



Certelec Com Laboratories Inc.

Safety - EMI - Telecom - ISO Guide 25

ENGINEERING TEST REPORT

**ON:
THE ELECTRONIC SYSTEMS TECHNOLOGY INC.
"ESTEEM 192M WIRELESS MODEM"**

FCC ID: ENPESTEEM192M

**IN ACCORDANCE WITH:
FCC PART 90, SUBPART I**

PROJECT NO.: 8R00570.1

TESTED FOR:

**ELECTRONIC SYSTEMS TECHNOLOGY INC.
415N. QUAY STREET
KENNEWICK, WA
99336
USA**

TESTED BY:

**CERTELECOM LABORATORIES INC.
3325 RIVER ROAD, R.R. 5
OTTAWA, ONTARIO K1V 1H2**

MAY 1998

This document contains 36 pages including this one.

Certelec Com Laboratories Inc. authorizes the above named company to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Certelec Com Laboratories Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report applies only to the items tested.

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

MODEL NO.: 192M

SERIAL NO.: 192M-P1

GENERAL:

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 90, Subpart I.

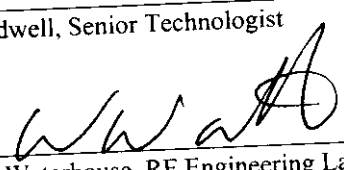
THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See "Summary of Test Data"

TESTED BY: _____
Tom Tidwell, Senior Technologist

DATE: _____

APPROVED BY:  _____
W. Waterhouse, RF Engineering Lab Manager

DATE: 28th May 1998

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

SUMMARY OF TEST DATA

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	90.205		2W/4W	Complies
Audio Frequency Response	TIA/IEA-603.3.2.6	N/A	N/A	N/A
Audio Low-Pass Filter Response	N/A	N/A	N/A	N/A
Modulation Limiting	N/A	N/A	N/A	N/A
Occupied Bandwidth	90.210	Mask C or D	Plots	
Spurious Emissions at Antenna Terminals	90.210	Mask C or D	Plots	Complies
Field Strength of Spurious Emissions	90.210	Mask C or D	Table	Complies
Frequency Stability	90.213	5 ppm	1.93 ppm	Complies
Transient Frequency Behaviour	90.214	Plot	Plot	Complies

FOOTNOTES FOR N/A'S:

The E.U.T. does not provide for voice modulation.

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

GENERAL EQUIPMENT SPECIFICATION
TRANSMITTER

Power Input:	11 - 15 Vdc
Frequency Range:	150 - 174 MHz
Tunable Bands:	1
Necessary Bandwidth:	10.8 kHz or 17.6 kHz
20 dB Bandwidth:	N/A
Type of Modulation:	4 Level FSK
Data Rate:	9600 bps or 19,200 bps
Internal/External Data Source:	External
Emission Designator:	10K8F2D (9600 bps), 17K6F2D (19,200 bps)
Link AGC:	N/A
Output Impedance:	50 ohms
Gain:	N/A
RF Power Output (rated):	Single: 2 W or 4W Composite: N/A
Duty Cycle:	100%
Channel Spacing:	12.5 kHz or 25 kHz
Operator Selection of Operating Frequency:	Software Controlled
Power Output Adjustment Capability:	Software Controlled

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

GENERAL EQUIPMENT SPECIFICATION
RECEIVER

Frequency Range:	150 - 174 MHz
Tunable Bands:	1
1st IF:	90 MHz
2nd IF:	0.455 MHz
Bandwidth:	4.8 kHz
Type of Modulation:	4 Level FSK
Operator Selection of Operating Frequency:	Software Controlled

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

THEORY OF OPERATION

The E.U.T. is a wireless data modem that operates in the 150 - 174 MHz band. Modulation level is 4 level FSK. The radio can generate at a data rate of 9600 bps in a 12.5 kHz channel or 19,200 bps in a 25 kHz channel. The receiver portion of the radio is double conversion.

The E.U.T. is Super Heterodyne design and is for fixed base or mobile applications with the antenna mounted some distance from the transmitter.

MODULATION DESCRIPTION AND NECESSARY BANDWIDTH

10K8F2D The modem assembles incoming data, adds forward error correction and detection information and interleaves the result for burst-error protection. After automatically adding symbol and frame sync code words the data packet is converted into filtered 4-level 0 to 2400 Hz analogue signals for modulating the radio.

Necessary Bandwidth:

$$\begin{aligned} B_n &= 2M + 2D \\ M &= 2400 \text{ Hz} \\ D &= 3 \text{ kHz} \\ B_n &= 10.8 \text{ kHz} \end{aligned}$$

17K6F2D The modem assembles incoming data, adds forward error correction and detection information and interleaves the result for burst-error protection. After automatically adding symbol and frame sync code words the data packet is converted into filtered 4-level 0 to 4800 Hz analogue signals for modulating the radio.

Necessary Bandwidth:

$$\begin{aligned} B_n &= 2M + 2D \\ M &= 4800 \text{ Hz} \\ D &= 4 \text{ kHz} \\ B_n &= 17.6 \text{ kHz} \end{aligned}$$

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

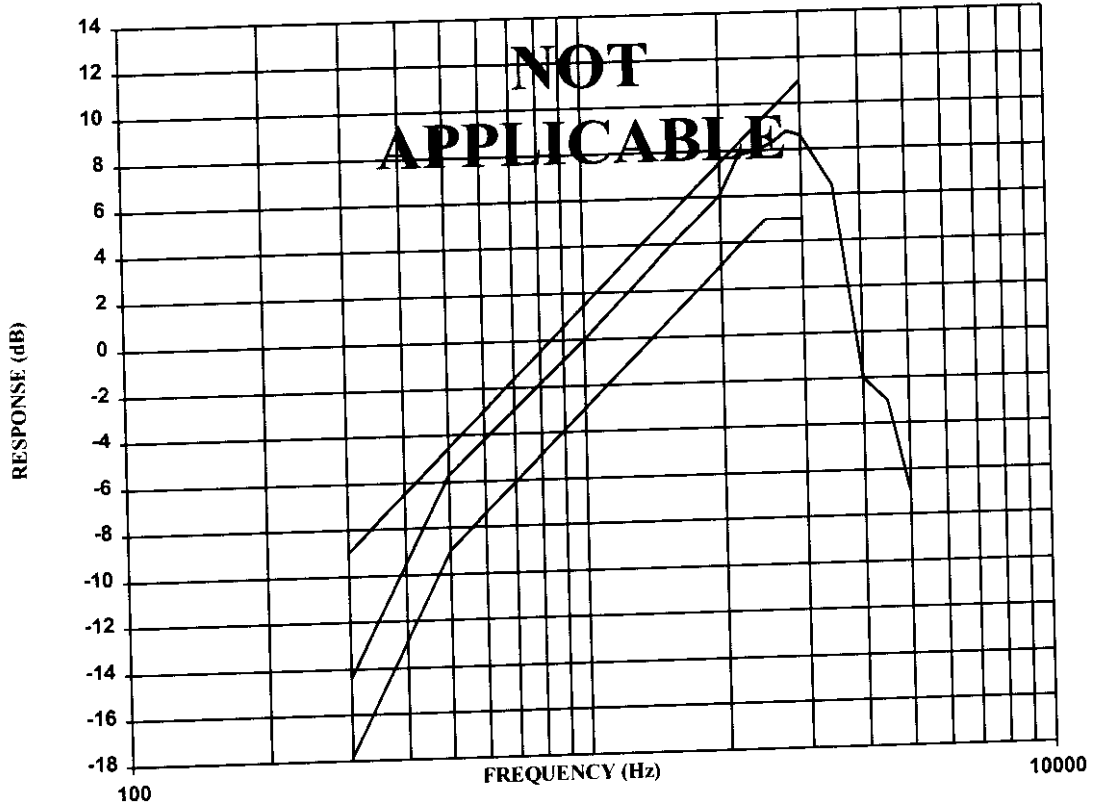
NAME OF TEST: RF Power Output	PARA. NO.: 2.985
TEST PERFORMED BY: Tom Tidwell	DATE: May 20, 1998

Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Measured/Rated (dB)
162.000	+33.1	+33.0	+0.1
162.000	+36.0	+36.0	0.0

