



DATE: 4 January 2021

**I.T.L. (PRODUCT TESTING) LTD.
FCC/IC Radio Test Report**

for

AeroScout

Equipment under test:

Fall Monitor

M200

Tested by: _____


M. Zohar

Approved by: _____


D. Shidlow

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This report relates only to items tested.



Measurement/Technical Report for AeroScout

Fall Monitor

M200

FCC ID: Q3HM200

IC: 5115A-M200

This report concerns:	Original Grant: X
	Class I Change:
	Class II Change:
Equipment type:	FCC: (DTS) Digital Transmission System IC: Spread Spectrum Digital Device (2400-2483.5)
Limits used:	47CFR15 Section 15.247 RSS 247, Issue 2, February 2017, Section 5 RSS-Gen, Issue 5, April 2018

Measurement procedure used is KDB 558074 D01 v05r03, ANSI C63.10:2013, and RSS-Gen, Issue 5, April 2018

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1. General Information

1.1 Administrative Information

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Applicant's Representative:	Reuven Amsalem
Manufacturers:	1. SFO Technologies Private Limited Electronics Division, Plot 36,37, Csez Kakannad, Kochi, Kerala, 682037 India Contact: Mohammed Jawhar (mohammed.jawhar@nestgroup.net) 2. Stanley Security Solutions, Inc 4600 Vine Street Lincoln, NE 68526, USA Contact: Paul Hall (Paul.Hall@sbdinc.com)
Equipment Under Test (E.U.T):	Fall Monitor
Equipment PMN:	M200
Equipment Serial No.:	Not designated
Equipment HVIN:	M200
Date of Receipt of E.U.T:	November 10, 2020
Start of Test:	November 10, 2020
End of Test:	November 25, 2020
Test Laboratory Location:	I.T.L (Product Testing) Ltd. 1 Batsheva St., Lod ISRAEL 7120101
Test Specifications:	FCC Part 15, Subpart C RSS 247, Issue 2, February 2017, Section 5 RSS-Gen, Issue 5, April 2018



1.2 **List of Accreditations**

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), FCC Designation No. IL1005.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. Department of Innovation, Science and Economic Development (ISED) Canada, CAB identifier: IL1002

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.



1.3 **Product Description**

The M200 device is designed to monitor residents in senior living facilities to detect possible fall from bed or chair.

It is done by connecting pressure pads (resistive) or any other sensor to the device through an RJ9 connector or wirelessly via BLE.

The pads/sensors act as pressure switches indicating if the resident is on the pad or not.

The device has also visual indications (LEDs), pushbuttons, audible indication (speaker) and isolated output to external systems via a relay connected to a 1/4" mono jack. NFC Tag-A support (passive only).

The device is powered by an external DC power supply via barrel connector, 5V 1A rated.

The device can also be powered by 3 parallel CR123A 3V batteries (non-rechargeable) in a closed battery compartment.

When external power is connected, the batteries are disconnected and used as backup power source.

Working voltage	5VDC via AC/DC power supply
Mode of operation	BLE Transceiver
Modulations	GFSK
Assigned Frequency Range	2400.0-2483.5MHz
Operating Frequency Range	2402.0-2480.0MHz
Transmit power(conducted)	~0.0dBm
Antenna Gain	5.3dBi printed antenna
Modulation BW	2MHz
Bit rate (Mbit/s)	1, 2

1.4 **Test Methodology**

Both conducted and radiated testing was performed according to the procedures in KDB 558074 D01 v05r03, ANSI C63.10: 2013 and RSS-Gen, Issue 5, April 2018. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 **Test Facility**

Emissions tests were performed at I.T.L.'s testing facility in Lod, Israel. I.T.L.'s EMC Laboratory is accredited by A2LA, certificate No. 1152.01. Its FCC Designation Number is IL1005 and its Innovation, Science and Economic Development Canada (ISED) CAB identifier is IL1002.



1.6 **Measurement Uncertainty**

Conducted Emission

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)

0.15 – 30 MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 3.44 dB

Radiated Emission

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site:

30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 4.96 dB

1 GHz to 6 GHz

Expanded Uncertainty (95% Confidence, K=2):

±5.19 dB

>6 GHz

Expanded Uncertainty (95% Confidence, K=2):

±5.51 dB



2. System Test Configuration

2.1 Justification

1. The E.U.T contains a standard (BLE) IEEE 802.15.1 transceiver.
2. The unit was evaluated while transmitting at the low channel (2402MHz), the mid channel (2440MHz) and the high channel (2480MHz).
3. The evaluation was performed while the E.U.T was connected to typical AC/DC power supply as the “worst case”.
4. Conducted emission tests were performed with the E.U.T. antenna terminal connected by a RF cable to the Spectrum Analyzer through a 30dB external attenuator.
5. Final radiated emission tests were performed while the E.U.T was in “installation“ position orientation.

2.2 EUT Exercise Software

No special exercise software was used.

2.3 Special Accessories

Equipment	Manufacturer	Part Number	Serial Number
Laptop	Lenovo	T440P	N/A
AC/DC power supply	ADAPTER TECH.	ATM012-W050U	N/A

2.4 Equipment Modifications

No modifications were necessary in order to achieve compliance.

