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FCC ID: HH8TRC1600TX

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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. 8/31/01 Due 8/31/02
2. X Biconnical Antenna: Eaton Model 94455-1, S/N 1057,
Cal. 10/1/01 Due 10/1/02
3. Biconnical Antenna: Electro-Metrics Model BIA-25, S/N 1171
Cal. 4/26/01 Due 4/26/03
4. X Log-Periodic Antenna: Electro-Metrics Model EM-6950, S/N 632
Char. 10/15/01 Due 10/15/02
5. Log-Periodic Antenna: Electro-Metrics Model LPA-30, S/N 409
Char. 10/16/01 Due 10/16/02
6. Log-Periodic Antenna: Electro-Metrics Model LPA-25, S/N 1122
Char. 2/10/01 Due 3/10/02
7. X Double-Ridged Horn Antenna: Electro-Metrics Model RGA-180,
1-18 GHz, S/N 2319 Cal. 12/19/01 Due 12/19/02
8. 18-26.3GHz Systron Donner Standard Gain Horn #DBE-520-20
No Cal Required
9. Horn 40-60GHz: ATM Part #19-443-6R No Cal Required
10. Line Impedance Stabilization Network: Electro-Metrics Model
EM-7820, w/NEMA Adapter S/N 2682 Cal. 3/16/01 Due 3/16/02
11. Temperature Chamber: Tenney Engineering Model TTRC, S/N 11717-7
Char. 1/22/02 Due 1/22/03
12. Frequency Counter: HP Model 5385A, S/N 3242A07460
Char. 12/11/01 Due 12/11/02
13. Peak Power Meter: HP Model 8900C, S/N 2131A00545
Char. 1/26/01 Due 1/26/02
14. X Open Area Test Site #1-3meters Cal. 12/22/99
15. Signal Generator: HP 8640B, S/N 2308A21464
Cal. 11/15/01 Due 11/15/02
16. Passive Loop Antenna: EMC Model 6512, 9KHz to 30MHz, S/N
9706-1211 Char. 7/10/01 Due 7/10/02
17. Dipole Antenna Kit: Electro-Metrics Model TDA-30/1-4, S/N 152
Cal. 3/21/01 Due 3/21/02
18. AC Voltmeter: HP Model 400FL, S/N 2213A14499
Cal. 10/9/01 Due 10/09/02
19. X Digital Multimeter: Fluke Model 77, S/N 35053830
Char. 1/8/02 Due 1/8/03
20. Oscilloscope: Tektronix Model 2230, S/N 300572
Char. 2/1/01 Due 2/1/02

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 100 kHz and the video bandwidth was 300 kHz. The ambient temperature of the UUT was 98.3°F with a humidity of 40%.

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 |

ANSI STANDARD C63.4-1992 10.1.7 MEASUREMENT PROCEDURES: The UUT was placed on a table 80 cm high and with dimensions of 1 m by 1.5 m. The UUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to 10th harmonic of the fundamental.

Peak readings were taken in three (3) orthogonal planes and the highest readings were converted to average readings based on the duration of "ON" time.

Measurements were made by TIMCO ENGINEERING INC. at the registered open field test site located at 849 N.W. State Road 45, Newberry, Fl 32669.

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.

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NAME OF TEST: RADIATION INTERFERENCE

RULES PART NO.: 15.231

REQUIREMENTS:

| Fundamental Frequency | Field Strength of Fundamental | Field Strength of Harmonics and Spurious Emissions (dBuV/m @ 3m) |
|-----------------------|-------------------------------|--|
| 40.66 to 40.70 | 67.04 | 47.04 |
| 70 to 130 | 61.94 | 41.94 |
| 130 to 174 | 61.94 to 71.48 | 41.94 to 51.48 |
| 174 to 260 | 71.48 | 51.48 |
| 260 to 470 | 71.48 to 81.94 | 51.48 to 61.94 |
| 470 and above | 81.94 | 61.94 |

THE LIMIT FOR AVERAGE FIELD STRENGTH dBuV/m FOR THE FUNDAMENTAL FREQUENCY= 74.951 dBuV/m. NO FUNDAMENTAL IS ALLOWED IN THE RESTRICTED BANDS.

