

FCC PART 15C TEST REPORT FOR CERTIFICATION

On Behalf of

ELECOM CO., LTD.

ELECOM TrackBall Mouse

Model No.: M-XPT1MR; M-XPT1MRX

FCC ID: YWO-M-XPT1MR

Prepared for : ELECOM CO., LTD.

Fushimimachi 4-1-1, Chuo-ku, Osaka, Japan 541-8765

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Report Number : ACS-F18105

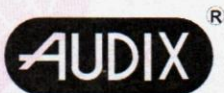
Date of Test : Apr.09~10, 2018

Date of Report : May.08, 2018

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FCC ID: YWO-M-XPT1MR

## TEST REPORT CERTIFICATION

Applicant : ELECOM CO., LTD.  
Product : ELECOM TrackBall Mouse  
FCC ID : YWO-M-XPT1MR  
(A) Model No. : M-XPT1MR; M-XPT1MRX  
(B) Serial No. : N/A  
(C) Power Supply : DC 1.5V  
(D) Test Voltage : DC 1.5V

Tested for comply with:  
FCC CFR 47 Part 15 Subpart C

Test procedure used:  
ANSI C63.10:2013

The device described above is tested by AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. to confirm comply with all the FCC Part 15 Subpart C requirements.

The test results are contained in this test report and AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. is assumed full responsibility for the accuracy and completeness of these tests. This report contains data that are not covered by the NVLAP accreditation. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This Report is made under FCC Part 2.1075. No modifications were required during testing to bring this product into compliance.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Date of Test : Apr.09~10, 2018 Report of date: May.08, 2018

Prepared by : Monica Liu Reviewed by : Sunny Lu  
Monica Liu / Assistant Sunny Lu / Deputy Manager



Approved & Authorized Signer :

David Jin / Manager

## 1. SUMMARY OF STANDARDS AND RESULTS

### 1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION		
Description of Test Item	Standard	Results
Power Line Conducted Emission Test	FCC Part 15C: 15.207 ANSI C63.10-2013	N/A
Radiated Emission Test	FCC Part 15C: 15.209 FCC Part 15C: 15.249 ANSI C63.10-2013	PASS
Band Edge Compliance Test	FCC Part 15: 15.249 ANSI C63.10-2013	PASS
20dB Bandwidth Test	FCC Part 15: 15.215 ANSI C63.10-2013	PASS
N/A is an abbreviation for Not Applicable.		



## 2. GENERAL INFORMATION

### 2.1. Description of Device (EUT)

Product	: ELECOM TrackBall Mouse
Model No.	: M-XPT1MR; M-XPT1MRX Models different only in model names.
FCC ID	: YWO-M-XPT1MR
Radio	: BT 4.0; General 2.4GHz wireless
Operation frequency	: 2402MHz-2480MHz; 2404MHz-2477MHz
Antenna	: Internal Antenna, 2.805dBi
Modulation	: GFSK
Applicant	: ELECOM CO., LTD. Fushimimachi 4-1-1, Chuo-ku, Osaka, Japan 541-8765
Manufacturer	: ELECOM CO., LTD. Fushimimachi 4-1-1, Chuo-ku, Osaka, Japan 541-8765
Factory	: G.Tech Technology Ltd. No.8, Jinyuan 1st Road, High-tech Zone, Zhuhai City, Guangdong, China, 519085
USB Cable	: Shielded, Detachable, 1.5m
Date of Test	: Apr.09~10, 2018
Date of Receipt	: Apr.06, 2018
Sample Type	: Prototype production

## 2.2. Channel list of EUT

Channel list	Frequency
1	2404MHz
2	2425MHz
3	2442MHz
4	2463MHz
5	2477MHz

## 2.3. EUT Configuration and operation conditions for test

EUT
-----

**(EUT: ELECOM TrackBall Mouse)**

## 2.4. Test Facility

### Site Description

#### Name of Firm

Audix Technology (Shenzhen) Co., Ltd.  
No. 6, Kefeng Road, Science & Technology  
Park, Nanshan District, Shenzhen,  
Guangdong, China

#### EMC Lab.

Certificated by Industry Canada  
: Registration Number: IC 5183A-1  
Valid Date: May.07,2020

Certificated by DAkkS, Germany  
: Registration No: D-PL-12151-01-00  
Valid Date: Dec.07, 2021

Accredited by NVLAP, USA  
: NVLAP Code: 200372-0  
Valid Date: Mar.31, 2018

Certificated by FCC, USA  
: Designation No: CN5022  
Valid Date: Mar.31, 2018

## 2.5. Measurement Uncertainty (95% confidence levels, k=2)

Test Item	Uncertainty
Uncertainty for Radiation Emission test in 3m chamber	2.8 dB(30~200MHz, Polarization: H)
	2.8 dB(30~200MHz, Polarization: V)
	3.0 dB(200M~1GHz, Polarization: H)
	3.0 dB(200M~1GHz, Polarization: V)
Uncertainty for Radiation Emission test in 3m chamber (1GHz-25GHz)	5.8 dB (1~6GHz, Distance: 3m)
	5.8 dB (6~25GHz, Distance: 3m)
Uncertainty for Radiated Spurious Emission test in RF chamber	3.6 dB
Uncertainty for Conduction Spurious emission test	2.0 dB
Uncertainty for Output power test	0.8 dB
Uncertainty for Bandwidth test	83 kHz
Uncertainty for DC power test	0.1 %
Uncertainty for test site temperature and humidity	0.6℃
	3%

### **3. POWER LINE CONDUCTED EMISSION TEST**

According to Paragraph (c) of FCC Part 15 section 15.207, Tests to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.



## 4. RADIATED EMISSION TEST

### 4.1. Test Equipment

Frequency range: 9kHz~1000MHz

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3#Chamber	AUDIX	N/A	N/A	Jun.19,17	1 Year
2.	Spectrum Analyzer	Agilent	E7405A	MY45116588	Dec.19,17	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESR7	101547	Apr.22,17	1 Year
4.	Amplifier	HP	8447D	2648A04738	Apr.22,17	1 Year
5.	Bi-log Antenna	TESEQ	CBL6112D	35375	Aug.29,17	1 Year
6.	Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	493	Jun.27,17	1 Year
7.	Loop Antenna	Chase	HLA6120	1062	Oct.15,17	1 Year
8.	RF Cable	MIYAZAKI	CFD400NL-LW	No.3	Sep.02,17	1 Year
9.	Coaxial Switch	Anritsu	MP59B	6201397222	Apr.22,17	1 Year
10.	Test Software	AUDIX	e3	6.2009-5-21a(n)	N/A	N/A

Note: N/A means Not applicable.

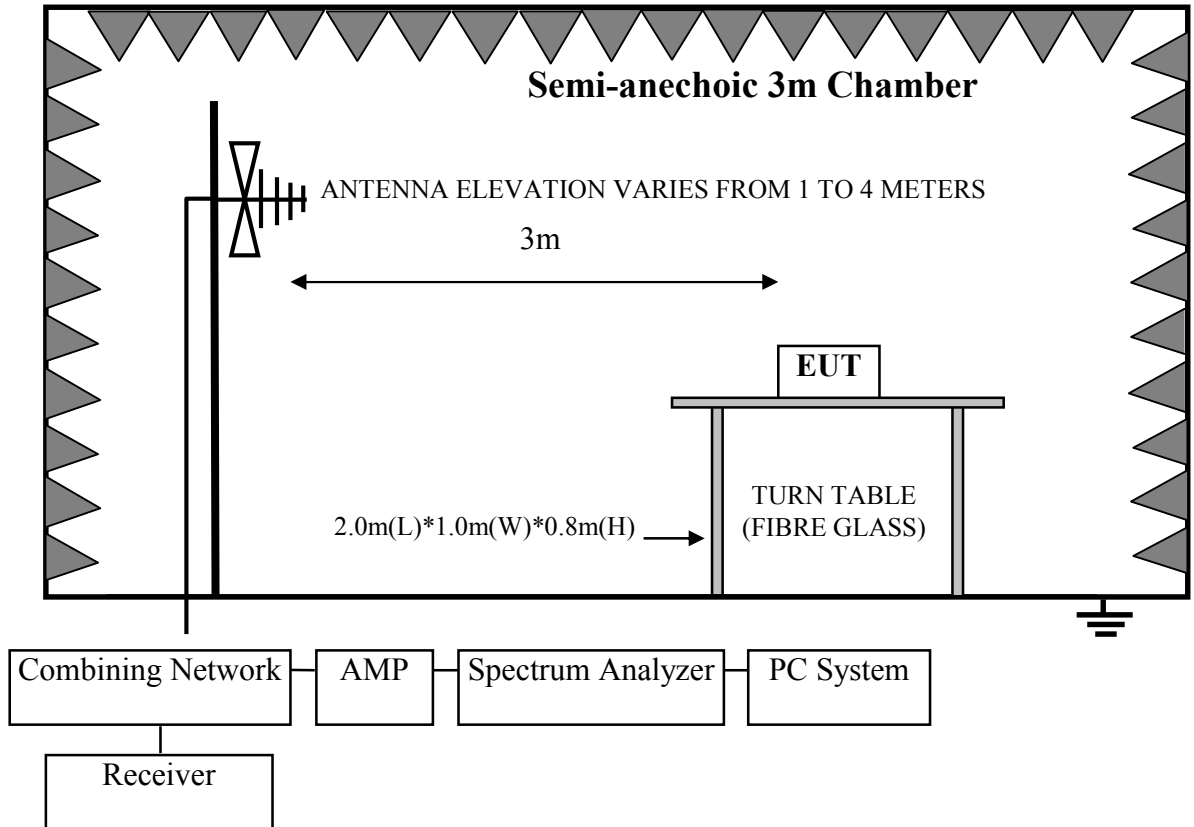
Frequency range: above 1000MHz

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Chamber	AUDIX	N/A	N/A	May.17,17	1 Year
2.	EMC Analyzer	Agilent	N9030A	MY51380221	Sep.19,17	1 Year
3.	Horn Antenna	ETS	3115	9510-4580	Dec.01,17	1 Year
4.	Amplifier	Agilent	8449B	3008A00863	May.15,18	1 Year
5.	Amplifier	EMCI	EMC184040SE	980507	Jul.27,17	1 Year
6.	RF Cable	Hubersuhner	EMC102-KM-KM-3500	170702	Oct.15,17	1 Year
7.	RF Cable	Hubersuhner	N/A	NO.5	Oct.15,17	1 Year
8.	Horn Antenna	ETS	3116	00060089	Dec.03,17	Year
9.	Test Software	AUDIX	e3	6.2009-5-21a(n)	N/A	N/A

