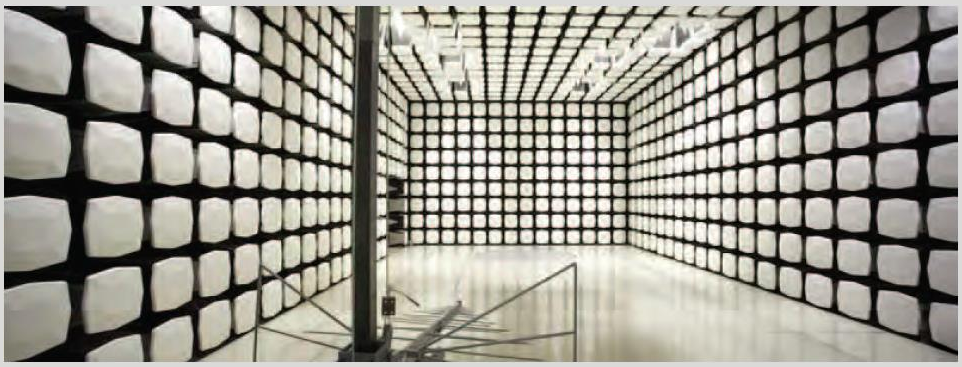
Masimo Corporation

AIR01 Receiver

FCC 15.225:2018

13.56 MHz Radio

Report # MASI0519.5



NVLAP LAB CODE: 200676-0

CERTIFICATE OF TEST

Last Date of Test: December 14, 2018
Masimo Corporation
Model: AIR01 Receiver

Radio Equipment Testing

Standards

Specification	Method
FCC 15.225:2018	ANSI C63.10:2013

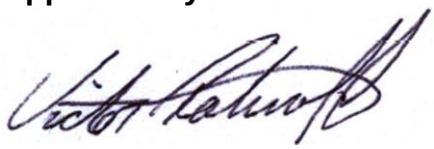
Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	No	N/A	Not required for a battery powered EUT.
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:



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

REVISION HISTORY

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

ACCREDITATIONS AND AUTHORIZATIONS

United States

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

A2LA - 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

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

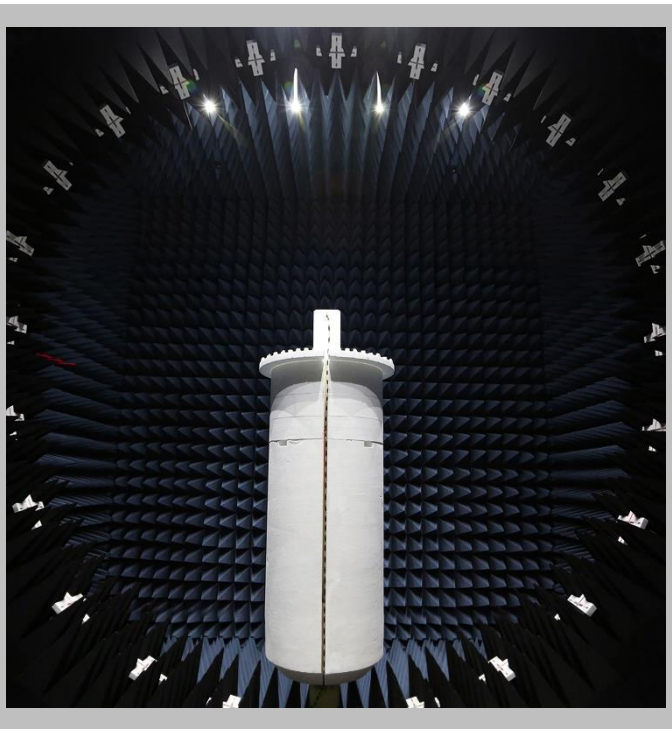
MIC – Recognized by MIC as a CAB for the acceptance of test data.

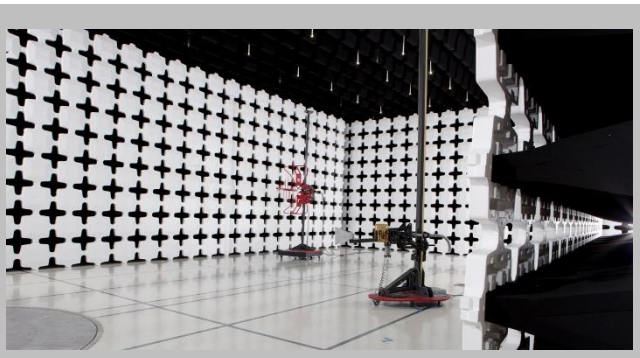
SCOPE

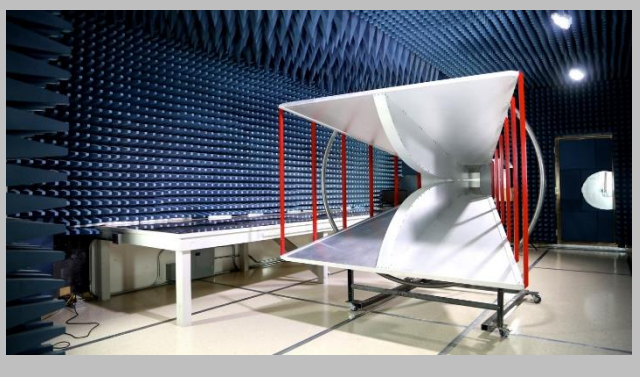
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-10 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 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
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
Innovation, Science and Economic Development Canada					
2834B-1, 2834B-3	2834E-1, 2834E-3	N/A	2834D-1	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







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.

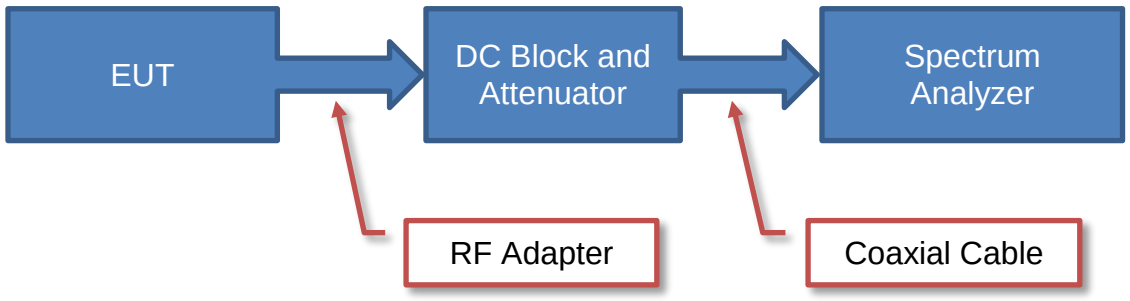
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable 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.

