

TEST REPORT

Report Number: 21081567HKG-002

Application for Original Grant of 47 CFR Part 15 Certification

FCC ID: 2AW6I-4802

Prepared and Checked by:

Approved by:

Signed On File

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Date: September 27, 2021

TEST REPORT

GENERAL INFORMATION

Applicant Name:	HALO Innovations, Inc.
Applicant Address:	213 West 35th Street, Suite 2E, New York, NY 10001
FCC Specification Standard:	FCC Part 15, October 1, 2020 Edition
FCC ID:	2AW6I-4802
FCC Model(s):	4669
Type of EUT:	Spread Spectrum Transmitter
Description of EUT:	SleepSure Sensor
Serial Number:	N/A
Sample Receipt Date:	August 31, 2021
Date of Test:	August 31, 2021 to September 20, 2021
Report Date:	September 27, 2021
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%
Conclusion:	Test was conducted by client submitted sample. The submitted sample as received complied with the 47 CFR Part 15 Certification.

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1.0 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.1 Summary of Test Results

Test Items	FCC Part 15 Section	Results	Details See Section
Antenna Requirement	15.203	Pass	2.1
Max. Conducted Output Power (Peak)	15.247(b)(3)&(4)	Pass	4.1
Min. 6dB RF Bandwidth	15.247(a)(2)	Pass	4.2
Max. Power Density (average)	15.247(e)	Pass	4.3
Out of Band Antenna Conducted Emission	15.247(d)	Pass	4.4
Radiated Emission in Restricted Bands and Spurious Emissions	15.247(d), 15.209 & 15.109	Pass	4.6
AC Power Line Conducted Emission	15.207 & 15.107	Pass	4.7

Note: Pursuant to FCC Part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

1.2 Statement of Compliance

The equipment under test is found to be complying with the following standard:

FCC Part 15, October 1, 2020 Edition

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2.0 GENERAL DESCRIPTION

2.1 Product Description

The 4669 is a SleepSure Sensor incorporating a Bluetooth BLE transceiver.

The Equipment Under Test (EUT) operates at frequency range of 2402MHz to 2480MHz with 39 channels.

The EUT is power by a 3.7V internal rechargeable battery.

The antenna(s) used in the EUT is integral, and the test sample is a prototype.

The circuit description is saved with filename: descri.pdf.

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2.2 Test Methodology

Both AC power line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Preliminary radiated scans and all radiated measurements were performed in radiated emission test sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. Antenna port conducted measurements were performed according to ANSI C63.10 (2013) and KDB Publication No.558074 D01 v05r01 (11-February-2019) All other measurements were made in accordance with the procedures in 47 CFR Part 2.

2.3 Test Facility

The radiated emission test site and antenna port conducted measurement facility used to collect the radiated data and conductive data are at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong SAR, China. This test facility and site measurement data have been fully placed on file with the FCC.

2.4 Related Submittal(s) Grants

This is a single application for certification of a transceiver

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3.0 SYSTEM TEST CONFIGURATION

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit / receive continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

There were two powering methods for the EUT:

Case 1) the EUT operating alone and was powered by a fully charged 3.7V internal rechargeable battery.

Case 2) the EUT operating and was charging by Base Station with adaptor
AC/DC adaptor (Base Unit: AC Input 100-240VAC 50/60Hz 0.3A; Output 5VDC 1A)
Model: HX075B-0501000-CU

Both powering methods were tested. Only the worse-case data (Case 2) is shown in test report.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable. If the base unit attached to peripherals, they were connected and operational (as typical as possible).

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Radiated emissions were taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For any intentional radiator powered by AC power line, measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Radiated emission measurement for transmitter were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Emission that are directly caused by digital circuits in the transmit path and transmitter portion were measured, and the limit are according to FCC Part 15 Section 15.209. Digital circuitries used to control additional functions other than the operation of the transmitter are subject to FCC Part 15 Section 15.109 Limits.

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3.1 Justification – Cont'd

Detector function for radiated emissions was in peak mode. Average readings, when required, were taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in section 4.8.3.

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF*. The effective period (Teff) was referred to Exhibit 4.8.3. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3dB, the pulse desensitization factor was 0dB.

For AC line conducted emission test, the EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50ohm coupling impedance for measuring instrument. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were manipulated to find the maximum emission.

All relevant operation modes / data rates have been tested, and the worst-case data is included in this report.

3.2 EUT Exercising Software

The EUT exercise program (if any) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

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3.3 Details of EUT and Description of Accessories

Details of EUT:

There were two powering methods for the EUT:

Case 1)

the EUT operating alone and was powered by a fully charged 3.7V internal rechargeable battery.

Case 2)

the EUT operating and was charging by Base Station

AC/DC adaptor (Base Unit: AC Input 100-240VAC 50/60Hz 0.3A; Output 5VDC 1A)

Model: HX075B-0501000-CU

Both powering methods were tested. Only the worse-case data (Case 2) is shown in test report.

Description of Accessories:

1. Base Station (for charging rechargeable battery)
2. AC/DC adaptor (Base Unit: AC Input 100-240VAC 50/60Hz 0.3A; Output 5VDC 1A)
Model: HX075B-0501000-CU
(Provided by Applicant)

There are no accessories for compliance of this product.

3.4 Measurement Uncertainty

Decision Rule for compliance: For FCC/IC standard, the measured value must be within the limits of applicable standard without accounting for the measurement uncertainty. For EN/IEC/HKTA/HKTC standard, conformity rules will be used as per standard directly excepted EN/IEC 61000-3-2, EN/IEC 61000-3-3, HKTA1004, HKCA1008, HKTA1019, HKTA1020, HKTA1041 and HKTA1044. For these excepted or not mentioned standards, Cl 4.2.2 of ILAC-G8:09/2019 decision rules will be reference and guard band will be equal to our measurement uncertainty with 95% confidence level (k=2). In case, the measured value is within guard band region, undetermined decision will be used. The values of the Measurement uncertainty for radiated emission test and RF conducted measurement test are $\pm 5.3\text{dB}$ and $\pm 0.99\text{dB}$ respectively. The value of the Measurement uncertainty for conducted emission test is $\pm 4.2\text{dB}$.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

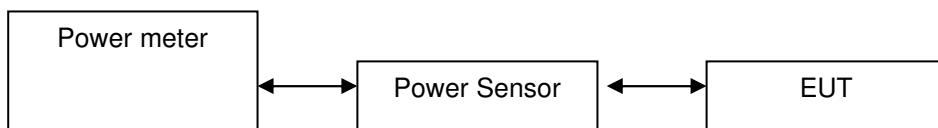
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4.0 TEST RESULTS

4.1 Maximum Conducted (peak) Output Power at Antenna Terminals

RF Conduct Measurement Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



The antenna port of the EUT was connected to the input of a spectrum analyzer.

- The antenna power of the EUT was connected to the input of a power meter. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals. The measurement procedure 9.1.2 was used.
- The EUT should be configured to transmit continuously (at a minimum duty cycle of 98%) at full power over the measurement duration. The measurement procedure AVG1 was used.

