



# MEASUREMENT REPORT

## FCC PART 15.247 / RSS-247 Bluetooth-LE

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**FCC ID:** HD5-CT40L0N  
**IC:** 1693B-CT40L0N  
**APPLICANT:** Honeywell International Inc  
Honeywell Safety and Productivity Solutions  
**Application Type:** Certification  
**Product:** DOLPHINE CT40  
**Model No.:** CT40-L0N  
**Brand Name:** Honeywell  
**FCC Classification:** Digital Transmission System (DTS)  
**FCC Rule Part(s):** Part15 Subpart C (Section 15.247)  
**IC Rule(s):** RSS-247 Issue 2, RSS-GEN Issue 5  
**Test Procedure(s):** ANSI C63.10-2013, KDB 558074 D01v04  
**Test Date:** April 18 ~ June 04, 2018

Reviewed By : Jame Yuan  
( Jame Yuan )

Approved By : Robin Wu  
( Robin Wu )



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 558074 D01v04. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

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### Revision History

Report No.	Version	Description	Issue Date	Note
1804RSU010-U3	Rev. 01	Initial report	06-05-2018	Valid

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## §2.1033 General Information

<b>Applicant:</b>	Honeywell International Inc Honeywell Safety and Productivity Solutions
<b>Applicant Address:</b>	9680 Old Bailes Road, Fort Mill, SC 29707 United States
<b>Manufacturer:</b>	Honeywell International Inc Honeywell Safety and Productivity Solutions
<b>Manufacturer Address:</b>	9680 Old Bailes Road, Fort Mill, SC 29707 United States
<b>Test Site:</b>	MRT Technology (Suzhou) Co., Ltd
<b>Test Site Address:</b>	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
<b>MRT FCC Registration No.:</b>	893164
<b>MRT IC Registration No.:</b>	11384A-1
<b>Test Device Serial No.:</b>	N/A <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering

### Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- MRT facility is a FCC registered (MRT Reg. No. 893164) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.
- MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.
- MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.



## 1. INTRODUCTION

### 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

### 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



## 2. PRODUCT INFORMATION

### 2.1. Feature of Equipment under Test

Product Name:	DOLPHINE CT40
Model No.:	CT40-L0N
Brand Name:	Honeywell
Hardware Version:	1.0
Software Version:	OS.01.008
Wi-Fi Specification:	802.11a/b/g/n/ac
Bluetooth Version:	v5.0 dual mode
<b>Accessories</b>	
USB Adapter:	Model No.: ADS-12B-06 05010E Input Power: 100 - 240V ~ 50/60Hz, Max. 0.3A Output Power: 5VDC 2.0A
Snap-on Adapter:	Model No.: CT40-SN
Battery:	Model No.: CT50-BTSC Capacitance: 15.5Wh, 4090mAh Rated Voltage: 3.8V Limit Charge Voltage: 4.36V

### 2.2. Product Specification Subjective to this Report

Bluetooth Frequency	2402~2480MHz
Bluetooth Version	V5.0
Type of modulation	GFSK
Data Rate	1Mbps & 2Mbps
Antenna Type:	FPC Antenna
Antenna Gain:	2.20dBi for 2.4GHz Band, 3.39dBi for 5GHz Band

Note: For other features of this EUT, test report will be issued separately.

### 2.3. Working Frequencies for this Report

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz
03	2408 MHz	04	2410 MHz	05	2412 MHz
06	2414 MHz	07	2416 MHz	08	2418 MHz
09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz
15	2432 MHz	16	2434 MHz	17	2436 MHz
18	2438 MHz	19	2440 MHz	20	2442 MHz
21	2444 MHz	22	2446 MHz	23	2448 MHz
24	2450 MHz	25	2452 MHz	26	2454 MHz
27	2456 MHz	28	2458 MHz	29	2460 MHz
30	2462 MHz	31	2464 MHz	32	2466 MHz
33	2468 MHz	34	2470 MHz	35	2472 MHz
36	2474 MHz	37	2476 MHz	38	2478 MHz
39	2480 MHz	--	--	--	--

### 2.4. Test Mode

Test Mode	Mode 1: Transmit by BLE
	Mode 2: Transmit by BLE (2M)



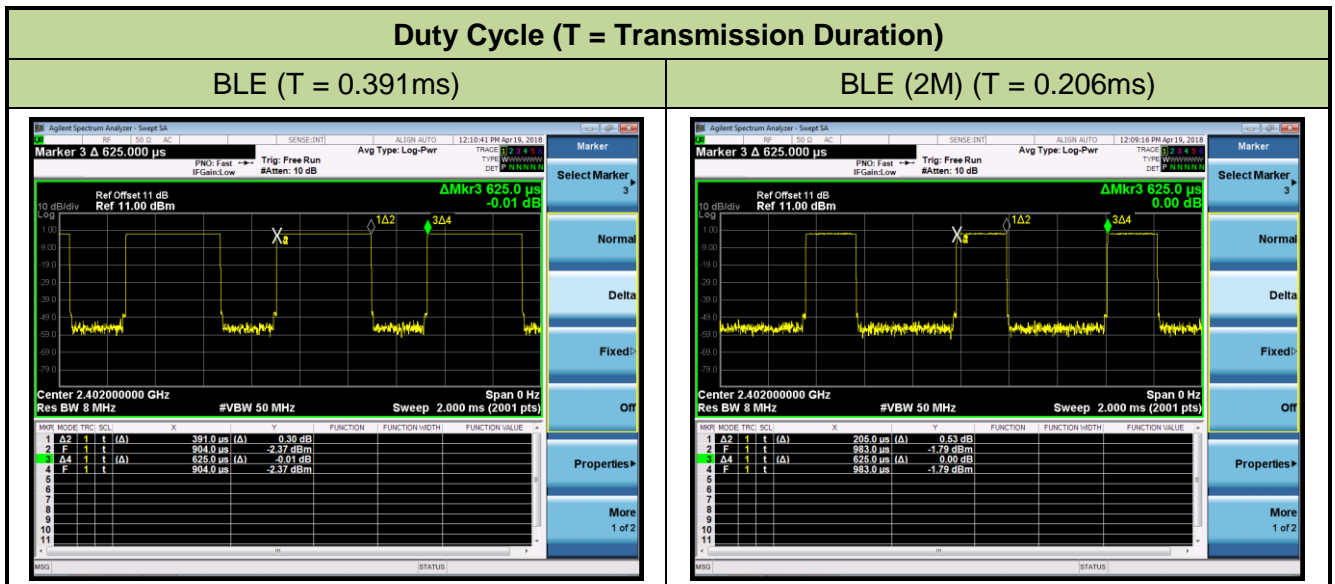
## 2.5. Device Capabilities

This device contains the following capabilities:

2.4GHz WLAN (DTS), 5GHz WLAN (UNII) and Bluetooth (v5.0 dual mode), NFC

**Note:** The maximum achievable duty cycles was determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Test Mode	Duty Cycle
BLE - 1Mbps	62.56%
BLE - 2Mbps	32.80%



## 2.6. Test Configuration

The **DOLPHINE CT40** was tested per the guidance of KDB 558074 D01v04. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

## 2.7. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

## 2.8. Description of Test Software

The test utility software used during testing was “QRCT”, and the version was 3.0.268.0.

## 2.9. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

RSP-100 Issue 11 Section 3

The manufacturer, importer or distributor shall meet the labelling requirements set out in this section for every unit:

- (i) prior to marketing in Canada, for products manufactured in Canada
- (ii) prior to importation into Canada, for imported products

For information regarding the e-labelling option, see Notice 2014-DRS1003. The label for the certified product represents the manufacturer’s or importer’s compliance with Innovation, Science and Economic Development Canada’s (ISED) regulatory requirements.

Please see attachment for IC label and label location.

### 3. DESCRIPTION OF TEST

#### 3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 558074 D01v04 were used in the measurement of the **DOLPHINE CT40**.

**Deviation from measurement procedure.....None**

#### 3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions were used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

### 3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the Antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable. For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive Antenna height using a broadband Antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn Antennas were used. For frequencies below 30MHz, a calibrated loop Antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband Antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive Antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn Antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive Antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive Antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn Antenna, the horn Antenna should be always directed to the EUT when rising height.

## 4. ANTENNA REQUIREMENTS

### **Excerpt from §15.203 of the FCC Rules/Regulations:**

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- The antenna of the **DOLPHINE CT40** is **permanently attached**.
- There are no provisions for connection to an external antenna.

### **Conclusion:**

The **DOLPHINE CT40** unit complies with the requirement of §15.203.

## 5. TEST EQUIPMENT CALIBRATION DATE

### Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2018/08/18
Two-Line V-Network	R&S	ENV 216	MRTSUE06002	1 year	2018/06/21
Two-Line V-Network	R&S	ENV 216	MRTSUE06003	1 year	2018/06/21
Thermohygrometer	Testo	608-H1	MRTSUE06404	1 year	2018/08/14

### Radiated Emissions - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
MXE EMI Receiver	Agilent	N9038A	MRTSUE06125	1 year	2018/08/18
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2018/11/17
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2018/11/20
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2018/11/18
Broad Band Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2018/10/21
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06024	1 year	2018/12/14
Broadband Coaxial Preamp	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2018/11/17
Thermohygrometer	Testo	608-H1	MRTSUE06403	1 year	2018/08/14
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2019/05/02

### Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2018/12/06
Programmable Temperature & Humidity Chamber	BAOYT	BYH-1500L	MRTSUE06051	1 year	2018/12/06
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2018/04/20
				1 year	2019/04/20
Thermohygrometer	Testo	608-H1	MRTSUE06401	1 year	2018/08/14

Software	Version	Function
EMI Software	V3	EMI Test Software

## 6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

<b>AC Conducted Emission Measurement - SR2</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): 150kHz~30MHz: 3.46dB
<b>Radiated Emission Measurement - AC1</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 25GHz: 4.76dB
<b>Spurious Emissions, Conducted - TR3</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): 0.78dB
<b>Output Power - TR3</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): 1.13dB
<b>Power Spectrum Density - TR3</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): 1.15dB
<b>Occupied Bandwidth - TR3</b>
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2Uc(y)$ ): 0.28%

## 7. TEST RESULT

### 7.1. Summary

**Product Name:** DOLPHINE CT40  
**Data Rate(s) Tested:** 1Mbps(GFSK), 2Mbps(GFSK)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	RSS-247 [5.2]	6dB Bandwidth	$\geq 500\text{kHz}$	Conducted	Pass	Section 7.2
15.247(b)(3)	RSS-247 [5.4(d)]	Output Power	$\leq 1\text{Watt}$ & $\text{EIRP} \leq 4\text{Watt}$		Pass	Section 7.3
15.247(e)	RSS-247 [5.2]	Power Spectral Density	$\leq 8\text{dBm} / 3\text{kHz}$		Pass	Section 7.4
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions	$\geq 20\text{dBc(Peak)}$		Pass	Section 7.5
15.205 15.209	RSS-247 [5.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 7.6&7.7
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.8

#### Notes:

- 1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 2) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.



## 7.2. 6dB Bandwidth Measurement

### 7.2.1. Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

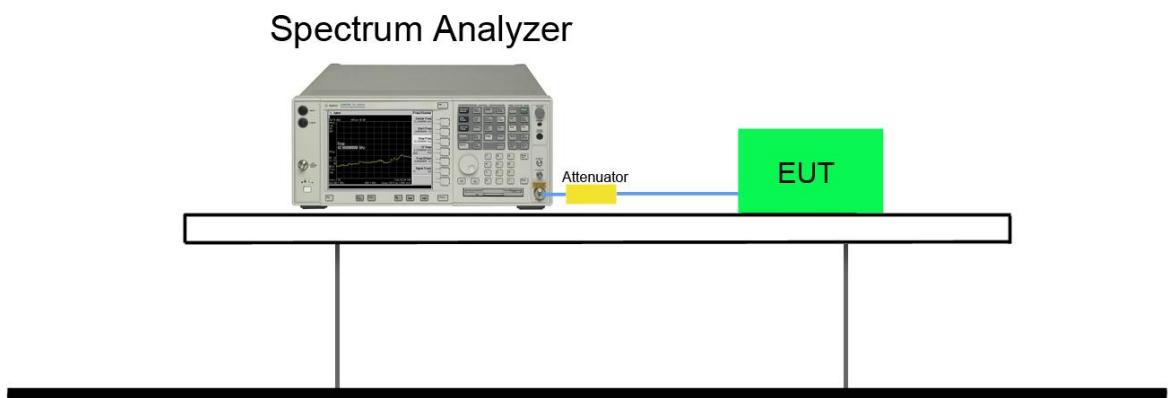
### 7.2.2. Test Procedure used

KDB 558074 D01v04 - Section 8.2 Option 2

### 7.2.3. Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to  $X = 6$ . The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW  $\geq 3 \times$  RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace was allowed to stabilize

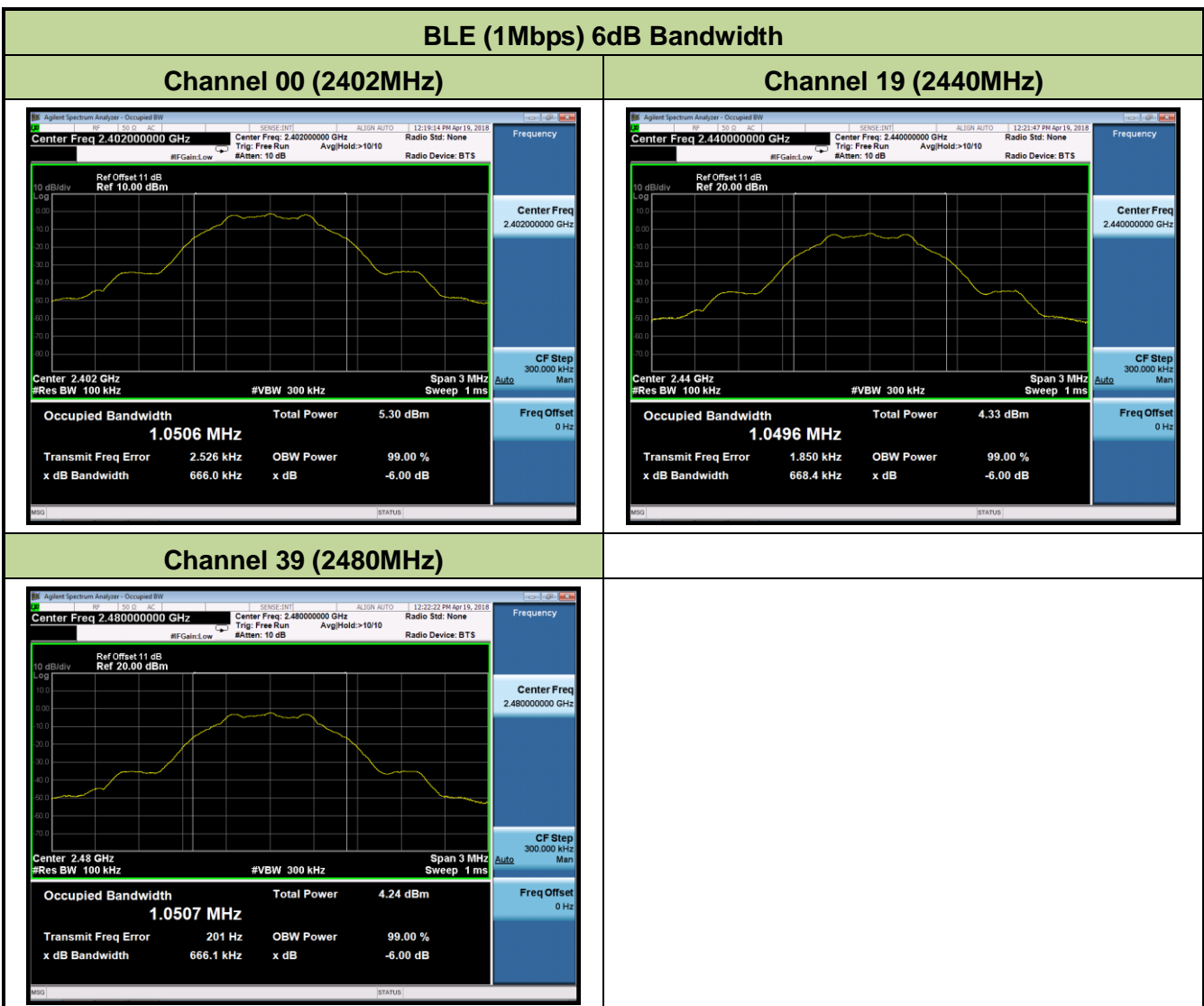
### 7.2.4. Test Setup



**7.2.5. Test Result**

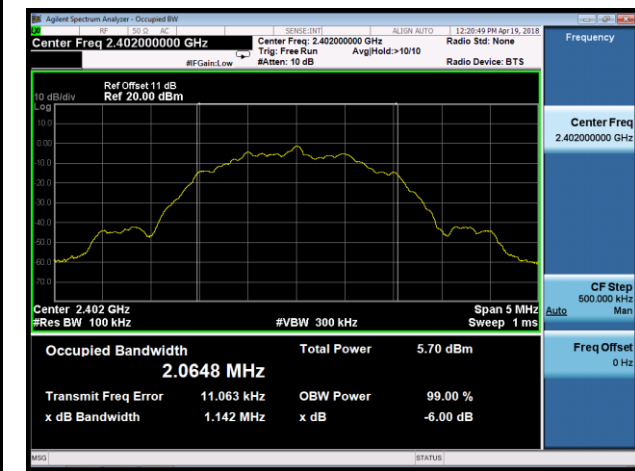
Product	DOLPHINE CT40	Temperature	24°C
Test Engineer	Kevin Ker	Relative Humidity	64%
Test Site	SR2	Test Date	2018/04/19

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	99% Bandwidth (MHz)	Result
BLE	1	00	2402	0.666	≥ 0.5	1.051	Pass
BLE	1	19	2440	0.668	≥ 0.5	1.050	Pass
BLE	1	39	2480	0.666	≥ 0.5	1.051	Pass
BLE	2	00	2402	1.142	≥ 0.5	2.065	Pass
BLE	2	19	2440	1.145	≥ 0.5	2.062	Pass
BLE	2	39	2480	1.144	≥ 0.5	2.064	Pass

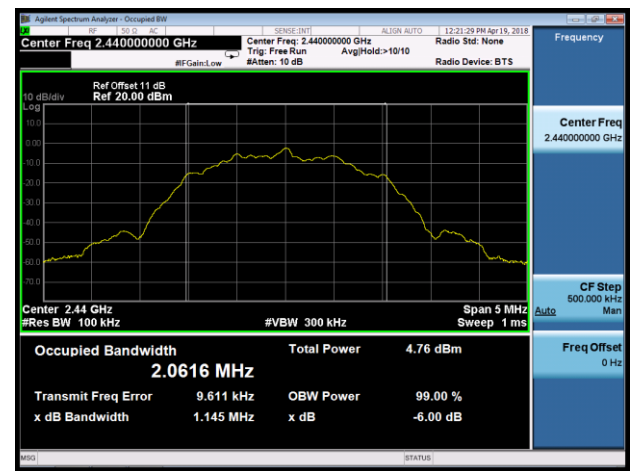


**BLE (2Mbps) 6dB Bandwidth**

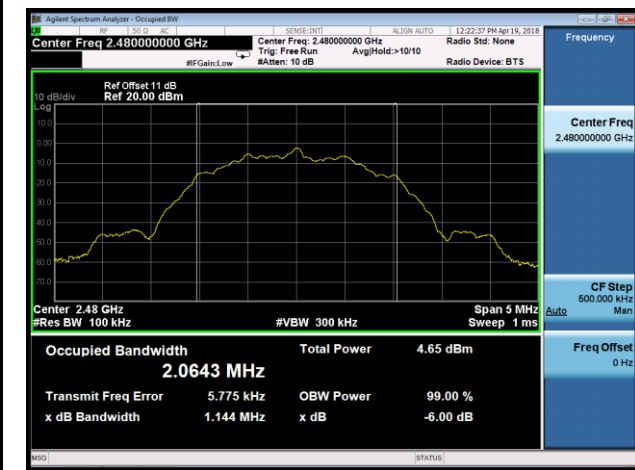
**Channel 00 (2402MHz)**



**Channel 19 (2440MHz)**



**Channel 39 (2480MHz)**



### 7.3. Output Power Measurement

#### 7.3.1. Test Limit

The maximum out power shall be less 1 Watt (30dBm) and the E.I.R.P shall not exceed 4 Watt (36dBm).

#### 7.3.2. Test Procedure Used

KDB 558074 D01v04 - Section 9.1.2 PKPM1 - Peak Power Method

KDB 558074 D01v04 - Section 9.2.3.2 AVGPM-G Average Power Method

#### 7.3.3. Test Setting

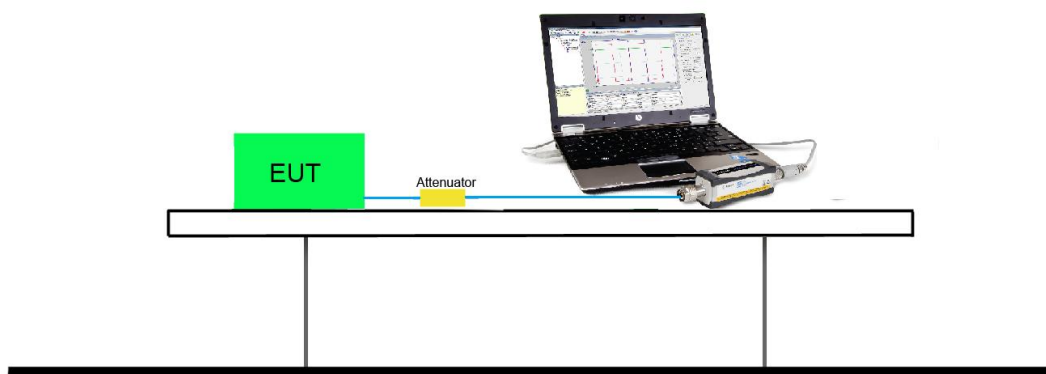
##### **Method PKPM1 (Peak Power Measurement)**

Peak power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The pulse sensor employs a VBW = 50MHz so this method was only used for signals whose DTS bandwidth was less than or equal to 50MHz.

##### **Method AVGPM-G (Measurement using a gated RF average-reading power meter)**

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

#### 7.3.4. Test Setup



### 7.3.5. Test Result of Output Power

Product	DOLPHINE CT40	Temperature	25°C
Test Engineer	Cat Hu	Relative Humidity	50%
Test Site	SR2	Test Date	2018/04/19

### Test Result of Peak Output Power

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Result
BLE	1	00	2402	-1.19	≤ 30.00	Pass
BLE	1	19	2440	-1.96	≤ 30.00	Pass
BLE	1	39	2480	-2.07	≤ 30.00	Pass
BLE	2	00	2402	-0.86	≤ 30.00	Pass
BLE	2	19	2440	-1.81	≤ 30.00	Pass
BLE	2	39	2480	-1.87	≤ 30.00	Pass

Note 1: EIRP (dBm) = Conducted Power (dBm) + Antenna Gain (dBi), Antenna Gain = 2.2 dBi.

Note 2: Max EIRP (dBm) = -0.86 dBm + 2.2 dBi = 1.34 dBm < 36 dBm.

### Test Result of Average Output Power (Reporting Only)

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Average Power (dBm)	Limit (dBm)	Result
BLE	1	00	2402	-1.42	≤ 30.00	Pass
BLE	1	19	2440	-2.30	≤ 30.00	Pass
BLE	1	39	2480	-2.35	≤ 30.00	Pass
BLE	2	00	2402	-1.45	≤ 30.00	Pass
BLE	2	19	2440	-2.36	≤ 30.00	Pass
BLE	2	39	2480	-2.39	≤ 30.00	Pass

Note 1: EIRP (dBm) = Conducted Power (dBm) + Antenna Gain (dBi), Antenna Gain = 2.2 dBi.

Note 2: Max EIRP (dBm) = -1.42 dBm + 2.2 dBi = 0.78 dBm < 36 dBm.

## 7.4. Power Spectral Density Measurement

### 7.4.1. Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

The same method of determining the conducted output power shall be used to determine the power spectral density.

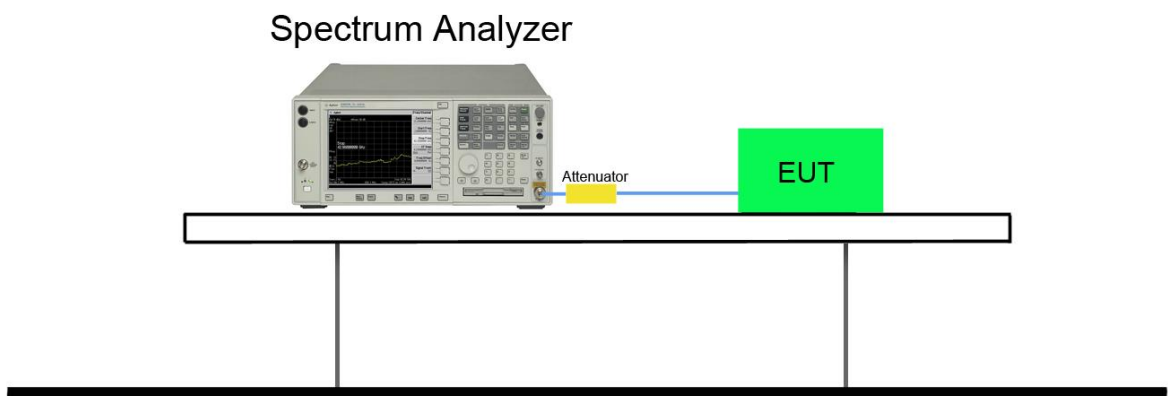
### 7.4.2. Test Procedure Used

KDB 558074 D01v04 - Section 10.2 Method PKPSD

### 7.4.3. Test Setting

1. Analyzer was set to the center frequency of the DTS channel under investigation
2. Span = 1.5 times the DTS channel bandwidth
3. RBW = 3kHz
4. VBW = 10kHz
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Trace was allowed to stabilize

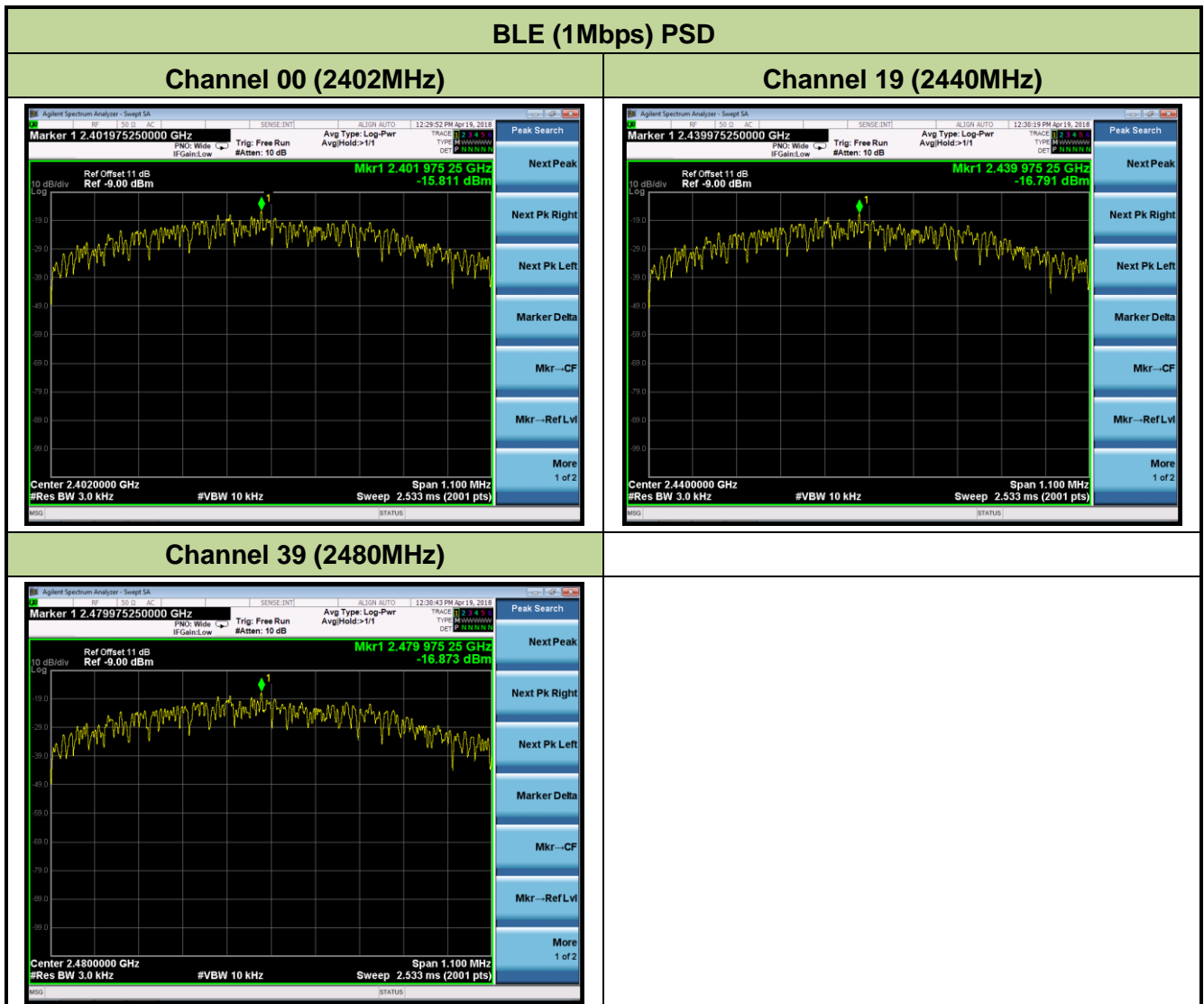
### 7.4.4. Test Setup



**7.4.5. Test Result**

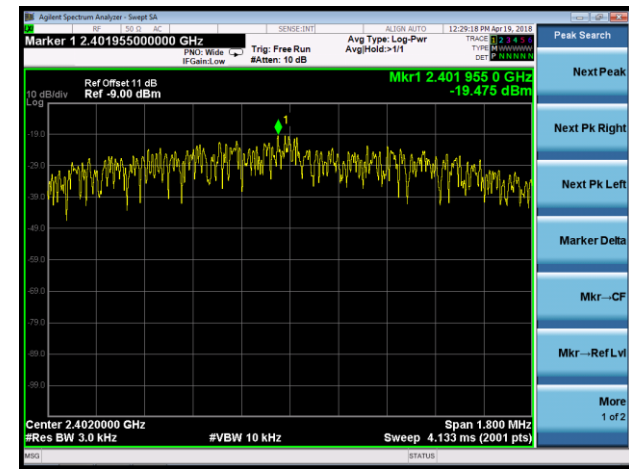
Product	DOLPHINE CT40	Temperature	25°C
Test Engineer	Cat Hu	Relative Humidity	50%
Test Site	TR3	Test Date	2018/04/19

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
BLE	1	00	2402	-15.81	≤ 8.00	Pass
BLE	1	19	2440	-16.79	≤ 8.00	Pass
BLE	1	39	2480	-16.87	≤ 8.00	Pass
BLE	2	00	2402	-19.48	≤ 8.00	Pass
BLE	2	19	2440	-20.39	≤ 8.00	Pass
BLE	2	39	2480	-20.46	≤ 8.00	Pass

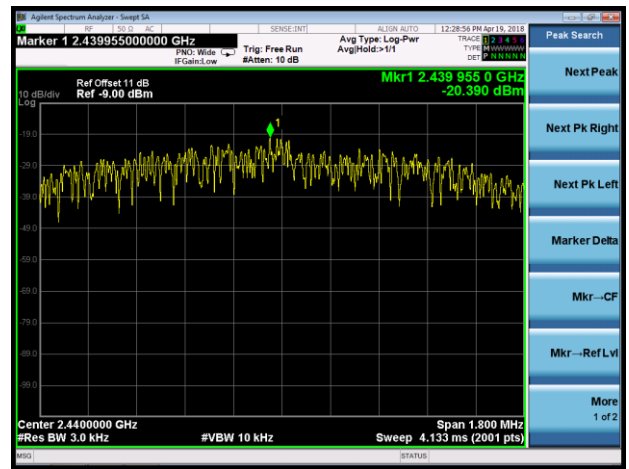


**BLE (2Mbps) PSD**

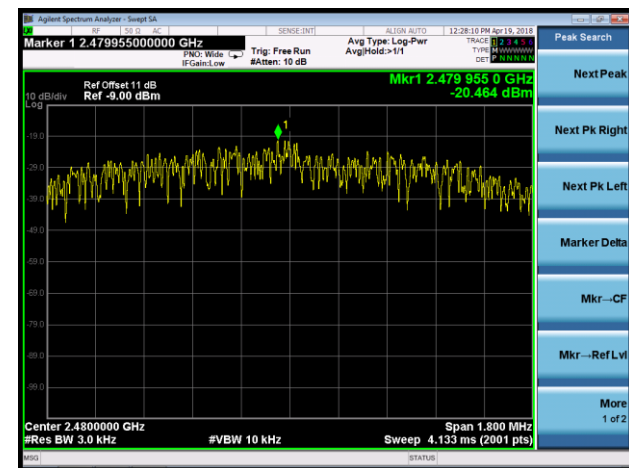
**Channel 00 (2402MHz)**



**Channel 19 (2440MHz)**



**Channel 39 (2480MHz)**





## **7.5. Conducted Band Edge and Out-of-Band Emissions**

### **7.5.1. Test Limit**

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the PSD procedure.

### **7.5.2. Test Procedure Used**

KDB 558074 D01v04 - Section 11.2 & Section 11.3

### **7.5.3. Test Setting**

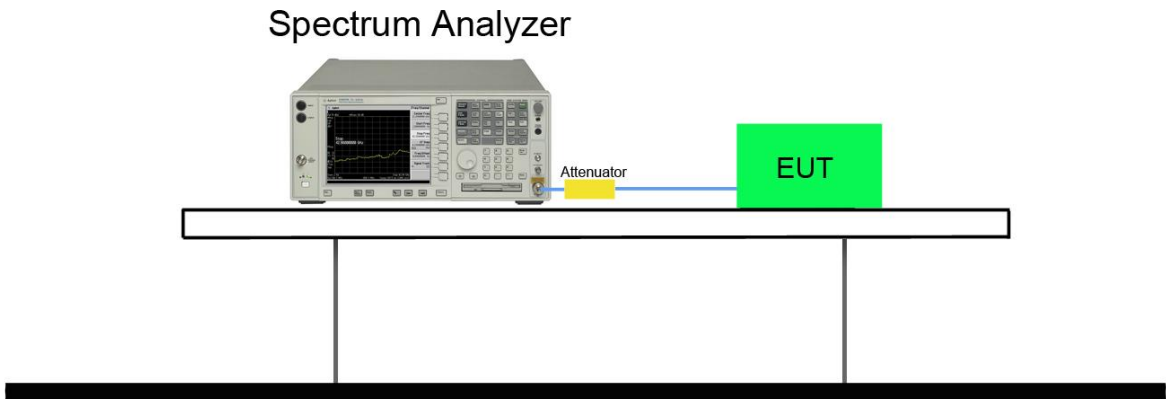
#### **Reference level measurement**

1. Set instrument center frequency to DTS channel center frequency
2. Set the span to  $\geq 1.5$  times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW  $\geq 3 \times$  RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize

#### **Emission level measurement**

1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

### 7.5.4. Test Setup



**7.5.5. Test Result**

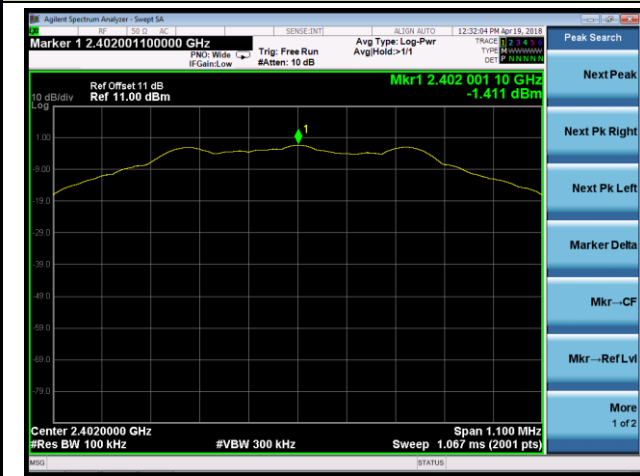
Product	DOLPHINE CT40	Temperature	25°C
Test Engineer	Cat Hu	Relative Humidity	50%
Test Site	SR2	Test Date	2018/04/19

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Limit	Result
BLE	1	00	2402	20dBc	Pass
BLE	1	19	2440	20dBc	Pass
BLE	1	39	2480	20dBc	Pass
BLE	2	00	2402	20dBc	Pass
BLE	2	19	2440	20dBc	Pass
BLE	2	39	2480	20dBc	Pass

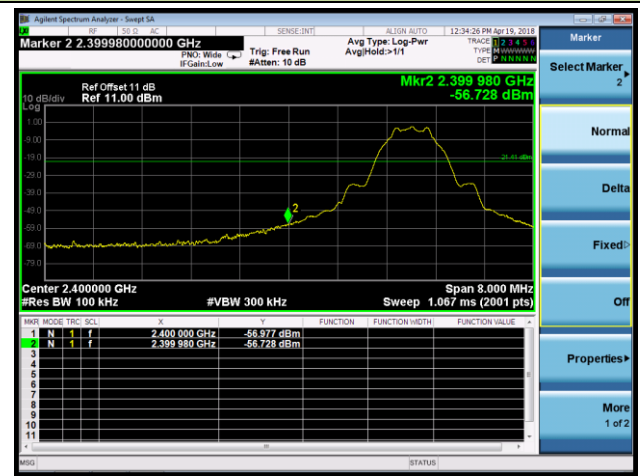
### BLE (1Mbps) Out-of-Band Emissions

#### Channel 00 (2402MHz)

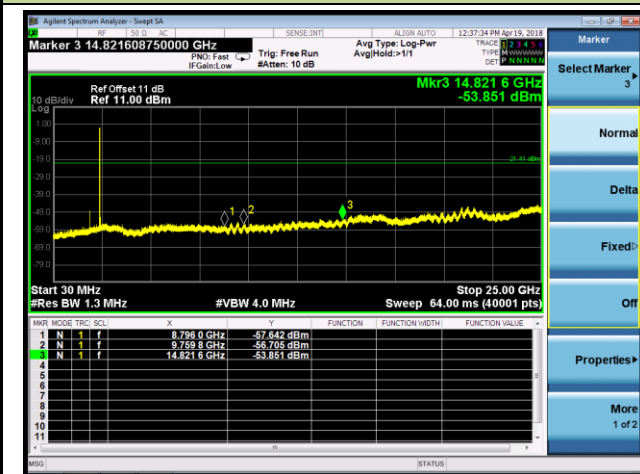
#### 100kHz PSD reference Level



#### Low Band Edge



#### Spurious Emission 30MHz ~ 25GHz



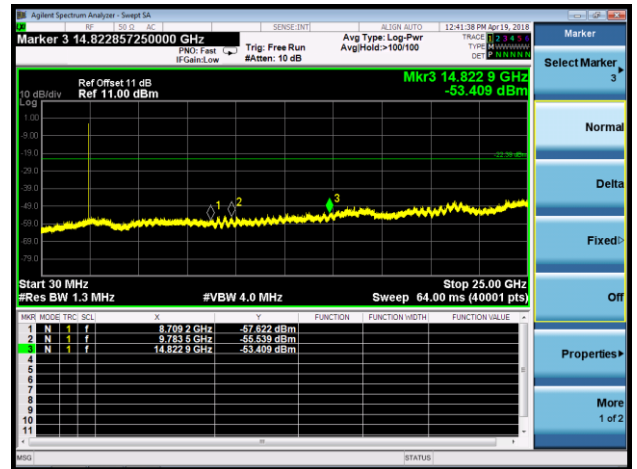
Note: The Value of the Display Line is -21.41dBm

### Channel 19 (2440MHz)

#### 100kHz PSD reference Level



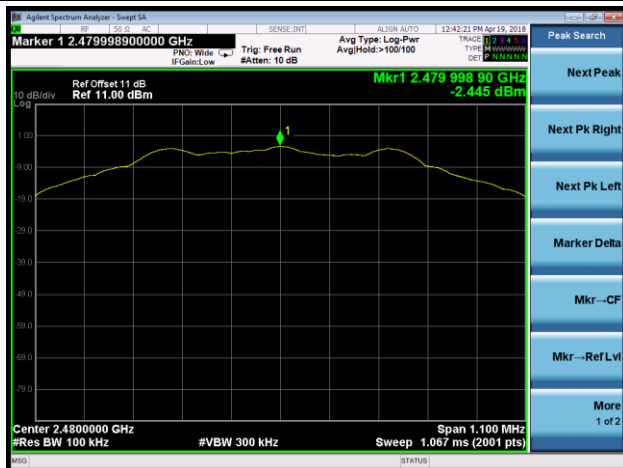
#### Spurious Emission 30MHz ~ 25GHz



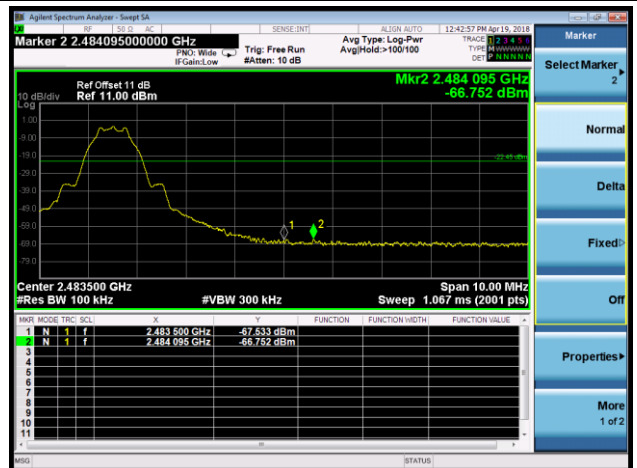
Note: The Value of the Display Line is -22.39dBm

### Channel 39 (2480MHz)

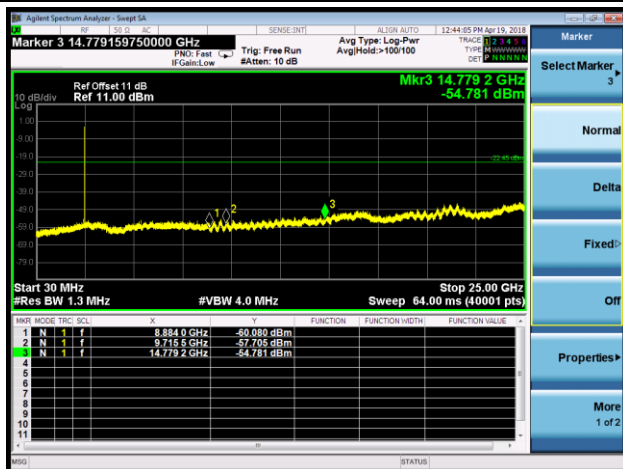
#### 100kHz PSD reference Level



#### High Band Edge



#### Spurious Emission 30MHz ~ 25GHz

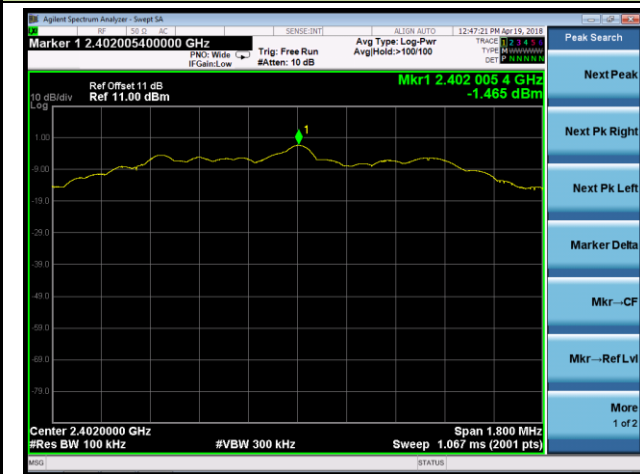


Note: The Value of the Display Line is -22.45dBm

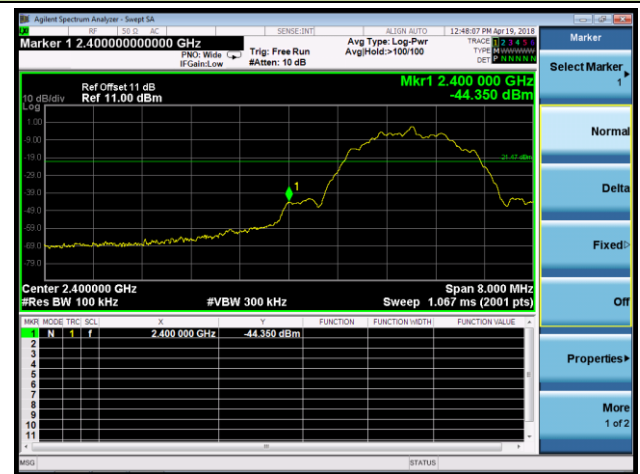
### BLE (2Mbps) Out-of-Band Emissions

#### Channel 00 (2402MHz)

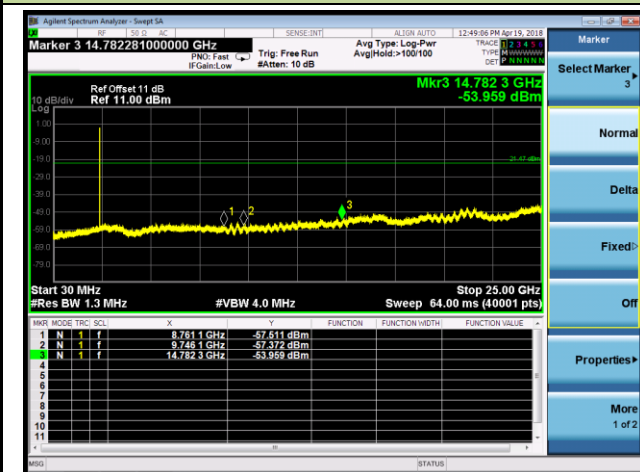
##### 100kHz PSD reference Level



##### Low Band Edge



##### Spurious Emission 30MHz ~ 25GHz



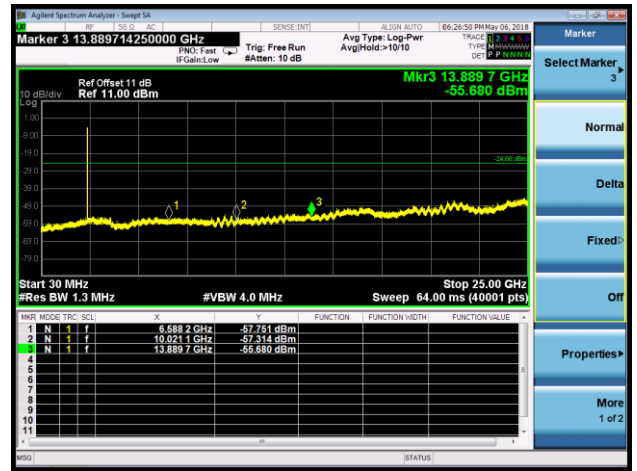
Note: The Value of the Display Line is -21.47dBm

### Channel 19 (2440MHz)

#### 100kHz PSD reference Level



#### Spurious Emission 30MHz ~ 25GHz



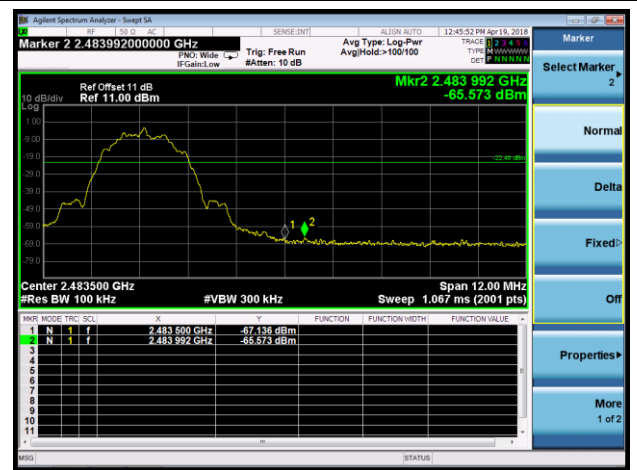
Note: The Value of the Display Line is -24.68dBm

