NORTHWEST EMC

Entrust Datacard

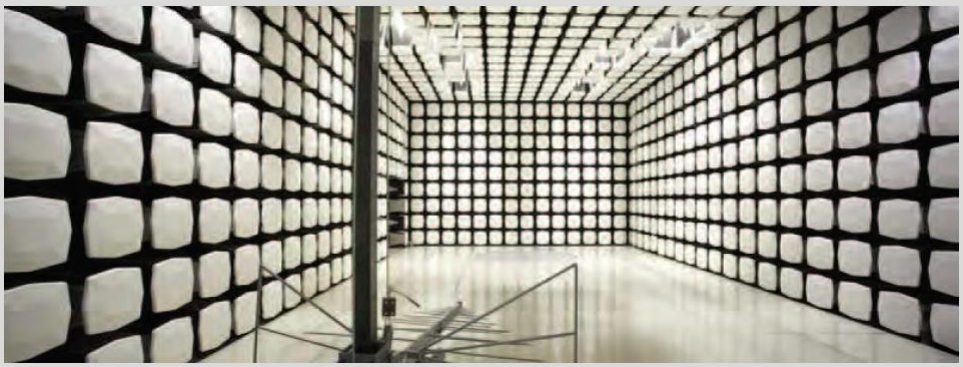
MX/MPR Series with Microprossmartcard couplers

FCC 15.207:2016

FCC 15.225:2016

13.56 MHz Radio

Report # DTCD0028.1



NVLAP Lab Code: 200881-0

CERTIFICATE OF TEST

NORTHWEST EMC
2014-12-10

Last Date of Test: February 19, 2016
Entrust Datacard
Model: MX/MPR Series with Microprocess smartcard couplers

Radio Equipment Testing

Standards

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

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	AC - 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:

Tim O'Shea, 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
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

REV 2015.2.19

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

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and 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 WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is on each data sheet. 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.

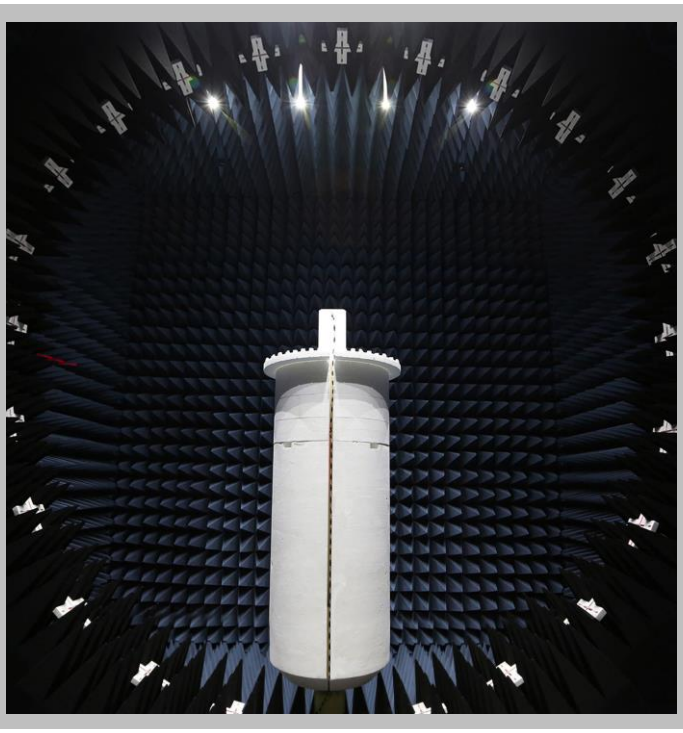
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

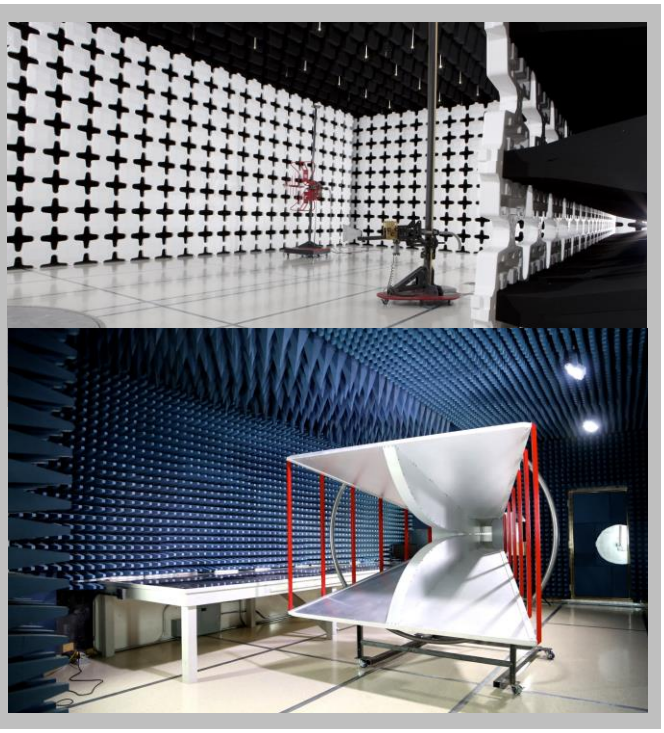
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%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

FACILITIES

NORTHWEST EMC
REV 2015.2.19

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
Industry 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:	Entrust Datacard
Address:	1187 Park Place
City, State, Zip:	Shakopee, MN 55379
Test Requested By:	Mark Forster
Model:	MX/MPR Series with Microprossmartcard couplers
First Date of Test:	January 21, 2016
Last Date of Test:	February 19, 2016
Receipt Date of Samples:	January 20, 2016
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

The 740247 Smart Card Barrel is an internal component of an Entrust Datacard card personalization system. The purpose of the Smart Card Barrel is to program financial cards, such as credit and debit cards, which contain an embedded integrated circuit. These financial cards are typically known as Smart Cards or Chip Cards and can be programmed either contacted, via physical electrical connections with the card, or contactless, via a wireless intentional radiator circuit operating at a carrier frequency of 13.56MHz. Single cards are passed to the Smart Card Barrel automatically via the card track and are loaded into 12 successive stations positioned around an axis like spokes on a wheel. Each station holds a single card and the cards can be programming simultaneously. Once programming is complete, the cards are automatically output.

The 740247 Smart Card Barrel employs couplers from Microprossmartcard. A maximum four Microprossmartcard MP300/MCL1/MX1 coupler PWA's may be installed in the Smart Card Barrel. One coupler PWA is capable of supporting up to three antenna stations, thus four couplers are needed to attain the maximum 12 antenna station configuration. The MCL1 portion of the coupler PWA is used to program the contactless type Smart Cards. The hardware configuration that comprises the Limited Modular Approval is one coupler PWA with 3 antennas. So each coupler PWA will have an FCC and IC ID label and the large, finished Entrust Datacard product will have a "contains" label.

Testing Objective:

To demonstrate compliance of the 13.56 MHz radios contained in the 740247 coupler and its antennas for Limited Modular Approval to FCC Part 15.225 specifications.

