

APPLICATION CERTIFICATION FCC Part 15C
On Behalf of
MODULAR ROBOTICS INCORPORATED.

Cubelet kit

Model No.: cb-kt-cubelets12, cb-kt-cubelets20, cb-kt-cubelets6, cb-kt-bargraph-1, cb-kt-battery-1, cb-kt-blocker-1, cb-kt-bluetooth-1, cb-kt-brightness-1, cb-kt-distance-1, cb-kt-drive-1, cb-kt-flashlight-1, cb-kt-inverse-1, cb-kt-knob-1, cb-kt-max-1, cb-kt-min-1, cb-kt-passive-1, cb-kt-rotate-1, cb-kt-speaker-1, cb-kt-temperature-1, cb-kt-brick4pk-1

FCC ID: 2ADWM-CUBELET-KIT

Prepared for : MODULAR ROBOTICS INCORPORATED.
Address : 1860 38th ST BOULDER COLORADO 80301 USA

Prepared by : ACCURATE TECHNOLOGY CO., LTD
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Report No. : ATE20152278
Date of Test : Oct 24-Nov 01, 2015
Date of Report : Nov 02, 2015

TABLE OF CONTENTS

Description

Page

Test Report Certification

| | |
|--|-----------|
| 1. GENERAL INFORMATION | 5 |
| 1.1. Description of Device (EUT)..... | 5 |
| 1.2. Carrier Frequency of Channels | 6 |
| 1.3. Special Accessory and Auxiliary Equipment | 6 |
| 1.4. Description of Test Facility | 7 |
| 1.5. Measurement Uncertainty | 7 |
| 2. MEASURING DEVICE AND TEST EQUIPMENT | 8 |
| 3. OPERATION OF EUT DURING TESTING | 9 |
| 3.1. Operating Mode | 9 |
| 3.2. Configuration and peripherals | 9 |
| 4. TEST PROCEDURES AND RESULTS | 10 |
| 5. POWER LINE CONDUCTED MEASUREMENT | 11 |
| 5.1. Block Diagram of Test Setup..... | 11 |
| 5.2. Power Line Conducted Emission Measurement Limits..... | 11 |
| 5.3. Configuration of EUT on Measurement | 11 |
| 5.4. Operating Condition of EUT | 11 |
| 5.5. Test Procedure | 12 |
| 5.6. Power Line Conducted Emission Measurement Results | 12 |
| 6. 6DB BANDWIDTH MEASUREMENT | 19 |
| 6.1. Block Diagram of Test Setup..... | 19 |
| 6.2. The Requirement For Section 15.247(a)(2)..... | 19 |
| 6.3. EUT Configuration on Measurement | 19 |
| 6.4. Operating Condition of EUT | 19 |
| 6.5. Test Procedure | 19 |
| 6.6. Test Result | 20 |
| 7. MAXIMUM PEAK OUTPUT POWER | 22 |
| 7.1. Block Diagram of Test Setup..... | 22 |
| 7.2. The Requirement For Section 15.247(b)(3)..... | 22 |
| 7.3. EUT Configuration on Measurement | 22 |
| 7.4. Operating Condition of EUT | 22 |
| 7.5. Test Procedure | 22 |
| 7.6. Test Result | 23 |
| 8. POWER SPECTRAL DENSITY MEASUREMENT..... | 25 |
| 8.1. Block Diagram of Test Setup..... | 25 |
| 8.2. The Requirement For Section 15.247(e)..... | 25 |
| 8.3. EUT Configuration on Measurement | 25 |
| 8.4. Operating Condition of EUT | 25 |
| 8.5. Test Procedure | 26 |
| 8.6. Test Result | 27 |
| 9. BAND EDGE COMPLIANCE TEST | 29 |
| 9.1. Block Diagram of Test Setup..... | 29 |
| 9.2. The Requirement For Section 15.247(d) | 29 |
| 9.3. EUT Configuration on Measurement | 29 |
| 9.4. Operating Condition of EUT | 30 |

| | | |
|------------|--|-----------|
| 9.5. | Test Procedure | 30 |
| 9.6. | Test Result | 30 |
| 10. | RADIATED SPURIOUS EMISSION TEST | 36 |
| 10.1. | Block Diagram of Test Setup..... | 36 |
| 10.2. | The Limit For Section 15.247(d) | 37 |
| 10.3. | Restricted bands of operation | 37 |
| 10.4. | Configuration of EUT on Measurement | 38 |
| 10.5. | Operating Condition of EUT | 38 |
| 10.6. | Test Procedure | 38 |
| 10.7. | The Field Strength of Radiation Emission Measurement Results | 39 |
| 11. | CONDUCTED SPURIOUS EMISSION COMPLIANCE TEST | 51 |
| 11.1. | Block Diagram of Test Setup..... | 51 |
| 11.2. | The Requirement For Section 15.247(d) | 51 |
| 11.3. | EUT Configuration on Measurement | 51 |
| 11.4. | Operating Condition of EUT | 51 |
| 11.5. | Test Procedure | 52 |
| 11.6. | Test Result | 52 |
| 12. | ANTENNA REQUIREMENT..... | 54 |
| 12.1. | The Requirement | 54 |
| 12.2. | Antenna Construction | 54 |

Test Report Certification

Applicant : MODULAR ROBOTICS INCORPORATED.
Manufacturer : MODULAR ROBOTICS INCORPORATED.
EUT Description : Cubelet kit
cb-kt-cubelets12, cb-kt-cubelets20, cb-kt-cubelets6,
cb-kt-bargraph-1, cb-kt-battery-1, cb-kt-blocker-1,
Model No. : cb-kt-bluetooth-1, cb-kt-brightness-1, cb-kt-distance-1,
cb-kt-drive-1, cb-kt-flashlight-1, cb-kt-inverse-1, cb-kt-knob-1,
cb-kt-max-1, cb-kt-min-1, cb-kt-passive-1, cb-kt-rotate-1
cb-kt-speaker-1, cb-kt-temperature-1, cb-kt-brick4pk-1
Trade Name : n.a

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247
ANSI C63.10: 2013

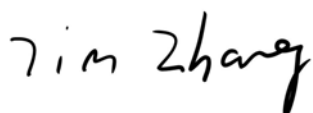
The EUT was tested according to DTS test procedure of Jun 09, 2015 KDB558074 D01 DTS Meas Guidance v03r03 for compliance to FCC 47CFR 15.247 requirements

The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.


This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test : Oct 24, 2015-Nov 02, 2015
Date of Report: Nov 02, 2015

Prepared by :


(Tim.zhang, Engineer)

Approved & Authorized Signer :


(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

| | | |
|-------------------------|---|---|
| EUT | : | Cubelet kit |
| Model Number | : | cb-kt-cubelets12, cb-kt-cubelets20, cb-kt-cubelets6, cb-kt-bargraph-1, cb-kt-battery-1, cb-kt-blocker-1, cb-kt-bluetooth-1, cb-kt-brightness-1, cb-kt-distance-1, cb-kt-drive-1, cb-kt-flashlight-1, cb-kt-inverse-1, cb-kt-knob-1, cb-kt-max-1, cb-kt-min-1, cb-kt-passive-1, cb-kt-rotate-1, cb-kt-speaker-1, cb-kt-temperature-1, cb-kt-brick4pk-1 |
| Bluetooth version | : | BT V4.0 LE |
| Frequency Range | : | 2402MHz-2480MHz |
| Number of Channels | : | 40 for BT V4.0 LE |
| Antenna Gain | : | 0dBi |
| Antenna type | : | PCB Antenna |
| Trade Name | : | n.a |
| Power Supply | : | DC 3.7V(Battery) Or DC 5V(USB port) |
| Modulation mode | : | GFSK for BT V4.0 LE |
| Applicant | : | MODULAR ROBOTICS INCORPORATED |
| Address | : | 1860 38th ST BOULDER COLORADO 80301 USA. |
| Manufacturer | : | MODULAR ROBOTICS INCORPORATED |
| Address | : | 1860 38th ST BOULDER COLORADO 80301 USA. |
| Date of sample received | : | Oct 24, 2015 |
| Date of Test | : | Oct 24, 2015-Nov 02, 2015 |

1.2.Carrier Frequency of Channels

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|---------|-----------------|
| 0 | 2402 | 10 | 2422 | 20 | 2442 | 30 | 2462 |
| 1 | 2404 | 11 | 2424 | 21 | 2444 | 31 | 2464 |
| 2 | 2406 | 12 | 2426 | 22 | 2446 | 32 | 2466 |
| 3 | 2408 | 13 | 2428 | 23 | 2448 | 33 | 2468 |
| 4 | 2410 | 14 | 2430 | 24 | 2450 | 34 | 2470 |
| 5 | 2412 | 15 | 2432 | 25 | 2452 | 35 | 2472 |
| 6 | 2414 | 16 | 2434 | 26 | 2454 | 36 | 2474 |
| 7 | 2416 | 17 | 2436 | 27 | 2456 | 37 | 2476 |
| 8 | 2418 | 18 | 2438 | 28 | 2458 | 38 | 2478 |
| 9 | 2420 | 19 | 2440 | 29 | 2460 | 39 | 2480 |

1.3.Special Accessory and Auxiliary Equipment

PC

Manufacturer: LENOVO

M/N: 4290-RT8

S/N: R9-FW93G 11/08

1.4. Description of Test Facility

EMC Lab : Accredited by TUV Rheinland Shenzhen

Listed by FCC
The Registration Number is 752051

Listed by Industry Canada
The Registration Number is 5077A-2

Accredited by China National Accreditation Committee
for Laboratories
The Certificate Registration Number is L3193

Name of Firm : ACCURATE TECHNOLOGY CO. LTD

Site Location : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.
Science & Industry Park, Nanshan, Shenzhen, Guangdong
P.R. China

1.5. Measurement Uncertainty

Conducted Emission Expanded Uncertainty = 2.23dB, k=2

Radiated emission expanded uncertainty = 3.08dB, k=2
(9kHz-30MHz)

Radiated emission expanded uncertainty = 4.42dB, k=2
(30MHz-1000MHz)

Radiated emission expanded uncertainty = 4.06dB, k=2
(Above 1GHz)

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

| Kind of equipment | Manufacturer | Type | S/N | Calibrated dates | Calibrated until |
|--------------------|---------------------------|---|------------|------------------|------------------|
| EMI Test Receiver | Rohde&Schwarz | ESCS30 | 100307 | Jan. 11, 2015 | Jan. 10, 2016 |
| EMI Test Receiver | Rohde&Schwarz | ESPI3 | 101526/003 | Jan. 11, 2015 | Jan. 10, 2016 |
| Spectrum Analyzer | Agilent | E7405A | MY45115511 | Jan. 11, 2015 | Jan. 10, 2016 |
| Pre-Amplifier | Rohde&Schwarz | CBLU118354 0-01 | 3791 | Jan. 11, 2015 | Jan. 10, 2016 |
| Loop Antenna | Schwarzbeck | FMZB1516 | 1516131 | Jan. 15, 2015 | Jan. 14, 2016 |
| Bilog Antenna | Schwarzbeck | VULB9163 | 9163-323 | Jan. 15, 2015 | Jan. 14, 2016 |
| Horn Antenna | Schwarzbeck | BBHA9120D | 9120D-655 | Jan. 15, 2015 | Jan. 14, 2016 |
| Horn Antenna | Schwarzbeck | BBHA9170 | 9170-359 | Jan. 15, 2015 | Jan. 14, 2016 |
| LISN | Rohde&Schwarz | ESH3-Z5 | 100305 | Jan. 11, 2015 | Jan. 10, 2016 |
| LISN | Schwarzbeck | NSLK8126 | 8126431 | Jan. 11, 2015 | Jan. 10, 2016 |
| Highpass Filter | Wainwright Instruments | WHKX3.6/18 G-10SS | N/A | Jan. 11, 2015 | Jan. 10, 2016 |
| Band Reject Filter | Wainwright Instruments | WRCG2400/2 485-2375/2510 -60/11SS | N/A | Jan. 11, 2015 | Jan. 10, 2016 |

3. OPERATION OF EUT DURING TESTING

3.1.Operating Mode

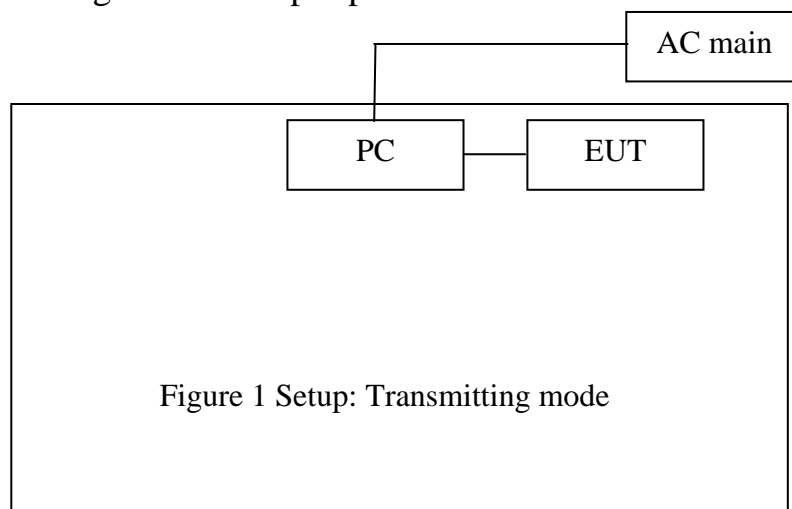
The mode is used: **BLE Transmitting mode**

Low Channel: 2402MHz

Middle Channel: 2440MHz

High Channel: 2480MHz

3.2.Configuration and peripherals

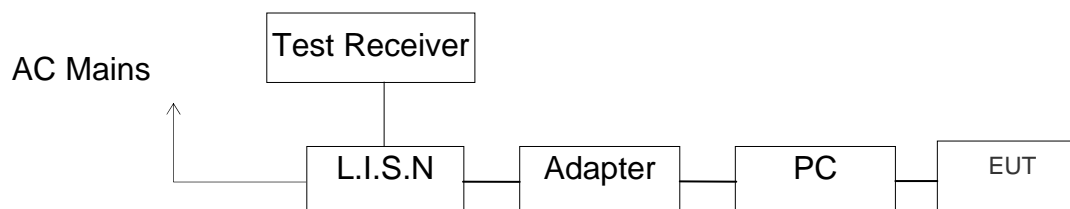


4. TEST PROCEDURES AND RESULTS

| FCC Rules | Description of Test | Result |
|-------------------------------------|---------------------------------------|-----------|
| Section 15.247(a)(2) | 6dB Bandwidth Test | Compliant |
| Section 15.247(e) | Power Spectral Density Test | Compliant |
| Section 15.247(b)(3) | Maximum Peak Output Power Test | Compliant |
| Section 15.247(d) | Band Edge Compliance Test | Compliant |
| Section 15.247(d) Section 15.209 | Radiated Spurious Emission Test | Compliant |
| Section 15.247(d) | Conducted Spurious Emission Test | Compliant |
| Section 15.207 | AC Power Line Conducted Emission Test | Compliant |
| Section 15.203 | Antenna Requirement | Compliant |

5. POWER LINE CONDUCTED MEASUREMENT

5.1. Block Diagram of Test Setup



(EUT: Cubelet kit)

5.2. Power Line Conducted Emission Measurement Limits

| Frequency (MHz) | Limit dB(μ V) | |
|--------------------|--------------------|---------------|
| | Quasi-peak Level | Average Level |
| 0.15 - 0.50 | 66.0 – 56.0 * | 56.0 – 46.0 * |
| 0.50 - 5.00 | 56.0 | 46.0 |
| 5.00 - 30.00 | 60.0 | 50.0 |

NOTE1: The lower limit shall apply at the transition frequencies.
 NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

5.3. Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

5.4. Operating Condition of EUT

- 5.4.1. Setup the EUT and simulator as shown as Section 5.1.
- 5.4.2. Turn on the power of all equipment.
- 5.4.3. Let the EUT work in test mode and measure it.

5.5.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4: 2014 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

5.6.Power Line Conducted Emission Measurement Results

PASS.

The frequency range from 150kHz to 30MHz is checked.

