

# SARGENT MANUFACTURING CO. TEST REPORT

**SCOPE OF WORK**

Emissions Testing – Aperio RF Module, Model IN100

**REPORT NUMBER**

105626878BOX-001c

**ISSUE DATE**

February 28, 2024

**[REVISED DATE]**

Original Issue



**DOCUMENT CONTROL NUMBER**

Non-Specific Radio Report Shell Rev. October 2022  
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**EMISSIONS TEST REPORT**  
(CLASS II PERMISSIVE CHANGE – FULL COMPLIANCE)

**Report Number:** 105626878BOX-001c

**Project Number:** G105626878

**Report Issue Date:** February 28, 2024

**Model(s) Tested:** IN100

**Model(s) Partially Tested:** None

**Model(s) Not Tested but declared equivalent by the client:** None

**Standards:** CFR47 FCC Part 15 Subpart C, Section 15.247: 12/2023  
RSS-247 Issue 3 August 2023  
KDB 558074 D01 15.247 Meas Guidance v05r02: 04/2019

Contains BLE Limited Module  
FCC ID: Y88-MBM1CC2640  
IC: 9504A-MBM1CC2640

Tested by:  
Intertek  
70 Codman Hill Road  
Boxborough, MA 01719  
USA

Client:  
Sargent Manufacturing Co.  
110 Sargent Drive  
New Haven, CT 6511  
USA

Report prepared by Reviewer



Kouma Sinn / Sr. EMC Staff Engineer

Report reviewed by



Vathana Ven / Sr. EMC Staff Engineer

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## 1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

## 2 Test Summary

Section	Test full name	Result
3	Client Information	--
4	Description of Equipment Under Test and Variant Models	--
5	System Setup and Method	---
6	Maximum Peak Output Power CFR47 FCC Part 15 Subpart C: 12/2023, Section 15.247 (b)(3) RSS-247 Issue 3 August 2023	Pass
7	Band Edge Compliance CFR47 FCC Part 15 Subpart C: 12/2023, Section 15.247 (d) RSS-247 Issue 3 August 2023	Pass
8	Transmitter spurious emissions CFR47 FCC Part 15 Subpart C: 12/2023, Section 15.247 (d) RSS-247 Issue 3 August 2023	Pass
9	Revision History	--

**3 Client Information**

**This EUT was tested at the request of:**

**Client:** Sargent Manufacturing Co.  
 110 Sargent Drive  
 New Haven, CT 6511  
 USA

**Contact:** David Debiase  
**Telephone:** (203) 821 5724  
**Email:** dave.debiase@assaabloy.com

**4 Description of Equipment Under Test and Variant Models**

**Manufacturer:** Sargent Manufacturing Co.  
 110 Sargent Drive  
 New Haven, CT 6511  
 USA

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Aperio RF Module	Assa Abloy, Inc.	IN100	N/A
Aperio RF Module	Assa Abloy, Inc.	IN100-MB (added metal wing model)	N/A

Receive Date:	12/11/2023
Received Condition:	Good
Type:	Production

Description of Equipment Under Test (provided by client)
<p>Electronic access control system. It contains the radio modules as below.</p> <p>Contains BLE Limited Module                  FCC ID: Y88-MBM1CC2640                  IC: 9504A-MBM1CC2640</p>

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
9 V (6 x 1.5 V Batteries)	1.5 A	DC	N/A

**Operating modes of the EUT:**

No.	Descriptions of EUT Exercising
1	Pre-programmed to transmit continuously using HyperTerminal

**Software used by the EUT:**

No.	Descriptions of EUT Exercising
1	HyperTerminal

**Bluetooth Low Energy (BLE)**

Radio/Receiver Characteristics	
<b>Frequency Band(s)</b>	See FCC ID # Y88-MBM1CC2640
<b>Modulation Type(s)</b>	See FCC ID # Y88-MBM1CC2640
<b>Maximum Output Power (Plastic Enclosure)</b>	+1.37 dBm (EIRP)
<b>Maximum Output Power (Metal Enclosure)</b>	-0.40 dBm (EIRP)
<b>Test Channels</b>	Low, Mid, and High Channels
<b>Occupied Bandwidth</b>	See FCC ID # Y88-MBM1CC2640
<b>Frequency Hopper: Number of Hopping Channels</b>	N/A
<b>Frequency Hopper: Channel Dwell Time</b>	N/A
<b>Frequency Hopper: Max interval between two instances of use of the same channel</b>	N/A
<b>MIMO Information (# of Transmit and Receive antenna ports)</b>	N/A
<b>Equipment Type</b>	Limited Module
<b>Antenna Type and Gain</b>	See FCC ID # Y88-MBM1CC2640

**Variant Models:**

The following variant models were not tested as part of this evaluation and are not eligible for certification; but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

**5 System Setup and Method**

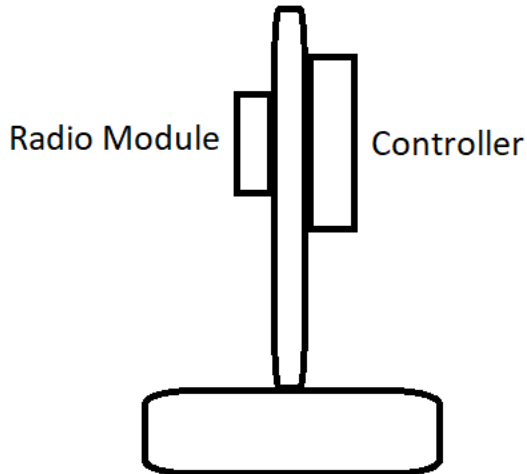
Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
--	None	--	--	--	--

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
None	--	--	--

**5.1 Method:**

Configuration as required by ANSI C63.10-2013, RSS-Gen Issue 5 April 2018, and KDB 558074 D01 15.247 Meas Guidance v05r02: 04/2019.

**5.2 EUT Block Diagram:**



## 6 Maximum Peak Output Power

### 6.1 Method

Tests are performed in accordance with ANSI C63.10, RSS-Gen, and KDB 558074.

**TEST SITE:** 10m ALSE

**The 10m ALSE** is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

#### Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucisp
Radiated Emissions, 10m	30-1000 MHz	5.0 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.6 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.9 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.1 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	4.7 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.7 dB	5.5 dB

As shown in the table above our radiated emissions  $U_{lab}$  is less than the corresponding  $U_{CISPR}$  reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.



**Sample Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where

- FS = Field Strength in dB $\mu$ V/m
- RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

RA = 52.0 dB $\mu$ V  
 AF = 7.4 dB/m  
 CF = 1.6 dB  
 AG = 29.0 dB  
 FS = 32 dB $\mu$ V/m

To convert from dB $\mu$ V to  $\mu$ V or mV the following was used:

$$UF = 10^{(NF / 20)} \text{ where UF = Net Reading in } \mu\text{V}$$

$$NF = \text{Net Reading in dB}\mu\text{V}$$

**Example:**

$$FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0$$

$$UF = 10^{(32 \text{ dB}\mu\text{V} / 20)} = 39.8 \mu\text{V/m}$$

Alternately, when BAT-EMC Emission Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". The "Correction" includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the "Level" column.

**6.2 Test Equipment Used:**

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV006'	Weather Station	Davis	6250	MS191218071	02/21/2023	02/21/2024
ROS011'	ESW44 receiver 1Hz-44GHz	Rhode and Schwarz	ESW44	103296	06/28/2023	06/28/2024
145-420'	Receiver to floor cable	Utiflex	UFB311A-2-0591-70070	145-420	02/18/2023	02/18/2024
145-408'	10m Chamber - 3m Track B In-floor Cable	Huber + Suhner	sucoflex 106-11000mm	001	07/19/2023	07/19/2024
HS002'	DC-18GHz cable 1.5M long	Huber & Suhner	SucoFlex 106A	HS002	07/19/2023	07/19/2024
145-422'	10Amp Pre-amp to under floor	Utiflex	UFB311A-0-2756-70070	145-422	02/18/2023	02/18/2024
ETS002'	1-18GHz DRG Horn Antenna	ETS Lindgren	3117	00143260	10/16/2023	10/16/2024

**Software Utilized:**

Name	Manufacturer	Version
None	--	--

**6.3 Results:**

The sample tested was found to Comply.

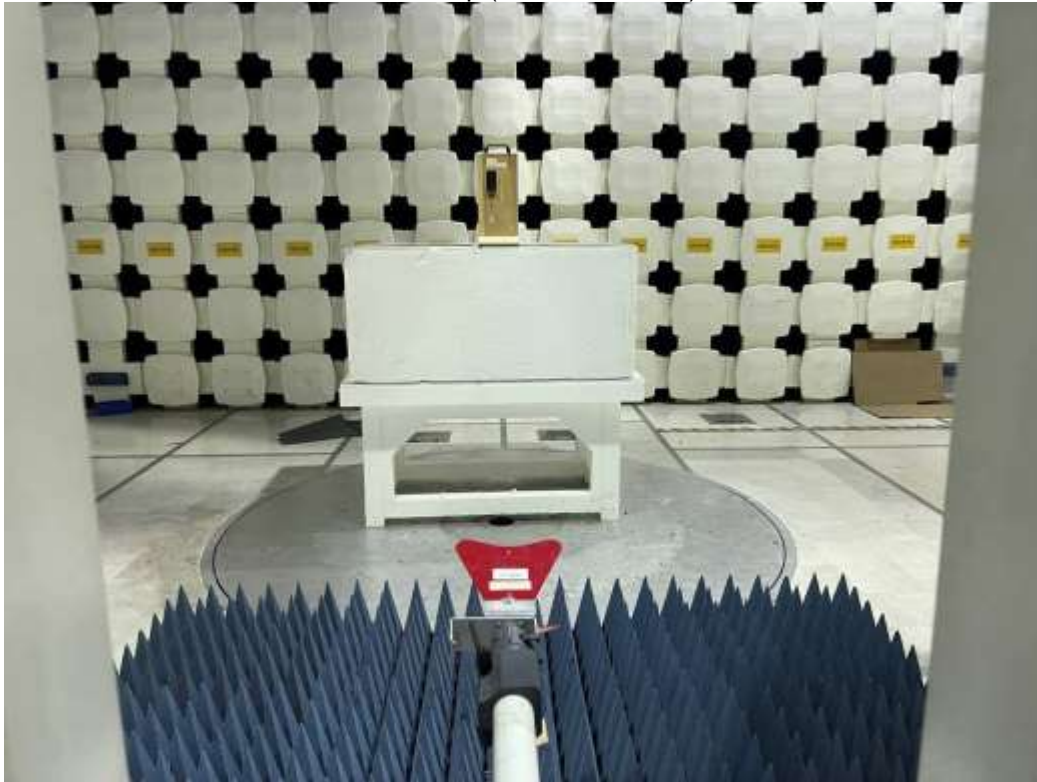
Limits – FCC Part §15.247 (b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt or 30 dBm.

6.4 Setup Photographs:

Test Setup (Plastic Enclosure)

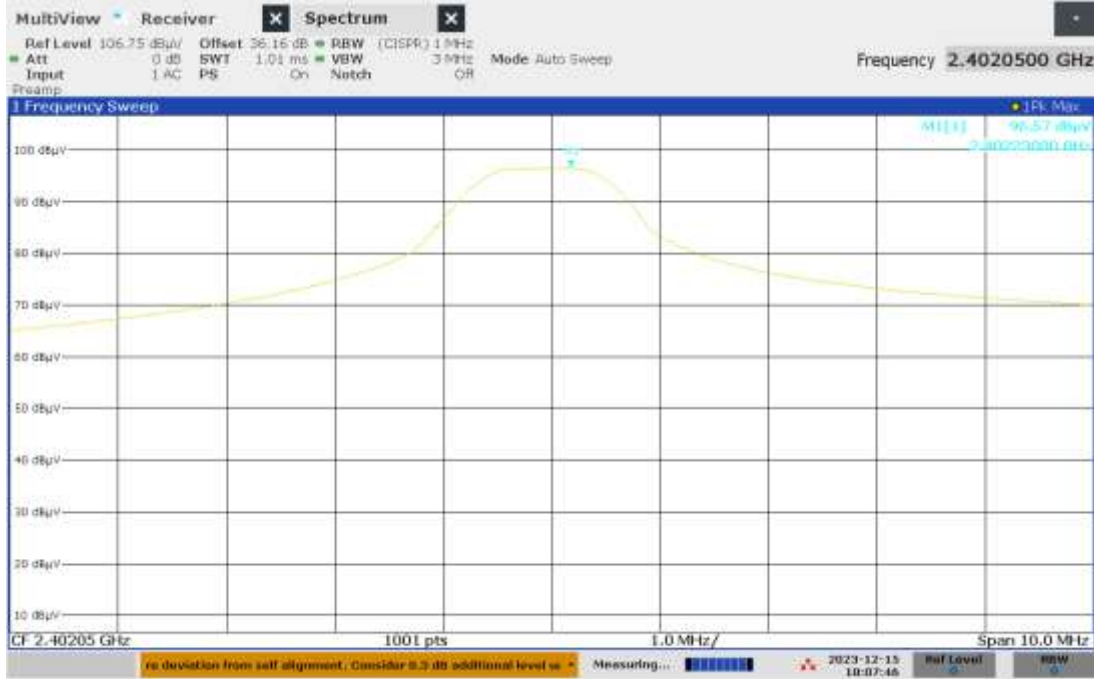


Test Setup (Metal Enclosure)



6.5 Plots/Data:

Bluetooth (Plastic Enclosure), Low Channel Radiated Field Strength at 3m (Worst-case polarity: H)



06:07:47 PM 12/15/2023

Bluetooth (Plastic Enclosure), Mid Channel Radiated Field Strength at 3m (Worst-case polarity: H)

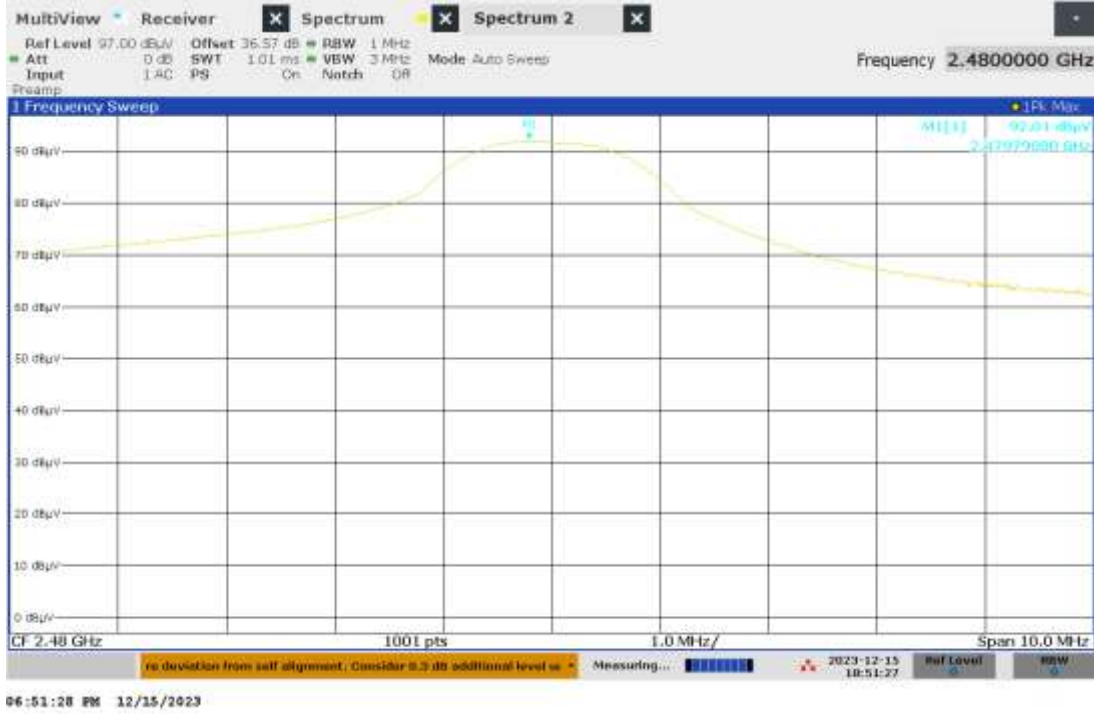


06:16:36 PM 12/15/2023

Notes: Cable loss and antenna were compensated internally as offset.



