

FCC PART 15.227

EMI MEASUREMENT AND TEST REPORT

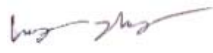
For

G.tech Technology Ltd.

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FCC ID:OO9P2301B

2004 -03-30

This Report Concerns: ☒ Original Report	Equipment Type: Transmitter, Wireless Mouse
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Report No.: R0403155 (T)	
Test Date: 2004-03-17	
Reviewed By:  Ling Zhang /	
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It may not be duplicated without prior written consent of Bay Area Compliance
Laboratory Corporation. This report **must not** be used by the client to claim product
endorsement by NVLAP or any agency of the U.S. Government.

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *G.tech Technology Ltd.*'s product, model number: P2301B or the "EUT" as referred to in this report is a Wireless Mouse Transmitter. The EUT is measured approximately 4.75" L x 2.5" W x 1.5" H. Powered by two 1.5V AAA battery.

** The test data gathered are from production sample, serial number: P2301B001, provided by the manufacturer.*

Objective

This Type approval report is prepared on behalf of *G.tech Technology Ltd.* in accordance with Part 2, Subpart J, and Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules, sec 15.203, 15.205, 15.209 and sec 15.227.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2001, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp.

Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules and Article 8 of the VCCI regulations on. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2001.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, CISPR 22: 1997, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2001.

Schematics and Block Diagram

Please refer to Appendix D.

Equipment Modifications

No modifications were made to the EUT.

Test Setup Configuration



Mouse Transmitter

SUMMARY OF TEST RESULTS

Results reported relate only to the product tested, serial number:R2301B001.

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna requirement	Compliant
§15.205	Restricted Band	Compliant
§15.209	Radiated Emission Limit	Compliant
§15.227	Frequency of Operation	Compliant
§15.227(a)	Field Strength	Compliant
§15.227(b)	Band Edge	Compliant

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The antenna for this device is an integral antenna that the end user cannot access.

§15.205, §15.209, §15.227 - RADIATED EMISSIONS TEST

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ± 4.0 dB.

The fundamental data was recorded in average detection mode: set the VBW AVE on, then record the data.

EUT Setup

The radiated emission tests were performed in the open area 10-meter test site, EUT to test antenna distance is 3 meters, using the setup accordance with the ANSI C63.4-2001. The specification used was the FCC Part 15 Subpart C limits.

According to FCC rules, 47 CFR 15.33, The EUT emission were investigated from 25 – 1000 MHz

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
Below 30MHz	10KHz	10KHz
30 – 1000MHz	100KHz	100KHz
Above 1000MHz	1MHz	1MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Amplifier	8447D	2944A10198	2003-09-23
HP	Analyzer, Spectrum, Display	8565EC	3026A20081	2003-06-13
HP	Adapter, Quasi-Peak	85650A	3107A01505	2003-09-30
HP	Analyzer, Spectrum, RF	8568B	3019A05393	2003-06-13
HP	Plotter	7475A	2541A49659	N/R
EMCO	Antenna, Loop, H-Field Gain/AF	6512	00029604	2004-02-12
Electro Metrics	Biconical Antenna	EM-6912	585	2003-04-17
Electro Metrics	Logperiodic Antenna	EM-6950	788	2003-04-15