Test mode : BT communicating(AC 120V/60Hz)

MEASUREMENT RESULT: "AFCC003_fin"

2015-10-29 13:34

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.154000 | 52.30 | 10.4 | 66 | 13.5 | QP | L1 | GND |
| 0.490000 | 39.90 | 11.5 | 56 | 16.3 | QP | L1 | GND |
| 3.287000 | 26.70 | 11.7 | 56 | 29.3 | QP | L1 | GND |

MEASUREMENT RESULT: "AFCC003_fin2"

2015-10-29 13:34

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.164000 | 35.80 | 10.4 | 55 | 19.5 | AV | L1 | GND |
| 0.488000 | 35.20 | 11.5 | 46 | 11.0 | AV | L1 | GND |
| 2.063000 | 25.00 | 11.7 | 46 | 21.0 | AV | L1 | GND |

MEASUREMENT RESULT: "AFCC004_fin"

2015-10-29 13:37

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.152000 | 52.70 | 10.4 | 66 | 13.2 | QP | N | GND |
| 0.486000 | 39.40 | 11.5 | 56 | 16.8 | QP | N | GND |
| 2.310500 | 29.80 | 11.7 | 56 | 26.2 | QP | N | GND |

MEASUREMENT RESULT: "AFCC004_fin2"

2015-10-29 13:37

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.152000 | 37.70 | 10.4 | 56 | 18.2 | AV | N | GND |
| 0.492000 | 35.70 | 11.5 | 46 | 10.4 | AV | N | GND |
| 2.310500 | 24.40 | 11.7 | 46 | 21.6 | AV | N | GND |

Test mode : BT communicating(AC 240V/60Hz)

MEASUREMENT RESULT: "FQOU010_fin"

2015-10-29 13:41

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.158000 | 51.30 | 10.4 | 66 | 14.3 | QP | L1 | GND |
| 0.490000 | 39.90 | 11.5 | 56 | 16.3 | QP | L1 | GND |
| 1.766000 | 29.50 | 11.7 | 56 | 26.5 | QP | L1 | GND |

MEASUREMENT RESULT: "FQOU010_fin2"

2015-10-29 13:41

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.154000 | 37.00 | 10.4 | 56 | 18.8 | AV | L1 | GND |
| 0.490000 | 35.50 | 11.5 | 46 | 10.7 | AV | L1 | GND |
| 1.766000 | 24.00 | 11.7 | 46 | 22.0 | AV | L1 | GND |

MEASUREMENT RESULT: "FQOU009_fin"

2015-10-29 13:39

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.152000 | 52.90 | 10.4 | 66 | 13.0 | QP | N | GND |
| 0.490000 | 39.80 | 11.5 | 56 | 16.4 | QP | N | GND |
| 1.898000 | 29.80 | 11.7 | 56 | 26.2 | QP | N | GND |

MEASUREMENT RESULT: "FQOU009_fin2"

2015-10-29 13:39

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.152000 | 37.60 | 10.4 | 56 | 18.3 | AV | N | GND |
| 0.492000 | 35.70 | 11.5 | 46 | 10.4 | AV | N | GND |
| 1.898000 | 24.10 | 11.7 | 46 | 21.9 | AV | N | GND |

Emissions attenuated more than 20 dB below the permissible value are not reported.

The spectral diagrams are attached as below.

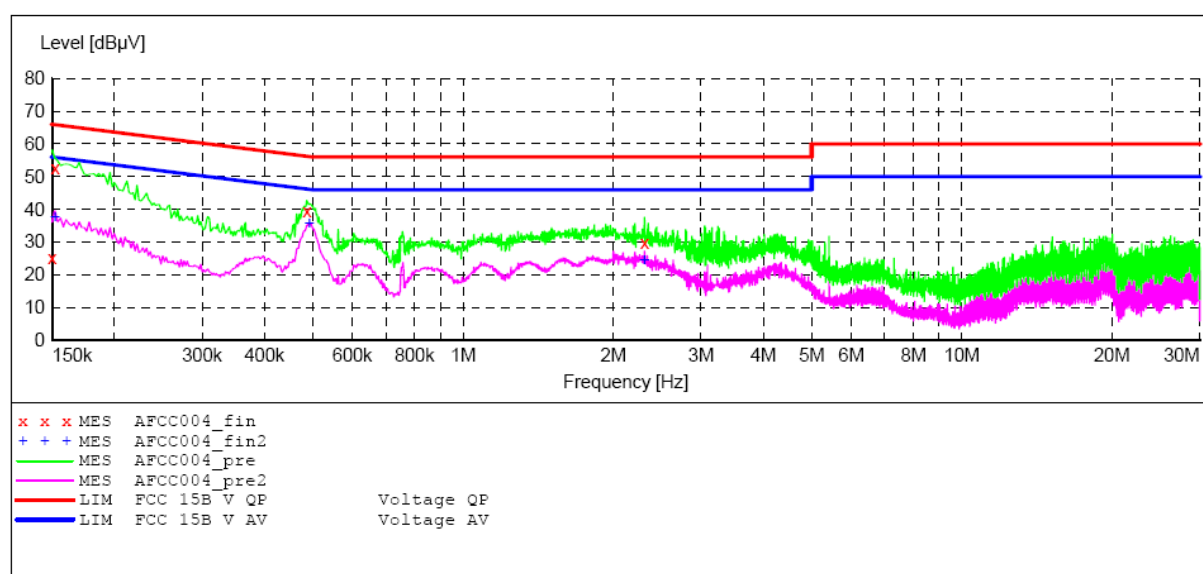
ACCURATE TECHNOLOGY CO.,LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: Cubelet kit M/N:cb-kt-cubelets12
 Manufacturer: MODULAR ROBOTICS INCORPORATED
 Operating Condition: BT OPERATION
 Test Site: 2#Shielding Room
 Operator: star
 Test Specification: N 120V/60Hz
 Comment: Report NO.:ATE20152278
 Start of Test: 2015-10-29 / 13:35:34

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz LISN(ESH3-Z5)
 Average



MEASUREMENT RESULT: "AFCC004_fin"

2015-10-29 13:37

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.152000 | 52.70 | 10.4 | 66 | 13.2 | QP | N | GND |
| 0.486000 | 39.40 | 11.5 | 56 | 16.8 | QP | N | GND |
| 2.310500 | 29.80 | 11.7 | 56 | 26.2 | QP | N | GND |

MEASUREMENT RESULT: "AFCC004_fin2"

2015-10-29 13:37

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.152000 | 37.70 | 10.4 | 56 | 18.2 | AV | N | GND |
| 0.492000 | 35.70 | 11.5 | 46 | 10.4 | AV | N | GND |
| 2.310500 | 24.40 | 11.7 | 46 | 21.6 | AV | N | GND |

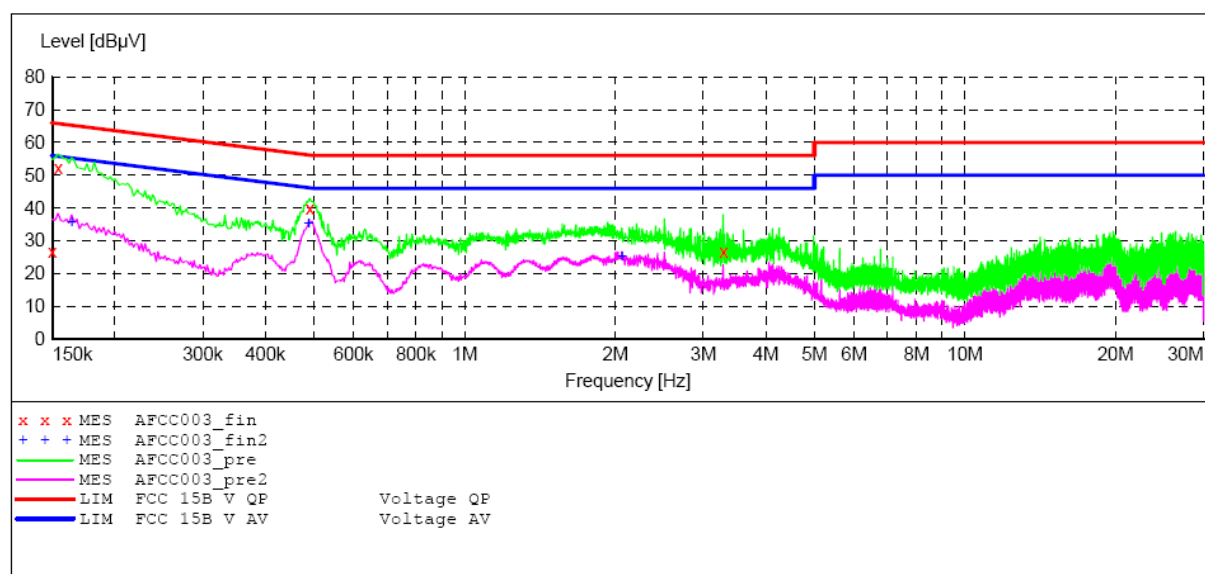
ACCURATE TECHNOLOGY CO.,LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: Cubelet kit M/N:cb-kt-cubelets12
 Manufacturer: MODULAR ROBOTICS INCORPORATED
 Operating Condition: BT OPERATION
 Test Site: 2#Shielding Room
 Operator: star
 Test Specification: L 120V/60Hz
 Comment: Report NO.:ATE20152278
 Start of Test: 2015-10-29 / 13:33:05

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz LISN(ESH3-Z5)
 Average



MEASUREMENT RESULT: "AFCC003_fin"

2015-10-29 13:34

| Frequency MHz | Level dBuV | Transd dB | Limit dBuV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.154000 | 52.30 | 10.4 | 66 | 13.5 | QP | L1 | GND |
| 0.490000 | 39.90 | 11.5 | 56 | 16.3 | QP | L1 | GND |
| 3.287000 | 26.70 | 11.7 | 56 | 29.3 | QP | L1 | GND |

MEASUREMENT RESULT: "AFCC003_fin2"

2015-10-29 13:34

| Frequency MHz | Level dBuV | Transd dB | Limit dBuV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.164000 | 35.80 | 10.4 | 55 | 19.5 | AV | L1 | GND |
| 0.488000 | 35.20 | 11.5 | 46 | 11.0 | AV | L1 | GND |
| 2.063000 | 25.00 | 11.7 | 46 | 21.0 | AV | L1 | GND |

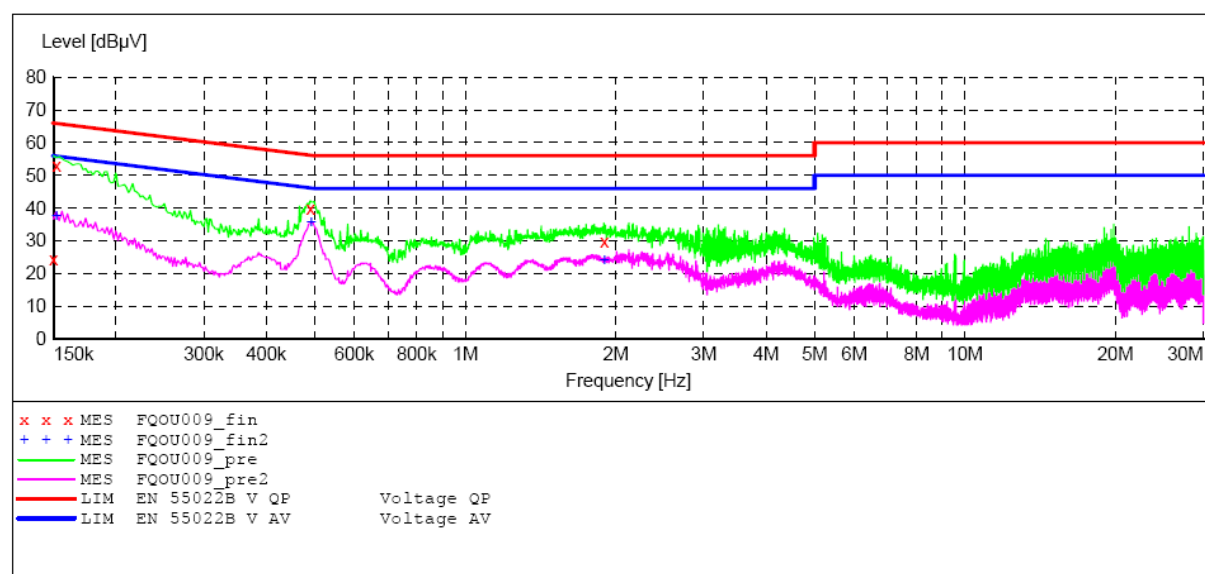
ACCURATE TECHNOLOGY CO.,LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: Cubelet kit M/N:cb-kt-cubelets12
 Manufacturer: MODULAR ROBOTICS INCORPORATED
 Operating Condition: BT OPERATION
 Test Site: 2#Shielding Room
 Operator: star
 Test Specification: N 240V/60Hz
 Comment: Report No.:ATE20152278
 Start of Test: 2015-10-29 / 13:37:41

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz LISN(ESH3-Z5)
 Average



MEASUREMENT RESULT: "FQOU009_fin"

2015-10-29 13:39

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.152000 | 52.90 | 10.4 | 66 | 13.0 | QP | N | GND |
| 0.490000 | 39.80 | 11.5 | 56 | 16.4 | QP | N | GND |
| 1.898000 | 29.80 | 11.7 | 56 | 26.2 | QP | N | GND |

MEASUREMENT RESULT: "FQOU009_fin2"

2015-10-29 13:39

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.152000 | 37.60 | 10.4 | 56 | 18.3 | AV | N | GND |
| 0.492000 | 35.70 | 11.5 | 46 | 10.4 | AV | N | GND |
| 1.898000 | 24.10 | 11.7 | 46 | 21.9 | AV | N | GND |

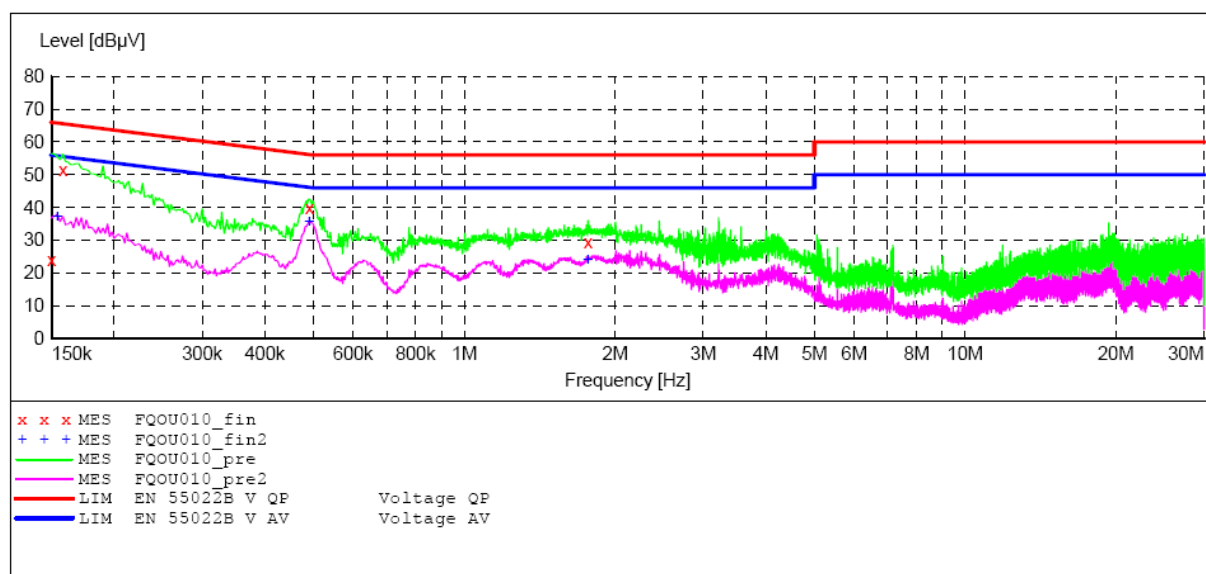
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: Cubelet kit M/N:cb-kt-cubelets12
 Manufacturer: MODULAR ROBOTICS INCORPORATED
 Operating Condition: BT OPERATION
 Test Site: 2#Shielding Room
 Operator: star
 Test Specification: L 240V/60Hz
 Comment: Report No.:ATE20152278
 Start of Test: 2015-10-29 / 13:40:15

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz LISN(ESH3-Z5)
 Average



MEASUREMENT RESULT: "FQOU010_fin"

2015-10-29 13:41

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.158000 | 51.30 | 10.4 | 66 | 14.3 | QP | L1 | GND |
| 0.490000 | 39.90 | 11.5 | 56 | 16.3 | QP | L1 | GND |
| 1.766000 | 29.50 | 11.7 | 56 | 26.5 | QP | L1 | GND |

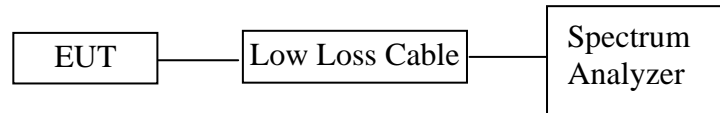
MEASUREMENT RESULT: "FQOU010_fin2"

2015-10-29 13:41

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Detector | Line | PE |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.154000 | 37.00 | 10.4 | 56 | 18.8 | AV | L1 | GND |
| 0.490000 | 35.50 | 11.5 | 46 | 10.7 | AV | L1 | GND |
| 1.766000 | 24.00 | 11.7 | 46 | 22.0 | AV | L1 | GND |

6. 6DB BANDWIDTH MEASUREMENT

6.1. Block Diagram of Test Setup



(EUT: Cubelet kit)

6.2. The Requirement For Section 15.247(a)(2)

Section 15.247(a)(2): Systems using digital modulation techniques may operate in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

6.3. EUT Configuration on Measurement

The equipment is installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4. Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480 MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

6.5. Test Procedure

6.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

6.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.

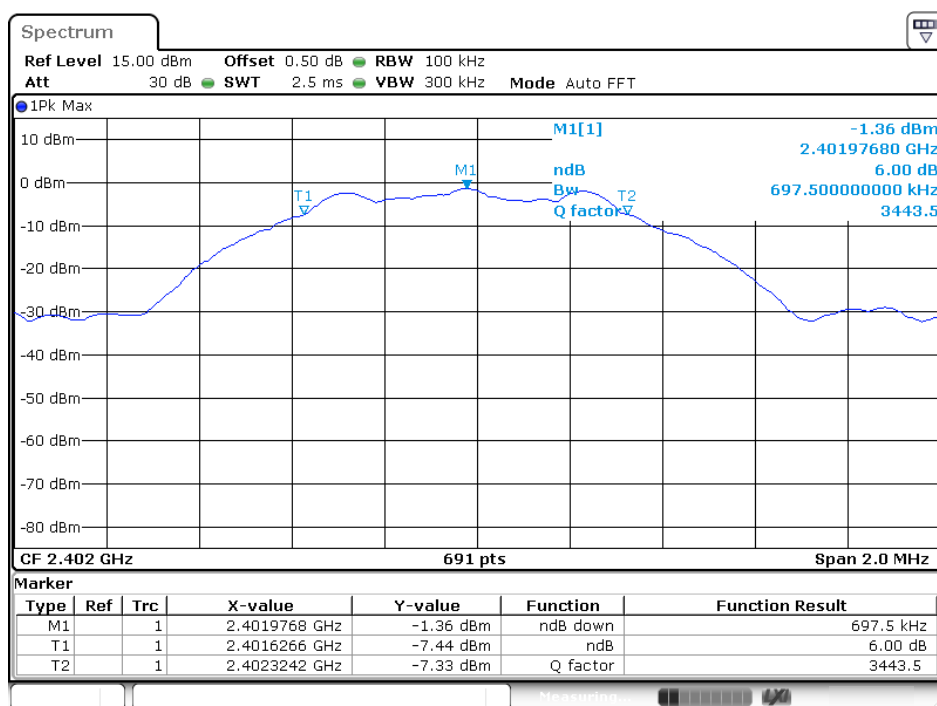
6.5.3. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

6.6.Test Result

| Channel | Frequency (MHz) | 6 dB Bandwidth (MHz) | Minimum Limit(MHz) | PASS/FAIL |
|---------|-----------------|----------------------|--------------------|-----------|
| 0 | 2402 | 0.6975 | 0.5 | PASS |
| 19 | 2440 | 0.6918 | 0.5 | PASS |
| 39 | 2480 | 0.6946 | 0.5 | PASS |

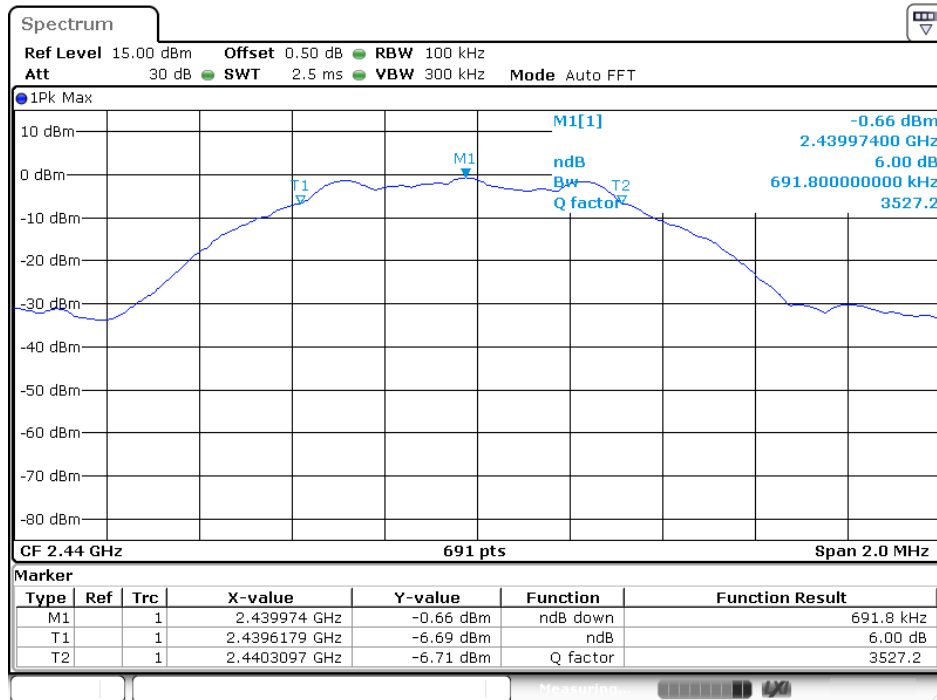
The spectrum analyzer plots are attached as below.

channel 0



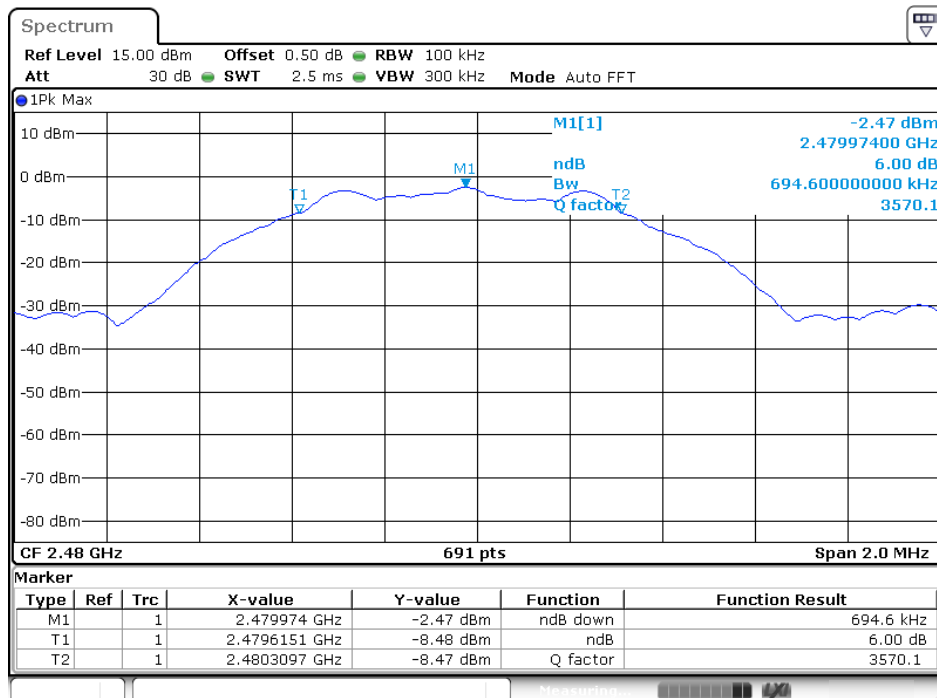
Date: 24.Oct.2015 09:37:18

channel 19



Date: 24.Oct.2015 09:38:31

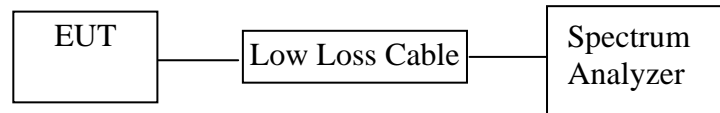
channel 39



Date: 24.Oct.2015 09:38:49

7. MAXIMUM PEAK OUTPUT POWER

7.1. Block Diagram of Test Setup



(EUT: Cubelet kit)

7.2. The Requirement For Section 15.247(b)(3)

Section 15.247(b)(3): For systems using digital modulation in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands: 1 Watt.

7.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4. Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 7.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480 MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

7.5. Test Procedure

7.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

7.5.2. Test method is options 1 from KDB558074 D01 DTS Meas Guidance v03r03

7.5.3. Set RBW of spectrum analyzer to 1 MHz and VBW to 3 MHz.

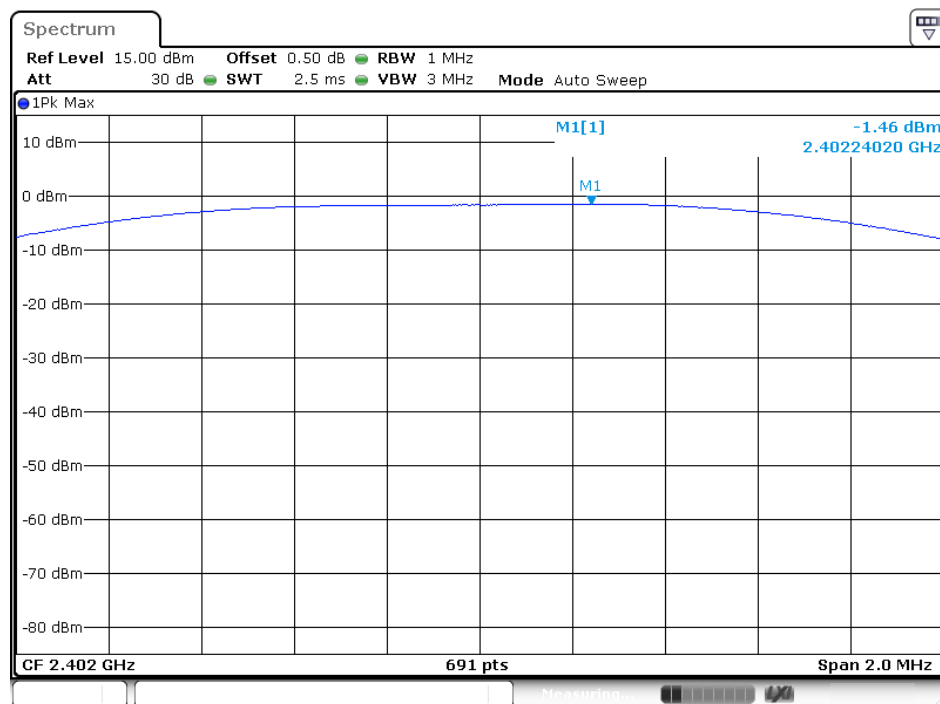
7.5.4. Measurement the maximum peak output power.

7.6.Test Result

| Channel | Frequency (MHz) | Peak Power Output (dBm) | Peak Power Limit (dBm) | Pass / Fail |
|---------|-----------------|-------------------------|------------------------|-------------|
| 0 | 2402 | -1.46 | 30 | PASS |
| 19 | 2440 | -0.47 | 30 | PASS |
| 39 | 2480 | -2.14 | 30 | PASS |

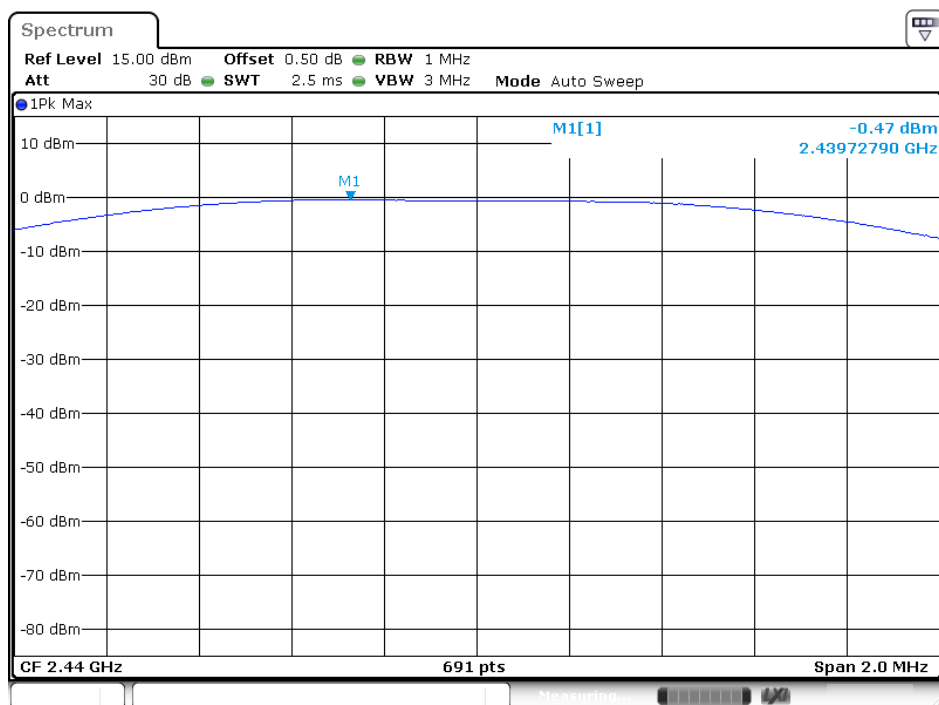
The spectrum analyzer plots are attached as below.

channel 0



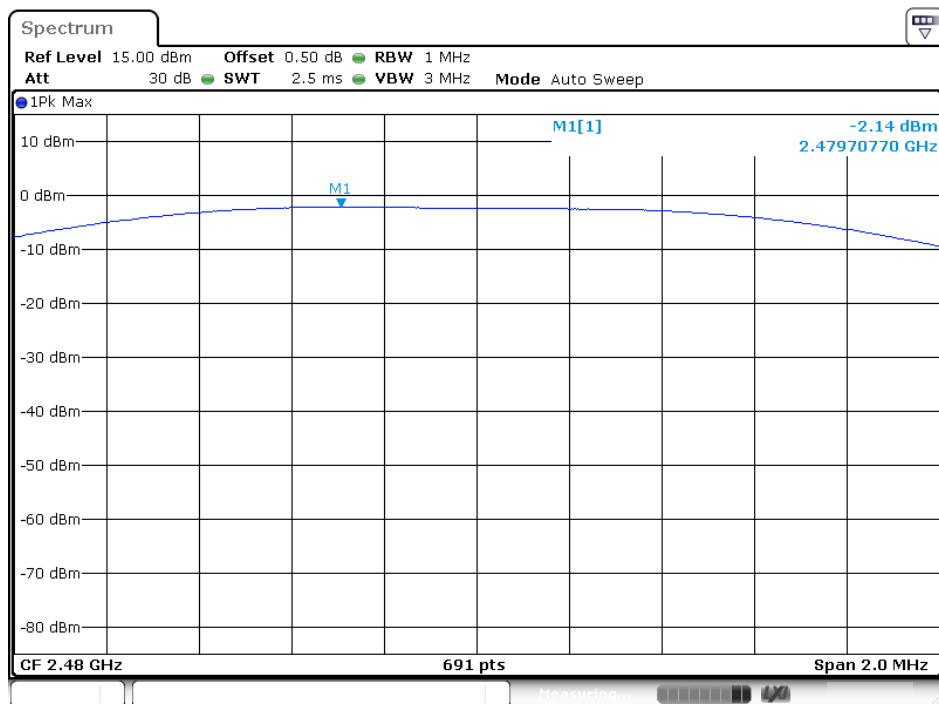
Date: 24.Oct.2015 09:41:20

channel 19



Date: 24.Oct.2015 09:41:46

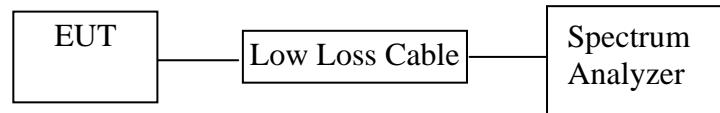
channel 39



Date: 24.Oct.2015 09:42:03

8. POWER SPECTRAL DENSITY MEASUREMENT

8.1. Block Diagram of Test Setup



(EUT: Cubelet kit)

8.2. The Requirement For Section 15.247(e)

Section 15.247(e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

8.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4. Operating Condition of EUT

8.4.1. Setup the EUT and simulator as shown as Section 8.1.

8.4.2. Turn on the power of all equipment.

8.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

8.5. Test Procedure

8.5.1. The EUT was tested according to DTS test procedure of Jun 09, 2015 KDB558074 D01 DTS Meas Guidance v03r03 for compliance to FCC 47CFR 15.247 requirements.

8.5.2. The transmitter output was connected to the spectrum analyzer through a low loss cable.

8.5.3. Measurement Procedure PKPSD:

8.5.4. This procedure must be used if maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit, and is optional if the maximum (average) conducted output power was used to demonstrate compliance.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

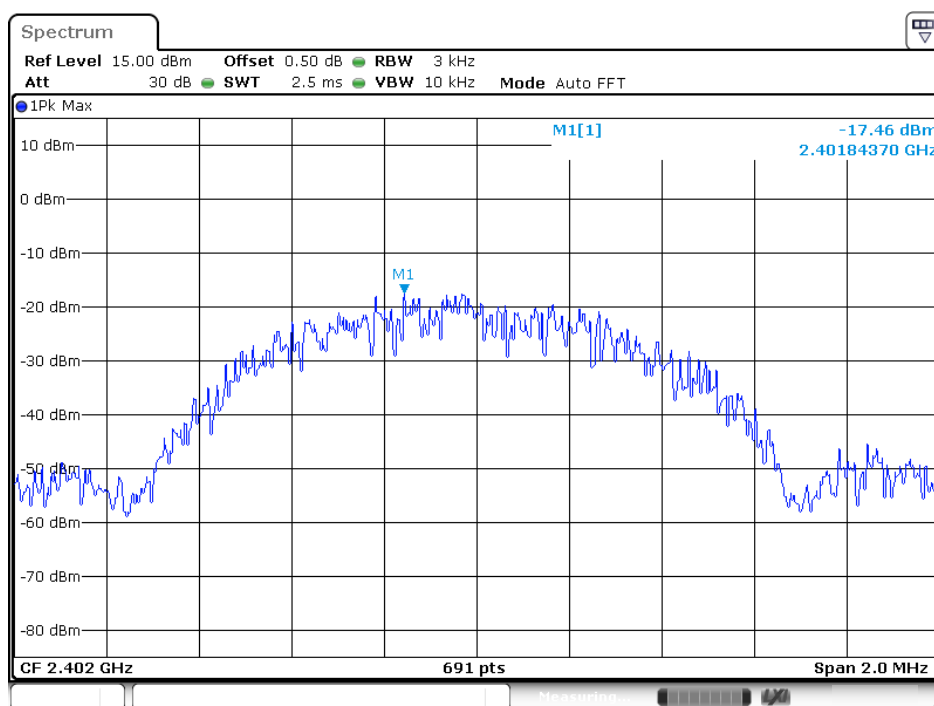
8.5.5. Measurement the maximum power spectral density.

8.6.Test Result

| CHANNEL NUMBER | FREQUENCY (MHz) | PSD (dBm/3KHz) | LIMIT (dBm/3KHz) | PASS/FAIL |
|----------------|------------------|----------------|------------------|-----------|
| 0 | 2402 | -17.46 | 8 | PASS |
| 19 | 2440 | -16.44 | 8 | PASS |
| 39 | 2480 | -17.97 | 8 | PASS |

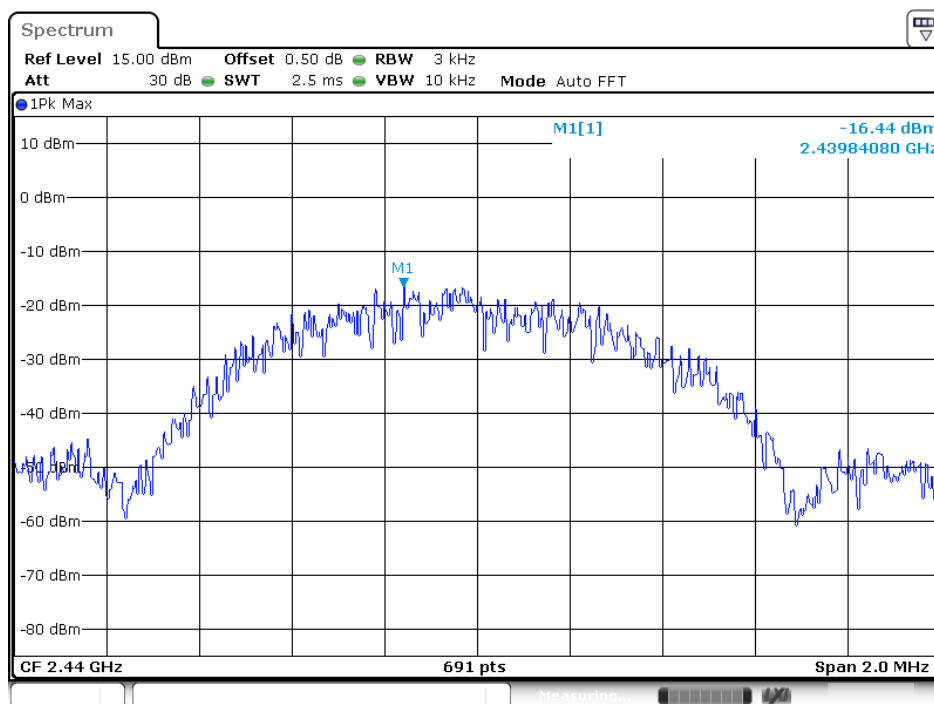
The spectrum analyzer plots are attached as below.

channel 0



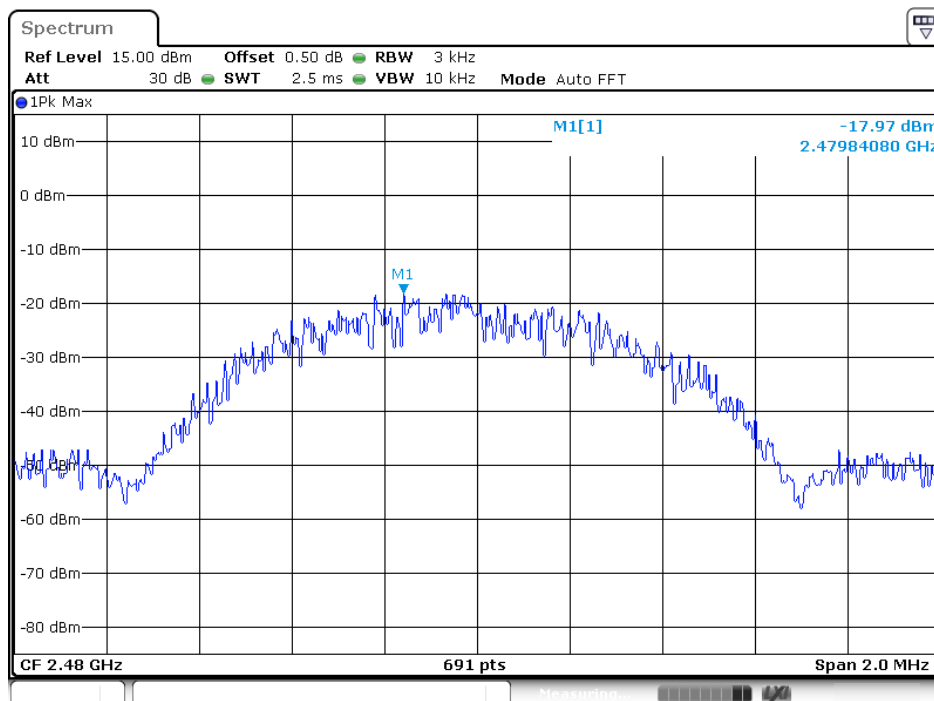
Date: 24.Oct.2015 09:43:11

channel 19



Date: 24.Oct.2015 09:42:54

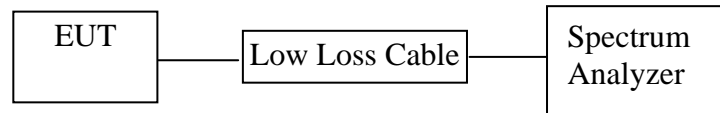
channel 39



Date: 24.Oct.2015 09:42:33

9. BAND EDGE COMPLIANCE TEST

9.1. Block Diagram of Test Setup



(EUT: Cubelet kit)

9.2. The Requirement For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

9.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.4.Operating Condition of EUT

9.4.1.Setup the EUT and simulator as shown as Section 9.1.

9.4.2.Turn on the power of all equipment.

9.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480 MHz. We select 2402MHz, 2480MHz TX frequency to transmit.

9.5.Test Procedure

Conducted Band Edge:

9.5.1.The transmitter output was connected to the spectrum analyzer via a low loss cable.

9.5.2.Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.

9.5.3. Radiate Band Edge:

9.5.4.The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.

9.5.5.The turntable was rotated for 360 degrees to determine the position of maximum emission level.

9.5.6.EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

9.5.7.Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

9.5.8.RBW=1MHz, VBW=1MHz

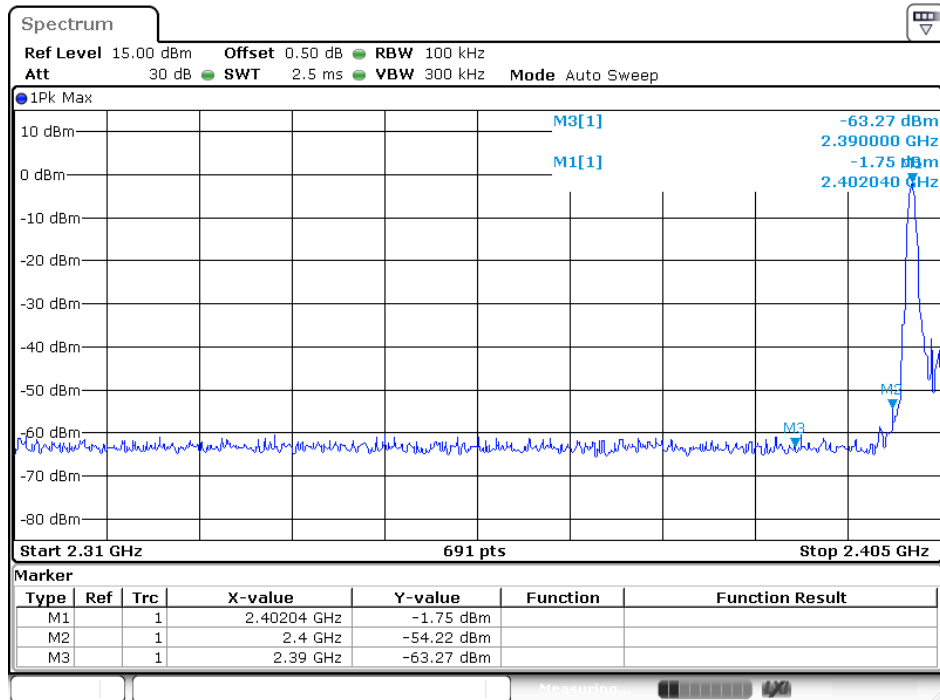
9.5.9.The band edges was measured and recorded.

9.6.Test Result

Pass

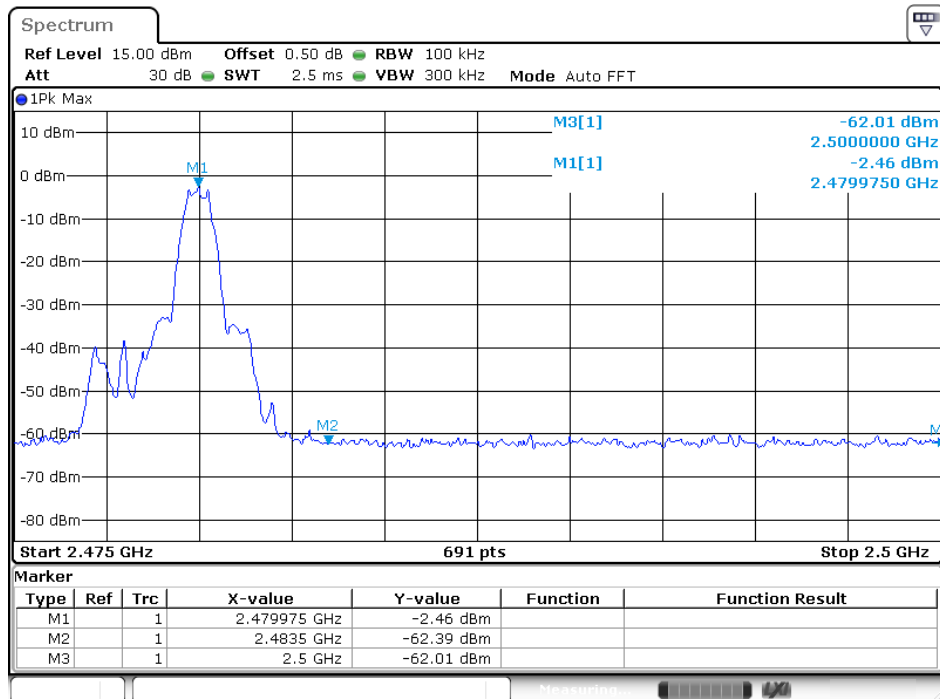
| Channel | Frequency | Delta peak to band emission | Limit(dBc) |
|---------|-----------|-----------------------------|------------|
| 0 | 2.4GHz | 52.47 | 20 |
| 39 | 2.4835GHz | 59.93 | 20 |

