FCC PART 15 SUBPART C
EMI MEASUREMENT AND TEST REPORT

For

G.tech Technology Ltd.

No.21,Jinding Industrial Park,West Jinfeng Road,TangJiawan Town,Zhuhai Guangdong China
COMPTON, CA90220

FCC ID: 009P7301

November 14, 2003

This Report Concerns:	**Equipment Type:**
☒ Original Report	Wireless Optical Mouse

Test Engineer:	Ling Zhang /
Report No.:	RSZA03111101(T)
Test Date:	November 14, 2003
Reviewed By:	Ming Jing /
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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *G.tech Technology Ltd.* 's product, model *P7301* or the "EUT" as referred to in this report is a Mini Wireless Optical Mouse. EUT composites of two parts, one is transmitter mouse which is measured approximately 3.5" L x 1.7" W x 1.1" H; the other is receiver which is measured approximately 2.7"L x 0.6" W x 0.5" H.

** The test data gathered are from production sample, serial number: 20339, provided by the manufacturer.*

1.2 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 and B of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine compliance with FCC rules, sec 15.209 and sec 15.227.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals.

1.4 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. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 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 on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. 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.

1.6 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Sony	Notebook PC	PCG-885L	283520304516747	DOC
HP	Printer	2225C	N/A	DOC

1.7 External I/O Cables List and Details

Description	Length (M)	From	To
Shielded Printer Cable	2.0	Parallel Port/Host	Printer

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

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

2.2 Schematics and Block Diagram

Please refer to Appendix D.

2.3 Equipment Modifications

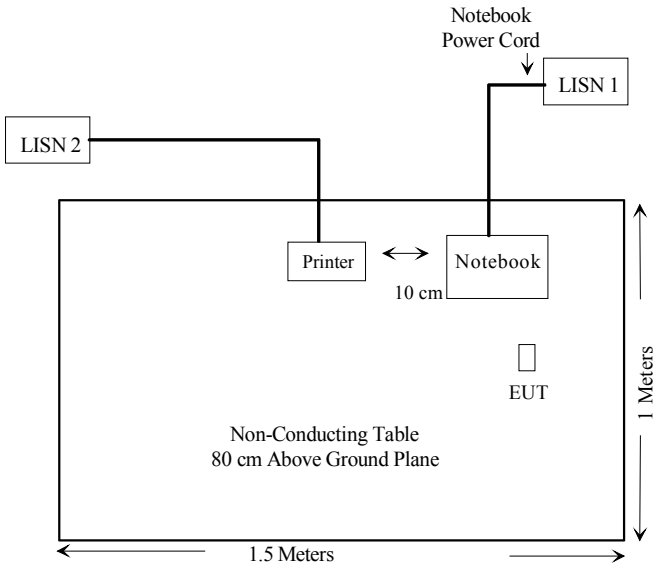
No modifications were made to the EUT.

2.4 Test Setup Configuration

Test Setup for Transmitter

EUT

Test Setup for Receiver



3 - SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 15.203	Antenna requirement	Compliant
§ 15.227 (b)	Occupied Bandwidth	Compliant
§ 15.205 § 15.209 § 15.227 (a)	Restricted Band Radiated Emission Field Strength	Compliant

4 - RADIATED EMISSIONS TEST

4.1 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 $\pm$4.0 dB.

4.2 EUT Setup

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

The spacing between the peripherals was 10 cm.

External I/O cables are draped over edge of test table or bundled when necessary.

The notebook PC was connected to a 120Vac/60Hz power source.

4.3 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR 15.33, the EUT was tested to 1000 MHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Start Frequency ..... 27 MHz
Stop Frequency ..... 1000 MHz
Sweep Speed ..... Auto
IF Bandwidth..... 100 KHz
Video Bandwidth ..... 100 KHz
Quasi-Peak Adapter Bandwidth ..... 120 kHz
Quasi-Peak Adapter Mode ..... Normal
Resolution Bandwidth 100KHz

4.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8568B	2601A02165	2004-01-07
HP	Amplifier	8447E	2944A10187	2004-09-23
HP	Quasi-Peak Adapter	85650A	3019A05393	2004-06-13
EMCO	Biconical Antenna	3110B	9309-1165	2004-10-11
EMCO	Log Periodic Antenna	3146	2101	2004-10-11

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

4.5 Test Procedure

For the radiated emissions test, the power cord of the host system and all support equipment were connected to the AC floor outlet.

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

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dBμV of specification limits), and are distinguished with a "**Qp**" in the data table.

