



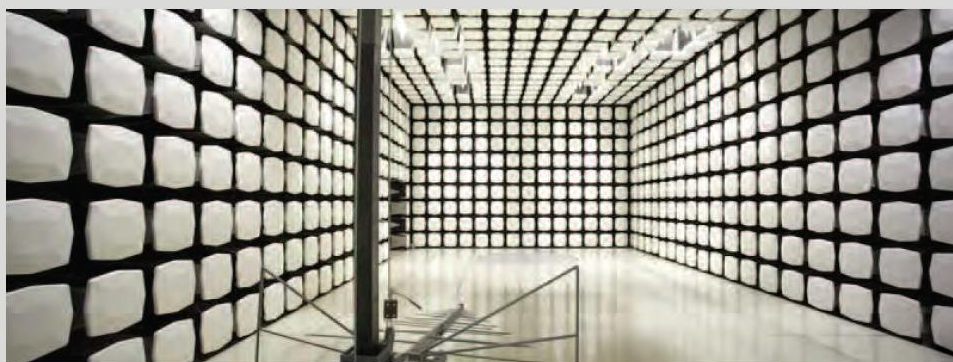
Entrust Corporation

MX LC Upgrade Phase 4.0

FCC 15.225:2022

13.56 MHz Radio

Report: DTCD0105.0, Issue Date: August 8, 2023



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CERTIFICATE OF TEST

Last Date of Test: December 1, 2022

Entrust Corporation

EUT: MX LC Upgrade Phase 4.0

Radio Equipment Testing

Standards

Specification	Method
FCC 15.225:2022	ANSI C63.10:2013

Results

Test Description	Result	Specification Section(s)	Method Section(s)	Comments
Powerline Conducted Emissions	Pass	15.207	6.2	
Field Strength of Fundamental	Pass	15.225(a)-(c)	6.4	
Field Strength of Spurious Emissions (Less Than 30 MHz)	Pass	15.225(d), 15.209	6.4	
Field Strength of Spurious Emissions (Greater Than 30 MHz)	Pass	15.225(d), 15.209	6.5	
Frequency Stability	N/A	15.225(e), 15.31(e), 15.215(c), 2.1055	6.8	Not included for a C2PC related to testing a limited module in a new host.
Emissions Bandwidth (20 dB)	N/A	15.215(c)	6.9.2	Not included for a C2PC related to testing a limited module in a new host.

Deviations From Test Standards

None

Approved By:



Eric Brandon, Department 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. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY



Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS



United States

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

A2LA - Each laboratory is accredited by A2LA to ISO / IEC 17025, and as a product certifier to ISO / IEC 17065 which allows Element to certify transmitters to FCC and IC specifications.

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

United Kingdom

BEIS – Recognized by the UK as an Approved Body under the UK Radio Equipment and UK EMC Regulations.

Australia/New Zealand

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

Korea

MSIT / 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:

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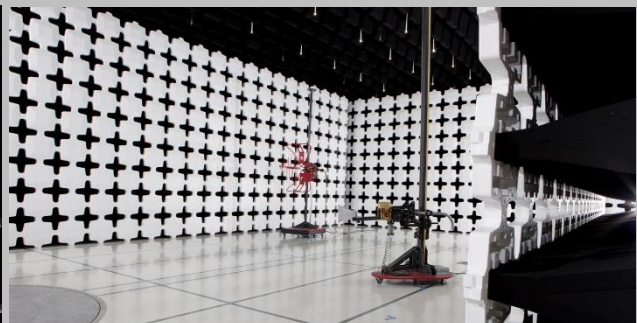
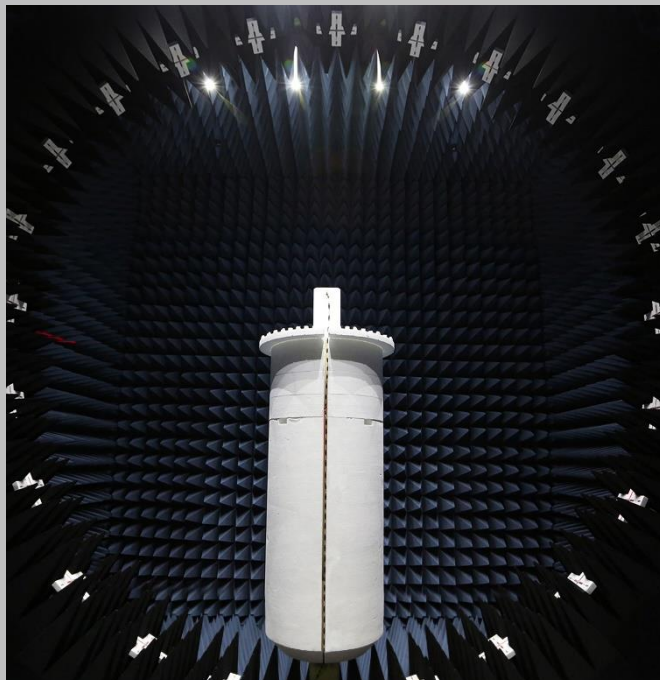
[Texas](#)

[Washington](#)

FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600
A2LA				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157



MEASUREMENT UNCERTAINTY

Measurement Uncertainty

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

A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found in the table below. A lab specific value may also be found in the applicable test description section. 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	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 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)	3.2 dB	-3.2 dB

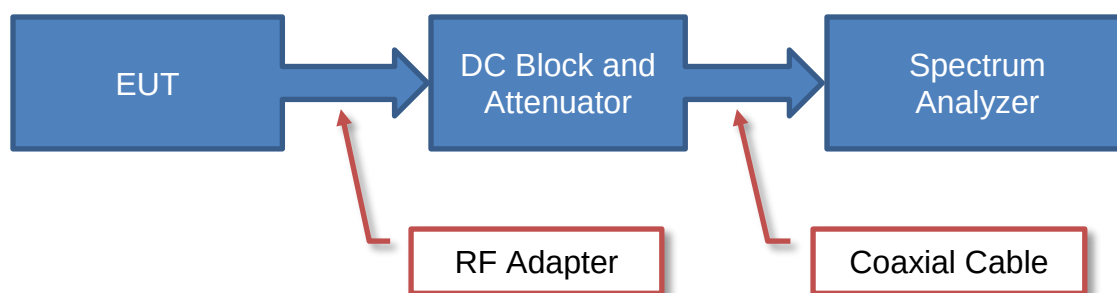
TEST SETUP BLOCK DIAGRAMS

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

Unless otherwise stated, measurements were made using the bandwidths and detectors specified. No video filter was used.

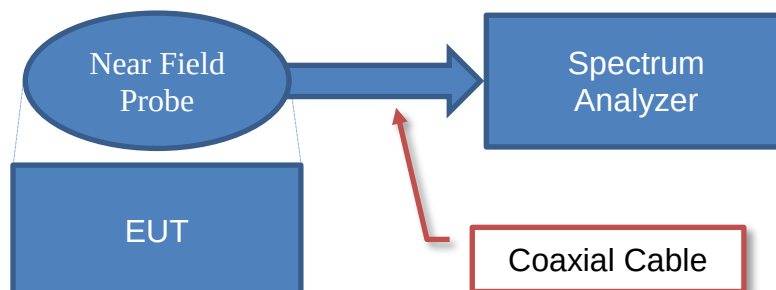
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

Near Field Test Fixture Measurements

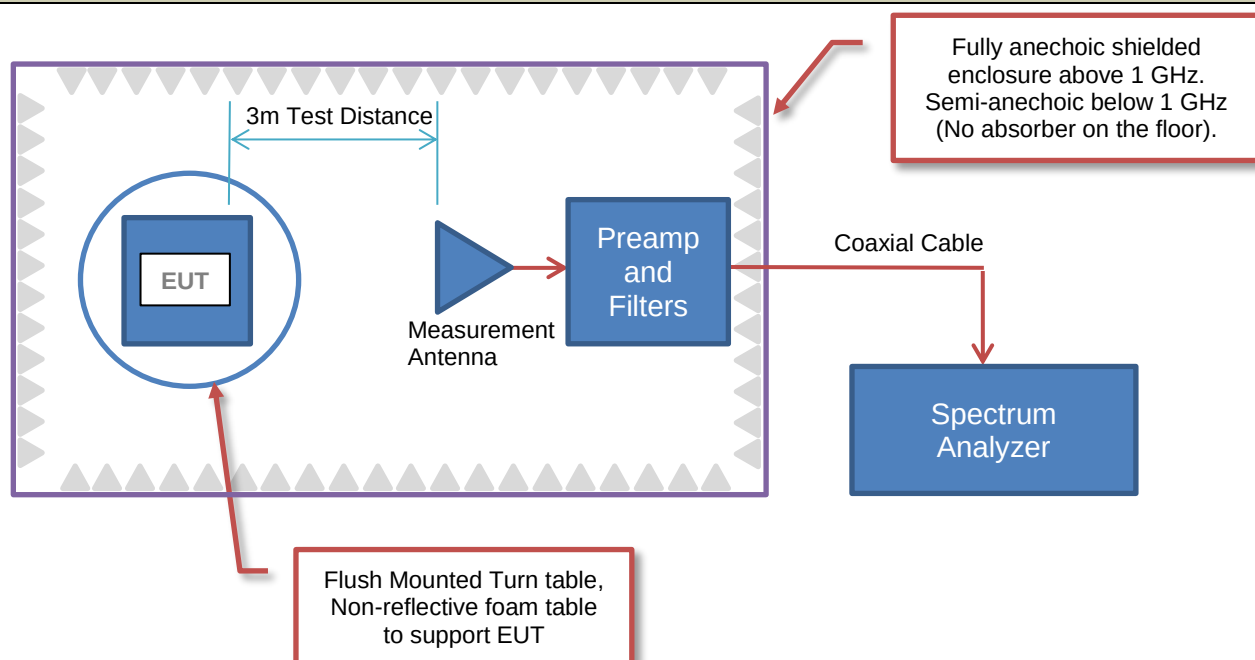


Sample Calculation (logarithmic units)