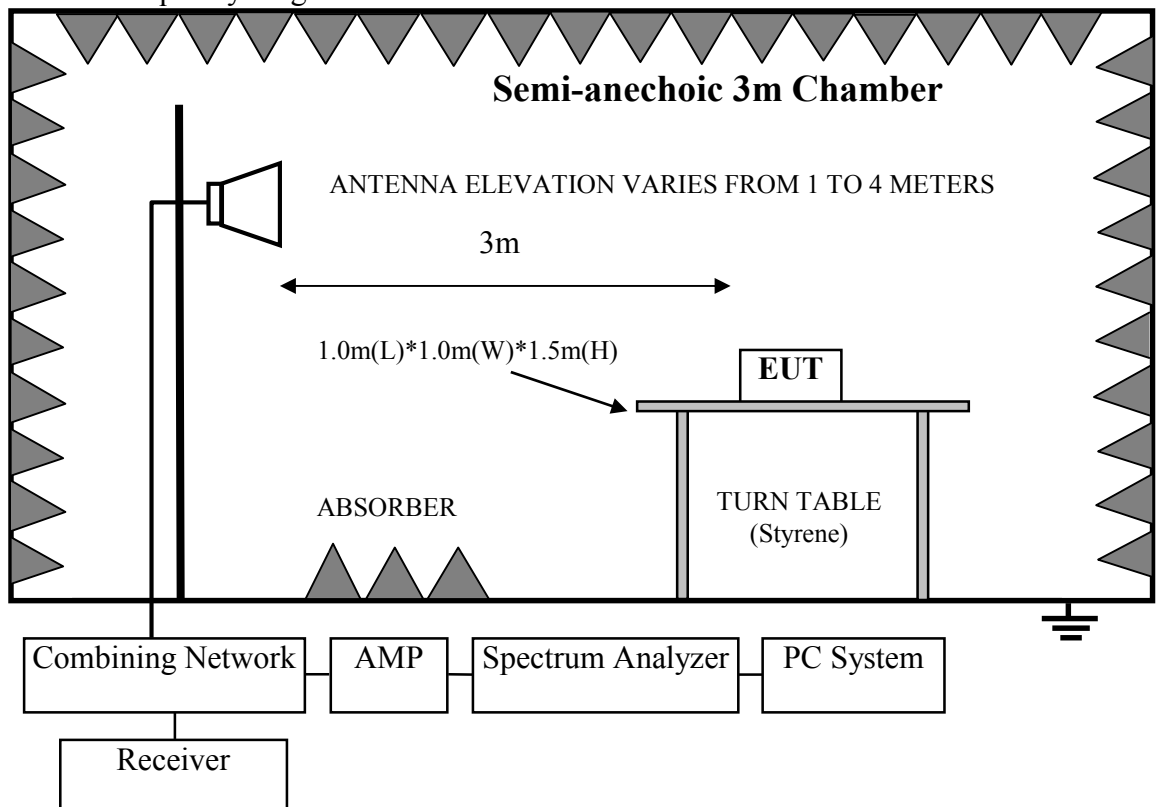
Note: N/A means Not applicable.

## 4.2. Block Diagram of Test Setup

For frequency range 30MHz-1000MHz



For frequency range above 1GHz



### 4.3. Radiated Emission Limit Standard: FCC 15.209 and 15.249

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000MHz	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	
Field Strength of fundamental emissions for 2.4GHz-2.4835GHz	3	114.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 94.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

- Remark :
- (1) Emission level  $\text{dB}\mu\text{V} = 20 \log$  Emission level  $\mu\text{V/m}$
  - (2) The smaller limit shall apply at the cross point between two frequency bands.
  - (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.
  - (4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

### 4.4.EUT Configuration on Test

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

### 4.5.Operating Condition of EUT

- 4.5.1.Setup the EUT and simulator as shown as Section 4.2.
- 4.5.2.Turn on the power of all equipments.
- 4.5.3.Let EUT work in Tx mode.

### 4.6.Test Procedure

#### Frequency below 30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground for frequency 30MHz~1000MHz, 1.5 meter high above ground for frequency above 1GHz and put the absorbing with 2.4m(L)\*2.4m(W)\*0.3m(H) on the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna for frequency 30MHz~1000MHz, and the Horn antenna is used as receiving antenna for frequency above 1GHz. Both horizontal and vertical polarization of the antenna is set on Test. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.10-2013 on radiated emission Test.

During the pretest the EUT was rotated through three orthogonal axes to determine the attitude that maximizes the emissions.

After that the EUT was manually handled to find the orientation that has the maximum emission, which is the orientation show in the test setup photos.

The bandwidth of the EMI test receiver (R&S ESR7) is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's RBW is set at 1MHz and VBW is set at 3MHz for peak emissions measurement above 1GHz

This device is pulse modulated, a duty cycle factor was used to calculate average level based measured peak level.

The frequency range from 30MHz to 10th harmonic (25GHz) is checked. And no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

#### 4.7. Radiated Emission Test Results

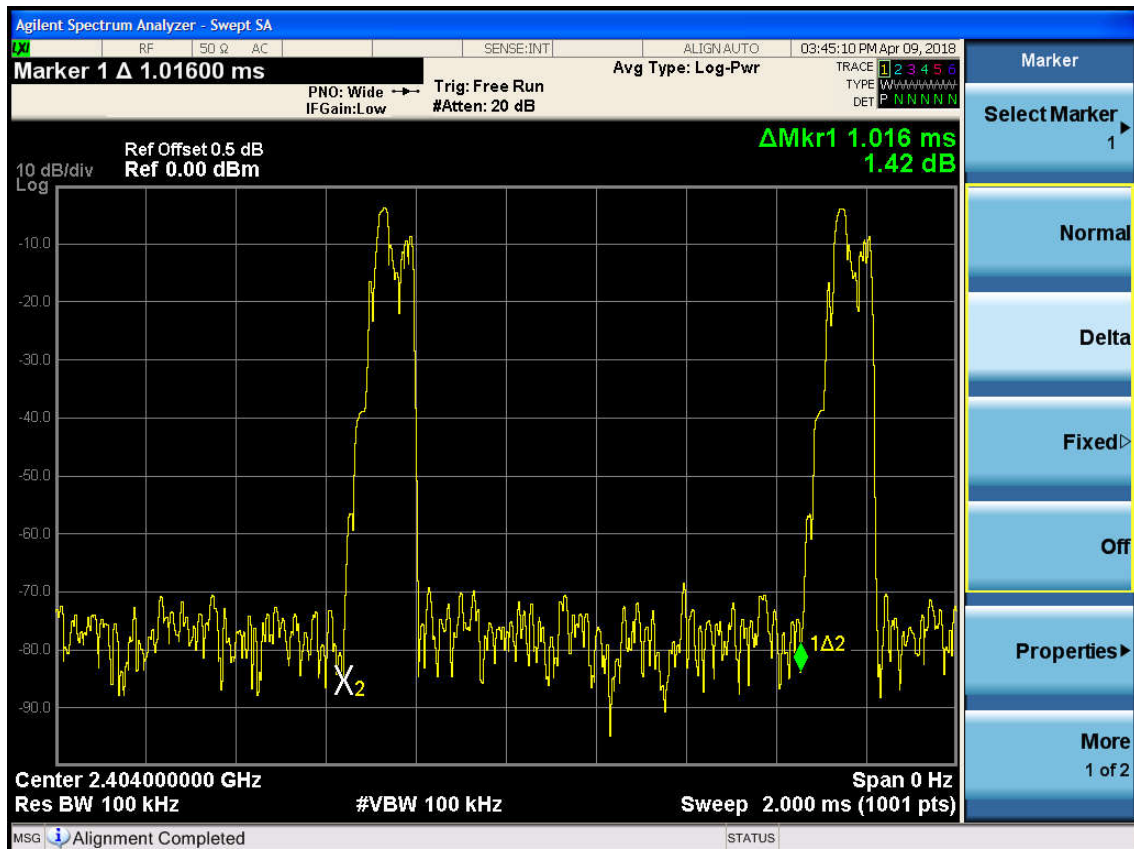
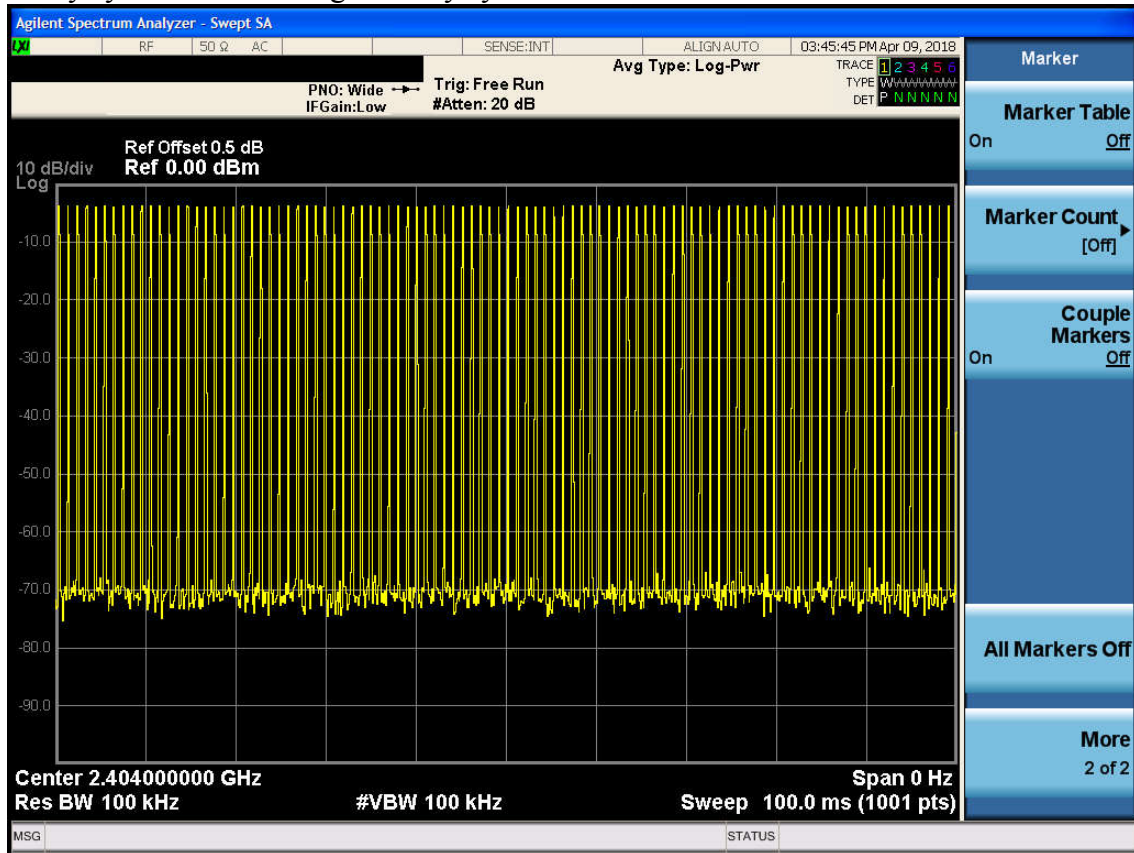
##### **PASS.**

