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576 Castle Peak Road, Kowloon,
Hong Kong SAR, China.

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www.intertek.com

TEST REPORT

Report No.: 23080483HKG-001

BrandGoods B.V. / BrandBase B.V.

Application For Original Grant of 47 CFR Part 15 Certification

2.4GHz BLE Car Core

FCC ID: 2BCUGMSBTLIPOS

Prepared and Checked by:	**Approved by:**
Signed on File Leung Chun Ning, Peter Assistant Engineer	Digitally signed by Jess Tang Location: Intertek Testing Services Hong Kong Limited Tang Kwan Mo, Jess Lead Engineer Date: September 29, 2023

TEST REPORT

GENERAL INFORMATION

Grantee:	BrandGoods B.V. / BrandBase B.V.
Grantee Address:	Danzigerkade 2-D1, 1013 AP Amsterdam, Netherlands.
Manufacturer:	BrandGoods B.V. / BrandBase B.V.
Manufacturer Address:	Danzigerkade 2-D1, 1013 AP Amsterdam, Netherlands.
FCC Specification Standard:	FCC Part 15, October 1, 2021 Edition
FCC ID:	2BCUGMSBTLIPOS
Model:	MSBTLipoS
Additional Model:	MSBTLipoS (Ref no. BMSLipo), SWDV, SWST, SWMN, SWBF, SWBB8, SWDM, MS2F1-75, MS2MUSTANG, MS2ISWY(Ref no.MS2ISWYR), MS2GEN3, MS2FORZE9, MS2LMDH, MS2I20, BMSCSL, BMSM1, BMSM3, BMSM4GT3, BMSM5S, BMSM5S (Ref no. BMSM5SB), BMSZ4GT3
Type of EUT:	Transceiver
Description of EUT:	Bluetooth Remote Control Battery S (for the smaller battery) (MSBTLipoS), BMW M Motorsport Collection Smart Battery (MSBTLipoS (Ref no. BMSLipo)) Star Wars Racers – Darth Vader (SWDV), Stormtrooper (SWST), Mandalorian (SWMN), Boba Fett (SWBF), BB-8 (SWBB8), Darth Maul (SWDM), New Shell Motorsport Collection – Ferrari F1-75 (MS2F1-75), Team Penske Ford Mustang GT 2023 (NASCAR) (MS2MUSTANG), Team Penske Indycar ® 2023 (MS2ISWY(Ref no.MS2ISWYR)), Nissan Formula E Gen 3 Car (MS2GEN3), Forze Hydrogen Racing Forze IX (MS2FORZE9), BMW M HYBRID V8 (MS2LMDH), Hyundai i20 N Rally1 Hybrid (MS2I20), BMW M Motorsport Collection – BMW 3.0 CSL (BMSCSL), BMW M1 (BMSM1), BMW M3 (BMSM3), BMW M4 GT3 (BMSM4GT3), BMW M5 SAFETY CAR(White) (BMSM5S), BMW M5 SAFETY CAR(Black) (BMSM5S (Ref no. BMSM5SB)), BMW Z4 GT3 (BMSZ4GT3)
Brand Name:	BrandGoods B.V. / BrandBase B.V.
Sample Receipt Date:	August 11, 2023
Date of Test:	September 18, 2023 to September 26, 2023
Report Date:	September 29, 2023

TEST REPORT

Environmental Conditions:	Temperature: +10 to 40°C Relative 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.

TEST REPORT

SUMMARY OF TEST RESULT

Test Items	FCC Part 15 Section	Results
Transmitter Power Line Conducted Emissions	15.207	Complied
Radiated Emission	15.249, 15.209	Complied
Radiated Emission on the Bandedge		Complied
Radiated Emission in Restricted Bands	15.205	Complied

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

FCC Part 15, October 1, 2021 Edition

Note:
1. The EUT uses a permanently attached antenna which, in accordance to section 15.203, is considered sufficient to comply with the previsions of this section.
2. 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.

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TEST REPORT

1.0 GENERAL DESCRIPTION

1.1 Product Description

The Equipment Under Test (EUT), is a portable 2.4GHz BLE Transceiver for a car core. The sample supplied operated on 40 channels, normally at 2402 - 2480MHz. The channels are separated with 2MHz spacing.

The EUT is powered by 1 x 3.7V Lithium-ion battery. After switching on and inserting the EUT into a car shell, it can be paired up with a smartphone and the car will be moved forward or backward and turned left and right based on the switches pressed in a mobile app. Light will be emitted from the car core based on the button pressed in the mobile app.

MSBTLipoS (Ref no. BMSLipo), SWDV, SWST, SWMN, SWBF, SWBB8, SWDM, MS2F1-75, MS2MUSTANG, MS2ISWY(Ref no.MS2ISWYR), MS2GEN3, MS2FORZE9, MS2LMDH, MS2I20, BMSCSL, BMSM1, BMSM3, BMSM4GT3, BMSM5S, BMSM5S (Ref no. BMSM5SB) and BMSZ4GT3 are the same as the Model: MSBTLipoS in hardware aspect, materials, PCB layout, electrical, mechanical, and physical design, including software/firmware and they are different in color, cosmetics and model number only as declared by client.