Spectrum Analyzer Resolution Bandwidth: N/A

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

NAME OF TEST: Audio Frequency Response **PARA.NO.: 2.987(a)**



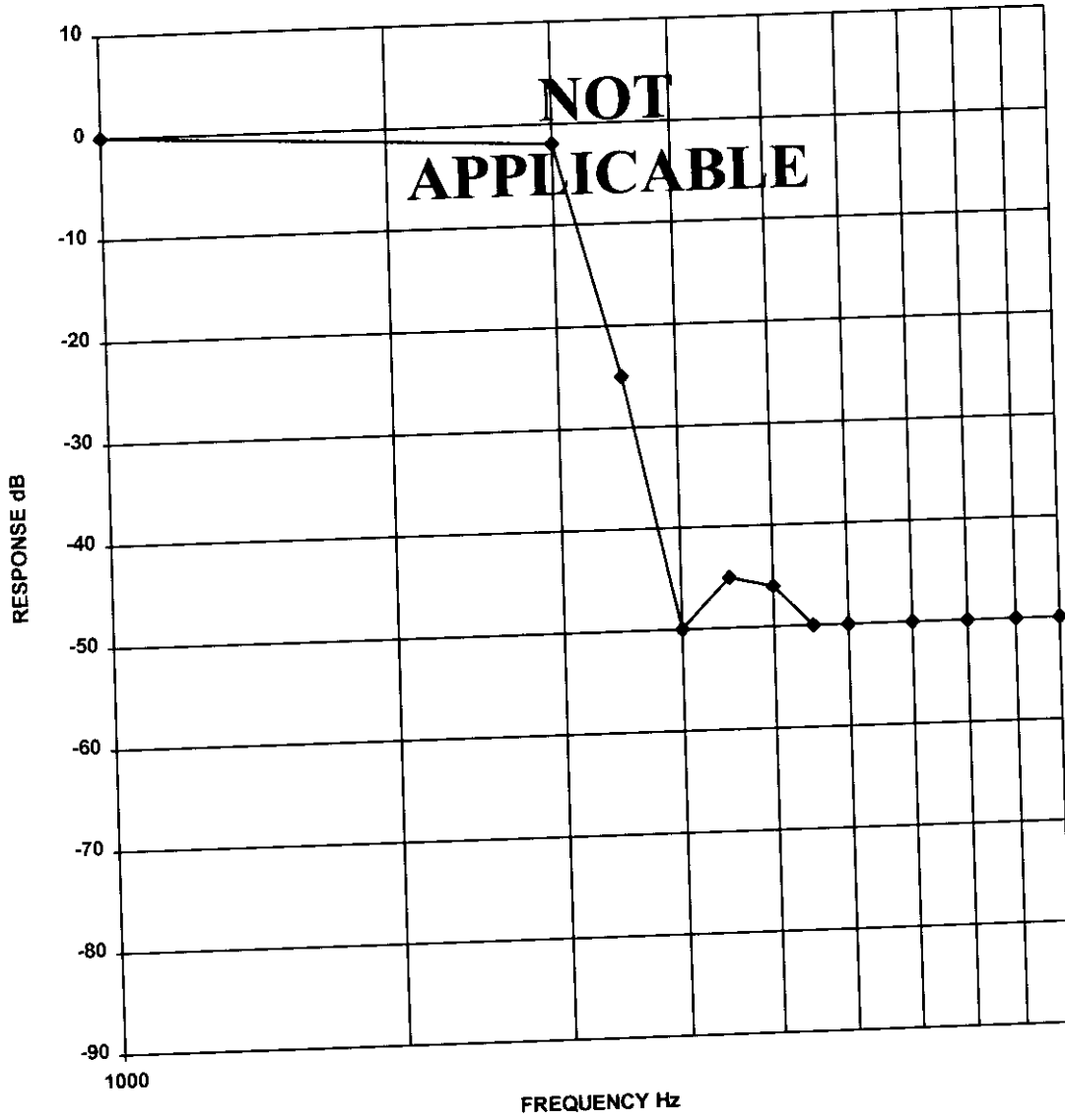
AUDIO FREQUENCY RESPONSE

Frequency	300	600	900	1.2 k	1.5 k	1.8 k	2.1 k	2.3 k	2.6 k	3.0 k	3.5 k	4 k

Frequency	4.5 k	5 k	5.5 k	6 k	6.5 k	7 k	7.5 k	8 k	8.5 k	9 k	9.5 k	10 k

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

NAME OF TEST: Audio Low-Pass Filter Frequency Response **PARA.NO.: 2.987(a)**

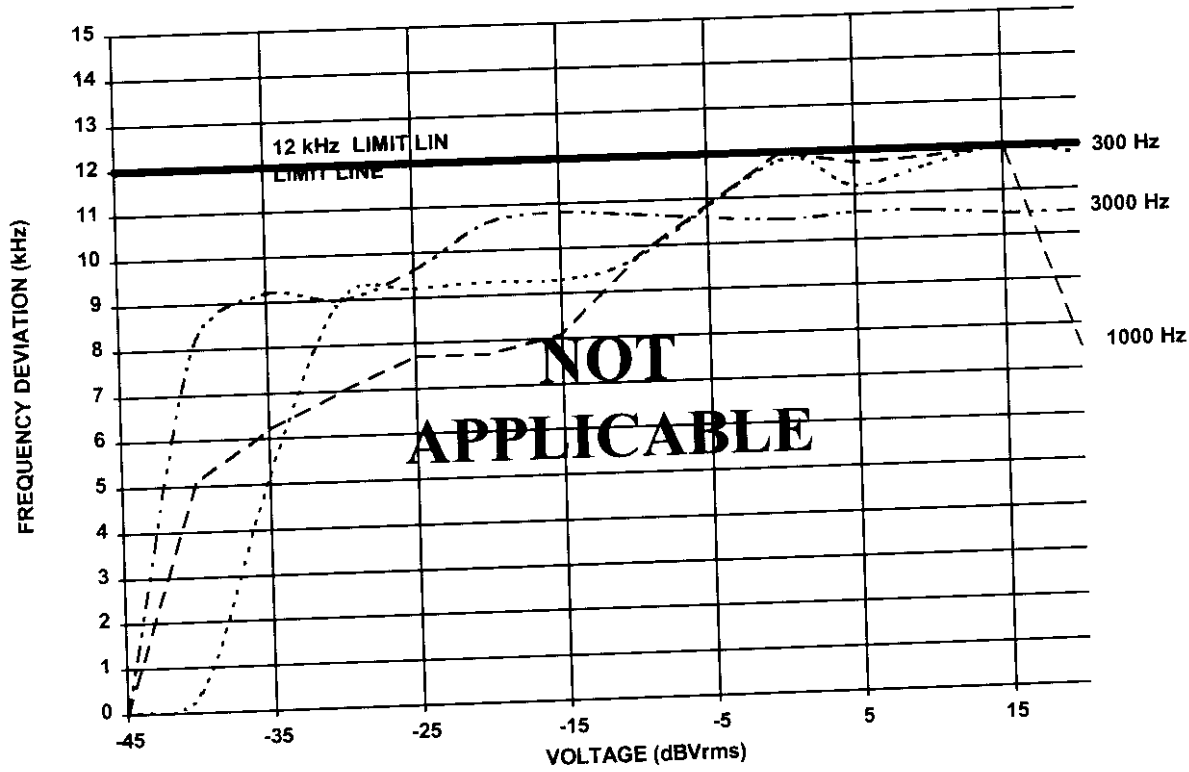


AUDIO LOW PASS FILTER RESPONSE

Frequency	1k	3 k	3.5 k	4 k	4.5 k	5 k	5.5 k	6 k	7 k	8 k	9 k	10 k

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

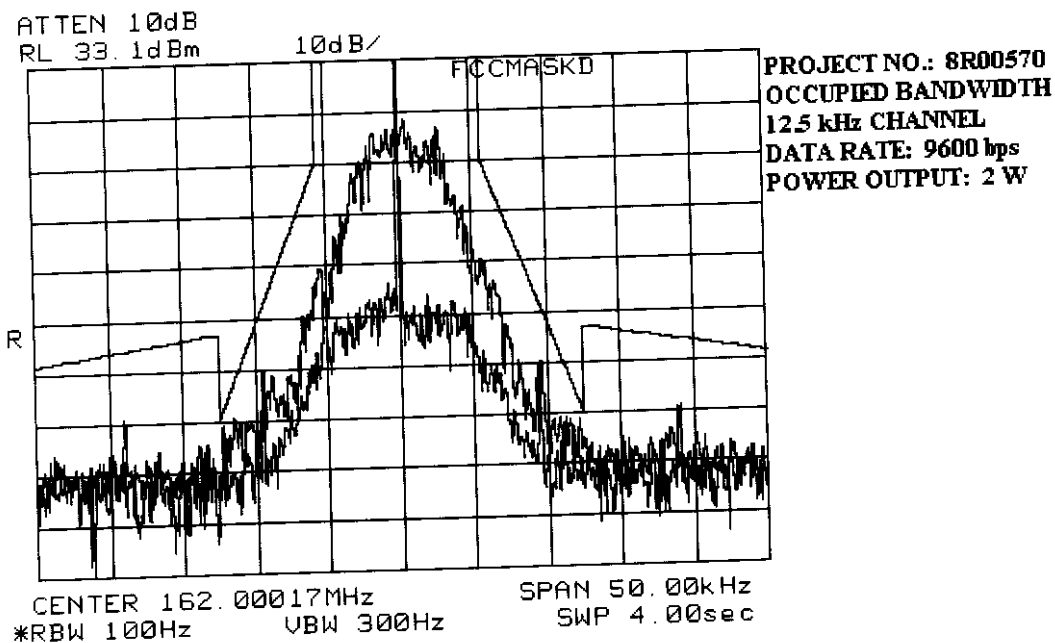
NAME OF TEST: Modulation Limiting **PARA.NO.: 2.987(b)**