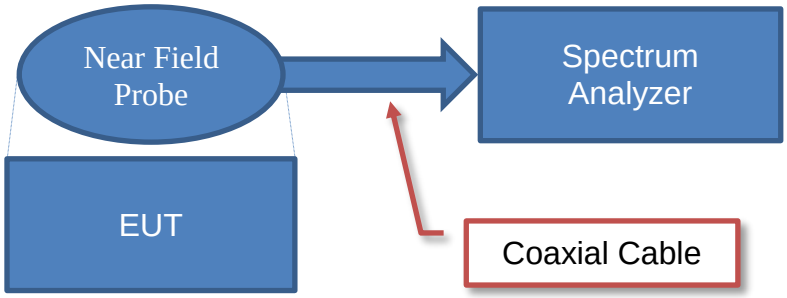
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.1 dB	-5.1 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

Test Setup Block Diagrams

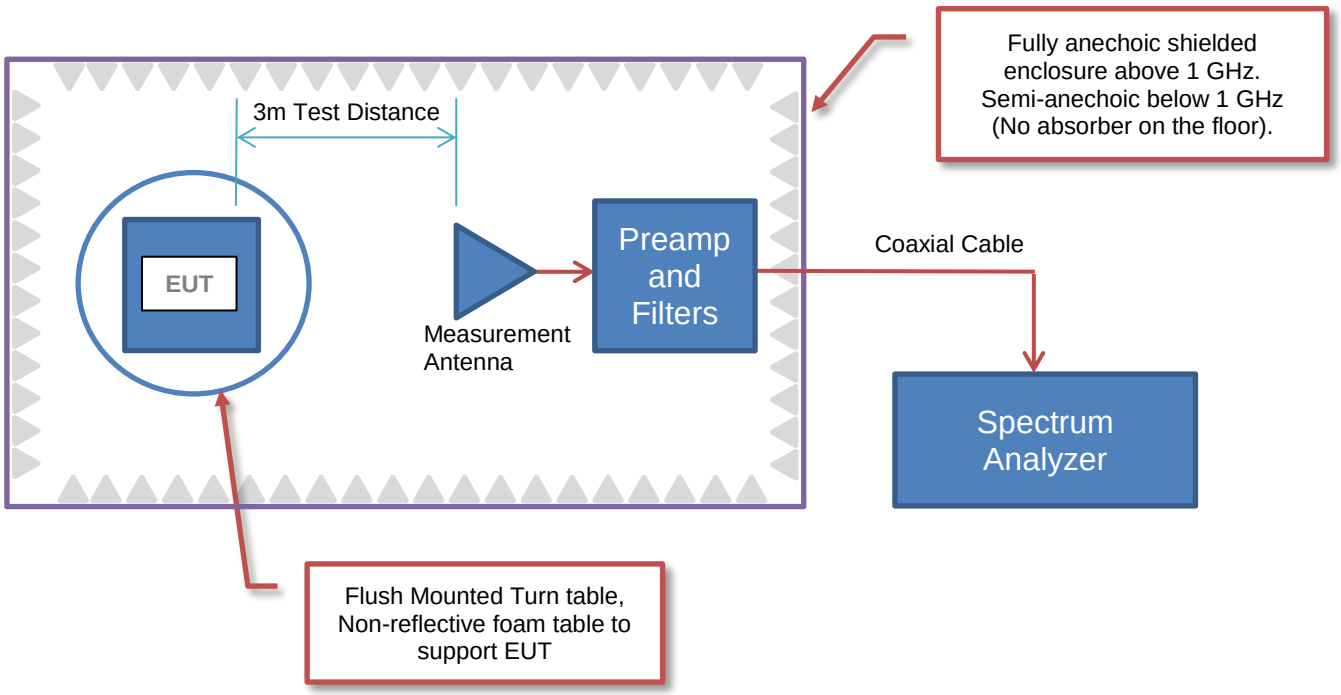
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Masimo Corporation
Address:	52 Discovery
City, State, Zip:	Irvine, CA 92618
Test Requested By:	Anami Joshi
Model:	AIR01 Receiver
First Date of Test:	December 10, 2018
Last Date of Test:	December 14, 2018
Receipt Date of Samples:	December 10, 2018
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
AIR01 Technology Board snaps on to AIR01 Sensor (no cable). This assembly of AIR01 Technology Board and AIR01 Sensor is battery powered. This assembly connects to AIR01 Receiver over Bluetooth LE. AIR01 Receiver has a cable (less than 0.3m) that connects to patient port of Rad-97.

Testing Objective:
To demonstrate compliance of the 13.56 MHz radio to FCC Part 15.225 specifications.

CONFIGURATIONS

Configuration MASI0519- 1

Software/Firmware Running during test	
Description	**Version**
AIR01 Receiver	V1001

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AIR01 Receiver	Masimo Corporation	26896 Rev.A	RX-RF-2

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Host Laptop	Hewlett Packard	HSNIO4C	5CGB271JH4
Host Laptop Power Adapter	Masimo Corporation	TPN-CAD6	1588-3003

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
Receiver Cable	No	0.15m	No	AIR01 Receiver	Unterminated
USB Cable	Yes	1.8m	No	AIR01 Receiver	Host Laptop
DC Cable	Yes	1.4m	No	Host Laptop	Host Laptop Power Adapter
AC Cable	No	0.9m	No	Host Laptop Power Adapter	AC Mains

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2018-12-10	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	2018-12-10	Field Strength of Spurious Emissions Less than 30MHz	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	2018-12-14	Field Strength of Spurious Emissions Greater than 30MHz	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	2018-12-14	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWER SETTINGS

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

FIELD STRENGTH OF FUNDAMENTAL

PSA-ESCI 2018.07.27

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 at 13.56 MHz

POWER SETTINGS INVESTIGATED

USB via 120VAC/60Hz

CONFIGURATIONS INVESTIGATED

MASI0519 - 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
Antenna - Loop	EMCO	6502	AZB	22-Aug-2017	24 mo
Cable	Northwest EMC	3 kHz - 1 GHz RE Cables	OCB	1-Aug-2018	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	7-Aug-2018	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.

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, 6.4, 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.

