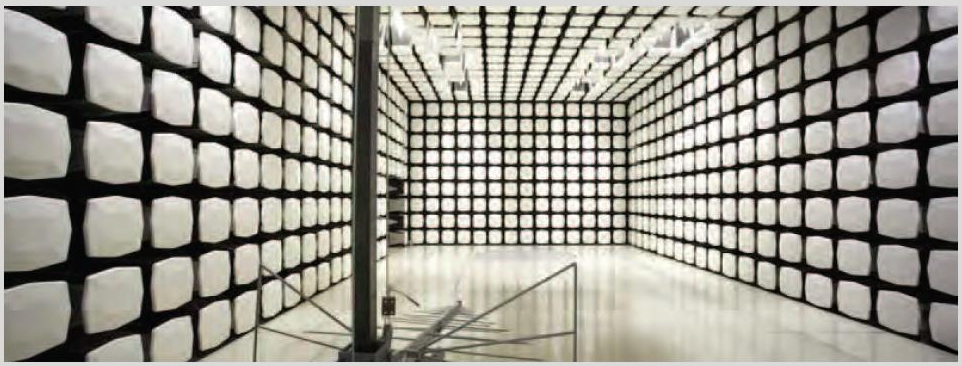
Entrust Corporation

MX8100

FCC 15.225:2022

13.56 MHz Radio

Report: DTCD0088.1 Rev. 1, Issue Date: February 6, 2023



ACCREDITED
CERT #3310.05

CERTIFICATE OF TEST

Last Date of Test: February 4, 2022
Entrust Corporation
EUT: MX8100

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2022	ANSI C63.10:2013
FCC 15.225:2022	

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.4	Field Strength of Fundamental	Yes	Pass	
6.4	Field Strength of Spurious Emissions (Less Than 30 MHz)	Yes	Pass	
6.5	Field Strength of Spurious Emissions (Greater Than 30 MHz)	Yes	Pass	
6.8	Frequency Stability	Yes	Pass	
6.9.2	Occupied Bandwidth	No	N/A	Not required to add a host to a limited modular approval. Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart.

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
01	Added comment to certificate of test addressing occupied bandwidth.	2023-02-06	2
	Updated functional description.	2023-02-06	10
	Updated power settings table.	2023-02-06	11
	Updated all configurations and added configuration DTCD0091.4.	2023-02-06	12-14
	Corrected distance adjustment factor to 40db/decade instead of 20.	2023-02-06	21, 26, 31, 34
	Added in the comments which crystal oscillator PN is being tested.	2023-02-06	36-39
	Updated test description to include note of near field probe. Corrected data to nominal frequency.	2023-02-06	41-52

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

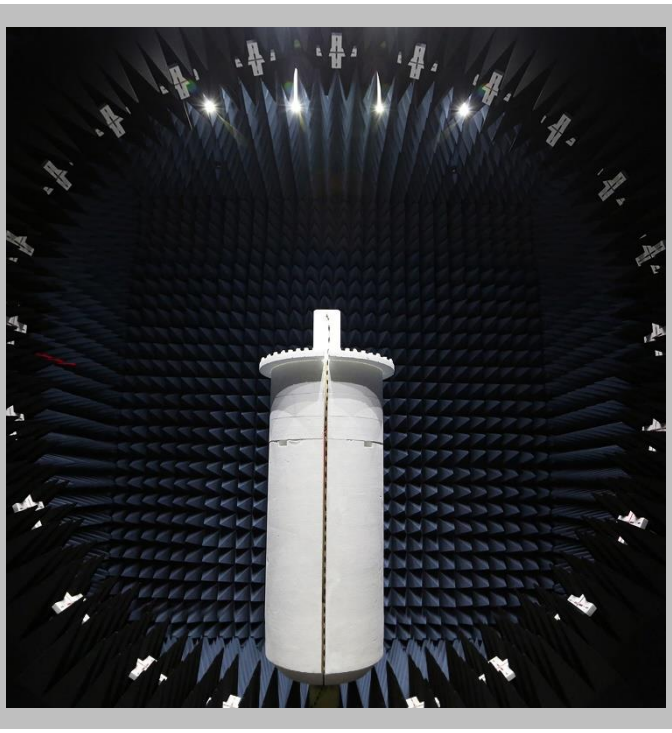
For details on the Scopes of our Accreditations, please visit:

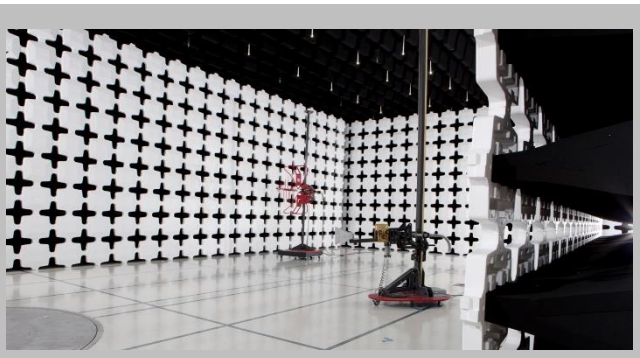
California Minnesota Oregon Texas Washington

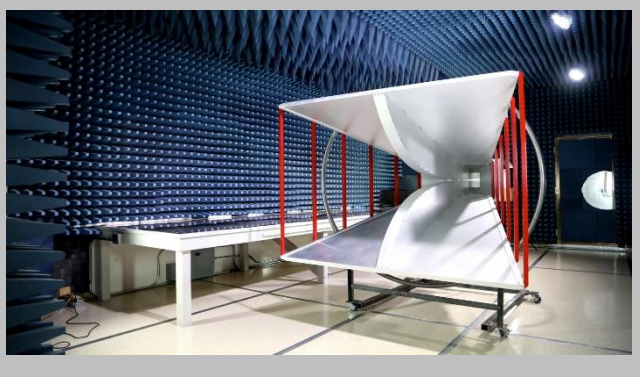
FACILITIES

element
2020.12.15

California	Minnesota	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs EV01-12 6775 NE Evergreen Pkwy #400 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
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

element
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 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

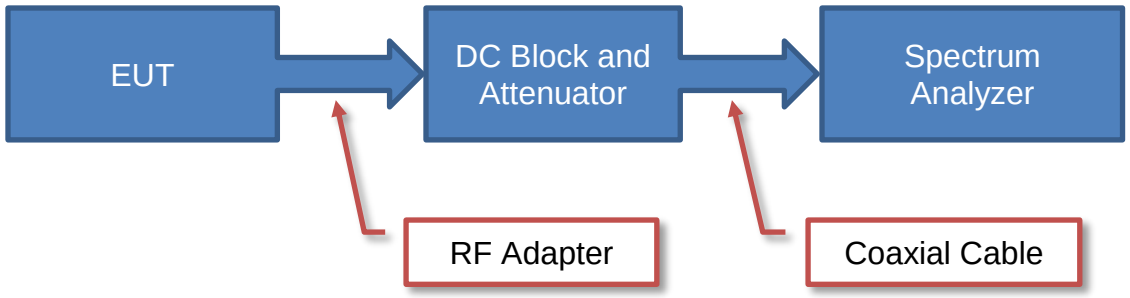
TEST SETUP BLOCK DIAGRAMS

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.

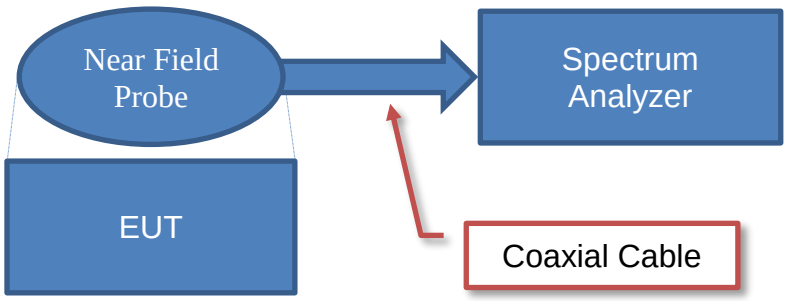
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

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

Near Field Test Fixture Measurements

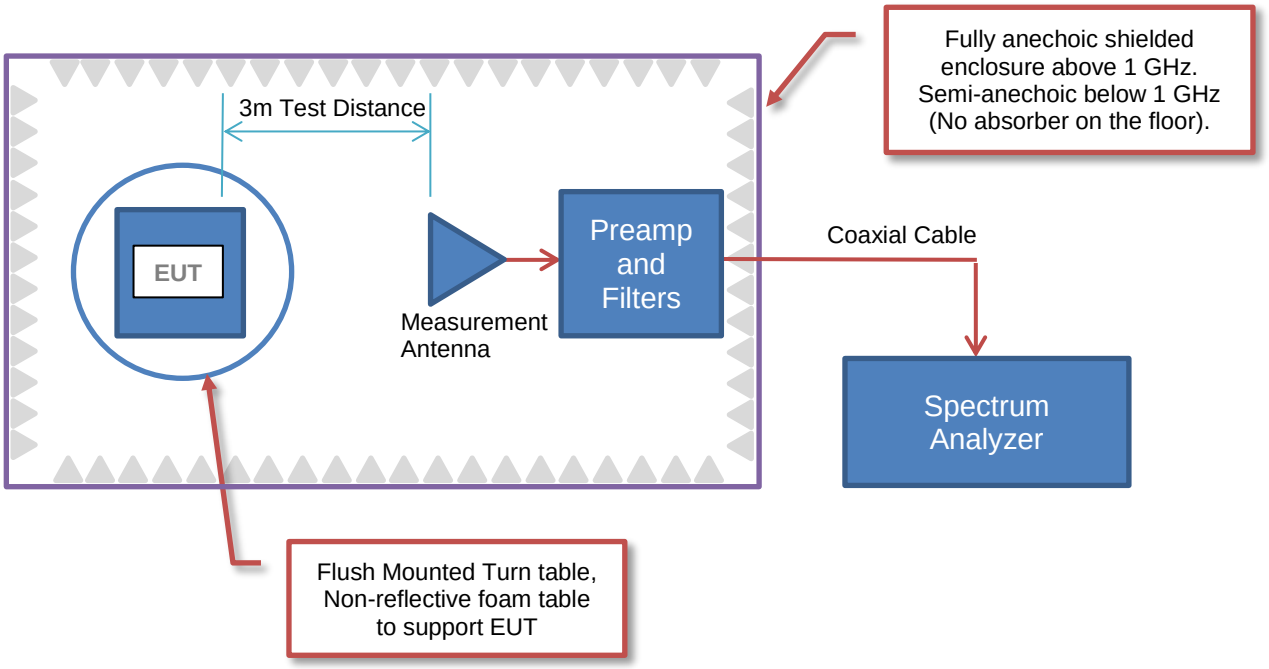


Sample Calculation (logarithmic units)

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: Antenna Factor		Factor: Cable Factor		Factor: Amplifier Gain		Distance Adjustment Factor		External Attenuation		Field Strength
42.6	+	28.6	+	3.1	-	40.8	+	0.0	+	0.0	=	**33.5**

Conducted Emissions:

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

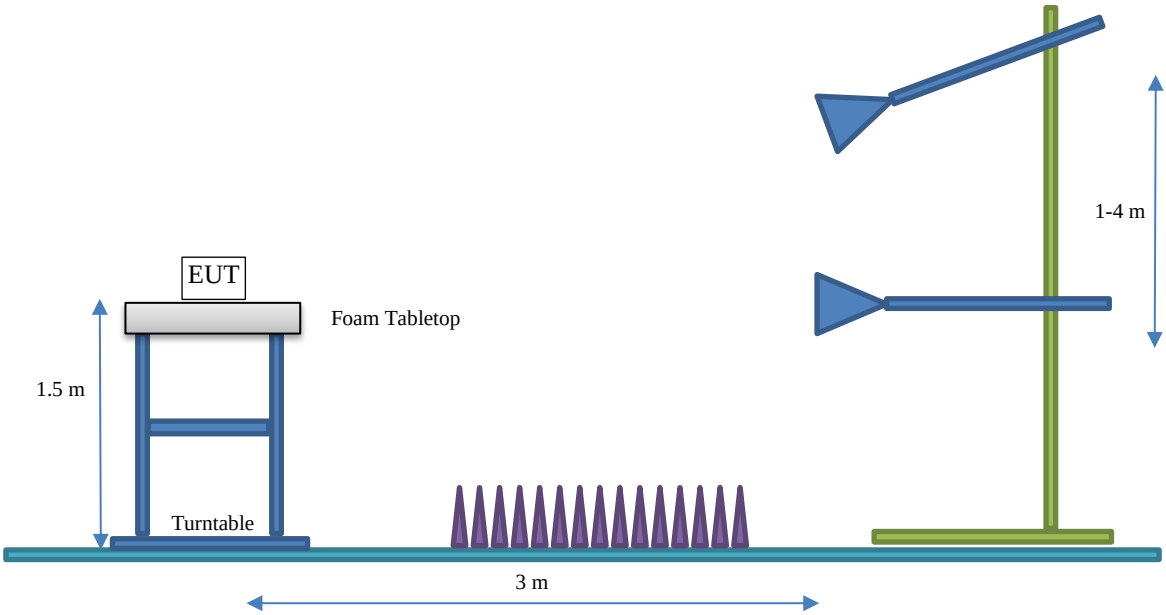
Radiated Power (ERP/EIRP) – Substitution Method:

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:	MX8100
First Date of Test:	November 22, 2021
Last Date of Test:	February 4, 2022
Receipt Date of Samples:	November 15, 2021
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

DTCD0088
Card machine with cleaning module that contains the following FCC ID:
Cleaner supplies, GDI-SID004, quantity 1

DTCD0091
Card Machine with 12 electrically identical 13.56 MHz radios which transmit sequentially in a loop, as well as containing 1 separate RFID board. Contains the following radios with the following FCC IDs which are being integrated into the LC Conversion Phase 1 host:
Contactless card, GDI-50543001, quantity 12
Cleaner supplies, GDI-SID004, quantity 1

Testing Objective:

To demonstrate compliance to FCC Part 15.225 specifications.

POWER SETTINGS

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.