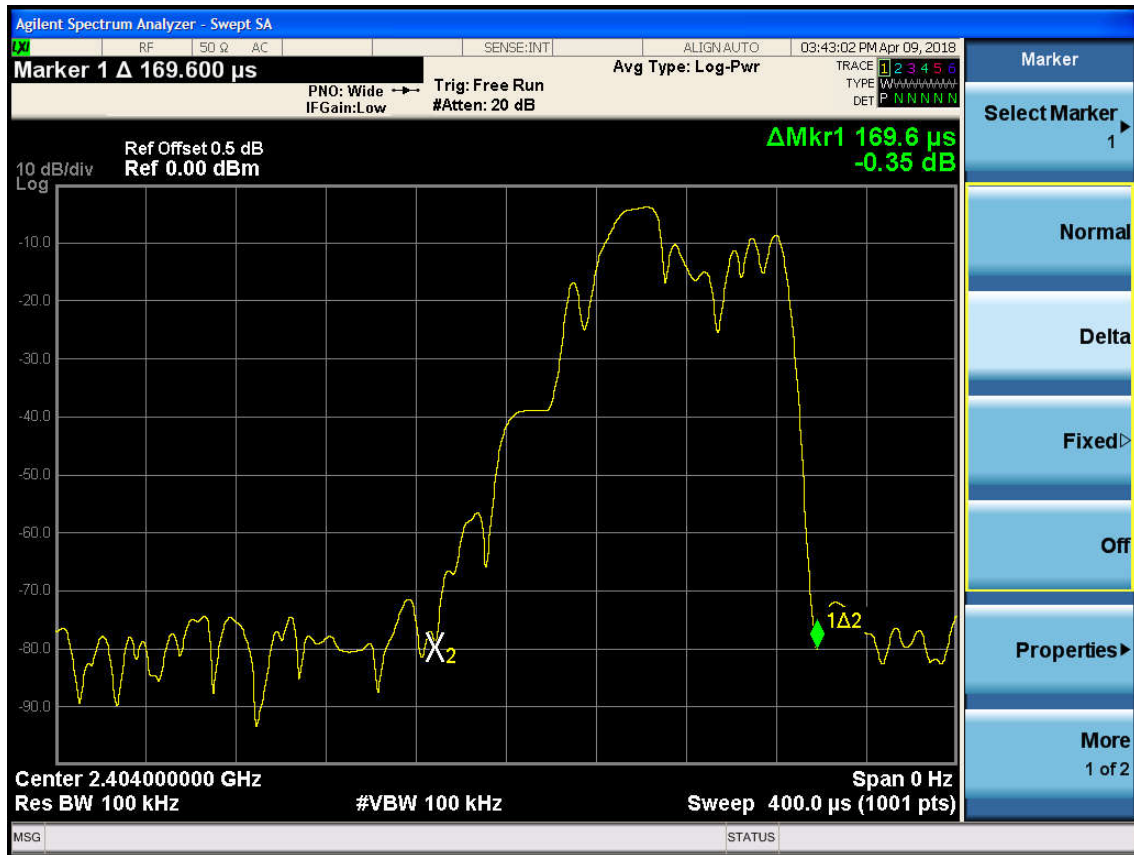
All the emissions from 30MHz to 25GHz were comply with the 15.209 Limit.

Note 1: The duty cycle factor for calculate average level is 15.549dB, and average limit is 20dB below peak limit, so if peak measured level comply with average limit, the average level was deemed to comply with average limit.

Note 2: The emissions (9kHz~30MHz) not reported for there is no emission be found.

Duty cycle factor =  $20\log(1/\text{duty cycle}) = 15.549\text{dB}$





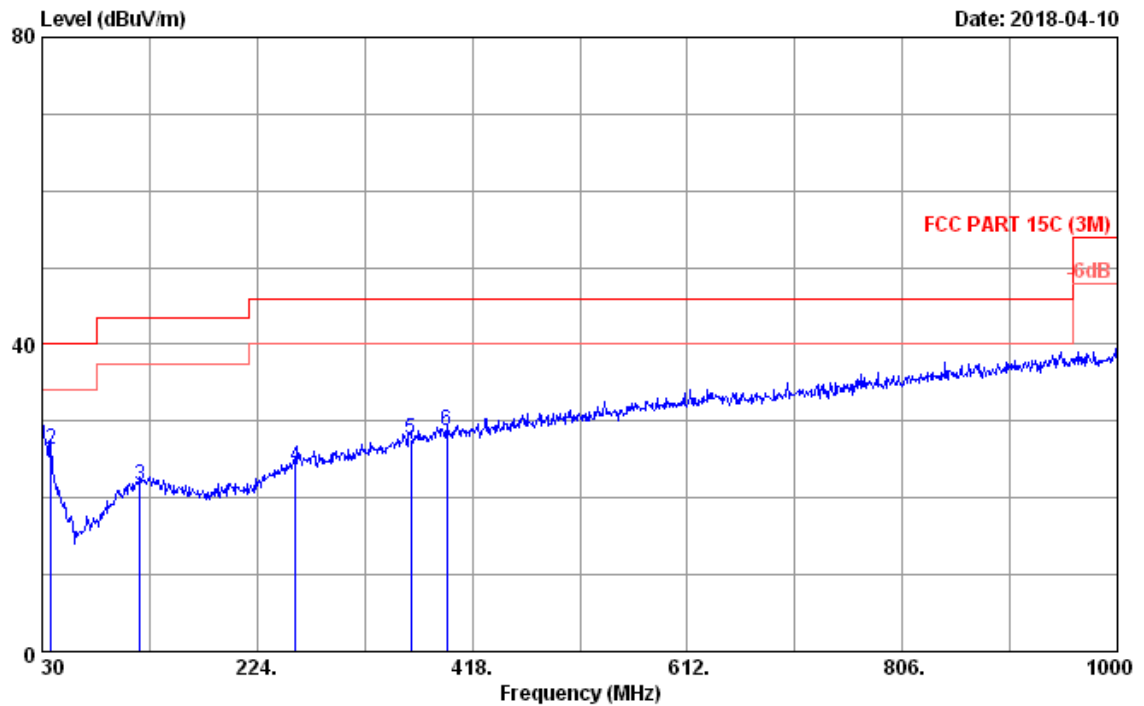


# Frequency: 30MHz~1GHz

Data: 35

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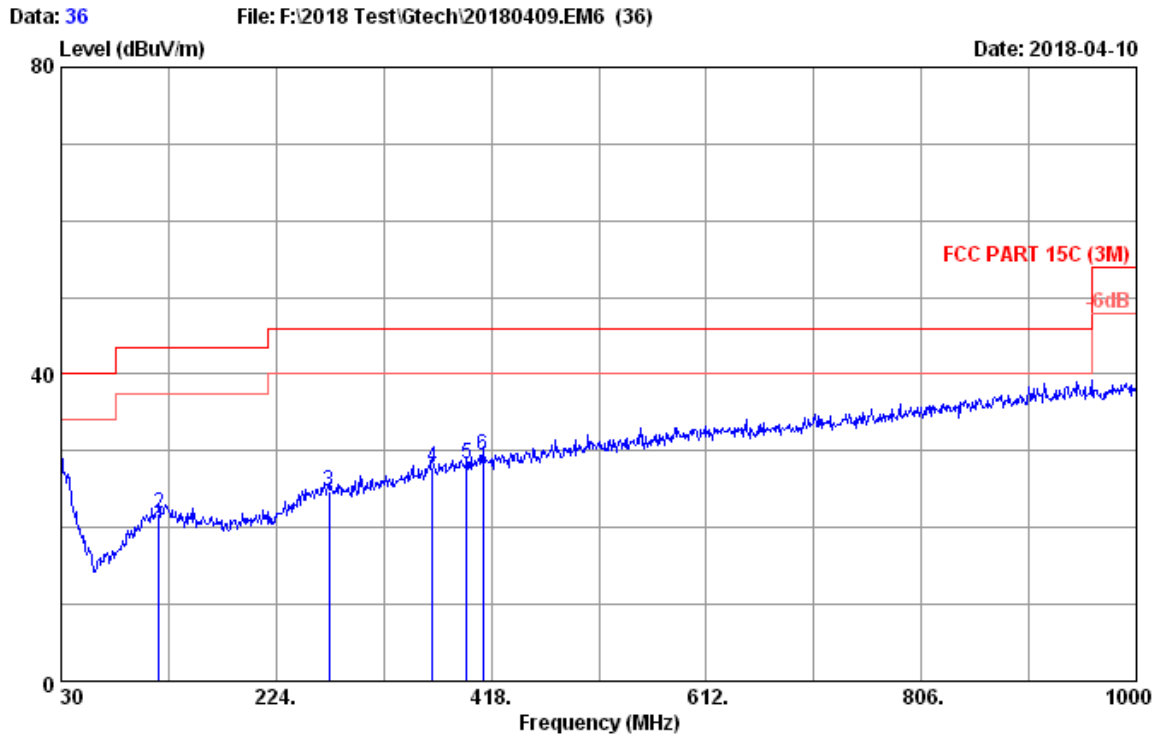
Date: 2018-04-10



Site no. : 3m Chamber Data no. : 35  
 Dis. / Ant. : 3m 2017 ANT 35375 Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C (3M)  
 Env. / Ins. : 23.4°C/52.9% Engineer : Lynn  
 EUT : ELECOM TrackBall Mouse M/N:M-XPT1MR  
 Power rating : DC 1.5V  
 Test Mode : 2.4G Tx mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	30.000	27.50	1.18	0.48	29.16	40.00	10.84	QP
2	37.760	21.90	1.18	3.31	26.39	40.00	13.61	QP
3	118.270	19.31	2.18	0.20	21.69	43.50	21.81	QP
4	258.920	19.92	3.14	1.01	24.07	46.00	21.93	QP
5	362.710	21.73	3.86	2.09	27.68	46.00	18.32	QP
6	394.720	22.66	3.98	2.01	28.65	46.00	17.35	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Site no. : 3m Chamber Data no. : 36  
 Dis. / Ant. : 3m 2017 ANT 35375 Ant. pol. : VERTICAL  
 Limit : FCC PART 15C (3M)  
 Env. / Ins. : 23.4°C/52.9% Engineer : Lynn  
 EUT : ELECOM TrackBall Mouse M/N:M-XPTIMR  
 Power rating : DC 1.5V  
 Test Mode : 2.4G Tx mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	30.000	27.50	1.18	0.20	28.88	40.00	11.12	QP
2	118.270	19.31	2.18	0.41	21.90	43.50	21.60	QP
3	271.530	19.83	3.14	1.87	24.84	46.00	21.16	QP
4	364.650	21.79	3.86	2.29	27.94	46.00	18.06	QP
5	395.690	22.69	3.98	1.59	28.26	46.00	17.74	QP
6	410.240	22.96	4.10	2.41	29.47	46.00	16.53	QP

