

# Module Integration Compliance Verification Report

**EUT Name:** AC GTW 03

**Model No.:** CB3

CFR 47 Part 15.247: 2019 and RSS 247: 2017

*Prepared for:*

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*Report/Issue Date:* February 14, 2020  
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## Revisions

| Revision No. | Date MM/DD/YYYY   | Reason for Change | Author |
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| 1            | January 29, 2020  | TCB Review        | OC     |
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| 3            | February 14, 2020 | TCB Review        | OC     |
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Note: Latest revision report will replace all previous reports.

# Statement of Compliance

*Manufacturer:* Schindler Elevator Corporation  
20 Whippany Road  
Morristown, NJ 07960  
*Requester / Applicant:* Schindler Elevator Corporation  
*Name of Equipment:* AC GTW 03  
*Model No.* CB3  
*Type of Equipment:* Intentional Radiator  
*Application of Regulations:* CFR 47 Part 15.247: 2019 and RSS 247: 2017  
*Test Dates:* October 28th, 2019 to November 15th, 2019

## *Guidance Documents:*

Emissions: ANSI C63.10-2013, KDB 558074 D01 DTS Measurement Guidance v05r02, KDB 996369 Module Certification D01 and D03

## *Test Methods:*

Emissions: ANSI C63.10-2013, KDB 558074 D01 DTS Measurement Guidance v05r02, KDB 996369 Module Certification D01 and D03

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in the Executive Summary of this report.

The applied Module Integration Verification Testing documented in this report does not reveal any non-compliance.

This report must not be used to claim product endorsement by A2LA or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written authorization of TUV Rheinland of North America.

Osvaldo Casorla

Test Engineer

Date February 14, 2020

Richard Decker

A2LA Signatory

Date February 14, 2020



**Testing Cert #3331.02**



**US1131**



Industry  
Canada Industrie  
Canada

**2932D**

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# 1 Executive Summary

## 1.1 Scope

This report is intended to document the status of conformance with the requirements of the CFR 47 Part 15.247: 2019 and RSS 247: 2017 based on the results of testing performed on October 28th, 2019 to November 15th, 2019 on the AC GTW 03 Model CB3 manufactured by Schindler Elevator Corporation. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

We have verified that all testing and results leveraged from the test reports of the modular approval are still valid and not impacted from updates to relevant rule parts or test stands since then.

Original test report number: D60104R1 for FCC-ID: 2ADHKWILC3000

## 1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report. The 2402 MHz to 2480 MHz frequency band for Bluetooth, Low Energy is covered in this document.

## 1.3 Summary of Test Results

**Table 1:** Summary of Test Results

| Test                                  | Test Method<br>ANSI C 63.10 &<br>C63.4        | Worse Case<br>(Measured)                | Result   |
|---------------------------------------|-----------------------------------------------|-----------------------------------------|----------|
| Maximum Output Power                  | CFR47 15.247 (a),<br>RSS 247 Sect. 5.4 (c)    | 1.06 dBm @ 2480 MHz Channel             | Complied |
| DTS Bandwidth (6dB)                   | CFR47 15.247 (a)(1),<br>RSS 247 Sect. 5.1 (a) | 0.644 MHz @ 2402 MHz Channel            | Complied |
| Peak Power Spectral Density           | CFR47 15.247 (e),<br>RSS 247 Sect. 5.2 (b)    | See Note 3                              | N/A      |
| Out of Band Emissions: Non-Restricted | CFR47 15.247 (d),<br>RSS 247 Sect.5.5         | See Note 3                              | N/A      |
| Out of Band Emissions: Restricted     | CFR47 15.247 (d),<br>RSS 247 Sect.5.5         | -20.65dB margin @ 2507.792 MHz, Average | Complied |
| Transmitter Spurious Emissions        | CFR47 15.247 (d),<br>RSS 247 Sect.5.5         | -4.46dB Margin @ 48.99 MHz, QuasiPeak   | Complied |
| AC Power Conducted Emission           | CFR47 15.207,<br>RSS-GEN Sect.8.8             | See Note 2                              | N/A      |

Note 1: This test report covers 2400 MHz to 2483.5 MHz band. \* = summed power.

Note 2: The CB3 devices are designed to be powered by a DC take-off from existing Schindler equipment.

The Schindler equipment has as part of its design the ability to provide 24V DC to ancillary equipment like the CB3. Said equipment has been tested during its design and certification process.

Note 3: Covered by Modular Test report Number D60104R1 for FCC-ID: 2ADHKWILC3000

## 1.4 Special Accessories

No special accessories were necessary in order to achieve compliance.

## 1.5 Equipment Modifications

None



## 2 Laboratory Information

### 2.1 Accreditations & Endorsements

#### 2.1.1 US Federal Communications Commission



TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct, Fremont, CA 94538, are recognized by the Commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (Registration No. US1131). The laboratory Scopes of Accreditation include Title 47 CFR Parts 15, 18 and 90. The accreditations are updated every three years.

#### 2.1.2 NIST / A2LA



TUV Rheinland of North America is accredited by the National Voluntary Laboratory Accreditation Program, which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Guide 17025:2017. The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

#### 2.1.3 Canada – Industry Canada



Industry  
Canada Industrie  
Canada

The Pleasanton 5-meter Semi-Anechoic Chamber, Registration No. 2932M-1, has been accepted by Industry Canada to perform testing to 3 and 5 meters based on the test procedures described in ANSI C63.4-2014. The Fremont 10-meter Semi-Anechoic Chamber, Registration No. 2932D-1, has been accepted by Industry Canada to perform testing to 3 and 10 meters based on the test procedures described in ANSI C63.4-2014.

#### 2.1.4 Japan – VCCI



The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct, Fremont, CA 94538, have been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0268

VCCI Registration No. for Fremont: A-0268

## 2.1.5 Acceptance by Mutual Recognition Arrangement



The United States has an established agreement with specific countries under the Asia Pacific Laboratory Accreditation Corporation (APLAC) Mutual Recognition Arrangement. Under this agreement, all TUV Rheinland at 1279 Quarry Ln, Pleasanton, CA 94566 test results and test reports within the scope of the laboratory NIST / A2LA accreditation will be accepted by each member

country.

## 2.2 Test Facilities

Test facilities are located at 5015 Brandin Ct, Fremont, California, 94538, USA and 1279 Quarry Lane, Pleasanton, California 94566, USA (Fremont is the Pleasanton Annex).

### 2.2.1 Emission Test Facility

The Semi-Anechoic Chambers and AC Line Conducted measurement facilities used to collect radiated and conducted emissions data have been constructed in accordance with ANSI C63.7:1992. The Fremont 10 meter semi-anechoic chamber has been measured in accordance with and verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2014 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04), at test distances of 3 and 10 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by A2LA (Testing Certificate #3331.02). The Pleasanton 5 meter semi-anechoic chamber has been verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2009 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04) at a test distance of 3 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by A2LA (Testing Certificate #3331.02).

### 1.1.1 EMC Software - Fremont

| Manufacturer             | Name       | Version    | Test Type                          |
|--------------------------|------------|------------|------------------------------------|
| EMISoft                  | Vasona     | 5.0        | Radiated & Conducted Emissions     |
| ETS-Lindgren             | TILE       | 4.2.A      | Radiated Emissions > 1 GHz         |
| ETS-Lindgren             | TILE       | V.3.4.K.22 | Radiated & Conducted Immunity      |
| Haefely                  | WinFEAT    | 1.6.3      | Surge                              |
| Thermo Electron - Keytek | CEWare32   | 3.0        | EFT/Surge/Voltage Dips & Interrupt |
| Voltech                  | IEC61000-3 | 1.15.07RC  | Harmonic & Flicker                 |
| Rohde & Schwarz          | EMC32      | 10.40.10   | Radiated Emissions                 |

## 2.3 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1<sup>st</sup> Edition, 1995.

*The Combined Standard Uncertainty* is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities; it is equal to the positive square root of the sum of the variances or co-variances of these other quantities, weighted according to how the measurement result varies with changes in these quantities. The term *standard uncertainty* is the result of a measurement expressed as a standard deviation.

*The Expanded Uncertainty* defines an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurement and the fraction may be viewed as the coverage probability or level of confidence of the interval.

### 2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

$$\text{Field Strength (dB}\mu\text{V/m)} = \text{RAW} - \text{AMP} + \text{CBL} + \text{ACF}$$

Where: RAW = Measured level before correction (dB $\mu$ V)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu\text{V/m} = 10^{\frac{\text{dB}\mu\text{V} / \text{m}}{20}}$$

#### Sample radiated emissions calculation @ 30 MHz

**Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)**

$$25 \text{ dBuV/m} + 17.5 \text{ dB} - 20 \text{ dB} + 1.0 \text{ dB} = 23.5 \text{ dBuV/m}$$

## 2.3.2 Measurement Uncertainty

| Per CISPR 16-4-2                               | $U_{lab}$ | $U_{cisp}$ |
|------------------------------------------------|-----------|------------|
| <b>Radiated Disturbance @ 10 meters</b>        |           |            |
| 30 – 1,000 MHz                                 | 2.25 dB   | 4.51 dB    |
| <b>Radiated Disturbance @ 3 meters</b>         |           |            |
| 30 – 1,000 MHz                                 | 2.26 dB   | 4.52 dB    |
| 1 – 6 GHz                                      | 2.12 dB   | 4.25 dB    |
| 6 – 18 GHz                                     | 2.47 dB   | 4.93 dB    |
| <b>Conducted Disturbance @ Mains Terminals</b> |           |            |
| 150 kHz – 30 MHz                               | 1.09 dB   | 2.18 dB    |
| <b>Disturbance Power</b>                       |           |            |
| 30 MHz – 300 MHz                               | 3.92 dB   | 4.3 dB     |

## 2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2017. Equipment calibration records are kept on file at the test facility.

## **4 Product Information**

### **4.1 Product Description**

The Model CB3 is an AC GTW 03 utilizing Bluetooth. The EUT will be in compliance with regulatory standards of regions it will be operating in.

### **4.2 Equipment Configuration**

A description of the equipment configuration is given in the Test Plan Section. The EUT was tested as called for in the test standard and was configured and operated in a manner consistent with its intended use. The EUT was connected to rated power and allowed to reach intended operating conditions. The placement of the EUT system components was guided by the test standard and selected to represent typical installation conditions.

In the case of an EUT that can operate in more than one configuration, preliminary testing was performed to determine the configuration that produced maximum radiation.

The final configuration was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

### **4.3 Operating Mode**

A description of the operation mode is given in the Test Plan Section. In the case of an EUT that can operate in more than one state, preliminary testing was performed to determine the operating mode that produced maximum radiation.

The final operating mode was selected to produce the worst case radiation for emissions testing.