ANTENNA GAIN (dBi)

Name	Type	Provided by:	Frequency Range (MHz)	Antenna Description	Quantity
Graphics supplies	PCB Trace	Entrust Corporation	13.56	Circular, 4 turns, 46mm diameter	1
Contactless card	PCB Trace	Entrust Corporation	13.56	Rectangular, 2 turns, 68mm x 43 mm	12

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

POWER SETTING

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

CONFIGURATIONS

Configuration DTCD0088- 1

Software/Firmware Running During Test	
Description	**Version**
Firmware	538874-001

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
MX System LC	Entrust Datacard	MX Series, LC Conversion, Phase 1	MXX810182

Peripherals in Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Monitor	NEC Corporation	EA245WMi-BK	95129786NA
Keyboard	Logitech Corporation	K120	N/A
Mouse	HP Corporation	N/A	N/A

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power cable	No	3 m	No	MX System LC	AC Mains
Keyboard cable	No	2 m	No	MX System LC	Keyboard
Mouse cable	No	2 m	No	MX System LC	Mouse
Monitor cable	No	2 m	No	MX System LC	Monitor
Monitor Power cable	No	3 m	No	MX System LC	Monitor
Ethernet Cable	No	4.2 m	No	MX System LC	Unterminated

Configuration DTCD0091- 1

Software/Firmware Running During Test	
Description	**Version**
Firmware, Graphics	538874-001

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
MX Card System	Entrust Datacard	MX Series, LC Conversion, Phase 2	MXX810182

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Cable	No	2 m	No	AC Mains	MX Card System

CONFIGURATIONS

Configuration DTCD0091- 2

Software/Firmware Running During Test	
Description	**Version**
Firmware, Graphics	538874-001

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
MX Card System	Entrust Datacard	MX Series, LC Conversion, Phase 2	MXX810182
RFID Radio Module w/ECS crystal	Entrust Datacard	534508-001-D	1981D201106687

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Cable	No	2 m	No	AC Mains	MX Card System
Serial Extender Cable	No	>3.0 m	No	MX Card System	RFID Radio Module

Configuration DTCD0091- 3

Software/Firmware Running During Test	
Description	**Version**
Firmware, Graphics	538874-001

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
MX Card System	Entrust Datacard	MX Series, LC Conversion, Phase 2	MXX810182
RFID Radio Module w/Raltron crystal	Entrust Datacard	534508-001-F	11860F3621004472

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Cable	No	2 m	No	AC Mains	MX Card System
Serial Extender Cable	No	>3.0 m	No	MX Card System	RFID Radio Module

CONFIGURATIONS

Configuration DTCD0091- 4

Software/Firmware Running During Test	
Description	**Version**
Firmware, Graphics	538874-001

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
RFID Radio Module w/Raltron crystal	Entrust Datacard	534508-001-F	11860F3621004472

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Step Up Transformer	Hammond Manufacturing	176D	None
LC Base	Entrust Datacard	529765-004	1186011622000008
Ethernet Switch	Netgear	GS305E	5W13115MA07AD
PC	Custom	524498-001	663852-05
DC Adapter	Netgear	332-10992-01	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Module Cable	No	1.3 m	Yes	Radio Module	LC Base
AC Cable with inline switch	No	3 m	No	Step Up Transformer	LC Base
Ethernet (Unterminated)	No	> 3 m	No	LC Base	Unterminated
DC Cable (Switch)	No	1.6 m	No	DC Supply (Switch)	Netgear Switch
AC Power	No	1.8 m	No	AC Mains	Step Up Transformer
Ethernet	No	0.9 m	No	PC	Netgear Switch
Ethernet	No	> 3 m	Yes	Netgear Switch	LC Base
AC Cable (PC)	No	1.6 m	No	PC	AC Mains

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-11-24	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	2022-02-02	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.
3	2022-02-02	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 Element following the test.
4	2022-02-04	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2022-09-15	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

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	ARK	2021-11-02	2022-11-02
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	2021-03-15	2022-03-15
Filter - High Pass	TTE	H97-100K-50-720B	HGN	NCR	NCR
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, TYK	MNCA	2021-03-10	2022-03-10

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	3.2 dB	-3.2 dB

CONFIGURATIONS INVESTIGATED

DTCD0088-1

MODES INVESTIGATED

Running all-purpose exerciser. Transmitting RFID 13.56 MHz

POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

EUT:	MX8100	Work Order:	DTCD0088
Serial Number:	MX810182	Date:	2021-11-24
Customer:	Entrust Corporation	Temperature:	23.8°C
Attendees:	Jeff Aymond	Relative Humidity:	27.1%
Customer Project:	None	Bar. Pressure (PMSL):	1011 mb
Tested By:	Christopher Heintzelman	Job Site:	MN03
Power:	208VAC/60Hz	Configuration:	DTCD0088-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2021	ANSI C63.10:2013

TEST PARAMETERS

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

COMMENTS

None

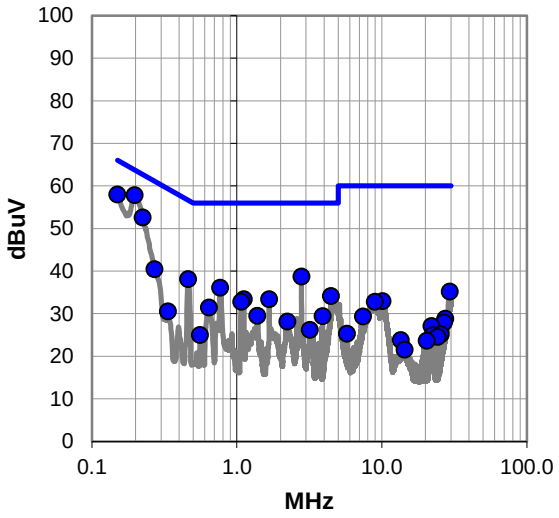
EUT OPERATING MODES

Running all-purpose exerciser. Transmitting RFID 13.56 MHz

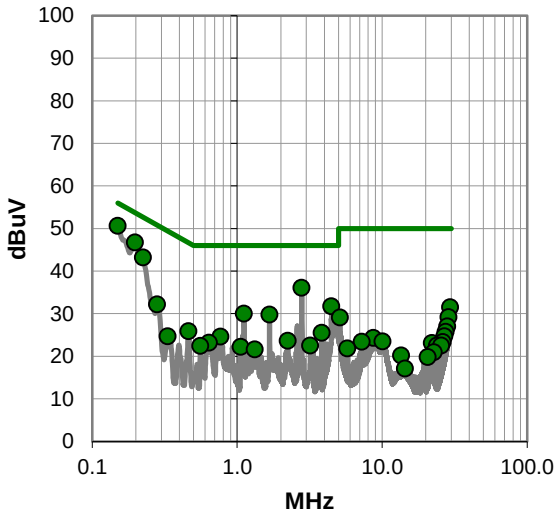
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #6

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.197	37.1	20.7	57.8	63.7	-5.9
0.150	37.0	21.0	58.0	66.0	-8.0
0.224	32.0	20.6	52.6	62.7	-10.1
2.789	18.1	20.6	38.7	56.0	-17.3
0.462	17.6	20.5	38.1	56.7	-18.6
0.769	15.6	20.5	36.1	56.0	-19.9
0.271	19.9	20.5	40.4	61.1	-20.7
4.475	13.5	20.6	34.1	56.0	-21.9
1.116	12.9	20.5	33.4	56.0	-22.6
1.673	12.9	20.5	33.4	56.0	-22.6
1.073	12.3	20.5	32.8	56.0	-23.2
0.642	11.0	20.4	31.4	56.0	-24.6
29.416	13.7	21.5	35.2	60.0	-24.8
1.383	9.0	20.5	29.5	56.0	-26.5
3.903	8.8	20.6	29.4	56.0	-26.6
10.105	12.0	20.9	32.9	60.0	-27.1
8.942	12.0	20.8	32.8	60.0	-27.2
2.230	7.6	20.5	28.1	56.0	-27.9
0.335	10.0	20.5	30.5	59.3	-28.8
3.197	5.6	20.6	26.2	56.0	-29.8
7.424	8.5	20.8	29.3	60.0	-30.7
0.557	4.5	20.5	25.0	56.0	-31.0
27.497	7.4	21.4	28.8	60.0	-31.2
26.853	6.5	21.4	27.9	60.0	-32.1
22.059	5.8	21.3	27.1	60.0	-32.9

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	29.6	21.0	50.6	56.0	-5.4
0.197	26.0	20.7	46.7	53.7	-7.0
0.224	22.6	20.6	43.2	52.7	-9.5
2.787	15.5	20.6	36.1	46.0	-9.9
4.475	11.1	20.6	31.7	46.0	-14.3
1.115	9.5	20.5	30.0	46.0	-16.0
1.673	9.3	20.5	29.8	46.0	-16.2
29.413	10.0	21.5	31.5	50.0	-18.5
0.281	11.7	20.5	32.2	50.8	-18.6
3.835	4.9	20.6	25.5	46.0	-20.5
28.764	7.7	21.5	29.2	50.0	-20.8
0.462	5.4	20.5	25.9	46.7	-20.8
5.116	8.5	20.6	29.1	50.0	-20.9
0.769	4.1	20.5	24.6	46.0	-21.4
2.230	3.1	20.5	23.6	46.0	-22.4
0.640	2.8	20.4	23.2	46.0	-22.8
28.129	5.5	21.5	27.0	50.0	-23.0
3.197	1.9	20.6	22.5	46.0	-23.5
0.557	1.9	20.5	22.4	46.0	-23.6
1.058	1.7	20.5	22.2	46.0	-23.8
27.486	4.3	21.4	25.7	50.0	-24.3
1.322	1.1	20.5	21.6	46.0	-24.4
0.332	4.2	20.5	24.7	49.4	-24.7
26.853	3.3	21.4	24.7	50.0	-25.3
8.672	3.5	20.8	24.3	50.0	-25.7

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

EUT:	MX8100	Work Order:	DTCD0088
Serial Number:	MX810182	Date:	2021-11-24
Customer:	Entrust Corporation	Temperature:	23.8°C
Attendees:	Jeff Aymond	Relative Humidity:	27.1%
Customer Project:	None	Bar. Pressure (PMSL):	1011 mb
Tested By:	Christopher Heintzelman	Job Site:	MN03
Power:	208VAC/60Hz	Configuration:	DTCD0088-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2021	ANSI C63.10:2013

TEST PARAMETERS

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

COMMENTS

None

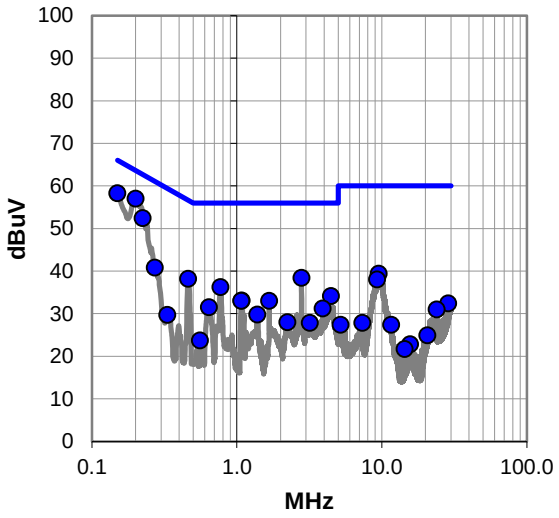
EUT OPERATING MODES

Running all-purpose exerciser. Transmitting RFID 13.56 MHz

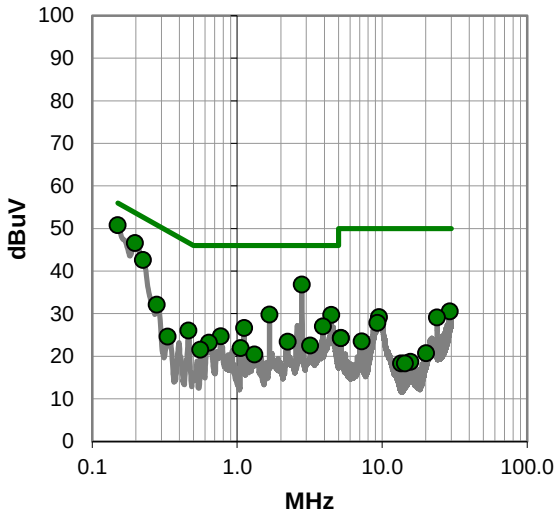
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #7

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.200	36.3	20.7	57.0	63.6	-6.6
0.150	37.3	21.0	58.3	66.0	-7.7
0.224	31.8	20.6	52.4	62.7	-10.3
2.789	17.8	20.6	38.4	56.0	-17.6
0.462	17.7	20.5	38.2	56.7	-18.5
0.770	15.7	20.5	36.2	56.0	-19.8
0.272	20.3	20.5	40.8	61.0	-20.2
9.535	18.6	20.8	39.4	60.0	-20.6
4.465	13.5	20.6	34.1	56.0	-21.9
9.264	17.2	20.8	38.0	60.0	-22.0
1.078	12.6	20.5	33.1	56.0	-22.9
1.073	12.5	20.5	33.0	56.0	-23.0
1.674	12.5	20.5	33.0	56.0	-23.0
0.644	11.1	20.4	31.5	56.0	-24.5
3.906	10.6	20.6	31.2	56.0	-24.8
1.385	9.3	20.5	29.8	56.0	-26.2
28.751	10.9	21.5	32.4	60.0	-27.6
2.232	7.5	20.5	28.0	56.0	-28.0
3.194	7.2	20.6	27.8	56.0	-28.2
23.987	9.7	21.3	31.0	60.0	-29.0
0.331	9.2	20.5	29.7	59.4	-29.7
7.348	7.0	20.8	27.8	60.0	-32.2
0.557	3.2	20.5	23.7	56.0	-32.3
5.202	6.8	20.6	27.4	60.0	-32.6
11.607	6.5	20.9	27.4	60.0	-32.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	29.8	21.0	50.8	56.0	-5.2
0.197	25.9	20.7	46.6	53.7	-7.1
2.789	16.2	20.6	36.8	46.0	-9.2
0.224	22.0	20.6	42.6	52.7	-10.1
1.674	9.3	20.5	29.8	46.0	-16.2
4.464	9.1	20.6	29.7	46.0	-16.3
0.279	11.6	20.5	32.1	50.8	-18.7
3.906	6.4	20.6	27.0	46.0	-19.0
1.119	6.1	20.5	26.6	46.0	-19.4
29.391	9.0	21.5	30.5	50.0	-19.5
0.462	5.5	20.5	26.0	46.7	-20.7
9.513	8.4	20.8	29.2	50.0	-20.8
23.988	7.8	21.3	29.1	50.0	-20.9
0.770	4.2	20.5	24.7	46.0	-21.3
9.264	7.0	20.8	27.8	50.0	-22.2
2.233	2.9	20.5	23.4	46.0	-22.6
0.638	2.8	20.4	23.2	46.0	-22.8
3.194	1.9	20.6	22.5	46.0	-23.5
1.058	1.4	20.5	21.9	46.0	-24.1
0.557	1.0	20.5	21.5	46.0	-24.5
0.332	4.1	20.5	24.6	49.4	-24.8
1.320	-0.1	20.5	20.4	46.0	-25.6
5.201	3.7	20.6	24.3	50.0	-25.7
5.202	3.6	20.6	24.2	50.0	-25.8
7.224	2.7	20.8	23.5	50.0	-26.5

CONCLUSION

Pass

Tested By

FIELD STRENGTH OF FUNDAMENTAL

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

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
Receiver	Rohde & Schwarz	ESR26	ARP	2021-04-08	2022-04-08
Antenna - Loop	ETS Lindgren	6502	AOB	2021-06-01	2023-06-01
Cable	ESM Cable Corp.	Antenna Loop Cable	MNE	2021-02-17	2022-02-17

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	1.8 dB	-1.8 dB

FREQUENCY RANGE INVESTIGATED

9 kHz TO 30 MHz

POWER INVESTIGATED

230VAC/50Hz

CONFIGURATIONS INVESTIGATED

DTCD0088-1

MODES INVESTIGATED

RFID radio transmitting at 13.56 MHz and monitoring.

FIELD STRENGTH OF FUNDAMENTAL

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

EUT:	MX8100	Work Order:	DTCD0088
Serial Number:	MX810182	Date:	2021-11-22
Customer:	Entrust Corporation	Temperature:	23.4°C
Attendees:	Jeff Aymond	Relative Humidity:	21.2%
Customer Project:	None	Bar. Pressure (PMSL):	1022 mb
Tested By:	Christopher Heintzelman	Job Site:	MN07
Power:	230VAC/50Hz	Configuration:	DTCD0088-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.225:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	7	Test Distance (m):	2	Ant. Height(s) (m):	1(m)

COMMENTS

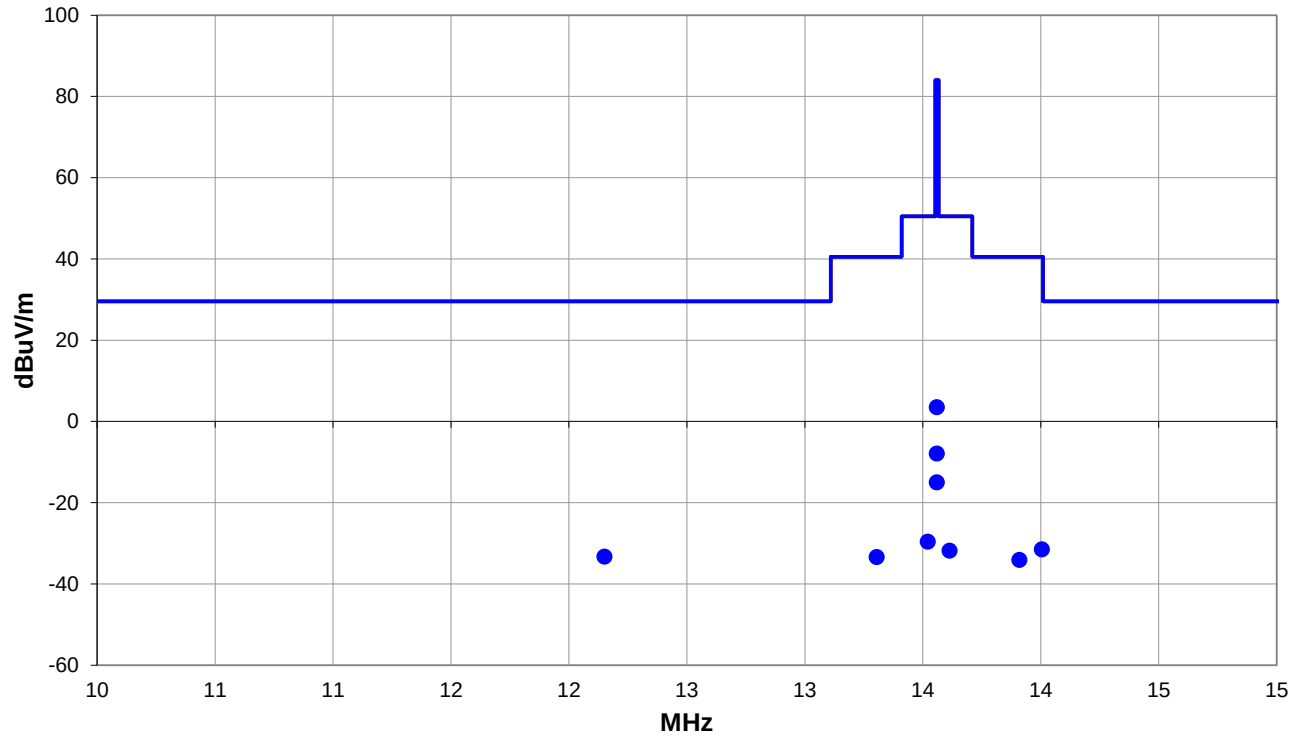
EUT is floor standing. The EUT uses a switching power supply capable of auto ranging between 208VAC and 230VAC so the DC voltage applied to the module should be the same using either AC voltage.