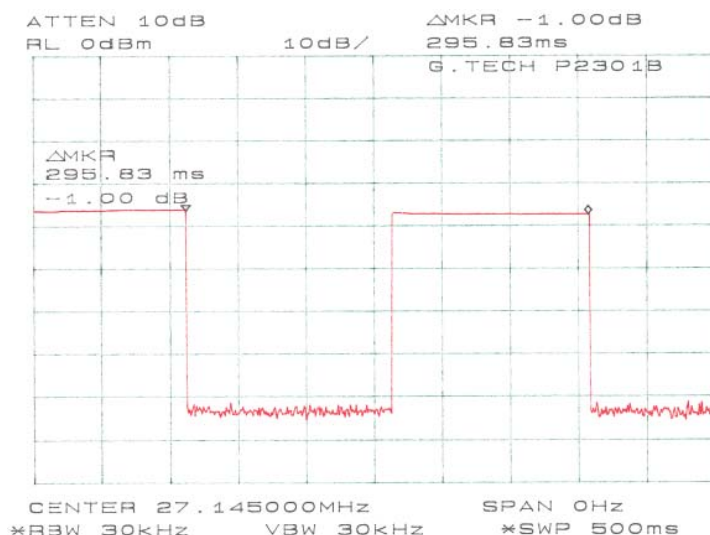
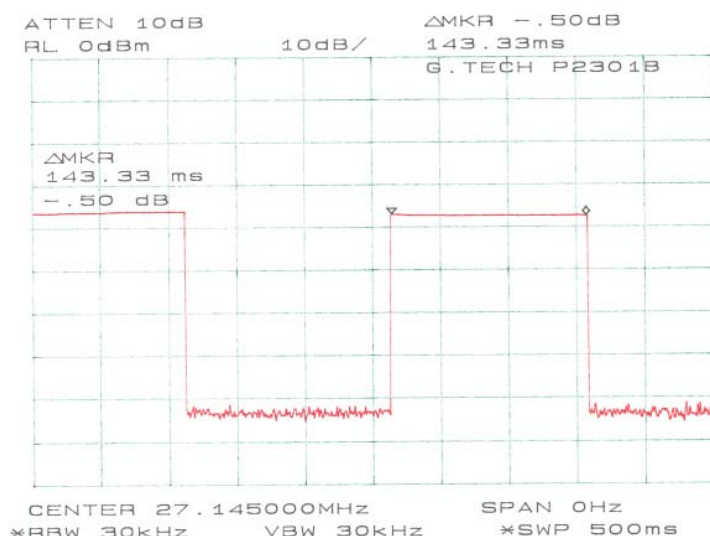
*** Statement of Traceability:** BACL Corp. certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions in the described configurations.

According to FCC rules 15.33 (c) Unless otherwise specified, e.g. §15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

The pulse train of the EUT is 143.33ms (Please refer to the following plot) which is longer than 0.1s, so the average absolute value is equal to the maximum value of the field strength during a 0.1s interval.



Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

Summary of Test Results

According to the final data in following table, the EUT complied with the FCC 15.227 and FCC 15.209 standards, and had the worst margin of:

-10.7 dB at 54.18 MHz in the Vertical polarization

Environmental Conditions

Temperature:	25°C
Relative Humidity:	57%
ATM Pressure:	1012 mbar

Radiated Emissions Test Result Data

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC SUBPART C	
Freq. MHz	Ampl. dBμV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable dB	Amp. dB	Correction Factor. dBμV/m	Limit dBμV/m	Margin dBμV/m
54.18	44.1	30	1.2	V	10.5	2.0	27.3	29.3	40	-10.7
54.18	43.8	0	2.5	H	10.5	2.0	27.3	29.0	40	-11.0
81.325	42.3	45	1.2	V	9.6	2.7	27.5	27.1	40	-12.9
81.325	40.9	30	3	H	9.6	2.7	27.5	25.7	40	-14.3
108.47	37.2	45	1.2	V	11.4	3.2	27.7	24.1	43.5	-15.9
108.48	35.3	30	2.5	H	11.4	3.2	27.7	22.2	43.5	-17.8
27.145	66.0	0	1.2	V	10.5	2.0	27.3	51.2	80	-28.8FUND/AVE
27.145	65.9	330	2	H	10.5	2.0	27.3	51.1	80	-28.9FUND/AVE
27.145	66.0	0	1.2	V	10.5	2.0	27.3	51.2	100	-48.8 FUND/PEAK
27.145	65.9	330	2	H	10.5	2.0	27.3	51.1	100	-48.9 FUND/PEAK

NOTES:

FUND: =Fundamental.

The mouse transmitter was placed in continuous transmit mode for all tests.

The EUT was tested in all 3 orthogonal planes.

§15.227(b) - Out of Band Emission

The result has been complied with the 15.227(b), see the following plot:

