



Test Report: 4W07972

Applicant: Vcom Inc.
150 Cardinal Place
Saskatoon, Saskatchewan
S7L 6H7
Canada

**Equipment Under Test:
(EUT)** TR700B UHF
Transceiver

FCC ID: OPPTR700B

In Accordance With: **FCC Part 27, Subpart C**

Tested By: Nemko Canada Inc.
303 River Road, R.R. 5
Ottawa, Ontario K1V 1H2



Authorized By: Glen Westwell, Wireless Specialist

Date: March 26, 2004

Total Number of Pages: 30

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EQUIPMENT: TR700B UHF Transceiver

Section 1. Summary of Test Results

General

All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 27, Subpart C.

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: Russell Grant

DATE: March 23, 2004



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This report applies only to the items tested.

EQUIPMENT: TR700B UHF Transceiver

Summary Of Test Data

Name Of Test	Para. No.	Result
RF Power Output	2.1046	Complies: 0.250 watt
Modulation Characteristics	2.1047	N/A*
Occupied Bandwidth	2.1049	Complies: 99% 350-1430 kHz
Spurious Emissions at Antenna Terminals	2.1051	Complies: -16 dBm at 710 MHz low band edge
Field Strength of Spurious Radiation	2.1053	Complies: -72.3 dBm ERP at 1426 MHz
Frequency Stability	2.1055	Complies: -1.527, +7.930 kHz

* This equipment does not have any provision for conventional AM/FM analogue audio processing circuits. All modulations are digital.

Test Conditions:

Indoor Temperature: 24°C
 Humidity: 11%

Outdoor Temperature: 5°C
 Humidity: 6%

EQUIPMENT: TR700B UHF Transceiver

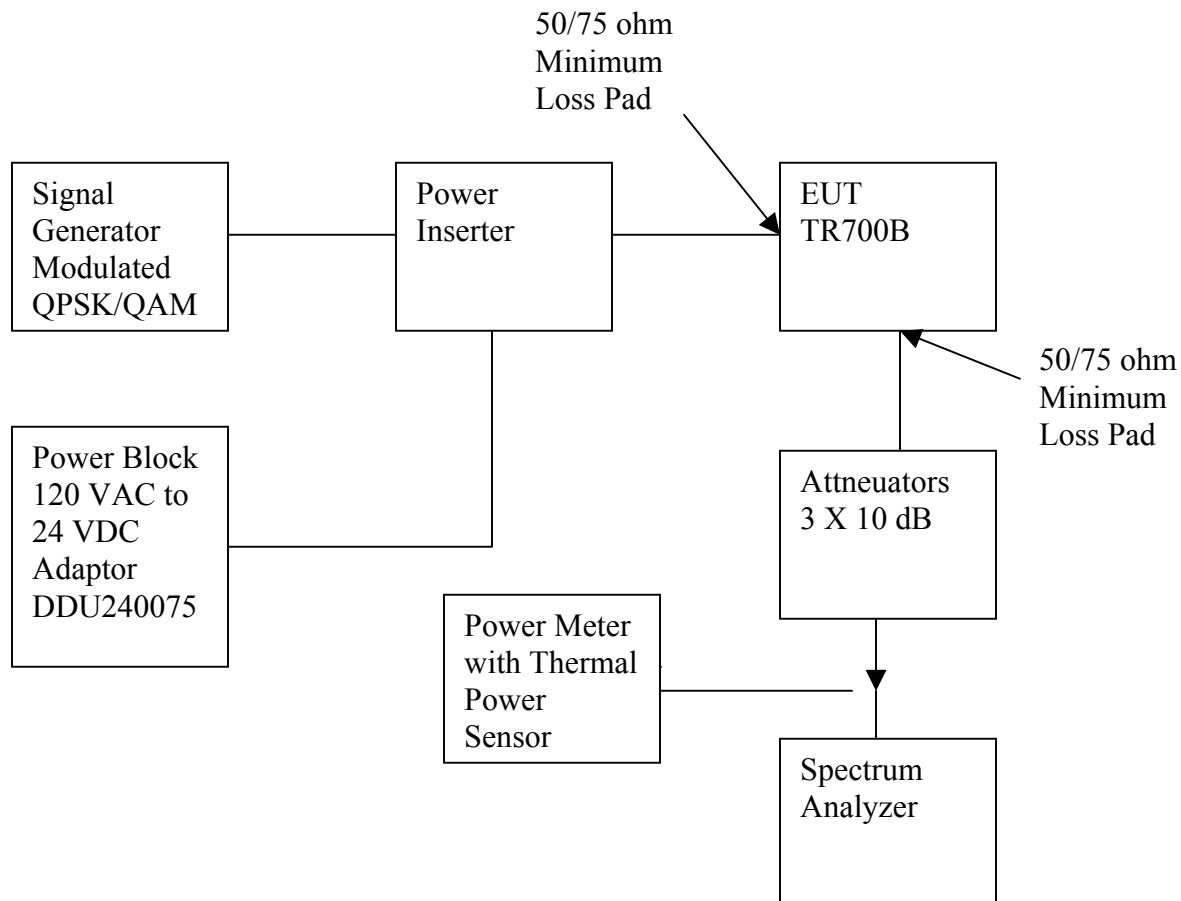
Section 2. General Equipment Specification

Manufacturer:	VCom Inc.
Model No.:	TR700B
Model Variants:	TR700B-IF1 *(See description of model variants below.)
Serial No.:	339782
Date Received In Laboratory:	March 11, 2004
Nemko Identification No.:	1
Supply Voltage Input:	120 VAC to 24 VDC Adaptor
Frequency Band:	27.5(c)(1) Block C: 710 – 716 MHz
Frequency Range of EUT:	Frequency range is dependent upon symbol rate. See attached channel plan. 710.6 – 715.4 MHz for 320 kbps 711.0 – 715.0 MHz for 640 kbps 711.4 – 714.6 MHz for 1280 kbps
RF Power Output:	0.250 watt
Type of Modulation:	QPSK, QAM
Data Rate:	320, 640, 1280 kbps
Emission Designator:	400KG1W, 400KD1W 800KG1W, 800KD1W 1M60G1W, 1M60D1W
Antenna Information:	Typical: Yagi 10dBi gain

* Model Variants: The TR700B uses a transmit IF of 36 - 42 MHz while the TR700B-IF1 uses a transmit IF of 44.375 – 50.375 MHz while still maintaining the same transmit RF frequency of 710 – 716 MHz. Both models use identical electronics. The local oscillator used internally for the up conversion is 674 MHz for the TR700B and 665.625 MHz for the TR700B-IF1. Different firmware is used to change the local oscillator frequency.

