



Multi-Tech Systems, Inc.

MTS-504-

FCC 15.247:2026

LoRa Hybrid Transceiver

Report: F3EN0281.0 Rev. 01, Issue Date: March 11, 2026



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CERTIFICATE OF TEST



Last Date of Test: January 27, 2026
Multi-Tech Systems, Inc.
EUT: MTS-504-

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2026	ANSI C63.10:2020 Cor.1:2023

Results

Test Description	Result	Specification Section(s)	Method Section(s)	Comments
Powerline Conducted Emissions (Transmitter)	N/A	15.207	6.2	Not requested.
Radiated Band Edge Emissions	N/A	15.247(d)	6.5	Not required for a 902-928 MHz radio as there are no restricted bands adjacent to that band.
Spurious Radiated Emissions	Pass	15.247(d)	6.4, 6.5, 6.6	
Duty Cycle	N/A	15.247	7.5	
Carrier Frequency Separation	N/A	15.247(a)(1)	7.8.2	Not requested.
Number of Hopping Frequencies	N/A	15.247(a)(1), KDB 558074 10(b)(4)	7.8.3	Not requested.
Dwell Time	N/A	15.247(a)(1), KDB 558074 10(b)(2)	7.8.4	Not requested.
Output Power	Pass	15.247(b)	11.9	
Equivalent Isotropic Radiated Power (EIRP)	Pass	15.247(b)	11.9	
Band Edge Compliance	N/A	15.247(d)	7.8.6	Not required for a Class 2 permissive change
Band Edge Compliance - Hopping Mode	N/A	15.247(d)	7.8.6	Not requested.
DTS Bandwidth (6 dB)	N/A	15.247(a), KDB 558074 10(b)(3)	7.8.7	
Occupied Bandwidth (99%)	Pass	15.247(a)	7.8.7	Not required for a Class 2 permissive change
Spurious Conducted Emissions	N/A	15.247(d)	7.8.8	Not required for a Class 2 permissive change
Power Spectral Density	N/A	15.247(e), KDB 558074 10(b)(1)	11.10.2	Not required for a Class 2 permissive change
Powerline Conducted Emissions (Receiver)	N/A	15.101, 15.107	ANSI C63.4 - 12.2.4	Not included per FCC 15.101 as this will be covered under SDoC rules for the FCC.
Radiated Emissions for Receiver	N/A	15.101, 15.109	ANSI C63.4 - 12.2.5	Not included per FCC 15.101 as this will be covered under SDoC rules for the FCC.

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.

CERTIFICATE OF TEST



Deviations From Test Standards

None

Approved By:

Jeff Alcock, Senior EMC Test Engineer
Signed for and on behalf of Element

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REVISION HISTORY



Revision Number	Description	Date (yyyy-mm-dd)	Page Number
01	added FCC ID and model to the product description	2026-03-09	11
	removed the comment on Duty Cycle about 'not required for a C2PC'	2026-03-09	3

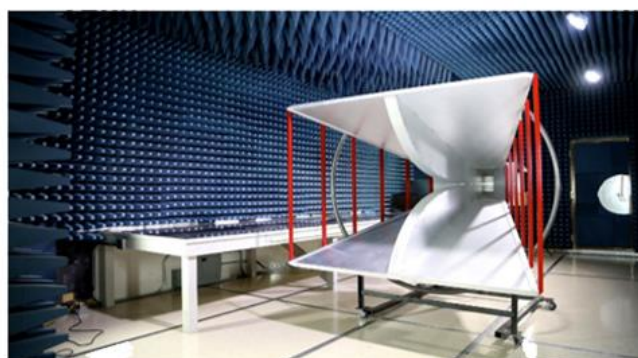
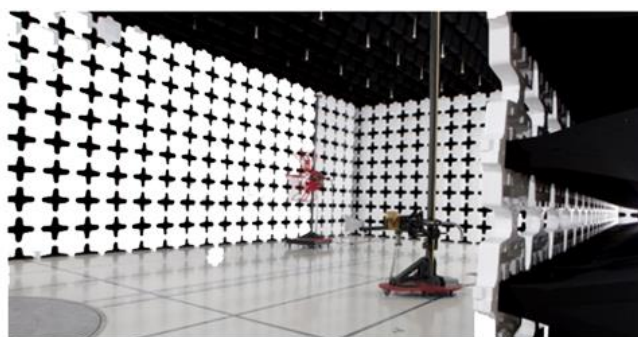
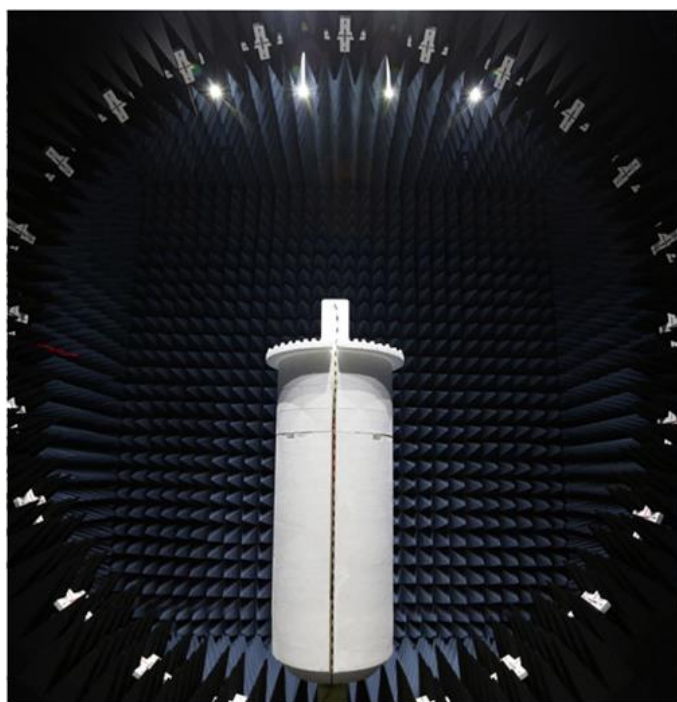
FACILITIES

Testing was performed at the following location(s)

	Location	Labs ⁽¹⁾	Address	A2LA ⁽²⁾	ISED ⁽³⁾	BSMI ⁽⁴⁾	VCCI ⁽⁵⁾	CAB	FDA ⁽⁶⁾
☐	California	OC01-17	41 Tesla Irvine, CA 92618 (949) 861-8918	3310.04	2834B	SL2-IN-E-1154R	A-0029	US0158	TL-55
☒	Minnesota	MN01-11	9349 W Broadway Ave. Brooklyn Park, MN 55445 (612) 638-5136	3310.05	2834E	SL2-IN-E-1152R	A-0109	US0175	TL-57
☐	Oregon	EV01-12	6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	3310.02	2834D	SL2-IN-E-1017	A-0108	US0017	TL-56
☐	Washington	NC01-05	19201 120th Ave NE Bothell, WA 98011 (425) 984-6600	3310.06	2834F	SL2-IN-E-1153R	A-0110	US0157	TL-67
☐	Offsite	N/A	See Product Description	N/A	N/A	N/A	N/A	N/A	N/A

See data sheets for specific labs

- (1) The lab designations denote individual rooms within each location. (OC01, OC02, OC03, etc.)
- (2) A2LA Certificate No.
- (3) ISED Company No.
- (4) BSMI No.
- (5) VCCI Site Filing No.
- (6) FDA ASCA No.



