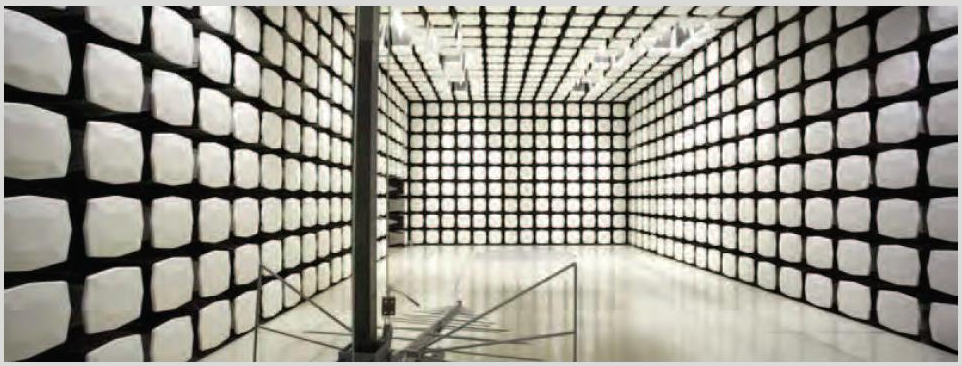
MicroTransponder, Inc.

Model 2100 Wireless Transmitter
FCC 95I:2021

MedRadio

Report: MIER0005.2 Rev. 2, Issue Date: December 22, 2021



CERT #3310.02

CERTIFICATE OF TEST

Last Date of Test: December 10, 2021
MicroTransponder, Inc.
EUT: Model 2100 Wireless Transmitter

Radio Equipment Testing

Standards

Specification	Method
FCC 95I:2021	ANSI C63.26:2015

Results

Method Clause	Test Description	Applied	Results	Comments
ANSI C63.26 5.4.3	Emission Bandwidth	Yes	Pass	
FCC 95.2579(c)(2)	Emission Mask	Yes	Pass	
ANSI C63.26 5.2.4	Duty Cycle Characterization	Yes	Pass	
ANSI C63.26 5.2.4	Conducted Output Power	Yes	Pass	
ANSI C63.26 5.6	Frequency Stability	Yes	Pass	
ANSI C63.26 5.5.4	Spurious Radiated Emissions	Yes	Pass	
ANSI C63.26 5.7	Spurious Conducted Emissions	Yes	Pass	
ANSI C63.26 5.2.3.3, 5.2.7	Radiated Power (EIRP)	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. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY

Revision Number	Description	Date (yyyy-mm-dd)	Page Number
01	Added Model 2100 Wireless Transmitter to the EUT name	2021-12-16	All pages
01	Updated the following data: Emissions Bandwidth, Emissions Mask, Conducted Output Power, Radiated Power (EIRP)	2021-12-16	13-20, 22-24, 45-47
02	Added additional Spurious Radiated Emissions Data, and updated the test equipment.	2021-12-22	37, 40-41

ACCREDITATIONS AND AUTHORIZATIONS

United States

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

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

Canada

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

European Union

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

United Kingdom

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

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

SCOPE

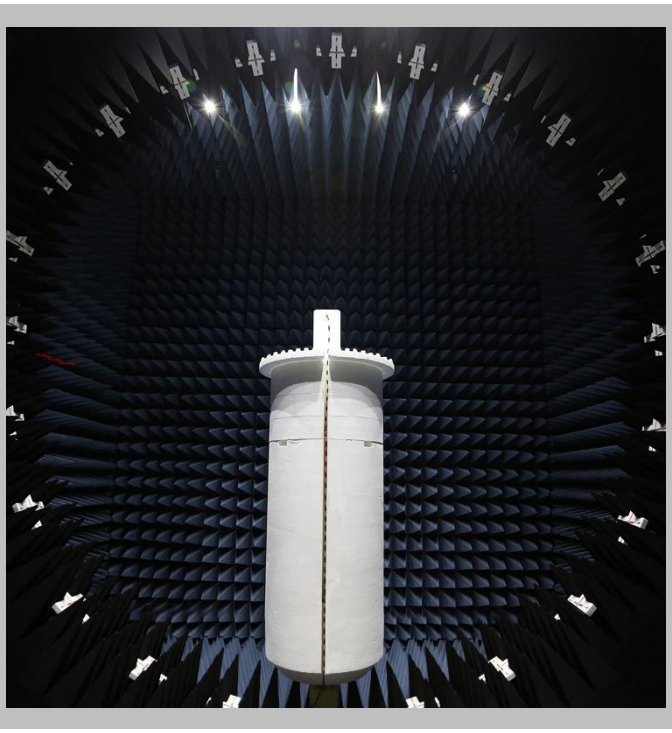
For details on the Scopes of our Accreditations, please visit:

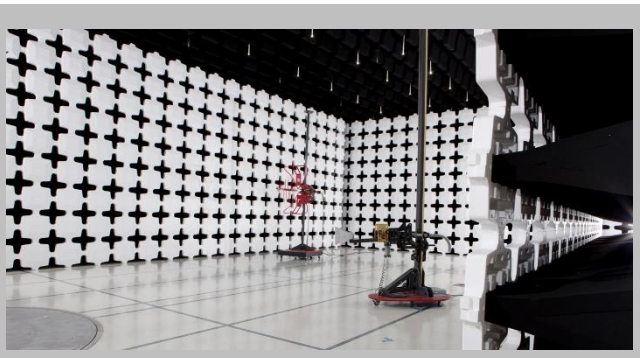
California Minnesota Oregon Texas Washington

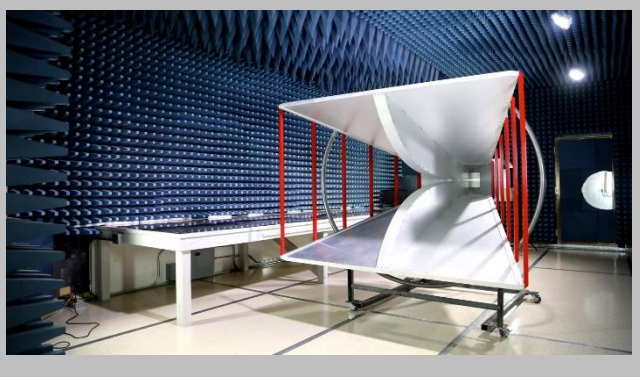
FACILITIES

element
2020.12.15

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







MEASUREMENT UNCERTAINTY

element
TMU.2015.07.10

Measurement Uncertainty

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

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

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

Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	3.2 dB	-3.2 dB

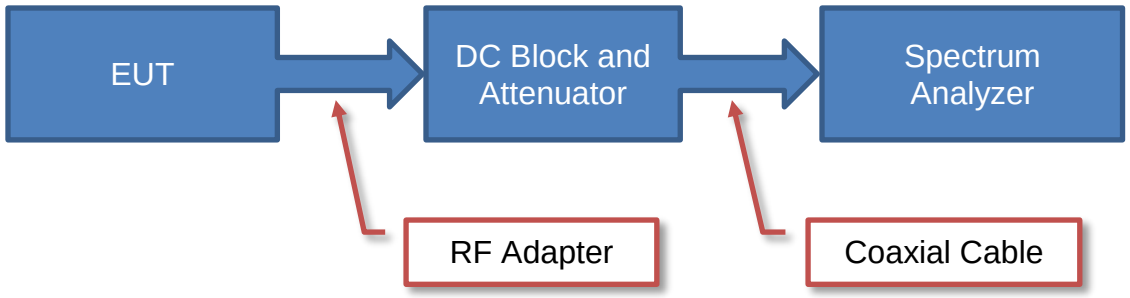
TEST SETUP BLOCK DIAGRAMS

Measurement Bandwidths

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

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

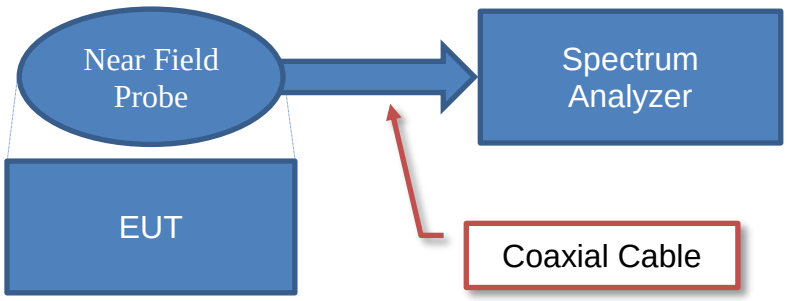
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

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

Near Field Test Fixture Measurements



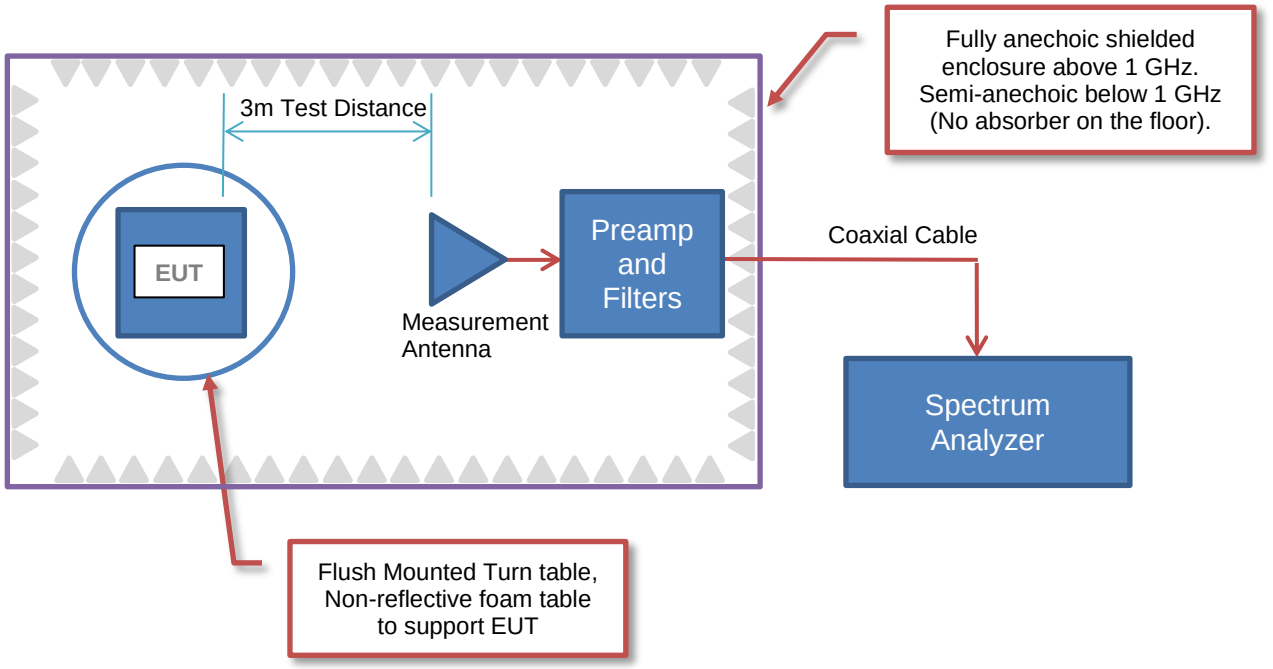
Sample Calculation (logarithmic units)

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

TEST SETUP BLOCK DIAGRAMS

element
2021.03.18

Emissions Measurements



Sample Calculation (logarithmic units)

Radiated Emissions:

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

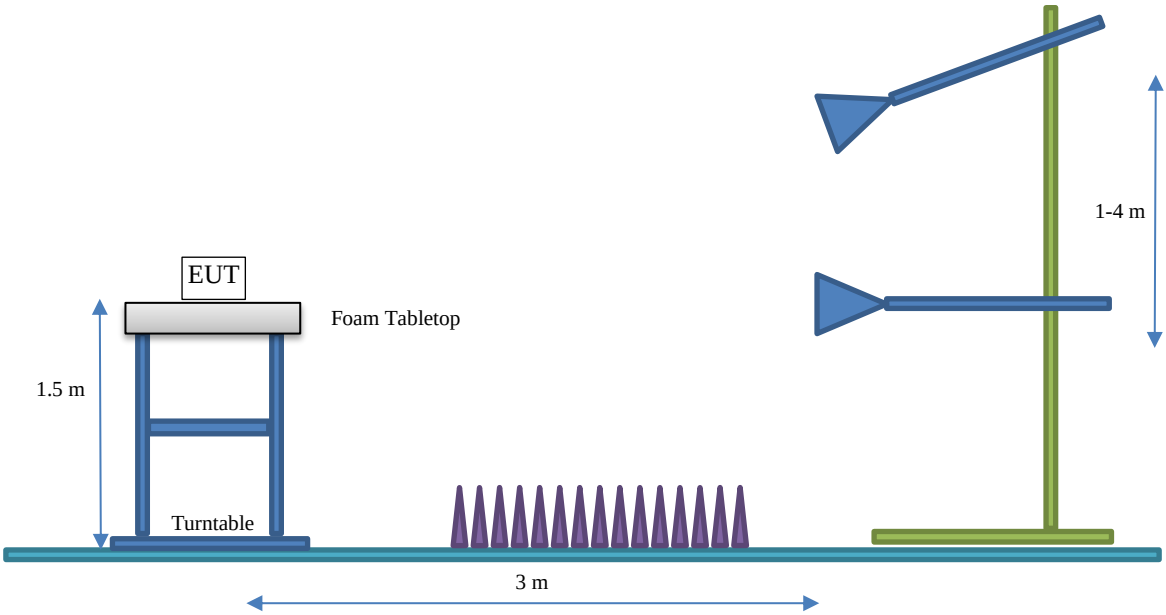
Conducted Emissions:

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

TEST SETUP BLOCK DIAGRAMS

Bore Sighting (>1GHz)

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



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	MicroTransponder, Inc.
Address:	2802 Flintrock Trace Ste 226
City, State, Zip:	Austin, TX 78738
Test Requested By:	Chester Buress
EUT:	Model 2100 Wireless Transmitter
First Date of Test:	October 19, 2021
Last Date of Test:	December 10, 2021
Receipt Date of Samples:	October 14, 2021
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
The Wolfgang System is a medical system for the treatment of Stroke. It is composed of an implantable device, the Wolfgang Implantable Pulse Generator (IPG), the Wolfgang Programmer Interface (PI) and the Stroke Application and Programming Software (SAPS). The Wolfgang PI, connected to the Laptop, is used to coordinate the stimulation by communicating wirelessly with the implant. The Wolfgang Programmer Interface and the Stroke Application and Programming Software are products designed and manufactured by CCC. The Laptop is an off-the-shelf device, selected by MTI, which comply with applicable IEC/ISO safety standards. These components shall be configured as a system and tested per this test plan.

Testing Objective:
Seeking FCC authorization for the MedRadio transmitter to FCC Part 95I.

POWER SETTINGS AND ANTENNAS

The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information.

ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Measured Gain (dBi) *reported by manufacturer	Peak Gain (dBi) *antenna data sheet
¼ wave monopole	Manufacturer	400 - 406	-12	-8.7

The EUT was tested using the power settings provided by the manufacturer:

SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types	Channel	Position	Frequency (MHz)	Power Setting
2FSK-fallback	1	Low Channel	402.450	-4 dBm
	4	Mid Channel	403.350	
	8	High Channel	404.550	

CONFIGURATIONS

Configuration MIER0005- 3

Software/Firmware Running during test	
Description	**Version**
RDP	6.6

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Wireless Transmitter	MicroTransponder, Inc.	2100	0132

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Dell	Vostro 15 3000	None
Laptop power supply	Dell	00285K	CN-00285K-CH200-16G-0DR0-A10

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB Extension Cable	Yes	3.0 m	No	Laptop	USB Cable
USB Cable	Yes	1.6 m	No	USB Extension Cable	Wireless Transmitter

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2021-10-19	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2021-10-21	Duty Cycle Characterization	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	2021-12-10	Conducted Output Power	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	2021-10-22	Spurious 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	2021-10-23	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed
6	2021-12-07	Radiated Power (EIRP)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	2021-12-10	Emission Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
8	2021-12-10	Emission Mask	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed
1	2021-12-22	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed

EMISSIONS BANDWIDTH

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5181A	TIG	2020-04-16	2023-04-16
Block - DC	Fairview Microwave	SD3379	AMX	2021-03-14	2022-03-14
Attenuator	Fairview Microwave	SA26B-20	TWJ	2021-03-14	2022-03-14
Cable	Micro-Coax	D150A-1-0720-200	EVH	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2021-07-06	2022-07-06

TEST DESCRIPTION

Per 47 CFR 95.2573(a), the emission bandwidth was determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 20 dB down relative to the maximum level of the modulated carrier. A spectrum analyzer using a peak detector with no video filtering was used with a resolution bandwidth equal to approximately 1.0 percent of the emission bandwidth of the EUT.

