



# The Hong Kong Standards and Testing Centre Ltd.

Date: 1998-08-03  
No.: HM1167/504

## TEST REPORT

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**APPLICANT:** (CODE : 001484)

Wavecon Electronics Ltd.

Block B, 4/F, Wo Fung Industry Building, 20 Yip Wo Street, On Lok Tsuen, Fanling, N.T., Hong Kong.

**DATE OF SAMPLES RECEIVED:** 1998.07.09

**DATE OF TESTING:** 1998.07.28

### **DESCRIPTION OF SAMPLE(S):**

A sample of product said to be:

Product: 49.86MHz Transmitter

Manufacturer: Wavecon Electronics Ltd.

Model Number: 19822

Brand Name: WAVECON

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 C - Intentional Radiator.

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

### **CONCLUSION:**

From the measurement data obtained, the tested sample was considered to have COMPLIED with the clause 15.235 of Federal Communications Commission Rules and Regulations Part 15.

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

Testing Engineer

Verify by

Patrick Wong  
for Managing Director

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### TEST SUMMARY

\*\*\* 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.



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

### (1) Measurement of Radiated Interference

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

TEST CONDITION : Normal

TEST DATE : 1998.07.14

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

| Emission Frequency | Meter Reading | Polarization | Antenna Factor | Field Strength (at 3m) |           | FCC Limit |
|--------------------|---------------|--------------|----------------|------------------------|-----------|-----------|
| MHz                | dB( $\mu$ V)  | H-V          | dB             | dB( $\mu$ V/m)         | $\mu$ V/m | $\mu$ V/m |
| 49.90              | 60.7          | V +          | 15.0           | 75.7                   | 6095.4    | 100000    |

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

| Emission Frequency | Meter Reading | Polarization | Antenna Factor | Field Strength (at 3m) |           | FCC Limit |
|--------------------|---------------|--------------|----------------|------------------------|-----------|-----------|
| MHz                | dB( $\mu$ V)  | H-V          | dB             | dB( $\mu$ V/m)         | $\mu$ V/m | $\mu$ V/m |
| 49.90              | 56.2          | V +          | 15.0           | 71.2                   | 3630.8    | 10000     |

... to be continued



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\*\*\* 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 : 1998.07.14

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

| Emission<br>Frequency | Meter<br>Reading | Polarization | Antenna<br>Factor | Field Strength<br>(at 3m) |           | FCC Limit |
|-----------------------|------------------|--------------|-------------------|---------------------------|-----------|-----------|
| MHz                   | dB( $\mu$ V)     | H-V          | dB                | dB( $\mu$ V/m)            | $\mu$ V/m | $\mu$ V/m |
| 99.7                  | 5.4              | V +          | 12.2              | 17.6                      | 7.6       | 150       |
| 149.6                 | 4.2              | V +          | 9.8               | 14.0                      | 5.0       | 150       |
| 199.4                 | < 1.0            | +            | 11.5              | < 12.5                    | < 4.2     | 150       |
| 249.3                 | < 1.0            | +            | 15.9              | < 16.9                    | < 7.0     | 200       |
| 299.1                 | < 1.0            | +            | 17.0              | < 18.0                    | < 7.9     | 200       |
| 348.8                 | < 1.0            | +            | 17.2              | < 18.2                    | < 8.1     | 200       |
| 398.6                 | < 1.0            | +            | 18.8              | < 19.8                    | < 9.8     | 200       |
| 448.5                 | < 1.0            | +            | 19.7              | < 20.7                    | < 10.8    | 200       |
| 498.3                 | < 1.0            | +            | 20.6              | < 21.6                    | < 12.0    | 200       |
| 543.1                 | < 1.0            | +            | 22.2              | < 23.2                    | < 14.5    | 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



