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

Test Report

Product Name: CYNTRX VEHICLE TRACKING DEVICE
W/EXTERNAL GPS ATTATCHED ANTENNA

FCC ID: R4S5150

Applicant:

EVA, LLC.
1901 S WEBSTER AVE., SUITE 4
GREEN WAY WI 54301

Date Receipt: OCTOBER 4, 2004

Date Tested: OCTOBER 15, 2004

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APPLICANT: EVA, LLC.

FCC ID: R4S5150

TABLE OF CONTENTS

TEST REPORT:

EXHIBITS INCLUDING:

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GENERAL INFORMATION

2.1033(c)(1)(2) EVA, LLC. will sell the FCC ID: R4S5150, Fixed WLL cellular phone for use under FCC RULES PART 22(H)
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2.1033(c) **TECHNICAL DESCRIPTION**

2.1033 (3) The User Manual is included in the exhibits.

2.1033 (4) Type of Emission:

Emission Designator = 40K0F8W
Calculation: Voice + SAT
Modulation: Voice is 2.5 kHz and SAT is 6 kHz
Maximum modulation is M = 6 kHz
Deviation: Voice is 12 kHz and SAT is 2 kHz
Maximum deviation is D = 12 + 2 = 14 kHz
Bn = 2xM + 2xDK with K = 1
Bn = 40 kHz

Calculation: Signaling Tone (ST) + SAT
Modulation: ST is 10 kHz and SAT is 6 kHz
Maximum modulation is M = 10 kHz
Deviation: ST is 8 kHz and SAT is 2 kHz
Maximum deviation is D = 8 + 2 = 10 kHz
Bn = 2xM + 2xDK with K = 1
Bn = 40 kHz

Emission Designator = 40K0F1D
Calculation: Voice + SAT
Modulation: Wideband Data is 10 kHz and SAT is 6 kHz
Maximum modulation is M = 10 kHz
Deviation: Wideband Data is 8 kHz and SAT is 2 kHz
Maximum deviation is D = 8 + 2 = 10 kHz
Bn = 2xM + 2xDK with K = 1
Bn = 40 kHz

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2.1033 (5) Frequency Range: 824-849 MHz

(6) Power Range and Controls: There are NO user Power controls.

(7) Maximum Output Power Rating:

0.25 Watts ERP

(8) DC Voltages and Current into Final Amplifier:

POWER INPUT
FINAL AMPLIFIER ONLY

Vce =5.0 Volts
IC = 1.3 A

Pin = 6.5 W

(9) Tune-up procedure. The tune-up procedure is given in the exhibits

(10) Complete Circuit Diagrams: Description of all circuitry and devices provided for determining and stabilizing frequency is included in the circuit description in the instruction manual. The circuit diagram and block diagram are included in the exhibits.

2.1033(c)(11) A photograph or drawing of the equipment identification label is shown in the Exhibits.

2.1033(c)(12) Photographs of the equipment of sufficient clarity to reveal equipment construction and layout and label location, are shown in the Exhibits.

2.1033(c)(13) For equipment employing digital modulation, a detail description of the modulation technique. This UUT uses analogue FM to modulate the transmitter.

2.1033(c)(14) Data required for 2.1046 to 2.1057 See Below

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22.913 **Power Output – Effective Radiated Power - ERP**

Method of measurement:

This test was performed per TIA/EIA STANDARD 603 using the substitution method.

Tuned Frequency (MHz)	Polarization (H/V)	ERP (dBm)	ERP (W)
824.7	V	24.0	0.251
835.8	V	23.5	0.224
848.0	V	23.5	0.224

2.1047(a) **Voice Modulation characteristics**:
NOT APPLICABLE, F8 type of emission.

2.1047 **Audio Low Pass Filter**
This UUT does not have a low pass filter.

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2.1049 **Occupied bandwidth: 99% power bandwidth**:

22.917 (a) **Out of band emissions**: The mean power of emissions must be attenuated below the mean power of the un-modulated carrier (P) on any frequency twice or more than twice the fundamental frequency by:
At least 43 + 10log(Po) = dB.

