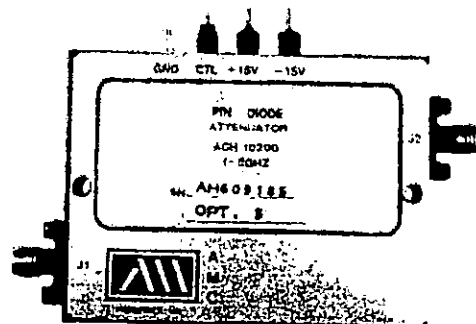
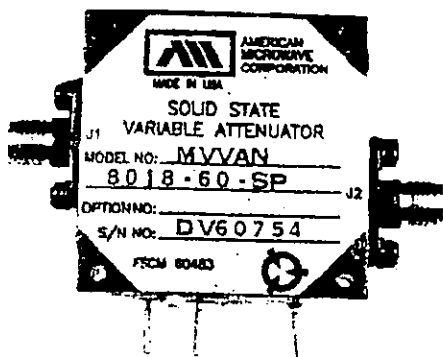
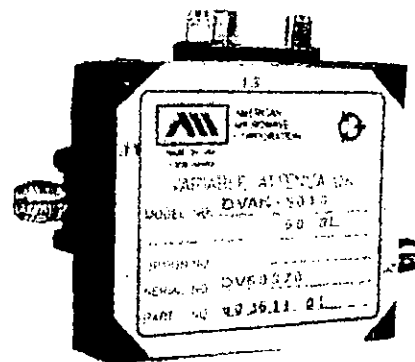
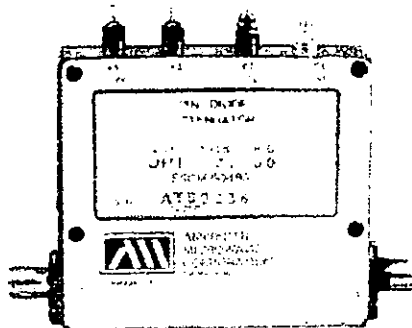
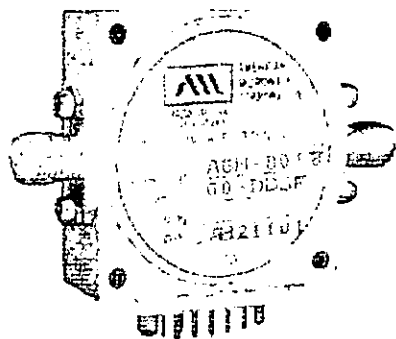


**AMERICAN MICROWAVE
CORPORATION**

SOLID STATE ELECTRONIC VARIABLE ATTENUATORS



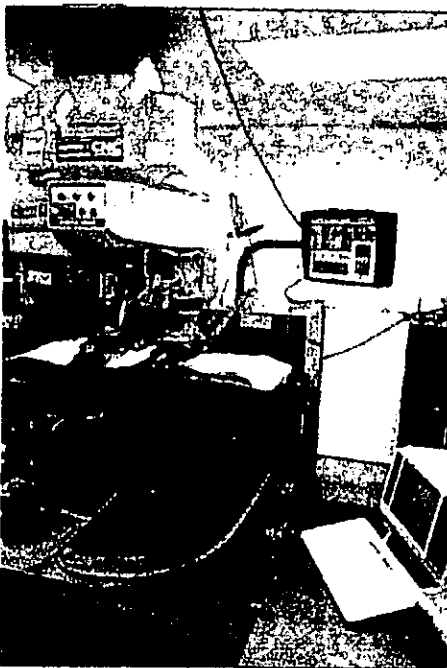
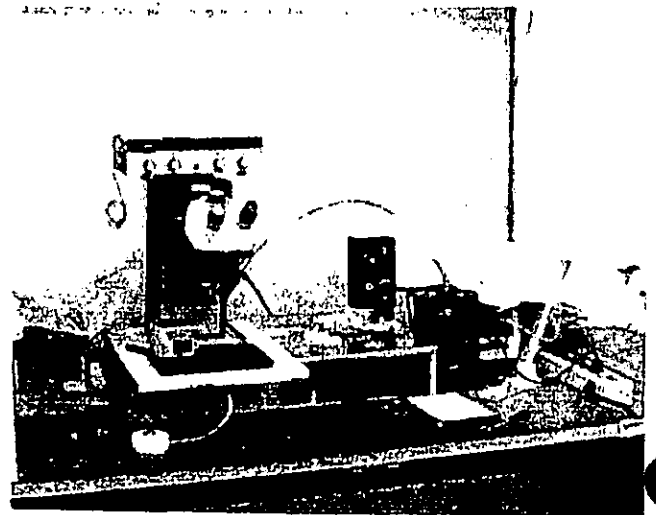
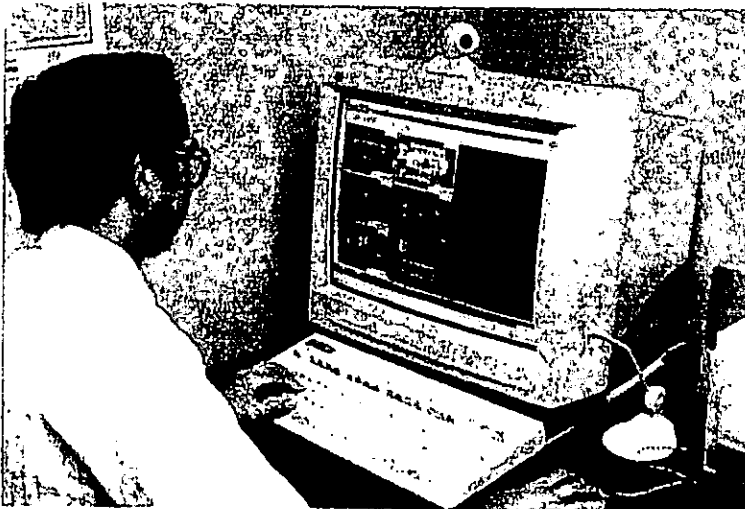
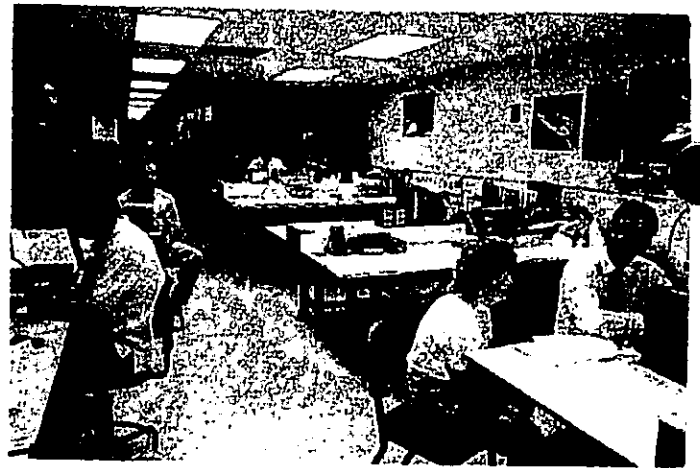
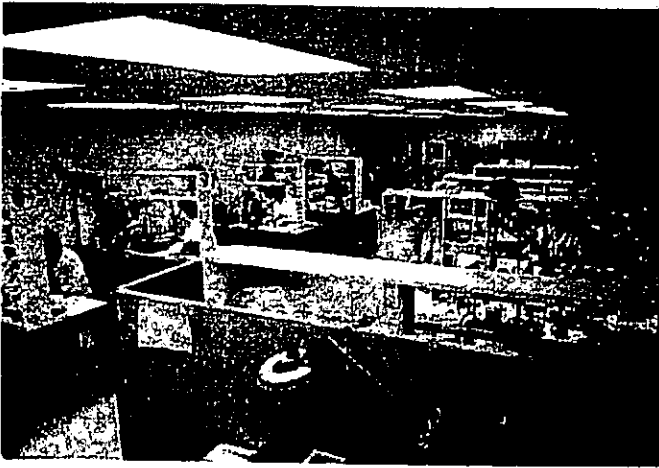
NOVEMBER 11, 1997

WEB PAGE: [HTTP://WWW.AMWAVE.COM](http://WWW.AMWAVE.COM) E-MAIL ADDRESS: AMCPMI@AOL.COM

7311 G GROVE ROAD, FREDERICK, MARYLAND 21704 • Tel. (301) 662-4700 • Fax (301) 662-4938

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6.0	4 GHz TO 18 GHz (SIZE 1.34" x 1.34" x 0.5") <u>HIGH SPEED ($\leq 1\mu\text{Sec}$) MINIATURE, M-DVAN, M-VVAN, M-CVAN-OCTAVE BAND VARIABLE ATTENUATOR SERIES. SIZE 1.34" x 1.34" x 0.5"</u> • DIGITAL: M-DVAN • ANALOG/VOLTAGE: M-VVAN • CURRENT: M-CVAN	6-0 TO 6-18
7.0	2 GHz TO 18 GHz (SIZE 2.25" x 2.0" x 1.0") <u>A-DVAN, A-VVAN, A-CVAN-OCTAVE BAND, VARIABLE ATTENUATOR SERIES. SIZE 2.25" x 2.0" x 1.0"</u> • DIGITAL: A-DVAN • ANALOG/VOLTAGE: A-VVAN • CURRENT: A-CVAN	7-0 TO 7-11
8.0	0.5 GHz TO 18 GHz <u>AGH SERIES, OCTAVE BAND, VARIABLE ATTENUATORS</u> • DIGITAL: AGH-DD • ANALOG/VOLTAGE: AGH-D • CURRENT: AGH	8-0 TO 8-67
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**AMERICAN MICROWAVE
CORPORATION**

7311-G GROVE RD., FREDERICK MD. 21704

TEL: 301-662-4700 FAX: 301-662-4938

WEB PAGE: [HTTP://WWW.AMWAVE.COM](http://www.amwave.com) E-MAIL ADDRESS: AMCPMI@AOL.COM



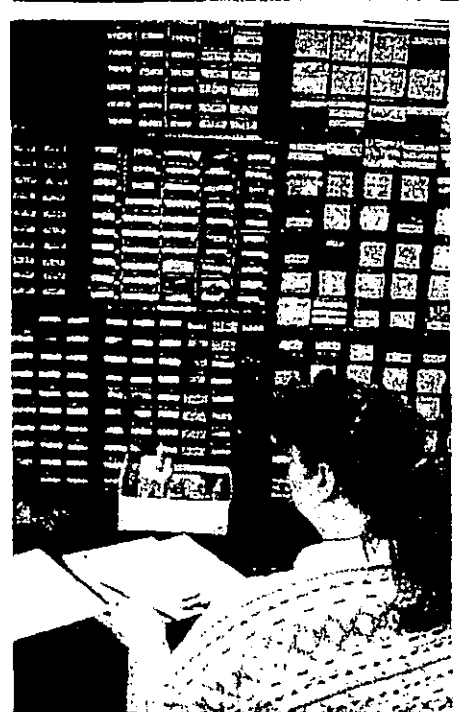
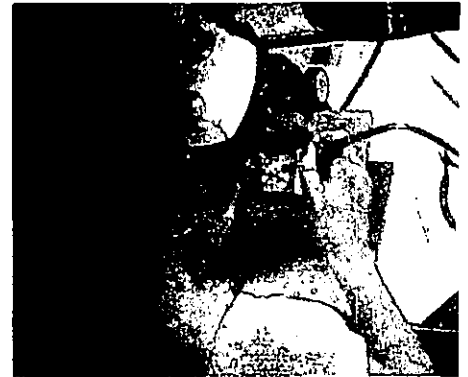
AMERICAN MICROWAVE
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7311-G GROVE RD., FREDERICK MD. 21704
TEL: 301-662-4700 FAX: 301-662-4938
WEB PAGE: [HTTP://WWW.AMWAVE.COM](http://www.amwave.com) E-MAIL ADDRESS: AMCPMI@AOL.COM

Introduction to American Microwave Corporation

Since its founding in 1978, American Microwave Corporation has become a leader in the design and manufacture of solid state control components. At American Microwave, we are dedicated to providing state-of-the-art technology and uniformly high quality microwave components and subsystems that meet or exceed your specifications and are delivered on schedule at fair prices. AMC's vertically integrated manufacturing plant makes it possible to design, machine and manufacture microwave hardware which means total technology, quality and schedule control on all prototype or production orders.

American Microwave's product line has grown steadily since the company's inception. From the line of ferrite products and SW-2000 switches introduced in 1978, to the introduction of microwave switches in 1981, linearized reflectionless attenuators in 1986 to present day work on microwave integrated circuits, the company has produced hundreds of custom and catalog product types. AMC is dedicated to solving customer problems and meeting promised delivery dates with the lowest return rate in the industry.

This catalog contains a sampling of the most popular products in general use today. If you have a requirement that is not listed in the catalog, call us. We may have already made it or something close to it for someone else.



Raymond L. Sicotte

RAYMOND L. SICOTTE
Chairman

Ash K. Gorwara

ASH K. GORWARA
President and CEO



AMERICAN
MICROWAVE
CORPORATION

SECTION 2.0

General Information

ORDERING INFORMATION

Please order by model or part number and product name with any options clearly specified. Please specify any modifications or special testing requirements on the order.

Telephone orders are acceptable and processed immediately. Shipments can only be made upon receipt of a confirming written order either by mail or facsimile.

Your order may be placed directly to the factory or through your local representative.

AMERICAN MICROWAVE CORPORATION
7311 G Grove Road
Frederick, Maryland 21704
Phone: 301-662-4700 Fax: 301-662-4938

All prices are FOB factory, Frederick, Maryland 21704

DOMESTIC TERMS

Net 30 days if credit has been established. Otherwise, unless payment is received before shipment, shipment will be made C.O.D.

INTERNATIONAL TERMS

Add 30% for international pricing. Irrevocable sight letter credit engaged and accepted by Maryland National Bank, payable to the account of American Microwave Corporation, Frederick, Maryland.

SPECIFICATION AND PRICE CHANGES

The right to discontinue any item or change specifications and/or prices on any item without notice is reserved.

WARRANTY/SERVICE

American Microwave Corporation warrants all parts of equipment of its manufacture to be free from defects in material and workmanship for one year after the delivery of the equipment to the original purchaser.

Liability under the warranty is limited to repair or replacement of the equipment or parts at the discretion of American Microwave Corporation without charge for any part found to be defective under normal use and service within the warranty time period.

All equipment returned under warranty must have a Return Material Authorization number obtainable from the factory. Original parts or equipment must be returned to American Microwave Corporation, transportation charges prepaid FOB factory. If warranty repair is applicable, the unit will be returned freight prepaid, FOB destination. If warranty is not applicable, the customer will be advised of the repair charges and his authorization to proceed awaited before any costs are incurred. Non-warranty repairs will be returned FOB factory, Frederick, Maryland 21704.

REVISED
OCTOBER 9, 1997



**AMERICAN
MICROWAVE
CORPORATION**

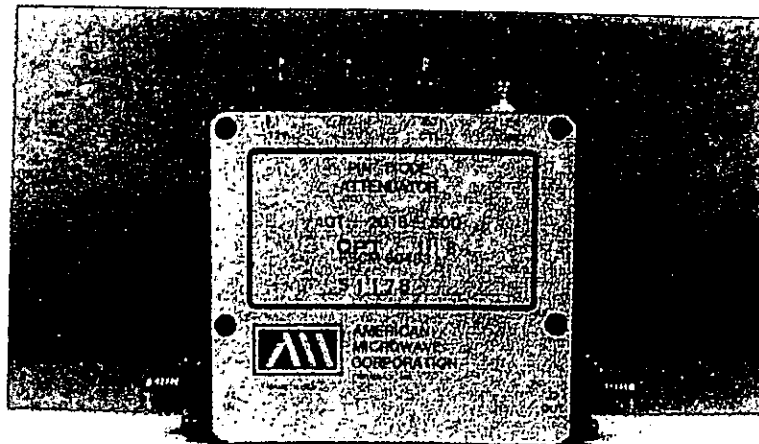
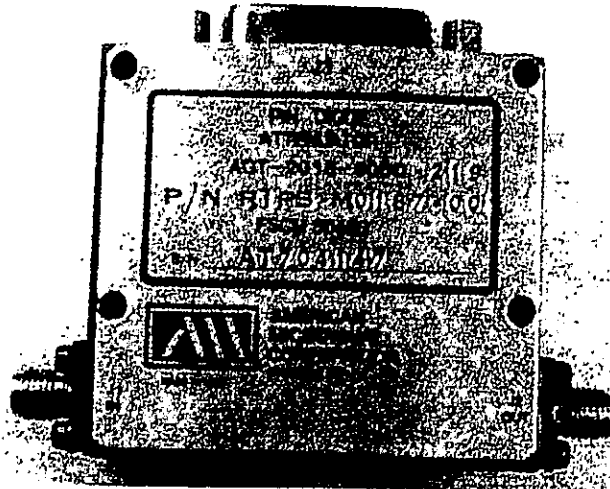
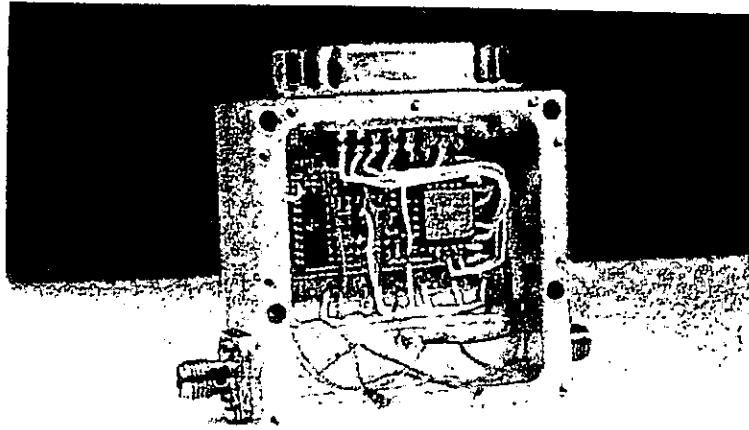
3.0	100 MHz TO 18 GHz	<u>HIGH SPEED ($\leq 1\mu\text{Sec}$) AGTN SERIES, MULTI OCTAVE BAND, DIGITAL OR ANALOG VOLTAGE CONTROLLED ATTENUATORS</u>	3-0
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HIGH SPEED DIGITAL CONTROLLED ATTENUATORS

3.1	2 GHz TO 18 GHz (0.2 TO 18 GHz OPTIONAL)	60dB, <u>HIGH SPEED ($\leq 1\mu\text{Sec}$)</u> , SLIM LINE, 8 BIT DIGITAL ● AGTN-2018-60DD-100	3-2 TO 3-3
3.2	2 GHz TO 18 GHz (0.2 TO 18 GHz OPTIONAL)	60dB, <u>HIGH SPEED ($\leq 1\mu\text{Sec}$)</u> , 8 BIT DIGITAL ● AGTN-2018-60DD	3-4 TO 3-5
3.3	2 GHz TO 18 GHz (0.5 TO 18 GHz OPTIONAL)	80dB, <u>HIGH SPEED ($\leq 1\mu\text{Sec}$)</u> , SLIM LINE, 9 BIT DIGITAL ● AGTN-2018-80DD-100	3-6 TO 3-7
3.4	2 GHz TO 18 GHz (0.5 TO 18 GHz OPTIONAL)	120dB, <u>HIGH SPEED ($\leq 1\mu\text{Sec}$)</u> , SLIM LINE, 9 BIT DIGITAL ● AGTN-2018-120DD-100	3-8 TO 3-9

HIGH SPEED VOLTAGE CONTROLLED ATTENUATORS

3.5	2 GHz TO 18 GHz (0.2 TO 18 GHz OPTIONAL)	60dB, <u>HIGH SPEED ($\leq 1\mu\text{Sec}$)</u> , SLIM LINE, 10dB/VOLT ● AGTN-2018-60D-100	3-10 TO 3-11
3.6	2 GHz TO 18 GHz (0.2 TO 18 GHz OPTIONAL)	60dB, <u>HIGH SPEED ($\leq 1\mu\text{Sec}$)</u> , 10dB/VOLT ● AGTN-2018-60D	3-12 TO 3-13



DESCRIPTION

AMC MODEL AGTN-2018-60DD-100 IS A BROAD BAND VARIABLE ATTENUATOR/
MODULATOR, CONTROLLED BY 8 BIT POSITIVE TRUE BINARY LOGIC.

SPECIFICATIONS

- | | |
|--|--|
| ● FREQUENCY RANGE | 2.0-18.0 GHz MINIMUM |
| ● INSERTION LOSS | 4.5 dB MAXIMUM |
| ● ATTENUATION FLATNESS
(± dB MAXIMUM) | 0-30 dB ±1.0 dB MAXIMUM |
| | 30-40 dB ±2.0 dB MAXIMUM |
| | 40-50 dB ±3.0 dB MAXIMUM |
| | 50-60 dB ±5.5 dB MAXIMUM |
| ● ATTENUATION ACCURACY | 0-10 dB ±2.0 dB MAXIMUM |
| | 10-20 dB ±1.0 dB MAXIMUM |
| | 20-40 dB ±1.5 dB MAXIMUM |
| | 40-60 dB ±2.0 dB MAXIMUM |
| ● SWITCHING TIME | <1 μsec (500 nsec TYPICAL) |
| ● VSWR | 2.2:1 MAXIMUM |
| ● RF POWER RATINGS | |
| OPERATING | +20 dBm CW MAXIMUM |
| | +10 dBm (0.3 GHz OR BELOW) |
| SURVIVAL | +30 dBm CW MAXIMUM |
| | +27 dBm (0.3 GHz OR BELOW) |
| ● CONTROL | 8 BIT TRUE BINARY LOGIC |
| ● POWER SUPPLY | +12VDC @ 250 mA MAXIMUM, 210mA TYPICAL |
| | -12VDC @ 50 mA MAXIMUM, 30 mA TYPICAL |
| ● CONNECTORS | |
| RF INPUT/OUTPUT | SMA FEMALE |
| POWER AND CONTROLS | 15 PIN MICRO-D SUBMINIATURE (MALE) |
| | MATING CONNECTOR FURNISHED |
| ● SIZE | 2.00" x 1.81" x 0.50" |

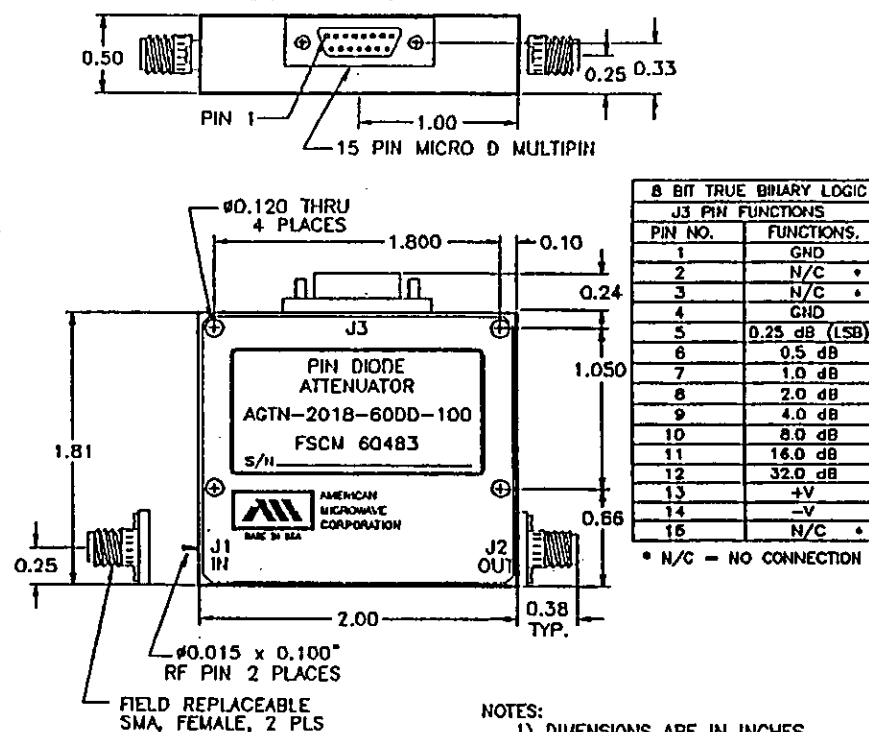
AVAILABLE OPTIONS

- AD1 TWO SMA MALE RF CONNECTORS
A02 J1 SMA MALE, J2 SMA FEMALE
A03 BLIND MATE CONNECTORS
AD4 ANALOG CONTROLLED UNIT OF 10dB/VOLT. PIN 2 IS USED AS CONTROL
(OTHER CONTROL VOLTAGES AVAILABLE). FOR SOLDER PIN UNITS REFER
TO DATA SHEET AGTN-2018-60D-100.
A05 ±15VDC POWER SUPPLY
A06 0 TO 30 dB RANGE
 FLATNESS: 0 - 15dB: ±0.5dB ACCURACY: 0 - 10dB: ±2.0dB
 15 - 20dB: ±1.0dB 10 - 20dB: ±1.0dB
 20 - 25dB: ±1.5dB 20 - 30dB: ±1.5dB
 25 - 30dB: ±2.0dB
A07 EXTENDED FREQUENCY RANGE UNITS AND OPTIONS
 200M18 OPTION EXTENDED BANDWIDTH (200 MHz - 18 GHz)
 300M18 OPTION EXTENDED BANDWIDTH (300 MHz - 18 GHz)
 10M18 OPTION EXTENDED BANDWIDTH (10 MHz - 18 GHz) WITH SLOWER SPEED.
 REFER TO DATA SHEETS AGT-2018-60DD-100 (DIGITAL CONTROL)
 OR AGT-2018-60D-100 (SOLDER PIN ANALOG CONTROLLED).
 219 OPTION EXTENDED BANDWIDTH (2 GHz - 19 GHz)
A08 FREQUENCY BAND OF 2 - 8 GHz
A09 9 BIT TRUE BINARY LOGIC
A10 10 BIT TRUE BINARY LOGIC
A11 11 BIT TRUE BINARY LOGIC
A12 12 BIT TRUE BINARY LOGIC
A13 FREQUENCY BAND OF 10 MHz - 2 GHz REFER TO DATA SHEET
 AGT-2000-60D-100 (SUM LINE), FOR DIGITAL VERSION
 REFER TO DATA SHEET AGT-2000-60DD-100 (SUM LINE)
A14 MOUNTING SURFACE UNPAINTED
SCS SPECIAL CUSTOMER SPECIFICATIONS
NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS				
DATE	REV	DESCRIPTION	DATE	APPROVED
	A	ORIGINAL RELEASE	08/05/87	AKC

MECHANICAL OUTLINE



NOTES:
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES: X.XX ±0.020
X.XXX ±0.010

ENVIRONMENTAL RATINGS

- TEMPERATURE.....-55°C TO +125°C (OPERATING)
 -65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION..... MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE.....MIL-STD-202F, METHOD 107D COND. A



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TEL: (301) 662-4700 FAX: (301) 662-4938

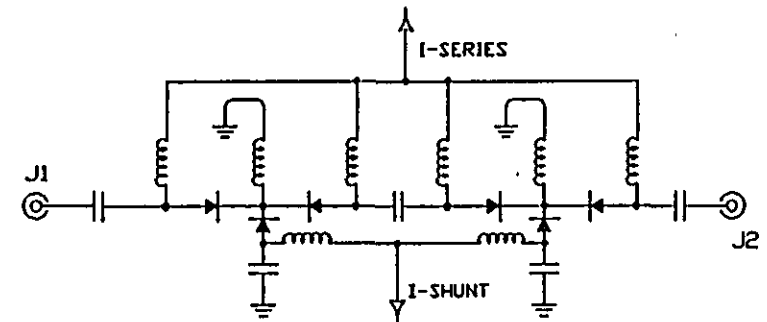
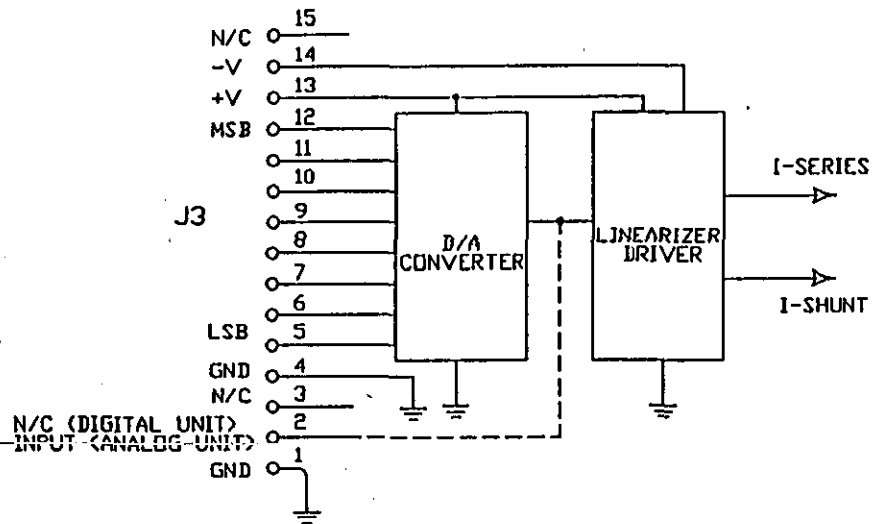
PRODUCT FEATURE
AGTN-2018-60DD-100
2-18 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A	SHEET 1 OF 2	DWG. # 100-4226
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FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

RF SECTION



3-3

		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRODUCT FEATURE AGTN-2018-60DD-100 2-18 GHz, PROGRAMMABLE VARIABLE ATTENUATOR	
APPROVALS DRAWN <i>WSP</i> CHECKED	DATE 09/05/97	SIZE A	SHEET 2 OF 2

DWG. # 100-4226

DESCRIPTION

AMC MODEL AGTN-2018-60DD IS A BROAD BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 8 BIT POSITIVE TRUE BINARY LOGIC.

SPECIFICATIONS

- FREQUENCY RANGE 2.0-18.0 GHz MINIMUM
- INSERTION LOSS 4.5 dB MAXIMUM
- ATTENUATION FLATNESS
($\pm$ dB MAXIMUM) 0-30 dB ± 1.0 dB MAXIMUM
30-40 dB ± 2.0 dB MAXIMUM
40-50 dB ± 3.0 dB MAXIMUM
50-60 dB ± 5.5 dB MAXIMUM
- ATTENUATION ACCURACY 0-10 dB ± 2.0 dB MAXIMUM
10-20 dB ± 1.0 dB MAXIMUM
20-40 dB ± 1.5 dB MAXIMUM
40-60 dB ± 2.0 dB MAXIMUM
- SWITCHING TIME <1 μ sec (500 nsec TYPICAL)
- VSWR 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING +20 dBm CW MAXIMUM
+10 dBm (0.3 GHz OR BELOW)
SURVIVAL +30 dBm CW MAXIMUM
+27 dBm (0.3 GHz OR BELOW)
- CONTROL 8 BIT TRUE BINARY LOGIC
- POWER SUPPLY +12VDC @ 250 mA MAXIMUM, 210 mA TYPICAL
-12VDC @ 50 mA MAXIMUM, 30 mA TYPICAL
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS 15 PIN D-SUBMINIATURE (MALE)
MATING CONNECTOR FURNISHED
- SIZE 2.00" x 1.81" x 0.88"

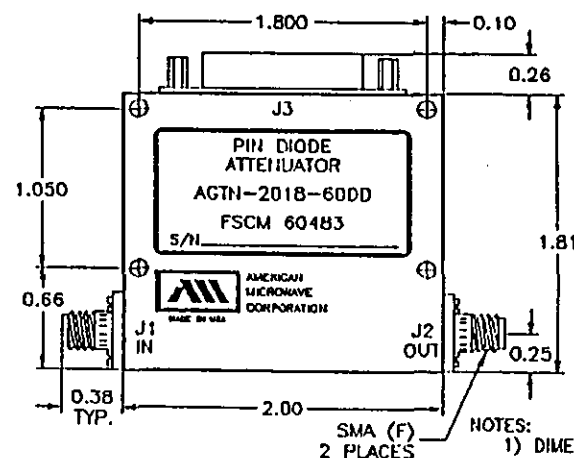
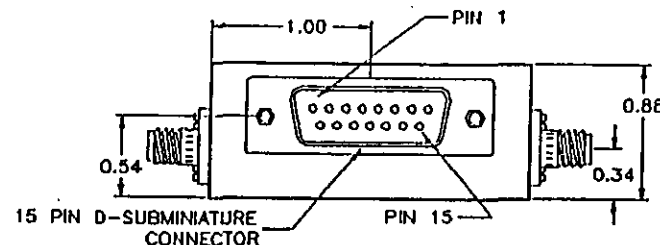
AVAILABLE OPTIONS

- A01 TWO SMA MALE RF CONNECTORS
- A02 J1 SMA MALE, J2 SMA FEMALE
- A03 MOUNTING SURFACE UNPAINTED
- A04 ANALOG CONTROLLED UNIT OF 10dB/VOLT. PIN 2 IS USED AS CONTROL (OTHER CONTROL VOLTAGES AVAILABLE). FOR SOLDER PIN UNITS REFER TO DATA SHEET AGTN-2018-60D-100.
- A05 ± 15 VDC POWER SUPPLY
- A06 0 TO 30 dB RANGE
FLATNESS: 0 - 15dB: ± 0.5 dB ACCURACY: 0 - 10dB: ± 2.0 dB
15 - 20dB: ± 1.0 dB 10 - 20dB: ± 1.0 dB
20 - 25dB: ± 1.5 dB 20 - 30dB: ± 1.5 dB
25 - 30dB: ± 2.0 dB
- A07 EXTENDED FREQUENCY RANGE UNITS AND OPTIONS
200M18 OPTION EXTENDED BANDWIDTH (200 MHz - 18 GHz)
300M18 OPTION EXTENDED BANDWIDTH (300 MHz - 18 GHz)
10M18 OPTION EXTENDED BANDWIDTH (10 MHz - 18 GHz) WITH SLOWER SPEED
REFER TO DATA SHEETS AGT-2018-60DD-100 (DIGITAL CONTROL)
OR AGT-2018-60D-100 (SOLDER PIN ANALOG CONTROL).
- 219 OPTION EXTENDED BANDWIDTH (2 GHz - 19 GHz)
- A08 FREQUENCY BAND OF 2 - 8 GHz
- A09 9 BIT TRUE BINARY LOGIC
- A10 10 BIT TRUE BINARY LOGIC
- A11 11 BIT TRUE BINARY LOGIC
- A12 12 BIT TRUE BINARY LOGIC
- A13 FREQUENCY BAND OF 10 MHz - 2 GHz REFER TO DATA SHEET AGT-2000-60D-100 (SLIM LINE), FOR DIGITAL VERSION
REFER TO DATA SHEET AGT-2000-60DD-100 (SLIM LINE)
- SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS			
DATE	REV.	DESCRIPTION	APPROVED
09/05/97	A	ORIGINAL RELEASE	AKG

MECHANICAL OUTLINE



8 BIT TRUE BINARY LOGIC J3 PIN FUNCTIONS	
PIN NO.	FUNCTIONS.
1	GND
2	N/C
3	N/C
4	GND
5	0.25 dB (LSB)
6	0.5 dB
7	1.0 dB
8	2.0 dB
9	4.0 dB
10	6.0 dB
11	16.0 dB
12	32.0 dB
13	+V
14	-V
15	N/C

* N/C = NO CONNECTION

- NOTES:
- 1) DIMENSIONS ARE IN INCHES
 - 2) TOLERANCES: X.XX ± 0.020
X.XXX ± 0.010
 - 3) WEIGHT: APPROX. 4.0 OZ

ENVIRONMENTAL RATINGS

- TEMPERATURE -55°C TO +125°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

PRODUCT FEATURE
AGTN-2018-60DD

2-18 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

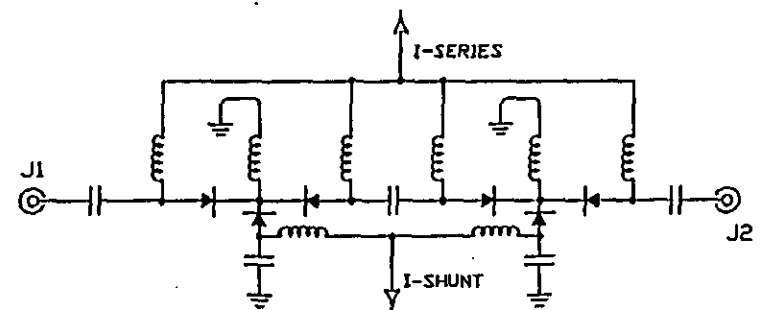
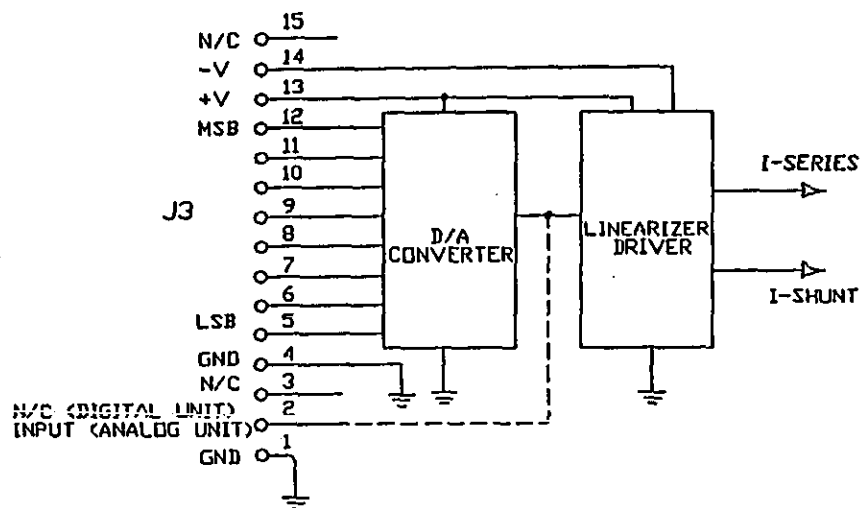
SIZE A SHEET 1 OF 2 DWG. # 100-4224

APPROVALS	DATE
DRAWN: WSP	09/05/97
CHECKED: J. H. L.	10/9/97

FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

RF SECTION



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS

DATE

DRAWN

WSP

08/05/97

CHECKED

PRODUCT FEATURE

AGTN-2018-60DD

2-18 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

DWG. # 100-4224

DESCRIPTION

AMC MODEL AGT-2018-80DD-100 IS A BROAD BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 9 BIT POSITIVE TRUE BINARY LOGIC.

SPECIFICATIONS

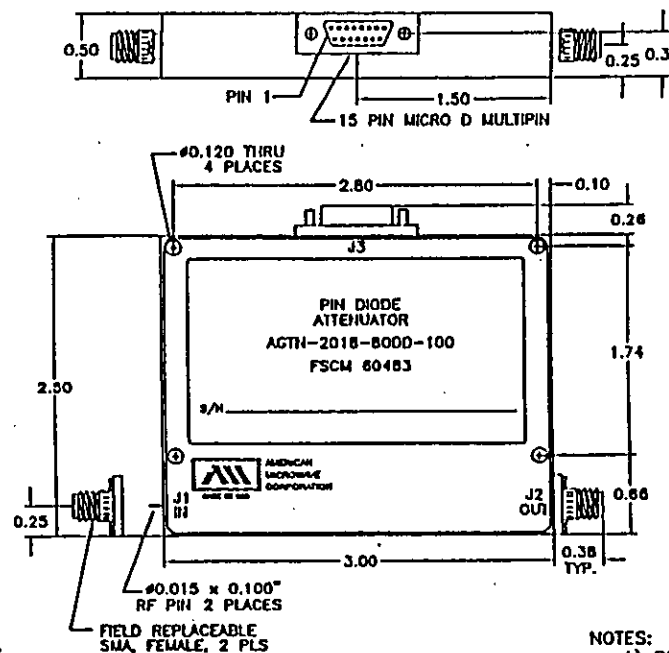
- FREQUENCY RANGE 2.0-18.0 GHz MINIMUM
- INSERTION LOSS 6.0 dB MAXIMUM
- ATTENUATION FLATNESS
($\pm$ dB MAXIMUM) 0-30 dB $\pm$ 1.0 dB MAXIMUM
30-40 dB $\pm$ 1.5 dB MAXIMUM
40-50 dB $\pm$ 2.5 dB MAXIMUM
50-80 dB $\pm$ 4.0 dB MAXIMUM
- ATTENUATION ACCURACY 0-20 dB $\pm$ 2.5 dB MAXIMUM
20-30 dB $\pm$ 1.5 dB MAXIMUM
30-50 dB $\pm$ 1.5 dB MAXIMUM
50-80 dB $\pm$ 2.0 dB MAXIMUM
- SWITCHING TIME <1 μ sec (500 nsec TYPICAL)
- VSWR 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING +20 dBm CW MAXIMUM
+10 dBm (0.3 GHz OR BELOW)
- SURVIVAL +30 dBm CW MAXIMUM
+27 dBm (0.3 GHz OR BELOW)
- CONTROL 9 BIT TRUE BINARY LOGIC
- POWER SUPPLY +12VDC @ 375 mA MAXIMUM
-12VDC @ 50 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS 15 PIN MICRO-D SUBMINIATURE (MALE)
MATING CONNECTOR FURNISHED
- SIZE 3.00" x 2.50" x 0.5"

AVAILABLE OPTIONS

- A01 TWO SMA MALE RF CONNECTORS
A02 J1 SMA MALE, J2 SMA FEMALE
A03 MOUNTING SURFACE UNPAINTED
A04 ANALOG CONTROLLED UNIT OF 15dB/VOLT. PIN 2 IS USED
USED AS CONTROL (OTHER CONTROL VOLTAGES AVAILABLE).
FOR SOLDER PIN UNITS REFER TO DATA SHEET AGTN-2018-80D-100.
A05 $\pm$ 15VDC POWER SUPPLY
A06 0-30 dB RANGE
FLATNESS: 0 - 15dB: $\pm$ 0.5dB ACCURACY: 0 - 10dB: $\pm$ 2.5dB
15 - 20dB: $\pm$ 1.0dB 10 - 20dB: $\pm$ 1.5dB
20 - 25dB: $\pm$ 1.5dB 20 - 30dB: $\pm$ 1.5dB
25 - 30dB: $\pm$ 2.0dB
A07 EXTENDED FREQUENCY RANGE UNITS AND OPTIONS
200M18 OPTION EXTENDED BANDWIDTH (200 MHz TO 18 GHz)
300M18 OPTION EXTENDED BANDWIDTH (300 MHz TO 18 GHz)
10M18 OPTION EXTENDED BANDWIDTH (10 MHz TO 18 GHz) WITH SLOWER SPEED
REFER TO DATA SHEETS AGT-2018-80DD-100 (DIGITAL CONTROL)
OR AGT-2018-80D-100 (SOLDER PIN ANALOG CONTROLLED).
219 OPTION EXTENDED BANDWIDTH (2 GHz TO 19 GHz)
A08 8 BIT TRUE BINARY LOGIC
A09 FREQUENCY BAND OF 2 - 8 GHz
A10 10 BIT TRUE BINARY LOGIC
A11 11 BIT TRUE BINARY LOGIC
A12 12 BIT TRUE BINARY LOGIC
A13 FREQUENCY BAND OF 10 MHz - 2 GHz REFER TO DATA SHEET
AGT-2000-80D-100 (SLIM LINE), FOR DIGITAL VERSION
REFER TO DATA SHEET AGT-2000-80DD-100 (SLIM LINE)
SCS SPECIAL CUSTOMER SPECIFICATIONS
NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS				DATE	APPROVED
ZONE	REV.	DESCRIPTION			
	A	ORIGINAL RELEASE		10/11/97	

MECHANICAL OUTLINE



9 BIT TRUE BINARY LOGIC	
J3 PIN	FUNCTION
1	GND
2	LATCHING STROBE OPTIONAL
3	0.18 dB (LSB)
4	GND
5	0.31 dB
6	0.63 dB
7	1.25 dB
8	2.5 dB
9	5.0 dB
10	10.0 dB
11	20.0 dB
12	40.0 dB (MSB)
13	+V
14	-V
15	N/C

- NOTES:
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
3) WEIGHT: APPROX. 4.0 OZ

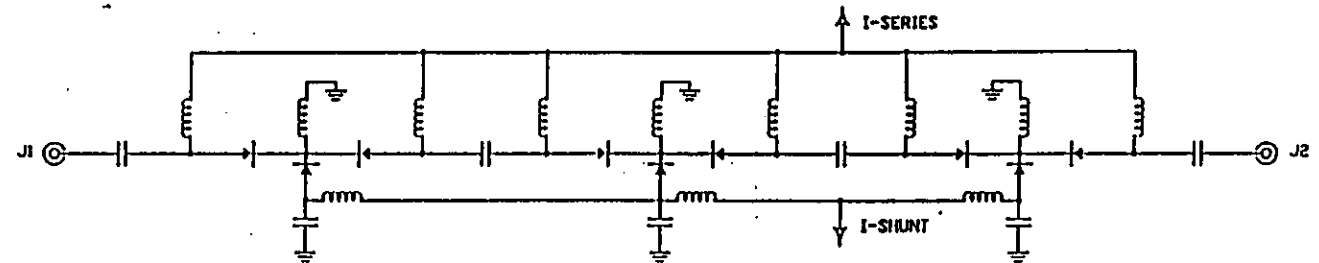
ENVIRONMENTAL RATINGS

- TEMPERATURE -55°C TO +125°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A

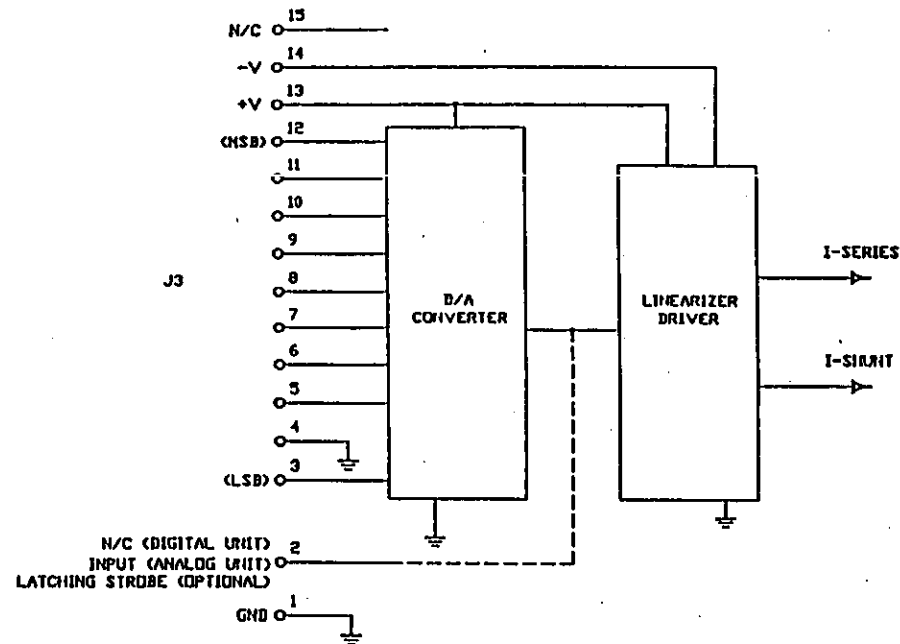
		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRELIMINARY PRODUCT FEATURE AGTN-2018-80DD-100 2-18 GHz, PROGRAMMABLE VARIABLE ATTENUATOR	
APPROVALS DRN: B.L.G. DESIGNED: L.A.	DATE 10/20/97 10/24/97	SIZE A SHEET 1 OF 2 DWG. 100-4247	

FUNCTIONAL SCHEMATIC

RF SECTION



DRIVER CIRCUIT



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS

DATE

DRAWN

BLG

10/16/97

CHECKED

PRELIMINARY PRODUCT FEATURE

AGTN-2018-80DD-100

2-18 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

DWG. 100-4247

DESCRIPTION

AMC MODEL AGTN-2018-120DD-100 IS A BROAD BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 9 BIT POSITIVE TRUE BINARY LOGIC.

SPECIFICATIONS

- FREQUENCY RANGE 2.0-18.0 GHz MINIMUM
- INSERTION LOSS 9.0 dB MAXIMUM
- ATTENUATION FLATNESS
($\pm$ dB MAXIMUM) 0-30 dB $\pm$ 1.0 dB MAXIMUM
30-40 dB $\pm$ 1.5 dB MAXIMUM
40-50 dB $\pm$ 2.5 dB MAXIMUM
50-80 dB $\pm$ 4.0 dB MAXIMUM
80-120 dB $\pm$ 11.0 dB MAXIMUM
- ATTENUATION ACCURACY 0-20 dB $\pm$ 2.5 dB MAXIMUM
20-30 dB $\pm$ 1.5 dB MAXIMUM
30-50 dB $\pm$ 1.5 dB MAXIMUM
50-80 dB $\pm$ 2.0 dB MAXIMUM
80-120 dB $\pm$ 2.5 dB MAXIMUM
- SWITCHING TIME <1 μ sec (500 nsec TYPICAL)
- VSWR 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING +20 dBm CW MAXIMUM
+10 dBm (0.3 GHz OR BELOW)
SURVIVAL +30 dBm CW MAXIMUM
+27 dBm (0.3 GHz OR BELOW)
- CONTROL 9 BIT TRUE BINARY LOGIC
- POWER SUPPLY +12VDC @ 375 mA MAXIMUM
-12VDC @ 50 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS 15 PIN MICRO-D SUBMINIATURE (MALE)
MATING CONNECTOR FURNISHED
- SIZE 3.00" x 2.50" x 0.5"

AVAILABLE OPTIONS

- A01 TWO SMA MALE RF CONNECTORS
- A02 J1 SMA MALE, J2 SMA FEMALE
- A03 MOUNTING SURFACE UNPAINTED
- A04 ANALOG CONTROLLED UNIT OF 20dB/VOLT. PIN 2 IS USED AS CONTROL (OTHER CONTROL VOLTAGES AVAILABLE).
FOR SOLDER PIN UNITS REFER TO DATA SHEET AGTN-2018-120D-100.
- A05 $\pm$ 15VDC POWER SUPPLY
- A06 0-30 dB RANGE

FLATNESS: 0 - 15dB: $\pm$ 0.5dB ACCURACY: 0 - 10dB: $\pm$ 2.5dB
15 - 20dB: $\pm$ 1.0dB 10 - 20dB: $\pm$ 1.5dB
20 - 25dB: $\pm$ 1.5dB 20 - 30dB: $\pm$ 1.5dB
25 - 30dB: $\pm$ 2.0dB

- A07 EXTENDED FREQUENCY RANGE UNITS AND OPTIONS

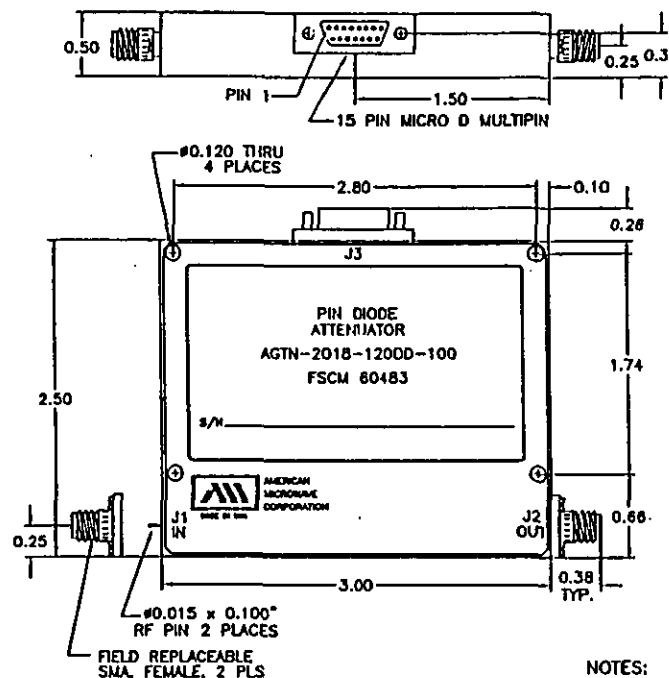
200M18 OPTION EXTENDED BANDWIDTH (200 MHz TO 18 GHz)
300M18 OPTION EXTENDED BANDWIDTH (300 MHz TO 18 GHz)
10M18 OPTION EXTENDED BANDWIDTH (10 MHz TO 18 GHz) WITH SLOWER SPEED
REFER TO DATA SHEETS AGT-2018-120DD-100 (DIGITAL CONTROL)
OR AGT-2018-120D-100 (SOLDER PIN ANALOG CONTROLLED).

219 OPTION EXTENDED BANDWIDTH (2 GHz TO 19 GHz)

- A08 8 BIT TRUE BINARY LOGIC
- A09 FREQUENCY BAND OF 2 - 8 GHz
- A10 10 BIT TRUE BINARY LOGIC
- A11 11 BIT TRUE BINARY LOGIC
- A12 12 BIT TRUE BINARY LOGIC
- A13 FREQUENCY BAND OF 10 MHz - 2 GHz REFER TO DATA SHEET
AGT-2000-120D-100 (SLIM LINE), FOR DIGITAL VERSION
REFER TO DATA SHEET AGT-2000-120DD-100 (SLIM LINE)
- A14 LATCHING STROBE (NOT AVAILABLE WITH OPTION A12)
- SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

MECHANICAL OUTLINE



9 BIT TRUE BINARY LOGIC	
J3 PIN	FUNCTION
1	GND
2	LATCHING STROBE
3	0.25 dB (LSB)
4	GND
5	0.5 dB
6	1.0 dB
7	2.0 dB
8	4.0 dB
9	8.0 dB
10	16.0 dB
11	32.0 dB
12	64.0 dB (MSB)
13	+V
14	-V
15	N/C

NOTES:

- 1) DIMENSIONS ARE IN INCHES
- 2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
APPROX. 4.0 OZ
- 3) WEIGHT:

ENVIRONMENTAL RATINGS

- TEMPERATURE -55°C TO +125°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



AMERICAN MICROWAVE CORPORATION

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TEL: (301) 662-4700 FAX: (301) 662-4938

PRELIMINARY PRODUCT FEATURE

AGTN-2018-120DD-100

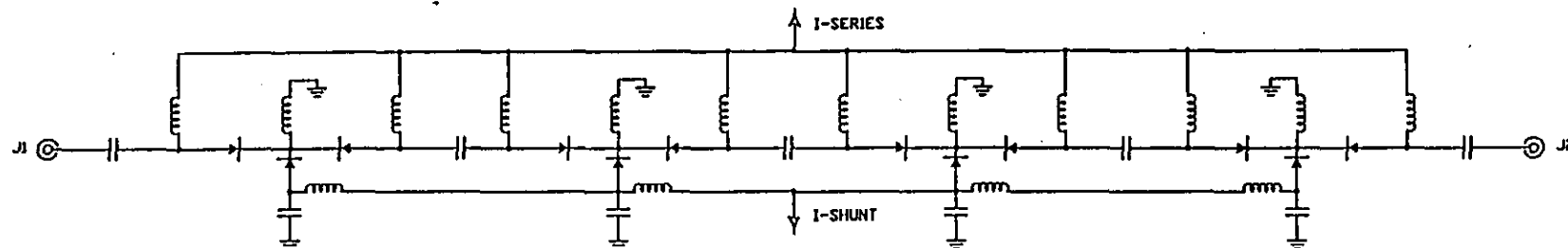
2-18 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

APPROVALS	DATE
DRAWN: B.L.G.	11/11/97
CHECKED: C. Mohr	11/11/97

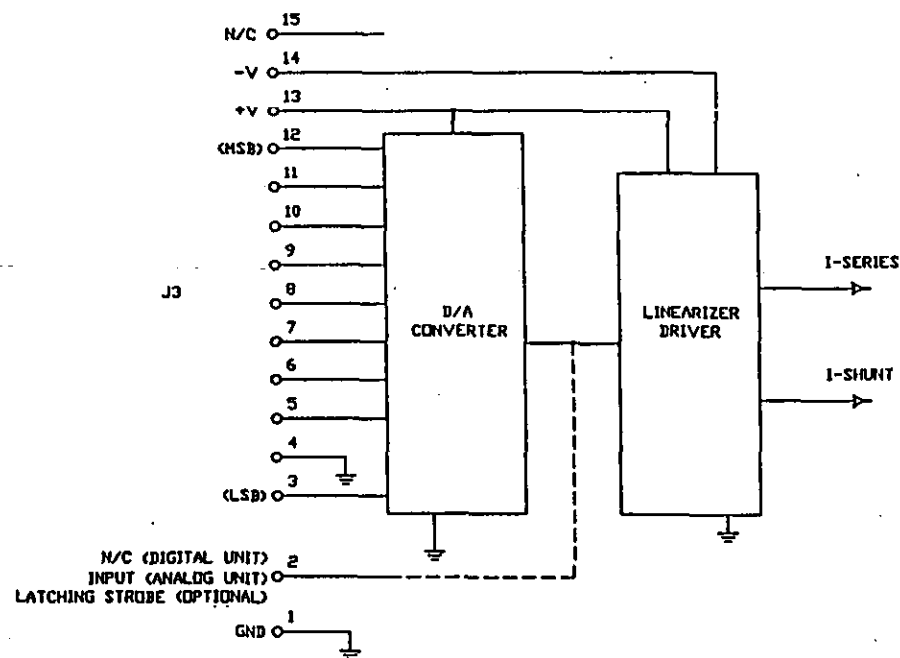
SIZE A SHEET 1 OF 2 DWG. # 100-4259

FUNCTIONAL SCHEMATIC

RF SECTION



DRIVER CIRCUIT



		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRELIMINARY PRODUCT FEATURE AGTN-2018-120DD-100 2-18 GHz, PROGRAMMABLE VARIABLE ATTENUATOR	
APPROVALS DRAWN <i>RLG</i> CHECKED	DATE 11/01/01	SIZE A	SHEET 2 OF 2

DESCRIPTION

AMC MODEL AGTN-2018-60D-100 IS A BROAD BAND VARIABLE ATTENUATOR/MODULATOR, 10dB/VOLT ANALOG CONTROLLED

SPECIFICATIONS

- FREQUENCY RANGE 2.0-18.0 GHz MINIMUM
- INSERTION LOSS 4.5 dB MAXIMUM
- ATTENUATION FLATNESS
($\pm$ dB MAXIMUM) 0-30 dB $\pm$ 1.0 dB MAXIMUM
30-40 dB $\pm$ 2.0 dB MAXIMUM
40-50 dB $\pm$ 3.0 dB MAXIMUM
50-60 dB $\pm$ 5.5 dB MAXIMUM
- ATTENUATION ACCURACY 0-10 dB $\pm$ 2.0 dB MAXIMUM
10-20 dB $\pm$ 1.0 dB MAXIMUM
20-40 dB $\pm$ 1.5 dB MAXIMUM
40-60 dB $\pm$ 2.0 dB MAXIMUM
- SWITCHING TIME <1 μ sec (500 nsec TYPICAL)
- VSWR 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING +20 dBm CW MAXIMUM
+10 dBm (0.3 GHz OR BELOW)
SURVIVAL +30 dBm CW MAXIMUM
+27 dBm (0.3 GHz OR BELOW)
- CONTROL 10dB/VOLT ANALOG CONTROLLED
- POWER SUPPLY +12VDC @ 250 mA MAXIMUM, 210 mA TYPICAL
-12VDC @ 50 mA MAXIMUM, 30 mA TYPICAL
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS SOLDER PIN CONTROL
- SIZE 2.00" x 1.81" x 0.50"

AVAILABLE OPTIONS

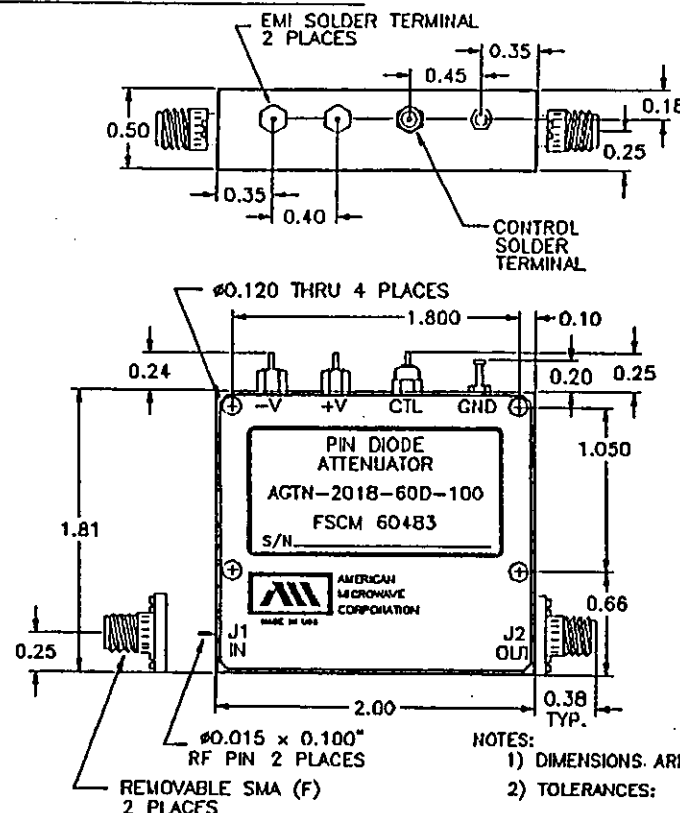
- A01 TWO SMA MALE RF CONNECTORS
A02 J1 SMA MALE, J2 SMA FEMALE
A03 BLIND MATE CONNECTORS
A04 5dB/VOLT SENSITIVITY
A05 $\pm$ 15VDC POWER SUPPLY
A06 0 TO 30 dB RANGE
FLATNESS: 0 - 15dB: $\pm$ 0.5dB ACCURACY: 0 - 10dB: $\pm$ 2.0dB
15 - 20dB: $\pm$ 1.0dB 10 - 20dB: $\pm$ 1.0dB
20 - 25dB: $\pm$ 1.5dB 20 - 30dB: $\pm$ 1.5dB
25 - 30dB: $\pm$ 2.0dB
- A07 EXTENDED FREQUENCY RANGE UNIT AND OPTIONS
200M18 OPTION EXTENDED BANDWIDTH (200 MHz - 18 GHz)
300M18 OPTION EXTENDED BANDWIDTH (300 MHz - 18 GHz)
10M18 OPTION EXTENDED BANDWIDTH (10 MHz - 18 GHz), WITH SLOWER SPEED REFER TO AGT-2018-60D-100 (SLIM LINE). FOR DIGITAL CONTROLLED UNIT REFER TO AGT-2018-60DD-100 (SLIM LINE).
219 OPTION EXTENDED BANDWIDTH (2 GHz - 19 GHz)
- A08 FREQUENCY BAND OF 2 - 8 GHz
A09 FREQUENCY BAND OF 10 MHz - 2 GHz REFER TO DATA SHEET AGT-2000-60D-100 (SLIM LINE), FOR DIGITAL VERSION REFER TO DATA SHEET AGT-2000-60DD-100 (SLIM LINE)
- A10 FOR HIGH SPEED $\leq$ 1 μ sec DIGITAL CONTROLLED UNITS AND EXTENDED FREQUENCY RANGE REFER TO DATA SHEET AGTN-2018-60DD-100 (SLIM LINE).
- A11 MOUNTING SURFACE UNPAINTED
SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS			
ZONE	REV.	DESCRIPTION	DATE
	A	ORIGINAL RELEASE	09/05/97

APPROVED
AKG

MECHANICAL OUTLINE



- NOTES:
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010

ENVIRONMENTAL RATINGS

- TEMPERATURE -55°C TO +125°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

PRODUCT FEATURE
AGTN-2018-60D-100
2-18 GHz, VOLTAGE VARIABLE ATTENUATOR

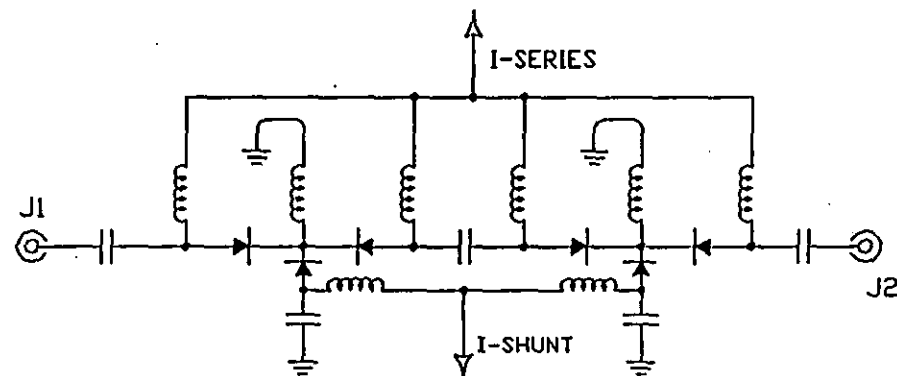
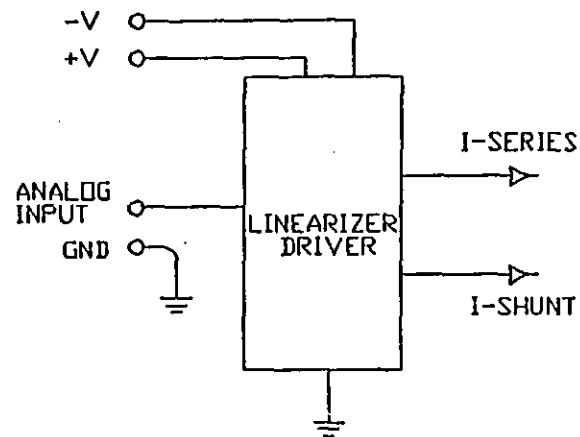
SIZE A SHEET 1 OF 2 DWG. 100-4227

APPROVALS	DATE
W.P.P.	09/05/97
E.K.	
B.L.	09/07/97

FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

RF SECTION



AMERICAN MICROWAVE CORPORATION

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TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS

DATE

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WSP

09/05/97

CHECKED

PRODUCT FEATURE

AGTN-2018-60D-100

2-18 GHz, VOLTAGE VARIABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

OWG, 100-4227

DESCRIPTION

AMC MODEL AGTN-2018-60D IS A BROAD BAND VARIABLE ATTENUATOR/
MODULATOR, 10dB/VOLT ANALOG CONTROLLED

SPECIFICATIONS

- FREQUENCY RANGE 2.0-18.0 GHz MINIMUM
- INSERTION LOSS 4.5 dB MAXIMUM
- ATTENUATION FLATNESS
($\pm$ dB MAXIMUM) 0-30 dB ± 1.0 dB MAXIMUM
30-40 dB ± 2.0 dB MAXIMUM
40-50 dB ± 3.0 dB MAXIMUM
50-60 dB ± 5.5 dB MAXIMUM
- ATTENUATION ACCURACY 0-10 dB ± 2.0 dB MAXIMUM
10-20 dB ± 1.0 dB MAXIMUM
20-40 dB ± 1.5 dB MAXIMUM
40-60 dB ± 2.0 dB MAXIMUM
- SWITCHING TIME <1 μ sec (500 nsec TYPICAL)
- VSWR 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING +20 dBm CW MAXIMUM
+10 dBm (0.3 GHz OR BELOW)
SURVIVAL +30 dBm CW MAXIMUM
+27 dBm (0.3 GHz OR BELOW)
- CONTROL 10dB/VOLT ANALOG CONTROLLED
- POWER SUPPLY +12VDC @ 250 mA MAXIMUM, 210 mA TYPICAL
-12VDC @ 50 mA MAXIMUM, 30 mA TYPICAL
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS SOLDER PIN CONTROL
- SIZE 2.00" x 1.81" x 0.88"

AVAILABLE OPTIONS

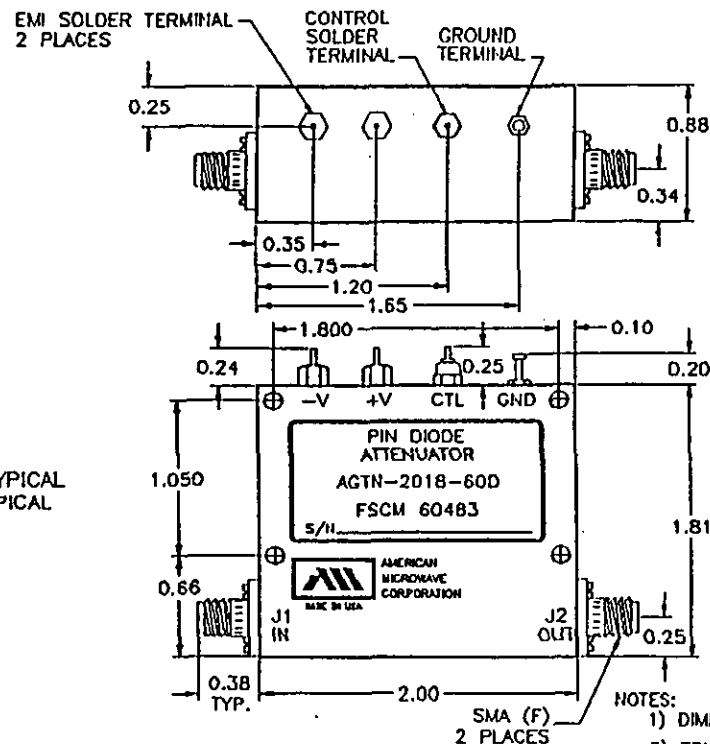
- A01 TWO SMA MALE RF CONNECTORS
A02 J1 SMA MALE, J2 SMA FEMALE
A03 MOUNTING SURFACE UNPAINTED
A04 5dB/VOLT SENSITIVITY
A05 ± 15 VDC POWER SUPPLY
A06 0 TO 30 dB RANGE
FLATNESS: 0 - 15dB: ± 0.5 dB ACCURACY: 0 - 10dB: ± 2.0 dB
15 - 20dB: ± 1.0 dB 10 - 20dB: ± 1.0 dB
20 - 25dB: ± 1.5 dB 20 - 30dB: ± 1.5 dB
25 - 30dB: ± 2.0 dB
A07 EXTENDED FREQUENCY RANGE UNIT AND OPTIONS
200M18 OPTION EXTENDED BANDWIDTH (200 MHz - 18 GHz)
300M18 OPTION EXTENDED BANDWIDTH (300 MHz - 18 GHz)
10M18 OPTION EXTENDED BANDWIDTH (10 MHz - 18 GHz), WITH SLOWER SPEED REFER
TO AGT-2018-60D-100 (SLIM LINE). FOR DIGITAL CONTROLLED UNIT
REFER TO AGT-2018-60DD-100 (SLIM LINE).
219 OPTION EXTENDED BANDWIDTH (2 GHz - 19 GHz)
A08 FREQUENCY BAND OF 2 - 8 GHz
A09 FREQUENCY BAND OF 10 MHz - 2 GHz REFER TO DATA SHEET
AGT-2000-60D-100 (SLIM LINE). FOR DIGITAL VERSION
REFER TO DATA SHEET AGT-2000-60DD-100 (SLIM LINE)
A10 FOR HIGH SPEED ≤ 1 μ sec DIGITAL CONTROLLED UNITS AND
EXTENDED FREQUENCY RANGE REFER TO DATA SHEET
AGTN-2018-60DD-100 (SLIM LINE).
SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS			
ZONE	REV.	DESCRIPTION	DATE
	A	ORIGINAL RELEASE	00/05/97

APPROVED
AKG

MECHANICAL OUTLINE



ENVIRONMENTAL RATINGS

- TEMPERATURE -55°C TO +125°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



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TEL: (301) 662-4700 FAX: (301) 662-4938

PRODUCT FEATURE

AGTN-2018-60D

2-18 GHz, VOLTAGE VARIABLE ATTENUATOR

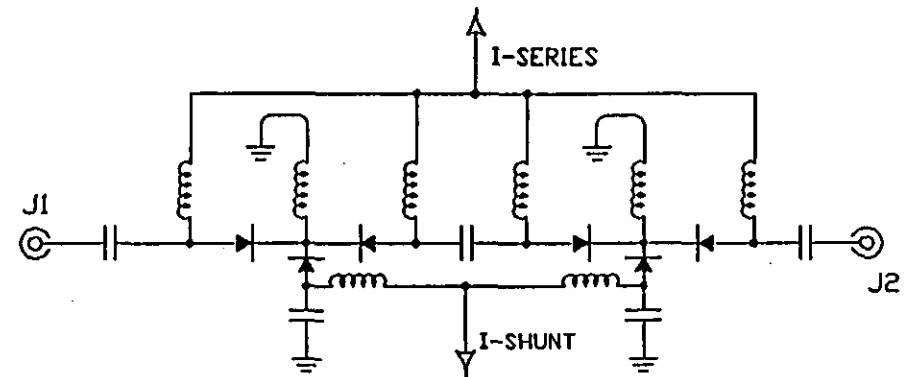
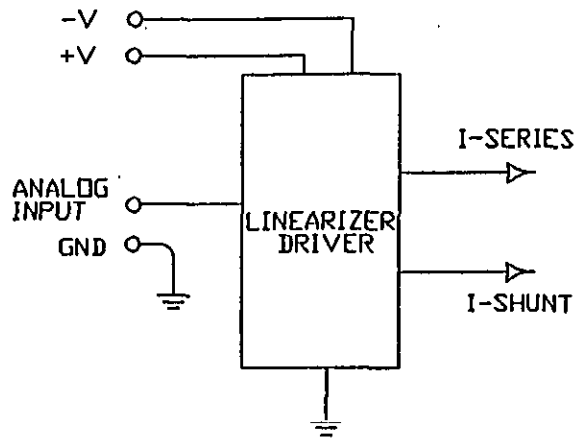
SIZE A SHEET 1 OF 2 DWG. # 100-4225

APPROVALS	DATE
DRAWN: WSP	00/05/97
CHECKED: P. M. J.	00/05/97

FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

RF SECTION



AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS	DATE
DRAWN WSP	09/05/97
CHECKED	

PRODUCT FEATURE
AGTN-2018-60D
2-18 GHz, VOLTAGE VARIABLE ATTENUATOR

SIZE A	SHEET 2 OF 2	DWG. # 100-4225
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SECTION

PRODUCT DESCRIPTION

PAGES

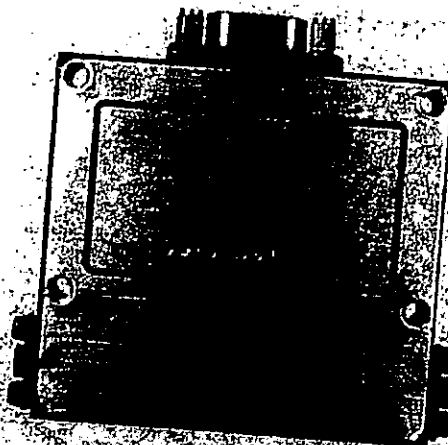
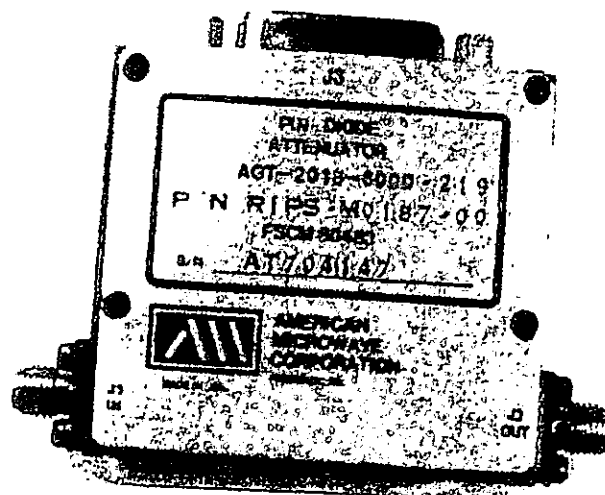
4.0	10 MHz TO 18 GHz	AGT SERIES-MULTI OCTAVE BAND, DIGITAL OR ANALOG VOLTAGE CONTROLLED ATTENUATORS	4-0
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DIGITAL CONTROLLED ATTENUATORS

4.1	10 MHz TO 2.0 GHz	60dB, <u>SLIMLINE</u> , 8 BIT DIGITAL • AGT-2000-60DD-100	4-2 TO 4-3
4.2	10 MHz TO 2.0 GHz	60dB, 8 BIT DIGITAL • AGT-2000-60DD	4-4 TO 4-5
4.3	10 MHz TO 2.0 GHz	70dB, 10 BIT DIGITAL • AGT-2000-70DD	4-6 TO 4-7
4.4	2.0 GHz TO 18 GHz (10 MHz TO 18 GHz OPTIONAL)	60dB, <u>SLIMLINE</u> , 8 BIT DIGITAL • AGT-2018-60DD-100	4-8 TO 4-9
4.5	0.3 GHz TO 18 GHz	60dB, 8 BIT DIGITAL • AGT-2018-60DD	4-10 TO 4-12

VOLTAGE CONTROLLED ATTENUATORS

4.6	10 MHz TO 2.0 GHz	60dB, <u>SLIMLINE</u> , 10dB/VOLT • AGT-2000-60D-100	4-14 TO 4-15
4.7	10 MHz TO 2.0 GHz	60dB, 10dB/VOLT • AGT-2000-60D	4-16 TO 4-17
4.8	10 MHz TO 2.0 GHz	70dB, 10dB/VOLT • AGT-2000-70D	4-18 TO 4-19
4.9	2.0 GHz TO 18 GHz (10 MHz TO 18 GHz OPTIONAL)	60dB, <u>SLIMLINE</u> , 10dB/VOLT • AGT-2018-60D-100	4-20 TO 4-21
4.10	0.3 GHz TO 18 GHz	60dB, 10dB/VOLT • AGT-2018-60D	4-22 TO 4-24



DESCRIPTION

AMC MODEL AGT-2000-60DD-100 IS A BROAD BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 8 BIT POSITIVE TRUE BINARY LOGIC.

