KTL Test Report:	0R03082
Applicant:	Nortel Networks 2351 Blvd. Alfred Nobel St. Laurent, PQ H4S 2A9
Equipment Under Test: **(E.U.T.)**	Digital Microwave Radio 23 GHz ODU
In Accordance With:	**FCC Part 101, Subpart C**
Tested By:	KTL Ottawa Inc. 3325 River Road, R.R. 5 Ottawa, Ontario K1V 1H2
Authorized By:	 R. Grant, Wireless Group Manager
Date:	November 1, 2000
Total Number of Pages:	28
Authorized Copy:	E-Mail

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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 101, Subpart C.

☒ New Submission
☐ Class II Permissive Change

☒ Production Unit
☐ Pre-Production Unit

T	N	B

Equipment Code

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".

NVLAP LAB CODE: 100351-0

TESTED BY: DATE: November 1, 2000
Glen Westwell, Technologist

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This report applies only to the items tested.

Summary Of Test Data

Name Of Test	Para. No.	Result
RF Power Output	101.113	Complies
Occupied Bandwidth	101.111	Complies
Spurious Emissions at Antenna Terminals	101.111	Marginal Compliance
Field Strength of Spurious Emissions	101.111	Complies
Frequency Stability	101.107	Complies

Footnotes For N/A's:

Test Conditions:

Indoor	Temperature:	25 °C
	Humidity:	40 %
Outdoor	Temperature:	N/A
	Humidity:	N/A

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Section 2. General Equipment Specification

Manufacturer:	SierraCom Corp.
Model No.:	23 GHz ODU Digital Microwave Radio
Serial No.:	250
Date Received In Laboratory:	October 2, 2000
KTL Identification No.:	Item #98

Transmitter

Supply Voltage Input:	-48 VDC
Frequency Range:	Tx = 21.20125 GHz to 23598.75 GHz @ 2 x T1 Tx = 21.20250 GHz to 23597.5 GHz @ 4 x T1
Tunable Bands:	1
Types of Modulation:	4 Level Frequency Shift Keying (4FSK)
Data Rate(s)	2 x T1 & 4 x T1 T1 = 1.544 Mb/s (DS1)
Internal/External Data Source:	External
Emission Designator:	2 x T1 = 2M57F7W 4 x T1 = 5M05F7W
Output Impedance:	50 Ω
RF Power Output (rated):	18 – 20 dBm
Channel Spacing(s):	2 x T1 = 2.5 MHz, 4 x T1 = 5 MHz
Operator Selection of Operating Frequency:	None
Power Output Adjustment Capability:	0-20 dBm

Section 3. RF Power Output

Para. No.: 1.1046

Test Performed By: Glen Westwell	**Date of Test:** October 23, 2000

Minimum Standard: 101.113 (a)

Test Results: Complies. The RF power output is within 0.3 dB of the manufacturer's rating.

Measurement Data:

	Rated (dBm)	**Measured (dBm)**
4 x T1	19	19.3
2 x T1	19	19.3

Section 4. Occupied Bandwidth

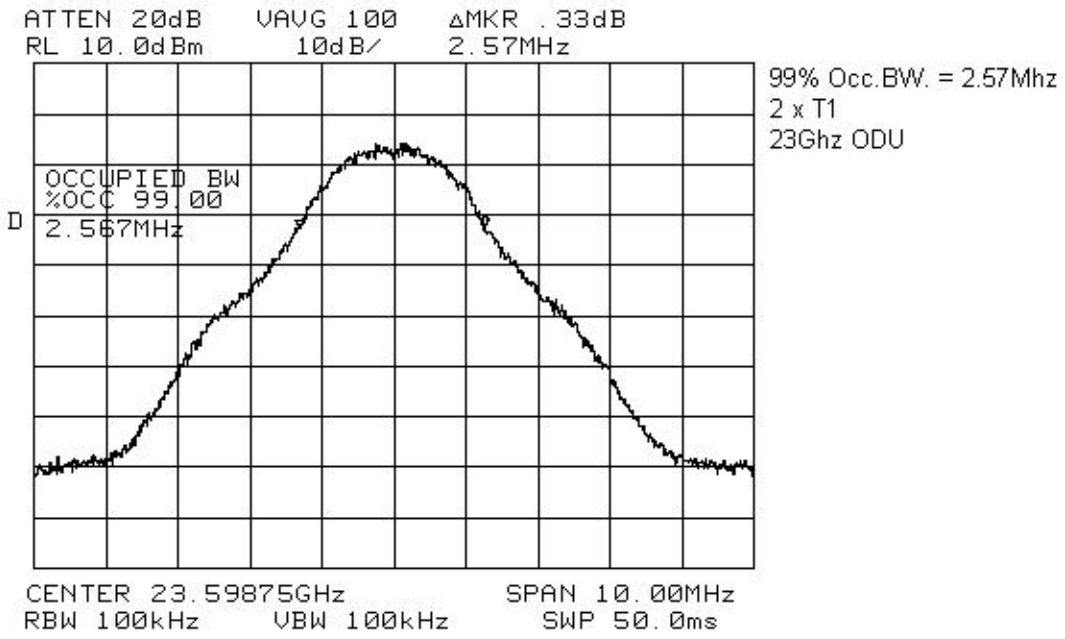
Para. No.: 2.1049

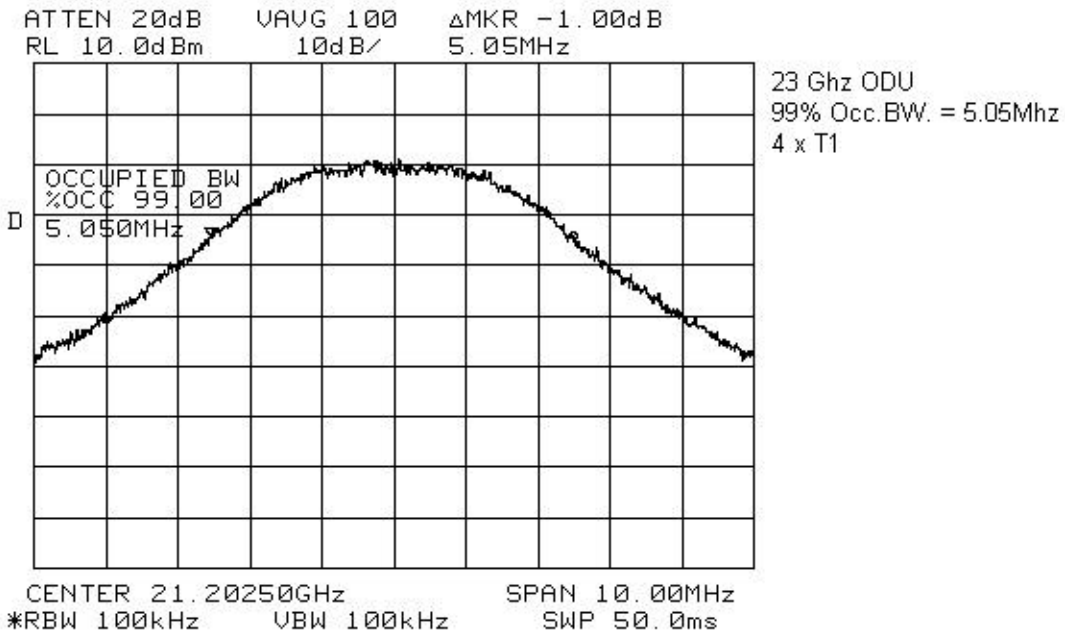
Test Performed By: Glen Westwell	**Date of Test:** October 24, 2000

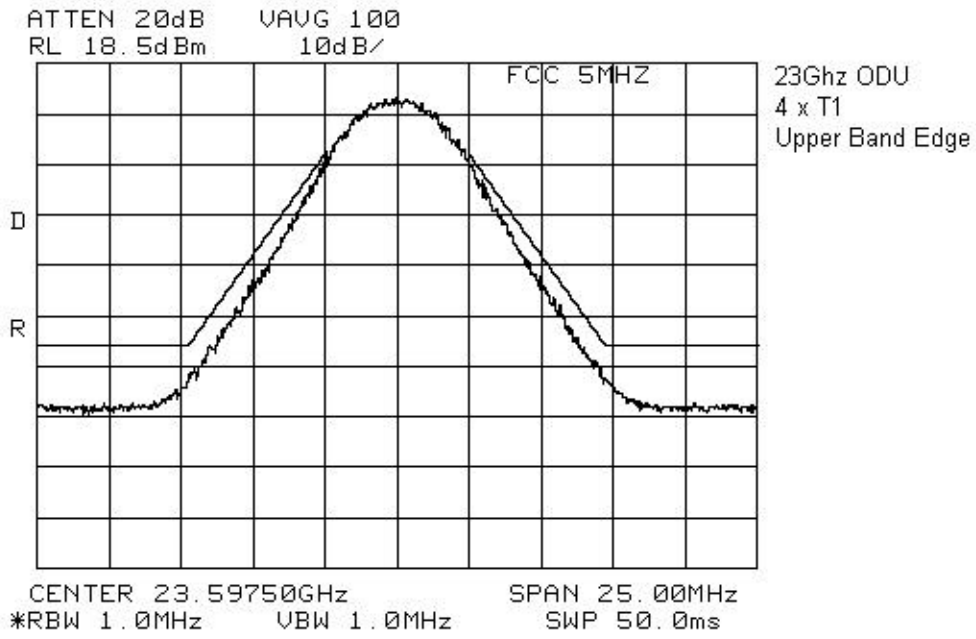
Minimum Standard: 101.111 (a)(2)(ii)

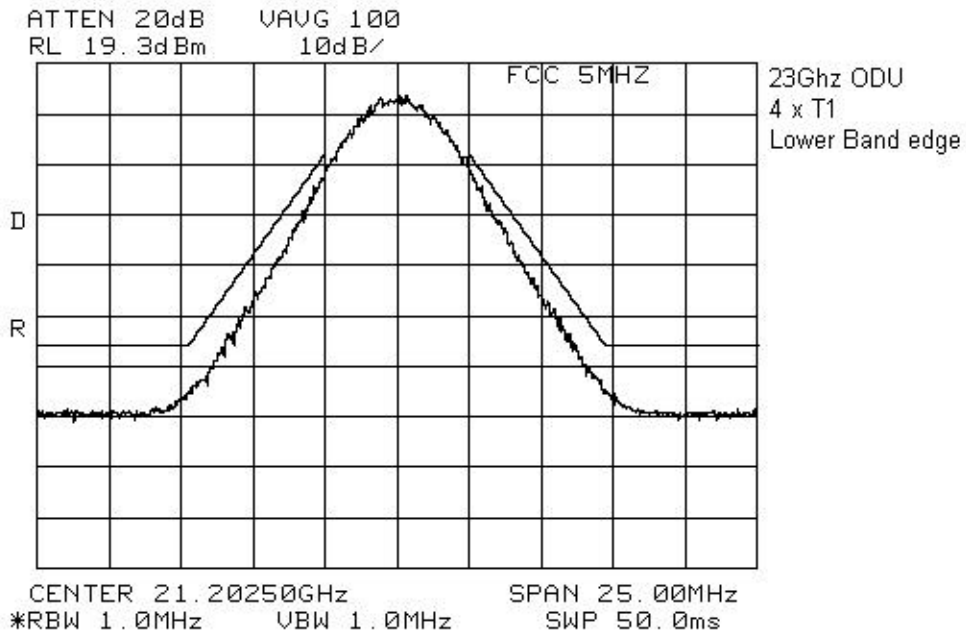
Test Results: Complies.

