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MARIGOLD ENTERPRISES LTD.

TEST REPORT

SCOPE OF WORK
FCC TESTING– MODEL: QQ6

REPORT NUMBER
190523032SZN-001

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MARIGOLD ENTERPRISES LTD.

Application For Certification

FCC ID: 2ATRE-QQ6

Robotic Vacuum

Model: QQ6

Trade Name: Alcove

2.4GHz Transmitter

Report No.: 190523032SZN-001

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-18]

Prepared and Checked by:

Jeff Liang
Engineer

Approved by:

Kidd Yang
Technical Supervisor
Date: June 21, 2019

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MEASUREMENT/TECHNICAL REPORT

This report concerns (check one:) Original Grant _X_ Class II Change _____

Equipment Type: DXX - Part 15 Low Power Communication Device Transmitter

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Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes _____ No __X__

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
date
of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes _____ No __X__

If no, assumed Part 15, Subpart C for intentional radiator – the new 47 CFR [10-1-18 Edition] provision.

Report prepared by:

Jeff Liang
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1.0 Summary of Test Result

Applicant: MARIGOLD ENTERPRISES LTD.
Applicant Address: ROOM 713- 714, TOWER A, HUNGHOM COMMERCIAL CENTRE, 39 MA TAU WAI ROAD, KOWLOON, HONG KONG.
Manufacturer: MARIGOLD ENTERPRISES LTD.
Manufacturer Address: ROOM 713- 714, TOWER A, HUNGHOM COMMERCIAL CENTRE, 39 MA TAU WAI ROAD, KOWLOON, HONG KONG.

MODEL: QQ6

FCC ID: 2ATRE-QQ6

Test Specification	Reference	Results
Transmitter Radiated Emission Bandedge	15.249 &15.209 &15.205	Pass
Conducted Emission	15.207	Pass
20dB Bandwidth	15.215(c)	Pass

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

2.0 General Description

2.1 Product Description

The equipment under test (EUT) is a Robotic Vacuum with 2.4GHz Transmitter function operating in 2402-2480MHz and contains a certified WIFI module which can be operated in the frequency band of 2412-2462MHz. The EUT can be powered by DC 14.4V, 2500mAh rechargeable battery and/or DC 20V with recharging base and/or DC 20V with Adapter. The EUT can't transmit while charged by adapter directly. For more detail information pls. refer to the user manual.

Antenna Type: PCB antenna
Modulation Type: GFSK
Antenna Gain: 2dBi

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

2.2 Related Submittal(s) Grants

This is an application for certification of a transmitter for the Robotic Vacuum which has 2.4G RF transmitter function, and related report for FCC SDOC is subjected to report number: 190523033SZN-001.

The part of a system that operated with this devise is under the FCC ID:2ATRE-QQ6-Base.

The Robotic Vacuum contains a WIFI module which has been granted under the FCC ID:2AHMRESP12S.

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Radiated emission measurement was performed in Semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the 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. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The Semi-Anechoic chamber and shield room used to collect the radiated data and conducted data are Intertek Testing Services Shenzhen Ltd. Longhua Branch and located at 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, ShenZhen, P.R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: CN1188).

3.0 System Test Configuration

3.1 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 EUT was powered by DC 14.4V, 2500mAh rechargeable battery or DC 20V with recharging base during the test. Both standalone and charged with recharging base have been considered. The EUT contains a WIFI module which was installed and operating during the test, only the worst data was reported in this report.

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the centre of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. 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 Section 4.

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 placed on a turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

3.2 EUT Exercising Software

There was no special software to exercise the device.

3.3 Special Accessories

No special accessories used.

3.4 Equipment Modification

Any modifications installed previous to testing by MARIGOLD ENTERPRISES LTD. will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd Longhua Branch.

3.5 Measurement Uncertainty

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

3.6 Support Equipment List and Description

Description	Manufacturer	Model No.
Adapter	MARIGOLD ENTERPRISES LTD.	NLD100200Q1A4
remote-control unit	MARIGOLD ENTERPRISES LTD.	N/A
Recharging base	MARIGOLD ENTERPRISES LTD.	QQ6

4.0 Emission Results

Data is included worst-case configuration (the configuration which resulted in the highest emission levels).

4.1 Radiated Test Results

A sample calculation, configuration photographs and data tables of the emissions are included.

4.1.1 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 dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
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

Assume a receiver reading of 62.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 62.0 dBµV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
AV = -10 dB
FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 dBµV/m

Level in µV/m = Common Antilogarithm [(42 dBµV/m)/20] = 125.9 µV/m

4.1.2 Radiated Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos. pdf.

4.1.3 Radiated Emissions

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. Simultaneous transmission was considered and only the worst case data was reported.