Band-edges compliance: Measurement were performed in accordance with Part 22.917

Output Power: 24 dBm

Channel (MHz)	Band-edge Frequency (MHz)	Amplitude level at the band-edge(dBm)	Limit (dBm)	Margin (dB)
824.7	824.0	-14.7	-13.0	-1.7
848.0	849.0	-15.6	-13.0	-2.6

The following plot shows the composite power measured with a RBW = 3MHz = VBW and the modulated envelop measured with a RBW = 30 kHz = VBW

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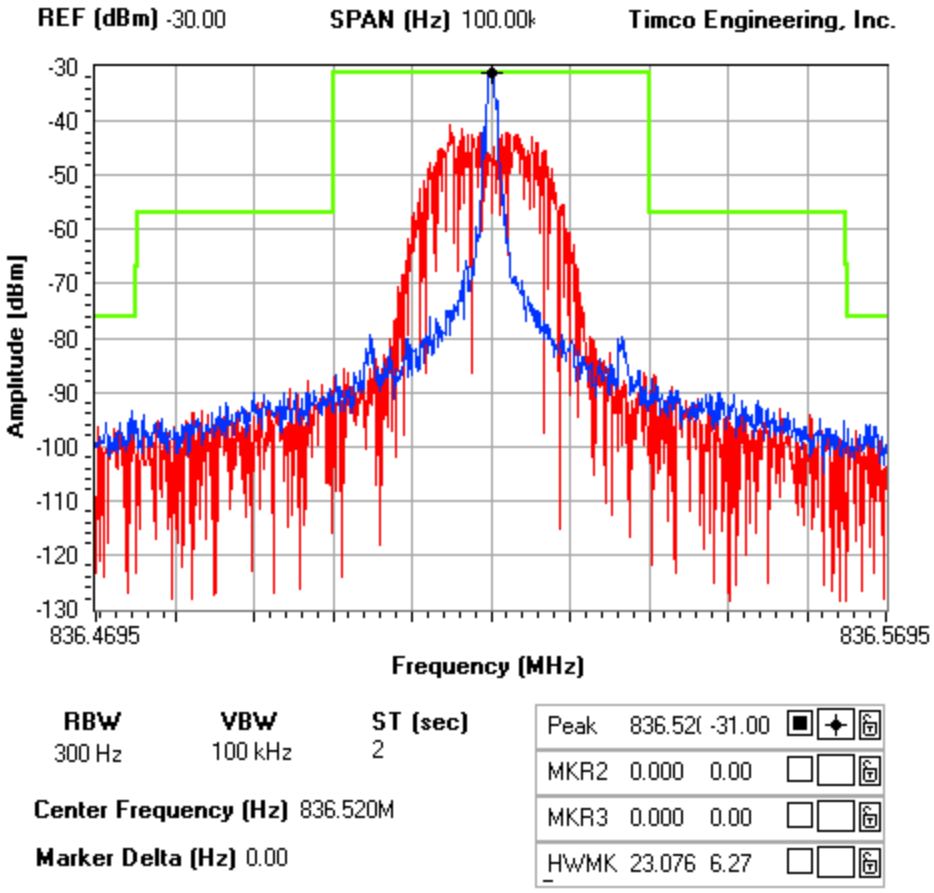
OCCUPIED BANDWIDTH

NOTES:
EVA, LLC. - FCC ID: R4S5150
OCCUPIED BANDWIDTH PLOT - DTMF LEVEL

FCC 22.917 (d) F1D



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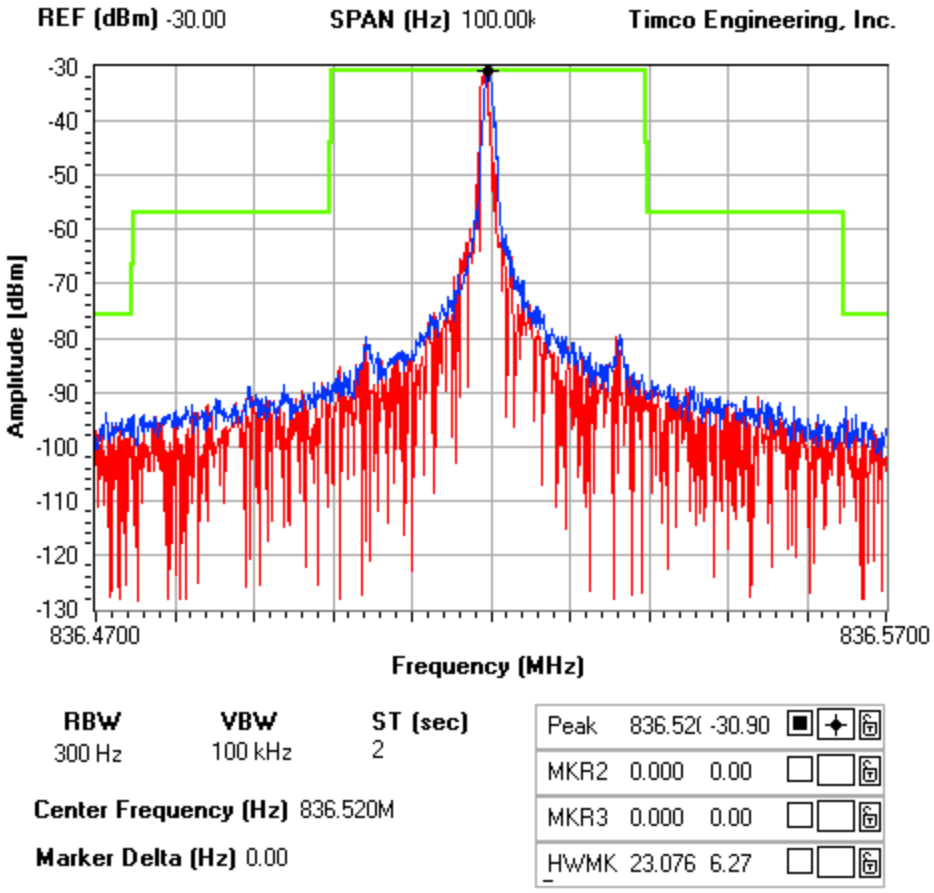
OCCUPIED BANDWIDTH

