TIMCO ENGINEERING INC.
849 NW State Road 45
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888.472.2424 F 352.472.2030 email: sid@timcoengr.com

Test Report

Product Name: UHF DATA RADIO

FCC ID: MMASD171

Applicant:

MIDLAND RADIO CORPORATION
1120 CLAY STREET
KANSAS CITY, MO 64116

Date Receipt: FEBRUARY 23, 2004

Date Tested: MARCH 22, 2004

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APPLICANT: MIDLAND RADIO CORPORATION

FCC ID: MMASD171

TEST REPORT:

EXHIBITS CONTAINING:

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GENERAL INFORMATION REQUIRED
FOR TYPE ACCEPTANCE

2.1033(c)(1)(2) Midland Radio Corporation will manufacture the FCCID: MMASD171 UHF TRANSCEIVER in quantity, for use under FCC RULES PART 90.

MIDLAND RADIO CORPORATION
1120 CLAY STREET
KANSAS CITY, MO 64116

2.1033(c) **TECHNICAL DESCRIPTION**

2.1033(c)(3) Instruction book. A draft copy of the instruction manual is included in the exhibits.

Necessary bandwidth for wideband in kHz:
2.1033(c) (4) Type of Emission: 15K0F3E
90.209

Bn = 2M + 2DK
M = 3000
D = 4500
Bn = 2(3000)+2(4500) = 6000 + 9000 = 15k
For 25kHz
Allowed Authorized Bandwidth 20 kHz

Necessary bandwidth for narrowband in kHz:
2.1033 (4) Type of Emission: 10K2F3E
90.209

Bn = 2M + 2DK
M = 3000
D = 2100
K = 1
Bn = 2(3000)+ 2(2100)(1)=6k + 4.2k = 10.2k

For 12.5 kHz
ALLOWED AUTHORIZED BANDWIDTH = 11.25 kHz.

Necessary bandwidth for narrowband data channel is:
2.1033 (4) Type of Emission: 11K2F2D
90.209

Bn = 2M + 2DK
M = 9,600 Bits per second
D = 825 Hz (Peak Deviation)
K = 1
Bn = 2(9.6k/2)+ 2(825)(1)=9.6k + 1.65k = 11.25k

For 12.5 kHz
ALLOWED AUTHORIZED BANDWIDTH = 11.25 kHz.

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2.1033(c)(5) 90.209	Frequency Range:	148 - 174 MHz
2.1033(c)(6)(7) 90.205	Power Output shall not exceed 59 Watts into a 50 ohm resistive load. There are no user power controls.	

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

FINAL AMPLIFIER ONLY (148 MHz)
INPUT POWER – HIGH: (12V)(1.42A) = 17.04 Watts
INPUT POWER – LOW: (12V)(0.63A) = 7.56 Watts

FINAL AMPLIFIER ONLY (174 MHz)
INPUT POWER – HIGH: (12V)(1.39A) = 16.68 Watts
INPUT POWER – LOW: (12V)(0.61A) = 7.32 Watts

2.1033(c)(9) Tune-up procedure. The tune-up procedure is included in the exhibits.

2.1033(c)(10) Complete Circuit Diagrams: The circuit diagram and block diagram are included in the exhibits.

(11) Function of each electron tube or semiconductor device or other active circuit device are included in the exhibits.

(12) Description of all circuitry and devices provided for determining and stabilizing frequency is included in the circuit description in the instruction manual.

2.1033(c)(13) A photograph or drawing of the equipment identification label is shown in the exhibits.

2.1033(c)(14) Photographs of the equipment of sufficient clarity to reveal equipment construction and layout and label location are shown in the exhibits.

2.1033(c)(15) For equipment employing digital modulation, a detail description of the modulation technique. This UUT uses FSK to modulate the transmitter.

2.1033(c)(16) The data required for 2.1046 through 2.1057 is submitted below.

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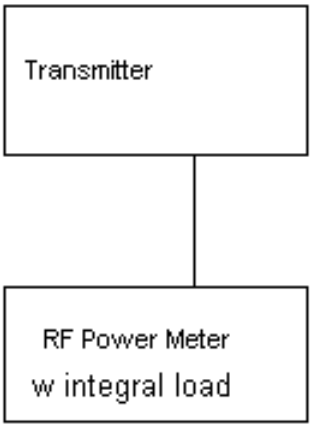
2.1046(a) **RF POWER OUTPUT**

RF power is measured by connecting a 50-ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage of 12 VDC, and the transmitter properly adjusted the RF output measures:

OUTPUT POWER: HIGH – 5.0 Watts Conducted
LOW - 1.0 Watts Conducted



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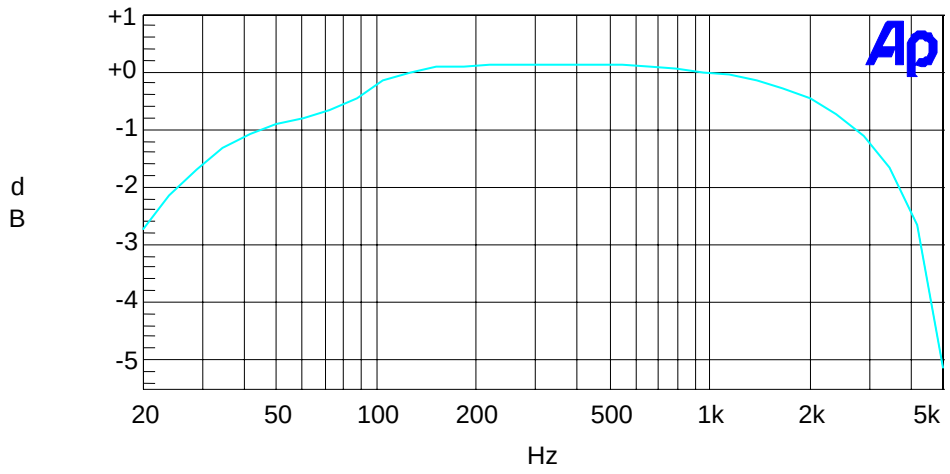
2.1047(a)(b) **Modulation characteristics:**

