CERTIFICATION TEST REPORT

FOR THE

TRA ASSY, TRX 1000S, FE, 9.4, 38GHZ [S1],
MODEL PTM 1000-38

FCC PART 101
COMPLIANCE

DATE OF ISSUE: SEPTEMBER 10, 1999

PREPARED FOR:

Wavtrace, Inc.
1545 134th Ave NE
Bellevue, WA 98005

P.O. No: 8590
W.O. No: 71941

PREPARED BY:

Joyce Walker
CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

Date of test: August 9-13, 17-20,
& 23-25, 1999

Report No: FC99-029

DOCUMENTATION CONTROL:

Tracy Phillips
Documentation Control Supervisor
CKC Laboratories, Inc.

APPROVED BY:

Dennis Ward
Director of Laboratories
CKC Laboratories, Inc.

TABLE OF CONTENTS FOR
CERTIFICATION TEST REPORT

ADMINISTRATIVE INFORMATION

DATE OF TEST:	Date of test: August 9-13, 17-20 & 23-25, 1999
PURPOSE OF TEST:	To demonstrate the compliance of the TRA Assy, TRX 1000S, FE, 9.4, 38GHz [S1], Model PTM 1000-38, with the requirements for FCC Part 101 devices.
MANUFACTURER:	Wavtrace, Inc. 13434 NE 16th St., Suite 140 Bellevue, WA 98005
REPRESENTATIVE:	Mel Fuchikami
TEST LOCATION:	CKC Laboratories, Inc. 22105 Wilson River Hwy Tillamook, OR 97141
TEST PERSONNEL:	Mike Wilkinson & Adam Ross
TEST METHOD:	FCC Part 2 and Part 101
FREQUENCY RANGE TESTED:	9kHz – 200GHz

EQUIPMENT UNDER TEST:

TRA Assy, TRX 1000S, FE, 9.4, 38GHz [S1]

Manuf:	Wavtrace, Inc.
Model:	PTM 1000-38
Serial:	38-22 & 38-27
FCC ID:	XXX-PTM1000-38 (pending)

SUMMARY OF RESULTS

The TRA Assy, TRX 1000S, FE, 9.4, 38GHz [S1], Model PTM 1000-38, was tested in accordance with FCC Part 101 for compliance with the transmitter characteristics requirements of the FCC Rules.

As received, the above equipment was found to be fully compliant with the limits of FCC Part 101.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

Broadband wireless receiver/transmitter antenna to be mounted on an outside pole.

MEASUREMENT UNCERTAINTY

Associated with data in this report is a ±4dB measurement uncertainty.

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

HUB
Manuf: Wavtrace, Inc.
Model: PTM 1000L
Serial: Prototype
FCC ID: None

Outside Distribution Box
Manuf: Wavtrace, Inc.
Model: 2000-0140-01
Serial: 502
FCC ID: None

Remote Indoor Unit
Manuf: Wavtrace, Inc.
Model: PTM 1000
Serial: None
FCC ID: None

Laptop Computer
Manuf: Dell
Model: TS30H
Serial: 5119C
FCC ID: None

2.1033(c)(4) – Type(s) of Emissions

DXW 8M10

2.1033(c)(5) – Frequency Range

38604.167 – 39995.833 MHz

2.1033(c)(6) –Range of Operating Power

High power = +16.2 dBm
Low power = -34 dBm (power can also be turned off)

2.1033(c)(7) – Maximum Power Rating

+16.2 dBm

2.1033(c)(8) - DC Voltages

48 DC

2.1033(c)(9) – Tune-Up Procedure

See PTM 1000 Operations and Maintenance Manual uploaded along with the 731 Form.

2.1033(c)(10) – Frequency Stabilization, Modulation, & Spurious Radiation

Refer to the following schematic drawing numbers upload with the FCC 731 electronic filing:

2260-0053-03, TRX IFP-S
2260-0054-02, TRX Controller S
2260-0074-01 TRA-S DC/DC Power Supply
2260-0069-01, L01 38GHz (1st Local Oscillator)
2260-0068-01, FE Controller, 38GHz

2.1033(c)(13) – Description of Modulation

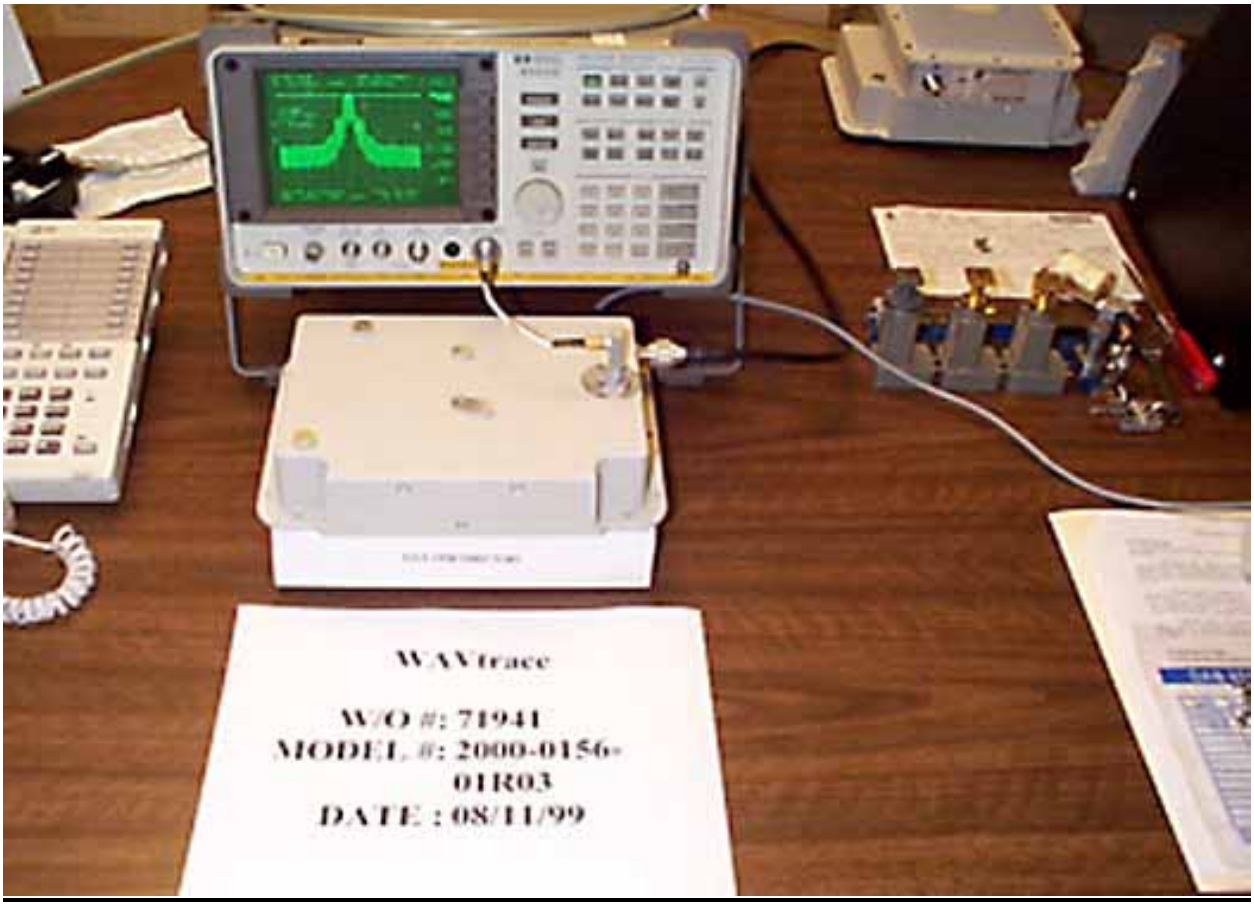
The modulation format will be variable index Quadrature Amplitude Modulation (QAM).

