampling at least every 4 degrees). Then the antenna, which was fixed at 1-meter height, was rotated until the highest emissions levels found. Final measurements were taken utilizing quasi-peak detection. Measurement results were automatically calculated via software running the EMI receiver. The final measurements recorded were determined by the following formula:

Result (dBμV/m) = receiver level (μV) + antenna factor (dB/m) + cable loss (dB) - preamp gain (dB) + lineal conversion (dB).

5.3.2 Test Criteria

The FCC Part 15, Subpart C radiated limits are given below.

Frequency (MHz)	Distance (Meters)	Field Strength (dBμV/m)
12.000 to 13.110	10	48.62
13.110 to 13.410	10	59.58
13.410 to 13.553	10	69.55
13.553 to 13.567	10	103.00
13.567 to 13.710	10	69.55
13.710 to 14.010	10	59.58
14.010 to 30.000	10	48.62

Note: A 40 dB/decade extrapolation factor was used per 15.31.

5.3.3 Test Results

The EUT met the FCC Part 15, Subpart C Spurious Emissions (12 kHz to 30 MHz.) requirements. No measurable spurious emissions were detected below 12.5MHz or from 12.5 MHz to 30 MHz. All spurious emissions from the reader were below the noise floor.

Report Number	F0911005	**Date**	7 October 2011
EUT Name	MiY Series Readers	**EUT Power**	12 VDC
EUT Model	MiY-Card (MiY-Search)	**Test Std**	FCC
EUT Serial #	MiY-Card-2-0103-XXXX	**Temperature (°C)**	23
EUT Description	Access System	**Humidity (%)**	33
		Air Pressure (kPa)	98.7

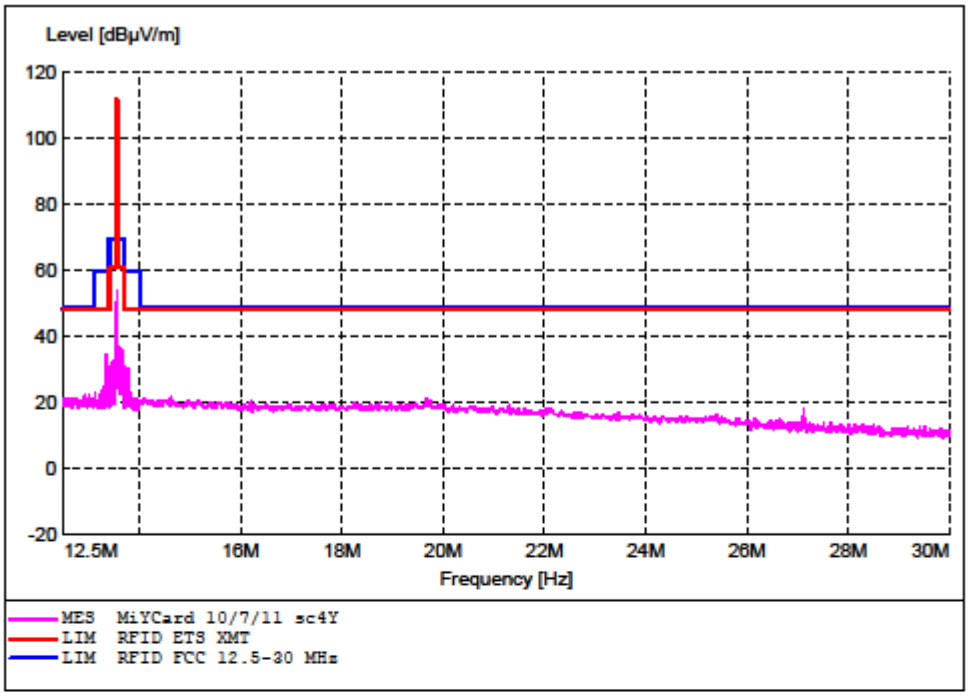
Carrier Frequency 13.5601 Turntable Degrees 100°

Loop Angle Y -15°

HARMONICS

		Measured Frequency	**Limit**	**QP Level**
2nd	27.12 MHz	27.1194	48.62 dBµV/m	**16.22**

