

NORTHWEST EMC

Third Millennium Systems Ltd

Door Access RFID Reader Family:

BD Inline / LNL-R11030 / 3M Inline / 3MIL-R11030

BD Mullion / LNL-R11330 / 3M Mullion / 3MIL-R11330

BD S-Gang / LNL-R11320 / 3M S-Gang / 3MIL-R11320

BD S-Gang Keypad / LNL R11325 / 3M S-Gang Keypad / 3MIL-R11325

FCC 15.207:2016

FCC 15.225:2016

13.56 MHz Radio

Report # ELEM0005 Rev. 2



NVLAP Lab Code: 201049-0

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America. This Report may only be duplicated in its entirety

CERTIFICATE OF TEST

Last Date of Test: September 15, 2016
Third Millennium Systems Ltd
Model: Door Access RFID Reader Family

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2016	
FCC 15.225:2016	ANSI C63.10:2013

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.4	Field Strength of Fundamental	Yes	Pass	
6.4	Field Strength of Spurious Emissions Less Than 30 MHz	Yes	Pass	
6.5	Field Strength of Spurious Emissions Greater Than 30 MHz	Yes	Pass	
6.8	Frequency Stability	Yes	Pass	

Deviations From Test Standards

None

Approved By:



Victor Ratinoff, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information.

REVISION HISTORY

Revision Number	Description	Date	Page Number
01	Updated Functional Description to clarify the radios contained in each model	10-7-16	7
02	Updated Cover Page to list each of the four variants of each model	10-20-16	1
	Updated functional description on Product Description page with explanation and table of models and variants	10-20-16	8
	Updated ANSI C63.10:2009 method to 2013	10-20-16	55, 56, 58

ACCREDITATIONS AND AUTHORIZATIONS

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

European Union

European Commission – Validated by the European Commission as a Notified Body under the R&TTE Directive.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIP / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>

<http://gsi.nist.gov/global/docs/cabs/designations.html>

MEASUREMENT UNCERTAINTY

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

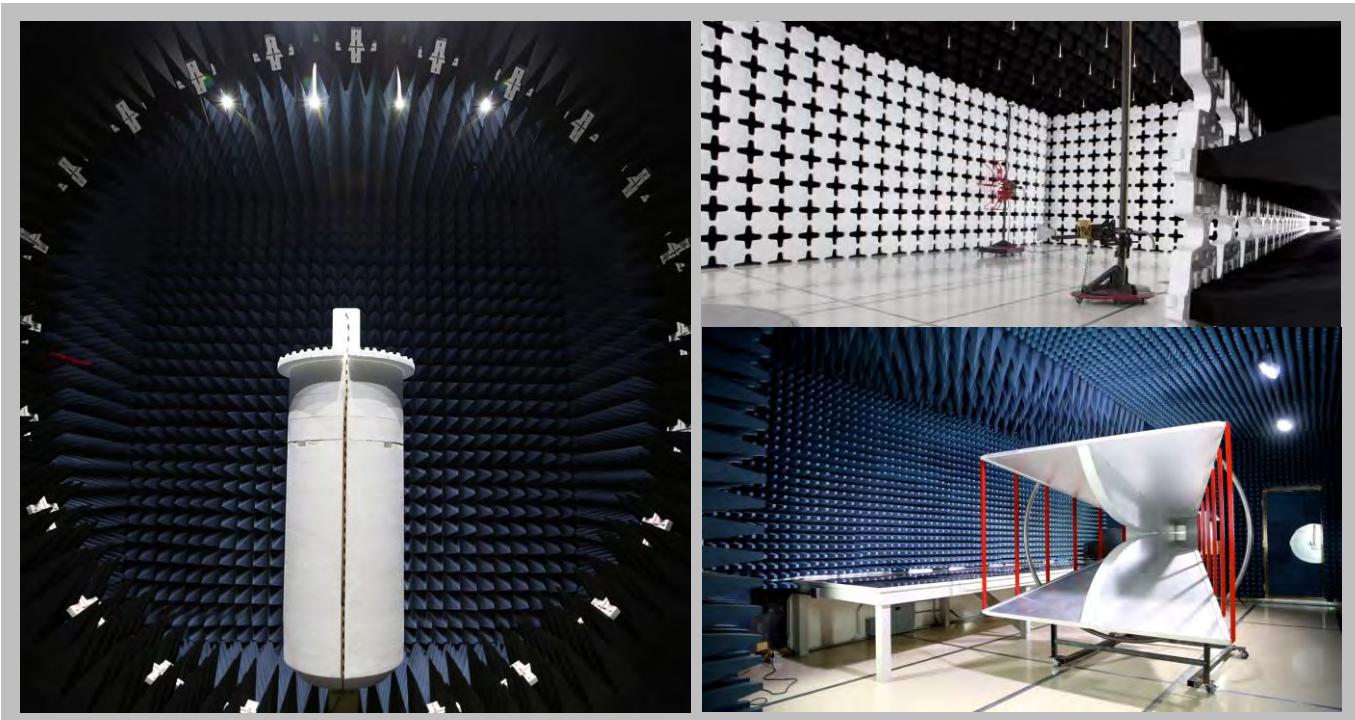
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

<u>Test</u>	<u>+ MU</u>	<u>- MU</u>
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

FACILITIES



California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code: 201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-2	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Third Millennium Systems Ltd
Address:	18/19 Torfaen Business Centre
City, State, Zip:	Panteg Way, New Inn Pontypool NP4 0LS
Test Requested By:	Alex Toohe
Model:	Door Access RFID Reader Family
First Date of Test:	September 7, 2016
Last Date of Test:	September 15, 2016
Receipt Date of Samples:	September 7, 2016
Equipment Design Stage:	Production
Equipment Condition:	No Damage

PRODUCT DESCRIPTION

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

The Door Access RFID Reader Family includes the AV400, AV390, AV3K90, and AV490. All four models contain a 125 kHz Inductive radio with one antenna and a Bluetooth radio module. Only the AV390, AV3K90 and AV490 also contain a 13.56 MHz radio that uses one modulation scheme and has one antenna configuration. All three radios use different antennas and can transmit simultaneously.

The four models tested, the AV400, AV390, AV3K90, and AV490, are intended to represent the entire Door Access RFID Reader Family. Each of those four models has four variants that are electrically and mechanically identical to the models tested. The table below provides the cross reference for each of the different models. Therefore, this report is intended to demonstrate compliance for each of the following models listed below.

AV00	
Old Model	New Models (AV00 Variants)
AV400	BD Inline
	LNL-R11030
	3M Inline
	3MIL-R11030

AV90	
Old Model	New Models (AV90 Variants)
AV490	BD Mullion
	LNL-R11330
	3M Mullion
	3MIL-R11330
AV390	BD S-Gang
	LNL-R11320
	3M S-Gang
	3MIL-R11320
AV3K90	BD S-Gang Keypad
	LNL-R11325
	3M S-Gang Keypad
	3MIL-R11325

Testing Objective:

To demonstrate compliance of the 13.56 MHz radio to FCC Part 15.225 specifications.

CONFIGURATIONS

Configuration ELEM0005- 1

EUT				
Description	Manufacturer	Model/Part Number	Serial Number	
3M MULLION (AV490)	Third Millennium Systems Ltd	3MIL-R11330	IRN0430-07	
Main PCB	Third Millennium Systems Ltd	AV90	None	

Remote Equipment Outside of Test Setup Boundary				
Description	Manufacturer	Model/Part Number	Serial Number	
DC Power Supply	Agilent	E3648A	MY51120046	

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable	No	3.0m	No	Device Under Test	DC Power Supply
AC Cable	No	1.8m	No	AC Mains	DC Power Supply

Configuration ELEM0005- 2

EUT				
Description	Manufacturer	Model/Part Number	Serial Number	
3M S-GANG (AV390)	Third Millennium Systems Ltd	3MIL-R11320	IRN0430-09	
Main PCB	Third Millennium Systems Ltd	AV90	None	

Peripherals in test setup boundary				
Description	Manufacturer	Model/Part Number	Serial Number	
DC Power Supply	Agilent	E3648A	MY51120046	

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable	No	3.0m	No	Device Under Test	DC Power Supply
AC Cable	No	1.8m	No	AC Mains	DC Power Supply

CONFIGURATIONS

Configuration ELEM0005- 4

EUT				
Description	Manufacturer	Model/Part Number	Serial Number	
3M S-GANG KEYPAD (AV3K90)	Third Millennium Systems Ltd	3MIL-R11325	IRN0430-10	
Main PCB	Third Millennium Systems Ltd	AV90	None	

Peripherals in test setup boundary				
Description	Manufacturer	Model/Part Number	Serial Number	
DC Power Supply	Agilent	E3648A	MY51120046	

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Cable	No	3.0m	No	Device Under Test	DC Power Supply
AC Cable	No	1.8m	No	AC Mains	DC Power Supply

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	9/7/2016	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	9/8/2016	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	9/8/2016	Field Strength of Spurious Emissions less than 30 MHz	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	9/8/2016	Field Strength of Spurious Emissions greater than 30 MHz	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	9/14/2016	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	9/15/2016	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS – AV390

TEST DESCRIPTION

The EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT.

The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.10.

In the event that the operating frequency of 13.56 MHz is causing the product to fail the FCC 15.207 limits, the following guidance can be used:

In the FCC-TCBC Conference Call Meeting Minutes from April 12, 2005, the FCC stated:

“We are willing to accept measurements on a 13.56 MHz transmitter done with a dummy load under the following conditions. First, perform the AC line conducted tests with the antenna attached to make sure the device complies with the 15.207 limits outside the transmitter's fundamental emission band, and then retest with a dummy load to make sure the device complies with the 15.207 limits inside the transmitter's fundamental emission band. For the second portion of these tests, only the fundamental emission band of the transmitter needs to be retested.”

This procedure was followed for the AC powerline conducted emissions testing documented on the following pages.

Per the FCC Guidance, the FCC will accept measurements on a 13.56 MHz transmitter done with a dummy load under the following conditions. (1) First, perform the AC line conducted tests with the antenna attached to make sure the device complies with the 15.207 limits outside the transmitter's fundamental emission band, and then retest with a dummy load to make sure the device complies with the 15.207 limits inside the transmitter's fundamental emission band. (2) For the second portion of these tests, only the fundamental emission band of the transmitter needs to be retested.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESCI	ARG	6/9/2016	6/9/2017
Cable - Conducted Cable Assembly	Northwest EMC	OCP, HFP, AWC	OCPA	4/4/2016	4/4/2017
LISN	Solar Electronics	9252-50-24-BNC	LIA	3/3/2016	3/3/2017

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

ELEM0005-2

MODES INVESTIGATED

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

POWERLINE CONDUCTED EMISSIONS – AV390

EUT:	Door Access RFID Reader Family (AV390)	Work Order:	ELEM0005
Serial Number:	IRN0430-09	Date:	09/07/2016
Customer:	Third Millennium Systems Ltd	Temperature:	21.7°C
Attendees:	None	Relative Humidity:	51.4%
Customer Project:	TRA-030990	Bar. Pressure:	1018 mb
Tested By:	Mike Tran	Job Site:	OC06
Power:	12VDC	Configuration:	ELEM0005-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	1	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

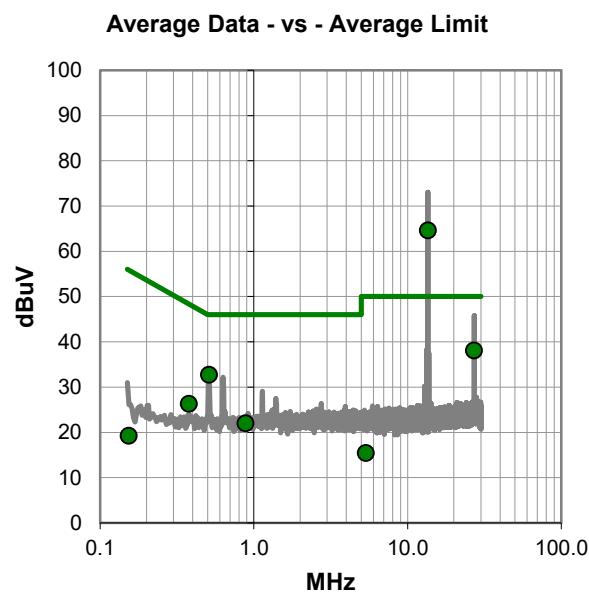
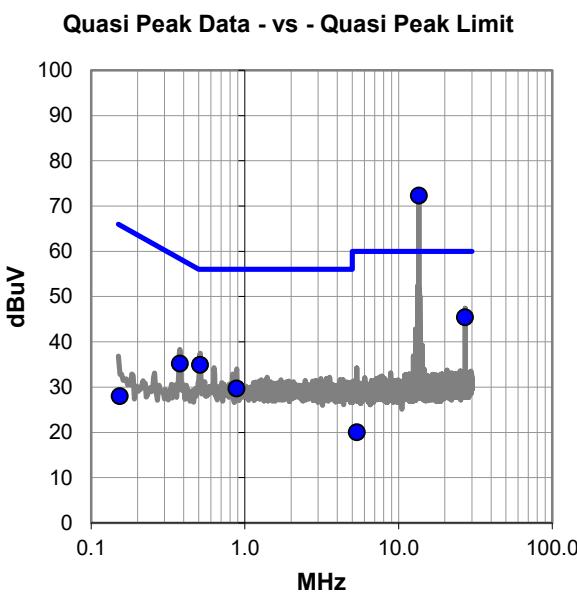
The EUT contains a 125 kHz Inductive radio, a Bluetooth radio module, and a 13.56 MHz radio. All three radios use different antennas which transmit simultaneously. The 125 KHz and 13.56 MHz radios were transmitting with no means to stop transmitting. The Bluetooth radio was not transmitting.

EUT OPERATING MODES

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS – AV390

RESULTS - Run #1

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	51.5	20.8	72.3	60.0	12.3
27.122	23.5	21.9	45.4	60.0	-14.6
0.512	15.0	19.9	34.9	56.0	-21.1
0.379	15.2	20.0	35.2	58.3	-23.1
0.884	9.7	20.0	29.7	56.0	-26.3
0.154	7.8	20.2	28.0	65.8	-37.8
5.355	-0.3	20.3	20.0	60.0	-40.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	43.8	20.8	64.6	50.0	14.6
27.122	16.2	21.9	38.1	50.0	-11.9
0.512	12.8	19.9	32.7	46.0	-13.3
0.379	6.3	20.0	26.3	48.3	-22.0
0.884	2.0	20.0	22.0	46.0	-24.0
5.355	-4.9	20.3	15.4	50.0	-34.6
0.154	-1.0	20.2	19.2	55.8	-36.6

CONCLUSION



Tested By

POWERLINE CONDUCTED EMISSIONS – AV390

EUT:	Door Access RFID Reader Family (AV390)	Work Order:	ELEM0005
Serial Number:	IRN0430-09	Date:	09/07/2016
Customer:	Third Millennium Systems Ltd	Temperature:	21.7°C
Attendees:	None	Relative Humidity:	51.4%
Customer Project:	TRA-030990	Bar. Pressure:	1018 mb
Tested By:	Mike Tran	Job Site:	OC06
Power:	12VDC	Configuration:	ELEM0005-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	2	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

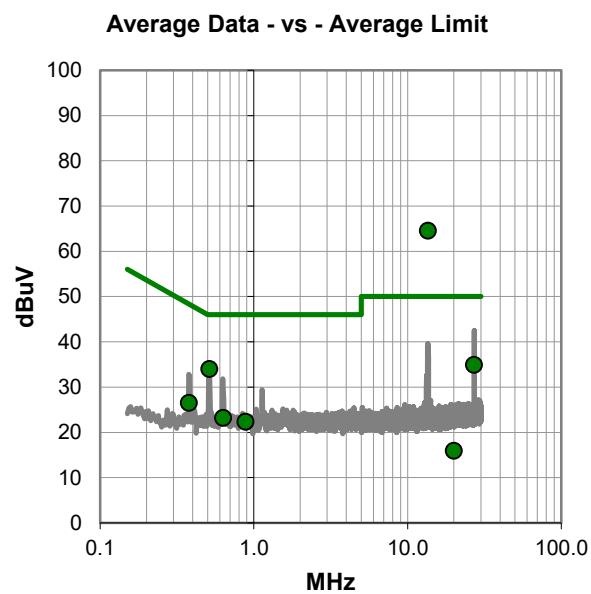
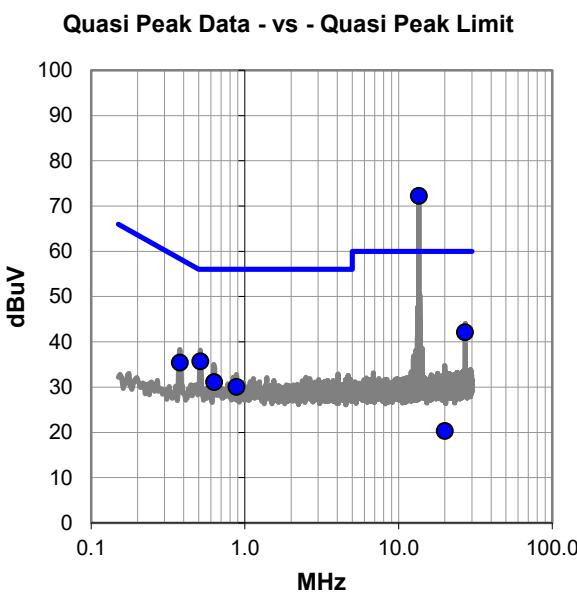
The EUT contains a 125 kHz Inductive radio, a Bluetooth radio module, and a 13.56 MHz radio. All three radios use different antennas which transmit simultaneously. The 125 KHz and 13.56 MHz radios were transmitting with no means to stop transmitting. The Bluetooth radio was not transmitting.