2.1033(c)(14)/2.1046 - RF Power Output

Test Conditions:

The 38 GHz (CH 0, 84 & 167) TRA is antenna-port connected to the analyzer for RF Output Power measurements. A 3.0 dB offset is used for the loss of the 5" co-axial cable between the TRA waveguide end and the analyzer. An additional 6 dB offset is used to compensate for 8:2 occupied-to-resolution bandwidth ratio. The temperature is 70°F. The humidity is 45%.

Photo Of Test Setup Used for Peak Power Measurement:



Test Equipment Used:

1. Spectrum Analyzer, HP, Model 8564E, S/N 3623A00539. Calibration date: October 14, 1998. Calibration due date: October 14, 1999.
2. Signal Generator, Giga-Tronics, Model 7200, S/N 745113. Calibration date: January 15, 1999. Calibration due date: January 15, 2000.
3. Frequency Doubler, Miteq, Model MX2M2260400, S/N 375490. No calibration required. Operator verification only.

Test Data:

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Transmit/Receive Assembly*	Wavtrace	2000-0156-01R03	38-22

Support Devices:

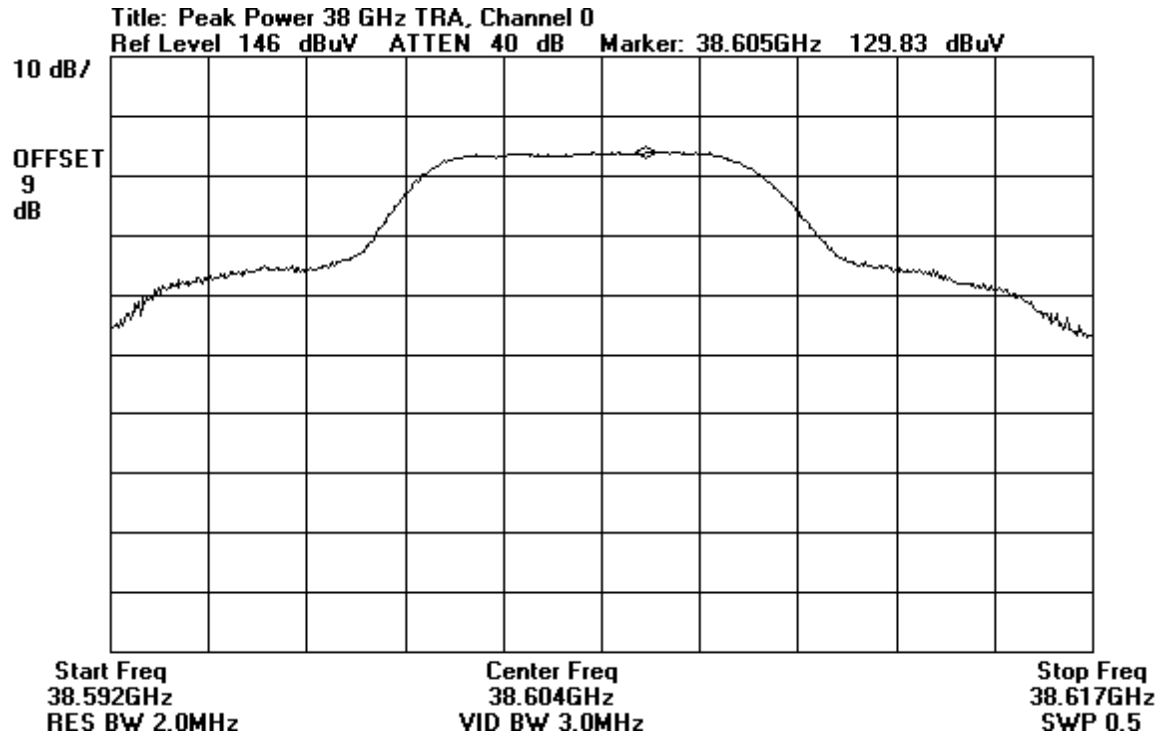
Function	Manufacturer	Model #	S/N
HUB	Wavtrace	PTM1000L	Prototype
Outdoor Distribution Box	Wavtrace	2000-0140-01	502