EMISSIONS BANDWIDTH

TbtTx 2021.10.29.2 XMit 2020.12.30.0

EUT:	**Model 2100 Wireless Transmitter**			**Work Order:**	**MIER0005**
Serial Number:	**0132**			**Date:**	**10-Dec-21**
Customer:	**MicroTransponder, Inc.**			**Temperature:**	**19.5 °C**
Attendees:	**None**			**Humidity:**	**39.3% RH**
Project:	**None**			**Barometric Pres.:**	**1024 mbar**
Tested by:	**Jeff Alcoke**	**Power:**	**5.0 VDC via USB**	**Job Site:**	**EV01**

TEST SPECIFICATIONS	**Test Method**
FCC 90I:2021	ANSI C63.26:2015

COMMENTS

Reference level offest includes: DC Block, 20 dB attenuator, and measurement cable.

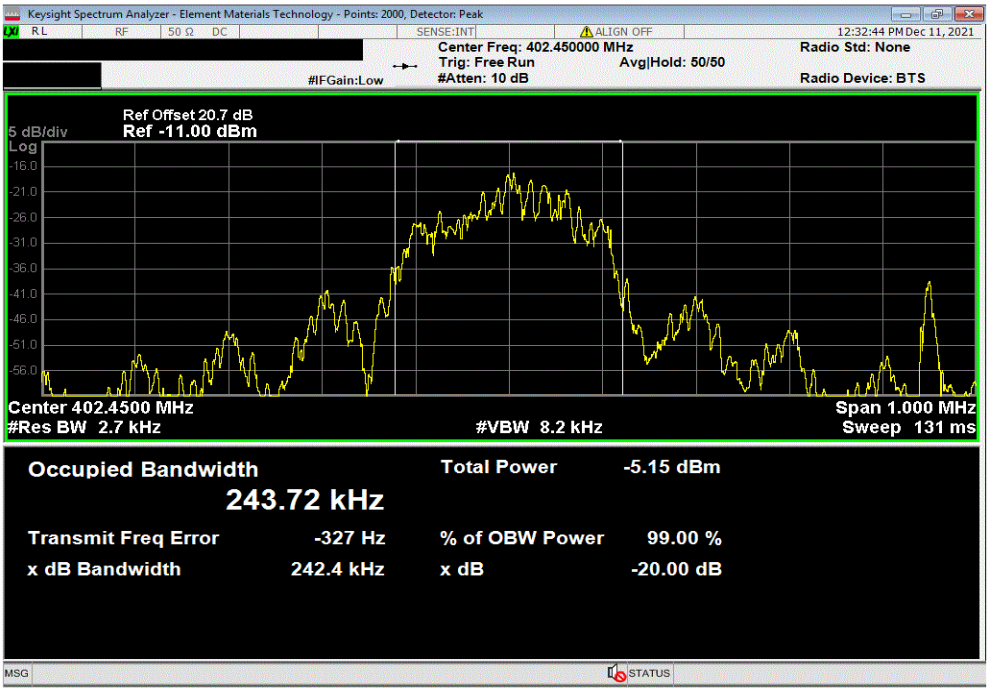
DEVIATIONS FROM TEST STANDARD

None

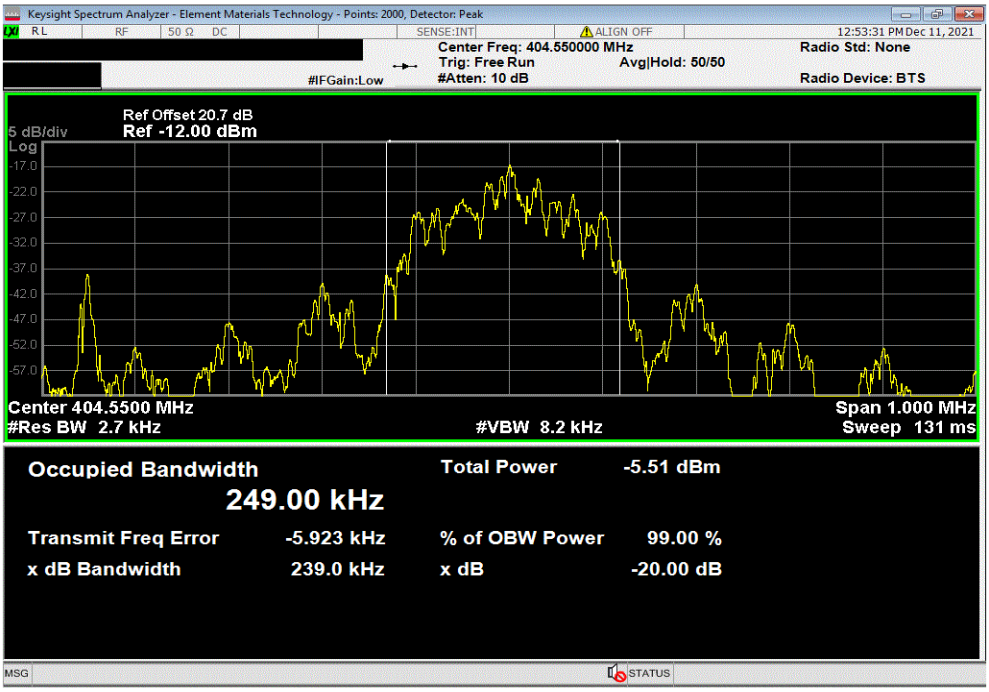
Configuration #	**1**	*Signature*

	Value	**Limit (≤)**	**Result**
Low Channel, 402.450 MHz	242.36 kHz	300 kHz	Pass
High Channel, 404.550 MHz	239.021 kHz	300 kHz	Pass

Low Channel, 402.450 MHz						
				Value	Limit (≤)	Result
				242.36 kHz	300 kHz	Pass



High Channel, 404.550 MHz						
				Value	Limit (≤)	Result
				239.021 kHz	300 kHz	Pass



EMISSIONS MASK

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3379	AMX	2021-03-14	2022-03-14
Attenuator	Fairview Microwave	SA26B-20	TWJ	2021-03-14	2022-03-14
Cable	Micro-Coax	D150A-1-0720-200	EVH	2021-03-14	2022-03-14
Generator - Signal	Agilent	N5181A	TIG	2020-04-16	2023-04-16
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2021-07-06	2022-07-06

TEST DESCRIPTION

Per 47 CFR 95.2579(a)(1) the emission mask was measured. Emissions more than 150 kHz away from the center frequency must be attenuated below the transmitter output power by at least 20 dB. This was evaluated by the Occupied Bandwidth measurement according to 47 CFR 95.2573(a). In addition, emissions 250 kHz or less above and below the MICS band (402-405 MHz) must be attenuated below the maximum permitted output power by at least 20 dB.

A spectrum analyzer was used to measure the emission mask. A spectrum analyzer using a peak detector with no video filtering was used with a resolution bandwidth equal to approximately 1.0 percent of the emission bandwidth of the EUT. However, various plots were made using different frequency spans and resolution bandwidths in an attempt to not only satisfy the measurement criteria, but to also show that all emissions outside of the occupied band are greatly attenuated.

EMISSIONS MASK

TbtTx 2021.10.29.2 XMit 2020.12.30.0

EUT:	**Model 2100 Wireless Transmitter**			**Work Order:**	**MIER0005**
Serial Number:	**0132**			**Date:**	**10-Dec-21**
Customer:	**MicroTransponder, Inc.**			**Temperature:**	**19.5 °C**
Attendees:	**None**			**Humidity:**	**39.3% RH**
Project:	**None**			**Barometric Pres.:**	**1024 mbar**
Tested by:	**Jeff Alcoke**	**Power:**	**5.0 VDC via USB**	**Job Site:**	**EV01**

TEST SPECIFICATIONS	**Test Method**
FCC 90I:2021	ANSI C63.26:2015

COMMENTS

Reference level offest includes: DC Block, 20 dB attenuator, and measurement cable.

DEVIATIONS FROM TEST STANDARD

None

Configuration #	**1**	*Signature*

	Value (dBc)	**Limit ≤ (dBc)**	**Result**
Low Channel, 402.450 MHz	-38.97	-20	Pass
High Channel, 404.550 MHz	-39.96	-20	Pass

Low Channel, 402.450 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-38.97	-20	Pass

High Channel, 404.550 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-39.96	-20	Pass

DUTY CYCLE

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5181A	TIG	2020-04-16	2023-04-16
Cable	Micro-Coax	UFD150A-1-0720-200200	EVK	2021-03-14	2022-03-14
Attenuator	S.M. Electronics	SA26B-20	AUY	2021-03-14	2022-03-14
Block - DC	Fairview Microwave	SD3379	AMW	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2021-07-06	2022-07-06

TEST DESCRIPTION

The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum.

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.

If the transmit duty cycle < 98 percent, burst gating may have been used during some of the other tests in this report to only take the measurement during the burst duration.

DUTY CYCLE

XMit 2020.12.30.0

EUT:	**Model 2100 Wireless Transmitter**			**Work Order:**	**MIER0005**
Serial Number:	**0132**			**Date:**	**21-Oct-21**
Customer:	**MicroTransponder, Inc.**			**Temperature:**	**23.1 °C**
Attendees:	**None**			**Humidity:**	**43.5% RH**
Project:	**None**			**Barometric Pres.:**	**1008 mbar**
Tested by:	**Jeff Alcoke**	**Power:**	**USB via 110VAC/60Hz**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	**Test Method**
FCC 95I:2021	ANSI C63.26:2015

COMMENTS

Reference level offset includes: DC block, 20 dB attenuator, and measurement cable. The data below is representative of the duty cycle on all channels of the radio.

DEVIATIONS FROM TEST STANDARD

None

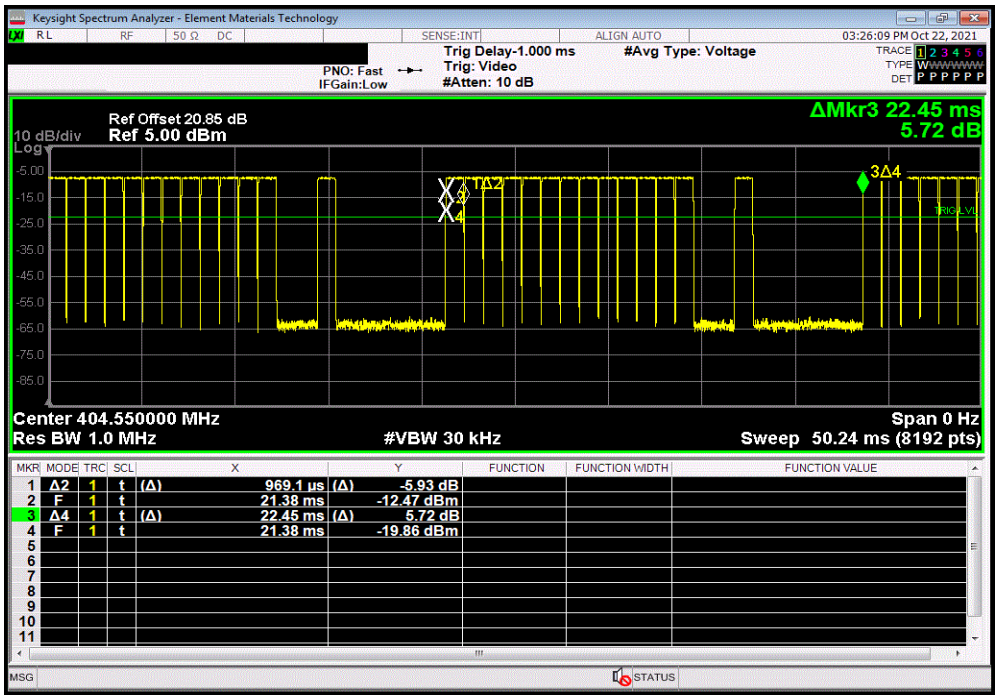
Configuration #	**3**	*Signature*

	Pulse Width (mS)	Period (mS)	Number of Pulses	Value (%)	Limit (%)	Result
High Channel, 404.550 MHz						
50 mS sweep	0.969	22.45	14	60	N/A	N/A
100 mS sweep	N/A	N/A	66	N/A	N/A	N/A

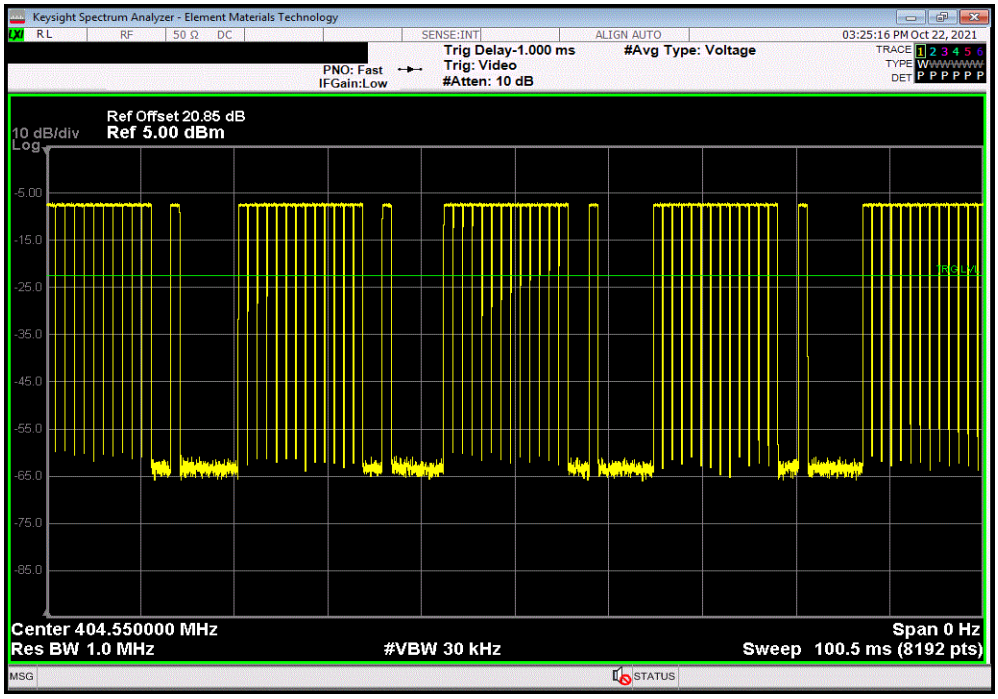
DUTY CYCLE

XMit 2020.12.30.0

High Channel, 404.550 MHz, 50 mS sweep						
	Pulse Width (mS)	Period (mS)	Number of Pulses	Value (%)	Limit (%)	Result
	0.969	22.45	14	60	N/A	N/A



High Channel, 404.550 MHz, 100 mS sweep						
	Pulse Width (mS)	Period (mS)	Number of Pulses	Value (%)	Limit (%)	Result
	N/A	N/A	66	N/A	N/A	N/A



OUTPUT POWER

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5181A	TIG	2020-04-16	2023-04-16
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2021-03-14	2022-03-14
Attenuator	S.M. Electronics	SA26B-20	AMX	2021-03-14	2022-03-14
Block - DC	Fairview Microwave	SD3379	TWJ	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2021-07-06	2022-07-06

TEST DESCRIPTION

Per FCC Part 2.1046, the output power shall be measured at the RF terminal. The RMS output power was measured with the EUT configured in the modes listed in the datasheet. The EUT was transmitting at its maximum data rate.

