



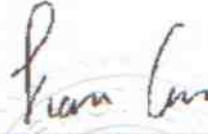
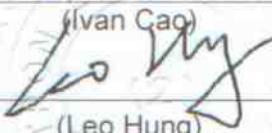
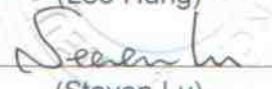
# FCC Radio TEST Report

## FCC ID: ZCWAL0728Y101

This report concerns (check one):  Original Grant  Class II Change

**Issued Date** : Mar. 17, 2011  
**Project No.** : 1103C160  
**Equipment** : Wireless 2.4G Keyboard  
**Model Name** : WK728  
**Applicant** : Shenzhen Xinyu Yuan Electronic Technology Co., Ltd.  
**Address** : Huafeng high-tech industrial zone, Song'Yu Road, Song'Gang, Bao'An, Shenzhen.china  
**Manufacturer** : Acrox Technologies Co., Ltd  
**Address** : Hsinmin Industria, Changan Town, Dongguan City, Guangdong, China

**Tested by:**  
Neutron Engineering Inc. EMC Laboratory  
**Date of Receipt:** Mar. 11, 2011  
**Date of Test:**  
Mar. 11, 2011 ~ Mar. 16, 2011

Testing Engineer :   
(Ivan Cao)  
Technical Manager :   
(Leo Hung)  
Authorized Signatory :   
(Steven Lu)

**Neutron Engineering Inc.**

No.3, Jinshagang 1st Road, ShiXia, Dalang  
Town, Dong Guan, China.  
TEL : (0769) 8318-3000 FAX : (0769) 8319-6000



### **Declaration**

**Neutron** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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### **Limitation**

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.



<b>Table of Contents</b>	<b>Page</b>
1 . CERTIFICATION	5
2 . SUMMARY OF TEST RESULTS	6
2.1 TEST FACILITY	7
2.2 MEASUREMENT UNCERTAINTY	7
3 . GENERAL INFORMATION	8
3.1 GENERAL DESCRIPTION OF EUT	8
3.2 DESCRIPTION OF TEST MODES	12
3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	13
3.4 DESCRIPTION OF SUPPORT UNITS	14
4 . EMC EMISSION TEST	15
4.1 CONDUCTED EMISSION MEASUREMENT	15
4.1.1 POWER LINE CONDUCTED EMISSION LIMITS	15
4.1.2 MEASUREMENT INSTRUMENTS LIST	15
4.1.3 TEST PROCEDURE	16
4.1.4 DEVIATION FROM TEST STANDARD	16
4.1.5 TEST SETUP	16
4.1.6 EUT OPERATING CONDITIONS	16
4.1.7 TEST RESULTS	17
4.2 RADIATED EMISSION MEASUREMENT	18
4.2.1 RADIATED EMISSION LIMITS	18
4.2.2 MEASUREMENT INSTRUMENTS LIST	19
4.2.3 TEST PROCEDURE	20
4.2.4 DEVIATION FROM TEST STANDARD	20
4.2.5 TEST SETUP	21
4.2.6 EUT OPERATING CONDITIONS	21
4.2.7 TEST RESULTS (BETWEEN 30 – 1000 MHz)	22
4.2.8 TEST RESULTS (ABOVE 1000 MHz)	24
4.2.9 TEST RESULTS (2400 – 2483.5 MHz)	36
5 . BANDWIDTH TEST	37
5.1 MEASUREMENT INSTRUMENTS LIST	37
5.2 TEST PROCEDURE	37
5.3 DEVIATION FROM STANDARD	37
5.4 TEST SETUP	37
5.5 EUT OPERATION CONDITIONS	37
5.6 TEST RESULTS	38
6 . ANTENNA CONDUCTED SPURIOUS EMISSION	40




<b>Table of Contents</b>	<b>Page</b>
6.1 APPLIED PROCEDURES / LIMIT	40
6.1.1 MEASUREMENT INSTRUMENTS LIST	40
6.1.2 TEST PROCEDURE	40
6.1.3 DEVIATION FROM STANDARD	40
6.1.4 TEST SETUP	40
6.1.5 EUT OPERATION CONDITIONS	40
6.1.6 TEST RESULTS	41
7 . EUT TEST PHOTO	46



## 1. CERTIFICATION

Equipment: Wireless 2.4G Keyboard

Brand Name : 

Model Name.: WK728

Applicant: Shenzhen Xinyuan Electronic Technology Co.,Ltd.

Factory: Acrox Technologies Co., Ltd

Address: Hsinmin Industria, Changan Town, Dongguan City, Guangdong, China

Date of Test: Mar. 11, 2011 ~ Mar. 16, 2011

Test Item: ENGINEERING SAMPLE

Standards: FCC Part15, Subpart C(15.249)/ ANSI C63.4 : 2003

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-1-1103C160) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP and TAF according to the ISO-17025 quality assessment standard and technical standard(s).



## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15, Subpart C (15.249)			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	N/A	
15.209	Radiated Emission	PASS	
15.249	Radiated Spurious Emission	PASS	

**NOTE:**

- (1) "N/A" denotes test is not applicable in this Test Report
- (2) The EUT used new battery.



**2.1 TEST FACILITY**

The test facilities used to collect the test data in this report is **DG-C02/DG-CB03** at the location of No.3, Jinshagang 1st Road, ShiXia, Dalang Town, Dong Guan, China.523792  
 Neutron's test firm number is 319330

**2.2 MEASUREMENT UNCERTAINTY**

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

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

**A. Conducted Measurement :**

Test Site	Method	Measurement Frequency Range	U , (dB)	NOTE
DG-C02	CISPR	150 KHz ~ 30MHz	1.94	

**B. Radiated Measurement :**

Test Site	Method	Measurement Frequency Range	Ant. H / V	U , (dB)	NOTE
CB03	CISPR	30MHz ~ 200MHz	V	2.48	
		30MHz ~ 200MHz	H	2.16	
		200MHz ~ 1,000MHz	V	2.50	
		200MHz ~ 1,000MHz	H	2.66	



**3. GENERAL INFORMATION**

**3.1 GENERAL DESCRIPTION OF EUT**

Equipment	Wireless 2.4G Keyboard	
Brand Name		
Model Name.	WK728	
OEM Brand/Model Name	N/A	
Model Difference	N/A	
Product Description	The EUT is a Wireless 2.4G Keyboard.	
	Product Type	Low Power Communication Device
	Operation Frequency:	2402~2480 MHz
	Modulation Type:	GFSK
	Date rate:	1Mbps
	Number Of Channel	79CH .Please see note 2.
	Antenna Designation:	Printed antenna
	Antenna Gain(Peak)	1.4 dBi
	Output Power:	80.40dBuV/m (AV Max.)
Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification. Please refer to the User's Manual.		
Channel List	Please refer to the Note 2.	
Power Source	DC Voltage supplied from battery	
Power Rating	DC 1.5V	
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.





According to the definition of FHSS modulation, adaptive frequency hopping :  
 b) at least be capable of operating over a minimum of 90 % of the band specified in table 1, from which at any given time a minimum of 20 channels or hopping channels shall be used.

The EUT 8 channels of each sequence, total 30 sequences is used, so it not considered as a hopping device.

2.

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
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		
26	2428	53	2455		



3.

<b>Hopping Channel List</b>							
<b>Group 1</b>	<b>Group 2</b>	<b>Group 3</b>	<b>Group 4</b>	<b>Group 5</b>	<b>Group 6</b>	<b>Group 7</b>	<b>Group 8</b>
2402	2404	2405	2406	2407	2408	2409	2410
2417	2414	2415	2416	2413	2422	2419	2420
2423	2427	2425	2426	2424	2428	2432	2430
2433	2434	2437	2436	2435	2438	2439	2442
2443	2444	2445	2447	2446	2448	2449	2450
2453	2454	2455	2456	2458	2457	2459	2460
2462	2464	2465	2466	2469	2468	2467	2470
2473	2472	2475	2476	2480	2478	2479	2477

<b>Group 9</b>	<b>Group 10</b>	<b>Group 11</b>	<b>Group 12</b>	<b>Group 13</b>	<b>Group 14</b>	<b>Group 15</b>	<b>Group 16</b>
2411	2412	2402	2404	2405	2406	2407	2408
2421	2418	2417	2414	2415	2416	2413	2422
2431	2429	2423	2427	2425	2426	2424	2428
2441	2440	2433	2434	2437	2436	2435	2438
2452	2451	2443	2444	2445	2447	2446	2448
2461	2463	2453	2454	2455	2456	2458	2457
2471	2474	2462	2464	2465	2466	2469	2468
2480	2480	2473	2472	2475	2476	2480	2478

<b>Group 17</b>	<b>Group 18</b>	<b>Group 19</b>	<b>Group 20</b>	<b>Group 21</b>	<b>Group 22</b>	<b>Group 23</b>	<b>Group 24</b>
2409	2410	2411	2412	2402	2404	2405	2406
2419	2420	2421	2418	2417	2414	2415	2416
2432	2430	2431	2429	2423	2427	2425	2426
2439	2442	2441	2440	2433	2434	2437	2436
2449	2450	2452	2451	2443	2444	2445	2447
2459	2460	2461	2463	2453	2454	2455	2456
2467	2470	2471	2474	2462	2464	2465	2466
2479	2477	2480	2480	2473	2472	2475	2476



3.

<b>Hopping Channel List</b>					
<b>Group 25</b>	<b>Group 26</b>	<b>Group 27</b>	<b>Group 28</b>	<b>Group 29</b>	<b>Group 30</b>
2407	2408	2409	2410	2411	2412
2413	2422	2419	2420	2421	2418
2424	2423	2420	2430	2431	2429
2435	2438	2439	2442	2441	2440
2446	2448	2449	2450	2452	2451
2458	2457	2459	2460	2461	2463
2469	2468	2467	2470	2471	2474
2480	2478	2479	2477	2480	2480

4. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Printed Antenna	N/A	1.4



### 3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based 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 above was evaluated respectively.

Pretest Mode	Description
Mode 1	CH Lower - 2402MHz
Mode 2	CH Middle - 2441MHz
Mode 3	CH Highest -2480MHz

For Conducted Test	
Final Test Mode	Description
-	"N/A" denotes test is not applicable in this Test Report

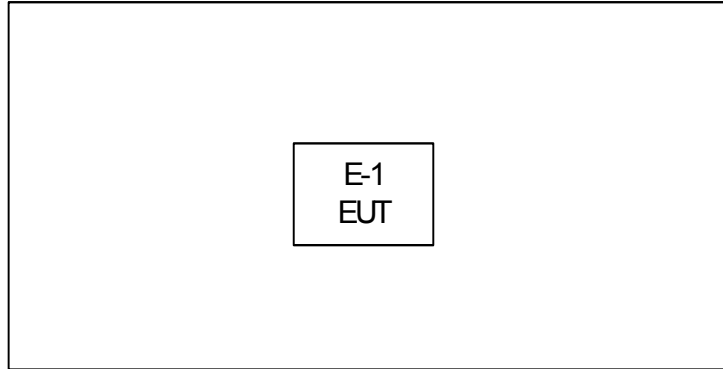
For Radiated Test	
Final Test Mode	Description
Mode 1	CH Lower - 2402MHz
Mode 2	CH Middle - 2441MHz
Mode 3	CH Highest -2480MHz

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.




3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED





**3.4 DESCRIPTION OF SUPPORT UNITS**

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	Wireless 2.4G Keyboard		WK728	ZCWAL0728Y101	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in m in 『Length』 column.



