

3D Systems Corporation

Skyetek M2 FCC 15.207:2017 FCC 15.225:2017 13.56 MHz Radio

Report # 3DSY0078





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CERTIFICATE OF TEST



Last Date of Test: August 1, 2017 3D Systems Corporation Model: Skyetek M2

Radio Equipment Testing

Standards	
Specification	Method
FCC 15.207:2017 FCC 15.225:2017	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



Revision Number	Description	Date	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS



United States

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

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

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

European Union

European Commission - Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

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: <u>http://portlandcustomer.element.com/ts/scope/scope.htm</u> <u>http://gsi.nist.gov/global/docs/cabs/designations.html</u>

MEASUREMENT UNCERTAINTY



Measurement Uncertainty

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

A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

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

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

FACILITIES





California	Minnesota	New York	Oregon	Texas	Washington	
Labs OC01-13	Labs MN01-08, MN10	Labs NY01-04	Labs EV01-12	Labs TX01-09	Labs NC01-05	
41 Tesla	9349 W Broadway Ave.	4939 Jordan Rd.	22975 NW Evergreen Pkwy	3801 E Plano Pkwy	19201 120 th Ave NE	
Irvine, CA 92618	Brooklyn Park, MN 55445	Elbridge, NY 13060	Hillsboro, OR 97124	Plano, TX 75074	Bothell, WA 98011	
(949) 861-8918	(612)-638-5136	(315) 554-8214	(503) 844-4066	(469) 304-5255	(425)984-6600	
		NV	LAP			
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0	
Innovation, Science and Economic Development Canada						
2834B-1, 2834B-3	2834E-1, 2834E-3	N/A	2834D-1, 2834D-2	2834G-1	2834F-1	
		BS	MI			
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	



Test Setup Block Diagrams



PRODUCT DESCRIPTION



Client and Equipment Under Test (EUT) Information

Company Name:	3D Systems Corporation
Address:	26600 SW Parkway
City, State, Zip:	Wilsonville, OR 97070-1000
Test Requested By:	Steve Wardle
Model:	Skyetek M2
First Date of Test:	July 31, 2017
Last Date of Test:	August 1, 2017
Receipt Date of Samples:	July 31, 2017
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

13.56 MHz RFID radio inside a ProJet® 6000 printer

Testing Objective:

To demonstrate compliance of the 13.56 MHz RFID radio to FCC 15.225 requirements

CONFIGURATIONS



Configuration 3DSY0078-1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
RFID Module (In Chassis)	SkyeTek	SkyeModule M2-MH	None
Host Interface Board (In Chassis)	SkyeTek	SP-IB-00-5.3	None
Multiplexer Board (In Chassis)	SkyeTek	Mux v1.3	None
Antenna Board (In Chassis)	SkyeTek	SP-AN-04-2.0	None

Peripherals in test setup boundary						
Description Manufacturer Model/Part Number Serial Number						
AC/DC Power Adapter	Dell	DA90PS1-00	None			
Laptop	Dell	Latitude D630	None			
3D Printer	3D Systems	ProJet 6000	None			

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial Data Cable	Yes	2.0m	Yes	Laptop	Host Interface Board
DC Bower Cable	Voc	1 7m	Voc		AC/DC Power
DC Fower Cable	res	1.7111	res	сартор	Adapter
AC Power Cable	No	1.7m	No	AC/DC Power Adapter	AC Mains
DC Power Cable	Yes	1.5m	Yes	AC/DC Power Adapter	Host Interface Board
Board to Board	No	0.0m	No		Host Interface Board
Connector	INU	0.011	INU	KFID WOULD	HUSI IIIIellace Dualu
Coax Cable	Yes	0.15m	No	RFID Module	Multiplexer Board
Coax Cable	Yes	0.9m	No	Mux Board	Antenna Board

Configuration 3DSY0078-2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
3D Printer	3D Systems	ProJet 6000	None

Cables						
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2	
AC Power Cable	No	2.0m	No	3D Printer	AC Mains	

CONFIGURATIONS



Configuration 3DSY0078-3

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
REID Modulo (Not in Chassie)	SkuoTok		SM-M2-MH-2.2
RFID MODULE (NOT IT CHASSIS)	Зкуетек		2250140120
Host Interface Board (Not in Chassis)	SkyeTek	SP-IB-00-5.3	1411132070
Multiplexer Board (Not in Chassis)	SkyeTek	Mux v1.3	1403170048
Antenna Board (Not in Chassis)	SkyeTek	SP-AN-04-2.0	1304150675

Remote Equipment Outside of Test Setup Boundary						
Description	Manufacturer	Model/Part Number	Serial Number			
Laptop	Dell	Latitude D630	None			

