NORTHWEST EMC

3D Systems Corporation

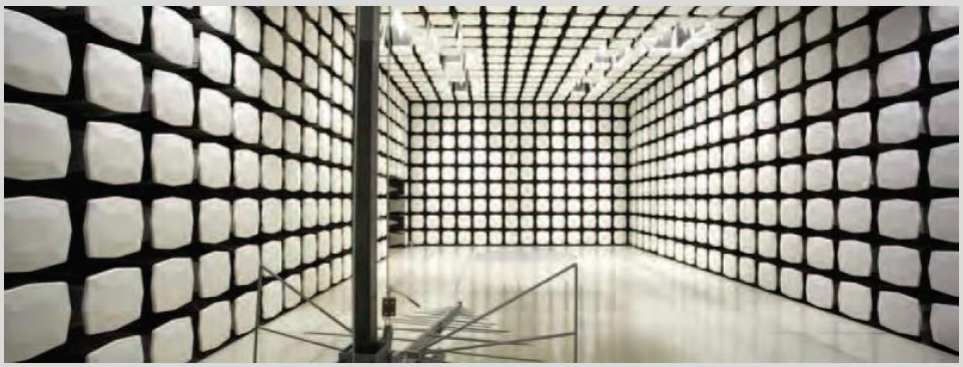
ProJet® MJP 2500

FCC 15.207:2015

FCC 15.225:2015

13.56MHz Radio

Report # 3DSY0030



NVLAP Lab Code: 200630-0

CERTIFICATE OF TEST

NORTHWEST EMC
2014-12-10

Last Date of Test: August 10, 2015
3D Systems Corporation
Model: ProJet® MJP 2500

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2015	ANSI C63.10:2013
FCC 15.225:2015	ANSI C63.10:2013

Results

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

Deviations From Test Standards

None

Approved By:

Kyle Holgate, Operations Manager

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

REVISION HISTORY

NORTHWEST EMC
REV 2014.10.14

Revision Number	Description	Date	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

REV 2015.2.19

United States

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

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

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

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

European Union

European Commission – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/
http://gsi.nist.gov/global/docs/cabs/designations.html

MEASUREMENT UNCERTAINTY

TMU.2015.07.10

Measurement Uncertainty

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

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is on each data sheet. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

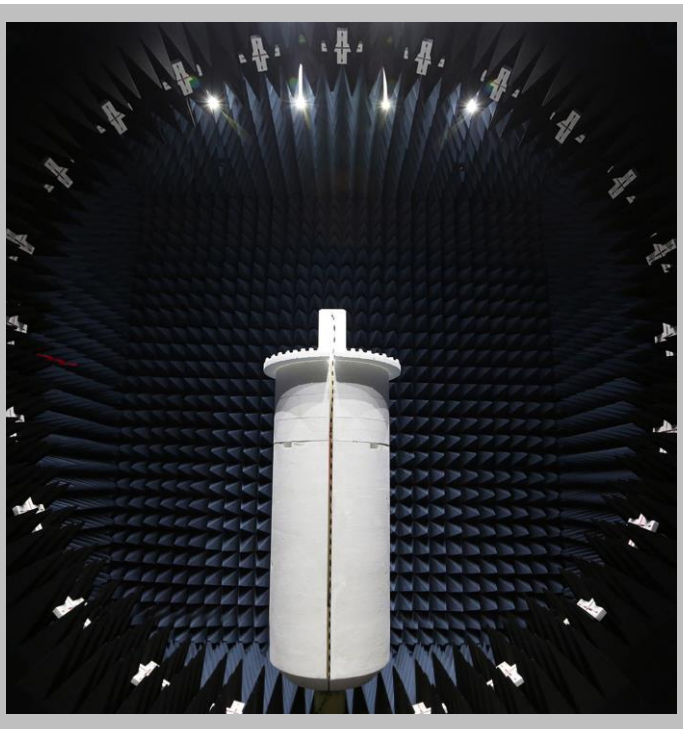
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

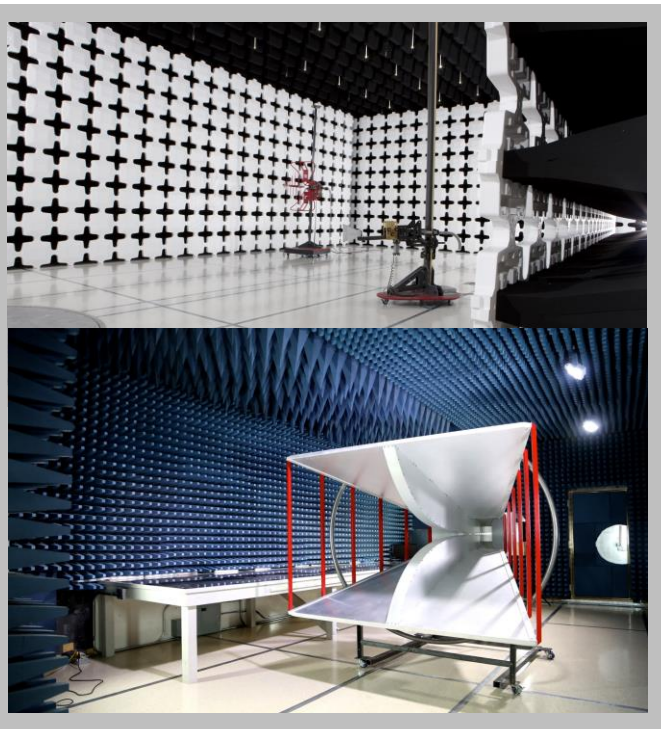
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%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

FACILITIES

REV 2015.2.19

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 9801 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Industry Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-*2*	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157





PRODUCT DESCRIPTION

NORTHWEST EMC
2014-12-10

Client and Equipment Under Test (EUT) Information

Company Name:	3D Systems Corporation
Address:	26600 SW Parkway
City, State, Zip:	Wilsonville, OR 97070
Test Requested By:	Steve Wardle
Model:	ProJet® MJP 2500
First Date of Test:	August 06, 2015
Last Date of Test:	August 10, 2015
Receipt Date of Samples:	August 06, 2015
Equipment Design Stage:	Pre-Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
3D printer with a 13.56MHz RFID Radio

Testing Objective:
To demonstrate compliance to FCC Part 15.225 specifications.

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration 3DSY0030- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
RFID Board (DMC)	3D Systems Corporation	310071-01	PP1-029
RFID Reader Board Antenna Five Turn Loop	3D Systems Corporation	3100084-02	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Power Supply 12V	3D Systems Corporation	LS50-12	None
Power Supply 5V	3D Systems Corporation	LS75-5	None

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop (Dell)	Dell	D630	KX335 A00

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power Cable	Yes	2m	No	AC Mains	AC/DC Power Adapter Set
DC Power Cable	No	.5m	No	AC/DC Power Adapter Set	RFID Board
Antenna Cables x4	No	.3m	No	RFID Board	RFID Antennas
Serial Cable	No	2.5m	No	RFID Board	Laptop

Configuration 3DSY0030- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
3D Printer	3D Systems Corporation	ProJet® MJP 2500	PP1-029

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power Cable	No	2m	No	3D Printer	AC Mains

MODIFICATIONS

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	8/6/2015	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	8/6/2015	AC Power Line Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	8/7/2015	Field Strength of Spurious Emissions greater than 30 MHz	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	8/10/2015	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	8/10/2015	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.	Scheduled testing was completed.

AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.03.19.1

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. 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 50 Ω measuring port is terminated by a 50 Ω EMI meter or a 50 Ω resistive load. All 50 Ω measuring ports of the LISN are terminated by 50Ω.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESCI	ARH	3/11/2015	03/11/2016
LISN	Solar Electronics	9252-50-R-24-BNC	LIR	10/7/2014	10/07/2015
High Pass Filter	TTE	H97-100K-50-720B	HHD	1/5/2015	01/05/2016
Attenuator, BNC 10 Watt	Fairview Microwave	SA6B10W-20	TQQ	11/20/2014	11/20/2015
Conducted Emissions Cable Assembly	Northwest EMC	EVG, HHD, TQQ	EVGA	5/12/2015	05/12/2016

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

3DSY0030-2

MODES INVESTIGATED

On, 13.56MHz continuous Tx

AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.03.19.1

EUT:	ProJet® MJP 2500	Work Order:	3DSY0030
Serial Number:	PP1-029	Date:	08/06/2015
Customer:	3D Systems, Inc.	Temperature:	23.6°C
Attendees:	Steve Wardle	Relative Humidity:	42.2%
Customer Project:	None	Bar. Pressure:	1019.6 mb
Tested By:	Brandon Hobbs	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	3DSY0030-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2015	ANSI C63.10:2013

TEST PARAMETERS

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

COMMENTS

None

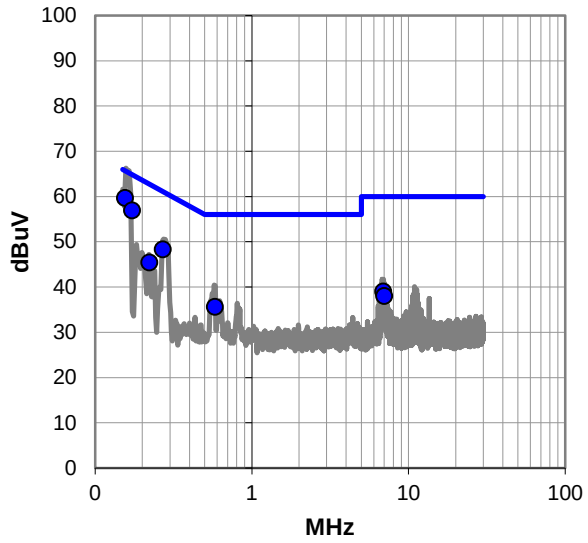
EUT OPERATING MODES

On, 13.56MHz continuous Tx

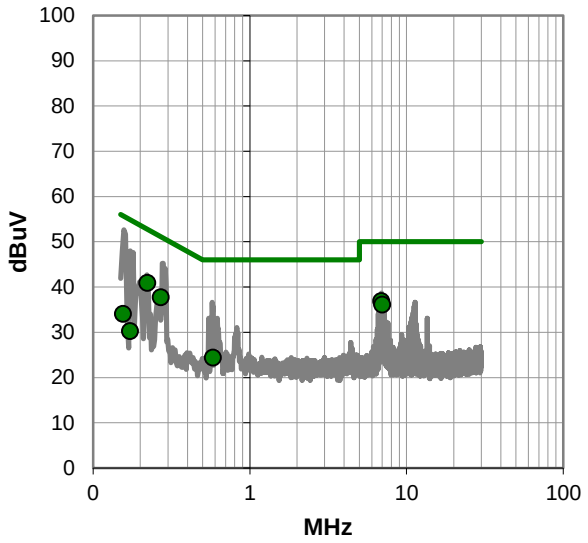
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.03.19.1

RESULTS - Run #2

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.155	39.6	20.1	59.7	65.7	-6.0
0.172	36.9	20.0	56.9	64.8	-7.9
0.271	28.4	19.9	48.3	61.1	-12.8
0.222	25.4	20.0	45.4	62.7	-17.3
0.582	15.7	19.9	35.6	56.0	-20.4
6.910	18.7	20.3	39.0	60.0	-21.0
7.010	17.7	20.3	38.0	60.0	-22.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.222	20.9	20.0	40.9	52.7	-11.8
6.910	16.6	20.3	36.9	50.0	-13.1
0.271	17.8	19.9	37.7	51.1	-13.4
7.010	15.8	20.3	36.1	50.0	-13.9
0.582	4.5	19.9	24.4	46.0	-21.6
0.155	14.0	20.1	34.1	55.7	-21.6
0.172	10.2	20.0	30.2	54.8	-24.6

CONCLUSION

Pass

Tested By

AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.03.19.1

EUT:	ProJet® MJP 2500	Work Order:	3DSY0030
Serial Number:	PP1-029	Date:	08/06/2015
Customer:	3D Systems, Inc.	Temperature:	23.6°C
Attendees:	Steve Wardle	Relative Humidity:	42.2%
Customer Project:	None	Bar. Pressure:	1019.6 mb
Tested By:	Brandon Hobbs	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	3DSY0030-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2015	ANSI C63.10:2013

TEST PARAMETERS

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

COMMENTS

None

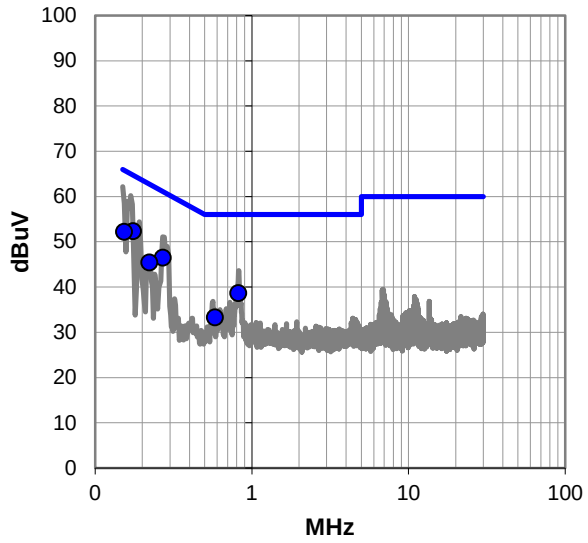
EUT OPERATING MODES

On, 13.56MHz continuous Tx

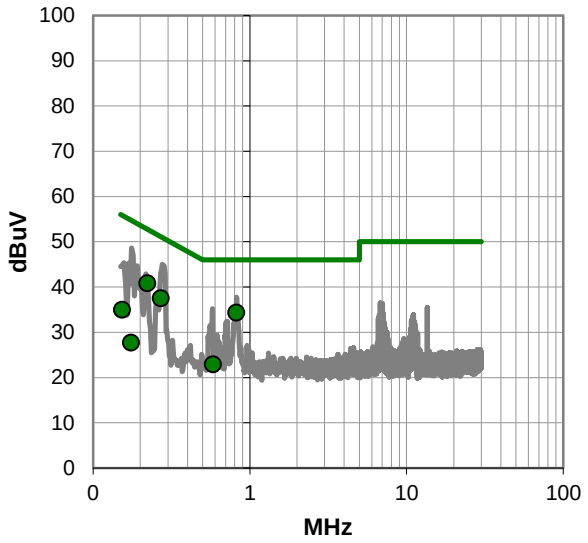
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.05.26
PSA-ESCI 2015.03.03, EmiR5 2015.03.19.1