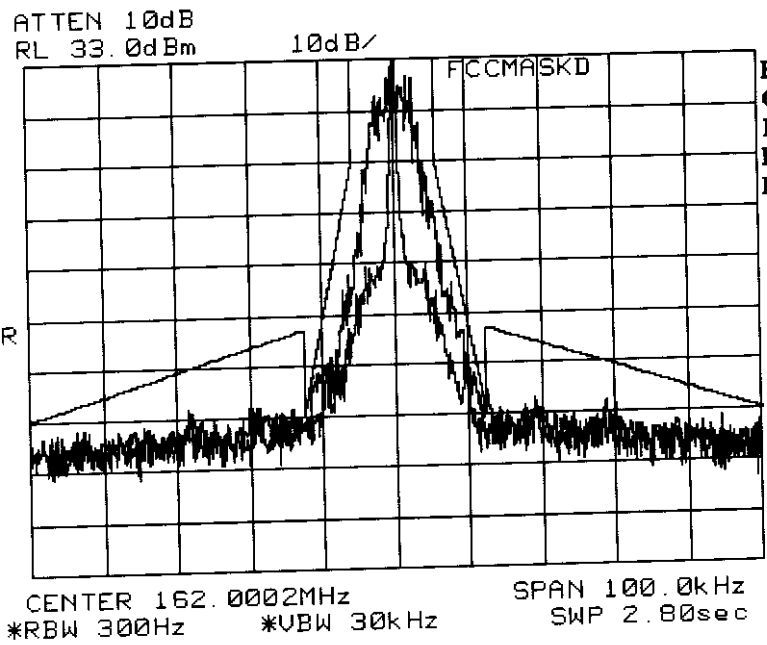
MODULATION LIMITING

Input	-45	-40	-35	-30	-25	-20	-15	-10	0	5	10	15	20
300 Hz	0	0.452	5.2	9	9.2	9.3	9.3	9.7	11.8	11.2	11.6	12	11.8
1k Hz	0	5.1	6.2	7	7.7	7.7	8.1	9.7	12	11.7	11.8	12	7.5
3k Hz	0	8.1	9.2	9	9.6	10.6	10.8	10.7	10.5	10.6	10.6	10.5	10.5

