



Engineering and Testing for EMC and Safety Compliance

CERTIFICATION APPLICATION REPORT FCC PART 15.255 CERTIFICATION

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FCC ID:	P57-FL60-1250	FRN NUMBER:	0005084207
EQUIPMENT TYPE:	Communications Transceiver Units	MODEL(S):	FL60-1250-AL1 (Access Unit A) and FL60-1250-BL1 (Access Unit B)
RTL WORK ORDER #	2002218	RTL QUOTE #	QRTL02-621
DATE OF TEST REPORT:	February 13, 2003		
FCC Classification:	☒ DXX: Part 15 Low Power Communication Device Transmitter		
FCC Rule Part(s):	Part 15.255: Operation within the bands 57.0 – 64.0 GHz		
Carrier/Frequency (GHz)	Output Power (mW)	Frequency Tolerance (Deviation MHz)	Emission Designator
62.0	.083 (Unit A)	8.970	N/A
58.7	.069 (Unit B)	6.351	N/A

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Furthermore, there was no deviation from, additions to or exclusions from the FCC Part 2, FCC Part 15 and ANSI 63.4.

Signature: 

Date: February 13, 2003

Typed/Printed Name: Desmond A. Fraser

Position: President
(NVLAP Signatory)



Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 200061-0.

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

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1. GENERAL INFORMATION

1.1. SCOPE

FCC Rules Part 15.255: Operation within the band of 57.0-64.0 GHz, products other than fixed disturbance sensors. The EUT is a low power telecommunications device.

1.2. TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992)

1.3. RELATED SUBMITTAL (S)/GRANT (S)

This is an original application for certification.

2. EQUIPMENT INFORMATION

2.1. APPLICANT AND EQUIPMENT INFORMATION

Test Lab: Rhein Tech Laboratories, Inc. Phone: 703-689-0368 360 Herndon Parkway Fax: 703-689-2056 Suite 1400 Web Site: www.rheintech.com Herndon, VA 20170 Email: ATCBINFO@rheintech.com		Applicant Information: Telaxis Communications Corporation 20 Industrial Drive East Contact: John L. Hutchings South Deerfield, MA 01373 Phone: 413-665-8551 USA Fax: 413-665-0089 Email: jhutchings@tlxs.com	
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62.0	.083 (Unit A)	8.970	N/A
58.7	.069 (Unit B)	6.351	N/A

2.2. EXERCISING THE EUT CW MODE

The EUT was configured internally so that the radiated carrier produced was unmodulated, i.e. CW mode, in order to measure the peak power densities of each access unit. The test was performed with the EUT polarized horizontally and vertically in order to determine worst-case emissions. The EUT supports only one channel within the authorized band, namely 62 GHz and 58.7 GHz for access units A and B respectively. Data for both access units is in the report. To complete the configuration required, the transceiver was tested with a fiber breakout box, and a 48-volt DC supply. The modulation input connector to the fiber break out box was left unconnected in this mode. All radiated measurements were performed at an antenna test distance of 3 meters.

2.3. EXERCISING THE EUT GIG-E MODULATION MODE

The EUT was configured with a communication analyzer providing GIG-E modulated fiber optic output signals. To complete the configuration required, the transceiver was tested with a fiber breakout box, and a 48-volt DC supply. The modulation input connector to the fiber break out box was connected to the communication analyzer. Both access units were modulated with this device in order to measure bandwidths, investigation of the restricted bands, and temperature/voltage frequency stabilities. The access units' spurious emissions were also investigated and tested in this mode. The tests were performed with the EUT polarized horizontally and vertically in order to determine worst-case emissions. The EUT supports only one channel within the authorized band, namely 62 GHz and 58.7 GHz for access units A and B respectively. All radiated measurements were performed at an antenna test distance of 3 meters.

2.4. TEST SYSTEM DETAILS

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system are:

TABLE 2-1: EQUIPMENT UNDER TEST (EUT)

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
ACCESS UNIT A	TELAXIS	FL60-1250-AL1	022179664	P57-FL60-1250	SHIELDED I/O	14987
ACCESS UNIT B	TELAXIS	FL60-1250-BL1	022179665	P57-FL60-1250	SHIELDED I/O	14988

TABLE 2-2: EXTERNAL COMPONENTS IN TEST CONFIGURATION

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
FIBER INTERFACE PANEL	TELAXIS	SP2000		N/A	FIBER CABLE	014993
DC POWER SUPPLY	XANTREX	LX60-2	002898	N/A	SHIELDED	014990
LAPTOP COMPUTER	FINISAR	GTX-FC-N0100 NOTEBOOK		N/A	SERIAL	014992

2.5. CONFIGURATION OF TESTED SYSTEM

PHOTOGRAPH 1: CONFIGURATION OF TESTED SYSTEM

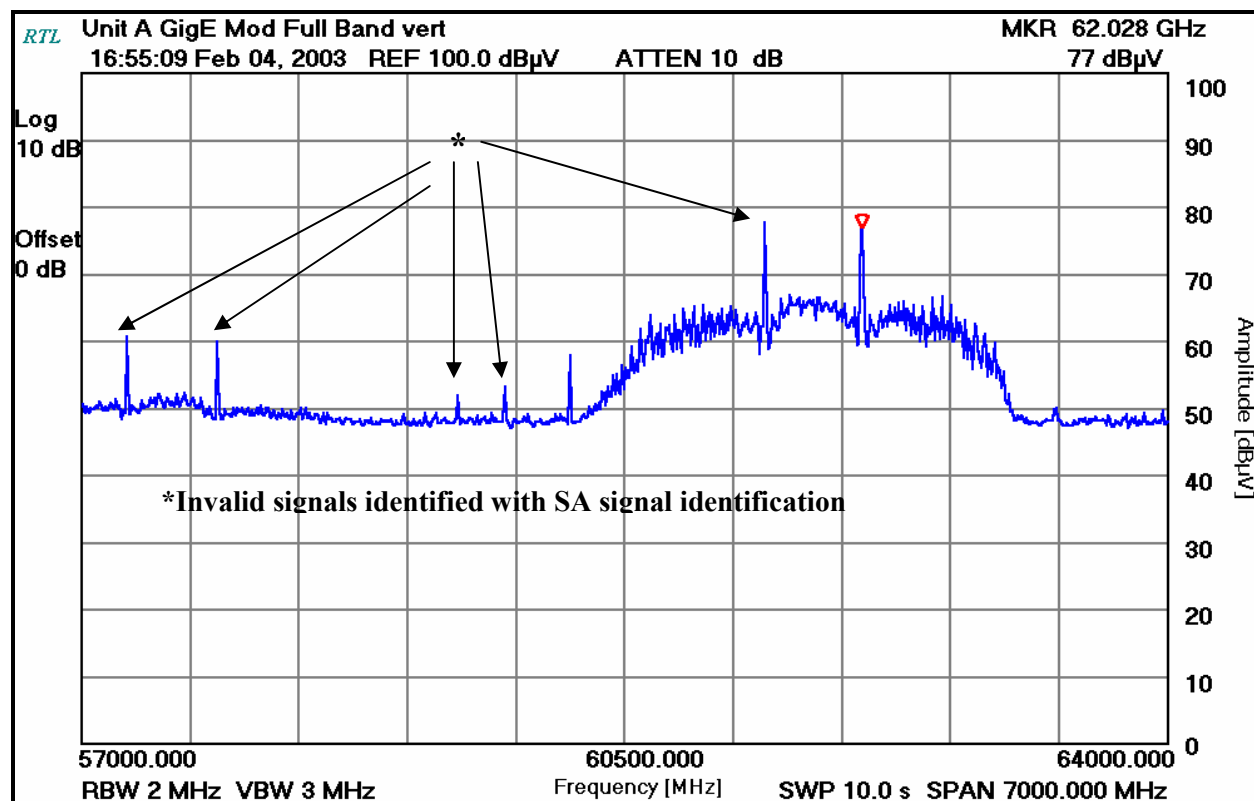


3. RESTRICTED BANDS OF OPERATION - §15.205

3.1. TEST PROCEDURE

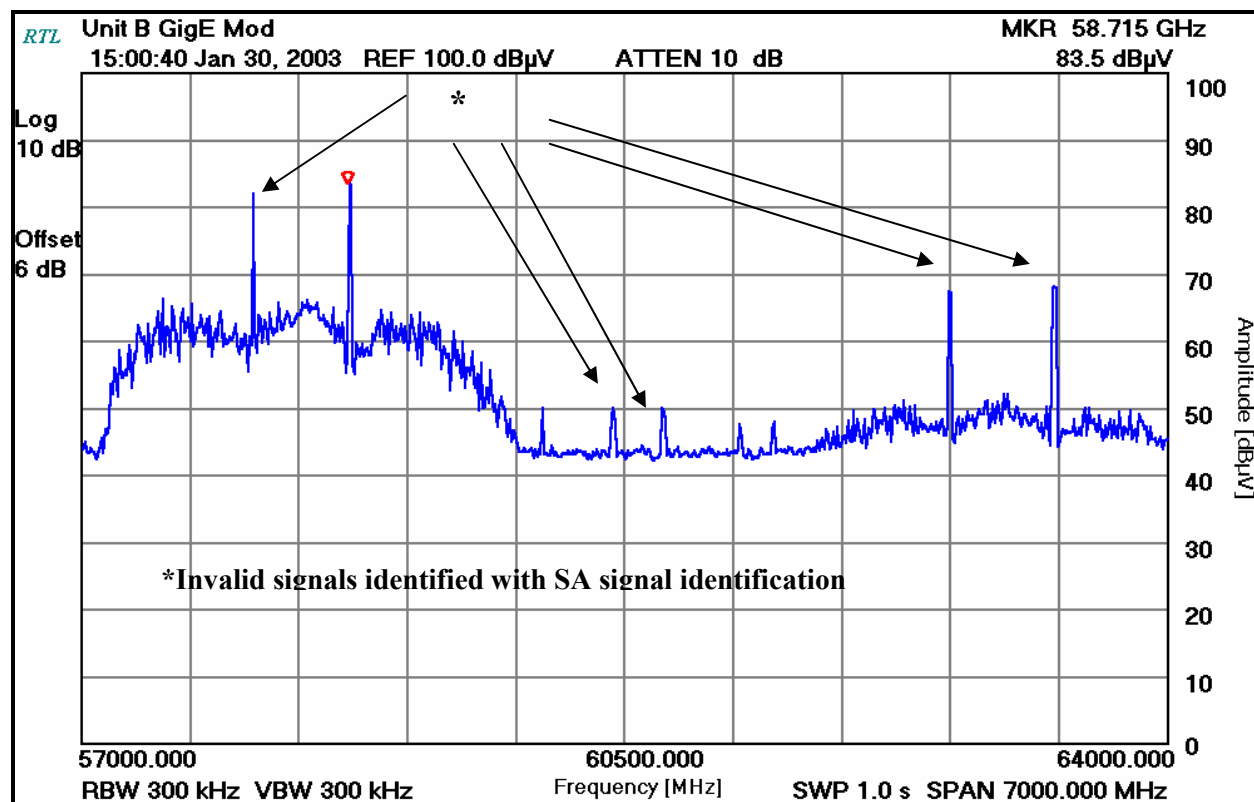
The restricted band edges at 57 GHz and 64 GHz were investigated and checked for compliance. The entire modulated carrier at 58.7GHz and 62 GHz were within the authorized band for both access units when exercised in the CW, and GIG-E modes. For both units, GIG-E vertically polarized mode is the worst-case mode.