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration DTCD0028- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
MX/MPR Series System Employing – Controller, Input Module, Smartcard Barrel Module (Employing Microprоss MCL1 Couplers), Output Module	Entrust Datacard	MX6100	None
Couplers (4 installed in system)	Microprоss	MCL1 (Datacard PN 740247)	Unknown
Antennas (12 installed in system)	Microprоss	9072120A	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Cable	Yes	2m	No	SmartCard Barrell	AC Mains

Configuration DTCD0028- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
MX/MPR Series System Employing – Controller, Input Module, Smartcard Barrel Module (Employing Microprоss MCL1 Couplers), Output Module	Entrust Datacard	MX6100	None
Couplers (4 installed in system)	Microprоss	MCL1 (Datacard PN 740247)	Unknown
Antennas (12 installed in system)	Microprоss	9072120A	None
Power Board (for standalone operation)	Entrust Datacard	507493-003	None

MODIFICATIONS

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	1/21/2016	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	1/21/2016	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.
3	1/21/2016	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.
4	1/21/2016	AC 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.
5	2/19/2016	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

FREQUENCY STABILITY

XMit 2015.01.14

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.	Interval (mo)
Meter - Multimeter	Fluke	117/EFSP	MLR	5/27/2015	36
Power Supply - DC	EZ Digital Co., Ltd.	GP-4030D	TQK	NCR	0
Thermometer	Omega Engineering, Inc.	HH311	DUB	11/3/2014	36
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-32-3.5-SCT/AC	TBF	10/21/2015	12
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	12
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	2/10/2015	15

TEST DESCRIPTION

A near field measurement was made using a near field probe between the EUT's integral antenna and a 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 ±0.01% is equivalent to 100 ppm
The formula to check for compliance is:

ppm = (Measured Frequency / Measured Nominal Frequency - 1) * 1,000,000
.

FREQUENCY STABILITY

NORTHWEST EMC

XMit 2015.01.14

EUT:	MX6100 with Micropross smartcard couplers			**Work Order:**	DTCD0028
Serial Number:	None			**Date:**	02/19/16
Customer:	Entrust Datacard			**Temperature:**	21.9°C
Attendees:	Edwin Mitei, Andrew Edmunds, Mark Forster			**Humidity:**	27%
Project:	None			**Barometric Pres.:**	967.1
Tested by:	Kyle McMullan, Trevor Buls	**Power:**	230VAC/50Hz	**Job Site:**	MN08

TEST SPECIFICATIONS	**Test Method**
FCC 15.225:2016	ANSI C63.10:2013

COMMENTS

None

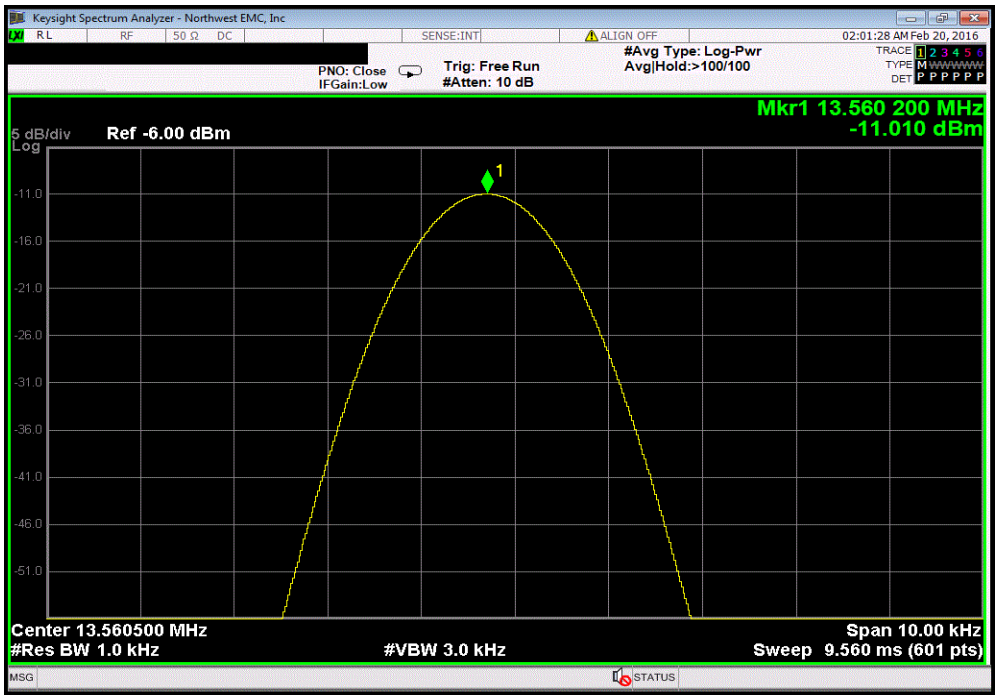
DEVIATIONS FROM TEST STANDARD

None

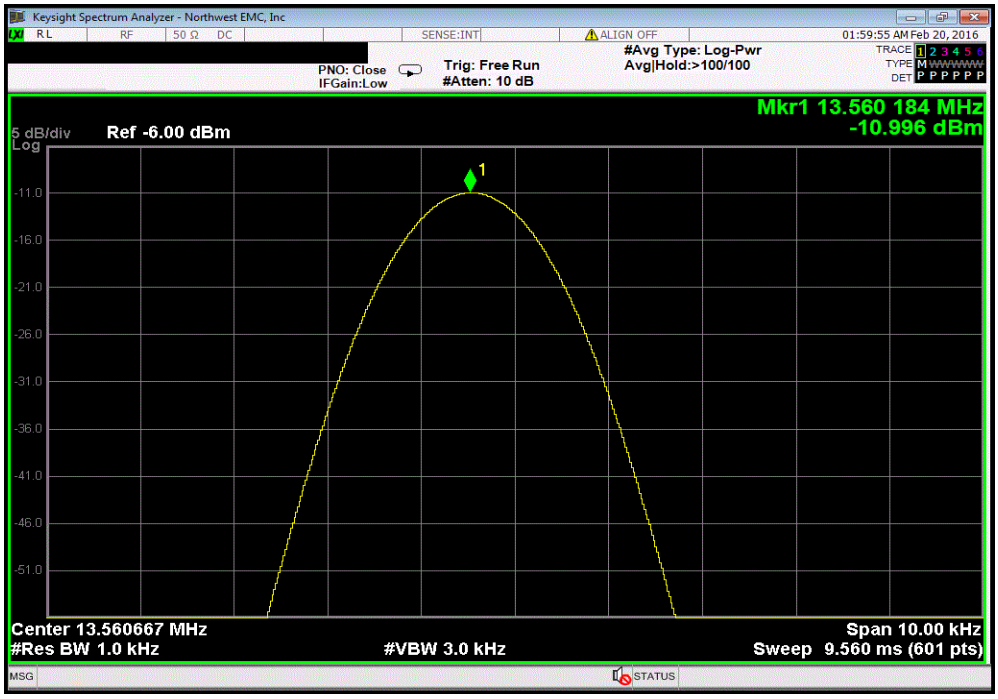
Configuration #	2	*Signature* Trevor Buls

	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
13.56 MHz					
Voltage: 115%	13.5602	13.56	14.8	100	Pass
Voltage: 100%	13.56018367	13.56	13.5	100	Pass
Voltage: 85%	13.56018367	13.56	13.5	100	Pass
Temperature: +50°	13.56018367	13.56	13.5	100	Pass
Temperature: +40°	13.56020033	13.56	14.8	100	Pass
Temperature: +30°	13.560217	13.56	16	100	Pass
Temperature: +20°	13.56023367	13.56	17.2	100	Pass
Temperature: +10°	13.56026733	13.56	19.7	100	Pass
Temperature: 0°	13.56028367	13.56	20.9	100	Pass
Temperature: -10°	13.56026733	13.56	19.7	100	Pass
Temperature: -20°	13.56023367	13.56	17.2	100	Pass

