FCC ID TEST REPORT

According to

FCC Part 15   Subpart C, Intentional Radiators

EUT   Type   **USB Wireless Keyboard**

Transmitter (TX)   **1) Model No.: rfKEY**

   2) FCC ID: L2BACEKEY82K

   3) Power Supply: DC 3V, battery Type AA, 1.5Vdc x 2

Receiver (RX)   **1) Model No.: rfKEY**

   2) FCC ID: N/A, (under DoC)

   3) Power Supply: DC 5V from USB Port of PC

Applicant Name: **SOLID YEAR CO., LTD.**

Address   See the General Information for details.

Test Date :   MAY 19, 2003   Issued Date   :   MAY   27,   2003

Test Engineer   :   JASON KUNG   NVLAP Signature :   Peter Kao

Peter Kao / Director

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・The report must not be used by the client to claim product endorsement by NVLAP or any
  agency of the United States government.
・This report is applicable only for EUT Model which described in page 4 .
・The testing result in this report are traceable to national or international standard .

PEP   TESTING   LABORATORY

12-3Fl, No. 27-1, Lane 169, Kang-Ning St., Hsi-Chih,
Taipei Hsien, Taiwan, R. O. C.
Tel : 8862-26922097 Fax : 8862-26956236

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1. General Information

Measurement of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC Part 2 and 15.

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a) EUT Transmitter (TX):
    Model No.: rfKEY   **FCC ID: L2BACEKEY82K**

b) EUT Receiver (RX):
    Model No.: rfKEY   **FCC ID: N/A, (under DoC)**

c) Applicant Name/Address: SOLID YEAR CO., LTD.
                                    2F-1, NO. 94, BAO CHUNG RD., HSIN TIEN CITY,
                                      TAIPEI HSIEN, TAIWAN, R. O. C.
    Contact Person: **CHARLES LIU**
    Phone No.:   **886-2-29156767**   **Fax No.:**   **886-2-29152525**

d) Manufacturer Name/Address: **WONDER UNION FACTORY**
                                        TIANXIN INDUSTRIAL AREA, QIAOTOU,
                                        DONGGUAN, GUANDONG, CHINA

    ✧ Regulation: FCC   Parts 2 and 15

    ✧ Limitation: Part 15, Section 15.227, 15.207 and 15.209

    ✧ Test Procedure: ANSI C63.4-1992

    ✧ Place of Test: PEP Testing Laboratory

                                   12-3Fl, No. 27-1, Lane 169, Kang-Ning St., Hsi-Chih,
                                   Taipei Hsien, Taiwan, R. O. C.
                                   TEL : 8862-26922097   FAX : 8862-26956236

2. Product Information

a. **EUT Type: USB Wireless Keyboard**

b. **Transmitter Model: rfKEY**　　　　**Receiver Model: rfKEY**

c. **TX FCC ID: L2BACEKEY82K**　　　**RX FCC ID: N/A, (under DoC)**

d. **TX Channel No.：   One**　　　　**RX Channel No.：   One**

e. **TX Working Freq. :   27.045 MHz**　　**RX Working Freq.:   26.59 MHz**

f. **TX Modulation：   FSK**　　　　**RX Modulation：   N/A**

g. **TX Crystal / Osc.：6 MHz, 13.5225 MHz**　**RX Crystal / Osc.：6 MHz, 26.59 MHz, 455 KHz**

h. **TX Port(s) ：   N/A**　　　　**RX Port(s) ：   USB for Keyboard**

i. **TX Transmitting Power：DC 3V (1.5V × 2)** **RX Receiver Power：DC 5V   40mA**

j   **TX Power Supply：Battery(Type AA)**　　**RX Power Supply：USB Port of PC**

j. **TX Case：   ABS**　　　　**RX Case：   ABS**

k. **EUT Condition :   ☑ Prototype   ☐ Engineering   ☐ Production**

l. **EUT Received Date :   MAY   19,   2003**

3. EUT Description and Test Methods

(A)   The EUT is USB Wireless Keyboard, FCC ID: L2BACEKEY82K, model rfKEY. The major electrical design and construction of this requested sample is identical to the original one listed in PEP Report No. E910717 except the followings are different attached to additional sample from original sample.

