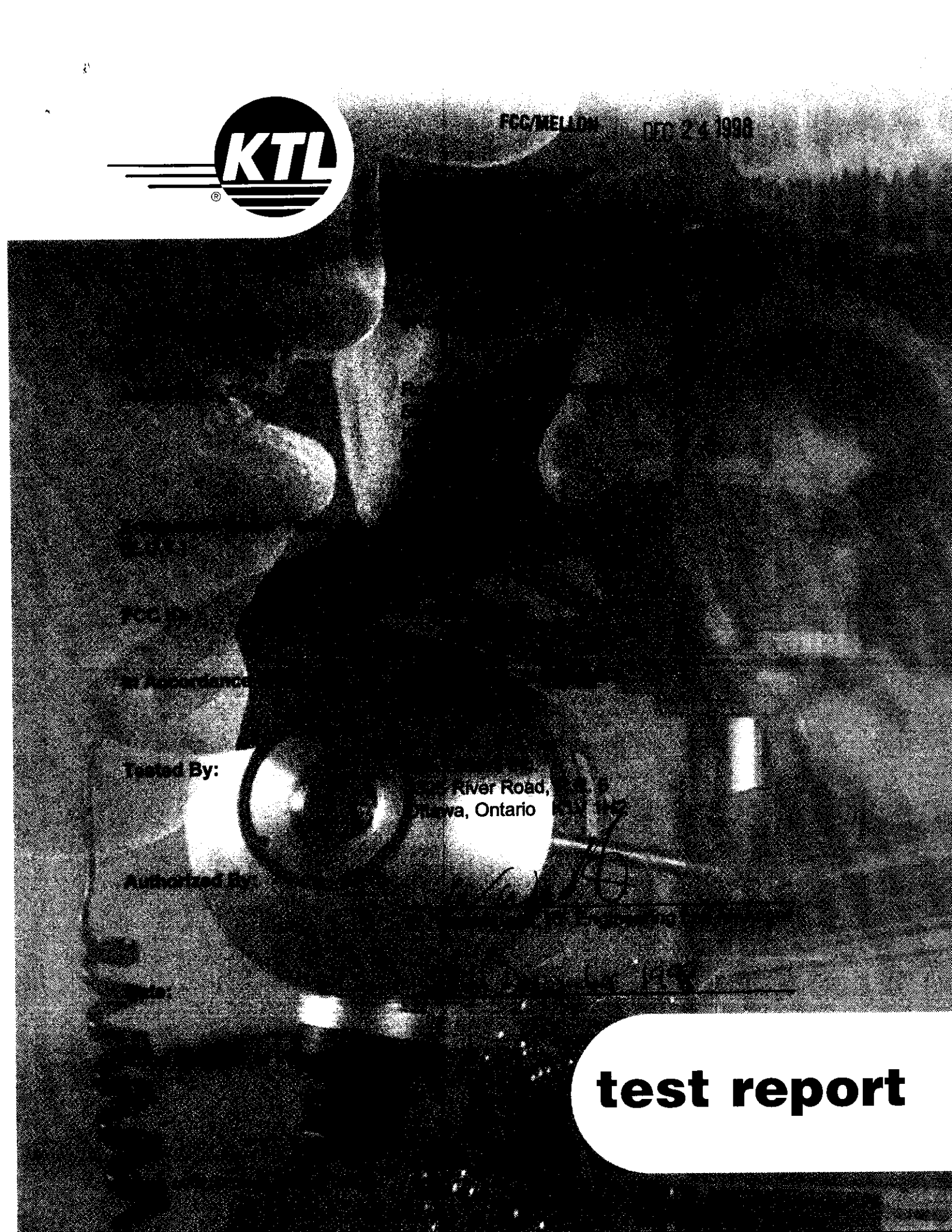

Tested By:

River Road,
Ottawa, Ontario

test report

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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 15, Subpart B. Measurement procedure ANSI C63.4-1992 was used for all tests. Radiated Emissions were measured on an open area test site.

Abstract:

Name Of Test	Para. No.	Results
Antenna Conducted Emissions	15.111	Not Applicable
Radiated Emissions	15.109	Complies
Powerline Conducted Emissions	15.107	Complies

THIS REPORT APPLIES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.
Antenna Conducted Emissions was not performed as the EUT was tested with the antenna attached.

