

Shenzhen Toby Technology Co., Ltd.

Report No.: TB-FCC145902

1 of 54 Page:

FCC Radio Test Report FCC ID: 2AGGR-B5

Original Grant

Report No. TB-FCC145902

Applicant Shenzhen Rivers Technology Co., Limited

Equipment Under Test (EUT)

EUT Name Middle Glass Keyboard(SKU:6928514351118)

Model No. **B**5

N/A Series Model No.

Brand Name Bastron

Receipt Date 2015-11-03

Test Date 2015-11-03 to 2015-11-10

Issue Date 2015-11-11

Standards FCC Part 15: 2015, Subpart C(15.247)

Test Method ANSI C63.10: 2013

Conclusions PASS

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

The EUT technically complies with the FCC requirements

Test/Witness Engineer

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

Shenzhen, China

1.2 General Description of EUT (Equipment Under Test)

EUT Name		Middle Glass Keyboard(Sh	(U:6928514351118)			
Models No.		B5	B5			
Model Difference	i	N/A				
6003		Operation Frequency: Bluetooth:2402~2480MHz				
Product		Number of Channel:	Bluetooth:79 Channels see Note 3			
Description		Max Peak Output Power:	Bluetooth: 1.84 dBm(GFSK)			
		Antenna Gain:	2 dBi PCB Antenna			
		Modulation Type:	GFSK 1Mbps(1 Mbps)			
Power Supply		DC Voltage supplied from Host System by USB cable. DC power by Li-ion Battery.				
Power Rating	:	DC 5.0V by USB cable. DC 3.7V 1.92Wh Li-ion Battery.				
Connecting I/O Port(S)		Please refer to the User's Manual				

Note:

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (3) Channel List:

Bluetooth Channel List							
Channel Frequency (MHz) Channel Frequency (MHz) Freq							
00	2402	27	2429	54	2456		
01	2403	28	2430	55	2457		
02	2404	29	2431	56	2458		



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03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454	Million	A W
26	2428	53	2455	E-11	(4.9)

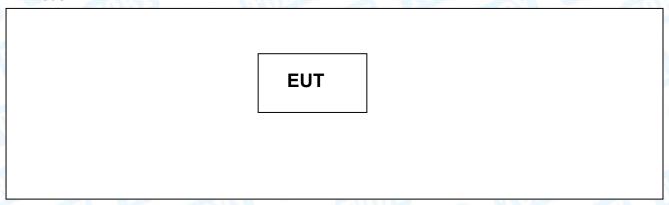
⁽⁴⁾ The Antenna information about the equipment is provided by the applicant.



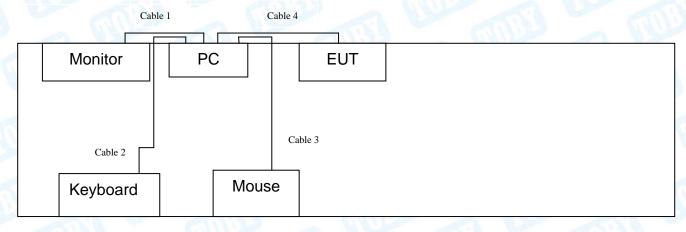
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1.3 Block Diagram Showing the Configuration of System Tested

TX Mode



USB Charging with TX Mode



1.4 Description of Support Units

Equipment Information							
Name Model FCC ID/DOC Manufacturer Used "√"							
LCD Monitor	E170Sc	DOC	DELL	√			
PC	OPTIPLEX380	DOC	DELL	√			
Keyboard	L100	DOC	DELL	1			
Mouse	M-UARDEL7	DOC	DELL	1			
		Cable Informa	tion				
Number	Shielded Type	Ferrite Core	Length	Note			
Cable 1	YES	YES	1.5M				
Cable 2	YES	YES	1.5M				
Cable 2	YES	NO	1.5M	a Gillian			
Cable 3	YES	NO	1.6M	Accessorise			



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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	USB Charging with TX GFSK Mode					

For Radiated Test						
Final Test Mode Description						
Mode 1	USB Charging with TX GFSK Mode					
Mode 2	TX Mode(GFSK) Channel 00/39/78					
Mode 3	Hopping Mode(GFSK)					

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. We have pretested all the test mode above.

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:

TX Mode: GFSK (1 Mbps)

(2) The EUT is considered a portable unit; it was pre-tested on the positioned of each 3 axis, X-plane, Y-plane and Z-plane. The worst case was found positioned on X-plane as the normal use. 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 Bluetooth mode.

Test Software Version Broadcom BlueTool			
Frequency	2402 MHz	2441MHz	2480 MHz
GFSK	DEF	DEF	DEF



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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 _{Lab})
	Level Accuracy:	3 13
Conducted Emission	9kHz~150kHz	±3.42 dB
	150kHz to 30MHz	±3.42 dB
Padiated Emission	Level Accuracy:	±4.60 dB
Radiated Emission	9kHz to 30 MHz	±4.60 dB
Dadiated Emission	Level Accuracy:	.4.40 dD
Radiated Emission	30MHz to 1000 MHz	±4.40 dB
Dadiated Emission	Level Accuracy:	. 4 20 dD
Radiated Emission	Above 1000MHz	±4.20 dB



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1.8 Test Facility

The testing report were 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.

May 22, 2014 certificated by TUV Rheinland(China) Co., Ltd. with TUV certificate No.: UA 50282953 0001 and report No.: 17026822 002. The certificate is valid until the next scheduled audit or up to 18 months, at the discretion of TUV Rhineland.



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2. Test Summary

FCC Part 15 Subpart C(15.247)/ RSS 247 Issue 1					
Standard S	ection	T4 4	l d		
FCC	IC	Test Item	Judgment	Remark	
15.203	9	Antenna Requirement	PASS	N/A	
15.207	RSS-GEN 7.2.2	Conducted Emission	PASS	N/A	
15.205	RSS-Gen 7.2.3	Restricted Bands	PASS	N/A	
15.247(a)(1)	RSS 247 5.1 (2)	Hopping Channel Separation	PASS	N/A	
15.247(a)(1)	RSS 247 5.1 (4)	Dwell Time	PASS	N/A	
15.247(b)(1)	RSS 247 5.4 (2)	Peak Output Power	PASS	N/A	
15.247(b)(1)	RSS 247 5.1 (4)	Number of Hopping Frequency	PASS	N/A	
15.247(c)	RSS 247 5.5	Radiated Spurious Emission	PASS	N/A	
15.247(a)	RSS 247 5.1 (1)	99% Occupied Bandwidth & 20dB Bandwidth	PASS	99%OBW GFSK:972.00kHz	



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3. Test Equipment

Conducted Emission Test							
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date		
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Aug. 07, 2015	Aug. 06, 2016		
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Aug. 07, 2015	Aug. 06, 2016		
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Aug. 07, 2015	Aug. 06, 2016		
LISN	Rohde & Schwarz	ENV216	101131	Aug. 07, 2015	Aug. 06, 2016		
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date		
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.			
Spectrum Analyzer	Agilent	E4407B	MY45106456	Aug. 29, 2015	Aug. 28, 2016		
EMI Test Receiver	Rohde & Schwarz	ESCI	100010/007	Aug. 07, 2015	Aug. 06, 2016		
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 28, 2015	Mar. 27, 2016		
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 28, 2015	Mar. 27, 2016		
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 28, 2015	Mar. 27, 2016		
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 28, 2015	Mar. 27, 2016		
Pre-amplifier	Sonoma	310N	185903	Mar. 28, 2015	Mar. 27, 2016		
Pre-amplifier	HP	8447B	3008A00849	Mar. 28, 2015	Mar. 27, 2016		
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 28, 2015	Mar. 27, 2016		
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A		



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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

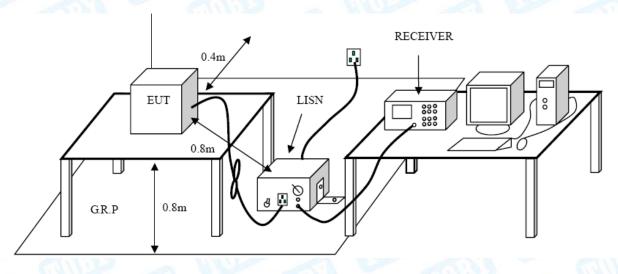
Conducted Emission Test Limit

Eroguenov	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 9kHz, 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 Data

Please see the next page.



