

# Shenzhen Toby Technology Co., Ltd.

Report No.: TB-FCC155539

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# **FCC Radio Test Report** FCC ID: 2AGGR-B45

# **Original Grant**

Report No. TB-FCC155539

**Applicant** Shenzhen Rivers Technology Co., Limited

**Equipment Under Test (EUT)** 

**EUT Name** Keyboard

Model No. **B45** 

Serial Model No. B46, B47, B48, B49, B50

**Brand Name Bastron** 

**Receipt Date** 2017-06-25

**Test Date** 2017-06-26 to 2017-07-12

**Issue Date** 2017-07-12

**Standards** FCC Part 15: 2016, Subpart C(15.247)

**Test Method** ANSI C63.10: 2013

**Conclusions PASS** 

In the configuration tested, the EUT complied with the standards specified above,

**Test/Witness** 

**Engineer** 

: LURN SU : fugla.

Approved&

**Authorized** 

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

TB-RF-074-1.0

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# 1. General Information about EUT

#### 1.1 Client Information

**Applicant**: Shenzhen Rivers Technology Co.,Limited

Address : A#1611, Zhantao Technology Building, Longhua New District,

Shenzhen, China

Manufacturer : Shenzhen Rivers Technology Co., Limited

Address : 6F, First Building, Taiming Industrial Park, New Longhua District,

Shenzhen, China

### 1.2 General Description of EUT (Equipment Under Test)

EUT Name		Keyboard	Keyboard				
Models No.		B45, B46, B47, B48, B49	B45, B46, B47, B48, B49, B50				
Model Difference	:	All these models are identical in the same PCB layout and electrical circuit, the only difference is model name for commercial.					
		Operation Frequency:	Bluetooth 4.0(BLE): 2402MHz~2480MHz				
		Number of Channel:	Bluetooth 4.0(BLE): 40 channels see note(3)				
Product Description		RF Output Power:	-3.099 dBm Conducted Power(Module 1) -3.138 dBm Conducted Power(Module 2) -3.142 dBm Conducted Power(Module 3)				
		Antenna Gain:	1.6 dBi PCB Antenna				
		Modulation Type:	GFSK				
		Bit Rate of Transmitter:	1Mbps(GFSK)				
Power Supply	:	DC Voltage Supply from USB Port. DC Supply by the Battery.					
Power Rating		DC 5.0 V from the USB Cable.					
	5.7	DC 3.7V by 4000mAh Li-ion Battery.					
Connecting I/O Port(S)	:	Please refer to the User's Manual					

Note: The EUT has four bluetooth Module, the three module is N51822(BLE) for keyboard, the other Module is JL(BT 2.1+EDR) for play music.(please see the separate test report)

#### Note:

This Test Report is FCC Part 15.247 for BLE, the test procedure follows the FCC KDB 558074 D01 DTS Means Guidance v04.

(1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



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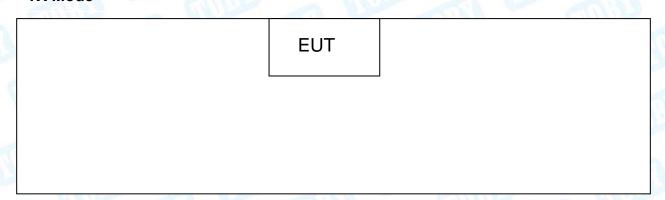
(2) Antenna information provided by the applicant.

# (3) Channel List:

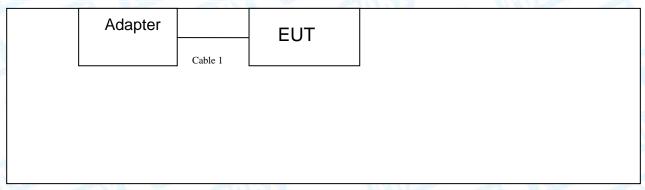
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	14	2430	28	2458
01	2404	15	2432	29	2460
02	2406	16	2434	30	2462
03	2408	17	2436	31	2464
04	2410	18	2438	32	2466
05	2412	19	2440	33	2468
06	2414	20	2442	34	2470
07	2416	21	2444	35	2472
08	2418	22	2446	36	2474
09	2420	23	2448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

# 1.3 Block Diagram Showing the Configuration of System Tested

# **TX Mode**



# **USB Charging+TX Mode**





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# 1.4 Description of Support Units

Equipment Information						
Name Model FCC ID/VOC Manufacturer Used "√"						
AC/DC Adapter TEKA012 VOC TEKA				1		
AC/DC Adapter:	Input:100~240V, 50/60	OHz, 0.2A. Output: 5V	, 1A			
		Cable Information				
Number Shielded Type Ferrite Core		Length	Note			
Cable 1	NO	NO	1.5M	THE REAL PROPERTY.		

## 1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

	For Conducted Test				
Final Test Mode Description					
Mode 1 TX Mode					
	For Radiated Test				
Final Test Mode	Description				
Mode 2	TX Mode				
Mode 3	TX Mode (Channel 00/20/39)				
Note: The EUT has three bluetooth Modul	le, they can be operated simultaneously.				

#### Note:

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.



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According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

BLE Mode: GFSK Modulation Transmitting mode.

- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a portable unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

### 1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of RF setting.

Test Software Version	Nrfgo studio		
Frequency	2402 MHz	2442MHz	2480 MHz
BLE GFSK	DEF	DEF	DEF

# 1.7 Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

Test Item	Parameters	Expanded Uncertainty (U <sub>Lab</sub> )
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	±3.42 dB ±3.42 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	±4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	±4.40 dB
Radiated Emission	Level Accuracy: Above 1000MHz	±4.20 dB



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# 1.8 Test Facility

The testing was performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at:1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China.

At the time of testing, the following bodies accredited the Laboratory:

#### **CNAS (L5813)**

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

#### FCC List No.: (811562)

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

#### IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.



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# 2. Test Summary

Standard S	Section	Took House	lucione e est	Damada
FCC	IC	Test Item	Judgment	Remark
15.203		Antenna Requirement	PASS	N/A
15.207(a)	RSS-GEN 7.2.4	Conducted Emission	PASS	N/A
15.205&15.247(d)	RSS-GEN 7.2.2	Band-Edge & Unwanted Emissions into Restricted Frequency	PASS	N/A
15.247(a)(2)	RSS 247 5.2 (1)	6dB Bandwidth	PASS	N/A
15.247(b)(3)	RSS 247 5.4 (4)	Conducted Max Output Power	PASS	N/A
15.247(e)	RSS 247 5.2 (2)	Power Spectral Density	PASS	N/A
15.205, RSS 247 15.209&15.247(d) 5.5		Transmitter Radiated Spurious &Unwanted Emissions into Restricted Frequency	PASS	N/A

**Note:** (1) The EUT is powered by DC battery, no requirement for this test item. N/A is an abbreviation for Not Applicable.



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# 3. Test Equipment

Conducted	d Emission Te	st			
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jul. 22, 2016	Jul. 21, 2017
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Jul. 22, 2016	Jul. 21, 2017
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jul. 22, 2016	Jul. 21, 2017
LISN	Rohde & Schwarz	ENV216	101131	Jul. 22, 2016	Jul. 21, 2017
Radiation	Emission Tes	t			
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 22, 2016	Jul. 21, 2017
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 22, 2016	Jul. 21, 2017
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar.25, 2017	Mar. 24, 201
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar.25, 2017	Mar. 24, 201
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar.24, 2017	Mar. 23, 201
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar.24, 2017	Mar. 23, 201
Loop Antenna	Laplace instrument	RF300	0701	Mar.24, 2017	Mar. 23, 201
Pre-amplifier	Sonoma	310N	185903	Mar.25, 2017	Mar. 24, 201
Pre-amplifier	HP	8449B	3008A00849	Mar. 29, 2017	Mar. 28, 201
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 29, 2017	Mar. 28, 201
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Antenna C	onducted Em	ission			
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 22, 2016	Jul. 21, 2017
Spectrum Analyzer	Rohde & Schwarz	ESCI	100010/007	Jul. 22, 2016	Jul. 21, 2017
Power Meter	Anritsu	ML2495A	25406005	Jul. 22, 2016	Jul. 21, 2017
Power Sensor	Anritsu	ML2411B	25406005	Jul. 22, 2016	Jul. 21, 2017



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# 4. Conducted Emission Test

#### 4.1 Test Standard and Limit

4.1.1Test Standard FCC Part 15.207

#### 4.1.2 Test Limit

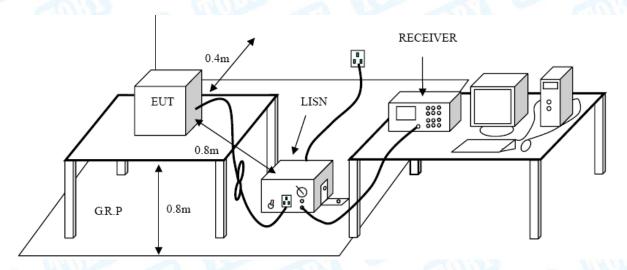
#### **Conducted Emission Test Limit**

Fraguency	Maximum RF Line Voltage (dBμV)		
Frequency	Quasi-peak Level	Average Level	
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *	
500kHz~5MHz	56	46	
5MHz~30MHz	60	50	

#### Notes:

- (1) \*Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

# 4.2 Test Setup



#### 4.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.



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I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9 kHz, and the test frequency band is from 0.15MHz to 30MHz.

# 4.4 EUT Operating Mode

Please refer to the description of test mode.

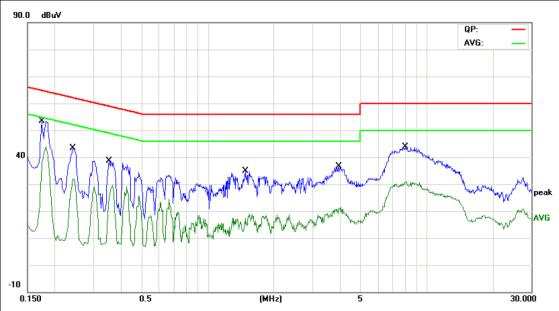
#### 4.5 Test Da5ta

Test data please refer the following pages.