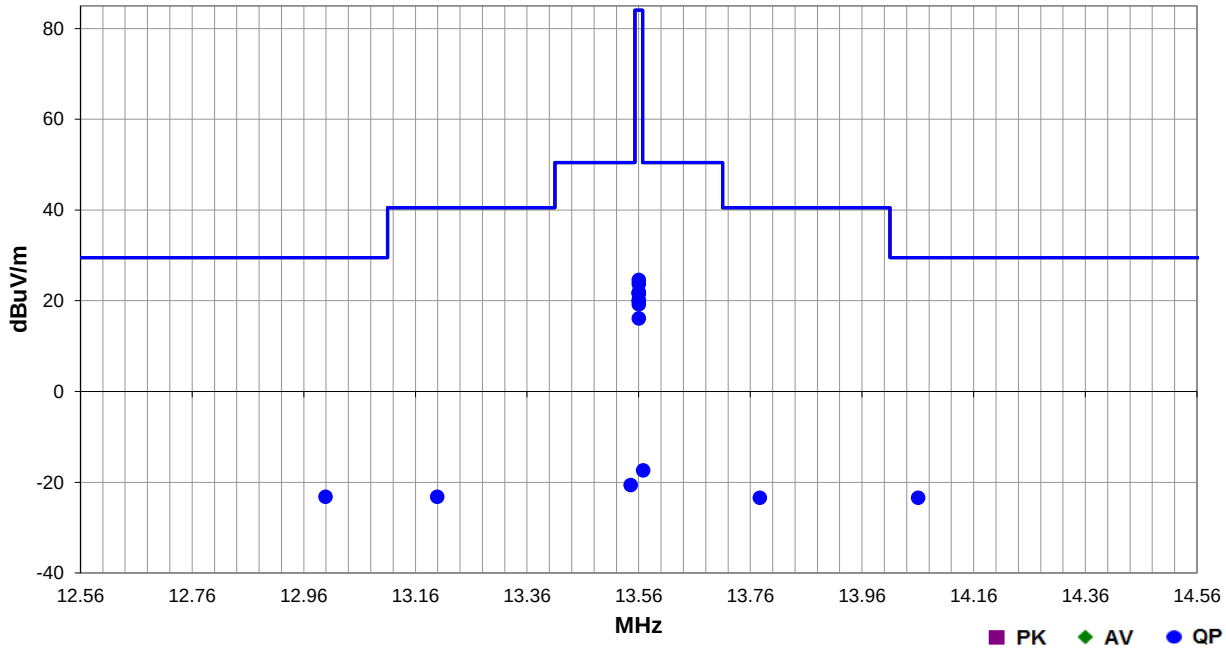
FIELD STRENGTH OF FUNDAMENTAL

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	MASI0519	**Date:**	10-Dec-2018		
Project:	None	**Temperature:**	20.3 °C		
Job Site:	OC08	**Humidity:**	53.2% RH		
Serial Number:	RX-RF-2	**Barometric Pres.:**	1019 mbar	**Tested by:**	Mark Baytan
EUT:	AIR01 Receiver				
Configuration:	1				
Customer:	Masimo Corporation				
Attendees:	Nghi Nguyen				
EUT Power:	USB via 120VAC/60Hz				
Operating Mode:	Transmitting at 13.56 MHz				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.225:2018	ANSI C63.10:2013

Run #	2	**Test Distance (m)**	3	**Antenna Height(s)**	1(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12.999	5.3	11.5	1.0	46.0	3.0	0.0	Par to GND	QP	-40.0	-23.2	29.5	-52.7	EUT Vert
14.060	5.1	11.5	1.0	46.0	3.0	0.0	Par to GND	QP	-40.0	-23.4	29.5	-52.9	EUT Vert
13.560	53.1	11.5	1.0	46.0	3.0	0.0	Par to GND	QP	-40.0	24.6	84.0	-59.4	EUT Vert
13.560	52.2	11.5	1.0	45.0	3.0	0.0	Par to GND	QP	-40.0	23.7	84.0	-60.3	EUT on Side
13.560	50.4	11.5	1.0	352.0	3.0	0.0	Par to GND	QP	-40.0	21.9	84.0	-62.1	EUT Horz
13.560	50.1	11.5	1.0	162.0	3.0	0.0	Par to EUT	QP	-40.0	21.6	84.0	-62.4	EUT Vert
13.560	50.1	11.5	1.0	207.0	3.0	0.0	Perp to EUT	QP	-40.0	21.6	84.0	-62.4	EUT Vert
13.199	5.3	11.5	1.0	46.0	3.0	0.0	Par to GND	QP	-40.0	-23.2	40.5	-63.7	EUT Vert
13.560	48.6	11.5	1.0	224.0	3.0	0.0	Perp to EUT	QP	-40.0	20.1	84.0	-63.9	EUT on Side
13.777	5.1	11.5	1.0	46.0	3.0	0.0	Par to GND	QP	-40.0	-23.4	40.5	-63.9	EUT Vert
13.560	48.5	11.5	1.0	147.0	3.0	0.0	Par to EUT	QP	-40.0	20.0	84.0	-64.0	EUT on Side
13.560	47.7	11.5	1.0	208.0	3.0	0.0	Perp to EUT	QP	-40.0	19.2	84.0	-64.8	EUT Horz
13.560	44.6	11.5	1.0	126.0	3.0	0.0	Par to EUT	QP	-40.0	16.1	84.0	-67.9	EUT Horz
13.568	11.1	11.5	1.0	46.0	3.0	0.0	Par to GND	QP	-40.0	-17.4	50.5	-67.9	EUT Vert
13.546	7.9	11.5	1.0	46.0	3.0	0.0	Par to GND	QP	-40.0	-20.6	50.5	-71.1	EUT Vert

FIELD STRENGTH OF SPURIOUS EMISSIONS < 30MHz

PSA-ESCI 2018.07.27

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 at 13.56 MHz

POWER SETTINGS INVESTIGATED

USB via 120VAC/60Hz

CONFIGURATIONS INVESTIGATED

MASI0519 - 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
Antenna - Loop	EMCO	6502	AZB	22-Aug-2017	24 mo
Cable	Northwest EMC	3 kHz - 1 GHz RE Cables	OCB	1-Aug-2018	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AAR	7-Aug-2018	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.

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, 6.4, 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 < 30MHz