2.5 Configuration of Tested System

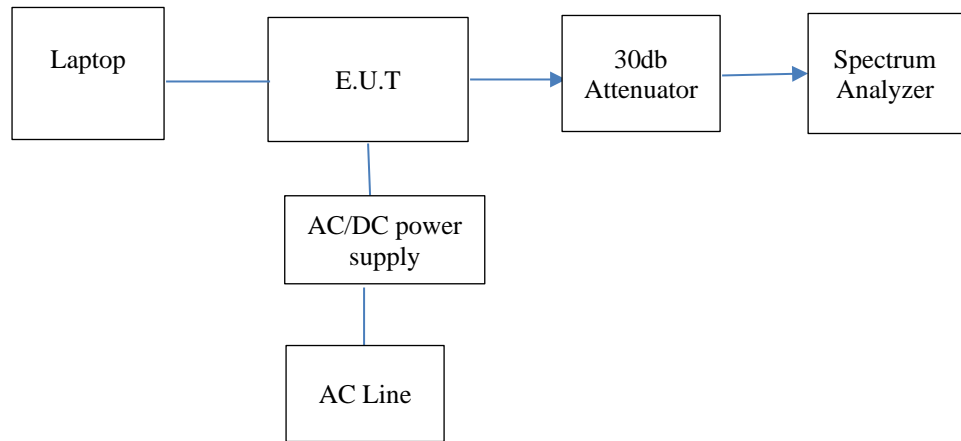


Figure 1. Configuration of Tested System Conducted

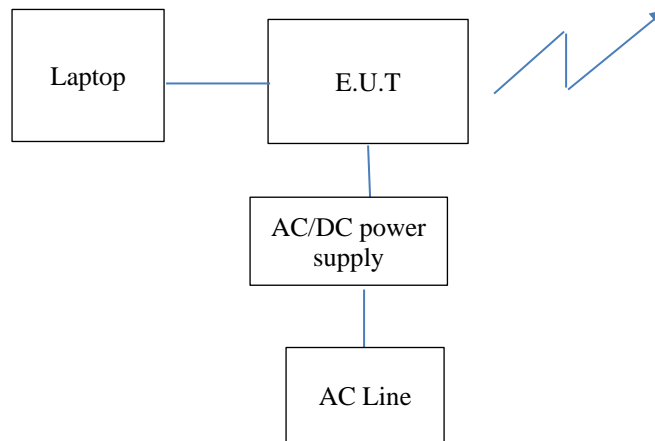


Figure 2. Configuration of Tested System Radiated

3. Conducted & Radiated Measurement Test Set-Up Photos



Figure 3. Conducted Emission from AC Line Test



Figure 4. Radiated Emission Test, 0.009-30MHz



Figure 5. Radiated Emission Test, 30-200MHz

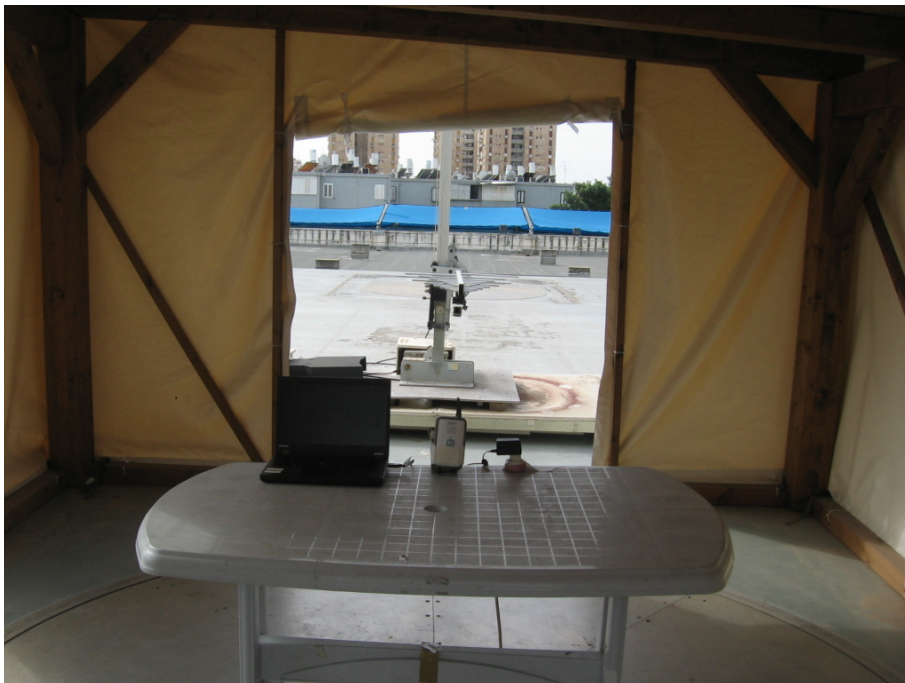


Figure 6. Radiated Emission Test, 200-1000MHz

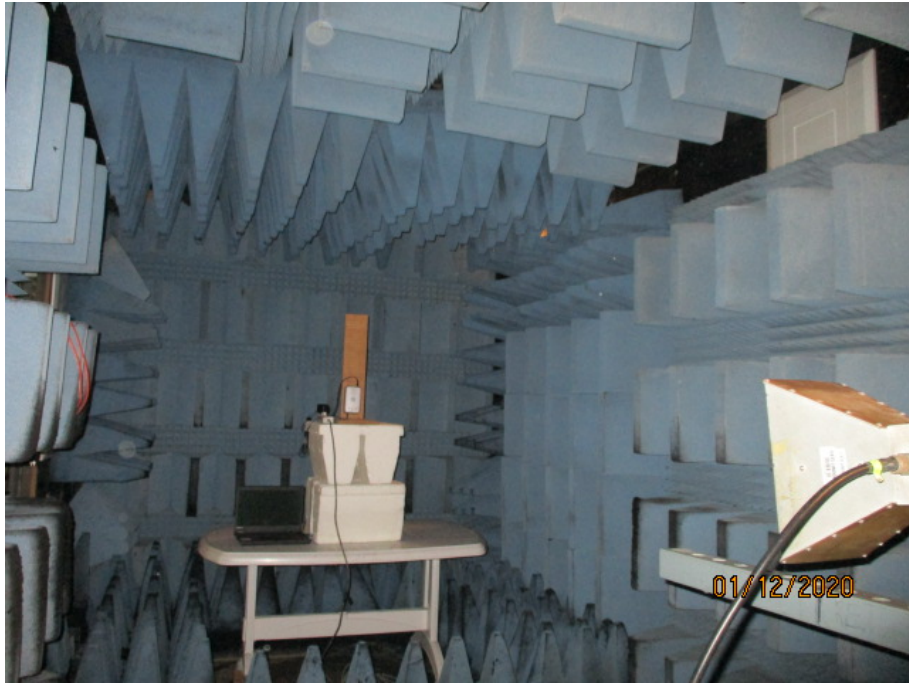


Figure 7. Radiated Emission Test, 1-18GHz

4. Conducted Emission From AC Mains

4.1 Test Specification

FCC Part 15, Subpart C, Section 15.207
RSS Gen, Issue %, Clause 8.8

4.2 Test Procedure

(Temperature (19°C)/ Humidity (58%RH))

The E.U.T operation mode and test setup are as described in Section 2 of this report. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room, with the E.U.T placed on a 0.8 meter high wooden table, 0.4 meter from the room's vertical wall. In the case of a floor-standing E.U.T., it was placed on the horizontal ground plane.

The E.U.T was powered from 115 V AC / 60 Hz via 50 Ohm / 50 μ Hn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T.

The center of the E.U.T.'s AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission.

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are loaded to the receiver and are displayed on the receiver's spectrum display.

The E.U.T was evaluated in TX operation mode.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector.

4.3 Test Limit

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.



4.4 **Test Results**

JUDGEMENT: Passed by 26.75 dB

The margin between the emission levels and the specification limit is, in the worst case, 26.75 dB for the phase line at 0.202MHz and 27.25 dB at 0.150 MHz for the neutral line.

The EUT met the F.C.C. Part 15, Subpart C specification requirements.

The details of the highest emissions are given in *Figure 8* to *Figure 11*.



Conducted Emission

E.U.T Description Fall Monitor
Type M200
Serial Number: Not designated

Specification: FCC Part 15, Subpart C;
 RSS Gen, Issue 5, Clause 8.8
Lead: Phase
Detectors: : Peak, Quasi-peak, Average
Power Operation AC/DC Adapter

	1	2	3	4	5	6	7
Frequency	Peak	QP	Limit_QP	Margin QP	AV	Limit_AV	Margin AV
Hz							
202.238 KHz	47.730	39.900	63.518	-23.618	26.768	53.518	-26.751
351.488 KHz	39.470	31.460	58.927	-27.467	15.690	48.927	-33.237
478.350 KHz	35.780	25.520	56.368	-30.848	6.203	46.368	-40.165
12.486 MHz	36.610	27.030	60.000	-32.970	17.802	50.000	-32.198
12.978 MHz	37.740	30.270	60.000	-29.730	19.735	50.000	-30.265
13.202 MHz	36.580	30.550	60.000	-29.450	19.938	50.000	-30.063
13.299 MHz	37.180	30.830	60.000	-29.170	20.052	50.000	-29.948
13.515 MHz	38.030	31.310	60.000	-28.690	20.072	50.000	-29.928
13.642 MHz	37.350	30.670	60.000	-29.330	19.210	50.000	-30.790
13.814 MHz	36.100	29.400	60.000	-30.600	17.392	50.000	-32.608

Figure 8. Detectors: Peak, Quasi-peak, Average

Note: QP Delta/Av Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.



Conducted Emission

E.U.T Description: Fall Monitor
Type: M200
Serial Number: Not designated

Specification: FCC Part 15, Subpart C;
RSS Gen, Issue 5, Clause 8.8
Lead: Phase
Detectors: Peak, Quasi-peak, Average
Power Operation: AC/DC Adapter

