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 15.209:2016

Inductive Radio Module

Report # ELEM0005.1 Rev. 2

NVLAP TESTING

NVLAP Lab Code: 201049-0

CERTIFICATE OF TEST

NORTHWEST EMC
2014-12-10

Last Date of Test: September 13, 2016
Third Millennium Systems Ltd
Model: Door Access RFID Reader Family

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2016 FCC 15.209:2016	ANSI C63.10:2013

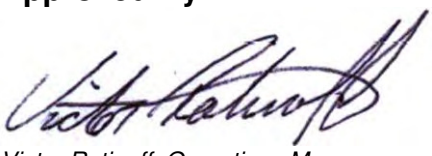
Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.4	Field Strength of Fundamental	Yes	Pass	
6.4, 6.5	Spurious Radiated Emissions	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

NORTHWEST EMC
REV 2014.10.14

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	12, 15, 18, 21

ACCREDITATIONS AND AUTHORIZATIONS

NORTHWEST EMC
REV 2016.7.25

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

TMU.2015.07.10

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.

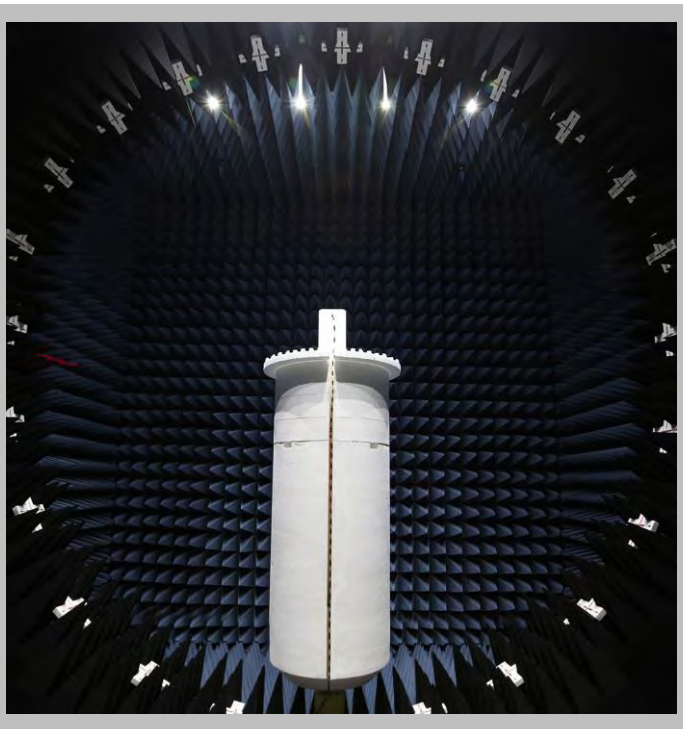
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

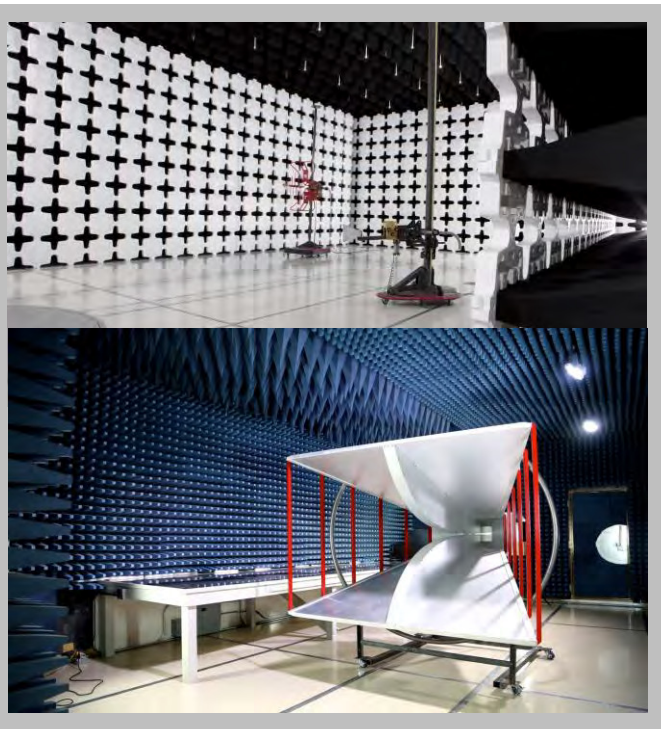
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%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

FACILITIES

NORTHWEST EMC
REV 2016.7.25

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 120th 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

NORTHWEST EMC
2014-12-10

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 Toohie
Model:	Door Access RFID Reader Family
First Date of Test:	September 7, 2016
Last Date of Test:	September 13, 2016
Receipt Date of Samples:	September 7, 2016
Equipment Design Stage:	Production
Equipment Condition:	No Damage

PRODUCT DESCRIPTION

NORTHWEST EMC 2014-12-10

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 125 kHz inductive radio to FCC Part 15.209 specifications.

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

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

NORTHWEST EMC 2014-12-10

Configuration ELEM0005- 3

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
3M INLINE (AV400)	Third Millennium Systems Ltd	3MIL-R11030	IRN0430-06
Main PCB	Third Millennium Systems Ltd	AV00	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

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

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	9/7/2016	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.
2	9/9/2016	Spurious Radiated 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.
3	9/13/2016	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

PSA-ESCI 2016.07.22

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.

MODES OF OPERATION

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

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 2

SAMPLE CALCULATIONS

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar Electronics	9252-50-24-BNC	LIA	3/3/2016	12 mo
Cable - Conducted Cable Assembly	Northwest EMC	OCP, HFP, AWC	OCPA	4/4/2016	12 mo
Receiver	Rohde & Schwarz	ESCI	ARG	6/9/2016	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	BWI (kHz)
0.15 - 30.0	1.0
30.0 - 400.0	10.0
400.0 - 1000.0	100.0
1000.0 - 6000.0	1000.0

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 C63.10-2013.

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:

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.

POWERLINE CONDUCTED EMISSIONS
AV390

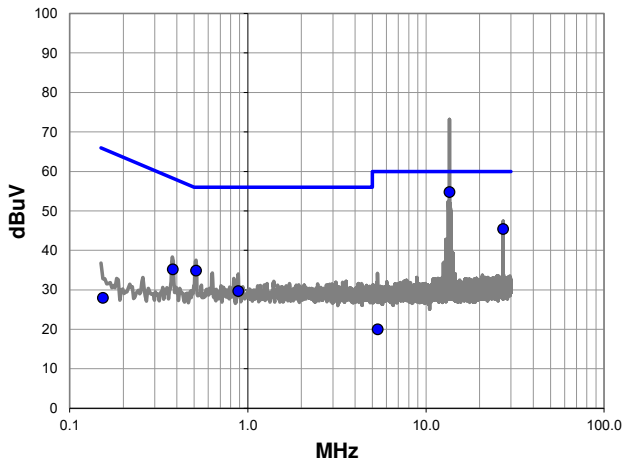
PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/07/16		
Project:	TRA-030990	**Temperature:**	21.7 °C		
Job Site:	OC06	**Humidity:**	51.4% RH		
Serial Number:	IRN0430-09	**Barometric Pres.:**	1018 mbar	**Tested by:**	Mike Tran
EUT:	Door Access RFID Reader Family (AV390)				
Configuration:	2				
Customer:	Third Millennium Systems Ltd				
Attendees:	None				
EUT Power:	12VDC				
Operating Mode:	Transmitting at 125KHz and 13.56MHz, 2.4GHz off.				
Deviations:	None				
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.				

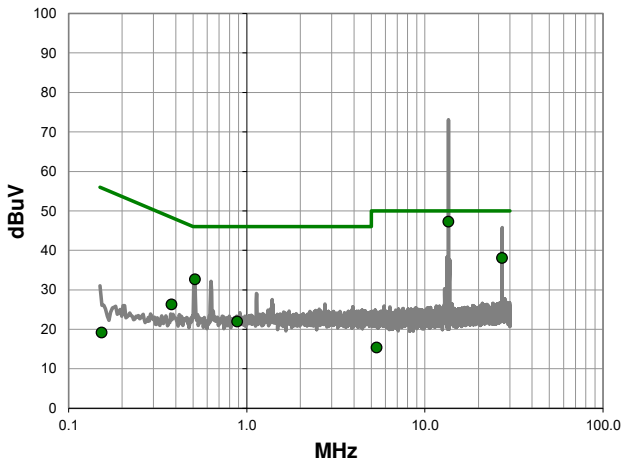
Test Specifications	**Test Method**
FCC 15.207:2016	ANSI C63.10:2013

Run #	1	**Line:**	High Line	**Ext. Attenuation:**	0	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.561	34.0	20.8	54.8	60.0	-5.2
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)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.561	26.5	20.8	47.3	50.0	-2.7
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

POWERLINE CONDUCTED EMISSIONS
AV390

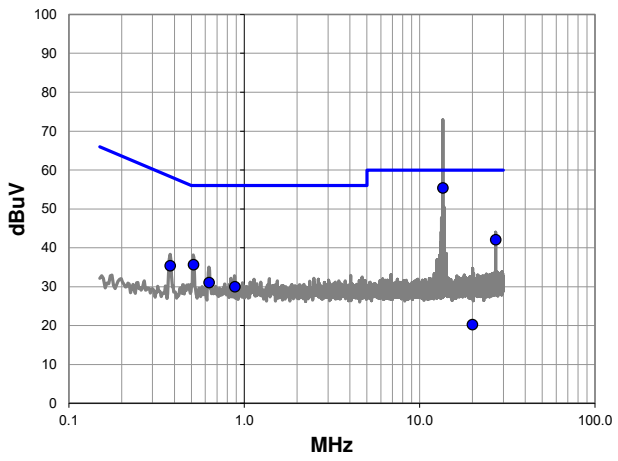
PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/07/16		
Project:	TRA-030990	**Temperature:**	21.7 °C		
Job Site:	OC06	**Humidity:**	51.4% RH		
Serial Number:	IRN0430-09	**Barometric Pres.:**	1018 mbar	**Tested by:**	Mike Tran
EUT:	Door Access RFID Reader Family (AV390)				
Configuration:	2				
Customer:	Third Millennium Systems Ltd				
Attendees:	None				
EUT Power:	12VDC				
Operating Mode:	Transmitting at 125KHz and 13.56MHz, 2.4GHz off.				
Deviations:	None				
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.				

