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

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TEST REPORT

Report No.: 22061212HKG-002

Qmax Systems India Private Limited

Application For Original Grant of 47 CFR Part 15 Certification

Tekion Digital Displays

FCC ID: 2APD6TEKTDD001

Transceiver – Bluetooth & BLE

This report contains the data of Bluetooth & BLE portion only.

Prepared and Checked by:	**Approved by:**
Signed on File Leung Chun Ning, Peter Lead Engineer	Digitally signed by Kenneth Wong Location: Intertek Testing Services Hong Kong Limited Wong Kwok Yeung, Kenneth Assistant Supervisor Date: March 10, 2023

TEST REPORT

GENERAL INFORMATION

Grantee:	Qmax Systems India Private Limited
Grantee Address:	795, Trunk Road, Poonamallee, Chennai, India.
FCC Specification Standard:	FCC Part 15, October 1, 2021 Edition
FCC ID:	2APD6TEKTDD001
FCC Model(s):	TDD1
Type of EUT:	Transceiver
Description of EUT:	Tekion Digital Displays
Brand Name:	Tekion
Serial Number:	N/A
Sample Receipt Date:	February 10, 2023
Date of Test:	February 10, 2023 to March 03, 2023
Report Date:	March 10, 2023
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. This report covers the test data of Bluetooth & BLE only.

TEST REPORT

SUMMARY OF TEST RESULT

Test Items	FCC Part 15 Section	Results
Antenna Requirement	15.203	Complied
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 pervisions of this section.
2. Pursuant to FCC part 15 Section 15.215(c), the 20 dB 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 excepted variations in temperature and supply voltage were considered.

TEST REPORT

TABLE OF CONTENTS

TEST REPORT

1.0 GENERAL DESCRIPTION

1.1 Product Description

The Equipment Under Test (EUT) that is an OTT Box which operating at 2.4GHz Bluetooth, BLE, 2.4GHz & 5GHz (UNII-1 & UNII-3) Wi-Fi respectively. The EUT is powered by AC/DC Adaptor (Input: AC100 – 240V 50/60Hz Output: 12V 2000mA). It is used typically with TVs in the Customer Lounge of various Business to display tailored content.

This report contains the data of Bluetooth & BLE portion only.

Antenna(s) Information:

- 2 x External dedicated detachable Antennas
- Each Antenna has maximum gain of 5.0 dBi

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 vehicle's OBD port or 3.7V internal rechargeable battery and/or AC/DC USB adaptor Input: 100-240VAC 50/60Hz ; Output: 12.0VDC 2000mA.

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 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.

For simultaneous transmission, both Wi-Fi and Bluetooth portions are also switched on when taking radiated emission for determining worst-case spurious emission.

2.2 EUT Exercising Software

The EUT exercise program (if any) 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.

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.

2.5 Support Equipment List and Description

Description	Remark
AC/DC USB adaptor Input: 100-240VAC 50/60Hz; Output: 12.0VDC 2000mA; Model: L6R24-120	Provided by Applicant
2 x 2m length Belkin HDMI cable	Provided by Intertek
1 x IR EXT with 1.5m cable	Provided by Intertek
1 x 2m length LAN cable	Provided by Intertek

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

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 249.99855 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated 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 0.5 dB

3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 0.447 MHz

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

3.5 Conducted Emission Data

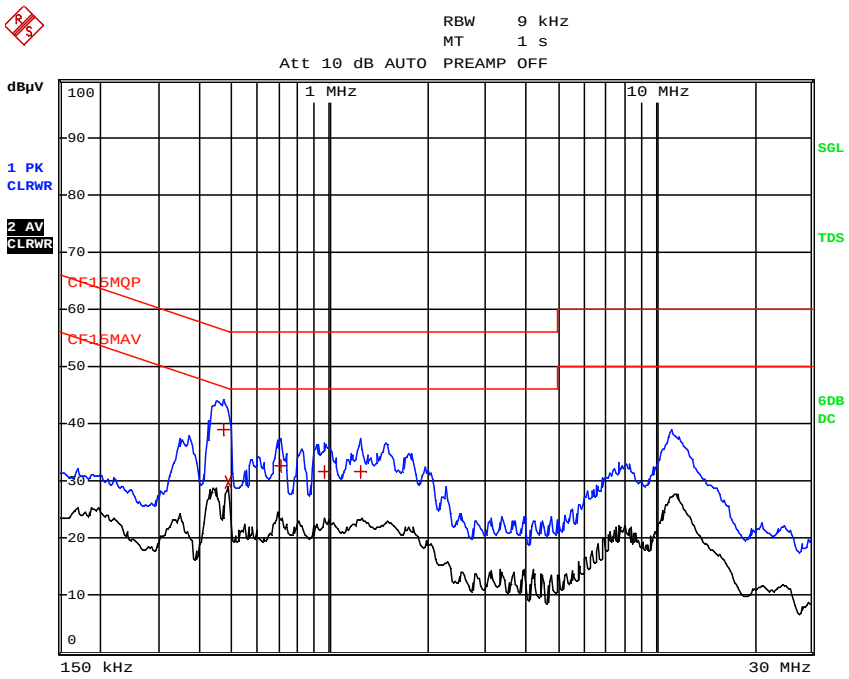
For electronic filing, the graph and data table of conducted emission is saved with filename: conducted.pdf.