EUT OPERATING MODES

RFID radio transmitting at 13.56 MHz and monitoring.

DEVIATIONS FROM TEST STANDARD

None



Run #: 7 ■ PK ◆ AV ● QP

FIELD STRENGTH OF FUNDAMENTAL

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #7

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)
12.150	2.6	11.1	1.0	332.0	2.0	0.0	Para to GND	QP	-47.0	-33.3	29.5	-62.8
14.004	4.5	11.0	1.0	332.0	2.0	0.0	Para to GND	QP	-47.0	-31.5	40.5	-72.0
13.304	2.5	11.1	1.0	332.0	2.0	0.0	Para to GND	QP	-47.0	-33.4	40.5	-73.9
13.909	1.9	11.0	1.0	332.0	2.0	0.0	Para to GND	QP	-47.0	-34.1	40.5	-74.6
13.521	6.4	11.0	1.0	332.0	2.0	0.0	Para to GND	QP	-47.0	-29.6	50.5	-80.1
13.560	39.5	11.0	1.0	332.0	2.0	0.0	Para to GND	QP	-47.0	3.5	84.0	-80.5
13.614	4.2	11.0	1.0	332.0	2.0	0.0	Para to GND	QP	-47.0	-31.8	50.5	-82.3
13.559	28.1	11.0	1.0	235.0	2.0	0.0	Para to EUT	QP	-47.0	-7.9	84.0	-91.9
13.560	21.0	11.0	1.0	22.0	2.0	0.0	Perp to GND	QP	-47.0	-15.0	84.0	-99.0

CONCLUSION

Pass

Tested By

FIELD STRENGTH OF FUNDAMENTAL

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

EUT:	MX8100	Work Order:	DTCD0088
Serial Number:	MX810182	Date:	2021-11-22
Customer:	Entrust Corporation	Temperature:	23.4°C
Attendees:	Jeff Aymond	Relative Humidity:	21.2%
Customer Project:	None	Bar. Pressure (PMSL):	1022 mb
Tested By:	Christopher Heintzelman	Job Site:	MN07
Power:	230VAC/50Hz	Configuration:	DTCD0088-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.225:2021	ANSI C63.10:2013

TEST PARAMETERS

Run #:	8	Test Distance (m):	10	Ant. Height(s) (m):	1(m)

COMMENTS

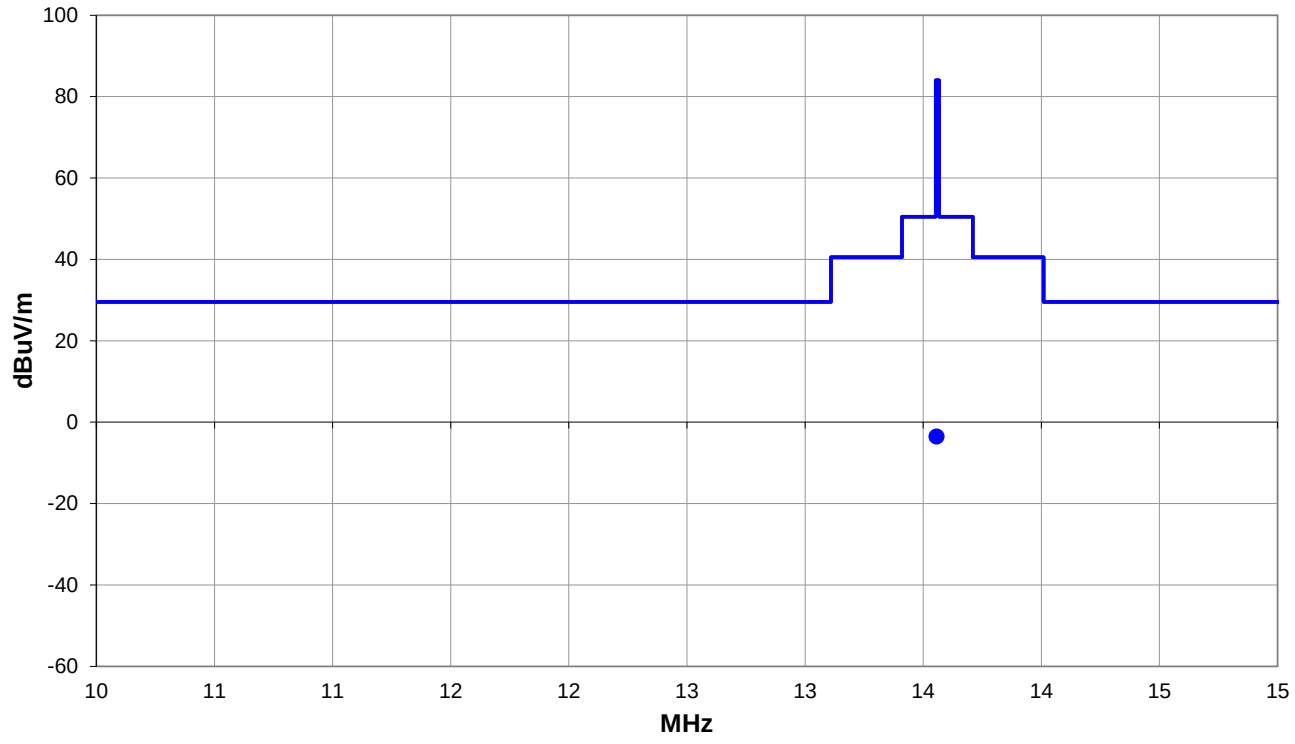
The EUT uses a switching power supply capable of auto ranging between 208VAC and 230VAC so the DC voltage applied to the module should be the same using either AC voltage.

EUT OPERATING MODES

RFID radio transmitting at 13.56 MHz and monitoring.

DEVIATIONS FROM TEST STANDARD

None



Run #: 8 ■ PK ◆ AV ● QP

FIELD STRENGTH OF FUNDAMENTAL

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #8

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)
13.556	4.6	11.0	1.0	289.0	10.0	0.0	Para to GND	QP	-19.1	-3.5	84.0	-87.5

CONCLUSION
Pass

Tested By

FIELD STRENGTH OF FUNDAMENTAL

element
WTD.2022.02.22.0
EmiR5 2022.07.06.0
PSA-ESCI 2022.08.23.0

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
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

12 MHz TO 15 MHz

POWER INVESTIGATED

120VAC/60Hz

CONFIGURATIONS INVESTIGATED

DTCD0091-4

MODES INVESTIGATED

Transmitting RFID, 13.56 MHz

FIELD STRENGTH OF FUNDAMENTAL

element
WTD.2022.02.22.0
EmiR5 2022.07.06.0
PSA-ESCI 2022.08.23.0

EUT:	MX8100	Work Order:	DTCD0091
Serial Number:	11860F3621004472	Date:	2022-09-15
Customer:	Entrust Corporation	Temperature:	23°C
Attendees:	Jeff Aymond	Relative Humidity:	47.7%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mb
Tested By:	Christopher Heintzelman	Job Site:	MN04
Power:	120VAC/60Hz	Configuration:	DTCD0091-4

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	12	Test Distance (m):	3	Ant. Height(s) (m):	1(m)

COMMENTS

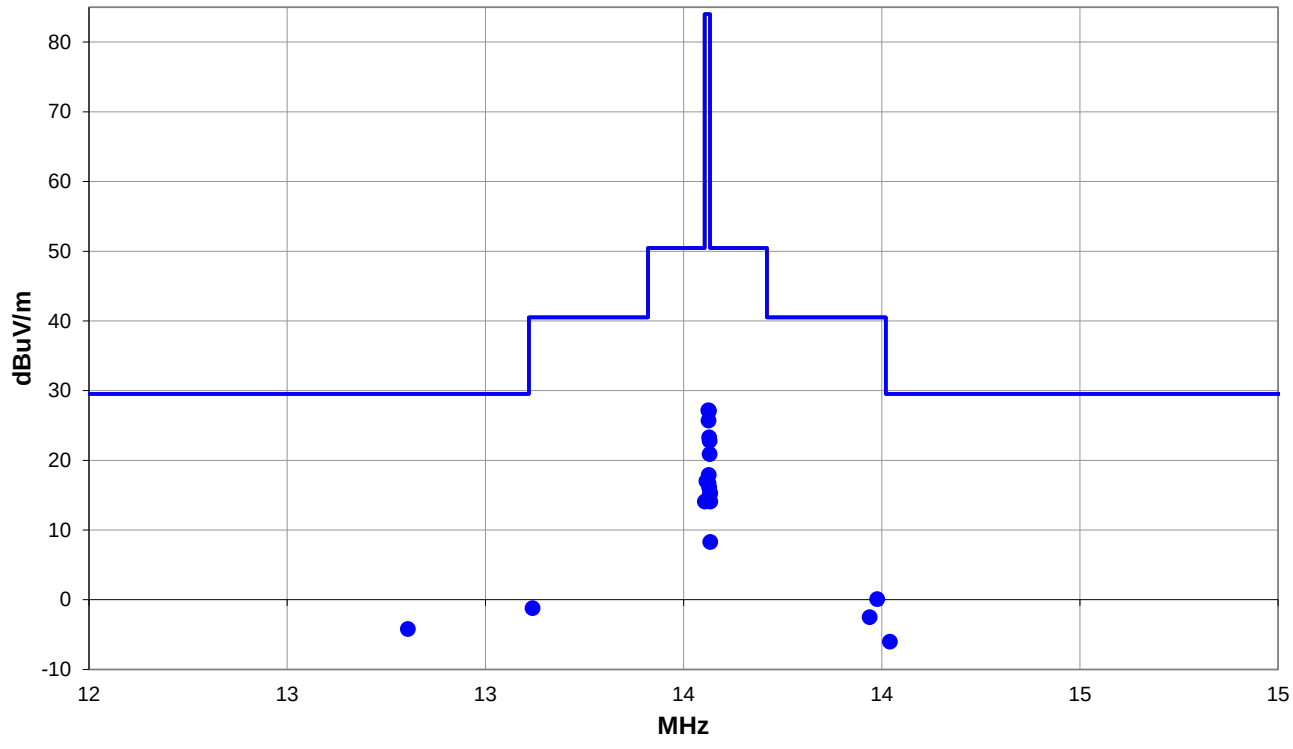
EUT is centered on the turntable. The table is offset due to cable length restrictions to support equipment under the ground plane. RFID tag placed on module. Box ferrite on the module cable where it passes the ground plane.

EUT OPERATING MODES

Transmitting RFID, 13.56 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 12

PK AV QP

FIELD STRENGTH OF FUNDAMENTAL

element
WTD.2022.02.22.0
EmiR5 2022.07.06.0
PSA-ESCI 2022.08.23.0

RESULTS - Run #12

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)	Comments
12.805	4.8	11.0	1.0	274.0	3.0	0.0	Perp to GND	QP	-40.0	-24.2	29.5	-33.7	EUT Vert
13.567	24.4	10.9	1.0	274.0	3.0	0.0	Perp to GND	QP	-40.0	-4.7	50.5	-35.2	EUT Vert
14.020	3.1	10.9	1.0	274.0	3.0	0.0	Perp to GND	QP	-40.0	-26.0	29.5	-35.5	EUT Vert
13.567	23.2	10.9	1.0	274.0	3.0	0.0	Perp to GND	QP	-40.0	-5.9	50.5	-36.4	EUT Vert
13.988	9.2	10.9	1.0	274.0	3.0	0.0	Perp to GND	QP	-40.0	-19.9	40.5	-40.4	EUT Vert
13.119	7.8	11.0	1.0	274.0	3.0	0.0	Perp to GND	QP	-40.0	-21.2	40.5	-41.7	EUT Vert
13.567	17.4	10.9	1.0	166.0	3.0	0.0	Para to GND	QP	-40.0	-11.7	50.5	-42.2	EUT On Side
13.969	6.6	10.9	1.0	274.0	3.0	0.0	Perp to GND	QP	-40.0	-22.5	40.5	-43.0	EUT Vert
13.562	36.3	10.9	1.0	272.0	3.0	0.0	Perp to GND	QP	-40.0	7.2	84.0	-56.8	EUT Vert
13.564	36.2	10.9	1.0	353.0	3.0	0.0	Para to EUT	QP	-40.0	7.1	84.0	-56.9	EUT On Side
13.563	34.8	10.9	1.0	60.0	3.0	0.0	Perp to GND	QP	-40.0	5.7	84.0	-58.3	EUT On Side
13.565	32.4	10.9	1.0	274.0	3.0	0.0	Perp to GND	QP	-40.0	3.3	84.0	-60.7	EUT Vert
13.566	31.9	10.9	1.0	168.0	3.0	0.0	Para to EUT	QP	-40.0	2.8	84.0	-61.2	EUT Vert
13.566	30.0	10.9	1.0	274.0	3.0	0.0	Perp to GND	QP	-40.0	0.9	84.0	-63.1	EUT Vert
13.563	27.0	10.9	1.0	287.0	3.0	0.0	Perp to GND	QP	-40.0	-2.1	84.0	-66.1	EUT Horz
13.557	26.1	10.9	1.0	123.0	3.0	0.0	Para to GND	QP	-40.0	-3.0	84.0	-67.0	EUT Horz
13.563	25.8	10.9	1.0	189.0	3.0	0.0	Para to EUT	QP	-40.0	-3.3	84.0	-67.3	EUT Horz
13.565	25.2	10.9	1.0	358.0	3.0	0.0	Para to GND	QP	-40.0	-3.9	84.0	-67.9	EUT On Side
13.565	24.0	10.9	1.0	174.0	3.0	0.0	Para to GND	QP	-40.0	-5.1	84.0	-69.1	EUT Vert
13.554	23.2	10.9	1.0	274.0	3.0	0.0	Perp to GND	QP	-40.0	-5.9	84.0	-69.9	EUT Vert

CONCLUSION

Pass

Tested By

FIELD STRENGTH OF FUNDAMENTAL

element
WTD.2022.02.22.0
EmiR5 2022.07.06.0
PSA-ESCI 2022.08.23.0

EUT:	MX8100	Work Order:	DTCD0091
Serial Number:	11860F3621004472	Date:	2022-09-15
Customer:	Entrust Corporation	Temperature:	23°C
Attendees:	Jeff Aymond	Relative Humidity:	47.7%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mb
Tested By:	Christopher Heintzelman	Job Site:	MN04
Power:	120VAC/60Hz	Configuration:	DTCD0091-4