NVLAP®

NVLAP Lab Code: 100351-0

TESTED BY: Russell Grant DATE: Nov 25, 98
Russell Grant, Technologist

TECHNICAL REVIEW: _____ DATE: 25 Nov. 1998
Tom Tidwell, Wireless Group Manager

Section 2. Equipment Under Test (E.U.T.)

Manufacturer: Rohde & Schwartz Canada Ltd.

Model No.: EU231

Serial No.: 827266/027

☐ Class II Permissive Change	☒ New Submission	☒ Production Unit	☐ Pre-Production Unit

T	N	B	Equipment Code

Equipment Details

Frequency Range: 118 - 144 MHz

Number of Channels: 1

Operating Frequency(ies) of Sample: 122.4 MHz, 132 MHz, 142 MHz

Primary Power Requirement: 120 VAC

Bandwidth and Emission Designator: 6K0A3E

Intermediate Frequency(ies): 10.7 MHz

Description of E.U.T.

The equipment is a VHF receiver module.

Modifications Incorporated in E.U.T.

The EUT has not been modified from what is described by the brand name and unique type identification stated above.

Theory of Operation

The EU231 VHF Rx Unit is a superhetrodyne receiver designed for operation in the band 118 – 144 MHz. This equipment is designed to receive conventional amplitude modulation, (full carrier, doubled side band) signals.

Justification

The E.U.T. was configured for testing as per typical installation. Position and bundling of cables were investigated to establish maximum amplitude of emissions.

The following combinations were investigated to establish worst case configuration: N/A

Exercise Program

The E.U.T. exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

Exercise mode:

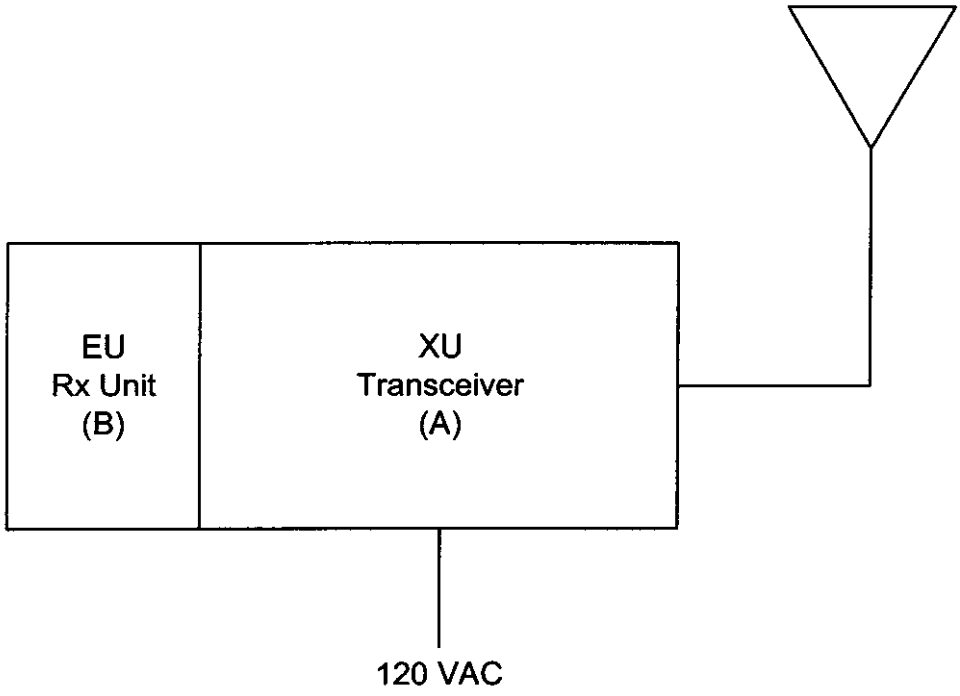
(1) The E.U.T. was in receiver mode.