Worst Case Radiated Emission
at
583.385 MHz

Judgement: Passed by 9.1 dB

TEST PERSONNEL:

Sign on file

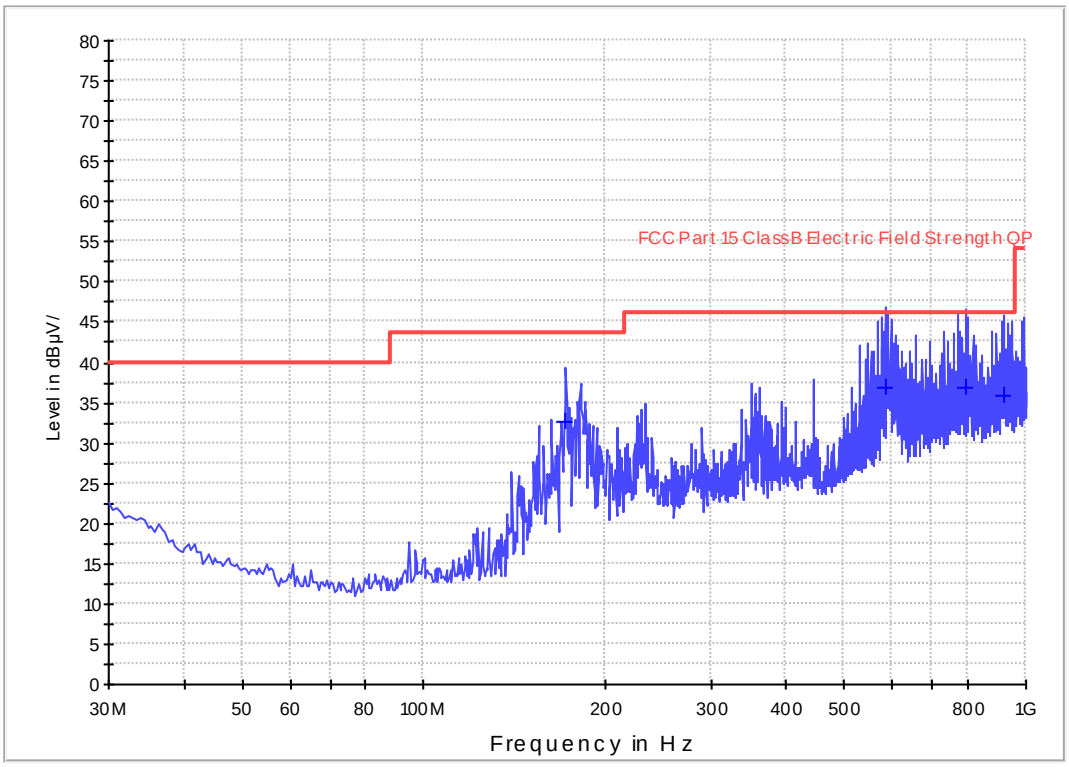
Jeff Liang, Engineer
Typed/Printed Name

June 19, 2019
Date

Applicant: MARIGOLD ENTERPRISES LTD.
Date of Test: June 19, 2019 Model: QQ6
Worst Case Operating Mode: Simultaneous transmission

ANT Polarity: Horizontal

FCC Part 15



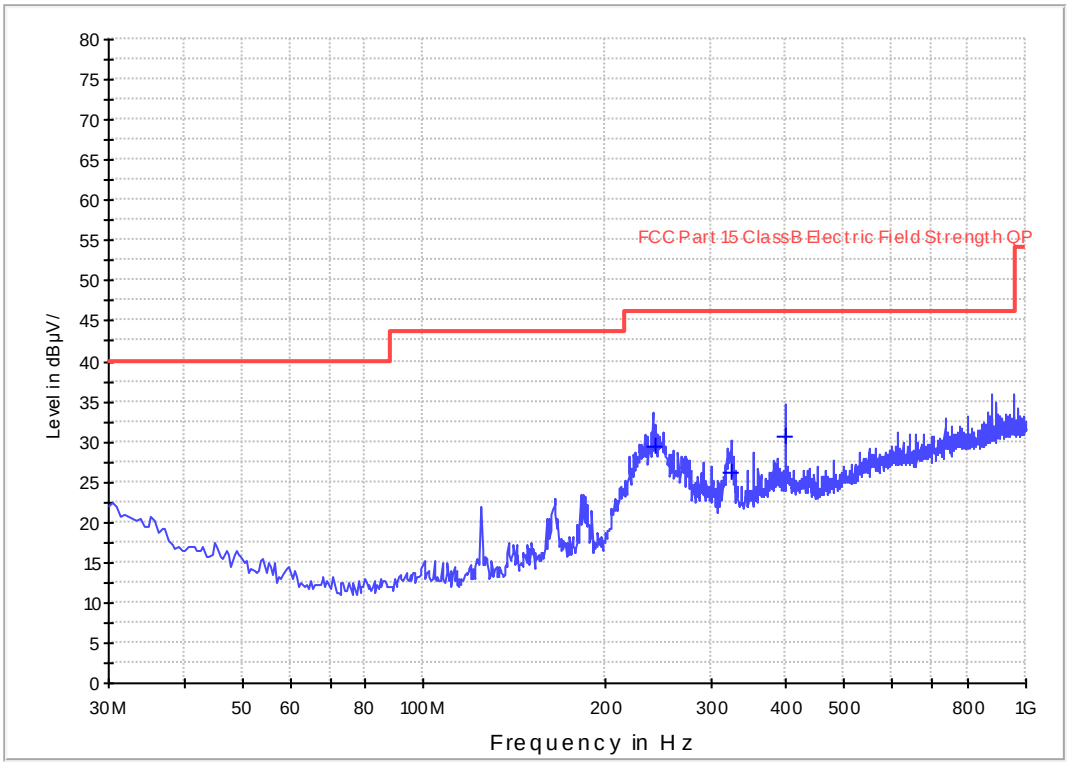
Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
583.385000	36.9	1000.0	120.000	100.0	H	23.6	9.1	46.0
797.270000	36.9	1000.0	120.000	100.0	H	26.0	9.1	46.0
919.975000	35.9	1000.0	120.000	100.0	H	27.7	10.1	46.0