## **4.4 §15.203 Antenna requirement**

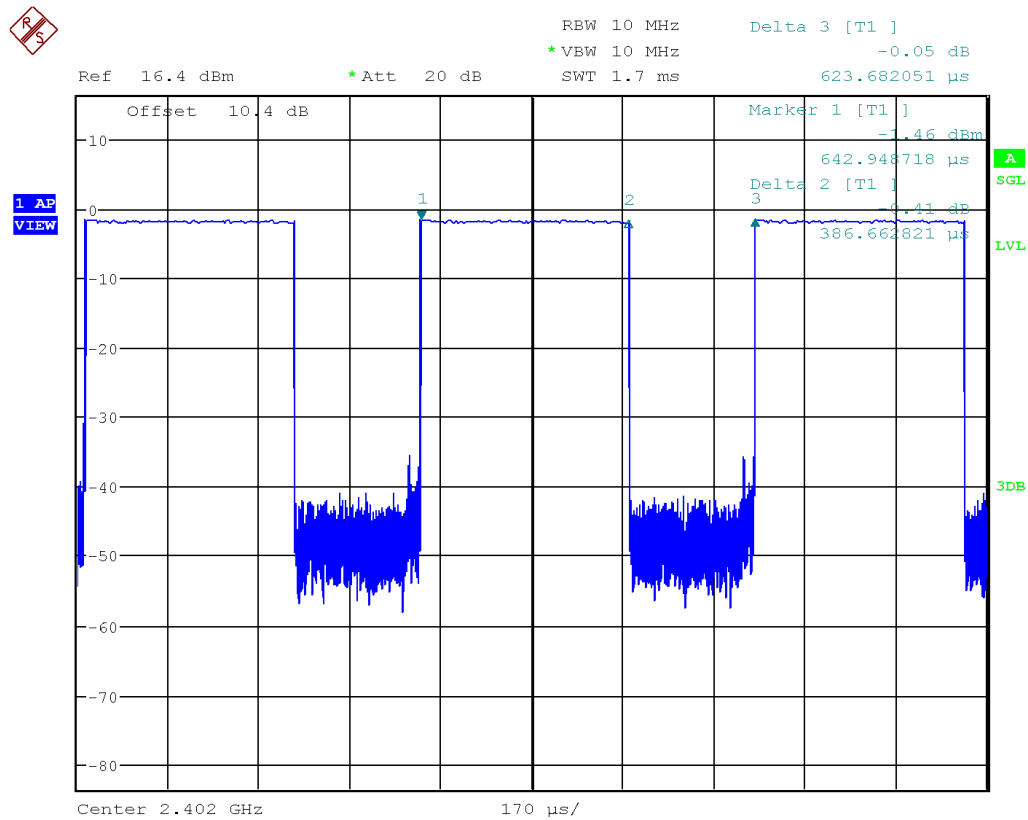
### **4.4.1 Results**

The AC GTW 03 has an external BLE antenna connector. However, the manufacturer has confirmed that device will only be installed by professional staff.

## **4.5 Duty Cycle**

Duty cycles were measured by the spectrum analyzer used for measurements in section 4.1 of this report.

| Mode | Measured Duty Cycle | Duty Cycle Correction Factor (dB) |
|------|---------------------|-----------------------------------|
| BLE  | 62%                 | 2.08                              |



**Figure 1: Duty Cycle for BLE**

## 5 Emissions

Testing was performed in accordance with CFR 47 Part 15.247: 2019 and RSS 247: 2017. These test methods are listed under the laboratory's A2LA Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Procedures described in section 8 of the standard were used.

### 5.1 Output Power Requirements

*The maximum output power requirement is the maximum equivalent isotropic radiated power delivering at the transmitting antenna under specified conditions of measurements in the presence of modulation.*

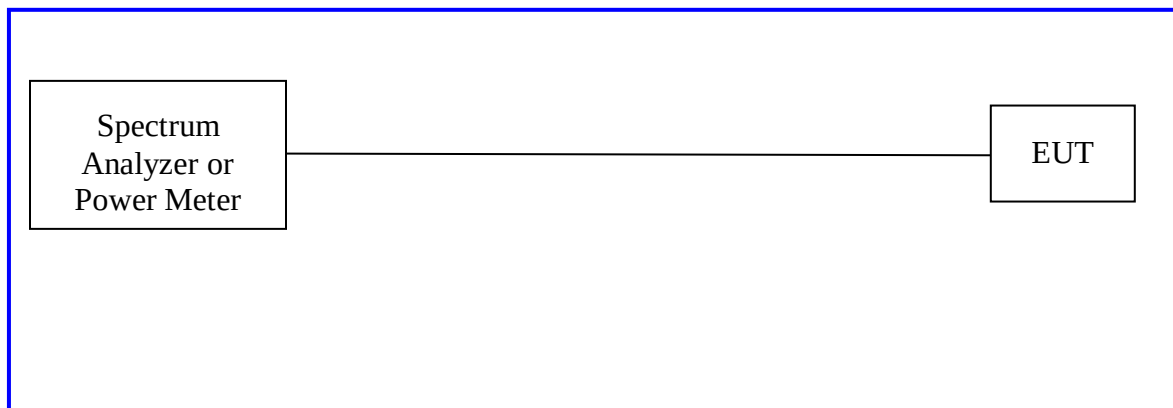
*The maximum output power and harmonics shall not exceed CFR47 Part 15.247 (b) and RSS 247 5.4 (d).*

*The maximum transmitted power in the band 2400-2483.5 MHz: 1 W*

#### 5.1.1 Test Method

Conducted method was used to measure the channel power output. The worst findings were conducted on 3 channels in each operating range per CFR47 Part 15.247(b) and RSS 247 Sect. 5.4(d); 2400 MHz to 2483.5 MHz. The worst mode results indicated below.

Test Setup:



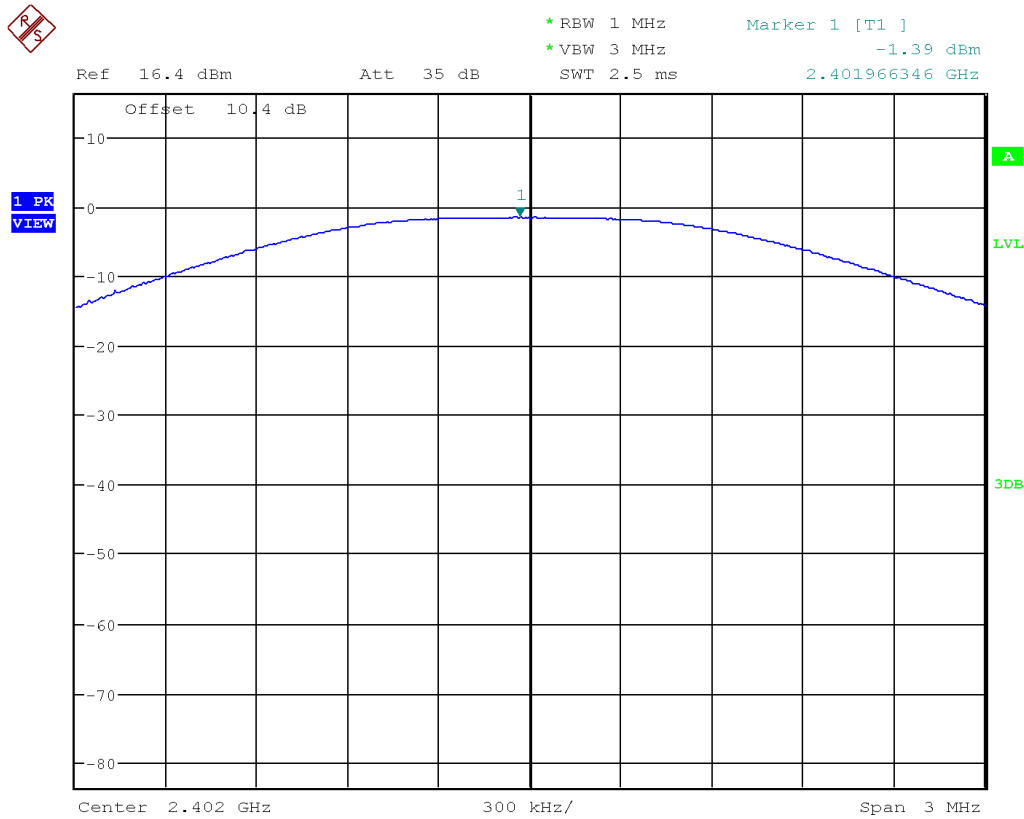


## 5.1.2 Results

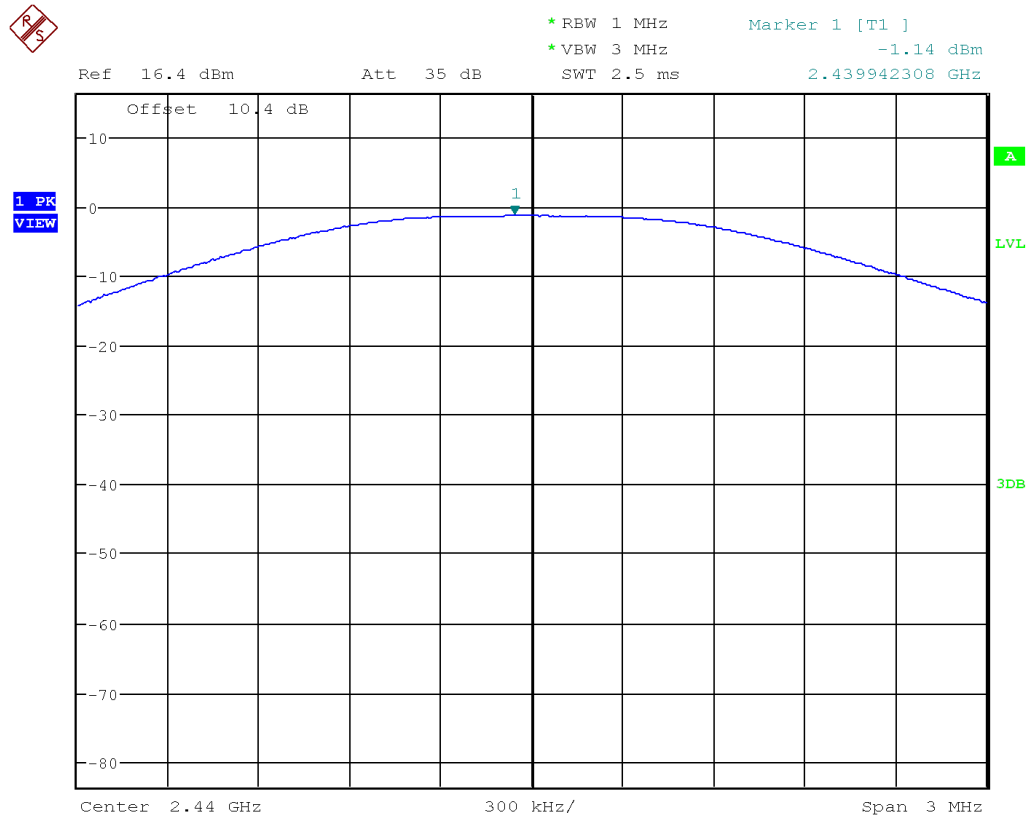
As originally tested, the EUT was found to be compliant to the requirements of the test standard(s). Worse case data for each mode reported below. Plots of highest power included for low, medium, and high channels.