channel 0



Date: 24.Oct.2015 09:40:46

channel 39



Date: 24.Oct.2015 09:39:49

Radiated Band Edge Result



ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR2015 #813

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Cubelet kit

Mode: TX 2402MHz

Model: cb-kt-cubelets12

Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Horizontal

Power Source: DC 5V

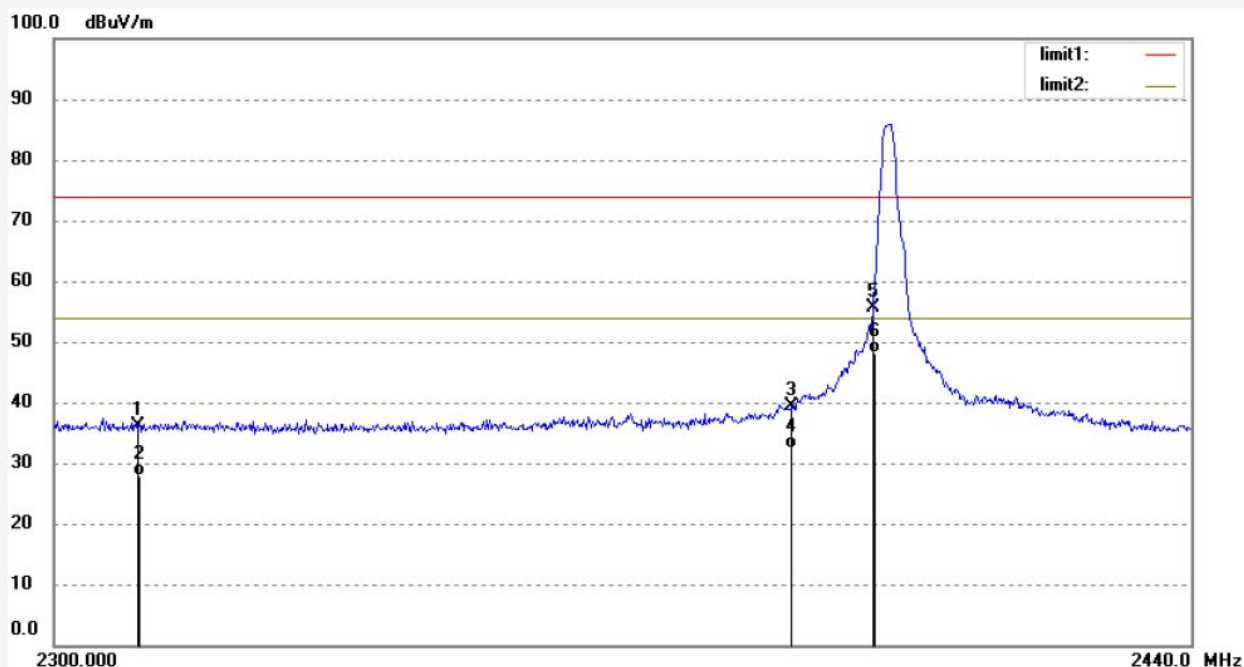
Date: 15/10/28/

Time: 10/29/59

Engineer Signature: STAR

Distance: 3m

Note: Report No.:ATE20152278

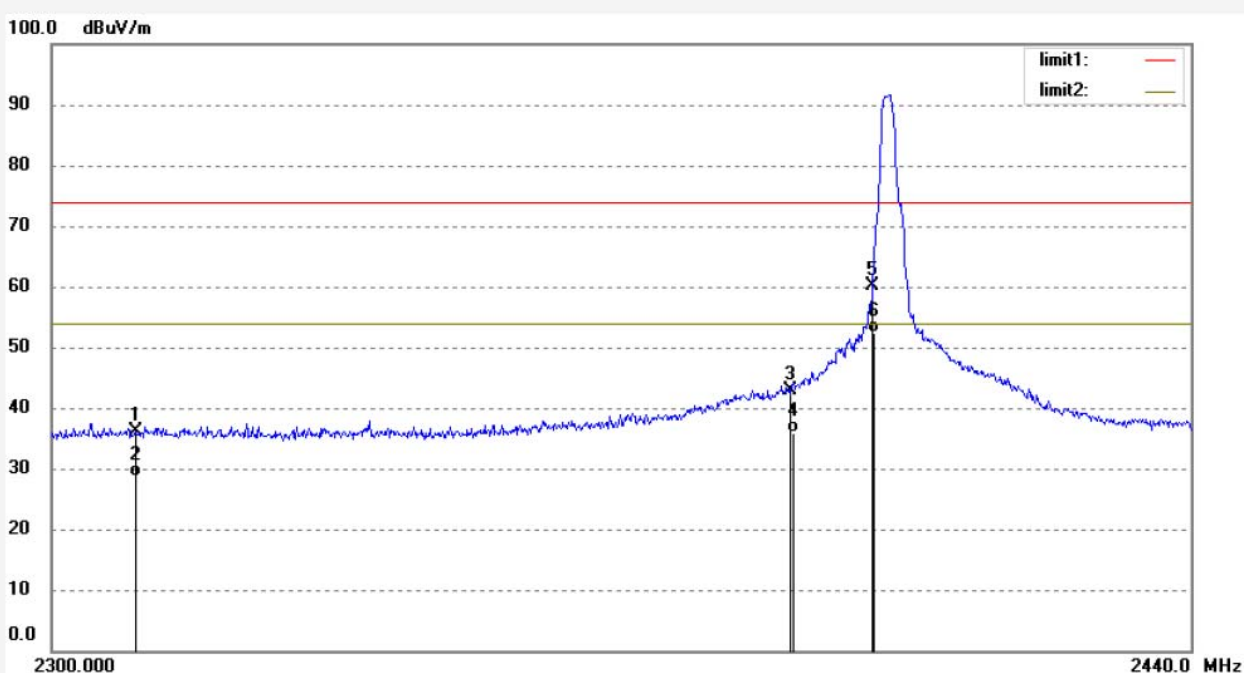


| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|-------------|------------------|-------------|-----------------|----------------|-------------|----------|-------------|---------------|--------|
| 1 | 2310.000 | 43.11 | -6.99 | 36.12 | 74.00 | -37.88 | peak | | | |
| 2 | 2310.000 | 34.88 | -6.99 | 27.89 | 54.00 | -26.11 | AVG | | | |
| 3 | 2390.000 | 46.06 | -6.78 | 39.28 | 74.00 | -34.72 | peak | | | |
| 4 | 2390.000 | 39.17 | -6.78 | 32.39 | 54.00 | -21.61 | AVG | | | |
| 5 | 2400.000 | 62.38 | -6.76 | 55.62 | 74.00 | -18.38 | peak | | | |
| 6 | 2400.000 | 55.00 | -6.76 | 48.24 | 54.00 | -5.76 | AVG | | | |

Job No.: STAR2015 #812
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Cubelet kit
Mode: TX 2402MHz
Model: cb-kt-cubelets12
Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Vertical
Power Source: DC 5V
Date: 15/10/28/
Time: 10/28/24
Engineer Signature: STAR
Distance: 3m

Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|-------------|------------------|-------------|-----------------|----------------|-------------|----------|-------------|---------------|--------|
| 1 | 2310.000 | 43.18 | -6.99 | 36.19 | 74.00 | -37.81 | peak | | | |
| 2 | 2310.000 | 35.67 | -6.99 | 28.68 | 54.00 | -25.32 | AVG | | | |
| 3 | 2390.000 | 49.74 | -6.78 | 42.96 | 74.00 | -31.04 | peak | | | |
| 4 | 2390.000 | 42.71 | -6.78 | 35.93 | 54.00 | -18.07 | AVG | | | |
| 5 | 2400.000 | 66.80 | -6.76 | 60.04 | 74.00 | -13.96 | peak | | | |
| 6 | 2400.000 | 59.14 | -6.76 | 52.38 | 54.00 | -1.62 | AVG | | | |

Job No.: star2015 #814

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Cubelet kit

Mode: TX 2480MHz

Model: cb-kt-cubelets12

Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Horizontal

Power Source: DC 5V

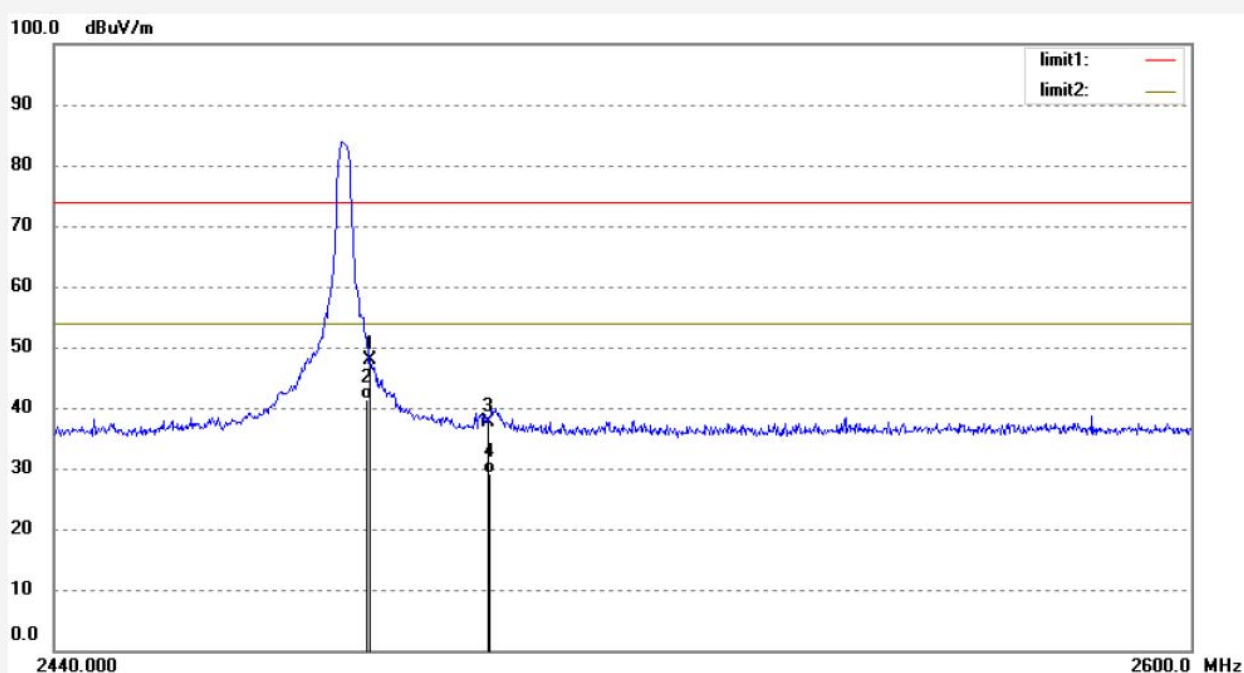
Date: 15/10/28/

Time: 10/31/16

Engineer Signature: STAR

Distance: 3m

Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|-------------|------------------|-------------|-----------------|----------------|-------------|----------|-------------|---------------|--------|
| 1 | 2483.500 | 54.54 | -6.54 | 48.00 | 74.00 | -26.00 | peak | | | |
| 2 | 2483.500 | 47.85 | -6.54 | 41.31 | 54.00 | -12.69 | AVG | | | |
| 3 | 2500.000 | 44.13 | -6.50 | 37.63 | 74.00 | -36.37 | peak | | | |
| 4 | 2500.000 | 35.69 | -6.50 | 29.19 | 54.00 | -24.81 | AVG | | | |

Job No.: star2015 #815

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Cubelet kit

Mode: TX 2480MHz

Model: cb-kt-cubelets12

Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Vertical

Power Source: DC 5V

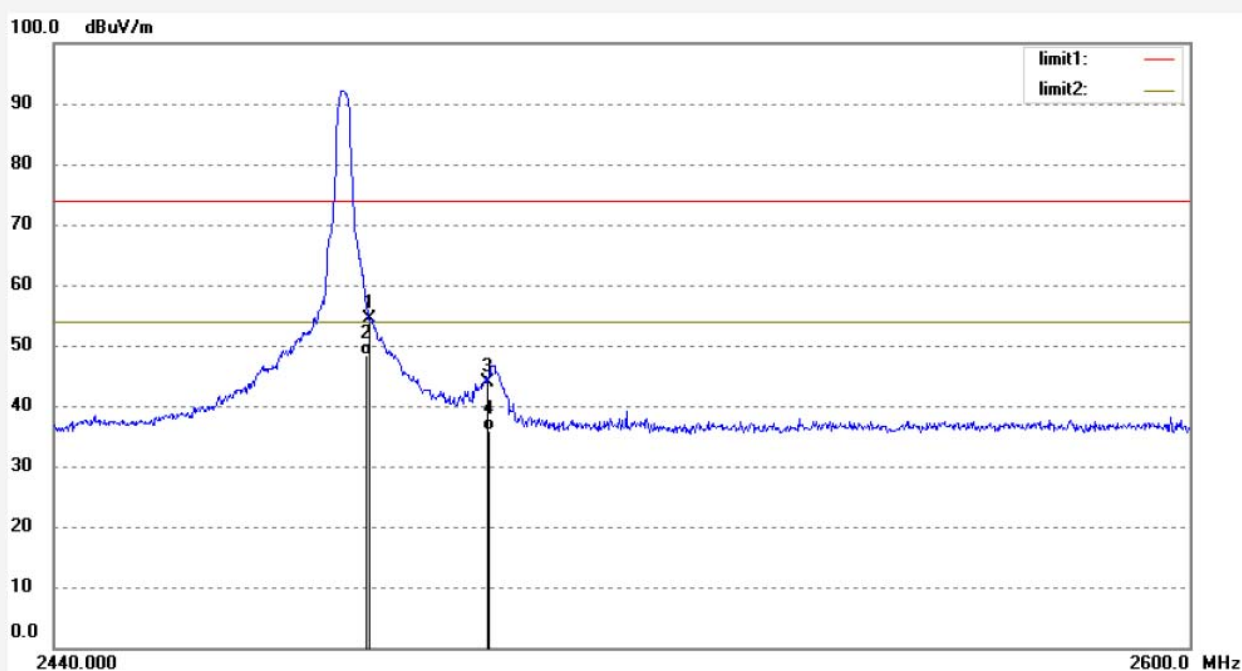
Date: 15/10/28/

Time: 10/32/55

Engineer Signature: STAR

Distance: 3m

Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|-------------|------------------|-------------|-----------------|----------------|-------------|----------|-------------|---------------|--------|
| 1 | 2483.500 | 61.00 | -6.54 | 54.46 | 74.00 | -19.54 | peak | | | |
| 2 | 2483.500 | 55.00 | -6.54 | 48.46 | 54.00 | -5.54 | AVG | | | |
| 3 | 2500.000 | 50.45 | -6.50 | 43.95 | 74.00 | -30.05 | peak | | | |
| 4 | 2500.000 | 42.36 | -6.50 | 35.86 | 54.00 | -18.14 | AVG | | | |

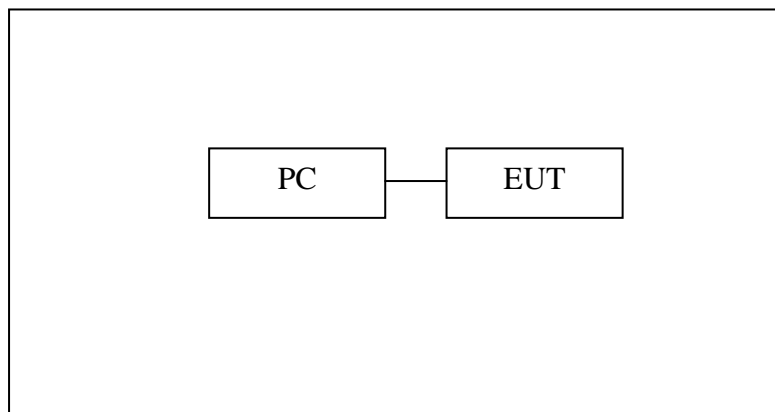
Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:
Result = Reading + Corrected Factor
3. Display the measurement of peak values.

10.RADIATED SPURIOUS EMISSION TEST

10.1.Block Diagram of Test Setup

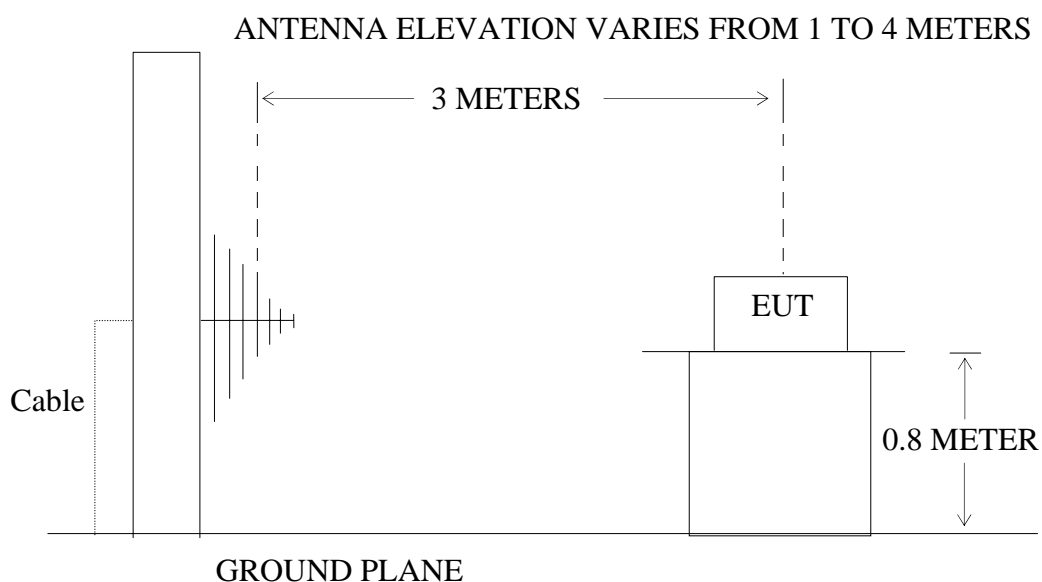
10.1.1.Block diagram of connection between the EUT and peripherals



Setup: Transmitting mode

(EUT: Cubelet kit)

10.1.2.Semi-Anechoic Chamber Test Setup Diagram



10.2.The Limit For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

10.3.Restricted bands of operation

10.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|--------------------------|---------------------|---------------|------------------|
| 0.090-0.110 | 16.42-16.423 | 399.9-410 | 4.5-5.15 |
| ¹ 0.495-0.505 | 16.69475-16.69525 | 608-614 | 5.35-5.46 |
| 2.1735-2.1905 | 16.80425-16.80475 | 960-1240 | 7.25-7.75 |
| 4.125-4.128 | 25.5-25.67 | 1300-1427 | 8.025-8.5 |
| 4.17725-4.17775 | 37.5-38.25 | 1435-1626.5 | 9.0-9.2 |
| 4.20725-4.20775 | 73-74.6 | 1645.5-1646.5 | 9.3-9.5 |
| 6.215-6.218 | 74.8-75.2 | 1660-1710 | 10.6-12.7 |
| 6.26775-6.26825 | 108-121.94 | 1718.8-1722.2 | 13.25-13.4 |
| 6.31175-6.31225 | 123-138 | 2200-2300 | 14.47-14.5 |
| 8.291-8.294 | 149.9-150.05 | 2310-2390 | 15.35-16.2 |
| 8.362-8.366 | 156.52475-156.52525 | 2483.5-2500 | 17.7-21.4 |
| 8.37625-8.38675 | 156.7-156.9 | 2690-2900 | 22.01-23.12 |
| 8.41425-8.41475 | 162.0125-167.17 | 3260-3267 | 23.6-24.0 |
| 12.29-12.293 | 167.72-173.2 | 3332-3339 | 31.2-31.8 |
| 12.51975-12.52025 | 240-285 | 3345.8-3358 | 36.43-36.5 |
| 12.57675-12.57725 | 322-335.4 | 3600-4400 | (²) |
| 13.36-13.41 | | | |

¹Until February 1, 1999, this restricted band shall be 0.490-0.510

²Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

10.4.Configuration of EUT on Measurement

The equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

10.5.Operating Condition of EUT

10.5.1.Setup the EUT and simulator as shown as Section 10.1.

10.5.2.Turn on the power of all equipment.

10.5.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480 MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

10.6.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground(Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. The EUT was tested in 3 orthogonal planes.

The bandwidth of test receiver is set at 9 kHz in below 30MHz. and set at 120 kHz in 30-1000MHz, and 1MHz in above 1000MHz.

The frequency range from 9 kHz to 25GHz is checked.

The final measurement in band 9-90 kHz, 110-490 kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

The field strength is calculated by adding the antenna factor, and cable loss, and subtracting the amplifier gain from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

10.7.The Field Strength of Radiation Emission Measurement Results

PASS.

Note: 1. Emissions attenuated more than 20 dB below the permissible value are not reported.

2. *: Denotes restricted band of operation.

3.The radiation emissions from 18-25GHz are not reported, because the test values lower than the limits of 20dB.



ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber

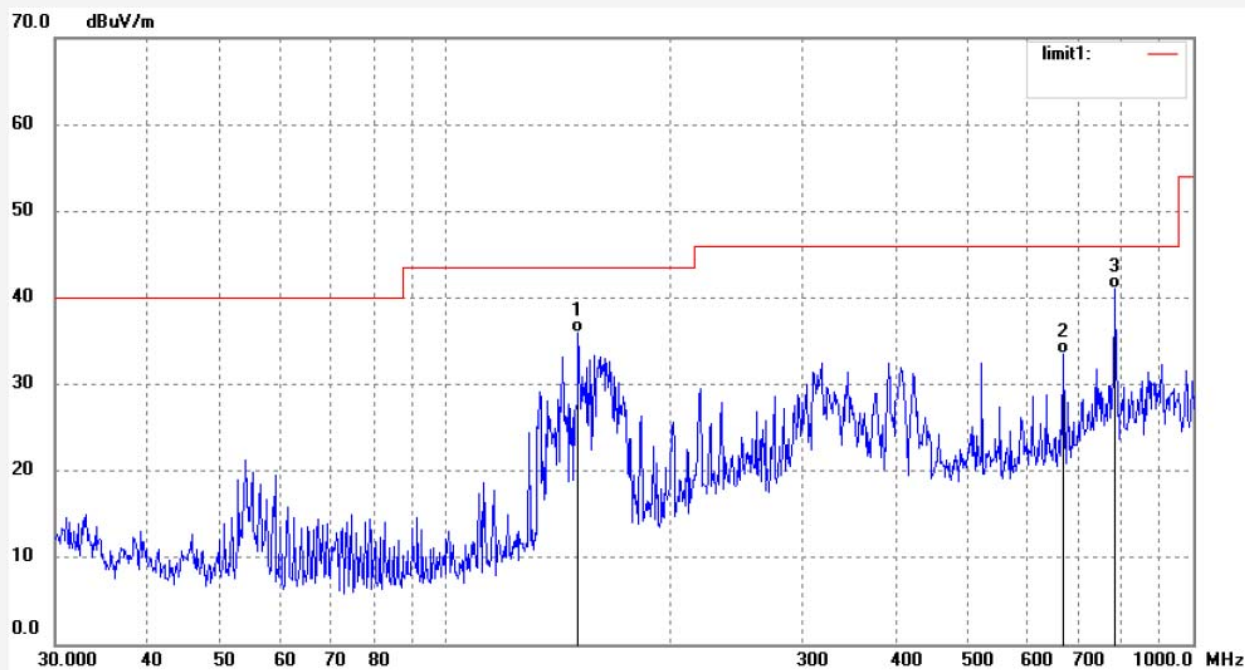
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2015 #1943
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Cubelet kit
Mode: TX 2402MHz
Model: cb-kt-cubelets12
Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Horizontal
Power Source: DC 5V
Date: 2015/10/30
Time: 11:02:47
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|-------------|------------------|-------------|-----------------|----------------|-------------|----------|-------------|---------------|--------|
| 1 | 150.4953 | 58.22 | -22.27 | 35.95 | 43.50 | -7.55 | QP | | | |
| 2 | 669.9523 | 41.97 | -8.48 | 33.49 | 46.00 | -12.51 | QP | | | |
| 3 | 787.4749 | 47.07 | -6.10 | 40.97 | 46.00 | -5.03 | QP | | | |

Job No.: star2015 #1942

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Cubelet kit

Mode: TX 2402MHz

Model: cb-kt-cubelets12

Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Vertical

Power Source: DC 5V

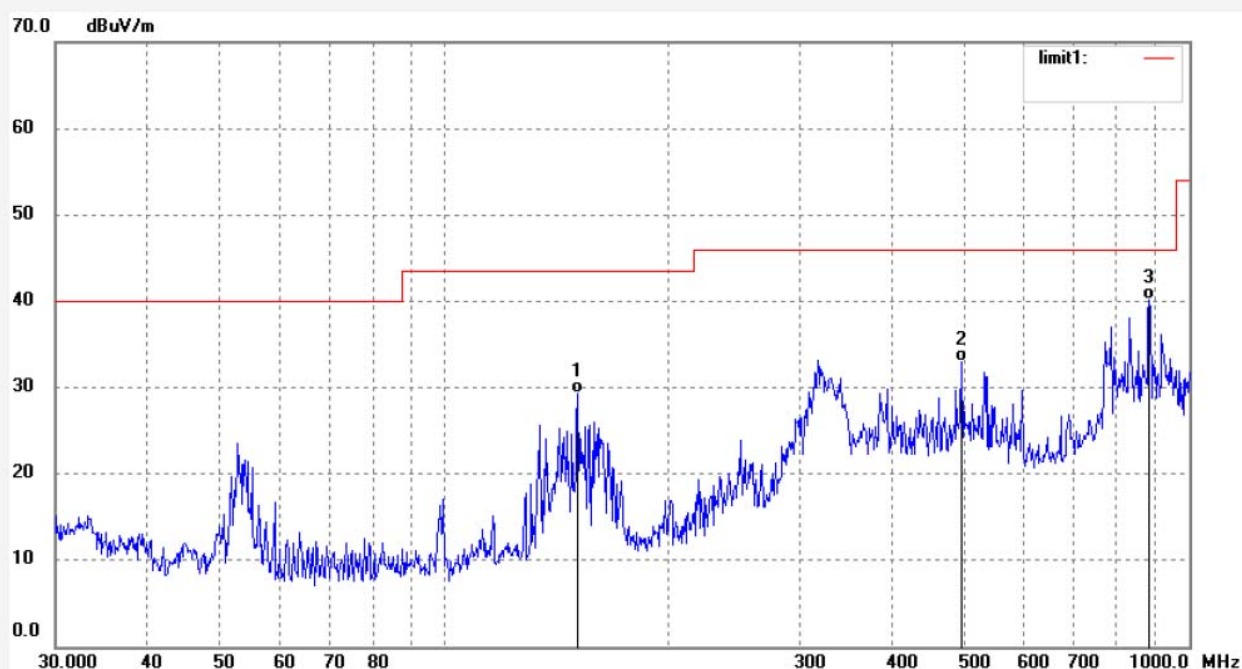
Date: 2015/10/30

Time: 11:01:54

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|-------------|------------------|-------------|-----------------|----------------|-------------|----------|-------------|---------------|--------|
| 1 | 151.0252 | 51.58 | -22.22 | 29.36 | 43.50 | -14.14 | QP | | | |
| 2 | 495.2379 | 45.20 | -12.29 | 32.91 | 46.00 | -13.09 | QP | | | |
| 3 | 884.2853 | 44.68 | -4.44 | 40.24 | 46.00 | -5.76 | QP | | | |

Job No.: star2015 #1944

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Cubelet kit

Mode: TX 2440MHz

Model: cb-kt-cubelets12

Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Horizontal

Power Source: DC 5V

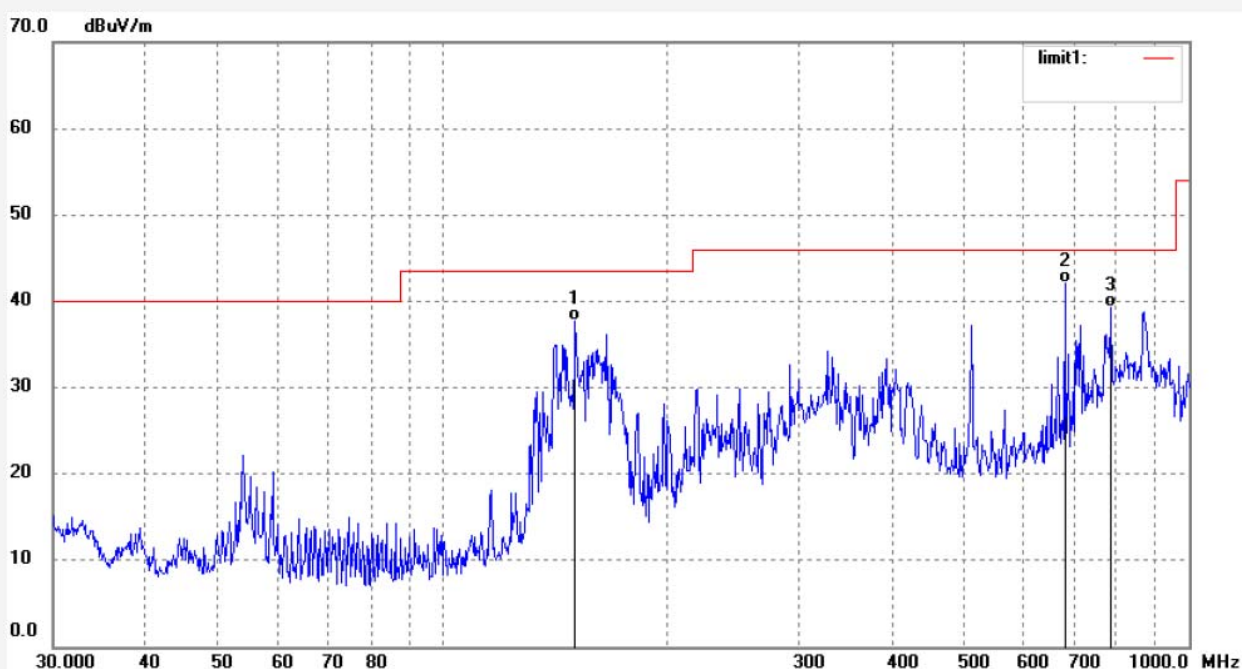
Date: 2015/10/30

Time: 11:04:17

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|-------------|------------------|-------------|-----------------|----------------|-------------|----------|-------------|---------------|--------|
| 1 | 150.4953 | 59.93 | -22.27 | 37.66 | 43.50 | -5.84 | QP | | | |
| 2 | 681.8260 | 50.32 | -8.29 | 42.03 | 46.00 | -3.97 | QP | | | |
| 3 | 787.4749 | 45.31 | -6.10 | 39.21 | 46.00 | -6.79 | QP | | | |

Job No.: star2015 #1945

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Cubelet kit

Mode: TX 2440MHz

Model: cb-kt-cubelets12

Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Vertical

Power Source: DC 5V

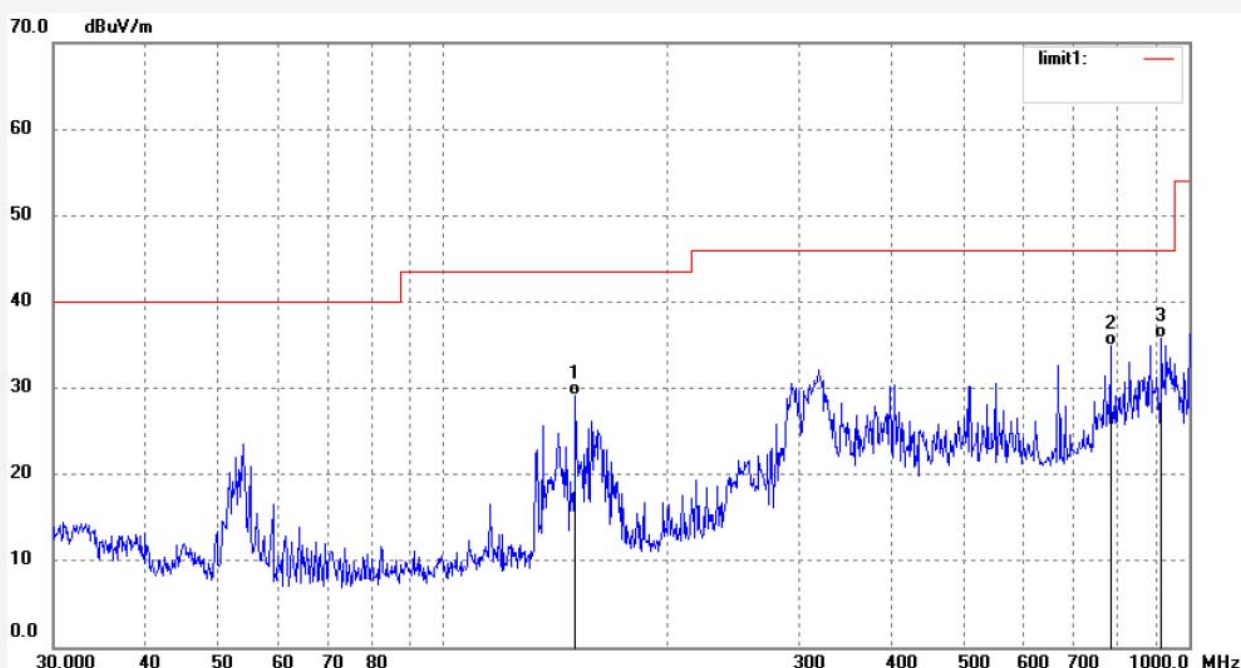
Date: 2015/10/30

Time: 11:05:30

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|-------------|------------------|-------------|-----------------|----------------|-------------|----------|-------------|---------------|--------|
| 1 | 150.4953 | 51.38 | -22.27 | 29.11 | 43.50 | -14.39 | QP | | | |
| 2 | 784.7128 | 41.00 | -6.15 | 34.85 | 46.00 | -11.15 | QP | | | |
| 3 | 919.1314 | 39.61 | -3.88 | 35.73 | 46.00 | -10.27 | QP | | | |

Job No.: star2015 #1947

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Cubelet kit

Mode: TX 2480MHz

Model: cb-kt-cubelets12

Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Horizontal

Power Source: DC 5V

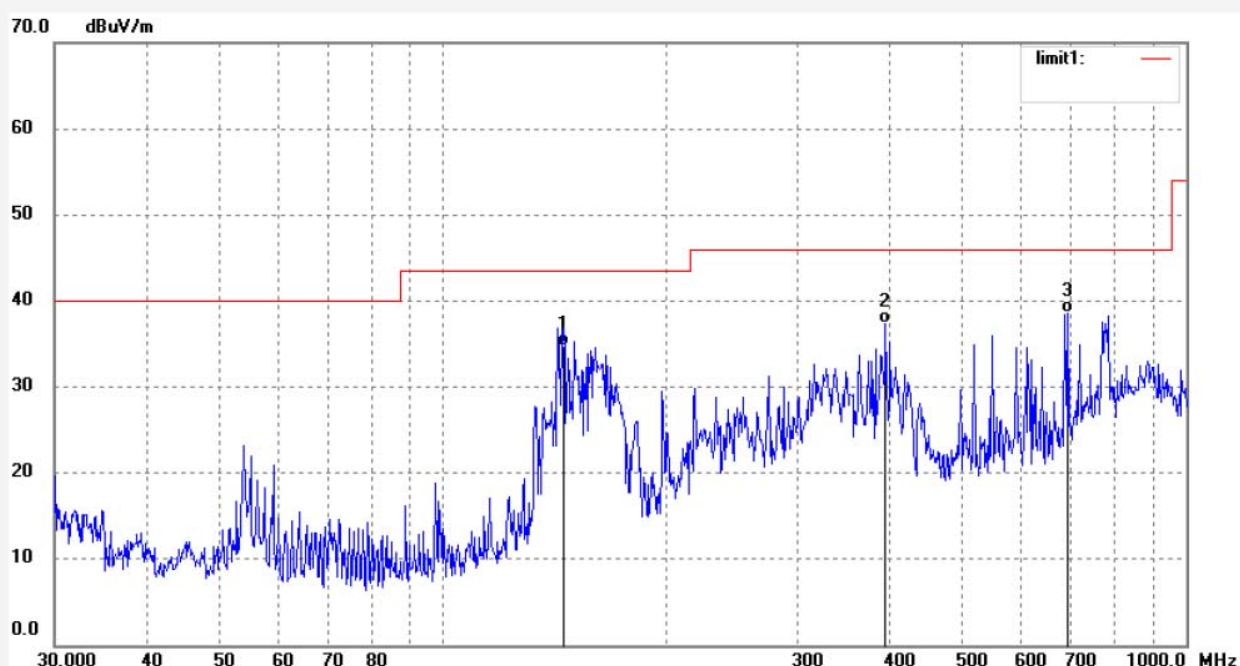
Date: 2015/10/30

Time: 11:07:15

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|-------------|------------------|-------------|-----------------|----------------|-------------|----------|-------------|---------------|--------|
| 1 | 145.2994 | 56.97 | -22.25 | 34.72 | 43.50 | -8.78 | QP | | | |
| 2 | 394.1198 | 51.46 | -14.05 | 37.41 | 46.00 | -8.59 | QP | | | |
| 3 | 693.9101 | 46.76 | -8.09 | 38.67 | 46.00 | -7.33 | QP | | | |