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 reported is based on statistical analysis that was performed by the laboratory. 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.

Various Measurements

Test	All Labs (+/-)
Frequency Accuracy (%)	0.0007
Amplitude Accuracy (dB)	1.2
Conducted Power (dB)	1.2
Radiated Power via Substitution (dB)	0.7
Temperature (degrees C)	0.7
Humidity (% RH)	2.5
Voltage (AC) (%)	1
Voltage (DC) (%)	0.7
Near-field Measurement of E-Field (dB)	1.89
Near-field Measurement of H-Field (dB)	2.65

Field Strength Measurements (dB)

Range	MN05 (+/-)
10kHz-30MHz	1.8
30MHz-1GHz 3m	4.6
1GHz-6GHz	5.1
6GHz-40GHz	5.3
40GHz-220GHz	4.9

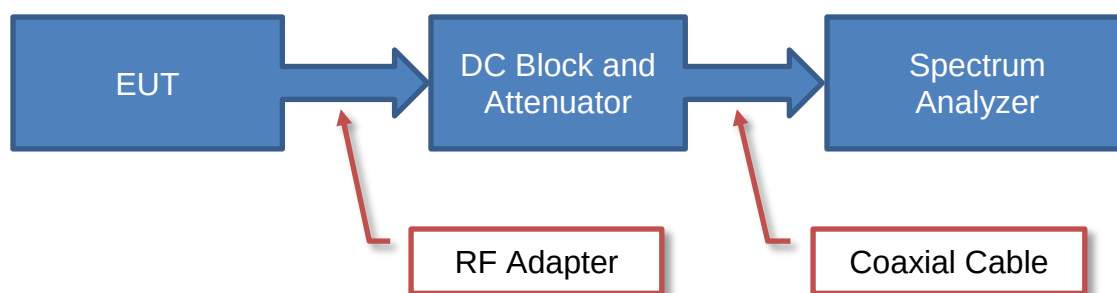
TEST SETUP BLOCK DIAGRAMS

Measurement Bandwidths

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

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

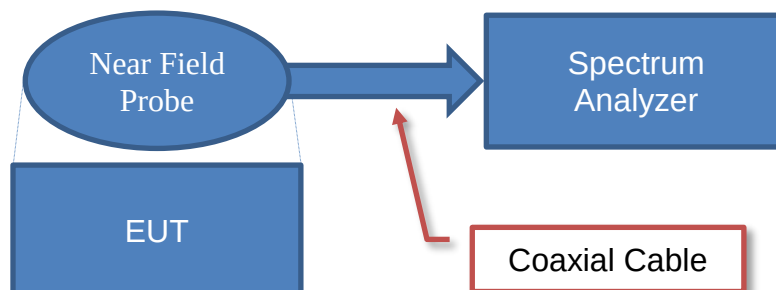
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

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

Near Field Test Fixture Measurements

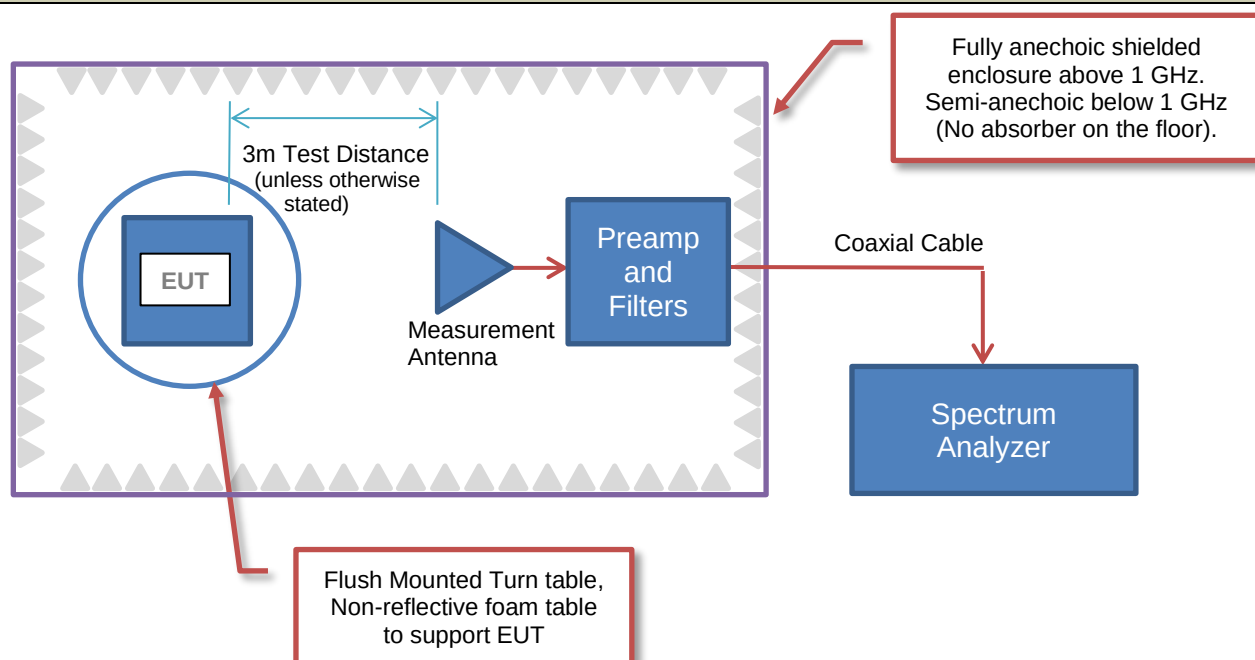


Sample Calculation (logarithmic units)

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

TEST SETUP BLOCK DIAGRAMS

Emissions Measurements



Sample Calculation (logarithmic units)

Radiated Emissions:

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

Conducted Emissions:

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

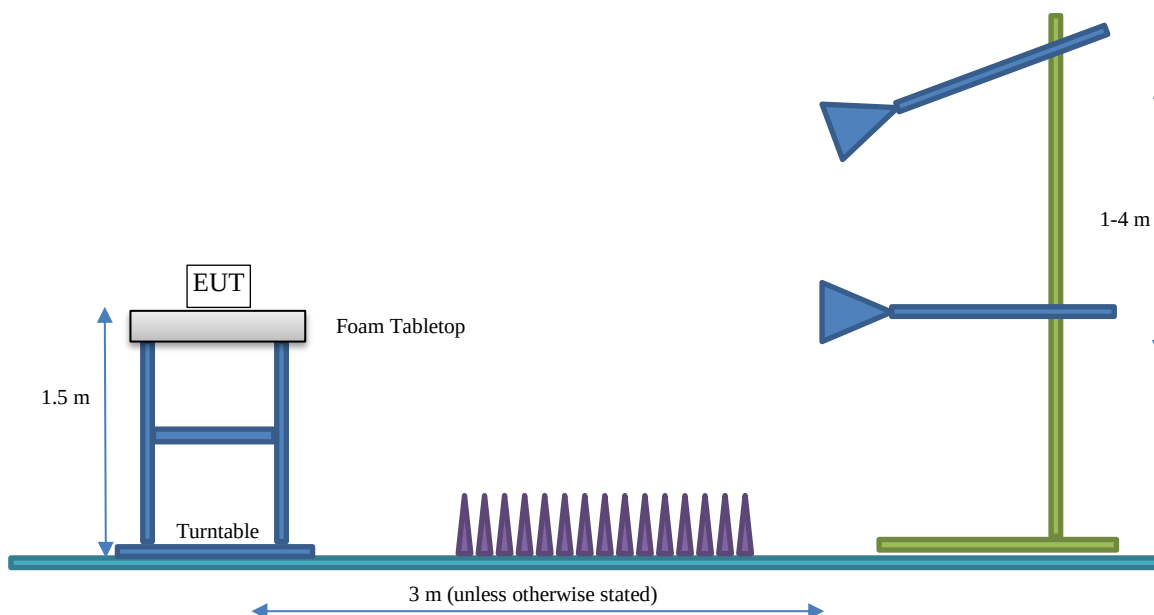
Radiated Power (ERP/EIRP) – Substitution Method:

Measured Level into Substitution Antenna (Amplitude dBm)	Substitution Antenna Factor (dBi)	EIRP to ERP (if applicable)	Measured power (dBm ERP/EIRP)
10.0	6.0	2.15	13.9/16.0

TEST SETUP BLOCK DIAGRAMS

Bore Sighting (>1GHz)

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



PRODUCT DESCRIPTION



Client and Equipment under Test (EUT) Information

Company Name:	Multi-Tech Systems, Inc.
Address:	2205 Woodale Dr.
City, State, Zip:	Mounds View, MN 55112
Test Requested By:	Tim Gunn
EUT:	MTS-504-
First Date of Test:	January 27, 2026
Last Date of Test:	January 27, 2026
Receipt Date of Samples:	January 27, 2026
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

MTS-504- Raptor is a LoRaWAN, body worn, personal emergency device capable of two-way communication. It contains a LoRa radio module model MTXDOT-NA1 with FCC ID AU792U23B16873.

Testing Objective:

Seeking C2PC for the addition of new antenna type for the LoRa radio with operation under FCC 15.247:2026 and also body worn use case.

CONFIGURATIONS



Configuration F3EN0281-1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
MTS-504-	Multi-Tech Systems, Inc.	MTS-504-	23580765

Configuration F3EN0281-2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
MTS-504-	Multi-Tech Systems, Inc.	MTS-504-	23580814

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2026-01-27	Duty Cycle	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	2026-01-27	Equivalent Isotropic 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.
3	2026-01-27	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	2026-01-27	Spurious Radiated Emissions	The EUT was modified.	A notch filter was added to the front end of the Bluetooth radio and conductive tape was applied to the battery.	Scheduled testing was completed.

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. The power settings below reflect the maximum power that the EUT is allowed to transmit at during normal operation.

ANTENNA GAIN (dBi)

Type	Manufacturer:	Frequency Range (MHz)	Gain (dBi)
IFA – PCB Trace	F3 Wireless	902-915 MHz	-0.24

The EUT was tested using the power settings provided by the manufacturer which were based upon:

- ☐ Test software settings Software / firmware used for testing: xDot4.2.26-6
☒ Rated power settings

SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Type	Bandwidth	Channel	Power Setting
LoRa CSS	125 kHz	Low Channel (902.3 MHz)	22 dBm
		Mid Channel (908.7 MHz)	
		High Channel (914.9 MHz)	
	500 kHz	Low Channel (903 MHz)	
		Mid Channel (909.4 MHz)	
		High Channel (914.2 MHz)	

SPURIOUS RADIATED EMISSIONS

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. A reference preview scan (pre-scan) is 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). 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 within 2 MHz of the allowable band may have been taken using the integration method from ANSI C63.10 clause 11.13.3. This procedure uses the channel power feature of the spectrum analyzer to integrate the power of the emission within a 1 MHz bandwidth.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of $10 \cdot \log(1/dc)$.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Double Ridge	ETS Lindgren	3115	AIP	2024-08-02	2026-08-02
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	2025-09-05	2026-09-05
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	2026-01-07	2027-01-07
Attenuator	Fairview Microwave	SA18H-20	VAF	2025-09-03	2026-09-03
Filter - High Pass	Micro-Tronics	HPM50108	LFM	2025-09-03	2026-09-03
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	NCR
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	2025-09-05	2026-09-05
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	2026-01-07	2027-01-07
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	2025-02-04	2026-02-04
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	2026-01-07	2027-01-07
Antenna - Biconilog	ETS Lindgren	3142D	AXO	2025-09-29	2027-09-29
Cable	ESM Cable Corp.	Bilog Cables	MNH	2025-09-05	2026-09-05
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	2025-10-07	2026-10-07
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	2025-09-03	2026-09-03
Filter - Low Pass	Micro-Tronics	LPM50003	LFJ	2025-09-03	2026-09-03
Attenuator	Fairview Microwave	SA18E-10	TYA	2025-09-03	2026-09-03
Antenna - Loop	ETS Lindgren	6502	AOB	2025-06-17	2027-06-17
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	2025-04-11	2026-04-11

SPURIOUS RADIATED EMISSIONS

FREQUENCY RANGE INVESTIGATED

9 kHz TO 18000 MHz

POWER INVESTIGATED

Battery

CONFIGURATIONS INVESTIGATED

F3EN0281-2

MODES INVESTIGATED

Transmitting LoRa Low, Mid and High Channels (902.3, 908.7, 914.2 MHz) 125 kHz Bandwidth and Low Ch (903 MHz) 500 kHz BW

SPURIOUS RADIATED EMISSIONS

EUT:	MTS-504-	Work Order:	F3EN0281
Serial Number:	23580814	Date:	2026-01-27
Customer:	Multi-Tech Systems, Inc.	Temperature:	22.6°C
Attendees:	Dustin Morris	Relative Humidity:	12.2%
Customer Project:	None	Bar. Pressure (PMSL):	1025 mb
Tested By:	Marcelo Aguayo	Job Site:	MN05
Power:	Battery	Configuration:	F3EN0281-2

TEST PARAMETERS

Run #:	34	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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COMMENTS