THE LIMIT FOR AVERAGE FIELD STRENGTH dBuV/m FOR THE HARMONICS AND SPURIOUS FREQUENCIES = 54.951 dBuV/m. SPURIOUS IN THE RESTRICTED BANDS MUST BE LESS THAN 54 dBuV/m OR 15.209.

TEST DATA:

| Emission Frequency | Meter Reading | Ant. Polarity | Coax Loss | Correction Factor | Duty Cycle Factor | Field Strength | Margin |
|--------------------|---------------|---------------|-----------|-------------------|-------------------|----------------|--------|
| MHz | dBuV | | dB | dB | dB | dBuV/m | dB |
| 304.20 | 59.5 | V | 2.23 | 16.27 | 13.15 | 64.85 | 10.11 |
| 304.20 | 67.9 | H | 2.23 | 16.27 | 13.15 | 73.25 | 1.71 |
| 304.20 | 54.1 | V | 2.23 | 16.27 | 13.15 | 59.45 | 15.51 |
| 304.20 | 58.7 | H | 2.23 | 16.27 | 13.15 | 64.05 | 10.91 |
| 304.20 | 61.8 | V | 2.23 | 16.27 | 13.15 | 67.15 | 7.81 |
| 304.20 | 63.4 | H | 2.23 | 16.27 | 13.15 | 68.75 | 6.21 |
| 608.40 | ** | 22.5 | V | 3.43 | 21.73 | 13.15 | 34.51 |
| 608.40 | ** | 28.3 | V | 3.43 | 21.73 | 13.15 | 40.31 |
| 608.40 | ** | 26.3 | H | 3.43 | 21.73 | 13.15 | 38.31 |
| 608.40 | ** | 31.1 | H | 3.43 | 21.73 | 13.15 | 43.11 |
| 608.40 | ** | 20.9 | V | 3.43 | 21.73 | 13.15 | 32.91 |
| 912.60 | 23.6 | H | 3.92 | 24.75 | 13.15 | 39.12 | 15.83 |
| 912.60 | 31.2 | H | 3.92 | 24.75 | 13.15 | 46.72 | 8.23 |
| 912.60 | 31.6 | V | 3.92 | 24.75 | 13.15 | 47.12 | 7.83 |
| 912.60 | 28.2 | V | 3.92 | 24.75 | 13.15 | 43.72 | 11.23 |
| 912.60 | 22.8 | V | 3.92 | 24.75 | 13.15 | 38.32 | 16.63 |
| 912.60 | 30.0 | H | 3.92 | 24.75 | 13.15 | 45.52 | 9.43 |

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REQUIREMENTS:

| Fundamental Frequency MHz | Field Strength of Fundamental dBuV | Field Strength of Harmonics and Spurious Emissions (dBuV/m @ 3m) |
|------------------------------|--|--|
| 40.66 to 40.70 | 67.04 | 47.04 |
| 70 to 130 | 61.94 | 41.94 |
| 130 to 174 | 61.94 to 71.48 | 41.94 to 51.48 |
| 174 to 260 | 71.48 | 51.48 |
| 260 to 470 | 71.48 to 81.94 | 51.48 to 61.94 |
| 470 and above | 81.94 | 61.94 |

THE LIMIT FOR AVERAGE FIELD STRENGTH dBuV/m FOR THE FUNDAMENTAL FREQUENCY= 74.951 dBuV/m. NO FUNDAMENTAL IS ALLOWED IN THE RESTRICTED BANDS.

THE LIMIT FOR AVERAGE FIELD STRENGTH dBuV/m FOR THE HARMONICS AND SPURIOUS FREQUENCIES = 54.951 dBuV/m. SPURIOUS IN THE RESTRICTED BANDS MUST BE LESS THAN 54 dBuv/m OR 15.209.