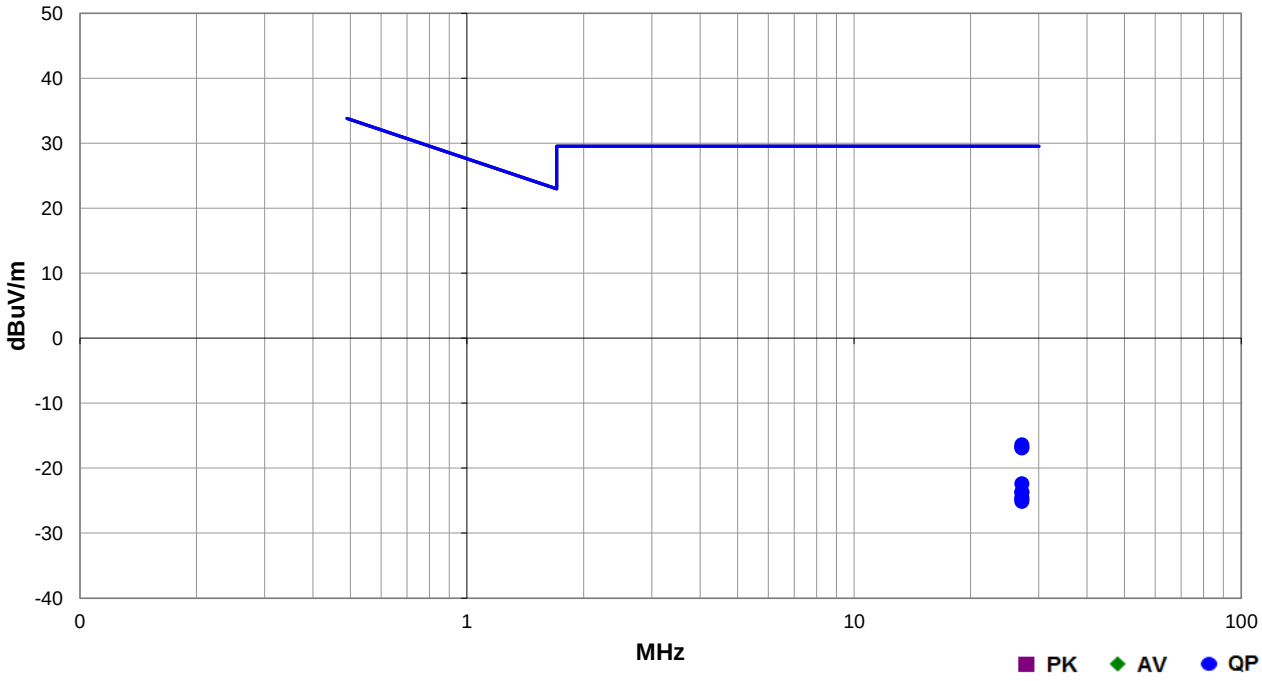
element

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	MASI0519	**Date:**	10-Dec-2018		
Project:	None	**Temperature:**	20.3 °C		
Job Site:	OC08	**Humidity:**	53.2% RH		
Serial Number:	RX-RF-2	**Barometric Pres.:**	1019 mbar	**Tested by:**	Mark Baytan
EUT:	AIR01 Receiver				
Configuration:	1				
Customer:	Masimo Corporation				
Attendees:	Nghi Nguyen				
EUT Power:	USB via 120VAC/60Hz				
Operating Mode:	Transmitting at 13.56 MHz				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.225:2018	ANSI C63.10:2013

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



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
27.120	13.8	9.8	1.0	16.0	3.0	0.0	Perp to EUT	QP	-40.0	-16.4	29.5	-45.9	EUT on Side
27.120	13.4	9.8	1.0	215.0	3.0	0.0	Perp to EUT	QP	-40.0	-16.8	29.5	-46.3	EUT Vert
27.120	13.3	9.8	1.0	18.0	3.0	0.0	Perp to EUT	QP	-40.0	-16.9	29.5	-46.4	EUT Horz
27.121	7.8	9.8	1.0	143.0	3.0	0.0	Par to EUT	QP	-40.0	-22.4	29.5	-51.9	EUT Vert
27.119	6.5	9.8	1.0	139.0	3.0	0.0	Par to GND	QP	-40.0	-23.7	29.5	-53.2	EUT Vert
27.121	6.5	9.8	1.0	159.0	3.0	0.0	Par to EUT	QP	-40.0	-23.7	29.5	-53.2	EUT on Side
27.120	5.7	9.8	1.0	164.0	3.0	0.0	Par to EUT	QP	-40.0	-24.5	29.5	-54.0	EUT Horz
27.119	5.4	9.8	1.0	109.0	3.0	0.0	Par to GND	QP	-40.0	-24.8	29.5	-54.3	EUT Horz
27.118	5.1	9.8	1.0	87.0	3.0	0.0	Par to GND	QP	-40.0	-25.1	29.5	-54.6	EUT on Side

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHZ

PSA-ESCI 2018.07.27

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 at 13.56 MHz

POWER SETTINGS INVESTIGATED

USB via 120VAC/60Hz

CONFIGURATIONS INVESTIGATED

MASI0519 - 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.	Interval
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	PAD	10-Jul-2018	12 mo
Cable	ESM Cable Corp.	30-1GHz cables	OCW	10-May-2018	12 mo
Antenna - Biconilog	EMCO	3142	AXB	5-Apr-2018	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAY	30-Nov-2018	12 mo

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.

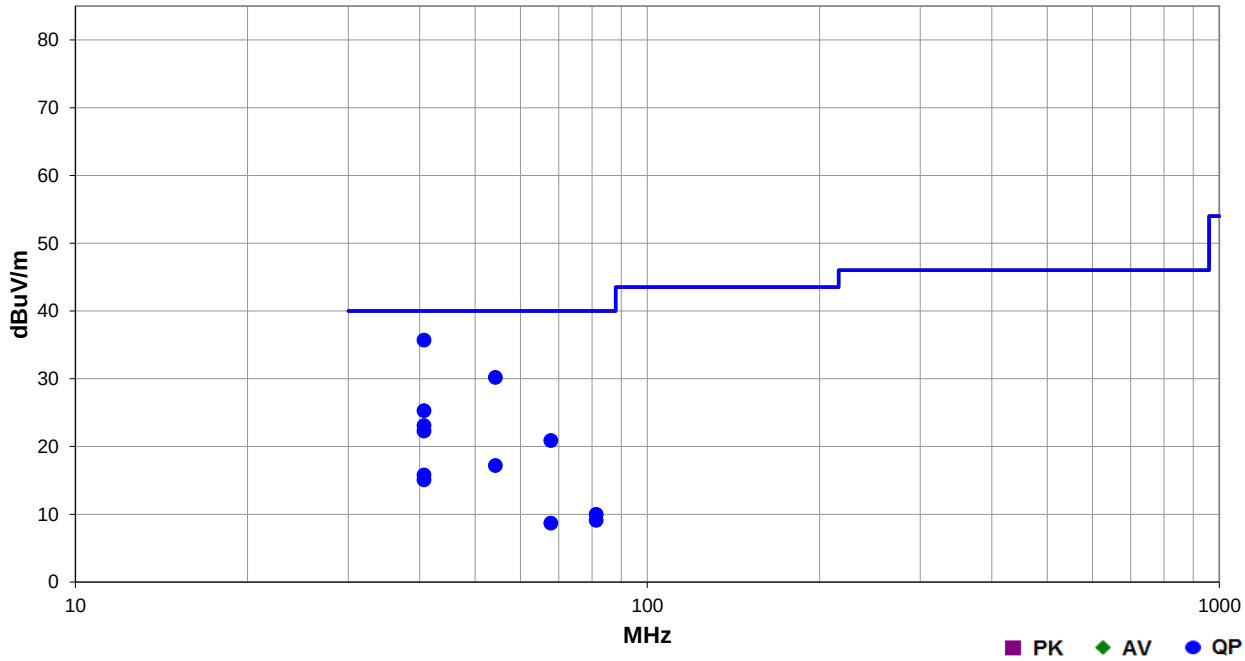
FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHZ

EmiR5 2018.09.26 PSA-ESCI 2018.07.27

Work Order:	MASI0519	**Date:**	14-Dec-2018		
Project:	None	**Temperature:**	19.1 °C		
Job Site:	OC07	**Humidity:**	46.1% RH		
Serial Number:	RX-RF-2	**Barometric Pres.:**	1024 mbar	**Tested by:**	Johnny Candelas
EUT:	AIR01 Receiver				
Configuration:	1				
Customer:	Masimo Corporation				
Attendees:	Nghi Nguyen				
EUT Power:	USB via 120VAC/60Hz				
Operating Mode:	Transmitting at 13.56 MHz				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.225:2018	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)	Comments
40.686	40.5	-4.8	1.0	295.0	3.0	0.0	Vert	QP	0.0	35.7	40.0	-4.3	EUT on Side
54.249	39.2	-9.0	1.0	349.0	3.0	0.0	Vert	QP	0.0	30.2	40.0	-9.8	EUT on Side
40.685	30.1	-4.8	4.0	244.0	3.0	0.0	Horz	QP	0.0	25.3	40.0	-14.7	EUT on Side
40.683	27.9	-4.8	1.0	303.0	3.0	0.0	Vert	QP	0.0	23.1	40.0	-16.9	EUT Vert
40.683	27.1	-4.8	1.0	303.0	3.0	0.0	Vert	QP	0.0	22.3	40.0	-17.7	EUT Horiz
67.805	31.2	-10.3	1.0	335.0	3.0	0.0	Vert	QP	0.0	20.9	40.0	-19.1	EUT on Side
54.246	26.2	-9.0	3.9	234.0	3.0	0.0	Horz	QP	0.0	17.2	40.0	-22.8	EUT on Side
40.686	20.6	-4.8	2.4	238.0	3.0	0.0	Horz	QP	0.0	15.8	40.0	-24.2	EUT Vert
40.683	19.9	-4.8	2.0	222.0	3.0	0.0	Horz	QP	0.0	15.1	40.0	-24.9	EUT Horiz
81.368	20.4	-10.4	1.0	93.0	3.0	0.0	Vert	QP	0.0	10.0	40.0	-30.0	EUT on Side
81.363	19.5	-10.4	4.0	256.0	3.0	0.0	Horz	QP	0.0	9.1	40.0	-30.9	EUT on Side
67.805	19.0	-10.3	1.0	241.0	3.0	0.0	Horz	QP	0.0	8.7	40.0	-31.3	EUT on Side

FREQUENCY STABILITY

XMit 2017.12.13

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	Omega Engineering, Inc.	HH311	DUC	8-Nov-17	8-Nov-20
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPHS-32-3.5-SCT/AC	TBE	19-Nov-18	19-Nov-19
Attenuator	Fairview Microwave	SA18E-20	TKS	31-Jan-18	31-Jan-19
Probe - Near Field Set	EMCO	7405	IPI	NCR	NCR
Block - DC	Aeroflex	INMET 8535	AMO	23-Mar-18	23-Mar-19
Cable	Fairview Microwave	SCA1814-0101-120	OCZ	NCR	NCR
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	20-Nov-18	20-Nov-19

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 ° to +50° C and at 10°C intervals.

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

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

FREQUENCY STABILITY

element

TbtTx 2018.09.13 XMit 2017.12.13

EUT:	**AIR01 Receiver**			**Work Order:**	**MASI0519**
Serial Number:	**RX-RF-2**			**Date:**	**14-Dec-18**
Customer:	**Masimo Corporation**			**Temperature:**	**20.3 °C**
Attendees:	**Nghi Nguyen**			**Humidity:**	**50.7% RH**
Project:	**None**			**Barometric Pres.:**	**1020 mbar**
Tested by:	**Johnny Candelas**	**Power:**	**USB via 120VAC/60Hz**	**Job Site:**	**OC13**