Section 3. Equipment Configuration

Equipment Configuration List:

Item	Description	Model No.	Serial.	Rev.
(A)	Transceiver	XU221	845264/016	
(B)	Receiver Module	EU231	827266/027	

Configuration of the Equipment Under Test (E.U.T)



Section 4. Receiver Antenna Conducted Emissions

NAME OF TEST: Receiver Antenna Conducted Emissions	PARA. NO.: 15.111
TESTED BY:	DATE:

Test Conditions: Test Voltage: _____VAC
Temperature: _____°C
Humidity: _____%

Test Results: Complies/Does Not Comply. See attached graphs and table.

Measurement Data: See attached graphs and table.

NOT APPLICABLE

Section 5(A). Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.109(a)
TESTED BY: Russell Grant	DATE: November 20, 1998

Test Conditions: Test Voltage: 120
Temperature: 20
Humidity: 30

Minimum Standard:

Frequency(MHz)	Field Strength (dBμV/m @ 3m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0

Test Results: Complies. No emissions were detected above the noise floor. Our threshold of sensitivity is –11 dBμV/m at 30 MHz and increases uniformly to 40 dBμV/m at 2 GHz.

Measurement Data: See attached table.

For super-regenerative receivers the receiver is cohered using a signal generator and dipole antenna.

Handheld equipment and equipment not designed to be mounted in any fixed orientation, the E.U.T. is tested in three orthogonal axis to obtain worst case results.

Test Data - Radiated Emissions

Test Distance (meters) :		Range:		Receiver:		RBW(kHz):		Detector:			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Table (deg.)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)

NO EMISSIONS DETECTED

Notes:
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole
* Re-measured using dipole antenna. ( ) Denotes failing emission level.
(1) 120 kHz, Q-Peak, (2) 10 kHz, Peak, (3) 100 kHz RBW, 300 kHz VBW, Peak,
(4) 300 kHz RBW, 1 MHz VBW, Peak, (5) 1 MHz RBW, 3 MHz VBW, Peak, (6) 1 MHz RBW, 10 Hz VBW, Peak

Section 5(B). Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.109(b)
TESTED BY:	DATE:

Test Conditions:

Test Voltage: _____VAC
Temperature: _____°C
Humidity: _____%

NOT APPLICABLE

Minimum Standard:

Equipment manufactured or imported before June 23, 1999 is permitted the following limits.

Frequency (MHz)	Field Strength (dBµV/m @ 3m)
30-70	320 (50.1 dBµV/m)
70-130	500 (54.0 dBµV/m)
130-174	500 - 1500 dBµV/m)
174-260	1500 (63.5 dBµV/m)
260-470	1500 - 5000 (linear interpolation)
Above 470	5000 (74.0 dBµV/m)

Test Results:

Complies / Does Not Comply. The worst-case emission level is _____ dBµV/m @ 3m at _____ MHz. This is _____ dB above/below the specification limit.

Measurement Data:

See attached table.

Test Data - Radiated Emissions

Test Distance (meters) :		Range:		Receiver:		RBW(kHz):		Detector:			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Table (deg.)	RCVD Signal (dBμV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)

NOT APPLICABLE

Notes:
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole
* Re-measured using dipole antenna. ( ) Denotes failing emission level.
(1) 120 kHz, Q-Peak, (2) 10 kHz, Peak, (3) 100 kHz RBW, 300 kHz VBW, Peak,
(4) 300 kHz RBW, 1 MHz VBW, Peak, (5) 1 MHz RBW, 3 MHz VBW, Peak, (6) 1 MHz RBW, 10 Hz VBW, Peak

Radiated Photographs (Worst Case Configuration)