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EUT	D:			Middle Glass Keyboard (SKU:6928514351118)				Mod	Model Name :			В	35					
Tem	per	rature	:	25	°C						1	Rela	tive	Hun	nidity:	5	55%	
Test	t Vo	ltage		A	C 12	:0V/	60	Hz	601	1119			A.					A
Tern	mina	al:		Liı	ne		4	1	1			(AC)				6	1115	
Test	t Mc	ode:		US	SB (Cha	rgir	ng wi	ith TX	GFSK	Mod	le 240	2 M	Hz	18	10		1
Ren	nark	(:		Oı	nly v	vors	se o	case	is rep	orted							1	
80.0) dB	uV																
																QP: AVG:	_	
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-20 0.1		Mk.	F	Freq			ad ev	ling el	Col	Hz)		asurent	1,44/	-imit	Y)YAAYA	ver	30.00	AVG
-20 0.1		Mk.				L		el	Cor	rrect	m	asure	L	-imit dΒu∨		ver !B	30.00	AVG
-20 0.1		Mk.	١	req	-	L	ev	el V	Cor Fa	rrect ictor	r r	asure nent	L	dBu V		iB	Dete	AVG
-20 0.1	No.	Mk.	0.5	req MHz). D	3:	ev 1Bu	el ∨ 38	Cor Fa	rrect actor	dl 42	asure n ent BuV	- L	dBu V	o -13	:B . 06	Dete Q	ave on the control of
-20 0.1	No.	Mk.	0.5 0.5	req //Hz). O	3: 2:	ev 1Bu 2.8	el ∨ ∨ 38 57	Cor Fa 10	rrect actor B	42 35	asure nent BuV 2.94	5 4	dBu∨ 66.00) -13) -10	.06 .27	Dete Q A	otor
-20 0.1	No.	Mk.	0.5 0.5 2.2	req 4Hz 578). O O	3: 2: 3:	ev 1Bu 2.8 5.6	el v 88 67	Col Fa 10 10	rrect actor B .06	42 35 41	asurent BuV 2.94	5 4	dBu√ 6.00 6.00) -13) -10	.06 .27 .90	Dete Q A	ctor

		0.5760	25.67	10.00	33.73	40.00 -10.27	AVG
3		2.2659	31.05	10.05	41.10	56.00 -14.90	QP
4		2.2659	24.73	10.05	34.78	46.00 -11.22	AVG
5		2.7500	33.35	10.04	43.39	56.00 -12.61	QP
6		2.7500	24.93	10.04	34.97	46.00 -11.03	AVG
7		4.9660	37.71	9.96	47.67	56.00 -8.33	QP
8	*	4.9660	29.24	9.96	39.20	46.00 -6.80	AVG
9		10.7020	33.66	10.17	43.83	60.00 -16.17	QP
10		10.7020	26.57	10.17	36.74	50.00 -13.26	AVG
11		16.1540	34.77	10.24	45.01	60.00 -14.99	QP
12		16.1540	24.46	10.24	34.70	50.00 -15.30	AVG

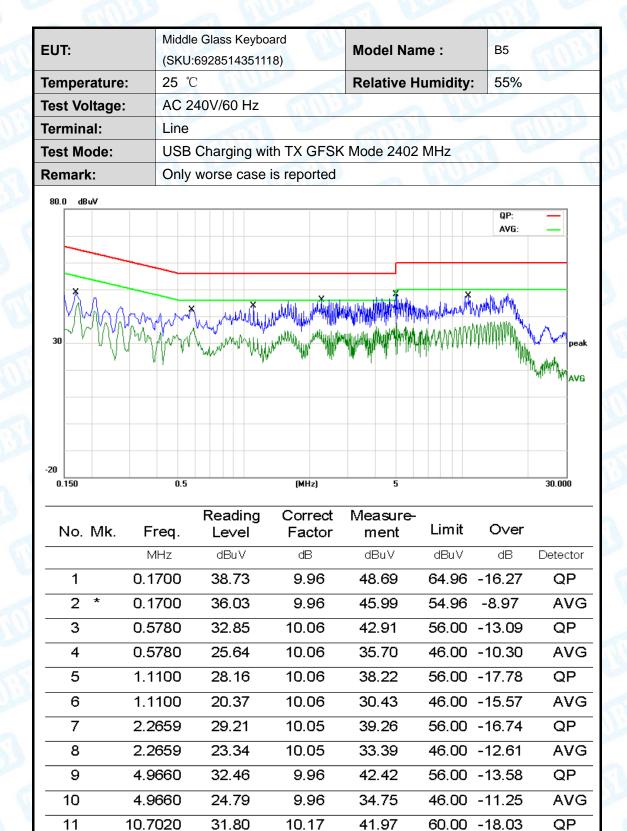


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EUT:	Middle Glass Keybo (SKU:692851435111		Model Name :	B5	
Temperature:	25 °C	10)	Relative Humidity:	55%	
Test Voltage:	AC 120V/60 Hz				
Terminal:	Neutral		1000		1100
Test Mode:	USB Charging wi	th TX GFSK	Mode 2402 MHz	A W	
Remark:	Only worse case	is reported	THU!		a V
30 dBuV -20 0.150	0.5	CMHz)		QP: AVG:	peak AVG
No. Mk. Fr	Reading eq. Level	Correct Factor	Measure- ment Limit	O∨er	
	Hz dBuV	dB	dBuV dBuV	dB	 Detector
1 0.17	700 38.73	9.96	48.69 64.96	-16.27	QP
2 0.17	700 36.04	9.96	46.00 54.96	-8.96	AVG
3 0.20	060 38.03	10.02	48.05 63.36	-15.31	QP
4 * 0.20	060 35.06	10.02	45.08 53.36	-8.28	AVG
5 0.82	260 27.87	10.09	37.96 56.00	-18.04	QP
6 0.82	260 21.60	10.09	31.69 46.00	-14.31	AVG
7 1.49	940 28.34	10.06	38.40 56.00	-17.60	QP
8 1.49	940 21.78	10.06		-14.16	AVG
9 2.26	659 29.19	10.05	39.24 56.00	-16.76	QP
10 2.26	659 23.25	10.05	33.30 46.00	-12.70	AVG
11 4.96		9.96	42.32 56.00	-13.68	QP
12 4.96		9.96	34.60 46.00	-11.40	AVG
Emission Level=	Read Level+ Corr	ect Factor			



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Emission Level= Read Level+ Correct Factor