Bluetooth 4.0 Antenna Gain = 2 dBi

Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2402	-6.0	0.3
Middle Channel: 2440	-7.8	0.2
High Channel: 2480	-9.4	0.1

Cable loss : 0.5 dB External Attenuation : 0 dB

Cable loss, external attenuation: included in OFFSET function
 added to SA raw reading

Bluetooth 4.0

max. conducted (peak) output level = -6.0 dBm

Limits:

1W (30dBm) for antennas with gains of 6dBi or less

 W (dBm) for antennas with gains more than 6dBi

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4.2 Minimum 6dB RF Bandwidth

The antenna port of the EUT was connected to the input of a spectrum analyzer. The EBW measurement procedure was used. A PEAK output reading was taken, a DISPLAY line was drawn 6dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Bluetooth 4.0		
Frequency (MHz)	6dB Bandwidth (MHz)	
Low Channel:	2402	0.804
Middle Channel:	2440	0.792
High Channel:	2480	0.792

Limits

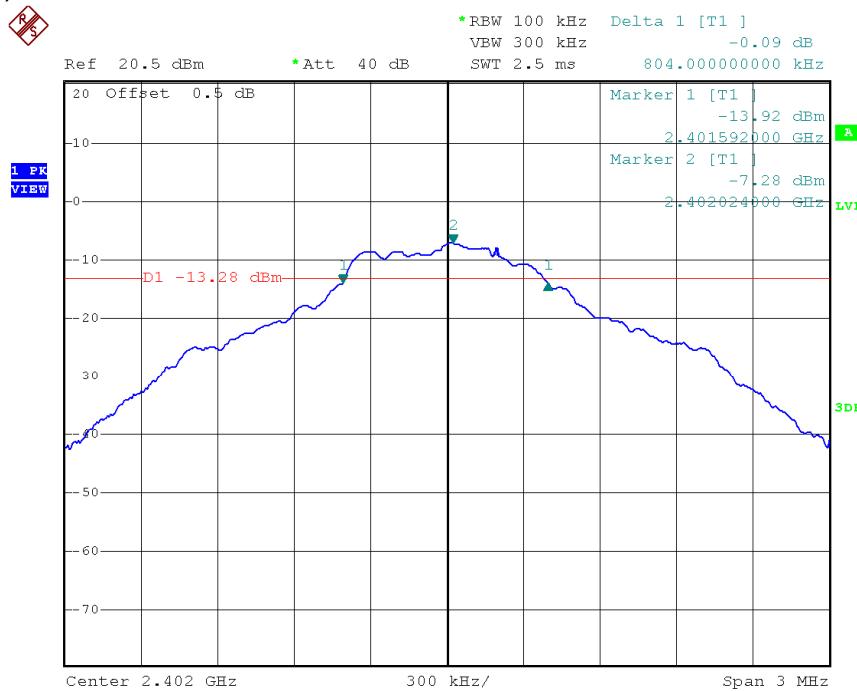
6 dB bandwidth shall be at least 500kHz

The plots of 6dB RF bandwidth are saved as below.

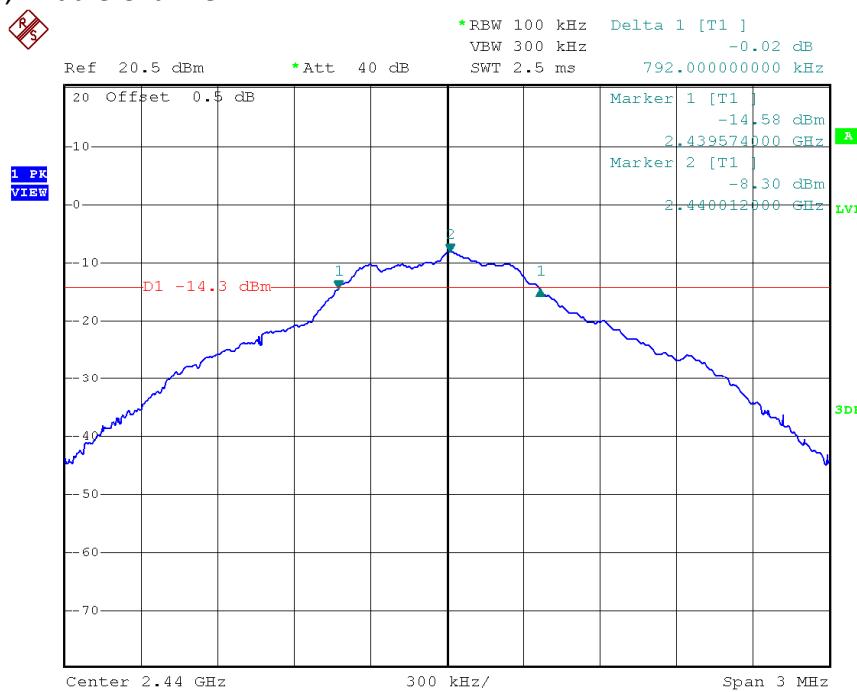
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PLOTS OF 6dB RF BANDWIDTH

Bluetooth 4.0, Lowest Channel



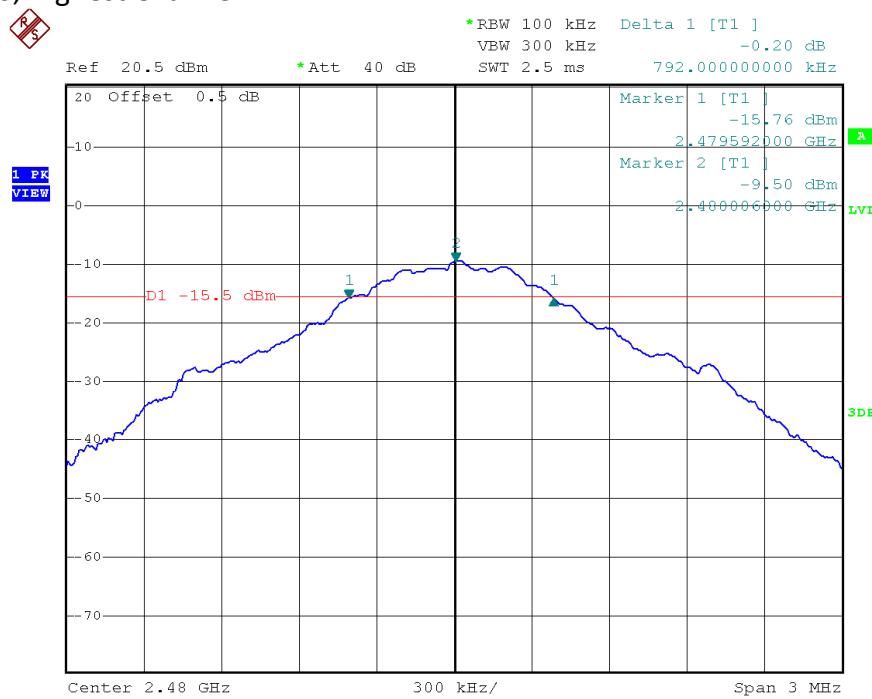
Bluetooth 4.0, Middle Channel



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PLOTS OF 6dB RF BANDWIDTH

Bluetooth 4.0, Highest Channel



TEST REPORT**4.3 Maximum Power Spectral Density**

Antenna output of the EUT was coupled directly to spectrum analyzer. The measurement procedure 10.2 PKPSD was used. If an external attenuator and/or cable was used, these losses are compensated for using the OFFSET function of the analyser.