**4. EMC EMISSION TEST**

**4.1 CONDUCTED EMISSION MEASUREMENT**

**4.1.1 POWER LINE CONDUCTED EMISSION LIMITS (Frequency Range 150KHz-30MHz)**

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

**4.1.2 MEASUREMENT INSTRUMENTS LIST**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	EMCO	3816/2	00052765	May.26.2011
2	LISN	Rolf Heine	NNB-2-16Z	99044	May.26.2011
3	50Ω Terminator	SHX	TF2-3G-A	08122901	May.26.2011
4	Transient Limiter	Agilent	11947A	3107A03668	May.26.2011
5	Test Cable	N/A	C-06_C03	N/A	Nov.15.2011
6	EMI TEST RECEIVER	R&S	ESCS30	8333641017	May.26.2011

Remark: " N/A" denotes No Model Name. , Serial No. or No Calibration specified.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

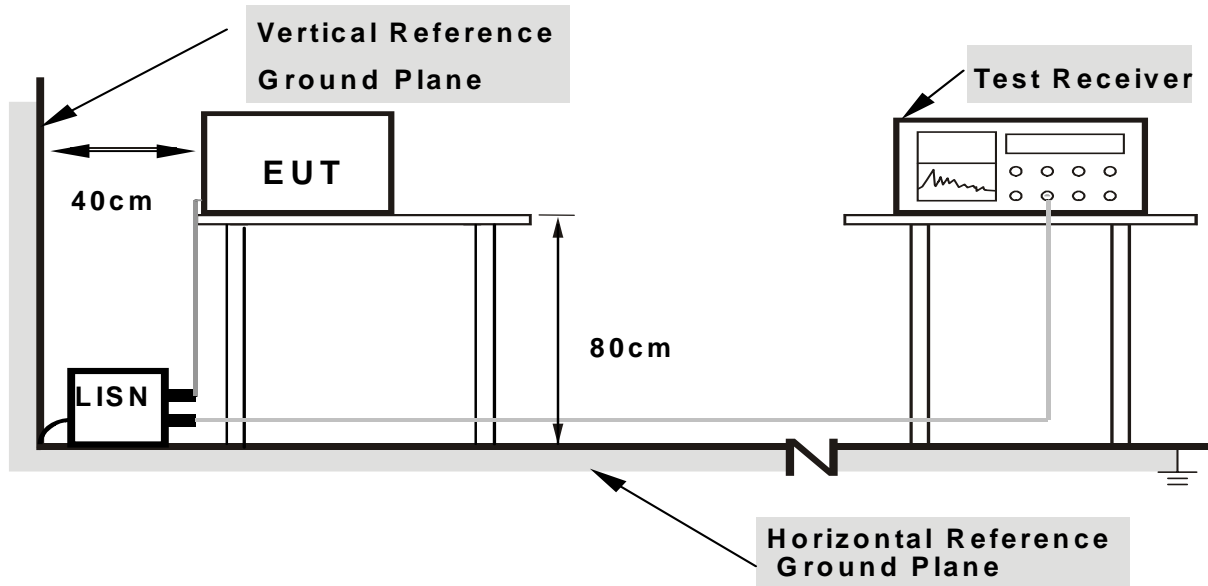
**4.1.3 TEST PROCEDURE**

- a. 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.
- b. 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.
- c. 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.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

**4.1.4 DEVIATION FROM TEST STANDARD**

No deviation

**4.1.5 TEST SETUP**



- Note: 1.Support units were connected to second LISN.**  
**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

**4.1.6 EUT OPERATING CONDITIONS**

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

The EUT was programmed to be in continuously transmitting mode.





4.1.7 TEST RESULTS

EUT :	Wireless 2.4G Keyboard	Model Name. :	WK728
Temperature :	--	Relative Humidity :	--
Pressure :	--	Test Power :	--
Test Mode :	"N/A" denotes test is not applicable in this Test Report		

Remark

- (1) All readings are QP Mode value unless otherwise stated AVG in column of 'Note'. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a "\*" marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150KHz to 30MHz.



**4.2 RADIATED EMISSION MEASUREMENT**

**4.2.1 RADIATED EMISSION LIMITS ( FCC 15.209 )**

<b>Frequencies (MHz)</b>	<b>Field Strength (micorvolts/meter)</b>	<b>Measurement Distance (meters)</b>
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

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

Note:

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

**LIMITS OF RADIATED EMISSION MEASUREMENT ( FCC 15.209 )**

FREQUENCY (MHz)	(dBuV/m) (at 3m)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

**LIMITS OF RADIATED EMISSION MEASUREMENT (FCC Part 15.249)**

FCC Part15 (15.249) , Subpart C	
Limit	Frequency Range (MHz)
Field strength of fundamental 50000 μV/m (94 dBμV/m) @ 3 m	2400-2483.5
Field strength of harmonics 500 μV/m (54 dBμV/m) @ 3 m	Above 2483.5



4.2.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Triple Loop Antenna	R&S	HFH2-Z2	830749/020	May.27.2011
2	Bi-log Antenna	Schwarbeck	VULB9160	9160-3232	May.26.2011
3	Horn Antenna	ETS	3115	00075789	May.12.2011
4	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170340	Dec.15.2011
5	Amplifier	HP	8447D	2944A09673	May.26.2011
6	Amplifier	Agilent	8449B	3008A02274	May.26.2011
7	Amplifier	EMC	EMC2654045	980039	Aug.12.2011
8	Test Receiver	R&S	ESCI	100895	May.26.2011
9	Spectrum Analyzer	R&S	FSP 40	100185	Nov.26.2011
10	Test Cable	N/A	C-01_CB03	N/A	Jul.05.2011
11	Test Cable	HUBER+SUHNER	SUCOFLEX_8m	313794/4	Apr.12.2011
12	Controller	CT	SC100	N/A	N/A

Remark: " N/A" denotes No Model Name. / Serial No. and No Calibration specified.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP



#### 4.2.3 TEST PROCEDURE

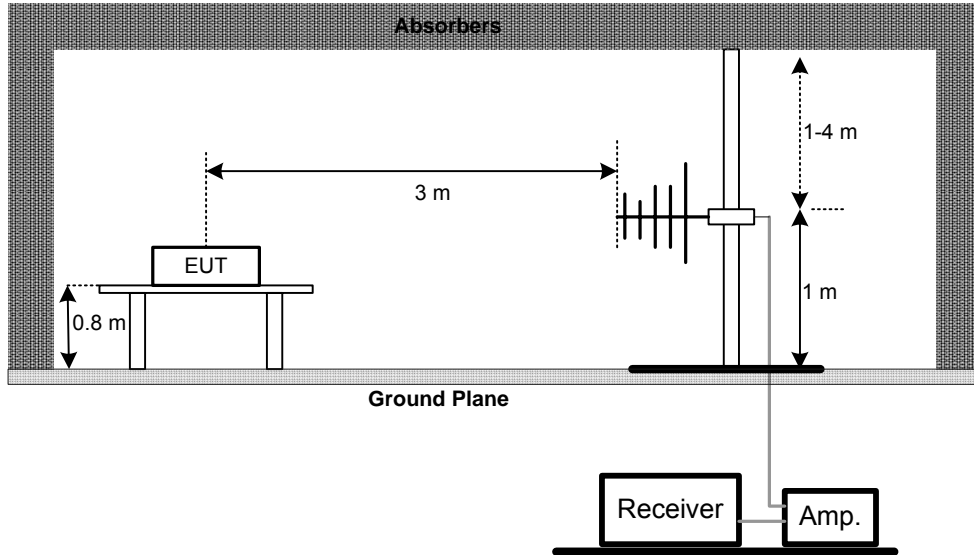
- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. 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.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.2.4 DEVIATION FROM TEST STANDARD

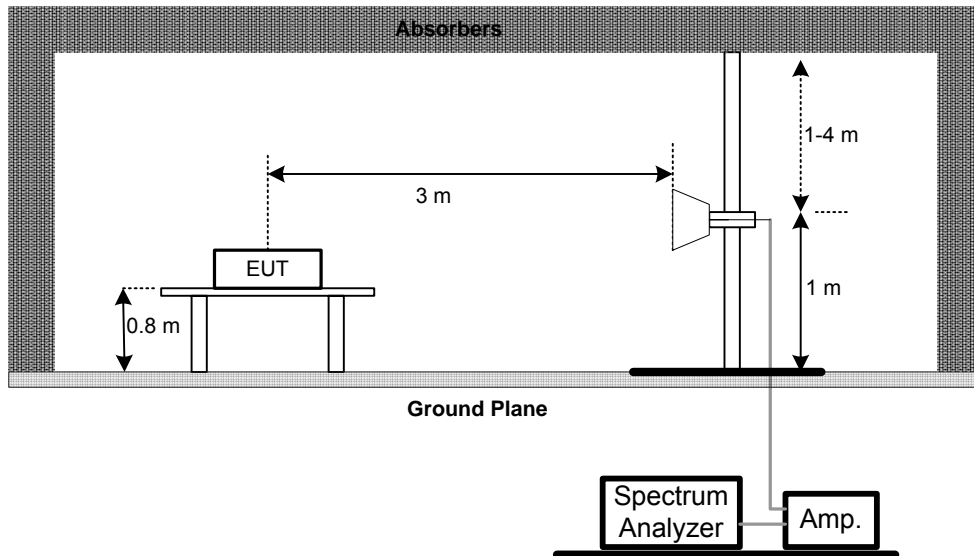
No deviation

**4.2.5 TEST SETUP**

**(A) Radiated Emission Test Set-Up Frequency Below 1 GHz**



**(B) Radiated Emission Test Set-Up Frequency Above 1 GHz**



**4.2.6 EUT OPERATING CONDITIONS**

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



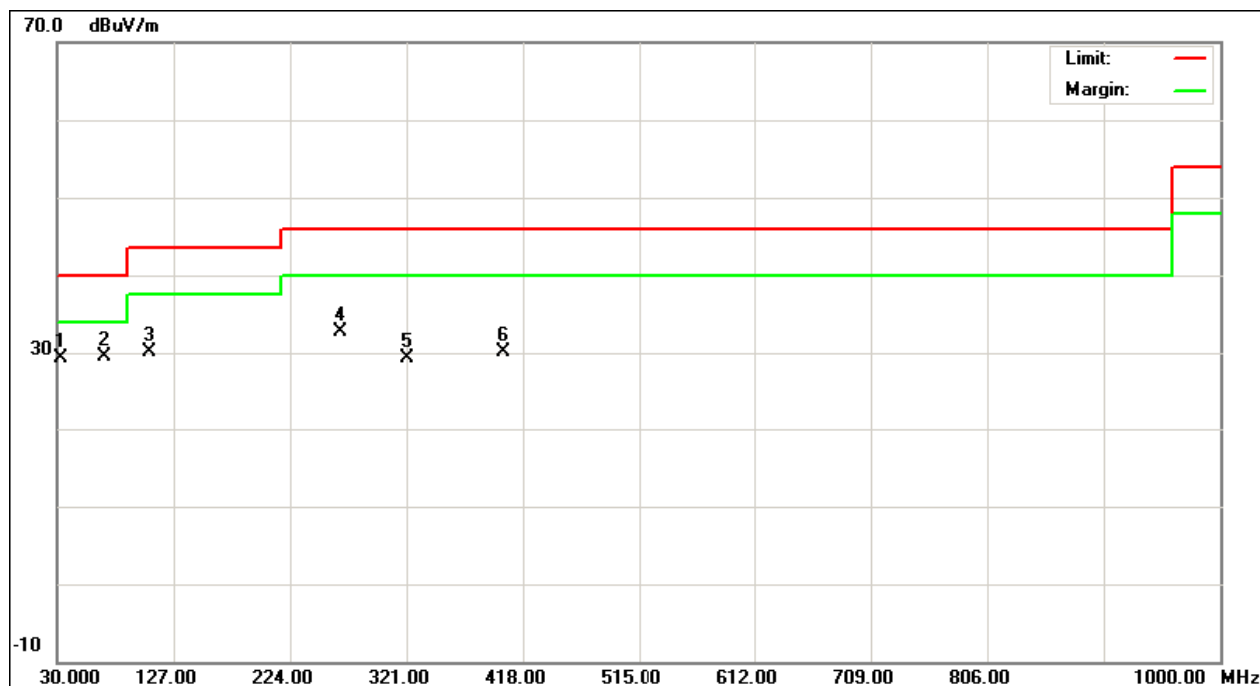
4.2.7 TEST RESULTS (BETWEEN 30 – 1000 MHz)

EUT :	Wireless 2.4G Keyboard	Model Name. :	WK728
Temperature :	20°C	Relative Humidity :	50 %
Pressure :	1006 hPa	Test Power :	DC 1.5V
Test Mode :	TX 2402MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
32.01	V	45.60	-16.39	29.21	40.00	- 10.79	
68.35	V	47.64	-18.10	29.54	40.00	- 10.46	
106.58	V	48.50	-18.38	30.12	43.50	- 13.38	
265.14	V	46.21	-13.56	32.65	46.00	- 13.35	
321.14	V	40.83	-11.55	29.28	46.00	- 16.72	
401.25	V	39.11	-8.99	30.12	46.00	- 15.88	

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ “F” denotes fundamental frequency; “ H” denotes spurious frequency. “E” denotes band edge frequency.
- (3) Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode or QP detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.