24.70

10.17

34.87

10.7020

12

AVG

50.00 -15.13



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EI	JT:						(eyboa		N	lodel	Name	.	B5	
						28514	35111	8)						THU
		rature		25		111			R	elativ	e Hu	midity:	55%	
		oltage:			240\	//60	Hz	511				a W		
Те	rmin	al:		Neu	ıtral	4		-			TIL			111
Те	st M	ode:								Mod	e 240	2 MHz	18	
Re	emar	k:		Only	y wo	rse o	case i	is repo	rted			AND		
80	0.0 dB	uV	1										OP-	
													QP: AVG:	
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_		_		_			_					_		
		5 dl.				eadi	_	Corr			sure	Limit	Over	
I _	No.	Mk.		eq.	ı	Leve		Fac			ent		Over	
_				Hz		dBu∖		d⊟			uV	dBu∨		Detector
l	1		0.20	060	:	38.0	0	10.0)2	48.	.02	63.36	-15.34	QP
	2	*	0.20	060	;	35.0	7	10.0)2	45.	09	53.36	-8.27	AVG
4	3		0.5	780	;	32.8	2	10.0)6	42.	88	56.00	-13.12	QP
	4		0.5	780	2	25.6	3	10.0)6	35.	69	46.00	-10.31	AVG
	5		1.59	940	2	28.1	8	10.0)6	38.	24	56.00	-17.76	QP
	6		1.59	940	2	22.6	8	10.0	06	32.	74	46.00	-13.26	AVG
	7		2.20	659	2	29.4	7	10.0)5	39.	52	56.00	-16.48	QP
	8		2.2	659	2	23.4	5	10.0)5	33.	50	46.00	-12.50	AVG
	9		2.7	500	2	28.3	5	10.0)4	38.	39	56.00	-17.61	QP
-	10		2.7	500	2	21.8	2	10.0)4	31.	86	46.00	-14.14	AVG

Emission Level= Read Level+ Correct Factor

4.9660

4.9660

11

12

32.48

24.71

9.96

9.96

42.44

34.67

QP

AVG

56.00 -13.56

46.00 -11.33



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5. Radiated Emission Test

5.1 Test Standard and Limit

5.1.1 Test Standard FCC Part 15.209

5.1.2 Test Limit

Radiated Emission Limit (9 kHz~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	Class B (dBuV/m)(at 3m)				
(MHz)	Peak	Average			
Above 1000	74	54			

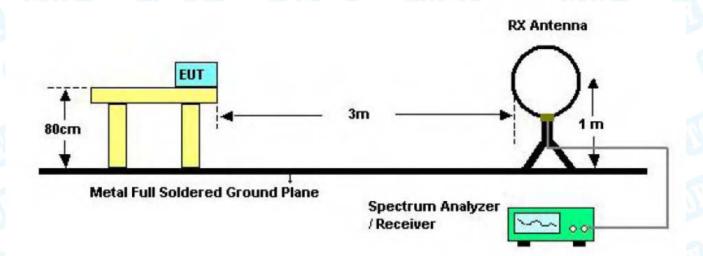
Note:

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

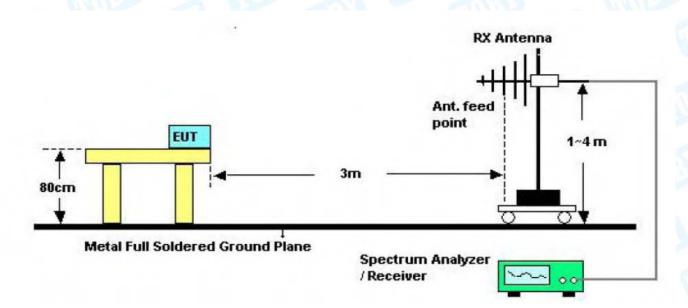


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5.2 Test Setup



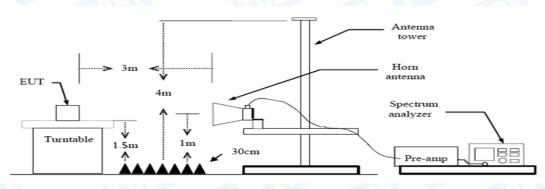
Bellow 30MHz Test Setup



Bellow 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.

5.4 EUT Operating Condition

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

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=1 Kz with Peak Detector for Average Values.

Test data please refer the following pages.



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EUT:		Glass Keybo		Model N	lame :	B5		
Famous a water was		69285143511	18)	Deletive	Llumaidituu	FF0/	TRIP.	
Temperature:	25 °C			Relative	Humidity:	55%		
Test Voltage:	DC 5		Dilli.		1 600			
Ant. Pol.	Horiz		2400141			- 67	11:00	
Test Mode:		FSK Mode						
Remark:								
80.0 dBuV/m								
					(RF)FCC 150	3M Radiation Margin -6		
						Margin 4		
							++++	
30			1	2	3 4 5 X X X	6 X		
4 4			1			J. Hambur	man de la companya de	
. M/M				بالالماما	Named Survey	THE VIEW		
WW /M			بهالأس ا	VI WAY TO BE A STATE OF THE STA				
		المستلخ والطالة التاميحات	and head have been like in					
	Arbantan da	Amenikation of many places	May rough why yelled					
. 1	distribution of the	glander-gerkelskel beforeskeld freskel	May had had had had had					
	Mountain actions			200	100 500	C00 700	1000 00	
-20 30.000 40 50	Monthly action	80	(MHz)	300	400 500	600 700	1000.00	
30.000 40 50	60 70		(MHz) Correct	300 Measure-			1000.00	
30.000 40 50	Monthly action	80	(MHz)		400 500 Limit	600 700 Over	1000.00	
30.000 40 50 No. Mk. F	60 70	80 Reading	(MHz) Correct	Measure-			1000.00	
30.000 40 50 No. Mk. F	60 70 Freq.	Reading Level	(MHz) Correct Factor	Measure- ment	Limit	Over	Detecto	
No. Mk. F	60 70 Freq.	Reading Level	(MHz) Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over	Detecto peak	
No. Mk. F 1 191 2 287	Freq. MHz	Reading Level dBuV 46.61	Correct Factor dB/m -20.81	Measure- ment dBuV/m 25.80	Limit dBuV/m 43.50 46.00	Over dB -17.70	Detecto peak peak	
No. Mk. F 1 191 2 287 3 * 336	Freq. MHz .7450	Reading Level dBuV 46.61 43.22	Correct Factor dB/m -20.81 -17.32	Measure- ment dBuV/m 25.80 25.90	Limit dBuV/m 43.50 46.00	Over dB -17.70 -20.10	Detecto peak peak peak	
No. Mk. F 1 191 2 287 3 * 336 4 383	Freq. MHz .7450 .9904	Reading Level dBuV 46.61 43.22 43.93	(MHz) Correct Factor dB/m -20.81 -17.32 -15.46	Measure- ment dBuV/m 25.80 25.90 28.47	Limit dBuV/m 43.50 46.00 46.00	Over dB -17.70 -20.10 -17.53	Detecto peak peak peak peak	
No. Mk. F 1 191 2 287 3 * 336 4 383 5 480	Freq. MHz .7450 .9904 .0351 .9318	Reading Level dBuV 46.61 43.22 43.93 40.79	(MHz) Correct Factor dB/m -20.81 -17.32 -15.46 -13.87	Measure- ment dBuV/m 25.80 25.90 28.47 26.92	Limit dBuV/m 43.50 46.00 46.00 46.00 46.00	Over dB -17.70 -20.10 -17.53 -19.08		