Judgment: Pass by 22.01 dB

TEST REPORT

CONDUCTED EMISSION

Model: TDD1
Date of Test: March 03, 2023
Worst-Case Operating Mode: Operating Mode



EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	469.5 kHz	38.98	L1	-17.54
2	CISPR Average	487.5 kHz	29.75	N	-16.45
1	Quasi Peak	708 kHz	32.63	L1	-23.36
1	Quasi Peak	969 kHz	31.58	L1	-24.42
1	Quasi Peak	1.2435 MHz	31.58	L1	-24.41

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

TEST REPORT

RADIATED EMISSIONS

Model: TDD1
Date of Test: March 03, 2023
Worst-Case Operating Mode: Transmitting (Bluetooth)

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	89.8	33	29.4	86.2	94.0	-7.8
V	4804.000	26.8	33	34.9	28.7	54.0	-25.3
V	7206.000	26.6	33	37.9	31.5	54.0	-22.5
H	9608.000	26.1	33	40.4	33.5	54.0	-20.5
H	12010.000	25.5	33	40.5	33.0	54.0	-21.0
H	14412.000	29.5	33	40.0	36.5	54.0	-17.6

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	109.3	33	29.4	105.7	114.0	-8.3
V	4804.000	42.3	33	34.9	44.2	74.0	-29.8
V	7206.000	39.9	33	37.9	44.8	74.0	-29.2
H	9608.000	39.7	33	40.4	47.1	74.0	-26.9
H	12010.000	39.0	33	40.5	46.5	74.0	-27.6
H	14412.000	42.8	33	40.0	49.8	74.0	-24.2

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 meets 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: TDD1
Date of Test: March 03, 2023
Worst-Case Operating Mode: Transmitting (Bluetooth)

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	89.2	33	29.4	85.6	94.0	-8.4
H	4880.000	20.3	33	34.9	22.2	54.0	-31.8
V	7320.000	21.2	33	37.9	26.1	54.0	-28.0
V	9760.000	19.6	33	40.4	27.0	54.0	-27.0
H	12200.000	19.9	33	40.5	27.4	54.0	-26.6
H	14640.000	26.5	33	38.4	31.9	54.0	-22.1

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	110.9	33	29.4	107.3	114.0	-6.7
H	4880.000	34.7	33	34.9	36.6	74.0	-37.4
V	7320.000	35.5	33	37.9	40.4	74.0	-33.6
V	9760.000	34.0	33	40.4	41.4	74.0	-32.6
H	12200.000	34.3	33	40.5	41.8	74.0	-32.2
H	14640.000	40.9	33	38.4	46.3	74.0	-27.7

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 meets 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: TDD1
Date of Test: March 03, 2023
Worst-Case Operating Mode: Transmitting (Bluetooth)

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	93.1	33	29.4	89.5	94.0	-4.5
V	4960.000	23.5	33	34.9	25.4	54.0	-28.6
V	7440.000	23.5	33	37.9	28.4	54.0	-25.6
V	9920.000	21.5	33	40.4	28.9	54.0	-25.1
H	12400.000	22.0	33	40.5	29.5	54.0	-24.6
V	14880.000	26.6	33	38.4	32.0	54.0	-22.0

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	112.9	33	29.4	109.3	114.0	-4.7
V	4960.000	37.9	33	34.9	39.8	74.0	-34.2
V	7440.000	37.9	33	37.9	42.8	74.0	-31.2
V	9920.000	35.9	33	40.4	43.3	74.0	-30.7
H	12400.000	36.3	33	40.5	43.8	74.0	-30.2
V	14880.000	41.0	33	38.4	46.4	74.0	-27.6

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 meets 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: TDD1
Date of Test: March 03, 2023
Worst-Case Operating Mode: Transmitting (BLE)

Table 4

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	66.3	33	29.4	62.7	94.0	-31.3
V	4804.000	28.1	33	34.9	30.0	54.0	-24.0
V	7206.000	26.6	33	37.9	31.5	54.0	-22.5
V	9608.000	26.0	33	40.4	33.4	54.0	-20.6
H	12010.000	25.5	33	40.5	33.0	54.0	-21.0
V	14412.000	29.5	33	40.0	36.5	54.0	-17.5

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	2402.000	108.2	33	29.4	104.6	114.0	-9.4
V	4804.000	45.1	33	34.9	47.0	74.0	-27.0
V	7206.000	39.7	33	37.9	44.6	74.0	-29.4
V	9608.000	39.3	33	40.4	46.7	74.0	-27.3
H	12010.000	38.7	33	40.5	46.2	74.0	-27.8
V	14412.000	43.1	33	40.0	50.1	74.0	-23.9