Cables										
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2					
Serial Data Cable	Yes	2.0m	Yes	Laptop	Host Interface Board					
DC Power Cable	Yes	1.5m	Yes	AC/DC Power Adapter	Host Interface Board					
Board to Board	No	0.0m	No	REID Module	Host Interface Board					
Connector	INU	0.011	INU		Tiost Interface Board					
Coax Cable	Yes	0.15m	No	RFID Module	Multiplexer Board					
Coax Cable	Yes	0.9m	No	Mux Board	Antenna Board					

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	7/31/2017	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	7/31/2017	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	7/31/2017	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	7/31/2017	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.
5	8/1/2017	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.



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

MODES OF OPERATION

Cart antenna active

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

3DSY0078 - 2

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Filter - High Pass	TTE	H97-100K-50-720B	HFX	1/9/2017	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AFB	5/16/2017	12 mo
LISN	Solar Electronics	9252-50-R-24-BNC	LIR	10/4/2016	12 mo

MEASUREMENT BANDWIDTHS

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

MEASUREMENT UNCERTAINTY

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 for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The test setup and procedures were in accordance with ANSI C63.10.

In the event that the operating frequency of 13.56 MHz is causing the product to fail the FCC 15.207 limits, the following guidance can be used:

In the FCC-TCBC Conference Call Meeting Minutes from April 12, 2005, the FCC stated:

"We are willing to accept measurements on a 13.56 MHz transmitter done with a dummy load under the following conditions. First, perform the AC line conducted tests with the antenna attached to make sure the device complies with the 15.207 limits outside the transmitter's fundamental emission band, and then retest with a dummy load to make sure the device complies with the 15.207 limits inside the transmitter's fundamental emission band. For the second portion of these tests, only the fundamental emission band of the transmitter needs to be retested."

This procedure was followed for the AC powerline conducted emissions testing documented on the following pages.

Per the FCC Guidance, the FCC will accept measurements on a 13.56 MHz transmitter done with a dummy load under the following conditions. (1) First, perform the AC line conducted tests with the antenna attached to make sure the device complies with the 15.207 limits outside the transmitter's fundamental emission band, and then retest with a dummy load to make sure the device complies with the 15.207 limits inside the transmitter's fundamental emission band. (2) For the second portion of these tests, only the fundamental emission band of the transmitter needs to be retested.



					EmiR5 2017.07.11	PSA-ESCI 2017.06.01
Work Orde	r: 3DSY0078	Date:	07/31/17	10	1 1	20
Projec	t: None	Temperature:	23.8 °C	rocky	te te	erengs
Job Sit	e: EV11	Humidity:	43% RH	C		0
Serial Numbe	r: None	Barometric Pres.:	1023 mbar	Tested by	y: Travis Pow ar	nd Rod Peloquin
EU	T: Skyetek M2					
Configuratio	n: 2					
Custome	r: 3D Systems Corporat	tion				
Attendee	s: Steve Wardle					
EUT Powe	r: 110VAC/60Hz					
Operating Mod	e: Cart antenna active					
Deviation	s: None					
Comment	Antennas in ProJet 60	000				
Test Specification	s		Test Meth	od		
FCC 15.207:2017			ANSI C63.	.10:2013		
Run # 8	Line:	High Line	Ext. Attenuation:	0	Results	Pass

100 90 80 70 60 dBuV 50 40 30 20 10 0 L 0.1 1.0 10.0 100.0 MHz

Quasi Peak Data - vs - Quasi Peak Limit

Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit									
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)				
0.186	52.1	0.4	52.5	64.2	-11.7				
1.300	42.7	0.5	43.2	56.0	-12.8				
5.238	45.9	1.0	46.9	60.0	-13.1				
3.576	41.3	0.9	42.2	56.0	-13.8				
0.248	47.6	0.4	48.0	61.8	-13.8				
1.625	40.8	0.6	41.4	56.0	-14.6				

Average Data - vs - Average Limit									
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)				
1.300	42.1	0.5	42.6	46.0	-3.4				
1.625	40.5	0.6	41.1	46.0	-4.9				
3.576	40.0	0.9	40.9	46.0	-5.1				
0.248	45.8	0.4	46.2	51.8	-5.6				
0.186	47.8	0.4	48.2	54.2	-6.0				
5.238	36.4	1.0	37.4	50.0	-12.6				



