

# TIMCO ENGINEERING INC.

849 NW State Road 45

Newberry, Florida 32669

<http://www.timcoengr.com>

888.472.2424 F 352.472.2030 email: [sid@timcoengr.com](mailto:sid@timcoengr.com)



## Test Report

Product Name: FM EXCITER TRANSMITTER

FCC ID: RMYNT20FP03

Applicant:

**NiCOM USA, INC.  
2626 SOUTHPORT WAY  
SUITE B  
NATIONAL CITY, CA 91950**

**Date Receipt: DECEMBER 2, 2003**

**Date Tested: DECEMBER 18, 2003**

APPLICANT: NiCOM USA, INC.

FCC ID: RMYNT20FP03

REPORT #: N\Nicom\1598UT3\1598UT3TestReport.doc

COVER SHEET

# TIMCO ENGINEERING INC.

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**APPLICANT:** NiCOM USA, INC.

**FCC ID:** RMYNT20FP03

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### EXHIBITS INCLUDING:

BLOCK DIAGRAM  
SCHEMATIC  
PARTS LIST  
USERS MANUAL  
LABEL SAMPLE & LOCATION  
EXTERNAL PHOTOGRAPHS  
INTERNAL PHOTOGRAPHS  
TUNING PROCEDURE  
OPERATIONAL DESCRIPTION  
TEST SET UP PHOTOGRAPH

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## GENERAL INFORMATION REQUIRED FOR TYPE ACCEPTANCE

2.1033 NiCOM USA, INC. will manufacture the FCC ID: RMYNT20FP03 in quantity, for use under FCC RULES PART 73.801, LOW POWER FM BROADCAST STATIONS (LPFM).

### 2.1033(c)(4) TECHNICAL DESCRIPTION

Type of Emission: 75KF3E

$$B_n = 2M + 2DK$$

$$M = 15000$$

$$D = 22\text{KHz (Peak Deviation)}$$

$$K = 1$$

$$B_n = 2(15K) + 2(22K)(1) = 75K$$

ALLOWED AUTHORIZED BANDWIDTH = 75 kHz.

2.1033 (c)(5) Frequency Range: 88 - 108MHz

2.1033 (c)(6) Power Range and Controls: The EUT can be adjusted from 2 Watt up to the maximum of the rated power.

2.1033 (c)(7) Maximum Output Power Rating: 30 Watts into 50 ohms resistive load.

2.1033 (c)(8) DC Voltages and Current into Final Amplifier:

FINAL AMPLIFIER ONLY

$$\text{INPUT POWER: } 24(V) @ 2(A) = 48 \text{ W}$$

2.1033 (c)(9) Tune-up procedure. The tune-up procedure is given in the Exhibits.

2.1033(c)(10) Complete Circuit Diagrams: The circuit diagram and the block diagrams are included as part of the attached exhibits.

2.1033(c)(11) Photographs or drawings of the identification label & its location are included as part of the exhibits.

2.1033(c)(12) Photographs of both the externals & internals are included as part of the exhibits.

2.1033(c)(13) Digital Modulation is NOT used in this EUT.

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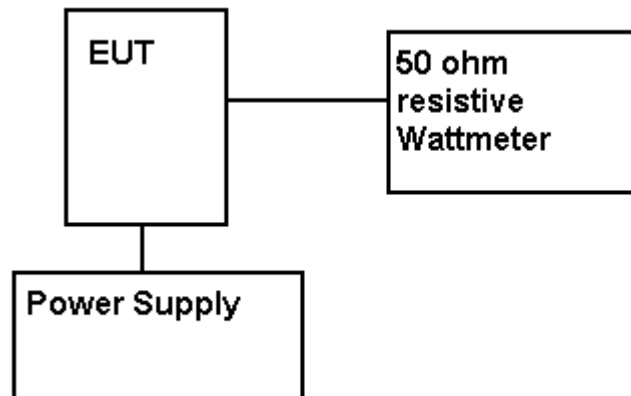
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2.1033(c)(14) Data required by ¶ 2.1046 Through ¶ 2.1057 is submitted below.

2.1046 **RF power output.**  
73.267 (b)(2)

RF power is measured by Direct Method power using TIA/EIA STANDARD 603.