Access unit: A
 Carrier Frequency: 62.0 GHz
 Resolution Bandwidth: 2 MHz
 Video Bandwidth: 3 MHz
 Sweep Time: 10 Sec
 Span: 7 GHz



PLOT 3-1: GIG-E BAND-EDGES ACCESS UNIT A

Access unit: B
Frequency: 58.7 GHz
Resolution Bandwidth: 300 kHz
Video Bandwidth: 300 kHz
Sweep Time: 1 Sec
Span: 7 GHz



PLOT 3-2: GIG-E BAND-EDGES ACCESS UNIT B

TEST PERSONNEL:

Dan Biggs
Test Engineer

Daniel Biggs
Signature

01-30-03 and 02-04-03
Dates Of Test

TABLE 3-1: TEST EQUIPMENT USED FOR RESTRICTED BANDS MEASUREMENTS

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Cal Due
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	07/02/03
900715	Agilent	11970V	Harmonic Mixer (50 - 75 GHz)	2521A00512	03/07/04
900712	ATM	15-443-6	Horn Antenna (50 - 75 GHz)	8051805-1	03/07/04

Rhein Tech Laboratories, Inc.
360 Herndon Parkway
Suite 1400
Herndon, VA 20170
<http://www.rheintech.com>

Telaxis Communications Corp.
Model(s): FL60-1250(-AL1 & -BL1)
FCC ID: P57-FL60-1250
RTL WO#: 2002218
Report Date: February 13, 2003

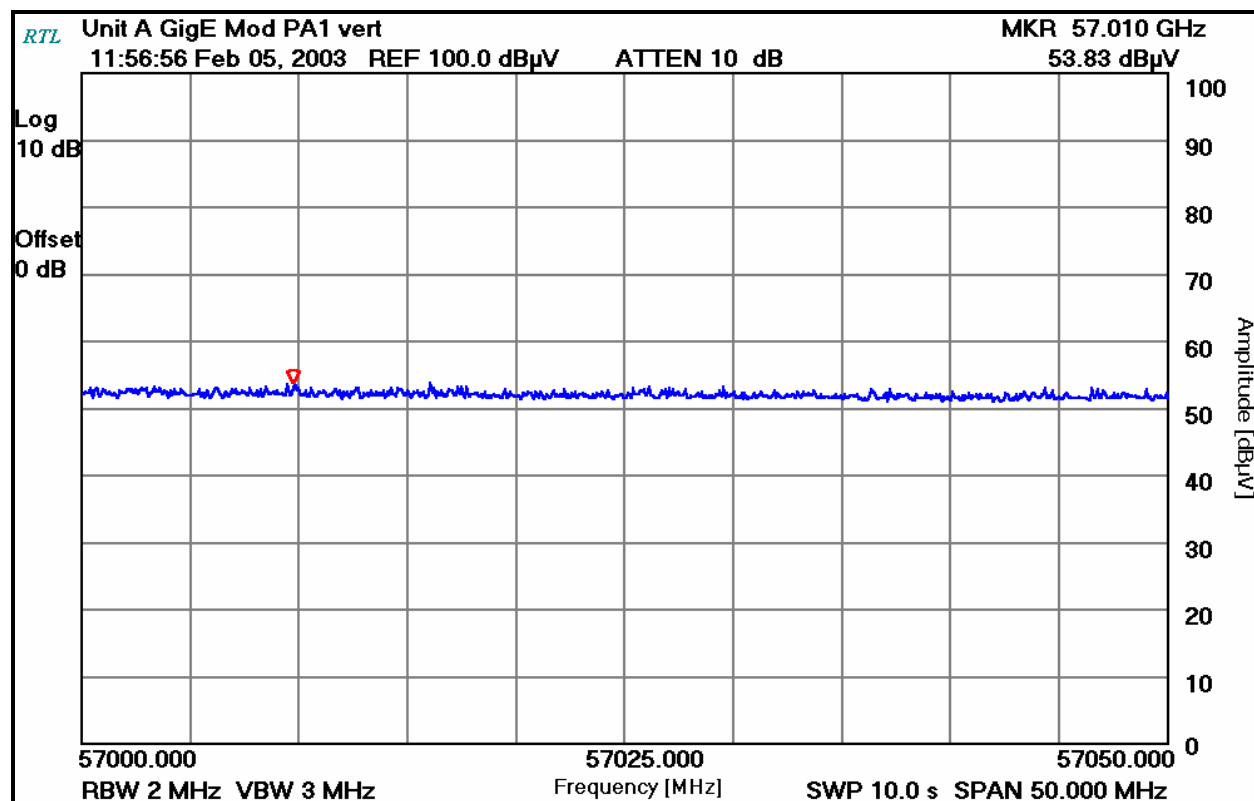
4. CONDUCTED LIMITS - §15.207

These units are 48 VDC powered. Conducted emission is not applicable.

5. COMPLIANCE WITH THE PUBLIC ACCESS BAND 57-57.05GHz - §15.255 (D)

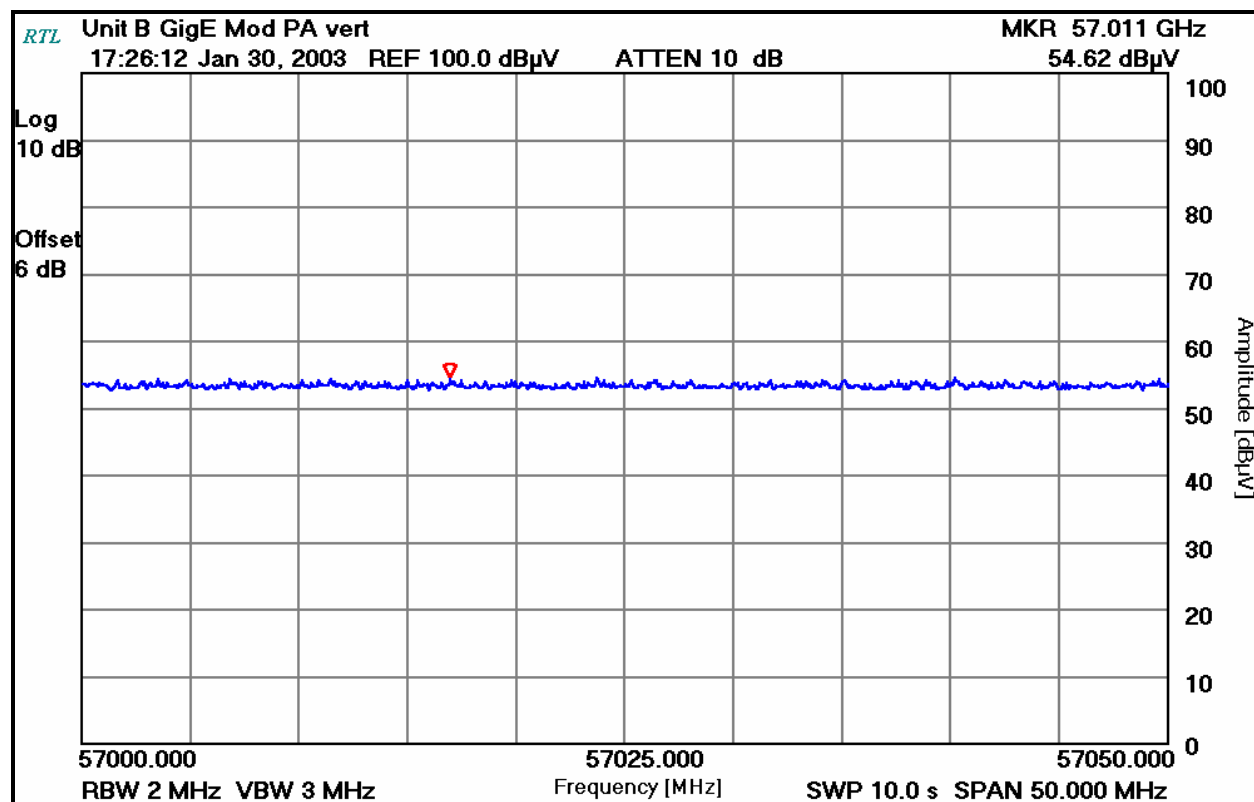
The EUT does not support public accessible coordination within the 57-57.05 GHz channel, the public access band at 57-57.05 GHz was investigated and checked for compliance on both access units in the CW and GIG-E modes for spurious noise. There was no spurious noise within this band on either unit. The GIG-E vertically polarized mode is considered the worst-case mode for both units. See plots below for this mode.

Access unit: A
 Carrier Frequency: 62.0 GHz
 Resolution Bandwidth: 2 MHz
 Video Bandwidth: 3 MHz
 Sweep Time: 10 Sec
 Span: 50 MHz



PLOT 5-1: GIG-E BAND-EDGES ACCESS UNIT A

Access unit: B
 Frequency: 58.7 GHz
 Resolution Bandwidth: 2 MHz
 Video Bandwidth: 3 MHz
 Sweep Time: 10 Sec
 Span: 50 MHz



PLOT 5-2: GIG-E BAND-EDGES ACCESS UNIT B

TEST PERSONNEL:

Dan Biggs

Test Engineer

Signature

01-30-03 and 02-05-03

Dates Of Test

TABLE 5-1: TEST EQUIPMENT USED FOR PUBLIC ACCESS BAND MEASUREMENTS

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Cal Due
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	07/02/03
900715	Agilent	11970V	Harmonic Mixer (50 - 75 GHz)	2521A00512	03/07/04
900712	ATM	15-443-6	Horn Antenna (50 - 75 GHz)	8051805-1	03/07/04

6. RADIATED EMISSION LIMITS - §15.255(C)(2) AND (C)(3)

6.1. RADIATED EMISSION LIMITS TEST PROCEDURE

Radiated Spurious Emissions applies to harmonics and spurious emissions that fall in the restricted and non-restricted bands. The EUT's were investigated from 10 kHz to 200 GHz. The restricted bands are listed in Part 15.205. The maximum permitted average field strength for the restricted band is listed in Part 15.209. The EUT was tested in the horizontal and vertical polarized plane. The general limit under part 15.209 was applied for all frequencies 10 kHz to 40 GHz per FCC 15.255 (c)(2). Above 40 GHz, the limit from FCC 15.255 (c)(3) is applicable. The worst-case mode is represented by GIG-E mode.

The EUT was investigated at the following distances:

10 kHz - 18 GHz distance at 3 meters, 18 GHz - 50 GHz distance at 3 meters, 50 GHz - 75 GHz distance at 3 meters, 75 GHz - 200 GHz distance at approx. 20 cm. There was no spurious noise other than the EUT carrier found above 18 GHz. Radiated emissions were only found in the authorized bands 57 - 64 MHz.

