



Test Report

Product Name : Cordless Keyboard
Model No. : Y-RAZ71
FCC ID No. : JNZYRAZ71

Applicant : Logitech Far East Ltd.

Address : #2 Creation Rd., 4, Science-Based Ind. Park,
Hsinchu, Taiwan, R.O.C.

Date of Receipt : 2006/09/11

Issued Date : 2006/09/22

Report No. : 069H020-RF-US-P03V01

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by CNLA, NVLAP or any agency of the Government.
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Test Report Certification

Issued Date : 2006/09/22

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Product Name : Cordless Keyboard

Applicant : Logitech Far East Ltd.

Address : #2 Creation Rd., 4, Science-Based Ind. Park,
Hsinchu, Taiwan, R.O.C.

Manufacturer : Logitech Far East Ltd.

Model No. : Y-RAZ71

FCC ID No. : JNZYRAZ71

Rated Voltage : AC 120V/60Hz

EUT Voltage : Power by Battery 3V DC

Trade Name : Logitech

Applicable Standard : FCC Part 15 Subpart C: 2005
ANSI C63.4: 2003

Test Result : Complied

Performed Location : SuZhou EMC Laboratory
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Laboratory Information

We , **Quietek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited by the following accreditation Bodies in compliance with ISO 17025, EN 45001 and Guide 25:

Taiwan R.O.C.	:	BSMI, DGT, CNLA
Germany	:	TUV Rheinland
Norway	:	Nemko, DNV
USA	:	FCC, NVLAP
Japan	:	VCCI

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site : <http://tw.quietek.com/modules/myalbum/>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site : <http://www.quietek.com/>

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1. General Information

1.1. EUT Description

Product Name	Cordless Keyboard
Trade Name	Logitech
Model No.	Y-RAZ71
FCC ID No.	JNZYRAZ71
Operating Frequency	27.095MHz, 27.145MHz
Channel Number	2 Channel
Type of Modulation	FSK
Antenna Gain	0dBi
Antenna Type	Loop Antenna

Working Frequency of Each Channel:

Channel	Frequency
1	27.095MHz
2	27.145MHz

1.2. Mode of Operation

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode	Mode 1: Transmit by Channel 1 (27.095MHz)
	Mode 2: Transmit by Channel 2 (27.145MHz)

1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	N/A	N/A	N/A	N/A	N/A

Note: No tested auxiliary equipment during Radio Test.

1.4. Configuration of Tested System

Connection Diagram		
EUT		
Signal Cable Type		Signal cable Description
N/A	N/A	N/A

1.5. EUT Exercise Software

1	Setup the EUT as shown on 1.4.
2	Enable RF signal and confirm EUT active.
3	Modulate output capacity of EUT up to specification.

2. Technical Test

2.1. Summary of Test Result

- ☒ No deviations from the test standards
- ☐ Deviations from the test standards as below description:

Emission			
Performed Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC Part 15 Subpart C Paragraph 15.207	N/A	No
Radiated Emission	FCC Part 15 Subpart C Paragraph 15.209 and 15.227	Yes	No
Occupied Bandwidth	FCC Part 15 Subpart C Paragraph 15.215	Yes	No

2.2. List of Test Equipment

Conducted Emission / SR-1

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
EMI Test Receiver	R&S	ESCI	100175	2005/11/25
Two-Line V-Network	R&S	ENV216	100013	2005/11/25
Two-Line V-Network	R&S	ENV216	100014	2005/11/25
V-Network	R&S	ESH3-Z6	100248	2005/11/25
V-Network	R&S	ESH3-Z6	100249	2005/11/25
ISN	Schaffner	ISN T400	21648	2005/11/25
Current Probe	R&S	EZ-17	100252	2006/04/18
50ohm Coaxial Switch	ANRITSU	MP59B	6200447305	2005/11/25
50ohm Impedance	SHX	50ohml	QT-IM001	2006/03/20
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH004	2006/03/30