RESULTS - Run #3

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.175	32.3	20.0	52.3	64.7	-12.4
0.153	32.1	20.1	52.2	65.8	-13.7
0.271	26.6	19.9	46.5	61.1	-14.6
0.222	25.4	20.0	45.4	62.7	-17.3
0.822	18.7	19.9	38.6	56.0	-17.4
0.583	13.4	19.9	33.3	56.0	-22.7

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.822	14.4	19.9	34.3	46.0	-11.7
0.222	20.8	20.0	40.8	52.7	-11.9
0.271	17.6	19.9	37.5	51.1	-13.6
0.153	14.9	20.1	35.0	55.8	-20.9
0.583	3.0	19.9	22.9	46.0	-23.1
0.175	7.7	20.0	27.7	54.7	-27.0

CONCLUSION

Pass

Tested By

FIELD STRENGTH OF FUNDAMENTAL

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

MODES OF OPERATION

On, 13.56MHz continuous Tx

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

3DSY0030 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	12.5 MHz	Stop Frequency	15 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Analyzer - Spectrum Analyzer	Agilent	E4443A	AFB	3/17/2015	12 mo
Cable	None	10m Test Distance Cable	EVL	5/11/2015	12 mo
Antenna, Loop	EMCO	6502	AOA	6/24/2014	24 mo

TEST DESCRIPTION

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

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

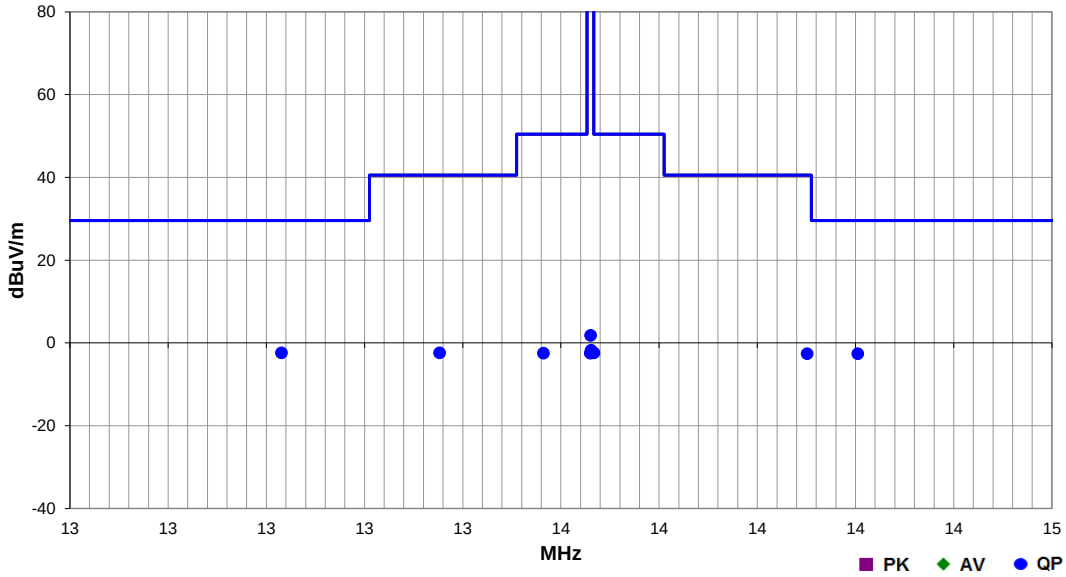
As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of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

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	3DSY0030	**Date:**	08/10/15		
Project:	None	**Temperature:**	24.6 °C		
Job Site:	EV11	**Humidity:**	42% RH		
Serial Number:	PP1-029	**Barometric Pres.:**	1013 mbar	**Tested by:**	Brandon Hobbs
EUT:	ProJet® MJP 2500				
Configuration:	2				
Customer:	3D Systems, Inc.				
Attendees:	Steve Wardle				
EUT Power:	110VAC/60Hz				
Operating Mode:	On, 13.56MHz continuous Tx				
Deviations:	None				
Comments:	Please reference the data comments for Antenna orientation and EUT position.				

Test Specifications	**Test Method**
FCC 15.225:2015	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)	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
12.931	5.9	10.8	1.0	259.0	10.0	0.0	Horz	QP	-19.1	-2.4	29.5	-31.9	Ant perp to GND, Ant perp to EUT, EUT Normal
14.105	5.7	10.8	1.0	343.0	10.0	0.0	Horz	QP	-19.1	-2.6	29.5	-32.1	Ant perp to GND, Ant perp to EUT, EUT Normal
13.253	5.9	10.8	1.0	64.0	10.0	0.0	Horz	QP	-19.1	-2.4	40.5	-42.9	Ant perp to GND, Ant perp to EUT, EUT Normal
14.002	5.7	10.8	1.0	237.0	10.0	0.0	Horz	QP	-19.1	-2.6	40.5	-43.1	Ant perp to GND, Ant perp to EUT, EUT Normal
13.567	5.9	10.8	1.0	96.0	10.0	0.0	Horz	QP	-19.1	-2.4	50.5	-52.9	Ant perp to GND, Ant perp to EUT, EUT Normal
13.464	5.8	10.8	1.0	317.0	10.0	0.0	Horz	QP	-19.1	-2.5	50.5	-53.0	Ant perp to GND, Ant perp to EUT, EUT Normal
13.560	10.1	10.8	1.0	23.0	10.0	0.0	Horz	QP	-19.1	1.8	84.0	-82.2	Ant perp to GND, Ant perp to EUT, EUT Normal
13.562	6.5	10.8	1.0	331.0	10.0	0.0	Horz	QP	-19.1	-1.8	84.0	-85.8	Ant prp to GND, Ant para to EUT, EUT Normal
13.560	5.8	10.8	1.0	11.0	10.0	0.0	Vert	QP	-19.1	-2.5	84.0	-86.5	Ant para to GND, Ant perp to EUT, EUT Normal

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHz

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

MODES OF OPERATION

On, 13.56MHz continuous Tx

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

3DSY0030 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	9 kHz	Stop Frequency	30 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna, Loop	EMCO	6502	AOA	6/24/2014	24 mo
Cable	None	3m Test Distance Cable	EVM	5/11/2015	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AFB	3/17/2015	12 mo