The measurement was performed using ANSI C63.26, clause 5.2.4.3.2 which uses trace averaging followed by a duty cycle correction factor (DCCF).

The analyzer settings were configured as follows:

- Span = 2x to 3x the OBW
- RBW > OBW
- Detector = power average (RMS)
- Trace average = 100 traces

The PK marker function was used to indicate the maximum amplitude level, followed by a DCCF of 10*log(1/Duty Cycle) to

OUTPUT POWER

XMit 2020.12.30.0

EUT:	**Model 2100 Wireless Transmitter**			**Work Order:**	**MIER0005**
Serial Number:	**0132**			**Date:**	**10-Dec-21**
Customer:	**MicroTransponder, Inc.**			**Temperature:**	**19.5 °C**
Attendees:	**None**			**Humidity:**	**39.3% RH**
Project:	**None**			**Barometric Pres.:**	**1024 mbar**
Tested by:	**Jeff Alcoke**	**Power:**	**USB via 110VAC/60Hz**	**Job Site:**	**EV01**

TEST SPECIFICATIONS	**Test Method**
FCC 95I:2021	ANSI C63.26:2015

COMMENTS

Reference level offset includes: DC block, 20 dB attenuator, and measurement cable. The EUT operates at a duty cycle of 60%, giving a duty cycle correction factor (DCCF) of 10 * log (1/0.6) = 2.2 dB

DEVIATIONS FROM TEST STANDARD

None

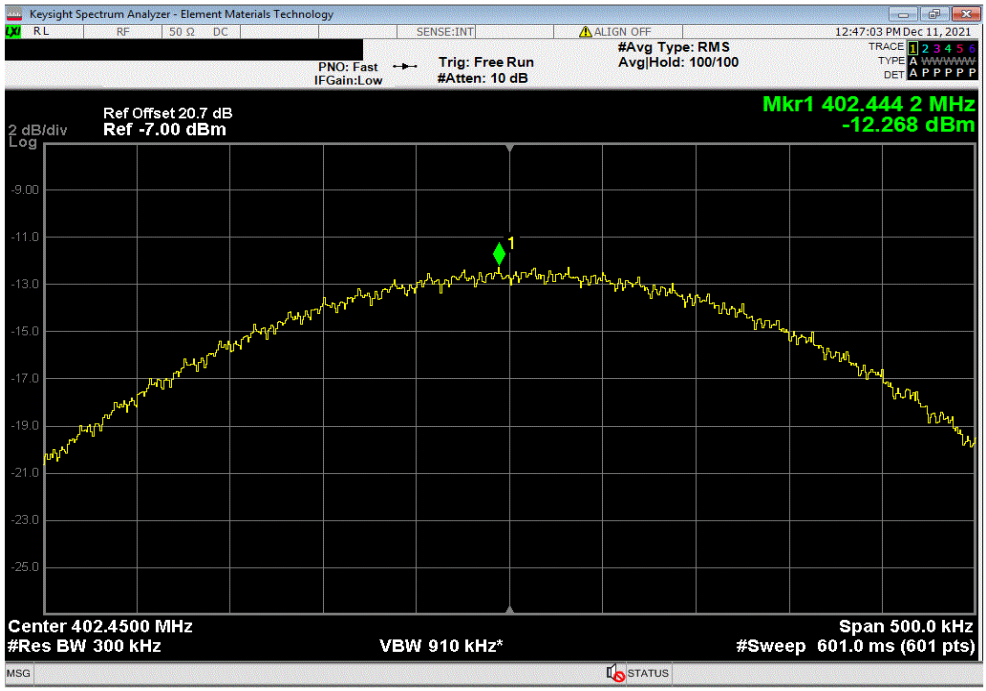
Configuration #	**3**	*Signature* 

	Measured Value (dBm)	**DCCF (dB)**	**Final Value (dBm)**	**Limit**	**Result**
Low Channel, 402.450 MHz	-12.268	2.2	-10.0	N/A	N/A
High Channel, 404.550 MHz	-12.674	2.2	-10.5	N/A	N/A

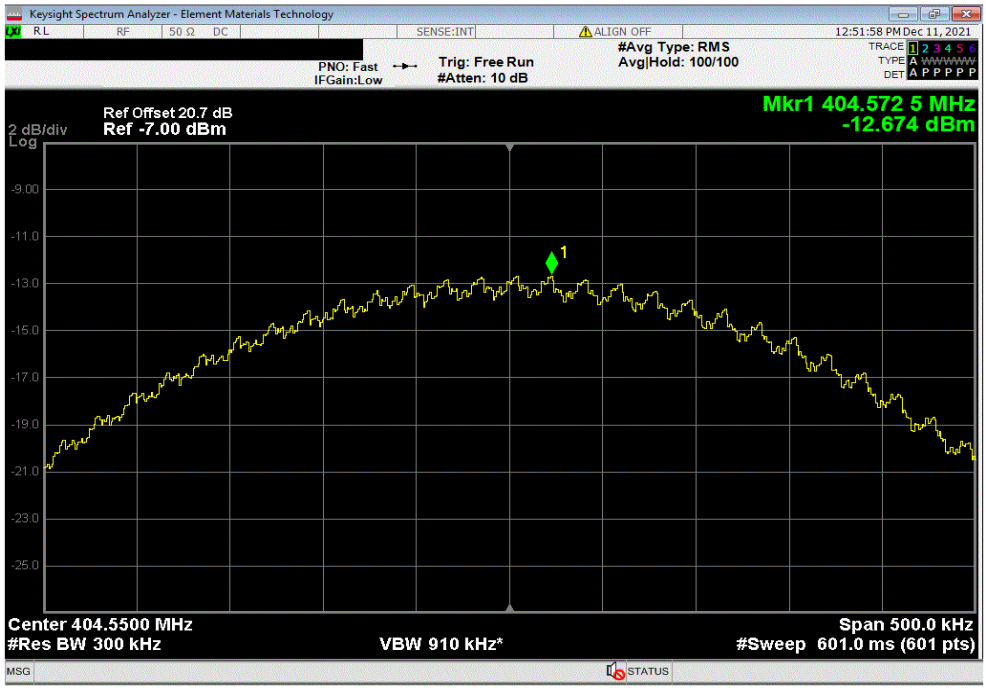
OUTPUT POWER

XMit 2020.12.30.0

Low Channel, 402.450 MHz						
		Measured Value (dBm)	DCCF (dB)	Final Value (dBm)	Limit	Result
		-12.268	2.2	-10.0	N/A	N/A



High Channel, 404.550 MHz						
		Measured Value (dBm)	DCCF (dB)	Final Value (dBm)	Limit	Result
		-12.674	2.2	-10.5	N/A	N/A



FREQUENCY STABILITY

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-8-1-1-H/AC	TBI	NCR	NCR
Thermometer	Omegaette	HH311	DTY	2021-02-04	2024-02-04
Meter - Multimeter	Tektronix	DMM912	MMH	2019-02-15	2022-02-15
Power Supply - DC	Topward	TPS-2000	TPD	NCR	NCR
Generator - Signal	Agilent	N5181A	TIG	2020-04-16	2023-04-16
Cable	Micro-Coax	UFD150A-1-0720-200200	EVK	2021-03-14	2022-03-14
Attenuator	S.M. Electronics	SA26B-20	AUY	2021-03-14	2022-03-14
Block - DC	Fairview Microwave	SD3379	AMW	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2021-07-06	2022-07-06

TEST DESCRIPTION

The spectrum analyzer is configured with a precision frequency reference that exceeds the stability requirement of the transmitter. The EUT was placed inside a temperature / humidity chamber.

Variation of Supply Voltage

The primary supply voltage was varied from 85% to 115% of the nominal voltage. A DC lab supply was used to vary the supply voltage.

Variation of Ambient Temperature

Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range 0°C – 55°C

Where a ppm limit applies: ppm = (Measured Frequency / Measured Nominal Frequency - 1) * 1,000,000

FREQUENCY STABILITY

TbtTx 2021.03.19.1 XMit 2020.12.30.0

EUT:	**Model 2100 Wireless Transmitter**			**Work Order:**	**MIER0005**
Serial Number:	**0132**			**Date:**	**23-Oct-21**
Customer:	**MicroTransponder, Inc.**			**Temperature:**	**22.2 °C**
Attendees:	**None**			**Humidity:**	**46% RH**
Project:	**None**			**Barometric Pres.:**	**1009 mbar**
Tested by:	**Jeff Alcoke**	**Power:**	**USB via 110VAC/60Hz**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	**Test Method**
FCC 95I:2021	ANSI C63.26:2015

COMMENTS

Reference level offset includes: DC block, 20 dB attenuator, and measurement cable.

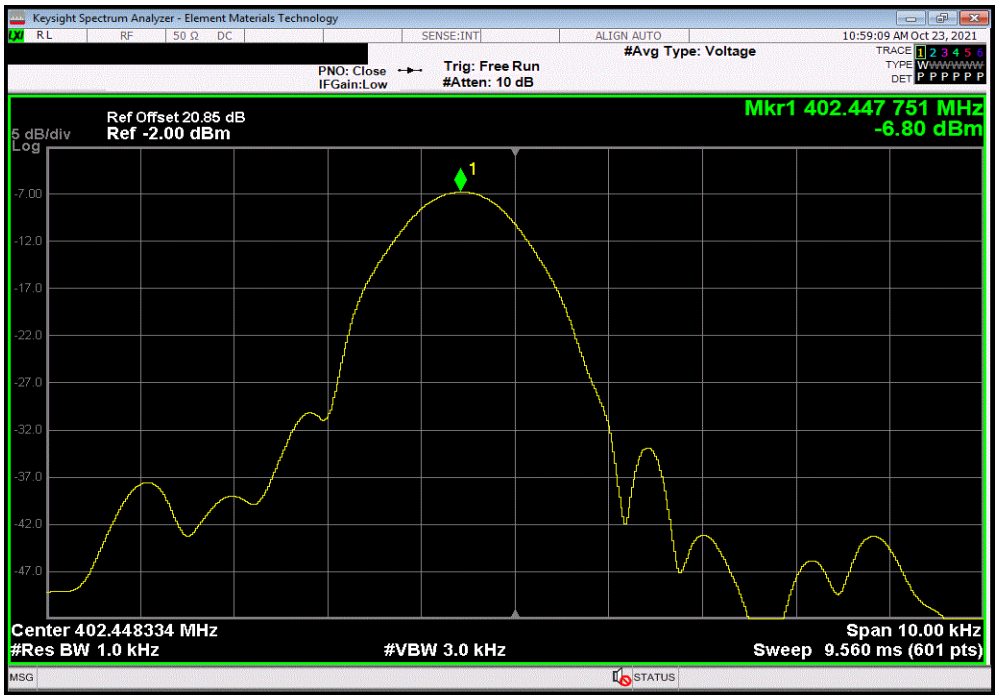
DEVIATIONS FROM TEST STANDARD

None

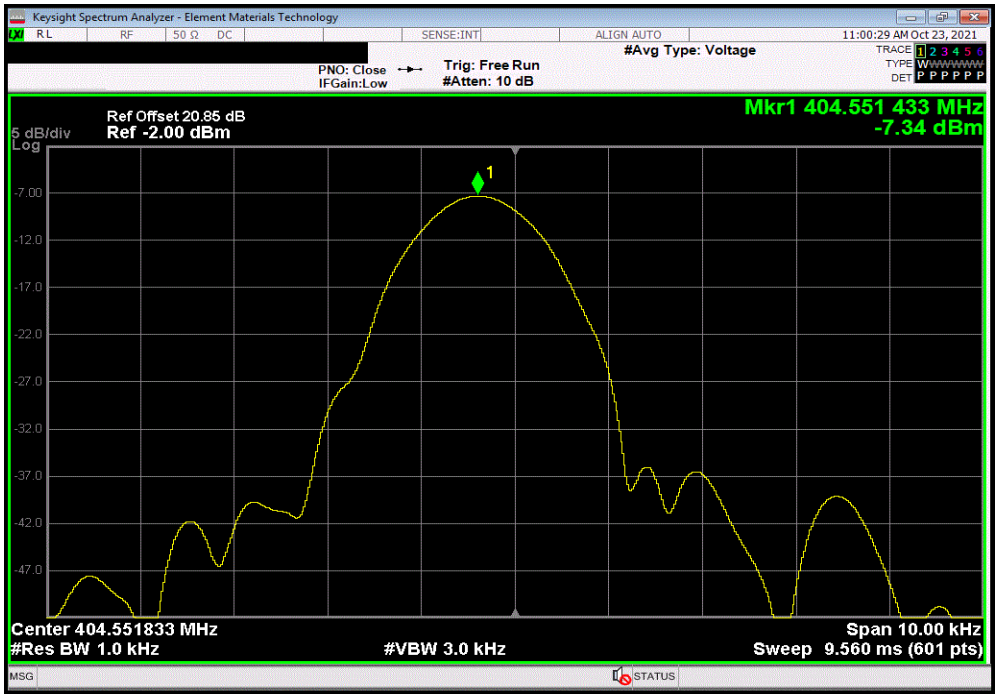
Configuration #	**3**	*Signature*

		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
CW						
	Normal Voltage, 5.0 VDC					
	Low Channel, 402.450 MHz	402.4477507	402.4477507	0	100	Pass
	High Channel, 404.550 MHz	404.551433	404.551433	0	100	Pass
	Extreme Voltage +15%, 5.75 VDC					
	Low Channel, 402.450 MHz	402.44745	402.4477507	1	100	Pass
	High Channel, 404.550 MHz	404.551367	404.551433	0	100	Pass
	Extreme Voltage -15%, 4.25 VDC					
	Low Channel, 402.450 MHz	402.4481333	402.4477507	1	100	Pass
	High Channel, 404.550 MHz	404.5507503	404.551433	2	100	Pass
	Extreme Temperature +55°C					
	Low Channel, 402.450 MHz	402.4482327	402.4477507	1	100	Pass
	High Channel, 404.550 MHz	404.5495663	404.551433	5	100	Pass
	Extreme Temperature +50°C					
	Low Channel, 402.450 MHz	402.4494	402.4477507	4	100	Pass
	High Channel, 404.550 MHz	404.5480993	404.551433	8	100	Pass
	Extreme Temperature +40°C					
	Low Channel, 402.450 MHz	402.45215	402.4477507	11	100	Pass
	High Channel, 404.550 MHz	404.5455333	404.551433	15	100	Pass
	Extreme Temperature +30°C					
	Low Channel, 402.450 MHz	402.4553667	402.4477507	19	100	Pass
	High Channel, 404.550 MHz	404.5430333	404.551433	21	100	Pass
	Extreme Temperature +20°C					
	Low Channel, 402.450 MHz	402.4587173	402.4477507	27	100	Pass
	High Channel, 404.550 MHz	404.539767	404.551433	29	100	Pass
	Extreme Temperature +10°C					
	Low Channel, 402.450 MHz	402.4622337	402.4477507	36	100	Pass
	High Channel, 404.550 MHz	404.5376667	404.551433	34	100	Pass
	Extreme Temperature 0°C					
	Low Channel, 402.450 MHz	402.4643663	402.4477507	41	100	Pass
	High Channel, 404.550 MHz	404.5334337	404.551433	44	100	Pass

CW, Normal Voltage, 5.0 VDC, Low Channel, 402.450 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		402.4477507	402.4477507	0	100	Pass