NOTES:
EVA, LLC. - FCC ID: R4S5150
OCCUPIED BANDWIDTH PLOT - MICAUDIO LEVEL

FCC 22.917 (d) F1D



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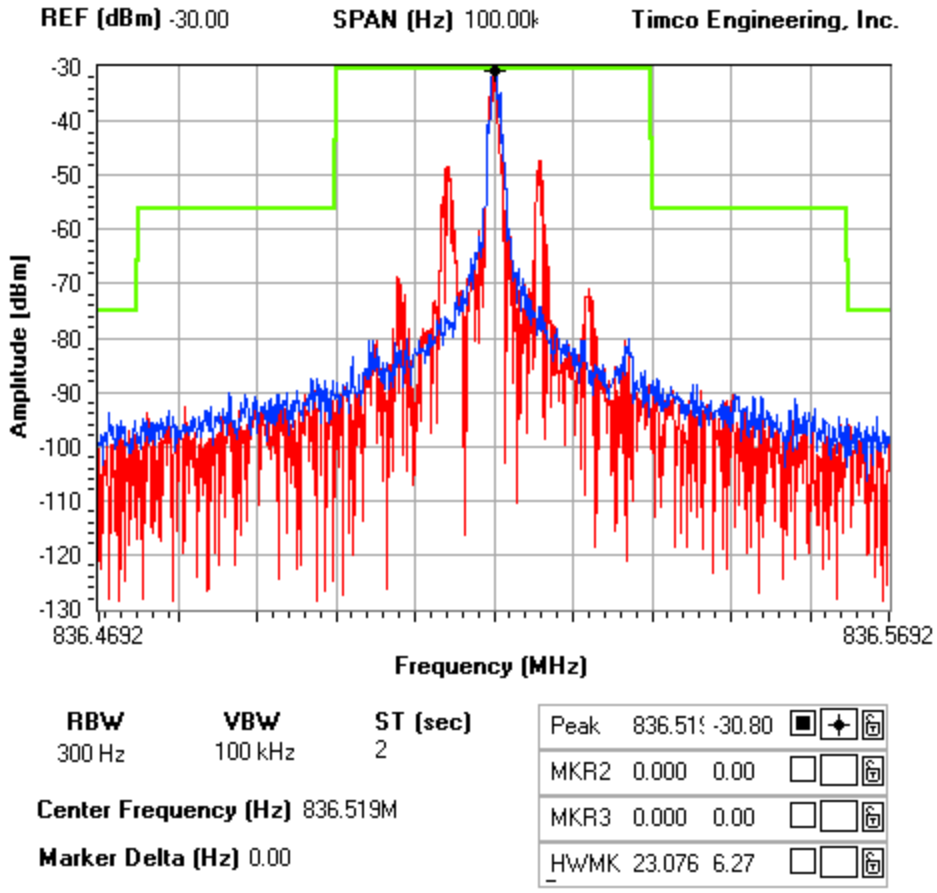
OCCUPIED BANDWDITH