Test Engineer: Mike Schultz **Date: 7 October 2011**



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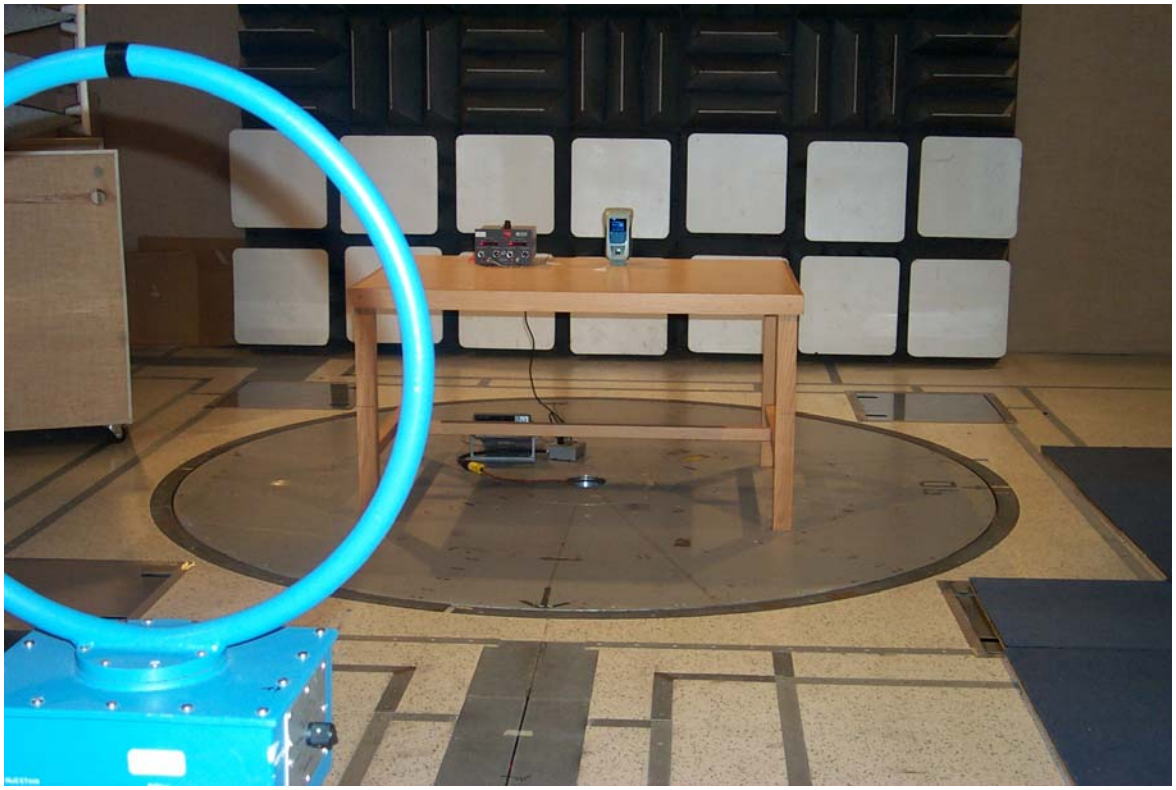
5.3.4 Test Setup Photo



Spurious emissions below 30 MHz

5.4 Spurious Emissions (30 to 1000 MHz.)

The EUT was placed in a semi-anechoic chamber for spurious emissions testing in accordance with ANSI C63.4, FCC Part 15, Subpart C and 3M Test Procedures: 13.56 MHz RFID Emissions Test, PBLI-6WHLEM and Radiated Emissions Test (30 MHz – 1 GHz), PBLI-6SHLK2. The Spurious Emission measurements were made to determine the level of spurious electromagnetic energy radiated from the EUT while in the transmit mode.

5.4.1 Test Procedure

The EUT was placed in the center of a turntable. An EMI receiver was used for the emissions measurements in the range of 30MHz to 1000MHz. Initial measurements were taken with the receiver in continuous frequency overview mode utilizing peak level signal detection. Peak results were maximized at discrete frequencies utilizing quasi-peak detection. Maximizing a frequency involves finding the angle of the highest emission levels by rotating the EUT 360 degrees (sampling every 4 degrees) and varying the antenna height between 1 and 4 meters at the angles of the highest emissions levels found. Measurements were taken in both vertical and horizontal antenna polarization. The final measurements recorded were determined by the following formula:

Result (dBμV /m) = receiver level (μV) + antenna factor (dB/m) + cable loss (dB) - preamp gain (dB) + lineal conversion (dB)

5.4.2 Test Criteria

The FCC Part 15, Subpart C radiated limits are given below.

Frequency (MHz)	Distance (Meters)	Field Strength (dBμV/m)
30 - 88	10	29.54
88 - 216	10	33.06
216 - 960	10	35.56
960 and higher	10	43.52

5.4.3 Test Results

The EUT met the FCC Part 15, Subpart C Spurious Emissions (30 to 1000 MHz.) requirements. No spurious emissions above 1000 MHz.

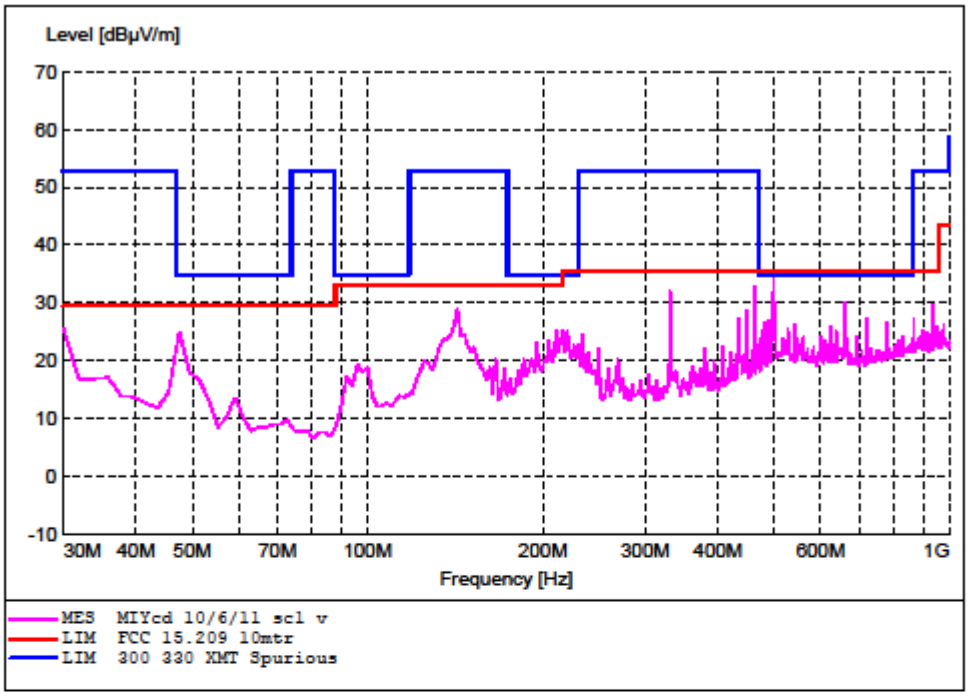
Report Number	F0911005	**Date**	10 Oct 2011
EUT Name	MiY Series Readers	**EUT Power**	12 Volt DC
EUT Model	MiY-Card (MiY-Search)	**Test Std**	FCC 15.109
EUT Serial #	MiY-Card-2-0103-XXXX	**Temperature (°C)**	23
EUT Description	Access System	**Humidity (%)**	33
		Air Pressure (kPa)	98.7

