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APPLICANT: HK PROTECH, INC

FCC ID: PQXHKM1002

TEST REPORT:

EXHIBITS CONTAINING:

GENERAL_INFORMATION_REQUIRED FOR_TYPE_ACCEPTANCE

2.1033(c)(1)(2) HK PROTECH, INC will manufacture the FCC ID: PQXHKM1002 MULTI USER RADIO SERVICE TRANSCEIVER in quantity, for use under FCC RULES PART 95. The UUT is a PTT Radio with a maximum duty cycle of 50%.

HK PROTECH, INC
3-10, CHUNGCHUN-DONG, BUPYUNG-GU
INCHON, KOREA

2.1033 (c) TECHNICAL_DESCRIPTION

2.1033(c)(3) Instruction book. A draft copy of the instruction manual is included as EXHIBIT 14.

2.1033(c) (4) Type of Emission: 10K0F3E
95.632 Bn = 2M + 2DK
M = 3000
D = 2.0K
Bn = 2(3.0)+2(2.0) = 10.0K

Authorized Bandwidth – 11.25 kHz for frequencies:
151.820, 151.880, 151.940 MHz

Authorized Bandwidth - 12.5 kHz for frequencies:
154.570, 154.600 MHz

2.1033(c)(5) Frequency Range: 1. 151.820
95.632 2. 151.880
3. 151.940
4. 154.570
5. 154.600

2.1033(c)(6)(7) Power Output shall not exceed 2.0 Watts effective
95.639 radiated power. There can be no provisions for
95.649 increasing the power or varing the power.

The antenna is an intergral part to the unit, it cannot be removed without rendering the unit inoperative. In order to remove the antenna the case must unscrewed, then the PCB assemblies must be removed then the antenna can be removed.

2.1033(c)(9) Tune-up procedure. The tune-up procedure is included in the IN EXHIBIT 16.

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

High - Vce = 6.0 Volts DC Ice = 0.44A
Pin = 2.64 Watts

Low - Vce = 6.0 Volts DC Ice = 0.44A
Pin = 2.64 Watts

2.1033(c)(10) Complete Circuit Diagrams: The circuit diagram is included as EXHIBIT 13 of this report. The block diagram is included as EXHIBIT 12 of this report.

2.1033(c)(11) A photograph or a drawing of the equipment identification label is included as exhibit No. 1.

2.1033(c)(12) Photographs(8"X10") of the equipment of sufficient clarity to reveal equipment construction and layout, including meters, labels for controls, including any view under shields - See EXHIBIT 3-11.

2.1033(c)(13) Digital modulation is not not used in this device.

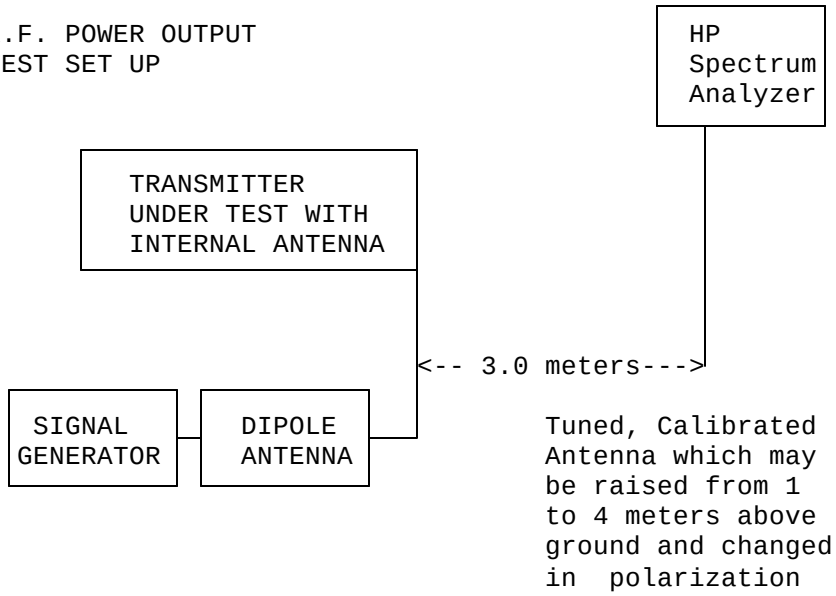
2.1033(c)(14) The data required by 2.1046 through 2.1057 is submitted below.

2.1046(a) RF_power_output.

95.639(g) RF power is measured by measuring the radiated power at 3 meters and then replacing the transmitter with a signal generator to determine the effective radiated power. The ERP shall not exceed 2.0 Watts.

MEASURED POWER OUTPUT = 0.5 Watts ERP HIGH POWER
.033 Watts ERP LOW POWER

R.F. POWER OUTPUT
TEST SET UP



Equipment placed 80cm above ground
on a rotatable platform.