TEST DESCRIPTION

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

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

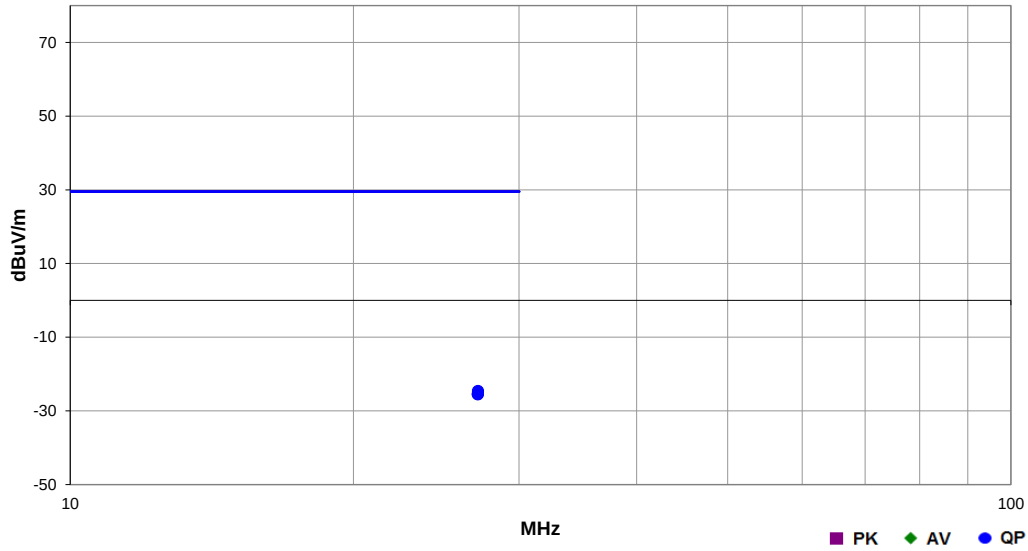
As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of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

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHz

Work Order:	3DSY0030	**Date:**	08/11/15		
Project:	None	**Temperature:**	26.4 °C		
Job Site:	EV11	**Humidity:**	37.9% RH		
Serial Number:	PP1-029	**Barometric Pres.:**	1013 mbar	**Tested by:**	Brandon Hobbs
EUT:	ProJet® MJP 2500				
Configuration:	2				
Customer:	3D Systems, Inc.				
Attendees:	Steve Wardle				
EUT Power:	110VAC/60Hz				
Operating Mode:	On, 13.56MHz continuous Tx				
Deviations:	None				
Comments:	Please reference the data comments for Antenna orientation and EUT position.				

Test Specifications	**Test Method**
FCC 15.225:2015	ANSI C63.10:2013

Run #	8	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
27.125	6.2	9.2	1.0	197.0	3.0	0.0	Horz	QP	-40.0	-24.6	29.5	-54.1	ANT prep to GND, ANT perp to EUT, EUT Normal
27.118	5.4	9.2	1.0	173.0	3.0	0.0	Horz	QP	-40.0	-25.4	29.5	-54.9	ANT prep to GND, ANT para to EUT, EUT Normal
27.117	5.3	9.2	1.0	204.0	3.0	0.0	Vert	QP	-40.0	-25.5	29.5	-55.0	ANT para to GND, ANT perp to EUT, EUT Normal

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHz

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

MODES OF OPERATION

On, 13.56MHz continuous Tx

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

3DSY0030 - 2

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.	Interval
Spectrum Analyzer	Keysight	N9010A	AFN	2/10/2015	12 mo
Cable	N/A	Bilog Cables	EVA	2/10/2015	12 mo
Pre-Amplifier	Miteq	AM-1616-1000	AOL	2/10/2015	12 mo
Antenna, Biconilog	EMCO	3141	AXE	8/29/2014	24 mo

TEST DESCRIPTION

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

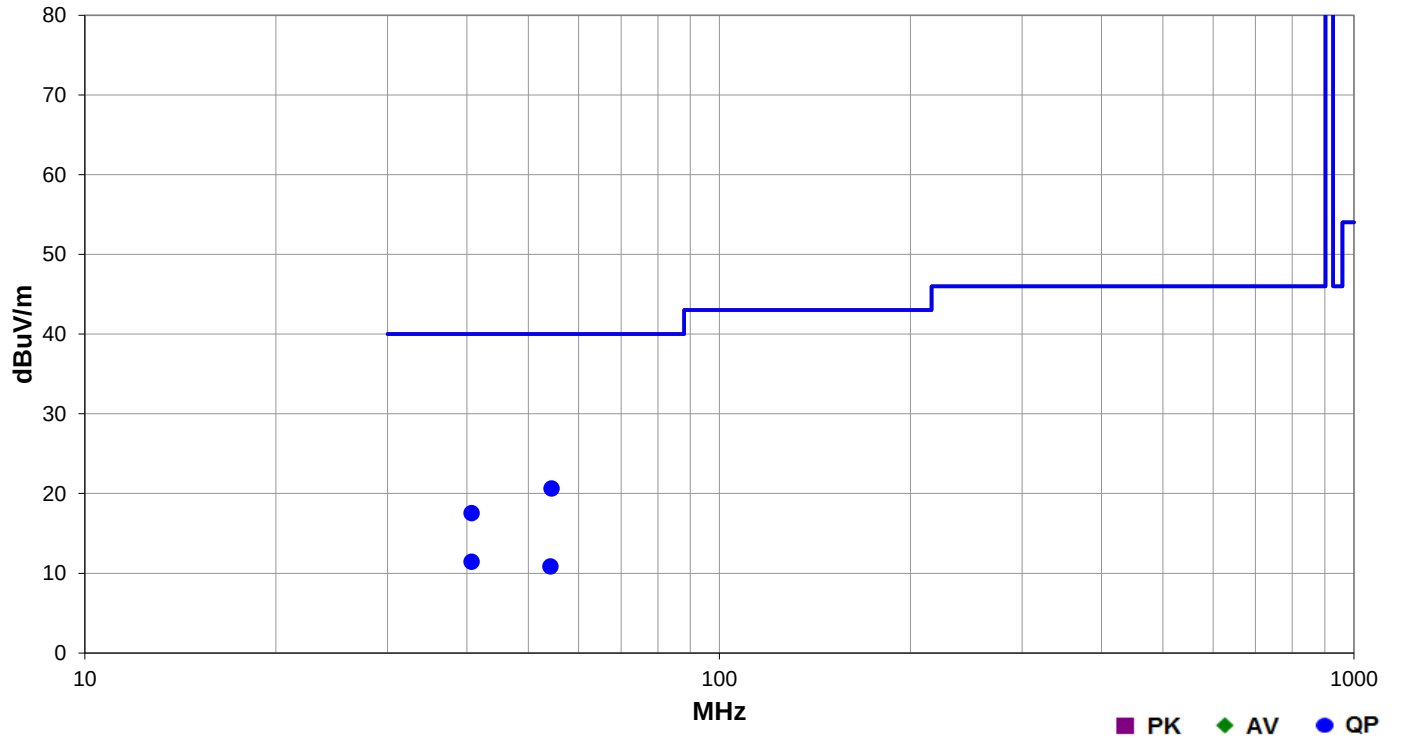
While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and mantaining the EUT antenna oriented in the fixed normally operating position (per ANSI C63.10:2013).

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHz

Work Order:	3DSY0030	**Date:**	08/07/15		
Project:	None	**Temperature:**	24.7 °C		
Job Site:	EV01	**Humidity:**	41.9% RH		
Serial Number:	PP1-029	**Barometric Pres.:**	1012.8 mbar	**Tested by:**	Brandon Hobbs
EUT:	ProJet® MJP 2500				
Configuration:	2				
Customer:	3D Systems, Inc.				
Attendees:	Steve Wardle				
EUT Power:	110VAC/60Hz				
Operating Mode:	On, 13.56MHz continuous Tx				
Deviations:	None				
Comments:	The EUT is in the normal orientation for regular use.				

