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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Revisions

Revision No.	Date MM/DD/YYYY	Reason for Change	Author
0	November 20, 2019	Original Document	NA
1	January 29, 2020	TCB Review	OC
2	February 3, 2020	TCB Review	OC
3	February 14, 2020	TCB Review	OC

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		Richard Decker	
Test Engineer	Date February 14, 2020	A2LA Signatory	Date February 14, 2020

Testing Cert #3331.02 **US1131** **2932D**

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

Field Strength (dBμV/m) = RAW - AMP + CBL + ACF

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

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

Sample radiated emissions calculation @ 30 MHz

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

25 dBuV/m + 17.5 dB – 20 dB + 1.0 dB = 23.5 dBuV/m

2.3.2 Measurement Uncertainty

Per CISPR 16-4-2	U_{lab}	U_{cispr}
Radiated Disturbance @ 10 meters		
30 – 1,000 MHz	2.25 dB	4.51 dB
Radiated Disturbance @ 3 meters		
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
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	1.09 dB	2.18 dB
Disturbance Power		
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

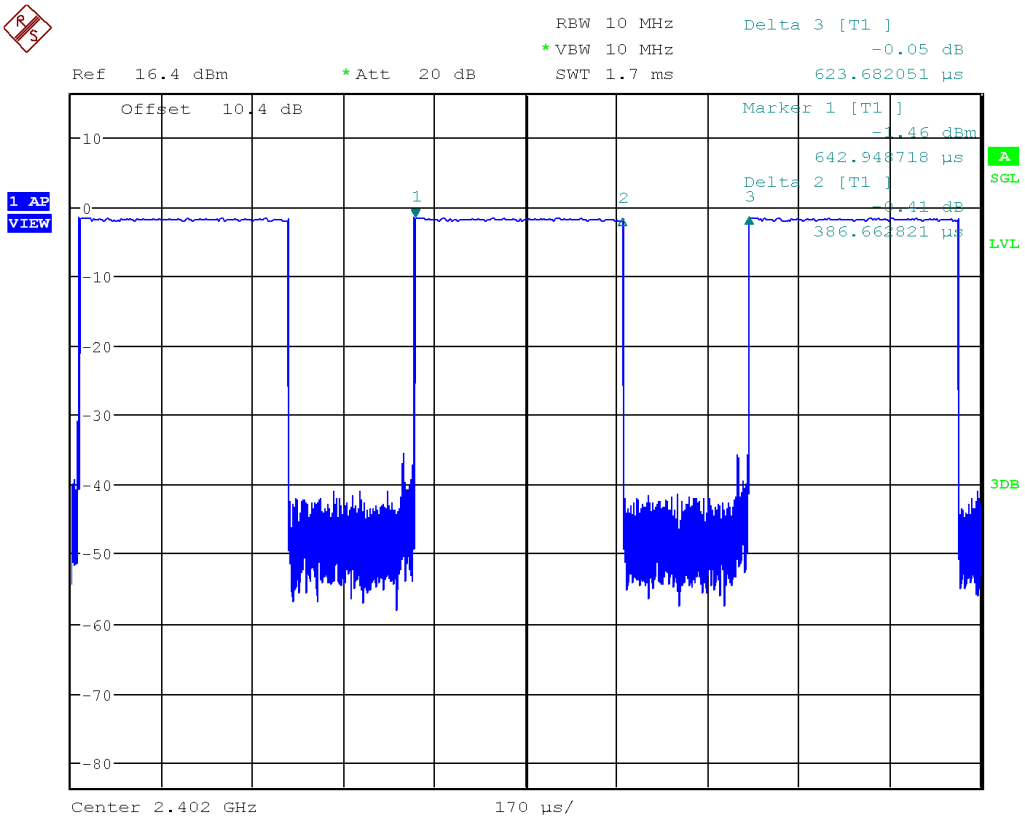


Figure 1: Duty Cycle for BLE

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.

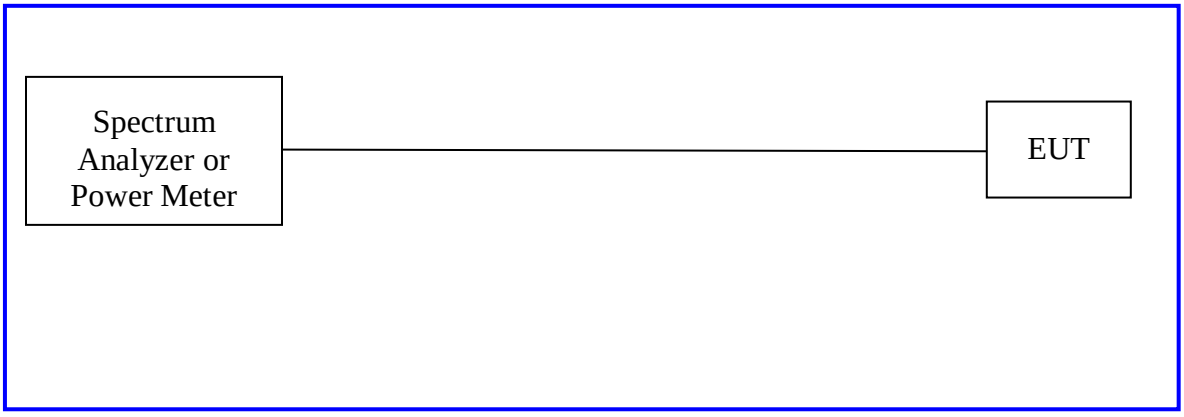
The maximum output power and harmonics shall not exceed CFR47 Part 15.247 (b) and RSS 247 5.4 (d).

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:

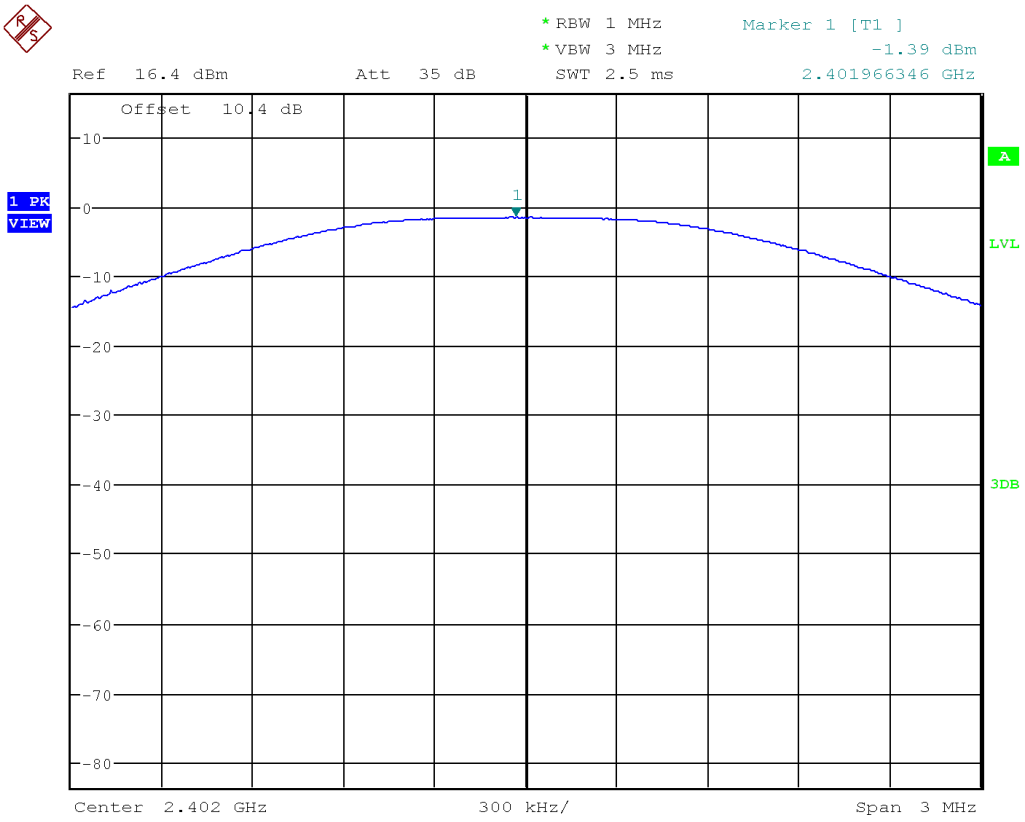


5.1.2 Results

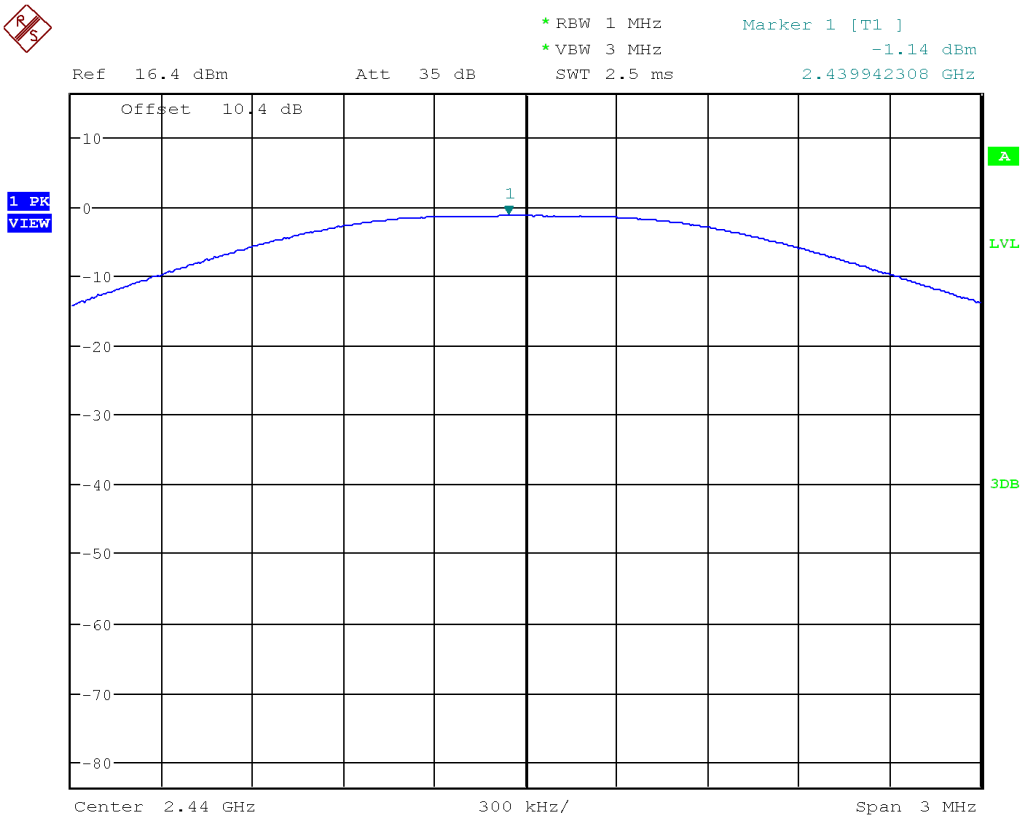
As originally tested, the EUT was found to be compliant to the requirements of the test standard(s). Worse case data for each mode reported below. Plots of highest power included for low, medium, and high channels.

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

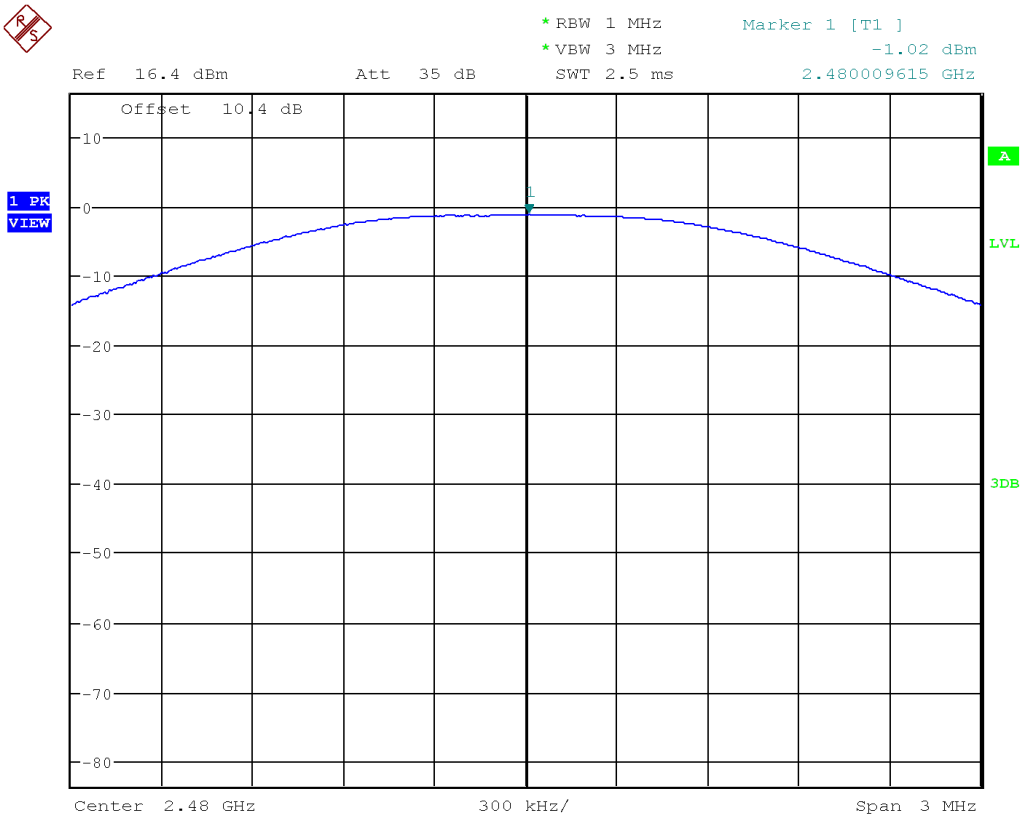
Test Conditions: Conducted Measurement, Normal Temperature			
Antenna Type: PCB trace antenna			
Max. Antenna Gain: 0.56 dBi			
Operating Channel (MHz)	**Limit [dBm]**	**Total Power [dBm]**	**Margin [dB]**
2402	30.00	0.69	-29.31
2440	30.00	0.94	-29.06
2480	30.00	1.06	-28.94



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.