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 meets 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: TDD1
Date of Test: March 03, 2023
Worst-Case Operating Mode: Transmitting (BLE)

Table 5

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	66.9	33	29.4	63.3	94.0	-30.7
H	4880.000	26.6	33	34.9	28.5	54.0	-25.5
V	7320.000	22.3	33	37.9	27.2	54.0	-26.9
V	9760.000	23.0	33	40.4	30.4	54.0	-23.6
H	12200.000	22.0	33	40.5	29.5	54.0	-24.5
H	14640.000	28.9	33	38.4	34.3	54.0	-19.7

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	112.3	33	29.4	108.7	114.0	-5.3
H	4880.000	39.8	33	34.9	41.7	74.0	-32.3
V	7320.000	35.5	33	37.9	40.4	74.0	-33.6
V	9760.000	36.3	33	40.4	43.7	74.0	-30.3
H	12200.000	35.2	33	40.5	42.7	74.0	-31.3
H	14640.000	42.2	33	38.4	47.6	74.0	-26.4

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 meets 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: TDD1
Date of Test: March 03, 2023
Worst-Case Operating Mode: Transmitting (BLE)

Table 6

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	67.7	33	29.4	64.1	94.0	-29.9
H	4960.000	23.4	33	34.9	25.3	54.0	-28.7
H	7440.000	23.4	33	37.9	28.3	54.0	-25.7
H	9920.000	21.8	33	40.4	29.2	54.0	-24.8
V	12400.000	23.2	33	40.5	30.7	54.0	-23.3
H	14880.000	26.4	33	38.4	31.8	54.0	-22.2

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	112.3	33	29.4	108.7	114.0	-5.3
H	4960.000	36.7	33	34.9	38.6	74.0	-35.4
H	7440.000	36.6	33	37.9	41.5	74.0	-32.5
H	9920.000	35.1	33	40.4	42.5	74.0	-31.5
V	12400.000	36.4	33	40.5	43.9	74.0	-30.1
H	14880.000	39.7	33	38.4	45.1	74.0	-28.9

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 meets 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: TDD1
Date of Test: March 03, 2023
Worst-Case Operating Mode: Operating Mode

Table 7

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)
H	249.999	41.5	16	20.0	45.5	46.0	-0.5
H	296.998	38.9	16	22.0	44.9	46.0	-1.1
V	593.997	32.5	16	29.0	45.5	46.0	-0.5
V	624.996	31.2	16	29.0	44.2	46.0	-1.8
V	749.996	30.3	16	30.0	44.3	46.0	-1.7
H	874.995	29.1	16	32.0	45.1	46.0	-0.9

Notes:
1. Quasi-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. Emissions within the restricted band meets the requirement of FCC Part 15 Section 15.205.
5. 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.