Test Specifications	**Test Method**
FCC 15.225:2015	ANSI C63.10:2013

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



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)
54.368	30.7	-10.1	1.0	165.0	3.0	0.0	Vert	QP	0.0	20.6	40.0	-19.4
40.684	24.0	-6.4	1.0	333.0	3.0	0.0	Vert	QP	0.0	17.6	40.0	-22.4
40.680	17.9	-6.4	3.7	76.0	3.0	0.0	Horz	QP	0.0	11.5	40.0	-28.5
54.182	20.9	-10.0	3.8	360.0	3.0	0.0	Horz	QP	0.0	10.9	40.0	-29.1

FREQUENCY STABILITY

XMit 2015.01.14

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Thermometer	Omegaette	HH311	DTY	1/21/2015	36
Multimeter	Tektronix	DMM912	MMH	2/5/2013	36
Humidity and Temperature Chamber	Cincinnati Sub Zero (CSZ)	ZPH-8-2-SCT/AC	TBI	NCR	0
Near Field Probe	EMCO	7405	IPD	NCR	0
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/14/2015	12
Spectrum Analyzer	Agilent	E4446A	AAQ	3/10/2015	12

TEST DESCRIPTION

A direct connect measurement was made between the EUT's antenna cable and a spectrum analyzer. The spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT.

Measurements were made at the edges of the main transmit bands as called out on the data sheets. Testing was done with an absence of modulation in a CW mode of operation.

The primary supply voltage was varied from 85 % to 115% of the nominal voltage Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range (-30 ° to +50° C) and at 10°C intervals.

FREQUENCY STABILITY

NORTHWEST EMC

XMit 2015.01.14

EUT:	**ProJet® MJP 2500**			**Work Order:**	**3DSY0030**
Serial Number:	**PP1-029**			**Date:**	**08/06/15**
Customer:	**3D Systems, Inc.**			**Temperature:**	**23.6°C**
Attendees:	**Steve Wardle**			**Humidity:**	**42%**
Project:	**None**			**Barometric Pres.:**	**1019.9**
Tested by:	**Brandon Hobbs**	**Power:**	**110VAC/60Hz**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	**Test Method**
FCC 15.225:2015	ANSI C63.10:2013

COMMENTS

The DC voltages to the RFID board was varied via the spec for testing.

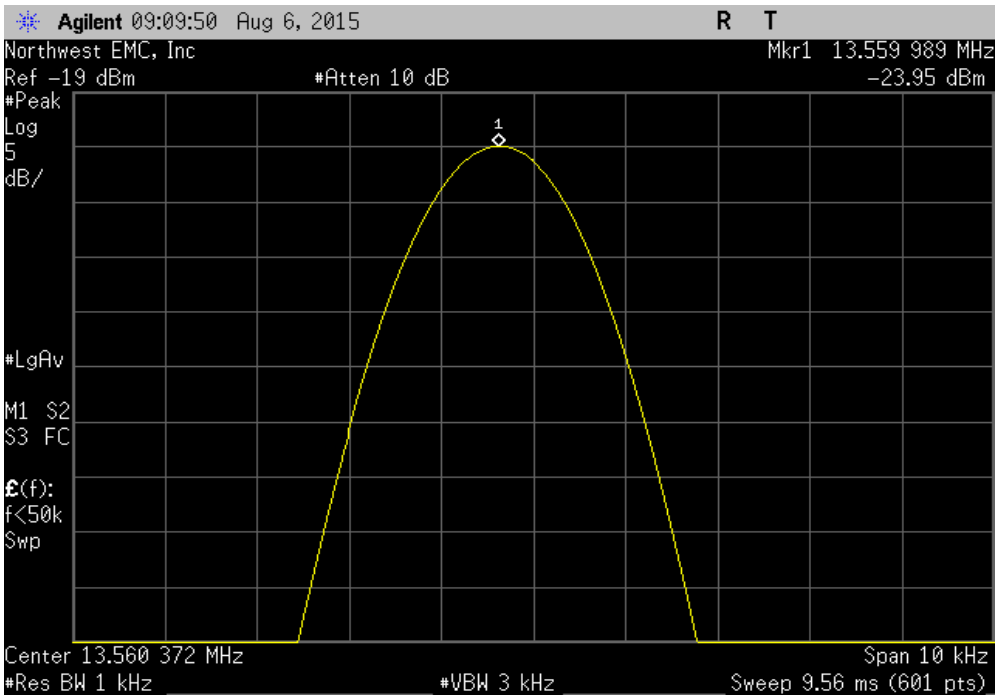
DEVIATIONS FROM TEST STANDARD

None

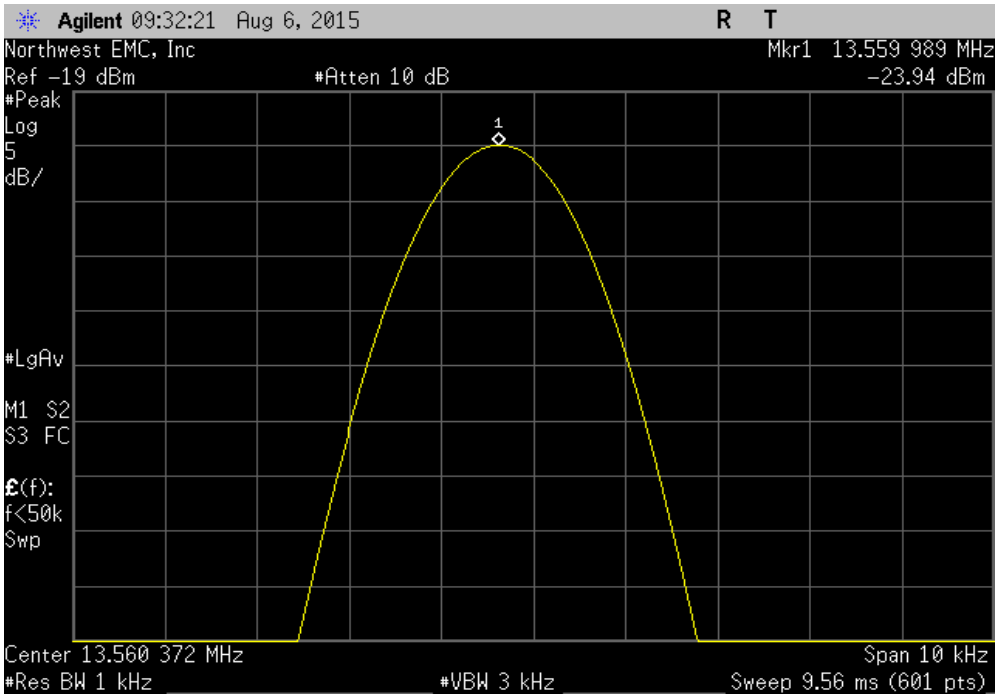
Configuration #	**1**	*Signature*

	Measured Value (MHz)	**Assigned Value (MHz)**	**Error (ppm)**	**Limit (ppm)**	**Results**
RFID System 13.56 MHz					
Voltage: 115%	13.559989	13.56	0.8	100	Pass
Voltage: 100%	13.559989	13.56	0.8	100	Pass
Voltage: 85%	13.559989	13.56	0.8	100	Pass
Temperature: +50°	13.559905	13.56	7	100	Pass
Temperature: +40°	13.559938	13.56	4.6	100	Pass
Temperature: +30°	13.559972	13.56	2.1	100	Pass
Temperature: +20°	13.56002	13.56	1.5	100	Pass
Temperature: +10°	13.560053	13.56	3.9	100	Pass
Temperature: 0°	13.560072	13.56	5.3	100	Pass
Temperature: -10°	13.560072	13.56	5.3	100	Pass
Temperature: -20°	13.560036	13.56	2.7	100	Pass
Temperature: -30°	13.559972	13.56	2.1	100	Pass