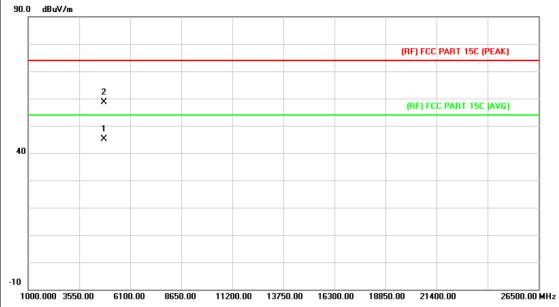
Page: 22 of 54

EUT:	1 10 11 10	Glass Keyboa		Model Na	ame :	B5	TO I
		92851435111	8)			a 1	MILL OF
Temperature:	25 ℃	ART		Relative	Humidity:	55%	
Test Voltage:	DC 5V		CALL S		ART		
Ant. Pol.	Vertica		1	THE PARTY		GW	الماليا
Test Mode:	TX GF	SK Mode 2	402MHz	A Distance		1600	6
Remark:	Only w	orse case i	s reported		CHILL		1
80.0 dBuV/m							
					(RF)FCC 15C 3	M Radiation	
						Margin -6	iB
			6				
30		3	4 5 X				
/\mathrew{\mathrew{M}}_{\text{.}}		X		. 1 1 1		المرجود المالية	J. July J.
					della March tales	and profession of the second	•
Y " Y Y	1	hahmendella maria	A PROPERTY OF THE PARTY OF THE		****		
Why.	Appliched Market	.,,,,,	* #				
-20							
30.000 40 50	60 70	80	(MHz)	300	400 500	600 700	1000.000
		Reading	Correct	Measure-			
No. Mk. F	req.	Level	Factor	ment	Limit	Over	
	ИНz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1 36.	5092	48.98	-17.99	30.99	40.00	-9.01	peak
2 39.5	9942	47.59	-20.16	27.43	40.00	-12.57	peak
3 96.	0986	49.57	-22.16	27.41	43.50	-16.09	peak
4 143	.8295	51.76	-21.67	30.09	43.50	-13.41	peak
5 167	.8243	50.33	-21.04	29.29	43.50	-14.21	peak
6 * 191	.7450	56.03	-20.81	35.22	43.50	-8.28	peak
*:Maximum data x:0	Over limit	!:over margin					
Emission Level=	Read Le	evel+ Corre	ect Factor				



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EUT:	Middle Glass Keyboard (SKU:6928514351118)	Model Name :	B5				
Temperature:	25 ℃	Relative Humidity:	55%				
Test Voltage:	DC 5V						
Ant. Pol.	Horizontal		WILLIAM STATE				
Test Mode:	TX GFSK Mode 2402MHz						
Remark:	No report for the emission which more than 10 dB below the prescribed limit.						

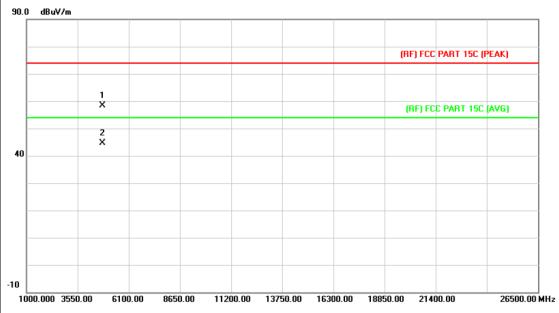


N	o. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.227	31.65	13.44	45.09	54.00	-8.91	AVG
2		4804.349	45.29	13.44	58.73	74.00	-15.27	peak



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EUT:	Middle Glass Keyboard (SKU:6928514351118)	Model Name :	B5				
Temperature:	25 ℃	Relative Humidity:	55%				
Test Voltage:	DC 5V						
Ant. Pol.	Vertical						
Test Mode:	TX GFSK Mode 2402MHz						
Remark:	No report for the emission which more than 10 dB below the prescribed limit.						

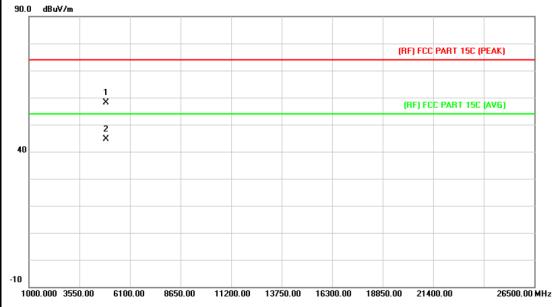


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4803.627	44.91	13.43	58.34	74.00	-15.6	6 peak
2	*	4804.368	31.13	13.44	44.57	54.00	-9.43	AVG



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EUT:	Middle Glass Keyboard (SKU:6928514351118) Model Name :		B5			
Temperature: 25 °C		Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Horizontal					
Test Mode:	TX GFSK Mode 2441MHz	The same of the sa				
Remark: No report for the emission which more than 10 dB below the prescribed limit.						

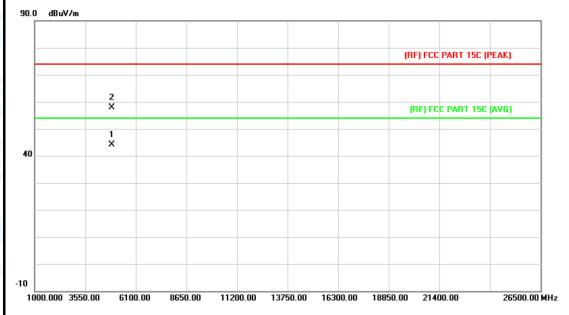


No	. Mk.	Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4881.654	44.22	13.90	58.12	74.00	-15.88	peak
2	*	4882.548	30.61	13.90	44.51	54.00	-9.49	AVG



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EUT:	Middle Glass Keyboard (SKU:6928514351118) Model Name :		B5				
Temperature:	25 ℃	Relative Humidity:	55%				
Test Voltage:	DC 5V						
Ant. Pol.	Vertical						
Test Mode:	TX GFSK Mode 2441MHz	The same of the sa					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.						

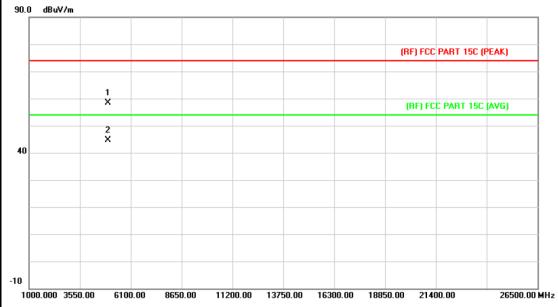


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4881.284	30.33	13.90	44.23	54.00	-9.77	AVG
2		4882.671	43.99	13.90	57.89	74.00	-16.11	peak



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EUT:	Middle Glass Keyboard (SKU:6928514351118)	Model Name :	B5			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Horizontal		WILL TO SERVE			
Test Mode:	TX GFSK Mode 2480MHz					
Remark:	No report for the emission which more than 10 dB below the prescribed limit.					

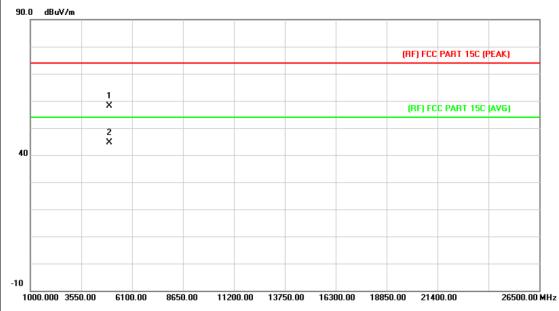


No	. Mk	. Freq.	Reading Level		Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4960.203	43.92	14.36	58.28	74.00	-15.72	peak
2	*	4960.282	30.36	14.36	44.72	54.00	-9.28	AVG



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EUT:	Middle Glass Keyboard (SKU:6928514351118)	Model Name :	B5				
Temperature:	25 ℃	Relative Humidity:	55%				
Test Voltage:	DC 5V						
Ant. Pol.	Vertical						
Test Mode:	TX GFSK Mode 2480MHz	The same					
Remark: No report for the emission which more than 10 dB below the prescribed limit.							