TEST DATA CONT.'D :

| | | | | | | | | |
|----------|----|------|---|------|-------|-------|-------|-------|
| 1,216.90 | ** | 31.8 | H | 2.18 | 26.19 | 13.15 | 47.02 | 6.98 |
| 1,216.90 | ** | 23.9 | H | 2.18 | 26.19 | 13.15 | 39.12 | 14.88 |
| 1,216.90 | ** | 24.7 | V | 2.18 | 26.19 | 13.15 | 39.92 | 14.08 |
| 1,216.90 | ** | 33.4 | V | 2.18 | 26.19 | 13.15 | 48.62 | 5.38 |
| 1,216.90 | ** | 33.0 | V | 2.18 | 26.19 | 13.15 | 48.22 | 5.78 |
| 1,216.90 | ** | 29.0 | H | 2.18 | 26.19 | 13.15 | 44.22 | 9.78 |
| 1,521.10 | ** | 18.0 | H | 2.50 | 27.21 | 13.15 | 34.56 | 19.44 |
| 1,521.10 | ** | 18.9 | V | 2.50 | 27.21 | 13.15 | 35.46 | 18.54 |
| 1,521.10 | ** | 13.5 | H | 2.50 | 27.21 | 13.15 | 30.06 | 23.94 |
| 1,521.10 | ** | 16.7 | V | 2.50 | 27.21 | 13.15 | 33.26 | 20.74 |
| 1,521.10 | ** | 14.3 | H | 2.50 | 27.21 | 13.15 | 30.86 | 23.14 |
| 1,521.10 | ** | 17.7 | V | 2.50 | 27.21 | 13.15 | 34.26 | 19.74 |
| 1,825.30 | | 15.9 | V | 2.82 | 28.73 | 13.15 | 34.30 | 20.65 |
| 1,825.30 | | 15.3 | H | 2.82 | 28.73 | 13.15 | 33.70 | 21.25 |
| 1,825.30 | | 15.5 | V | 2.82 | 28.73 | 13.15 | 33.90 | 21.05 |
| 1,825.30 | | 16.4 | V | 2.82 | 28.73 | 13.15 | 34.80 | 20.15 |
| 1,825.30 | | 16.0 | V | 2.82 | 28.73 | 13.15 | 34.40 | 20.55 |
| 2,129.60 | | 8.6 | V | 3.10 | 29.94 | 13.15 | 28.49 | 26.46 |
| 2,129.60 | | 9.1 | V | 3.10 | 29.94 | 13.15 | 28.99 | 25.96 |
| 2,129.60 | | 9.5 | V | 3.10 | 29.94 | 13.15 | 29.39 | 25.56 |
| 2,129.60 | | 10.0 | H | 3.10 | 29.94 | 13.15 | 29.89 | 25.06 |
| 2,433.80 | | 7.1 | V | 3.35 | 30.73 | 13.15 | 28.03 | 26.92 |
| 2,433.80 | | 7.0 | H | 3.35 | 30.73 | 13.15 | 27.93 | 27.02 |
| 2,433.80 | | 7.9 | V | 3.35 | 30.73 | 13.15 | 28.83 | 26.12 |

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SAMPLE CALCULATION OF LIMIT @ 303 MHz:

$$(470 - 260) \text{MHz} = 210 \text{ MHz}$$

$$(12500 - 3750) \mu\text{V/m} = 8750 \mu\text{V/m}$$

$$8750 \mu\text{V/m} / 210 \text{MHz} = 41.67 \mu\text{V/m/MHz}$$

$$(303 - 260) \text{MHz} = 43 \text{ MHz}$$

$$43 \text{ MHz} * 41.67 \mu\text{V/m/MHz} = 1791.81 \mu\text{V/m}$$

$$(1791.81 + 3750) \mu\text{V/m} = 5541.81 \mu\text{V/m} \text{ limit @ 303 MHz}$$

The transmitter ceases transmitting when the button is released.

TEST RESULTS: The unit DOES meet the FCC requirements.

