ISRAEL TESTING LABORATORIES
Global Certifications You Can Trust

ACCREDITED
Certificate: 1152.01

DATE: 27 December 2021

I.T.L. (PRODUCT TESTING) LTD.

FCC/ISED Radio Test Report

for

AeroScout Inc.

Equipment under test:

BLE Asset Tag, WGB Blue*, WGB Wearable Tag*

TAG2200B, TAG2200B-F*, WGB-TAG-1000-XYZ*, WGB-TAG-2ABC-XYZ*

*See customer declaration on page 5.

Tested by: _____
M. Zohar

Approved by: _____
D. Shidlowsky

ISRAEL TESTING LABORATORIES
Global Certifications You Can Trust

Measurement/Technical Report for

AeroScout Inc.

BLE Asset Tag, WGB Blue*, WGB Wearable Tag*

TAG2200B, TAG2200B-F*, WGB-TAG-1000-XYZ*, WGB-TAG-2ABC-XYZ*

*See customer declaration on pages 6-7.

FCC ID: Q3HTAGB1200
IC: 5115A-TAGB1200

Limited Modular Approval (LMA)

This report concerns:	Original Grant: X Class I Change: Class II Change:
Equipment type:	FCC: (DTS) Digital Transmission System ISED: 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 procedures used: KDB 558074 D01 v05r01, ANSI C63.10:2013, and RSS-Gen, Issue 5, April 2018

Prepared by:

R. Ezrah
I.T.L. Product Testing Ltd.
1 Bat Sheva St., Lod 7116002, Israel
Email: rame@itlglobal.org

Applicant:

Reuven Amsalem
AeroScout
2 Ilan Ramon St., Ness-Ziona 7403635, Israel
Email: reuven.amsalem@aeroscout.com

TABLE OF CONTENTS

1. General Information

1.1 *Administrative Information*

Manufacturer:	AeroScout Inc.
Manufacturer's Address:	2 Ilan Ramon St., Ness-Ziona 7403635, Israel
Manufacturer's Representative:	Leonid Genusin
Equipment Under Test (E.U.T.):	BLE Asset Tag, WGB Blue*, WGB Wearable Tag*
Equipment Serial No.:	Not designated
Equipment Model/PMN:	TAG2200B, TAG2200B-F*, WGB-TAG-1000-XYZ*, WGB-TAG-2ABC-XYZ*
Equipment HVIN:	TAG-2200B
Date of Receipt of E.U.T:	September 01, 2021
Start of Test:	September 01, 2021
End of Test:	October 02, 2021
Test Laboratory Location:	I.T.L. (Product Testing) Ltd. 1 Bat Sheva St., Lod 7120101 ISRAEL
Test Specifications:	FCC Part 15, Subpart C RSS 247, Issue 2, February 2017, Section 5 RSS-Gen, Issue 5, April 2018

* See customer declaration on following pages

Customer declaration

AeroScout®

Date: December 16, 2021

To whom it may concern

Multiple Model Difference Declaration

I hereby declare that the name, model, and serial number of the EUT tested at the I.T.L. Product Testing EMC laboratory between 20/08/21 and 20/10/21 are as follows:

EUT: BLE Tag

Model Name: TAG-2200B

Serial Number: MAC address 00 0C CC 58 28 A3

I hereby declare the following regarding the below models:

#	Product Name	P/N/other identifier
1	Flange version BLE Asset Tag	TAG-2200B-F
2	Standard WGB Tag	WGB-TAG-1000-XYZ
3	Wearable WGB Tag	WGB-TAG-2ABC-XYZ

Note: WGB-TAG-vzxx-yyy

- Yyy: Tag/battery life time
- Xx: Strap type
- Z: Strap length
- V: Case type

All the above models use the same PCB and batteries. These models are identical except for the following (plastic enclosures):

1. Model TAG-2200B is a small asset tag
2. Model TAG-2200B-F is a small asset tag with cable tie mounting option
3. Models WGB-TAG-1000-XYZ are small asset tags with strap mounting option
4. Models WGB-TAG-2ABC-XYZ are tags with "watch style" enclosure

Please relate to them (from an EMC/Radio point of view) as the same product.

Thank you,

Signature: 

Reuven Amsalem

VP HW R&D

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*

Battery-operated Tag with 2.4 GHz BLE transceiver and a 125 kHz LF receiver.

Working voltage	3.0VDC battery operated
Mode of operation	Transceiver
Modulations	GFSK
Assigned Frequency Range	2400.0-2483.5MHz
Operating Frequency Range	2402.0-2480.0MHz
Transmit power(conducted)	~4.0dBm
Antenna Gain	+1.0 dBi (max.)
Modulation BW	1/2MHz
Bit rate (Mbit/s)	1,2,3

1.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in KDB 558074 D01 v05r01, ANSI C63.10: 2013, RSS-Gen, Issue 5, April 2018. Radiated testing was performed at an antenna-to-E.U.T. 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 and its FCC Designation Number is IL1005.

