

TABLE OF CONTENTS LIST

APPLICANT: KA WAH MANUFACTORY LTD.

FCC ID: F5J31449

TEST REPORT CONTAINING:

PAGE 1.....TEST EQUIPMENT LIST AND TEST PROCEDURE
PAGE 2.....TEST PROCEDURE CONTD. & CIRCUIT DESCRIPTION
PAGE 3.....RADIATION INTERFERENCE TEST DATA
PAGE 4.....OCCUPIED BANDWIDTH TEST DATA

EXHIBITS CONTAINING:

EXHIBIT 1.....BLOCK DIAGRAM
EXHIBIT 2.....SCHEMATIC
EXHIBIT 3A-3E.....INSTRUCTION MANUAL
EXHIBIT 4.....SAMPLE OF FCC ID LABEL
EXHIBIT 5.....LOCATION OF FCC ID LABEL
EXHIBIT 6A.....EXTERNAL PHOTO - FRONT SIDE
EXHIBIT 6B.....EXTERNAL PHOTO - BACK SIDE
EXHIBIT 6C.....INTERNAL PHOTO - COMPONENT SIDE
EXHIBIT 6D.....INTERNAL PHOTO - COPPER SIDE
EXHIBIT 7.....OCCUPIED BANDWIDTH PLOT - CW

APPLICANT: KA WAH MANUFACTORY LTD.

FCC ID: F5J31449

REPORT #: T:\CUS\K\KA WAH\KAW200H0\200H0.RPT

PAGE: TABLE OF CONTENTS LIST

APPLICANT: KA WAH MANUFACTORY LTD.
FCC ID: F5J31449

TEST EQUIPMENT LIST

1. X Spectrum Analyzer: HP 8566B-Opt 462, S/N 3138A07786, w/
preselector HP 85685A, S/N 3221A01400, Quasi-Peak Adapter
HP 85650A, S/N 3303A01690 & Preamplifier HP 8449B-OPT H02,
S/N 3008A00372 Cal. 10/17/99
2. X Biconnical Antenna: Eaton Model 94455-1, S/N 1057
3. X Log-Periodic Antenna: Electro-Metrics Model EM-6950, S/N 632
4. Double-Ridged Horn Antenna: Electro-Metrics Model RGA-180,
1-18 GHz, S/N 2319 Cal. 4/27/99
5. Horn 40-60GHz: ATM Part #19-443-6R
6. Line Impedance Stabilization Network: Electro-Metrics Model
ANS-25/2, S/N 2604 Cal. 2/9/00
7. Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
8. Frequency Counter: HP Model 5385A, S/N 3242A07460 Cal 10/6/99
9. Peak Power Meter: HP Model 8900C, S/N 2131A00545 Cal 7/19/99
10. X Open Area Test Site #1-3meters Cal. 12/22/99
11. Signal Generator: HP 8640B, S/N 2308A21464 Cal. 9/23/99
12. Signal Generator: HP 8614A, S/N 2015A07428 Cal. 5/29/99
13. Passive Loop Antenna: EMC0 Model 6512, 9KHz to 30MHz, S/N
9706-1211 Cal. 6/23/97
14. Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 153
Cal. 11/24/99
15. AC Voltmeter: HP Model 400FL, S/N 2213A14499 Cal. 9/21/99
16. Digital Multimeter: Fluke Model 8012A, S/N 4810047 Cal 9/21/99
17. Digital Multimeter: Fluke Model 77, S/N 43850817 Cal 9/21/99
18. Oscilloscope: Tektronix Model 2230, S/N 300572 Cal 9/23/99
9706-1211 Cal. 6/23/97

TEST PROCEDURE

GENERAL: This report shall NOT be reproduced except in full without
the written approval of TIMCO ENGINEERING, INC.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD
C63.4-1992 using a HEWLETT PACKARD spectrum analyzer with a prese-
lector. The bandwidth of the spectrum analyzer was 100 kHz with an
appropriate sweep speed. The analyzer was calibrated in dB above a
microvolt at the output of the antenna. The resolution bandwidth was
100KHz and the video bandwidth was 300KHz. The ambient temperature of
the UUT was 80oC with a humidity of 76%.

APPLICANT: KA WAH MANUFACTORY LTD.
FCC ID: F5J31449
REPORT #: T:\CUS\K\KAHAH\KAW200H0\200H0.RPT
PAGE: 1

APPLICANT: KA WAH MANUFACTORY LTD.
FCC ID: F5J31449

TEST PROCEDURES CONTINUED

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

| | |
|------------|--|
| Freq (MHz) | METER READING + ACF = FS |
| 33 | 20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m |

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-1992 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The ambient temperature of the UUT was 80oC with a humidity of 76%.