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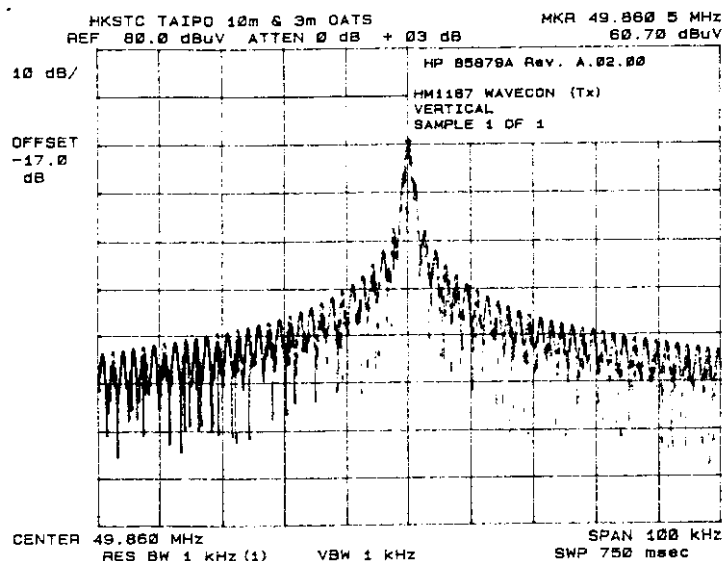
\*\*\* INTENTIONAL RADIATOR \*\*\*

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

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

TEST CONDITION: Normal

TEST DATE : 1998.07.14



### RESULTS AND NOTES

L: FCC Lower Band Edge.....-> 49.820MHz  
H: FCC Higher Band Edge.....-> 49.900MHz  
C: Unmodulated carrier at frequency.....-> 49.860MHz  
D: No. of dB from unmodulated carrier.....-> 60.70dB

### 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



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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 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.

(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 15.235.

(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 =  $+ 3.0\text{dB}/-2.7\text{dB}$ .

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.

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



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## APPENDIX A

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### TEST EQUIPMENT AUDIT

#### Radiated Emission

| EQP NO. | DESCRIPTION                                                                  | MANUFACTURER   | MODEL NO.                      | SERIAL NO.                             | LAST CAL |
|---------|------------------------------------------------------------------------------|----------------|--------------------------------|----------------------------------------|----------|
| EM007   | SPECTRUM ANALYZER                                                            | HP             | HP85660B                       | 3144A21192                             | 29/05/98 |
| EM008   | SPECTRUM ANALYZER DISPLAY                                                    | HP             | HP85662A                       | 3144A20514                             | 29/05/98 |
| EM009   | QUASI PEAK ADAPTOR                                                           | HP             | HP85650A                       | 3303A01702                             | 29/05/98 |
| EM010   | RF PRESELECTOR                                                               | HP             | HP85683A                       | 3221A01410                             | 29/05/98 |
| EM011   | ATTENUATOR/SWITCH                                                            | HP             | HP11713A                       | 2508A10595                             | 29/05/98 |
| EM012   | PRE-AMPLIFIER                                                                | HP             | HP8449B                        | 3008A00262                             | 29/05/98 |
| EM013   | CONTROLLER (COMPUTER),<br>COLOR MONITOR, KEYBOARD &<br>MOUSE<br>FLOPPY DRIVE | HP<br>HP<br>HP | HP9000<br>HP A1097C<br>HP9133L | 6226A60314<br>3151J39517<br>2623A02468 | CM       |
| EM017   | ANTENNA                                                                      | ARA INC.       | LPB-2513/A                     | 1069                                   | 31/12/97 |
| EM072   | SIGNAL GENERATOR                                                             | HP             | 8640B                          | 1948A11892                             | 30/03/98 |
| EM083   | HKSTC OPEN AREA TEST SITE                                                    | HKSTC          | N/A                            | N/A                                    | 16/02/98 |

#### ABBREVIATIONS:

CM = Corrective Maintenance

N/A = Not Applicable