(1) Add RESET IC at U3 for improving startup stability.

(2) Add 20PF capacitor at C27 for diminishing harmonic.

The EUT consists of one wireless transmitter supplied from DC 3V (Battery size AA 1.5V ×2). One receiver connected to USB port rated DC5V from PC was used as corresponding peripheral device for the test. The EUT radio frequency is 27.045MHz. The effective transmitting distance of EUT system is approximate 6 feet. We located both EUT transmitter and corresponding peripheral receiver on turntable under test. For more detail information about the EUT, please refer to the user's manual.

(B)   Test Method: Including EUT transmitter and corresponding peripheral receiver link with PC system were setup as a complete test system on turntable. The receiver is connected to USB port of PC system and the PC operating system was setup to detect and drive every peripheral devices including EUT. Then, we pressed "H" key on the transmitter to enable RF keyboard under Control panel of WIN98 for Tx-On Mode, and ran "EMITEST" for Tx-Off Mode, and the worst-case test data as ANSI C63.4 requirement was recorded and provided in this report.

(C)   Test Mode : (1) For Conducted EMI---"Tx-Off" Mode
                         (2) For Radiated EMI---"Tx-On" and "Tx-Off" Mode

(D)   At the frequencies where the peak values of the emission exceeded the quasi-peak limit, the emissions were also measured with the quasi-peak detectors. The average detector also measured the emission either (A) quasi-peak values were under quasi-peak limit but exceeded average limit, or (B) peak values were under quasi-peak limit but exceeded average limit.

(E)   Due to EUT system is Desktop type not handheld type, only one orthogonal plane is tested for detecting the required EMI testing data.

4. Modification(s):

N/A

5. Test Software Used

(A) EMITEST program that continuously generates a complete line of repeating ''H'' letter was the software used during test.

6. Support Equipment Used

1. Personal Computer (PC3)   CPU : Intel P4 Socket 478 1.6GHz
                                   FCC ID：Declaration of Conformity(DoC)
                                   Manufacturer：LEMEL
                                   Model Number：LMIH1A2
                                   Power Supply：Switching
                                   Power Cord：Non-Shielded, Detachable, 1.8m
                                   Data Cable： N/A

2. Monitor (MON1 15")   **FCC ID**：Declaration of Conformity(DoC)
                                   Manufacturer：SAMSUNG
                                   Model Number：550S
                                   Power Supply：Switching
                                   Power Cord：Non-Shielded, Detachable, 1.8m
                                   Data Cable：**1 >** Shielded , Non-detachable,1.2m
                                                   2 > Back Shell : Metal

3. Printer (PRN1)   **FCC ID**：B94C2642X
                                   Manufacturer：Hewlett-Packard
                                   Model Number：C2642E
                                   Power Supply：Linear, 30Vdc O/P
                                   Power Cable：Non-Shielded , Detachable,1.8m
                                   Data Cable：**1 >** Shielded , Detachable,1.2m
                                                   2 > Back Shell : Metal

4. Modem (MOD1) ✕ 2   **FCC ID**：IFAXDM1414
                                   Manufacturer：ACEEX
                                   Model Number：1414
                                   Power Supply：Linear, 9Vac O/P
                                   Power Cable：Non-Shielded , Detachable,1.7m
                                   Data Cable：**1 >** Shielded , Detachable,1m
                                                   2 > Back Shell : Metal

5. Keyboard (KBS1 PS/2)   **FCC ID**：E5XKB5121WTH0110
                                   Manufacturer：BTC
                                   Model Number： 5121W
                                   Power Supply：+5Vdc from PS2 of PC
                                   Power Cord：N/A
                                   Data Cable：**1 >** Shielded , Non-detachable,1.6m
                                                   2 > Back Shell : Metal