NOTES:
EVA, LLC. - FCC ID: R4S5150
OCCUPIED BANDWIDTH PLOT - SAT LEVEL



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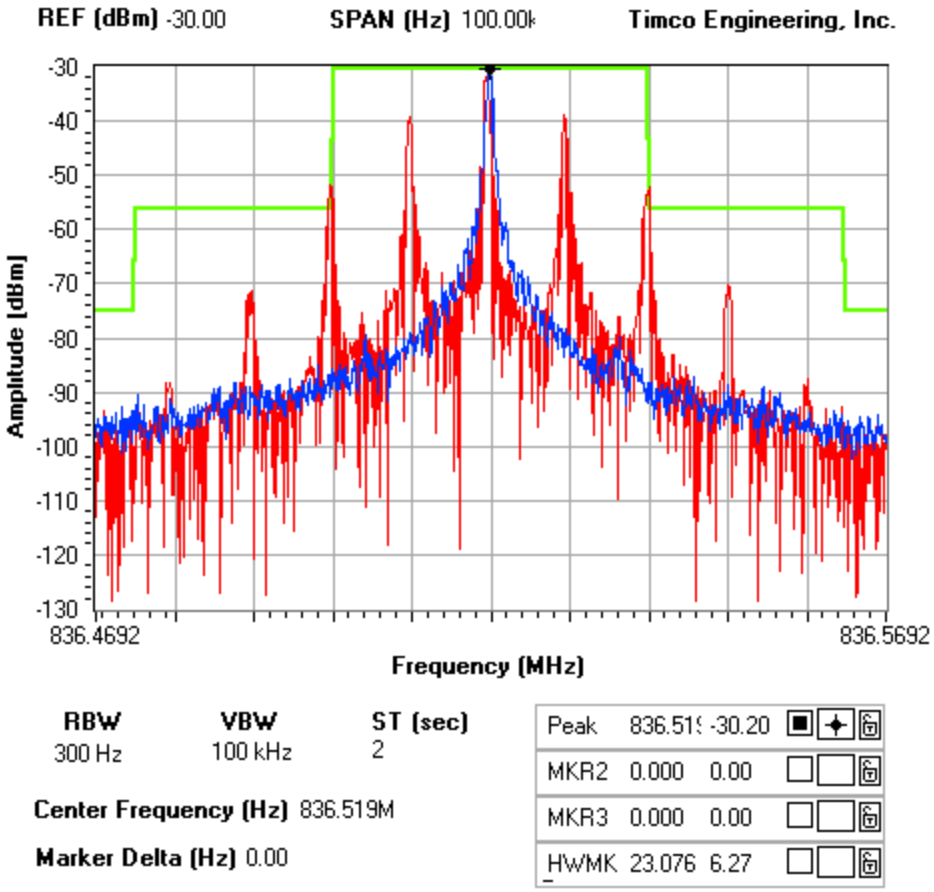
OCCUPIED BANDWIDTH

NOTES:
EVA, LLC. - FCC ID: R4S5150
OCCUPIED BANDWIDTH PLOT - ST LEVEL



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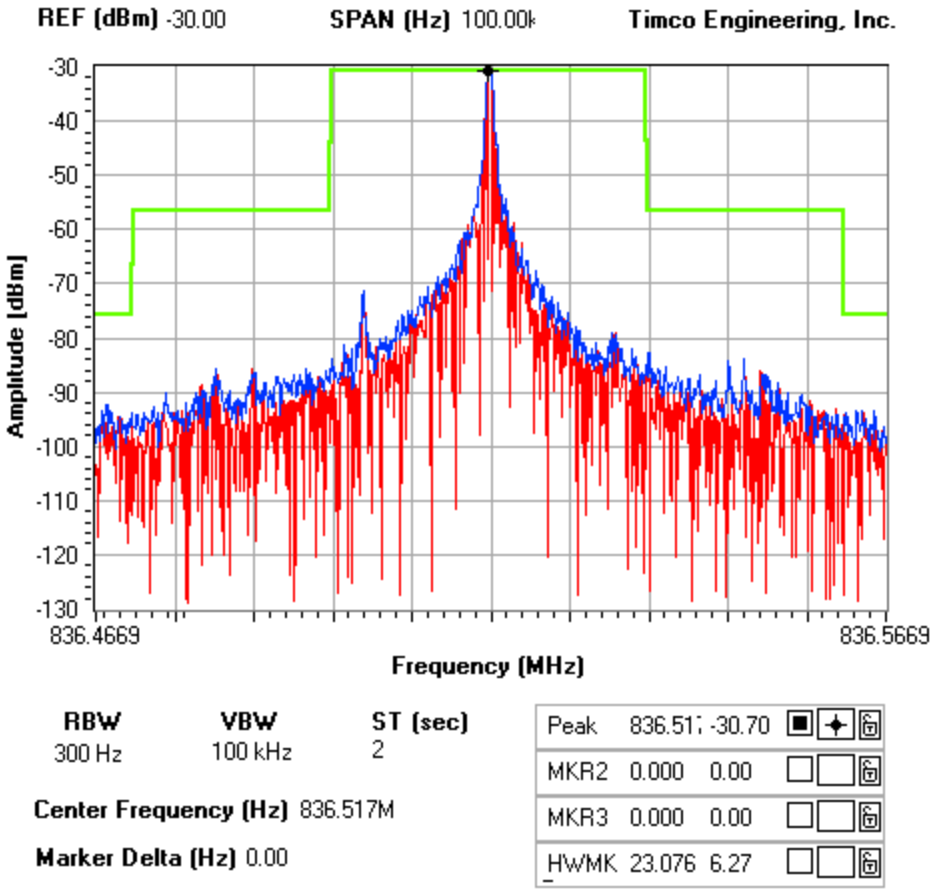
OCCUPIED BANDWIDTH