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EUT:	Keyboard	Model Name :	B45		
Temperature:	25℃	Relative Humidity:	55%		
Test Voltage: AC 120V/60 Hz					
Terminal:	Line				
Test Mode:	Mode 1				
Remark:	Only showed test data of the worst mode				
90.0 dB <sub>1</sub> V					



No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MHz	dBu∀	dB	dBu∀	dBu∀	dB	Detector
1 *	0.1740	37.48	9.97	47.45	64.76	-17.31	QP
2	0.1740	24.70	9.97	34.67	54.76	-20.09	AVG
3	0.2420	30.32	10.02	40.34	62.02	-21.68	QP
4	0.2420	21.91	10.02	31.93	52.02	-20.09	AVG
5	0.3540	25.23	10.02	35.25	58.87	-23.62	QP
6	0.3540	15.24	10.02	25.26	48.87	-23.61	AVG
7	1.4819	16.82	10.06	26.88	56.00	-29.12	QP
8	1.4819	2.05	10.06	12.11	46.00	-33.89	AVG
9	3.9700	21.49	9.99	31.48	56.00	-24.52	QP
10	3.9700	9.55	9.99	19.54	46.00	-26.46	AVG
11	8.0020	29.27	10.09	39.36	60.00	-20.64	QP
12	8.0020	20.11	10.09	30.20	50.00	-19.80	AVG



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EUT:	Keyboa	ard	3 117.	Model Nan	ne :	B45	CONT.
Temperature:	25℃	dinn		Relative H	umidity:	55%	
Test Voltage:	AC 120	0V/60 Hz			mil	1733	
Terminal:	Neutra		Alle	VIV			Com
Test Mode:	Mode 1				N. Carrie		
Remark: Only showed test data of the worst mode							- 4
90.0 dBuV						OD:	
						QP: AVG:	
X	+						
A X	K x						
40		1.		نسل بديرا	Karangaran dar Alagh	Membel	
	WALANT .	May Johnson	Mand on Market Market	hard the state of	M.	V	يد بالماكم بدر
I	W W W W W	M M	. VVVV	William And Market Street	The state of the s	where one	peak
$\square$ $\square$ $\square$ $\square$ $\square$	11111	Juliud Live With March	May my my my	All the second		V.	AVG
,							
-10							
-10 0.150	0.5		(MHz)	5			30.000
0.150	F	Reading	Correct	Measure-			30.000
0.150		Level	Correct Factor	Measure- ment	Limit	Over	
0.150 No. Mk.	Freq. MHz	<b>Level</b> dBuV	Correct Factor	Measure- ment	dBuV	dB	Detector
0.150  No. Mk.	Freq. MHz 1819	dBuV 43.21	Correct Factor dB 9.98	Measure- ment dBuV 53.19	dBu√ 64.39	dB -11.20	Detector
0.150  No. Mk.	Freq. MHz	<b>Level</b> dBuV	Correct Factor	Measure- ment	dBuV	dB	Detector
0.150  No. Mk.  1 0. 2 * 0.	Freq. MHz 1819	dBuV 43.21	Correct Factor dB 9.98	Measure- ment dBuV 53.19	dBu√ 64.39	dB -11.20 -6.95	Detector
0.150  No. Mk.  1 0. 2 * 0. 3 0.	Freq. MHz 1819 1819	dBuV 43.21 37.46	Correct Factor dB 9.98 9.98	Measure- ment dBuV 53.19 47.44	dBuV 64.39 54.39 61.75	dB -11.20 -6.95	Detector QP AVG
0.150  No. Mk.  1 0.  2 * 0.  3 0.  4 0.	Freq. MHz 1819 1819 2500	dBuV 43.21 37.46 30.49	Correct Factor dB 9.98 9.98 10.02	Measure- ment dBuV 53.19 47.44 40.51	dBuV 64.39 54.39 61.75 51.75	dB -11.20 -6.95 -21.24	Detector QP AVG QP
0.150  No. Mk.  1 0. 2 * 0. 3 0. 4 0. 5 0.	Freq. MHz 1819 1819 2500	dBuV 43.21 37.46 30.49 20.84	Correct Factor dB 9.98 9.98 10.02 10.02	Measure- ment dBuV 53.19 47.44 40.51 30.86	dBuV 64.39 54.39 61.75 51.75 58.68	dB -11.20 -6.95 -21.24 -20.89	Detector QP AVG QP AVG
No. Mk.  1 0. 2 * 0. 3 0. 4 0. 5 0. 6 0.	Freq. MHz 1819 1819 2500 2500 3620	dBuV 43.21 37.46 30.49 20.84 31.70	Correct Factor dB 9.98 9.98 10.02 10.02	Measure- ment  dBuV  53.19  47.44  40.51  30.86  41.72	dBuV 64.39 54.39 61.75 51.75 58.68 48.68	dB -11.20 -6.95 -21.24 -20.89 -16.96	Detector QP AVG QP AVG QP
0.150  No. Mk.  1 0. 2 * 0. 3 0. 4 0. 5 0. 6 0. 7 0.	Freq. MHz 1819 1819 2500 2500 3620	dBuV 43.21 37.46 30.49 20.84 31.70 24.97	Correct Factor dB 9.98 9.98 10.02 10.02 10.02	Measure- ment  dBuV  53.19  47.44  40.51  30.86  41.72  34.99	dBuV 64.39 54.39 61.75 51.75 58.68 48.68 57.25	dB -11.20 -6.95 -21.24 -20.89 -16.96 -13.69	Detector QP AVG QP AVG QP AVG
0.150  No. Mk.  1 0. 2 * 0. 3 0. 4 0. 5 0. 6 0. 7 0. 8 0.	Freq. MHz 1819 1819 2500 2500 3620 3620 4300	dBuV 43.21 37.46 30.49 20.84 31.70 24.97 30.75	Correct Factor  dB  9.98  9.98  10.02  10.02  10.02  10.02	Measure- ment  dBuV  53.19  47.44  40.51  30.86  41.72  34.99  40.77	dBuV 64.39 54.39 61.75 51.75 58.68 48.68 57.25 47.25	dB -11.20 -6.95 -21.24 -20.89 -16.96 -13.69 -16.48	Detector QP AVG QP AVG QP AVG QP AVG
0.150  No. Mk.  1 0. 2 * 0. 3 0. 4 0. 5 0. 6 0. 7 0. 8 0. 9 0.	Freq. MHz 1819 1819 2500 2500 3620 3620 4300 4300	dBuV 43.21 37.46 30.49 20.84 31.70 24.97 30.75 23.82	Correct Factor  dB  9.98  9.98  10.02  10.02  10.02  10.02  10.02	Measure-ment  dBuV  53.19  47.44  40.51  30.86  41.72  34.99  40.77  33.84	dBuV 64.39 54.39 61.75 51.75 58.68 48.68 57.25 47.25 56.00	dB -11.20 -6.95 -21.24 -20.89 -16.96 -13.69 -16.48 -13.41	Detector QP AVG QP AVG QP AVG QP AVG
No. Mk.  1 0. 2 * 0. 3 0. 4 0. 5 0. 6 0. 7 0. 8 0. 9 0. 10 0.	Freq. MHz 1819 1819 2500 2500 3620 3620 4300 4300 6580	dBuV 43.21 37.46 30.49 20.84 31.70 24.97 30.75 23.82 24.61 13.25	Correct Factor  dB  9.98  9.98  10.02  10.02  10.02  10.02  10.02  10.10  10.10	Measurement  dBuV  53.19  47.44  40.51  30.86  41.72  34.99  40.77  33.84  34.71  23.35	dBuV 64.39 54.39 61.75 51.75 58.68 48.68 57.25 47.25 56.00 46.00	dB -11.20 -6.95 -21.24 -20.89 -16.96 -13.69 -16.48 -13.41 -21.29	Detector QP AVG QP AVG QP AVG QP AVG QP AVG
No. Mk.  1 0. 2 * 0. 3 0. 4 0. 5 0. 6 0. 7 0. 8 0. 9 0. 10 0. 11 6.	Freq. MHz 1819 1819 2500 2500 3620 3620 4300 4300 6580	dBuV 43.21 37.46 30.49 20.84 31.70 24.97 30.75 23.82 24.61	Correct Factor  dB  9.98  9.98  10.02  10.02  10.02  10.02  10.02  10.02  10.02	Measure-ment  dBuV  53.19  47.44  40.51  30.86  41.72  34.99  40.77  33.84  34.71	dBuV 64.39 54.39 61.75 51.75 58.68 48.68 57.25 47.25 56.00 46.00	dB -11.20 -6.95 -21.24 -20.89 -16.96 -13.69 -16.48 -13.41 -21.29 -22.65	Detector QP AVG QP AVG QP AVG QP AVG QP AVG



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# 5. Radiated Emission Test

## 5.1 Test Standard and Limit

5.1.1 Test Standard FCC Part 15.247(d)

5.1.2 Test Limit

### Radiated Emission Limits (9kHz~1000MHz)

Frequency (MHz	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

#### Radiated Emission Limit (Above 1000MHz)

Frequency	Distance Met	ers(at 3m)
(MHz)	Peak (dBuV/m)	Average (dBuV/m)
Above 1000	74	54

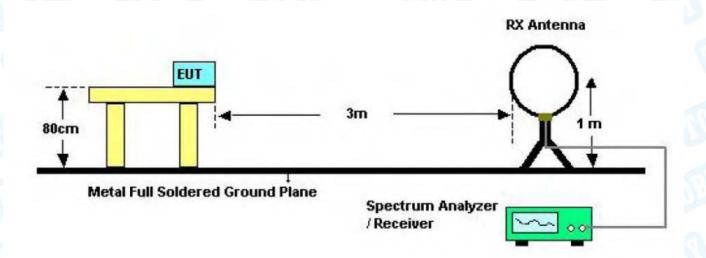
#### Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBuV/m)=20log Emission Level (uV/m)

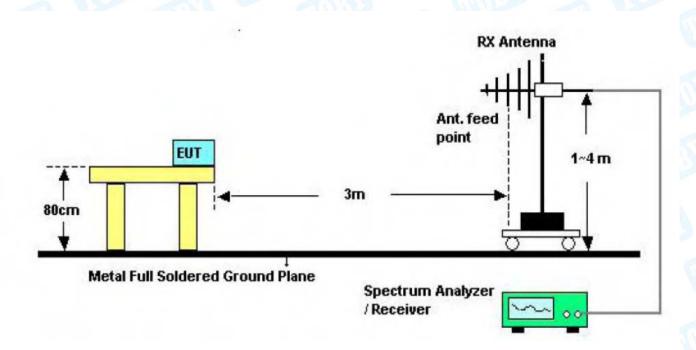


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# 5.2 Test Setup



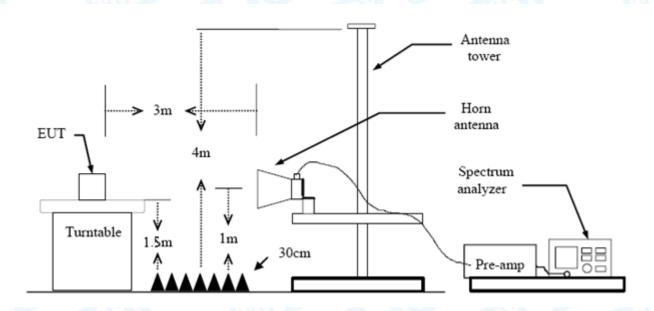
Below 30MHz Test Setup



Below 1000MHz Test Setup



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Above 1GHz Test Setup

#### 5.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.



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# 5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

#### 5.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

Test data please refer the following pages.



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## 9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB

below the permissible value has no need to be reported.

## 30MHz~1GHz

EUT:	Keyboard	Model:	B45			
Temperature:	ure: 25℃ Relative Humidity:		55%			
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal		Alle			
Test Mode:	BLE TX 2402 Mode (Module 1)					
Remark:	Only worse case is reported					
80.0 dBuV/m						
30	3		3M Radiation Margin -6 dB			
	Marily white (I	and a number of the ball of the beauti	AND			
20 30.000 40 50	60 70 80 (MHz)  Reading Correct	300 400 500 Measure-				
20 30.000 40 50 No. Mk. F	Reading Correct req. Level Factor	300 400 500 Measure-	600 700 1000.000			
20 30.000 40 50 No. Mk. F	Reading Correct req. Level Factor	300 400 500  Measure- ment Limit	Over  dB Detector			
No. Mk. F	Reading Correct Factor  MHz dBuV dB/m  9174 52.24 -16.17	300 400 500  Measurement Limit  dBuV/m dBuV/m  36.07 40.00	Over  dB Detector  -3.93 peak			
No. Mk. F  1 * 33.9 2 ! 38.3	Reading Correct Factor MHz dBuV dB/m 9174 52.24 -16.17 3462 53.50 -18.89	300 400 500  Measurement Limit  dBuV/m dBuV/m  36.07 40.00  34.61 40.00	Over  dB Detector  -3.93 peak  -5.39 peak			
No. Mk. F  1 * 33.9 2 ! 38.3 3 100.	Reading Correct Factor MHz dBuV dB/m 9174 52.24 -16.17 3462 53.50 -18.89 .5806 55.42 -21.37	300 400 500  Measurement Limit  dBuV/m dBuV/m  36.07 40.00  34.61 40.00  34.05 43.50	Over  dB Detector  -3.93 peak  -5.39 peak  -9.45 peak			
No. Mk. F  No. Mk. F  1 * 33.9  2 ! 38.3  3 100.  4 155.	Reading Correct Factor MHz dBuV dB/m 9174 52.24 -16.17 3462 53.50 -18.89 .5806 55.42 -21.37	300 400 500  Measurement Limit  dBuV/m dBuV/m  36.07 40.00  34.61 40.00  34.05 43.50  34.29 43.50	Over  dB Detector  -3.93 peak  -5.39 peak  -9.45 peak  -9.21 peak			
No. Mk. F  No. Mk. F  1 * 33.9  2 ! 38.3  3 100.  4 155.  5 167.	Reading Correct Factor MHz dBuV dB/m 9174 52.24 -16.17 3462 53.50 -18.89 .5806 55.42 -21.37	300 400 500  Measurement Limit  dBuV/m dBuV/m  36.07 40.00  34.61 40.00  34.05 43.50	Over  dB Detector  -3.93 peak  -5.39 peak  -9.45 peak			