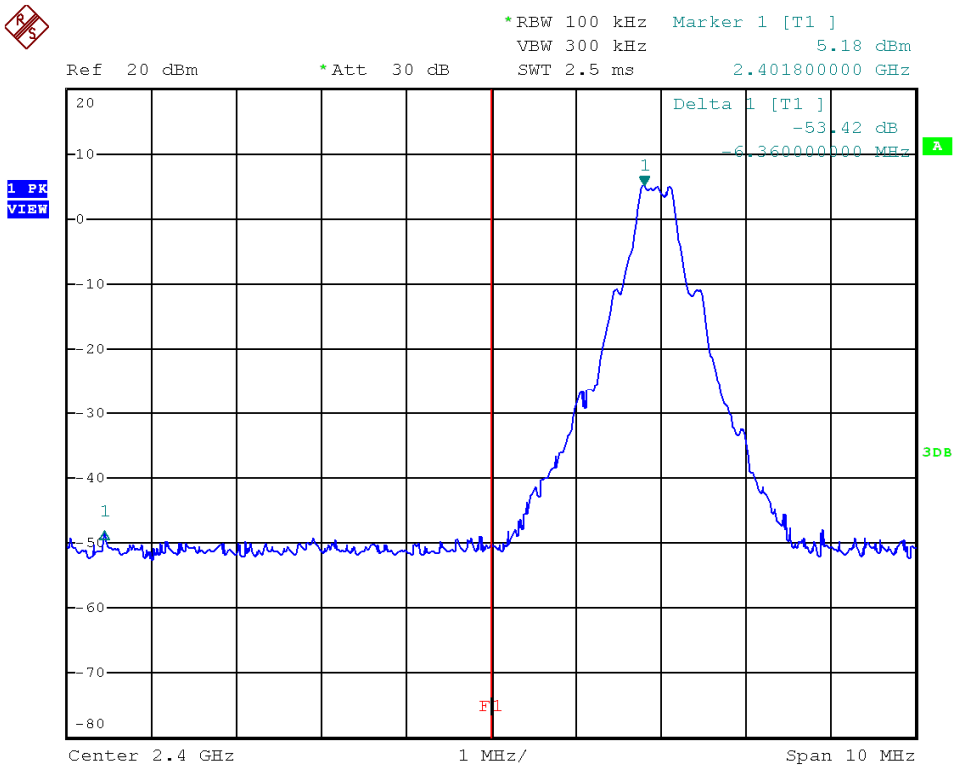
8.1 Radiated Emission on the Bandedge

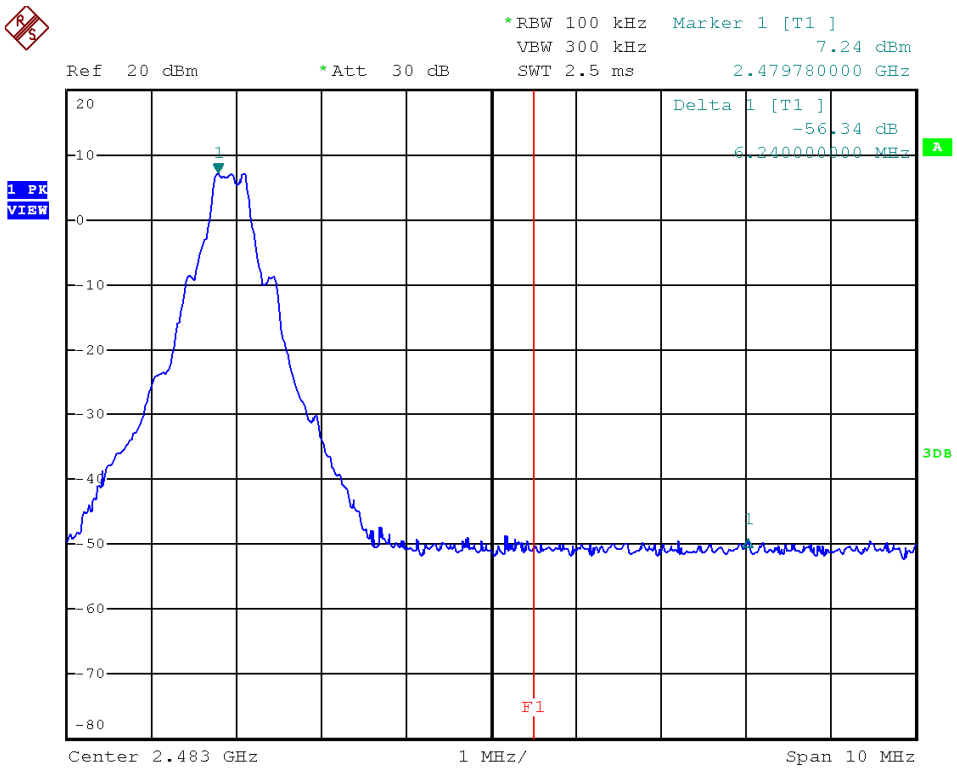
From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz to 2483.5MHz). In case of the fundamental emissions are within two standard bandwidths from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard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

TEST REPORT

PEAK MEASUREMENT (Bluetooth)





TEST REPORT

PEAK MEASUREMENT (Bluetooth)

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

= 105.7 dBµV/m - 53.4 dB
= 52.3 dBµV/m

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

= 86.2 dBµV/m - 53.4 dB
= 32.8 dBµV/m

Upper Bandedge

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

= 109.3 dBµV/m - 56.3 dB
= 53.0 dBµV/m

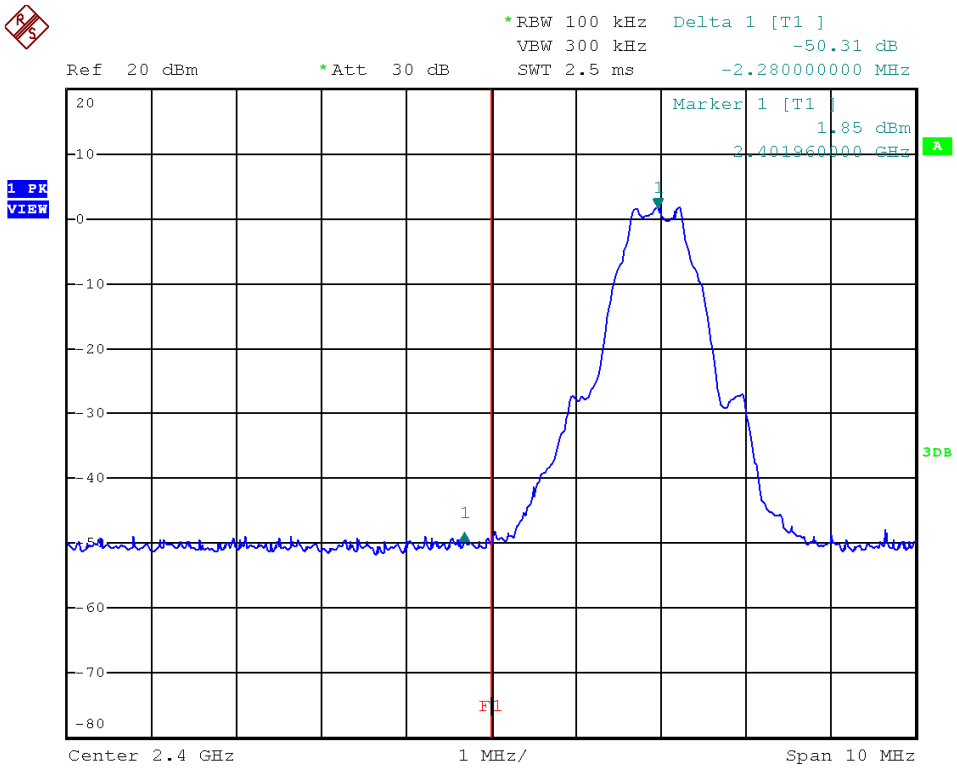
Average Resultant Field Strength = Fundamental Emissions (Average Value) – delta from the plot

