



FCC PART 15.227



TEST AND MEASUREMENT REPORT

For

South Pacific Electronics Ltd.

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FCC ID: OHKGLT2708

Report Type: Original Report	Product Type: 27 MHz Remote Control Transmitter
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1204231-227	Original Report	2012-05-30

1. General Information

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *South Pacific Electronics Ltd.* and their product, FCC ID: OHKGLT2708 model: GLT2708, which will henceforth be referred to as the EUT (Equipment Under Test). The EUT is a hand held remote control transmitter to turn on/off lights and automatic gates.

Specifications	
Fixed Frequency	27.195 MHz
Modulation Type	FM
Power Supply	9 V Battery

1.2 Mechanical Description

The EUT measures approximately 8.1 cm (L) x 5.6 cm (W) x 2.4 cm (H) and weighs approximately 56g.

The test data gathered are from production sample, serial number: 6J9JCP, assigned by BACL.

1.3 Objective

This type approval report is prepared on behalf of *South Pacific Electronics Ltd.* in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commissions rules.

The objective was to determine the Spurious Emissions are in compliance with the FCC rules.

1.4 Related Submittal(s)/Grant(s)

None.

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the 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 CISPR16-4-2:2003, The Treatment of Uncertainty in EMC Measurements, the values ranging from ± 2.0 dB for Conducted Emissions tests and ± 4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

1.7 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. 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 have 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 test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2003, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. 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 Corp. is an American Association for laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at <http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b>

2 System Test Configuration

2.1 Justification

The system was configured for testing in accordance with ANSI C63.4-2003.

The EUT was tested in the testing mode to represent *worst*-case results during the final qualification test.

2.2 EUT Exercise Software

N/A

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 Internal Configuration

Manufacturers	Descriptions	Model	Serial Numbers
Elsema	PCB	GLT2708	-

2.5 Local Support Equipment

N/A

2.6 External I/O Cabling List and Details

N/A

3 Summary of Test Results

FCC Rules	Description of Tests	Results
§15.203	Antenna Description	Compliant
§15.207	Conducted Emissions	N/A ¹
§15.35, §15.209, §15.227	Radiated Emissions	Compliant

Note 1: EUT is battery powered.

FCC §15.203 – Antenna Description

3.1 Applicable Standard

According to FCC §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 use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

3.2 Antenna Connector Construction

The EUT has one internal PCB track, omni-directional antenna for TX/RX for the 27 to 27.3 MHz with -13 dBi Max antenna gain, which in accordance to sections FCC Part 15.203, is considered sufficient to comply with the provisions of these sections. Please refer to the EUT photos.

4 FCC §15.209 & §15.227 – Radiated Emissions

4.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per FCC §15.227 (a) the field strength of any emission within this band shall not exceed 10,000 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

4.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.4-2003. The specification limits were in accordance with FCC 15 Subpart C.

The radiated emissions tests were performed using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15C limits.

The spacing between the peripherals was 3 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

4.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT placed on a turntable, 0.8 meter above ground plane. The turntable shall be rotated 360 degrees to determine the highest emission with the antenna in both horizontal and vertical polarizations.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

$$\text{RBW} = 100 \text{ kHz} / \text{VBW} = 300 \text{ kHz} / \text{Sweep} = \text{Auto}$$

Above 1000 MHz:

- (1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
- (2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

4.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

$$\text{CA} = \text{Ai} + \text{AF} + \text{CL} + \text{Atten} - \text{Ga}$$

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

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

$$\text{Margin} = \text{Corrected Amplitude} - \text{Limit}$$

4.5 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	US42221851	2012-02-28
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2012-03-22
Sunol Science Corp	Combination Antenna	JB3	A020106-2	2011-08-10
EMCO	Loop Antenna	6512	34167	2012-04-10 ¹
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2011-06-09

Note 1: Based on a two year calibration cycle.

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

4.6 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	50 %
ATM Pressure:	101.3 kPa

The testing was performed by Lionel Lara on 2012-05-08 in 5 meter chamber 3.

4.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Part 15C standard's radiated emissions limits, and had the worst margin of:

30-1000 MHz:

Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Channel, Range
-2.08	407.9328	Vertical	30 MHz-1 GHz

4.8 Radiated Emissions Test Result Data

1) 30 MHz – 1 GHz, Radiated Spurious Emissions Measured at 3 meters

Quasi-Peak Measurement

Frequency (MHz)	Corrected Amplitude (dB)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dB μ V/m)	Margin (dB)
407.9328	43.92	119	V	181	46	-2.08
978.954	46.00	113	V	274	54	-8.00
326.3173	25.36	167	V	55	46	-20.64
108.783	20.45	99	V	294	43.5	-23.05
163.136	18.11	105	V	93	43.5	-25.39
989.486	19.98	263	V	116	54	-34.02

2) Fundamental, Measured at 3 meters

Frequency (MHz)	S.A. Reading (dB μ V)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dB μ V/m)	FCC Part 15.227		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dB μ V/m)	Margin (dB)	
27.195	38.18	125	100	N/A	34.9	0.02	25.13	47.97	100	-52.03	Peak
27.195	36.96	125	100	N/A	34.9	0.02	25.13	46.75	80	-33.25	Ave.