

FCC PART 15 C

MEASUREMENT AND TEST REPORT

For

SHENZHEN LISIN ELECTRONICS CO.,LTD

Rm 2803, East Block Yihai Plaza, Chuang Ye Road, Nanshan, Shenzhen, China

FCC ID: UA4-C-002B

June 13, 2006

| | |
|---|---|
| This Report Concerns: <input checked="" type="checkbox"/> Original Report | Equipment Type: FM TRANSMITTER |
| Test Engineer: | Tony Wu |
| Report Number: | SE06F-233E |
| Test Date: | May 27 ~June 12, 2006 |
| Reviewed By: |  |
| Prepared By: | S&E Technologies Laboratory Ltd Room407,Block A Shennan Garden,Hi-Tech Industrial Park, Shenzhen 518057, P.R. China. Tel: 86-755-26636573, 26630631 Fax: 86-755-26630557 |

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of S&E Technologies Laboratory Ltd.

TABLE OF CONTENTS

| | |
|--|-----------|
| 1 - GENERAL INFORMATION | 3 |
| 1.1 Product Description for Equipment Under Test (EUT) | 3 |
| 1.2 Test Standards..... | 4 |
| 1.3 Test Summary..... | 4 |
| 1.4 Test Methodology | 4 |
| 1.5 Test Facility..... | 4 |
| 1.6 Test Equipment List and Details | 5 |
| 2 - SYSTEM TEST CONFIGURATION..... | 6 |
| 2.1 Justification | 6 |
| 2.2 EUT Exercise Software..... | 6 |
| 2.3 Special Accessories..... | 6 |
| 2.4 Equipment Modifications..... | 6 |
| 2.5 Basic Test Setup Block Diagram | 6 |
| 3 – DISTURBANCE VOLTAGE AT THE MAINS TERMINALS | 7 |
| 3.1 Measurement Uncertainty | 7 |
| 3.2 Applicable Standard..... | 7 |
| 3.3 Test Description | 7 |
| 4- RADIATED DISTURBANCES | 8 |
| 4.1 Measurement Uncertainty | 8 |
| 4.2 Limit of Radiated Disturbances | 8 |
| 4.3 EUT Setup | 8 |
| 4.4 Test Receiver Setup | 8 |
| 4.5 Test Procedure | 9 |
| 4.6 Corrected Amplitude & Margin Calculation | 9 |
| 4.7 Radiated Emissions Test Result | 9 |
| 5- OCCUPIED BANDWIDTH | 11 |
| 5.1 Requirement of Occupied Bandwidth | 11 |
| 5.2 Test Procedure | 11 |
| 5.3 Occupied Bandwidth Test Result..... | 11 |

1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: **SHENZHEN LISIN ELECTRONICS CO., LTD**

Address of applicant: Rm 2803, East Block Yihai Plaza, Chuang Ye Road, Nanshan, Shenzhen, China

Tel: 86-755-83241645 Fax: 86-755-83241645

Manufacturer: **SHENZHEN LISIN ELECTRONICS CO., LTD**

Address of manufacturer: Rm 2803, East Block Yihai Plaza, Chuang Ye Road, Nanshan, Shenzhen, China

Tel: 86-755-83241645 Fax: 86-755-83241645

General Description of E.U.T

The **SHENZHEN LISIN ELECTRONICS CO.,LTD**'s product, model number: **UA4-C-002B** or the "EUT" as referred to in this report is a transmitter of **FM TRANSMITTER**.

The technical data has been listed following:

| Items | Description |
|----------------------|--|
| EUT Description: | FM TRANSMITTER |
| Trade Name: | N/A |
| Model No.: | UA4-C-002B |
| Power Supply: | DC 12V from Car Battery |
| Frequency range: | 107.87~107.98MHz |
| Antenna Designation: | Non-User Replaceable |
| Product Class: | Low Power Communication Device Transmitter |

** The test data gathered are from the production sample provided by the manufacturer.*

1.2 Test Standards

The following Declaration of Conformity report of EUT is prepared in accordance with

FCC Rules and Regulations Part 15 Subpart C Section 15.239

The objective of the manufacturer is to demonstrate compliance with the described above standards.