Measured Value		Measured Level		Reference Level Offset
71.2	=	42.6	+	28.6

TEST SETUP BLOCK DIAGRAMS

Emissions Measurements



Sample Calculation (logarithmic units)

Radiated Emissions:

Measured Level (Amplitude)	Factor			Distance Adjustment Factor	External Attenuation	Field Strength
	Antenna Factor	Cable Factor	Amplifier Gain			
42.6	28.6	3.1	40.8	0.0	0.0	33.5

Conducted Emissions:

Measured Level (Amplitude)	Factor		External Attenuation	Adjusted Level
	Transducer Factor	Cable Factor		
26.7	0.3	0.1	20.0	47.1

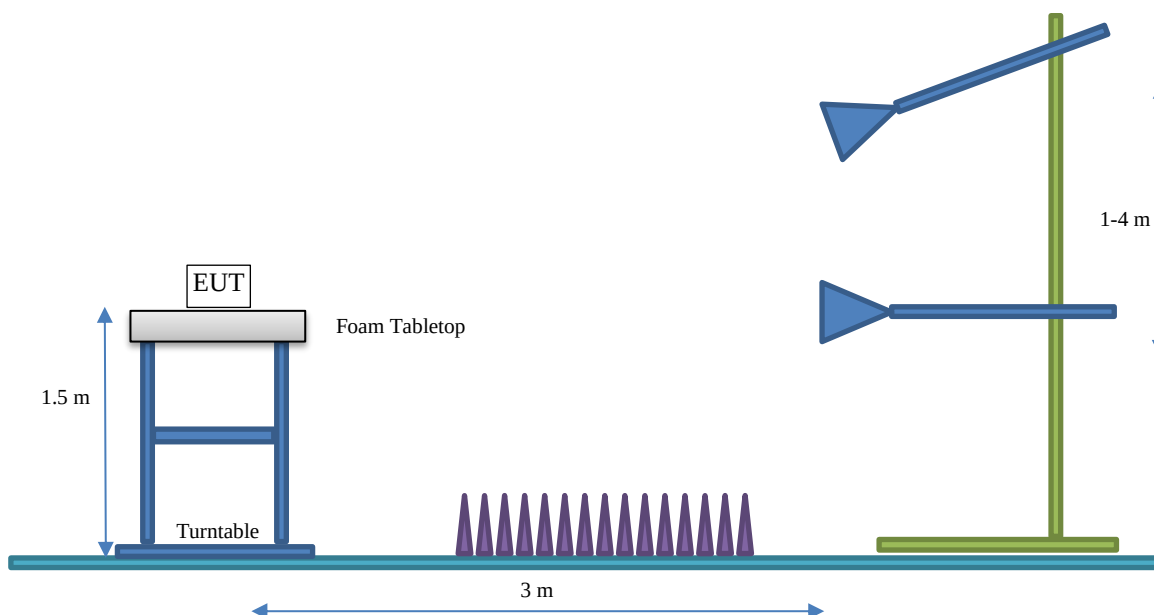
Radiated Power (ERP/EIRP) – Substitution Method:

Measured Level into Substitution Antenna (Amplitude dBm)	Substitution Antenna Factor (dBi)	EIRP to ERP (if applicable)	Measured power (dBm ERP/EIRP)
10.0	6.0	2.15	13.9/16.0

TEST SETUP BLOCK DIAGRAMS

Bore Sighting (>1GHz)

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.



PRODUCT DESCRIPTION



Client and Equipment under Test (EUT) Information

Company Name:	Entrust Corporation
Address:	1187 Park Place
City, State, Zip:	Shakopee, MN 55379
Test Requested By:	Mike Greschner
EUT:	MX LC Upgrade Phase 4.0
First Date of Test:	November 14, 2022
Last Date of Test:	December 1, 2022
Receipt Date of Samples:	November 14, 2022
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
Large device containing a 13.56 MHz radio.
Testing Objective:
To demonstrate compliance to FCC Part 15.225 specifications.

POWER SETTINGS AND ANTENNAS



The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information. The power settings below reflect the maximum power that the EUT is allowed to transmit at during normal operation.

ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
PCB Loop An. (4 turns) 46 mm Diameter	Entrust Corporation	13.56 (1.063 W)	-

No adjustable power settings were provided. The EUT was tested using power settings pre-defined by the manufacturer.

Radio	Modulation	Protocol	Data Rate	Frequency
Passive RFID	ASK	ISO 15693	26.48 kbps	13.56 MHz

CONFIGURATIONS



Configuration DTCD0105- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
MX LC Upgrade Phase 4.0	Entrust Corporation	MX LC	1

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Controller Supply Cable	No	2.0 m	No	MX LC Upgrade Phase 4.0	AC Mains
Cure Lamp Supply Cable	No	2.0 m	No	MX LC Upgrade Phase 4.0	AC Mains

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2022-11-14	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2022-11-30	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2022-11-30	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 Element following the test.
4	2022-12-01	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.	Scheduled testing was completed.

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	Gauss Instruments	TDEMI 30M	ARS	2022-04-20	2023-04-20
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	2022-04-04	2023-04-04
LISN	Solar Electronics	9252-50-R-24-BNC	LIQ	2022-04-04	2023-04-04
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, TYK	MNCA	2022-03-07	2023-03-07

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	3.2 dB	-3.2 dB

CONFIGURATIONS INVESTIGATED

DTCD0105-1

MODES INVESTIGATED

All Parallel Exerciser (APE) mode, RFID active.

POWERLINE CONDUCTED EMISSIONS

EUT:	MX LC Upgrade Phase 4.0	Work Order:	DTCD0105
Serial Number:	1	Date:	2022-11-14
Customer:	Entrust Corporation	Temperature:	20.5°C
Attendees:	Craig Jacobsen	Relative Humidity:	25.4%
Customer Project:	None	Bar. Pressure (PMSL):	1025 mb
Tested By:	Dan Haas	Job Site:	MN03
Power:	208VAC/60Hz	Configuration:	DTCD0105-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2022	ANSI C63.10:2013

TEST PARAMETERS

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

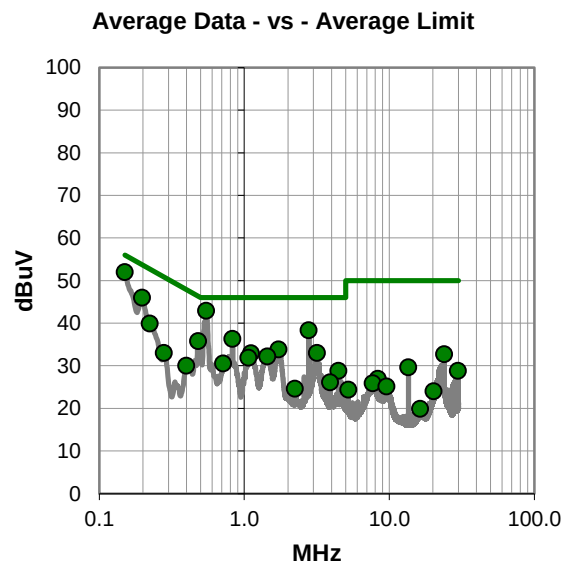
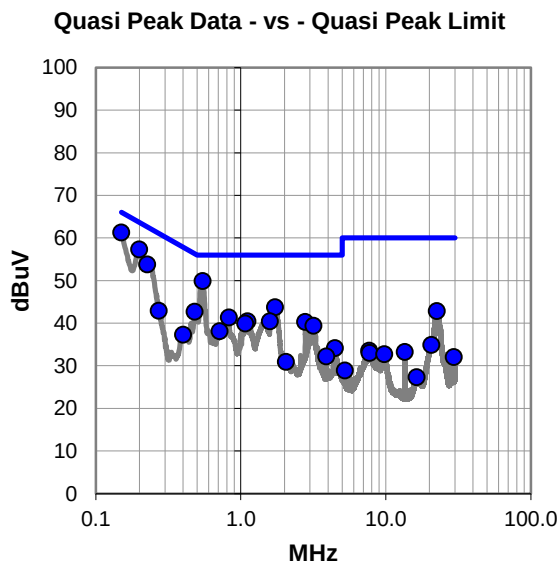
Controller AC power cable.