OUTPUT POWER: 20 Watts



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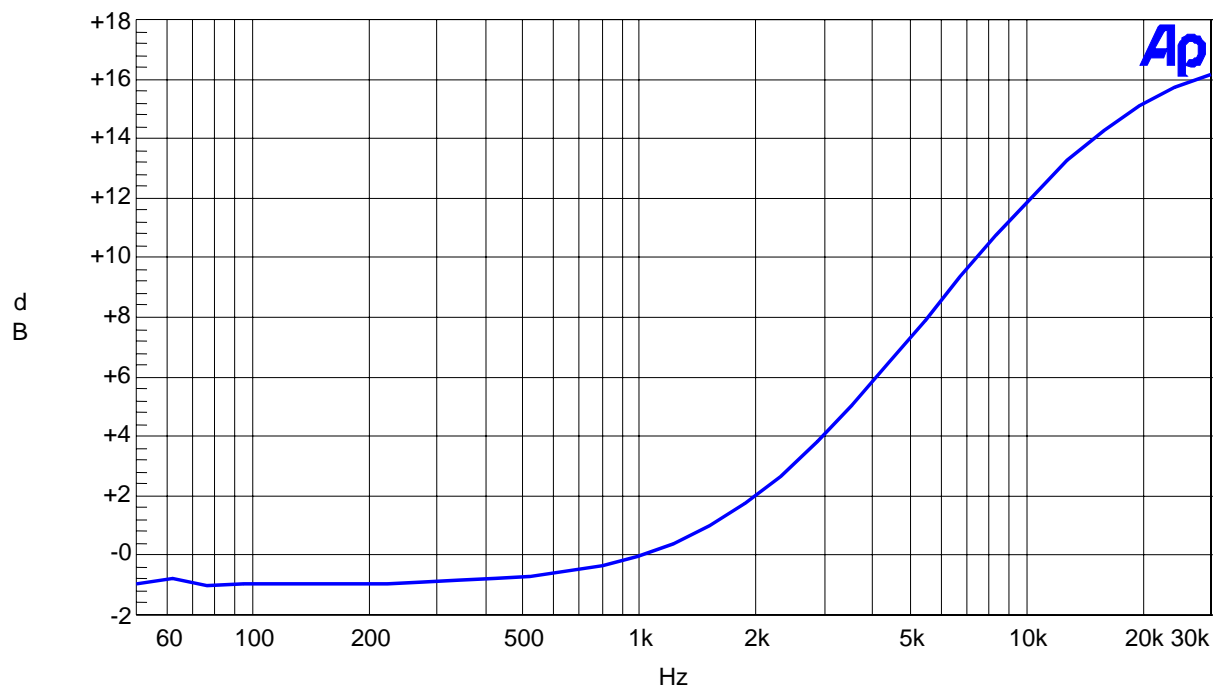
2.1047(a)(b)

## Modulation characteristics:

### AUDIO FREQUENCY RESPONSE

The audio frequency response was measured in accordance with TIA/EIA Specification 603. The audio frequency response curve is shown below.

Audio Frequency Response



2.1047(a)(b)

### AUDIO LOW PASS FILTER

The audio low pass filter is NA for this EUT.

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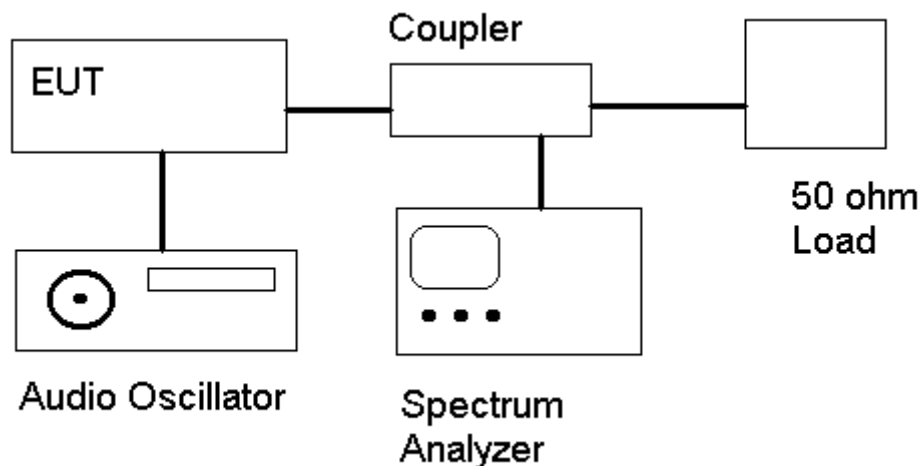
2.1049