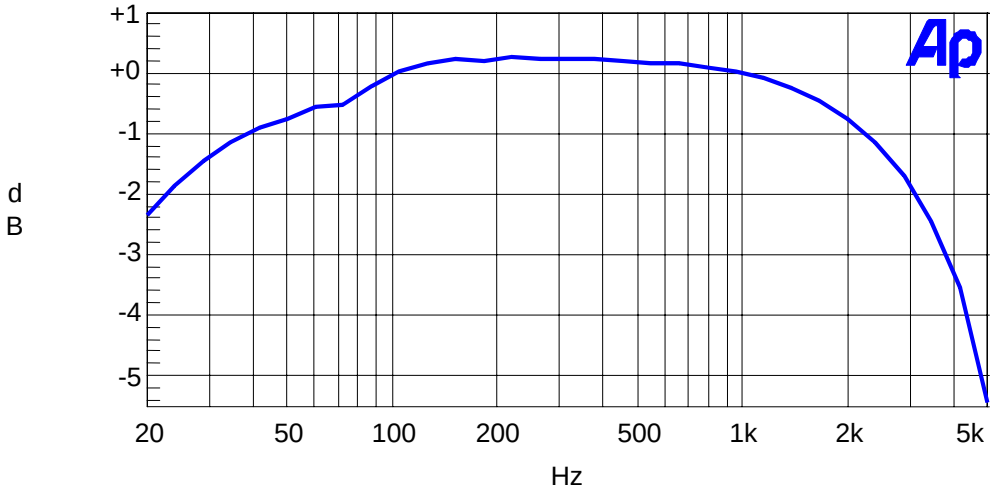
AUDIO FREQUENCY RESPONSE

The audio frequency response was measured in accordance with TIA/EIA Specification 603. The audio frequency response curve is shown below. The audio signal was fed into a dummy microphone circuit and into the microphone connector. The input required to produce 30 percent modulation level was measured.

Audio Response 25k

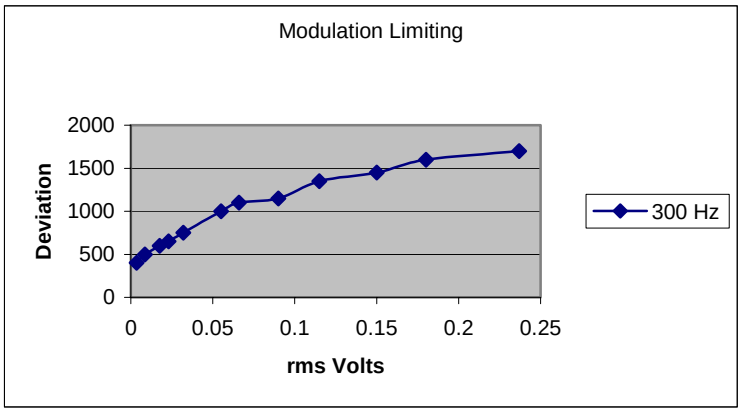


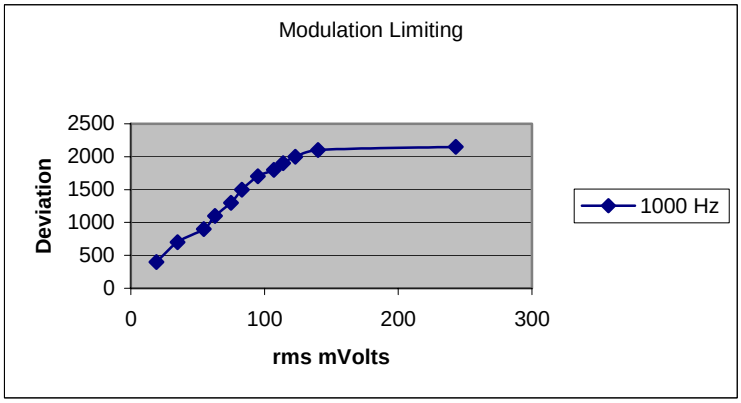
Audio Frequency Response 12.5K

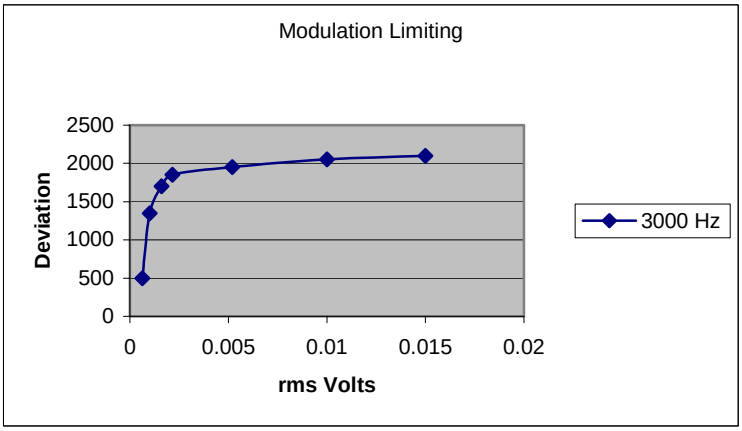


2.1047(b) **Audio input versus modulation – Narrow Band**

The audio input level needed for a particular percentage of modulation was measured in accordance with TIA/EIA Specification 603. The audio input curves versus modulation are shown below. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