No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4959.714	43.81	14.36	58.17	74.00	-15.83	peak
2	*	4960.179	30.29	14.36	44.65	54.00	-9.35	AVG



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6. Restricted Bands Requirement

6.1 Test Standard and Limit

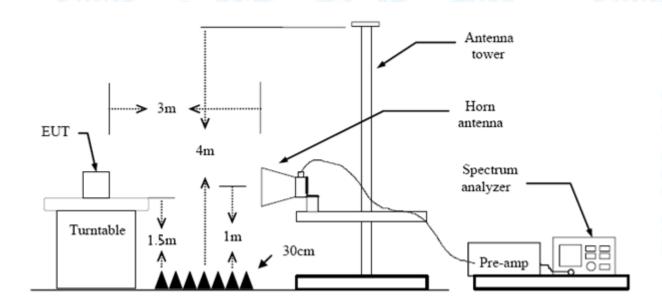
6.1.1 Test Standard FCC Part 15.209 FCC Part 15.205

6.1.2 Test Limit

Restricted Frequency	Class B (dE	BuV/m)(at 3m)
Band (MHz)	Peak	Average
310 ~2390	74	54
2483.5 ~2500	74	54

Note: All restriction bands have been tested, only the worst case is reported.

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.



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(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.

6.4 EUT Operating Condition

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

6.4 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=1 KHz with Peak Detector for Average Values.

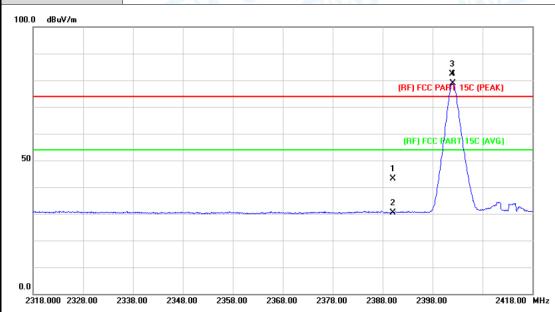
All restriction bands have been tested, only the worst case is reported.



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(1) Radiation Test

	EUT:	Middle Glass Keyboard (SKU:6928514351118)	Model Name :	B5				
	Temperature:	25 ℃	Relative Humidity:	55%				
	Test Voltage:	DC 5V	DC 5V					
	Ant. Pol.	Horizontal	The same of					
	Test Mode:	TX GFSK Mode 2402MHz						
Ì	Remark:	N/A						

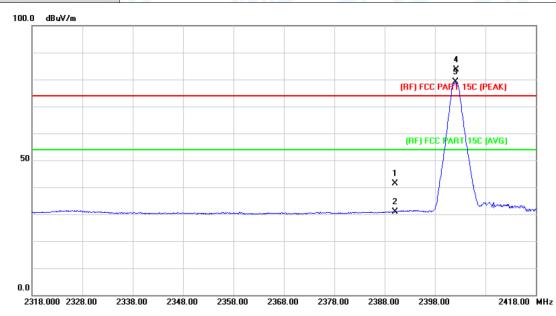


No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	42.24	0.77	43.01	74.00	-30.99	peak
2		2390.000	29.71	0.77	30.48	54.00	-23.52	AVG
3	Χ	2401.900	81.49	0.82	82.31	Fundamental	Frequency	peak
4	*	2402.000	78.09	0.82	78.91	Fundamental	Frequency	AVG



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EUT:	Middle Glass Keyboard (SKU:6928514351118)	Model Name :	B5			
Temperature:	25 ℃	Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Vertical					
Test Mode:	TX GFSK Mode 2402MHz					
Remark:	N/A					

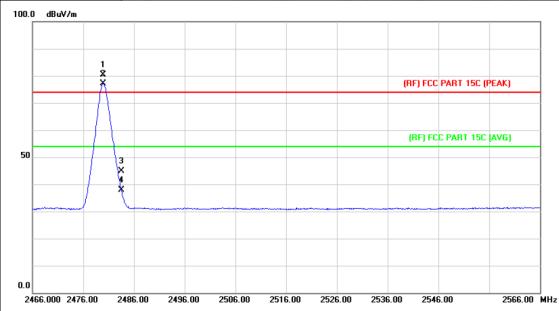


No	o. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB	Detector
1		2390.000	40.62	0.77	41.39	74.00	-32.61	peak
2		2390.000	30.19	0.77	30.96	54.00	-23.04	AVG
3	*	2402.100	78.21	0.82	79.03	Fundamental Frequency		AVG
4	Х	2402.200	82.70	0.82	83.52	Fundamental Frequency		peak



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EUT:	Middle Glass Keyboard (SKU:6928514351118)	Model Name :	B5				
Temperature:	25 ℃	Relative Humidity:	55%				
Test Voltage:	DC 5V	DC 5V					
Ant. Pol.	Horizontal						
Test Mode:	TX GFSK Mode 2480 MHz						
Remark:	N/A	DIV.					
	·						

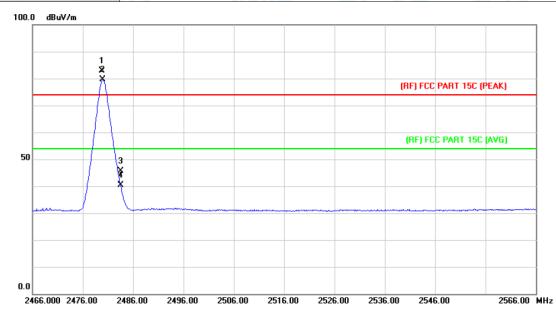


١	۱o. ۱	Иk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	O∨er	
			MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1)	(2479.900	79.20	1.15	80.35	Fundamental Frequency		peak
2	*		2479.900	75.99	1.15	77.14	Fundamental Frequency		AVG
3			2483.500	43.83	1.17	45.00	74.00	-29.00	peak
4			2483.500	36.67	1.17	37.84	54.00	-16.16	AVG



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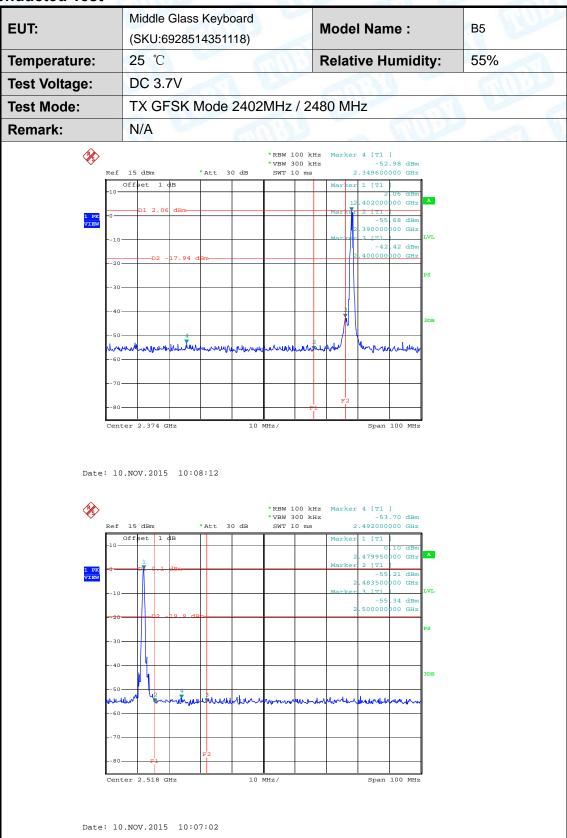
EUT:	Middle Glass Keyboard (SKU:6928514351118)	Model Name :	B5			
Temperature: 25 ℃		Relative Humidity:	55%			
Test Voltage:	DC 5V					
Ant. Pol.	Vertical					
Test Mode:	TX GFSK Mode 2480 MHz					
Remark:	N/A					