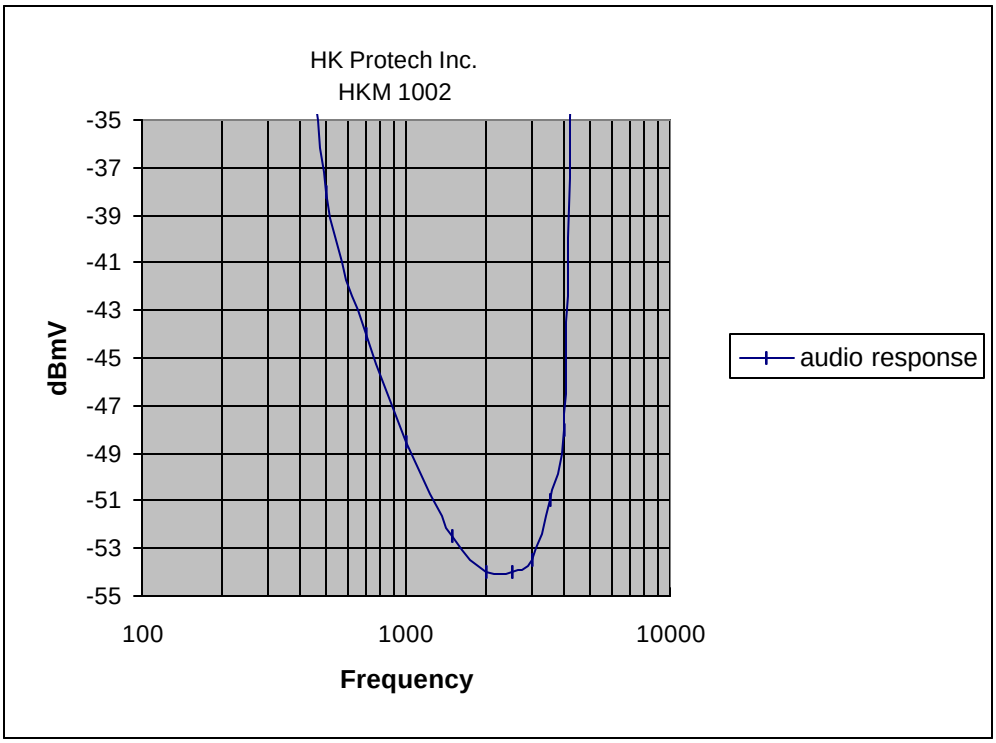
2.1047(a)(b) Modulation characteristics:

AUDIO FREQUENCY RESPONSE
The audio frequency response was measured in accordance with TIA/EIA Specification 603. The audio frequency response curve is shown on the next page. 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. See Page 5 of report.

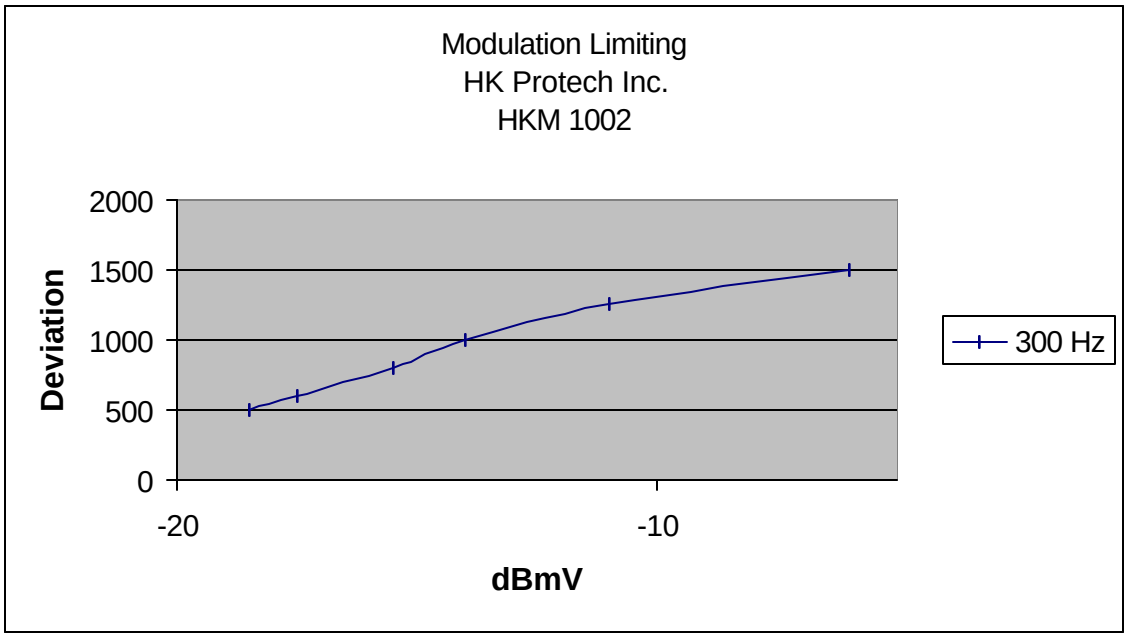
2.1047(b) Audio input versus modulation
The audio input level needed for a particular per-percentage of modulation was measured in accordance with TIA/EIA Specification 603. The audio input curves versus modulation are on the following pages. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz. See Pages 6,7 & 8 of report.

95.637 Post Limiter Filter Each GMRS transmitter, except a mobile station transmitter with a power of 2.5Watts or less, must be equipped with an audio low pass filter. At any frequency between 3 & 20 kHz the filter must have an attenuation of 60log (f/3) greater than the attenuation at 1KHz. See Page 9 of report.