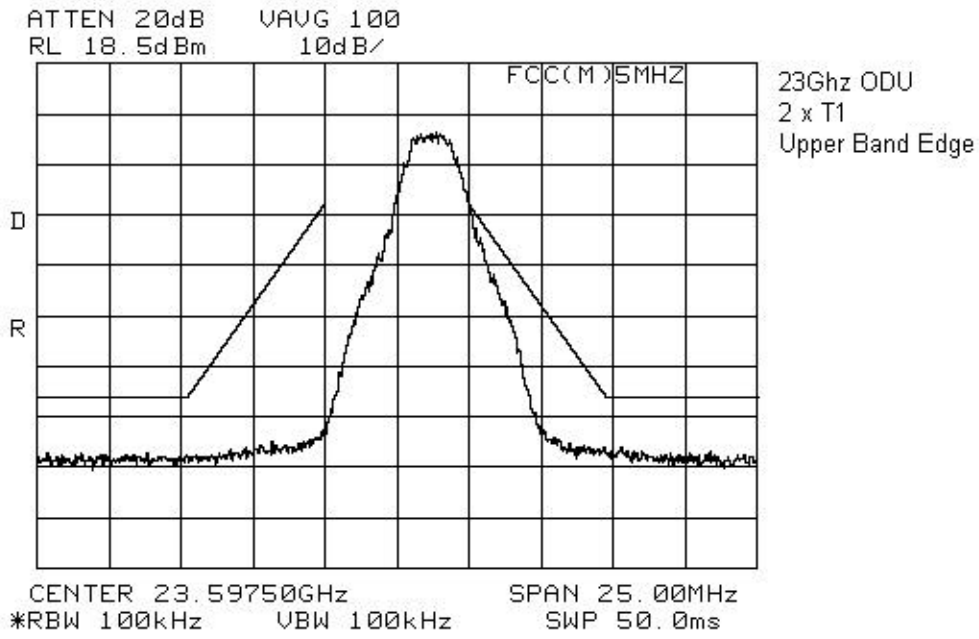
Test Data: See attached graph(s).

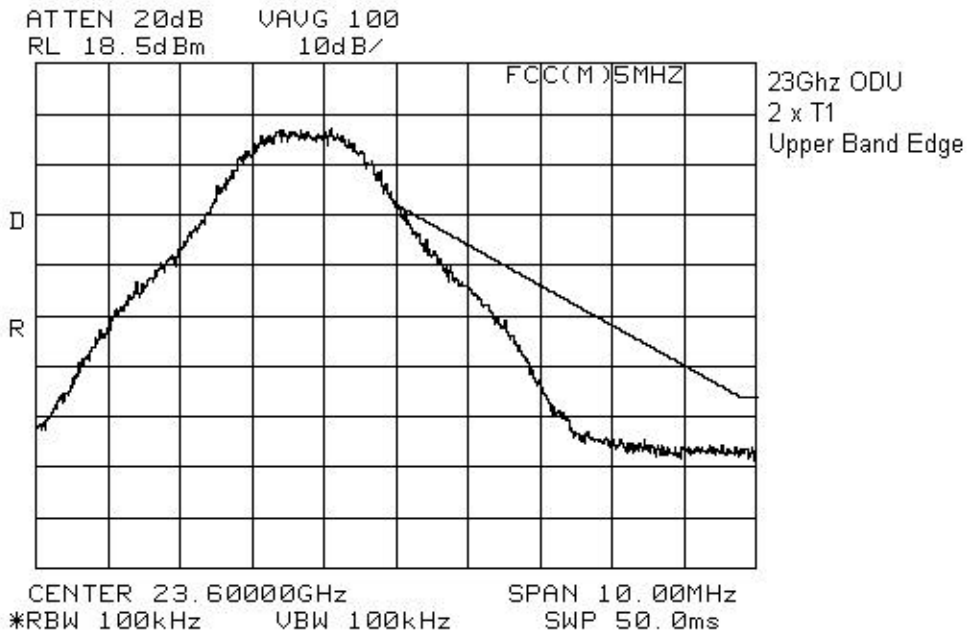

ATTEN 20dB
RL 10.0dBm
VAVG 100
10dB/
ΔMKR .33dB
2.57MHz
99% Occ.BW. = 2.57Mhz
2 x T1
23Ghz ODU
OCCUPIED BW
%OCC 99.00
2.567MHz
D
CENTER 23.59875GHz
SPAN 10.00MHz
RBW 100kHz
VBW 100kHz
SWP 50.0ms