EUT OPERATING MODES

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS – AV390

RESULTS - Run #2

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	51.4	20.8	72.2	60.0	12.2
27.122	20.2	21.9	42.1	60.0	-17.9
0.513	15.8	19.9	35.7	56.0	-20.3
0.379	15.4	20.0	35.4	58.3	-22.9
0.631	11.1	20.0	31.1	56.0	-24.9
0.883	10.0	20.0	30.0	56.0	-26.0
19.994	-0.9	21.2	20.3	60.0	-39.7

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	43.7	20.8	64.5	50.0	14.5
0.513	14.1	19.9	34.0	46.0	-12.0
27.122	13.0	21.9	34.9	50.0	-15.1
0.379	6.5	20.0	26.5	48.3	-21.8
0.631	3.2	20.0	23.2	46.0	-22.8
0.883	2.3	20.0	22.3	46.0	-23.7
19.994	-5.3	21.2	15.9	50.0	-34.1

CONCLUSION



Tested By

POWERLINE CONDUCTED EMISSIONS – AV390

EUT:	Door Access RFID Reader Family (AV390)	Work Order:	ELEM0005
Serial Number:	IRN0430-09	Date:	09/13/2016
Customer:	Third Millennium Systems Ltd	Temperature:	21.2°C
Attendees:	None	Relative Humidity:	48%
Customer Project:	TRA-030990	Bar. Pressure:	1018 mb
Tested By:	Mike Tran	Job Site:	OC06
Power:	12VDC	Configuration:	ELEM0005-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	12	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

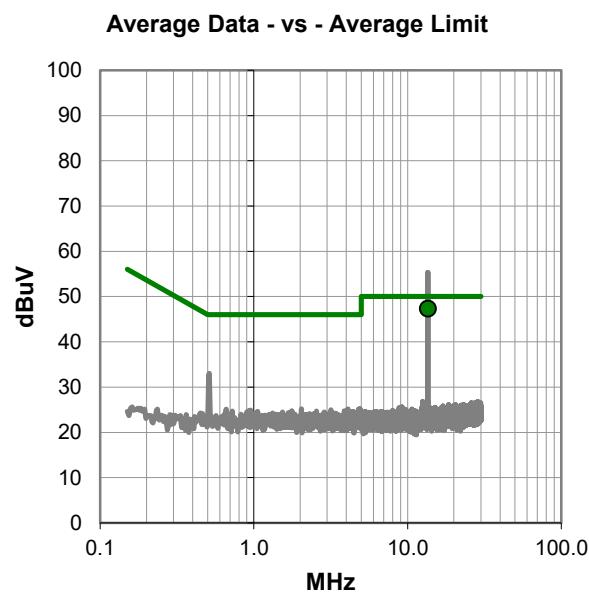
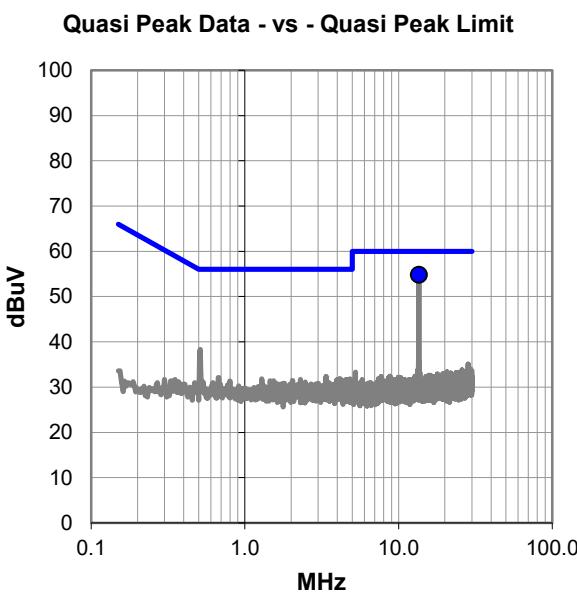
The EUT contains a 125 kHz Inductive radio, a Bluetooth radio module, and a 13.56 MHz radio. All three radios use different antennas which transmit simultaneously. The 125 KHz radio was transmitting with no means to stop transmitting. The 13.56 MHz radio antenna was terminated by a 50 Ohm load. The Bluetooth radio was not transmitting.

EUT OPERATING MODES

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS – AV390

RESULTS - Run #12

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	34.0	20.8	54.8	60.0	-5.2

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	26.5	20.8	47.3	50.0	-2.7

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS – AV390

EUT:	Door Access RFID Reader Family (AV390)	Work Order:	ELEM0005
Serial Number:	IRN0430-09	Date:	09/13/2016
Customer:	Third Millennium Systems Ltd	Temperature:	21.2°C
Attendees:	None	Relative Humidity:	48%
Customer Project:	TRA-030990	Bar. Pressure:	1018 mb
Tested By:	Mike Tran	Job Site:	OC06
Power:	12VDC	Configuration:	ELEM0005-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	14	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

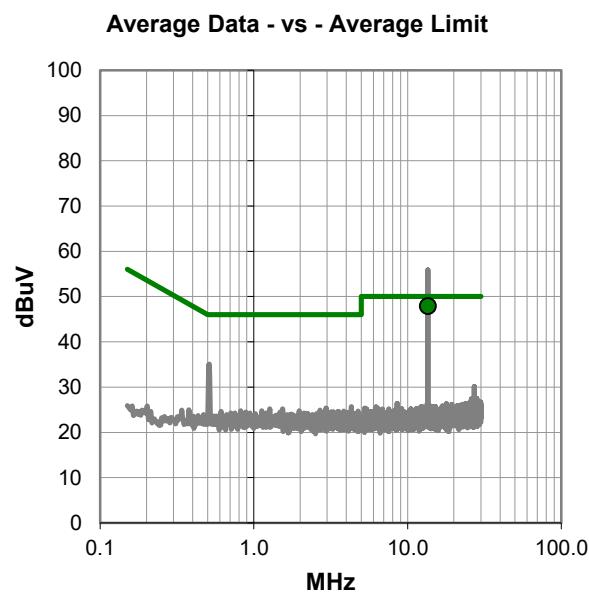
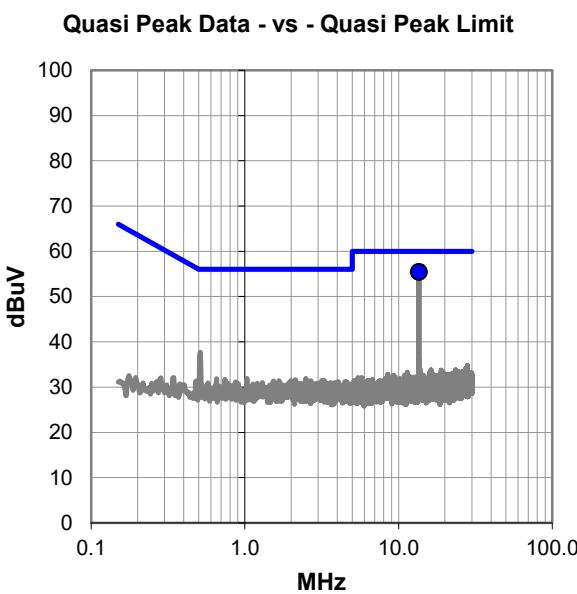
The EUT contains a 125 kHz Inductive radio, a Bluetooth radio module, and a 13.56 MHz radio. All three radios use different antennas which transmit simultaneously. The 125 KHz radio was transmitting with no means to stop transmitting. The 13.56 MHz radio antenna was terminated by a 50 Ohm load. The Bluetooth radio was not transmitting.

EUT OPERATING MODES

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS – AV390

RESULTS - Run #14

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	34.6	20.8	55.4	60.0	-4.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	27.1	20.8	47.9	50.0	-2.1

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS – AV3K90



TEST DESCRIPTION

The EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT.

The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.10.

In the event that the operating frequency of 13.56 MHz is causing the product to fail the FCC 15.207 limits, the following guidance can be used:

In the FCC-TCBC Conference Call Meeting Minutes from April 12, 2005, the FCC stated:

“We are willing to accept measurements on a 13.56 MHz transmitter done with a dummy load under the following conditions. First, perform the AC line conducted tests with the antenna attached to make sure the device complies with the 15.207 limits outside the transmitter's fundamental emission band, and then retest with a dummy load to make sure the device complies with the 15.207 limits inside the transmitter's fundamental emission band. For the second portion of these tests, only the fundamental emission band of the transmitter needs to be retested.”

This procedure was followed for the AC powerline conducted emissions testing documented on the following pages.

Per the FCC Guidance, the FCC will accept measurements on a 13.56 MHz transmitter done with a dummy load under the following conditions. (1) First, perform the AC line conducted tests with the antenna attached to make sure the device complies with the 15.207 limits outside the transmitter's fundamental emission band, and then retest with a dummy load to make sure the device complies with the 15.207 limits inside the transmitter's fundamental emission band. (2) For the second portion of these tests, only the fundamental emission band of the transmitter needs to be retested.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESCI	ARG	6/9/2016	6/9/2017
Cable - Conducted Cable Assembly	Northwest EMC	OCP, HFP, AWC	OCPA	4/4/2016	4/4/2017
LISN	Solar Electronics	9252-50-24-BNC	LIA	3/3/2016	3/3/2017

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

ELEM0005-4

MODES INVESTIGATED

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

POWERLINE CONDUCTED EMISSIONS – AV3K90

EUT:	Door Access RFID Reader Family (AV3K90)	Work Order:	ELEM0005
Serial Number:	IRN0430-10	Date:	09/07/2016
Customer:	Third Millennium Systems Ltd	Temperature:	21.7°C
Attendees:	None	Relative Humidity:	51.4%
Customer Project:	TRA-030990	Bar. Pressure:	1018 mb
Tested By:	Mike Tran	Job Site:	OC06
Power:	12VDC	Configuration:	ELEM0005-4

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	7	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

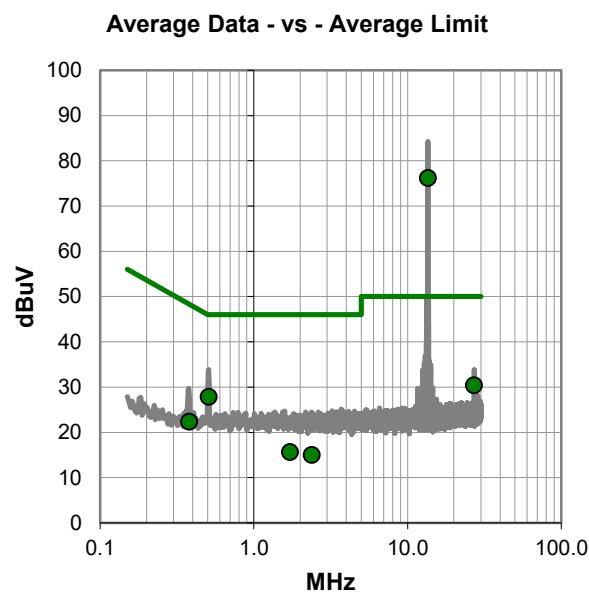
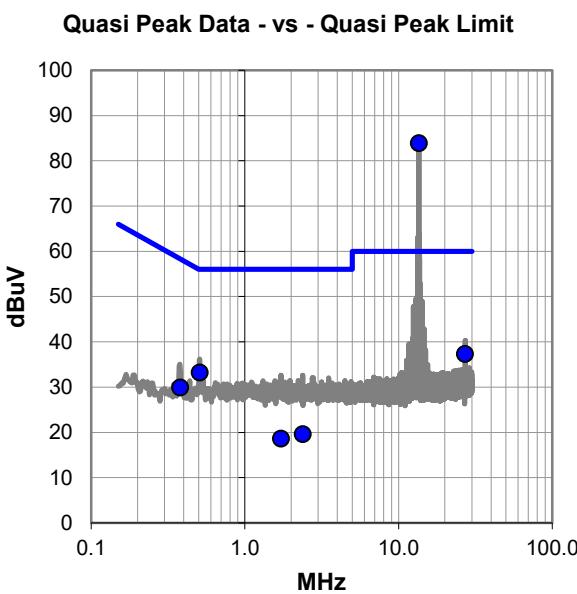
The EUT contains a 125 kHz Inductive radio, a Bluetooth radio module, and a 13.56 MHz radio. All three radios use different antennas which transmit simultaneously. The 125 KHz and 13.56 MHz radios were transmitting with no means to stop transmitting. The Bluetooth radio was not transmitting.

EUT OPERATING MODES

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS – AV3K90

RESULTS - Run #7

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	63.1	20.8	83.9	60.0	23.9
27.121	15.4	21.9	37.3	60.0	-22.7
0.509	13.3	19.9	33.2	56.0	-22.8
0.379	9.9	20.0	29.9	58.3	-28.4
2.384	-0.5	20.1	19.6	56.0	-36.4
1.718	-1.5	20.1	18.6	56.0	-37.4

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	55.4	20.8	76.2	50.0	26.2
0.509	7.9	19.9	27.8	46.0	-18.2
27.121	8.5	21.9	30.4	50.0	-19.6
0.379	2.3	20.0	22.3	48.3	-26.0
1.718	-4.5	20.1	15.6	46.0	-30.4
2.384	-5.1	20.1	15.0	46.0	-31.0

CONCLUSION



Tested By

POWERLINE CONDUCTED EMISSIONS – AV3K90

EUT:	Door Access RFID Reader Family (AV3K90)	Work Order:	ELEM0005
Serial Number:	IRN0430-10	Date:	09/07/2016
Customer:	Third Millennium Systems Ltd	Temperature:	21.7°C
Attendees:	None	Relative Humidity:	51.4%
Customer Project:	TRA-030990	Bar. Pressure:	1018 mb
Tested By:	Mike Tran	Job Site:	OC06
Power:	12VDC	Configuration:	ELEM0005-4

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	8	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

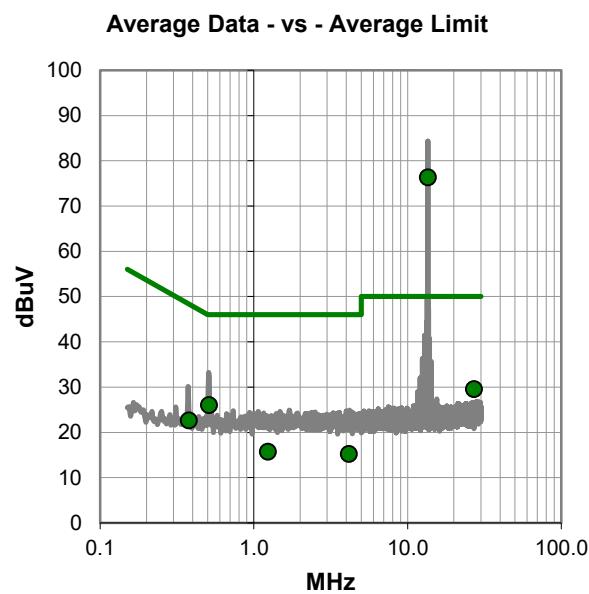
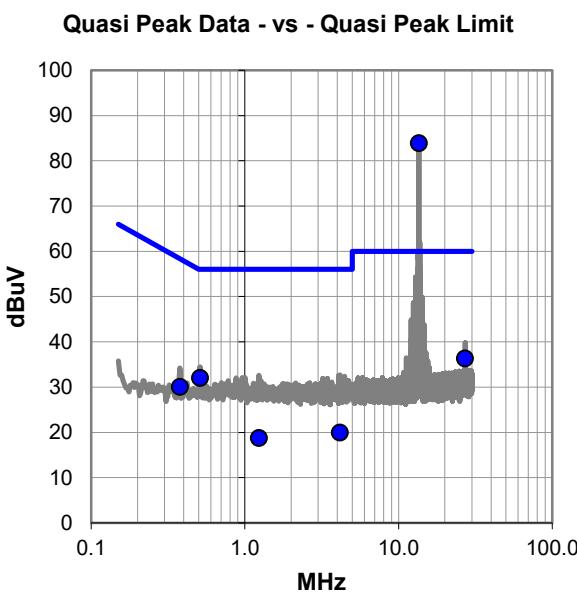
The EUT contains a 125 kHz Inductive radio, a Bluetooth radio module, and a 13.56 MHz radio. All three radios use different antennas which transmit simultaneously. The 125 KHz and 13.56 MHz radios were transmitting with no means to stop transmitting. The Bluetooth radio was not transmitting.