6. Mouse (MOUS/1 PS/2)   **FCC ID**：DZL211106
                                   Manufacturer：LOGITECH
                                   Model Number：M-S43
                                   Power Supply：+5Vdc from PS2 of PC
                                   Power Cord：N/A
                                   Data Cable：**1 >** Shielded , Non-detachable,1.8m
                                                   2 > Back Shell : Metal

7. Receiver   **FCC ID**：Declaration of Conformity(DoC)
                                   Manufacturer：SOLID YEAR CO., LTD.
                                   Model Number：rfKEY
                                   Power Supply：+5Vdc from USB of PC
                                   Power Cord：N/A
                                   Data Cable：**1 >** Shielded , Non-detachable,1m
                                                   2 > Back Shell : N/A

7. Description of Conducted Emissions Test

7.1 Conducted Emissions Limits

	Maximum RF Voltage in dB(uV)				
Frequency	FCC Part 15, Subpart C		Frequency	CISPR 22	
MHz	QUASI-PEAK	AVERAGE	MHz	QUASI-PEAK	AVERAGE
0.45 – 30	48	--	0.15 – 0.5	66-56	56-46
--	--	--	0.5– 5	56	46
--	--	--	5-30	60	50

Remarks :   In the above table, the tighter limit applies at the band edges.

8. Description of Radiated Emissions Test

8.1 Radiated Emissions

Preliminary measurements were made indoors chamber at 3 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 1000 MHz using logbicon antenna. Above 1GHz, linearly polarized double ridge horn antenna was used.

Final measurements were made outdoors at 3-meter test range using logbicon antenna and horn antenna. The test equipment was placed on a wooden bench situated on a 1.5x1 meter area adjacent to the measurement area. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using Quasi-Peak Adapter. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120kHz.

The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet , if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in radiated emission test photo.