No	. Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	O∨er	
		MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB	Detector
1	Χ	2479.800	81.82	1.15	82.97	Fundamental Frequency		peak
2	*	2479.900	78.41	1.15	79.56	Fundamental Frequency		AVG
3		2483.500	44.39	1.17	45.56	74.00	-28.44	peak
4		2483.500	39.12	1.17	40.29	54.00	-13.71	AVG



(2) Conducted Test





Middle Glass Keyboard EUT: **Model Name: B5** (SKU:6928514351118) Temperature: 25 ℃ **Relative Humidity:** 55% DC 3.7V Test Voltage: **Test Mode: GFSK Hopping Mode** Remark: N/A **%** Ref 15 dBm *Att 30 dB Center 2.381 GHz Span 100 MHz Date: 10.NOV.2015 10:20:02 *RBW 100 kHz Marker 4 [T1]

*VBW 300 kHz -52.95 dBm
SWT 10 ms 2.492600000 GHz *Att 30 dB 15 dBm Offset 1 dB 483500 00 GH2 Date: 10.NOV.2015 10:23:03



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7. Number of Hopping Channel

7.1 Test Standard and Limit

6.1.1 Test Standard FCC Part 15.247 (a)(1)

6.1.2 Test Limit

Section	Test Item	Limit
15.247	Number of Hopping Channel	>15

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) Spectrum Setting: RBW=100 KHz, VBW=100 KHz, Sweep time= Auto.

7.4 EUT Operating Condition

The EUT was set to the Hopping Mode by the Customer.

7.5 Test Data



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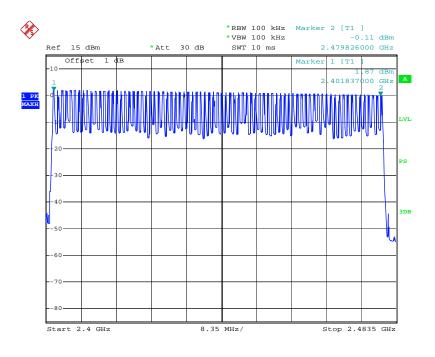
EUT:	Middle Glass Keyboard (SKU:6928514351118)	Model Name :	B5
Temperature:	25 ℃	Relative Humidity:	55%
Tost Voltago:	DC 3.7\/	11/11	No.

DC 3.7V Test Voltage:

Hopping Mode (GFSK) **Test Mode:**

Frequency Range	Quantity of Hopping Channel	Limit
2402MHz~2480MHz	79	>15

GFSK Mode



Date: 10.NOV.2015 10:13:24



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8. Average Time of Occupancy

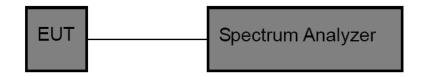
8.1 Test Standard and Limit

8.1.1 Test Standard FCC Part 15.247 (a)(1)

8.1.2 Test Limit

Section	Test Item	Limit
15.247(a)(1)/ RSS-210	Average Time of	0.4.000
Annex 8(A8.1d)	Occupancy	0.4 sec

8.2 Test Setup



8.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting: RBW=1MHz, VBW=1MHz.
- (3) Use video trigger with the trigger level set to enable triggering only on full pulses.
- (4) Sweep Time is more than once pulse time.
- (5) Set the center frequency on any frequency would be measure and set the frequency span to zero.
- (6) Measure the maximum time duration of one single pulse.
- (7) Set the EUT for packet transmitting.
- (8) Measure the maximum time duration of one single pulse.

8.4 EUT Operating Condition

The EUT was set to the Hopping Mode by the Customer.



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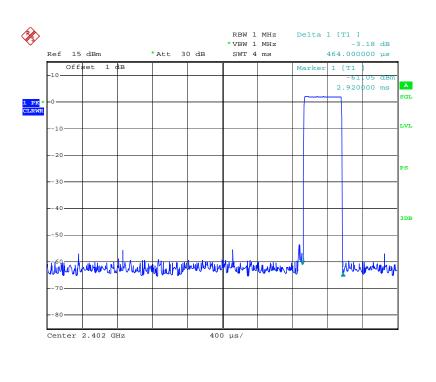
8.5 Test Data

	EUT:			ss Keyboard 514351118)	Model Name :		B5	30
	Temperature:		25 ℃	Relative Humidity:		55%		
	Test Voltage: DC 3.7V		WILL ST.		I FIFT	la de		
Test Mode:			Hopping I	Mode (GFSK DH1)	Co-		3	
	Channel Pulse Time Total of Dw		Total of Dwell	Period Time	Limit			

Channel	Pulse Time	Total of Dwell	Period Time	Limit	Result
(MHz)	(ms)	(ms)	(s)	(ms)	Result
2402	0.464	148.48			
2441	0.464	148.48	31.60	400	PASS
2480	0.464	148.48			

GFSK Hopping Mode DH1

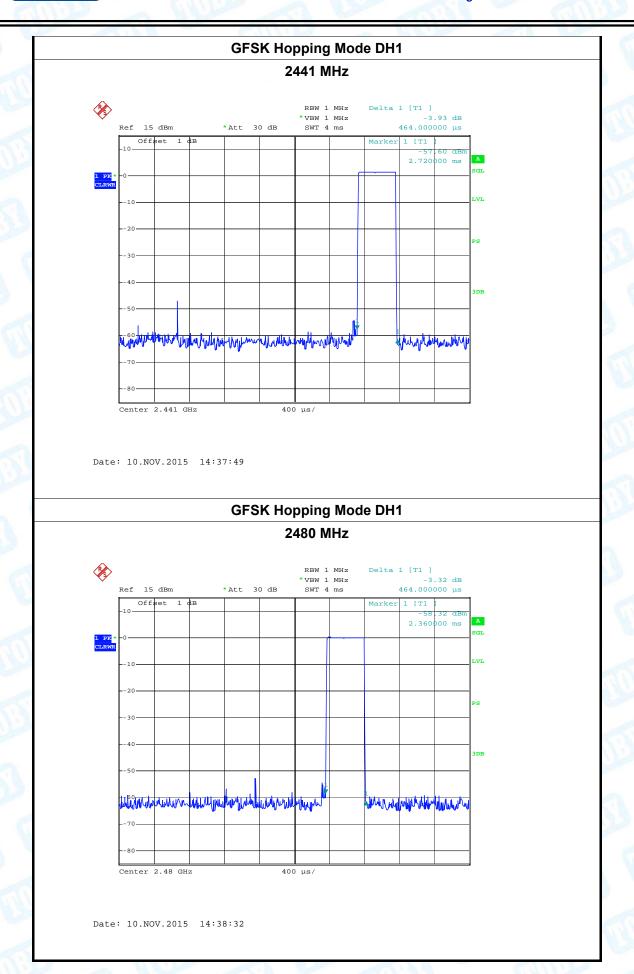
2402 MHz



Date: 10.NOV.2015 14:33:44



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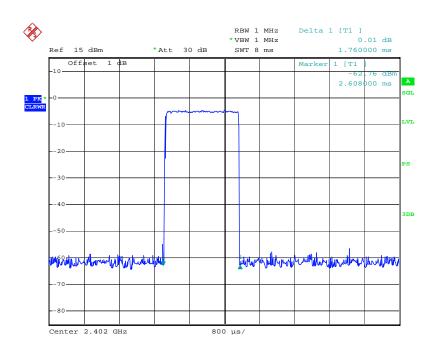
EUT:	Middle Glass Keyboard (SKU:6928514351118)	Model Name :	B5
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