Remark:
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
3. Margin (dB) = Limit Line(dBµV/m) – Level (dBµV/m)

Applicant: MARIGOLD ENTERPRISES LTD.
Date of Test: June 19, 2019 Model: QQ6
Worst Case Operating Mode: Simultaneous transmission

ANT Polarity: Vertical

FCC Part 15



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
243.400000	29.4	1000.0	120.000	0.0	V	14.4	16.6	46.0
323.910000	26.3	1000.0	120.000	0.0	V	16.5	19.7	46.0
400.055000	30.5	1000.0	120.000	0.0	V	18.9	15.5	46.0

Remark:
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
3. Margin (dB) = Limit Line(dBµV/m) – Level (dBµV/m)

4.1.4 Transmitter Spurious Emissions (Radiated)

Worst Case Radiated Emission
at
2399.783 MHz

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos. pdf.

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.

Judgement: Passed by 8.9 dB

TEST PERSONNEL:

Sign on file

Jeff Liang, Engineer
Typed/Printed Name

June 19, 2019
Date

Applicant: MARIGOLD ENTERPRISES LTD.
Date of Test: June 19, 2019 Model: QQ6
Worst Case Operating Mode: Transmit

Table 1

Radiated Emissions
(2402 MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Vertical	2402.000	101.0	36.7	28.1	92.4	114.0	-21.6
Vertical	4804.000	47.1	36.7	35.5	45.9	74.0	-28.1
Vertical	7206.000	57.4	36.8	35.6	56.2	74.0	-17.8

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Vertical	2402.000	101.0	36.7	28.1	50.8	41.6	94.0	-52.4
Vertical	4804.000	47.1	36.7	35.5	50.8	-4.9	54.0	-58.9
Vertical	7206.000	57.4	36.8	35.6	50.8	5.4	54.0	-48.6

Notes:
1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.

Applicant: MARIGOLD ENTERPRISES LTD.
Date of Test: June 19, 2019 Model: QQ6
Worst Case Operating Mode: Transmit

Table 2

Radiated Emissions
(2443 MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Vertical	2443.000	100.8	36.7	28.1	92.2	114.0	-21.8
Vertical	4886.000	48.4	36.7	35.5	47.2	74.0	-26.8
Vertical	7329.000	56.3	36.8	35.6	55.1	74.0	-18.9

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Vertical	2443.000	100.8	36.7	28.1	50.8	41.4	94.0	-52.6
Vertical	4886.000	48.4	36.7	35.5	50.8	-3.6	54.0	-57.6
Vertical	7329.000	56.3	36.8	35.6	50.8	4.3	54.0	-49.7

Notes:
1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.

Applicant: MARIGOLD ENTERPRISES LTD.
Date of Test: June 19, 2019 Model: QQ6
Worst Case Operating Mode: Transmit

Table 3

Radiated Emissions
(2480 MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Vertical	2480.000	100.5	36.7	28.1	91.9	114.0	-22.1
Vertical	4960.000	47.9	36.7	35.5	46.7	74.0	-27.3
Vertical	7440.000	56.3	36.8	35.6	55.1	74.0	-18.9

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Vertical	2480.000	100.5	36.7	28.1	50.8	41.1	94.0	-52.9
Vertical	4960.000	47.9	36.7	35.5	50.8	-4.1	54.0	-58.1
Vertical	7440.000	56.3	36.8	35.6	50.8	4.3	54.0	-49.7

Notes:
1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna is used for the emission over 1000MHz.

4.2 Conducted Emission Configuration Photograph

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

4.2.1 Conducted Emission

Worst Case Conducted Configuration
at
0.166MHz

Judgement: Passed by 10.3dB margin

TEST PERSONNEL:

Sign on file

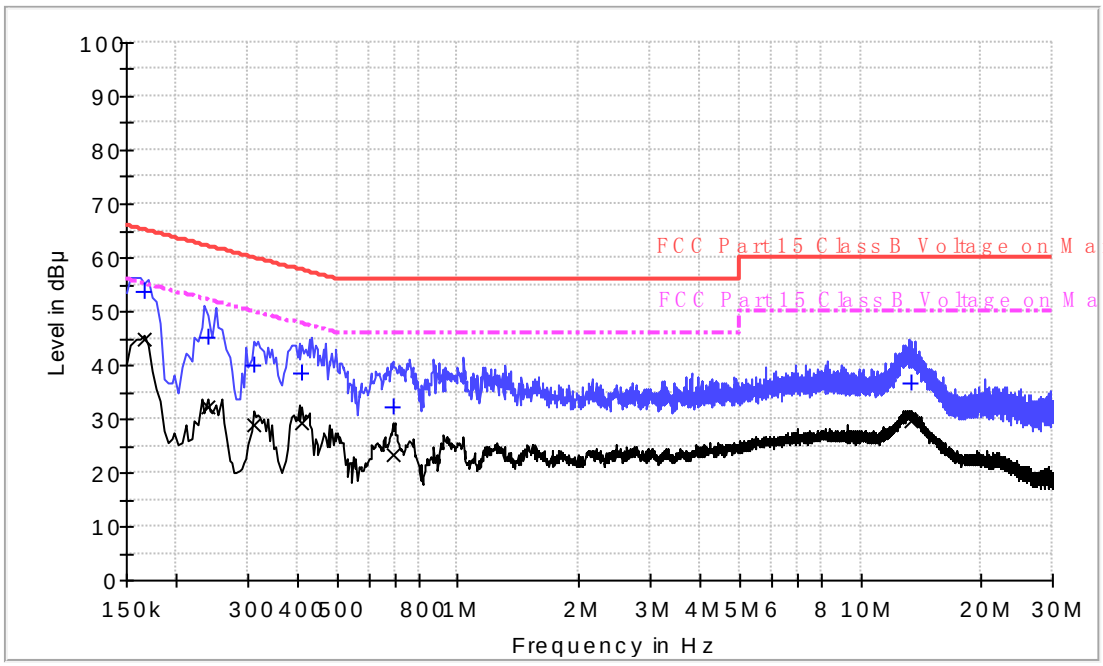
Jeff Liang, Engineer
Typed/Printed Name

June 14, 2019
Date

Applicant: MARIGOLD ENTERPRISES LTD.
Date of Test: June 14, 2019 Model: QQ6
Worst Case Operating Mode: Simultaneous transmission
Phase: Live

Graphic / Data Table

Conducted Emissions
Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.166000	53.7	9.000	L1	9.7	11.5	65.2
0.238000	45.0	9.000	L1	9.7	17.2	62.2
0.310000	40.1	9.000	L1	9.8	19.9	60.0
0.410000	38.5	9.000	L1	9.8	19.1	57.6
0.690000	32.4	9.000	L1	9.8	23.6	56.0
13.366000	36.8	9.000	L1	10.1	23.2	60.0

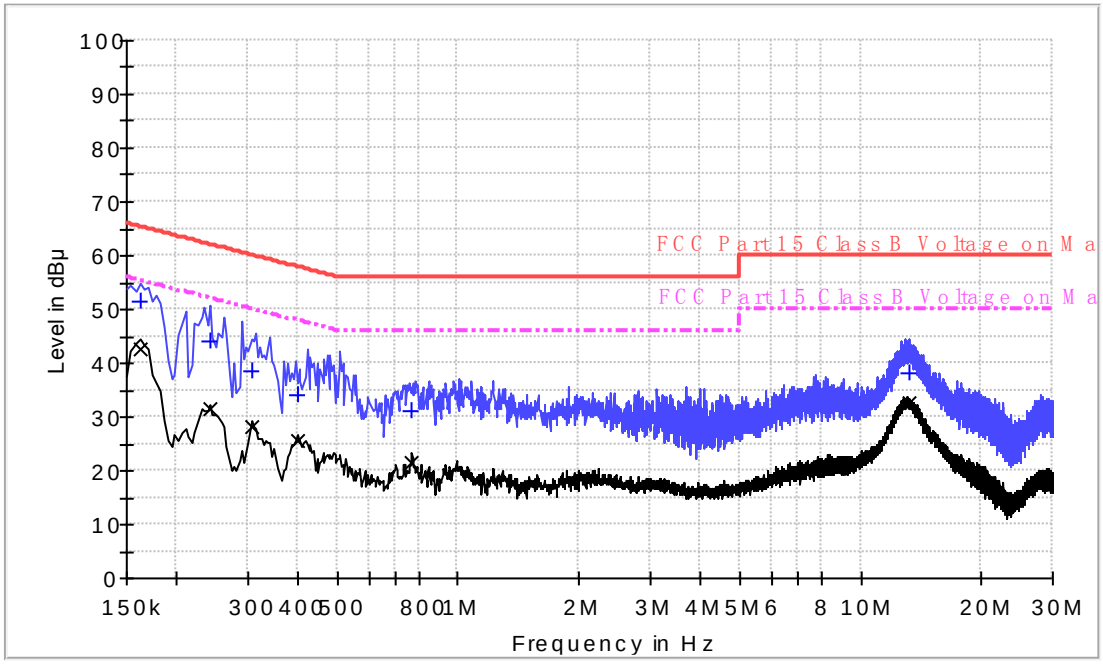
Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.166000	44.9	9.000	L1	9.7	10.3	55.2
0.238000	32.3	9.000	L1	9.7	19.9	52.2
0.310000	29.0	9.000	L1	9.8	21.0	50.0
0.410000	29.2	9.000	L1	9.8	18.4	47.6
0.690000	23.4	9.000	L1	9.8	22.6	46.0
13.366000	29.7	9.000	L1	10.1	20.3	50.0

Applicant: MARIGOLD ENTERPRISES LTD.
Date of Test: June 14, 2019 Model: QQ6
Worst Case Operating Mode: Simultaneous transmission
Phase: Neutral

