

**Date: 1998-09-30**  
**No.: HM1073/504**

## **TEST REPORT**

**Page 1 of 8**

**APPLICANT:** (CODE : 006889)

ARTLIGHT ELECTRICAL MANUFACTURING CO. LTD.  
Unit 301, Eastern Centre, 1065 Kings Road, Hong Kong.

**DATE OF SAMPLES RECEIVED:** 1998-08-04

**DATE OF TESTING:** 1998-09-23

**DESCRIPTION OF SAMPLE(S):**

A sample of product said to be:

Product: Walkie Talkies  
Manufacturer: Artlight Electrical Manufacturing Co., Ltd.  
Model Number: AL-216(220)  
Brand Name: N/A  
Rating: 9.0Vd.c. ( "6F22" size battery x 1)  
Origin: China

**INVESTIGATIONS REQUESTED:**

Measurement to the relevant clauses of F.C.C. Rules and Regulations Part 15 Subpart B - Unintentional Radiator and Subpart C - Intentional Radiator.

**RESULT/ REMARK:** Please see attached sheet(s).

**CONCLUSION:**

From the measurement data obtained, the tested sample was considered to have COMPLIED after modification with the clause 15.109(a) and ANSI C63.4-1992 Section 12.1.1.1-2. for Receiver Section and with the clause 15.235 for Transmitter Section of Federal Communications Commission Rules and Regulations Part 15.

**TEST EQUIPMENT AUDIT:** Please see Appendix A

**MODIFICATION :**

Add inductor (5 $\mu$ H) between Ant. and L1.  
Add cap. (8P) between R3 and ground.

LAW MAN KIT  
Testing Engineer

KITTY CHOY  
Verify by

PATRICK WO NG  
Patrick Wong  
for Managing Director

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Date: 1998-09-30  
No.: HM1073/504

## TEST REPORT

Page 2 of 8

### TEST SUMMARY

#### \*\*\*UNINTENTIONAL RADIATOR\*\*\*

- |     |                                                |                |
|-----|------------------------------------------------|----------------|
| (A) | <u>Measurement of Radiated Emissions</u> ..... | Satisfactory   |
| (B) | <u>Line Conducted Voltage Test</u> .....       | Not applicable |

#### \*\*\* INTENTIONAL RADIATOR \*\*\*

- |     |                                                                            |                |
|-----|----------------------------------------------------------------------------|----------------|
| (1) | <u>Measurement of Emission of RF energy on the carrier frequency</u> ..... | Satisfactory   |
|     | <u>Measurement of the out-of band emissions including harmonics</u> .....  | Satisfactory   |
| (2) | <u>Measurement of Emission Within Band Edges</u> .....                     | Satisfactory   |
| (3) | <u>Measurement of Line-Conducted Voltage onto AC Power Line</u> .....      | Not applicable |

### TEST DATA

Please refer to the attached result sheets.

Date: 1998-09-30  
No.: HM1073/504

## TEST REPORT

Page 3 of 8

\*\*\*UNINTENTIONAL RADIATOR\*\*\*

\*\* RECEIVER SECTION \*\*

### (A) Measurement of Radiated Interference

=====

TEST REFERENCE: FCC Rules Part 15 Subpart B section 15.109(a)

TEST CONDITION : Normal

TEST DATE : 1998-09-23

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| Freq. to which<br>tuned | Freq of the<br>emission | Polarization<br>H-V | Meter<br>reading (at 3m) |   | Antenna<br>factor | Field Strength<br>(at 3m) |      | FCC limit<br>@ |
|-------------------------|-------------------------|---------------------|--------------------------|---|-------------------|---------------------------|------|----------------|
| MHz                     | MHz                     |                     | dB(μV)                   |   |                   | dB(μV/m)                  | μV/m | μV/m           |
| 49.860                  | 49.9                    | V                   | 20.6                     | + | 15.0              | 35.6                      | 60.3 | 100            |
|                         | 99.7                    | <                   | 1.0                      | + | 12.2              | <                         | 13.2 | < 5            |
|                         | 149.6                   | <                   | 1.0                      | + | 9.8               | <                         | 10.8 | < 3            |
|                         | 199.4                   | <                   | 1.0                      | + | 11.5              | <                         | 12.5 | < 4            |
|                         | 249.3                   | <                   | 1.0                      | + | 15.9              | <                         | 16.9 | < 7            |
|                         | 299.1                   | <                   | 1.0                      | + | 17.0              | <                         | 18.0 | < 8            |
|                         | 349.0                   | <                   | 1.0                      | + | 17.2              | <                         | 18.2 | < 8            |
|                         | 398.8                   | <                   | 1.0                      | + | 18.8              | <                         | 19.8 | <10            |
|                         | 448.7                   | <                   | 1.0                      | + | 19.7              | <                         | 20.7 | <11            |
|                         | 498.6                   | <                   | 1.0                      | + | 20.6              | <                         | 21.6 | <12            |
|                         | 548.4                   | <                   | 1.0                      | + | 22.2              | <                         | 23.2 | <14            |
|                         | 598.3                   | <                   | 1.0                      | + | 23.4              | <                         | 24.4 | <17            |
|                         | 648.1                   | <                   | 1.0                      | + | 23.5              | <                         | 24.5 | <17            |
|                         | 698.0                   | <                   | 1.0                      | + | 25.0              | <                         | 26.0 | <20            |
|                         | 747.8                   | <                   | 1.0                      | + | 26.2              | <                         | 27.2 | <25            |
|                         | 797.7                   | <                   | 1.0                      | + | 27.2              | <                         | 28.2 | <25            |
|                         | 847.5                   | <                   | 1.0                      | + | 27.2              | <                         | 28.2 | <25            |
|                         | 897.5                   | <                   | 1.0                      | + | 27.2              | <                         | 28.2 | <25            |
|                         | 947.2                   | <                   | 1.0                      | + | 27.8              | <                         | 28.8 | <27            |
|                         | 997.1                   | <                   | 1.0                      | + | 28.5              | <                         | 29.5 | <27            |