Antenna Type: Internal, Integral

For electronic filing, the brief circuit description is saved with filename: Descri.pdf.

1.2 Related Submittal(s) Grants

This is a single application for certification of a transceiver.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). All radiated measurements were performed in an 3m Chamber. Preliminary scans were performed in the 3m Chamber only to determine worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility

The 3m Chamber and conducted measurement facility used to collect the radiated data is located 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 placed on file with the FCC.

TEST REPORT

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.10 (2013).

The device was powered by 3.7VDC (1 x 3.7V Lithium-ion Battery).

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a plastic stand if necessary and placed on the wooden turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

There are 2 different configurations for this EUT, when the car core is standalone and when it is inserted into the car shell. Both configurations have been tested. Only the worst-case data is shown in this report.

2.2 EUT Exercising Software

The EUT exercise program (Serial Assistant V0.0.005) used during radiated testing was designed to exercise the various system components in a manner similar to a typical use.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

2.4 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.

2.5 Support Equipment List and Description

Description	Remark
HP 820G1 Notebook	Provided by Intertek
30.5cm micro-USB Charging Cable	Provided by Applicant

TEST REPORT

3.0 EMISSION RESULTS

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.

3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Average Factor (optional) from the measured reading.

The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG - AV

where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
AF = Antenna Factor in dB
CF = Cable Attenuation Factor in dB
AG = Amplifier Gain in dB
AV = Average Factor in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain.

An example for the calculations in the following table is as follows:

FS = RR + LF

where FS = Field Strength in dBµV/m
RR = RA - AG - AV in dBµV
LF = CF + AF in dB

Assume a receiver reading of 52.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29.0 dB and average factor of 5.0 dB are subtracted, giving a field strength of 27.0 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 52.0 dBµV/m
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
AV = 5.0 dB
FS = RR + LF
FS = 18.0 + 9.0 = 27.0 dBµV/m

RR = 18.0 dBµV
LF = 9.0 dB

Level in µV/m = Common Antilogarithm [(27.0 dBµV/m)/20] = 22.4 µV/m

TEST REPORT

3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 443.58375 MHz.

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: Setup Photos.pdf.

3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgment: Passed by 7.8 dB

3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 0.204 MHz.

For electronic filing, the worst-case line-conducted configuration photographs are saved with filename: Setup Photos.pdf.

3.5 Conducted Emission Data

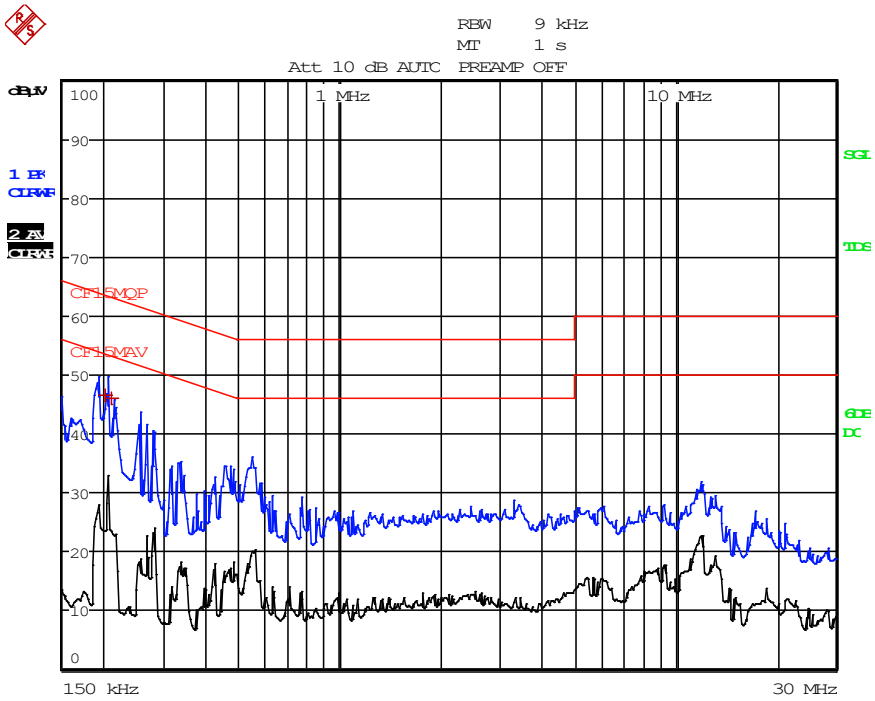
The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgment: Pass by 16.9 dB

TEST REPORT

CONDUCTED EMISSION

Model: MSBTLipoS
Date of Test: September 20, 2023
Worst-Case Operating Mode: Charging and Operating Mode (Car Core Standalone)



EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	204 kHz	46.58	N	-16.86
1	Quasi Peak	213 kHz	46.09	L1	-16.99

Note: Measurement Uncertainty is ±4.2dB at a level of confidence of 95%.