Bluetooth (Plastic Enclosure), High Channel Radiated Field Strength at 3m (Worst-case polarity: H)



Notes: Cable loss and antenna were compensated internally as offset.

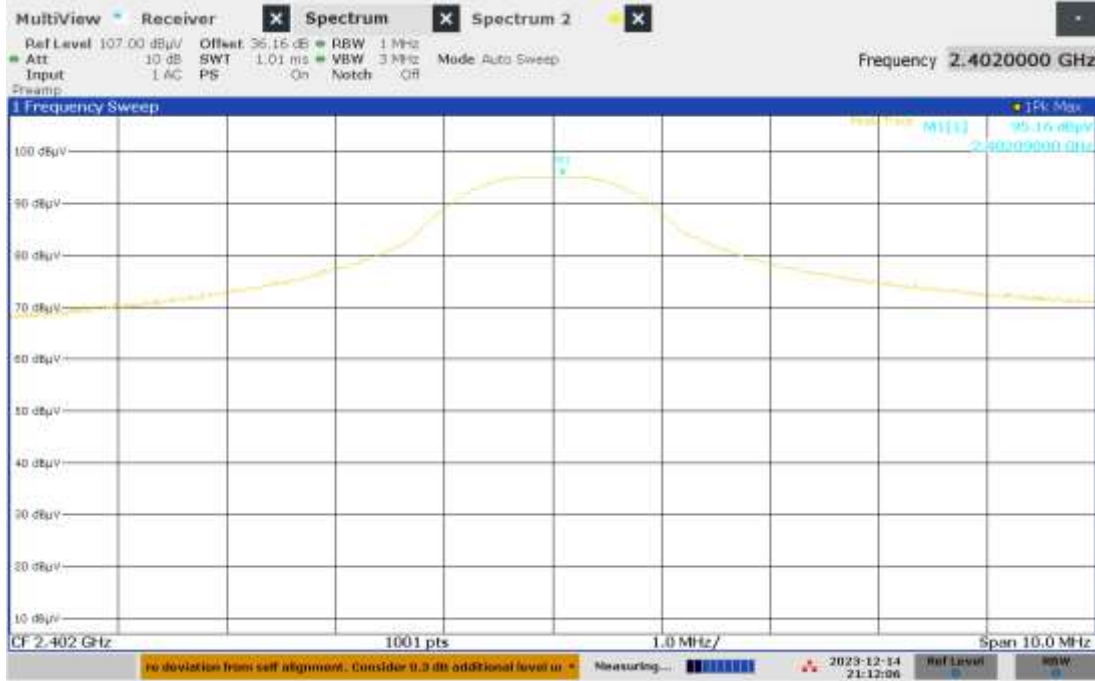
**Bluetooth (Plastic Enclosure) EIRP**

Channels (MHz)	Field Strength (dBuV/m)	EIRP (dBm)
2402	96.57	+1.37
2440	91.11	-4.09
2480	92.01	-3.19

Notes: The EIRP was calculated from field strength as the formula below:

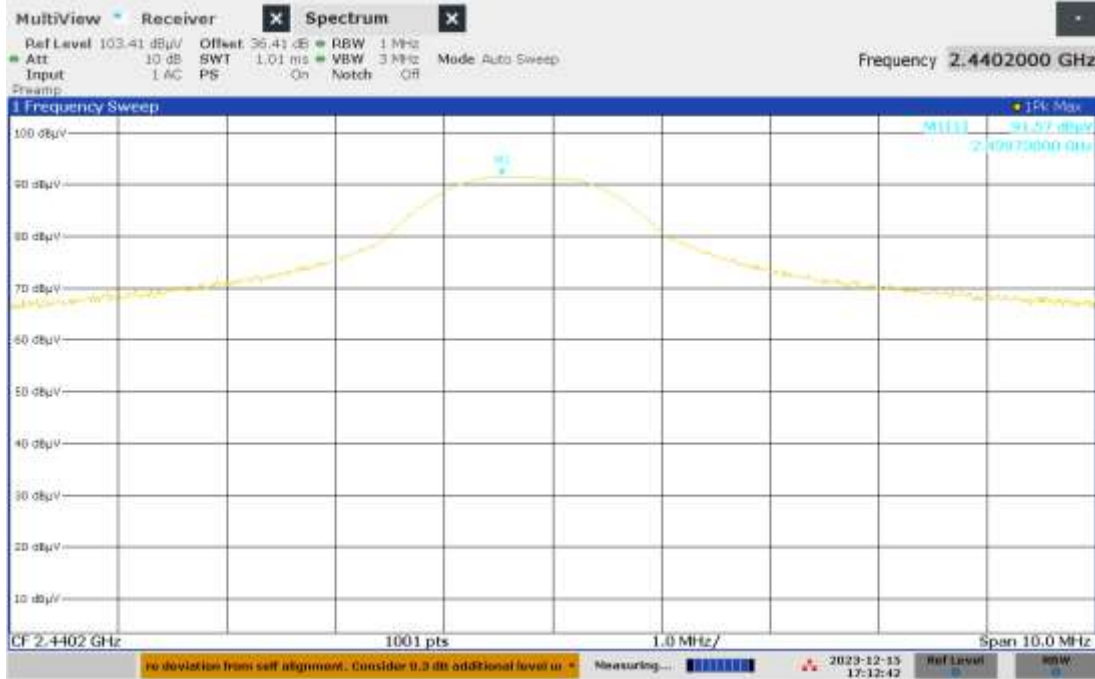
$$EIRP = E_{Meas} + 20 \log(d_{Meas}) - 104.7$$

Bluetooth (Metal Enclosure), Low Channel Radiated Field Strength at 3m (Worst-case polarity: H)



09:12:07 PM 12/14/2023

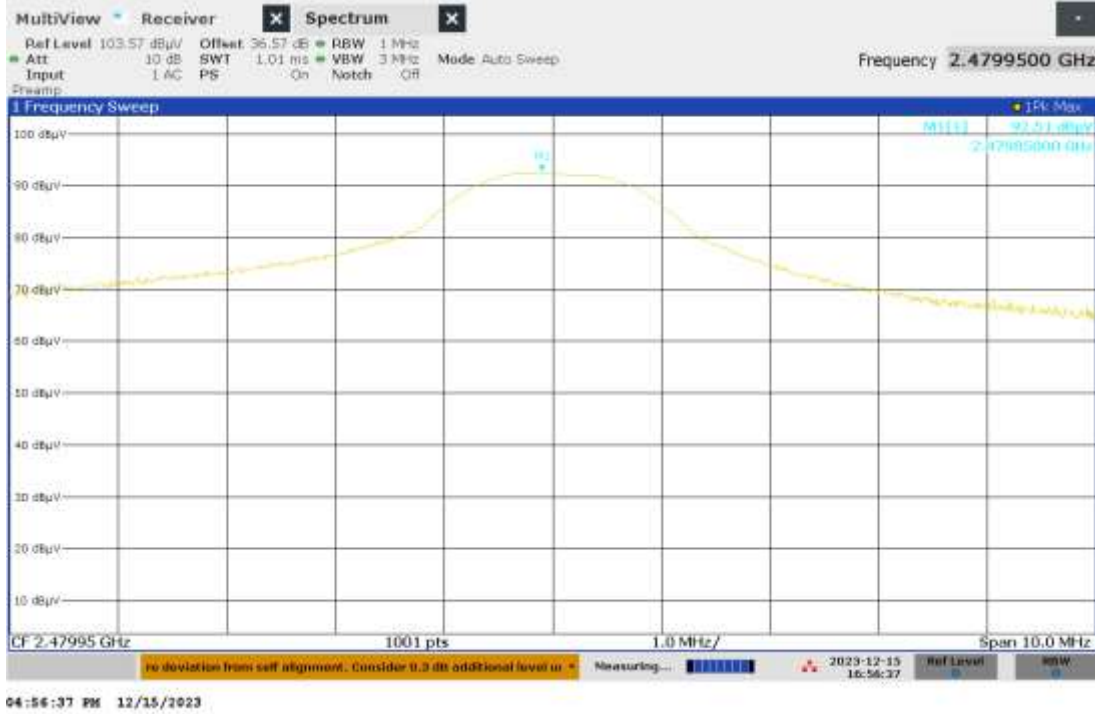
Bluetooth (Metal Enclosure), Mid Channel Radiated Field Strength at 3m (Worst-case polarity: H)



05:12:43 PM 12/15/2023

Notes: Cable loss and antenna were compensated internally as offset.

Bluetooth (Metal Enclosure), High Channel Radiated Field Strength at 3m (Worst-case polarity: H)



Notes: Cable loss and antenna were compensated internally as offset.

**Bluetooth (Metal Enclosure) EIRP**

Channels (MHz)	Field Strength (dBuV/m)	EIRP (dBm)
2402	95.16	-0.04
2440	91.57	-3.63
2480	92.51	-2.69

Notes: The EIRP was calculated from field strength as the formula below:

$$EIRP = E_{Meas} + 20 \log(d_{Meas}) - 104.7$$



# Intertek

Report Number: 105626878BOX-001c

Issued: 02/28/2024

Product Standard: CFR47 FCC Part 15.247, RSS-247				Limit applied: See Report Section 7.3 Pretest Verification w/BB source: Yes			
Test Date	Test Personnel/ Initials	Supervising Engineer/ Initials	Input Voltage	Mode	Atmospheric Data		
					Temp C°	Relative Humidity %	Atmospheric Pressure mbar
12/14/2023	Kouma Sinn <i>KPS</i>	N/A	Battery Powered	Continuous Transmitting	24	15	1026
12/15/2023	Kouma Sinn <i>KPS</i>	N/A	Battery Powered	Continuous Transmitting	27	18	1011
01/29/2024	Kouma Sinn <i>KPS</i>	N/A	Battery Powered	Continuous Transmitting	22	29	1003
01/30/2024	Kouma Sinn <i>KPS</i>	N/A	Battery Powered	Continuous Transmitting	22	29	1003

Deviations, Additions, or Exclusions: None

## 7 Band Edge Compliance

### 7.1 Method

Tests are performed in accordance with ANSI C63.10, RSS-Gen, and KDB 558074.

**TEST SITE:** 10m ALSE

**The 10m ALSE** is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

#### Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucisp
Radiated Emissions, 10m	30-1000 MHz	5.0 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.6 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.9 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.1 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	4.7 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.7 dB	5.5 dB

As shown in the table above our radiated emissions  $U_{lab}$  is less than the corresponding  $U_{CISPR}$  reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

**Sample Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where

- FS = Field Strength in dB $\mu$ V/m
- RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

RA = 52.0 dB $\mu$ V  
 AF = 7.4 dB/m  
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 AG = 29.0 dB  
 FS = 32 dB $\mu$ V/m

To convert from dB $\mu$ V to  $\mu$ V or mV the following was used:

$$UF = 10^{(NF / 20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$$

$$NF = \text{Net Reading in dB}\mu\text{V}$$

**Example:**

$$FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0$$

$$UF = 10^{(32 \text{ dB}\mu\text{V} / 20)} = 39.8 \mu\text{V/m}$$

Alternately, when BAT-EMC Emission Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". The "Correction" includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the "Level" column.

**7.2 Test Equipment Used:**

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV006'	Weather Station	Davis	6250	MS191218071	02/21/2023	02/21/2024
ROS011'	ESW44 receiver 1Hz-44GHz	Rhode and Schwarz	ESW44	103296	06/28/2023	06/28/2024
145-420'	Receiver to floor cable	Utiflex	UFB311A-2-0591-70070	145-420	02/18/2023	02/18/2024
145-408'	10m Chamber - 3m Track B In-floor Cable	Huber + Suhner	sucoflex 106-11000mm	001	07/19/2023	07/19/2024
HS002'	DC-18GHz cable 1.5M long	Huber & Suhner	SucoFlex 106A	HS002	07/19/2023	07/19/2024
145-422'	10Amp Pre-amp to under floor	Utiflex	UFB311A-0-2756-70070	145-422	02/18/2023	02/18/2024
ETS002'	1-18GHz DRG Horn Antenna	ETS Lindgren	3117	00143260	10/16/2023	10/16/2024

**Software Utilized:**

Name	Manufacturer	Version
None	--	--

**7.3 Results:**

The sample tested was found to Comply.

Limits – FCC Part §15.247 (d) 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, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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))

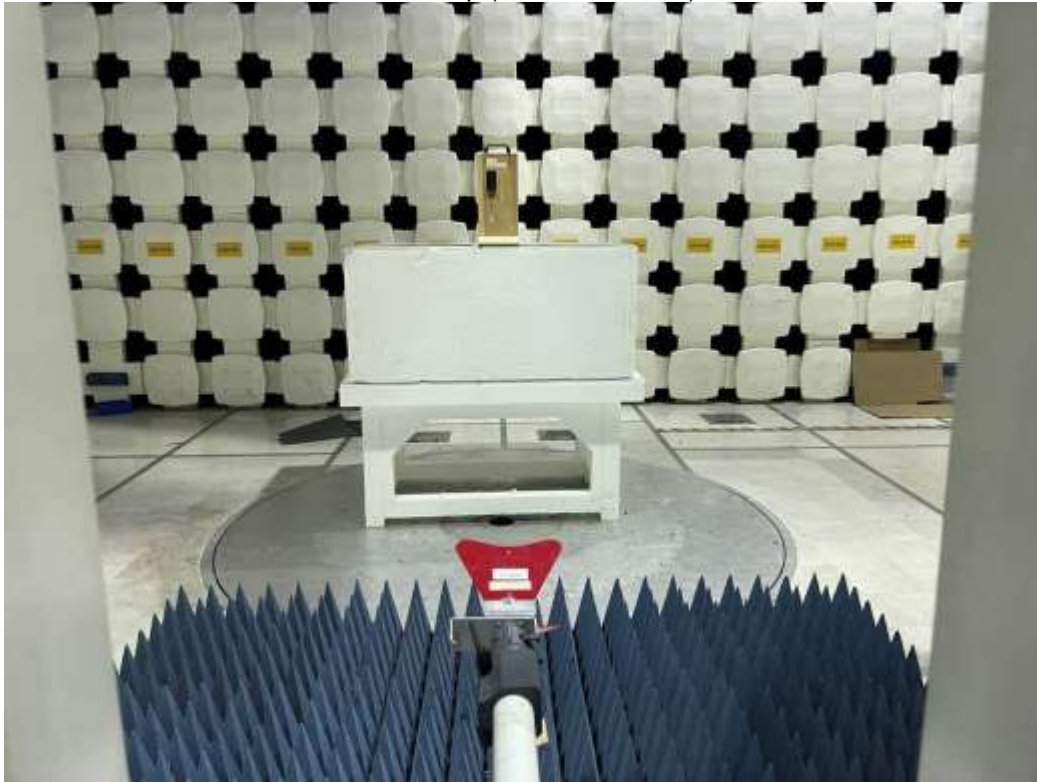
7.4 Setup Photographs:

Test Setup (Plastic Enclosure)





Test Setup (Metal Enclosure)



7.5 Plots/Data:

BLE (Plastic Enclosure), Lower Edge, Restricted Band Limit [Worst-case Polarity: H], 3m