EQUIPMENT: TR700B UHF Transceiver

Channel Plan													
QPSK 320 kbps	710.6	711	711.4	711.8	712.2	712.6	713	713.4	713.8	714.2	714.6	715	715.4
LO	36.6	37	37.4	37.8	38.2	38.6	39	39.4	39.8	40.2	40.6	41	41.4
16 QAM 320 kbps	710.6	711	711.4	711.8	712.2	712.6	713	713.4	713.8	714.2	714.6	715	715.4
LO	36.6	37	37.4	37.8	38.2	38.6	39	39.4	39.8	40.2	40.6	41	41.4
QPSK 640 kbps	711	711.8	712.6	713.4	714.2	715							
LO	37	37.8	38.6	39.4	40.2	41							
16 QAM 640 kbps	711	711.8	712.6	713.4	714.2	715							
LO	37	37.8	38.6	39.4	40.2	41							
QPSK 1280 kbps	711.4	713	714.6										
LO	37.4	39	40.6										
16 QAM 1280 kbps	711.4	713	714.6										
LO	37.4	39	40.6										

EQUIPMENT: TR700B UHF Transceiver

Configuration Block Diagram

Equipment Under Test: (EUT) Model TR700B UHF Transceiver

Power Block: Model DDU240075 supplied with EUT

Power Inserter: TAIWAN supplied with EUT

50/75 Ohm minimum loss pads for test purposes only, 5.5 dB insertion loss, INMET model 9079 supplied by VCom. The minimum loss pads were calibrated (2 back to back) up to 8GHz for insertion loss. This was included in the reference level offset for the power meter and spectrum analyzer.

EQUIPMENT: TR700B UHF Transceiver

Section 3. RF Power Output

Para. No.: 2.1046

Test Performed By: Russell Grant	Date of Test: March 22, 2004
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Minimum Standard: Para. No. 27.50(c), 50 kW ERP

Test Results: The RF power output is 1.52 watt ERP. This is 45.2 dB below the specification limit.

Measurement Data: 24 dBm, 0.250 watt

Antenna Gain 10 dBi typical

$EIRP = 10 \times 0.250 = 2.5 \text{ watt}$

$ERP = EIRP/1.64 = 2.5/1.64 = 1.52 \text{ watt}$

RF power output was measured at the antenna terminal using a power meter with thermal power sensor. All modulations and data rates were measured and identical results were obtained.

EQUIPMENT: TR700B UHF Transceiver

Section 4. Occupied Bandwidth**Para. No.: 2.1049**

Test Performed By: Russell Grant	Date of Test: March 19, 2004
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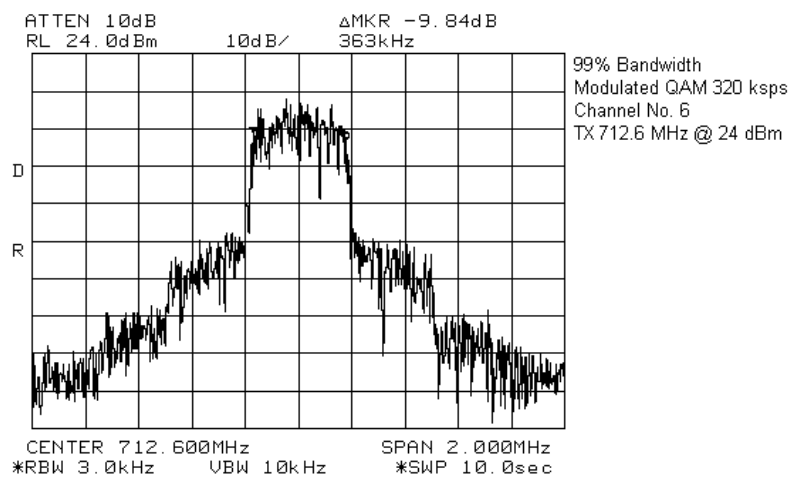
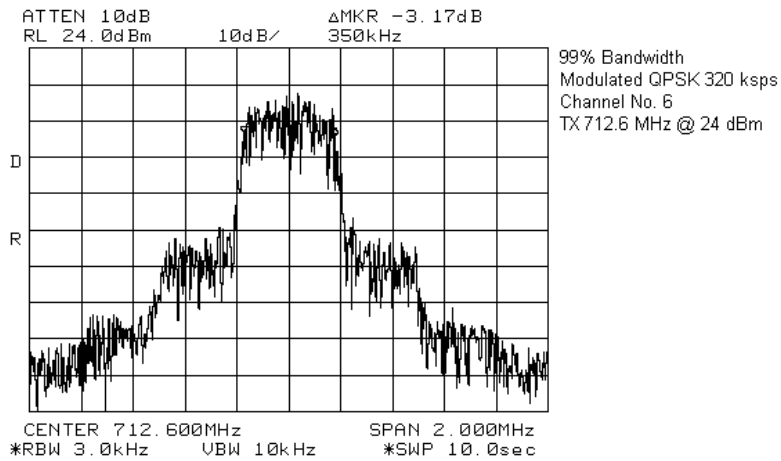
Test Results: The occupied bandwidth is dependent upon the symbol rate as shown in the table of measurement data. Occupied bandwidth varies from 350 to 1430 kHz.

Measurement Data: See attached spectral plots

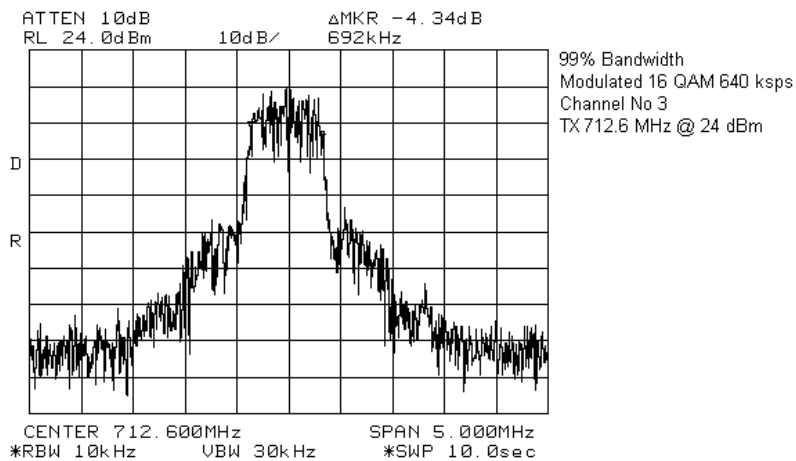
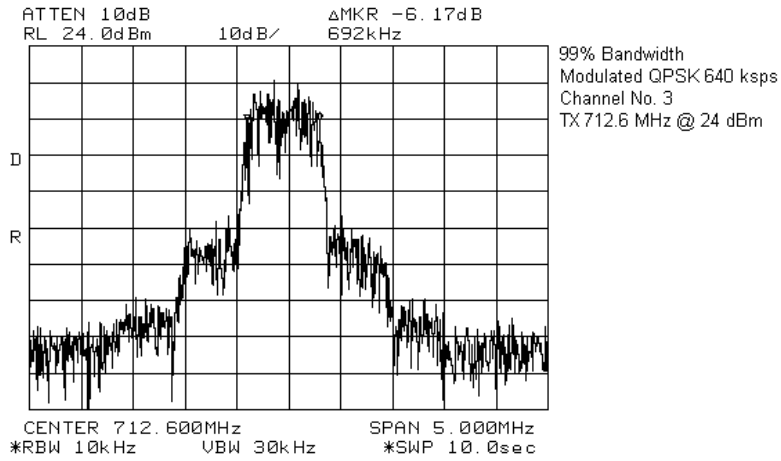
Modulation	Symbol Rate (ksps)	Occupied Bandwidth kHz
QPSK	320	350
QAM	320	363
QPSK	640	692
QAM	640	692
QPSK	1280	1370
QAM	1280	1430

Occupied bandwidth is the measured 99% bandwidth as shown on the attached spectral plots.