PERFORMED BY: JOE SCOGLIO DATE : JANUARY 24, 2002

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CALCULATION OF DUTY CYCLE:

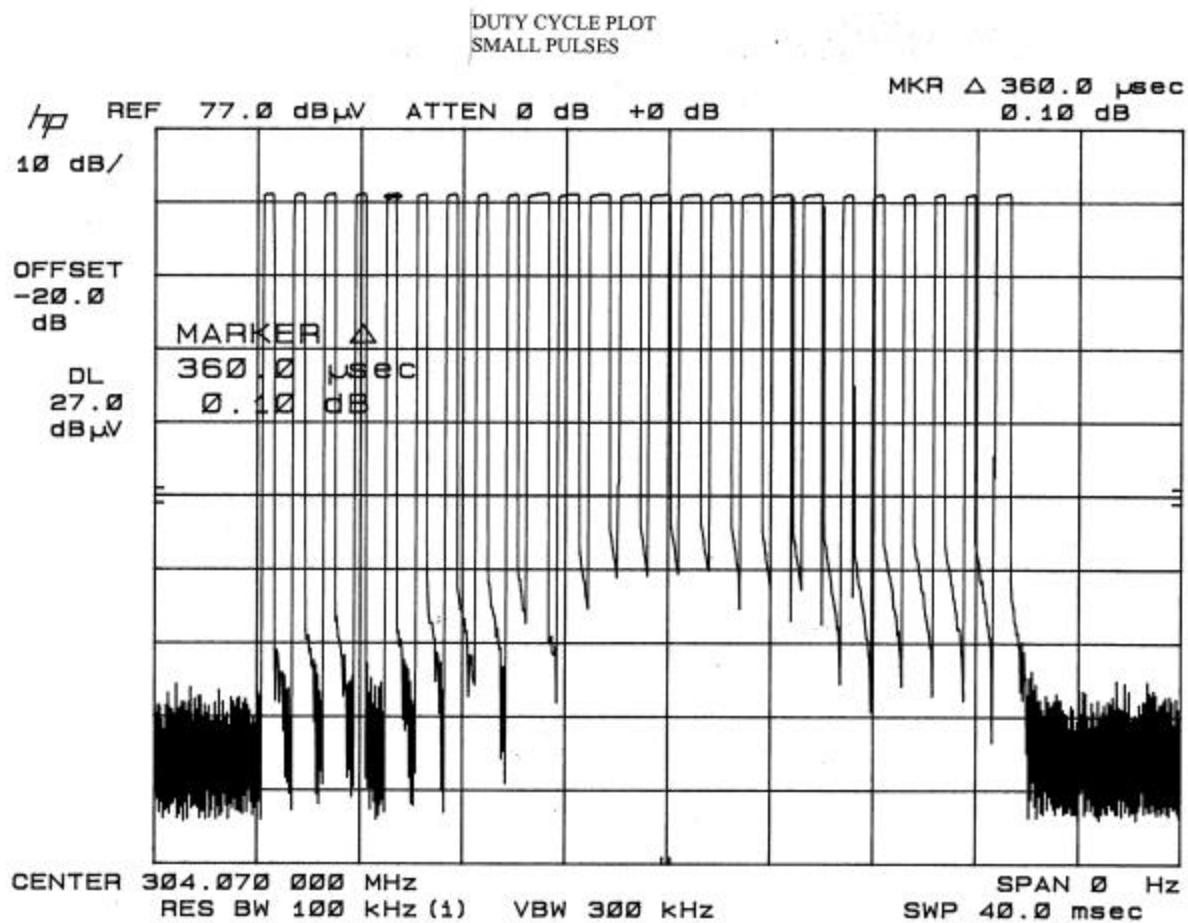
The period of the pulse train is determined by observing it on an oscilloscope or a spectrum analyzer with zero(0) frequency span. A plot is then made of the pulse train with a sweep time of 100 milliseconds. This sweep determines the duration of the pulse train, which in this case is 58.65 msec. This sweep allows the determination of the number of and type of pulses, i.e. long & short. Plots are then made showing the duration of each type of pulse and its duration. From the 100 millisecond Plot the number of a given type of pulse is then multiplied by the duration of that type pulse. This allows the calculation of the amount of time the UUT is on within 100 msec. If the pulse train is longer than 100 msec then this number is multiplied by 100 to determine the percentage ON TIME. If the pulse train is less than 100 msec the total on-time is divided by the length of the pulse train and then multiplied by 100 to determine the percentage ON TIME. In this case there were 14 short pulses .360 mS long and 11 long pulses .720 mS long for a total of 58.65 msec on time within either the 100 msec or the pulse train. The average field strength is determined by multiplying the peak field strength by the percent on time. In this case the percentage ON time was 22%.