Radiated Emission / AC-2

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2006/03/11
EMI Test Receiver	R&S	ESCI	100175	2005/11/25
Preamplifier	Quietek	AP-025C	QT-AP003	2005/11/25
Preamplifier	Quietek	AP-180C	CHM-0602013	2006/03/20
Loop Antenna	schwarzbeck	FMZB	1516	2006/09/01
Bilog Type Antenna	Schaffner	CBL6112B	2932	2005/10/26
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	496	2005/09/30
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2006/03/30
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH002	2006/03/11

Occupied Bandwidth / AC-3

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2006/03/11
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH003	2006/03/30

2.3. Measurement Uncertainty

Conducted Emission

The measurement uncertainty is evaluated as ± 2.26 dB.

Radiated Emission

The measurement uncertainty is evaluated as ± 3.19 dB.

2.4. Test Environment

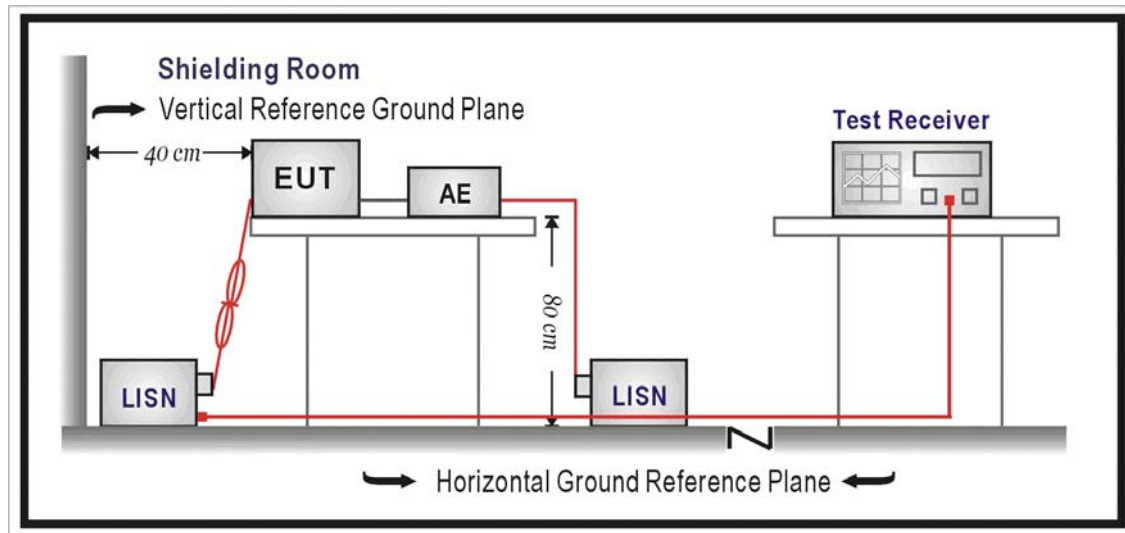
Performed Item	Items	Required	Actual
Conducted Emission	Temperature (°C)	15-35	23
	Humidity (%RH)	25-75	48
	Barometric pressure (mbar)	860-1060	950-1000
Radiated Emission	Temperature (°C)	15-35	25
	Humidity (%RH)	25-75	51
	Barometric pressure (mbar)	860-1060	950-1000

3. Conducted Emission

3.1. Test Specification

According to EMC Standard: FCC Part 15 Subpart C Paragraph 15.207

3.2. Test Setup



3.3. Limit

Limits (dBuV)		
Frequency	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

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

3.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed on conducted measurement.

The bandwidth of the field strength meter is 9kHz.

3.5. Deviation from Test Standard

No deviation.

3.6. Test Result

The EUT is a battery operated equipment, so the test item is not necessary performed.