EUT OPERATING MODES

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS – AV3K90

RESULTS - Run #8

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	63.1	20.8	83.9	60.0	23.9
27.120	14.4	21.9	36.3	60.0	-23.7
0.511	12.1	19.9	32.0	56.0	-24.0
0.378	10.0	20.0	30.0	58.3	-28.3
4.150	-0.4	20.3	19.9	56.0	-36.1
1.234	-1.4	20.1	18.7	56.0	-37.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	55.5	20.8	76.3	50.0	26.3
0.511	6.1	19.9	26.0	46.0	-20.0
27.120	7.6	21.9	29.5	50.0	-20.5
0.378	2.6	20.0	22.6	48.3	-25.7
1.234	-4.4	20.1	15.7	46.0	-30.3
4.150	-5.1	20.3	15.2	46.0	-30.8

CONCLUSION



Tested By

POWERLINE CONDUCTED EMISSIONS – AV3K90

EUT:	Door Access RFID Reader Family (AV3K90)	Work Order:	ELEM0005
Serial Number:	IRN0430-10	Date:	09/13/2016
Customer:	Third Millennium Systems Ltd	Temperature:	21.2°C
Attendees:	None	Relative Humidity:	48%
Customer Project:	TRA-030990	Bar. Pressure:	1018 mb
Tested By:	Mike Tran	Job Site:	OC06
Power:	12VDC	Configuration:	ELEM0005-4

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	15	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

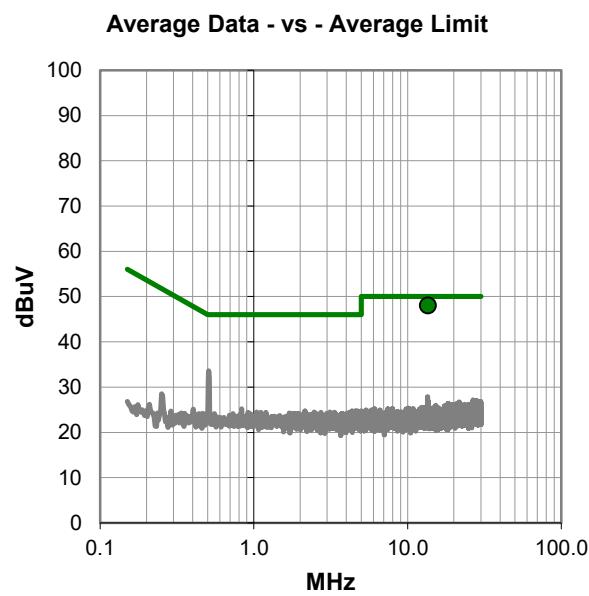
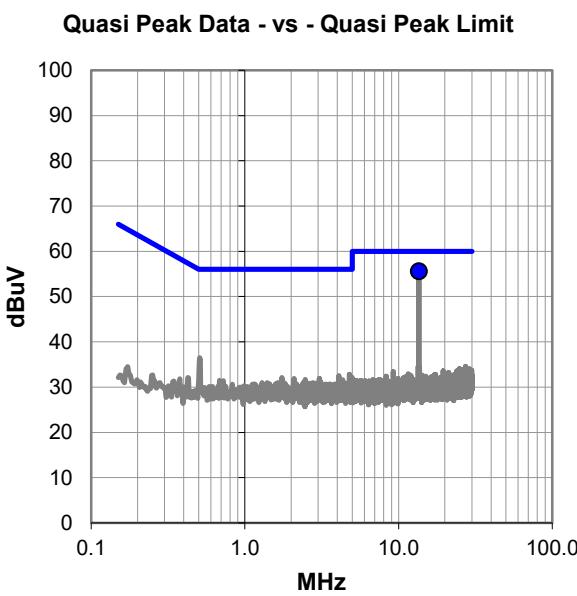
The EUT contains a 125 kHz Inductive radio, a Bluetooth radio module, and a 13.56 MHz radio. All three radios use different antennas which transmit simultaneously. The 125 KHz radio was transmitting with no means to stop transmitting. The 13.56 MHz radio antenna was terminated by a 50 Ohm load. The Bluetooth radio was not transmitting.

EUT OPERATING MODES

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS – AV3K90

NORTHWEST
EMC
WTD.2016.05.18

RESULTS - Run #15

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	34.8	20.8	55.6	60.0	-4.4

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	27.2	20.8	48.0	50.0	-2.0

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS – AV3K90

EUT:	Door Access RFID Reader Family (AV3K90)	Work Order:	ELEM0005
Serial Number:	IRN0430-10	Date:	09/13/2016
Customer:	Third Millennium Systems Ltd	Temperature:	21.2°C
Attendees:	None	Relative Humidity:	48%
Customer Project:	TRA-030990	Bar. Pressure:	1018 mb
Tested By:	Mike Tran	Job Site:	OC06
Power:	12VDC	Configuration:	ELEM0005-4

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	16	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

The EUT contains a 125 kHz Inductive radio, a Bluetooth radio module, and a 13.56 MHz radio. All three radios use different antennas which transmit simultaneously. The 125 KHz radio was transmitting with no means to stop transmitting. The 13.56 MHz radio antenna was terminated by a 50 Ohm load. The Bluetooth radio was not transmitting.

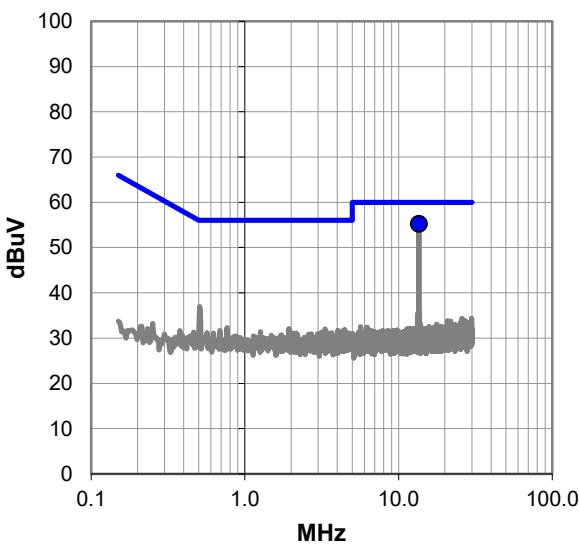
EUT OPERATING MODES

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

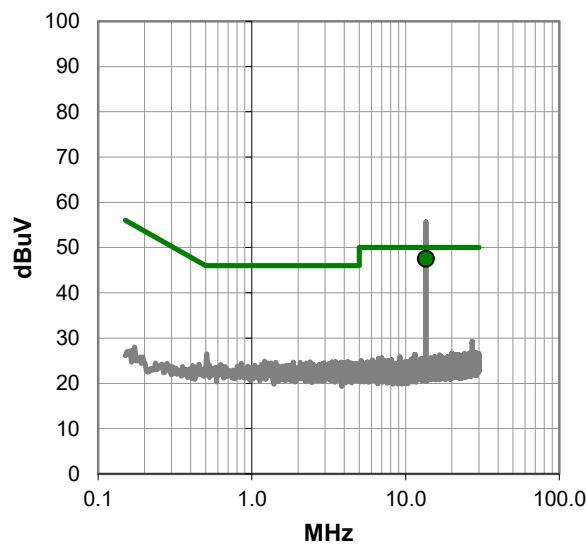
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS – AV3K90

RESULTS - Run #16

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	34.4	20.8	55.2	60.0	-4.8

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	26.7	20.8	47.5	50.0	-2.5

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS – AV490

TEST DESCRIPTION

The EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT.

The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.10.

In the event that the operating frequency of 13.56 MHz is causing the product to fail the FCC 15.207 limits, the following guidance can be used:

In the FCC-TCBC Conference Call Meeting Minutes from April 12, 2005, the FCC stated:

“We are willing to accept measurements on a 13.56 MHz transmitter done with a dummy load under the following conditions. First, perform the AC line conducted tests with the antenna attached to make sure the device complies with the 15.207 limits outside the transmitter's fundamental emission band, and then retest with a dummy load to make sure the device complies with the 15.207 limits inside the transmitter's fundamental emission band. For the second portion of these tests, only the fundamental emission band of the transmitter needs to be retested.”

This procedure was followed for the AC powerline conducted emissions testing documented on the following pages.

Per the FCC Guidance, the FCC will accept measurements on a 13.56 MHz transmitter done with a dummy load under the following conditions. (1) First, perform the AC line conducted tests with the antenna attached to make sure the device complies with the 15.207 limits outside the transmitter's fundamental emission band, and then retest with a dummy load to make sure the device complies with the 15.207 limits inside the transmitter's fundamental emission band. (2) For the second portion of these tests, only the fundamental emission band of the transmitter needs to be retested.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESCI	ARG	6/9/2016	6/9/2017
Cable - Conducted Cable Assembly	Northwest EMC	OCP, HFP, AWC	OCPA	4/4/2016	4/4/2017
LISN	Solar Electronics	9252-50-24-BNC	LIA	3/3/2016	3/3/2017

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

ELEM0005-1

MODES INVESTIGATED

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

POWERLINE CONDUCTED EMISSIONS – AV490

EUT:	Door Access RFID Reader Family (AV490)	Work Order:	ELEM0005
Serial Number:	IRN0430-07	Date:	09/07/2016
Customer:	Third Millennium Systems Ltd	Temperature:	21.7°C
Attendees:	None	Relative Humidity:	51.4%
Customer Project:	TRA-030990	Bar. Pressure:	1018 mb
Tested By:	Mike Tran	Job Site:	OC06
Power:	12VDC	Configuration:	ELEM0005-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	3	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

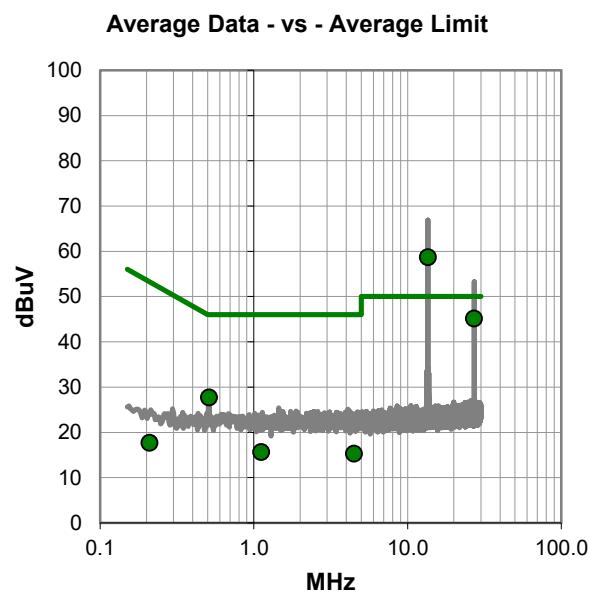
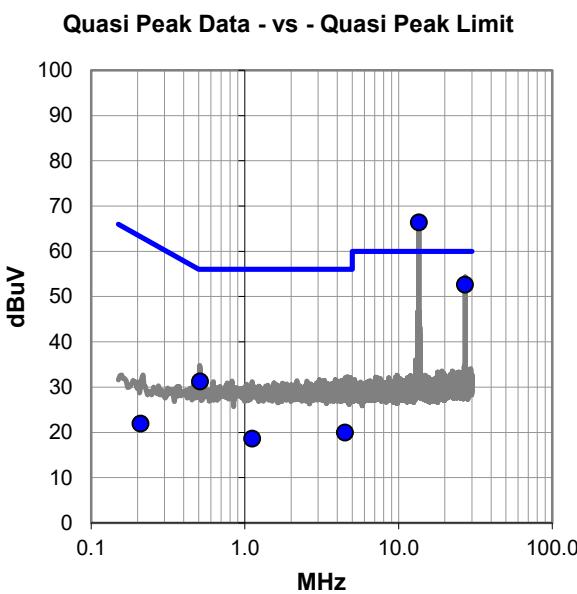
The EUT contains a 125 kHz Inductive radio, a Bluetooth radio module, and a 13.56 MHz radio. All three radios use different antennas which transmit simultaneously. The 125 KHz and 13.56 MHz radios were transmitting with no means to stop transmitting. The Bluetooth radio was not transmitting.

EUT OPERATING MODES

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS – AV490

RESULTS - Run #3

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	45.6	20.8	66.4	60.0	6.4
27.122	30.7	21.9	52.6	60.0	-7.4
0.510	11.3	19.9	31.2	56.0	-24.8
4.485	-0.4	20.3	19.9	56.0	-36.1
1.119	-1.4	20.0	18.6	56.0	-37.4
0.209	1.8	20.1	21.9	63.2	-41.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	37.9	20.8	58.7	50.0	8.7
27.122	23.2	21.9	45.1	50.0	-4.9
0.510	7.8	19.9	27.7	46.0	-18.3
1.119	-4.4	20.0	15.6	46.0	-30.4
4.485	-5.0	20.3	15.3	46.0	-30.7
0.209	-2.4	20.1	17.7	53.2	-35.5

CONCLUSION



Tested By

POWERLINE CONDUCTED EMISSIONS – AV490

EUT:	Door Access RFID Reader Family (AV490)	Work Order:	ELEM0005
Serial Number:	IRN0430-07	Date:	09/07/2016
Customer:	Third Millennium Systems Ltd	Temperature:	21.7°C
Attendees:	None	Relative Humidity:	51.4%
Customer Project:	TRA-030990	Bar. Pressure:	1018 mb
Tested By:	Mike Tran	Job Site:	OC06
Power:	12VDC	Configuration:	ELEM0005-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	4	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

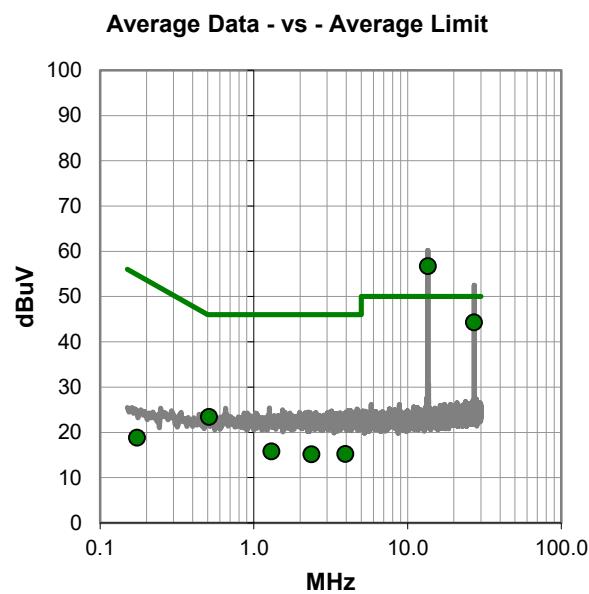
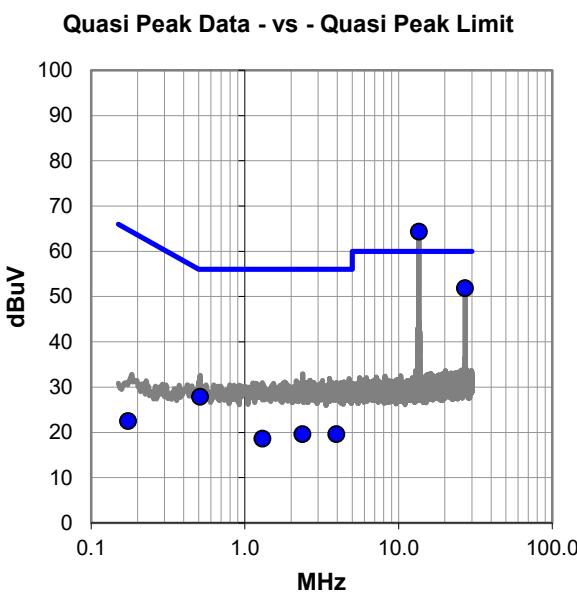
The EUT contains a 125 kHz Inductive radio, a Bluetooth radio module, and a 13.56 MHz radio. All three radios use different antennas which transmit simultaneously. The 125 KHz and 13.56 MHz radios were transmitting with no means to stop transmitting. The Bluetooth radio was not transmitting.

EUT OPERATING MODES

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS – AV490

RESULTS - Run #4

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	43.5	20.8	64.3	60.0	4.3
27.121	29.9	21.9	51.8	60.0	-8.2
0.512	7.9	19.9	27.8	56.0	-28.2
2.377	-0.5	20.1	19.6	56.0	-36.4
3.936	-0.6	20.2	19.6	56.0	-36.4
1.300	-1.5	20.1	18.6	56.0	-37.4
0.174	2.3	20.2	22.5	64.8	-42.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	35.9	20.8	56.7	50.0	6.7
27.121	22.4	21.9	44.3	50.0	-5.7
0.512	3.5	19.9	23.4	46.0	-22.6
1.300	-4.3	20.1	15.8	46.0	-30.2
3.936	-5.0	20.2	15.2	46.0	-30.8
2.377	-5.0	20.1	15.1	46.0	-30.9
0.174	-1.4	20.2	18.8	54.8	-36.0

CONCLUSION



Tested By

POWERLINE CONDUCTED EMISSIONS – AV490

EUT:	Door Access RFID Reader Family (AV490)	Work Order:	ELEM0005
Serial Number:	IRN0430-07	Date:	09/15/2016
Customer:	Third Millennium Systems Ltd	Temperature:	21.2°C
Attendees:	None	Relative Humidity:	49.6%
Customer Project:	TRA-030990	Bar. Pressure:	1018 mb
Tested By:	Mike Tran	Job Site:	OC06
Power:	12VDC	Configuration:	ELEM0005-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	18	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

The EUT contains a 125 kHz Inductive radio, a Bluetooth radio module, and a 13.56 MHz radio. All three radios use different antennas which transmit simultaneously. The 125 KHz radio was transmitting with no means to stop transmitting. Pertaining to the 13.56 MHz radio, per the manufacturer's instructions, the following components were removed on the PCB to disconnect the aerial loop: R33, L8, L7, and R32. The Bluetooth radio was not transmitting.