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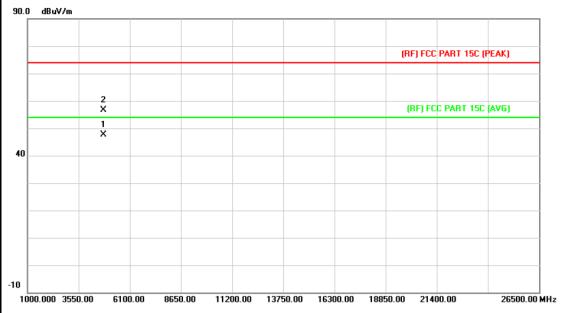
UT:	Keyboa	ard	1 W	Model:		B45	301	
Temperature:	25℃	6.11	1193	Relative	Humidity:	55%		
Test Voltage:	DC 3.7	V						
Ant. Pol.	Vertica	P _						
Test Mode:	BLE T	X 2402 M	lode (Module 1			BR	A STATE OF THE PARTY OF THE PAR	
Remark:	Only w	orse cas	e is reported		MARY			
80.0 dBuV/m								
					(RF)FCC 15C 3	BM Radiation		
						Margin -6 d	IB	
1 2		5	6	_				
X 5	3 4	X	× ۲	_				
30 # 1	. M T M	J.J.M.W.	և, լ [ [					
30	MIM 1.		Wall had belowed		Lilia ak	Malaka	A STANSON STANSON	
30	Mayney	MAN AND MAN		In the state of th	Julius Hamphilia de Allens de La	west, we have shall like the same	A STANSON OF THE STAN	
30	Mahamak		Legh Jak Jak Jahradah		der south the second design of the second	mento antique de legitario en	Addition to	
30	Man Ja	wall place	Landrah Jan Landra	Market folks had been been been been been been been bee	delated by his hold filly sight.	wexions, byco bellistic on	phonoid politicals	
30		MANY MARKA	Landrah Januaria		delain the september of	wasanin kate kate asan n	12 March	
- AND COMPANY IN COLUMN	pl Juph		Landrah January		delated by his held filly people.	ortenero, kyrodollyddiaeno,	and alphan	
20 30.000 40 50	60 70	80	(MHz)	300	400 500	600 700	1000.00	
-20	60 70	80	(MHz)		400 500			
20 30.000 40 50		80 Reading	(MHz)	Measure-				
20 30.000 40 50 No. Mk. F	req.	80 Reading Level	(MHz) g Correct Factor	Measure- ment	Limit	600 700 Over	1000.00	
20 30.000 40 50 No. Mk. F	req. 1Hz	Reading Level	(MHz) g Correct Factor dB/m	Measure- ment	Limit dBuV/m	600 700 Over	1000.00	
No. Mk. F	req. 1Hz	Reading Level dBuV 53.27	g Correct Factor dB/m -17.44	Measure- ment dBuV/m 35.83	Limit  dBuV/m  40.00	000 700  Over  dB  -4.17	1000.00	
No. Mk. F	req. 1Hz	Reading Level	(MHz) g Correct Factor dB/m	Measure- ment	Limit dBuV/m	600 700 Over	1000.00	
No. Mk. F  1 * 36.0 2 44.9	req. 1Hz	Reading Level dBuV 53.27	g Correct Factor dB/m -17.44 -21.94	Measure- ment dBuV/m 35.83	Limit  dBuV/m  40.00  40.00	000 700  Over  dB  -4.17	Detector	
No. Mk. F  1 * 36.0 2 44.9 3 59.8	req. 1Hz 0007 9004 3588	Reading Level dBuV 53.27 55.81 56.99	(MHz) g Correct Factor dB/m -17.44 -21.94 -24.19	Measure- ment dBuV/m 35.83 33.87 32.80	Limit  dBuV/m  40.00  40.00  40.00	Over dB -4.17 -6.13 -7.20	Detector peal peal peal	
No. Mk. F  1 * 36.0 2 44.9 3 59.8 4 71.8	req. 1Hz 0007 9004 3588 3319	80 Reading Level dBuV 53.27 55.81 56.99 55.44	(MHz) g Correct Factor dB/m -17.44 -21.94 -24.19 -23.22	Measure- ment dBuV/m 35.83 33.87 32.80 32.22	Limit  dBuV/m  40.00  40.00  40.00  40.00	Over dB -4.17 -6.13 -7.20 -7.78	Detector peal peal peal	
No. Mk. F  No. Mk. F  1 * 36.0  2 44.9  3 59.8  4 71.8  5 107.	req. 1Hz 0007 9004 3588	Reading Level dBuV 53.27 55.81 56.99	(MHz) g Correct Factor dB/m -17.44 -21.94 -24.19 -23.22 -21.41	Measure- ment dBuV/m 35.83 33.87 32.80	Limit  dBuV/m  40.00  40.00  40.00  40.00  40.00  43.50	Over dB -4.17 -6.13 -7.20	Detector peal peal peal	



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## Above 1GHz

EUT:	Keyboard	Model:	B45			
Temperature:	25℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal		CHID TO SERVE			
Test Mode:	BLE Mode TX 2402 MHz (Modu	le 1)				
Remark:	No report for the emission which more than 10 dB below the					
	prescribed limit.		THE			

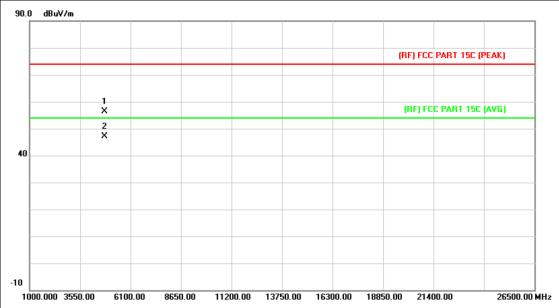


1	No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
			MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		*	4803.720	34.22	13.44	47.66	54.00	-6.34	AVG
2			4804.279	43.14	13.44	56.58	74.00	-17.42	peak



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EUT:	Keyboard	Model:	B45			
Temperature:	25°C	Relative Humidity:	55%			
Test Voltage:	DC 3.7V	COUNTY OF THE PARTY OF THE PART				
Ant. Pol.	Vertical					
Test Mode:	BLE Mode TX 2402 MHz (Modu	ule 1)	A Brown			
Remark:	No report for the emission which more than 10 dB below the					
	prescribed limit.		THE PARTY OF			

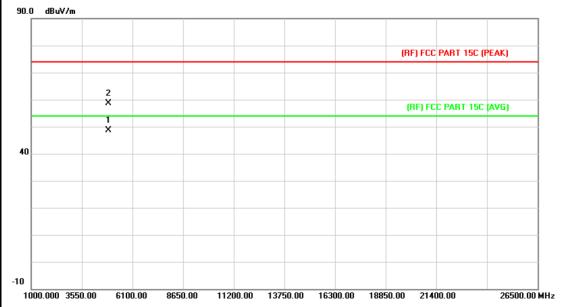


No	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4804.255	42.88	13.44	56.32	74.00	-17.68	peak
2	*	4804.336	33.74	13.44	47.18	54.00	-6.82	AVG



Page: 23 of 77

EUT:	Keyboard	Model:	B45			
Temperature:	25℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V	WILLIAM TO THE PARTY OF THE PAR				
Ant. Pol.	Horizontal					
Test Mode:	BLE Mode TX 2442 MHz (Modu	ıle 1)	File			
Remark:	No report for the emission which more than 10 dB below the					
	prescribed limit.					

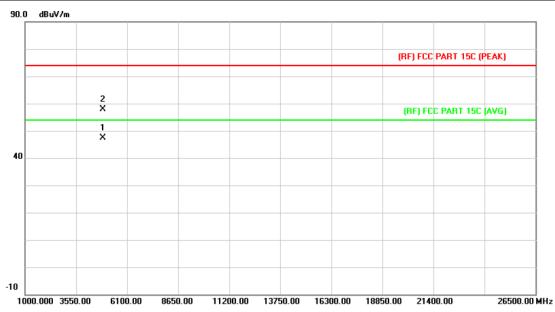


N	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4883.960	34.69	13.92	48.61	54.00	-5.39	AVG
2		4884.527	44.80	13.92	58.72	74.00	-15.28	peak



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EUT:	Keyboard	Model:	B45			
Temperature:	25℃	Relative Humidity: 55%				
Test Voltage:	DC 3.7V					
Ant. Pol.	Vertical	Vertical				
Test Mode:	BLE Mode TX 2442 MHz (Modu	ıle 1)	File			
Remark:	No report for the emission which	n more than 10 dB belo	w the			
	prescribed limit.					
l I						

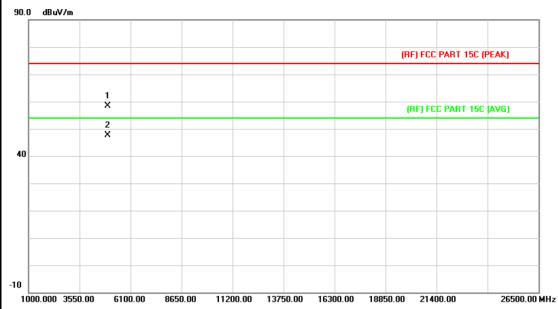


	No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
			MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		*	4883.855	33.49	13.92	47.41	54.00	-6.59	AVG
2			4884.117	43.85	13.92	57.77	74.00	-16.23	peak



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EUT:	Keyboard	Model:				
Temperature:	25℃	Relative Humidity: 55%				
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal	Horizontal				
Test Mode:	BLE Mode TX 2480 MHz (Mod	dule 1)	N. B.			
Remark:	No report for the emission which more than 10 dB below the prescribed limit.					

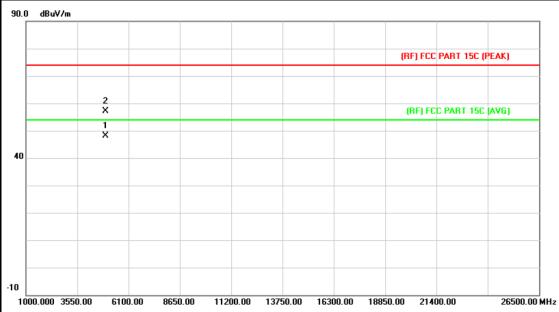


No	. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4960.587	43.99	14.36	58.35	74.00	-15.65	peak
2	*	4961.122	33.14	14.38	47.52	54.00	-6.48	AVG



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EUT:	Keyboard	Model:	B45			
Temperature:	25℃	55%				
Test Voltage:	DC 3.7V					
Ant. Pol.	Vertical	Vertical				
Test Mode:	BLE Mode TX 2480 MHz (Modu	le 1)	F. B. Carrie			
Remark:	No report for the emission which	more than 10 dB below	w the			
	prescribed limit.					