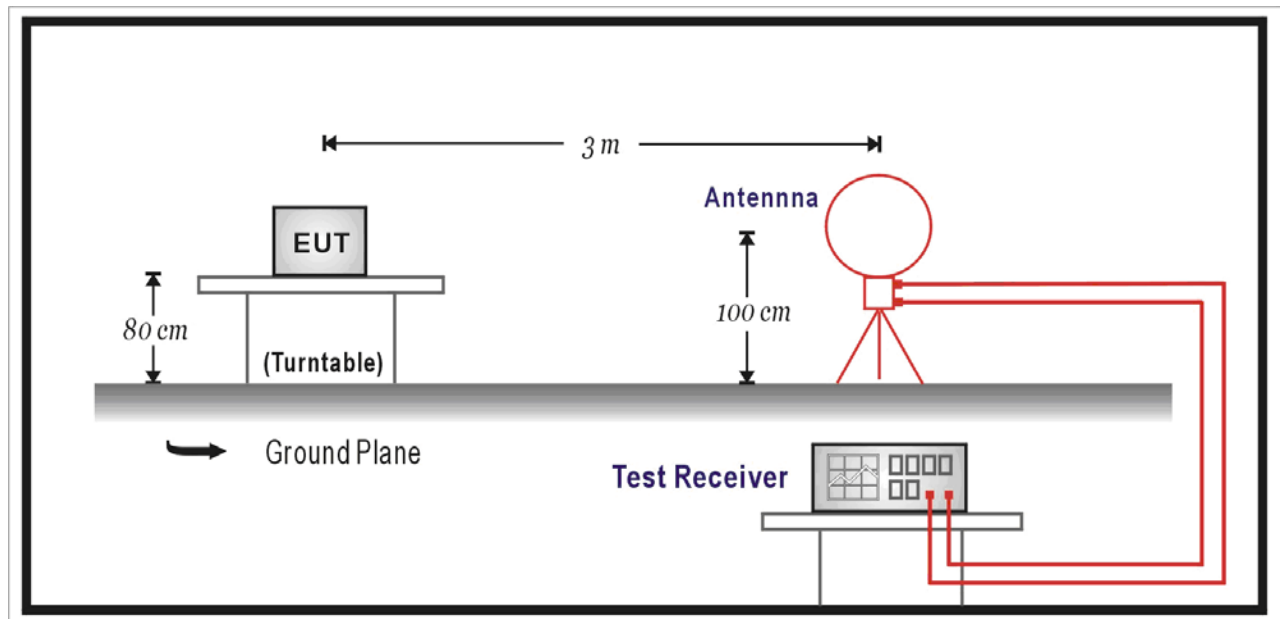
4. Radiated Emission

4.1. Test Specification

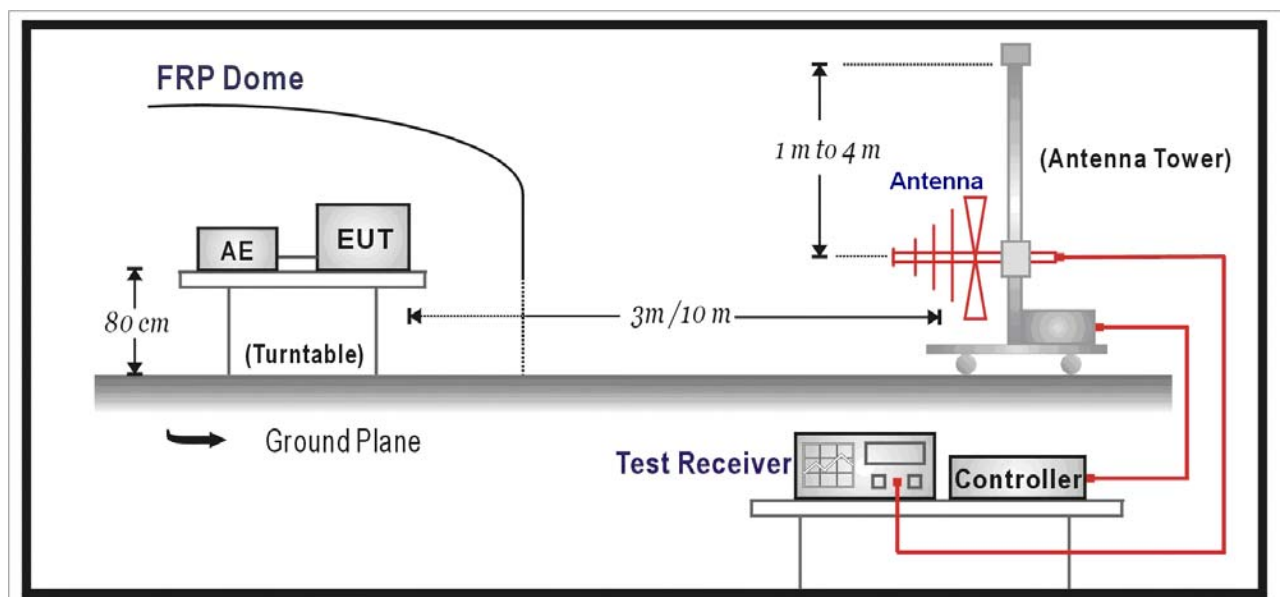
According to EMC Standard: FCC Part 15 Subpart C Paragraph 15.209 and 15.227