Test Mode: Hopping Mode (GFSK DH3)

Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2402	1.760	281.60			
2441	1.728	276.48	31.60	400	PASS
2480	1.760	281.60			

GFSK Hopping Mode DH3

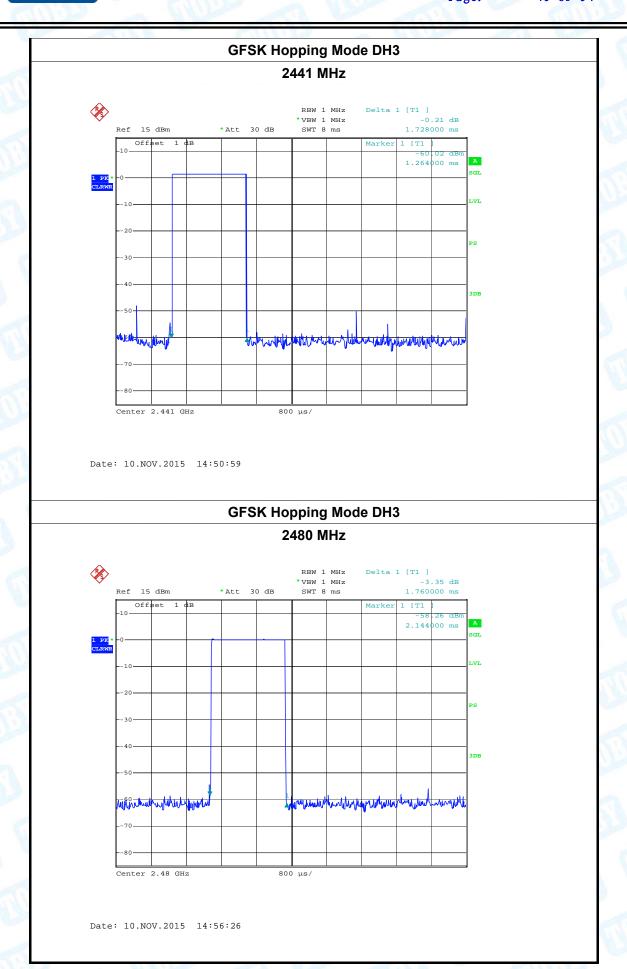
2402 MHz



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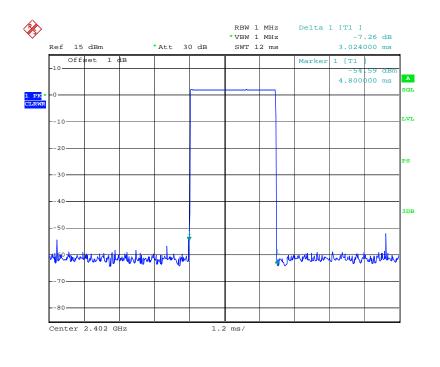
EUT:	Middle Glass Keyboard (SKU:6928514351118)	Model Name :	B5
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V	THE PARTY OF THE P	

Test Mode: Hopping Mode (GFSK DH5)

Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time	Limit (ms)	Result
(1411 12)	(1115)		(s)	(1113)	
2402	3.024	322.56		0 400	
2441	3.000	320.00	31.60		PASS
2480	3.000	320.00			

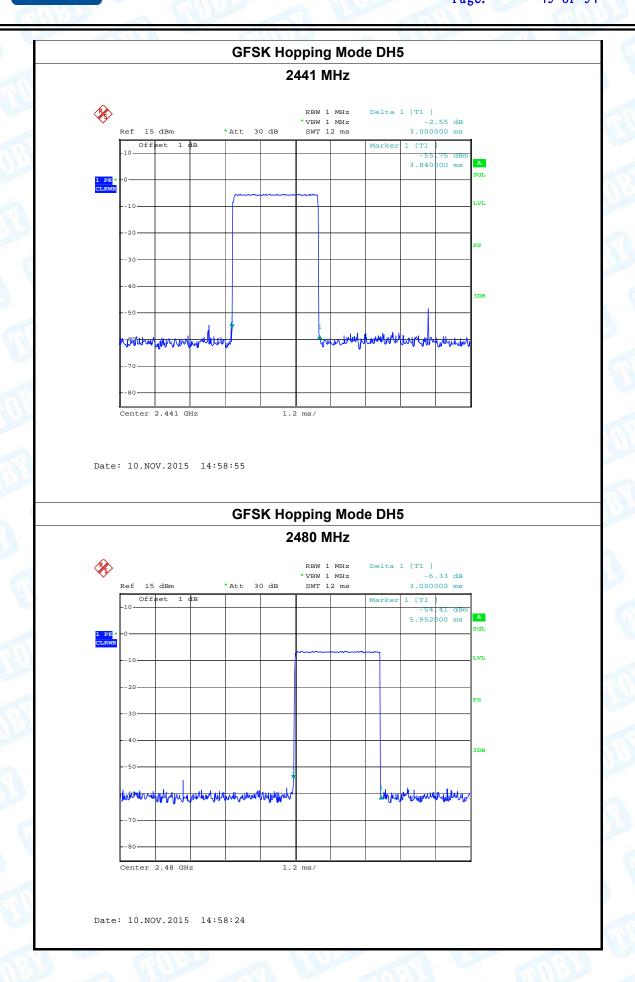
GFSK Hopping Mode DH5

2402 MHz



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9. Channel Separation and Bandwidth Test

9.1 Test Standard and Limit

9.1.1 Test Standard FCC Part 15.247

9.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
Bandwidth	<=1 MHz (20dB bandwidth)	2400~2483.5
Channel Separation	>25KHz or >two-thirds of the 20 dB bandwidth Which is greater	2400~2483.5

9.2 Test Setup



9.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:

Channel Separation: RBW=30 kHz, VBW=100 kHz.

Bandwidth: RBW=30 kHz, VBW=100 kHz.

- (3) The bandwidth is measured at an amplitude level reduced 20dB 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.
 - (4) Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:30 kHz, and Video Bandwidth:100 kHz. Sweep Time set auto.

9.4 EUT Operating Condition

The EUT was set to the Hopping Mode for Channel Separation Test and continuously transmitting for the Bandwidth Test.



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9.5 Test Data

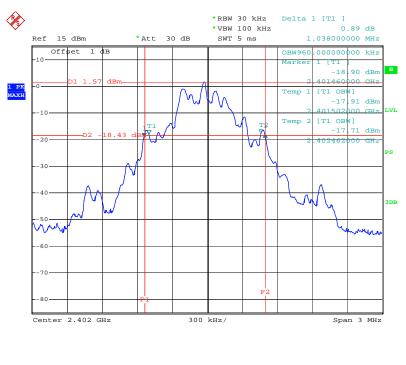
EUT:	Middle Glass Keyboard (SKU:6928514351118)	Model Name :	B5
Temperature:	25 ℃	Relative Humidity:	
Test Voltage:	DC 3.7V		A PULL
	T)/ 14 / (OFO)/)		

Test Mode: TX Mode (GFSK)

Channel frequency (MHz)	99% OBW (kHz)	20dB Bandwidth (kHz)	20dB Bandwidth *2/3 (kHz)
2402	960.00	1038.00	692.00
2441	972.00	1038.00	692.00
2480	966.00	1038.00	692.00