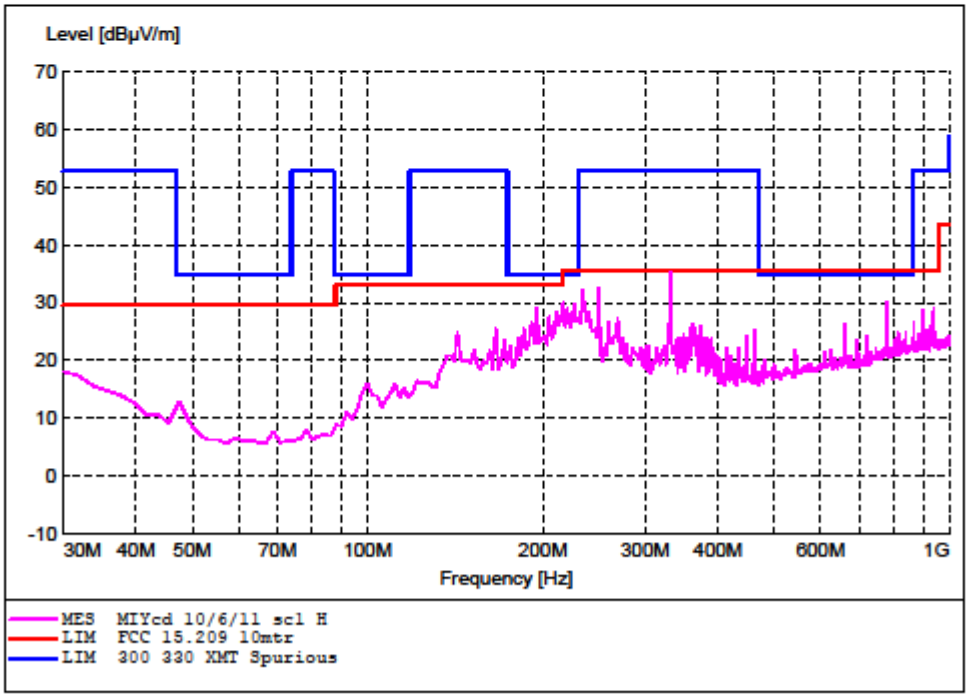
MAXIMIZED FILES MIYcd 10/6/11 sc1

FREQ. (MHz)	MAXIMIZED QP SIGNAL H/V	MAXIMIZED QP SIGNAL dBµV	LIMIT LINE dBµV	PASSING MARGIN dBµV	MAXIMIZED POSITION TURNTABLE (°)	MAXIMIZED POSITION ANTENNA (M)	REMARKS
216.96	H	28.16	35.56	7.40	121	1.41	
433.91	V	27.4	35.56	8.16	148	1.23	
447.46	V	29.72	35.56	5.84	134	1.23	
461.03	V	31.35	35.56	4.21	92	1.1	

* - All readings have the correction factors applied.

Test Engineer: Bruce Jungwirth	Date: 6 Oct 2011


Level [dBµV/m]
70
60
50
40
30
20
10
0
-10
30M 40M 50M 70M 100M 200M 300M 400M 600M 1G
Frequency [Hz]
MES MIYcd 10/6/11 scl v
LIM FCC 15.209 10mtr
LIM 300 330 XMT Spurious