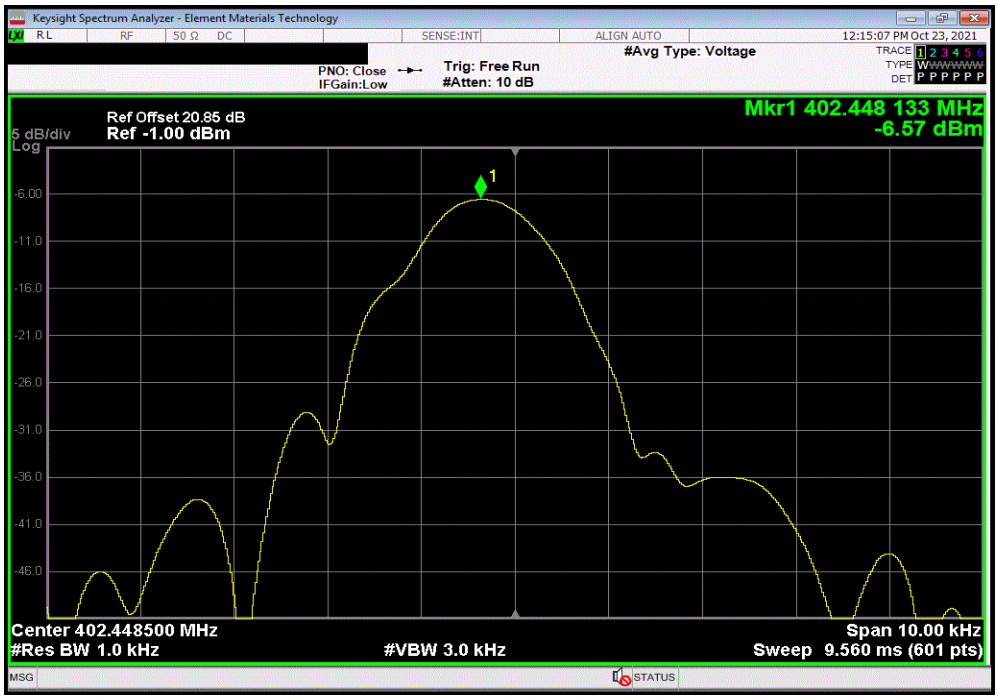


CW, Normal Voltage, 5.0 VDC, High Channel, 404.550 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		404.551433	404.551433	0	100	Pass

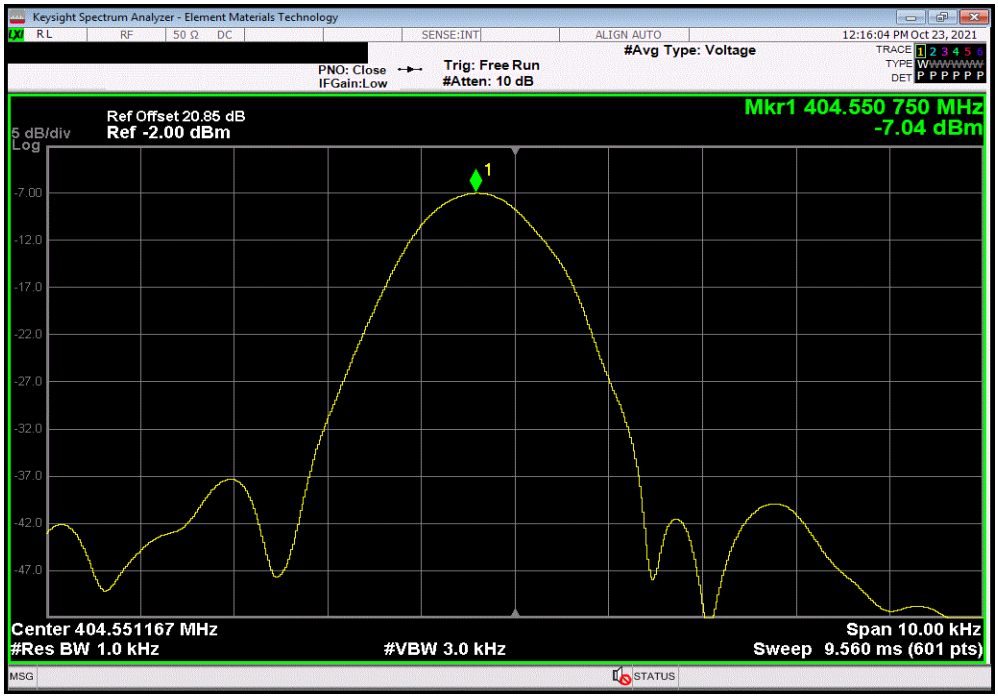


FREQUENCY STABILITY

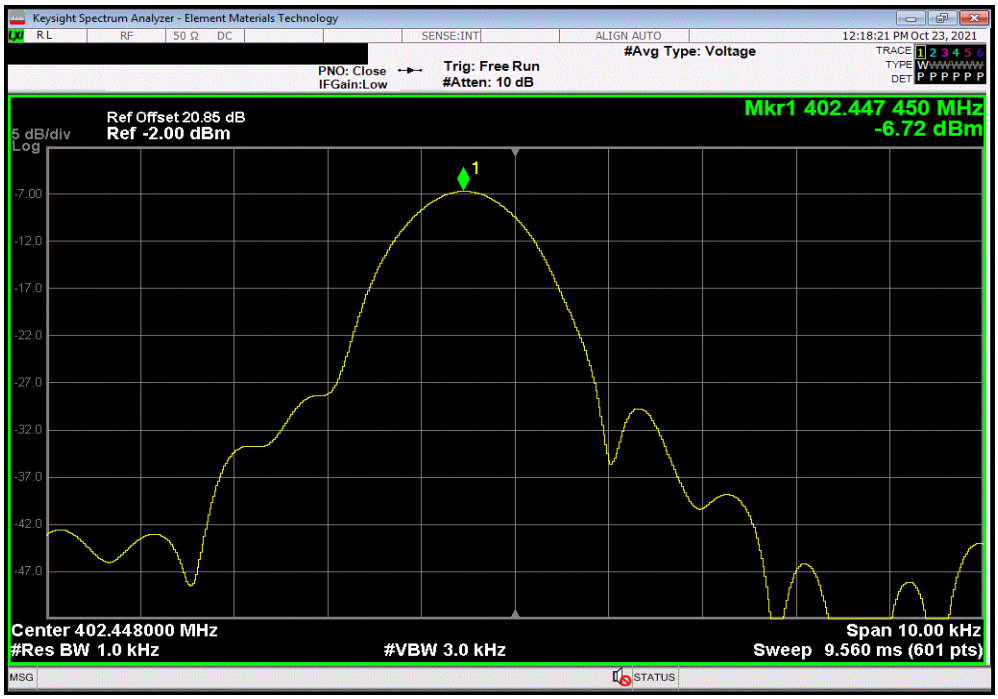
CW, Extreme Voltage -15%, 4.25 VDC Low Channel, 402.450 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		402.4481333	402.4477507	1	100	Pass



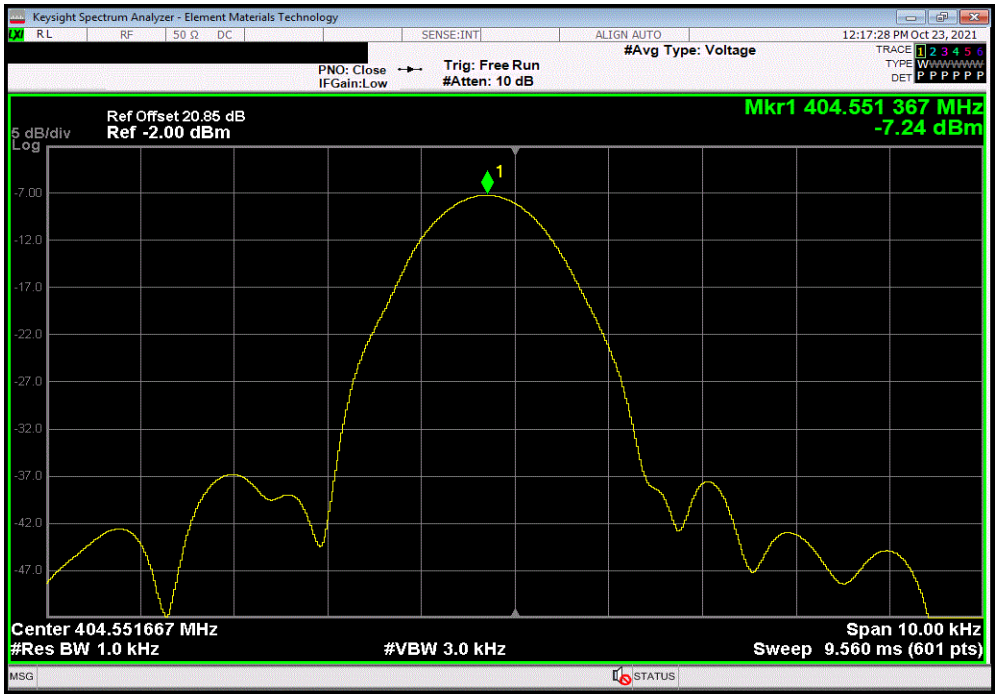
CW, Extreme Voltage -15%, 4.25 VDC High Channel, 404.550 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		404.5507503	404.551433	2	100	Pass



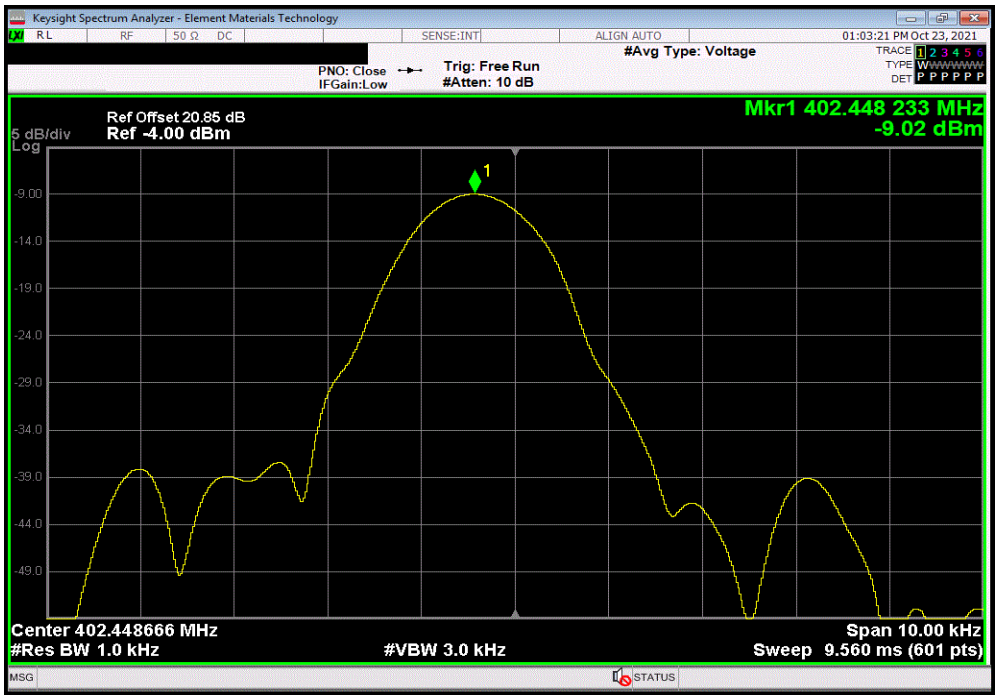
CW, Extreme Voltage +15%, 5.75 VDC, Low Channel, 402.450 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		402.44745	402.4477507	1	100	Pass



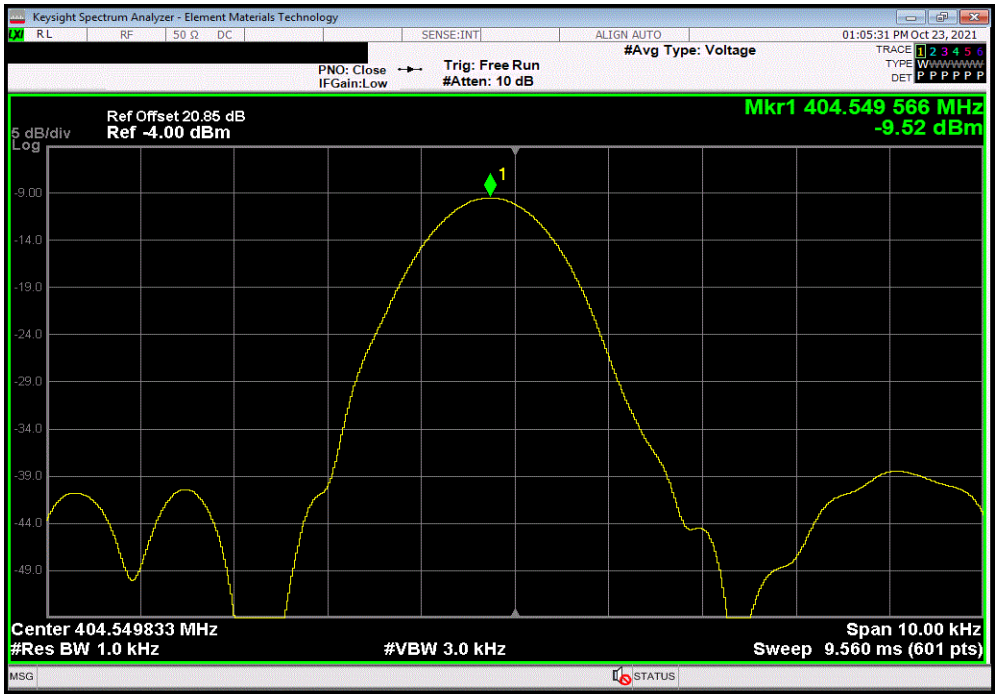
CW, Extreme Voltage +15%, 5.75 VDC High Channel, 404.550 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		404.551367	404.551433	0	100	Pass



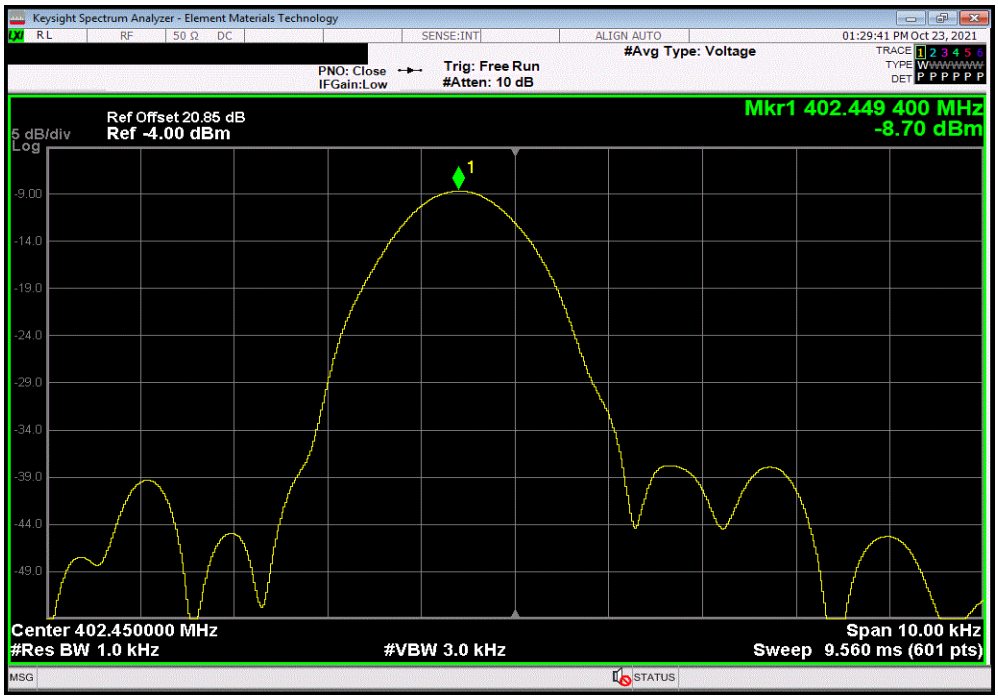
CW, Extreme Temperature +55°C, Low Channel, 402.450 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		402.4482327	402.4477507	1	100	Pass