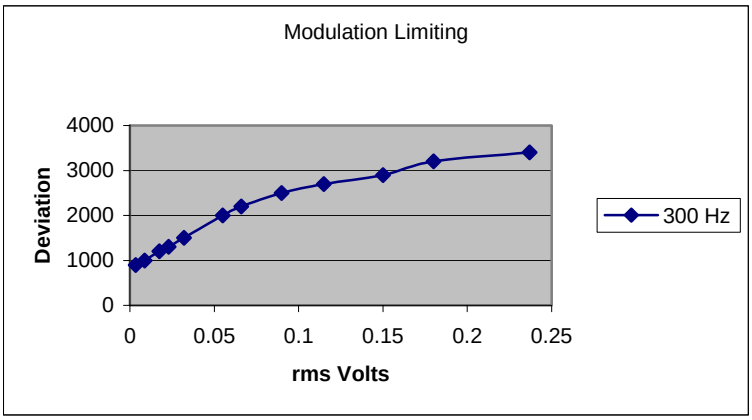


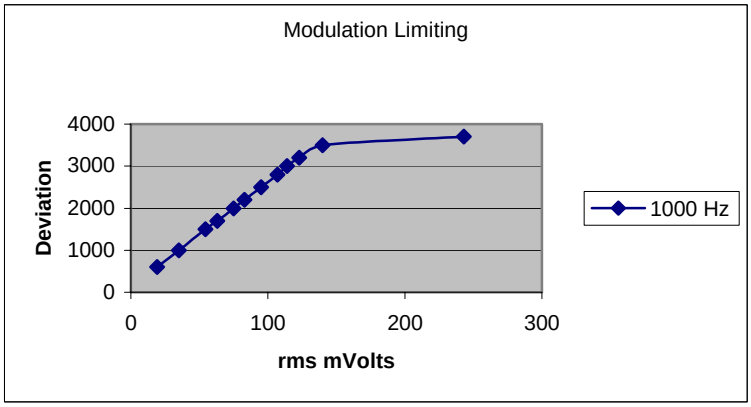


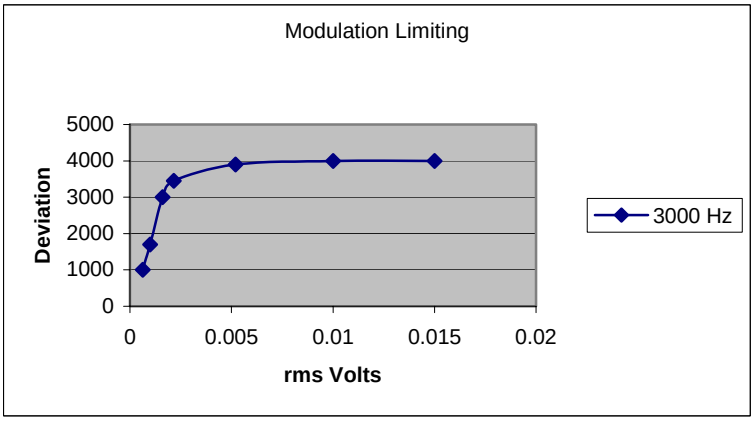


2.1047(b) **Audio input versus modulation – Wide Band**

The audio input level needed for a particular percentage of modulation was measured in accordance with TIA/EIA Specification 603. The audio input curves versus modulation are shown below. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.







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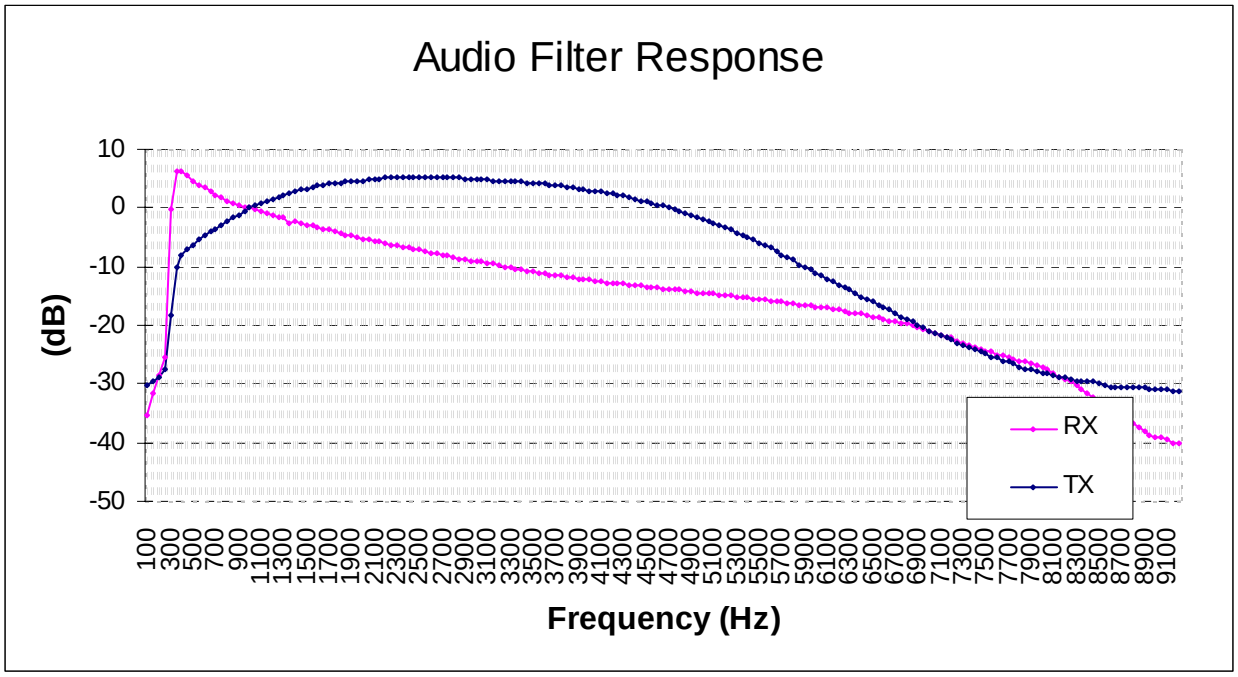
Post Limiter Filter

The filter must be between the modulation limiter and the modulated stage. At any frequency between 3 & 20 kHz the filter must have an attenuation of 60log (f/3) greater that the attenuation at 1kHz. See the plot below.



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2.1049
90.210(b)

Occupied bandwidth:

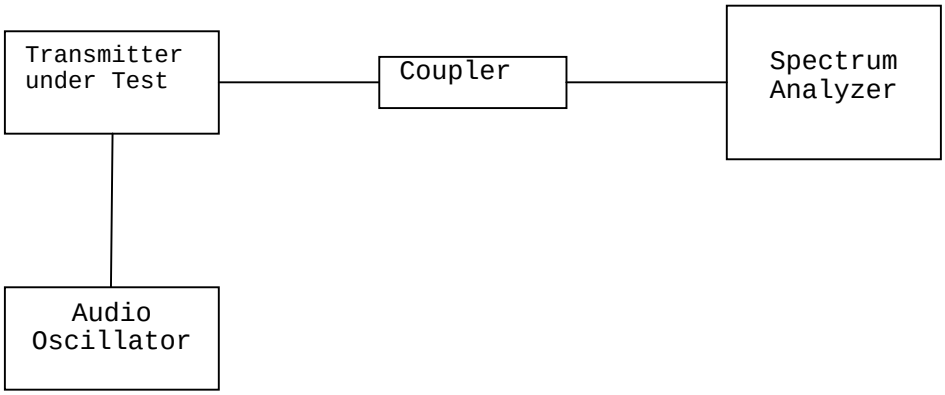
Emission Mask B: Data in the plots show that on any frequency removed from the assigned frequency by more than 50%, but not more than 100%: At least 25dB. On any frequency removed from the assigned frequency by more than 100%, but not more than 250%: At least 35 dB. On any frequency removed from the assigned frequency by more than 250%, of the authorized bandwidth: At least 43 +10log(P)dB.

Radiotelephone Transmitter with Modulation Limiter

Test procedure: TIA/EIA-603 para 2.2.11, with the exception that various tones were used.