1.3 Test Summary

For the EUT described above. The standards used were FCC Part 15 Subpart C Section 15.239

Tests Carried Out Under FCC Part 15 Subpart C Section 15.239

| Standard | Test Items | Status | Application |
|-------------------------------------|--|--------|------------------------------|
| Part 15 Subpart C Section 15.239 | Disturbance Voltage at The Mains Terminals | X | N/A, without AC power supply |
| | Radiation Emission | √ | |
| | Occupied Bandwidth | √ | |

- √ Indicates that the test is applicable
 × Indicates that the test is not applicable

1.4 Test Methodology

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

The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

The maximum emission levels emanating from the device are compared to the Part 15 Subpart C Section 15.239 limits for radiation emissions and the measurement results contained in this test report show that EUT is to be technically compliant with FCC requirements.

All measurement required was performed at laboratory of Shenzhen Huatongwei International Inspection Co., Ltd at Keji Nan No.12 Road, Hi-tech Park, Shenzhen, China

1.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 662850

Shenzhen Huatongwei International Inspection Co., Ltd, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 662850, November 17, 2003.

1.6 Test Equipment List and Details

Table 1: Test Equipment for Emission Test

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal | Calibration Period |
|-------------------------|-----------------|-----------|-----------------|----------|--------------------|
| EMI Test Receiver | ROHDE & SCHWARZ | ESCS30 | 100038 | 2005/11 | 1 year |
| EMI Test Receiver | ROHDE & SCHWARZ | ESPI | 100123 | 2005/03 | 1 year |
| Artificial Mains | ROHDE & SCHWARZ | ESH2-Z5 | 100028 | 2005/11 | 1 year |
| Pulse Limiter | ROHDE & SCHWARZ | ESHSZ2 | 100044 | 2005/11 | 1 year |
| Ultra-Broadband Antenna | ROHDE & SCHWARZ | HL562 | 100015 | 2005/11 | 1 year |
| EMI Test Receiver | ROHDE & SCHWARZ | ESI 26 | 100009 | 2005/11 | 1 year |
| RF Test Panel | ROHDE & SCHWARZ | TS / RSP | 335015/ 0017 | N/A | N/A |
| Turntable | ETS | 2088 | 2149 | N/A | N/A |
| Antenna Mast | ETS | 2075 | 2346 | N/A | N/A |

Table 2: General Description of Test Auxiliary

| Description: | Manufacturer | Model No. | Serial No. | Certificate |
|--------------|--------------|-----------|-------------|-------------|
| iPod | APPLE | A1137 | 6U546CR7SZB | CE, FCC |

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

2.2 EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software offered by manufacture, can let the EUT being normal operation.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product supplied by **SHENZHEN LISIN ELECTRONICS CO.,LTD** and its respective support equipment manufacturers.

2.4 Equipment Modifications

The EUT tested was not modified by S&E.