6.2. RADIATED EMISSION LIMITS TEST DATA

- No spurious emissions from the EUT's were found between 10 kHz to 200 GHz.
- Average Measurement mode: Res: =1 MHz, VID= 10 Hz; NF = noise floor

TEST PERSONNEL:

Dan Biggs
Test Engineer


Signature

02-06-03
Date Of Test

6.3. TEST EQUIPMENT USED FOR TESTING

TABLE 6-1: RADIATED SPURIOUS EMISSIONS TEST EQUIPMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719
901218	EMCO	3160-09	Horn Antenna (18 - 26 GHz)	960281-003
900392	Agilent	1197OK	Harmonic Mixer (18 - 26 GHz)	2332A00563
900126	Agilent	11970A	Harmonic Mixer (26.5 - 40 GHz)	2332A01199
901218	EMCO	3160-10	Horn Antenna (26.5 - 40 GHz)	960452-007
900256	ATM	19-443-6	Horn Antenna (40 – 60 GHz)	8041704-01
900717	Agilent	11970U	Harmonic Mixer (40 - 60 GHz)	2332A01110
900715	Agilent	11970V	Harmonic Mixer (50 - 75 GHz)	2521A00512
900712	ATM	15-443-6	Horn Antenna (50 – 75 GHz)	8051805-1
900711	ATM	10-443-6	Horn Antenna (75 – 110 GHz)	805 1905-1
900716	Agilent	11970W	Harmonic Mixer (75 - 110 GHz)	2521A00710
900744	Olsen	M08HW	Harmonic Mixer (90 - 140 GHz)	F80814-1
900826	ATM	08-443-6	Horn Antenna (90 – 140 GHz)	8041904-01
901257	Olsen	M05HW	Harmonic Mixer (140 - 220 GHz)	G80814-1
900713	ATM	05-443-6	Horn Antenna (140 – 220 GHz)	50685
900791	Schaffner - Chase	CBL6112	Antenna (25 MHz 2 GHz)	2099
900723	Hewlett Packard	NA	AMP-1 GHz-26 GHz	NA
900444	Miteq	Amplifier	30 – 1000 MHz	PR1040

7. MODULATED BANDWIDTH - §15.255

7.1. MODULATED BANDWIDTH TEST PROCEDURE

The minimum 26 dB Bandwidth per FCC 15.255 was measured using a 50-ohm spectrum analyzer using the bandwidth measurement guideline from the FCC's Millimeter Wave Procedure. Measurements were made for each access unit using CW and GIG-E modulation. The manufacturer configured CW mode, while a GIG-E Communication analyzer model GTX-FC-N0100 with fiber optic interface, provided GIG-E modulations. The modulated bandwidth measurements may be used to calculate wide band Emission per the Millimeter Wave Guide procedure. However, emission bandwidth measurement results were not used in this report; the EUT's were configured in CW mode for the power density test presented in Section 8. The bandwidth plots were measured by taking the lower and upper band frequencies.

7.2. MODULATED BANDWIDTH TEST DATA

TABLE 7-1: MINIMUM 26 DB MODULATED BANDWIDTHS

EUT	MODULATION	26 dB BANDWIDTH (MHz)
Access Unit A	CW	1.400
Access Unit A	GIG-E	1716.0
Access Unit B	CW	1.300
Access Unit B	GIG-E	2207.0

The 26 dB bandwidth plots are below. The data in the table represents the worst-case result.

7.3. 2/PULSEWIDTH BANDWIDTH

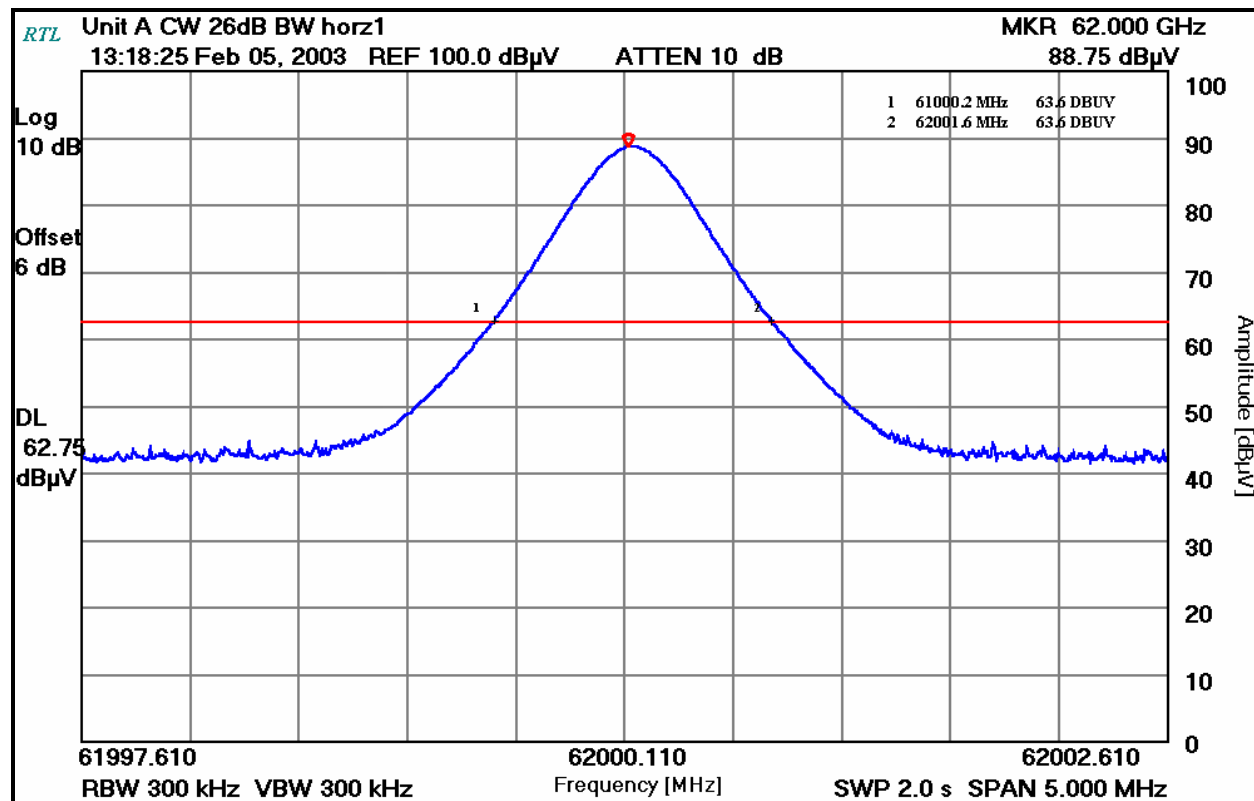
The main lobe (2/pulse width) is within the authorized band where the GIG-E pulse-width is 800 picoseconds.
The 2/pulse-width = 2.5 GHz

TABLE 7-2: TEST EQUIPMENT USED FOR (MODULATED BW) MEASUREMENTS

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719
900715	Agilent	11970V	Harmonic Mixer (50 - 75 GHz)	2521A00512
900056	ATM	19-443-6	Horn Antenna (40 - 60 GHz)	8041704-01
900717	Agilent	11970U	Harmonic Mixer (40 - 60 GHz)	2332A01110
900712	ATM	WR15	Horn Antenna	8051805-1

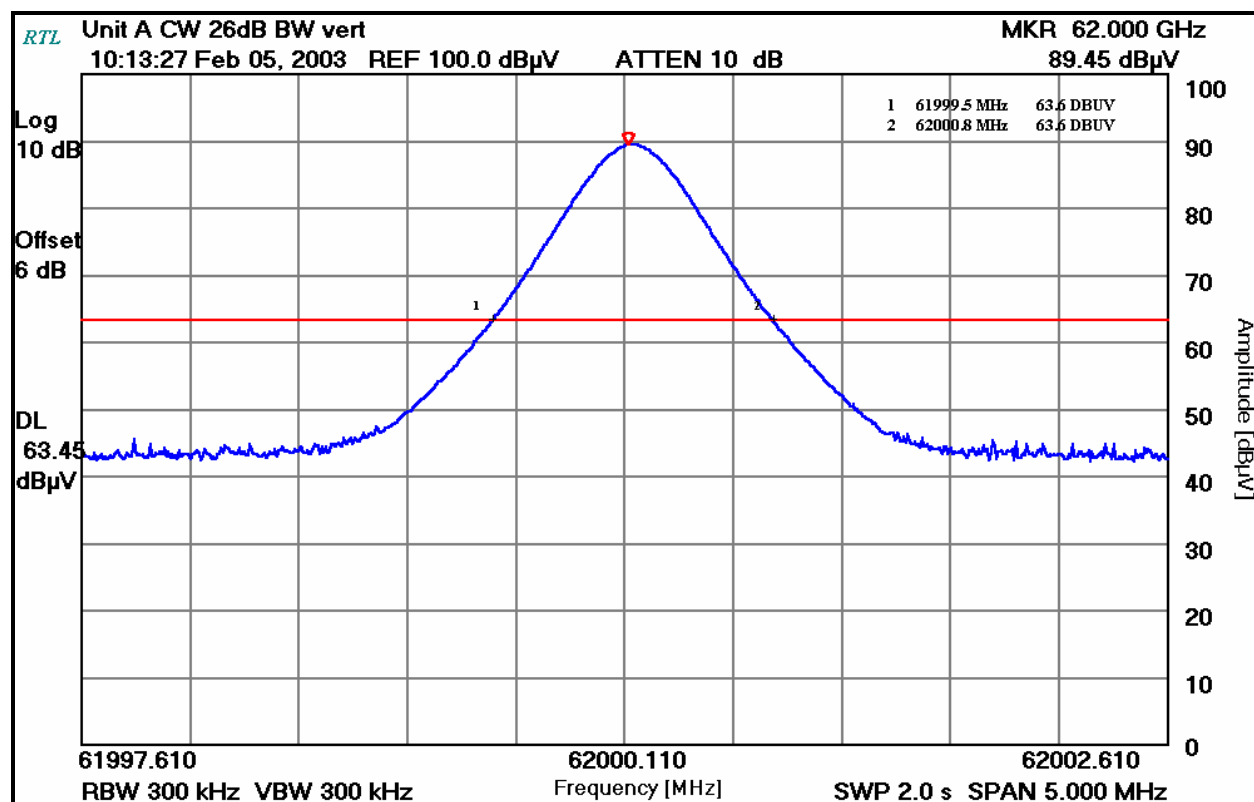
7.4. 26 dB BANDWIDTH PLOTS

Access unit: A
 Frequency: 62 GHz
 Resolution Bandwidth: 300 kHz
 Video Bandwidth: 300 kHz
 Sweep Time: 2 Sec
 Span: 5 MHz



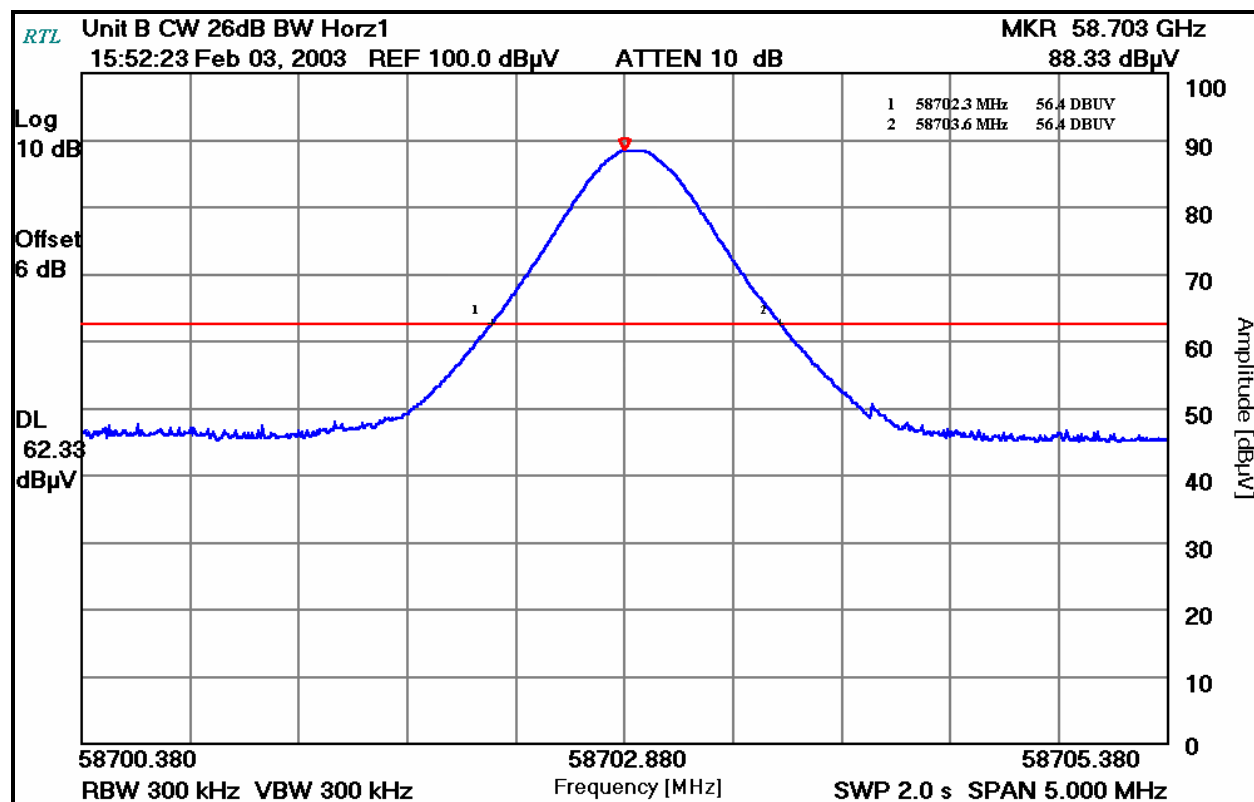
PLOT 7-1: HORIZONTAL CW BANDWIDTH ACCESS UNIT A