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 IEEE 802.15.1 standard (BLE) transceiver.
2. The unit was evaluated while transmitting at the three operational frequencies: low channel (2402MHz), mid channel (2426MHz), and high channel (2480MHz).
3. Conducted emission tests were performed with the E.U.T. antenna terminal connected by an RF cable to the Spectrum Analyzer, through a 30dB external attenuator. For conducted emission test, the E.U.T. was powered by an external DC power supply.
4. The E.U.T. can have three different enclosures with minor changes between them: the HW/SW is identical in all three enclosers (see customer declaration on page 5). Final radiated emission tests were performed after exploratory emission testing, that was performed in three orthogonal polarities to determine the "worst case" radiation each for other encloser type.
6. The results are shown in Figure 1 to Figure 3.

Orientation	Frequency	2nd Harmonic (N.L.)[1]	3rd Harmonic	Band Edge
	(MHz)	(dBuV/m)	(dBuV/m)	(dBuV/m)
X axis	2402.0	42.5	54.5	52.0
	2426.0	43.2	55.1	-
	2480.0	43.0	55.5	52.7
Y axis	2402.0	42.8	54.5	52.3
	2426.0	42.9	55.3	-
	2480.0	43.3	55.5	55.3
Z axis	2402.0	42.7	54.4	51.8
	2426.0	43.0	55.0	-
	2480.0	42.9	55.2	54.0

Figure 1. Screening Results, model: WGB-TAG-1000-XYZ

[1] Noise Level

Orientation	Frequency	2nd Harmonic (N.L.)[1]	3rd Harmonic	Band Edge
	(MHz)	(dBuV/m)	(dBuV/m)	(dBuV/m)
X axis	2402.0	42.3	54.6	52.9
	2426.0	43.0	55.3	-
	2480.0	42.8	55.2	53.3
Y axis	2402.0	43.2	54.8	53.0
	2426.0	42.8	55.7	-
	2480.0	43.0	55.8	55.9
Z axis	2402.0	42.9	54.0	50.2
	2426.0	43.4	54.4	-
	2480.0	42.3	54.8	52.5

Figure 2. Screening Results model:TAG-2200B-F

Orientation	Frequency	2nd Harmonic (N.L.)[1]	3rd Harmonic	Band Edge
	(MHz)	(dBuV/m)	(dBuV/m)	(dBuV/m)
X axis	2402.0	43.0	53.0	51.6
	2426.0	43.7	54.5	-
	2480.0	43.1	55.7	52.9
Y axis	2402.0	42.9	54.0	51.1
	2426.0	43.4	54.2	-
	2480.0	43.7	55.8	55.0
Z axis	2402.0	43.0	55.3	52.9
	2426.0	43.3	54.8	-
	2480.0	42.4	53.7	53.3

Figure 3. Screening Results model: WGB-TAG-2ABC-XYZ

According to above results, the worst case was model TAG-2200B-F, at the Y axis.

2.2 *EUT Exercise Software*

No special exercise software was used.

2.3 *Special Accessories*

N/A

2.4 *Equipment Modifications*

No modifications were necessary in order to achieve compliance.

2.5 *Configuration of Tested System*

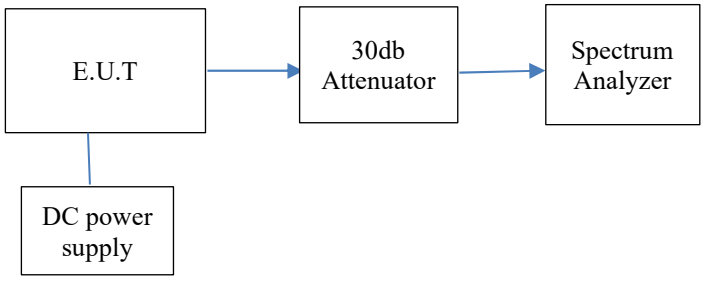

Figure 4. Configuration of Tested System - Conducted

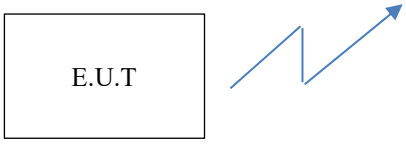

Figure 5. Configuration of Tested System - Radiated

3. Conducted and Radiated Measurement Tests Setup Photos

Figure 6. Conducted Emission Test

Figure 7. Radiated Emission Test, 0.009-30MHz

Figure 8. Radiated Emission Test, 30-200MHz

Figure 9. Radiated Emission Test, 200-1000MHz

Figure 10. Radiated Emission Test, 1-18GHz

Figure 11. Radiated Emission Test, 18-26.5GHz

4. 6 dB Minimum Bandwidth

4.1 *Test Specification*

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

RSS 247, Issue 2, Section 5.2(a)

4.2 *Test Procedure*

(Temperature (20°C)/ Humidity (65%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=31.5 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.

4.3 *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.