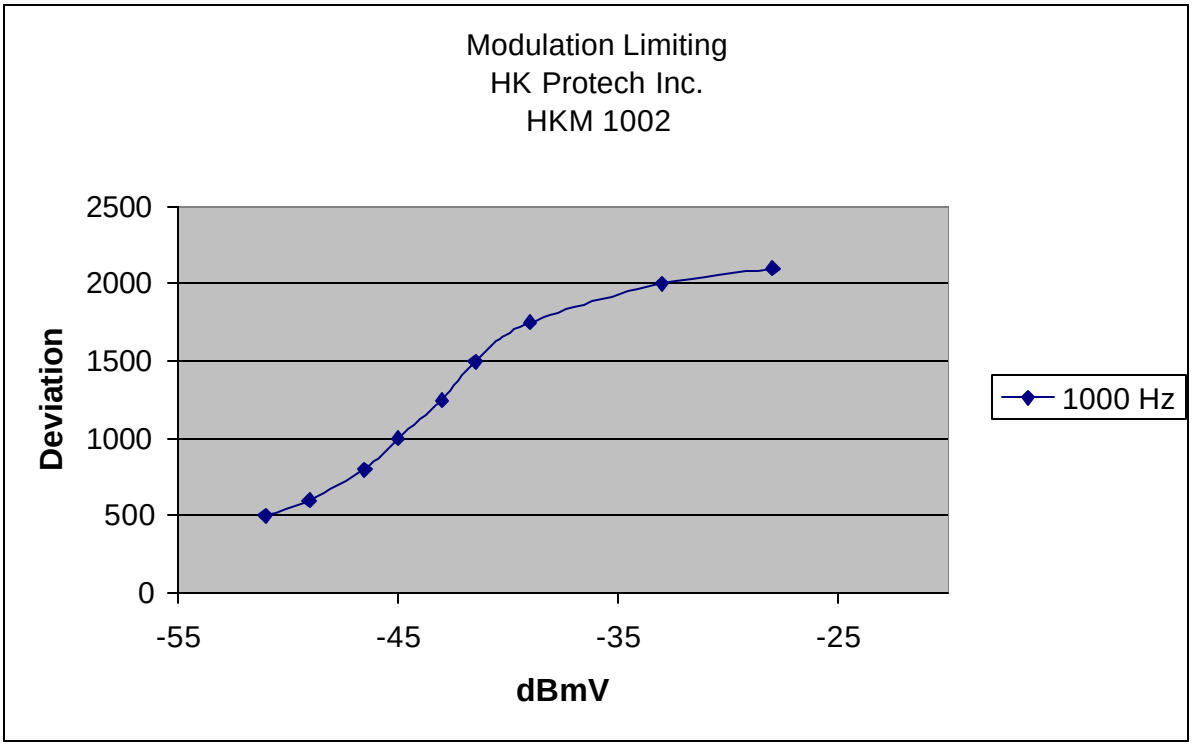
AUDIO FREQUENCY RESPONSE PLOT



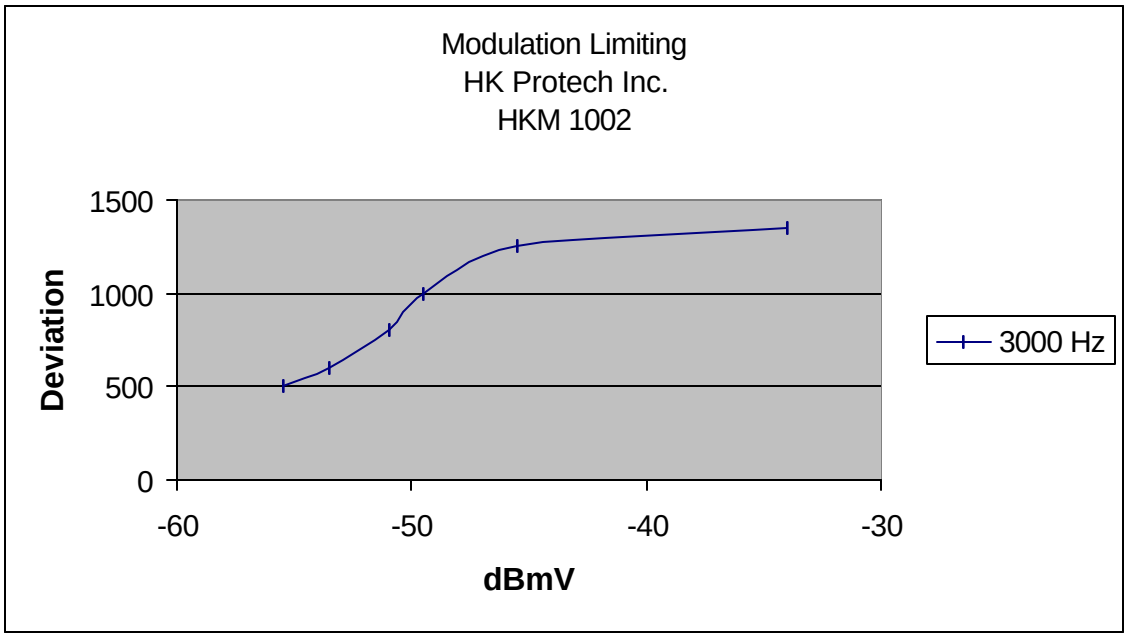
MODULATION LIMITING PLOT 300 Hz



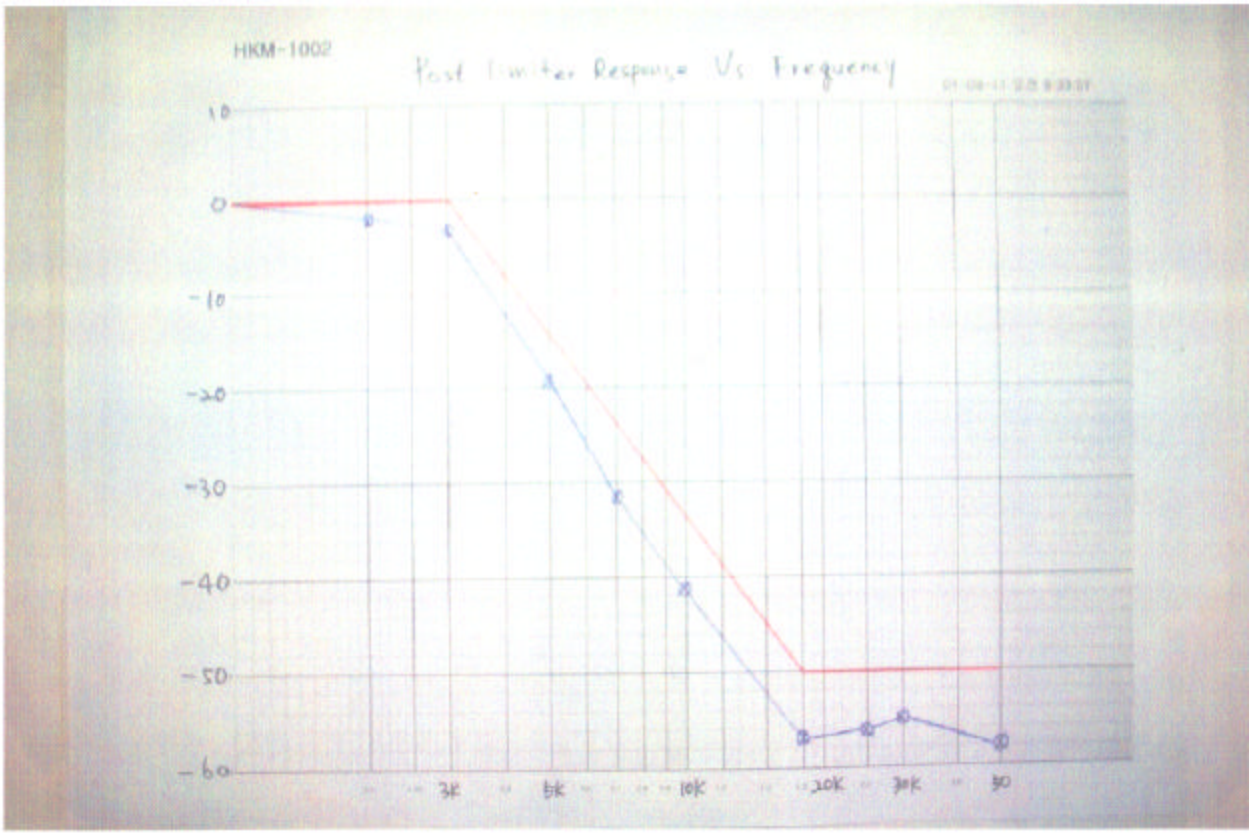
MODULATION LIMITING PLOT – 1000 Hz



MODULATION LIMITING PLOT 3000 Hz



AUDIO LOW PASS FILTER PLOT



EMISSION BANDWIDTH:

95.633(c)

90.210(b) Emission Mask B. For transmitters that are equipped with an audio low pass filter pursuant to § 90.211(a), the power of any emission must be below the unmodulated carrier power (P) as follows :