TEST SPECIFICATIONS	**Test Method**
FCC 15.225:2018	ANSI C63.10:2013

COMMENTS

Transmitting at 13.56 MHz

DEVIATIONS FROM TEST STANDARD

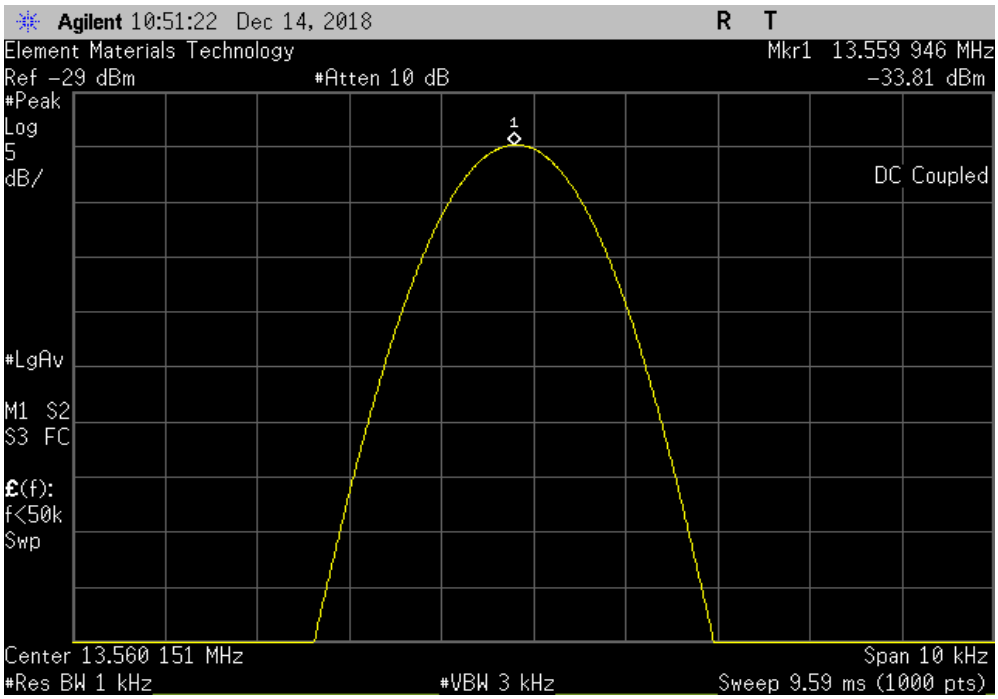
None

Configuration #	**1**	*Signature*

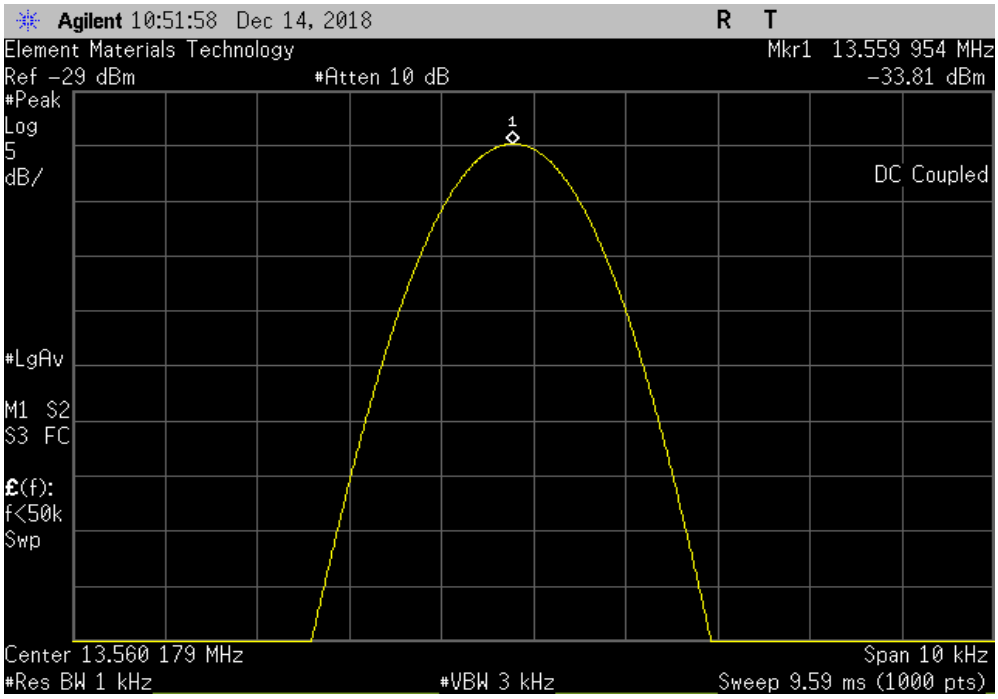
	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
13.56 MHz					
Voltage: 115%	13.559946	13.56	4	100	Pass
Voltage: 100%	13.559954	13.56	3.4	100	Pass
Voltage: 85%	13.559945	13.56	4.1	100	Pass
Temperature: +50°C	13.559845	13.56	11.4	100	Pass
Temperature: +40°C	13.559864	13.56	10	100	Pass
Temperature: +30°C	13.559904	13.56	7.1	100	Pass
Temperature: +20°C	13.559944	13.56	4.1	100	Pass
Temperature: +10°C	13.559984	13.56	1.2	100	Pass
Temperature: 0°C	13.560016	13.56	1.2	100	Pass
Temperature: -10°C	13.560016	13.56	1.2	100	Pass
Temperature: -20°C	13.559994	13.56	0.4	100	Pass