4.4 *Test Results*

Protocol Type	Operation Frequency (MHz)	Reading (kHz)	Limit (kHz)
BLE	2402.0	694.6	>500.0
	2426.0	700.6	>500.0
	2480.0	706.6	>500.0

Figure 12 6 dB Minimum Bandwidth

JUDGEMENT: Passed

For additional information see *Figure 13* to *Figure 15.*

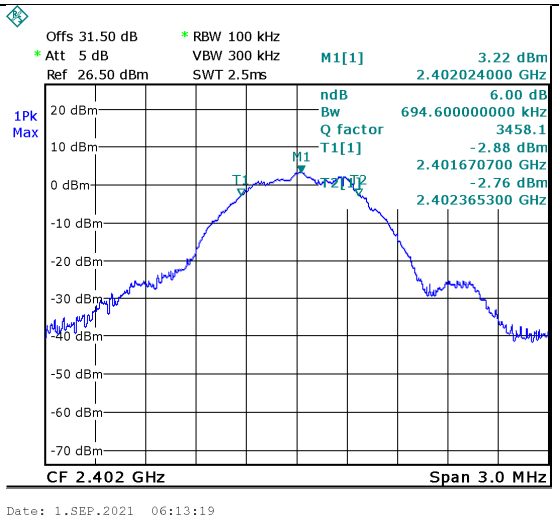

Figure 13. 2402.0 MHz, BLE

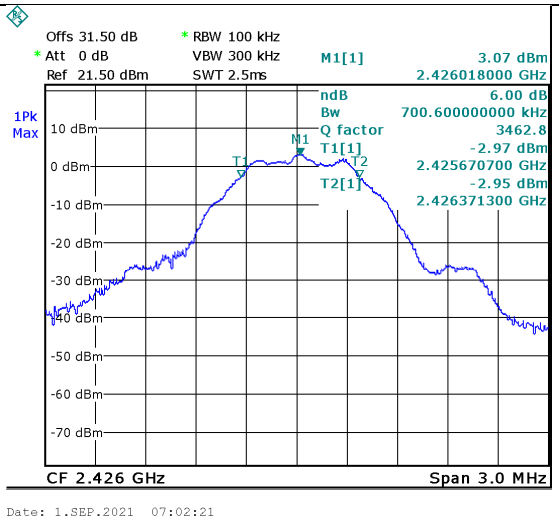

Figure 14. 2426.0 MHz, BLE

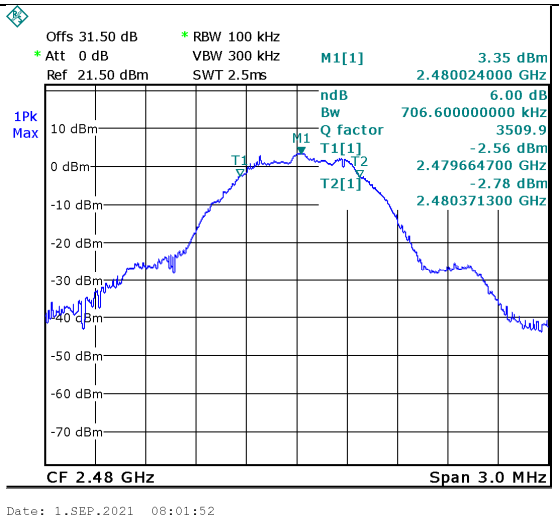

Figure 15. 2480.0 MHz, BLE

4.5 *Test Equipment Used; 6dB Bandwidth*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	February 23, 2021	February 23, 2022
30dB Attenuator	MCL	BW-S30W5	533	May 23, 2021	May 23, 2022
RF Cable	Huber Suhner	Sucofelex	27504/4PEA	May 23, 2021	May 23, 2022

Figure 16 Test Equipment Used

5. Maximum Conducted Output Power

5.1 *Test Specification*

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

RSS 247, Issue 2, Section 5.4(d)

5.2 *Test Procedure*

(Temperature (20°C)/ Humidity (65%RH))

The E.U.T. operation mode and test setup 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=31.5 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

5.3 *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.

5.4 *Test Results*

Protocol Type	Operation Frequency	Power	Power	Limit	Margin
	(MHz)	(dBm)	(mW)	(mW)	(mW)
BLE	2402.0	3.6	2.3	1000.0	-997.7
	2426.0	3.3	2.1	1000.0	-997.9
	2480.0	3.5	2.3	1000.0	-997.7

Figure 17 Maximum Peak Power Output

JUDGEMENT: Passed by -997.7 mW

For additional information see *Figure 18* to *Figure 20*.