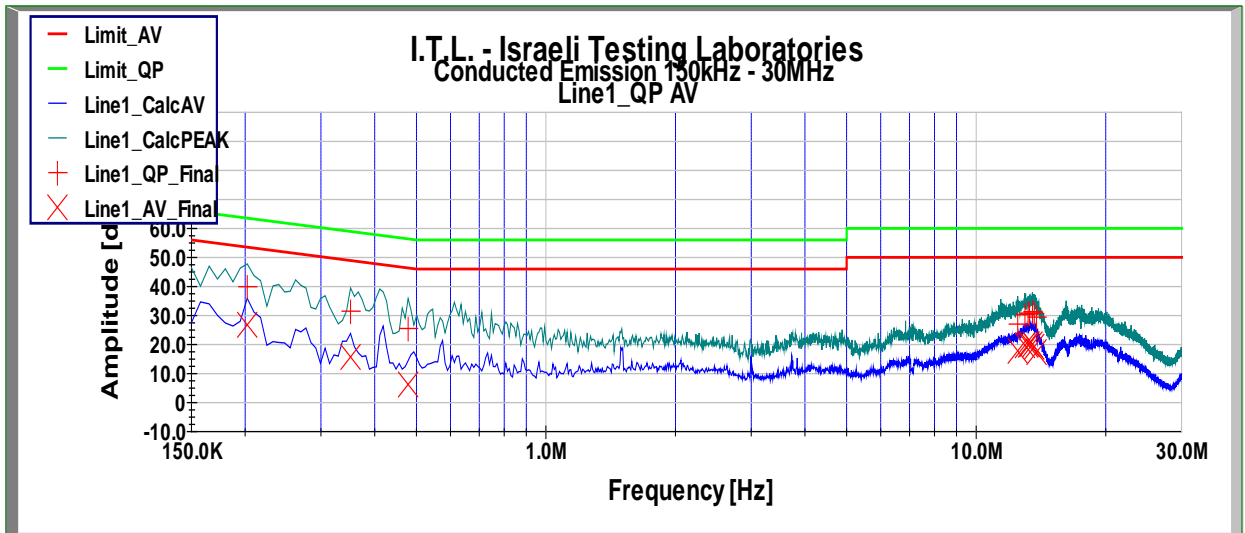


Figure 9. Detectors: Peak, Quasi-peak, Average



Conducted Emission

E.U.T Description Fall Monitor
Type M200
Serial Number: Not designated

Specification: FCC Part 15, Subpart C;
 RSS Gen, Issue 5, Clause 8.8
Lead: Neutral
Detectors: Peak, Quasi-peak, Average
Power Operation AC/DC Adapter

	1	2	3	4	5	6	7
Frequency Hz	Peak	QP	Limit_QP	Margin QP	AV	Limit_AV	Margin AV
150.000 KHz	49.130	44.420	66.000	-21.580	28.745	56.000	-27.255
194.775 KHz	50.380	39.510	63.830	-24.320	25.153	53.830	-28.678
351.488 KHz	37.600	32.740	58.927	-26.187	16.605	48.927	-32.322
12.918 MHz	36.730	30.390	60.000	-29.610	20.483	50.000	-29.517
13.053 MHz	37.170	30.790	60.000	-29.210	20.587	50.000	-29.413
13.165 MHz	37.300	31.120	60.000	-28.880	20.977	50.000	-29.023
13.396 MHz	38.170	32.010	60.000	-27.990	20.985	50.000	-29.015
13.515 MHz	38.790	31.620	60.000	-28.380	20.880	50.000	-29.120
13.665 MHz	37.640	31.030	60.000	-28.970			

Figure 10. Detectors: Peak, Quasi-peak, Average

Note: QP Delta/Av Delta refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

Conducted Emission

E.U.T Description Fall Monitor
Type M200
Serial Number: Not designated

Specification: FCC Part 15, Subpart C;
 RSS Gen, Issue 5, Clause 8.8
Lead: Neutral
Detectors: Peak, Quasi-peak, Average
Power Operation AC/DC Adapter

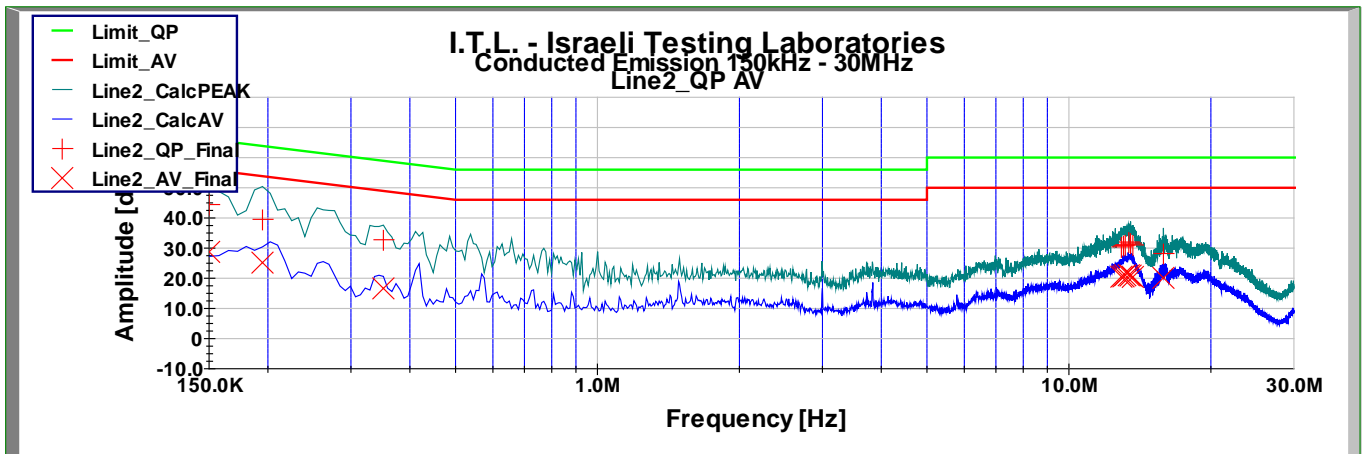


Figure 11 Detectors: Peak, Quasi-peak, Average



4.5 *Test Equipment Used; Conducted Emission*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
LISN	Fischer	FCC-LISN-25A	127	October 28, 2020	October 31, 2021
Transient Limiter	HP	11947A	3107A03042	July 12, 2020	July 31, 2021
EMI Analyzer	HP	8593 EM	3826A00265	March 9, 2020	March 31, 2021
RF Cable	Telrad	RJ214	-	October 28, 2020	October 31, 2021

Figure 12 Test Equipment Used

5. 6 dB Minimum Bandwidth

5.1 Test Specification

FCC Part 15, Subpart C, Section 247(a)(2)

RSS 247, Issue 2, Section 5.2(a)

5.2 Test Procedure

(Temperature (20°C)/ Humidity (50%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (total loss=31.0 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The spectrum bandwidth of the E.U.T. at the point of 6 dB below maximum peak power was measured and recorded. The RBW was set to 100 kHz.

5.3 Test Limit

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.4 Test Results

Protocol Type	Operation Frequency	Reading	Limit
	(MHz)	(kHz)	(kHz)
BLE	2402.0	1,178.0	>500.0
	2440.0	1,158.0	>500.0
	2480.0	1,178.0	>500.0

Figure 13 6 dB Minimum Bandwidth

JUDGEMENT: Passed

For additional information see *Figure 14* to *Figure 16*.