### Channel 39 (2480MHz)

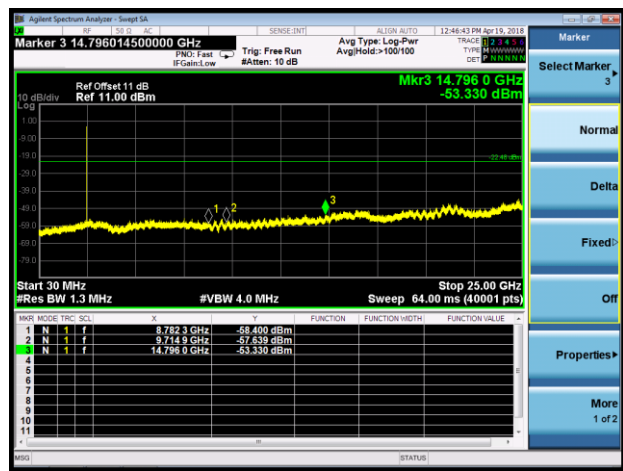
#### 100kHz PSD reference Level



#### High Band Edge



#### Spurious Emission 30MHz ~ 25GHz



Note: The Value of the Display Line is -22.48dBm

## 7.6. Radiated Spurious Emission Measurement

### 7.6.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

### 7.6.2. Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

### 7.6.3. Test Setting

#### Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize



**Table 1 - RBW as a function of frequency**

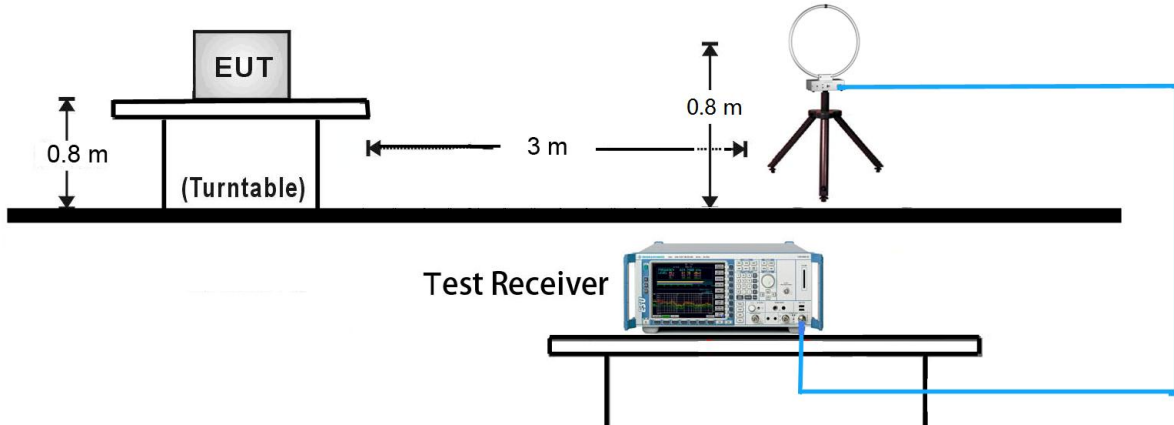
Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

**Average Field Strength Measurements**

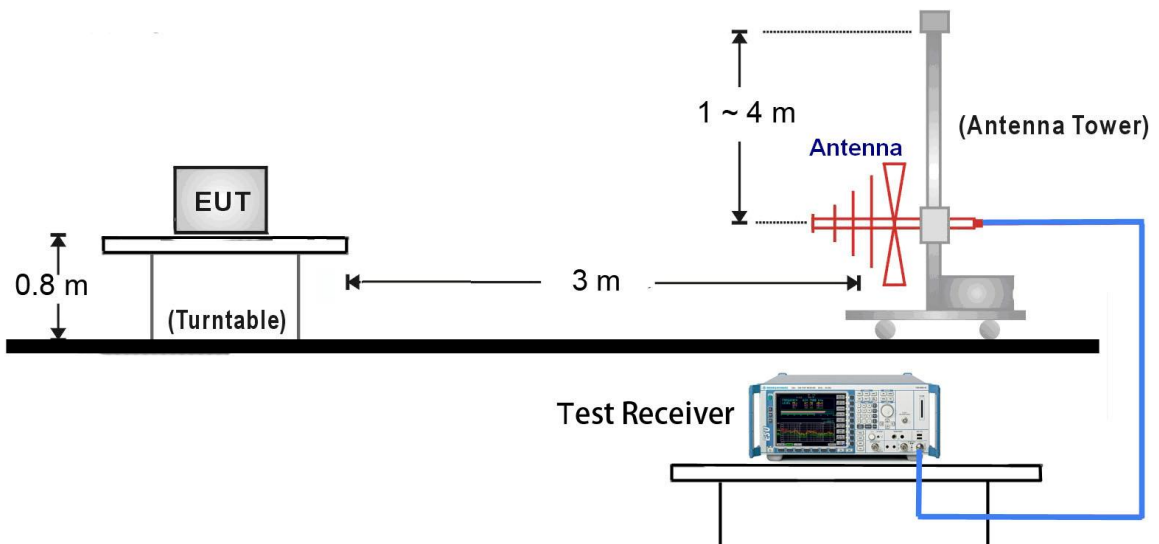
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW  $\geq 1/T$
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

### 7.6.4. Test Setup

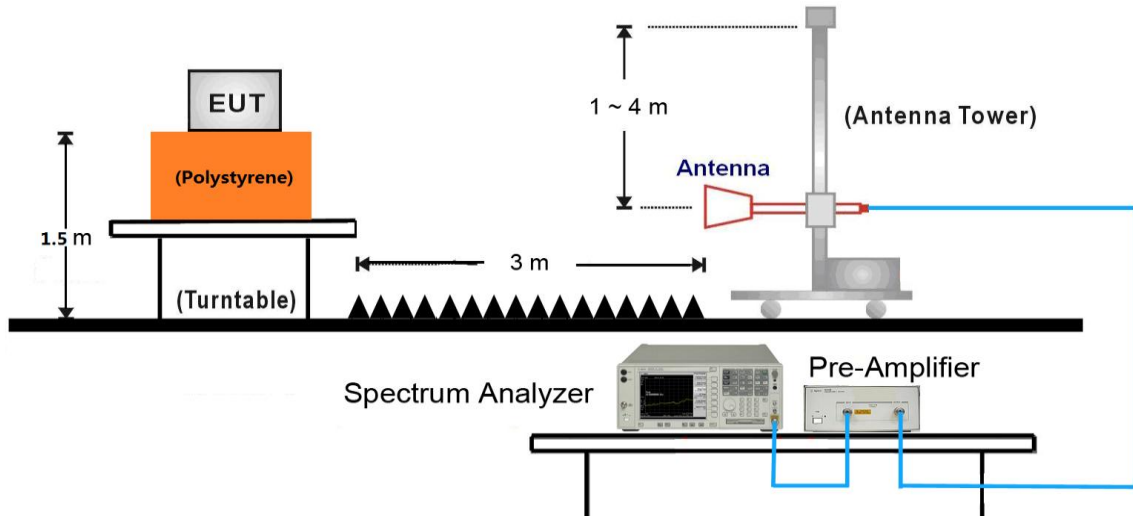
#### 9kHz ~ 30MHz Test Setup:



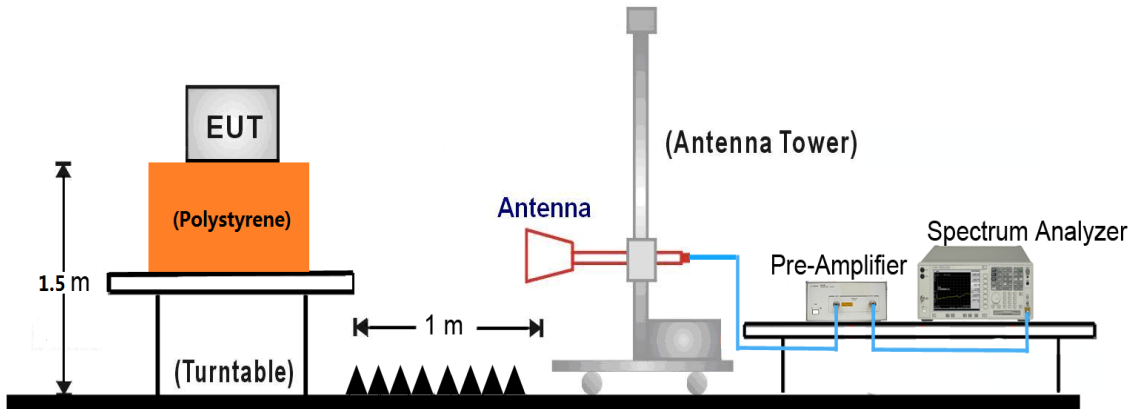
#### 30MHz ~ 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:



18GHz ~ 25GHz Test Setup:



**7.6.5. Test Result**

Product	DOLPHINE CT40	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	58%
Test Site	AC1	Test Date	2018/06/08
Test Mode:	BLE	Test Channel:	00
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	3915.5	37.7	3.2	40.9	74.0	-33.1	Peak	Horizontal
	4808.0	37.7	5.9	43.6	74.0	-30.4	Peak	Horizontal
*	5743.0	35.4	7.4	42.8	74.0	-31.2	Peak	Horizontal
*	6542.0	35.0	10.1	45.1	74.0	-28.9	Peak	Horizontal
	3949.5	38.2	3.1	41.3	74.0	-32.7	Peak	Vertical
	4825.0	36.8	5.9	42.7	74.0	-31.3	Peak	Vertical
*	5811.0	35.4	7.6	43.0	74.0	-31.0	Peak	Vertical
*	6899.0	36.2	10.8	47.0	74.0	-27.0	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is 20dBc of the fundamental emission level (93.8dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Product	DOLPHINE CT40	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	58%
Test Site	AC1	Test Date	2018/06/08
Test Mode:	BLE	Test Channel:	19
Remark:	1. Average measurement was not performed if peak level lower than average limit. So the margin was calculated using the average limit for emissions fall within the restricted bands. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	3898.5	37.1	3.1	40.2	74.0	-33.8	Peak	Horizontal
	4876.0	38.0	6.0	44.0	74.0	-30.0	Peak	Horizontal
*	6015.0	35.6	7.9	43.5	74.0	-30.5	Peak	Horizontal
*	7052.0	35.6	11.8	47.4	74.0	-26.6	Peak	Horizontal
	4051.5	37.4	3.5	40.9	74.0	-33.1	Peak	Vertical
	4774.0	35.1	5.7	40.8	74.0	-33.2	Peak	Vertical
*	5734.5	34.5	7.4	41.9	74.0	-32.1	Peak	Vertical
*	6737.5	35.4	10.1	45.5	74.0	-28.5	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is 20dBc of the fundamental emission level (92.6dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Product	DOLPHINE CT40	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	58%
Test Site	AC1	Test Date	2018/06/08
Test Mode:	BLE	Test Channel:	39
Remark:	<ol style="list-style-type: none"> <li>1. Average measurement was not performed if peak level lower than average limit. So the margin was calculated using the average limit for emissions fall within the restricted bands.</li> <li>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.</li> </ol>		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	3890.0	37.7	3.0	40.7	74.0	-33.3	Peak	Horizontal
	4961.0	38.1	6.1	44.2	74.0	-29.8	Peak	Horizontal
*	5819.5	36.0	7.6	43.6	74.0	-30.4	Peak	Horizontal
*	7120.0	35.6	12.2	47.8	74.0	-26.2	Peak	Horizontal
	3907.0	36.8	3.1	39.9	74.0	-34.1	Peak	Vertical
	4791.0	36.1	5.8	41.9	74.0	-32.1	Peak	Vertical
*	6049.0	35.4	7.9	43.3	74.0	-30.7	Peak	Vertical
*	6865.0	36.2	10.6	46.8	74.0	-27.2	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is 20dBc of the fundamental emission level (91.5dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Product	DOLPHINE CT40	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	58%
Test Site	AC1	Test Date	2018/06/08
Test Mode:	BLE (2M)	Test Channel:	00
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4026.0	38.3	3.4	41.7	74.0	-32.3	Peak	Horizontal
	4799.5	37.7	5.8	43.5	74.0	-30.5	Peak	Horizontal
*	5947.0	35.9	7.8	43.7	74.0	-30.3	Peak	Horizontal
*	6567.5	36.2	10.2	46.4	74.0	-27.6	Peak	Horizontal
	4017.5	37.2	3.4	40.6	74.0	-33.4	Peak	Vertical
	4910.0	36.7	6.1	42.8	74.0	-31.2	Peak	Vertical
*	5972.5	36.5	7.9	44.4	74.0	-29.6	Peak	Vertical
*	6559.0	35.4	10.2	45.6	74.0	-28.4	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is 20dBc of the fundamental emission level (93.8dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

Product	DOLPHINE CT40	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	58%
Test Site	AC1	Test Date	2018/06/08
Test Mode:	BLE (2M)	Test Channel:	19
Remark:	<ol style="list-style-type: none"> <li>1. Average measurement was not performed if peak level lower than average limit. So the margin was calculated using the average limit for emissions fall within the restricted bands.</li> <li>2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.</li> </ol>		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4017.5	37.3	3.4	40.7	74.0	-33.3	Peak	Horizontal
	4816.5	37.2	5.9	43.1	74.0	-30.9	Peak	Horizontal
*	5743.0	36.3	7.4	43.7	74.0	-30.3	Peak	Horizontal
*	6508.0	35.9	9.9	45.8	74.0	-28.2	Peak	Horizontal
	4060.0	36.8	3.5	40.3	74.0	-33.7	Peak	Vertical
	4723.0	36.1	5.6	41.7	74.0	-32.3	Peak	Vertical
*	6032.0	35.7	7.9	43.6	74.0	-30.4	Peak	Vertical
*	6839.5	36.0	10.5	46.5	74.0	-27.5	Peak	Vertical

Note 1: "\*" is not in restricted band, its limit is 20dBc of the fundamental emission level (92.5dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)



Product	DOLPHINE CT40	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	58%
Test Site	AC1	Test Date	2018/06/08
Test Mode:	BLE (2M)	Test Channel:	39
Remark:	1. Average measurement was not performed if peak level lower than average limit. So the margin was calculated using the average limit for emissions fall within the restricted bands. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4060.0	37.5	3.5	41.0	74.0	-33.0	Peak	Horizontal
	4961.0	38.6	6.1	44.7	74.0	-29.3	Peak	Horizontal
*	6270.0	36.0	8.6	44.6	74.0	-29.4	Peak	Horizontal
*	7026.5	34.9	11.5	46.4	74.0	-27.6	Peak	Horizontal
	4034.5	37.4	3.4	40.8	74.0	-33.2	Peak	Vertical
	4655.0	36.1	5.3	41.4	74.0	-32.6	Peak	Vertical
*	5955.5	35.9	7.9	43.8	74.0	-30.2	Peak	Vertical
*	6465.5	35.1	9.8	44.9	74.0	-29.1	Peak	Vertical

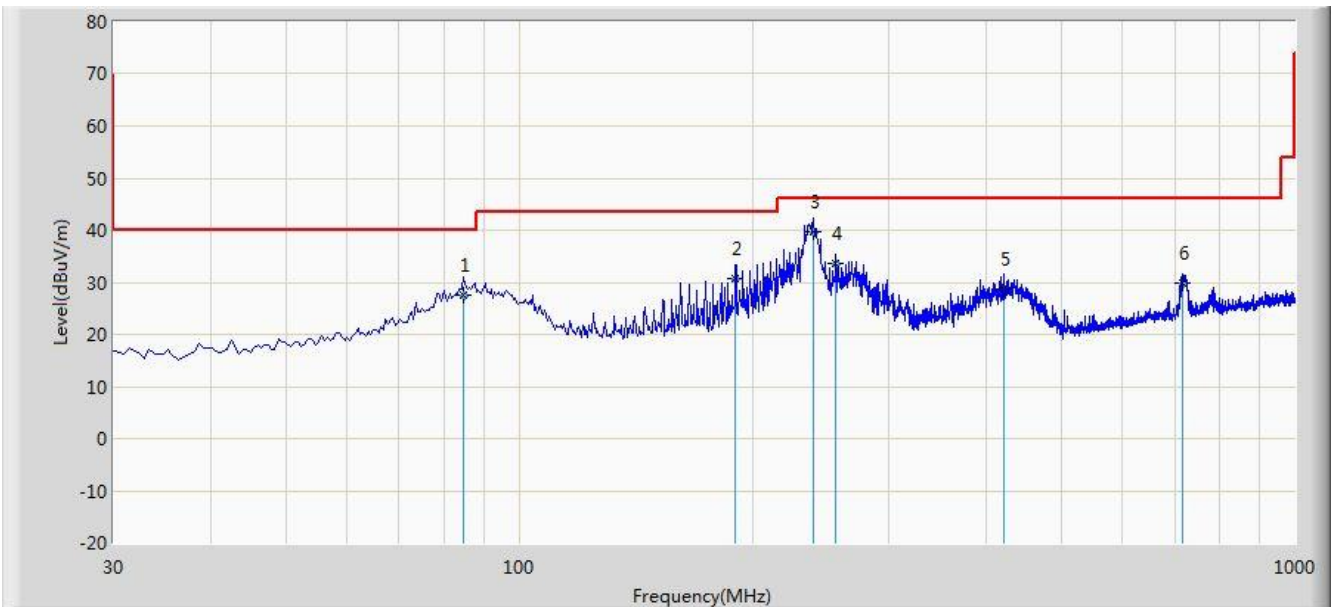
Note 1: "\*" is not in restricted band, its limit is 20dBc of the fundamental emission level (91.3dBμV/m) or 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB)