EQUIPMENT: *Esteem 192M Wireless Modem*
FCC ID: *ENPESTEEM192M*

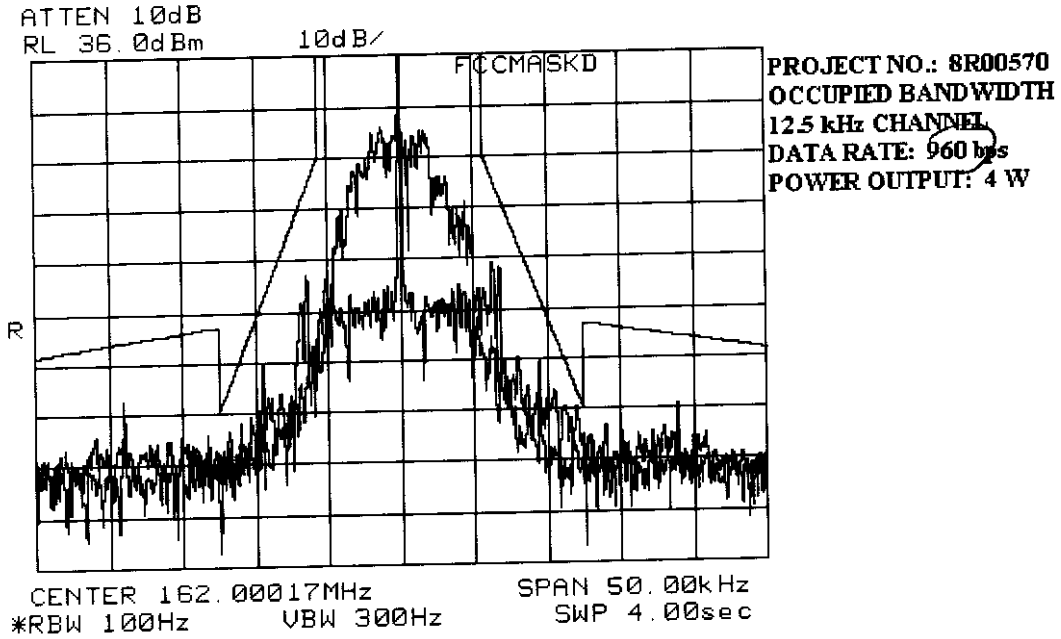


EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

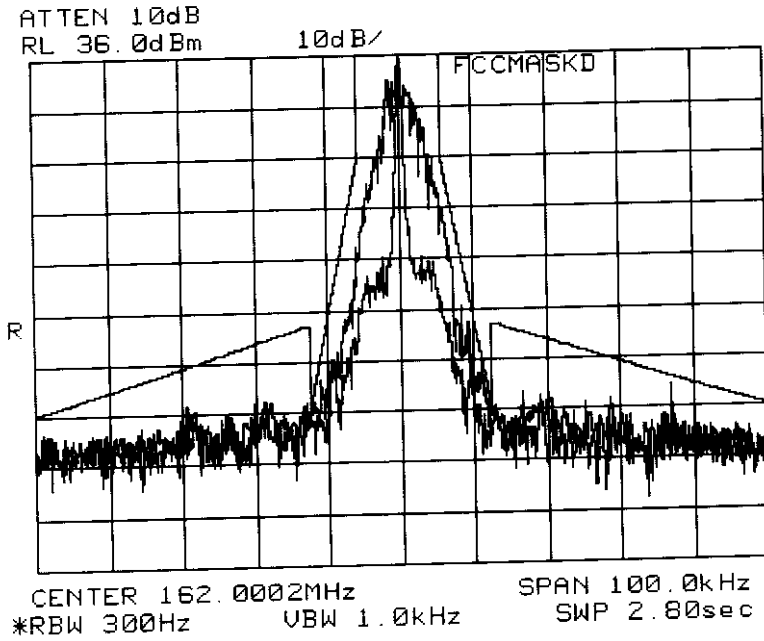


PROJECT NO.: 8R00570
OCCUPIED BANDWIDTH
12.5 kHz CHANNEL
DATA RATE: 9600 bps
POWER OUTPUT: 2 W

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

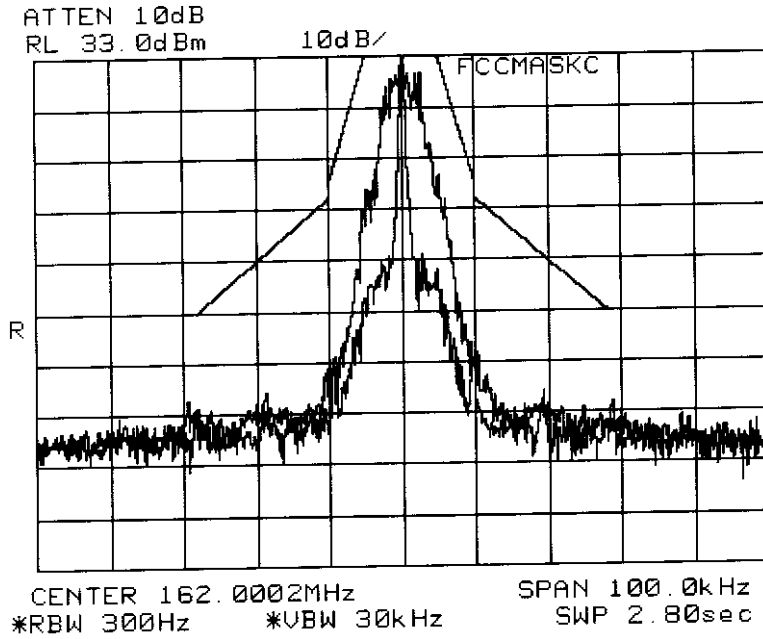


EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M



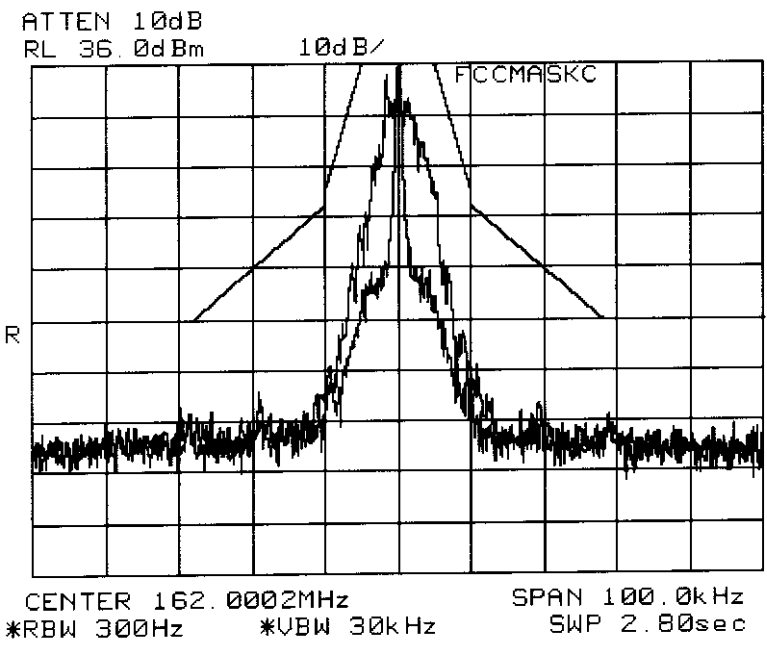
PROJECT NO.: 8R00570
OCCUPIED BANDWIDTH
12.5 kHz CHANNEL
DATA RATE: 9600 bps
POWER OUTPUT: 4 W

EQUIPMENT: *Esteem 192M Wireless Modem*
FCC ID: *ENPESTEEM192M*



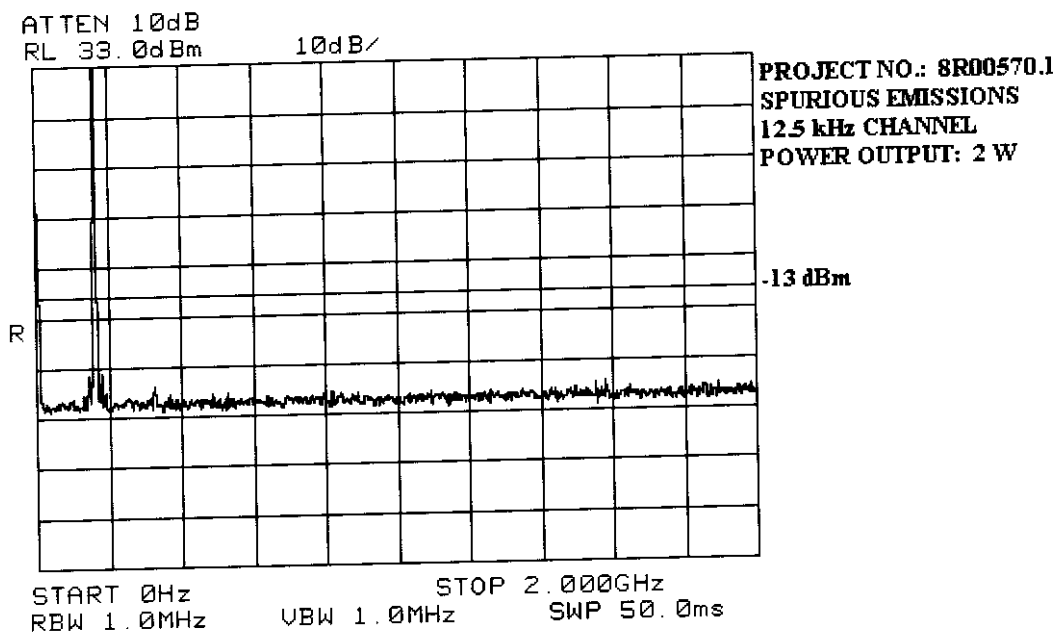
PROJECT NO.: 8R00570
OCCUPIED BANDWIDTH
25 kHz CHANNEL
DATA RATE: 19,200 bps
POWER OUTPUT: 2 W

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

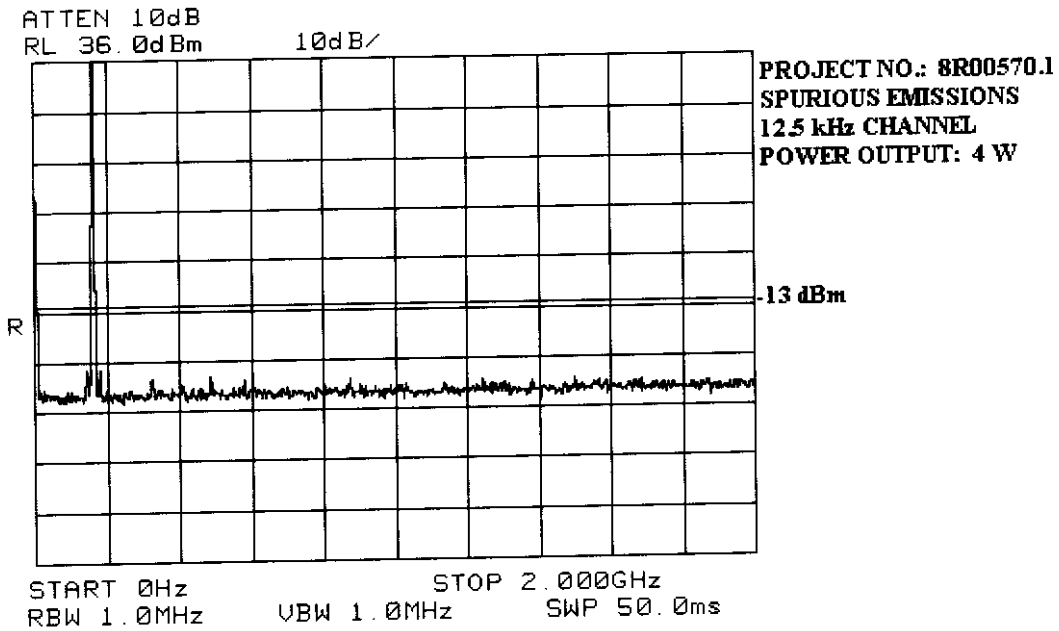


PROJECT NO.: 8R00570
OCCUPIED BANDWIDTH
25 kHz CHANNEL
DATA RATE: 19,200 bps
POWER OUTPUT: 4 W

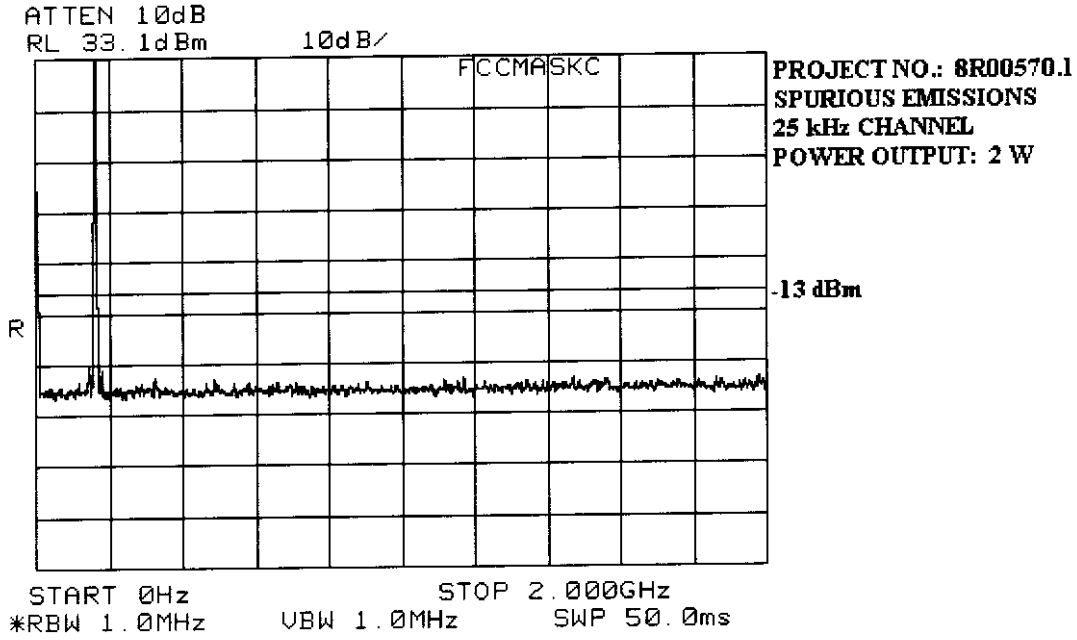
EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M