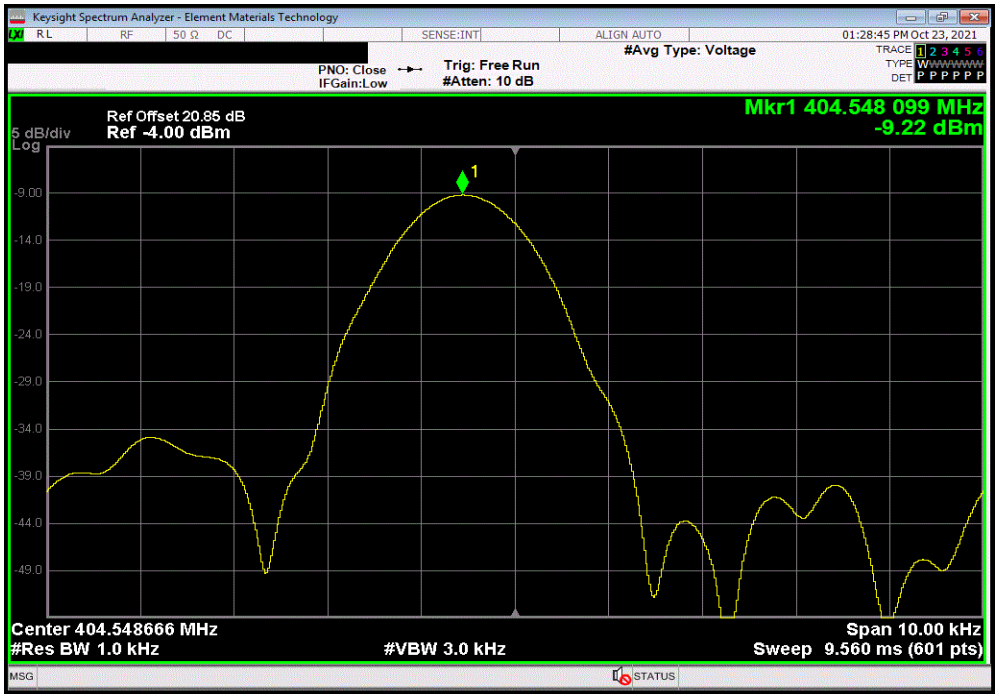
CW, Extreme Temperature +55°C, High Channel, 404.550 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		404.5495663	404.551433	5	100	Pass



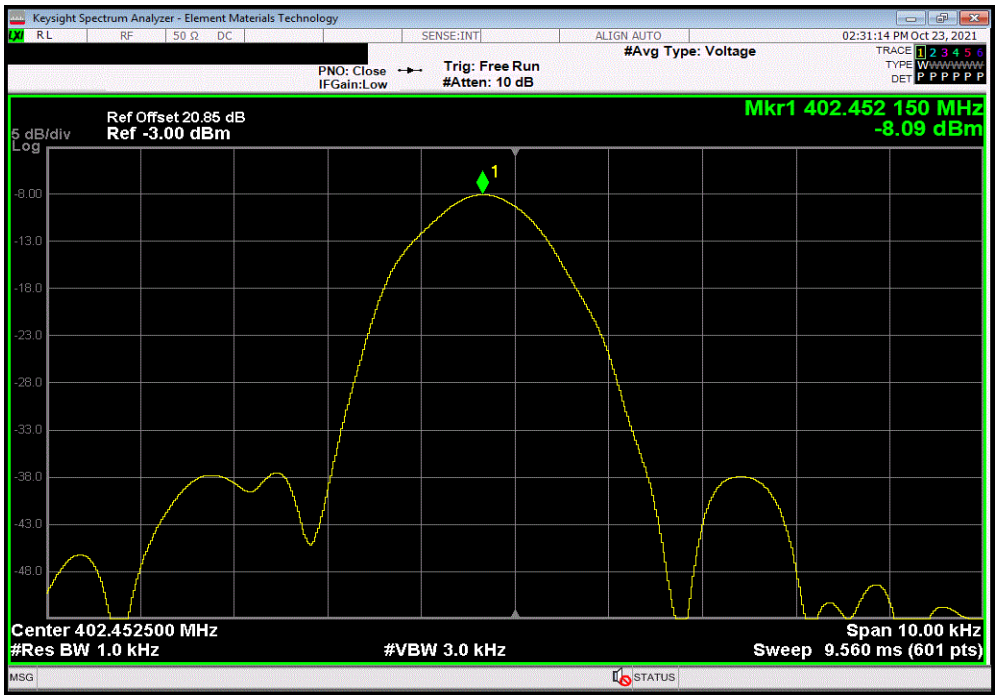
CW, Extreme Temperature +50°C, Low Channel, 402.450 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		402.4494	402.4477507	4	100	Pass



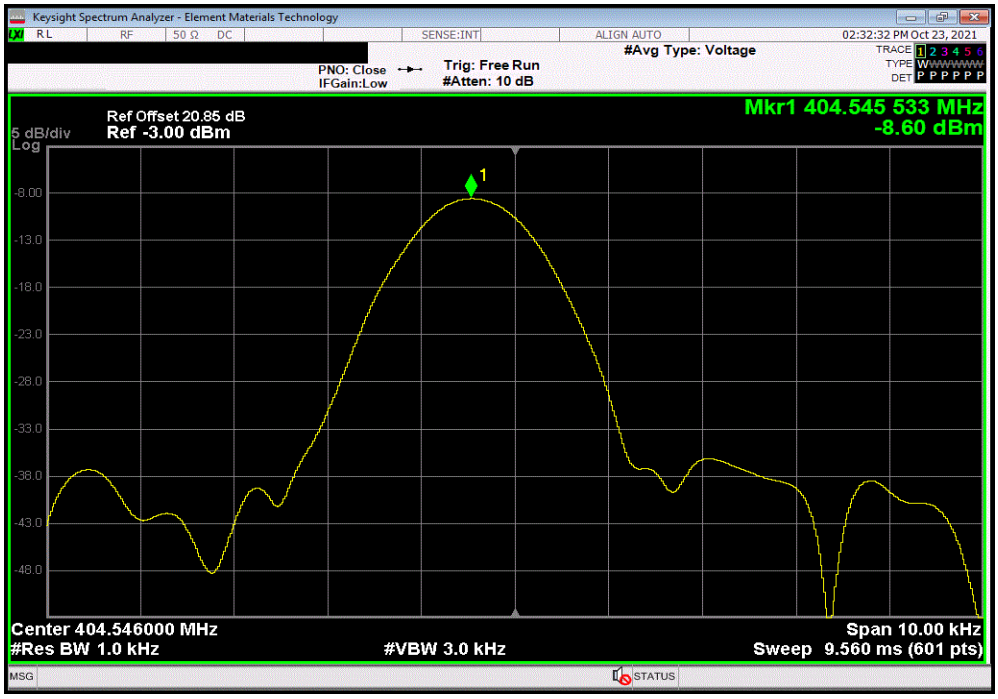
CW, Extreme Temperature +50°C, High Channel, 404.550 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		404.5480993	404.551433	8	100	Pass



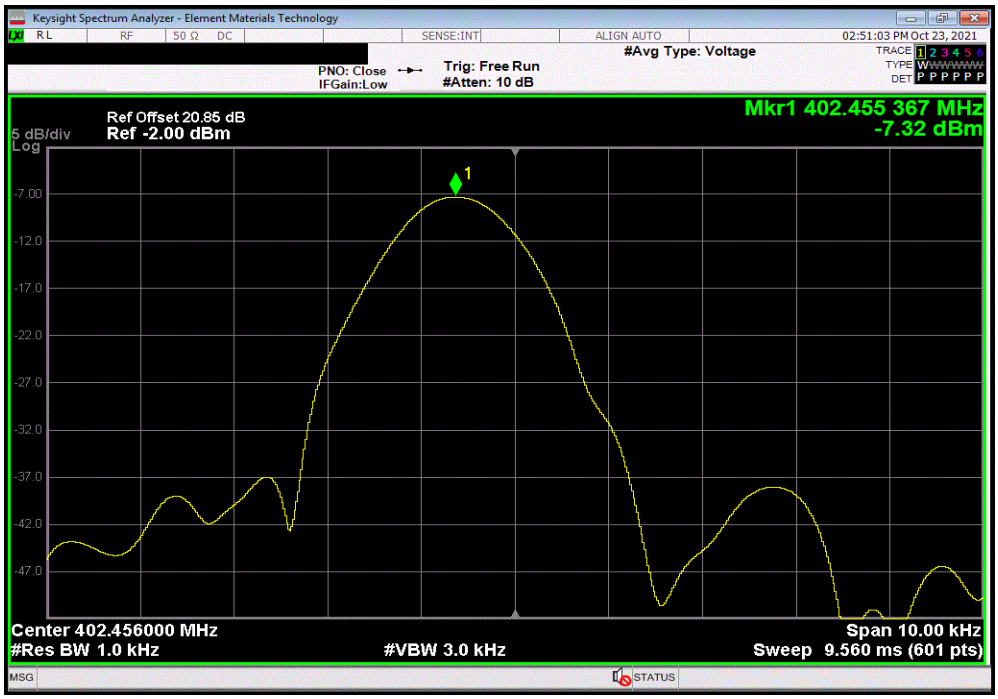
CW, Extreme Temperature +40°C, Low Channel, 402.450 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		402.45215	402.4477507	11	100	Pass



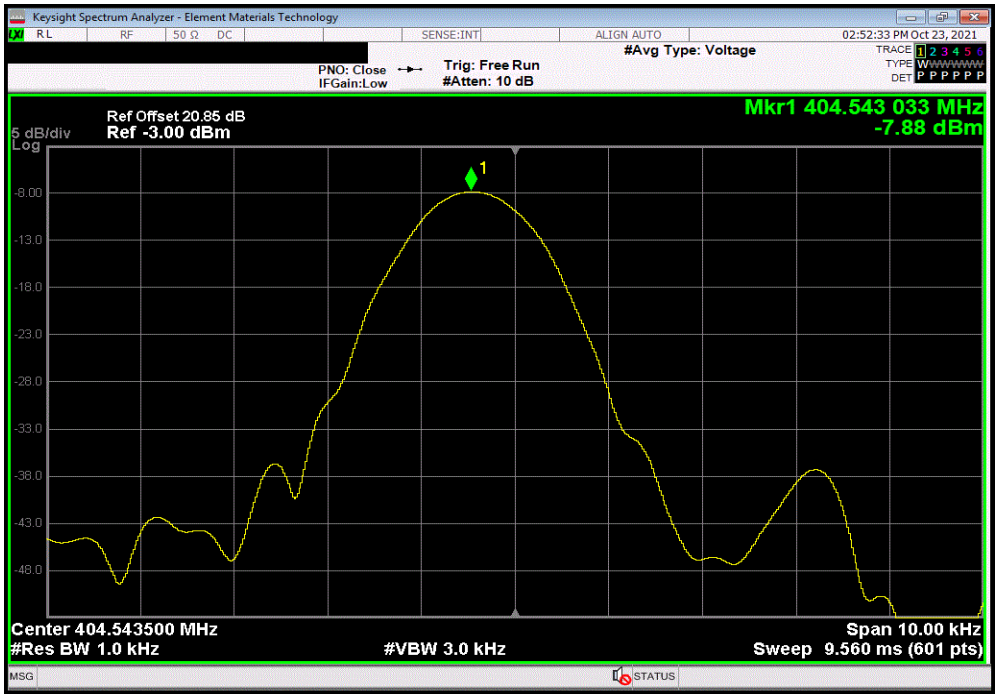
CW, Extreme Temperature +40°C, High Channel, 404.550 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		404.5455333	404.551433	15	100	Pass



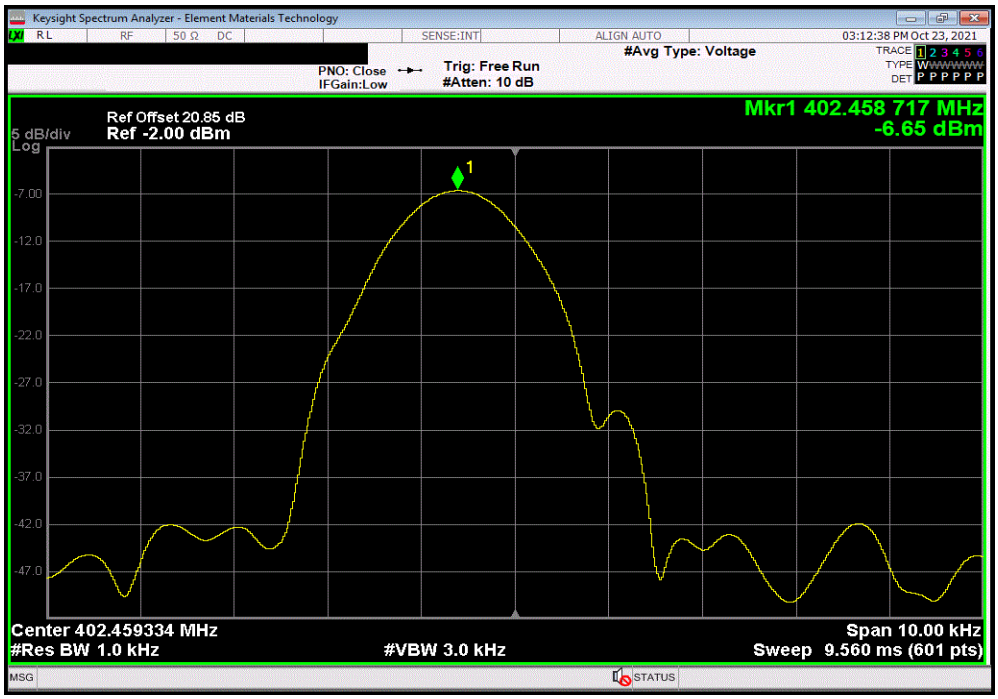
CW, Extreme Temperature +30°C, Low Channel, 402.450 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		402.4553667	402.4477507	19	100	Pass



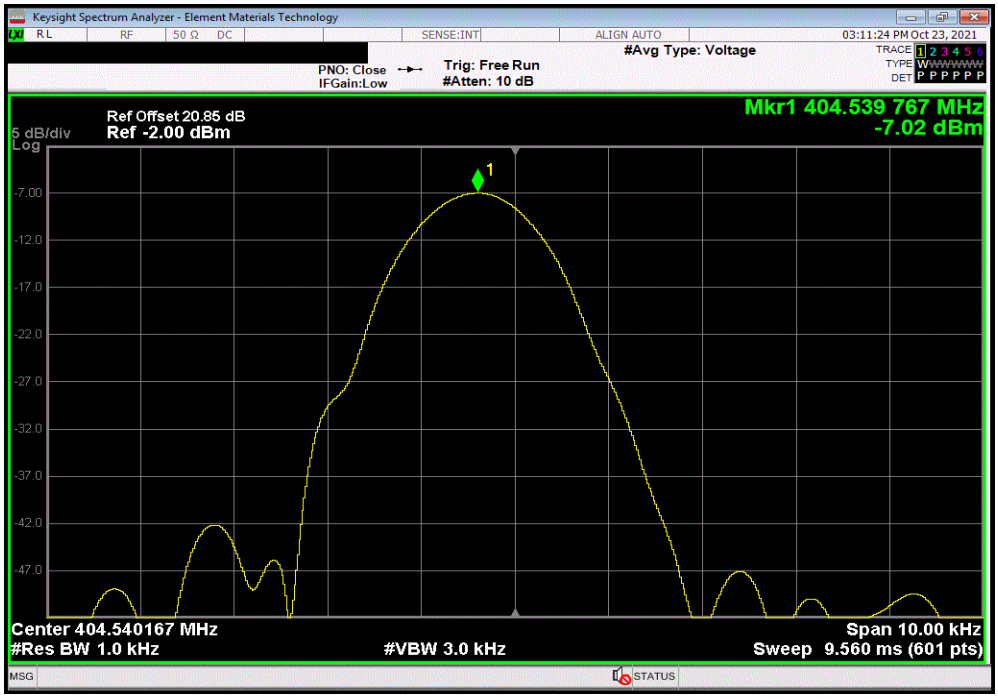
CW, Extreme Temperature +30°C, High Channel, 404.550 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		404.5430333	404.551433	21	100	Pass