FREQUENCY STABILITY

13.56 MHz, Voltage: 115%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559946	13.56	4	100	Pass

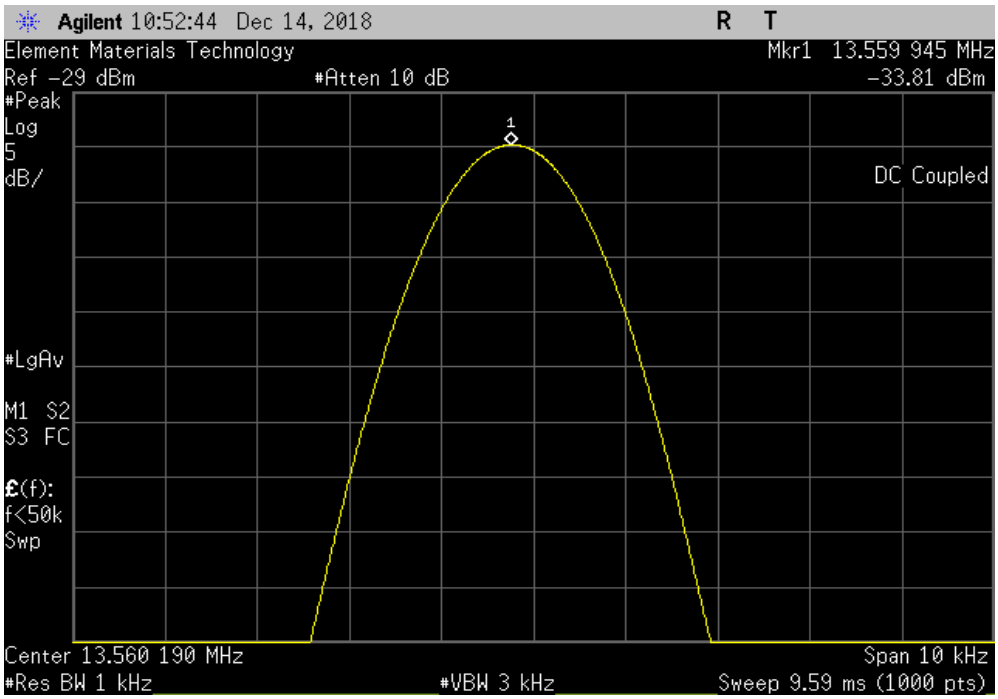


13.56 MHz, Voltage: 100%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559954	13.56	3.4	100	Pass

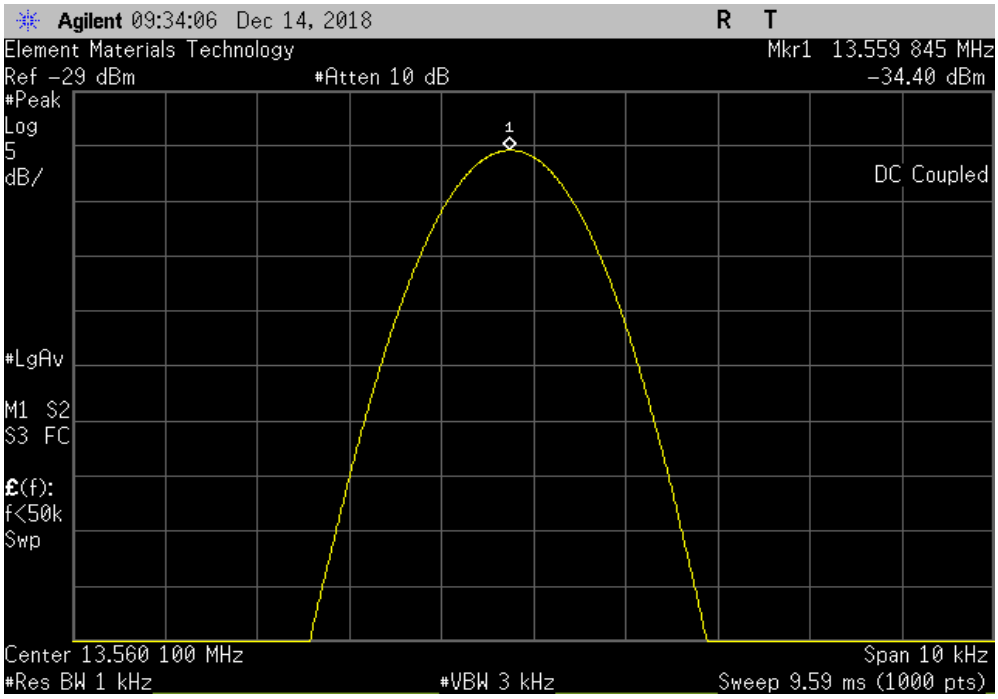


FREQUENCY STABILITY

13.56 MHz, Voltage: 85%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559945	13.56	4.1	100	Pass

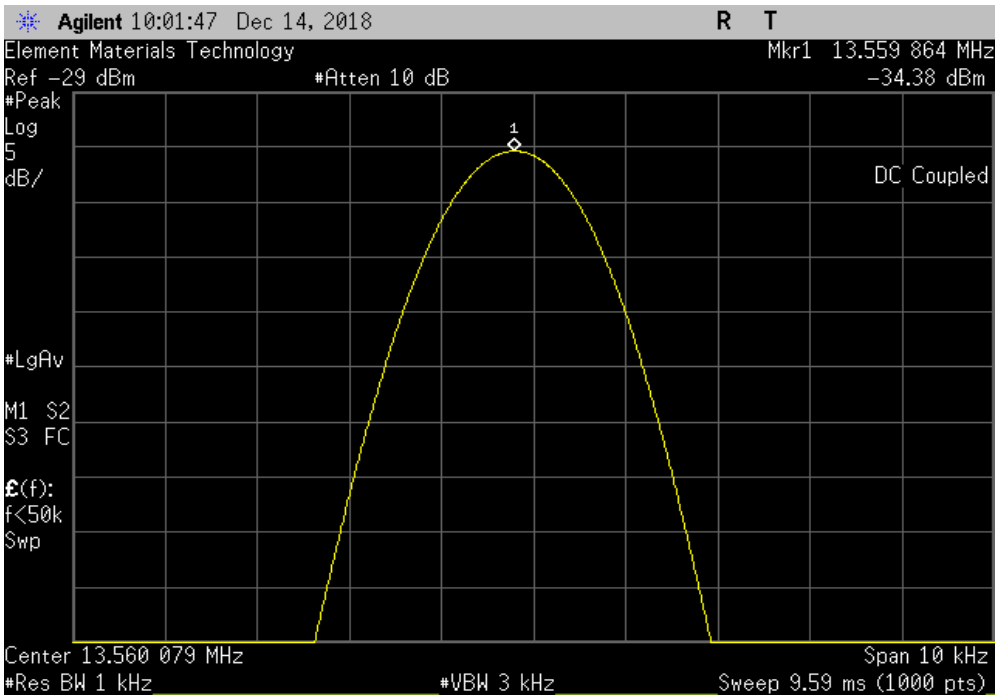


13.56 MHz, Temperature: +50°C						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559845	13.56	11.4	100	Pass

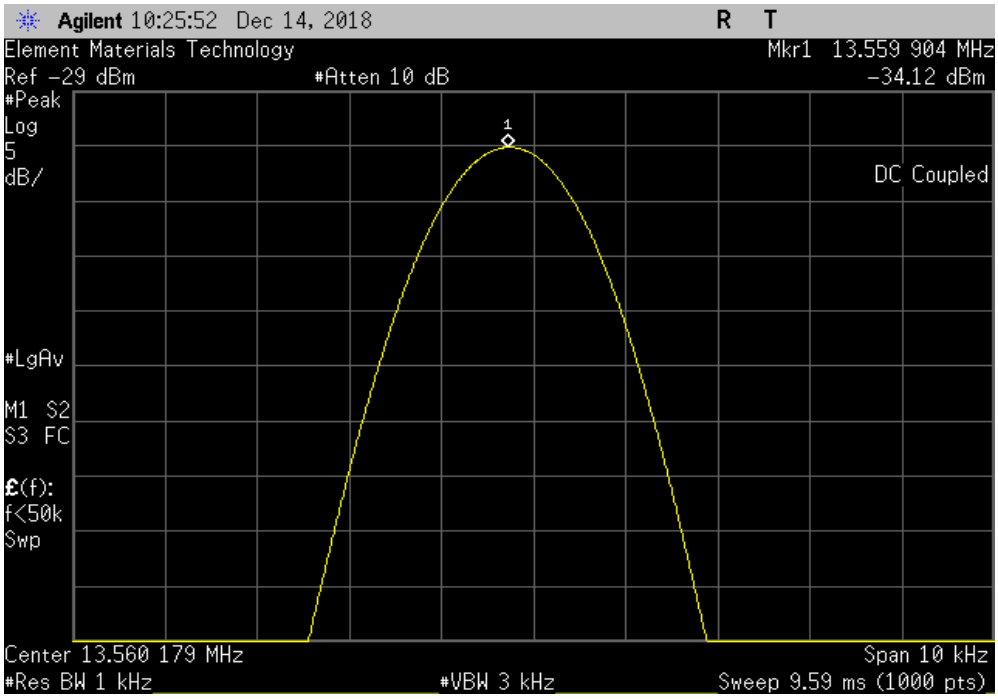


FREQUENCY STABILITY

13.56 MHz, Temperature: +40°C						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559864	13.56	10	100	Pass

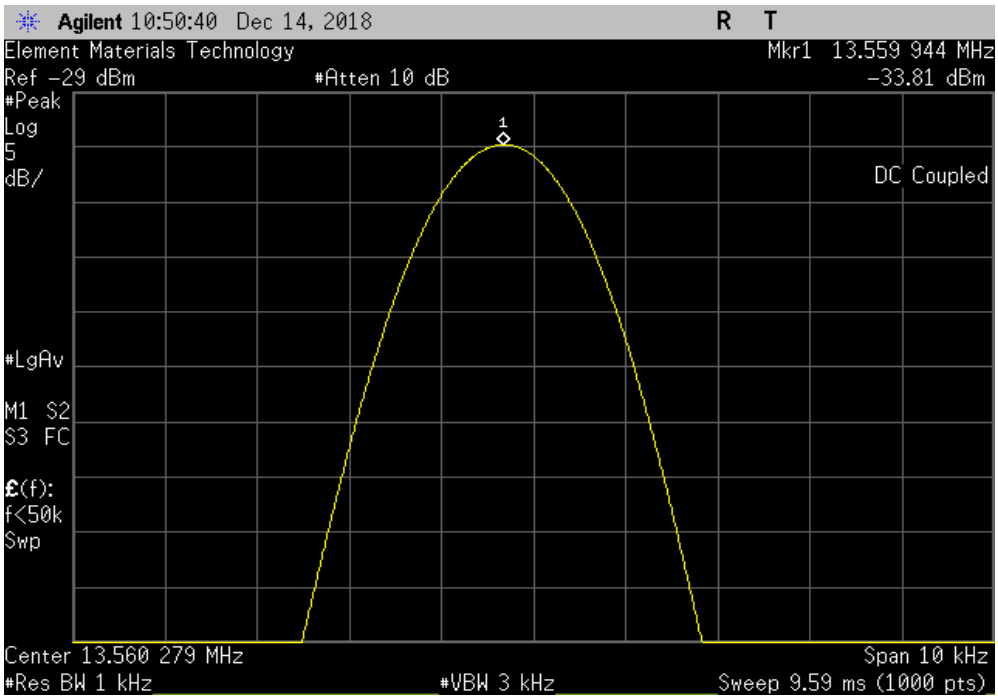