SPECIFICATIONS

- FREQUENCY RANGE 10 MHz - 2.0 GHz MINIMUM
- INSERTION LOSS 2.5 dB MAXIMUM
- ATTENUATION FLATNESS
($\pm$ dB MAXIMUM) 0-30 dB $\pm$ 0.5 dB MAXIMUM
30-50 dB $\pm$ 1.5 dB MAXIMUM
50-60 dB $\pm$ 2.5 dB MAXIMUM
- ATTENUATION ACCURACY 0-10 dB $\pm$ 2.0 dB MAXIMUM
10-20 dB $\pm$ 1.0 dB MAXIMUM
20-50 dB $\pm$ 1.5 dB MAXIMUM
50-60 dB $\pm$ 2.0 dB MAXIMUM
- SWITCHING TIME ON: 25 μ sec OFF: 10 μ sec
- VSWR 2.0:1 MAXIMUM, 1.75 TYPICAL (@ 0dB ATTENUATION)
- RF POWER RATINGS
OPERATING +10 dBm CW MAXIMUM,
+20 dBm TYPICAL
SURVIVAL +30 dBm CW MAXIMUM
- CONTROL 8 BIT TRUE BINARY LOGIC
- POWER SUPPLY +12VDC @ 250 mA MAXIMUM
(210 mA TYPICAL)
-12VDC @ 50 mA MAXIMUM
(30 mA TYPICAL)
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS 15 PIN MICRO-D SUBMINIATURE (MALE)
MATING CONNECTOR FURNISHED
- SIZE 2.00" x 1.81" x 0.50"

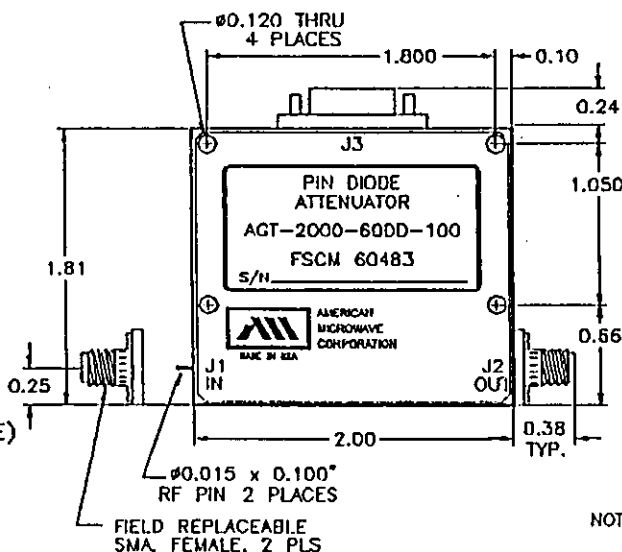
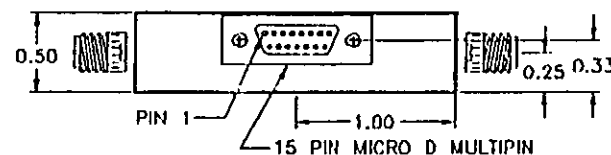
AVAILABLE OPTIONS

- A01 TWO SMA MALE RF CONNECTORS
- A02 J1 SMA MALE, J2 SMA FEMALE
- A03 FOR EXTENDED FREQUENCY RANGE UNITS OF
2-18 GHz, 2-19 GHz, 0.3-18 GHz, 0.2-18 GHz,
10 MHz-18 GHz REFER TO AGT-2018-60DD-100 (SLIM LINE)
DATA SHEET. FOR ANALOG VOLTAGE CONTROLLED UNITS WITH SOLDER
PINS REFER TO AGT-2018-60D-100 (SLIM LINE).
- A04 MOUNTING SURFACE UNPAINTED
- A05 $\pm$ 15 VDC POWER SUPPLY
- A06 0 TO 30 dB RANGE
- A07 FOR HIGH SPEED UNITS OF $\leq$ 1 μ sec AND EXTENDED FREQUENCY
RANGES OF 2-18 GHz, 2-19 GHz, 0.3-18 GHz, AND
0.2-18 GHz REFER TO DATA SHEETS AGTN-2018-60DD-100
(SLIM LINE). FOR ANALOG VOLTAGE CONTROLLED UNIT WITH
SOLDER PINS REFER TO AGTN-2018-60D-100 (SLIM LINE)
- A08 ANALOG CONTROLLED UNIT-10dB/VOLT PIN 2 IS USED
AS CONTROL (OTHER CONTROL VOLTAGES AVAILABLE).
FOR SOLDER PIN UNITS REFER TO AGT-2000-60D-100
(SLIM LINE)
- A09 9 BIT TRUE BINARY LOGIC
- A10 10 BIT TRUE BINARY LOGIC
- A11 11 BIT TRUE BINARY LOGIC
- A12 12 BIT TRUE BINARY LOGIC
- A13 BLIND MATE CONNECTORS
- SCS SPECIAL CUSTOMER SPECIFICATION

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	ORIGINAL RELEASE	08/23/93	AKG

MECHANICAL OUTLINE



8 BIT TRUE BINARY LOGIC	
J3 PIN FUNCTIONS	
PIN NO.	FUNCTIONS.
1	GND
2	N/C *
3	N/C *
4	GND
5	0.25 dB (LSB)
6	0.5 dB
7	1.0 dB
8	2.0 dB
9	4.0 dB
10	8.0 dB
11	16.0 dB
12	32.0 dB
13	+V
14	-V
15	N/C *

* N/C = NO CONNECTION

- NOTES:
- 1) DIMENSIONS ARE IN INCHES
 - 2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010

ENVIRONMENTAL RATINGS

- TEMPERATURE -55°C TO +125°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



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APPROVALS	DATE
W.P.P.	04/20/93
M.J.L.	04/07

PRODUCT FEATURE

AGT-2000-60DD-100

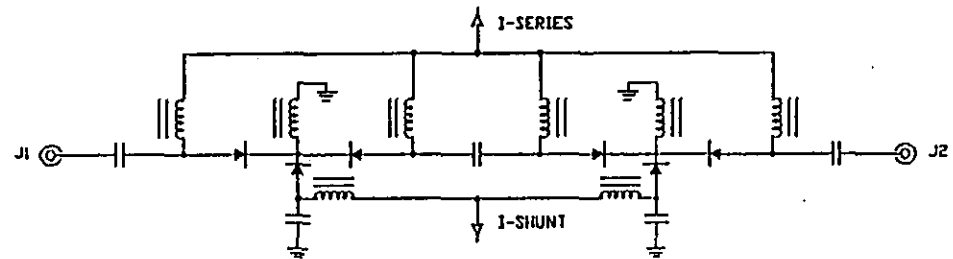
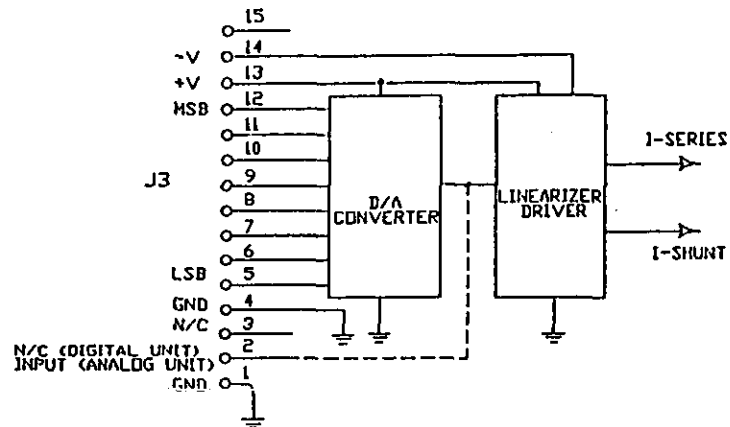
10 MHz - 2 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SHEET A SHEET 1 OF 2 DWG. # 100-4228

FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

RF SECTION



4-3



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS

DATE

DRAWN

WJP

08/28/93

CHECKED

PRODUCT FEATURE

AGT-2000-60DD-100

10 MHz - 2 GHz. PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

DWG. # 100-4228

DESCRIPTION

AMC MODEL AGT-2000-60DD IS A BROAD BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 8 BIT POSITIVE TRUE BINARY LOGIC.

SPECIFICATIONS

- FREQUENCY RANGE 10 MHz - 2.0 GHz MINIMUM
- INSERTION LOSS 2.5 dB MAXIMUM
- ATTENUATION FLATNESS
($\pm$ dB MAXIMUM) 0-30 dB $\pm$ 0.5 dB MAXIMUM
30-50 dB $\pm$ 1.5 dB MAXIMUM
50-60 dB $\pm$ 2.5 dB MAXIMUM
- ATTENUATION ACCURACY 0-10 dB $\pm$ 2.0 dB MAXIMUM
10-20 dB $\pm$ 1.0 dB MAXIMUM
20-50 dB $\pm$ 1.5 dB MAXIMUM
50-60 dB $\pm$ 2.0 dB MAXIMUM
- SWITCHING TIME ON: 25 μ sec OFF: 10 μ sec
- VSWR 2.0:1 MAXIMUM, 1.75 TYPICAL
(@ 0dB ATTENUATION)
- RF POWER RATINGS
OPERATING +10 dBm CW MAXIMUM
+20 dBm TYPICAL
SURVIVAL +30 dBm CW MAXIMUM
- CONTROL 8 BIT TRUE BINARY LOGIC
- POWER SUPPLY +12VDC @ 250 mA MAXIMUM
(210 mA TYPICAL)
-12VDC @ 50 mA MAXIMUM
(30 mA TYPICAL)
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS 15 PIN D-SUBMINIATURE (MALE)
MATING CONNECTOR FURNISHED
- SIZE 2.00" x 1.81" x 0.88"

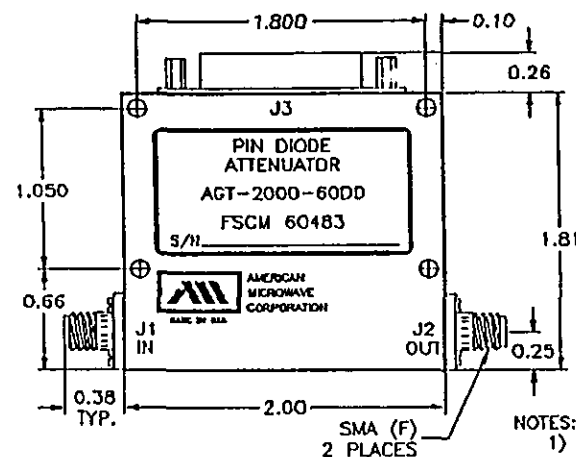
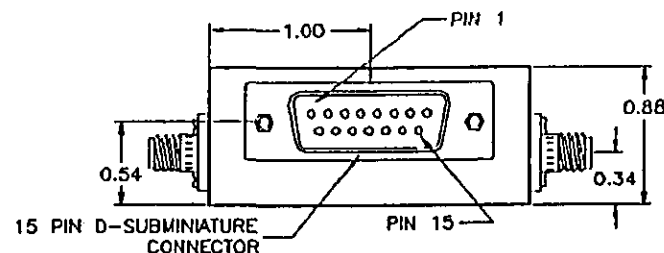
AVAILABLE OPTIONS

- A01 TWO SMA MALE RF CONNECTORS
- A02 J1 SMA MALE, J2 SMA FEMALE
- A03 FOR EXTENDED FREQUENCY RANGE UNITS OF
2-18 GHz, 2-19 GHz, 0.3-18 GHz, 0.2-18 GHz,
10 MHz-18 GHz REFER TO AGT-2018-60DD-100 (SLIM LINE)
DATA SHEET. FOR ANALOG VOLTAGE CONTROLLED UNITS WITH SOLDER
PINS REFER TO AGT-2018-60D-100 (SLIM LINE).
- A04 MOUNTING SURFACE UNPAINTED
- A05 $\pm$ 15 VDC POWER SUPPLY
- A06 0 TO 30 dB RANGE
- A07 FOR HIGH SPEED UNITS OF $\leq$ 1 μ sec AND EXTENDED FREQUENCY
RANGES OF 2-18 GHz, 2-19 GHz, 0.3-18 GHz, AND
0.2-18 GHz REFER TO DATA SHEETS AGT-2018-60DD-100
(SLIM LINE). FOR ANALOG VOLTAGE CONTROLLED UNIT WITH
SOLDER PINS REFER TO AGT-2018-60D-100 (SLIM LINE)
- A08 ANALOG CONTROLLED UNIT-10dB/VOLT PIN 2 IS USED
AS CONTROL (OTHER CONTROL VOLTAGES AVAILABLE).
FOR SOLDER PIN UNITS REFER TO AGT-2000-60D-100
(SLIM LINE)
- A09 9 BIT TRUE BINARY LOGIC
- A10 10 BIT TRUE BINARY LOGIC
- A11 11 BIT TRUE BINARY LOGIC
- A12 12 BIT TRUE BINARY LOGIC
- SCS SPECIAL CUSTOMER SPECIFICATION

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	ORIGINAL RELEASE	01/23/93	AKG

MECHANICAL OUTLINE



8 BIT TRUE BINARY LOGIC	
J3 PIN FUNCTIONS	
PIN NO.	FUNCTIONS
1	GND
2	N/C *
3	N/C *
4	GND
5	0.25 dB (LSB)
6	0.5 dB
7	1.0 dB
8	2.0 dB
9	4.0 dB
10	8.0 dB
11	16.0 dB
12	32.0 dB
13	+V
14	-V
15	N/C *

* N/C = NO CONNECTION

- NOTES:
- 1) DIMENSIONS ARE IN INCHES
 - 2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
 - 3) WEIGHT: APPROX. 4.0 OZ

ENVIRONMENTAL RATINGS

- TEMPERATURE -55°C TO +125°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



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APPROVALS	DATE
DRAWN: W.P.P.	09/28/93
CHECKED: [Signature]	09/29/93

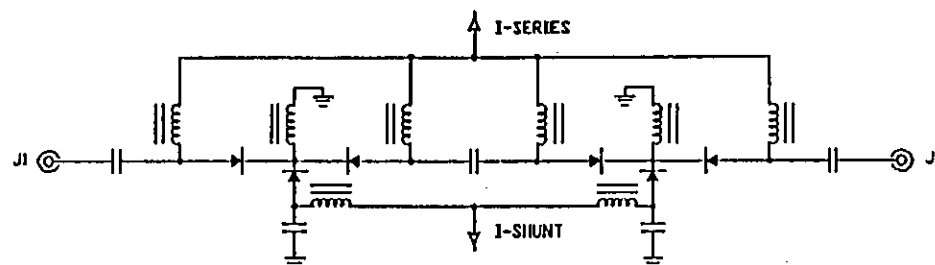
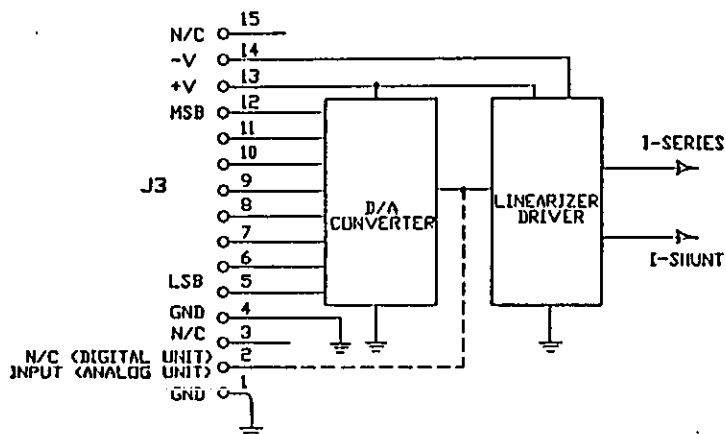
PRODUCT FEATURE
AGT-2000-60DD
10 MHz - 2 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A SHEET 1 OF 2 DWG. # 100-3127-2

FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

RF SECTION



4-5



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APPROVALS	DATE
DRAWN <i>WSP</i>	04/28/93
CHECKED	

PRODUCT FEATURE
AGT-2000-60DD
10 MHz - 2 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A | SHEET 2 OF 2 | DWG. # 100-3127-2

DESCRIPTION

AMC MODEL AGT-2000-70DD IS A BROAD BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 10 BIT POSITIVE TRUE BINARY LOGIC.

SPECIFICATIONS

- FREQUENCY RANGE 10 MHz - 2.0 GHz MINIMUM
- INSERTION LOSS 2.5 dB MAXIMUM
- ATTENUATION FLATNESS
($\pm$ dB MAXIMUM) 0-30 dB $\pm$ 0.5 dB MAXIMUM
30-50 dB $\pm$ 1.5 dB MAXIMUM
50-70 dB $\pm$ 2.5 dB MAXIMUM
- ATTENUATION ACCURACY 0-10 dB $\pm$ 2.0 dB MAXIMUM
10-20 dB $\pm$ 1.0 dB MAXIMUM
20-50 dB $\pm$ 1.5 dB MAXIMUM
50-70 dB $\pm$ 2.0 dB MAXIMUM
- SWITCHING TIME ON: 25 μ sec OFF: 10 μ sec
- VSWR 2.0:1 MAXIMUM, 1.75 TYPICAL
(@ 0dB ATTENUATION)
- RF POWER RATINGS
OPERATING +10 dBm CW MAXIMUM, +20dBm TYPICAL.
SURVIVAL +30 dBm CW MAXIMUM
- CONTROL 10 BIT TRUE BINARY LOGIC
- POWER SUPPLY +15VDC @ 250 mA MAXIMUM
-15VDC @ 50 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS 15 PIN D-SUBMINIATURE (MALE)
MATING CONNECTOR FURNISHED
- SIZE 2.00" x 1.81" x 0.88"

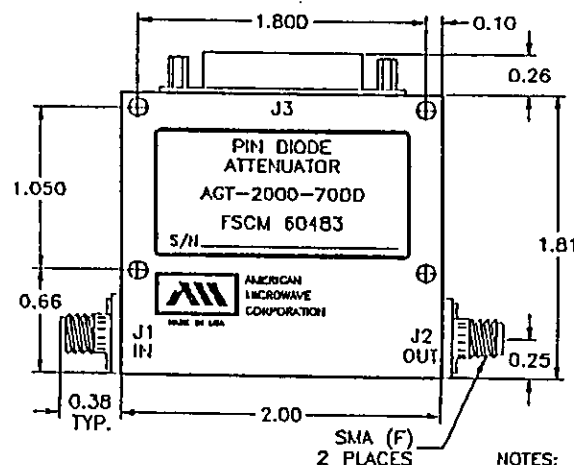
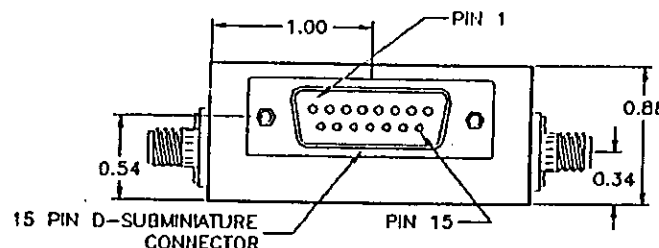
AVAILABLE OPTIONS

- A01 J1 SMA MALE, J2 SMA FEMALE
- A02 TWO SMA MALE RF CONNECTORS
- A03 8 BIT BINARY LOGIC
- A04 9 BIT BINARY LOGIC
- A05 11 BIT BINARY LOGIC
- A06 12 BIT BINARY LOGIC
- A07 EXTENDED BANDWIDTH, SLOW SPEED AND 60 dB ATTENUATION RANGE WITH DIGITAL CONTROL REFER TO DATA SHEET AGT-2018-60DD-100 (SLIM LINE). FOR ANALOG VOLTAGE CONTROLLED UNIT WITH SOLDER PINS REFER TO AGT-2018-60D-100 (SLIM LINE). (SPECIFY FREQUENCY)
 - 218 2 GHz TO 18 GHz
 - 219 2 GHz TO 19 GHz
 - 200M18 200 MHz TO 18 GHz
 - 300M18 300 MHz TO 18 GHz
 - 10M18 10 MHz TO 18 GHz
- A08 ANALOG CONTROLLED UNIT - 10/dBVOLT PIN 2 IS USED AS CONTROL (OTHER CONTROL VOLTAGES AVAILABLE). FOR SOLDER PIN UNITS REFER TO AGT-2000-70D.
- A09 HIGH SPEED UNIT $\leq 1 \mu$ SEC, DIGITAL CONTROLLED, EXTENDED BANDWIDTH AND 60 dB ATTENUATION RANGE REFER TO DATA SHEET AGN-2018-60DD-100 (SLIM LINE) FOR ANALOG VOLTAGE CONTROLLED UNITS WITH SOLDER PINS REFER TO AGN-2018-60D-100 (SLIM LINE). (FREQUENCY RANGE OPTIONS)
 - 218 2 GHz TO 18 GHz
 - 219 2 GHz TO 19 GHz
 - 300M18 300 MHz TO 18 GHz
 - 200M18 200 MHz TO 18 GHz
- A10 MOUNTING SURFACE UNPAINTED
- SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS			
ZONE	REV.	DESCRIPTION	DATE
	A	ORIGINAL RELEASE, JOB # 212313-1E	09/28/93

MECHANICAL OUTLINE



NOTES:

- 1) DIMENSIONS ARE IN INCHES
- 2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
APPROX. 4.0 OZ
- 3) WEIGHT:

10 BIT TRUE BINARY LOGIC	
J3 PIN FUNCTION	
PIN#	FUNCTION
1	GND
2	N/C
3	0.1 dB (LSB)
4	0.2 dB
5	0.4 dB
6	0.8 dB
7	1.6 dB
8	3.2 dB
9	6.4 dB
10	12.8 dB
11	25.6 dB
12	51.2 dB (MSB)
13	+V
14	-V
15	N/C

8 BIT TRUE BINARY LOGIC	
J3 PIN FUNCTIONS	
PIN NO.	FUNCTIONS.
1	GND
2	N/C
3	N/C
4	GND
5	0.25 dB (LSB)
6	0.5 dB
7	1.0 dB
8	2.0 dB
9	4.0 dB
10	8.0 dB
11	16.0 dB
12	32.0 dB
13	+V
14	-V
15	N/C

ENVIRONMENTAL RATINGS

- TEMPERATURE -55°C TO +125°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A

APPROVALS

DATE

DRAWN

WYP

10/20/93

CHIEF

J.M.

10/1/97

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7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

PRODUCT FEATURE

AGT-2000-70DD

10 MHz - 2 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZF A

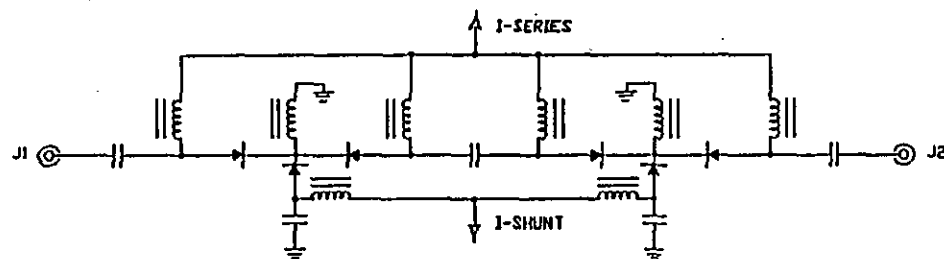
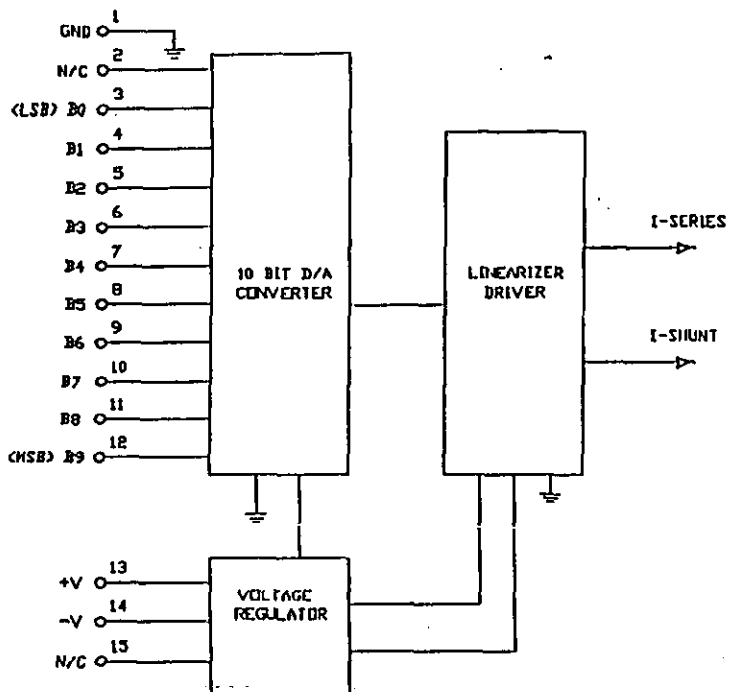
SHEET 1 OF 2

DWG. # 100-3127

FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

RF SECTION



AMERICAN MICROWAVE CORPORATION
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APPROVALS	DATE
DRAWN <i>WSP</i>	09/28/95
CHECKED	

PRODUCT FEATURE
AGT-2000-70DD

10 MHz - 2 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A	SHEET 2 OF 2	DWG. # 100-3127
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AMC MODEL AGT-2018-60DD-100 IS A BROAD BAND VARIABLE ATTENUATOR/
MODULATOR, CONTROLLED BY 8 BIT POSITIVE TRUE BINARY LOGIC.

● FREQUENCY RANGE	2.0-18.0 GHz	MINIMUM
● INSERTION LOSS	4.5 dB	MAXIMUM
● ATTENUATION FLATNESS (± dB MAXIMUM)	0-30 dB ±1.0 dB	MAXIMUM
	30-40 dB ±2.0 dB	MAXIMUM
	40-50 dB ±3.0 dB	MAXIMUM
	50-60 dB ±5.5 dB	MAXIMUM
● ATTENUATION ACCURACY	0-10 dB ±2.0 dB	MAXIMUM
	10-20 dB ±1.0 dB	MAXIMUM
	20-40 dB ±1.5 dB	MAXIMUM
	40-60 dB ±2.0 dB	MAXIMUM

- RISE & FALL TIME 3 nsec MAXIMUM
- VSWR 2.2:1 MAXIMUM
- RF POWER RATINGS
 - OPERATING +20 dBm CW MAXIMUM
 - +10 dBm (0.3 GHz OR BELOW)
 - SURVIVAL +30 dBm CW MAXIMUM
 - +27 dBm (0.3 GHz OR BELOW)
- CONTROL 8 BIT TRUE BINARY LOGIC
- POWER SUPPLY +12VDC @ 250 mA MAXIMUM, 210 mA TYPICAL
 .. -12VDC @ 50 mA MAXIMUM, 30 mA TYPICAL

- CONNECTORS
 - RF INPUT/OUTPUT..... SMA FEMALE
 - POWER AND CONTROLS..... 15 PIN MICRO-D SUBMINIATURE (MALE)
- MATING CONNECTOR FURNISHED

- **SIZE**..... 2.00" x 1.81" x 0.50"

A01. TWO SMA MALE RF CONNECTORS

A02. J1 SMA MALE, J2 SMA FEMALE

A03. BLIND MATE CONNECTORS

A04. ANALOG CONTROLLED UNIT OF 10dB/VOLT. PIN 2 IS USED AS CONTROL
(OTHER CONTROL VOLTAGES AVAILABLE). FOR SOLDER PIN UNITS REFER
TO DATA SHEET AGTN-2018-60D-100.

A05. ± 15 VDC POWER SUPPLY

A06. 0 TO 30 dB RANGE

FLATNESS: 0 - 15dB: ± 0.5 dB ACCURACY: 0 - 10dB: ± 2.0 dB
15 - 20dB: ± 1.0 dB 10 - 20dB: ± 1.0 dB
20 - 25dB: ± 1.5 dB 20 - 30dB: ± 1.5 dB
25 - 30dB: ± 2.0 dB

A07. EXTENDED FREQUENCY RANGE UNITS AND OPTIONS

200M18 OPTION EXTENDED BANDWIDTH (200 MHz - 18 GHz)

300M18 OPTION EXTENDED BANDWIDTH (300 MHz - 18 GHz)

10M18 OPTION EXTENDED BANDWIDTH (10 MHz - 18 GHz) REFER
TO DATA SHEETS AGT-2018-60DD-100 (DIGITAL CONTROL)
OR AGT-2018-60D-100 (SOLDER PIN ANALOG CONTROLLED).

219 OPTION EXTENDED BANDWIDTH (2 GHz - 19 GHz)

A08. FREQUENCY BAND OF 2 - 8 GHz

A09. 9 BIT TRUE BINARY LOGIC

A10. 10 BIT TRUE BINARY LOGIC

A11. 11 BIT TRUE BINARY LOGIC

A12. 12 BIT TRUE BINARY LOGIC

A13. FREQUENCY BAND OF 10 MHz - 2 GHz REFER TO DATA SHEET
AGT-2000-60D-100 (SLIM LINE), FOR DIGITAL VERSION
REFER TO DATA SHEET AGT-2000-60DD-100 (SLIM LINE)

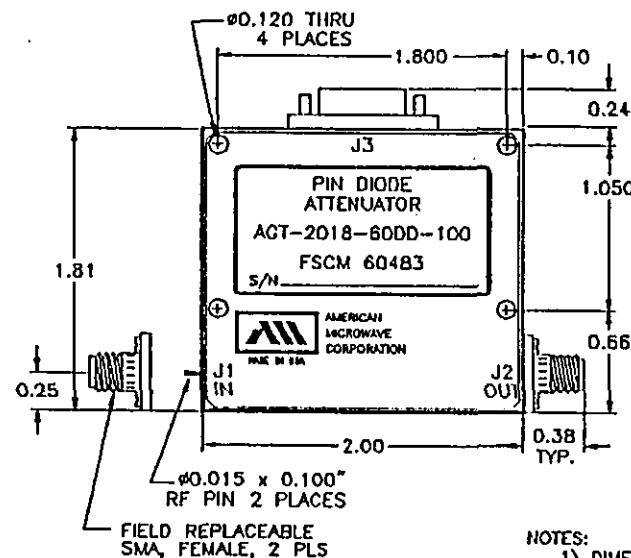
A14. MOUNTING SURFACE UNPAINTED

A15. FOR HIGH SPEED ≤ 1 μ sec AND EXTENDED FREQUENCY RANGE REFER
TO DATA SHEET AGTN-2018-60DD-100 (SLIM LINE). FOR ANALOG
CONTROLLED UNITS REFER TO AGTN-2018-60D-100 (SLIM LINE).

SCS. SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	ORIGINAL RELEASE	09/03/07	DEG



8 BIT TRUE BINARY LOGIC	
J3 PIN FUNCTIONS	
PIN NO.	FUNCTIONS.
1	GND
2	N/C *
3	N/C *
4	GND
5	0.25 dB (LSB)
6	0.5 dB
7	1.0 dB
8	2.0 dB
9	4.0 dB
10	8.0 dB
11	16.0 dB
12	32.0 dB
13	+V
14	-V
15	N/C *

* N/C = NO CONNECTION

NOTES:
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES: X.XX ±0.020
X.XXX ±0.010

- TEMPERATURE -55°C TO +125°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



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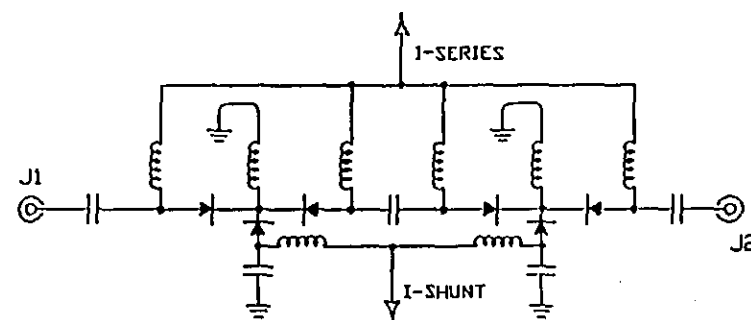
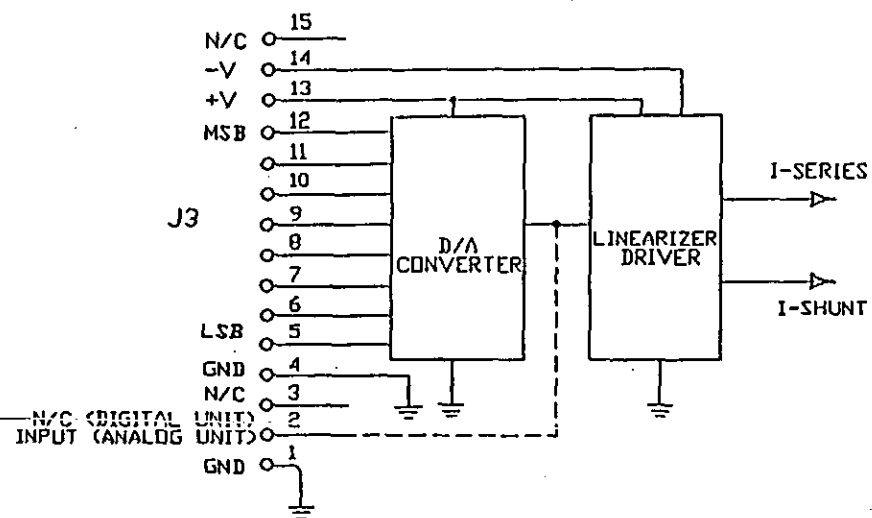
PRODUCT FEATURE
AGT-2018-60DD-100
2-18 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A	SHEET 1 OF 2	DWG. # 100-4232
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FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

RF SECTION



4-9



AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS

DATE

DESIGNER

09/05/97

CHECKED

PRODUCT FEATURE

AGT-2018-60DD-100

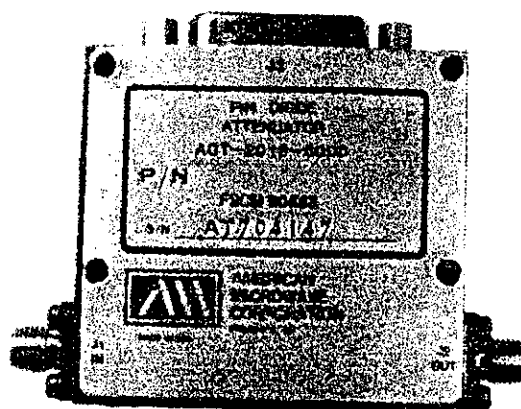
2-18 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

DWG. # 100-4232

AGT 2018-60DD MULTI-OCTAVE PIN DIODE ATTENUATOR/MODULATOR 0.3 - 18 GHz



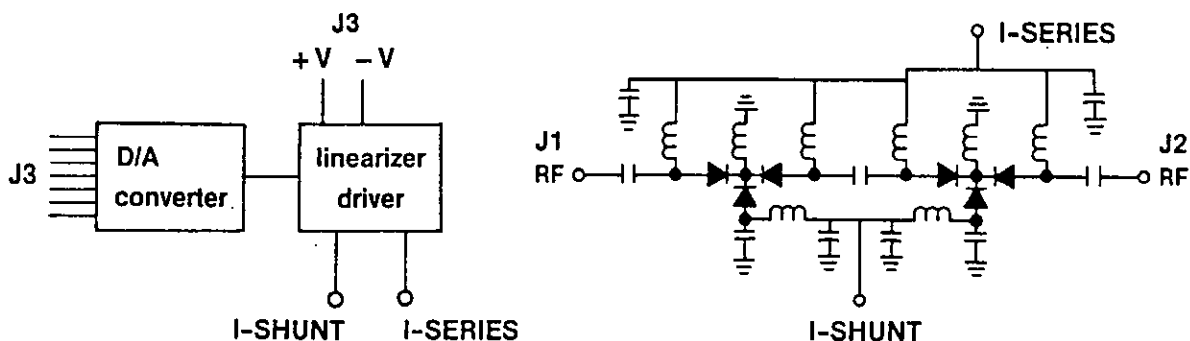
FEATURES

- Solid State Reliability
- Absorptive Type
- Linearized
- 8 Bit Digital Control

DESCRIPTION

The AGT Suffix DD Series are digitally controlled linearized attenuator/modulators that operate over the 0.3 to 18 GHz band and are non-reflective at all attenuation levels. The units consist of an AGT Series Dual "Tee" Pad Pin Diode Attenuator and Integrated Hybrid Linearizers for the Series and Shunt Diodes. The standard model covers the frequency band from 2 - 18 GHz with a band extension option to 0.3 GHz.

FUNCTIONAL SCHEMATIC



REVISED
OCTOBER 9, 1997

10/88

7311G GROVE ROAD, FREDERICK, MARYLAND 21701

Tel.: (301) 662-4700
Fax: (301) 662-4938

STANDARD SPECIFICATIONS

Frequency Range:	2 - 18 GHz (Standard Unit) 0.3 - 18 GHz (Option 007)
Insertion loss:	4.5 dB, Maximum
Attenuation Range:	0 - 60 dB (see note 1)
Attenuation Flatness:	0 - 30 dB ± 1 dB 30 - 40 dB ± 2 dB 40 - 50 dB ± 3 dB 50 - 60 dB ± 5.5 dB
Accuracy: (see note 1)	0 - 10 dB ± 2 dB 10 - 20 dB ± 1 dB 20 - 40 dB ± 1.5 dB 40 - 60 dB ± 2 dB
Power Handling (Operating):	+20 dBm, (2 - 18 GHz) +10 dBm, (0.3 - 2 GHz) Option 007 only
Power Handling (Survival):	+30 dBm, Survival +27 dBm, Survival (Option 007)
Rise and Fall Time:	3 microseconds, Maximum
Monotonicity:	Guaranteed
Control Characteristics:	8 Bit Positive. True Binary. See Table 1
Power Supply Requirements:	+12V, $\pm 5\%$ @ 250 mA Maximum, 210 mA Typical -12V, $\pm 5\%$ @ 50 mA Maximum, 30 mA Typical

NOTES

1. Attenuators are linearized to nominal (average) attenuation over the operating band unless otherwise specified. Attenuation range and accuracy are expressed in terms of nominal attenuation setting.

2. Option 6 Accuracy Insertion Loss and Flatness is as specified below:

Flatness:	0 - 15 dB ± 0.5 dB	Accuracy:	0 - 10 dB ± 2.0 dB
	15 - 20 dB ± 1.0 dB		10 - 20 dB ± 1.0 dB
	20 - 25 dB ± 1.5 dB		20 - 30 dB ± 1.5 dB
	25 - 30 dB ± 2.0 dB		

Insertion Loss: 3.5 dB Maximum

Control Voltage: 0 to +3V DC

3. Option 7 Flatness specifications are the same as standard unit

TABLE 1

PIN NO.	J3
1.	8 BIT
2.	GND
3.	ANALOG INPUT
4.	NC
5.	GND
6.	0.25 dB (LSB)
7.	0.5 dB
8.	1.0 dB
9.	2.0 dB
10.	4.0 dB
11.	8.0 dB
12.	16.0 dB
13.	32.0 dB
14.	+V
15.	-V
16.	NC

PROGRAMMING: POSITIVE TRUE, BINARY

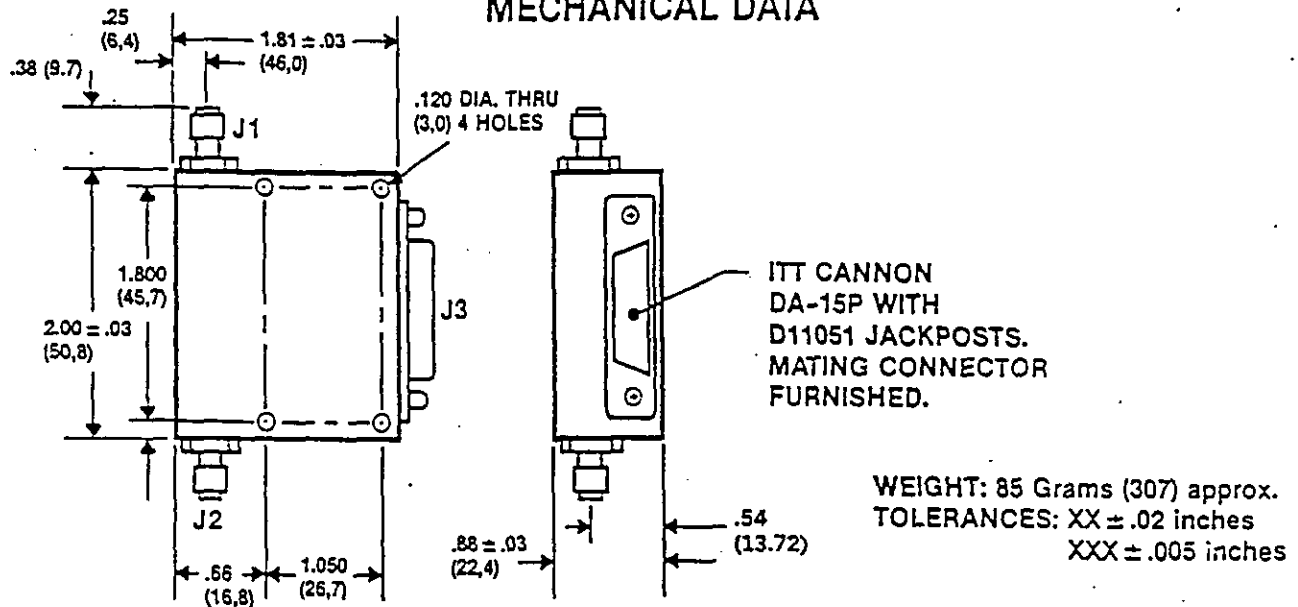
REVISED
OCTOBER 9, 1997

Handwritten:
P.A. W.P.
B.G. P.W.
E.K.
H.H.

AVAILABLE OPTIONS

Option No.	Description
001	Two SMA male RF connectors
002	One SMA male and one SMA female RF connector
003	SMA female control connector
005	$\pm 15V$ DC power supply
006	0 - 30 dB range (see Note 2)
007	Extend frequency band 0.3 - 18 GHz (see Note 3)
008	Frequency Band 2 - 8 GHz

MECHANICAL DATA



ENVIRONMENTAL RATINGS

Temperature Range:

Operating: $-55^{\circ}C$ to $+125^{\circ}C$

Storage: $-65^{\circ}C$ to $+125^{\circ}C$

Humidity: MIL-STD-202C, Method 103B, Cond. B
(96 Hrs. @ 95%)

Shock: MIL-STD-202C, Method 213, Cond. B
(75G, 6 msec)

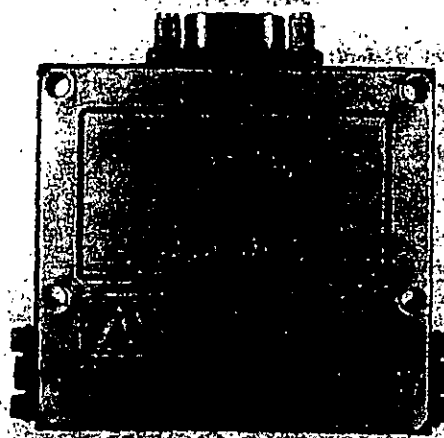
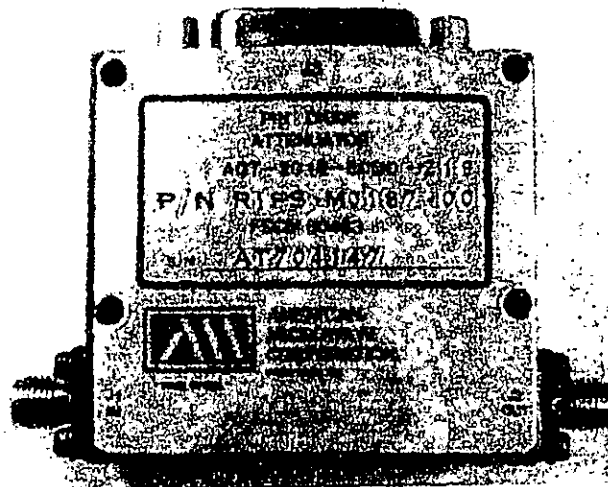
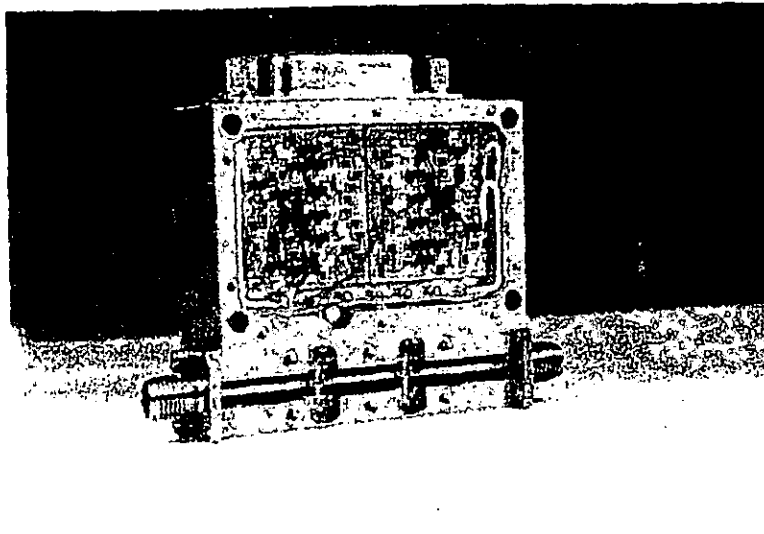
Vibration: MIL-STD-202C, Method 204A, Cond. B
(.06" double amplitude or 15G whichever is less).

Altitude: MIL-STD-202C, Method 105C, Cond. B
(50,000 ft.)

Temp. Cycling: MIL-STD-202C, Method 102, Cond. D, 5 cycles.

REVISED
OCTOBER 9, 1997

Handwritten: R.A. WP HH
B4 M EK



DESCRIPTION

AMC MODEL AGT-2000-60D-100 IS A BROAD BAND VARIABLE ATTENUATOR/MODULATOR, 10dB/VOLT ANALOG CONTROLLED (OTHER CONTROL VOLTAGES AVAILABLE)

SPECIFICATIONS

- FREQUENCY RANGE 10 MHz - 2.0 GHz MINIMUM
- INSERTION LOSS 2.5 dB MAXIMUM
- ATTENUATION FLATNESS
($\pm$ dB MAXIMUM) 0-30 dB $\pm$ 0.5 dB MAXIMUM
30-50 dB $\pm$ 1.5 dB MAXIMUM
50-60 dB $\pm$ 2.5 dB MAXIMUM
- ATTENUATION ACCURACY 0-10 dB $\pm$ 2.0 dB MAXIMUM
10-20 dB $\pm$ 1.0 dB MAXIMUM
20-50 dB $\pm$ 1.5 dB MAXIMUM
50-60 dB $\pm$ 2.0 dB MAXIMUM
- SWITCHING TIME ON: 25 μ sec OFF: 10 μ sec
- VSWR 2.0:1 MAXIMUM, 1.75 TYPICAL
(@ 0dB ATTENUATION)
- RF POWER RATINGS
OPERATING +10 dBm CW MAXIMUM, +20 dBm TYPICAL
SURVIVAL +30 dBm CW MAXIMUM
- CONTROL 10dB/VOLT ANALOG CONTROLLED
(OTHER CONTROL VOLTAGES AVAILABLE)
- POWER SUPPLY +12VDC @ 250 mA MAXIMUM, (210 mA TYPICAL)
-12VDC @ 50 mA MAXIMUM, (30 mA TYPICAL)
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS SOLDER PIN CONTROL
- SIZE 2.00" x 1.81" x 0.50"

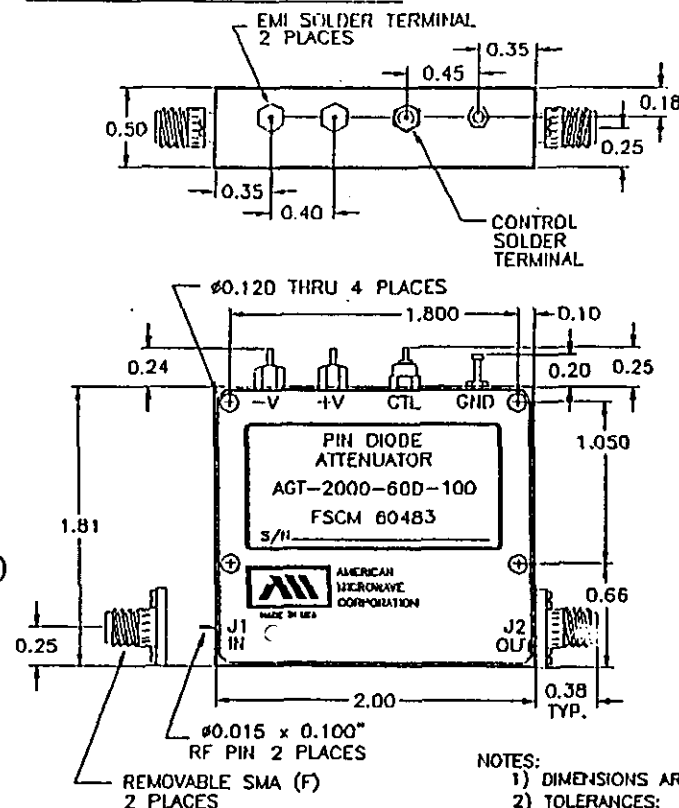
AVAILABLE OPTIONS

- A01 TWO SMA MALE RF CONNECTORS
- A02 J1 SMA MALE, J2 SMA FEMALE
- A03 FOR EXTENDED FREQUENCY RANGE UNITS OF 2-18 GHz,
2-19 GHz, 0.3-18 GHz, 0.2-18 GHz, 10 MHz-18 GHz REFER
TO AGT-2018-60D-100 (SLIM LINE) DATA SHEET. FOR DIGITAL
CONTROLLED UNITS REFER TO AGT-2018-60DD-100 (SLIM LINE).
- A04 5dB/VOLT ANALOG CONTROL
- A05 $\pm$ 15 VDC POWER SUPPLY
- A06 0 TO 30 dB RANGE
- A07 FOR HIGH SPEED UNITS OF $\leq$ 1 μ sec AND EXTENDED
FREQUENCY RANGE UNITS OF 2-18 GHz, 2-19 GHz, 0.3-18
GHz AND 0.2-18 GHz REFER TO AGT-2018-60D-100
(SLIM LINE). FOR DIGITAL CONTROLLED UNITS REFER
TO AGT-2018-60DD-100 (SLIM LINE)
- A08 FOR DIGITAL CONTROLLED UNIT REFER TO
AGT-2000-60DD-100 DATA SHEET
- A09 MOUNTING SURFACE UNPAINTED
- A10 BLIND MATE CONNECTORS
- SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	ORIGINAL RELEASE	04/28/93	AKG

MECHANICAL OUTLINE



- NOTES:
- 1) DIMENSIONS ARE IN INCHES
 - 2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010

ENVIRONMENTAL RATINGS

- TEMPERATURE -55°C TO +125°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

PRODUCT FEATURE

AGT-2000-60D-100

10 MHz - 2 GHz, VOLTAGE VARIABLE ATTENUATOR

SIZE A SHEET 1 OF 2 DWG. # 100-4229

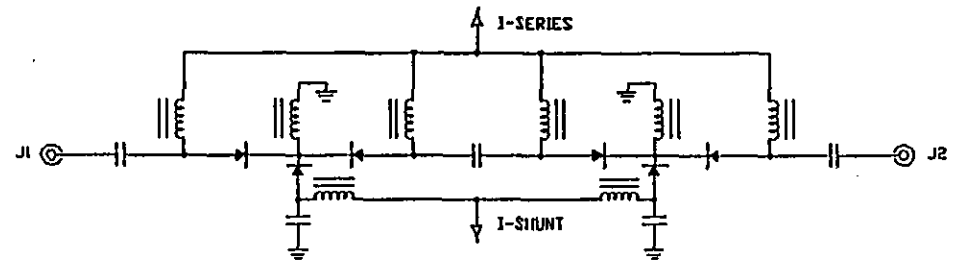
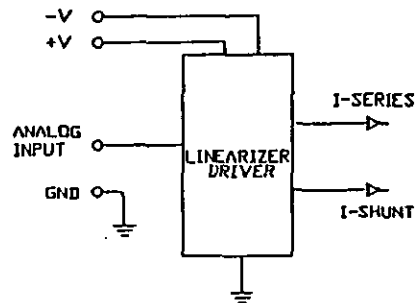
HH
AW
EK
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APPROVALS		DATE
DRAWN	W.P.P.	
CHECKED	E.H.H.	08/28/93

FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

RF SECTION



4-15



AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS

DATE

DRAWN

WYP

04/28/93

CHECKED

PRODUCT FEATURE
AGT-2000-60D-100

10 MHz ~ 2 GHz, VOLTAGE VARIABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

DWG. # 100-4229

DESCRIPTION

AMC MODEL AGT-2000-60D IS A BROAD BAND VARIABLE ATTENUATOR/MODULATOR, 10dB/VOLT ANALOG CONTROLLED (OTHER CONTROL VOLTAGES AVAILABLE)

SPECIFICATIONS

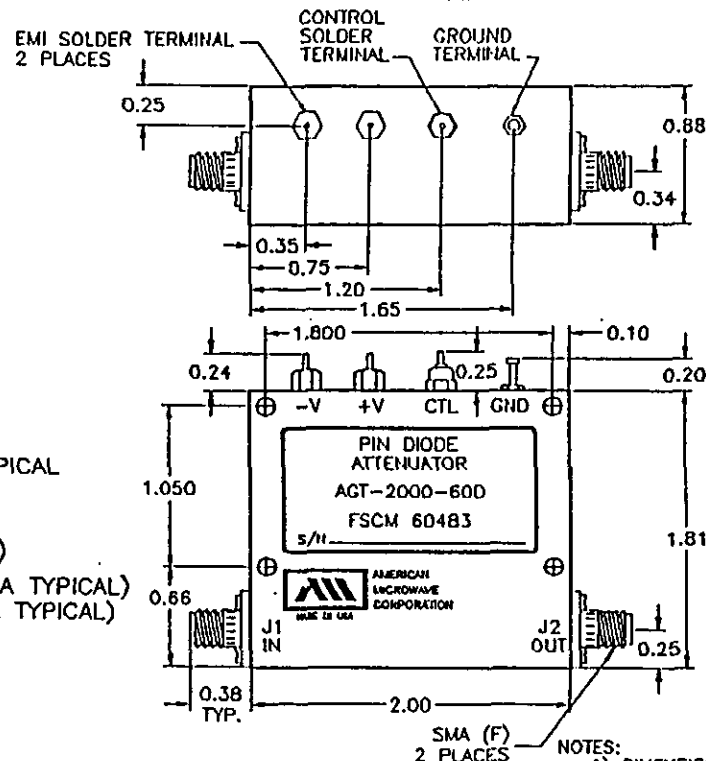
- FREQUENCY RANGE 10 MHz - 2.0 GHz MINIMUM
- INSERTION LOSS 2.5 dB MAXIMUM
- ATTENUATION FLATNESS
($\pm$ dB MAXIMUM) 0-30 dB ± 0.5 dB MAXIMUM
30-50 dB ± 1.5 dB MAXIMUM
50-60 dB ± 2.5 dB MAXIMUM
- ATTENUATION ACCURACY 0-10 dB ± 2.0 dB MAXIMUM
10-20 dB ± 1.0 dB MAXIMUM
20-50 dB ± 1.5 dB MAXIMUM
50-60 dB ± 2.0 dB MAXIMUM
- SWITCHING TIME ON: 25 μ sec OFF: 10 μ sec
- VSWR 2.0:1 MAXIMUM, 1.75 TYPICAL
(@ 0dB ATTENUATION)
- RF POWER RATINGS
OPERATING +10 dBm CW MAXIMUM, +20 dBm TYPICAL
SURVIVAL +30 dBm CW MAXIMUM
- CONTROL 10dB/VOLT ANALOG CONTROLLED
(OTHER CONTROL VOLTAGES AVAILABLE)
- POWER SUPPLY +12VDC @ 250 mA MAXIMUM (210 mA TYPICAL)
-12VDC @ 50 mA MAXIMUM (30 mA TYPICAL)
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS SOLDER PIN CONTROL
- SIZE 2.00" x 1.81" x 0.88"

AVAILABLE OPTIONS

- A01 TWO SMA MALE RF CONNECTORS
- A02 J1 SMA MALE, J2 SMA FEMALE
- A03 FOR EXTENDED FREQUENCY RANGE UNITS OF
2-18 GHz, 2-19 GHz, 0.3-18 GHz, 0.2-18 GHz,
10 MHz-18 GHz AND ANALOG CONTROLLED REFER TO
AGT-2018-60D-100 (SLIM LINE VERSION) DATA SHEETS. FOR
DIGITAL CONTROL REFER TO AGT-2018-60DD-100 (SLIM LINE)
- A04 5dB/VOLT ANALOG CONTROL
- A05 ± 15 VDC POWER SUPPLY
- A06 0 TO 30 dB RANGE
- A07 FOR HIGH SPEED UNITS OF ≤ 1 μ sec AND EXTENDED
FREQUENCY RANGE UNITS OF 2-18 GHz, 2-19 GHz, 0.3-18
GHz AND 0.2-18 GHz REFER TO AGTN-2018-60D-100 (SLIM
LINE). FOR DIGITAL CONTROLLED UNITS REFER TO DATA
SHEETS AGTN-2018-60DD-100 (SLIM LINE)
- A08 FOR DIGITAL CONTROL UNITS REFER TO AGT-2000-60DD-100
(SLIM LINE VERSION) DATA SHEETS.
- A09 MOUNTING SURFACE UNPAINTED
- SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

MECHANICAL OUTLINE



- NOTES:
- 1) DIMENSIONS ARE IN INCHES
 - 2) TOLERANCES: X.XX ± 0.020
X.XXX ± 0.010
APPROX. 4.0 OZ
 - 3) WEIGHT:

ENVIRONMENTAL RATINGS

- TEMPERATURE -55°C TO +125°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS	DATE
WSP	09/25/93
WSP	09/25/93
WSP	09/25/93

PRODUCT FEATURE	
AGT-2000-60D	
10 MHz - 2 GHz, VOLTAGE VARIABLE ATTENUATOR	
SIZE A	SHEET 1 OF 2

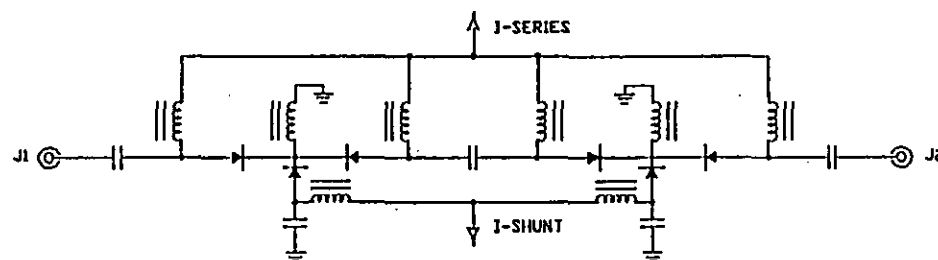
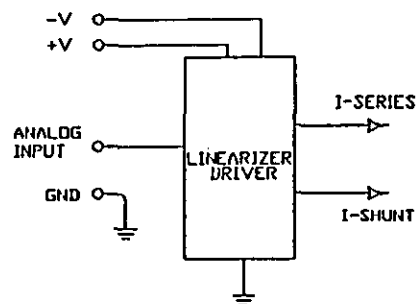
DWG. # 100-3127-3

WSP
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WSP
WSP

FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

RF SECTION



		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRODUCT FEATURE AGT-2000-60D 10 MHz - 2 GHz, VOLTAGE VARIABLE ATTENUATOR	
APPROVALS DRAWN <i>WSP</i> CHECKED	DATE 09/28/95	SIZE A	SHEET 2 OF 2

DESCRIPTION

AMC MODEL AGT-2000-70D IS A BROAD BAND VARIABLE ATTENUATOR/MODULATOR, 10dB/VOLT ANALOG CONTROLLED (OTHER CONTROL VOLTAGES AVAILABLE).

SPECIFICATIONS

- FREQUENCY RANGE 10 MHz-2.0 GHz MINIMUM
- INSERTION LOSS 2.5 dB MAXIMUM
- ATTENUATION FLATNESS
($\pm$ dB MAXIMUM) 0-30 dB $\pm$ 0.5 dB MAXIMUM
30-50 dB $\pm$ 1.5 dB MAXIMUM
50-70 dB $\pm$ 2.5 dB MAXIMUM
- ATTENUATION ACCURACY 0-10 dB $\pm$ 2.0 dB MAXIMUM
10-20 dB $\pm$ 1.0 dB MAXIMUM
20-50 dB $\pm$ 1.5 dB MAXIMUM
50-70 dB $\pm$ 2.0 dB MAXIMUM
- SWITCHING TIME ON: 25 μ sec OFF: 10 μ sec
- VSWR 2.0:1 MAXIMUM, 1.75 TYPICAL
(@ 0dB ATTENUATION)
- RF POWER RATINGS
OPERATING +10 dBm CW MAXIMUM, +20dBm TYPICAL.
SURVIVAL +30 dBm CW MAXIMUM
- CONTROL 10dB/VOLT ANALOG CONTROLLED
(OTHER CONTROL VOLTAGES AVAILABLE)
- POWER SUPPLY +15VDC @ 250 mA MAXIMUM
-15VDC @ 50 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS SOLDER PIN CONTROL
- SIZE 2.00" x 1.81" x 0.88"

AVAILABLE OPTIONS

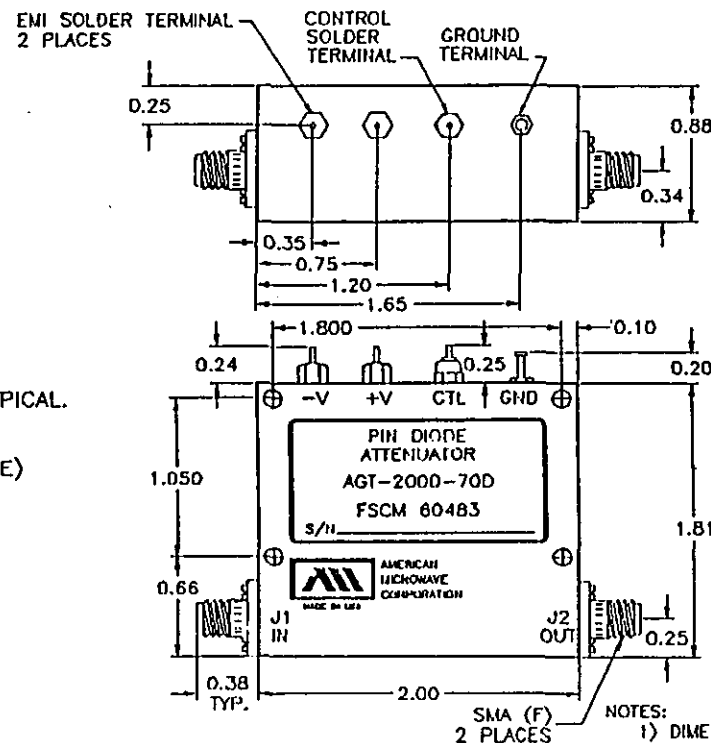
- A01 J1 SMA MALE, J2 SMA FEMALE
- A02 TWO SMA MALE RF CONNECTORS
- A03 FOR DIGITAL UNIT REFER TO AGT-2000-7000 DATA SHEET
- A04 5dB/VOLT ANALOG CONTROL
- A05 MOUNTING SURFACE UNPAINTED
- A06 EXTENDED BANDWIDTH, SLOW SPEED AND 60 dB ATTENUATION RANGE
REFER TO DATA SHEETS AGT-2018-600-100 (SLIM LINE). FOR DIGITAL
CONTROLLED UNIT REFER TO AGT-2018-600D-100 (SLIM LINE).
(SPECIFY FREQUENCY)
218 2 GHz TO 18 GHz
219 2 GHz TO 19 GHz
200M18 200 MHz TO 18 GHz
300M18 300 MHz TO 18 GHz
10M18 10 MHz TO 18 GHz
- A07 HIGH SPEED UNIT ($\leq 1\mu$ SEC) AND 60 dB ATTENUATION RANGE REFER TO
DATA SHEETS AGT-2018-600-100 (SLIM LINE) FOR DIGITAL
CONTROLLED UNITS REFER TO AGT-2018-600D-100
(SLIM LINE). (FREQUENCY RANGE OPTIONS)
218 2 GHz TO 18 GHz
219 2 GHz TO 19 GHz
300M18 300 MHz TO 18 GHz
200M18 200 MHz TO 18 GHz
- SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS			
ZONE	REV.	DESCRIPTION	DATE
	A	ORIGINAL RELEASE, JOB # 212313-1E	08/28/93

APPROVED
AKG

MECHANICAL OUTLINE



- NOTES:
- 1) DIMENSIONS ARE IN INCHES
 - 2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
APPROX. 4.0 OZ
 - 3) WEIGHT:

ENVIRONMENTAL RATINGS

- TEMPERATURE -55°C TO +125°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A

		APPROVALS	DATE
		DRAWN WSPD 10/23/93 CHECKED P. J. J. 10/29/97	

AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

PRODUCT FEATURE
AGT-2000-70D

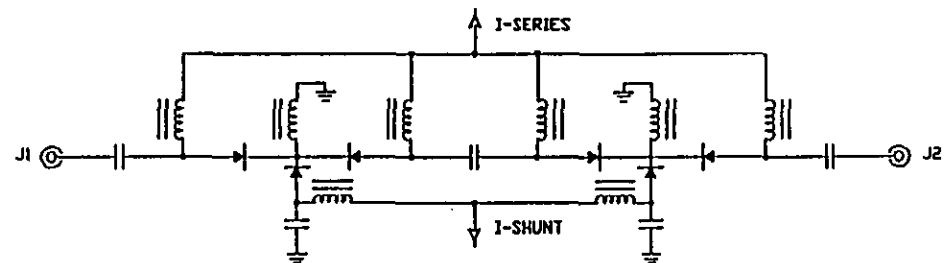
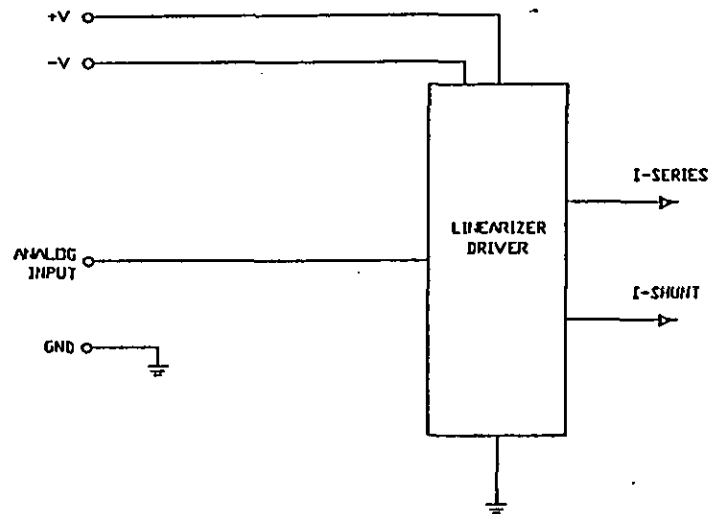
10 MHz - 2 GHz, VOLTAGE VARIABLE ATTENUATOR

SIZE A SHEET 1 OF 2 DWG. # 100-3127-4

FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

RF SECTION



4-19



AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS

DATE

DRAWN

08/28/95

CHECKED

PRODUCT FEATURE

AGT-2000-70D

10 MHz - 2 GHz, VOLTAGE VARIABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

DWG. # 100-3127-4

DESCRIPTION

ANC MODEL AGT-2018-60D-100 IS A BROAD BAND VARIABLE ATTENUATOR/
MODULATOR, 10dB/VOLT ANALOG CONTROLLED

SPECIFICATIONS

- FREQUENCY RANGE 2.0-18.0 GHz MINIMUM
- INSERTION LOSS 4.5 dB MAXIMUM
- ATTENUATION FLATNESS
($\pm$ dB MAXIMUM) 0-30 dB $\pm$ 1.0 dB MAXIMUM
30-40 dB $\pm$ 2.0 dB MAXIMUM
40-50 dB $\pm$ 3.0 dB MAXIMUM
50-60 dB $\pm$ 5.5 dB MAXIMUM
- ATTENUATION ACCURACY 0-10 dB $\pm$ 2.0 dB MAXIMUM
10-20 dB $\pm$ 1.0 dB MAXIMUM
20-40 dB $\pm$ 1.5 dB MAXIMUM
40-60 dB $\pm$ 2.0 dB MAXIMUM
- RISE & FALL TIME 3 μ sec MAXIMUM
- VSWR 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING +20 dBm CW MAXIMUM
+10 dBm (0.3 GHz OR BELOW)
SURVIVAL +30 dBm CW MAXIMUM
+27 dBm (0.3 GHz OR BELOW)
- CONTROL 10dB/VOLT ANALOG CONTROLLED
- POWER SUPPLY +12VDC @ 250 mA MAXIMUM, 210 mA TYPICAL
-12VDC @ 50 mA MAXIMUM, 30 mA TYPICAL
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS SOLDER PIN CONTROL
- SIZE 2.00" x 1.81" x 0.50"

AVAILABLE OPTIONS

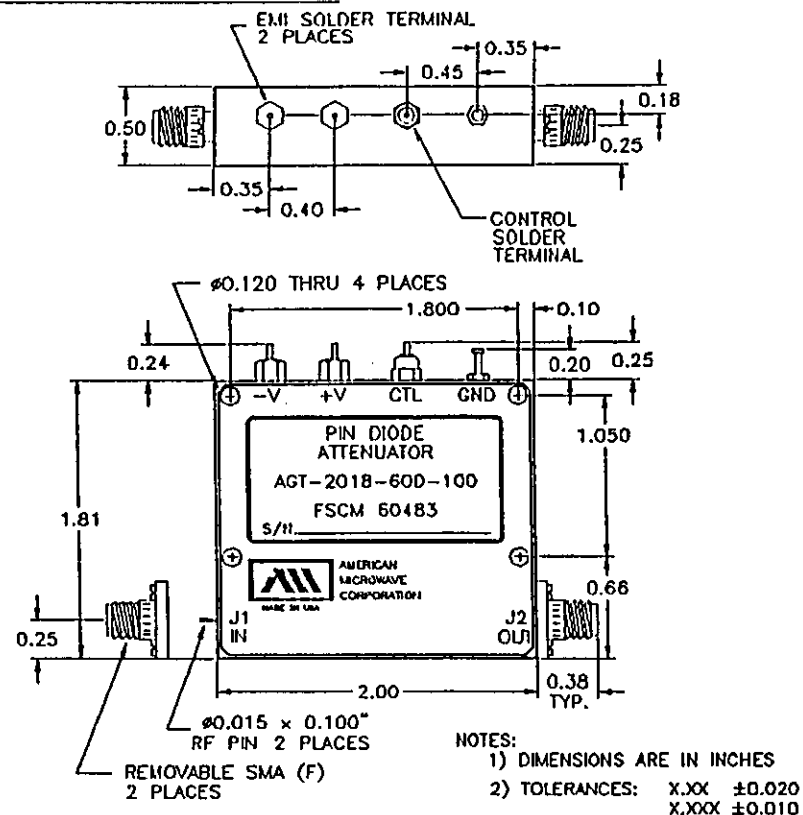
- A01 TWO SMA MALE RF CONNECTORS
- A02 J1 SMA MALE, J2 SMA FEMALE
- A03 BLIND MATE CONNECTORS
- A04 5dB/VOLT SENSITIVITY
- A05 $\pm$ 15VDC POWER SUPPLY
- A06 0 TO 30 dB RANGE
FLATNESS: 0 - 15dB: $\pm$ 0.5dB ACCURACY: 0 - 10dB: $\pm$ 2.0dB
15 - 20dB: $\pm$ 1.0dB 10 - 20dB: $\pm$ 1.0dB
20 - 25dB: $\pm$ 1.5dB 20 - 30dB: $\pm$ 1.5dB
25 - 30dB: $\pm$ 2.0dB
- A07 EXTENDED FREQUENCY RANGE UNIT AND OPTIONS
200M18 OPTION EXTENDED BANDWIDTH (200 MHz - 18 GHz)
300M18 OPTION EXTENDED BANDWIDTH (300 MHz - 18 GHz)
10M18 OPTION EXTENDED BANDWIDTH (10 MHz - 18 GHz)
219 OPTION EXTENDED BANDWIDTH (2 GHz - 19 GHz)
- A08 FREQUENCY BAND OF 2 - 18 GHz
- A09 FREQUENCY BAND OF 10 MHz - 2 GHz REFER TO DATA SHEET
AGT-2000-60D-100 (SLIM LINE), FOR DIGITAL VERSION
REFER TO DATA SHEET AGT-2000-60DD-100 (SLIM LINE)
- A10 FOR HIGH SPEED $\leq$ 1 μ sec DIGITAL CONTROLLED UNITS AND
EXTENDED FREQUENCY RANGE REFER TO DATA SHEET
AGT-2018-60DD-100 (SLIM LINE). FOR HIGH SPEED ANALOG
CONTROLLED UNIT REFER TO AGT-2018-60D-100 (SLIM LINE).
- A11 MOUNTING SURFACE UNPAINTED
- A12 FOR DIGITAL CONTROLLED UNITS REFER TO AGT-2018-60DD-100
(SLIM LINE).
- SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS			
ZONE	REV.	DESCRIPTION	DATE
	A	ORIGINAL RELEASE	09/05/97

APPROVED
AKG

MECHANICAL OUTLINE



ENVIRONMENTAL RATINGS

- TEMPERATURE -55°C TO +125°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A

		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRODUCT FEATURE AGT-2018-60D-100 2-18 GHz, VOLTAGE VARIABLE ATTENUATOR	
APPROVALS DESIGNED: <i>WSP</i> CHECKED: <i>J.M.</i>	DATE 10/05/97 10/9/97	SIZE A	SHEET 1 OF 2

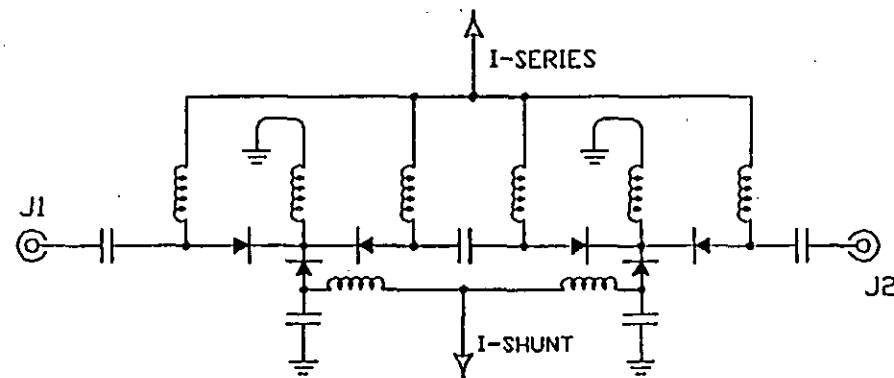
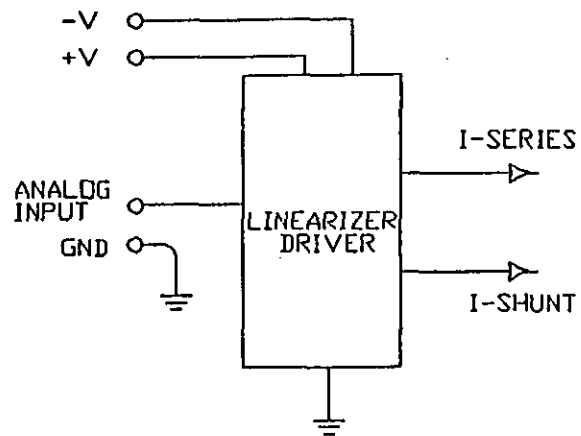
28 44 84
20 86
10/9/97

OWG. # 100-4233

FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

RF SECTION



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS

DATE

DRAWN

WSP

09/05/97

CHECKED

PRODUCT FEATURE

AGT-2018-60D-100

2-18 GHz, VOLTAGE VARIABLE ATTENUATOR

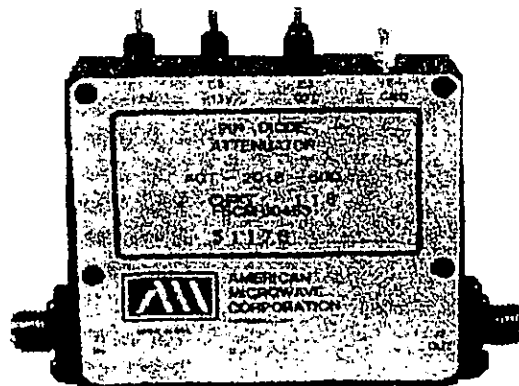
SIZE A

SHEET 2 OF 2

DWG. # 100-4233

AMERICAN Microwave Corporation

AGT-2018-60D MULTI-OCTAVE PIN DIODE ATTENUATOR/MODULATOR 0.3 - 18 GHz



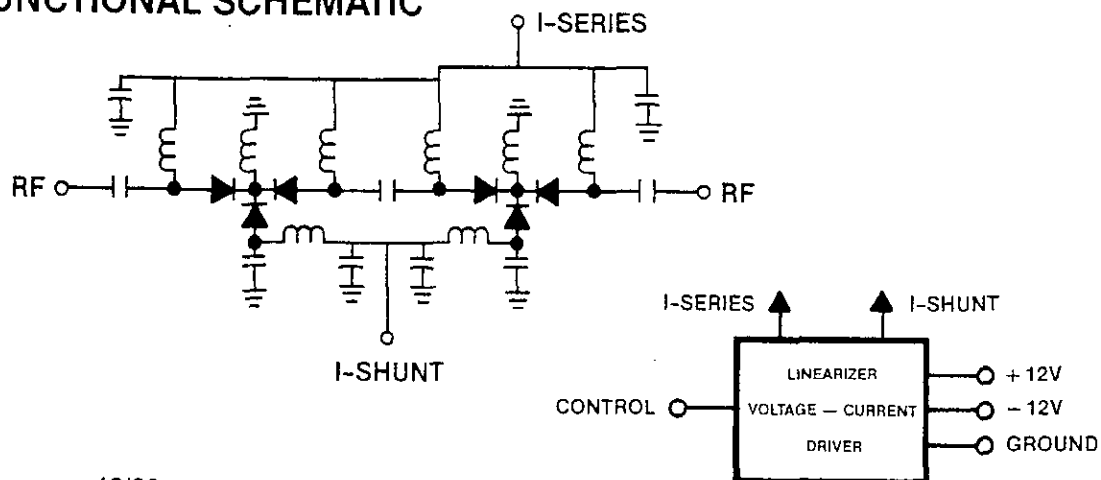
FEATURES

- Solid State Reliability
- Absorptive Type
- Linearized
- Voltage Controlled

DESCRIPTION

The AGT Suffix D Series are voltage controlled linearized attenuator/modulators that operate over the 0.3 to 18 GHz band and are non-reflective at all attenuation levels. The units consist of an AGT Series Dual "Tee" Pad Pin Diode Attenuator and Integrated Hybrid Linearizers for the Series and Shunt Diodes. The standard model covers the frequency band from 2 - 18 GHz with a band extension option to 0.3 GHz.