EUT OPERATING MODES

All Parallel Exerciser (APE) mode, RFID active.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #1

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	40.6	20.7	61.3	66.0	-4.7
0.547	29.6	20.3	49.9	56.0	-6.1
0.199	36.8	20.5	57.3	63.7	-6.4
0.226	33.4	20.4	53.8	62.6	-8.8
1.723	23.4	20.3	43.7	56.0	-12.3
0.480	22.4	20.3	42.7	56.3	-13.6
0.831	21.1	20.2	41.3	56.0	-14.7
1.114	20.2	20.2	40.4	56.0	-15.6
1.590	20.1	20.3	40.4	56.0	-15.6
2.787	19.9	20.4	40.3	56.0	-15.7
1.072	19.7	20.2	39.9	56.0	-16.1
3.182	18.9	20.5	39.4	56.0	-16.6
22.506	20.9	21.9	42.8	60.0	-17.2
0.715	17.8	20.3	38.1	56.0	-17.9
0.272	22.6	20.3	42.9	61.1	-18.2
0.400	17.0	20.3	37.3	57.8	-20.5
4.460	13.6	20.5	34.1	56.0	-21.9
3.900	11.7	20.5	32.2	56.0	-23.8
2.051	10.6	20.3	30.9	56.0	-25.1
20.646	13.1	21.8	34.9	60.0	-25.1
7.691	12.7	20.8	33.5	60.0	-26.5
13.559	11.8	21.4	33.2	60.0	-26.8
7.729	12.2	20.8	33.0	60.0	-27.0
9.749	11.6	21.1	32.7	60.0	-27.3
29.478	9.5	22.5	32.0	60.0	-28.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.547	22.6	20.3	42.9	46.0	-3.1
0.150	31.3	20.7	52.0	56.0	-4.0
2.787	17.9	20.4	38.3	46.0	-7.7
0.197	25.5	20.5	46.0	53.7	-7.7
0.831	16.1	20.2	36.3	46.0	-9.7
0.481	15.5	20.3	35.8	46.3	-10.5
1.722	13.5	20.3	33.8	46.0	-12.2
0.223	19.5	20.4	39.9	52.7	-12.8
3.182	12.5	20.5	33.0	46.0	-13.0
1.114	12.7	20.2	32.9	46.0	-13.1
1.441	11.9	20.3	32.2	46.0	-13.8
1.069	11.7	20.2	31.9	46.0	-14.1
0.715	10.2	20.3	30.5	46.0	-15.5
4.460	8.3	20.5	28.8	46.0	-17.2
23.986	10.7	22.0	32.7	50.0	-17.3
0.278	12.7	20.3	33.0	50.9	-17.9
0.397	9.7	20.3	30.0	47.9	-17.9
3.903	5.6	20.5	26.1	46.0	-19.9
13.559	8.2	21.4	29.6	50.0	-20.4
29.798	6.3	22.5	28.8	50.0	-21.2
2.231	4.3	20.3	24.6	46.0	-21.4
8.366	6.0	20.9	26.9	50.0	-23.1
7.691	5.1	20.8	25.9	50.0	-24.1
9.584	4.1	21.0	25.1	50.0	-24.9
5.214	3.8	20.6	24.4	50.0	-25.6

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	MX LC Upgrade Phase 4.0	Work Order:	DTCD0105
Serial Number:	1	Date:	2022-11-14
Customer:	Entrust Corporation	Temperature:	20.5°C
Attendees:	Craig Jacobsen	Relative Humidity:	25.4%
Customer Project:	None	Bar. Pressure (PMSL):	1025 mb
Tested By:	Dan Haas	Job Site:	MN03
Power:	208VAC/60Hz	Configuration:	DTCD0105-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2022	ANSI C63.10:2013

TEST PARAMETERS

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

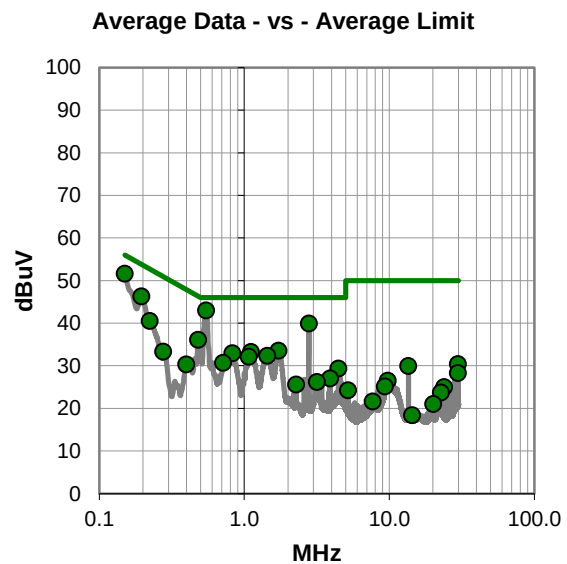
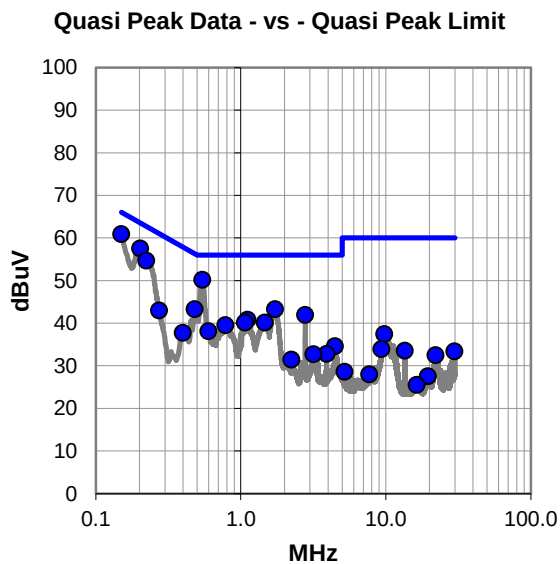
Controller AC power cable.

EUT OPERATING MODES

All Parallel Exerciser (APE) mode, RFID active.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #2

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	40.2	20.7	60.9	66.0	-5.1
0.542	29.9	20.3	50.2	56.0	-5.8
0.202	37.0	20.5	57.5	63.5	-6.0
0.223	34.3	20.4	54.7	62.7	-8.0
1.722	23.0	20.3	43.3	56.0	-12.7
0.481	23.0	20.3	43.3	56.3	-13.0
2.787	21.5	20.4	41.9	56.0	-14.1
1.114	20.6	20.2	40.8	56.0	-15.2
1.070	19.9	20.2	40.1	56.0	-15.9
1.462	19.8	20.3	40.1	56.0	-15.9
0.785	19.3	20.2	39.5	56.0	-16.5
0.597	17.8	20.3	38.1	56.0	-17.9
0.274	22.7	20.3	43.0	61.0	-18.0
0.399	17.4	20.3	37.7	57.9	-20.2
4.460	14.1	20.5	34.6	56.0	-21.4
9.755	16.3	21.1	37.4	60.0	-22.6
3.903	12.3	20.5	32.8	56.0	-23.2
3.179	12.2	20.5	32.7	56.0	-23.3
2.231	11.1	20.3	31.4	56.0	-24.6
9.325	12.9	21.0	33.9	60.0	-26.1
13.559	12.1	21.4	33.5	60.0	-26.5
29.778	10.9	22.5	33.4	60.0	-26.6
22.094	10.6	21.9	32.5	60.0	-27.5
5.211	8.0	20.6	28.6	60.0	-31.4
7.689	7.2	20.8	28.0	60.0	-32.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.547	22.7	20.3	43.0	46.0	-3.0
0.150	30.9	20.7	51.6	56.0	-4.4
2.790	19.5	20.4	39.9	46.0	-6.1
0.196	25.8	20.5	46.3	53.8	-7.5
0.481	15.8	20.3	36.1	46.3	-10.2
0.223	20.1	20.4	40.5	52.7	-12.2
1.720	13.2	20.3	33.5	46.0	-12.5
1.114	13.0	20.2	33.2	46.0	-12.8
0.829	12.7	20.2	32.9	46.0	-13.1
1.441	12.0	20.3	32.3	46.0	-13.7
1.072	11.9	20.2	32.1	46.0	-13.9
0.715	10.4	20.3	30.7	46.0	-15.3
4.460	8.8	20.5	29.3	46.0	-16.7
0.399	10.0	20.3	30.3	47.9	-17.6
0.277	13.0	20.3	33.3	50.9	-17.6
3.902	6.5	20.5	27.0	46.0	-19.0
29.783	7.9	22.5	30.4	50.0	-19.6
3.182	5.7	20.5	26.2	46.0	-19.8
13.559	8.5	21.4	29.9	50.0	-20.1
2.282	5.3	20.3	25.6	46.0	-20.4
29.790	5.8	22.5	28.3	50.0	-21.7
9.755	5.4	21.1	26.5	50.0	-23.5
9.322	4.1	21.0	25.1	50.0	-24.9
23.986	3.0	22.0	25.0	50.0	-25.0
5.211	3.6	20.6	24.2	50.0	-25.8

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	MX LC Upgrade Phase 4.0	Work Order:	DTCD0105
Serial Number:	1	Date:	2022-11-14
Customer:	Entrust Corporation	Temperature:	20.5°C
Attendees:	Craig Jacobsen	Relative Humidity:	25.4%
Customer Project:	None	Bar. Pressure (PMSL):	1025 mb
Tested By:	Dan Haas	Job Site:	MN03
Power:	208VAC/60Hz	Configuration:	DTCD0105-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2022	ANSI C63.10:2013

TEST PARAMETERS

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

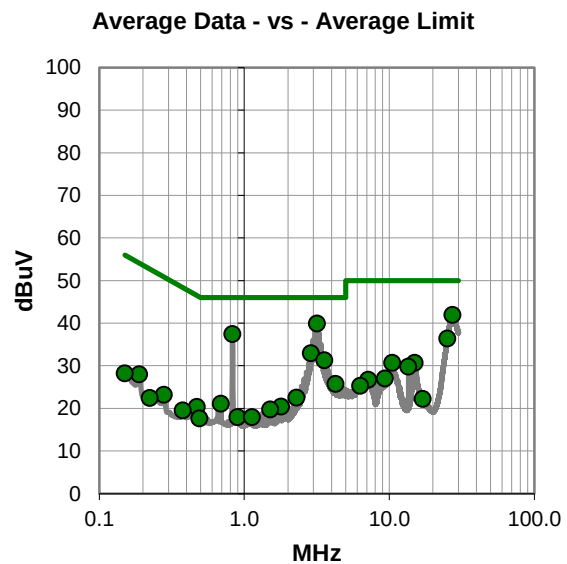
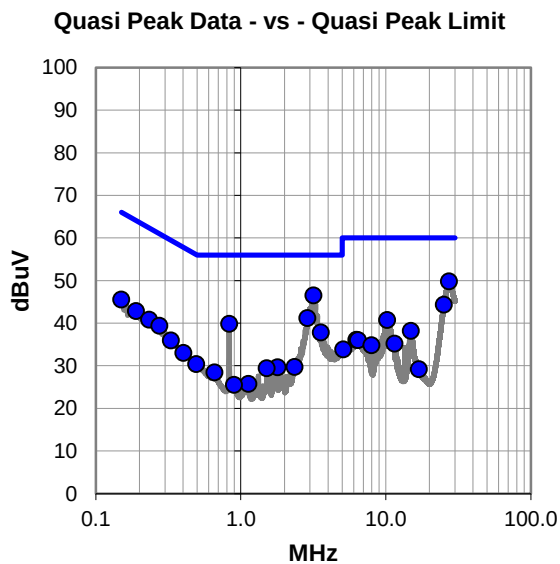
Cure Lamp AC power cable.