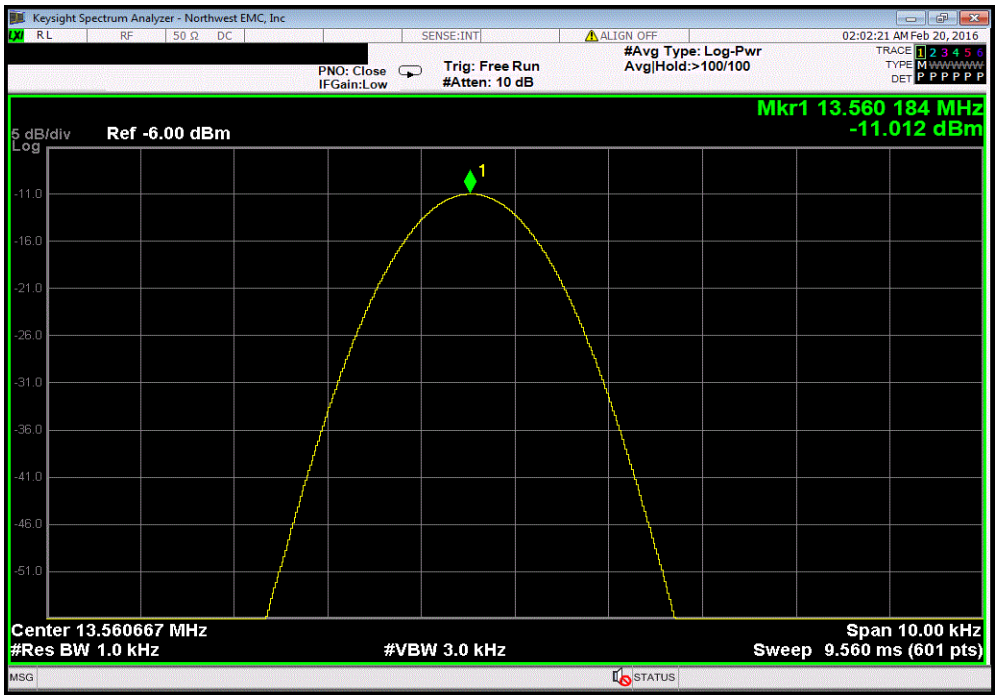
13.56 MHz, Voltage: 115%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.5602	13.56	14.8	100	Pass



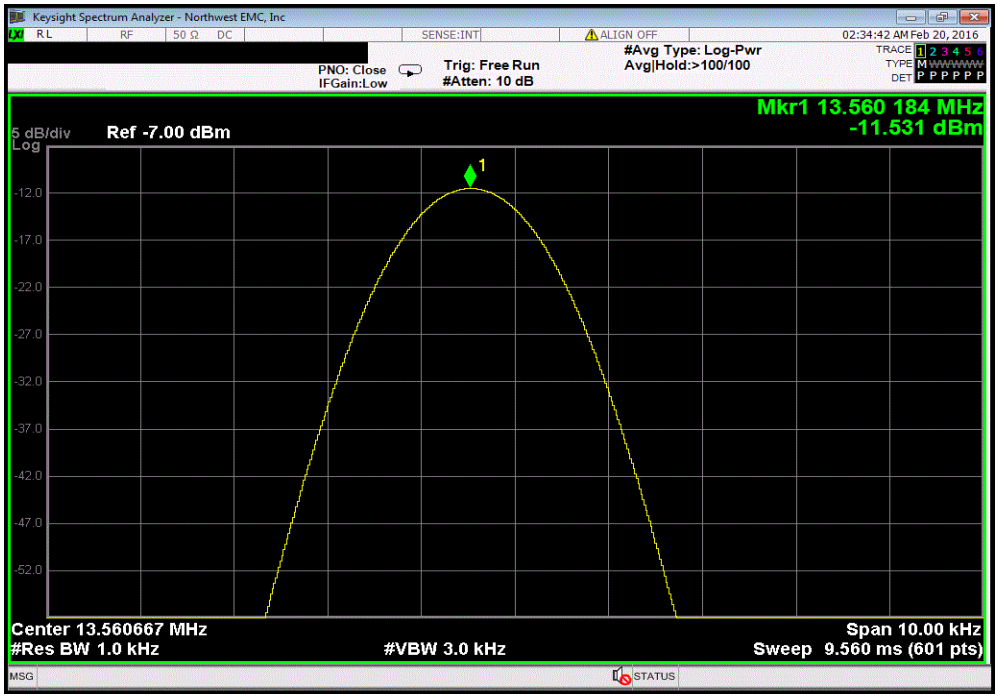
13.56 MHz, Voltage: 100%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56018367	13.56	13.5	100	Pass



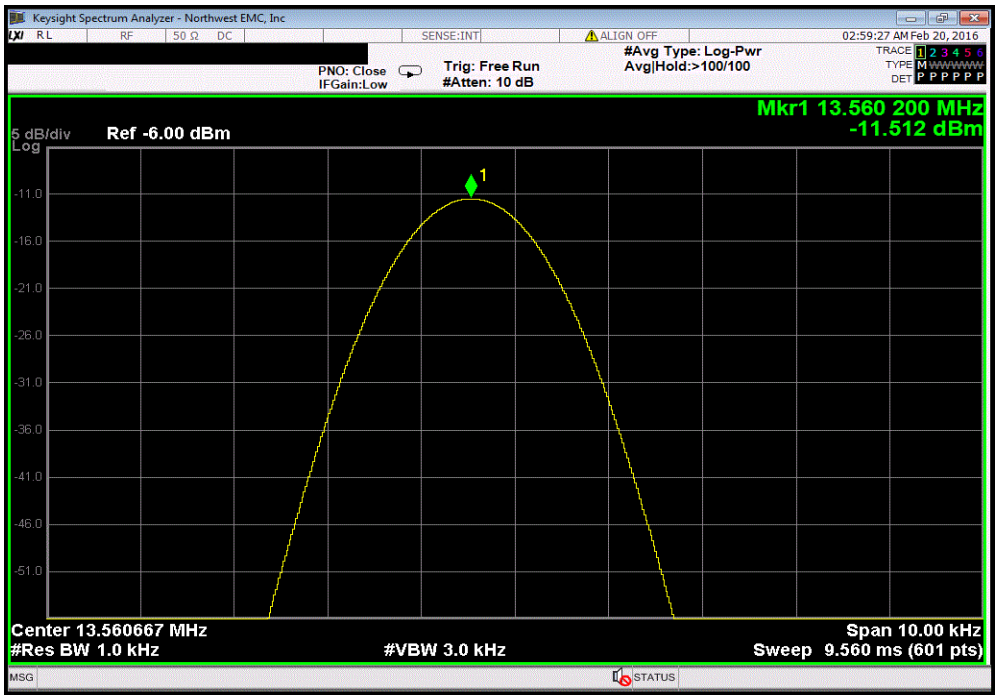
13.56 MHz, Voltage: 85%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56018367	13.56	13.5	100	Pass