73.317(b-d)

## OCCUPIED BANDWIDTH:

Any emission appearing on the frequency removed from the carrier between 120kHz and 240kHz inclusive must be attenuated at least 25 dB below the level of the un-modulated carrier. Compliance with this requirement will be deemed to show occupied bandwidth to be 240kHz or less. Any emission appearing on the frequency removed from the carrier by more than 240 kHz and up to and including 600 kHz must be attenuated at least 35 dB below the level of the un-modulated carrier. Any emission appearing on the frequency removed from the carrier by more than 600 kHz must be attenuated at least  $43 + 10 \log(P)$  dB below the level of the un-modulated carrier, or 80 dB, whichever is the lesser attenuation.

## OCCUPIED BANDWIDTH MEASUREMENT



REQUIREMENT: PART 73: 200kHz EMISSION BANDWIDTH.

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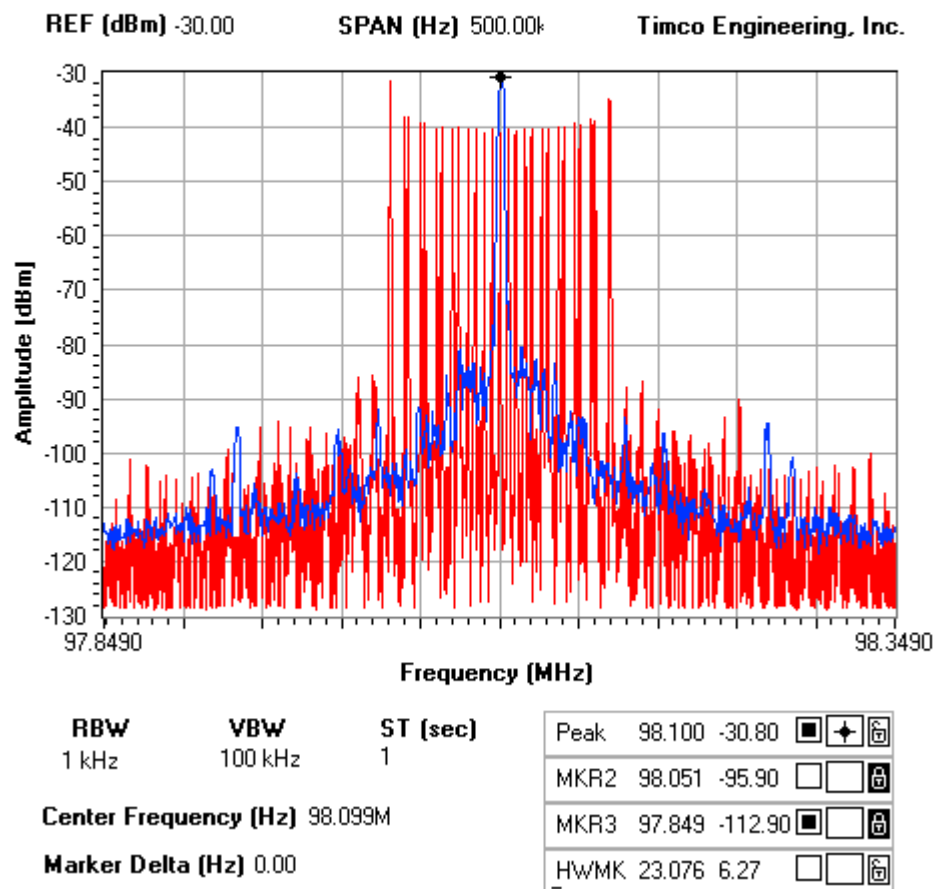
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OCCUPIED BANDWIDTH - 50 Hz

## NOTES:

NiCOM USA, INC. - FCC ID: RMYNT 20  
OCCUPIED BANDWIDTH PLOT (50Hz)