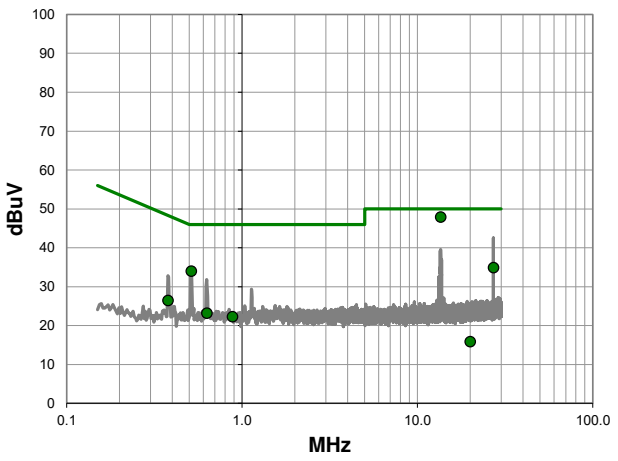
Test Specifications	**Test Method**
FCC 15.207:2016	ANSI C63.10:2013

Run #	2	**Line:**	Neutral	**Ext. Attenuation:**	0	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.561	34.6	20.8	55.4	60.0	-4.6
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)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.561	27.1	20.8	47.9	50.0	-2.1
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

POWERLINE CONDUCTED EMISSIONS
AV3K90

PSA-ESCI 2016.07.22

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.

MODES OF OPERATION

Transmitting at 125KHz and 13.56MHz, 2.4GHz Off

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 4

SAMPLE CALCULATIONS

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar Electronics	9252-50-24-BNC	LIA	3/3/2016	12 mo
Cable - Conducted Cable	Northwest EMC	OCP, HFP, AWC	OCPA	4/4/2016	12 mo
Receiver	Rohde & Schwarz	ESCI	ARG	6/9/2016	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	BWI (kHz)
0.15 - 30.0	1.0
30.0 - 400.0	10.0
400.0 - 1000.0	100.0
1000.0 - 6000.0	1000.0

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 C63.10-2013.

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:

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.

POWERLINE CONDUCTED EMISSIONS
AV3K90

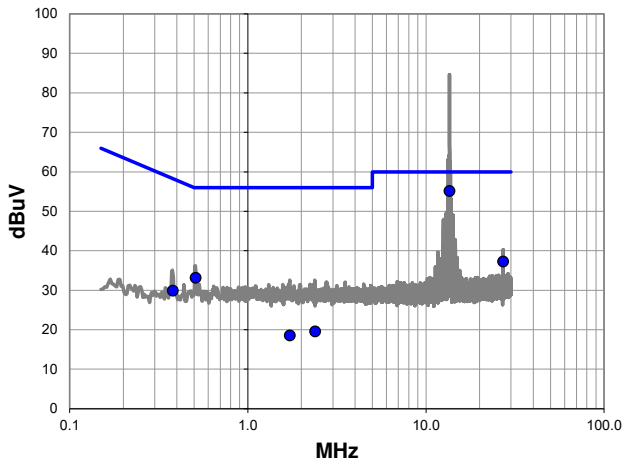
PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/07/16		
Project:	TRA-030990	**Temperature:**	21.7 °C		
Job Site:	OC06	**Humidity:**	51.4% RH		
Serial Number:	IRN0430-09	**Barometric Pres.:**	1018 mbar	**Tested by:**	Mike Tran
EUT:	Door Access RFID Reader Family (AV3K90)				
Configuration:	4				
Customer:	Third Millennium Systems Ltd				
Attendees:	None				
EUT Power:	12VDC				
Operating Mode:	Transmitting at 125KHz and 13.56MHz, 2.4GHz off.				
Deviations:	None				
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.				

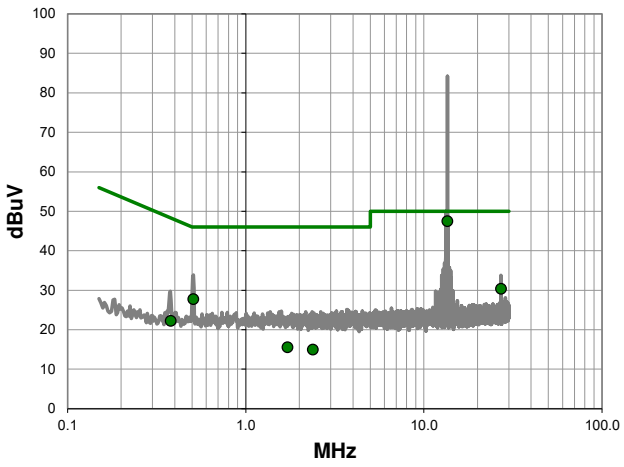
Test Specifications	**Test Method**
FCC 15.207:2016	ANSI C63.10:2013

Run #	7	**Line:**	Neutral	**Ext. Attenuation:**	0	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.561	34.4	20.8	55.2	60.0	-4.8
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)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.561	26.7	20.8	47.5	50.0	-2.5
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

POWERLINE CONDUCTED EMISSIONS
AV3K90

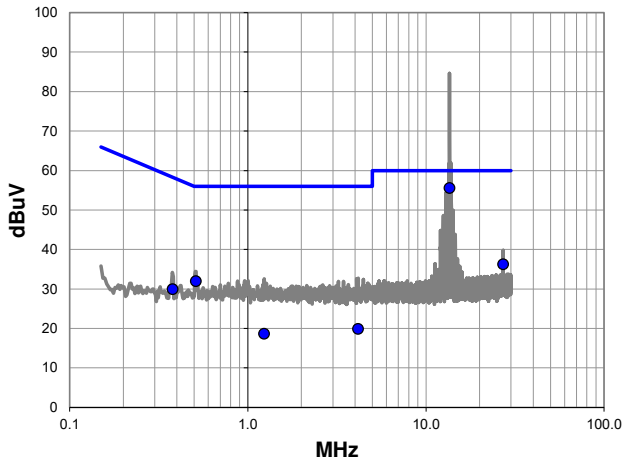
PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/07/16		
Project:	TRA-030990	**Temperature:**	21.7 °C		
Job Site:	OC06	**Humidity:**	51.4% RH		
Serial Number:	IRN0430-09	**Barometric Pres.:**	1018 mbar	**Tested by:**	Mike Tran
EUT:	Door Access RFID Reader Family (AV3K90)				
Configuration:	4				
Customer:	Third Millennium Systems Ltd				
Attendees:	None				
EUT Power:	12VDC				
Operating Mode:	Transmitting at 125KHz and 13.56MHz, 2.4GHz off.				
Deviations:	None				
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.				

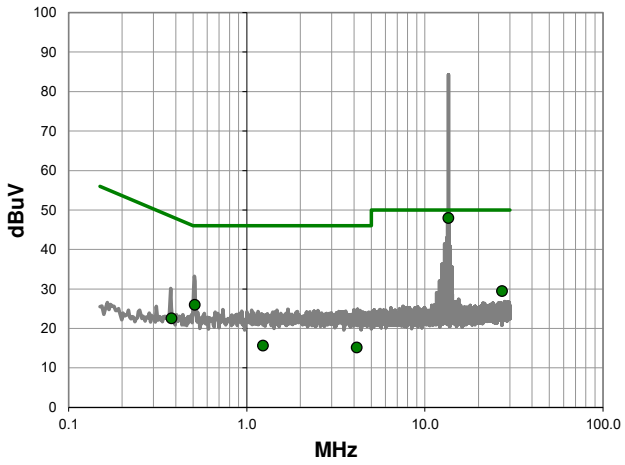
Test Specifications	**Test Method**
FCC 15.207:2016	ANSI C63.10:2013

Run #	8	**Line:**	High Line	**Ext. Attenuation:**	0	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.561	34.8	20.8	55.6	60.0	-4.4
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)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.561	27.2	20.8	48.0	50.0	-2.0
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

POWERLINE CONDUCTED EMISSIONS
AV400

PSA-ESCI 2016.07.22

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.

MODES OF OPERATION

Transmitting at 125KHz and 13.56MHz, 2.4GHz Off

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 3

SAMPLE CALCULATIONS

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar Electronics	9252-50-24-BNC	LIA	3/3/2016	12 mo
Cable - Conducted Cable	Northwest EMC	OCP, HFP, AWC	OCPA	4/4/2016	12 mo
Receiver	Rohde & Schwarz	ESCI	ARG	6/9/2016	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	BWI (kHz)
0.15 - 30.0	1.0
30.0 - 400.0	10.0
400.0 - 1000.0	100.0
1000.0 - 6000.0	1000.0

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 C63.10-2013.

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:

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.

POWERLINE CONDUCTED EMISSIONS
AV400

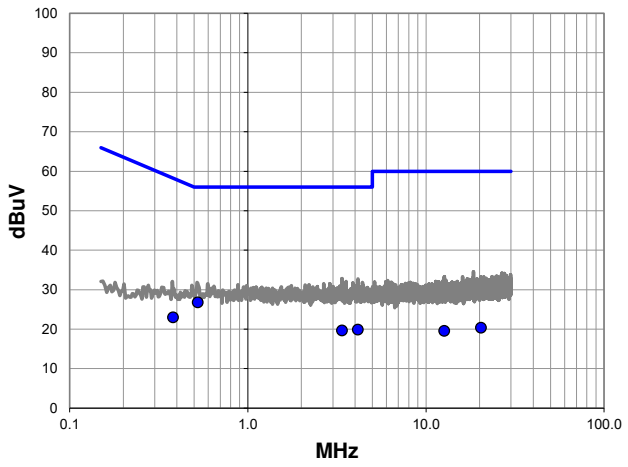
PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/13/16		
Project:	TRA-030990	**Temperature:**	21.2 °C		
Job Site:	OC06	**Humidity:**	48% RH		
Serial Number:	IRN0430-06	**Barometric Pres.:**	1018 mbar	**Tested by:**	Mike Tran
EUT:	Door Access RFID Reader Family (AV400)				
Configuration:	3				
Customer:	Third Millennium Systems Ltd				
Attendees:	None				
EUT Power:	12VDC				
Operating Mode:	Transmitting at 125KHz and 13.56MHz, 2.4GHz Off				
Deviations:	None				
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.				