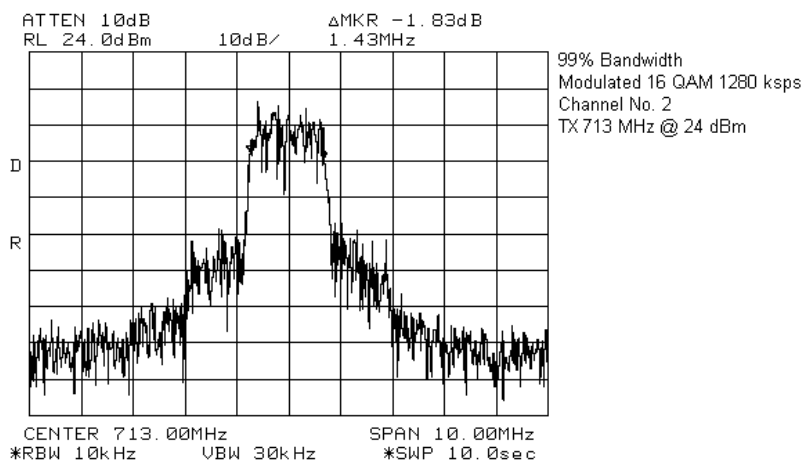
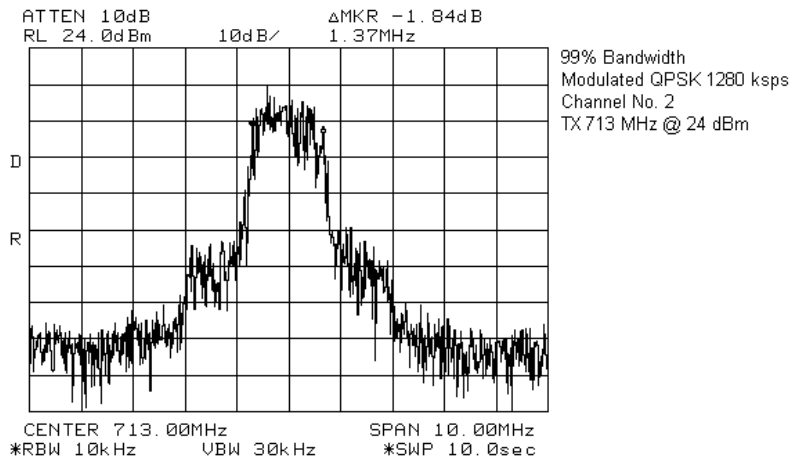
EQUIPMENT: TR700B UHF Transceiver



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Section 5. Spurious Emissions at Antenna Terminals

Para. No.: 2.1051

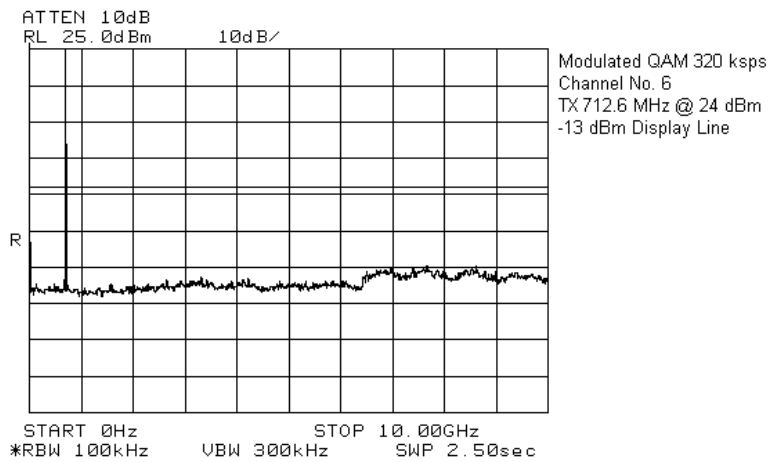
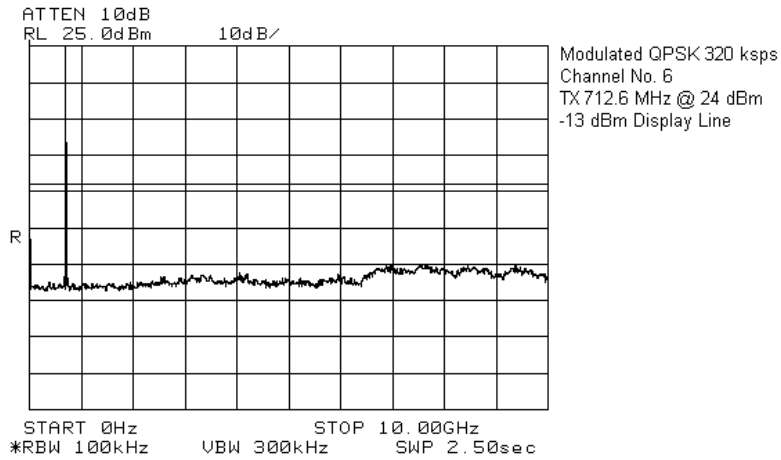
Test Performed By: Russell Grant	Date of Test: March 19, 2004
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Minimum Standard: Para. No. 27.53(f), -13 dBm

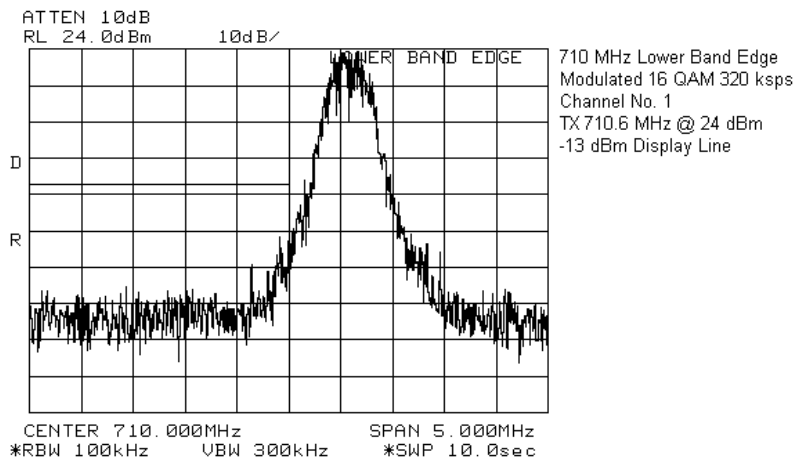
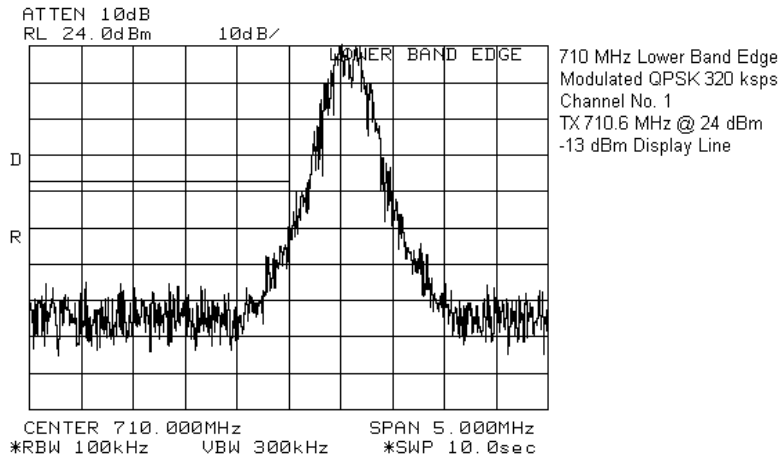
Test Results: The worst case emission is -16 dBm at the 710 MHz low band edge. This is 3 dB below the specification limit.