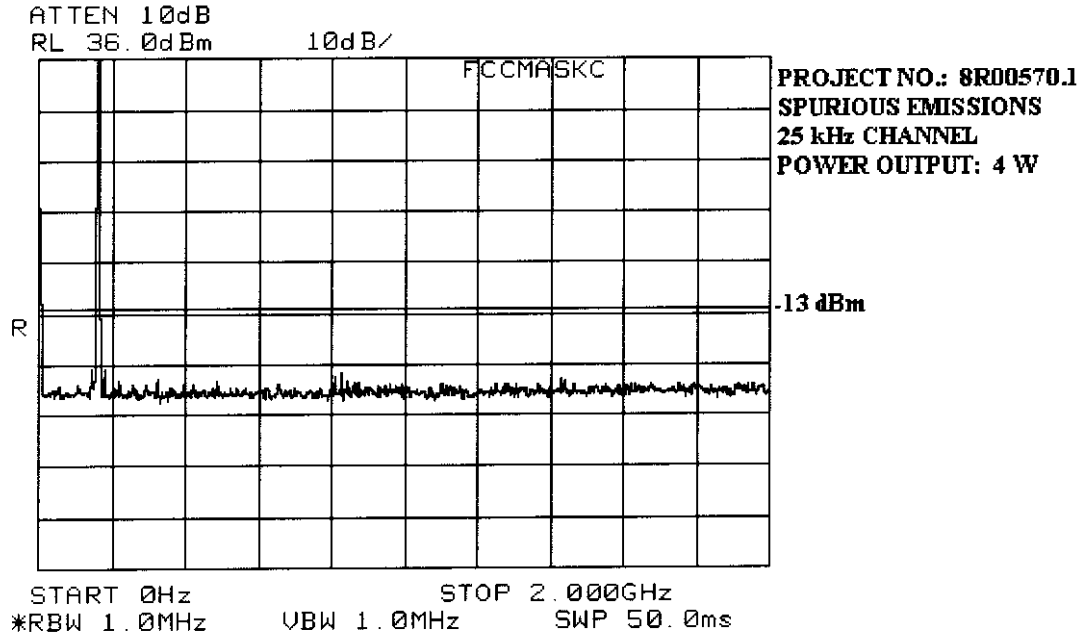
EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M



EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M



EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M



EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

NAME OF TEST: Frequency Stability	PARA. NO.: 2.995
TEST PERFORMED BY: Tom Tidwell	DATE: May 20, 1998

Voltage Variations

Frequency being tested: 162.000000 MHz

Time (min.)	Frequency (MHz)		
	85%	100%	115%
0.0	162.000003	162.000040	162.000067
0.5	162.000009	162.000049	162.000079
1.0	162.000015	162.000053	162.000083
1.5	162.000018	162.000056	162.000085
2.0	162.000022	162.000057	162.000088
2.5	162.000026	162.000058	162.000089
3.0	162.000032	162.000062	162.000090
3.5	162.000033	162.000065	162.000090
4.0	162.000036	162.000072	162.000095
4.5	162.000038	162.000077	162.000097
5.0	162.000041	162.000079	162.000103

Voltage	Maximum Deviation	
	MHz	ppm
85%	0.000041	0.25
100%	0.000079	0.49
115%	0.000103	0.64

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

Frequency Stability

Frequency being tested: 162.000000 MHz

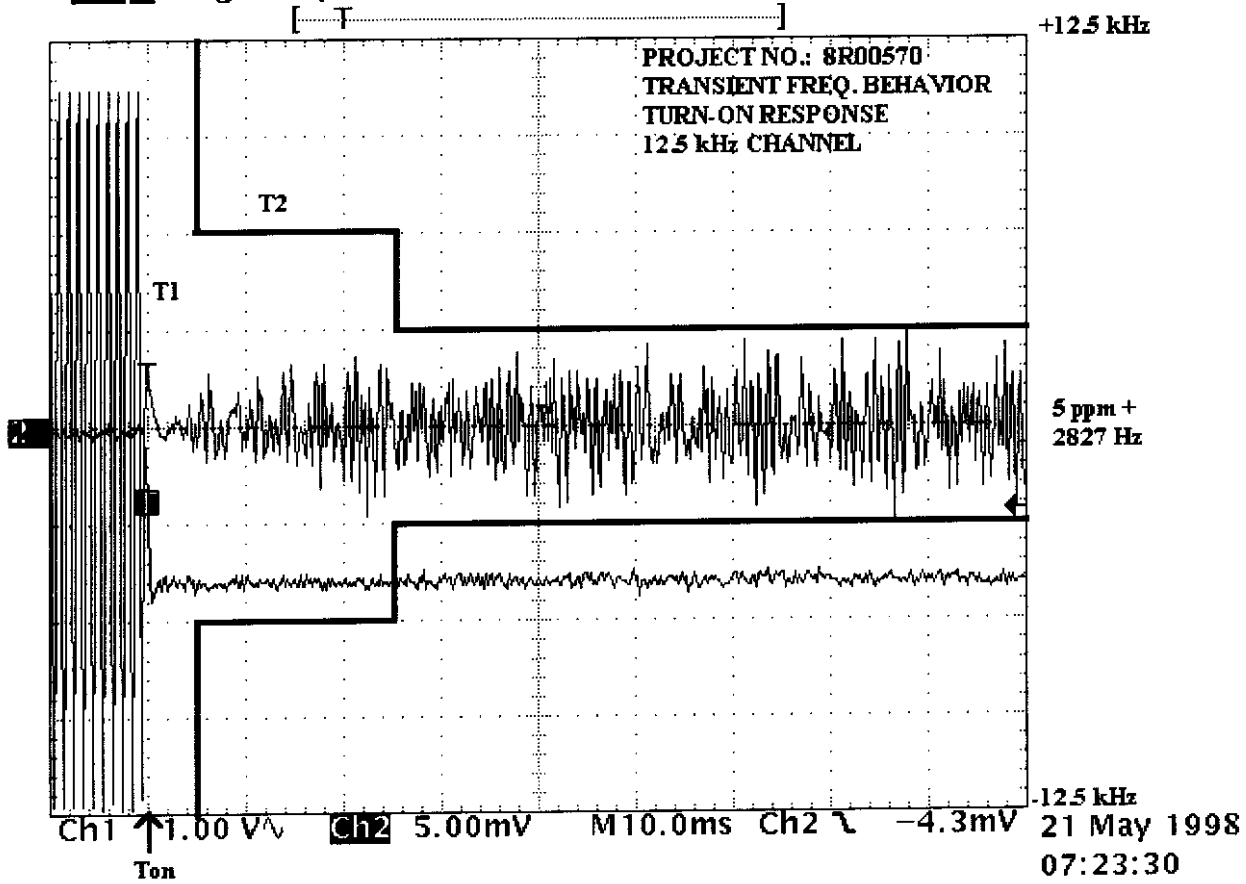
Time (min.)	Frequency (MHz)				
	-30 °C	-20 °C	-10 °C	0 °C	10 °C
0.0	161.999688	161.999753	161.999744	161.999839	161.999981
0.5	161.999703	161.999718	161.999749	161.999845	161.999989
1.0	161.999708	161.999722	161.999759	161.999850	161.999986
1.5	161.999713	161.999726	161.999764	161.999857	161.999988
2.0	161.999715	161.999735	161.999768	161.999859	161.999990
2.5	161.999717	161.999745	161.999771	161.999862	161.999991
3.0	161.999725	161.999755	161.999777	161.999864	161.999992
3.5	161.999731	161.999761	161.999784	161.999869	161.999992
4.0	161.999733	161.999770	161.999787	161.999876	161.999992
4.5	161.999734	161.999778	161.999790	161.999889	161.999992
5.0	161.999740	161.999783	161.999805	161.999997	161.999996