Graphic / Data Table

Conducted Emissions
Pursuant to FCC 15.107: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.162000	51.4	9.000	N	9.7	14.0	65.4
0.242000	44.0	9.000	N	9.7	18.0	62.0
0.306000	38.4	9.000	N	9.8	21.7	60.1
0.398000	34.0	9.000	N	9.8	23.9	57.9
0.766000	31.0	9.000	N	9.8	25.0	56.0
13.150000	38.1	9.000	N	10.2	21.9	60.0

Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.162000	42.7	9.000	N	9.7	12.7	55.4
0.242000	31.3	9.000	N	9.7	20.7	52.0
0.306000	28.2	9.000	N	9.8	21.9	50.1
0.398000	25.5	9.000	N	9.8	22.4	47.9
0.766000	21.5	9.000	N	9.8	24.5	46.0
13.150000	32.4	9.000	N	10.2	17.6	50.0

5.0 Equipment Photographs

For electronic filing, the photographs of the tested EUT are saved with filename: external photos.pdf & internal photos.pdf.

6.0 Product Labelling

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

7.0 Technical Specifications

For electronic filing, the block diagram and schematics of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

8.0 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.

9.0 Miscellaneous Information

This miscellaneous information includes details of the measured bandedge, 20dB Bandwidth, the test procedure and calculation of factor such as pulse desensitization.

9.1 Bandedge Plot

The test plots are attached as below. From the plot, the field strength of any emissions outside of the specified frequency band are attenuated to the general radiated emission limits in section 15.209. It fulfils the requirement of 15.249(d).

Peak Measurement

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

(i) Lower channel 2402.000 MHz:

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

= 92.4 dBµv/m-27.3 dB
= 65.1 dBµv/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the bandedge plot

= 41.6 dBµv/m-27.3 dB
= 14.3 dBµv/m

(ii) Upper channel 2480.000 MHz:

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

= 91.9 dBµv/m-35.0 dB
= 56.9 dBµv/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the bandedge plot