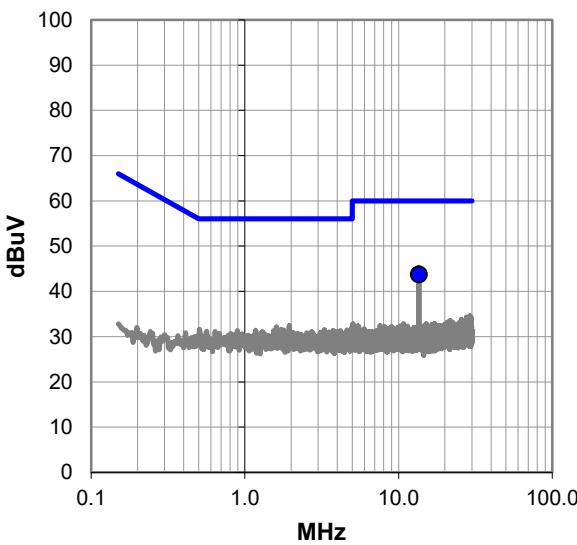
EUT OPERATING MODES

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

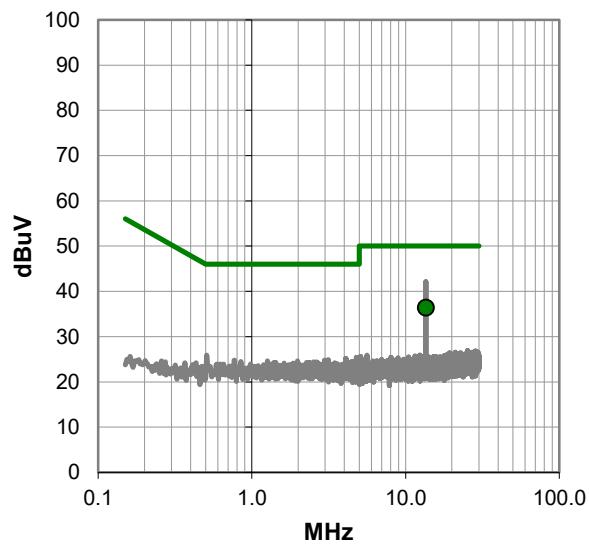
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS – AV490

RESULTS - Run #18

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	22.9	20.8	43.7	60.0	-16.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	15.6	20.8	36.4	50.0	-13.6

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS – AV490

EUT:	Door Access RFID Reader Family (AV490)	Work Order:	ELEM0005
Serial Number:	IRN0430-07	Date:	09/15/2016
Customer:	Third Millennium Systems Ltd	Temperature:	21.2°C
Attendees:	None	Relative Humidity:	49.6%
Customer Project:	TRA-030990	Bar. Pressure:	1018 mb
Tested By:	Mike Tran	Job Site:	OC06
Power:	12VDC	Configuration:	ELEM0005-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	19	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

The EUT contains a 125 kHz Inductive radio, a Bluetooth radio module, and a 13.56 MHz radio. All three radios use different antennas which transmit simultaneously. The 125 KHz radio was transmitting with no means to stop transmitting. Pertaining to the 13.56 MHz radio, per the manufacturer's instructions, the following components were removed on the PCB to disconnect the aerial loop: R33, L8, L7, and R32. The Bluetooth radio was not transmitting.

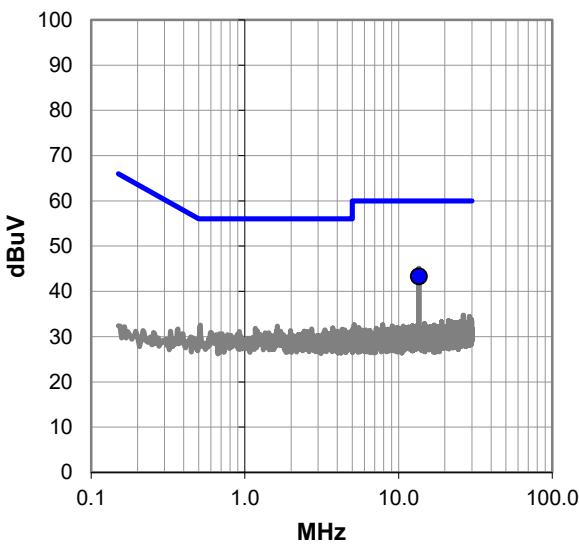
EUT OPERATING MODES

Transmitting at 125KHz and 13.56MHz, 2.4GHz off.

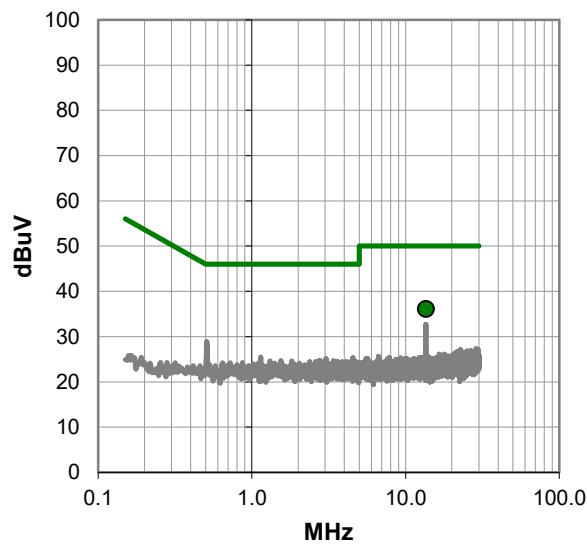
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS – AV490

RESULTS - Run #19

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	22.5	20.8	43.3	60.0	-16.7

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.561	15.3	20.8	36.1	50.0	-13.9

CONCLUSION

Pass



Tested By

FIELD STRENGTH OF FUNDAMENTAL AV390

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting at 13.56MHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	10 kHz	Stop Frequency	30 MHz
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SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	Northwest EMC	30MHz-6GHz RE Cables	OCB	1/21/2016	12 mo
Antenna	EMCO	6502	AZB	8/14/2015	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	7/15/2016	12 mo

TEST DESCRIPTION

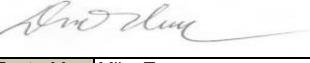
The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

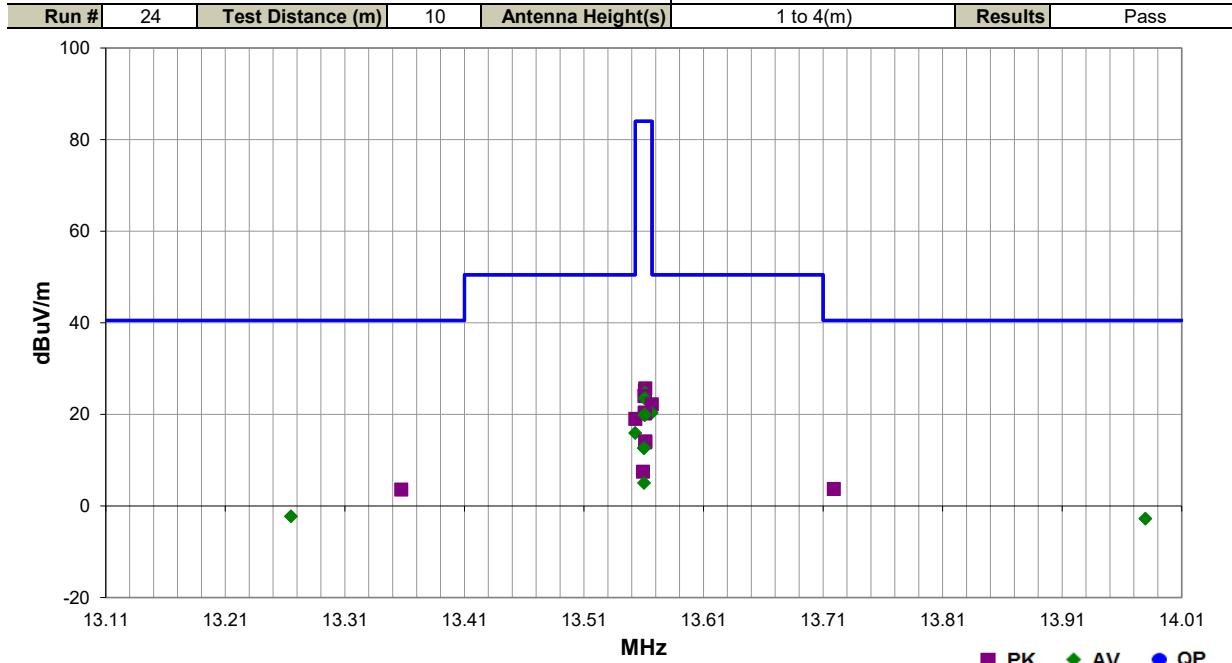
While scanning, fundamental carrier from the EUT was maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

FIELD STRENGTH OF FUNDAMENTAL AV390

**NORTHWEST
EMC**
PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	Date:	09/08/16	
Project:	TRA-030990	Temperature:	21.2 °C	
Job Site:	OC08	Humidity:	45.7% RH	
Serial Number:	IRN0430-09	Barometric Pres.:	1021 mbar	Tested by: Mike Tran
EUT:	Door Access RFID Reader Family (AV390)			
Configuration:	2			
Customer:	Third Millennium Systems Ltd			
Attendees:	None			
EUT Power:	12V/DC			
Operating Mode:	Transmitting at 13.56MHz			
Deviations:	None			
Comments:	None			
Test Specifications		Test Method		
FCC 15.225:2016		ANSI C63.10:2013		



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
13.553	27.1	11.0	1.0	115.0	10.0	0.0	Perp EUT	PK	-19.1	19.0	50.5	-31.5	EUT Vert
13.553	24.0	11.0	1.0	115.0	10.0	0.0	Perp EUT	AV	-19.1	15.9	50.5	-34.6	EUT Vert
13.719	11.7	11.1	1.0	224.0	10.0	0.0	Perp EUT	PK	-19.1	3.7	40.5	-36.8	EUT Vert
13.357	11.7	11.0	1.0	223.0	10.0	0.0	Perp EUT	PK	-19.1	3.6	40.5	-36.9	EUT Vert
13.265	5.8	11.0	1.0	223.0	10.0	0.0	Perp EUT	AV	-19.1	-2.3	40.5	-42.8	EUT Vert
13.980	5.2	11.1	1.0	224.0	10.0	0.0	Perp EUT	AV	-19.1	-2.8	40.5	-43.3	EUT Vert
13.561	33.7	11.1	1.0	90.0	10.0	0.0	Perp EUT	PK	-19.1	25.7	84.0	-58.3	EUT Vert
13.561	33.3	11.1	1.0	90.0	10.0	0.0	Perp EUT	AV	-19.1	25.3	84.0	-58.7	EUT Vert
13.561	33.2	11.1	1.0	1.0	10.0	0.0	Perp EUT	PK	-19.1	25.2	84.0	-58.8	EUT on Side
13.561	32.8	11.1	1.0	1.0	10.0	0.0	Perp EUT	AV	-19.1	24.8	84.0	-59.2	EUT on Side
13.561	32.0	11.1	1.5	1.0	10.0	0.0	Par GND	PK	-19.1	24.0	84.0	-60.0	EUT on Side
13.561	32.0	11.1	1.5	98.0	10.0	0.0	Par GND	PK	-19.1	24.0	84.0	-60.0	EUT Vert
13.561	31.5	11.1	1.5	98.0	10.0	0.0	Par GND	AV	-19.1	23.5	84.0	-60.5	EUT Vert
13.561	31.4	11.1	1.5	1.0	10.0	0.0	Par GND	AV	-19.1	23.4	84.0	-60.6	EUT on Side
13.567	30.2	11.1	1.0	99.0	10.0	0.0	Perp EUT	PK	-19.1	22.2	84.0	-61.8	EUT Vert
13.561	28.4	11.1	1.0	295.0	10.0	0.0	Par EUT	PK	-19.1	20.4	84.0	-63.6	EUT on Side
13.567	28.3	11.1	1.0	99.0	10.0	0.0	Perp EUT	AV	-19.1	20.3	84.0	-63.7	EUT Vert
13.561	28.2	11.1	1.0	21.0	10.0	0.0	Par GND	PK	-19.1	20.2	84.0	-63.8	EUT Vert

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
13.561	28.0	11.1	1.0	295.0	10.0	0.0	Par EUT	AV	-19.1	20.0	84.0	-64.0	EUT on Side
13.561	27.8	11.1	1.0	21.0	10.0	0.0	Par GND	AV	-19.1	19.8	84.0	-64.2	EUT Vert
13.561	22.1	11.1	1.0	135.0	10.0	0.0	Perp EUT	PK	-19.1	14.1	84.0	-69.9	EUT Horz
13.561	21.9	11.1	1.5	135.0	10.0	0.0	Par GND	PK	-19.1	13.9	84.0	-70.1	EUT Horz
13.561	20.7	11.1	1.0	135.0	10.0	0.0	Perp EUT	AV	-19.1	12.7	84.0	-71.3	EUT Horz
13.560	20.6	11.1	1.5	135.0	10.0	0.0	Par GND	AV	-19.1	12.6	84.0	-71.4	EUT Horz
13.559	15.5	11.1	2.5	226.0	10.0	0.0	Par EUT	PK	-19.1	7.5	84.0	-76.5	EUT Horz
13.560	13.0	11.1	2.5	226.0	10.0	0.0	Par EUT	AV	-19.1	5.0	84.0	-79.0	EUT Horz

FIELD STRENGTH OF FUNDAMENTAL AV3K90

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting at 13.56MHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 4

FREQUENCY RANGE INVESTIGATED

Start Frequency	10 kHz	Stop Frequency	30 MHz
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SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	Northwest EMC	30MHz-6GHz RE Cables	OCB	1/21/2016	12 mo
Antenna	EMCO	6502	AZB	8/14/2015	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	7/15/2016	12 mo

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

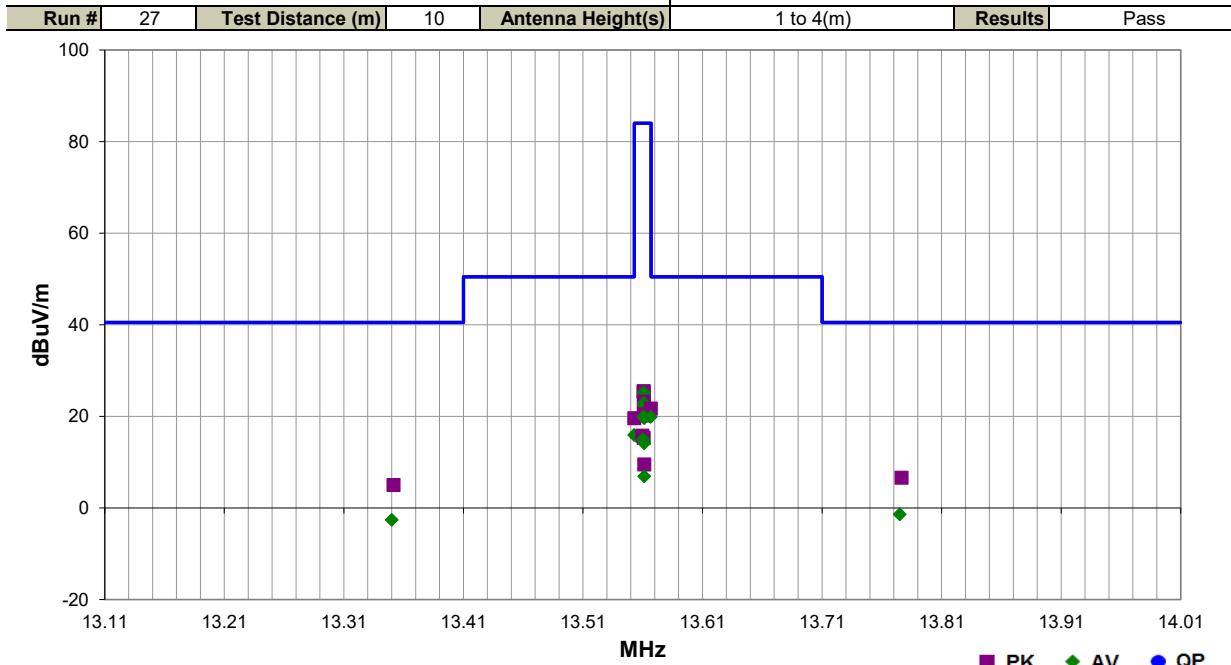
While scanning, fundamental carrier from the EUT was maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

FIELD STRENGTH OF FUNDAMENTAL AV3K90

**NORTHWEST
EMC**
PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	Date:	09/08/16	
Project:	TRA-030990	Temperature:	21.2 °C	
Job Site:	OC08	Humidity:	45.7% RH	
Serial Number:	IRN0430-10	Barometric Pres.:	1021 mbar	Tested by: Mike Tran
EUT:	Door Access RFID Reader Family (AV3K90)			
Configuration:	4			
Customer:	Third Millennium Systems Ltd			
Attendees:	None			
EUT Power:	12V/DC			
Operating Mode:	Transmitting at 13.56MHz			
Deviations:	None			
Comments:	None			
Test Specifications				Test Method
FCC 15.225:2016				ANSI C63.10:2013



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
13.553	27.7	11.0	1.0	104.0	10.0	0.0	Perp EUT	PK	-19.1	19.6	50.5	-30.9	EUT Vert
13.777	14.6	11.1	1.0	258.0	10.0	0.0	Perp EUT	PK	-19.1	6.6	40.5	-33.9	EUT Vert
13.553	24.0	11.0	1.0	104.0	10.0	0.0	Perp EUT	AV	-19.1	15.9	50.5	-34.6	EUT Vert
13.352	13.1	11.0	1.0	240.0	10.0	0.0	Perp EUT	PK	-19.1	5.0	40.5	-35.5	EUT Vert
13.775	6.6	11.1	1.0	258.0	10.0	0.0	Perp EUT	AV	-19.1	-1.4	40.5	-41.9	EUT Vert
13.350	5.5	11.0	1.0	240.0	10.0	0.0	Perp EUT	AV	-19.1	-2.6	40.5	-43.1	EUT Vert
13.561	33.5	11.1	1.0	90.0	10.0	0.0	Perp EUT	PK	-19.1	25.5	84.0	-58.5	EUT Vert
13.561	33.3	11.1	1.0	358.0	10.0	0.0	Perp EUT	PK	-19.1	25.3	84.0	-58.7	EUT on Side
13.561	33.2	11.1	1.0	90.0	10.0	0.0	Perp EUT	AV	-19.1	25.2	84.0	-58.8	EUT Vert
13.561	33.0	11.1	1.0	358.0	10.0	0.0	Perp EUT	AV	-19.1	25.0	84.0	-59.0	EUT on Side
13.561	31.2	11.1	1.5	104.0	10.0	0.0	Par GND	PK	-19.1	23.2	84.0	-60.8	EUT Vert
13.561	30.9	11.1	1.5	2.0	10.0	0.0	Par GND	PK	-19.1	22.9	84.0	-61.1	EUT on Side
13.561	30.9	11.1	1.5	104.0	10.0	0.0	Par GND	AV	-19.1	22.9	84.0	-61.1	EUT Vert
13.561	30.5	11.1	1.5	2.0	10.0	0.0	Par GND	AV	-19.1	22.5	84.0	-61.5	EUT on Side
13.567	29.7	11.1	1.0	81.0	10.0	0.0	Perp EUT	PK	-19.1	21.7	84.0	-62.3	EUT Vert
13.561	28.4	11.1	1.0	293.0	10.0	0.0	Par EUT	PK	-19.1	20.4	84.0	-63.6	EUT on Side
13.561	28.2	11.1	1.0	360.0	10.0	0.0	Par EUT	PK	-19.1	20.2	84.0	-63.8	EUT Vert
13.561	28.0	11.1	1.0	293.0	10.0	0.0	Par EUT	AV	-19.1	20.0	84.0	-64.0	EUT on Side