					EmiR5 2017.07.11	PSA-ESCI 2017.06.01
Work Order	: 3DSY0078	Date:	07/31/17	10	1 1	20
Project	: None	Temperature:	23.8 °C	rocky	te te	erings
Job Site	: EV11	Humidity:	43% RH	C		0
Serial Number	: None	Barometric Pres.:	1023 mbar	Tested by	Travis Pow a	and Rod Peloquin
EUT	Skyetek M2				•	
Configuration	: 2					
Customer	3D Systems Corporat	ion				
Attendees	Steve Wardle					
EUT Power	: 110VAC/60Hz					
Operating Mode	Cart antenna active					
Deviations	None					
Comments	Antennas in ProJet 60	000				
Test Specifications			Test Meth	od		
FCC 15.207:2017			ANSI C63.	10:2013		
Run # 9	Line:	Neutral	Ext. Attenuation:	0	Results	Pass



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit									
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)				
0.186	53.7	0.4	54.1	64.2	-10.1				
0.248	48.3	0.4	48.7	61.8	-13.1				
3.575	41.3	0.9	42.2	56.0	-13.8				
3.248	41.4	0.8	42.2	56.0	-13.8				
4.223	39.6	0.9	40.5	56.0	-15.5				
2.924	38.2	0.8	39.0	56.0	-17.0				

Average Data - vs - Average Limit									
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)				
0.248	46.5	0.4	46.9	51.8	-4.9				
3.248	40.2	0.8	41.0	46.0	-5.0				
3.575	40.0	0.9	40.9	46.0	-5.1				
0.186	48.7	0.4	49.1	54.2	-5.1				
4.223	38.0	0.9	38.9	46.0	-7.1				
2.924	37.3	0.8	38.1	46.0	-7.9				



					EmiR5 2017.07.11	PSA-ESCI 2017.06.01
Work Orde	r: 3DSY0078	Date:	07/31/17	1.0	1 5	20
Projec	t: None	Temperature:	23.8 °C	1 acry	te ?	erings
Job Sit	e: EV11	Humidity:	43% RH	V		0
Serial Numbe	r: None	Barometric Pres.:	1023 mbar	Tested b	y: Travis Pow	and Rod Peloquin
EU	T: Skyetek M2					
Configuratio	n: 2					
Custome	r: 3D Systems Corporat	ion				
Attendee	s: Steve Wardle					
EUT Powe	r: 110VAC/60Hz					
Operating Mod	e: Cart antenna active					
Deviation	s: None					
Comment	Antennas in ProJet 60	000				
Test Specification	S		Test Meth	od		
FCC 15.207:2017			ANSI C63.	10:2013		
Run # 11	Line:	High Line	Ext. Attenuation:	0	Results	Pass
Quas	i Peak Data - vs - Quas	i Peak Limit	A 100	verage Data - vs -	Average Limit	







Quasi Peak Data - vs - Quasi Peak Limit						Avera	ige Data - v	s - Average	e Limit		
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)	Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.561	24.2	1.9	26.1	60.0	-33.9	13.561	22.8	1.9	24.7	50.0	-25.3

dBuV





Quasi Peak Data - vs - Quasi Peak Limit						Avera	ge Data - v	s - Average	e Limit		
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)	Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
13.561	23.5	1.9	25.4	60.0	-34.6	13.561	22.0	1.9	23.9	50.0	-26.1

100.0

0

0.1

1.0

MHz

10.0

0

0.1

1.0

MHz

10.0

100.0

FIELD STRENGTH OF FUNDAMENTAL



PSA-ESCI 2017.06.01

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

Cart antenna active

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

3DSY0078 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency 12 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
Cable	None	10m Test Distance Cable	EVL	4/17/2017	12 mo
Antenna	EMCO	6502	AOA	7/6/2016	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AFB	5/16/2017	12 mo

MEASUREMENT BANDWIDTHS

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

TEST DESCRIPTION

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

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 center 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, 6.4, 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