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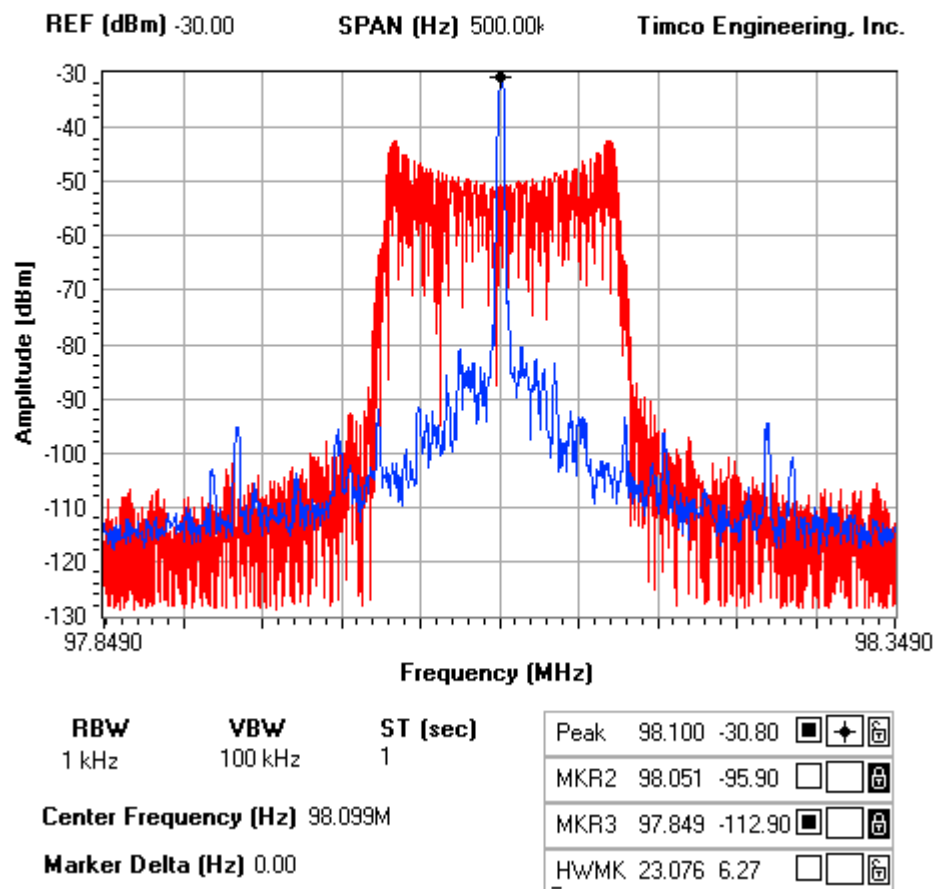
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OCCUPIED BANDWIDTH - 1kHz

## NOTES:

NiCOM USA, INC. - FCC ID: RMYNT 20  
OCCUPIED BANDWIDTH PLOT (1KHz)