8.2 Test Configuration
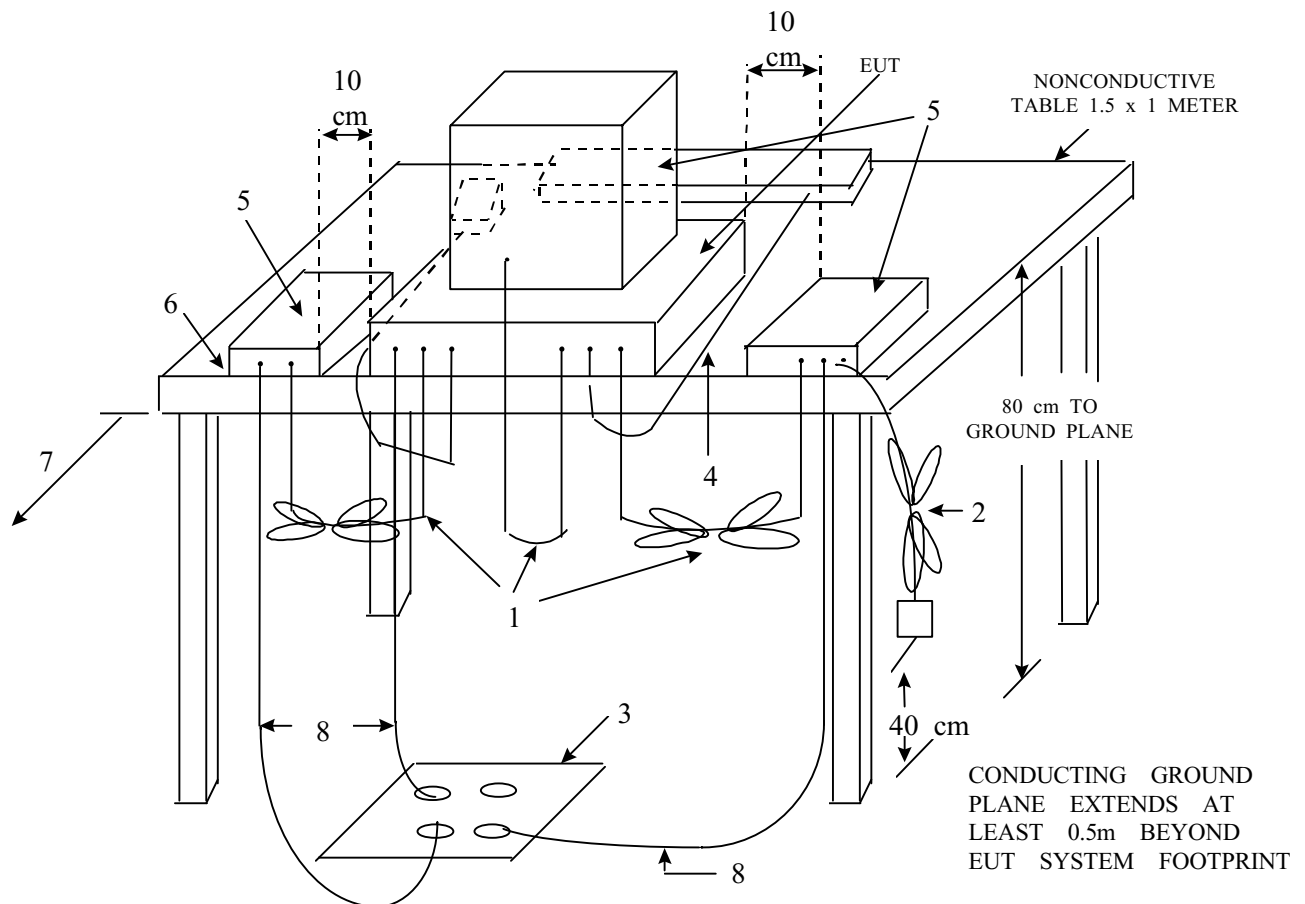
LEGEND
1. Interconnecting cables which hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 to 40 cm long. hanging approximately in the middle between ground plane and table.
2. I/O cables which are connected to a peripheral hall be bundled in center. The end of the cable may b terminated if required using correct terminating impedance. The total length shall not exceed 1 m.
3. If LISN are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground if requires receptacle flush with the ground plane.
4. Cables of hand-operated devices, such as keyboards, KEYPADs, etc., have to be placed as close as possible to the controller.
5. Non-EUT components of EUT system being tested.
6. The rear of all components of the system under test shall be located flush with the rear of the table.
7. No vertical conducting wall used.
8. Power cords drape to the floor and are routed over to receptacle.

8.3 Radiated Emission Limits

Limits   for   radiated   disturbance   of
Class   B   ITE   or   Intentional   Radiator
At a   measuring   distance   of   3 m

Frequency MHz	Field Strength dB(μ V/m) or uV/m	
30 to 88	40	100
88 to 216	43.5	150
216 to 960	46	200
Above 960	54	500
NOTES 1 The lower limit shall apply at the transition frequency. 2 Additional provisions may be required for cases where interference occurs.		

9. Conducted Emissions Test Setup Photo.

< Front View >

<Rear View >

10. Conducted Emissions Test Data

Model No.   : **rfKEY**
Frequency   range   : **150KHz   to   30MHz**
Detector   : **Quasi-peak   Value**
Temperature   : **28   ℃**
Humidity   : **54   %**