Test procedure diagram

OCCUPIED BANDWIDTH MEASUREMENT



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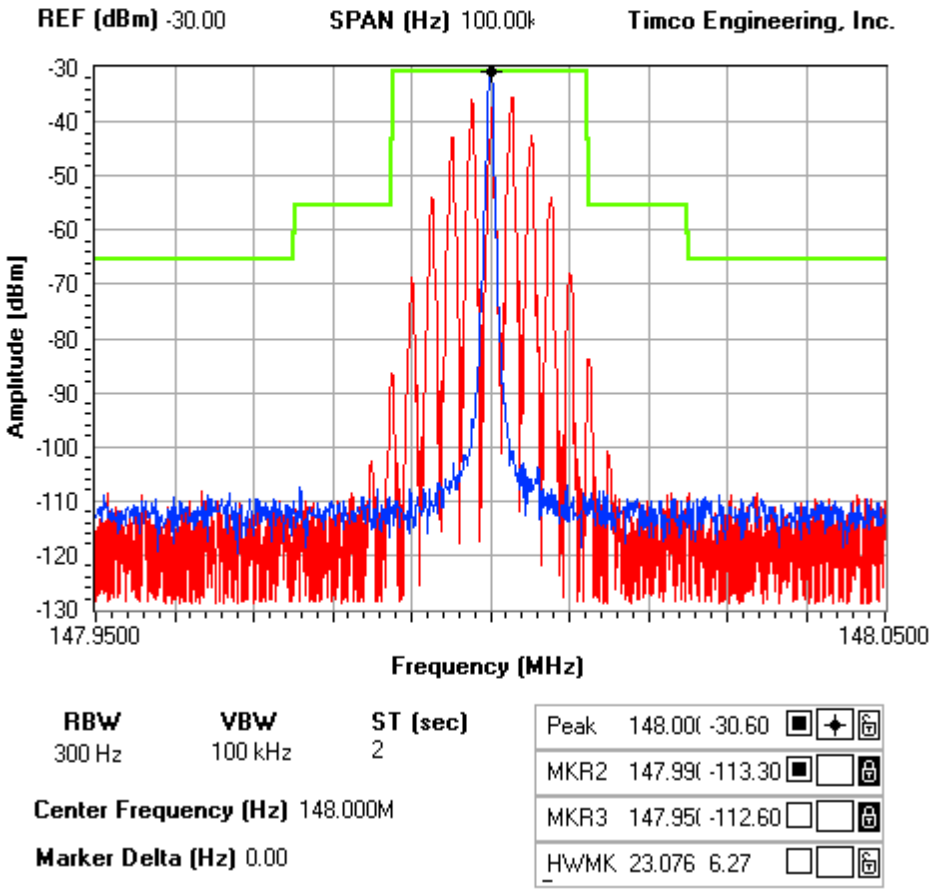
OCCUPIED BANDWIDTH
Wideband Voice Channel

NOTES:
213aut4 Midland MMA sd171 occupied bw 25k

FCC 90.210 Mask B



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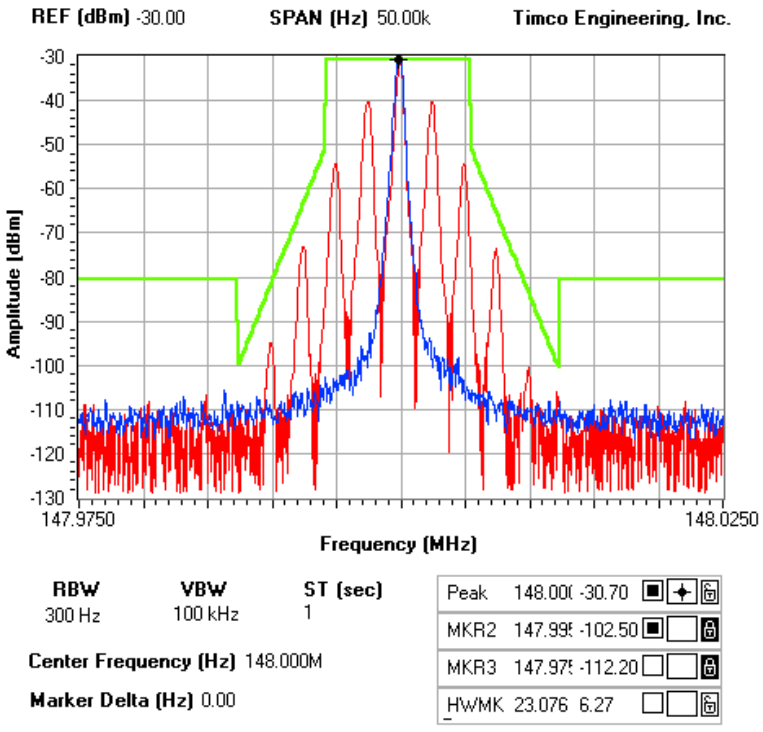
90.210(d) Emission Mask D - 12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0: Zero dB.
(2) On any frequency from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27 (fd - 2.88 kHz) dB.
(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least 50 + 10log(P) dB or 70 dB, whichever is the lesser attenuation.

OCCUPIED BANDWIDTH
Narrowband Voice Channel

NOTES:
213aut4 occ bw 12.5k

FCC 90.210 Mask D



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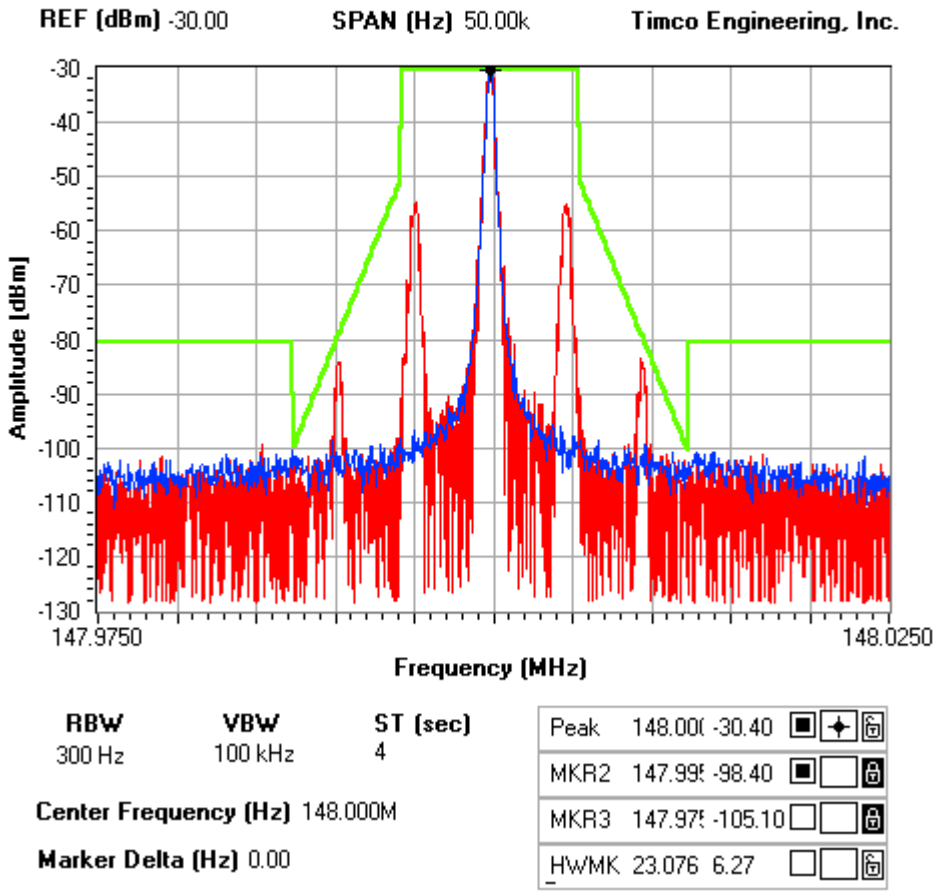
OCCUPIED BANDWIDTH
Narrowband Data Channel