Transmitter Power Limitations

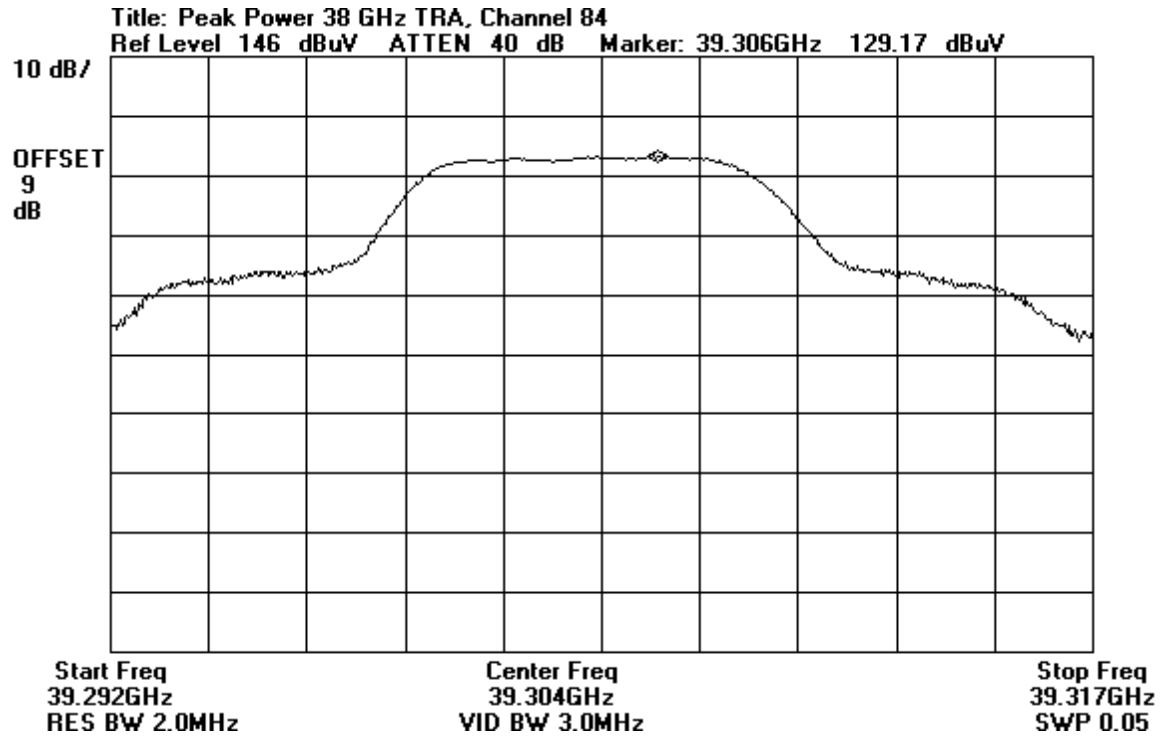
38 GHz TRA

Average Antenna-Port Measured Power (dBm)		Horn Antenna Gain (dBi) 2020-0004-04	Dish Antenna Gain (dBi) 6585-0003-00	Measured EIRP (dBW) Horn Antenna	Measured EIRP (dBW) Dish Antenna	Maximum Allowable EIRP (dBW)
CH 0	16.2	21.9	37.5	8.1	23.7	55
CH 84	15.7	21.9	37.5	7.6	23.2	55
CH 167	14.8	21.9	37.5	6.7	22.3	55

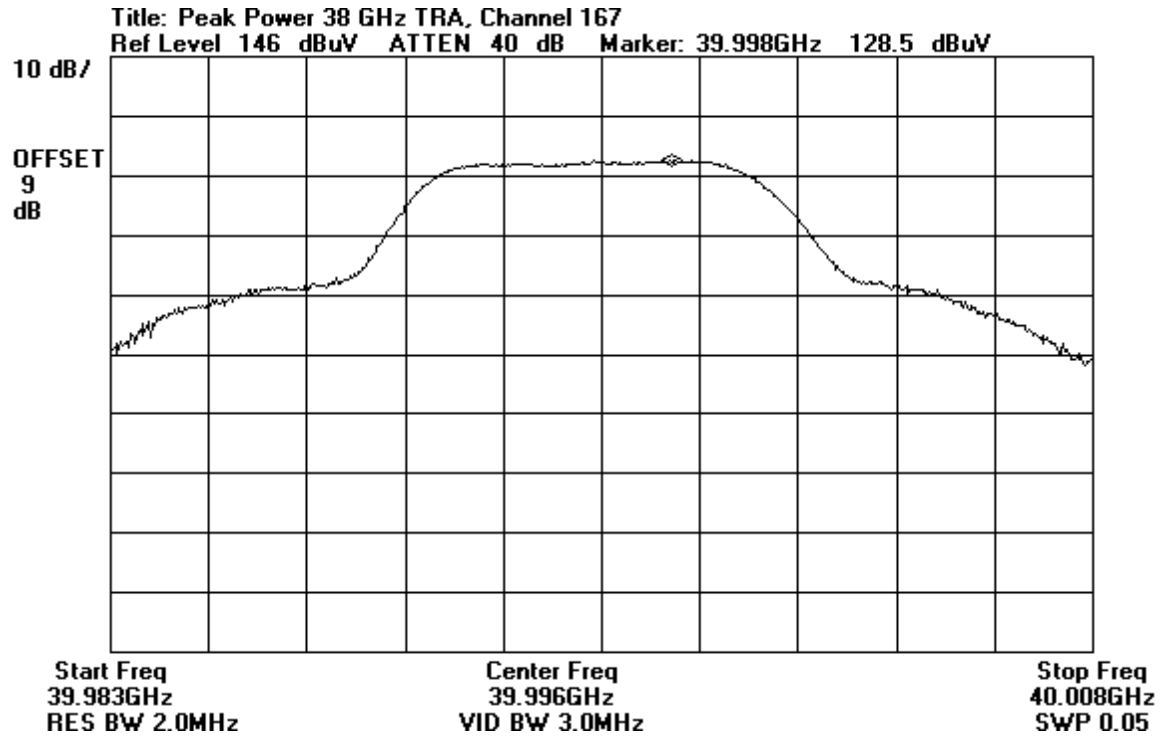
Peak Power


Title: Peak Power 38 GHz TRA, Channel 0
Ref Level 146 dBuV ATTEN 40 dB Marker: 38.605GHz 129.83 dBuV
10 dB/
OFFSET
9
dB
Start Freq
38.592GHz
RES BW 2.0MHz
Center Freq
38.604GHz
VID BW 3.0MHz
Stop Freq
38.617GHz
SWP 0.5

Peak Power


Title: Peak Power 38 GHz TRA, Channel 84
Ref Level 146 dBuV ATTEN 40 dB Marker: 39.306GHz 129.17 dBuV
10 dB/
OFFSET
9
dB
Start Freq
39.292GHz
RES BW 2.0MHz
Center Freq
39.304GHz
VID BW 3.0MHz
Stop Freq
39.317GHz
SWP 0.05

Peak Power


Title: Peak Power 38 GHz TRA, Channel 167
Ref Level 146 dBuV ATTEN 40 dB Marker: 39.998GHz 128.5 dBuV
10 dB/
OFFSET
9
dB
Start Freq
39.983GHz
RES BW 2.0MHz
Center Freq
39.996GHz
VID BW 3.0MHz
Stop Freq
40.008GHz
SWP 0.05

2.1033(c)(14)/2.1047(a) - MODULATION CHARACTERISTICS – Audio Frequency Response

Not applicable to this unit.

2.1033(c)(14)/2.1047(b) - MODULATION CHARACTERISTICS – Modulation Limiting Response

Not applicable to this unit.

2.1033(c)(14)/2.1049(i) - OCCUPIED BANDWIDTH

Test Conditions:

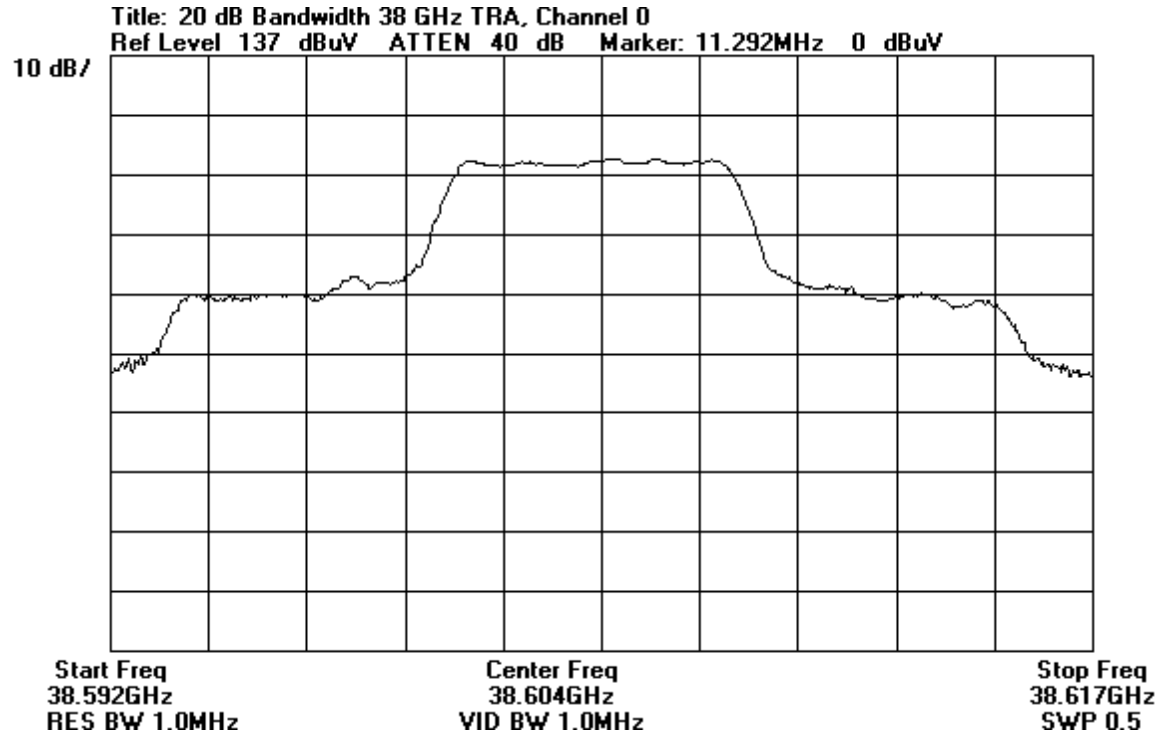
The 38 GHz (CH 0, 84 & 167) TRA is antenna-port connected to the analyzer for Occupied Bandwidth measurements. A 3.0 dB offset is used for the loss of the 5" co-axial cable between the TRA waveguide end and the analyzer. An additional 6 dB offset is used to compensate for 8:2 occupied-to-resolution bandwidth ratio. The temperature is 70°F. The humidity is 45%.

Photo Of Test Setup Used for Test:

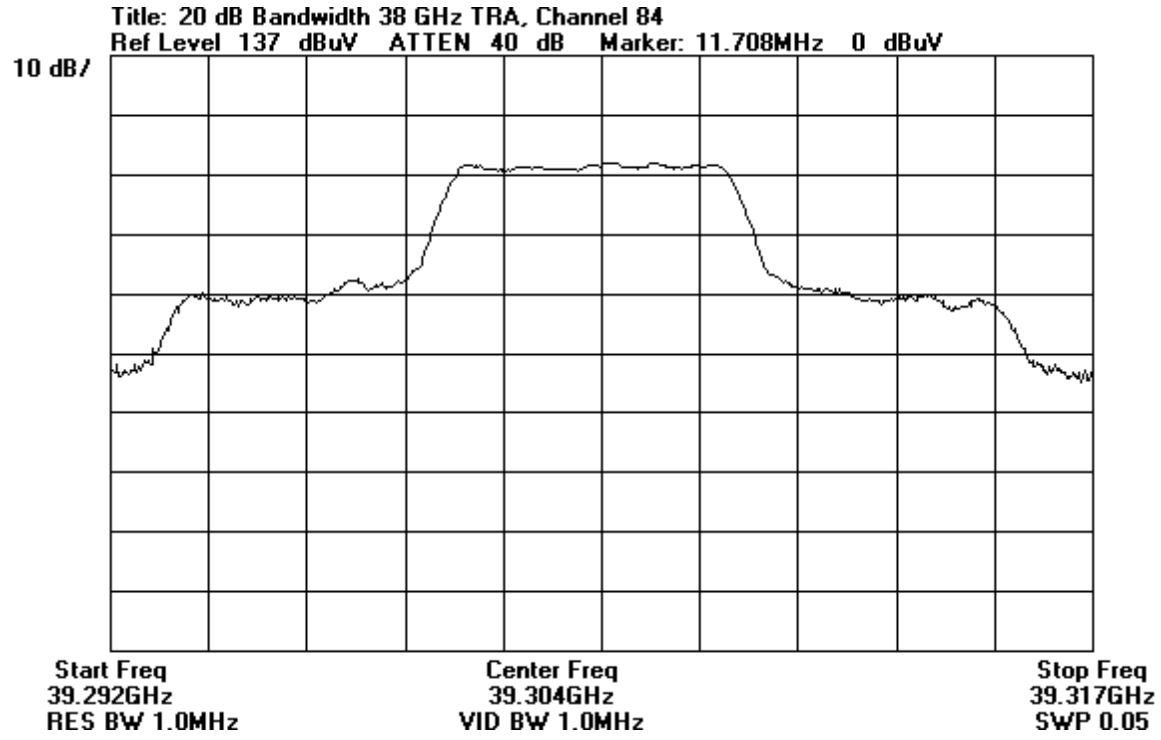
Test Equipment Used:

1. Spectrum Analyzer, HP, Model 8564E, S/N 3623A00539. Calibration date: October 14, 1998. Calibration due date: October 14, 1999.

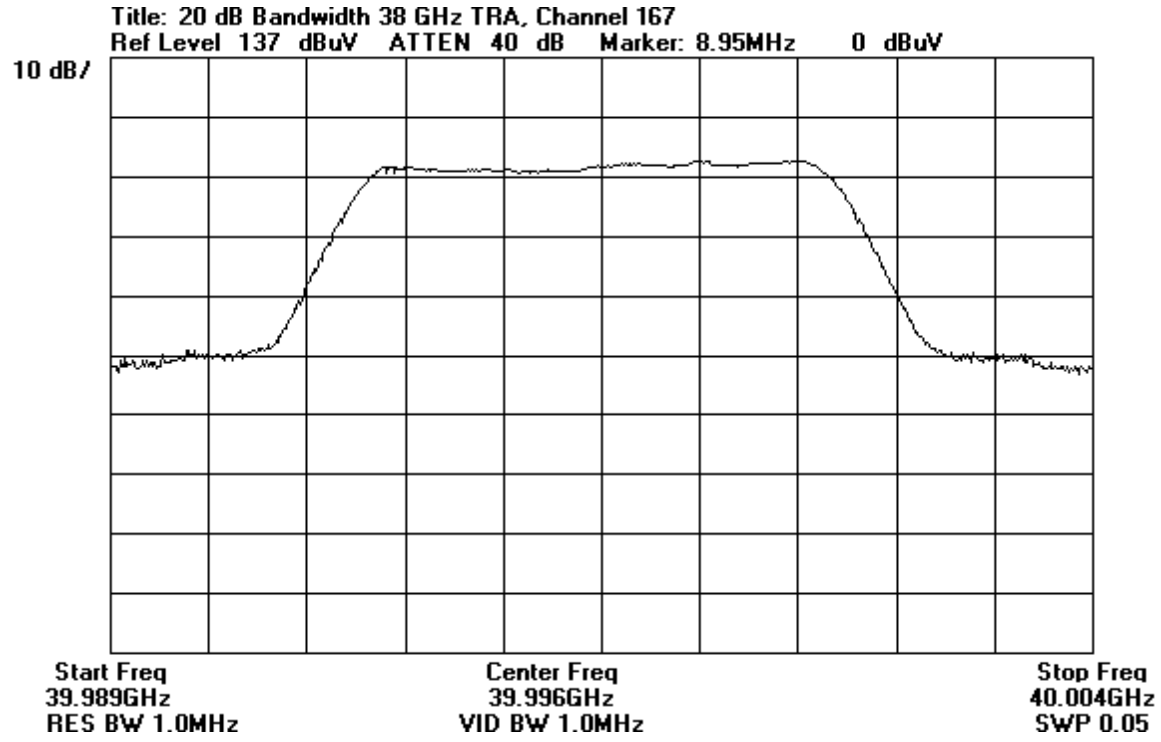
Occupied Bandwidth Plot



Occupied Bandwidth Plot



Occupied Bandwidth Plot

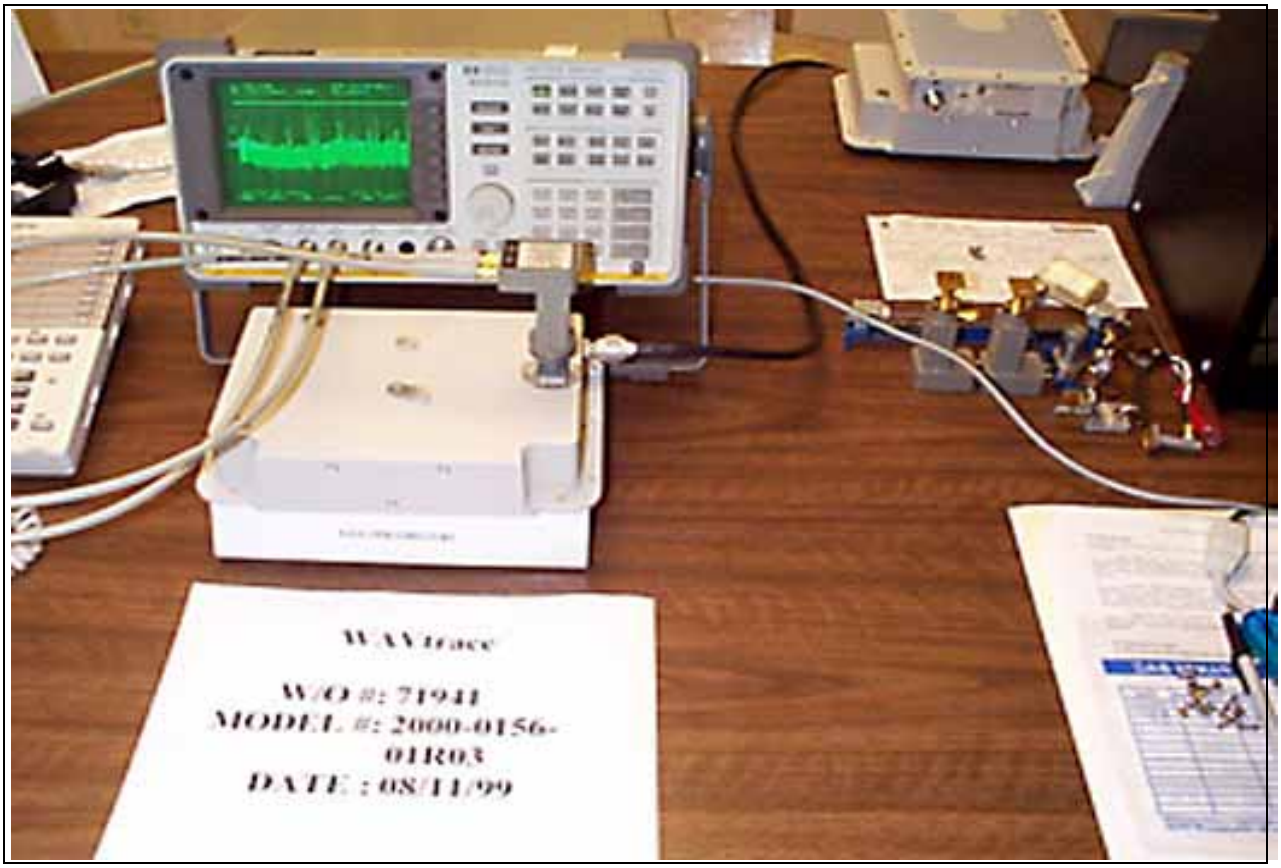


2.1033(c)(14)/2.1051 - SPURIOUS EMISSIONS AT ANTENNA TERMINAL

Video Bandwidth and Resolution Bandwidth Settings:

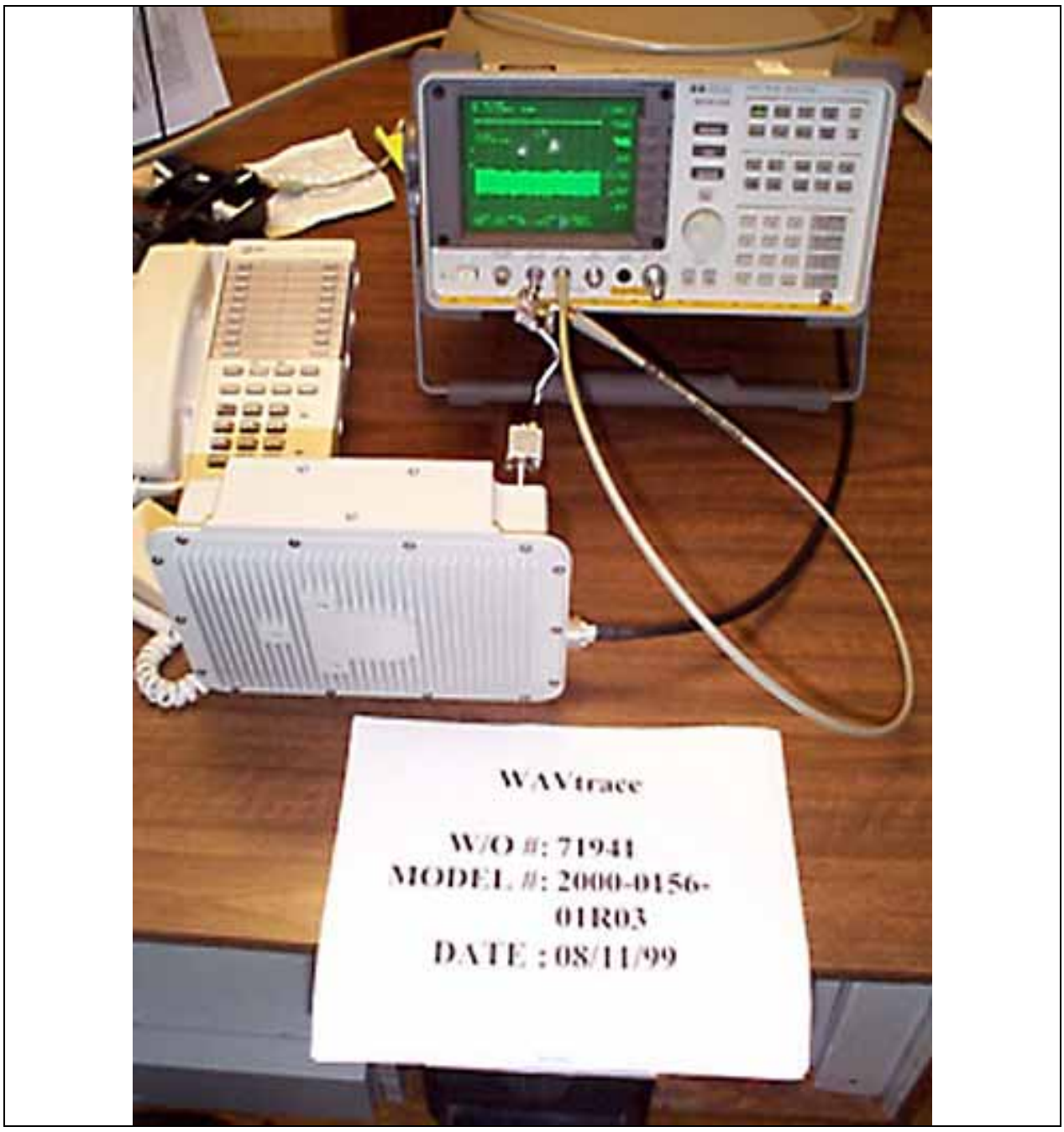
Frequency Range	Signal Analyzer VBW & RBW Setting
9kHz – 150kHz	200Hz
150kHz – 30MHz	9kHz
30MHz – 1MHz	120kHz
1GHz – 200GHz	1MHz

Photo of Test Setup Used for Conducted Spurious



40-110 GHz

Photograph Showing Conducted Spurious



110-200 GHz

Test Equipment Used:

1. Spectrum Analyzer, HP, Model 8564E, S/N 3623A00539. Calibration date: October 14, 1998. Calibration due date: October 14, 1999.
2. Spectrum Analyzer, HP, Model 8593A, S/N 3624A00159. Calibration date: October 12, 1998. Calibration due date: October 12, 1999.
3. Harmonic Mixers, HP, Model 11970U, S/N 3003A01623. Calibration date: July 24, 1998. Calibration due date: July 24, 2001.
4. Harmonic Mixers, HP, Model 11970V, S/N 2521A01237. Calibration date: February 20, 1998. Calibration due date: February 20, 2001.
5. Harmonic Mixers, HP Model 11970W, S/N 2521A01441. Calibration date: July 7, 1998. Calibration due date: July 7, 2001.
6. Harmonic Mixers, OML D Band, model M06HW, S/N D80724-1 & OLM G Band, model M05HW S/N G80724-1. No calibration required. Operator verification only.

Test Data: Channels 167, 0, 84

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Transmit/Receive Assembly*	Wavtrace	2000-0156-01R03	38-22

Support Devices:

Function	Manufacturer	Model #	S/N
HUB	Wavtrace	PTM1000L	Prototype
Outdoor Distribution Box	Wavtrace	2000-0140-01	502

Test Conditions / Notes: Channel 167

The 38 GHz (CH 167) TRA is antenna-port connected to the analyzer for Spurious measurements. A 3 dB offset is used for the loss of the 5" co-axial cable between the TRA waveguide end and the analyzer. Frequency range of investigation = 9 kHz - 200 GHz. The temperature is 65°F. The humidity is 50%.

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	50072.500M Ave	88.3					+0.0	88.3	94.0	-5.7	None
2	49295.850M Ave	86.3					+0.0	86.3	94.0	-7.7	None
3	56379.630M Ave	84.8					+0.0	84.8	94.0	-9.2	None
4	52800.000M Ave	83.7					+0.0	83.7	94.0	-10.3	None
5	57270.070M Ave	82.7					+0.0	82.7	94.0	-11.3	None
6	43766.660M Ave	81.8					+0.0	81.8	94.0	-12.2	None

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Transmit/Receive Assembly*	Wavtrace	2000-0156-01R03	38-22

Support Devices:

Function	Manufacturer	Model #	S/N
HUB	Wavtrace	PTM1000L	Prototype
Outdoor Distribution Box	Wavtrace	2000-0140-01	502

Test Conditions / Notes: Channel 0

The 38 GHz (CH 0) TRA is antenna-port connected to the analyzer for Spurious measurements. A 3 dB offset is used for the loss of the 5" co-axial cable between the TRA waveguide end and the analyzer. Frequency range of investigation = 9 kHz - 200 GHz. The temperature is 65°F. The humidity is 50%.

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	48332.730M Ave	91.7					+0.0	91.7	94.0	-2.3	None
2	47556.220M Ave	88.0					+0.0	88.0	94.0	-6.0	None
3	50954.670M Ave	85.3					+0.0	85.3	94.0	-8.7	None
4	51383.330M Ave	84.7					+0.0	84.7	94.0	-9.3	None
5	44933.330M Ave	80.3					+0.0	80.3	94.0	-13.7	None
6	99325.000M Ave	66.0					+0.0	66.0	94.0	-28.0	None
7	40081.040M Ave	63.5					+0.0	63.5	94.0	-30.5	None

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Transmit/Receive Assembly*	Wavtrace	2000-0156-01R03	38-22

Support Devices:

Function	Manufacturer	Model #	S/N
HUB	Wavtrace	PTM1000L	Prototype
Outdoor Distribution Box	Wavtrace	2000-0140-01	502

Test Conditions / Notes: Channel 84

The 38 GHz (CH 84) TRA is antenna-port connected to the analyzer for Spurious measurements. A 3 dB offset is used for the loss of the 5" co-axial cable between the TRA waveguide end and the analyzer. Frequency range of investigation = 9 kHz - 200 GHz. The temperature is 65°F. The humidity is 50%.