FUNCTIONAL SCHEMATIC



10/88

REVISED
OCTOBER 9, 1997

7311G GROVE ROAD, FREDERICK, MARYLAND 21701

Tel.: (301) 662-4700
Fax: (301) 662-4938

SPECIFICATIONS

Frequency Range:	2 - 18 Ghz (Standard Unit) 0.3 - 18 Ghz (Option 007)
Insertion loss:	4.5 dB, Maximum
Attenuation Range:	0 - 60 dB (see note 1)
Attenuation Flatness:	0 - 30 dB ± 1 dB 30 - 40 dB ± 2 dB 40 - 50 dB ± 3 dB 50 - 60 dB ± 5.5 dB
Accuracy: (see note 1)	0 - 10 dB ± 2 dB 10 - 20 dB ± 1 dB 20 - 40 dB ± 1.5 dB 40 - 60 dB ± 2 dB
Power Handling (Operating):	+20 dBm, (2 - 18 Ghz) +10 dBm, (0.3 - 2 Ghz) Option 007 only
Power Handling (Survival):	+30 dBm, Survival +27 dBm, Survival (Option 007)
Rise and Fall Time:	3 microseconds, Maximum
Monotonicity:	Guaranteed
Control Characteristics:	Range: 0 to +6V DC Transfer Function: 10 dB/Volt Input Impedance: 10K Ohms
Power Supply Requirements:	+12V, $\pm 5\%$ @ 250 mA Maximum, 210 mA Typical -12V, $\pm 5\%$ @ 50 mA Maximum, 30 mA Typical

NOTES

1. Attenuators are linearized to nominal (average) attenuation over the operating band unless otherwise specified. Attenuation range and accuracy are expressed in terms of nominal attenuation setting.

2. Option 6 Accuracy Insertion Loss and Flatness is as specified below:

Flatness:	0 - 15 dB ± 0.5 dB	Accuracy:	0 - 10 dB ± 2.0 dB
	15 - 20 dB ± 1.0 dB		10 - 20 dB ± 1.0 dB
	20 - 25 dB ± 1.5 dB		20 - 30 dB ± 1.5 dB
	25 - 30 dB ± 2.0 dB		

Insertion Loss: 3.5 dB Maximum

Control Voltage: 0 to +3V DC

3. Option 7 Flatness specifications are the same as standard unit

ENVIRONMENTAL RATINGS

Temperature Range:

Operating: -55° C to $+125^{\circ}$ C

Storage: -65° C to $+125^{\circ}$ C

Humidity: MIL-STD-202C, Method 103B, Cond. B
(96 Hrs. @ 95%)

Shock: MIL-STD-202C, Method 213, Cond. B
(75G, 6 msec)

Vibration: MIL-STD-202C, Method 204A, Cond. B
(.06" double amplitude or 15G whichever
is less).

Altitude: MIL-STD-202C, Method 105C, Cond. B
(50,000 ft.)

Temp. Cycling: MIL-STD-202C, Method 102, Cond. D, 5 cycles.

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OCTOBER 9, 1997

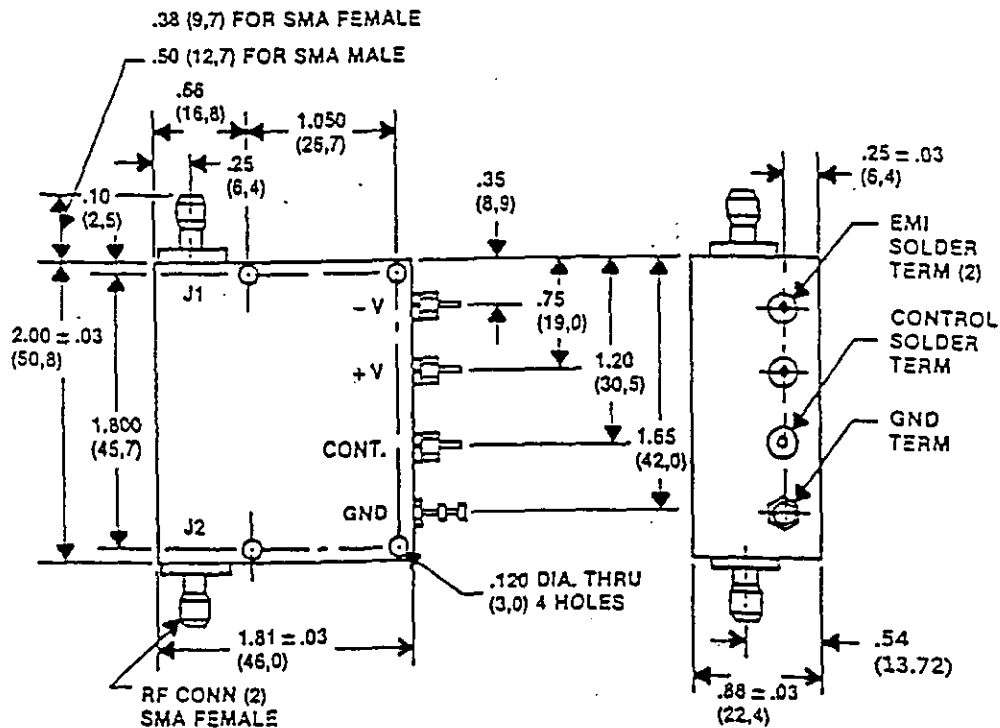
U1 R.A. WP
B.G. PW EK
Hib

AVAILABLE OPTIONS

Option No.	Description
001	Two SMA male RF connectors
002	One SMA male and one SMA female RF connector
003	SMA female control connector
004	5 dB/Volt sensitivity
005	$\pm 15V$ DC power supply
006	0 - 30 dB range (see Note 2)
007	Extend frequency band 0.3 - 18 GHz (see Note 3)
008	Frequency Band 2 - 8 GHz

MECHANICAL DATA

Dimensions and Weights

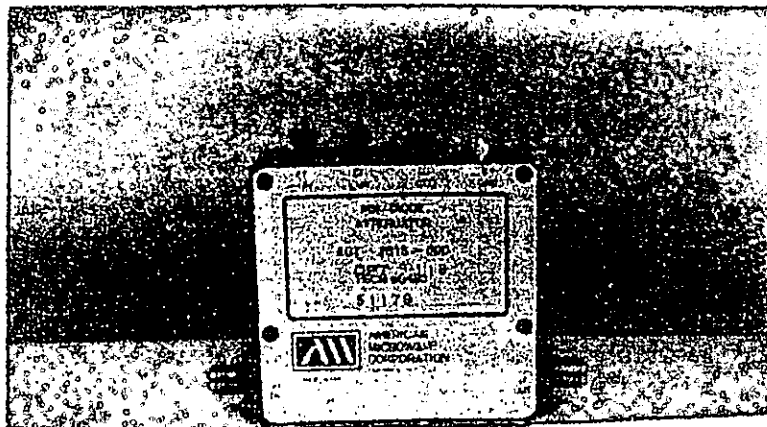
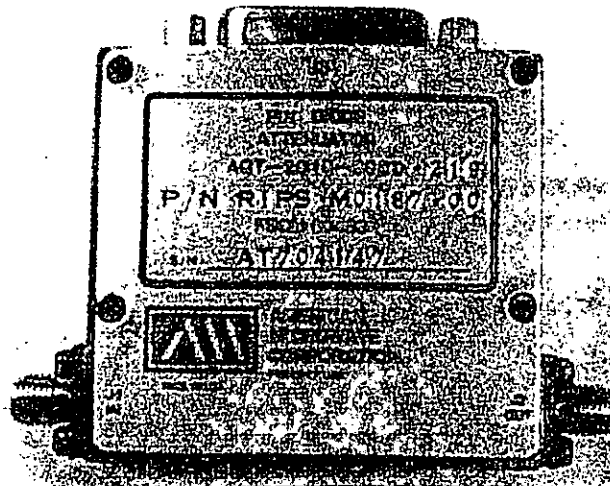
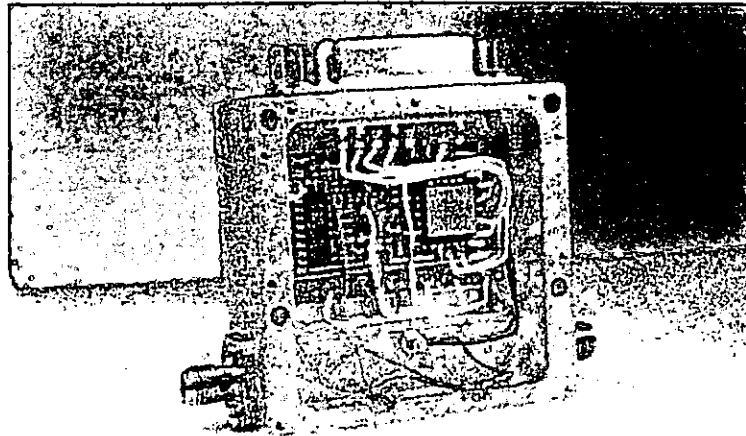


WEIGHT: 85 GRAMS (3 OZ.) APPROX.

TOLERANCES: .XX = .02 INCHES
 .XXX = .005 INCHES

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 OCTOBER 9, 1997

Handwritten notes:
 R.A. WP
 BG PW EK





SECTION

PRODUCT DESCRIPTION

PAGES

5.0	0.5 TO 18 GHz (SIZE: 1.8" x 2.0" x 0.5")	<u>HIGH SPEED ($\leq 1\mu\text{Sec}$) DVAN, VVAN, CVAN-OCTAVE BAND, VARIABLE ATTENUATOR SERIES. SIZE: 1.8" x 2.0" x 0.5"</u> • DIGITAL: DVAN • ANALOG/VOLTAGE: VVAN • CURRENT: CVAN CONTROLLED ATTENUATORS 5-0 TO 5-2																																				
5.1	0.5 TO 18 GHz	TYPICAL DATA ON OCTAVE BAND 0.5 TO 18 GHz, <u>500ns HIGH SPEED, 60dB DYNAMIC RANGE,</u> • DIGITALLY VARIABLE: DVAN • VOLTAGE VARIABLE: VVAN • CURRENT VARIABLE: CVAN ABSORPTIVE PIN DIODE ATTENUATORS WITH <u>REMOVABLE SMA RF CONNECTORS FOR</u> <u>SURFACE MOUNT CAPABILITY</u> 5-4																																				
5.2	0.5 TO 18 GHz	(DVAN/VVAN/CVAN) SPECIFICATIONS: (E : EXTENDED BAND)																																				
		<table><tr><th></th><th><u>FREQUENCY RANGE</u></th><th><u>MODEL NUMBER</u></th><th></th></tr><tr><td>5.2.1</td><td>0.5 TO 1 GHz 0.4 TO 1.25 GHz</td><td>0510 0510E</td><td>5-5 TO 5-7</td></tr><tr><td>5.2.2</td><td>1 TO 2 GHz 0.75 TO 2.25 GHz</td><td>1020 1020E</td><td>5-5 TO 5-7</td></tr><tr><td>5.2.3</td><td>2 TO 4 GHz 1.5 TO 4.5 GHz</td><td>2040 2040E</td><td>5-5 TO 5-7</td></tr><tr><td>5.2.4</td><td>2.5 TO 5 GHz 1.9 TO 5.6 GHz</td><td>2550 2550E</td><td>5-5 TO 5-7</td></tr><tr><td>5.2.5</td><td>4 TO 8 GHz 3 TO 9 GHz</td><td>4080 4080E</td><td>5-5 TO 5-7</td></tr><tr><td>5.2.6</td><td>5 TO 10 GHz 3.75 TO 11.25 GHz</td><td>5010 5010E</td><td>5-5 TO 5-7</td></tr><tr><td>5.2.7</td><td>6 TO 12 GHz 4.5 TO 13 GHz</td><td>6012 6012E</td><td>5-5 TO 5-7</td></tr><tr><td>5.2.8</td><td>8 TO 18 GHz 6 TO 18 GHz</td><td>8018 8018E</td><td>5-5 TO 5-7</td></tr></table>		<u>FREQUENCY RANGE</u>	<u>MODEL NUMBER</u>		5.2.1	0.5 TO 1 GHz 0.4 TO 1.25 GHz	0510 0510E	5-5 TO 5-7	5.2.2	1 TO 2 GHz 0.75 TO 2.25 GHz	1020 1020E	5-5 TO 5-7	5.2.3	2 TO 4 GHz 1.5 TO 4.5 GHz	2040 2040E	5-5 TO 5-7	5.2.4	2.5 TO 5 GHz 1.9 TO 5.6 GHz	2550 2550E	5-5 TO 5-7	5.2.5	4 TO 8 GHz 3 TO 9 GHz	4080 4080E	5-5 TO 5-7	5.2.6	5 TO 10 GHz 3.75 TO 11.25 GHz	5010 5010E	5-5 TO 5-7	5.2.7	6 TO 12 GHz 4.5 TO 13 GHz	6012 6012E	5-5 TO 5-7	5.2.8	8 TO 18 GHz 6 TO 18 GHz	8018 8018E	5-5 TO 5-7
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5.3	0.5 TO 18 GHz	<u>DVAN/VVAN/CVAN</u> OPTIONS, STANDARD MODELS, AND HOW TO ORDER 5-8 TO 5-10																																				
5.4	0.5 TO 18 GHz	MECHANICAL OUTLINES FOR STANDARD DVAN (DIGITAL VARIABLE ATTENUATOR) MODELS:																																				
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PRODUCT DESCRIPTION

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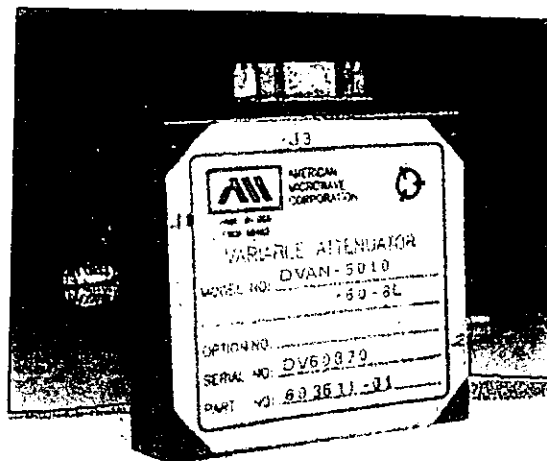
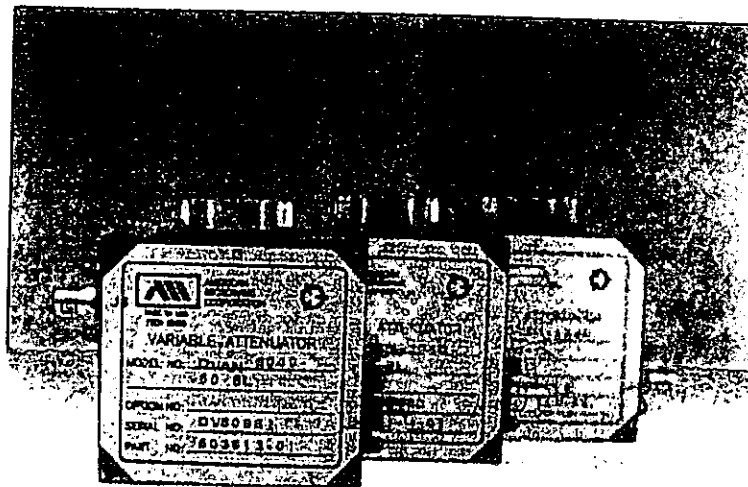
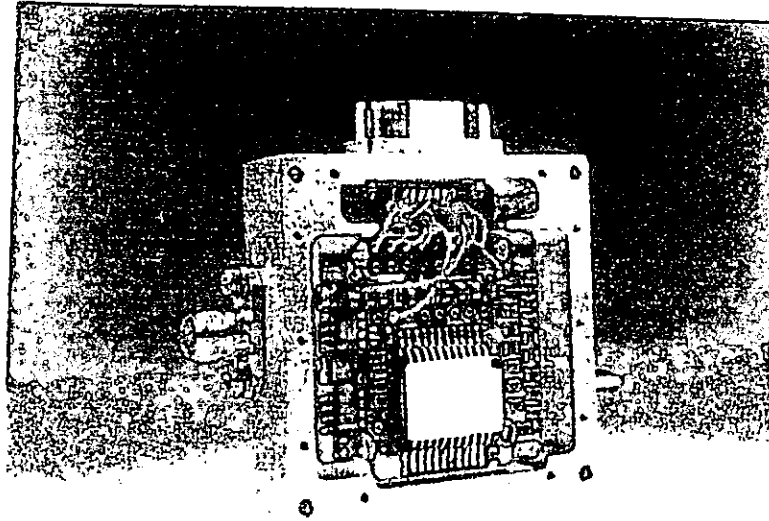
5.4.3	4.0 TO 8.0 GHz 5.0 TO 10.0 GHz 6.0 TO 12.0 GHz	DVAN-4080-60-8 DVAN-5010-60-8 DVAN-6012-60-8	5-12
5.4.4	8.0 TO 18.0 GHz	DVAN-8018-60-8	5-12
5.5	0.5 TO 18 GHz	MECHANICAL OUTLINES FOR STANDARD <u>VVAN</u> (<u>VOLTAGE VARIABLE ATTENUATOR</u>) MODELS WITH MULTIPIN CONNECTORS:	
	<u>FREQUENCY RANGE</u>	<u>MODEL NUMBER</u>	
5.5.1	0.5 TO 1.0 GHz 1.0 TO 2.0 GHz	VVAN-0510-60-MP VVAN-1020-60-MP	5-13
5.5.2	2.0 TO 4.0 GHz 2.5 TO 5.0 GHz	VVAN-2040-60-MP VVAN-2550-60-MP	5-13
5.5.3	4.0 TO 8.0 GHz 5.0 TO 10.0 GHz 6.0 TO 12.0 GHz	VVAN-4080-60-MP VVAN-5010-60-MP VVAN-6012-60-MP	5-14
5.5.4	8.0 TO 18.0 GHz	VVAN-8018-60-MP	5-14
5.6	0.5 TO 18 GHz	OTHER CONTROL CONNECTOR OPTIONS AVAILABLE ON <u>VVAN</u> (<u>VOLTAGE VARIABLE</u>) ATTENUATORS:	
		• SP : SOLDER PIN CONTROL CONNECTOR	5-15 TO 5-16
		• SMA : SMA CONTROL CONNECTOR	5-15 TO 5-16
		• SMC : SMC CONTROL CONNECTOR	5-15 TO 5-16
5.7	0.5 TO 18 GHz	MECHANICAL OUTLINES FOR <u>VVAN</u> (<u>VOLTAGE VARIABLE</u> <u>ATTENUATOR</u>) MODELS WITH <u>OPTIONAL</u> CONTROL CONNECTORS:	
		• <u>SOLDER PIN CONTROL CONNECTOR</u>	
	<u>FREQUENCY RANGE</u>	<u>MODEL NUMBER</u>	
5.7.1	0.5 TO 1.0 GHz 1.0 TO 2.0 GHz	VVAN-0510-60-SP VVAN-1020-60-SP	5-17
5.7.2	2.0 TO 4.0 GHz 2.5 TO 5.0 GHz	VVAN-2040-60-SP VVAN-2550-60-SP	5-18
5.7.3	4.0 TO 8.0 GHz 5.0 TO 10.0 GHz 6.0 TO 12.0 GHz	VVAN-4080-60-SP VVAN-5010-60-SP VVAN-6012-60-SP	5-19
5.7.4	8.0 TO 18.0 GHz	VVAN-8018-60-SP	5-20

• SMA CONTROL CONNECTOR

	<u>FREQUENCY RANGE</u>	<u>MODEL NUMBER</u>	
5.7.5	0.5 TO 1.0 GHz	VVAN-0510-60-SMA	
	1.0 TO 2.0 GHz	VVAN-1020-60-SMA	5-21
5.7.6	2.0 TO 4.0 GHz	VVAN-2040-60-SMA	
	2.5 TO 5.0 GHz	VVAN-2550-60-SMA	5-22
5.7.7	4.0 TO 8.0 GHz	VVAN-4080-60-SMA	
	5.0 TO 10.0 GHz	VVAN-5010-60-SMA	
	6.0 TO 12.0 GHz	VVAN-6012-60-SMA	5-23
5.7.8	8.0 TO 18.0 GHz	VVAN-8018-60-SMA	5-24

• SMC CONTROL CONNECTOR

	<u>FREQUENCY RANGE</u>	<u>MODEL NUMBER</u>	
5.7.9	0.5 TO 1.0 GHz	VVAN-0510-60-SMC	
	1.0 TO 2.0 GHz	VVAN-1020-60-SMC	5-21
5.7.10	2.0 TO 4.0 GHz	VVAN-2040-60-SMC	
	2.5 TO 5.0 GHz	VVAN-2550-60-SMC	5-22
5.7.11	4.0 TO 8.0 GHz	VVAN-4080-60-SMC	
	5.0 TO 10.0 GHz	VVAN-5010-60-SMC	
	6.0 TO 12.0 GHz	VVAN-6012-60-SMC	5-23
5.7.12	8.0 TO 18.0 GHz	VVAN-8018-60-SMC	5-24





**AMERICAN MICROWAVE
CORPORATION**

TYPICAL DATA

ON

OCTAVE BAND

0.5 TO 18.0 GHz

500nS, HIGH SPEED

60dB DYNAMIC RANGE

DIGITALLY VARIABLE (DVAN)

VOLTAGE VARIABLE (VVAN)

AND

CURRENT VARIABLE (CVAN)

ABSORPTIVE, PIN DIODE ATTENUATORS

WITH

**REMOVABLE SMA RF CONNECTORS FOR
SURFACE MOUNT CAPABILITY**

**DVAN AND VVAN
SERIES
ATTENUATORS**

**DESIGNED
BY
A. K. GORWARA**

**REPORTED
BY
P. D. WOOD**

JANUARY 29, 1996



**AMERICAN MICROWAVE
CORPORATION**

DVAN & VVAN SERIES OCTAVE BAND 0.5 TO 18.0 GHz VARIABLE ATTENUATORS

- 60dB DYNAMIC RANGE
- LATCHING STROBE CAPABILITY
- 500 nSEC., MAXIMUM SWITCHING SPEED
- 8,10,11 & 12-BIT DIGITALLY VARIABLE MODELS(DVAN)
- 5dB & 10dB/VOLT, VOLTAGE VARIABLE MODELS (VVAN)
- REMOVABLE SMA RF CONNECTORS FOR SURFACE MOUNT CAPABILITY

SPECIFICATIONS:

MODEL # (DVAN/VVAN)	FREQUENCY RANGE	INSERTION LOSS _{MAX}	VSWR (MAX)	FLATNESS @ 10dB	FLATNESS @ 20dB	FLATNESS @ 40dB	FLATNESS @ 60dB
0510	0.5 to 1.0 GHz	2.0 dB	2.0:1	±0.45 dB	±0.8 dB	±1.5 dB	±1.6 dB
0510E (Extended Bandwidth)	0.4 to 1.25 GHz	2.5 dB	2.2:1	±0.65 dB	±1.5 dB	±3.0 dB	±3.5 dB
1020	1.0 to 2.0 GHz	2.0 dB	2.0:1	±0.45 dB	±0.8 dB	±1.5 dB	±1.6 dB
1020E (Extended Bandwidth)	0.75 to 2.25 GHz	2.5 dB	2.2:1	±0.65 dB	±1.5 dB	±3.0 dB	±3.5 dB
2040	2.0 to 4.0 GHz	2.0 dB	2.0:1	±0.45 dB	±0.8 dB	±1.5 dB	±1.6 dB
2040E (Extended Bandwidth)	1.5 to 4.5 GHz	2.5 dB	2.2:1	±0.65 dB	±1.5 dB	±3.0 dB	±3.5 dB
2550	2.5 to 5.0 GHz	2.1 dB	2.0:1	±0.47 dB	±0.87 dB	±1.5 dB	±1.6 dB
2550E (Extended Bandwidth)	1.9 to 5.6 GHz	2.6 dB	2.2:1	±0.7 dB	±1.5 dB	±3.0 dB	±3.5 dB
4080	4.0 to 8.0 GHz	2.5 dB	2.0:1	±0.5 dB	±0.87 dB	±1.5 dB	±1.6 dB
4080E (Extended Bandwidth)	3.0 to 9.0 GHz	2.7 dB	2.2:1	±0.75 dB	±1.5 dB	±3.0 dB	±3.5 dB
5010	5.0 to 10.0 GHz	2.7 dB	2.0:1	±0.6 dB	±0.9 dB	±1.5 dB	±1.6 dB
5010E (Extended Bandwidth)	3.75 to 11.25 GHz	2.9 dB	2.2:1	±0.8 dB	±1.5 dB	±3.0 dB	±3.5 dB
6012	6.0 to 12.0 GHz	2.8 dB	2.0:1	±0.7 dB	±1.0 dB	±1.5 dB	±1.6 dB
6012E (Extended Bandwidth)	4.5 to 13.5 GHz	3.0 dB	2.2:1	±0.9 dB	±1.6 dB	±3.0 dB	±3.5 dB
8018	8.0 to 18.0 GHz	2.7 dB**	2.0:1	±0.8 dB	±1.1 dB	±1.5 dB	±1.6 dB
8018E (Extended Bandwidth)	6.0 to 18.0 GHz	3.7 dB**	2.2:1	±0.9 dB	±1.6 dB	±3.0 dB	±3.5 dB

** 2.7 dB Typical Loss to 16 GHz, 3.7 dB Max. Loss from 16.0 to 18.0 GHz.



AVAILABLE DVAN DIGITAL CONTROL PINOUTS

PINOUT	8-BIT (STANDARD)	10-BIT	11-BIT	12-BIT
PIN 1	NOT USED	NOT USED	0.06 dB	0.03 dB
PIN 2	LATCHING STROBE * (OPTIONAL)	LATCHING STROBE * (OPTIONAL)	LATCHING STROBE * (OPTIONAL)	0.06 dB
PIN 3	NOT USED	0.13 dB	0.13 dB	0.13 dB
PIN 4	GROUND	GROUND	GROUND	GROUND
PIN 5	0.25 dB (LSB)	0.25 dB	0.25 dB	0.25 dB
PIN 6	0.5 dB	0.5 dB	0.5 dB	0.5 dB
PIN 7	1.0 dB	1.0 dB	1.0 dB	1.0 dB
PIN 8	2.0 dB	2.0 dB	2.0 dB	2.0 dB
PIN 9	4.0 dB	4.0 dB	4.0 dB	4.0 dB
PIN 10	8.0 dB	8.0 dB	8.0 dB	8.0 dB
PIN 11	16.0 dB	16.0 dB	16.0 dB	16.0 dB
PIN 12	32.0 dB (MSB)	32.0 dB (MSB)	32.0 dB (MSB)	32.0 dB (MSB)
PIN 13	+12 OR +15 VDC	+12 OR +15 VDC	+12 OR +15 VDC	+12 OR +15 VDC
PIN 14	-12 OR -15 VDC	-12 OR -15 VDC	-12 OR -15 VDC	-12 OR -15 VDC
PIN 15	NOT USED	0.06 dB (LSB)	0.03 dB (LSB)	0.016 dB (LSB)

* Order "L" Suffix Models for Latching Strobe Capability, See "HOW TO ORDER" for more details.

STANDARD VVAN MULTIPIN ANALOG CONTROL PINOUTS (OPTION "MP")

MP-MULTIPIN CONNECTOR PINOUT FOR VOLTAGE VARIABLE ATTENUATORS (VVAN UNITS)	
PIN 3	ANALOG INPUT
PIN 4	GROUND
PIN 13	+12 or +15 VDC
PIN 14	-12 or -15 VDC
ALL OTHER PINS NOT USED	

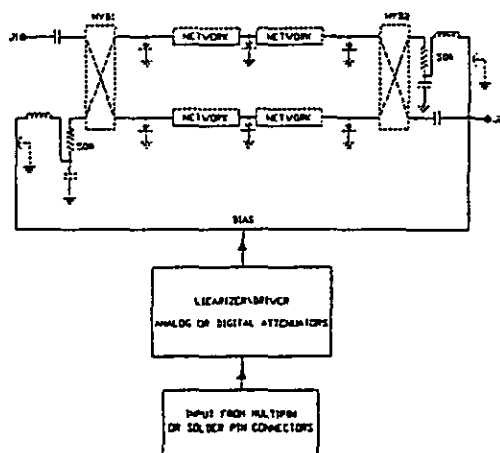
TYPICAL DATA
DVAN & VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



SPECIFICATIONS:

- **DEVIATION FROM LINEARITY** : 0 TO 30 dB $\pm$ 0.5 dB
: 30 TO 50 dB $\pm$ 1.0 dB
: 50 TO 60 dB $\pm$ 1.5 dB
- **MONOTICITY** : GUARANTEED
- **SWITCHING SPEED** : 500 nS MAX. (BETWEEN ATTENUATION SETTINGS)
- **TEMPERATURE COEFFICIENT** : $\pm$ 0.025 dB/ $^{\circ}$ C
- **RF POWER RATINGS** : + 20 dBm OPERATING, + 30 dBm SURVIVAL
- **CONTROL** : 8-BIT (STANDARD) POSITIVE TRUE BINARY (DVAN)
(10-BIT, 11-BIT OR 12-BIT ALSO AVAILABLE) -OR-
: 10dB/VOLT(STANDARD) ANALOG TRANSFER
FUNCTION (VVAN)
(5dB/VOLT TRANSFER FUNCTION ALSO
AVAILABLE)
- **DC POWER SUPPLY** : $\pm$ 12vdc (STANDARD) OR $\pm$ 15vdc,
@ +150 mA, -75 mA MAX.(8-BIT DVAN MODEL)
@ +125 mA, -50 mA MAX.(ANALOG VVAN MODEL)
- **CONNECTORS** : REMOVABLE SMA FEMALE(STANDARD) FOR RF
: 15-PIN MULTIPIN(STANDARD, OPTION "MP") FOR POWER
AND CONTROL (SOLDER PIN CONTROLS,
OPTION "SP", AND OTHER OPTIONS AVAILABLE)
- **SIZE** : 2.0" X 1.80" X 0.5"
- **WEIGHT** : $\leq$ 4 oz.

FUNCTIONAL SCHEMATIC



ENVIRONMENTAL RATINGS

- TEMPERATURE : -55 $^{\circ}$ C to +85 $^{\circ}$ C (Operating), -65 $^{\circ}$ C to +125 $^{\circ}$ C (Storage)
- HUMIDITY : MIL-STD-202F, METHOD 103B CONDITION B
- SHOCK : MIL-STD-202F, METHOD 312B CONDITION B
- VIBRATION : MIL-STD-202F, METHOD 204D CONDITION B
- ALTITUDE : MIL-STD-202F, METHOD 105C CONDITION B
- TEMPERATURE CYCLING : MIL-STD-202F, METHOD 107D CONDITION A

AMERICAN MICROWAVE CORPORATION



AVAILABLE OPTIONS AND HOW TO ORDER

EXAMPLE

DVAN - 4080 - 60 - 8 - X - GP
1 2 3 4 5 6

- 1 : DVAN : DIGITALLY VARIABLE ATTENUATOR NEW
- 2 : FREQUENCY OF OPERATION (e.g. 4.0 to 8.0 GHz)
- 3 : DYNAMIC RANGE IN dB
- 4 : NUMBER OF DIGITAL BITS (e.g. 8, 10, 11 or 12-bits)
- 5 : X=ANY COMBINATION OF THE DVAN OPTIONS GIVEN BELOW.
- 6 : GOLD PLATED (GP) MOUNTING SURFACE
All other sides are Painted.
PAINTED (P) MOUNTING SURFACE
This is Standard for all products

EXAMPLE

VVAN - 6012 - 60 - MP - 3 - GP
1 2 3 4 5 6

- 1 : VVAN : VOLTAGE VARIABLE ATTENUATOR NEW
- 2 : FREQUENCY OF OPERATION (e.g. 6.0 to 12.0 GHz)
- 3 : DYNAMIC RANGE IN dB
- 4 : CONTROL CONNECTOR OPTION
 - MP : Standard Connector for Analog Units
(ITT Cannon 15-Pin Multipin Connector MDM-157SP).
 - SP : Solder Pins for both Voltage and Control
 - SMA : Solder Pins for Voltage & SMA Female Control Connector
 - SMC : Solder Pins for Voltage & SMC Male Control Connector
- 5 : ADDITIONAL OPTIONS AS GIVEN BELOW
- 6 : GOLD PLATED (GP) MOUNTING SURFACE
All other sides are Painted.
PAINTED (P) MOUNTING SURFACE
This is Standard for all products

ADDITIONAL DVAN AND VVAN OPTIONS

OPTION No:	DVAN AVAILABLE OPTIONS (DIGITALLY VARIABLE)	OPTION No:	VVAN AVAILABLE OPTIONS (VOLTAGE VARIABLE)
1	Two SMA Male Removable RF Connectors	1	Two SMA Male Removable RF Connectors
2	One SMA Male & One SMA Female Removable RF Connector	2	One SMA Male & One SMA Female Removable RF Connector
3	Not/Applicable	3	5 dB/Volt Transfer Function
4	0 to 30dB Attenuation Range	4	0 to 30 dB Attenuation Range
5	± 15 vdc Supply Voltage	5	± 15 vdc Supply Voltage
L	Latching Strobe Capability	6	Substitute CVAN product code for the VVAN product code for Current Controlled (Non-Linearized) Attenuators (AVAILABLE WITH OPTIONS 1, 2, & 4 AND EITHER MP, SP, SMC OR SMA CONTROL CONNECTORS)

ORDERING:

AMERICAN MICROWAVE CORPORATION
7311-G GROVE ROAD, FREDERICK, MARYLAND 21704
TELEPHONE NUMBER : 301-662-4700
FACSIMILE NUMBER : 301-662-4938

PLEASE CALL OR FAX FOR CATALOGS, TEST REPORTS AND ORDERING INFORMATION ON ANY OF OUR PRODUCTS.

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
 DVAN & VVAN SERIES
 60dB ABSORPTIVE ATTENUATORS



STANDARD DVAN MODELS AVAILABLE

FREQUENCY	MODEL NUMBER	CONTROL
0.5 TO 1.0 GHz	DVAN-0510-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)
1.0 TO 2.0 GHz	DVAN-1020-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)
2.0 TO 4.0 GHz	DVAN-2040-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)
4.0 TO 8.0 GHz	DVAN-4080-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)
5.0 TO 10.0 GHz	DVAN-5010-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)
6.0 TO 12.0 GHz	DVAN-6012-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)
8.0 TO 18.0 GHz	DVAN-8018-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)

DVAN : DIGITALLY VARIABLE ATTENUATOR



STANDARD VVAN MODELS AVAILABLE

FREQUENCY	MODEL NUMBER	CONTROL
0.5 TO 1.0 GHz	VVAN-0510-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSP)
1.0 TO 2.0 GHz	VVAN-1020-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSP)
2.0 TO 4.0 GHz	VVAN-2040-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSP)
4.0 TO 8.0 GHz	VVAN-4080-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSP)
5.0 TO 10.0 GHz	VVAN-5010-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSP)
6.0 TO 12.0 GHz	VVAN-6012-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSP)
8.0 TO 18.0 GHz	VVAN-8018-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSP)

VVAN : VOLTAGE VARIABLE ATTENUATOR

Technical drawing of the AWC Model No. 10M-10-10-1 Solid State Variable Attenuator. The drawing shows the front and side views of the component with various dimensions and labels.

Dimensions (inches):

- 0.537
- 1.000
- 0.298
- 0.250
- 0.925
- 0.095
- 0.304
- 0.790
- 1.80
- 0.015 PIN DIA.
- 1.610
- 0.500
- 1.810
- 2.00
- 0.125 (GP)
- 0.127 (P)
- 0.70

Labels and Callouts:

- MULTI PIN CONNECTOR MDH-15PSP 1 PL
- 0.089 DIA THRU 4 PLS
- AWC MICROELECTRONIC CORPORATION
- SOLID STATE VARIABLE ATTENUATOR
- MODEL NO. 10M-10-10-1
- OPTION NO.
- SERIAL NO.
- PART NO.
- REMOVABLE RF CONNECTORS SMA FEMALE 2 PLS
- MOUNTING SURFACE GP-GOLD PLATED P-PAINTED
- 0.38 FOR SMA FEMALE 0.50 FOR SMA MALE

MULTI PIN CONNECTOR
MDM-1SPSP
1 PL

0.537 1.090 0.298 0.200 0.925 0.075 0.304

0.089 DIA THRU
4 PLS

0.300 1.80 0.015 PIN DIA. 1.610 0.500

GP-GOLD PLATED
P-PAINTED

AVM
MICROWAVE
COMPONENTS
CORPORATION
MADE IN U.S.A.
**SOLID STATE
VARIABLE ATTENUATOR**
MODEL NO. DVAW-7040-48-B
OPTION NO.: _____
SERIAL NO.: _____
PART NO.: _____

0.38 FOR SMA FEMALE
0.50 FOR SMA MALE

1.810 2.34 REMOVABLE
RF CONNECTORS
SMA FEMALE
2 PLS 0.125 GP)
0.127 GP)

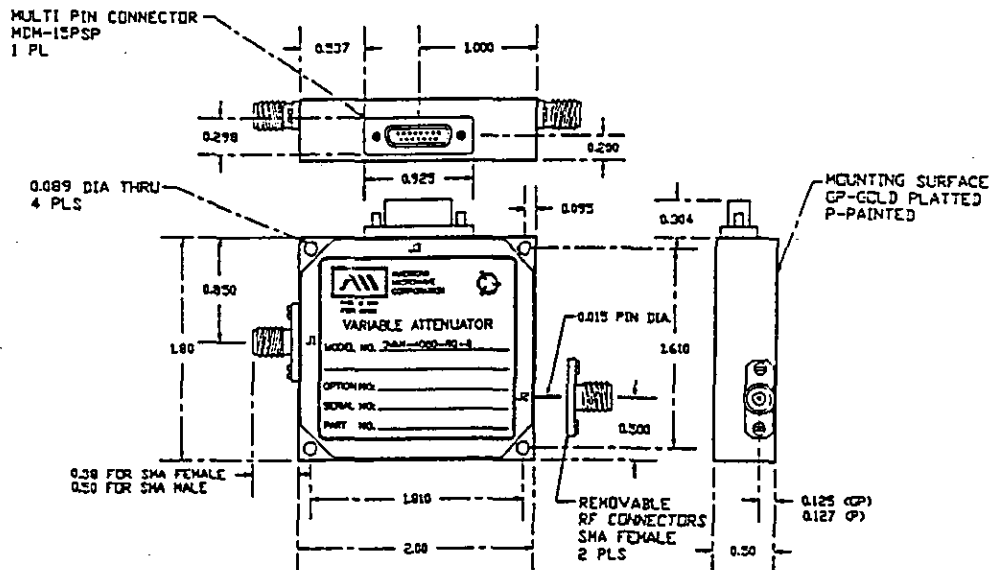
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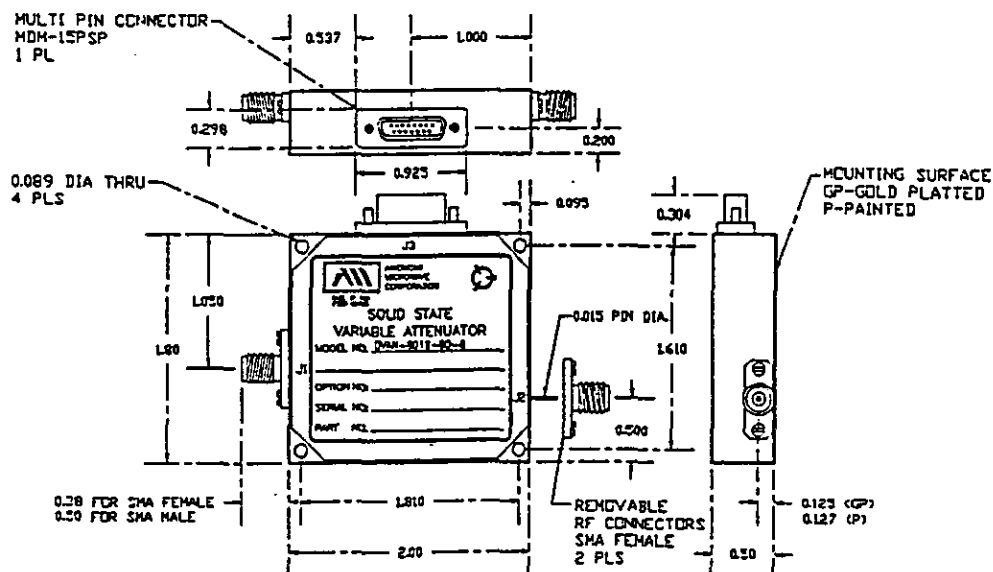
TYPICAL DATA
DVAN & VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



STANDARD MODEL
DVAN-4080/5010/6012-60-8
DIGITALLY VARIABLE ATTENUATOR
(4.0 TO 8.0 GHz, 5.0 TO 10.0 GHz & 6.0 TO 12.0 GHz)



STANDARD MODEL
DVAN-8018-60-8
DIGITALLY VARIABLE ATTENUATOR
(8.0 TO 18.0 GHz)



ALL DIMENSIONS ARE IN INCHES, TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

AMERICAN MICROWAVE CORPORATION

MULTI PIN CONNECTOR
MDM-15PSP
1 PL

0.537 1.000 0.299 0.925 0.200

0.089 DIA THRU
4 PLS

0.790 1.80 0.095 0.304 0.015 PIN DIA. 1.610 0.500 1.810 2.00 0.125 (GP) 0.127 (P) 0.50

AVM
FRENCH
MICROWAVE
CORPORATION
75B-2-2
SOLID STATE
VARIABLE ATTENUATOR
MODEL NO.
OPTION NO.
SERIAL NO.
PART NO.

REMOVABLE
RF CONNECTORS
SMA FEMALE
2 PLS

MOUNTING SURFACE
GP-GOLD PLATED
P-PAINTED

0.38 FOR SMA FEMALE
0.50 FOR SMA MALE

MULTI PIN CONNECTOR
MDM-1SPSP
1 PL

0.337 1.000

0.298 0.250

0.925

0.089 DIA THRU
4 PLS

0.075 0.304

HOUNTING SURFACE
GP-GOLD PLATED
P-PAINTED

J1

SOLID STATE
VARIABLE ATTENUATOR

MODEL NO.

OPTION NO.

SERIAL NO.

PART NO.

L60

0.300

0.015 PIN DIA.

L610

0.300

0.38 FOR SMA FEMALE
0.50 FOR SMA MALE

L610

2.00

REMOVABLE RF CONNECTORS
SMA FEMALE
2 PLS

0.125 (F)
0.127 (F)

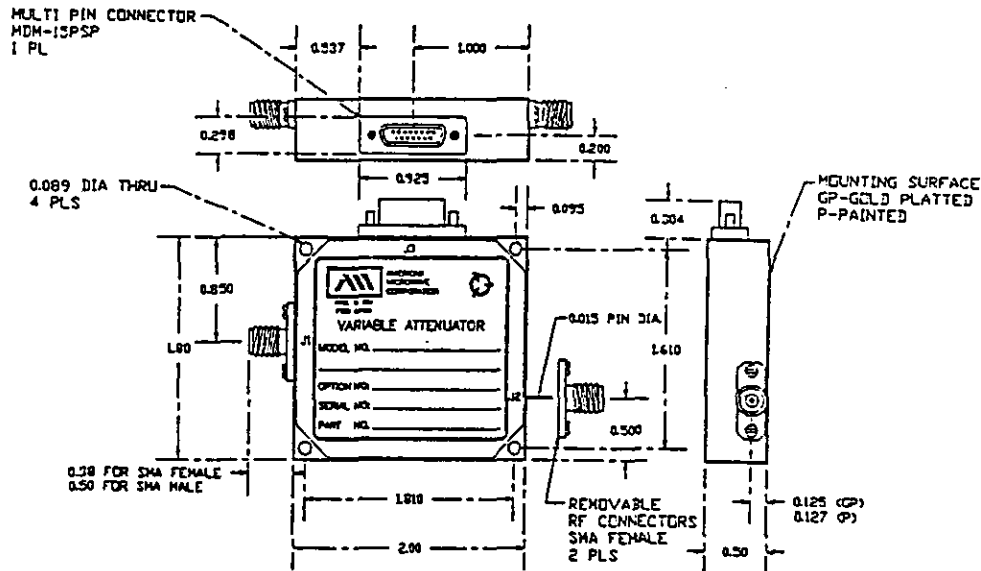
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AMERICAN MICROWAVE CORPORATION

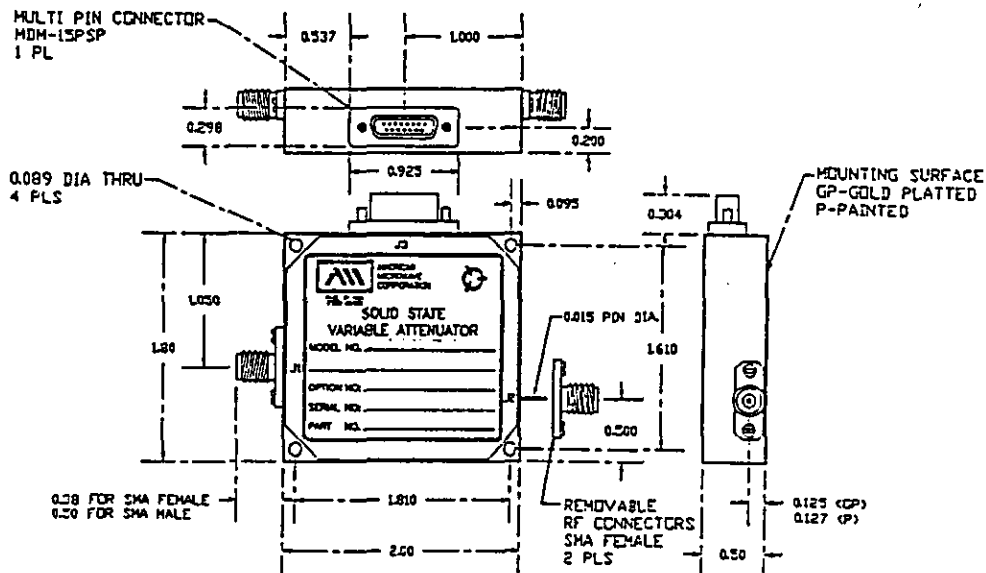
TYPICAL DATA
DVAN & VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



STANDARD MODELS
VVAN-4080/5010/6012-60-MP
VOLTAGE VARIABLE ATTENUATOR
(4.0 TO 8.0 GHz, 5.0 TO 10.0 GHz & 6.0 TO 12.0 GHz)



STANDARD MODEL
VVAN-8018-60-MP
VOLTAGE VARIABLE ATTENUATOR
(8.0 TO 18.0 GHz)



ALL DIMENSIONS ARE IN INCHES. TOLERANCE: X.XY ± 0.020 , X.XXX ± 0.010

AMERICAN MICROWAVE CORPORATION



AVAILABLE OPTIONS ON VVAN ATTENUATORS

FREQUENCY	MODEL NUMBER	CONTROL
0.5 TO 1.0 GHz	VVAN-0510-60-SP	10dB/Volt Analog Control with Solder Pin Voltage & Control
0.5 TO 1.0 GHz	VVAN-0510-60-SMA	10dB/Volt Analog Control with Solder Pin Voltage & SMA Female Control Connector
0.5 TO 1.0 GHz	VVAN-0510-60-SMC	10dB/Volt Analog Control with Solder Pin Voltage & SMC Male Control Connector
1.0 TO 2.0 GHz	VVAN-1020-60-SP	10dB/Volt Analog Control with Solder Pin Voltage & Control
1.0 TO 2.0 GHz	VVAN-1020-60-SMA	10dB/Volt Analog Control with Solder Pin Voltage & SMA Female Control Connector
1.0 TO 2.0 GHz	VVAN-1020-60-SMC	10dB/Volt Analog Control with Solder Pin Voltage & SMC Male Control Connector
2.0 TO 4.0 GHz	VVAN-2040-60-SP	10dB/Volt Analog Control with Solder Pin Voltage & Control
2.0 TO 4.0 GHz	VVAN-2040-60-SMA	10dB/Volt Analog Control with Solder Pin Voltage & SMA Female Control Connector
2.0 TO 4.0 GHz	VVAN-2040-60-SMC	10dB/Volt Analog Control with Solder Pin Voltage & SMC Male Control Connector

VVAN : VOLTAGE VARIABLE ATTENUATOR



AVAILABLE OPTIONS ON VVAN ATTENUATORS

FREQUENCY	MODEL NUMBER	CONTROL
4.0 TO 8.0 GHz	VVAN-4080-60-SP	10dB/Volt Analog Control with Solder Pin Voltage & Control
4.0 TO 8.0 GHz	VVAN-4080-60-SMA	10dB/Volt Analog Control with Solder Pin Voltage & SMA Female Control Connector
4.0 TO 8.0 GHz	VVAN-4080-60-SMC	10dB/Volt Analog Control with Solder Pin Voltage & SMC Male Control Connector
5.0 TO 10.0 GHz	VVAN-5010-60-SP	10dB/Volt Analog Control with Solder Pin Voltage & Control
5.0 TO 10.0 GHz	VVAN-5010-60-SMA	10dB/Volt Analog Control with Solder Pin Voltage & SMA Female Control Connector
5.0 TO 10.0 GHz	VVAN-5010-60-SMC	10dB/Volt Analog Control with Solder Pin Voltage & SMC Male Control Connector
6.0 TO 12.0 GHz	VVAN-6012-60-SP	10dB/Volt Analog Control with Solder Pin Voltage & Control
6.0 TO 12.0 GHz	VVAN-6012-60-SMA	10dB/Volt Analog Control with Solder Pin Voltage & SMA Female Control Connector
6.0 TO 12.0 GHz	VVAN-6012-60-SMC	10dB/Volt Analog Control with Solder Pin Voltage & SMC Male Control Connector
8.0 TO 18.0 GHz	VVAN-8018-60-SP	10dB/Volt Analog Control with Solder Pin Voltage & Control
8.0 TO 18.0 GHz	VVAN-8018-60-SMA	10dB/Volt Analog Control with Solder Pin Voltage & SMA Female Control Connector
8.0 TO 18.0 GHz	VVAN-8018-60-SMC	10dB/Volt Analog Control with Solder Pin Voltage & SMC Male Control Connector

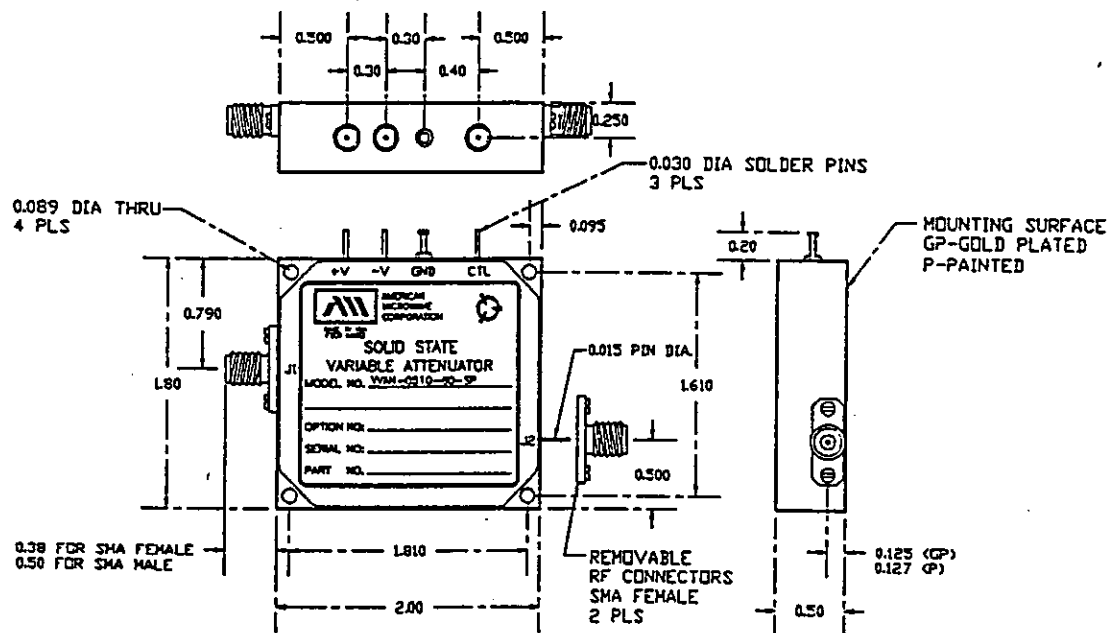
VVAN : VOLTAGE VARIABLE ATTENUATOR

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
 DVAN & VVAN SERIES
 60dB ABSORPTIVE ATTENUATORS



OPTIONAL MODELS
VVAN-0510/1020-60-SP
 VOLTAGE VARIABLE ATTENUATOR
 WITH SOLDER PIN CONTROL CONNECTORS
 (0.5 TO 1.0 GHz & 1.0 TO 2.0 GHz)



ALL DIMENSIONS ARE IN INCHES, TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

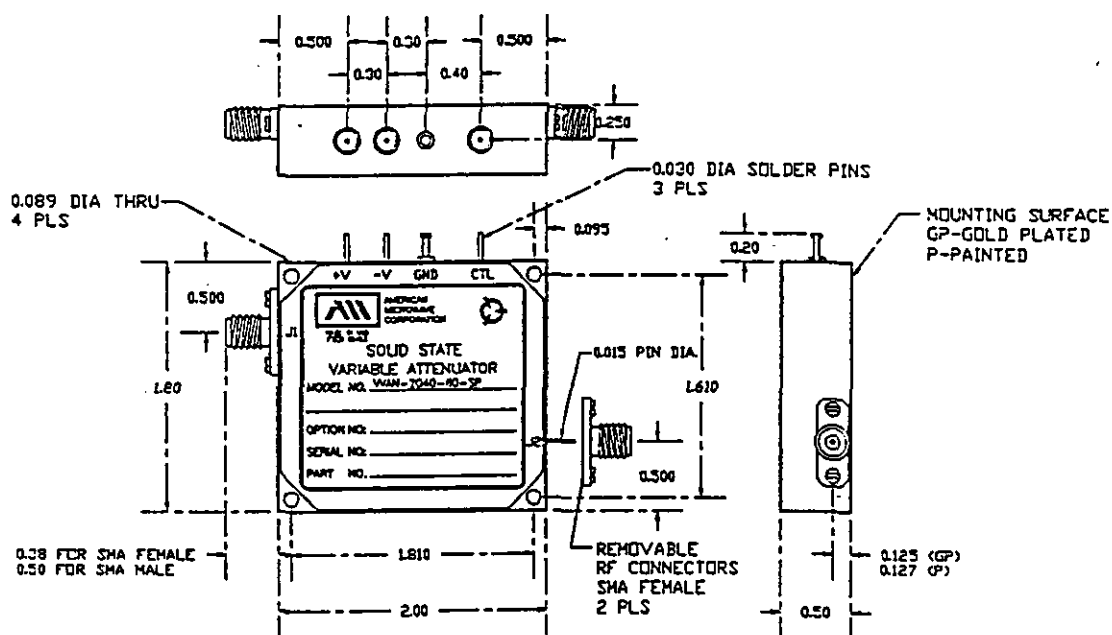
VVAN-0510/1020-60-SP

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
 DVAN & VVAN SERIES
 60dB ABSORPTIVE ATTENUATORS



OPTIONAL MODELS
VVAN-2040/2550-60-SP
 VOLTAGE VARIABLE ATTENUATOR
 WITH SOLDER PIN CONTROL CONNECTORS
 (2.0 TO 4.0 GHz & 2.5 TO 5.0 GHz)



ALL DIMENSIONS ARE IN INCHES, X.XY ± 0.020 , X.XXX ± 0.010

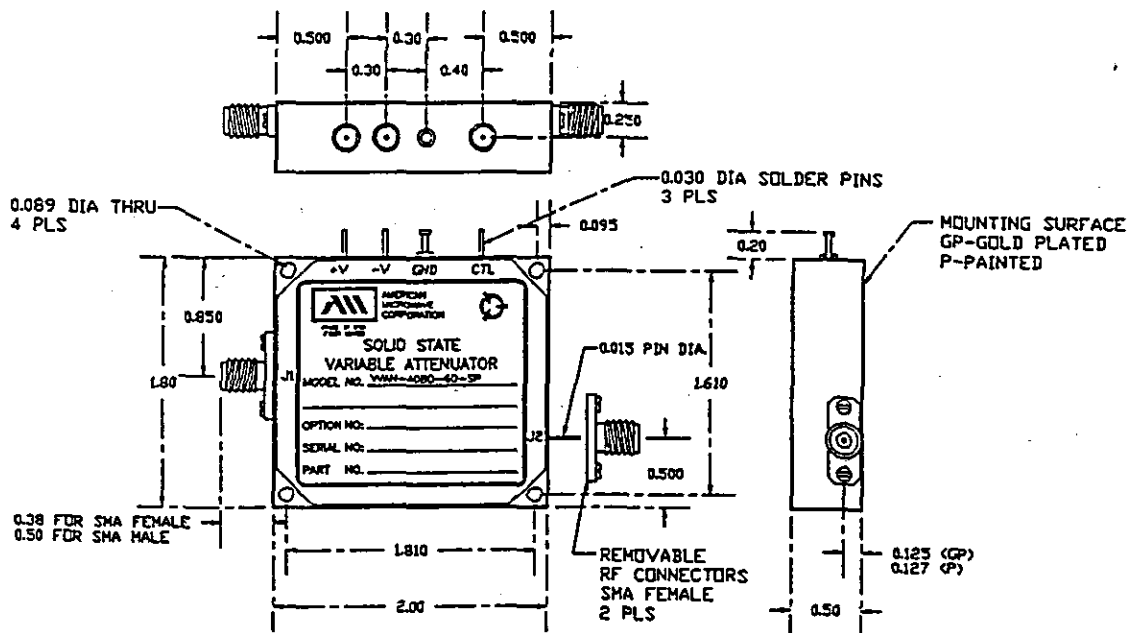
VVAN-2040/2550-60-SP

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
 DVAN & VVAN SERIES
 60dB ABSORPTIVE ATTENUATORS



OPTIONAL MODEL
VVAN-4080/5010/6012-60-SP
 VOLTAGE VARIABLE ATTENUATOR
 WITH SOLDER PIN CONTROL CONNECTORS
 (4.0 TO 8.0 GHz, 5.0 TO 10.0 GHz & 6.0 TO 12.0 GHz)



ALL DIMENSIONS ARE IN INCHES, TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

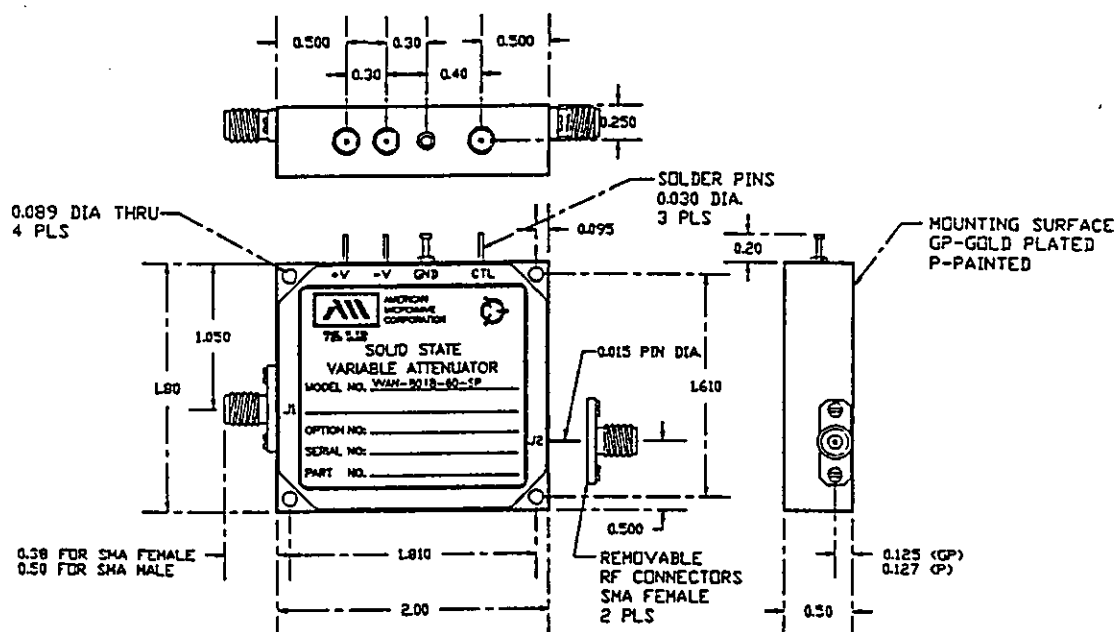
VVAN-4080/5010/6012-60-SP

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
DVAN & VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



OPTIONAL MODEL
VVAN-8018-60-SP
VOLTAGE VARIABLE ATTENUATOR
WITH SOLDER PIN CONTROL CONNECTOR
(8.0 TO 18.0 GHz)



ALL DIMENSIONS ARE IN INCHES, TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

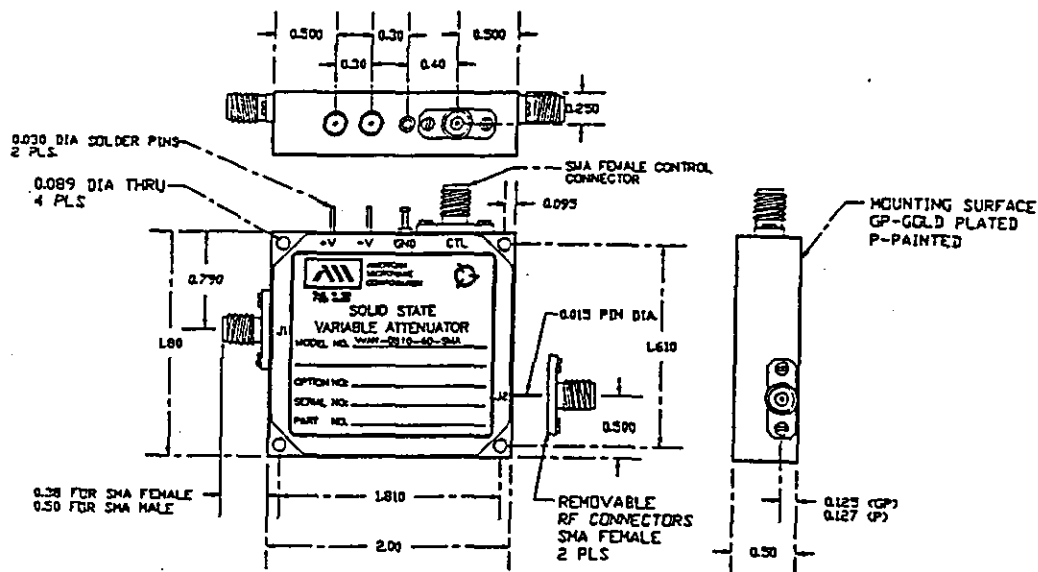
VVAN-8018-60-SP

AMERICAN MICROWAVE CORPORATION

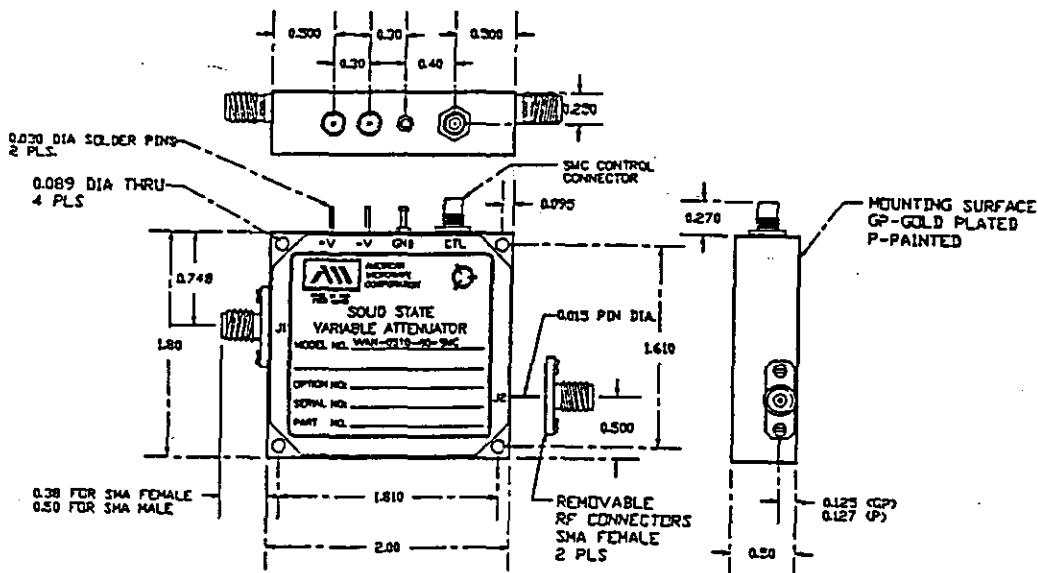
TYPICAL DATA
DVAN & VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