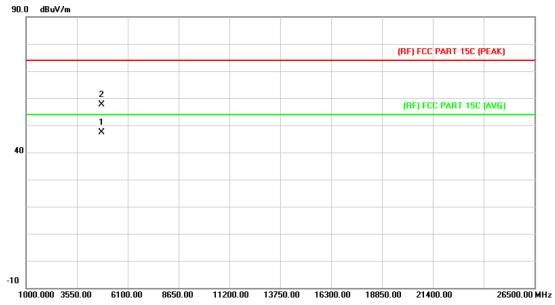


N	lo. N	۸k.	Freq.	Reading Level		Measure- ment	Limit	Over	
			MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4	4960.524	33.86	14.36	48.22	54.00	-5.78	AVG
2		4	4961.336	42.76	14.38	57.14	74.00	-16.86	peak



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EUT:	Keyboard	Model:	B45			
Temperature:	25℃	Relative Humidity: 55				
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal	Horizontal				
Test Mode:	BLE Mode TX 2402 MHz (Modu	ıle 2)	F. Dr.			
Remark:	No report for the emission which	n more than 10 dB belo	w the			
	prescribed limit.					

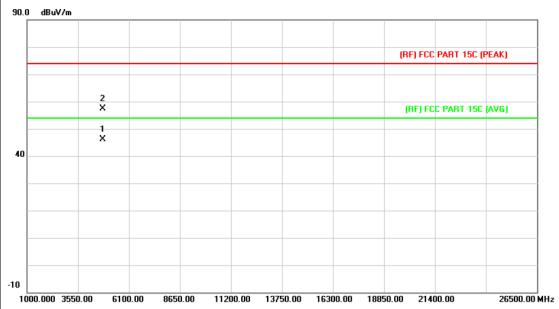


N	o. M	k. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.854	34.05	13.44	47.49	54.00	-6.51	AVG
2		4804.476	44.14	13.44	57.58	74.00	-16.42	peak



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EUT:	Keyboard	Model:	B45			
Temperature:	25℃	Relative Humidity: 55%				
Test Voltage:	DC 3.7V					
Ant. Pol.	Vertical	Vertical				
Test Mode:	BLE Mode TX 2402 MHz (Mod	lule 2)	A Brown			
Remark:	No report for the emission whi	ch more than 10 dB below	v the			
	prescribed limit.					

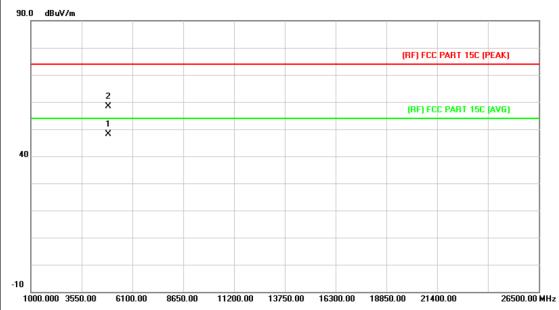


No	o. MI	k. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4804.287	32.67	13.44	46.11	54.00	-7.89	AVG
2		4804.635	43.88	13.44	57.32	74.00	-16.68	peak



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EUT:	Keyboard	Model: B45				
Temperature:	<b>25</b> ℃	Relative Humidity: 55%				
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal	Horizontal				
Test Mode:	BLE Mode TX 2442 MHz (Mode	ule 2)	F. B.			
Remark:	No report for the emission which more than 10 dB below the					
	prescribed limit.					

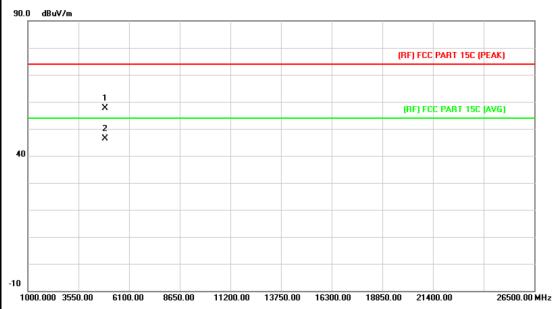


	No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
			MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		*	4883.742	34.23	13.92	48.15	54.00	-5.85	AVG
2			4884.364	44.44	13.92	58.36	74.00	-15.64	peak



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EUT:	Keyboard	Model:	B45					
Temperature:	25℃	C Relative Humidity: 55%						
Test Voltage:	DC 3.7V	DC 3.7V						
Ant. Pol.	Vertical							
Test Mode:	BLE Mode TX 2442 MHz (Modu	le 2)	F. Brown					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.							

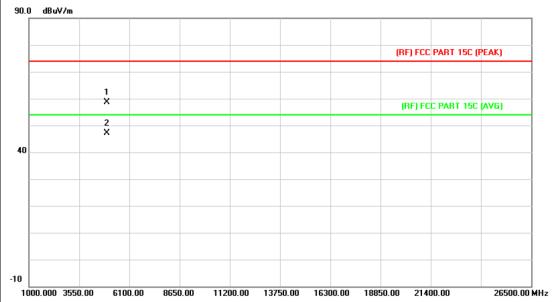


N	lo. Mk	. Freq.	_	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4883.745	43.63	13.92	57.55	74.00	-16.45	peak
2	*	4884.248	32.39	13.92	46.31	54.00	-7.69	AVG



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EUT:	Keyboard	rd Model: B					
Temperature:	<b>25</b> ℃	Relative Humidity: 55%					
Test Voltage:	DC 3.7V	DC 3.7V					
Ant. Pol.	Horizontal						
Test Mode:	BLE Mode TX 2480 MHz (Modu	le 2)	F. D.				
Remark:	No report for the emission which	No report for the emission which more than 10 dB below the					
	prescribed limit.						
i							

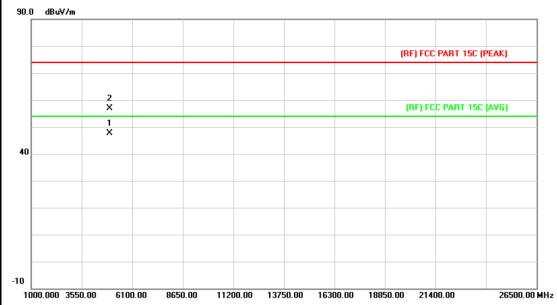


No	o. Mk	Freq.	_	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4960.873	44.31	14.36	58.67	74.00	-15.33	peak
2	*	4961.455	32.64	14.38	47.02	54.00	-6.98	AVG



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EUT:	Keyboard Model: B45							
Temperature:	25℃	25℃ Relative Humidity: 55%						
Test Voltage:	DC 3.7V	DC 3.7V						
Ant. Pol.	Vertical							
Test Mode:	BLE Mode TX 2480 MHz (Modu	le 2)	A DO					
Remark:	No report for the emission which more than 10 dB below the							
	prescribed limit.							

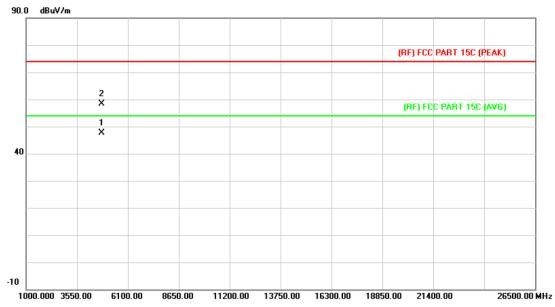


N	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4960.982	33.20	14.36	47.56	54.00	-6.44	AVG
2		4961.543	42.49	14.38	56.87	74.00	-17.13	peak



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EUT:	Keyboard	Keyboard Model: B45					
Temperature:	25℃	Relative Humidity: 55%					
Test Voltage:	DC 3.7V	DC 3.7V					
Ant. Pol.	Horizontal						
Test Mode:	BLE Mode TX 2402 MHz (Modu	le 3)	A DO				
Remark:	No report for the emission which	No report for the emission which more than 10 dB below the					
	prescribed limit.						

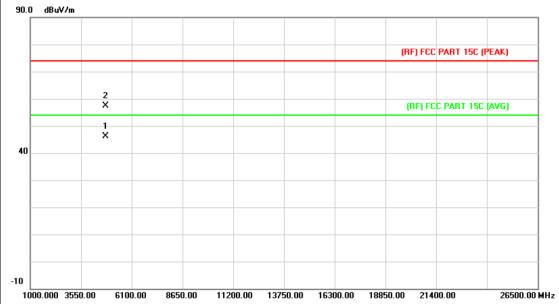


No	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.963	34.22	13.44	47.66	54.00	-6.34	AVG
2		4804.587	45.01	13.44	58.45	74.00	-15.55	peak



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EUT:	Keyboard	Model:	B45			
Temperature:	<b>25</b> ℃	Relative Humidity: 55%				
Test Voltage:	DC 3.7V	MILLS				
Ant. Pol.	Vertical					
Test Mode:	BLE Mode TX 2402 MHz (Modu	ıle 3)	A Brown			
Remark:	No report for the emission which	No report for the emission which more than 10 dB below the				
	prescribed limit.					

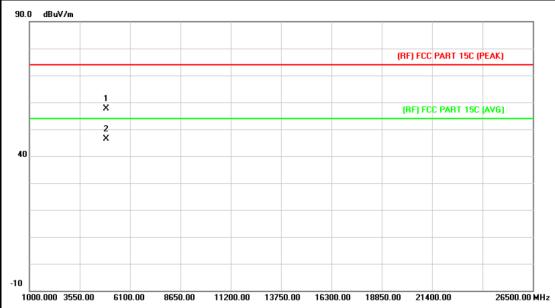


No	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4804.287	32.67	13.44	46.11	54.00	-7.89	AVG
2		4804.635	43.88	13.44	57.32	74.00	-16.68	peak



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Keyboard	Model:	B45				
25℃	Relative Humidity:	55%				
DC 3.7V	DC 3.7V					
Horizontal						
BLE Mode TX 2442 MHz (Modu	ıle 3)	Film				
No report for the emission which more than 10 dB below the						
prescribed limit.						
	25°C  DC 3.7V  Horizontal  BLE Mode TX 2442 MHz (Modul No report for the emission which	25°C Relative Humidity:  DC 3.7V  Horizontal  BLE Mode TX 2442 MHz (Module 3)  No report for the emission which more than 10 dB below				

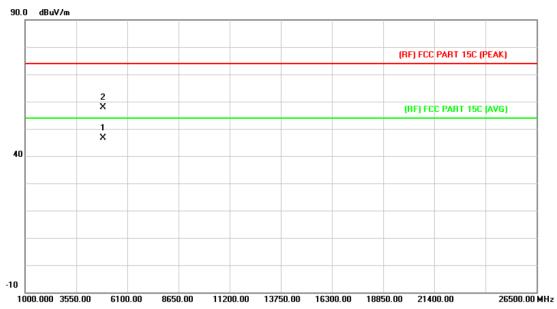


No	. Mk	. Freq.	_	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4883.745	43.63	13.92	57.55	74.00	-16.45	peak
2	*	4884.248	32.39	13.92	46.31	54.00	-7.69	AVG



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EUT:	Keyboard	Model:	B45		
Temperature:	25℃	Relative Humidity:	55%		
Test Voltage:	DC 3.7V				
Ant. Pol.	Vertical				
Test Mode:	BLE Mode TX 2442 MHz (Module 3)				
Remark:	No report for the emission which more than 10 dB below the				
	prescribed limit.				

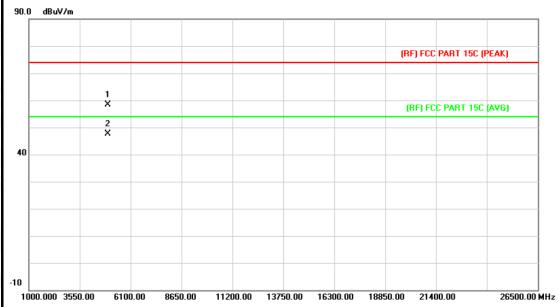


No	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4884.362	32.76	13.92	46.68	54.00	-7.32	AVG
2		4884.468	44.00	13.92	57.92	74.00	-16.08	peak



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EUT:	Keyboard	Model:	B45					
Temperature:	<b>25</b> ℃	25℃ Relative Humidity:						
Test Voltage:	DC 3.7V	DC 3.7V						
Ant. Pol.	Horizontal							
Test Mode:	BLE Mode TX 2480 MHz (Modu	ıle 3)	A DOME					
Remark:	No report for the emission whic	No report for the emission which more than 10 dB below the						
	prescribed limit.							