**Table 2: RF Output Power at the Antenna Port – Test Results**

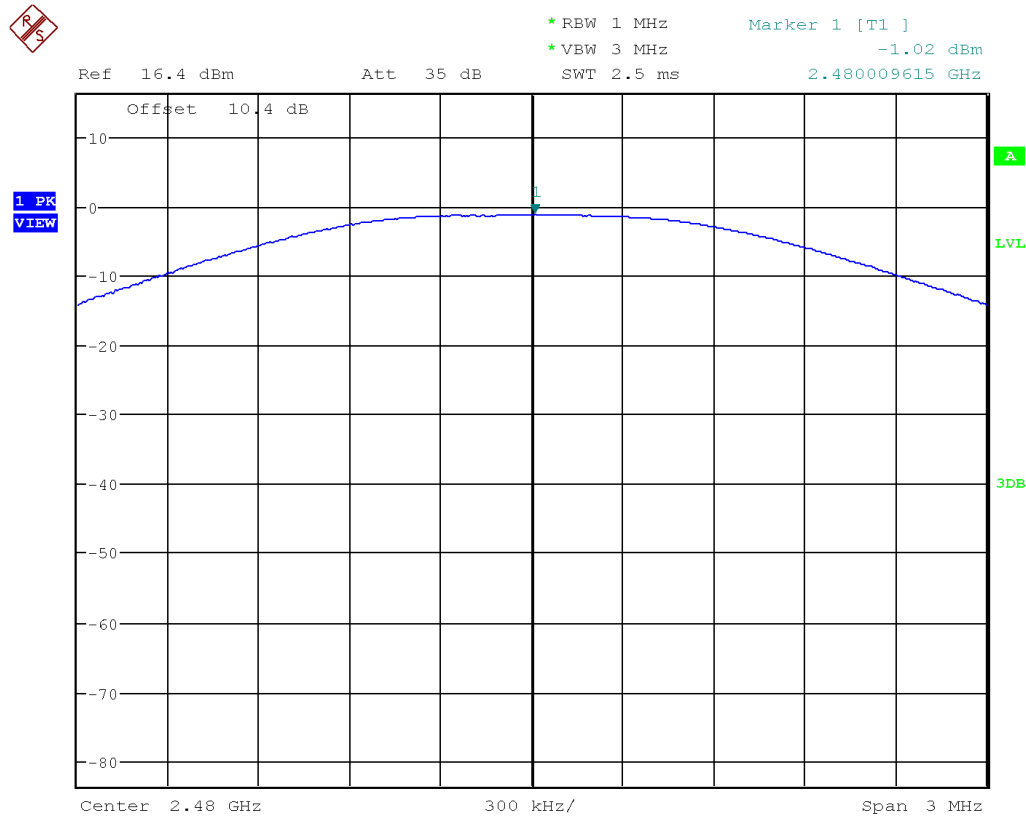
| <b>Test Conditions:</b> Conducted Measurement, Normal Temperature |                    |                          |                    |
|-------------------------------------------------------------------|--------------------|--------------------------|--------------------|
| <b>Antenna Type:</b> PCB trace antenna                            |                    |                          |                    |
| <b>Max. Antenna Gain:</b> 0.56 dBi                                |                    |                          |                    |
| <b>Operating Channel (MHz)</b>                                    | <b>Limit [dBm]</b> | <b>Total Power [dBm]</b> | <b>Margin [dB]</b> |
| 2402                                                              | 30.00              | 0.69                     | -29.31             |
| 2440                                                              | 30.00              | 0.94                     | -29.06             |
| 2480                                                              | 30.00              | 1.06                     | -28.94             |



**Plot 1.** Maximum Conducted Power, 2402MHz



**Plot 2.** Maximum Conducted Power, 2440MHz



**Plot 3.** Maximum Conducted Power, 2480MHz

## 5.2 DTS Bandwidth (6dB) and Occupied Bandwidth

*The occupied bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency.*

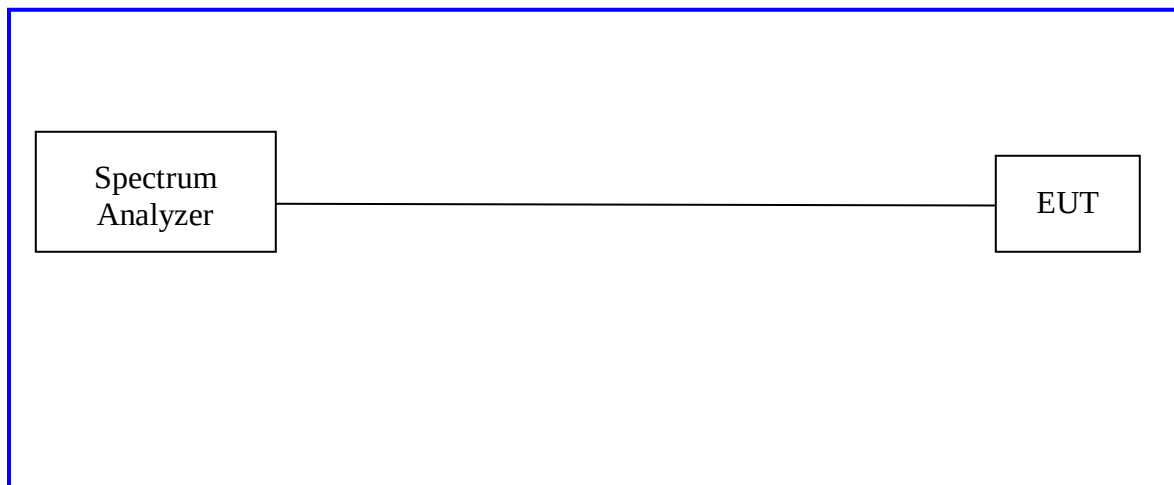
*The 99% bandwidth is the bandwidth in which 99% of the transmitted power occupied.*

*The minimum 6 dB bandwidth shall be at least 500 kHz.*

### 5.2.1 Test Method

The conducted method was used to measure the occupied bandwidth according to ANSI C63.10:2013 Section 11.8. The measurement was performed with modulation per CFR47 15.247 (a) (2) and RSS Gen Sect. 6.6. Measurements were performed on the low, middle and high channels of the operating frequency range; 2400 MHz to 2483.5 MHz.

Test Setup:



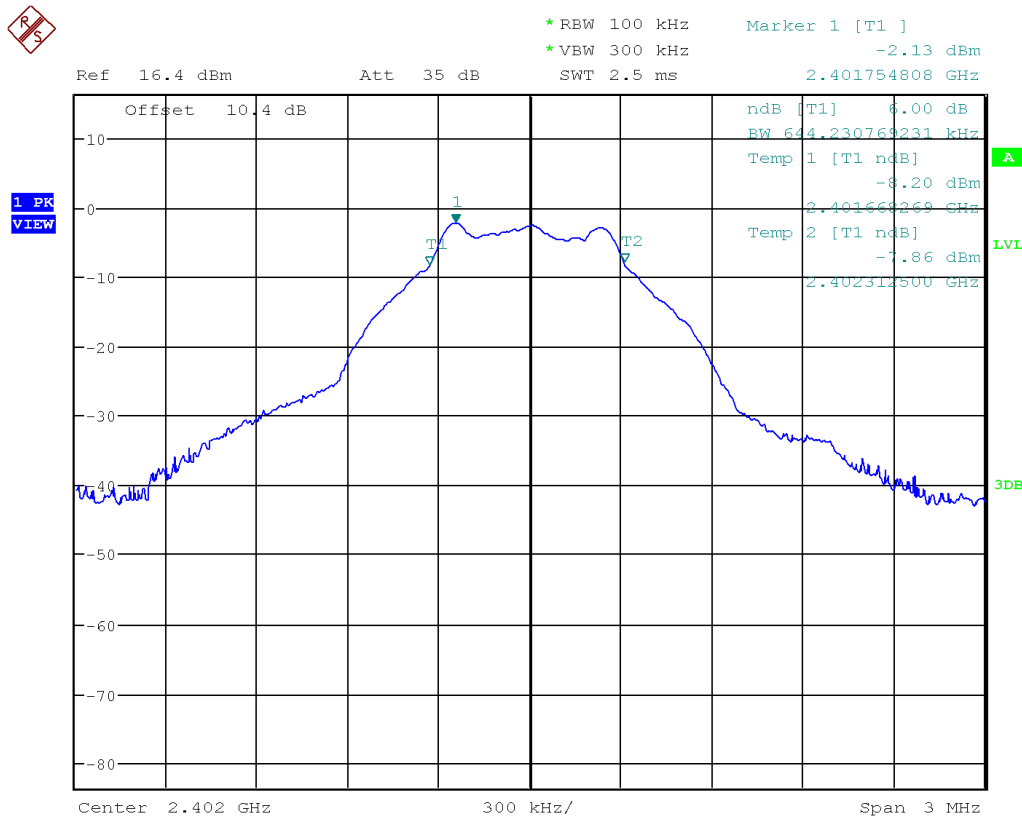
### 5.2.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

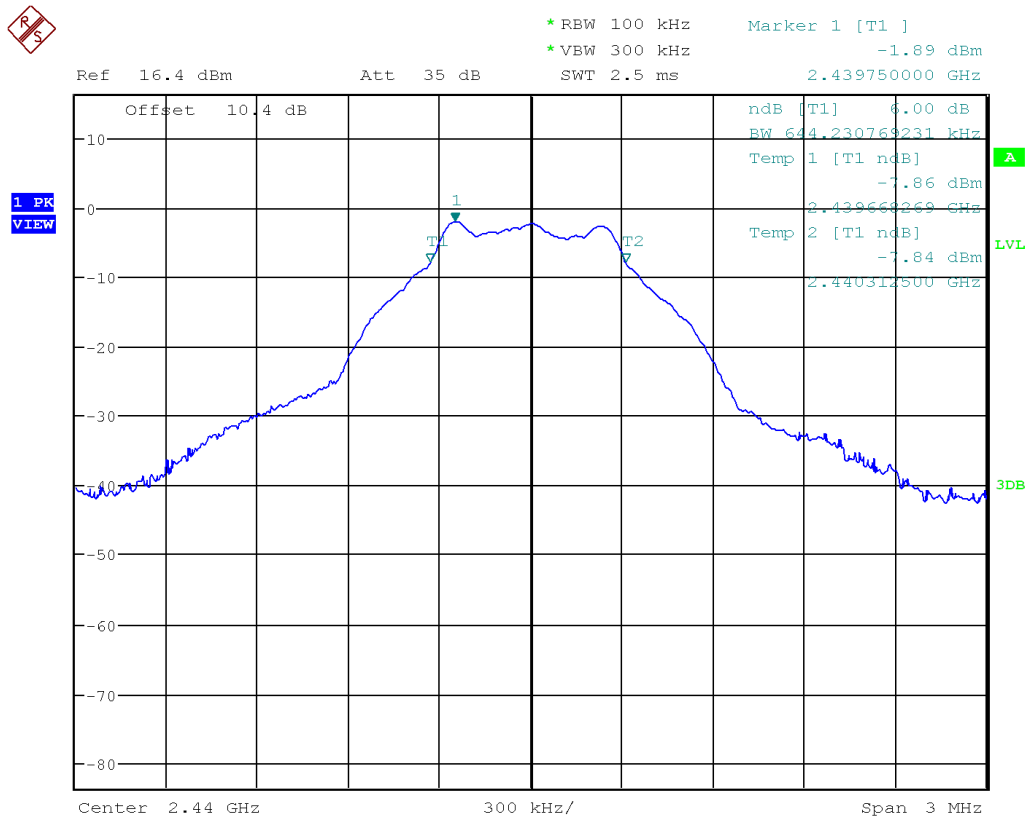
**Table 3:** Occupied Bandwidth – Test Results

|                                                                   |
|-------------------------------------------------------------------|
| <b>Test Conditions:</b> Conducted Measurement, Normal Temperature |
|-------------------------------------------------------------------|

| Bandwidth (MHz)   |                           |
|-------------------|---------------------------|
| Freq.<br>(MHz)    | 6dB (DTS) Bandwidth (MHz) |
|                   |                           |
| 2402              | 0.644                     |
| 2440              | 0.644                     |
| 2480              | 0.644                     |
| <b>Note:</b> None |                           |