**The Worst Case of Radiated Emission below 1GHz:**

Site: AC1	Time: 2018/04/20 - 14:26
Limit: FCC_Part15.209_RE(3m)	Engineer: Alex Ma
Probe: VULB 9168 _20-2000MHz	Polarity: Horizontal
EUT: DOLPHINE CT40	Power: By Battery
<b>Worst Case Mode:</b> Transmit by BLE at Channel 2440MHz	



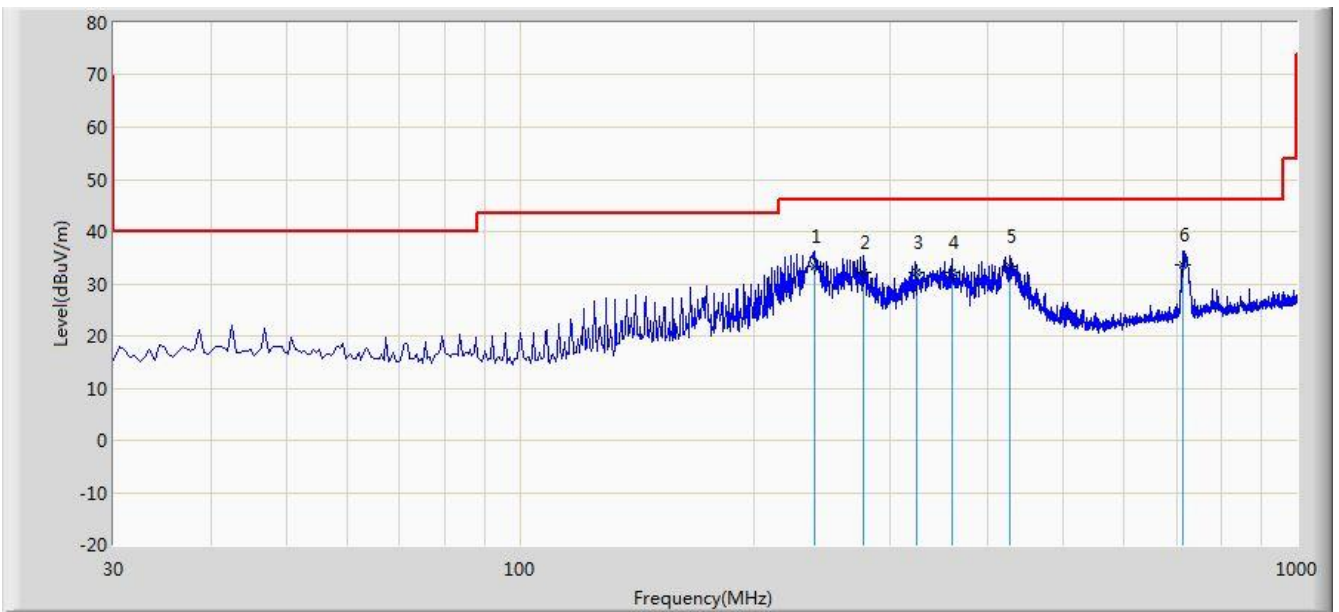
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			84.820	27.643	17.430	-12.357	40.000	10.213	QP
2			190.060	30.760	19.020	-12.740	43.500	11.741	QP
3		*	240.000	39.597	26.730	-6.403	46.000	12.868	QP
4			256.090	33.612	20.450	-12.388	46.000	13.161	QP
5			420.980	28.631	11.460	-17.369	46.000	17.171	QP
6			718.250	29.814	7.450	-16.186	46.000	22.364	QP

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

Site: AC1	Time: 2018/04/20 - 14:27
Limit: FCC_Part15.209_RE(3m)	Engineer: Alex Ma
Probe: VULB 9168 _20-2000MHz	Polarity: Vertical
EUT: DOLPHINE CT40	Power: By Battery
<b>Worst Case Mode:</b> Transmit by BLE at Channel 2440MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			240.000	33.377	20.510	-12.623	46.000	12.868	QP
2			276.400	32.101	18.300	-13.899	46.000	13.801	QP
3			323.500	32.118	17.070	-13.882	46.000	15.048	QP
4			360.300	32.265	16.490	-13.735	46.000	15.775	QP
5			427.200	33.377	16.040	-12.623	46.000	17.337	QP
6		*	714.850	33.658	11.350	-12.342	46.000	22.308	QP

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

## 7.7. Radiated Restricted Band Edge Measurement

### 7.7.1. Test Limit

#### For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 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	8.25 - 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 - 156.525	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	( <sup>2</sup> )
13.36 - 13.41	--	--	--

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR must not exceed the limits shown in Table per Section 15.209.

<b>FCC Part 15 Subpart C Paragraph 15.209</b>		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

**For RSS-Gen Section 8.10 requirement:**

Radiated emissions which fall in the restricted bands, as defined in Section 8.10 of RSS-Gen, must also comply with the radiated emission limits specified in Section 8.9.

Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.009 - 0.110	240 - 285	9.0 - 9.2
2.1735 - 2.1905	322 - 335.4	9.3 - 9.5
3.020 - 3.026	399.9 - 410	10.6 - 12.7
4.125 - 4.128	608 - 614	13.25 - 13.4
4.17725 - 4.17775	960 - 1427	14.47 - 14.5
4.20725 - 4.20775	1435 - 1626.5	15.35 - 16.2
5.677 - 5.683	1645.5 - 1646.5	17.7 - 21.4
6.215 - 6.218	1660 - 1710	22.01 - 23.12
6.26775 - 6.26825	1718.8 - 1722.2	23.6 - 24.0
6.31175 - 6.31225	2200 - 2300	31.2 - 31.8
8.291 - 8.294	2310 - 2390	36.43 - 36.5
8.362 - 8.366	2655 - 2900	Above 38.6
8.37625 - 8.38675	3260 - 3267	--
8.41425 - 8.41475	3332 - 3339	
12.29 - 12.293	334.5 - 3358	
12.51975 - 12.52025	3500 - 4400	
12.57675 - 12.57725	4500 - 5150	
13.36 - 13.41	5350 - 5460	
16.42 - 16.423	7250 - 7750	
16.69475 - 16.69525	8025 - 8500	
16.80425 - 16.80475	--	
25.5 - 25.67		
37.5 - 38.25		
73 - 74.6		
74.8 - 75.2		
108 - 138		
156.52475 - 156.525225		
156.7 - 156.9		

All out of band emissions appearing in a restricted band as specified in Section 8.10 of the RSS-Gen must not exceed the limits shown in Table per Section 8.9.

RSS-Gen Section 8.9		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

### 7.7.2. Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

### 7.7.3. Test Setting

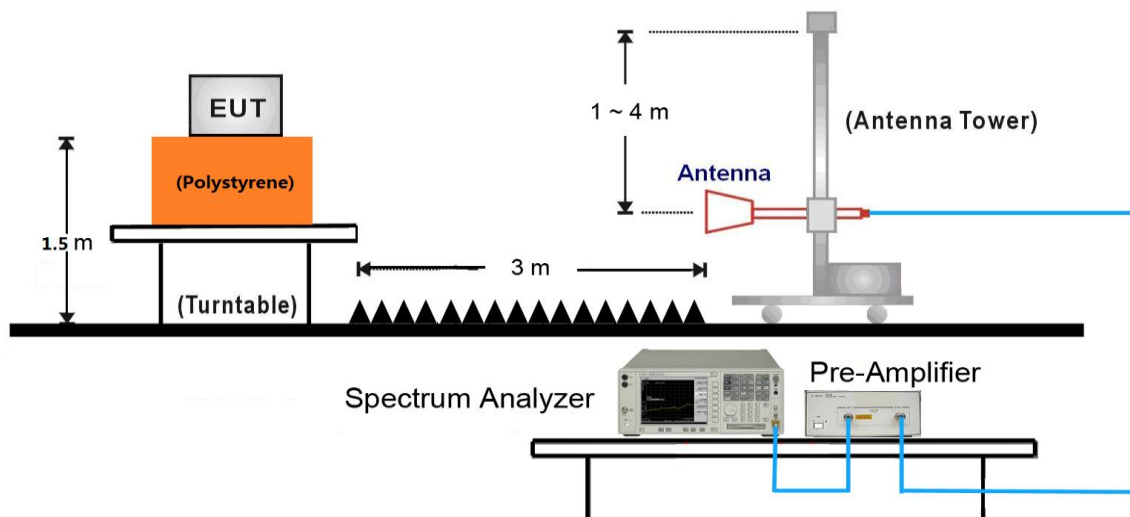
#### Peak Field Strength Measurements

8. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
9. RBW = 1MHz
10. VBW = 3MHz
11. Detector = peak
12. Sweep time = auto couple
13. Trace mode = max hold
14. Trace was allowed to stabilize

### Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW  $\geq 1/T$
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

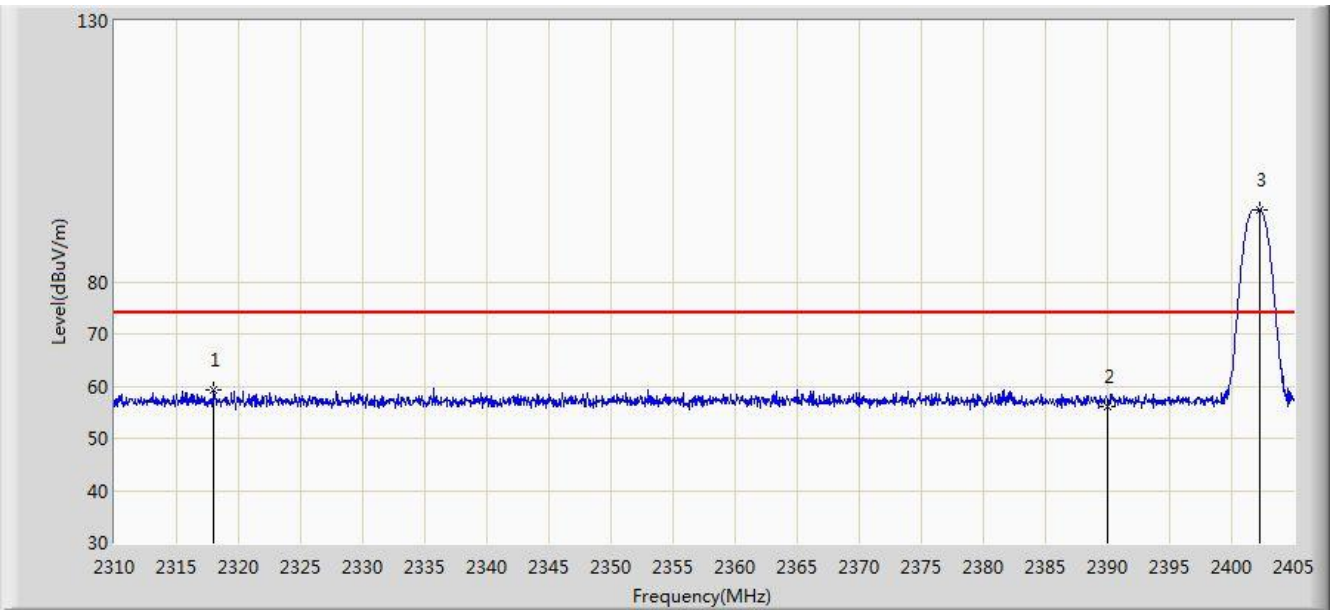
#### 7.7.4. Test Setup





### 7.7.5. Test Result

Site: AC1	Time: 2018/06/08 - 05:17
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(1Mbps) at Channel 2402MHz	

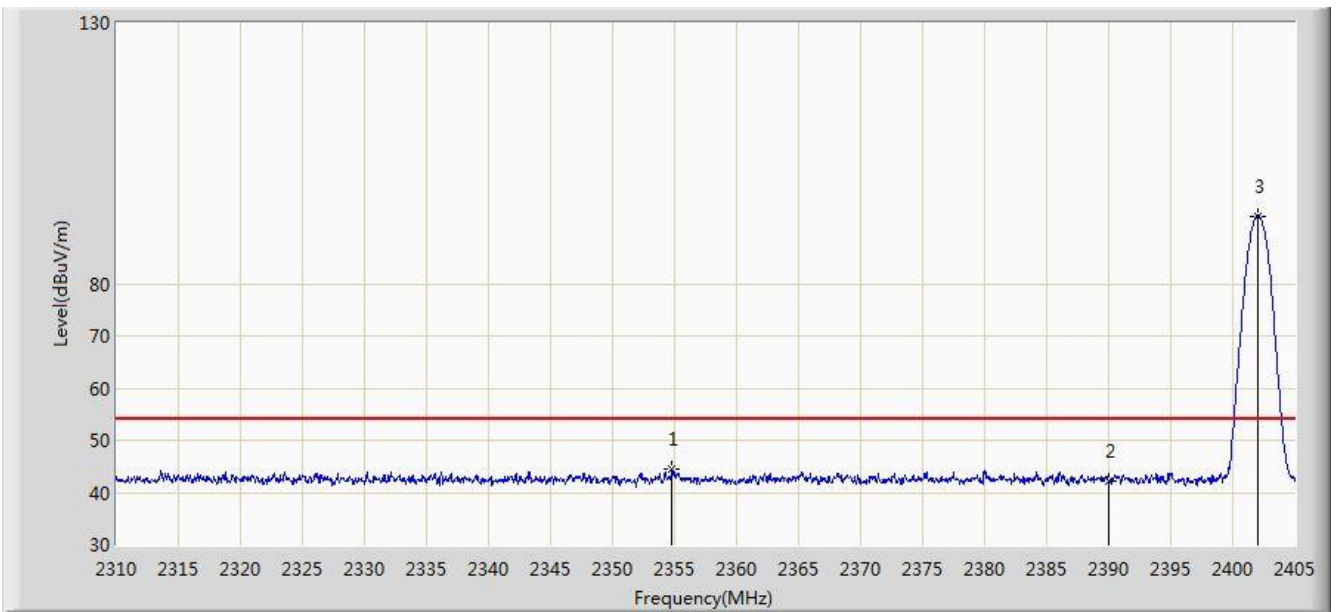


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2318.028	59.356	26.833	-14.644	74.000	32.523	PK
2			2390.000	56.037	23.710	-17.963	74.000	32.327	PK
3			2402.292	93.799	61.495	N/A	N/A	32.304	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC1	Time: 2018/06/08 - 05:20
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(1Mbps) at Channel 2402MHz	

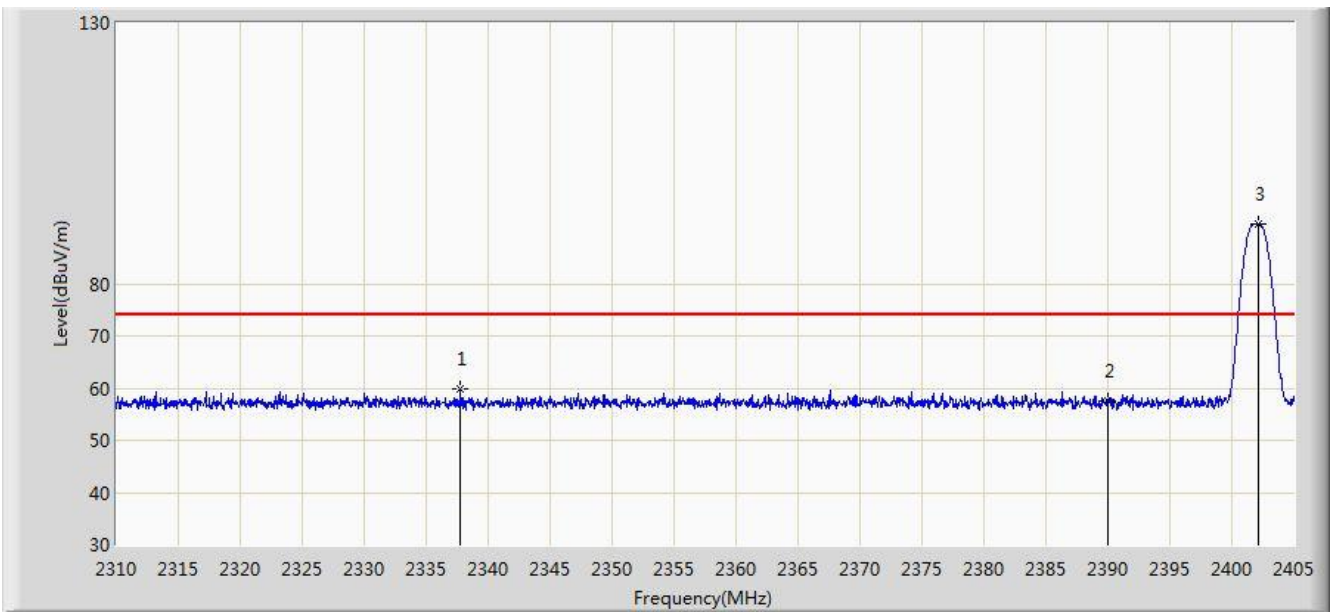


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2354.792	44.370	11.983	-9.630	54.000	32.387	AV
2			2390.000	42.045	9.718	-11.955	54.000	32.327	AV
3			2402.008	93.037	60.733	N/A	N/A	32.305	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC1	Time: 2018/06/08 - 05:22
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(1Mbps) at Channel 2402MHz	