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	13	Test Distance (m):	10	Ant. Height(s) (m):	1(m)

COMMENTS

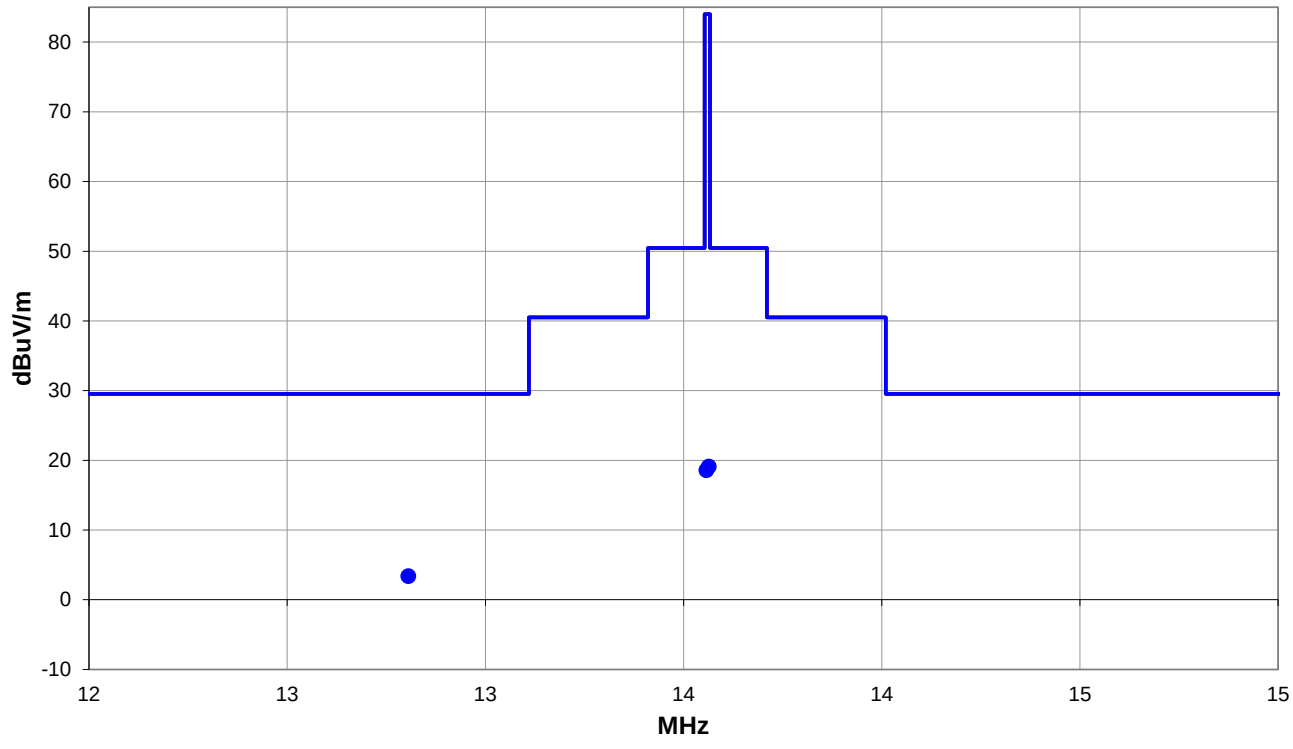
EUT is centered on the turntable. The table is offset due to cable length restrictions to support equipment under the ground plane. RFID tag placed on module. Box ferrite on the module cable where it passes the ground plane.

EUT OPERATING MODES

Transmitting RFID, 13.56 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 13

PK AV QP

FIELD STRENGTH OF FUNDAMENTAL

element
WTD.2022.02.22.0
EmiR5 2022.07.06.0
PSA-ESCI 2022.08.23.0

RESULTS - Run #13

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)	Comments
12.805	1.9	11.0	1.0	274.0	10.0	0.0	Perp to GND	QP	-19.1	-6.2	29.5	-26.1	EUT Vert
13.564	17.7	10.9	1.0	274.0	10.0	0.0	Perp to GND	QP	-19.1	9.5	84.0	-64.9	EUT Vert
13.557	17.2	10.9	1.0	229.0	10.0	0.0	Perp to GND	QP	-19.1	9.0	84.0	-65.4	EUT Vert

CONCLUSION

Pass

Tested By

FIELD STRENGTH OF SPURIOUS EMISSIONS (LESS THAN 30 MHZ)

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

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
Receiver	Rohde & Schwarz	ESR26	ARP	2021-04-08	2022-04-08
Antenna - Loop	ETS Lindgren	6502	AOB	2021-06-01	2023-06-01
Cable	ESM Cable Corp.	Antenna Loop Cable	MNE	2021-02-17	2022-02-17

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	1.8 dB	-1.8 dB

FREQUENCY RANGE INVESTIGATED

9 kHz TO 30 MHz

POWER INVESTIGATED

230VAC/50Hz

CONFIGURATIONS INVESTIGATED

DTCD0088-1

MODES INVESTIGATED

RFID radio transmitting at 13.56 MHz and monitoring.

FIELD STRENGTH OF SPURIOUS EMISSIONS (LESS THAN 30 MHZ)

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

EUT:	MX8100	Work Order:	DTCD0088
Serial Number:	MX810182	Date:	2021-11-22
Customer:	Entrust Corporation	Temperature:	23.4°C
Attendees:	Jeff Aymond	Relative Humidity:	21.2%
Customer Project:	None	Bar. Pressure (PMSL):	1022 mb
Tested By:	Christopher Heintzelman	Job Site:	MN07
Power:	230VAC/50Hz	Configuration:	DTCD0088-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.225:2021	ANSI C63.10:2013

TEST PARAMETERS

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

COMMENTS

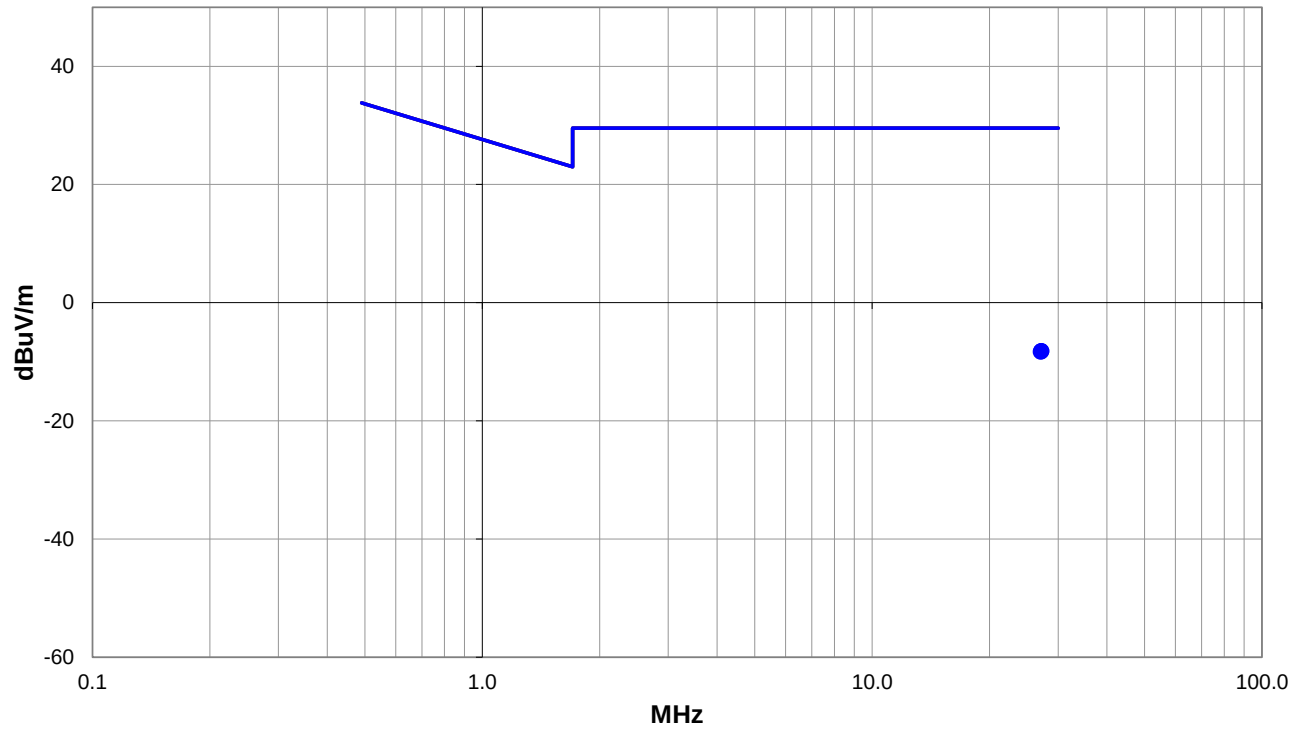
The EUT uses a switching power supply capable of auto ranging between 208VAC and 230VAC so the DC voltage applied to the module should be the same using either AC voltage.

EUT OPERATING MODES

RFID radio transmitting at 13.56 MHz and monitoring.

DEVIATIONS FROM TEST STANDARD

None



Run #: 10 ■ PK ◆ AV ● QP

FIELD STRENGTH OF SPURIOUS EMISSIONS (LESS THAN 30 MHZ)

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #10

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)
27.168	1.4	9.5	1.0	230.0	10.0	0.0	Para to EUT	QP	-19.1	-8.2	29.5	-37.7
27.138	1.4	9.5	1.0	8.0	10.0	0.0	Perp to GND	QP	-19.1	-8.2	29.5	-37.7
27.076	1.3	9.5	1.0	109.0	10.0	0.0	Para to GND	QP	-19.1	-8.3	29.5	-37.8

CONCLUSION

Pass

Tested By

FIELD STRENGTH OF SPURIOUS EMISSIONS (LESS THAN 30 MHz)

PSA-ESCI 2022.1.12.0

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 RFID 13.56 MHz

POWER SETTINGS INVESTIGATED

220VAC/60Hz

CONFIGURATIONS INVESTIGATED

DTCD0091 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	490 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.	Cal. Due
Receiver	Rohde & Schwarz	ESR26	ARP	2021-04-08	2022-04-08
Cable	ESM Cable Corp.	Antenna Loop Cable	MNE	2022-01-30	2023-01-30
Antenna - Loop	ETS Lindgren	6502	AOB	2021-06-01	2023-06-01

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.

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.

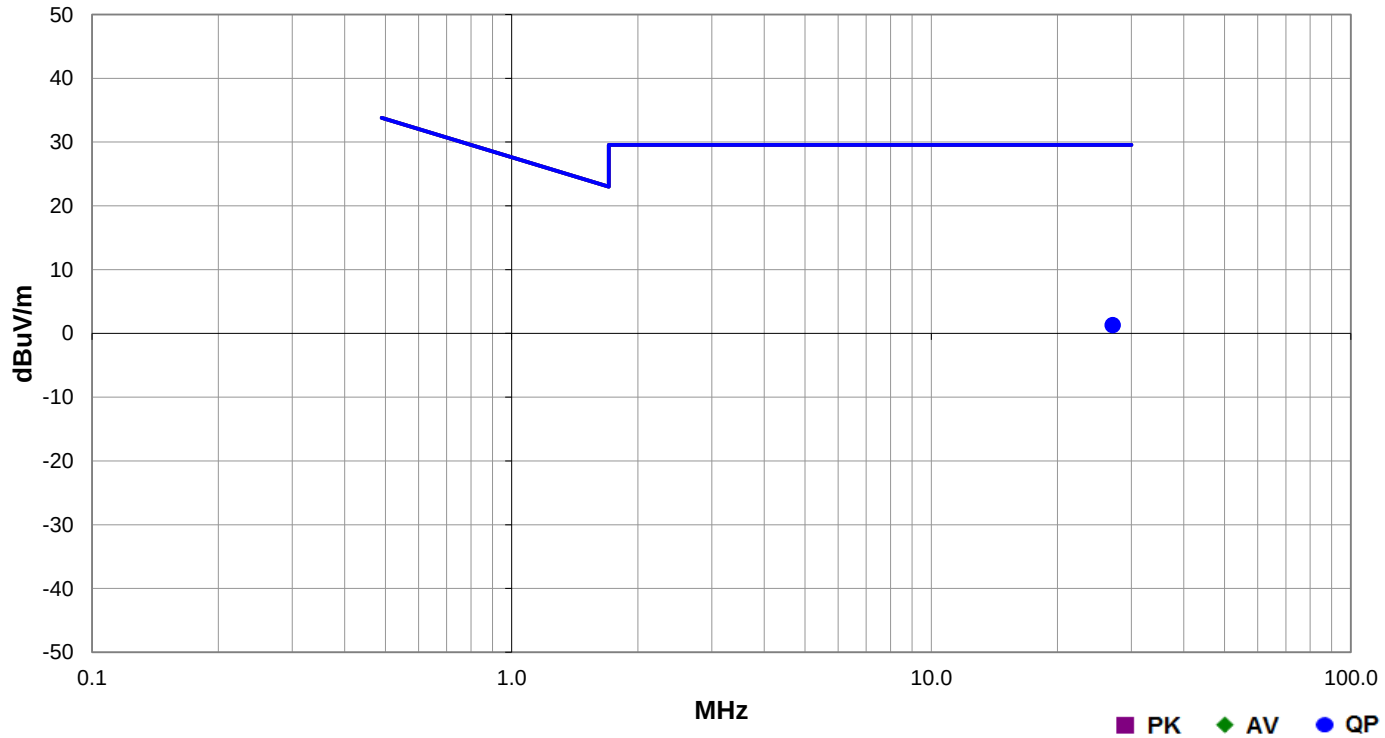
FIELD STRENGTH OF SPURIOUS EMISSIONS (LESS THAN 30 MHz)

EmiR5 2021.09.09.0 PSA-ESCI 2022.1.12.0

Work Order:	DTCD0091	**Date:**	2022-02-02		
Project:	None	**Temperature:**	22.1 °C		
Job Site:	MN04	**Humidity:**	16.9% RH		
Serial Number:	MX810182	**Barometric Pres.:**	1037 mbar	**Tested by:**	Chris Patterson
EUT:	MX8100				
Configuration:	1				
Customer:	Entrust Corporation				
Attendees:	Craig Jacobsen				
EUT Power:	220VAC/60Hz				
Operating Mode:	Transmitting RFID 13.56 MHz				
Deviations:	None				
Comments:	Only worst case antenna orientation was tested.				