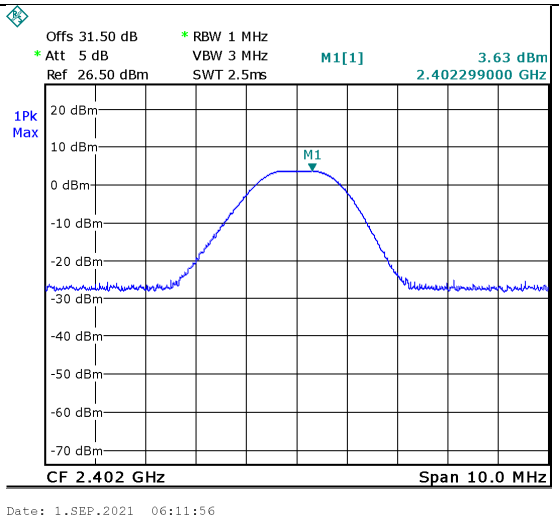

Figure 18. 2402.0 MHz, BLE

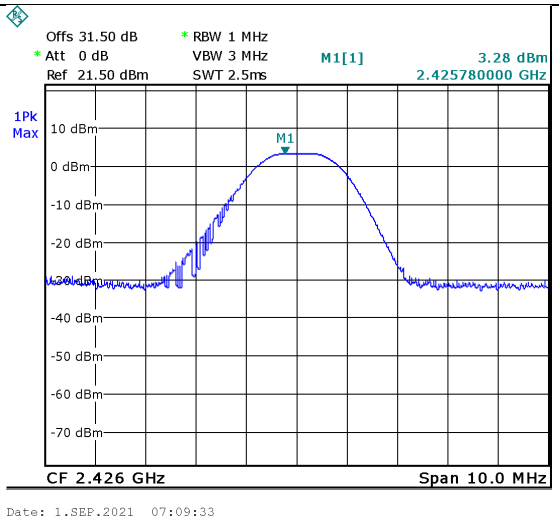

Figure 19. 2426.0 MHz, BLE

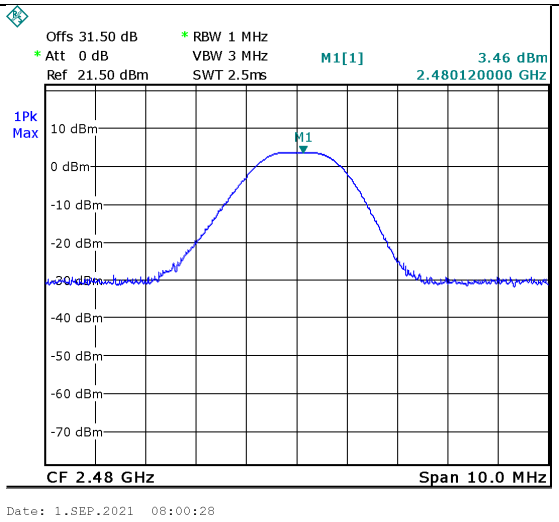

Figure 20. 2480.0 MHz, BLE

5.5 *Test Equipment Used; Maximum Peak Power Output*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	Feb. 23, 2021	Feb. 23, 2022
30dB Attenuator	MCL	BW-S30W5	533	May 23, 2021	May 23, 2022
RF Cable	Huber Suhner	Sucofelex	27504/4PEA	May 23, 2021	May 23, 2022

Figure 21 Test Equipment Used

6. Band Edge Spectrum

6.1 *Test Specification*

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

RSS 247, Issue 2, Section 5.5

6.2 *Test Procedure*

(Temperature (20°C)/ Humidity (65%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=31.5 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The RBW was set to 100 kHz.

6.3 *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.

6.4 *Test Results*

Protocol Type	Operation Frequency (MHz)	Band Edge Frequency (MHz)	Spectrum Level (dBm)	Limit (dBm)	Margin (dB)
BLE	2402.0	2400.0	-43.3	-17.1	-26.2
	2480.0	2483.5	-45.8	-18.2	-27.6

Figure 22 Band Edge Spectrum

JUDGEMENT: Passed by -26.2dB

For additional information see *Figure 23* and *Figure 24.*

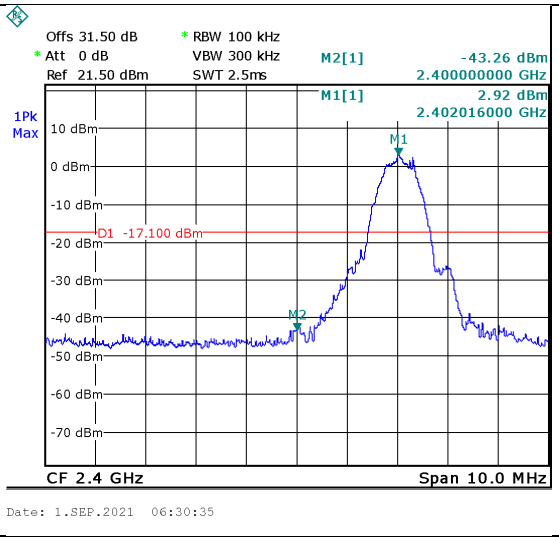

Figure 23. 2402.0 MHz, BLE

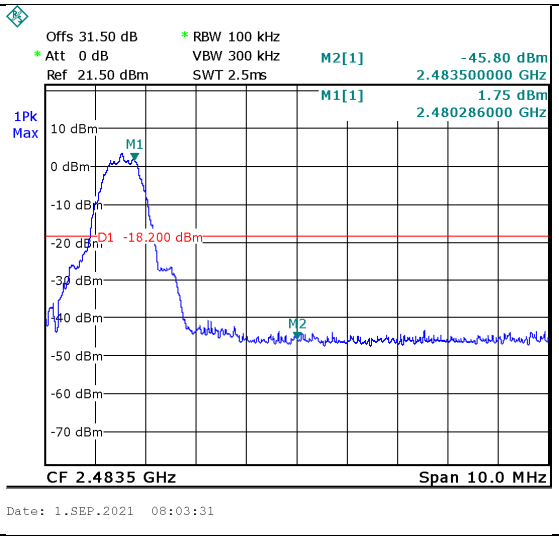

Figure 24. 2480.0 MHz, BLE

6.5 *Test Equipment Used; Band Edge*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	Feb. 23, 2021	Feb. 23, 2022
30dB Attenuator	MCL	BW-S30W5	533	May 23, 2021	May 23, 2022
RF Cable	Huber Suhner	Sucofelex	27504/4PEA	May 23, 2021	May 23, 2022