TEST REPORT

RADIATED EMISSIONS

Model: MSBTLipoS
Date of Test: September 26, 2023
Worst-Case Operating Mode: Transmitting and Charging (Car Core Standalone)

Table 1

Pursuant to FCC Part 15 Section 15.249 Requirement

Lowest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	2402.000	82.8	33	29.4	79.2	94.0	-14.8
H	4804.000	39.7	33	34.9	41.6	54.0	-12.4
H	7206.000	28.1	33	37.9	33.0	54.0	-21.0
V	9608.000	30.0	33	40.4	37.4	54.0	-16.6
V	12010.000	29.6	33	40.5	37.1	54.0	-16.9
H	14412.000	34.4	33	40.0	41.4	54.0	-12.6

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
V	2402.000	87.2	33	29.4	83.6	114.0	-30.4
H	4804.000	48.6	33	34.9	50.5	74.0	-23.5
H	7206.000	41.3	33	37.9	46.2	74.0	-27.8
V	9608.000	43.9	33	40.4	51.3	74.0	-22.7
V	12010.000	42.7	33	40.5	50.2	74.0	-23.8
H	14412.000	47.7	33	40.0	54.7	74.0	-19.3

Notes:
1. Peak Detector Data unless otherwise stated.
2. Average detector is applied according to ANSI C63.10.
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. Emissions within the restricted band meet the requirement of FCC Part 15 Section 15.205.
7. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

TEST REPORT

RADIATED EMISSIONS

Model: MSBTLipoS
Date of Test: September 26, 2023
Worst-Case Operating Mode: Transmitting and Charging (Car Core Standalone)

Table 2

Pursuant to FCC Part 15 Section 15.249 Requirement

Middle Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	2440.000	80.2	33	29.4	76.6	94.0	-17.4
H	4880.000	39.8	33	34.9	41.7	54.0	-12.3
H	7320.000	28.5	33	37.9	33.4	54.0	-20.6
V	9760.000	30.2	33	40.4	37.6	54.0	-16.4
V	12200.000	29.8	33	40.5	37.3	54.0	-16.7
H	14640.000	35.9	33	38.4	41.3	54.0	-12.7

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
V	2440.000	85.3	33	29.4	81.7	114.0	-32.3
H	4880.000	48.9	33	34.9	50.8	74.0	-23.2
H	7320.000	41.6	33	37.9	46.5	74.0	-27.5
V	9760.000	44.1	33	40.4	51.5	74.0	-22.5
V	12200.000	43.3	33	40.5	50.8	74.0	-23.2
H	14640.000	49.1	33	38.4	54.5	74.0	-19.5

Notes:
1. Peak Detector Data unless otherwise stated.
2. Average detector is applied according to ANSI C63.10.
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. Emissions within the restricted band meet the requirement of FCC Part 15 Section 15.205.
7. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

TEST REPORT

RADIATED EMISSIONS

Model: MSBTLipoS
Date of Test: September 26, 2023
Worst-Case Operating Mode: Transmitting and Charging (Car Core Standalone)

Table 3

Pursuant to FCC Part 15 Section 15.249 Requirement

Highest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	2480.000	79.6	33	29.4	76.0	94.0	-18.0
H	4960.000	39.6	33	34.9	41.5	54.0	-12.5
H	7440.000	28.4	33	37.9	33.3	54.0	-20.7
V	9920.000	29.8	33	40.4	37.2	54.0	-16.8
V	12400.000	30.0	33	40.5	37.5	54.0	-16.5
H	14880.000	36.1	33	38.4	41.5	54.0	-12.5

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
V	2480.000	84.3	33	29.4	80.7	114.0	-33.3
H	4960.000	48.5	33	34.9	50.4	74.0	-23.6
H	7440.000	41.8	33	37.9	46.7	74.0	-27.3
V	9920.000	43.8	33	40.4	51.2	74.0	-22.8
V	12400.000	42.8	33	40.5	50.3	74.0	-23.7
H	14880.000	48.8	33	38.4	54.2	74.0	-19.8

Notes:
1. Peak Detector Data unless otherwise stated.
2. Average detector is applied according to ANSI C63.10.
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. Emissions within the restricted band meet the requirement of FCC Part 15 Section 15.205.
7. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

TEST REPORT

RADIATED EMISSIONS

Model: MSBTLipoS
Date of Test: September 26, 2023
Worst-Case Operating Mode: Charging and Operating Mode (Car Core Standalone)

