

EMC TEST Report

FCC ID: H8GRK5

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

Issued Date : Aug. 23, 2006

Report No. : 0606C042

Equipment : RF Keyboard

Model No. : RK-5; RKS-5

Applicant : A-FOUR TECH CO., LTD.

Address : 6F, NO.108, Min-Chuan Rd., Hsin-Tien,
Taipei Taiwan, R.O.C.

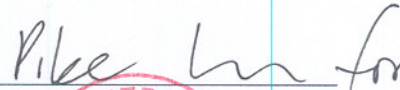
Tested by:

Neutron Engineering Inc. EMC Laboratory

Data of Test:

Jun. 22, 2006 ~ Jul. 24, 2006

Testing Engineer :


(Alan Liu)

Technical Manager :


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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.

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1. CERTIFICATION

Equipment : RF Keyboard
Trade Name : A4TECH
Model No. : RK-5; RKS-5
Applicant : A-FOUR TECH CO., LTD.
Data of Test : Jun. 22, 2006 ~ Jul. 24, 2006
Test Item : ENGINEERING SAMPLE
Standards : FCC Part15, Subpart C / RSS-210: 2004/ ANCI 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-1-0606C042) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP and CNLA according to the ISO-17025 quality assessment standard and technical standard(s).

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards: (Antenna to EUT distance is **3 m**)

FCC Part15, Subpart C				
Standard	Test Item	Limit	Frequency Range (MHz)	Judgment
15.207	Conducted Emission	Class B	0.15 - 30	N/A
15.209	Radiated Emission	Class B	30-1000	PASS
15.227	Radiated Emission	10000 μ V/m (80dB μ V/m) @ 3m	26.96-27.28	PASS

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is **OS02** at the location of No.132-1, Lane 329, Sec. 2, Palain Road, Shijr City, Taipei, Taiwan.

2.2 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 %**.

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U , (dB)	NOTE
C01	ANSI	150 KHz ~ 30MHz	1.94	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U , (dB)	NOTE
OS-01	ANSI	30MHz ~ 200MHz	V	3.82	
		30MHz ~ 200MHz	H	3.60	
		200MHz ~ 1,000MHz	V	3.86	
		200MHz ~ 1,000MHz	H	3.94	
OS-02	ANSI	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	RF Keyboard	
Trade Name	A4TECH	
Model No.	RK-5;RKS-5	
OEM Brand/Model No.	N/A	
Model Difference	Model RKS-5 is identical to model RK-5 except the model designation.	
Product Description	The EUT is a RF Keyboard.	
	A. Operation Frequency	CH1: 26.995 MHz CH2: 27.195 MHz
	B. Modulation Type	FSK
	C. Equipment Type	I (Transfer of messages)
	D. Channel Separation	100 KHz
	E. Antenna Designation	Integral Antenna
	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.	
Power Supply	DC 3.3V, 13mA	
Connecting I/O Port(s)	Please refer to the User's Manual	
Products Covered	N/A	
EUT Modification(s)	N/A	

Note:

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

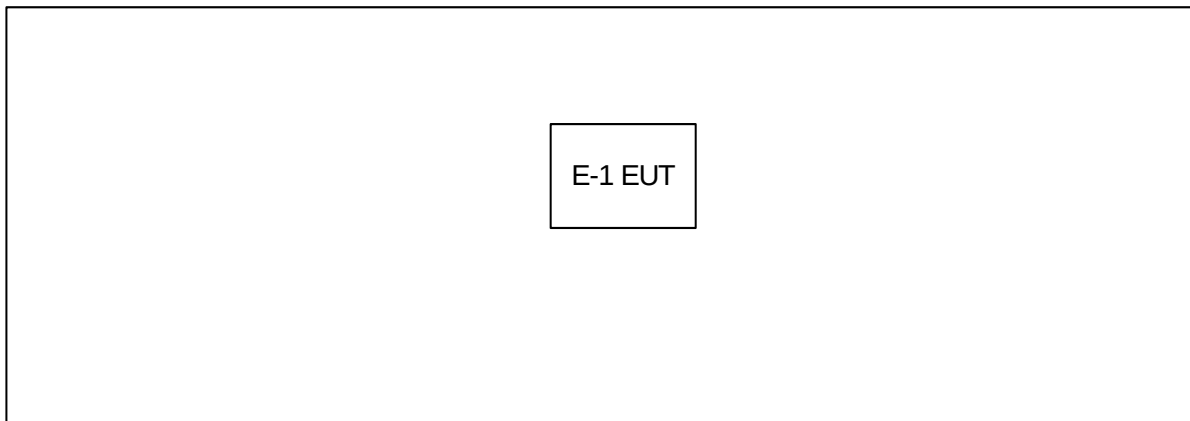
3.2 DESCRIPTION OF TEST MODES

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 possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Test Mode	Description
Mode 1	CH1
Mode 2	CH2