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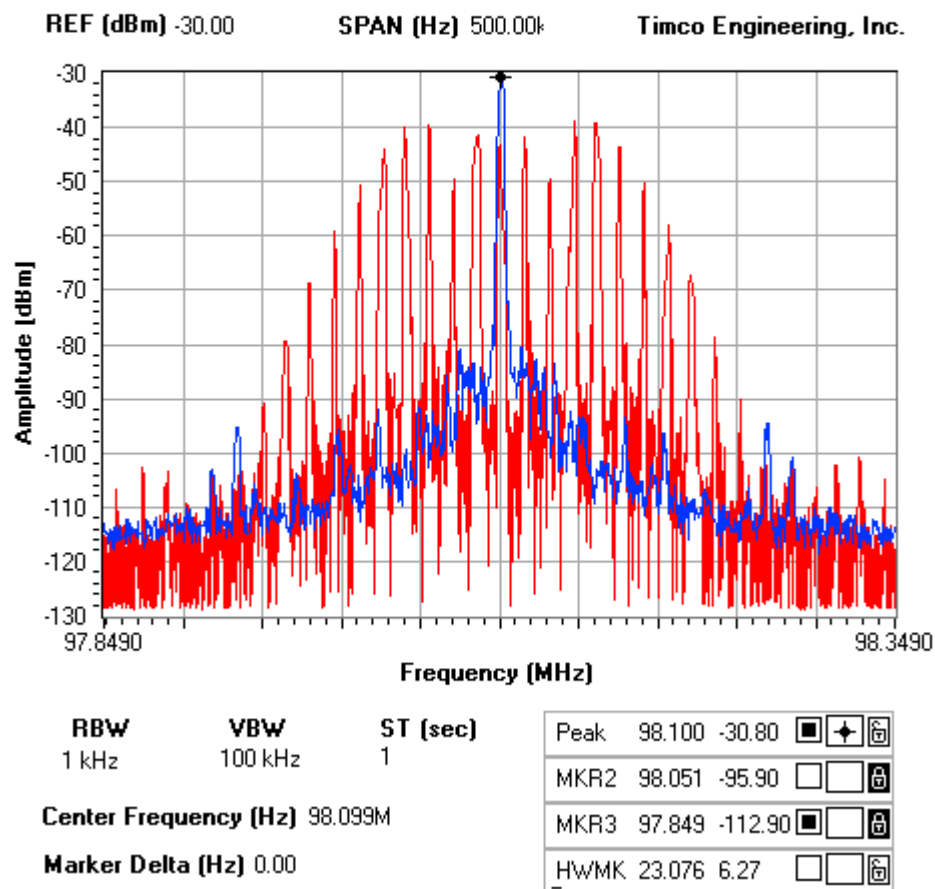
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OCCUPIED BANDWIDTH - 15 kHz

## NOTES:

NiCOM USA, INC. - FCC ID: RMYNT 20

OCCUPIED BANDWIDTH PLOT (15KHz)



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2.1051

## Spurious emissions at antenna terminals (conducted):

Data on the following page shows the level of conducted spurious responses. The carrier was modulated 100% using 2500Hz tone. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard TIA/EIA-603.

### REQUIREMENTS:

Emissions must be 43 +10log(Po) dB below the mean power output of the transmitter.

$$43 + 10\log(20) = 56.00 \text{ dBc}$$

EMISSION FREQUENCY MHz	dB BELOW CARRIER
94	0.0
188	76.6
282	93.5
376	94.7
470	96.2
564	93.9
658	94.4
752	93.5
846	95.8
940	95.3
98.1	0.0
196.2	75.3
294.3	94.0
392.4	100.3
490.5	99.0
588.6	96.4
686.7	99.0
784.8	98.6
882.9	96.3
981.0	98.0
108	0.0
216	105.1
324	85.3
432	99.0
540	100.3
648	100.4
756	98.7
864	99.4
972	102.0
1080	99.2

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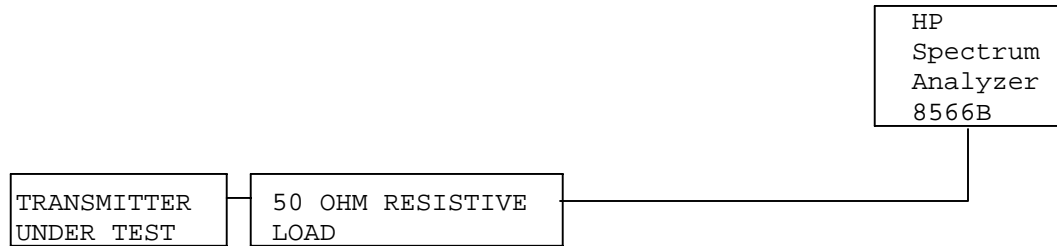
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2.1051

## Method of Measuring Conducted Spurious Emissions



**METHOD OF MEASUREMENT:** The procedure used was TIA/EIA-603 STANDARD without any exceptions. An audio generator was connected to the UUT through a dummy microphone circuit and the output of the transmitter connected to a standard load and from the standard load through a pre-selector filter of the spectrum analyzer. The spectrum was scanned from 400 kHz to at least the tenth harmonic of the fundamental using a HP model 8566B spectrum analyzer. The measurements were made using the shielded room located at TIMCO ENGINEERING INC. 849 N.W. State Road 45, Newberry, Florida 32669.