Table 4

Pursuant to FCC Part 15 Section 15.209 Requirement

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	32.304	32.2	16	10.0	26.2	40.0	-13.8
V	93.899	22.6	16	11.0	17.6	43.5	-25.9
V	120.816	20.4	16	14.0	18.4	43.5	-25.1
H	167.983	24.7	16	18.0	26.7	43.5	-16.8
H	191.990	24.7	16	16.0	24.7	43.5	-18.8
H	215.998	25.5	16	17.0	26.5	43.5	-17.0
H	272.015	19.7	16	22.0	25.7	46.0	-20.3
H	345.008	23.0	16	24.0	31.0	46.0	-15.0
H	391.446	28.8	16	25.0	37.8	46.0	-8.2
V	443.584	28.2	16	26.0	38.2	46.0	-7.8
V	517.061	25.3	16	27.0	36.3	46.0	-9.7
V	939.618	17.2	16	33.0	34.2	46.0	-11.8

Notes:
1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emissions within the restricted band meet the requirement of FCC Part 15 Section 15.205.
6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

TEST REPORT

4.0 EQUIPMENT PHOTOGRAPHS

For electronic filing, the photographs are saved with filename: External Photos.pdf and Internal Photos.pdf.

5.0 PRODUCT LABELLING

For electronics filing, the FCC ID label artwork and the label location are saved with filename: Label.pdf.

6.0 TECHNICAL SPECIFICATIONS

For electronic filing, the block diagram and schematic of the tested EUT are saved with filename: Block.pdf and Circuit.pdf respectively.

7.0 INSTRUCTION MANUAL

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: Manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

TEST REPORT

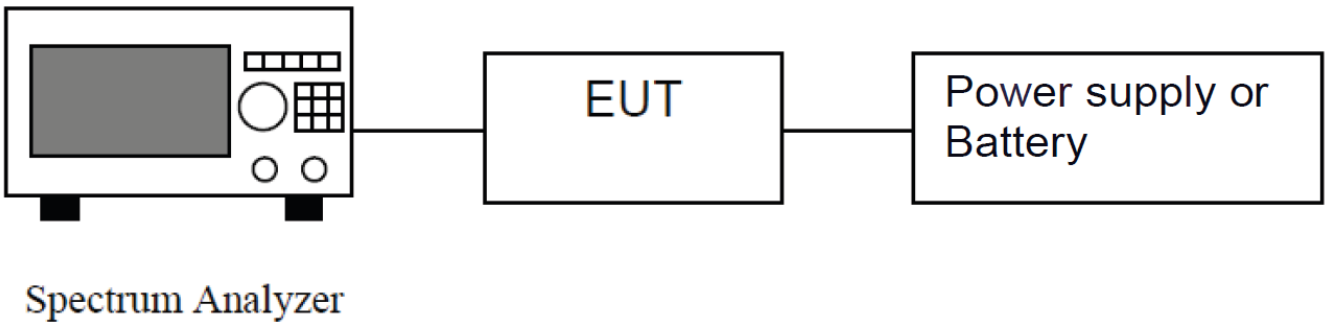
8.0 MISCELLANEOUS INFORMATION

The miscellaneous information includes details of the test procedure and measured bandwidth and calculation of factor such as pulse desensitization and averaging factor.

8.1 Radiated Emission on the Bandedge

From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz to 2483.5MHz). In case of the fundamental emissions are within two standard bandwidths from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard bandwidth is the bandwidth specified by ANSI C63.10 (2013) for frequency being measured.

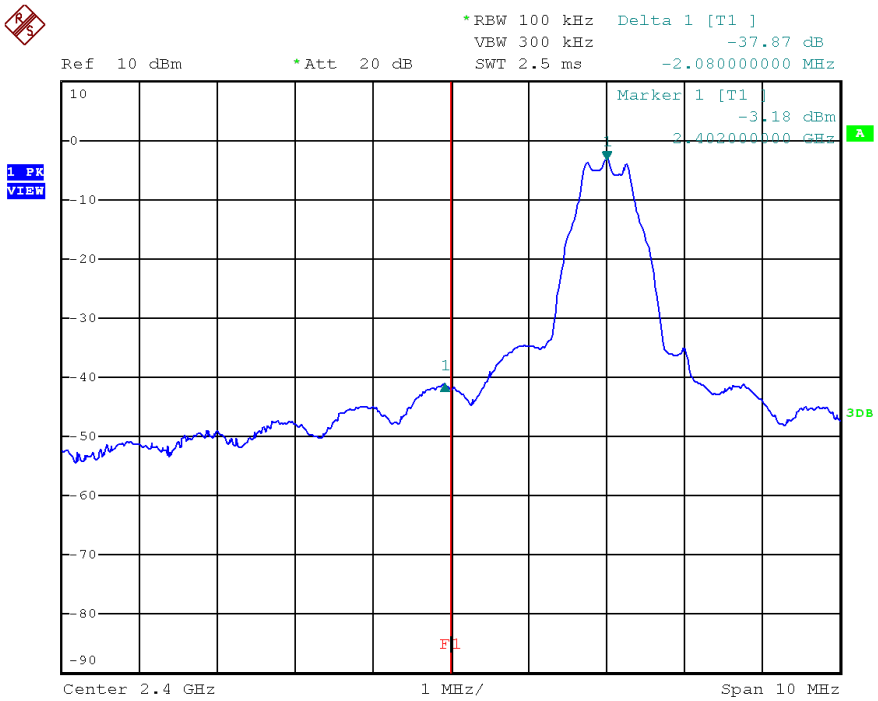
Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50dB below the level of the fundamental or to the general radiated emissions limits in Section 15.209, whichever is the lesser attenuation, which meet the requirement of Part 15.249(d).