2.5 Basic Test Setup Block Diagram

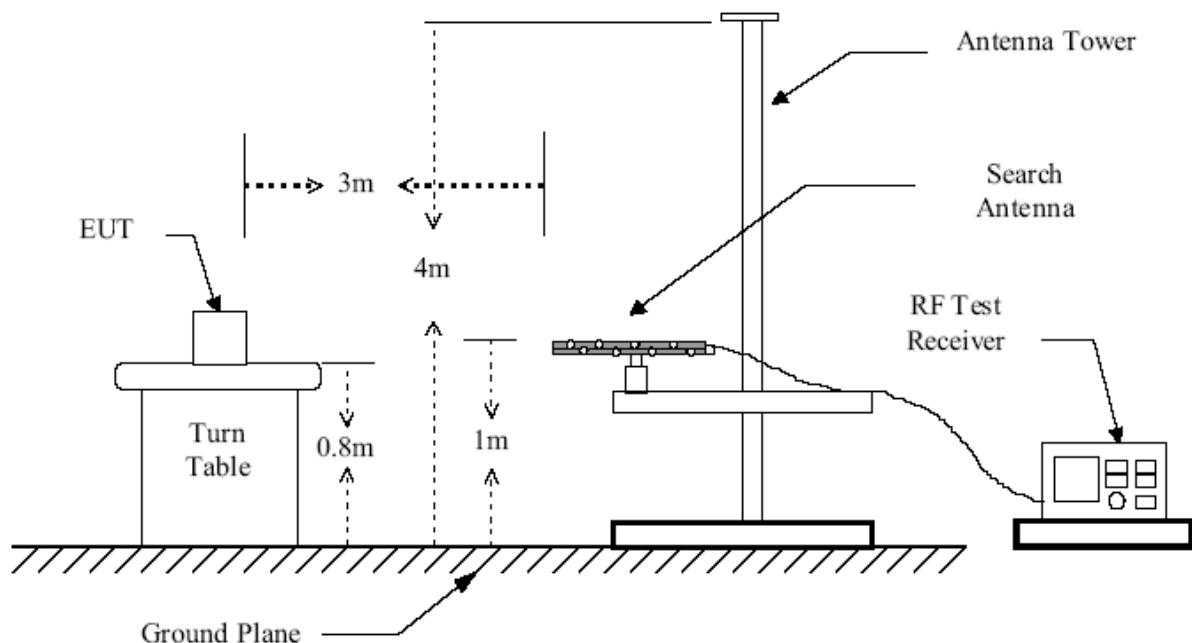


Figure 1 : Frequencies measured below 1 GHz configuration

3 – DISTURBANCE VOLTAGE AT THE MAINS TERMINALS

3.1 Measurement Uncertainty

All test results complied with Section 15.207 requirements. Measurement Uncertainty is 2.4 dB.

3.2 Applicable Standard

Section 15.207: For a Low-power Radio-frequency Device is designed to be connected to the AC power line, The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

| Frequency Range (MHz) | Limits (dBuV) | |
|-----------------------|----------------|---------|
| | Quasi-Peak | Average |
| 0.150 ~ 0.500 | 66 ~ 56 | 56 ~ 46 |
| 0.500 ~ 5.000 | 56 | 46 |
| 5.000 ~ 30.00 | 60 | 50 |

3.3 Test Description

The EUT is excused from investigation of Disturbance Voltage at The Mains Terminals, for it is powered by a DC 12V battery. According to the Section 15.207(d), measurement to demonstrate compliance with the limits of Disturbance Voltage at The Mains Terminals are not required to the devices which only employed battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

4- RADIATED DISTURBANCES

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.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ± 4.0 dB.

4.2 Limit of Radiated Disturbances

| Frequency (MHz) | Distance (Meters) | Field Strengths Limits (dB μ V/m) |
|-----------------|-------------------|---------------------------------------|
| 30 ~ 88 | 3 | 40 |
| 88~216 | 3 | 43.5 |
| 216 ~ 960 | 3 | 46 |
| 960 and above | 3 | 54 |

Note: (1) The tighter limit shall apply at the edge between two frequency bands.
 (2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

4.3 EUT Setup

The radiated emission tests were performed in the in the 3-meter anechoic chamber, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part 15 Subpart B limits.

The EUT was placed on the center of the test table. In the frequency range below 1 GHz, Ultra-Broadband Antenna horn-antenna is used. Test setup refer to **Section 2.5 Basic Test Setup Block Diagram** of this report.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

4.4 Test Receiver Setup

According to FCC Part 15 rule, the frequency was investigated from 30 to 1000 MHz. During the radiated emission test, the test receiver was set with the following configurations:

Test Receiver Setting for frequency range below 1000MHz:

Detector.....Peak & Quasi-Peak
 IF Band Width.....100KHz
 Frequency Range.....30MHz to 1000MHz
 Turntable Rotated.....0 to 360 degrees

Antenna Position:

Height.....1m to 4m

Polarity.....Horizontal and Vertical

4.5 Test Procedure

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

- 1). Configure the EUT according to ANSI C63.4-2003.
- 2). The EUT was placed on the top of the turntable 0.8 meter above ground.
- 3). The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 4). Power on the EUT and all the supporting units.
- 5). The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 6). For each suspected emission, the antenna tower was scanned (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading of both horizontal and vertical polarization.
- 7). Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode. Then all data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -10 dB μ V of specification limits), and are distinguished with a "QP" in the data plots.