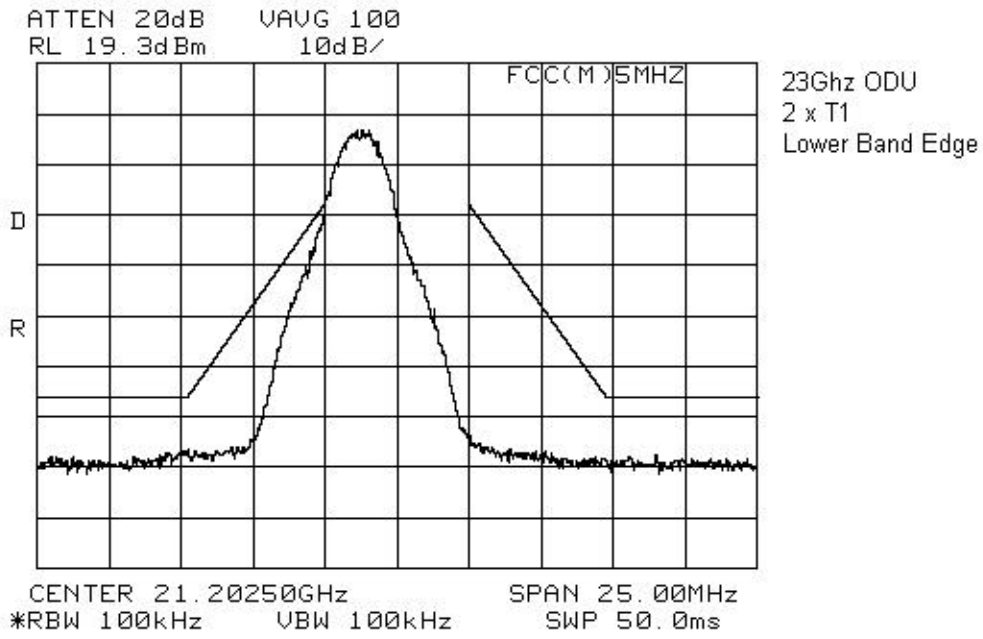

ATTEN 20dB
RL 10.0dBm
VAVG 100
10dB/
ΔMKR -1.00dB
5.05MHz
23 Ghz ODU
99% Occ.BW. = 5.05Mhz
4 x T1
OCCUPIED BW
%OCC 99.00
5.050MHz
D
CENTER 21.20250GHz
SPAN 10.00MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

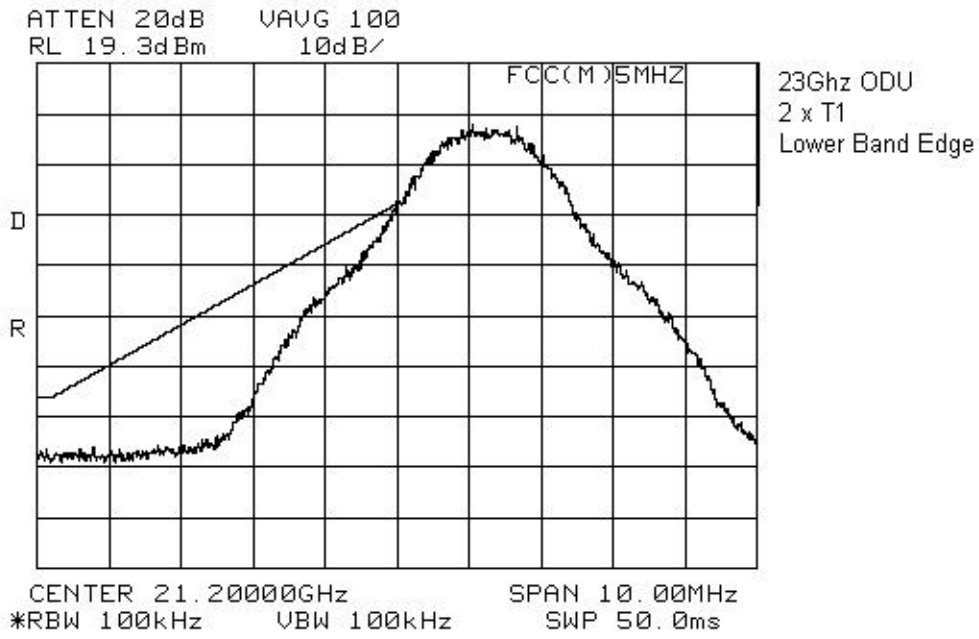

ATTEN 20dB
VAVG 100
RL 18.5dBm
10dB/
FCC 5MHZ
23Ghz ODU
4 x T1
Upper Band Edge
D
R
CENTER 23.59750GHz
SPAN 25.00MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms


ATTEN 20dB
VAVG 100
RL 19.3dBm
10dB/
FCC 5MHZ
23Ghz ODU
4 x T1
Lower Band edge
D
R
CENTER 21.20250GHz
SPAN 25.00MHz
*RBW 1.0MHz
VBW 1.0MHz
SWP 50.0ms


ATTEN 20dB
VAVG 100
RL 18.5dBm
10dB/
FCC(M)5MHZ
23Ghz ODU
2 x T1
Upper Band Edge
D
R
CENTER 23.59750GHz
SPAN 25.00MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 20dB
VAVG 100
RL 18.5dBm
10dB/
FCC(M)5MHZ
23Ghz ODU
2 x T1
Upper Band Edge
D
R
CENTER 23.60000GHz
SPAN 10.00MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 20dB
VAVG 100
RL 19.3dBm
10dB/
FCC(M)5MHZ
D
R
CENTER 21.20250GHz
SPAN 25.00MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms
23Ghz ODU
2 x T1
Lower Band Edge


ATTEN 20dB
VAVG 100
RL 19.3dBm
10dB/
FCC(M)5MHZ
23Ghz ODU
2 x T1
Lower Band Edge
D
R
CENTER 21.20000GHz
SPAN 10.00MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