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	48430.910M Ave	87.2					+0.0	87.2	94.0	-6.8	None
2	49208.000M Ave	84.3					+0.0	84.3	94.0	-9.7	None
3	55394.400M Ave	84.0					+0.0	84.0	94.0	-10.0	None
4	43020.000M Ave	83.0					+0.0	83.0	94.0	-11.0	None
5	56283.070M Ave	82.3					+0.0	82.3	94.0	-11.7	None
6	59921.880M Ave	80.7					+0.0	80.7	94.0	-13.3	None

2.1033(c)(14)/2.1053 - FIELD STRENGTH OF SPURIOUS RADIATION

Video Bandwidth and Resolution Bandwidth Settings:

Frequency Range	Signal Analyzer VBW & RBW Setting
9kHz – 150kHz	200Hz
150kHz - 30MHz	9kHz
30MHz – 1MHz	120kHz
1GHz – 200GHz	1MHz

Photograph Showing Spurious Emissions

Front View

Photograph Showing Spurious Emissions

Back View

Test Equipment Used:

1. Spectrum Analyzer, HP, Model 8574A, S/N 3010A1076. Calibration date: July 15, 1999. Calibration due date: July 15, 2000.
2. Spectrum Analyzer, HP, Model 8447D, S/N 2727A05392. Calibration date: February 23, 1999. Calibration due date: February 23, 2000.
3. Rod Antenna, EMCO, Model 3301B, S/N 9101-3083. Calibration date: June 30, 1999. Calibration due date: June 30, 2000.
4. Bilog Antenna, Chase, Model CBL6111C, S/N 2455. Calibration date: July 15, 1999. Calibration due date: July 15, 2000.
5. 10 Meter Cables, CKC Site A. Calibration date: October 26, 1998. Calibration due date: October 26, 1999.
6. Spectrum Analyzer, HP, Model 8593M, S/N 3624A00159. Calibration date: October 12, 1998. Calibration due date: October 12, 1999.
7. Spectrum Analyzer, HP, Model 8564E, S/N 3623A00539. Calibration date: October 14, 1998. Calibration due date: October 14, 1999.
8. Spectrum Analyzer, HP, Model 83017A, S/N 3123A00321. Calibration date: October 26, 1998. Calibration due date: October 26, 1999.
9. Pr-Amp Pack, HP, Model 841255C, S/N 3643A00026. Calibration date: November 18, 1998. Calibration due date: November 18, 1999.
10. 18 GHz Horn, EMCO, Model 3115, S/N 9006-3413. Calibration date: February 24, 1999. Calibration due date: February 24, 2000.
11. 18-26.5 GHz Horn, HP, Model 84125-80008, S/N 961178-006. January 13, 1999. Calibration due date: January 13, 2000.
12. 26-40 GHz Horn, ARA, Model MWH-2640/B, S/N 1012. Calibration date: January 12, 1999. Calibration due date: January 12, 2000.
13. 10' Cable, CKC, #1016. Calibration date: February 25, 1999. Calibration due date: February 25, 2000.
14. 100' Cable, CKC #2086. Calibration date: February 24, 1999. Calibration due date: February 24, 2000.

Test Date: For 9 kHz To 1 GHz

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Transmit/Receive Assembly*	Wavtrace	2000-0158-01R01	28-25
Transmit/Receive Assembly	Wavtrace	2000-0163-00R01	31-03
Transmit/Receive Assembly	Wavtrace	2000-0156-01R03	38-27
Transmit/Receive Assembly	Wavtrace	2000-0158-01R01	28-35

Support Devices:

Function	Manufacturer	Model #	S/N
HUB	Wavtrace	PTM1000L	Prototype
Outdoor Distribution Box	Wavtrace	2000-0140-01	502

Test Conditions / Notes: 3 Different Transmitter Models All Set To Channel 15

The Transmit/Receive Assemblies are transmitting data received from the remote HUB through the local ODU. The TRA's are set to CH 15. The horn antennas on site are on the 28 GHz TRA's and the 31 GHz TRA and are of the 30°, vertical polarization, high gain type. The parabolic dish on site is connected to the 28 GHz TRA and is of the 10" 2° type. Frequency range of investigation = 9 kHz - 1 GHz. The temperature is 70°F. The humidity is 45%.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	Amp-A	Bilog	cb10a	3301B	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	486.800M	42.8	-27.6	+17.8	+5.5	+0.0	+0.0	38.5	46.0	-7.5	Horiz
2	486.440M	41.5	-27.6	+17.8	+5.5	+0.0	+0.0	37.2	46.0	-8.8	Vert
3	50.936M	46.1	-27.1	+8.6	+1.6	+0.0	+0.0	29.2	40.0	-10.8	Vert
4	1.168M	51.0	+0.0	+0.0	+0.0	+4.5	+0.0	55.5	66.3	-10.8	Vert
5	244.188M	40.0	-26.4	+12.4	+3.7	+0.0	+0.0	29.7	46.0	-16.3	Horiz
6	244.176M	39.8	-26.4	+12.4	+3.7	+0.0	+0.0	29.5	46.0	-16.5	Vert

Test Date: For 9 kHz To 1 GHz

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Transmit/Receive Assembly	Wavtrace	2000-0156-01R03	38-22
Transmit/Receive Assembly	Wavtrace	2000-0158-01R01	28-25
Transmit/Receive Assembly	Wavtrace	2000-0158-01R01	28-35
Transmit/Receive Assembly	Wavtrace	2000-0163-00R01	31-11
Transmit/Receive Assembly	Wavtrace	2000-0158-01R01	28-22

Support Devices:

Function	Manufacturer	Model #	S/N
HUB	Wavtrace	PTM 1000	Prototype
Laptop Computer	Dell	TS30H	5119C
Remote Indoor Unit	Wavtrace	PTM 1000	none
Outdoor Distribution Box	Wavtrace	2000-0140-01	502

Test Conditions / Notes: 3 Different Transmitter Models Set To Different Channels

The Transmit/Receive Assemblies are transmitting data received from the remote HUB (4 TRA's) and the Remote Indoor Unit (remaining TRA 38-22) through the local ODU. The TRA's channel settings are as follows: 38-22 CH0, 31-11 CH0, 28-22 CH0, 28-25 CH51 & 28-35 CH101. The horn antennas on site are on the 28 GHz TRA's and the 31 GHz TRA and are of the 30°, vertical polarization, high gain type. The parabolic dish on site is connected to the 38 GHz TRA and is of the 10" 2° type. Frequency range of investigation = 9 kHz - 1 GHz. The temperature is 60°F. The humidity is 40%.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	Amp-A dB	Bilog dB	cb10a dB	3301B dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	487.080M QP	44.5	-27.7	+17.8	+5.5	+0.0	+0.0	40.1	46.0	-5.9	Vert
2	486.560M	43.5	-27.6	+17.8	+5.5	+0.0	+0.0	39.2	46.0	-6.8	Horiz
3	53.320M	46.8	-27.1	+7.9	+1.7	+0.0	+0.0	29.3	40.0	-10.7	Vert
4	244.177M	40.7	-26.4	+12.4	+3.8	+0.0	+0.0	30.5	46.0	-15.5	Vert
5	244.168M	40.3	-26.4	+12.4	+3.8	+0.0	+0.0	30.1	46.0	-15.9	Horiz
6	1.168M	20.7	+0.0	+0.0	+0.0	+4.5	+0.0	25.2	66.5	-41.3	Vert