FRONT VIEW

REAR VIEW

Section 6. Powerline Conducted Emissions

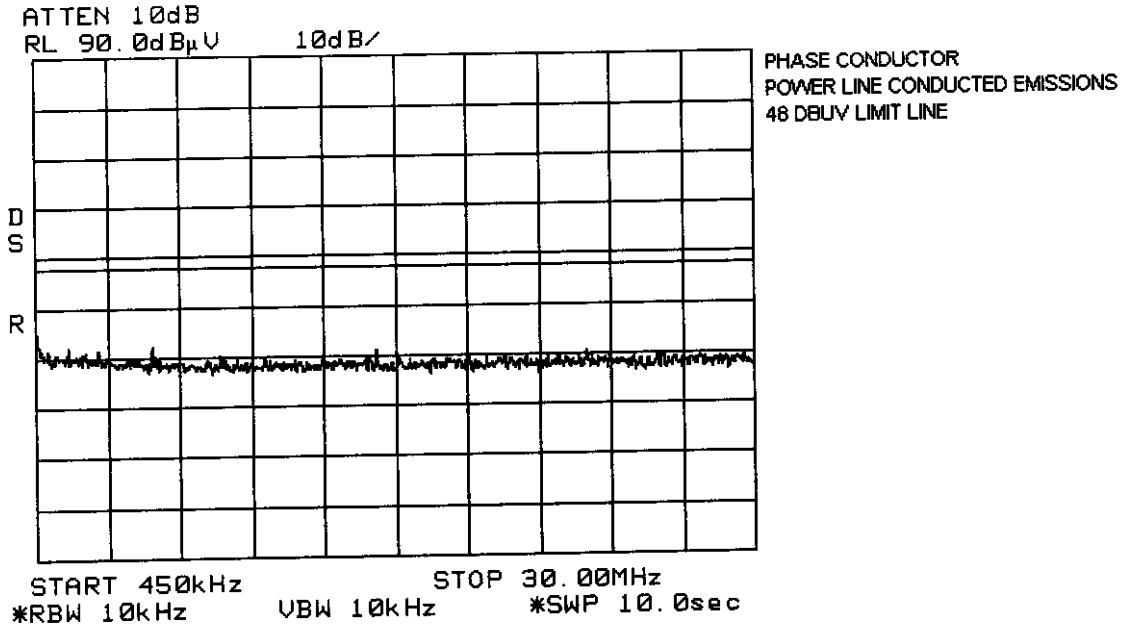
NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.107
TESTED BY: Russell Grant	DATE: November 20, 1998

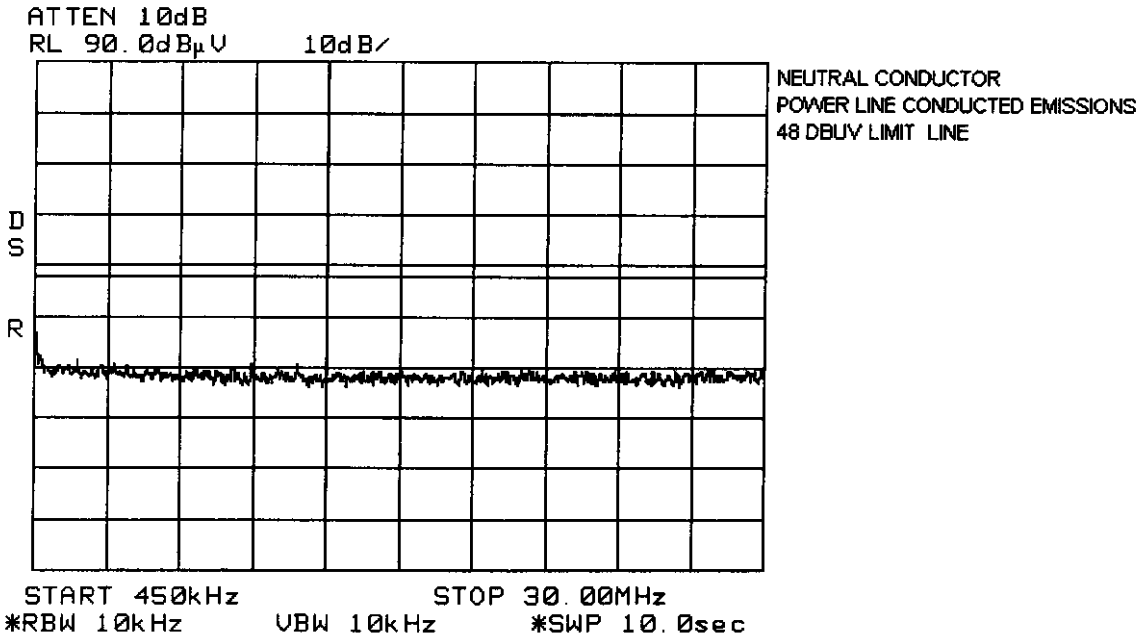
Test Conditions: Test Voltage: 120 VAC
Temperature: 20 °C
Humidity: 30 %

Minimum Standard: The RF energy feed back into the power lines shall not exceed 48 dBμV on any frequency between 0.45 MHz and 30 MHz inclusive.