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#### =====SUMMARY=====

All data is within limits

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Broad-band Antennas were used and both polarizations of emissions were measured

Polarizations at highest reading indicated as:

H -- Horizontal                      V -- Vertical

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**NOTES FOR THE RADIATION MEASUREMENT**

(1) Test site facility:

Open field test site located at Taipo (Hong Kong) with a metal ground plane on filed with the FCC pursuant to section 2.948 of the FCC Rules.

(2) Distance between the ET and measuring antenna:

3 meters.

(3) Measuring instrumentation's:

CISPR Quasi-peak type field strength meter (25 MHz - 1000 MHz.). 6 dB bandwidth set at 120 KHz. Also, peak level of the fundamental emissions was measured in order to determine compliance with the 20dB peak to average limit specified in Section 15.35(b) of the FCC new Rules.

(4) Measuring antenna:

Broad band antenna for the frequency range 25-1000 MHz, connected with 10 meters coaxial cable. Cable loss of the coaxial cable. included in the Antenna Factor for measurement data. The antenna are capable of measuring both horizontal and vertical polarizations.

(5) Frequency range scanned:

The frequency range from 25 MHz to 1000 MHz had been searched. Readings of the highest emissions relating to the limit were reported as above.

(6) Arrangement of EUT:

During the test, the sample was operated at rated supply voltage and arranged for maximum emissions.

(7) Measuring Procedure:

In accordance with the relevant clauses of the FCC Rules Part 15 section 15.109(a) and ANSI C63.4:1992 section 12.1.1.1-2.

(8) Measuring Uncertainty:

The calculated uncertainty for measurement performed at 3M test distance are:-  
30MHz to 200MHz =  $\pm 3.7\text{dB}$ , 200MHz to 1000MHz =  $+ 3.0\text{dB}/-2.7\text{dB}$ .

Remark: Purpose of this test is to provide the Applicant with the necessary test data of their device for the submission to FCC with application for Equipment Authorization under FCC's Equipment Authorization Program. This test itself is not an Approval Test.

Date: 1998-09-30  
No.: HM1073/504

## TEST REPORT

Page 5 of 8

\*\*\* INTENTIONAL RADIATOR \*\*\*

### (1) Measurement of Radiated Interference

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TEST REFERENCE: FCC Rules Part 15 Subpart Section 15.235(49.82-49.90 MHz)  
TEST CONDITION : Normal  
TEST DATE : 1998-09-23

#### Emission of RF energy on the carrier frequency -- 49.860 MHz (PEAK VALUE)

=====

| Emission<br>Frequency | Meter<br>Reading | Polarization | Antenna<br>Factor | Field Strength<br>(at 3m) | FCC Limit |
|-----------------------|------------------|--------------|-------------------|---------------------------|-----------|
| MHz                   | dB(μV)           | H-V          | dB                | dB(μV/m)   μV/m           | μV/m      |
| 49.90                 | 53.5             | V            | +                 | 15.0   68.5   2660.7      | 10000     |

#### Emission of RF energy on the carrier frequency -- 49.860 MHz (AVERAGE VALUE)

=====

| Emission<br>Frequency | Meter<br>Reading | Polarization | Antenna<br>Factor | Field Strength<br>(at 3m) | FCC Limit |
|-----------------------|------------------|--------------|-------------------|---------------------------|-----------|
| MHz                   | dB(μV)           | H-V          | dB                | dB(μV/m)   μV/m           | μV/m      |
| 49.90                 | 52.1             | V            | +                 | 15.0   67.1   2264.6      | 100000    |

... to be continued

Date: 1998-09-30  
No.: HM1073/504

## TEST REPORT

Page 6 of 8

\*\*\* INTENTIONAL RADIATOR \*\*\*

### (1) Measurement of Radiated Interference . . Continued ..

TEST REFERENCE: FCC Rules Part 15 Section 15.235(49.82-49.90 MHz)