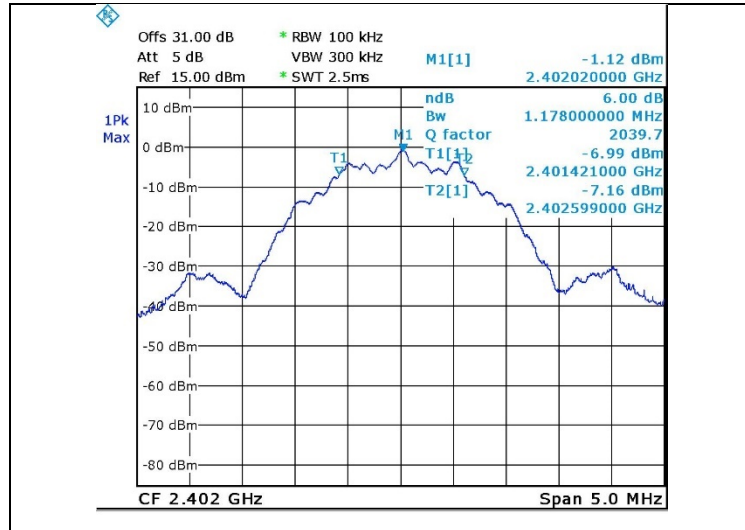


Figure 14. 2402.0 MHz, BLE

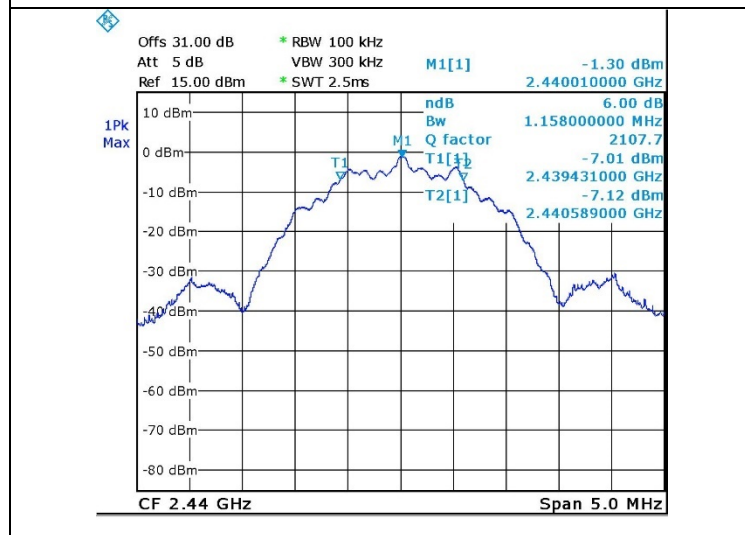


Figure 15. 2440.0 MHz, BLE

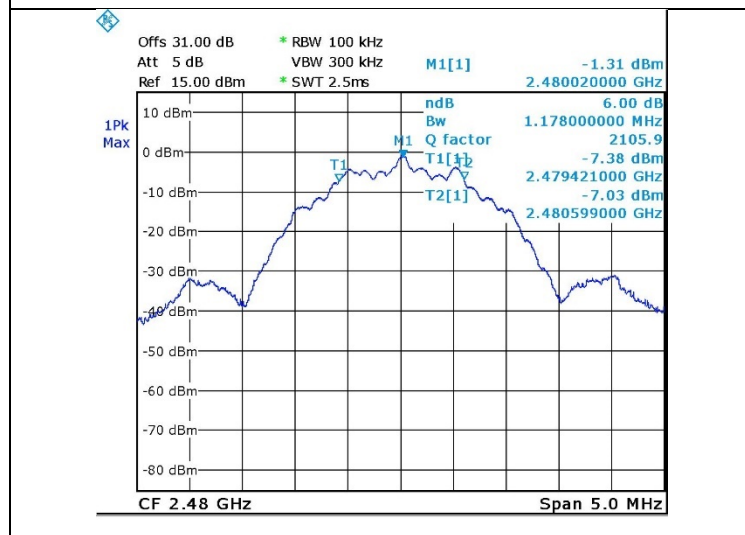


Figure 16. 2480.0 MHz, BLE



5.5 Test Equipment Used; 6dB Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	March 10, 2020	March 31, 2021
30dB Attenuator	MCL	BW-S30W5	533	August 23, 2020	August 31, 2021
RF Cable	EIM	-	-	August 23, 2020	August 31, 2021

Figure 17 Test Equipment Used

6. Maximum Conducted Output Power

6.1 Test Specification

FCC, Part 15, Subpart C, Section 247(b)(3)

RSS 247, Issue 2, Section 5.4(d)

6.2 Test Procedure

(Temperature (20°C)/ Humidity (50%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (total loss=31.0 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

6.3 Test Limit

The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

6.4 Test Results

Protocol Type	Operation Frequency	Power	Power	Limit	Margin
	(MHz)	(dBm)	(mW)	(mW)	(mW)
BLE	2402.0	-0.80	0.83	1000.0	-999.17
	2440.0	-1.04	0.79	1000.0	-999.21
	2480.0	-1.04	0.79	1000.0	-999.21

Figure 18 Maximum Peak Power Output

JUDGEMENT: Passed by 999.17 mW

For additional information see *Figure 19* to *Figure 21*.

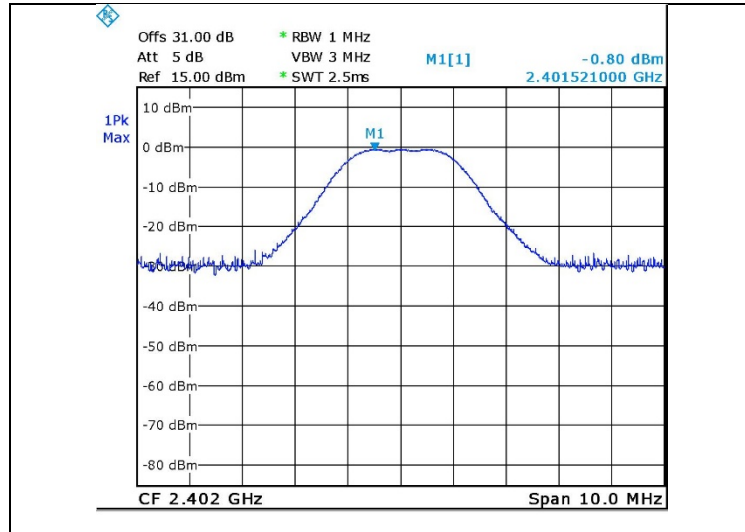


Figure 19. 2402.0 MHz, BLE

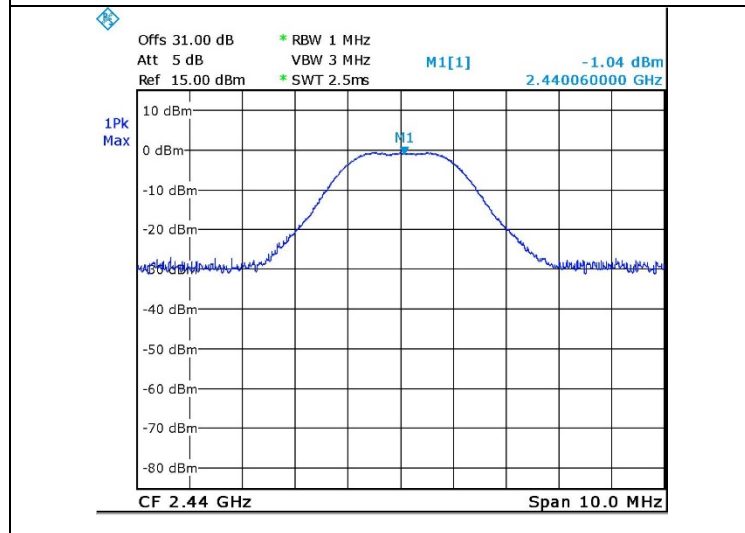


Figure 20. 2440.0 MHz, BLE

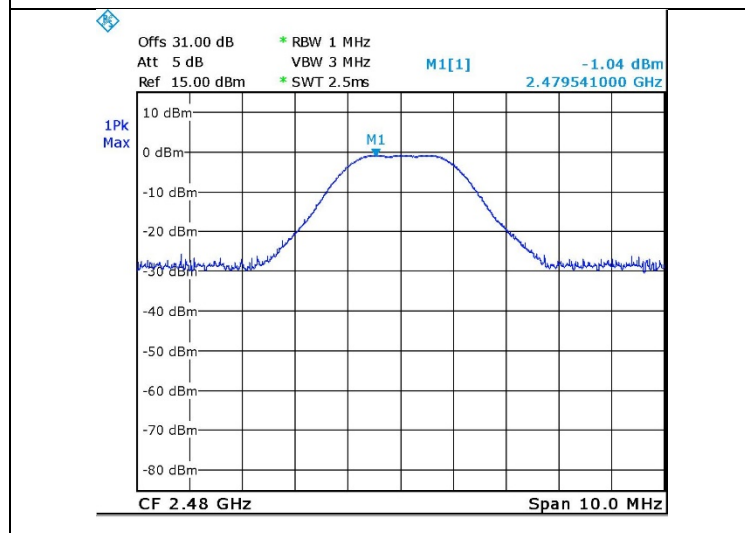


Figure 21. 2480.0 MHz, BLE



6.5 Test Equipment Used; Maximum Peak Power Output

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	March 10, 2020	March 31, 2021
30dB Attenuator	MCL	BW-S30W5	533	August 23, 2020	August 31, 2021
RF Cable	EIM	-	-	August 23, 2020	August 31, 2021

Figure 22 Test Equipment Used

7. Band Edge Spectrum

7.1 Test Specification

FCC, Part 15, Subpart C, Section 247(d)

RSS 247, Issue 2, Section 5.5

7.2 Test Procedure

(Temperature (20°C)/ Humidity (50%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (loss=31.0 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The RBW was set to 100 kHz.