OPTIONAL MODELS
VVAN-0510/1020-60-SMA
VOLTAGE VARIABLE ATTENUATOR
WITH SMA FEMALE CONTROL CONNECTOR
(0.5 TO 1.0 GHz & 1.0 TO 2.0 GHz)



VVAN-0510/1020-60-SMC
VOLTAGE VARIABLE ATTENUATOR
WITH SMC MALE CONTROL CONNECTOR
(0.5 TO 1.0 GHz & 1.0 TO 2.0 GHz)



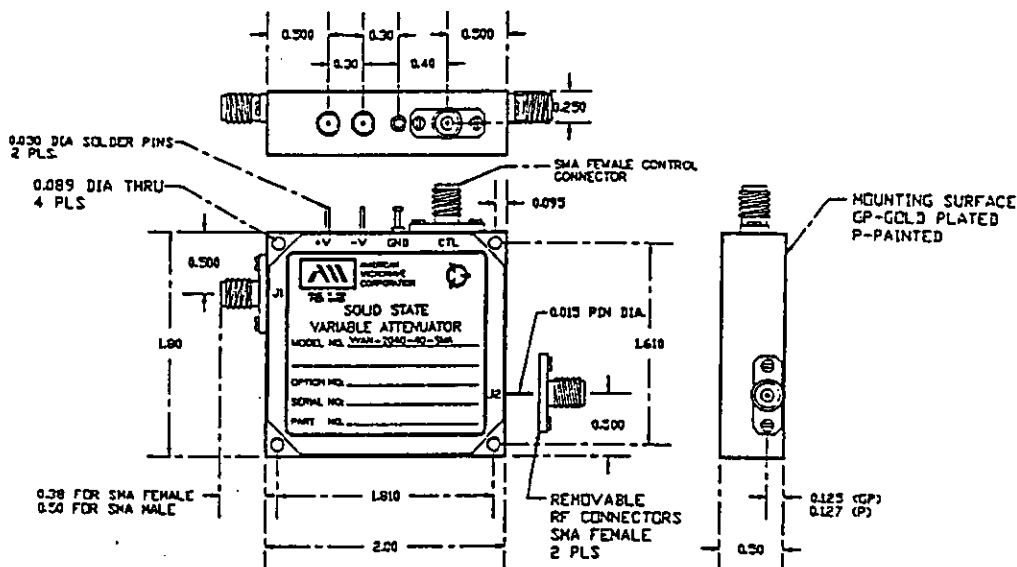
ALL DIMENSIONS ARE IN INCHES, TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

AMERICAN MICROWAVE CORPORATION

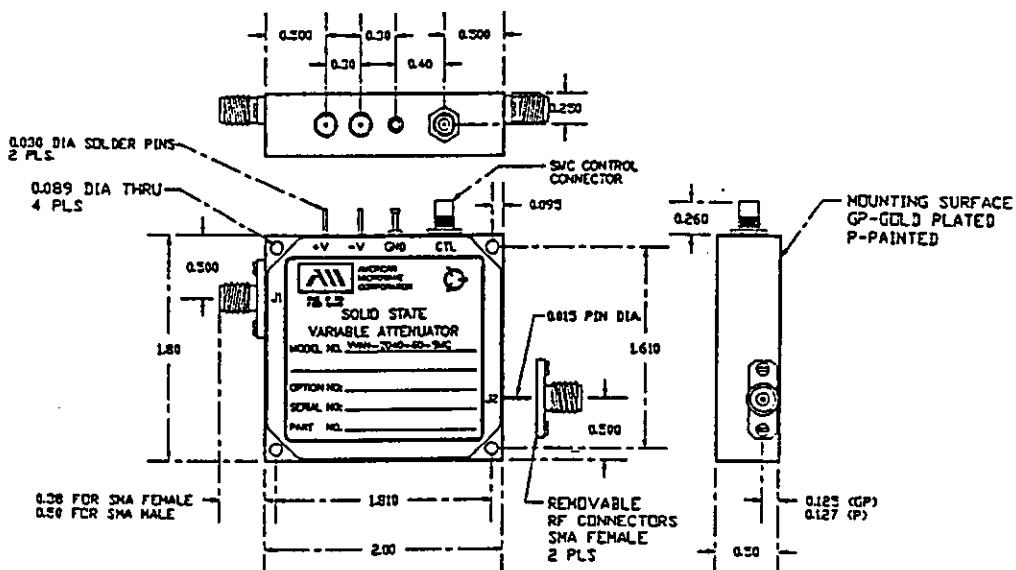
TYPICAL DATA
DVAN & VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



OPTIONAL MODELS
VVAN-2040/2550-60-SMA
VOLTAGE VARIABLE ATTENUATOR
WITH SMA FEMALE CONTROL CONNECTOR
(2.0 TO 4.0 GHz & 2.5 TO 5.0 GHz)



VVAN-2040/2550-60-SMC
VOLTAGE VARIABLE ATTENUATOR
WITH SMC MALE CONTROL CONNECTOR
(2.0 TO 4.0 GHz & 2.5 TO 5.0 GHz)



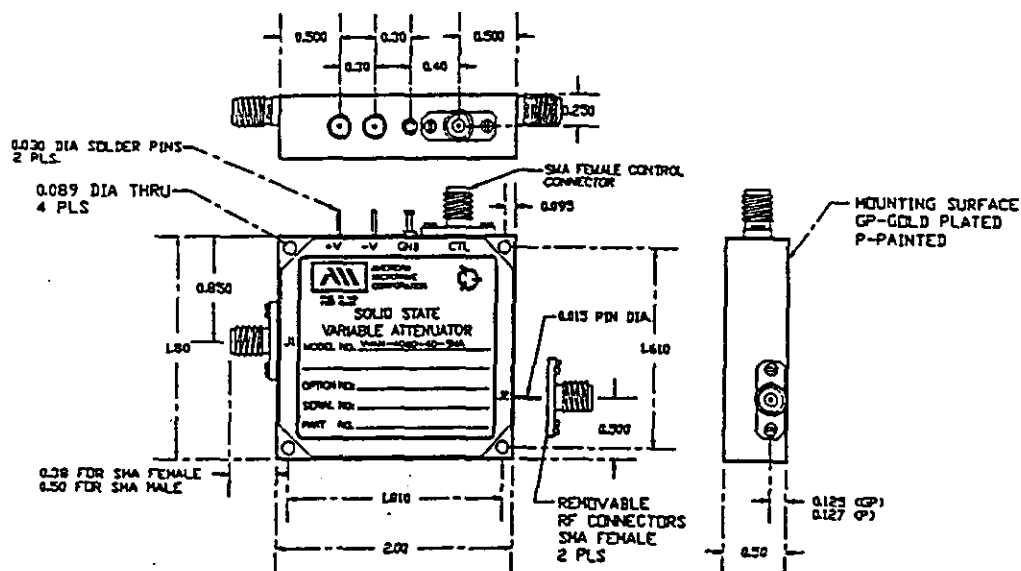
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AMERICAN MICROWAVE CORPORATION

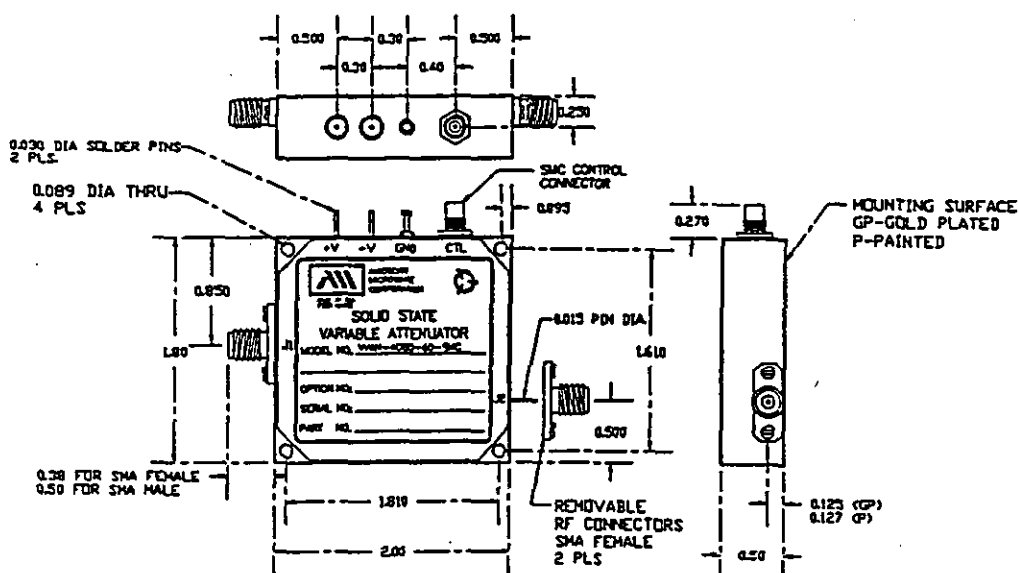
TYPICAL DATA
DVAN & VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



OPTIONAL MODELS
VVAN-4080/5010/6012-60-SMA
VOLTAGE VARIABLE ATTENUATOR
WITH SMA FEMALE CONTROL CONNECTOR
(4.0 TO 8.0 GHz, 5.0 TO 10.0 GHz & 6.0 TO 12.0 GHz)



VVAN-4080/5010/6012-60-SMC
VOLTAGE VARIABLE ATTENUATOR
WITH SMC MALE CONTROL CONNECTOR
(4.0 TO 8.0 GHz, 5.0 TO 10.0 GHz & 6.0 TO 12.0 GHz)



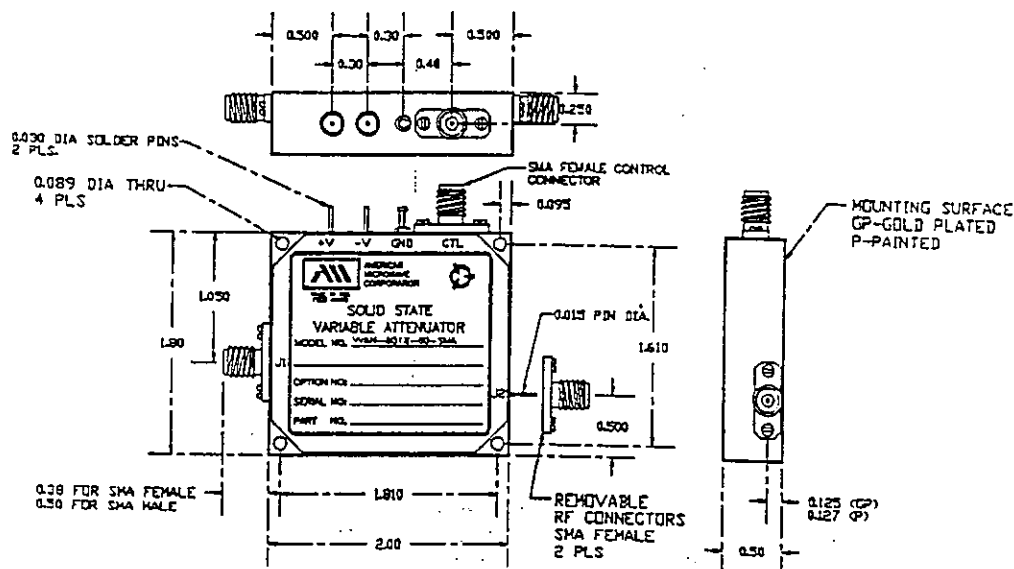
ALL DIMENSIONS ARE IN INCHES. TOLERANCE: ± 0.020 , X.XXX ± 0.010

AMERICAN MICROWAVE CORPORATION

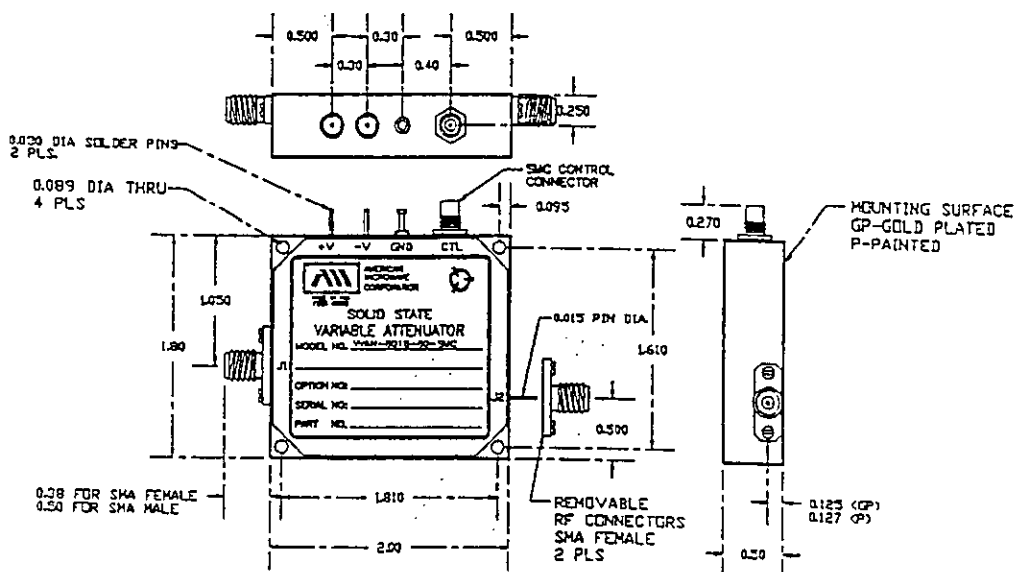
TYPICAL DATA
DVAN & VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



OPTIONAL MODELS
VVAN-8018-60-SMA
VOLTAGE VARIABLE ATTENUATOR
WITH SMA FEMALE CONTROL CONNECTOR
(8.0 TO 18.0 GHz)

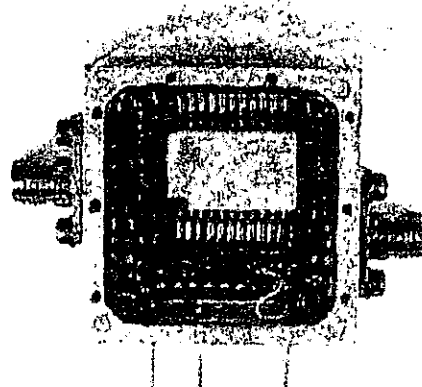
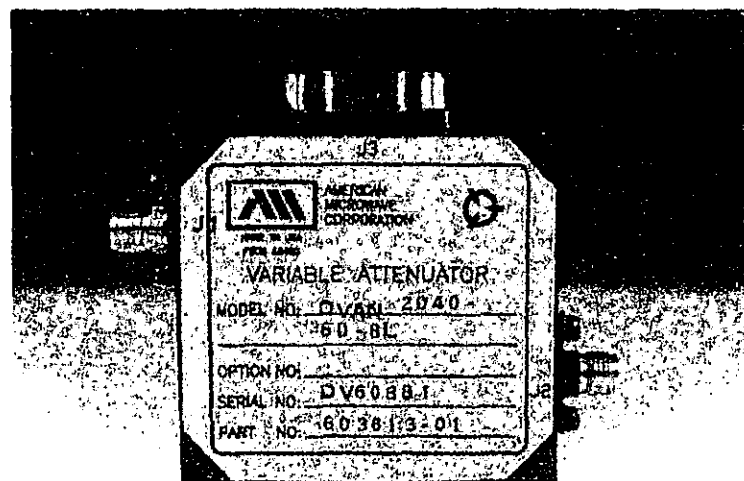
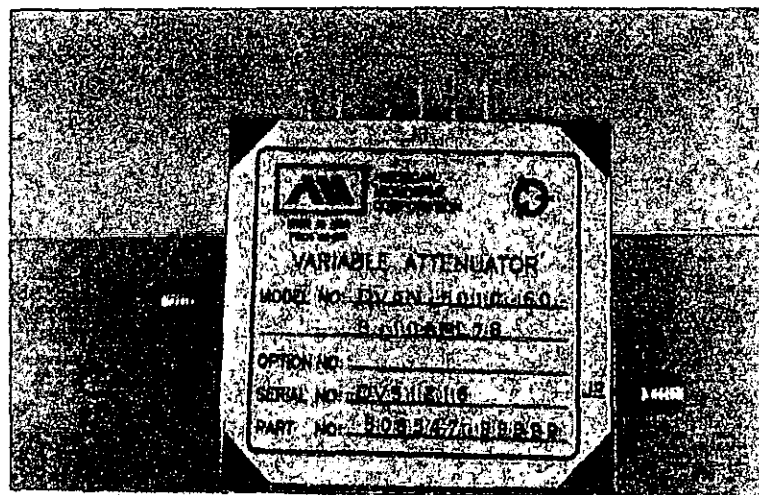


VVAN-8018-60-SMC
VOLTAGE VARIABLE ATTENUATOR
WITH SMC MALE CONTROL CONNECTOR
(8.0 TO 18.0 GHz)



ALL DIMENSIONS ARE IN INCHES, TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

AMERICAN MICROWAVE CORPORATION





6.0 4 TO 18 GHz
(SIZE: 1.34" x 1.34" x 0.50")

HIGH SPEED (< 1μSec), MINIATURE, M-DVAN, M-VVAN, M-CVAN-OCTAVE BAND VARIABLE ATTENUATOR SERIES

- DIGITAL: M-DVAN
- ANALOG/VOLTAGE: M-VVAN
- CURRENT: M-CVAN

CONTROLLED ATTENUATORS 6-0 TO 6-1

6.1 4 TO 18 GHz

TYPICAL DATA ON OCTAVE BAND 4.0 TO 18 GHz, MINIATURE, 500ns HIGH SPEED, 60dB DYNAMIC RANGE

- DIGITALLY VARIABLE: M-DVAN
- VOLTAGE VARIABLE: M-VVAN
- CURRENT VARIABLE: M-CVAN

ABSORPTIVE, PIN DIODE ATTENUATORS WITH REMOVABLE SMA RF CONNECTORS FOR SURFACE MOUNT CAPABILITY 6-2

6.2 4 TO 18 GHz

M-DVAN/M-VVAN/M-CVAN) SPECIFICATIONS:
(E : EXTENDED BAND)

	<u>FREQUENCY RANGE</u>	<u>MODEL NUMBER</u>	
6.2.1	4 TO 8 GHz	4080	
	3 TO 9 GHz	4080E	6-3 TO 6-5
6.2.2	5 TO 10 GHz	5010	
	3.75 TO 11.25 GHz	5010E	6-3 TO 6-5
6.2.3	6 TO 12 GHz	6012	
	4.5 TO 13 GHz	6012E	6-3 TO 6-5
6.2.4	8 TO 18 GHz	8018	
	6 TO 18 GHz	8018E	6-3 TO 6-5

6.3 4 TO 18 GHz

M-DVAN/M-VVAN/M-CVAN) OPTIONS, STANDARD MODELS, AND HOW TO ORDER 6-6 TO 6-7

6.4 4 TO 18 GHz

MECHANICAL OUTLINES FOR STANDARD M-DVAN (DIGITAL VARIABLE ATTENUATOR) MODELS:

	<u>FREQUENCY RANGE</u>	<u>MODEL NUMBER</u>	
6.4.1	4.0 TO 8.0 GHz	M-DVAN-4080-60-8	
	5.0 TO 10.0 GHz	M-DVAN-5010-60-8	
	6.0 TO 12.0 GHz	M-DVAN-6012-60-8	6-8
6.4.2	8.0 TO 18.0 GHz	M-DVAN-8018-60-8	6-9

6.5 4 TO 18 GHz

MECHANICAL OUTLINES FOR STANDARD M-VVAN (VOLTAGE VARIABLE ATTENUATOR) MODELS WITH MULTIPIN CONNECTORS:

	<u>FREQUENCY RANGE</u>	<u>MODEL NUMBER</u>	
6.5.1	4.0 TO 8.0 GHz	M-VVAN-4080-60-MP	
	5.0 TO 10.0 GHz	M-VVAN-5010-60-MP	
	6.0 TO 12.0 GHz	M-VVAN-6012-60-MP	6-10
6.5.2	8.0 TO 18.0 GHz	M-VVAN-8018-60-MP	6-11



SECTION

PRODUCT DESCRIPTION

PAGE

6.6 4 TO 18 GHz

OTHER CONTROL CONNECTOR OPTIONS AVAILABLE
ON M-VVAN (VOLTAGE VARIABLE) ATTENUATORS:

- SP : SOLDER PIN CONTROL CONNECTOR 6-12
- SMA : SMA CONTROL CONNECTOR 6-12
- SMC : SMC CONTROL CONNECTOR 6-12

6.7 4 TO 18 GHz

MECHANICAL OUTLINES FOR M-VVAN (VOLTAGE
VARIABLE ATTENUATOR) MODELS WITH OPTIONAL
CONTROL CONNECTORS:• SOLDER PIN CONTROL CONNECTOR

	<u>FREQUENCY RANGE</u>	<u>MODEL NUMBER</u>	
6.7.1	4.0 TO 8.0 GHz	M-VVAN-4080-60-SP	
	5.0 TO 10.0 GHz	M-VVAN-5010-60-SP	
	6.0 TO 12.0 GHz	M-VVAN-6012-60-SP	6-13
6.7.2	8.0 TO 18.0 GHz	M-VVAN-8018-60-SP	6-14

• SMA CONTROL CONNECTOR

	<u>FREQUENCY RANGE</u>	<u>MODEL NUMBER</u>	
6.7.3	4.0 TO 8.0 GHz	M-VVAN-4080-60-SMA	
	5.0 TO 10.0 GHz	M-VVAN-5010-60-SMA	
	6.0 TO 12.0 GHz	M-VVAN-6012-60-SMA	6-15
6.7.4	8.0 TO 18.0 GHz	M-VVAN-8018-60-SMA	6-16

• SMC CONTROL CONNECTOR

	<u>FREQUENCY RANGE</u>	<u>MODEL NUMBER</u>	
6.7.5	4.0 TO 8.0 GHz	M-VVAN-4080-60-SMC	
	5.0 TO 10.0 GHz	M-VVAN-5010-60-SMC	
	6.0 TO 12.0 GHz	M-VVAN-6012-60-SMC	6-17
6.7.6	8.0 TO 18.0 GHz	M-VVAN-8018-60-SMC	6-18



AMERICAN MICROWAVE
CORPORATION

TYPICAL DATA
ON
OCTAVE BAND
4.0 TO 18.0 GHz
MINIATURE
500nS, HIGH SPEED
60dB DYNAMIC RANGE
DIGITALLY VARIABLE (M-DVAN)
VOLTAGE VARIABLE (M-VVAN)
AND
CURRENT VARIABLE (M-CVAN)
ABSORPTIVE, PIN DIODE ATTENUATORS
WITH
REMOVABLE SMA RF CONNECTORS FOR
SURFACE MOUNT CAPABILITY
M-DVAN AND M-VVAN
SERIES
MINIATURE ATTENUATORS

DESIGNED
BY
A. K. GORWARA

REPORTED
BY
P. D. WOOD

JANUARY 19, 1996

M-DVAN & M-VVAN SERIES OCTAVE BAND 4.0 TO 18.0 GHz VARIABLE ATTENUATORS

- 60dB DYNAMIC RANGE
- LATCHING STROBE CAPABILITY
- 500 nSEC., MAXIMUM SWITCHING SPEED
- 8,10,11 & 12-BIT DIGITALLY VARIABLE MODELS(DVAN)
- 5dB & 10dB/VOLT, VOLTAGE VARIABLE MODELS (VVAN)
- REMOVABLE SMA RF CONNECTORS FOR SURFACE MOUNT CAPABILITY

SPECIFICATIONS:

MODEL # (M-DVAN/ M-VVAN)	FREQUENCY RANGE *	INSERTION LOSS (MAX)	VSWR (MAX)	FLATNESS @ 10dB	FLATNESS @ 20dB	FLATNESS @ 40dB	FLATNESS @ 60dB
4080	4.0 TO 8.0 GHz	2.5 dB	2.0:1	± 0.5 dB	± 0.87 dB	± 1.5 dB	± 1.6 dB
4080E (Extended Bandwidth)	3.0 TO 9.0 GHz	2.7 dB	2.2:1	± 0.75 dB	± 1.5 dB	± 3.0 dB	± 3.5 dB
5010	5.0 TO 10.0 GHz	2.7 dB	2.0:1	± 0.6 dB	± 0.9 dB	± 1.5 dB	± 1.6 dB
5010E (Extended Bandwidth)	3.75 TO 11.25 GHz	2.9 dB	2.2:1	± 0.8 dB	± 1.5 dB	± 3.0 dB	± 3.5 dB
6012	6.0 TO 12.0 GHz	2.8 dB	2.0:1	± 0.7 dB	± 1.0 dB	± 1.5 dB	± 1.6 dB
6012E (Extended Bandwidth)	4.5 TO 13.5 GHz	3.0 dB	2.2:1	± 0.9 dB	± 1.6 dB	± 3.0 dB	± 3.5 dB
8018	8.0 TO 18.0 GHz	2.7 dB **	2.0:1	± 0.8 dB	± 1.1 dB	± 1.5 dB	± 1.6 dB
8018E (Extended Bandwidth)	6.0 TO 18.0 GHz	3.7 dB **	2.2:1	± 0.9 dB	± 1.6 dB	± 3.0 dB	± 3.5 dB

** 2.7 dB Typical Loss to 16 GHz, 3.7 dB MAX. Loss 16.0-18.0 GHz

- DEVIATION FROM LINEARITY : 0 TO 30 dB ± 0.5 dB
: 30 TO 50 dB ± 1.0 dB
: 50 TO 60 dB ± 1.5 dB
- MONOTICITY : GUARANTEED
- SWITCHING SPEED : 500 nS MAX.(BETWEEN ATTENUATION SETTINGS)
- TEMPERATURE COEFFICIENT : ± 0.025 dB/°C
- RF POWER RATINGS : + 20 dBm OPERATING, + 30 dBm SURVIVAL

TYPICAL DATA
M-DVAN & M-VVAN SERIES
60dB ABSORPTIVE ATTENUATORS

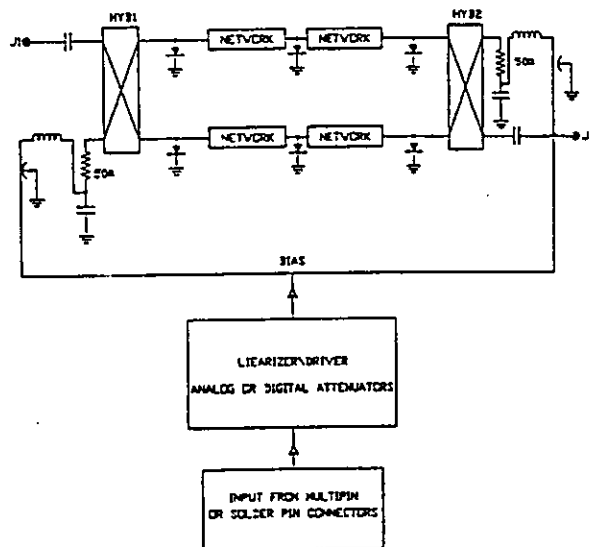


SPECIFICATIONS:

(CONTINUED)

- **CONTROL** : 8-BIT (STANDARD) POSITIVE TRUE BINARY (M-DVAN)
 (10-BIT, 11-BIT OR 12-BIT ALSO AVAILABLE) -OR-
 : 10dB/VOLT (STANDARD) ANALOG TRANSFER
 FUNCTION (M-VVAN)
 (5dB/VOLT TRANSFER FUNCTION ALSO
 AVAILABLE)
- **DC POWER SUPPLY** : $\pm 12\text{vdc}$ (STANDARD) OR $\pm 15\text{vdc}$,
 @ +150 mA, -75 mA MAX. (8-BIT M-DVAN MODEL)
 @ +125 mA, -50 mA MAX. (ANALOG M-VVAN MODEL)
- **CONNECTORS** : REMOVABLE SMA FEMALE (STANDARD) FOR RF
 : 15-PIN MULTIPIN (STANDARD, OPTION "MP") FOR POWER
 AND CONTROL
 (SOLDER PIN CONTROLS, OPTION "SP", AND OTHER OPTIONS
 AVAILABLE)
- **SIZE** : 1.34" X 1.34" X 0.5"
- **WEIGHT** : ≤ 3 oz.

FUNCTIONAL SCHEMATIC



ENVIRONMENTAL RATINGS

- TEMPERATURE : -55°C to +85°C (Operating), -65°C to +125°C (Storage)
- HUMIDITY : MIL-STD-202F, METHOD 103B CONDITION B
- SHOCK : MIL-STD-202F, METHOD 312B CONDITION B
- VIBRATION : MIL-STD-202F, METHOD 204D CONDITION B
- ALTITUDE : MIL-STD-202F, METHOD 105C CONDITION B
- TEMPERATURE CYCLING : MIL-STD-202F, METHOD 107D CONDITION A

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
M-DVAN & M-VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



AVAILABLE M-DVAN DIGITAL CONTROL PINOUTS

PINOUT	8-BIT (STANDARD)	10-BIT	11-BIT	12-BIT
PIN 1	NOT USED	NOT USED	0.06 dB	0.03 dB
PIN 2	LATCHING STROBE * (OPTIONAL)	LATCHING STROBE * (OPTIONAL)	LATCHING STROBE * (OPTIONAL)	0.06 dB
PIN 3	NOT USED	0.13 dB	0.13 dB	0.13 dB
PIN 4	GROUND	GROUND	GROUND	GROUND
PIN 5	0.25 dB (LSB)	0.25 dB	0.25 dB	0.25 dB
PIN 6	0.5 dB	0.5 dB	0.5 dB	0.5 dB
PIN 7	1.0 dB	1.0 dB	1.0 dB	1.0 dB
PIN 8	2.0 dB	2.0 dB	2.0 dB	2.0 dB
PIN 9	4.0 dB	4.0 dB	4.0 dB	4.0 dB
PIN 10	8.0 dB	8.0 dB	8.0 dB	8.0 dB
PIN 11	16.0 dB	16.0 dB	16.0 dB	16.0 dB
PIN 12	32.0 dB (MSB)	32.0 dB (MSB)	32.0 dB (MSB)	32.0 dB (MSB)
PIN 13	+12 OR +15 VDC	+12 OR +15 VDC	+12 OR +15 VDC	+12 OR +15 VDC
PIN 14	-12 OR -15 VDC	-12 OR -15 VDC	-12 OR -15 VDC	-12 OR -15 VDC
PIN 15	NOT USED	0.06 dB (LSB)	0.03 dB (LSB)	0.016 dB (LSB)

* Order "L" Suffix Models for Latching Strobe Capability, See "HOW TO ORDER" for more details.

STANDARD M-VVAN MULTIPIN ANALOG CONTROL PINOUTS
(OPTION "MP")

MP-MULTIPIN CONNECTOR PINOUT FOR VOLTAGE VARIABLE ATTENUATORS (VVAN UNITS)	
PIN 3	ANALOG INPUT
PIN 4	GROUND
PIN 13	+12 or +15 VDC
PIN 14	-12 or -15 VDC
ALL OTHER PINS NOT USED	

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
M-DVAN & M-VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



AVAILABLE OPTIONS AND HOW TO ORDER

EXAMPLE

M-DVAN - 4080 - 60 - 8 - X - GP
1 2 3 4 5 6

- 1 : M-DVAN : MINIATURE DIGITALLY
VARIABLE ATTENUATOR NEW
2 : FREQUENCY OF OPERATION (e.g. 4.0 to 8.0 GHz)
3 : DYNAMIC RANGE IN dB
4 : NUMBER OF DIGITAL BITS (e.g. 8, 10, 11 or 12-bits)
5 : X=ANY COMBINATION OF THE
M-DVAN OPTIONS GIVEN BELOW.
6 : GOLD PLATED (GP) MOUNTING SURFACE
All other sides are Painted.
PAINTED (P) MOUNTING SURFACE
This is Standard for all products

EXAMPLE

M-VVAN - 6012 - 60 - MP - 3 - GP
1 2 3 4 5 6

- 1 : VVAN : MINIATURE VOLTAGE
VARIABLE ATTENUATOR NEW
2 : FREQUENCY OF OPERATION (e.g. 6.0 to 12.0 GHz)
3 : DYNAMIC RANGE IN dB
4 : CONTROL CONNECTOR OPTION
• MP : Standard Connector for Analog Units
(ITT Cannon 15-Pin Multipin Connector MDM-15PSP).
• SP : Solder Pins for both Voltage and Control
• SMA : Solder Pins for Voltage & SMA Female
Control Connector
• SMC : Solder Pins for Voltage & SMC Male
Control Connector
5 : ADDITIONAL OPTIONS AS GIVEN BELOW
6 : GOLD PLATED (GP) MOUNTING SURFACE
All other sides are Painted.
PAINTED (P) MOUNTING SURFACE
This is Standard for all products

ADDITIONAL M-DVAN AND M-VVAN OPTIONS

OPTION No:	M-DVAN AVAILABLE OPTIONS (DIGITALLY VARIABLE)	OPTION No:	M-VVAN AVAILABLE OPTIONS (VOLTAGE VARIABLE)
1	Two SMA Male Removable RF Connectors	1	Two SMA Male Removable RF Connectors
2	One SMA Male & One SMA Female Removable RF Connector	2	One SMA Male & One SMA Female Removable RF Connector
3	Not/Applicable	3	5 dB/Volt Transfer Function
4	0 to 30dB Attenuation Range	4	0 to 30 dB Attenuation Range
5	± 15 vdc Supply Voltage	5	± 15 vdc Supply Voltage
L	Latching Strobe Capability	6	Substitute M-CVAN product code for the M-VVAN product code for Current Controlled (Non-Linearized) Attenuators (AVAILABLE WITH OPTIONS 1, 2, & 4 AND EITHER MP, SP, SMC OR SMA CONTROL CONNECTORS)

ORDERING:

AMERICAN MICROWAVE CORPORATION
7311-G GROVE ROAD, FREDERICK, MARYLAND 21704
TELEPHONE NUMBER : 301-662-4700
FACSIMILE NUMBER : 301-662-4938

PLEASE CALL OR FAX FOR CATALOGS, TEST REPORTS AND ORDERING INFORMATION ON ANY OF OUR PRODUCTS.

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
M-DVAN & M-VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



STANDARD M-DVAN MODELS AVAILABLE

FREQUENCY	MODEL NUMBER	CONTROL
4.0 TO 8.0 GHz	M-DVAN-4080-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)
5.0 TO 10.0 GHz	M-DVAN-5010-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)
6.0 TO 12.0 GHz	M-DVAN-6012-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)
8.0 TO 18.0 GHz	M-DVAN-8018-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)

M-DVAN : MINIATURE DIGITALLY VARIABLE ATTENUATOR

STANDARD M-VVAN MODELS AVAILABLE

FREQUENCY	MODEL NUMBER	CONTROL
4.0 TO 8.0 GHz	M-VVAN-4080-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSP)
5.0 TO 10.0 GHz	M-VVAN-5010-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSP)
6.0 TO 12.0 GHz	M-VVAN-6012-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSP)
8.0 TO 18.0 GHz	M-VVAN-8018-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSP)

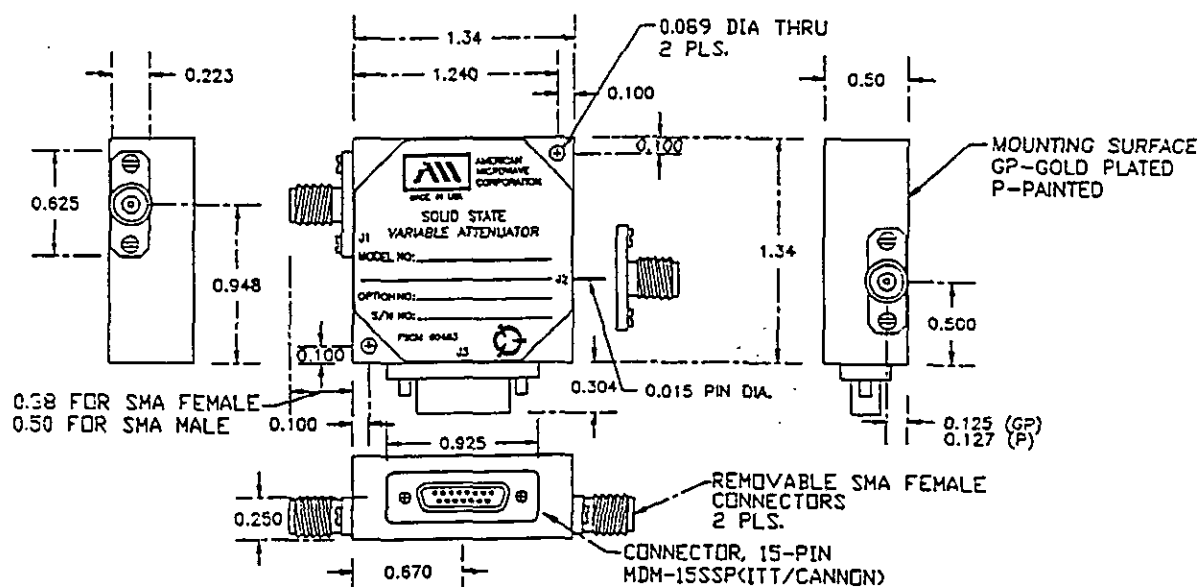
M-VVAN : MINATURE VOLTAGE VARIABLE ATTENUATOR

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
M-DVAN & M-VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



STANDARD MODEL
M-DVAN-4080/5010/6012-60-8
MINIATURE DIGITALLY VARIABLE ATTENUATOR
(4.0 TO 3.0 GHz, 5.0 TO 10.0 GHz & 6.0 TO 12.0 GHz)



ALL DIMENSIONS ARE IN INCHES, TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

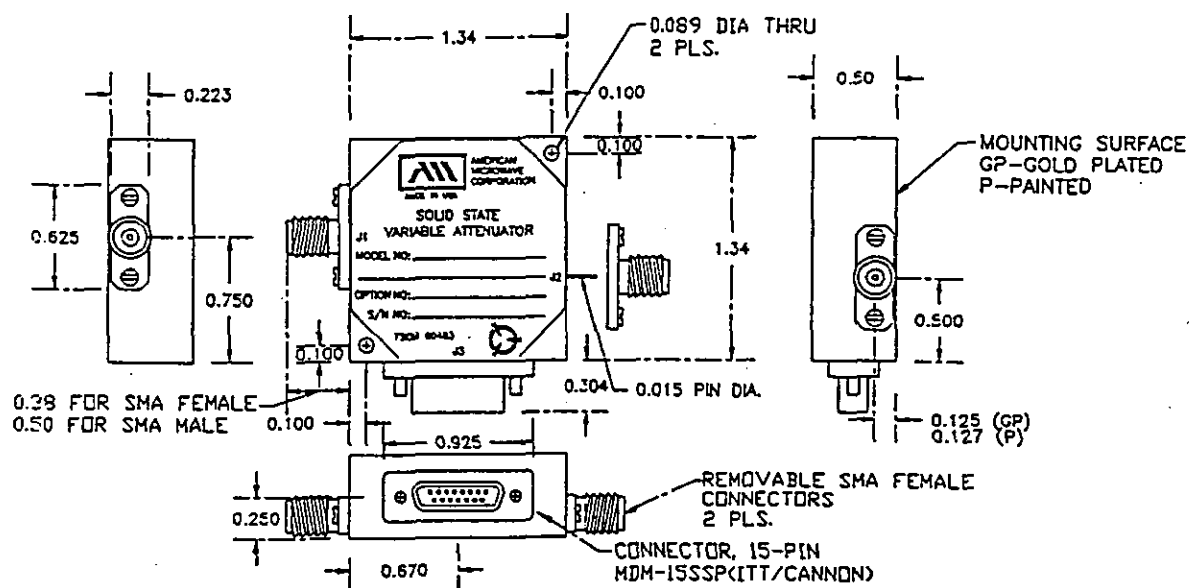
M-DVAN-4080/5010/6012-60-8

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
M-DVAN & M-VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



STANDARD MODEL
M-DVAN-8018-60-8
MINIATURE DIGITALLY VARIABLE ATTENUATOR
(8.0 TO 18.0 GHz)



ALL DIMENSIONS ARE IN INCHES, TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

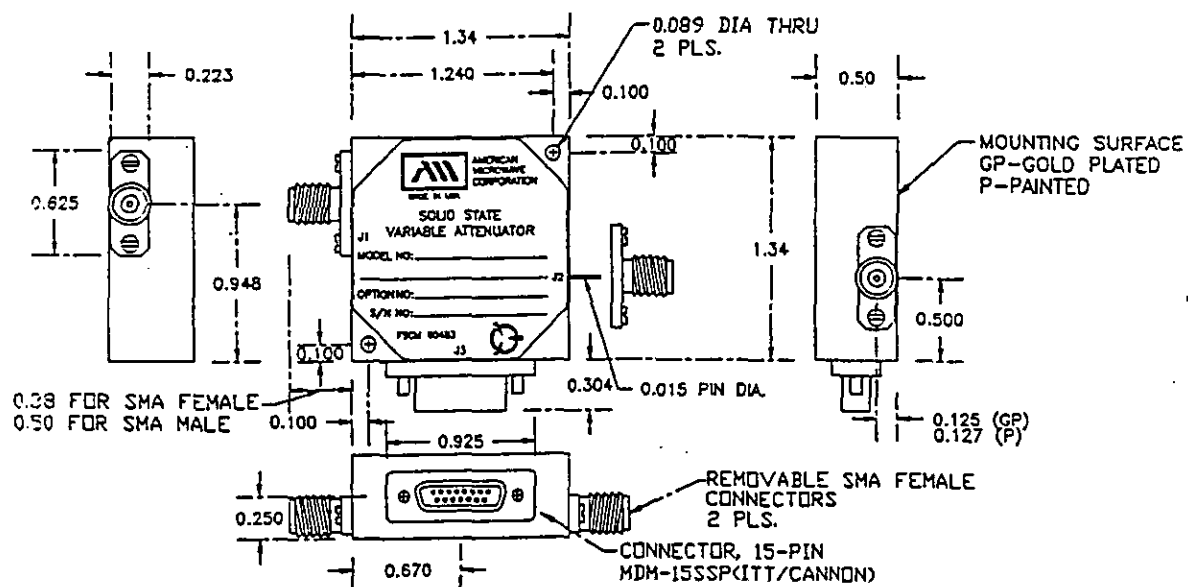
M-DVAN-8018-60-8

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
M-DYAN & M-VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



STANDARD MODEL
M-VVAN-4080/5010/6012-60-MP
MINIATURE VOLTAGE VARIABLE ATTENUATOR
WITH MULTIPIN CONNECTOR
(4.0 TO 8.0 GHz, 5.0 TO 10.0 GHz & 6.0 TO 12.0 GHz)



ALL DIMENSIONS ARE IN INCHES, TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

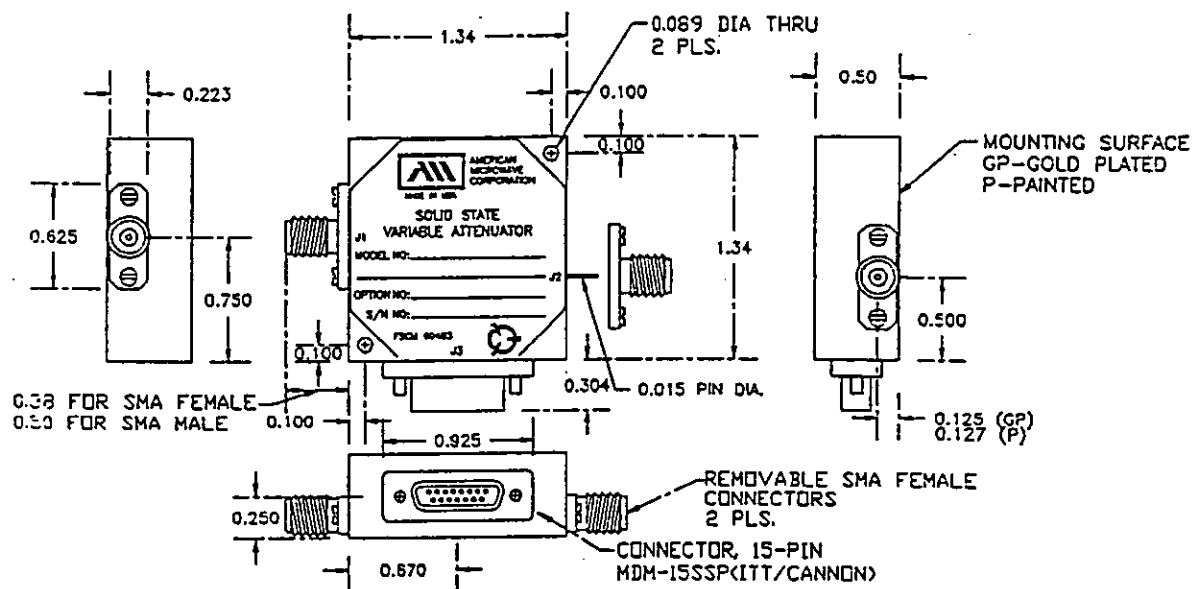
M-VVAN-4080/5010/6012-60-MP

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
M-DVAN & M-VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



STANDARD MODEL
M-VVAN-8018-60-MP
MINIATURE VOLTAGE VARIABLE ATTENUATOR
WITH MULTIPIN CONNECTOR
(8.0 TO 18.0 GHz)



ALL DIMENSIONS ARE IN INCHES. TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

M-VVAN-8018-60-MP

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
M-DVAN & M-VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



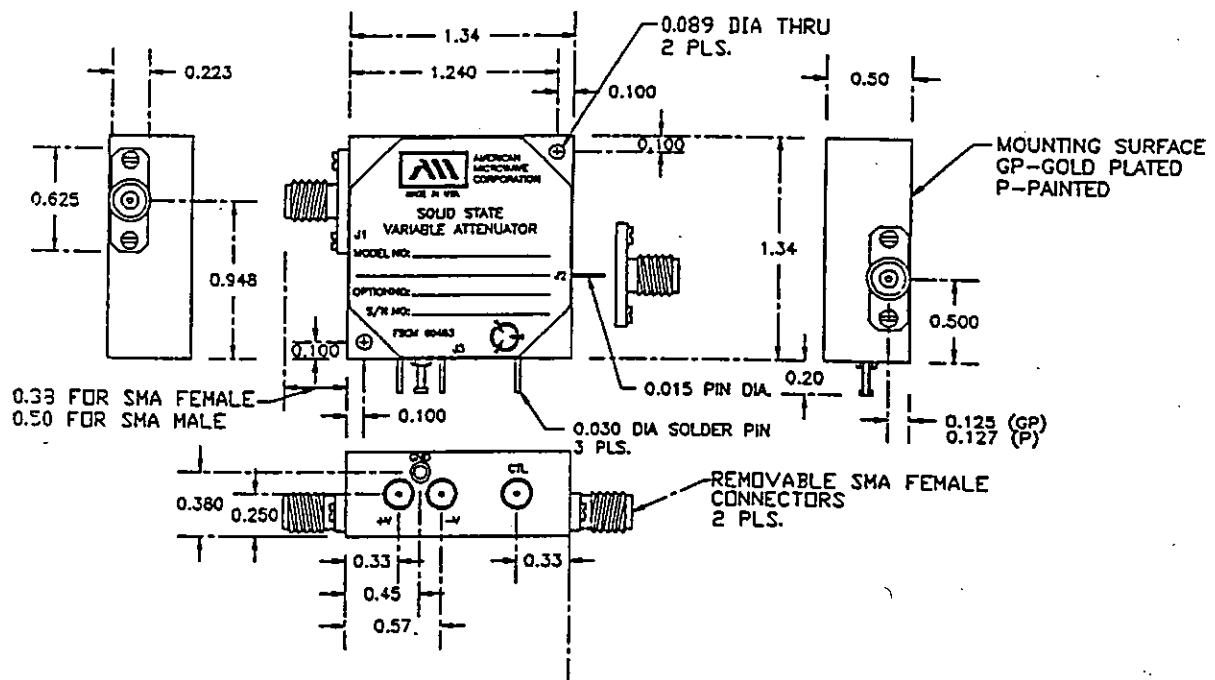
AVAILABLE OPTIONS ON M-VVAN ATTENUATORS

FREQUENCY	MODEL NUMBER	CONTROL
4.0 TO 8.0 GHz	M-VVAN-4080-60-SP	10dB/Volt Analog Control with Solder Pin Voltage & Control
4.0 TO 8.0 GHz	M-VVAN-4080-60-SMA	10dB/Volt Analog Control with Solder Pin Voltage & SMA Female Control Connector
4.0 TO 8.0 GHz	M-VVAN-4080-60-SMC	10dB/Volt Analog Control with Solder Pin Voltage & SMC Male Control Connector
5.0 TO 10.0 GHz	M-VVAN-5010-60-SP	10dB/Volt Analog Control with Solder Pin Voltage & Control
5.0 TO 10.0 GHz	M-VVAN-5010-60-SMA	10dB/Volt Analog Control with Solder Pin Voltage & SMA Female Control Connector
5.0 TO 10.0 GHz	M-VVAN-5010-60-SMC	10dB/Volt Analog Control with Solder Pin Voltage & SMC Male Control Connector
6.0 TO 12.0 GHz	M-VVAN-6012-60-SP	10dB/Volt Analog Control with Solder Pin Voltage & Control
6.0 TO 12.0 GHz	M-VVAN-6012-60-SMA	10dB/Volt Analog Control with Solder Pin Voltage & SMA Female Control Connector
6.0 TO 12.0 GHz	M-VVAN-6012-60-SMC	10dB/Volt Analog Control with Solder Pin Voltage & SMC Male Control Connector
8.0 TO 18.0 GHz	M-VVAN-8018-60-SP	10dB/Volt Analog Control with Solder Pin Voltage & Control
8.0 TO 18.0 GHz	M-VVAN-8018-60-SMA	10dB/Volt Analog Control with Solder Pin Voltage & SMA Female Control Connector
8.0 TO 18.0 GHz	M-VVAN-8018-60-SMC	10dB/Volt Analog Control with Solder Pin Voltage & SMC Male Control Connector

M-VVAN : MINIATURE VOLTAGE VARIABLE ATTENUATOR

AMERICAN MICROWAVE CORPORATION

**MINIATURE VOLTAGE VARIABLE ATTENUATOR
WITH SOLDER PEN CONTROL CONNECTORS
(4.0 TO 8.0 GHz, 5.0 TO 10.0 GHz & 6.0 TO 12.0 GHz)**



ALL DIMENSIONS ARE IN INCHES, TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

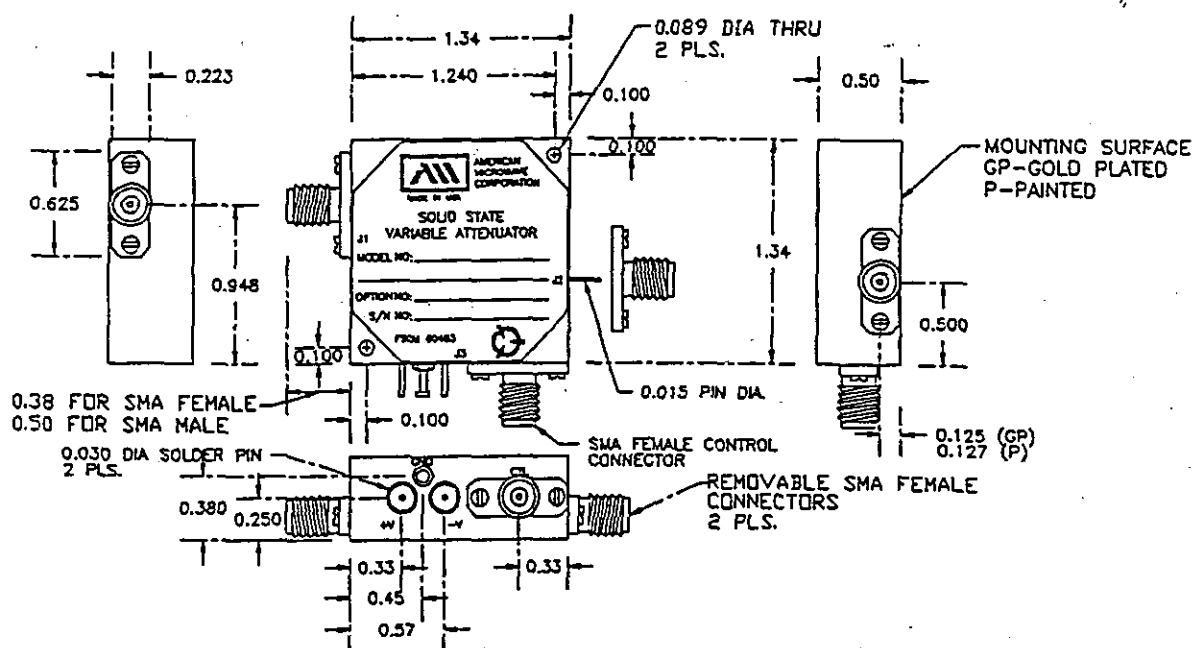
M-VVAN-4080/5010/6012-60-SP

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M-VVAN-8018-60-SP

6-14

**MINIATURE VOLTAGE VARIABLE ATTENUATOR
WITH SMA FEMALE CONTROL CONNECTOR
(4.0 TO 8.0 GHz, 5.0 TO 10.0 GHz & 6.0 TO 12.0 GHz)**



ALL DIMENSIONS ARE IN INCHES, TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

M-VVAN-4080/5010/6012-SMA

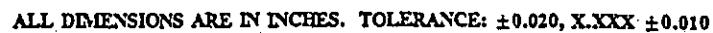
6-15

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M-VVAN-8018-60-SMA

6-16

**MINIATURE VOLTAGE VARIABLE ATTENUATOR
WITH SMC MALE CONTROL CONNECTOR
(4.0 TO 8.0 GHz, 5.0 TO 10.0 GHz & 6.0 TO 12.0 GHz)**



AMERICAN MICROWAVE CORPORATION

Technical drawing of the J1 Variable Attenuator, showing front, side, and top views with dimensions and labels.

Front View Dimensions:

- Overall width: 1.34
- Overall height: 1.34
- Left mounting flange width: 0.223
- Left mounting flange height: 0.625
- Left mounting flange hole spacing: 0.750
- Right mounting flange width: 0.50
- Right mounting flange height: 0.500
- Top mounting flange hole spacing: 0.100
- Bottom mounting flange hole spacing: 0.100

Side View Dimensions:

- Overall width: 0.50
- Overall height: 0.500
- Top mounting flange hole spacing: 0.100
- Bottom mounting flange hole spacing: 0.100

Top View Dimensions:

- Overall width: 1.34
- Overall height: 1.34
- Left mounting flange width: 0.223
- Left mounting flange height: 0.625
- Left mounting flange hole spacing: 0.750
- Right mounting flange width: 0.50
- Right mounting flange height: 0.500
- Top mounting flange hole spacing: 0.100
- Bottom mounting flange hole spacing: 0.100

Labels and Notes:

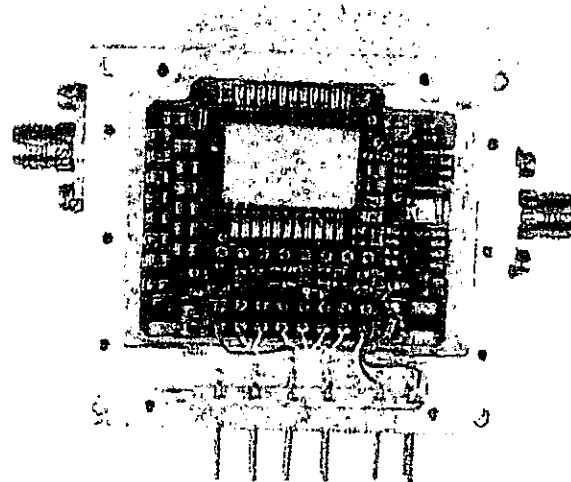
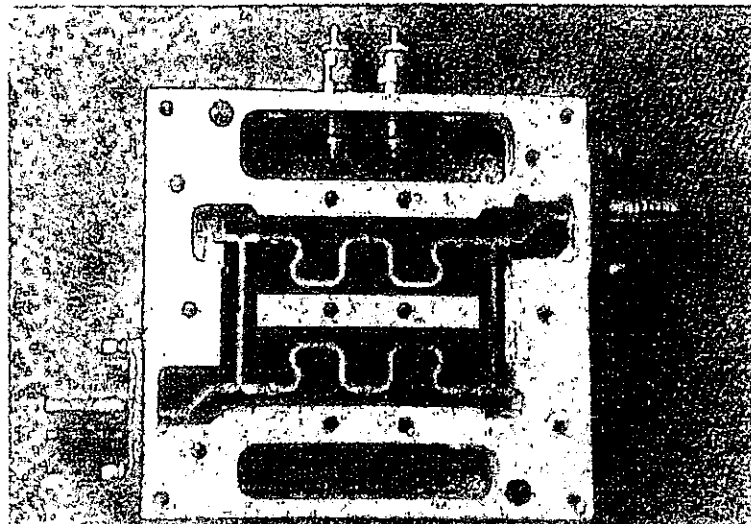
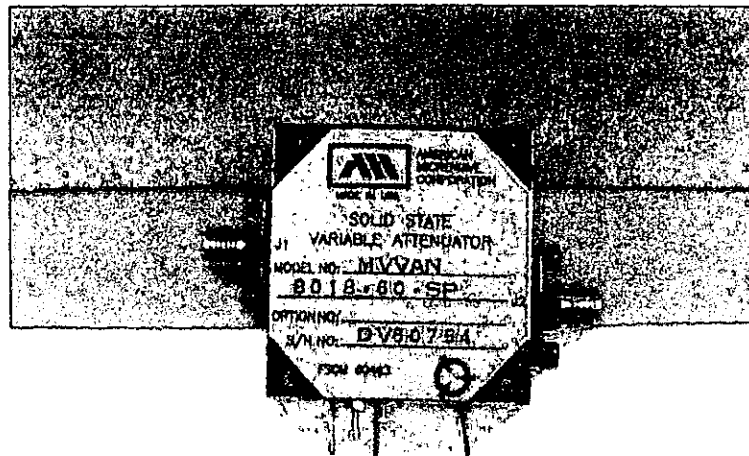
- 0.089 DIA THRU 2 PLS.
- 0.100
- 0.100
- 0.50
- 0.625
- 0.750
- 0.100
- 0.100
- 0.015 PIN DIA.
- 0.270
- 0.125 (GP)
- 0.127 (P)
- 0.38 FOR SMA FEMALE
- 0.50 FOR SMA MALE
- 0.030 DIA SOLDER PIN 2 PLS.
- 0.380
- 0.250
- 0.33
- 0.45
- 0.57
- 0.33
- SMC CONTROL CONNECTOR
- REMOVABLE SMA FEMALE CONNECTORS 2 PLS.
- MOUNTING SURFACE GP-GOLD PLATED P-PAINTED

Front View Text:

AMERICAN MICROWAVE CORPORATION
MADE IN U.S.A.
SOLID STATE
J1 VARIABLE ATTENUATOR
MODEL NO.:
OPTION NO.:
S/N NO.:
FICH 60463

M-VVAN-8018-60-SMC

6-18





7.0 2 TO 18 GHz
(SIZE: 2.25" x 2.00" x 1.00")

A-DVAN, A-VVAN, A-CVAN-OCTAVE BAND, VARIABLE
ATTENUATOR SERIES. SIZE: 2.25" x 2.00" x 1.00"

- DIGITAL: A-DVAN
- ANALOG/VOLTAGE: A-VVAN
- CURRENT: A-CVAN

CONTROLLED ATTENUATORS 7-0 TO 7-1

7.1 2 TO 18 GHz

TYPICAL DATA ON OCTAVE BAND 2 TO 18 GHz,
500ns HIGH SPEED, 60dB DYNAMIC RANGE,

- DIGITALLY VARIABLE: A-DVAN
- VOLTAGE VARIABLE: A-VVAN
- CURRENT VARIABLE: A-CVAN

ABSORPTIVE PIN DIODE ATTENUATORS 7-2

7.2 2 TO 18 GHz

(A-DVAN/A-VVAN/A-CVAN) SPECIFICATIONS:
(E = EXTENDED BAND)

	<u>FREQUENCY RANGE</u>	<u>MODEL NUMBER</u>	
--	------------------------	---------------------	--

7.2.1	2 TO 4 GHz	2040	7-3 TO 7-5
	1.5 TO 4.5 GHz	2040E	
7.2.2	2.5 TO 5 GHz	2550	7-3 TO 7-5
	1.9 TO 5.6 GHz	2550E	
7.2.3	4 TO 8 GHz	4080	7-3 TO 7-5
	3 TO 9 GHz	4080E	
7.2.4	5 TO 10 GHz	5010	7-3 TO 7-5
	3.75 TO 11.25 GHz	5010E	
7.2.5	6 TO 12 GHz	6012	7-3 TO 7-5
	4.5 TO 13 GHz	6012E	
7.2.6	8 TO 18 GHz	8018	7-3 TO 7-5
	6 TO 18 GHz	8018E	

7.3 2 TO 18 GHz

(A-DVAN/A-VVAN/A-CVAN) OPTIONS, STANDARD
MODELS, AND HOW TO ORDER 7-6 TO 7-7

7.4 2 TO 18 GHz

MECHANICAL OUTLINES FOR STANDARD A-DVAN
(DIGITAL VARIABLE ATTENUATOR) MODELS:

	<u>FREQUENCY RANGE</u>	<u>MODEL NUMBER</u>	
--	------------------------	---------------------	--

7.4.1	2.0 TO 4.0 GHz	A-DVAN-2040-60-8	7-8
	2.5 TO 5.0 GHz	A-DVAN-2550-60-8	
7.4.2	4.0 TO 8.0 GHz	A-DVAN-4080-60-8	7-9
	5.0 TO 10.0 GHz	A-DVAN-5010-60-8	
	6.0 TO 12.0 GHz	A-DVAN-6012-60-8	
7.4.3	8.0 TO 18.0 GHz	A-DVAN-8018-60-8	7-9



SECTION

PRODUCT DESCRIPTION

PAGE

- 7.5 2 TO 18 GHz MECHANICAL OUTLINES FOR STANDARD A-VVAN
(VOLTAGE VARIABLE ATTENUATOR) MODELS WITH
MULTIPIN CONNECTORS:

	<u>FREQUENCY RANGE</u>	<u>MODEL NUMBER</u>	
7.5.1	2.0 TO 4.0 Ghz	A-VVAN-2040-60-MP	
	2.5 TO 5.0 Ghz	A-VVAN-2550-60-MP	7-10
7.5.2	4.0 TO 8.0 Ghz	A-VVAN-4080-60-MP	
	5.0 TO 10.0 Ghz	A-VVAN-5010-60-MP	
	6.0 TO 12.0 Ghz	A-VVAN-6012-60-MP	7-11
7.5.3	8.0 TO 18.0 Ghz	A-VVAN-8018-60-MP	7-11



AMERICAN MICROWAVE
CORPORATION

TYPICAL DATA
ON
OCTAVE BAND
2.0 TO 18.0 GHz
500nS, HIGH SPEED
60dB DYNAMIC RANGE
DIGITALLY VARIABLE (A-DVAN)
VOLTAGE VARIABLE (A-VVAN)
AND
CURRENT VARIABLE (A-CVAN)
ABSORPTIVE, PIN DIODE ATTENUATORS

A-DVAN AND A-VVAN
SERIES
ATTENUATORS

DESIGNED
BY
A. K. GORWARA

REPORTED
BY
P. D. WOOD

FEBRUARY 17, 1996



A-DVAN & A-VVAN SERIES OCTAVE BAND 2.0 TO 18.0 GHz VARIABLE ATTENUATORS

- 60dB DYNAMIC RANGE
- LATCHING STROBE CAPABILITY
- 500 nSEC., MAXIMUM SWITCHING SPEED
- 8,10,11 & 12-BIT DIGITALLY VARIABLE MODELS(A-DVAN)
- 5dB & 10dB/VOLT, VOLTAGE VARIABLE MODELS (A-VVAN)

SPECIFICATIONS:

MODEL # (A-DVAN/A-VVAN)	FREQUENCY RANGE	INSERTION LOSS _(MAX)	VSWR (MAX)	FLATNESS @ 10dB	FLATNESS @ 20dB	FLATNESS @ 40dB	FLATNESS @ 60dB
2040	2.0 to 4.0 GHz	2.0 dB	2.0:1	±0.45 dB	±0.8 dB	±1.5 dB	±1.6 dB
2040E (Extended Bandwidth)	1.5 to 4.5 GHz	2.5 dB	2.2:1	±0.65 dB	±1.5 dB	±3.0 dB	±3.5 dB
2550	2.5 to 5.0 GHz	2.1 dB	2.0:1	±0.47 dB	±0.87 dB	±1.5 dB	±1.6 dB
2550E (Extended Bandwidth)	1.9 to 5.6 GHz	2.6 dB	2.2:1	±0.7 dB	±1.5 dB	±3.0 dB	±3.5 dB
4080	4.0 to 8.0 GHz	2.5 dB	2.0:1	±0.5 dB	±0.97 dB	±1.5 dB	±1.6 dB
4080E (Extended Bandwidth)	3.0 to 9.0 GHz	2.7 dB	2.2:1	±0.75 dB	±1.5 dB	±3.0 dB	±3.5 dB
5010	5.0 to 10.0 GHz	2.7 dB	2.0:1	±0.6 dB	±0.9 dB	±1.5 dB	±1.6 dB
5010E (Extended Bandwidth)	3.75 to 11.25 GHz	2.9 dB	2.2:1	±0.8 dB	±1.5 dB	±3.0 dB	±3.5 dB
6012	6.0 to 12.0 GHz	2.8 dB	2.0:1	±0.7 dB	±1.0 dB	±1.5 dB	±1.6 dB
6012E (Extended Bandwidth)	4.5 to 13.5 GHz	3.0 dB	2.2:1	±0.9 dB	±1.6 dB	±3.0 dB	±3.5 dB
8018	8.0 to 18.0 GHz	2.7 dB**	2.0:1	±0.8 dB	±1.1 dB	±1.5 dB	±1.6 dB
8018E (Extended Bandwidth)	6.0 to 18.0 GHz	3.7 dB**	2.2:1	±0.9 dB	±1.6 dB	±3.0 dB	±3.5 dB

** 2.7 dB Typical Loss to 16 GHz, 3.7 dB Max. Loss from 16.0 to 18.0 GHz.

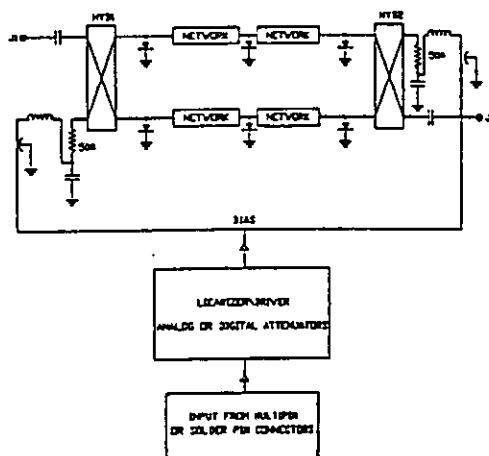
TYPICAL DATA
A-DVAN & A-VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



SPECIFICATIONS:

• DEVIATION FROM LINEARITY	: 0 TO 30 dB $\pm$ 0.5 dB
	: 30 TO 50 dB $\pm$ 1.0 dB
	: 50 TO 60 dB $\pm$ 1.5 dB
• MONOTICITY	: GUARANTEED
• SWITCHING SPEED	: 500 nS MAX.(BETWEEN ATTENUATION SETTINGS)
• TEMPERATURE COEFFICIENT	: $\pm$ 0.025 dB/°C
• RF POWER RATINGS	: + 20 dBm OPERATING, + 30 dBm SURVIVAL
• CONTROL	: 8-BIT(STANDARD) POSITIVE TRUE BINARY (A-DVAN) (10-BIT, 11-BIT OR 12-BIT ALSO AVAILABLE)
	-OR-
	: 10dB/VOLT(STANDARD) ANALOG TRANSFER FUNCTION (A-VVAN) (5dB/VOLT TRANSFER FUNCTION ALSO AVAILABLE)
• DC POWER SUPPLY	: $\pm$ 12vdc(STANDARD) OR $\pm$ 15vdc, @ +150 mA, -75 mA MAX.(8-BIT A-DVAN MODEL) @ +125 mA, -50 mA MAX.(ANALOG A-VVAN MODEL)
• CONNECTORS	: REMOVABLE SMA FEMALE(STANDARD) FOR RF 15-PIN MULTIPIN(STANDARD) FOR POWER AND CONTROL
• SIZE	: 2.5" X 2.0" X 1.0"
• WEIGHT	: $\leq$ 5 oz.

FUNCTIONAL SCHEMATIC



ENVIRONMENTAL RATINGS

• TEMPERATURE	: -55°C to +85°C (Operating), -65°C to +125°C (Storage)
• HUMIDITY	: MIL-STD-202F, METHOD 103B CONDITION B
• SHOCK	: MIL-STD-202F, METHOD 312B CONDITION B
• VIBRATION	: MIL-STD-202F, METHOD 204D CONDITION B
• ALTITUDE	: MIL-STD-202F, METHOD 105C CONDITION B
• TEMPERATURE CYCLING	: MIL-STD-202F, METHOD 107D CONDITION A

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AVAILABLE A-DVAN DIGITAL CONTROL PINOUTS

PINOUT	8-BIT (STANDARD)	10-BIT	11-BIT	12-BIT
PIN 1	NOT USED	NOT USED	0.06 dB	0.03 dB
PIN 2	LATCHING STROBE * (OPTIONAL)	LATCHING STROBE * (OPTIONAL)	LATCHING STROBE * (OPTIONAL)	0.06 dB
PIN 3	NOT USED	0.13 dB	0.13 dB	0.13 dB
PIN 4	GROUND	GROUND	GROUND	GROUND
PIN 5	0.25 dB (LSB)	0.25 dB	0.25 dB	0.25 dB
PIN 6	0.5 dB	0.5 dB	0.5 dB	0.5 dB
PIN 7	1.0 dB	1.0 dB	1.0 dB	1.0 dB
PIN 8	2.0 dB	2.0 dB	2.0 dB	2.0 dB
PIN 9	4.0 dB	4.0 dB	4.0 dB	4.0 dB
PIN 10	8.0 dB	8.0 dB	8.0 dB	8.0 dB
PIN 11	16.0 dB	16.0 dB	16.0 dB	16.0 dB
PIN 12	32.0 dB (MSB)	32.0 dB (MSB)	32.0 dB (MSB)	32.0 dB (MSB)
PIN 13	+12 OR +15 VDC	+12 OR +15 VDC	+12 OR +15 VDC	+12 OR +15 VDC
PIN 14	-12 OR -15 VDC	-12 OR -15 VDC	-12 OR -15 VDC	-12 OR -15 VDC
PIN 15	NOT USED	0.06 dB (LSB)	0.03 dB (LSB)	0.016 dB (LSB)

* Order "L" Suffix Models for Latching Strobe Capability, See "HOW TO ORDER" for more details.

STANDARD A-VVAN MULTIPIN ANALOG CONTROL PINOUTS (OPTION "MP")

MP-MULTIPIN	CONNECTOR PINOUT FOR VOLTAGE VARIABLE ATTENUATORS (A-VVAN UNITS)
PIN 3	ANALOG INPUT
PIN 4	GROUND
PIN 13	+12 or +15 VDC
PIN 14	-12 or -15 VDC
ALL OTHER PINS NOT USED	



AVAILABLE OPTIONS AND HOW TO ORDER

EXAMPLE

A-DVAN - 4080 - 60 - 8 - X - GP
1 2 3 4 5 6

- 1 : A-DVAN : DIGITALLY VARIABLE ATTENUATOR NEW
2 : FREQUENCY OF OPERATION (e.g. 4.0 to 8.0 GHz)
3 : DYNAMIC RANGE IN dB
4 : NUMBER OF DIGITAL BITS (e.g. 8, 10, 11 or 12-bits)
5 : X=ANY COMBINATION OF THE
A-DVAN OPTIONS GIVEN BELOW.
6 : GOLD PLATED (GP) MOUNTING SURFACE
All other sides are Painted.
PAINTED (P) MOUNTING SURFACE
This is Standard for all products

EXAMPLE

A-VVAN - 6012 - 60 - MP - 3 - GP
1 2 3 4 5 6

- 1 : A-VVAN : VOLTAGE VARIABLE ATTENUATOR NEW
2 : FREQUENCY OF OPERATION (e.g. 6.0 to 12.0 GHz)
3 : DYNAMIC RANGE IN dB
4 : CONTROL CONNECTOR
• MP : Standard Connector for Analog Units
(ITT Cannon 15-Pin Multi-Plug Connector Per MIL-C-24308).
5 : ADDITIONAL OPTIONS AS GIVEN BELOW
6 : GOLD PLATED (GP) MOUNTING SURFACE
All other sides are Painted.
PAINTED (P) MOUNTING SURFACE
This is Standard for all products

ADDITIONAL A-DVAN AND A-VVAN OPTIONS

OPTION No:	A-DVAN AVAILABLE OPTIONS (DIGITALLY VARIABLE)	OPTION No:	A-VVAN AVAILABLE OPTIONS (VOLTAGE VARIABLE)
1	Two SMA Male Removable RF Connectors	1	Two SMA Male Removable RF Connectors
2	One SMA Male & One SMA Female Removable RF Connector	2	One SMA Male & One SMA Female Removable RF Connector
3	Not/Applicable	3	5 dB/Volt Transfer Function
4	0 to 30dB Attenuation Range	4	0 to 30 dB Attenuation Range
5	± 15 vdc Supply Voltage	5	± 15 vdc Supply Voltage
L	Latching Strobe Capability	6	Substitute A-CVAN product code for the A-VVAN product code for Current Controlled (Non-Linearized) Attenuators

ORDERING:

AMERICAN MICROWAVE CORPORATION
7311-G GROVE ROAD, FREDERICK, MARYLAND 21704
TELEPHONE NUMBER : 301-662-4700
FACSIMILE NUMBER : 301-662-4938

PLEASE CALL OR FAX FOR CATALOGS, TEST REPORTS AND ORDERING INFORMATION ON ANY OF OUR PRODUCTS.