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth : At least 25dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth : At least 35dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43+10 log (P) dB.

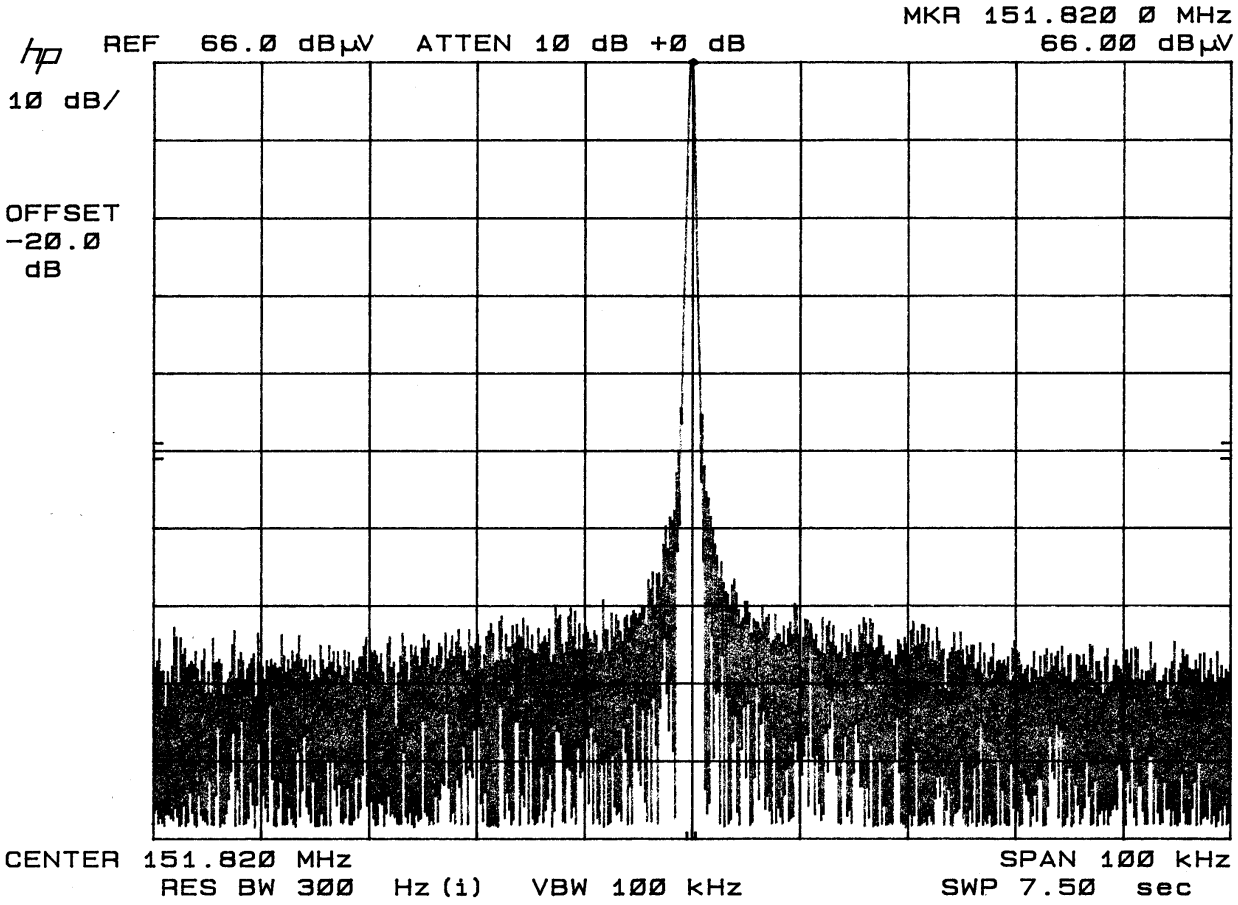
90.210(d) Emission Mask D. 12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency for the center of the authorized bandwidth f to 5.625 kHz removed from f : Zero dB.