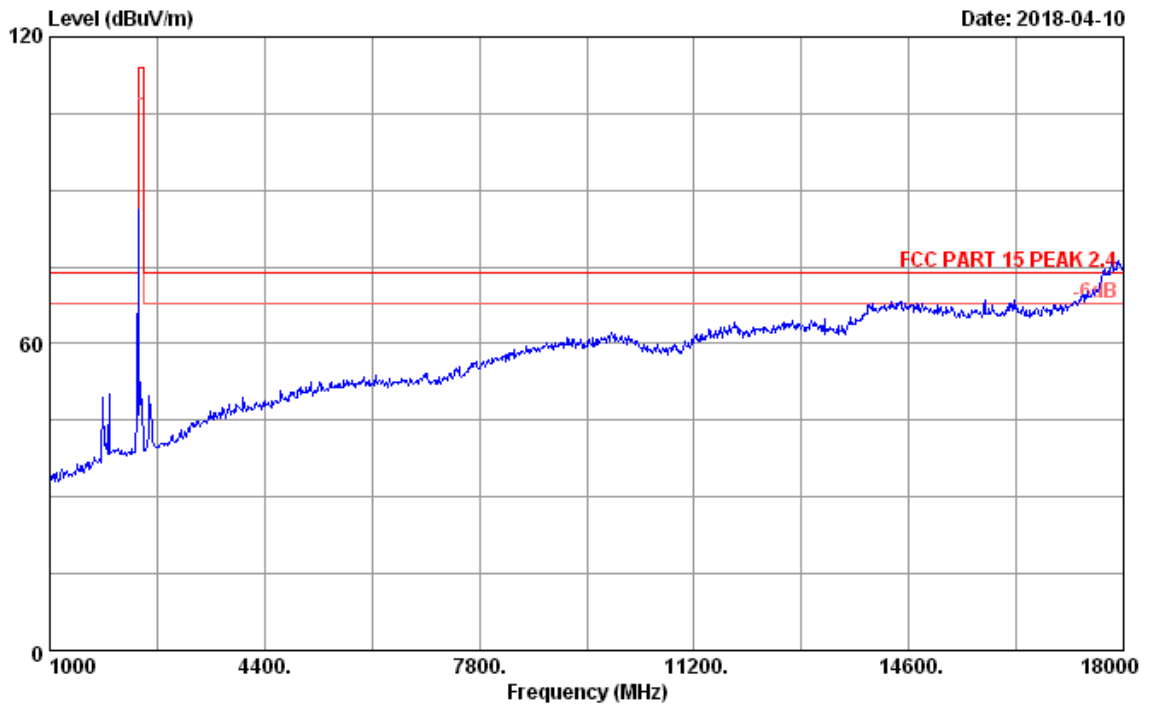
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

# Frequency: 1GHz~18GHz

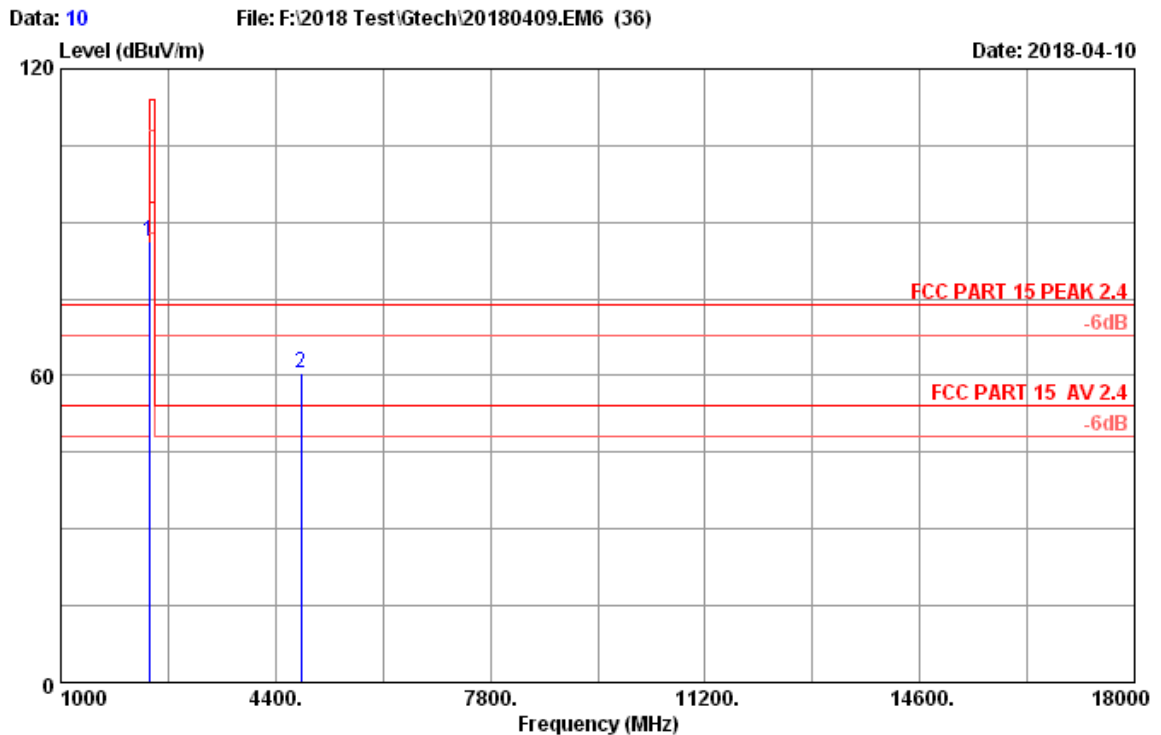
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Date: 2018-04-10



Site no.	: 3m Chamber	Data no.	: 9
Dis. / Ant.	: 3m 2017 3115(4580)	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15 PEAK 2.4		
Env. / Ins.	: 23.4°C/52.9%	Engineer	: Lynn
EUT	: ELECOM TrackBall Mouse	M/N:	M-XPT1MR
Power rating	: DC 1.5V		
Test Mode	: 2.4g 2404MHz Tx mode		

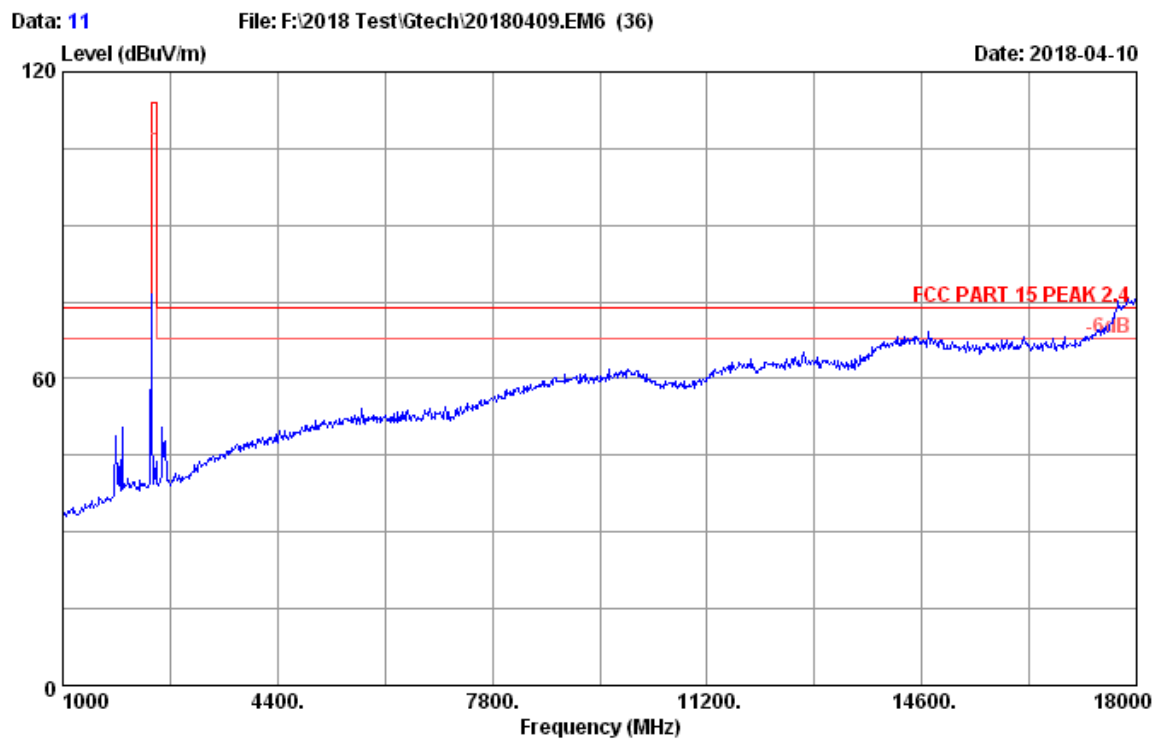


Site no. : 3m Chamber Data no. : 10  
 Dis. / Ant. : 3m 2017 3115(4580) Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23.4°C/52.9% Engineer : Lynn  
 EUT : ELECOM TrackBall Mouse M/N:M-XPTIMR  
 Power rating : DC 1.5V  
 Test Mode : 2.4g 2404MHz Tx mode

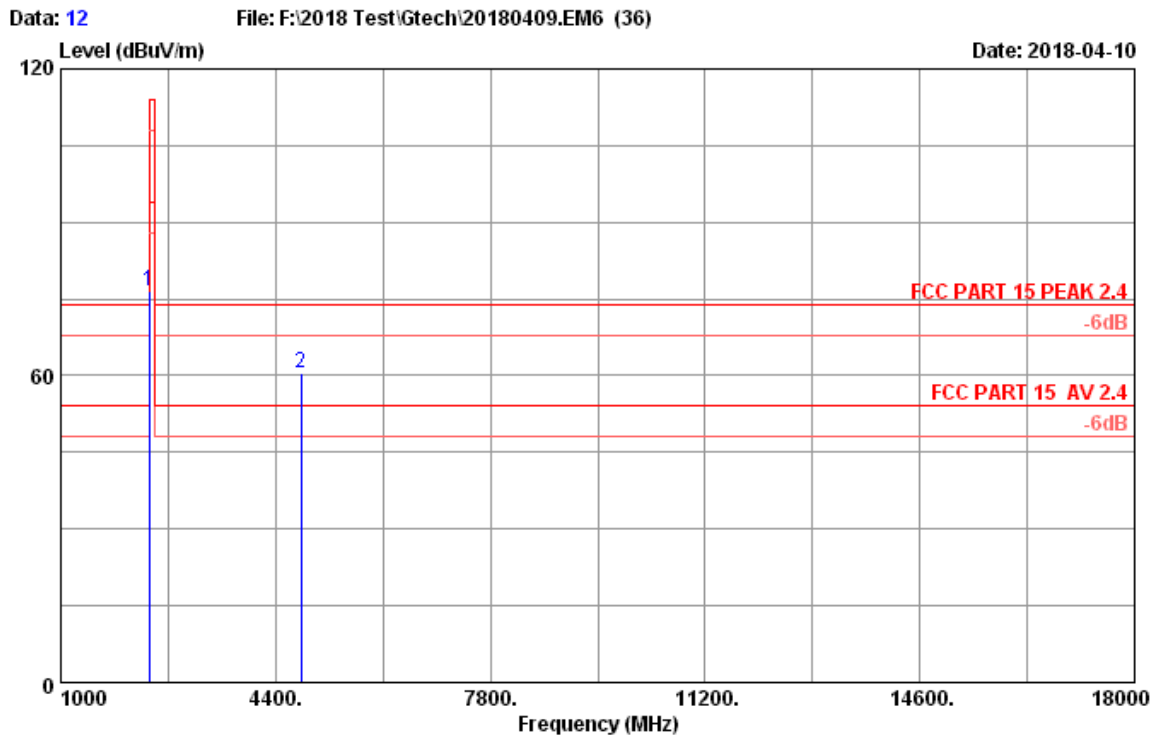
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2404.00	27.87	10.30	83.69	35.61	86.25	114.00	27.75	Peak
2	4808.00	32.62	14.52	47.34	33.82	60.66	74.00	13.34	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
4808	60.66	15.549	45.111	54	Pass