Bluetooth 4.0		
Frequency (MHz)	PSD in 100kHz (dBm)	
Low Channel: 2402		-7.32
Middle Channel: 2440		-8.28
High Channel: 2480		-9.42

Cable Loss: 0.5 dB

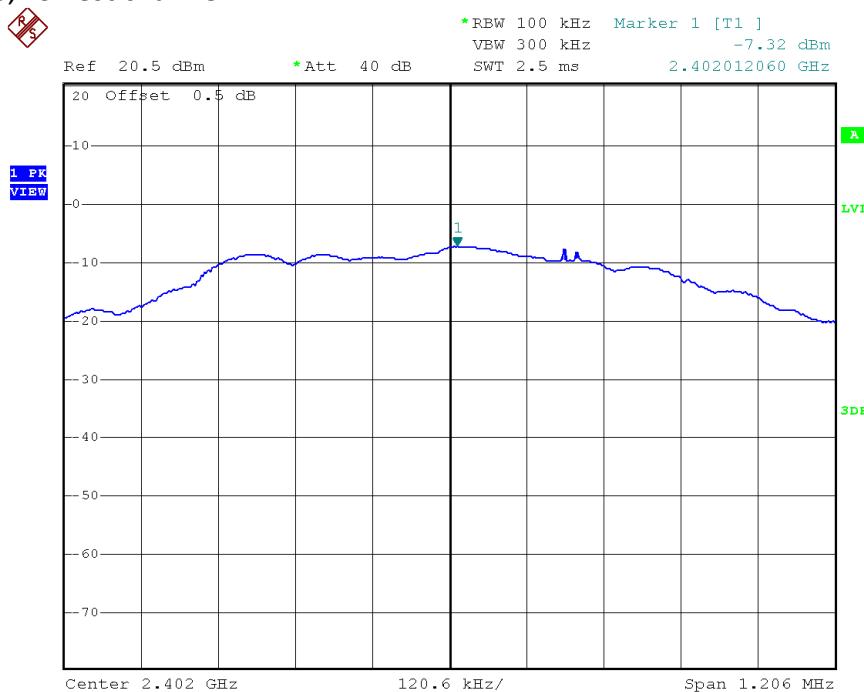
Limit:
8dBm

The plots of power spectral density are as below.

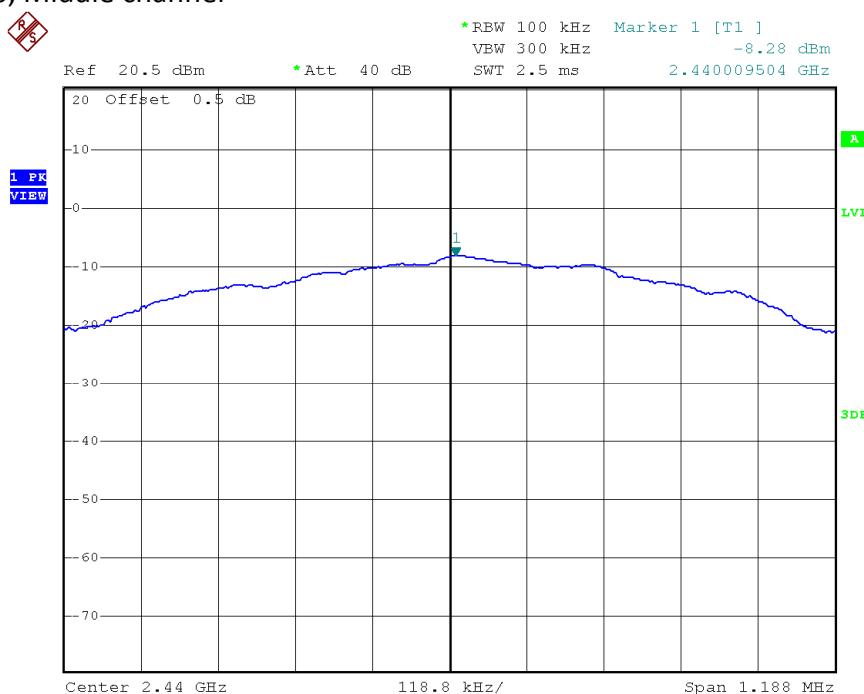
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PLOTS OF POWER SPECTRAL DENSITY

Bluetooth 4.0, Lowest channel

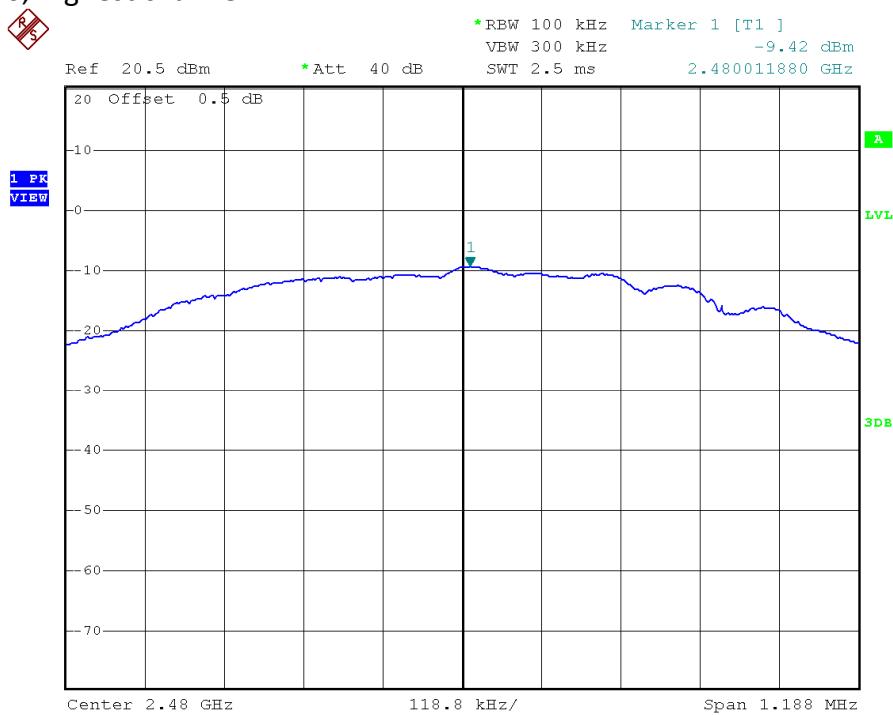


Bluetooth 4.0, Middle channel



TEST REPORT**PLOTS OF POWER SPECTRAL DENSITY**

Bluetooth 4.0, Highest channel



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4.4 Out of Band Conducted Emissions

For Bluetooth 4.0, the maximum conducted (peak) output power was used to demonstrate compliance as described in 9.1. Then the display line (in red) shown in the following plots denotes the limit at 20dB below maximum measured in-band peak PSD level in 100 KHz bandwidth for Bluetooth 4.0.

The measurement procedures under sections 11 of KDB No.558074 D01 v05r01 (11-February-2019) were used.

Furthermore, delta measurement technique for measuring bandedge emissions was incorporated in the test of the edge at 2483.5MHz.

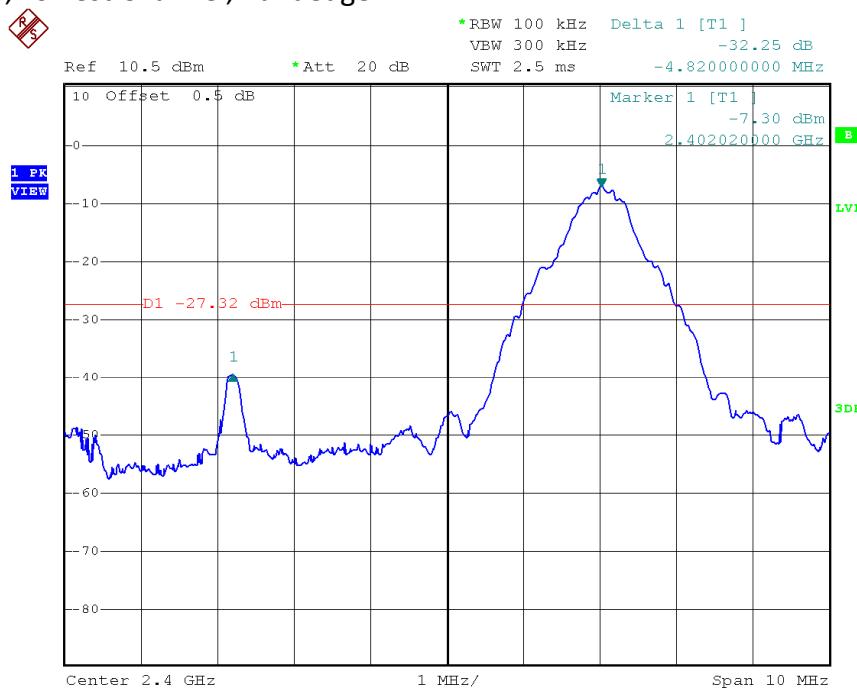
Limits:

All spurious emission and up to the tenth harmonic was measured and they were found to be at least 20dB below the maximum measured in-band peak PSD level.

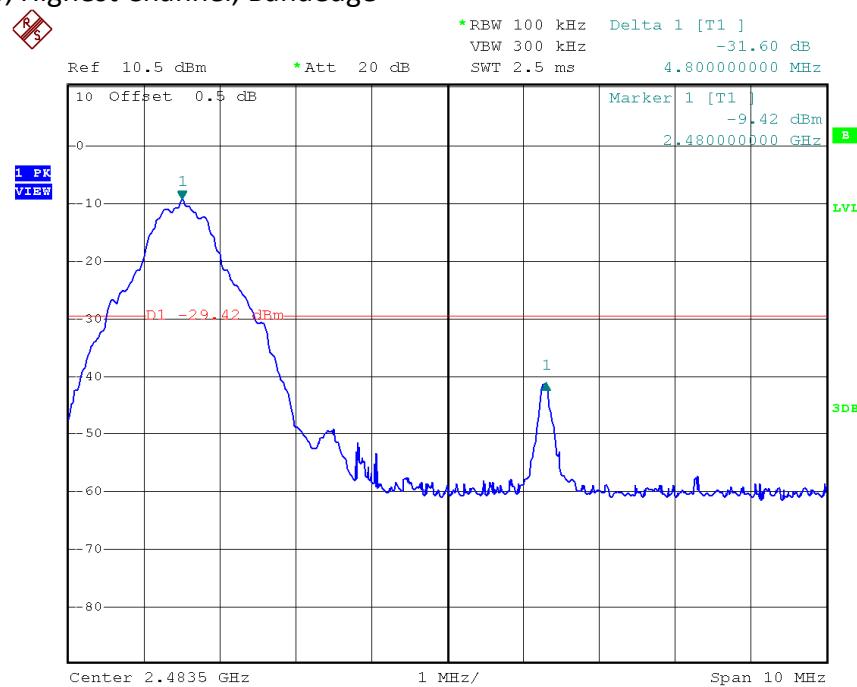
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PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Bluetooth 4.0, Lowest Channel, Bandedge



Bluetooth 4.0, Highest Channel, Bandedge

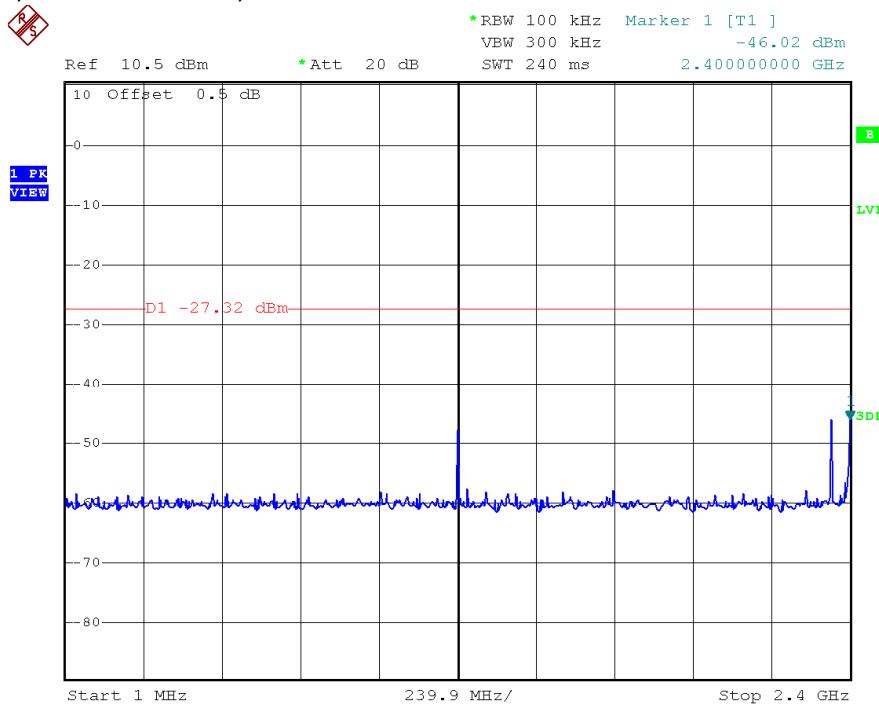


Date: 7.SEP.2021 17:49:20

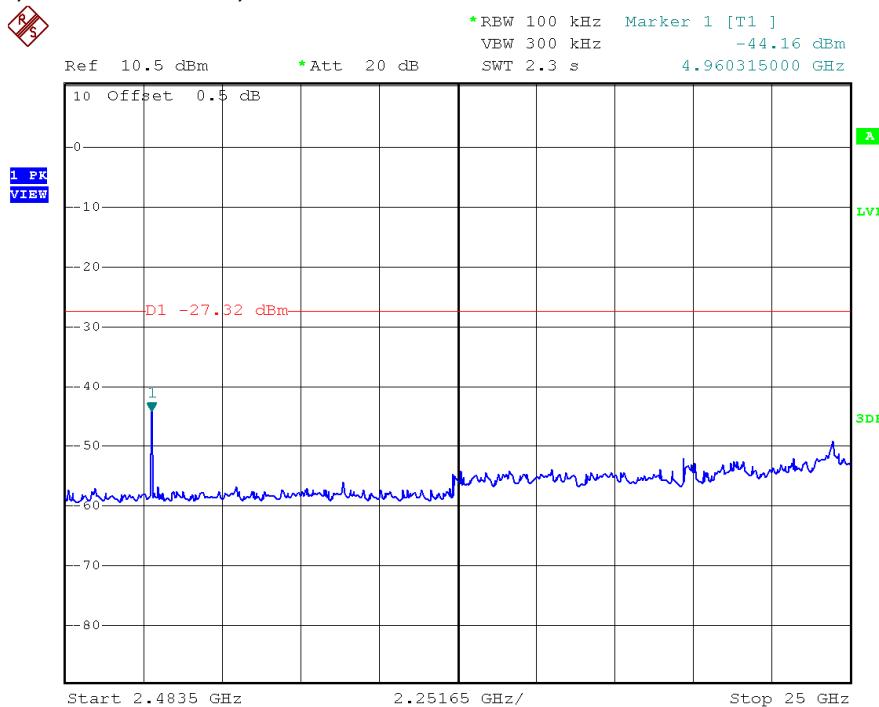
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PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Bluetooth 4.0, Lowest Channel, Plot A