06:05:24 PM 12/15/2023

BLE (Plastic Enclosure), Lower Edge, 20 dBc [Worst-case Polarity: H], 3m



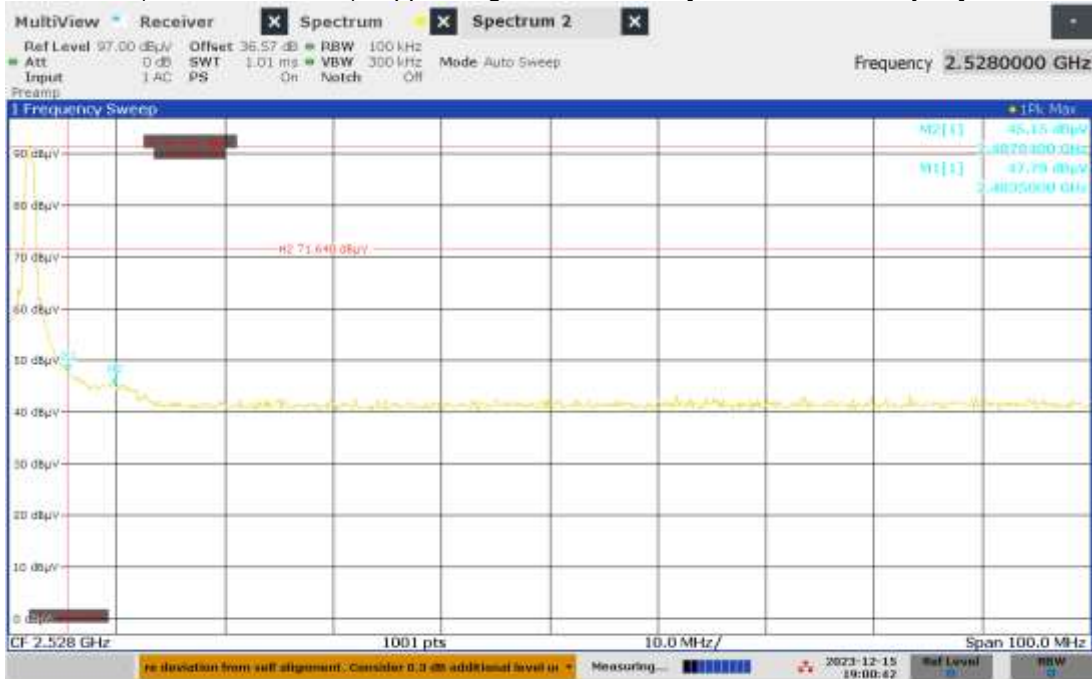
06:02:05 PM 12/15/2023

BLE (Plastic Enclosure), Upper Edge, Restricted Band Limit [Worst-case Polarity: H], 3m



06:56:27 PM 12/15/2023

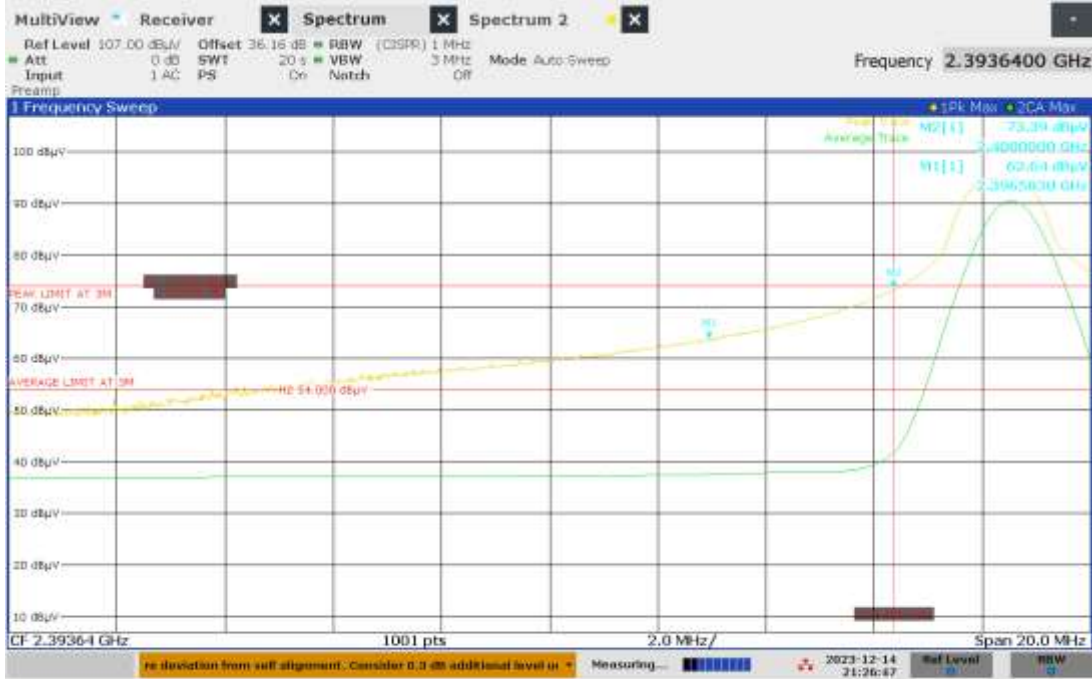
BLE (Plastic Enclosure), Upper Edge, 20 dBc Limit [Worst-case Polarity: H], 3m



07:00:43 PM 12/15/2023



BLE (Metal Enclosure), Lower Edge, Restricted Band Limit [Worst-case Polarity: H], 3m



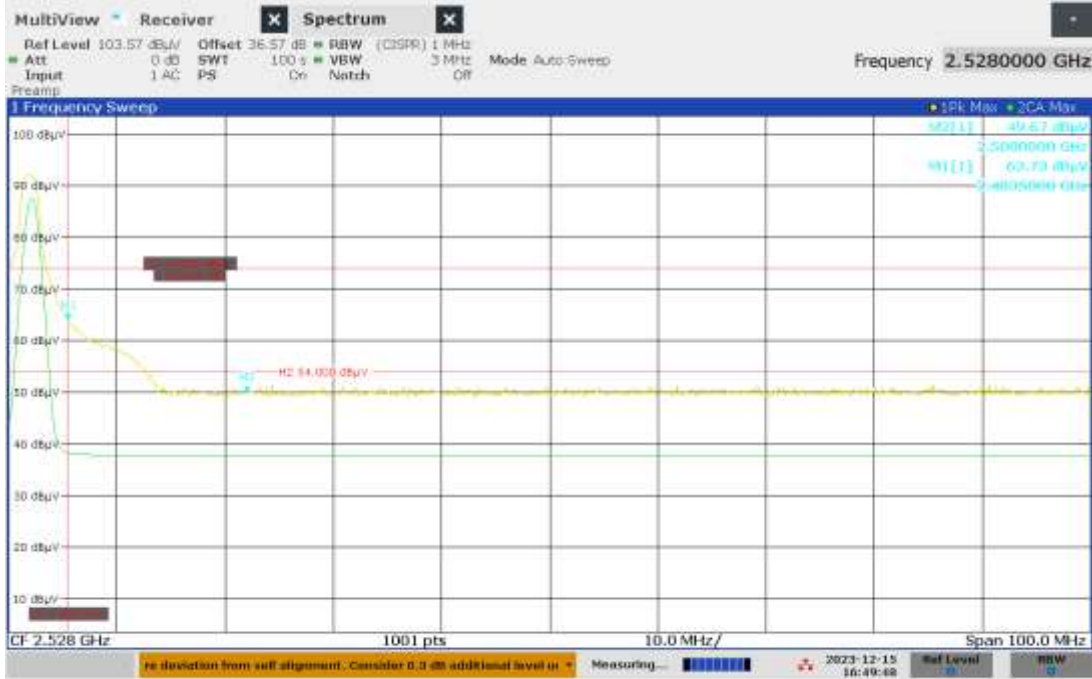
09:26:47 PM 12/14/2023

BLE (Metal Enclosure), Lower Edge, 20 dBc Limit [Worst-case Polarity: H], 3m



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BLE (Metal Enclosure), Upper Edge, Restricted Band Limit [Worst-case Polarity: H], 3m



04:49:49 PM 12/15/2023

BLE (Metal Enclosure), Upper Edge, 20 dBc Limit [Worst-case Polarity: H], 3m



04:53:19 PM 12/15/2023

# Intertek

Report Number: 105626878BOX-001c

Issued: 02/28/2024

Product Standard: CFR47 FCC Part 15.247, RSS-247				Limit applied: See Report Section 7.3 Pretest Verification w/BB source: Yes			
Test Date	Test Personnel/ Initials	Supervising Engineer/ Initials	Input Voltage	Mode	Atmospheric Data		
					Temp C°	Relative Humidity %	Atmospheric Pressure mbar
12/14/2023	Kouma Sinn <i>KPS</i>	N/A	Battery Powered	Continuous Transmitting	24	15	1026
12/15/2023	Kouma Sinn <i>KPS</i>	N/A	Battery Powered	Continuous Transmitting	27	18	1011

## 8 Transmitter Spurious Emissions

### 8.1 Method

Tests are performed in accordance with ANSI C63.10, RSS-Gen, and KDB 558074.

**TEST SITE:** 10m ALSE

**The 10m ALSE** is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

#### Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucisp
Radiated Emissions, 10m	30-1000 MHz	5.0 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.6 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.9 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.1 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	4.7 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.7 dB	5.5 dB

As shown in the table above our radiated emissions  $U_{lab}$  is less than the corresponding  $U_{CISPR}$  reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

**Sample Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where

- FS = Field Strength in dB $\mu$ V/m
- RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

RA = 52.0 dB $\mu$ V  
 AF = 7.4 dB/m  
 CF = 1.6 dB  
 AG = 29.0 dB  
 FS = 32 dB $\mu$ V/m

To convert from dB $\mu$ V to  $\mu$ V or mV the following was used:

$UF = 10^{(NF / 20)}$  where UF = Net Reading in  $\mu$ V  
 NF = Net Reading in dB $\mu$ V

**Example:**

$FS = RA + AF + CF - AG = 52.0 + 7.4 + 1.6 - 29.0 = 32.0$   
 $UF = 10^{(32 \text{ dB}\mu\text{V} / 20)} = 39.8 \mu\text{V/m}$

Alternately, when BAT-EMC Emission Software is used, the "Level" includes all losses and gains and is compared directly in the "Margin" column to the "Limit". The "Correction" includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the "Level" column.

**8.2 Test Equipment Used:**

Test equipment used from 30-1000 MHz

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV006'	Weather Station	Davis	6250	MS191218071	02/21/2023	02/21/2024
ROS011'	ESW44 receiver 1Hz-44GHz	Rhode and Schwarz	ESW44	103296	06/28/2023	06/28/2024
145145'	Broadband Hybrid Antenna 30 MHz - 3 GHz	Sunol Sciences Corp.	JB3	A122313	06/23/2023	06/23/2024
PRE10'	30-1000MHz pre-amp	ITS	PRE10	PRE10	02/17/2023	02/17/2024
145-420'	Receiver to floor cable	Utiflex	UFB311A-2-0591-70070	145-420	02/18/2023	02/18/2024
145-424'	9kHz to 40GHz Cable	Huber and Suhner	Sucoflex	145-424	02/18/2023	02/18/2024
HS001'	DC-18GHz cable 1.5m long	Huber & Suhner	SucoFlex 106A	HS001	01/25/2023	01/25/2024
HS003'	10m under floor cable	Huber-Schuner	10m-1	HS003	02/18/2023	02/18/2024

**Software Utilized:**

Name	Manufacturer	Version
BAT-EMC	Nexio	2022.0.27.0

Test equipment used from 1-18 GHz

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV006'	Weather Station	Davis	6250	MS191218071	02/21/2023	02/21/2024
ROS011'	ESW44 receiver 1Hz-44GHz	Rhode and Schwarz	ESW44	103296	06/28/2023	06/28/2024
145-420'	Receiver to floor cable	Utiflex	UFB311A-2-0591-70070	145-420	02/18/2023	02/18/2024
145-408'	10m Chamber - 3m Track B In-floor Cable	Huber + Suhner	sucoflex 106-11000mm	001	07/19/2023	07/19/2024
HS002'	DC-18GHz cable 1.5M long	Huber & Suhner	SucoFlex 106A	HS002	07/19/2023	07/19/2024
145-422'	10Amp Pre-amp to under floor	Utiflex	UFB311A-0-2756-70070	145-422	02/18/2023	02/18/2024
REA008'	band reject filter 2.4GHz	Reactel, Inc	12RX7-2441.75-x140 S	17-01	10/31/2023	10/31/2024
REA004'	3GHz High Pass Filter	Reactel, Inc	7HSX-3G/18G-S11	06-1	02/14/2023	02/14/2024
ETS002'	1-18GHz DRG Horn Antenna	ETS Lindgren	3117	00143260	10/16/2023	10/16/2024
PRE12	Pre-amplifier	Com Power	PAM-118A	18040117	12/17/2022	12/17/2023

**Software Utilized:**

Name	Manufacturer	Version
BAT-EMC	Nexio	2022.0.27.0

Test equipment used from 18-25 GHz

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV006'	Weather Station	Davis	6250	MS191218071	02/21/2023	02/21/2024
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	11/22/2023	11/22/2024
CBLHF2012-2M-2'	2m 9kHz-40GHz Coaxial Cable - SET2	Huber & Suhner	SF102	252675002	02/18/2023	02/18/2024
CBLHF2012-5M-2'	5m 9kHz-40GHz Coaxial Cable - SET2	Huber & Suhner	SF102	252676002	02/25/2023	02/25/2024
REA006'	18GHz High Pass Filter	Reactel, Inc	7HS-18G/40G K11	(06)1	04/25/2023	04/25/2024
EMC04'	ANTENNA, RIDGED GUIDE, 18-40 GHZ	EMCO	3116	2090	01/26/2023	01/26/2024
EMC018'	18-40GHz Pre-amp 40dB gain	The EMC Shop	PA40G	27490-01	07/18/2023	07/18/2024

**Software Utilized:**

Name	Manufacturer	Version
None	--	--

**8.3 Results:**

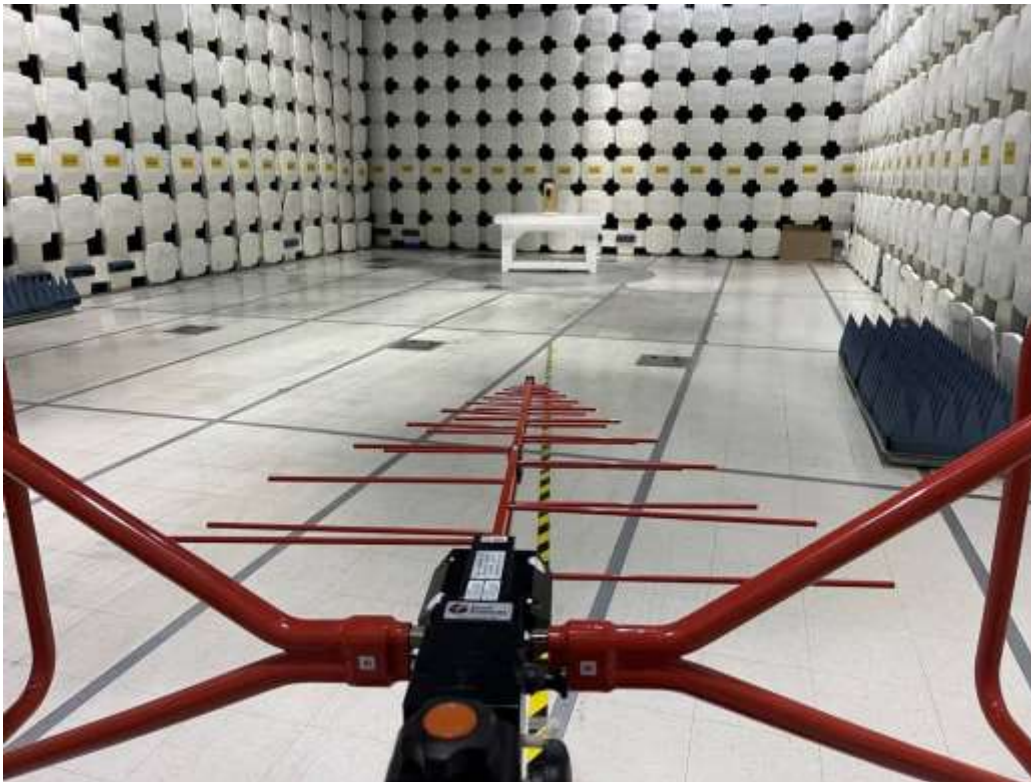
The sample tested was found to Comply.