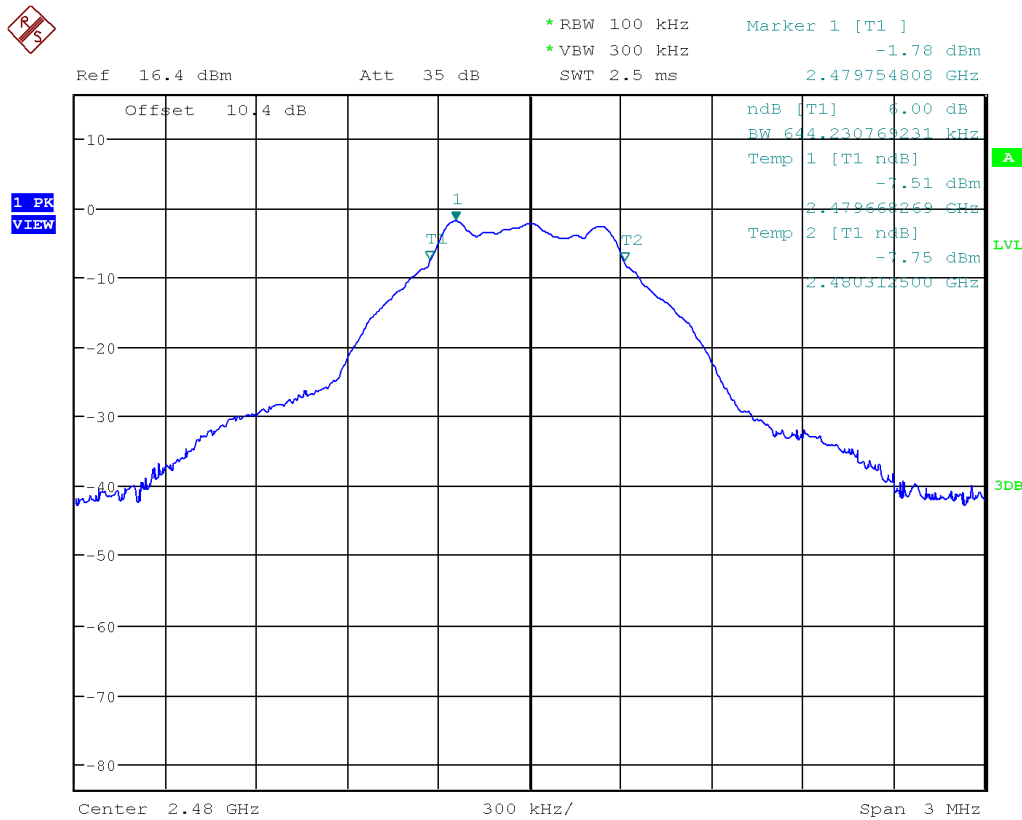


Plot 4. 2402MHz, 6dB Bandwidth



Plot 5. 2440MHz, 6dB Bandwidth





Plot 6. 2480MHz, 6dB Bandwidth

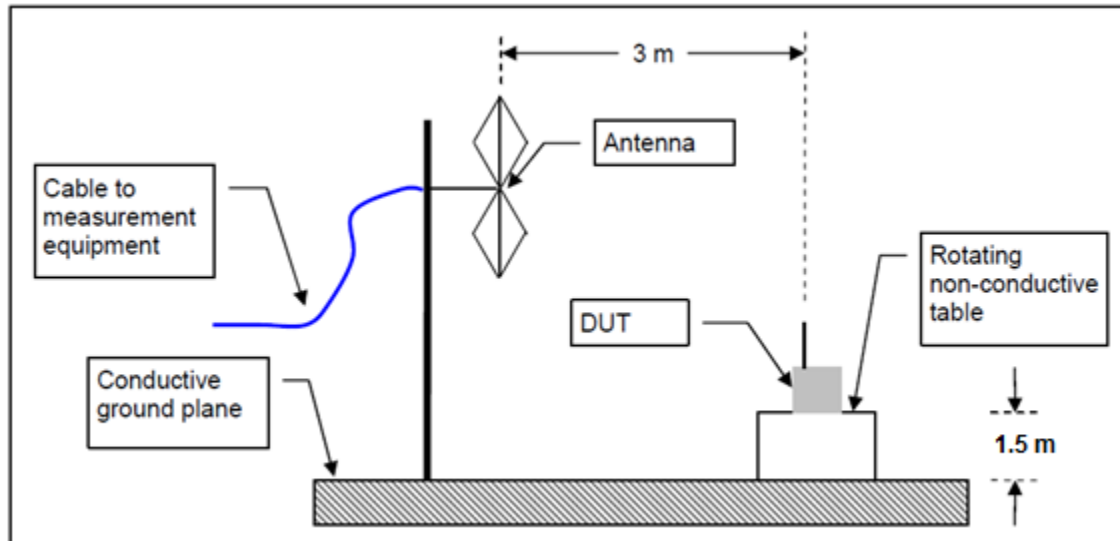
### 5.3 Out of Band Emissions: Restricted Band Edge

*Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmitting mode; per requirement of CFR47 15.205, 15.209, 15.247(d), RSS-247 Sect. 5.5, RSS-GEN Sect. 8.9 and 8.10.*

#### 5.3.1 Test Method

Radiated measurements per ANSI C63.10-2013 Section 6.10.5 were used to measure the undesirable emission requirement in restricted bands. Peak points were found and RMS Average was taken for each point found. The measurement was performed with modulation. This test was conducted on 3 channels in each mode on the EUT. The worst case measurement of each channel is recorded in this report. All channels were tested at highest power settings.

#### Test Setup

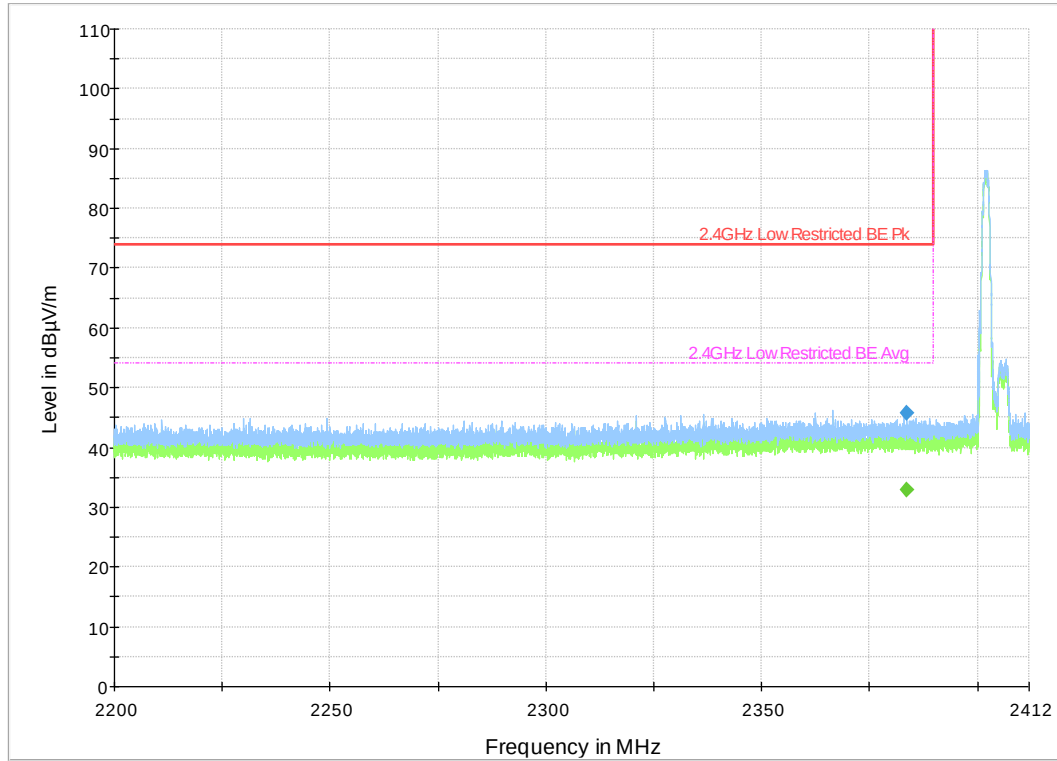


The DUT was stimulated by manufacturer provided test software that is not available to the end user.