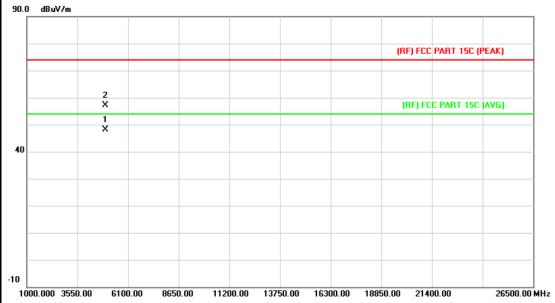


No.	Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4960.587	43.99	14.36	58.35	74.00	-15.65	peak
2	*	4961.122	33.14	14.38	47.52	54.00	-6.48	AVG



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EUT:	Keyboard	Model:	B45					
Temperature:	25℃	5℃ Relative Humidity: 55						
Test Voltage:	DC 3.7V	DC 3.7V						
Ant. Pol.	Vertical							
Test Mode:	BLE Mode TX 2480 MHz (Modu	ule 3)	A DO					
Remark:	No report for the emission whic	h more than 10 dB belo	w the					
	prescribed limit.							



N	o. N	Лk.	Freq.	Reading Level		Measure- ment	Limit	Over	
			MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*		4960.524	33.86	14.36	48.22	54.00	-5.78	AVG
2			4961.336	42.76	14.38	57.14	74.00	-16.86	peak



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# 6. Restricted Bands Requirement

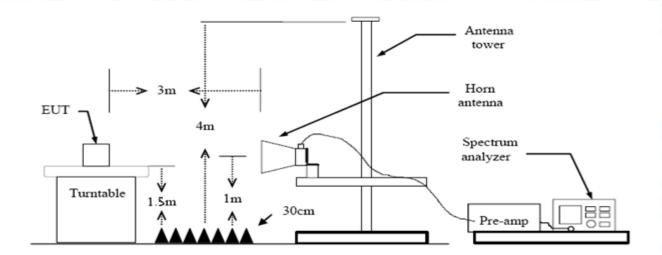
#### 6.1 Test Standard and Limit

6.1.1 Test Standard FCC Part 15.247(d) FCC Part 15.205

6.1.2 Test Limit

Restricted Frequency	Distance Me	eters(at 3m)
Band (MHz)	Peak (dBuV/m)	Average (dBuV/m)
310 ~2390	74	54
2483.5 ~2500	74	54

# 6.2 Test Setup



## 6.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector



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mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.

# 6.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

# 6.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

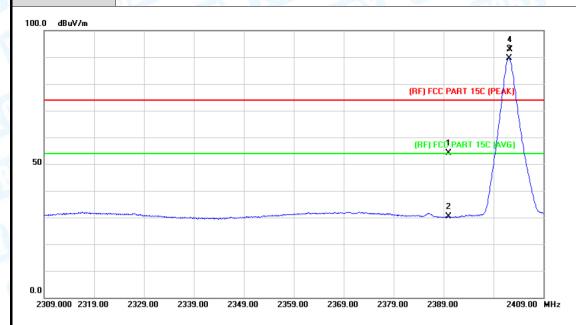
Test data please refer the following pages.



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# (1) Radiation Test

EUT:	Keyboard	Model:	B45			
Temperature:	25℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal		N. W.			
Test Mode:	BLE Mode TX 2402 MHz(Module	1)				
Remark:	N/A					

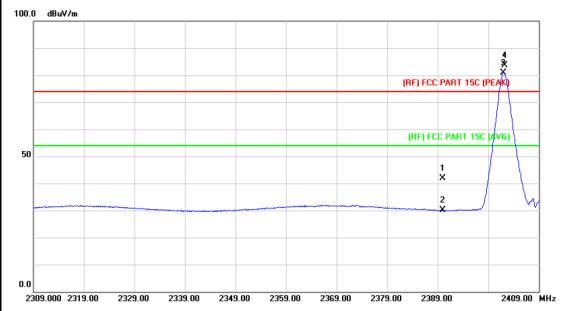


No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	53.25	0.77	54.02	74.00	-19.98	peak
2		2390.000	29.69	0.77	30.46	54.00	-23.54	AVG
3	*	2402.100	88.85	0.82	89.67	- Fundamenta	Frequency	AVG
4	Χ	2402.300	91.98	0.82	92.80	Fundamenta	l Frequency	peak



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Keyboard	Model:	B45					
25℃ Relative Humidity: 55%							
DC 3.7V	DC 3.7V						
Vertical							
BLE Mode TX 2402 MHz(Module	e 1)	A DO					
N/A	N/A						
	25℃ DC 3.7V Vertical BLE Mode TX 2402 MHz(Module	25℃ Relative Humidity:  DC 3.7V  Vertical  BLE Mode TX 2402 MHz(Module 1)					

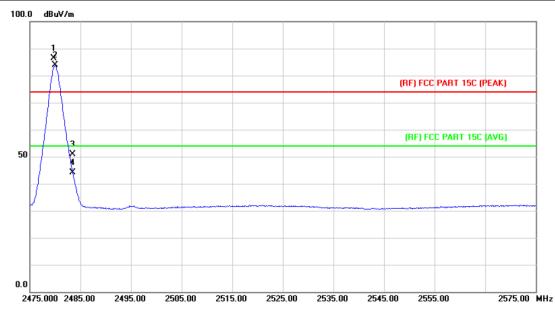


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	41.20	0.77	41.97	74.00	-32.03	peak
2		2390.000	29.24	0.77	30.01	54.00	-23.99	AVG
3	*	2402.000	80.07	0.82	80.89	Fundamental	Frequency	AVG
4	Χ	2402.300	82.88	0.82	83.70	Fundamental	Frequency	peak



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EUT:	Keyboard	B45						
Temperature:	25℃ Relative Humidity: 55%							
Test Voltage:	DC 3.7V	DC 3.7V						
Ant. Pol.	Horizontal							
Test Mode:	BLE Mode TX 2480 MHz(Module	1)	M. C.					
Remark:	N/A							

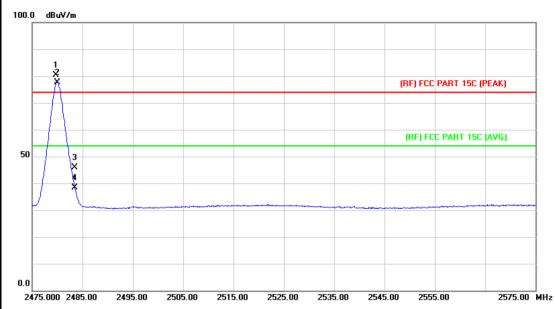


No.	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	X	2479.700	85.21	1.15	86.36	- Fundamental	Frequency	peak
2	*	2480.000	82.74	1.15	83.89	Fundamental	Frequency	AVG
3		2483.500	49.83	1.17	51.00	74.00	-23.00	peak
4		2483.500	42.95	1.17	44.12	54.00	-9.88	AVG



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Š	EUT:	Keyboard	Model:	B45					
	Temperature:	25℃	55%						
1	Test Voltage:	DC 3.7V	DC 3.7V						
N	Ant. Pol.	Vertical							
P	Test Mode:	BLE Mode TX 2480 MHz(Module	e 1)	F. B. Carrie					
ĺ	Remark:	N/A							

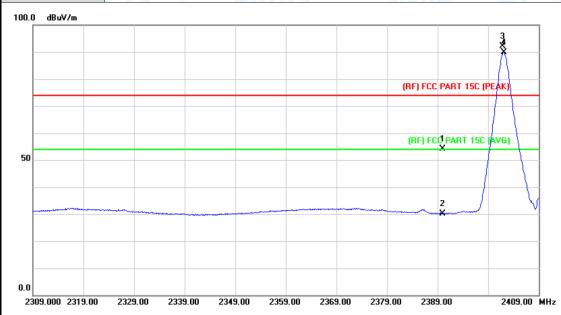


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	X	2479.700	79.25	1.15	80.40	Fundamental F	requency	peak
2	*	2480.000	76.60	1.15	77.75	Fundamental F	requency	AVG
3		2483.500	44.73	1.17	45.90	74.00	-28.10	peak
4		2483.500	37.14	1.17	38.31	54.00	-15.69	AVG



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EUT:	Keyboard	Model:	B45				
Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V						
Ant. Pol.	Horizontal						
Test Mode:	BLE Mode TX 2402 MHz(Module 2)						
Remark:	N/A		- D				

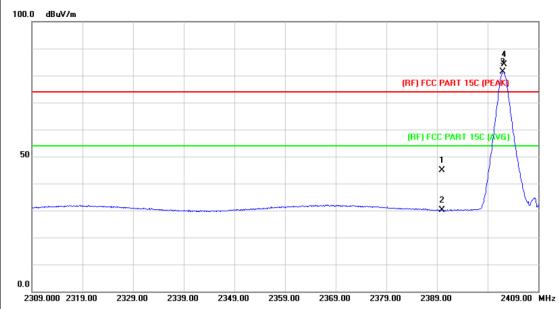


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	53.45	0.77	54.22	74.00	-19.78	peak
2		2390.000	29.32	0.77	30.09	54.00	-23.91	AVG
3	Χ	2401.800	91.38	0.82	92.20	Fundamental	Frequency	peak
4	*	2402.100	88.96	0.82	89.78	Fundamental	Frequency	AVG



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EUT:	Keyboard	Model:	B45				
Temperatur	re: 25℃	Relative Humidity:	55%				
Test Voltage	e: DC 3.7V	DC 3.7V					
Ant. Pol.	Vertical	THE STATE OF THE S					
Test Mode:	BLE Mode TX 2402	BLE Mode TX 2402 MHz(Module 2)					
Remark:	N/A		~ 0				

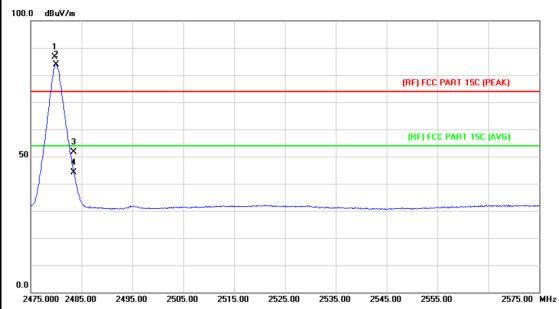


No.	Mk.	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	44.04	0.77	44.81	74.00	-29.19	peak
2		2390.000	29.35	0.77	30.12	54.00	-23.88	AVG
3	*	2402.000	80.48	0.82	81.30	- Fundamental	Frequency	AVG
4	X	2402.300	83.30	0.82	84.12	- Fundamental	Frequency	peak



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EUT:	Keyboard	Model:	B45				
Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V						
Ant. Pol.	Horizontal						
Test Mode:	BLE Mode TX 2480 MHz(Module 2)						
Remark:	N/A		1				

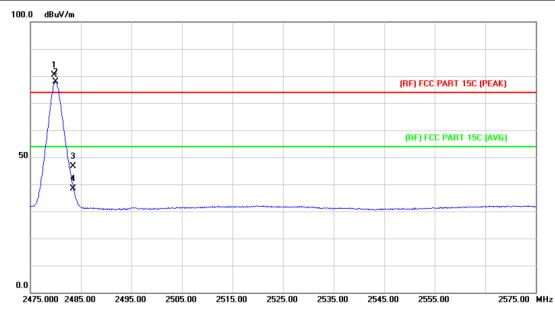


N	lo. N	۸k.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
			MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	X		2479.700	85.50	1.15	86.65	Fundamental	Frequency	peak
2	*		2480.000	82.67	1.15	83.82	Fundamental	Frequency	AVG
3			2483.500	50.58	1.17	51.75	74.00	-22.25	peak
4			2483.500	43.04	1.17	44.21	54.00	-9.79	AVG