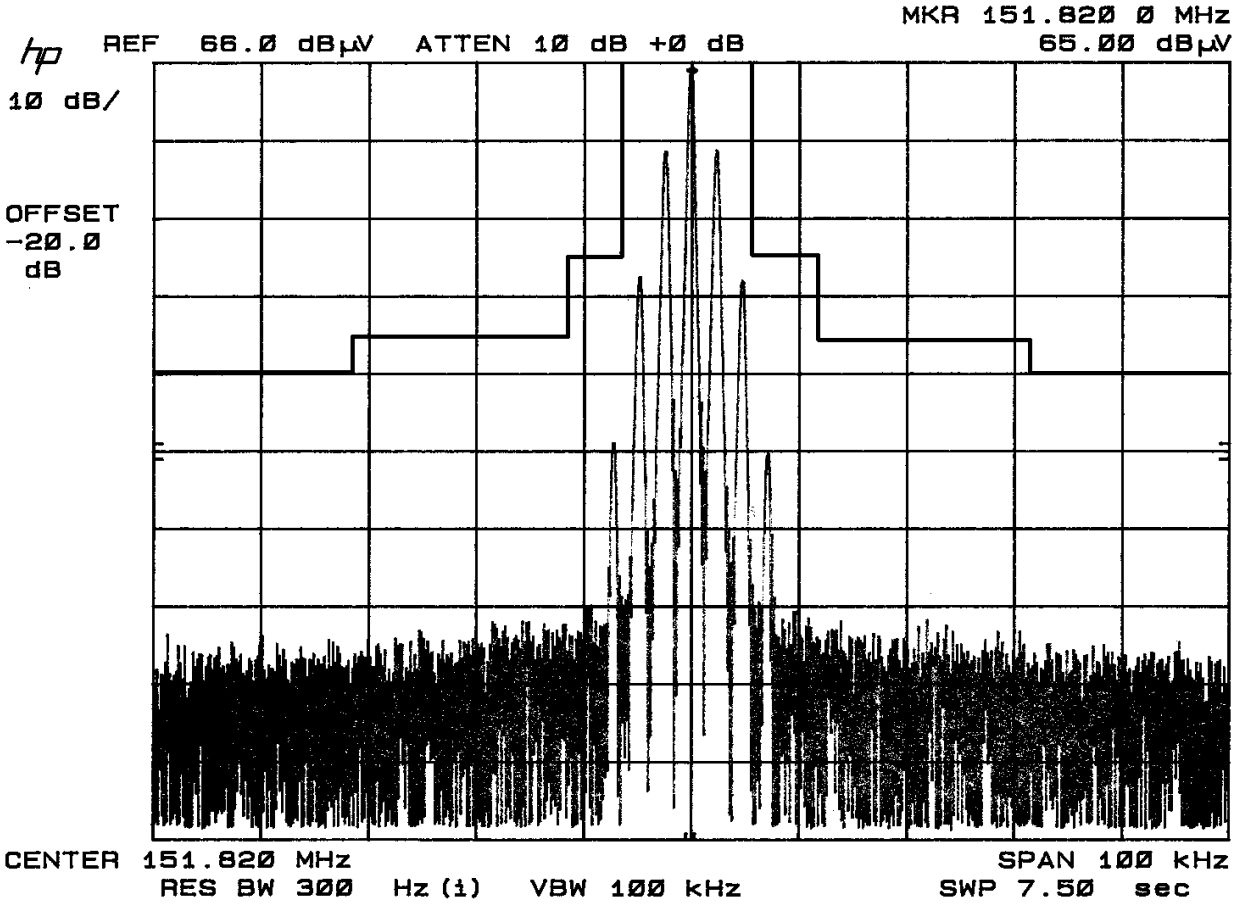
(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27 (f - 2.88kHz) dB.

(4) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f in kHz) of more than 12.5kHz: Atleast 50+10 log (P) dB or 70dB, whichever is the lesser attenuation.