NOTES:
213aut4 12.5kch 9600 baud

FCC 90.210 Mask D



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2.1051 **Spurious emissions at antenna terminals (conducted):**

Data below shows the level of conducted spurious responses. The carrier was modulated 100% using a 2500 Hz 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: Worse case Emissions must be 50 + 10log(Po) dB below the mean power output of the transmitter.

50 + 10log(1) = 50 **50 + 10log(5) = 57**

TF LOW POWER	EF	dB below carrier	TF HIGH POWER	EF	dB below carrier
148	148	0.0	148	148	0.0
	296	73.9		296	80.7
	444	84.4		444	89.8
	592	93.1		592	100.1
	740	108.1		740	104
	888	109.3		888	107.3
	1036	103.0		1036	106.9
	1184	107.3		1184	114.9
	1332	95.8		1332	92.7
	1480	86.0		1480	84

TF LOW POWER	EF	dB below carrier	TF HIGH POWER	EF	dB below carrier
174	174	0.0	174	174	0.0
	348	73.7		348	88.1
	522	92.7		522	98.2
	696	107.3		696	102.7
	870	109.5		870	115
	1044	99.8		1044	108.3
	1218	107.1		1218	114.5
	1392	103.5		1392	104.2
	1566	96.9		1566	96.2
	1740	103.7		1740	97

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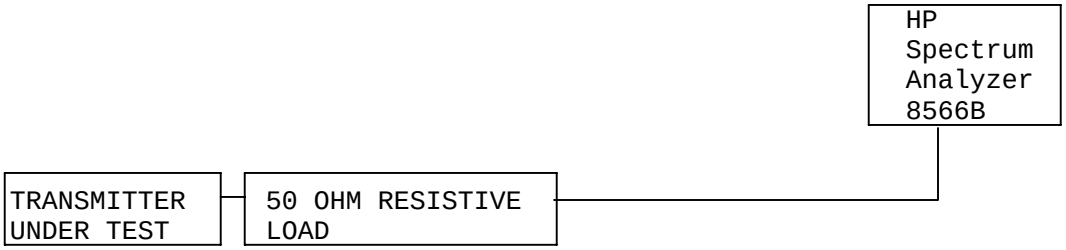
Method of Measuring Conducted Spurious Emissions



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 Field strength of spurious emissions:

NAME OF TEST: **RADIATED SPURIOUS EMISSIONS (148 MHz)**

REQUIREMENTS: Emissions must be 50 + 10log(Po) dB below the mean power output of the transmitter.

50 + 10log(1) = 43 dB
50 + 10log(5) = 57 dB

TEST DATA (LOW):

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
148.00	H	27.90	0	0	0
296.00	H	-35.90	0	-2.21	66.01
444.00	H	-36.50	0	-0.45	64.85
592.00	H	-38.60	0	-0.45	66.95
740.00	H	-42.60	0	-0.79	71.29
888.00	H	-44.80	0	-0.046	72.746
1036.00	H	-49.50	1.0072	3.094	75.3132
1184.00	H	-52.80	1.0368	-3.686	85.4228
1332.00	H	-48.80	1.0664	-4.278	82.0444
1480.00	H	-51.40	1.096	4.87	75.526

TEST DATA (HIGH):

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
148.00	H	34.30	0	0	0
296.00	H	-21.80	0	-2.21	58.31
444.00	H	-23.40	0	-0.45	58.15
592.00	H	-31.50	0	-0.45	66.25
740.00	H	-36.20	0	-0.79	71.29
888.00	H	-34.00	0	-0.046	68.346
1036.00	H	-38.90	1.0072	3.094	71.1132
1184.00	H	-46.30	1.0368	-3.686	85.3228
1332.00	H	-45.50	1.0664	-4.278	85.1444
1480.00	H	-43.30	1.096	4.87	73.826

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2.1053 Field strength of spurious emissions:

NAME OF TEST: **RADIATED SPURIOUS EMISSIONS (174 MHz)**

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

50 + 10log(1) = 50 dB
50 + 10log(5) = 57 dB

TEST DATA (LOW):

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
174.00	H	27.10	0	0	0
348.00	H	-40.00	0	-1.15	68.25
522.00	V	-44.50	0	-0.562	72.162
696.00	H	-48.80	0	0.434	75.466
870.00	H	-55.10	0	-0.39	82.59
1044.00	H	-51.70	1.0088	3.126	76.6828
1218.00	H	-55.40	1.0436	3.822	79.7216
1392.00	H	-56.00	1.0784	4.518	79.6604
1566.00	H	-54.60	1.112	5.2896	77.5224

TEST DATA (HIGH):

Emission Frequency MHz	Ant. Polarity	Corrected EUT Signal Reading	Coax Loss (dB)	Substitution Antenna (dBd)	dB Below Carrier (dBc)
174.00	H	34.20	0	0	0
348.00	H	-25.20	0	-1.15	60.55
522.00	V	-35.20	0	-0.562	69.962
696.00	H	-36.30	0	0.434	70.066
870.00	H	-51.40	0	-0.39	85.99
1044.00	H	-48.60	1.0088	3.126	80.6828
1218.00	H	-53.60	1.0436	3.822	85.0216
1392.00	H	-49.70	1.0784	4.518	80.4604
1566.00	H	-54.30	1.112	5.2896	84.3224
1740.00	H	-51.40	1.248	5.394	81.454