Level [dBµV/m]
70
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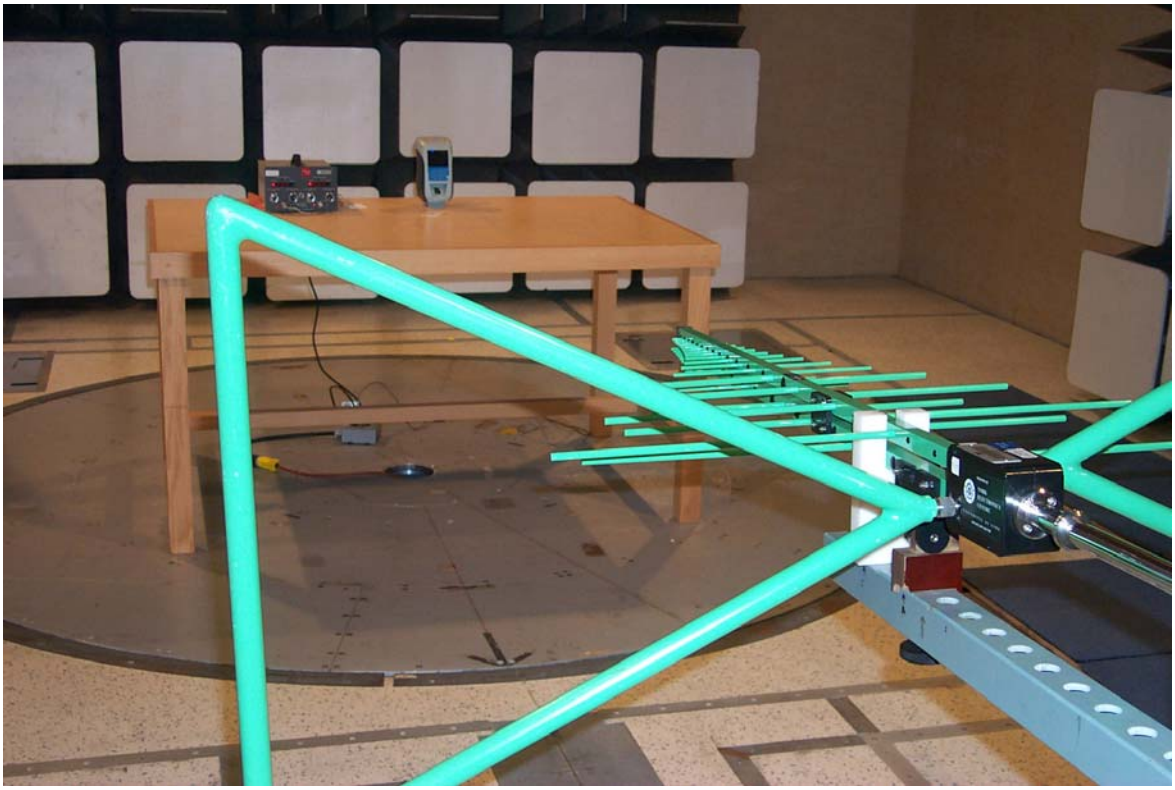
-10
30M 40M 50M 70M 100M 200M 300M 400M 600M 1G
Frequency [Hz]
MES MIYcd 10/6/11 scl H
LIM FCC 15.209 10mtr
LIM 300 330 XMT Spurious

5.4.4 Test Setup Photo



Spurious Emissions above 30 MHz

5.5 Digital Radiated Emissions (30 MHz - 6000 MHz)

The EUT was placed in an anechoic chamber and radiated emissions testing was performed in accordance with ANSI C63.4, FCC Part 15 and 3M Test Procedures: Radiated Emissions Test (30 MHz – 1 GHz), PBLI-6SHLK2, and Radiated Emissions Test (1 GHz – 5 GHz), PBLI-6SNHFY. Radiated emissions measurements were made to determine the level of electromagnetic energy radiating from the EUT.

5.5.1 Test Procedure

The EUT was placed in the center of a turntable. An EMI receiver was used for the emissions measurements in the range of 30MHz to 40GHz (the upper limit of measurement is determined by the 5^{th} harmonic of the highest frequency generated in the device or 40 GHz whichever is lower). Initial measurements were taken with the receiver in continuous frequency overview mode utilizing peak level signal detection. Peak results were maximized at discrete frequencies utilizing quasi-peak detection. Maximizing a frequency involves finding the angle of the highest emission levels by rotating the EUT 360 degrees (sampling every 4 degrees) and varying the antenna height between 1 and 4 meters at the angles of the highest emissions levels found. Measurements were taken in both vertical and horizontal antenna polarization. The final quasi-peak measurements recorded were determined by the following (the detector used above 1000 MHz is both average and peak):

Result (dBμV /m) = receiver level (μV) + antenna factor (dB/m) + cable loss (dB) - preamp gain (dB) + lineal conversion (dB)

5.5.2 Test Criteria

The FCC Class 'A' radiated limits are given below. The lower limit shall apply at the transition frequency.

Frequency (MHz)	Distance (Meters)	Field Strength (dBμV/m)
30 - 88	10	39.08
88 - 216	10	43.52
216 - 960	10	46.44
960 - 1000	10	49.54
1000 – 40000	10	49.54 AVG 69.54 PEAK

5.5.3 Test Results

The EUT met the FCC Class 'A' radiated emission requirements. The upper Limit of testing was 15000 MHz. All maximized quasi-peak measurements for the EUT were below the quasi-peak limit.