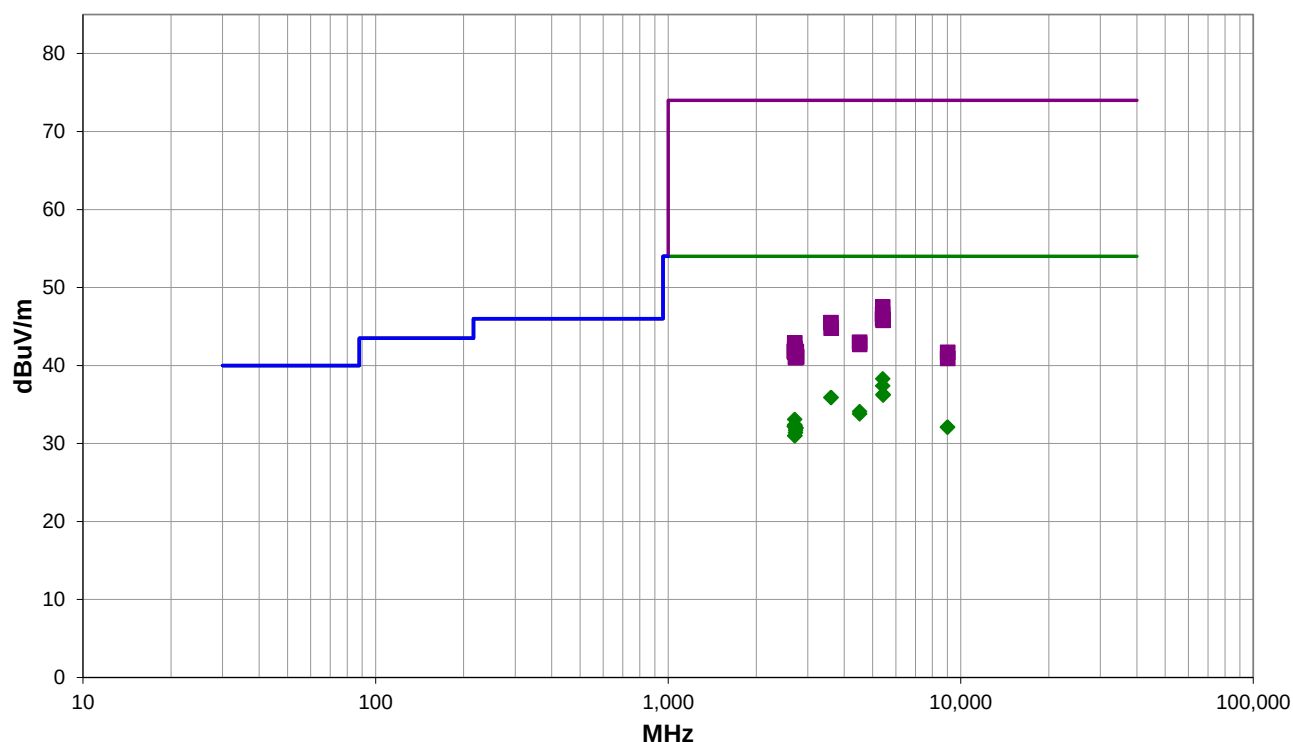
Power Added notch filter to BT front end, antenna connected. Conductive tape on battery. Test mode is 66% (125kHz) and 84% (250 kHz). DCCF applied per $10\log(DC) = 1.8\text{ dB}$ (125kHz BW) and 0.7 dB (500kHz BW)

EUT OPERATING MODES

Transmitting LoRa Low, Mid and High Channels (902.3, 908.7, 914.2 MHz) 125 kHz Bandwidth and Low Ch (903 MHz) 500 kHz BW

DEVIATIONS FROM TEST STANDARD

None



Run #: 34

■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

RESULTS - Run #34

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
5413.470	28.2	8.3	1.5	145.0	1.8	0.0	Vert	AV	0.0	38.3	54.0	-15.7	EUT Horz, Low Ch 125kHz BW
5410.180	27.3	8.3	3.9	90.0	1.8	0.0	Horz	AV	0.0	37.4	54.0	-16.6	EUT Horz, Low Ch 125kHz BW
5428.670	27.3	8.3	1.1	347.0	0.7	0.0	Horz	AV	0.0	36.3	54.0	-17.7	EUT Horz, Low Ch 500kHz BW
5427.880	27.2	8.3	1.5	325.0	0.7	0.0	Vert	AV	0.0	36.2	54.0	-17.8	EUT Horz, Low Ch 500kHz BW
3601.280	29.6	4.5	1.5	212.0	1.8	0.0	Horz	AV	0.0	35.9	54.0	-18.1	EUT Horz, Low Ch 125kHz BW
3603.410	29.6	4.5	1.5	0.0	1.8	0.0	Vert	AV	0.0	35.9	54.0	-18.1	EUT Horz, Low Ch 125kHz BW
4511.330	27.2	5.1	1.5	24.0	1.8	0.0	Horz	AV	0.0	34.1	54.0	-19.9	EUT Horz, Low Ch 125kHz BW
4511.670	26.9	5.1	1.5	115.0	1.8	0.0	Vert	AV	0.0	33.8	54.0	-20.2	EUT Horz, Low Ch 125kHz BW
2706.690	31.9	-0.6	1.5	110.0	1.8	0.0	Horz	AV	0.0	33.1	54.0	-20.9	EUT Horz, Low Ch 125kHz BW
2707.020	31.2	-0.6	2.6	223.0	1.8	0.0	Vert	AV	0.0	32.4	54.0	-21.6	EUT Horz, Low Ch 125kHz BW
2706.940	31.1	-0.6	2.2	320.0	1.8	0.0	Horz	AV	0.0	32.3	54.0	-21.7	EUT Vert, Low Ch 125kHz BW
2706.570	31.1	-0.6	1.5	51.0	1.8	0.0	Vert	AV	0.0	32.3	54.0	-21.7	EUT Vert, Low Ch 125kHz BW
2696.070	31.0	-0.6	1.5	8.0	1.8	0.0	Horz	AV	0.0	32.2	54.0	-21.8	EUT On Side, Low Ch 125kHz BW
2706.650	31.0	-0.6	3.4	312.0	1.8	0.0	Vert	AV	0.0	32.2	54.0	-21.8	EUT On Side, Low Ch 125kHz BW
9011.210	32.8	-2.5	1.5	1.0	1.8	0.0	Horz	AV	0.0	32.1	54.0	-21.9	EUT Horz, Low Ch 125kHz BW
9010.580	32.8	-2.5	2.1	79.0	1.8	0.0	Vert	AV	0.0	32.1	54.0	-21.9	EUT Horz, Low Ch 125kHz BW
2733.140	30.8	-0.6	1.5	55.0	1.8	0.0	Horz	AV	0.0	32.0	54.0	-22.0	EUT Horz, High Ch 125kHz BW
2733.430	30.8	-0.6	1.5	44.0	1.8	0.0	Vert	AV	0.0	32.0	54.0	-22.0	EUT Horz, High Ch 125kHz BW
2726.358	30.5	-0.6	2.0	1.0	1.8	0.0	Vert	AV	0.0	31.7	54.0	-22.3	EUT Horz, Mid Ch 125kHz BW
2723.850	30.2	-0.6	1.5	323.0	1.8	0.0	Horz	AV	0.0	31.4	54.0	-22.6	EUT Horz, Mid Ch 125kHz BW
2709.170	30.9	-0.6	2.4	133.0	0.7	0.0	Horz	AV	0.0	31.0	54.0	-23.0	EUT Horz, Low Ch 500kHz BW
2709.040	30.9	-0.6	1.5	324.0	0.7	0.0	Vert	AV	0.0	31.0	54.0	-23.0	EUT Horz, Low Ch 500kHz BW
5413.380	39.2	8.3	1.5	145.0	0.0	0.0	Vert	PK	0.0	47.5	74.0	-26.5	EUT Horz, Low Ch 125kHz BW
5408.920	38.4	8.2	1.5	325.0	0.0	0.0	Vert	PK	0.0	46.6	74.0	-27.4	EUT Horz, Low Ch 500kHz BW
5410.050	37.7	8.3	3.9	90.0	0.0	0.0	Horz	PK	0.0	46.0	74.0	-28.0	EUT Horz, Low Ch 125kHz BW
5430.170	37.5	8.3	1.1	347.0	0.0	0.0	Horz	PK	0.0	45.8	74.0	-28.2	EUT Horz, Low Ch 500kHz BW
3600.780	41.0	4.5	1.5	0.0	0.0	0.0	Vert	PK	0.0	45.5	74.0	-28.5	EUT Horz, Low Ch 125kHz BW
3607.740	40.5	4.3	1.5	212.0	0.0	0.0	Horz	PK	0.0	44.8	74.0	-29.2	EUT Horz, Low Ch 125kHz BW
4511.460	37.9	5.1	1.5	24.0	0.0	0.0	Horz	PK	0.0	43.0	74.0	-31.0	EUT Horz, Low Ch 125kHz BW
2707.570	43.5	-0.6	1.5	110.0	0.0	0.0	Horz	PK	0.0	42.9	74.0	-31.1	EUT Horz, Low Ch 125kHz BW
4516.380	37.5	5.2	1.5	115.0	0.0	0.0	Vert	PK	0.0	42.7	74.0	-31.3	EUT Horz, Low Ch 125kHz BW
2713.150	42.8	-0.6	1.5	8.0	0.0	0.0	Horz	PK	0.0	42.2	74.0	-31.8	EUT On Side, Low Ch 125kHz BW
2706.940	42.8	-0.6	1.5	51.0	0.0	0.0	Vert	PK	0.0	42.2	74.0	-31.8	EUT Vert, Low Ch 125kHz BW
2710.230	42.5	-0.6	2.6	223.0	0.0	0.0	Vert	PK	0.0	41.9	74.0	-32.1	EUT Horz, Low Ch 125kHz BW
2707.540	42.5	-0.6	2.4	133.0	0.0	0.0	Horz	PK	0.0	41.9	74.0	-32.1	EUT Horz, Low Ch 500kHz BW
2720.380	42.5	-0.6	1.5	324.0	0.0	0.0	Vert	PK	0.0	41.9	74.0	-32.1	EUT Horz, Low Ch 500kHz BW
2700.940	42.4	-0.6	2.2	320.0	0.0	0.0	Horz	PK	0.0	41.8	74.0	-32.2	EUT Vert, Low Ch 125kHz BW
2742.430	42.4	-0.6	1.5	55.0	0.0	0.0	Horz	PK	0.0	41.8	74.0	-32.2	EUT Horz, High Ch 125kHz BW
2708.440	42.3	-0.6	3.4	312.0	0.0	0.0	Vert	PK	0.0	41.7	74.0	-32.3	EUT On Side, Low Ch 125kHz BW
9023.710	44.2	-2.5	2.1	79.0	0.0	0.0	Vert	PK	0.0	41.7	74.0	-32.3	EUT Horz, Low Ch 125kHz BW

SPURIOUS RADIATED EMISSIONS

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2726.142	41.7	-0.6	2.0	1.0	0.0	0.0	Vert	PK	0.0	41.1	74.0	-32.9	EUT Horz, Mid Ch 125kHz BW
2752.390	41.8	-0.7	1.5	44.0	0.0	0.0	Vert	PK	0.0	41.1	74.0	-32.9	EUT Horz, High Ch 125kHz BW
2728.100	41.6	-0.6	1.5	323.0	0.0	0.0	Horz	PK	0.0	41.0	74.0	-33.0	EUT Horz, Mid Ch 125kHz BW
9021.620	43.4	-2.5	1.5	1.0	0.0	0.0	Horz	PK	0.0	40.9	74.0	-33.1	EUT Horz, Low Ch 125kHz BW

CONCLUSION

Pass

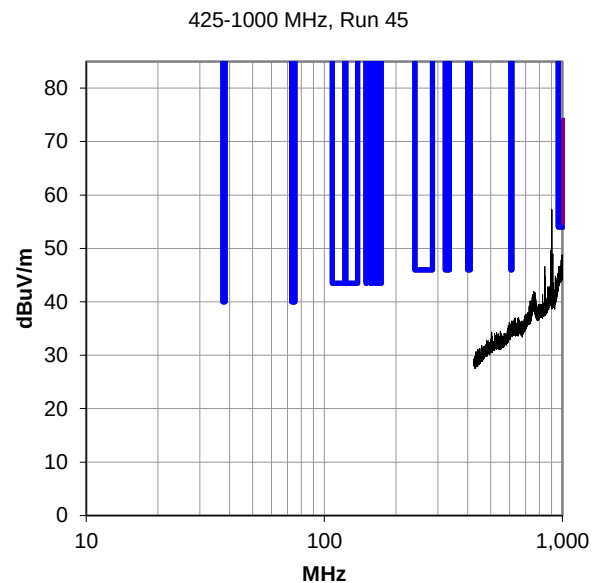
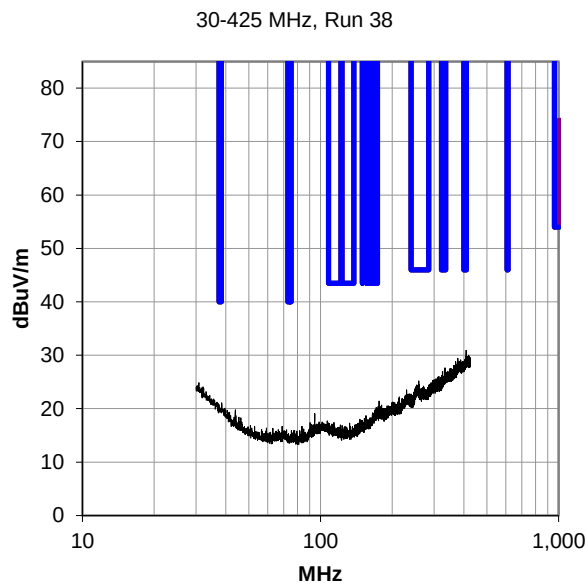
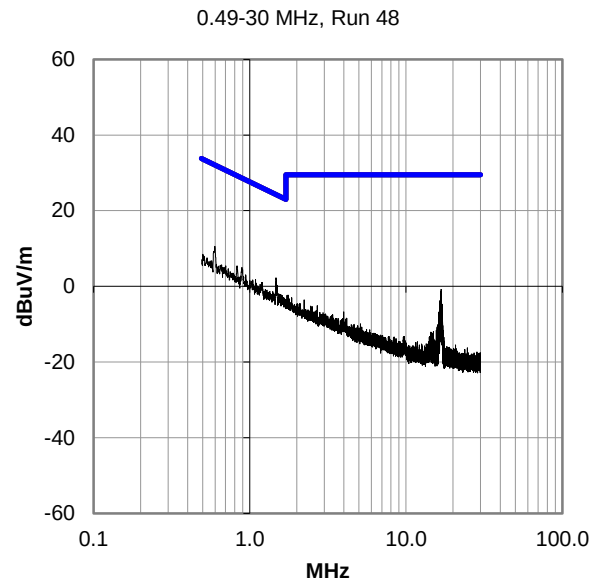
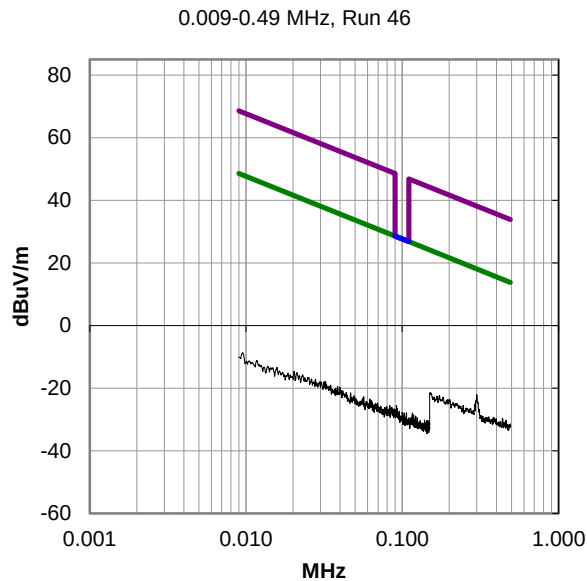


Tested By

SPURIOUS RADIATED EMISSIONS

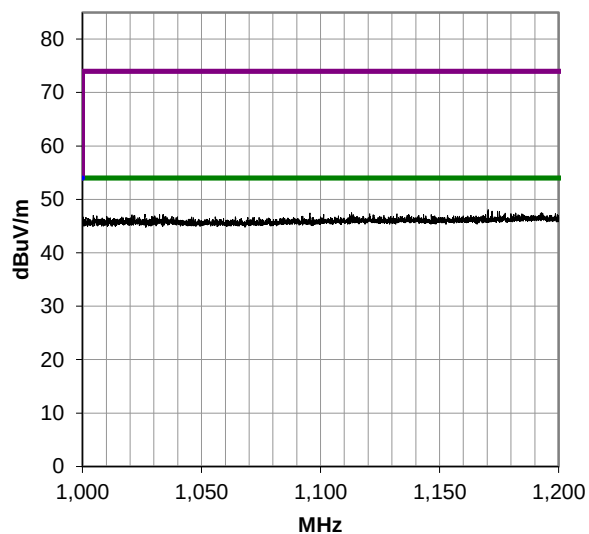
PRESCAN DATA

Radiated spurious emissions from the EUT are initially reviewed with Pre-scans (Preview scans). Pre-scans are performed, with the EUT transmitting on the lowest applicable data rate, for both vertical and horizontal polarizations. The Pre-scan plots below are shown with a peak detector and RBW for the following frequency ranges: 9 kHz RBW (< 30 MHz); 120 kHz RBW (30 - 1000 MHz); 1 MHz RBW (> 1 GHz). In the case where unintentional emissions are observed, an ambient or idle pre-scan with the radio off, will be shown for comparison.

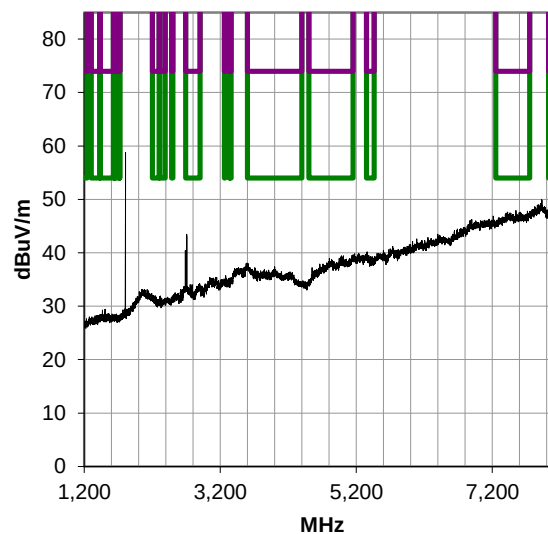


SPURIOUS RADIATED EMISSIONS

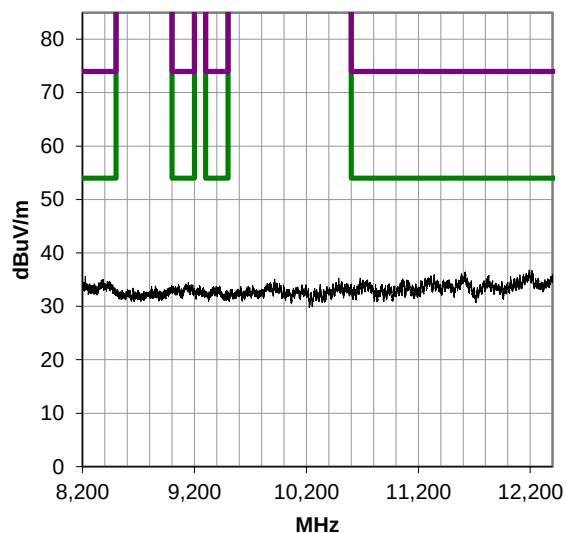
1000-1200 MHz, Run 28



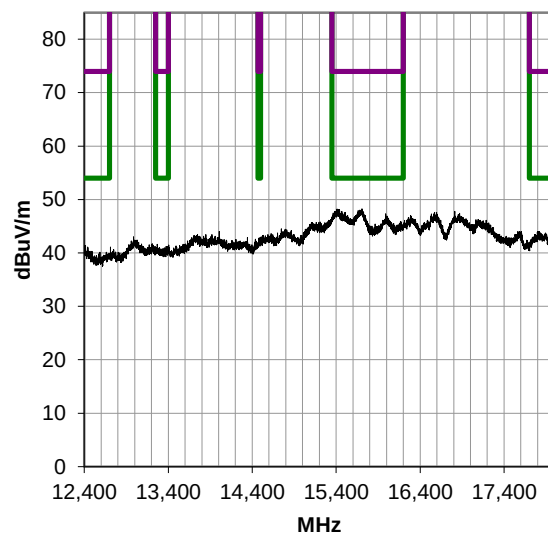
1200-8200 MHz, Run 19



8200-12400 MHz, Run 29



12400-18000 MHz, Run 30



DUTY CYCLE

TEST DESCRIPTION

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 measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2025-06-09	2026-06-09
Generator - Signal	Keysight	N5182B	TFX	2023-05-14	2026-05-14
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2025-09-03	2026-09-03
Block - DC	Fairview Microwave	SD3379	ANK	2025-06-03	2026-06-03
Attenuator	S.M. Electronics	SA26B-20	RFW	2025-02-03	2026-02-03

DUTY CYCLE

EUT:	MTS-504-	Work Order:	F3EN0281
Serial Number:	23580765	Date:	2026-01-27
Customer:	Multi-Tech Systems, Inc.	Temperature:	22.8°C
Attendees:	Dustin Morris	Relative Humidity:	13.2%
Customer Project:	None	Bar. Pressure (PMSL):	1024 mbar
Tested By:	Christopher Heintzelman	Job Site:	MN11
Power:	Battery	Configuration:	F3EN0281-1

COMMENTS

Reference level offset includes measurement cable, 20 dB attenuator, DC block, and additional 60cm SMA cable.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

N/A

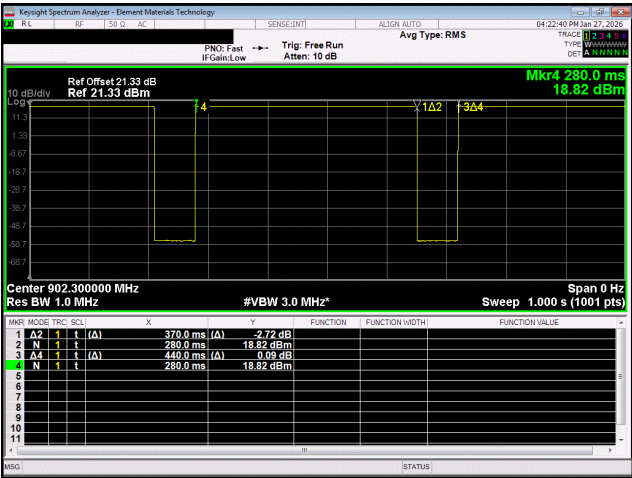


Tested By

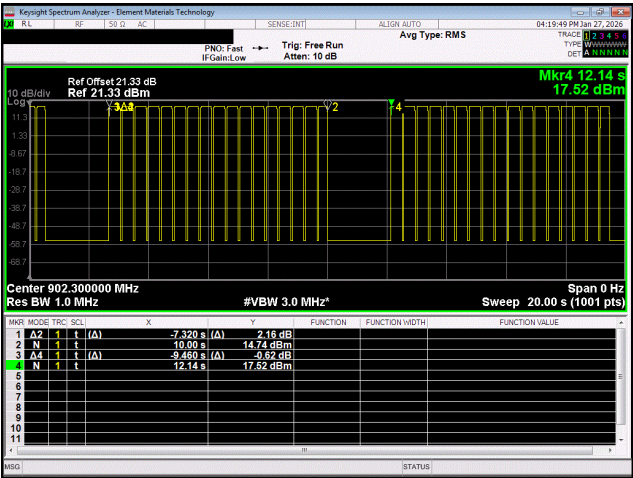
TEST RESULTS

	Pulse Width (ms)	Number of Pulses	Total On Time (ms)	Period (ms)	Value (%)	Limit (%)	Results
LoRa CSS, 125 kHz BW, Low Channel (902.3 MHz)							
Pulse Width	370	N/A	N/A	N/A	N/A	N/A	N/A
Number of Pulses in Burst	N/A	17	6290	9460	66.490	N/A	N/A
40s Sweep	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LoRa CSS, 500 kHz BW, Low Channel (903 MHz)							
Pulse Width	370.7	1	370.7	439.9	84.269	N/A	N/A
20s Sweep	N/A	N/A	N/A	N/A	N/A	N/A	N/A

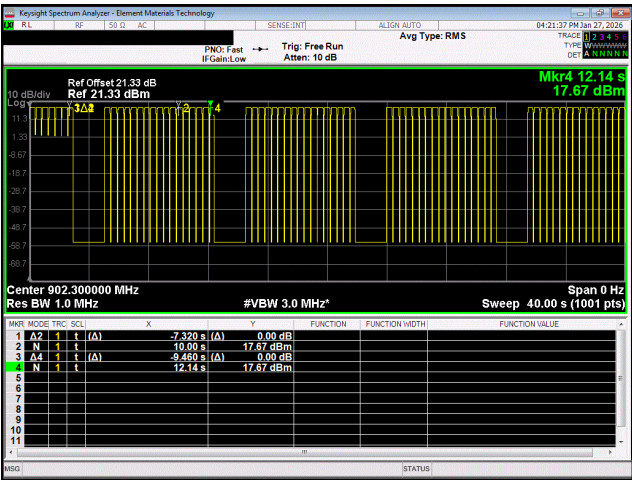
DUTY CYCLE



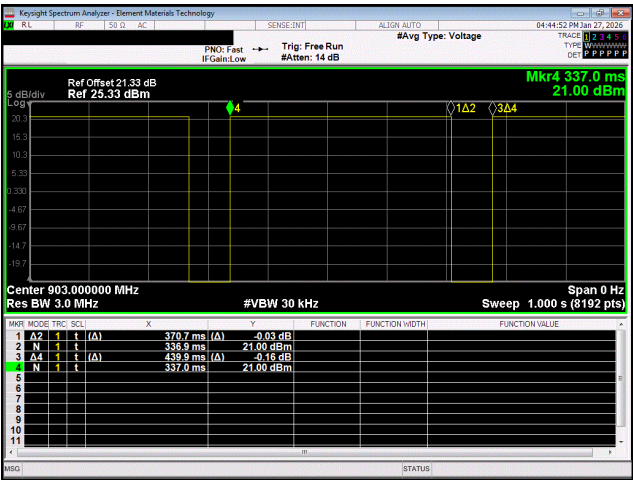
LoRa CSS, 125 kHz BW, Low Channel (902.3 MHz)
Pulse Width



LoRa CSS, 125 kHz BW, Low Channel (902.3 MHz)
Number of Pulses in Burst

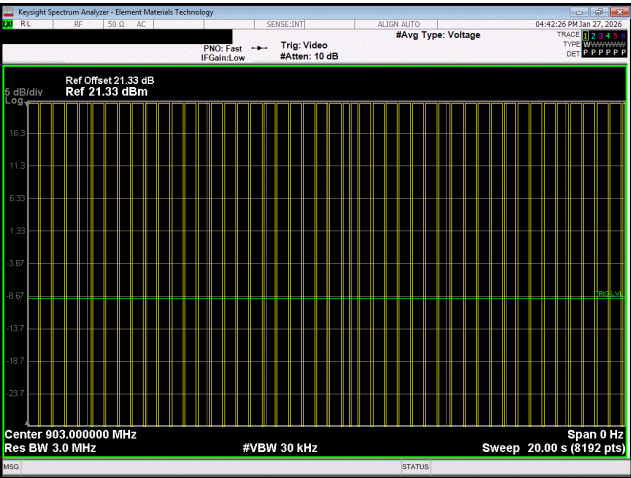


LoRa CSS, 125 kHz BW, Low Channel (902.3 MHz)
40s Sweep



LoRa CSS, 500 kHz BW, Low Channel (903 MHz)
Low Channel, 903 MHz

DUTY CYCLE



LoRa CSS, 500 kHz BW
20s Sweep

OUTPUT POWER

TEST DESCRIPTION

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 measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

Prior to measuring output power; the emission bandwidth (B) and the transmission pulse duration (T) were measured. Both are required to determine the method of measuring Maximum Conducted Output Power. The transmission pulse duration (T) was measured using a zero span on the spectrum analyzer to see the pulses in the time domain.