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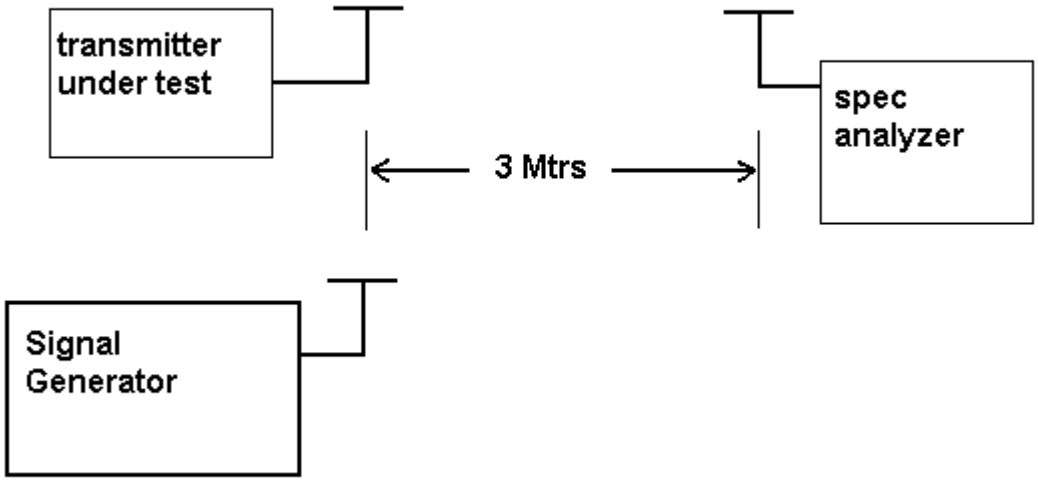
Method of Measuring Radiated Spurious Emissions



METHOD OF MEASUREMENTS: The tabulated data shows the results of the 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 90.213(a)(1) Frequency stability:

Temperature and voltage tests were performed to verify that the frequency remains within the 5 ppm specification limit for 25 kHz spacing and 2.5 ppm for 12.5 kHz spacing. 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° C.

Readings were also taken at minus 15% of the battery voltage of 12 VDC, which we estimate to be the battery endpoint.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 160.000 000 MHz

TEMPERATURE_°C	FREQUENCY_MHz	PPM
REFERENCE_____	160.000 000	00.0
-30_____	160.999 77	- 1.43
-20_____	160.999 800	- 1.24
-10_____	160.999 8	- 1.24
0_____	160.999 810	- 1.18
+10_____	160.999 900	- 0.62
+20_____	160.999 93	- 0.43
+30_____	160.999 92	- 0.50
+40_____	160.999 88	- 0.75
+50_____	160.999 85	- 0.93

BATT	%BATT. DATA	VOLTS	BATT. PPM
-15%	160.999 94	10.82	- 0.37

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

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2.1055(a)(1) Frequency stability:
90.214 Transient Frequency Behavior

REQUIREMENTS: Transmitters designed to operate in the 150-174 MHz and 421-512 MHz frequency bands must maintain transient frequencies within the maximum transient frequencies within the maximum frequency difference limits during the time intervals indicated:

Time Intervals	Maximum frequency difference	All Equipment	
		150-174 MHz	421-512 MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels			
t_1[4]	±25.0 kHz	5.0 mS	10.0 mS
t_2	±12.5 kHz	20.0 mS	25.0 mS
t_3[4]	±25.0 kHz	5.0 mS	10.0 mS
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels			
t_1[4]	±12.5 kHz	5.0 mS	10.0 mS
t_2	±6.25 kHz	20.0 mS	25.0 mS
t_3[4]	±12.5 kHz	5.0 mS	10.0 mS
Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels			
t_1[4]	±6.25 kHz	5.0 mS	10.0 mS
t_2	±3.125 kHz	20.0 mS	25.0 mS
t_3[4]	±6.25 kHz	5.0 mS	10.0 mS

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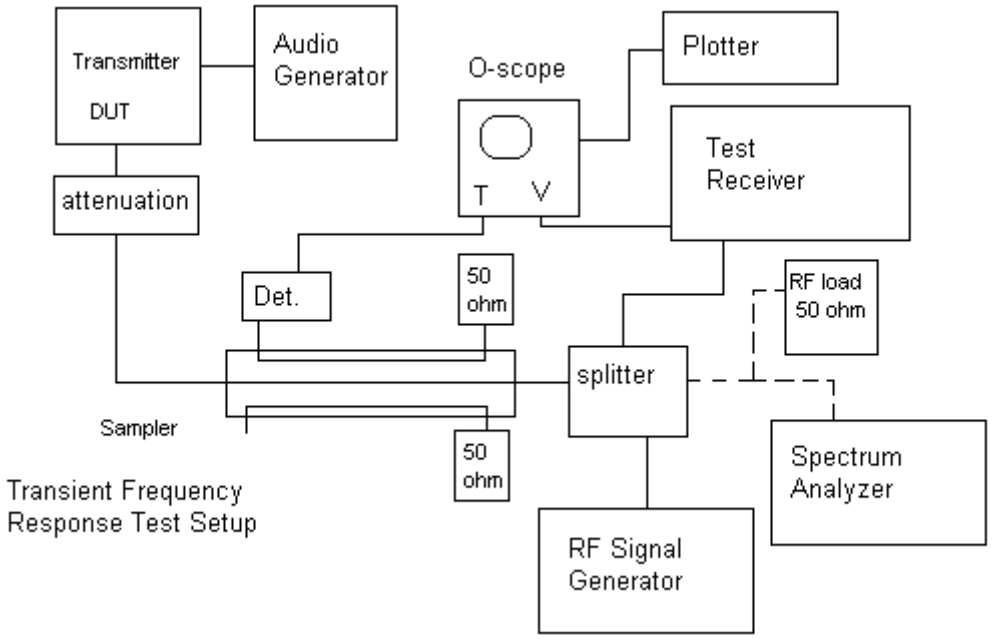
TEST PROCEEDURE: TIA/EIA TS603 PARA 2.2.19, the levels were set as follows;

1. Using the variable attenuator the transmitter level was set to 40 dB below the test receivers maximum input level, then the transmitter was turned off.
2. With the transmitter off the signal generator was set 20dB below the level of the transmitter in the above step, this level will be maintained with the signal generator through-out the test.
3. Reduce the attenuation between the transmitter and the RF detector by 30 dB.
4. With the levels set as above the transient frequency behavior was observed & recorded.