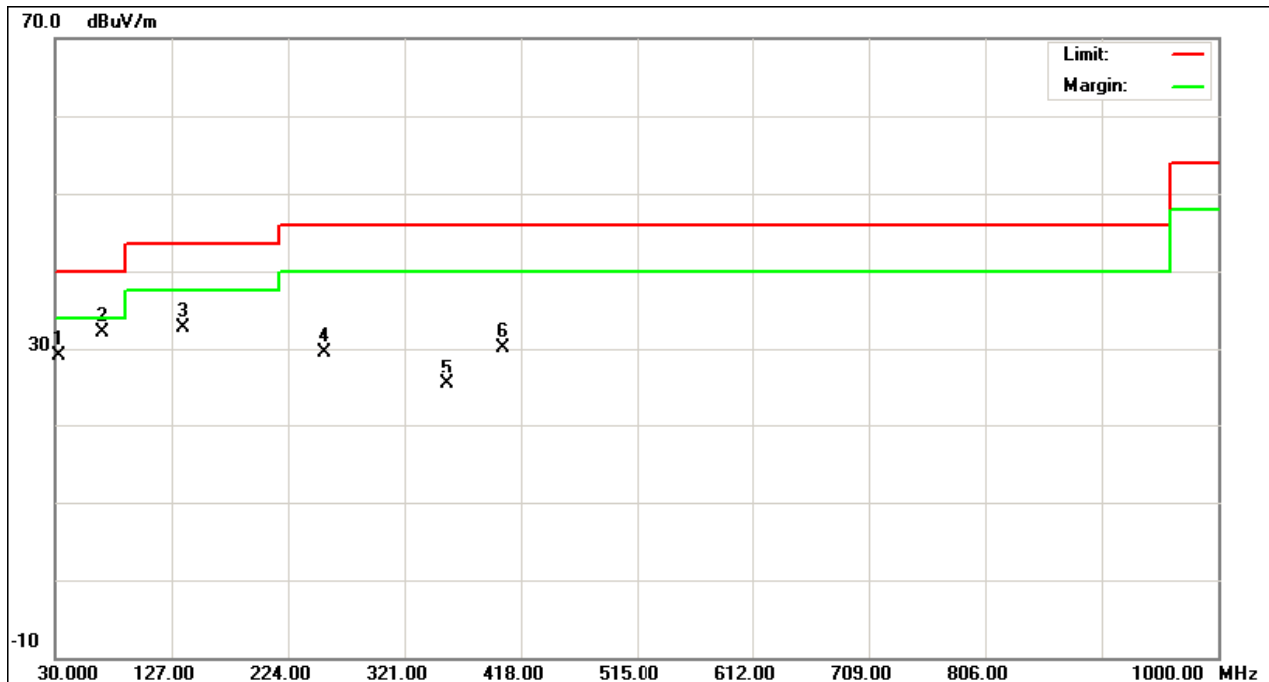


EUT :	Wireless 2.4G Keyboard	Model Name. :	WK728
Temperature :	20°C	Relative Humidity :	51 %
Pressure :	1006 hPa	Test Power :	DC 1.5V
Test Mode :	TX 2402MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
32.25	H	45.62	-16.45	29.17	40.00	- 10.83	
68.24	H	50.27	-18.08	32.19	40.00	- 7.81	
136.12	H	50.56	-17.89	32.67	43.50	- 10.83	
253.70	H	43.87	-14.30	29.57	46.00	- 16.43	
356.41	H	35.99	-10.60	25.39	46.00	- 20.61	
402.35	H	39.10	-8.98	30.12	46.00	- 15.88	

**Remark :**

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ “F” denotes fundamental frequency; “ H” denotes spurious frequency. “E” denotes band edge frequency.
- (3) Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode or QP detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.





4.2.8 TEST RESULTS (ABOVE 1000 MHz)

EUT :	Wireless 2.4G Keyboard	Model Name. :	WK728
Temperature :	20°C	Relative Humidity :	50 %
Pressure :	1006 hPa	Test Power :	DC 1.5V
Test Mode :	TX 2402MHz		

Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2390.00	V	20.93	10.49	31.61	52.54	42.10	74.00	54.00	X/E
<b>2402.25</b>	<b>V</b>	<b>47.64</b>	<b>46.56</b>	<b>31.60</b>	<b>79.24</b>	<b>78.16</b>	<b>114.00</b>	<b>94.00</b>	<b>X/F</b>
4804.10	V	55.95	39.06	5.17	61.12	44.23	74.00	54.00	X/H

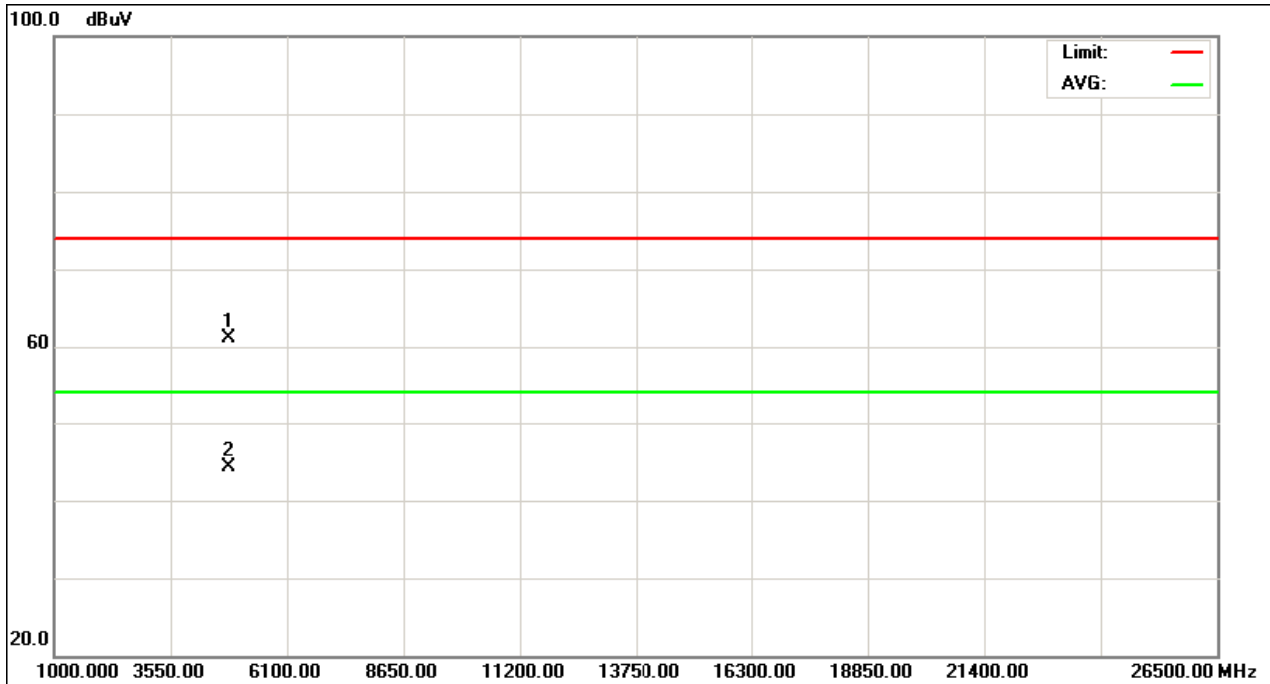
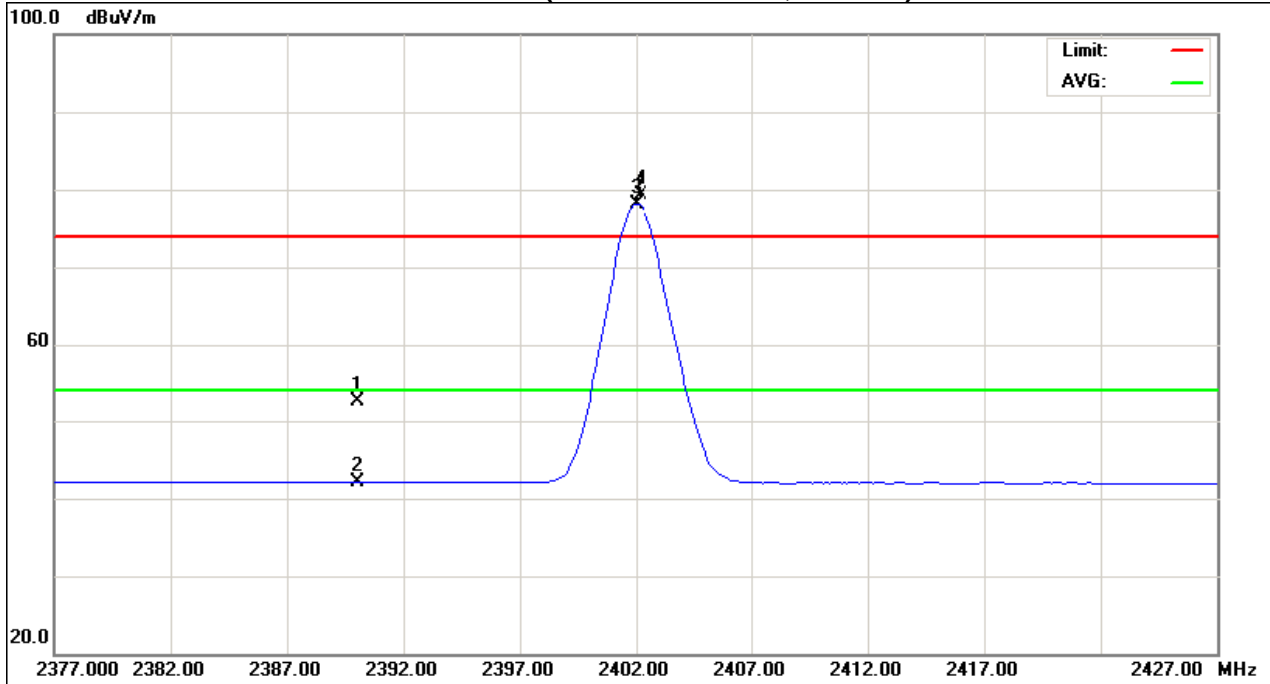
Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna





Orthogonal Axis : X  
TX 2402MHz (Above 1000 MHz, Vertical)





EUT :	Wireless 2.4G Keyboard	Model Name. :	WK728
Temperature :	20°C	Relative Humidity :	50 %
Pressure :	1006 hPa	Test Power :	DC 1.5V
Test Mode :	TX 2402MHz		

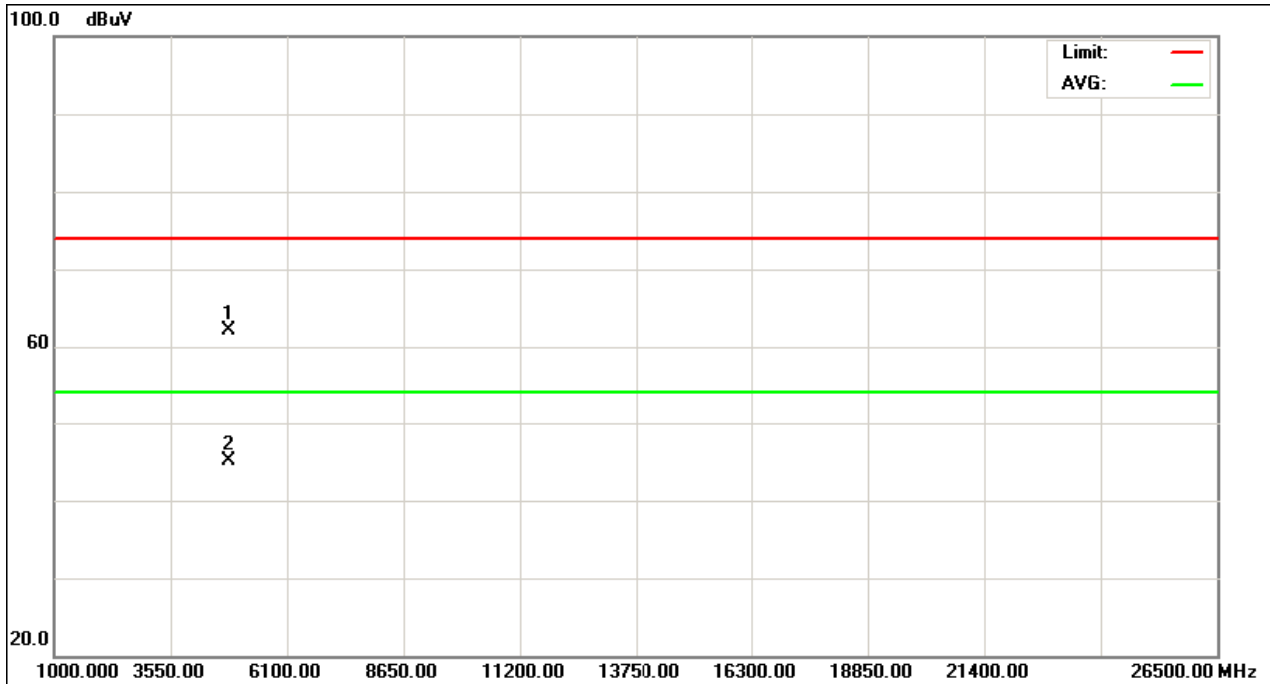
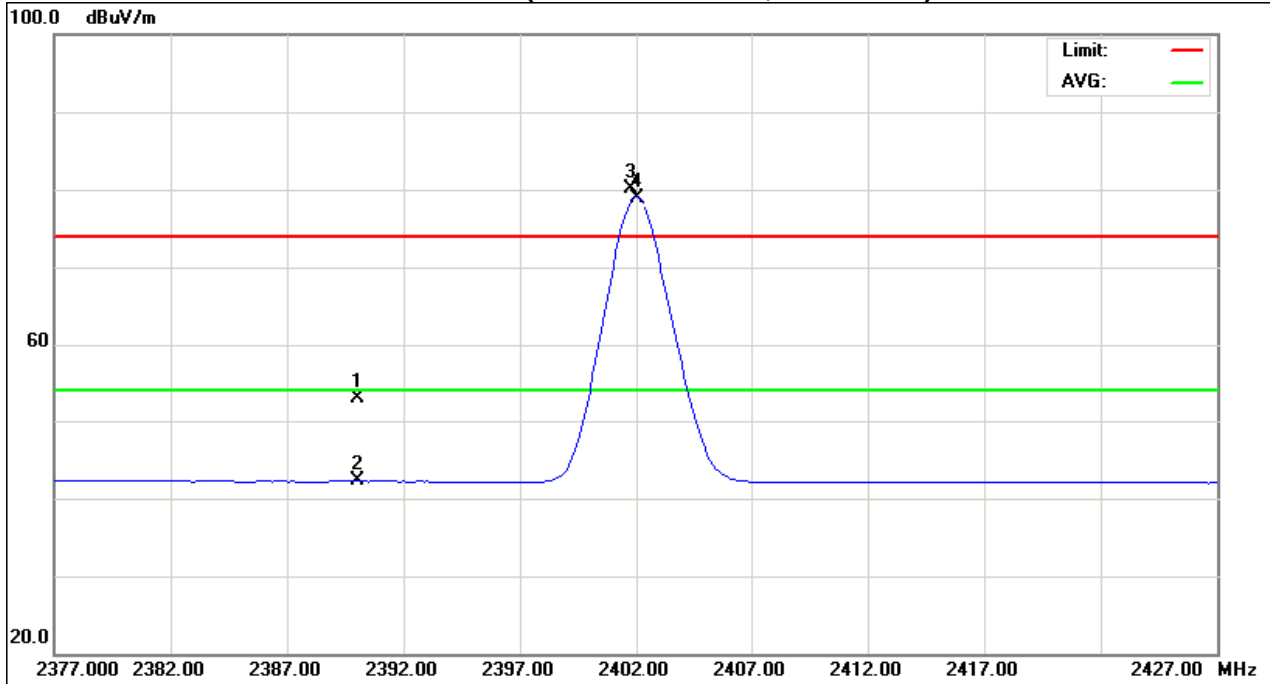
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
2390.00	H	21.28	10.63	31.61	52.89	42.24	74.00	54.00	X/E
<b>2401.75</b>	<b>H</b>	<b>48.49</b>	<b>47.39</b>	<b>31.60</b>	<b>80.09</b>	<b>78.99</b>	<b>114.00</b>	<b>94.00</b>	<b>X/F</b>
4804.10	H	56.95	40.00	5.17	62.12	45.17	74.00	54.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna



Orthogonal Axis : X  
TX 2402MHz (Above 1000 MHz, Horizontal)





EUT :	Wireless 2.4G Keyboard	Model Name. :	WK728
Temperature :	20°C	Relative Humidity :	50 %
Pressure :	1006 hPa	Test Power :	DC 1.5V
Test Mode :	TX 2441MHz		

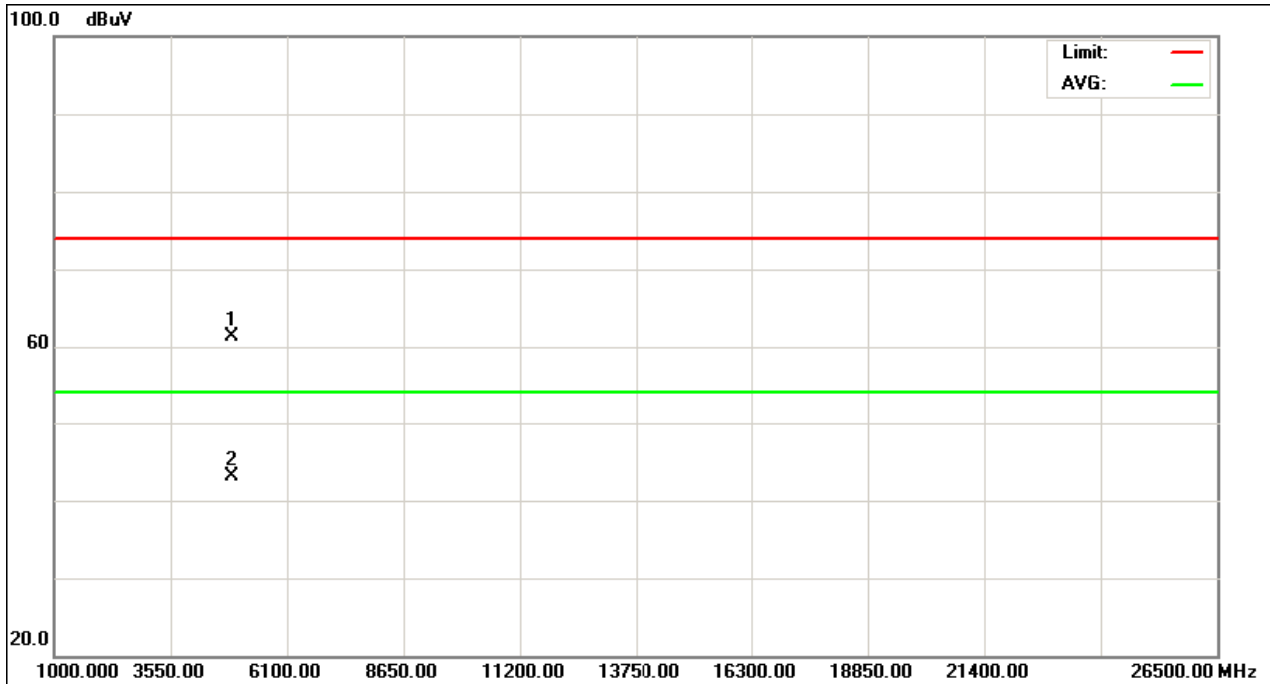
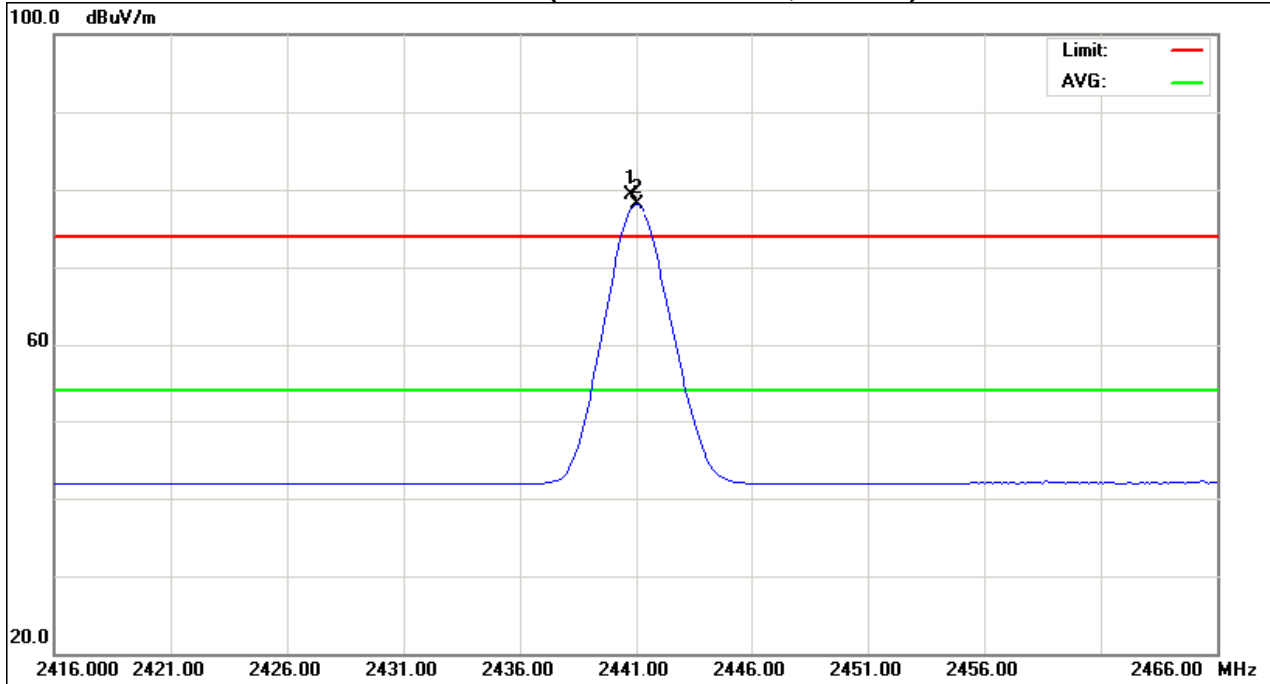
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
<b>2440.75</b>	<b>V</b>	<b>47.70</b>	<b>46.50</b>	<b>31.55</b>	<b>79.25</b>	<b>78.05</b>	<b>114.00</b>	<b>94.00</b>	<b>X/F</b>
4882.02	V	55.69	37.56	5.56	61.25	43.12	74.00	54.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ “F” denotes fundamental frequency; “H” denotes spurious frequency. “E” denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown “ \* ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
“X” - denotes Laid on Table ; “Y” - denotes Vertical Stand ; “Z” - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna



Orthogonal Axis : X  
TX 2441 MHz (Above 1000 MHz, Vertical)





EUT :	Wireless 2.4G Keyboard	Model Name. :	WK728
Temperature :	20°C	Relative Humidity :	50 %
Pressure :	1006 hPa	Test Power :	DC 1.5V
Test Mode :	TX 2441MHz		

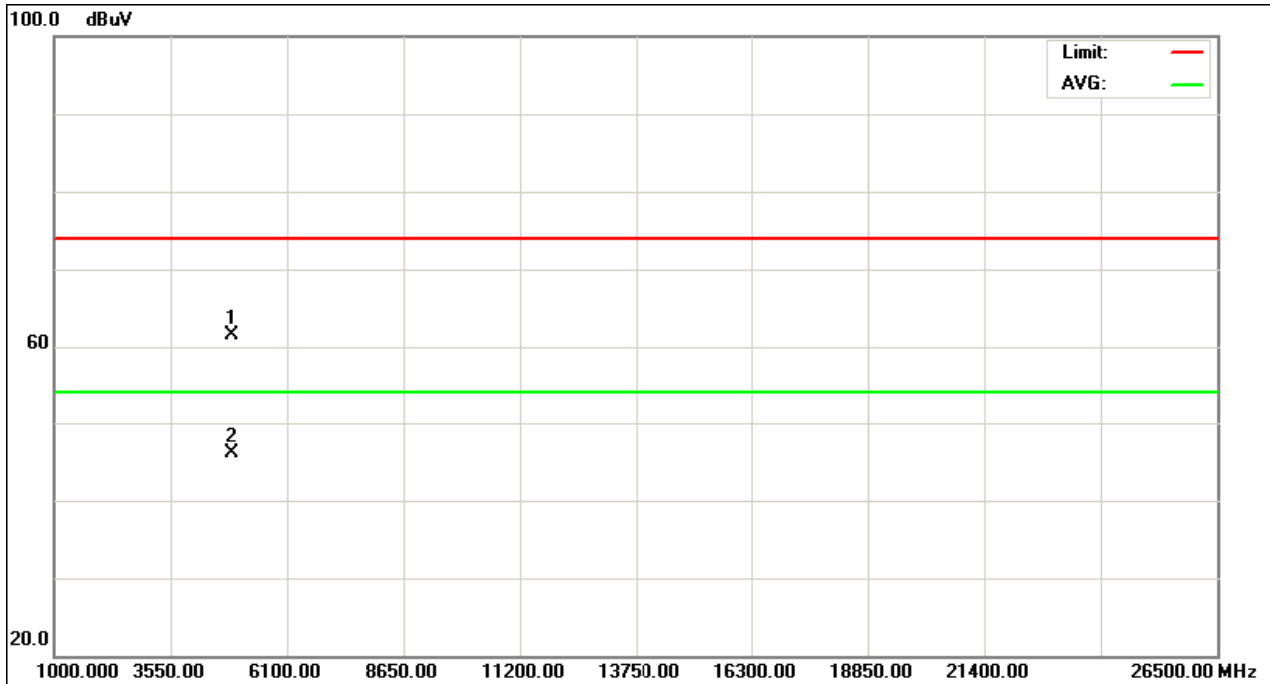
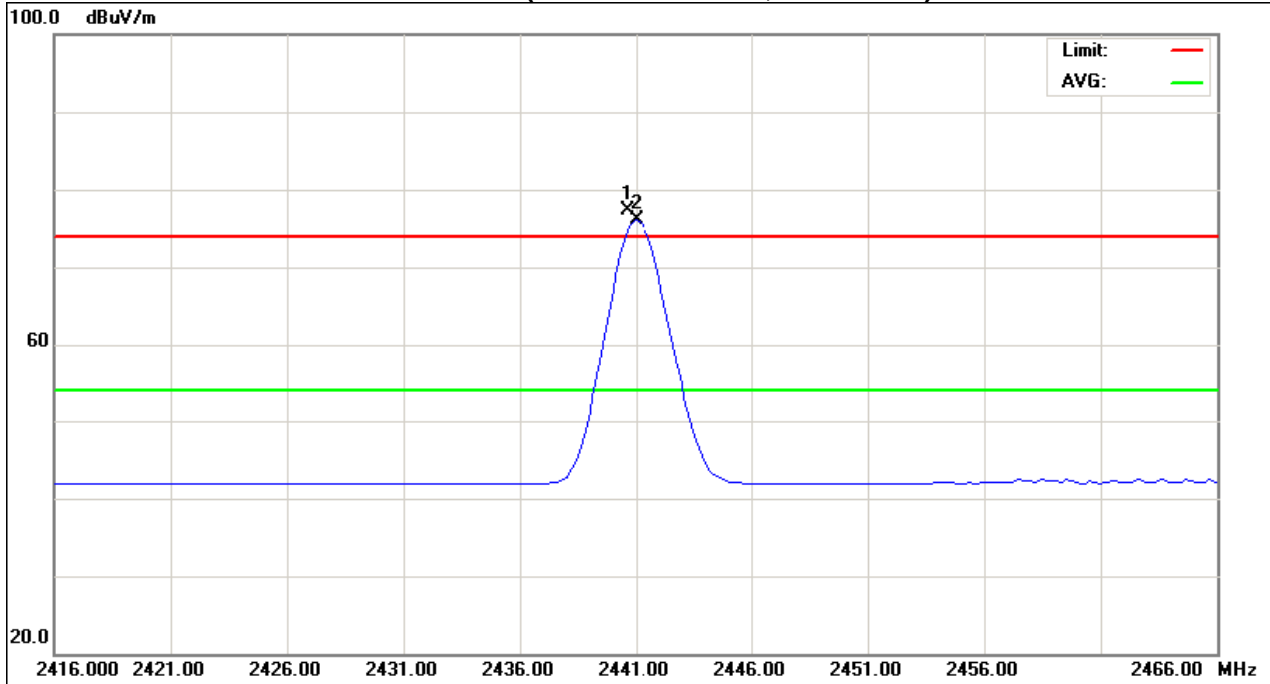
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
<b>2440.63</b>	<b>H</b>	<b>45.72</b>	<b>44.46</b>	<b>31.55</b>	<b>77.27</b>	<b>76.01</b>	<b>114.00</b>	<b>94.00</b>	<b>X/F</b>
4882.02	H	56.01	40.56	5.56	61.57	46.12	74.00	54.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna



Orthogonal Axis : X  
TX 2441MHz (Above 1000 MHz, Horizontal)





EUT :	Wireless 2.4G Keyboard	Model Name. :	WK728
Temperature :	20°C	Relative Humidity :	50 %
Pressure :	1006 hPa	Test Power :	DC 1.5V
Test Mode :	TX 2480MHz		

Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
<b>2479.63</b>	<b>V</b>	<b>50.00</b>	<b>48.90</b>	<b>31.50</b>	<b>81.50</b>	<b>80.40</b>	<b>114.00</b>	<b>94.00</b>	<b>X/F</b>
2483.50	V	22.01	12.69	31.50	53.51	44.19	74.00	54.00	X/E
4959.86	V	56.20	38.38	5.94	62.14	44.32	74.00	54.00	X/H

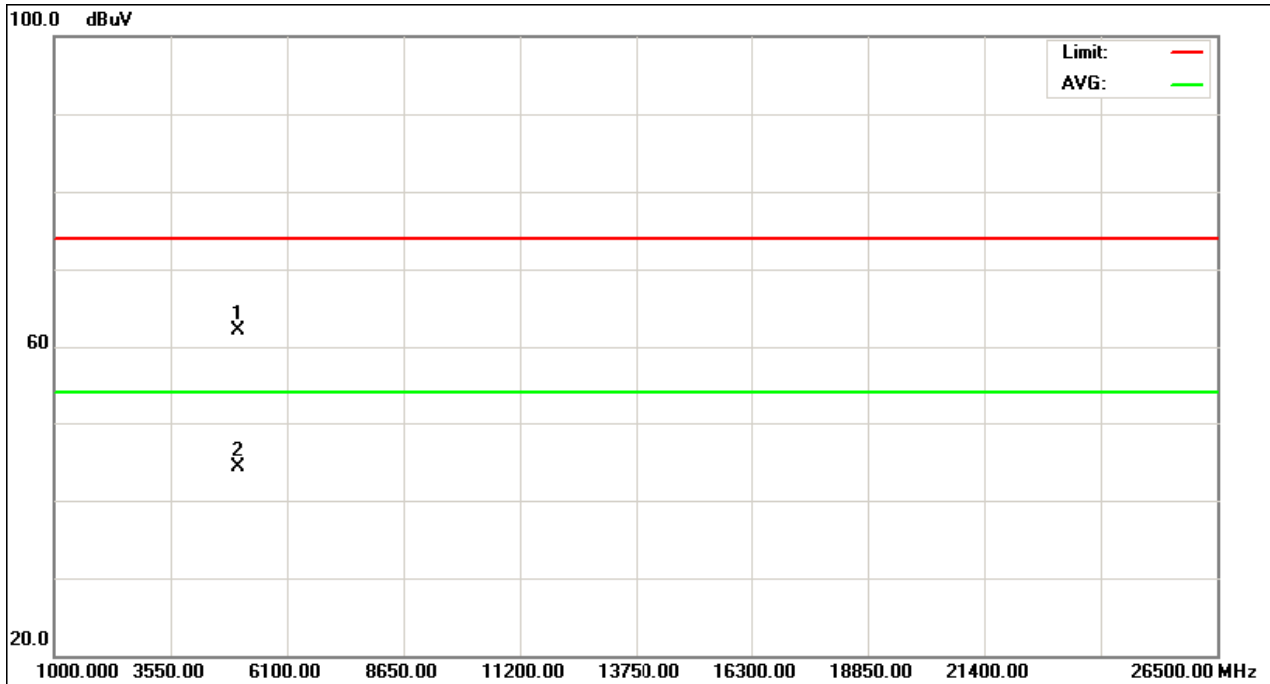
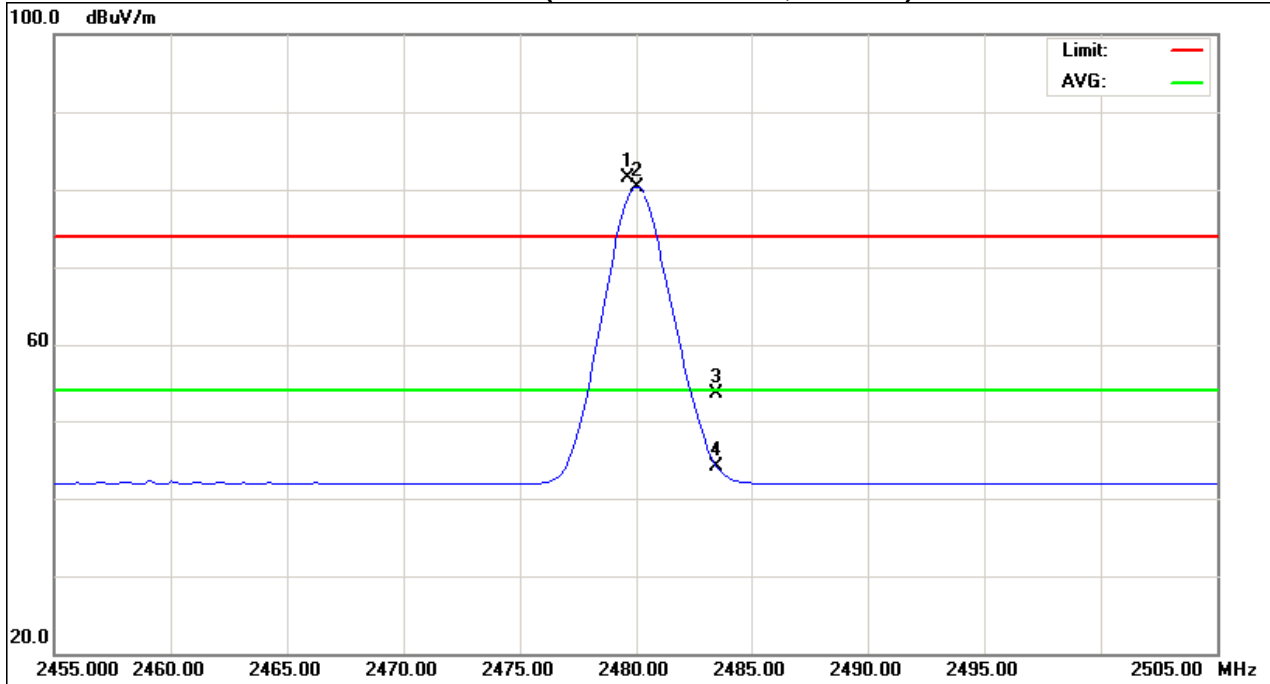
Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna





Orthogonal Axis : X  
TX 2480MHz (Above 1000 MHz, Vertical)





EUT :	Wireless 2.4G Keyboard	Model Name. :	WK728
Temperature :	20°C	Relative Humidity :	50 %
Pressure :	1006 hPa	Test Power :	DC 1.5V
Test Mode :	TX 2480MHz		

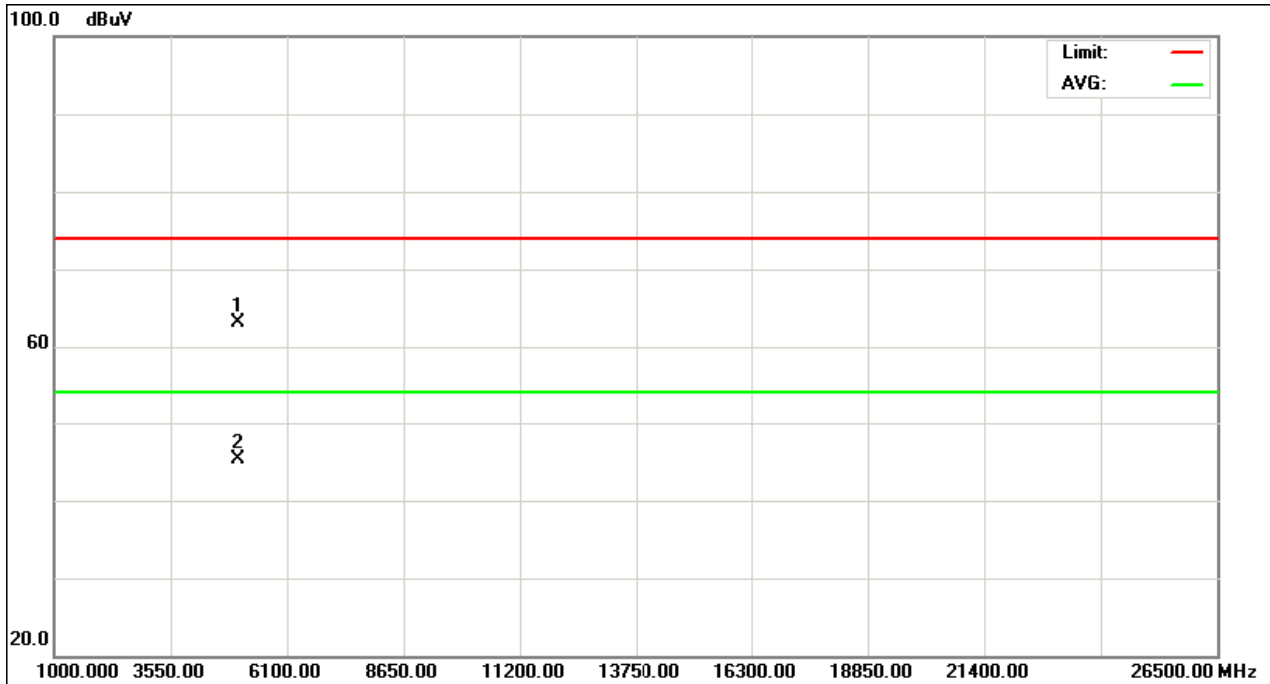
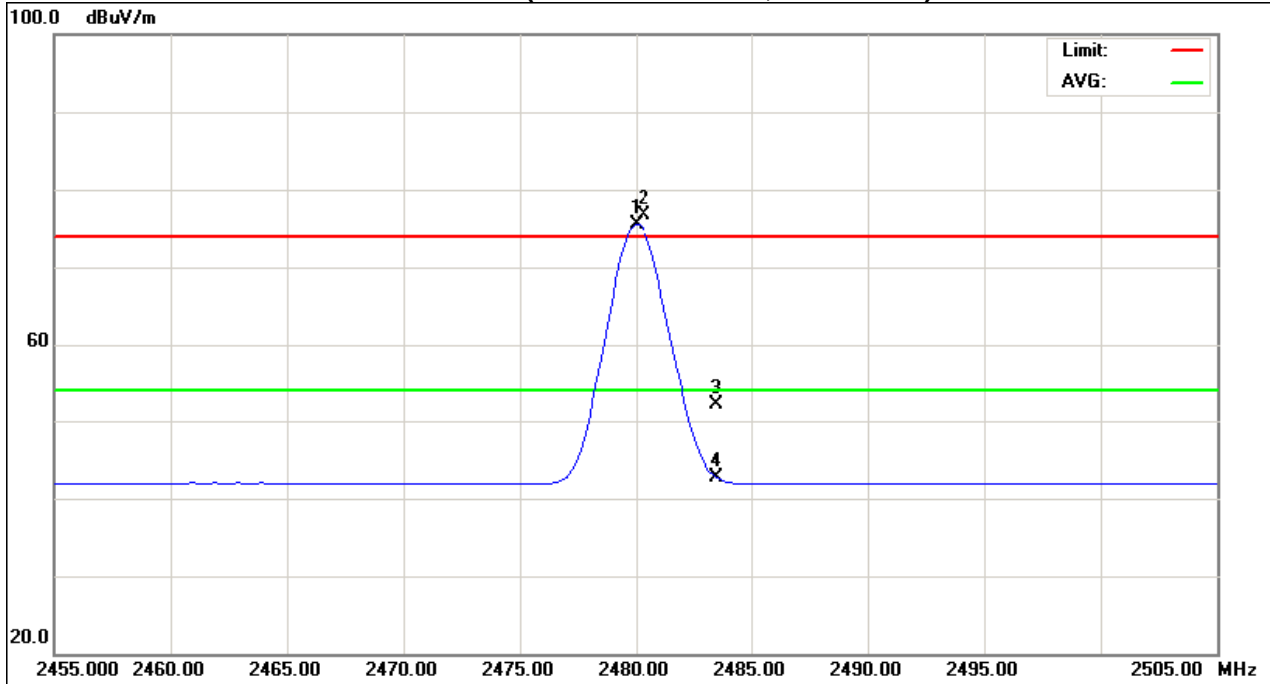
Freq. (MHz)	Ant.Pol. H/V	Reading		Ant./CF CF(dB)	Act.		Limit		Note
		Peak (dBuV)	AV (dBuV)		Peak (dBuV/m)	AV (dBuV/m)	Peak (dBuV/m)	AV (dBuV/m)	
<b>2480.38</b>	<b>H</b>	<b>45.14</b>	<b>44.02</b>	<b>31.50</b>	<b>76.64</b>	<b>75.52</b>	<b>114.00</b>	<b>94.00</b>	<b>X/F</b>
2483.50	H	20.64	11.25	31.50	52.14	42.75	74.00	54.00	X/E
4959.86	H	57.07	39.40	5.94	63.01	45.34	74.00	54.00	X/H