Access unit: A
 Frequency: 62 GHz
 Resolution Bandwidth: 300 kHz
 Video Bandwidth: 300 kHz
 Sweep Time: 2 Sec
 Span: 5 MHz



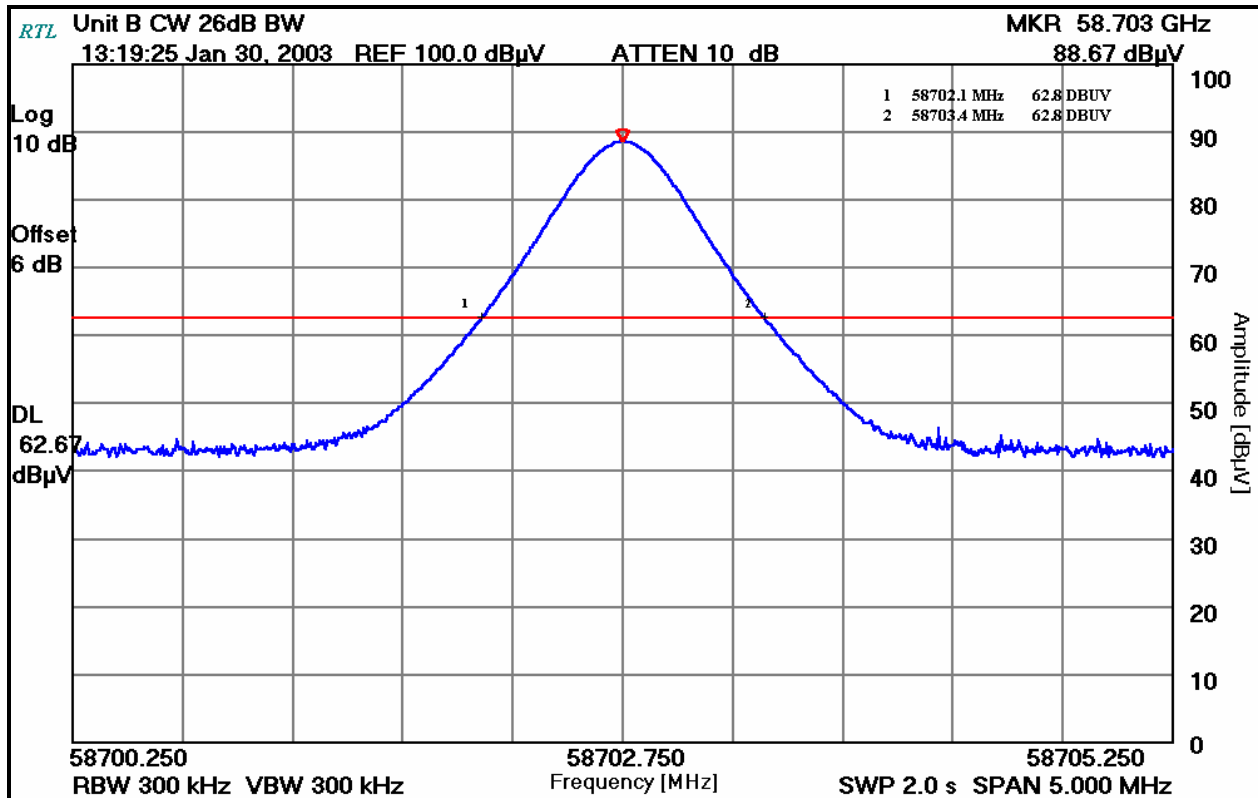
PLOT 7-2: VERTICAL CW BANDWIDTH ACCESS UNIT A

Access unit: B
 Frequency: 58.7 GHz
 Resolution Bandwidth: 300 kHz
 Video Bandwidth: 300 kHz
 Sweep Time: 2 Sec
 Span: 5 MHz



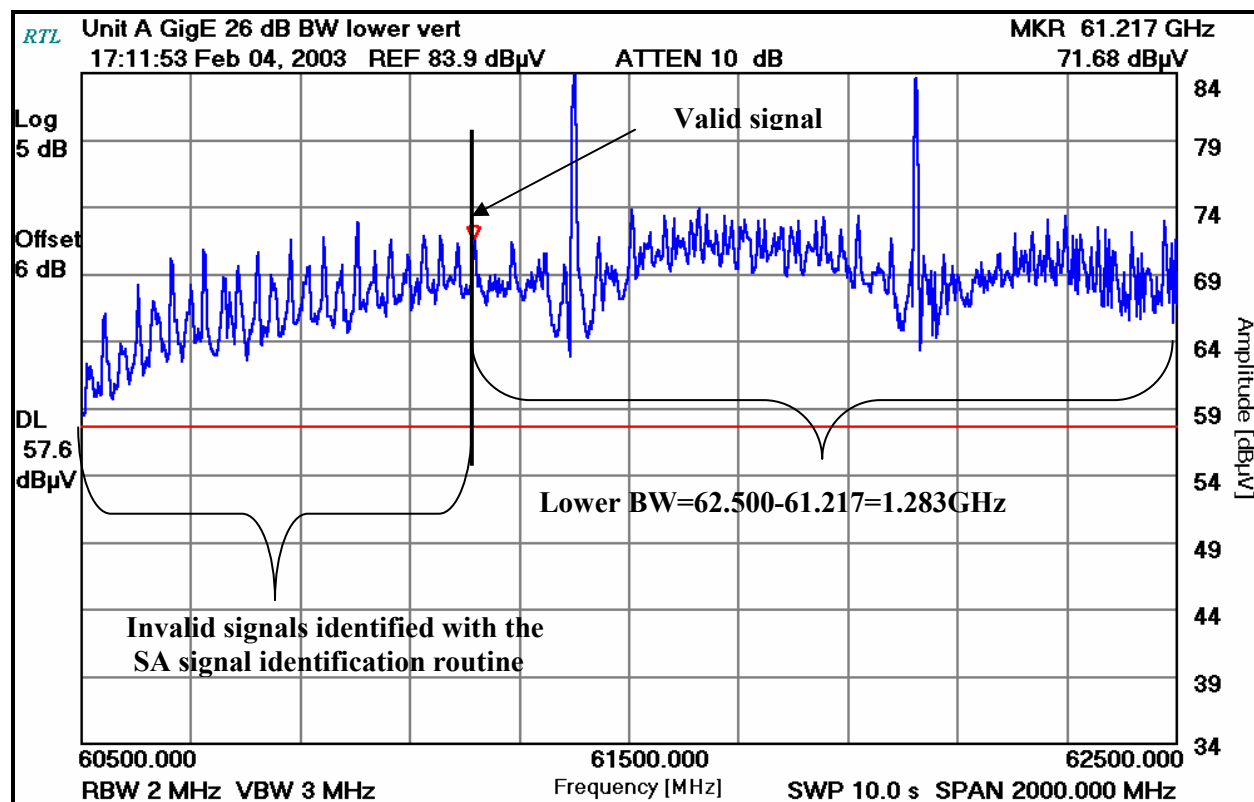
PLOT 7-3: HORIZONTAL CW BANDWIDTH ACCESS UNIT B

Access unit: B
 Frequency: 58.7GHz
 Resolution Bandwidth: 300 kHz
 Video Bandwidth: 300 kHz
 Sweep Time: 2 Sec
 Span: 5 MHz



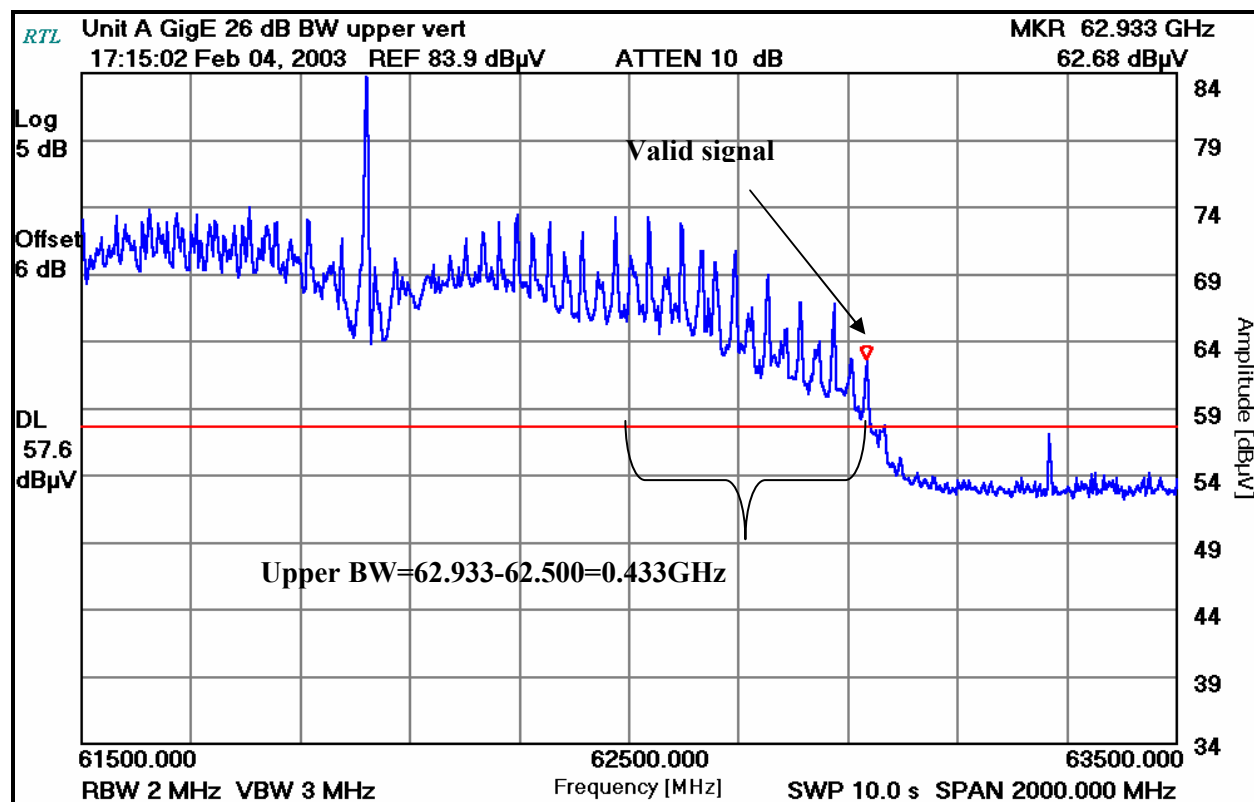
PLOT 7-4: VERTICAL CW BANDWIDTH ACCESS UNIT B

Access unit: A - Lower bandwidth frequency
Carrier Frequency: 62 GHz
Resolution Bandwidth: 2 MHz
Video Bandwidth: 3 MHz
Sweep Time: 10 Sec
Span: 2000 MHz