13.56 MHz, Temperature: +30°C						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559904	13.56	7.1	100	Pass

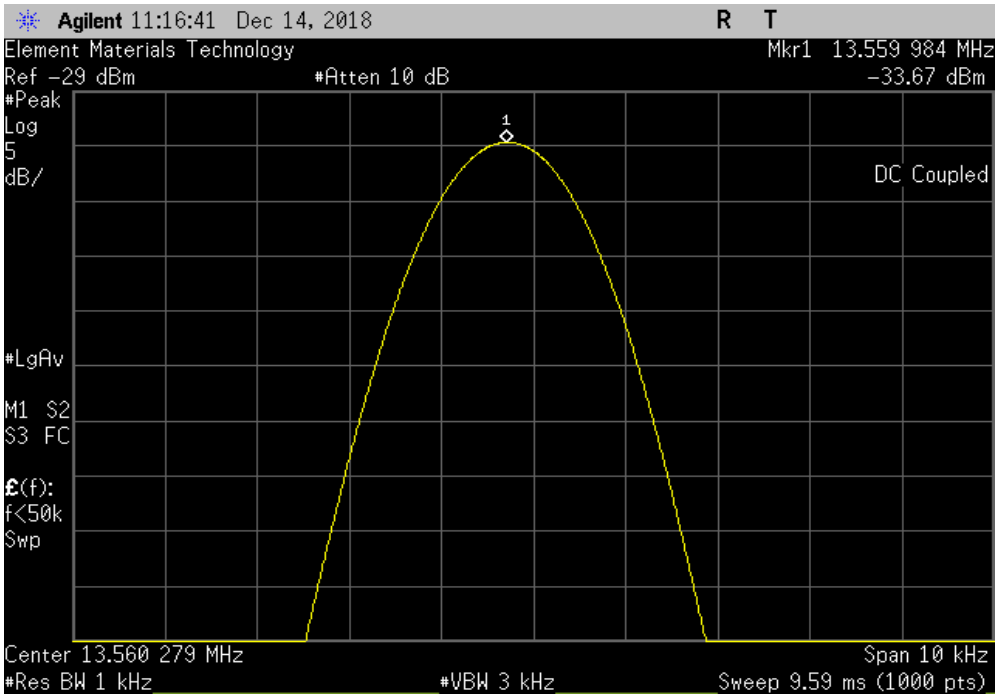


FREQUENCY STABILITY

13.56 MHz, Temperature: +20°C						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559944	13.56	4.1	100	Pass

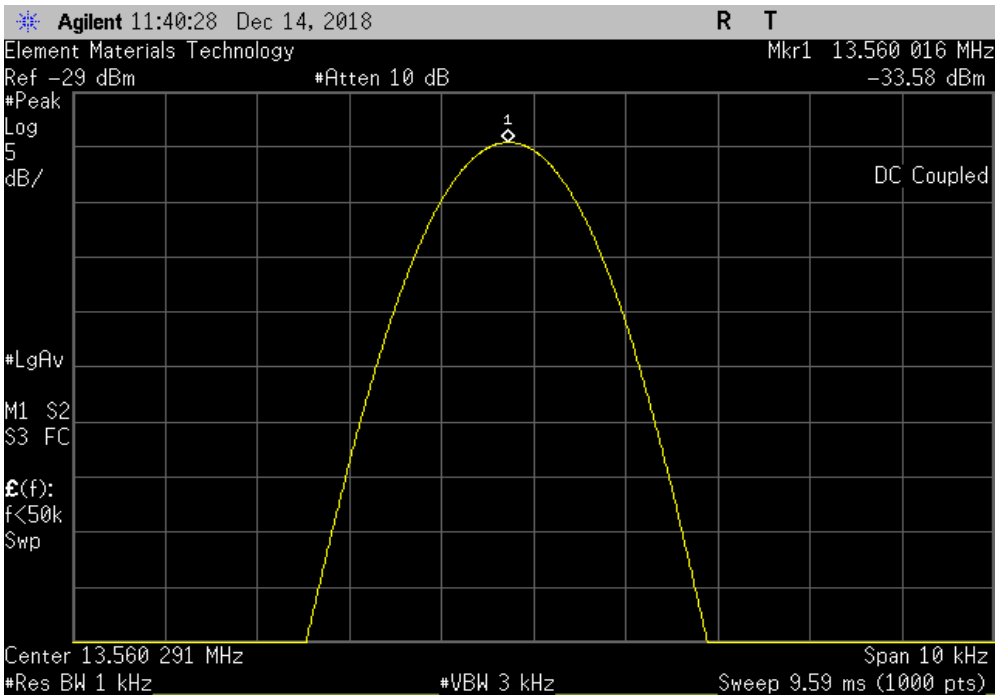


13.56 MHz, Temperature: +10°C						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559984	13.56	1.2	100	Pass

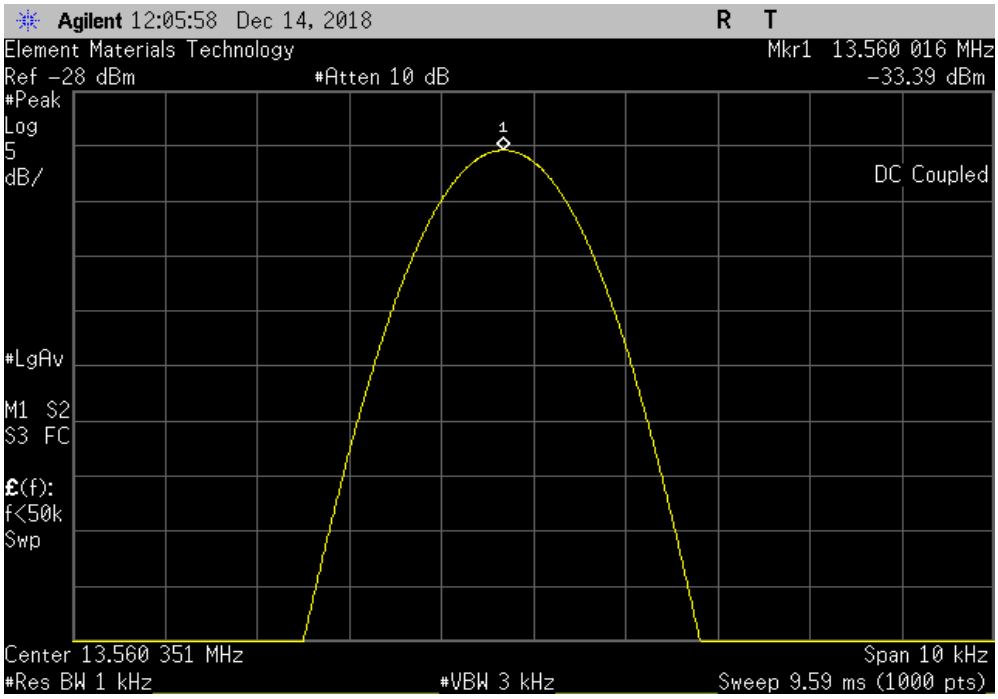


FREQUENCY STABILITY

13.56 MHz, Temperature: 0°C						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560016	13.56	1.2	100	Pass



13.56 MHz, Temperature: -10°C						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560016	13.56	1.2	100	Pass



FREQUENCY STABILITY

13.56 MHz, Temperature: -20°C						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.559994	13.56	0.4	100	Pass