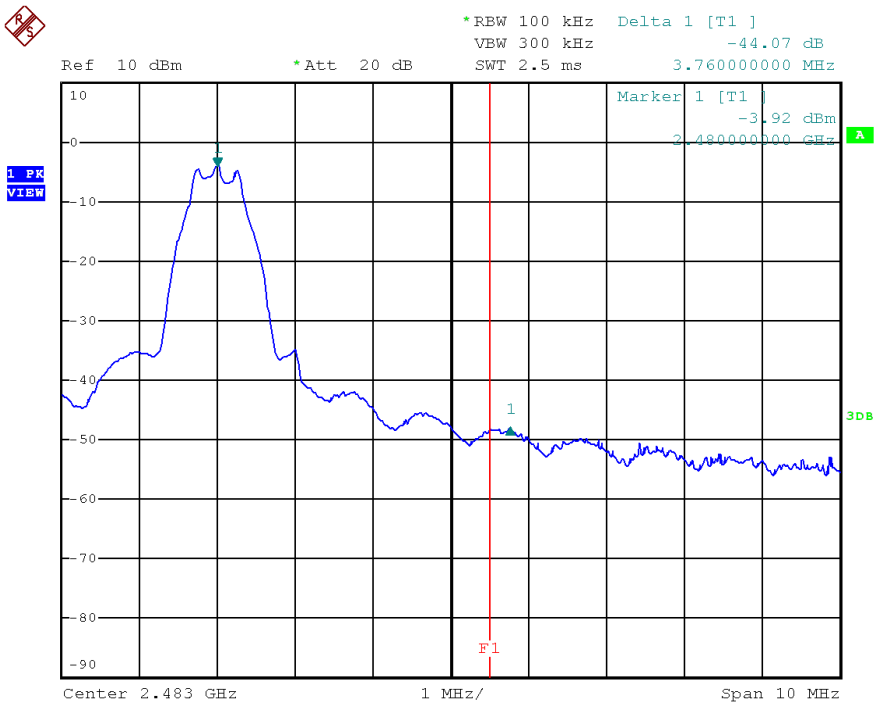


Block diagram of Test setup

TEST REPORT

PEAK MEASUREMENT (Bluetooth BLE)





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PEAK MEASUREMENT (Bluetooth BLE)

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower Bandedge

Peak Resultant Field Strength = Fundamental Emissions (Peak Value) – delta from the plot

= 83.6 dBµV/m - 37.9 dB
= 45.7 dBµV/m

Average Resultant Field Strength = Fundamental Emissions (Average Value) – delta from the plot

= 79.2 dBµV/m - 37.9 dB
= 41.3 dBµV/m

Upper Bandedge

Peak Resultant Field Strength = Fundamental Emissions (Peak Value) – delta from the plot

= 80.7 dBµV/m - 44.1 dB
= 36.6 dBµV/m

Average Resultant Field Strength = Fundamental Emissions (Average Value) – delta from the plot

= 76.0 dBµV/m - 44.1 dB
= 31.9 dBµV/m

The resultant field strength meets the general radiated emission limit in Section 15.209, which does not exceed 74 dBµV/m (Peak Limit) and 54 dBµV/m (Average Limit).

TEST REPORT

8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period (Teff) is approximately 625µs for a digital "1" bit which illustrated on technical specification, with a resolution bandwidth (3dB) of 3MHz, so the pulse desensitivity factor is 0dB.

8.3 Calculation of Average Factor

Not Applicable

8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of transmitter operating under the Part 15, Subpart C rules.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately 0.8m in height above the ground plane for emission measurement at or below 1GHz and 1.5m in height above the ground plane for emission measurement above 1GHz. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axis to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in peak mode. Average readings, when required, are 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 Exhibit 8.3. For line conducted emissions, the range scanned is 150 kHz to 30 MHz.

The frequency range scanned is 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 40 GHz, whichever is lower.

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements were made as described in ANSI C63.10 (2013).