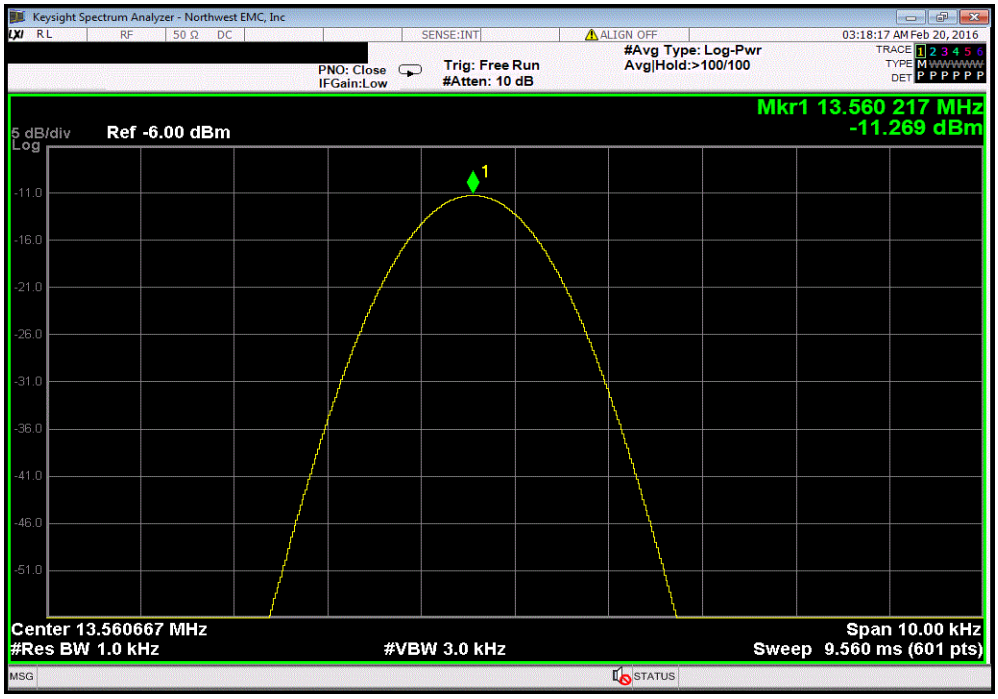
13.56 MHz, Temperature: +50°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56018367	13.56	13.5	100	Pass



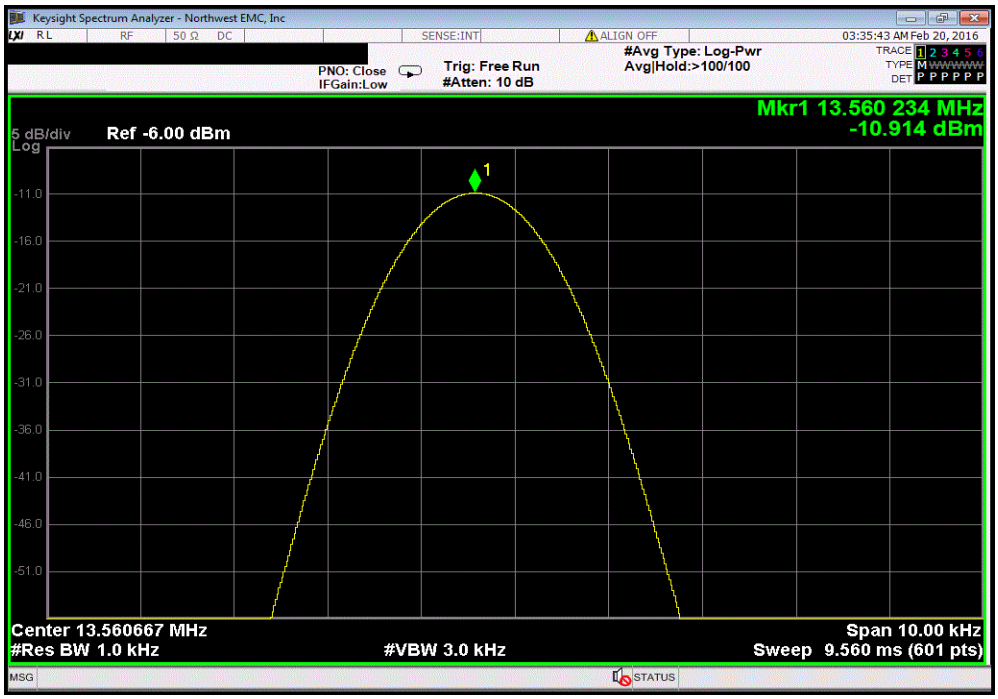
13.56 MHz, Temperature: +40°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56020033	13.56	14.8	100	Pass



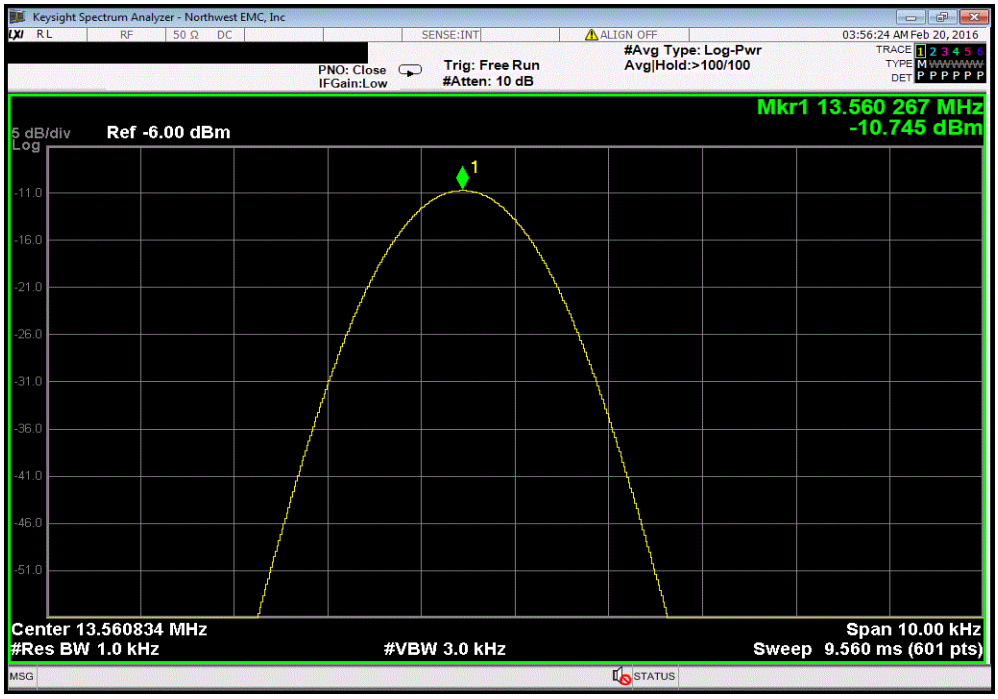
13.56 MHz, Temperature: +30°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560217	13.56	16	100	Pass



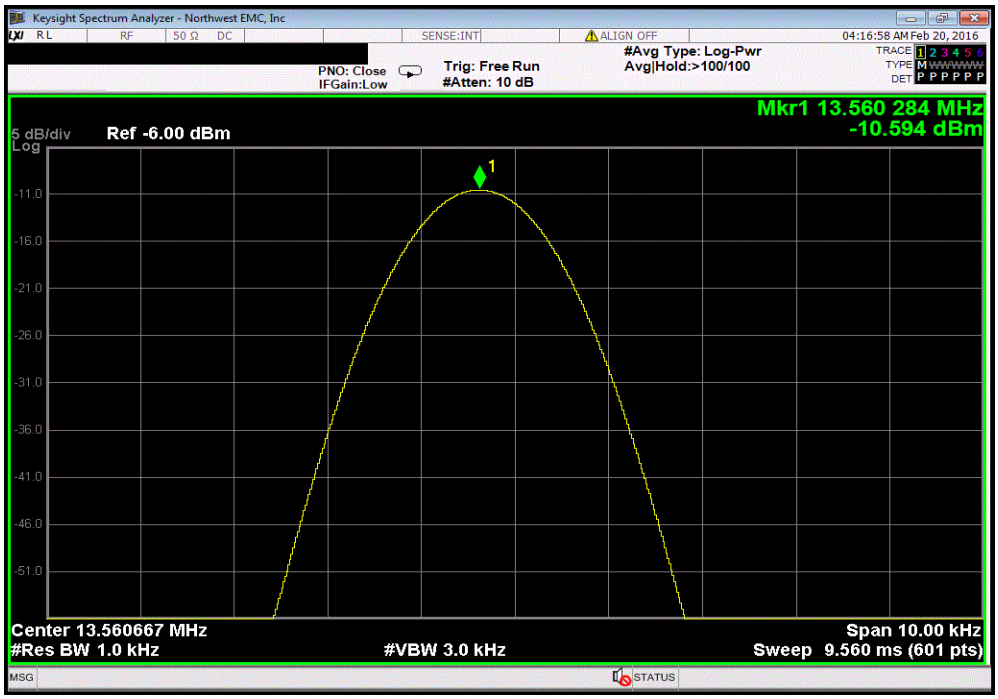
13.56 MHz, Temperature: +20°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56023367	13.56	17.2	100	Pass