Limits – FCC Part §15.247 (d) 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, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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))



8.4 Setup Photographs:

Test Setup (Plastic Enclosure), RE 30-1000 MHz





Test Setup (Plastic Enclosure), RE 1-18 GHz

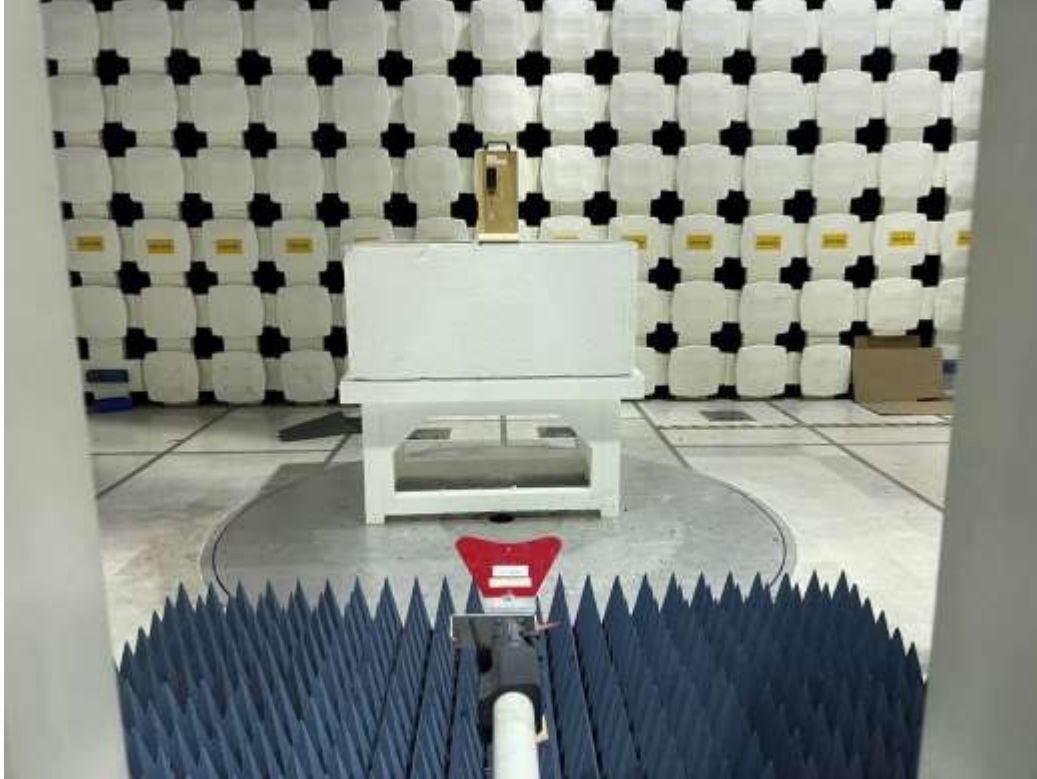


Test Setup (Metal Enclosure), RE 30-1000 MHz





Test Setup (Metal Enclosure), RE 1-18 GHz



Notes: 18-25 GHz test setup photo is not available.

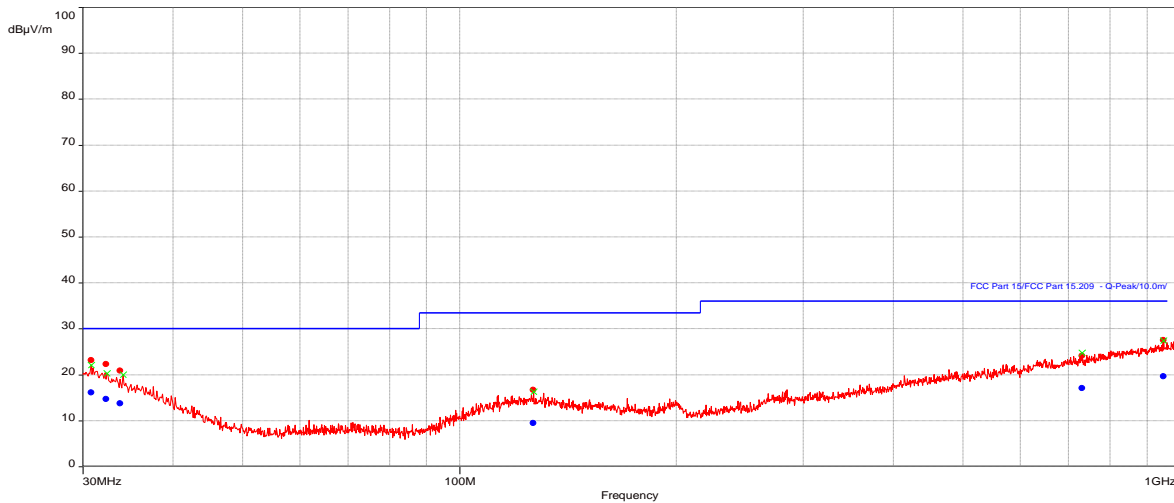
**8.5 Plots/Data:**

BLE (Plastic Enclosure) Tx Low Channel, RE 30-1000 MHz

**Test Information:**

Date and Time	12/11/2023 8:38:01 AM
Client and Project Number	Assa Abloy/Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	37 %
Atmospheric Pressure	990 mbar
Comments	Scan 1_BLE (Plastic Enclosure) Tx Low, RE 30-1000MHz

**Graph:**



**Results:**

Peak (PASS) (6)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
30.782	23.18	--	--	349.80	3.37	Horizontal	120000.00	120k	-12.82
32.31	22.34	--	--	162.60	2.89	Vertical	120000.00	120k	-13.97
33.806	20.97	--	--	141.60	2.96	Horizontal	120000.00	120k	-15.01
126.592	16.75	--	--	162.80	2.51	Vertical	120000.00	120k	-18.29
730.848	24.19	--	--	246.10	4.00	Horizontal	120000.00	120k	-8.48
948.342	27.57	--	--	79.40	2.51	Horizontal	120000.00	120k	-4.68

QuasiPeak (PASS) (6)

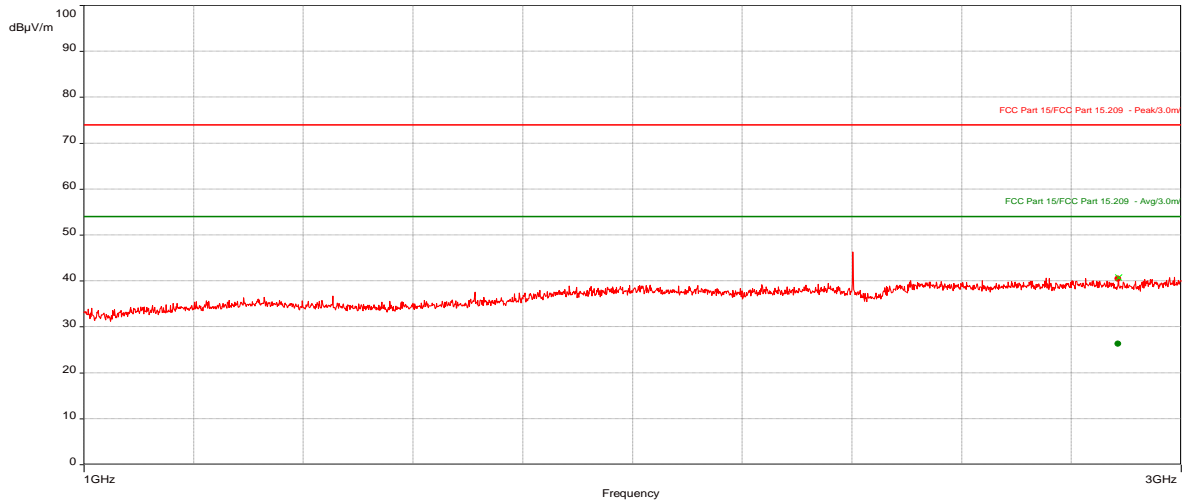
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
30.782	16.12	30.00	-13.88	349.80	3.37	Horizontal	120000.00	120k	-12.82
32.31	14.77	30.00	-15.23	162.60	2.89	Vertical	120000.00	120k	-13.97
33.806	13.75	30.00	-16.25	141.60	2.96	Horizontal	120000.00	120k	-15.01
126.592	9.52	33.50	-23.98	162.80	2.51	Vertical	120000.00	120k	-18.29
730.848	17.13	36.00	-18.87	246.10	4.00	Horizontal	120000.00	120k	-8.48
948.342	19.72	36.00	-16.28	79.40	2.51	Horizontal	120000.00	120k	-4.68

## BLE (Plastic Enclosure) Tx Low Channel, RE 1-3 GHz

**Test Information:**

Date and Time	12/13/2023 2:14:48 PM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	20 %
Atmospheric Pressure	1018 mbar
Comments	Scan 27_BLE (Plastic Enclosure) Tx Low RE 1-3 GHz

**Graph:**



**Results:**

Peak (PASS) (1)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
2884.5	40.54	74.00	-33.46	269.00	1.98	Horizontal	1000000.00	1M	-5.26

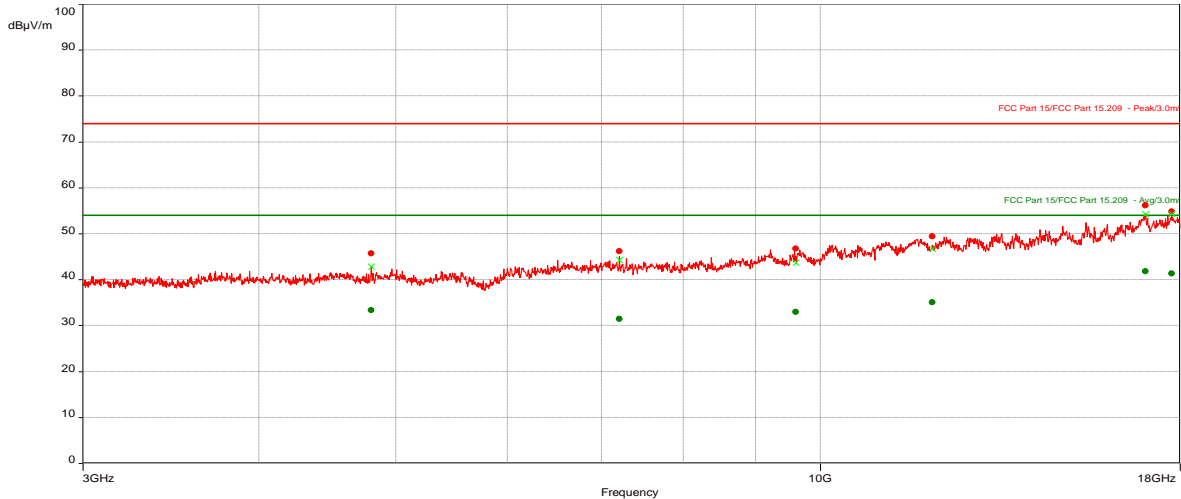
Average (PASS) (1)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
2884.5	26.38	54.00	-27.62	269.00	1.98	Horizontal	1000000.00	1M	-5.26

## BLE (Plastic Enclosure) Tx Low Channel, RE 3-18 GHz

**Test Information:**

Date and Time	12/14/2023 9:55:41 AM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	24 C
Humidity	15 %
Atmospheric Pressure	1026 mbar
Comments	Scan 34_BLE (Plastic Enclosure) Tx Low RE 3-18 GHz

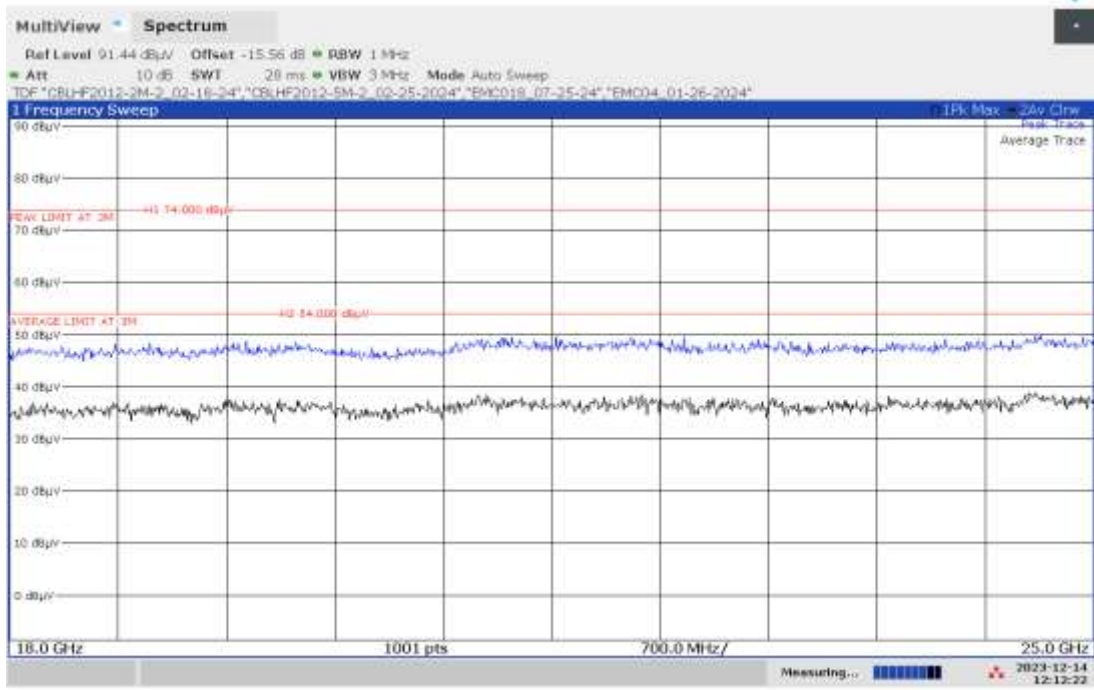
**Graph:**

**Results:**
**Peak (PASS) (6)**

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
4803.85	45.78	74.00	-28.22	360.00	4.00	Horizontal	1000000.00	1M	-2.36
7205.25	46.20	74.00	-27.80	265.30	4.00	Horizontal	1000000.00	1M	1.36
9611.55	46.81	74.00	-27.19	360.00	1.00	Vertical	1000000.00	1M	3.31
12011.5	49.44	74.00	-24.56	360.00	4.00	Horizontal	1000000.00	1M	7.19
17016.45	56.15	74.00	-17.85	0.00	1.00	Vertical	1000000.00	1M	15.81
17755.6	54.89	74.00	-19.11	265.30	1.00	Vertical	1000000.00	1M	16.15

**Average (PASS) (6)**

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
4803.85	33.38	54.00	-20.62	360.00	4.00	Horizontal	1000000.00	1M	-2.36
7205.25	31.46	54.00	-22.54	265.30	4.00	Horizontal	1000000.00	1M	1.36
9611.55	33.03	54.00	-20.97	360.00	1.00	Vertical	1000000.00	1M	3.31
12011.5	35.04	54.00	-18.96	360.00	4.00	Horizontal	1000000.00	1M	7.19
17016.45	41.83	54.00	-12.17	0.00	1.00	Vertical	1000000.00	1M	15.81
17755.6	41.40	54.00	-12.60	265.30	1.00	Vertical	1000000.00	1M	16.15

BLE (Plastic Enclosure) Tx Low Channel, RE 18-25 GHz



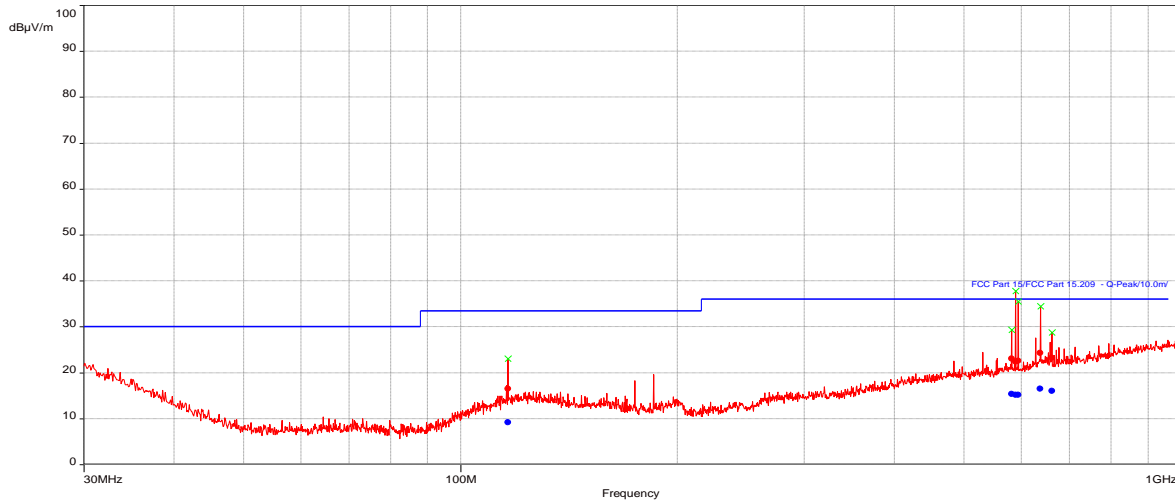
12:12:22 PM 12/14/2023

Notes: No emission was detected at a distance of 0.5 meter. Noise floor signal was recorded as shown in plot above. The distance factor was compensated as dB offset.