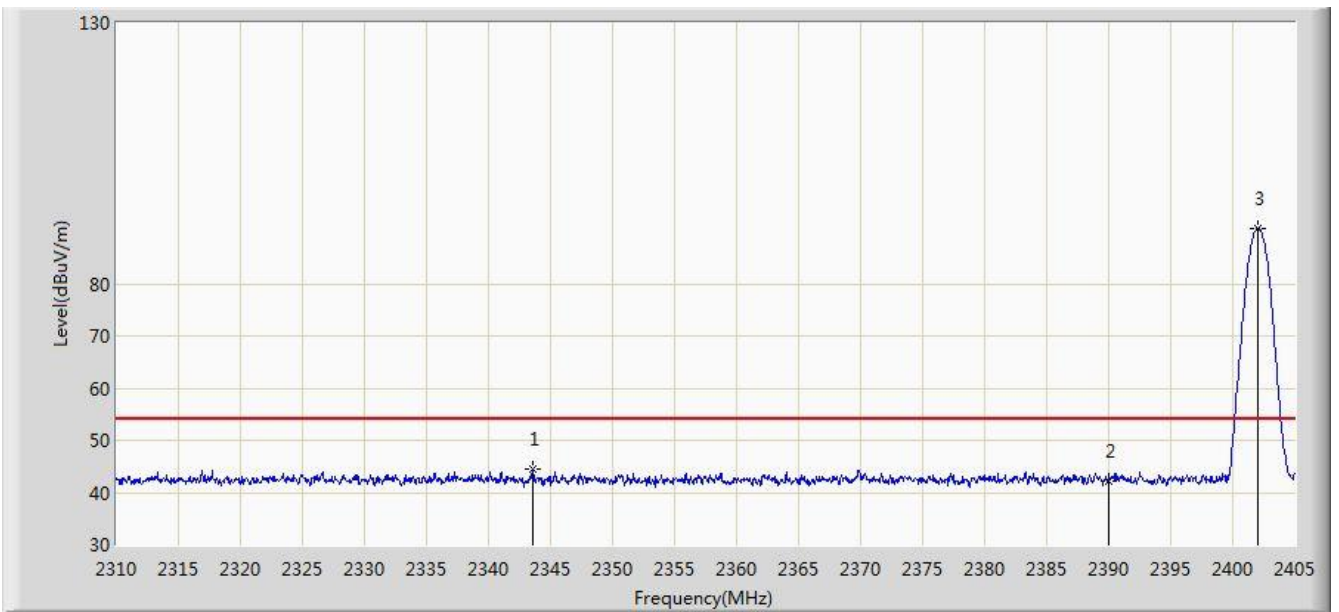


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2337.788	59.865	27.425	-14.135	74.000	32.440	PK
2			2390.000	57.509	25.182	-16.491	74.000	32.327	PK
3			2402.198	91.443	59.139	N/A	N/A	32.304	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC1	Time: 2018/06/08 - 05:25
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(1Mbps) at Channel 2402MHz	

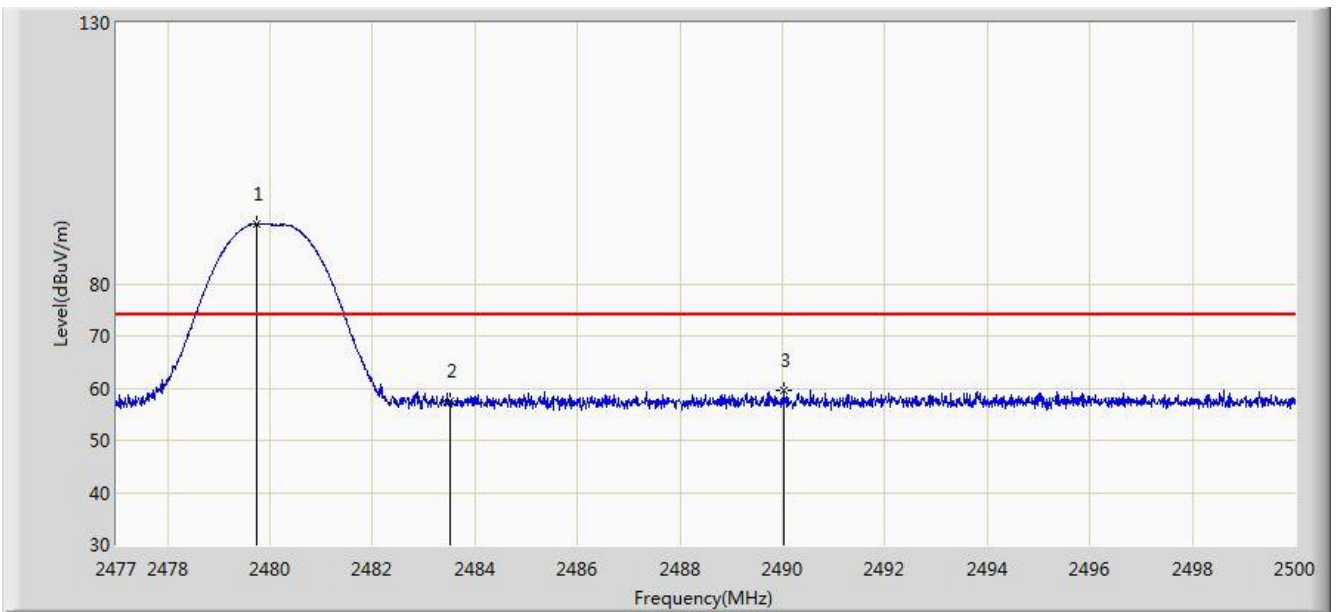


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2343.583	44.620	12.202	-9.380	54.000	32.418	AV
2			2390.000	42.295	9.968	-11.705	54.000	32.327	AV
3			2402.055	90.690	58.386	N/A	N/A	32.304	AV

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC1	Time: 2018/06/08 - 05:27
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(1Mbps) at Channel 2480MHz	

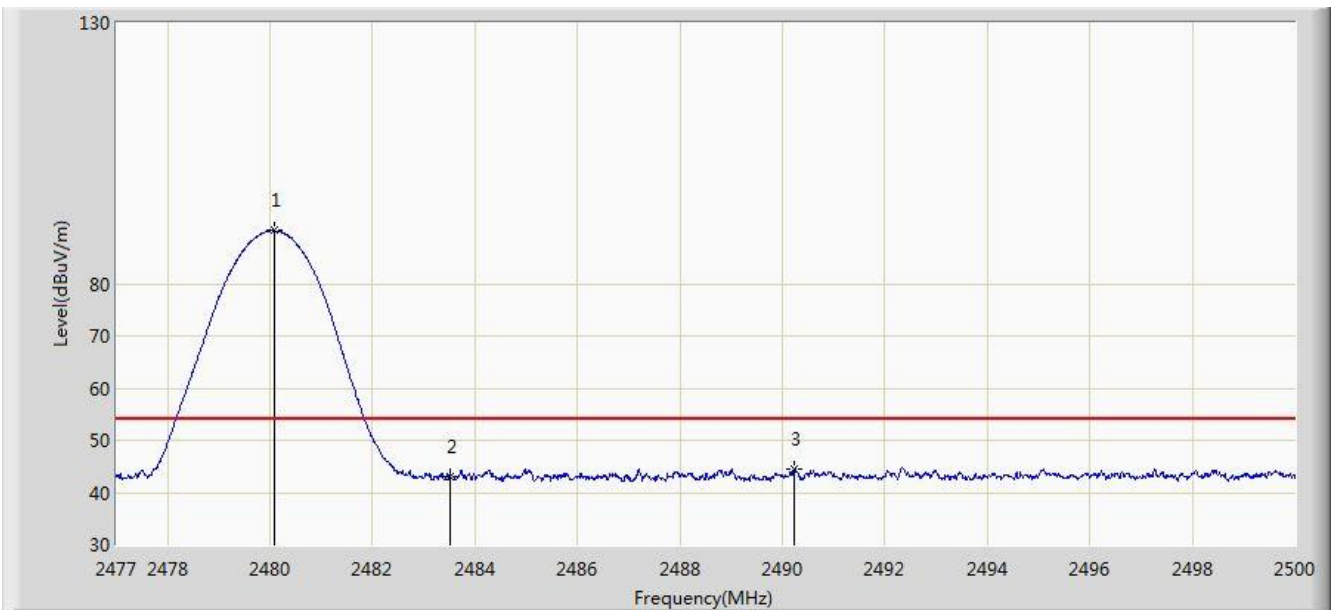


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2479.749	91.509	59.185	N/A	N/A	32.325	PK
2			2483.500	57.676	25.337	-16.324	74.000	32.340	PK
3			2490.018	59.635	27.270	-14.365	74.000	32.364	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC1	Time: 2018/06/08 - 05:30
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(1Mbps) at Channel 2480MHz	

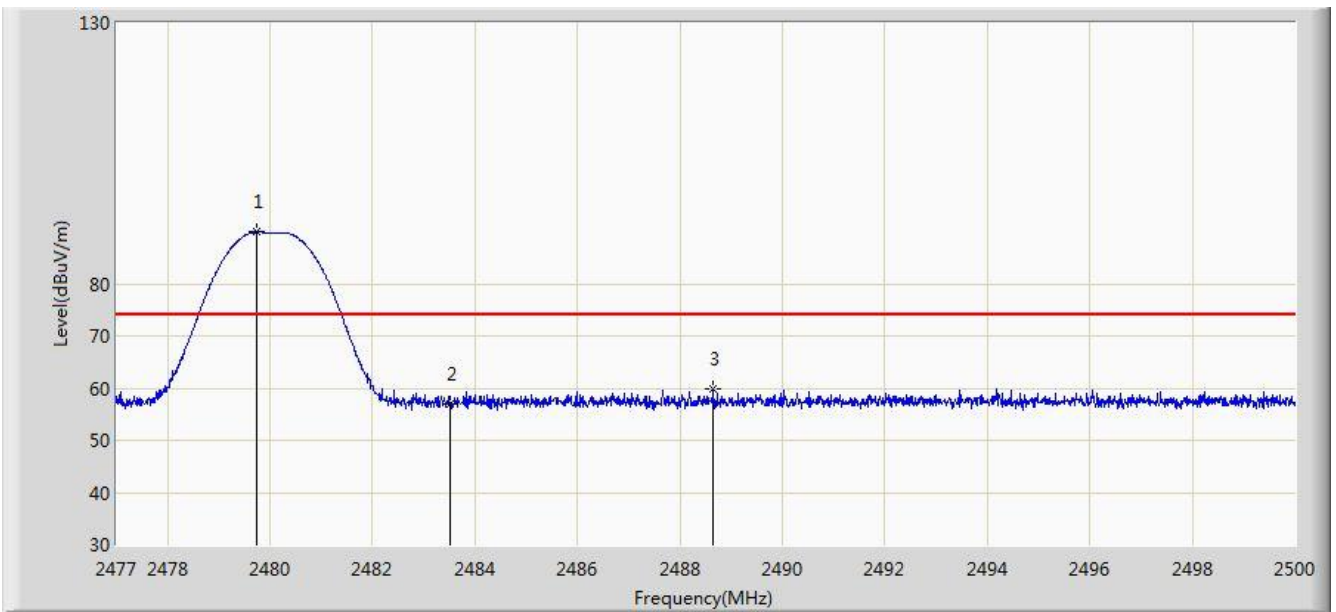


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2480.071	90.177	57.851	N/A	N/A	32.325	AV
2			2483.500	43.105	10.766	-10.895	54.000	32.340	AV
3			2490.237	44.466	12.100	-9.534	54.000	32.366	AV

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC1	Time: 2018/06/08 - 05:31
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(1Mbps) at Channel 2480MHz	

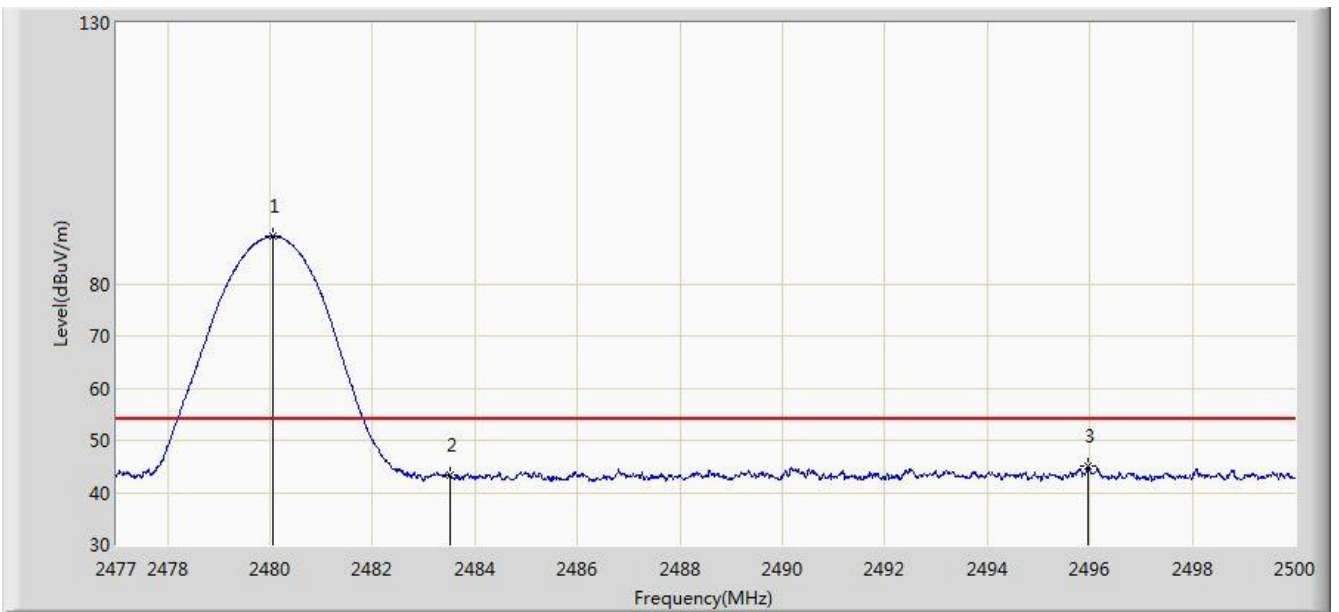


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2479.749	89.956	57.632	N/A	N/A	32.325	PK
2			2483.500	56.833	24.494	-17.167	74.000	32.340	PK
3			2488.649	59.743	27.384	-14.257	74.000	32.359	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC1	Time: 2018/06/08 - 05:33
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(1Mbps) at Channel 2480MHz	