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:

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

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

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

4.7 Radiated Emissions Test Result

| | |
|------------------------------|-------------------------|
| Temperature () | 22~23 |
| Humidity (%RH) | 50~54 |
| Barometric Pressure (mbar) | 950~1000 |
| EUT | FM TRANSMITTER |
| M/N | C-002B |
| Operating Mode | Continuous Transmitting |

Fundamental Emission Test Data

| Peak Measurement | | | | | |
|-------------------------|--------------------------------|------------|--------------------------|-------------|------------|
| Test Frequency (MHz) | Measuring Level (dB μ V/m) | | Limits (dB μ V/m) | Margin (dB) | |
| | Vertical | Horizontal | | Vertical | Horizontal |
| 107.894 | 45.5 | 34.7 | 68.0 | 22.5 | 33.3 |
| Average Measurement | | | | | |
| 107.894 | 39.4 | 29.3 | 48.0 | 8.6 | 18.7 |

Harmonics & Spurious Emission

| 107.89MHz Spurious Emission | | | | | | | |
|-------------------------------|--------------------|-------------------|-----------------------|--------|------------------------|--------------|--------------|
| Maximum Frequency (MHz) | Position and Level | | | | | Limit | Margin |
| | Polarity | Ant. Hei. m | Value dB μ V/m | Transd | Result dB μ V/m | dB μ V/m | dB μ V/m |
| 215.79 | H | 2.4 | 17.8 | 9.7 | 27.5 | 43.5 | 16.0 |
| 323.68 | H | 2.5 | 15.3 | 13.8 | 29.1 | 46.0 | 16.9 |
| 431.58 | H | 2.5 | 6.1 | 18.1 | 24.2 | 46.0 | 21.8 |
| 539.47 | H | 1.8 | 6.2 | 18.9 | 25.1 | 46.0 | 20.9 |
| 647.36 | H | 2.5 | 8.7 | 20.0 | 28.7 | 46.0 | 17.3 |
| 755.26 | H | 2.1 | 5.7 | 22.1 | 27.8 | 46.0 | 18.2 |
| 863.15 | H | 1.5 | 8.9 | 21.5 | 30.4 | 46.0 | 15.6 |
| 971.05 | H | 1.5 | 10.1 | 23.5 | 33.6 | 54.0 | 20.4 |
| 1078.95 | H | 1.5 | 10.0 | 22.4 | 32.4 | 54.0 | 21.6 |
| | | | | | | | |

5- OCCUPIED BANDWIDTH

5.1 Requirement of Occupied Bandwidth

Emission from the intentional radiator shall be confined within a band 200kHz wide centered on the operation frequency. The 200kHz band shall lie wholly within the frequency range of 88~108MHz.

5.2 Test Procedure

- 1). The EUT was placed on the top of the turntable 0.8 meter above ground.
- 2). The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 3). Power on the EUT and all the supporting units.
- 4). The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 5). For each suspected emission, the antenna tower was scanned (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading of both horizontal and vertical polarization.
- 6). Set EMI test receiver with Max hold. Mark peak, -20dB.

5.3 Occupied Bandwidth Test Result

| | |
|------------------------------|-------------------------|
| Temperature () | 22~23 |
| Humidity (%RH) | 50~54 |
| Barometric Pressure (mbar) | 950~1000 |
| EUT | FM TRANSMITTER |
| M/N | C-002B |
| Operating Mode | Continuous Transmitting |

Test Result:

Test plots see following pages

The image shows a Spectrum Analyzer screen with the following details:

- Top Status Bar:**
 - Left: **Ref Lvl** 122 dBμV
 - Center: **Delta** 3.1713, **1.39 dB**, **150.00160321 kHz**
 - Right: **RBW** 10 kHz, **RF Att** 30 dB, **VBW** 10 kHz, **SWT** 720 as, **Unit** dBμV
- Grid and Trace:**
 - A yellow trace shows the signal spectrum.
 - A red horizontal line is at **83.3 dB**.
 - A red vertical line is at **187.976489 MHz**.
 - Other red vertical lines are labeled **F1** and **F2**.
- Right Side Controls:**
 - 0 LINES**
 - DISPLAY LINE 1** (Green button)
 - DISPLAY LINE 2** (Green button)
 - THRESHOLD LINE** (Grey button)
 - REFERENCE LINE** (Grey button)
 - FREQ LINE 1** (Green button)
 - FREQ LINE 2** (Red button)
 - BASELINE CLIPPING** (Grey button)
- Bottom Status Bar:**
 - Center: **Center** 187.894489 MHz
 - Left: **50 kHz/**
 - Right: **Span** 500 kHz