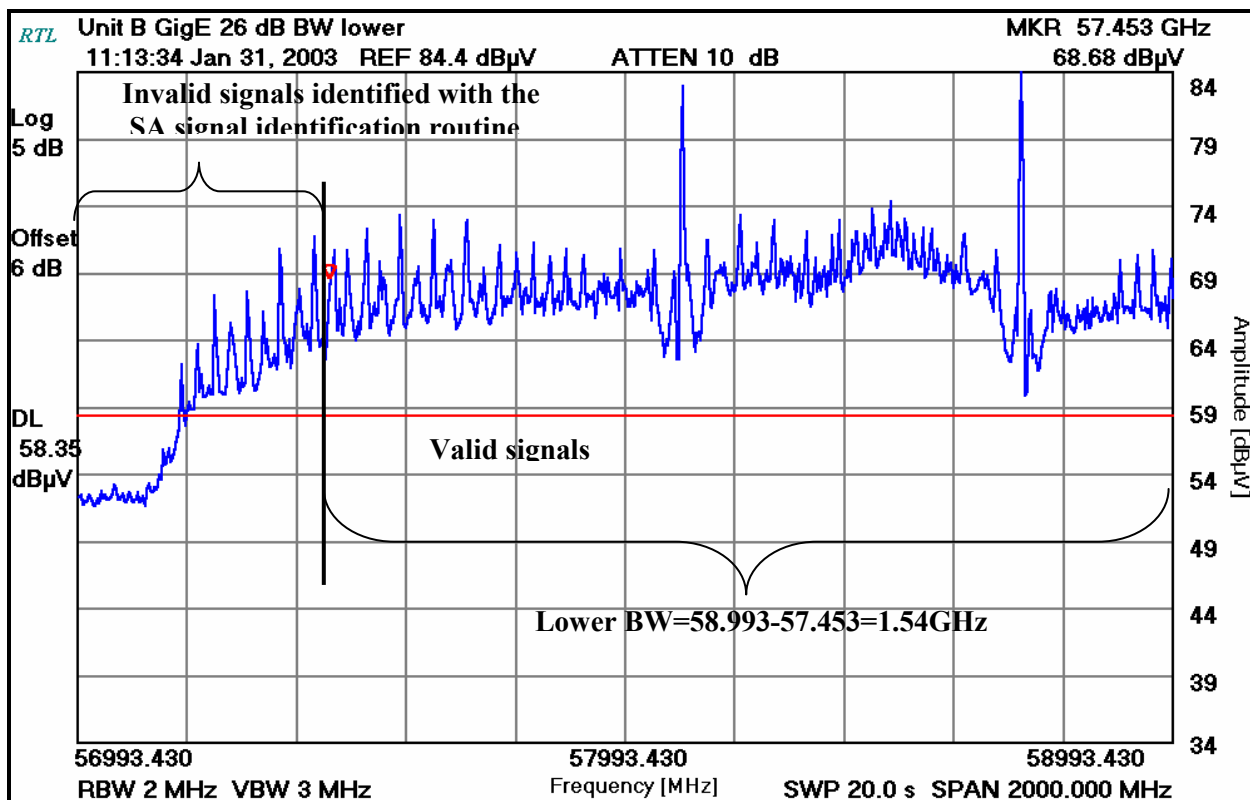
PLOT 7-5: GIG-E MODULATION BANDWIDTH ACCESS UNIT A LOWER FREQUENCY

Access unit: A – Upper bandwidth frequency
Carrier Frequency: 62 GHz
Resolution Bandwidth: 2 MHz
Video Bandwidth: 3 MHz
Sweep Time: 10 sec
Span: 2000 MHz



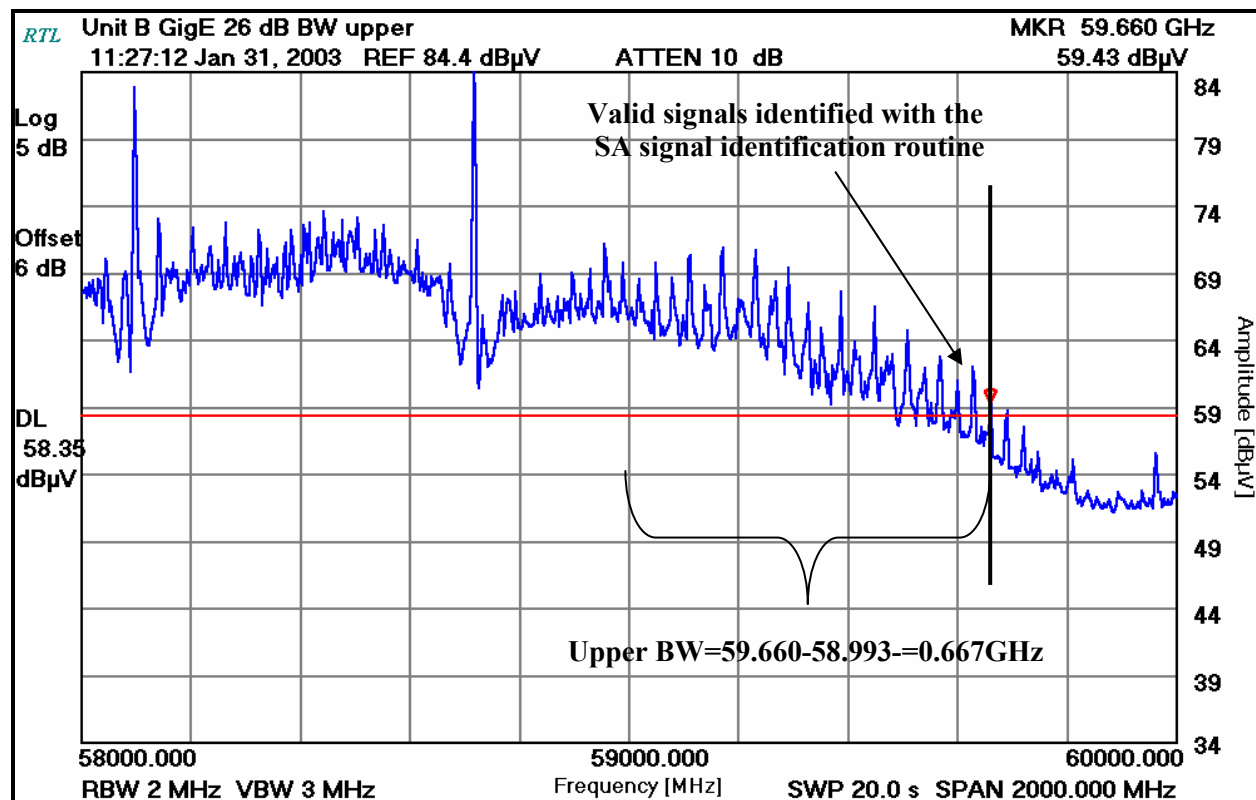
PLOT 7-6: GIG-E MODULATION BANDWIDTH ACCESS UNIT A UPPER FREQUENCY

Access unit: B – Lower bandwidth frequency
Frequency: 58.7 GHz
Resolution Bandwidth: 2 MHz
Video Bandwidth: 3 MHz
Sweep Time: 20 Sec
Span: 2000 MHz



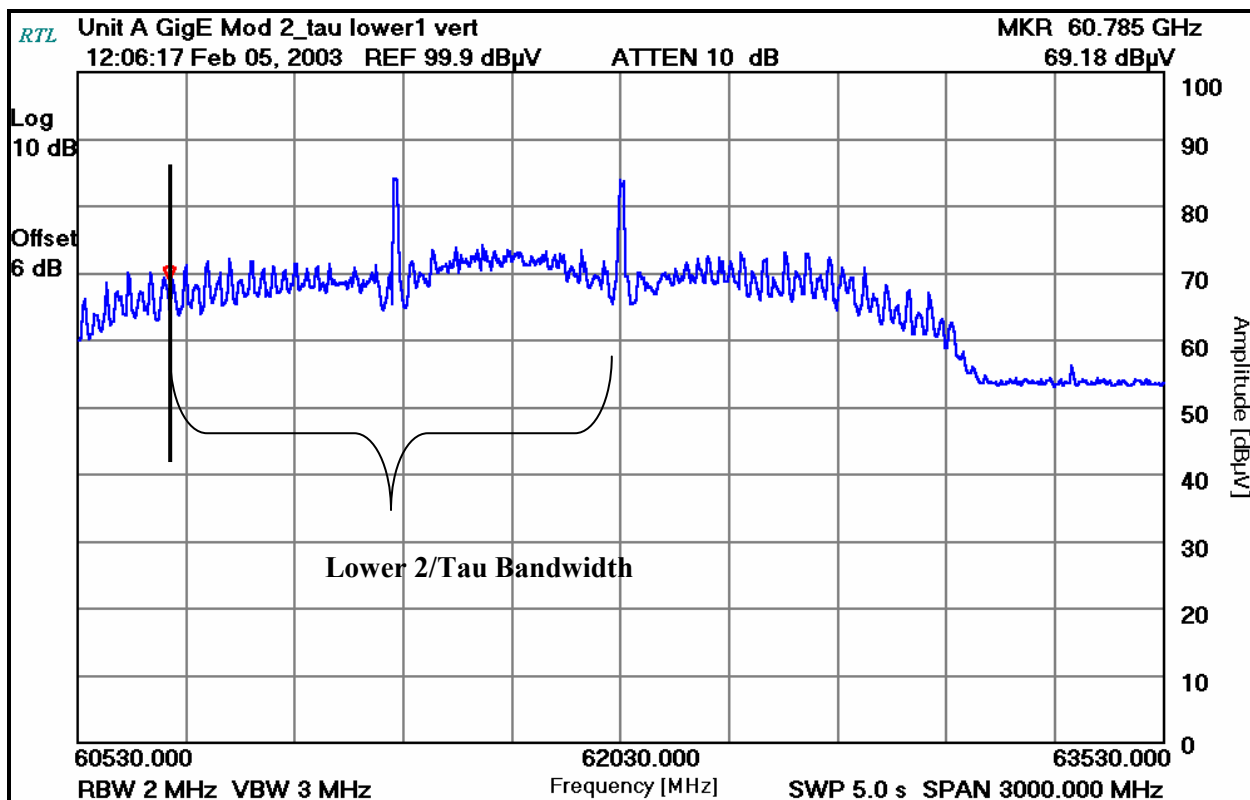
PLOT 7-7: GIG-E MODULATION BANDWIDTH ACCESS UNIT B LOWER FREQUENCY

Access unit: B – Upper bandwidth frequency
Frequency: 58.7 GHz
Resolution Bandwidth: 2 MHz
Video Bandwidth: 3 MHz
Sweep Time: 20 Sec
Span: 2000 MHz



