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FCC ID: KR5MIS

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TEST EQUIPMENT LIST

1. Spectrum Analyzer: Hewlett Packard 8566B - Opt 462, w/ preselector 85685A, & Quasi-Peak Adapter HP 85650A, & HP 8449B - OPT H02 Cal. 7/6/99
2. Signal Generator, Hewlett Packard 8640B, cal. 9/23/99
3. Signal Generator, HP 8614A Serial No. 2015A07428 cal. 5/27/99
3. Eaton Biconnical Antenna Model 94455-1
20-200 MHz Serial No. 0997 Cal. 10/30/98
4. Electro-Metric Dipole Kit, 20-1000 MHz, Model TDA-30 10/31/98
5. Electro-Metric Horn 1-18 GHz, Model RGA-180, Cal. 4/27/99
6. Electro-Metric Antennas Model TDA-30/1-4, Cal. 10/15/98
7. Electro-Metric Line Impedance Stabilization Network Model No. EM-7821, Serial No. 101; 100KHz-30MHz 50uH. Cal. 11/19/98
8. Electro-Metric Line Impedance Stabilization Network Model No. EM-7820, Serial No. 2682; 10KHz-30MHz 50uH. Cal. 11/19/98
9. Special low loss cable was used above 1 GHz
10. Tenney Temperature Chamber
11. AC Voltmeter, HP 400FL, Serial No 2213A14499. Cal. 9/21/99
12. Digital Multimeter, Fluke 8010A/12A, Serial No. 4810047.
Cal 9/21/99
13. Digital Multimeter, Fluke 77, Serial No. 43850817. Cal 9/21/99
14. Oscilloscope, Tektronix 2230, Serial No. 300572. Cal 9/23/99
15. Frequency Counter, HP 5385A, Serial No. 3242A07460. Cal 10/6/99
16. EMC0 Passive Loop Model No. 6512 10kHz-30MHz

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 preselector. 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 with a humidity of .

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

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TEST PROCEDURES CONTINUED

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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 with a humidity of .

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:

In the transmit mode the UUT transmits on 13.56MHz. This device is a bar code reader that transmits the data that is read by the optical scanner.

ANTENNA_AND_GROUND_CIRCUITRY

This unit makes use of a short, antenna. The antenna is inductively coupled. The antenna is self contained, no provision is made for an external antenna. This unit is powered from a 2.4V battery.

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

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NAME OF TEST: RADIATION INTERFERENCE

RULES PART NO.: 15.225

REQUIREMENTS: CARRIER FREQUENCY WILL NOT EXCEED 80 dBuV/m
AT 30M.

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.
13.56	30.10	1.00	35.50	66.60	13.04	V
27.12	5.80	0.2	11.76	17.76	22.24	V
40.68	3.6	0.30	10.65	14.50	25.50	V

SAMPLE CALCULATION:

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

The TEST PROCEDURE: The procedure used was ANSI STANDARD C63.4-1992.
was spectrum was scanned from 13 MHz to 1000 MHz. When an emission
was found, the table was rotated to produce the maximum signal
strength.
and The antenna was placed in both the horizontal and vertical planes
orthogonal the worse case emissions were reported. The UUT was tested in 3
gonal planes.

TEST RESULTS: THE UNIT DOES MEET THE FCC REQUIREMENTS.

PERFORMED BY: S. S. SANDERS

DATE: October 22, 1999

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NAME OF TEST: Occupied Bandwidth

RULES PART NO.: 15.225

REQUIREMENTS: The field strength of any emissions appearing outside the 13.553-13.567 MHz band shall not exceed 100 uV/m (15.209).

THE GRAPHS IN EXHIBIT 7 AND 8 REPRESENT THE WORSE CASE OCCUPIED BANDWIDTH EMISSIONS FOR THIS 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: S. S. SANDERS

October 22, 1999

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NAME OF TEST: Frequency Tolerance of Carrier

RULES PART#: 15.225

MINIMUM

STANDARD: .01% or 100 PPM for a temperature variation of
-20c to +50c at the standard voltage of 9V dc,
and a voltage variation of 85% to 115% at the
standard ambient temperature of 20c.

MEASUREMENT

DATA:

TEMPERATURE c	FREQUENCY MHz	PPM
REFERENCE	13.561 750	00.00
-20	13.561 708	-3.09
-10	13.561 718	-2.35
0	13.561 708	-3.09
+10	13.561 679	-5.24
+20	13.561 631	-8.77
+30	13.561 610	-10.32
+40	13.561 542	-15.33
+50	13.561 512	-17.55

RESULTS OF

MEASUREMENTS: The maximum frequency variation over the
temperature range was -2.35 to -17.55 ppm.

TEST PROCEDURE: The procedure used followed the requirements
outlined in FCC Vol. II, Part 2, par.2.995
(B) & (D).

PERFORMED BY: _____ DATE: _____

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