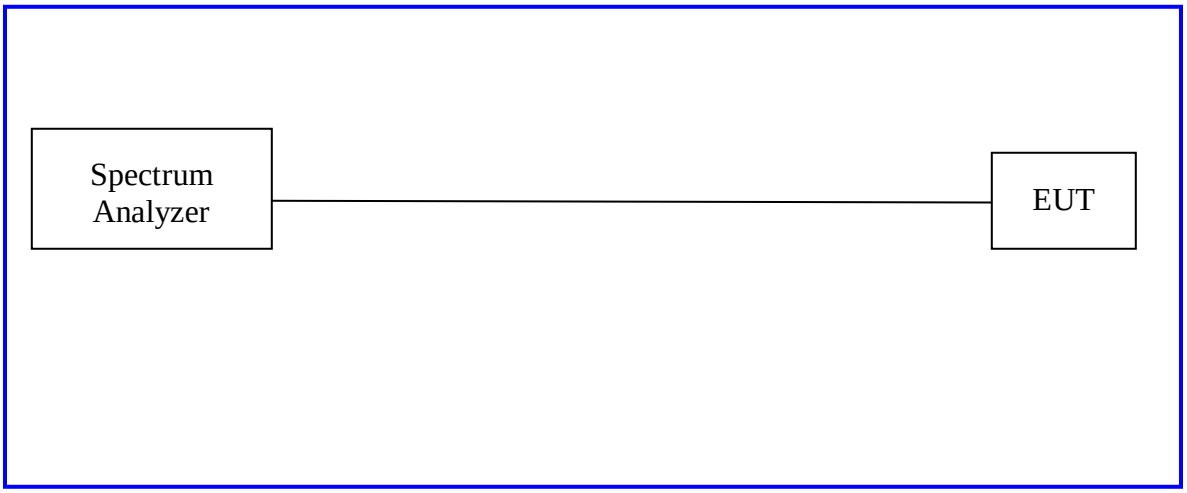
The 99% bandwidth is the bandwidth in which 99% of the transmitted power occupied.

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:



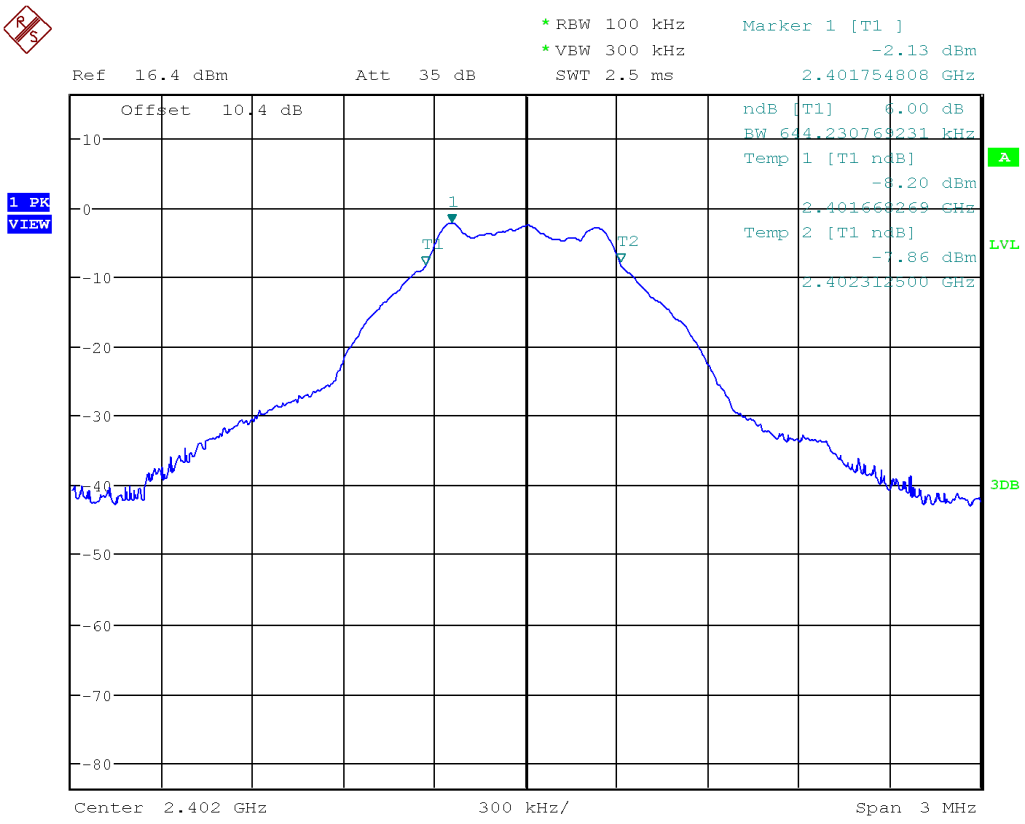
5.2.2 Results

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

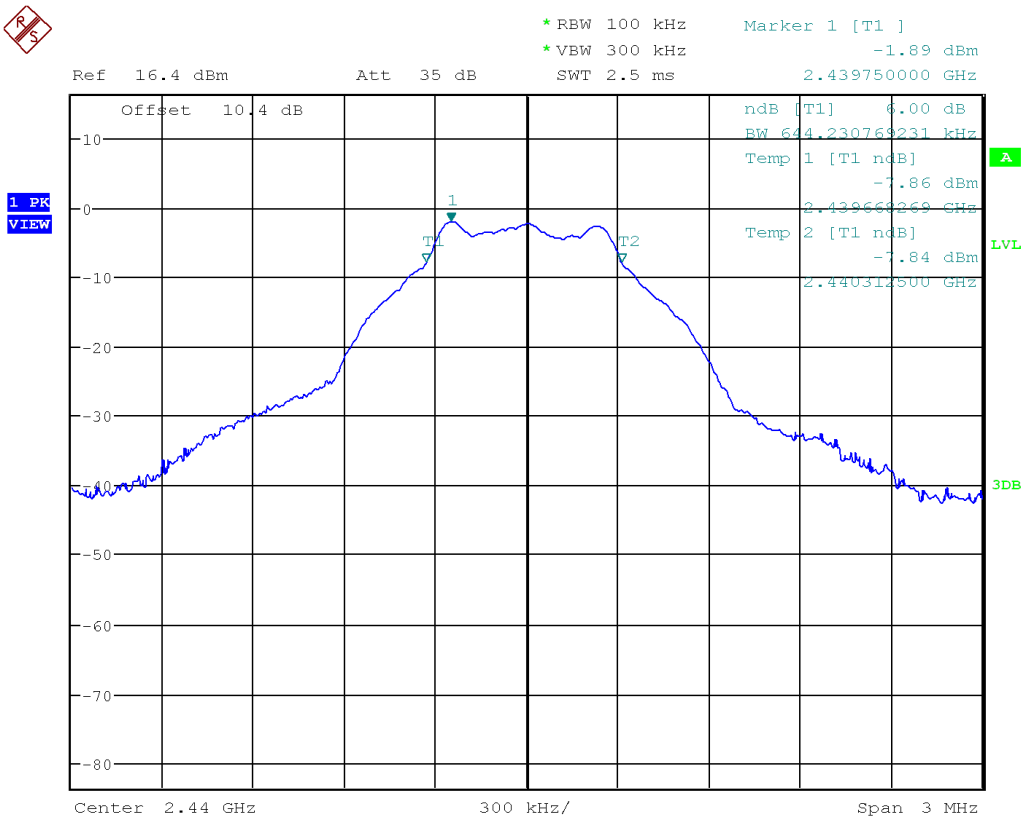
Table 3: Occupied Bandwidth – Test Results