Test Data: For 1 GHz to 40 GHz

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Transmit/Receive Assembly*	Wavtrace	2000-0158-01R01	28-25
Transmit/Receive Assembly	Wavtrace	2000-0156-01R03	38-27
Transmit/Receive Assembly	Wavtrace	2000-0158-01R01	28-35

Support Devices:

Function	Manufacturer	Model #	S/N
HUB	Wavtrace	PTM1000L	Prototype
Outdoor Distribution Box	Wavtrace	2000-0140-01	502

Test Conditions / Notes: 3 Different Transmitter Models All Set To Channel 15

The Transmit/Receive Assemblies are transmitting data received from the remote HUB through the local ODU. The TRA's are set to CH 15. The horn antennas on site are on the 28 GHz TRA's and are of the 30°, vertical polarization, high gain type. The parabolic dish on site is connected to the 28 GHz TRA and is of the 10" 2° type. Frequency range of investigation = 1 GHz - 40 GHz. The temperature is 70°F. The humidity is 45%.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	26.5 Horn dB	Cable High dB	Cbl-2 dB	Horn dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	20028.670M	51.8	+0.0	+0.0	+0.0	+0.0	+0.0	47.0	54.0	-7.0	Vert
	Ave		+40.5	-45.3							
2	3445.000M	46.2	-33.8	+1.3	+1.6	+30.1	+0.0	45.4	54.0	-8.6	Horiz
	Ave		+0.0	+0.0							
3	1965.050M	52.5	-36.8	+0.9	+1.1	+27.7	+0.0	45.4	54.0	-8.6	Horiz
	Ave		+0.0	+0.0							
4	8860.000M	33.4	-33.8	+6.4	+2.9	+35.8	+0.0	44.7	54.0	-9.3	Vert
	Ave		+0.0	+0.0							
5	24134.730M	48.8	+0.0	+0.0	+0.0	+0.0	+0.0	44.0	54.0	-10.0	Horiz
	Ave		+40.4	-45.2							
6	1970.000M	49.5	-36.7	+0.9	+1.1	+27.7	+0.0	42.5	54.0	-11.5	Vert
	Ave		+0.0	+0.0							
7	22200.580M	45.8	+0.0	+0.0	+0.0	+0.0	+0.0	41.4	54.0	-12.6	Horiz
	Ave		+40.9	-45.3							
8	2696.000M	42.2	-34.8	+1.4	+1.3	+29.3	+0.0	39.4	54.0	-14.6	Vert
	Ave		+0.0	+0.0							
9	21020.130M	43.3	+0.0	+0.0	+0.0	+0.0	+0.0	38.9	54.0	-15.1	Vert
	Ave		+40.9	-45.3							
10	1086.000M	50.5	-38.9	+0.6	+0.9	+24.2	+0.0	37.3	54.0	-16.7	Horiz
	Ave		+0.0	+0.0							

Test Data: For 1 GHz to 40 GHz

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Transmit/Receive Assembly	Wavtrace	2000-0156-01R03	38-22
Transmit/Receive Assembly	Wavtrace	2000-0158-01R01	28-25
Transmit/Receive Assembly	Wavtrace	2000-0158-01R01	28-35
Transmit/Receive Assembly	Wavtrace	2000-0163-00R01	31-11
Transmit/Receive Assembly	Wavtrace	2000-0158-01R01	28-22

Support Devices:

Function	Manufacturer	Model #	S/N
HUB	Wavtrace	PTM 1000	Prototype
Laptop Computer	Dell	TS30H	5119C
Remote Indoor Unit	Wavtrace	PTM 1000	none
Outdoor Distribution Box	Wavtrace	2000-0140-01	502

Test Conditions / Notes: 3 Different Transmitter Models Set To Different Channels

The Transmit/Receive Assemblies are transmitting data received from the remote HUB (4 TRA's) and the Remote Indoor Unit (remaining TRA 38-22) through the local ODU. The TRA's channel settings are as follows: 38-22 CH0, 31-11 CH0, 28-22 CH0, 28-25 CH51 & 28-35 CH101. The horn antennas on site are on the 28 GHz TRA's and the 31 GHz TRA and are of the 30°, vertical polarization, high gain type. The parabolic dish on site is connected to the 38 GHz TRA and is of the 10" 2° type. Frequency range of investigation = 1 GHz - 40 GHz. The temperature is 60°F. The humidity is 40%.

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	High dB	Horn dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	21357.330M Ave	54.2	-45.3	+40.7			+0.0	49.6	54.0	-4.4	Vert
2	18085.000M Ave	57.8	-49.9	+40.3			+0.0	48.2	54.0	-5.8	Vert
3	20040.000M Ave	52.7	-45.3	+40.5			+0.0	47.9	54.0	-6.1	Vert
4	21017.560M Ave	52.0	-45.3	+40.9			+0.0	47.6	54.0	-6.4	Vert
5	26259.180M Ave	52.5	-45.2	+39.9			+0.0	47.2	54.0	-6.8	Vert
6	20875.830M Ave	51.3	-45.3	+40.9			+0.0	46.9	54.0	-7.1	Vert
7	25848.200M Ave	50.7	-45.2	+40.6			+0.0	46.1	54.0	-7.9	Horiz
8	24729.370M Ave	46.3	-45.2	+40.7			+0.0	41.8	54.0	-12.2	Vert

2.1033(c)(14)/2.1055/101.107 - FREQUENCY STABILITY

Test Conditions:

The TRA is antenna-port connected to the analyzer for fundamental frequency measurements over temperature and supply voltage, and is transmitting data received from the remote HUB. The ambient room temperature is 72 °F. The humidity is 50%.

Photo of Test Setup Used for Test:

Test Equipment Used:

1. Spectrum Analyzer, HP, Model 8564E, S/N 3623A00539. Calibration date: October 14, 1998. Calibration due date: October 14, 1999.
2. Thermotron Temperature Chamber, Model S1.2 Mini-Max. Calibration date: August 6, 1999. Calibration due date: August 6, 2000.
3. Mini Hygrothermograph, Oaktron, Model 8369-70, S/N 031155. Calibration date: January 28, 1999. Calibration due date: January 28, 2000.
4. Multimeter, Fluke, Model 70 Series II, S/N 55230270. Calibration date: November 9, 1998. Calibration due date: November 9, 1999.

Test Data:

Frequency in MHz
38 GHz TRA (s/n 38-22)

	CH 0	CH 84	CH 167
Ambient 120 VAC	38603.75	39303.78	39995.83
Ambient 102 VAC	38604.13	39303.17	39995.02
Ambient 138 VAC	38603.8	39303.16	39995.03
-30°C	38603.14	39303.16	39995.88
-20°C	38603.18	39303.15	39995.88
-10°C	38603.17	39303.21	39995.88
0°C	38603.19	39303.15	39995.82
10°C	38603.16	39303.19	39995.88
20°C	38603.17	39303.17	39995.86
30°C	38603.15	39303.18	39995.86
40°C	38603.17	39303.20	39995.88
50°C	38603.17	39303.18	39995.88