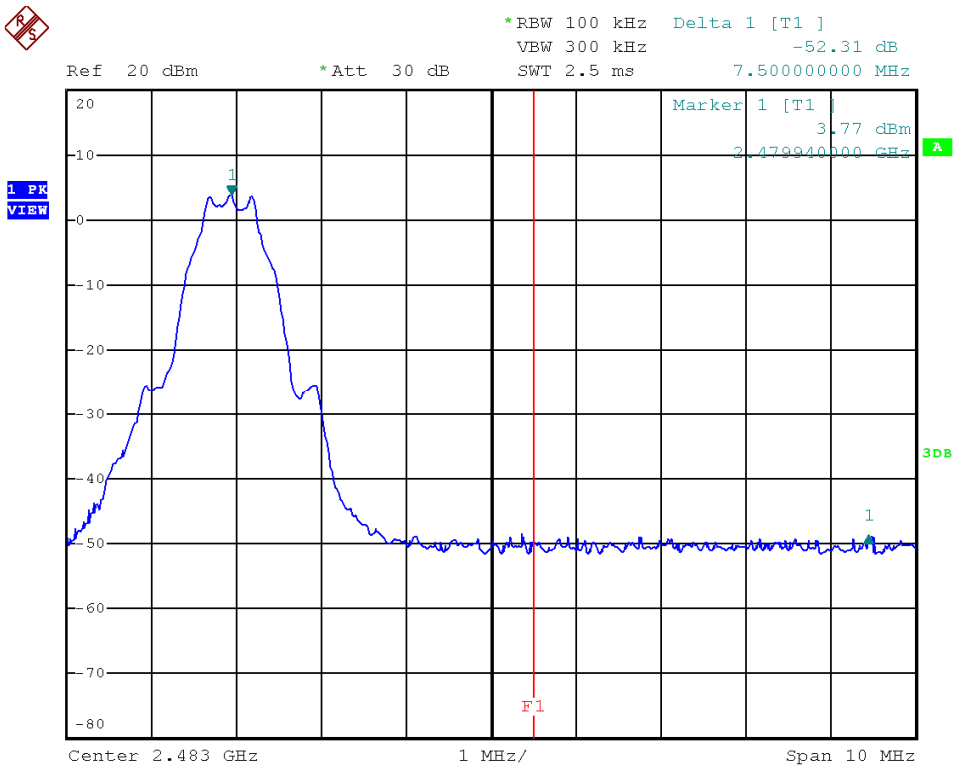
= 89.5 dBµV/m - 56.3 dB
= 33.2 dBµV/m

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

PEAK MEASUREMENT (BLE)





TEST REPORT

PEAK MEASUREMENT (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

= 104.6 dBµV/m - 50.3 dB
= 54.3 dBµV/m

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

= 62.7 dBµV/m - 50.3 dB
= 12.4 dBµV/m

Upper Bandedge

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

= 108.7 dBµV/m - 52.3 dB
= 56.4 dBµV/m

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

= 64.1 dBµV/m - 52.3 dB
= 11.8 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 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.

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).