NOTES:
EVA, LLC. - FCC ID: R4S5150
OCCUPIED BANDWIDTH PLOT - WIDE BAND DEVIATION

FCC 22.917 (d) F1D



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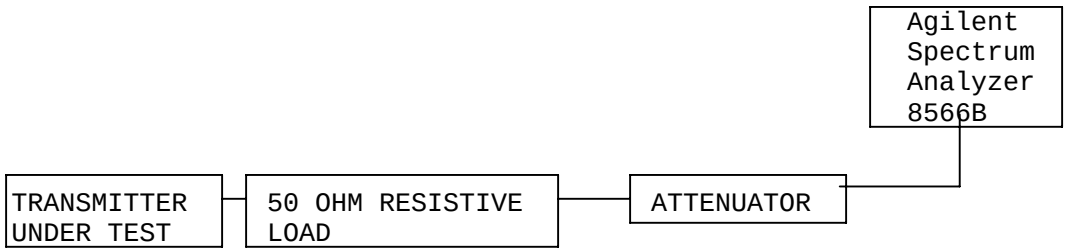
2.1051 **Spurious emissions at antenna terminals:**
Data on the following page shows the level of conducted spurious responses. The carrier was modulated 100% using a 2500 Hz tone. The spectrum was scanned from 9kHz to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard TIA/EIA-603.

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

43 + 10log(0.25) = 37.0 dB

"Not applicable fixed antenna device"

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 9kHz kHz to at least the tenth harmonic of the fundamental using a Agilent 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 **Field strength of spurious emissions:**

NAME OF TEST: **RADIATED SPURIOUS EMISSIONS**

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

43 + 10log(0.250) = 37.0 dB

TEST DATA (824 MHz):

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
824.00	H	13.40	0	-1.16	0
1648.00	H	-31.00	1.13	5.04	39.33
2472.00	V	-43.30	1.29	6.76	50.07
3296.00	V	-46.10	1.38	7.43	52.29
4120.00	V	-48.10	1.46	7.74	54.06
4944.00	V	-52.00	1.81	7.82	58.23
5768.00	V	-61.70	1.96	8.73	67.17
6592.00	V	-45.10	2	8.49	50.85

TEST DATA (836.5 MHz):

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
836.50	H	14.10	0	-1.06	0
1673.00	H	-35.50	1.13	5.05	44.62
2509.50	H	-44.90	1.3	6.86	52.38
3346.00	H	-38.90	1.38	7.46	45.86
4182.50	H	-52.80	1.47	7.84	59.47
5019.00	V	-53.50	1.6	7.77	60.37
5855.50	V	-51.50	1.84	8.85	57.53
6692.00	V	-36.00	1.97	8.21	42.8
7528.50	V	-45.80	2.01	8.58	52.27
8365.00	V	-51.00	2.17	8.25	57.96

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2.1053 **Field strength of spurious emissions:**

NAME OF TEST: **RADIATED SPURIOUS EMISSIONS**

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

43 + 10log(0.250) = 37.0 dB

TEST DATA (848.9 MHz):

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
848.90	H	12.90	0	-0.96	0
1697.80	H	-33.70	1.14	5.07	41.71
2546.70	H	-50.20	1.3	6.89	56.55
3395.60	H	-53.00	1.39	7.49	58.84
4244.50	V	-52.30	1.47	7.94	57.77
5942.30	V	-51.60	1.88	8.97	56.45
6791.20	V	-44.10	1.98	7.93	50.09