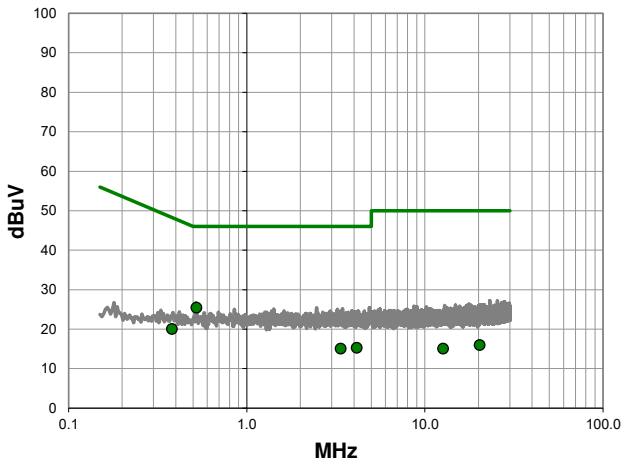
Test Specifications	**Test Method**
FCC 15.207:2016	ANSI C63.10:2013

Run #	9	**Line:**	High Line	**Ext. Attenuation:**	0	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.523	6.9	19.9	26.8	56.0	-29.2
0.380	3.0	20.0	23.0	58.3	-35.3
4.146	-0.4	20.3	19.9	56.0	-36.1
3.373	-0.5	20.2	19.7	56.0	-36.3
20.324	-0.9	21.3	20.4	60.0	-39.6
12.661	-1.1	20.7	19.6	60.0	-40.4

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.523	5.6	19.9	25.5	46.0	-20.5
0.380	0.1	20.0	20.1	48.3	-28.2
4.146	-5.0	20.3	15.3	46.0	-30.7
3.373	-5.1	20.2	15.1	46.0	-30.9
20.324	-5.3	21.3	16.0	50.0	-34.0
12.661	-5.6	20.7	15.1	50.0	-34.9

POWERLINE CONDUCTED EMISSIONS
AV400

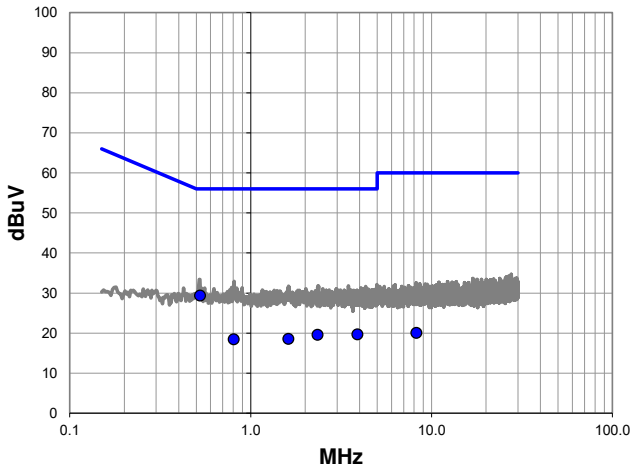
PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/13/16		
Project:	TRA-030990	**Temperature:**	21.2 °C		
Job Site:	OC06	**Humidity:**	48% RH		
Serial Number:	IRN0430-06	**Barometric Pres.:**	1018 mbar	**Tested by:**	Mike Tran
EUT:	Door Access RFID Reader Family (AV400)				
Configuration:	3				
Customer:	Third Millennium Systems Ltd				
Attendees:	None				
EUT Power:	12VDC				
Operating Mode:	Transmitting at 125KHz and 13.56MHz, 2.4GHz Off				
Deviations:	None				
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.				

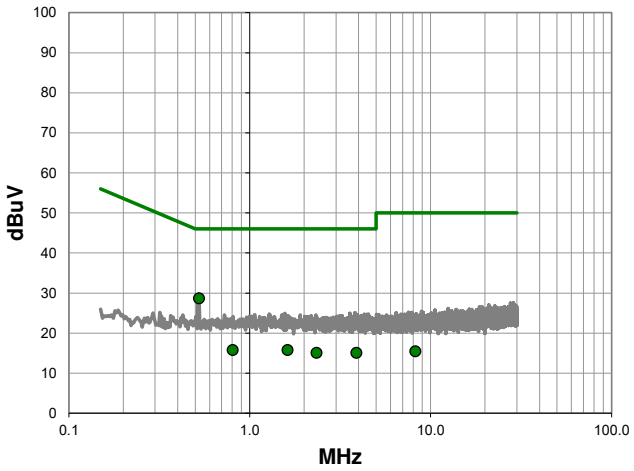
Test Specifications	**Test Method**
FCC 15.207:2016	ANSI C63.10:2013

Run #	10	**Line:**	Neutral	**Ext. Attenuation:**	0	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.524	9.5	19.9	29.4	56.0	-26.6
3.886	-0.5	20.2	19.7	56.0	-36.3
2.341	-0.5	20.1	19.6	56.0	-36.4
1.615	-1.5	20.1	18.6	56.0	-37.4
0.805	-1.6	20.1	18.5	56.0	-37.5
8.227	-0.4	20.5	20.1	60.0	-39.9

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.524	8.8	19.9	28.7	46.0	-17.3
0.805	-4.3	20.1	15.8	46.0	-30.2
1.615	-4.3	20.1	15.8	46.0	-30.2
3.886	-5.1	20.2	15.1	46.0	-30.9
2.341	-5.0	20.1	15.1	46.0	-30.9
8.227	-5.0	20.5	15.5	50.0	-34.5

POWERLINE CONDUCTED EMISSIONS
AV490

PSA-ESCI 2016.07.22

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.

MODES OF OPERATION

Transmitting at 125KHz and 13.56MHz, 2.4GHz Off

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 1

SAMPLE CALCULATIONS

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar Electronics	9252-50-24-BNC	LIA	3/3/2016	12 mo
Cable - Conducted Cable	Northwest EMC	OCP, HFP, AWC	OCPA	4/4/2016	12 mo
Receiver	Rohde & Schwarz	ESCI	ARG	6/9/2016	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	BWI (kHz)
0.15 - 30.0	1.0
30.0 - 400.0	10.0
400.0 - 1000.0	100.0
1000.0 - 6000.0	1000.0

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 C63.10-2013.

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:

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.

POWERLINE CONDUCTED EMISSIONS
AV490

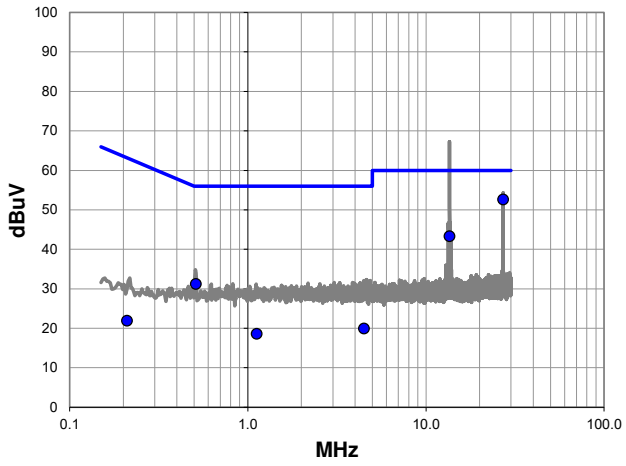
PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/07/16		
Project:	TRA-030990	**Temperature:**	21.7 °C		
Job Site:	OC06	**Humidity:**	51.4% RH		
Serial Number:	IRN0430-07	**Barometric Pres.:**	1018 mbar	**Tested by:**	Mike Tran
EUT:	Door Access RFID Reader Family (AV490)				
Configuration:	1				
Customer:	Third Millennium Systems Ltd				
Attendees:	None				
EUT Power:	12VDC				
Operating Mode:	Transmitting at 125KHz and 13.56MHz, 2.4GHz Off				
Deviations:	None				
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.				

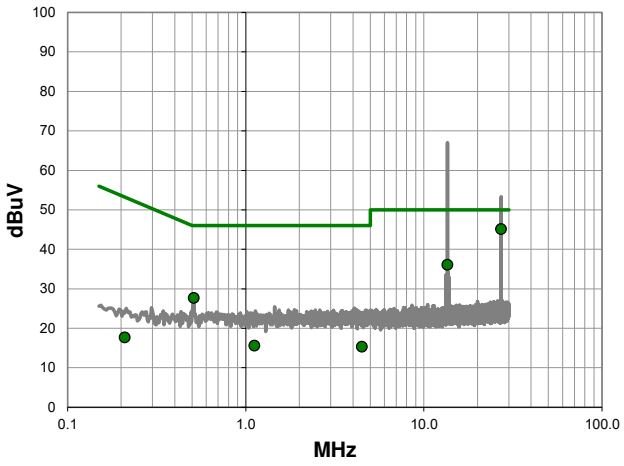
Test Specifications	**Test Method**
FCC 15.207:2016	ANSI C63.10:2013

Run #	3	**Line:**	Neutral	**Ext. Attenuation:**	0	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
27.122	30.7	21.9	52.6	60.0	-7.4
13.561	22.5	20.8	43.3	60.0	-16.7
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)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
27.122	23.2	21.9	45.1	50.0	-4.9
13.561	15.3	20.8	36.1	50.0	-13.9
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

POWERLINE CONDUCTED EMISSIONS
AV490

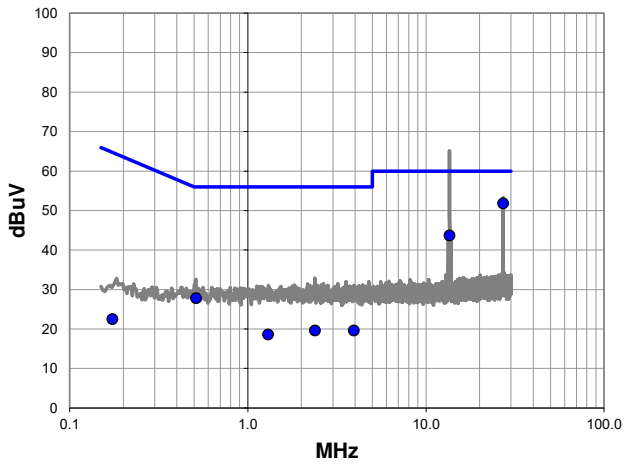
PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/07/16		
Project:	TRA-030990	**Temperature:**	21.7 °C		
Job Site:	OC06	**Humidity:**	51.4% RH		
Serial Number:	IRN0430-07	**Barometric Pres.:**	1018 mbar	**Tested by:**	Mike Tran
EUT:	Door Access RFID Reader Family (AV490)				
Configuration:	1				
Customer:	Third Millennium Systems Ltd				
Attendees:	None				
EUT Power:	12VDC				
Operating Mode:	Transmitting at 125KHz and 13.56MHz, 2.4GHz Off				
Deviations:	None				
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.				