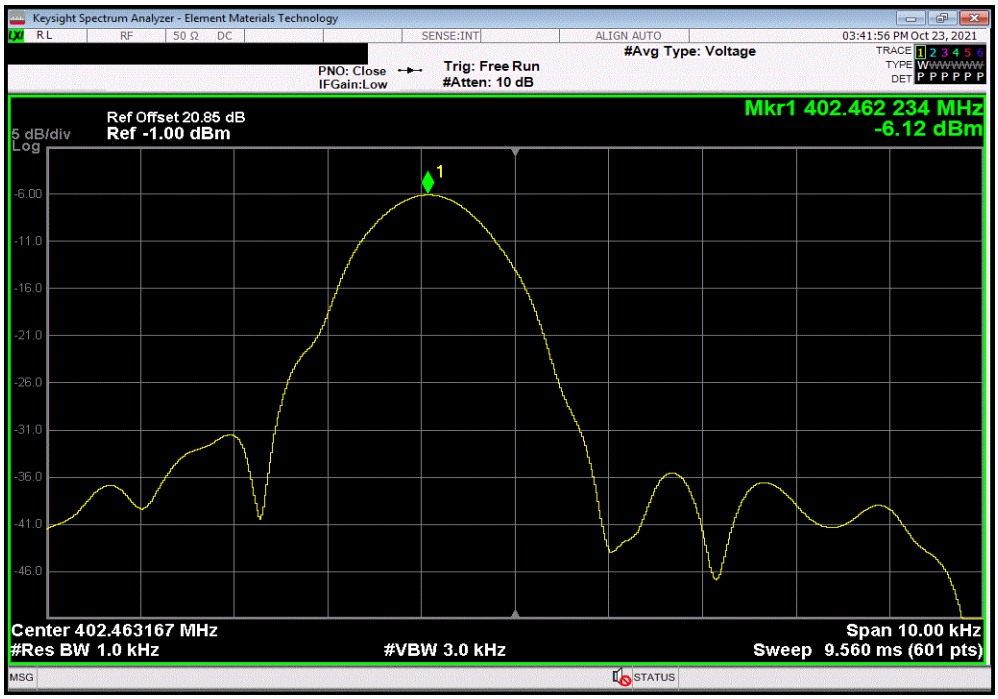
CW, Extreme Temperature +20°C, Low Channel, 402.450 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		402.4587173	402.4477507	27	100	Pass



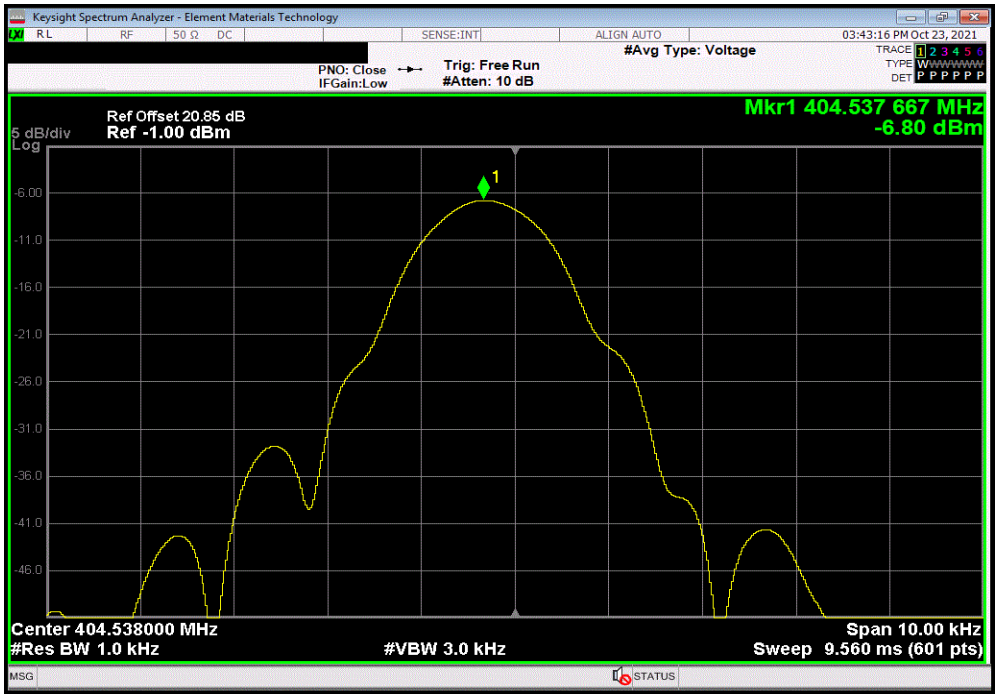
CW, Extreme Temperature +20°C, High Channel, 404.550 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		404.539767	404.551433	29	100	Pass



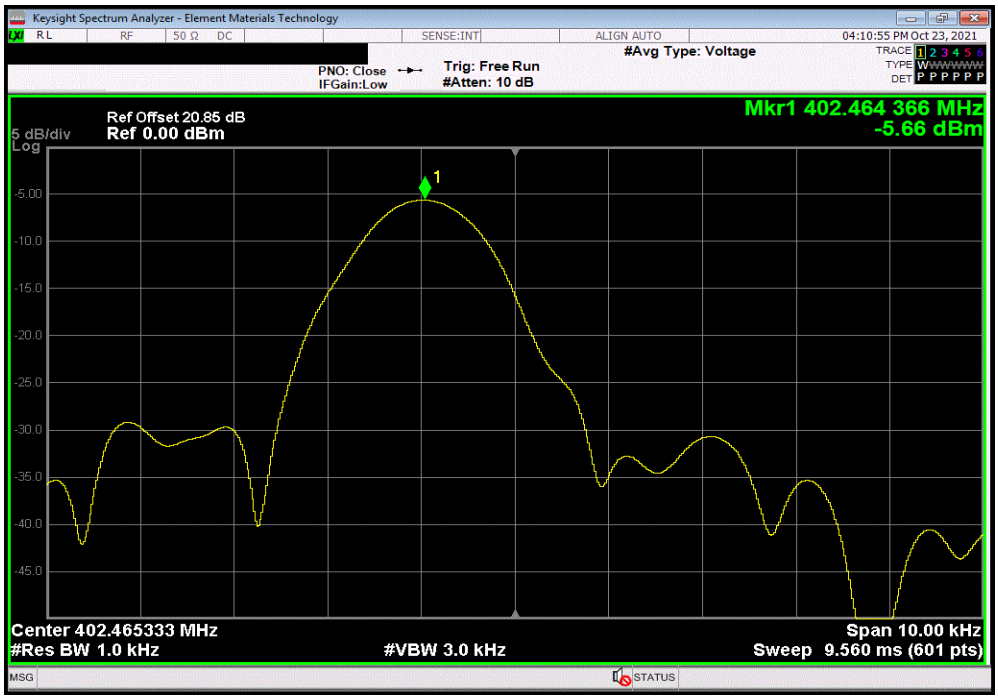
CW, Extreme Temperature +10°C, Low Channel, 402.450 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		402.4622337	402.4477507	36	100	Pass



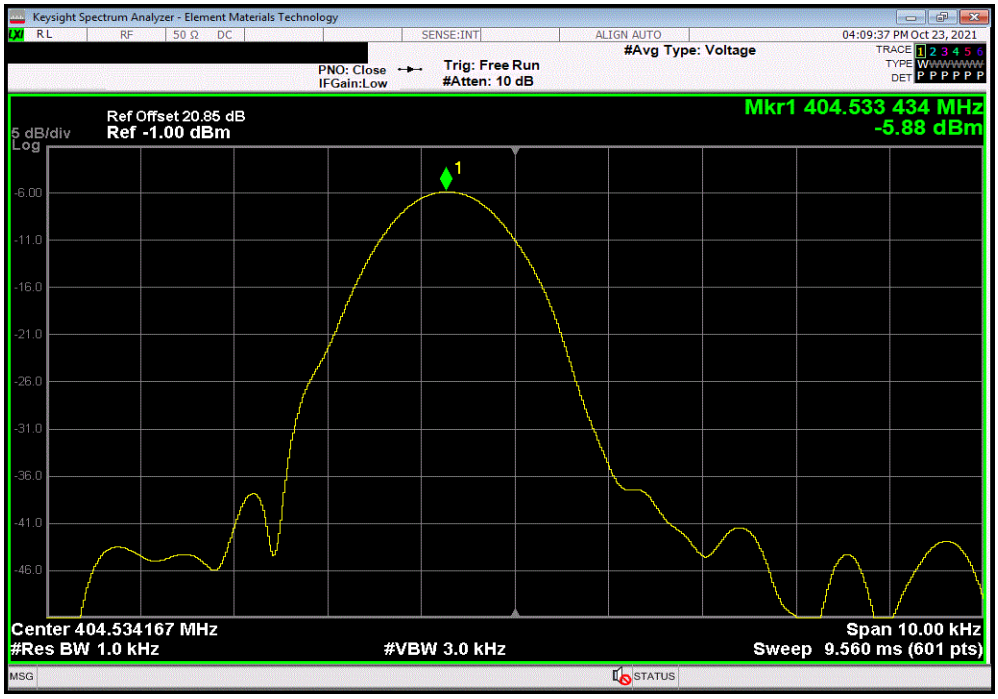
CW, Extreme Temperature +10°C, High Channel, 404.550 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		404.5376667	404.551433	34	100	Pass



CW, Extreme Temperature 0°C, Low Channel, 402.450 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		402.4643663	402.4477507	41	100	Pass



CW, Extreme Temperature 0°C, High Channel, 404.550 MHz						
		Measured Value (MHz)	Nominal Value Value (MHz)	Error (ppm)	Limit (ppm)	Results
		404.5334337	404.551433	44	100	Pass



SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.08.30.0
PSA-ESCI 2021.03.17.0

TEST DESCRIPTION

The highest gain of each type of antenna to be used with the EUT was tested. For each configuration, the spectrum was scanned throughout the specified range. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.26). A preamp was used for this test in order to provide sufficient measurement sensitivity.

Per CFR 47 95.2579(a), field strength measurements were performed and compared to the specified limits.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	2020-12-08	2021-12-08
Antenna - Biconilog	Teseq	CBL 6141B	AXR	2020-10-13	2022-10-13
Antenna - Double Ridge	EMCO	3115	AHC	2020-07-01	2022-07-01
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	2020-11-17	2021-11-17
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	2020-11-17	2021-11-17
Cable	N/A	Bilog Cables	EVA	2020-11-17	2021-11-17
Cable	N/A	Double Ridge Horn Cables	EVB	2020-11-17	2021-11-17
Equipment used on 2021-12-22					
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	2021-12-09	2022-12-09
Antenna - Biconilog	EMCO	3142B	AXJ	2021-03-03	2023-03-03
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	2020-11-17	2021-11-17
Cable	N/A	Bilog Cables	EVA	2020-11-17	2021-11-17

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.1 dB	-5.1 dB

FREQUENCY RANGE INVESTIGATED

30 MHz TO 4000 MHz

POWER INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

MIER0005-3

MODES INVESTIGATED

Tx, 2FSK-fallback, Low Channel = 402.450 MHz and High Channel = 404.550 MHz

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.08.30.0
PSA-ESCI 2021.03.17.0

EUT:	Model 2100 Wireless Transmitter	Work Order:	MIER0005
Serial Number:	0132	Date:	2021-10-19
Customer:	MicroTransponder, Inc.	Temperature:	22.8°C
Attendees:	None	Relative Humidity:	42.6%
Customer Project:	None	Bar. Pressure:	1009 mb
Tested By:	Jeff Alcoke	Job Site:	EV01
Power:	110VAC/60Hz	Configuration:	MIER0005-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 95I:2021	ANSI C63.26:2015

TEST PARAMETERS

Run #:	5	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

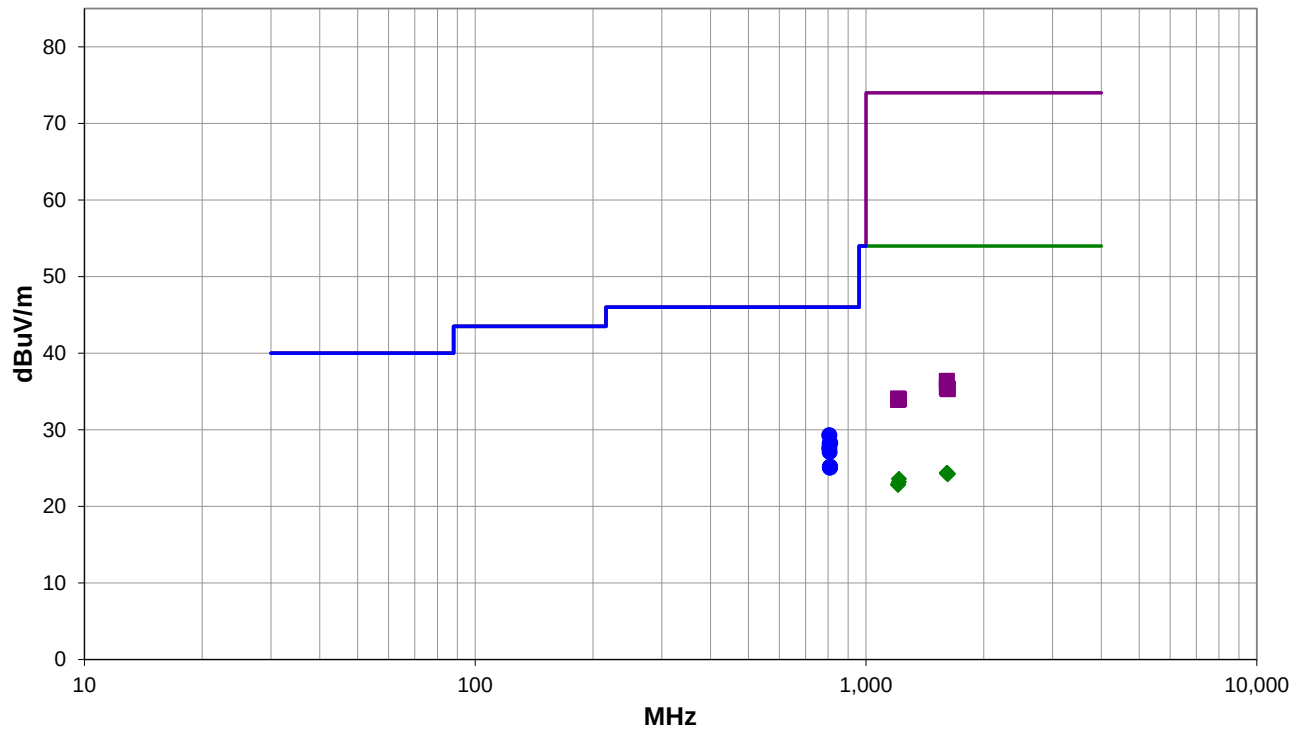
Please reference data comments below for channel and EUT orientation.