			_				_						_														E	miR5 2	017.07	.11			PSA	-ESCI 2	2017.06.0
	Work	Order		31	DSY	007	8	_					Da	te:			07/	31/	7		-	1	2	-6	2		1			7	2	1	2		
		Project	-		Nor			_			em	per	atu	re:			23	10/ T	<u>;</u>		-	-		(0	~	~					1	>		>
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	Cu	stomer	: 3D	Sys	tems	s Co	orpor	ratic	on																										
	Atte	endees	: Ste	eve V	Varc	lle																													
	EUT	Power	: 11	OVAC	C/60	Hz																													
0	perating	g Mode	: Ca	rt an	tenn	ia ai	ctive	9																											
	Dev	iations	: No	ne																															
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Test :	Specific	ations																Te	st N	/leth	od														
FCC	15.225:2	2017																A	ISI (C63	.10	201	3												
R	un #	3		Test	Dist	tand	ce (r	m)		10		A	nte	nna	Не	igh	nt(s)			1	to 4	(m)					Re	sult	S			Pas	s	
	80					_			_		_		_	_			-				_							_	_		_		_		
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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
13.050	10.1	11.1	1.0	365.0	10.0	0.0	Horz	QP	-19.1	2.1	29.5	-27.4	Antenna Perp to EUT
14.175	7.5	11.1	1.0	365.0	10.0	0.0	Horz	QP	-19.1	-0.5	29.5	-30.0	Antenna Perp to EUT
13.389	7.1	11.1	1.0	365.0	10.0	0.0	Horz	QP	-19.1	-0.9	40.5	-41.4	Antenna Perp to EUT
13.717	6.0	11.1	1.0	-5.0	10.0	0.0	Horz	QP	-19.1	-2.0	40.5	-42.5	Antenna Perp to EUT
13.523	7.8	11.1	1.0	365.0	10.0	0.0	Horz	QP	-19.1	-0.2	50.5	-50.7	Antenna Perp to EUT
13.583	7.6	11.1	1.0	365.0	10.0	0.0	Horz	QP	-19.1	-0.4	50.5	-50.9	Antenna Perp to EUT
13.560	20.7	11.1	1.0	208.0	10.0	0.0	Horz	QP	-19.1	12.7	84.0	-71.3	Antenna Perp to EUT
13.561	17.4	11.1	1.0	311.0	10.0	0.0	Vert	QP	-19.1	9.4	84.0	-74.6	Antenna Par to GND
13.560	12.5	11.1	1.0	-5.0	10.0	0.0	Horz	QP	-19.1	4.5	84.0	-79.5	Antenna Par to EUT

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHz



P3A-E3012017.00.01

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

Cart antenna active

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

3DSY0078 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency 9 kHz

Stop Frequency 30 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Analyzer - Spectrum Analyzer	Agilent	E4443A	AFB	5/16/2017	12 mo
Cable	None	10m Test Distance Cable	EVL	4/17/2017	12 mo
Antenna	EMCO	6502	AOA	7/6/2016	24 mo

MEASUREMENT BANDWIDTHS

Frequency Range	Peak Data	Quasi-Peak Data	Average Data
(MHz)	(kHz)	(kHz)	(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.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