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STANDARD A-DVAN MODELS AVAILABLE

FREQUENCY	MODEL NUMBER	CONTROL
2.0 TO 4.0 GHz	A-DVAN-2040-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON per MIL-C-24308)
4.0 TO 8.0 GHz	A-DVAN-4080-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON per MIL-C-24308)
5.0 TO 10.0 GHz	A-DVAN-5010-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON per MIL-C-24308)
6.0 TO 12.0 GHz	A-DVAN-6012-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON per MIL-C-24308)
8.0 TO 18.0 GHz	A-DVAN-8018-60-8	8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON per MIL-C-24308)

A-DVAN : DIGITALLY VARIABLE ATTENUATOR

STANDARD A-VVAN MODELS AVAILABLE

FREQUENCY	MODEL NUMBER	CONTROL
2.0 TO 4.0 GHz	A-VVAN-2040-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON per MIL-C-24308)
4.0 TO 8.0 GHz	A-VVAN-4080-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON per MIL-C-24308)
5.0 TO 10.0 GHz	A-VVAN-5010-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON per MIL-C-24308)
6.0 TO 12.0 GHz	A-VVAN-6012-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON per MIL-C-24308)
8.0 TO 18.0 GHz	A-VVAN-8018-60-MP	Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON per MIL-C-24308)

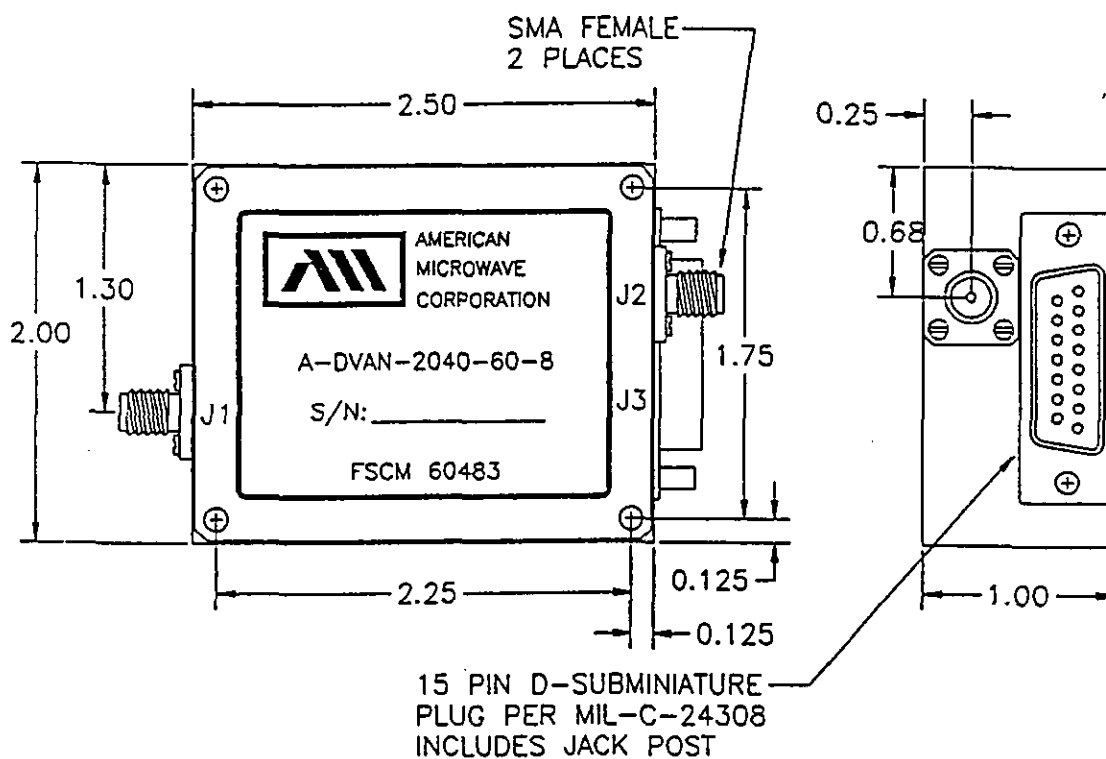
A-VVAN : VOLTAGE VARIABLE ATTENUATOR

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
A-DVAN & A-VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



A-DVAN-2040/2550-60-8
DIGITALLY VARIABLE ATTENUATOR
(2.0 TO 4.0 GHz & 2.5 TO 5.0 GHz)



ALL DIMENSIONS ARE IN INCHES, TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

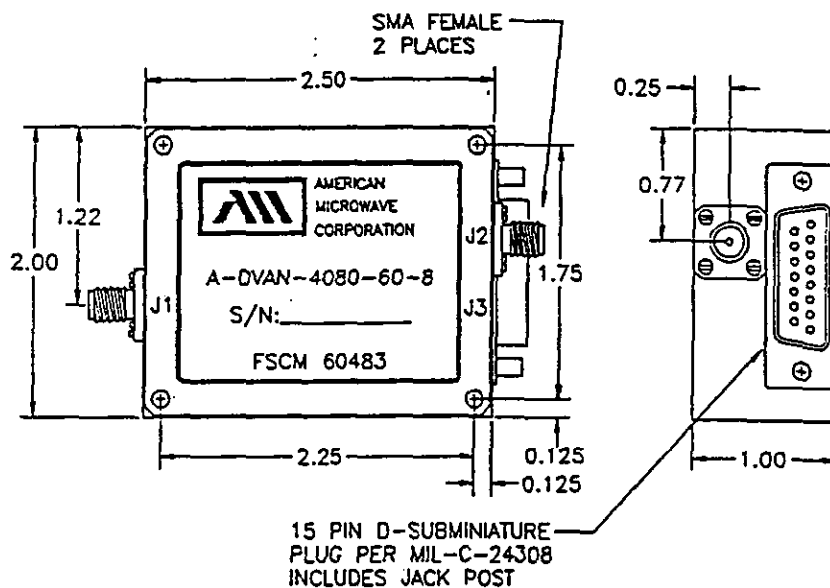
A-DVAN-2040/2550-60-8

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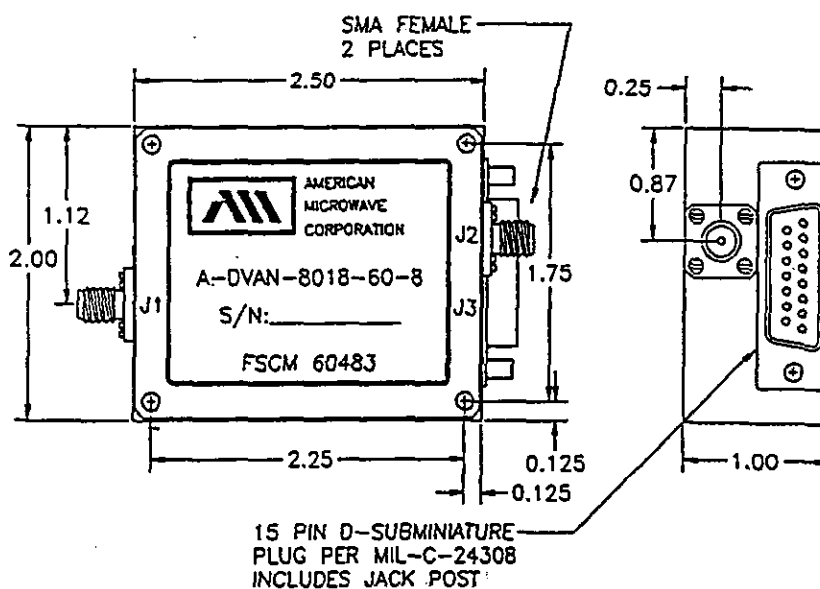
TYPICAL DATA
A-DVAN & A-VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



A-DVAN-4080/5010/6012-60-8
DIGITALLY VARIABLE ATTENUATOR
(4.0 TO 8.0 GHz, 5.0 TO 10.0 GHz & 6.0 TO 12.0 GHz)



A-DVAN-8018-60-8
DIGITALLY VARIABLE ATTENUATOR
(8.0 TO 18.0 GHz)



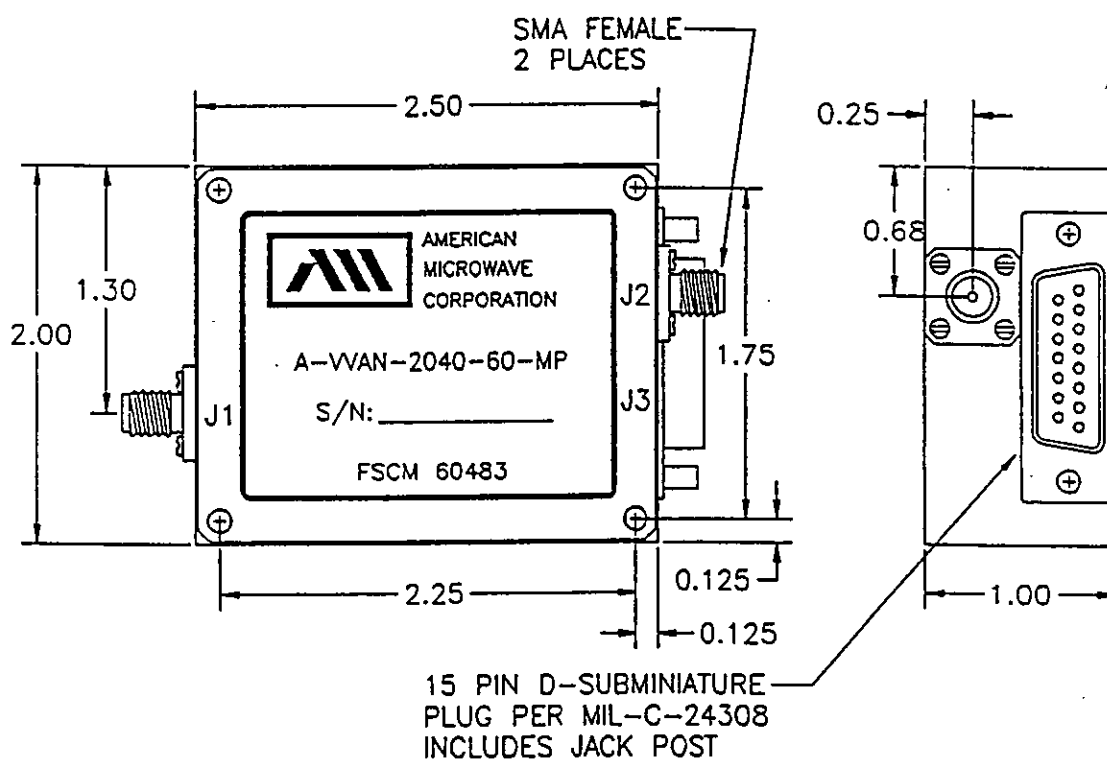
ALL DIMENSIONS ARE IN INCHES, TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010 .

AMERICAN MICROWAVE CORPORATION

TYPICAL DATA
A-DVAN & A-VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



A-VVAN-2040/2550-60-MP
VOLTAGE VARIABLE ATTENUATOR
(2.0 TO 4.0 GHz & 2.5 TO 5.0 GHz)



ALL DIMENSIONS ARE IN INCHES, TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

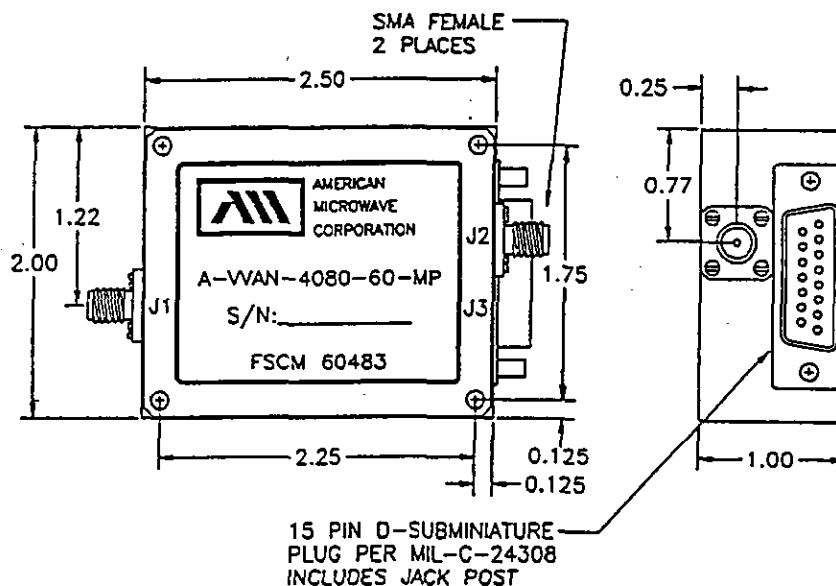
A-VVAN-2040/2550-60-MP

AMERICAN MICROWAVE CORPORATION

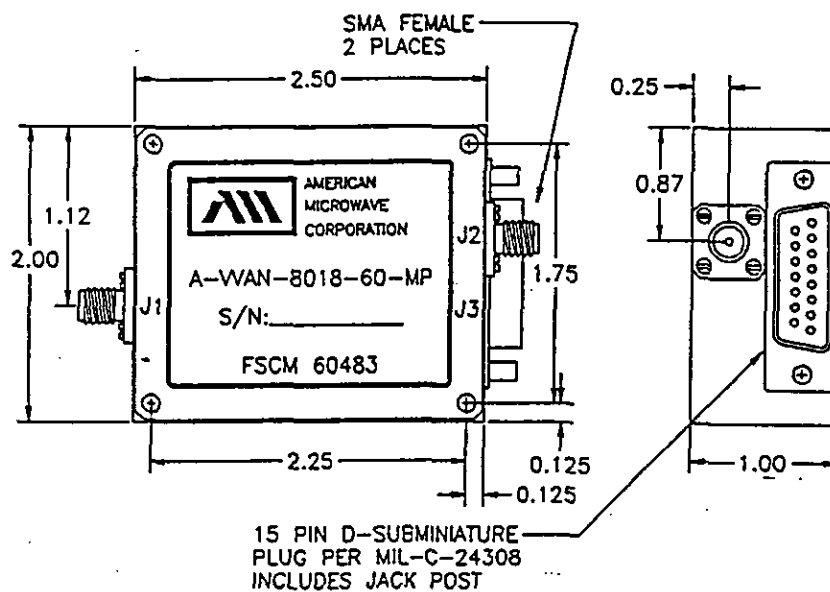
TYPICAL DATA
A-DVAN & A-VVAN SERIES
60dB ABSORPTIVE ATTENUATORS



A-VVAN-4080/5010/6012-60-MP
VOLTAGE VARIABLE ATTENUATOR
(4.0 TO 8.0 GHz, 5.0 TO 10.0 GHz & 6.0 TO 12.0 GHz)



A-VVAN-8018-60-MP
VOLTAGE VARIABLE ATTENUATOR
(8.0 TO 18.0 GHz)



ALL DIMENSIONS ARE IN INCHES. TOLERANCE: X.XX ± 0.020 , X.XXX ± 0.010

AMERICAN MICROWAVE CORPORATION



SECTION

PRODUCT DESCRIPTION

PAGES

8.0	0.5 TO 18 GHz	AGH SERIES, OCTAVE BAND, VARIABLE ATTENUATORS	
		• DIGITAL:	AGH-DD
		• ANALOG/VOLTAGE:	AGH-D
		• CURRENT:	AGH 8-0 TO 8-2

DIGITALLY CONTROLLED-HIGH SPEED ATTENUATORS

8.1	6 TO 12 GHz	125ns <u>HIGH SPEED</u> , 60dB, 8 BIT, PROGRAMMABLE	
		• AGH-0612-60DDSF	8-4 TO 8-5
8.2	6 TO 18 GHz	125ns TO 500ns <u>HIGH SPEED</u> , 60dB, 8 BIT PROGRAMMABLE	
		• AGH-8018-60DD-SF	8-6 TO 8-7
8.3	8 TO 18 GHz	900ns, 60dB, 8 BIT PROGRAMMABLE	
		• AGH-8018-65DD-205	8-8 TO 8-9
8.4	9 TO 10 GHz	500ns <u>HIGH SPEED</u> , 60dB, 8 BIT PROGRAMMABLE	
		• AGH-0910-60DDSF	8-10 TO 8-11

60 dB DYNAMIC RANGE DIGITALLY CONTROLLED ATTENUATORS

8.5	2 TO 4 GHz	60dB, 8 BIT PROGRAMMABLE	
		• AGH-2040-65DD	8-12 TO 8-13
8.6	1.9 TO 5.6 GHz	60dB, 10 BIT PROGRAMMABLE	
		• AGH-2550-60DD-410	8-14 TO 8-15
8.7	4 TO 8 GHz	60dB, 8 BIT PROGRAMMABLE	
		• AGH-4080-65DD	8-16 TO 8-17
8.8	8 TO 12 GHz	60dB, 8 BIT PROGRAMMABLE	
		• AGH-0812-65DD	8-18 TO 8-19
8.9	1 TO 18 GHz	AGH DD SERIES OCTAVE BAND, 60dB RANGE, 8 BIT DIGITAL	

FREQUENCY	(OPTIONAL)	MODEL NO	
• 1 TO 2 GHz	(0.75 TO 2.25 GHz)	AGH-1020DD	
• 2 TO 4 GHz	(1.5 TO 4.5 GHz)	AGH-2040DD	
• 2.5 TO 5 GHz	(1.9 TO 5.6 GHz)	AGH-2550DD	
• 4 TO 8 GHz	(3.0 TO 9.0 GHz)	AGH-4080DD	
• 5 TO 10 GHz	(3.75 TO 11.25 GHz)	AGH-5010DD	
• 6 TO 12 GHz	(4.5 TO 13.5 GHz)	AGH-6012DD	
• 8 TO 18 GHz	(6.0 TO 18.0 GHz)	AGH-8018DD	8-20 TO 8-23

120 dB DYNAMIC RANGE DIGITALLY CONTROLLED ATTENUATORS

8.10	1 TO 2 GHz	120dB, 8 BIT PROGRAMMABLE	
		• AGH-1020-60DD-120	8-24 TO 8-25
8.11	2 TO 4 GHz	120dB, 8 BIT PROGRAMMABLE	
		• AGH-2040-60DD-120	8-26 TO 8-27



SECTION

PRODUCT DESCRIPTION

PAGE

8.12	2.5 TO 5 GHz	120dB, 8 BIT PROGRAMMABLE • AGH-2550-60DD-120	8-28 TO 8-29
8.13	4 TO 8 GHz	120dB, 8 BIT PROGRAMMABLE • AGH-4080-60DD-120	8-30 TO 8-31
8.14	5 TO 10 GHz	120dB, 8 BIT PROGRAMMABLE • AGH-5010-60DD-120	8-32 TO 8-33
8.15	6 TO 12 GHz	120dB, 8 BIT PROGRAMMABLE • AGH-6012-60DD-120	8-34 TO 8-35
8.16	8 TO 18 GHz	120dB, 8 BIT PROGRAMMABLE • AGH-8018-60DD-120	8-36 TO 8-37

HIGH SPEED VOLTAGE CONTROLLED ATTENUATORS

8.17	1 TO 2 GHz	125ns TO 500ns HIGH SPEED, 60dB, 10dB/VOLT • AGH-1020-60DSF	8-38 TO 8-39
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60dB VOLTAGE CONTROLLED ATTENUATORS

8.18	0.5 TO 1 GHz	60dB, 10dB/VOLT • AGH-0510-60D	8-40 TO 8-41
8.19	4.2 TO 4.4 GHz	70dB, 10dB/VOLT • AGH-2856-70D	8-42 TO 8-43
8.20	1 TO 18 GHz	AGH D SERIES, OCTAVE BAND, 60dB RANGE, VOLTAGE VARIABLE ATTENUATORS.	

FREQUENCY	(OPTIONAL)	MODEL NO	
• 1 TO 2 GHz	(0.75 TO 2.25 GHz)	AGH-1020D	
• 2 TO 4 GHz	(1.5 TO 4.5 GHz)	AGH-2040D	
• 2.5 TO 5 GHz	(1.9 TO 5.6 GHz)	AGH-2550D	
• 4 TO 8 GHz	(3.0 TO 9.0 GHz)	AGH-4080D	
• 5 TO 10 GHz	(3.75 TO 11.25 GHz)	AGH-5010D	
• 6 TO 12 GHz	(4.5 TO 13.5 GHz)	AGH-6012D	
• 8 TO 18 GHz	(6.0 TO 18.0 GHz)	AGH-8018D	8-44 TO 8-47

120dB VOLTAGE CONTROLLED ATTENUATORS

8.21	1 TO 2 GHz	120dB, 20dB/VOLT • AGH-1020-60D-120	8-48 TO 8-49
8.22	2 TO 4 GHz	120dB, 20dB/VOLT • AGH-2040-60D-120	8-50 TO
8.23	2.5 TO 5 GHz	120dB, 20dB/VOLT • AGH-2550-60D-120	8-52 TO 8-53



SECTION

PRODUCT DESCRIPTION

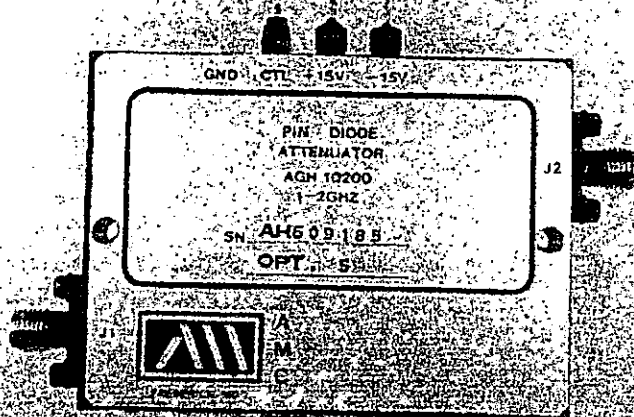
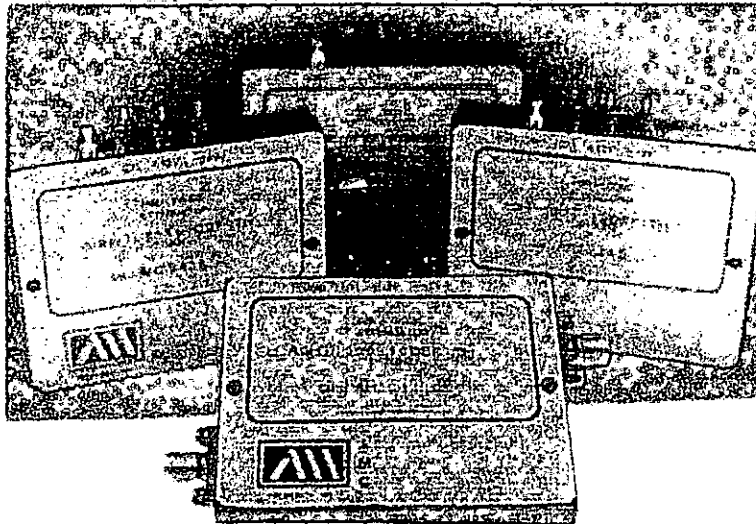
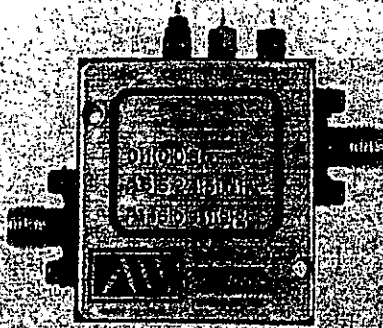
PAGES

8.24	4 TO 8 GHz	120dB, 20dB/VOLT • AGH-4080-60D-120	8-54 TO 8-55
8.25	5 TO 10 GHz	120dB, 20dB/VOLT • AGH-5010-60D-120	8-56 TO 8-57
8.26	6 TO 12 GHz	120dB, 20dB/VOLT • AGH-6012-60D-120	8-58 TO 8-59
8.27	8 TO 18 GHz	120dB, 20dB/VOLT • AGH-8018-60D-120	8-60 TO 8-61

CURRENT CONTROLLED ATTENUATORS

8.28	4 TO 8 GHz	60dB, NEGATIVE CURRENT CONTROLLED • AGH-4080-N	8-62 TO 8-63
8.29	1 TO 18 GHz	AGH SERIES OCTAVE BAND, 60dB RANGE, CURRENT CONTROLLED ATTENUATORS	

FREQUENCY	(OPTIONAL)	MODEL NO	
• 1 TO 2 GHz	(0.75 TO 2.25 GHz)	AGH-1020	
• 2 TO 4 GHz	(1.5 TO 4.5 GHz)	AGH-2040	
• 2.5 TO 5 GHz	(1.9 TO 5.6 GHz)	AGH-2550	
• 4 TO 8 GHz	(3.0 TO 9.0 GHz)	AGH-4080	
• 5 TO 10 GHz	(3.75 TO 11.25 GHz)	AGH-5010	
• 6 TO 12 GHz	(4.5 TO 13.5 GHz)	AGH-6012	
• 8 TO 18 GHz	(6.0 TO 18.0 GHz)	AGH-8018	 8-64 TO 8-67



DESCRIPTION

AMC MODEL AGH-0612-60DDSF IS AN ULTRA HIGH SPEED OCTAVE BAND ATTENUATOR/MODULATOR, PROGRAMMABLE BY 8 BIT POSITIVE TRUE BINARY LOGIC.

SPECIFICATIONS

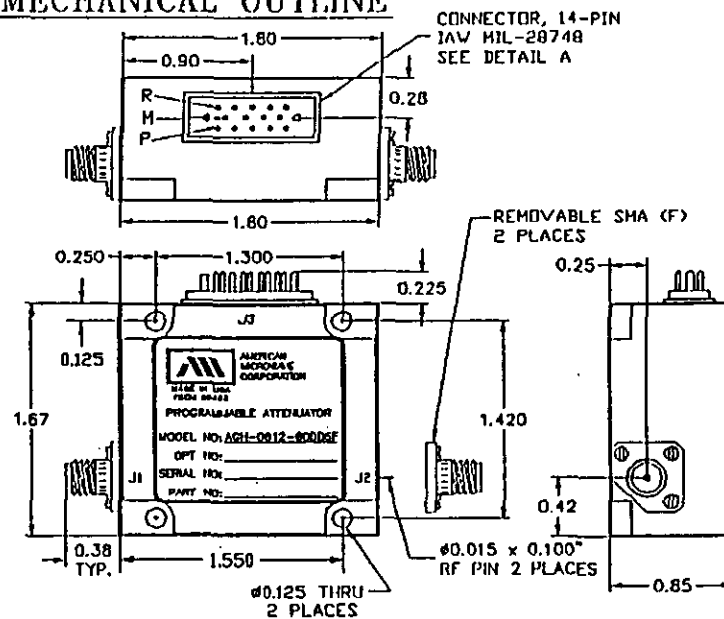
- FREQUENCY RANGE 6-12 GHz MINIMUM
- INSERTION LOSS 2.5 dB MAXIMUM
- ATTENUATION FLATNESS 0-10db ± 0.7 MAXIMUM
10-20db ± 1.0 MAXIMUM
20-40db ± 1.5 MAXIMUM
40-60db ± 1.6 MAXIMUM
- ATTENUATION ACCURACY 0-30db ± 0.5 MAXIMUM
30-50db ± 1.0 MAXIMUM
50-63.75b ± 1.5 MAXIMUM
- SWITCHING TIME 125nS MAXIMUM
- TEMPERATURE COEFFICIENT ± 0.01 dB/ $^{\circ}$ C
- VSWR (ON/OFF) 1.7:1 MAXIMUM
- POWER RATINGS
OPERATING +20dBm MAXIMUM
SURVIVAL +30dBm MAXIMUM
- CONTROL 8 BIT POSITIVE TRUE TTL BINARY LOGIC,
0.25dB MINIMUM ATTENUATION STEPS
(SEE PIN FUNCTION TABLE)
- POWER SUPPLY +12 TO +18VDC @100mA MAXIMUM
-12 TO -18VDC @ 15mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT FIELD REPLACEABLE SMA (FEMALE)
POWER AND CONTROLS MINATURE 14 PIN MALE (MIL-28748),
MATING CONNECTOR (FEMALE) FURNISHED
- SIZE 1.80" x 1.67" x 0.85"

AVAILABLE OPTIONS

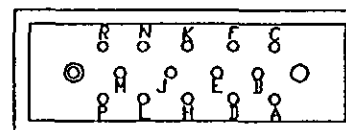
- A01 J1 SMA MALE, J2 SMA FEMALE
- A02 TWO SMA MALE CONNECTORS
- A03 MINIATURE 15 PIN, MALE CONNECTOR (MDM15SSP)
- A04 ULTRA HIGH SPEED (70ns ON/OFF TIME)

J3 PIN FUNCTION	PIN FUNCTION
A	N/C
B	GND
C	0.25dB
D	0.5dB
E	N/C
F	1.0dB
H	2.0dB
J	4.0dB
K	8.0dB
L	16.0dB
M	32.0dB
N	GND
P	+12V TO +18V
R	-12V TO -18V

MECHANICAL OUTLINE



DETAIL A



NOTES:

- 1) DIMENSIONS ARE IN INCHES
- 2) TOLERANCES: X.XX ± 0.020
X.XXX ± 0.010
- 3) WEIGHT: APPROX. 3.4 OZ

ENVIRONMENTAL RATINGS

- TEMPERATURE -55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A

APPROVALS	DATE
DRAWN <i>WSP</i>	11/11/92
CHECKED <i>WSP</i>	10/14/92

AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

PRODUCT FEATURE

AGH-0612-60DDSF

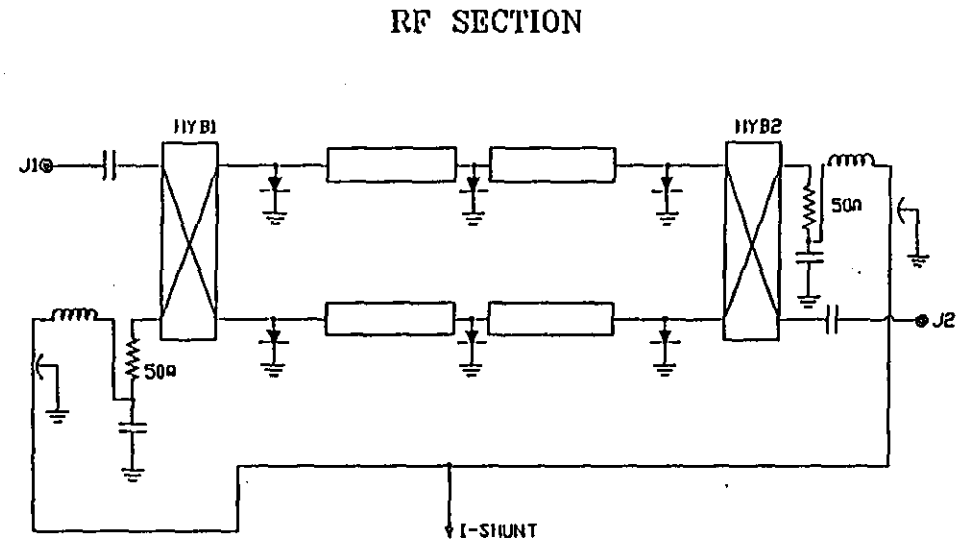
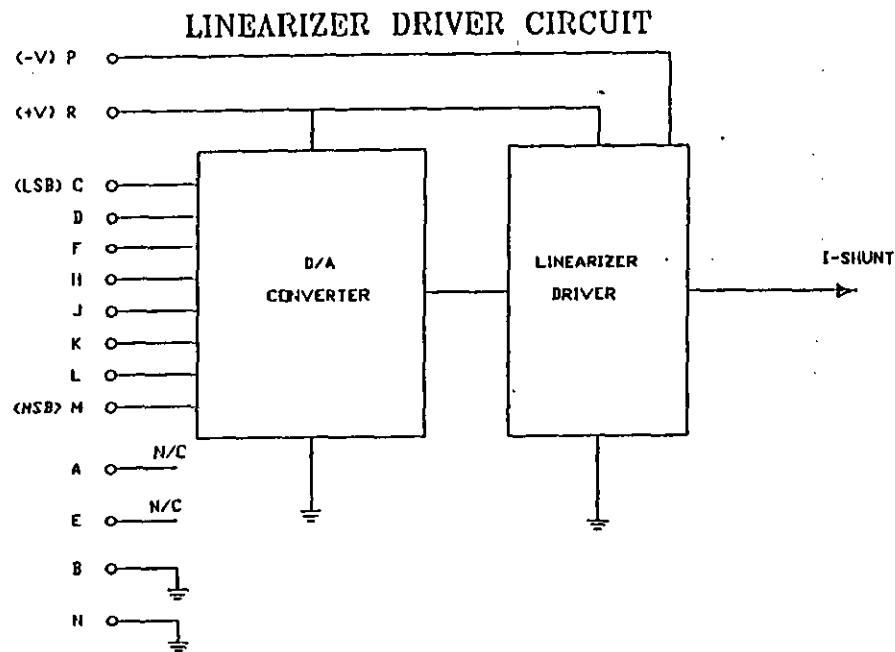
ULTRA HIGH SPEED, 6 TO 12 GHz PROGRAMMABLE ATTENUATOR

SIZE A

SHEET 1 OF 2

DWG. # 100-2812

FUNCTIONAL SCHEMATIC



AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS	DATE
DRW: WJP	11/11/02
CHECKED	

PRODUCT FEATURE
AGH-0612-60DDSF
ULTRA HIGH SPEED, 6 TO 12 GHz PROGRAMMABLE ATTENUATOR

SIZE A	SHEET 2 OF 2	DWG. # 100-2812
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DESCRIPTION

AMC MODEL AGH-8018-60DD-SF IS A HIGH SPEED OVER-OCTAVE BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 8 BIT BINARY LOGIC OR DRIVEN BY AN ANALOG POSITIVE VOLTAGE; UNIT IS PACKAGED IN A MINIATURE HERMETIC HOUSING FOR HIGH RELIABILITY APPLICATIONS.

SPECIFICATIONS

- FREQUENCY RANGE 6-18 GHz MINIMUM
- INSERTION LOSS 3.0 dB MAXIMUM
- ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

FREQUENCY RANGE	10dB	20dB	40dB	60dB
8.0-18 GHz	0.7	1.0	1.5	1.6
6.0-18 GHz	0.9	1.5	3.0	3.5

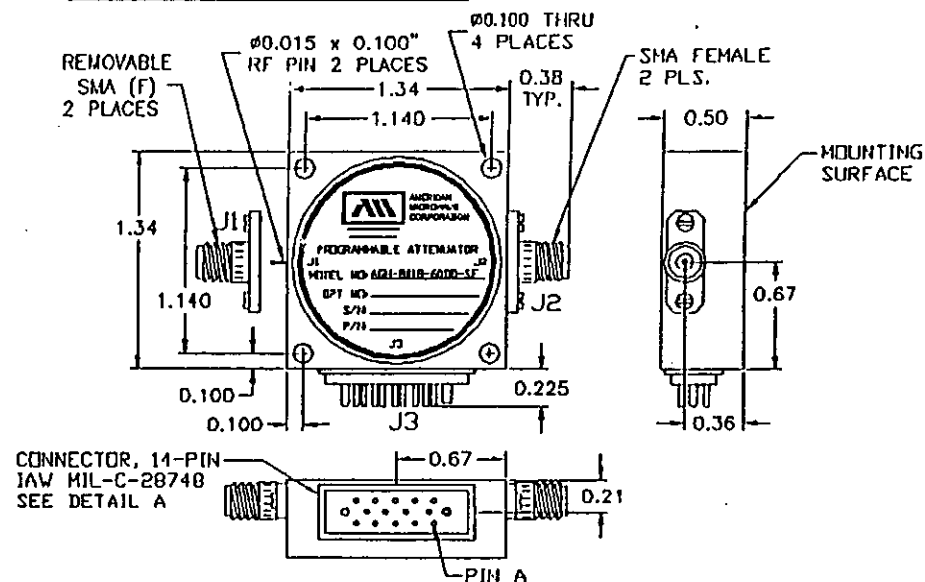
- ATTENUATION ACCURACY 0-30dB $\pm$ 0.5dB MAXIMUM
30-50dB $\pm$ 1.0dB MAXIMUM
50-60dB $\pm$ 1.5dB MAXIMUM
- MONOTONICITY GUARANTEED
- TEMPERATURE COEFFICIENT $\pm$ 0.02 dB/ $^{\circ}$ C
- SWITCHING TIME
(-SF) 500 nS MAXIMUM
(-VF) 200 nS MAXIMUM
(-UF) 125 nS MAXIMUM
- VSWR (ALL ATTENUATION LEVELS) 1.8:1 MAXIMUM
- POWER RATINGS
(-SF) +20dBm CW OR PEAK
(-VF) & (-UF) +10dBm CW OR PEAK
- CONTROL
DIGITAL 8 BIT TRUE BINARY LOGIC, 0.25dB MINIMUM ATTENUATION STEP.
ANALOG 0-6V ANALOG VOLTAGE, 10dB/VOLT TRANSFER FUNCTION
- POWER SUPPLY +12 TO +18VDC @ 100 mA MAXIMUM
-12 TO -18VDC @ 15 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT FIELD REPLACEABLE SMA (FEMALE)
POWER & CONTROLS MINIATURE 14 PIN MALE (MIL-C-28748)
MATING CONNECTOR (FEMALE) FURNISHED
- SIZE 1.34" x 1.34" x 0.50"

AVAILABLE OPTIONS

- A01 J1 SMA MALE, J2 SMA FEMALE
- A02 TWO SMA MALE CONNECTORS
- A03 HERMETIC SEALING (MIL-STI)-883)

REV.		DESCRIPTION	DATE	APPROVED
1	A	ORIGINAL RELEASE	11/18/92	

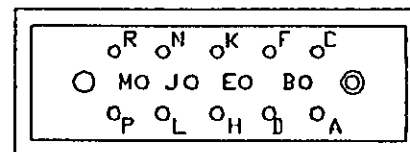
MECHANICAL OUTLINE



DETAIL A

NOTES:

- DIMENSIONS ARE IN INCHES [MILLIMETERS]
- TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
- WEIGHT: APPROX. 2.4 OZ



ENVIRONMENTAL RATINGS

- TEMPERATURE -55 $^{\circ}$ C TO +110 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



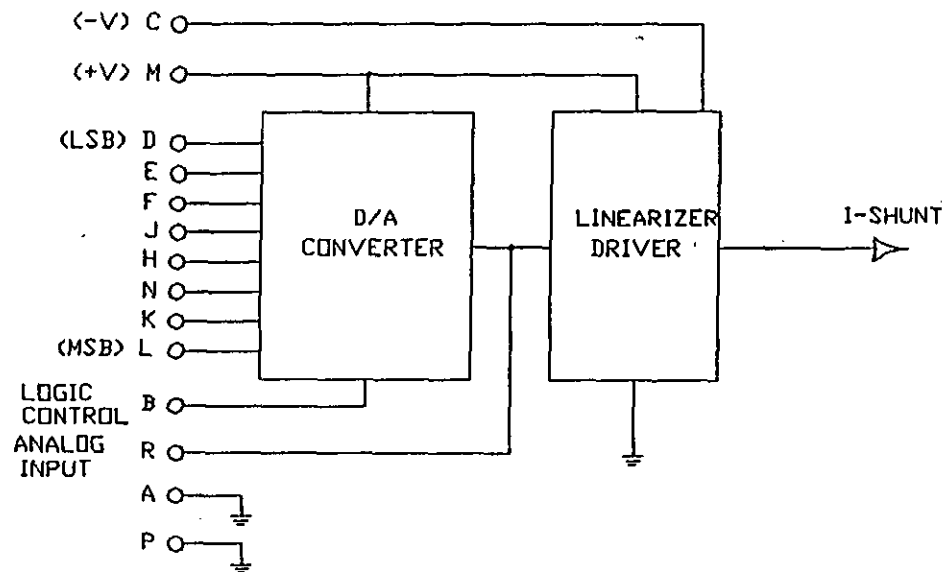
AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS	DATE
DESIGN WSP	11/18/92
CHECKED [Signature]	10/14/92

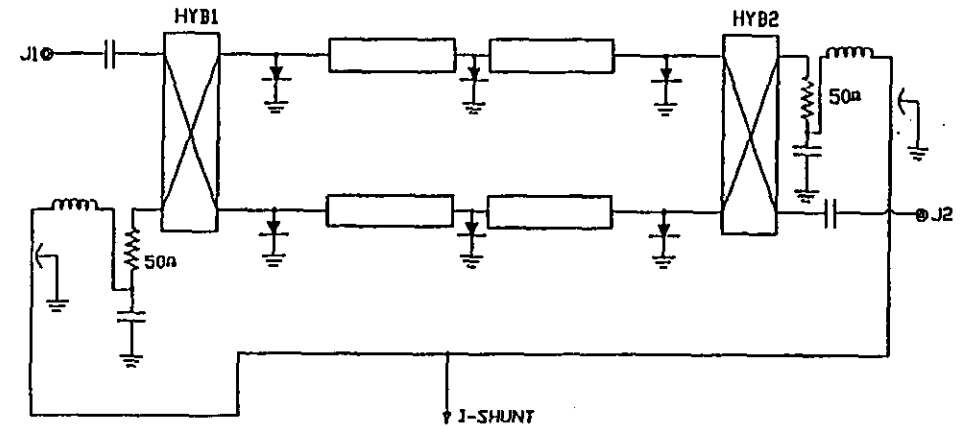
PRODUCT FEATURE		SF (STANDARD)
AGH-8018-60DD-SF		VF (VERY FAST)
HIGH SPEED, 6-18 GHz, PIN DIODE, VARIABLE ATTENUATOR		UF (ULTRA FAST)
SIZE A	SHEET 1 OF 2	DWG. # 100-2813

FUNCTIONAL SCHEMATIC

LINEARIZER DRIVER CIRCUIT



RF SECTION



J3 PIN FUNCTION	
PIN	FUNCTION
A	GND
B	LOGIC CONTROL
C	-12 TO -15VDC
D	0.25dB(LSB)
E	0.5dB
F	1.0dB
H	4.0dB
J	2.0dB
K	16.0dB
L	32.0dB(MSB)
M	+12 TO +15VDC
N	8.0dB
P	GND
R	ANALOG OUTPUT

(NOTE 1)

(NOTE 2)

NOTES:

- FOR NORMAL PROGRAMMING CONTROL, PIN B MUST BE GROUNDED OR LOGIC '0'. APPLICATION OF LOGIC '1' TO PIN B OVER THE DIGITAL INPUT AND SETS THE UNIT TO HIGH ISOLATION (60dB OR GREATER).
- FOR ANALOG INPUT CONTROL, CONNECT LOGIC '1' (HIGH) ON PIN B, AND APPLY 0-6 VOLTS FOR ANALOG PROGRAMMING.



AMERICAN MICROWAVE CORPORATION

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TEL: (301) 662-4700 FAX: (301) 662-4938

PRODUCT FEATURE

AGH-8018-60DD-SF

HIGH SPEED, 6-18 GHz, PIN DIODE, VARIABLE ATTENUATOR

SF (STANDARD)

VF (VERY FAST)

UF (ULTRA FAST)

SIZE A

SHEET 2 OF 2

OWG. # 100-2813

APPROVALS

DATE

DRAWN

CHECKED

WSP

11/14/82

DESCRIPTION

AMC MODEL AGH-8018-65DD-205 IS A HIGH SPEED OVER-OCTAVE BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 8 BIT POSITIVE TRUE BINARY LOGIC.

SPECIFICATIONS

- FREQUENCY RANGE 6.0-18.0 GHz MINIMUM
- INSERTION LOSS 3.0 dB MAXIMUM
- ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

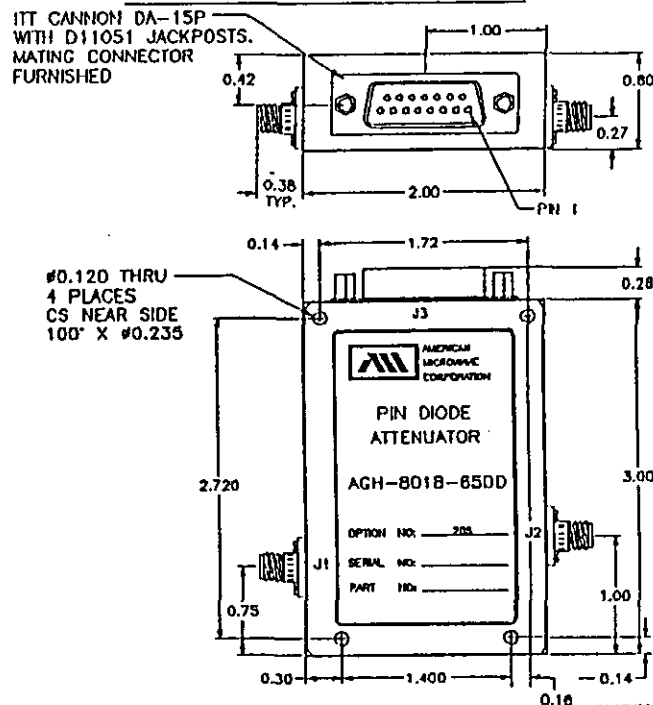
FREQUENCY RANGE	10 dB	20 dB	40 dB	60 dB
8.0-18.0 GHz	0.7	1.0	1.5	1.6
6.0-18.0 GHz	0.9	1.5	3.0	3.5

- ATTENUATION ACCURACY..... 0-30 dB $\pm$ 0.5 dB MAXIMUM
(MONOTICITY IS GUARANTEED) 30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT..... $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME
DELAY ON (50% TTL TO 90% RF) ... 900 ns MAXIMUM
DELAY OFF (50% TTL TO 10% RF) .. 900 ns MAXIMUM
- VSWR (ALL ATTENUATION LEVELS)..... 2:1 MAXIMUM
- RF POWER RATINGS
OPERATING POWER..... +20 dBm CW MAXIMUM
SURVIVAL POWER..... +30 dBm CW MAXIMUM
- CONTROL 8 BIT TRUE BINARY LOGIC
0.25 dB MAXIMUM ATTENUATION STEPS
- POWER SUPPLY..... +12 TO +18VDC @ 100 mA MAXIMUM
-12 TO -18VDC @ 100 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT..... SMA FEMALE
POWER AND CONTROLS..... 15 PIN D TYPE SUBMINIATURE MALE,
MATING CONNECTOR FURNISHED
- SIZE 2.00" x 3.00" x 0.80"

AVAILABLE OPTIONS

A01.....J1 SMA MALE, J2 SMA FEMALE
A02.....TWO SMA MALE RF CONNECTORS

MECHANICAL OUTLINE



J3	PIN FUNCTION
PIN#	FUNCTION
1	GND
2	ANALOG INPUT
3	N/C
4	GND
5	0.25 dB (LSB)
6	0.5 dB
7	1.0 dB
8	2.0 dB
9	4.0 dB
10	8.0 dB
11	16.0 dB
12	32.0 dB (MSB)
13	+V
14	-V
15	N/C

NOTES:

- DIMENSIONS ARE IN INCHES
- TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
- WEIGHT: APPROX. 7.0 OZ

ENVIRONMENTAL RATINGS

- TEMPERATURE.....-55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITYMIL-STD-202F, METHOD 103B COND. B
- SHOCKMIL-STD-202F, METHOD 213B COND. B
- VIBRATION.....MIL-STD-202F, METHOD 204D COND. B
- ALTITUDEMIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE.....MIL-STD-202F, METHOD 107D COND. A



AMERICAN MICROWAVE CORPORATION
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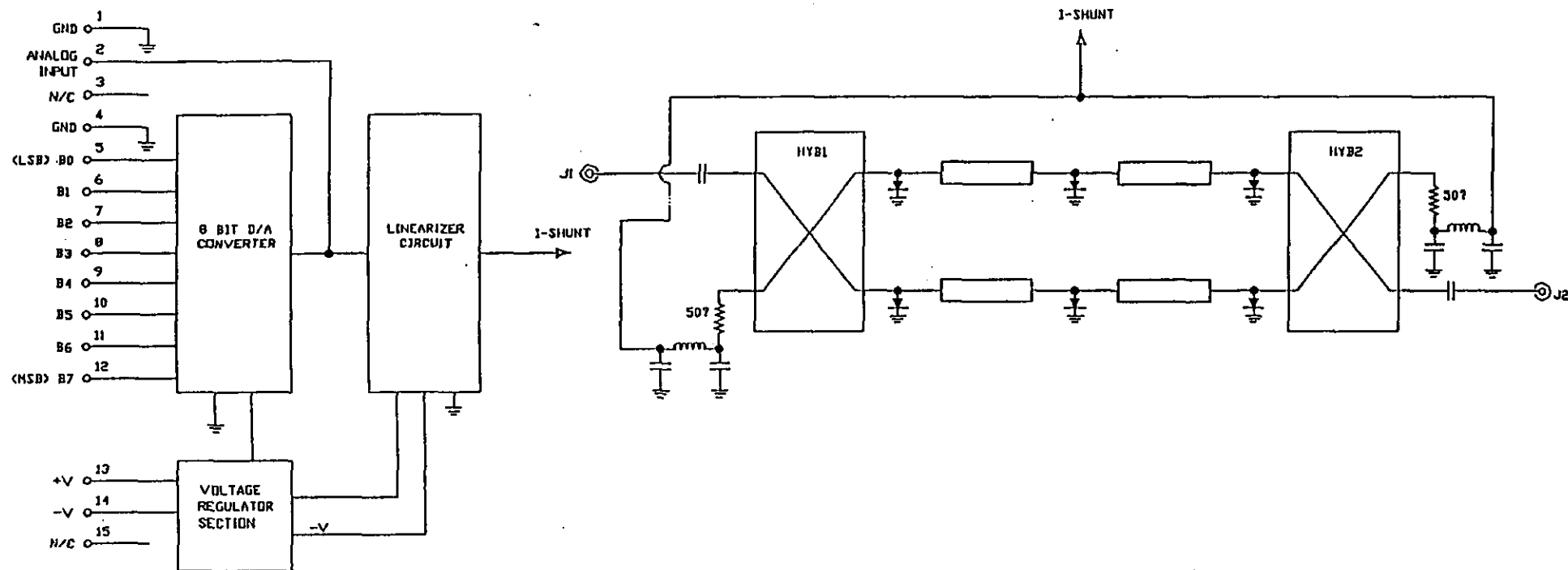
APPROVALS	DATE
DRAWN WSP	01/27/95
CHECKED R. H. Fable	01/14/97

PRODUCT FEATURE		
AGH-8018-65DD-205		
8.0-18 GHz, HIGH SPEED PROGRAMMABLE VARIABLE ATTENUATOR		
SIZE A	SHEET 1 OF 2	DWG. # 100-3120

FUNCTIONAL SCHEMATIC

DRIVER/CONTROL CIRCUIT

RF SECTION



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS

DATE

DRAWN

WSP

08/27/95

CHECKED

PRODUCT FEATURE

AGH-8018-65DD-205

8.0-18 GHz, HIGH SPEED PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

DWG. # 100-3120

DESCRIPTION

AMC MODEL AGH-0910-60DDSF IS AN ULTRA HIGH SPEED OCTAVE BAND ATTENUATOR/MODULATOR, PROGRAMMABLE BY 8 BIT POSITIVE TRUE BINARY LOGIC.

SPECIFICATIONS

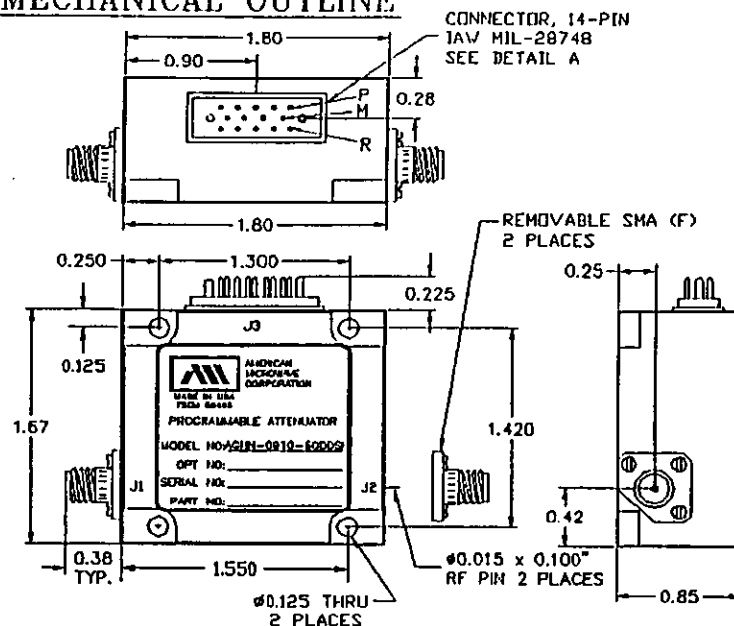
- FREQUENCY RANGE 9-10 GHz MINIMUM
- INSERTION LOSS 2.8 dB MAXIMUM
- ATTENUATION ACCURACY 0-60db $\pm 0.5 + 2\%$ OF ATTENUATION VALUE @ 25°C MAXIMUM
60-63.75db $\pm 1.0 + 2\%$ OF ATTENUATION VALUE @ 25°C MAXIMUM
- ACCURACY VARIATION ± 0.75 dB + 2% @ 25°C MAXIMUM
- SWITCHING TIME 500ns MAXIMUM
- TEMPERATURE COEFFICIENT ± 0.01 dB/°C
- VSWR (ON/OFF) 1.8:1 MAXIMUM
- POWER RATINGS
OPERATING +20dBm MAXIMUM
SURVIVAL +30dBm MAXIMUM
- CONTROL 8 BIT POSITIVE TRUE TTL BINARY LOGIC, 0.25dB MINIMUM ATTENUATION STEPS (SEE PIN FUNCTION TABLE)
- POWER SUPPLY +15 VDC @ 195mA MAXIMUM
-15 VDC @ 95mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT FIELD REPLACEABLE SMA (FEMALE)
POWER AND CONTROLS MINATURE 14 PIN MALE (MIL-28748), MATING CONNECTOR (FEMALE) FURNISHED
- SIZE 1.80" x 1.67" x 0.85"

AVAILABLE OPTIONS

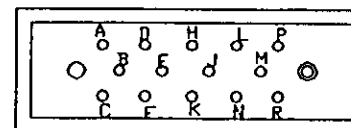
- A01 J1 SMA MALE, J2 SMA FEMALE
A02 TWO SMA MALE CONNECTORS
A03 MINIATURE 15 PIN, MALE CONNECTOR (MDM15SSP)
A04 ULTRA HIGH SPEED (70ns ON/OFF TIME)

J3 PIN	FUNCTION
PIN	FUNCTION
A	N/C
B	GND
C	0.25dB
D	0.5dB
E	N/C
F	1.0dB
H	2.0dB
J	4.0dB
K	8.0dB
L	16.0dB
M	32.0dB
N	GND
P	+15V
R	-15V

MECHANICAL OUTLINE



DETAIL A



NOTES:

- 1) DIMENSIONS ARE IN INCHES
- 2) TOLERANCES: X.XX ± 0.020
X.XXX ± 0.010
- 3) WEIGHT: APPROX. 3.4 OZ

ENVIRONMENTAL RATINGS

- TEMPERATURE -55°C TO +85°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



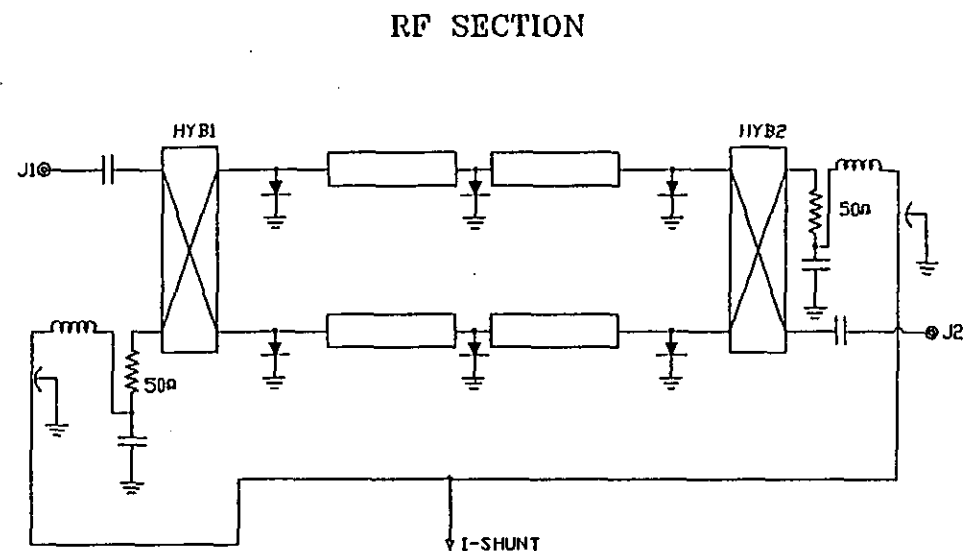
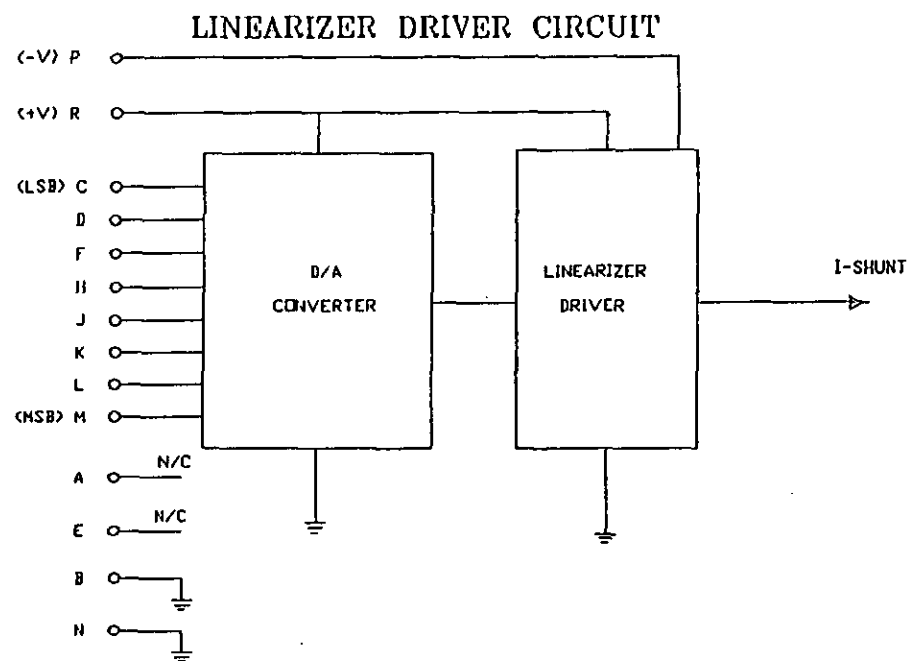
AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS	DATE
DRAWN WSP	11/9/97
CHECKED L.A.	12/2/97

PRODUCT FEATURE
AGH-0910-60DDSF
ULTRA HIGH SPEED, 9 TO 10 GHz PROGRAMMABLE ATTENUATOR

SIZE A SHEET 1 OF 2 DWG. # 100-2812-2

FUNCTIONAL SCHEMATIC



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 TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS	DATE
DRAWN <i>WJP</i>	11/3/97
CHECKED	

PRODUCT FEATURE
AGH-0910-60DDSF
 ULTRA HIGH SPEED, 9 TO 10 GHz PROGRAMMABLE ATTENUATOR

SIZE A SHEET 2 OF 2 DWG. # 100-2812-2

DESCRIPTION

AMC MODEL AGH-2040-65DD IS AN OCTAVE BAND ATTENUATOR/MODULATOR, PROGRAMMABLE BY 8 BIT POSITIVE TRUE BINARY LOGIC WITH REAL DATA LATCHING FUNCTION CAPABILITY.

SPECIFICATIONS

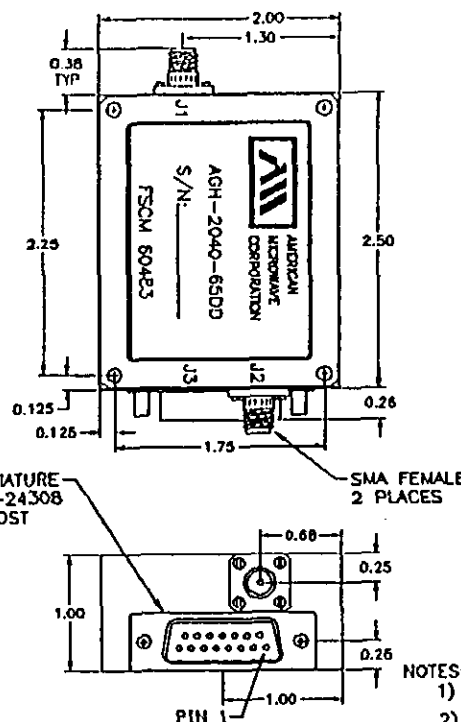
- FREQUENCY RANGE 2-4 GHz MINIMUM
- INSERTION LOSS 2.5 dB MAXIMUM
- ATTENUATION FLATNESS 0-10 dB ± 0.3 dB MAXIMUM
 10-20 dB ± 0.8 dB MAXIMUM
 20-40 dB ± 1.5 dB MAXIMUM
 40-63.75 dB ± 1.6 dB MAXIMUM
- ATTENUATION ACCURACY 0-30 dB ± 0.5 dB MAXIMUM
 (MONOTICITY IS GUARANTEED) 30-50 dB ± 1.0 dB MAXIMUM
 50-63.75 dB ± 1.5 dB MAXIMUM
- SWITCHING TIME 2 μ S MAXIMUM
- TEMPERATURE COEFFICIENT ± 0.025 dB/ $^{\circ}$ C MAXIMUM
- VSWR (ALL ATTENUATION LEVELS) 1.8:1 MAXIMUM
- RF POWER RATINGS +30 dBm CW MAXIMUM
- CONTROL 8 BIT POSITIVE TRUE TTL BINARY LOGIC, 300ns DATA TRANSFER STROBE TIME (ACTIVE LOW), 0.25dB MINIMUM ATTENUATION STEPS (SEE PIN FUNCTION TABLE)
- POWER SUPPLY +15VDC $\pm 5\%$ @100 mA MAXIMUM
 -15VDC $\pm 5\%$ @100 mA MAXIMUM
- CONNECTORS
 RF INPUT/OUTPUT SMA FEMALE
 POWER AND CONTROLS 15 PIN D-SUBMINIATURE (MALE) WITH JACK POST (MATING CONNECTOR FURNISHED)
- SIZE 2.00" x 2.50" x 1.00"

AVAILABLE OPTIONS

- A01 J1 SMA MALE, J2 SMA FEMALE
 A02 TWO SMA MALE RF CONNECTORS

REVISIONS			
ZONE	REV.	DESCRIPTION	DATE
	A	ORIGINAL RELEASE, JOB # 20371E	04/23/99

MECHANICAL OUTLINE



J3 PIN FUNCTION	
PIN#	FUNCTION
1	GND
2	ANALOG INPUT
3	CE
4	GND
5	0.25 dB (LSB)
6	0.5 dB
7	1.0 dB
8	2.0 dB ANA
9	4.0 dB IN
10	8.0 dB
11	16.0 dB
12	32.0 dB (MSB)
13	+15VDC
14	-15VDC
15	GND

- NOTES:
 1) DIMENSIONS ARE IN INCHES
 2) TOLERANCES: X.XX ± 0.020
 X.XXX ± 0.010
 3) WEIGHT: APPROX. 8.0 OZ

ENVIRONMENTAL RATINGS

- TEMPERATURE -55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
 -65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



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APPROVALS	DATE
DESIGN WSP	04/23/99
CHECKED LH	04/14/99

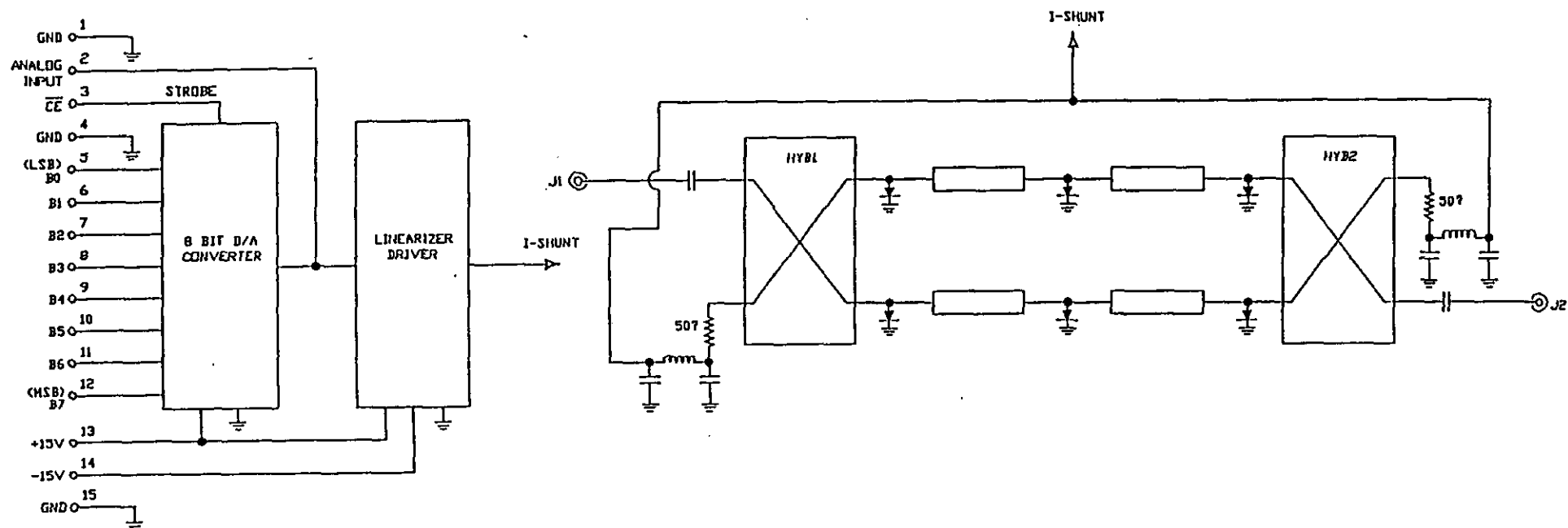
PRODUCT FEATURE
 AGH-2040-65DD
 2-4 GHz PROGRAMMABLE ATTENUATOR

SIZE A SHEET 1 OF 2 DWG. # 100-3118

FUNCTIONAL SCHEMATIC

CONTROL CIRCUIT

RF SECTION



AMERICAN MICROWAVE CORPORATION

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TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS

DATE

DRAWN

WSP

04/23/05

CHECKED

PRODUCT FEATURE

AGH-2040-65DD

2-4 GHz PROGRAMMABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

DWG. # 100-3118

DESCRIPTION

AMC MODEL AGH-2550-60DD-410 IS AN OVER-OCTAVE BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 10 BIT POSITIVE TRUE BINARY LOGIC.

SPECIFICATIONS

- FREQUENCY RANGE 1.9-5.6 GHz MINIMUM
- INSERTION LOSS 2.0 dB MAXIMUM 2.5-5.0 GHz
2.1 dB MAXIMUM 1.9-5.6 GHz
- ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

FREQUENCY RANGE	10 dB	20 dB	40 dB	60 dB
2.5-5.0 GHz	0.3	0.8	1.5	1.6
1.9-5.6 GHz	0.5	1.4	3.0	3.5

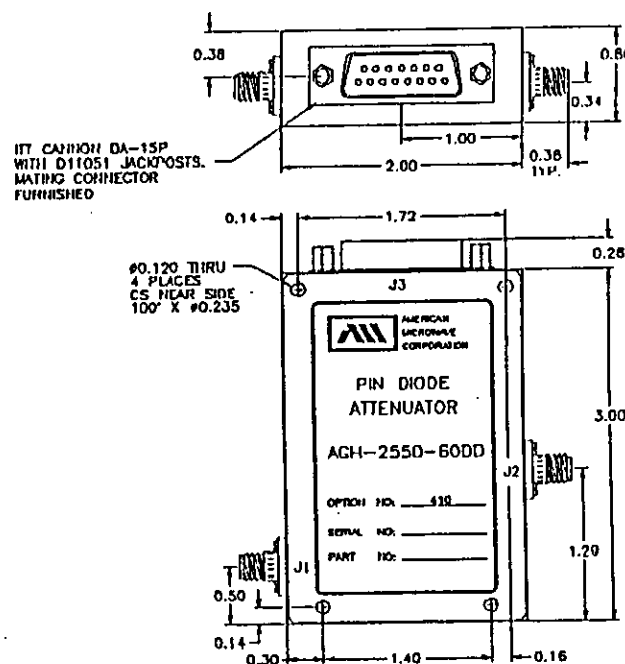
- ATTENUATION ACCURACY 0-30 dB $\pm$ 0.5 dB MAXIMUM
30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME
DELAY ON (50% TTL TO 90% RF) ... 2.0 μ s MAXIMUM
DELAY OFF (50% TTL TO 10% RF) ... 2.0 μ s MAXIMUM
- VSWR (ALL ATTENUATION LEVELS) 2:1 MAXIMUM
- RF POWER RATINGS
OPERATING POWER +20 dBm CW MAXIMUM
SURVIVAL POWER +30 dBm CW MAXIMUM
- CONTROL 10 BIT TRUE BINARY LOGIC
0.1 dB MAXIMUM ATTENUATION STEPS
- POWER SUPPLY +12 TO +18VDC @ 100 mA MAXIMUM
-12 TO -18VDC @ 100 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS 15 PIN D TYPE SUBMINIATURE MALE,
MATING CONNECTOR FURNISHED
- SIZE 2.00" x 3.00" x 0.80"

AVAILABLE OPTIONS

- A01 J1 SMA MALE, J2 SMA FEMALE
- A02 TWO SMA MALE RF CONNECTORS
- A03 8 BIT BINARY LOGIC
- A04 11 BIT BINARY LOGIC
- A05 12 BIT BINARY LOGIC

REVISIONS			
ZONE	REV.	DESCRIPTION	DATE
	A	ORIGINAL RELEASE, JOB # 212313-2E	04/28/93

MECHANICAL OUTLINE



J3 PIN	FUNCTION
1	GND
2	ANALOG INPUT
3	0.1 dB (LSB)
4	0.2 dB
5	0.4 dB
6	0.8 dB
7	1.6 dB
8	3.2 dB
9	6.4 dB
10	12.8 dB
11	25.6 dB
12	51.2 dB (MSB)
13	+V
14	-V
15	H/C

- NOTES:
- DIMENSIONS ARE IN INCHES
 - TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
 - WEIGHT: APPROX. 6.0 OZ

ENVIRONMENTAL RATINGS

- TEMPERATURE -55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A

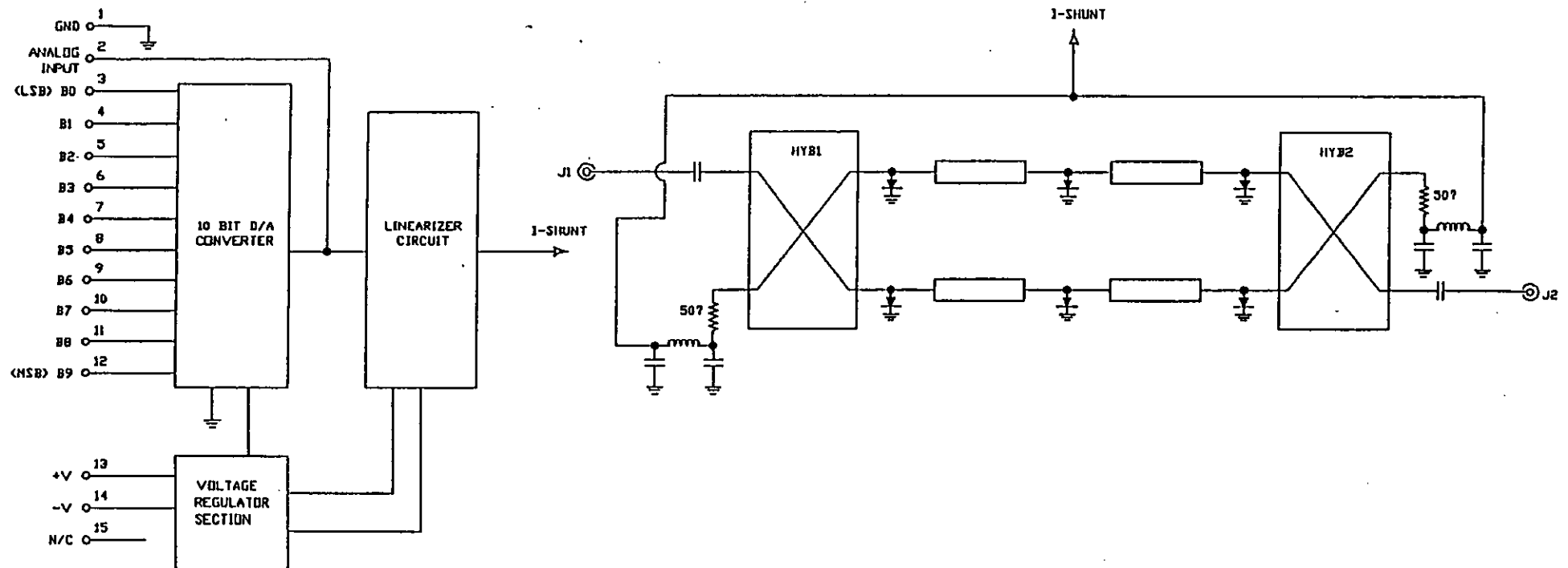
		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRODUCT FEATURE AGH-2550-60DD-410 1.9-5.6 GHz, PROGRAMMABLE VARIABLE ATTENUATOR	
APPROVALS DRAWN: WSP CHECKED: R. A. [Signature]	DATE 01/28/93 01/17/93	SIZE A	SHEET 1 OF 2

DWG. # 100-3128

FUNCTIONAL SCHEMATIC

DRIVER/CONTROL CIRCUIT

RF SECTION



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS

DATE

DRAWN

WSP

09/28/03

CHECKED

PRODUCT FEATURE

AGH-2550-60DD-410

1.9-5.6 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

DWG. # 100-3128

DESCRIPTION

AMC MODEL AGH-4080-65DD IS AN OCTAVE BAND ATTENUATOR/MODULATOR, PROGRAMMABLE BY 8 BIT POSITIVE TRUE BINARY LOGIC WITH READ DATA LATCHING FUNCTION CAPABILITY.