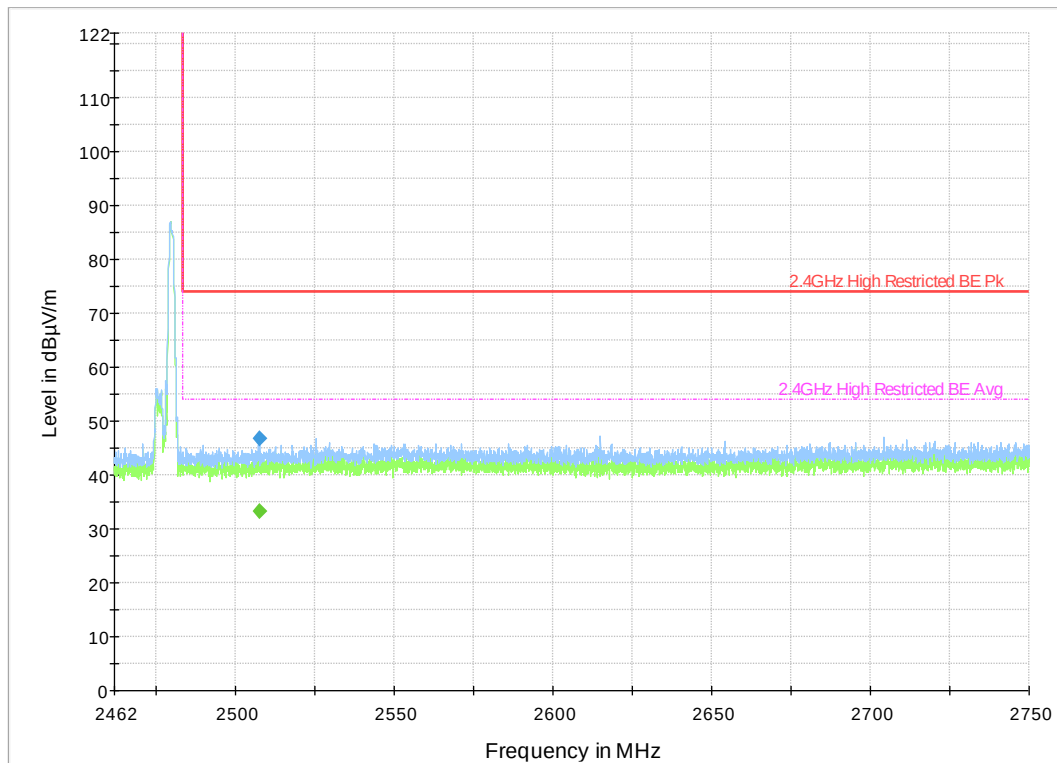
### 5.3.2 Test Results

**Table 4:** Emissions at the Band-Edge – Test Results

| <b>Test Conditions:</b> Radiated Measurement, Normal Temperature and Voltage                                  |                |                          |                                 |                          |                       |               |                |
|---------------------------------------------------------------------------------------------------------------|----------------|--------------------------|---------------------------------|--------------------------|-----------------------|---------------|----------------|
| <b>Lower Restricted Band Edge</b>                                                                             |                |                          |                                 |                          |                       |               |                |
| <b>Freq. (MHz)</b>                                                                                            | <b>Mode</b>    | <b>Center Freq (MHz)</b> | <b>Detector (Average/ Peak)</b> | <b>Measured (dBuV/m)</b> | <b>Limit (dBuV/m)</b> | <b>Margin</b> | <b>Results</b> |
| 2383.549                                                                                                      | BLE GFSK 1Mbps | 2402                     | Average                         | 32.93                    | 54                    | -21.07        | Pass           |
| 2383.549                                                                                                      | BLE GFSK 1Mbps | 2402                     | Peak                            | 45.68                    | 74                    | -28.32        | Pass           |
| <b>Upper Restricted Band Edge</b>                                                                             |                |                          |                                 |                          |                       |               |                |
| <b>Freq. (MHz)</b>                                                                                            | <b>Mode</b>    | <b>Center Freq (MHz)</b> | <b>Detector (Average/ Peak)</b> | <b>Measured (dBuV/m)</b> | <b>Limit (dBuV/m)</b> | <b>Margin</b> | <b>Results</b> |
| 2507.792                                                                                                      | BLE GFSK 1Mbps | 2480                     | Average                         | 33.35                    | 54                    | -20.65        | Pass           |
| 2507.792                                                                                                      | BLE GFSK 1Mbps | 2480                     | Peak                            | 46.83                    | 74                    | -27.17        | Pass           |
| <b>Note:</b> 1. The DCCF (Average Detector) is included in this table, the following plots are of peak values |                |                          |                                 |                          |                       |               |                |



**Figure 2.** 2402MHz, Lower Band Edge, Restricted



**Figure 3.** 2480MHz, Upper Band Edge, Restricted

## **5.4 Transmitter Spurious Emissions**

*Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmit mode; per requirement of CFR47 15.205, 15.209, 15.247(d), RSS 247 Sect.5.5, RSS-GEN Sect. 8.9 and 8.10.*

### **5.4.1 Test Methodology**

#### **5.4.1.1 Preliminary Test**

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

Pre-scans were performed to determine the worst data rate / chains.

#### **5.4.1.2 Final Test**

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, then the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

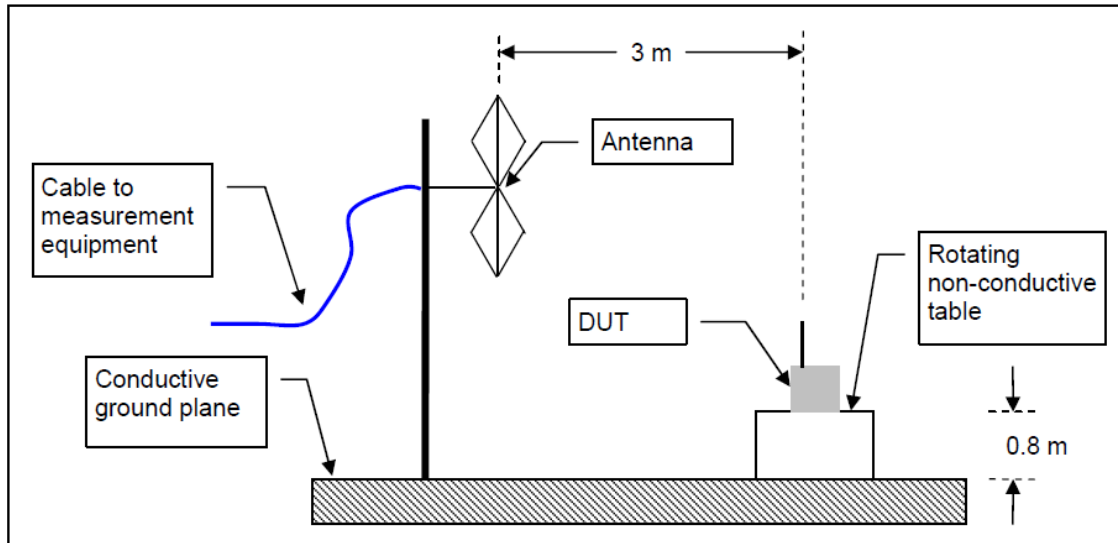
#### **5.4.1.3 Deviations**

None.

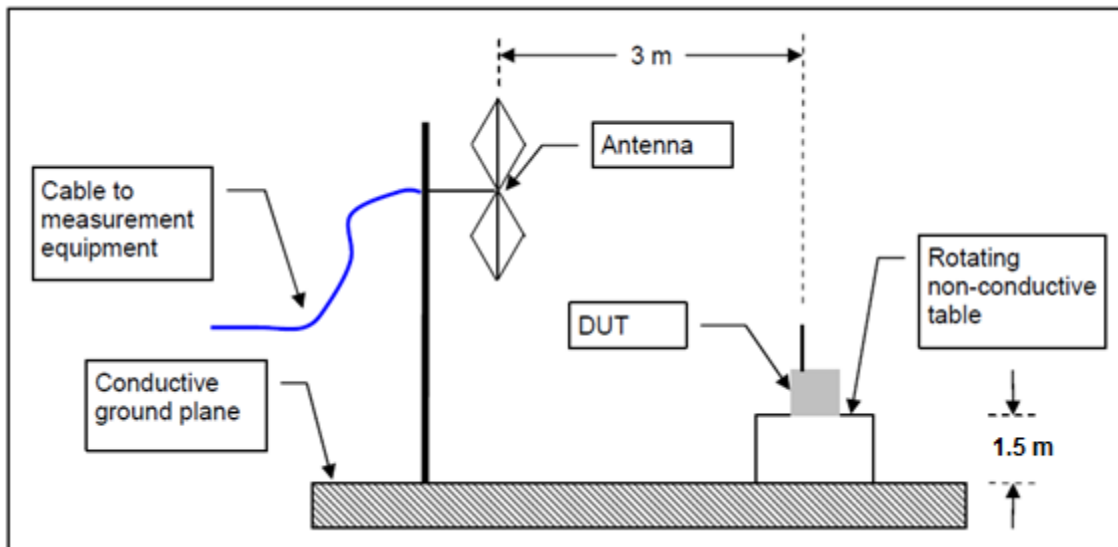
## 5.4.2 Test Setup:

All tests were conducted at full power on low, middle, and high channels. The DUT was stimulated by manufacturer provided test software that is not available to the end user.

### 30MHz-1GHz



### 1-26GHz



### 5.4.3 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209: 2015 and RSS Gen Sect. 8.9 and 8.10: 2014.

| Frequency (MHz)  | Field strength<br>(microvolts/meter) | Measurement<br>distance<br>(meters) |
|------------------|--------------------------------------|-------------------------------------|
| 0.009-0.490..... | 2400/F (kHz)                         | 300                                 |
| 0.490-1.705..... | 24000/F (kHz)                        | 30                                  |
| 1.705-30.0.....  | 30                                   | 30                                  |
| 30-88.....       | 100 **                               | 3                                   |
| 88-216.....      | 150 **                               | 3                                   |
| 216-960.....     | 200 **                               | 3                                   |
| Above 960.....   | 500                                  | 3                                   |

### 5.4.4 Test Results

The final measurement data was taken under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and test plan.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Note: Below 30 MHz was investigated and no emissions was found above noise floor. No Emissions within 6dB of the limit were found above 18 GHz.



Note: The 2.4 GHz notch filter was used to protect the front end of the pre-amp.

#### 5.4.4.1 Plots

| Frequency (MHz) | QuasiPeak (dBμV/m) | MaxPeak (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Comment |
|-----------------|--------------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|--------------|---------|
| 44.23           | 33.96              | ---              | 40.00          | 6.04        | 1000.00         | 120.00          | 100.00      | V   | -175.00       | -16.20       |         |
| 44.23           | ---                | 41.02            | ---            | ---         | 1000.00         | 120.00          | 100.00      | V   | -175.00       | -16.20       |         |
| 48.99           | ---                | 42.10            | ---            | ---         | 1000.00         | 120.00          | 100.00      | V   | -175.00       | -17.90       |         |
| 48.99           | 35.54              | ---              | 40.00          | 4.46        | 1000.00         | 120.00          | 100.00      | V   | -175.00       | -17.90       |         |
| 147.27          | 32.98              | ---              | 43.51          | 10.53       | 1000.00         | 120.00          | 101.00      | V   | -107.00       | -14.40       |         |
| 147.27          | ---                | 33.66            | ---            | ---         | 1000.00         | 120.00          | 101.00      | V   | -107.00       | -14.40       |         |
| 343.65          | 31.64              | ---              | 46.00          | 14.36       | 1000.00         | 120.00          | 101.00      | V   | 180.00        | -11.90       |         |
| 343.65          | ---                | 32.92            | ---            | ---         | 1000.00         | 120.00          | 101.00      | V   | 180.00        | -11.90       |         |
| 441.83          | ---                | 32.85            | ---            | ---         | 1000.00         | 120.00          | 228.00      | H   | 59.00         | -9.50        |         |
| 441.83          | 30.82              | ---              | 46.00          | 15.18       | 1000.00         | 120.00          | 228.00      | H   | 59.00         | -9.50        |         |
| 777.99          | 15.26              | ---              | 46.00          | 30.74       | 1000.00         | 120.00          | 100.00      | V   | -185.00       | -3.90        |         |
| 777.99          | ---                | 22.22            | ---            | ---         | 1000.00         | 120.00          | 100.00      | V   | -185.00       | -3.90        |         |