Test Data: See attached spectral plots.

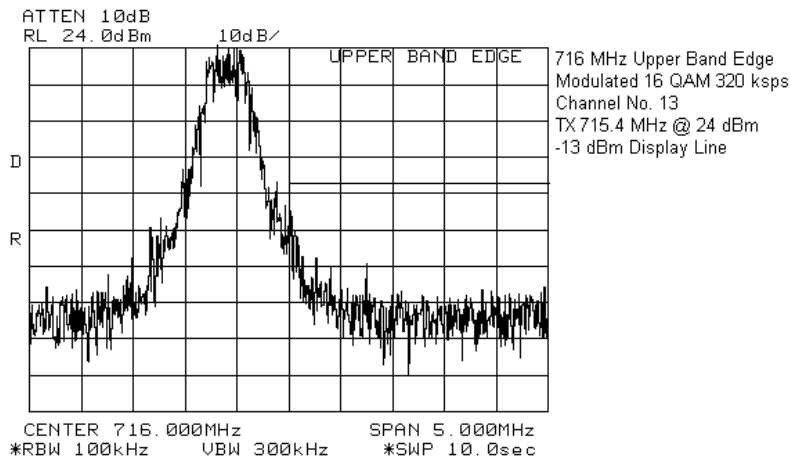
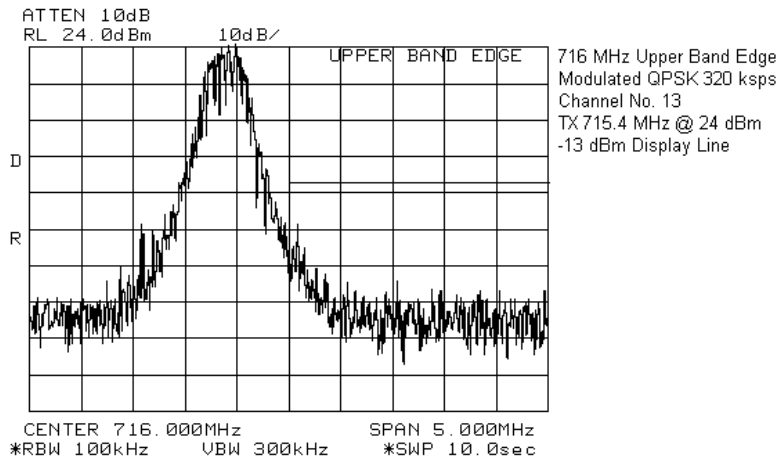
EQUIPMENT: TR700B UHF Transceiver



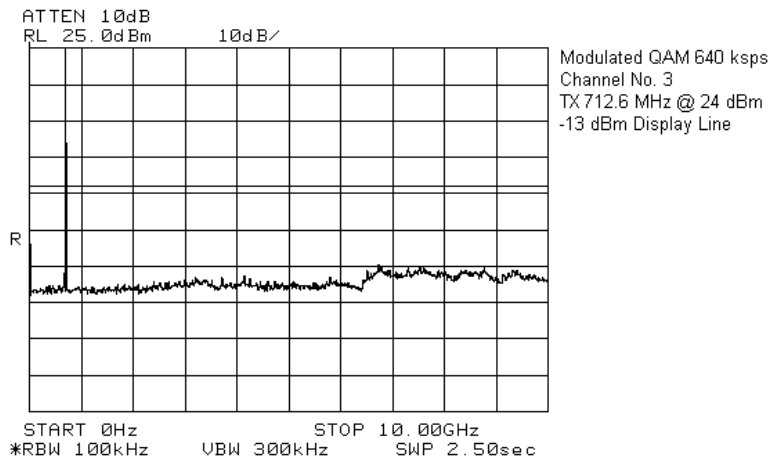
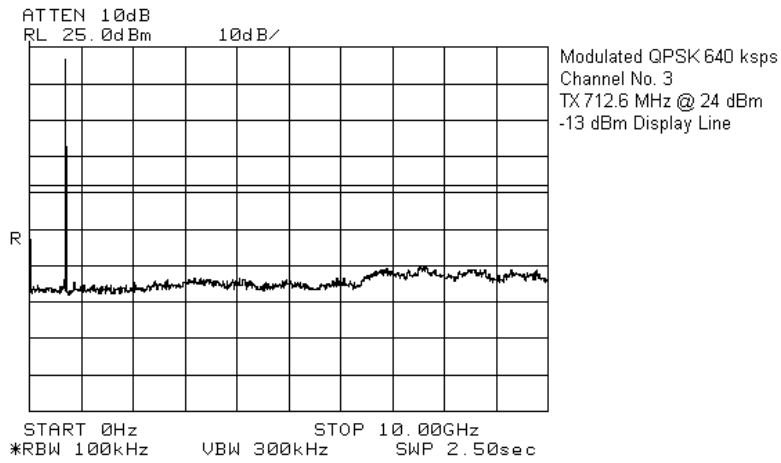
EQUIPMENT: TR700B UHF Transceiver