## BLE (Plastic Enclosure) Tx Mid Channel, RE 30-1000 MHz

**Test Information:**

Date and Time	12/11/2023 9:35:52 AM
Client and Project Number	Assa Abloy/Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	37 %
Atmospheric Pressure	990 mbar
Comments	Scan 2_BLE (Plastic Enclosure) Tx Mid, RE 30-1000MHz

**Graph:**

**Results:**

## Peak (PASS) (6)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
116.444	16.58	--	--	58.30	1.15	Horizontal	120000.00	120k	-18.67
582.202	23.10	--	--	120.70	2.02	Vertical	120000.00	120k	-11.37
589.468	22.41	--	--	350.90	3.32	Vertical	120000.00	120k	-11.54
594.022	22.61	--	--	142.00	1.00	Vertical	120000.00	120k	-11.62
637.69	24.31	--	--	266.60	2.01	Vertical	120000.00	120k	-9.79
661.768	23.27	--	--	328.70	1.16	Vertical	120000.00	120k	-9.91

## QuasiPeak (PASS) (6)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
116.444	9.24	33.50	-24.26	58.30	1.15	Horizontal	120000.00	120k	-18.67
582.202	15.36	36.00	-20.64	120.70	2.02	Vertical	120000.00	120k	-11.37
589.468	15.20	36.00	-20.80	350.90	3.32	Vertical	120000.00	120k	-11.54
594.022	15.21	36.00	-20.79	142.00	1.00	Vertical	120000.00	120k	-11.62
637.69	16.52	36.00	-19.48	266.60	2.01	Vertical	120000.00	120k	-9.79
661.768	16.08	36.00	-19.92	328.70	1.16	Vertical	120000.00	120k	-9.91

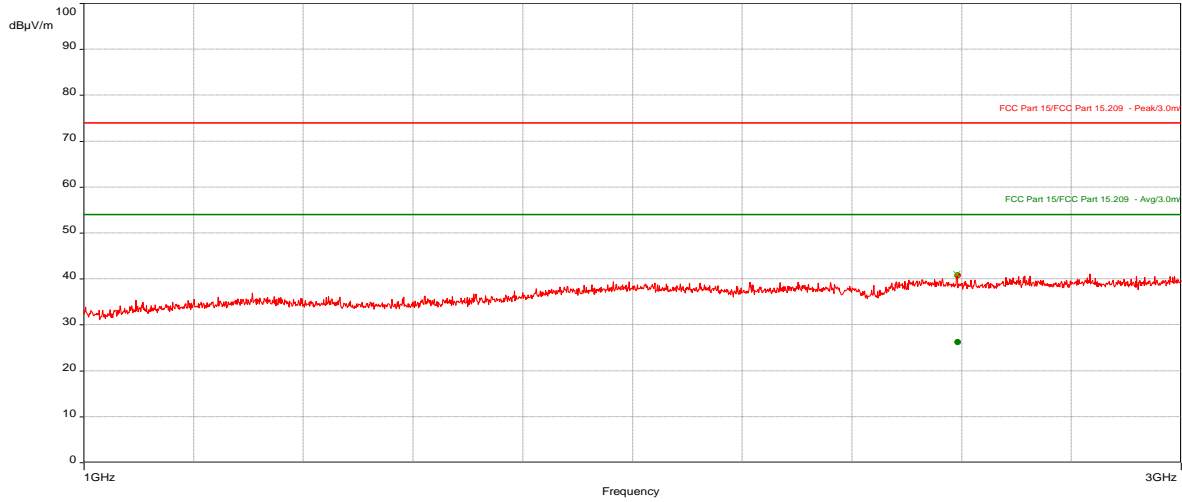


## BLE (Plastic Enclosure) Tx Mid Channel, RE 1-3 GHz

**Test Information:**

Date and Time	12/13/2023 2:02:21 PM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	20 %
Atmospheric Pressure	1018 mbar
Comments	Scan 26_BLE (Plastic Enclosure) Tx Mid RE 1-3 GHz

**Graph:**



**Results:**

Peak (PASS) (1)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
2592.55	40.76	74.00	-33.24	152.10	2.51	Vertical	1000000.00	1M	-5.38

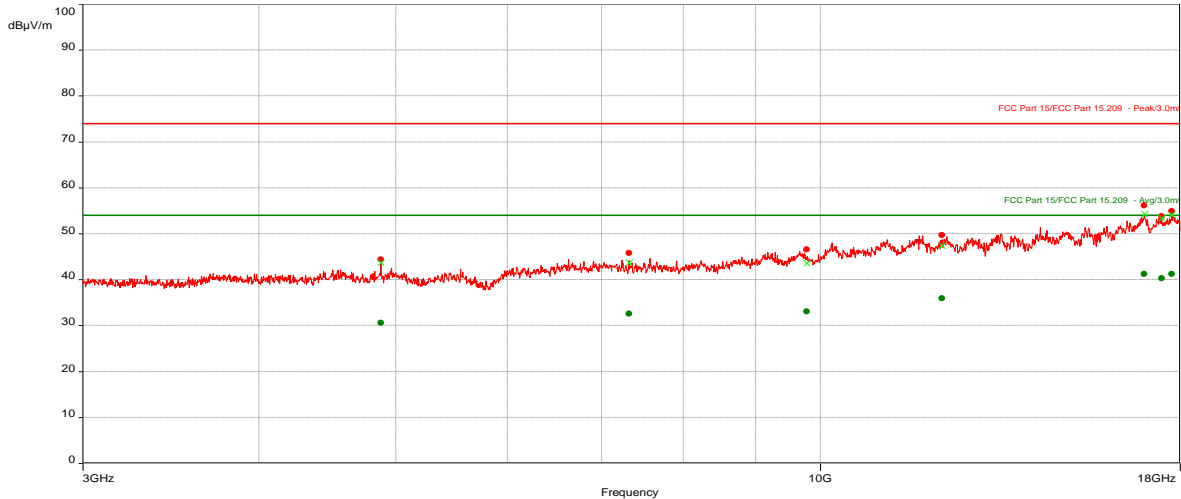
Average (PASS) (1)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
2592.55	26.22	54.00	-27.78	152.10	2.51	Vertical	1000000.00	1M	-5.38

## BLE (Plastic Enclosure) Tx Mid Channel, RE 3-18 GHz

**Test Information:**

Date and Time	12/14/2023 10:41:33 AM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	24 C
Humidity	15 %
Atmospheric Pressure	1026 mbar
Comments	Scan 35_BLE (Plastic Enclosure) Tx Mid RE 3-18 GHz

**Graph:**

**Results:**

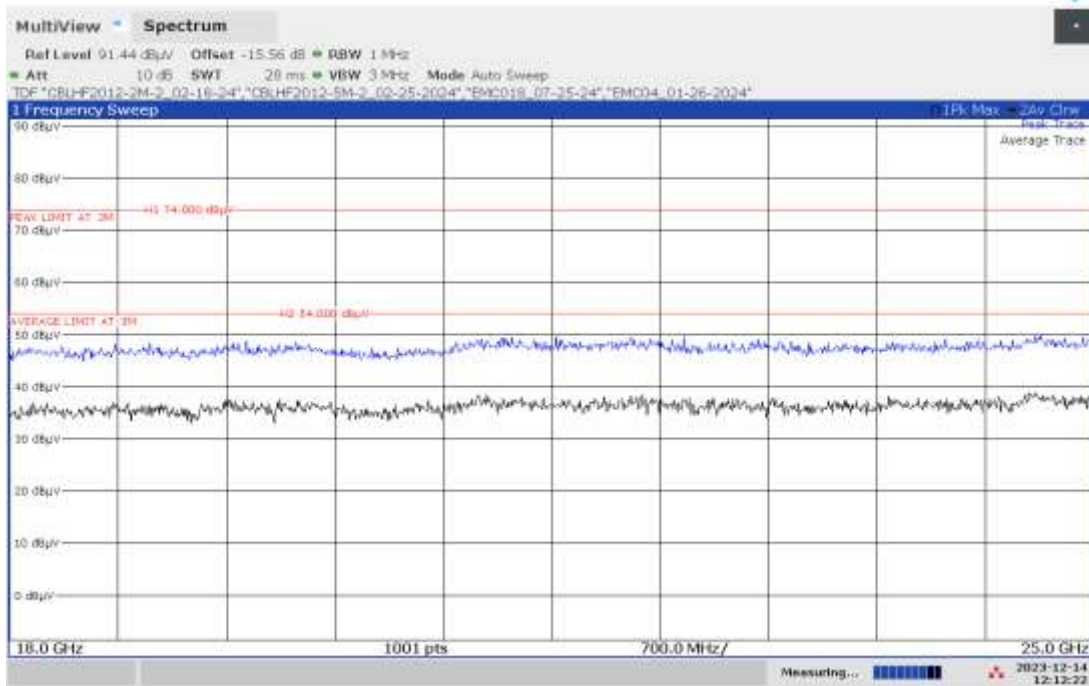
## Peak (PASS) (7)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
4879.7	44.44	74.00	-29.56	0.00	4.00	Horizontal	1000000.00	1M	-2.29
7319.65	45.78	74.00	-28.22	0.00	1.00	Horizontal	1000000.00	1M	1.37
9782.65	46.54	74.00	-27.46	265.40	4.00	Vertical	1000000.00	1M	3.50
12201.3	49.68	74.00	-24.32	265.30	1.00	Vertical	1000000.00	1M	7.70
16978.75	56.14	74.00	-17.86	0.00	1.00	Vertical	1000000.00	1M	15.75
17472.85	53.83	74.00	-20.17	0.00	1.00	Vertical	1000000.00	1M	15.35
17754.4	54.93	74.00	-19.07	360.00	4.00	Vertical	1000000.00	1M	16.15

## Average (PASS) (7)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
4879.7	30.60	54.00	-23.40	0.00	4.00	Horizontal	1000000.00	1M	-2.29
7319.65	32.65	54.00	-21.35	0.00	1.00	Horizontal	1000000.00	1M	1.37
9782.65	33.04	54.00	-20.96	265.40	4.00	Vertical	1000000.00	1M	3.50
12201.3	35.91	54.00	-18.09	265.30	1.00	Vertical	1000000.00	1M	7.70
16978.75	41.26	54.00	-12.74	0.00	1.00	Vertical	1000000.00	1M	15.75
17472.85	40.31	54.00	-13.69	0.00	1.00	Vertical	1000000.00	1M	15.35
17754.4	41.31	54.00	-12.69	360.00	4.00	Vertical	1000000.00	1M	16.15

BLE (Plastic Enclosure) Tx Mid Channel, RE 18-25 GHz

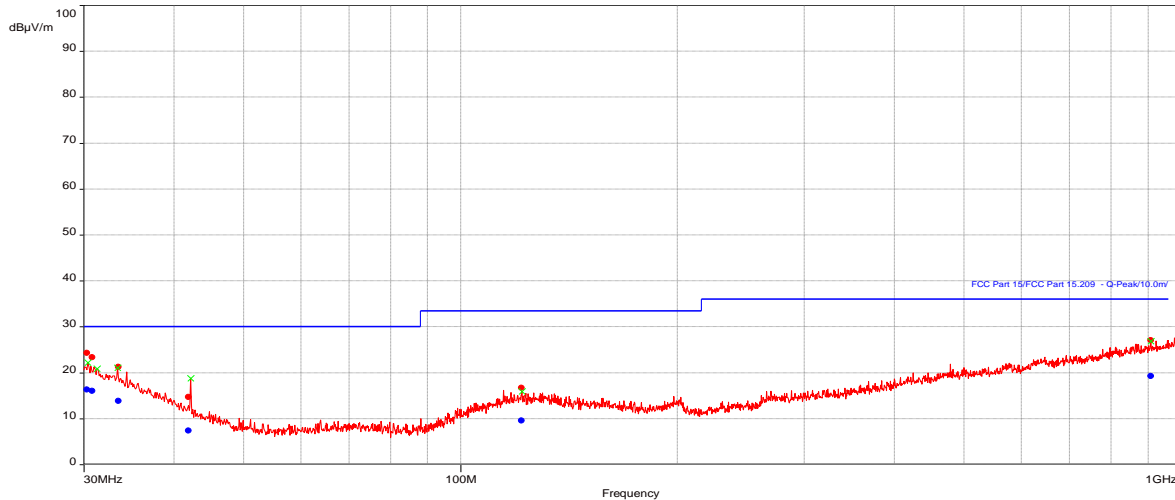


Notes: No emission was detected at a distance of 0.5 meter. Noise floor signal was recorded as shown in plot above. The distance factor was compensated as dB offset.