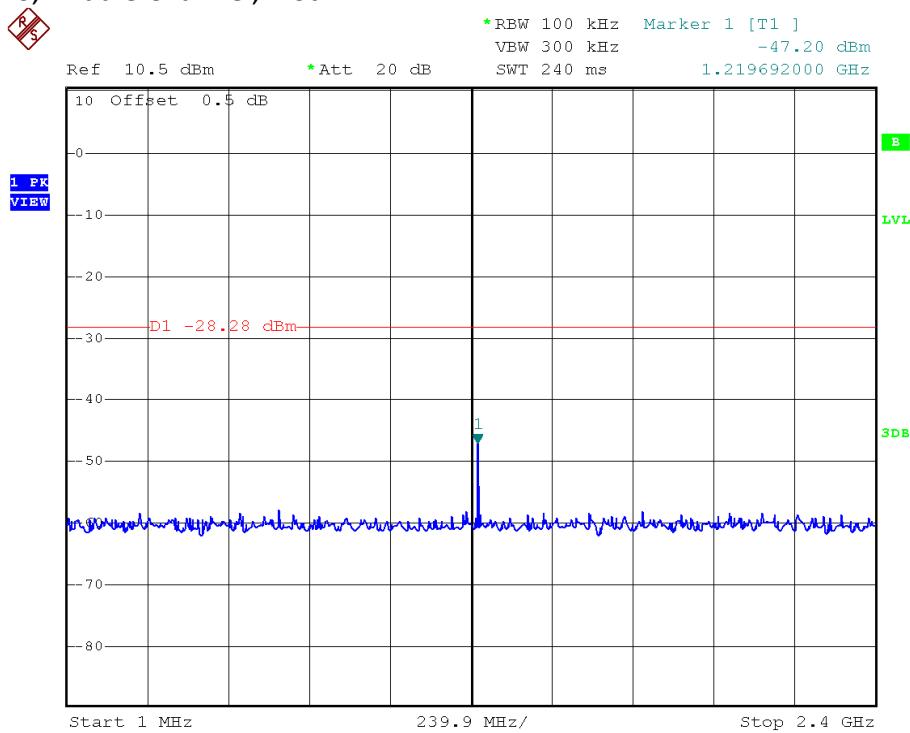
Bluetooth 4.0, Lowest Channel, Plot B



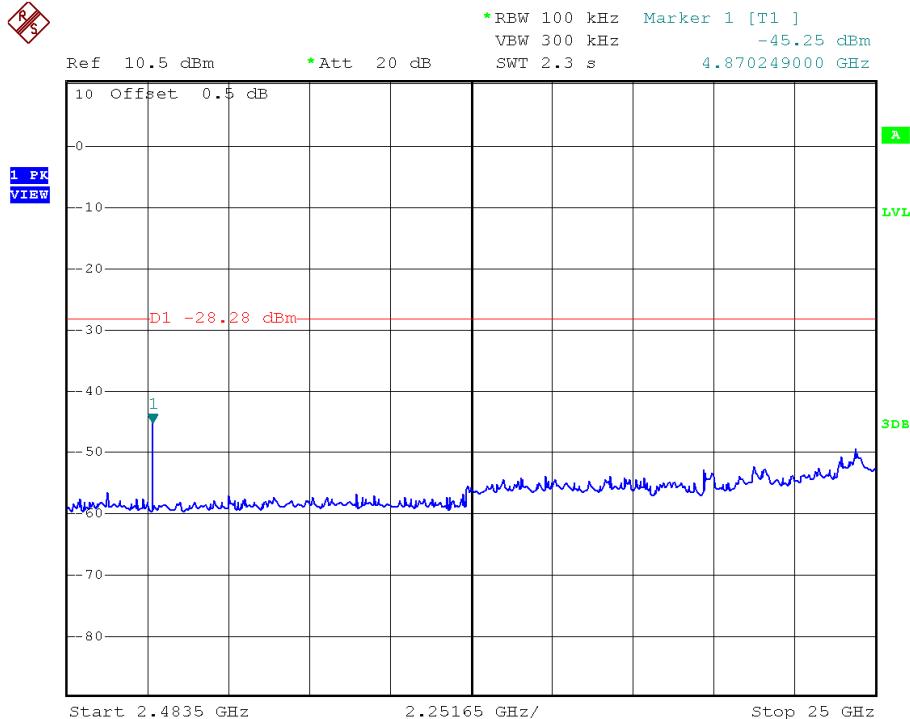
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PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Bluetooth 4.0, Middle Channel, Plot A



