

FCC PART 15.231

EMI MEASUREMENT AND TEST REPORT

For

Huge Technology Co., Ltd

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FCC ID: JKD4101

2004-05-25

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: Car Alarm System
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Report No.: R0405191	
Test Date: 2004-05-20	
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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Huge Technology Co., Ltd*'s product, model number: *TP-4101* or the "EUT" as referred to in this report is a Car Alarm System which is measured approximately 5.5cmL x 4cmW x 1.4cmH.

** The test data gathered are from production sample, serial number: TP-4101-001, provided by the manufacturer.*

Objective

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

The objective of the manufacturer is to determine compliance with FCC rules, Part 15, Sec 231 for radiated emission, 20dB Bandwidth, and Deactivation.

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 BACL.

Test Facility

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

SYSTEM TEST CONFIGURATION

Justification

The EUT was tested in accordance with ANSI C63.4-2001.

EUT Exercise Software

The EUT exercising software program was designed to exercise the various installed components in accordance with ANSI C63.4-2001.

Special Accessories

The unit was tested with the normally supplied cabling and accessories provided by the supporting equipment and no special accessories were used.

Schematics / Block Diagram

Exhibit A contains a copy of the EUT's schematics diagram as reference.

Equipment Modifications

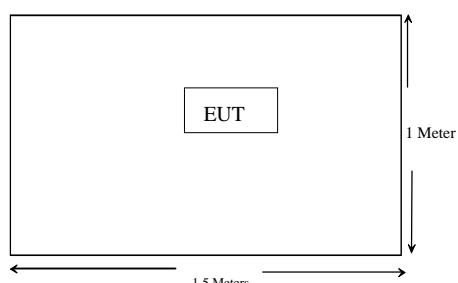
No modifications were made to the EUT.

Configuration of Test System



EUT

Test Setup Block Diagram



SUMMARY OF TEST RESULTS

Results reported relate only to the product tested, serial number: TP-4101-001.

FCC Rules	REQUIREMENTS	RESULT
FCC 15.203	Antenna Requirement	Pass
FCC 15.205, 15.209, 15.231(b)	Spurious Radiated Emissions	Pass
FCC 15.207 (a)	Conducted Emissions	N/A
FCC 15.231(a)(1)	Deactivation	Pass
FCC 15.231(b)(2)	Pulse desensitization or derating was not required because peak measurements were employed	N/A
FCC 15.231(c)	20dB Bandwidth	Pass

§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.

Refer to statement below for compliance.

“The antenna for this device is an integral antenna that the end user cannot access. Furthermore the device is for outdoor use as detailed in the Users Manual and Operational Description”.

Antenna Connected Construction

The antenna connector is designed with permanent attachment and no consideration of replacement.

§15.205 - RADIATED EMISSION DATA

Measurement Uncertainty

All measurements involve certain levels of uncertainties. 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.

EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the ANSI C63.4 - 2001. The specification used was the FCC Subpart C limits.

The spacing between the peripherals was 10 centimeters.

The EUT was placed on the center of the back edge on the test table.

The EUT used new battery.

Spectrum Analyzer Setup

According to FCC CFR 47, Section 15.31, the EUT was tested 40000 MHz.

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

<u>Frequency Range</u>	<u>RBW</u>	<u>Video B/W</u>
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	Spectrum Analyzer	8568B	3019A05393: RF, 2318A05603:Display	2004-06-13
HP	Spectrum Analyzer Display	85662A	3026A20081	2004-06-13
HP	Quasi-Peak Adapter	85650A	3107A01505	2003-09-30
HP	Amplifier, Pre	8447D	2944A10198	2003-09-23
Com-Power	Antenna	AL-130	17043	2004-04-03
Electro Metrics	Antenna, Biconical	EM-6912	585	2004-04-17
Electro Metrics	Antenna Logperiodic	EM-6950	788	2004-04-15

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

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

Above 1GHz, all data was recorded in both peak and average detection mode. For average reading, set the RBW = 1MHz, VBW = 10Hz.

According to §15.231, Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emission, based on the average value of the measured emissions. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. 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 operated 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.