EUT OPERATING MODES

All Parallel Exerciser (APE) mode, RFID active.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #3

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
3.179	26.1	20.4	46.5	56.0	-9.5
27.355	27.3	22.5	49.8	60.0	-10.2
2.880	20.9	20.3	41.2	56.0	-14.8
25.124	22.1	22.2	44.3	60.0	-15.7
0.832	19.7	20.1	39.8	56.0	-16.2
3.577	17.4	20.4	37.8	56.0	-18.2
10.252	20.0	20.7	40.7	60.0	-19.3
0.150	25.1	20.4	45.5	66.0	-20.5
0.190	22.5	20.3	42.8	64.1	-21.3
0.234	20.6	20.2	40.8	62.3	-21.5
0.275	19.2	20.2	39.4	61.0	-21.6
14.892	17.1	21.1	38.2	60.0	-21.8
0.330	15.7	20.2	35.9	59.5	-23.6
6.262	15.6	20.5	36.1	60.0	-23.9
6.430	15.5	20.5	36.0	60.0	-24.0
0.402	12.9	20.1	33.0	57.8	-24.8
11.499	14.3	20.9	35.2	60.0	-24.8
7.954	14.2	20.6	34.8	60.0	-25.2
0.493	10.3	20.1	30.4	56.1	-25.7
5.091	13.4	20.4	33.8	60.0	-26.2
2.356	9.4	20.3	29.7	56.0	-26.3
1.792	9.4	20.2	29.6	56.0	-26.4
1.509	9.2	20.2	29.4	56.0	-26.6
0.660	8.3	20.1	28.4	56.0	-27.6
1.131	5.6	20.1	25.7	56.0	-30.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
3.180	19.5	20.4	39.9	46.0	-6.1
27.248	19.5	22.4	41.9	50.0	-8.1
0.831	17.3	20.1	37.4	46.0	-8.6
2.880	12.6	20.3	32.9	46.0	-13.1
25.150	14.2	22.2	36.4	50.0	-13.6
3.577	10.9	20.4	31.3	46.0	-14.7
10.472	10.0	20.7	30.7	50.0	-19.3
14.956	9.6	21.1	30.7	50.0	-19.3
13.559	8.8	21.0	29.8	50.0	-20.2
4.273	5.3	20.4	25.7	46.0	-20.3
9.320	6.3	20.7	27.0	50.0	-23.0
7.150	6.1	20.6	26.7	50.0	-23.3
2.286	2.2	20.3	22.5	46.0	-23.5
6.314	4.8	20.5	25.3	50.0	-24.7
0.690	1.0	20.1	21.1	46.0	-24.9
1.793	0.2	20.2	20.4	46.0	-25.6
0.188	7.7	20.3	28.0	54.1	-26.1
0.472	0.2	20.1	20.3	46.5	-26.2
1.511	-0.5	20.2	19.7	46.0	-26.3
0.278	3.0	20.2	23.2	50.9	-27.7
0.150	7.8	20.4	28.2	56.0	-27.8
17.022	0.8	21.4	22.2	50.0	-27.8
0.898	-2.2	20.1	17.9	46.0	-28.1
1.131	-2.2	20.1	17.9	46.0	-28.1
0.490	-2.5	20.1	17.6	46.2	-28.6

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS

EUT:	MX LC Upgrade Phase 4.0	Work Order:	DTCD0105
Serial Number:	1	Date:	2022-11-14
Customer:	Entrust Corporation	Temperature:	20.5°C
Attendees:	Craig Jacobsen	Relative Humidity:	25.4%
Customer Project:	None	Bar. Pressure (PMSL):	1025 mb
Tested By:	Dan Haas	Job Site:	MN03
Power:	208VAC/60Hz	Configuration:	DTCD0105-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2022	ANSI C63.10:2013

TEST PARAMETERS

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

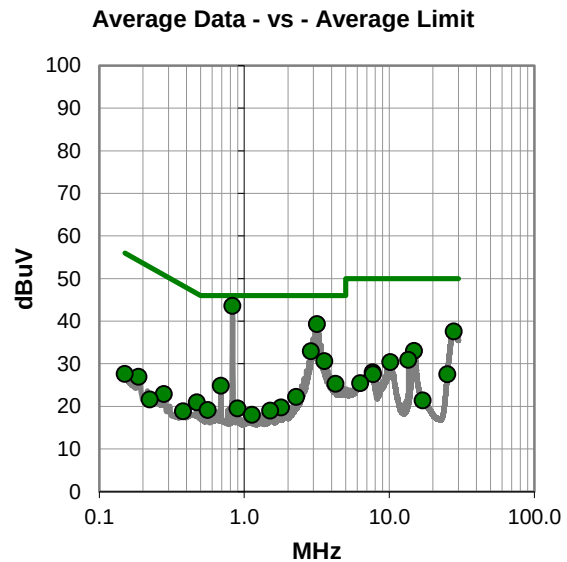
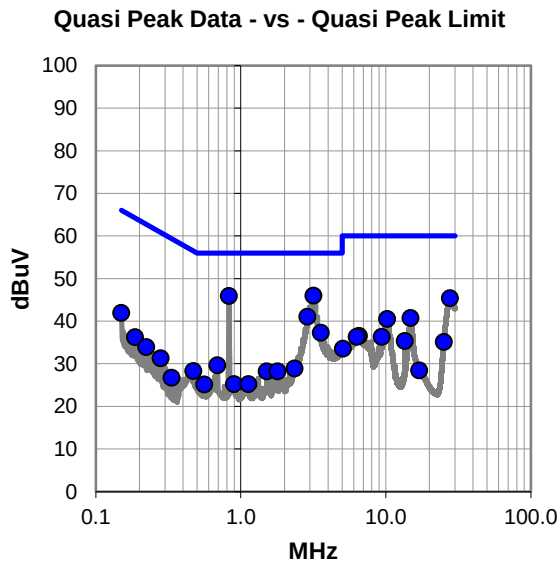
Cure Lamp AC power cable.

EUT OPERATING MODES

All Parallel Exerciser (APE) mode, RFID active.

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #4

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
3.179	25.6	20.4	46.0	56.0	-10.0
0.829	25.8	20.1	45.9	56.0	-10.1
27.769	22.9	22.5	45.4	60.0	-14.6
2.878	20.7	20.3	41.0	56.0	-15.0
3.575	16.9	20.4	37.3	56.0	-18.7
14.815	19.6	21.1	40.7	60.0	-19.3
10.210	19.8	20.7	40.5	60.0	-19.5
6.542	16.0	20.5	36.5	60.0	-23.5
6.310	15.8	20.5	36.3	60.0	-23.7
9.363	15.6	20.7	36.3	60.0	-23.7
0.150	21.5	20.4	41.9	66.0	-24.1
13.559	14.3	21.0	35.3	60.0	-24.7
25.134	12.9	22.2	35.1	60.0	-24.9
0.690	9.5	20.1	29.6	56.0	-26.4
5.068	13.1	20.4	33.5	60.0	-26.5
2.355	8.6	20.3	28.9	56.0	-27.1
1.509	8.0	20.2	28.2	56.0	-27.8
1.793	8.0	20.2	28.2	56.0	-27.8
0.187	15.9	20.3	36.2	64.2	-28.0
0.472	8.2	20.1	28.3	56.5	-28.2
0.223	13.7	20.2	33.9	62.7	-28.8
0.280	11.1	20.2	31.3	60.8	-29.5
0.899	5.1	20.1	25.2	56.0	-30.8
1.131	5.1	20.1	25.2	56.0	-30.8
0.559	5.0	20.1	25.1	56.0	-30.9

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.829	23.5	20.1	43.6	46.0	-2.4
3.179	18.9	20.4	39.3	46.0	-6.7
27.929	15.1	22.5	37.6	50.0	-12.4
2.880	12.6	20.3	32.9	46.0	-13.1
3.577	10.2	20.4	30.6	46.0	-15.4
14.859	11.9	21.1	33.0	50.0	-17.0
13.559	9.9	21.0	30.9	50.0	-19.1
10.193	9.7	20.7	30.4	50.0	-19.6
4.273	4.9	20.4	25.3	46.0	-20.7
0.690	4.7	20.1	24.8	46.0	-21.2
7.689	7.4	20.6	28.0	50.0	-22.0
7.727	6.9	20.6	27.5	50.0	-22.5
25.138	5.3	22.2	27.5	50.0	-22.5
2.285	1.9	20.3	22.2	46.0	-23.8
6.293	4.9	20.5	25.4	50.0	-24.6
0.472	0.8	20.1	20.9	46.5	-25.6
1.793	-0.5	20.2	19.7	46.0	-26.3
0.899	-0.6	20.1	19.5	46.0	-26.5
0.559	-1.0	20.1	19.1	46.0	-26.9
1.509	-1.2	20.2	19.0	46.0	-27.0
0.187	6.6	20.3	26.9	54.2	-27.3
0.278	2.7	20.2	22.9	50.9	-28.0
1.131	-2.1	20.1	18.0	46.0	-28.0
0.150	7.2	20.4	27.6	56.0	-28.4
17.028	0.0	21.4	21.4	50.0	-28.6