Site no.	: 3m Chamber	Data no.	: 11
Dis. / Ant.	: 3m 2017 3115(4580)	Ant. pol.	: VERTICAL
Limit	: FCC PART 15 PEAK 2.4		
Env. / Ins.	: 23.4°C/52.9%	Engineer	: Lynn
EUT	: ELECOM TrackBall Mouse	M/N:	M-XPTIMR
Power rating	: DC 1.5V		
Test Mode	: 2.4g 2404MHz Tx mode		



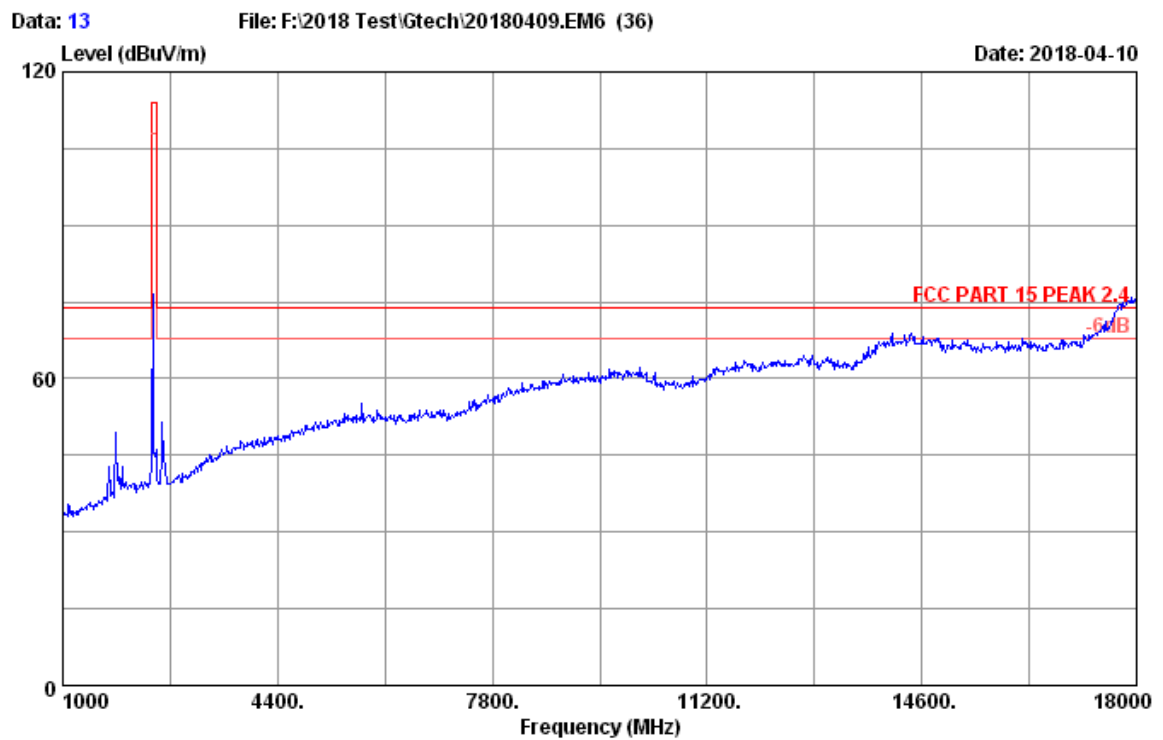
Site no. : 3m Chamber Data no. : 12  
 Dis. / Ant. : 3m 2017 3115(4580) Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23.4°C/52.9% Engineer : Lynn  
 EUT : ELECOM TrackBall Mouse M/N:M-XPT1MR  
 Power rating : DC 1.5V  
 Test Mode : 2.4g 2404MHz Tx mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2404.00	27.87	10.30	73.89	35.61	76.45	114.00	37.55	Peak
2	4808.00	32.62	14.52	47.18	33.82	60.50	74.00	13.50	Peak

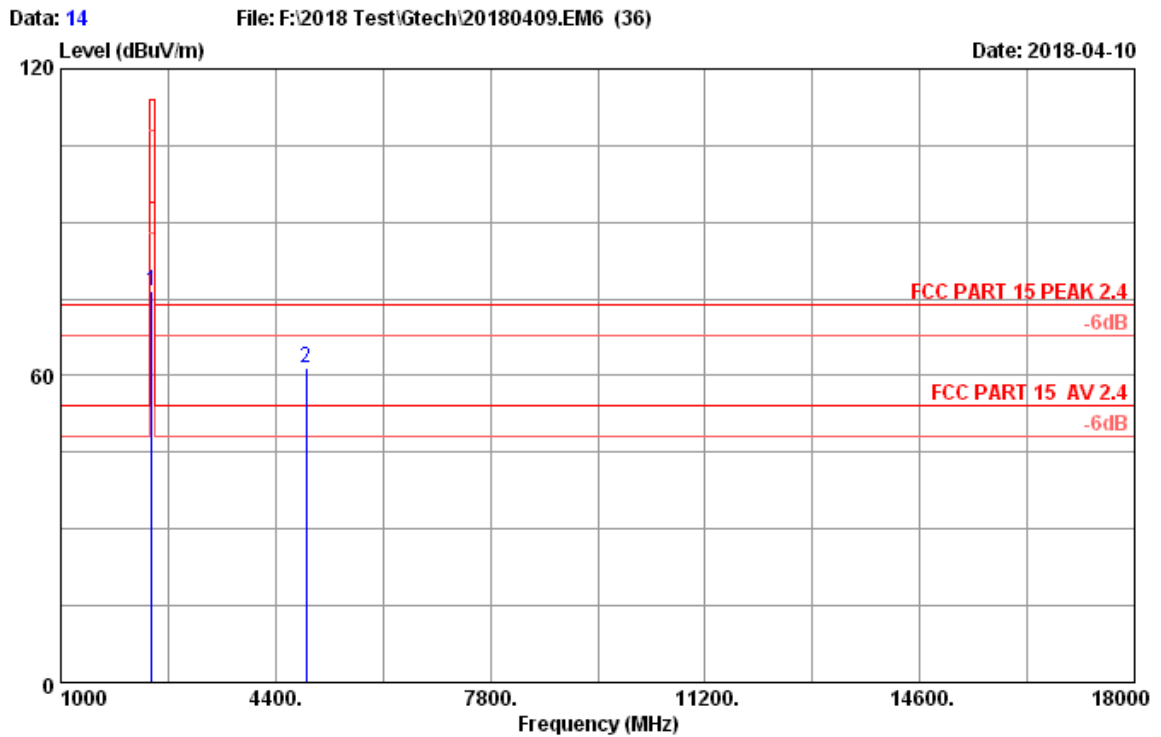
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
4808	60.50	15.549	44.951	54	Pass





Site no.	: 3m Chamber	Data no.	: 13
Dis. / Ant.	: 3m 2017 3115(4580)	Ant. pol.	: VERTICAL
Limit	: FCC PART 15 PEAK 2.4		
Env. / Ins.	: 23.4°C/52.9%	Engineer	: Lynn
EUT	: ELECOM TrackBall Mouse	M/N:	M-XPTIMR
Power rating	: DC 1.5V		
Test Mode	: 2.4g 2442MHz Tx mode		

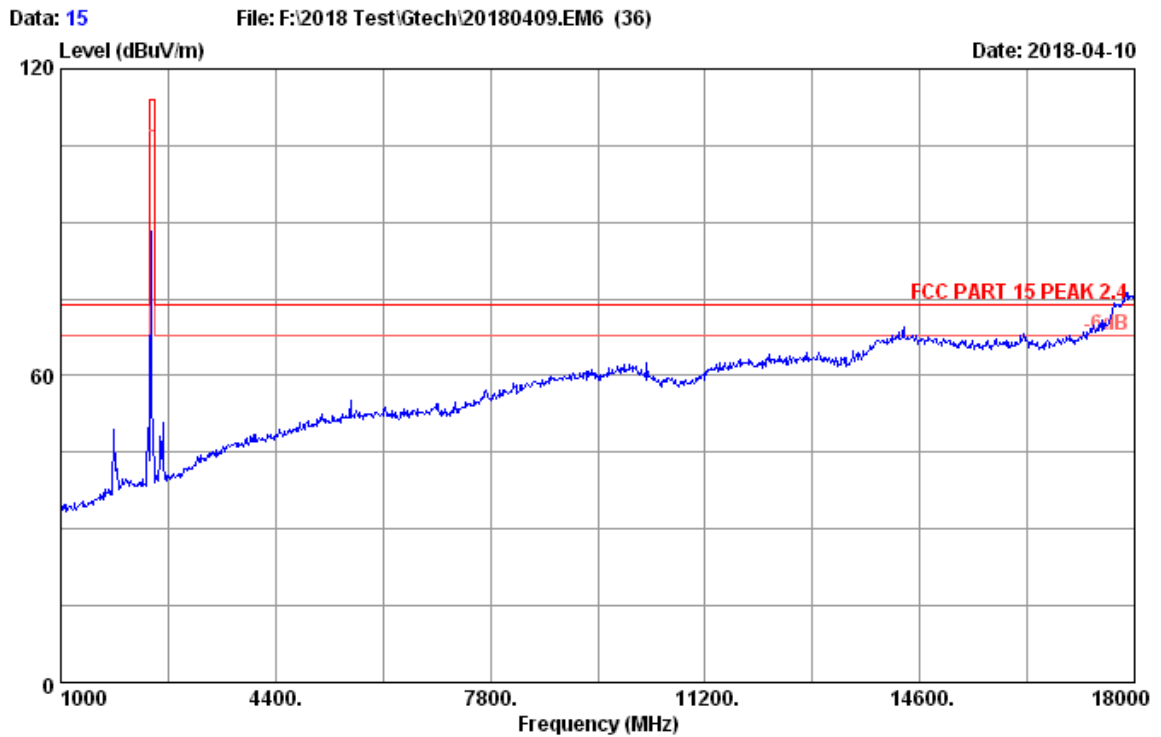


Site no. : 3m Chamber Data no. : 14  
 Dis. / Ant. : 3m 2017 3115(4580) Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23.4°C/52.9% Engineer : Lynn  
 EUT : ELECOM TrackBall Mouse M/N:M-XPTIMR  
 Power rating : DC 1.5V  
 Test Mode : 2.4g 2442MHz Tx mode