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:

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

Summary of Test Results

According to the data in the following table, the EUT complied with the FCC 15.231 standards and these test results is deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations, and had the worst margin of:

- 1.5 (Fund) dB at 310.11 MHz in the **Horizontal** polarization (Average Value), 30 to 40000 MHz, 3 meters

Radiated Emissions Test Data, 3 meters

Environmental Conditions

Temperature:	19° C
Relative Humidity:	56%
ATM Pressure:	1018 mbar

Peak Value:

INDICATED			TABLE		ANTENNA	CORRECTION FACTOR		CORRECTED AMPLITUDE	FCC 15.231	
Frequency	Peak	Direction	Height	Polar	Antenna Loss	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin
MHz	dB μ V	Degree	Meter	H/ V	dB μ V	dB μ V	dB μ V	dB μ V/m (PK)	dB μ V/m(Ave)	DB (Ave)
310.11	96.7	0	1.0	H3	13.7	3.8	27.6	86.6	75.33	11.3 Fund
619.92	70.8	150	2.0	H3	19.4	5.4	29.2	66.4	55.33	11.1
619.92	70.1	270	1.8	V3	19.4	5.4	29.2	65.7	55.33	10.4
930.31	61.3	270	1.0	H3	23.5	7.0	27.6	64.2	55.33	8.9
930.33	51.4	330	1.7	V3	23.5	7.0	27.6	54.3	55.33	-1.0
310.17	80.6	270	1.9	V3	13.7	3.8	27.6	70.5	75.33	-4.8 Fund
1240.42	57.9	270	1.3	H3	24.0	1.3	37.0	46.2	55.33	-9.1
1240.45	54.6	220	1.0	V3	24.0	1.3	37.0	42.9	55.33	-12.4
1550.44	42.6	60	1.2	H3	25.3	1.9	36.3	33.5	55.33	-21.9
1550.44	41.2	60	1.0	V3	25.3	1.9	36.3	32.1	55.33	-23.3

Peak & Average Value:

INDICATED			CORRECTION FACTOR		FCC 15.231			
Frequency	Peak	Average	Peak	Average	Limit	Limit	Margin	Margin
MHz	dB μ V	dB μ V	dB μ V	dB μ V	dB μ V/m (PK)	dB μ V/m(Ave)	dB (PK)	dB (Ave)
310.11	96.7	83.9	86.6	73.8	95.33	75.33	-8.73	-1.5 Fund
619.92	70.8	58.0	66.4	53.6	75.33	55.33	-8.93	-1.7
619.92	70.1	57.3	65.7	52.9	75.33	55.33	-9.63	-2.4
930.31	61.3	48.5	64.2	51.4	75.33	55.33	-11.13	-3.9
930.33	51.4	38.6	54.3	41.5	75.33	55.33	-21.03	-13.8
310.17	80.6	67.8	70.5	57.7	95.33	75.33	-24.83	-17.6 Fund
1240.42	57.9	45.1	46.2	33.4	75.33	55.33	-29.13	-21.9
1240.45	54.6	41.8	42.9	30.1	75.33	55.33	-32.43	-25.2
1550.44	42.6	29.8	33.5	20.7	75.33	55.33	-41.86	-34.7
1550.44	41.2	28.4	32.1	19.3	75.33	55.33	-43.26	-36.1

Duty Cycle: 22.9msec / 100msec = 0.229

Average = Peak x Duty Cycle (Absolute Value)

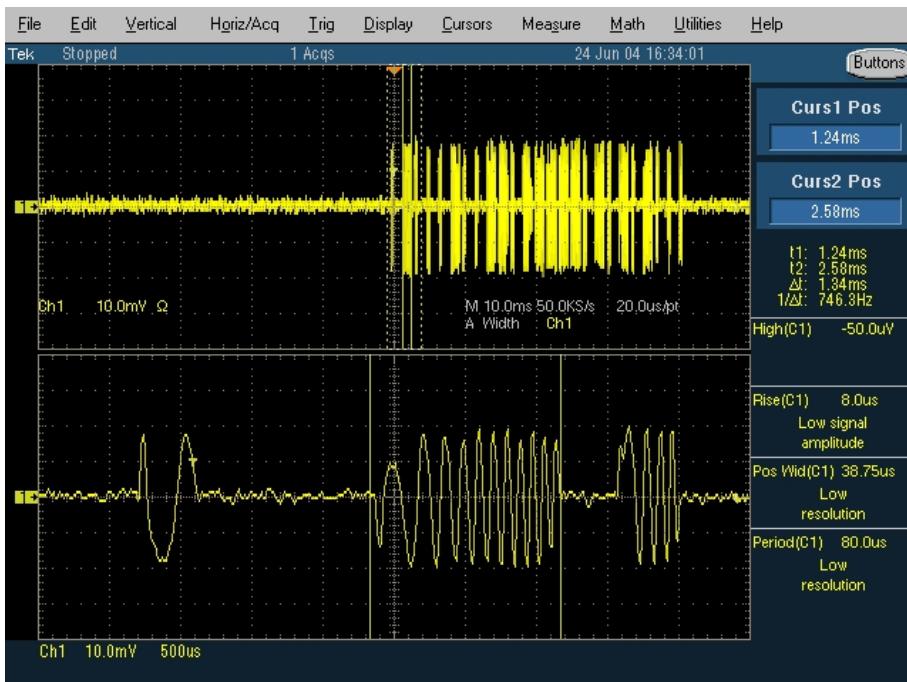
Note:

Fund: Fundamental

ON-Time for narrow pulse – 0.5ms



ON-Time for wide pulse – 1.34ms



Total ON-Time over 100ms is no more than 22.9ms. Duty Cycle = 0.23.

(Calculation for Total ON-Time is 12 narrow pulses + 13 wide pulses; $12 \times 0.5\text{ms} + 13 \times 1.3\text{ms} = 22.9\text{ms}$)

§15.207 - AC LINE CONDUCTED EMISSIONS

Not applicable due to battery operated.

§15.231(a)(1) - DEACTIVATION

Requirement

Per 15.231(a)(1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	8568B	2601A02165	2003-07-03
Agilent	Amplifier	8447E	2944A10187	2003-09-23
HP	Quasi-Peak Adapter	85650A	3019A05393	2003-06-13
EMCO	Biconical Antenna	3110B	9309-1165	2003-10-11
EMCO	Log Periodic Antenna	3146	2101	2003-10-11

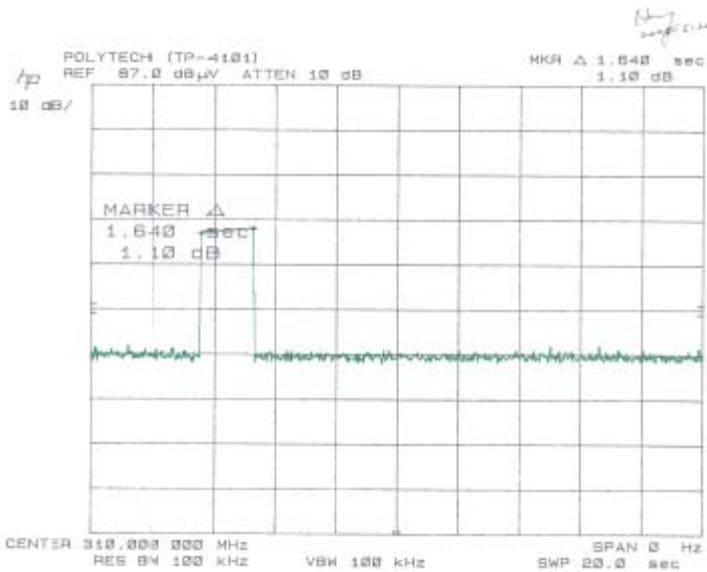
* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Result

Temperature:	19° C
Relative Humidity:	56%
ATM Pressure:	1018 mbar

Pass

Please see the following plot:



§15.231(c) - 20DB BANDWIDTH

Requirement

Per 15.231(c), the bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	8568B	2601A02165	2003-07-03
Agilent	Amplifier	8447E	2944A10187	2003-09-23
HP	Quasi-Peak Adapter	85650A	3019A05393	2003-06-13
EMCO	Biconical Antenna	3110B	9309-1165	2003-10-11
EMCO	Log Periodic Antenna	3146	2101	2003-10-11

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

Test Result

Temperature:	19° C
Relative Humidity:	56%
ATM Pressure:	1018 mbar

Fund. Frequency	20dB Bandwidth Emission (MHz)	Limit of 20dB Bandwidth Emission (MHz)	Result
310.00	0.296	0.775	Compliance

Please refer to the following plot.