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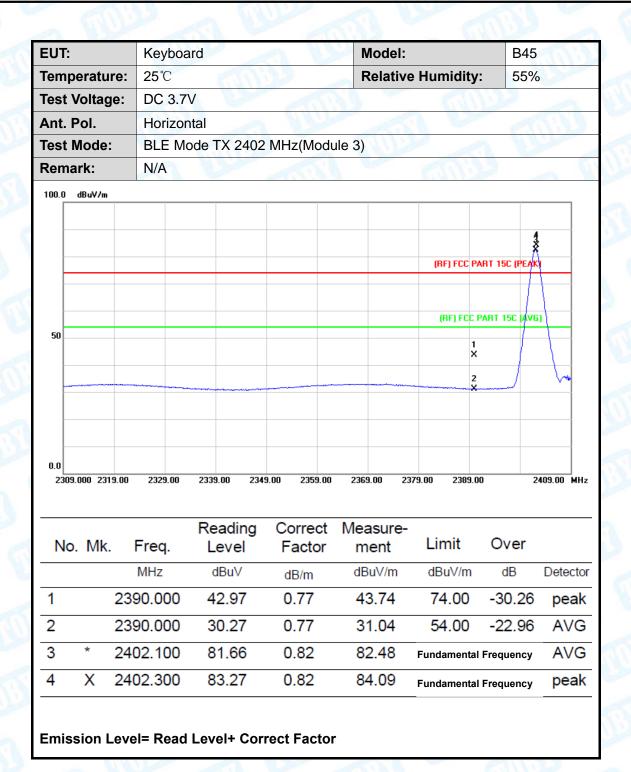
EUT:	Keyboard	Model:	B45				
Temperature:	25℃	Relative Humidity:	55%				
Test Voltage:	DC 3.7V	DC 3.7V					
Ant. Pol.	Vertical		(C)				
Test Mode:	BLE Mode TX 2480 MHz(Module 2)						
Remark:	N/A	W. W. W.					



N	lo. M	lk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
			MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	Χ	-	2479.700	79.24	1.15	80.39	Fundamental F	requency	peak
2	*	:	2480.000	76.78	1.15	77.93	Fundamental F	requency	AVG
3		:	2483.500	45.37	1.17	46.54	74.00	-27.46	peak
4		-	2483.500	37.33	1.17	38.50	54.00	-15.50	AVG



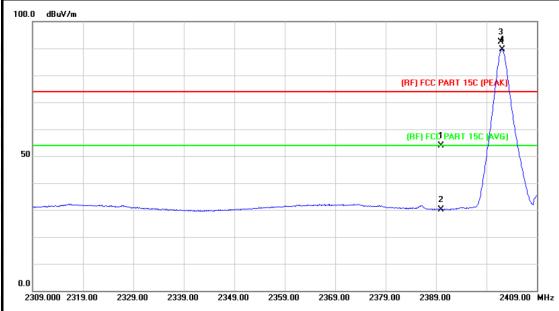
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EUT:	Keyboard	Model:	B45		
Temperature:	25℃	55%			
Test Voltage:	DC 3.7V				
Ant. Pol.	Vertical				
Test Mode:	BLE Mode TX 2402 MHz(Module 3)				
Remark:	N/A	WUP.	- B		

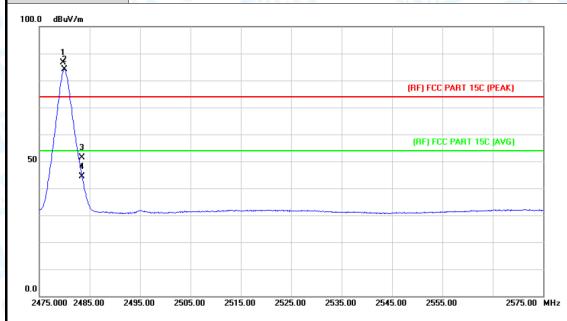


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	53.11	0.77	53.88	74.00	-20.12	peak
2		2390.000	29.42	0.77	30.19	54.00	-23.81	AVG
3	X	2401.800	91.53	0.82	92.35	Fundamental	Frequency	peak
4	*	2402.100	88.75	0.82	89.57	Fundamental	Frequency	AVG



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EUT:	Keyboard	Model:	B45			
Temperature:	25℃	Relative Humidity:	55%			
Test Voltage:	DC 3.7V					
Ant. Pol.	Horizontal					
Test Mode:	BLE Mode TX 2480 MHz(Module 3)					
Remark:	N/A		- 0			

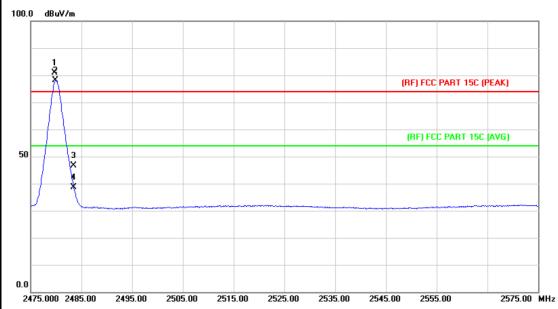


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	Χ	2479.700	85.36	1.15	86.51	Fundamental	Frequency	peak
2	*	2480.000	82.86	1.15	84.01	Fundamental	Frequency	AVG
3		2483.500	50.32	1.17	51.49	74.00	-22.51	peak
4		2483.500	43.14	1.17	44.31	54.00	-9.69	AVG



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EUT:	Keyboard	Model:	B45
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Ant. Pol.	Vertical		(C)
Test Mode:	BLE Mode TX 2480 MHz(Module	e 3)	A December 1
Remark:	N/A	WURT.	



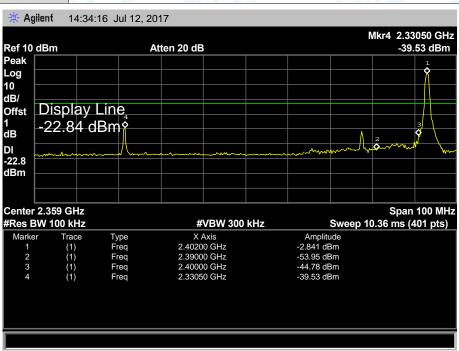
N	lo. 1	Иk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
			MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	×	(	2479.700	79.61	1.15	80.76	Fundamental	Frequency	peak
2	*		2479.900	77.04	1.15	78.19	Fundamental	Frequency	AVG
3			2483.500	45.44	1.17	46.61	74.00	-27.39	peak
4			2483.500	37.58	1.17	38.75	54.00	-15.25	AVG

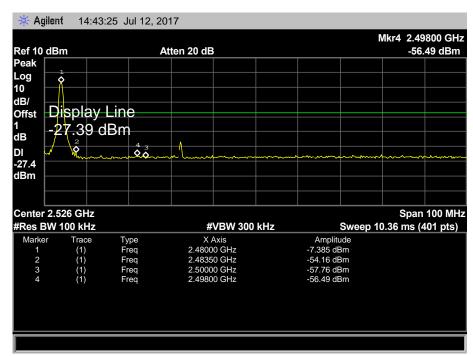


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# (2) Conducted Test

EUT:	Keyboard	Model:	B45
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Test Mode:	BLE Mode TX 2402MHz / BLE M	lode TX 2480MHz(Mod	lule 1)
Remark:	The EUT is programed in continu	uously transmitting mod	le

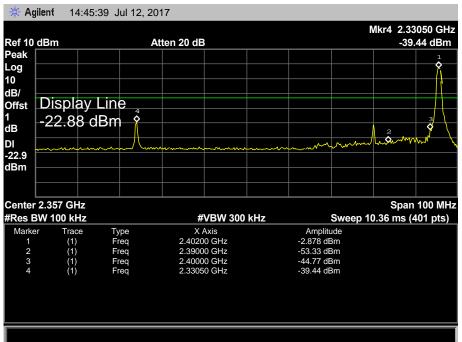


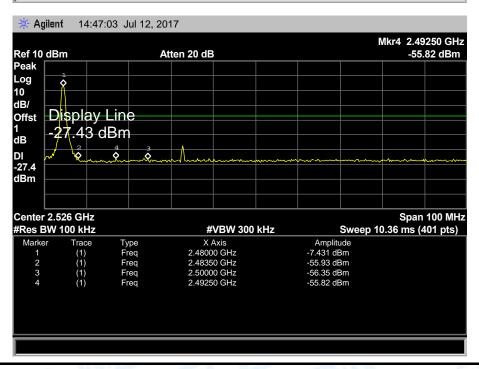




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EUT:	Keyboard	Model:	B45
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	0100	
Test Mode:	BLE Mode TX 2402MHz / BLE M	lode TX 2480MHz(Mod	dule 2)
Remark:	The EUT is programed in continu	uously transmitting mod	de

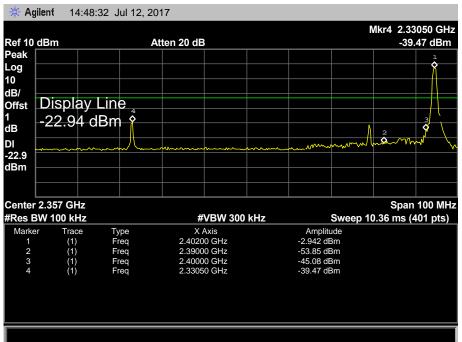


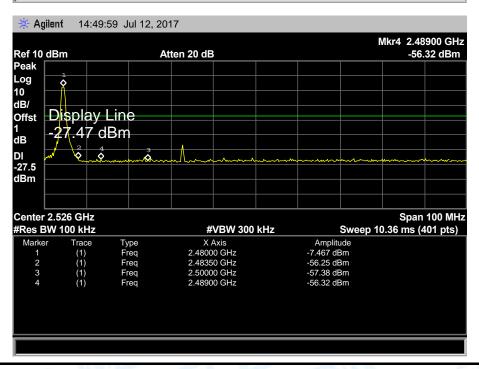




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EUT:	Keyboard	Model:	B45
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	THE PARTY OF THE P	
Test Mode:	BLE Mode TX 2402MHz / BLE M	lode TX 2480MHz(Mod	dule 3)
Remark:	The EUT is programed in continu	ously transmitting mod	de
			· ·







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# 7. Bandwidth Test

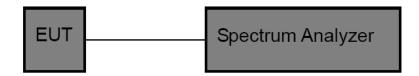
## 7.1 Test Standard and Limit

7.1.1 Test Standard FCC Part 15.247 (a)(2)

7.1.2 Test Limit

FCC P	art 15 Subpart C(15.247)/I	RSS-247
Test Item	Limit	Frequency Range(MHz)
Bandwidth	>=500 KHz (6dB bandwidth)	2400~2483.5

# 7.2 Test Setup



#### 7.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst –case (i.e the widest) bandwidth.
- (3)Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:100 kHz, and Video Bandwidth:300 kHz, Detector: Peak, Sweep Time set auto.