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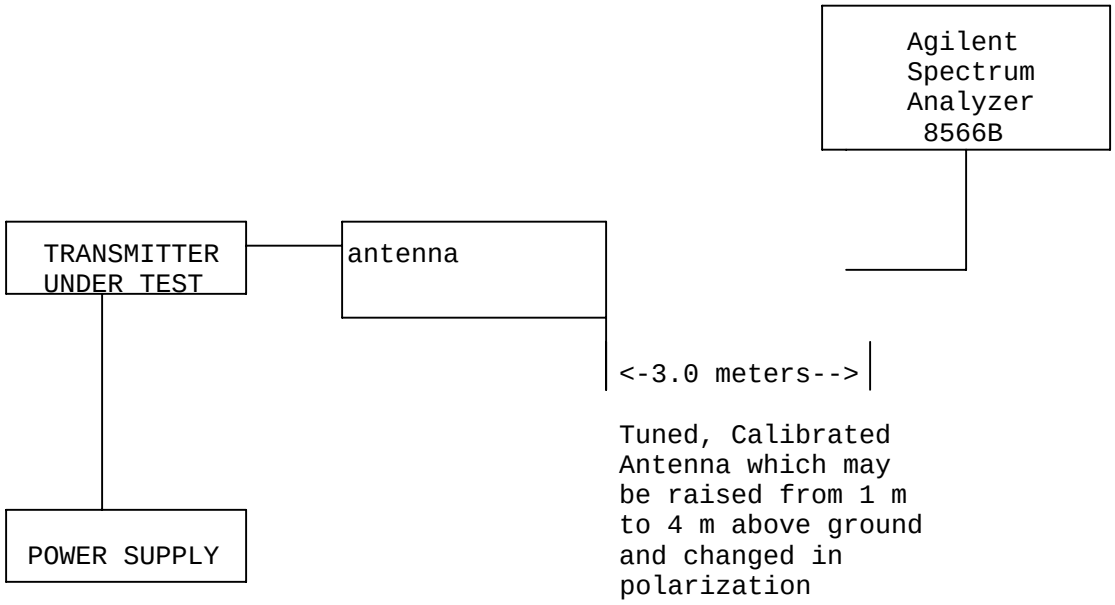
Method of Measuring Radiated Spurious Emissions



Equipment placed 80 cm above ground
on a rotating table platform.

METHOD OF MEASUREMENTS: The tabulated data shows the results of the worst case radiated field strength emissions test. The spectrum was scanned from 30 MHz 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 NW State Road 45, Newberry, FL 32669.

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2.1055 Frequency stability:

Measurement techniques have been in accordance with TIA/EIA STD 603-1992.

22.355: Frequency stability

Temperature and voltage tests were performed to verify that the frequency remains within the .00025%, 2.5 ppm specification limit for Base fixed unit. 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 transmitter was keyed ON for one minute during which four frequency readings were recorded at 15-second intervals. The worse case number was taken for temperature plotting. The assigned channel frequency was considered to be the reference frequency. The temperature was then reduced to -30° C after which the transmitter was again allowed to stabilize for one hour. The transmitter was keyed ON for one minute, 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 degrees C.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 836.520 252 MHz

TEMPERATURE_°C	FREQUENCY_MHz	PPM
REFERENCE	836.520 252	00.0
-30	836.518 730	- 1.82
-20	836.518 260	- 2.38
-10	836.518 464	- 2.14
0	836.520 418	+ 0.20
+10	836.519 659	- 0.71
+20	836.520 252	+ 0.00
+30	836.520 567	+ 0.38
+40	836.520 110	- 0.17
+50	836.518 911	- 1.60

BATT	%BATT.	DATA	PPM
	-15%	836.519625	-0.75

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 or Status
3-Meter OATS	TEI	N/A	N/A	Listed 1/13/03	1/12/06
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/27/04	3/26/07
Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 9/23/03	9/23/05
Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 9/23/03	9/23/05
Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 9/23/03	9/23/05
Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 9/23/03	9/23/05
Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/15/03	4/15/05
Blue Tower RF Preselector	HP	85685A	2620A00294	CAL 4/27/04	4/27/06
Blue Tower Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 4/15/03	4/15/05
Silver Tower Spectrum Analyzer	HP	8566B Opt 462	3552A22064 3638A08608	CAL 3/22/04	3/22/06
Silver Tower RF Preselector	HP	85685A	2926A00983	CAL 3/22/04	3/22/06
Silver Tower Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 3/22/04	3/22/06
Silver Tower Preamplifier	HP	8449B	3008A01075	CAL 3/22/04	3/22/06
Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/26/01	4/26/03
Biconnical Antenna	Eaton	94455-1	1096	CAL 8/17/04	8/17/06
Biconnical Antenna	Eaton	94455-1	1057	CAL 3/18/03	3/18/05
BiconiLog Antenna	EMCO	3143	9409-1043	No Cal Required	
Log-Periodic Antenna	Electro-Metrics	LPA-25	1122	CAL 8/26/04	8/26/06
Log-Periodic Antenna	Electro-Metrics	LPA-30	409	CAL 3/4/03	3/4/05
Log-Periodic	Eaton	96005	1243	CAL	5/8/05