For Radiated Test	
Final Test Mode	Description
Mode 1	CH1
Mode 2	CH2

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.1 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	RF Keyboard	A4TECH	RK-5	H8GRK5	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note
	N/A	N/A	N/A	

Note:

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

4. EMC EMISSION TEST

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 RADIATED EMISSION LIMITS (Frequency Range 30MHz-1000MHz)

Measurement Frequency Range (MHz)	Quasi-Peak Mode Class A Limits (dBuV/m)		Quasi-Peak Mode Class B Limits (dBuV/m)		Note CISPR FCC Std.
	10m	30m	10m	3m	
30.00 -230.00	40.00	30.00	30.00	40.00	CISPR
230.0 -1000.0	47.00	37.00	37.00	47.00	CISPR
30.00 - 88.00	39.00	N/A	30.00	40.00	FCC
88.00 - 216.0	43.50	N/A	33.50	43.50	FCC
216.0 -960.0	46.00	N/A	36.00	46.00	FCC
above 960.0	49.50	N/A	46.00	54.00	FCC

Notes:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).
- (3) A measuring distance of 10m is a primary used. However, either 3m or 10m (instead of 10m) distance may be allowed. If the distance is 3m, add 10dB to the QP-limit above. If the distance is 10m, subtract 10dB from the QP-limit above.

4.1.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Log-Bicon Antenna	MESS-ELEKTRONIK	VULB 9160	3058	Nov. 29, 2006
2	Loop Antenna	EMCO	6502	42960	Jan. 13, 2008
3	Test Cable	N/A	10M_OS02	N/A	Nov. 29, 2006
4	Test Cable	N/A	OS02-1/-2/-3	N/A	Nov. 29, 2006
5	Pre-Amplifier	Anritsu	MH648A	M09961	Nov. 29, 2006
6	EMI Test Receiver	R&S	ESCI	100082	Feb. 01, 2007
7	Antenna Mast	Chance Most	CMTB-1.5	N/A	N/A
8	Turn Table	Chance Most	CMTB-1.5	N/A	N/A

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

4.1.3 TEST PROCEDURE

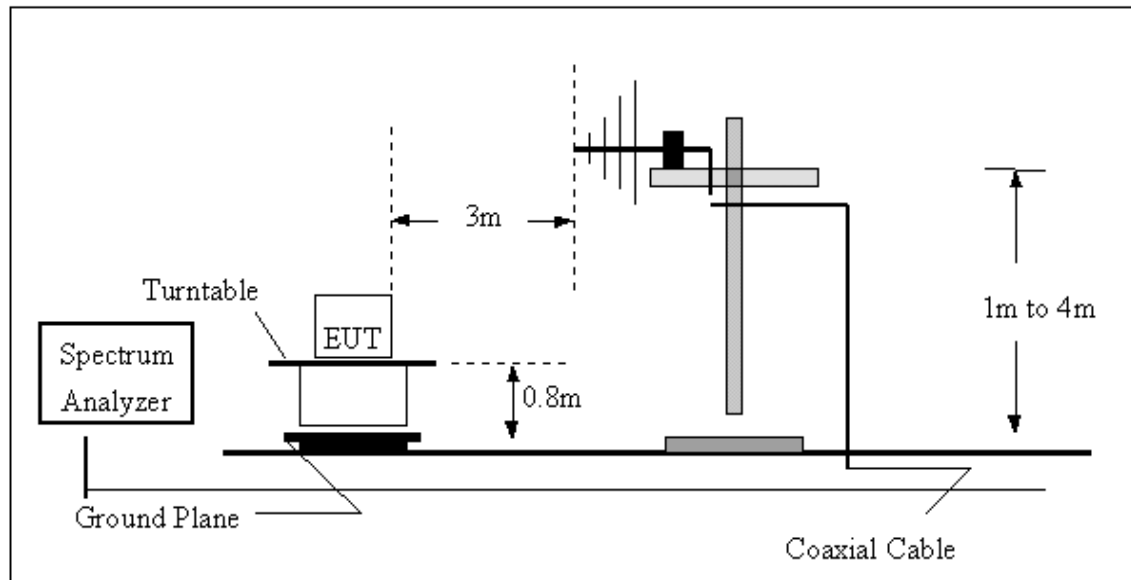
- The measuring distance of at 10 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m or 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- 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.
- 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.
- 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.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.4 DEVIATION FROM TEST STANDARD