Job No.: star2015 #1946

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Cubelet kit

Mode: TX 2480MHz

Model: cb-kt-cubelets12

Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Vertical

Power Source: DC 5V

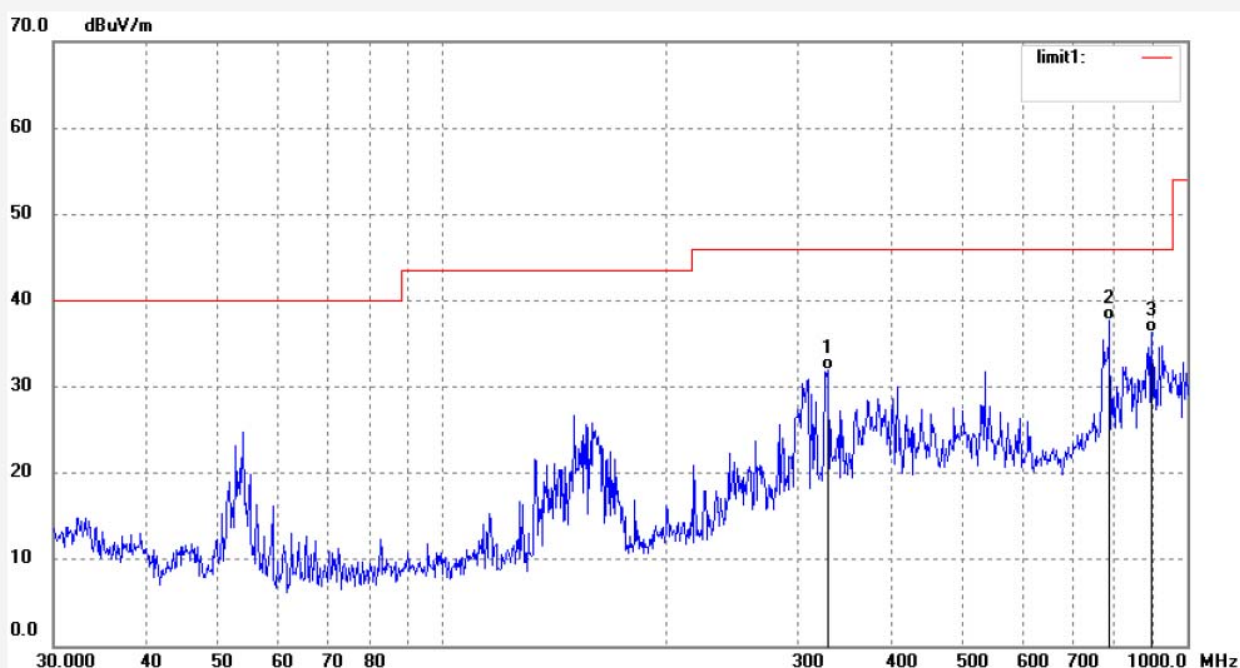
Date: 2015/10/30

Time: 11:06:15

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|-------------|------------------|-------------|-----------------|----------------|-------------|----------|-------------|---------------|--------|
| 1 | 329.4624 | 47.30 | -15.41 | 31.89 | 46.00 | -14.11 | QP | | | |
| 2 | 787.4749 | 43.77 | -6.10 | 37.67 | 46.00 | -8.33 | QP | | | |
| 3 | 896.8011 | 40.59 | -4.22 | 36.37 | 46.00 | -9.63 | QP | | | |

Job No.: star2015 #1948

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Cubelet kit

Mode: TX 2402MHz

Model: cb-kt-cubelets12

Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Horizontal

Power Source: DC 5V

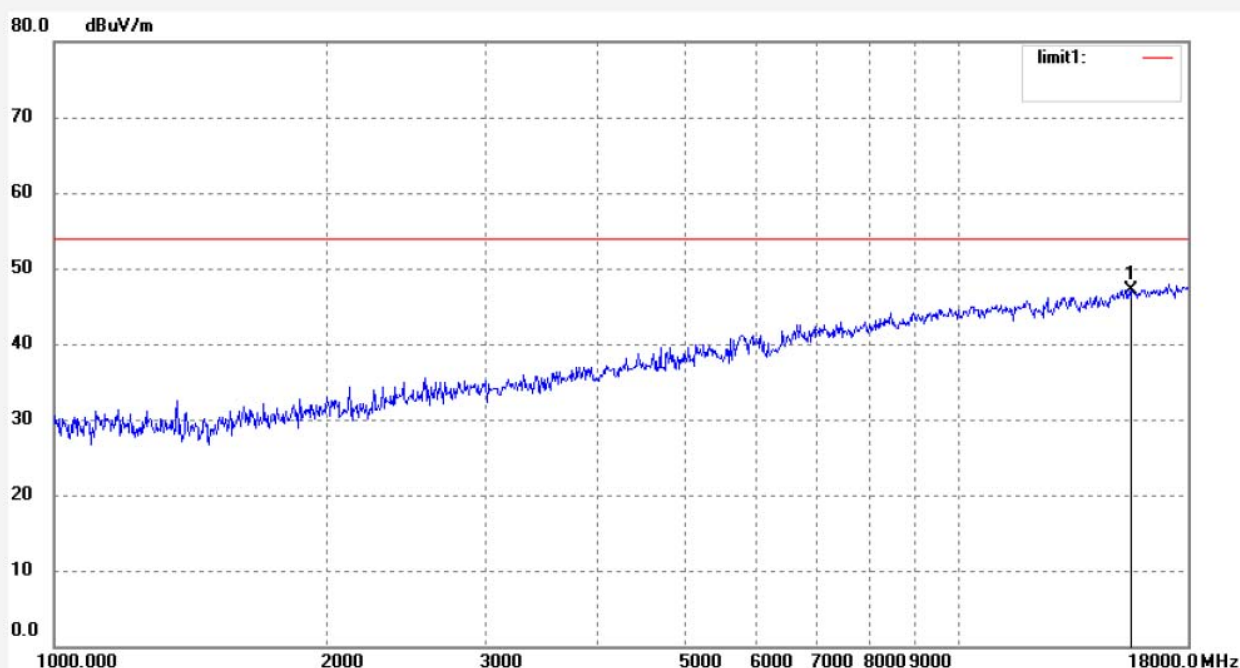
Date: 2015/10/30

Time: 11:08:45

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|----------------|---------------------|----------------|--------------------|-------------------|----------------|----------|----------------|------------------|--------|
| 1 | 15607.400 | 34.46 | 12.64 | 47.10 | 54.00 | -6.90 | peak | | | |

Job No.: star2015 #1949

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Cubelet kit

Mode: TX 2402MHz

Model: cb-kt-cubelets12

Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Vertical

Power Source: DC 5V

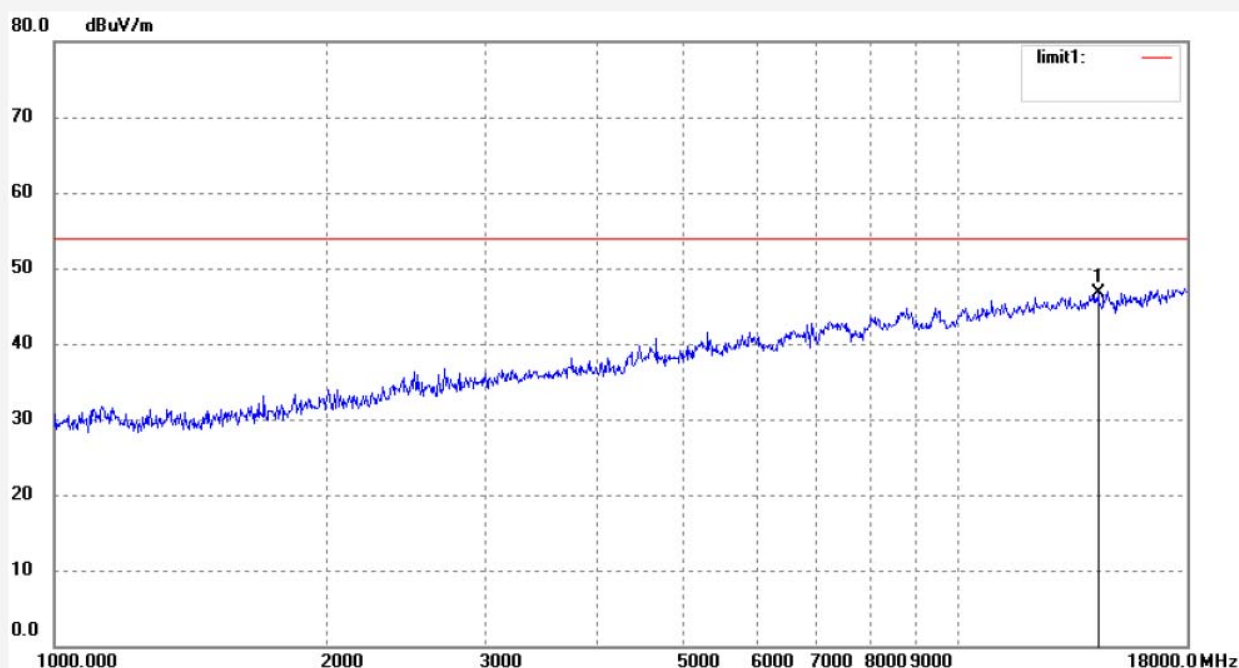
Date: 2015/10/30

Time: 11:09:55

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|----------------|---------------------|----------------|--------------------|-------------------|----------------|----------|----------------|------------------|--------|
| 1 | 14344.025 | 33.17 | 13.50 | 46.67 | 54.00 | -7.33 | peak | | | |

Job No.: star2015 #1951

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Cubelet kit

Mode: TX 2440MHz

Model: cb-kt-cubelets12

Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Horizontal

Power Source: DC 5V

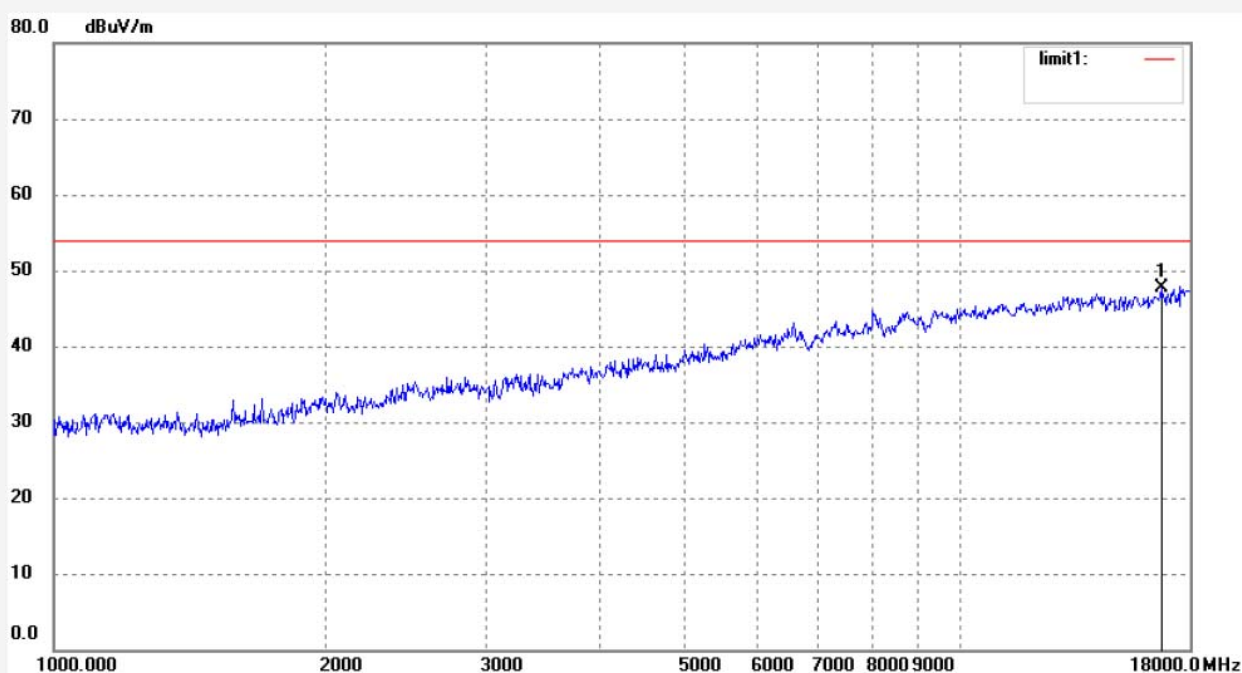
Date: 2015/10/30

Time: 11:12:03

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|----------------|---------------------|----------------|--------------------|-------------------|----------------|----------|----------------|------------------|--------|
| 1 | 16736.686 | 33.59 | 14.08 | 47.67 | 54.00 | -6.33 | peak | | | |

Job No.: star2015 #1950

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Cubelet kit

Mode: TX 2440MHz

Model: cb-kt-cubelets12

Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Vertical

Power Source: DC 5V

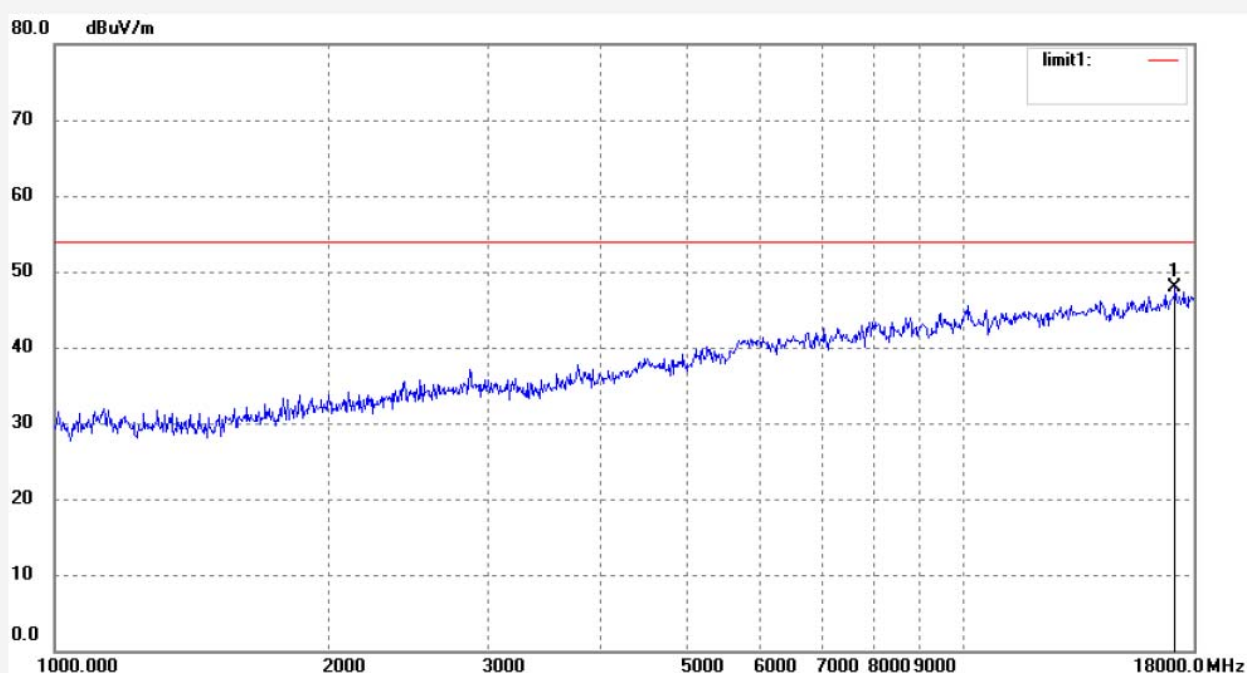
Date: 2015/10/30

Time: 11:11:01

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|----------------|---------------------|----------------|--------------------|-------------------|----------------|----------|----------------|------------------|--------|
| 1 | 17180.926 | 32.93 | 15.02 | 47.95 | 54.00 | -6.05 | peak | | | |