RFID System 13.56 MHz, Voltage: 115%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559989	13.56	0.8	100	Pass



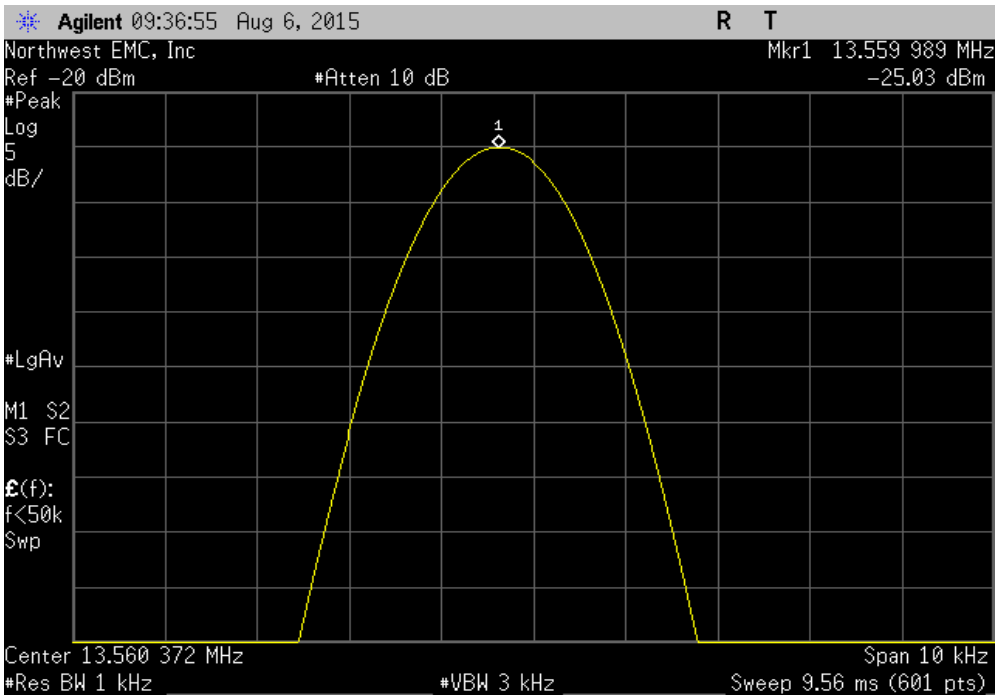
RFID System 13.56 MHz, Voltage: 100%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559989	13.56	0.8	100	Pass



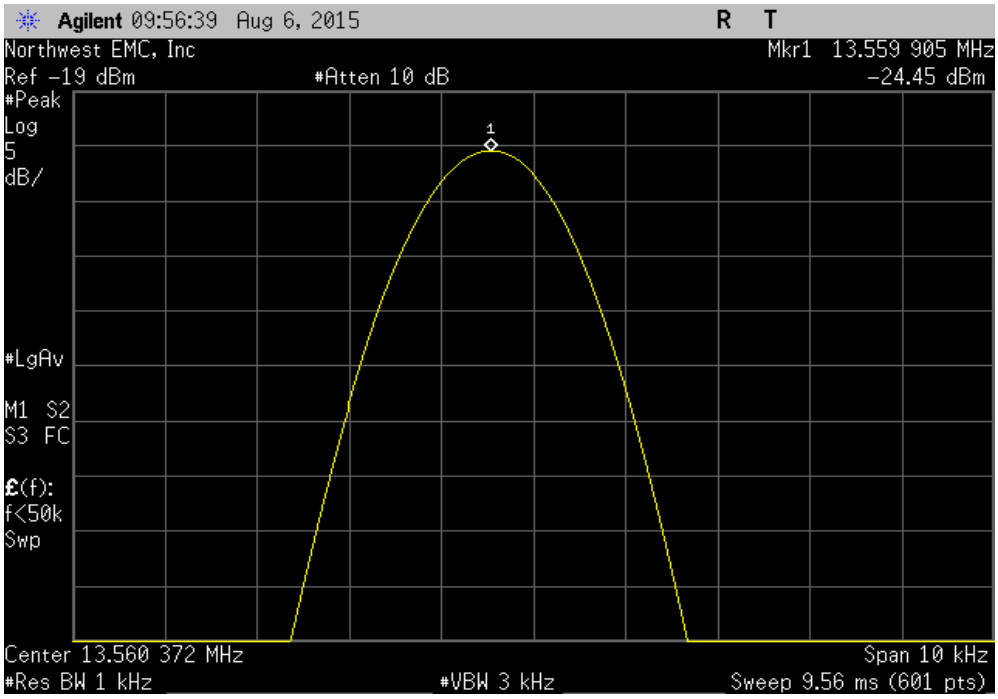
FREQUENCY STABILITY

XMit 2015.01.14

RFID System 13.56 MHz, Voltage: 85%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559989	13.56	0.8	100	Pass



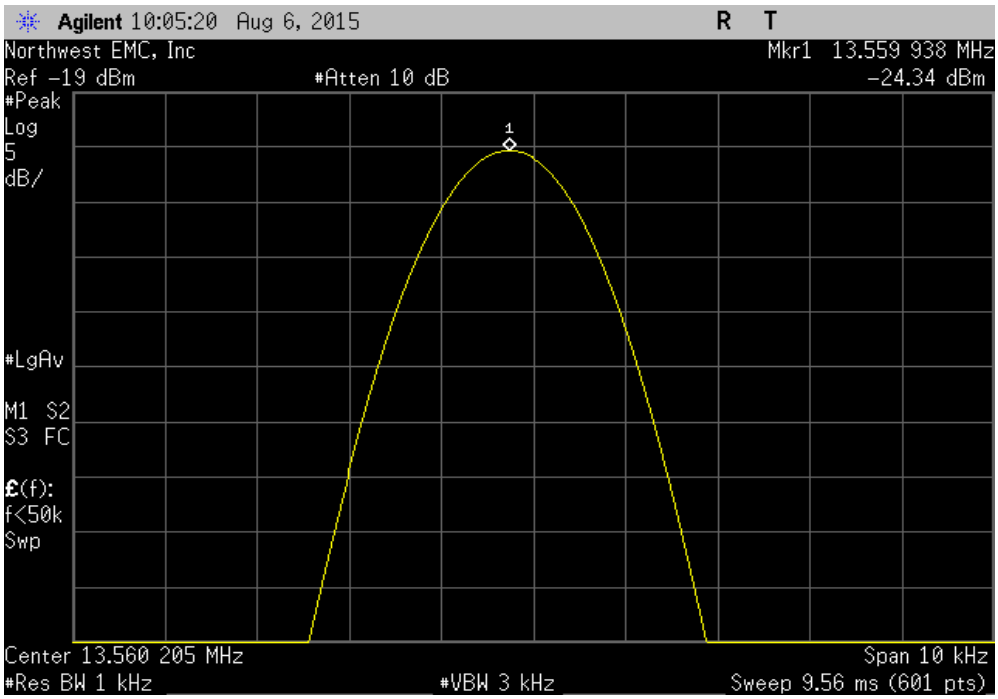
RFID System 13.56 MHz, Temperature: +50°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559905	13.56	7	100	Pass