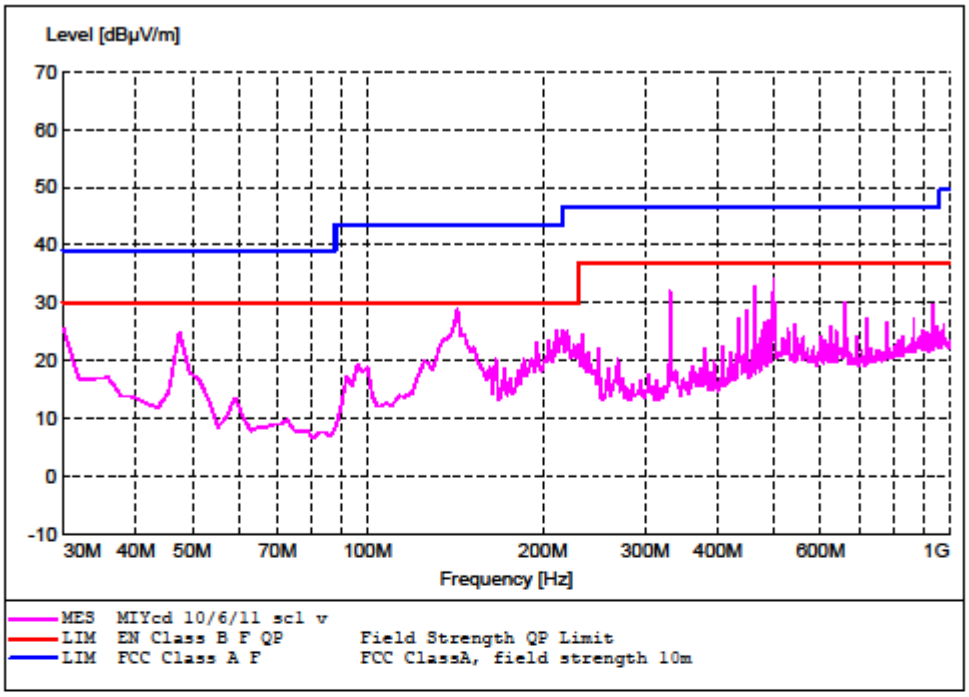
Report Number	F0911005	**Date**	10 Oct 2011
EUT Name	MiY Series Readers	**EUT Power**	12 Volt DC
EUT Model	MiY-Card (MiY-Search)	**Test Std**	FCC 15.109
EUT Serial #	MiY-Card-2-0103-XXXX	**Temperature (°C)**	23
EUT Description	Access System	**Humidity (%)**	33
		Air Pressure (kPa)	98.7

MAXIMIZED FILES MIYcd 10/6/11 sc1

	MAXIMIZED QP SIGNAL		LIMIT LINE	PASSING MARGIN	MAXIMIZED POSITION		
FREQ. (MHz)	H/V	dBµV	dBµV	dBµV	TURNTABLE (°)	ANTENNA (M)	REMARKS
48.0	V	24.17	39.08	14.91	0	1.0	
144.01	V	27.52	43.52	16.0	38	1.0	
196.36	H	21.99	43.52	21.53	221	1.71	
234.0	H	30.83	46.44	15.61	245	1.0	
250.0	H	31.75	46.44	14.69	246	1.0	
331.98	H	29.01	46.44	17.43	8	1.1	
498.0	V	30.21	46.44	13.79	95	1.0	

* - All readings have the correction factors applied.

Test Engineer: Bruce Jungwirth	Date: 6 Oct 2011


Level [dBµV/m]
70
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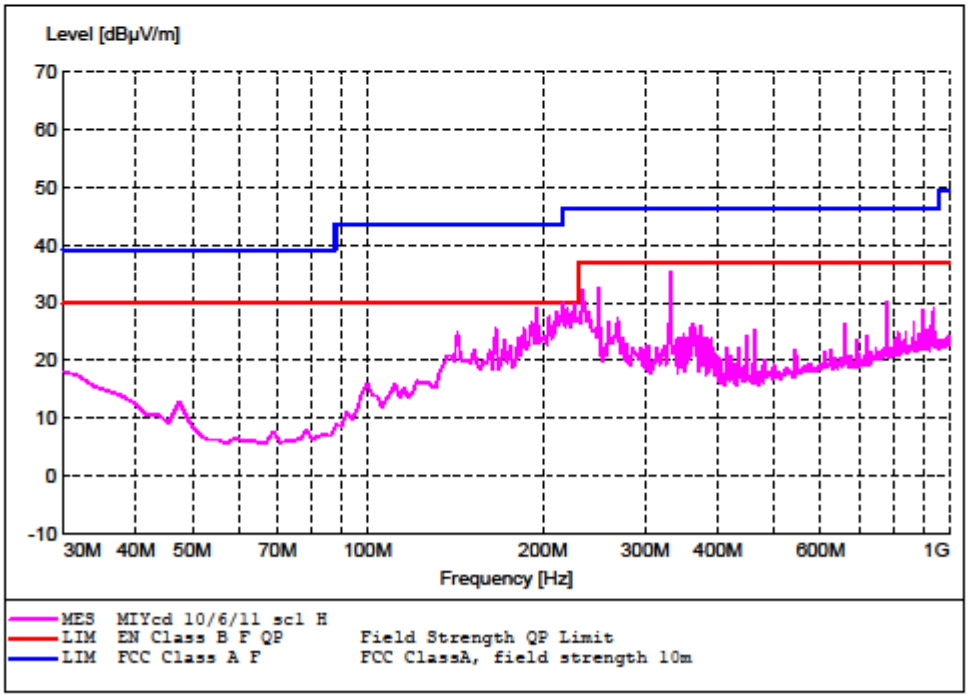
50
40
30
20
10
0
-10
30M 40M 50M 70M 100M 200M 300M 400M 600M 1G
Frequency [Hz]
MES MIYcd 10/6/11 scl v
LIM EN Class B F QP Field Strength QP Limit
LIM FCC Class A F FCC ClassA, field strength 10m