Test Conditions: Conducted Measurement, Normal Temperature

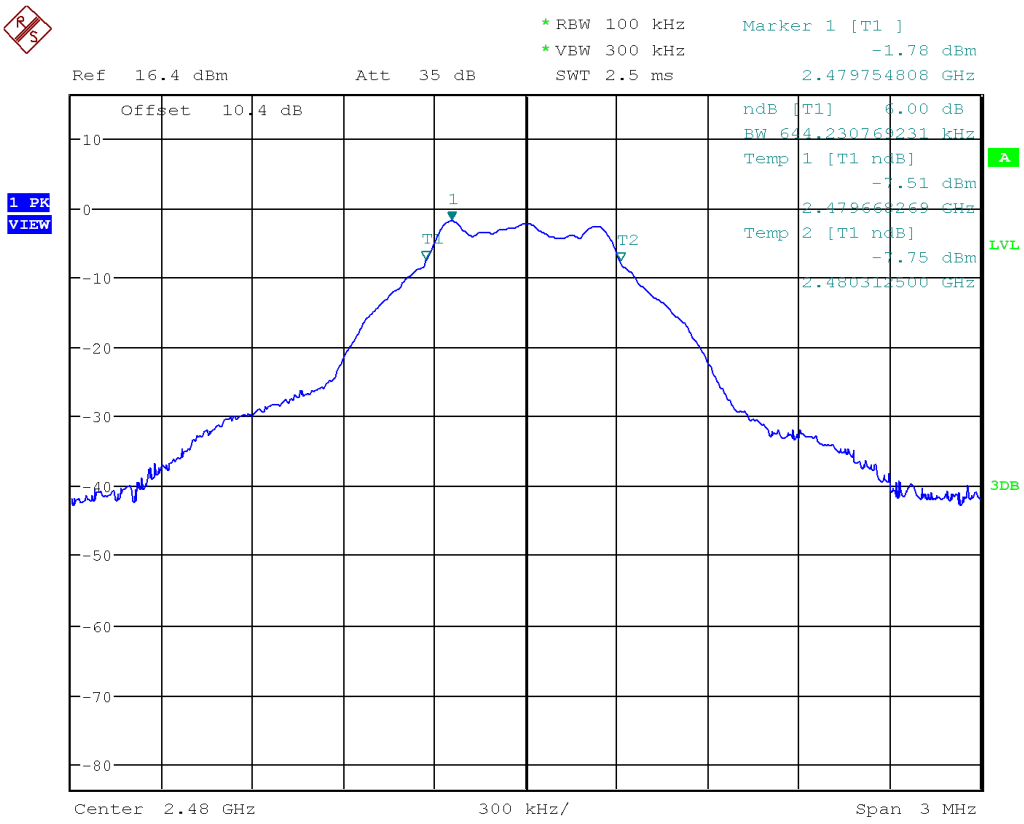
Bandwidth (MHz)	
Freq. (MHz)	**6dB (DTS) Bandwidth (MHz)**
2402	0.644
2440	0.644
2480	0.644
Note: None	



Plot 4. 2402MHz, 6dB Bandwidth



Plot 5. 2440MHz, 6dB Bandwidth



Plot 6. 2480MHz, 6dB Bandwidth

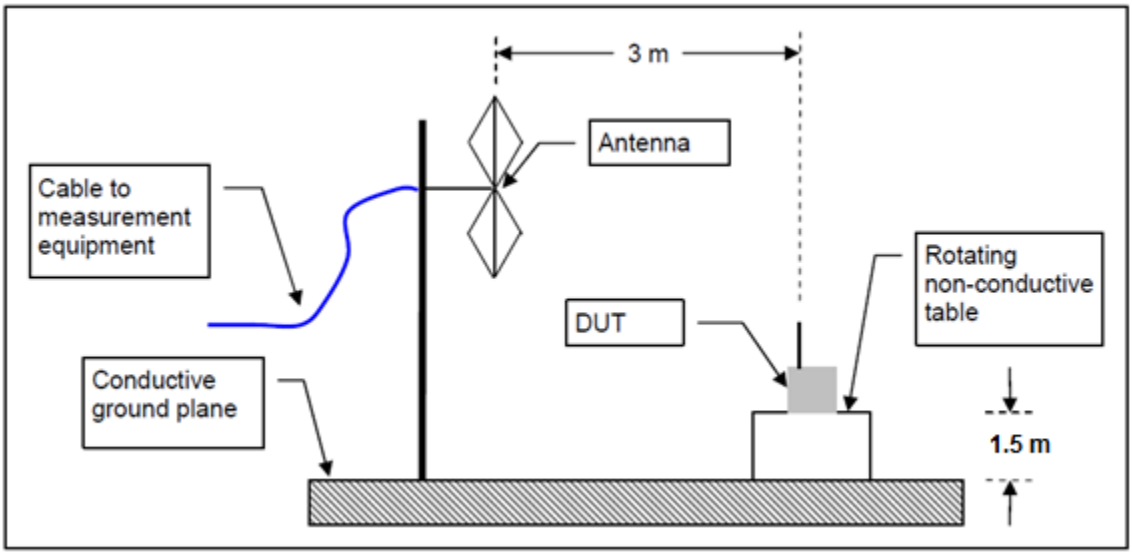
5.3 Out of Band Emissions: Restricted Band Edge

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

Test Conditions: Radiated Measurement, Normal Temperature and Voltage							
Lower Restricted Band Edge							
Freq. (MHz)	**Mode**	**Center Freq (MHz)**	**Detector (Average/ Peak)**	**Measured (dBuV/m)**	**Limit (dBuV/m)**	**Margin**	**Results**
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
Upper Restricted Band Edge							
Freq. (MHz)	**Mode**	**Center Freq (MHz)**	**Detector (Average/ Peak)**	**Measured (dBuV/m)**	**Limit (dBuV/m)**	**Margin**	**Results**
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
Note: 1. The DCCF (Average Detector) is included in this table, the following plots are of peak values							