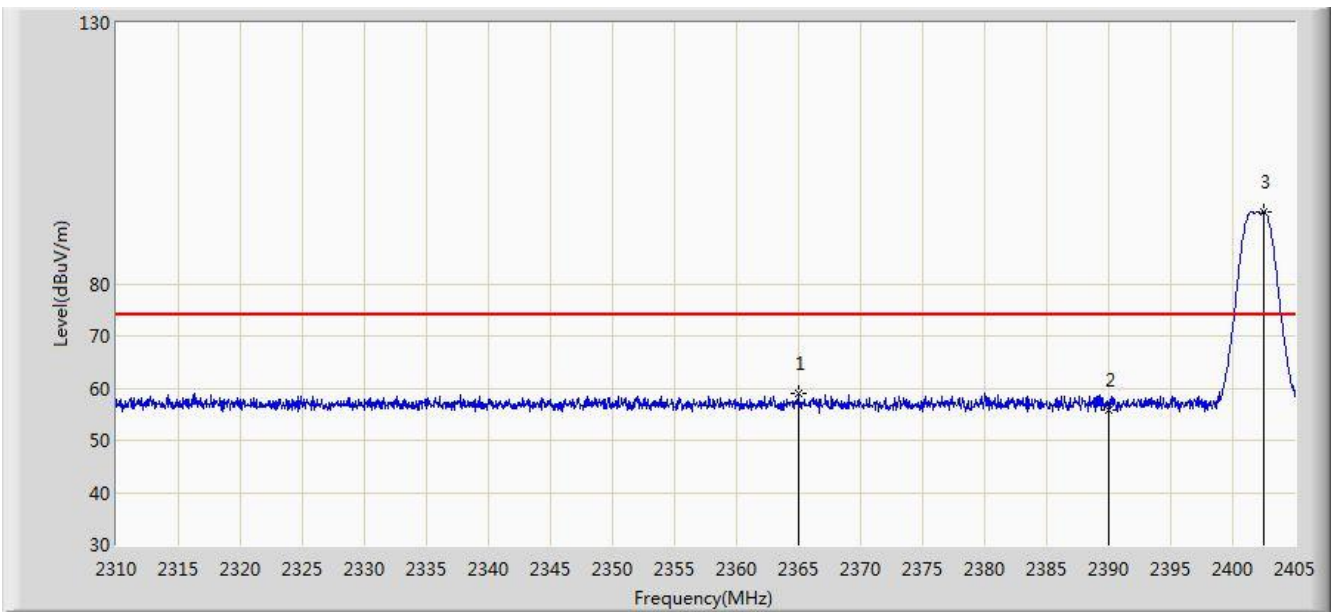
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2480.059	89.046	56.720	N/A	N/A	32.325	AV
2			2483.500	43.313	10.974	-10.687	54.000	32.340	AV
3			2495.963	45.060	12.672	-8.940	54.000	32.388	AV

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)



Site: AC1	Time: 2018/06/08 - 05:34
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(2Mbps) at Channel 2402MHz	

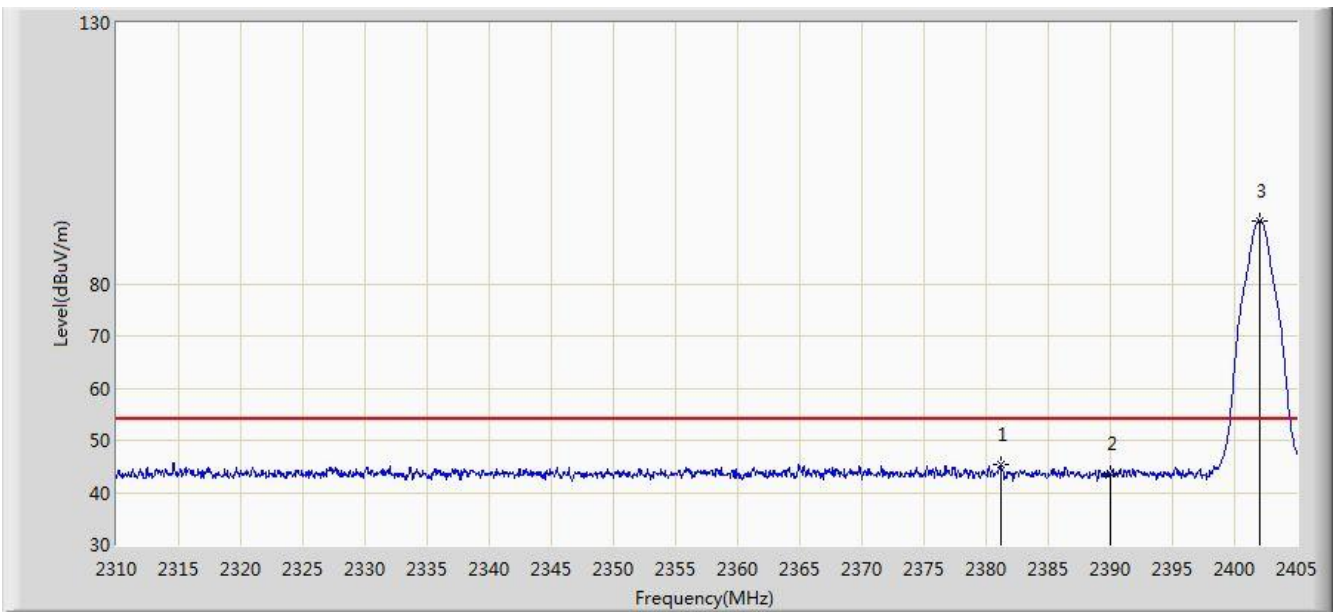


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2364.958	58.956	26.589	-15.044	74.000	32.367	PK
2			2390.000	55.787	23.460	-18.213	74.000	32.327	PK
3			2402.530	93.842	61.539	N/A	N/A	32.303	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC1	Time: 2018/06/08 - 05:40
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(2Mbps) at Channel 2402MHz	

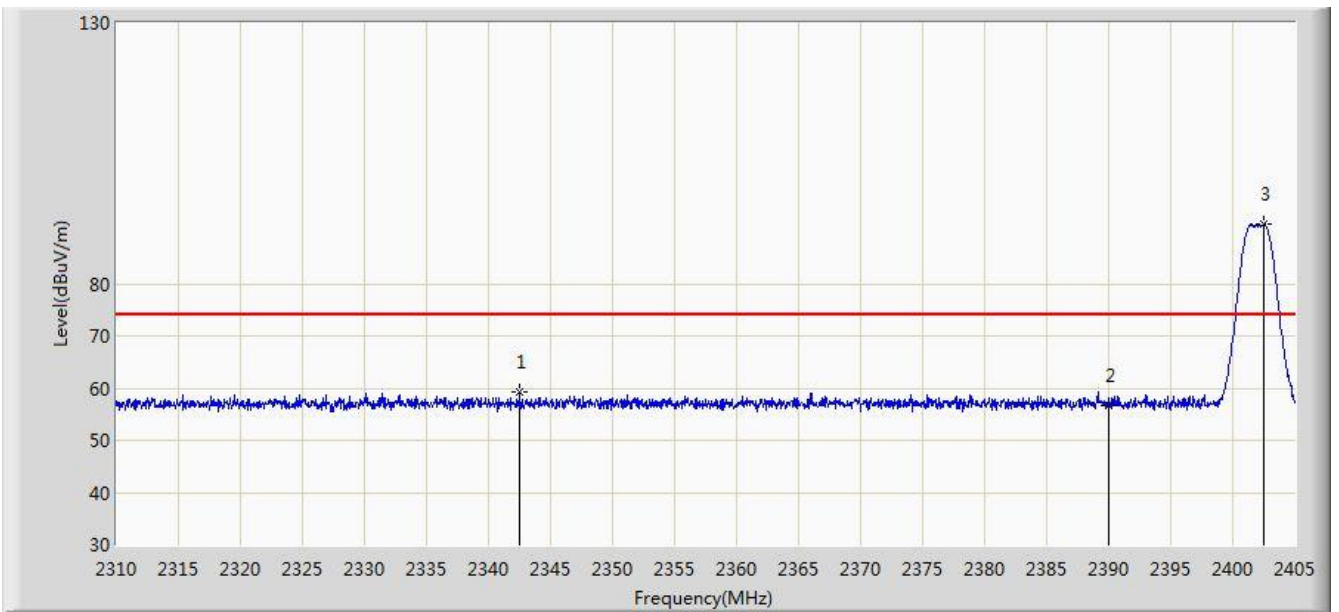


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2381.155	45.272	12.933	-8.728	54.000	32.339	AV
2			2390.000	43.714	11.387	-10.286	54.000	32.327	AV
3			2402.055	92.057	59.753	N/A	N/A	32.304	AV

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC1	Time: 2018/06/08 - 05:41
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(2Mbps) at Channel 2402MHz	

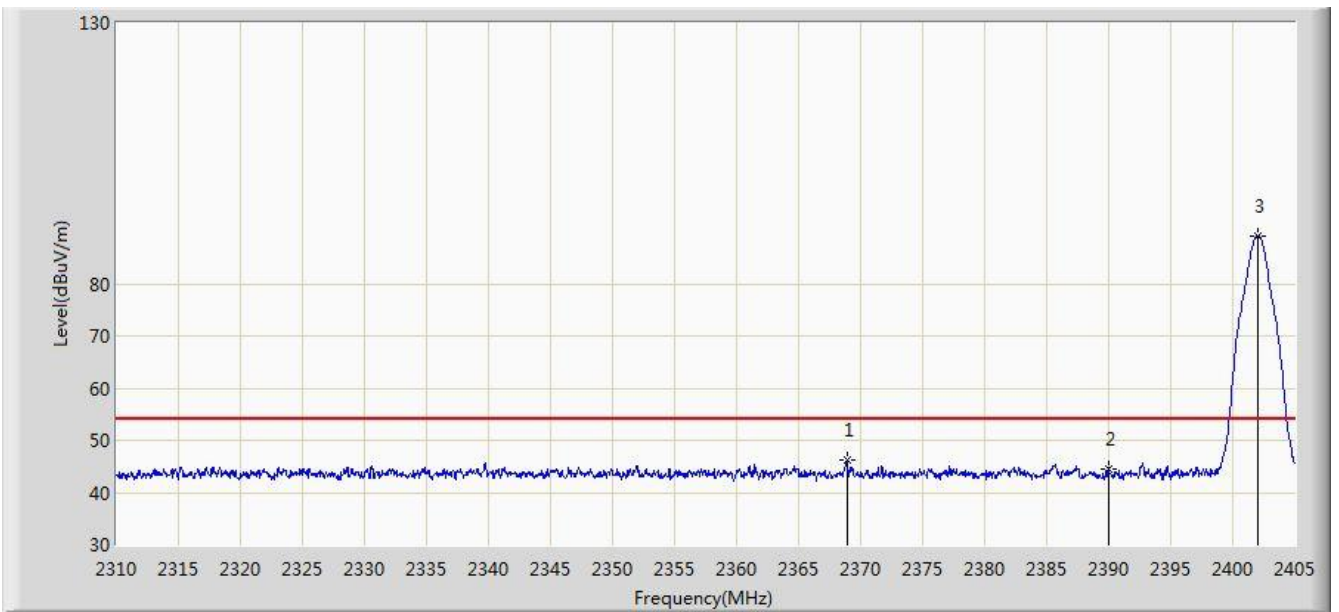


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2342.490	59.190	26.768	-14.810	74.000	32.422	PK
2			2390.000	56.665	24.338	-17.335	74.000	32.327	PK
3			2402.530	91.351	59.048	N/A	N/A	32.303	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC1	Time: 2018/06/08 - 05:43
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(2Mbps) at Channel 2402MHz	

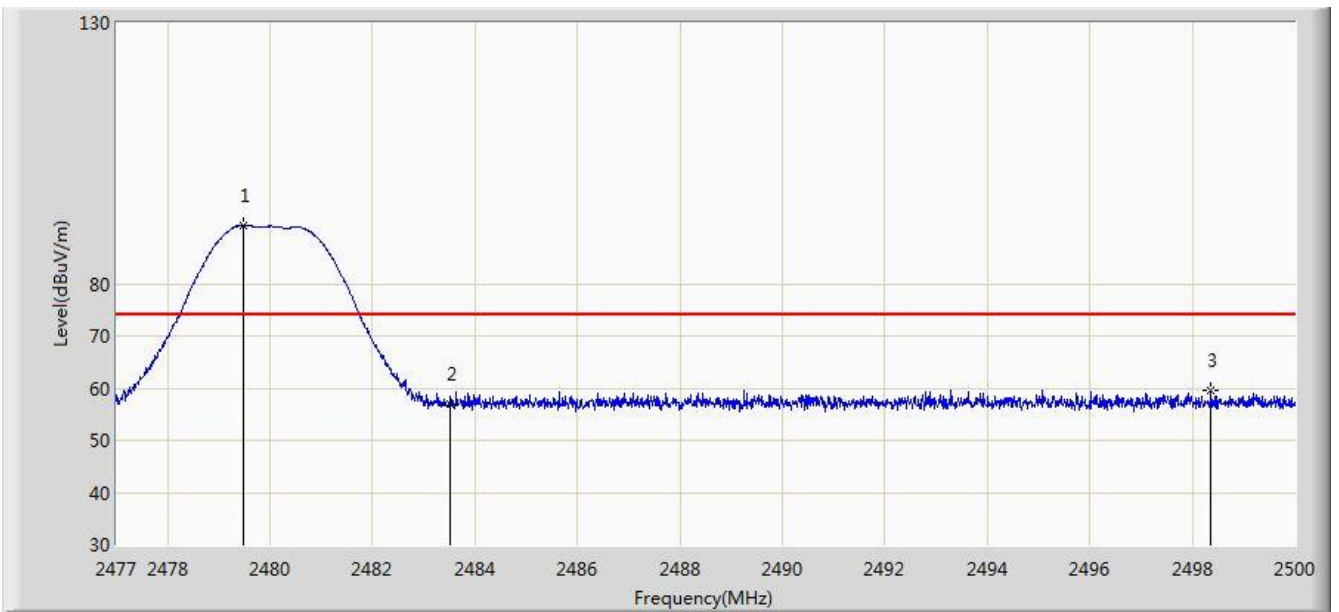


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2368.900	46.129	13.769	-7.871	54.000	32.360	AV
2			2390.000	44.470	12.143	-9.530	54.000	32.327	AV
3			2402.008	89.190	56.886	N/A	N/A	32.305	AV

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC1	Time: 2018/06/08 - 05:44
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(2Mbps) at Channel 2480MHz	

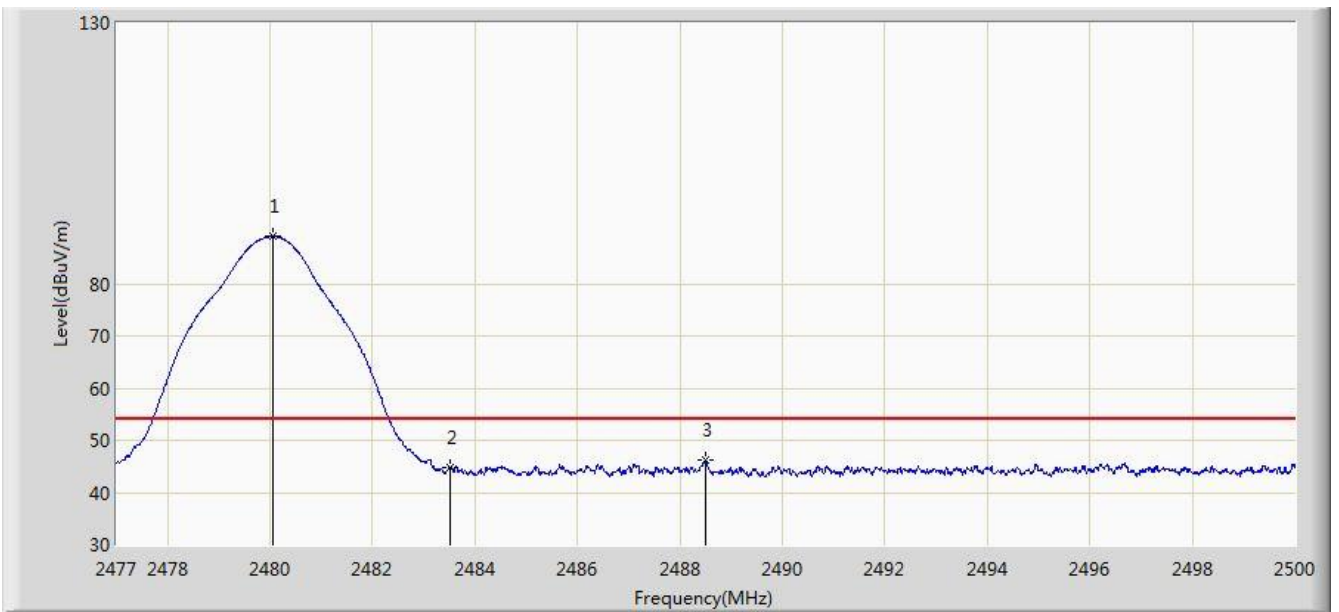


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2479.484	91.267	58.944	N/A	N/A	32.323	PK
2			2483.500	56.813	24.474	-17.187	74.000	32.340	PK
3			2498.355	59.699	27.307	-14.301	74.000	32.392	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC1	Time: 2018/06/08 - 05:47
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(2Mbps) at Channel 2480MHz	