As outlined in 15.209(e), 15.31(f)(2), and RSS-GEN, 6.4, 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: DOSY0078 Date: 073117 Project: None Temperature: 23.4 °C Job Ster: EV11 Humidity: 42.4 °C Berial Nume: None Beromeric Press: 1025 mbar Testod by: Testod by: Travis Pow EUT Foxyes Wande Comparation Operating Mode: Carl antennas in ProJet 6000, printer not powered. RFID powered by external AC to DC power adapter. Laptop connected via serial colob. Test Specifications Test Distance (m) 10 Antennas in ProJet 6000, printer not powered. RFID powered by external AC to DC power adapter. Laptop connected via serial colob. Test Specifications Test Distance (m) 10 Antennas in ProJet 6000, printer not powered. RFID powered by external AC to DC power adapter. Laptop connected via serial colob. Test Specifications Test Distance (m) 10 Antenna ProJet 6000, printer not powered. RFID powered by external AC to DC power adapter. Laptop connected via serial colob. Test Specifications Test Distance (m) 10 Antenna ProJet 6000, printer not powered. RFID powered by external AC to DC power adapter. Laptop connected via serial colob. Test Specifications Test Distance (m) 10 Antenna ProJet 6000, printer not powered.											EmiR5 2017.07.11		PSA-ESCI 2017.06.0	1
Project: None Temperature 23.4 °C Gold Site: EVII 1 Humidity 4245 RH Tested by: Travis Pow Come B1 Sorial Number: None Barometric Press: 1025 mbar Tested by: Travis Pow Come B1 Single Andrea Come B1 Single Andrea S	v	Vork Order:	3DS	Y0078		Date:	07/	31/17						
Job Site EV11 Humidity 42.4% RH Serial Mumber None Barometric Press. 1025 mbar Tested by: [Travis Pow EUT Skyteti M2 Configuration Costome: 3D System: 60 System: 60 System: 60 Operating Mode Operating Mode Configuration Costome: 3D System: 60 System: 60 Deviations None Antennas in ProJet 6000, printer not powered. RFID powered by external AC to DC power adapter. Laptop connected via serial cable. Test Specifications Feet Method Ansi DE3 10:2013 Mode Ansi DE3 10:2013 Pass Mode Its Method Its 4 (m) Results Pass Mode Mode Its 4 (m) Results Pass Mode Its 4 (m) Test Distance (m) 10 Antenna Height(s) 110 4(m) Results Pass Mode Its 4 (m) Test Distance (m) 10 Antenna Height(s) 110 4(m) Its 4 (m)		Project:	N	lone	Ter	mperature:	23	.4 °C						
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EUT: Bysterik M2 Configuration: 1 Customer: 30.5 Systems: Customer: 30.5 Systems: EUT Power: HitMACEOHz Operating Mode Cart antennas in Project 6000, printer not powered. Recipient in themas in Project 6000, printer not powered. RFID powered by external AC to DC power adapter. Test Specifications Test Method FCC 15 225:2017 Antenna Height(S) 1 to 4(m) Run # 4 Test Distance (m) 10 Antenna Height(S) 1 to 4(m) Results Pass 70 0 <td< th=""><th>Seri</th><th>al Number:</th><th>N</th><th>lone</th><th>Barome</th><th>etric Pres.:</th><th>1025</th><th>5 mbar</th><th></th><th>Tested by:</th><th>Travis Pov</th><th>V</th><th></th><th></th></td<>	Seri	al Number:	N	lone	Barome	etric Pres.:	1025	5 mbar		Tested by:	Travis Pov	V		
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16.968 17.2 10.9 1.0 -5.0 10.0 0.0 Horz QP -19.1 9.0 29.5 -20.5 Antenna Perp to EUT 27.121 12.2 9.3 1.0 -5.0 10.0 0.0 Vert QP -19.1 2.4 29.5 -27.1 Antenna Perp to GND 20.349 10.8 10.7 1.0 363.0 10.0 0.0 Horz QP -19.1 2.4 29.5 -27.1 Antenna Par to GND 27.120 7.1 9.3 1.0 -5.0 10.0 0.0 Horz QP -19.1 2.4 29.5 -27.1 Antenna Par to EUT 27.120 7.1 9.3 1.0 -5.0 10.0 0.0 Horz QP -19.1 2.4 29.5 -27.1 Antenna Par to EUT 27.120 7.1 9.3 1.0 -5.0 10.0 0.0 Horz QP -19.1 -27 29.5 -32.2 Antenna Par to EUT	27.121	20.2	9.3	1.0	-5.0	10.0	0.0	Horz	QP	-19.1	10.4	29.5	-19.1	Antenna Perp to EUT
27.121 12.2 9.3 1.0 -5.0 10.0 0.0 Vert QP -19.1 2.4 29.5 -27.1 Antenna Par to GND 20.349 10.8 10.7 1.0 363.0 10.0 0.0 Horz QP -19.1 2.4 29.5 -27.1 Antenna Par to GND 27.120 7.1 9.3 1.0 -5.0 10.0 0.0 Horz QP -19.1 2.4 29.5 -27.1 Antenna Par to EUT 27.120 7.1 9.3 1.0 -5.0 10.0 0.0 Horz QP -19.1 2.4 29.5 -27.1 Antenna Par to EUT 27.120 7.1 9.3 1.0 -5.0 10.0 0.0 Horz QP -19.1 -2.7 29.5 -32.2 Antenna Par to EUT	16.968	17.2	10.9	1.0	-5.0	10.0	0.0	Horz	QP	-19.1	9.0	29.5	-20.5	Antenna Perp to EUT
20.349 10.8 10.7 1.0 363.0 10.0 0.0 Horz QP -19.1 2.4 29.5 -27.1 Antenna Par to EUT 27.120 7.1 9.3 1.0 -5.0 10.0 0.0 Horz OP -19.1 -2.7 29.5 -32.2 Antenna Par to EUT	27.121	12.2	9.3	1.0	-5.0	10.0	0.0	Vert	QP	-19.1	2.4	29.5	-27.1	Antenna Par to GND
	20.349 27 120	10.8 7 1	10.7 9.3	1.0 1.0	363.0 -5 0	10.0 10.0	0.0	Horz Horz	QP QP	-19.1 -19.1	2.4 -2 7	29.5 29.5	-27.1 -32.2	Antenna Par to EUT

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHz



PSA-ESCI 2017.06.01

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

Cart antenna active

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

3DSY0078 - 1

FREQUENCY RANGE INVESTIGATED

|--|

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	5/16/2017	12 mo
Cable	None	3m Test Distance Cable	EVM	4/17/2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1551	AOY	4/17/2017	12 mo
Antenna - Biconilog	EMCO	3141	AXG	7/17/2017	24 mo

MEASUREMENT BANDWIDTHS

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

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was 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.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHz



									EmiR5 2017.07.11		PSA-ESCI 2017.06.01
W	ork Order:	3DSY0078		Date:	07/3	31/17	0	0	1 -	DO	2
	Project:	None	Ter	nperature:	23	6°C	1000	ting 1	e >	ela	29
	Job Site:	EV/11		Humidity:	/30			0		1	/ -
Soria	Number:	Nono	Barama	trio Broc I	1024	mbor	-	Tootod by	Trovia Dou	und Rod	Pologuin
Sena			Daronne	enic Fles.	1024	IIIDal		rested by.	TIAVIS FUN	anu Rou	Peloquin
	EUI:	Skyetek M2									
Con	figuration:	1									
	Customer:	3D Systems Corp	oration								
	Attendees:	Steve Wardle									
E	UT Power:	110VAC/60Hz									
Operat	ting Mode:	Cart antenna acti	ve								
C	Deviations:	None									
с	comments:	Antennas in ProJ via serial cable.	et 6000, printer	not powere	d. RFID p	owered by e	external AC	to DC powe	er adapter.	Laptop co	nnected
Test Spec	ifications					Test Meth	od				
FCC 15 22	25.2017					ANSI C63	10.2013				
Run #	5	Test Distance	(m) 3	Antenna	1 Height(s)	8	1 to 4(m)		Results	Pa	ass
80 -											
70											
10											
60											
00											
50											
ا ³⁰ ع											
S I											
2 40											
•											
30											
50			•								
						-					
20 -											
20											
10 -											
10											
0 -											
1(n				100						1000
	0										1000
					IVIHZ				PK	AV	QP
				1						• •	
Freq (MHz)	Amplitude (dBuV)	Anten Factor Heig (dB) (mete	na ht Azimuth rs) (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)
54.246	61.4	-29.7 1.0	311.0	3.0	0.0	Vert	QP	0.0	31.7	40.0	-8.3
54.247	60.7	-29.7 1.0	304.0	3.0	0.0	Vert	QP	0.0	31.0	40.0	-9.0

3.0

54.4

-26.0

1.0

60.0

40.687

0.0

Vert

QP

0.0

28.4

40.0

40.0

43.5

40.0

40.0

40.0

40.0

-11.6

-14.6

-17.2

-21.9

-23.5

-24.9

-25.1



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
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-8-2-SCT/AC	TBI	NCR	NCR
Probe - Near Field Set	EMCO	7405	IPD	NCR	NCR
Attenuator	S.M. Electronics	SA26B-20	AUY	5/30/2017	5/30/2018
Block - DC	Fairview Microwave	SD3379	AMW	6/5/2017	6/5/2018
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	8/10/2016	8/10/2017
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	5/30/2017	5/30/2018
Power Supply - AC	Instek	APS-9050	TPK	NCR	NCR
Thermometer	Omegaette	HH311	DTY	1/21/2015	1/21/2018

TEST DESCRIPTION

A near-field probe was placed near the transmitter. A low-loss coaxial cable was used to connect the near-field probe to the spectrum analyzer. The spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT.

Measurements were made on the single transmit frequency as called out on the data sheets. Testing was done while the EUT was continuously polling.

The primary supply voltage was varied from 85 % to 115% of the nominal voltage while at ambient temperature. Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range of -20 $^{\circ}$ to +50 $^{\circ}$ C and at 10 $^{\circ}$ C intervals.

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

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



									XMit 2017.02.08
EUT	Skyetek M2						Work Order:	3DSY0078	
Serial Number:	None						Date:	08/01/17	
Customer	3D Systems Corporation	1					Temperature:	24 °C	
Attendees	Steve Wardle						Humidity:	43.4% RH	
Project:	None						Barometric Pres.:	1018 mbar	
Tested by:	Travis Pow and Rod Pel	oquin	Power:	110VAC/60Hz			Job Site:	EV06	
TEST SPECIFICAT	IONS			Test Method					
FCC 15.225:2017				ANSI C63.10:2013					
COMMENTS									
None									
DEVIATIONS FROM	M TEST STANDARD								
None									
Configuration #	3	Signature	" Relings						
		• • • •			Measured Value (MHz)	Assigned Value (MHz)	Error ppm	Limit ppm	Result
50°C									
	100% at 110VAC/60Hz				13.56037	13.56	27	100	Pass
40°C									
	100% at 110VAC/60Hz				13.56039	13.56	29	100	Pass
30°C									
	100% at 110VAC/60Hz				13.56042	13.56	31	100	Pass
20°C									-
	115% at 110VAC/60Hz				13.56046	13.56	34	100	Pass
	100% at 110VAC/60Hz				13.56046	13.56	34	100	Pass
10%	85% at 110VAC/60Hz				13.30040	13.30	34	100	Pass
10 0	100% at 110\/AC/60Hz				13 56049	13.56	36	100	Pass
0°C	100 % at 110 VAC/00112				13.30043	13.30	50	100	1 835
00	100% at 110VAC/60Hz				13 56052	13.56	38	100	Pass
-10°C					.0.00002	10.00			1 400
	100% at 110VAC/60Hz				13.56052	13.56	38	100	Pass
-20°C									
	100% at 110VAC/60Hz				13.5605	13.56	37	100	Pass