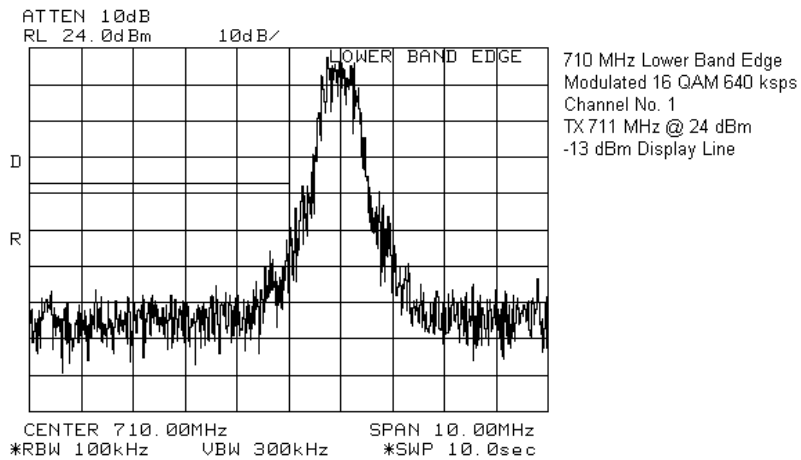
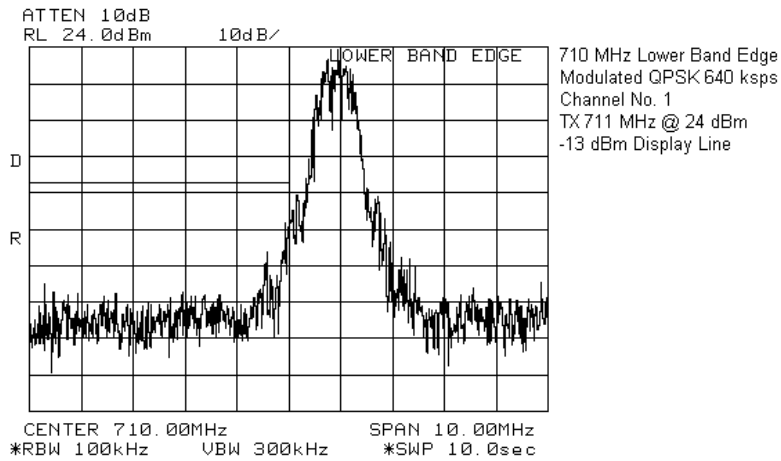
EQUIPMENT: TR700B UHF Transceiver



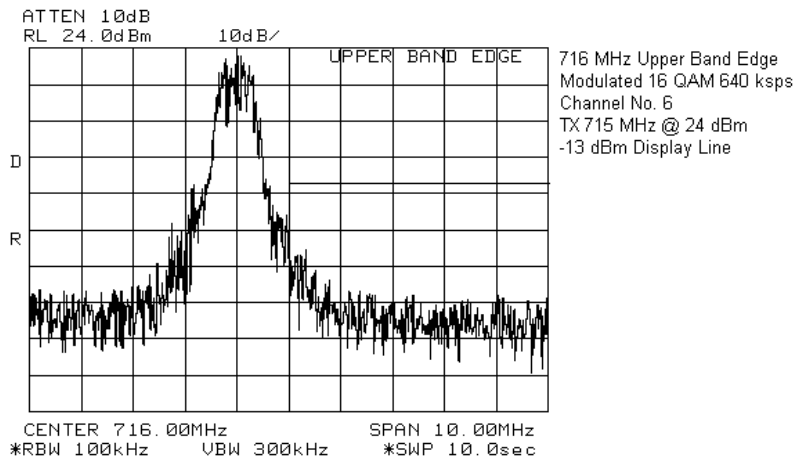
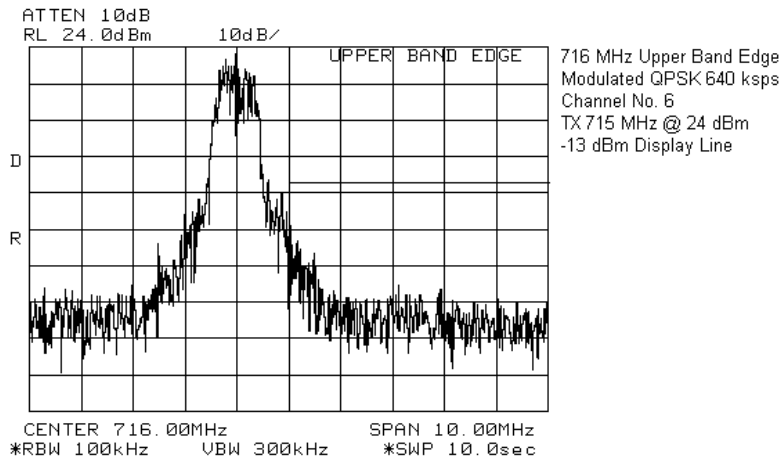
EQUIPMENT: TR700B UHF Transceiver



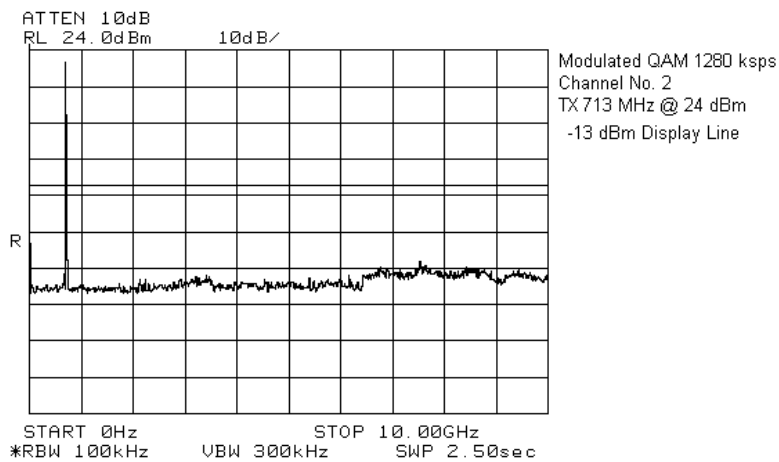
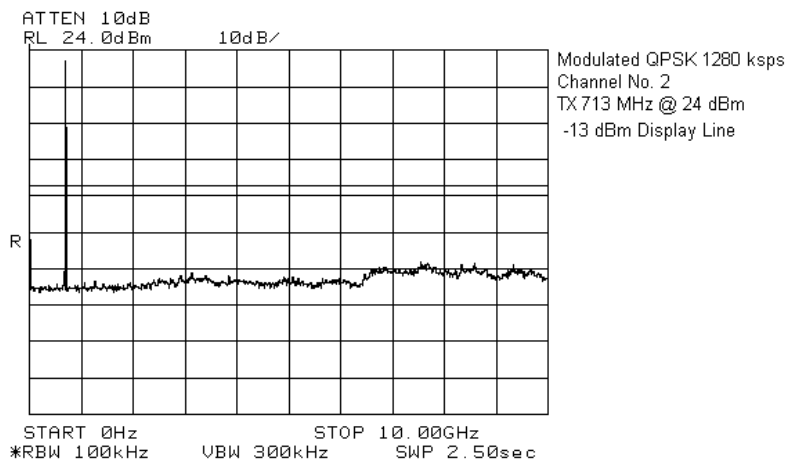
EQUIPMENT: TR700B UHF Transceiver