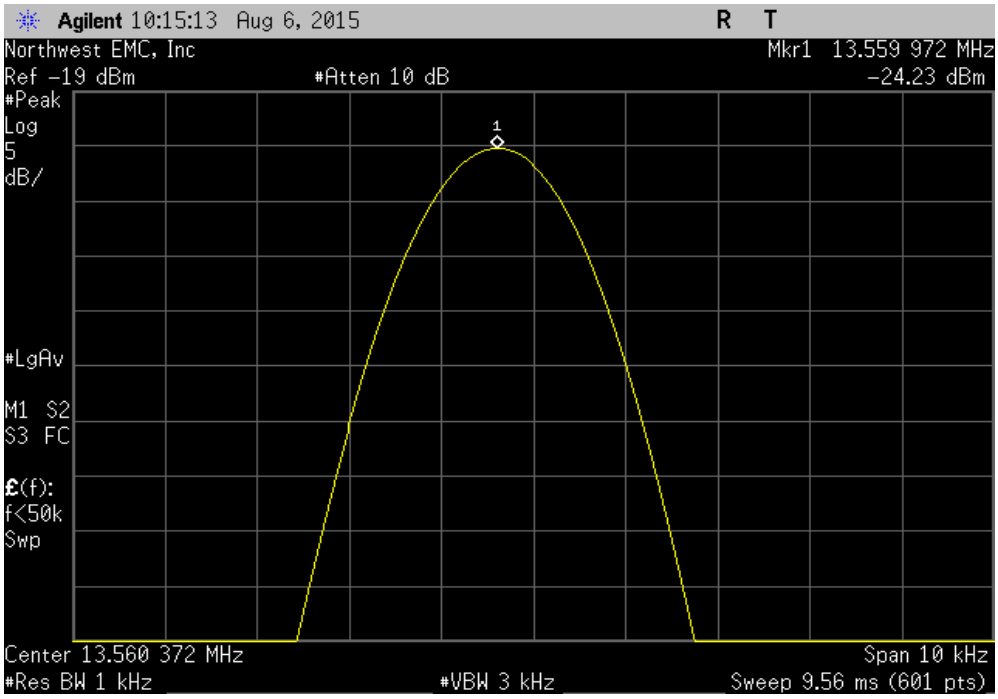
FREQUENCY STABILITY

XMit 2015.01.14

RFID System 13.56 MHz, Temperature: +40°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559938	13.56	4.6	100	Pass



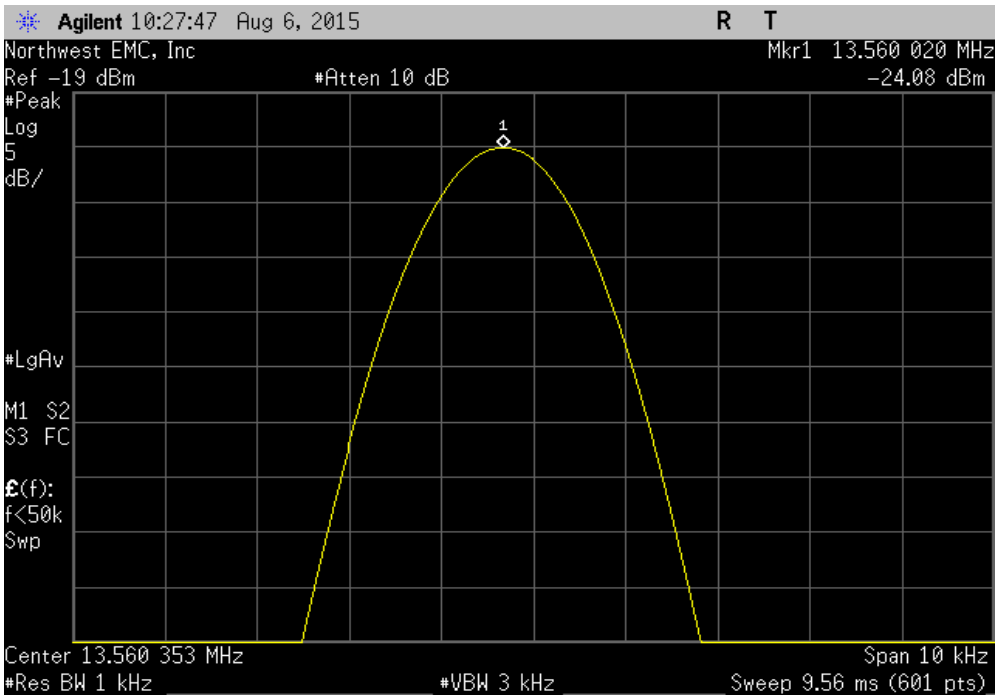
RFID System 13.56 MHz, Temperature: +30°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559972	13.56	2.1	100	Pass