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date or Status
Antenna				5/8/03	
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
Double-Ridged Horn Antenna	Electro-Metrics	RGA-180	2319	CAL 2/17/03	2/17/05
Horn Antenna *(at 3 meters)	Electro-Metrics	EM-6961	6246	CAL 3/31/03	3/31/05
Horn Antenna *(at 10 meters)	Electro-Metrics	EM-6961	6246	CAL 6/4/03	6/4/05
Passive Loop Antenna	EMC Test Systems	EMCO 6512	9706-1211	CHAR 7/10/01	7/10/03
Harmonic Mixer with Horn Antenna	Oleson Microwave Labs	M08HW/A	F30425-1	CHAR 4/25/03	4/25/05
Harmonic Mixer with Horn Antenna	Oleson Microwave Labs	M12HW/A	E30425-1	CHAR 4/25/03	4/25/05
LISN	Electro-Metrics	ANS-25/2	2604	CAL 8/27/04	8/27/06
LISN	Electro-Metrics	EM-7820	2682	CAL 3/12/03	3/12/05
Termaline Wattmeter	Bird Electronic Corporation	611	16405	CAL 7/16/04	7/16/06
Termaline Wattmeter	Bird Electronic Corporation	6104	1926	CAL 7/16/04	7/16/06
Oscilloscope	Tektronix	2230	300572	CAL 7/3/03	7/3/05
System One	Audio Precision	System One	SYS1-45868	CHAR 4/25/02	4/25/04
Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 1/22/02	1/22/04
AC Voltmeter	HP	400FL	2213A14499	CAL 7/19/04	7/19/06
AC Voltmeter	HP	400FL	2213A14261	CHAR 10/15/01	10/15/03
AC Voltmeter	HP	400FL	2213A14728	CHAR 10/15/01	10/15/03
Digital Multimeter	Fluke	77	35053830	CHAR 1/8/02	1/8/04
Digital Multimeter	Fluke	77	43850817	CHAR 1/8/02	1/8/04

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Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date or Status
Digital Multimeter	HP	E2377A	2927J05849	CHAR 1/8/02	1/8/04
Multimeter	Fluke	FLUKE-77-3	79510405	CHAR 9/26/01	9/26/03
Peak Power Meter	HP	8900C	2131A00545	CAL 7/2/03	7/2/05
Power Sensor	Agilent Technologies	84811A	2551A02705	CAL 7/2/03	7/2/05
Power Meter	HP	432A	1141A07655	CAL 4/15/03	4/15/05
Power Sensor	HP	478A	72129	CAL 4/15/03	4/15/05
Power Meter And Sensor	Bird	4421-107 & 4022	0166 & 0218	CAL 4/16/03	4/16/05
Digital Thermometer	Fluke	2166A	42032	CAL 7/19/04	7/19/06
Thermometer	Traulsen	SK-128		CHAR 1/22/02	1/22/04
Thermometer	Extech	4028	14871-2	CAL 3/7/03	3/7/05
Hygro-Thermometer	Extech	445703	0602	CAL 10/4/02	10/4/04
Frequency Counter	HP	5352B	2632A00165	CAL 8/3/04	8/3/06
Frequency Counter	HP	5385A	2730A03025	CAL 3/7/03	3/7/05
Service Monitor	IFR	FM/AM 500A	5182	CAL 11/22/00	Out of Service
Comm. Serv. Monitor	IFR	FM/AM 1200S	6593	CAL 5/12/02	5/12/04
Signal Generator	HP	8640B	2308A21464	CAL 8/26/04	8/26/06
Sweep Generator	Wiltron	6648	101009	CAL 4/15/03	4/15/05
Sweep Generator	Wiltron	6669M	007005	CAL 3/3/03	3/3/05
Modulation Analyzer	HP	8901A	3435A06868	CAL 9/5/01	9/5/03
Modulation Meter	Boonton	8220	10901AB	CAL 4/15/03	4/15/05
Near Field Probe	HP	HP11940A	2650A02748	CHAR 2/1/01	Out of Service
BandReject Filter	Lorch	5BR4-	Z1	CHAR	4/17/05

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date or Status
	Microwave	2400/60-N		4/17/03	
BandReject Filter	Lorch Microwave	6BR6-2442/300-N	Z1	CHAR 4/17/03	4/17/05
BandReject Filter	Lorch Microwave	5BR4-10525/900-S	Z1	CHAR 4/12/03	4/12/05
Notch Filter	Lorch Microwave	5BRX-850/X100-N	AD-1	CHAR 4/17/03	4/17/05
High Pass Filter	Unk	3768(5)-400	041	CHAR 12/17/02	12/17/04
High Pass Filter	Microlab	HA-10N		CHAR 11/17/02	11/17/04
High Pass Filter	Microlab	HA-20N		CHAR 12/17/02	12/17/04
Audio Oscillator	HP	653A	832-00260	CHAR 12/1/02	12/1/04
Audio Generator	B&K Precision	3010	8739686	CHAR 12/1/02	12/1/04
Frequency Counter	HP	5382A	1620A03535	CHAR 3/2/01	Out of Service
Frequency Counter	HP	5385A	3242A07460	CAL 3/7/03	3/7/05
Amplifier	HP	11975A	2738A01969	No Cal Required	
Egg Timer	Unk			CHAR 2/1/02	2/1/04
Measuring Tape-20M	Kraftixx	0631-20		CHAR 2/1/02	2/1/04
Measuring Tape-7.5M	Kraftixx	7.5M PROFI		CHAR 2/1/02	2/1/04
Coaxial Cable #51	Insulated Wire Inc.	NPS 2251-2880	Timco #51	CHAR 1/23/02	1/23/04
Coaxial Cable #64	Semflex Inc.	60637	Timco #64	CHAR 1/24/02	1/24/04
Coaxial Cable #65	General Cable Co.	E9917 RG233/U	Timco #65	CHAR 1/23/02	1/23/04
Coaxial Cable #106	Unknown	Unknown	Timco #106	CHAR 1/23/02	1/23/04
Injection Probe	Fischer Custom Communications	F-120-9A	270	CAL 6/1/01	6/1/03
Power Line Coupling/Decoupling Network	Fischer Custom Communications	FCC-801-M2-16A	01048	CAL 8/29/01	8/29/03
Power Line	Fischer Custom	FCC-801-M3-	01060	CAL	8/29/03