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## 2.1053(a)(b) Field strength of spurious emissions:

**NAME OF TEST:** RADIATED SPURIOUS EMISSIONS (94 MHz)

**REQUIREMENTS:** Any emission appearing on a frequency removed from the carrier by more than 600 kHz must be attenuated at least  $43 + 10\log(P)$  dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.

$$43 + 10\log(20) = 56.00 \text{ dBc}$$

### TEST DATA:

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
94.00	H	-48.4	0	0.00	0.00
188.00	H	-75.1	0	-0.93	25.77
282.00	H	-74.7	0	-1.17	25.13
376.00	V	-73.0	0	-1.21	23.39
470.00	V	-71.9	0	-0.53	22.97
658.00	V	-66.9	0	-0.09	18.41
752.00	V	-66.6	0	-0.58	17.62
846.00	V	-65.6	0	-0.98	16.22
940.00	V	-58.1	0	-1.03	8.67

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## 2.1053(a)(b) Field strength of spurious emissions:

**NAME OF TEST:** RADIATED SPURIOUS EMISSIONS (98.1 MHz)

**REQUIREMENTS:** Any emission appearing on a frequency removed from the carrier by more than 600 kHz must be attenuated at least  $43 + 10\log(P)$  dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.

$$43 + 10\log(20) = 56 \text{ dBc}$$

### TEST DATA:

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
98.00	V	-49.5	0	0.00	0.00
196.00	V	-61.9	0	-1.01	11.39
294.00	H	-77.6	0	-1.29	26.81
392.00	H	-65.9	0	-1.25	15.15
490.00	V	-69.9	0	-0.61	19.79
686.00	V	-64.3	0	0.09	14.89
784.00	V	-62.7	0	-1.09	12.11
980.00	H	-50.6	0	-1.49	-0.39

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## 2.1053(a)(b) Field strength of spurious emissions:

**NAME OF TEST:** RADIATED SPURIOUS EMISSIONS (98.1 MHz)

**REQUIREMENTS:** Any emission appearing on a frequency removed from the carrier by more than 600 kHz must be attenuated at least  $43 + 10\log(P)$  dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.

$$43 + 10\log(20) = 56 \text{ dBc}$$

### TEST DATA:

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
108.00	H	-40.9	0	0.00	0.00
216.00	V	-69.7	0	-1.15	27.65
324.00	H	-77.5	0	-1.21	35.39
432.00	V	-73.4	0	-1.15	31.35
540.00	H	-72.0	0	-0.55	30.55
648.00	H	-71.5	0	-0.16	30.44
756.00	H	-69.1	0	-0.65	27.55
972.00	V	-59.5	0	-1.43	17.17
1080.00	H	-65.8	0	3.27	28.17

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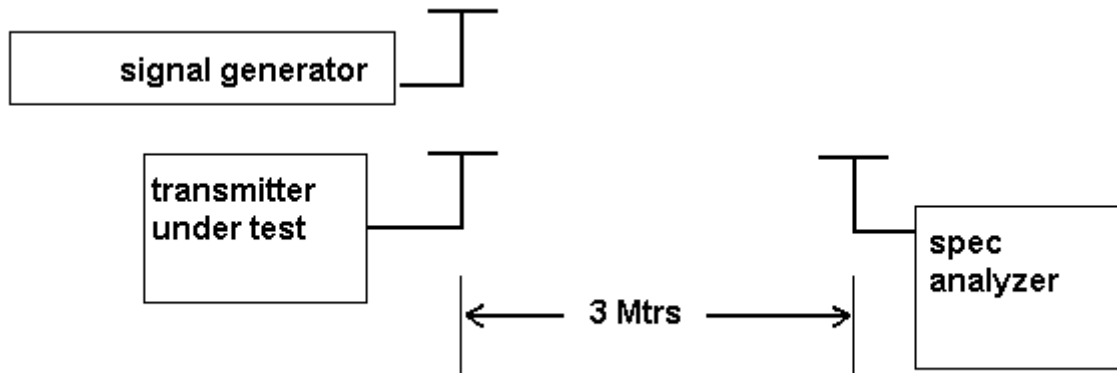
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2.1053(a)(b)

## Method of Measuring Radiated Spurious Emissions



**METHOD OF MEASUREMENT:** The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA STANDARD 603 using the substitution method. Measurements were made at the open field test site of TIMCO ENGINEERING, INC. located at 849 N.W. State Road 45, Newberry, FL 32669.