Section 5. Spurious Emissions at Antenna Terminals

Para. No.: 2.1051

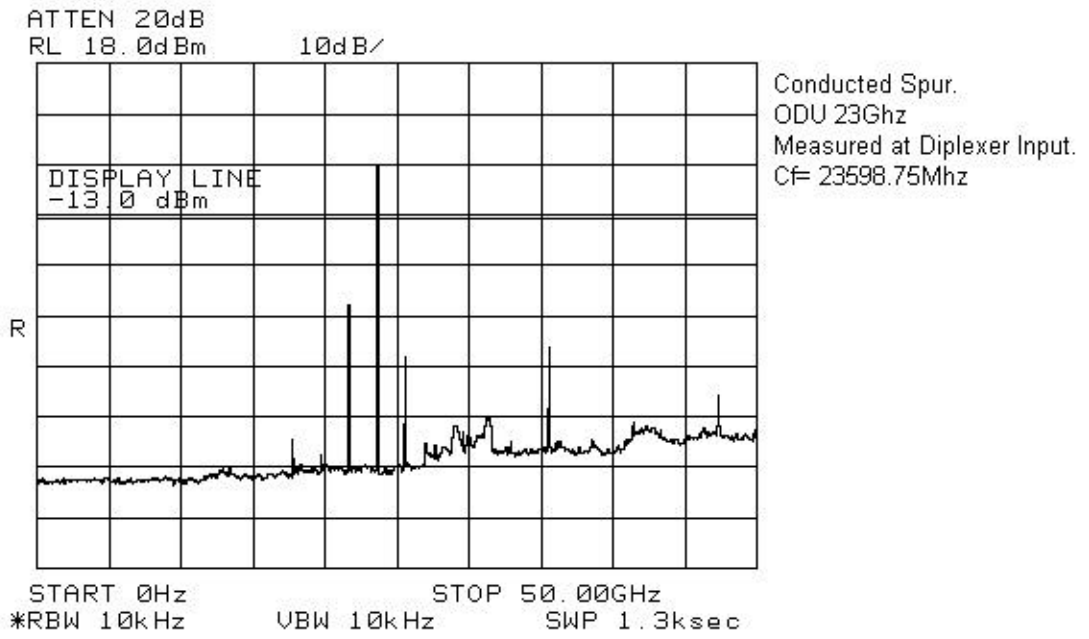
Test Performed By: Glen Westwell	**Date of Test:** October 23, 2000

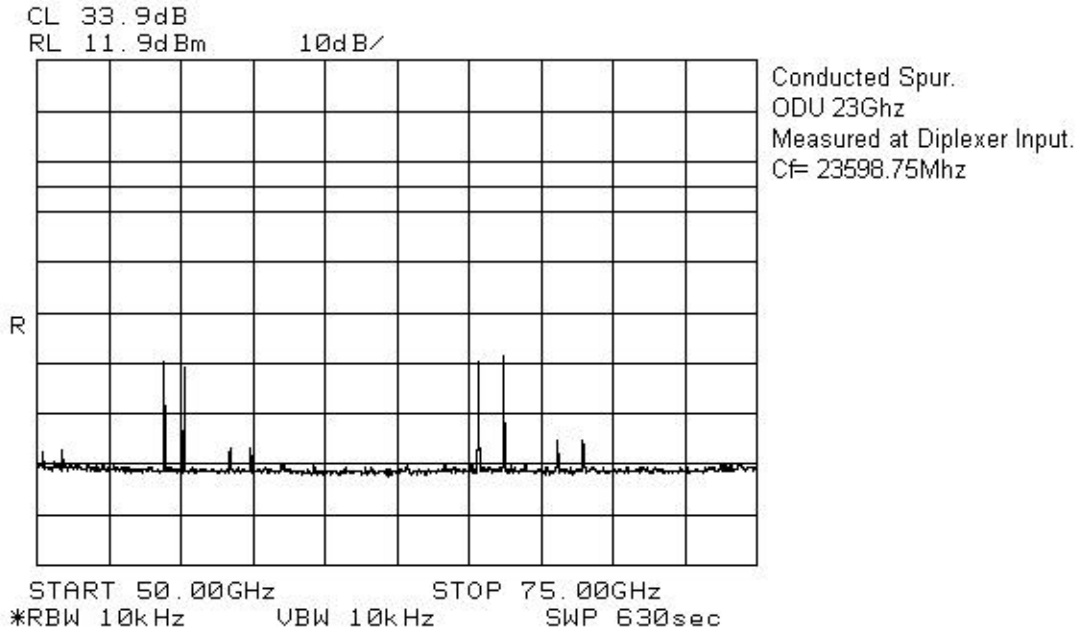
Minimum Standard: 101.111 (a)(2)(iii) –13 dBm