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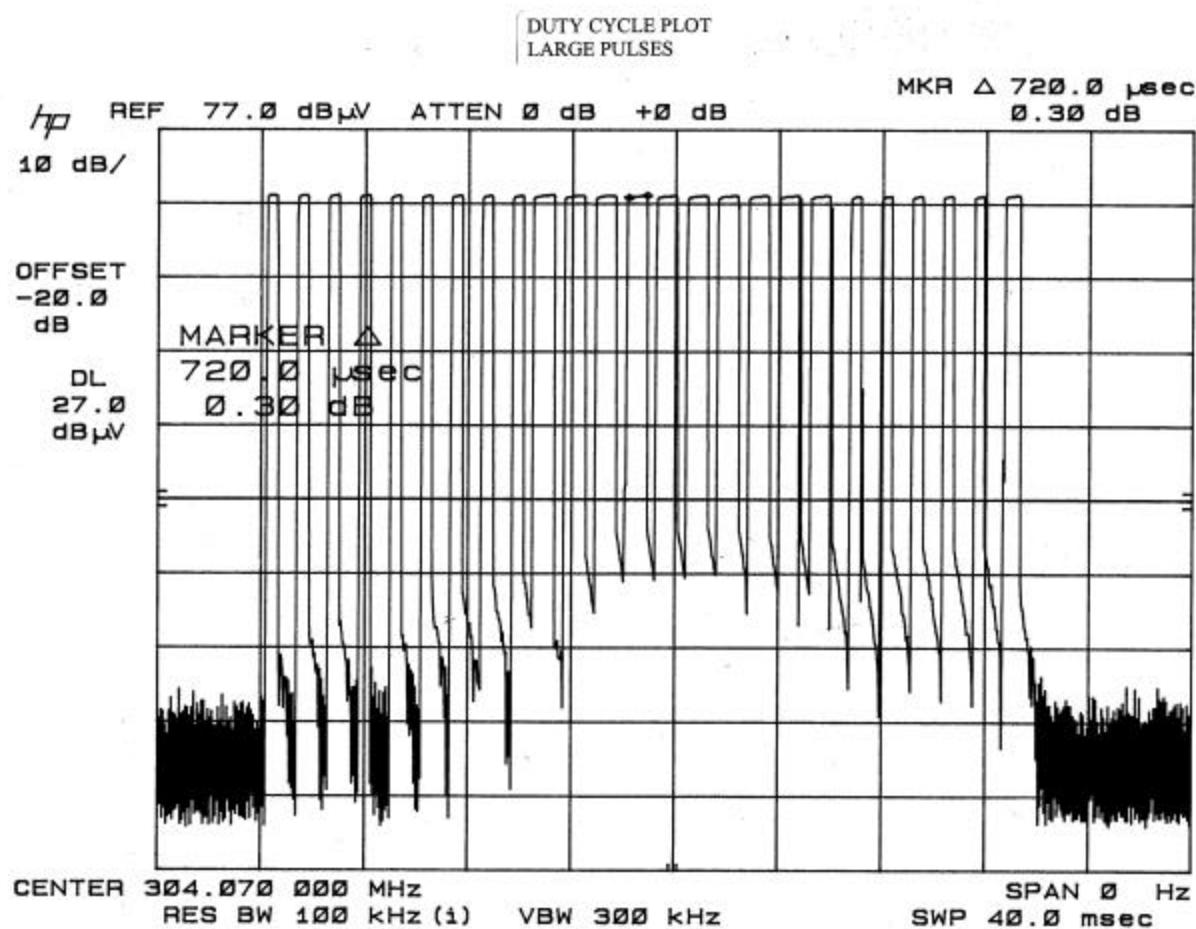