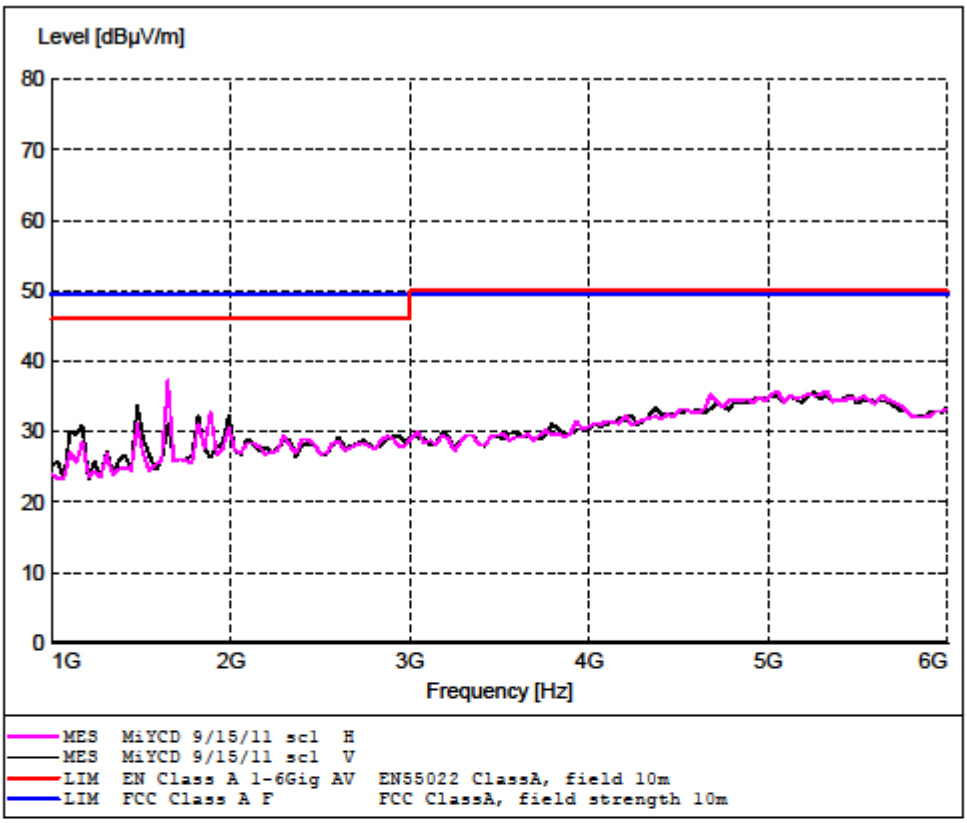

Level [dBµV/m]
70
60
50
40
30
20
10
0
-10
30M 40M 50M 70M 100M 200M 300M 400M 600M 1G
Frequency [Hz]
MES MIYcd 10/6/11 scl H
LIM EN Class B F QP Field Strength QP Limit
LIM FCC Class A F FCC ClassA, field strength 10m

Report Number	0911005	**Date**	15 September 2011
EUT Name	MiY Series Readers	**EUT Power**	12 Vdc
EUT Model	MiY-Card (MiY-Search)	**Test Std**	FCC
EUT Serial #	MiY-Card-2-0103-0000	Temperature (°C)	23
EUT Description	Access System	Humidity (%)	33
Tested with the SCM card		Air Pressure (kPa)	987

MAXIMIZED FILES ____MiYCD 915/11 sc1 V-H_____

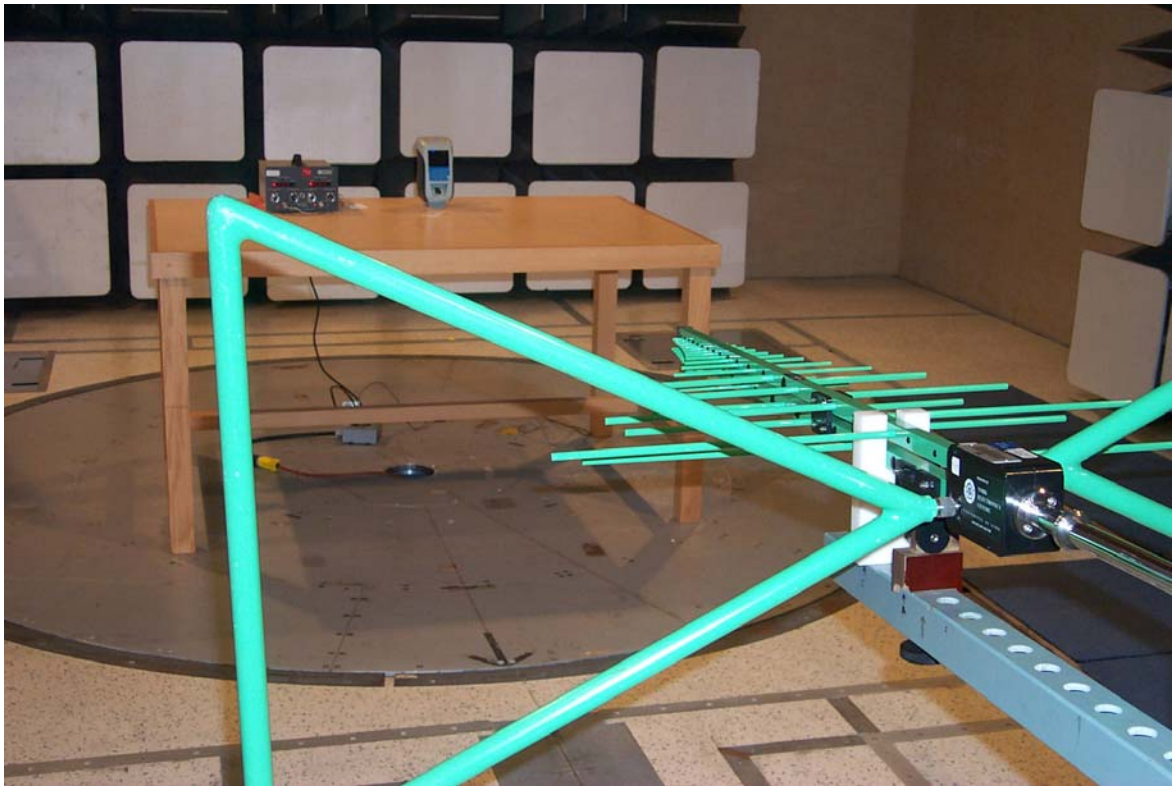
FREQ. (GHz)	MAXIMIZED AVG SIGNAL		LIMIT LINE	PASSING MARGIN	MAXIMIZED PEAK SIGNAL		LIMIT LINE	PASSING MARGIN	TURN TABLE	ANTENNA HEIGHT
	H/V	(dBµV/m)	(dBµV/m)	(dB)	H/V	(dBµV/m)	(dBµV/m)	(dB)	(degrees)	(m)
1151.903	V	26.92	49.54	22.62	V	31.31	69.54	38.23	40	1.0
1494.088	V	23.94	49.54	25.60	V	40.22	69.54	29.32	275	1.0
1659.800	H	23.02	49.54	26.52	H	41.78	69.54	27.76	182	1.9
1826.152	V	20.43	49.54	29.11	V	37.22	69.54	32.32	25	1.0
1919.740	H	23.98	49.54	25.56	H	33.76	69.54	35.78	344	1.4
1991.883	V	22.10	49.54	27.44	V	35.86	69.54	33.68	25	1.4