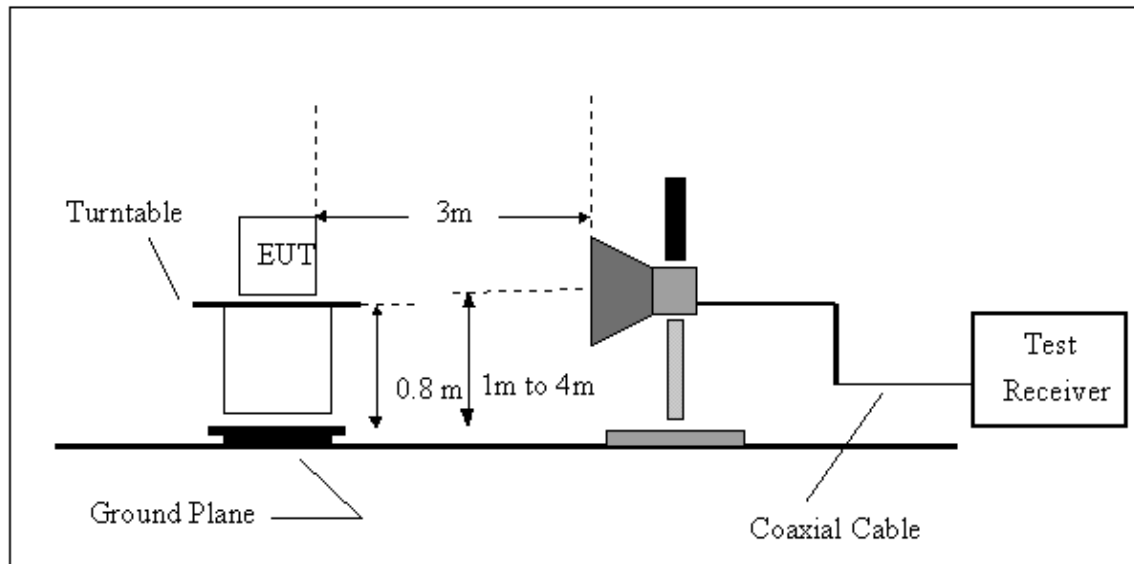
No deviation

4.1.5 TEST SETUP

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



4.1.6 EUT OPERATING CONDITIONS

- (a) Only radiated testing was performed during the max. EMI emission evaluation. Conducted testing excepted because of the EUT is a battery operating device and no any other cable connection to PC device.
- (b) 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.

4.1.7 TEST RESULTS (30-1000MHz)

EUT :	RF Keyboard	Model No. :	RK-5
Temperature :	30 °C	Relative Humidity :	60 %
Pressure :	1007 hPa	Test Power :	DC 3V
Test Mode :	CH1		

Freq. (MHz)	Ant. Pol. H/V	Detector Mode (PK/AV)	Reading (dBUV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBUV/m)	Limit-3m (dBUV/m)	Safe Margins (dBUV/m)	Note
26.995		Peak	43.78	8.70	52.48	80.00	- 27.52	F
53.99	V	Peak	47.60	- 15.83	31.77	40.00	- 8.23	H
80.99	V	Peak	43.87	- 19.52	24.35	40.00	- 15.65	H
107.98	V	Peak	37.00	- 16.94	20.06	43.50	- 23.44	H
134.98	V	Peak	38.62	- 14.56	24.06	43.50	- 19.44	H
161.97	V	Peak	36.65	- 13.92	22.73	43.50	- 20.77	H
188.97	V	Peak	36.55	- 15.91	20.64	43.50	- 22.86	H

Remark :

(1) Spectrum Setting:

9 KHz – 150 KHz, RBW= 1 KHz, VBW=1 KHz, Sweep time = 200 ms.

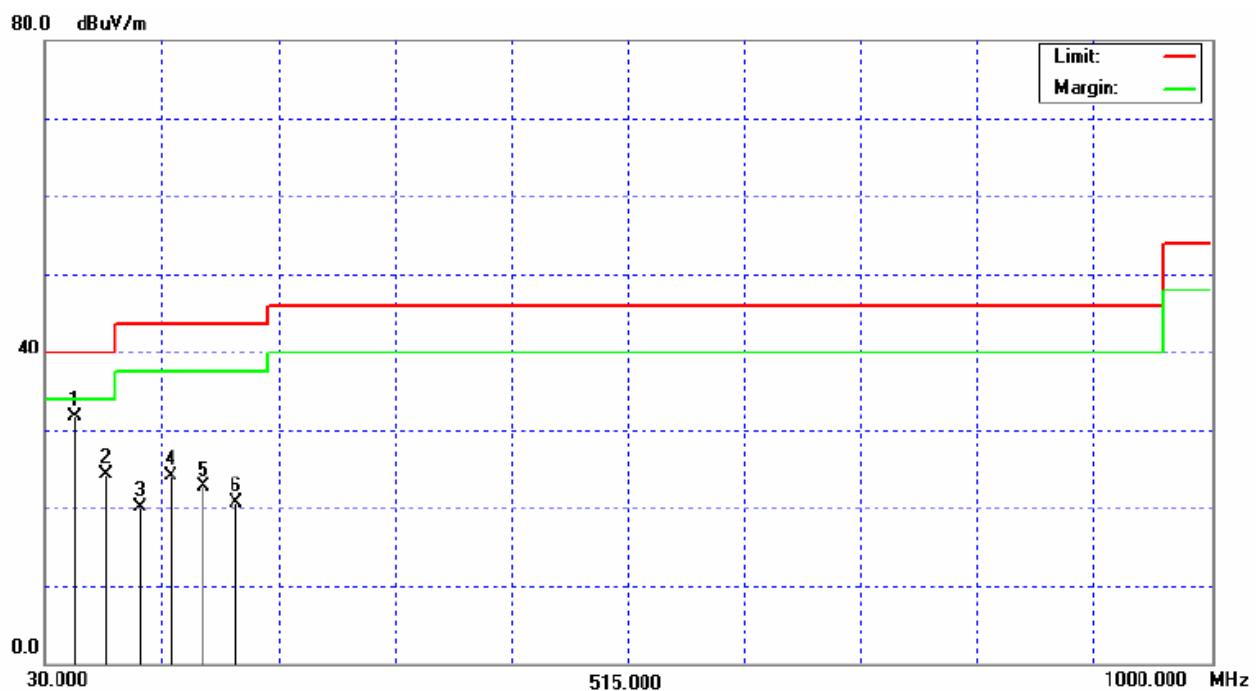
150 K Hz – 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms.

30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.

(2) 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 ◦

(3) The Log-Bicon Antenna will use to test frequency range from 30MHz to 1000MHz and the Loop Antenna will use to test frequency below 30MHz.