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
13.567	27.9	11.1	1.0	81.0	10.0	0.0	Perp EUT	AV	-19.1	19.9	84.0	-64.1	EUT Vert
13.561	27.6	11.1	1.0	360.0	10.0	0.0	Par EUT	AV	-19.1	19.6	84.0	-64.4	EUT Vert
13.560	23.8	11.1	1.0	270.0	10.0	0.0	Perp EUT	PK	-19.1	15.8	84.0	-68.2	EUT Horz
13.561	23.3	11.1	1.5	181.0	10.0	0.0	Par GND	PK	-19.1	15.3	84.0	-68.7	EUT Horz
13.560	23.0	11.1	1.0	270.0	10.0	0.0	Perp EUT	AV	-19.1	15.0	84.0	-69.0	EUT Horz
13.561	22.1	11.1	1.5	181.0	10.0	0.0	Par GND	AV	-19.1	14.1	84.0	-69.9	EUT Horz
13.561	17.5	11.1	3.0	270.0	10.0	0.0	Par EUT	PK	-19.1	9.5	84.0	-74.5	EUT Horz
13.561	14.9	11.1	3.0	270.0	10.0	0.0	Par EUT	AV	-19.1	6.9	84.0	-77.1	EUT Horz

FIELD STRENGTH OF FUNDAMENTAL AV490

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting at 13.56MHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	10 kHz	Stop Frequency	30 MHz
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SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	Northwest EMC	30MHz-6GHz RE Cables	OCB	1/21/2016	12 mo
Antenna	EMCO	6502	AZB	8/14/2015	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	7/15/2016	12 mo

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

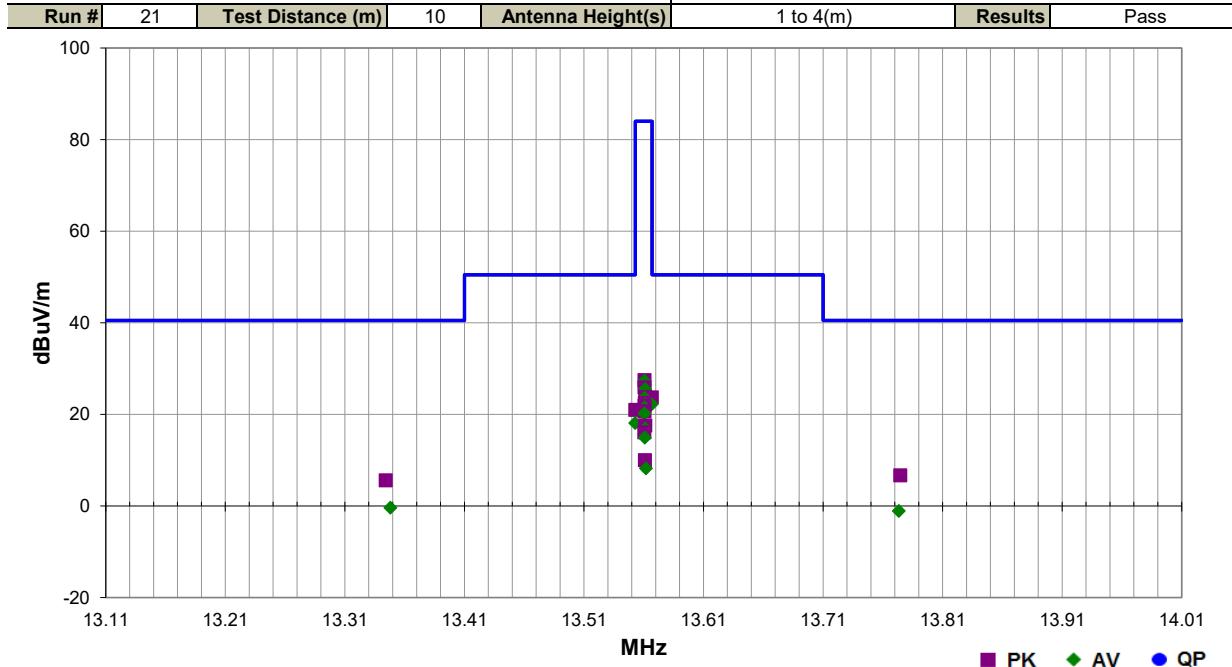
While scanning, fundamental carrier from the EUT was maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

FIELD STRENGTH OF FUNDAMENTAL AV490

**NORTHWEST
EMC**
PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	Date:	09/08/16	
Project:	TRA-030990	Temperature:	21.2 °C	
Job Site:	OC08	Humidity:	45.7% RH	
Serial Number:	IRN0430-07	Barometric Pres.:	1021 mbar	Tested by: Mike Tran
EUT:	Door Access RFID Reader Family (AV490)			
Configuration:	1			
Customer:	Third Millennium Systems Ltd			
Attendees:	None			
EUT Power:	12V/DC			
Operating Mode:	Transmitting at 13.56MHz			
Deviations:	None			
Comments:	None			
Test Specifications		Test Method		
FCC 15.225:2016		ANSI C63.10:2013		



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
13.553	29.1	11.0	1.0	196.0	10.0	0.0	Perp EUT	PK	-19.1	21.0	50.5	-29.5	EUT on Side
13.553	26.2	11.0	1.0	196.0	10.0	0.0	Perp EUT	AV	-19.1	18.1	50.5	-32.4	EUT on Side
13.775	14.7	11.1	1.0	180.0	10.0	0.0	Perp EUT	PK	-19.1	6.7	40.5	-33.8	EUT on Side
13.344	13.7	11.0	3.6	211.0	10.0	0.0	Perp EUT	PK	-19.1	5.6	40.5	-34.9	EUT on Side
13.348	7.7	11.0	3.6	211.0	10.0	0.0	Perp EUT	AV	-19.1	-0.4	40.5	-40.9	EUT on Side
13.774	6.9	11.1	1.0	180.0	10.0	0.0	Perp EUT	AV	-19.1	-1.1	40.5	-41.6	EUT on Side
13.561	35.5	11.1	1.0	180.0	10.0	0.0	Perp EUT	PK	-19.1	27.5	84.0	-56.5	EUT on Side
13.561	35.3	11.1	1.0	180.0	10.0	0.0	Perp EUT	AV	-19.1	27.3	84.0	-56.7	EUT on Side
13.561	33.9	11.1	1.0	90.0	10.0	0.0	Perp EUT	PK	-19.1	25.9	84.0	-58.1	EUT Vert
13.561	33.5	11.1	1.0	90.0	10.0	0.0	Perp EUT	AV	-19.1	25.5	84.0	-58.5	EUT Vert
13.561	31.8	11.1	1.4	190.0	10.0	0.0	Par GND	PK	-19.1	23.8	84.0	-60.2	EUT on Side
13.567	31.7	11.1	1.0	199.0	10.0	0.0	Perp EUT	PK	-19.1	23.7	84.0	-60.3	EUT on Side
13.561	31.6	11.1	1.4	190.0	10.0	0.0	Par GND	AV	-19.1	23.6	84.0	-60.4	EUT on Side
13.561	30.5	11.1	1.5	102.0	10.0	0.0	Par GND	PK	-19.1	22.5	84.0	-61.5	EUT Vert
13.561	30.2	11.1	1.5	102.0	10.0	0.0	Par GND	AV	-19.1	22.2	84.0	-61.8	EUT Vert
13.567	30.2	11.1	1.0	199.0	10.0	0.0	Perp EUT	AV	-19.1	22.2	84.0	-61.8	EUT on Side
13.561	29.9	11.1	1.0	114.0	10.0	0.0	Par EUT	PK	-19.1	21.9	84.0	-62.1	EUT on Side
13.561	29.5	11.1	1.0	114.0	10.0	0.0	Par EUT	AV	-19.1	21.5	84.0	-62.5	EUT on Side

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
13.561	28.7	11.1	1.0	23.0	10.0	0.0	Par EUT	PK	-19.1	20.7	84.0	-63.3	EUT Vert
13.561	28.2	11.1	1.0	23.0	10.0	0.0	Par EUT	AV	-19.1	20.2	84.0	-63.8	EUT Vert
13.561	25.6	11.1	1.0	180.0	10.0	0.0	Perp EUT	PK	-19.1	17.6	84.0	-66.4	EUT Horz
13.561	24.9	11.1	1.0	180.0	10.0	0.0	Perp EUT	AV	-19.1	16.9	84.0	-67.1	EUT Horz
13.561	24.1	11.1	1.2	180.0	10.0	0.0	Par GND	PK	-19.1	16.1	84.0	-67.9	EUT Horz
13.561	22.9	11.1	1.2	180.0	10.0	0.0	Par GND	AV	-19.1	14.9	84.0	-69.1	EUT Horz
13.561	18.0	11.1	3.0	270.0	10.0	0.0	Par EUT	PK	-19.1	10.0	84.0	-74.0	EUT Horz
13.562	16.2	11.1	3.0	270.0	10.0	0.0	Par EUT	AV	-19.1	8.2	84.0	-75.8	EUT Horz

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHZ AV390

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting at 13.56MHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	10 kHz	Stop Frequency	30 MHz
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SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	Northwest EMC	30MHz-6GHz RE Cables	OCB	1/21/2016	12 mo
Antenna	EMCO	6502	AZB	8/14/2015	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	7/15/2016	12 mo

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

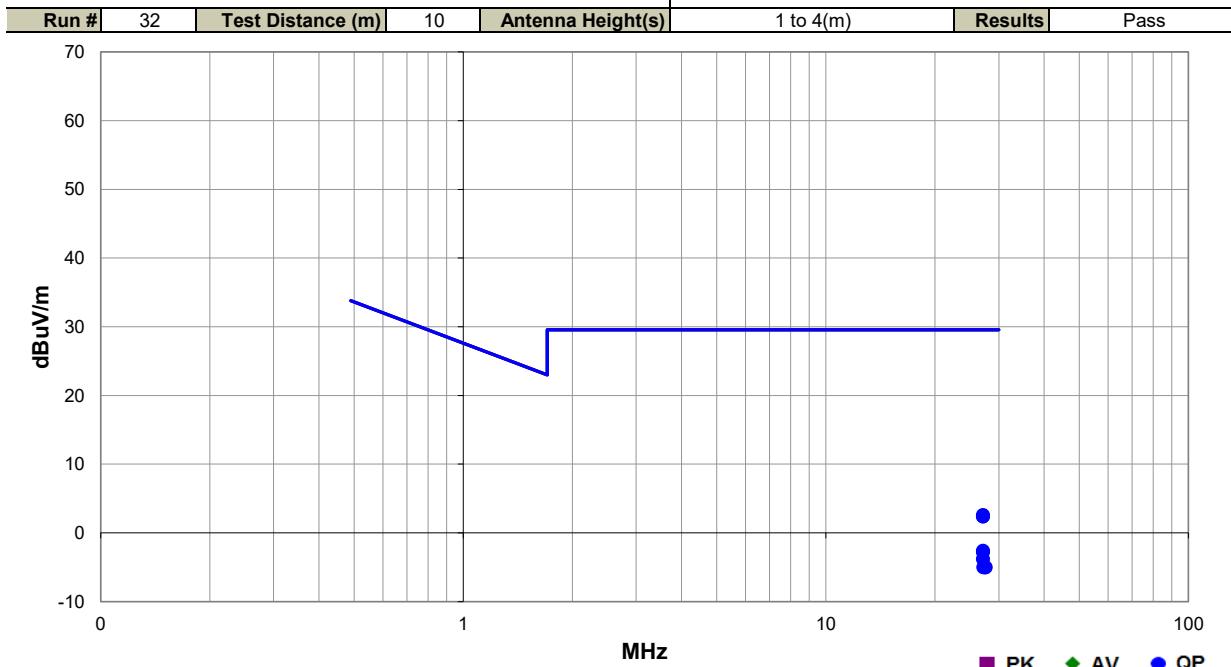
While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHZ AV390

NORTHWEST EMC
PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	Date:	09/08/16	
Project:	TRA-030990	Temperature:	22.8 °C	
Job Site:	OC08	Humidity:	48.1% RH	
Serial Number:	IRN0430-09	Barometric Pres.:	1018 mbar	Tested by: Mark Baytan
EUT:	Door Access RFID Reader Family (AV390)			
Configuration:	2			
Customer:	Third Millennium Systems Ltd			
Attendees:	None			
EUT Power:	12V/DC			
Operating Mode:	Transmitting at 13.56MHz			
Deviations:	None			
Comments:	None			
Test Specifications		Test Method		
FCC 15.225:2016		ANSI C63.10:2013		



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
27.120	12.2	9.5	1.0	65.0	10.0	0.0	Perp to EUT	QP	-19.1	2.6	29.5	-26.9	EUT Vert
27.120	12.0	9.5	1.0	360.0	10.0	0.0	Perp to EUT	QP	-19.1	2.4	29.5	-27.1	EUT Horz
27.120	12.0	9.5	1.0	351.0	10.0	0.0	Perp to EUT	QP	-19.1	2.4	29.5	-27.1	EUT on Side
27.120	7.0	9.5	1.9	334.0	10.0	0.0	Parallel to EUT	QP	-19.1	-2.6	29.5	-32.1	EUT on Side
27.120	6.8	9.5	1.0	314.0	10.0	0.0	Parallel to EUT	QP	-19.1	-2.8	29.5	-32.3	EUT Vert
27.119	5.8	9.5	2.1	217.0	10.0	0.0	Parallel to EUT	QP	-19.1	-3.8	29.5	-33.3	EUT Horz
27.209	4.7	9.4	1.0	359.0	10.0	0.0	Parallel to GND	QP	-19.1	-5.0	29.5	-34.5	EUT Horz
27.584	4.8	9.3	1.8	354.0	10.0	0.0	Parallel to GND	QP	-19.1	-5.0	29.5	-34.5	EUT Vert
27.511	4.8	9.3	1.0	100.0	10.0	0.0	Parallel to GND	QP	-19.1	-5.0	29.5	-34.5	EUT on Side

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHZ AV3K90

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting at 13.56MHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 4

FREQUENCY RANGE INVESTIGATED

Start Frequency	10 kHz	Stop Frequency	30 MHz
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SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	Northwest EMC	30MHz-6GHz RE Cables	OCB	1/21/2016	12 mo
Antenna	EMCO	6502	AZB	8/14/2015	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	7/15/2016	12 mo

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

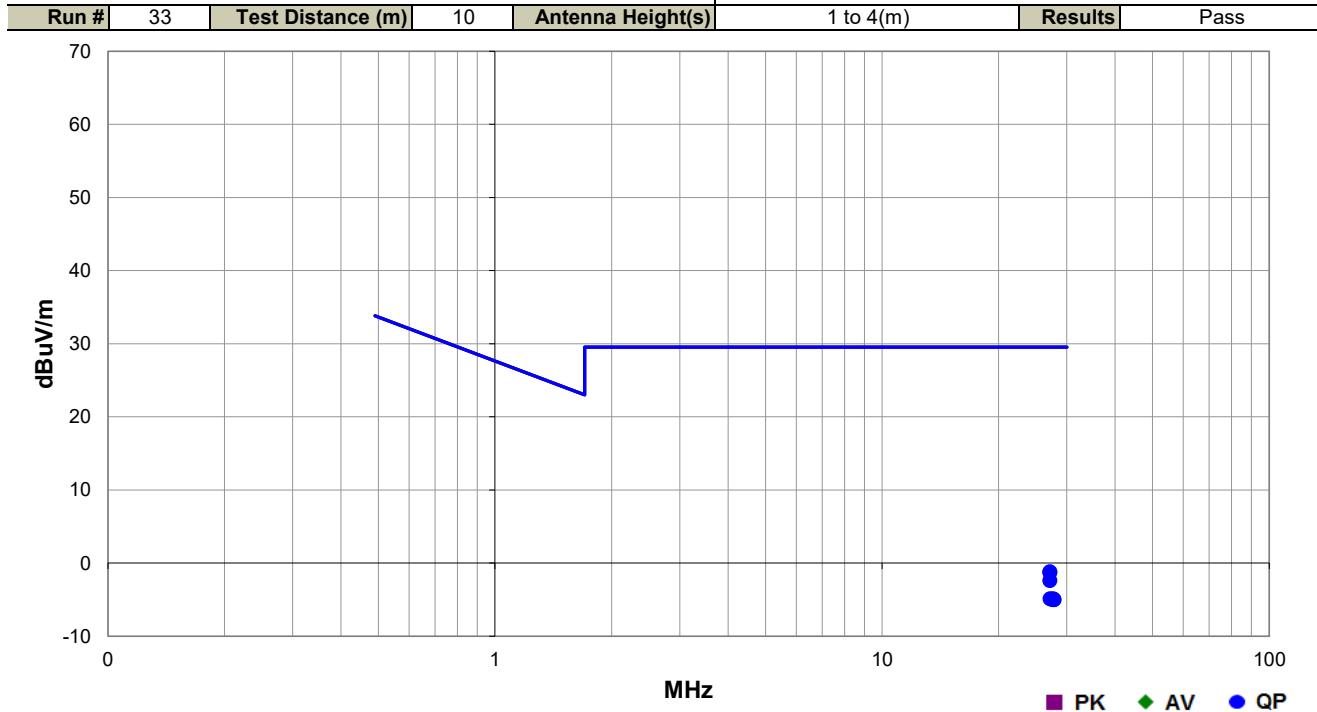
FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHZ AV3K90