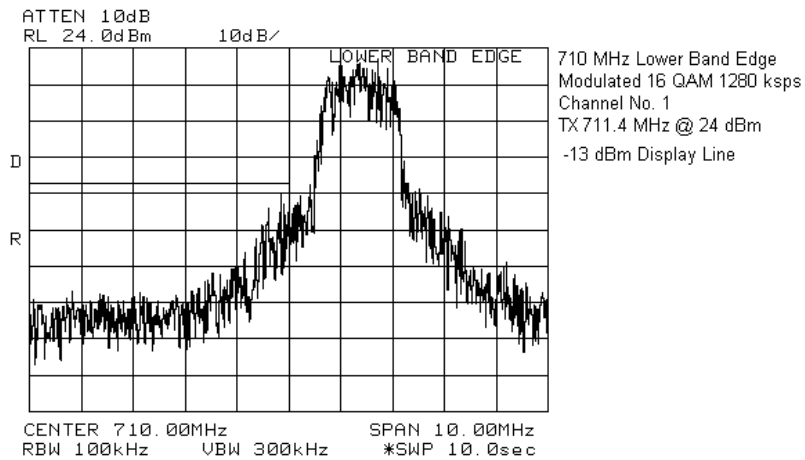
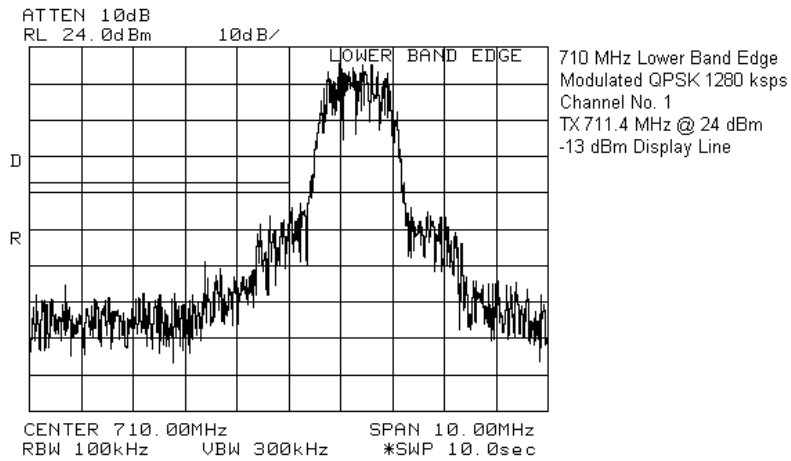
EQUIPMENT: TR700B UHF Transceiver



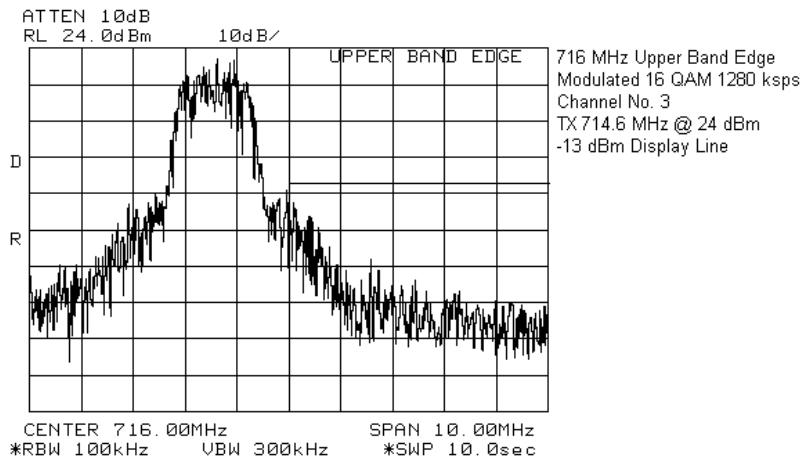
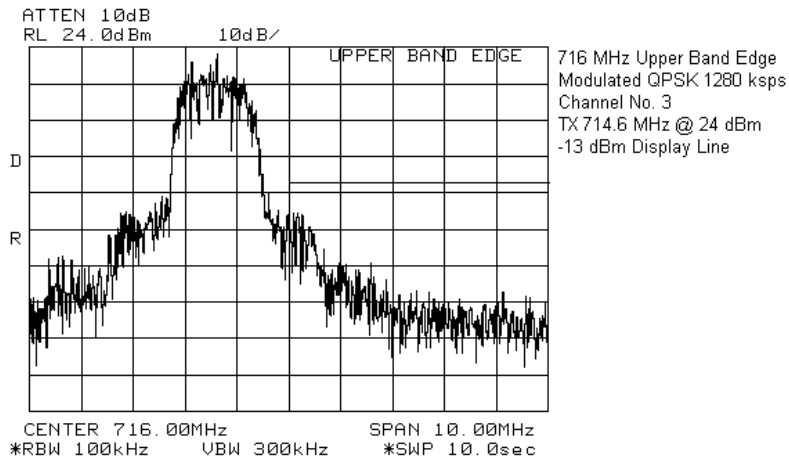
EQUIPMENT: TR700B UHF Transceiver



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EQUIPMENT: TR700B UHF Transceiver

Section 6. Field Strength of Spurious Radiation**Para. No.: 2.1053**

Test Performed By: Russell Grant	Date of Test: March 23, 2004
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Minimum Standard: Para. No. 27.53(f), -13 dBm**Test Results:** The worst case emission is -72.3 dBm ERP @ 1426 MHz. This is 59.3 dB below the specification limit.**Test Data:**

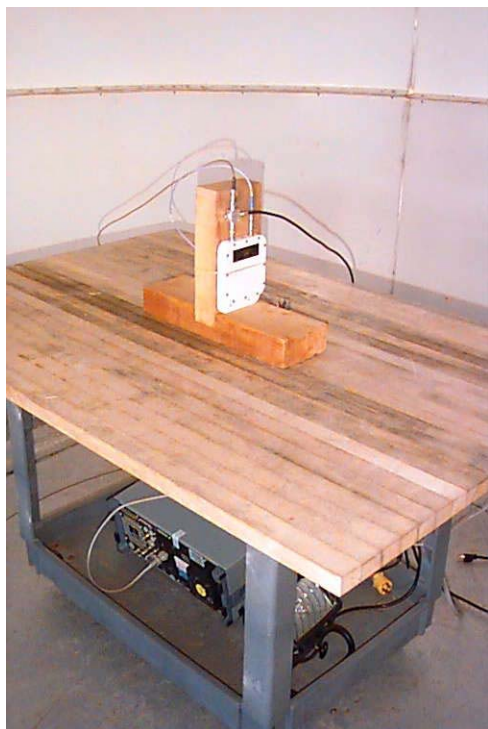
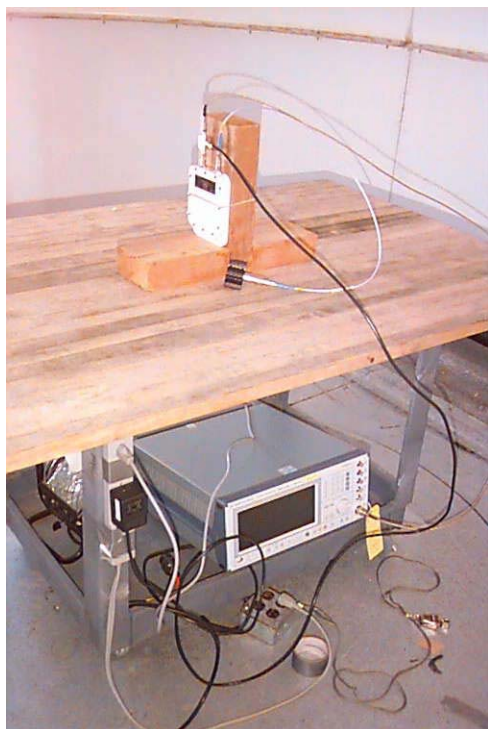
Frequency of Emission (MHz)	Polarization	Received Signal (dBuV)	Emission Level (dBm) ERP	Limit (dBm) ERP	Margin (dB)
1426	Vertical	47.3	-72.3	-13	59.3
1426	Horizontal	45.3	-73.6	-13	60.6

TX 713 MHz @ 24 dBm, 0.250 watt

Measured peak detector, 100 kHz RBW/VBW

The spectrum was search up to the 10 th harmonic of the fundamental frequency operation.