Figure 25 Test Equipment Used

7. Transmitted Power Density

7.1 *Test Specification*

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

RSS 247, Issue 2, Section 5.2(b)

7.2 *Test Procedure*

(Temperature (20°C)/ Humidity (65%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= 31.5dB). Special attention was taken to prevent Spectrum Analyzer RF input overload.

The spectrum analyzer was set to 3 kHz RBW.

7.3 *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.

7.4 *Test Results*

Protocol Type	Operation Frequency (MHz)	PSD Reading (dBm)	Limit (dBm)	Margin (dB)
BLE	2402.0	-9.7	8.0	-17.7
	2426.0	-10.5	8.0	-18.5
	2480.0	-9.5	8.0	-17.5

Figure 26 Test Results

JUDGEMENT: Passed by -17.5dB

For additional information see *Figure 27* to *Figure 29*.

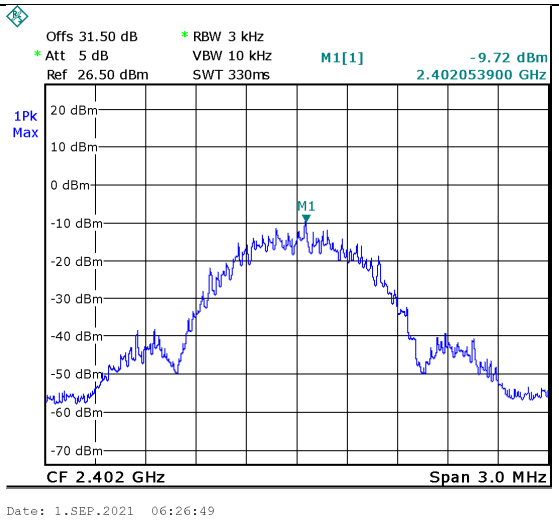

Figure 27. 2402.0 MHz, BLE

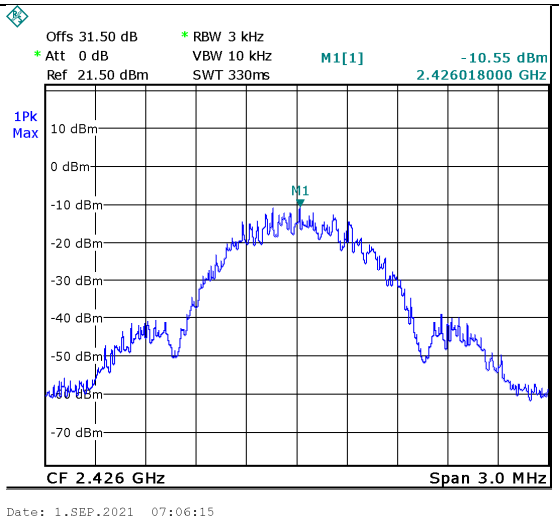

Figure 28. 2426.0 MHz, BLE

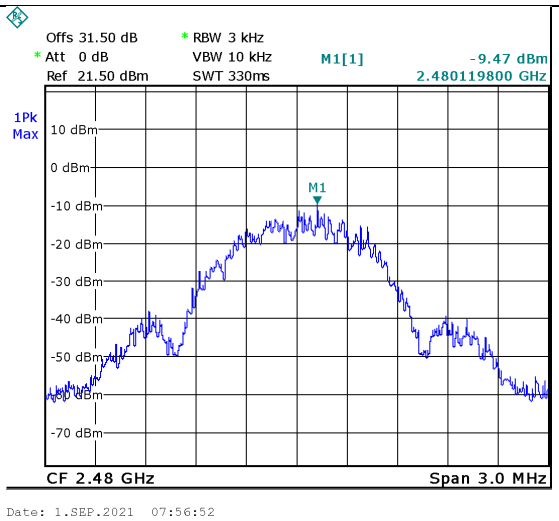

Figure 29. 2480.0 MHz, BLE

7.5 *Test Equipment Used; Transmitted Power Density*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	Feb. 23, 2021	Feb. 23, 2022
30dB Attenuator	MCL	BW-S30W5	533	May 23, 2021	May 23, 2022
RF Cable	Huber Suhner	Sucofelex	27504/4PEA	May 23, 2021	May 23, 2022

Figure 30 Test Equipment Used

8. Occupied Bandwidth

8.1 *Test Specification*

FCC, Part 2, Sub part J, Section 2.1049

RSS-Gen, Issue 5: 2014, Section 6.6

8.2 *Test Procedure*

(Temperature (20°C)/ Humidity (65%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= 31.5dB). 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.