Test   Data :   #   **119**   < LINE >
                     #   **123**   < NEUTRAL >
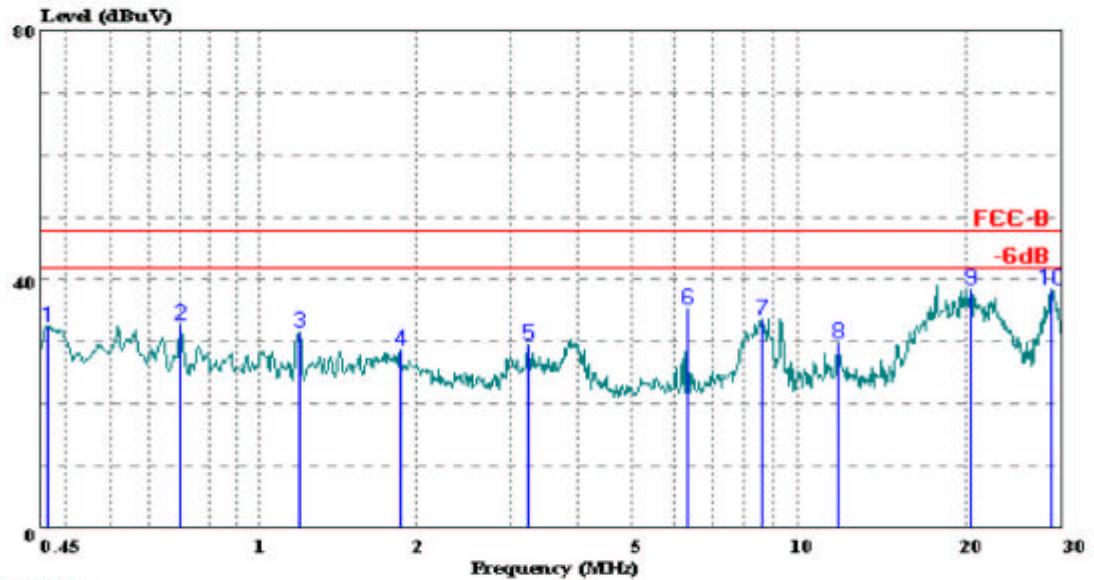
※ Note   1. Level = Read Level + Cable Loss + Probe (LISN)
          2. Over Limit = Level – Limit = Margin

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Data#: 119   File#: Fcc-b.emi   Date: 2003-05-20   Time: 10:08:34

Trace: 118

Site   : Conduction No.2(Mick)-Linko site
Condition: FCC-B LISN.L(32A)-2003 LINE
eut   : E910717-1
power   : AC120V 60Hz
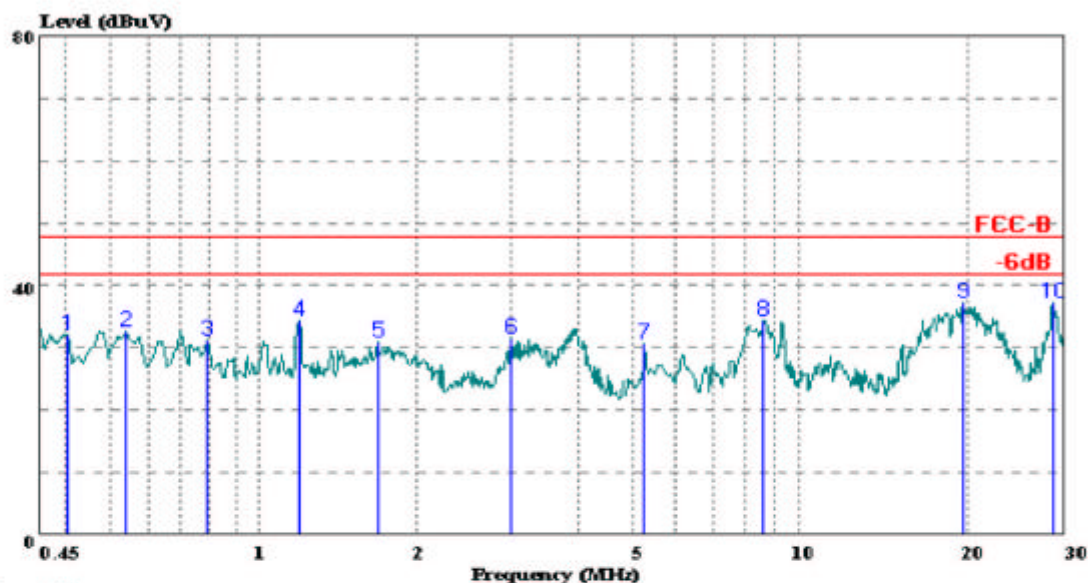memo   : Peak Value
          : TX-OFF