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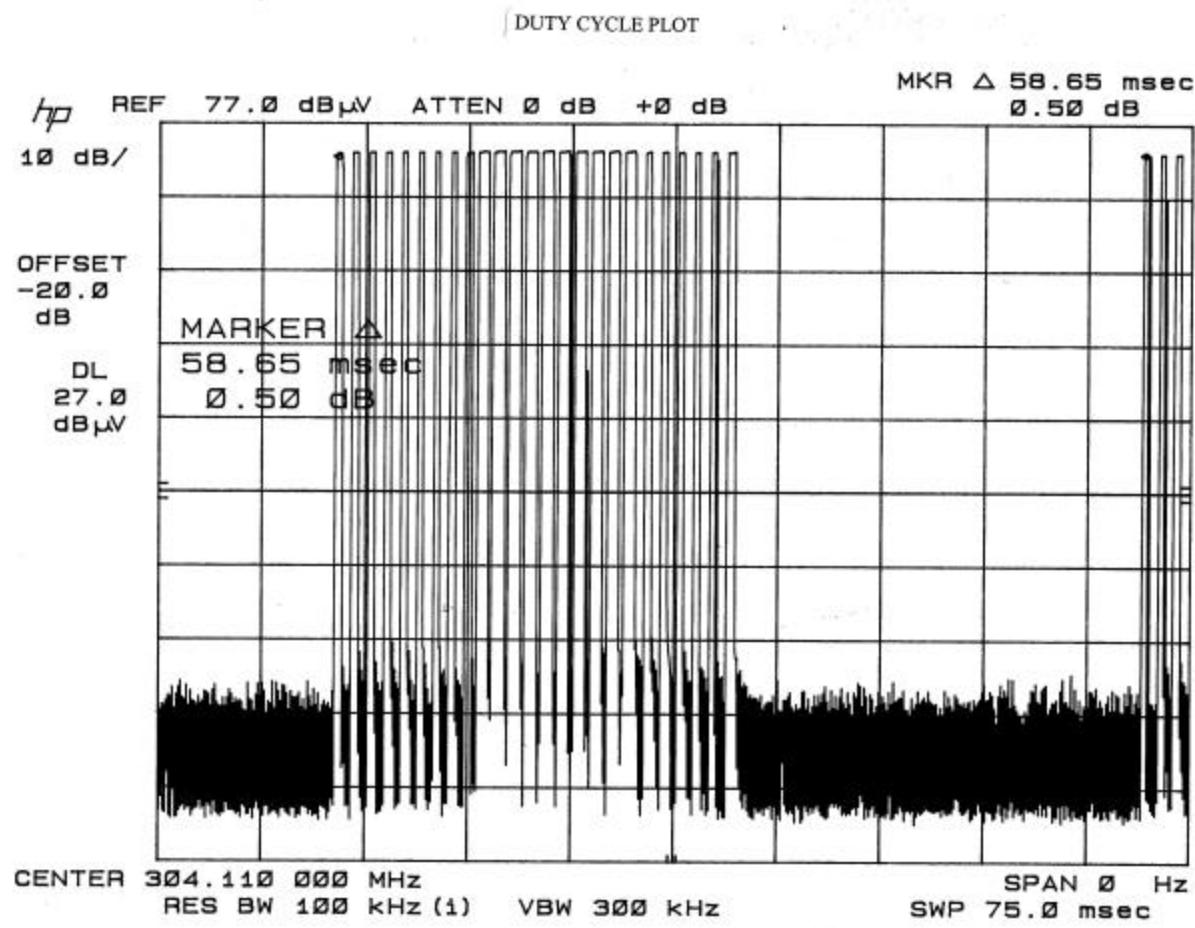