Test Results: Complies. See attached graphs.

Measurement Data: See attached graphs.


ATTEN 10dB
RL 90.0dBµV
10dB/
PHASE CONDUCTOR
POWER LINE CONDUCTED EMISSIONS
48 DBUV LIMIT LINE
D
S
R
START 450kHz
STOP 30.00MHz
*RBW 10kHz
VBW 10kHz
*SWP 10.0sec


ATTEN 10dB
RL 90.0dBµV
10dB/
NEUTRAL CONDUCTOR
POWER LINE CONDUCTED EMISSIONS
48 DBUV LIMIT LINE
D
S
R
START 450kHz
STOP 30.00MHz
*RBW 10kHz
VBW 10kHz
*SWP 10.0sec

Section 7. Sample Calculations

Conducted Emissions:

If the Quasi-Peak to Average ratio is greater than 6 dB, then the emission is classified as broadband and its Quasi-Peak level is reduced by 13 dB for comparison to the limit.

i.e. Quasi-Peak level = 40 dBμV
Average level = 34 dBμV
Corrected level = 40 - 13 = 27 dBμV

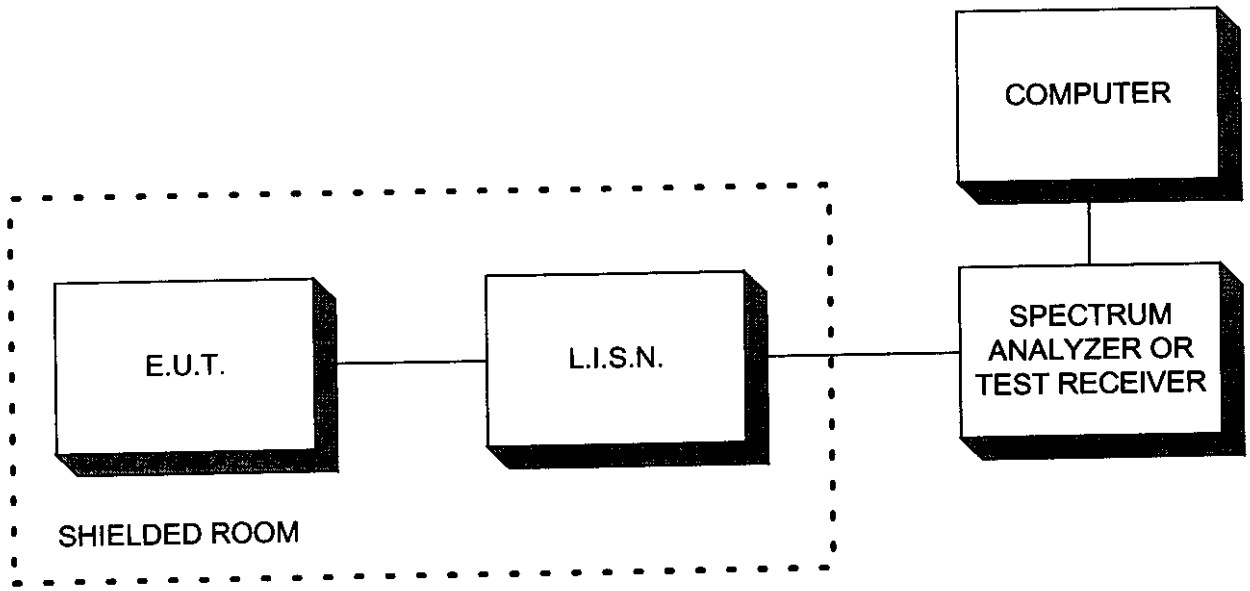
Radiated Emissions

Emissions are measured at a distance of 3 meters and corrected for antenna factor and cable loss.