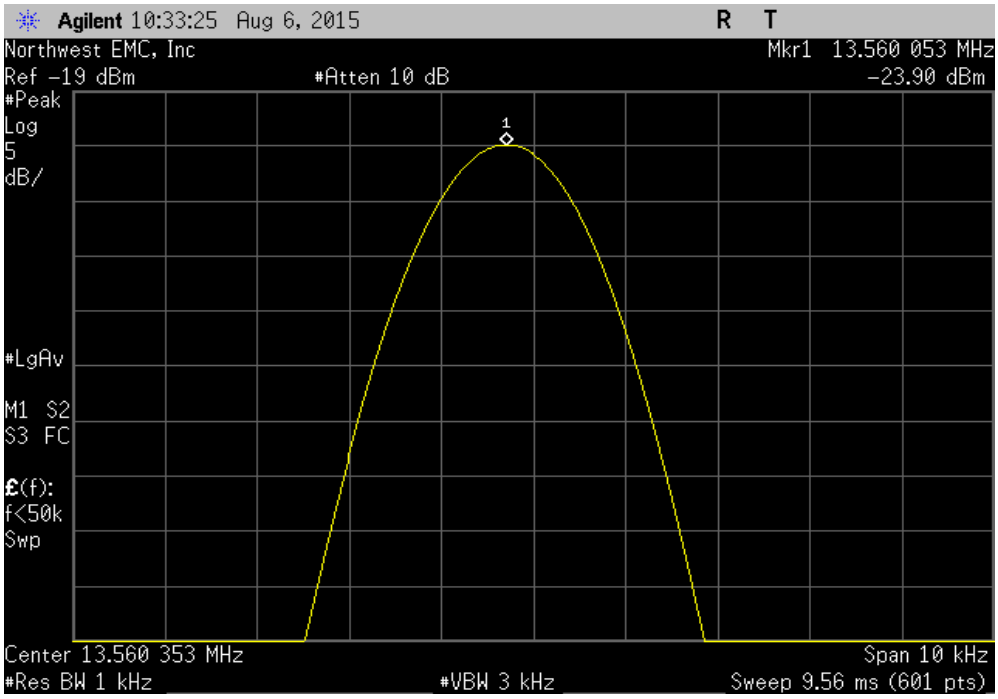
FREQUENCY STABILITY

XMit 2015.01.14

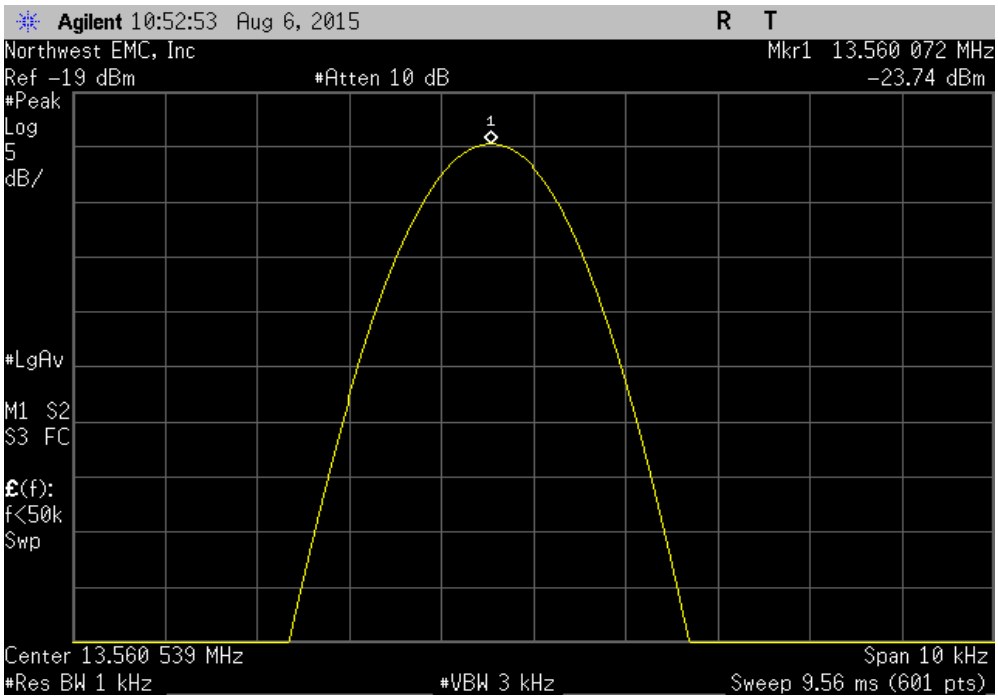
RFID System 13.56 MHz, Temperature: +20°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56002	13.56	1.5	100	Pass



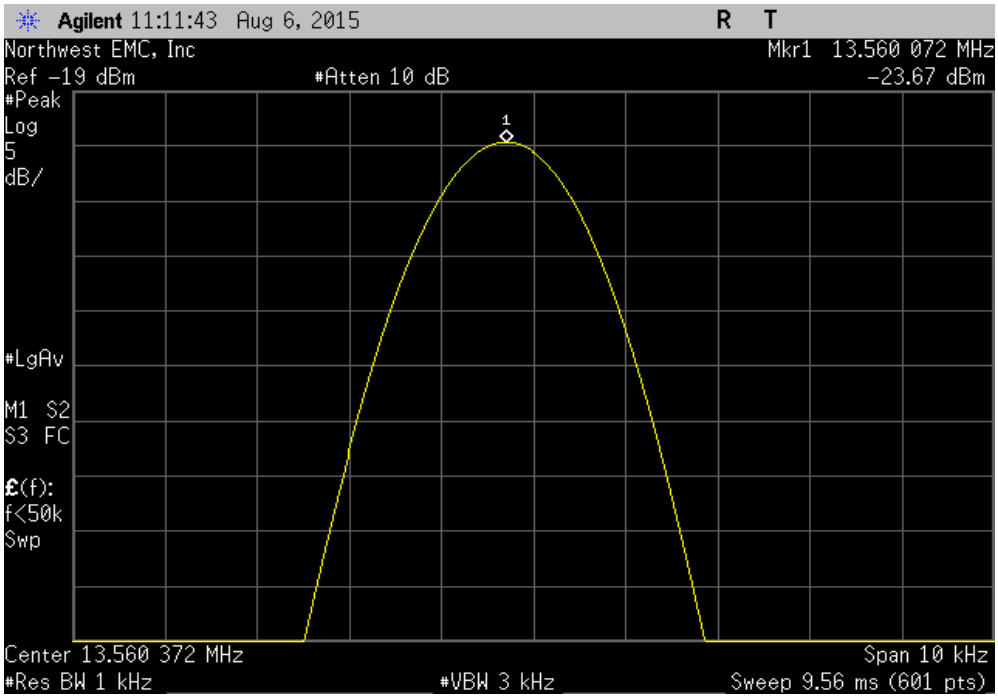
RFID System 13.56 MHz, Temperature: +10°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560053	13.56	3.9	100	Pass



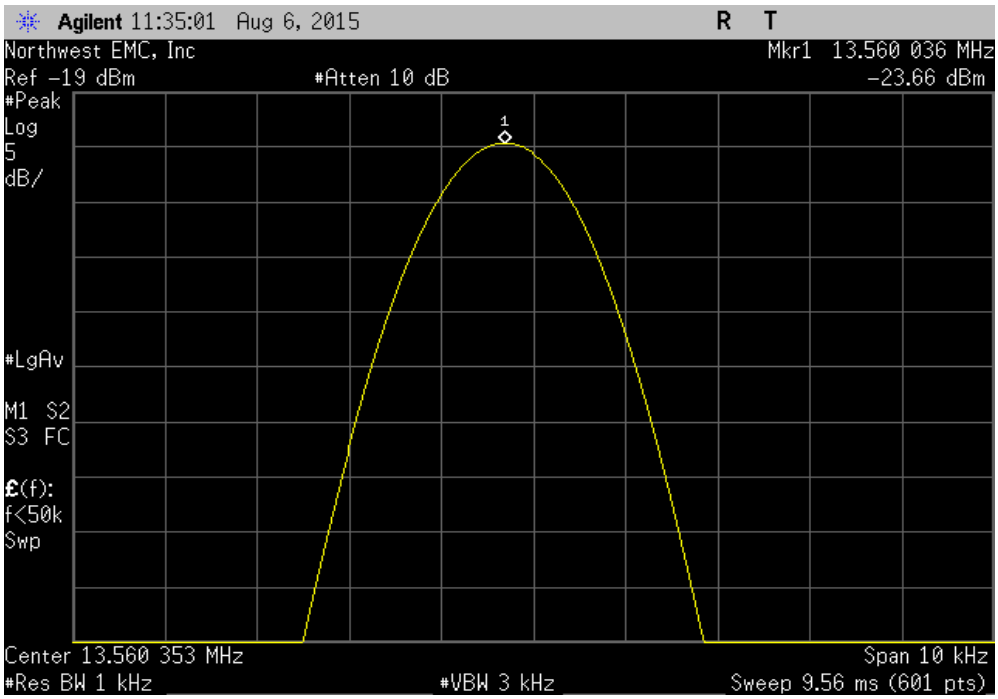
RFID System 13.56 MHz, Temperature: 0°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560072	13.56	5.3	100	Pass



RFID System 13.56 MHz, Temperature: -10°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560072	13.56	5.3	100	Pass



RFID System 13.56 MHz, Temperature: -20°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560036	13.56	2.7	100	Pass



RFID System 13.56 MHz, Temperature: -30°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559972	13.56	2.1	100	Pass