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NAME OF TEST: Occupied Bandwidth

RULES PART NO.: 15.231(C)

REQUIREMENTS: The bandwidth of the emission shall be no wider than .25% of the center frequency for devices operating between 70 and 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

$$304.20 \text{ MHz} * .0025 = .7605 \text{ MHz}$$
$$.7605 \text{ MHz}/2 = +/- 380.25$$

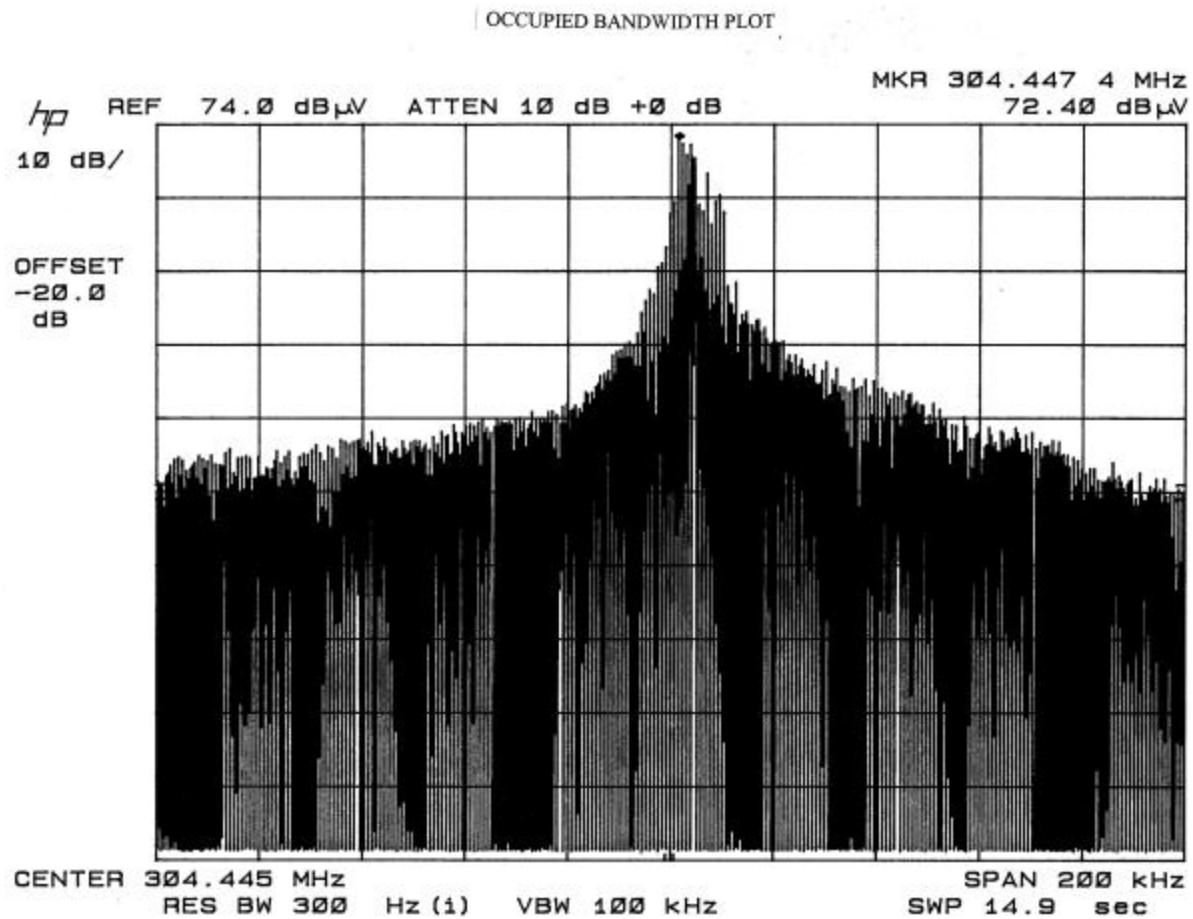
THE GRAPH ON THE FOLLOWING PAGE REPRESENTS THE EMISSIONS TAKEN FOR THE DEVICE.

METHOD OF MEASUREMENT: A small sample of the transmitter output was fed into the spectrum analyzer and the plot in exhibit 9 was generated. The vertical scale is set to 10 dB per division: the horizontal scale is set to 20 kHz per division.

TEST RESULTS: The unit meets the FCC requirements.

PERFORMED BY: JOE SCOGLIO DATE : JANUARY 24, 2002

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