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	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.463	32.30	-15.70	48.00	31.72	0.12	0.46	
2	0.800	32.71	-15.29	48.00	31.93	0.18	0.60	
3	1.302	31.59	-16.41	48.00	30.75	0.20	0.64	
4	1.965	28.59	-19.41	48.00	27.69	0.20	0.70	
5	3.322	29.55	-18.45	48.00	28.72	0.20	0.63	
6	6.423	35.18	-12.82	48.00	34.23	0.25	0.70	
7	8.691	33.54	-14.46	48.00	32.59	0.28	0.67	
8	11.959	29.79	-18.21	48.00	28.80	0.39	0.60	
9	20.471	38.51	-9.49	48.00	37.19	0.72	0.60	
10	28.526	38.41	-9.59	48.00	36.59	1.12	0.70	

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Data#: 123   File#: Fcc-b.emi   Date: 2003-05-20 Time: 10:11:52

Trace: 122

Site   : Conduction No.2(Mick)-Linko site
Condition: FCC-B LISN.N(32A)-2003 NEUTRAL
eut   : E910717-1
power   : AC120V 60Hz
memo   : Peak Value
          : TX-OFF

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	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.504	32.03	-15.97	48.00	31.43	0.10	0.50	
2	0.640	32.56	-15.44	48.00	31.82	0.10	0.64	
3	0.892	31.20	-16.80	48.00	30.50	0.10	0.60	
4	1.302	34.49	-13.51	48.00	33.71	0.14	0.64	
5	1.792	31.07	-16.93	48.00	30.21	0.18	0.68	
6	3.106	31.40	-16.60	48.00	30.59	0.20	0.61	
7	5.339	30.78	-17.22	48.00	29.79	0.23	0.76	
8	8.728	34.44	-13.56	48.00	33.48	0.29	0.67	
9	19.795	37.16	-10.84	48.00	36.16	0.40	0.60	
10	28.646	37.28	-10.72	48.00	36.43	0.15	0.70	

11. Radiated Emissions Test Setup Photo.

< FRONT   VIEW >

< REAR   VIEW >

12. Radiated Emissions Test Data

Model No.   : rfKEY
Frequency range : 30MHz to 1GHz   **Detector**   : Quasi-Peak Value
Frequency range : above 1GHz   **Detector**   : Quasi-Peak/Average Value
Temperature   :   26 ° C   **Humidity**   :   48 %
Memo   : TX ON

Antenna   polarization :   HORIZONTAL   ;   Test   distance :   3m   ;

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Azimuth (°angle)	Antenna High(m)
27.045	58.46	-21.54	80.00	56.11	21.73	0.62	20.00	240.0	4.0
34.597	24.59	-15.41	40.00	31.71	12.79	0.19	20.10	242.0	4.0
61.599	26.89	-13.11	40.00	34.90	11.76	0.40	20.17	151.0	4.0
133.144	26.03	-17.47	43.50	33.68	12.03	0.56	20.24	256.0	4.0
233.586	25.61	-20.39	46.00	32.89	12.19	0.67	20.14	183.0	4.0
297.031	30.76	-15.24	46.00	36.18	13.75	0.89	20.06	164.0	4.0
624.835	27.17	-18.83	46.00	24.57	20.47	1.73	19.60	279.0	3.5
875.494	31.31	-14.69	46.00	25.45	23.05	2.10	19.29	338.0	3.5

Note :