NORTHWEST EMC

PSA-ESCI 2016.07.22

EmIR5 2016.07.22.1

Work Order:	ELEM0005	Date:	09/08/16	
Project:	TRA-030990	Temperature:	22.8 °C	
Job Site:	OC08	Humidity:	48.1% RH	
Serial Number:	IRN0430-10	Barometric Pres.:	1018 mbar	
EUT:	Door Access RFID Reader Family (AV3K90)			
Configuration:	4			
Customer:	Third Millennium Systems Ltd			
Attendees:	None			
EUT Power:	12VDC			
Operating Mode:	Transmitting at 13.56MHz			
Deviations:	None			
Comments:	None			
Test Specifications		Test Method		
FCC 15.225:2016		ANSI C63.10:2013		



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
27.120	8.4	9.5	1.0	95.0	10.0	0.0	Perp to EUT	QP	-19.1	-1.2	29.5	-30.7	EUT on Side
27.120	8.3	9.5	1.0	72.0	10.0	0.0	Perp to EUT	QP	-19.1	-1.3	29.5	-30.8	EUT Vert
27.120	7.2	9.5	1.0	0.0	10.0	0.0	Perp to EUT	QP	-19.1	-2.4	29.5	-31.9	EUT Horz
27.655	4.9	9.3	1.0	171.0	10.0	0.0	Parallel to GND	QP	-19.1	-4.9	29.5	-34.4	EUT Vert
27.147	4.7	9.5	1.0	297.0	10.0	0.0	Parallel to EUT	QP	-19.1	-4.9	29.5	-34.4	EUT Vert
27.781	4.8	9.3	1.0	185.0	10.0	0.0	Parallel to EUT	QP	-19.1	-5.0	29.5	-34.5	EUT Horz
27.555	4.8	9.3	3.1	178.0	10.0	0.0	Parallel to GND	QP	-19.1	-5.0	29.5	-34.5	EUT Horz
27.802	4.8	9.3	1.0	332.0	10.0	0.0	Parallel to EUT	QP	-19.1	-5.0	29.5	-34.5	EUT on Side
27.709	4.8	9.3	1.0	22.0	10.0	0.0	Parallel to GND	QP	-19.1	-5.0	29.5	-34.5	EUT on Side

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHZ AV490

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting at 13.56MHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	10 kHz	Stop Frequency	30 MHz
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SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	Northwest EMC	30MHz-6GHz RE Cables	OCB	1/21/2016	12 mo
Antenna	EMCO	6502	AZB	8/14/2015	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	7/15/2016	12 mo

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

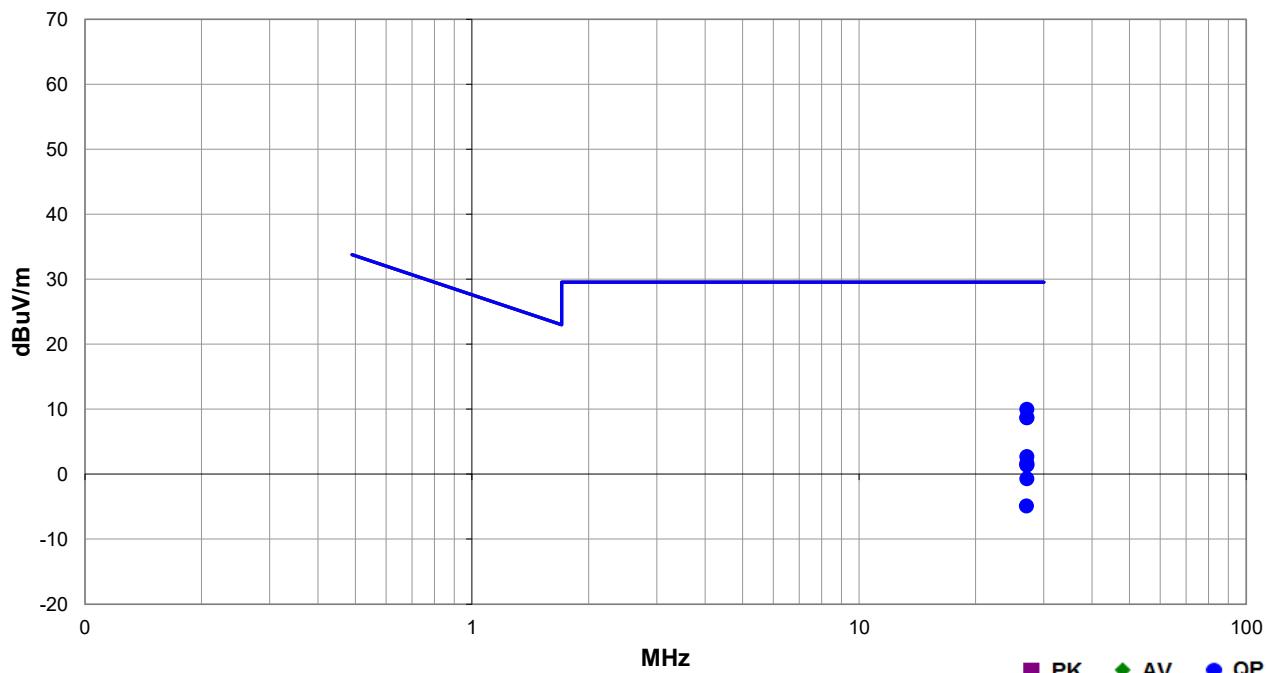
As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHZ AV490

NORTHWEST EMC
PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	Date:	09/08/16	
Project:	TRA-030990	Temperature:	22.8 °C	
Job Site:	OC08	Humidity:	48.1% RH	
Serial Number:	IRN0430-07	Barometric Pres.:	1018 mbar	
Tested by: Mark Baytan				
EUT: Door Access RFID Reader Family (AV490)				
Configuration: 1				
Customer: Third Millennium Systems Ltd				
Attendees: None				
EUT Power: 12VDC				
Operating Mode: Transmitting at 13.56MHz				
Deviations: None				
Comments: None				
Test Specifications		Test Method		
FCC 15.225:2016		ANSI C63.10:2013		

Run #	31	Test Distance (m)	10	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
27.121	19.6	9.5	1.9	44.0	10.0	0.0	Perp to EUT	QP	-19.1	10.0	29.5	-19.5	EUT Vert
27.121	18.3	9.5	1.0	33.0	10.0	0.0	Perp to EUT	QP	-19.1	8.7	29.5	-20.8	EUT on Side
27.121	18.3	9.5	1.0	10.0	10.0	0.0	Perp to EUT	QP	-19.1	8.7	29.5	-20.8	EUT Horz
27.121	12.3	9.5	2.0	297.0	10.0	0.0	Parallel to EUT	QP	-19.1	2.7	29.5	-26.8	EUT Vert
27.120	11.3	9.5	2.2	314.0	10.0	0.0	Parallel to EUT	QP	-19.1	1.7	29.5	-27.8	EUT on Side
27.120	11.0	9.5	3.8	312.0	10.0	0.0	Parallel to GND	QP	-19.1	1.4	29.5	-28.1	EUT Vert
27.120	11.0	9.5	1.9	317.0	10.0	0.0	Parallel to EUT	QP	-19.1	1.4	29.5	-28.1	EUT Horz
27.120	8.9	9.5	2.8	301.0	10.0	0.0	Parallel to GND	QP	-19.1	-0.7	29.5	-30.2	EUT on Side
27.063	4.7	9.5	2.0	137.0	10.0	0.0	Parallel to GND	QP	-19.1	-4.9	29.5	-34.4	EUT Horz

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHZ AV390

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting at 13.56MHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	1000 MHz
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SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	8/9/2016	12 mo
Antenna - Biconilog	EMCO	3142B	AXK	10/6/2014	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	2/9/2016	12 mo

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

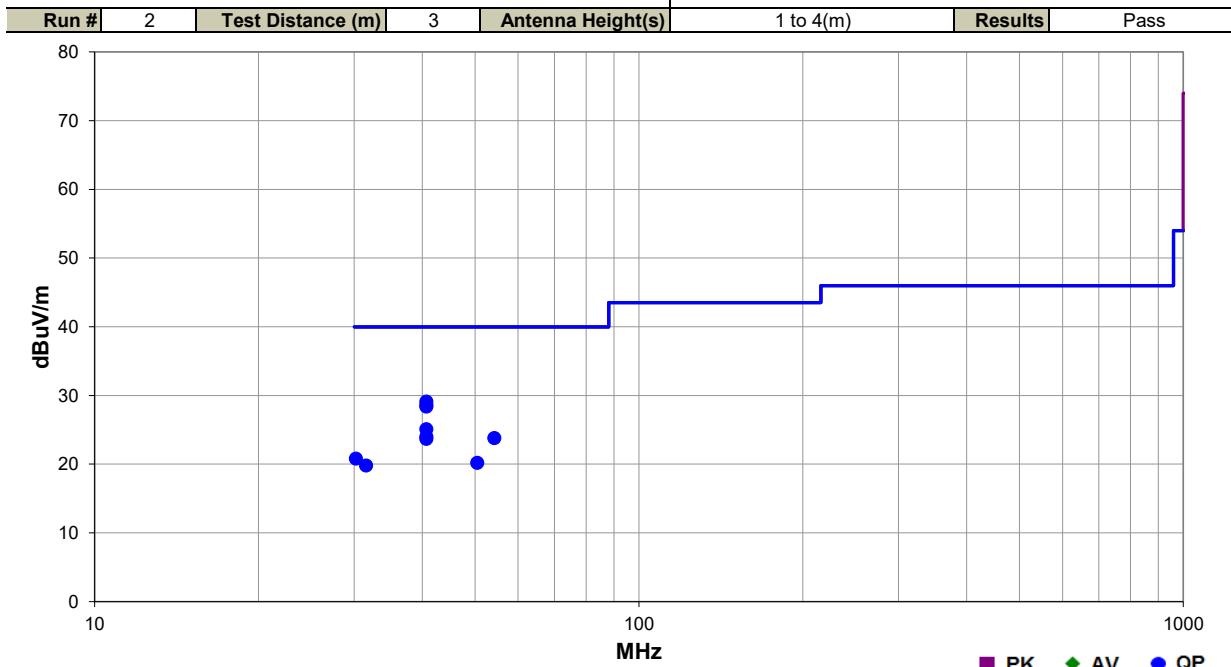
While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2013).

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHZ AV390

**NORTHWEST
EMC**

PSA-ESCI 2016.07.22
EmiR5 2016.04.26.1

Work Order:	ELEM0005	Date:	09/08/16	
Project:	TRA-030990	Temperature:	22.9 °C	
Job Site:	OC10	Humidity:	46.3% RH	
Serial Number:	IRN0430-09	Barometric Pres.:	1018 mbar	Tested by: Mark Baytan
EUT:	Door Access RFID Reader Family (AV390)			
Configuration:	2			
Customer:	Third Millennium Systems Ltd			
Attendees:	None			
EUT Power:	12V/DC			
Operating Mode:	Transmitting at 13.56MHz			
Deviations:	None			
Comments:	None			
Test Specifications		Test Method		
FCC 15.225:2016		ANSI C63.10:2013		



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
40.689	27.6	1.5	1.0	41.0	3.0	0.0	Vert	QP	0.0	29.1	40.0	-10.9	EUT on Side
40.690	27.1	1.5	1.0	11.0	3.0	0.0	Vert	QP	0.0	28.6	40.0	-11.4	EUT Vert
40.690	26.9	1.5	1.1	92.0	3.0	0.0	Vert	QP	0.0	28.4	40.0	-11.6	EUT Horz
40.690	23.6	1.5	1.5	268.0	3.0	0.0	Horz	QP	0.0	25.1	40.0	-14.9	EUT Horz
40.690	22.5	1.5	1.5	282.0	3.0	0.0	Horz	QP	0.0	24.0	40.0	-16.0	EUT Vert
54.252	26.2	-2.4	1.0	186.0	3.0	0.0	Vert	QP	0.0	23.8	40.0	-16.2	EUT on Side
40.692	22.2	1.5	1.5	296.0	3.0	0.0	Horz	QP	0.0	23.7	40.0	-16.3	EUT on Side
30.214	13.5	7.3	2.8	63.0	3.0	0.0	Vert	QP	0.0	20.8	40.0	-19.2	EUT on Side
50.461	21.8	-1.6	1.2	92.0	3.0	0.0	Vert	QP	0.0	20.2	40.0	-19.8	EUT on Side
31.525	13.4	6.4	1.0	46.0	3.0	0.0	Horz	QP	0.0	19.8	40.0	-20.2	EUT Horz

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHZ AV3K90

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting at 13.56MHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 4

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	1000 MHz
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SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	8/9/2016	12 mo
Antenna - Biconilog	EMCO	3142B	AXK	10/6/2014	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	2/9/2016	12 mo

TEST DESCRIPTION

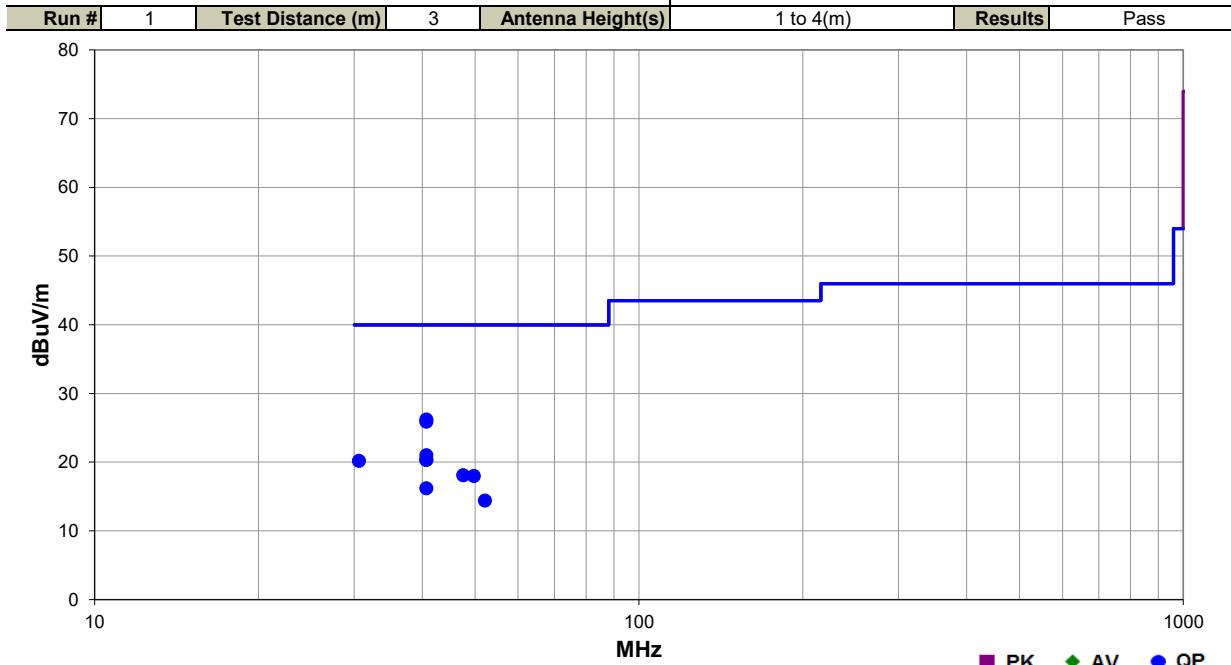
The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2013).