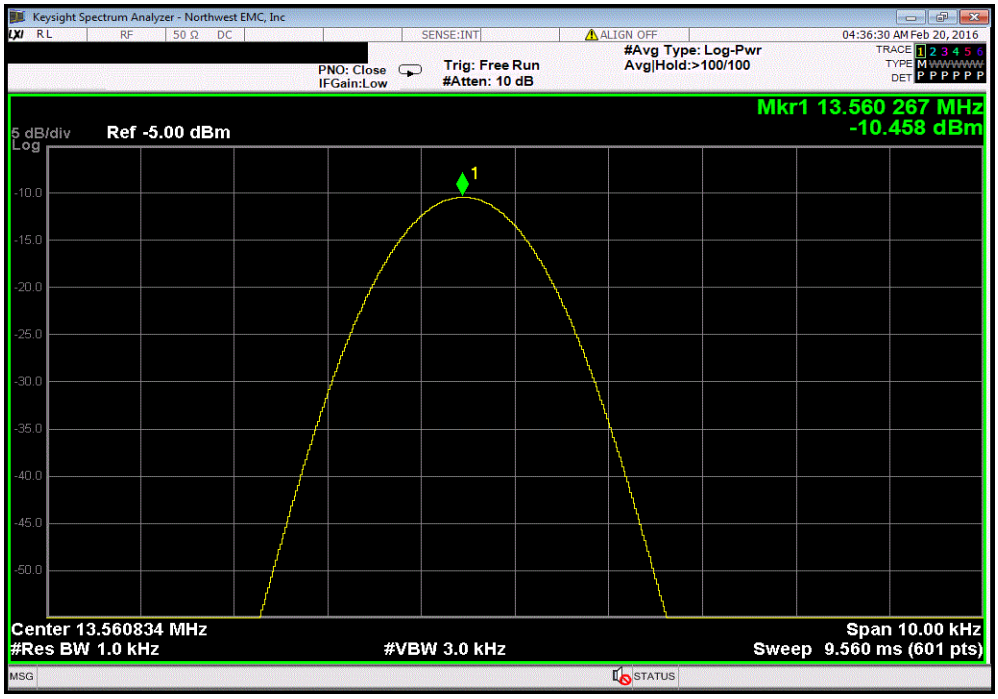
13.56 MHz, Temperature: +10°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56026733	13.56	19.7	100	Pass



13.56 MHz, Temperature: 0°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56028367	13.56	20.9	100	Pass



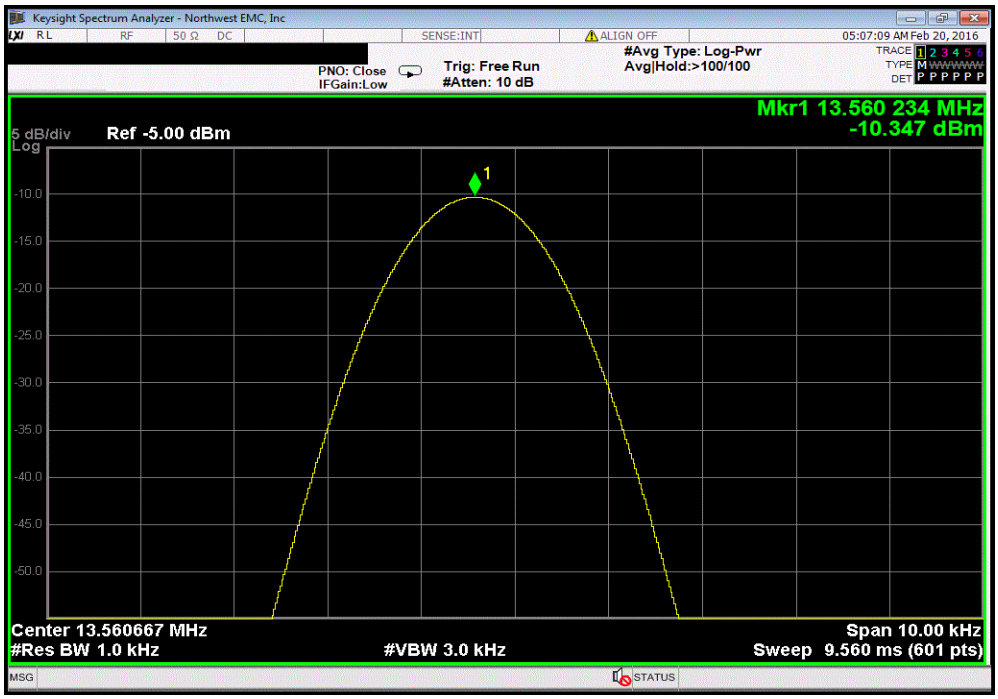
13.56 MHz, Temperature: -10°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56026733	13.56	19.7	100	Pass



FREQUENCY STABILITY

XMit 2015.01.14

13.56 MHz, Temperature: -20°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56023367	13.56	17.2	100	Pass



FIELD STRENGTH OF FUNDAMENTAL

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

Continuous operation. 12 stations (13.56 MHz) operating continuously.

POWER SETTINGS INVESTIGATED

220VAC/60Hz

CONFIGURATIONS INVESTIGATED

DTCD0028 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	490 kHz	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 (mo)
Cable	ESM Cable Corp.	MN04 Horn Cables	MNE	3/6/2015	12
Antenna	ETS Lindgren	6502	AOB	4/28/2015	24
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	6/5/2015	12

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.