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency ◦ "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)
- (3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (4) Data of measurement within this frequency range shown " \* " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
- (6) EUT Orthogonal Axis :  
"X" - denotes Laid on Table ; "Y" - denotes Vertical Stand ; "Z" - denotes Side Stand
- (7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna



Orthogonal Axis : X  
TX 2480MHz (Above 1000 MHz, Horizontal)





4.2.9 TEST RESULTS (2400 – 2483.5 MHz)

EUT :	Wireless 2.4G Keyboard	Model Name. :	WK728
Temperature :	20°C	Relative Humidity :	50 %
Pressure :	1006 hPa	Test Power :	DC 1.5V
Test Mode :	TX CH 2402MHz/2441MHz/2480MHz		

Freq. (MHz)	Ant.Pol. (H/V)	Peak	AV	Ant./CL/ CF(dB)	Peak	AV	Peak	AV	NOTE
		Reading (dBuV)			Actual FS (dBuV/m)		Limit3m (dBuV/m)		
2402.25	V	47.64	46.56	31.60	79.24	78.16	114.00	94.00	CH00
2401.75	H	48.49	47.39	31.60	80.09	78.99	114.00	94.00	CH00
2440.75	V	47.70	46.50	31.55	79.25	78.05	114.00	94.00	CH39
2441.63	H	45.72	44.46	31.55	77.27	76.01	114.00	94.00	CH39
2479.63	V	50.00	48.90	31.50	81.50	80.40	114.00	94.00	CH78
2480.38	H	45.14	44.02	31.50	76.64	75.52	114.00	94.00	CH78

Remark :

- (1) All readings are Peak unless otherwise stated QP in column of 『Note』 . Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform ◦
- (2) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode and AV detector mode of the emission ◦
- (3) Data of measurement within this frequency range shown “ \* ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) EUT Orthogonal Axis :  
 “X” - denotes Laid on Table ; “Y” - denotes Vertical Stand ; “Z” - denotes Side Stand



## 5. BANDWIDTH TEST

### 5.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.26.2011

Remark: " N/A" denotes No Model Name. , Serial No. or No Calibration specified.

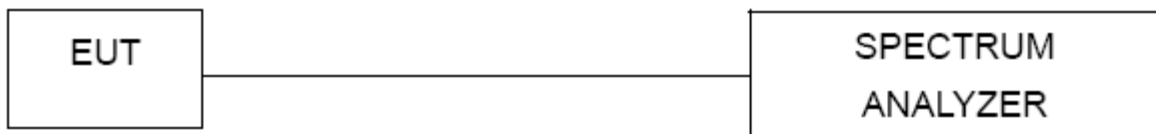
### 5.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = 2.5 ms.

### 5.3 DEVIATION FROM STANDARD

No deviation.

### 5.4 TEST SETUP



### 5.5 EUT OPERATION CONDITIONS

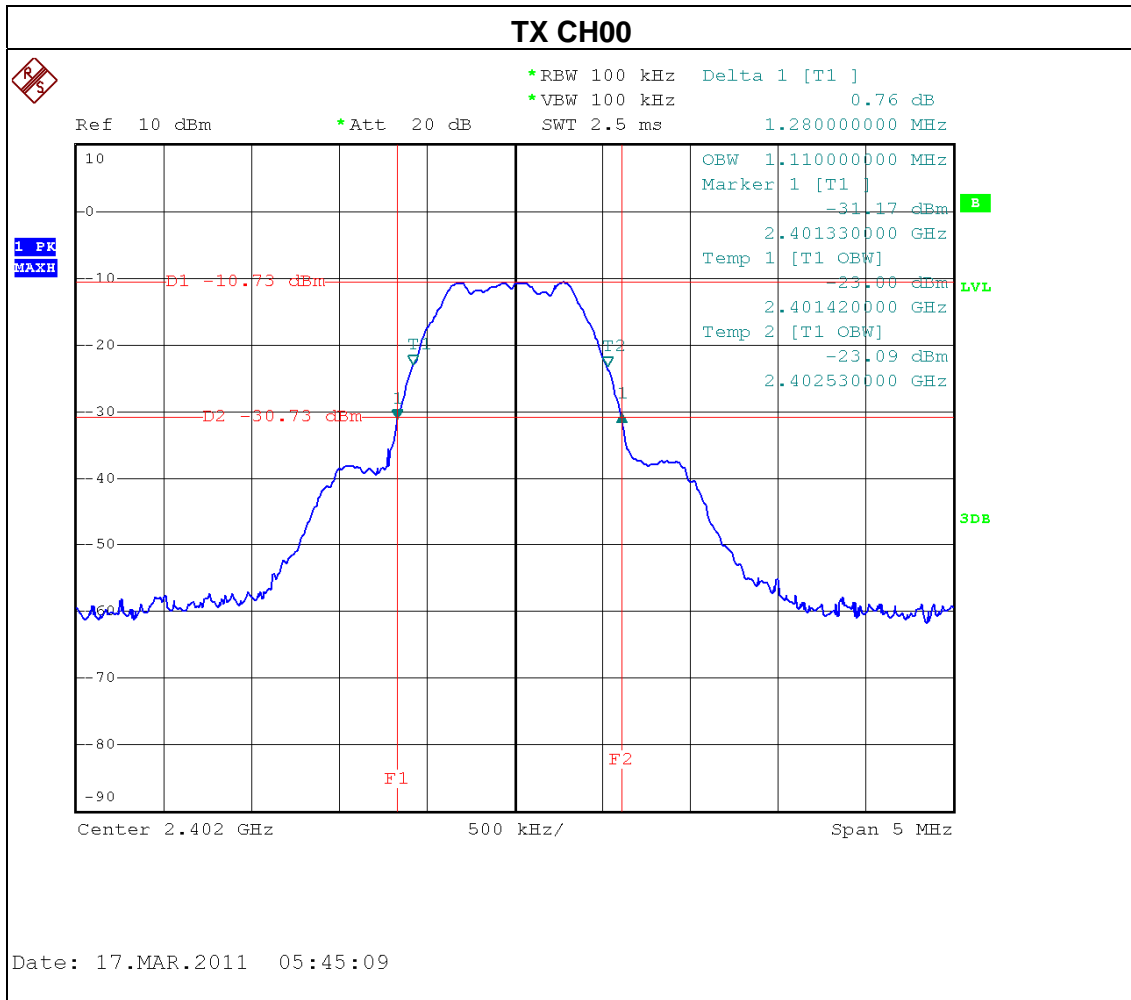
The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

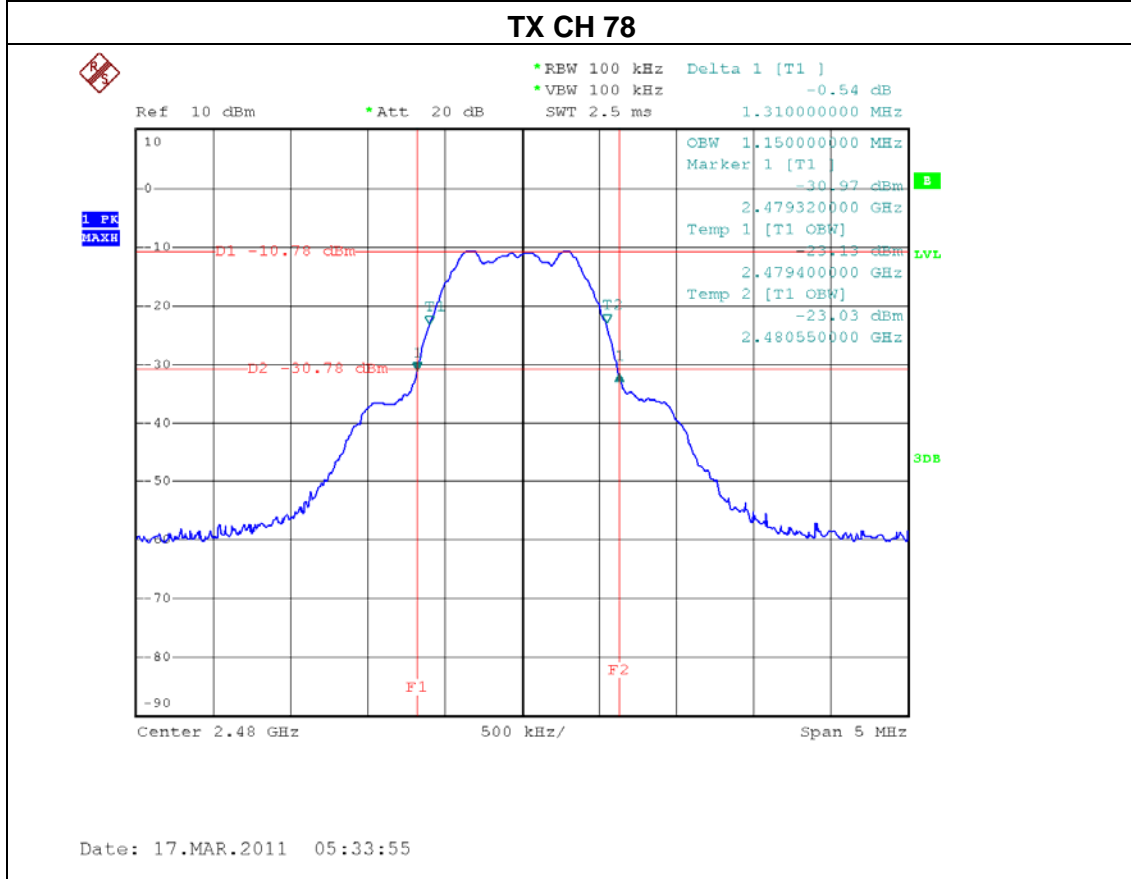
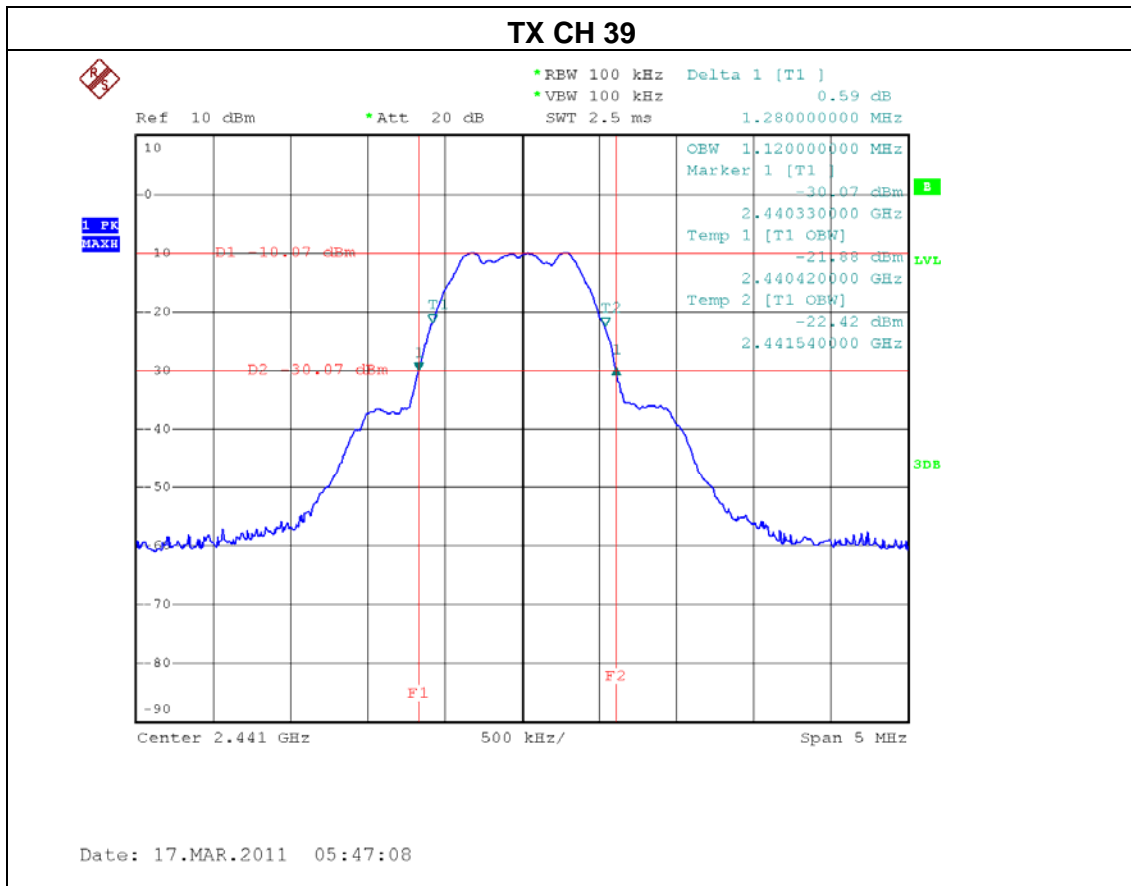