Test Engineer: Mike Schultz	Date: 15 September 2011



Page 1/1 9/15/2011 2:35PM

5.5.4 Test Photos



MiY-Card 30-1000 MHz (top), 1-6 GHz (bottom)

5.6 Human Exposure (EMF)

This procedure is for the evaluation of human exposure to electromagnetic fields (EMF) from devices containing RFID. The testing is in accordance with RSS-102 and 3M Test Procedure: EMF Test w/EMR-300, PBLI-7FAM2G. The EUT is FCC exempt.

5.6.1 Test Procedure

The EUT was setup in a shielded room and measurements were made of both the electric and magnetic fields at 13.56 MHz at a distance of 20 cm around the equipment using EMF exposure meters.

5.6.2 Test Criteria

For general public exposure, the results shall be compared with the exposure limits 4.2 of RSS-102. For 13.56 MHz, the limits are as follows:

E-Field 28 V/m

H-Field 0.073 A/m

5.6.3 Test Results

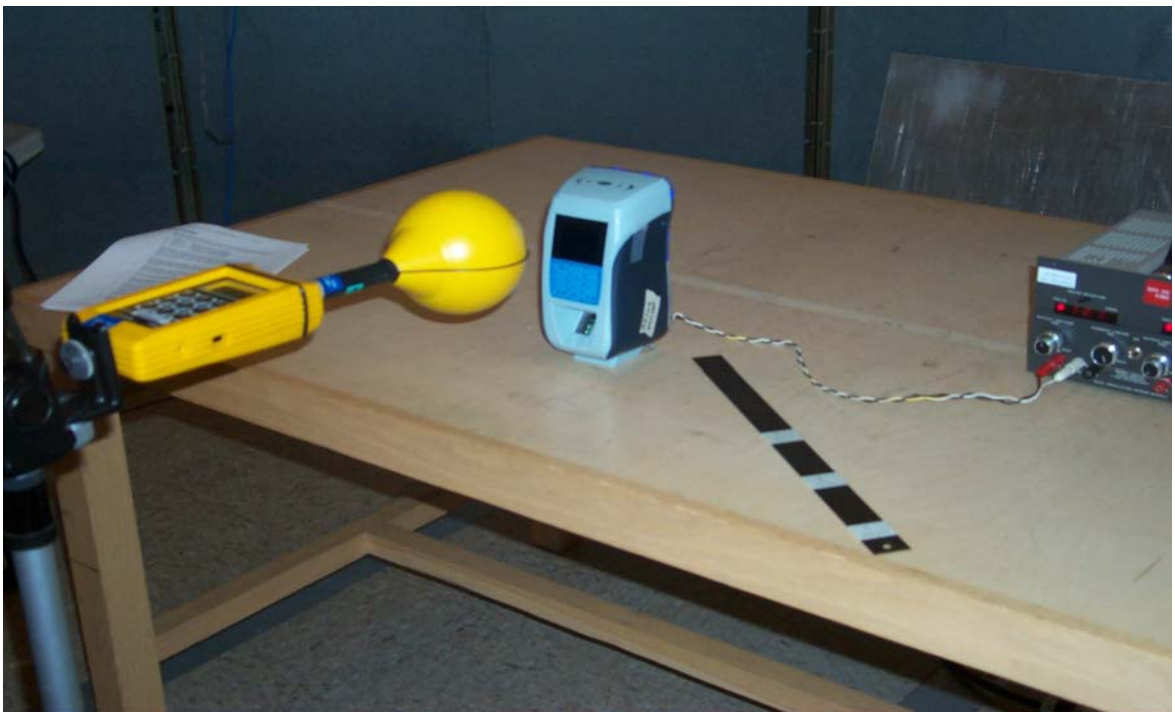
The EUT met the general public exposure criteria for both the electric field and the magnetic field.