4.2. Test Setup

For 9kHz-30MHz Test Setup



For 30MHz-1GHz Test Setup



4.3. Limit

➤ FCC Part 15 Subpart C Paragraph 15.227 Limit

FCC Part 15 Subpart C Paragraph 15.227 Limits		
Fundamental Frequency MHz	Field strength of fundamental	
	uV/m	dBuV/m
26.96-27.28	10000	80.0

Remarks :

1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. Measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

➤ Frequencies in restricted band are complied to limits on Paragraph 15.209.

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits			
Frequency MHz	uV/m	dBuV/m	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	See Remark ¹	300
0.490-1.705	24000/F(kHz)	See Remark ¹	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

- Remarks :
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4 on radiated measurement.

On the field strength of fundamental and harmonics, the limits shown are based on measuring equipment employing a average detector function. As an alternative, compliance with the limits may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

On the field strength of spurious electric, on any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function.

When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

4.5. Deviation from Test Standard

No deviation.

4.6. Test Result

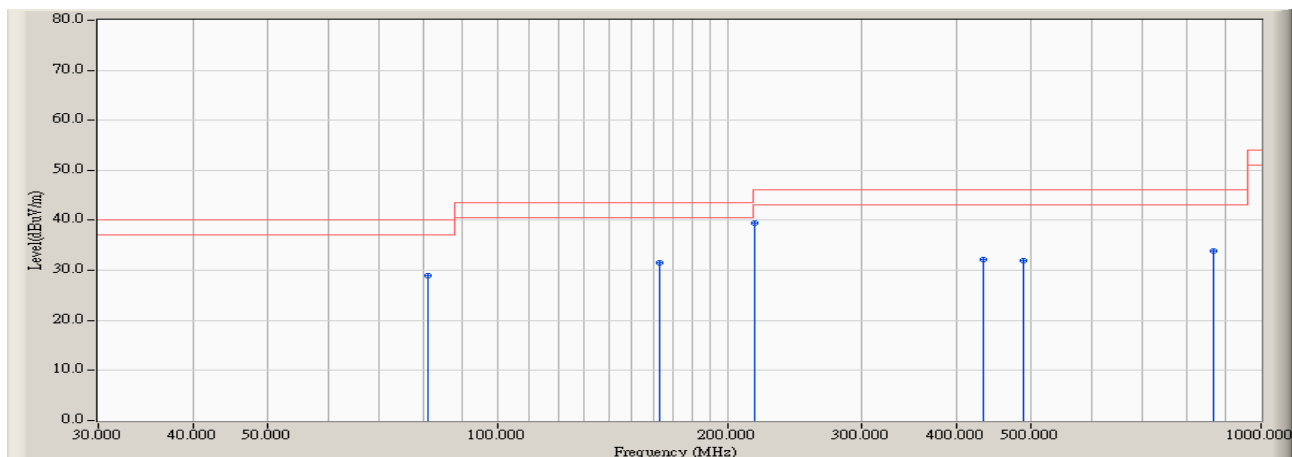
Product : Cordless Keyboard
Test Item : Fundamental Radiated Emission
Test Site : AC-2
Test Mode : Transmit