## BLE (Plastic Enclosure) Tx High Channel, RE 30-1000 MHz

**Test Information:**

Date and Time	12/11/2023 10:33:23 AM
Client and Project Number	Assa Abloy/Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	37 %
Atmospheric Pressure	990 mbar
Comments	Scan 3_BLE (Plastic Enclosure) Tx High, RE 30-1000MHz

**Graph:**

**Results:**
**Peak (PASS) (6)**

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
30.316	24.37	30.00	-5.63	37.50	1.00	Vertical	120000.00	120k	-12.63
30.826	23.42	30.00	-6.58	16.80	1.00	Horizontal	120000.00	120k	-12.83
33.508	21.29	30.00	-8.71	224.60	2.52	Horizontal	120000.00	120k	-14.77
41.918	14.76	30.00	-15.24	349.70	2.51	Horizontal	120000.00	120k	-21.00
121.454	16.69	33.50	-16.81	245.30	1.15	Horizontal	120000.00	120k	-18.38
907.778	27.15	36.00	-8.85	224.30	3.37	Vertical	120000.00	120k	-5.32

**QuasiPeak (PASS) (6)**

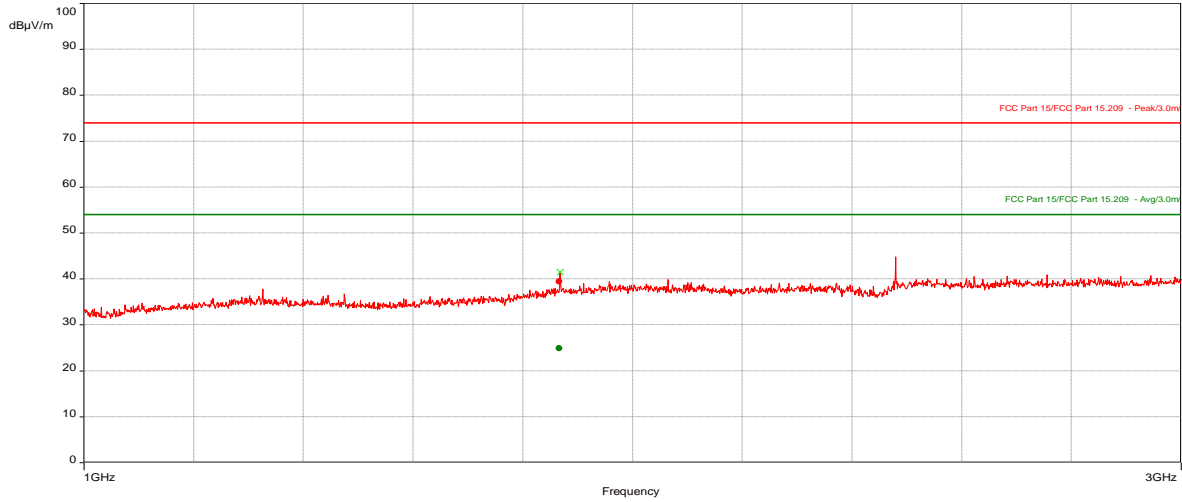
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
30.316	16.33	30.00	-13.67	37.50	1.00	Vertical	120000.00	120k	-12.63
30.826	16.05	30.00	-13.95	16.80	1.00	Horizontal	120000.00	120k	-12.83
33.508	13.91	30.00	-16.09	224.60	2.52	Horizontal	120000.00	120k	-14.77
41.918	7.38	30.00	-22.62	349.70	2.51	Horizontal	120000.00	120k	-21.00
121.454	9.64	33.50	-23.86	245.30	1.15	Horizontal	120000.00	120k	-18.38
907.778	19.31	36.00	-16.69	224.30	3.37	Vertical	120000.00	120k	-5.32

## BLE (Plastic Enclosure) Tx High Channel, RE 1-3 GHz

**Test Information:**

Date and Time	12/13/2023 1:51:15 PM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	20 %
Atmospheric Pressure	1018 mbar
Comments	Scan 25_BLE (Plastic Enclosure) Tx High RE 1-3 GHz

**Graph:**



**Results:**

Peak (PASS) (1)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
1866.35	39.45	74.00	-34.55	347.10	2.51	Horizontal	1000000.00	1M	-6.66

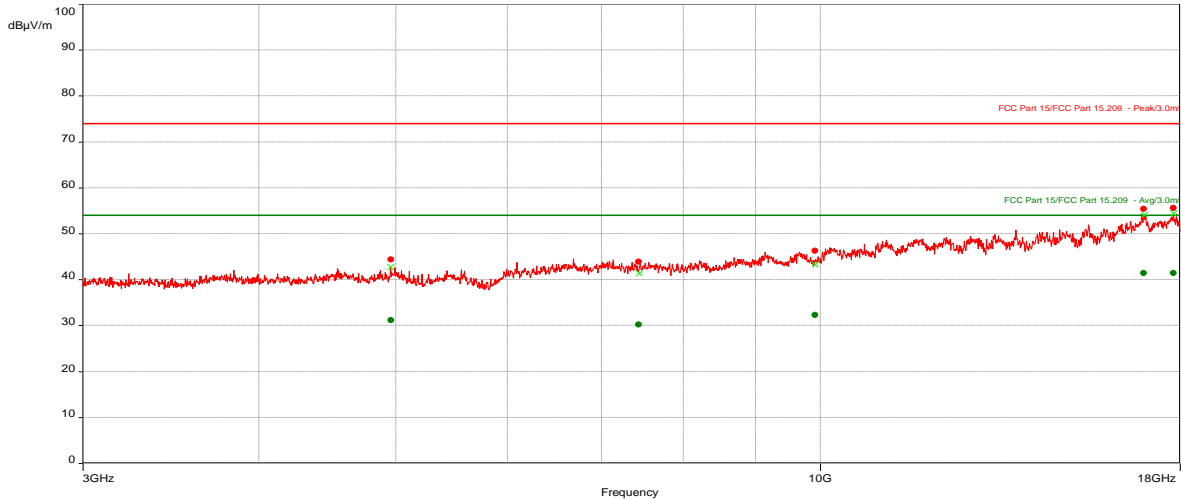
Average (PASS) (1)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
1866.35	24.90	54.00	-29.10	347.10	2.51	Horizontal	1000000.00	1M	-6.66

## BLE (Plastic Enclosure) Tx High Chanel, RE 3-18 GHz

**Test Information:**

Date and Time	12/14/2023 11:32:30 AM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	24 C
Humidity	15 %
Atmospheric Pressure	1026 mbar
Comments	Scan 36_BLE (Plastic Enclosure) Tx High RE 3-18 GHz

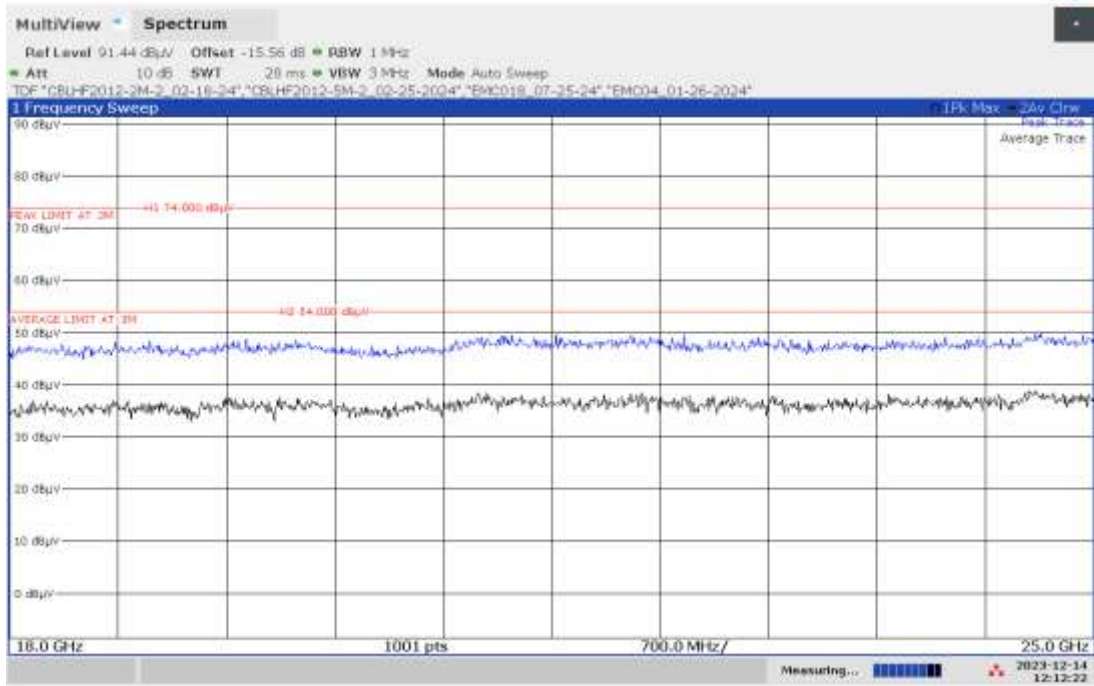
**Graph:**

**Results:**
**Peak (PASS) (5)**

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
4960.5	44.44	74.00	-29.56	360.00	4.00	Horizontal	1000000.00	1M	-2.16
7436.8	43.94	74.00	-30.06	360.00	1.00	Vertical	1000000.00	1M	1.44
9919.4	46.29	74.00	-27.71	360.00	4.00	Vertical	1000000.00	1M	3.96
16968.55	55.43	74.00	-18.57	0.00	1.00	Horizontal	1000000.00	1M	15.71
17807.2	55.59	74.00	-18.41	0.00	1.00	Vertical	1000000.00	1M	16.20

**Average (PASS) (5)**

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
4960.5	31.23	54.00	-22.77	360.00	4.00	Horizontal	1000000.00	1M	-2.16
7436.8	30.27	54.00	-23.73	360.00	1.00	Vertical	1000000.00	1M	1.44
9919.4	32.33	54.00	-21.67	360.00	4.00	Vertical	1000000.00	1M	3.96
16968.55	41.47	54.00	-12.53	0.00	1.00	Horizontal	1000000.00	1M	15.71
17807.2	41.47	54.00	-12.53	0.00	1.00	Vertical	1000000.00	1M	16.20

BLE (Plastic Enclosure) Tx High Chanel, RE 18-25 GHz



12:12:22 PM 12/14/2023

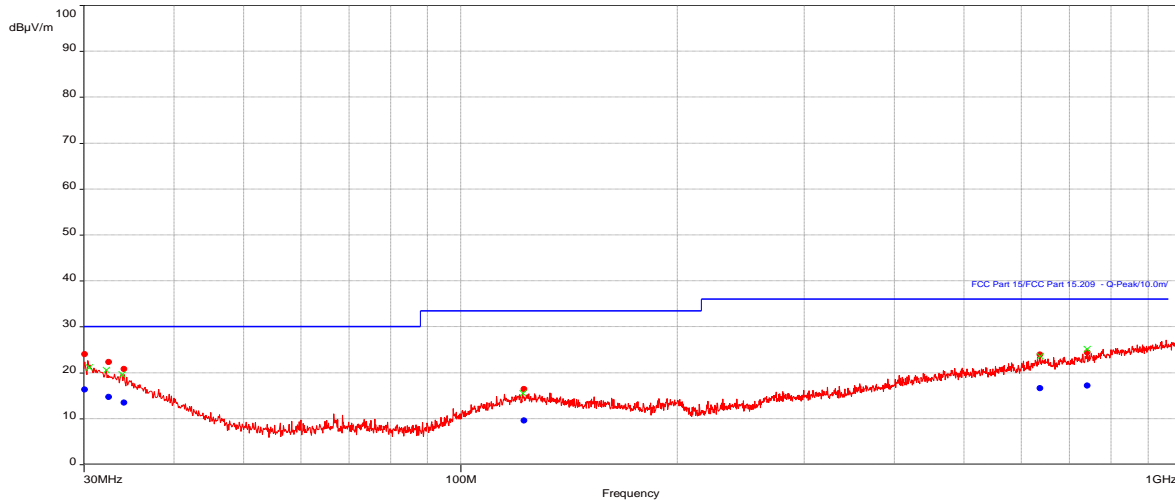
Notes: No emission was detected at a distance of 0.5 meter. Noise signal floor was recorded as shown in plot above. The distance factor was compensated as dB offset.



## BLE (Metal Enclosure) Tx Low Channel, RE 30-1000MHz

**Test Information:**

Date and Time	12/12/2023 10:39:17 AM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	23 %
Atmospheric Pressure	1015 mbar
Comments	Scan 10_BLE (Metal Enclosure) Tx Low RE 30-1000MHz

**Graph:**

**Results:**

## Peak (PASS) (6)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
30.102	24.07	30.00	-5.93	204.00	3.32	Horizontal	120000.00	120k	-12.55
32.452	22.31	30.00	-7.69	58.20	1.00	Vertical	120000.00	120k	-14.05
34.086	20.84	30.00	-9.16	266.90	3.38	Horizontal	120000.00	120k	-15.22
122.45	16.49	33.50	-17.01	78.80	2.51	Vertical	120000.00	120k	-18.37
637.1	23.99	36.00	-12.01	267.00	3.32	Vertical	120000.00	120k	-9.79
740.914	24.48	36.00	-11.52	58.60	3.33	Vertical	120000.00	120k	-8.34

## QuasiPeak (PASS) (6)

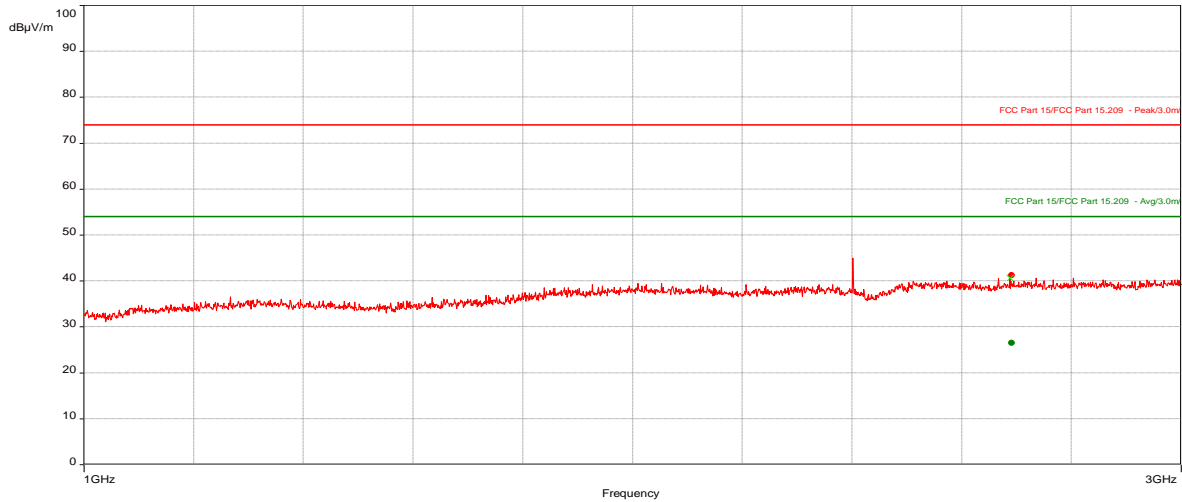
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
30.102	16.33	30.00	-13.67	204.00	3.32	Horizontal	120000.00	120k	-12.55
32.452	14.76	30.00	-15.24	58.20	1.00	Vertical	120000.00	120k	-14.05
34.086	13.54	30.00	-16.46	266.90	3.38	Horizontal	120000.00	120k	-15.22
122.45	9.65	33.50	-23.85	78.80	2.51	Vertical	120000.00	120k	-18.37
637.1	16.62	36.00	-19.38	267.00	3.32	Vertical	120000.00	120k	-9.79
740.914	17.18	36.00	-18.82	58.60	3.33	Vertical	120000.00	120k	-8.34

## BLE (Metal Enclosure) Tx Low Channel, RE 1-3 GHz

**Test Information:**

Date and Time	12/13/2023 1:03:46 PM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	20 %
Atmospheric Pressure	1018 mbar
Comments	Scan 22_BLE (Metal Enclosure) Tx Low RE 1-3 GHz

**Graph:**



**Results:**

Peak (PASS) (1)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
2690.6	41.29	74.00	-32.71	0.00	1.98	Vertical	1000000.00	1M	-5.27

Average (PASS) (1)