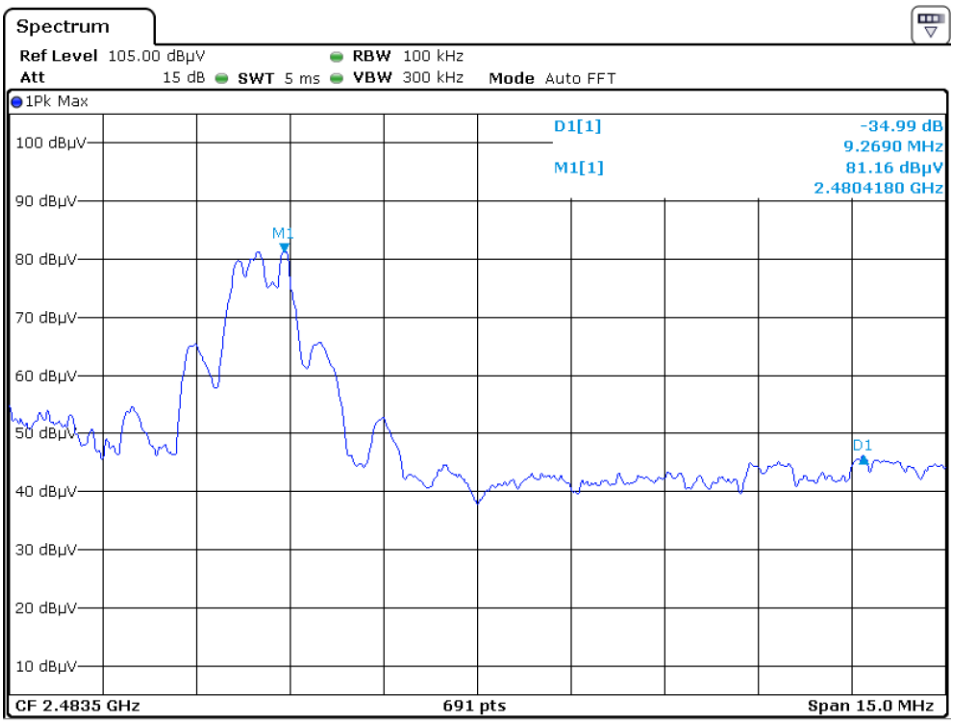
= 41.1 dBµv/m-35.0 dB
= 6.1 dBµv/m

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

Lowest frequency Channel

Date: 14.JUN.2019 14:56:10

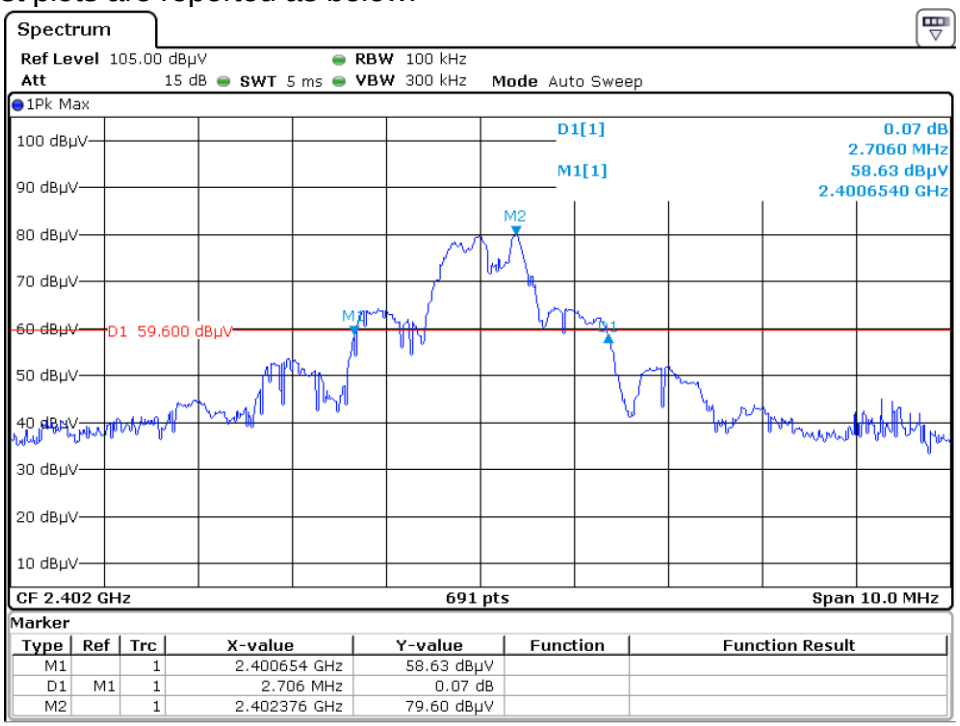
Highest frequency Channel

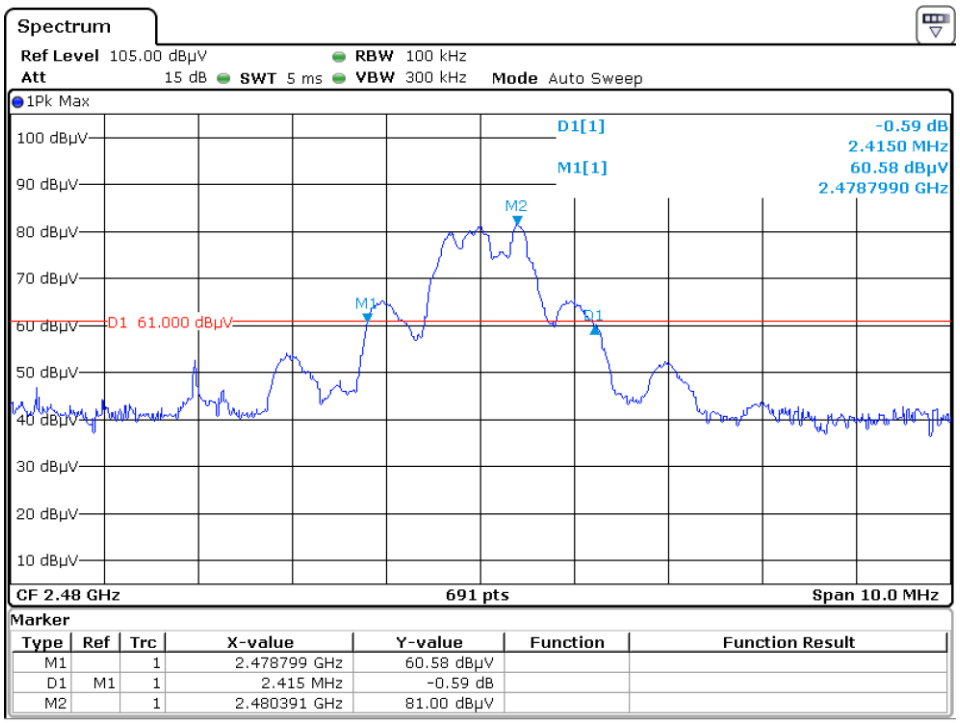


Date: 14.JUN.2019 14:52:17

9.2 20dB Bandwidth

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 excepted variations in temperature and supply voltage were considered. The test plots are reported as below.





9.3 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period (T_{eff}) is approximately 0.1159ms for a digital "1" bit, as shown in the plots of Section 9.4. With a resolution bandwidth (3 dB) of 100 kHz, the pulse desensitivity factor was 0 dB

9.4 Calculation of Average Factor

Averaging factor in dB = 20 log (duty cycle)

The specification for output field strengths in accordance with the FCC rules specify measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