4.6 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:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

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

Margin = Corr. Ampl. - Limit

4.7 Summary of Test Results

According to the final data in section 4.8, the EUT complied with the FCC 15.227 and FCC 15.209 standards, and had the worst margin of:

-8.1 dB at **54.29 MHz** in the **Vertical** polarization, 27-1000MHz, 3 meters, transmitter

-5.6 dB at **149.98 MHz** in the **Vertical** polarization, 27-1000MHz, 3 meters, receiver

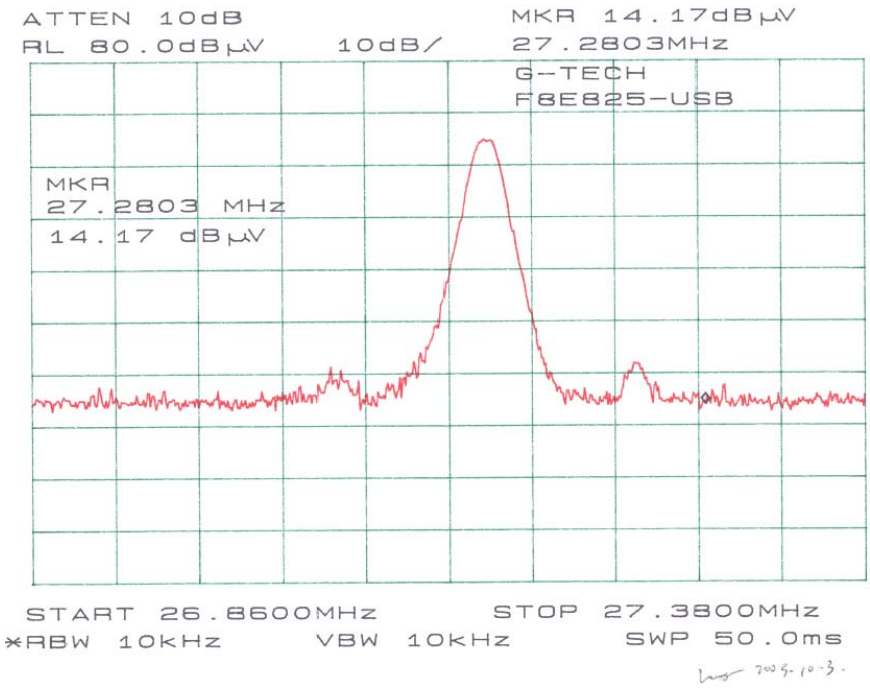
4.8 Radiated Emissions Test Result Data

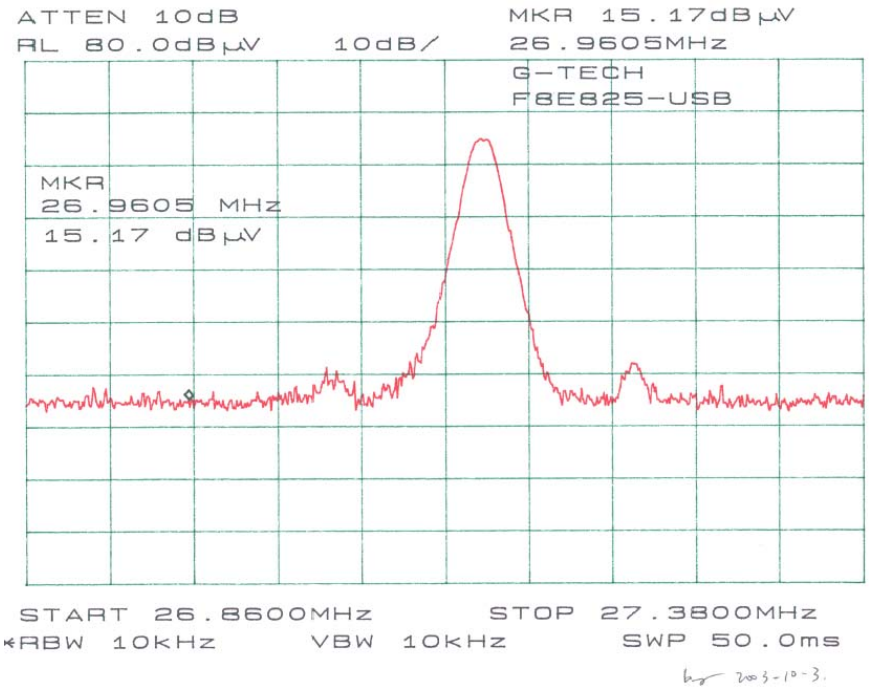
INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC SUBPART C	
Frequency MHz	Ampl. dBμV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/ m	Margin dB
Transmitter										
54.29	45.7	15	1.4	V	10.2	1.0	25.0	31.9	40	-8.1 PEAK
54.29	44.9	0	1.2	H	10.2	1.0	25.0	31.1	40	-8.9 PEAK
81.44	42.3	330	1.3	H	9.5	1.2	25.0	28.0	40	-12.0 PEAK
81.44	41.2	0	1.2	H	9.5	1.2	25.0	26.9	40	-13.1 PEAK
27.15	57.7	0	1.2	V	15.3	0.8	25.0	48.8	80	-31.2 FUND/AVE
27.15	49.8	0	1.2	H	15.3	0.8	25.0	40.9	80	-39.1 FUND/AVE
27.15	65.0	0	1.2	V	15.3	0.8	25.0	56.1	100	-43.9 FUND/PEAK
27.15	57.2	0	1.2	H	15.3	0.8	25.0	48.3	100	-51.7 FUND/PEAK
Receiver										
149.98	35.2	90	1.8	V	12.6	1.7	25.0	24.4	30	-5.6
53.38	37.6	30	1.2	V	10.2	1.0	25.0	23.8	30	-6.2
53.39	36.5	180	1.5	H	10.2	1.0	25.0	22.7	30	-7.3
80.10	36.2	0	1.6	H	9.5	1.2	25.0	21.9	30	-8.1
80.17	35.7	120	1.2	V	9.5	1.2	25.0	21.4	30	-8.6
250.00	36.3	300	1.2	H	13.3	2.2	25.0	26.8	37	-10.2