8.3 *Test Limit*

N/A

8.4 *Test Results*

Protocol Type	Operation Frequency (MHz)	Reading (MHz)
BLE	2402.0	1.03
	2426.0	1.06
	2480.0	1.06

Figure 31. Bandwidth Test Results

JUDGEMENT: N/A

See additional information in *Figure 32* to *Figure 34.*

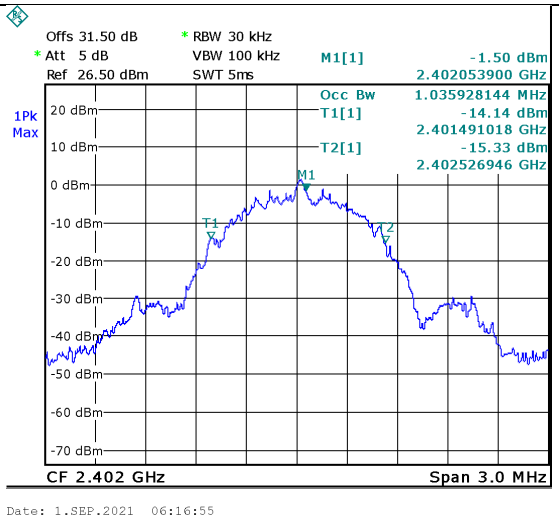

Figure 32. 2402.0 MHz, BLE

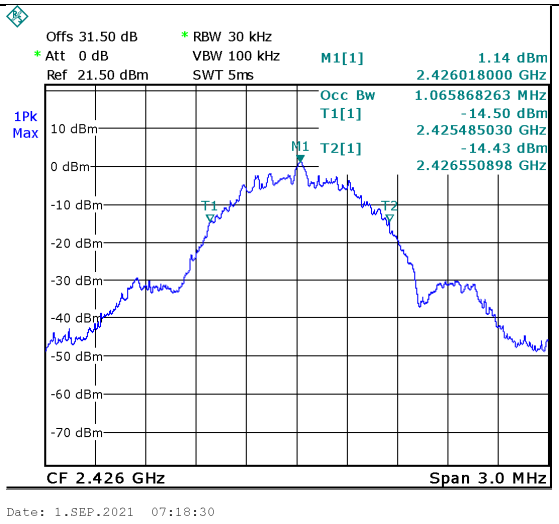

Figure 33. 2426.0 MHz, BLE

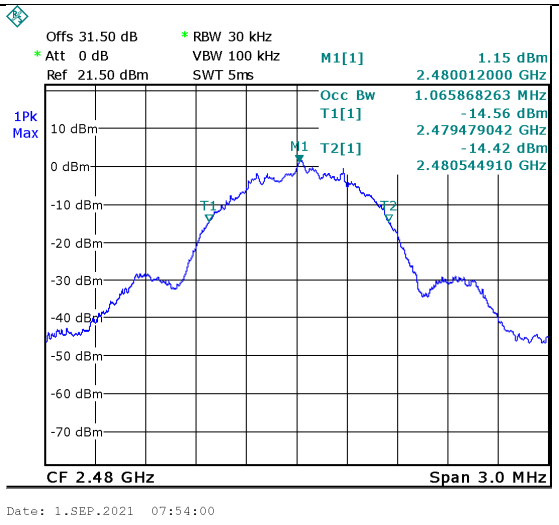

Figure 34. 2480.0 MHz, BLE

8.5 *Test Equipment Used; Bandwidth*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSL6	100194	Feb. 23, 2021	Feb. 23, 2022
30dB Attenuator	MCL	BW-S30W5	533	May 23, 2021	May 23, 2022
RF Cable	Huber Suhner	Sucofelex	27504/4PEA	May 23, 2021	May 23, 2022

Figure 35 Test Equipment Used

9. Emissions in Non-Restricted Frequency Bands

9.1 *Test Specification*

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

RSS 247, Issue 2, Section 5.5

9.2 *Test Procedure*

(Temperature (20°C)/ Humidity (65%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=31.5 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".

9.3 *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.