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date or Status
Coupling/Decoupling Network	Communications	16A		8/29/01	
VHF/UHF Current Probe	Fischer Custom Communications	F-52	130	CAL 8/30/01	8/30/03
Passive Impedance Adapter	Fischer Custom Communications	FCC-801-150-50-CDN	01117 & 01118	CAL 8/29/01	8/29/03
Radiating Field Coil	Fischer Custom Communications	F-1000-4-8/9/10-L-1M	9859	CAL 10/15/98	10/15/00
EMC Immunity Test System	Keytek	CEMASTER	9810210	CAL 2/1/02	2/1/04
Compliance Test System - AC Power Source	California Instruments	1251RP	L05865	CAL 2/25/04	2/25/06
Compliance Test System - PACS-1 Module	California Instruments	PACS-1	X71484	CAL 2/25/04	2/25/06
Isotropic Field Probe	Amplifier Research	FP5000	22839		
Isotropic Field Probe	Amplifier Research	FP5000	300103		
Capacitor Clamp	Keytek	CM-CCL	9811359	No Cal Required	
Amplifier	Amplifier Research	10W1000B	23117	No Cal Required	
Field Monitor	Amplifier Research	FM5004	22288	No Cal Required	
ELF Meter	F. W. Bell	4060	Not Serialized		Out of Service
Standard Gain Horn 1.0-2.4 GHz	Polarad	CA-L	235	No Cal Required	
Standard Gain Horn 2.14-4.34 GHz	Polarad	CA-S	203	No Cal Required	
Standard Gain Horn 3.95-5.85 GHz	Scientific-Atlanta Inc.	11A-3.9	8448CG	No Cal Required	
Standard Gain Horn 8.2-12.5 GHz	Systron Donner	DBG-520-20	Not Serialized	No Cal Required	
Standard Gain Horn 18.0-26.3 GHz	Systron Donner	DBE-520-20	Not Serialized	No Cal Required	
Standard Gain Horn 26.5-40.2 GHz	Systron Donner	DBD-520-20	Not Serialized	No Cal Required	
Standard Gain Horn 40.0-60.0 GHz	ATM	19-443-6R	Not Serialized	No Cal Required	
Double-Ridged Horn	EMCO	3116	9011-2145		Out of

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Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date or Status
Antenna					Service
Standard Gain Horn 12.4-18.0 GHz	ATM	62-442-6	D262108-01	No Cal Required	
Standard Gain Horn 5.85-8.2 GHz	ATM	137-442-2	D261908-01	No Cal Required	
AC Voltmeter	HP	400F	0950A05433	CAL 8/13/03	8/13/05
RF Power Amplifier	Ophir RF	5150F	1041 'X1'	No Cal Required	
Electric Field Sensor	Amplifier Research	FP6001	302504		
Electric Field Sensor	Amplifier Research	FP6001	302510	CAL 6/1/04	6/1/06
Surge Generator	Com-Power Corporation	SG-168	25802	CAL 2/27/04	2/27/06
RF Power Amplifier	Ophir RF, Inc.	5150F	1041	CHAR 10/31/03	10/31/05
3-Meter Anechoic Chamber	Panashield	N/A	N/A	Listed 5/12/04	5/11/07
Digital Multimeter	Fluke	77III	79510408	CAL 7/19/04	7/19/06
Open-Frame Tower Spectrum Analyzer	HP	8566B/85662A	2627A03154/2648A14276	CAL 7/9/04	7/9/06
Open-Frame Tower RF Preselector	HP	85685A	3107A01282	CAL 7/9/04	7/9/06
Open-Frame Tower Quasi-Peak Adapter	HP	85650A	2046A00305	CAL 7/9/04	7/9/06
Signal Generator	HP	8648C	3847A04696	CAL 9/27/04	9/27/06