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHZ AV3K90

**NORTHWEST
EMC**
PSA-ESCI 2016.07.22
EmiR5 2016.04.26.1

Work Order:	ELEM0005	Date:	09/08/16		
Project:	TRA-030990	Temperature:	22.9 °C		
Job Site:	OC10	Humidity:	46.3% RH		
Serial Number:	IRN0430-10	Barometric Pres.:	1018 mbar	Tested by:	Mark Baytan
EUT:	Door Access RFID Reader Family (AV3K90)				
Configuration:	4				
Customer:	Third Millennium Systems Ltd				
Attendees:	None				
EUT Power:	12V/DC				
Operating Mode:	Transmitting at 13.56MHz				
Deviations:	None				
Comments:	None				
Test Specifications		Test Method			
FCC 15.225:2016		ANSI C63.10:2013			



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
40.690	24.7	1.5	1.0	354.0	3.0	0.0	Vert	QP	0.0	26.2	40.0	-13.8	EUT Vert
40.690	24.4	1.5	1.0	348.0	3.0	0.0	Vert	QP	0.0	25.9	40.0	-14.1	EUT on Side
40.692	19.5	1.5	1.5	259.0	3.0	0.0	Horz	QP	0.0	21.0	40.0	-19.0	EUT on Side
40.692	18.9	1.5	1.0	126.0	3.0	0.0	Horz	QP	0.0	20.4	40.0	-19.6	EUT Vert
40.693	18.8	1.5	1.0	0.0	3.0	0.0	Vert	QP	0.0	20.3	40.0	-19.7	EUT Horz
30.606	13.2	7.0	1.0	338.0	3.0	0.0	Horz	QP	0.0	20.2	40.0	-19.8	EUT on Side
47.578	19.0	-0.9	1.0	242.0	3.0	0.0	Vert	QP	0.0	18.1	40.0	-21.9	EUT Vert
49.719	19.4	-1.4	1.0	229.0	3.0	0.0	Vert	QP	0.0	18.0	40.0	-22.0	EUT Vert
40.688	14.7	1.5	1.0	254.0	3.0	0.0	Horz	QP	0.0	16.2	40.0	-23.8	EUT Horz
52.130	16.4	-2.0	1.5	62.0	3.0	0.0	Vert	QP	0.0	14.4	40.0	-25.6	EUT Vert

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHZ AV490

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting at 13.56MHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	1000 MHz
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SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	8/9/2016	12 mo
Antenna - Biconilog	EMCO	3142B	AXK	10/6/2014	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFJ	2/9/2016	12 mo

TEST DESCRIPTION

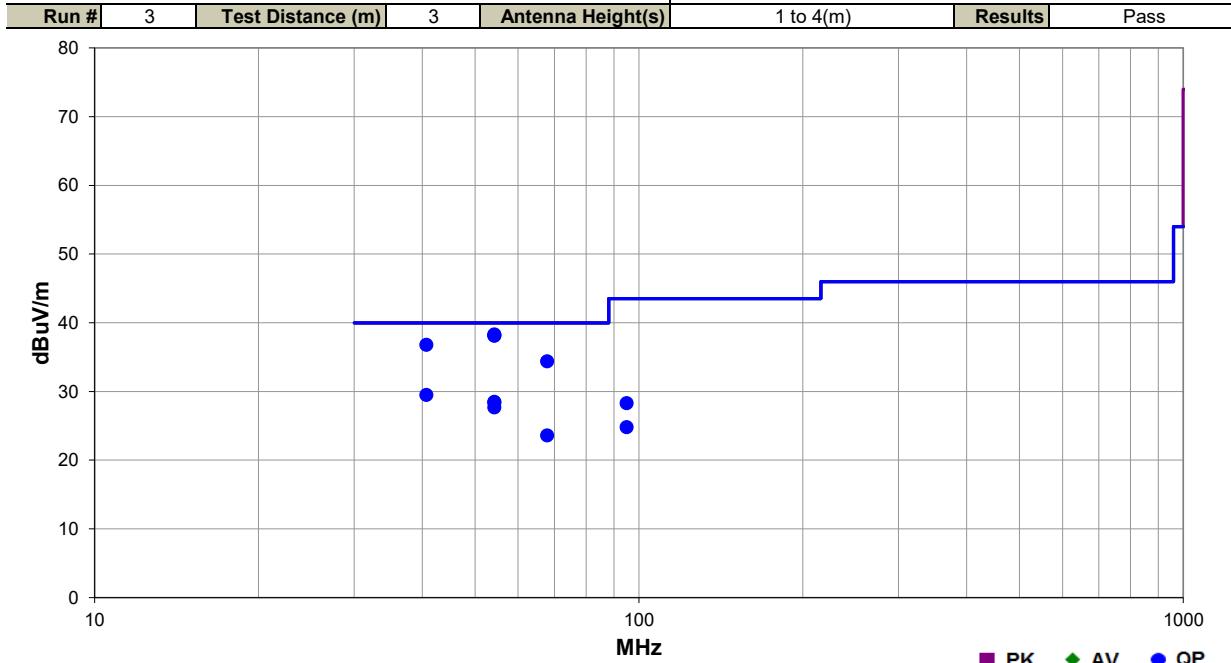
The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2013).

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHZ AV490

**NORTHWEST
EMC**
PSA-ESCI 2016.07.22
EmiR5 2016.04.26.1

Work Order:	ELEM0005	Date:	09/08/16	
Project:	TRA-030990	Temperature:	22.9 °C	
Job Site:	OC10	Humidity:	46.3% RH	
Serial Number:	IRN0430-07	Barometric Pres.:	1018 mbar	Tested by: Mark Baytan
EUT:	Door Access RFID Reader Family (AV490)			
Configuration:	1			
Customer:	Third Millennium Systems Ltd			
Attendees:	None			
EUT Power:	12V/DC			
Operating Mode:	Transmitting at 13.56MHz			
Deviations:	None			
Comments:	None			
Test Specifications		Test Method		
FCC 15.225:2016		ANSI C63.10:2013		



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
54.251	40.7	-2.4	1.0	182.0	3.0	0.0	Vert	QP	0.0	38.3	40.0	-1.7	EUT Horz
54.249	40.6	-2.4	1.0	193.0	3.0	0.0	Vert	QP	0.0	38.2	40.0	-1.8	EUT Vert
54.249	40.5	-2.4	1.0	203.0	3.0	0.0	Vert	QP	0.0	38.1	40.0	-1.9	EUT on Side
40.689	35.3	1.5	1.0	111.0	3.0	0.0	Vert	QP	0.0	36.8	40.0	-3.2	EUT Horz
67.810	37.6	-3.2	1.0	179.0	3.0	0.0	Vert	QP	0.0	34.4	40.0	-5.6	EUT Horz
40.689	28.0	1.5	1.5	278.0	3.0	0.0	Horz	QP	0.0	29.5	40.0	-10.5	EUT on Side
54.251	30.9	-2.4	3.8	267.0	3.0	0.0	Horz	QP	0.0	28.5	40.0	-11.5	EUT on Side
54.251	30.8	-2.4	1.5	210.0	3.0	0.0	Horz	QP	0.0	28.4	40.0	-11.6	EUT Horz
54.251	30.1	-2.4	1.8	237.0	3.0	0.0	Horz	QP	0.0	27.7	40.0	-12.3	EUT Vert
94.933	30.3	-2.0	1.0	50.0	3.0	0.0	Vert	QP	0.0	28.3	43.5	-15.2	EUT Horz
67.812	26.8	-3.2	1.6	152.0	3.0	0.0	Horz	QP	0.0	23.6	40.0	-16.4	EUT on Side
94.933	26.8	-2.0	3.9	110.0	3.0	0.0	Horz	QP	0.0	24.8	43.5	-18.7	EUT on Side

FREQUENCY STABILITY

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Meter - Multimeter	Fluke	79 III	MMD	2/11/2016	2/11/2019
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPHS-32-3.5-SCT/AC	TBE	NCR	NCR
Thermometer	Omega Engineering, Inc.	HH311	DUC	10/3/2014	10/3/2017
Probe - Near Field Set	EMCO	7405	IPI	NCR	NCR
Generator - Signal	Agilent	E8257D	TGU	2/5/2015	2/5/2018
Cable	Fairview Microwave	SCA1814-0101-120	OCZ	NCR	NCR
Attenuator	Fairview Microwave	SA18E-10	TKT	4/4/2016	4/4/2017
Block - DC	Aeroflex	INMET 8535	AMO	4/4/2016	4/4/2017
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	11/19/2015	11/19/2016

TEST DESCRIPTION

A near-field probe was placed near the transmitter. A low-loss coaxial cable was used to connect the near-field probe to the spectrum analyzer. The spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT.

Measurements were made on the single transmit frequency as called out on the data sheets. Testing was done while the EUT was continuously polling.

The primary supply voltage was varied from 85 % to 115% of the nominal voltage while at ambient temperature. Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range of -20 ° to +50° C and at 10°C intervals.

The requirement of a frequency tolerance of $\pm 0.01\%$ is equivalent to 100 ppm
The formula to check for compliance is:

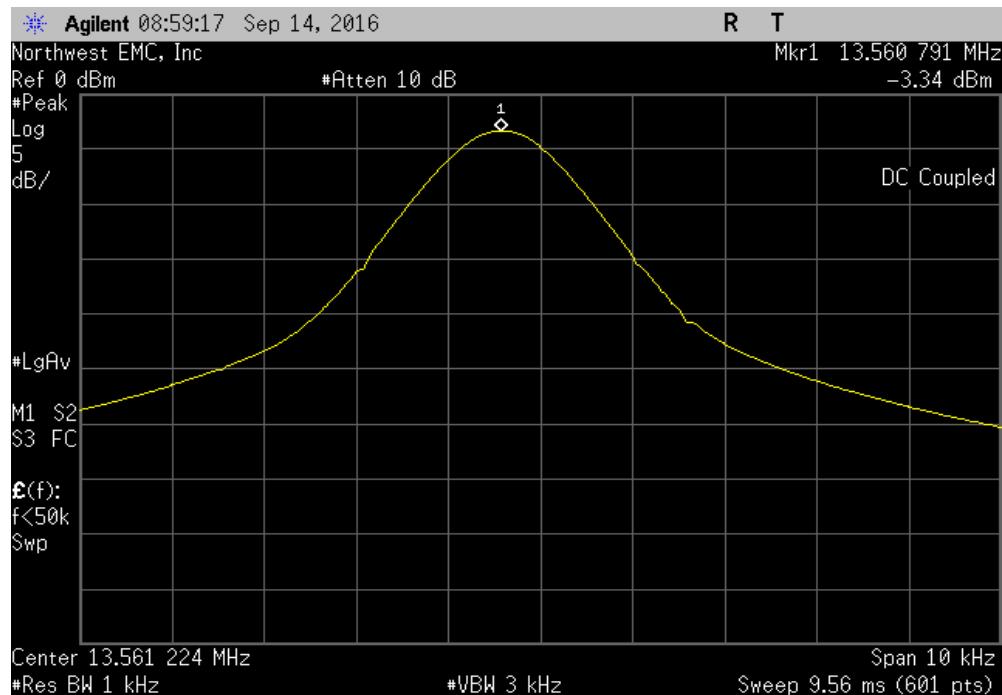
$$\text{ppm} = (\text{Measured Frequency} / \text{Measured Nominal Frequency} - 1) * 1,000,000$$

FREQUENCY STABILITY

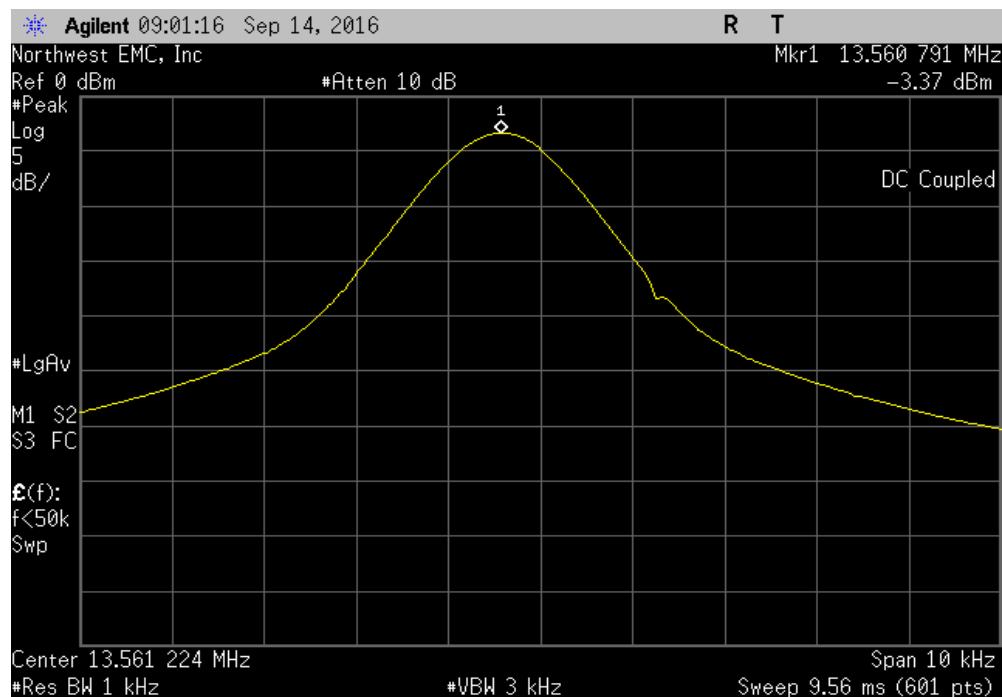
EUT:	Door Access RFID Reader Family (AV490)		Work Order:	ELEM0005																																																																									
Serial Number:	IRN0430-07		Date:	09/14/16																																																																									
Customer:	Third Millennium Systems Ltd		Temperature:	21.1 °C																																																																									
Attendees:	None		Humidity:	49.1% RH																																																																									
Project:	TRA-030990		Barometric Pres.:	1020 mbar																																																																									
Tested by:	Johnny Candelas	Power:	12VDC	Job Site:	OC13																																																																								
TEST SPECIFICATIONS			Test Method																																																																										
FCC 15.225:2016			ANSI C63.10:2013																																																																										
COMMENTS																																																																													
Unit model AV490 found to be worst case variant based on Emissions testing. Tested as representative unit for 13.56 MHz transmitter																																																																													
DEVIATIONS FROM TEST STANDARD																																																																													
None																																																																													
Configuration #	1	Signature		Measured Value (MHz)	Assigned Value (MHz)																																																																								
				Error (ppm)	Limit (ppm)																																																																								
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RFID 13.56MHz																																																																													
<table border="1"> <thead> <tr> <th>Condition</th> <th>Measured Value (MHz)</th> <th>Assigned Value (MHz)</th> <th>Error (ppm)</th> <th>Limit (ppm)</th> <th>Results</th> </tr> </thead> <tbody> <tr><td>Normal Temperature and Voltage</td><td>13.560791</td><td>13.56</td><td>58.3</td><td>100</td><td>Pass</td></tr> <tr><td>Normal Temperature, Extreme Voltage +15%</td><td>13.560791</td><td>13.56</td><td>58.3</td><td>100</td><td>Pass</td></tr> <tr><td>Normal Temperature, Extreme Voltage -15%</td><td>13.560791</td><td>13.56</td><td>58.3</td><td>100</td><td>Pass</td></tr> <tr><td>Extreme Temperature, +50°C</td><td>13.560812</td><td>13.56</td><td>59.9</td><td>100</td><td>Pass</td></tr> <tr><td>Extreme Temperature, +40°C</td><td>13.560807</td><td>13.56</td><td>59.5</td><td>100</td><td>Pass</td></tr> <tr><td>Extreme Temperature, +30°C</td><td>13.560789</td><td>13.56</td><td>58.2</td><td>100</td><td>Pass</td></tr> <tr><td>Extreme Temperature, +20°C</td><td>13.560791</td><td>13.56</td><td>58.3</td><td>100</td><td>Pass</td></tr> <tr><td>Extreme Temperature, +10°C</td><td>13.560791</td><td>13.56</td><td>58.3</td><td>100</td><td>Pass</td></tr> <tr><td>Extreme Temperature, 0°C</td><td>13.560774</td><td>13.56</td><td>57.1</td><td>100</td><td>Pass</td></tr> <tr><td>Extreme Temperature, -10°C</td><td>13.560757</td><td>13.56</td><td>55.8</td><td>100</td><td>Pass</td></tr> <tr><td>Extreme Temperature, -20°C</td><td>13.560724</td><td>13.56</td><td>53.4</td><td>100</td><td>Pass</td></tr> </tbody> </table>						Condition	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results	Normal Temperature and Voltage	13.560791	13.56	58.3	100	Pass	Normal Temperature, Extreme Voltage +15%	13.560791	13.56	58.3	100	Pass	Normal Temperature, Extreme Voltage -15%	13.560791	13.56	58.3	100	Pass	Extreme Temperature, +50°C	13.560812	13.56	59.9	100	Pass	Extreme Temperature, +40°C	13.560807	13.56	59.5	100	Pass	Extreme Temperature, +30°C	13.560789	13.56	58.2	100	Pass	Extreme Temperature, +20°C	13.560791	13.56	58.3	100	Pass	Extreme Temperature, +10°C	13.560791	13.56	58.3	100	Pass	Extreme Temperature, 0°C	13.560774	13.56	57.1	100	Pass	Extreme Temperature, -10°C	13.560757	13.56	55.8	100	Pass	Extreme Temperature, -20°C	13.560724	13.56	53.4	100	Pass
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FREQUENCY STABILITY

RFID 13.56MHz, Normal Temperature and Voltage					
Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results	
13.560791	13.56	58.3	100	Pass	

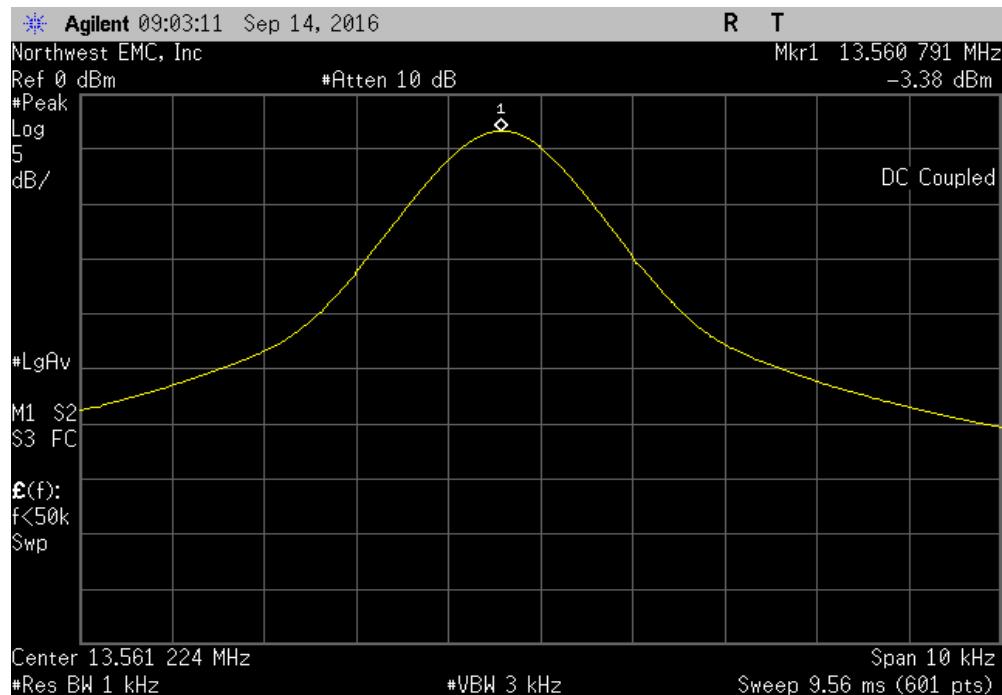


RFID 13.56MHz, Normal Temperature, Extreme Voltage +15%					
Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results	
13.560791	13.56	58.3	100	Pass	