EUT OPERATING MODES

Tx, 2FSK-fallback, Low Channel = 402.450 MHz and High Channel = 404.550 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 5 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.08.30.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #5

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
805.000	19.4	9.9	1.2	168.0	3.0	0.0	Vert	QP	0.0	29.3	46.0	-16.7	Low Ch, EUT Vert
809.217	18.4	9.9	1.0	170.0	3.0	0.0	Vert	QP	0.0	28.3	46.0	-17.7	High Ch, EUT Vert
806.803	18.3	9.9	1.1	199.0	3.0	0.0	Vert	QP	0.0	28.2	46.0	-17.8	Mid Ch, EUT Vert
805.000	17.7	9.9	1.0	215.0	3.0	0.0	Horz	QP	0.0	27.6	46.0	-18.4	Low Ch, EUT Horz
806.805	17.2	9.9	1.0	226.0	3.0	0.0	Horz	QP	0.0	27.1	46.0	-18.9	Mid Ch, EUT Horz
809.073	15.3	9.9	1.0	63.0	3.0	0.0	Horz	QP	0.0	25.2	46.0	-20.8	High Ch, EUT Horz
808.662	15.2	9.9	1.0	264.0	3.0	0.0	Vert	QP	0.0	25.1	46.0	-20.9	High Ch, EUT Horz
808.033	15.2	9.9	1.0	360.0	3.0	0.0	Horz	QP	0.0	25.1	46.0	-20.9	High Ch, EUT on Side
809.113	15.2	9.9	1.4	311.0	3.0	0.0	Vert	QP	0.0	25.1	46.0	-20.9	High Ch, EUT on Side
808.447	15.2	9.9	1.0	28.0	3.0	0.0	Horz	QP	0.0	25.1	46.0	-20.9	High Ch, EUT Vert
1610.102	30.3	-5.9	2.2	25.0	3.0	0.0	Vert	AV	0.0	24.4	54.0	-29.6	Low Ch, EUT Vert
1609.540	30.2	-5.9	1.0	81.0	3.0	0.0	Horz	AV	0.0	24.3	54.0	-29.7	Low Ch, EUT Horz
1618.283	30.3	-6.0	1.4	13.0	3.0	0.0	Horz	AV	0.0	24.3	54.0	-29.7	High Ch, EUT Horz
1618.268	30.2	-6.0	1.5	332.0	3.0	0.0	Vert	AV	0.0	24.2	54.0	-29.8	High Ch, EUT Vert
1213.743	31.3	-7.7	1.9	261.0	3.0	0.0	Vert	AV	0.0	23.6	54.0	-30.4	High Ch, EUT Vert
1213.303	30.9	-7.7	1.5	83.0	3.0	0.0	Horz	AV	0.0	23.2	54.0	-30.8	High Ch, EUT Horz
1207.718	30.6	-7.7	1.0	82.0	3.0	0.0	Vert	AV	0.0	22.9	54.0	-31.1	Low Ch, EUT Vert
1207.285	30.5	-7.7	1.0	158.0	3.0	0.0	Horz	AV	0.0	22.8	54.0	-31.2	Low Ch, EUT Horz
1609.767	42.3	-5.9	1.0	81.0	3.0	0.0	Horz	PK	0.0	36.4	74.0	-37.6	Low Ch, EUT Horz
1610.165	41.4	-5.9	2.2	25.0	3.0	0.0	Vert	PK	0.0	35.5	74.0	-38.5	Low Ch, EUT Vert
1618.027	41.4	-6.0	1.5	332.0	3.0	0.0	Vert	PK	0.0	35.4	74.0	-38.6	High Ch, EUT Vert
1618.017	41.3	-6.0	1.4	13.0	3.0	0.0	Horz	PK	0.0	35.3	74.0	-38.7	High Ch, EUT Horz
1207.065	41.8	-7.7	1.0	158.0	3.0	0.0	Horz	PK	0.0	34.1	74.0	-39.9	Low Ch, EUT Horz
1213.415	41.7	-7.7	1.5	83.0	3.0	0.0	Horz	PK	0.0	34.0	74.0	-40.0	High Ch, EUT Horz
1213.860	41.7	-7.7	1.9	261.0	3.0	0.0	Vert	PK	0.0	34.0	74.0	-40.0	High Ch, EUT Vert
1207.223	41.6	-7.7	1.0	82.0	3.0	0.0	Vert	PK	0.0	33.9	74.0	-40.1	Low Ch, EUT Vert

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.08.30.0
PSA-ESCI 2021.03.17.0

EUT:	Model 2100 Wireless Transmitter	Work Order:	MIER0005
Serial Number:	0132	Date:	2021-12-22
Customer:	MicroTransponder, Inc.	Temperature:	19.6°C
Attendees:	None	Relative Humidity:	43.9%
Customer Project:	None	Bar. Pressure (PMSL):	1009 mb
Tested By:	Jeff Alcoke	Job Site:	EV01
Power:	5.0 VDC via USB	Configuration:	MIER0005-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 95I:2021	ANSI C63.26:2015

TEST PARAMETERS

Run #:	30	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

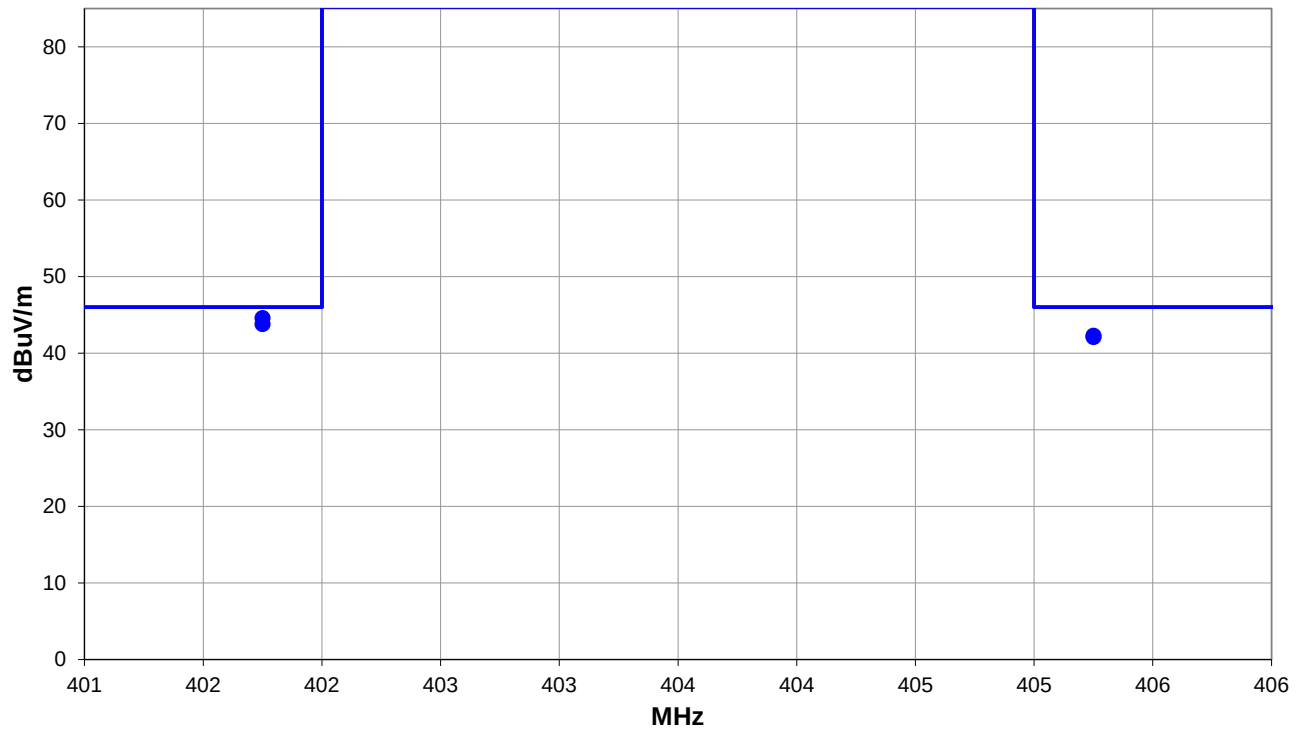
Please reference data comments below for channel and EUT orientation. AFI, AXJ, AOL, EVA

EUT OPERATING MODES

Continuous Tx, 2FSK-fallback, Low Channel = 402.450 MHz and High Channel = 404.550 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 30 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2021.09.02.0
EmiR5 2021.08.30.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #30

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
401.750	42.7	1.9	1.01	56.0	3.0	0.0	Vert	QP	0.0	44.6	46.0	-1.4	Ch 1, EUT Vert
401.750	41.9	1.9	1.0	229.0	3.0	0.0	Horz	QP	0.0	43.8	46.0	-2.2	Ch 1, EUT Horz
405.250	40.3	2.0	1.0	64.0	3.0	0.0	Vert	QP	0.0	42.3	46.0	-3.7	Ch 8, EUT Vert
405.250	40.1	2.0	1.0	219.0	3.0	0.0	Horz	QP	0.0	42.1	46.0	-3.9	Ch 8, EUT Horz

CONCLUSION

Pass

Tested By

SPURIOUS CONDUCTED EMISSIONS

XMit 2020.12.30.0

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5181A	TIG	2020-04-16	2023-04-16
Cable	Micro-Coax	UFD150A-1-0720-200200	EVK	2021-03-14	2022-03-14
Attenuator	S.M. Electronics	SA26B-20	AUY	2021-03-14	2022-03-14
Block - DC	Fairview Microwave	SD3379	AMW	2021-03-14	2022-03-14
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2021-07-06	2022-07-06

TEST DESCRIPTION

Per FCC Part 2.1051, the spurious emissions shall be measured at the RF terminal. The peak spurious emissions were measured with the EUT configured to the modes listed in the datasheet. The EUT was transmitting at its maximum data rate.

FCC Part 95 have no conducted spurious emissions limit. It is a requirement to characterize this information and that data is contained within this datasheet.

SPURIOUS CONDUCTED EMISSIONS

XMit 2020.12.30.0

EUT:	**Model 2100 Wireless Transmitter**			**Work Order:**	**MIER0005**
Serial Number:	**0132**			**Date:**	**22-Oct-21**
Customer:	**MicroTransponder, Inc.**			**Temperature:**	**22.3 °C**
Attendees:	**None**			**Humidity:**	**45.6% RH**
Project:	**None**			**Barometric Pres.:**	**1012 mbar**
Tested by:	**Jeff Alcoke**	**Power:**	**USB via 110VAC/60Hz**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	**Test Method**
FCC 95I:2021	ANSI C63.26:2015

COMMENTS

Reference level offset includes: DC block, 20 dB attenuator, and measurement cable.

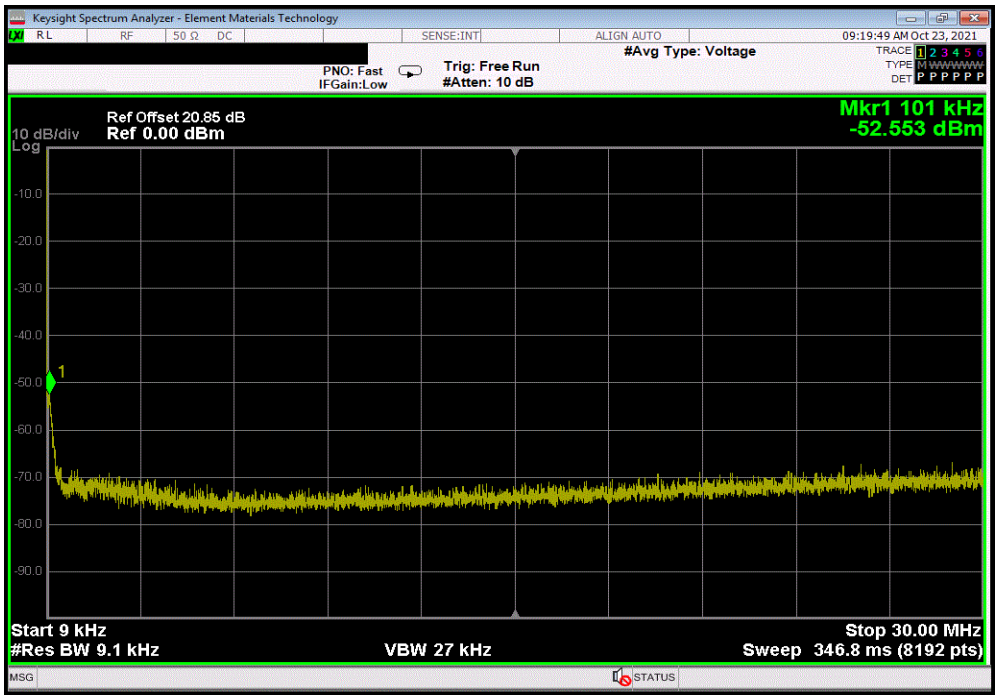
DEVIATIONS FROM TEST STANDARD

None

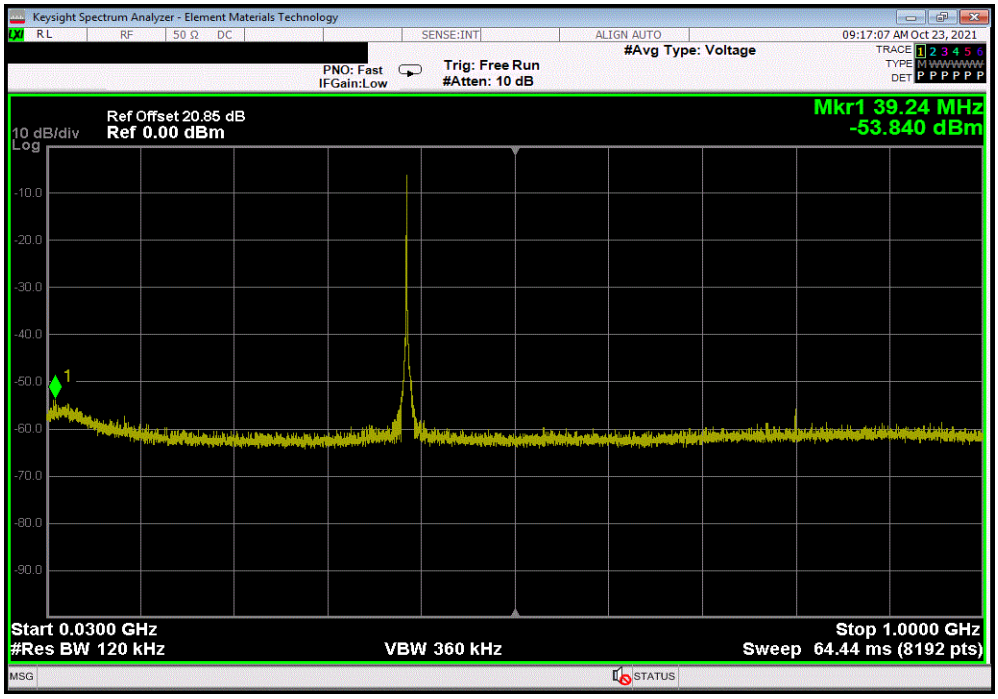
Configuration #	**3**	*Signature*

	Value (dBm)	**Limit**	**Result**
Low Channel, 402.450 MHz			
9 kHz - 30 MHz	-52.6	N/A	N/A
30 MHz - 1000 MHz	-53.8	N/A	N/A
1000 MHz - 5000 MHz	-46.1	N/A	N/A
High Channel, 404.550 MHz			
9 kHz - 30 MHz	-52.2	N/A	N/A
30 MHz - 1000 MHz	-53.8	N/A	N/A
1000 MHz - 5000 MHz	-44.8	N/A	N/A