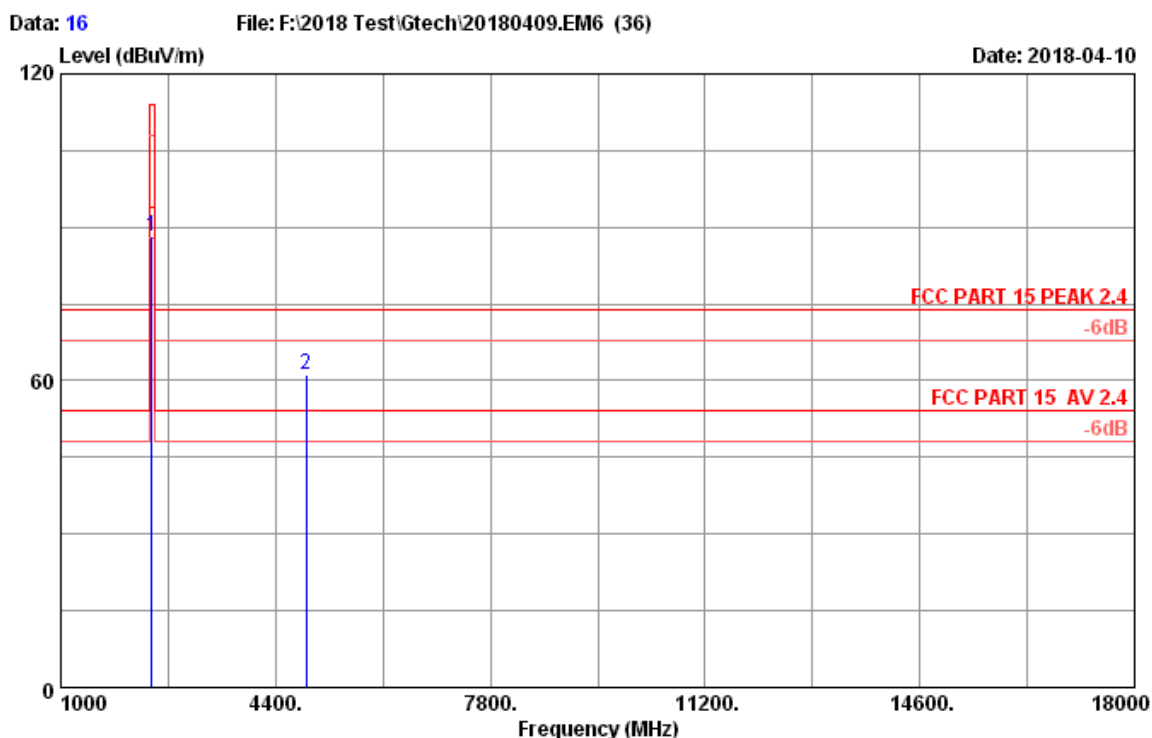
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2442.00	28.04	10.37	73.74	35.68	76.47	114.00	37.53	Peak
2	4884.00	32.76	14.62	47.99	33.75	61.62	74.00	12.38	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
4884	61.62	15.549	46.071	54	Pass



Site no.	: 3m Chamber	Data no.	: 15
Dis. / Ant.	: 3m 2017 3115(4580)	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15 PEAK 2.4		
Env. / Ins.	: 23.4°C/52.9%	Engineer	: Lynn
EUT	: ELECOM TrackBall Mouse	M/N:	M-XPT1MR
Power rating	: DC 1.5V		
Test Mode	: 2.4g 2442MHz Tx mode		



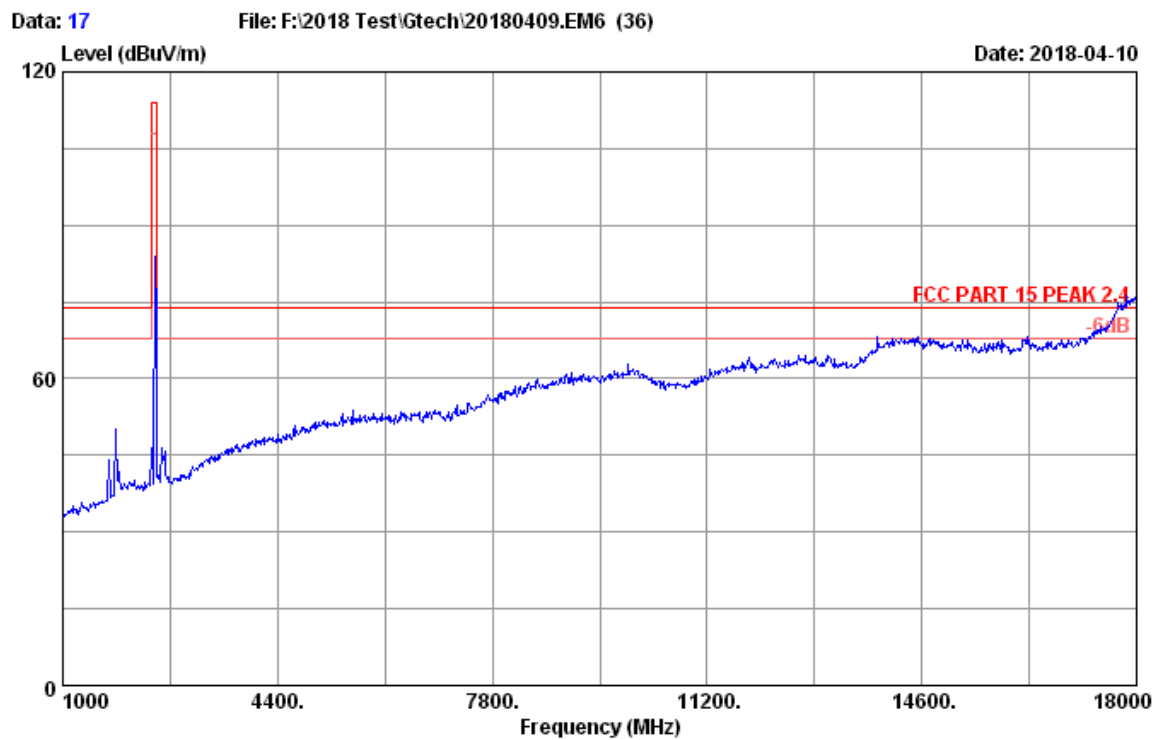
Site no. : 3m Chamber Data no. : 16  
 Dis. / Ant. : 3m 2017 3115(4580) Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23.4°C/52.9% Engineer : Lynn  
 EUT : ELECOM TrackBall Mouse M/N:M-XPTIMR  
 Power rating : DC 1.5V  
 Test Mode : 2.4g 2442MHz Tx mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2442.00	28.04	10.37	85.39	35.68	88.12	114.00	25.88	Peak
2	4884.00	32.76	14.62	47.58	33.75	61.21	74.00	12.79	Peak

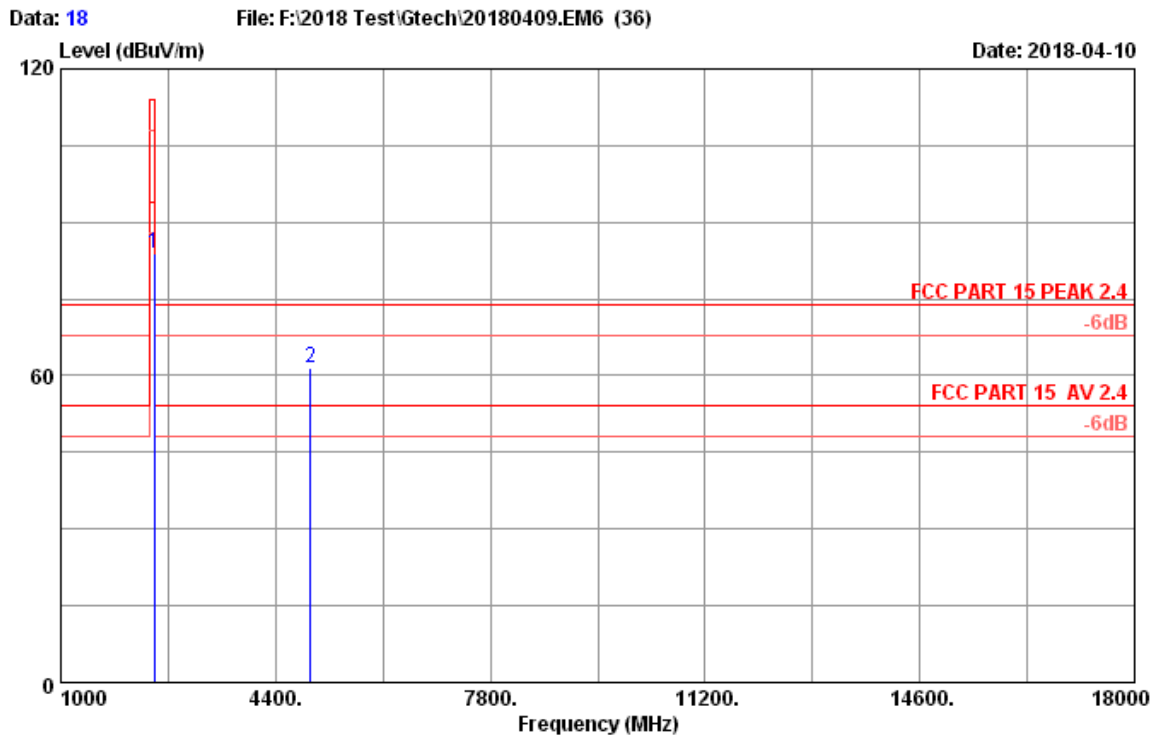
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.

2. The emission levels that are 20dB below the official  
 limit are not reported.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
4884	61.21	15.549	45.661	54	Pass



Site no.	: 3m Chamber	Data no.	: 17
Dis. / Ant.	: 3m 2017 3115(4580)	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15 PEAK 2.4		
Env. / Ins.	: 23.4°C/52.9%	Engineer	: Lynn
EUT	: ELECOM TrackBall Mouse	M/N:	M-XPTIMR
Power rating	: DC 1.5V		
Test Mode	: 2.4g 2477MHz Tx mode		



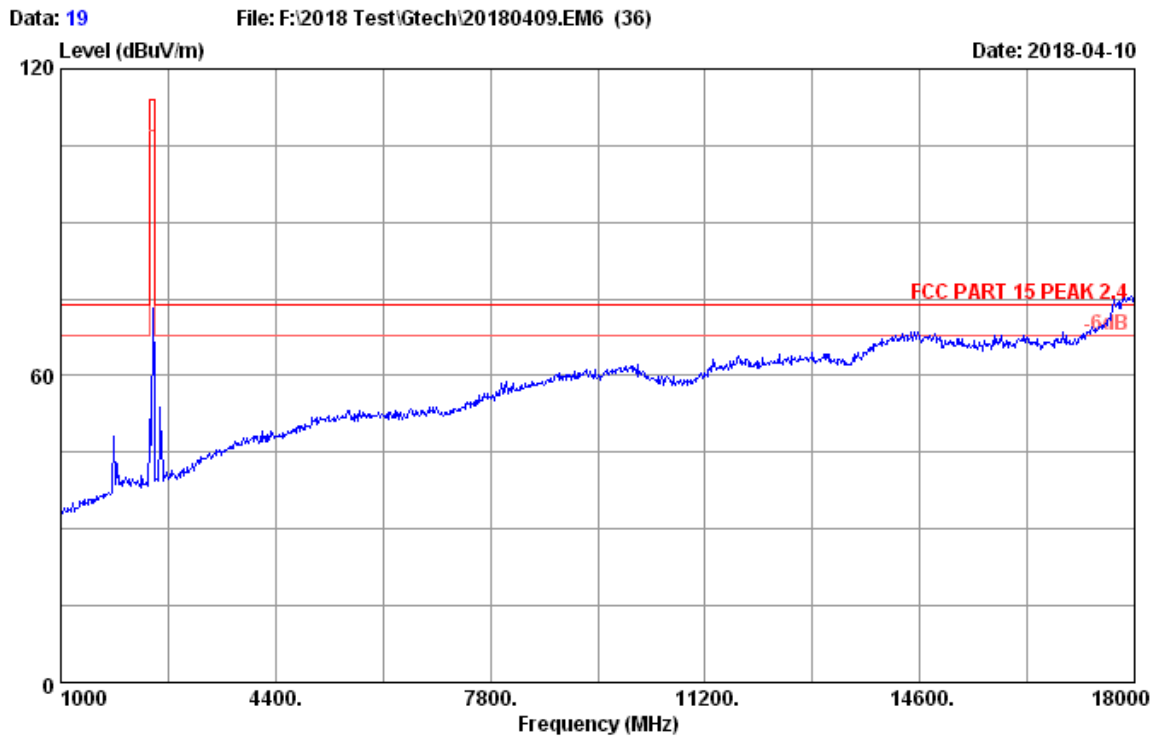
Site no. : 3m Chamber Data no. : 18  
 Dis. / Ant. : 3m 2017 3115(4580) Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23.4°C/52.9% Engineer : Lynn  
 EUT : ELECOM TrackBall Mouse M/N:M-XPTIMR  
 Power rating : DC 1.5V  
 Test Mode : 2.4g 2477MHz Tx mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2477.00	28.21	10.45	81.09	35.71	84.04	114.00	29.96	Peak
2	4954.00	32.93	14.73	47.52	33.69	61.49	74.00	12.51	Peak