TEST CONDITION : Normal

TEST DATE : 1998-09-23

### The out-of-band emissions, including harmonics (25-1000 MHz) (CISPR VALUE)

| Emission<br>Frequency<br>MHz | Meter<br>Reading<br>dB(μV) | Polarization<br>H-V | dB | Antenna<br>Factor<br>dB(μV/m) | Field Strength<br>(at 3m)<br>μV/m |        | FCC Limit |
|------------------------------|----------------------------|---------------------|----|-------------------------------|-----------------------------------|--------|-----------|
| 99.7                         | 21.2                       | V                   | +  | 12.2                          | 33.4                              | 46.8   | 150       |
| 149.6                        | 22.4                       | H                   | +  | 9.8                           | 32.2                              | 40.7   | 150       |
| 199.4                        | 20.7                       | H                   | +  | 11.5                          | 32.2                              | 40.7   | 150       |
| 249.3                        | 21.4                       | H                   | +  | 15.9                          | 37.3                              | 73.3   | 200       |
| 299.1                        | 23.5                       | H                   | +  | 17.0                          | 40.5                              | 105.9  | 200       |
| 348.8                        | 24.0                       | H                   | +  | 17.2                          | 41.2                              | 114.8  | 200       |
| 398.6                        | 13.9                       | V                   | +  | 18.8                          | 32.7                              | 43.2   | 200       |
| 448.5                        | 19.7                       | V                   | +  | 19.7                          | 39.4                              | 93.3   | 200       |
| 498.3                        | 20.6                       | V                   | +  | 20.6                          | 41.2                              | 114.8  | 200       |
| 543.1                        | 8.0                        | V                   | +  | 22.2                          | 30.2                              | 32.4   | 200       |
| 598.1                        | < 1.0                      |                     | +  | 23.4                          | < 24.4                            | < 16.6 | 200       |
| 647.8                        | < 1.0                      |                     | +  | 23.5                          | < 24.5                            | < 16.8 | 200       |
| 697.4                        | < 1.0                      |                     | +  | 25.0                          | < 26.0                            | < 20.0 | 200       |
| 747.8                        | < 1.0                      |                     | +  | 26.2                          | < 27.2                            | < 22.9 | 200       |
| 797.7                        | < 1.0                      |                     | +  | 27.2                          | < 28.2                            | < 25.7 | 200       |
| 847.5                        | < 1.0                      |                     | +  | 27.2                          | < 28.2                            | < 25.7 | 200       |
| 897.4                        | < 1.0                      |                     | +  | 27.2                          | < 28.2                            | < 25.7 | 200       |
| 947.2                        | < 1.0                      |                     | +  | 27.8                          | < 28.8                            | < 27.5 | 200       |
| 997.1                        | < 1.0                      |                     | +  | 28.5                          | < 29.5                            | < 29.9 | 500       |

### =====SUMMARY=====

data is within limits

Broad-band Antennas were used and both polarizations of emissions were measured.  
polarizations at highest reading indicated as:

H -- Horizontal                      V -- Vertical

Date: 1998-09-30  
No.: HM1073/504

## TEST REPORT

Page 7 of 8

\*\*\* INTENTIONAL RADIATOR \*\*\*

### (2) Measurement of Emissions Within Band Edges.

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TEST REFERENCE: FCC Rules Part 15 section 15.235(49.82-49.90 MHz)  
TEST CONDITION: Normal  
TEST DATE : 1998-09-23

### RESULTS AND NOTES

L: FCC Lower Band Edge.....-> 49.860MHz  
H: FCC Higher Band Edge.....-> 49.900MHz  
C: Unmodulated carrier at frequency.....-> 49.857MHz  
D: No. of dB from unmodulated carrier.....-> 53.50dB

### SPECTRUM ANALYZER SETTINGS

Resolution bandwidth : 1.0KHz  
Frequency span : 10.0KHz/div  
No. of dB/div : 10.0dB/div

### FCC Limit

Minimum No. of dB from unmodulated carrier required : 26.0dB

=====SUMMARY=====

All data is within limits

=====

**NOTES FOR THE RADIATION MEASUREMENT**

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(2) Distance between the EUT and measuring antenna:

3 meters.

(3) Measuring instrumentations:

CISPR Quasi-peak type field strength meter (25 MHz - 1000 MHz). 6 dB bandwidth set at 120KHz. Also, peak level of the fundamental emissions was measured in order to determine compliance with the 20dB peak to average limit specified in Section 15.35(b) of the FCC new Rules.

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(5) Frequency range scanned:

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(6) Arrangement of EUT:

During the test, the sample was operated at rated supply voltage and arranged for maximum emissions.

(7) Measuring Procedure:

In accordance with the relevant clauses of the FCC Rules Part 15 section 15.235.

(8) Measuring Uncertainty:

The calculated uncertainty for measurement performed at 3M test distance are:-  
30MHz to 200MHz =  $\pm 3.7\text{dB}$ , 200MHz to 1000MHz =  $+ 3.0\text{dB}/-2.7\text{dB}$ .

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\*\*\*\*\*End of Document\*\*\*\*\*