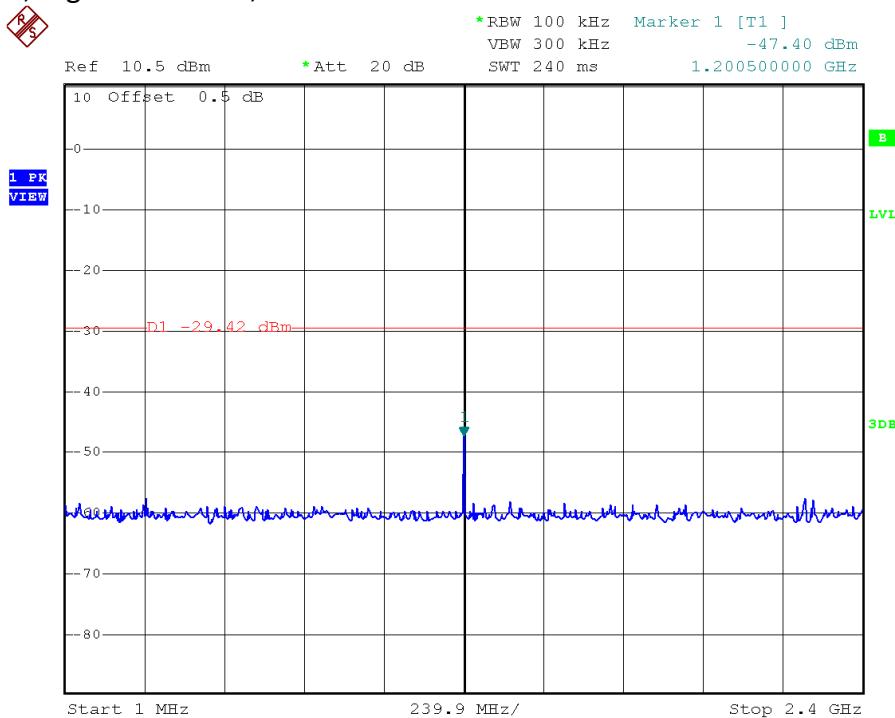
Bluetooth 4.0, Middle Channel, Plot B



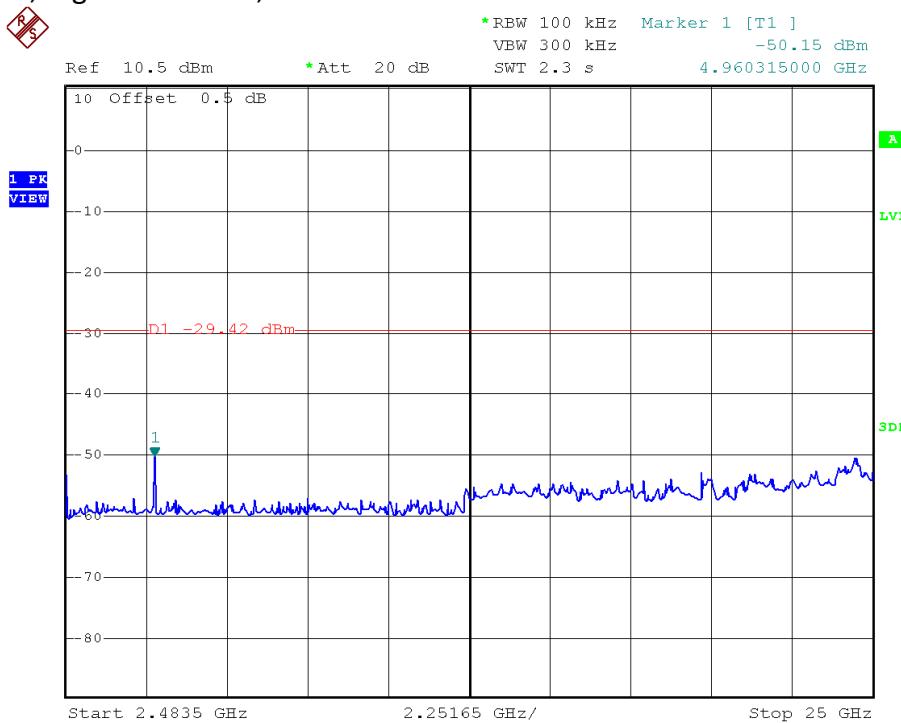
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PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Bluetooth 4.0, Highest Channel, Plot A



Bluetooth 4.0, Highest Channel, Plot B

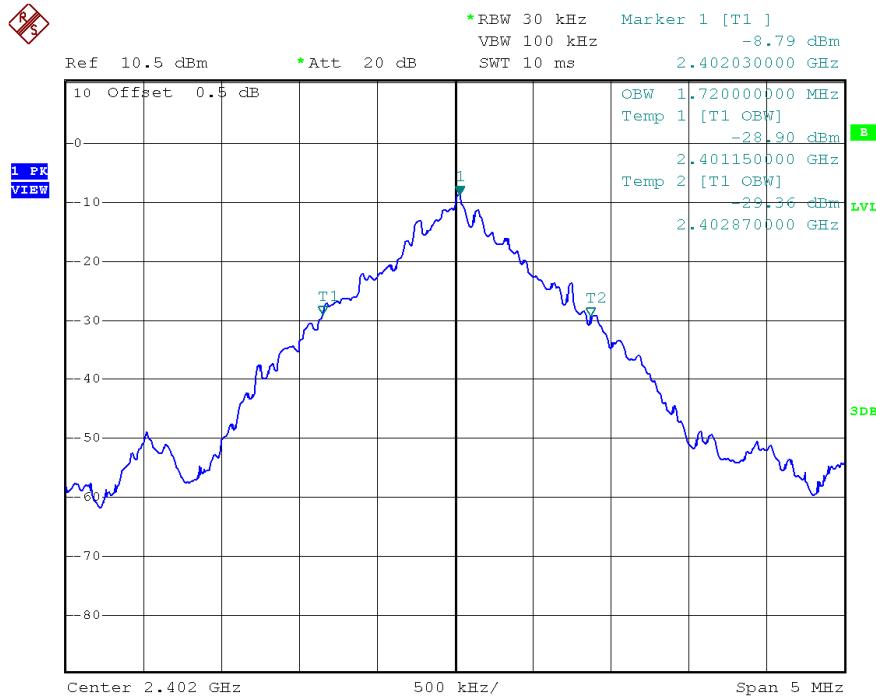


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Occupied Bandwidth Results: Bluetooth BLE

(Bluetooth 4.0)	Occupied Bandwidth (MHz)
Low Channel: 2402	1.72
Middle Channel: 2440	1.72
High Channel: 2480	1.66

The worst case is shown as below



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4.5 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

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

Where FS = Field Strength in $\text{dB}\mu\text{V}/\text{m}$

RA = Receiver Amplitude (including preamplifier) in $\text{dB}\mu\text{V}$

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

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

Example

Assume a receiver reading of 62.0 $\text{dB}\mu\text{V}$ is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29.0 dB is subtracted. The pulse desensitization factor of the spectrum analyzer is 0.0 dB, and the resultant average factor is -10.0 dB. The net field strength for comparison to the appropriate emission limit is 32.0 $\text{dB}\mu\text{V}/\text{m}$. This value in $\text{dB}\mu\text{V}/\text{m}$ is converted to its corresponding level in $\mu\text{V}/\text{m}$.

RA = 62.0 $\text{dB}\mu\text{V}$

AF = 7.4 dB

CF = 1.6 dB

AG = 29.0 dB

PD = 0.0 dB

AV = -10 dB

$$FS = 62.0 + 7.4 + 1.6 - 29.0 + 0.0 + (-10.0) = 32.0 \text{ dB}\mu\text{V}/\text{m}$$

$$\text{Level in } \mu\text{V}/\text{m} = \text{Common Antilogarithm } [(32.0 \text{ dB}\mu\text{V}/\text{m})/20] = 39.8 \mu\text{V}/\text{m}$$

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4.6 Transmitter Radiated Emissions in Restricted Bands and Spurious Emissions

Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

4.6.1 Radiated Emission Configuration Photograph

Worst Case Restricted Band Radiated Emission
at

2483.500 MHz

The worst-case radiated emission configuration photographs are saved with filename: config photos.pdf

4.6.2 Radiated Emission Data

The data in tables 1-4 list the significant emission frequencies, the limit and the margin of compliance.

Judgement -

Passed by 5.4 dB margin

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RADIATED EMISSION DATA

Mode: TX-Channel 01

Table 1
 Bluetooth 4.0

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	2390.000	52.0	33	29.4	48.4	54.0	-5.6
V	4804.000	37.7	33	34.9	39.6	54.0	-14.4
H	12010.000	22.7	33	40.5	30.2	54.0	-23.8

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	2390.000	59.2	33	29.4	55.6	74.0	-18.4
V	4804.000	48.9	33	34.9	50.8	74.0	-23.2
H	12010.000	31.3	33	40.5	38.8	74.0	-35.2

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205.

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Mode: TX-Channel 19

 Table 2
 Bluetooth 4.0

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	4880.000	36.7	33	34.9	38.6	54.0	-15.4
V	7320.000	26.3	33	37.9	31.2	54.0	-22.8
H	12200.000	22.9	33	40.5	30.4	54.0	-23.6

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	4880.000	49.3	33	34.9	51.2	74.0	-22.8
V	7320.000	33.4	33	37.9	38.3	74.0	-35.7
H	12200.000	31.1	33	40.5	38.6	74.0	-35.4

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205.

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Mode: TX-Channel 39

Table 3
Bluetooth 4.0

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	2483.500	52.2	33	29.4	48.6	54.0	-5.4
V	4960.000	35.5	33	34.9	37.4	54.0	-16.6
V	7440.000	25.3	33	37.9	30.2	54.0	-23.8
H	12400.000	22.7	33	40.5	30.2	54.0	-23.8

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	2483.500	57.8	33	29.4	54.2	74.0	-19.8
V	4960.000	47.7	33	34.9	49.6	74.0	-24.4
V	7440.000	33.6	33	37.9	38.5	74.0	-35.5
H	12400.000	31.1	33	40.5	38.6	74.0	-35.4

NOTES:

1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205.