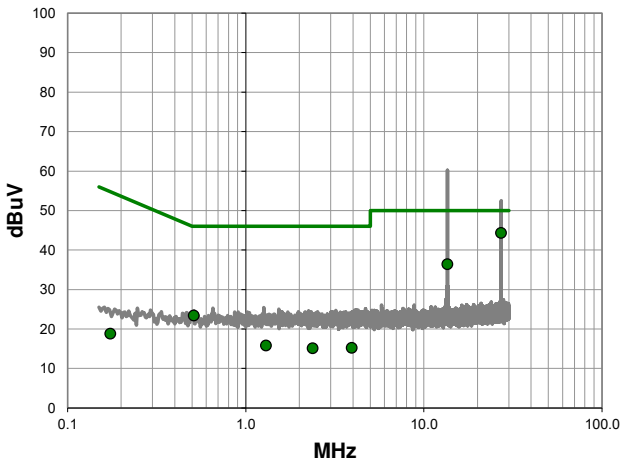
Test Specifications	**Test Method**
FCC 15.207:2016	ANSI C63.10:2013

Run #	4	**Line:**	High Line	**Ext. Attenuation:**	0	**Results**	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
27.121	29.9	21.9	51.8	60.0	-8.2
13.561	22.9	20.8	43.7	60.0	-16.3
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)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
27.121	22.4	21.9	44.3	50.0	-5.7
13.561	15.6	20.8	36.4	50.0	-13.6
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

FIELD STRENGTH OF FUNDAMENTAL
AV390

PSA-ESCI 2016.07.22

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 125KHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	10 kHz	Stop Frequency	490 kHz

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

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

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

Per ANSI C63.10 sections 6.4.4.1 and 6.4.4.2, the emissions from the EUT were maximized by rotating the EUT on the turntable. Also, the EUT and/or associated antenna was positioned in 3 orthogonal planes. A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity per section 4.5.1. The center of the loop antenna was maintained at 1m above the ground plane during the testing.

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.

If there are no detectable emissions above the noise floor, the data included will show noise floor measurements for reference only.

FIELD STRENGTH OF FUNDAMENTAL
AV390

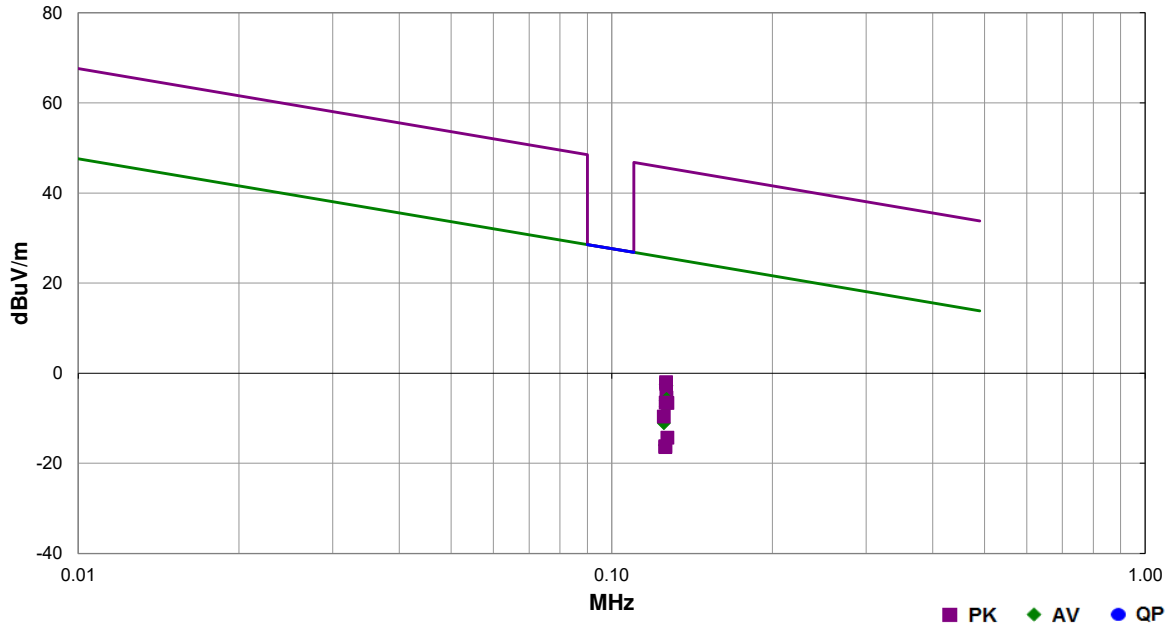
NORTHWEST EMC

PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/07/16		
Project:	TRA-030990	**Temperature:**	21.1 °C		
Job Site:	OC08	**Humidity:**	48.9% RH		
Serial Number:	IRN0430-09	**Barometric Pres.:**	1018 mbar	**Tested by:**	Mike Tran
EUT:	Door Access RFID Reader Family (AV390)				
Configuration:	2				
Customer:	Third Millennium Systems Ltd				
Attendees:	None				
EUT Power:	12VDC				
Operating Mode:	Transmitting at 125KHz				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.209:2016	ANSI C63.10:2013

Run #	10	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



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
0.126	67.2	10.3	1.0	358.0	3.0	0.0	Par EUT	AV	-80.0	-2.5	25.6	-28.1	EUT Vert
0.127	66.9	10.3	1.0	91.0	3.0	0.0	Par EUT	AV	-80.0	-2.8	25.6	-28.4	EUT on Side
0.126	63.6	10.3	1.0	356.0	3.0	0.0	Per EUT	AV	-80.0	-6.1	25.6	-31.7	EUT on Side
0.127	63.3	10.3	1.0	90.0	3.0	0.0	Per EUT	AV	-80.0	-6.4	25.6	-32.0	EUT Vert
0.127	62.3	10.3	2.0	90.0	3.0	0.0	Par GND	AV	-80.0	-7.4	25.6	-33.0	EUT on Side
0.126	62.3	10.3	2.0	360.0	3.0	0.0	Par GND	AV	-80.0	-7.4	25.6	-33.0	EUT Vert
0.125	58.6	10.3	1.5	315.0	3.0	0.0	Par GND	AV	-80.0	-11.1	25.7	-36.8	EUT Horz
0.126	53.7	10.3	1.0	315.0	3.0	0.0	Par EUT	AV	-80.0	-16.0	25.6	-41.6	EUT Horz
0.126	46.9	10.7	1.5	90.0	3.0	0.0	Per EUT	AV	-80.0	-16.4	26.6	-43.0	EUT Horz
0.127	67.7	10.3	1.0	358.0	3.0	0.0	Par EUT	PK	-80.0	-2.0	45.6	-47.6	EUT Vert
0.127	67.3	10.3	1.0	91.0	3.0	0.0	Par EUT	PK	-80.0	-2.4	45.6	-48.0	EUT on Side
0.127	64.3	10.3	1.0	356.0	3.0	0.0	Per EUT	PK	-80.0	-5.4	45.6	-51.0	EUT on Side
0.127	64.0	10.3	1.0	90.0	3.0	0.0	Per EUT	PK	-80.0	-5.7	45.6	-51.3	EUT Vert
0.127	63.1	10.3	2.0	90.0	3.0	0.0	Par GND	PK	-80.0	-6.6	45.5	-52.1	EUT on Side
0.126	63.2	10.3	2.0	360.0	3.0	0.0	Par GND	PK	-80.0	-6.5	45.6	-52.1	EUT Vert
0.125	60.1	10.3	1.5	315.0	3.0	0.0	Par GND	PK	-80.0	-9.6	45.7	-55.3	EUT Horz
0.127	55.4	10.3	1.0	315.0	3.0	0.0	Par EUT	PK	-80.0	-14.3	45.5	-59.8	EUT Horz
0.126	53.1	10.7	1.5	90.0	3.0	0.0	Per EUT	PK	-80.0	-16.2	49.3	-65.5	EUT Horz

FIELD STRENGTH OF FUNDAMENTAL
AV3K90

PSA-ESCI 2016.07.22

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 125KHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 4

FREQUENCY RANGE INVESTIGATED

Start Frequency	10 kHz	Stop Frequency	490 kHz

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

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

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

Per ANSI C63.10 sections 6.4.4.1 and 6.4.4.2, the emissions from the EUT were maximized by rotating the EUT on the turntable. Also, the EUT and/or associated antenna was positioned in 3 orthogonal planes. A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity per section 4.5.1. The center of the loop antenna was maintained at 1m above the ground plane during the testing.

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.

If there are no detectable emissions above the noise floor, the data included will show noise floor measurements for reference only.

FIELD STRENGTH OF FUNDAMENTAL
AV3K90

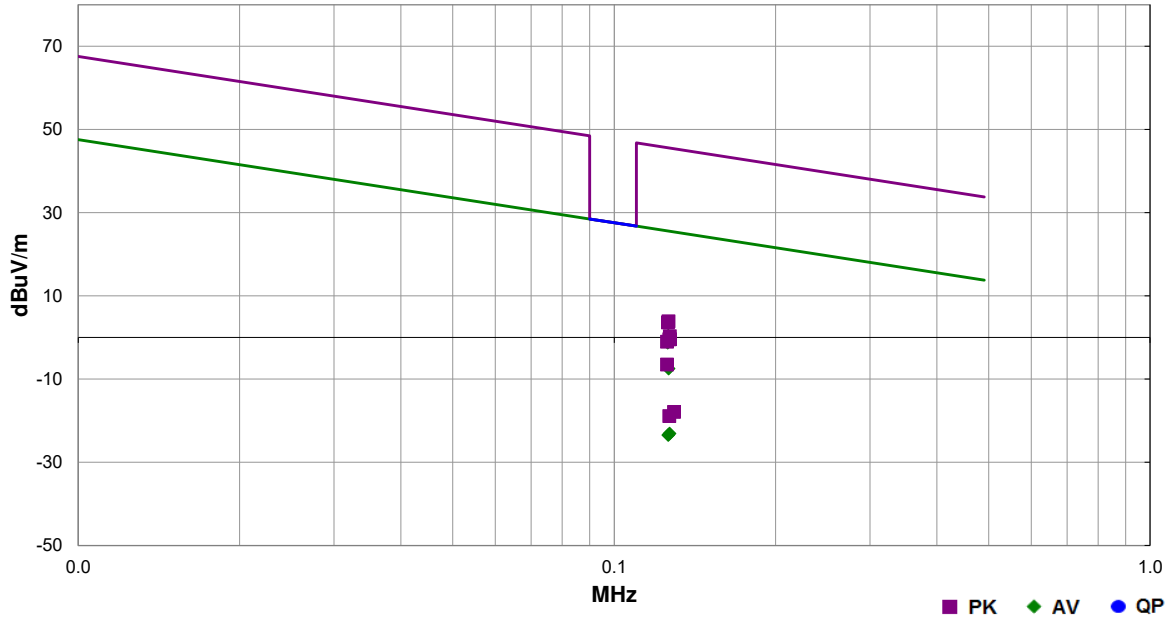
NORTHWEST EMC

PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/07/16		
Project:	TRA-030990	**Temperature:**	22.7 °C		
Job Site:	OC08	**Humidity:**	48.7% 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:	12VDC				
Operating Mode:	Transmitting at 125KHz				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.209:2016	ANSI C63.10:2013