     1.   Level = Read Level + Probe Factor + Cable Loss – Preamp Factor
     2.   Over Limit = Level – Limit Line

Model No.   **: rfKEY**
Frequency range **: 30MHz to 1GHz**   **Detector**   **: Quasi-Peak Value**
Frequency range **: above 1GHz**   **Detector**   **: Quasi-Peak/Average Value**
Temperature   **: 26 ° C**   **Humidity**   **:   48 %**
Memo   **: TX ON**

Antenna   polarization :   VERTICAL   ;   Test   distance :   3m   ;

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Azimuth (°angle)	Antenna High(m)
27.045	56.05	-23.95	80.00	53.70	21.73	0.62	20.00	150.0	1.0
36.484	30.33	- 9.67	40.00	37.88	12.40	0.18	20.13	144.0	1.0
60.786	28.32	-11.68	40.00	36.03	12.08	0.40	20.19	216.0	1.0
133.683	28.58	-14.92	43.50	36.09	12.15	0.56	20.22	193.0	1.1
297.039	29.61	-16.39	46.00	35.03	13.75	0.89	20.06	83.0	1.5
414.864	26.41	-19.59	46.00	29.08	16.17	1.12	19.96	137.0	2.2
626.918	32.63	-13.37	46.00	29.94	20.56	1.73	19.60	239.0	2.5
750.868	35.60	-10.40	46.00	31.79	21.29	2.00	19.48	254.0	2.5

Note :

1. Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor
2. Over Limit = Level – Limit Line

Model No.   : rfKEY
Frequency range : 30MHz to 1GHz   Detector   : Quasi-Peak Value
Frequency range : above 1GHz   Detector   : Quasi-Peak/Average Value
Temperature   : 26 ° C   Humidity   :   48 %
Memo   : TX OFF

Antenna   polarization :   HORIZONTAL   ;   Test   distance :   3m   ;

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Azimuth (°angle)	Antenna High(m)
34.593	32.19	- 7.81	40.00	39.40	12.79	0.10	20.10	196.0	4.0
58.898	27.98	-12.02	40.00	35.87	12.21	0.10	20.20	112.0	4.0
70.231	28.76	-11.24	40.00	39.43	9.41	0.12	20.20	120.0	4.0
293.798	26.37	-19.63	46.00	31.71	13.55	1.19	20.08	233.0	4.0
626.974	25.76	-20.24	46.00	23.10	20.56	1.70	19.60	263.0	3.5
735.495	30.83	-15.17	46.00	27.72	21.11	1.55	19.55	321.0	3.5
875.427	30.97	-15.03	46.00	24.60	23.05	2.61	19.29	293.0	3.5

Note :

1. Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor
2. Over Limit = Level – Limit Line

Model No. : rfKEY
Frequency range : 30MHz to 1GHz　　**Detector** : Quasi-Peak Value
Frequency range : above 1GHz　　　**Detector** : Quasi-Peak/Average Value
Temperature :　26° C　　　　　　　**Humidity** :　48 %
Memo : TX OFF

Antenna　polarization :　VERTICAL　;　Test　distance :　3m　;

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Azimuth (°angle)	Antenna High(m)
35.136	35.31	- 4.69	40.00	41.91	13.30	0.20	20.10	233.0	1.0
69.698	33.66	- 6.34	40.00	41.98	11.47	0.40	20.19	184.0	1.0
293.794	26.59	-19.41	46.00	31.44	14.32	0.89	20.06	153.0	1.5
481.327	26.14	-19.86	46.00	26.69	17.96	1.18	19.69	284.0	2.2
626.983	32.66	-13.34	46.00	29.53	21.00	1.73	19.60	275.0	2.5
750.841	36.08	- 9.92	46.00	30.98	22.60	2.00	19.50	327.0	2.5
875.419	32.28	-13.72	46.00	26.47	23.01	2.10	19.30	46.0	2.6

Note :

1. Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor
2. Over Limit = Level – Limit Line