# 7.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test.

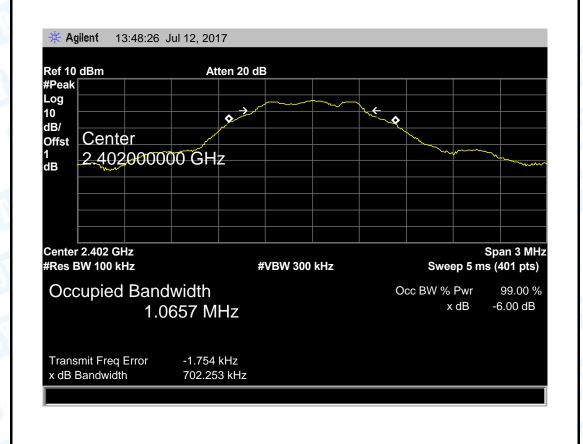


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# 7.5 Test Data

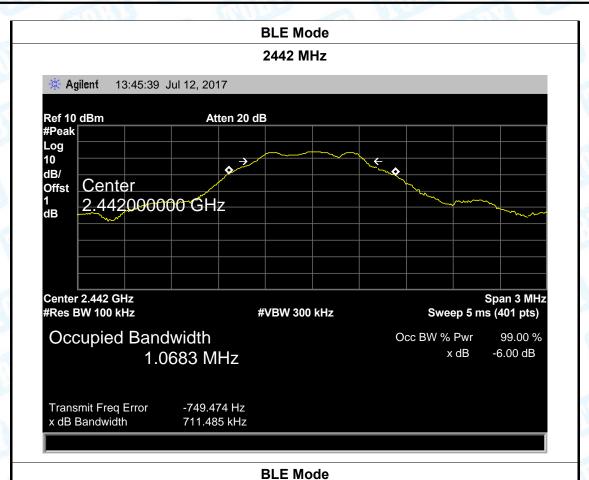
EUT:	Keyb	oard	Model:	B45
Temperature:	<b>25</b> ℃		Relative Humidity:	55%
Test Voltage:	DC 3	.7V		6
Test Mode:	BLE	TX Mode(Module 1)	MILLON	A
Channel freque	ncy	6dB Bandwidth	99% Bandwidth	Limit
(MHz)		(kHz)	(kHz)	(kHz)
2402		702.253	1065.70	
2442		711.485	1068.30	>=500
2480		715.282	1070.90	
		BLE Mode		

#### 2402 MHz





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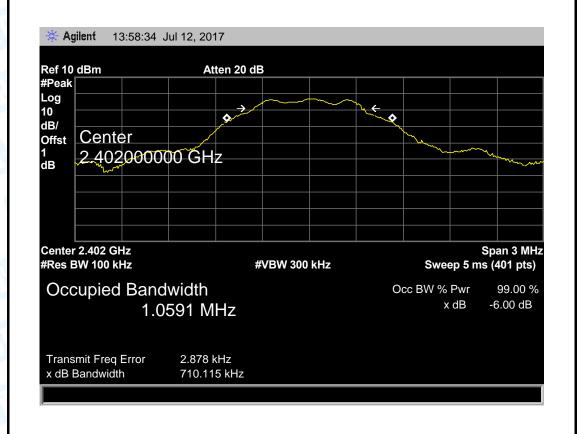
#### 2480 MHz Agilent 13:46:58 Jul 12, 2017 Ref 10 dBm Atten 20 dB #Peak Log 10 dB/ مرخرم <del>\</del> Center Offst 1 dB 2.480000000 GHz Center 2.48 GHz Span 3 MHz #Res BW 100 kHz **#VBW 300 kHz** Sweep 5 ms (401 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % -6.00 dB x dB 1.0709 MHz Transmit Freq Error -416.195 Hz x dB Bandwidth 715.282 kHz



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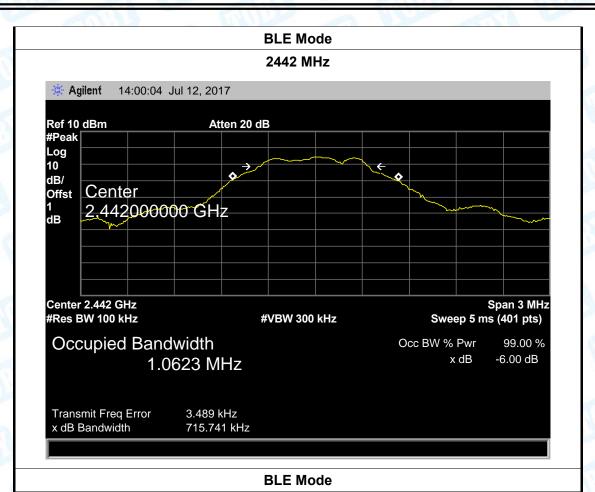
EUT:	Keyb	oard	Model:	B45
Temperature:	25℃	The same of the	Relative Humidity:	55%
Test Voltage:	DC 3	5.7V	THE STATE OF THE S	1 63
Test Mode:	BLE	TX Mode(Module 2)	TO THE	
Channel freque	ncy	6dB Bandwidth	99% Bandwidth	Limit
(MHz)		(kHz)	(kHz)	(kHz)
2402		710.115	1059.10	
2442		714.741	1062.30	>=500
2480		705.896	1063.80	
		BLE Mode		

2402 MHz





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#### 2480 MHz Agilent 14:00:56 Jul 12, 2017 Ref 10 dBm Atten 20 dB #Peak Log 10 dB/ **\$** <u>←</u> Center Offst 2.480000000 GHz 1 dB Center 2.48 GHz Span 3 MHz #Res BW 100 kHz **#VBW 300 kHz** Sweep 5 ms (401 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % -6.00 dB x dB 1.0638 MHz

Transmit Freq Error

x dB Bandwidth

4.595 kHz

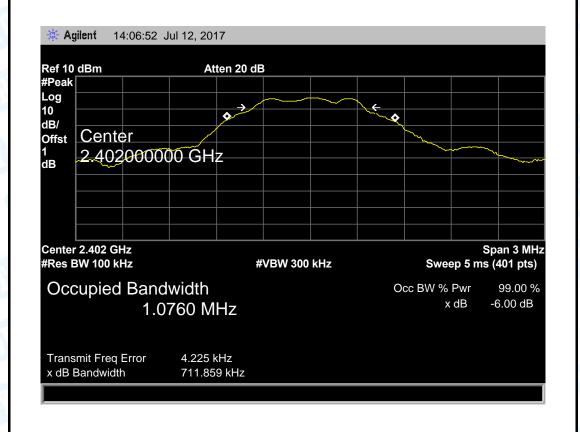
705.896 kHz



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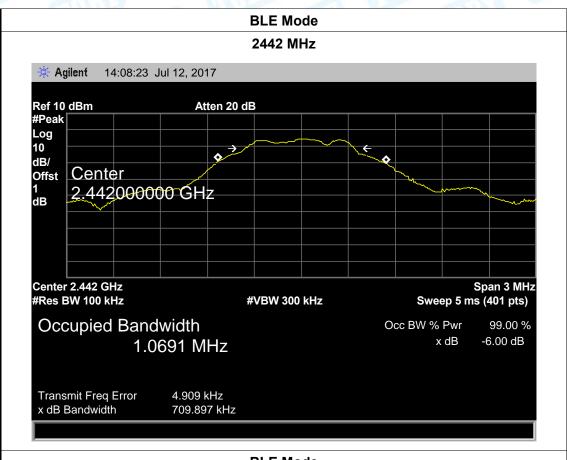
EUT:	Keyb	oard	Model:	B45
Temperature:	25℃	Jan Jan	Relative Humidity:	55%
Test Voltage:	DC 3	.7V	THE STATE OF THE S	1 62
Test Mode:	BLE	TX Mode(Module 3)	THE PARTY OF THE P	
Channel freque	ncy	6dB Bandwidth	99% Bandwidth	Limit
(MHz)		(kHz)	(kHz)	(kHz)
2402		711.859	1076.00	
2442		709.897	1069.10	>=500
2480		706.099	1064.10	
		BLE Mode		

### 2402 MHz





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#### **BLE Mode** 2480 MHz Agilent 14:09:42 Jul 12, 2017 Ref 10 dBm Atten 20 dB #Peak Log 10 dB/ <del>ر</del>خرو $\overline{\leftarrow}$ Center Offst 2.480000000 GHz 1 dB Center 2.48 GHz Span 3 MHz #Res BW 100 kHz **#VBW 300 kHz** Sweep 5 ms (401 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % -6.00 dB x dB 1.0641 MHz Transmit Freq Error 3.430 kHz x dB Bandwidth 706.099 kHz



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# 8. Peak Output Power Test

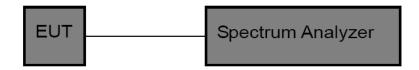
## 8.1 Test Standard and Limit

8.1.1 Test Standard FCC Part 15.247 (b)(3)

8.1.2 Test Limit

FCC Par	t 15 Subpart C(15.247)/RS	S-247
Test Item	Limit	Frequency Range(MHz)
Peak Output Power	1 Watt or 30 dBm	2400~2483.5

# 8.2 Test Setup



# 8.3 Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement is according to section 9.1.1 of KDB 558074 D01 DTS Meas Guidance v04.

- (1) Set the RBW≥DTS Bandwidth
- (2) Set VBW≥3\*RBW
- (3) Set Span≥3\*RBW
- (4) Sweep time=auto
- (5) Detector= peak
- (6) Trace mode= maxhold.
- (7) Allow trace to fully stabilize, and then use peak marker function to determine the peak amplitude level.

# 8.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.



Center 2.402 GHz #Res BW 1 MHz Report No.: TB-FCC155539

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# 8.5 Test Data

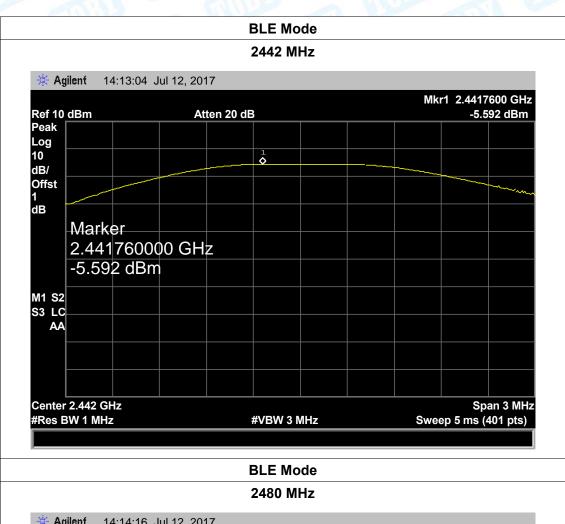
EUT:		Keyboard		1	Model:		B45
Temperat	ure:	25℃	A VIII	I	Relative	Humidity:	55%
Test Volta	age:	DC 3.7V	1:30	· OA	Ulika B		C.
Test Mod	e:	BLE TX Mo	ode(Module 1)	5	- 6	1110	
Channel	frequen	cy (MHz)	Test Result	t (dBm)		Limit (	dBm)
	2402		-3.09	9			
	2442		-5.59	2		30	)
	2480		-7.61	3			
			BLE Me	ode			
* Aq	ilent 14:	11:52 Jul 12, 2	017	lHz			_
∦ Ag		11:52 Jul 12, 2					17675 GHz
Ref 10 Peak			017 Atten 20 dB				17675 GHz .099 dBm
Ref 10							
Ref 10 Peak Log 10 dB/			Atten 20 dB				
Ref 10 Peak Log 10			Atten 20 dB				
Ref 10 Peak Log 10 dB/ Offst 1 dB			Atten 20 dB				
Ref 10 Peak Log 10 dB/ Offst 1 dB	Marke	r 767500 GI	Atten 20 dB				
Ref 10 Peak Log 10 dB/ Offst 1 dB	dBm Marke	r 767500 GI	Atten 20 dB				
Ref 10 Peak Log 10 dB/ Offst 1 dB	Marke	r 767500 GI	Atten 20 dB				