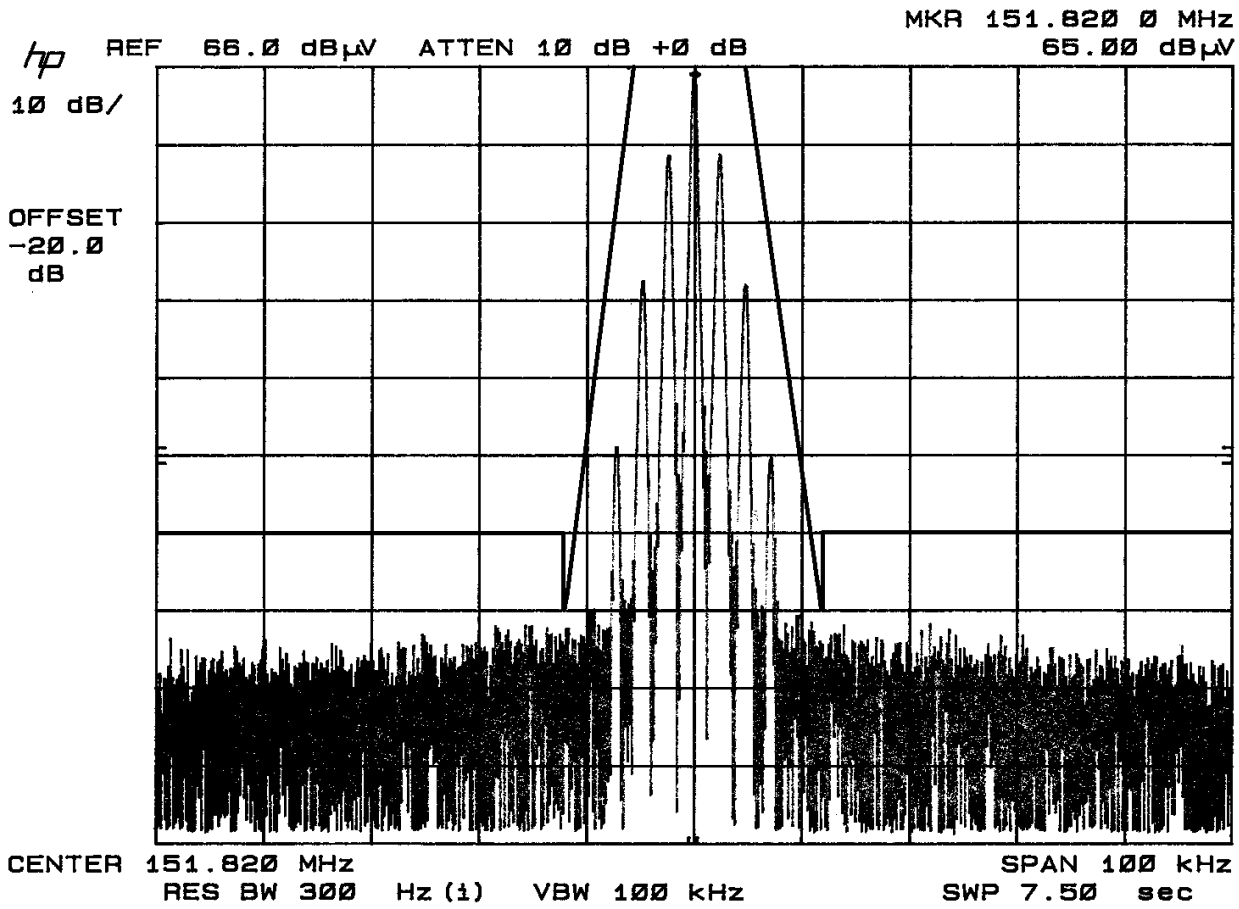
OCCUPIED BANDWIDTH PLOT



OCCUPIED BANDWIDTH PLOT



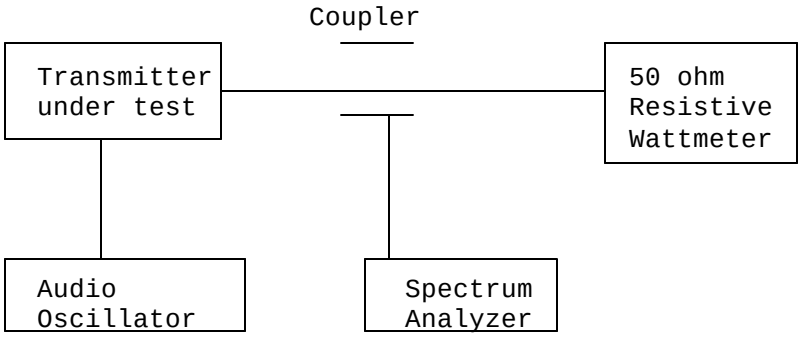
OCCUPIED BANDWIDTH PLOT



Radiotelephone transmitter with modulation limiter.

Test setup diagram

OCCUPIED BANDWIDTH MEASUREMENT



2.1051 Not Applicable, no external antenna terminal.

2.1053 SPURIOUS EMISSIONS:
95.635(c)

REQUIREMENTS: Emissions must be attenuated by at least the following below the output of the transmitter.

HIGH POWER	43 + 10log(.5) = 40.0 dB
LOW POWER	43 + 10log(.033) = 28.2 dB

TEST DATA:

Emission Frequency MHz	Ant. Polarity	dBc	Margin dB
LOW POWER			
151.90	V	0	0
303.90	H	38	10
455.90	V	45	16.61
607.50	H	**	**
759.80	V	**	**
911.80	H	**	**
1063.70	H	**	**
1215.70	V	43	14.44
1367.70	V	46	17.54
1519.00	V	**	**
HIGH POWER			
154.60	V	0	0
309.20	H	41	1.06
463.80	H	59	19.28
618.40	H	52	11.73
773.00	V	59	18.89
927.60	V	57	17.12
1082.20	V	**	**
1236.80	V	**	**
1391.40	V	**	**
1546.00	V	**	**

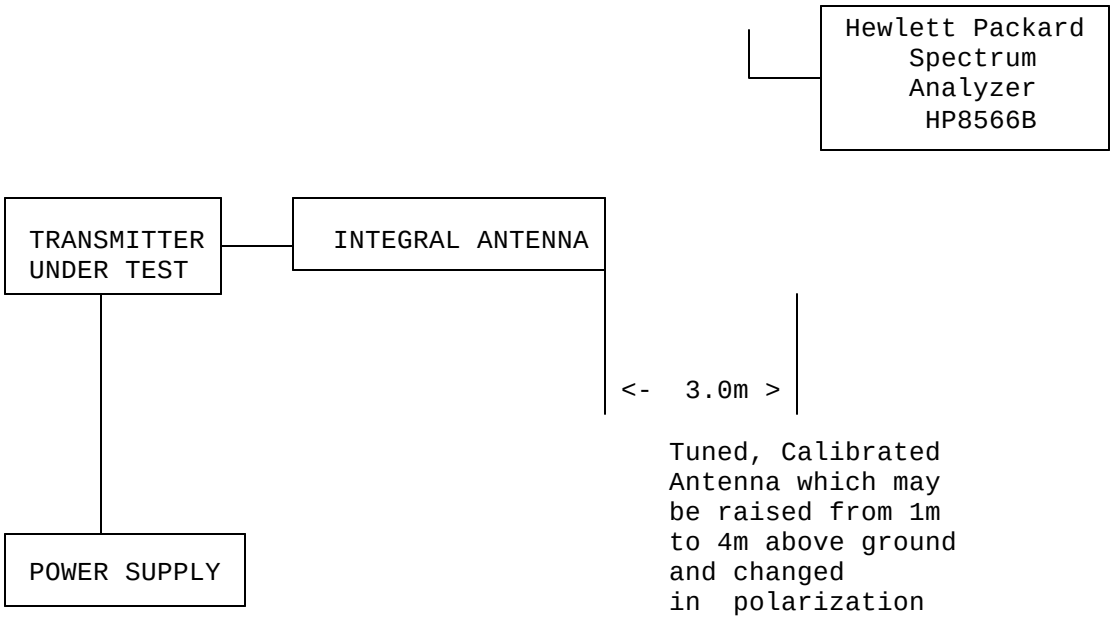
MARGIN = (Field strength of Fund – 40.0 dB) - FS OF EMISSION (HIGH)
MARGIN = (Field strength of Fund – 28.2 dB) - FS OF EMISSION (LOW)