Test Specifications	**Test Method**
FCC 15.225:2022	ANSI C63.10:2013

Run #	2	**Test Distance (m)**	10	**Antenna Height(s)**	1(m)	**Results**	Pass



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)
27.079	1.1	9.7	1.0	195.0	10.0	0.0	Para to GND	QP	-9.5	1.3	29.5	-28.2

FIELD STRENGTH OF SPURIOUS EMISSIONS (GREATER THAN 30MHz)

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

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 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 - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	NCR
Antenna - Double Ridge	ETS Lindgren	3115	AJQ	2021-01-25	2023-01-25
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	2021-01-15	2022-01-15
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	2021-01-15	2022-01-15
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	2021-01-15	2022-01-15
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	NCR
Filter - Band Reject	Wainwright Instruments	WTRCJV8-2200-2400-20-100-50EEK	CUN	2021-02-02	2022-02-02
Filter - Band Reject	Wainwright Instruments	WTRCT10-2400-2700-20-30-40EEK	CUO	2021-02-02	2022-02-02
Filter - Band Reject	Wainwright Instruments	WTRCT10-1780-2200-22-40-40EEK	HHP	2021-02-02	2022-02-02
Filter - High Pass	Micro-Tronics	HPM50108	LFM	2021-09-09	2022-09-09
Filter - High Pass	Micro-Tronics	HPM50111	LFN	2021-09-09	2022-09-09
Cable	ESM Cable Corp.	Bilog Cables	MNH	2021-10-13	2022-10-13
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	2021-01-15	2022-01-15
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	2021-03-07	2022-03-07
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2021-05-21	2022-05-21
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	2021-10-08	2022-10-08
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	2021-08-27	2022-08-27

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.2 dB	-5.2 dB

FIELD STRENGTH OF SPURIOUS EMISSIONS (GREATER THAN 30MHz)

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

FREQUENCY RANGE INVESTIGATED

30 MHz TO 1 GHz

POWER INVESTIGATED

230VAC/50Hz

CONFIGURATIONS INVESTIGATED

DTCD0088-1

MODES INVESTIGATED

Tx at 13.56 MHz

FIELD STRENGTH OF SPURIOUS EMISSIONS (GREATER THAN 30MHz)

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

EUT:	MX8100	Work Order:	DTCD0088
Serial Number:	MX810182	Date:	2021-11-23
Customer:	Entrust Corporation	Temperature:	23.8°C
Attendees:	Jeff Aymond	Relative Humidity:	22.7%
Customer Project:	None	Bar. Pressure (PMSL):	1010 mb
Tested By:	Kyle McMullan, Alexis Converse	Job Site:	MN05
Power:	230VAC/50Hz	Configuration:	DTCD0088-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.225:2021	ANSI C63.10:2013

TEST PARAMETERS

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

COMMENTS

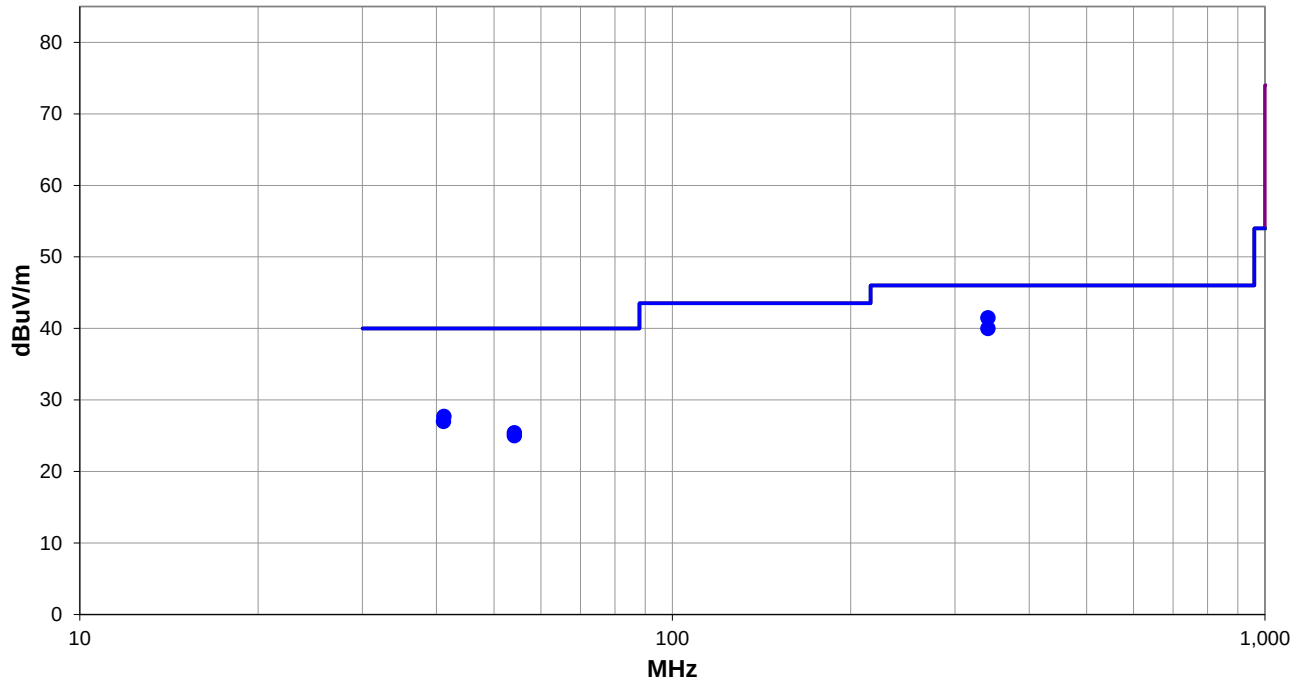
The EUT uses a switching power supply capable of auto ranging between 208VAC and 230VAC so the DC voltage applied to the module should be the same using either AC voltage.

EUT OPERATING MODES

Tx at 13.56 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 4 ■ PK ◆ AV ● QP

FIELD STRENGTH OF SPURIOUS EMISSIONS (GREATER THAN 30MHz)

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #4

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)
340.774	42.8	-1.3	1.0	326.9	3.0	0.0	Horz	QP	0.0	41.5	46.0	-4.5
340.864	41.3	-1.3	1.0	328.0	3.0	0.0	Vert	QP	0.0	40.0	46.0	-6.0
41.157	27.3	0.4	1.0	60.9	3.0	0.0	Horz	QP	0.0	27.7	40.0	-12.3
41.093	26.6	0.4	1.44	15.0	3.0	0.0	Vert	QP	0.0	27.0	40.0	-13.0
54.122	30.9	-5.5	1.0	360.0	3.0	0.0	Vert	QP	0.0	25.4	40.0	-14.6
54.131	30.5	-5.5	1.0	0.0	3.0	0.0	Horz	QP	0.0	25.0	40.0	-15.0

CONCLUSION

Pass

Tested By

FIELD STRENGTH OF SPURIOUS EMISSIONS (GREATER THAN 30 MHz)

element

PSA-ESCI 2022.1.12.0

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 RFID 13.56 MHz

POWER SETTINGS INVESTIGATED

220VAC/60Hz

CONFIGURATIONS INVESTIGATED

DTCD0091 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 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.	Cal. Due
Receiver	Rohde & Schwarz	ESR26	ARP	2021-04-08	2022-04-08
Amplifier - Pre-Amplifier	Miteq	AM-1551	PAC	2021-06-17	2022-06-17
Filter - Low Pass	Micro-Tronics	LPM50004	HGW	2021-09-12	2022-09-12
Cable	ESM Cable Corp.	MN04 Bilog Cables	MND	2022-01-30	2023-01-30
Antenna - Biconilog	ETS Lindgren	3142D	AXN	2021-12-08	2023-12-08

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.

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.

If measurements are taken at a measurement distance different than specified by the standard, the data is adjusted based on a 20 db/decade correction factor.

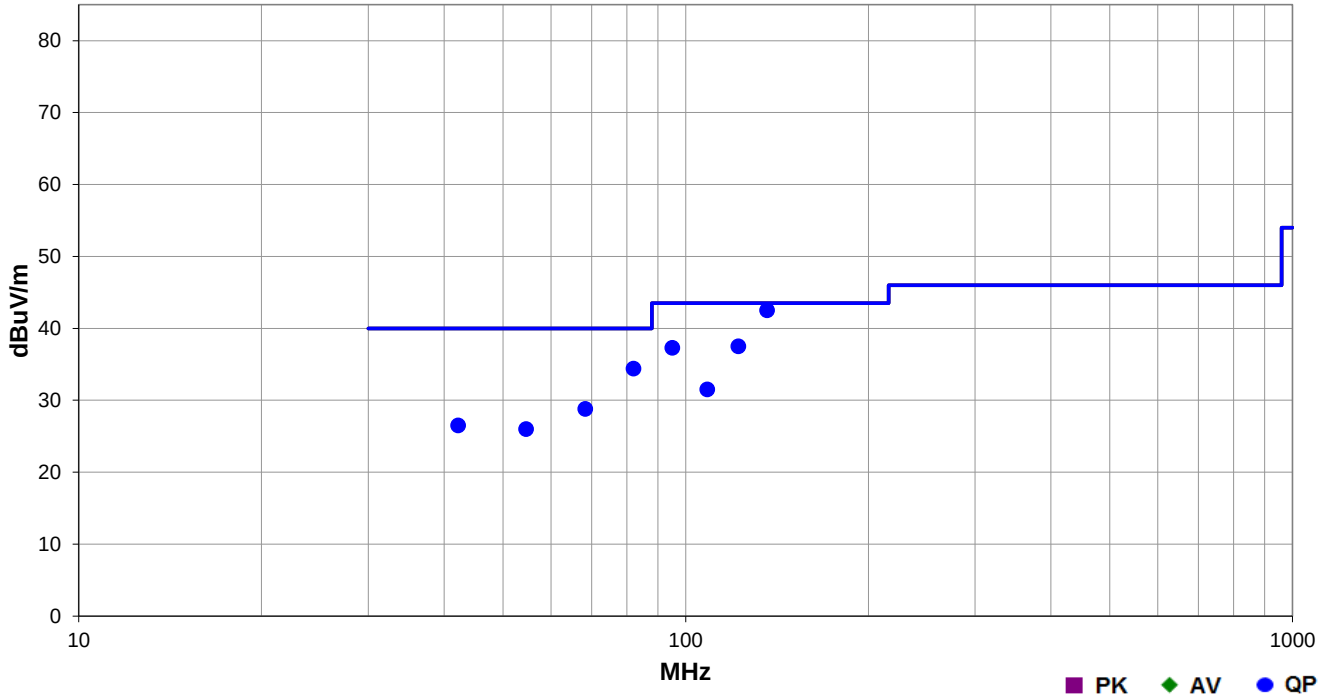
FIELD STRENGTH OF SPURIOUS EMISSIONS (GREATER THAN 30 MHz)

EmiR5 2021.09.09.0 PSA-ESCI 2022.1.12.0

Work Order:	DTCD0091	**Date:**	2022-02-02		
Project:	None	**Temperature:**	22.1 °C		
Job Site:	MN04	**Humidity:**	16.9% RH		
Serial Number:	MX810182	**Barometric Pres.:**	1037 mbar	**Tested by:**	Chris Patterson
EUT:	MX8100				
Configuration:	1				
Customer:	Entrust Corporation				
Attendees:	Craig Jacobsen				
EUT Power:	220VAC/60Hz				
Operating Mode:	Transmitting RFID 13.56 MHz				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.225:2022	ANSI C63.10:2013

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



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)
136.149	63.5	-31.5	1.0	5.0	10.0	0.0	Vert	QP	10.5	42.5	43.5	-1.0
82.019	56.4	-32.5	2.03	1.0	10.0	0.0	Vert	QP	10.5	34.4	40.0	-5.6
122.173	58.4	-31.4	1.0	302.0	10.0	0.0	Vert	QP	10.5	37.5	43.5	-6.0
95.090	57.8	-31.0	1.33	317.0	10.0	0.0	Vert	QP	10.5	37.3	43.5	-6.2
68.299	50.4	-32.1	2.69	285.0	10.0	0.0	Vert	QP	10.5	28.8	40.0	-11.2
108.533	51.7	-30.7	1.0	297.0	10.0	0.0	Vert	QP	10.5	31.5	43.5	-12.0
42.163	44.7	-28.7	1.0	259.0	10.0	0.0	Vert	QP	10.5	26.5	40.0	-13.5
54.601	47.4	-31.9	1.0	231.0	10.0	0.0	Vert	QP	10.5	26.0	40.0	-14.0

FREQUENCY STABILITY

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Thermometer	Omegaette	HH311	DUY	2020-09-04	2023-09-04
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-32-3.5-SCT/AC	TBF	NCR	NCR
Meter - Multimeter	Fluke	117	MLS	2020-02-03	2023-02-03
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16
Block - DC	Fairview Microwave	SD3379	AMZ	2021-11-05	2022-11-05
Attenuator	Fairview Microwave	SA18S5W-20	RFX	2021-06-02	2022-06-02
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

TEST DESCRIPTION

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. Measurements were taken using a near field probe in the temperature chamber.

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

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

FREQUENCY STABILITY

TbtTx 2021.10.29.2 XMit 2020.12.30.0

EUT:	MX8100			**Work Order:**	DTCD0091
Serial Number:	MXX810182, 1981D201106687, 11860F362100472			**Date:**	4-Feb-22
Customer:	Entrust Corporation			**Temperature:**	21.4 °C
Attendees:	Jeff Aymond			**Humidity:**	16.8% RH
Project:	None			**Barometric Pres.:**	1029 mbar
Tested by:	Andrew Rogstad	**Power:**	220VAC/60Hz	**Job Site:**	MN08
TEST SPECIFICATIONS		**Test Method**			
FCC 15.225:2022		ANSI C63.10:2013			

COMMENTS

Radio part numbers and serial numbers are noted down below as well as in the configurations. Serial number MXX810182 refers to the system, while serial numbers 1981D201106687 and 11860F362100472 refer to the radio modules tested.