(4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table ◦

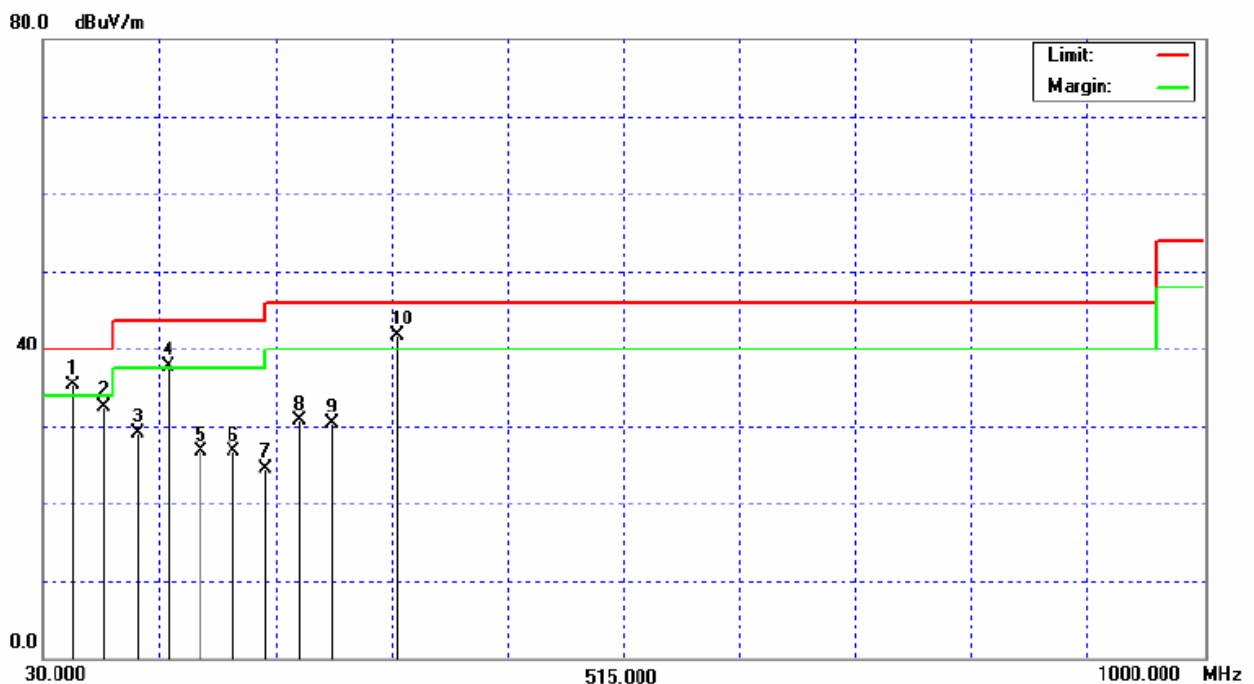


EUT :	RF Keyboard	Model No. :	RK-5
Temperature :	30 °C	Relative Humidity :	60 %
Pressure :	1007 hPa	Test Power :	DC 3V
Test Mode :	CH1		

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit-3m (dBuV/m)	Safe Margins (dBuV/m)	Note
26.995		Peak	43.78	8.70	52.48	80.00	- 27.52	F
53.99	H	Peak	51.20	- 15.83	35.37	40.00	- 4.63	H
80.99	H	Peak	52.10	- 19.52	32.58	40.00	- 7.42	H
107.98	H	Peak	46.00	- 16.94	29.06	43.50	- 14.44	H
134.98	H	Peak	52.20	- 14.56	37.64	43.50	- 5.86	H
161.99	H	Peak	40.60	- 13.92	26.68	43.50	- 16.82	H
188.96	H	Peak	42.70	- 15.91	26.79	43.50	- 16.71	H
215.93	H	Peak	40.80	- 16.35	24.45	43.50	- 19.05	H
242.94	H	Peak	46.25	- 15.52	30.73	46.00	- 15.27	H
269.94	H	Peak	45.00	- 14.60	30.40	46.00	- 15.60	H
323.94	H	Peak	54.65	- 12.94	41.71	46.00	- 4.29	H

Remark :

- (1) Spectrum Setting:
9 KHz – 150 KHz, RBW= 1 KHz, VBW=1 KHz, Sweep time = 200 ms.
150 K Hz – 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms.
30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
- (2) 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 ◦
- (3) The Log-Bicon Antenna will use to test frequency range from 30MHz to 1000MHz and the Loop Antenna will use to test frequency below 30MHz.
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table ◦