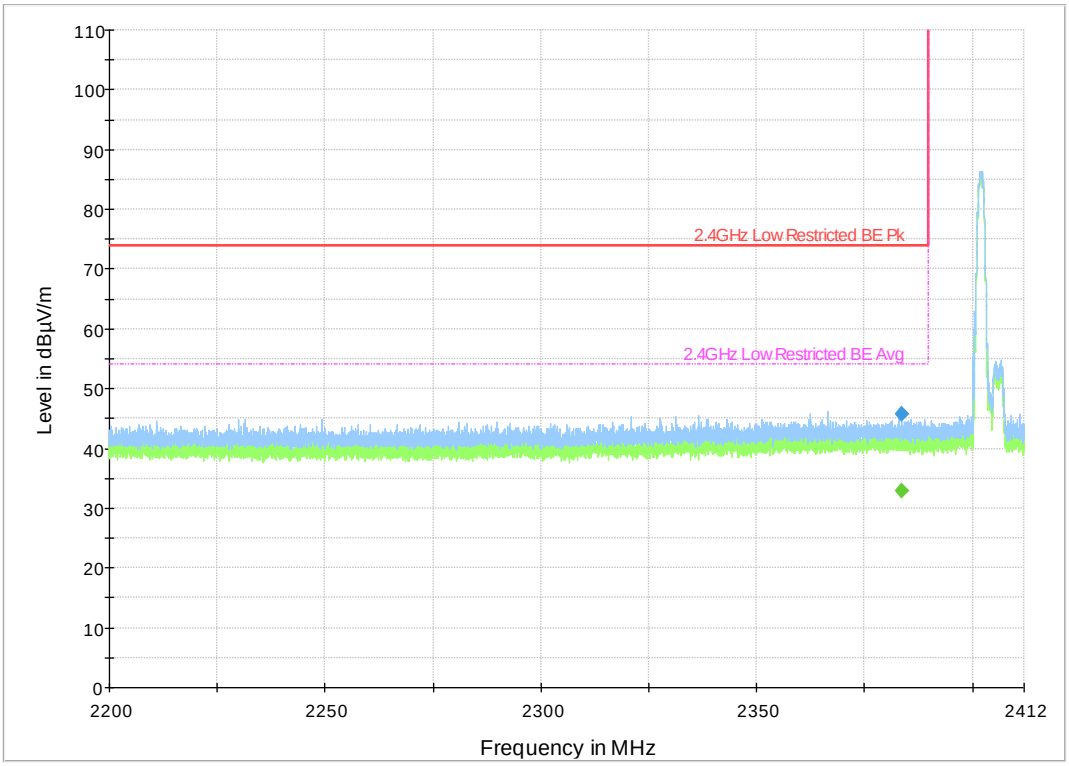


Figure 2. 2402MHz, Lower Band Edge, Restricted

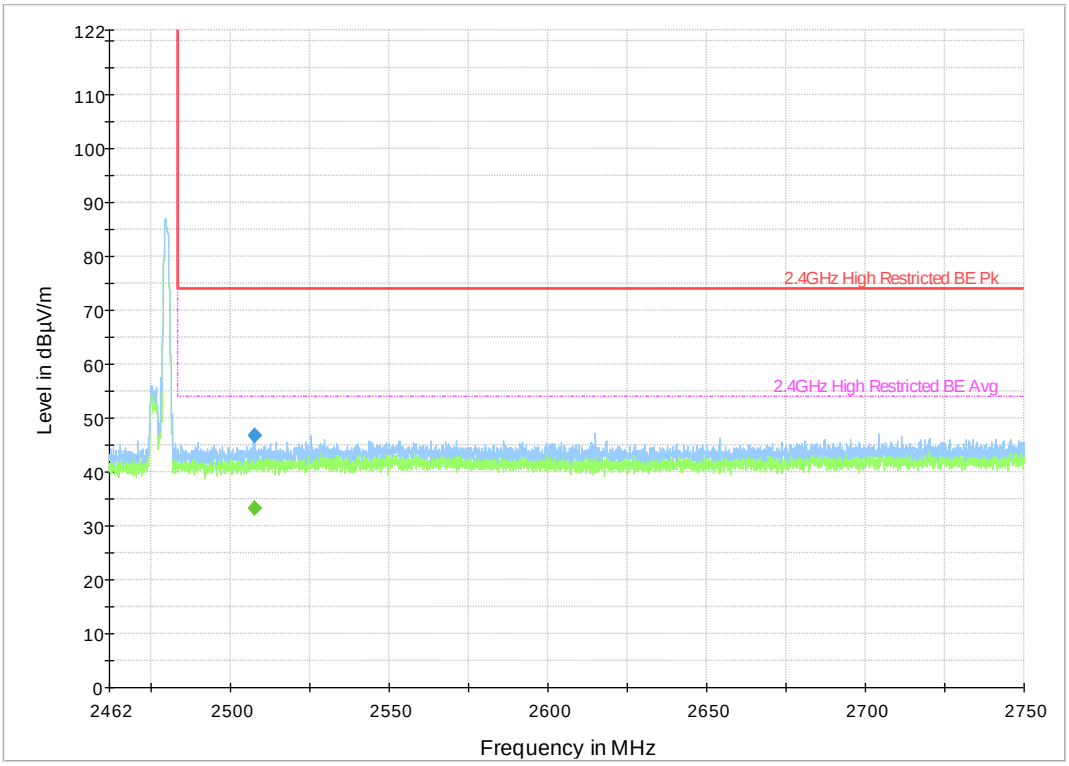


Figure 3. 2480MHz, Upper Band Edge, Restricted

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, 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.

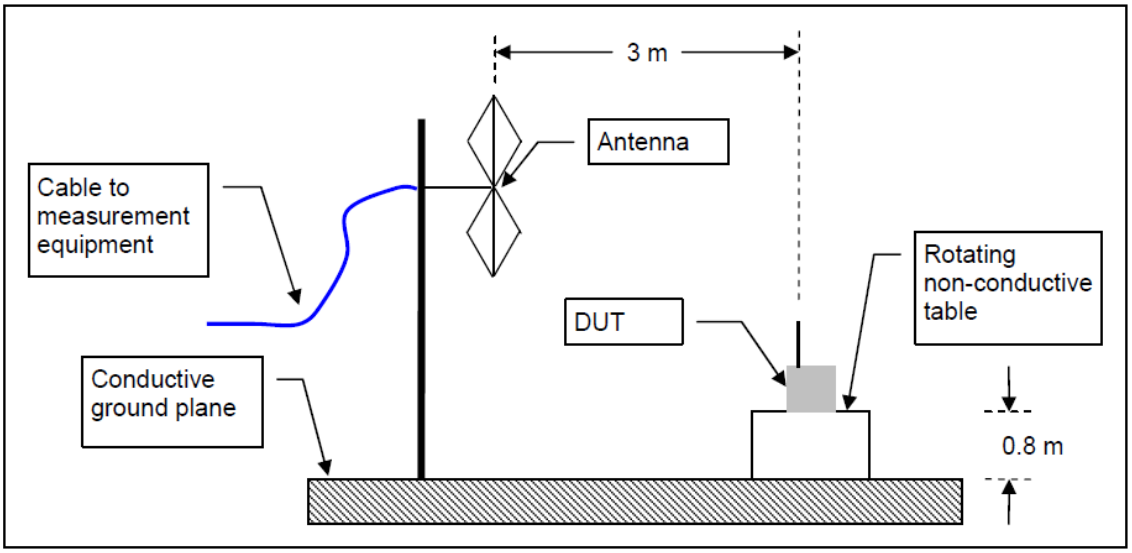
5.4.1.3 Deviations

None.