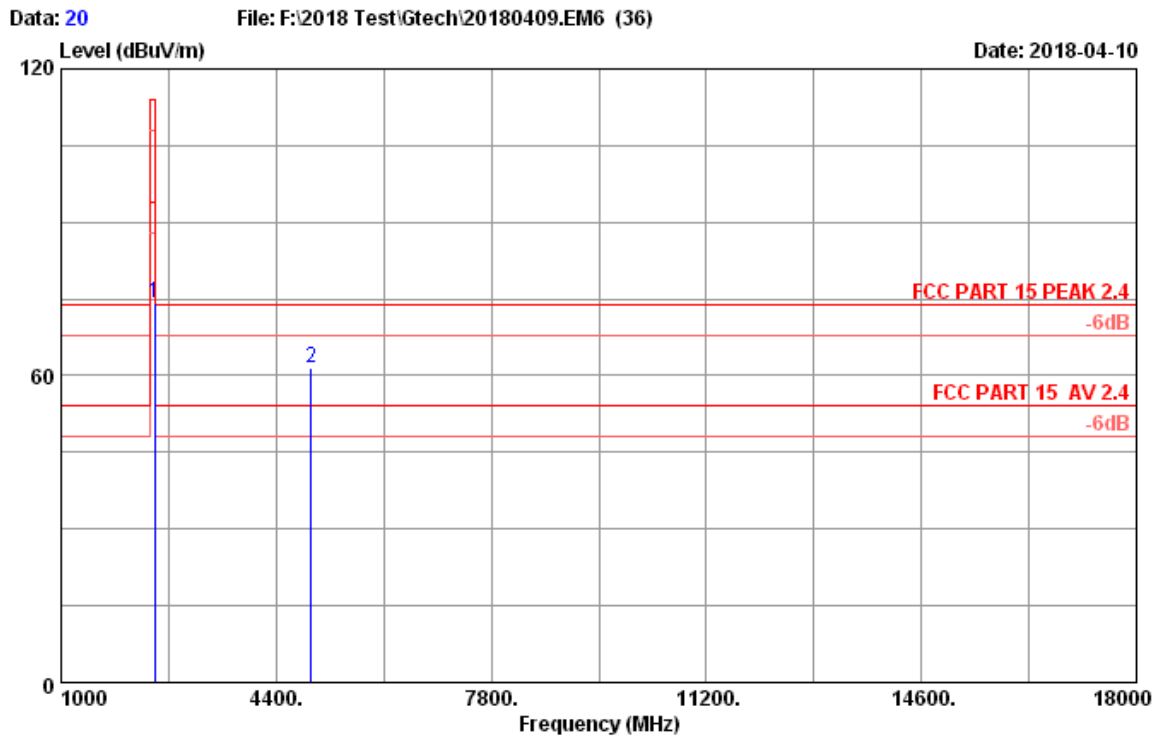
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
4954	61.49	15.549	45.941	54	Pass





Site no.	: 3m Chamber	Data no.	: 19
Dis. / Ant.	: 3m 2017 3115(4580)	Ant. pol.	: VERTICAL
Limit	: FCC PART 15 PEAK 2.4		
Env. / Ins.	: 23.4°C/52.9%	Engineer	: Lynn
EUT	: ELECOM TrackBall Mouse	M/N:	M-XPTIMR
Power rating	: DC 1.5V		
Test Mode	: 2.4g 2477MHz Tx mode		



Site no. : 3m Chamber Data no. : 20  
 Dis. / Ant. : 3m 2017 3115(4580) Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23.4°C/52.9% Engineer : Lynn  
 EUT : ELECOM TrackBall Mouse M/N:M-XPTIMR  
 Power rating : DC 1.5V  
 Test Mode : 2.4g 2477MHz Tx mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2477.00	28.21	10.45	71.41	35.71	74.36	114.00	39.64	Peak
2	4954.00	32.93	14.73	47.61	33.69	61.58	74.00	12.42	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
4954	61.58	15.549	46.031	54	Pass

## 5. 20 DB BANDWIDTH TEST

### 5.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52220804	Oct.14,17	1Year
2.	Attenuator(20dB)	Agilent	8491B	MY39262165	Oct.14,17	1 Year
3.	RF Cable	Marvelous Microwave Inc	SFL402105FLEX	NO.1	Oct.15,17	1 Year

### 5.2. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

### 5.3. Test Results

EUT: ELECOM TrackBall Mouse		
M/N: M-XPT1MR		
Test date: 2018-04-09	Pressure: 103.2±1.0 kpa	Humidity: 53.1±3.0%
Tested by: Lynn	Test site: RF site	Temperature:23.6±0.6 °C

Voltage (V)	Frequency (MHz)	-20dB bandwidth ( MHz )	Limit (KHz)
DC 1.5V	2404	1.9364	N/A
	2442	1.9477	N/A
	2477	1.9175	N/A
Conclusion : PASS			

## Test Frequency: 2404MHz



## Test Frequency: 2442MHz



Test Frequency: 2477MHz



## 6. BAND EDGE COMPLIANCE TEST

### 6.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Amp	HP	8449B	3008A02495	Apr.22.17	1 Year
2.	Horn Antenna	ETS	3115	9510-4580	Dec.01,17	1 Year
3.	RF Cable	Hubersuhner	SUCOFLEX1 04	274094&4+28 610&2	Apr.22,17	1 Year

### 6.2. Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 50dB below the fundamental emissions, or comply with 15.209 limits.

### 6.3. Test Produce

1. The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.
2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upperband-edges of the emission:
  - (a) PEAK: RBW=1MHz ;VBW=3MHz, PK detector, Sweep=AUTO
  - (b) This device is pulse modulated, a duty cycle factor was used to calculate average level based measured peak level

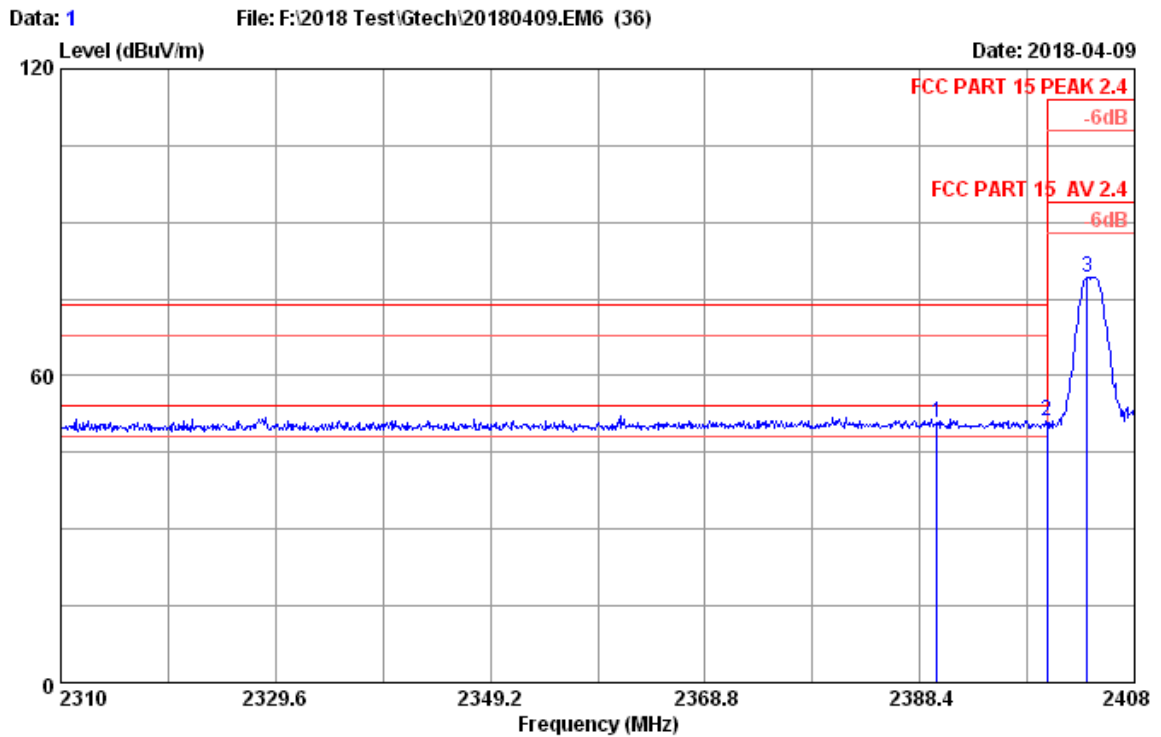
### 6.4. Test Results

Pass (The testing data was attached in the next pages.)

Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

Note: The duty cycle factor for calculate average level is 16.461dB, and average limit is 50dB below peak limit, so if peak measured level comply with average limit, the average level was deemed to comply with average limit.