Job No.: star2015 #1952

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Cubelet kit

Mode: TX 2480MHz

Model: cb-kt-cubelets12

Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Horizontal

Power Source: DC 5V

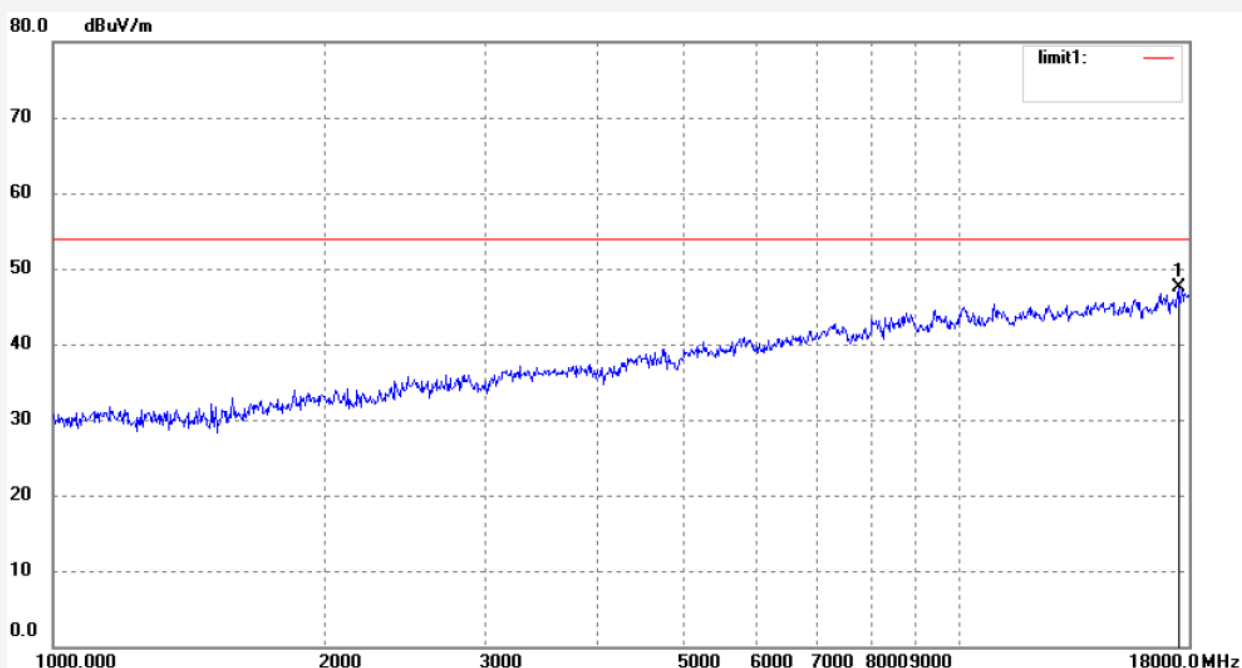
Date: 2015/10/30

Time: 11:13:01

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|----------------|---------------------|----------------|--------------------|-------------------|----------------|----------|----------------|------------------|--------|
| 1 | 17585.695 | 32.23 | 15.21 | 47.44 | 54.00 | -6.56 | peak | | | |

Job No.: star2015 #1953

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Cubelet kit

Mode: TX 2480MHz

Model: cb-kt-cubelets12

Manufacturer: MODULAR ROBOTICS INCORPORATED

Polarization: Vertical

Power Source: DC 5V

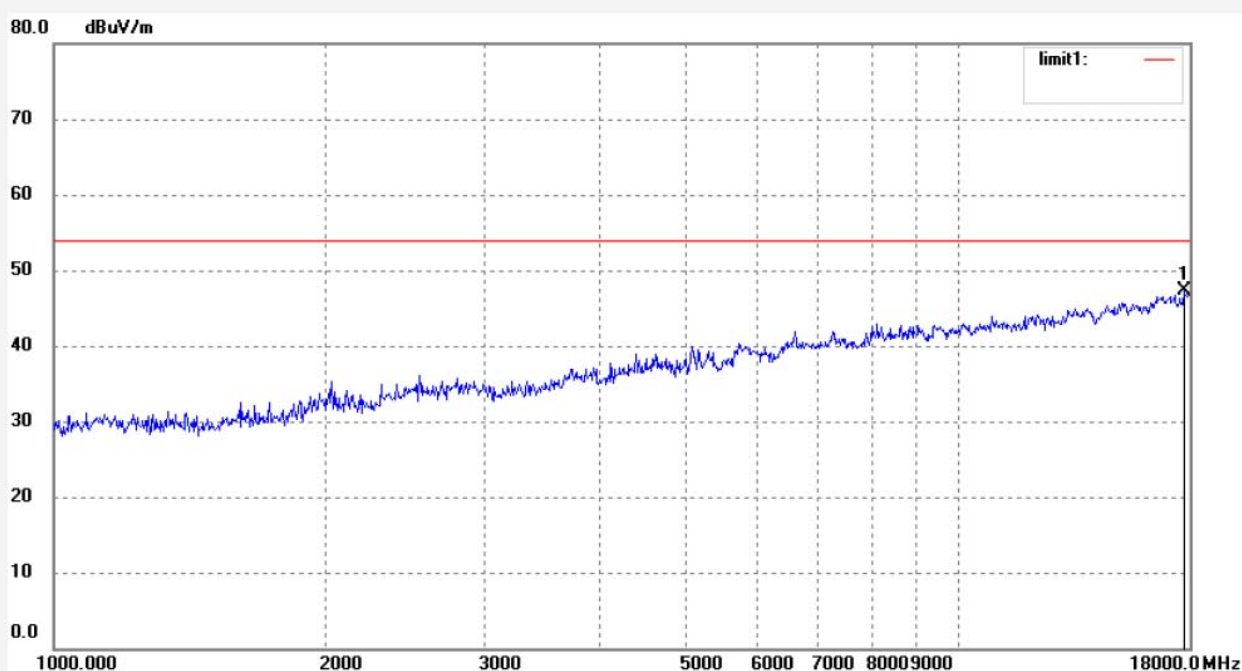
Date: 2015/10/30

Time: 11:13:57

Engineer Signature: star

Distance: 3m

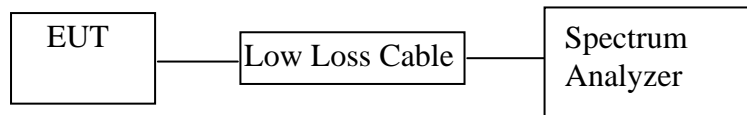
Note: Report No.:ATE20152278



| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|-----|-------------|------------------|-------------|-----------------|----------------|-------------|----------|-------------|---------------|--------|
| 1 | 17739.930 | 31.90 | 15.32 | 47.22 | 54.00 | -6.78 | peak | | | |

11.CONDUCTED SPURIOUS EMISSION COMPLIANCE TEST

11.1.Block Diagram of Test Setup



(EUT: Cubelet kit)

11.2.The Requirement For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

11.3.EUT Configuration on Measurement

The equipment is installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

11.4.Operating Condition of EUT

11.4.1.Setup the EUT and simulator as shown as Section 11.1.

11.4.2.Turn on the power of all equipment.

11.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480 MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

11.5. Test Procedure

11.5.1. The transmitter output was connected to the spectrum analyzer via a low loss cable.

11.5.2. Set RBW of spectrum analyzer to 100kHz and VBW to 300kHz

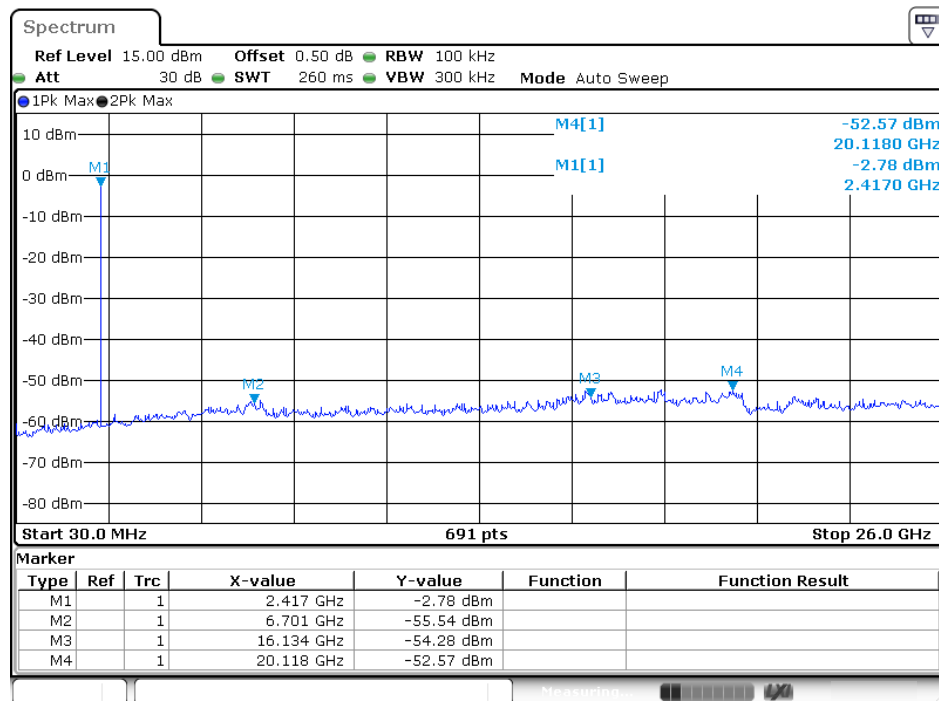
11.5.3. The Conducted Spurious Emission was measured and recorded.

11.6. Test Result

Pass.

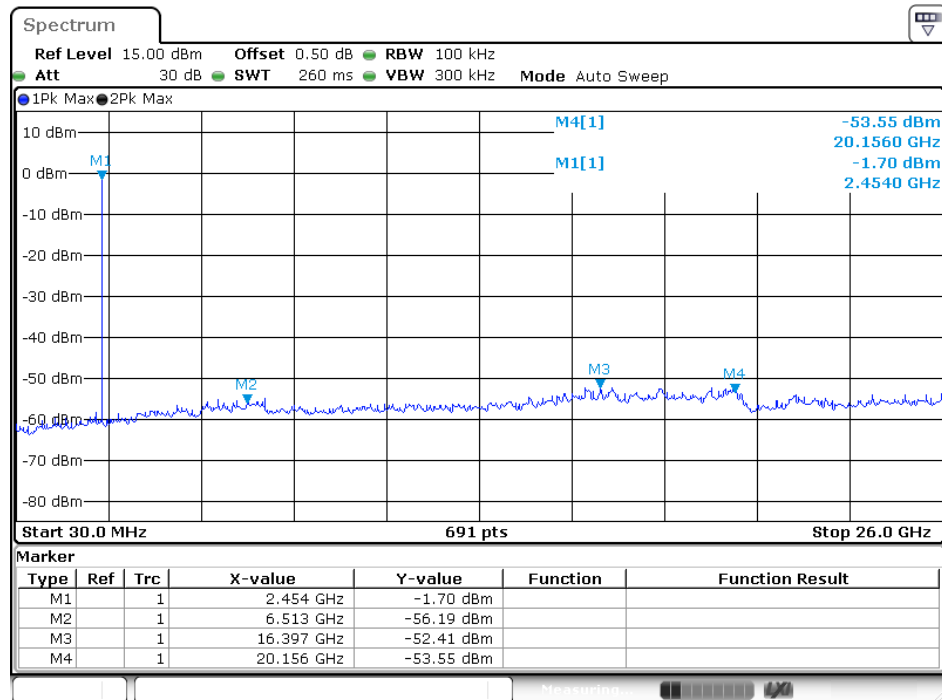
The spectrum analyzer plots are attached as below.

BLE Channel Low 2402MHz



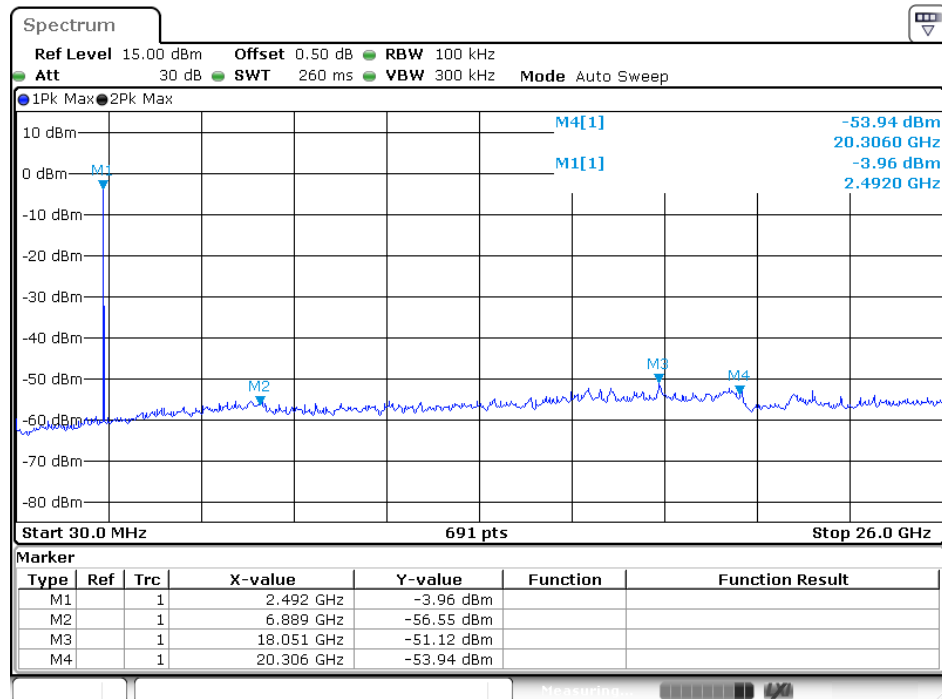
Date: 25.Oct.2015 11:48:14

BLE Channel Middle 2440MHz



Date: 25.Oct.2015 11:48:54

BLE Channel High 2480MHz



Date: 25.Oct.2015 11:49:32

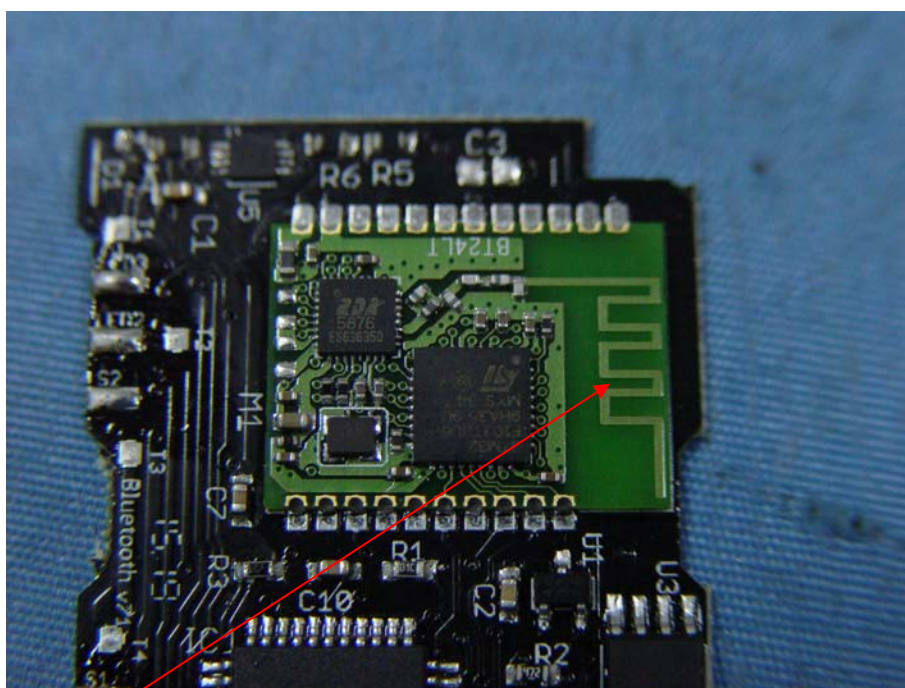
12.ANTENNA REQUIREMENT

12.1.The Requirement

According to Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

12.2.Antenna Construction

Device is equipped with unique antenna, which isn't displaced by other antenna. Therefore, the equipment complies with the antenna requirement of Section 15.203.



Antenna