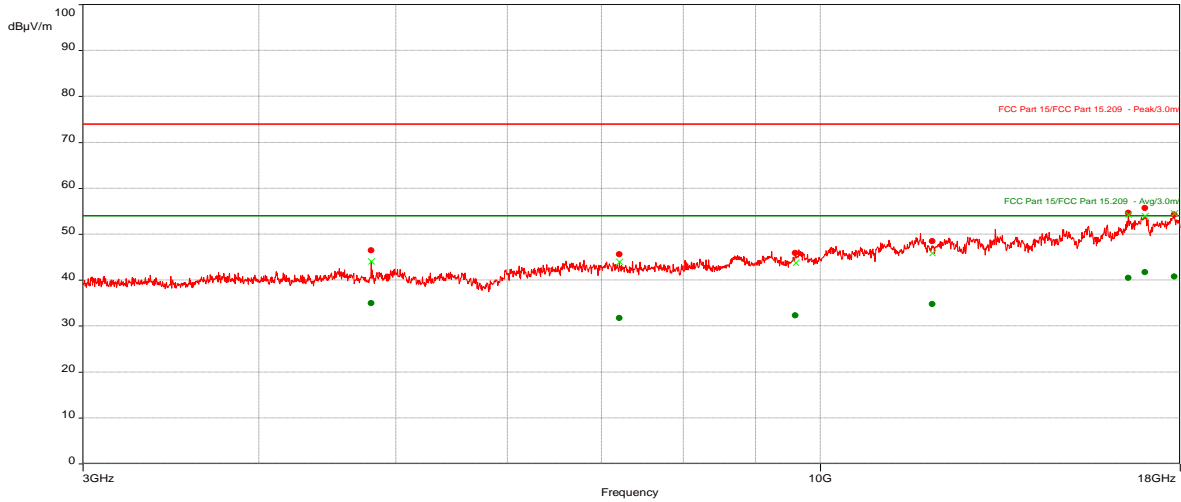
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
2690.6	26.55	54.00	-27.45	0.00	1.98	Vertical	1000000.00	1M	-5.27

## BLE (Metal Enclosure) Tx Low Channel, RE 3-18 GHz

**Test Information:**

Date and Time	12/12/2023 2:05:34 PM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	23 %
Atmospheric Pressure	1015 mbar
Comments	Scan 13_BLE (Metal Enclosure) Tx Low RE 3-18 GHz

**Graph:**



**Results:**

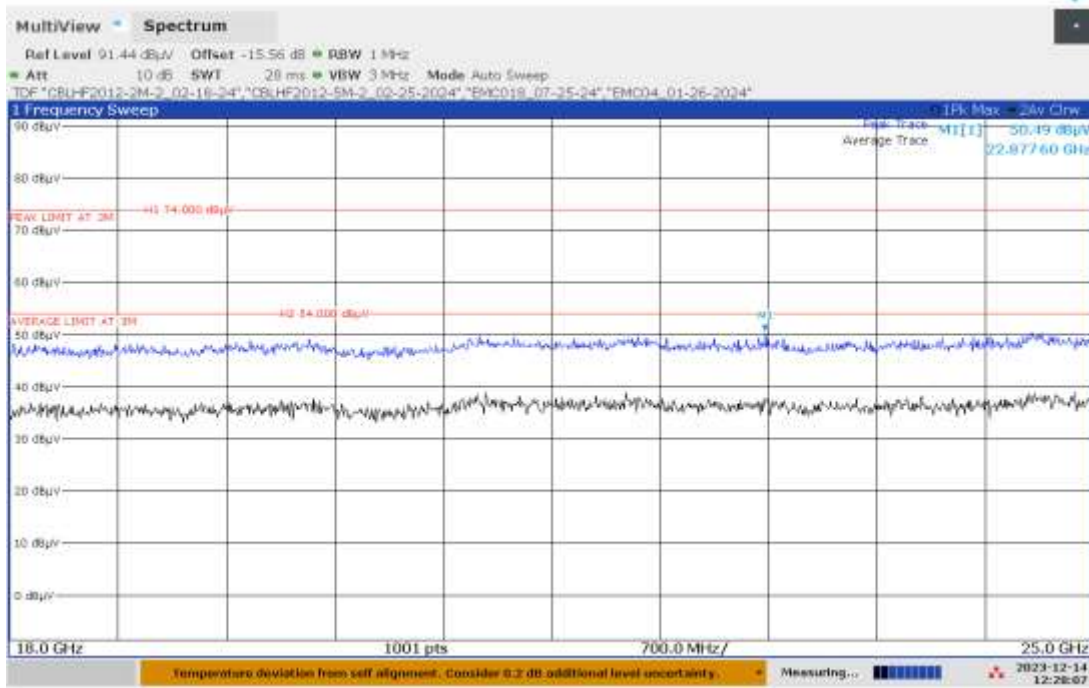
Peak (PASS) (7)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
4804	46.45	74.00	-27.55	0.00	1.00	Horizontal	1000000.00	1M	-2.36
7206.5	45.63	74.00	-28.37	265.30	4.00	Horizontal	1000000.00	1M	1.35
9606.35	45.93	74.00	-28.07	265.30	1.00	Horizontal	1000000.00	1M	3.30
12012.7	48.51	74.00	-25.49	265.50	4.00	Vertical	1000000.00	1M	7.19
16548.1	54.67	74.00	-19.33	0.00	4.00	Vertical	1000000.00	1M	13.31
17000.7	55.67	74.00	-18.33	0.00	4.00	Vertical	1000000.00	1M	15.84
17838	54.32	74.00	-19.68	0.00	1.00	Vertical	1000000.00	1M	16.16

Average (PASS) (7)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
4804	34.95	54.00	-19.05	0.00	1.00	Horizontal	1000000.00	1M	-2.36
7206.5	31.75	54.00	-22.25	265.30	4.00	Horizontal	1000000.00	1M	1.35
9606.35	32.33	54.00	-21.67	265.30	1.00	Horizontal	1000000.00	1M	3.30
12012.7	34.84	54.00	-19.16	265.50	4.00	Vertical	1000000.00	1M	7.19
16548.1	40.50	54.00	-13.50	0.00	4.00	Vertical	1000000.00	1M	13.31
17000.7	41.76	54.00	-12.24	0.00	4.00	Vertical	1000000.00	1M	15.84
17838	40.80	54.00	-13.20	0.00	1.00	Vertical	1000000.00	1M	16.16

BLE (Metal Enclosure) Tx Low RE 18-25 GHz



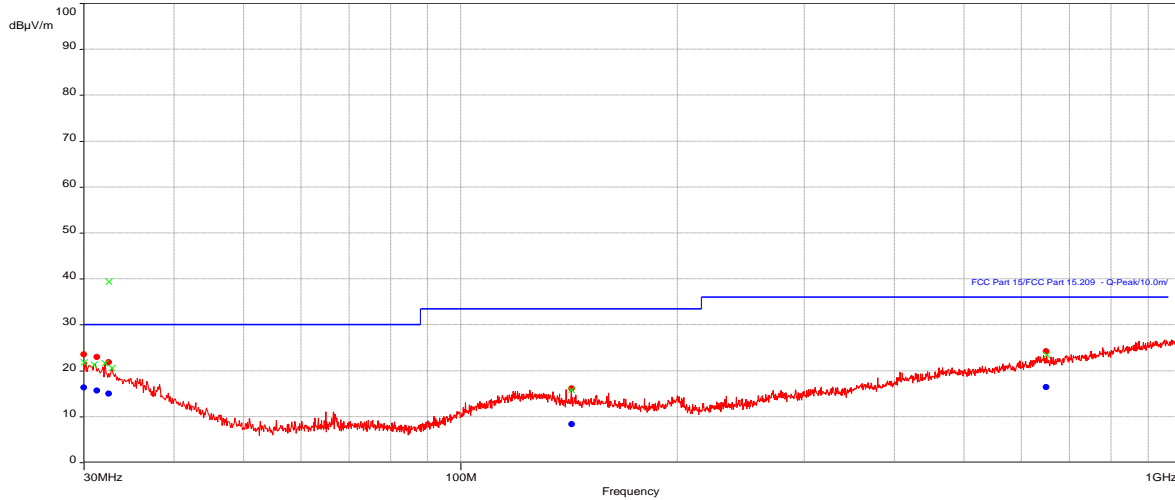
12:28:07 PM 12/14/2023

Notes: No emission was detected at a distance of 0.5 meter. Noise signal floor was recorded as shown in plot above. The distance factor was compensated as dB offset.

## BLE (Metal Enclosure) Tx Mid Channel, RE 30-1000 MHz

**Test Information:**

Date and Time	12/12/2023 11:35:50 AM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	23 %
Atmospheric Pressure	1015 mbar
Comments	Scan 11_BLE (Metal Enclosure) Tx Mid RE 30-1000MHz

**Graph:**

**Results:**
**Peak (PASS) (6)**

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
30.03	23.54	--	--	308.60	3.36	Horizontal	120000.00	120k	-12.53
31.306	23.03	--	--	37.60	3.80	Horizontal	120000.00	120k	-13.16
32.484	21.84	--	--	329.00	2.01	Vertical	120000.00	120k	-14.07
32.476	39.48	--	--	183.10	1.00	Vertical	120000.00	120k	-14.07
142.692	16.20	--	--	266.70	1.00	Vertical	120000.00	120k	-19.47
650.362	24.28	--	--	329.00	4.00	Horizontal	120000.00	120k	-9.71

**QuasiPeak (PASS) (5)**

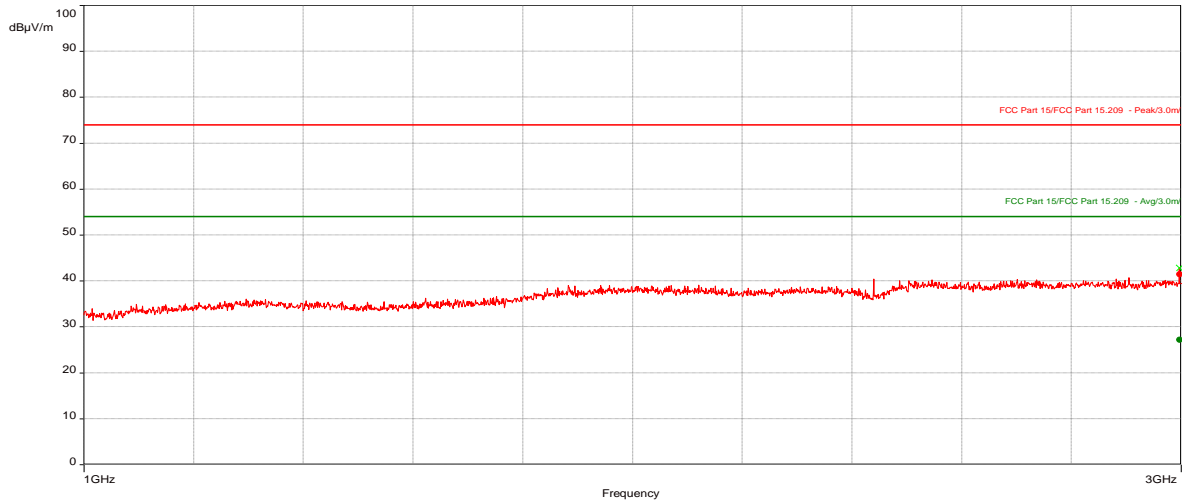
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
30.03	16.35	30.00	-13.65	308.60	3.36	Horizontal	120000.00	120k	-12.53
31.306	15.72	30.00	-14.28	37.60	3.80	Horizontal	120000.00	120k	-13.16
32.476	15.06	30.00	-14.94	183.10	1.00	Vertical	120000.00	120k	-14.07
142.692	8.36	33.50	-25.14	266.70	1.00	Vertical	120000.00	120k	-19.47
650.362	16.46	36.00	-19.54	329.00	4.00	Horizontal	120000.00	120k	-9.71

## BLE (Metal Enclosure) Tx Mid Channel, RE 1-3 GHz

**Test Information:**

Date and Time	12/13/2023 1:17:42 PM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	20 %
Atmospheric Pressure	1018 mbar
Comments	Scan 23_BLE (Metal Enclosure) Tx Mid RE 1-3 GHz

**Graph:**



**Results:**

Peak (PASS) (1)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
2997.8	41.42	74.00	-32.58	34.80	4.00	Horizontal	1000000.00	1M	-4.89

Average (PASS) (1)

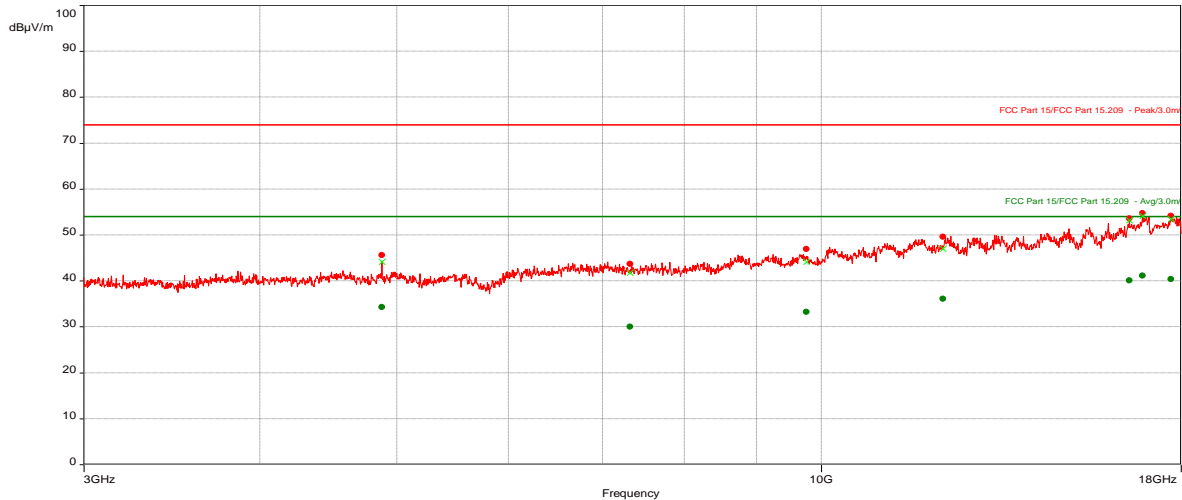
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
2997.8	27.19	54.00	-26.81	34.80	4.00	Horizontal	1000000.00	1M	-4.89



## BLE (Metal Enclosure) Tx Mid Channel, RE 3-18 GHz

**Test Information:**

Date and Time	12/12/2023 2:57:59 PM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	23 %
Atmospheric Pressure	1015 mbar
Comments	Scan 14_BLE (Metal Enclosure) Tx Mid RE 3-18 GHz

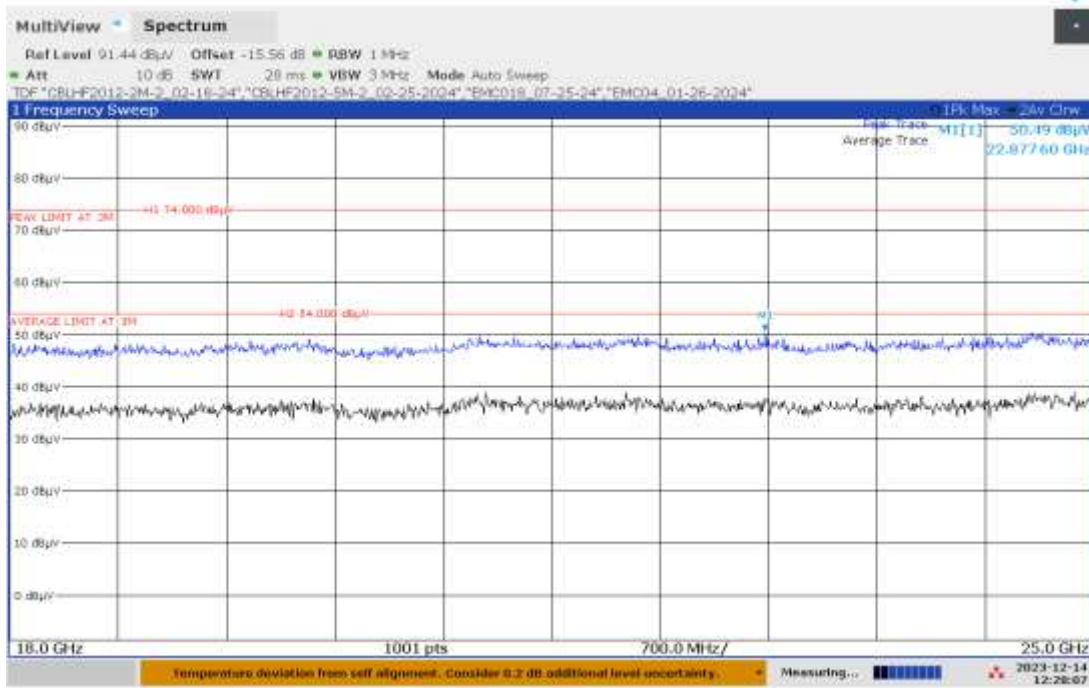
**Graph:**

**Results:**
**Peak (PASS) (7)**

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
4879.85	45.63	74.00	-28.37	0.00	1.00	Horizontal	1000000.00	1M	-2.29
7318.25	43.72	74.00	-30.28	0.00	1.00	Horizontal	1000000.00	1M	1.37
9759.7	46.99	74.00	-27.01	360.00	4.00	Horizontal	1000000.00	1M	3.47
12198.1	49.65	74.00	-24.35	0.00	4.00	Vertical	1000000.00	1M	7.70
16539	53.66	74.00	-20.34	0.00	1.00	Vertical	1000000.00	1M	13.27
16908.9	54.80	74.00	-19.20	265.30	1.00	Horizontal	1000000.00	1M	15.51
17701.65	54.21	74.00	-19.79	265.60	4.00	Horizontal	1000000.00	1M	15.96