CONCLUSION

Pass



Tested By

FIELD STRENGTH OF FUNDAMENTAL

TEST DESCRIPTION

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

The fundamental carrier of the EUT was maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A calibrated active loop antenna was used for this test in order to provide sufficient measurement sensitivity. The reference point of the loop antenna was maintained at 1m above the ground plane during the testing.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, 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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Loop	ETS Lindgren	6502	AOB	2021-06-01	2023-06-01
Receiver	Rohde & Schwarz	ESR26	ARP	2022-04-20	2023-04-20
Cable	ESM Cable Corp.	Antenna Loop Cable	MNE	2022-01-30	2023-01-30

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	1.8 dB	-1.8 dB

FREQUENCY RANGE INVESTIGATED

12.5 - 15 MHz

POWER INVESTIGATED

220VAC/60Hz

CONFIGURATIONS INVESTIGATED

DTCD0105-1

MODES INVESTIGATED

RFID Transmitting 13.56 MHz

FIELD STRENGTH OF FUNDAMENTAL

EUT:	MX LC Upgrade Phase 4.0	Work Order:	DTCD0105
Serial Number:	1	Date:	2022-11-30
Customer:	Entrust Corporation	Temperature:	21.4°C
Attendees:	Craig Jacobsen	Relative Humidity:	22.8%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mb
Tested By:	Chris Patterson	Job Site:	MN04
Power:	220VAC/60Hz	Configuration:	DTCD0105-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.225:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	2	Test Distance (m):	10	Ant. Height(s) (m):	1(m)
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COMMENTS

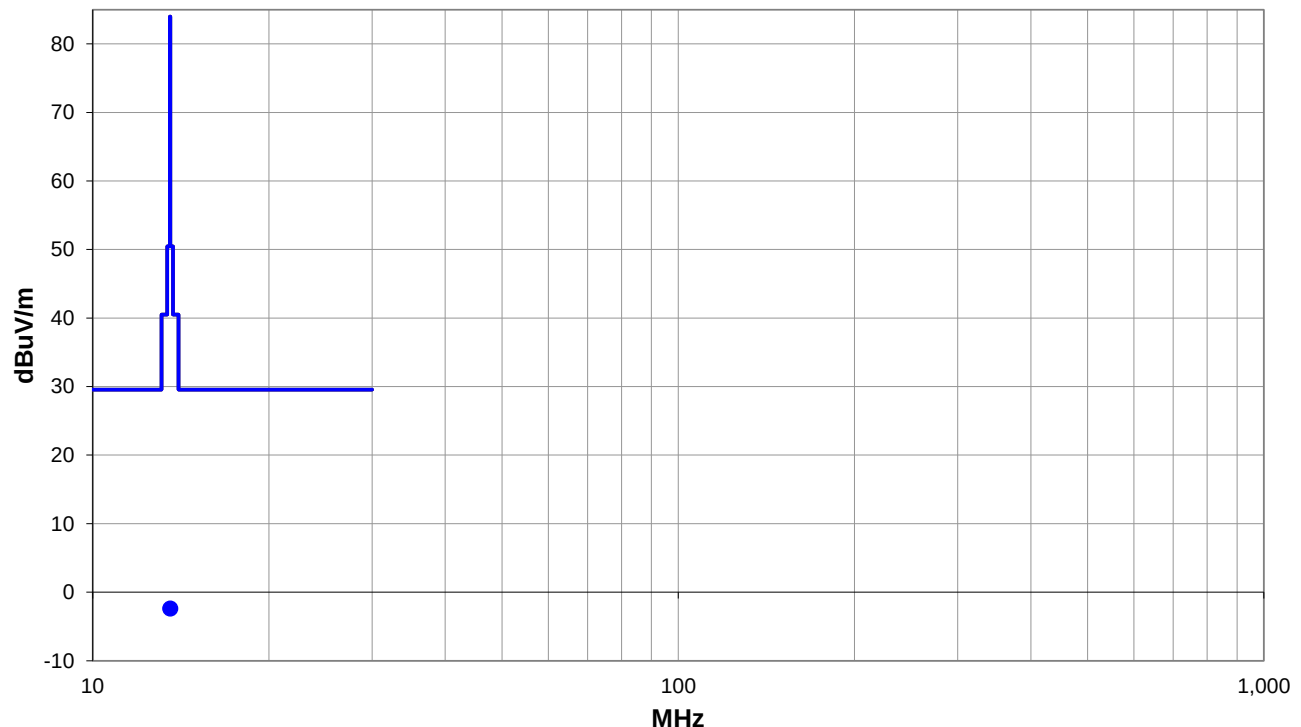
None

EUT OPERATING MODES

RFID Transmitting 13.56 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 2

PK AV QP

FIELD STRENGTH OF FUNDAMENTAL

RESULTS - Run #2

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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)
13.562	5.8	10.9	1.0	89.0	10.0	0.0	Para to GND	QP	-19.1	-2.4	84.0	-86.4

CONCLUSION

Pass



Tested By

FIELD STRENGTH OF FUNDAMENTAL

EUT:	MX LC Upgrade Phase 4.0	Work Order:	DTCD0105
Serial Number:	1	Date:	2022-11-30
Customer:	Entrust Corporation	Temperature:	21.4°C
Attendees:	Craig Jacobsen	Relative Humidity:	22.8%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mb
Tested By:	Chris Patterson	Job Site:	MN04
Power:	220VAC/60Hz	Configuration:	DTCD0105-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.225:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	1	Test Distance (m):	3	Ant. Height(s) (m):	1(m)
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COMMENTS

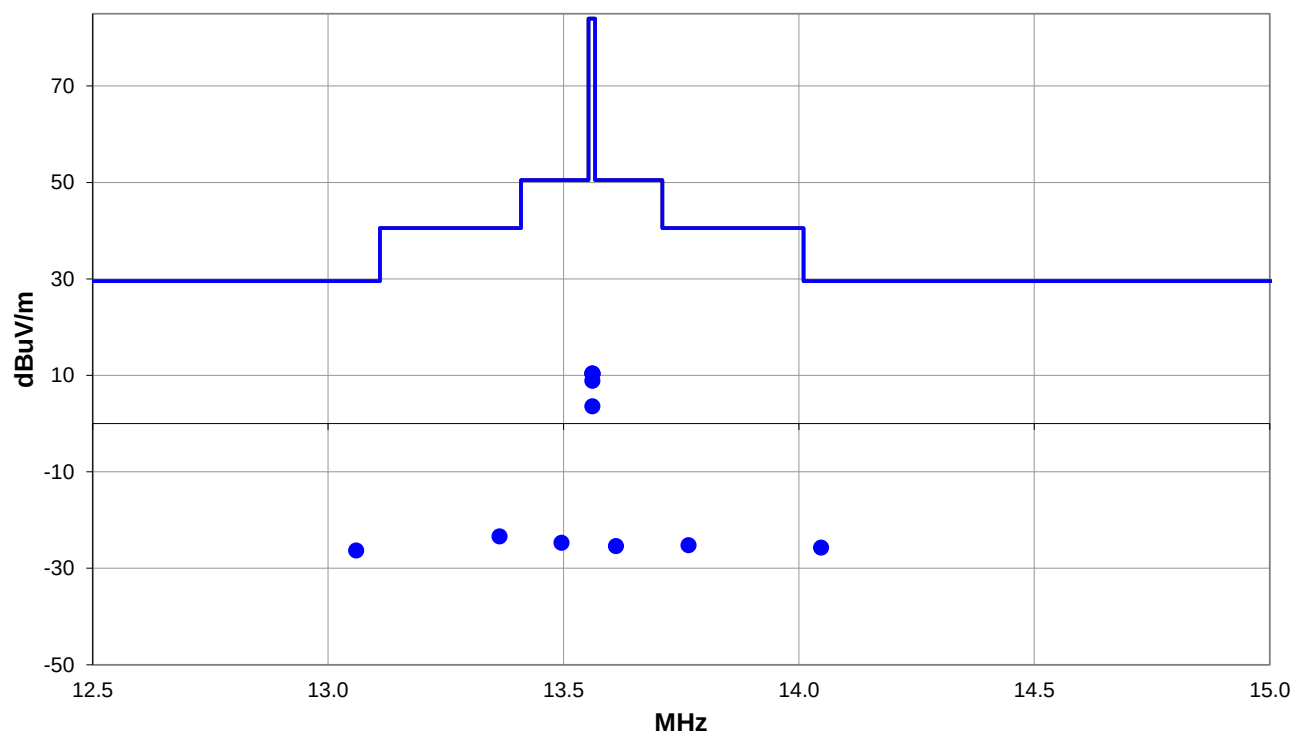
None

EUT OPERATING MODES

RFID Transmitting 13.56 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 1

PK AV QP

FIELD STRENGTH OF FUNDAMENTAL

RESULTS - Run #1

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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)
14.047	3.4	10.9	1.0	44.0	3.0	0.0	Para to GND	QP	-40.0	-25.7	29.5	-55.2
13.060	2.7	11.0	1.0	0.0	3.0	0.0	Para to GND	QP	-40.0	-26.3	29.5	-55.8
13.364	5.6	11.0	1.0	2.0	3.0	0.0	Para to GND	QP	-40.0	-23.4	40.5	-63.9
13.766	3.9	10.9	1.0	307.0	3.0	0.0	Para to GND	QP	-40.0	-25.2	40.5	-65.7
13.562	39.5	10.9	1.0	15.0	3.0	0.0	Para to GND	QP	-40.0	10.4	84.0	-73.6
13.561	39.5	10.9	1.0	18.0	3.0	0.0	Para to GND	QP	-40.0	10.4	84.0	-73.6
13.562	39.4	10.9	1.0	16.0	3.0	0.0	Para to GND	QP	-40.0	10.3	84.0	-73.7
13.562	38.0	10.9	1.0	354.0	3.0	0.0	Para to EUT	QP	-40.0	8.9	84.0	-75.1
13.496	4.3	11.0	1.0	63.0	3.0	0.0	Para to GND	QP	-40.0	-24.7	50.5	-75.2
13.611	3.7	10.9	1.0	294.0	3.0	0.0	Para to GND	QP	-40.0	-25.4	50.5	-75.9
13.562	32.7	10.9	1.0	74.0	3.0	0.0	Perp to EUT	QP	-40.0	3.6	84.0	-80.4