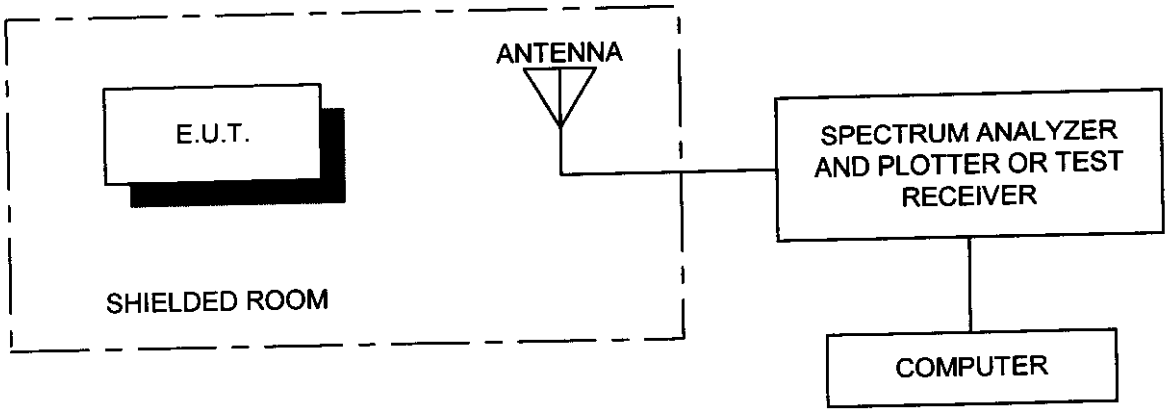
i.e. Received Signal = 25 dBμV @ 100 MHz
Antenna Factor & Cable Loss = 9.8 dB
Field Intensity = 25 + 9.8 = 34.8 dBμV/m @ 3 m

Section 8. Block Diagrams

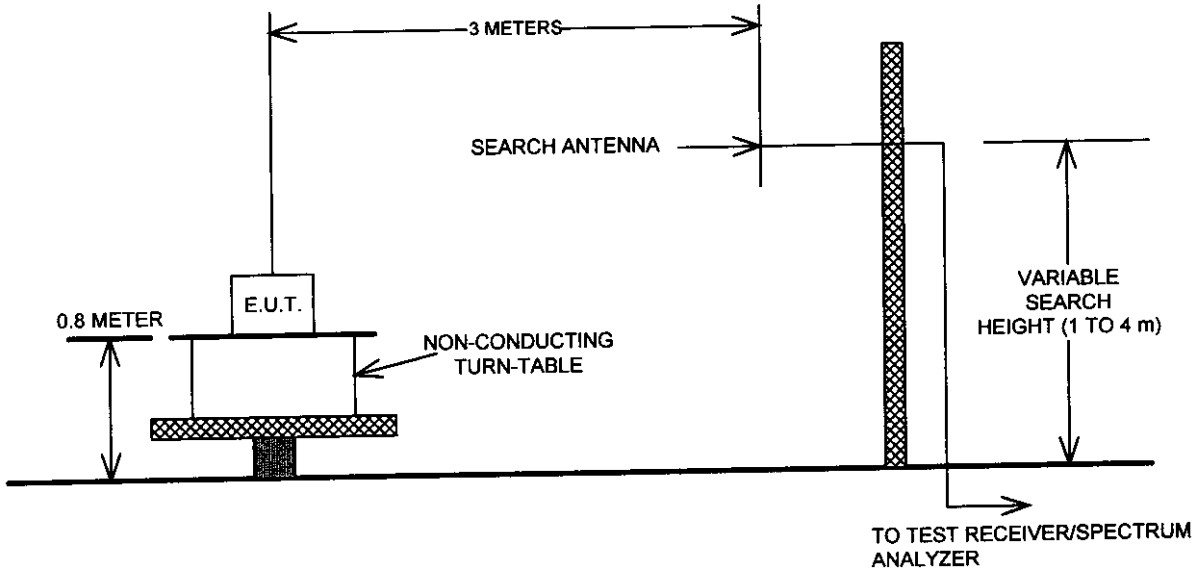
Conducted Emissions



Radiated Prescan



Outdoor Test Site For Radiated Emissions



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

Section 9. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.	
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	May 20/98	May 20/99	
1 Year	LISN	Tegam	95300-50	T-12855/56	July 24/98	July 24/99	
1 Year	LISN(peripheral)	Tegam	95300-50	T-109014/15	July 24/98	July 24/99	
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 27/98	July 27/99	
1 Year	Biconical (1) Antenna	EMCO	3109	9204-2708	July 27/98	July 27/99	

NA: Not Applicable
NCR: No Cal Required