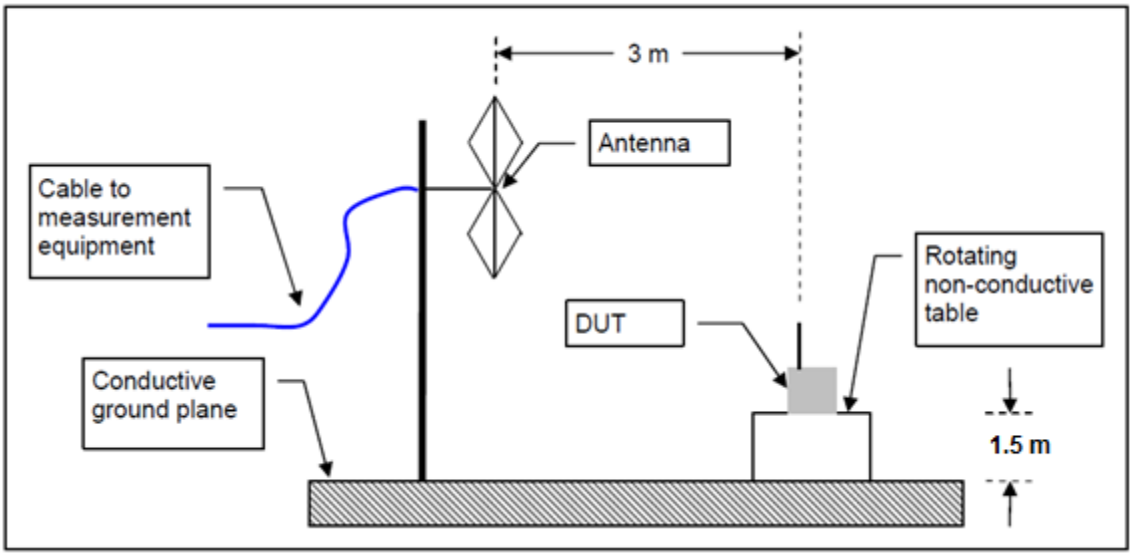
5.4.2 Test Setup:

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 (microvolts/meter)	Measurement distance (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	