EQUIPMENT: TR700B UHF Transceiver



EQUIPMENT: TR700B UHF Transceiver

Section 7. Frequency Stability

Para. No.: 2.1055

Test Performed By: Russell Grant	Date of Test: March 18, 2004
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Minimum Standard: Para. No. 27.54, The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Test Results: The fundamental emission remains within the band 710.461973 MHz to 715.589430 MHz.

Measurement Data: Lower fundamental emission band edge: 710.416973 MHz
Upper fundamental emission band edge: 715.589430 MHz
See attached tabulated data.

EQUIPMENT: TR700B UHF Transceiver

Standard Test Frequency 713 MHz
 Standard Test Voltage 120 VAC +/- 15%

Test Condition			
Temperature (C)	Voltage (Volt)	Frequency (MHz)	Frequency Drift (kHz)
50	120	712.998556	-1.444000
40	120	712.998473	-1.527000
30	120	713.001505	1.505000
20	138	713.001742	1.742000
20	120	713.001835	1.835000
20	102	713.001690	1.690000
-10	120	713.007930	7.930000
-20	120	713.007282	7.282000
-30	120	713.007096	7.096000

Fundamental emission band edge.						
Modulation	Symbol Rate	Occupied Bandwidth kHz	Low Channel	Lower Fundamental Emission Band Edge (MHz)	High Channel	Upper Fundamental Emission Band Edge (MHz)
QPSK	320	350	710.6	710.423473	715.4	715.582930
QAM	320	363	710.6	710.416973	715.4	715.589430
QPSK	640	692	711.0	710.652473	715.0	715.353930
QAM	640	692	711.0	710.652473	715.0	715.353930
QPSK	1280	1370	711.4	710.713473	714.6	715.292930
QAM	1280	1430	711.4	710.683473	714.6	715.322930

Lower fundamental emission was calculated as follows: Low Channel - (Occupied Bandwidth)/2 + Fd
 where Fd is the negative frequency drift from the abover table and occupied bandwidth is the measured 99% bandwidth

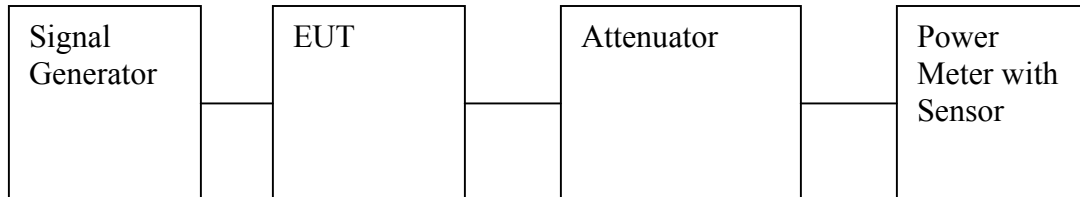
Upper fundamental emission was calculated as follows: High Channel + (Occupied Bandwidth)/2 + Fd

where Fd is the positive frequency drift from the abover table and occupied bandwidth is the measured 99% bandwidth

Sample Calculation: QPSK @ 320 kps Lower Fundamental Emission Band Edge
 This is $710.6 - 0.350/2 + (-1.5270/1000) = 710.423473$ MHz

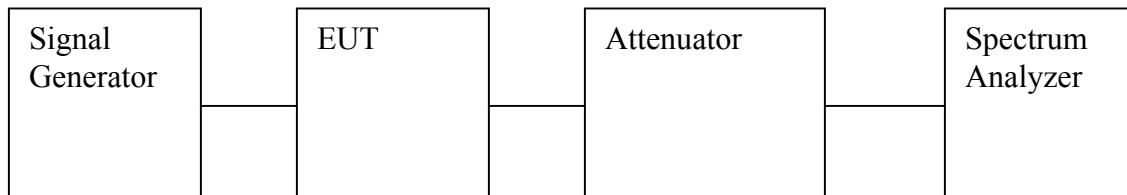
Section 8. Block Diagrams

Para. No. 2.1046 - R.F. Power Output



Para. No. 2.1049 - Occupied Bandwidth

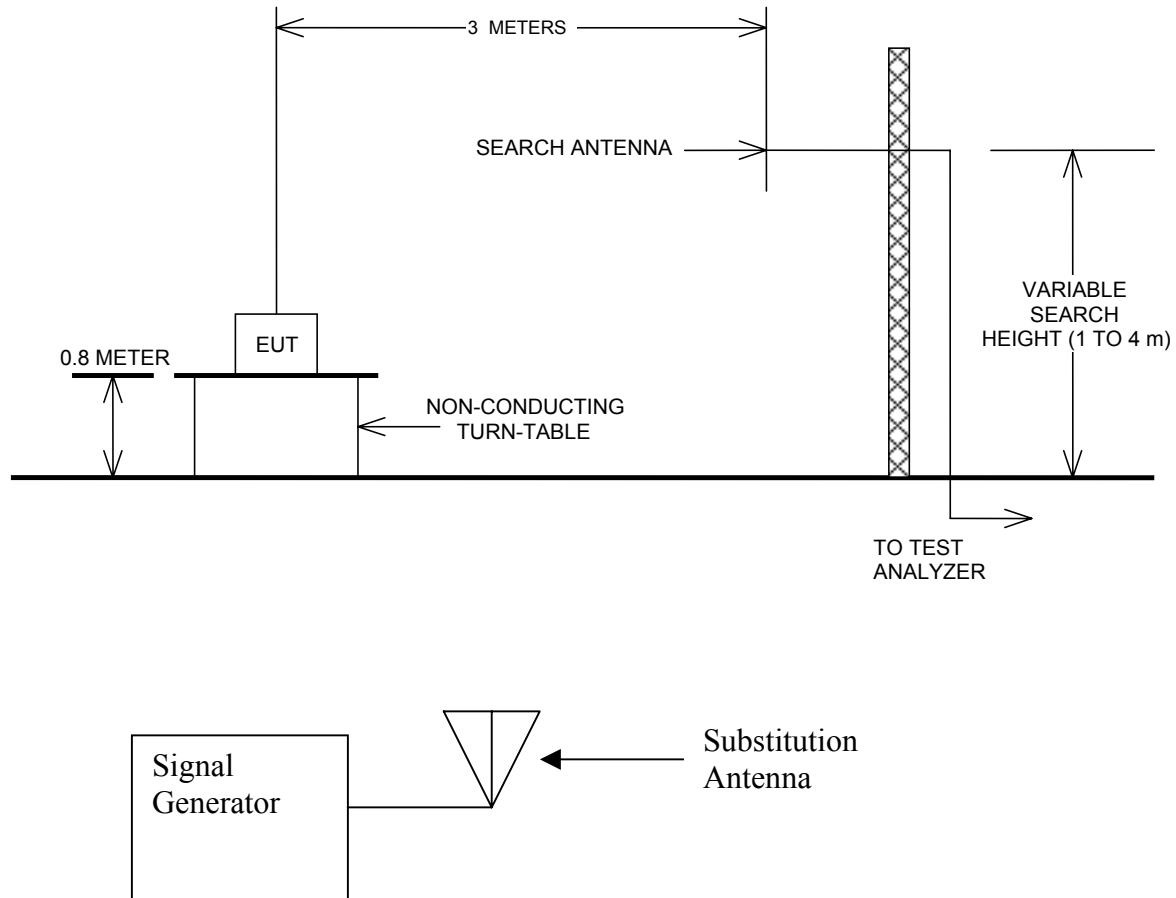
Para. No. 2.1051 Spurious Emissions at Antenna Terminals