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

4.9 Band Edge

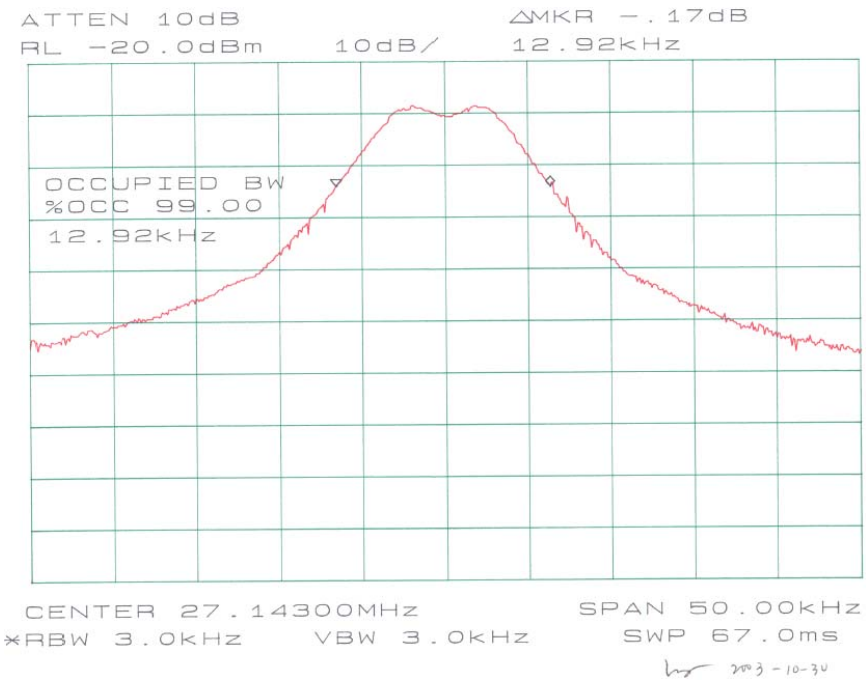
The result has been complied with the 15.227(b), see the following plot:





4.10 Occupied Bandwidth

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



5 - CONDUCTED EMISSIONS

5.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ±2.4 dB.

5.2 EUT Setup

The measurement was performed in the shield room, using the same setup per ANSI C63.4-2001 measurement procedure. The specification used was the FCC15 Class B limits.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and bundled if necessary.

The notebook PC was connected to 120Vac/60Hz power source.

5.3 Spectrum Analyzer Setup

The spectrum analyzer was set to investigate the spectrum from 150 kHz to 30Mhz.

5.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
Rohde & Schwarz	Artificial LISN	ESH2-Z5	871884/039	2003-03-28
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2003-12-03

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

5.5 Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Average readings are distinguished with an "Ave".