7.3 Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

7.4 Test Results

Protocol Type	Operation Frequency	Band Edge Frequency	Spectrum Level	Limit	Margin
	(MHz)	(MHz)	(dBm)	(dBm)	(dB)
BLE	2402.0	2400.0	-32.0	-21.2	-10.8
	2480.0	2483.5	-42.4	-21.4	-21.0

Figure 23 Band Edge Spectrum

JUDGEMENT: Passed by 10.8 dB

For additional information see *Figure 24* and *Figure 25*.

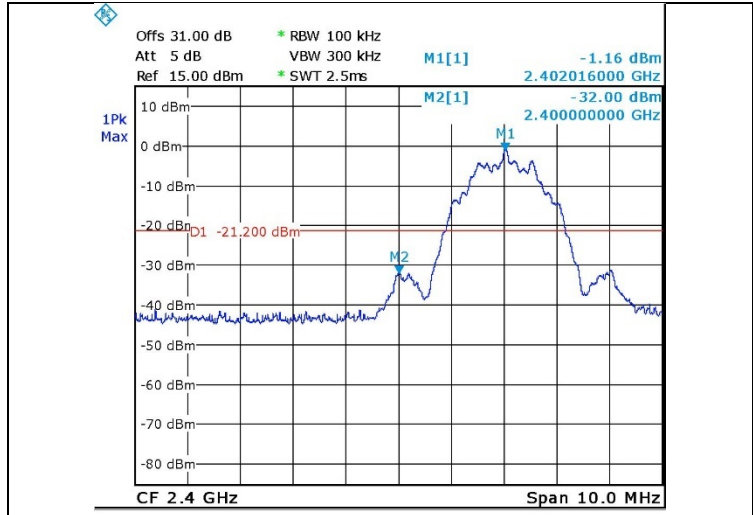


Figure 24. 2402.0 MHz, BLE

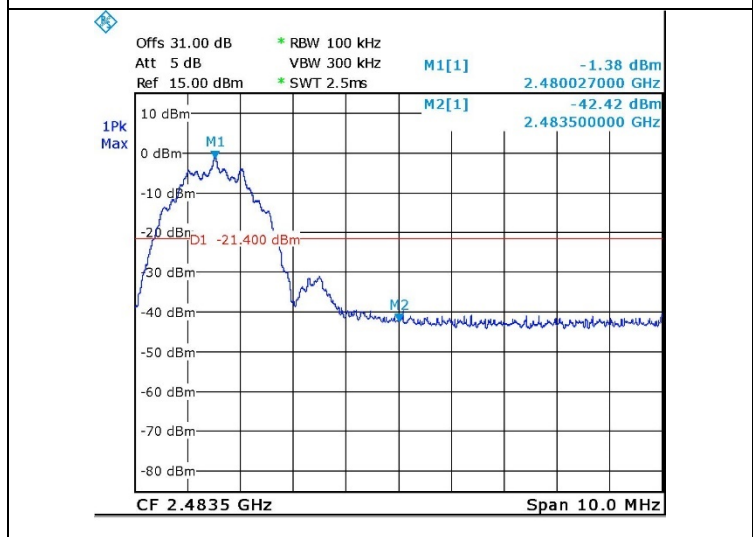


Figure 25. 2480.0 MHz, BLE



7.5 Test Equipment Used; Band Edge

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	March 10, 2020	March 31, 2021
30dB Attenuator	MCL	BW-S30W5	533	August 23, 2020	August 31, 2021
RF Cable	EIM	-	-	August 23, 2020	August 31, 2021

Figure 26 Test Equipment Used



8. Transmitted Power Density

8.1 *Test Specification*

FCC, Part 15, Subpart C, Section 247(e)

RSS 247, Issue 2, Section 5.2(b)

8.2 *Test Procedure*

(Temperature (20°C)/ Humidity (50%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (total loss= 31.0dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The spectrum analyzer was set to 3 kHz RBW.

8.3 *Test Limit*

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.



8.4 Test Results

Protocol Type	Operation Frequency	PSD Reading	Limit	Margin
	(MHz)	(dBm)	(dBm)	(dB)
BLE	2402.0	-18.8	8.0	-26.8
	2440.0	-19.0	8.0	-27.0
	2480.0	-19.2	8.0	-27.2

Figure 27 Test Results

JUDGEMENT: Passed by -26.8dB

For additional information see *Figure 28 to Figure 30*.

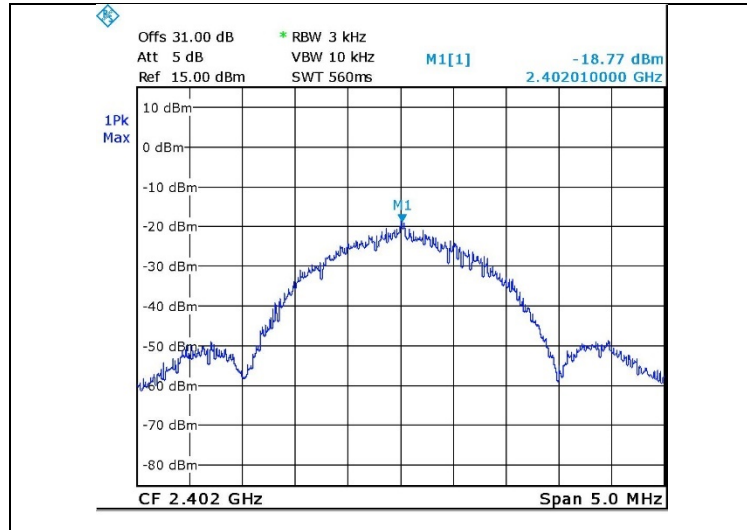


Figure 28. 2402.0 MHz, BLE

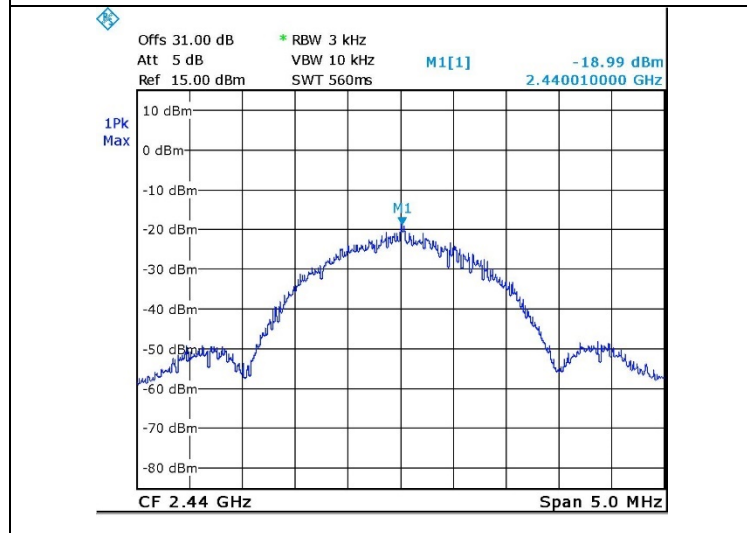


Figure 29. 2440.0 MHz, BLE

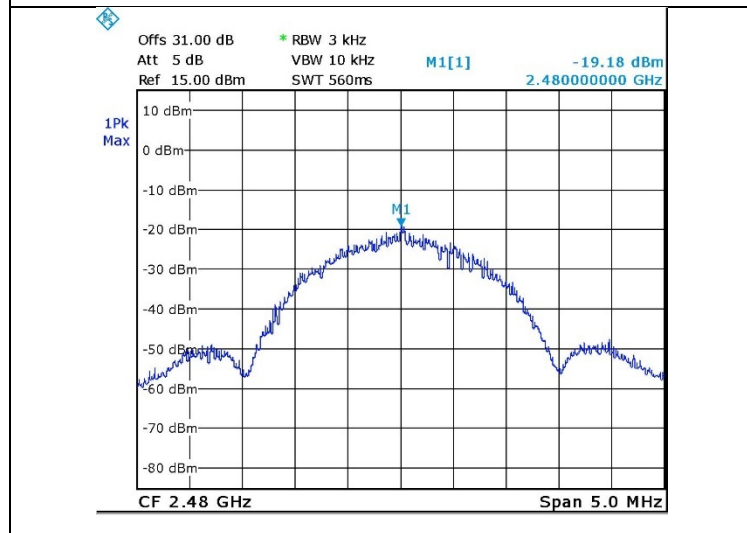


Figure 30. 2480.0 MHz, BLE



8.5 Test Equipment Used; Transmitted Power Density

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	March 10, 2020	March 31, 2021
30dB Attenuator	MCL	BW-S30W5	533	August 23, 2020	August 31, 2021
RF Cable	EIM	-	-	August 23, 2020	August 31, 2021

Figure 31 Test Equipment Used

9. Occupied Bandwidth

9.1 Test Specification

FCC, Part 2, Sub part J, Section 2.1049

RSS-Gen, Issue 5: 2014, Section 6.6

9.2 Test Procedure

(Temperature (20°C)/ Humidity (50%RH))

The E.U.T. operation mode and test set-up are as described in Section 2 of this report.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (total loss= 31.0dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The RBW set to the range of 1% to 5% of the OBW.