Time (min.)	Frequency (MHz)				
	20 °C	30 °C	40 °C	50 °C	60 °C
0.0	161.999967	162.000062	162.000122	162.000083	161.999986
0.5	161.999987	162.000065	162.000127	162.000086	161.999989
1.0	161.999991	162.000075	162.000131	162.000090	161.999991
1.5	162.000009	162.000085	162.000146	162.000096	162.000000
2.0	162.000013	162.000104	162.000144	162.000093	162.000014
2.5	162.000017	162.000113	162.000141	162.000086	162.000015
3.0	162.000029	162.000118	162.000141	162.000080	162.000016
3.5	162.000030	162.000123	162.000141	162.000077	162.000014
4.0	162.000034	162.000127	162.000140	162.000074	161.999979
4.5	162.000040	162.000128	162.000138	162.000070	161.999975
5.0	162.000042	162.000142	162.000139	162.000062	161.999970

Temperature	Maximum Deviation	
	MHz	ppm
-30°C	0.000312	1.93
-20°C	0.000282	1.74
-10°C	0.000256	1.58
0°C	0.000161	0.99
10°C	0.000019	0.12
20°C	0.000042	0.26
30°C	0.000142	0.88
40°C	0.000146	0.90
50°C	0.000096	0.59
60°C	0.000030	0.19

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

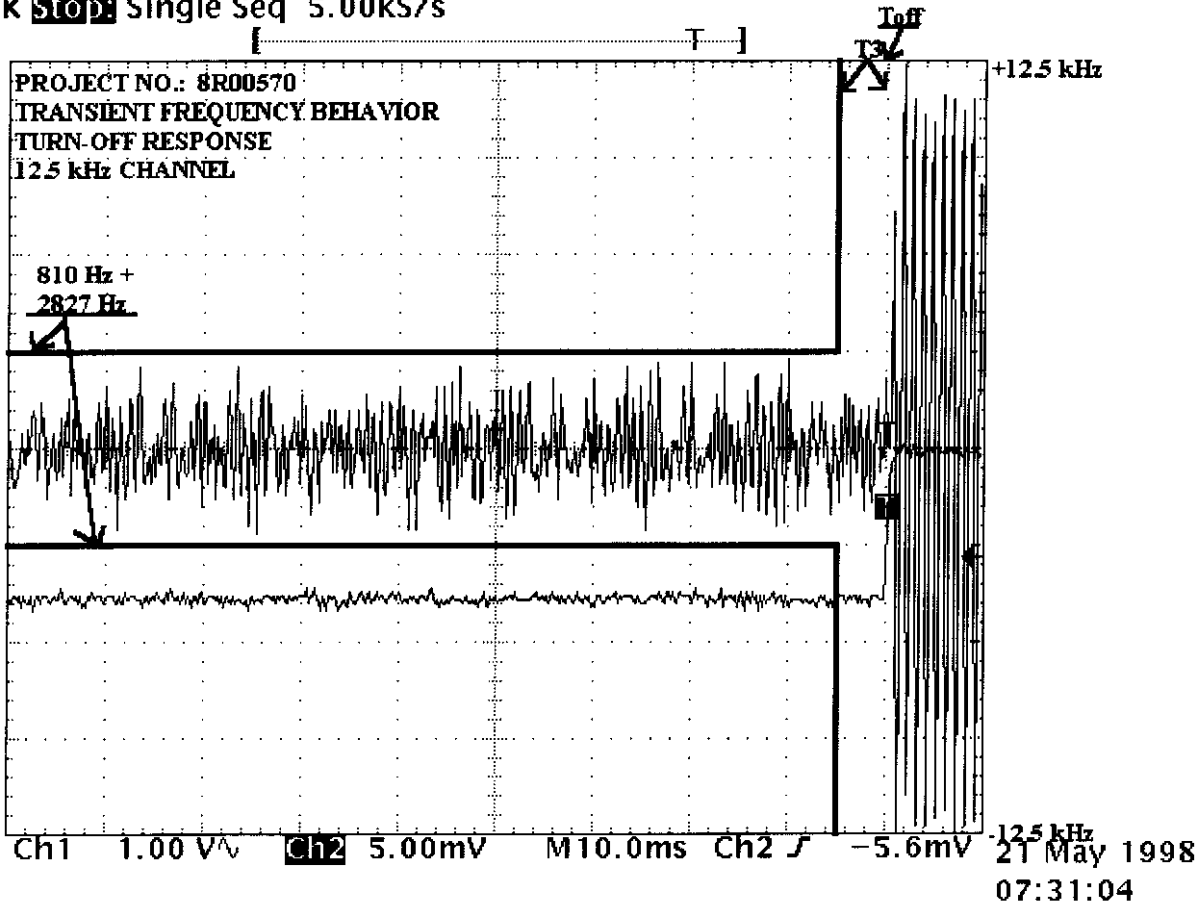
Tek Stop: Single Seq 5.00kS/s



EQUIPMENT: Esteem 192M Wireless Modem

FCC ID: ENPESTEEM192M

Tek **Stop** Single Seq 5.00kS/s



EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

RADIO TEST EQUIPMENT LIST

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.	
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	865366	Feb. 27/98	Feb. 27/99	
1 Year	Multimeter	Fluke	29	67902059	June 1/97	Jun 1/98	
1 Year	Radio Test Set	Rohde & Schwarz	CMS 52	840.0009.52	July 23/97	July 23/98	
1 Year	Climate Chamber	Thermotron	SM-16C	15649-S	May 23/97	May 23/98	
1 Year	Attenuator	Narda	768-20	9507	July 23/97	July 23/98	
1 Year	Attenuator	Narda	768-10	9704	Oct. 1/97	Oct. 1/98	
1 Year	Attenuator	Narda	768-10	9709	Oct. 1/97	Oct. 1/98	
1 Year	RF Millivoltmeter	Rohde & Schwarz	URV5	FA000420	July 23/97	July 23/98	
1 Year	Insertion Unit	Rohde & Schwarz	URV5-Z4	FA000905	July 23/97	July 23/98	
1 Year	Receiver	Rohde & Schwarz	ESVP	892661/014	Mar. 31/98	Mar. 31/99	
2 Year	Horn Antenna	EMCO #2	3115	4336	Oct. 30/97	Oct. 30/99	
1 Year	Log Periodic Antenna	EMCO	LPA-25	1141	July 10/97	July 10/98	
1 Year	Biconical (2) Antenna	EMCO	3109	9503-2894	April 24/97	April 24/98	
	50 Ω Termination	Wiltron	26N50	605248	N/A	N/A	
1 Year	Directional Coupler	Hewlett Packard	765D	228	July 23/97	July 23/98	
	Detector	Sierra	164B	395	N/A	N/A	
1 Year	50 ohm Combiner Pad	Mini Circuits	ZFC-3-4	922603	Dec. 5/97	Dec. 5/98	
1 Year	Digital Storage Oscilloscope	Tektronix	TDS544A	B012005	July 24/97	July 24/98	
1 Year	Frequency Counter	Hewlett Packard	HP5350A	2444A00135	Mar. 27/98	Mar. 27/99	

NA: Not Applicable
NCR: No Cal Required

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

ANNEX A

TEST METHODOLOGIES

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

NAME OF TEST:	RF Power Output	PARA.NO.: 2.985
----------------------	------------------------	------------------------

TEST CONDITIONS: Standard Temperature & Humidity: +20°C, 30%
Standard Test Voltage: 13.8 VDC
Unmodulated

MINIMUM STANDARD: Para. No. 90.205(d). The maximum allowable station effective radiated power (ERP) is dependent upon the stations HAAT and required service area and will be authorized in accordance with Table 1 of 90.205(d).

NAME OF TEST:	Audio Frequency Response	PARA.NO.: 2.987(a)
----------------------	---------------------------------	---------------------------

TEST CONDITIONS: Standard Temperature & Humidity: +20°C, 30%
Standard Test Voltage: 13.8 VDC
Modulated

MINIMUM STANDARD: TIA/E1A-603, Para. No. 3.2.6 from 300 Hz to 3000 Hz. The transmitter audio frequency response shall have a nominal 6 dB per octave pre-emphasis characteristic.