The method AVGSA-2 in section 11.9.2.2.4 of ANSI C63.10:2020 was used to make the measurement. This method uses trace averaging across ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding $[10 \log (1 / D)]$, where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2025-06-09	2026-06-09
Generator - Signal	Keysight	N5182B	TFX	2023-05-14	2026-05-14
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2025-09-03	2026-09-03
Block - DC	Fairview Microwave	SD3379	ANK	2025-06-03	2026-06-03
Attenuator	S.M. Electronics	SA26B-20	RFW	2025-02-03	2026-02-03

OUTPUT POWER

EUT:	MTS-504-	Work Order:	F3EN0281
Serial Number:	23580765	Date:	2026-01-27
Customer:	Multi-Tech Systems, Inc.	Temperature:	22.7°C
Attendees:	Dustin Morris	Relative Humidity:	13.2%
Customer Project:	None	Bar. Pressure (PMSL):	1024 mbar
Tested By:	Christopher Heintzelman	Job Site:	MN11
Power:	Battery	Configuration:	F3EN0281-1

COMMENTS

Reference level offset includes measurement cable, 20 dB attenuator, DC block, and additional 60cm SMA cable. Screen captures for worst case measurements are provided.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

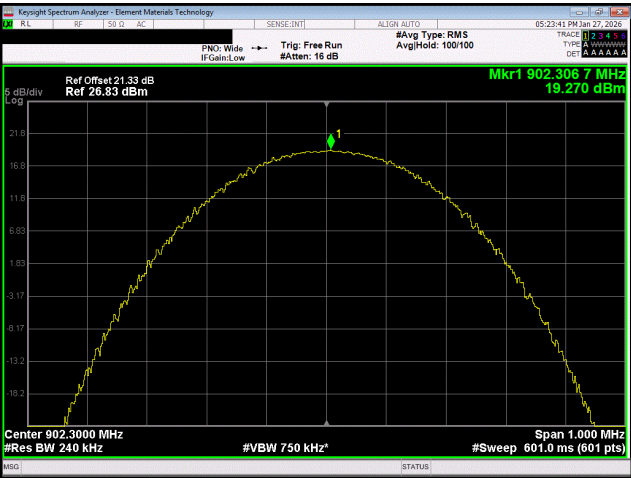


Tested By

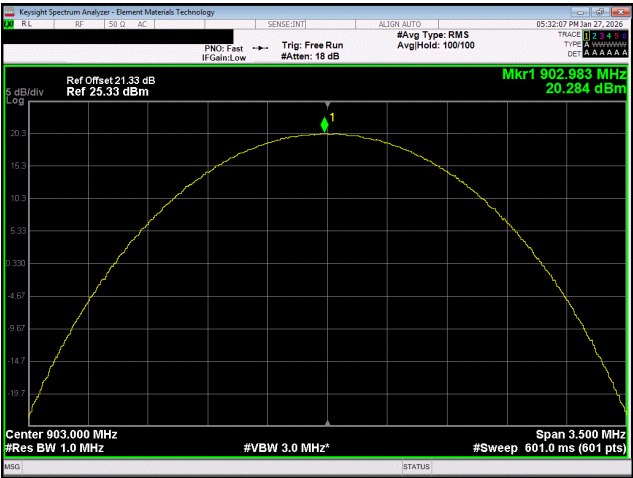
TEST RESULTS

	Meas. AVG Power (dBm)	DCCF (dB)	Corrected AVG Power (dBm)	Limit (dBm)	Result
LoRa CSS, 125 kHz BW					
Low Channel, 902.3 MHz	19.27	1.8	21.1	24	Pass
Mid Channel, 908.7 MHz	18.984	1.8	20.8	24	Pass
High Channel, 914.9 MHz	16.123	1.8	17.9	24	Pass
LoRa CSS, 500 kHz BW					
Low Channel, 903 MHz	20.284	0.7	21.0	24	Pass
Mid Channel, 909.4 MHz	19.854	0.7	20.6	24	Pass
High Channel, 914.2 MHz	19.806	0.7	20.5	24	Pass

OUTPUT POWER



LoRa CSS, 125 kHz BW
Low Channel, 902.3 MHz



LoRa CSS, 500 kHz BW
Low Channel, 903 MHz

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TEST DESCRIPTION

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 measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the following data sheets. The transmit power was set to its default maximum.

Prior to measuring output power; the emission bandwidth (B) and the transmission pulse duration (T) were measured. Both are required to determine the method of measuring Maximum Conducted Output Power. The transmission pulse duration (T) was measured using a zero span on the spectrum analyzer to see the pulses in the time domain.

The method AVGSA-2 in section 11.9.2.2.4 of ANSI C63.10:2020 was used to make the measurement. This method uses trace averaging across ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding $[10 \log (1 / D)]$, where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

Equivalent Isotropic Radiated Power (EIRP) = Max Measured Power + Antenna gain (dBi)

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2025-06-09	2026-06-09
Generator - Signal	Keysight	N5182B	TFX	2023-05-14	2026-05-14
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2025-09-03	2026-09-03
Block - DC	Fairview Microwave	SD3379	ANK	2025-06-03	2026-06-03
Attenuator	S.M. Electronics	SA26B-20	RFW	2025-02-03	2026-02-03

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



EUT:	MTS-504-	Work Order:	F3EN0281
Serial Number:	23580765	Date:	2026-01-27
Customer:	Multi-Tech Systems, Inc.	Temperature:	22.8°C
Attendees:	Dustin Morris	Relative Humidity:	13%
Customer Project:	None	Bar. Pressure (PMSL):	1024 mbar
Tested By:	Christopher Heintzelman	Job Site:	MN11
Power:	Battery	Configuration:	F3EN0281-1

COMMENTS

Reference level offset includes measurement cable, 20 dB attenuator, DC block, and additional 60cm SMA cable.

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

Tested By

TEST RESULTS

	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
LoRa CSS, 125 kHz BW							
Low Channel, 902.3 MHz	19.27	1.8	21.1	-0.24	20.9	30	Pass
Mid Channel, 908.7 MHz	18.984	1.8	20.8	-0.24	20.6	30	Pass
High Channel, 914.9 MHz	16.123	1.8	17.9	-0.24	17.7	30	Pass
LoRa CSS, 500 kHz BW							
Low Channel, 903 MHz	20.284	0.7	21.0	-0.24	20.8	30	Pass
Mid Channel, 909.4 MHz	19.854	0.7	20.6	-0.24	20.4	30	Pass
High Channel, 914.2 MHz	19.806	0.7	20.5	-0.24	20.3	30	Pass

End of Test Report