5.5 Test Results Summary

According to the recorded data, the EUT complied with the FCC Conducted limits for a Class B device, with the worst margin reading of:

-5.3 dB at 0.18 MHz in the Line mode

5.6 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC 15 CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
0.180	48.7	Ave	Line	54	-5.3
0.180	47.3	Ave	Neutral	54	-6.7
0.180	51.2	Op	Line	64	-12.8
0.180	49.6	Op	Neutral	64	-14.4
1.530	28.3	Ave	Neutral	46	-17.7
3.420	26.7	Ave	Line	46	-19.3
0.860	36.4	Op	Line	56	-19.6
0.810	24.8	Ave	Line	46	-21.2
3.510	33.4	Op	Neutral	56	-22.6
1.530	31.9	Op	Neutral	56	-24.1
3.510	21.5	Ave	Neutral	46	-24.5
3.420	30.8	Op	Line	56	-25.2

5.7 Plots of Conducted Emission

The plots of conducted emission are presented hereinafter as reference.

Bay Area Compliance Laboratory Corp 03. Oct 03 16:21

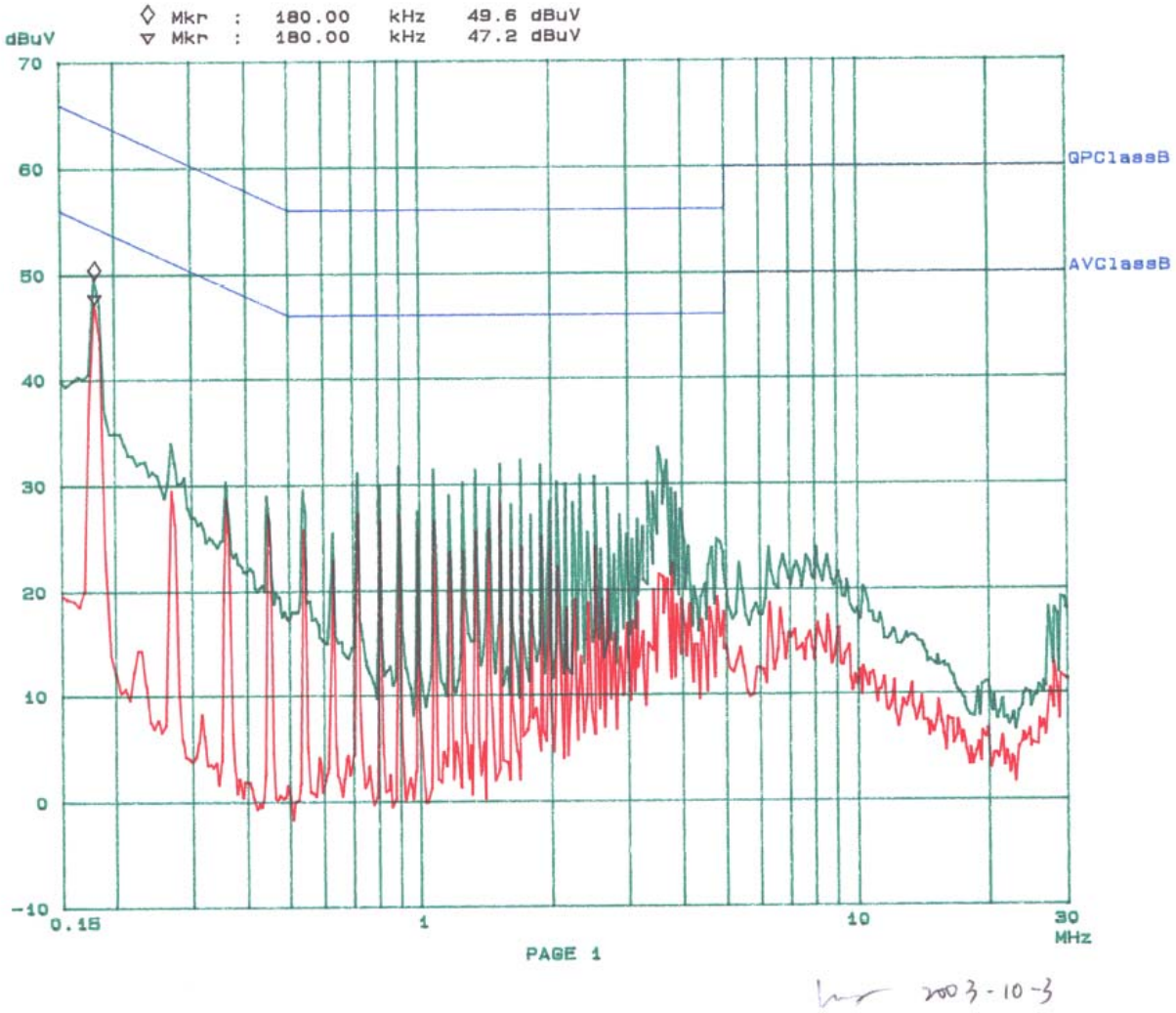
CLASS B

EUT: F8E825-USB
Manuf: G-TECH
Op Cond: Normal
Operator: LING
Comment: N

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	10dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	10dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	10dBLN	OFF