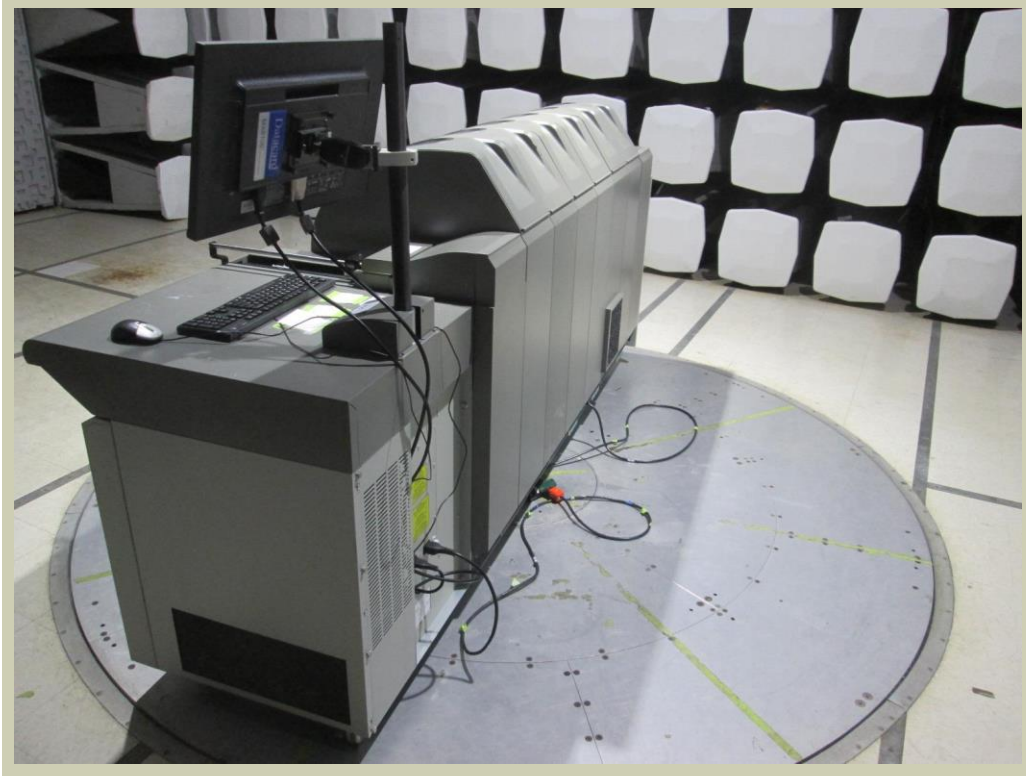
CONCLUSION

Pass

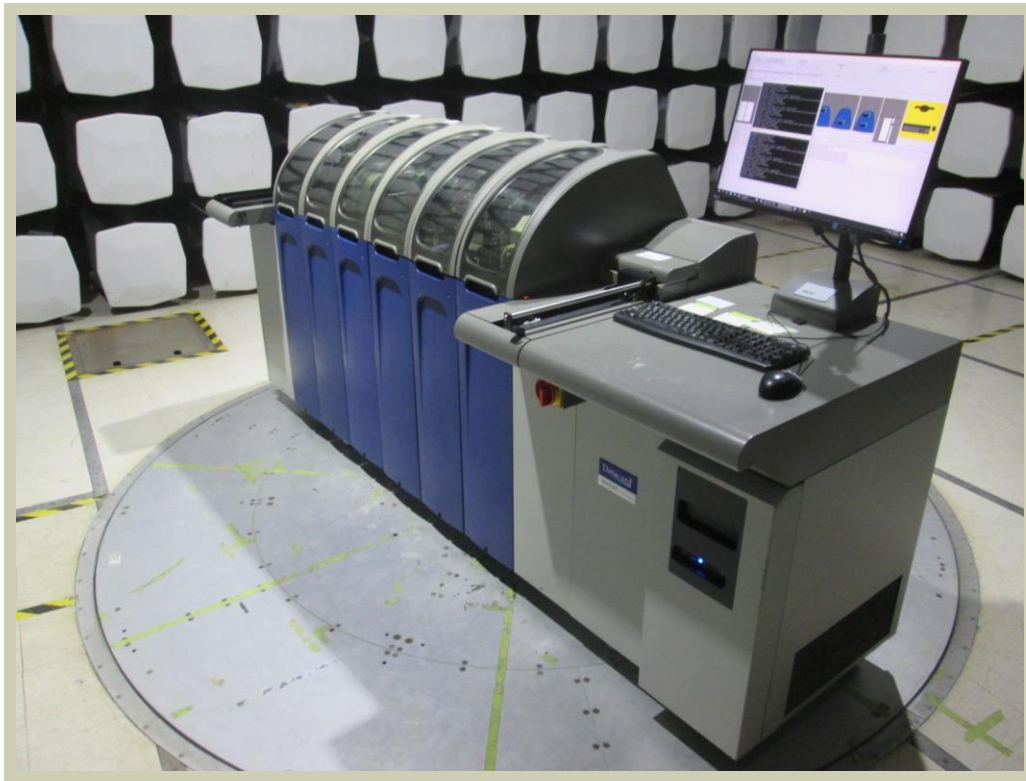


Tested By

FIELD STRENGTH OF FUNDAMENTAL



FIELD STRENGTH OF FUNDAMENTAL



FIELD STRENGTH OF SPURIOUS EMISIONS (LESS THAN 30MHz)

TEST DESCRIPTION

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

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These "pre-scans" are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

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

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.5, 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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Loop	ETS Lindgren	6502	AOB	2021-06-01	2023-06-01
Cable	ESM Cable Corp.	Antenna Loop Cable	MNE	2022-01-30	2023-01-30
Receiver	Rohde & Schwarz	ESR26	ARP	2022-04-20	2023-04-20

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	1.8 dB	-1.8 dB

FREQUENCY RANGE INVESTIGATED

490 kHz TO 30 MHz

POWER INVESTIGATED

220VAC/60Hz

CONFIGURATIONS INVESTIGATED

DTCD0105-1

MODES INVESTIGATED

RFID Transmitting 13.56 MHz

FIELD STRENGTH OF SPURIOUS EMISIONS (LESS THAN 30MHz)

EUT:	MX LC Upgrade Phase 4.0	Work Order:	DTCD0105
Serial Number:	1	Date:	2022-11-30
Customer:	Entrust Corporation	Temperature:	21.4°C
Attendees:	Craig Jacobsen	Relative Humidity:	22.8%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mb
Tested By:	Chris Patterson	Job Site:	MN04
Power:	220VAC/60Hz	Configuration:	DTCD0105-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.225:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	3	Test Distance (m):	10	Ant. Height(s) (m):	1(m)
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COMMENTS

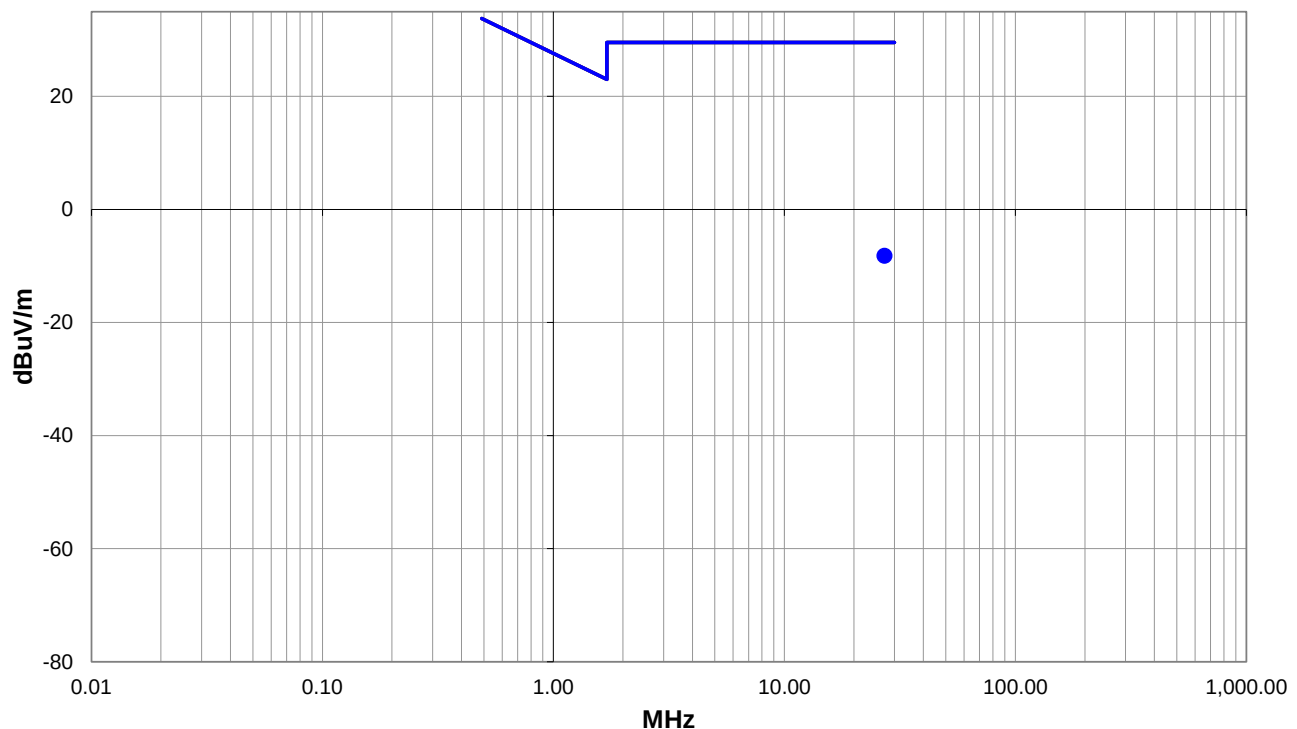
None

EUT OPERATING MODES

RFID Transmitting 13.56 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 3

■ PK ◆ AV ● QP

FIELD STRENGTH OF SPURIOUS EMISIONS (LESS THAN 30MHz)