DEVIATIONS FROM TEST STANDARD

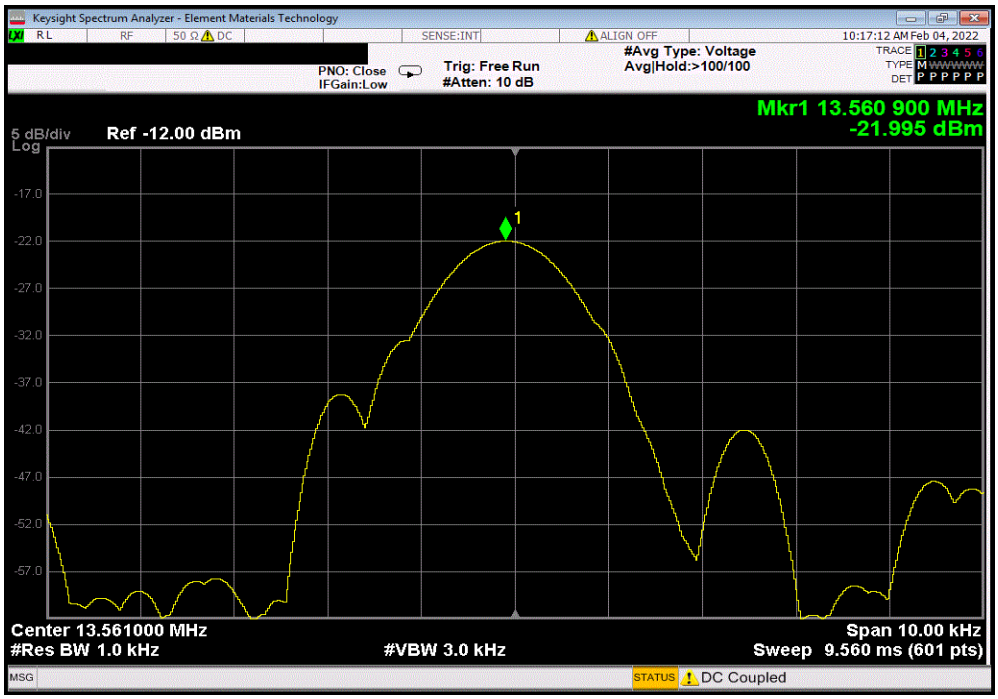
None

Configuration #	**2, 3**	*Signature*	Andrew Rogstad

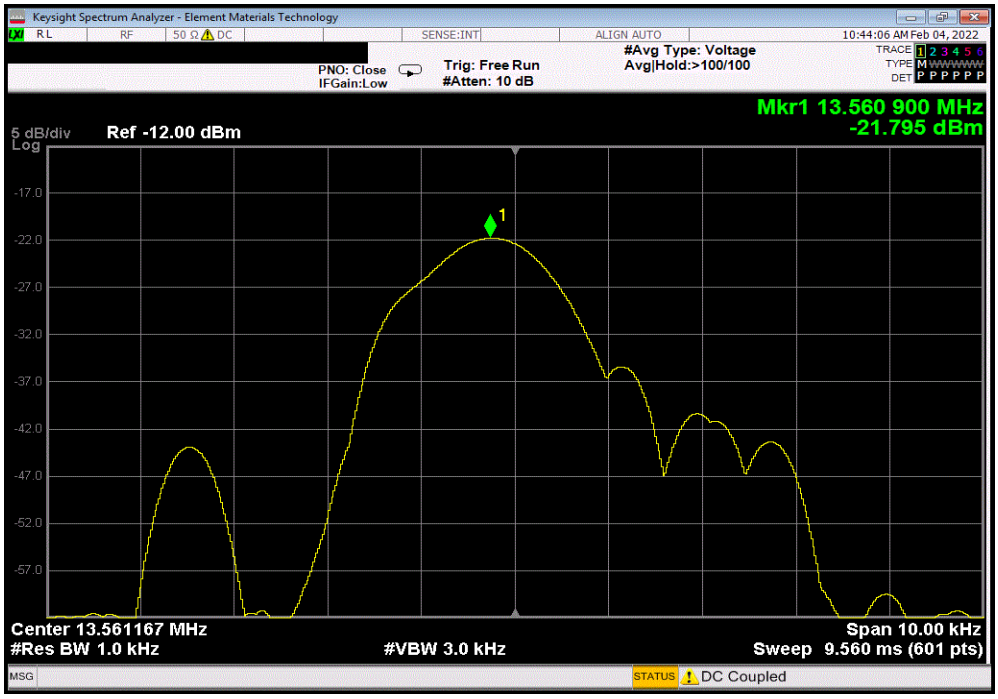
		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
RFID, 13.56 MHz, Modulated						
DTCD0088; Part 534508-001-D; Serial: 1981D201106687						
+50°C						
	Nominal Voltage, 220 VAC/60 Hz	13.5609	13.560983	6.121	100	Pass
+40°C						
	Nominal Voltage, 220 VAC/60 Hz	13.56090033	13.560983	6.096	100	Pass
+30°C						
	Nominal Voltage, 220 VAC/60 Hz	13.56095033	13.560983	2.409	100	Pass
+20°C						
	Nominal Voltage, 220 VAC/60 Hz	13.560983	13.560983	0.000	100	Pass
	-15% Extreme Voltage, 187 VAC/60 Hz	13.56098367	13.560983	0.049	100	Pass
	+15% Extreme Voltage, 253 VAC/60 Hz	13.560983	13.560983	0.000	100	Pass
+10°C						
	Nominal Voltage, 220 VAC/60 Hz	13.561017	13.560983	2.507	100	Pass
0°C						
	Nominal Voltage, 220 VAC/60 Hz	13.561016	13.560983	2.433	100	Pass
-10°C						
	Nominal Voltage, 220 VAC/60 Hz	13.56098267	13.560983	0.025	100	Pass
-20°C						
	Nominal Voltage, 220 VAC/60 Hz	13.56093267	13.560983	3.712	100	Pass
DTCD0091; Part 534508-001-F; Serial: 11860F362100472						
+50°C						
	Nominal Voltage, 220 VAC/60 Hz	13.56044933	13.56061633	12.315	100	Pass
+40°C						
	Nominal Voltage, 220 VAC/60 Hz	13.56049933	13.56061633	8.628	100	Pass
+30°C						
	Nominal Voltage, 220 VAC/60 Hz	13.56054967	13.56061633	4.916	100	Pass
+20°C						
	Nominal Voltage, 220 VAC/60 Hz	13.56061633	13.56061633	0.000	100	Pass
	-15% Extreme Voltage, 187 VAC/60 Hz	13.56061633	13.56061633	0.000	100	Pass
	+15% Extreme Voltage, 253 VAC/60 Hz	13.56061667	13.56061633	0.025	100	Pass
+10°C						
	Nominal Voltage, 220 VAC/60 Hz	13.56066633	13.56061633	3.687	100	Pass
0°C						
	Nominal Voltage, 220 VAC/60 Hz	13.56071633	13.56061633	7.374	100	Pass
-10°C						
	Nominal Voltage, 220 VAC/60 Hz	13.560733	13.56061633	8.603	100	Pass
-20°C						
	Nominal Voltage, 220 VAC/60 Hz	13.56071633	13.56061633	7.374	100	Pass

FREQUENCY STABILITY

RFID, 13.56 MHz, Modulated, DTCD0088; Part 534508-001-D; Serial: 1981D201106687, +50°C, Nominal Voltage, 220 VAC/60 Hz						
		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.5609	13.560983	6.120500262	100	Pass



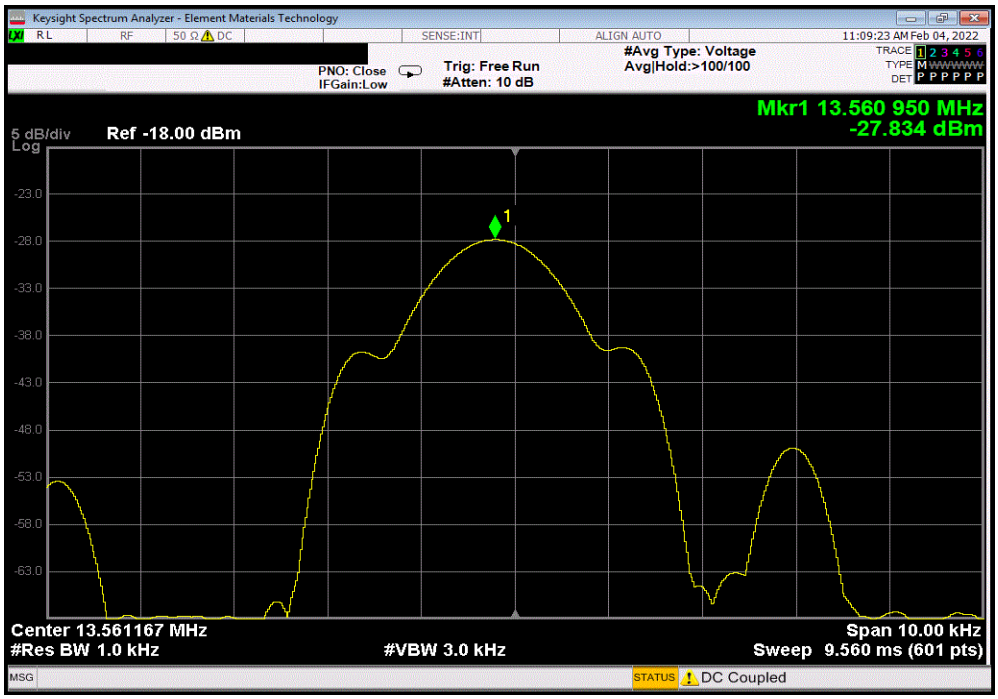
RFID, 13.56 MHz, Modulated, DTCD0088; Part 534508-001-D; Serial: 1981D201106687, +40°C, Nominal Voltage, 220 VAC/60 Hz						
		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56090033	13.560983	6.09594452	100	Pass



FREQUENCY STABILITY

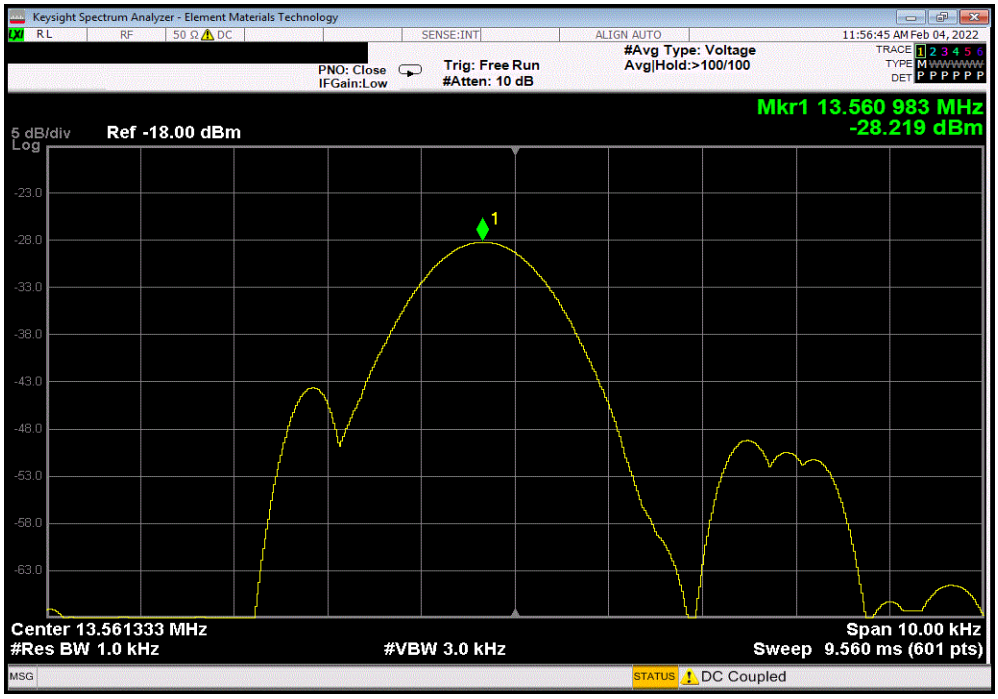
RFID, 13.56 MHz, Modulated, DTCD0088; Part 534508-001-D; Serial: 1981D201106687, +30°C, Nominal Voltage, 220 VAC/60 Hz

		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56095033	13.560983	2.408896169	100	Pass



RFID, 13.56 MHz, Modulated, DTCD0088; Part 534508-001-D; Serial: 1981D201106687, +20°C, Nominal Voltage, 220 VAC/60 Hz

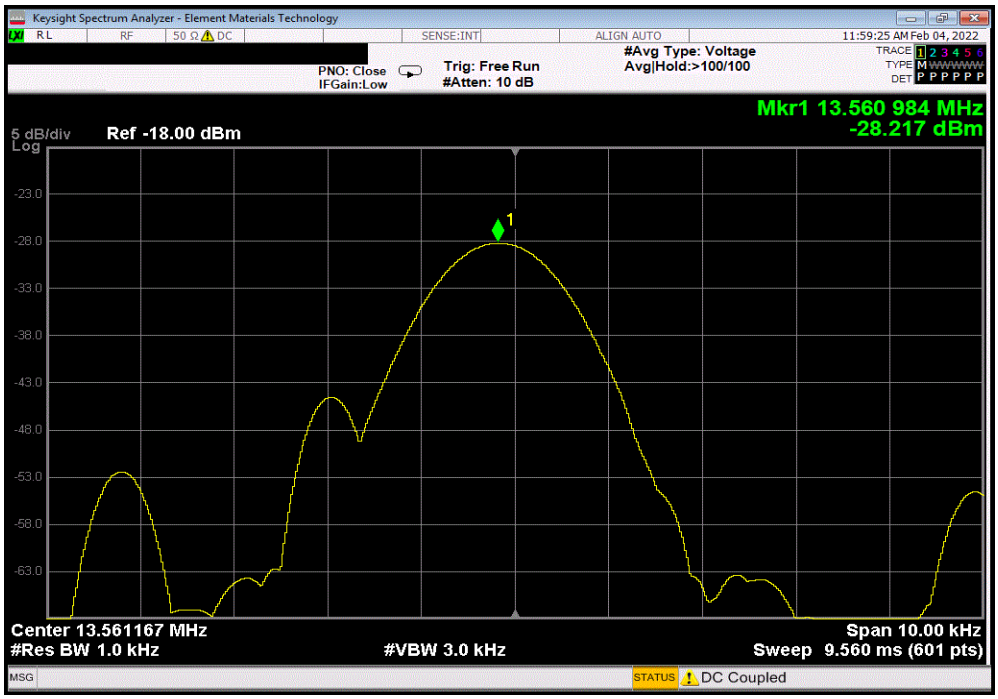
		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560983	13.560983	0	100	Pass



FREQUENCY STABILITY

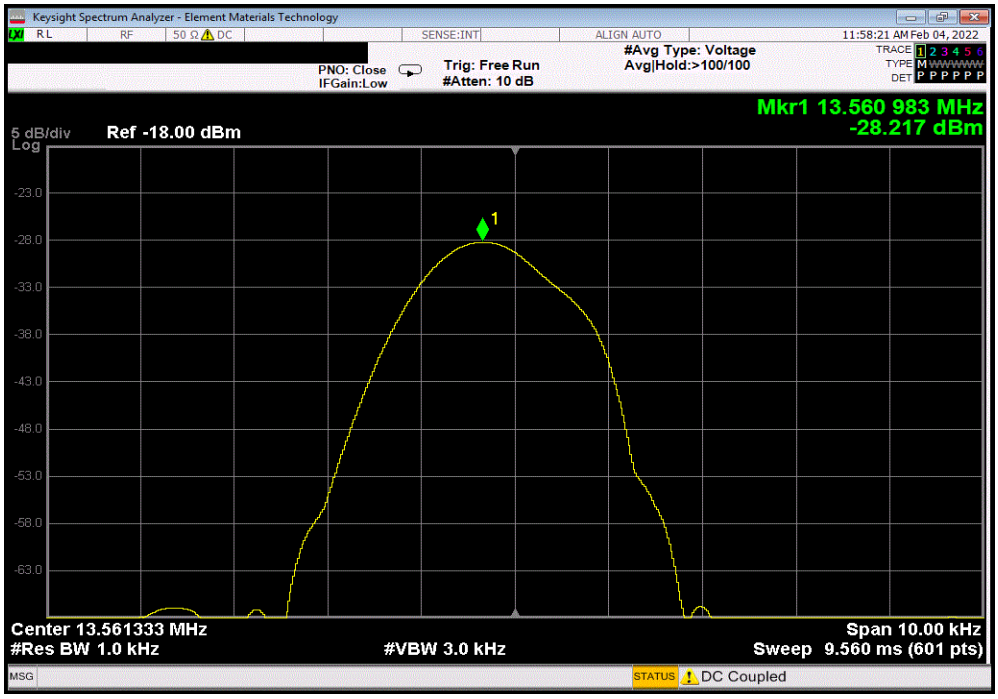
RFID, 13.56 MHz, Modulated, DTCD0088; Part 534508-001-D; Serial: 1981D201106687, +20°C, -15% Extreme Voltage, 187 VAC/60 Hz

		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56098367	13.560983	0.049185225	100	Pass



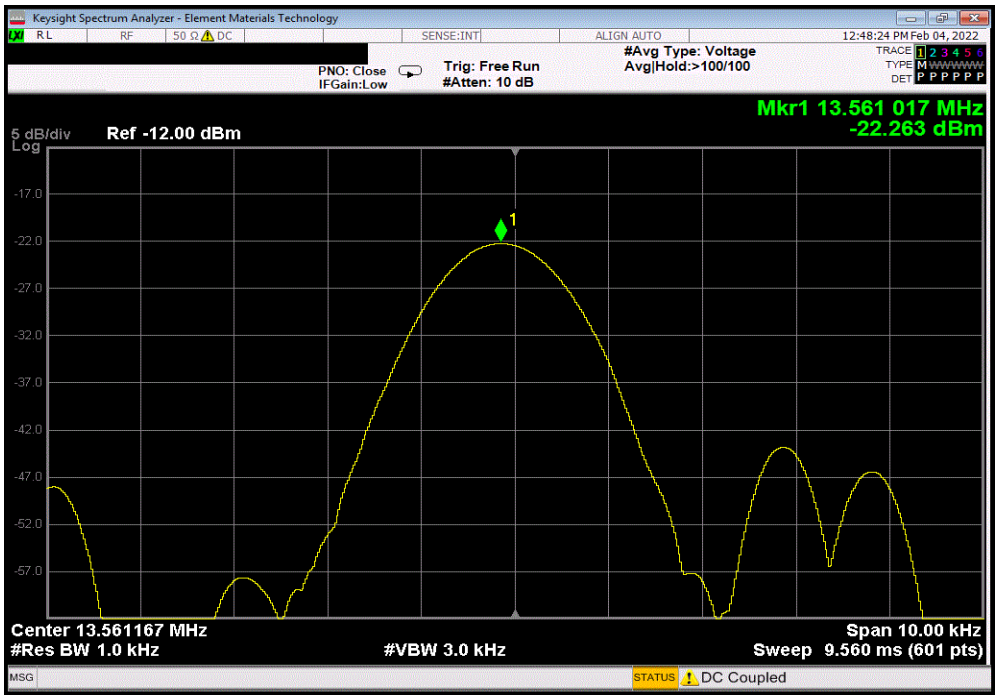
RFID, 13.56 MHz, Modulated, DTCD0088; Part 534508-001-D; Serial: 1981D201106687, +20°C, +15% Extreme Voltage, 253 VAC/60 Hz