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Mode: Sensor Bluetooth BLE operating with Charging by Base Station with adaptor

Table 4

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	30.118	38.8	16	10.0	32.8	40.0	-7.2
V	82.892	37.5	16	7.0	28.5	40.0	-11.5
V	118.722	26.5	16	14.0	24.5	43.5	-19.0
V	167.962	22.4	16	18.0	24.4	43.5	-19.1
V	282.766	23.6	16	22.0	29.6	46.0	-16.4
H	417.804	31.0	16	25.0	40.0	46.0	-6.0

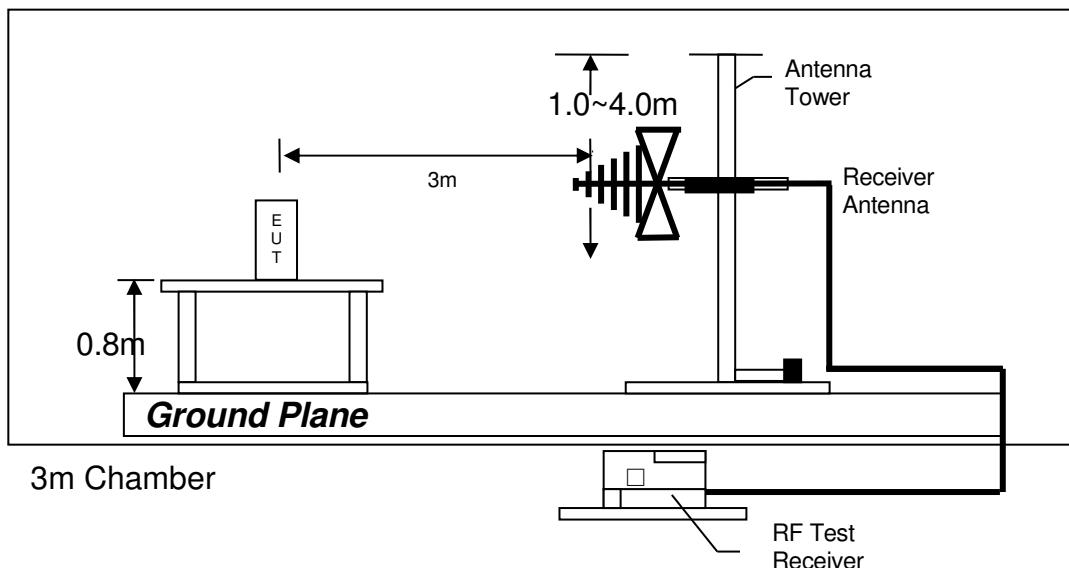
NOTES:

1. Quasi-Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.
4. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205.

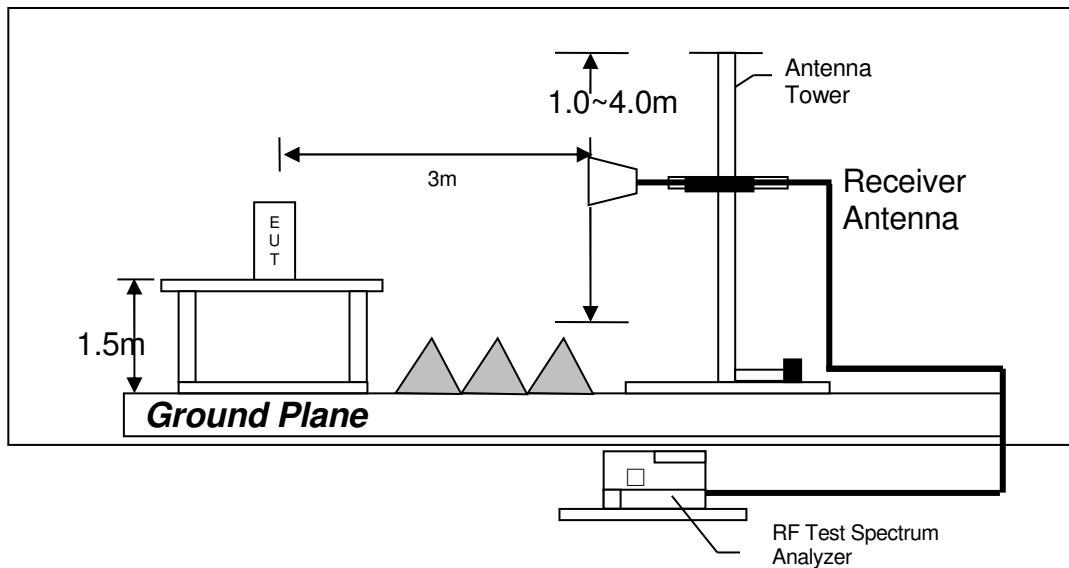
TEST REPORT

4.6.3 Radiated Emission Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



Test setup of radiated emissions up to 1GHz



Test setup of radiated emissions above 1GHz

TEST REPORT

4.6.4 Transmitter Duty Cycle Calculation

Not applicable – No average factor is required.

TEST REPORT**4.7 AC Power Line Conducted Emission**

- Not applicable – EUT is only powered by battery for operation.
- EUT connects to AC power line. Emission Data is listed in following pages.
- Base Unit connects to AC power line and has transmission. Handset connects to AC power line but has no transmission. Emission Data of Base Unit is listed in following pages.

4.7.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration

at

0.150 MHz

The worst-case line conducted configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

4.7.2 AC Power Line Conducted Emission Data

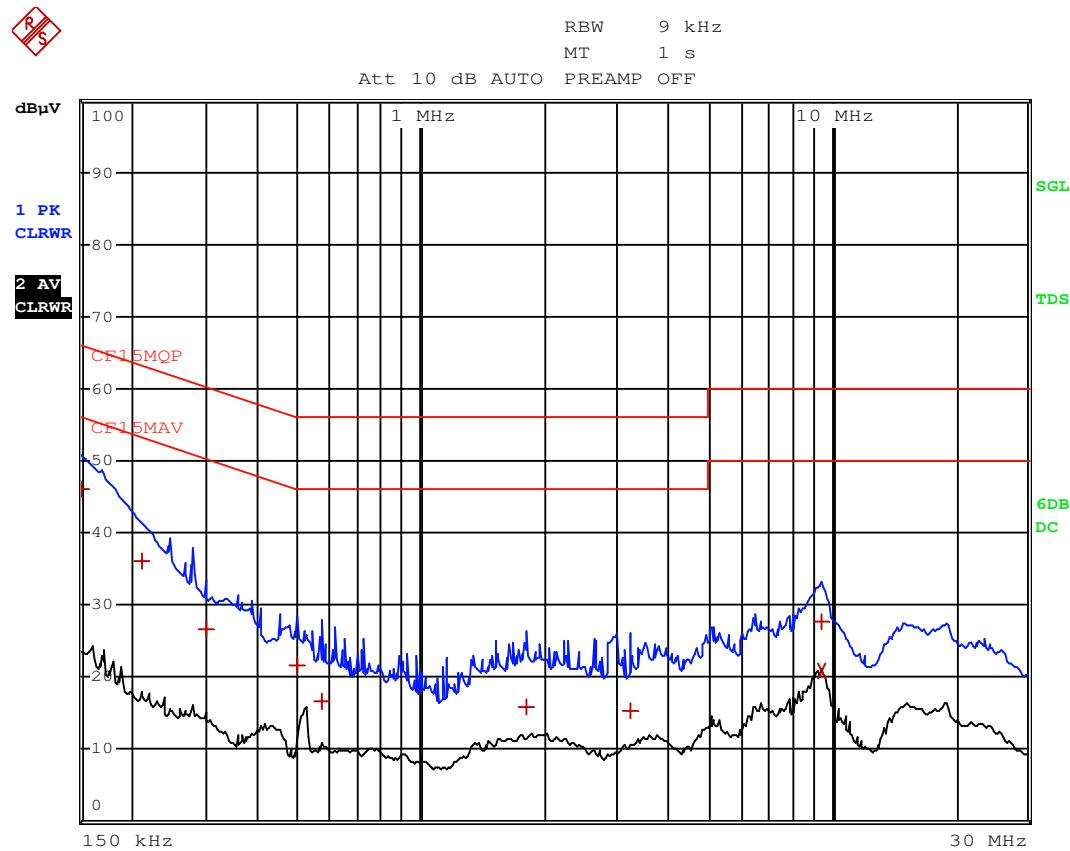
The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance.