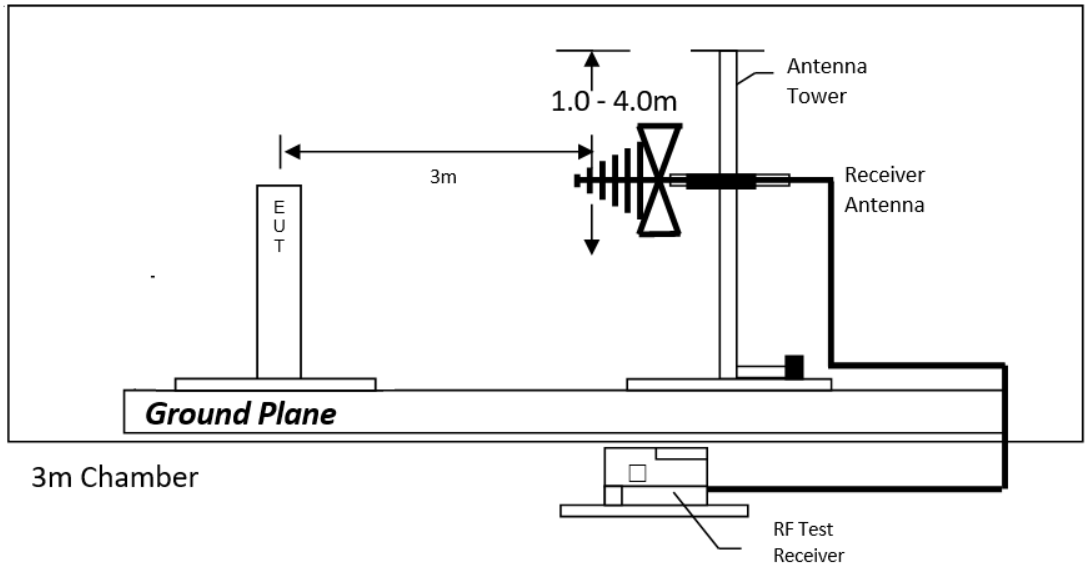
The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.1). Above 1000 MHz, a resolution bandwidth of 3 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.