SPECIFICATIONS

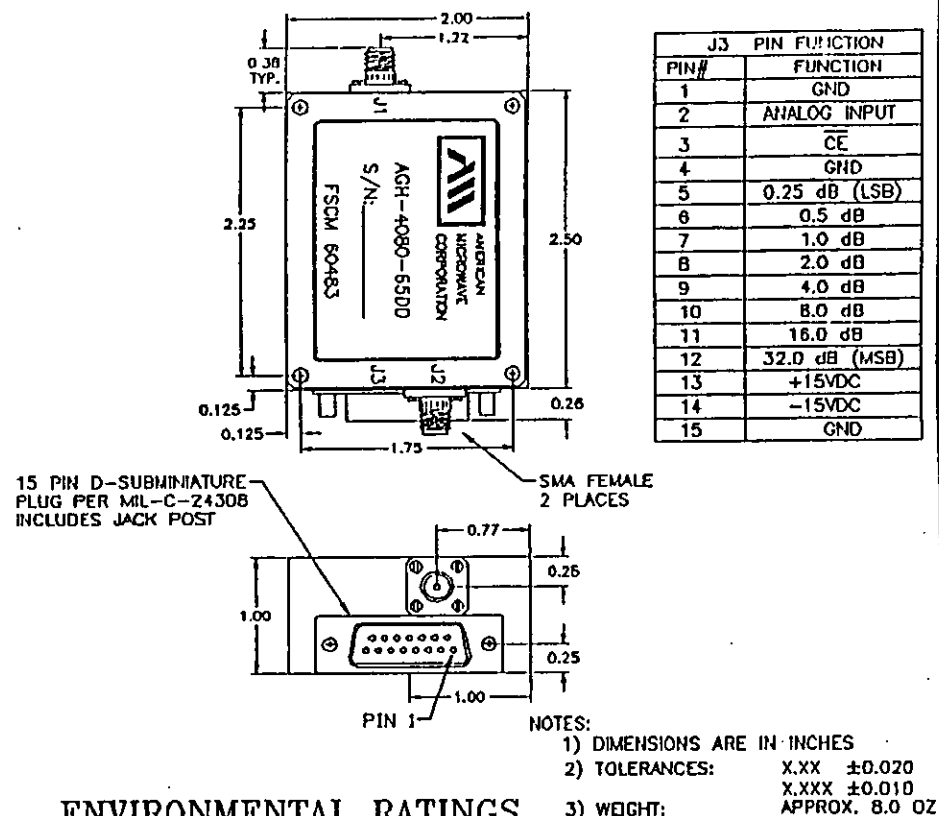
- FREQUENCY RANGE 4-8 GHz MINIMUM
- INSERTION LOSS 3.0 dB MAXIMUM
- ATTENUATION FLATNESS 0-10 dB ± 0.3 dB MAXIMUM
 10-20 dB ± 0.8 dB MAXIMUM
 20-40 dB ± 1.5 dB MAXIMUM
 40-63.75 dB ± 1.6 dB MAXIMUM
- ATTENUATION ACCURACY 0-30 dB ± 0.5 dB MAXIMUM
 (MONOTICITY IS GUARANTEED) 30-50 dB ± 1.0 dB MAXIMUM
 50-63.75 dB ± 1.5 dB MAXIMUM
- SWITCHING TIME 2 μ S MAXIMUM
- TEMPERATURE COEFFICIENT ± 0.025 dB/ $^{\circ}$ C MAXIMUM
- VSWR (ALL ATTENUATION LEVELS) 1.8:1 MAXIMUM
- RF POWER RATINGS +30 dBm CW MAXIMUM
- CONTROL 8 BIT POSITIVE TRUE TTL BINARY LOGIC, 300ns DATA TRANSFER STROBE TIME (ACTIVE LOW), 0.25dB MINIMUM ATTENUATION STEPS (SEE PIN FUNCTION TABLE)
- POWER SUPPLY +15VDC $\pm 5\%$ @100 mA MAXIMUM
 -15VDC $\pm 5\%$ @100 mA MAXIMUM
- CONNECTORS
 RF INPUT/OUTPUT SMA FEMALE
 POWER AND CONTROLS 15 PIN D-SUBMINIATURE (MALE)
 WITH JACK POST (MATING CONNECTOR FURNISHED)
- SIZE 2.00" x 2.50" x 1.00"

AVAILABLE OPTIONS

- A01 J1 SMA MALE, J2 SMA FEMALE
 A02 TWO SMA MALE RF CONNECTORS

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	ORIGINAL RELEASE, JOB # 20372E	08/23/93	

MECHANICAL OUTLINE



ENVIRONMENTAL RATINGS

- TEMPERATURE -55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
 -65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A

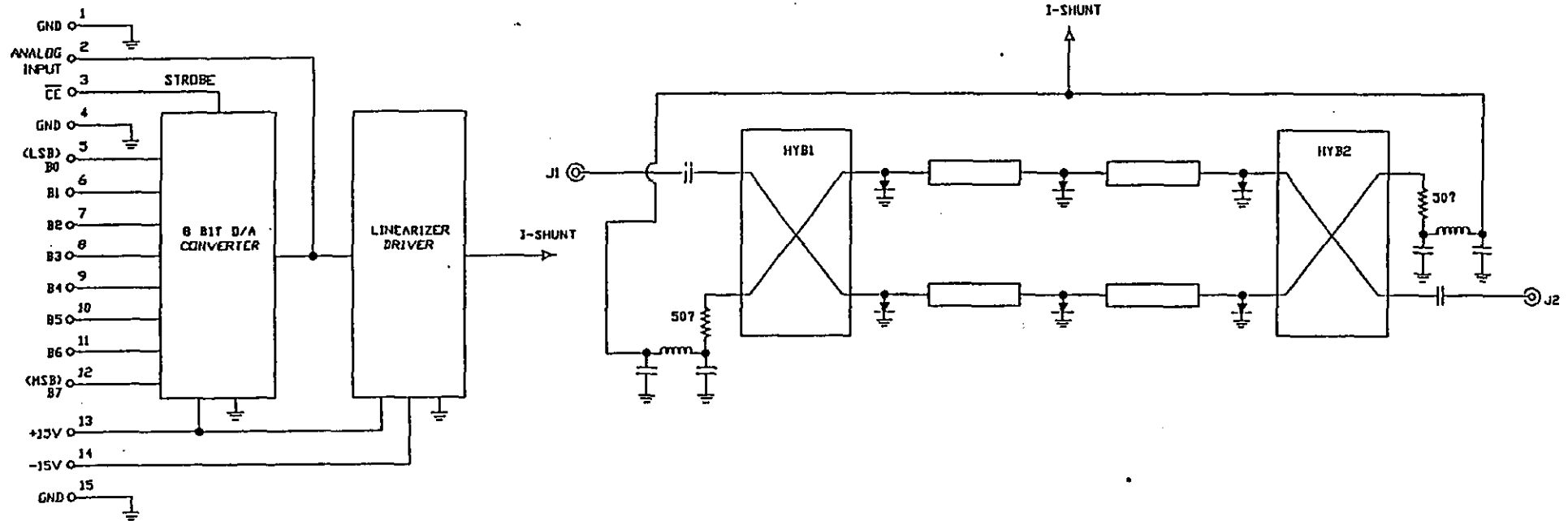
		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRODUCT FEATURE AGH-4080-65DD 4-8 GHz PROGRAMMABLE ATTENUATOR	
APPROVALS DRAWN CHECKED	DATE 08/23/93 10/14/93	SIZE A	SHEET 1 OF 2

DWG # 100-3119

FUNCTIONAL SCHEMATIC

CONTROL CIRCUIT

RF SECTION



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS

DATE

DRAWN

WSP

08/25/95

CHECKED

PRODUCT FEATURE

AGH-4080-G5DD

4-8 GHz PROGRAMMABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

DWG. # 100-3119

DESCRIPTION

AMC MODEL AGH-0812-65DD IS AN OCTAVE BAND ATTENUATOR/MODULATOR, PROGRAMMABLE BY 8 BIT POSITIVE TRUE BINARY LOGIC WITH READ DATA LATCHING FUNCTION CAPABILITY.

SPECIFICATIONS

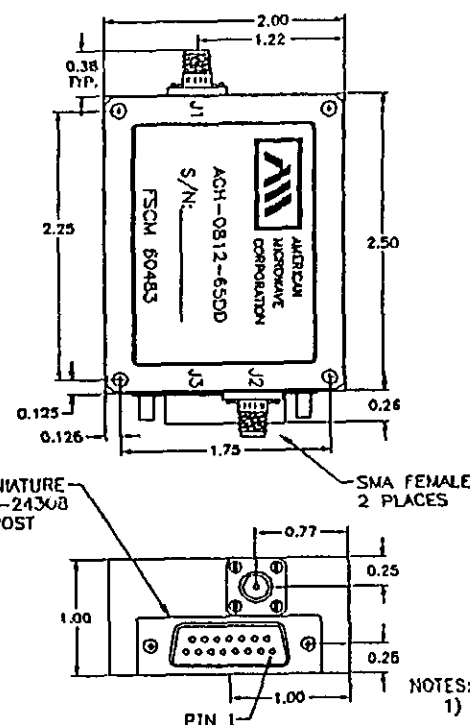
- FREQUENCY RANGE 8-12 GHz MINIMUM
- INSERTION LOSS 3.0 dB MAXIMUM
- ATTENUATION FLATNESS 0-10 dB ± 0.3 dB MAXIMUM
 10-20 dB ± 0.8 dB MAXIMUM
 20-40 dB ± 1.5 dB MAXIMUM
 40-63.75 dB ± 1.6 dB MAXIMUM
- ATTENUATION ACCURACY 0-30 dB ± 0.5 dB MAXIMUM
 (MONOTICITY IS GUARANTEED) 30-50 dB ± 1.0 dB MAXIMUM
 50-53.75 dB ± 1.5 dB MAXIMUM
- SWITCHING TIME 2 μ S MAXIMUM
- TEMPERATURE COEFFICIENT ± 0.025 dB/ $^{\circ}$ C MAXIMUM
- VSWR (ALL ATTENUATION LEVELS) 2.0:1 MAXIMUM
- RF POWER RATINGS +30 dBm CW MAXIMUM
- CONTROL 8 BIT POSITIVE TRUE TTL BINARY LOGIC, 300ns DATA TRANSFER STROBE TIME (ACTIVE LOW), 0.25dB MINIMUM ATTENUATION STEPS (SEE PIN FUNCTION TABLE)
- POWER SUPPLY +15VDC $\pm 5\%$ @ 100 mA MAXIMUM
 -15VDC $\pm 5\%$ @ 100 mA MAXIMUM
- CONNECTORS
 RF INPUT/OUTPUT SMA FEMALE
 POWER AND CONTROLS 15 PIN D-SUBMINIATURE (MALE) WITH JACK POST (MATING CONNECTOR FURNISHED)
- SIZE 2.00" x 2.50" x 1.00"

AVAILABLE OPTIONS

A01 J1 SMA MALE, J2 SMA FEMALE
 A02 TWO SMA MALE RF CONNECTORS

REVISIONS			
ZONE	REV.	DESCRIPTION	DATE
		A ORIGINAL RELEASE, JOB # 20373E	08/24/93

MECHANICAL OUTLINE



J3 PIN FUNCTION	
PIN#	FUNCTION
1	GND
2	ANALOG INPUT
3	CE
4	GND
5	0.25 dB (LSB)
6	0.5 dB
7	1.0 dB
8	2.0 dB
9	4.0 dB
10	8.0 dB
11	16.0 dB
12	32.0 dB (MSB)
13	+15VDC
14	-15VDC
15	GND

- NOTES:
- 1) DIMENSIONS ARE IN INCHES
 - 2) TOLERANCES: X.XX ± 0.020
 X.XXX ± 0.010
 - 3) WEIGHT: APPROX. 8.0 OZ

ENVIRONMENTAL RATINGS

- TEMPERATURE -55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
 -65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



AMERICAN MICROWAVE CORPORATION
 7311G GROVE RD., FREDERICK, MD. 21701
 TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS	DATE
DESIGN WSP	08/24/93
CHECKED R. H. [signature]	10/11/93

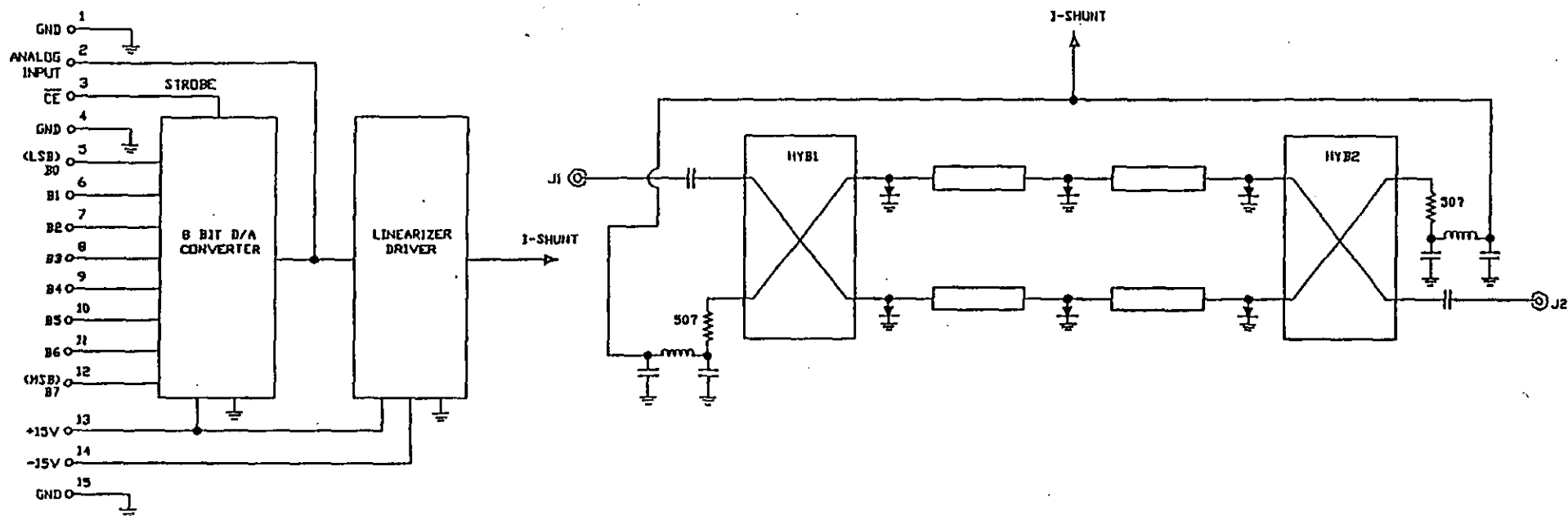
PRODUCT FEATURE
 AGH-0812-65DD
 8-12 GHz PROGRAMMABLE ATTENUATOR

SIZE A SHEET 1 OF 2 DWG. # 100-3126

FUNCTIONAL SCHEMATIC

CONTROL CIRCUIT

RF SECTION



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS

DATE

DRAWN

WJP

08/28/05

CHECKED

PRODUCT FEATURE

AGH-0812-65DD

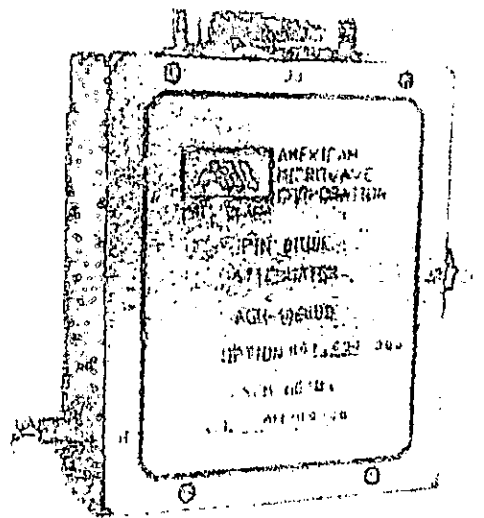
08-12 GHz PROGRAMMABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

QWG, # 100-3126

AGH DD SERIES LINEARIZED ATTENUATOR MODULATORS 18 GHz, 60 dB



FEATURES

- Solid State Reliability
- Absorptive Type
- 3:1 Bandwidth
- Linearized
- 8 Bit Digital Control

DESCRIPTION

The AGC suffix DD Series are digitally controlled linearized attenuator/modulators that operate over greater than octave bandwidth and are non-reflective at all attenuation levels. The units consist of an AGC Series modulator and an integrated hybrid linearizer that provides 10 dB per volt control function. Seven models in the series cover the frequency band from 1 to 18 GHz. The RF circuit employs two microstrip arrays of pin diodes that are hybrid coupled at the input and output with large couplers for repeatable low loss performance.

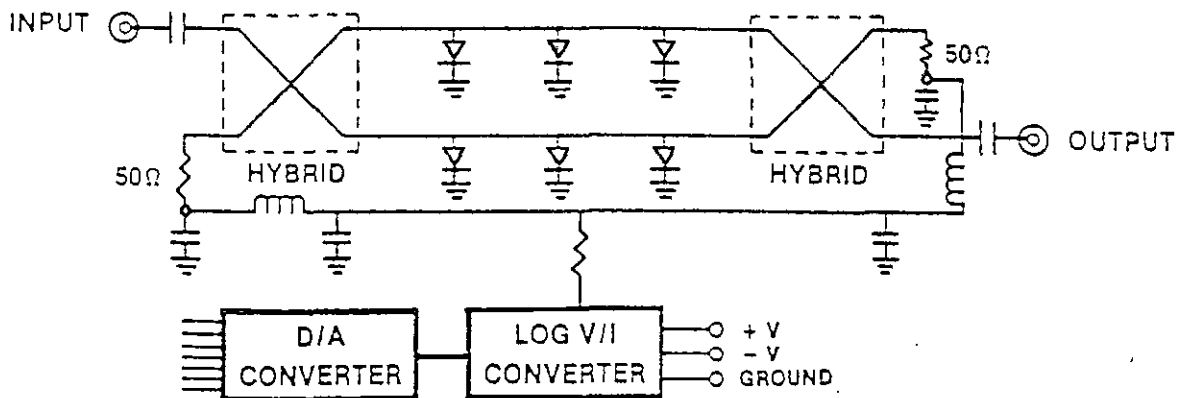
4/87

REVISED
OCTOBER 9, 1997

7311 G GROVE ROAD, FREDERICK, MARYLAND 21701

Tel.: (301) 662-4700
Fax: (301) 662-4938

FUNCTIONAL SCHEMATIC



SPECIFICATIONS

MODEL	FREQUENCY RANGE (GHz)	INSERTION LOSS, MAX (dB)	VSWR MAX.	FLATNESS ($\pm$ dB) AT NOMINAL ATTENUATION TO LEVELS OF			
				10 dB	20 dB	40 dB	60 dB
AGH-1020DD	1.0-2.0	1.8	1.5	0.45	0.8	1.5	1.6
	0.75-2.25	1.9	2.0	0.6	1.4	3.0	3.5
AGH-2040DD	2.0-4.0	1.8	1.5	0.3	0.8	1.5	1.6
	1.5-4.5	1.9	2.0	0.5	1.4	3.0	3.5
AGH-2550DD	2.5-5.0	2.0	1.6	0.3	0.8	1.5	1.6
	1.9-5.6	2.1	2.1	0.5	1.4	3.0	3.5
AGH-4080DD	4.0-8.0	2.4	1.7	0.3	0.8	1.5	1.6
	3.0-9.0	2.5	2.2	0.5	1.4	3.0	3.5
AGH-5010DD	5.0-10.0	2.6	1.7	0.5	0.9	1.5	1.6
	3.75-11.25	2.7	2.2	0.7	1.4	3.0	3.5
AGH-6012DD	6.0-12.0	2.7	1.8	0.7	1.0	1.5	1.6
	4.5-13.5	2.8	2.2	0.9	1.5	3.0	3.5
AGH-8018DD	8.0-18.0	2.7 (Note 1)	2.0	0.7	1.0	1.5	1.6
	6.0-18.0	2.7 (Note 1)	2.0	0.9	1.5	3.0	3.5

NOTE: Extended Frequency Range Specifications Are Typical.

1. Maximum loss to 16 GHz. 3.7 dB Maximum loss from 16 - 18 GHz.

REVISED
OCTOBER 9, 1997

Handwritten notes:
KJ
P.A. WP H/K
B6 W EK

Attenuation Range	60 dB
Deviation from Linearity	0 to 30 dB ± 0.5 dB 30 to 50 dB ± 1.0 dB 50 to 60 dB ± 1.5 dB
Monotonicity	Guaranteed
Attenuation Change with Temperature	$\pm .025$ dB/ $^{\circ}$ C, Max.
Power Handling	AGH-1020D: + 10 dBm CW All Others: + 20 dBm CW Survival Power: + 30 dBm
Rise and Fall Times	Rise Time: 1.5 μ sec, Max. Fall Time: 50 ns, Max.
Control Characteristics	8 Bit Positive True Binary (see Table 1)
Power Supply Requirements	+ 12 V $\pm 5\%$ @ 100 mA - 12 V $\pm 5\%$ @ 20 mA

J3 PIN FUNCTIONS	
PIN	8 BIT BINARY
1	GND
2	ANALOG INPUT
3	NOT USED
4	GND
5	0.25 dB (LSB)
6	0.5 dB
7	1.0 dB
8	2.0 dB
9	4.0 dB
10	8.0 dB
11	16.0 dB
12	32.0 dB
13	+V
14	-V
15	NOT USED

<u>NUMBER</u>	<u>DESCRIPTION</u>
001	Two SMA Male RF Connectors
002	One SMA Male and One SMA Female RF Connector
004	0 - 30 dB Range
005	± 15 Volt Power Supply

8-22



1. A. WP
 BG JW EK

REVISED
OCTOBER 9, 1997

Operating Temperature	-54°C to +110°C
Non-operating	-65°C to +125°C
Humidity	Mil-Std -202F, Method 103B Cond. B, 96 Hrs. @ 95%
Shock	Mil-Std -202F, Method 213B Cond. B, 75G, 6 msec
Vibration	Mil-Std -202F, Method 204D Cond. B
Altitude	Mil-Std -202F, Method 105C Cond. B, 50,000 Ft.
Temp Cycling	Mil-Std -202F, Method 107D Cond. A, 5 Cycles

DESCRIPTION

AMC MODEL AGH-1020-60DD-120 IS A OVER-OCTAVE BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 8 BIT POSITIVE TRUE BINARY LOGIC WITH 120 dB DYNAMIC RANGE.

SPECIFICATIONS

- FREQUENCY RANGE 1.0-2.0 GHz
- INSERTION LOSS 1.0-2.0 GHz 4.0 dB MAXIMUM
0.75-2.25 GHz 5.0 dB MAXIMUM
- ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

FREQUENCY RANGE	10 dB	20 dB	40 dB	60 dB	80 dB	120 dB
1.0-2.0 GHz	0.5	0.8	1.5	1.6	2.5	3.2
0.75-2.25 GHz	0.7	1.5	3.0	3.5	5.0	7.0

- ATTENUATION ACCURACY 0-30 dB $\pm$ 0.5 dB MAXIMUM
(MONOTICITY IS GUARANTEED) 30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
60-80 dB $\pm$ 2.0 dB MAXIMUM
80-120 dB $\pm$ 2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME 3 μ S MAXIMUM
- VSWR @ 0 dB ATTENUATION 1.0-2.0 GHz 2.0:1 MAXIMUM
0.75-2.25 GHz 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING POWER +20 dBm CW MAXIMUM
SURVIVAL POWER +30 dBm CW MAXIMUM
- CONTROL 8 BIT TRUE BINARY LOGIC
- POWER SUPPLY +12VDC @ 250 mA MAXIMUM
-12VDC @ 100 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS 15 PIN D TYPE SUBMINIATURE MALE,
MATING CONNECTOR FURNISHED
- SIZE 5.81" x 3.97" x 0.80"

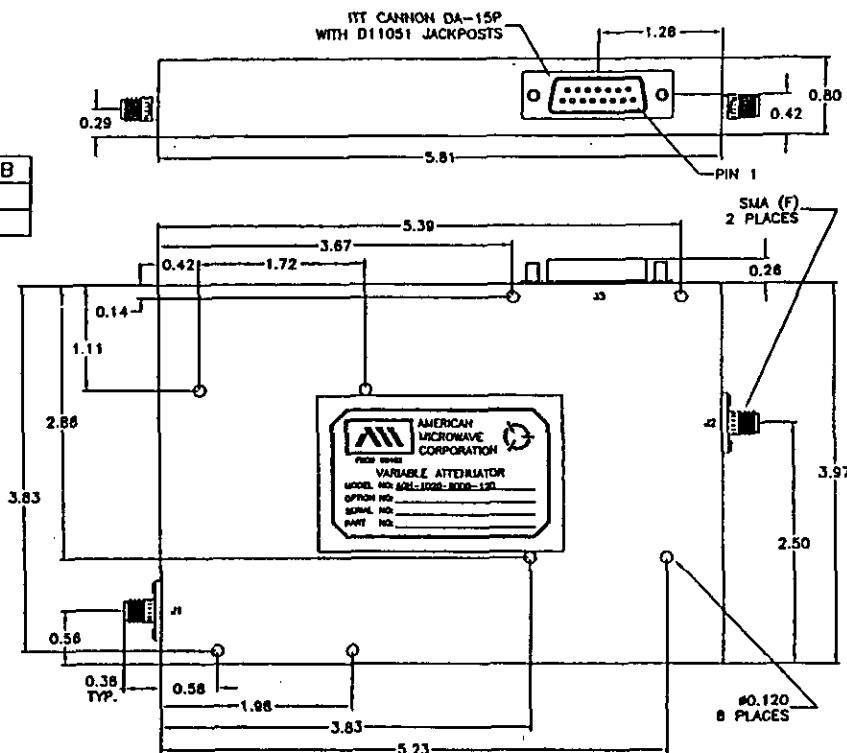
AVAILABLE OPTIONS

- A01 TWO SMA MALE RF CONNECTORS
- A02 J1 SMA MALE, J2 SMA FEMALE
- A03 MOUNTING SURFACE UNPAINTED
- A04 ANALOG CONTROLLED UNIT OF 20dB/VOLT. PIN 2 IS USED AS CONTROL. (OTHER CONTROL VOLTAGES AVAILABLE.) FOR SOLDER PIN UNITS REFER TO DATA SHEET AGH-1020-60D-120.
- A05 $\pm$ 15VDC POWER SUPPLY
- A06 0-90 dB DYNAMIC RANGE
- A07 EXTENDED BANDWIDTH (0.75-2.25 GHz)
- A08 LATCHING STROBE (NOT AVAILABLE WITH OPTION A12)
- A09 9 BIT TRUE BINARY LOGIC
- A10 10 BIT TRUE BINARY LOGIC
- A11 11 BIT TRUE BINARY LOGIC
- A12 12 BIT TRUE BINARY LOGIC
- A13 HIGH SPEED 500 nS MAXIMUM
- SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS				DATE	APPROVED
ZONE	REV.	DESCRIPTION			
	A	ORIGINAL RELEASE		11/17/97	

MECHANICAL OUTLINE



8 BIT TRUE BINARY LOGIC	
J3	PIN FUNCTION
1	GND
2	LATCHING STROBE OPTIONAL
3	N/C
4	GND
5	0.50 dB (LSB)
6	1.0 dB
7	2.0 dB
8	4.0 dB
9	8.0 dB
10	16.0 dB
11	32.0 dB
12	64.0 dB (MSB)
13	+V
14	-V
15	N/C

NOTES:
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010

ENVIRONMENTAL RATINGS

- TEMPERATURE -55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

PRELIMINARY PRODUCT FEATURE

AGH-1020-60DD-120

1.0-2.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A SHEET 1 OF 2 DWG. # 100-4266

APPROVALS
DATE
DRAWN B.L.G. 11/20/97
CHECKED T.M. 11/20/97
Rev 11/20/97
W.P. 11/20/97

DESCRIPTION

AMC MODEL AGH-2040-60DD-120 IS A OVER-OCTAVE BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 8 BIT POSITIVE TRUE BINARY LOGIC WITH 120 dB DYNAMIC RANGE.

SPECIFICATIONS

- FREQUENCY RANGE.....2.0-4.0 GHz
- INSERTION LOSS.....2.0-4.0 GHz 4.0 dB MAXIMUM
1.5-4.5 GHz 5.0 dB MAXIMUM
- ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

FREQUENCY RANGE	10 dB	20 dB	40 dB	60 dB	80 dB	120 dB
2.0-4.0 GHz	0.5	0.8	1.5	1.6	2.5	3.2
1.5-4.5 GHz	0.7	1.5	3.0	3.5	5.0	7.0
- ATTENUATION ACCURACY.....0-30 dB $\pm$ 0.5 dB MAXIMUM
(MONOTICITY IS GUARANTEED) 30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
60-80 dB $\pm$ 2.0 dB MAXIMUM
80-120 dB $\pm$ 2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT..... $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME.....3 μ S MAXIMUM
- VSWR @ 0 dB ATTENUATION.....2.0-4.0 GHz 2.0:1 MAXIMUM
1.5-4.5 GHz 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING POWER.....+20 dBm CW MAXIMUM
SURVIVAL POWER.....+30 dBm CW MAXIMUM
- CONTROL.....8 BIT TRUE BINARY LOGIC
- POWER SUPPLY.....+12VDC @ 250 mA MAXIMUM
-12VDC @ 100 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT.....SMA FEMALE
POWER AND CONTROLS.....15 PIN D TYPE SUBMINIATURE MALE,
MATING CONNECTOR FURNISHED
- SIZE.....4.68" x 3.80" x 0.80"

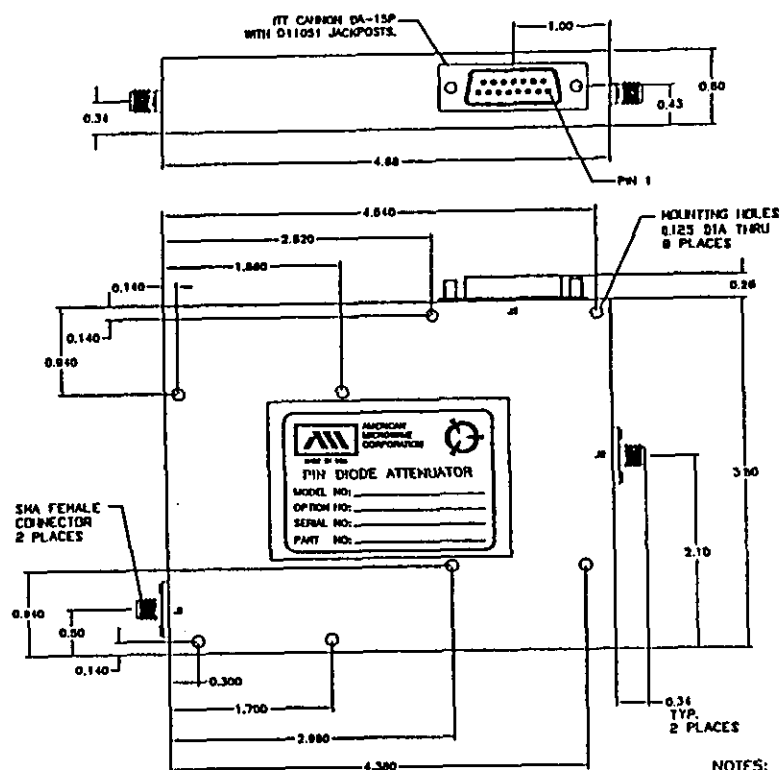
AVAILABLE OPTIONS

- A01.....TWO SMA MALE RF CONNECTORS
- A02.....J1 SMA MALE, J2 SMA FEMALE
- A03.....MOUNTING SURFACE UNPAINTED
- A04.....ANALOG CONTROLLED UNIT OF 20dB/VOLT. PIN 2 IS USED AS CONTROL. (OTHER CONTROL VOLTAGES AVAILABLE.) FOR SOLDER PIN UNITS REFER TO DATA SHEET AGH-2040-60D-120.
- A05..... $\pm$ 15VDC POWER SUPPLY
- A06.....0-90 dB DYNAMIC RANGE
- A07.....EXTENDED BANDWIDTH (1.5-4.5 GHz)
- A08.....LATCHING STROBE (NOT AVAILABLE WITH OPTION A12)
- A09.....9 BIT TRUE BINARY LOGIC
- A10.....10 BIT TRUE BINARY LOGIC
- A11.....11 BIT TRUE BINARY LOGIC
- A12.....12 BIT TRUE BINARY LOGIC
- A13.....HIGH SPEED 500 nS MAXIMUM
- SCS.....SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS				DATE	APPROVED
ZONE	REV.	DESCRIPTION			
A		ORIGINAL RELEASE		11/12/97	

MECHANICAL OUTLINE



8 BIT TRUE BINARY LOGIC	
J3 PIN	FUNCTION
1	GND
2	LATCHING STROBE OPTIONAL
3	N/C
4	GND
5	0.50 dB (LSB)
6	1.0 dB
7	2.0 dB
8	4.0 dB
9	8.0 dB
10	16.0 dB
11	32.0 dB
12	64.0 dB (MSB)
13	+V
14	-V
15	N/C

- NOTES:
- 1) DIMENSIONS ARE IN INCHES
 - 2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
APPROX. 7.0 OZ
 - 3) WEIGHT:

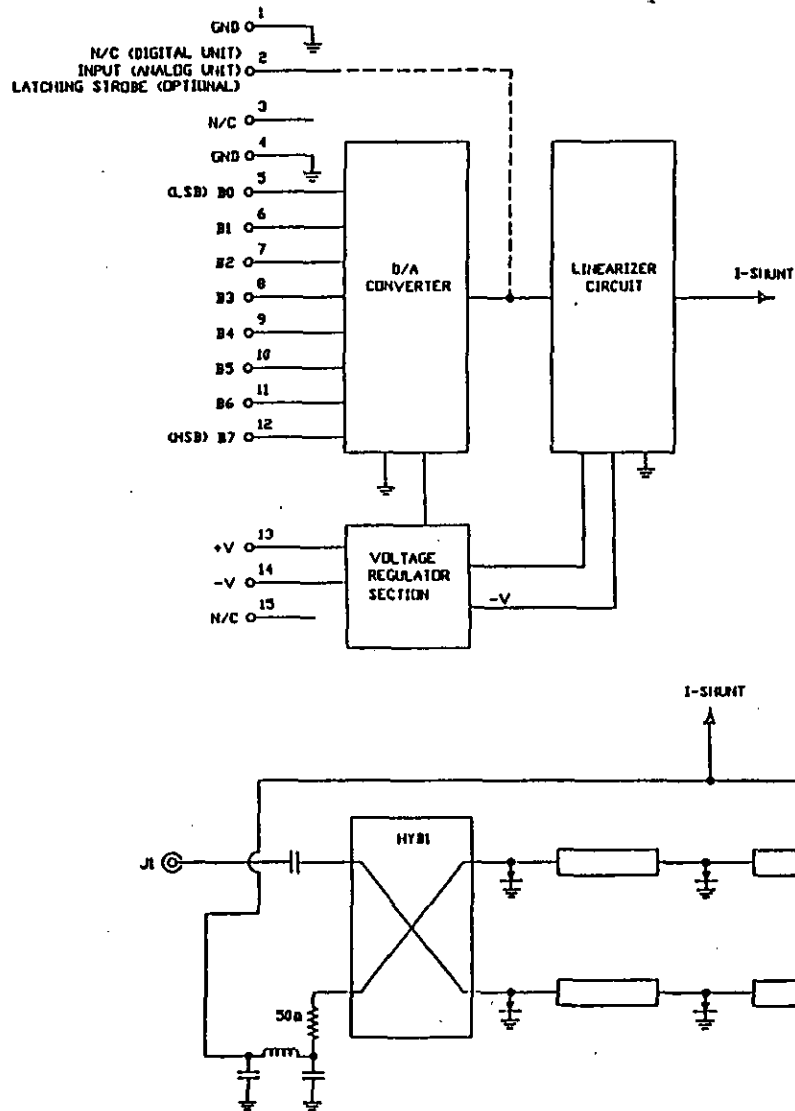
ENVIRONMENTAL RATINGS

- TEMPERATURE.....-55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY.....MIL-STD-202F, METHOD 103B COND. B
- SHOCK.....MIL-STD-202F, METHOD 213B COND. B
- VIBRATION.....MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE.....MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE...MIL-STD-202F, METHOD 107D COND. A

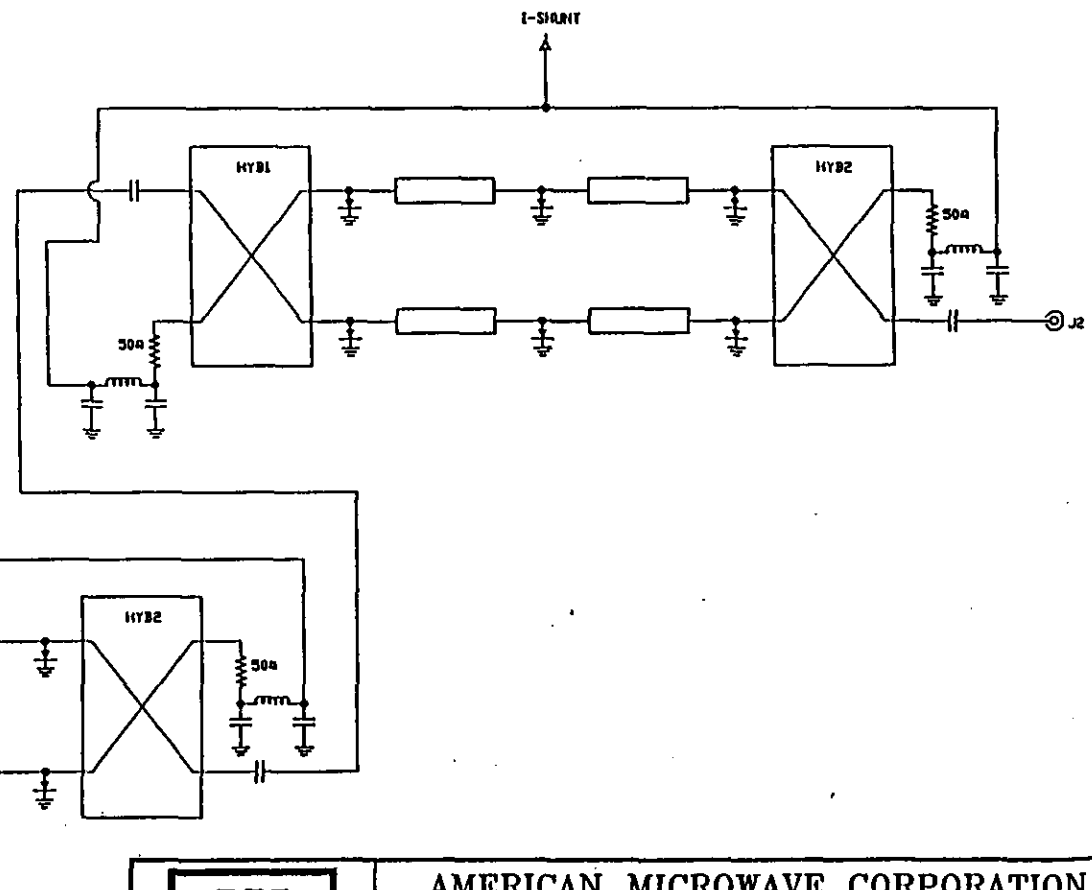
		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRELIMINARY PRODUCT FEATURE AGH-2040-60DD-120 2.0-4.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR	
APPROVALS DRAWN: <i>B. J. G.</i> CHECKED: <i>L. A. M.</i>	DATE 11/12/97	SIZE: A	SHEET 1 OF 2

FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT



RF SECTION



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS

DATE

DRAWN

11/12/91

CHECKED

PRELIMINARY PRODUCT FEATURE

AGH-2040-60DD-120

2.0-4.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

DWG. # 100-4255

DESCRIPTION

AMC MODEL AGH-2550-600D-120 IS A OVER-OCTAVE BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 8 BIT POSITIVE TRUE BINARY LOGIC WITH 120 dB DYNAMIC RANGE.

SPECIFICATIONS

- FREQUENCY RANGE.....2.5-5.0 GHz
- INSERTION LOSS.....2.5-5.0 GHz 4.2 dB MAXIMUM
1.9-5.6 GHz 5.2 dB MAXIMUM
- ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

FREQUENCY RANGE	10 dB	20 dB	40 dB	60 dB	80 dB	120 dB
2.5-5.0 GHz	0.5	0.9	1.5	1.6	2.5	3.2
1.9-5.6 GHz	0.7	1.5	3.0	3.5	5.0	7.0

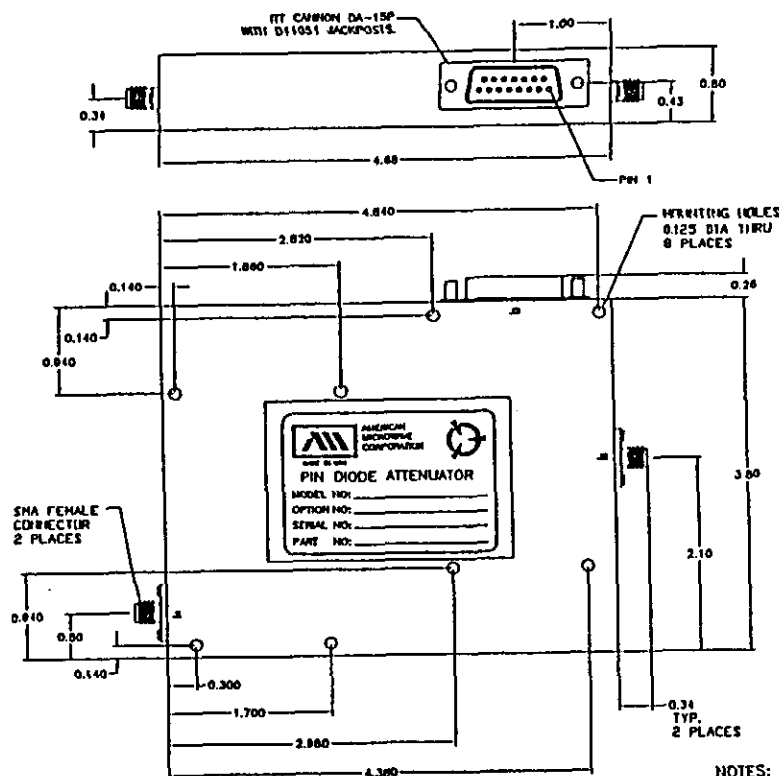
- ATTENUATION ACCURACY.....0-30 dB $\pm$ 0.5 dB MAXIMUM
(MONOTICITY IS GUARANTEED)
30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
60-80 dB $\pm$ 2.0 dB MAXIMUM
80-120 dB $\pm$ 2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT..... $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME.....3 μ S MAXIMUM
- VSWR @ 0 dB ATTENUATION.....2.5-5.0 GHz 2.0:1 MAXIMUM
1.9-5.6 GHz 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING POWER.....+20 dBm CW MAXIMUM
SURVIVAL POWER.....+30 dBm CW MAXIMUM
- CONTROL.....8 BIT TRUE BINARY LOGIC
- POWER SUPPLY.....+12VDC @ 250 mA MAXIMUM
-12VDC @ 100 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT.....SMA FEMALE
POWER AND CONTROLS.....15 PIN D TYPE SUBMINIATURE MALE,
MATING CONNECTOR FURNISHED
- SIZE.....4.68" x 3.80" x 0.80"

AVAILABLE OPTIONS

- A01.....TWO SMA MALE RF CONNECTORS
A02.....J1 SMA MALE, J2 SMA FEMALE
A03.....MOUNTING SURFACE UNPAINTED
A04.....ANALOG CONTROLLED UNIT OF 20dB/VOLT. PIN 2 IS USED AS CONTROL. (OTHER CONTROL VOLTAGES AVAILABLE.) FOR SOLDER PIN UNITS REFER TO DATA SHEET AGH-2550-60D-120.
A05..... $\pm$ 15VDC POWER SUPPLY
A06.....0-90 dB DYNAMIC RANGE
A07.....EXTENDED BANDWIDTH (1.9-5.6 GHz)
A08.....LATCHING STROBE (NOT AVAILABLE WITH OPTION A12)
A09.....9 BIT TRUE BINARY LOGIC
A10.....10 BIT TRUE BINARY LOGIC
A11.....11 BIT TRUE BINARY LOGIC
A12.....12 BIT TRUE BINARY LOGIC
A13.....HIGH SPEED 500 nS MAXIMUM
SCS.....SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

MECHANICAL OUTLINE



8 BIT TRUE BINARY LOGIC	J3 PIN FUNCTION
PIN#	FUNCTION
1	GND
2	LATCHING STROBE OPTIONAL
3	N/C
4	GND
5	0.50 dB (LSB)
6	1.0 dB
7	2.0 dB
8	4.0 dB
9	8.0 dB
10	16.0 dB
11	32.0 dB
12	64.0 dB (MSB)
13	+V
14	-V
15	N/C

NOTES:

- 1) DIMENSIONS ARE IN INCHES
- 2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
APPROX. 7.0 OZ
- 3) WEIGHT:

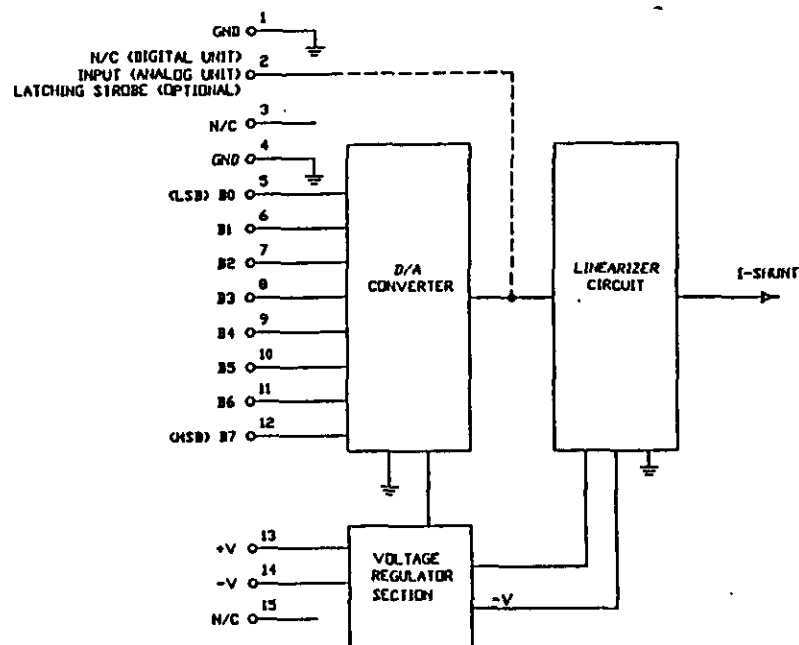
ENVIRONMENTAL RATINGS

- TEMPERATURE.....-55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY.....MIL-STD-202F, METHOD 103B COND. B
- SHOCK.....MIL-STD-202F, METHOD 213B COND. B
- VIBRATION.....MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE.....MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE.....MIL-STD-202F, METHOD 107D COND. A

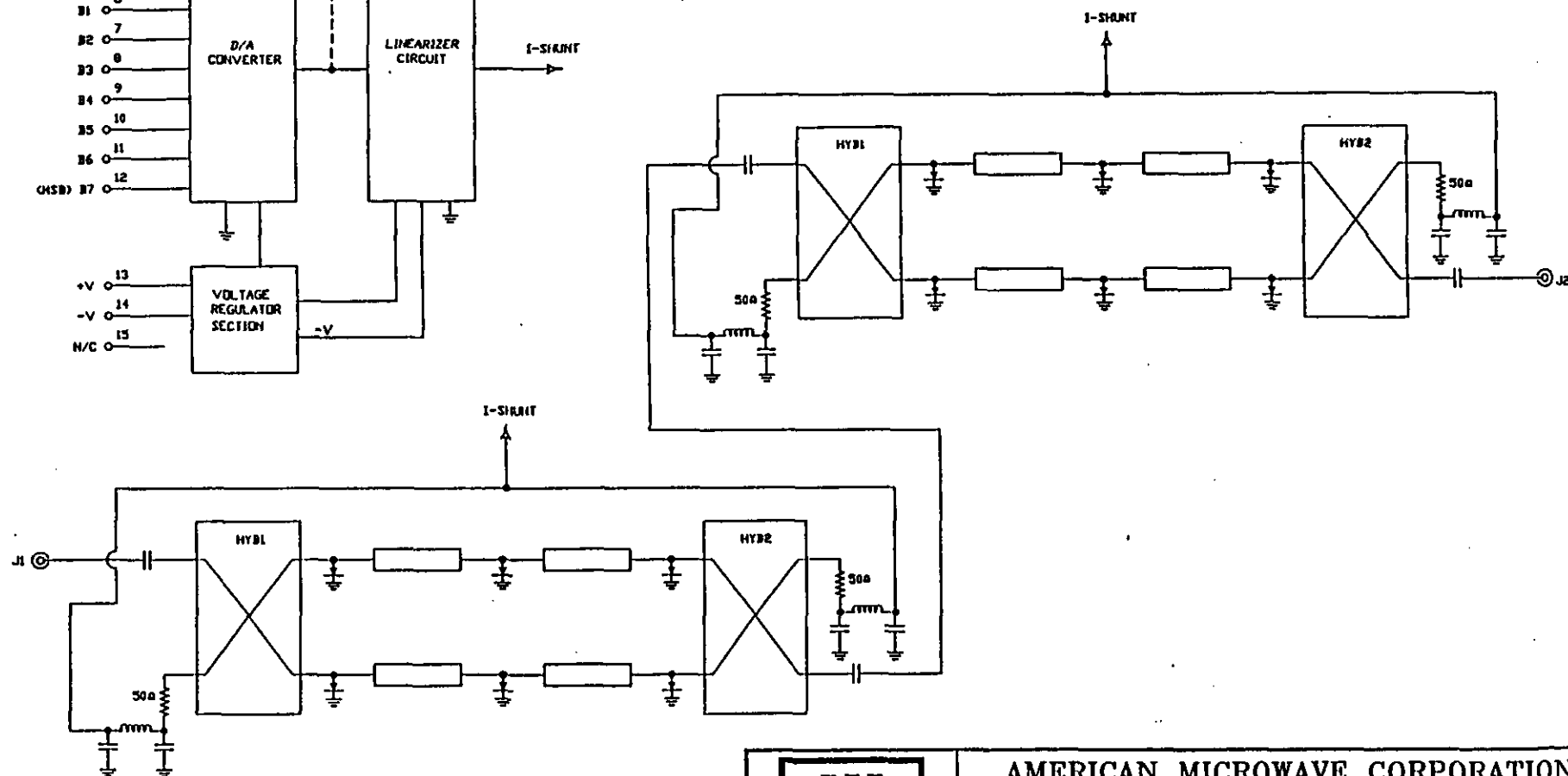
		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938		
		PRELIMINARY PRODUCT FEATURE AGH-2550-60DD-120 2.5-5.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR		
APPROVALS DRAWN: B.L.G. CHECKED: L.A.	DATE 11/12/97 11/12/97	SIZE: A	SHEET 1 OF 2	DWG. # 100-4264

FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT



RF SECTION



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

PRELIMINARY PRODUCT FEATURE

AGH-2550-60DD-120

2.5~5.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A

A

SHEET 2 OF 2

DWG. # 100-4264

APPROVALS

DATE _____

DRAWN

1971

100

25

DESCRIPTION

AMC MODEL AGH-4080-60DD-120 IS A OVER-OCTAVE BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 8 BIT POSITIVE TRUE BINARY LOGIC WITH 120 dB DYNAMIC RANGE.

SPECIFICATIONS

- FREQUENCY RANGE.....4.0-8.0 GHz
- INSERTION LOSS.....4.0-8.0 GHz 5.0 dB MAXIMUM
3.0-9.0 GHz 5.5 dB MAXIMUM

- ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

FREQUENCY RANGE	10 dB	20 dB	40 dB	60 dB	80 dB	120 dB
4.0-8.0 GHz	0.5	0.8	1.5	1.6	2.5	3.2
3.0-9.0 GHz	0.7	1.5	3.0	3.5	5.0	7.0

- ATTENUATION ACCURACY.....0-30 dB $\pm$ 0.5 dB MAXIMUM
(MONOTICITY IS GUARANTEED) 30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
60-80 dB $\pm$ 2.0 dB MAXIMUM
80-120 dB $\pm$ 2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT..... $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME.....3 μ S MAXIMUM
- VSWR @ 0 dB ATTENUATION.....4.0-8.0 GHz 2.0:1 MAXIMUM
3.0-9.0 GHz 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING POWER.....+20 dBm CW MAXIMUM
SURVIVAL POWER.....+30 dBm CW MAXIMUM
- CONTROL.....8 BIT TRUE BINARY LOGIC
- POWER SUPPLY.....+12VDC @ 250 mA MAXIMUM
-12VDC @ 100 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT.....SMA FEMALE
POWER AND CONTROLS.....15 PIN D TYPE SUBMINIATURE MALE,
MATING CONNECTOR FURNISHED
- SIZE.....4.68" x 3.45" x 0.80"

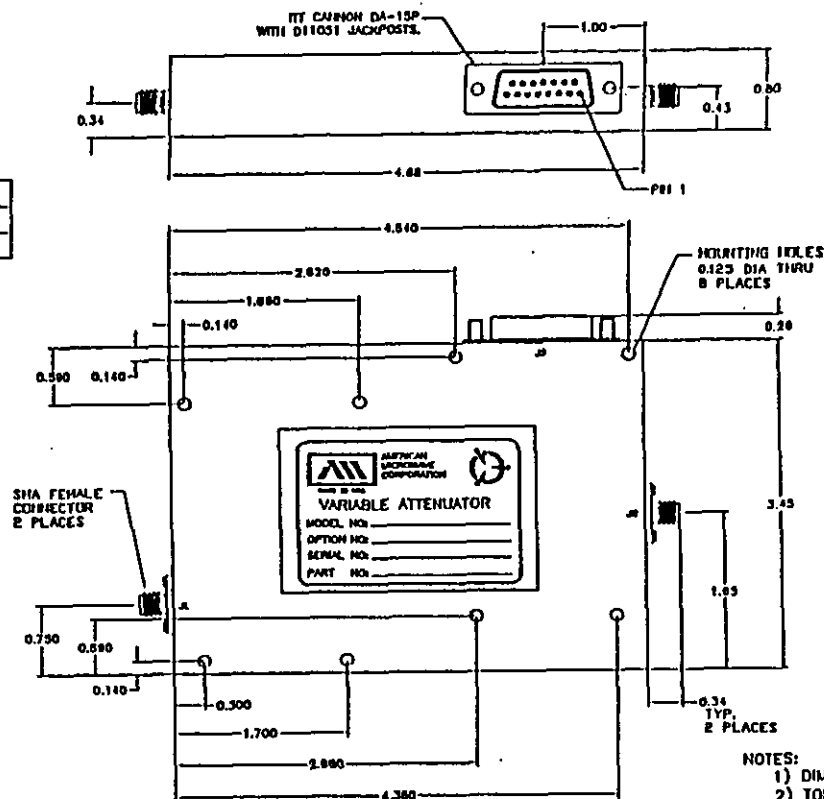
AVAILABLE OPTIONS

- A01.....TWO SMA MALE RF CONNECTORS
- A02.....J1 SMA MALE, J2 SMA FEMALE
- A03.....MOUNTING SURFACE UNPAINTED
- A04.....ANALOG CONTROLLED UNIT OF 20dB/VOLT. PIN 2 IS USED AS CONTROL. (OTHER CONTROL VOLTAGES AVAILABLE.) FOR SOLDER PIN UNITS REFER TO DATA SHEET AGH-4080-60D-120.
- A05..... $\pm$ 15VDC POWER SUPPLY
- A06.....0-90 dB DYNAMIC RANGE
- A07.....EXTENDED BANDWIDTH (3.0-9.0 GHz)
- A08.....LATCHING STROBE (NOT AVAILABLE WITH OPTION A12)
- A09.....9 BIT TRUE BINARY LOGIC
- A10.....10 BIT TRUE BINARY LOGIC
- A11.....11 BIT TRUE BINARY LOGIC
- A12.....12 BIT TRUE BINARY LOGIC
- A13.....HIGH SPEED 500 nS MAXIMUM
- SCS.....SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS			DATE	APPROVED
ZONE	REV.	DESCRIPTION		
		A JOB # 510206, HD COMMUNICATION	11/11/97	

MECHANICAL OUTLINE



8 BIT TRUE BINARY LOGIC	
J3 PIN	FUNCTION
1	GND
2	LATCHING STROBE OPTIONAL
3	N/C
4	GND
5	0.50 dB (LSB)
6	1.0 dB
7	2.0 dB
8	4.0 dB
9	8.0 dB
10	16.0 dB
11	32.0 dB
12	64.0 dB (MSB)
13	+V
14	-V
15	N/C

- NOTES:
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
3) WEIGHT: APPROX. 7.0 OZ

ENVIRONMENTAL RATINGS

- TEMPERATURE.....-55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY.....MIL-STD-202F, METHOD 103B COND. B
- SHOCK.....MIL-STD-202F, METHOD 213B COND. B
- VIBRATION.....MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE.....MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE...MIL-STD-202F, METHOD 107D COND. A

APPROVALS	DATE
DRAWN B.L.G.	11/12/97
CHECKED L. M. L.	11/12/97

AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

PRELIMINARY PRODUCT FEATURE

AGH-4080-60DD-120

4.0-8.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A SHEET 1 OF 2 DWG. # 100-4263

8-32

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	ORIGINAL RELEASE	11/12/97	

MECHANICAL OUTLINE

-
- MECHANICAL DRAWING OF A VARIABLE ATTENUATOR ASSEMBLY.
- Top View Dimensions:**
- Overall Width: 4.540
 - Overall Height: 2.820
 - Distance from Left Edge to Center of Connector: 1.880
 - Distance from Center of Connector to Right Edge: 0.140
 - Distance from Left Edge to Mounting Hole: 0.590
 - Distance from Mounting Hole to Center of Connector: 0.140
 - Distance from Center of Connector to Mounting Hole: 0.140
 - Distance from Mounting Hole to Right Edge: 0.26
 - Distance from Left Edge to Pin 1: 0.34
 - Distance from Pin 1 to Right Edge: 0.43
 - Distance from Pin 1 to Center of Connector: 1.00
- Side View Dimensions:**
- Overall Height: 3.45
 - Distance from Bottom Edge to Mounting Hole: 1.85
 - Distance from Bottom Edge to Pin 1: 0.34 TYP.
 - Distance from Pin 1 to Right Edge: 2.00
- Labels and Callouts:**
- ITV CANNON DA-15P WITH 011051 JACKPOSTS.
 - PIN 1
 - MOUNTING HOLES 0.125 DIA TH 8 PLACES
 - SMA FEMALE CONNECTOR 2 PLACES
 - Variable Attenuator Label:
 - AMERICAN MICROPHONE CORPORATION
 - Model No. _____
 - Option No. _____
 - Serial No. _____
 - Part No. _____
- Notes:**
- 1)
 - 2)

8 BIT TRUE BINARY LOGIC	
J3	PIN FUNCTION
PIN#	FUNCTION
1	GND
2	LATCHING STROBE OPTIONAL
3	N/C
4	GND
5	0.50 dB (LSB)
6	1.0 dB
7	2.0 dB
8	4.0 dB
9	8.0 dB
10	16.0 dB
11	32.0 dB
12	64.0 dB (MSB)
13	+V
14	-V
15	N/C

- | FREQUENCY RANGE | 10 dB | 20 dB | 40 dB | 60 dB | 80 dB | 120 dB |
|-----------------|-------|-------|-------|-------|-------|--------|
| 5.0-10.0 GHz | 0.6 | 0.9 | 1.5 | 1.6 | 2.5 | 3.2 |
| 3.75-11.25 GHz | 0.8 | 1.5 | 3.0 | 3.5 | 5.0 | 7.0 |

-
- 4.540
- 2.820
- 1.880
- 0.140
- 0.590
- 0.140
- 0.28
- MOUNTING HO.
0.125 DIA TH
8 PLACES
- SMA FEMALE
CONNECTOR
2 PLACES
- 0.750
- 0.590
- 0.140
- 0.300
- 1.700
- 2.980
- 4.380
- 3.45
- 1.85
- 0.34
TYP.
2 PLACES
- AMERICAN
MICROWAVE
CORPORATION
MADE IN USA
- VARIABLE ATTENUATOR
- MODEL NO. _____
- OPTION NO. _____
- SERIAL NO. _____
- PART NO. _____
- NOTES:
1)
2)

- 2.980
- 4.380
- ENVIRONMENTAL RATINGS
- NOTES:
- 1) DIMENSIONS ARE IN INCHES
- 2) TOLERANCES: X.XX ± 0.020
X.XXX ± 0.010
- 3) WEIGHT: APPROX. 7.0 OZ

- ENVIRONMENTAL RATINGS** 3) WEIGHT: APPROX. 7.0 OZ
- **TEMPERATURE** -55°C TO +85°C (OPERATING)
 -65°C TO +125°C (STORAGE)
 - **HUMIDITY** MIL-STD-202F, METHOD 103B COND. B
 - **SHOCK** MIL-STD-202F, METHOD 213B COND. B
 - **VIBRATION** MIL-STD-202F, METHOD 204D COND. B
 - **ALTITUDE** MIL-STD-202F, METHOD 105C COND. B
 - **TEMPERATURE CYCLE** MIL-STD-202F, METHOD 107D COND. A

	AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938		
	PRELIMINARY PRODUCT FEATURE AGH-5010-60DD-120 5.0-10.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR		
1/97	SIZE A	SHEET 1 OF 2	DWG. # 100-4262

- | | |
|---|----------|
|  | |
| APPROVALS | DATE |
| DRAWN
R.L.G. | 11/12/97 |
| CHECKED
L. M. Able | 11/17/97 |

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

DESCRIPTION

AMC MODEL AGH-6012-60DD-120 IS A OVER-OCTAVE BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 8 BIT POSITIVE TRUE BINARY LOGIC WITH 120 dB DYNAMIC RANGE.

SPECIFICATIONS

- FREQUENCY RANGE.....6.0-12.0 GHz
- INSERTION LOSS.....6.0-12.0 GHz 5.5 dB MAXIMUM
4.5-13.5 GHz 6.0 dB MAXIMUM
- ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

FREQUENCY RANGE	10 dB	20 dB	40 dB	60 dB	80 dB	120 dB
6.0-12.0 GHz	0.7	1.0	1.5	1.6	2.5	3.2
4.5-13.5 GHz	0.9	1.6	3.0	3.5	5.0	7.0
- ATTENUATION ACCURACY.....0-30 dB $\pm$ 0.5 dB MAXIMUM
(MONOTICITY IS GUARANTEED) 30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
60-80 dB $\pm$ 2.0 dB MAXIMUM
80-120 dB $\pm$ 2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT..... $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME.....3 μ S MAXIMUM
- VSWR @ 0 dB ATTENUATION.....6.0-12.0 GHz 2.0:1 MAXIMUM
4.5-13.5 GHz 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING POWER.....+20 dBm CW MAXIMUM
SURVIVAL POWER.....+30 dBm CW MAXIMUM
- CONTROL.....8 BIT TRUE BINARY LOGIC
- POWER SUPPLY.....+12VDC @ 250 mA MAXIMUM
-12VDC @ 100 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT.....SMA FEMALE
POWER AND CONTROLS.....15 PIN D TYPE SUBMINIATURE MALE,
MATING CONNECTOR FURNISHED
- SIZE.....4.68" x 3.45" x 0.80"

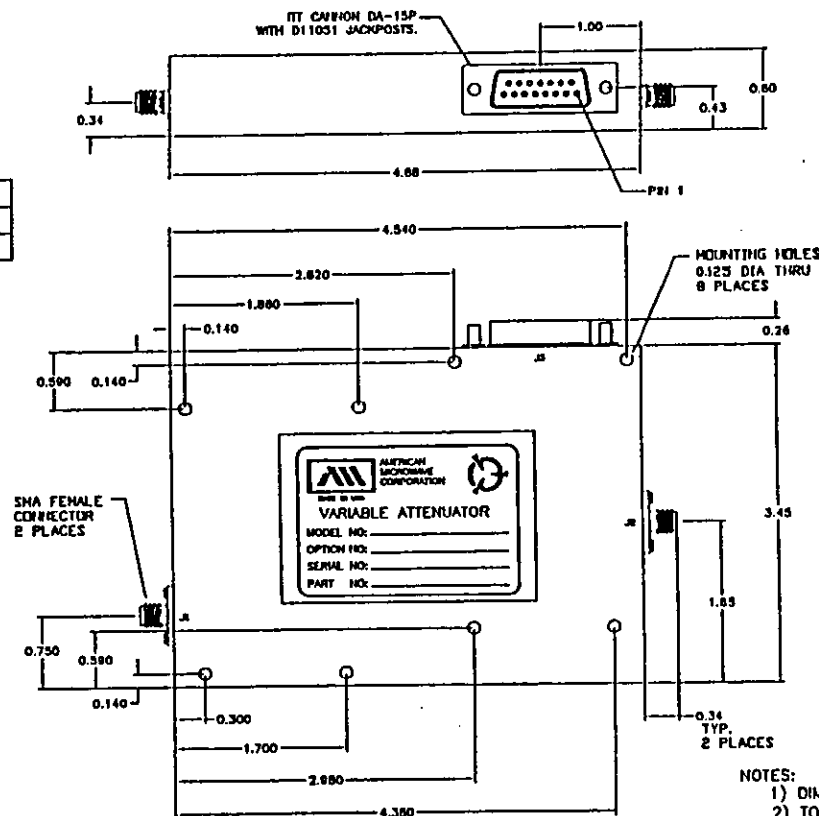
AVAILABLE OPTIONS

- A01.....TWO SMA MALE RF CONNECTORS
A02.....J1 SMA MALE, J2 SMA FEMALE
A03.....MOUNTING SURFACE UNPAINTED
A04.....ANALOG CONTROLLED UNIT OF 20dB/VOLT. PIN 2 IS USED AS CONTROL. (OTHER CONTROL VOLTAGES AVAILABLE.) FOR SOLDER PIN UNITS REFER TO DATA SHEET AGH-6012-60DD-120.
A05..... $\pm$ 15VDC POWER SUPPLY
A06.....0-90 dB DYNAMIC RANGE
A07.....EXTENDED BANDWIDTH (4.5-13.5 GHz)
A08.....LATCHING STROBE (NOT AVAILABLE WITH OPTION A12)
A09.....9 BIT TRUE BINARY LOGIC
A10.....10 BIT TRUE BINARY LOGIC
A11.....11 BIT TRUE BINARY LOGIC
A12.....12 BIT TRUE BINARY LOGIC
A13.....HIGH SPEED 500 nS MAXIMUM
SCS.....SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS			DATE	APPROVED
ZONE	REV.	DESCRIPTION		
	A	ORIGINAL RELEASE	11/12/97	

MECHANICAL OUTLINE



8 BIT TRUE BINARY LOGIC	
J3 PIN FUNCTION	
PIN#	FUNCTION
1	GND
2	LATCHING STROBE OPTIONAL
3	N/C
4	GND
5	0.50 dB (LSB)
6	1.0 dB
7	2.0 dB
8	4.0 dB
9	8.0 dB
10	16.0 dB
11	32.0 dB
12	64.0 dB (MSB)
13	+V
14	-V
15	N/C

- NOTES:
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
APPROX. 7.0 OZ
3) WEIGHT:

ENVIRONMENTAL RATINGS

- TEMPERATURE.....-55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY.....MIL-STD-202F, METHOD 103B COND. B
- SHOCK.....MIL-STD-202F, METHOD 213B COND. B
- VIBRATION.....MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE.....MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE.....MIL-STD-202F, METHOD 107D COND. A



APPROVALS		DATE
DESIGN	B.L.G.	11/12/97
CHECKED		
DATE		11/14/97

AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

PRELIMINARY PRODUCT FEATURE

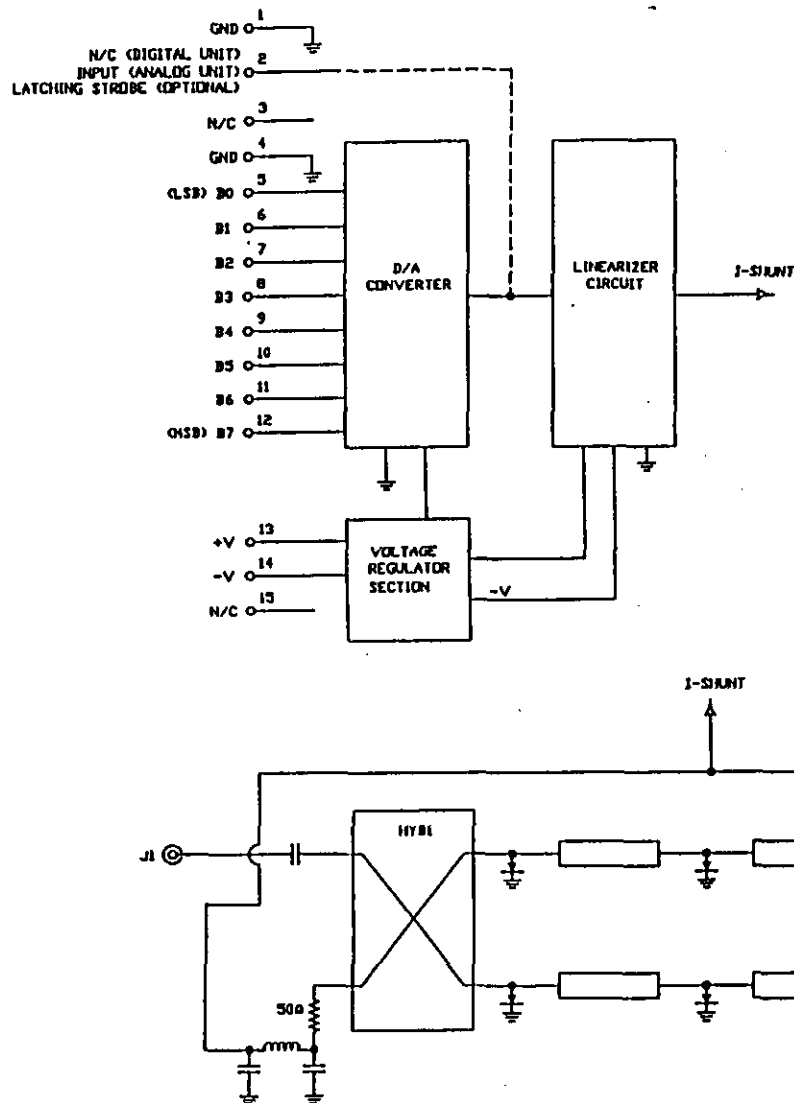
AGH-6012-60DD-120

6.0-12.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

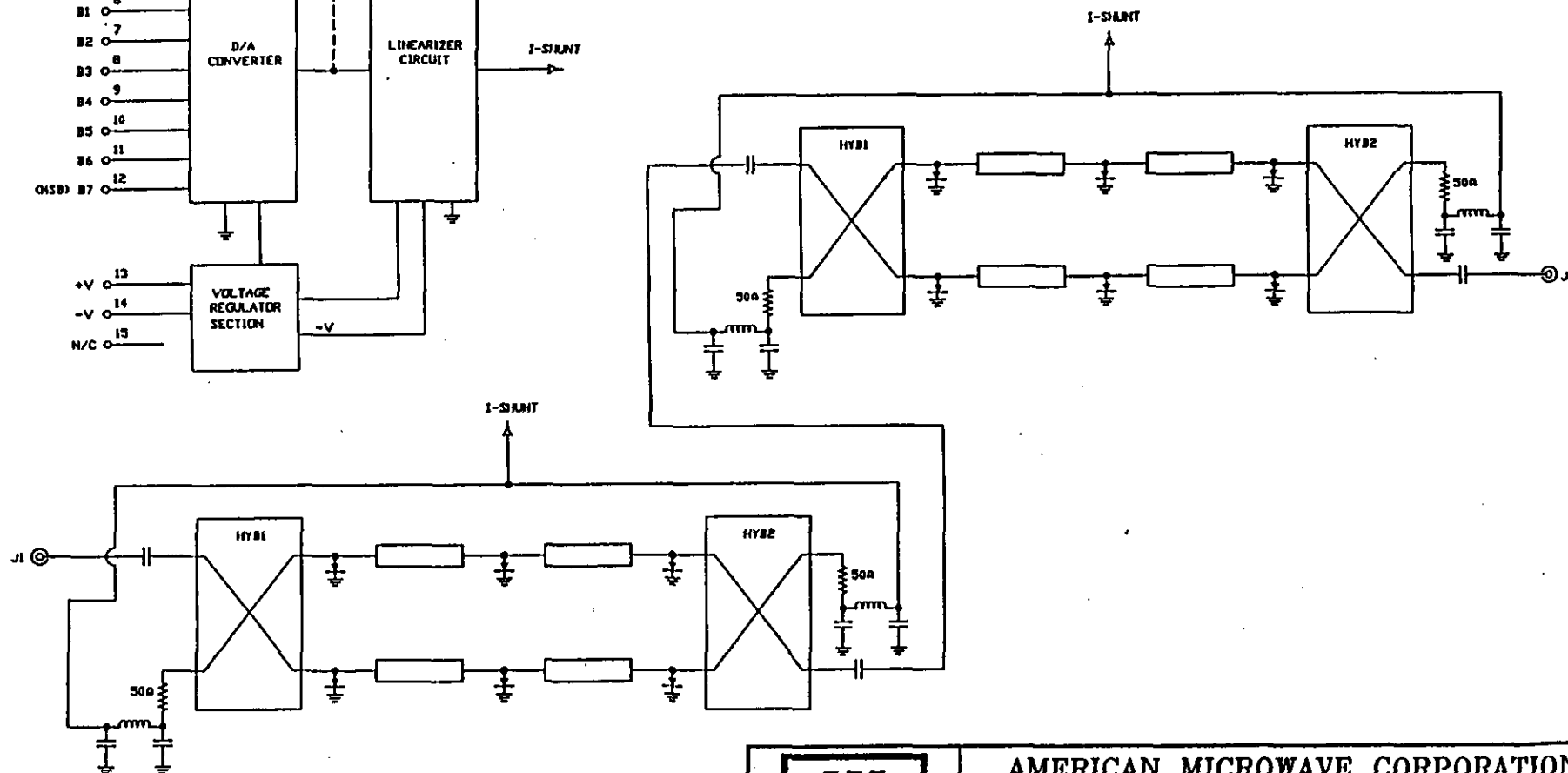
SIZE A SHEET 1 OF 2 DWG. # 100-4261

FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT



RF SECTION



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

PRELIMINARY PRODUCT FEATURE

AGH-6012-60DD-120

6.0-12.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

DWG. # 100-4261

APPROVALS

DATE

DRAWN

RLG

11/12/97

CHECKED

DESCRIPTION

AMC MODEL AGH-8018-60DD-120 IS A OVER-OCTAVE BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 8 BIT POSITIVE TRUE BINARY LOGIC WITH 120 dB DYNAMIC RANGE.