**5.6 TEST RESULTS**

EUT :	Wireless 2.4G Keyboard	Model Name. :	WK728
Temperature :	20°C	Relative Humidity :	50 %
Pressure :	1006 hPa	Test Power :	DC 1.5V
Test Mode :	TX CH 00/39/78		

Test Channel	Frequency (MHz)	20 dBc Bandwidth (MHz)	99% occupied Bandwidth(MHz)
CH00	2402	1.280	1.110
CH39	2441	1.280	1.120
CH78	2480	1.310	1.150







**6. ANTENNA CONDUCTED SPURIOUS EMISSION**

**6.1 APPLIED PROCEDURES / LIMIT**

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

<b>Frequencies (MHz)</b>	<b>Field Strength (micorvolts/meter)</b>	<b>Measurement Distance (meters)</b>
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

**6.1.1 MEASUREMENT INSTRUMENTS LIST**

<b>Item</b>	<b>Kind of Equipment</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Calibrated until</b>
1	Spectrum Analyzer	R&S	FSP 40	100185	Nov.26.2011

Remark: " N/A" denotes No Model Name. , Serial No. or No Calibration specified.

**6.1.2 TEST PROCEDURE**

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.

**6.1.3 DEVIATION FROM STANDARD**

No deviation.

**6.1.4 TEST SETUP**



**6.1.5 EUT OPERATION CONDITIONS**

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.

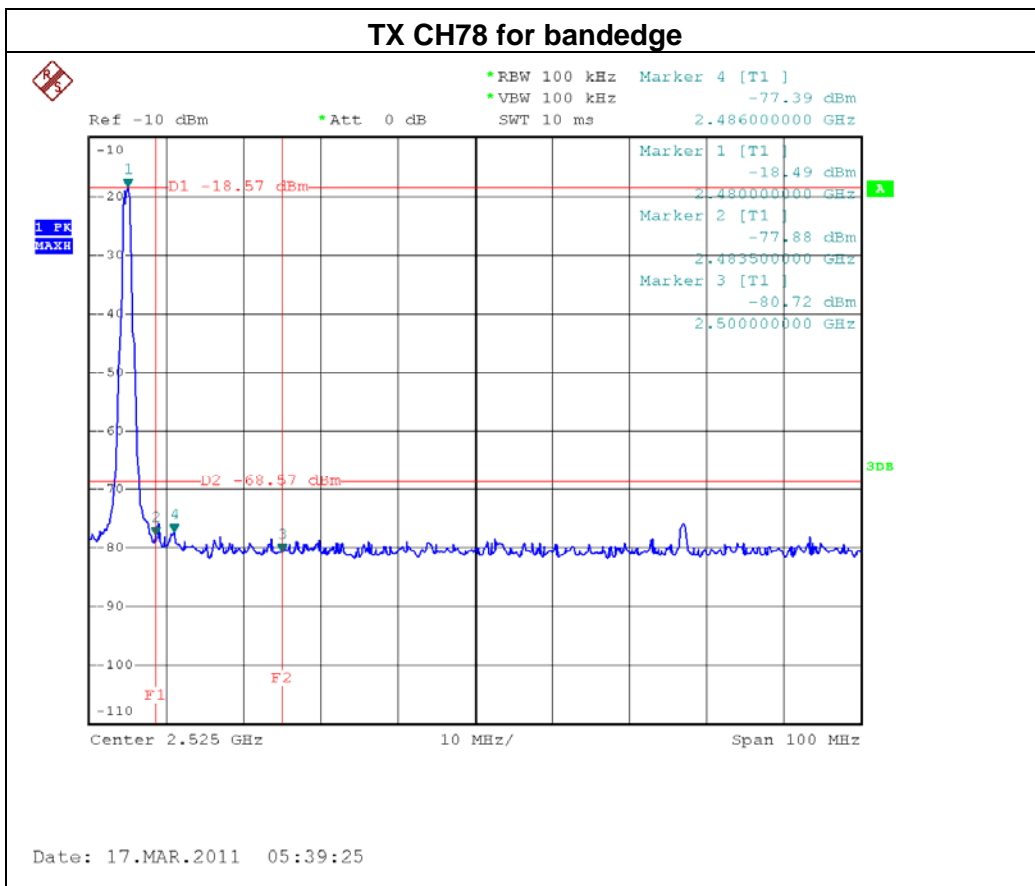
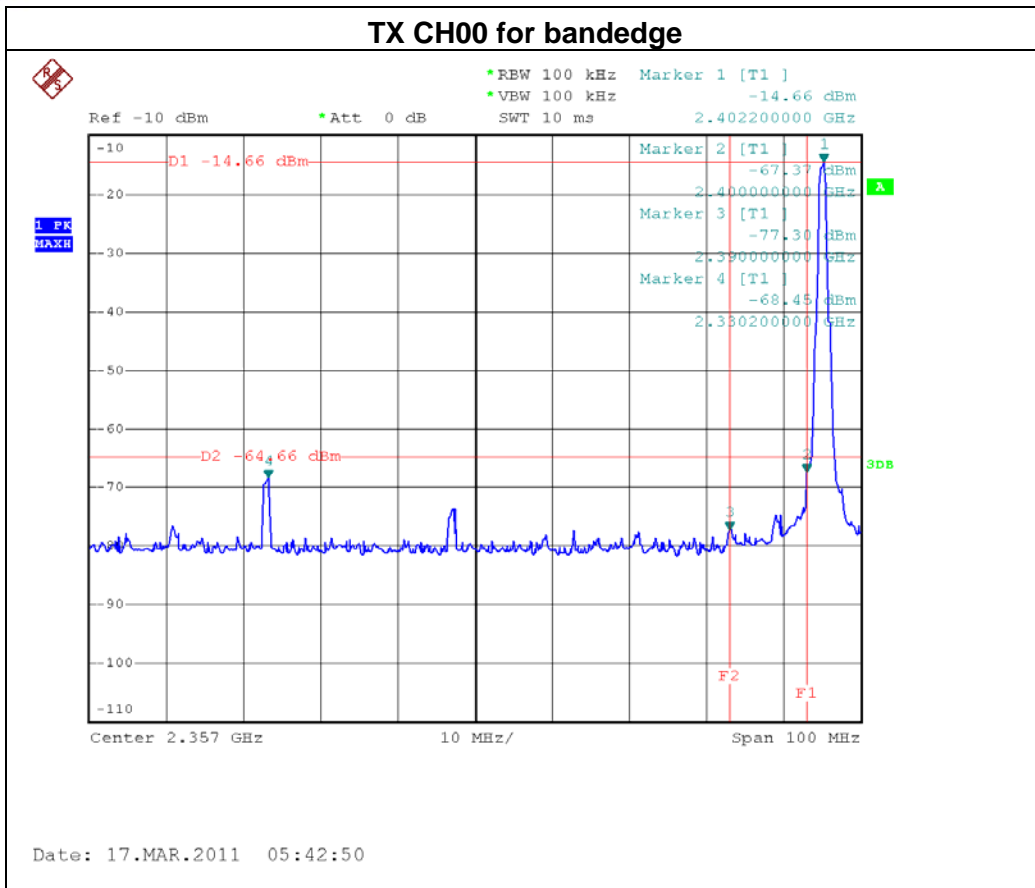


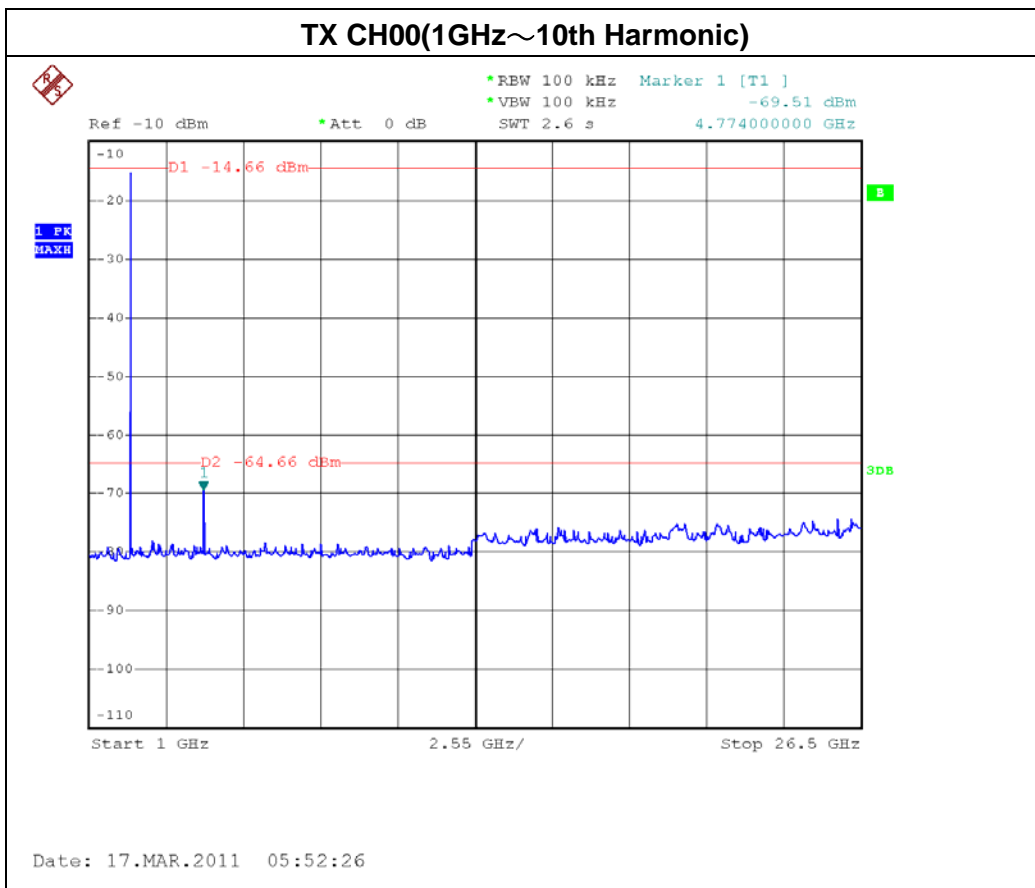
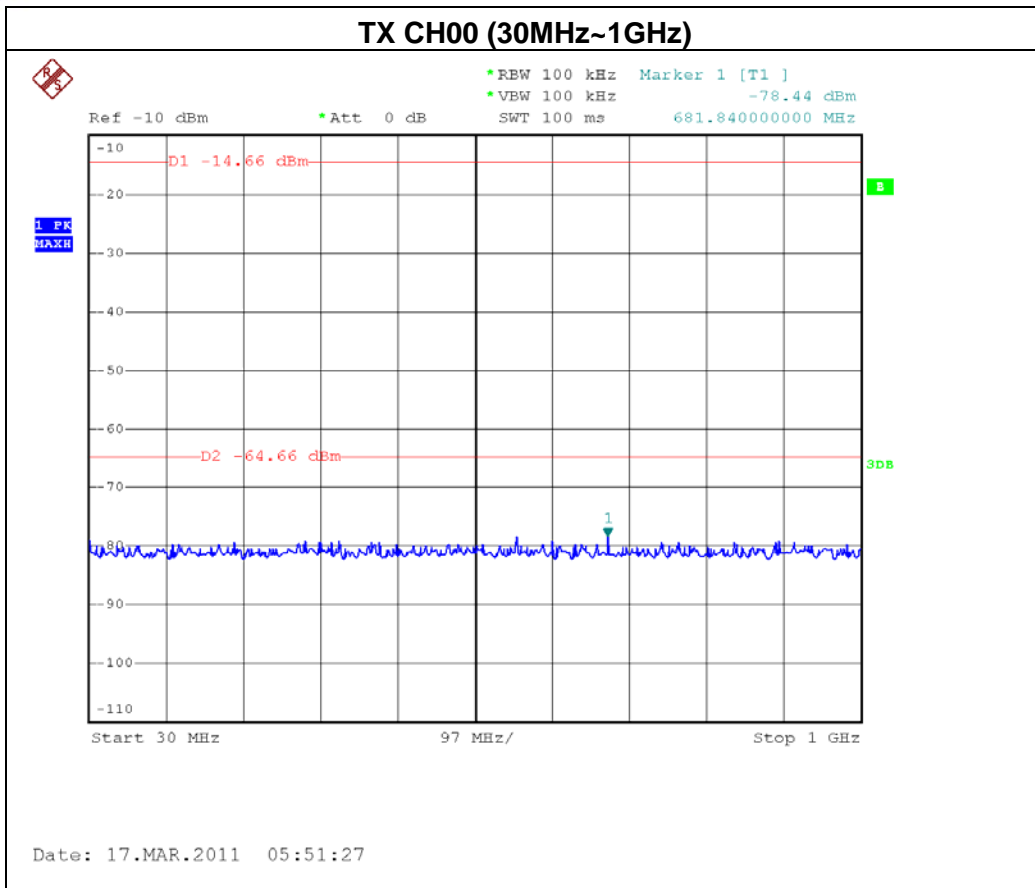