GFSK TX Mode

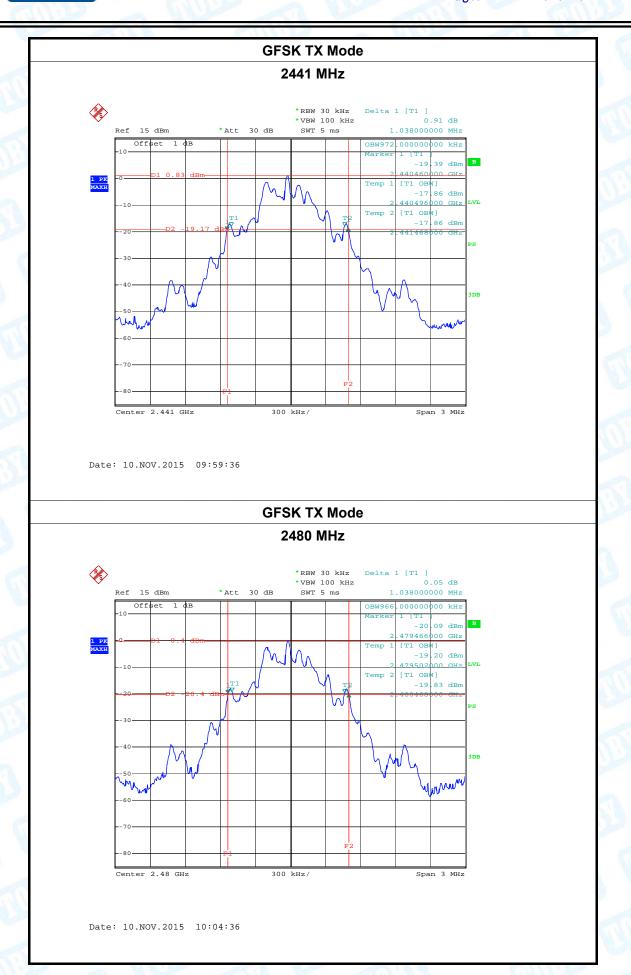
2402 MHz



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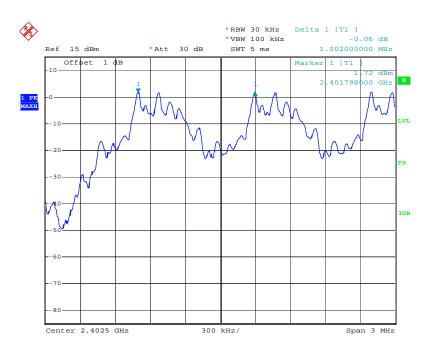
EUT:	Middle Glass Keyboard (SKU:6928514351118)	Model Name :	B5
Temperature:	25 ℃	Relative Humidity:	55%
Test Voltage:	DC 3.7V		

Hopping Mode (GFSK) **Test Mode:**

Channel frequency (MHz)	Separation Read Value	Separation Limit	
	(kHz)	(kHz)	
2402	1002.00	692.00	
2441	1002.00	692.00	
2480	1002.00	692.00	

GFSK Hopping Mode

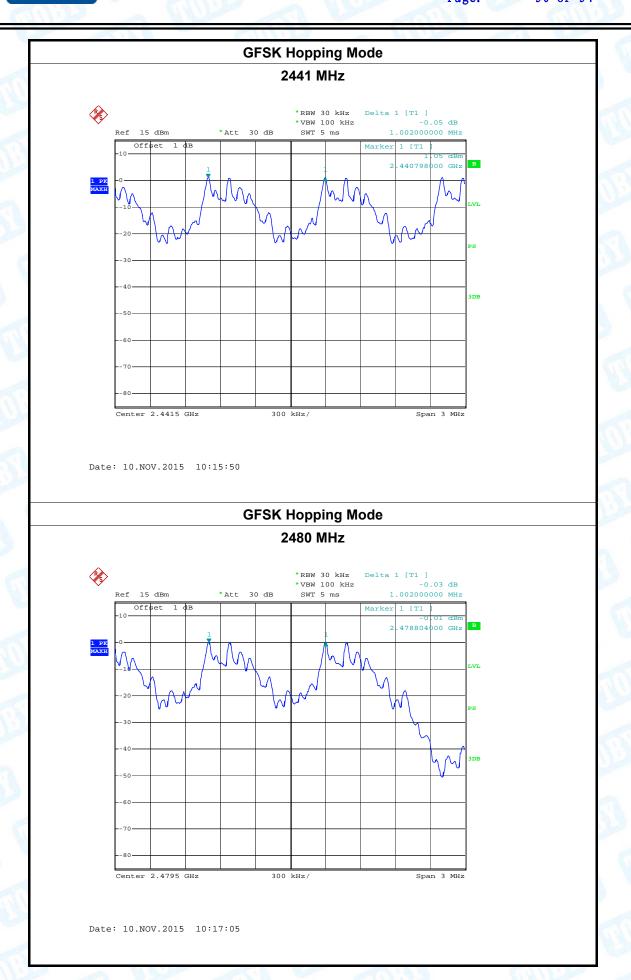
2402 MHz



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10. Peak Output Power Test

10.1 Test Standard and Limit

10.1.1 Test Standard FCC Part 15.247 (b) (1)

10.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
Peak Output Power	Hopping Channels>75 Power<1W(30dBm)	2400~2483.5
0.000	Other <125 mW(21dBm)	

10.2 Test Setup



10.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:

Peak Detector: RBW=1 MHz, VBW=3 MHz for bandwidth less than 1MHz. RBW=3 MHz, VBW=3 MHz for bandwidth more than 1MHz.

10.4 EUT Operating Condition

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



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10.5 Test Data

EUT:		Middle Glass Keyboard (SKU:6928514351118)			Model Name :		B5
Temperature:	25 ℃	25 ℃		Relativ	e Humic	lity:	55%
Test Voltage:	DC 3.7\	1	1	D			100
Test Mode:	TX Mod	e (GFSK)	100		V #73	No.	
Channel frequ	ency (MHz)	Test R	esult (d	Bm)		Limi	t (dBm)
2402	2		1.84				
244	1		1.15				21
2480)		-0.01				
		GFSI	K TX Mo	de			
		24	02 MHz				
	15 dBm Offset 1 dB		*RBW 3 MH2 *VBW 3 MH2 SWT 2.5 m		1 [T1] 1.84 2.401940000		
-10			*VBW 3 MHz		1.84	GHz	
1 PK -0			*VBW 3 MHz		1.84	GHz A	
-10			*VBW 3 MHz		1.84	GHz	
1 PK -0			*VBW 3 MHz		1.84	GHz A	
-10- 1 FF -0- MAXH			*VBW 3 MHz		1.84	A	
-10- 1 FF -0- MAXH10-			*VBW 3 MHz		1.84	A	
-10- NAXH1020-			*VBW 3 MHz		1.84	LVL	
-10 NAXH102030-			*VBW 3 MHz		1.84	LVL	
-10 1 PF			*VBW 3 MHz		1.84	LVL	
-10 1 PF			*VBW 3 MHz		1.84	LVL	



GFSK TX Mode 2441 MHz *RBW 3 MHz Marker 1 [T1] *VBW 3 MHz SWT 2.5 ms 1.15 dBm 2.440850000 GHz Ref 15 dBm *Att 30 dB Offset 1 dB Center 2.441 GHz 500 kHz/ Span 5 MHz Date: 10.NOV.2015 09:58:37 **GFSK TX Mode** 2480 MHz Marker 1 [T1]
-0.01 dBm
2.479950000 GHz *RBW 3 MHz *VBW 3 MHz SWT 2.5 ms Ref 15 dBm *Att 30 dB Offset 1 dB Date: 10.NOV.2015 10:05:34



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11. Antenna Requirement

11.1 Standard Requirement

11.1.1 Standard FCC Part 15.203

11.1.2 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.

11.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is 2 dBi, and the antenna connector is de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

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

	Antenna Type
a Eu	▼ Permanent attached antenna
	□ Unique connector antenna
	□ Professional installation antenna