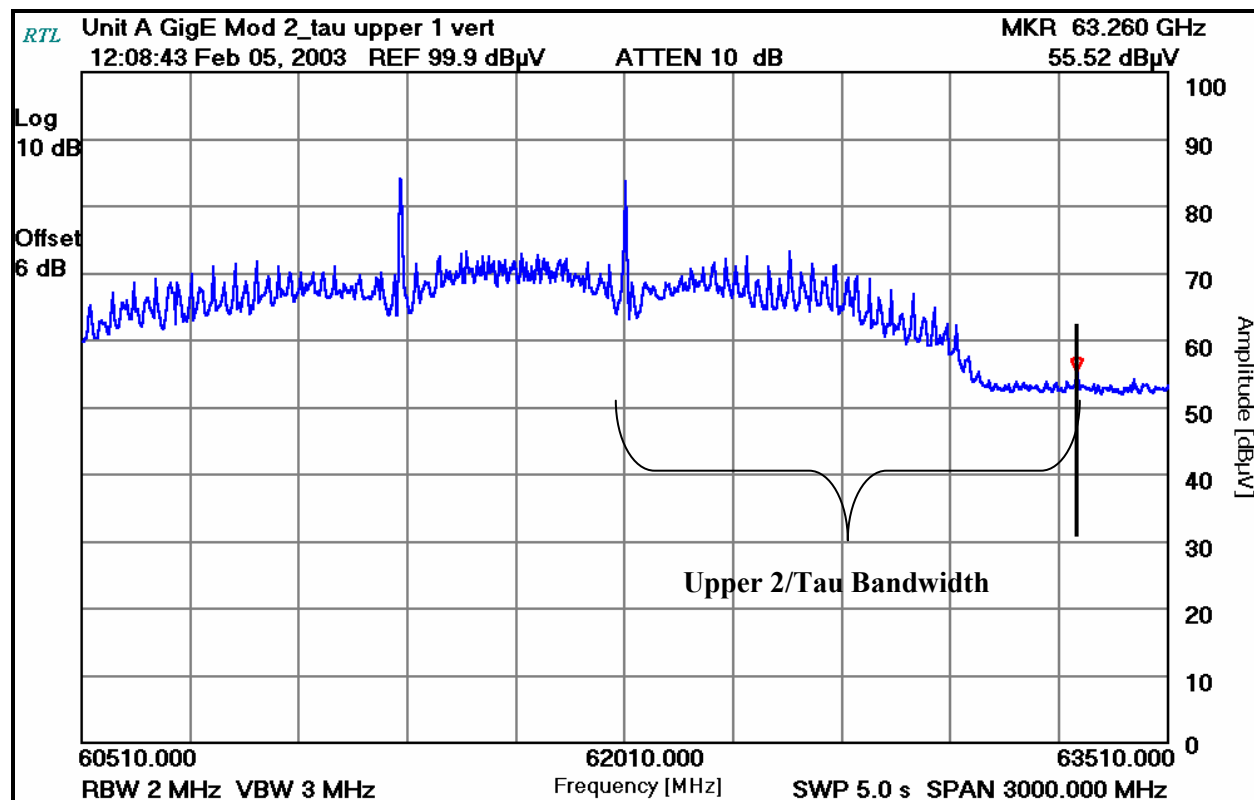
PLOT 7-8: GIG-E MODULATION BANDWIDTH ACCESS UNIT B UPPER FREQUENCY

Access unit: A
 Frequency: 62 GHz
 Resolution Bandwidth: 2 MHz
 Video Bandwidth: 3 MHz
 Sweep Time: 5 Sec
 Span: 3000 MHz



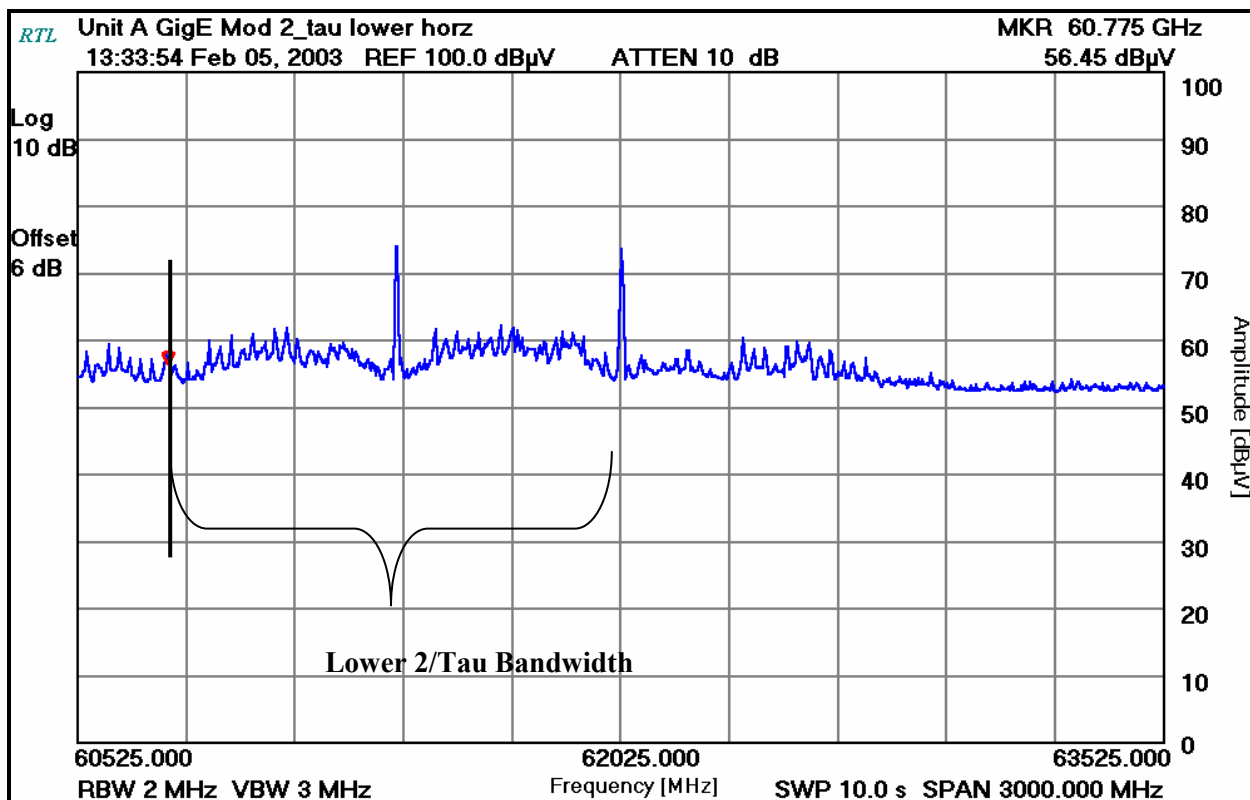
PLOT 7-9: 2/PULSEWIDTH MODULATION BANDWIDTH ACCESS UNIT A VERT LOWER

Access unit: A
 Frequency: 62 GHz
 Resolution Bandwidth: 2 MHz
 Video Bandwidth: 3 MHz
 Sweep Time: 5 Sec
 Span: 3000 MHz



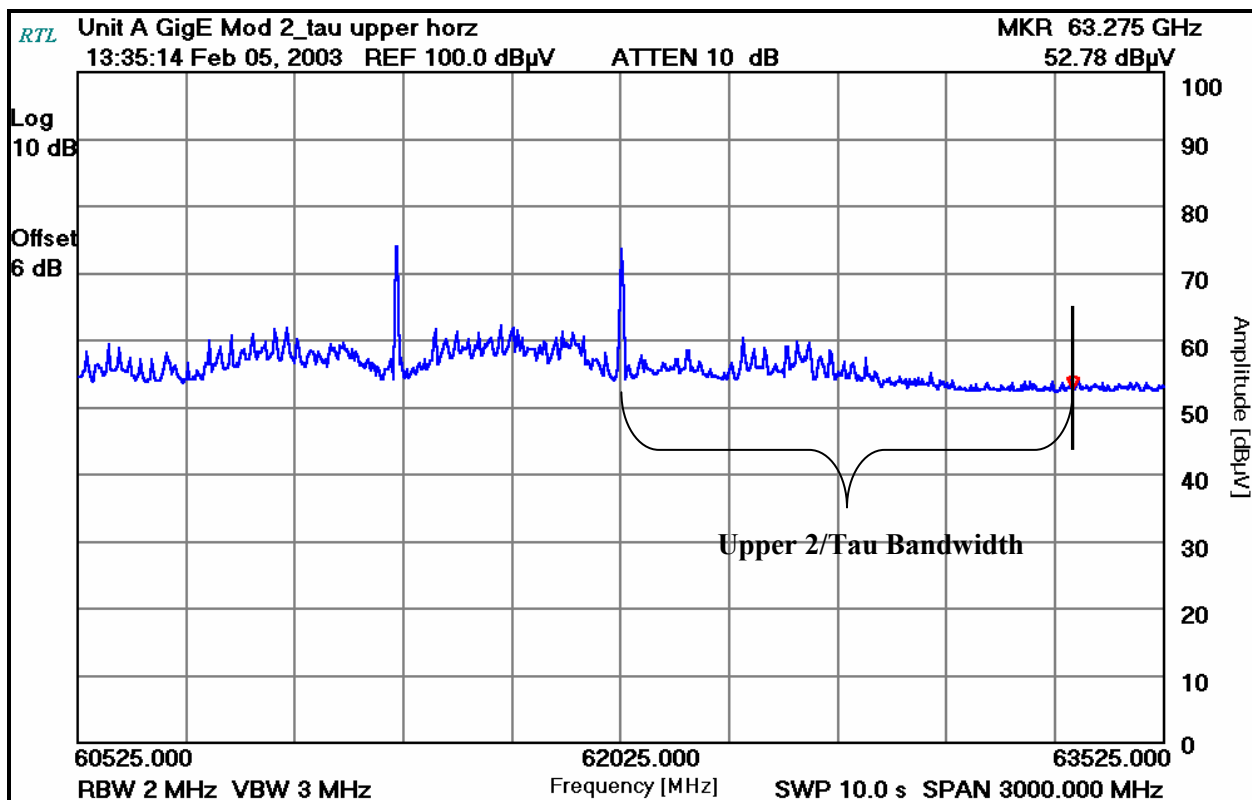
PLOT 7-10: 2/PULSEWIDTH MODULATION BANDWIDTH ACCESS UNIT A VERT UPPER

Access unit: A
 Frequency: 62 GHz
 Resolution Bandwidth: 2 MHz
 Video Bandwidth: 3 MHz
 Sweep Time: 10 Sec
 Span: 3000 MHz



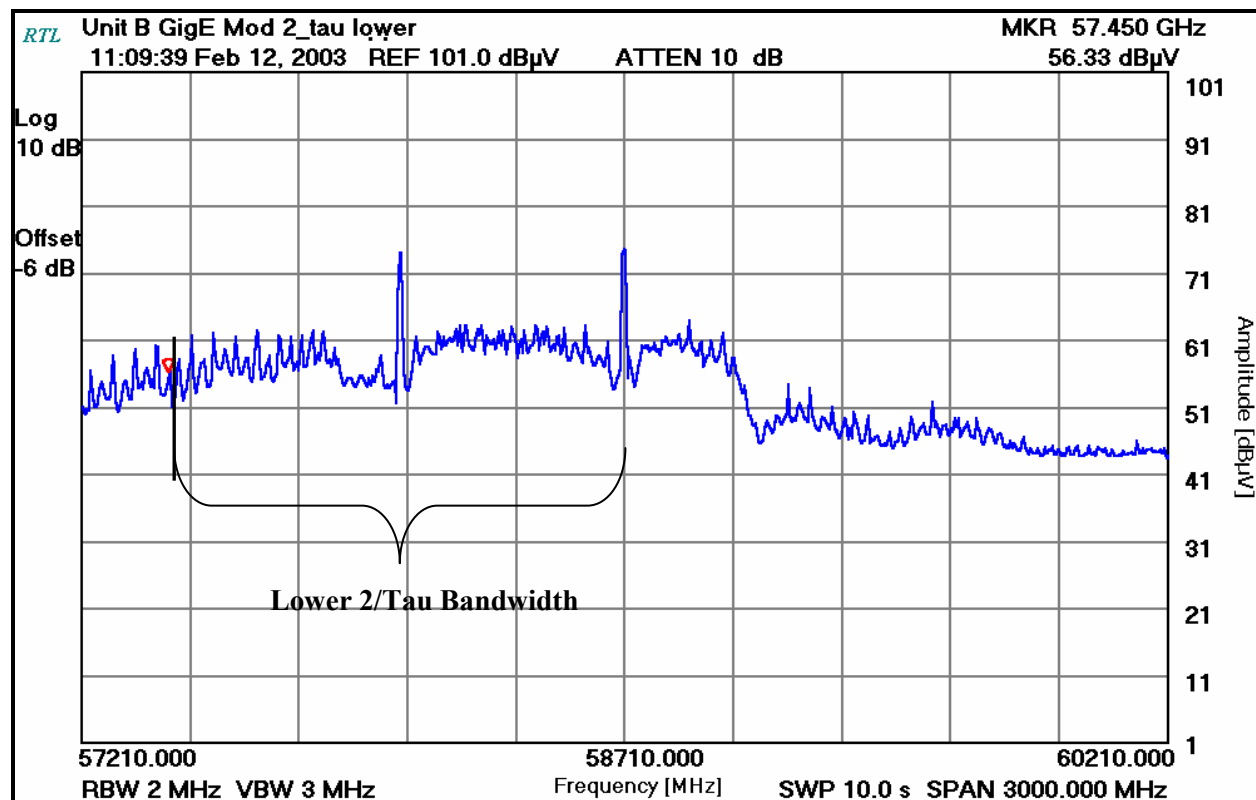
PLOT 7-11: 2/PULSEWIDTH MODULATION BANDWIDTH ACCESS UNIT A HORZ LOWER

Access unit: A
Frequency: 62 GHz
Resolution Bandwidth: 2 MHz
Video Bandwidth: 3 MHz
Sweep Time: 10 Sec
Span: 3000 MHz