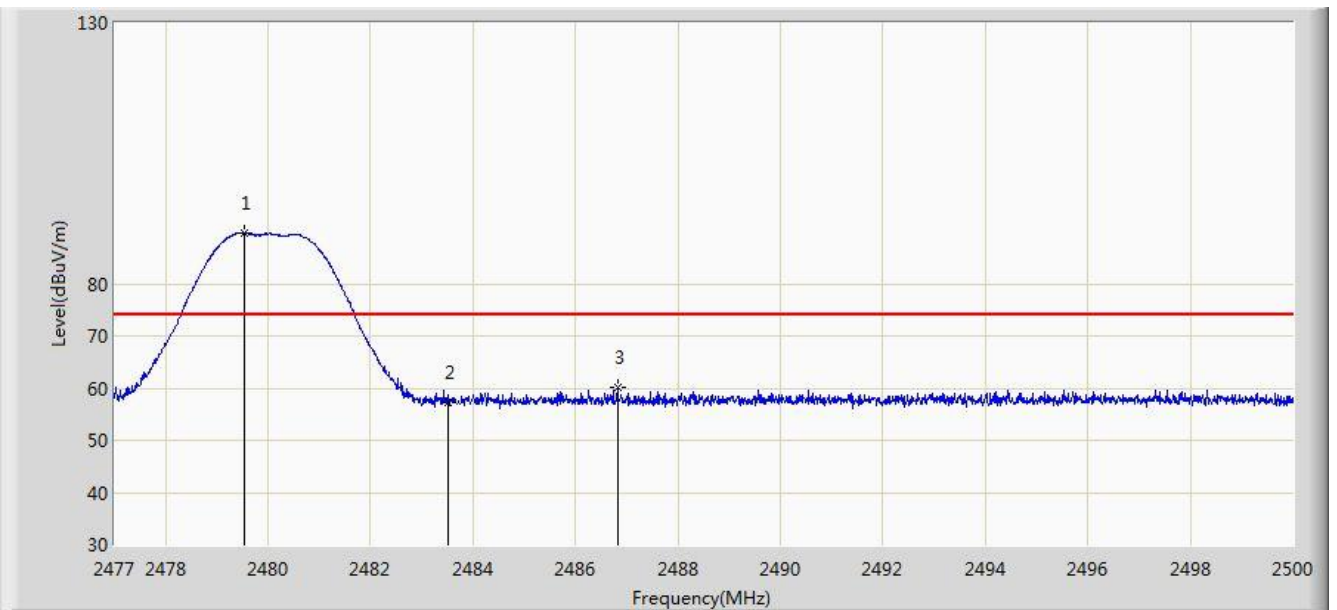


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2480.048	89.056	56.730	N/A	N/A	32.325	AV
2			2483.500	44.653	12.314	-9.347	54.000	32.340	AV
3			2488.500	46.337	13.978	-7.663	54.000	32.359	AV

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC1	Time: 2018/06/08 - 05:48
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(2Mbps) at Channel 2480MHz	

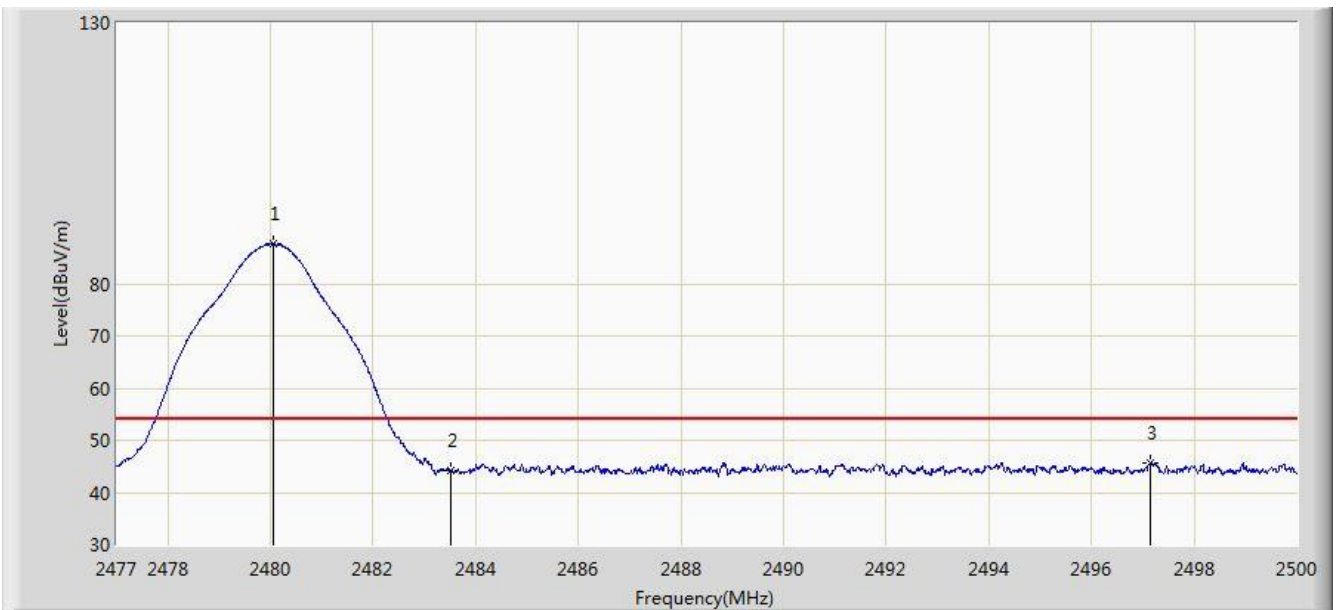


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2479.542	89.822	57.498	N/A	N/A	32.323	PK
2			2483.500	57.375	25.036	-16.625	74.000	32.340	PK
3			2486.821	60.041	27.689	-13.959	74.000	32.353	PK

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC1	Time: 2018/06/08 - 05:52
Limit: FCC_Part15.209_RE(3m)	Engineer: Hunk Li
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: DOLPHINE CT40	Power: By Battery
Test Mode: Transmit by BLE(2Mbps) at Channel 2480MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2480.048	87.567	55.241	N/A	N/A	32.325	AV
2			2483.500	44.274	11.935	-9.726	54.000	32.340	AV
3			2497.159	45.715	13.325	-8.285	54.000	32.390	AV

Note: Measure Level (dB $\mu$ V/m) = Reading Level (dB $\mu$ V) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)



## 7.8. AC Conducted Emissions Measurement

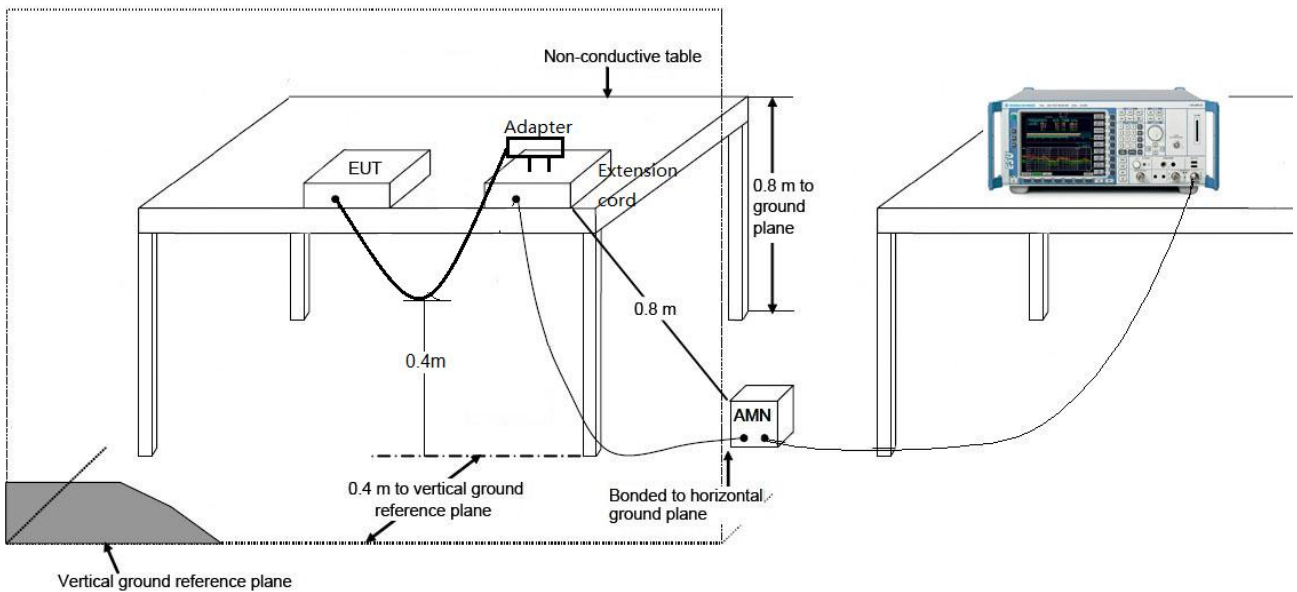
### 7.8.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

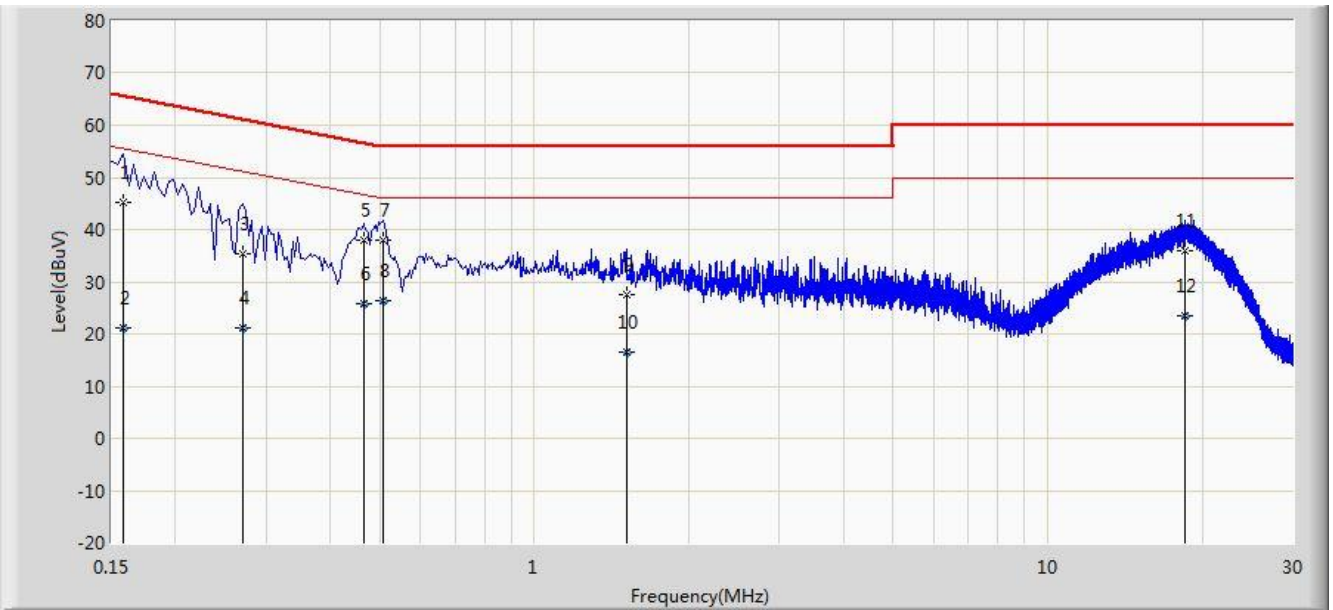
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

### 7.8.2. Test Setup



### 7.8.3. Test Result

Site: SR2	Time: 2018/04/27 - 13:28
Limit: FCC_Part15.207_CE_AC Power	Engineer: Bacon Dong
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: DOLPHINE CT40	Power: AC 120V/60Hz
Test Mode: Mode 1	

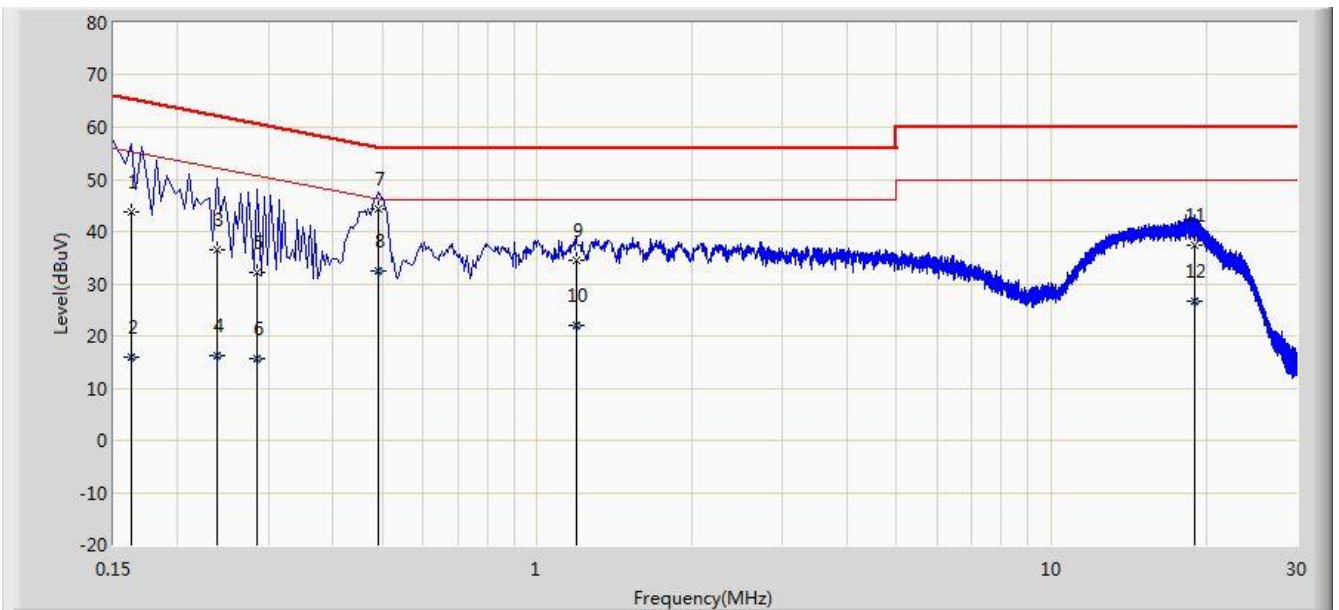


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.158	45.274	34.963	-20.294	65.568	10.311	QP
2			0.158	21.251	10.940	-34.318	55.568	10.311	AV
3			0.270	35.220	25.240	-25.898	61.118	9.980	QP
4			0.270	21.082	11.102	-30.036	51.118	9.980	AV
5			0.466	37.972	27.833	-18.613	56.585	10.139	QP
6			0.466	25.669	15.530	-20.916	46.585	10.139	AV
7		*	0.506	37.960	27.803	-18.040	56.000	10.157	QP
8			0.506	26.243	16.086	-19.757	46.000	10.157	AV
9			1.514	27.455	17.567	-28.545	56.000	9.888	QP
10			1.514	16.540	6.653	-29.460	46.000	9.888	AV
11			18.454	36.048	25.947	-23.952	60.000	10.101	QP
12			18.454	23.413	13.312	-26.587	50.000	10.101	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

Site: SR2	Time: 2018/04/27 - 13:33
Limit: FCC_Part15.207_CE_AC Power	Engineer: Bacon Dong
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: DOLPHINE CT40	Power: AC 120V/60Hz
Test Mode: Mode 1	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.162	43.688	33.609	-21.673	65.361	10.078	QP
2			0.162	15.871	5.793	-39.490	55.361	10.078	AV
3			0.238	36.651	26.659	-25.515	62.166	9.992	QP
4			0.238	16.239	6.247	-35.927	52.166	9.992	AV
5			0.286	32.034	22.006	-28.606	60.640	10.027	QP
6			0.286	15.744	5.716	-34.896	50.640	10.027	AV
7		*	0.490	44.344	34.165	-11.824	56.168	10.179	QP
8			0.490	32.492	22.313	-13.676	46.168	10.179	AV
9			1.190	34.477	24.574	-21.523	56.000	9.903	QP
10			1.190	21.895	11.992	-24.105	46.000	9.903	AV
11			18.978	37.434	27.287	-22.566	60.000	10.147	QP
12			18.978	26.777	16.630	-23.223	50.000	10.147	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

## 8. CONCLUSION

The data collected relate only the item(s) tested and show that the **DOLPHINE CT40** is in compliance with Part 15C of the FCC rules and RSS rules.

————— The End —————