EQUIPMENT: TR700B UHF Transceiver

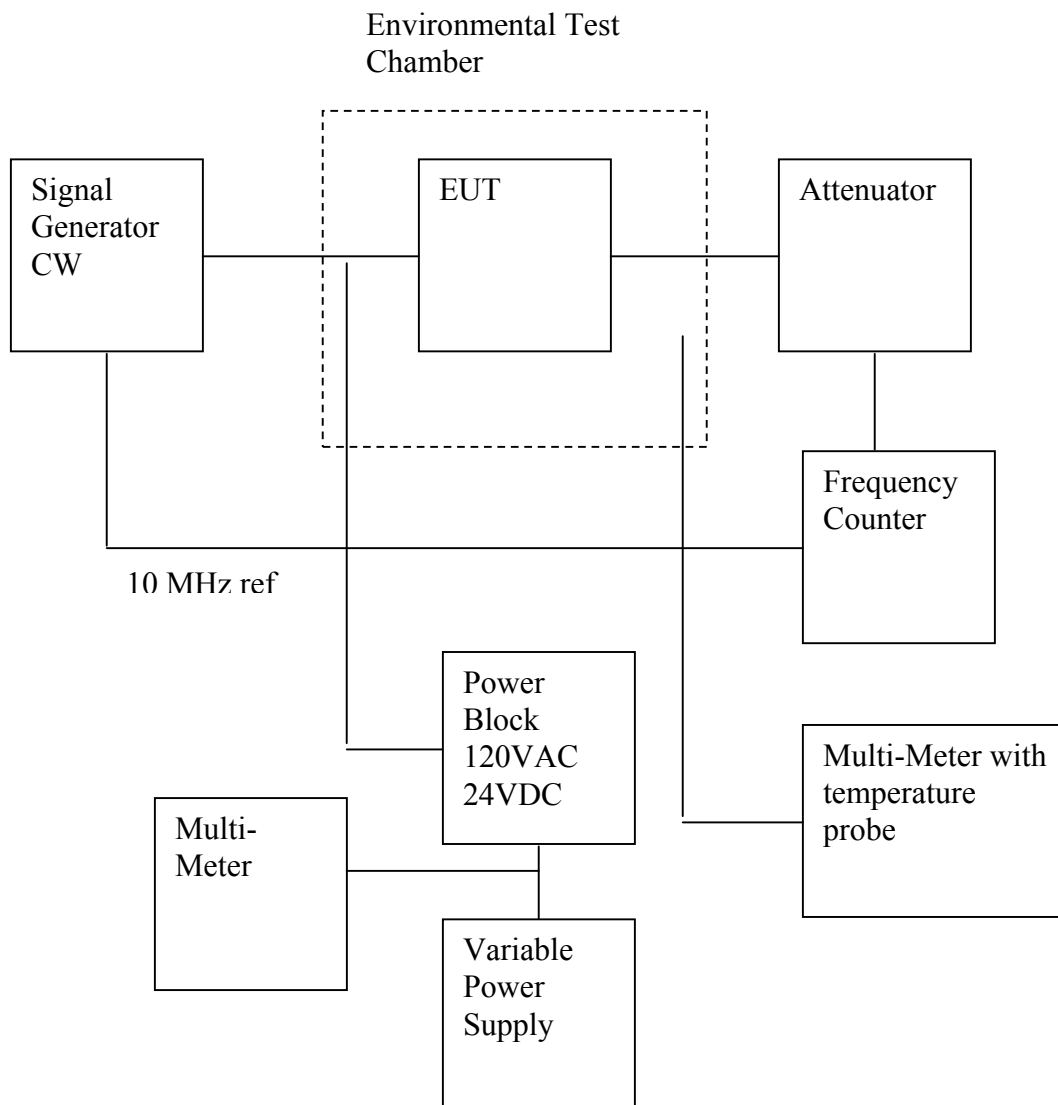
Para. No. 2.1053 - Field Strength of Spurious Radiation

ERP was measured using signal substitution method of TAI/EIA 603 standard.



EQUIPMENT: TR700B UHF Transceiver

Para. No. 2.1055 - Frequency Stability



*EQUIPMENT: TR700B UHF Transceiver***Section 9. Test Equipment List**

Equipment	Manufacturer	Model	Asset Number	Last Calibrated
Multi-Meter	Tektronix	TX 3	FA001675	June 16, 2003
Autotransformer	Powerstat	3PN116C	FA000006	Cal On Use
Signal Generator	HP	8656A	FA000072	Cal On Use
Frequency Counter	HP	8350A	FA000086	Feb 19, 2004
Multi-Meter	Fluke	16	FA001831	Feb 17, 2004
Temperature Probe	-----	SEL98	FA001248	Cal with meter
Signal Generator	R&S	SMIQ 03	FA001091	Sept 25, 2003
Spectrum Analyzer	HP	8564E	FA001367	May 13, 2003
Environmental Test Chamber	Thermotron	SM-16C	FA0001248	Cal On Use
Power Meter	HP	E4418B	FA001678	Feb 27, 2004
Power Sensor	HP	8487A	FA001471	March 28, 2003
Amplifier	JCA	1 – 2 GHz	FA001498	June 18, 2003
Amplifier	JCA	2 – 4 GHz	FA001496	June 18, 2003
Amplifier	JCA	4 – 8 GHz	FA001497	June 18, 2003
Horn Antenna	Electro-Metrics	3115	FA000649	Dec 18, 2003
BiLog Antenna	Schaffner	CBL6112B	FA001504	Used for radiated pre-scans only, 30 MHz to 1 GHz
Spectrum Analyzer	HP	8566B	FA001309	June 5, 2003
Attenuator	Weinschel	10dB	FA001739	Cal On Use
Attenuator	Narda	76810	-----	Cal On Use