Passed by 19.8 dB margin

TEST REPORT

AC POWER LINE CONDUCTED EMISSION

Worst Case: Sensor Bluetooth BLE operating with Charging by Base Station with adaptor

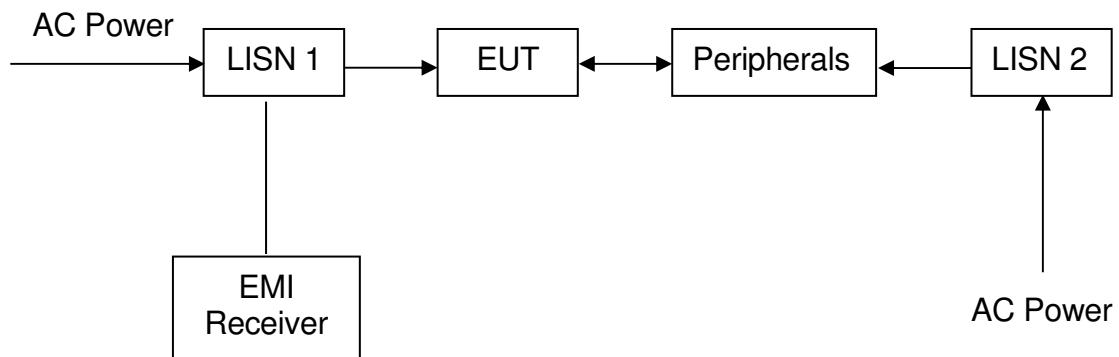


TEST REPORT**Worst Case: Sensor Bluetooth BLE operating with Charging by Base Station with adaptor**

EDIT PEAK LIST (Final Measurement Results)						
TRACE	FREQUENCY	LEVEL	dB μ V	DELTA	LIMIT	dB
1	Quasi Peak 150 kHz	46.15	N	-19.84		
1	Quasi Peak 213 kHz	36.15	L1	-26.93		
1	Quasi Peak 298.5 kHz	26.53	L1	-33.75		
1	Quasi Peak 496.5 kHz	21.71	N	-34.34		
1	Quasi Peak 573 kHz	16.59	N	-39.40		
1	Quasi Peak 1.8105 MHz	15.83	L1	-40.16		
1	Quasi Peak 3.237 MHz	15.42	L1	-40.58		
1	Quasi Peak 9.4335 MHz	27.72	L1	-32.27		
2	CISPR Average 9.4785 MHz	20.76	L1	-29.23		

TEST REPORT

4.7.3 Conducted Emission Test Setup



TEST REPORT

5.0 EQUIPMENT LIST

1) Radiated Emissions Test

Equipment	EMI Test Receiver (9kHz to 26.5GHz)	Spectrum Analyzer	Biconical Antenna (20MHz to 200MHz)
Registration No.	EW-3156	EW-2466	EW-2512
Manufacturer	ROHDE SCHWARZ	ROHDE SCHWARZ	EMCO
Model No.	ESR26	FSP30	3104C
Calibration Date	January 25, 2021	September 05, 2020	June 03, 2020
Calibration Due Date	January 25, 2022	December 05, 2021	December 03, 2021
Equipment	Log Periodic Antenna	Double Ridged Guide Antenna	RF Cable 14m (1GHz to 26.5GHz)
Registration No.	EW-3243	EW-1133	EW-2781
Manufacturer	EMCO	EMCO	GREATBILLION
Model No.	3148B	3115	SMA m/SHF5MPU /SMA m ra14m,26G
Calibration Date	June 30, 2021	June 03, 2021	November 24, 2020
Calibration Due Date	December 30, 2022	June 03, 2022	November 24, 2021
Equipment	RF Preamplifier (9kHz to 6000MHz)	2.4GHz Notch Filter	14m Double Shield RF Cable (20MHz to 6GHz)
Registration No.	EW-3006b	EW-3435	EW-2074
Manufacturer	SCHWARZBECK	MICROWAVE	RADIALL
Model No.	BBV9718	N0324413	N(m)-RG142-BNC(m) L=14M
Calibration Date	November 25, 2019	November 16, 2019	August 29, 2020
Calibration Due Date	December 25, 2021	December 16, 2021	November 29, 2021
Equipment	Active Loop H-field (9kHz to 30MHz)	Pyramidal Horn Antenna	
Registration No.	EW-2313	EW-0905	
Manufacturer	ELECTROMETRI	EMCO	
Model No.	EM-6876	3160-09	
Calibration Date	December 17, 2019	July 20, 2021	
Calibration Due Date	September 17, 2021	January 20, 2023	

TEST REPORT

2) Conducted Emissions Test

Equipment	RF Cable 240cm (RG142) (9kHz to 30MHz)	Artificial Mains Network	EMI Test Receiver
Registration No.	EW-2454	EW-3360	EW-2500
Manufacturer	RADIALL	ROHDE SCHWARZ	ROHDE SCHWARZ
Model No.	bnc m st / 142 /bnc m ra 240cm	ENV-216	ESCI
Calibration Date	November 10, 2020	October 20, 2020	March 29, 2021
Calibration Due Date	November 10, 2021	October 20, 2021	March 29, 2022

3) Conductive Measurement Test

Equipment	5m RF Cable (40GHz)	RF Power Meter with Power Sensor (N1921A)	Spectrum Analyzer
Registration No.	EW-2701	EW-2270	EW-2466
Manufacturer	RADIALL	N/A	ROHDE SCHWARZ
Model No.	sma m-m 5m 40G	AGILENTTECH	FSP30
Calibration Date	November 24, 2020	September 03, 2020	September 05, 2020
Calibration Due Date	November 24, 2021	December 03, 2021	December 05, 2021

4) Bandedge & Bandwidth Measurement

Equipment	5m RF Cable (40GHz)	Spectrum Analyzer
Registration No.	EW-2701	EW-2466
Manufacturer	RADIALL	ROHDE SCHWARZ
Model No.	sma m-m 5m 40G	FSP30
Calibration Date	November 24, 2020	September 05, 2020
Calibration Due Date	November 24, 2021	December 05, 2021

END OF TEST REPORT