



April 28 2008

***Artin Industrial Co.,Ltd.
Suites 1509-11, 15/F, Sun Life Tower, The Gateway, 15 Canton Road,
Tsim Sha Tsui, Kowloon, Hong Kong***

Dear Alfred Lee,

Enclosed you will find your file copy of a Part 15 Certification (FCC ID: L9G744501).

For your reference, review normally take 1 week. Approval will then be granted when no query is sorted.

Please contact me if you have any questions regarding the enclosed material.

Sincerely,

A handwritten signature in black ink, appearing to read "Shawn Xing", with a stylized flourish at the end.

***Shawn Xing
Assistant Manager***

Enclosure

FCC ID: L9G744501



Artin Industrial Co., Ltd.

Application
For
Certification
(FCC ID: L9G744501)
Transmitter

Sample Description : Remote Control Transmitter Tx
Model : 744501

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [20-9-2007]

GZ08040763-1
Louisa Lu
April 28, 2008

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
- This report shall not be reproduced except in full without prior authorization from Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
- For Terms And Conditions of the services, it can be provided upon request.
- The evaluation data of the report will be kept for 3 years from the date of issuance.

Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

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FCC ID: L9G744501

INTERTEK TESTING SERVICES

LIST OF EXHIBITS

INTRODUCTION

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MEASUREMENT/TECHNICAL REPORT

Artin Industrial CO., Ltd. - MODEL: 744501
FCC ID: L9G744501

April 28 2008

This report concerns (check one:) Original Grant ☒ Class II Change ☐

Equipment Type: Low Power Transmitter (example: computer, printer, modem, etc.)

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes ☐ No ☒

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes ☐ No ☒

If no, assumed Part 15, Subpart C for intentional radiator – the new 47 CFR [09-20-07 Edition] provision.

Report prepared by:

Shawn Xing
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List of attached file

Exhibit type	File Description	filename
Test Report	Test Report	report.pdf
Operation Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission	radiated photos.pdf
Test Report	Bandwidth Plot	bw.pdf
External Photo	External Photo	external photos.pdf
Internal Photo	Internal Photo	internal photos.pdf
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf
Test Report	Average Factor	af.pdf
Cover Letter	Letter of Agency	agency.pdf

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EXHIBIT 1

GENERAL DESCRIPTION

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1.0 **General Description**

1.1 Product Description

The equipment under test (EUT) is a transmitter for RC car operating at 27.145MHz which is operated by a crystal. The EUT is power by a 9V battery, The EUT has two control buttons on the left and right side of the front surface. The two control buttons are used to control the RC Car moving forward, backward, turning left and right respectively.

The EUT antenna type is telescopic and modulation type is pulse coded modulation.

The brief circuit description is saved with file name: descri.pdf

1.2 Related Submittal(s) Grants

The receiver for this transmitter is exempted from the Part 15 technical rules per 15.101(b).

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1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003). Radiated Emission measurement was performed in a Semi-chamber. Preliminary scans were performed in the Semi-chamber only to determine worst case modes. For each scan, the procedure for maximizing emissions in Appendices D and E were followed. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility

The Semi-chamber facility used to collect the radiated data is **SHENZHEN ACADEMY OF METROLOGY AND QUALITY INSPECTION** and located at Bldg. of Metrology & Quality Inspection, Longzhu Road, Shenzhen, Guangdong, China. This test facility and site measurement data have been fully placed on file with the FCC.

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EXHIBIT 2

SYSTEM TEST CONFIGURATION

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2.0 **System Test Configuration**

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2003).

The EUT was powered by a new 9V battery during test.

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the centre of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emission at and above 30 MHz, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data report in Exhibit 3.0.

The unit was operated standalone and placed in the center of the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on a turn table, and the Antenna of EUT was fully extended, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

For simplicity of testing, the unit was wired to transmit continuously.

2.2 EUT Exercising Software

There was no special software to exercise the device.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

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2.4 Equipment Modification

Any modifications installed previous to testing by Artin Industrial CO., Ltd. will be incorporated in each production model sold/leased in the United States.

No Modifications were installed by Intertek Testing Services.

2.5 Measurement Uncertainty

When determining the test conclusion, the measurement uncertainty of test has been considered.

2.6 Support Equipment List and Description

This product was tested in a standalone configuration.