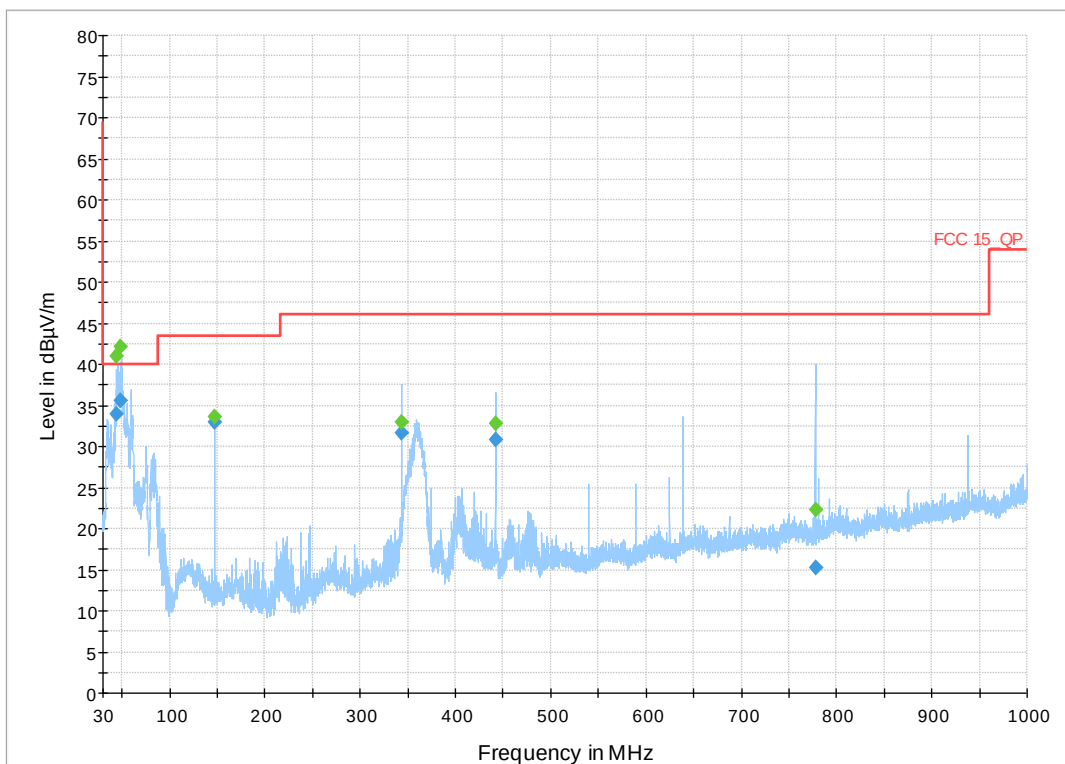


Figure 4. 30MHz-1GHz, 2440MHz

| Frequency (MHz) | MaxPeak (dBμV/m) | Average (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Comment |
|-----------------|------------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|--------------|---------|
| 1511.96         | 39.89            | ---              | 74.00          | 34.11       | 1000.00         | 1000.00         | 200.00      | V   | 32.00         | -35.00       |         |
| 1511.96         | ---              | 31.34            | 54.00          | 22.66       | 1000.00         | 1000.00         | 200.00      | V   | 32.00         | -35.00       |         |
| 4884.86         | ---              | 29.70            | 54.00          | 24.30       | 1000.00         | 1000.00         | 300.00      | H   | 59.00         | -24.00       |         |
| 4884.86         | 43.20            | ---              | 74.00          | 30.80       | 1000.00         | 1000.00         | 300.00      | H   | 59.00         | -24.00       |         |
| 8052.47         | ---              | 31.41            | 54.00          | 22.59       | 1000.00         | 1000.00         | 293.00      | V   | 3.00          | -17.60       |         |
| 8052.47         | 44.99            | ---              | 74.00          | 29.01       | 1000.00         | 1000.00         | 293.00      | V   | 3.00          | -17.60       |         |
| 9764.06         | 53.58            | ---              | 74.00          | 20.42       | 1000.00         | 1000.00         | 254.00      | H   | 0.00          | -16.10       |         |
| 9764.06         | ---              | 48.33            | 54.00          | 5.67        | 1000.00         | 1000.00         | 254.00      | H   | 0.00          | -16.10       |         |

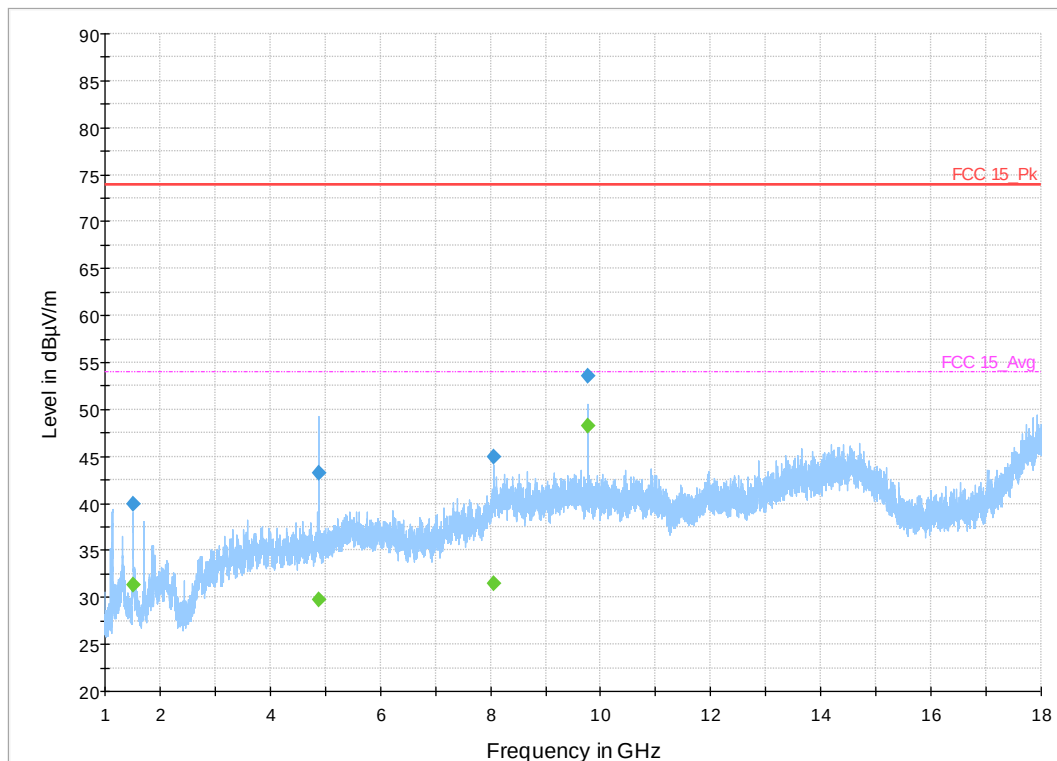


Figure 5. 1-18GHz, 2440MHz

## **5.5 Radiated Emissions Co-Location**

*Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmit mode; per requirement of CFR47 15.205, 15.209, 15.247(d), RSS 247 Sect.5.5, RSS-GEN Sect. 8.9 and 8.10.*

### **5.5.1 Test Methodology**

#### **5.5.1.1 Preliminary Test**

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

Pre-scans were performed to determine the worst data rate / chains.

#### **5.5.1.2 Final Test**

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

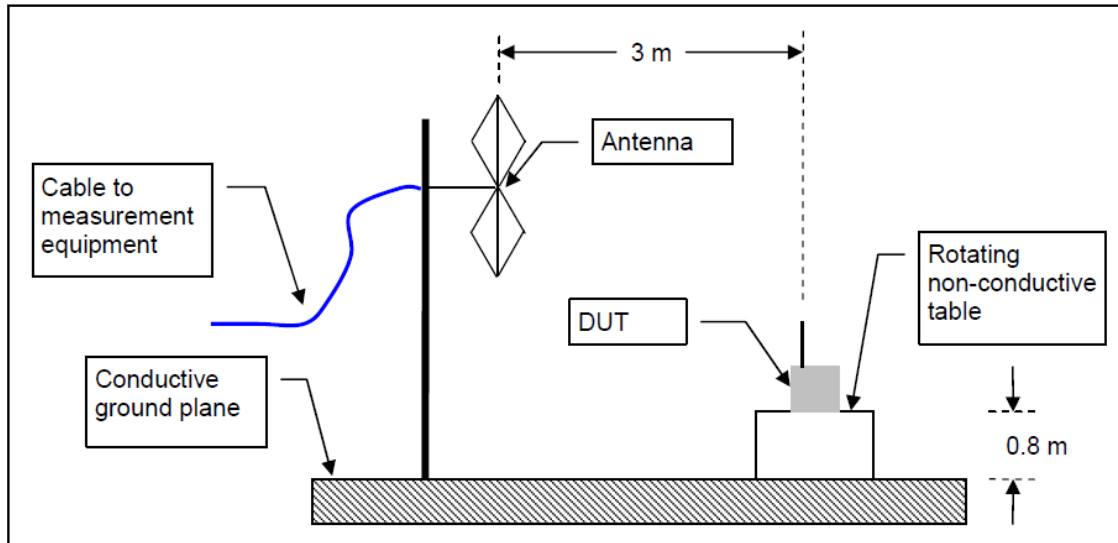
#### **5.5.1.3 Deviations**

None.

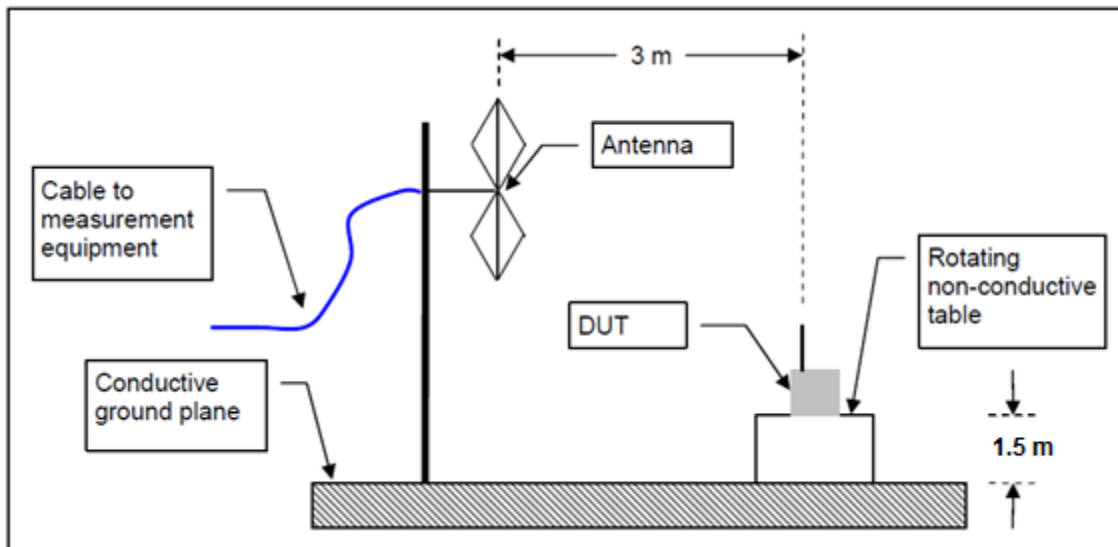
### 5.5.2 Test Setup:

All tests were conducted at full power on low, middle, and high channels. The DUT was stimulated by manufacturer provided test software that is not available to the end user.