METHOD OF MEASUREMENT: The procedure used was TIT/EIA STANDARD 603 USING THE SUBSTITUTION method. The spectrum was scanned from 30 to at least the tenth harmonic of the fundamental using a HP model 8566B spectrum analyzer, and an appropriate antenna - see test equipment list. Measurements were made at the open field test site of TIMCO ENGINEERING INC. located at 849 N.W. State Road 45, Newberry, FL 32669.

2.1053
95.635

SPURIOUS EMISSIONS:

Method of Measuring Radiated Spurious Emissions



Equipment placed 80cm above ground
on a rotatable platform.

95.632(c)
2.1055

Frequency_stability:

Temperature and voltage tests were performed to verify that the frequency remains within the 0.00050%, 5.0 ppm specification limit if the device is designed to operate with 11.25 kHz or 12.5 kHz authorized bandwidth and .00020%, 2.0 ppm if the device is designed to operate with 6.25 kHz authorized bandwidth. The test was conducted as follows: The transmitter was placed in the temperature chamber at 25 degrees 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 degrees 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.

Readings were also taken at the end point of the battery voltage of 6 VDC.

MEASUREMENT DATA:

Assigned Frequency (Ref. Frequency): 151.880 097

TEMPERATURE°C	FREQUENCY_MHz	PPM
REFERENCE	151.880 097	00.00
-30	151.879 990	-0.70
-20	151.880 552	3.00
-10	151.880 792	4.58
0	151.880 689	3.90
+10	151.880 439	2.25
+20	151.880 252	1.02
+30	151.880 018	-0.52
+40	151.879 803	-1.94
+50	151.879 696	-2.64
BATT. End-Point 5.1V/dc	151.880 084	-0.09

RESULTS OF MEASUREMENTS: The maximum frequency variation over the temperature range was –2.64 to +4.58 ppm. The maximum frequency variation with voltage was –0.09ppm.

$W := 0.5$ power in Watts $D := 1$ Duty Factor in decimal % (1=100%)

$E := 3.0$ exposure time in minutes $U := 6$ (use 6 for controlled and 30 for uncontrolled)

$$Wexp := W \cdot D \cdot \left(\frac{E}{U} \right) \qquad PC := \frac{E}{U}$$

$PC = 0.5$ percent on time

$Wexp = 0.25$ Watts

$Po := 250$ mWatts $dBd := -6.0$ antenna gain $f := 300$ Frequency in MHz

$G := dBd + 2.15$ gain in dBi

$Gn := 10^{\frac{G}{10}}$ gain numeric $S := \frac{f}{300}$ controlled exposure

300 for controlled

1500 for uncontrolled

$Gn = 0.412$ $S = 1$

$$R := \sqrt{\frac{(Po \cdot Gn)}{(4 \cdot \pi \cdot S)}} \qquad Rinches := \frac{R}{2.54}$$

$R = 2.863$ distance in centimeters required for compliance

$Rinches = 1.127$

MPE Calculation

Frequency taken a 300 MHz so that S would be equal to 1 as specified in OET 65.

Antenna gain based on a 2 watt conducted yielding a 0.5W ERP.

50% duty cycle also used.

Equipment List

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
X	3-Meter OATS	TEI	N/A	N/A	Listed 12/22/99	12/22/02
	3/10-Meter OATS	TEI	N/A	N/A	Listed 3/26/01	3/26/04
X	Receiver, Beige Tower					
X	Spectrum Analyzer (Tan)	HP	8566B Opt 462	3138A07786 3144A20661	CAL 8/31/01	8/31/02
X	RF Preselector (Tan)	HP	85685A	3221A01400	CAL 8/31/01	8/31/02
X	Quasi-Peak Adapter (Tan)	HP	85650A	3303A01690	CAL 8/31/01	8/31/02
	Receiver, Blue Tower					
	Spectrum Analyzer (Blue)	HP	8568B	2928A04729 2848A18049	CHAR 10/22/01	10/22/02
	RF Preselector (Blue)	HP	85685A	2926A00983	CHAR 10/22/01	10/22/02
	Quasi-Peak Adapter (Blue)	HP	85650A	2811A01279	CHAR 10/22/01	10/22/02
	Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/26/01	4/26/03
X	Biconnical Antenna	Eaton	94455-1	1096	CAL 10/1/01	10/1/02
	Biconnical Antenna	Eaton	94455-1	1057	CHAR 3/15/00	3/15/01
	BiconiLog Antenna	EMCO	3143	9409-1043		
X	Log-Periodic Antenna	Electro-Metrics	LPA-25	1122	CAL 10/2/01	10/2/02
	Log-Periodic Antenna	Electro-Metrics	EM-6950	632	CHAR 10/15/01	10/15/02
	Log-Periodic Antenna	Electro-Metrics	LPA-30	409	CHAR 10/16/01	10/16/02
	Dipole Antenna Kit	Electro-Metrics	TDA-30/1-4	152	CAL 3/21/01	3/21/02
	Dipole Antenna Kit	Electro-Metrics	TDA-30/1-4	153	CHAR 11/24/00	11/24/01