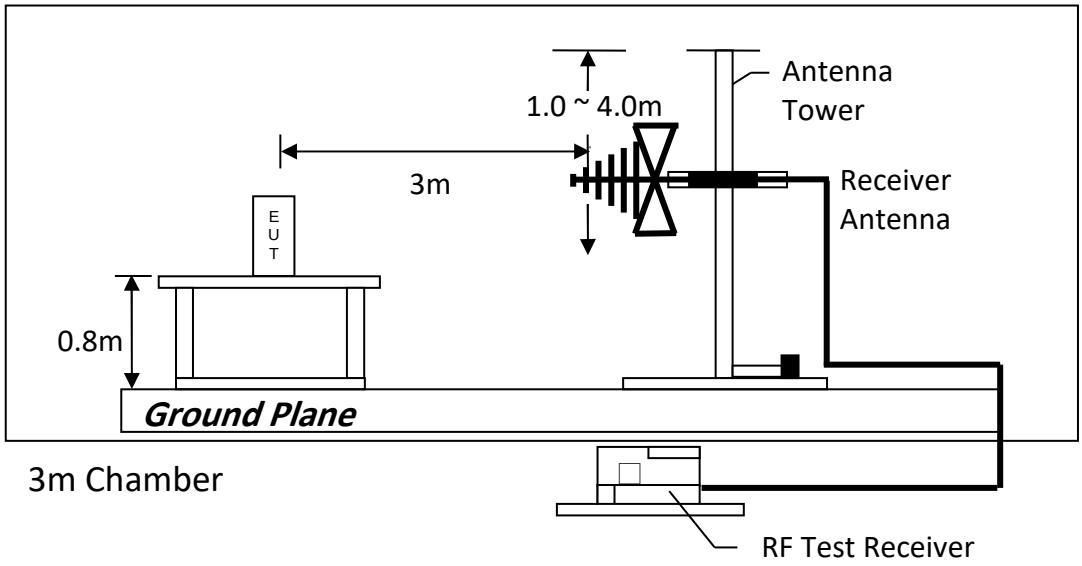
The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion 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.

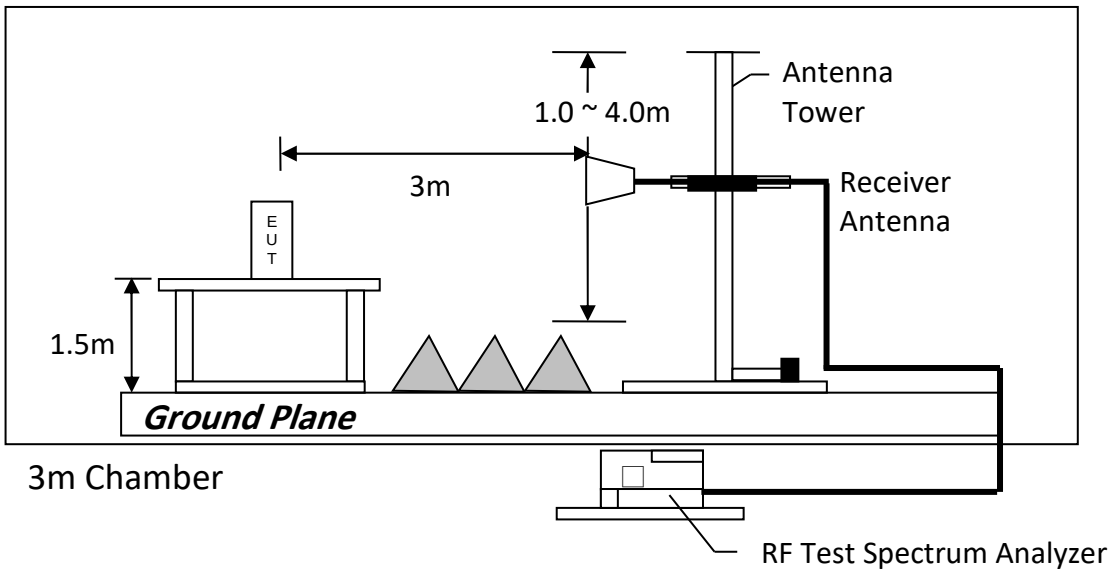
TEST REPORT

8.2.1 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

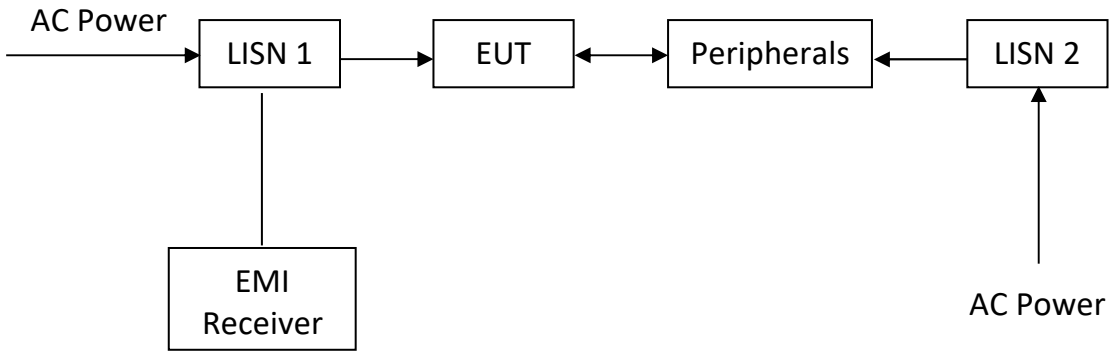
TEST REPORT

8.2.2 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.