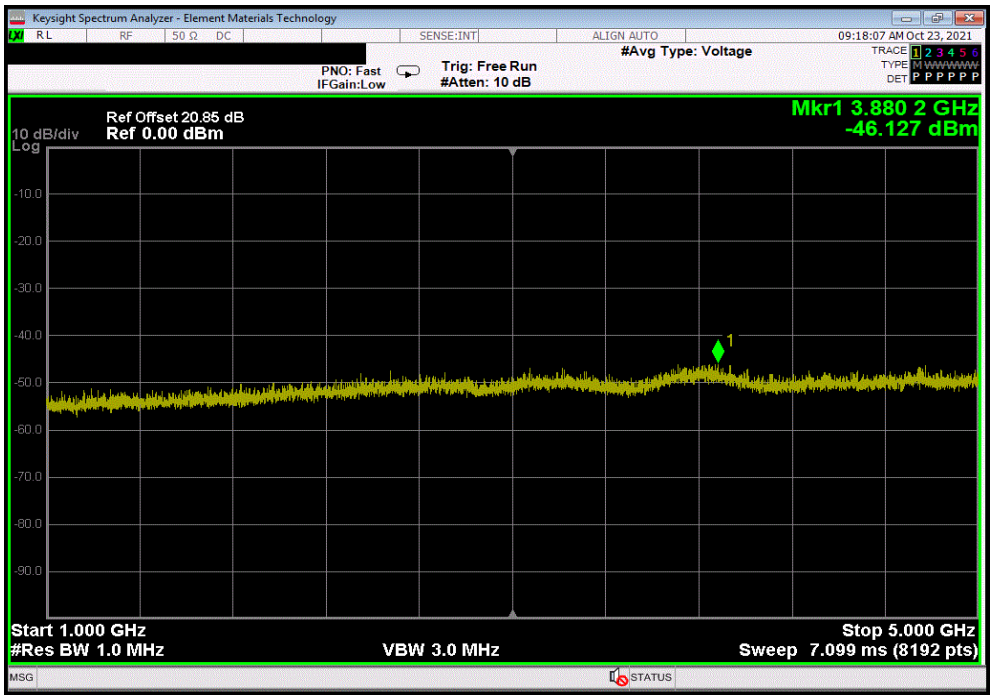
Low Channel, 402.450 MHz, 9 kHz - 30 MHz						
				Value (dBm)	Limit	Result
				-52.6	N/A	N/A



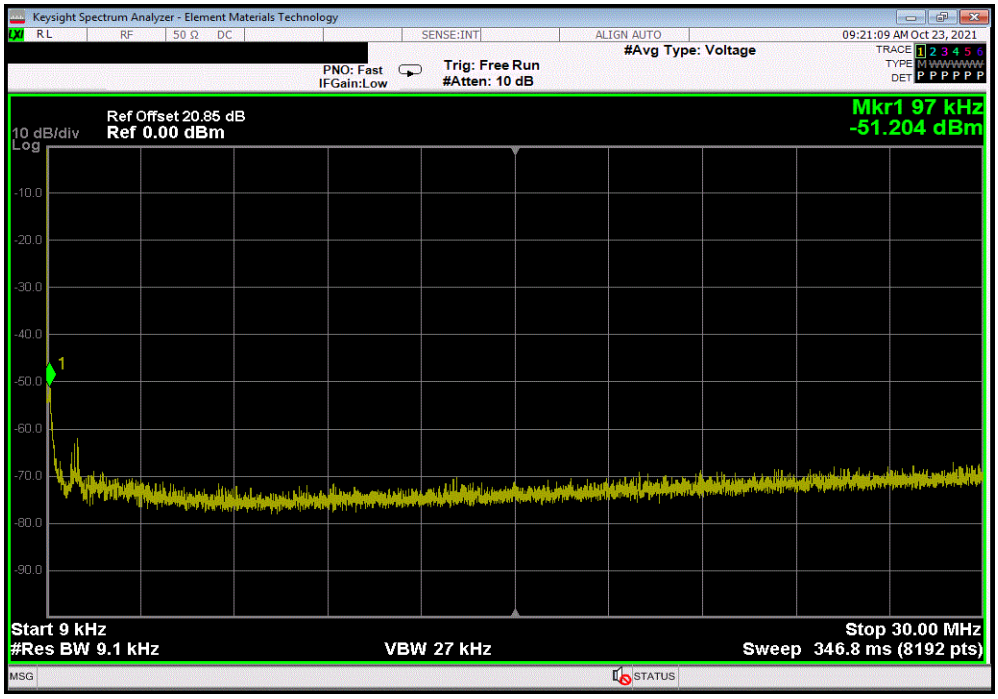
Low Channel, 402.450 MHz, 30 MHz - 1000 MHz						
				Value (dBm)	Limit	Result
				-53.8	N/A	N/A



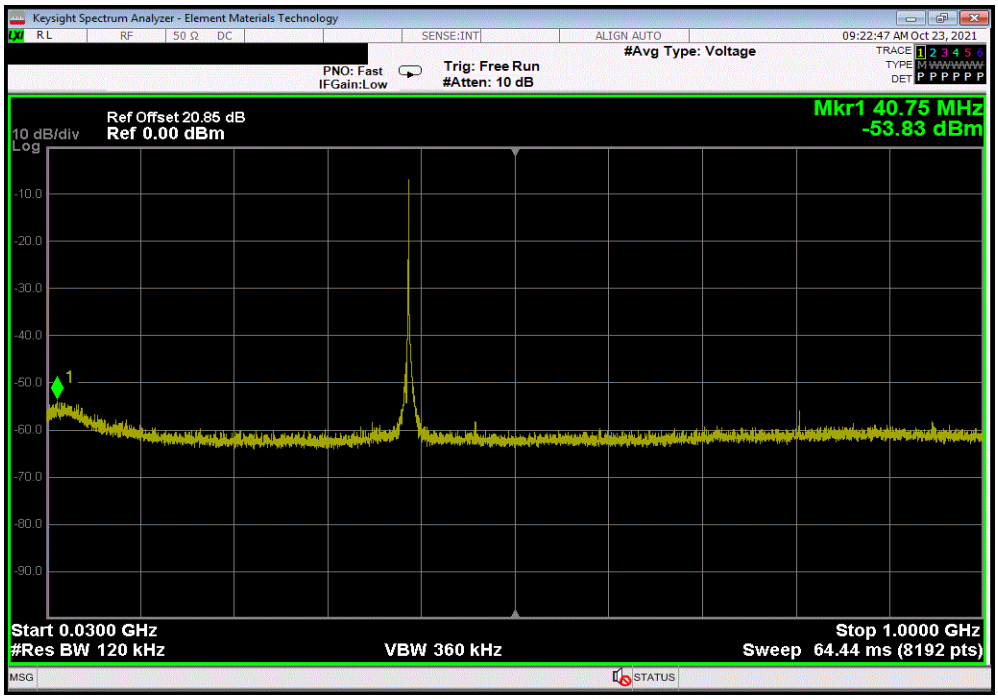
Low Channel, 402.450 MHz, 1000 MHz - 5000 MHz						
				Value (dBm)	Limit	Result
				-46.1	N/A	N/A



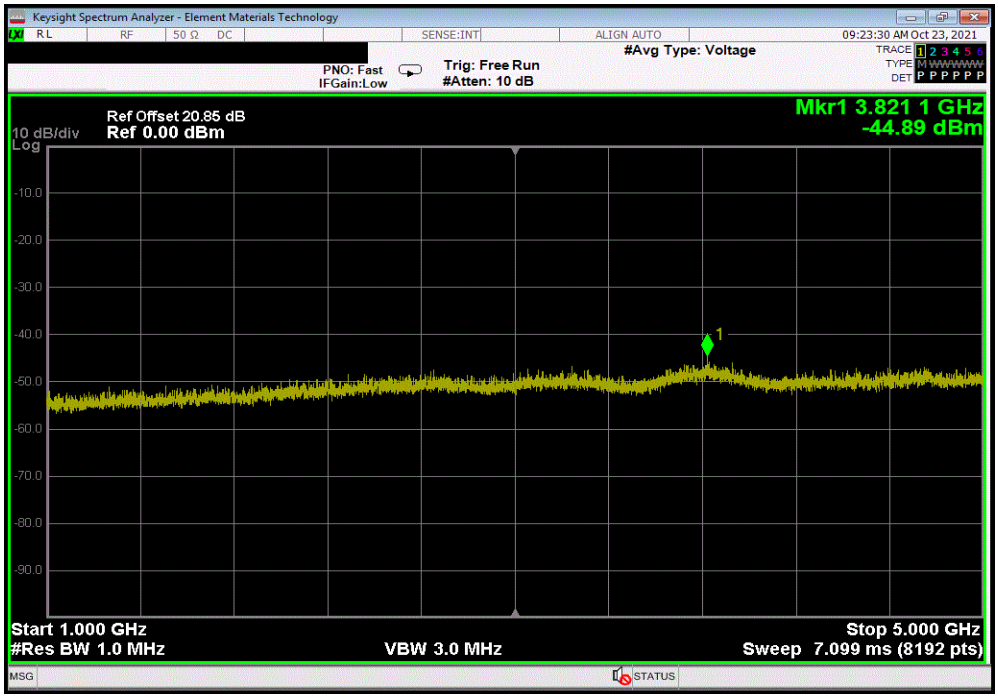
High Channel, 404.550 MHz, 9 kHz - 30 MHz						
				Value (dBm)	Limit	Result
				-52.2	N/A	N/A



High Channel, 404.550 MHz, 30 MHz - 1000 MHz						
				Value (dBm)	Limit	Result
				-53.8	N/A	N/A



High Channel, 404.550 MHz, 1000 MHz - 5000 MHz						
				Value (dBm)	Limit	Result
				-44.8	N/A	N/A



RADIATED POWER (EIRP)

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

TEST DESCRIPTION

The Field Strength of the Fundamental was measured in the far-field at an FCC Listed Semi-anechoic Chamber. Spectrum analyzer and linearly polarized antennas were used to measure the radiated field strength of the fundamental.

Per 95.2567(b)(1), the maximum radiated field strength for a MEDS transmitter is 250nW EIRP.

The EUT was transmitting an unmodulated signal. The fundamental carriers of the EUT were maximized by rotating the EUT, adjusting the measurement antenna height (1-4 meters) and polarization. The amplitude and frequency of the highest emissions were noted. The EUT was operated in three orthogonal axes to find the worst case orientation for each measurement antenna polarity.

The EUT was then replaced with a substitution antenna that varies depending on the frequency range of the emission. A small biconical antenna is utilized due to the increasing size of the dipole to match the ½ wavelength.

A signal generator is then connected to the substitution antenna and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the substitution antenna and its gain (dBi); the radiated power (dBm) for each fundamental carrier is determined.

Emissions radiated by the cabinet and the antenna identified during the pre-scans were measured using a Peak detector. If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2021-07-06	2022-07-06
Antenna - Biconilog	EMCO	3142B	AXJ	2021-03-03	2023-03-03
Cable	N/A	Bilog Cables	EVA	2021-11-17	2022-11-17
Antenna - Bicon	Schwarzbeck Mess-Elektronik	UBAA 9114 / BBUK 9139	ABS	2019-11-22	2022-11-22
Generator - Signal	Agilent	N5181A	TIG	2020-04-16	2023-04-16
Meter - Power	Agilent	N1913A	SQR	2021-10-15	2022-10-15
Power Sensor	Agilent	E9300H	SQO	2021-10-15	2022-10-15
Attenuator	Weinschel Corp	93459	REC	2021-04-19	2022-04-19

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	0.7 dB	-0.7 dB

FREQUENCY RANGE INVESTIGATED

402.550 MHz TO 404.450 MHz

POWER INVESTIGATED

5.0 VDC via USB

CONFIGURATIONS INVESTIGATED

MIER0005-1

MODES INVESTIGATED

Continuous Tx, CW, Ch 1 = 402.450 MHz, Ch 8 = 404.550 MHz

RADIATED POWER (EIRP)

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

EUT:	Model 2100 Wireless Transmitter	Work Order:	MIER0005
Serial Number:	0132	Date:	2021-12-07
Customer:	MicroTransponder, Inc.	Temperature:	19.5°C
Attendees:	None	Relative Humidity:	39.5%
Customer Project:	None	Bar. Pressure (PMSL):	1018 mb
Tested By:	Jeff Alcoke	Job Site:	EV01
Power:	5.0 VDC via USB	Configuration:	MIER0005-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 95I:2021	ANSI C63.26:2015

TEST PARAMETERS

Run #:	28	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

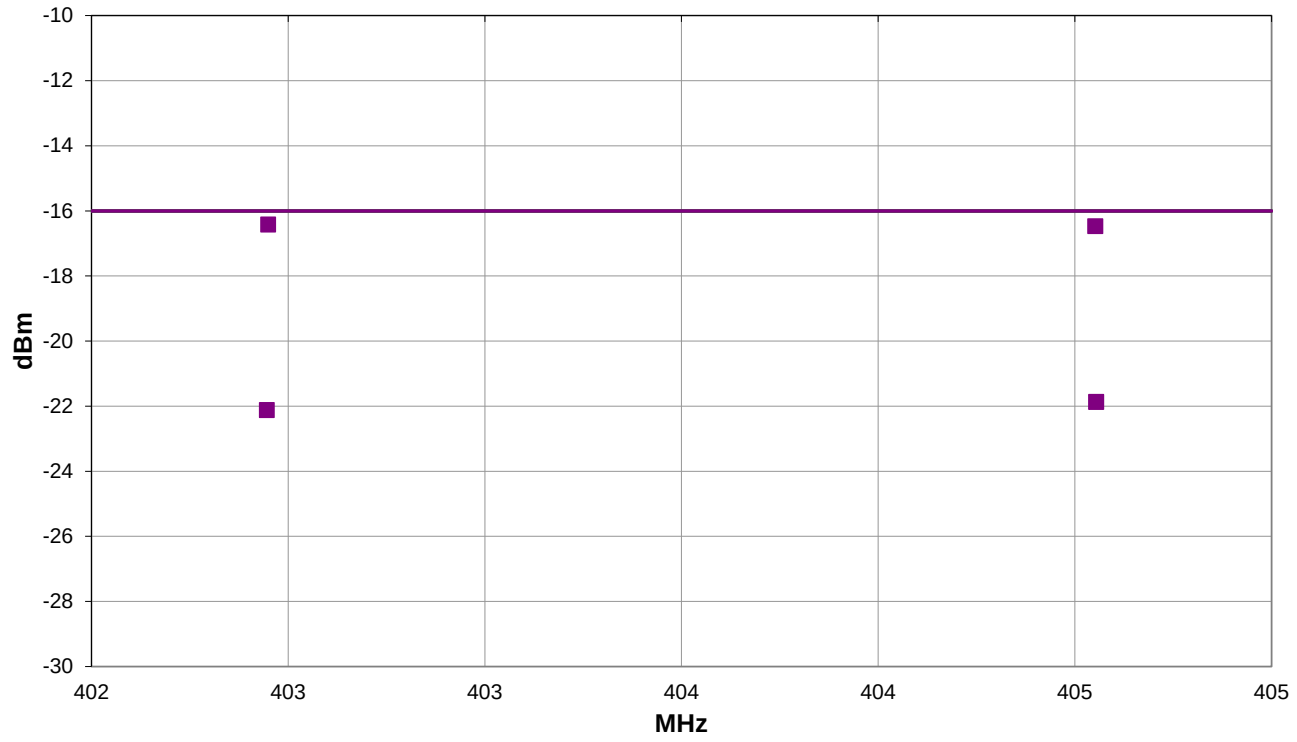
Please reference data comments below for channel and EUT orientation

EUT OPERATING MODES

Continuous Tx, CW, Ch 1 = 402.450 MHz, Ch 8 = 404.550 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 28 ■ PK ◆ AV ● QP

RADIATED POWER (EIRP)

element
WTD.2021.09.21.0
EmiR5 2021.09.09.0
PSA-ESCI 2021.03.17.0

RESULTS - Run #28

Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
402.449	1.37	317.0	Vert	PK	22.8E-6	-16.4	-16.0	-0.4	Ch 1, EUT Vert
404.552	1.34	321.0	Vert	PK	22.5E-6	-16.5	-16.0	-0.5	Ch 8, EUT Vert
404.554	1.0	225.0	Horz	PK	6.5E-6	-21.9	-16.0	-5.9	Ch 8, EUT Horz
402.446	1.0	127.0	Horz	PK	6.1E-6	-22.1	-16.0	-6.1	Ch 1, EUT Horz

CONCLUSION

Pass

Tested By

End of Test Report