All the items listed under section 2.0 of this report are

Confirmed by:

*Shawn Xing
Assistant Manager
Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Agent for Artin Industrial Co., Ltd.*



Signature

April 28, 2008

Date

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EXHIBIT 3

EMISSION RESULTS

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3.0 Emission Results

Data is included worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

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3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD + AV$$

where

- FS = Field Strength in dB μ V/m
- RA = Receiver Amplitude (including preamplifier) in dB μ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB
- PD = Pulse Desensitization in dB
- AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

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3.1 Field Strength Calculation (cont'd)

Example

Assume a receiver reading of 62.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 62.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$PD = 0 \text{ dB}$$

$$AV = -10 \text{ dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm} [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

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3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission

108.580 MHz

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos.pdf

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3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 2.6 dB

TEST PERSONNEL:



Signature

Louisa Lu, Engineer

Typed/Printed Name

April 28, 2008

Date

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Applicant: Artin Industrial Co., Ltd.
Model: 744501
Mode: Transmit
Sample: 1/1

Date of Test: April 28 2008

Table 1

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
Vertical	27.145	68.6	0.0	9.2	4.3	73.5	80.0	-6.5
Vertical	27.145	68.6	0.0	9.2	--	77.8	100.0	-22.2
Vertical	54.290	42.6	20.0	8.5	--	31.1	40.0	-8.9
Vertical	108.580	52.1	20.0	8.8	--	40.9	43.5	-2.6
Vertical	162.870	37.2	20.0	9.6	--	26.8	43.5	-16.7
Vertical	190.015	35.2	20.0	10.4	--	25.6	43.5	-17.9

Notes: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3 meter distance were measured at 0.3 meter and an inverse proportional extrapolation was performed to compare the signal level to the 3 meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3 meter.

3. Negative value in the margin column shows emission below limit.

4. Loop antenna is used for the emissions below 30 MHz.

*Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and peak detector data with average factor for frequencies over 1000 MHz.

Test Engineer: Louisa Lu

FCC ID: L9G744501

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EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

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4.0 **Equipment Photographs**

For electronic filing, the photographs are saved with filename:
external photos.pdf and internal photos.pdf

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EXHIBIT 5

PRODUCT LABELLING

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5.0 **Product Labelling**

For electronic filing, the FCC ID label artwork and the label location are saved with filename: label.pdf

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EXHIBIT 6

TECHNICAL SPECIFICATIONS

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6.0 **Technical Specifications**

For electronic filing, the block diagram and schematics are saved with filename:
block.pdf and circuit.pdf

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EXHIBIT 7

INSTRUCTION MANUAL

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7.0 **Instruction Manual**

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf

This manual will be provided to the end-user with each unit sold/leased in the United States.

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EXHIBIT 8

MISCELLANEOUS INFORMATION

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8.0 **Miscellaneous Information**

This miscellaneous information includes details of the measured bandwidth, the test procedure and calculation of factors such as pulse desensitization and averaging factor.

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8.1 Measured Bandwidth

The plot saved in bw.pdf which shows the fundamental emission is confined in the specified band. And it also shows that the emission is at least -34.3 dB below the carrier level at the band edge (26.96 and 27.28 MHz). It meets the requirement of Section 15.227(b) and 15.215 (c).

Bandedge compliance is determined by apply marker-delta method, i.e.
Resultant peak field strength = Fundamental peak emission – delta from the plot
= 77.8 dB μ V/m – 34.3 dB
= 43.5dB μ V/m

The resultant peak field strength meets the general radiated emission limit in Section 15.209, which does not exceed 69.5 dB μ V/m at 3m.

Figure 8.1 Bandwidth

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8.2 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF*.

The effective period (T_{eff}) was approximately 800 μs for a digital "1" bit, as shown in the plots of Exhibit 8.3. With a resolution bandwidth (3 dB) of 100 kHz, the pulse desensitivity factor was 0 dB.

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8.3 Calculation of Average Factor

Averaging factor in dB = $20 \log (\text{duty cycle})$

The specification for output field strengths in accordance with the FCC rules specifies measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation. The duty cycle is measured by placing the spectrum analyzer in zero scan (receiver mode) and linear mode at maximum bandwidth (3 MHz at 3 dB down) and viewing the resulting time domain signal output from the analyzer on a Tektronix oscilloscope. The oscilloscope is used because of its superior time base and triggering facilities.

A plot of the worst-case duty cycle as detected in this manner are saved with filename: af.pdf

The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 29.4ms
Effective period of the cycle = $4 \times 2.50\text{ms} + 10 \times 800\mu\text{s}$
= 18ms

DC = $18\text{ms} / 29.4\text{ms} = 0.61224$ or 61.224%

Therefore, the averaging factor is found by $20 \log_{10} 0.61224 = -4.3 \text{ dB}$

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8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 2003.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Exhibit 8.3.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 150 kHz to 30 MHz.

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8.4 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

Conducted measurements are made as described in ANSI C63.4 - 2003.