Report Number	F0911005	**Date**	7 Nov 2011
EUT Name	MiY Series Readers	**EUT Power**	12 VDC
EUT Model	MiY-Card (MiY-Search)	**Test Std**	RSS-102
EUT Serial #	MiY-Card-2-0103-XXXX	Temperature (°C)	22
EUT Description	Access System	Humidity (%)	23
		Air Pressure (kPa)	987

Test Position	Frequency	Distance	Measurement	Limit	Margin
E-FIELD					
Top Right Side	10-400 MHz	20 cm	1.22	28	
	10-400 MHz	20 cm	1.19	28	
	10-400 MHz	20 cm	1.89	28	
	10-400 MHz	20 cm	2.16	28	
	10-400 MHz	20 cm	2.06	28	
	10-400 MHz	20 cm	1.67	28	
Average			1.698	28	26.3
H-FIELD					
Top Front	10-400 MHz	20 cm	.0275	.0730	
	10-400 MHz	20 cm	.0453	.0730	
	10-400 MHz	20 cm	.0283	.0730	
	10-400 MHz	20 cm	.0378	.0730	
	10-400 MHz	20 cm	.0252	.0730	
	10-400 MHz	20 cm	.0229	.0730	
Average			.0311	.0730	.0419

Test Engineer: Bruce Jungwirth	Date: 7 Nov 2011

5.6.4 Test Setup Photo



RF Exposure Measurement E-Field (top), H-Field (bottom)

6.0 LIST OF TEST EQUIPMENT

The following test equipment was used to perform the indicated tests. All test equipment was calibrated by an accredited calibration laboratory or by the manufacturer. All calibration intervals are one year. All equipment calibrations, test procedures, and test facility are traceable to the standards of the National Institute of Standards and Technology (NIST). The test facility site attenuation verification results fall within the normalized site attenuation (NSA) criteria for open area test sites using volumetric measurements.

RADIATED EMISSIONS

Electro Metrics Large Loop Antenna, Model ALR25M, Serial No. 603 (cal due date: 20 Oct 12)
Schaffner Biconilog Antenna, Model CBL6112B, Serial No. 27491 (cal due date: 21 Oct 12)
A. H Systems Horn Antenna, Model SAS_200/571 Serial No: 234 (cal due date: 22 Oct 12)
HP Pre-Amplifier, Model 8447D, Serial No. 1937A03090 (cal due date: 21Oct 12)
HP Pre-Amplifier, Model 83017A, Serial No. 3123A00259 (cal due date: 20 Oct 12)
Rohde & Schwarz EMI Receiver, Model ESIB 40, S/N 100235 (cal due date: 23 Oct 12)
Rohde & Schwarz ESIB 40 Firmware Version 4.34.3

CONDUCTED EMISSIONS

EMCO LISN, Model 3825-2, Serial No. 1039 (cal due date: 20 Oct 12)
Solar High Pass Filter, Model 8131 - 5.0 (cal due date: 30 Aug 12)
Rohde & Schwarz EMI Receiver, Model ESIB 40, S/N 100235 (cal due date: 23 Oct 12)
Rohde & Schwarz ESIB 40 Firmware Version 4.34.3

FREQUENCY STABILITY / POWER OUTPUT

Agilent Freq. Counter Model 53131A, Serial No. MY40012264 (cal due date: 21 Oct 12)
HP Spectrum Analyzer Model 8591A, Serial No. 3108A02041 (cal due date: 9 Oct 12)
Envirotronics Environ. Chamber, EH16-1-1.5AC, SN:10066639 (cal due date: 1 Nov 12)

OCCUPIED BANDWIDTH

Rohde & Schwarz EMI Receiver, Model ESIB 40, S/N 100235 (cal due date: 23 Oct 12)
Rohde & Schwarz ESIB 40 Firmware Version 4.34.3

EMF MEASUREMENT

Narda EMR 300 Exposure Meter, Model 2244/31 (cal due date: 15 Jan 12)
Narda Type 8 E-Probe, s/n BG0030 (cal due date: 13 Jan 12)
Narda Type 12 H-Probe, s/n AE0020 (cal due date: 13 Jan 12)

TEST FACILITY

Lindgren Semi-Anechoic Chamber, (verification due date: 30 Aug 12)
FCC Site Registration Number: 93334
Canadian Site Registration Number: 458A-1

SOFTWARE

EMI Measurement Software, Rohde & Schwarz ESIB-K1 Vers. 1.20

7.0 LABELING INFORMATION

The following labeling information is required by the FCC (Federal Communications Commission) and IC (Industry Canada) for Class A digital devices. Since the equipment contains both intentional and unintentional radiators, it must be labeled as a digital device and as an intentional radiator.

Labels on the Product

The following statements shall be placed in a conspicuous location on the device:

> **This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**
>
> **FCC ID: DGFSSDCARDSCM**
> **IC ID: 458A-SSDCARDSCM**
>
> > **"This Class A digital apparatus complies with Canadian ICES-003."**
> >
> > **"Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada."**

Statements in the Manuals

The following statement shall be placed in a prominent location in the text of the user manual:

> **NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide a reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.**
>
> **FCC ID: DGFSSDCARDSCM**

NO MODIFICATIONS. Modifications to this device shall not be made without the written consent of 3M, Company. Unauthorized modifications may void the authority granted under Federal Communications Commission and Industry Canada Rules permitting the operation of this device.

"This Class A digital apparatus complies with Canadian ICES-003."

"Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada."

IC ID: 458A-SSDCARDSCM

This is the last page of the Test Report