9.4 *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 36* to *Figure 38.*

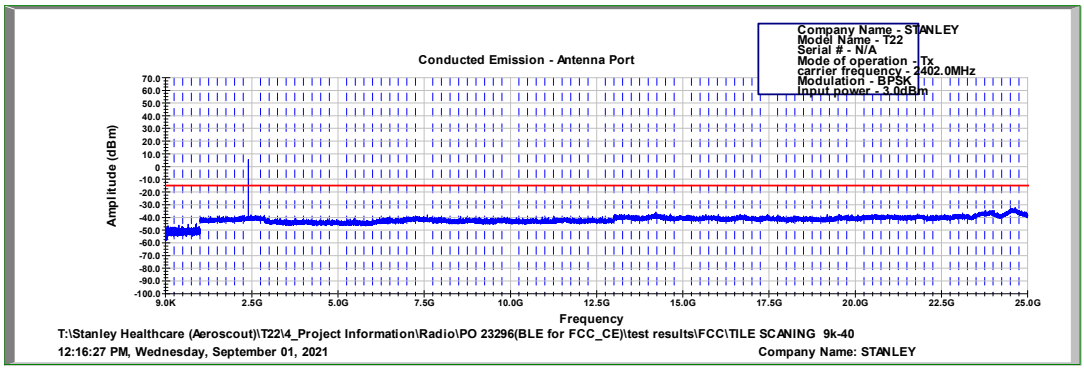

Figure 36 2402.0 MHz, BLE

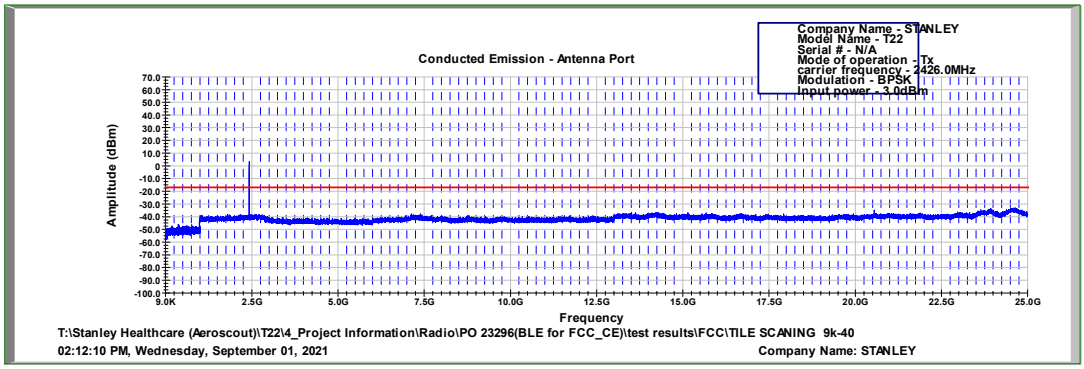

Figure 37 2426.0 MHz, BLE

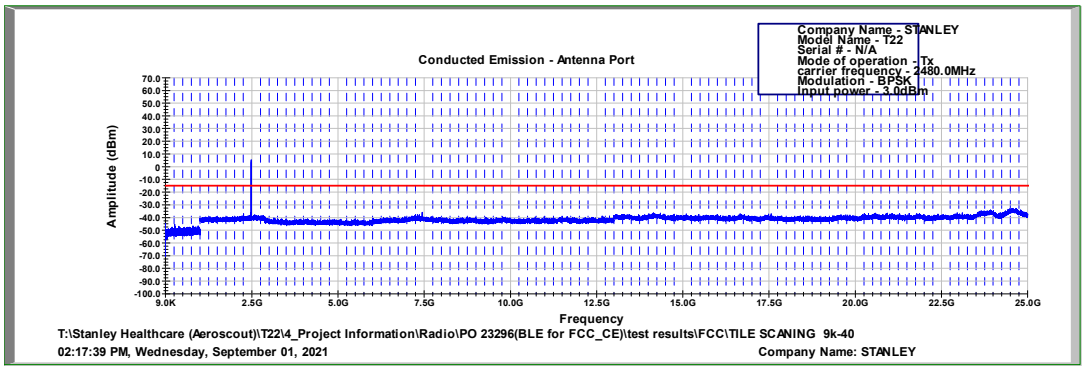

Figure 38 2480.0 MHz, BLE

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

9.1 *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	Feb. 28, 2021	Feb. 28, 2022
30dB Attenuator	MCL	BW-S30W5	533	May 23, 2021	May 23, 2022
RF Cable	Huber Suhner	Sucofelex	27504/4PEA	May 23, 2021	May 23, 2022

Figure 39 Test Equipment Used

10. Emissions in Restricted Frequency Bands

10.1 *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

10.2 *Test Procedure*

(Temperature (22°C)/ Humidity (63%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 1-25 GHz was scanned.

The highest radiation describes in the tables below

10.3 *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

Figure 40 FCC Table of Limits

*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.

10.4 *ISED 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

Figure 41 ISED Table of Limits

*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.

10.5 *Test Results*

JUDGEMENT: Passed by - 18.1dB

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

The details of the highest emissions are given in *Figure 42.*

Radiated Emission

E.U.T. Description	BLE Asset Tag
Type	TAG2200B
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: 9 kHz to 25.0 GHz

Protocol Type: BLE

Detector: Peak, Average

Operation Frequency	Frequency	Polarity	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	53.0 (N.L.)	74.0	-21.0	-	54.0	-
	2390.0	H	52.2 (N.L.)	74.0	-21.8	-	54.0	-
	7206.0	V	54.8	74.0	-19.2	47.3	54.0	-6.7
	7206.0	H	52.1	74.0	-21.9	-	54.0	-
2426.0	4852.0	V	42.8 (N.L.)	74.0	-31.2	-	54.0	-
	4852.0	H	42.9 (N.L.)	74.0	-31.1	-	54.0	-
	7278.0	V	55.7	74.0	-18.3	47.6	54.0	-6.4
	7278.0	H	52.5	74.0	-21.5	-	54.0	-
2480.0	7440.0	V	55.8	74.0	-18.2	48.9	54.0	-5.1
	7440.0	H	53.3	74.0	-20.7	-	54.0	-
	2483.5	V	55.9	74.0	-18.1	45.2	54.0	-8.8
	2483.5	H	53.5	74.0	-20.5	44.3	54.0	-9.7