		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560983	13.560983	0	100	Pass



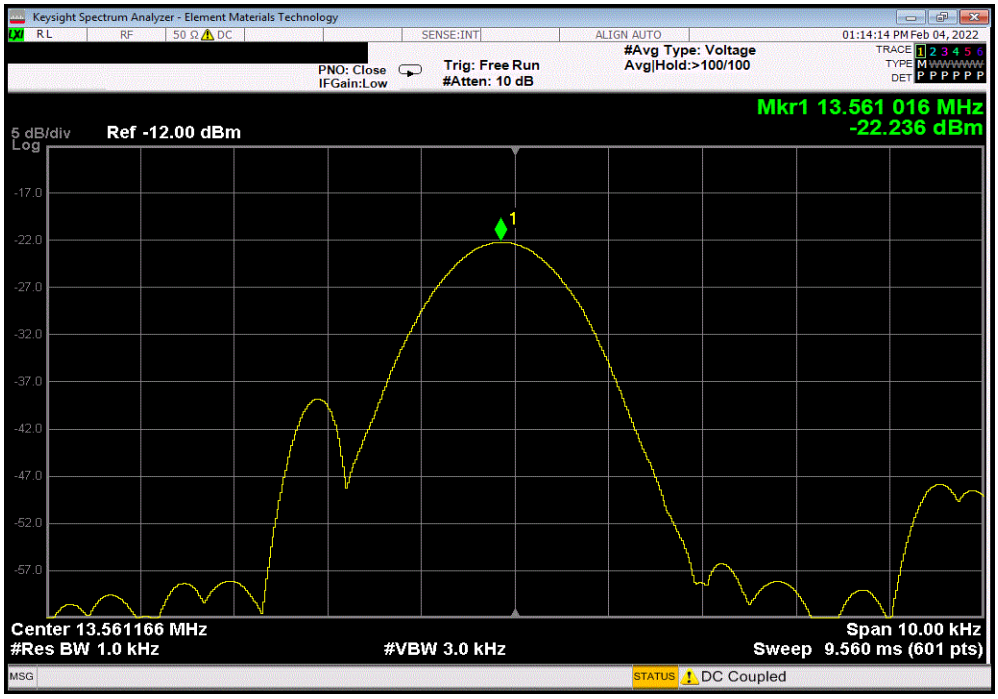
RFID, 13.56 MHz, Modulated, DTCD0088; Part 534508-001-D; Serial: 1981D201106687, +10°C, Nominal Voltage, 220 VAC/60 Hz

		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.561017	13.560983	2.507192878	100	Pass

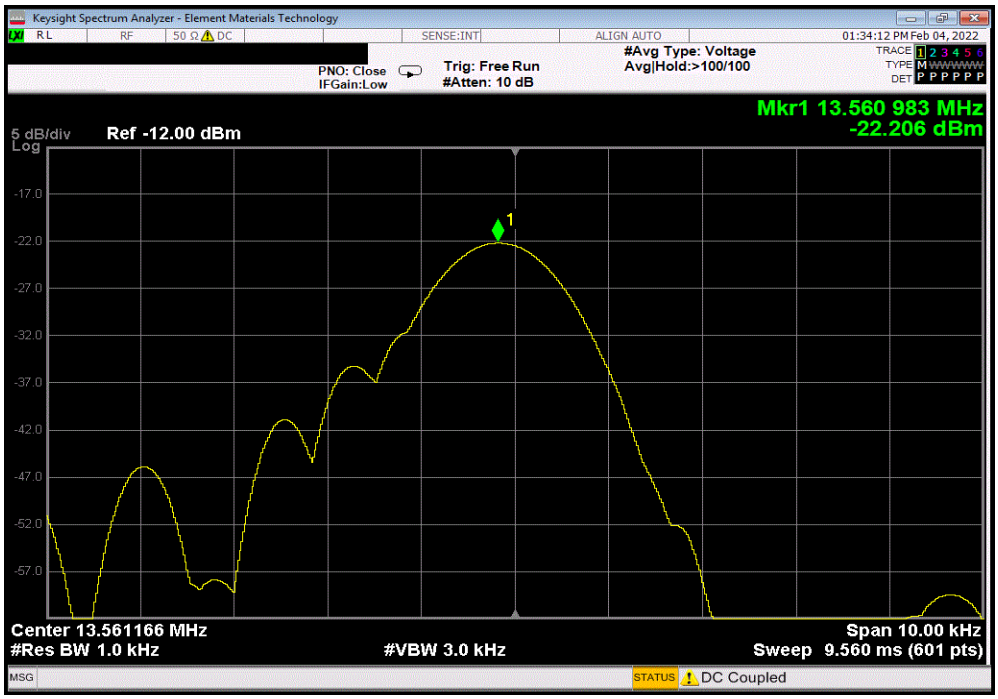


RFID, 13.56 MHz, Modulated, DTCD0088; Part 534508-001-D; Serial: 1981D201106687, 0°C, Nominal Voltage, 220 VAC/60 Hz

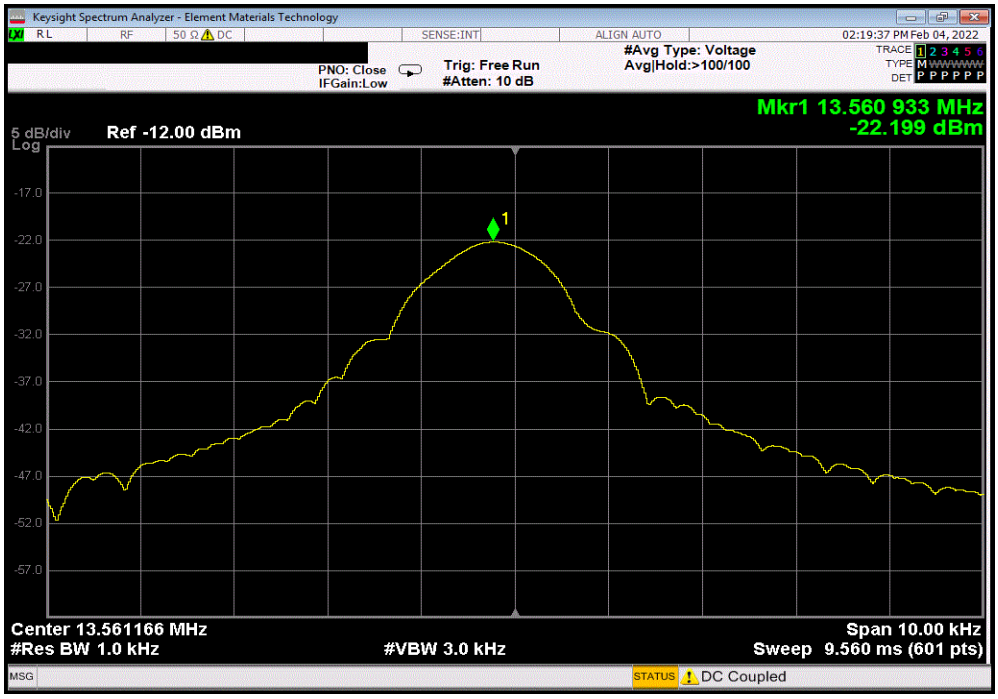
		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.561016	13.560983	2.433451911	100	Pass



RFID, 13.56 MHz, Modulated, DTCD0088; Part 534508-001-D; Serial: 1981D201106687, -10°C, Nominal Voltage, 220 VAC/60 Hz						
		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56098267	13.560983	0.024555742	100	Pass

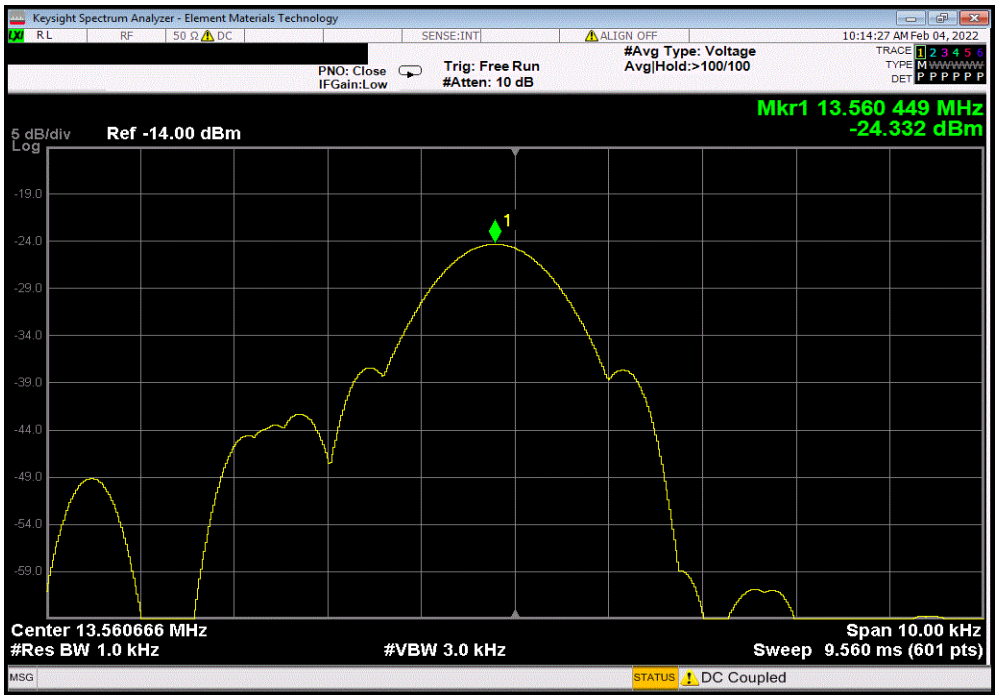


RFID, 13.56 MHz, Modulated, DTCD0088; Part 534508-001-D; Serial: 1981D201106687, -20°C, Nominal Voltage, 220 VAC/60 Hz						
		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56093267	13.560983	3.711604093	100	Pass

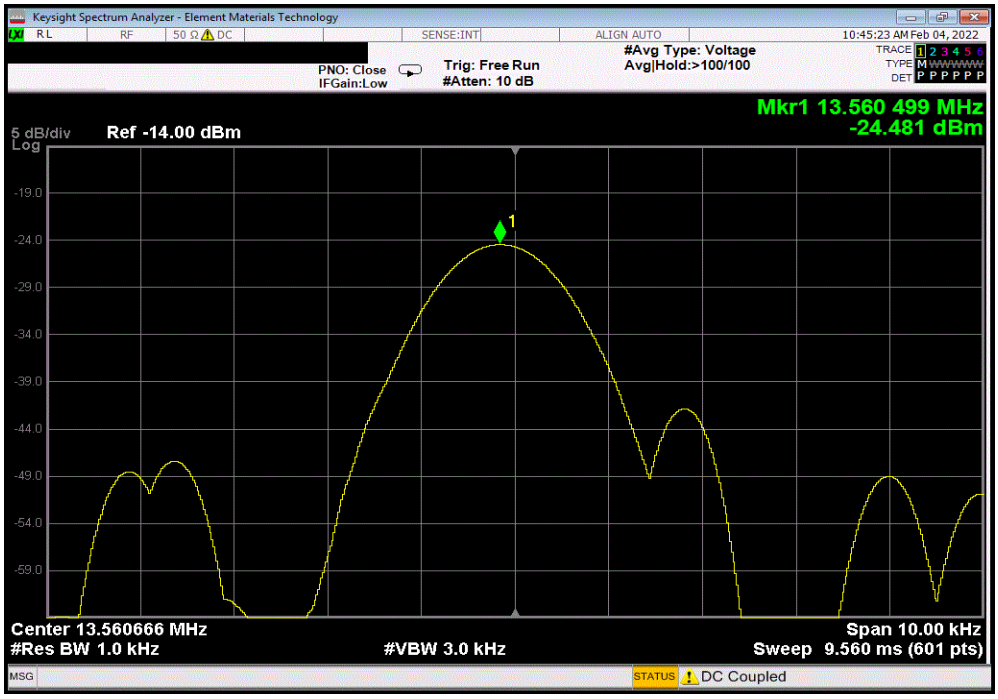


FREQUENCY STABILITY

RFID, 13.56 MHz, Modulated, DTCD0091; Part 534508-001-F; Serial: 11860F362100472, +50°C, Nominal Voltage, 220 VAC/60 Hz						
		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56044933	13.56061633	12.31507447	100	Pass



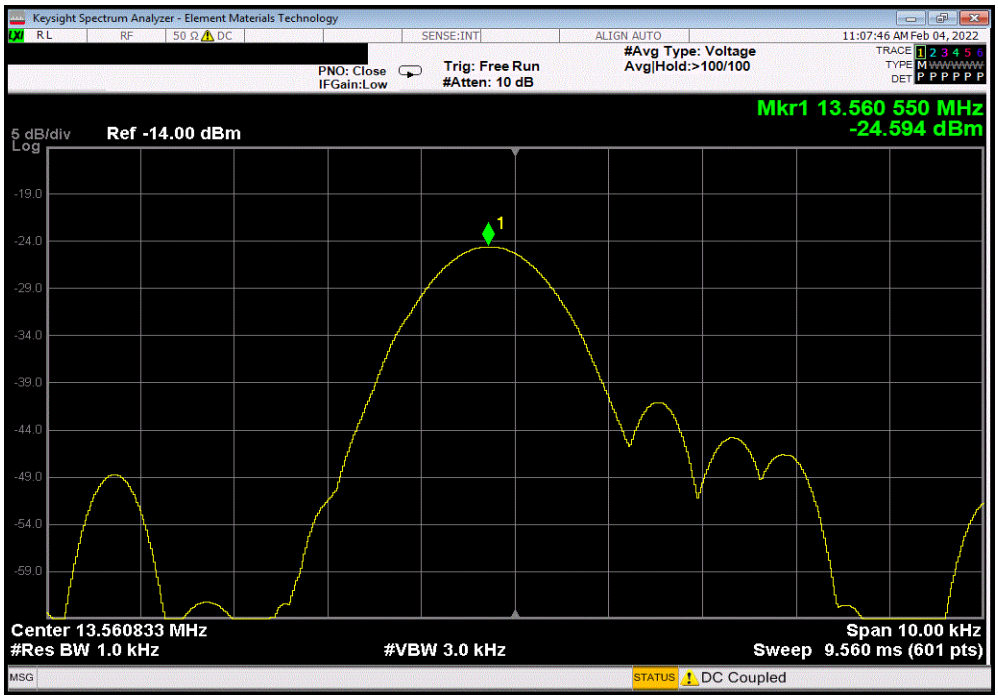
RFID, 13.56 MHz, Modulated, DTCD0091; Part 534508-001-F; Serial: 11860F362100472, +40°C, Nominal Voltage, 220 VAC/60 Hz						
		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56049933	13.56061633	8.627926425	100	Pass



FREQUENCY STABILITY

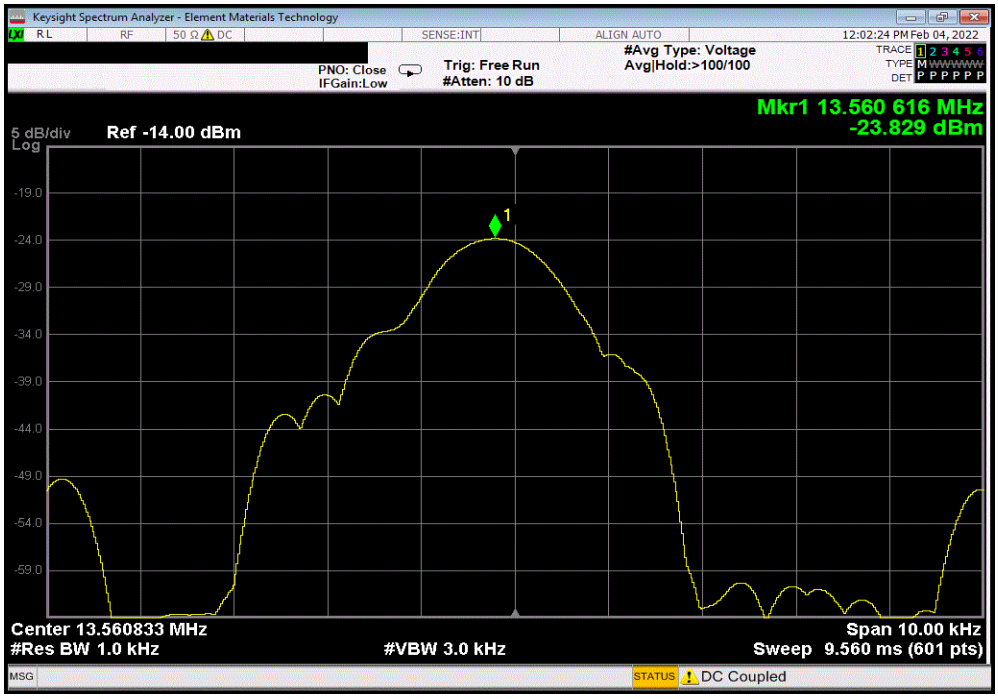
RFID, 13.56 MHz, Modulated, DTCD0091; Part 534508-001-F; Serial: 11860F362100472, +30°C, Nominal Voltage, 220 VAC/60 Hz