	50°C,	100% at 110VAC	/60HZ	Linet	
		Assigned	Error	Limit	Popult
	13 56037	13 56	27	100	Pass
	13.30037	13.50	21	100	1 855
📁 Keysight Spectrum Analyzer - Element Material:	s Technology				
IX RL RF 50Ω AC	SE	NSE:INT	ALIGN OFF	ere Diver	03:54:32 AM Aug 02, 201
	PNO: Close 🖵	Trig: Free Run Atten: 6 dB	Avg Type: I	-og-Pwr	TYPE WWWWWW DET NNNNN
				Mkr1	13.560 37 MH
5 dB/div Ref -9.00 dBm			1		-18.20 dBr
-14.0					
.19.0					
10.0					
-24.0					
20.0					
-23.0					
-34.0		/			
20.0	/				
-39.0					
-44.0					
(0.0)					
-49.0					
-54.0					
Center 13.560000 MHz					Span 10.00 kH
#Res BW 1.0 KHz	#VBW	3.0 KH2		Sweep 7	1.000 ms (1001 pt

	40°C,	100% at 110VAC	:/60Hz		
	Measured	Assigned	Error	Limit	
	Value (MHz)	Value (MHz)	ppm	ppm	Result
	13.56039	13.56	29	100	Pass





	30°C,	100% at 110VA0	C/60Hz		
	Measured	Assigned	Error	Limit	
·	Value (MHz)	Value (MHz)	ppm	ppm	Result
	13.56042	13.56	30.97345133	100	Pass
Keysight Spectrum Analyzer - Element Material	s Technology	NSE:INT	ALIGN OFF		04:27:59 AM Aug 02, 2017
	PNO: Close	Trig: Free Run Atten: 6 dB	Avg Type: L	og-Pwr	TRACE 1 2 3 4 5 6 TYPE WWWWWW DET NNNNN
	in SumEST			Mkr1	13.560 42 MHz
dB/div Ref -9.00 dBm					-18.03 dBm
- ^{og}					
14 0					
		A	1		
19.0			<u> </u>		
24.0					
34.0					
		/			
39.0			\\		
44.0					
49.0					
54.0					
Center 13.560000 MHz	{				Span 10.00 kHz

	20°C,	115% at 110VAC	C/60Hz			
	Measured	Assigned	Error	Limit		
	Value (MHz)	Value (MHz)	ppm	ppm	Result	_
	13.56046	13.56	33.92330383	100	Pass	

鱦 Keysight Spectr	rum Analyzer - Element Materials	Technology					
LXI RL	RF 50 Ω AC	SE	NSE:INT	ALIGN OFF		02:26:19 AM	Aug 02, 2017
		PNO: Close 😱 IFGain:Low	Trig: Free Run Atten: 6 dB	Avg I	ype: Log-Pwr	TYPE DET	1 2 3 4 5 6 WWWWWW N N N N N N N
5 dB/div	Ref -9.00 dBm				Μ	lkr1 13.560 4 -20.6	6 MHz 8 dBm
-14.0							
-19.0				<u>1</u>			
-24 0				×			
-29.0							
-34 0							
-39 በ							
-44.0		/	/				
-49.0							
-54.0							
Center 13.5 #Res BW 1.	60000 MHz 0 kHz	#VBW	3.0 kHz		Swee	Span 10 ep 1.000 ms (1).00 kHz 001 pts)
MSG				STATU	s		



Mit 2017.02.08 20°C, 100% at 110VAC/60Hz Assigned Value (MHz) 13.56 Measured Error Limit Value (MHz) **ppm** 33.92330383 **ppm** 100 Result 13.56046 Pass 02:19:54 AM Aug 02, 2017 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET N N N N N Keysight Sj Analyzer - Element Ma Is Technology ALIGN Avg Type: Log-Pwr PNO: Close Trig: Free Run IFGain:Low Atten: 6 dB Mkr1 13.560 46 MHz -17.69 dBm Ref -9.00 dBm 5 dB/div Log V Center 13.560000 MHz #Res BW 1.0 kHz Span 10.00 kHz Sweep 1.000 ms (1001 pts) #VBW 3.0 kHz STATUS