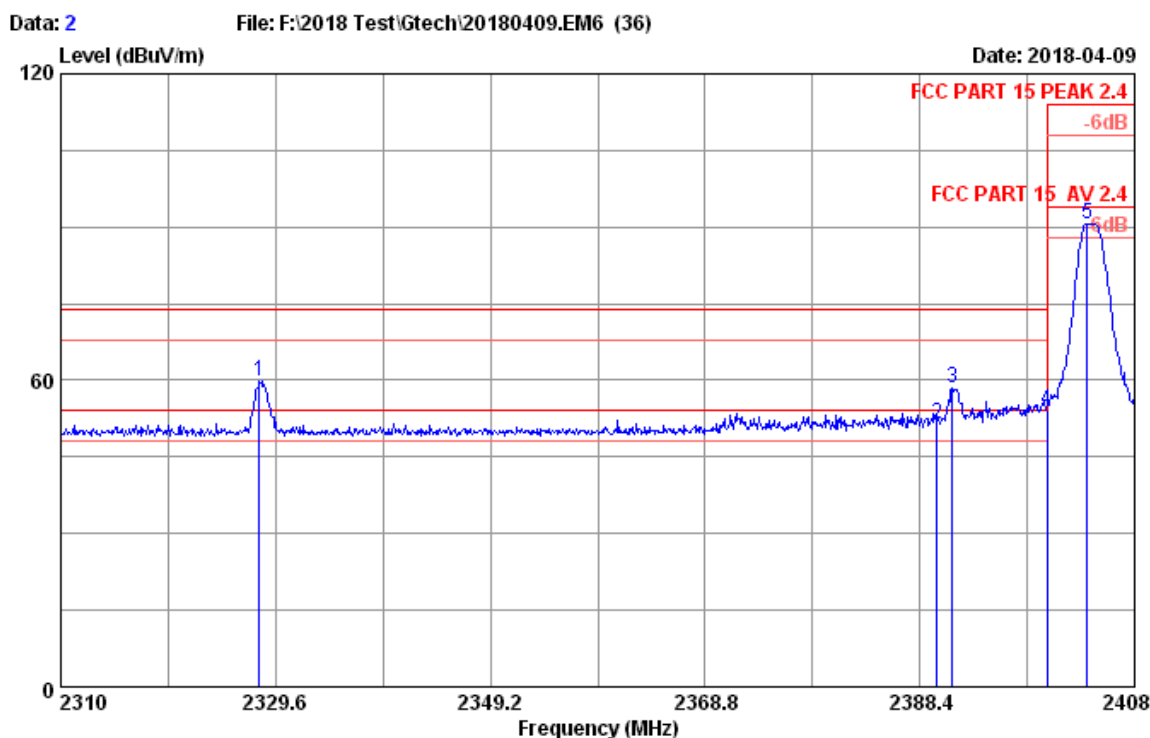




Site no. : 3m Chamber Data no. : 1  
 Dis. / Ant. : 3m 2017 3115(4580) Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23.4°C/52.9% Engineer : Lynn  
 EUT : ELECOM TrackBall Mouse M/N:M-XPT1MR  
 Power rating : DC 1.5V  
 Test Mode : 2.4G 2404MHz Tx mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.79	10.26	48.29	35.61	50.73	74.00	23.27	Peak
2	2400.00	27.79	10.30	48.70	35.61	51.18	74.00	22.82	Peak
3	2403.69	27.87	10.30	76.66	35.61	79.22	114.00	34.78	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

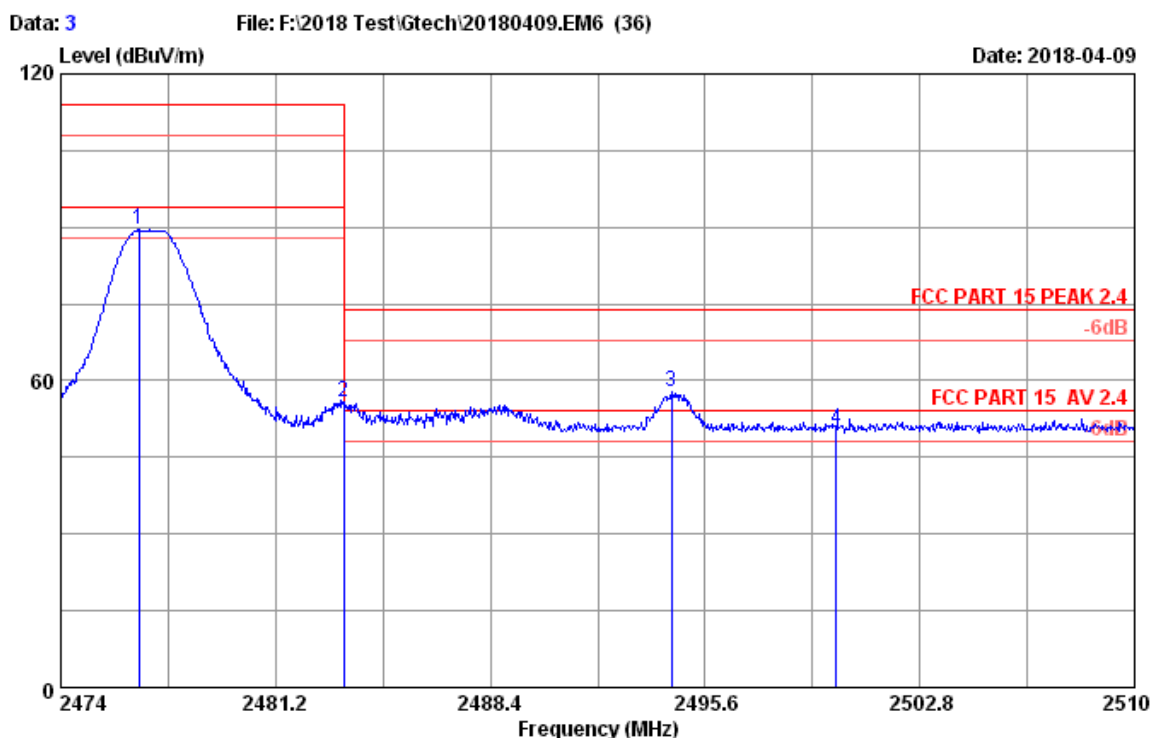


Site no. : 3m Chamber Data no. : 2  
 Dis. / Ant. : 3m 2017 3115(4580) Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23.4°C/52.9% Engineer : Lynn  
 EUT : ELECOM TrackBall Mouse M/N:M-XPTIMR  
 Power rating : DC 1.5V  
 Test Mode : 2.4G 2404MHz Tx mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2328.13	27.44	10.15	57.60	35.51	59.68	74.00	14.32	Peak
2	2390.00	27.79	10.26	49.07	35.61	51.51	74.00	22.49	Peak
3	2391.34	27.79	10.26	55.89	35.61	58.33	74.00	15.67	Peak
4	2400.00	27.79	10.30	51.81	35.61	54.29	74.00	19.71	Peak
5	2403.69	27.87	10.30	88.14	35.61	90.70	114.00	23.30	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
2328.13	59.68	15.549	44.131	54	Pass
2391.34	58.33	15.549	42.781	54	Pass
2400.00	54.29	15.549	38.741	54	Pass

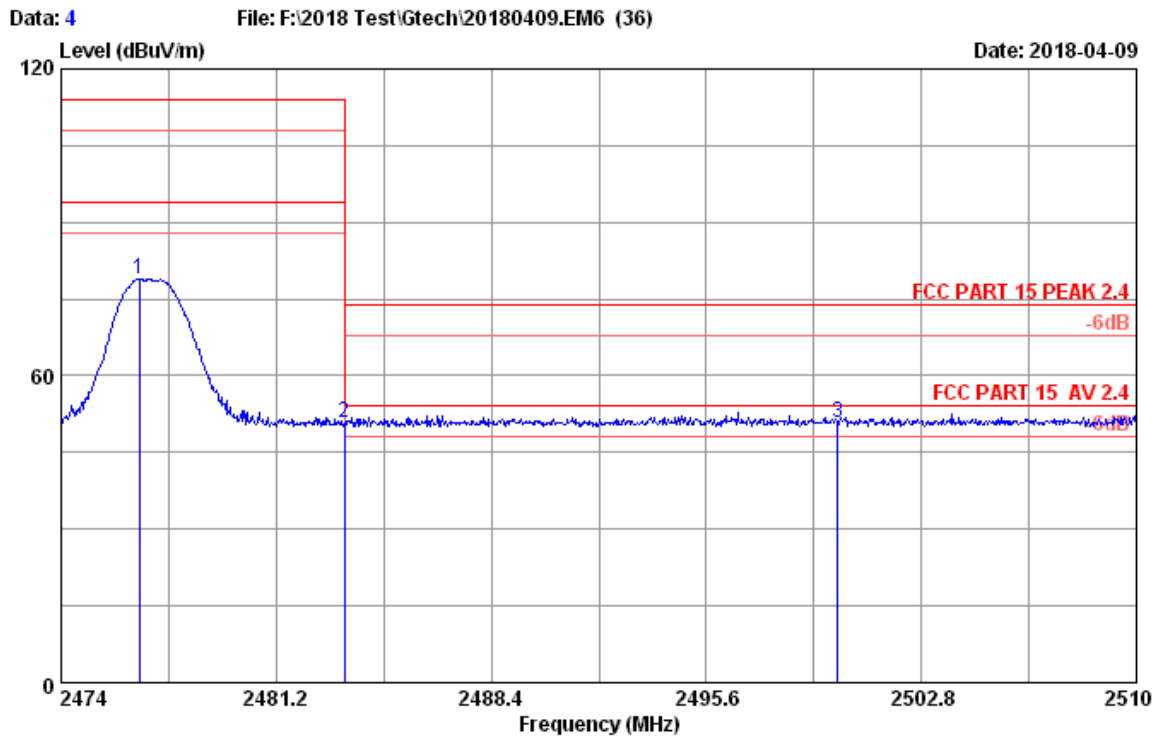


Site no. : 3m Chamber Data no. : 3  
 Dis. / Ant. : 3m 2017 3115(4580) Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23.4°C/52.9% Engineer : Lynn  
 EUT : ELECOM TrackBall Mouse M/N:M-XPT1MR  
 Power rating : DC 1.5V  
 Test Mode : 2.4G 2477MHz Tx mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2476.63	28.21	10.45	86.50	35.71	89.45	114.00	24.55	Peak
2	2483.50	28.21	10.48	52.94	35.71	55.92	74.00	18.08	Peak
3	2494.48	28.30	10.48	54.83	35.74	57.87	74.00	16.13	Peak
4	2500.00	28.30	10.48	47.41	35.74	50.45	74.00	23.55	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
2483.50	55.92	15.549	40.371	54	Pass
2494.48	57.87	15.549	42.321	54	Pass



Site no. : 3m Chamber Data no. : 4  
 Dis. / Ant. : 3m 2017 3115(4580) Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23.4°C/52.9% Engineer : Lynn  
 EUT : ELECOM TrackBall Mouse M/N:M-XPTIMR  
 Power rating : DC 1.5V  
 Test Mode : 2.4G 2477MHz Tx mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBUV)	Amp factor (dB)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	2476.63	28.21	10.45	75.97	35.71	78.92	114.00	35.08	Peak
2	2483.50	28.21	10.48	47.76	35.71	50.74	74.00	23.26	Peak
3	2500.00	28.30	10.48	47.87	35.74	50.91	74.00	23.09	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

## 7. ANTENNA REQUIREMENT

**RESULT** : **PASS**

Test Date : Mar.09~10, 2018

Test standard : FCC Part 15.203

Limit : 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

According to the manufacturer declared, the EUT has an Internal Antenna, the directional gain of antenna is 2.805dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply the provision.

## 8. RADIO FRREQUENCY EXPOSURE COMPLIANCE

**RESULT : PASS**

Test standard : FCC KDB Publication 447498 D01 V06

Since maximum peak output power of the transmitter is  $<10\text{mW}$ , i.e.  $0.000000277\text{mW} < 10\text{mW}$ , hence the EUT is excluded from SAR evaluation according to FCC KDB Publication 447498 D01: General RF Exposure Guidance V05.

## 9. DEVIATION TO TEST SPECIFICATIONS

[NONE]