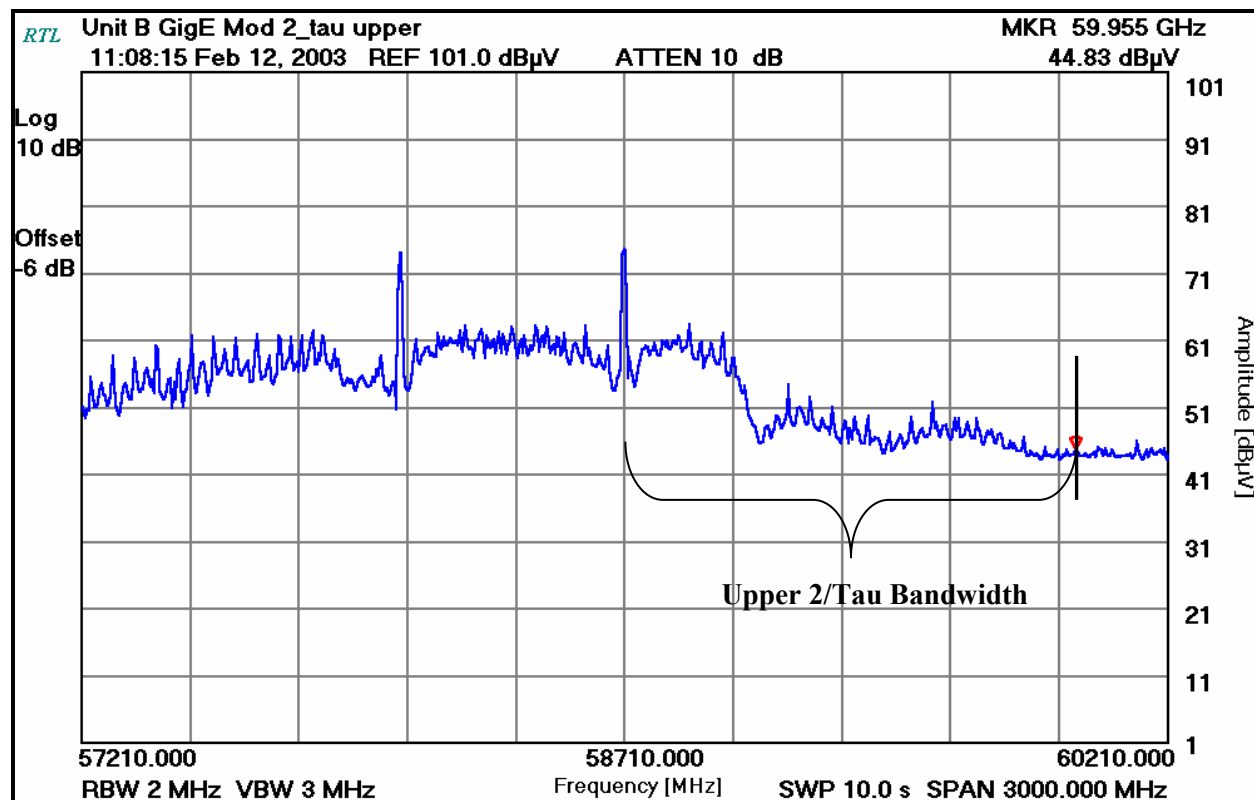
PLOT 7-12: 2/PULSEWIDTH MODULATION BANDWIDTH ACCESS UNIT A HORZ UPPER

Access unit: B
 Carrier Frequency: 58.7 GHz
 Resolution Bandwidth: 2 MHz
 Video Bandwidth: 3 MHz
 Sweep Time: 10 Sec
 Span: 3000 MHz



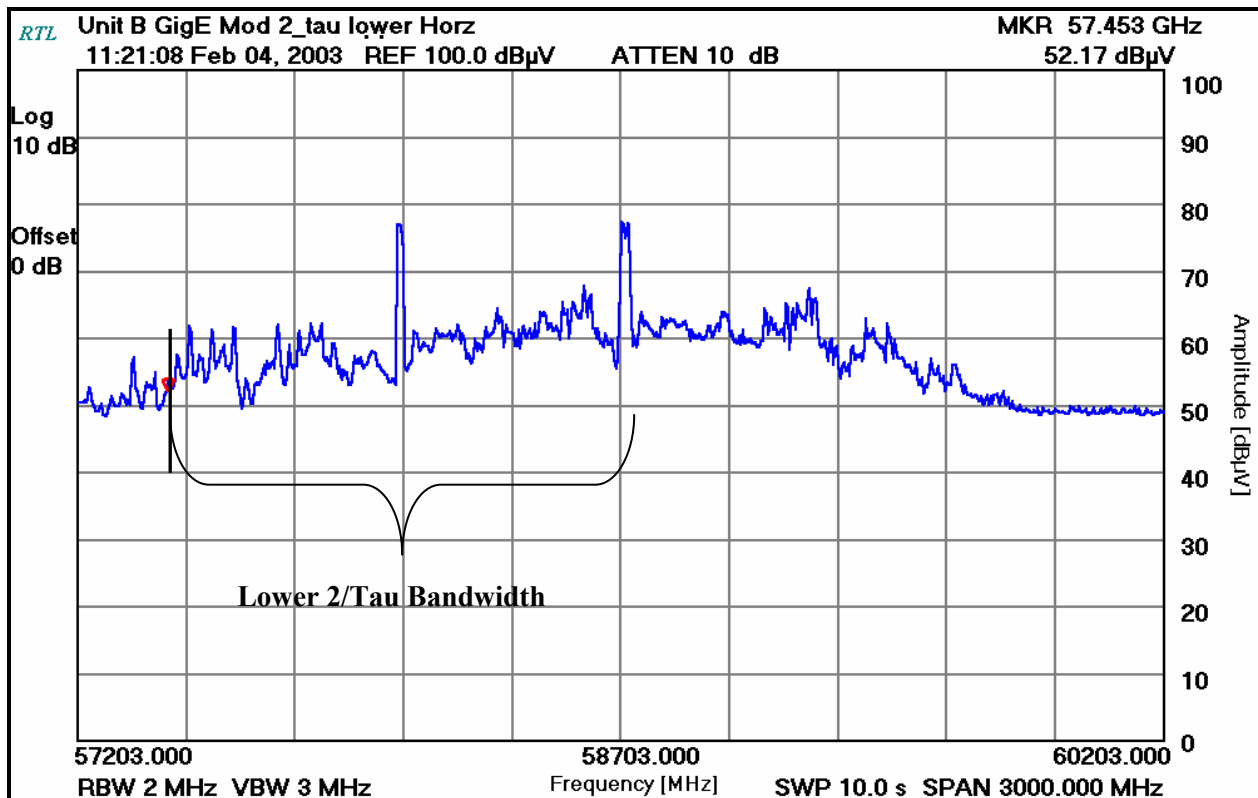
PLOT 7-13: 2/PULSEWIDTH MODULATION BANDWIDTH ACCESS UNIT B VERT LOWER

Access unit: B
 Carrier Frequency: 58.7 GHz
 Resolution Bandwidth: 2 MHz
 Video Bandwidth: 3 MHz
 Sweep Time: 10 Sec
 Span: 3000 MHz



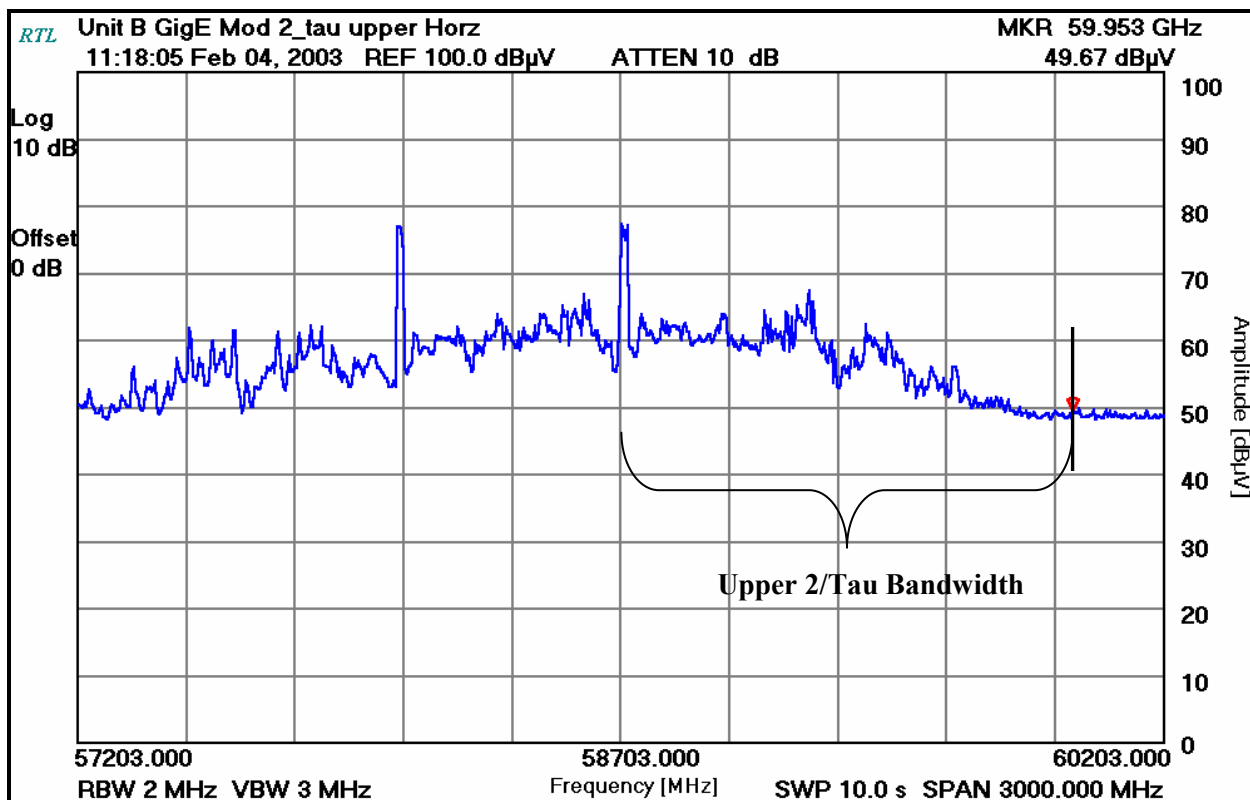
PLOT 7-14: 2/PULSEWIDTH MODULATION BANDWIDTH ACCESS UNIT B VERT UPPER

Access unit: B
 Carrier Frequency: 58.7 GHz
 Resolution Bandwidth: 2 MHz
 Video Bandwidth: 3 MHz
 Sweep Time: 10 Sec
 Span: 3000 MHz