RESULTS - Run #3

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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)
27.126	1.2	9.7	1.0	112.0	10.0	0.0	Para to GND	QP	-19.1	-8.2	29.5	-37.7

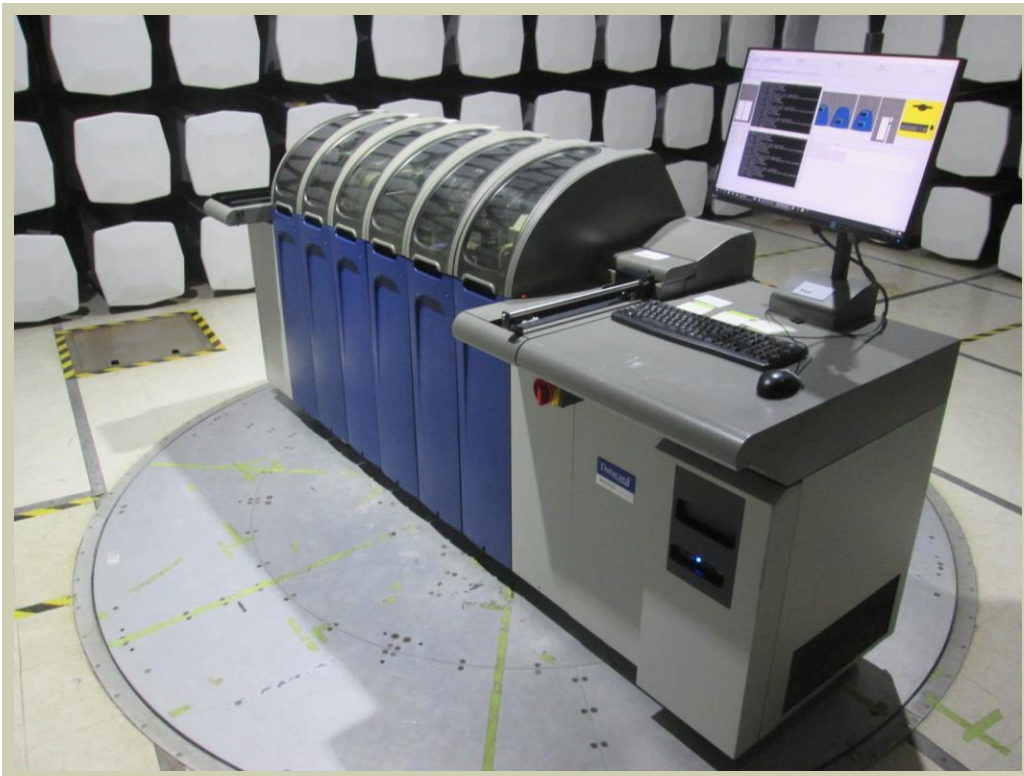
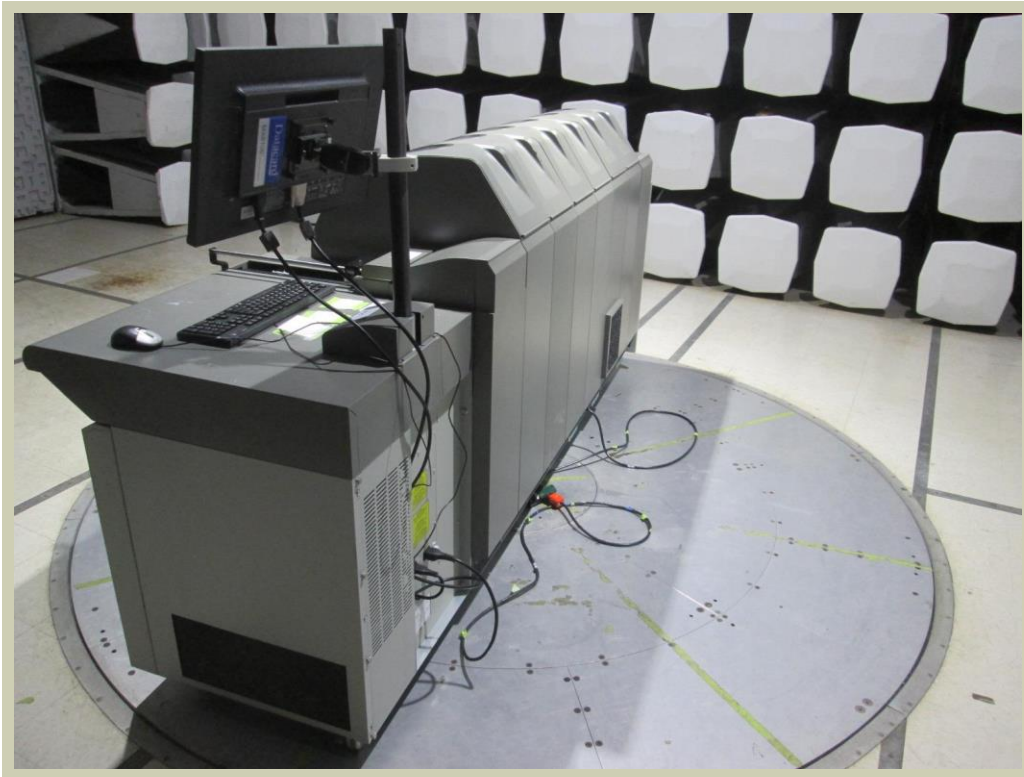
CONCLUSION

Pass



Tested By

FIELD STRENGTH OF SPURIOUS EMISIONS (LESS THAN 30MHz)



FIELD STRENGTH OF SPURIOUS EMISIONS (GREATER THAN 30MHz)

TEST DESCRIPTION

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

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These "pre-scans" are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Biconilog	ETS Lindgren	3142D	AXN	2021-12-08	2023-12-08
Cable	ESM Cable Corp.	MN04 Bilog Cables	MND	2022-01-30	2023-01-30
Amplifier - Pre-Amplifier	Miteq	AM-1551	PAC	2022-06-13	2023-06-13
Receiver	Rohde & Schwarz	ESR26	ARP	2022-04-20	2023-04-20
Filter - Low Pass	Micro-Tronics	LPM50004	HGW	2022-09-11	2023-09-11
Attenuator	Fairview Microwave	SA6021-10	UAT	2022-08-13	2023-08-13

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	4.6 dB	-4.6 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 1000 MHz

POWER INVESTIGATED

220VAC/60Hz

CONFIGURATIONS INVESTIGATED

DTCD0105-1

MODES INVESTIGATED

RFID Transmitting 13.56 MHz

FIELD STRENGTH OF SPURIOUS EMISIONS (GREATER THAN 30MHz)

EUT:	MX LC Upgrade Phase 4.0	Work Order:	DTCD0105
Serial Number:	1	Date:	2022-12-01
Customer:	Entrust Corporation	Temperature:	21.9°C
Attendees:	Jeff Aymond	Relative Humidity:	20.4%
Customer Project:	None	Bar. Pressure (PMSL):	1023 mb
Tested By:	Chris Patterson	Job Site:	MN04
Power:	220VAC/60Hz	Configuration:	DTCD0105-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.225:2022	ANSI C63.10:2013