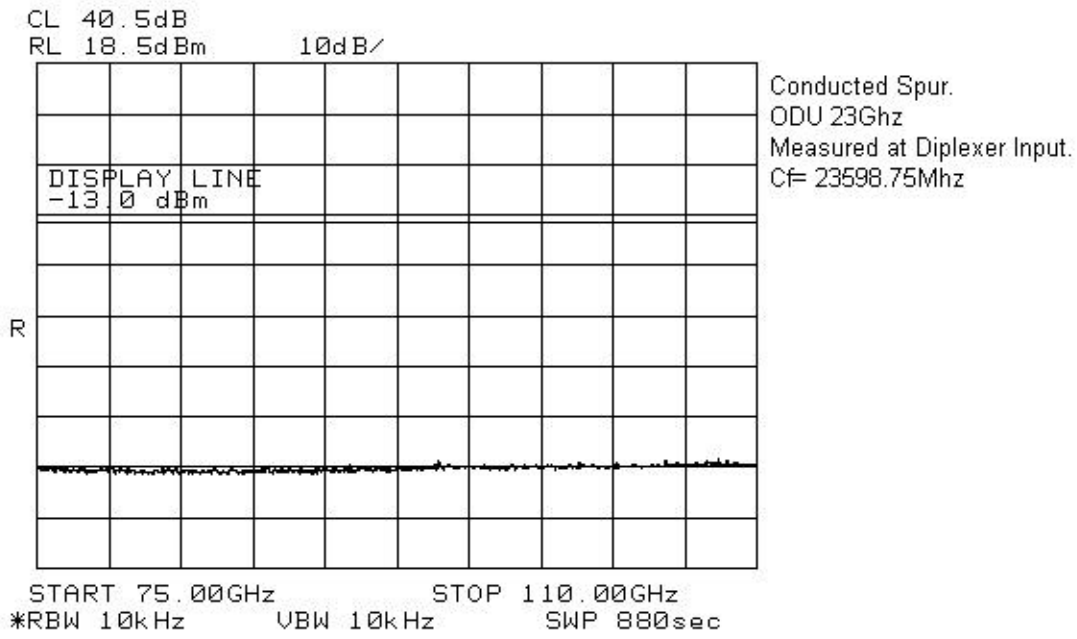
Test Results: Complies.

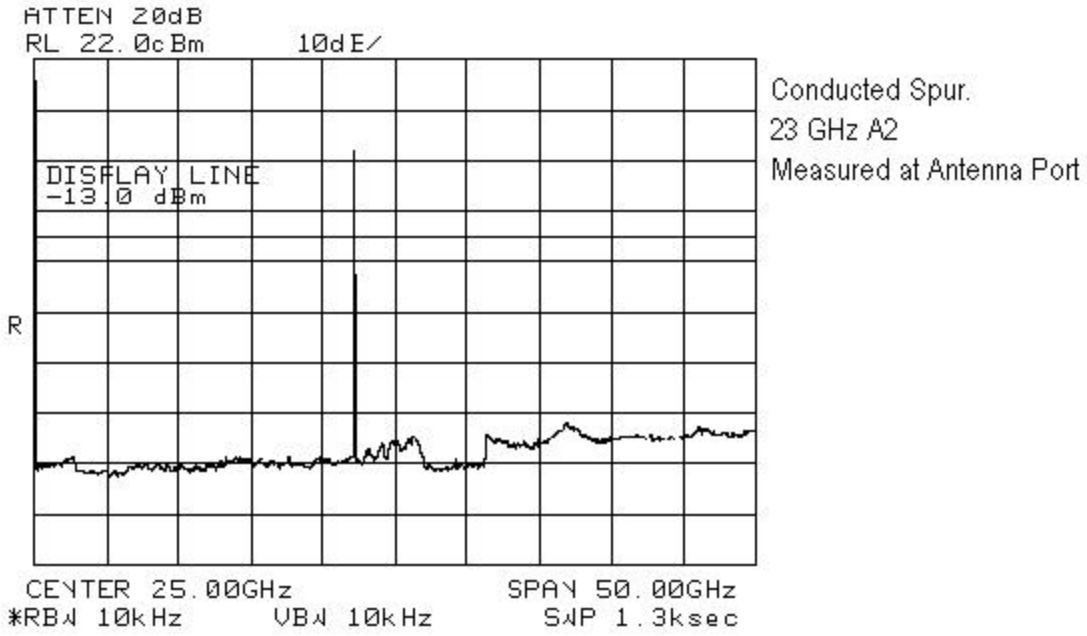
No emissions were detected within 20 dB of the specification limit. Test results for spurious emissions are shown at the input to the diplexer (broad band) as well as the output.

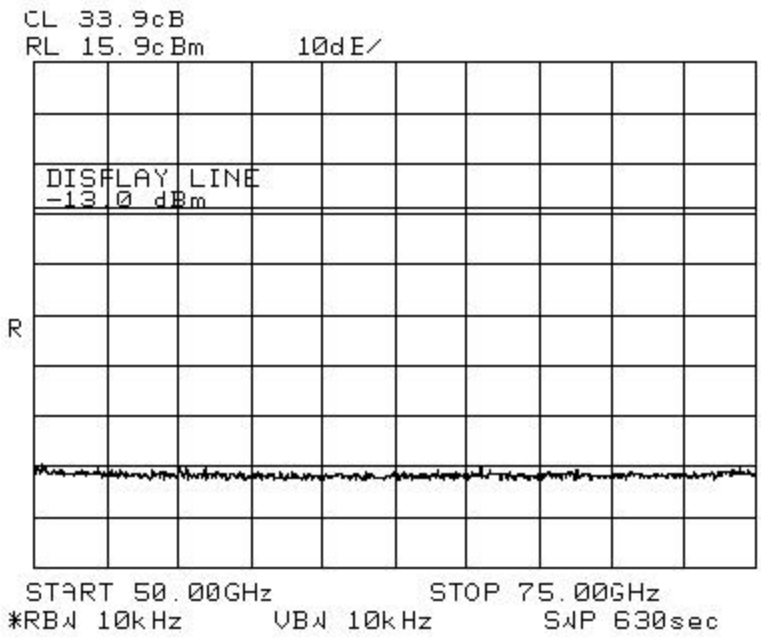
Test Data: See attached graphs.