		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56054967	13.56061633	4.916148231	100	Pass



RFID, 13.56 MHz, Modulated, DTCD0091; Part 534508-001-F; Serial: 11860F362100472, +20°C, Nominal Voltage, 220 VAC/60 Hz

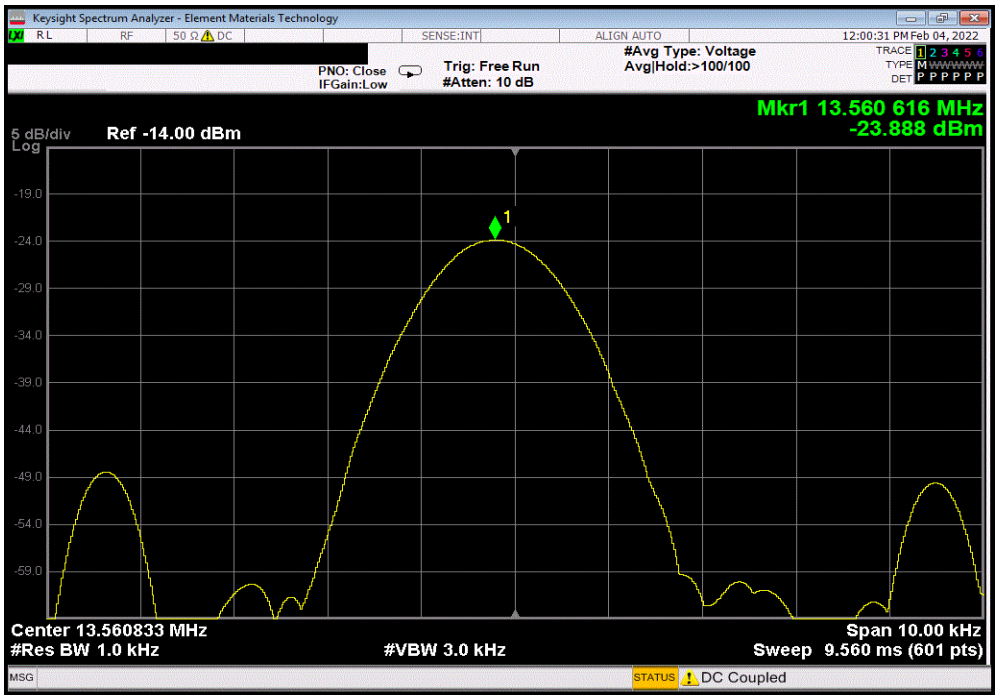
		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56061633	13.56061633	0	100	Pass



FREQUENCY STABILITY

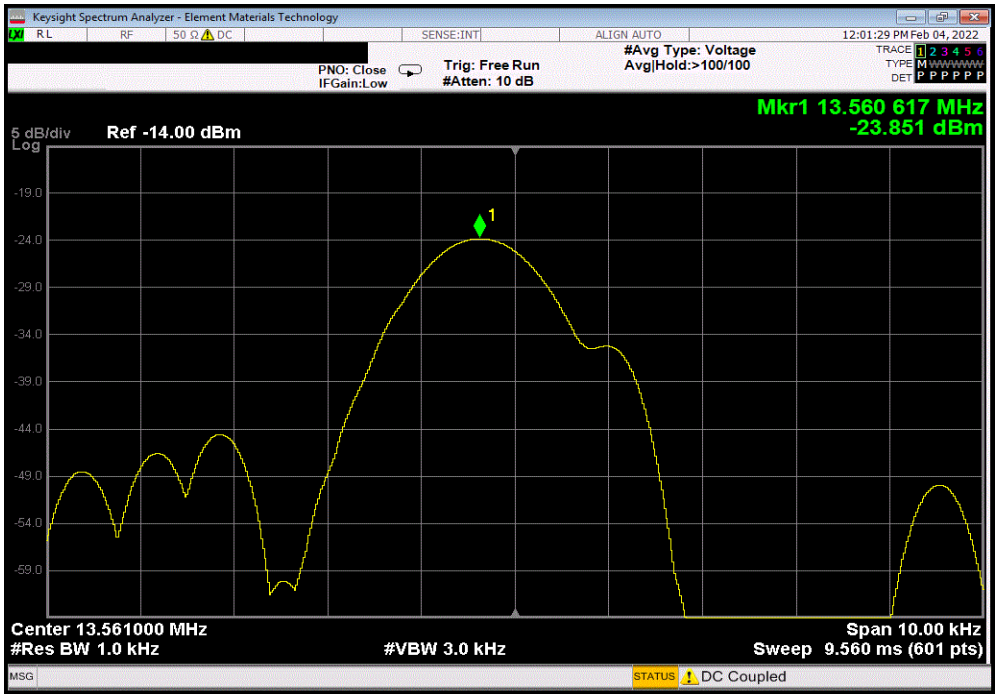
RFID, 13.56 MHz, Modulated, DTCD0091; Part 534508-001-F; Serial: 11860F362100472, +20°C, -15% Extreme Voltage, 187 VAC/60 Hz

		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56061633	13.56061633	0	100	Pass



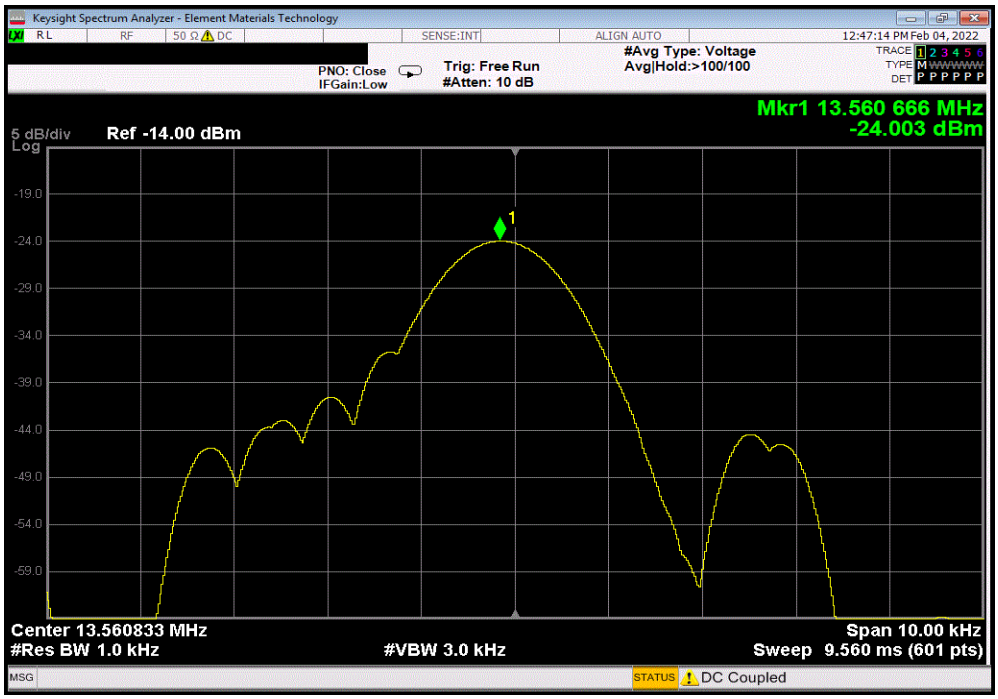
RFID, 13.56 MHz, Modulated, DTCD0091; Part 534508-001-F; Serial: 11860F362100472, +20°C, +15% Extreme Voltage, 253 VAC/60 Hz

		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56061667	13.56061633	0.024630149	100	Pass

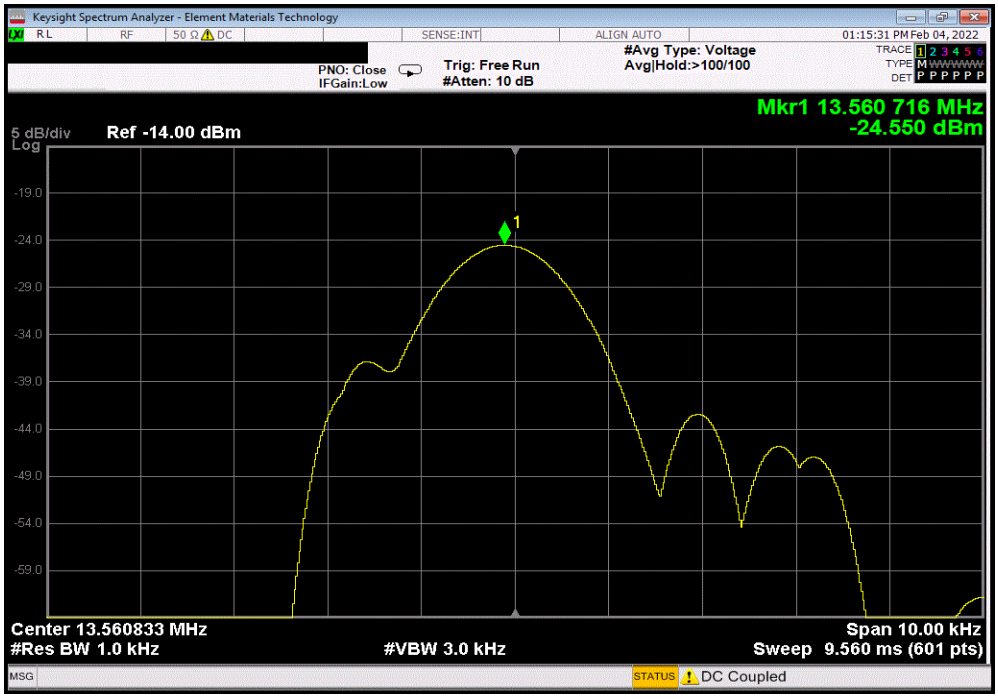


FREQUENCY STABILITY

RFID, 13.56 MHz, Modulated, DTCD0091; Part 534508-001-F; Serial: 11860F362100472, +10°C, Nominal Voltage, 220 VAC/60 Hz						
		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56066633	13.56061633	3.687148045	100	Pass

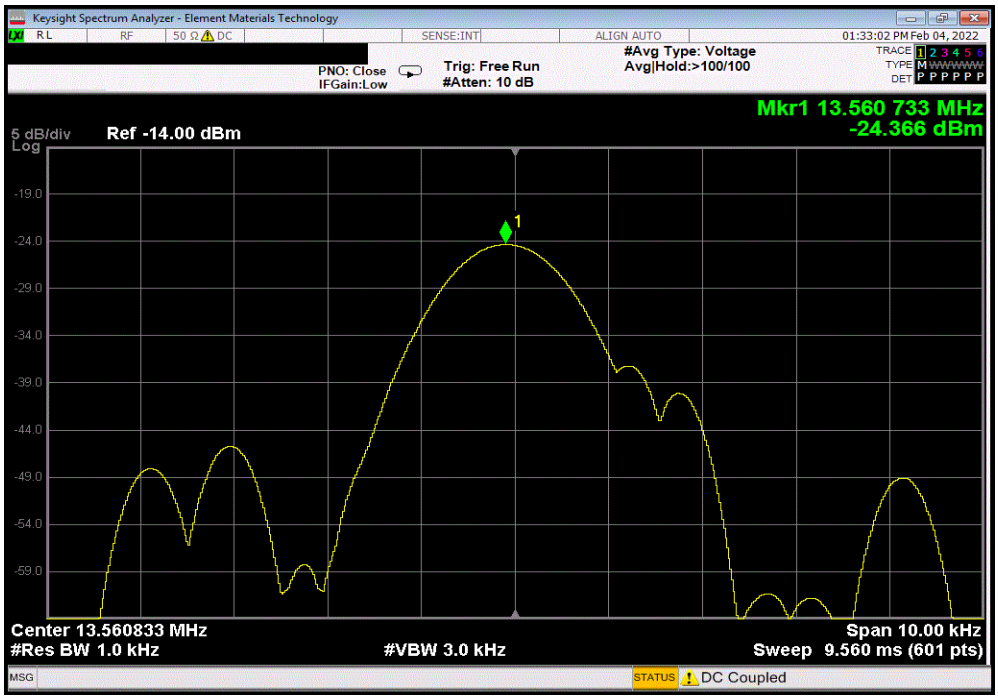


RFID, 13.56 MHz, Modulated, DTCD0091; Part 534508-001-F; Serial: 11860F362100472, 0°C, Nominal Voltage, 220 VAC/60 Hz						
		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56071633	13.56061633	7.37429609	100	Pass

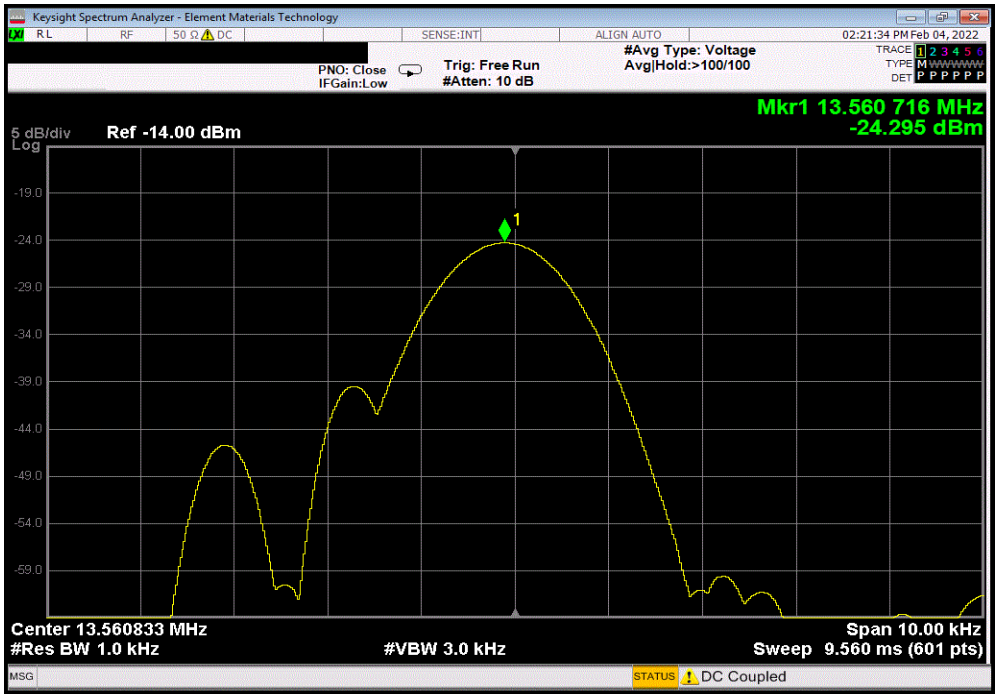


FREQUENCY STABILITY

RFID, 13.56 MHz, Modulated, DTCD0091; Part 534508-001-F; Serial: 11860F362100472, -10°C, Nominal Voltage, 220 VAC/60 Hz						
		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560733	13.56061633	8.603370019	100	Pass



RFID, 13.56 MHz, Modulated, DTCD0091; Part 534508-001-F; Serial: 11860F362100472, -20°C, Nominal Voltage, 220 VAC/60 Hz						
		Measured Value (MHz)	Nominal Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56071633	13.56061633	7.37429609	100	Pass



End of Test Report