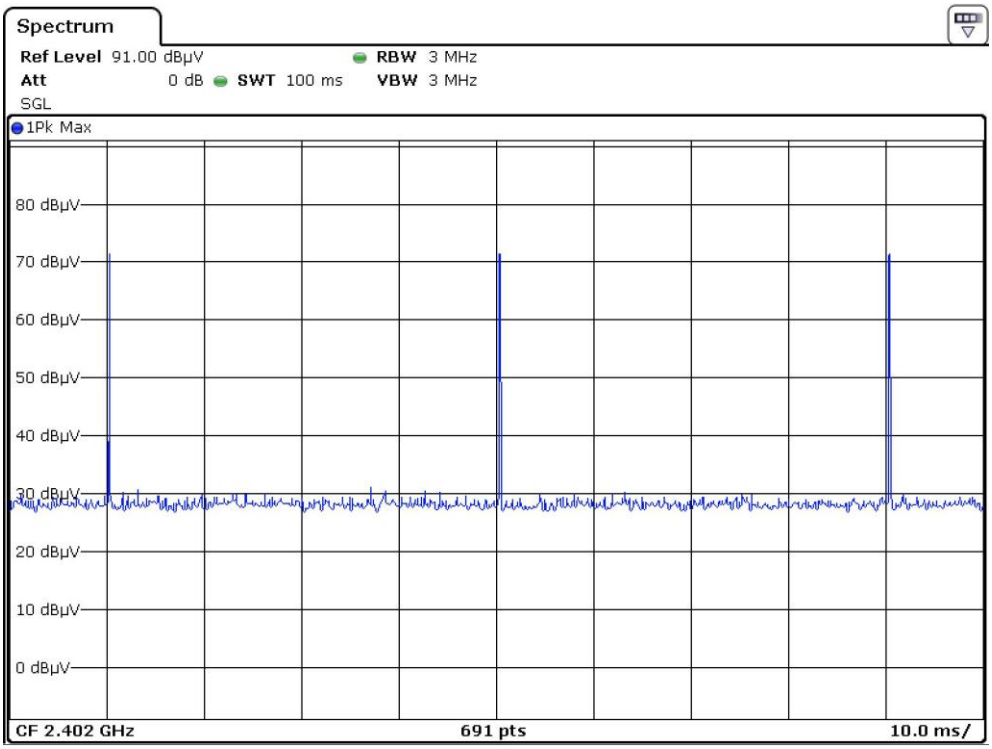
The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation. The duty cycle is measured by placing the spectrum analyzer in zero scan (receiver mode) and linear mode at maximum bandwidth (3 MHz at 3 dB down) and viewing the resulting time domain signal output from the analyzer on a Tektronix oscilloscope. The oscilloscope is used because of its superior time base and triggering facilities.

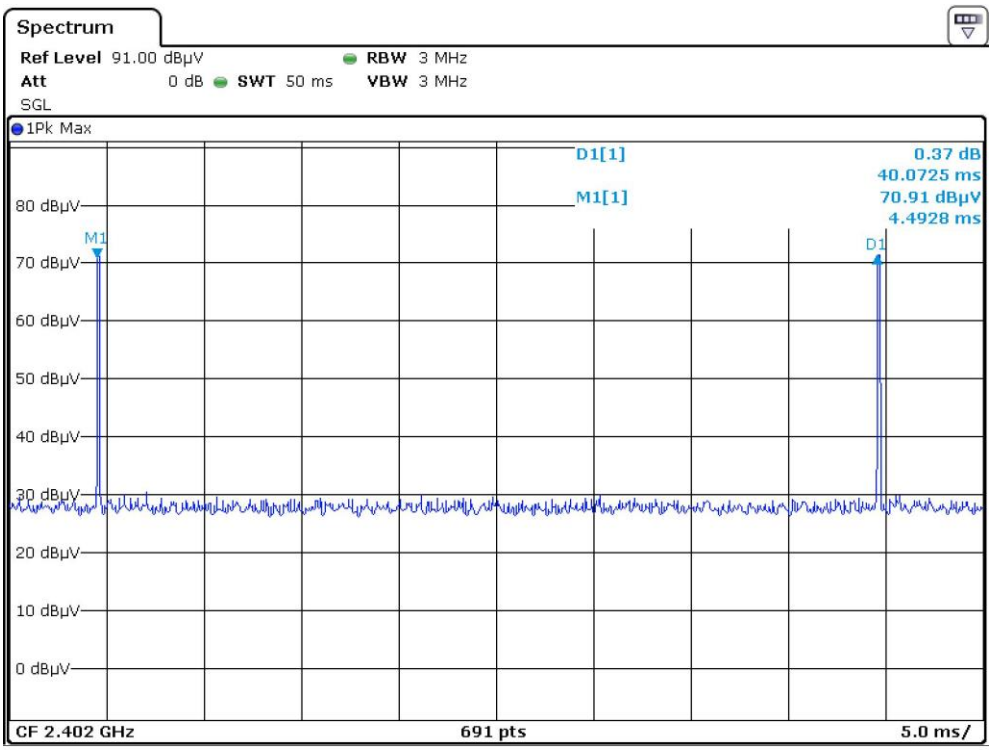
The duty cycle is simply the on-time divided by the period:

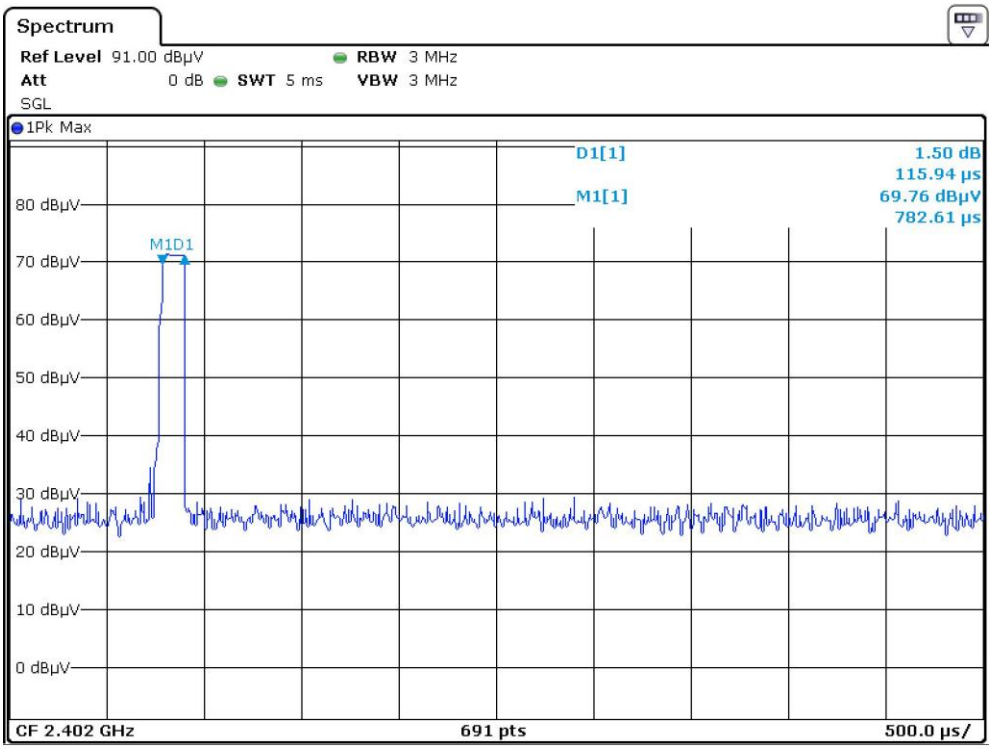
The duration of one cycle = 40.0725ms
Effective period of the cycle = 0.1159ms
DC =0.1159ms / 40.0725ms =0.0029 or 0.29%

Therefore, the averaging factor is found by $20 \log_{10} (0.0029) = -50.8$dB

The test plots are attached as below.


Spectrum
Ref Level 91.00 dBµV
RBW 3 MHz
Att 0 dB
SWT 100 ms
VBW 3 MHz
SGL
1Pk Max
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
20 dBµV
10 dBµV
0 dBµV
CF 2.402 GHz
691 pts
10.0 ms/


Spectrum
Ref Level 91.00 dBµV
RBW 3 MHz
Att 0 dB
SWT 50 ms
VBW 3 MHz
SGL
1Pk Max
D1[1]
0.37 dB
40.0725 ms
M1[1]
70.91 dBµV
4.4928 ms
M1
D1
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
20 dBµV
10 dBµV
0 dBµV
CF 2.402 GHz
691 pts
5.0 ms/


Spectrum
Ref Level 91.00 dBµV
RBW 3 MHz
Att 0 dB
SWT 5 ms
VBW 3 MHz
SGL
1Pk Max
D1[1]
1.50 dB
115.94 µs
M1[1]
69.76 dBµV
782.61 µs
M1D1
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
20 dBµV
10 dBµV
0 dBµV
CF 2.402 GHz
691 pts
500.0 µs/

9.5 Emissions Test Procedures

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

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.10 - 2013.

The transmitting equipment under test (EUT) is placed on a table which is four feet in diameter and approximately 12mm up to 1GHz and 1.5 meter above 1GHz in height above the ground plane. 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 axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

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 Section 9.4.

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.

Detector function for conducted emissions is in QP & AV mode and IFBW setting is 9 kHz from the frequency band 150 kHz to 30MHz.

9.5 Emissions Test Procedures (cont'd)

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 are made as described in ANSI C63.10 - 2013.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 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 Section 9.3). Above 1000 MHz, a resolution bandwidth of 1 MHz is used, RBW 3MHz used for fundamental emission.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted 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, but those measurements taken at a closer distance are so marked.

10.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-12	Biconilog Antenna	ETS	3142E	00166158	14-Sep-2018	14-Sep-2019
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	24-May-2019	24-May-2020
SZ061-08	Horn Antenna	ETS	3115	00092346	14-Sep-2018	14-Sep-2019
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	10-Mar-2019	10-Mar-2020
SZ056-03	Spectrum Analyzer	R&S	FSP30	101148	28-May-2019	28-May-2020
SZ185-01	EMI Receiver	R & S	ESCI	100547	4-Jan-2019	4-Jan-2020
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	15-Jan-2019	15-Jan-2020
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	15-Dec-2018	15-Dec-2020
SZ062-02	RF Cable	RADIALL	RG 213U	--	25-Dec-2018	25-Jun-2019
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	23-Feb-2019	23-Aug-2019
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	23-Feb-2019	23-Aug-2019
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	28-May-2019	28-May-2020
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	26-Oct-2018	26-Oct-2019
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	04-Jul-2018	04-Jul-2019
SZ188-03	Shielding Room	ETS	RFD-100	4100	16-Jan-2017	16-Jan-2020
SZ062-16	RF Cable	HUBER+SUHNER	CBL2-BN-1m	110127-2231000	29-Oct-2018	29-Oct-2019