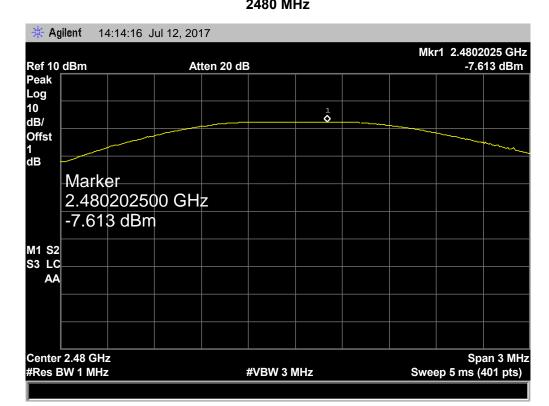
#VBW 3 MHz

Span 3 MHz Sweep 5 ms (401 pts)



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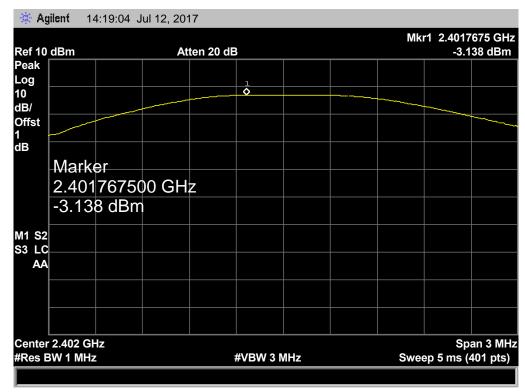






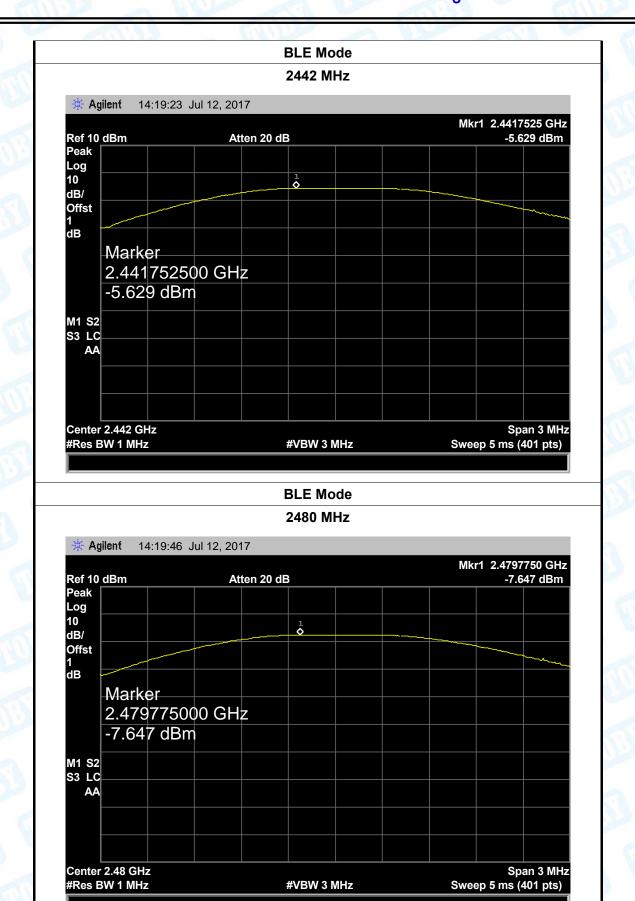
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60135		CHILL	1111		
EUT:	Keyboard		Model:		B45
Temperature:	25℃	13	Relativ	e Humidity:	55%
Test Voltage:	DC 3.7V	WILLIAM STATE	MAG		63
Test Mode:	BLE TX N	lode(Module 2)		011110	
Channel frequen	cy (MHz)	Test Result (dBm)	)	Limit (	dBm)
2402		-3.138			
2442		-5.629		30	
2480		-7.647			
		BLE Mode			
		2402 MHz			
Mr. Bulland	40.04 1 40	0047			
* Agilent 14:	19:04 Jul 12,	2017		Mkr1 2.40	17675 GHz





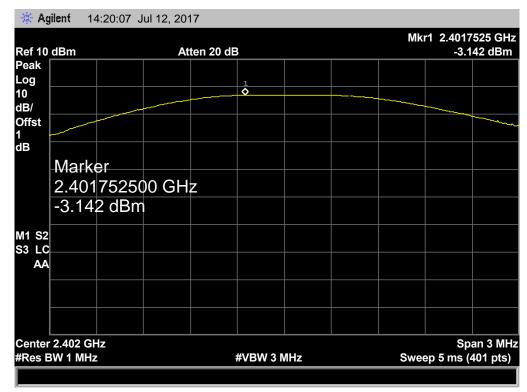
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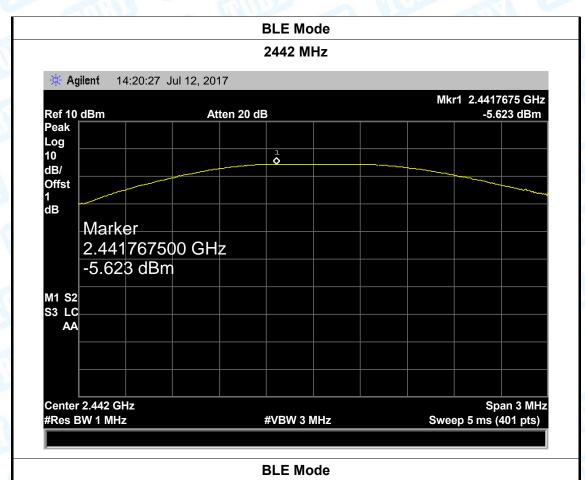
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EUT:	Keyboard		Model:	B45	
Temperature:	25℃	1	Relative Humidity:	55%	
Test Voltage:	DC 3.7V	THE STATE OF THE S		1 103	
Test Mode:	BLE TX M	ode(Module 3)	CIII)		
Channel freque	ncy (MHz)	Test Result (dBm)	Limit (	dBm)	
2402		-3.142			
2442		-5.623	30	30	
2480		-7.653			
		BLE Mode			
		2402 MHz			





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# 9. Power Spectral Density Test

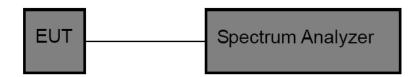
## 9.1 Test Standard and Limit

9.1.1 Test Standard FCC Part 15.247 (e)

9.1.2 Test Limit

FCC Part 15 Subpart C(15.247)			
Test Item Limit Frequency Range(MI			
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5	

# 9.2 Test Setup



## 9.3 Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance v04.

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Set analyser center frequency to DTS channel center frequenyc.
- (3) Set the span to 1.5 times the DTS bandwidth.
- (4) Set the RBW to: 3 kHz(5) Set the VBW to: 10 kHz
- (6) Detector: peak
- (7) Sweep time: auto
- (8) Allow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

# 9.4 EUT Operating Condition

The EUT was set to continuously transmitting in each mode and low, Midle and high channel for the test.



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# 9.5 Test Data

EUT:	Keyboard	Model:	B45
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Toot Modo:	BLE TY Modo(Modulo 1)	THE STATE OF THE S	

Test Mode: BLE TX Mode(Module 1)

Channel Frequency (MHz)	Power Density (dBm)	Limit (dBm)	Result
2402	-16.62		
2442	-18.97	8	PASS
2480	-20.65		

## **BLE Mode**

#### 2402 MHz





-20.65 dBm

M1 S2 S3 LC AA

Center 2.48 GHz

#Res BW 3 kHz

Report No.: TB-FCC155539

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#VBW 10 kHz

Span 1.08 MHz

Sweep 123.5 ms (401 pts)



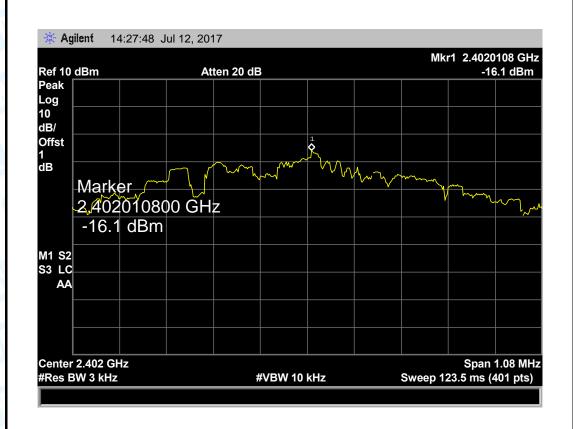
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EUT:	Keyboard	Model:	B45
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	MIN.	1 63
Test Mode:	BLE TX Mode(Module 2)		

Channel Frequency	Power Density	Limit	Popult
(MHz)	(dBm)	(dBm)	Result
2402	-16.10		
2442	-19.18	8	PASS
2480	-20.77		

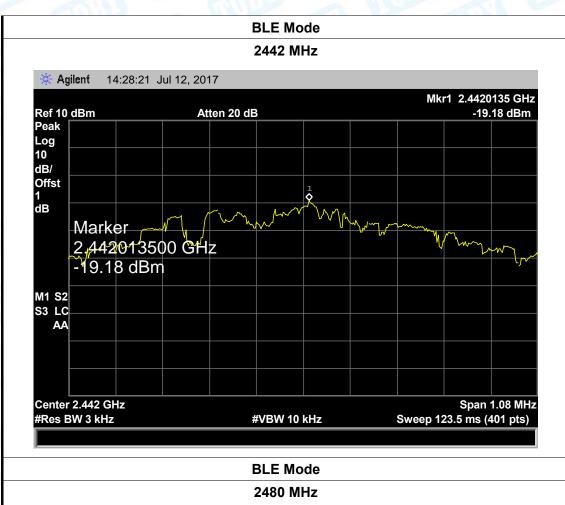
#### **BLE Mode**

#### 2402 MHz





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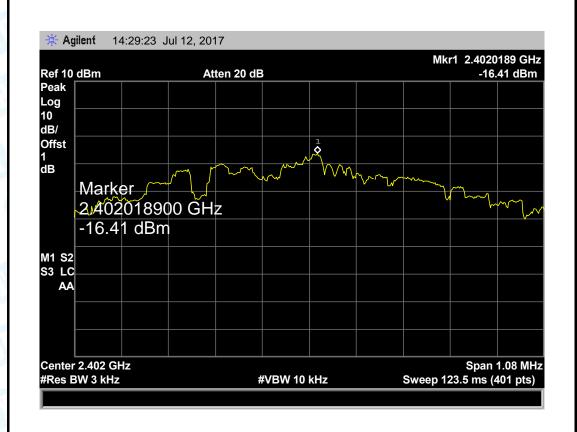
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EUT:	Keyboard	Model:	B45
Temperature:	25℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	MUL	1
Test Mode:	BLE TX Mode(Module 3)		

Channel Frequency	Power Density	Limit	Popult
(MHz)	(dBm)	(dBm)	Result
2402	-16.41		
2442	-19.11	8	PASS
2480	-20.46		

#### **BLE Mode**

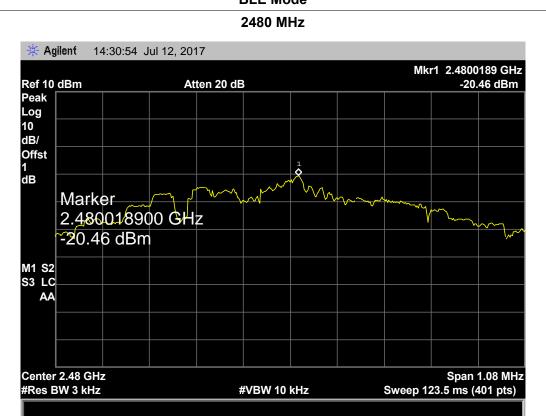
#### 2402 MHz





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# 10. Antenna Requirement

# 10.1 Standard Requirement

10.1.1 Standard FCC Part 15.203

## 10.1.2 Requirement

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. 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### 10.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is 1.6dBi, and the antenna de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

#### 10.3 Result

The EUT antenna is a PCB Antenna. It complies with the standard requirement.

	Antenna Type
3	▼ Permanent attached antenna
0.000	□ Unique connector antenna
	□ Professional installation antenna

----END OF REPORT-----