**Average (PASS) (7)**

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
4879.85	34.33	54.00	-19.67	0.00	1.00	Horizontal	1000000.00	1M	-2.29
7318.25	30.07	54.00	-23.93	0.00	1.00	Horizontal	1000000.00	1M	1.37
9759.7	33.30	54.00	-20.70	360.00	4.00	Horizontal	1000000.00	1M	3.47
12198.1	36.10	54.00	-17.90	0.00	4.00	Vertical	1000000.00	1M	7.70
16539	40.13	54.00	-13.87	0.00	1.00	Vertical	1000000.00	1M	13.27
16908.9	41.18	54.00	-12.82	265.30	1.00	Horizontal	1000000.00	1M	15.51
17701.65	40.45	54.00	-13.55	265.60	4.00	Horizontal	1000000.00	1M	15.96

BLE (Metal Enclosure) Tx Mid RE 18-25 GHz



12:28:07 PM 12/14/2023

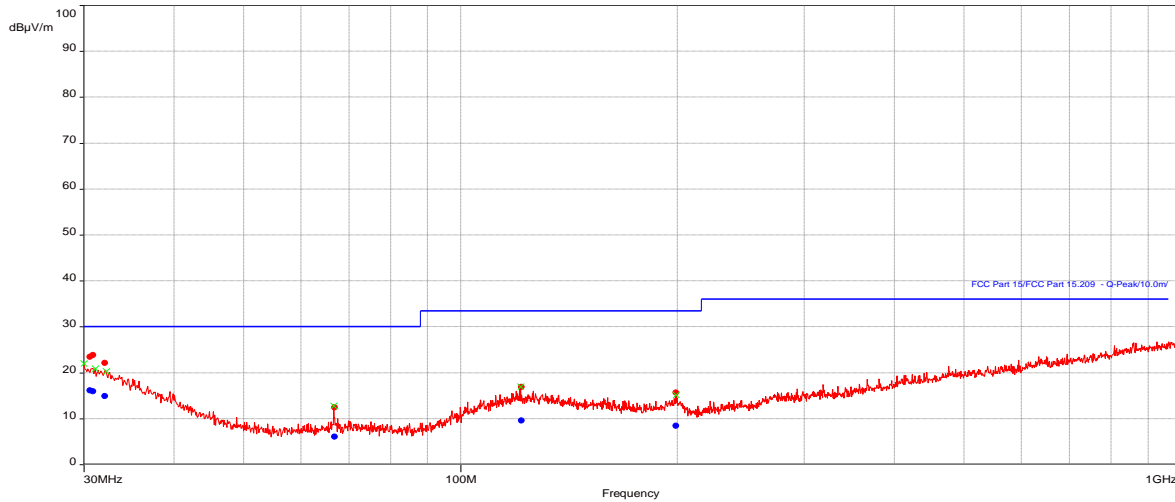
Notes: No emission was detected at a distance of 0.5 meter. Noise signal floor was recorded as shown in plot above. The distance factor was compensated as dB offset.

## BLE (Metal Enclosure) Tx High Channel, RE 30-1000MHz

**Test Information:**

Date and Time	12/12/2023 12:33:46 PM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	23 %
Atmospheric Pressure	1015 mbar
Comments	Scan 12_BLE (Metal Enclosure) Tx High RE 30-1000MHz

**Graph:**



**Results:**

Peak (PASS) (6)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
30.558	23.53	--	--	328.70	3.36	Horizontal	120000.00	120k	-12.73
30.944	23.91	--	--	307.50	3.37	Horizontal	120000.00	120k	-12.88
32.098	22.16	--	--	37.30	0.99	Horizontal	120000.00	120k	-13.85
66.934	12.48	--	--	360.00	3.78	Vertical	120000.00	120k	-24.87
121.464	16.96	--	--	287.20	1.57	Vertical	120000.00	120k	-18.38
199.208	15.67	--	--	287.30	1.58	Horizontal	120000.00	120k	-19.11

QuasiPeak (PASS) (6)

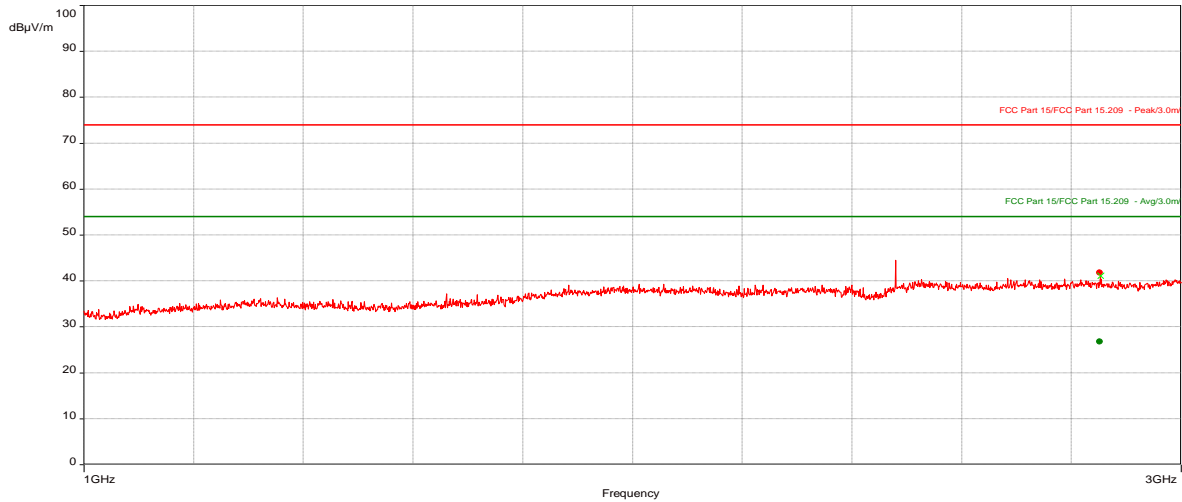
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
30.558	16.20	30.00	-13.80	328.70	3.36	Horizontal	120000.00	120k	-12.73
30.944	16.01	30.00	-13.99	307.50	3.37	Horizontal	120000.00	120k	-12.88
32.098	14.97	30.00	-15.03	37.30	0.99	Horizontal	120000.00	120k	-13.85
66.934	6.08	30.00	-23.92	360.00	3.78	Vertical	120000.00	120k	-24.87
121.464	9.64	33.50	-23.86	287.20	1.57	Vertical	120000.00	120k	-18.38
199.208	8.46	33.50	-25.04	287.30	1.58	Horizontal	120000.00	120k	-19.11

## BLE (Metal Enclosure) Tx High Channel, RE 1-3 GHz

**Test Information:**

Date and Time	12/13/2023 1:31:50 PM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	20 %
Atmospheric Pressure	1018 mbar
Comments	Scan 24_BLE (Metal Enclosure) Tx High RE 1-3 GHz

**Graph:**



**Results:**

Peak (PASS) (1)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
2851.75	41.86	74.00	-32.14	308.30	1.44	Horizontal	1000000.00	1M	-5.27

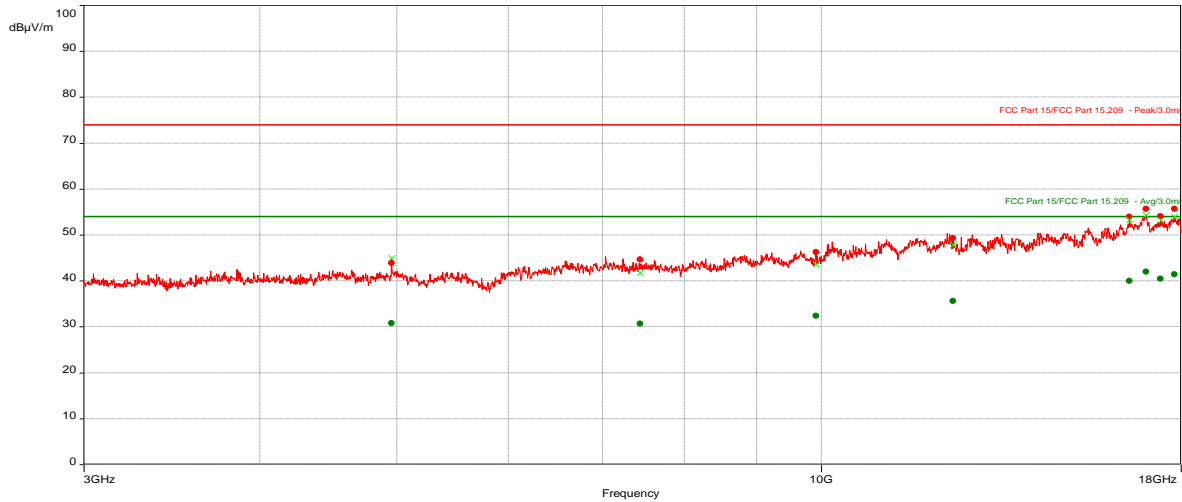
Average (PASS) (1)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
2851.75	26.85	54.00	-27.15	308.30	1.44	Horizontal	1000000.00	1M	-5.27

## BLE (Metal Enclosure) Tx High Channel, RE 3-18 GHz

**Test Information:**

Date and Time	12/13/2023 8:17:50 AM
Client and Project Number	Assa Abloy Sargent Mfg
Engineer	Kouma Sinn
Temperature	26 C
Humidity	20 %
Atmospheric Pressure	1018 mbar
Comments	Scan 15_BLE (Metal Enclosure) Tx High RE 3-18 GHz

**Graph:**

**Results:**

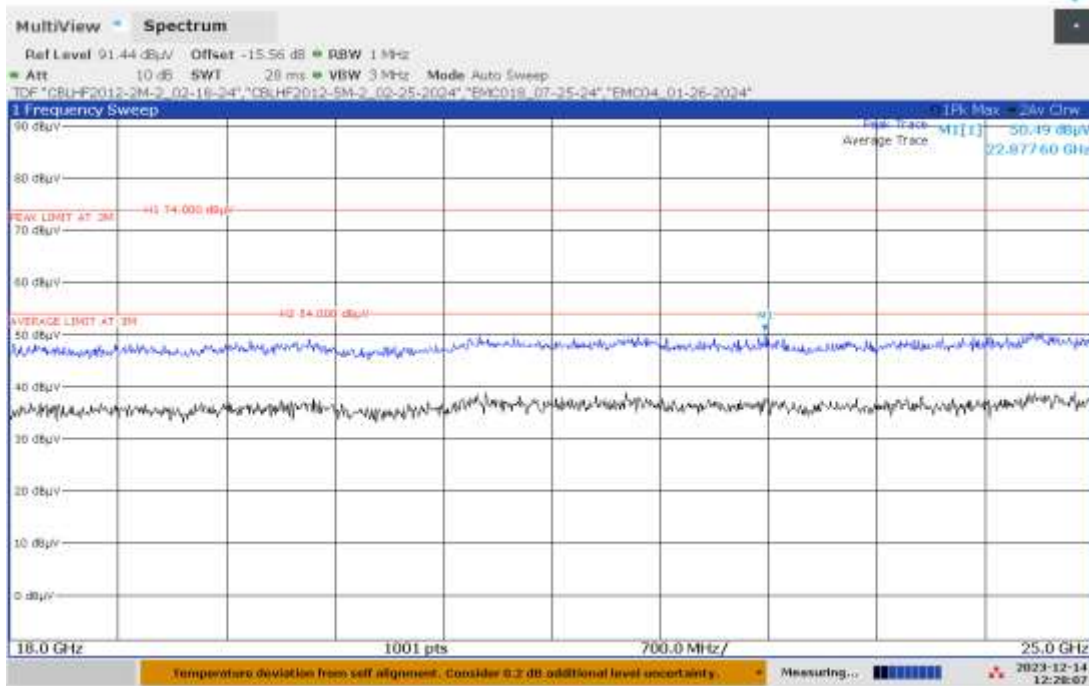
## Peak (PASS) (8)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
4960.1	43.96	74.00	-30.04	360.00	4.00	Horizontal	1000000.00	1M	-2.16
7440.55	44.72	74.00	-29.28	360.00	1.00	Horizontal	1000000.00	1M	1.44
9920.1	46.30	74.00	-27.70	360.00	1.00	Horizontal	1000000.00	1M	3.96
12401.9	49.35	74.00	-24.65	360.00	4.00	Horizontal	1000000.00	1M	7.77
16542.3	53.96	74.00	-20.04	360.00	1.00	Horizontal	1000000.00	1M	13.28
17002.6	55.69	74.00	-18.31	265.50	4.00	Vertical	1000000.00	1M	15.84
17411.4	54.05	74.00	-19.95	0.00	1.00	Vertical	1000000.00	1M	15.29
17805.5	55.72	74.00	-18.28	265.50	4.00	Horizontal	1000000.00	1M	16.20

## Average (PASS) (8)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	RBW	Correction (dB)
4960.1	30.78	54.00	-23.22	360.00	4.00	Horizontal	1000000.00	1M	-2.16
7440.55	30.72	54.00	-23.28	360.00	1.00	Horizontal	1000000.00	1M	1.44
9920.1	32.44	54.00	-21.56	360.00	1.00	Horizontal	1000000.00	1M	3.96
12401.9	35.63	54.00	-18.37	360.00	4.00	Horizontal	1000000.00	1M	7.77
16542.3	40.07	54.00	-13.93	360.00	1.00	Horizontal	1000000.00	1M	13.28
17002.6	41.98	54.00	-12.02	265.50	4.00	Vertical	1000000.00	1M	15.84
17411.4	40.50	54.00	-13.50	0.00	1.00	Vertical	1000000.00	1M	15.29

BLE (Metal Enclosure) Tx High RE 18-25 GHz



12:28:07 PM 12/14/2023

Notes: No emission was detected at a distance of 0.5 meter. Noise signal floor was recorded as shown in plot above. The distance factor was compensated as dB offset.

Product Standard: CFR47 FCC Part 15.247, RSS-247					Limit applied: See Report Section 8.3 Pretest Verification w/BB source: Yes		
Test Date	Test Personnel/ Initials	Supervising Engineer/ Initials	Input Voltage	Mode	Atmospheric Data		
					Temp C°	Relative Humidity %	Atmospheric Pressure mbar
12/11/2023	Kouma Sinn <i>KPS</i>	N/A	Battery Powered	Continuous Transmitting	26	37	990
12/12/2023	Kouma Sinn <i>KPS</i>	N/A	Battery Powered	Continuous Transmitting	26	23	1015
12/13/2023	Kouma Sinn <i>KPS</i>	N/A	Battery Powered	Continuous Transmitting	26	20	1018
12/14/2023	Kouma Sinn <i>KPS</i>	N/A	Battery Powered	Continuous Transmitting	24	15	1026

Deviations, Additions, or Exclusions: None



**9 Revision History**

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	02/28/2024	105626878BOX-001c	KPS <i>KPS</i>	VFV <i>VFV</i>	Original Issue