20°C, 85% at 110VAC/60Hz									
		Measured	Assigned	Error	Limit				
		Value (MHz)	Value (MHz)	ppm	ppm	Result			
		13.56046	13.56	33.92330383	100	Pass			

🍺 Keysight Sp	ectrum Analyzer - Element Ma	aterials Technology						
LXI RL	RF 50 Ω AC		SENSE:INT	Al 🔬 Al	IGN OFF	_	02:28:42	AM Aug 02, 2017
		PNO: Close 🖵 IFGain:Low	Trig: Free R Atten: 6 dB	lun 3	Avg Type: I	Log-Pwr	T	ACE 1 2 3 4 5 6 YPE WWWWWWW DET NNNNNN
5 dB/div	Ref -9.00 dBm					Mk	r1 13.560 -20) 46 MHz).68 dBm
-14.0								
-19.0				<u>_1</u>				
-19.0								
.29.0								
34.0								
39.0								
-44.0								
-49.0								
-54 0								
Center 13 #Res BW	3.560000 MHz 1.0 kHz	#VB	W 3.0 kHz			Sweep	Span 1.000 ms	10.00 kHz (1001 pts)
MSG					STATUS			



Ait 2017.02.08 10°C, 100% at 110VAC/60Hz Measured Assigned Error Limit Value (MHz) **ppm** 100 Value (MHz) ppm Result 13.56049 13.56 36.13569322 Pass Keysight Sp 06:03:27 AM Aug 02, 2017 RL ALIGN Avg Type: Log-Pwr TRACE 12345 TYPE WWWWW PNO: Close Trig: Free Run IFGain:Low #Atten: 6 dB TYPE Mkr1 13.560 49 MHz -17.89 dBm Ref -9.00 dBm 5 dB/div **♦**¹ Center 13.560000 MHz #Res BW 1.0 kHz Span 10.00 kHz Sweep 1.000 ms (1001 pts) #VBW 10 kHz STATUS

	0°C,	100% at 110VAC	/60Hz			
	Measured	Assigned	Error	Limit		
	Value (MHz)	Value (MHz)	ppm	ppm	Result	_
	13.56052	13.56	38.3480826	100	Pass	1





	-10°C	, 100% at 110VAC	C/60Hz		
	Measured	Assigned	Error	Limit	
· · · · ·	Value (MHz)	Value (MHz)	ppm	ppm	Result
	13.56052	13.56	38.3480826	100	Pass
🗾 Keysight Spectrum Analyzer - Elemen	nt Materials Technology				
μα RL RF 50 Ω γ	AC SI	ENSE:INT		Log-Pwr	07:33:11 AM Aug 02, 20: TRACE 1 2 3 4 5
	PNO: Close 🖵	Trig: Free Run			TYPE WWWWW
	IFGain:Low	#Atten: 6 dB			DET
				Mkr1	13.560 52 MH
5 dB/div Ref -9.00 dBr	m				-17.75 dBr
-14.0			1		
-19.0					
-24.0					
-29.0					
-34.0					
-39.0					
-44.0					
-49.0				A	
-54.0					
Center 13.560000 MHz	#\/D\			Swoon	Span 10.00 kH
#Kes BW 1.0 KHZ	#VBV		1 1	Sweep	1.000 ms (1001 pt
MSG			STATUS		
	-20°C	, 100% at 110VAC	C/60Hz		
	Maaa		L	1 10011	
	Measured	Assigned	Error		Decult
	Measured Value (MHz)	Assigned Value (MHz)	ppm	ppm	Result

-20°C, 100% at 110VAC/60Hz										
		Measured	Assigned	Error	Limit					
		Value (MHz)	Value (MHz)	ppm	ppm	Result				
		13.5605	13.56	36.87315634	100	Pass				

🎉 Keysight Spe	ctrum Analyzer - Element Materials T	echnology					
🗶 RL	RF 50 Ω AC	PNO: Close IFGain:Low	Trig: Free Run #Atten: 6 dB	ALIGN OFF Avg T	ype: Log-Pwr	08:11:10 AM Aug 02, 2017 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET N N N N N	
5 dB/div	Ref -9.00 dBm				Μ	kr1 13.560 50 MHz -20.53 dBm	
-14.0							
-19.0				1			
-24.0							
-29.0							
-34.0							
-39.0							
-44.0							
-54.0							
Center 13	.560000 MHz					Span 10.00 kHz	
#Res BW	1.0 KHZ	#VBV	N TO KHZ	STATU	s	p 1.000 ms (1001 pts)	