Transient Frequency Response Test Setup

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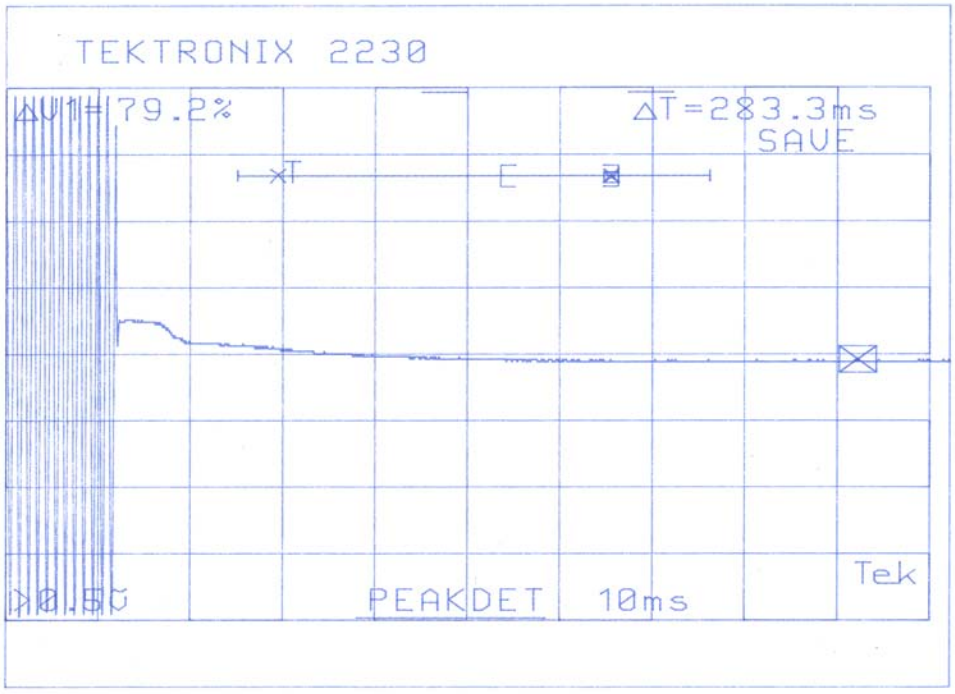
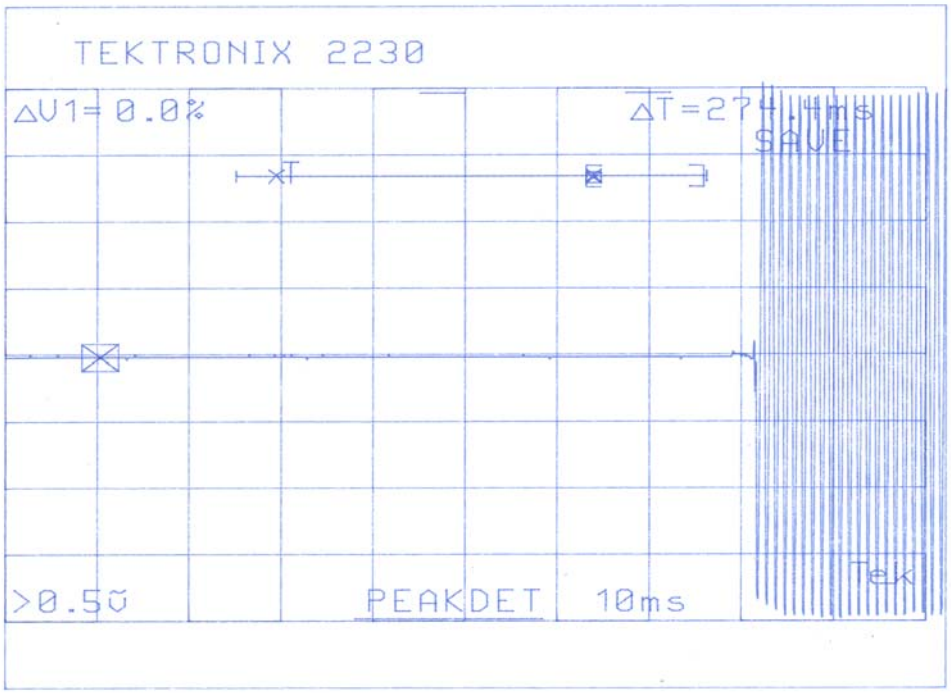
TRANSIENT FREQUENCY RESPONSE
25 KHz





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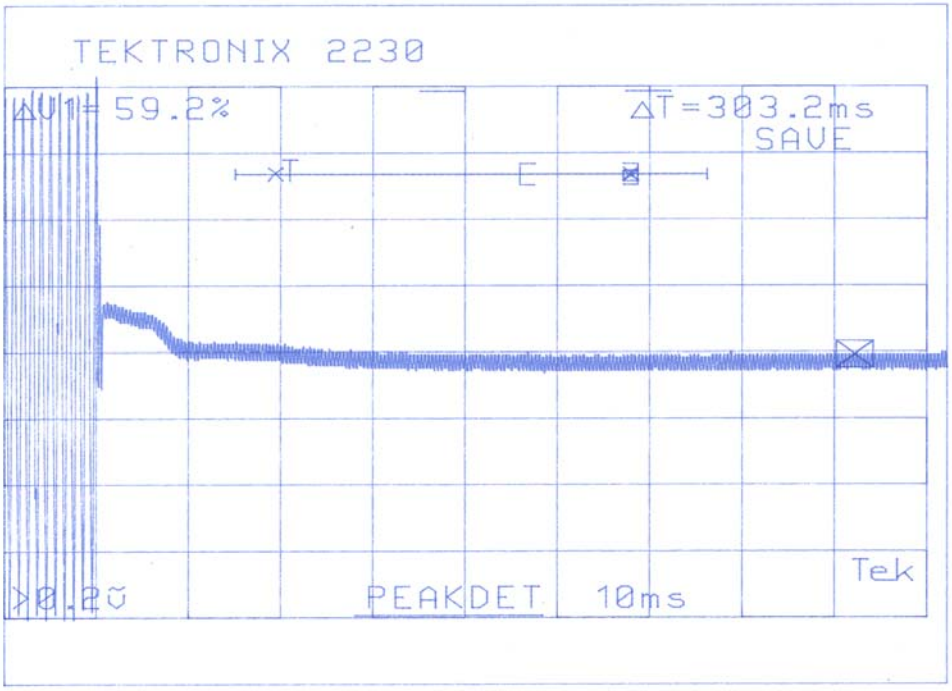
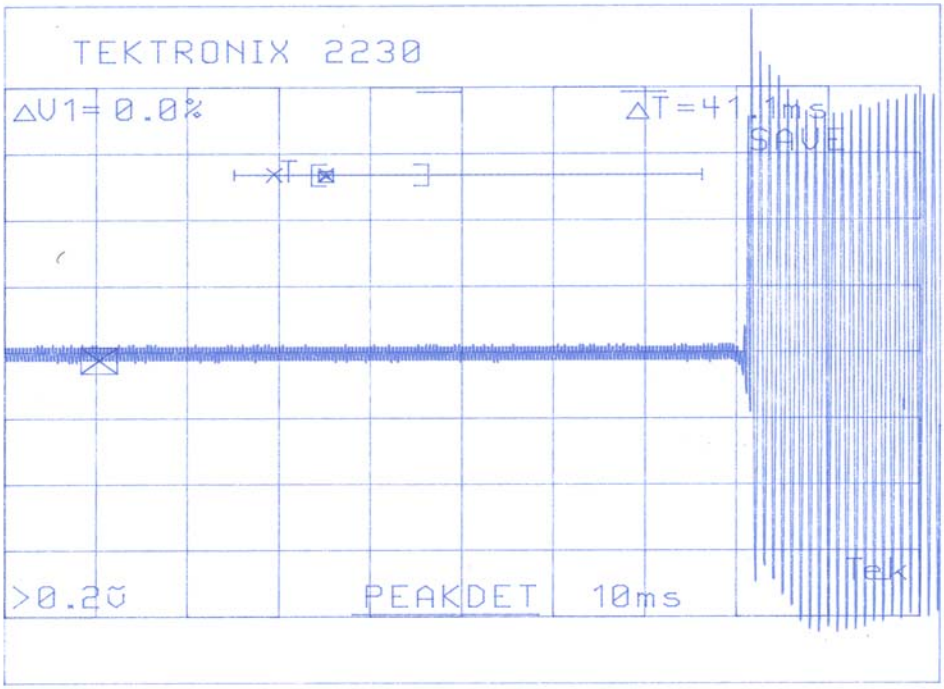
TRANSIENT FREQUENCY RESPONSE
12.5 KHz