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	Double-Ridged Horn Antenna	Electro-Metrics	RGA-180	2319	CAL 12/19/01	12/19/02
	Horn Antenna	Electro-Metrics	EM-6961	6246	CAL 3/21/01	3/21/02
	Horn Antenna	ATM	19-443-6R	None	No Cal Required	
	Passive Loop Antenna	EMC Test Systems	EMCO 6512	9706-1211	CHAR 7/10/01	7/10/02
	Line Impedance Stabilization . . .	Electro-Metrics	ANS-25/2	2604	CAL 10/9/01	10/9/02
	Line Impedance Stabilization . . .	Electro-Metrics	EM-7820	2682	CAL 3/16/01	3/16/02
	Termaline Wattmeter	Bird Electronic Corporation	611	16405	CAL 5/25/99	(5/25/00)
	Termaline Wattmeter	Bird Electronic Corporation	6104	1926	CAL 12/12/01	12/12/02
	Oscilloscope	Tektronix	2230	300572	CHAR 2/1/01	2/1/02
	Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 1/22/02	1/22/03
	AC Voltmeter	HP	400FL	2213A14499	CAL 10/9/01	10/9/02
	AC Voltmeter	HP	400FL	2213A14261	CHAR 10/15/01	10/15/02
	AC Voltmeter	HP	400FL	2213A14728	CHAR 10/15/01	10/15/02
X	Digital Multimeter	Fluke	77	35053830	CHAR 1/8/02	1/8/03
	Digital Multimeter	Fluke	77	43850817	CHAR 1/8/02	1/8/03
	Digital Multimeter	HP	E2377A	2927J05849	CHAR 1/8/02	1/8/03
	Multimeter	Fluke	FLUKE-77-3	79510405	CAL 9/26/01	9/26/02
	Peak Power Meter	HP	8900C	2131A00545	CHAR 1/26/01	1/26/02
	Digital Thermometer	Fluke	2166A	42032	CAL 1/16/02	1/16/03
	Thermometer	Traulsen	SK-128		CHAR 1/22/02	1/22/03

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
X	Temp/Humidity gauge	EXTech	44577F	E000901	CHAR 1/22/02	1/22/03
	Frequency Counter	HP	5352B	2632A00165	CAL 11/28/01	11/28/02
	Power Sensor	Agilent Technologies	84811A	2551A02705	CAL 1/26/01	1/26/02
	Injection Probe	Fischer Custom Communications	F-120-9A	270	CAL 6/1/01	6/1/02
	Service Monitor	IFR	FM/AM 500A	5182	CAL 11/22/00	11/22/01
	Comm. Serv. Monitor	IFR	FM/AM 1200S	6593	CAL 11/12/99	11/12/00
	Signal Generator	HP	8640B	2308A21464	CAL 11/15/01	11/15/02
	Modulation Analyzer	HP	8901A	3435A06868	CAL 9/5/01	9/5/02
	Power Line Coupling/ Decoupling Network	Fischer Custom Communications	FCC-801-M2-16A	01048	CAL 8/29/01	8/29/02
	Power Line Coupling/ Decoupling Network	Fischer Custom Communications	FCC-801-M3-16A	01060	CAL 8/29/01	8/29/02
	VHF/UHF Current Probe	Fischer Custom Communications	F-52	130	CAL 8/30/01	8/30/02
	Passive Impedance Adapter	Fischer Custom Communications	FCC-801-150-50-CDN	01117 & 01118	CAL 8/29/01	8/29/02
	Radiating Field Coil	Fischer Custom Communications	F-1000-4-8/9/10-L-1M	9859	CAL 10/15/98	10/15/99
	Near Field Probe	HP	HP11940A	2650A02748	CHAR 2/1/01	2/1/02
	BandReject Filter	Lorch Microwave	5BR4-2400/ 60-N	Z1	CHAR 3/2/01	3/2/02
	BandReject Filter	Lorch Microwave	6BR6-2442/ 300-N	Z1	CHAR 3/2/01	3/2/02
	BandReject Filter	Lorch Microwave	5BR4-10525/ 900-S	Z1	CHAR 3/2/01	3/2/02
	High Pas Filter	Microlab	HA-10N		CHAR 10/4/01	10/4/02
	Audio Oscillator	HP	653A	832-00260	CHAR 3/1/01	3/1/02

	DEVICE	MFGR	MODEL	SERNO	CAL/CHAR DATE	DUE DATE or STATUS
	Frequency Counter	HP	5382A	1620A03535	CHAR 3/2/01	3/2/02
	Frequency Counter	HP	5385A	3242A07460	CHAR 12/11/01	12/11/02
	Preamplifier	HP	8449B-H02	3008A00372	CHAR 3/4/01	3/4/02
	Amplifier	HP	11975A	2738A01969	CHAR 3/1/01	3/1/02
	Egg Timer	Unk			CHAR 2/28/01	2/28/02
	Measuring Tape, 20M	Kraftixx	0631-20		CHAR 2/28/01	2/28/02
	Measuring Tape, 7.5M	Kraftixx	7.5M PROFI		CHAR 2/28/01	2/28/02
	EMC Immunity Test System	Keytek	CEMASTER	9810210		
	AC Power Source	California Instruments	1251RP	L05865		
	AC Power Source	California Instruments	PACS-1	X71484		
	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		
	Coaxial Cable #51	Insulated Wire Inc.	NPS 2251-2880	Timco #51	CHAR 1/23/02	1/23/03
	Coaxial Cable #64	Semflex Inc.	60637	Timco #64	CHAR 1/24/02	1/24/03
	Coaxial Cable #65	General Cable Co.	E9917 RG233/U	Timco #65	CHAR 1/23/02	1/23/03
	Coaxial Cable #106	Unknown	Unknown	Timco #106	CHAR 1/23/02	1/23/03