ATTEN 20dB
RL 18.0dBm
10dB/
DISPLAY LINE
-13.0 dBm
R
START 0Hz
STOP 50.00GHz
*RBW 10kHz
VBW 10kHz
SWP 1.3ksec
Conducted Spur.
ODU 23Ghz
Measured at Diplexer Input.
Cf= 23598.75Mhz

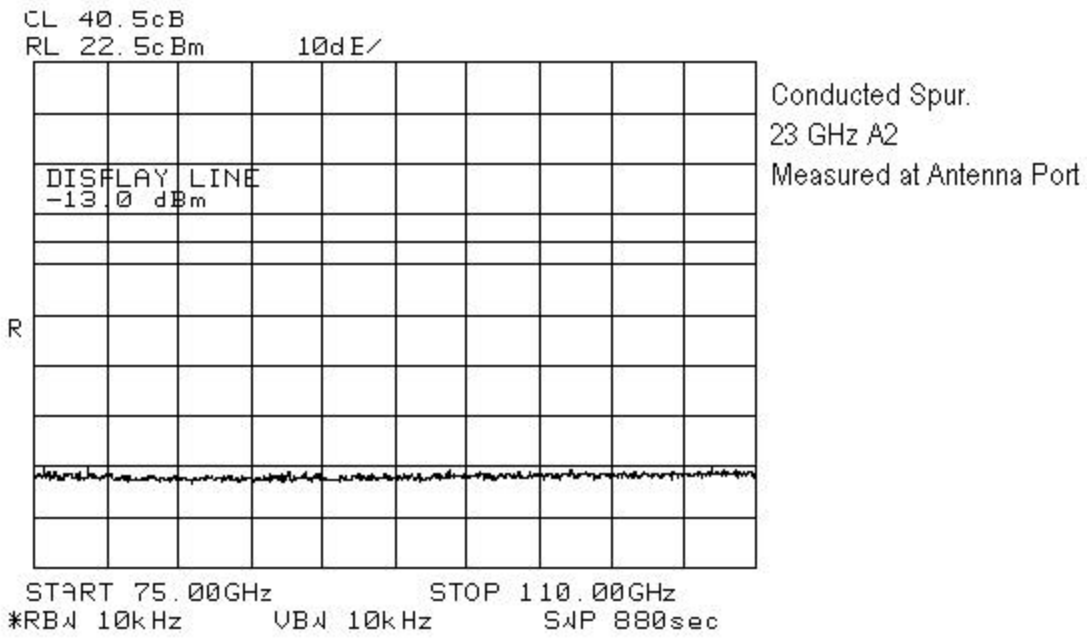

CL 33.9dB
RL 11.9dBm
10dB/
R
START 50.00GHz
STOP 75.00GHz
*RBW 10kHz
VBW 10kHz
SWP 630sec
Conducted Spur.
ODU 23Ghz
Measured at Diplexer Input.
Cf= 23598.75Mhz


CL 40.5dB
RL 18.5dBm
10dB/
DISPLAY LINE
-13.0 dBm
R
START 75.00GHz
STOP 110.00GHz
*RBW 10kHz
VBW 10kHz
SWP 880sec
Conducted Spur.
ODU 23Ghz
Measured at Diplexer Input.
Cf= 23598.75Mhz


ATTEN 20dB
RL 22.0dBm
10dB/
DISPLAY LINE
-13.0 dBm
R
CENTER 25.00GHz
SPAN 50.00GHz
*RBW 10kHz
VBW 10kHz
SWP 1.3ksec
Conducted Spur.
23 GHz A2
Measured at Antenna Port



Conducted Spur.
23 GHz A2
Measured at Antenna Port


CL 40.5cB
RL 22.5cBm
10dE/
DISPLAY LINE
-13.0 dBm
R
START 75.00GHz
STOP 110.00GHz
*RBW 10kHz
VBW 10kHz
SWP 880sec
Conducted Spur.
23 GHz A2
Measured at Antenna Port

Section 6. Field Strength of Spurious Emissions

Para. No.: 2.1053

Test Performed By: Glen Westwell	**Date of Test:** October 5, 2000

Minimum Standard: 101.111 (a)(2)(iii) –13 dBm

84.4 dBµV/m @ 3m < 1 GHz
82.2 dBµV/m @ 3m > 1 GHz

Test Results: Complies.
No emissions were detected within 20 dB of the specification limit.

Test Data: The spectrum was searched from 30 MHz to 100 GHz.

See attached data plots.

Section 7. Frequency Stability

Para. No.: 2.1055

Test Performed By: Glen Westwell	**Date of Test:** October 10, 2000

Minimum Standard: ± 0.03%, 7050 kHz

Test Results: Complies.

The maximum frequency drift is 103 kHz.
This is 0.000438%

Test Data:

Standard Test Voltage: STV –48 VDC
Standard Test Voltage: 23 500.000 MHz

Test Condition	Frequency (kHz)	Frequency Drift (kHz)
STV	23 499 930	70
115% STV	23 499 930	70
85% STV	23 499 930	70
-30°C	23 499 965	35
-20°C	23 499 960	40
-10°C	23 499 959	41
0°C	23 499 957	43
+10°C	23 499 920	80
+30°C	23 499 915	85
+40°C	23 499 910	90
+50°C	23 499 897	103