8.2.3 Conducted Emission Test Setup



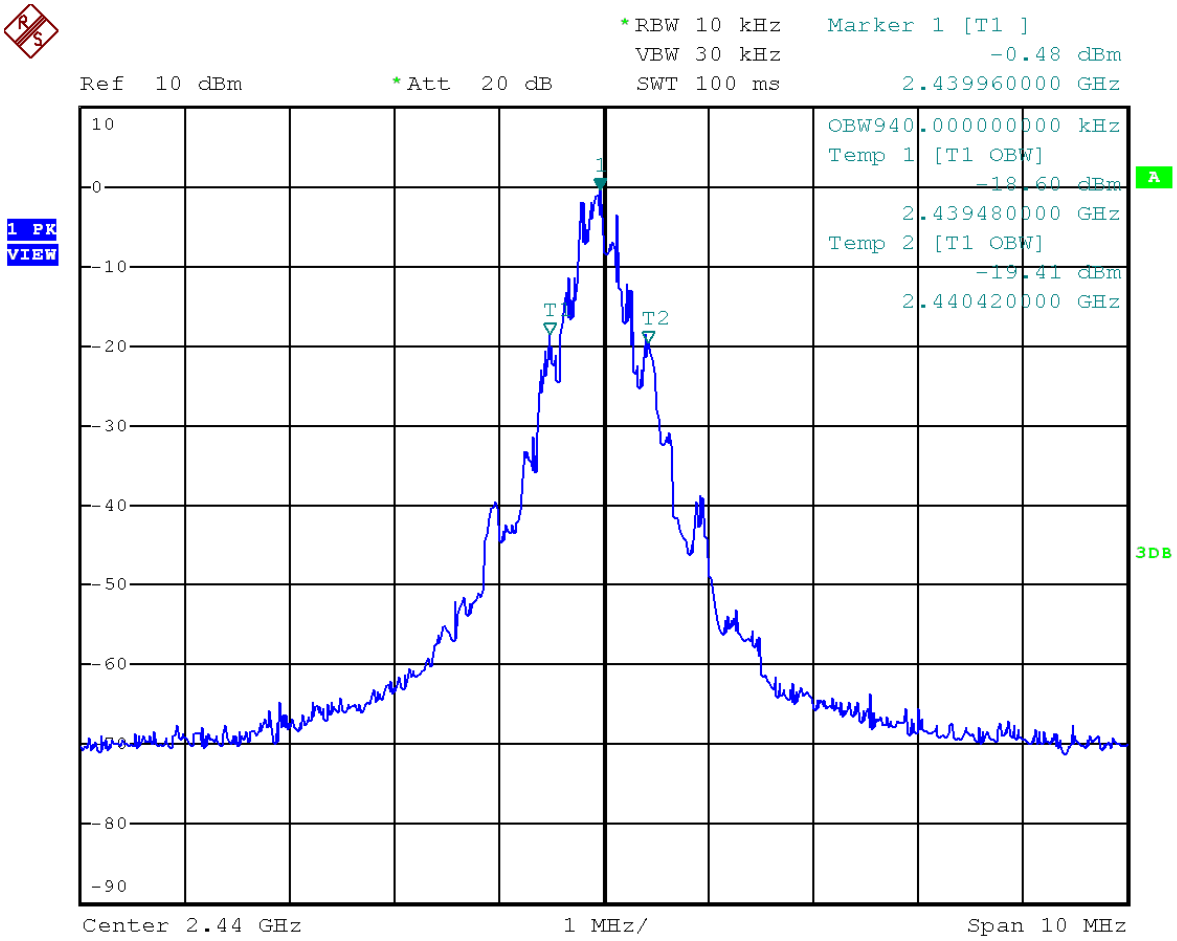
TEST REPORT

8.3 Occupied Bandwidth

Occupied Bandwidth Results: (Bluetooth)

Frequency (MHz)	Occupied Bandwidth (kHz)
Low Channel: 2402	920
Middle Channel: 2442	940
High Channel: 2480	920

The worst case is shown as below:



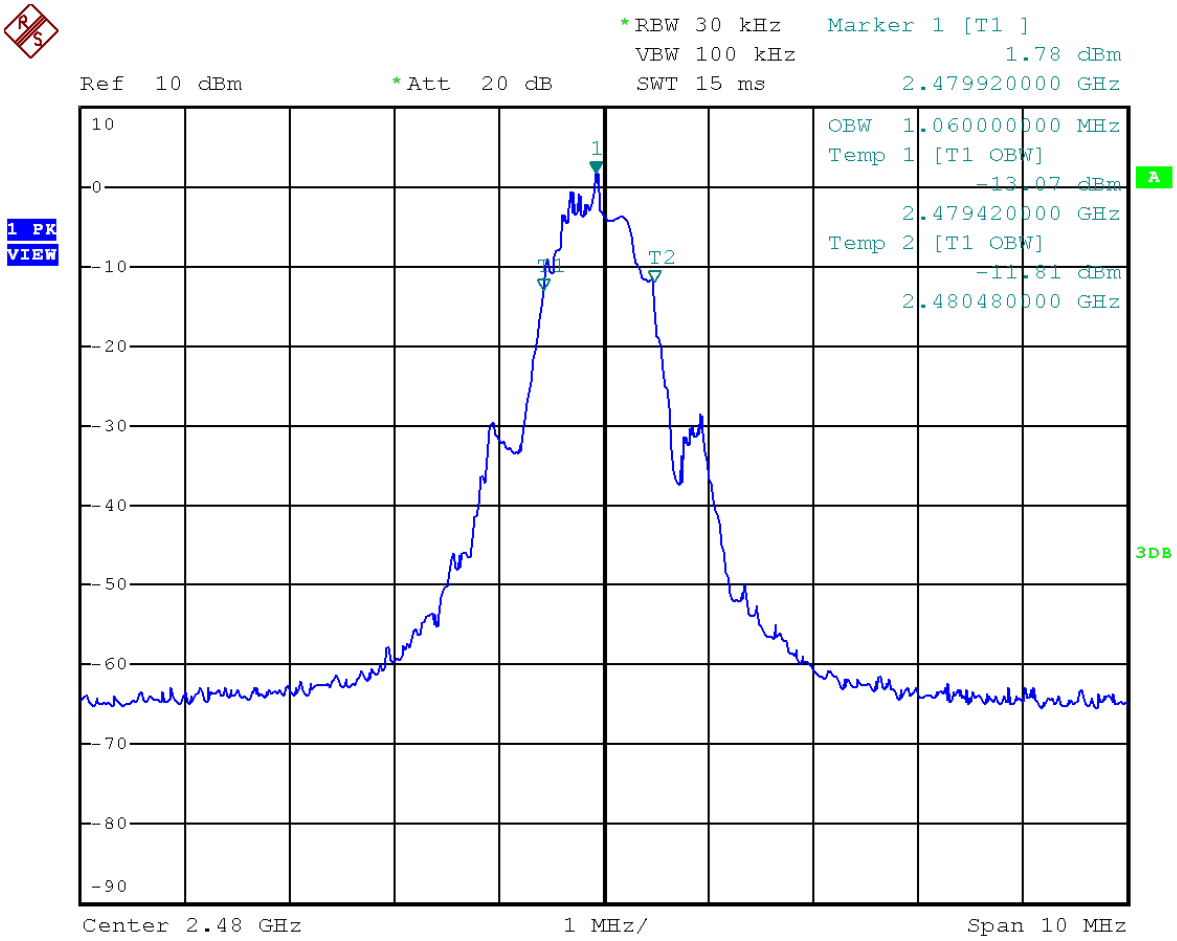
TEST REPORT

8.3 Occupied Bandwidth (Cont'd)

Occupied Bandwidth Results: (BLE)

Frequency (MHz)	Occupied Bandwidth (kHz)
Low Channel: 2402	1060
Middle Channel: 2442	1060
High Channel: 2480	1060

The worst case is shown as below:



TEST REPORT

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	Spectrum Analyzer (10Hz to 40GHz)	Biconical Antenna (30MHz to 300MHz)
Registration No.	EW-3016	EW-3241
Manufacturer	ROHDESCHWARZ	EMCO
Model No.	FSV40	3110C
Calibration Date	December 13, 2022	May 26, 2021
Calibration Due Date	December 13, 2023	May 26, 2023

Equipment	Log Periodic Antenna	Double Ridged Guide Antenna	Active Loop H-field (9kHz to 30MHz)
Registration No.	EW-3243	EW-1133	EW-3302
Manufacturer	EMCO	EMCO	EMCO
Model No.	3148B	3115	6502
Calibration Date	June 03, 2021	May 26, 2021	December 13, 2021
Calibration Due Date	March 30, 2023	May 26, 2023	June 13, 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	May 15, 2023	June 16, 2023	April 26, 2023

Equipment	Pyramidal Horn Antenna
Registration No.	EW-0905
Manufacturer	EMCO
Model No.	3160-09
Calibration Date	July 20, 2021
Calibration Due Date	April 20, 2023

TEST REPORT

2) Conducted Emissions Test

Equipment	RF Cable 80cm (RG142) (9kHz to 30MHz)	Artificial Mains Network	EMI Test Receiver (9kHz to 26.5GHz)
Registration No.	EW-2451	EW-2501	EW-3156
Manufacturer	RADIALL	ROHDESCHWARZ	ROHDESCHWARZ
Model No.	bnc m st / 142 / bnc m st 80cm	ENV-216	ESR26
Calibration Date	May 06, 2022	November 09, 2021	September 26, 2022
Calibration Due Date	May 06, 2023	May 09, 2023	September 26, 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	September 26, 2023	May 24, 2023

4) OBW Measurement

Equipment	EMI Test Receiver 7GHz	5m RF Cable (40GHz)
Registration No.	EW-3481	EW-2701
Manufacturer	ROHDESCHWARZ	RADIALL
Model No.	ESR7	Sma m-m 5m 40G
Calibration Date	December 21, 2021	November 24, 2021
Calibration Due Date	March 21, 2023	May 24, 2023

5) Control Software for Radiated Emission

Software Information	
Software Name	EMC32
Manufacturer	ROHDESCHWARZ
Software version	10.50.40

END OF TEST REPORT