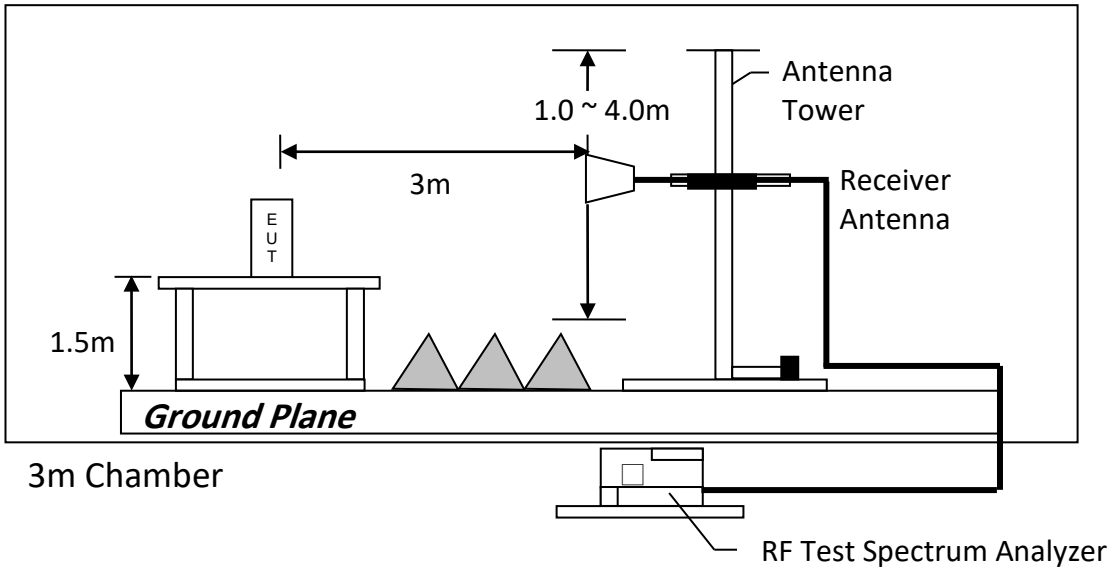
TEST REPORT

8.4.1 Radiated Emission Test Setup

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



Test setup of radiated emissions 30MHz to 1GHz



Test setup of radiated emissions above 1GHz

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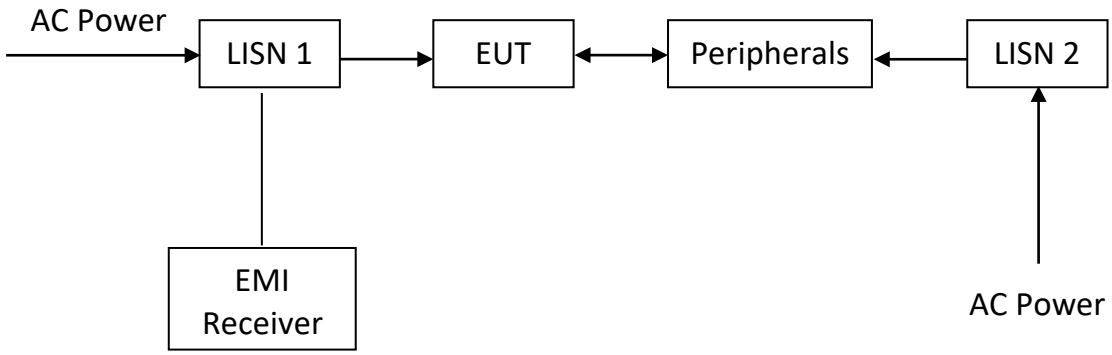
8.4.2 Conducted Emission Test Procedures

For tabletop equipment, the EUT along with its peripherals were placed on a 1.0m(W)×1.5m(L) and 0.8m in height wooden table. For floor-standing equipment, the EUT and all cables were insulated, if required, from the ground plane by up to 12 mm of insulating material. 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 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled.

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

8.4.3 Conducted Emission Test Setup



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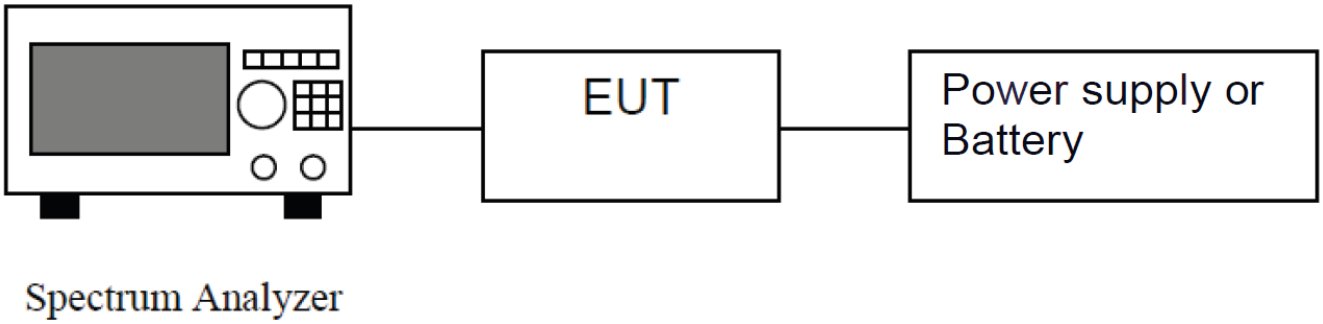
8.5 Occupied Bandwidth