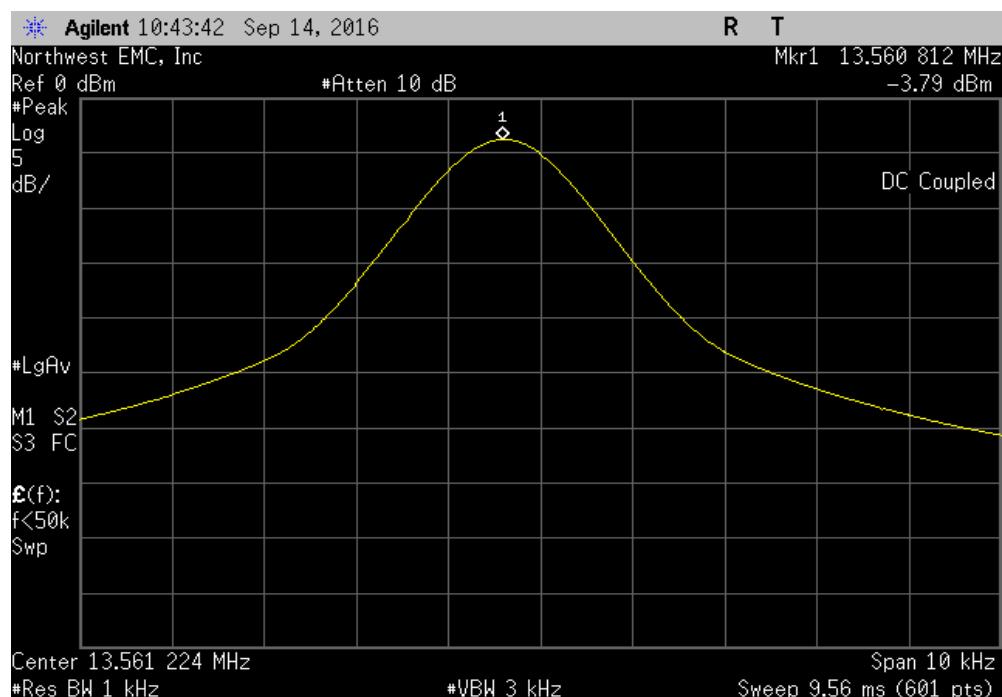


FREQUENCY STABILITY

RFID 13.56MHz, Normal Temperature, Extreme Voltage -15%					
	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
	13.560791	13.56	58.3	100	Pass

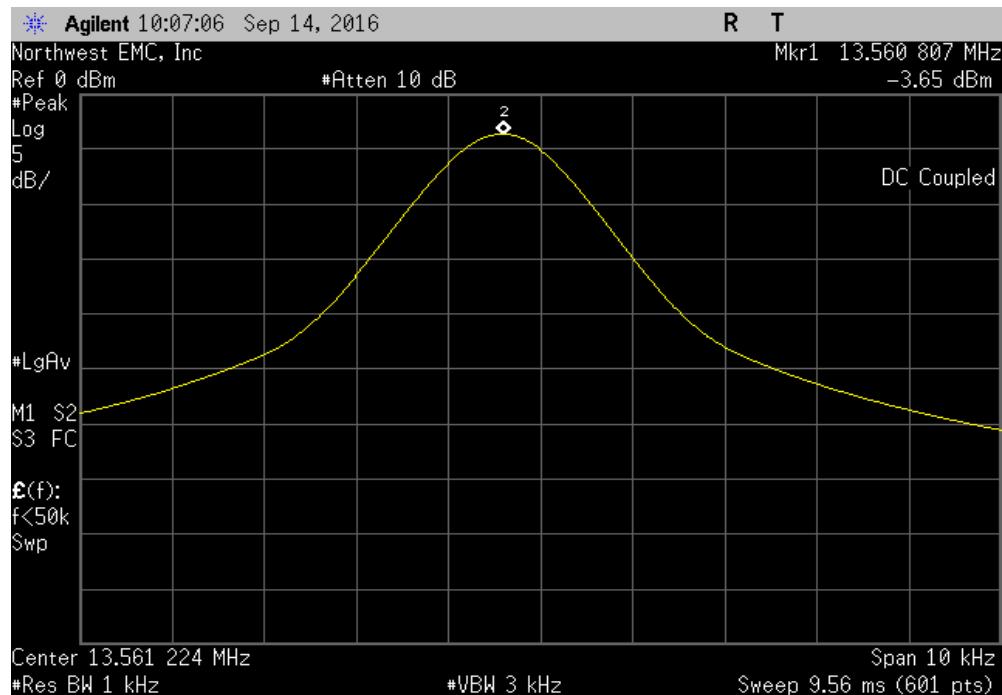


RFID 13.56MHz, Extreme Temperature, +50°C					
	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
	13.560812	13.56	59.9	100	Pass

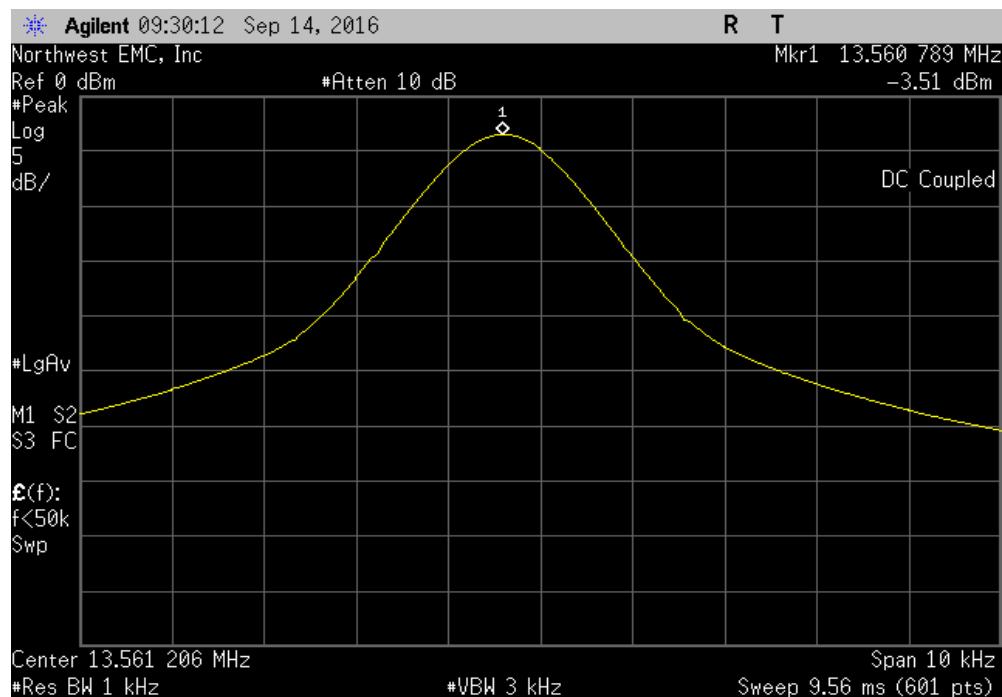


FREQUENCY STABILITY

RFID 13.56MHz, Extreme Temperature, +40°C					
Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results	
13.560807	13.56	59.5	100	Pass	

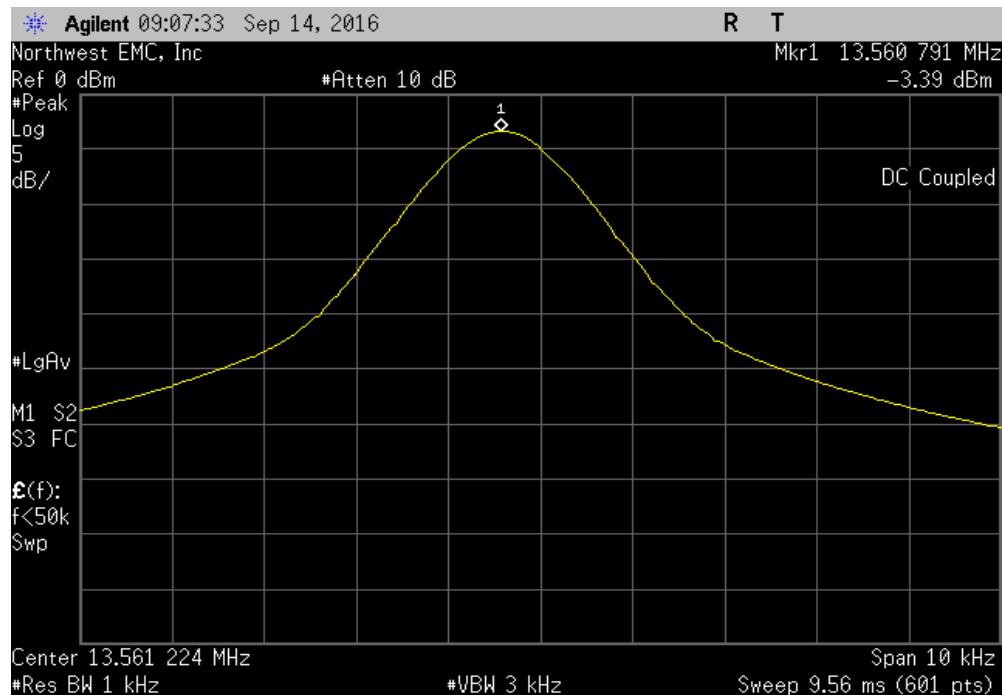


RFID 13.56MHz, Extreme Temperature, +30°C					
Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results	
13.560789	13.56	58.2	100	Pass	

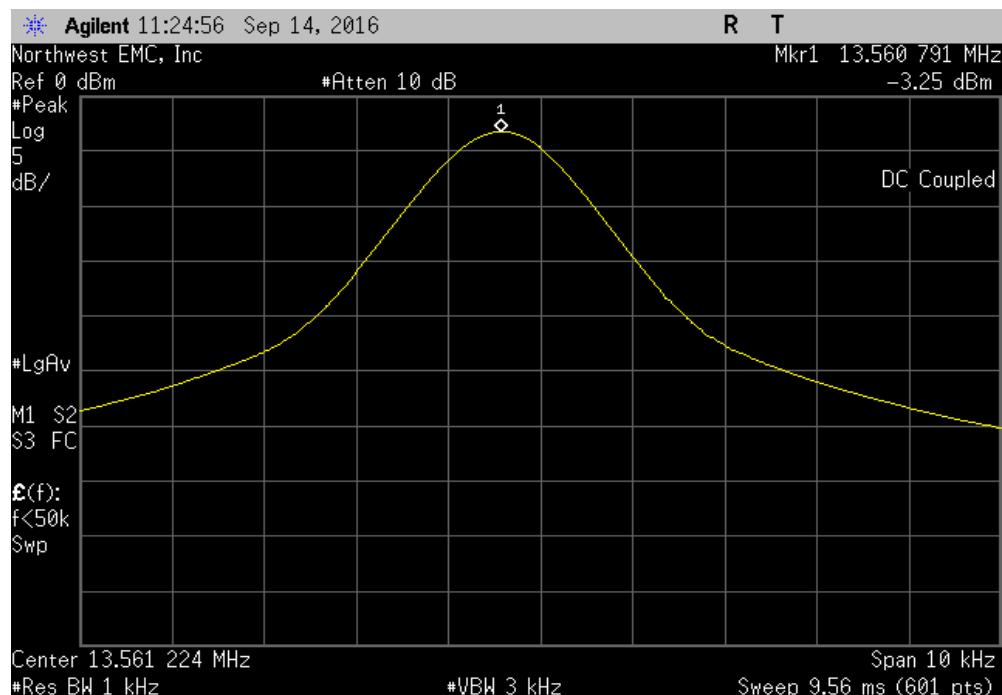


FREQUENCY STABILITY

RFID 13.56MHz, Extreme Temperature, +20°C					
Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results	
13.560791	13.56	58.3	100	Pass	

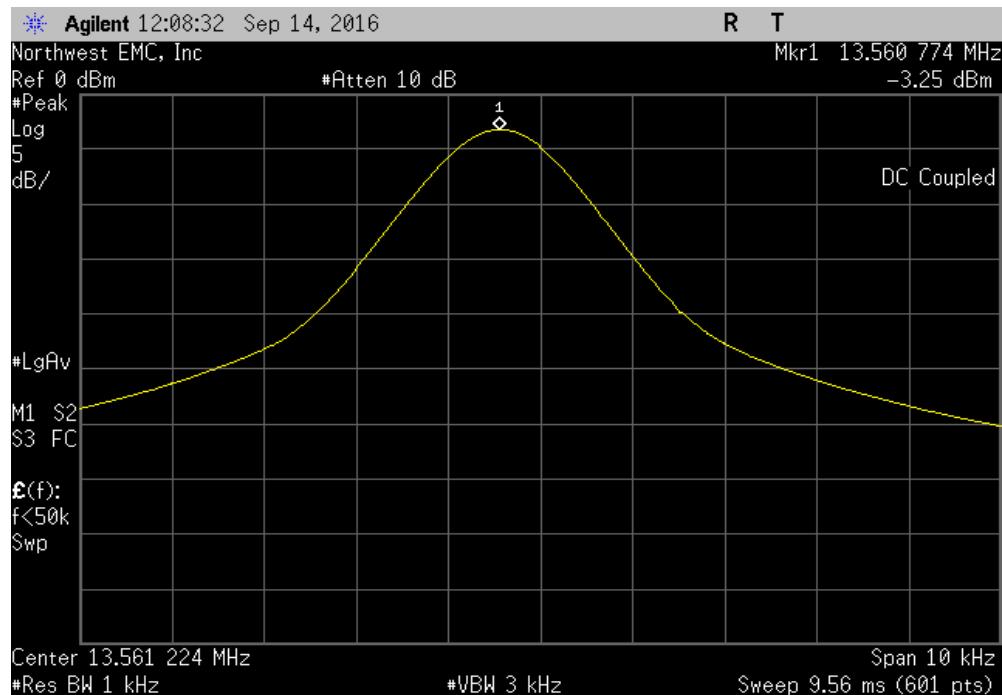


RFID 13.56MHz, Extreme Temperature, +10°C					
Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results	
13.560791	13.56	58.3	100	Pass	

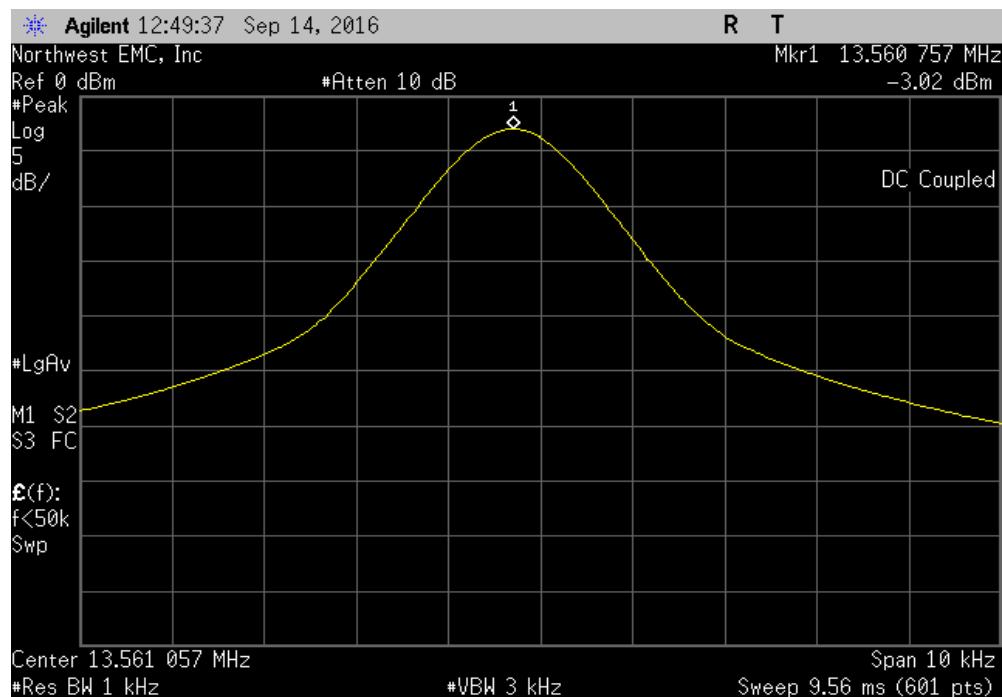


FREQUENCY STABILITY

RFID 13.56MHz, Extreme Temperature, 0°C					
Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results	
13.560774	13.56	57.1	100	Pass	



RFID 13.56MHz, Extreme Temperature, -10°C					
Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results	
13.560757	13.56	55.8	100	Pass	



FREQUENCY STABILITY

RFID 13.56MHz, Extreme Temperature, -20°C					
Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results	
13.560724	13.56	53.4	100	Pass	