Run #	11	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



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
0.126	73.4	10.3	1.0	186.0	3.0	0.0	Parallel to EUT	AV	-80.0	3.7	25.6	-21.9	EUT Vert
0.126	73.1	10.3	1.0	180.0	3.0	0.0	Parallel to EUT	AV	-80.0	3.4	25.6	-22.2	EUT on Side
0.126	69.8	10.3	1.0	263.0	3.0	0.0	Perp to EUT	AV	-80.0	0.1	25.6	-25.5	EUT on Side
0.126	69.0	10.3	1.0	202.0	3.0	0.0	Parallel to GND	AV	-80.0	-0.7	25.6	-26.3	EUT Vert
0.126	68.9	10.3	1.9	196.0	3.0	0.0	Parallel to GND	AV	-80.0	-0.8	25.6	-26.4	EUT on Side
0.126	68.4	10.3	1.0	227.0	3.0	0.0	Parallel to GND	AV	-80.0	-1.3	25.6	-26.9	EUT Horz
0.126	62.2	10.3	2.0	273.0	3.0	0.0	Parallel to EUT	AV	-80.0	-7.5	25.6	-33.1	EUT Horz
0.126	73.6	10.3	1.0	186.0	3.0	0.0	Parallel to EUT	PK	-80.0	3.9	45.6	-41.7	EUT Vert
0.126	73.3	10.3	1.0	180.0	3.0	0.0	Parallel to EUT	PK	-80.0	3.6	45.6	-42.0	EUT on Side
0.127	70.0	10.3	1.0	263.0	3.0	0.0	Perp to EUT	PK	-80.0	0.3	45.5	-45.2	EUT on Side
0.127	69.3	10.3	1.9	196.0	3.0	0.0	Parallel to GND	PK	-80.0	-0.4	45.5	-45.9	EUT on Side
0.127	69.3	10.3	1.0	202.0	3.0	0.0	Parallel to GND	PK	-80.0	-0.4	45.6	-46.0	EUT Vert
0.125	68.7	10.3	1.0	227.0	3.0	0.0	Parallel to GND	PK	-80.0	-1.0	45.7	-46.7	EUT Horz
0.127	46.6	10.3	1.0	255.0	3.0	0.0	Perp to EUT	AV	-80.0	-23.1	25.6	-48.7	EUT Horz
0.126	46.2	10.3	1.0	201.0	3.0	0.0	Perp to EUT	AV	-80.0	-23.5	25.6	-49.1	EUT Vert
0.125	63.2	10.3	2.0	273.0	3.0	0.0	Parallel to EUT	PK	-80.0	-6.5	45.7	-52.2	EUT Horz
0.129	51.8	10.3	1.0	201.0	3.0	0.0	Perp to EUT	PK	-80.0	-17.9	45.4	-63.3	EUT Vert
0.127	50.8	10.3	1.0	255.0	3.0	0.0	Perp to EUT	PK	-80.0	-18.9	45.6	-64.5	EUT Horz

FIELD STRENGTH OF FUNDAMENTAL
AV400

PSA-ESCI 2016.07.22

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 125kHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	.01 MHz	Stop Frequency	.490 MHz

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

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

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
AV400

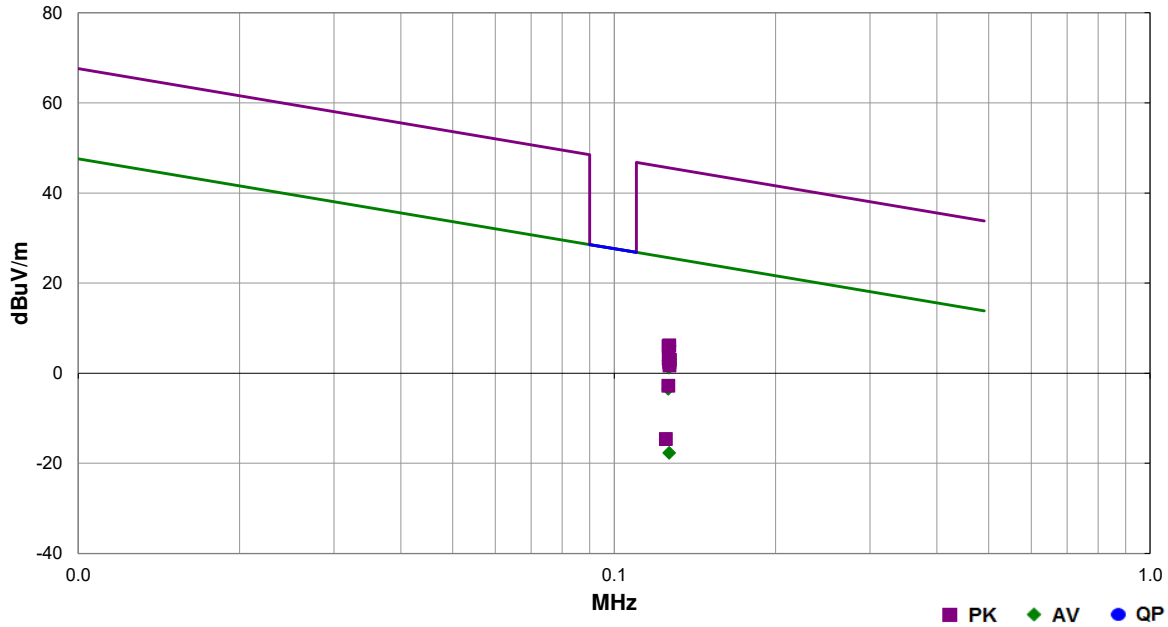
NORTHWEST EMC

PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/09/16		
Project:	TRA-030990	**Temperature:**	22.3 °C		
Job Site:	OC08	**Humidity:**	49.7% RH		
Serial Number:	IRN0430-06	**Barometric Pres.:**	1017 mbar	**Tested by:**	Mark Baytan
EUT:	Door Access RFID Reader Family (AV400)				
Configuration:	3				
Customer:	Third Millennium Systems Ltd				
Attendees:	None				
EUT Power:	12VDC				
Operating Mode:	Transmitting at 125kHz				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.209:2016	ANSI C63.10:2013

Run #	38	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



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
0.127	75.7	10.3	1.0	189.0	3.0	0.0	Parallel to EU	AV	-80.0	6.0	25.6	-19.6	EUT Vert
0.127	75.5	10.3	1.0	183.0	3.0	0.0	Parallel to EU	AV	-80.0	5.8	25.6	-19.8	EUT on Side
0.126	72.5	10.3	1.0	109.0	3.0	0.0	Perp to EUT	AV	-80.0	2.8	25.6	-22.8	EUT on Side
0.127	72.5	10.3	1.0	101.0	3.0	0.0	Perp to EUT	AV	-80.0	2.8	25.6	-22.8	EUT Vert
0.126	72.2	10.3	1.6	190.0	3.0	0.0	Parallel to GNI	AV	-80.0	2.5	25.6	-23.1	EUT Vert
0.126	71.8	10.3	1.0	163.0	3.0	0.0	Perp to EUT	AV	-80.0	2.1	25.6	-23.5	EUT Horz
0.126	70.9	10.3	1.6	179.0	3.0	0.0	Parallel to GNI	AV	-80.0	1.2	25.6	-24.4	EUT on Side
0.126	66.2	10.3	1.8	159.0	3.0	0.0	Parallel to EU	AV	-80.0	-3.5	25.6	-29.1	EUT Horz
0.127	75.9	10.3	1.0	189.0	3.0	0.0	Parallel to EU	PK	-80.0	6.2	45.6	-39.4	EUT Vert
0.126	75.7	10.3	1.0	183.0	3.0	0.0	Parallel to EU	PK	-80.0	6.0	45.6	-39.6	EUT on Side
0.126	72.8	10.3	1.0	109.0	3.0	0.0	Perp to EUT	PK	-80.0	3.1	45.6	-42.5	EUT on Side
0.127	72.7	10.3	1.0	101.0	3.0	0.0	Perp to EUT	PK	-80.0	3.0	45.5	-42.5	EUT Vert
0.127	72.6	10.3	1.6	190.0	3.0	0.0	Parallel to GNI	PK	-80.0	2.9	45.6	-42.7	EUT Vert
0.127	72.1	10.3	1.0	163.0	3.0	0.0	Perp to EUT	PK	-80.0	2.4	45.6	-43.2	EUT Horz
0.127	52.0	10.3	1.9	87.0	3.0	0.0	Parallel to GNI	AV	-80.0	-17.7	25.6	-43.3	EUT Horz
0.127	71.4	10.3	1.6	179.0	3.0	0.0	Parallel to GNI	PK	-80.0	1.7	45.6	-43.9	EUT on Side
0.126	66.9	10.3	1.8	159.0	3.0	0.0	Parallel to EU	PK	-80.0	-2.8	45.6	-48.4	EUT Horz
0.125	55.1	10.3	1.9	87.0	3.0	0.0	Parallel to GNI	PK	-80.0	-14.6	45.7	-60.3	EUT Horz

FIELD STRENGTH OF FUNDAMENTAL
AV490

PSA-ESCI 2016.07.22

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 125KHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	10 kHz	Stop Frequency	490 kHz

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

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

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

Per ANSI C63.10 sections 6.4.4.1 and 6.4.4.2, the emissions from the EUT were maximized by rotating the EUT on the turntable. Also, the EUT and/or associated antenna was positioned in 3 orthogonal planes. A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity per section 4.5.1. The center of the loop antenna was maintained at 1m above the ground plane during the testing.

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.

If there are no detectable emissions above the noise floor, the data included will show noise floor measurements for reference only.

FIELD STRENGTH OF FUNDAMENTAL
AV490

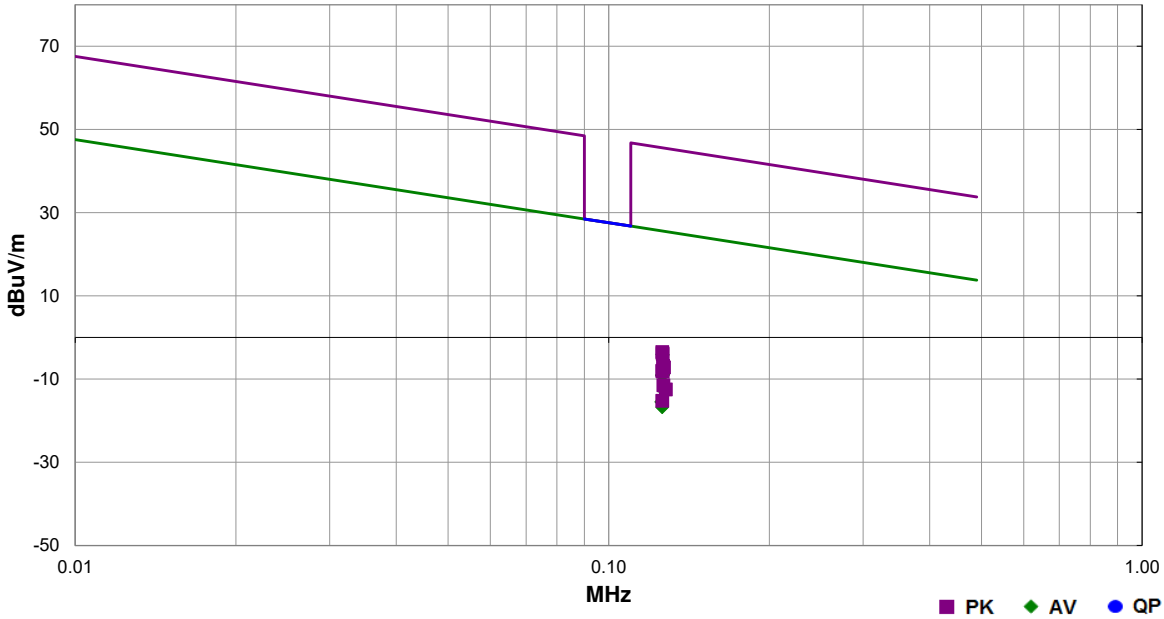
NORTHWEST EMC

PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/07/16		
Project:	TRA-030990	**Temperature:**	20.7 °C		
Job Site:	OC08	**Humidity:**	47.1% RH		
Serial Number:	IRN0430-07	**Barometric Pres.:**	1016 mbar	**Tested by:**	Mike Tran
EUT:	Door Access RFID Reader Family (AV490)				
Configuration:	1				
Customer:	Third Millennium Systems Ltd				
Attendees:	None				
EUT Power:	12VDC				
Operating Mode:	Transmitting at 125KHz				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.209:2016	ANSI C63.10:2013

Run #	6	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



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
0.126	65.6	10.3	1.0	360.0	3.0	0.0	Par EUT	AV	-80.0	-4.1	25.6	-29.7	EUT Vert
0.127	65.5	10.3	1.0	90.0	3.0	0.0	Par EUT	AV	-80.0	-4.2	25.6	-29.8	EUT on Side
0.127	62.2	10.3	1.0	360.0	3.0	0.0	Per EUT	AV	-80.0	-7.5	25.6	-33.1	EUT on Side
0.127	61.9	10.3	1.0	90.0	3.0	0.0	Per EUT	AV	-80.0	-7.8	25.6	-33.4	EUT Vert
0.127	60.7	10.3	2.0	180.0	3.0	0.0	Par GND	AV	-80.0	-9.0	25.6	-34.6	EUT Vert
0.126	60.6	10.3	2.0	93.0	3.0	0.0	Par GND	AV	-80.0	-9.1	25.6	-34.7	EUT on Side
0.127	56.9	10.3	1.0	45.0	3.0	0.0	Par GND	AV	-80.0	-12.8	25.5	-38.3	EUT Horz
0.126	54.2	10.3	1.0	135.0	3.0	0.0	Par EUT	AV	-80.0	-15.5	25.7	-41.2	EUT Horz
0.126	47.3	10.9	1.0	90.0	3.0	0.0	Per EUT	AV	-80.0	-16.8	26.1	-42.9	EUT Horz
0.126	66.2	10.3	1.0	360.0	3.0	0.0	Par EUT	PK	-80.0	-3.5	45.6	-49.1	EUT Vert
0.126	65.8	10.3	1.0	90.0	3.0	0.0	Par EUT	PK	-80.0	-3.9	45.6	-49.5	EUT on Side
0.127	62.9	10.3	1.0	360.0	3.0	0.0	Per EUT	PK	-80.0	-6.8	45.6	-52.4	EUT on Side
0.127	62.5	10.3	1.0	90.0	3.0	0.0	Per EUT	PK	-80.0	-7.2	45.5	-52.7	EUT Vert
0.126	61.7	10.3	2.0	180.0	3.0	0.0	Par GND	PK	-80.0	-8.0	45.6	-53.6	EUT Vert
0.126	61.5	10.3	2.0	93.0	3.0	0.0	Par GND	PK	-80.0	-8.2	45.6	-53.8	EUT on Side
0.127	58.2	10.3	1.0	45.0	3.0	0.0	Par GND	PK	-80.0	-11.5	45.6	-57.1	EUT Horz
0.128	57.2	10.3	1.0	135.0	3.0	0.0	Par EUT	PK	-80.0	-12.5	45.5	-58.0	EUT Horz
0.126	54.0	10.8	1.0	90.0	3.0	0.0	Per EUT	PK	-80.0	-15.2	50.0	-65.2	EUT Horz

SPURIOUS RADIATED EMISSIONS AV390

PSA-ESCI 2016.07.22

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 125KHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	.01 MHz	Stop Frequency	1000 MHz

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
Amplifier - Pre-Amplifier	Miteq	AM-1551	AOX	1/21/2016	12 mo
Antenna - Biconilog	Teseq	CBL 6141A	AYE	5/18/2015	24 mo
Antenna	EMCO	6502	AZB	8/14/2015	24 mo
Cable	Northwest EMC	30MHz-6GHz RE Cables	OCB	1/21/2016	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	7/15/2016	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

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

Per ANSI C63.10 sections 6.4.4.1 and 6.4.4.2, the emissions from the EUT were maximized by rotating the EUT on the turntable. Also, the EUT and/or associated antenna was positioned in 3 orthogonal planes. A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity per section 4.5.1. The center of the loop antenna was maintained at 1m above the ground plane during the testing.

For measurements below 30 MHz, 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. Per FCC 15.33(a)(4), measurements were taken up to the highest frequency range of either the 10th harmonic of the fundamental or the applicable digital frequency test range.

If there are no detectable emissions above the noise floor, the data included will show noise floor measurements for reference only.

SPURIOUS RADIATED EMISSIONS AV390

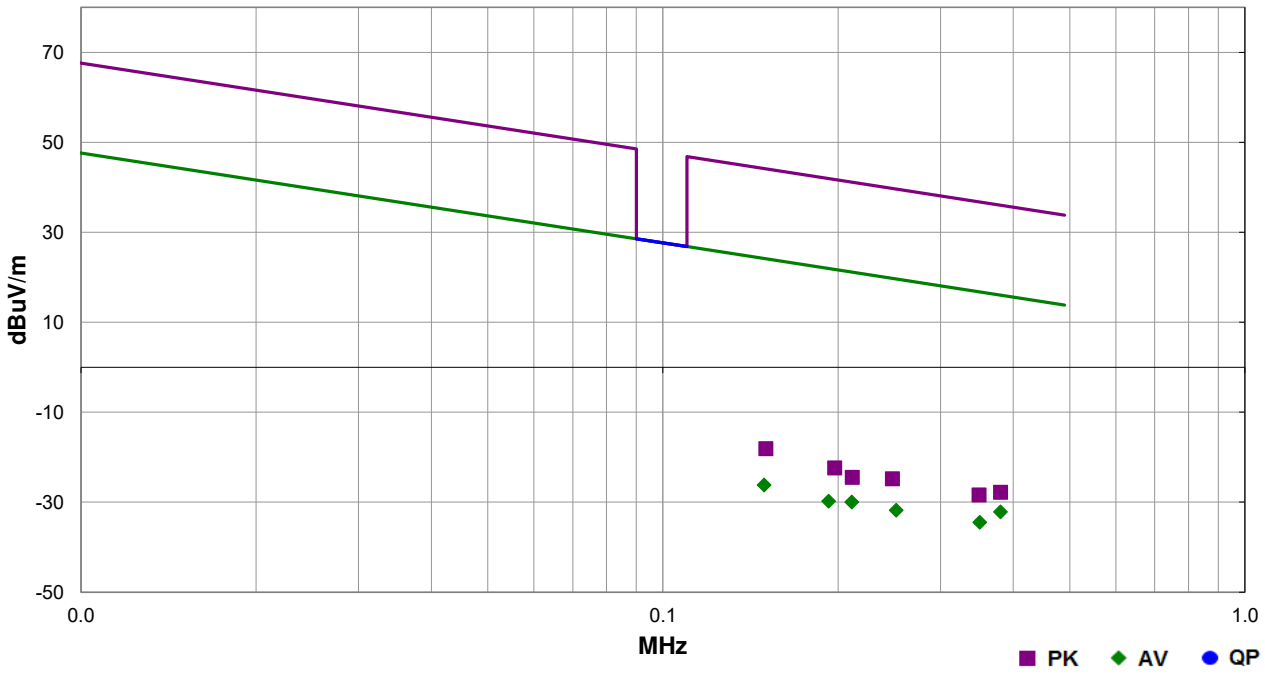
NORTHWEST EMC

PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/07/16		
Project:	TRA-030990	**Temperature:**	22.7 °C		
Job Site:	OC08	**Humidity:**	48.7% 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:	12VDC				
Operating Mode:	Transmitting at 125KHz				
Deviations:	None				
Comments:	Wide span maximization for harmonic investigation. No emissions were found. Measurements taken were noise floor.				