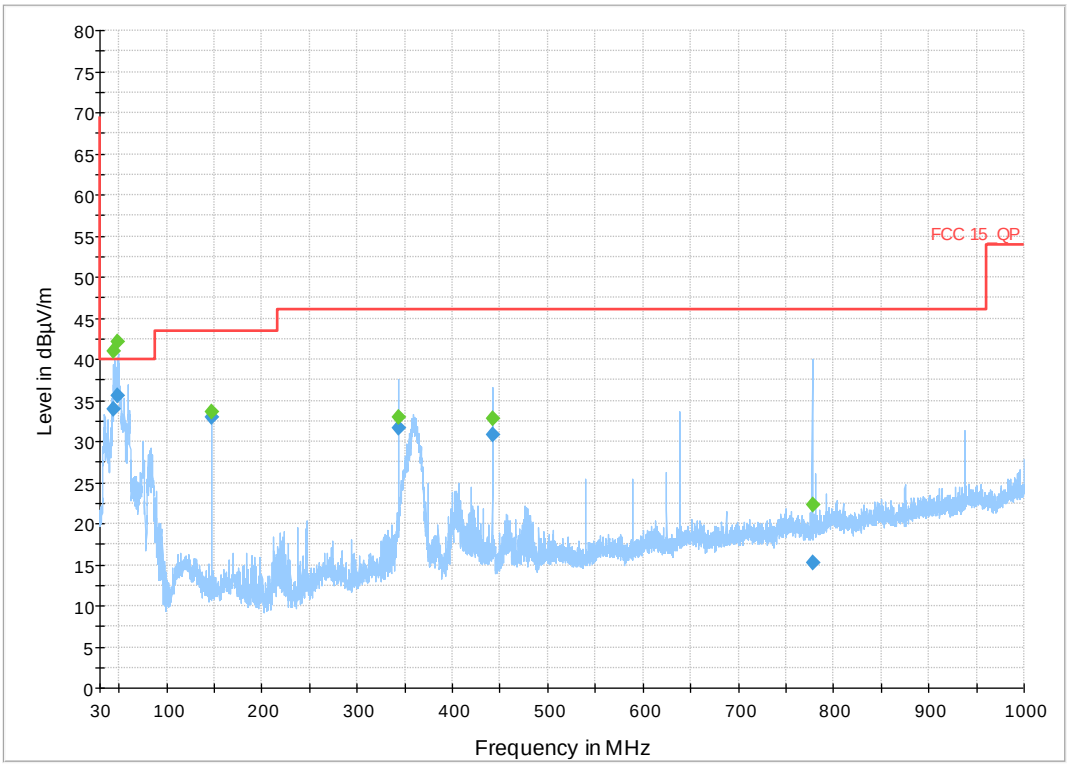


Figure 4. 30MHz-1GHz, 2440MHz

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	

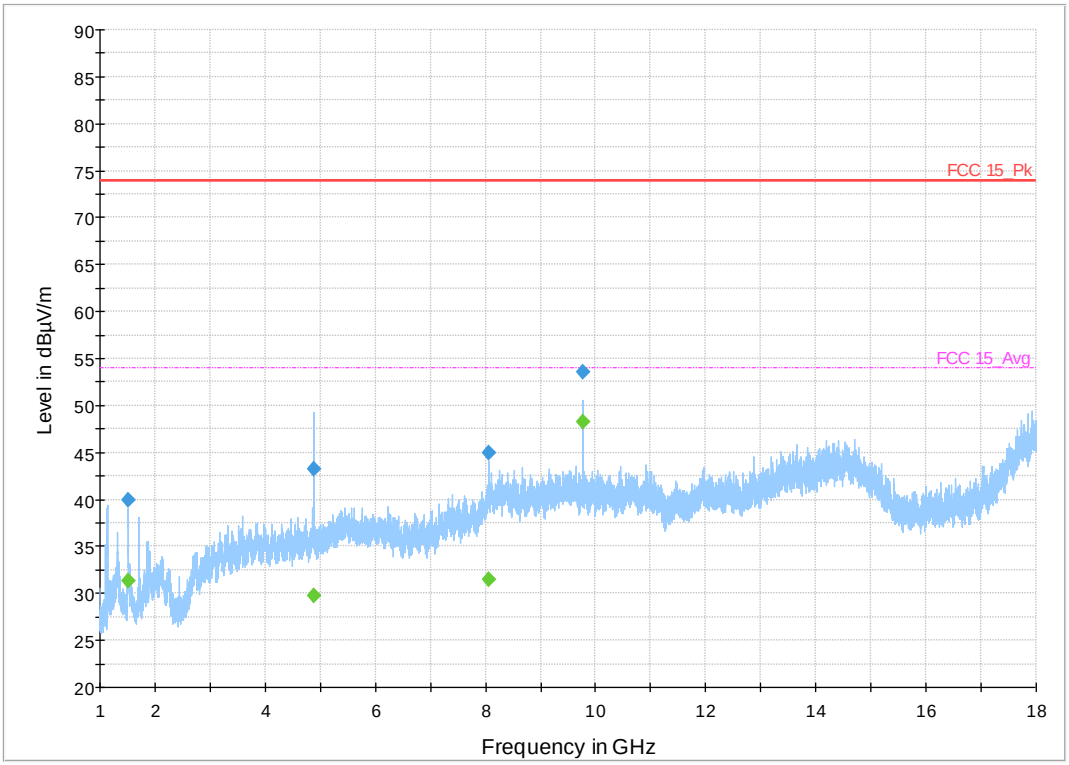


Figure 5. 1-18GHz, 2440MHz

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.

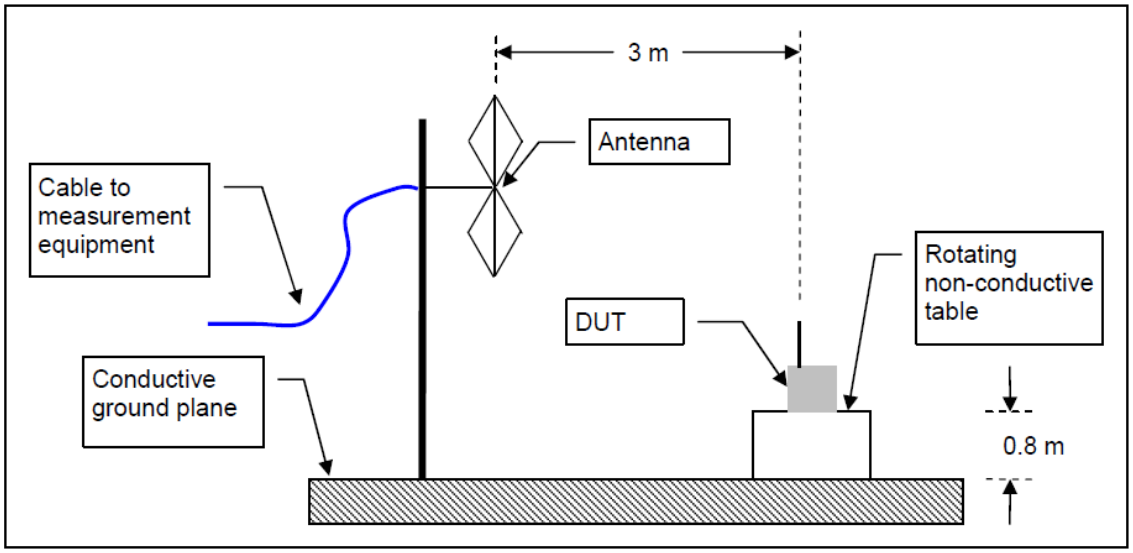
5.5.1.3 Deviations

None.

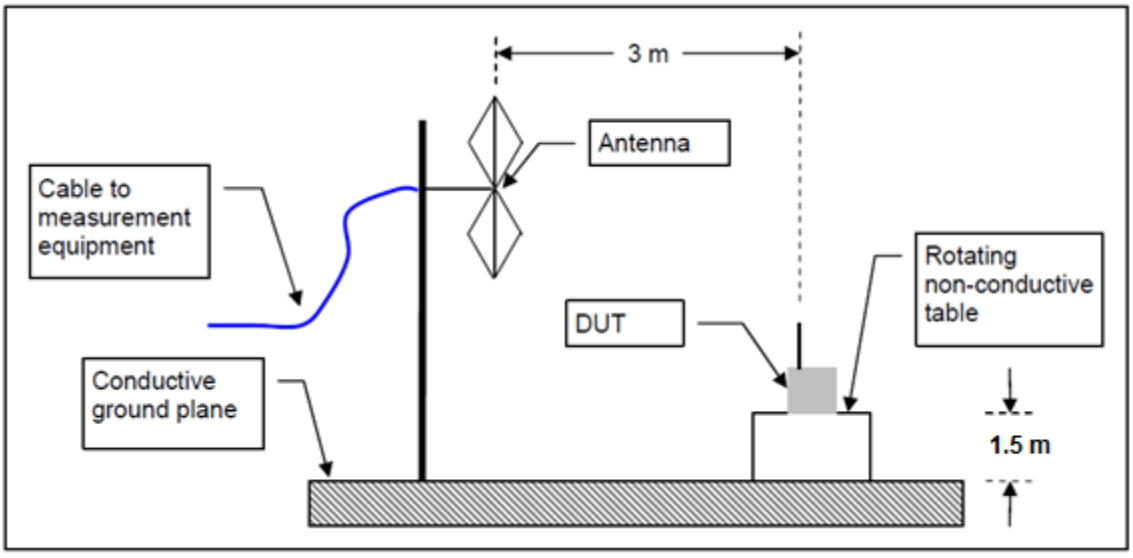
5.5.2 Test Setup:

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.

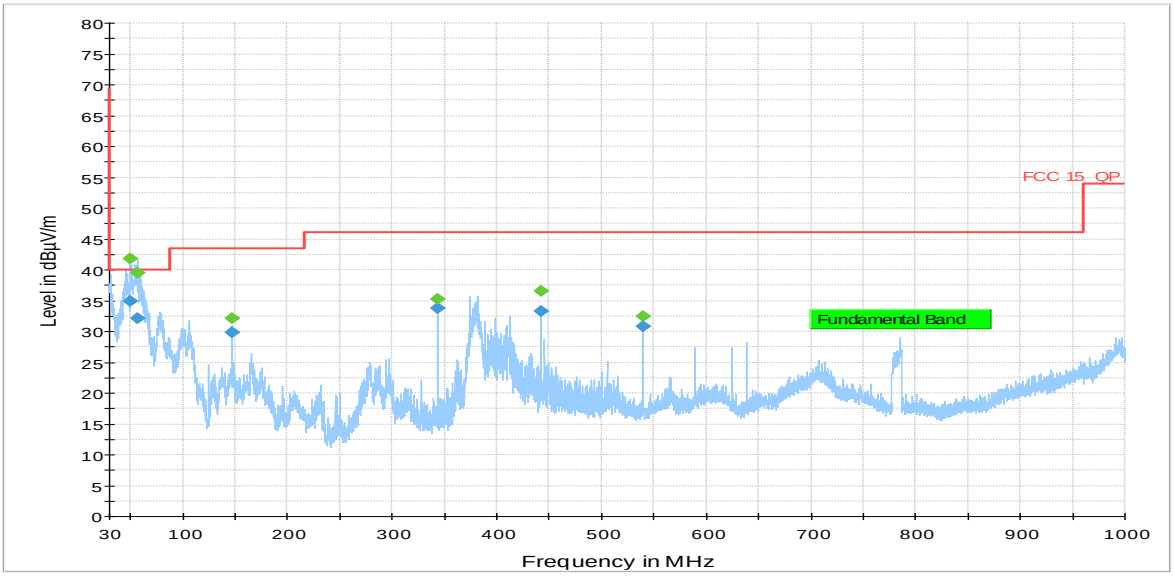
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490.....	2400/F(kHz)	300
0.490-1.705.....	24000/F(kHz)	30
1.705-30.0.....	30	30
30-88.....	100 **	3
88-216.....	150 **	3
216-960.....	200 **	3
Above 960.....	500	3