TEST PARAMETERS

Run #:	9	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

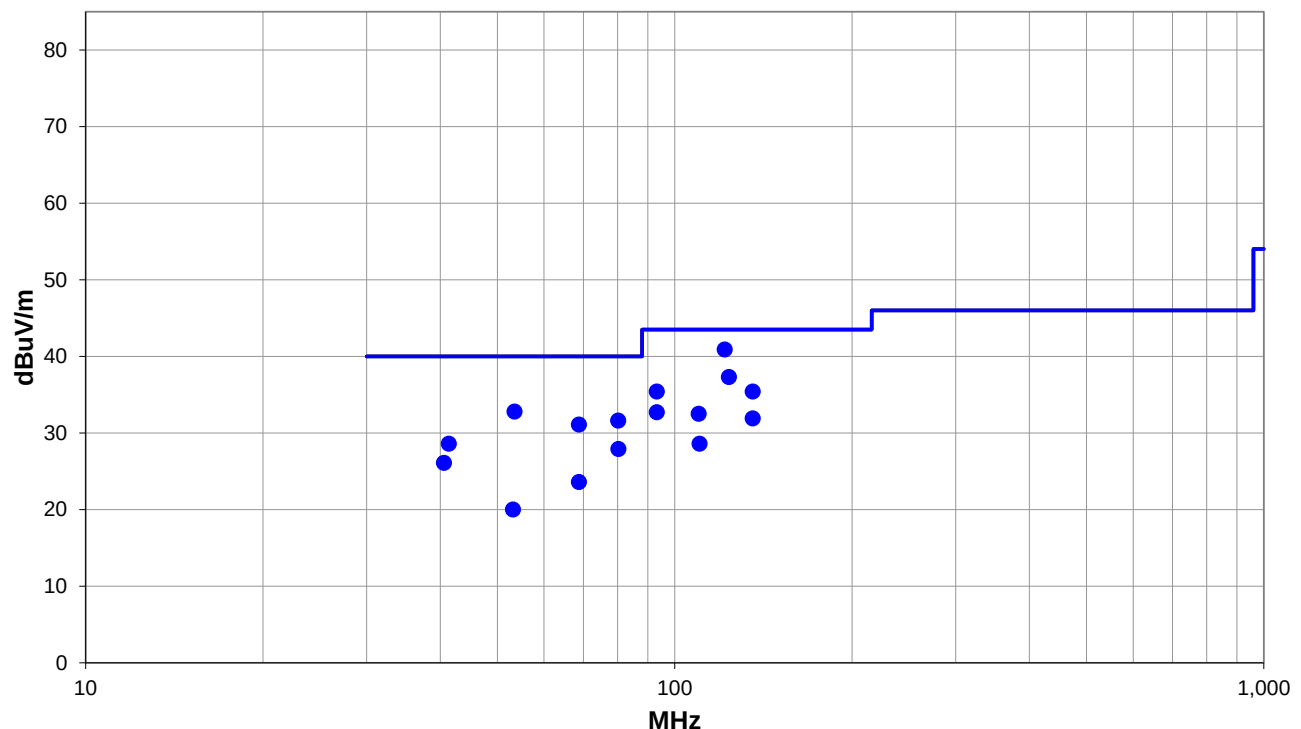
None

EUT OPERATING MODES

RFID Transmitting 13.56 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 9

■ PK ◆ AV ● QP

FIELD STRENGTH OF SPURIOUS EMISIONS (GREATER THAN 30MHz)

RESULTS - Run #9

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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)
121.605	61.8	-30.9	1.54	116.0	3.0	10.0	Horz	QP	0.0	40.9	43.5	-2.6
123.516	58.4	-31.1	1.0	358.0	3.0	10.0	Vert	QP	0.0	37.3	43.5	-6.2
53.458	54.2	-31.4	1.09	34.0	3.0	10.0	Vert	QP	0.0	32.8	40.0	-7.2
93.231	56.3	-30.9	1.0	0.0	3.0	10.0	Vert	QP	0.0	35.4	43.5	-8.1
135.609	56.6	-31.2	2.09	129.0	3.0	10.0	Horz	QP	0.0	35.4	43.5	-8.1
80.183	54.1	-32.5	1.0	120.0	3.0	10.0	Vert	QP	0.0	31.6	40.0	-8.4
68.732	52.8	-31.7	1.19	113.0	3.0	10.0	Vert	QP	0.0	31.1	40.0	-8.9
93.243	53.6	-30.9	2.19	114.0	3.0	10.0	Horz	QP	0.0	32.7	43.5	-10.8
109.816	52.7	-30.2	1.0	146.0	3.0	10.0	Vert	QP	0.0	32.5	43.5	-11.0
41.333	46.6	-28.0	1.0	145.0	3.0	10.0	Vert	QP	0.0	28.6	40.0	-11.4
135.628	53.1	-31.2	1.0	0.0	3.0	10.0	Vert	QP	0.0	31.9	43.5	-11.6
80.203	50.4	-32.5	2.39	313.0	3.0	10.0	Horz	QP	0.0	27.9	40.0	-12.1
40.567	43.7	-27.6	3.79	94.0	3.0	10.0	Horz	QP	0.0	26.1	40.0	-13.9
110.149	48.8	-30.2	2.83	146.0	3.0	10.0	Horz	QP	0.0	28.6	43.5	-14.9
68.749	45.3	-31.7	2.28	284.0	3.0	10.0	Horz	QP	0.0	23.6	40.0	-16.4
53.149	41.4	-31.4	3.78	186.0	3.0	10.0	Horz	QP	0.0	20.0	40.0	-20.0

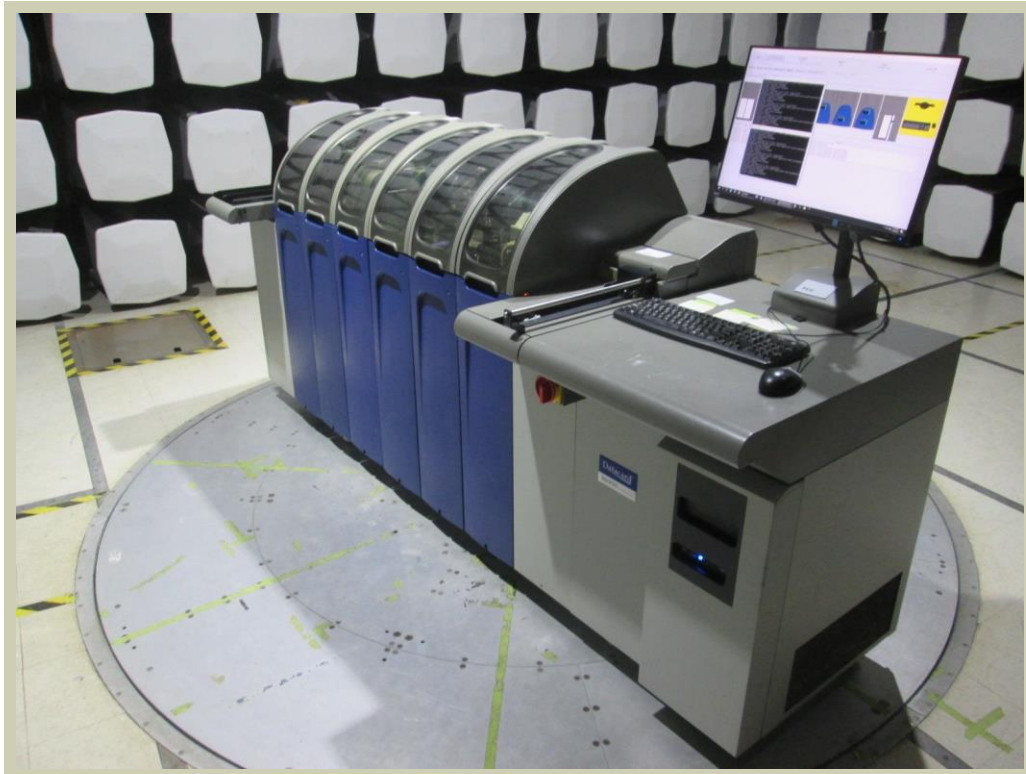
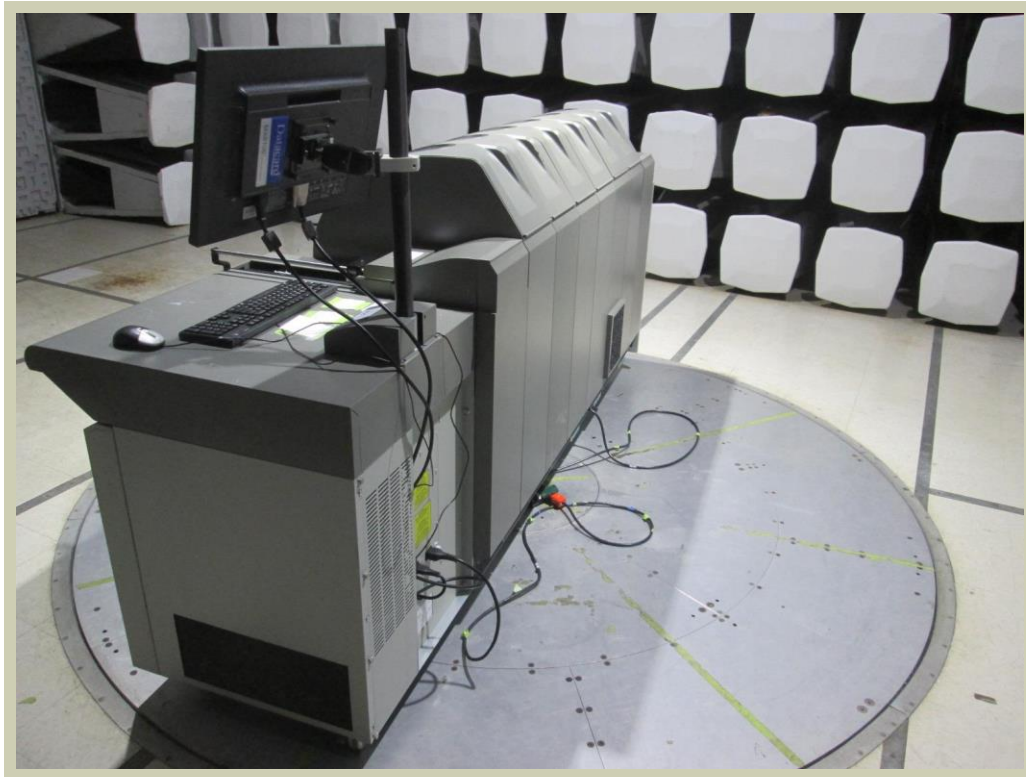
CONCLUSION

Pass



Tested By

FIELD STRENGTH OF SPURIOUS EMISIONS (GREATER THAN 30MHz)



End of Test Report