Section 8. Test Equipment List

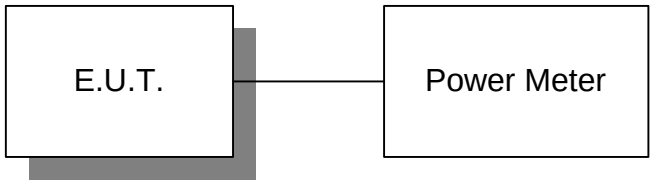
CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	June 16/00	June 16/01
1 Year	Climate Chamber	Thermotron	SM-16C	15649-S	COU	COU
1 Year	RF Power Meter	Hewlett Packard	E4418B	FA001413	Nov. 8/99	Dec. 7/00
1 Year	Horn Antenna	EMCO #1	3115	3132	Dec. 21/99	Dec. 21/00
1 Year	Log Periodic Antenna 1	EMCO	LPA-25	1141	Aug. 4/99	Aug. 4/00
3 Year	Standard Gain Horn	Electro-Metrics	SH-50/60-1	FA000479	July 7/00	July 7/01
3 Year	Standard Gain Horn	Electro-Metrics	SH-50/60-2	FA000485	July 7/00	July 7/01
3 year	Harmonic Mixer	H.P.	50-75Ghz	FA001027	Mar. 9/00	Mar. 9/03
3 year	Harmonic Mixer	H.P.	75-110Ghz	FA001302	Oct. 13/98	Oct. 13/01
3 year	Diplexer	Olsen - OML	DPL.26 (H.P)		Mar. 15/00	Mar 15/03
3 year	Mixer/Antenna 40-60Ghz	Olsen – OML	M19HWA (H.P.)		Mar. 15/00	Mar. 15/03
3 year	Mixer /Antenna 60-90Ghz	Olsen – OML	M12HWA (H.P.)		Mar. 15/00	Mar. 15/03
3 year	Mixer / Antenna 90-140Ghz	Olsen – OML	M08HWA (H.P.)		Mar. 15/00	Mar. 15/03

NA: Not Applicable
NCR: No Cal Required
COU: CAL On Use

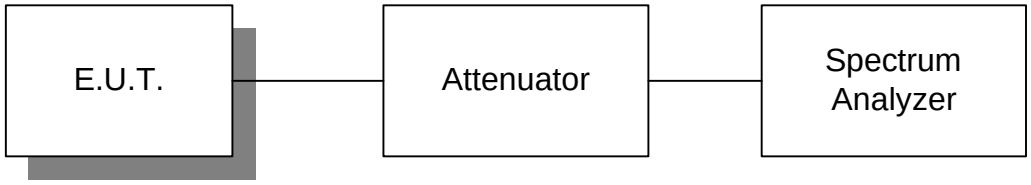
Annex A

Test Diagrams

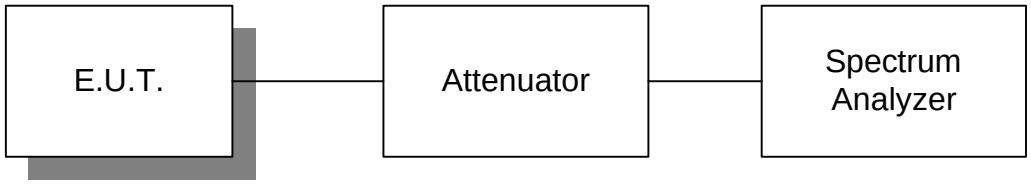
Para. No. 2.1046 - R.F. Power Output



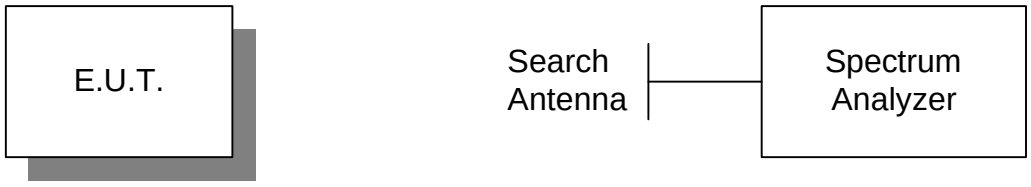
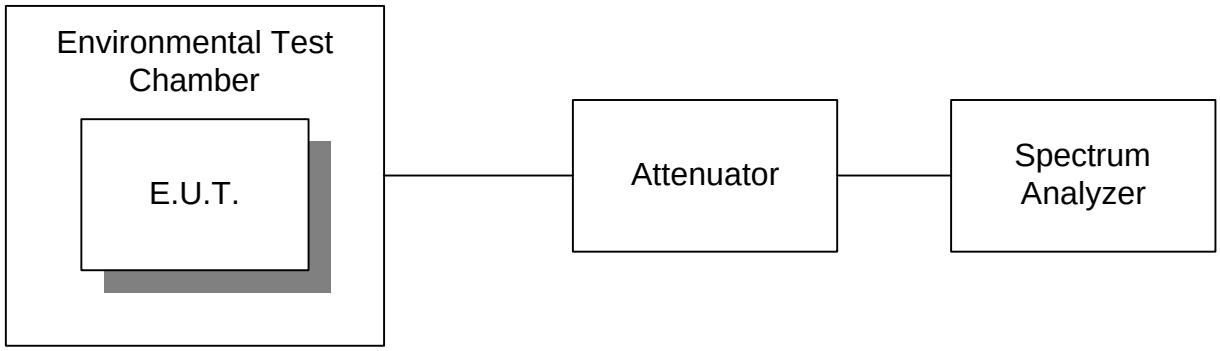
Para. No. 2.1049 - Occupied Bandwidth



Para. No. 2.1051 - Spurious Emissions at Antenna Terminals



Para. No. 2.1053 - Field Strength of Spurious Radiation



Para. No. 2.1055 - Frequency Stability