

CERTIFICATION MEASUREMENT REPORT

I. INTRODUCTION

This measurement report is submitted in support of an Application for Certification in accordance with Part 2, Subpart J and Part 15, Subpart C (effective 6/23/89) of the Federal Communications Commission's Rules and Regulations.

The equipment under test (EUT) is a low power pulsed RF transmitter. This transmitter operates at a fixed frequency within the band from 49.82 MHz to 49.90 MHz and is powered by one 9.0 Volt battery. It is identified as the Beetle Transmitter (FCC ID: AEK992249). Operation under the transition provisions of Paragraph 15.37 is not requested for this device. The measurements contained in this report demonstrate compliance with the limitations in effect since 6/23/89.

II. INFORMATION REQUIRED FOR CERTIFICATION

Paragraph(s)

- 2.1033(a) This application for certification is filed on FCC Form 731 with all questions answered. An application fee of \$940.00 was paid.
- 2.1033(b)(1) The full name and mailing address of the manufacturer of the device and applicant for certification is:
- Taiyo Kogyo Co., Ltd.
No. 1-23-17, Higashiyotsugi,
Katsushika-ku, Tokyo 124
Japan
- (2) The FCC Identifier of the device is AEK992249.
- (3) A copy of the installation and operating instructions to be furnished to the user is included in the exhibits section of this application.
- (4) The transmitter is a hand-held unit and is powered by one 9.0 Volt transistor battery.

It is designed to operate in the frequency band of 49.82 MHz - 49.90 MHz.

Complete circuit schematics are provided in the exhibits section of this application.

- (5) A block diagram of the device is included in the exhibits section of this application.
- (6) A report of measurements is included in this report.
- (7) Photographs of this device showing the label placement, chassis assembly, and circuit layout are included in the exhibits section of this application. An Actual label photograph is included.
- (8) This equipment is a stand-alone unit. No peripherals or accessories are involved.
- (9) Certification under the transition provisions of Paragraph 15.37 is not being requested for this device.
- (10) N/A.

III. GENERAL TEST CONDITIONS AND PROCEDURES

Measurement procedures were used as outlined in ANSI C63.4-92, as specified in Part 15.31, except as noted herein. The open field tests were performed on a three-meter range maintained by Carl T. Jones Corporation at the Springfield facility. Complete description and measurement data for the site have been placed on file with the Commission. Carl T. Jones Corporation is listed by the FCC as a facility available to do measurement work for others on a contract basis. Prior to open-field testing, the equipment was placed in a shielded enclosure and scanned at a close distance to determine its emission characteristics.

IV. RADIATED EMISSION MEASUREMENTS

The transmitter was assembled on a rotatable wooden test stand approximately 0.8 meters in height. The transmitter's antenna was fully extended. The emission spectrum was examined up to 1000 MHz using

a Hewlett-Packard 8568B spectrum analyzer and Compliance Design "Roberts" tuned dipole antennas.

At each emission frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 100 kHz. The analyzer was operated in the peak detection mode for measurements of emissions less than 1000 MHz. No post-detector video filters were used. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in Table 1. All emissions not reported were more than 20 dB below the specified limit.

The actual field intensity in decibels above one microvolt per meter (dBuV/m) is determined by algebraically adding the measured level in dBuV, the antenna factor (dB), and the cable loss (dB) at the appropriate frequency.

$$F_{la} \text{ (dBuV/m)} = F_{lm} \text{ (dBuV)} + AF \text{ (dB)} + CL \text{ (dB)}$$

F_{la} = Actual Field Intensity

F_{lm} = Measured Field Intensity

AF = Antenna Factor

CL = Cable Loss

As a sample calculation, assume a particular device emits a signal with a frequency of 49.86 MHz. The maximized received signal level measured as 71.4 dB μ V. The total attenuation factor (antenna factor plus cable loss) for 49.86 MHz is 4.8 dB. The actual radiated field is calculated as follows:

$$71.4 \text{ dB}\mu\text{V} + 4.8 \text{ dB} = 76.2 \text{ dBuV/m or } 6,456.5 \mu\text{V/m (peak)}$$

The field strength of the fundamental did not exceed 10,000 uV/m (average) at 3 meters, as specified in Paragraph 15.235.

As per the requirements defined in 15.209(a), the radiated emission limit at the band edges is 40.0 dB μ V/m (100 μ V/m) at 3 meters. As per the attached spectral plot (Figure 1) the highest emission level at the lower band edge approximately 40 dB below the modulated carrier peak level. At the upper band edge the highest emission level is approximately 40 dB below the modulated carrier peak level. **Note: Because the the EUT complies using peak detection (worst case), quasi-peak detection was not used.** Based on the maximized peak radiation measurements of the carrier, these emission levels are:

Lower Band Edge

$$76.2 \text{ dB}\mu\text{V/m} - 38.0 \text{ dB} = 38.2 \text{ dB}\mu\text{V/m (at 3 meters), or } 81.3 \mu\text{V/m}$$

Upper Band Edge

$$76.2 \text{ dB}\mu\text{V/m} - 37.0 \text{ dB} = 39.2 \text{ dB}\mu\text{V/m (at 3 meters), or } 91.2 \mu\text{V/m}$$

All other emissions were found to be in compliance with the restrictions of Paragraph 15.209(a) of the Commission's Rules. Because the emissions were below the limits using peak detection, duty cycle correction factors were not calculated.

V. OCCUPIED BANDWIDTH MEASUREMENTS

In order to demonstrate compliance with the band edge restrictions of Paragraph 15.235(b), the occupied bandwidth of the EUT was measured. Paragraph 15.235(b) specifies that the field strength of any emissions appearing between the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the general limits in Paragraph 15.209, whichever permits the higher emission levels. The field strength of any emissions removed by more than 10 kHz from the band edges shall not exceed the general radiated emission limits in Paragraph 15.209. Two spectral plots are included, one with a resolution bandwidth (RBW) of 1 kHz, and another with a RBW of

3 kHz. These plot demonstrate compliance with the requirements of Paragraph 15.235(b) and 15.209(a).

VI. POWER LINE CONDUCTED EMISSIONS MEASUREMENTS

Measurements of the power line conducted emissions were not performed since the EUT has no means for connection to the public power utility grid.