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



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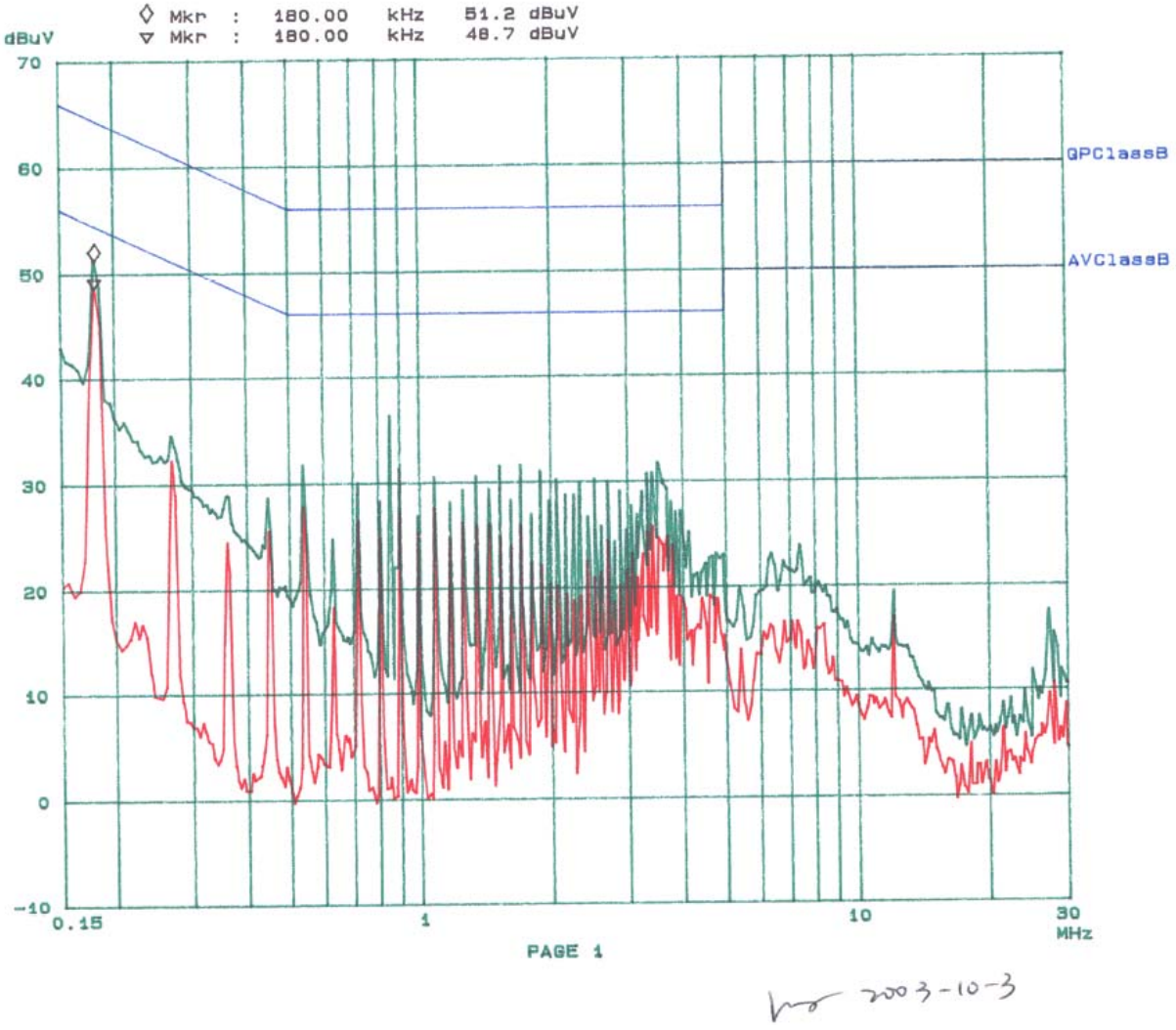
CLASS B

EUT: F8E825-USB
Manuf: G-TECH
Op Cond: Normal
Operator: LING
Comment: L

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	10dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	10dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	10dBLN	OFF

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



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