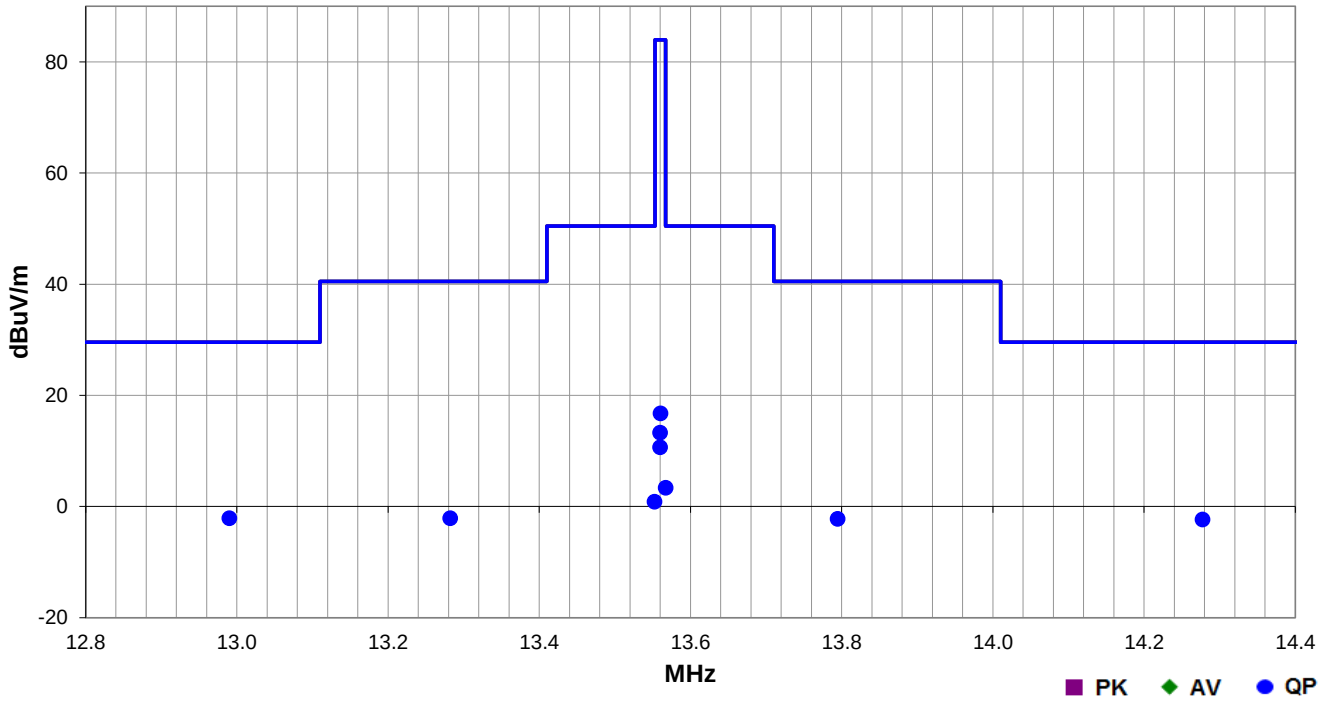
As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of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

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	DTCD0028	**Date:**	01/21/16		
Project:		**Temperature:**	22.5 °C		
Job Site:	MN04	**Humidity:**	17.1% RH		
Serial Number:	None	**Barometric Pres.:**	998.3 mbar	**Tested by:**	Jared Ison
EUT:	MX6100 with Microprossmartcard couplers				
Configuration:	1				
Customer:	Entrust Datacard				
Attendees:	Edwin Mitei, Andrew Edmunds, Mark Forster				
EUT Power:	220VAC/60Hz				
Operating Mode:	Continuous operation. 12 stations (13.56 MHz) operating continuously.				
Deviations:	None				
Comments:	Using Microprossmartcard couplers, Part Number: MCL1. (Datacard PN 740247).				

Test Specifications	**Test Method**
FCC 15.225:2016	ANSI C63.10:2013

Run #	5	**Test Distance (m)**	10	**Antenna Height(s)**	1(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)
12.990	6.3	10.7	1.0	253.0	10.0	0.0	Perp EUT	QP	-19.1	-2.1	29.5	-31.6
14.277	6.1	10.6	1.0	298.0	10.0	0.0	Perp EUT	QP	-19.1	-2.4	29.5	-31.9
13.282	6.3	10.7	1.0	205.0	10.0	0.0	Perp EUT	QP	-19.1	-2.1	40.5	-42.6
13.795	6.2	10.6	1.0	324.0	10.0	0.0	Perp EUT	QP	-19.1	-2.2	40.5	-42.7
13.567	11.8	10.7	1.0	71.0	10.0	0.0	Perp EUT	QP	-19.1	3.4	50.5	-47.1
13.553	9.3	10.7	1.0	258.0	10.0	0.0	Perp EUT	QP	-19.1	0.9	50.5	-49.6
13.560	25.2	10.7	1.0	62.0	10.0	0.0	Perp EUT	QP	-19.1	16.8	84.0	-67.2
13.560	21.7	10.7	1.0	243.0	10.0	0.0	Para GND	QP	-19.1	13.3	84.0	-70.7
13.560	19.1	10.7	1.0	209.0	10.0	0.0	Para EUT	QP	-19.1	10.7	84.0	-73.3

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHZ

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

Continuous operation. 12 stations (13.56 MHz) operating continuously.

POWER SETTINGS INVESTIGATED

220VAC/60Hz

CONFIGURATIONS INVESTIGATED

DTCD0028 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	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 (mo)
Antenna	ETS Lindgren	6502	AOB	4/28/2015	24
Cable	ESM Cable Corp.	MN04 Horn Cables	MNE	3/6/2015	12
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	6/5/2015	12

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, 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.

NORTHWEST EMC

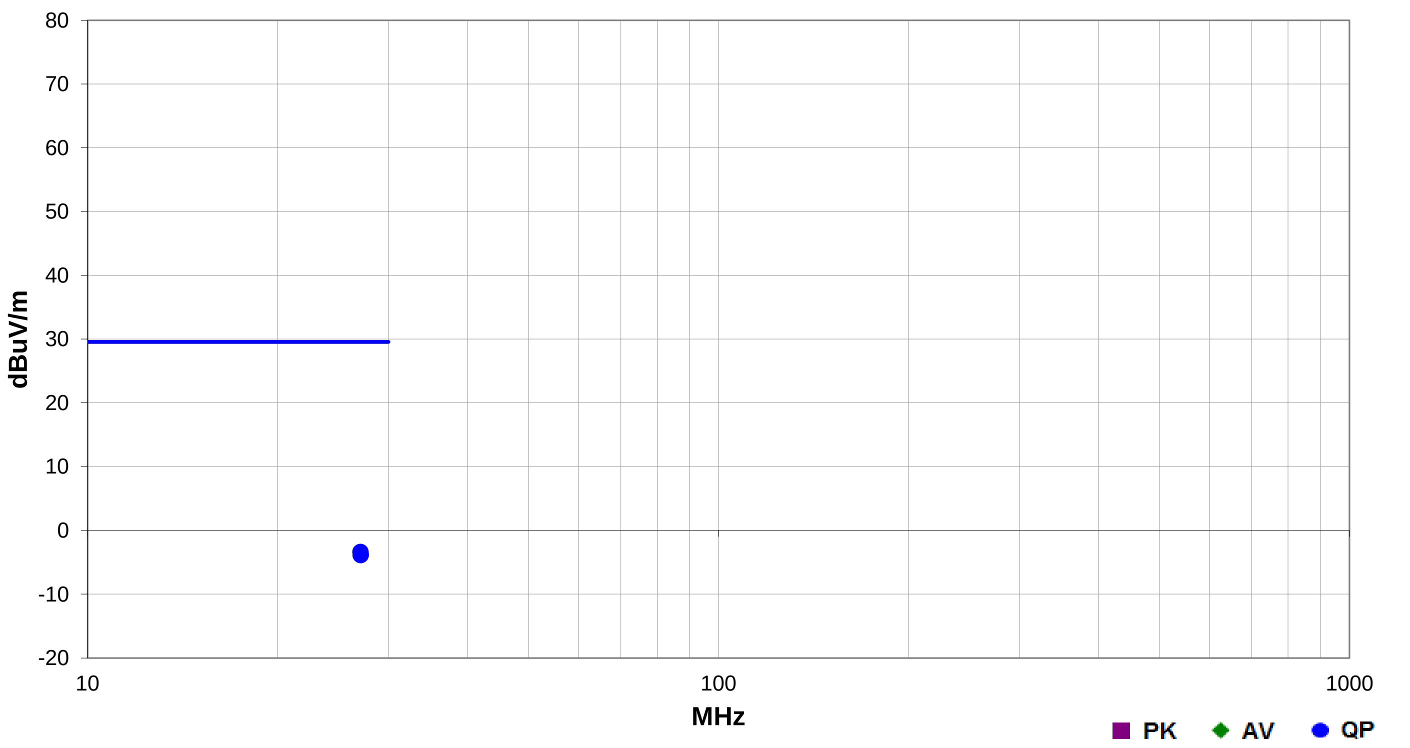
FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHZ

Work Order:	DTCD0028	**Date:**	01/21/16	
Project:	None	**Temperature:**	22.5 °C	
Job Site:	MN04	**Humidity:**	17.5% RH	
Serial Number:	None	**Barometric Pres.:**	998.7 mbar	**Tested by:** Jared Ison

EUT:	MX6100 with Micropross smartcard couplers
Configuration:	1
Customer:	Entrust Datacard
Attendees:	Edwin Mitei, Andrew Edmunds, Mark Forster
EUT Power:	220VAC/60Hz
Operating Mode:	Continuous operation. 12 stations (13.56 MHz) operating continuously.
Deviations:	None
Comments:	Using Micropross couplers, Part Number: MCL1. (Datacard PN 740247).

Test Specifications	**Test Method**
FCC 15.225:2016	ANSI C63.10:2013

Run #	6	**Test Distance (m)**	10	**Antenna Height(s)**	1(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)
27.084	6.5	9.2	1.0	1.0	10.0	0.0	Perp EUT	QP	-19.1	-3.4	29.5	-32.9
27.089	6.1	9.2	1.0	257.0	10.0	0.0	Para EUT	QP	-19.1	-3.8	29.5	-33.3
27.093	6.0	9.2	1.0	171.0	10.0	0.0	Para GND	QP	-19.1	-3.9	29.5	-33.4

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHZ

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

12 stations (13.56 MHz) operating continuously.

POWER SETTINGS INVESTIGATED

220VAC/60Hz

CONFIGURATIONS INVESTIGATED

DTCD0028 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	140 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 (mo)
Amplifier - Pre-Amplifier	Miteq	AM-1551	AVS	3/6/2015	12
Cable	ESM Cable Corp.	MN04 Bilog Cables	MND	9/17/2015	12
Antenna - Biconilog	ETS Lindgren	3142D	AXN	11/6/2015	24

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 transmitting while set at the operating channel.

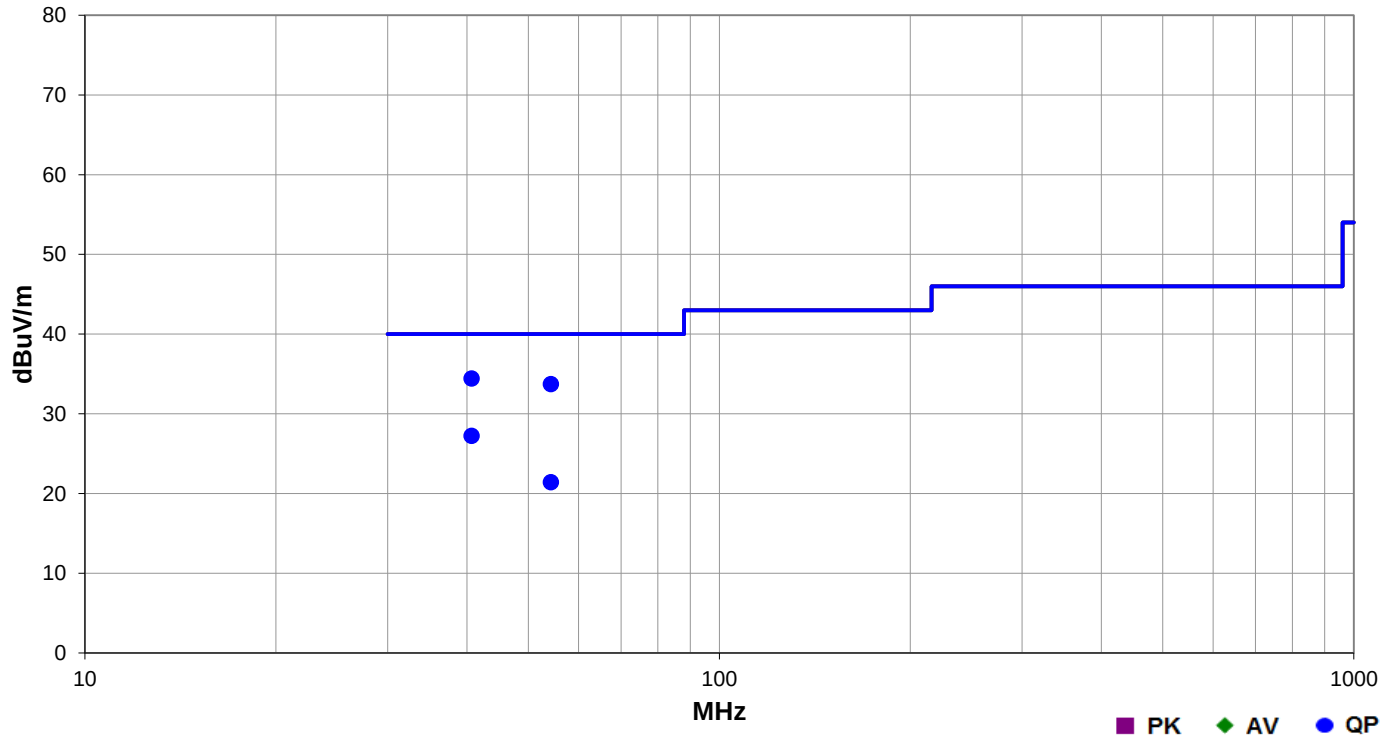
While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2013).

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHZ

Work Order:	DTCD0028	**Date:**	01/21/16		
Project:	None	**Temperature:**	22 °C		
Job Site:	MN04	**Humidity:**	17% RH		
Serial Number:	None	**Barometric Pres.:**	993 mbar	**Tested by:**	Jared Ison
EUT:	MX6100 with Microprossmartcard couplers				
Configuration:	1				
Customer:	Entrust Datacard				
Attendees:	Edwin Mitei, Andrew Edmunds, Mark Forster				
EUT Power:	220VAC/60Hz				
Operating Mode:	Continuous operation. 12 stations (13.56 MHz) operating continuously.				
Deviations:	None				
Comments:	Using Microprossmartcard couplers, Part Number: MCL1. (Datacard PN 740247).				

Test Specifications	**Test Method**
FCC 15.225:2016	ANSI C63.10:2013

Run #	9	**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)
40.683	52.7	-28.3	1.1	312.0	3.0	10.0	Vert	QP	0.0	34.4	40.0	-5.6
54.244	55.8	-32.1	1.0	326.0	3.0	10.0	Vert	QP	0.0	33.7	40.0	-6.3
40.683	45.5	-28.3	3.4	56.0	3.0	10.0	Horz	QP	0.0	27.2	40.0	-12.8
54.247	43.5	-32.1	2.9	246.0	3.0	10.0	Horz	QP	0.0	21.4	40.0	-18.6

AC POWERLINE CONDUCTED EMISSIONS

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESR7	ARI	5/21/2015	5/21/2016
Attenuator	Fairview Microwave	SA01B-20	AQP	NCR	NCR
Cable - Conducted Cable Assembly	Northwest EMC	None	MNC	NCR	NCR
Filter - High Pass	TTE	H97-100K-50-720B	HGN	NCR	NCR
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	3/23/2015	3/23/2016

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

DTCD0028-1

MODES INVESTIGATED

Continuous transmission. 12 stations (13.56 MHz) operating continuously.

AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.12.01
PSA-ESCI 2015.07.01, EmiR5 2015.11.06

EUT:	MX6100 with Microprоss smartcard couplers	Work Order:	DTCD0028
Serial Number:	None	Date:	01/21/2016
Customer:	Entrust Datacard	Temperature:	22.4°C
Attendees:	Edwin Mitei, Andrew Edmunds, Mark Forster	Relative Humidity:	17.9%
Customer Project:	None	Bar. Pressure:	999 mb
Tested By:	Jared Ison	Job Site:	MN03
Power:	220VAC/60Hz	Configuration:	DTCD0028-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	6	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

Using Microprоss couplers, Part Number: MCL1. (Datacard PN 740247).

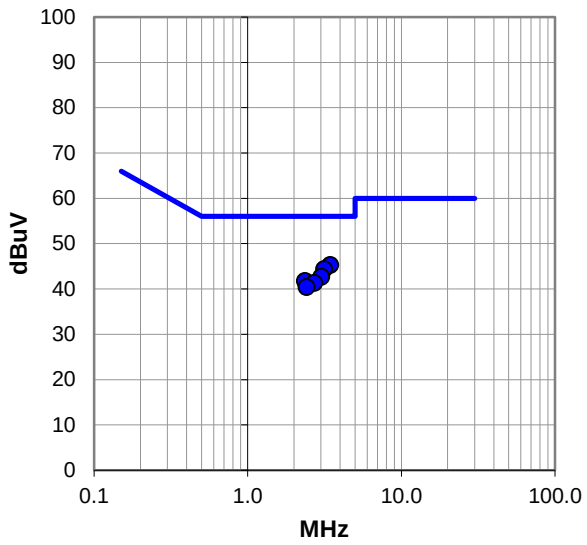
EUT OPERATING MODES

Continuous transmission. 12 stations (13.56 MHz) operating continuously.

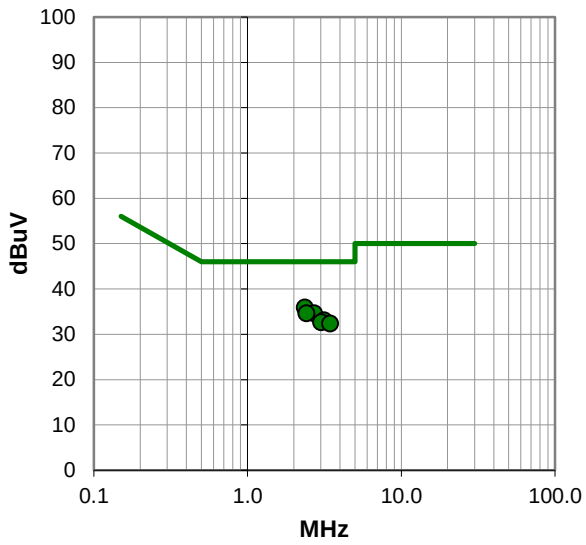
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.12.01
PSA-ESCI 2015.07.01, EmiR5 2015.11.06

RESULTS - Run #6

Quasi Peak Data - vs - Quasi Peak Limit

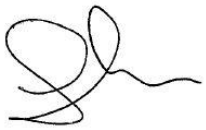
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
3.443	24.9	20.3	45.2	56.0	-10.8
3.141	24.0	20.3	44.3	56.0	-11.7
3.020	22.3	20.3	42.6	56.0	-13.4
2.356	21.4	20.3	41.7	56.0	-14.3
2.718	21.0	20.3	41.3	56.0	-14.7
2.417	20.1	20.3	40.4	56.0	-15.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
2.356	15.6	20.3	35.9	46.0	-10.1
2.718	14.3	20.3	34.6	46.0	-11.4
2.417	14.3	20.3	34.6	46.0	-11.4
3.141	12.7	20.3	33.0	46.0	-13.0
3.020	12.3	20.3	32.6	46.0	-13.4
3.443	12.0	20.3	32.3	46.0	-13.7

CONCLUSION

Pass



Tested By

AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.12.01
PSA-ESCI 2015.07.01, EmiR5 2015.11.06

EUT:	MX6100 with Microprоss smartcard couplers	Work Order:	DTCD0028
Serial Number:	None	Date:	01/21/2016
Customer:	Entrust Datacard	Temperature:	22.4°C
Attendees:	Edwin Mitei, Andrew Edmunds, Mark Forster	Relative Humidity:	17.9%
Customer Project:	None	Bar. Pressure:	999 mb
Tested By:	Jared Ison	Job Site:	MN03
Power:	220VAC/60Hz	Configuration:	DTCD0028-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

COMMENTS

Using Microprоss couplers, Part Number: MCL1. (Datacard PN 740247).

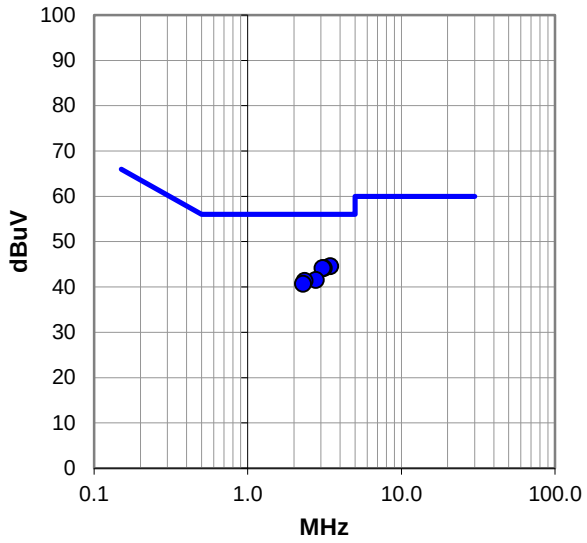
EUT OPERATING MODES

Continuous transmission. 12 stations (13.56 MHz) operating continuously.

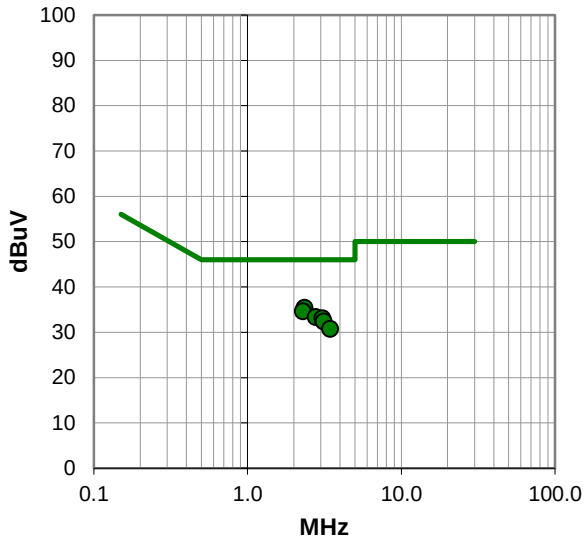
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.12.01
PSA-ESCI 2015.07.01, EmiR5 2015.11.06

RESULTS - Run #7

Quasi Peak Data - vs - Quasi Peak Limit

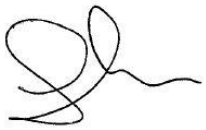
Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
3.442	24.2	20.3	44.5	56.0	-11.5
3.140	23.8	20.3	44.1	56.0	-11.9
3.080	23.8	20.3	44.1	56.0	-11.9
2.778	21.2	20.3	41.5	56.0	-14.5
2.355	21.0	20.3	41.3	56.0	-14.7
2.294	20.4	20.3	40.7	56.0	-15.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
2.355	15.1	20.3	35.4	46.0	-10.6
2.294	14.3	20.3	34.6	46.0	-11.4
2.778	13.0	20.3	33.3	46.0	-12.7
3.080	12.7	20.3	33.0	46.0	-13.0
3.140	12.0	20.3	32.3	46.0	-13.7
3.442	10.4	20.3	30.7	46.0	-15.3

CONCLUSION

Pass



Tested By