NAME OF TEST:	Audio Low-Pass Filter Frequency Response	PARA.NO.: 2.987(a)
----------------------	---	---------------------------

TEST CONDITIONS: Standard Temperature & Humidity: +20°C, 30%
Standard Test Voltage: 13.8 VDC

MINIMUM STANDARD: N/A

NAME OF TEST:	Modulation Limiting	PARA.NO.: 2.987(b)
----------------------	----------------------------	---------------------------

TEST CONDITIONS: Standard Temperature & Humidity: ±20°C, 30%
Standard Test Voltage: 13.8 VDC

TEST EQUIPMENT: As per block diagram and equipment list attached.

MINIMUM STANDARD: N/A

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

NAME OF TEST: Occupied Bandwidth	PARA.NO.: 2.989
---	------------------------

TEST CONDITIONS: Standard Temperature & Humidity: +20°C, 30%
Standard Test Voltage: 13.8 VDC

MINIMUM STANDARD: Para. No. 90.210, see table 1 below for applicable mask.

Frequency Band (MHz)	Mask for equipment with Low Pass Filter	Mask for equipment without Low Pass Filter
Below 25	A or B	A or C
25 - 50	B	C
72 - 76	B	C
150 - 174	B, D or E	C, D or E
150 Paging only	B	C
220 - 222	F	F
421 - 512	B, D or E	C, D or E
450 paging only	B	H
806 - 821/ 851 - 866	B	G
821 - 824/ 866 - 869	B	H
896 - 901/ 935 - 940	I	J
902 - 928	K	K
929 - 930	B	G
Above 940	B	C
All other bands	B	C

Table 1

NAME OF TEST: Spurious Emission at Antenna Terminals	PARA.NO.: 2.991
---	------------------------

TEST CONDITIONS: Standard Temperature & Humidity: +20°C, 30%
Standard Test Voltage: 13.8 VDC
Modulated: 2500 Hz @ 16 dB overdrive

MINIMUM STANDARD: Para. No. 90.210, see table 1 above for applicable mask. Spurious Emissions at the antenna terminals shall be attenuated below the mean output power of the transmitter by at least 50 + 10Log (mean power output in watts) dB. This is equivalent to -20 dBm.

*EQUIPMENT: Esteem 192M Wireless Modem**FCC ID: ENPESTEEM192M***NAME OF TEST: Field Strength of Spurious Radiation****PARA.NO.: 2.993**TEST CONDITIONS: Outdoor Range: +14°C, 30%
Standard Test Voltage: 13.8 VDCMINIMUM STANDARD: Para. No. 90.210 see table 1 for applicable mask. The field strength of spurious radiation shall be attenuated below the mean output power of the transmitter by at least 50 + 10Log (mean output power in watts) dB.**CALCULATION OF FIELD STRENGTH LIMIT**

An example of attenuation requirement of 50 + 10 Log P is equivalent to -20 dBm (1 x 10⁻⁵ Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

$$GP/4\pi R^2 = E^2/120\pi$$

For emissions ≤ 1 GHz:

G = 1.64 (Dipole Gain)

P = 10⁻⁵ Watts (Maximum spurious output power)

R = 3m (Measurement Distance)

$$E = \frac{\sqrt{30GP}}{R} = E = \frac{\sqrt{30 \times 1.64 \times 10^{-5}}}{3} = 0.00739 \text{ V/m} = 77.4 \text{ dB}\cdot\text{V/m}$$

For emissions > 1 GHz:

G = 1 (Isotropic Gain)

P = 1 x 10⁻⁵ Watts (Maximum spurious output power)

R = 3m (Measurement Distance)

$$E = 77.4 - 20\text{Log}\sqrt{1.64} = 75.3\text{dB}\cdot\text{V/m}@3\text{m}$$

EQUIPMENT: Esteem 192M Wireless Modem

FCC ID: ENPESTEEM192M

NAME OF TEST:	Frequency Stability	PARA.NO.: 2.995
----------------------	----------------------------	------------------------

TEST CONDITIONS: As per measurement data.

MINIMUM STANDARD: Para. No. 90.213. The transmitter carrier frequency shall remain within the assigned frequency below in ppm.

Frequency Band (MHz)	Fixed and base stations	Mobile Stations	
		> 2 Watts o/p pwr	< 2 Watts o/p pwr
Below 25	100	100	200
25 - 50	20	20	50
72 - 76	5	-	50
150 - 174	5	5	5
220 - 222	0.1	1.5	1.5
421 - 512	2.5	5	5
806 - 821	1.5	2.5	2.5
821 - 824	1.0	1.5	15
851 - 866	1.5	2.5	2.5
866 - 869	1.0	1.5	1.5
869 - 901	0.1	1.5	1.5
902 - 928	2.5	2.5	2.5
929 - 930	1.5	-	-
935 - 940	0.1	1.5	1.5
1427 - 1435	300	300	300
above 2450	-	-	-

Table 2

NAME OF TEST:	Transient Frequency Behaviour	PARA.NO.: 90.214
----------------------	--------------------------------------	-------------------------

TEST CONDITIONS: Standard Temperature & Humidity: +20°C, 30%
Standard Test Voltage: 13.8 VDC

MINIMUM STANDARD:

Transient Frequency Behaviour for Equipment Designed to Operate on 25 kHz Channels

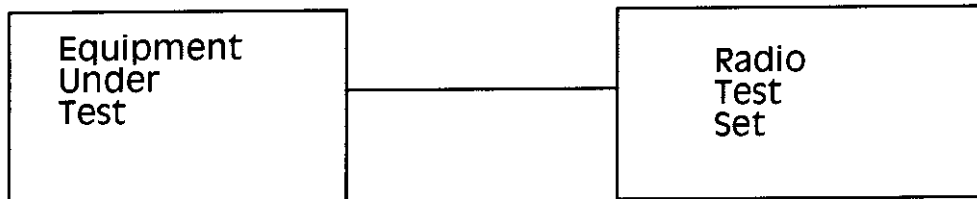
Time intervals ^{1,2}	Maximum Frequency difference ³ (kHz)	Frequency ranges (MHz) All equipment					
		Base station and portable radios			Mobile Radios		
		150 - 174 (ms)	450 - 500 (ms)	500 - 512 (ms)	150 - 174 (ms)	450 - 500 (ms)	500 - 512 (ms)
t ₁ ⁴	± 25	5.0	10.0	20.0	5.0	10.0	5.0
t ₂	± 12	20.0	25.0	50.0	20.0	25.0	20.0
t ₃ ⁴	± 25	5.0	10.0	10.0	5.0	10.0	5.0

Transient Frequency Behaviour for Equipment Designed to Operate on 12.5 kHz & 6.25 kHz Channels

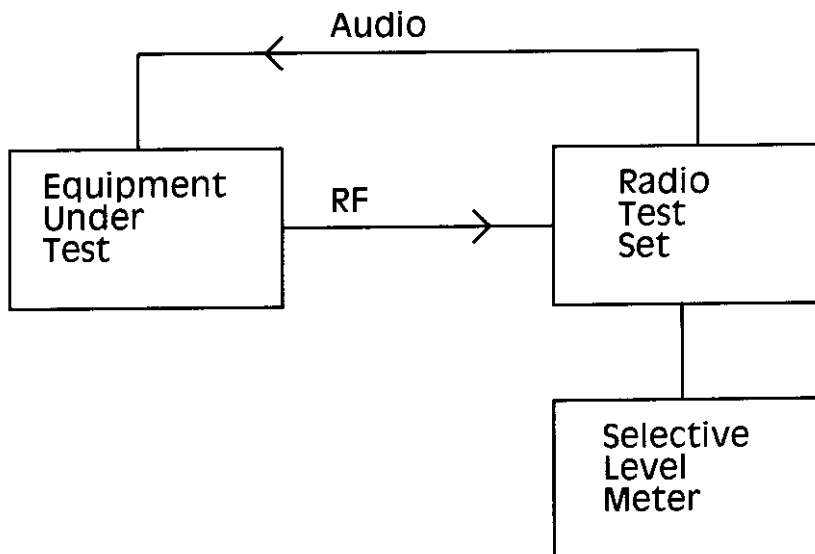
Time intervals ^{1,2}	Maximum Frequency difference ³ (kHz)	Frequency ranges (MHz) All equipment		
		150 - 174 (ms)	450 - 500 (ms)	500 - 512 (ms)
t ₁ ⁴	± 12.5 / ± 6.25	5.0	10.0	20.0
t ₂	± 6.25 / ± 3.125	20.0	25.0	50.0
t ₃ ⁴	± 12.5 / ± 6.25	5.0	10.0	10.0