The span was set between 1.5 to 5 times of the OBW.

99% occupied bandwidth function was set on.

9.3 Test Limit

N/A

9.4 Test Results

Protocol Type	Operation Frequency	Reading	Reading
	(MHz)	(MHz)	(kHz)
BLE	2402.0	2.1	2100
	2440.0	2.1	2100
	2480.0	2.1	2100

Figure 32. Bandwidth Test Results

JUDGEMENT: N/A

See additional information in *Figure 33* to *Figure 35*.

Occupied Bandwidth

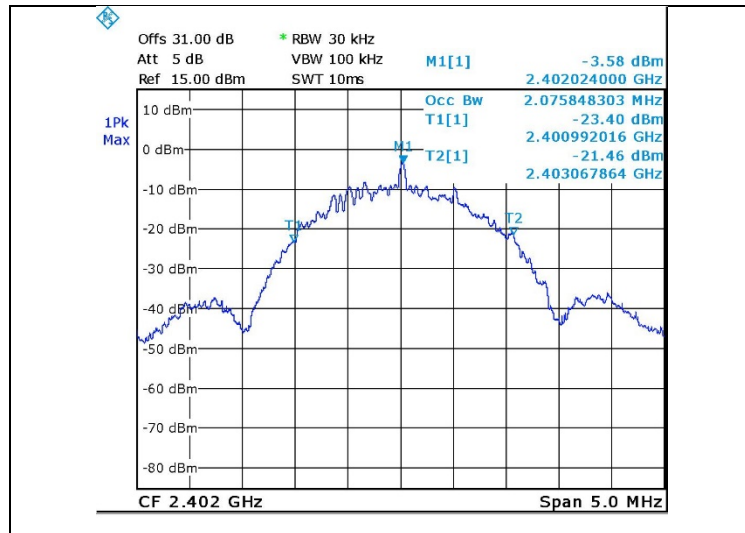


Figure 33. 2402.0 MHz, BLE

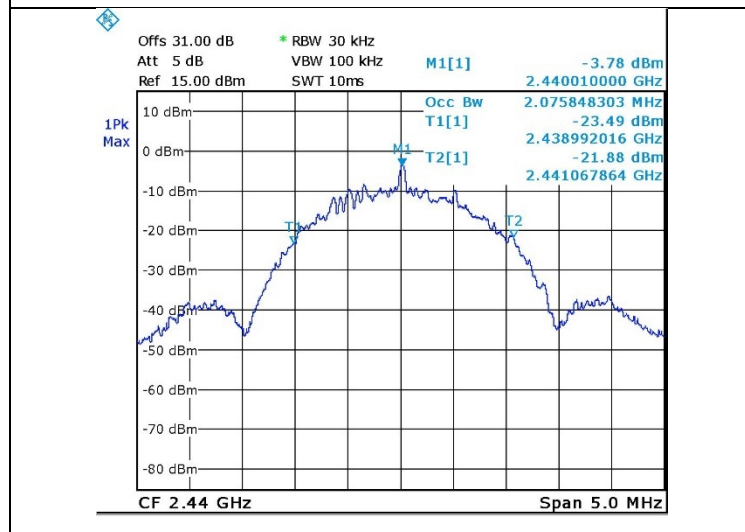


Figure 34. 2440.0 MHz, BLE

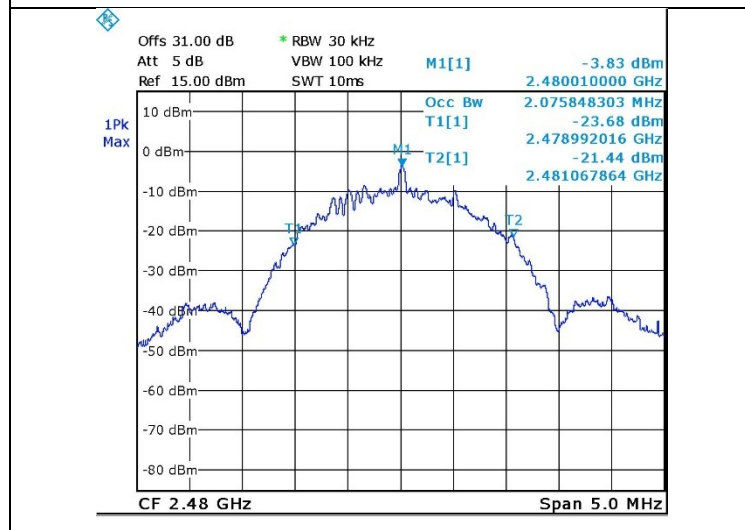


Figure 35. 2480.0 MHz, BLE



9.5 Test Equipment Used; Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	March 10, 2020	March 31, 2021
30dB Attenuator	MCL	BW-S30W5	533	August 23, 2020	August 31, 2021
RF Cable	EIM	-	-	August 23, 2020	August 31, 2021

Figure 36 Test Equipment Used



10. Emissions in Non-Restricted Frequency Bands

10.1 Test Specification

FCC, Part 15, Subpart C, Section 247(d)

RSS 247, Issue 2, Section 5.5

10.2 Test Procedure

(Temperature (20°C)/ Humidity (52%RH))

The E.U.T. operation mode and test set-up are as described in Section 2 of this report.

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (max total loss=34.0 dB).

Special attention was taken to prevent Spectrum Analyzer RF input overload.

RBW was set to 100kHz, detector set to max peak and trace to “max hold”.

10.3 Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

10.4 Test Results

JUDGEMENT: Passed

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 247(d) specification.

For additional information see *Figure 37* to *Figure 39*.

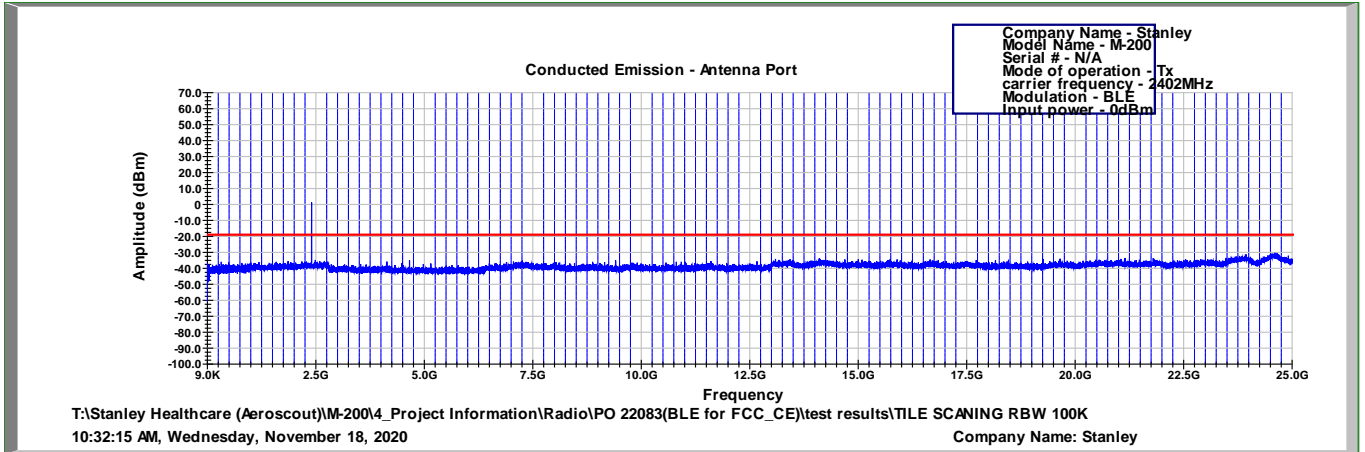


Figure 37 2402.0 MHz, BLE

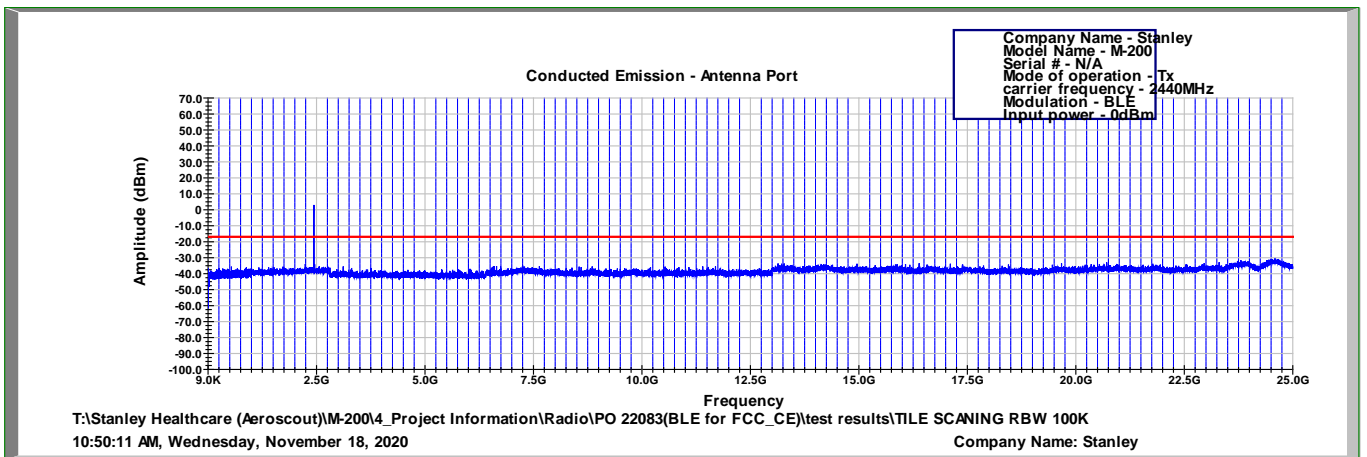


Figure 38 2440.0 MHz, BLE

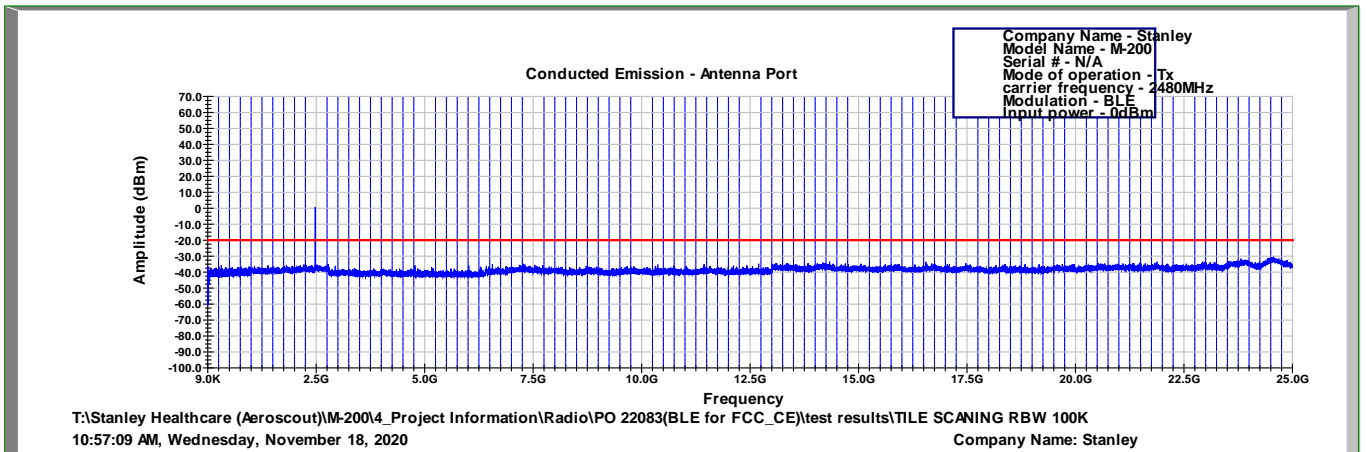


Figure 39 2480.0 MHz, BLE

Note: All peaks in plots are the fundamental transmission frequency.



10.5 Test Instrumentation Used, Emission in Non Restricted Frequency Bands

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	HP	8564E	3442A00275	March 10, 2020	March 31, 2021
30dB Attenuator	MCL	BW-S30W5	533	August 23, 2020	August 31, 2021
RF Cable	EIM	-	-	August 23, 2020	August 31, 2021

Figure 40 Test Equipment Used



11. Emissions in Restricted Frequency Bands

11.1 Test Specification

FCC Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)

RSS 247, Issue 2, Section 3.3

RSS Gen, Issue 5, Section 8.10

11.2 Test Procedure

(Temperature (20°C)/ Humidity (50%RH))

The E.U.T. operation mode and test set-up are as described in Section 2 of this report.

For measurements between 0.009-30MHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The frequency range 0.009MHz-30MHz was scanned.

For measurements between 30-1000MHz:

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. The frequency range 30MHz -1000MHz was scanned and the list of the highest emissions was verified and updated accordingly.

For measurements between 1GHz-25GHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 1.5 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The frequency range 1GHz -25GHz was scanned.

The highest radiations are described in the tables below.

11.3 FCC Test Limit

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement distance (meters)	Field Strength* (dBµV/m)	Field Strength* (dBµV/m)@3m
0.009-0.490	2400/F(kHz)	300	48.5-13.8	128.5-73.8
0.490-1.705	24000/F(kHz)	30	33.8-23.0	73.8-63.0
1.705-30.0	30	30	29.5	69.5
30-88	100	3	40.0	40.0
88-216	150	3	43.5	43.5
216-960	200	3	46.0	46.0
Above 960	500	3	54.0	54.0

*The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

Figure 41 FCC Table of Limits

11.4 IC Test Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Magnetic Field strength (microampere/meter)	Measurement distance (meters)	Magnetic Field strength (dBµA/m)	Magnetic Field strength* (dBµA/m)@3m
0.009-0.490	6.37/F(kHz)	300	-3.0-(-37.7)	77.0-42.2
0.490-1.705	63.7/F(kHz)	30	-17.7-(-28.5)	22.3-11.4
1.705-30.0	0.08	30	-21.9	18.0
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)	Field strength (dBµV/m)	Field strength* (dBµV/m)@3m
30-88	100	3	40.0	40.0
88-216	150	3	43.5	43.5
216-960	200	3	46.0	46.0
Above 960	500	3	54.0	54.0

*The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

Figure 42 IC Table of Limits



11.5 **Test Results**

JUDGEMENT: Passed by 7.7 dB

For the operation frequency of 2402 MHz, the margin between the emission level and the specification limit is in the worst case 7.8 dB at the frequency of 2390.0 MHz, vertical polarization.

For the operation frequency of 2480 MHz, the margin between the emission level and the specification limit is in the worst case 7.7 dB at the frequency of 2483.5 MHz, vertical polarization.

The EUT met the requirements of the F.C.C. Part 15, Subpart C Sections 15.209, 15.205, 15.247(d) and RSS 247, Issue 2, Section 3.3, RSS Gen, Issue 5, Section 8.10 specifications.

The details of the highest emissions are given in *Figure 43*.