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EMC Equipment List

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
X	3-Meter OATS	TEI	N/A	N/A	Listed 1/13/03	1/13/06
	3/10-Meter OATS	TEI	N/A	N/A	Listed 3/26/01	3/26/04
	Receiver, Beige Tower					
	Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 8/31/01	8/31/03
	RF Preselector	HP	85685A	3221A01400	CAL 8/31/01	8/31/03
	Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 8/31/01	8/31/03
X	Receiver, Blue Tower					
X	Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/15/03	4/15/05
X	RF Preselector	HP	85685A	2926A00983	CAL 4/15/03	4/15/05
X	Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 4/15/03	4/15/05
	Receiver, Silver/Grey Tower					
	Spectrum Analyzer	HP	8566B Opt 462	3552A22064 3638A08608	CAL 10/14/02	10/14/04
	RF Preselector	HP	85685A	2620A00294	CAL 10/14/02	10/14/04
	Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 10/14/02	10/14/04
	Preamplifier	HP	8449B	3008A01075	CHAR 1/28/02	1/28/04
X	Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/26/01	4/26/03
	Biconnical Antenna	Eaton	94455-1	1096	CAL 10/1/01	10/1/03
	Biconnical Antenna	Eaton	94455-1	1057	CAL 3/18/03	3/18/05
	BiconiLog Antenna	EMCO	3143	9409-1043		
X	Log-Periodic Antenna	Electro-Metrics	LPA-25	1122	CAL 10/2/01	10/2/03
	Log-Periodic Antenna	Electro-Metrics	EM-6950	632	CHAR 10/15/01	10/15/03
	Log-Periodic Antenna	Electro-Metrics	LPA-30	409	CAL 3/4/03	3/4/05

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	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	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	Electro-Metrics	EM-6961	6246	CAL 3/31/03	3/31/05
	Horn Antenna	ATM	19-443-6R	None	No Cal Required	
	Passive Loop Antenna	EMC Test Systems	EMCO 6512	9706-1211	CHAR 7/10/01	7/10/03
	Line Impedance Stabilization . . .	Electro-Metrics	ANS-25/2	2604	CAL 10/9/01	10/9/03
	Line Impedance Stabilization . . .	Electro-Metrics	EM-7820	2682	CAL 3/12/03	3/12/05
	Termaline Wattmeter	Bird Electronic Corporation	611	16405	CAL 5/25/99	5/25/01
	Termaline Wattmeter	Bird Electronic Corporation	6104	1926	CHAR 12/12/01	12/12/03
	Oscilloscope	Tektronix	2230	300572	CHAR 2/1/01	2/1/03
	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 10/9/01	10/9/03
	AC Voltmeter	HP	400FL	2213A14261	CHAR 10/15/01	10/15/03
	AC Voltmeter	HP	400FL	2213A14728	CHAR 10/15/01	10/15/03
X	Digital Multimeter	Fluke	77	35053830	CHAR 1/8/02	1/8/04
	Digital Multimeter	Fluke	77	43850817	CHAR 1/8/02	1/8/04
	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	CHAR 1/26/01	1/26/03
	Power Meter	HP	432A	1141A07655	CAL 4/15/03	4/15/05

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	Power Meter And Sensor	Bird	4421-107 4022	0166 0218	CAL 4/16/03	4/16/05
	Power Sensor	HP	478A	72129	CAL 4/15/03	4/15/05
	Digital Thermometer	Fluke	2166A	42032	CAL 1/16/02	1/16/04
	Thermometer	Traulsen	SK-128		CHAR 1/22/02	1/22/04
	Thermometer	Extech	4028	14871-2	CAL 3/7/03	3/7/05
X	Hygro-Thermometer	Extech	445703	0602	CAL 10/4/02	10/4/04
	Frequency Counter	HP	5352B	2632A00165	CAL 11/28/01	11/28/03
	Frequency Counter	HP	5385A	2730A03025	CAL 3/7/03	3/7/05
	Power Sensor	Agilent Technologies	84811A	2551A02705	CHAR 1/26/01	1/26/03
	Service Monitor	IFR	FM/AM 500A	5182	CAL 11/22/00	11/22/02
	Comm. Serv. Monitor	IFR	FM/AM 1200S	6593	CAL 5/12/02	5/12/04
	Signal Generator	HP	8640B	2308A21464	CAL 2/15/02	2/15/04
	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	2/1/03
	BandReject Filter	Lorch Microwave	5BR4-2400/ 60-N	Z1	CHAR 3/2/01	3/2/03
	BandReject Filter	Lorch Microwave	6BR6-2442/ 300-N	Z1	CHAR 3/2/01	3/2/03
	BandReject Filter	Lorch Microwave	5BR4-10525/ 900-S	Z1	CHAR 3/2/01	3/2/03
	High Pass Filter	Microlab	HA-10N		CHAR 10/4/01	10/4/03
	High Pass Filter	Microlab	HA-20N		CHAR 2/7/03	2/7/05

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	Audio Oscillator	HP	653A	832-00260	CHAR 3/1/01	3/1/03
	Frequency Counter	HP	5382A	1620A03535	CHAR 3/2/01	3/2/03
	Frequency Counter	HP	5385A	3242A07460	CAL 3/7/03	3/7/05
	Preamplifier	HP	8449B-H02	3008A00372	CHAR 3/4/01	3/4/03
	Amplifier	HP	11975A	2738A01969	CHAR 3/1/01	3/1/03
	Egg Timer	Unk			CHAR 8/31/01	8/31/03
	Measuring Tape, 20M	Kraftixx	0631-20		CHAR 2/1/02	2/1/04
	Measuring Tape, 7.5M	Kraftixx	7.5M PROFI		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