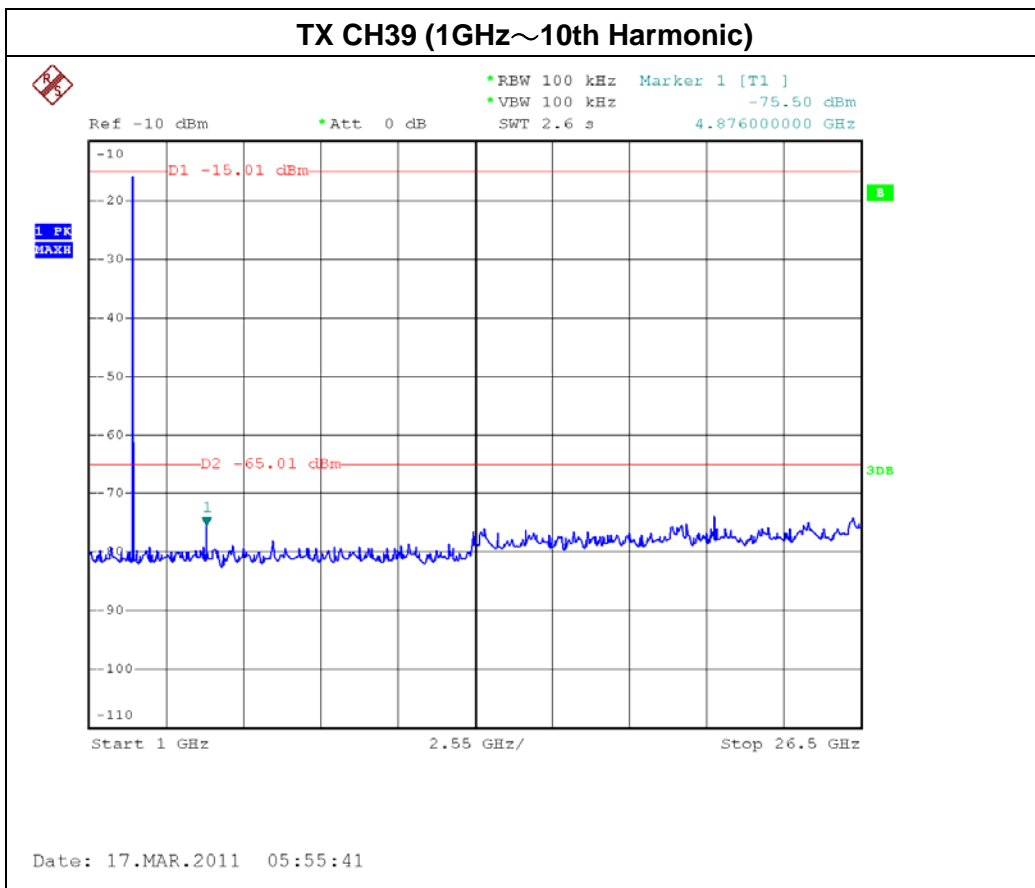
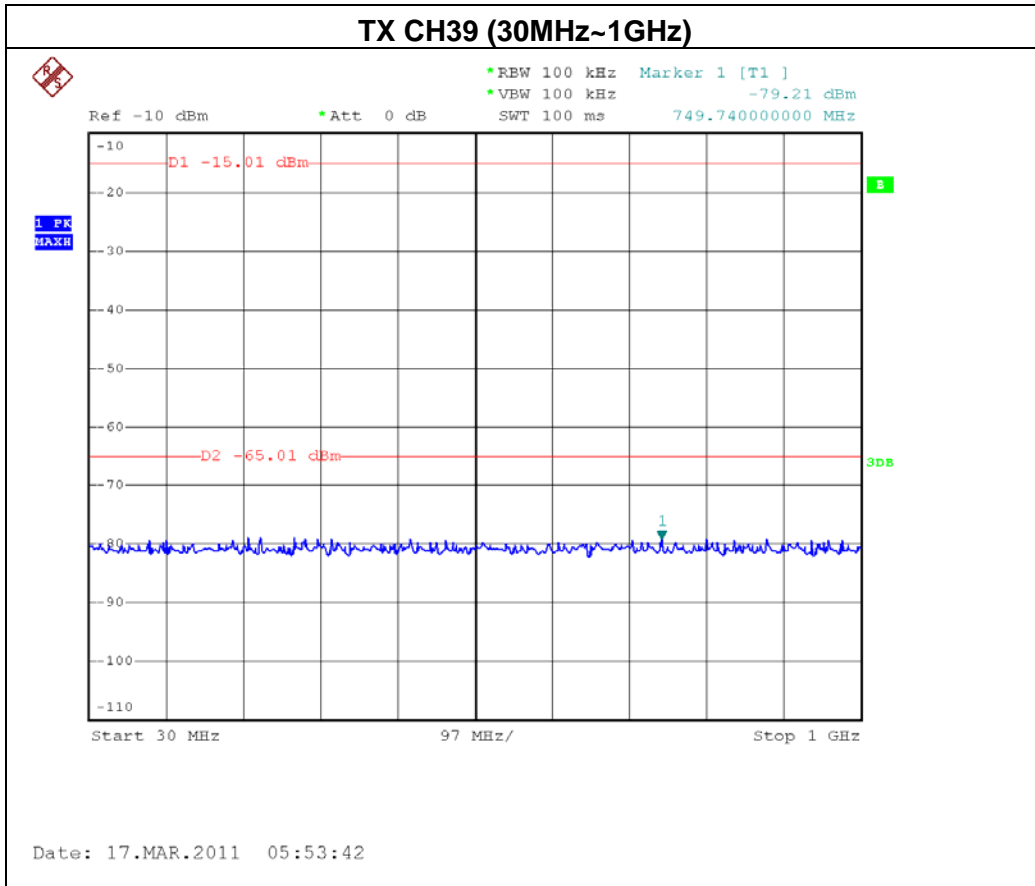
6.1.6 TEST RESULTS

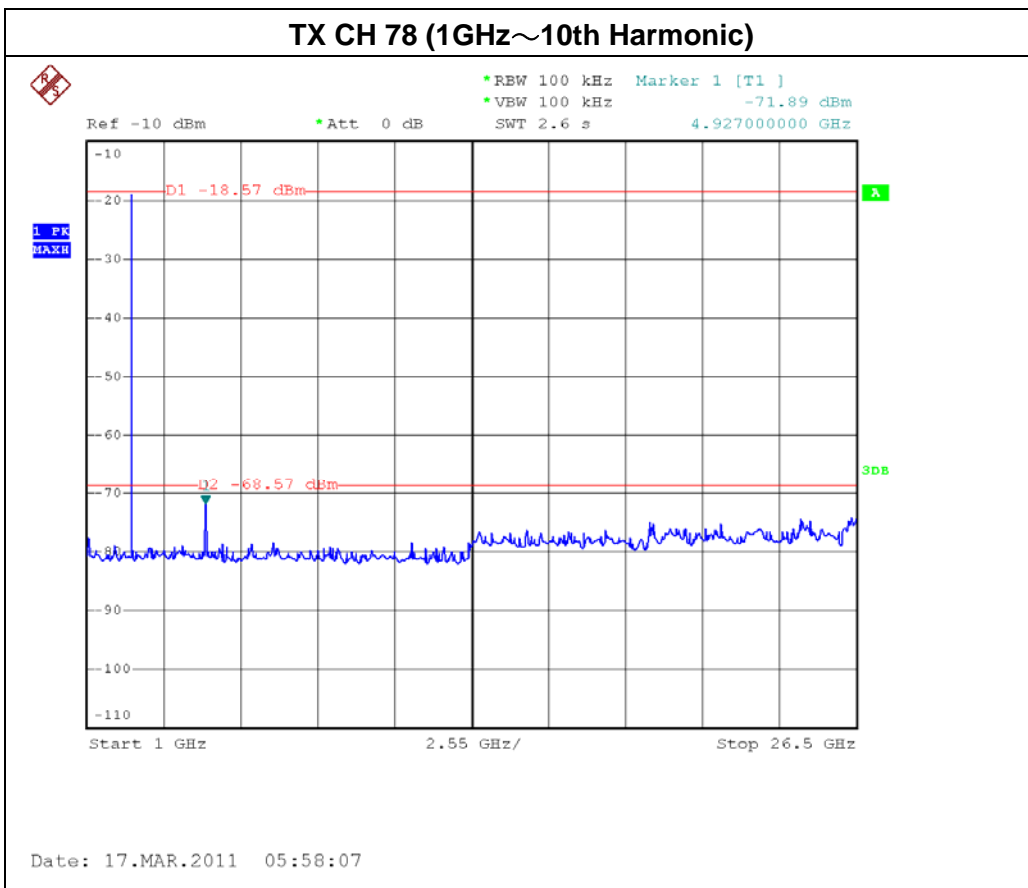
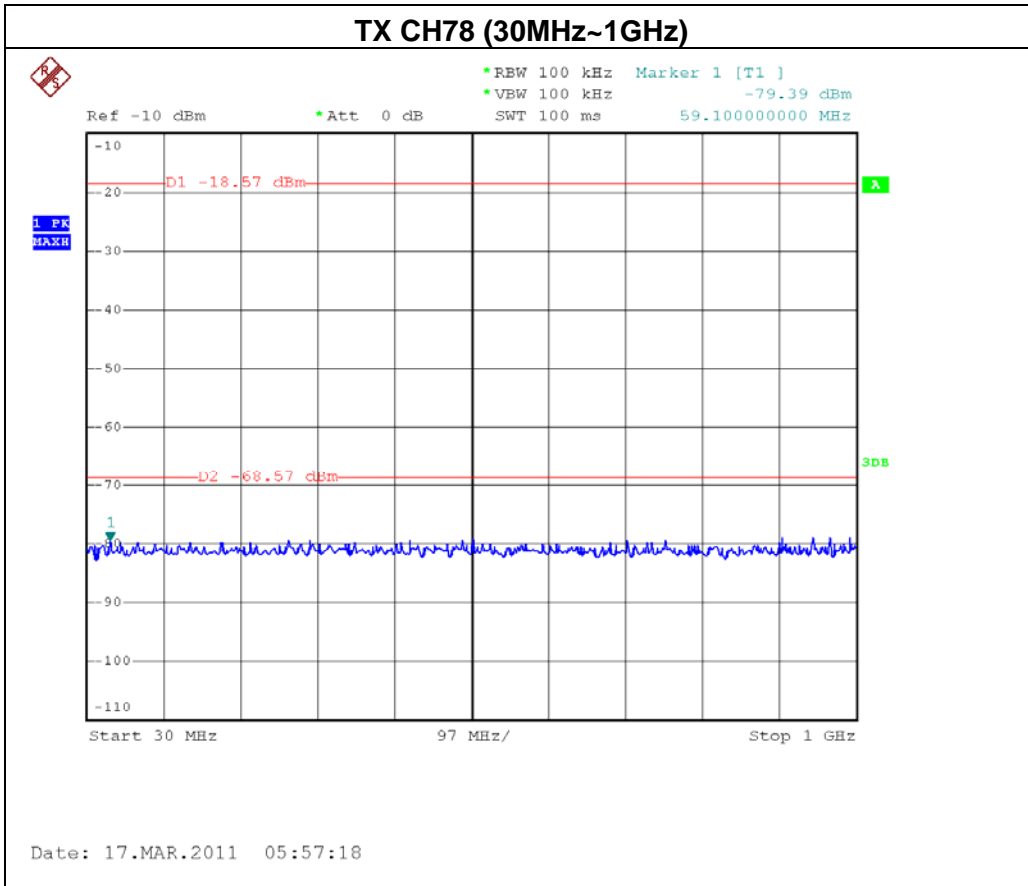
EUT :	Wireless 2.4G Keyboard	Model Name. :	WK728
Temperature :	21°C	Relative Humidity :	60 %
Pressure :	1006 hPa	Test Power :	DC 1.5V
Test Mode :	TX CH00, CH39, CH78		

Channel of Worst Data: CH01			
The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2330.20	-68.45	2486.00	-77.39
Result			
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 50dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.			











**7. EUT TEST PHOTO**

**Radiated Measurement Photos**