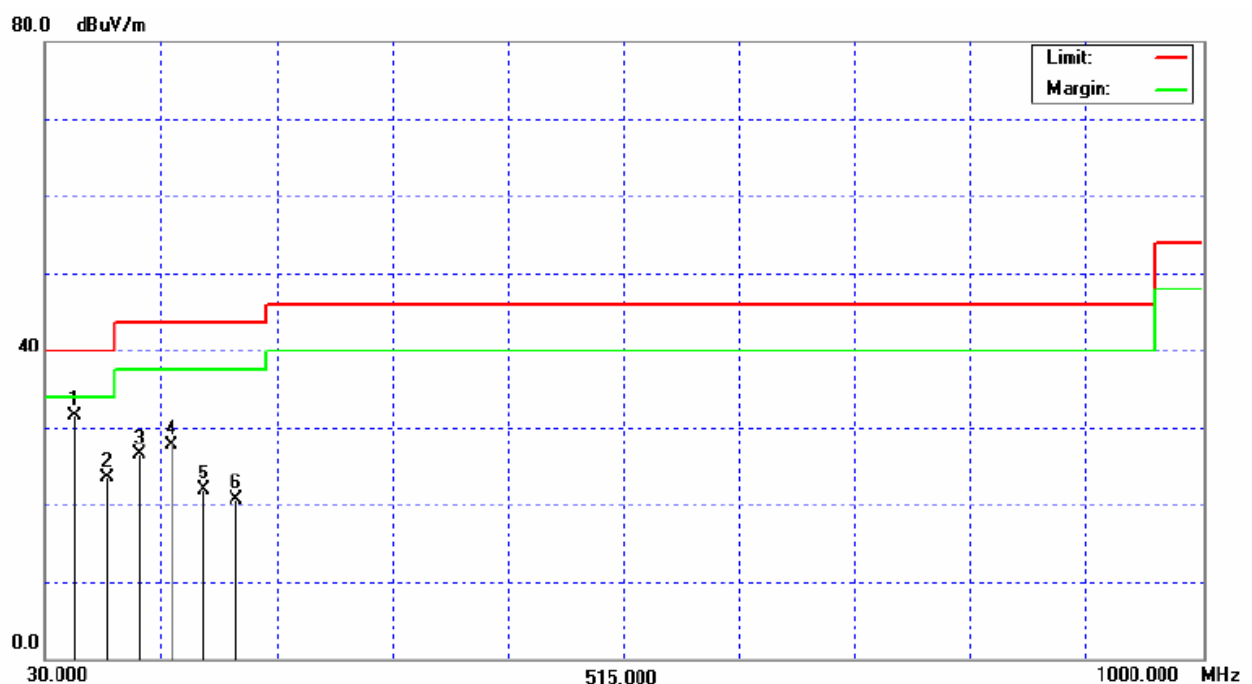


EUT :	RF Keyboard	Model No. :	RK-5
Temperature :	30 °C	Relative Humidity :	60 %
Pressure :	1007 hPa	Test Power :	DC 3V
Test Mode :	CH2		

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit-3m (dBuV/m)	Safe Margins (dBuV/m)	Note
27.195		Peak	46.25	8.70	54.95	80.00	- 25.05	F
54.30	V	Peak	47.25	- 15.82	31.43	40.00	- 8.57	H
81.58	V	Peak	42.95	- 19.47	23.48	40.00	- 16.52	H
108.78	V	Peak	43.25	- 16.84	26.41	43.50	- 17.09	H
135.98	V	Peak	42.15	- 14.53	27.62	43.50	- 15.88	H
163.17	V	Peak	35.80	- 13.98	21.82	43.50	- 21.68	H
190.37	V	Peak	36.82	- 16.03	20.79	43.50	- 22.71	H

Remark :

- (1) Spectrum Setting:
9 KHz – 150 KHz, RBW= 1 KHz, VBW=1 KHz, Sweep time = 200 ms.
150 K Hz – 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms.
30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
- (2) 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 ◦
- (3) The Log-Bicon Antenna will use to test frequency range from 30MHz to 1000MHz and the Loop Antenna will use to test frequency below 30MHz.
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table ◦



EUT :	RF Keyboard	Model No. :	RK-5
Temperature :	30 °C	Relative Humidity :	60 %
Pressure :	1007 hPa	Test Power :	DC 3V
Test Mode :	CH2		

Freq. (MHz)	Ant.Pol. HV	DetectorMode (PK/AV)	Reading (dBUV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBUV/m)	Limit-3m (dBUV/m)	Safe Margins (dBUV/m)	Note
27.195		Peak	46.25	8.70	54.95	80.00	- 25.05	F
54.39	H	Peak	52.87	- 15.82	37.05	40.00	- 2.95	H
81.59	H	Peak	54.15	- 19.47	34.68	40.00	- 5.32	H
108.79	H	Peak	46.12	- 16.84	29.28	43.50	- 14.22	H
135.97	H	Peak	51.37	- 14.53	36.84	43.50	- 6.66	H
163.16	H	Peak	39.62	- 13.98	25.64	43.50	- 17.86	H
190.36	H	Peak	43.55	- 16.03	27.52	43.50	- 15.98	H
244.74	H	Peak	47.77	- 15.46	32.31	46.00	- 13.69	H
271.92	H	Peak	47.67	- 14.55	33.12	46.00	- 12.88	H
299.13	H	Peak	56.30	- 13.57	42.73	46.00	- 3.27	H
326.34	H	Peak	55.37	- 12.87	42.50	46.00	- 3.50	H
353.55	H	Peak	49.02	- 12.19	36.83	46.00	- 9.17	H

Remark :

- (1) Spectrum Setting:
9 KHz – 150 KHz, RBW= 1 KHz, VBW=1 KHz, Sweep time = 200 ms.
150 K Hz – 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms.
30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
- (2) 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 ◦
- (3) The Log-Bicon Antenna will use to test frequency range from 30MHz to 1000MHz and the Loop Antenna will use to test frequency below 30MHz.
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not how in table ◦