Radiated Emission

E.U.T Description Fall Monitor
Type M200
Serial Number: Not designated

Specifications: FCC, Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)
RSS 247, Issue 2, Section 3.3; RSS Gen, Issue 5, Section 8.10

Antenna Polarization: Horizontal/Vertical Frequency Range: 9kHz to 25.0 GHz
Protocol Type: BLE Detector: Peak, Average

Operation Frequency	Freq.	Pol.	Peak Reading	Peak Limit	Peak Margin	Average Reading	Average Limit	Average Margin
(MHz)	(MHz)	(H/V)	(dBµV/m)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV/m)	(dB)
2402.0	2390.0	V	55.1	74.0	-18.9	46.2	54.0	-7.8
	2390.0	H	55.0	74.0	-19.0	46.0	54.0	-8.0
	4804.0	V	42.9(N.L)	74.0	-31.1	-	54.0	-
	4804.0	H	43.5(N.L)	74.0	-30.5	-	54.0	-
2440.0	4880.0	V	44.0(N.L)	74.0	-30.0	-	54.0	-
	4880.0	H	43.8(N.L)	74.0	-30.2	-	54.0	-
2480.0	4960.0	V	44.4(N.L)	74.0	-29.6	-	54.0	-
	4960.0	H	44.1(N.L)	74.0	-29.9	-	54.0	-
	2483.5	V	55.4	74.0	-18.6	46.3	54.0	-7.7
	2483.5	H	55.2	74.0	-18.8	46.2	54.0	-7.8

Figure 43. Radiated Emission Results

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Amp” includes correction factor.

* “Correction Factor” = Antenna Factor + Cable Loss- Low Noise Amplifier Gain



11.6 Test Instrumentation Used; Emissions in Restricted Frequency Bands

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EMI Analyzer	HP	8593 EM	3826A00265	March 9, 2020	March 31, 2021
EMI Receiver	HP	8542E	3906A00276	March 11, 2020	March 31, 2021
RF Filter Section	HP	85420E	3705A00248	March 11, 2020	March 31, 2021
Spectrum Analyzer	HP	8593EM	3536A00120 ADI	March 9, 2020	March 31, 2021
Active Loop Antenna	EMCO	6502	9506-2950	February 5, 2019	February 28, 2021
Biconical Antenna	EMCO	3110B	9912-3337	May 21, 2019	May 31, 2021
Log Periodic Antenna	EMCO	3146	9505-4081	May 31, 2018	May 31, 2021
Horn Antenna	ETS	3115	29845	May 31, 2018	May 31, 2021
Horn Antenna	ARA	SWH-28	1007	December 31, 2017	December 31, 2020
Filter Band Pass 4-20 GHz	Meuro	MFL040120H5 0	902252	December 24, 2018	December 31, 2020
RF Cable Chamber	Commscope ORS	0623 WBC-400	G020132	December 24, 2018	December 31, 2020
RF Cable Oats	EIM	RG214- 11N(X2)		August 4, 2020	August 31, 2021
MicroWave System Amplifier	HP	83006A	3104A00589	NCR	NCR
Semi Anechoic Civil Chamber	ETS	S81	SL 11643	NCR	NCR
Antenna Mast	ETS	2070-2	9608-1497	NCR	NCR
Turntable	ETS	2087	-	NCR	NCR
Mast & Table Controller	ETS/EMCO	2090	9608-1456	NCR	NCR

Figure 44 Test Equipment Used



12. Antenna Gain/Information

The antenna gain is 5.3dBi, type: printed.



SWRA117D

13. R.F Exposure/Safety

The typical placement of the E.U.T. is wall mounted. The typical distance between the E.U.T. and the user is at least 20cm.

Calculation of Maximum Permissible Exposure (MPE)

Based on 47CFR1 Section 1.1307(b)(1) and RSS 102 Issue 5, Table 4 Requirements

- (a) FCC Limit at 2402 MHz is:
- $$1 \frac{mW}{cm^2}$$

Using Table 1 of 47CFR1 Section 1.1310 limit for general population/uncontrolled exposures, the above levels are an average over 30 minutes.

- (b) ISED Limit: 300-6000MHz = $0.02619f^{0.6834} \text{ W/m}^2 =$
 $0.02619 \times 2402^{0.6834} = 0.02619 \times 204.31 = 5.35 \text{ W/m}^2 = 0.535 \text{ mW/cm}^2$

- (c) The power density produced by the E.U.T. is:

$$S = \frac{P_t G_t}{4\pi R^2}$$

P_t = Conducted Transmitted Power -0.80 dBm = 0.83 mW

G_t = Antenna Gain 5.3dBi = 3.4 numeric

R = Distance From Transmitter 20 cm

- (d) The peak power density produced by the E.U.T. is:

$$S = 0.83 * 3.4 / 4\pi(20)^2 = 5.61 \times 10^{-4} \text{ mW/cm}^2$$

- (e) This is below the FCC/ISED limit.



14. APPENDIX A - CORRECTION FACTORS

14.1 Correction factors for RF OATS Cable 35m ITL #1911

Frequency (MHz)	loss (dB)
30.0	1.3
50.0	1.7
100.0	2.6
200.0	3.7
300.0	4.7
400.0	5.5
500.0	6.3
600.0	7.0
700.0	7.6
800.0	8.4
900.0	9.0
1000.0	9.6



**14.2 Correction Factors for RF Cable for Anechoic Chamber
ITL #1840**

FREQ (MHz)	LOSS (dB)
1000.0	1.5
2000.0	2.1
3000.0	2.7
4000.0	3.1
5000.0	3.5
6000.0	4.1
7000.0	4.6
8000.0	4.9
9000.0	5.7
10000.0	5.7
11000.0	6.1
12000.0	6.1
13000.0	6.2
14000.0	6.7
15000.0	7.4
16000.0	7.5
17000.0	7.9
18000.0	8.1
19000.0	8.8
20000.0	9.1



14.3 Correction Factors for Active Loop Antenna ITL # 1075

F(MHz)	AF(dB/m)
0.01	18.4
0.02	14.3
0.03	13.3
0.05	11.7
0.1	11.4
0.2	11.2
0.3	11.2
0.5	11.2
0.7	11.2
1	11.4
2	11.5
3	11.5
4	11.4
5	11.3
6	11.1
7	11.1
8	11.1
9	11
10	11
20	10
30	8



14.4 Correction Factors for Biconical Antenna ITL #1356

Frequency [MHz]	AF [dB/m]
30	13.00
35	10.89
40	10.59
45	10.63
50	10.12
60	9.26
70	7.74
80	6.63
90	8.23
100	11.12
120	13.16
140	13.07
160	14.80
180	16.95
200	17.17



14.5 Correction Factors for Log Periodic Antenna ITL # 1349

Frequency [MHz]	AF [dB/m]
200	11.58
250	12.04
300	14.76
400	15.55
500	17.85
600	18.66
700	20.87
800	21.15
900	22.32
1000	24.22



**14.6 Correction Factors for Double – Ridged Waveguide Horn
ANTENNA ,ITL # 1352**

FREQUENCY	AFE	FREQUENCY	AFE
(GHz)	(dB/m)	(GHz)	(dB/m)
0.75	25.0	9.5	38.0
1.0	23.5	10.0	38.5
1.5	26.0	10.5	38.5
2.0	29.0	11.0	38.5
2.5	27.5	11.5	38.5
3.0	30.0	12.0	38.0
3.5	31.5	12.5	38.5
4.0	32.5	13.0	40.0
4.5	32.5	13.5	41.0
5.0	33.0	14.0	40.0
5.5	35.0	14.5	39.0
6.0	36.5	15.0	38.0
6.5	36.5	15.5	37.5
7.0	37.5	16.0	37.5
7.5	37.5	16.5	39.0
8.0	37.5	17.0	40.0
8.5	38.0	17.5	42.0
9.0	37.5	18.0	42.5



14.7 Correction Factors for Horn Antenna Model SWH-28 ITL # 1353

CALIBRATION DATA

3 m distance

Frequency, MHz	Measured antenna factor, dB/m ¹⁾
18000	32.4
18500	32.0
19000	32.3
19500	32.4
20000	32.3
20500	32.8
21000	32.8
21500	32.7
22000	33.1
22500	33.0
23000	33.1
23500	33.8
24000	33.5
24500	33.5
25000	33.8
25500	33.9
26000	34.2
26500	34.7

¹⁾ The antenna factor shall be added to receiver reading in dB μ V to obtain field strength in dB μ V/m.