PLOT 7-15: 2/PULSEWIDTH MODULATION BANDWIDTH ACCESS UNIT B HORZ LOWER

Access unit: B
 Carrier Frequency: 58.7 GHz
 Resolution Bandwidth: 2 MHz
 Video Bandwidth: 3 MHz
 Sweep Time: 10 Sec
 Span: 3000 MHz



PLOT 7-16: 2/PULSEWIDTH MODULATION BANDWIDTH ACCESS UNIT B HORZ UPPER

TEST PERSONNEL:

Dan Biggs
Test Engineer

Dan Biggs
Signature

01-30-03 - 02-12-03
Dates Of Test

8. PEAK POWER DENSITY AND AVERAGED POWER - §15.255 (B)(1)

8.1. PEAK POWER DENSITY AND AVERAGED POWER TEST PROCEDURE

In order to calculate the Average Peak Power and Peak Power Densities of the EUT, the field strengths at 3 meters were measured for both access units. Mixer conversion loss associated with each mixer was input into the spectrum analyzer conversion loss register so that the spectrum analyzer result contained the mixer conversion loss. The peak radiated field strength was measured in the CW mode. The result from this measurement was used to calculate the Peak Power Density for access units A and B. The measurements were performed using the FCC's 15.255 Millimeter Wave Test procedure. Care was taken, as described in the aforementioned procedure, to avoid mixer saturation and overloading. During testing, small adjustments were made in order to stay within the EUT's narrow beam width for azimuth and test antenna height variations. Maximum spectrum analyzer resolution bandwidth, video bandwidth, and appropriate sweep time that ensure a stable signal were used. The spectrum analyzer signal identification feature was enabled to ensure proper identification of all valid spurious signals as well as wanted signals. The following equations were used to calculate the corrected field strength, peak power density and peak power.

Peak Output Power:

$$P = (E \cdot d)^2 / 30G$$

Power measured from EUT = 89.5 dBuV

$$E[V/m] = 89.5 \text{ dBuV} + 42.9 \text{ dB/m (antenna factor)} + 1 \text{ dB (cable loss)} = 133.4 \text{ dBuV/m}$$

$$\text{dBuV/m to V/m} = 10^{\{[(\text{dBuV/m}) - 120] / 20\}}$$

$$133.4 \text{ dBuV/m} = 4.68 \text{ V/m}$$

$$P = (4.68 \text{ V/m} \cdot 3 \text{ m})^2 / (30 \cdot 79,432.8) \text{ (numeric gain of TX antenna)}$$

$$P = 0.0000827 \text{ W} = \mathbf{0.0827 \text{ mW}}$$

$$P_{\text{EIRP}} = 6.57 \text{ W} = P_t$$

Peak Power Density:

$$P_d = P_t / (4 \cdot \pi \cdot d^2) = E^2 / 377$$

$$P_d = 6.57 \text{ W} / (4 \cdot \pi \cdot 3 \text{ m}^2) = 0.058 \text{ W/m}^2$$

$$= \mathbf{5.8 \text{ uW/cm}^2}$$

8.2. POWER DENSITY TEST DATA POWER OUTPUT TEST DATA

8.2.1 PEAK POWER DENSITY MEASURED DATA

TABLE 8-1 ACCESS UNIT A PEAK CW MODE

V/H	Freq. (MHz)	S/A Reading (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Mixer Factor (dB)	Corrected Field Strength (dBμV/m)	Peak Power Density (μW/cm ²)	Peak Power Density Limit (μW/cm ²)	Peak TX Output Power (mW)	Peak TX Power Limit (mW)	Result
V	62000	89.5	42.925	1.0	0.0	133.4	5.84	18	0.083	500	Pass
H	62000	88.8	42.925	1.0	0.0	132.7	4.97	18	0.070	500	Pass

TABLE 8-2 ACCESS UNIT B PEAK CW MODE

V/H	Freq. (MHz)	S/A Reading (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Mixer Factor (dB)	Corrected Field Strength (dBμV/m)	Peak Power Density (μW/cm ²)	Peak Power Density Limit (μW/cm ²)	Peak TX Output Power (mW)	Peak TX Power Limit (mW)	Result
V	58703	88.7	42.925	1.0	0.0	132.6	4.85	18	0.069	500	Pass
H	58703	88.3	42.925	1.0	0.0	132.2	4.43	18	0.063	500	Pass

Note: Mixer conversion loss is within spectrum analyzer reading

TEST PERSONNEL:

Dan Biggs
Test Engineer


Signature

01-30-03
Date Of Tests

8.3. AVERAGE POWER DENSITY CALCULATED DATA

The average power density transmitted from the EUT's was calculated based on the worst-case power output data measured in section 8.2.1 above. In doing the calculation for duty cycle it was considered that the EUT operates with GiG-E compliant data resulting in a 50% Duty cycle data stream to the EUT. The EUT modulates the incoming GiG-E data for the transmission over the air. Modulation used by the EUT is such that the 50% GiG-E duty cycle is maintained and results in average EUT power output being 3dB below the peak power measured in section 8.2.1.

TABLE 8-3 ACCESS UNIT A AVERAGE CW MODE

V/H	Freq. (MHz)	S/A Reading (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Mixer Factor (dB)	Corrected Field Strength (dBμV/m)	Average Power Density (μW/cm ²)	Average Power Density Limit (μW/cm ²)	Average TX Output Power (mW)	Average TX Power Limit (mW)	Result
V	62000	86.5	42.925	1.0	0.0	130.4	2.93	9	0.042	500	Pass
H	62000	85.8	42.925	1.0	0.0	129.7	2.49	9	0.035	500	Pass

TABLE 8-4 ACCESS UNIT B AVERAGE CW MODE

V/H	Freq. (MHz)	S/A Reading (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Mixer Factor (dB)	Corrected Field Strength (dBμV/m)	Average Power Density (μW/cm ²)	Average Power Density Limit (μW/cm ²)	Average TX Output Power (mW)	Average TX Power Limit (mW)	Result
V	58703	85.7	42.925	1.0	0.0	129.6	2.43	9	0.035	500	Pass
H	58703	85.3	42.925	1.0	0.0	129.2	2.22	9	0.031	500	Pass

Note: Mixer conversion loss is within spectrum analyzer reading

TEST PERSONNEL:

Dan Biggs
Test Engineer



Signature

01-30-03
Date Of Tests

8.4. TOTAL PEAK TRANSMITTER OUTPUT POWER FCC 15.255 (e)

The Transmitter Peak Output Power in Tables 8-1 through 8-2 was calculated using the formula of Transmitter Peak Output Power in section 8-1. The Peak Output Power complies with the FCC's total peak output power limit of 500 mW.

TABLE 8-5: TEST EQUIPMENT USED FOR POWER MEASUREMENTS

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719
900715	Agilent	11970V	Harmonic Mixer (50 - 75 GHz)	2521A00512
900056	ATM	19-443-6	Horn Antenna (40 – 60 GHz)	8041704-01
900717	Agilent	11970U	Harmonic Mixer (40 - 60 GHz)	2332A01110
900712	ATM	WR15	Horn Antenna	8051805-1

9. FREQUENCY STABILITY - §15.255(F)

The EUT's were tested using the general frequency stability set up found in the Millimeter Wave Test procedure. The horn antenna and mixer were placed outside the test chamber at 100 cm from the test chamber viewing glass window. The EUT's were tested from +50 degrees Celsius to -20 degrees Celsius for temperature stability and from 36 VDC to 60 VDC for voltage stability. Both Access units A and B were tested. The reference frequency in the tables below is based on the EUT's nominal voltage of 48 VDC and at nominal temperature of 20 °C.

TABLE 9-1: TEMPERATURE STABILITY ACCESS UNIT A CW MODULATION

Temperature °C	Reference Frequency (MHz)	Measured Frequency (MHz)	Deviation (MHz)	Pass/Fail
+50	62001.558	62004.085	2.527	Pass
+40	62001.558	62003.965	2.407	Pass
+30	62001.558	62003.373	1.815	Pass
+20	62001.558	62001.558	0.000	Pass
+10	62001.558	62000.083	1.475	Pass
0	62001.558	61997.727	3.831	Pass
-10	62001.558	61994.837	6.721	Pass
-20	62001.558	61992.588	8.970	Pass

Maximum allowable deviation per manufacturer specification: 20 MHz

TABLE 9-2 VOLTAGE STABILITY ACCESS UNIT A CW MODULATION

Voltage (VDC)	Reference Frequency (GHz)	Measured Frequency (GHz)	Level (dBuV)	Pass/Fail
36	62.000	62.000	66.30	Pass
40	62.000	62.000	66.30	Pass
44	62.000	62.000	66.30	Pass
48 (nominal)	62.000	62.000	66.47	Pass
52	62.000	62.000	66.47	Pass
56	62.000	62.000	66.47	Pass
60	62.000	62.000	66.47	Pass

Maximum allowable deviation per manufacturer specification: 20 MHz

TEST PERSONNEL:

Dan Biggs
Test Engineer


Signature

02-10-03
Date Of Test

TABLE 9-3: TEMPERATURE STABILITY ACCESS UNIT B CW MODULATION

Temperature °C	Reference Frequency (MHz)	Measured Frequency (MHz)	Deviation (MHz)	Pass/Fail
+50	58.702404	58704.808	2.404	Pass
+40	58.702404	58704.785	2.381	Pass
+30	58.702404	58703.728	1.324	Pass
+20	58.702404	58702.404	0.000	Pass
+10	58.702404	58701.041	1.363	Pass
0	58.702404	58698.689	3.715	Pass
-10	58.702404	5869.7950	4.454	Pass
-20	58.702404	58704.808	6.351	Pass

Maximum allowable deviation per manufacturer specification: 20 MHz

TABLE 9-4: VOLTAGE STABILITY ACCESS UNIT B CW MODULATION

Voltage (VDC)	Reference Frequency (GHz)	Measured Frequency (GHz)	Level (dBuV)	Pass/Fail
36	58.702	58.702	62.50	Pass
40	58.702	58.702	62.50	Pass
44	58.702	58.702	62.50	Pass
48 (nominal)	58.702	58.702	62.50	Pass
52	58.702	58.702	62.57	Pass
56	58.702	58.702	62.57	Pass
60	58.702	58.702	62.57	Pass

Maximum allowable deviation per manufacturer specification: 20 MHz

TEST PERSONNEL:

Dan Biggs
Test Engineer


Signature

02-11-03
Date Of Test

TABLE 9-5: TEST EQUIPMENT USED FOR FREQUENCY STABILITY MEASUREMENT

RTL Asset #	Manufacturer	Model	Part Type	Serial Number
900931	Hewlett Packard	8564E	Spectrum Analyzer (30 Hz – 40 GHz)	3138A07771
900712	ATM	WR15	Horn Antenna (50 – 75 GHz)	8051805-1
900723	Miteq	NA	AMP 100 MHz – 26 GHz	NA
900715	Hewlett Packard	11970V	Mixer 50 – 75 GHz	2521A00512
900946	Tenney Engineering	TH65	Temperature Chamber	11380

10. CONCLUSION

The data in this FCC certification application test report indicates that Telaxis Communications Corporation's FiberLeap Access Units, Models FL60-1250-AL1 (62 GHz) and FL60-1250-BL1 (58.7 GHz), FCC ID: P57-FL60-1250, comply with the Federal Communications Commission's rules and regulations on all the requirements listed above.