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15.107

## POWER LINE CONDUCTED INTERFERENCE

### REQUIREMENTS:

	QUASI-PEAK	AVERAGE
.15 - 0.5 MHz	66-56 dBuV	56-46 dBuV
0.5 - 5.0	56	46
5.0 - 30.	60	50

### TEST PROCEDURE:

ANSI STANDARD C63.4-1992. The spectrum was scanned from .15 to 30 MHz.

### TEST DATA:

**THE FOLLOWING GRAPHS REPRESENT THE EMISSIONS TAKEN FOR THIS DEVICE.**

TEST RESULTS: Both lines were observed. The measurements indicate that the unit DOES appear to meet the FCC requirements for this class of equipment.

PERFORMED BY: NAM NGUYEN

DATE: DECEMBER 18, 2003

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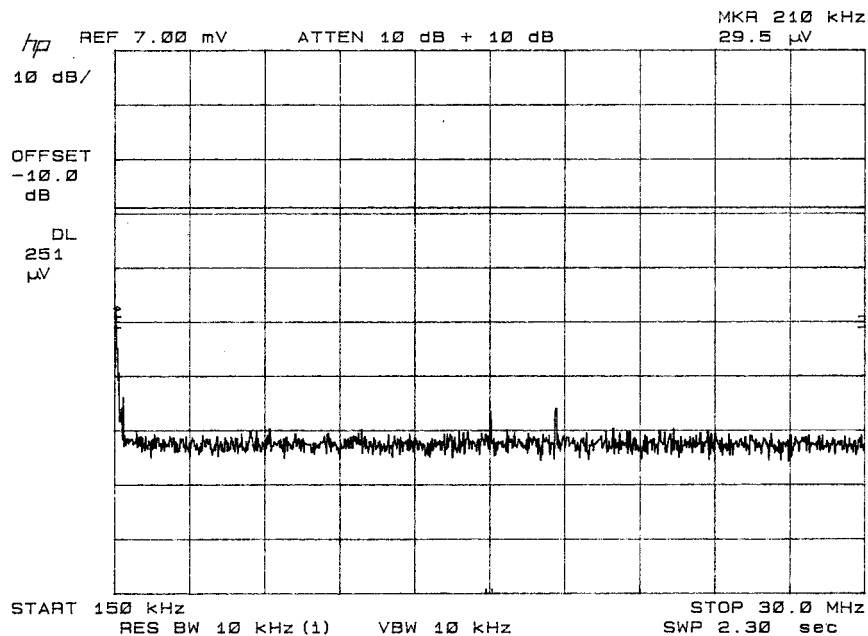
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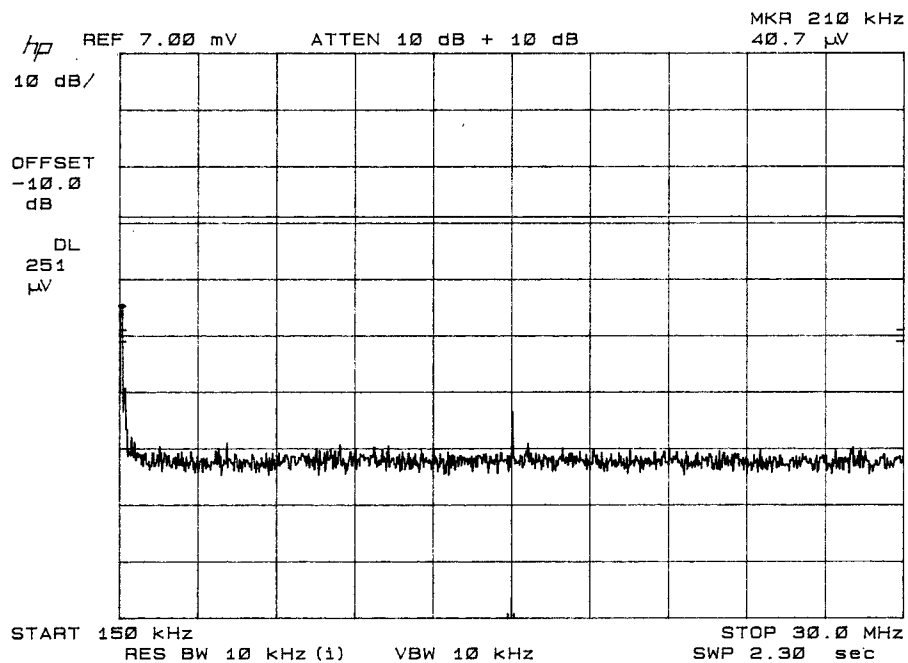
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## POWER LINE CONDUCTED LINE 1



## LINE 2



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## 2.1055 Frequency\_stability:

Temperature and voltage tests were performed to verify that the frequency remains within the 2000Hz, specification limit.