Frequency (MHz)	Correction Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Average Limit (dBuV/m)	Peak Limit (dBuV/m)
Channel 1					
27.095	20.29	32.20	52.49	80	100
Channel 2					
27.145	20.29	33.10	53.39	80	100

Note:

1. All Readings Levels are performed with peak and/or average measurements as necessary.
2. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Engineer : John	
Site : AC-2	Time : 2006/09/22 - 08:59
Limit : FCC_SpartC_15.209_03M_QP	Margin : 3
EUT : Cordless Keyboard	Probe : CBL6112B_2932(30-2000MHz) - HORIZONTAL
Power : DC 3V	Note : Mode 1: Transmit by Channel 1 (27.095MHz)

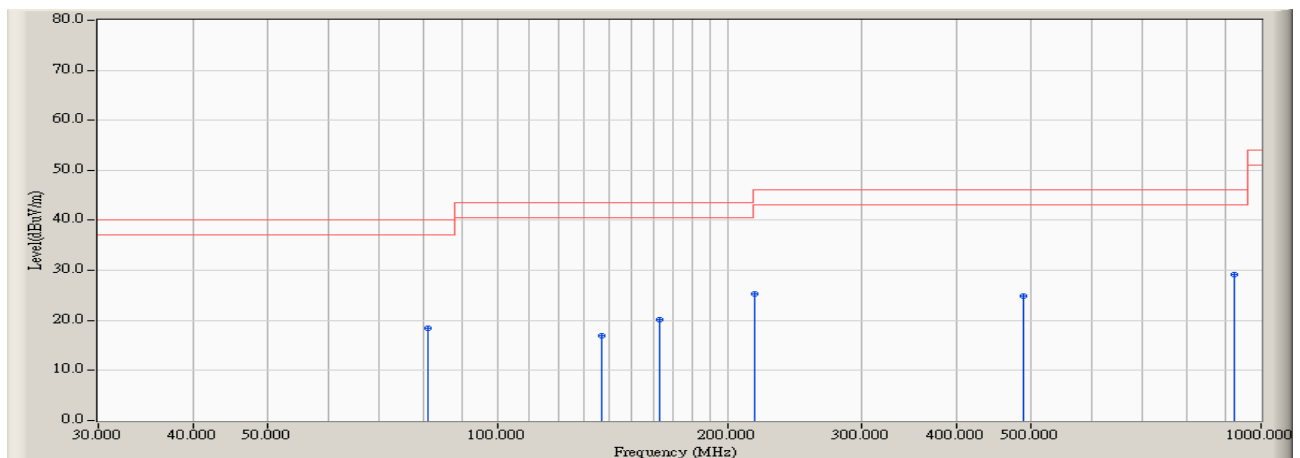


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		80.925	-15.104	44.037	28.933	-11.067	40.000	QUASIPeAK
2		163.375	-12.246	43.722	31.476	-12.044	43.520	QUASIPeAK
3	*	216.725	-13.059	52.588	39.529	-6.491	46.020	QUASIPeAK
4		432.550	-4.117	36.378	32.261	-13.759	46.020	QUASIPeAK
5		488.325	-2.967	34.842	31.875	-14.145	46.020	QUASIPeAK
6		866.625	1.267	32.600	33.867	-12.153	46.020	QUASIPeAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Engineer : John	
Site : AC-2	Time : 2006/09/22 - 08:59
Limit : FCC_SpartC_15.209_03M_QP	Margin : 3
EUT : Cordless Keyboard	Probe : CBL6112B_2932(30-2000MHz) - VERTICAL
Power : DC 3V	Note : Mode 1: Transmit by Channel 1 (27.095MHz)