EQUIPMENT: Esteem 192M Wireless Modem
FCC ID: ENPESTEEM192M

PARA. NO. 2.985 RF POWER OUTPUT



PARA. NO. 2.987(a) AUDIO FREQUENCY RESPONSE



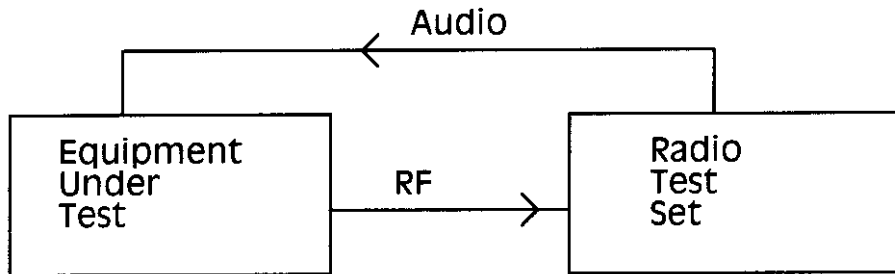
PARA. NO. 2.987(a) AUDIO LOW-PASS FILTER FREQUENCY RESPONSE



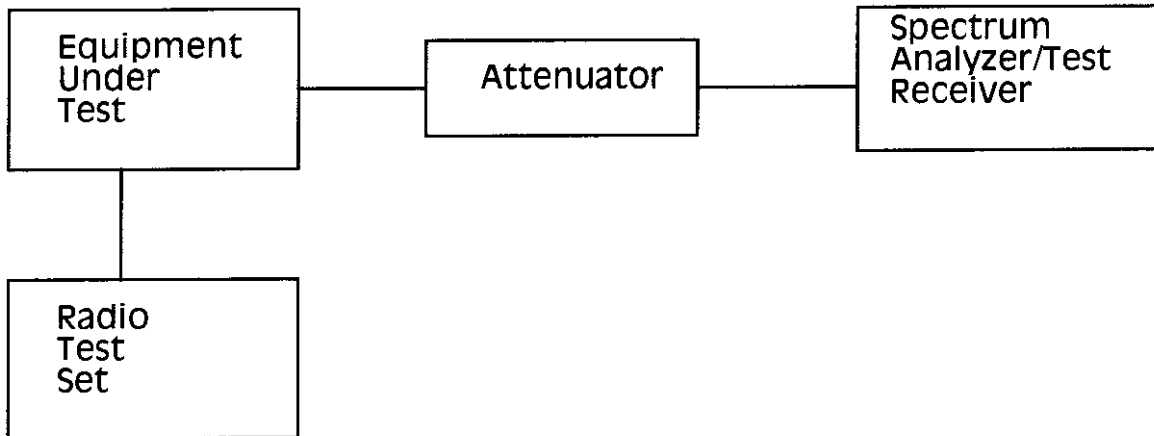
EQUIPMENT: Esteem 192M Wireless Modem

FCC ID: ENPESTEEM192M

PARA. NO. 2.987(b) MODULATION LIMITING



PARA. NO. 2.989 OCCUPIED BANDWIDTH



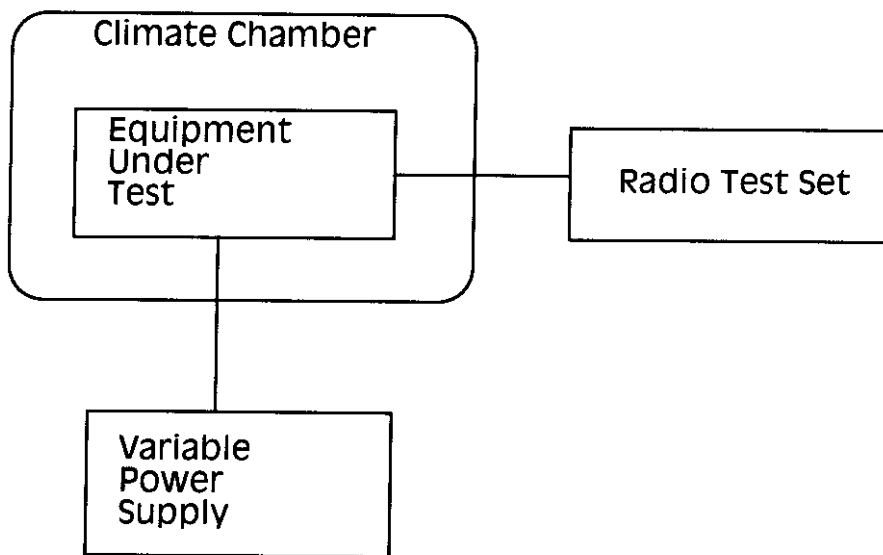
The transmitter was modulated with a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50% modulation.

Spectrum Analyzer settings as per measurement data.

EQUIPMENT: Esteem 192M Wireless Modem

FCC ID: ENPESTEEM192M

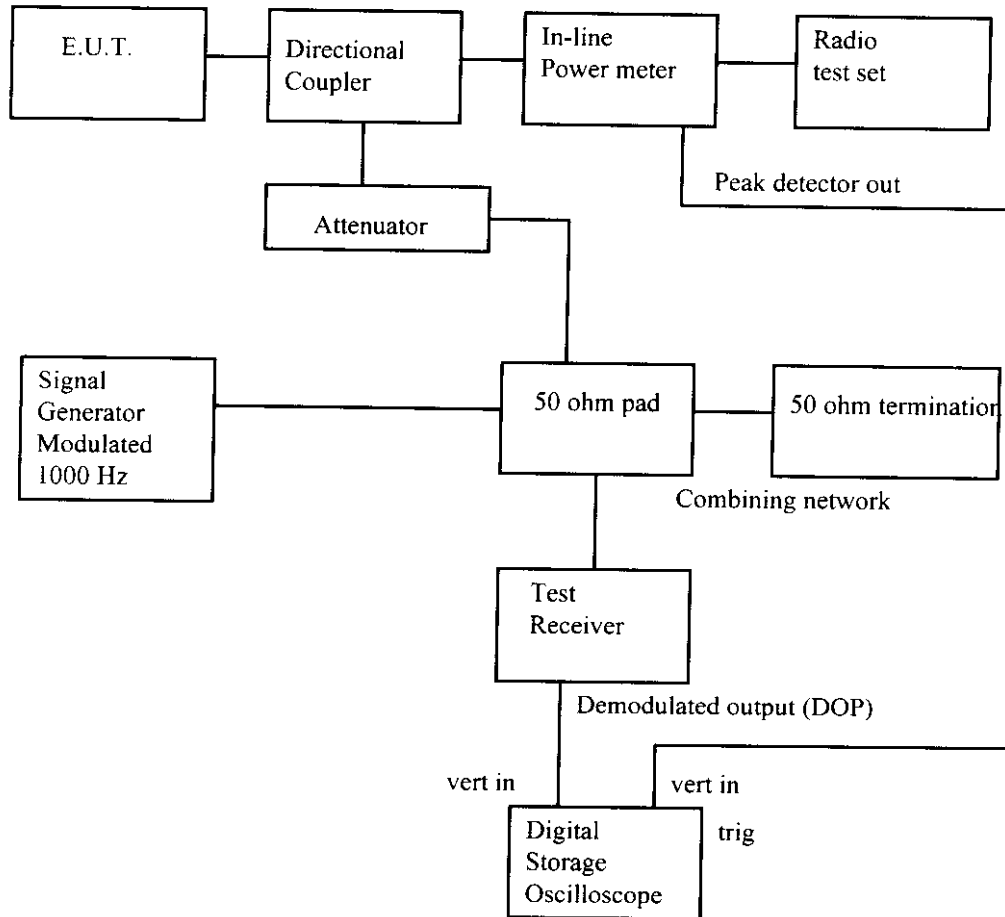
PARA. NO. 2.995 FREQUENCY STABILITY



EQUIPMENT: Esteem 192M Wireless Modem

FCC ID: ENPESTEEM192M

PARA. NO. 90.214 TRANSIENT FREQUENCY BEHAVIOUR



Voice

This measurement was made using measurement procedure TIA/EIA Land Mobile FM or PM Communications Equipment Measurement and Performance Standards TIA/EIA-603 February 1993 Telecommunications Industry Association (American National Standard ANSI/TIA/EIA-603-1992 Approved: October 27, 1992) Para. no. 2.2 Methods of Measurement for Transmitters Para. no. 2.2.19 Transient Frequency Behaviour (page no. 83).

Data

This measurement was made using measurement procedure TIA/EIA Digital C4FM/CQPSK Transceiver Measurement Methods TSB102.CAAA Para. no. 2.2.17 Transient Frequency Behaviour (page no. 74).