The test was conducted as follows: The transmitter was placed in the temperature chamber at 25° C and allowed to stabilize for one hour. The temperature was then reduced to -30° C after which the transmitter was again allowed to stabilize for one hour. The transmitter was ON continuously because that is how it is used and again frequency readings were noted at 15 second intervals. The worst case number was recorded for temperature plotting. This procedure was repeated in 10 degree increments up to + 50° C.

### MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 98.099 680

TEMPERATURE°C	FREQUENCY_MHz	PPM
-30	98.100 889	12.32
-20	98.100 930	12.74
-10	98.100 911	12.55
0	98.100 742	10.83
10	98.100 429	7.64
20	98.100 298	6.30
30	98.099 470	-2.14
40	98.099 000	-6.93
50	98.098 598	-11.03

<u>VOLTAGE</u>	<u>VOLTAGE LEVEL</u>	<u>FREQUENCY</u>	<u>PPM</u>
-15%	102 VAC	98.099 679	0.01

**RESULTS OF MEASUREMENTS:** The test results indicates that the EUT meets the requirements.

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## EMC Equipment List

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/26/01	3/26/04
3-Meter OATS	TEI	N/A	N/A	Listed 1/13/03	1/13/06
AC Voltmeter	HP	400FL	2213A14499	CAL 10/9/01	10/9/03
Blue Tower	HP	85650A	2811A01279	CAL 4/15/03	4/15/05
Quasi-Peak Adapter					
Blue Tower	HP	85685A	2926A00983	CAL 4/15/03	4/15/05
RF Preselector					
Blue Tower	HP	8568B	2928A04729	CAL 4/15/03	4/15/05
Spectrum Analyzer			2848A18049		
Coaxial Cable #64	Semflex Inc.	60637	Timco #64	CHAR 1/24/02	1/24/04
Dipole Antenna Kit	Electro-Metrics	TDA-30/1-4	152	CAL 3/21/01	3/21/04
Dipole Antenna Kit	Electro-Metrics	TDA-30/1-4	153	CAL 9/26/02	9/26/05
Frequency Counter	HP	5385A	2730A03025	CAL 3/7/03	3/7/05
Hygro-Thermometer	Extech	445703	0602	CAL 10/4/02	10/4/04
Log-Periodic Antenna	Electro-Metrics	LPA-25	1122	CAL 10/2/01	10/2/03
Measuring Tape-7.5M	Kraftixx	7.5M PROFI		CHAR 2/1/02	2/1/04
Modulation Analyzer	HP	8901A	3435A06868	CAL 9/5/01	9/5/03
Multimeter	Fluke	FLUKE-77-3	79510405	CHAR 9/26/01	9/26/03
Silver Tower Preamplifier	HP	8449B	3008A01075	CHAR 1/28/02	1/28/04
Silver Tower Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 10/14/02	10/14/04
Silver Tower RF Preselector	HP	85685A	2620A00294	CAL 10/14/02	10/14/04

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Silver Tower Spectrum Analyzer System One	HP	8566B Opt 462	3552A22064 3638A08608	CAL 10/14/02	10/14/04
Tan Tower Preamplifier	Audio Precision	System One	SYS1-45868	CHAR 4/25/02	4/25/04
Tan Tower Quasi-Peak Adapter	HP	8449B-H02	3008A00372	CAL 9/23/03	9/23/05
Tan Tower RF Preselector	HP	85650A	3303A01690	CAL 9/23/03	9/23/05
Tan Tower Spectrum Analyzer	HP	85685A	3221A01400	CAL 9/23/03	9/23/05
Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 1/22/02	1/22/04

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