SPECIFICATIONS

- FREQUENCY RANGE.....8.0-18.0 GHz
- INSERTION LOSS.....7.5 dB MAXIMUM
- ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

FREQUENCY RANGE	10 dB	20 dB	40 dB	60 dB	80 dB	120 dB
8.0-18.0 GHz	0.8	1.1	1.5	1.6	2.5	3.2
6.0-18.0 GHz	0.9	1.6	3.0	3.5	5.0	7.0

- ATTENUATION ACCURACY.....0-30 dB $\pm$ 0.5 dB MAXIMUM (MONOTICITY IS GUARANTEED)
30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
60-80 dB $\pm$ 2.0 dB MAXIMUM
80-120 dB $\pm$ 2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT..... $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME.....3 μ S MAXIMUM
- VSWR @ 0 dB ATTENUATION.....8.0-18.0 GHz 2.0:1 MAXIMUM
6.0-18.0 GHz 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING POWER.....+20 dBm CW MAXIMUM
SURVIVAL POWER.....+30 dBm CW MAXIMUM
- CONTROL.....8 BIT TRUE BINARY LOGIC
- POWER SUPPLY.....+12 VDC @ 250 mA MAXIMUM
-12 VDC @ 100 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT.....SMA FEMALE
POWER AND CONTROLS.....15 PIN D TYPE SUBMINIATURE MALE, MATING CONNECTOR FURNISHED
- SIZE.....4.43" x 3.25" x 0.80"

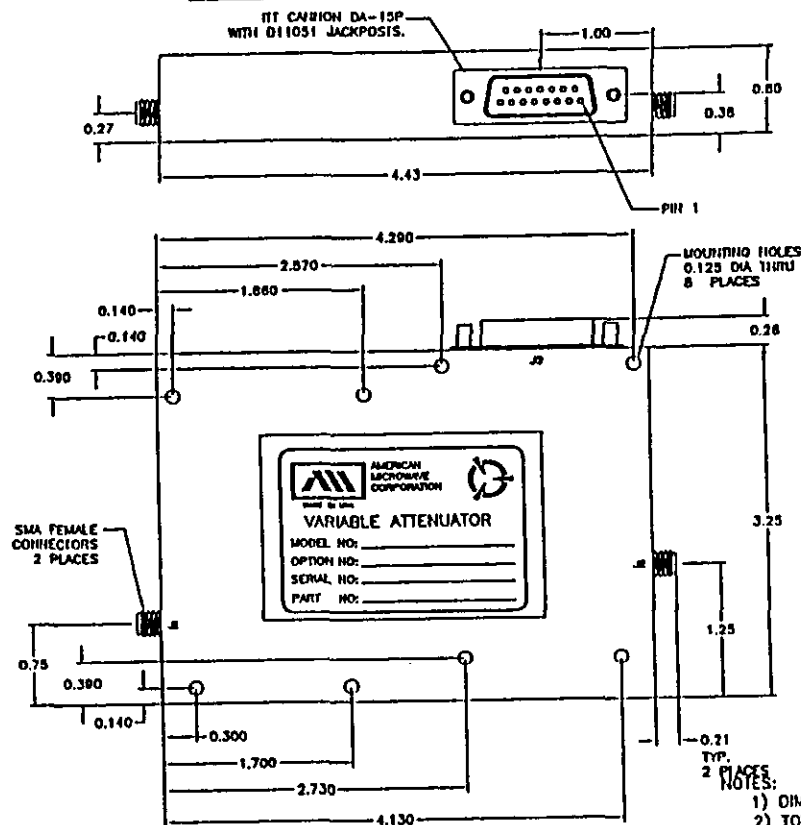
AVAILABLE OPTIONS

- A01.....TWO SMA MALE RF CONNECTORS
- A02.....J1 SMA MALE, J2 SMA FEMALE
- A03.....MOUNTING SURFACE UNPAINTED
- A04.....ANALOG CONTROLLED UNIT OF 20dB/VOLT. PIN 2 IS USED AS CONTROL. (OTHER CONTROL VOLTAGES AVAILABLE.) FOR SOLDER PIN UNITS REFER TO DATA SHEET AGH-8018-60D-120.
- A05..... $\pm$ 15 VDC POWER SUPPLY
- A06.....0-90 dB DYNAMIC RANGE
- A07.....EXTENDED BANDWIDTH (6.0-18.0 GHz)
- A08.....LATCHING STROBE (NOT AVAILABLE WITH OPTION A12)
- A09.....9 BIT TRUE BINARY LOGIC
- A10.....10 BIT TRUE BINARY LOGIC
- A11.....11 BIT TRUE BINARY LOGIC
- A12.....12 BIT TRUE BINARY LOGIC
- A13.....HIGH SPEED 500 ns MAXIMUM
- SCS.....SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE ON REVISION

REVISIONS				DATE	APPROVED
DATE	REV.	DESCRIPTION			
	A	JOB # 308196, NRL		11/11/97	

MECHANICAL OUTLINE



8 BIT TRUE BINARY LOGIC		
J3	PIN	FUNCTION
1		GND
2		LATCHING STROBE OPTIONAL
3		N/C
4		GND
5		0.50 dB (LSB)
6		1.0 dB
7		2.0 dB
8		4.0 dB
9		8.0 dB
10		16.0 dB
11		32.0 dB
12		64.0 dB (MSB)
13		+V
14		-V
15		N/C

- NOTES:
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
APPROX. 7.0 OZ
3) WEIGHT:

ENVIRONMENTAL RATINGS

- TEMPERATURE.....-55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY.....MIL-STD-202F, METHOD 103B COND. B
- SHOCK.....MIL-STD-202F, METHOD 213B COND. B
- VIBRATION.....MIL-STD-202F, METHOD 2040 COND. B
- ALTITUDE.....MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE.....MIL-STD-202F, METHOD 107D COND. A

APPROVALS	DATE
DRAWN BY: [Signature]	11/11/97
CHECKED BY: [Signature]	11/11/97

AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

PRELIMINARY PRODUCT FEATURE

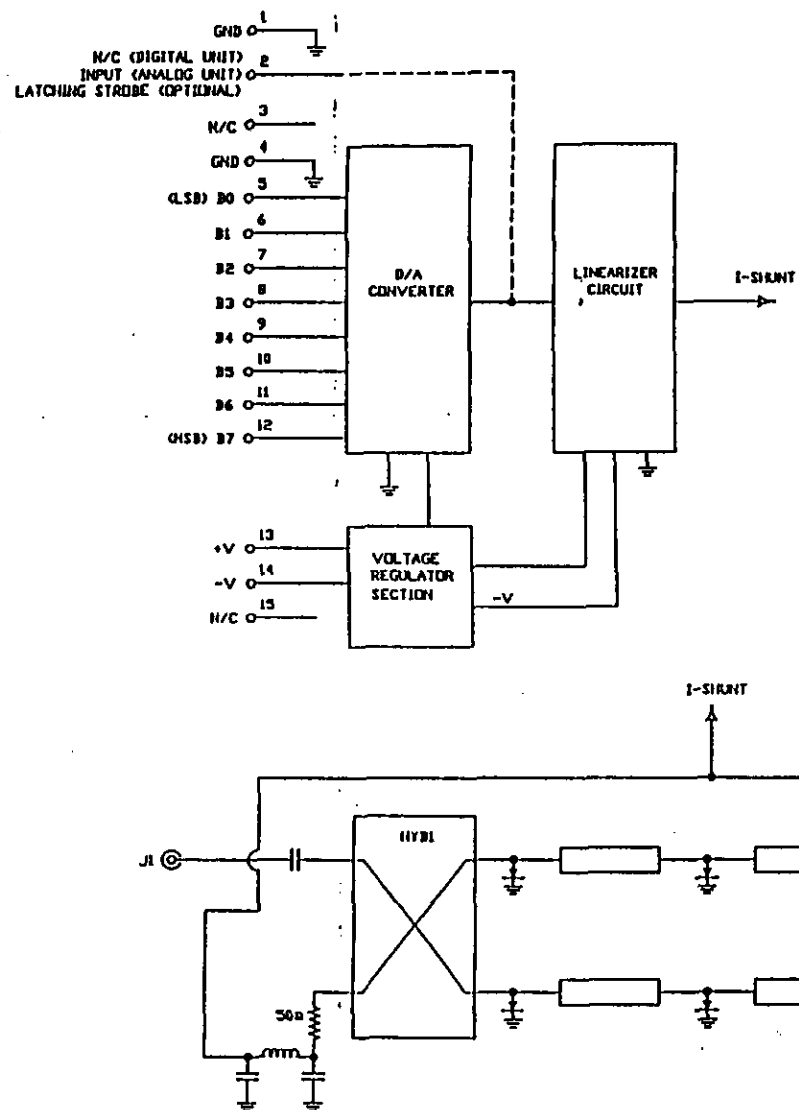
AGH-8018-60DD-120

8.0-18.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

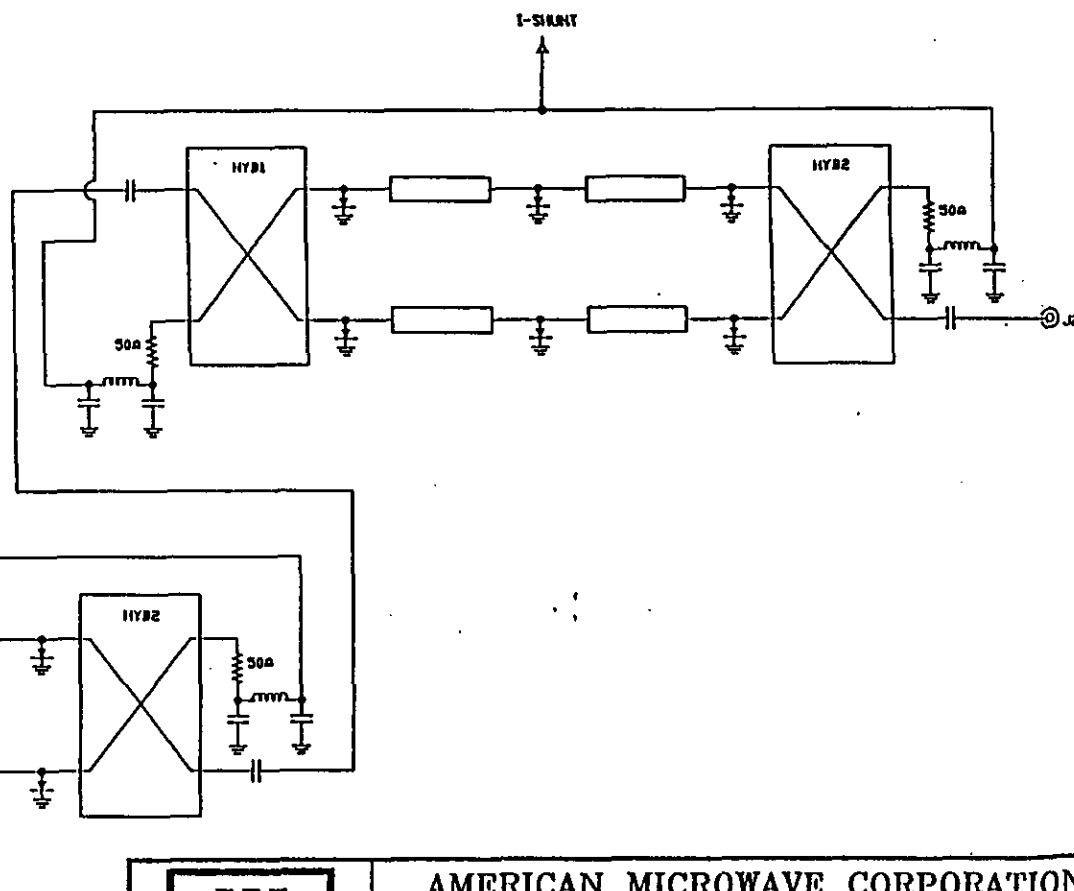
SIZE A SHEET 1 OF 2 DWG. # 100-4260

FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT



RF SECTION



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

PRELIMINARY PRODUCT FEATURE

AGH-8018-60DD-120

8.0-18.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

APPROVALS

DATE

DRAWN

RLG

11/11/97

CHECKED

SIZE A

SHEET 2 OF 2

DWG # 100-4260

8-38

AMC MODEL AGH-1020-60D-SF IS A VOLTAGE CONTROLLED, HIGH SPEED VARIABLE ATTENUATOR/MODULATOR WITH BUILT IN LINEARIZER/DRIVER CIRCUITRY DESIGNED FOR HIGH DYNAMIC RANGE AND HIGH ACCURACY APPLICATIONS.

SPECIFICATIONS

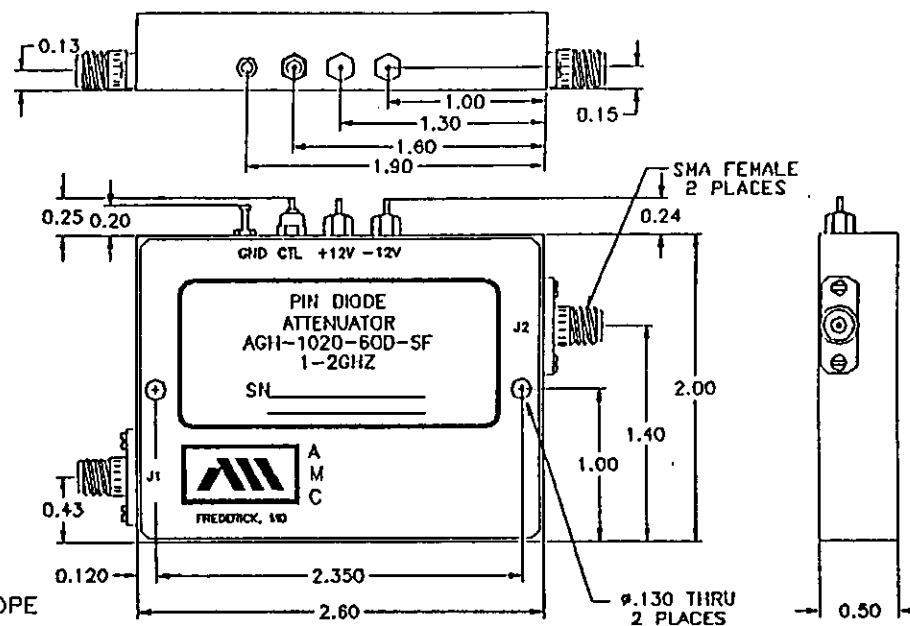
- | | |
|---------------------------------------|--------------------------------------|
| • FREQUENCY RANGE | 1-2 GHz |
| • INSERTION LOSS | 2.0 dB MAXIMUM |
| • ATTENUATION FLATNESS | 0-10 dB ± 0.45 dB MAXIMUM |
| | 10-20 dB ± 0.8 dB MAXIMUM |
| | 20-40 dB ± 1.5 dB MAXIMUM |
| | 40-60 dB ± 1.6 dB MAXIMUM |
| • ATTENUATION DYNAMIC RANGE | 60 dB |
| • ATTENUATION ACCURACY | 0-30 dB ± 0.5 dB MAXIMUM |
| (DEVIATION FROM | 30-50 dB ± 1.0 dB MAXIMUM |
| NOMINAL ATTENUATION) | 50-60 dB ± 1.5 dB MAXIMUM |
| • MONOTONICITY | GUARANTEED |
| • TEMPERATURE COEFFICIENT | ± 0.025 dB/ $^{\circ}$ C MAXIMUM |
| • SWITCHING TIME | |
| (-SF) | 500 ns MAXIMUM |
| (-VF) | 200 ns MAXIMUM |
| (-UF) | 125 ns MAXIMUM |
| • VSWR (ALL ATTENUATION LEVELS) | 1.5:1 MAXIMUM (1-2 GHz) |
| • POWER HANDLING | |
| (-SF) | +20 dBm CW OR PEAK |
| (-VF) & (-UF) | +10 dBm CW OR PEAK |
| • CONTROL | VOLTAGE CONTROLLED |
| | 10 dB/VOLT TRANSFER FUNCTION SLOPE |
| • POWER SUPPLY | +12VDC $\pm 5\%$ @100 mA MAXIMUM |
| • CONNECTORS | -12VDC $\pm 5\%$ @ 20 mA MAXIMUM |
| RF INPUT/OUTPUT | SMA FEMALE |
| POWER | SOLDER PIN |
| CONTROL | SOLDER PIN |
| • SIZE | 2.6" x 2.0" x 0.50" |

AVAILABLE OPTIONS

- | | | |
|-----|-------|---|
| A01 | ..... | J1 SMA MALE, J2 SMA FEMALE |
| A02 | ..... | J1 SMA FEMALE, J2 SMA MALE |
| A03 | ..... | J1 SMA MALE, J2 SMA MALE |
| A04 | ..... | SMA FEMALE CONTROL CONNECTOR |
| A05 | ..... | SMC MALE CONTROL CONNECTOR |
| A06 | ..... | MINIATURE 14 PIN MALE (MIL-C-28748) CONNECTOR |
| A07 | ..... | REMOVABLE SMA FEMALE RF CONNECTOR |
| A08 | | ± 15 VDC SUPPLIES |
| A09 | | ± 18 VOLT POWER SUPPLY |
| A10 | ..... | 0-30 dB RANGE |
| A11 | ..... | 5 dB/VOLT TRANSFER FUNCTION SLOPE |
| A12 | | 0.75-2.25 GHz WITH INSERTION LOSS OF 2.5 dB MAXIMUM
VSWR OF 2.2:1 MAXIMUM AND ATTENUATION FLATNESS OF
± 0.65 dB @ 10 dB, ± 1.5 dB @ 20 dB, ± 3.0 dB @ 40 dB
AND ± 3.5 dB @ 60 dB |
| A13 | ..... | 8 BIT DIGITAL CONTROLLED AND LINEARIZED |
| A14 | ..... | OPTION 20, OPTIMIZED FOR 1365-1435 MHz |

REVISIONS				
DATE	REV.	DESCRIPTION	DATE	APPROVED
	A	ORIGINAL RELEASE. JOB # 211297E	6/18/93	

MECHANICAL OUTLINE



NOTES:

1. DIMENSIONS ARE IN INCHES
2. TOLERANCES: X.XX ± 0.020
 X.XXX ± 0.010
3. WEIGHT: APPROX. 3.0 OZ

ENVIRONMENTAL RATINGS

- | | |
|---------------------------|---|
| • TEMPERATURE..... | -20°C TO +70°C (OPERATING)
-65°C TO +125°C (STORAGE) |
| • HUMIDITY | MIL-STD-202F, METHOD 103B COND. B |
| • SHOCK | MIL-STD-202F, METHOD 213B COND. B |
| • VIBRATION..... | MIL-STD-202F, METHOD 204D COND. B |
| • ALTITUDE | MIL-STD-202F, METHOD 105C COND. B |
| • TEMPERATURE CYCLE | MIL-STD-202F, METHOD 107D COND. A |

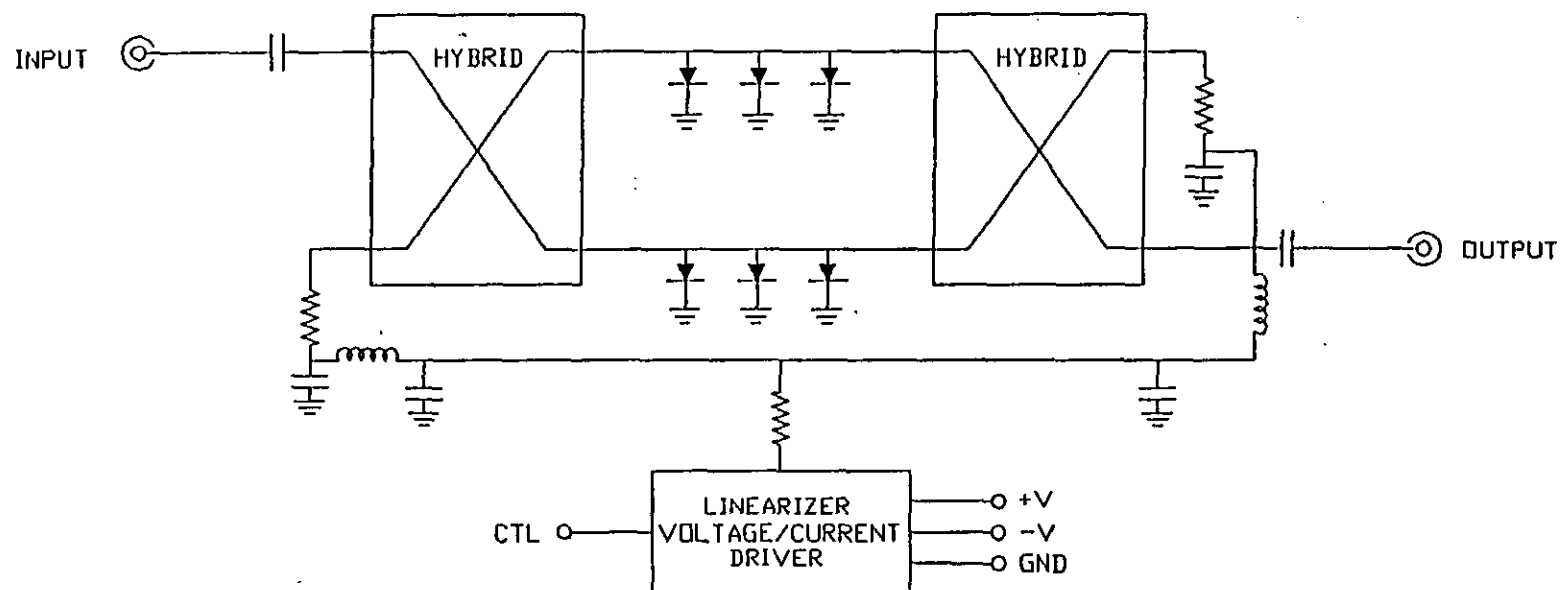


AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-493

APPROVALS	DATE	PRODUCT FEATURE			SF (STANDARD)
DRAWN WSP	5/16/99	AGH-1020-60D-SF			VF (VERY FAST)
CHECKED WSP	10/11/99	1-2 GHz. VOLTAGE CONTROLLED, HIGH SPEED, VARIABLE ATTENUATOR/MODULATOR			UF (ULTRA FAST)
		SIZE A	SHEET 1 OF 2	DWG. #	100-3170

FUNCTIONAL SCHEMATIC



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS	DATE
DRAWN WJS	6/16/93
CHECKED	

PRODUCT FEATURE

AGH-1020-60D-SF

1-2 GHz, VOLTAGE CONTROLLED, HIGH SPEED, VARIABLE ATTENUATOR/MODULATOR

SF (STANDARD)
VF (VERY FAST)
UF (ULTRA FAST)

SIZE A

SHEET 2 OF 2

DWG. # 100-3170

DESCRIPTION

AMC MODEL AGH-0510-60D IS AN OCTAVE BAND VOLTAGE CONTROLLED VARIABLE ATTENUATOR MODULE WITH BUILT IN DRIVER/LINEARIZER CIRCUITRY, DESIGNED FOR HIGH DYNAMIC RANGE AND HIGH ACCURACY APPLICATIONS.

SPECIFICATIONS

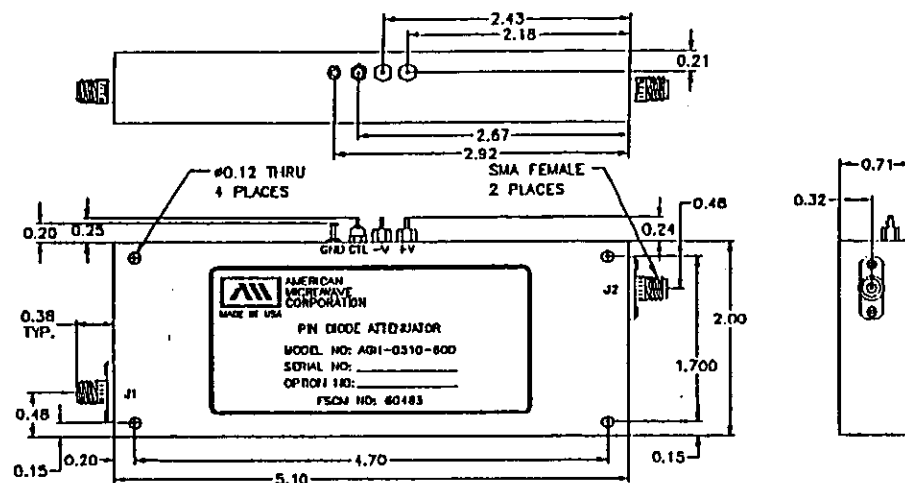
- FREQUENCY RANGE 0.5-1.0 GHz MINIMUM
- INSERTION LOSS 4.0 dB MAXIMUM
- ATTENUATION FLATNESS 0-40 dB ± 2.0 dB MAXIMUM
40-60 dB ± 2.5 dB MAXIMUM
- ATTENUATION DYNAMIC RANGE 70 dBc MINIMUM
- ATTENUATION ACCURACY 0-40 dB ± 1.5 dB MAXIMUM
(DEVIATION FROM NOMINAL ATTENUATION) 40-60 dB ± 2.0 dB MAXIMUM
- MONOTONICITY GUARANTEED
- TEMPERATURE COEFFICIENT ± 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME 1.5 μ S MAXIMUM
- VSWR (ALL ATTENUATION LEVELS) 1.7:1 MAXIMUM
- POWER RATINGS +20 dBm MAXIMUM
- CONTROL VOLTAGE CONTROLLED (0-6VOLTS)
10 dB/VOLT TRANSFER FUNCTION SLOPE
- POWER SUPPLY +12VDC $\pm 5\%$ @ 100 mA MAXIMUM
-12VDC $\pm 5\%$ @ 20 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER SOLDER PIN
CONTROL SOLDER PIN
- SIZE 5.10" x 2.0" x 0.71"

AVAILABLE OPTIONS

- A01 J1 SMA MALE, J2 SMA FEMALE
- A02 TWO SMA MALE CONNECTORS
- A03 ± 15 VDC SUPPLIES
- A04 SMC MALE CONTROL CONNECTOR
- A05 SMA FEMALE CONTROL CONNECTOR
- A06 5 dB/VOLT TRANSFER FUNCTION SLOPE
(CONSULT FACTORY FOR OTHER AVAILABLE TRANSFER FUNCTION SLOPES)

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
A		ORIGINAL RELEASE, JOB # 10479	01/23/93	

MECHANICAL OUTLINE



NOTES:

- 1) DIMENSIONS ARE IN INCHES
- 2) TOLERANCES: X.XX ± 0.020
X.XXX ± 0.010
- 3) WEIGHT: APPROX. 4.0 OZ

ENVIRONMENTAL RATINGS

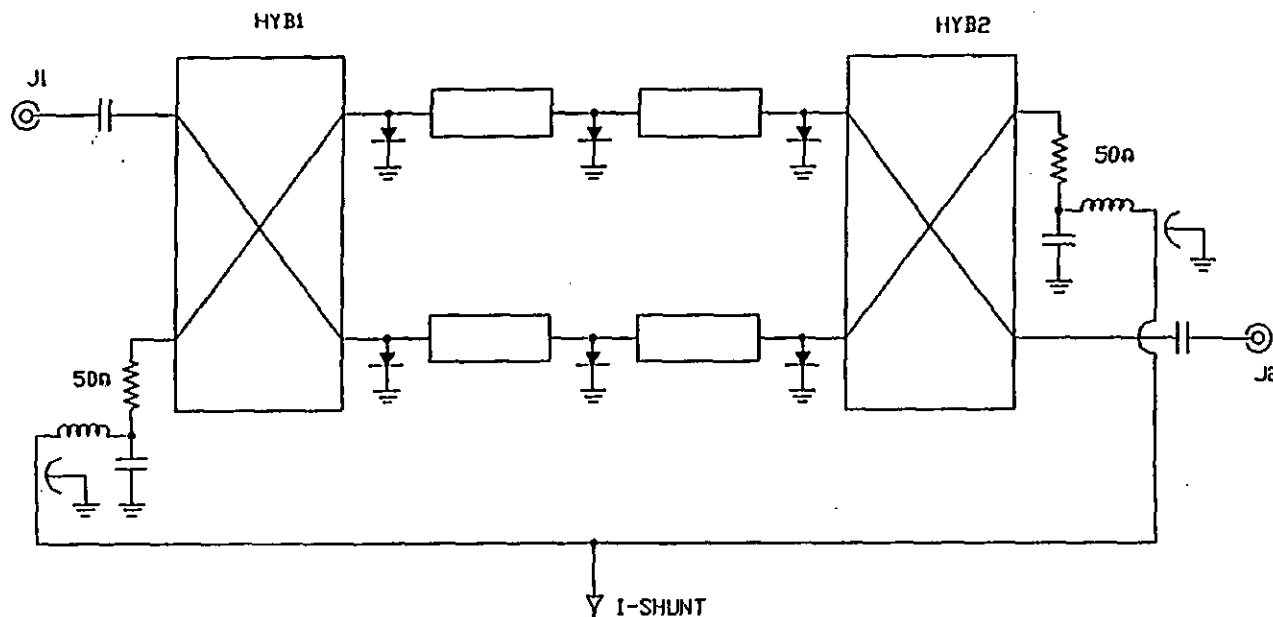
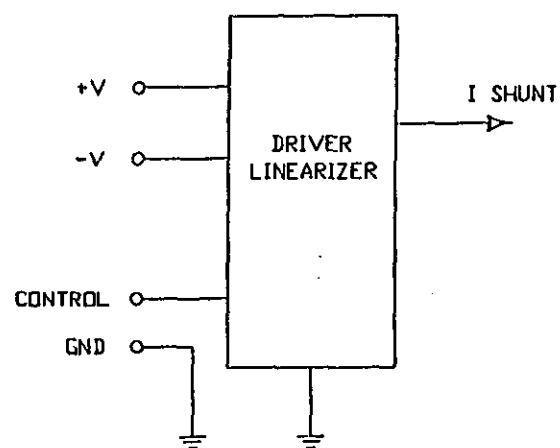
- TEMPERATURE -55 $^{\circ}$ C TO +125 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A

		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRODUCT FEATURE AGH-0510-60D 0.5-1.0 GHz, VOLTAGE CONTROLLED VARIABLE ATTENUATOR MODULE	
APPROVALS DRAWN: <i>WSP</i> CHECKED: <i>P.M. L.</i>	DATE 01/23/93 10/14/97	SIZE A	SHEET 1 OF 2

FUNCTIONAL SCHEMATIC

LINEARIZER

RF SECTION



AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS	DATE
DRAWN <i>WSP</i>	01/23/93
CHECKED	

PRODUCT FEATURE		
AGH-0510-60D		
0.5-1.0 GHz, VOLTAGE CONTROLLED VARIABLE ATTENUATOR MODULE		
SIZE A	SHEET 2 OF 2	DWG. # 100-2934

DESCRIPTION

AMC MODEL AGH-2856-70D IS A VOLTAGE CONTROLLED VARIABLE ATTENUATOR MODULE WITH BUILT IN LINEARIZER/DRIVER CIRCUITRY DESIGNED FOR HIGH DYNAMIC RANGE AND HIGH ACCURACY APPLICATIONS.

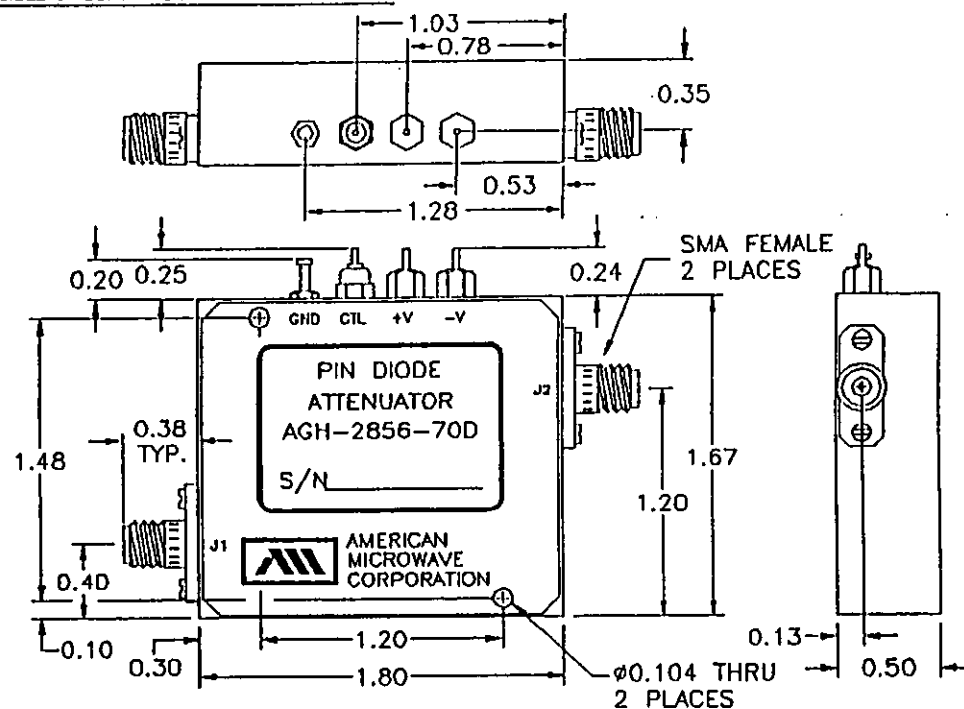
SPECIFICATIONS

- FREQUENCY RANGE 4.2-4.4 GHz MINIMUM
(CONSULT FACTORY FOR OTHER FREQUENCY RANGES)
- INSERTION LOSS 2.0 dB MAXIMUM
- ATTENUATION FLATNESS 0-30 dB ± 0.3 dB MAXIMUM
30-50 dB ± 0.4 dB MAXIMUM
50-70 dB ± 0.5 dB MAXIMUM
- ATTENUATION DYNAMIC RANGE 70 dBc MINIMUM
- ATTENUATION ACCURACY 0-30 dB ± 0.5 dB MAXIMUM
(DEVIATION FROM NOMINAL ATTENUATION) 30-50 dB ± 1.0 dB MAXIMUM
50-70 dB ± 1.5 dB MAXIMUM
- MONOTONICITY GUARANTEED
- TEMPERATURE COEFFICIENT ± 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME 1.5 μ S MAXIMUM
- VSWR (ALL ATTENUATION LEVELS) 2 : 1 MAXIMUM
- POWER RATINGS +20 dBm MAXIMUM
- CONTROL VOLTAGE CONTROLLED (0-4V)
17.5 dB/VOLT TRANSFER FUNCTION SLOPE
- POWER SUPPLY +12VDC $\pm 5\%$ @ 100 mA MAXIMUM
-12VDC $\pm 5\%$ @ 20 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER SOLDER PIN
CONTROL SOLDER PIN
- SIZE 1.8" x 1.67" x 0.50"

AVAILABLE OPTIONS

- A01 J1 SMA MALE, J2 SMA FEMALE
- A02 TWO SMA MALE CONNECTORS
- A03 ± 15 VDC SUPPLIES
- A04 SMC MALE CONTROL CONNECTOR
- A05 SMA FEMALE CONTROL CONNECTOR
- A06 10 dB/VOLT TRANSFER FUNCTION SLOPE
(OTHER TRANSFER FUNCTION SLOPES AVAILABLE)

MECHANICAL OUTLINE



- NOTES:
- 1) DIMENSIONS ARE IN INCHES
 - 2) TOLERANCES: X.XX ± 0.020
X.XXX ± 0.010
 - 3) WEIGHT: APPROX. 2.0 OZ

ENVIRONMENTAL RATINGS

- TEMPERATURE -55 $^{\circ}$ C TO +125 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



AMERICAN MICROWAVE CORPORATION

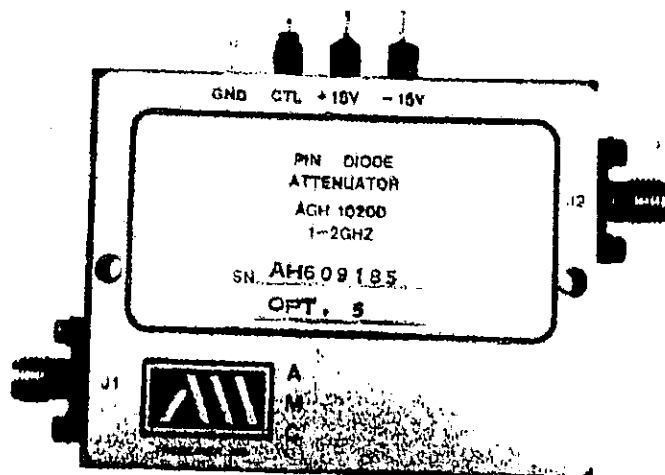
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS	DATE
DRAWN WSP	01/22/93
CHECKED M. J. [Signature]	10/14/93

PRODUCT FEATURE		
AGH-2856-70D		
4.2-4.4 GHz, VOLTAGE CONTROLLED VARIABLE ATTENUATOR MODULE		
SIZE A	SHEET 1 OF 2	DWG. # 100-2933

**AMERICAN Microwave
corporation**

AGH D SERIES LINEARIZED ATTENUATOR MODULATORS 18 GHz, 60 dB



FEATURES

- Solid State Reliability
- Absorptive Type
- 3:1 Bandwidth
- Linearized
- Voltage Controlled

DESCRIPTION

The AGH suffix D Series are voltage controlled linearized attenuator/modulators that operate over greater than octave bandwidth and are non-reflective at all attenuation levels. The units consist of an AGH Series modulator and an integrated hybrid linearizer that provides 10 dB per volt control function. Seven models in the series cover the frequency band from 1 to 18 GHz. The RF circuit employs two microstrip arrays of pin diodes that are hybrid coupled at the input and output with large couplers for repeatable low loss performance.

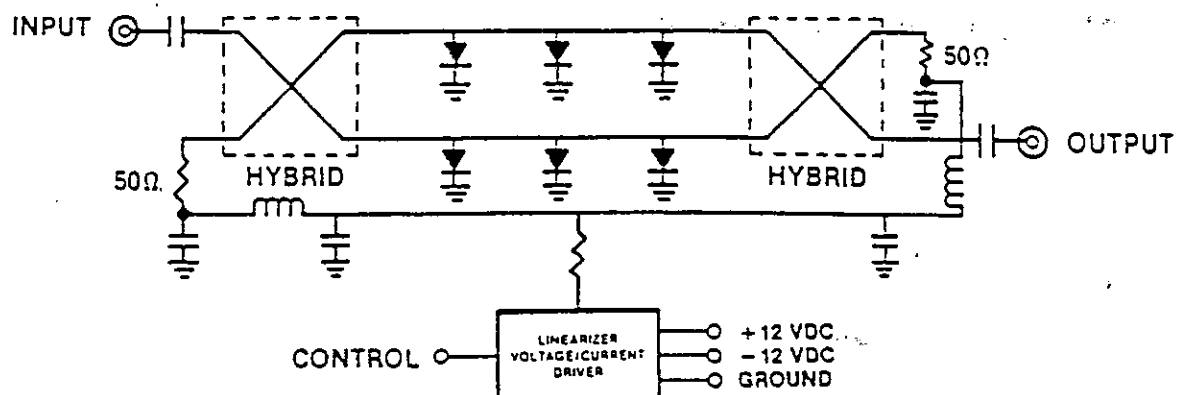
4/89

REVISED
OCTOBER 9, 1997

7311G GROVE ROAD, FREDERICK, MARYLAND 21701

Tel.: (301) 662-4700
Fax: (301) 662-4938

FUNCTIONAL SCHEMATIC



SPECIFICATIONS

MODEL	FREQUENCY RANGE (GHz)	INSERTION LOSS, MAX (dB)	VSWR MAX.	FLATNESS ($\pm$ dB) AT NOMINAL ATTENUATION TO LEVELS OF			
				10 dB	20 dB	40 dB	60 dB
AGH-1020D	1.0-2.0	1.8	1.5	0.45	0.8	1.5	1.6
	0.75-2.25	1.9	2.0	0.6	1.4	3.0	3.5
AGH-2040D	2.0-4.0	1.8	1.5	0.3	0.8	1.5	1.6
	1.5-4.5	1.9	2.0	0.5	1.4	3.0	3.5
AGH-2550D	2.5-5.0	2.0	1.6	0.3	0.8	1.5	1.6
	1.9-5.6	2.1	2.1	0.5	1.4	3.0	3.5
AGH-4080D	4.0-8.0	2.4	1.7	0.3	0.8	1.5	1.6
	3.0-9.0	2.5	2.2	0.5	1.4	3.0	3.5
AGH-5010D	5.0-10.0	2.6	1.7	0.5	0.9	1.5	1.6
	3.75-11.25	2.7	2.2	0.7	1.4	3.0	3.5
AGH-6012D	6.0-12.0	2.7	1.8	0.7	1.0	1.5	1.6
	4.5-13.5	2.8	2.2	0.9	1.5	3.0	3.5
AGH-8018D	8.0-18.0	2.7 (Note 1)	2.0	0.7	1.0	1.5	1.6
	6.0-18.0	2.7 (Note 1)	2.0	0.9	1.5	3.0	3.5

NOTES: 1. Typical loss to 16 GHz.

3.7 dB, max loss 16-18 GHz.

2. Extended frequency range specifications are typical.

REVISED
OCTOBER 9, 1997

Handwritten:
HLS
R.A. WP WH
B9 PW EK

ADDITIONAL SPECIFICATIONS

Attenuation Range	60 dB
Deviation from Linearity	0 to 30 dB $\pm$ 0.5 dB
	30 to 50 dB $\pm$ 1.0 dB
	50 to 60 dB $\pm$ 1.5 dB
Monotonicity	Guaranteed
Attenuation Change with	
Temperature	$\pm$.025 dB/ $^{\circ}$ C, Max.
Power Handling	+ 20 dBm
(Operating)	
Rise and Fall Times	Rise Time: 1.5 μ sec, Max.
	Fall Time: 50 ns, Max.
Control Characteristics	Range: 0 to 6 volts:
	$\pm$ 15 volts, Maximum
	Transfer Function: 10 dB/volt
	Input Impedance: 10 k Ohms
Power Supply Requirements	+ 12 V $\pm$ 5% @ 100 Ma
	- 12 V $\pm$ 5% @ 20 Ma

AVAILABLE OPTIONS

NUMBER	DESCRIPTION
001	Two SMA Male RF Connectors
002	One SMA Male and One SMA Female RF Connector
003	5 dB/volt Sensitivity
004	0 - 30 dB Range
005	$\pm$ 15 Volt Power Supply
006	SMA - F Control Connector
008	SMC - M Control Connector
102	$\pm$ 18 Volt Power Supply
200	Removable SMA Female RF Connector

ENVIRONMENTAL RATINGS

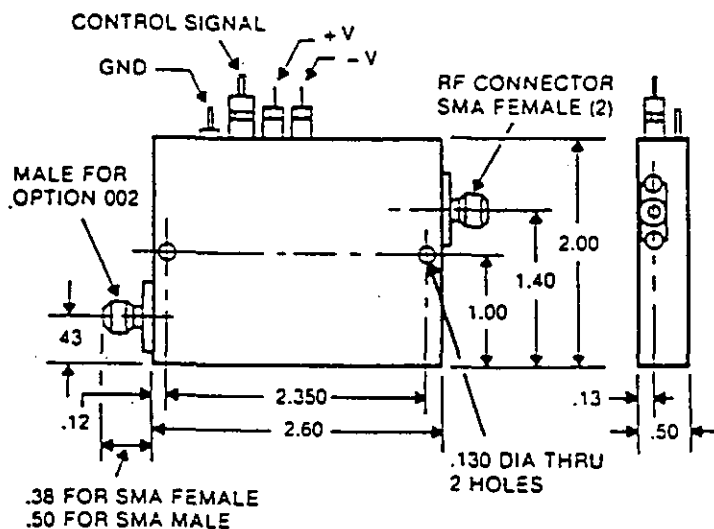
Operating Temperature	- 54 $^{\circ}$ C to + 110 $^{\circ}$ C
Non-operating	- 65 $^{\circ}$ C to + 125 $^{\circ}$ C
Humidity	Mil-Std - 202F, Method 103B
	Cond B, 96 Hrs @ 95%
Shock	Mil-Std - 202F, Method 213B
	Cond B, 75G, 6 msec
Vibration	Mil-Std - 202F, Method 204D
	Cond B
Altitude	Mil-Std - 202F, Method 105C
	Cond B, 50,000 Ft.
Temp Cycling	Mil-Std - 202F, Method 107D
	Cond A, 5 Cycles

REVISED
OCTOBER 9, 1997

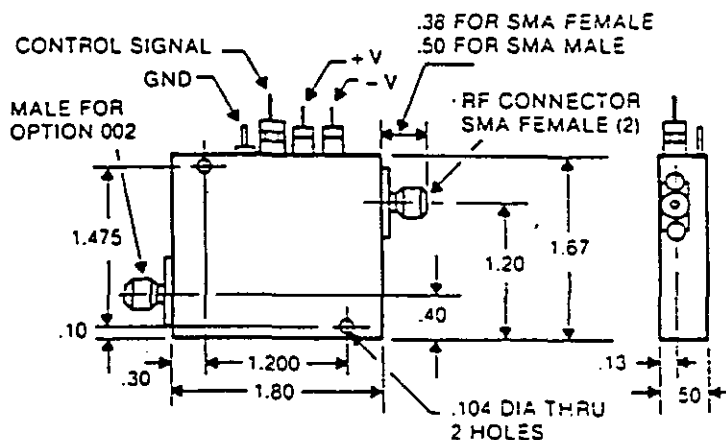
Handwritten:
R.A. W.P. WH
B6 PW EK

MECHANICAL DATA

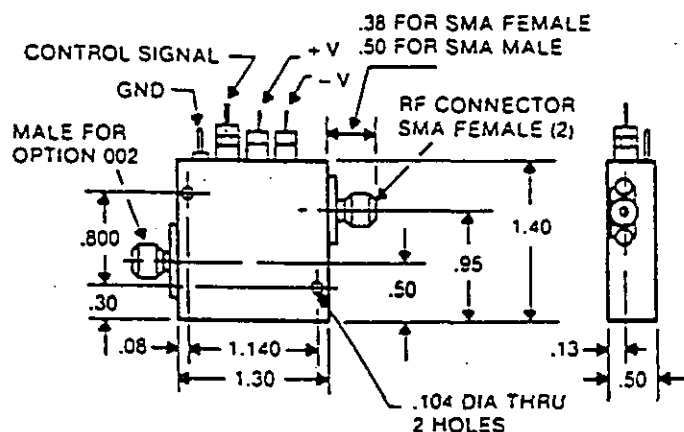
DIMENSIONS AND WEIGHTS



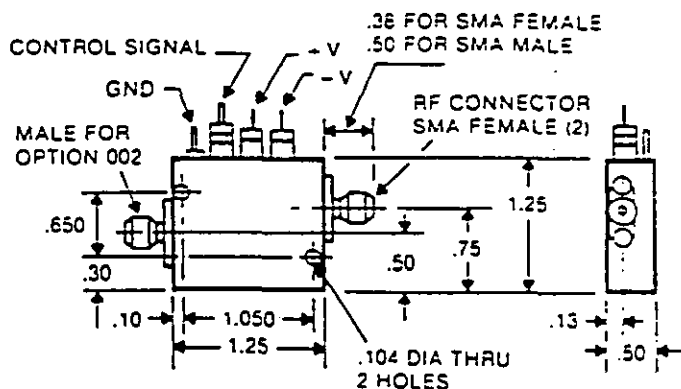
MODEL: AGH-1020D
Wt. 3 oz. (85 gm) approx.



MODELS: AGH 2040D, 2550D
Wt. 2 oz. (57 gm) approx.



MODELS: AGH-4080D, 5010D, 6012D
Wt. 1 oz. (28 gm) approx.



MODEL: AGH-8018D
Wt. 1 oz. (28 gm) approx.

Dimensional Tolerances unless otherwise indicated xx = 0.020 xxx = 0.005

REVISED
OCTOBER 9, 1997

2.A. WP MH
BG PW EIK

DESCRIPTION

AMC MODEL AGH-1020-60D-120 IS A OVER-OCTAVE BAND VOLTAGE CONTROLLED ATTENUATOR/MODULATOR, WITH 120 dB DYNAMIC RANGE.

SPECIFICATIONS

- FREQUENCY RANGE 1.0-2.0 GHz
 - INSERTION LOSS 1.0-2.0 GHz 4.0 dB MAXIMUM
0.75-2.25 GHz 5.0 dB MAXIMUM
 - ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)
- | FREQUENCY RANGE | 10 dB | 20 dB | 40 dB | 60 dB | 80 dB | 120 dB |
|-----------------|-------|-------|-------|-------|-------|--------|
| 1.0-2.0 GHz | 0.5 | 0.8 | 1.5 | 1.6 | 2.5 | 3.2 |
| 0.75-2.25 GHz | 0.7 | 1.5 | 3.0 | 3.5 | 5.0 | 7.0 |
- ATTENUATION ACCURACY 0-30 dB $\pm$ 0.5 dB MAXIMUM
(MONOTICITY IS GUARANTEED) 30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
60-80 dB $\pm$ 2.0 dB MAXIMUM
80-120 dB $\pm$ 2.5 dB MAXIMUM
 - TEMPERATURE COEFFICIENT $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
 - SWITCHING TIME 3 μ S MAXIMUM
 - VSWR @ 0 dB ATTENUATION 1.0-2.0 GHz 2.0:1 MAXIMUM
0.75-2.25 GHz 2.2:1 MAXIMUM
 - RF POWER RATINGS
OPERATING POWER +20 dBm CW MAXIMUM
SURVIVAL POWER +30 dBm CW MAXIMUM
 - CONTROL 20 dB/VOLT
(OTHER CONTROL VOLTAGES AVAILABLE)
 - POWER SUPPLY +12VDC @ 250 mA MAXIMUM
-12VDC @ 100 mA MAXIMUM
 - CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS SOLDER PIN
 - SIZE 5.89" x 2.97" x 0.60"
5.81" x 3.97" x 0.80" (OPTION A04)

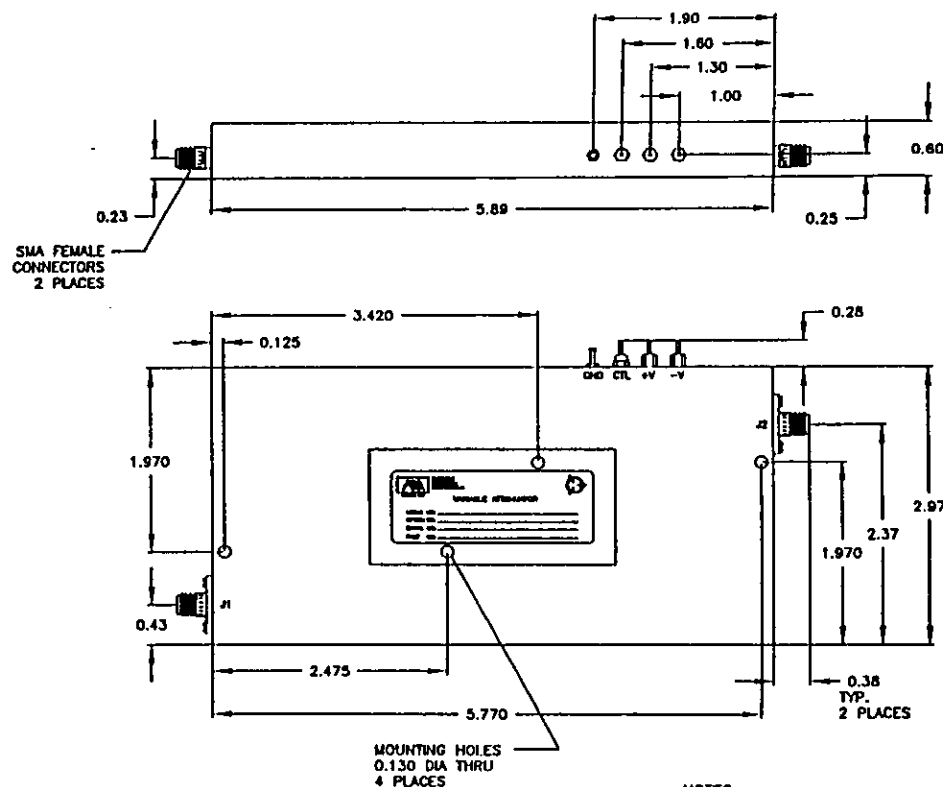
AVAILABLE OPTIONS

- A01 TWO SMA MALE RF CONNECTORS
A02 J1 SMA MALE, J2 SMA FEMALE
A03 MOUNTING SURFACE UNPAINTED
A04 MULTIPIN ANALOG CONTROLLED UNIT (SEE SHEET 2 OF 2)
FOR DIGITALLY CONTROLLED UNITS REFER TO DATA SHEET AGH-1020-60DD-120.
- A05 $\pm$ 15VDC POWER SUPPLY
A06 0-90 dB DYNAMIC RANGE
A07 EXTENDED BANDWIDTH (0.75-2.25 GHz)
A08 LATCHING STROBE
A09 HIGH SPEED 500 ns MAXIMUM
SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	ORIGINAL RELEASE	12/18/97	

MECHANICAL OUTLINE



- NOTES:
- 1) DIMENSIONS ARE IN INCHES
 - 2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
APPROX. 7.0 OZ
 - 3) WEIGHT:

ENVIRONMENTAL RATINGS

- TEMPERATURE -55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

PRELIMINARY PRODUCT FEATURE

AGH-1020-60D-120

1.0-2.0 GHz, VOLTAGE VARIABLE ATTENUATOR

SIZE A

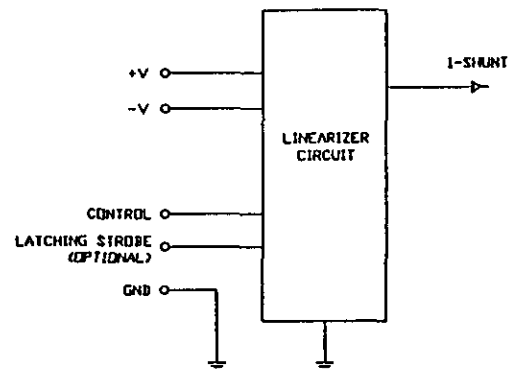
SHEET 1 OF 2

DWG. # 100-4291

APPROVALS	DATE
DRAWN <i>R. J. G.</i>	12/18/97
CHECKED <i>W. P.</i>	12/19/97

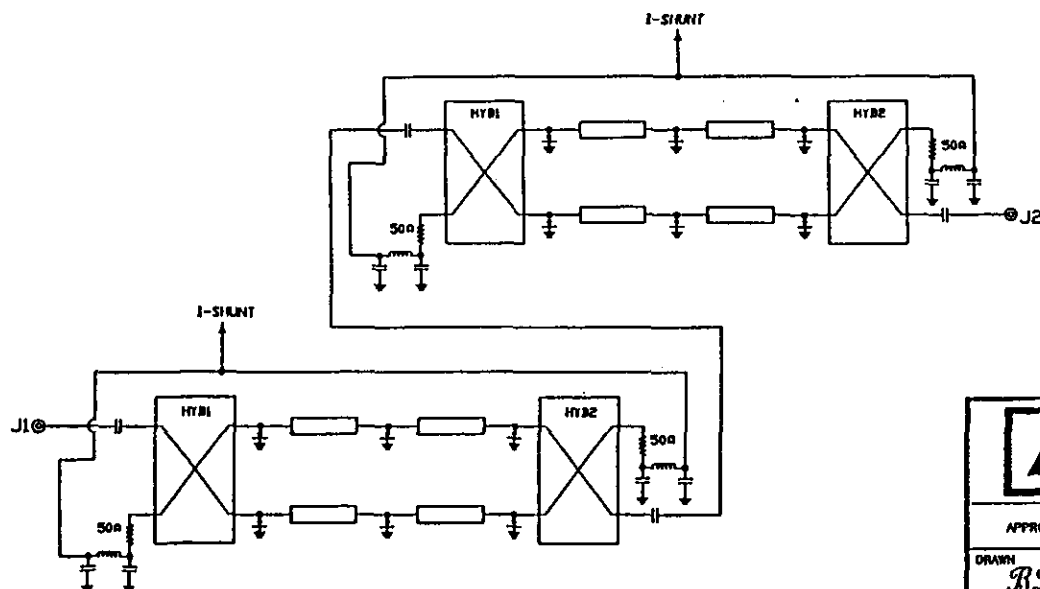
FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

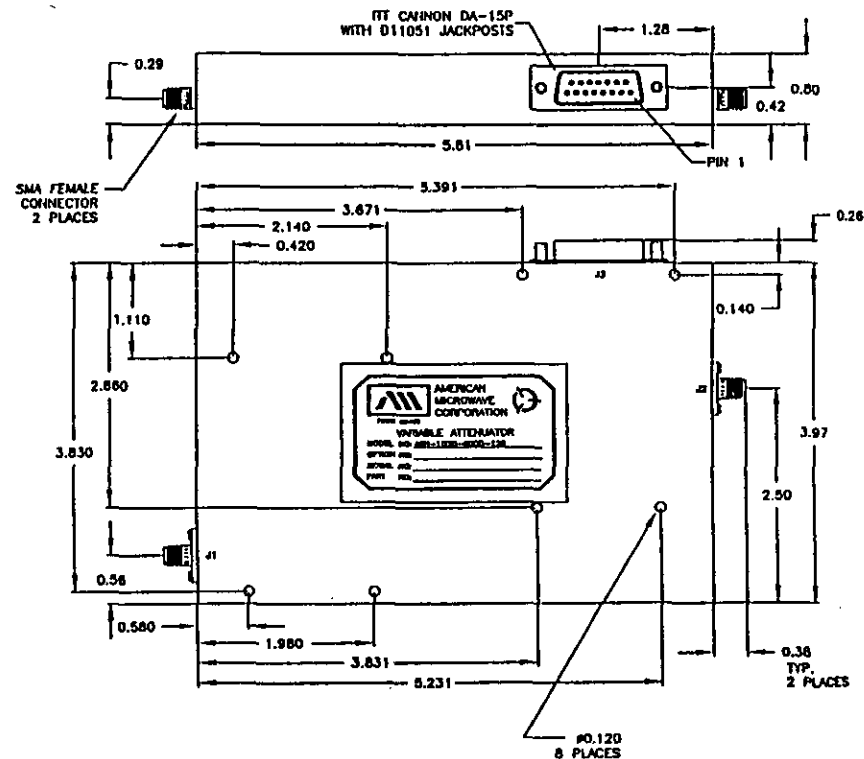


MULTIPIN ANALOG CONTROL	
J3	PIN FUNCTION
PIN#	FUNCTION
1	N/C
2	CONTROL
3	N/C
4	GND
5	N/C
6	N/C
7	N/C
8	N/C
9	N/C
10	N/C
11	N/C
12	N/C
13	+V
14	-V
15	LATCHING STROBE (OPTIONAL)

RF SECTION



MECHANICAL OUTLINE (OPTION A04)



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

PRELIMINARY PRODUCT FEATURE

AGH-1020-60D-120

1.0-2.0 GHz, VOLTAGE VARIABLE ATTENUATOR

APPROVALS

DATE

DRAWN

12/18/97

CHECKED

SIZE

A

SHEET 2 OF 2

DWG. # 100-4291

DESCRIPTION

AMC MODEL AGH-2040-60D-120 IS A OVER-OCTAVE BAND VOLTAGE CONTROLLED ATTENUATOR/MODULATOR, WITH 120 dB DYNAMIC RANGE.

SPECIFICATIONS

- FREQUENCY RANGE 2.0-4.0 GHz
- INSERTION LOSS 2.0-4.0 GHz 4.0 dB MAXIMUM
1.5-4.5 GHz 5.0 dB MAXIMUM

ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

FREQUENCY RANGE	10 dB	20 dB	40 dB	60 dB	80 dB	120 dB
2.0-4.0 GHz	0.5	0.8	1.5	1.6	2.5	3.2
1.5-4.5 GHz	0.7	1.5	3.0	3.5	5.0	7.0

- ATTENUATION ACCURACY 0-30 dB $\pm$ 0.5 dB MAXIMUM
(MONOTICITY IS GUARANTEED)
30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
60-80 dB $\pm$ 2.0 dB MAXIMUM
80-120 dB $\pm$ 2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME 3 μ S MAXIMUM
- VSWR @ 0 dB ATTENUATION 2.0-4.0 GHz 2.0:1 MAXIMUM
1.5-4.5 GHz 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING POWER +20 dBm CW MAXIMUM
SURVIVAL POWER +30 dBm CW MAXIMUM
- CONTROL 20 dB/VOLT
(OTHER CONTROL VOLTAGES AVAILABLE)
- POWER SUPPLY +12VDC @ 250 mA MAXIMUM
-12VDC @ 100 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS SOLDER PIN
- SIZE 4.30" x 2.47" x 0.60"
4.68" x 3.80" x 0.80" (OPTION A04)

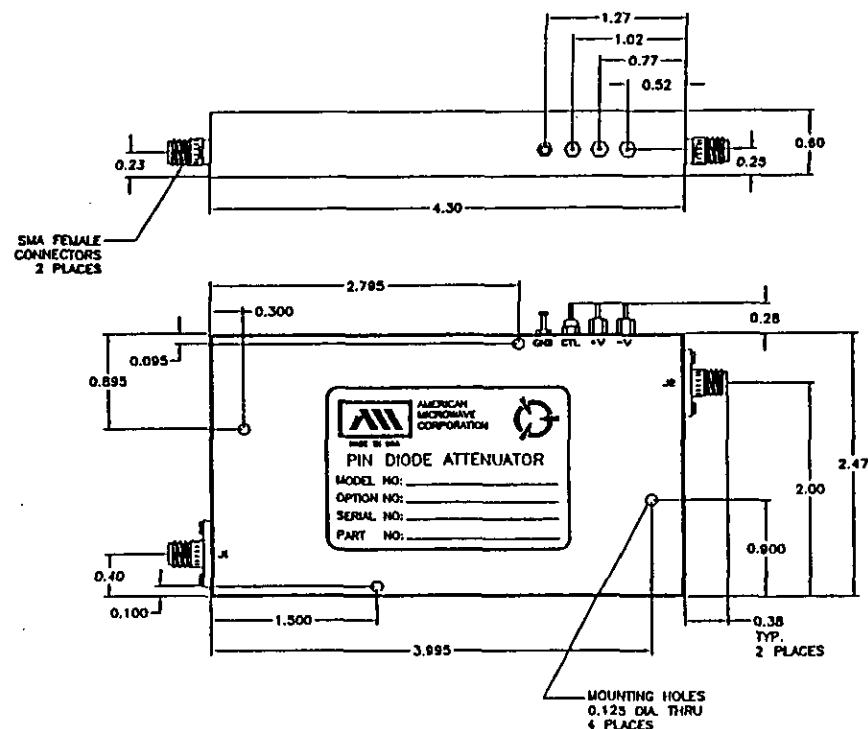
AVAILABLE OPTIONS

- A01 TWO SMA MALE RF CONNECTORS
- A02 J1 SMA MALE, J2 SMA FEMALE
- A03 MOUNTING SURFACE UNPAINTED
- A04 MULTIPIN ANALOG CONTROLLED UNIT (SEE SHEET 2 OF 2)
FOR DIGITALLY CONTROLLED UNITS REFER TO DATA SHEET AGH-2040-60DD-120.
- A05 $\pm$ 15VDC POWER SUPPLY
- A06 0-90 dB DYNAMIC RANGE
- A07 EXTENDED BANDWIDTH (1.5-4.5 GHz)
- A08 LATCHING STROBE
- A09 HIGH SPEED 500 nS MAXIMUM
- SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS			
ZONE	REV.	DESCRIPTION	DATE
	A	ORIGINAL RELEASE	12/18/97

MECHANICAL OUTLINE



- NOTES:
- 1) DIMENSIONS ARE IN INCHES
 - 2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
APPROX. 7.0 $^{\circ}$ C
 - 3) WEIGHT:

ENVIRONMENTAL RATINGS

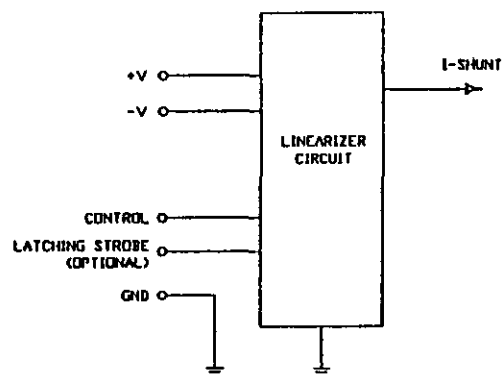
- TEMPERATURE -55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. I
- SHOCK MIL-STD-202F, METHOD 213B COND. I
- VIBRATION MIL-STD-202F, METHOD 204D COND. I
- ALTITUDE MIL-STD-202F, METHOD 105C COND. I
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. I

		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRELIMINARY PRODUCT FEATURE AGH-2040-60D-120 2.0-4.0 GHz, VOLTAGE VARIABLE ATTENUATOR	
APPROVALS DRAWN: <i>BLS</i> CHECKED: <i>WP</i>	DATE 12/18/97	SIZE: A	SHEET 1 OF 2

DWG. # 100-4290

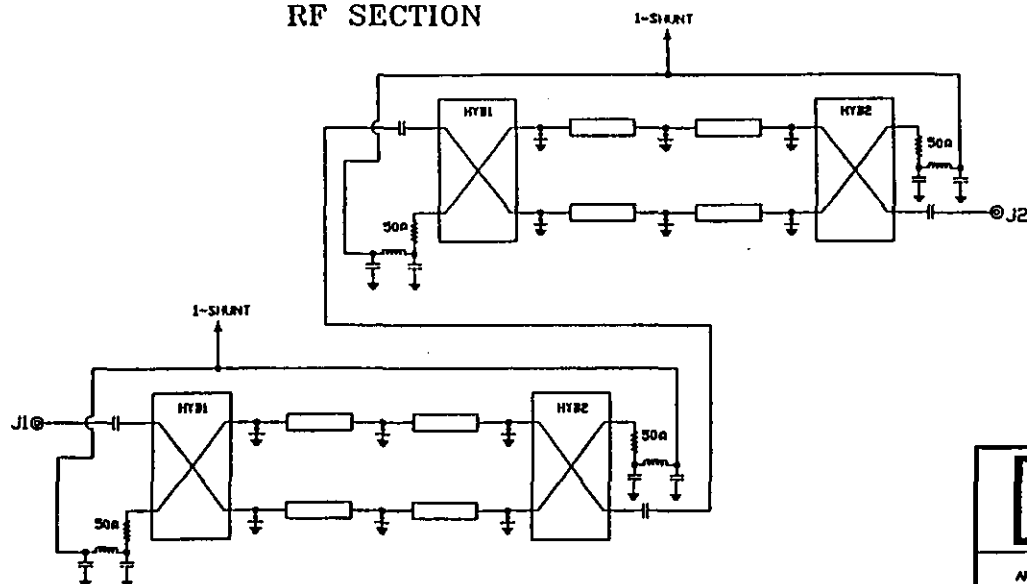
FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

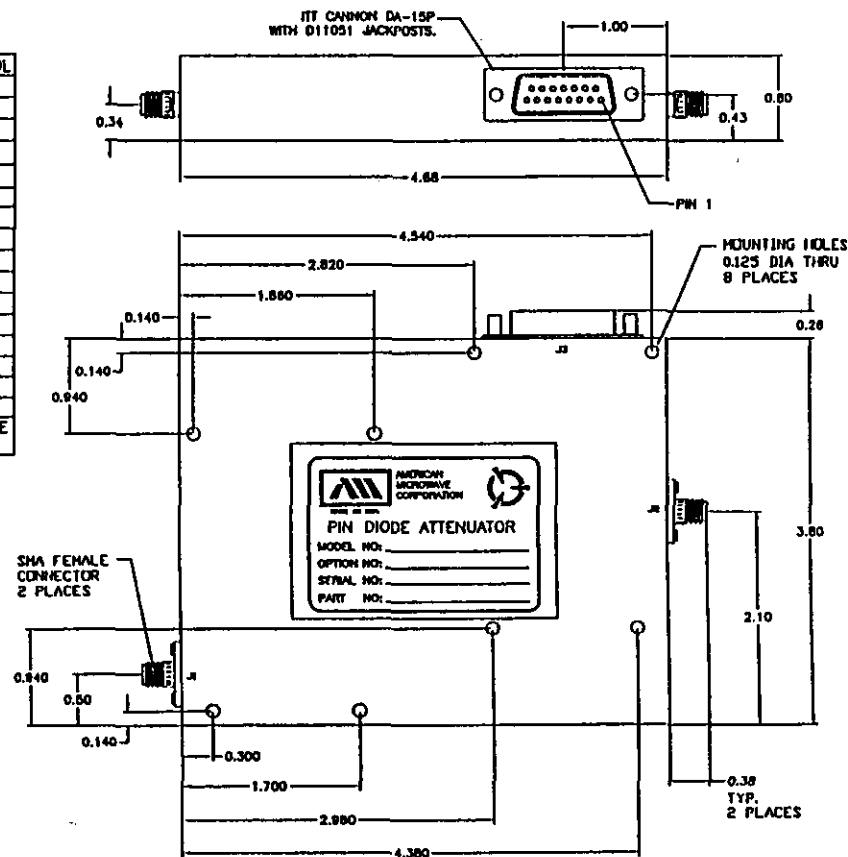


MULTIPIN ANALOG CONTROL	
J3	PIN FUNCTION
PIN#	FUNCTION
1	N/C
2	CONTROL
3	N/C
4	GND
5	N/C
6	N/C
7	N/C
8	N/C
9	N/C
10	N/C
11	N/C
12	N/C
13	+V
14	-V
15	LATCHING STROBE (OPTIONAL)

RF SECTION



MECHANICAL OUTLINE (OPTION A04)



AMERICAN MICROWAVE CORPORATION
 7311G GROVE RD., FREDERICK, MD. 21701
 TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS	DATE
DRAWN <i>RLG</i>	12/18/97
CHECKED	

PRELIMINARY PRODUCT FEATURE
AGH-2040-60D-120
 2.0-4.0 GHz, VOLTAGE VARIABLE ATTENUATOR

SIZE: A SHEET 2 OF 2 DWG. # 100-4290

DESCRIPTION

AMC MODEL AGH-2550-60D-120 IS A OVER-OCTAVE BAND VOLTAGE CONTROLLED ATTENUATOR/MODULATOR, WITH 120 dB DYNAMIC RANGE.