ANSI STANDARD C63.4-1992 10.1.7 MEASUREMENT PROCEDURES: The unit under test was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

The situation was similar for the conducted measurement except that the table did not rotate. The EUT was setup as described in ANSIC63.4-1992 with the EUT 40 cm from the vertical ground wall.

CIRCUIT DESCRIPTION:

Energy is supplied by a 9Volt battery. This is reduced in voltage/regulated down by zener diode DZ1 to 5.1Volts to power the integrated circuit U1 and the crystal oscillator. Q3 is the modulator which is in series with the RF final Q2.

ANTENNA AND GROUND CIRCUITRY

The antenna is a spring wound wire which acts as an electrically short monopole. It is inductively coupled to the RF output through L3 and T1. L2 with C7 and C8 form a pi filter section to help reduce harmonics and aid in matching to the antenna.

No ground connection is provided. The unit relies on the ground track of the printed circuit board.

APPLICANT: KA WAH MANUFACTORY LTD.

FCC ID: F5J31449

NAME OF TEST: RADIATION INTERFERENCE

RULES PART NO.: 15.235

REQUIREMENTS: CARRIER FREQUENCY WILL NOT EXCEED 80 dBuV/m AT 3M.
OUT-OF-BAND EMISSIONS SHALL NOT EXCEED:

| | |
|---------------|----------------------------------|
| 30 - 88 MHz | 40.0 dBuV/M MEASURED AT 3 METERS |
| 88 - 216 MHz | 43.5 dBuV/M |
| 216 - 960 MHz | 46.0 dBuV/M |
| ABOVE 960 MHz | 54.0 dBuV/M |

TEST DATA:

| EMISSION FREQUENCY MHz | METER READING AT 3 METERS dBuV | COAX LOSS dB | ANTENNA CORRECTION FACTOR dB | PEAK FIELD STRENGTH dBuV/m@3m | MARGIN dB | ANT. POL. |
|------------------------------|--------------------------------------|--------------------|------------------------------------|--|--------------|--------------|
| 49.86 | 56.30 | 0.25 | 10.99 | 67.54 | 12.46 | V |
| 99.70 | 11.90 | 0.80 | 8.39 | 21.09 | 22.41 | V |
| 249.30 | 19.80 | 1.20 | 13.35 | 34.35 | 11.65 | V |
| 299.20 | 26.60 | 1.40 | 15.65 | 43.65 | 2.35 | V |
| 349.00 | 27.40 | 1.40 | 15.52 | 44.32 | 1.68 | V |
| 398.90 | 26.20 | 1.40 | 16.97 | 44.57 | 1.43 | V |
| 448.70 | 18.30 | 1.60 | 18.12 | 38.02 | 7.98 | V |
| 498.60 | 7.50 | 1.60 | 19.27 | 28.37 | 17.63 | V |

SAMPLE CALCULATION: $FSdBuV/m = MR(dBuV) + ACFdB$.

TEST PROCEDURE: The procedure used was ANSI STANDARD C63.4-1992. The spectrum was scanned from 30 MHz to 1000 MHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The UUT was tested in 3 orthogonal planes.

TEST RESULTS: THE UNIT DOES MEET THE FCC REQUIREMENTS.

PERFORMED BY: _____

DATE: JUNE 9, 2000

APPLICANT: KA WAH MANUFACTORY LTD.

FCC ID: F5J31449

REPORT #: T:\CUS\K\KAWAH\KAW200H0\200H0.RPT

PAGE #: 3

APPLICANT: KA WAH MANUFACTORY LTD.
FCC ID: F5J31449
NAME OF TEST: Occupied Bandwidth
RULES PART NO.: 15.235
REQUIREMENTS: 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 of 15.209, whichever permits the higher emission levels.

THE GRAPHS IN EXHIBIT 7 REPRESENT THE EMISSIONS TAKEN FOR THE DEVICE.

METHOD OF MEASUREMENT: A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was taken. The vertical scale is set to -10 dBm per division. The horizontal scale is set to 5 kHz per division.

TEST RESULTS: The unit DOES meet the FCC requirements.

PERFORMED BY: _____ DATE: JUNE 9, 2000

APPLICANT: KA WAH MANUFACTORY LTD.
FCC ID: F5J31449
REPORT #: T:\CUS\K\KA WAH\KAW200H0\200H0.RPT
PAGE #: 4