Test Specifications	**Test Method**
FCC 15.209:2016	ANSI C63.10:2013

Run #	13	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



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
0.380	37.8	10.0	1.0	5.0	3.0	0.0	Parallel to EUT	AV	-80.0	-32.2	16.0	-48.2	EUT Vert
0.149	43.5	10.3	1.0	143.0	3.0	0.0	Parallel to EUT	AV	-80.0	-26.2	24.1	-50.3	EUT Vert
0.211	39.8	10.2	1.0	27.0	3.0	0.0	Parallel to EUT	AV	-80.0	-30.0	21.1	-51.1	EUT Vert
0.350	35.5	10.0	1.0	214.0	3.0	0.0	Parallel to EUT	AV	-80.0	-34.5	16.7	-51.2	EUT Vert
0.252	38.1	10.1	1.0	197.0	3.0	0.0	Parallel to EUT	AV	-80.0	-31.8	19.6	-51.4	EUT Vert
0.193	40.0	10.2	1.0	0.0	3.0	0.0	Parallel to EUT	AV	-80.0	-29.8	21.9	-51.7	EUT Vert
0.150	51.7	10.2	1.0	143.0	3.0	0.0	Parallel to EUT	PK	-80.0	-18.1	44.1	-62.2	EUT Vert
0.380	42.2	10.0	1.0	5.0	3.0	0.0	Parallel to EUT	PK	-80.0	-27.8	36.0	-63.8	EUT Vert
0.197	47.4	10.2	1.0	0.0	3.0	0.0	Parallel to EUT	PK	-80.0	-22.4	41.7	-64.1	EUT Vert
0.248	45.1	10.1	1.0	197.0	3.0	0.0	Parallel to EUT	PK	-80.0	-24.8	39.7	-64.5	EUT Vert
0.349	41.6	10.0	1.0	214.0	3.0	0.0	Parallel to EUT	PK	-80.0	-28.4	36.7	-65.1	EUT Vert
0.212	45.3	10.2	1.0	27.0	3.0	0.0	Parallel to EUT	PK	-80.0	-24.5	41.1	-65.6	EUT Vert

SPURIOUS RADIATED EMISSIONS
AV3K90

PSA-ESCI 2016.07.22

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 125KHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 4

FREQUENCY RANGE INVESTIGATED

Start Frequency	.01 MHz	Stop Frequency	1000 MHz

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
Amplifier - Pre-Amplifier	Miteq	AM-1551	AOX	1/21/2016	12 mo
Antenna - Biconilog	Teseq	CBL 6141A	AYE	5/18/2015	24 mo
Antenna	EMCO	6502	AZB	8/14/2015	24 mo
Cable	Northwest EMC	30MHz-6GHz RE Cables	OCB	1/21/2016	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	7/15/2016	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

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

Per ANSI C63.10 sections 6.4.4.1 and 6.4.4.2, the emissions from the EUT were maximized by rotating the EUT on the turntable. Also, the EUT and/or associated antenna was positioned in 3 orthogonal planes. A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity per section 4.5.1. The center of the loop antenna was maintained at 1m above the ground plane during the testing.

For measurements below 30 MHz, 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. Per FCC 15.33(a)(4), measurements were taken up to the highest frequency range of either the 10th harmonic of the fundamental or the applicable digital frequency test range.

If there are no detectable emissions above the noise floor, the data included will show noise floor measurements for reference only.

SPURIOUS RADIATED EMISSIONS AV3K90

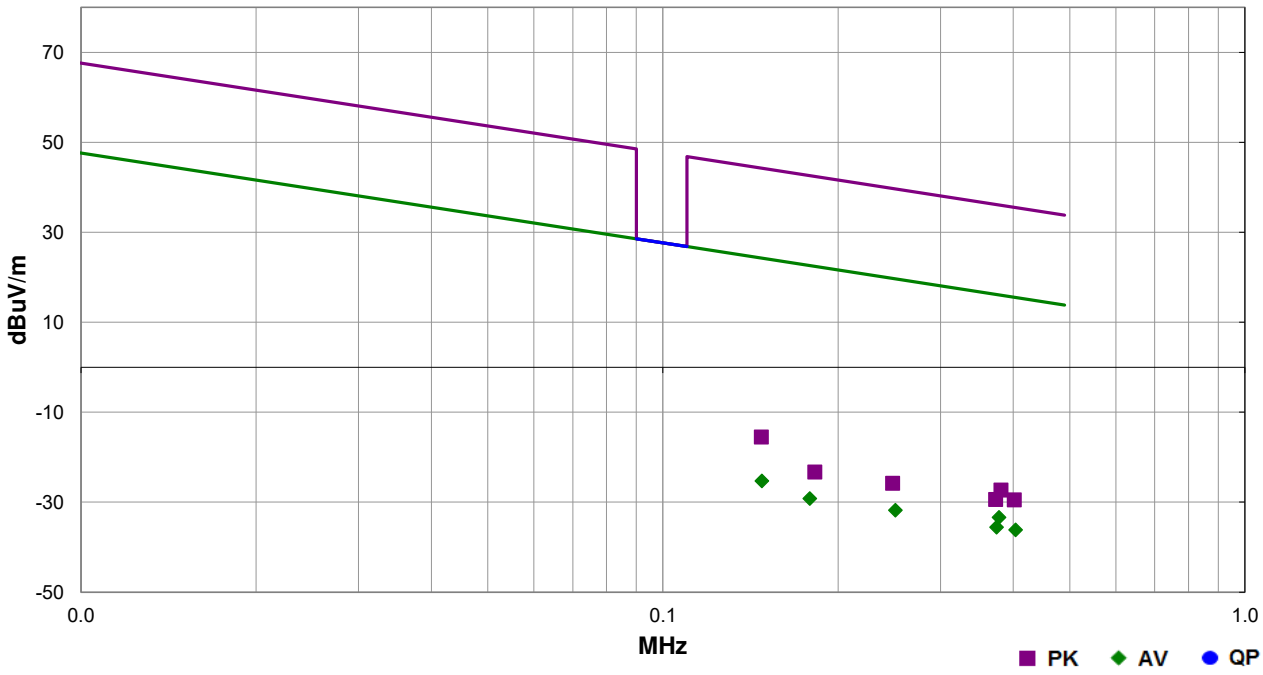
NORTHWEST EMC

PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/07/16		
Project:	TRA-030990	**Temperature:**	22.7 °C		
Job Site:	OC08	**Humidity:**	48.7% 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:	12VDC				
Operating Mode:	Transmitting at 125KHz				
Deviations:	None				
Comments:	Wide span maximization for harmonic investigation. No emissions were found. Measurements taken at noise floor.				

Test Specifications	**Test Method**
FCC 15.209:2016	ANSI C63.10:2013

Run #	12	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



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
0.148	44.4	10.3	1.0	4.0	3.0	0.0	Parallel to EUT	AV	-80.0	-25.3	24.2	-49.5	EUT Vert
0.378	36.6	10.0	1.0	30.0	3.0	0.0	Parallel to EUT	AV	-80.0	-33.4	16.1	-49.5	EUT Vert
0.251	38.1	10.1	1.0	146.0	3.0	0.0	Parallel to EUT	AV	-80.0	-31.8	19.6	-51.4	EUT Vert
0.404	33.8	10.0	1.8	276.0	3.0	0.0	Parallel to EUT	AV	-80.0	-36.2	15.5	-51.7	EUT Vert
0.375	34.4	10.0	3.2	17.0	3.0	0.0	Parallel to EUT	AV	-80.0	-35.6	16.1	-51.7	EUT Vert
0.179	40.6	10.2	1.0	301.0	3.0	0.0	Parallel to EUT	AV	-80.0	-29.2	22.6	-51.8	EUT Vert
0.148	54.2	10.3	1.0	4.0	3.0	0.0	Parallel to EUT	PK	-80.0	-15.5	44.2	-59.7	EUT Vert
0.381	42.7	10.0	1.0	30.0	3.0	0.0	Parallel to EUT	PK	-80.0	-27.3	36.0	-63.3	EUT Vert
0.401	40.5	10.0	1.8	276.0	3.0	0.0	Parallel to EUT	PK	-80.0	-29.5	35.5	-65.0	EUT Vert
0.248	44.1	10.1	1.0	146.0	3.0	0.0	Parallel to EUT	PK	-80.0	-25.8	39.7	-65.5	EUT Vert
0.373	40.6	10.0	3.2	17.0	3.0	0.0	Parallel to EUT	PK	-80.0	-29.4	36.2	-65.6	EUT Vert
0.182	46.5	10.2	1.0	301.0	3.0	0.0	Parallel to EUT	PK	-80.0	-23.3	42.4	-65.7	EUT Vert

SPURIOUS RADIATED EMISSIONS
AV400

PSA-ESCI 2016.07.22

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 125kHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	.01 MHz	Stop Frequency	30 MHz

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
Antenna - Biconilog	Teseq	CBL 6141A	AYE	5/18/2015	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1551	AOX	1/21/2016	12 mo
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

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

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

Per ANSI C63.10 sections 6.4.4.1 and 6.4.4.2, the emissions from the EUT were maximized by rotating the EUT on the turntable. Also, the EUT and/or associated antenna was positioned in 3 orthogonal planes. A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity per section 4.5.1. The center of the loop antenna was maintained at 1m above the ground plane during the testing.

For measurements below 30 MHz, 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. Per FCC 15.33(a)(4), measurements were taken up to the highest frequency range of either the 10th harmonic of the fundamental or the applicable digital frequency test range.

If there are no detectable emissions above the noise floor, the data included will show noise floor measurements for reference only.

SPURIOUS RADIATED EMISSIONS AV400

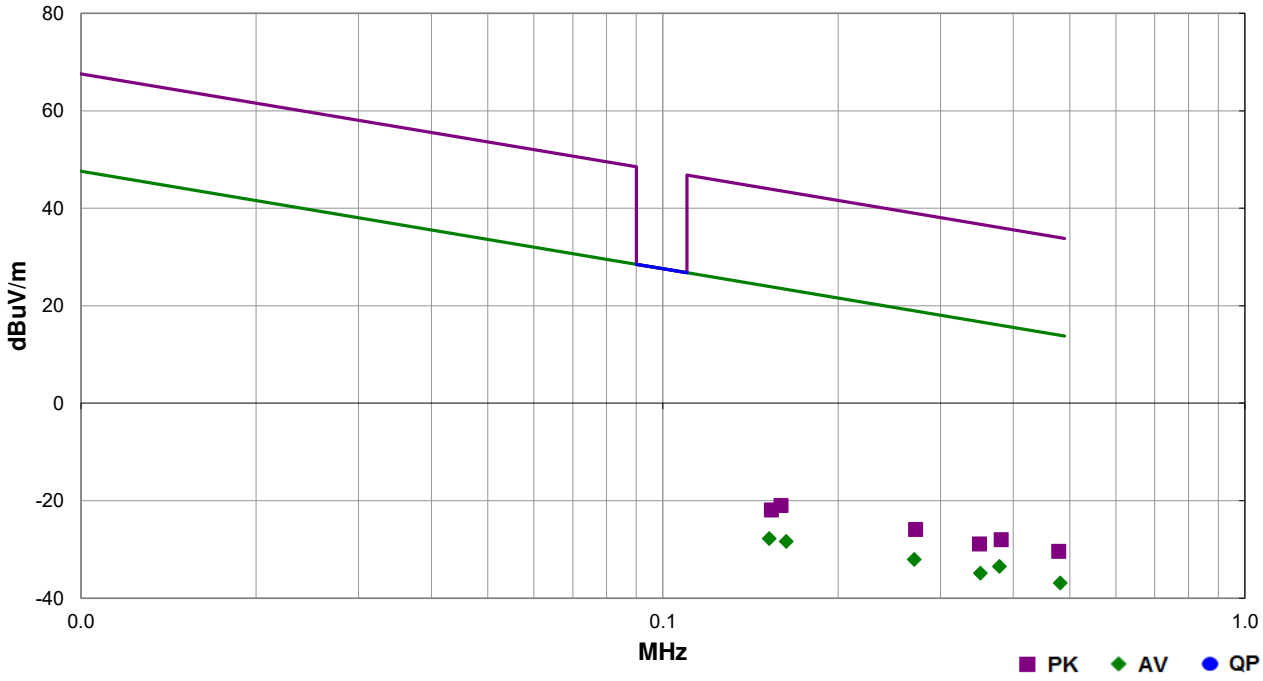
NORTHWEST EMC

PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/09/16		
Project:	TRA-030990	**Temperature:**	22.3 °C		
Job Site:	OC08	**Humidity:**	49.7% RH		
Serial Number:	IRN0430-06	**Barometric Pres.:**	1017 mbar	**Tested by:**	Mark Baytan
EUT:	Door Access RFID Reader Family (AV400)				
Configuration:	3				
Customer:	Third Millennium Systems Ltd				
Attendees:	None				
EUT Power:	12VDC				
Operating Mode:	Transmitting at 125kHz				
Deviations:	None				
Comments:	Wide span maximization for harmonic investigation. No emissions were found. Measurements taken at noise floor.				

Test Specifications	**Test Method**
FCC 15.209:2016	ANSI C63.10:2013

Run #	39	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



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
0.379	36.5	10.0	1.2	112.0	3.0	0.0	Horz	AV	-80.0	-33.5	16.0	-49.5	EUT Vert
0.482	32.9	10.2	1.0	154.0	3.0	0.0	Horz	AV	-80.0	-36.9	13.9	-50.8	EUT Vert
0.270	37.8	10.1	1.0	185.0	3.0	0.0	Horz	AV	-80.0	-32.1	19.0	-51.1	EUT Vert
0.351	35.1	10.0	1.0	108.0	3.0	0.0	Horz	AV	-80.0	-34.9	16.7	-51.6	EUT Vert
0.152	42.0	10.2	1.0	144.0	3.0	0.0	Horz	AV	-80.0	-27.8	24.0	-51.8	EUT Vert
0.163	41.4	10.2	1.0	5.0	3.0	0.0	Horz	AV	-80.0	-28.4	23.4	-51.8	EUT Vert
0.381	42.0	10.0	1.2	112.0	3.0	0.0	Horz	PK	-80.0	-28.0	36.0	-64.0	EUT Vert
0.479	39.4	10.2	1.0	154.0	3.0	0.0	Horz	PK	-80.0	-30.4	34.0	-64.4	EUT Vert
0.160	48.8	10.2	1.0	144.0	3.0	0.0	Horz	PK	-80.0	-21.0	43.6	-64.6	EUT Vert
0.272	44.0	10.1	1.0	185.0	3.0	0.0	Horz	PK	-80.0	-25.9	38.9	-64.8	EUT Vert
0.350	41.1	10.0	1.0	108.0	3.0	0.0	Horz	PK	-80.0	-28.9	36.7	-65.6	EUT Vert
0.154	47.9	10.2	1.0	5.0	3.0	0.0	Horz	PK	-80.0	-21.9	43.9	-65.8	EUT Vert

SPURIOUS RADIATED EMISSIONS AV490

PSA-ESCI 2016.07.22

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 125KHz

POWER SETTINGS INVESTIGATED

12VDC

CONFIGURATIONS INVESTIGATED

ELEM0005 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	.01 MHz	Stop Frequency	1000 MHz

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
Amplifier - Pre-Amplifier	Miteq	AM-1551	AOX	1/21/2016	12 mo
Antenna - Biconilog	Teseq	CBL 6141A	AYE	5/18/2015	24 mo
Antenna	EMCO	6502	AZB	8/14/2015	24 mo
Cable	Northwest EMC	30MHz-6GHz RE Cables	OCB	1/21/2016	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	7/15/2016	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

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

Per ANSI C63.10 sections 6.4.4.1 and 6.4.4.2, the emissions from the EUT were maximized by rotating the EUT on the turntable. Also, the EUT and/or associated antenna was positioned in 3 orthogonal planes. A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity per section 4.5.1. The center of the loop antenna was maintained at 1m above the ground plane during the testing.

For measurements below 30 MHz, 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. Per FCC 15.33(a)(4), measurements were taken up to the highest frequency range of either the 10th harmonic of the fundamental or the applicable digital frequency test range.

If there are no detectable emissions above the noise floor, the data included will show noise floor measurements for reference only.

SPURIOUS RADIATED EMISSIONS AV490

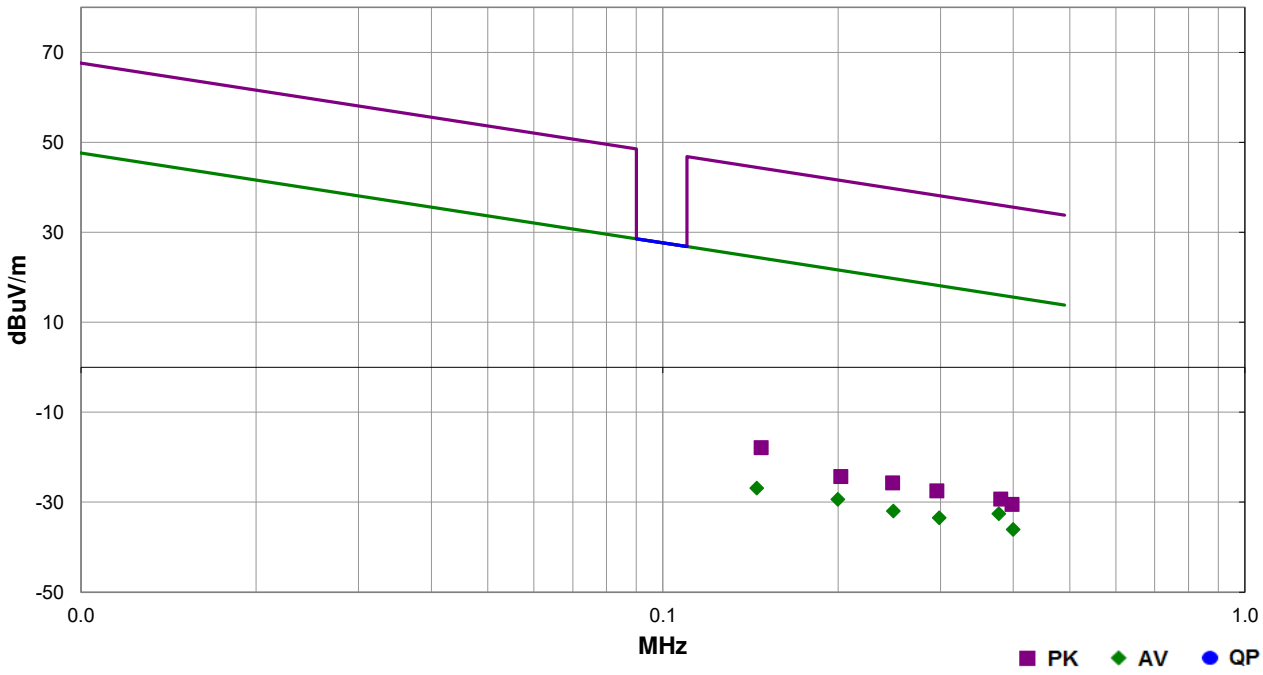
NORTHWEST EMC

PSA-ESCI 2016.07.22
EmiR5 2016.07.22.1

Work Order:	ELEM0005	**Date:**	09/07/16		
Project:	TRA-030990	**Temperature:**	22.7 °C		
Job Site:	OC08	**Humidity:**	48.7% 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 125KHz				
Deviations:	None				
Comments:	Wide span maximization for harmonic investigation. No emissions were found. Measurements taken were noise floor.				

Test Specifications	**Test Method**
FCC 15.209:2016	ANSI C63.10:2013

Run #	14	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



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
0.378	37.4	10.0	1.0	359.0	3.0	0.0	Parallel to EUT	AV	-80.0	-32.6	16.1	-48.7	EUT Vert
0.200	40.4	10.2	1.0	28.0	3.0	0.0	Parallel to EUT	AV	-80.0	-29.4	21.6	-51.0	EUT Vert
0.145	42.8	10.3	1.3	56.0	3.0	0.0	Parallel to EUT	AV	-80.0	-26.9	24.4	-51.3	EUT Vert
0.298	36.5	10.0	1.0	349.0	3.0	0.0	Parallel to EUT	AV	-80.0	-33.5	18.1	-51.6	EUT Vert
0.249	37.9	10.1	1.0	0.0	3.0	0.0	Parallel to EUT	AV	-80.0	-32.0	19.7	-51.7	EUT Vert
0.400	33.9	10.0	1.0	266.0	3.0	0.0	Parallel to EUT	AV	-80.0	-36.1	15.6	-51.7	EUT Vert
0.148	51.8	10.3	1.3	56.0	3.0	0.0	Parallel to EUT	PK	-80.0	-17.9	44.2	-62.1	EUT Vert
0.380	40.7	10.0	1.0	359.0	3.0	0.0	Parallel to EUT	PK	-80.0	-29.3	36.0	-65.3	EUT Vert
0.248	44.2	10.1	1.0	0.0	3.0	0.0	Parallel to EUT	PK	-80.0	-25.7	39.7	-65.4	EUT Vert
0.295	42.5	10.0	1.0	349.0	3.0	0.0	Parallel to EUT	PK	-80.0	-27.5	38.2	-65.7	EUT Vert
0.202	45.5	10.2	1.0	28.0	3.0	0.0	Parallel to EUT	PK	-80.0	-24.3	41.5	-65.8	EUT Vert
0.398	39.5	10.0	1.0	266.0	3.0	0.0	Parallel to EUT	PK	-80.0	-30.5	35.6	-66.1	EUT Vert