#### 30MHz-1GHz



#### 1-26GHz



### 5.5.3 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209: 2015 and RSS Gen Sect. 8.9 and 8.10: 2014.

| Frequency (MHz)  | Field strength<br>(microvolts/meter) | Measurement<br>distance<br>(meters) |
|------------------|--------------------------------------|-------------------------------------|
| 0.009-0.490..... | 2400/F (kHz)                         | 300                                 |
| 0.490-1.705..... | 24000/F (kHz)                        | 30                                  |
| 1.705-30.0.....  | 30                                   | 30                                  |
| 30-88.....       | 100 **                               | 3                                   |
| 88-216.....      | 150 **                               | 3                                   |
| 216-960.....     | 200 **                               | 3                                   |
| Above 960.....   | 500                                  | 3                                   |

The CB3 was in a continuous Co-Location TX mode operating at BLE 2440 with LTE Band 13.

## 5.5.4 Test Results

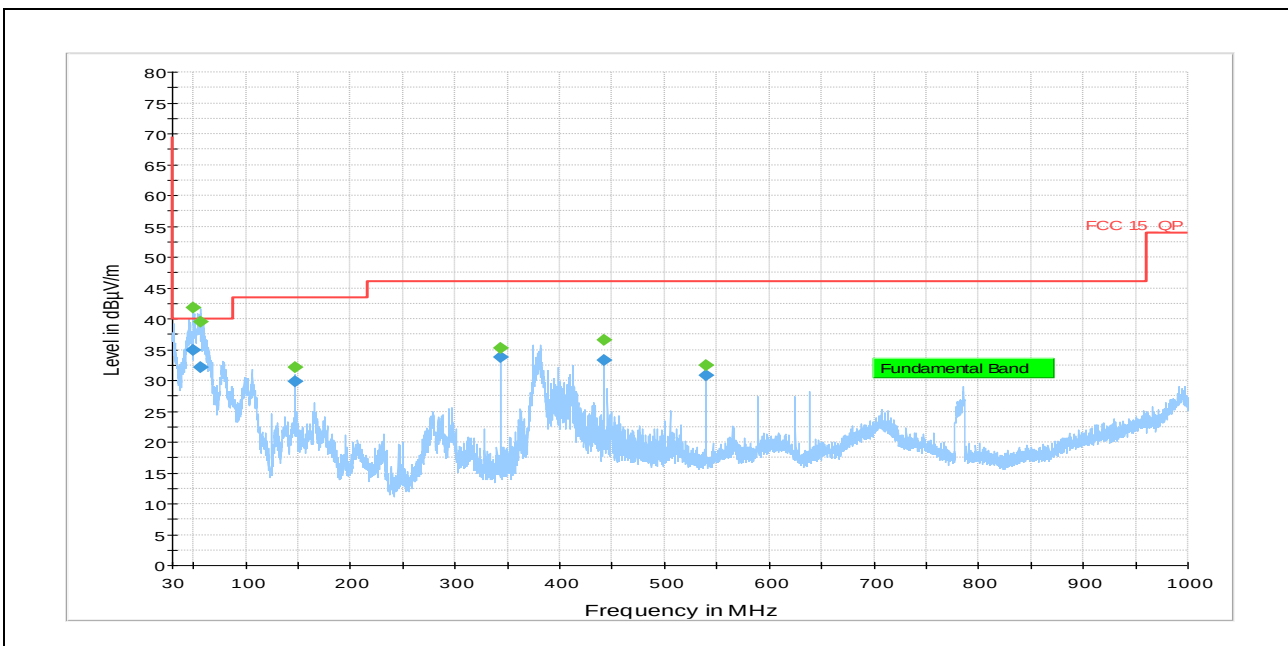
### 5.5.4.1 LTE Band 13 and Bluetooth BLE Tx

NOTES:

Radiated Emissions Full Scan

30 MHz – 1000 MHz

Vertical / Horizontal



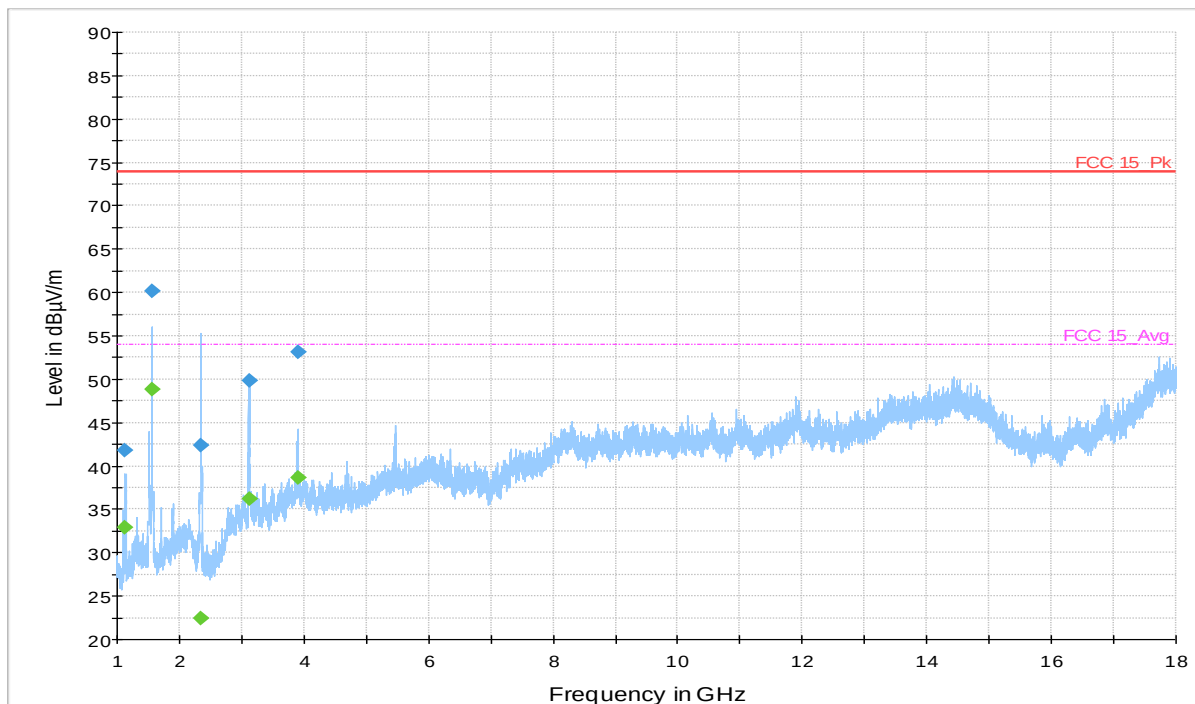
### Final Tabulated Data

30 MHz – 1000 MHz

| Frequency (MHz) | QuasiPeak (dBµV/m) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Comment |
|-----------------|--------------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|--------------|---------|
| 49.75           | 34.98              | ---              | 40.00          | 5.02        | 1000.00         | 120.00          | 100.00      | V   | -173.00       | -18.20       |         |
| 49.75           | ---                | 41.74            | ---            | ---         | 1000.00         | 120.00          | 100.00      | V   | -173.00       | -18.20       |         |
| 56.14           | ---                | 39.47            | ---            | ---         | 1000.00         | 120.00          | 100.00      | V   | 25.00         | -17.80       |         |
| 56.14           | 32.21              | ---              | 40.00          | 7.79        | 1000.00         | 120.00          | 100.00      | V   | 25.00         | -17.80       |         |
| 147.28          | 29.91              | ---              | 43.51          | 13.60       | 1000.00         | 120.00          | 100.00      | V   | -180.00       | -14.40       |         |
| 147.28          | ---                | 32.09            | ---            | ---         | 1000.00         | 120.00          | 100.00      | V   | -180.00       | -14.40       |         |
| 343.65          | ---                | 35.32            | ---            | ---         | 1000.00         | 120.00          | 100.00      | H   | 145.00        | -11.90       |         |
| 343.65          | 33.69              | ---              | 46.00          | 12.31       | 1000.00         | 120.00          | 100.00      | H   | 145.00        | -11.90       |         |
| 441.82          | 33.21              | ---              | 46.00          | 12.79       | 1000.00         | 120.00          | 100.00      | H   | 27.00         | -9.50        |         |
| 441.82          | ---                | 36.49            | ---            | ---         | 1000.00         | 120.00          | 100.00      | H   | 27.00         | -9.50        |         |
| 540.01          | 30.86              | ---              | 46.00          | 15.14       | 1000.00         | 120.00          | 100.00      | V   | -90.00        | -7.80        |         |
| 540.01          | ---                | 32.40            | ---            | ---         | 1000.00         | 120.00          | 100.00      | V   | -90.00        | -7.80        |         |

NOTES:

**Radiated Emissions Full Scan**  
**1000 MHz – 18000 MHz**  
**Vertical / Horizontal**



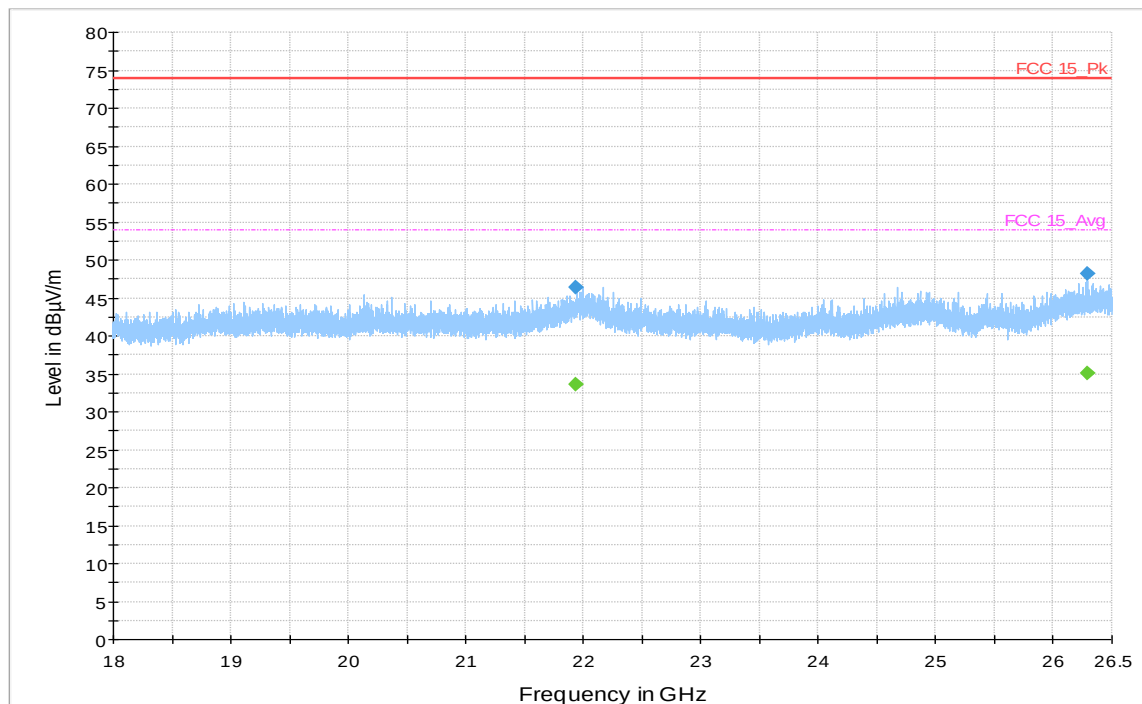
**Final Tabulated Data**

1000 MHz – 18000 MHz

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Comment |
|-----------------|------------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|--------------|---------|
| 1133.00         | ---              | 32.95            | 54.00          | 21.05       | 1000.00         | 1000.00         | 100.00      | V   | 26.00         | -36.20       |         |
| 1133.00         | 41.78            | ---              | 74.00          | 32.22       | 1000.00         | 1000.00         | 100.00      | V   | 26.00         | -36.20       |         |
| 1563.80         | 60.14            | ---              | 74.00          | 13.86       | 1000.00         | 1000.00         | 150.00      | V   | 106.00        | -34.70       |         |
| 1563.80         | ---              | 48.86            | 54.00          | 5.14        | 1000.00         | 1000.00         | 150.00      | V   | 106.00        | -34.70       |         |
| 2334.42         | ---              | 22.38            | 54.00          | 31.62       | 1000.00         | 1000.00         | 101.00      | V   | 98.00         | -31.10       |         |
| 2334.42         | 42.33            | ---              | 74.00          | 31.67       | 1000.00         | 1000.00         | 101.00      | V   | 98.00         | -31.10       |         |
| 3117.20         | ---              | 36.26            | 54.00          | 17.74       | 1000.00         | 1000.00         | 167.00      | V   | 89.00         | -27.50       |         |
| 3117.20         | 49.79            | ---              | 74.00          | 24.21       | 1000.00         | 1000.00         | 167.00      | V   | 89.00         | -27.50       |         |
| 3897.74         | 53.13            | ---              | 74.00          | 20.87       | 1000.00         | 1000.00         | 127.00      | V   | 106.00        | -24.90       |         |
| 3897.74         | ---              | 38.62            | 54.00          | 15.38       | 1000.00         | 1000.00         | 127.00      | V   | 106.00        | -24.90       |         |

NOTES:

**Radiated Emissions Full Scan**  
**18000 MHz – 26000 MHz**  
**Vertical / Horizontal**



**Final Tabulated Data**

18000 MHz – 26000 MHz

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Comment |
|-----------------|------------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|--------------|---------|
| 21938.88        | ---              | 33.65            | 54.00          | 20.35       | 1000.00         | 1000.00         | 210.00      | H   | -151.00       | 12.30        |         |
| 21938.88        | 46.47            | ---              | 74.00          | 27.53       | 1000.00         | 1000.00         | 210.00      | H   | -151.00       | 12.30        |         |
| 26293.34        | ---              | 35.01            | 54.00          | 18.99       | 1000.00         | 1000.00         | 195.00      | H   | -126.00       | 13.70        |         |
| 26293.34        | 48.19            | ---              | 74.00          | 25.81       | 1000.00         | 1000.00         | 195.00      | H   | -126.00       | 13.70        |         |



## 6 Test Equipment List

### 6.1 Equipment List

| Equipment                   | Manufacturer    | Model #                  | Serial/Inst # | Last Cal<br>mm/dd/yyyy | Next Cal<br>mm/dd/yyyy |
|-----------------------------|-----------------|--------------------------|---------------|------------------------|------------------------|
| Spectrum Analyzer           | Rohde & Schwarz | FSU26.5                  | 200050        | 11/20/2018             | 11/20/2019             |
| Spectrum Analyzer           | Rohde & Schwarz | FSU8                     | 101358        | 12/07/2018             | 12/07/2019             |
| EMI Receiver                | Rohde & Schwarz | ESIB40                   | 100180        | 05/31/2018             | 05/31/2020             |
| L.I.S.N.                    | Com-Power       | LI-215                   | 192000        | 01/16/2019             | 01/16/2020             |
| Transient Limiter           | Com-Power       | LIT-930                  | 531582        | 01/16/2019             | 01/16/2020             |
| EMI Receiver                | Agilent         | MXE N9038A               | MY51210195    | 01/16/2019             | 01/16/2020             |
| Preamplifier, 9 kHz – 1 GHz | Sonoma          | 310N                     | 213221        | 01/16/2019             | 01/16/2020             |
| Bilog Antenna               | Sunol Sciences  | JB3                      | A060502       | 05/27/2018             | 05/27/2020             |
| Amplifier                   | Miteq           | TTA1800-30-HG            | 1842452       | 01/15/2019             | 01/15/2020             |
| Horn Antenna                | Sunol Sciences  | DRH-118                  | A040806       | 03/05/2019             | 03/05/2020             |
| Amplifier                   | HP              | 8449B                    | 3008A01013    | 01/15/2019             | 01/15/2020             |
| Amplifier                   | Sonoma          | 310N                     | 185516        | N/A (See Note)         |                        |
| 1.6 GHz Low Pass Filter     | K&L Microwave   | 8L120-X1600-0/09135-0249 | UA691-35      | N/A (See Note)         |                        |
| 3.5 GHz High Pass Filter    | Hewlett Packard | 84300-80038              | 820004        | N/A (See Note)         |                        |
| 2.4 GHz Notch Filter        | Micro-Tronics   | BRM50702                 | 009           | 01/15/2019             | 01/15/2020             |

Note: Equipment is characterized before use.

## 7 EMC Test Plan

### 7.1 Introduction

This section provides a description of the Equipment Under Test (EUT), configurations, operating conditions, and performance acceptance criteria. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing.

### 7.2 Customer

**Table 5:** Customer Information

|                  |                                |
|------------------|--------------------------------|
| Company Name     | Schindler Elevator Corporation |
| Address          | 20 Whippany Road               |
| City, State, Zip | Morristown, NJ 07960           |
| Country          | US                             |
| Phone            | +1 201-40-0-1867               |

**Table 6:** Technical Contact Information

|           |                             |
|-----------|-----------------------------|
| Name      | Guy, Monhollen              |
| Phone nr. | +1 201-40-0-1867            |
| E-mail    | guy.monhollen@schindler.com |

### 7.3 Equipment Under Test (EUT)

The information provided in the following table should be listed as it should appear in the final report. For those products that have only a model name, list the model number as *non-applicable* and vice-versa.

**Table 7:** EUT Designation

|              |           |
|--------------|-----------|
| Product Name | AC GTW 03 |
| Model Number | CB3       |
| System Name  | AC GTW 03 |

## 7.4 Product Specifications

**Table 8:** EUT Specifications

| EUT Specifications                                                                                                  |                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC Input                                                                                                            | 8-30 V DC                                                                                                                                                            |
| Environment                                                                                                         | Commercial                                                                                                                                                           |
| Operating Temperature Range:                                                                                        | 0°C - 50°C                                                                                                                                                           |
| Multiple Feeds:                                                                                                     | <input type="checkbox"/> Yes and how many<br><input checked="" type="checkbox"/> No                                                                                  |
| Product Marketing Name (PMN)                                                                                        | N/A                                                                                                                                                                  |
| Hardware Version Identification Number (HVIN)                                                                       | N/A                                                                                                                                                                  |
| Firmware Version Identification Number (FVIN)                                                                       | N/A                                                                                                                                                                  |
| RF Test Software Version                                                                                            | 2.4.2                                                                                                                                                                |
| Operating Modes                                                                                                     | BT Low Energy, 1Mbps                                                                                                                                                 |
|                                                                                                                     | LTE band: B2/B4/B5/B12/B13/B66/B71<br>WCDMA band: 2/4/5                                                                                                              |
| Transmitter Frequency Band                                                                                          | 2.4 GHz – 2.480 GHz                                                                                                                                                  |
| Power Setting @ Operating Channel                                                                                   | Max power                                                                                                                                                            |
| Modulation                                                                                                          | GFSK                                                                                                                                                                 |
| TX/RX Chain (s)                                                                                                     | SISO                                                                                                                                                                 |
| Type of Equipment                                                                                                   | <input checked="" type="checkbox"/> Table Top <input type="checkbox"/> Wall-mount <input type="checkbox"/> Floor standing cabinet<br><input type="checkbox"/> Other: |
| <b>Note:</b> EUT will be on / transmitted at all times with the highest power levels and antenna gains per channel. |                                                                                                                                                                      |

### **Client provided Information:**

CB3 is the easiest way to get telecommunication services to premises that cannot be reached by telephone landlines, but where there is adequate cellular telephone coverage.

Through the mobile network, CB3 allows you to make/receive calls from standard telephones, PBX, fax, modem, without difference with respect to a standard PSTN line.

Voice, data and fax services require different phone numbers: during the installation the end-user will be assigned three different phone numbers, for voice, data and fax reception respectively.

When making a call (both voice, data or fax), CB3 uses the main number (the voice number), while in order to receive a data or fax call, it is necessary that CB3 is called on its corresponding data or fax number.

It is equipped with an external battery that works during any network malfunction, with an estimated autonomy equal to 5 hours in call mode and 16 hours in stand-by mode.

**Table 9:** Antenna Information

| Number    | Antenna Type | Description          | Max Gain (dBi) |
|-----------|--------------|----------------------|----------------|
| Antenna 0 | External     | Bluetooth Low Energy | 0.56           |
| Antenna 1 | External     | LTE                  | 5.0            |

**Table 10:** Interface Specifications

| Interface Type | Cabled with what type of cable? | Is the cable shielded? | Maximum potential length of the cable? | Metallic (M), Coax (C), Fiber (F), or Not Applicable? |
|----------------|---------------------------------|------------------------|----------------------------------------|-------------------------------------------------------|
| RJ45           | RJ45                            | No                     | < 3m                                   | M                                                     |

**Table 11:** Accessory Equipment

| Equipment | Manufacturer | Model | Serial | Comment |
|-----------|--------------|-------|--------|---------|
| N/A       | N/A          | N/A   | N/A    | N/A     |

**Table 12:** Ancillary Equipment (used for test purposes only)

| Equipment          | Manufacturer | Model               | Serial | Used for                                                               |
|--------------------|--------------|---------------------|--------|------------------------------------------------------------------------|
| Laptop             | Dell         | Inspiron<br>15-5548 | N/A    | Setup EUT operating modes/<br>channels via a RJ45 connection to<br>EUT |
| <b>Note:</b> None. |              |                     |        |                                                                        |

**Table 13:** Description of Sample used for Testing

| Sample Number      | Device | Serial Number           | Configuration                 | Used For                              |
|--------------------|--------|-------------------------|-------------------------------|---------------------------------------|
| 1                  | CB3    | A1NAB8C1P1E<br>B1000031 | Radiated/<br>Conducted Sample | TX Spurious<br>Emissions,<br>Bandedge |
| <b>Note:</b> None. |        |                         |                               |                                       |

**Table 14:** Description of Test Configuration used for Radiated Measurement.

| Device       | Antenna  | Mode     | Setup Photo<br>(X-Axis) | Setup Photo<br>(Y-Axis) | Setup Photo<br>(Z-Axis) |
|--------------|----------|----------|-------------------------|-------------------------|-------------------------|
| CB3          | External | Transmit | EUT upright             | N/A                     | N/A                     |
| <b>Note:</b> |          |          |                         |                         |                         |

## 7.5 Test Specifications

**Table 15:** ANSI C63.10

| Emissions and Immunity   |             |
|--------------------------|-------------|
| Standard                 | Requirement |
| CFR 47 Part 15.247: 2019 | All         |
| RSS 247 Issue 2, 2017    | All         |

**END OF REPORT**