Figure 42. 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

10.6 *Test Instrumentation Used; Emissions in Restricted Frequency Bands*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EMI Receiver	R&S	ESCI7	100724	Feb. 23, 2021	Feb. 23, 2022
EMI Receiver	HP	8542E	3906A00276	Feb. 24, 2021	Feb. 24, 2022
RF Filter Section	HP	85420E	3705A00248	Feb. 24, 2021	Feb. 24, 2022
Spectrum Analyzer	HP	8593EM	3826A00265	Feb. 22, 2021	Feb. 22, 2022
Biconical Antenna	EMCO	3110B	9912-3337	Apr. 27, 2021	Apr. 27, 2023
Log Periodic Antenna	EMCO	3146	9505-4081	Apr. 27, 2021	Apr. 27, 2023
Horn Antenna	ETS	3115	29845	May 25, 2018	May 25 2024
Active Loop Antenna	EMCO	6502	9506-2950	May 3, 2021	May 3, 2022
MicroWave System Amplifier	HP	83006A	3104A00589	Aug. 23, 2020	Aug. 23, 2021
Low Noise Amplifier 1GHz-18GHz	Miteq	AFSX4-02001800-50-8P	-	Jul. 12, 2020	Jul. 12, 2021
RF Cable Chamber	Commscope ORS	0623 WBC-400	G020132-	Aug. 23, 2020	Aug. 23, 2021
RF Cable Oats	EIM	RG214-11N(X2)	-	Aug. 4, 2020	Aug. 4, 2021
High Pass Band Filter	Meuro	MFL040120H50	902252	Nov. 2, 2020	Nov. 2, 2021
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 43 Test Equipment Used

11. Antenna Gain/Information

The antenna gain is 1.0 dBi. Type: printed.

12. R.F. Exposure/Safety

Refer to a separate document.

13. APPENDIX A - CORRECTION FACTORS

13.1 *For ITL #1911 OATS RF Cable*

Frequency (MHz)	Cable Loss (dB)		Frequency (MHz)	Cable Loss (dB)
1.0	0.5		450.00	5.83
10.00	1.0		500.00	6.33
20.00	1.34		550.00	6.67
30.00	1.5		600.00	6.83
50.00	1.83		650.00	7.17
100.00	2.67		700.00	7.66
150.00	3.17		750.00	7.83
200.00	3.83		800.00	8.16
250.00	4.17		850.00	8.5
300.00	4.5		900.00	8.83
350.00	5.17		950.00	8.84
400.00	5.5		1000.00	9.0

13.2 *For ITL #1840 Anechoic Chamber RF Cable*

Frequency (MHz)	Cable Loss (dB)		Frequency (MHz)	Cable Loss (dB)
1000.0	-1.4		10000.0	-6.0
1500.0	-1.7		10500.0	-6.2
2000.0	-2.0		11000.0	-6.2
2500.0	-2.3		11500.0	-6.0
3000.0	-2.6		12000.0	-6.0
3500.0	-2.8		12500.0	-6.1
4000.0	-3.1		13000.0	-6.3
4500.0	-3.3		13500.0	-6.5
5000.0	-3.6		14000.0	-6.7
5500.0	-3.7		14500.0	-7.0
6000.0	-4.0		15000.0	-7.3
6500.0	-4.4		15500.0	-7.5
7000.0	-4.7		16000.0	-7.6
7500.0	-4.8		16500.0	-8.0
8000.0	-5.0		17000.0	-8.0
8500.0	-5.1		17500.0	-8.1
9000.0	-5.6		18000.0	-8.2
9500.0	-5.8			

13.3 *For ITL # 1075 Active Loop Antenna*

Frequency (MHz)	MAF (dBs/m)	AF (dB/m)
0.01	-33.1	18.4
0.02	-37.2	14.3
0.03	-38.2	13.3
0.05	-39.8	11.7
0.1	-40.1	11.4
0.2	-40.3	11.2
0.3	-40.3	11.2
0.5	-40.3	11.2
0.7	-40.3	11.2
1	-40.1	11.4
2	-40.0	11.5
3	-40.0	11.5
4	-40.1	11.4
5	-40.2	11.3
6	-40.4	11.1
7	-40.4	11.1
8	-40.4	11.1
9	-40.5	11.0
10	-40.5	11.0
20	-41.5	10.0
30	-43.5	8.0

13.4 *For ITL #1356 Biconical Antenna*

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

13.5 *For ITL # 1349 Log Periodic Antenna*

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

13.6 *For ITL # 1352 1-18 Horn Antenna*

Frequency (GHz)	AF (dB/m)		Frequency (GHz)	AF (dB/m)
0.75	25		9.5	38
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

13.7 *For ITL # 1353 18-26.5 GHz Horn Antenna*

CALIBRATION DATA

3 m distance

Frequency MHZ	Measured antenna factor dB/m
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 dBµV to obtain field strength in dBµV/m.