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**



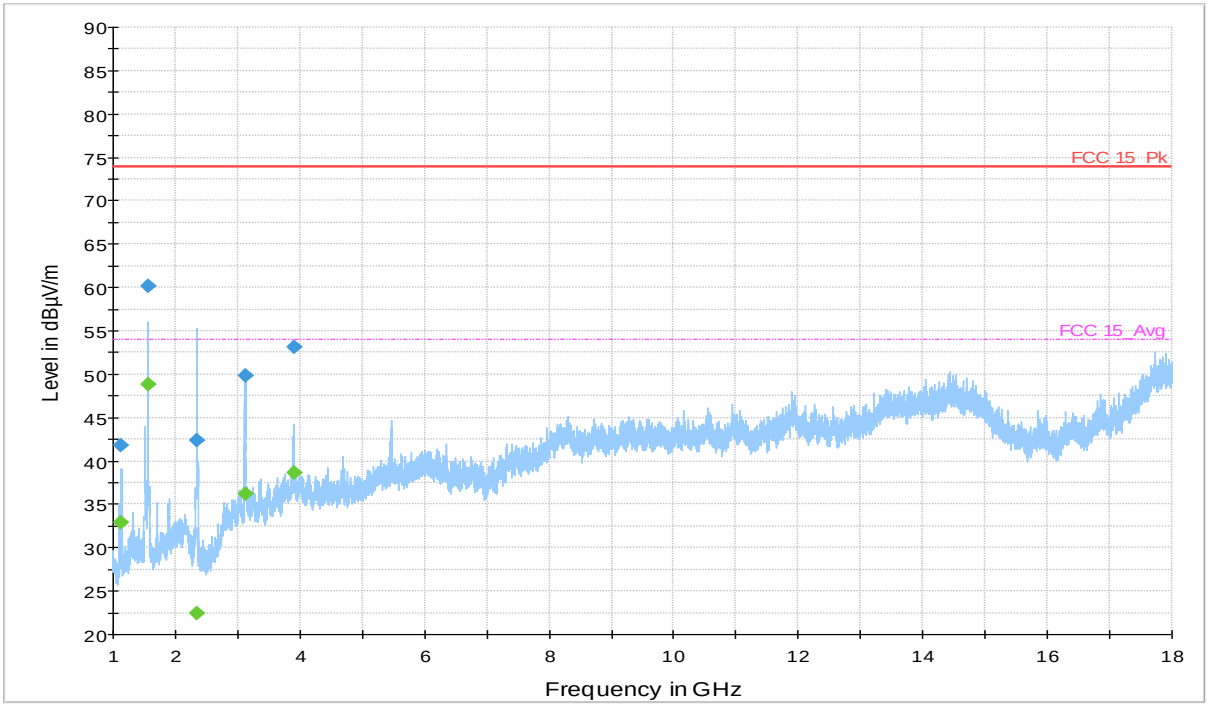
Final Tabulated Data

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



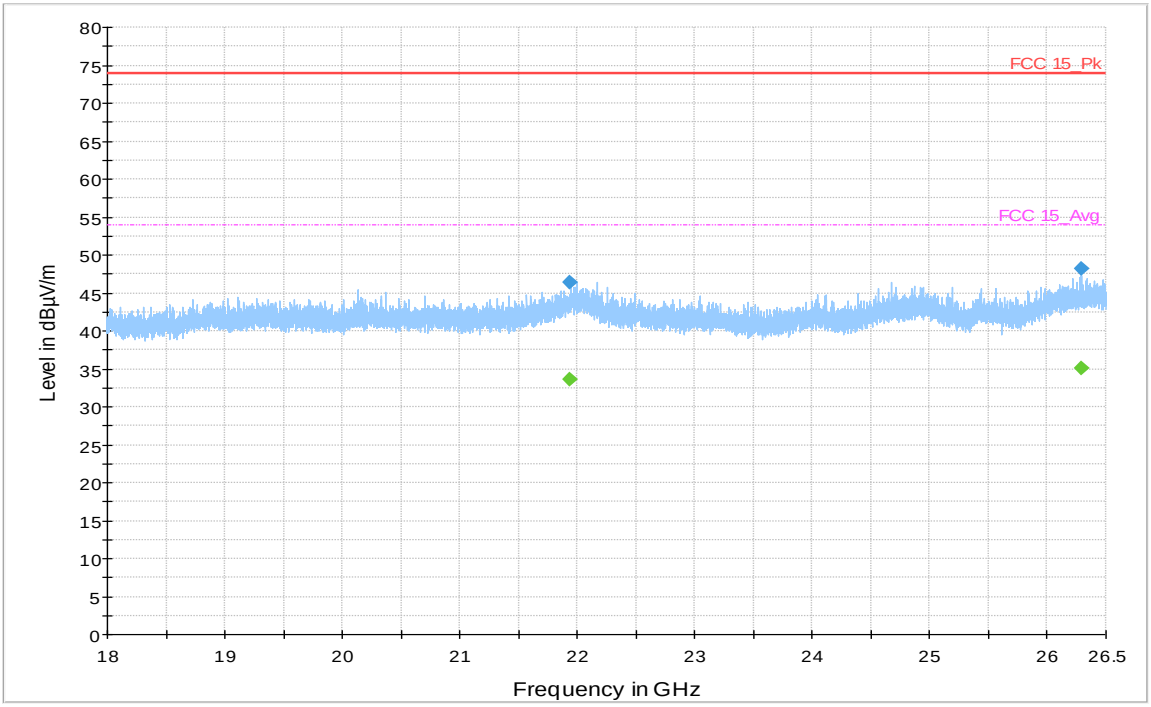
Final Tabulated Data

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 mm/dd/yyyy	Next Cal 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:	☐ Yes and how many ☒ 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 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	☒ Table Top ☐ Wall-mount ☐ Floor standing cabinet ☐ Other:
Note: 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 15-5548	N/A	Setup EUT operating modes/ channels via a RJ45 connection to EUT
Note: None.				

Table 13: Description of Sample used for Testing

Sample Number	Device	Serial Number	Configuration	Used For
1	CB3	A1NAB8C1P1E B1000031	Radiated/ Conducted Sample	TX Spurious Emissions, Bandedge
Note: None.				

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

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

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