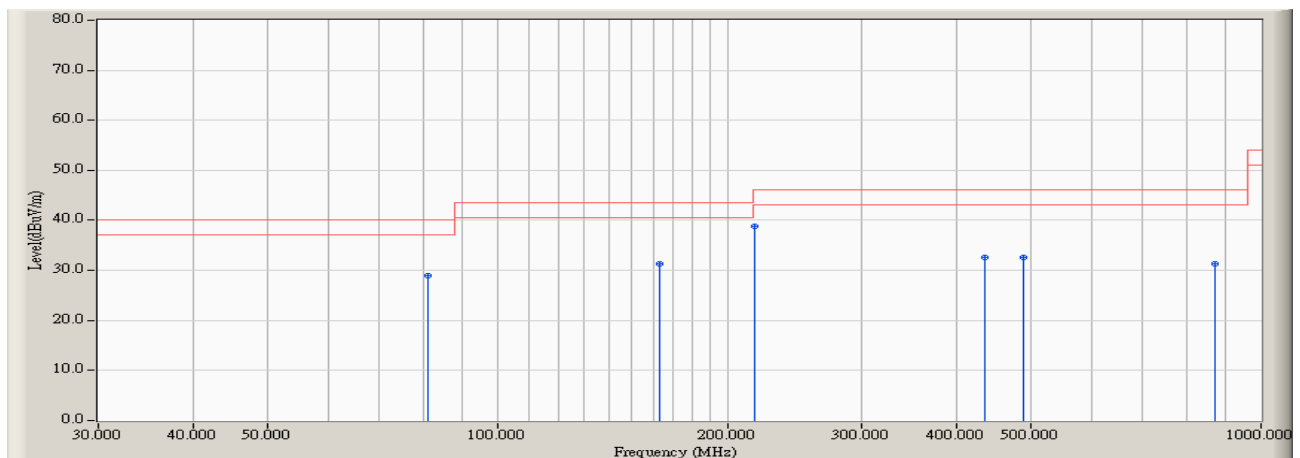


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		80.925	-15.104	33.613	18.509	-21.491	40.000	QUASIPeAK
2		136.700	-10.639	27.537	16.898	-26.622	43.520	QUASIPeAK
3		163.375	-12.246	32.484	20.238	-23.282	43.520	QUASIPeAK
4		216.725	-13.059	38.358	25.299	-20.721	46.020	QUASIPeAK
5		488.325	-2.967	27.781	24.814	-21.206	46.020	QUASIPeAK
6	*	922.400	1.770	27.436	29.206	-16.814	46.020	QUASIPeAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Engineer : John	
Site : AC-2	Time : 2006/09/22 - 09:00
Limit : FCC_SpartC_15.209_03M_QP	Margin : 3
EUT : Cordless Keyboard	Probe : CBL6112B_2932(30-2000MHz) - HORIZONTAL
Power : DC 3V	Note : Mode 2: Transmit by Channel 2 (27.145MHz)

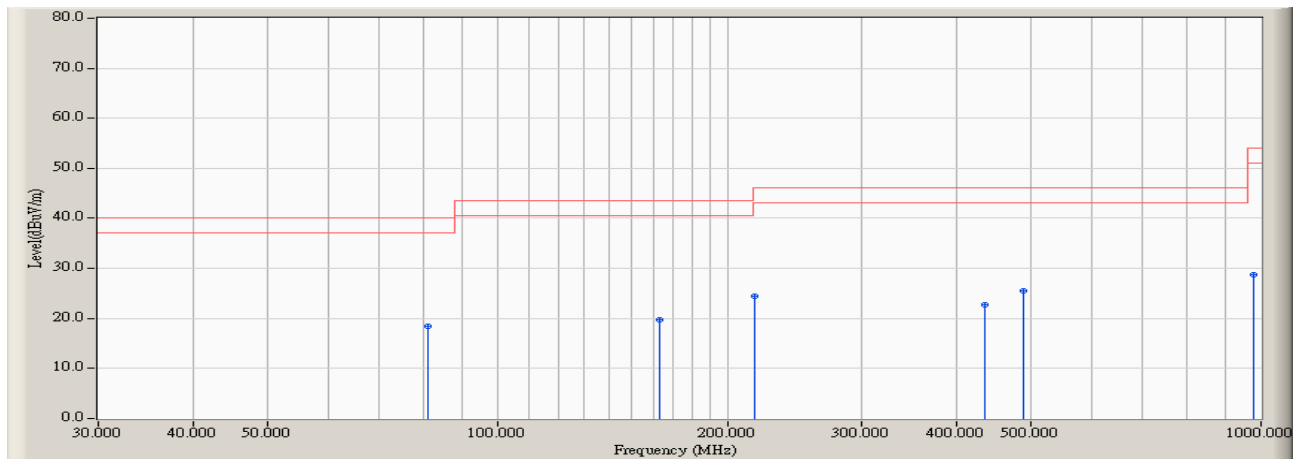


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		80.925	-15.104	44.123	29.019	-10.981	40.000	QUASIPeAK
2		163.375	-12.246	43.505	31.259	-12.261	43.520	QUASIPeAK
3	*	216.725	-13.059	51.969	38.910	-7.110	46.020	QUASIPeAK
4		434.975	-4.181	36.829	32.648	-13.372	46.020	QUASIPeAK
5		488.325	-2.967	35.648	32.681	-13.339	46.020	QUASIPeAK
6		869.050	1.309	30.035	31.344	-14.676	46.020	QUASIPeAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Engineer : John	
Site : AC-2	Time : 2006/09/22 - 09:00
Limit : FCC_SpartC_15.209_03M_QP	Margin : 3
EUT : Cordless Keyboard	Probe : CBL6112B_2932(30-2000MHz) - VERTICAL
Power : DC 3V	Note : Mode 2: Transmit by Channel 2 (27.145MHz)



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		80.925	-15.104	33.521	18.417	-21.583	40.000	QUASIPeAK
2		163.375	-12.246	31.927	19.681	-23.839	43.520	QUASIPeAK
3		216.725	-13.059	37.459	24.400	-21.620	46.020	QUASIPeAK
4		434.975	-4.181	27.016	22.835	-23.185	46.020	QUASIPeAK
5	*	488.325	-2.967	28.395	25.428	-20.592	46.020	QUASIPeAK
6		978.175	2.492	26.349	28.841	-25.129	53.970	QUASIPeAK

Note:

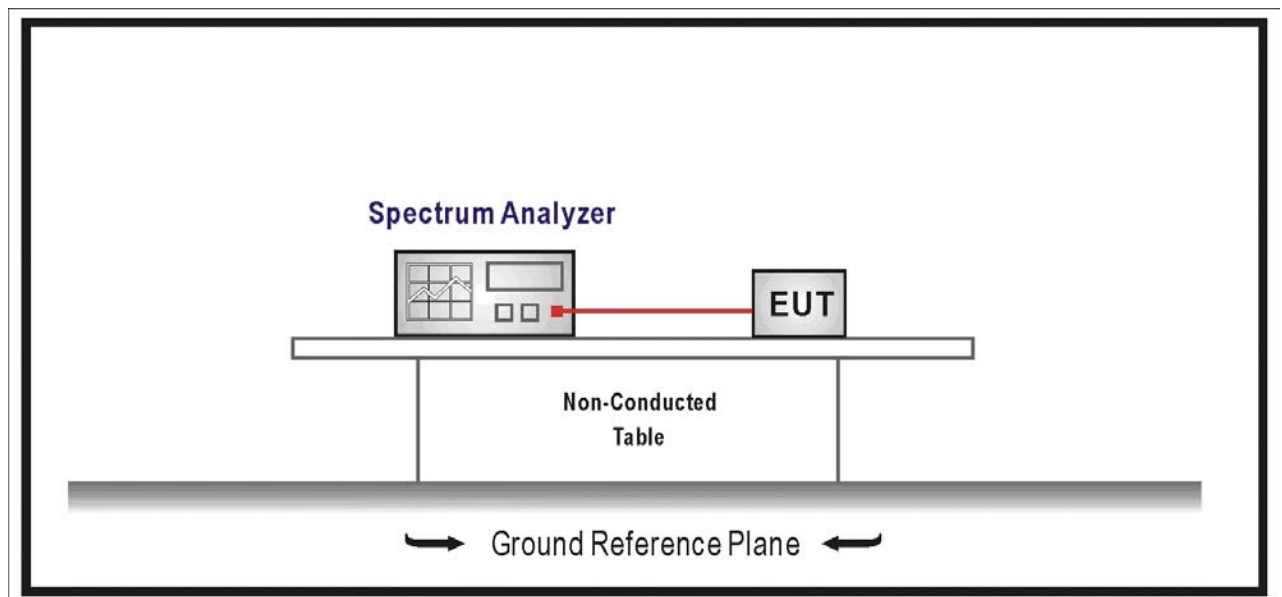
1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

5. Occupied Bandwidth

5.1. Test Specification

According to EMC Standard: FCC Part 15 Subpart C Paragraph 15.215

5.2. Test Setup



5.3. Limit

N/A

5.4. Deviation from Test Standard

No deviation.

5.5. Test Result

Product	Cordless Keyboard		
Test Item	Occupied Bandwidth		
Test Mode	Transmit		
Date of Test	2006/09/22	Test Site	AC-3

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)
1	27.095	42.50	--
2	27.145	42.50	--

Figure Channel 1 (27.095MHz)

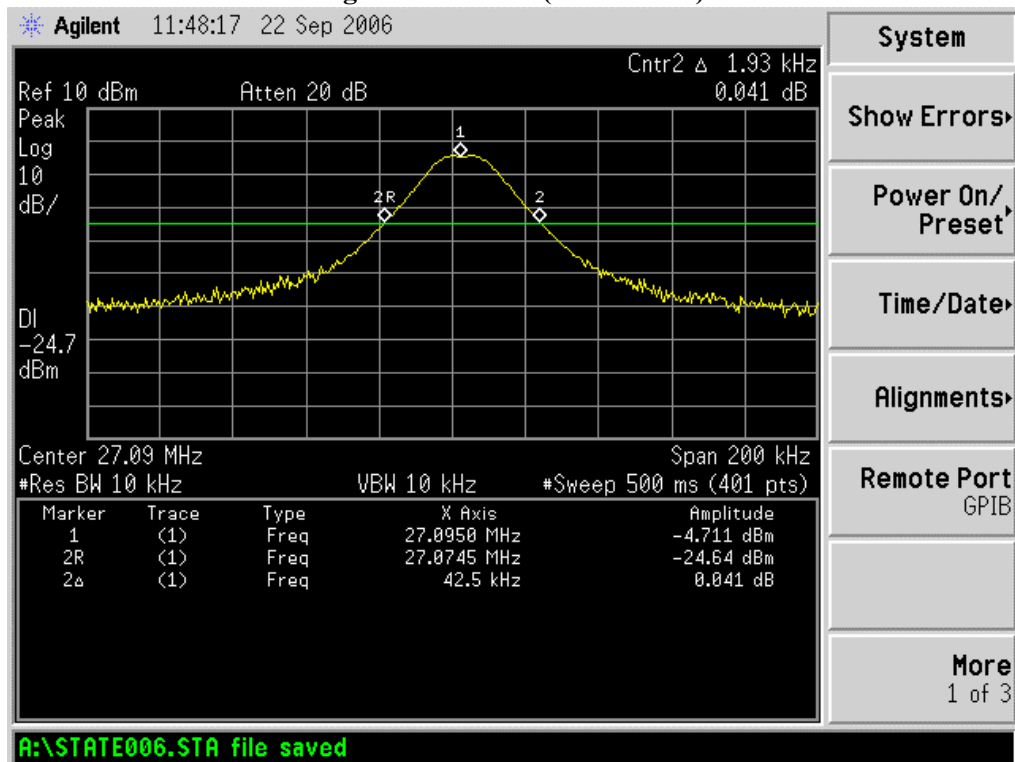


Figure Channel 2 (27.145MHz)