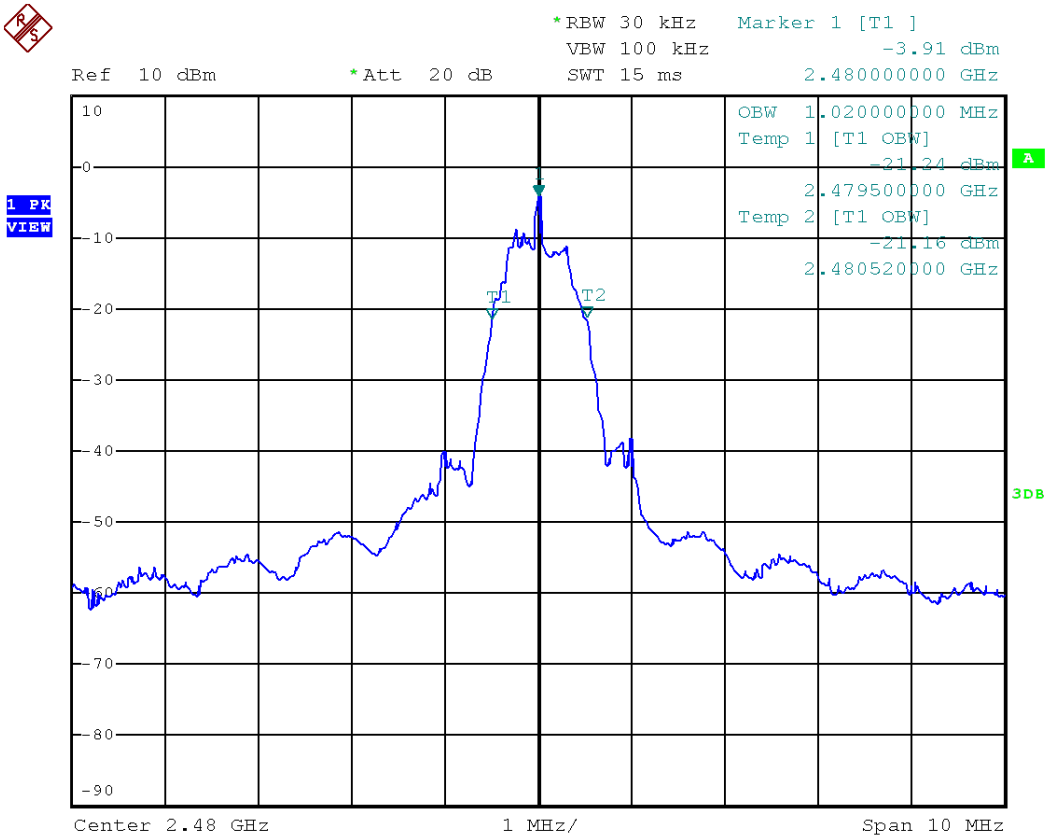


Block diagram of Test setup

Occupied Bandwidth Results: (Bluetooth BLE)

Bluetooth (MHz)	Occupied Bandwidth (kHz)
Low Channel: 2402	1000
Middle Channel: 2440	1000
High Channel: 2480	1020

The worst case is shown as below:



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9 CONFIDENTIALITY REQUEST

For electronic filing, a preliminary copy of the confidentiality request is saved with filename: Request.pdf.

10 EQUIPMENT LIST

1) Radiated Emissions Test

Equipment	Signal and Spectrum Analyzer (10Hz to 40GHz)	Biconical Antenna (30MHz to 300MHz)	EMI Test Receiver 7GHz
Registration No.	EW-3016	EW-3242	EW-3603
Manufacturer	ROHDESCHWARZ	EMCO	ROHDESCHWARZ
Model No.	FSV40	3110C	ESR7
Calibration Date	December 13, 2022	May 26, 2021	December 06, 2022
Calibration Due Date	December 13, 2023	November 26, 2023	December 06, 2023

Equipment	Log Periodic Antenna	Double Ridged Guide Antenna (1GHz - 18GHz)	Active Loop H-field (9kHz to 30MHz)
Registration No.	EW-3243	EW-0194	EW-3302
Manufacturer	EMCO	EMCO	EMCO
Model No.	3148B	3115	6502
Calibration Date	June 03, 2021	May 10, 2023	September 08, 2022
Calibration Due Date	September 30, 2023	November 10, 2024	December 08, 2023

Equipment	RF Preamplifier (9kHz to 6000MHz)	2.4GHz Notch Filter	14m Double Shield RF Cable (9kHz - 6GHz)
Registration No.	EW-3006b	EW-3435	EW-2376
Manufacturer	SCHWARZBECK	MICROWAVE	RADIALL
Model No.	BBV9718	N0324413	n m/br56/bnc m 14m
Calibration Date	February 15, 2022	June 16, 2022	January 26, 2022
Calibration Due Date	November 15, 2023	December 16, 2023	October 26, 2023

Equipment	RF Cable 14m (1GHz to 26.5GHz)	14m Double Shield RF Cable (20MHz to 6GHz)	Pyramidal Horn Antenna
Registration No.	EW-2781	EW-2074	EW-0905
Manufacturer	GREATBILLION	RADIALL	EMCO
Model No.	SMA m/SHF5MPU /SMA m ra14m,26G	N(m)-RG142-BNC(m) L=14M	3160-09
Calibration Date	December 12, 2022	December 10, 2021	July 20, 2021
Calibration Due Date	December 12, 2023	December 10, 2023	November 20, 2023

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2) Conducted Emissions Test

Equipment	5m RF Cable (40GHz)	Artificial Mains Network	EMI Test Receiver 7GHz
Registration No.	EW-2701	EW-2501	EW-3481
Manufacturer	RADIALL	ROHDESCHWARZ	ROHDESCHWARZ
Model No.	Sma m-m 5m 40G	ENV-216	ESR7
Calibration Date	November 24, 2020	September 11, 2021	December 21, 2021
Calibration Due Date	November 24, 2023	December 11, 2023	December 21, 2023

3) Bandedge Measurement

Equipment	EMI Test Receiver (9kHz to 26.5GHz)	5m RF Cable (40GHz)
Registration No.	EW-3156	EW-2701
Manufacturer	ROHDESCHWARZ	RADIALL
Model No.	ESR26	Sma m-m 5m 40G
Calibration Date	September 26, 2022	November 24, 2021
Calibration Due Date	December 26, 2023	November 24, 2023

4) OBW Measurement

Equipment	EMI Test Receiver (9kHz to 26.5GHz)	5m RF Cable (40GHz)
Registration No.	EW-3156	EW-2701
Manufacturer	ROHDESCHWARZ	RADIALL
Model No.	ESR26	Sma m-m 5m 40G
Calibration Date	September 26, 2022	November 24, 2021
Calibration Due Date	December 26, 2023	November 24, 2023

5) Control Software for Radiated Emission

Software Information	
Software Name	EMC32
Manufacturer	ROHDESCHWARZ
Software version	10.50.40

END OF TEST REPORT