SPECIFICATIONS

- FREQUENCY RANGE 2.5-5.0 GHz
- INSERTION LOSS 2.5-5.0 GHz 4.2 dB MAXIMUM
1.9-5.6 GHz 5.2 dB MAXIMUM
- ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

FREQUENCY RANGE	10 dB	20 dB	40 dB	60 dB	80 dB	120 dB
2.5-5.0 GHz	0.5	0.9	1.5	1.6	2.5	3.2
1.9-5.6 GHz	0.7	1.5	3.0	3.5	5.0	7.0
- ATTENUATION ACCURACY 0-30 dB $\pm$ 0.5 dB MAXIMUM
(MONOTICITY IS GUARANTEED) 30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
60-80 dB $\pm$ 2.0 dB MAXIMUM
80-120 dB $\pm$ 2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME 3 μ S MAXIMUM
- VSWR @ 0 dB ATTENUATION 2.5-5.0 GHz 2.0:1 MAXIMUM
1.9-5.6 GHz 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING POWER +20 dBm CW MAXIMUM
SURVIVAL POWER +30 dBm CW MAXIMUM
- CONTROL 20 dB/VOLT
(OTHER CONTROL VOLTAGES AVAILABLE)
- POWER SUPPLY +12VDC @ 250 mA MAXIMUM
-12VDC @ 100 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS SOLDER PIN
- SIZE 4.30" x 1.85" x 0.60"
4.68" x 3.80" x 0.80" (OPTION A04)

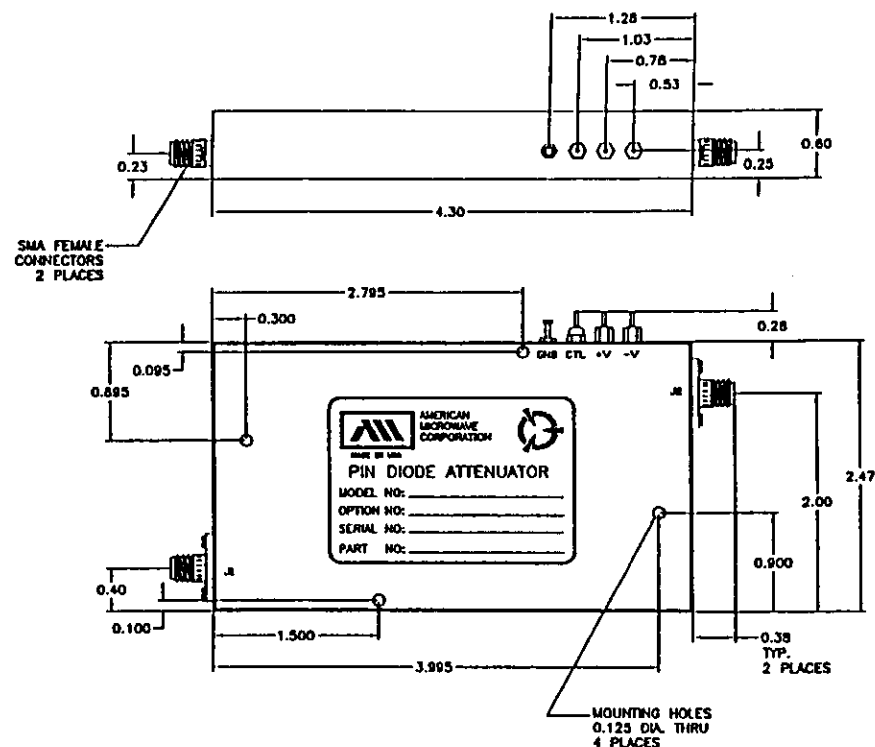
AVAILABLE OPTIONS

- A01 TWO SMA MALE RF CONNECTORS
- A02 J1 SMA MALE, J2 SMA FEMALE
- A03 MOUNTING SURFACE UNPAINTED
- A04 MULTIPIN ANALOG CONTROLLED UNIT (SEE SHEET 2 OF 2)
FOR DIGITALLY CONTROLLED UNITS REFER TO DATA SHEET AGH-2550-60DD-120.
- A05 $\pm$ 15VDC POWER SUPPLY
- A06 0-90 dB DYNAMIC RANGE
- A07 EXTENDED BANDWIDTH (1.9-5.6 GHz)
- A08 LATCHING STROBE
- A09 HIGH SPEED 500 ns MAXIMUM
- SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS			
ZONE	REV.	DESCRIPTION	DATE
	A	ORIGINAL RELEASE	12/18/97

MECHANICAL OUTLINE



- NOTES:
- 1) DIMENSIONS ARE IN INCHES
 - 2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
 - 3) WEIGHT: APPROX. 7.0 OZ

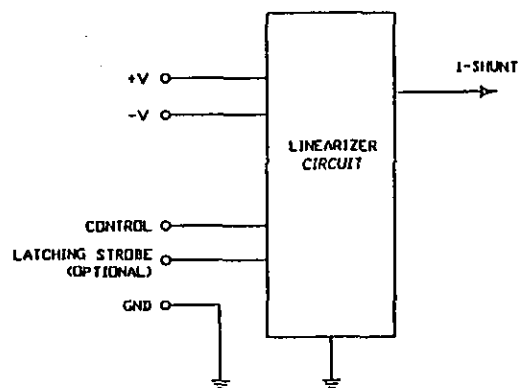
ENVIRONMENTAL RATINGS

- TEMPERATURE -55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A

		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRELIMINARY PRODUCT FEATURE AGH-2550-60D-120 2.5-5.0 GHz, VOLTAGE VARIABLE ATTENUATOR	
APPROVALS DRAWN <i>B2g</i> CHECKED <i>WUP</i>	DATE 12/18/97 12/19/97	SIZE A	SHEET 1 OF 2

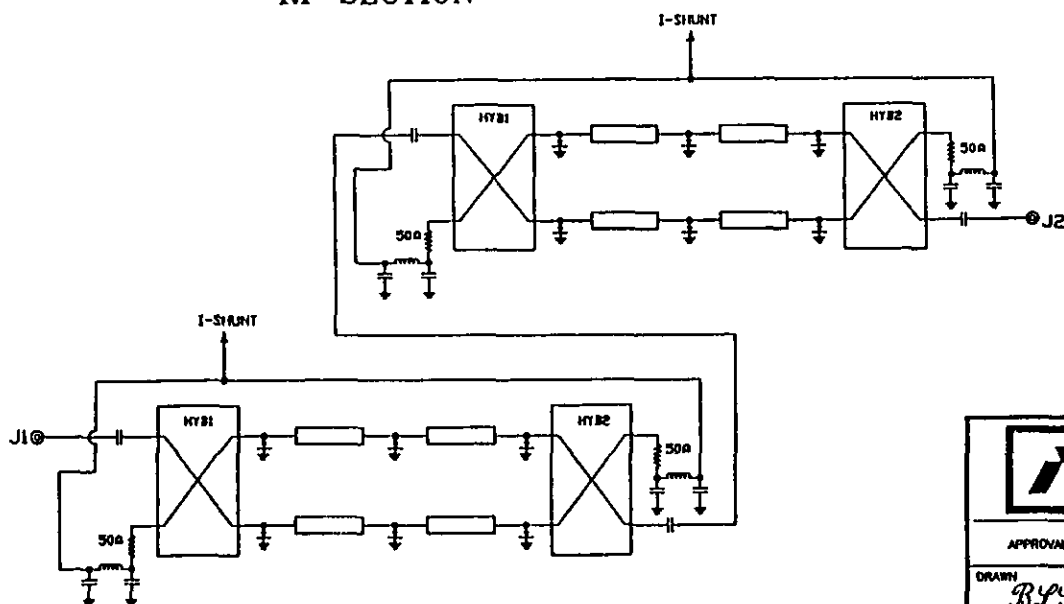
FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

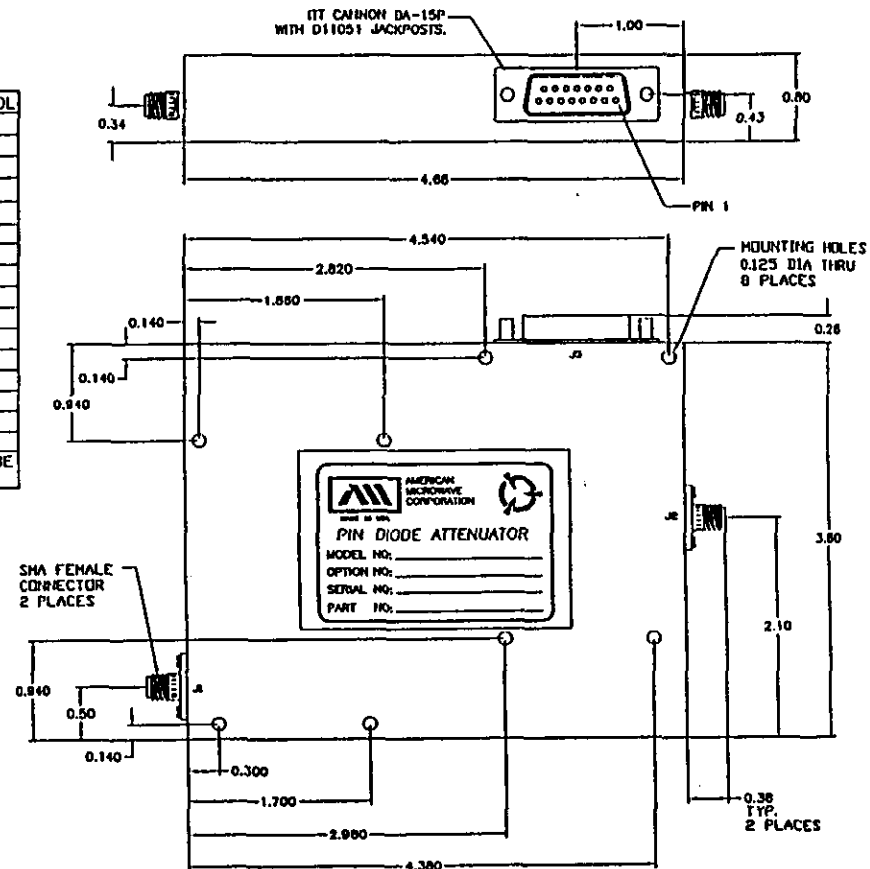


MULTIPIN ANALOG CONTROL	
J3	PIN FUNCTION
PIN#	FUNCTION
1	N/C
2	CONTROL
3	N/C
4	GRD
5	N/C
6	N/C
7	N/C
8	N/C
9	N/C
10	N/C
11	N/C
12	N/C
13	+V
14	-V
15	LATCHING STROBE (OPTIONAL)

RF SECTION



MECHANICAL OUTLINE (OPTION A04)



		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRELIMINARY PRODUCT FEATURE AGH-2550-60D-120 2.5-5.0 GHz, VOLTAGE VARIABLE ATTENUATOR	
APPROVALS DRAWN RLG CHECKED	DATE 12/18/97	SIZE A	SHEET 2 OF 2
		DWG. # 100-4289	

DESCRIPTION

AMC MODEL AGH-4080-60D-120 IS A OVER-OCTAVE BAND VOLTAGE CONTROLLED ATTENUATOR/MODULATOR, WITH 120 dB DYNAMIC RANGE.

SPECIFICATIONS

- FREQUENCY RANGE 4.0-8.0 GHz
- INSERTION LOSS 4.0-8.0 GHz 5.0 dB MAXIMUM
3.0-9.0 GHz 5.5 dB MAXIMUM
- ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

FREQUENCY RANGE	10 dB	20 dB	40 dB	60 dB	80 dB	120 dB
4.0-8.0 GHz	0.5	0.8	1.5	1.6	2.5	3.2
3.0-9.0 GHz	0.7	1.5	3.0	3.5	5.0	7.0
- ATTENUATION ACCURACY 0-30 dB $\pm$ 0.5 dB MAXIMUM
(MONOTICITY IS GUARANTEED) 30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
60-80 dB $\pm$ 2.0 dB MAXIMUM
80-120 dB $\pm$ 2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME 3 μ S MAXIMUM
- VSWR @ 0 dB ATTENUATION 4.0-8.0 GHz 2.0:1 MAXIMUM
3.0-9.0 GHz 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING POWER +20 dBm CW MAXIMUM
SURVIVAL POWER +30 dBm CW MAXIMUM
- CONTROL 20 dB/VOLT
(OTHER CONTROL VOLTAGES AVAILABLE)
- POWER SUPPLY +12VDC @ 250 mA MAXIMUM
-12VDC @ 100 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS SOLDER PIN
- SIZE 3.29" x 1.85" x 0.60"
4.68" x 3.45" x 0.80" (OPTION A04)

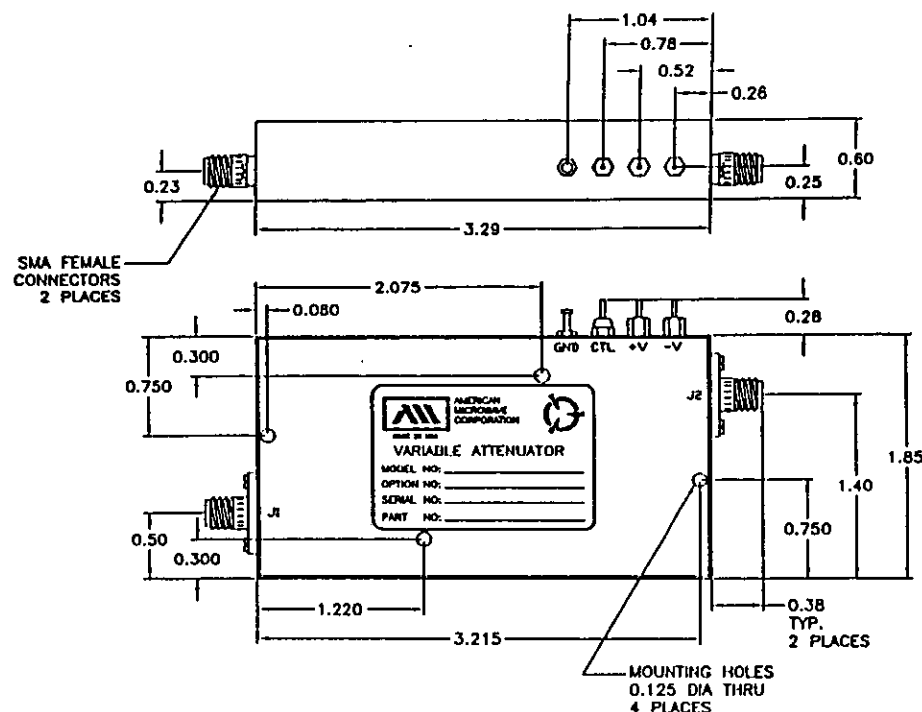
AVAILABLE OPTIONS

- A01 TWO SMA MALE RF CONNECTORS
- A02 J1 SMA MALE, J2 SMA FEMALE
- A03 MOUNTING SURFACE UNPAINTED
- A04 MULTIPIN ANALOG CONTROLLED UNIT (SEE SHEET 2 OF 2)
FOR DIGITALLY CONTROLLED UNITS REFER TO DATA SHEET AGH-4080-60DD-120.
- A05 $\pm$ 15VDC POWER SUPPLY
- A06 0-90 dB DYNAMIC RANGE
- A07 EXTENDED BANDWIDTH (3.0-9.0 GHz)
- A08 LATCHING STROBE
- A09 HIGH SPEED 500 nS MAXIMUM
- SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	ORIGINAL RELEASE	12/18/97	

MECHANICAL OUTLINE



- NOTES:
- 1) DIMENSIONS ARE IN INCHES
 - 2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
 - 3) WEIGHT: APPROX. 7.0 OZ

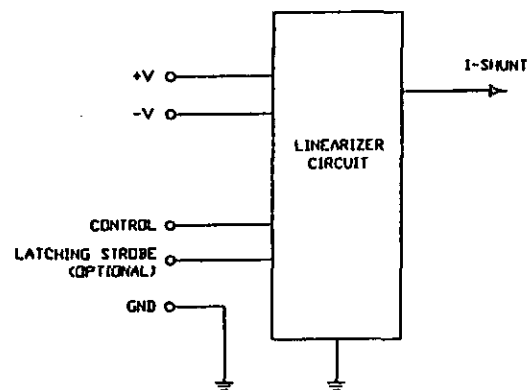
ENVIRONMENTAL RATINGS

- TEMPERATURE -55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A

		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRELIMINARY PRODUCT FEATURE AGH-4080-60D-120 4.0-8.0 GHz, VOLTAGE VARIABLE ATTENUATOR	
APPROVALS DRAWN <i>BLG</i> CHECKED <i>WJ</i>	DATE 12/18/97	SIZE A	SHEET 1 OF 2

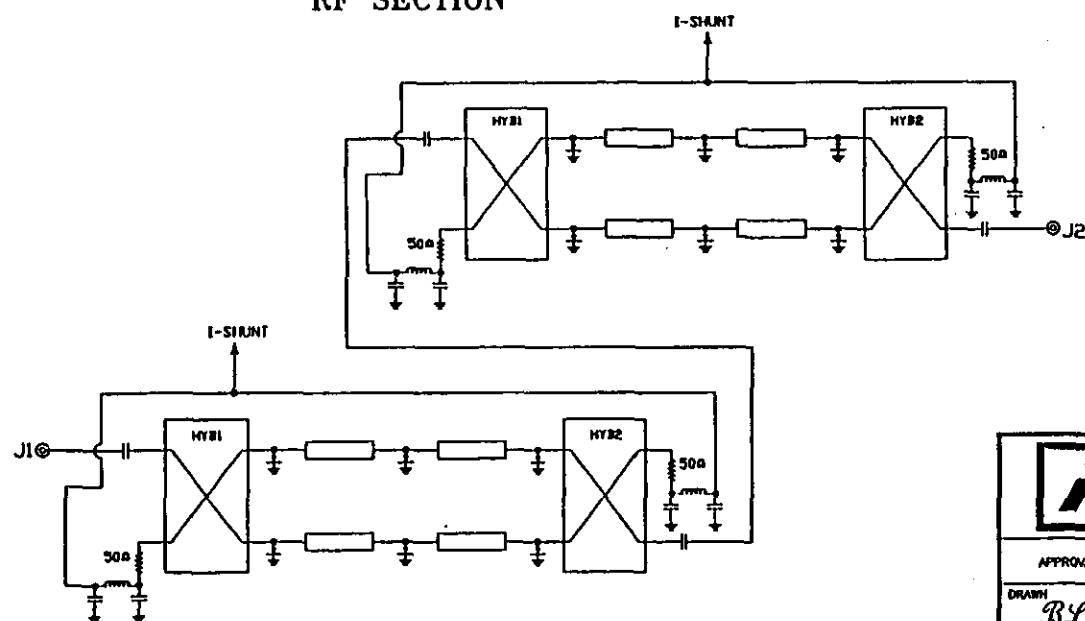
FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

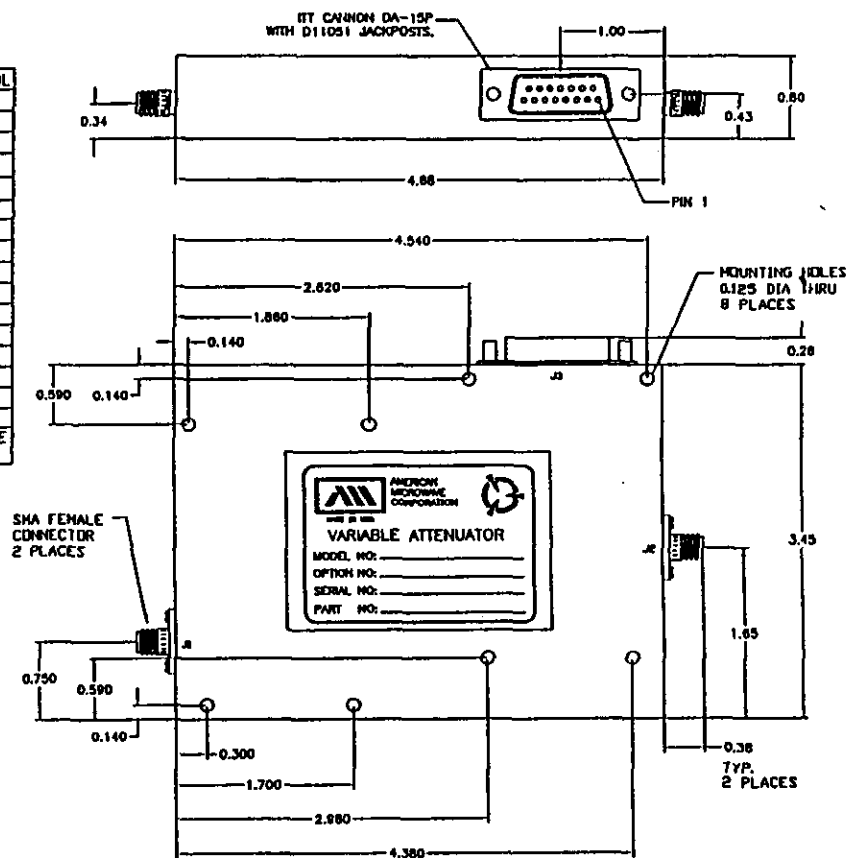


MULTIPIN ANALOG CONTROL	
J3	PIN FUNCTION
1	N/C
2	CONTROL
3	N/C
4	GND
5	N/C
6	N/C
7	N/C
8	N/C
9	N/C
10	N/C
11	N/C
12	N/C
13	+V
14	-V
15	LATCHING STROBE (OPTIONAL)

RF SECTION



MECHANICAL OUTLINE (OPTION A04)



AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS
DATE
DRAWN
CHECKED

PRELIMINARY PRODUCT FEATURE

AGH-4080-60D-120

4.0-8.0 GHz, VOLTAGE VARIABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

DWG. # 100-4288

DESCRIPTION

AMC MODEL AGH-5010-60D-120 IS A OVER-OCTAVE BAND VOLTAGE CONTROLLED ATTENUATOR/MODULATOR, WITH 120 dB DYNAMIC RANGE.

SPECIFICATIONS

- FREQUENCY RANGE 5.0-10.0 GHz
- INSERTION LOSS 5.0-10.0 GHz 5.4 dB MAXIMUM
3.75-11.25 GHz 5.8 dB MAXIMUM
- ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

FREQUENCY RANGE	10 dB	20 dB	40 dB	60 dB	80 dB	120 dB
5.0-10.0 GHz	0.6	0.9	1.5	1.6	2.5	3.2
3.75-11.25 GHz	0.8	1.5	3.0	3.5	5.0	7.0
- ATTENUATION ACCURACY 0-30 dB $\pm$ 0.5 dB MAXIMUM
(MONOTICITY IS GUARANTEED) 30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
60-80 dB $\pm$ 2.0 dB MAXIMUM
80-120 dB $\pm$ 2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME 3 μ S MAXIMUM
- VSWR @ 0 dB ATTENUATION 5.0-10.0 GHz 2.0:1 MAXIMUM
3.75-11.25 GHz 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING POWER +20 dBm CW MAXIMUM
SURVIVAL POWER +30 dBm CW MAXIMUM
- CONTROL 20 dB/VOLT
(OTHER CONTROL VOLTAGES AVAILABLE)
- POWER SUPPLY +12VDC @ 250 mA MAXIMUM
-12VDC @ 100 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS SOLDER PIN
- SIZE 3.29" x 1.85" x 0.60"
4.68" x 3.45" x 0.80" (OPTION A04)

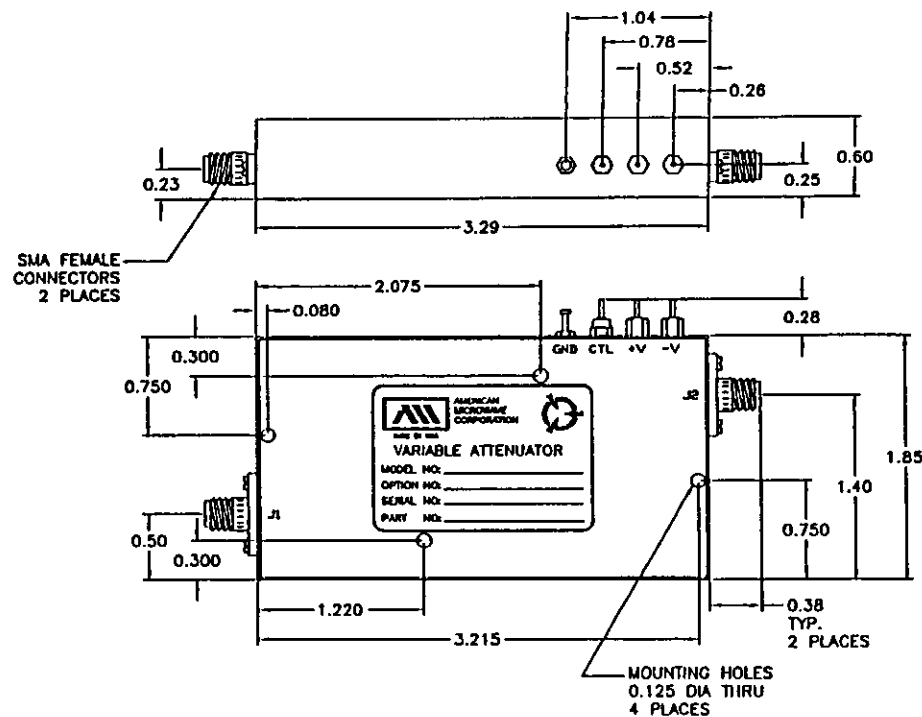
AVAILABLE OPTIONS

- A01 TWO SMA MALE RF CONNECTORS
A02 J1 SMA MALE, J2 SMA FEMALE
A03 MOUNTING SURFACE UNPAINTED
A04 MULTIPIN ANALOG CONTROLLED UNIT (SEE SHEET 2 OF 2)
FOR DIGITALLY CONTROLLED UNITS REFER TO DATA SHEET AGH-5010-60DD-120.
- A05 $\pm$ 15VDC POWER SUPPLY
A06 0-90 dB DYNAMIC RANGE
A07 EXTENDED BANDWIDTH (3.75-11.25 GHz)
A08 LATCHING STROBE
A09 HIGH SPEED 500 nS MAXIMUM
SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS				DATE	APPROVED
ZONE	REV.	DESCRIPTION			
	A	ORIGINAL RELEASE		12/18/97	

MECHANICAL OUTLINE



NOTES:

- 1) DIMENSIONS ARE IN INCHES
- 2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
APPROX. 7.0 ϕ
- 3) WEIGHT:

ENVIRONMENTAL RATINGS

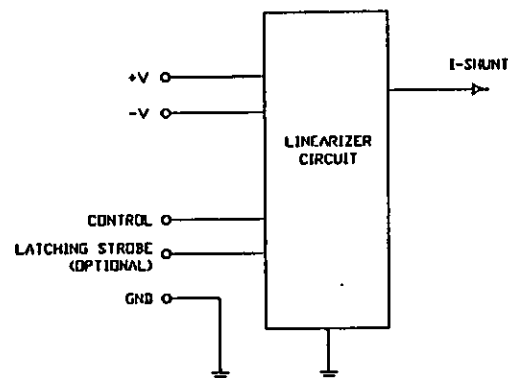
- TEMPERATURE -55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. E
- SHOCK MIL-STD-202F, METHOD 213B COND. E
- VIBRATION MIL-STD-202F, METHOD 2040 COND. E
- ALTITUDE MIL-STD-202F, METHOD 105C COND. E
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. E

		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRELIMINARY PRODUCT FEATURE AGH-5010-60D-120 5.0-10.0 GHz, VOLTAGE VARIABLE ATTENUATOR	
APPROVALS DRAWN <i>R.L.G.</i> CHECKED <i>W.P.</i>	DATE 12/18/97 12/19/97	SIZE A	SHEET 1 OF 2

OWG. # 100-4287

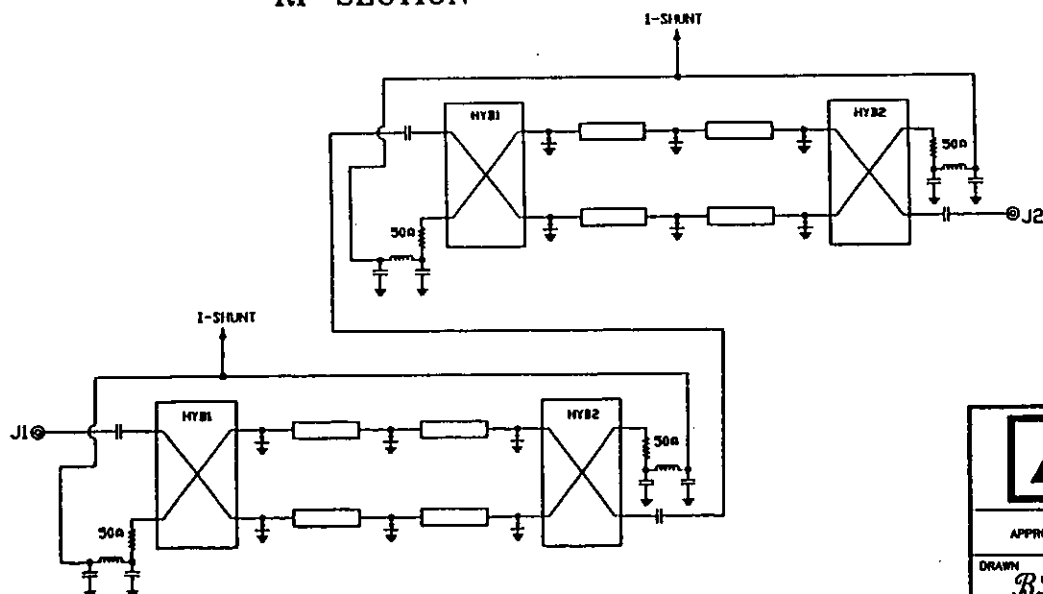
FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

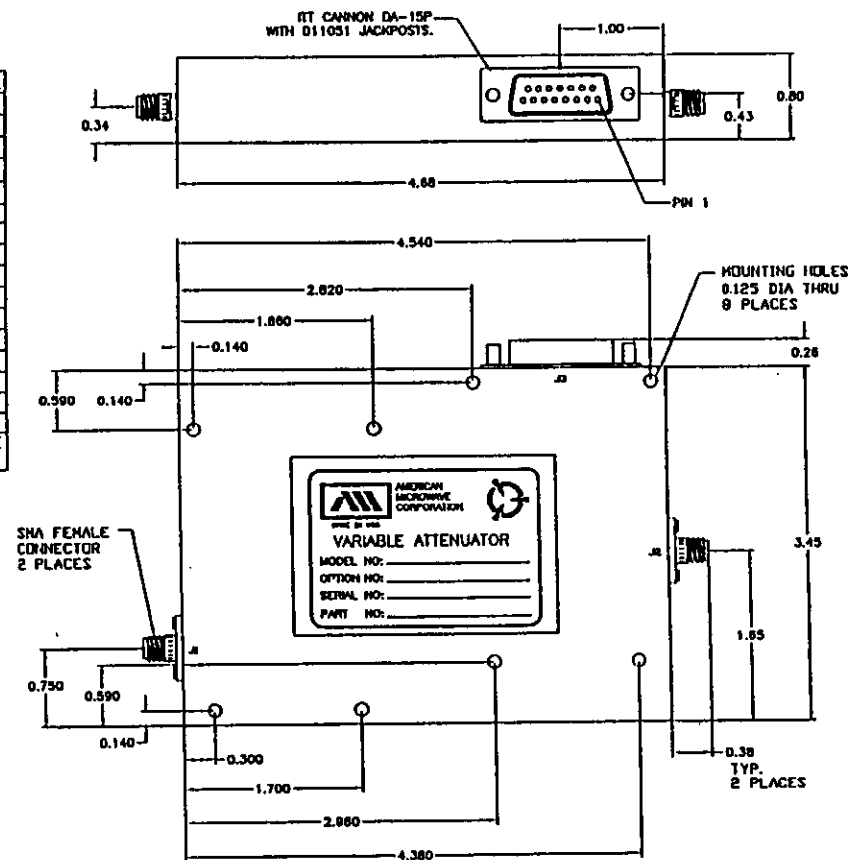


MULTIPIN ANALOG CONTROL	
J3	PIN FUNCTION
1	N/C
2	CONTROL
3	N/C
4	GND
5	N/C
6	N/C
7	N/C
8	N/C
9	N/C
10	N/C
11	N/C
12	N/C
13	+V
14	-V
15	LATCHING STROBE (OPTIONAL)

RF SECTION



MECHANICAL OUTLINE (OPTION A04)



		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRELIMINARY PRODUCT FEATURE AGH-5010-60D-120 5.0-10.0 GHz, VOLTAGE VARIABLE ATTENUATOR	
APPROVALS DRAWN <i>BLG</i> CHECKED	DATE 12/18/91	SIZE A	SHEET 2 OF 2

DWG. # 100-4287

DESCRIPTION

AMC MODEL AGH-6012-60D-120 IS A OVER-OCTAVE BAND VOLTAGE CONTROLLED ATTENUATOR/MODULATOR, WITH 120 dB DYNAMIC RANGE.

SPECIFICATIONS

- FREQUENCY RANGE.....6.0-12.0 GHz
- INSERTION LOSS.....6.0-12.0 GHz 5.5 dB MAXIMUM
4.5-13.5 GHz 6.0 dB MAXIMUM
- ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

FREQUENCY RANGE	10 dB	20 dB	40 dB	60 dB	80 dB	120 dB
6.0-12.0 GHz	0.7	1.0	1.5	1.6	2.5	3.2
4.5-13.5 GHz	0.9	1.6	3.0	3.5	5.0	7.0

- ATTENUATION ACCURACY.....0-30 dB $\pm$ 0.5 dB MAXIMUM
(MONOTICITY IS GUARANTEED) 30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
60-80 dB $\pm$ 2.0 dB MAXIMUM
80-120 dB $\pm$ 2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT..... $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME.....3 μ S MAXIMUM
- VSWR @ 0 dB ATTENUATION.....6.0-12.0 GHz 2.0:1 MAXIMUM
4.5-13.5 GHz 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING POWER.....+20 dBm CW MAXIMUM
SURVIVAL POWER.....+30 dBm CW MAXIMUM
- CONTROL.....20 dB/VOLT
(OTHER CONTROL VOLTAGES AVAILABLE)
- POWER SUPPLY.....+12VDC @ 250 mA MAXIMUM
-12VDC @ 100 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT.....SMA FEMALE
POWER AND CONTROLS.....SOLDER PIN
- SIZE.....3.29" x 1.85" x 0.60"
4.68" x 3.45" x 0.80" (OPTION A04)

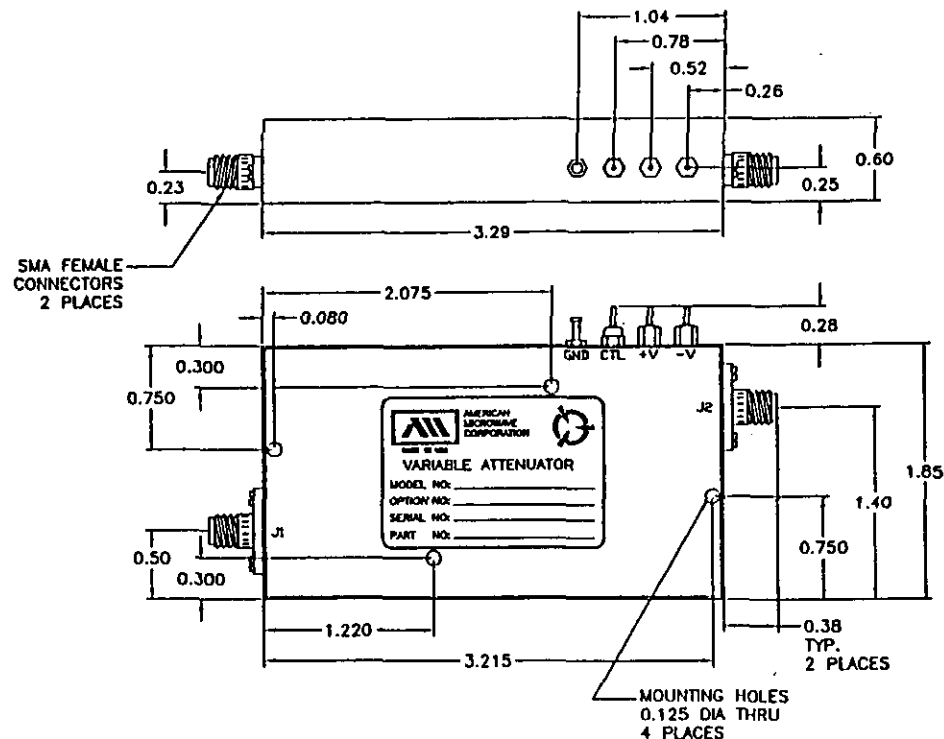
AVAILABLE OPTIONS

- A01.....TWO SMA MALE RF CONNECTORS
- A02.....J1 SMA MALE, J2 SMA FEMALE
- A03.....MOUNTING SURFACE UNPAINTED
- A04.....MULTIPIN ANALOG CONTROLLED UNIT (SEE SHEET 2 OF 2)
FOR DIGITALLY CONTROLLED UNITS REFER TO DATA SHEET AGH-6012-60DD-120.
- A05..... $\pm$ 15VDC POWER SUPPLY
- A06.....0-90 dB DYNAMIC RANGE
- A07.....EXTENDED BANDWIDTH (4.5-13.5 GHz)
- A08.....LATCHING STROBE
- A09.....HIGH SPEED 500 nS MAXIMUM
- SCS.....SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS				DATE	APPROVED
ZONE	REV.	DESCRIPTION			
	A	ORIGINAL RELEASE		12/18/97	

MECHANICAL OUTLINE



- NOTES:
- DIMENSIONS ARE IN INCHES
 - TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
APPROX. 7.0 OZ
 - WEIGHT:

ENVIRONMENTAL RATINGS

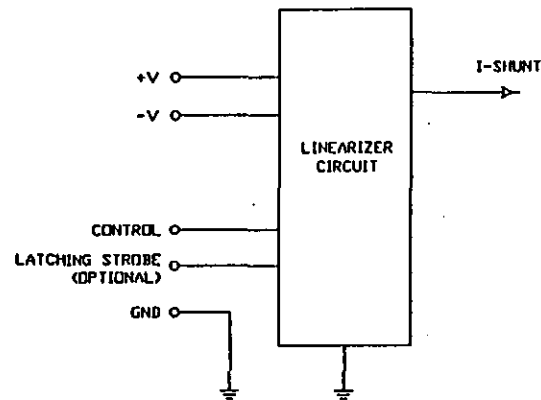
- TEMPERATURE.....-55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY.....MIL-STD-202F, METHOD 103B COND. B
- SHOCK.....MIL-STD-202F, METHOD 213B COND. B
- VIBRATION.....MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE.....MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE.....MIL-STD-202F, METHOD 107D COND. A

		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRELIMINARY PRODUCT FEATURE AGH-6012-60D-120 6.0-12.0 GHz, VOLTAGE VARIABLE ATTENUATOR	
APPROVALS DRAWN <i>RLB</i> CHECKED <i>WP</i>	DATE 12/18/97 12/19/97	SIZE A	SHEET 1 OF 2

fw
RA

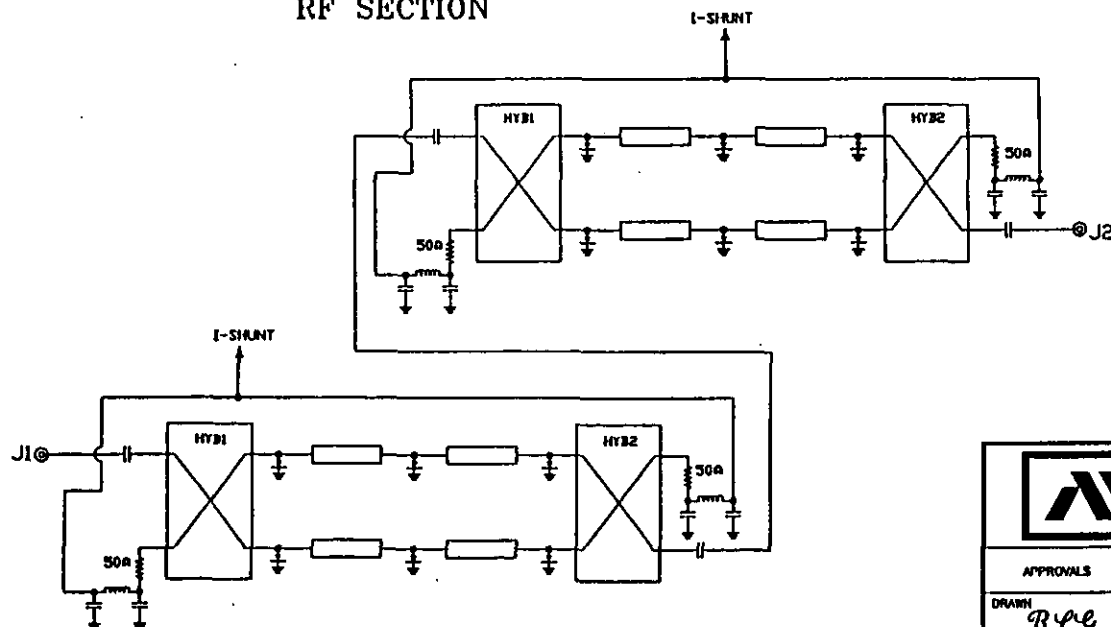
FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

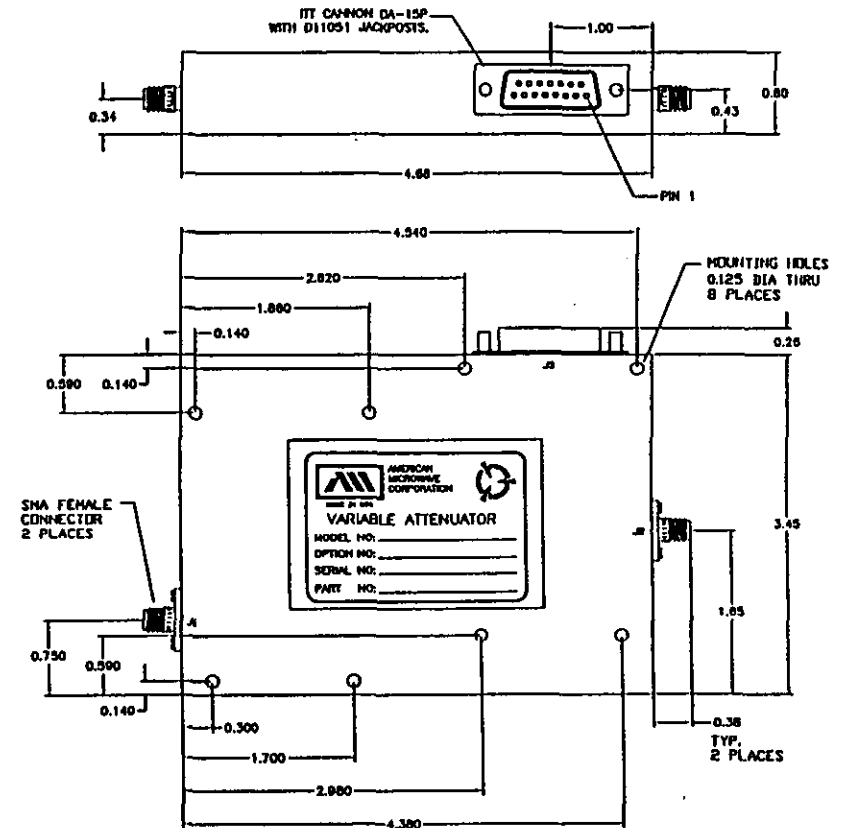


MULTIPIN ANALOG CONTROL		
J3	PIN	FUNCTION
1	N/C	
2	CONTROL	
3	N/C	
4	GND	
5	N/C	
6	N/C	
7	N/C	
8	N/C	
9	N/C	
10	N/C	
11	N/C	
12	N/C	
13	+V	
14	-V	
15	LATCHING STROBE (OPTIONAL)	

RF SECTION



MECHANICAL OUTLINE (OPTION A04)



AMERICAN MICROWAVE CORPORATION

7311G GROVE RD., FREDERICK, MD. 21701

TEL: (301) 662-4700 FAX: (301) 662-4938

PRELIMINARY PRODUCT FEATURE

AGH-6012-60D-120

6.0-12.0 GHz, VOLTAGE VARIABLE ATTENUATOR

SIZE A

SHEET 2 OF 2

DWG. # 100-4286

APPROVALS

DATE

DRAWN

12/18/97

CHECKED

DESCRIPTION

AMC MODEL AGH-8018-60D-120 IS A OVER-OCTAVE BAND VOLTAGE CONTROLLED ATTENUATOR/MODULATOR, WITH 120 dB DYNAMIC RANGE.

SPECIFICATIONS

- FREQUENCY RANGE 8.0-18.0 GHz
- INSERTION LOSS 7.5 dB MAXIMUM
- ATTENUATION FLATNESS ($\pm$ dB MAXIMUM)

FREQUENCY RANGE	10 dB	20 dB	40 dB	60 dB	80 dB	120 dB
8.0-18.0 GHz	0.8	1.1	1.5	1.6	2.5	3.2
6.0-18.0 GHz	0.9	1.6	3.0	3.5	5.0	7.0

- ATTENUATION ACCURACY 0-30 dB $\pm$ 0.5 dB MAXIMUM
(MONOTICITY IS GUARANTEED) 30-50 dB $\pm$ 1.0 dB MAXIMUM
50-60 dB $\pm$ 1.5 dB MAXIMUM
60-80 dB $\pm$ 2.0 dB MAXIMUM
80-120 dB $\pm$ 2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT $\pm$ 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME 3 μ S MAXIMUM
- VSWR @ 0 dB ATTENUATION 8.0-18.0 GHz 2.0:1 MAXIMUM
6.0-18.0 GHz 2.2:1 MAXIMUM
- RF POWER RATINGS
OPERATING POWER +20 dBm CW MAXIMUM
SURVIVAL POWER +30 dBm CW MAXIMUM
- CONTROL 20 dB/VOLT
(OTHER CONTROL VOLTAGES AVAILABLE)
- POWER SUPPLY +12 VDC @ 250 mA MAXIMUM
-12 VDC @ 100 mA MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
POWER AND CONTROLS SOLDER PIN
- SIZE 3.20" x 1.50" x 0.60"
4.43" x 3.25" x 0.80" (OPTION A04)

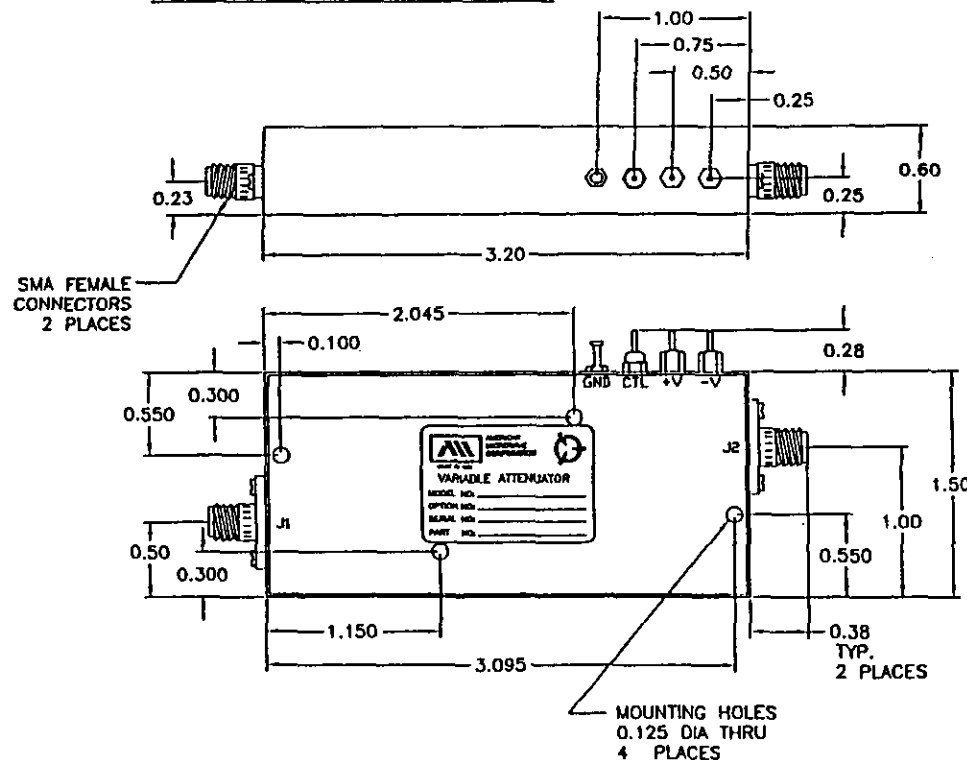
AVAILABLE OPTIONS

- A01 TWO SMA MALE RF CONNECTORS
- A02 J1 SMA MALE, J2 SMA FEMALE
- A03 MOUNTING SURFACE UNPAINTED
- A04 MULTIPIN ANALOG CONTROLLED UNIT (SEE SHEET 2 OF 2)
FOR DIGITALLY CONTROLLED UNITS REFER TO DATA SHEET AGH-8018-60DD-120.
- A05 $\pm$ 15 VDC POWER SUPPLY
- A06 0-90 dB DYNAMIC RANGE
- A07 EXTENDED BANDWIDTH (6.0-18.0 GHz)
- A08 LATCHING STROBE
- A09 HIGH SPEED 500 nS MAXIMUM
- SCS SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
A		ORIGINAL RELEASE	12/18/97	

MECHANICAL OUTLINE



- NOTES:
- 1) DIMENSIONS ARE IN INCHES
 - 2) TOLERANCES: X.XX $\pm$ 0.020
X.XXX $\pm$ 0.010
APPROX. 7.0 0Z
 - 3) WEIGHT:

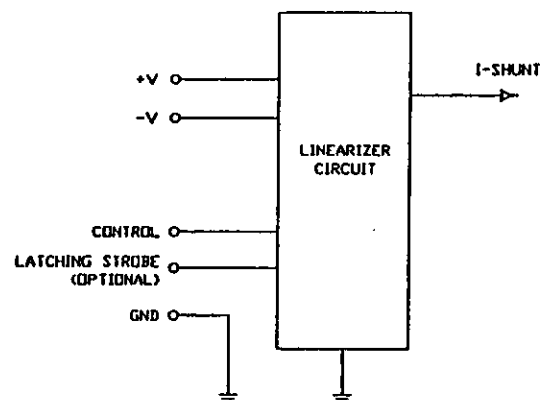
ENVIRONMENTAL RATINGS

- TEMPERATURE -55 $^{\circ}$ C TO +85 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A

		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRELIMINARY PRODUCT FEATURE AGH-8018-60D-120 8.0-18.0 GHz, VOLTAGE VARIABLE ATTENUATOR	
APPROVALS DRAWN <i>RLE</i> CHECKED <i>WJP</i>	DATE 12/18/97 12/19/97	SIZE A SHEET 1 OF 2 DWG. # 100-4285	

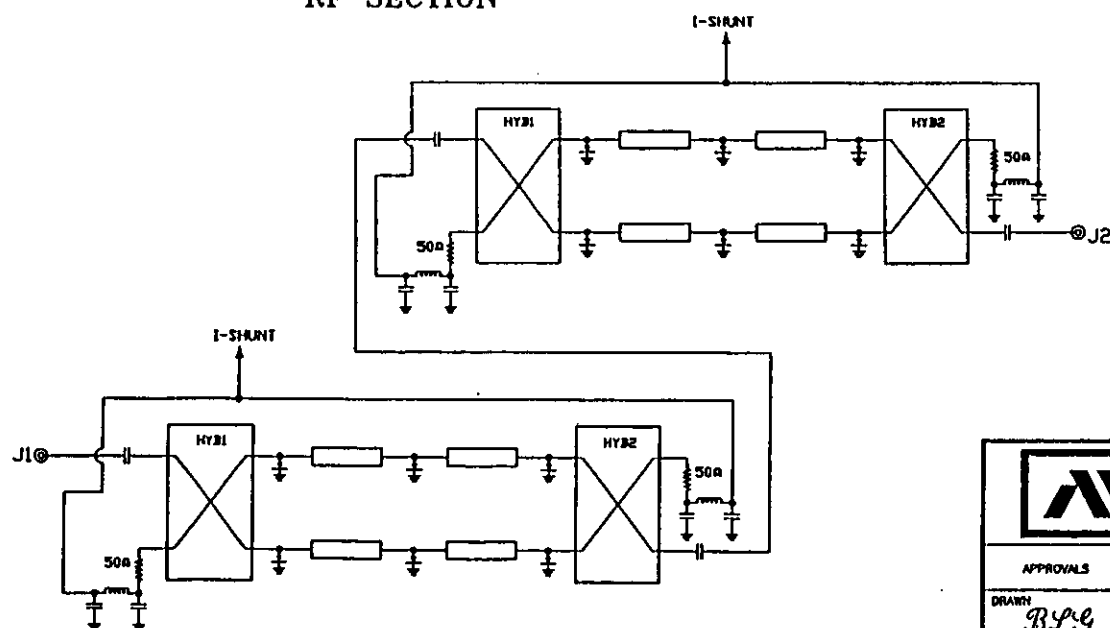
FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

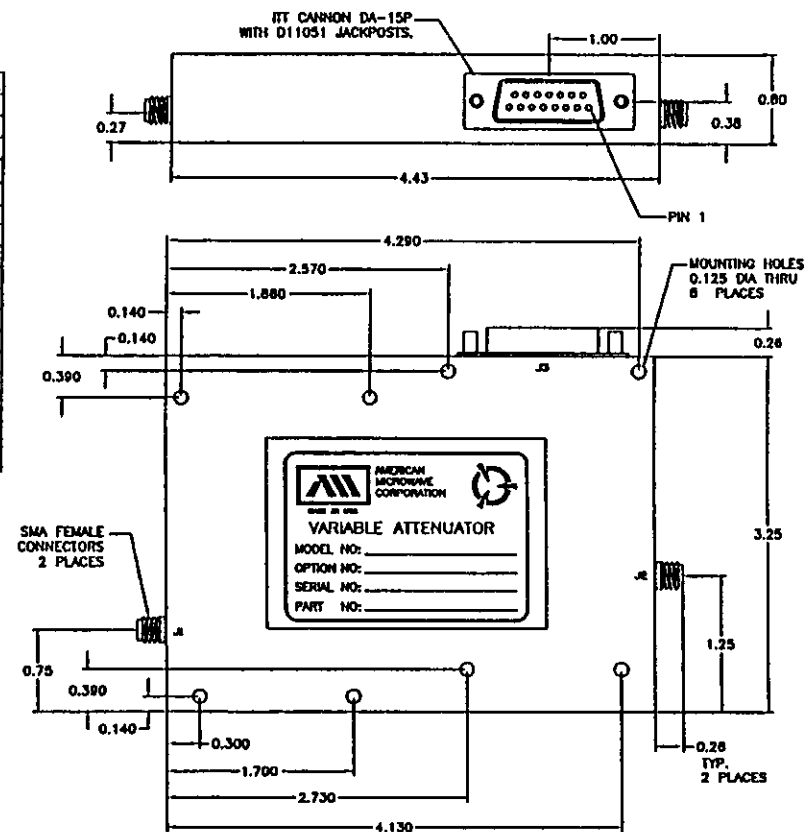


MULTIPIN ANALOG CONTROL	
J3	PIN FUNCTION
PIN#	FUNCTION
1	N/C
2	CONTROL
3	N/C
4	GND
5	N/C
6	N/C
7	N/C
8	N/C
9	N/C
10	N/C
11	N/C
12	N/C
13	+V
14	-V
15	LATCHING STROBE (OPTIONAL)

RF SECTION



MECHANICAL OUTLINE (OPTION A04)



AMERICAN MICROWAVE CORPORATION
7311G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

APPROVALS	DATE
DRAWN BLS	12/18/91
CHECKED	

PRELIMINARY PRODUCT FEATURE

AGH-8018-60D-120
8.0-18.0 GHz, VOLTAGE VARIABLE ATTENUATOR

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
		A ORIGINAL RELEASE, JOB # 210262E	6/10/93	

DESCRIPTION

AMC MODEL AGH-4080-N IS A CURRENT CONTROLLED, ABSORPTIVE/
NON-REFLECTIVE VARIABLE ATTENUATOR MODULATOR.

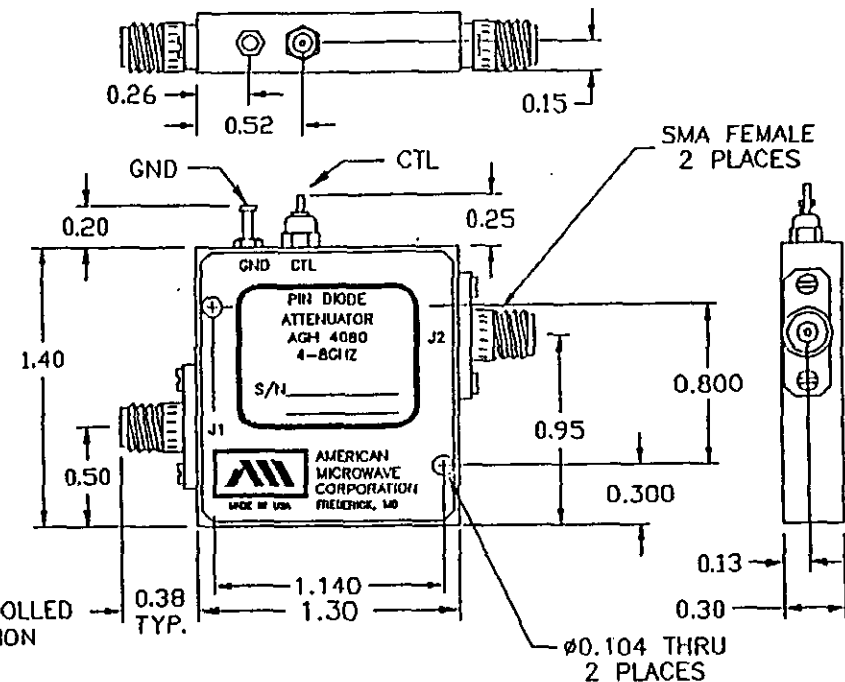
SPECIFICATIONS

- FREQUENCY RANGE 4-8 GHz MINIMUM
- INSERTION LOSS 2.4 dB MAXIMUM
- ATTENUATION FLATNESS 0-10 dB ± 0.5 dB MAXIMUM
10-20 dB ± 1.0 dB MAXIMUM
20-40 dB ± 1.5 dB MAXIMUM
40-60 dB ± 1.6 dB MAXIMUM
- MONOTONICITY GUARANTEED
- TEMPERATURE COEFFICIENT ± 0.025 dB/ $^{\circ}$ C MAXIMUM
- SWITCHING TIME
RISE TIME (90% TO 10% RF) 1.5 μ s MAXIMUM
FALL TIME (10% TO 90% RF) 50 ns MAXIMUM
- VSWR (ALL ATTENUATION LEVELS) 2.0:1 MAXIMUM
- POWER HANDLING +20 dBm MAXIMUM CW OR PEAK
- CONTROL NEGATIVE BIAS VOLTAGE, CURRENT CONTROLLED
50 mA MAXIMUM FOR MINIMUM ATTENUATION
- CONNECTORS
RF INPUT/OUTPUT SMA FEMALE
CONTROL SOLDER PIN
- SIZE 1.3" x 1.4" x 0.50"

AVAILABLE OPTIONS

- A01 ONE SMA MALE, ONE SMA FEMALE RF CONNECTOR
A02 TWO SMA MALE CONNECTORS RF CONNECTORS
A03 SMA FEMALE CONTROL CONNECTOR
A04 REMOVABLE SMA FEMALE RF CONNECTOR
A05 3.0-9.0 GHz WITH INSERTION LOSS OF 2.5 dB,
VSWR OF 2.2:1 AND FREQUENCY FLATNESS OF
 ± 0.5 dB @ 10 dB, ± 1.4 dB @ 20 dB, ± 3.0 dB
@ 40 dB, AND ± 3.5 dB @ 60 dB.

MECHANICAL OUTLINE



NOTES:

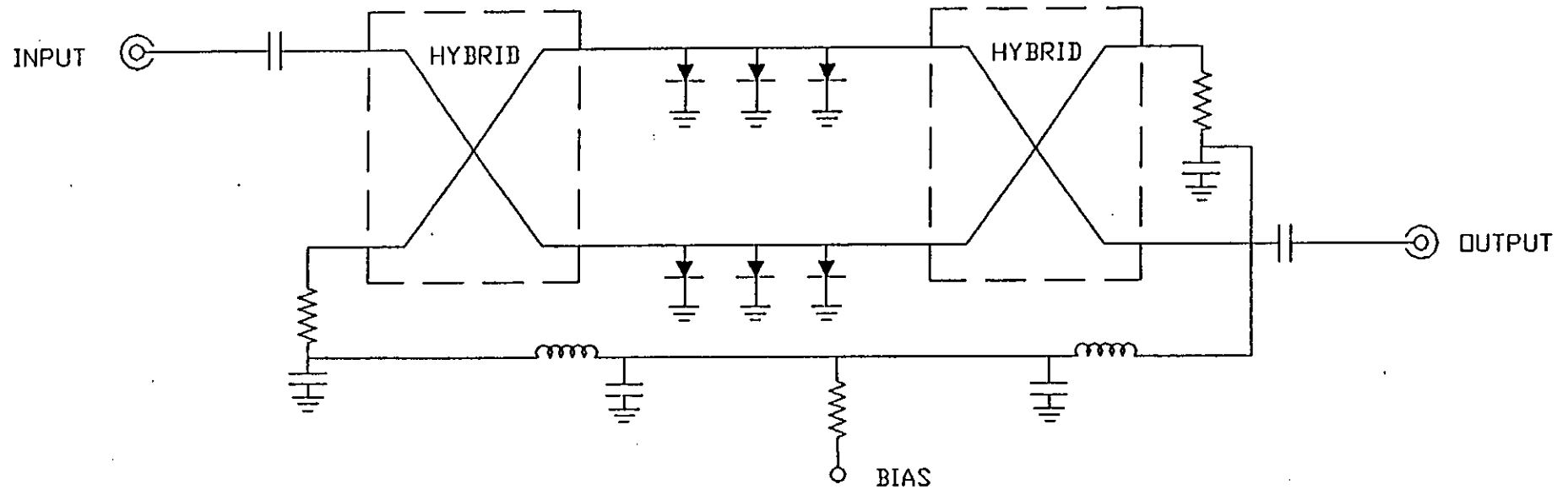
1. DIMENSIONS ARE IN INCHES
2. TOLERANCES: X.XX ± 0.020
X.XXX ± 0.010
3. WEIGHT: APPROX. 1.0 OZ

ENVIRONMENTAL RATINGS

- TEMPERATURE -55 $^{\circ}$ C TO +125 $^{\circ}$ C (OPERATING)
-65 $^{\circ}$ C TO +125 $^{\circ}$ C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. A

		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRODUCT FEATURE AGH-4080-N 4-8 GHz, CURRENT CONTROLLED NON-REFLECTIVE VARIABLE ATTENUATOR MODULATOR	
APPROVALS DRAWN: <i>WJP</i> CHECKED: <i>L. A. [signature]</i>	DATE 6/10/93 10/14/93	SIZE A	SHEET 1 OF 2 DWG. # 100-3171

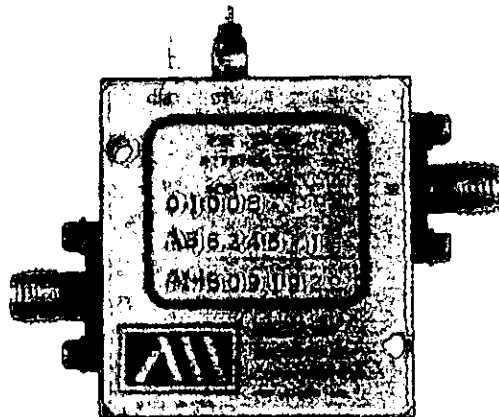
FUNCTIONAL SCHEMATIC



		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRODUCT FEATURE AGH-4080-N 4-B GHz, CURRENT CONTROLLED NON-REFLECTIVE VARIABLE ATTENUATOR MODULATOR	
APPROVALS DRAWN <i>WSP</i> CHECKED	DATE 6/16/93	SIZE A	SHEET 2 OF 2

**AMERICAN Microwave
Corporation**

AGH SERIES NON-REFLECTIVE ATTENUATOR / MODULATOR 1-18 GHz, 60 dB



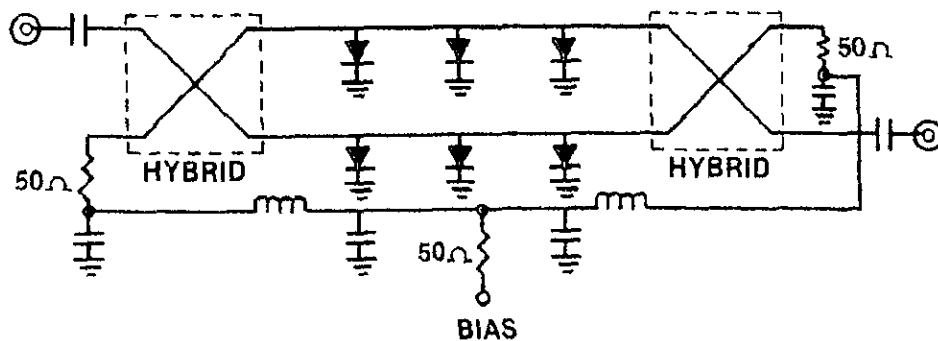
FEATURES

- Solid State Reliability
- Absorptive Type
- 3:1 Bandwidth
- Small Size

DESCRIPTION

The AGH Series are current controlled attenuator/modulators that operate over greater than octave bandwidth and are non-reflective at all attenuation levels. Seven models in the series cover the frequency band from 1 to 18 GHz. The RF circuit employs two microstrip arrays of pin diodes that are hybrid coupled at the input and output with large couplers for repeatable low loss performance.

FUNCTIONAL SCHEMATIC



6/90

REVISED
OCTOBER 9, 1997

7311G GROVE ROAD, FREDERICK, MARYLAND 21701

Tel.: (301) 662-4700
Fax: (301) 662-4938

SPECIFICATIONS

MODEL	FREQUENCY RANGE (GHz)	INSERTION LOSS, MAX (dB)	VSWR MAX.	FLATNESS ($\pm$ dB) AT MID-BAND ATTENUATION TO LEVELS OF			
				10 dB	20 dB	40 dB	60 dB
AGH-1020	1.0-2.0	1.8	1.5	0.45	0.8	1.5	1.6
	0.75-2.25	1.9	2.0	0.6	1.4	3.0	3.5
AGH-2040	2.0-4.0	1.8	1.5	0.3	0.8	1.5	1.6
	1.5-4.5	1.9	2.0	0.5	1.4	3.0	3.5
AGH-2550	2.5-5.0	2.0	1.6	0.3	0.8	1.5	1.6
	1.9-5.6	2.1	2.1	0.5	1.4	3.0	3.5
AGH-4080	4.0-8.0	2.4	1.7	0.3	0.8	1.5	1.6
	3.0-9.0	2.5	2.2	0.5	1.4	3.0	3.5
AGH-5010	5.0-10.0	2.6	1.7	0.5	0.9	1.5	1.6
	3.75-11.25	2.7	2.2	0.7	1.4	3.0	3.5
AGH-6012	6.0-12.0	2.7	1.8	0.7	1.0	1.5	1.6
	4.5-13.5	2.8	2.2	0.9	1.5	3.0	3.5
AGH-8018	8.0-18.0	3.7	2.0	0.7	1.0	1.5	1.6
	6.0-18.0	3.7	2.0	0.9	1.5	3.0	3.5

NOTE: Extended Frequency Range Specifications Are Typical.

REVISED
OCTOBER 9, 1997

8-65

14-10-97
36-10-97
3-11-97

ADDITIONAL SPECIFICATIONS

Monotonicity Guaranteed
Phase Shift 100° Worst Case, Over Octave
Frequency Range and 60 dB
Attenuation Range
Power Handling: + 20 dBm CW or Peak
(Operating)
Switching Speed
High to Low Attenuation (90% to 10% RF) ... 20 nsec, Max
Low to High Attenuation (10% to 90% RF) ... 100 nsec, Max

Bias Current for Maximum Attenuation 50 mA Maximum

ENVIRONMENTAL RATINGS

Operating Temperature Range: - 54°C to + 125°C
Non-operating Temperature Range: - 65°C to + 125°C

Humidity
Shock, Vibration, Altitude } Per Mil-Std-202C
Temperature Cycling } Method 103B, 213, 204A, 105C and 102

OPTIONS

<u>NUMBER</u>	<u>DESCRIPTION</u>
001	Two SMA Male RF Connectors
002	One SMA Male and One SMA Female RF Connector
003	SMA Female Control Connector
200	Removable SMA Female RF Connector

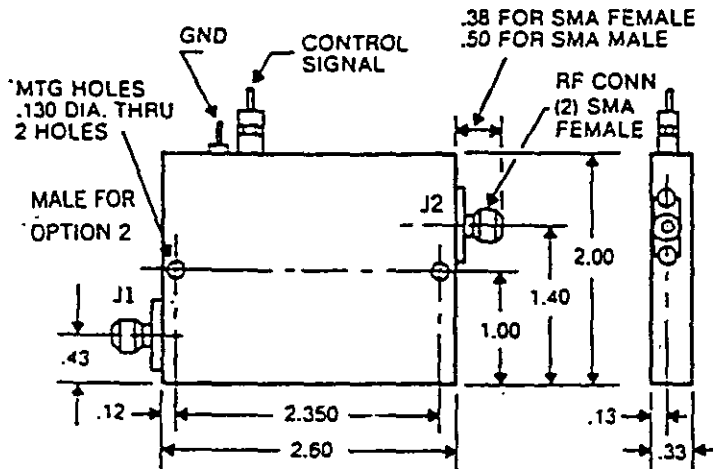
REVISED
OCTOBER 9, 1997

8-66

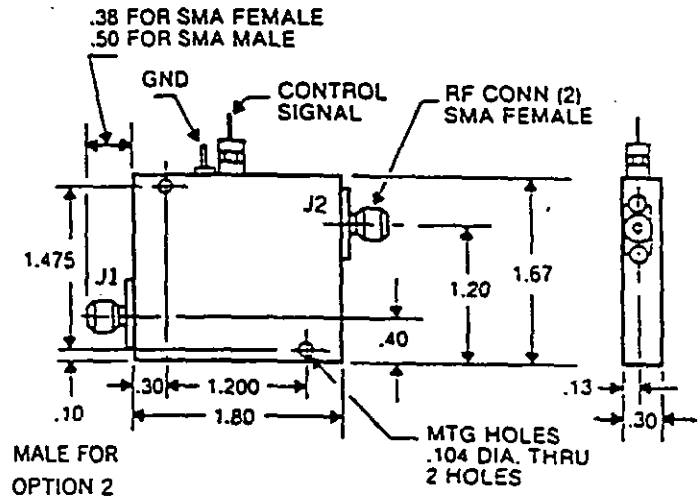
R.A. HLD
B6 WP HH
pw EK

MECHANICAL DATA

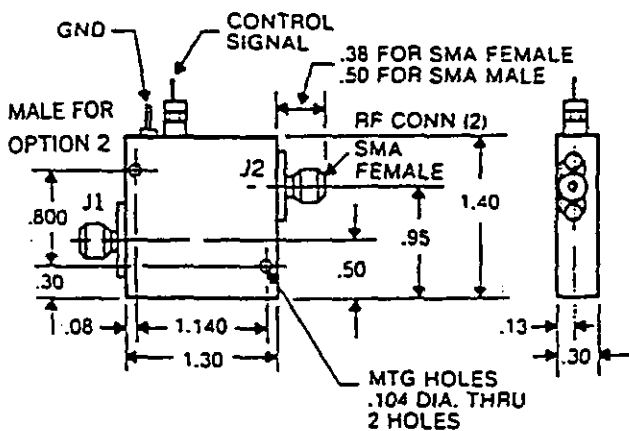
DIMENSIONS AND WEIGHTS



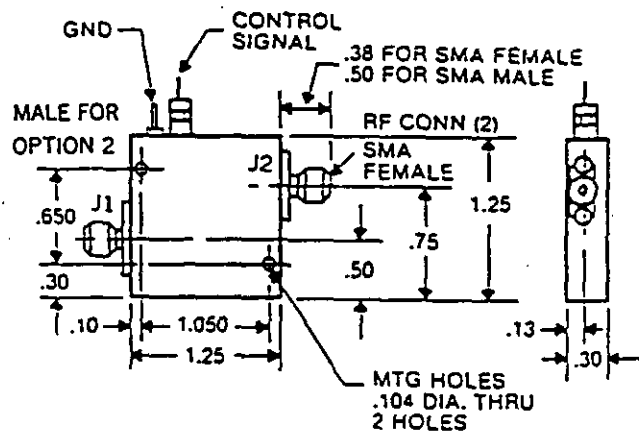
MODEL: AGH-1020
Wt. 3 oz. (85 gm) approx.



MODELS: AGH-2040, 2550
Wt. 2 oz. (57 gm) approx.



MODELS: AGH-4080, 5010, 6012
Wt. 1 oz. (28 gm) approx.



MODEL: AGH-8018
Wt. 1 oz. (28 gm) approx.

Dimensional Tolerances, unless otherwise indicated: .XX = .02; .XXX = .005

REVISED
OCTOBER 9, 1997

7/8 HH
P.A. WP EK
BG

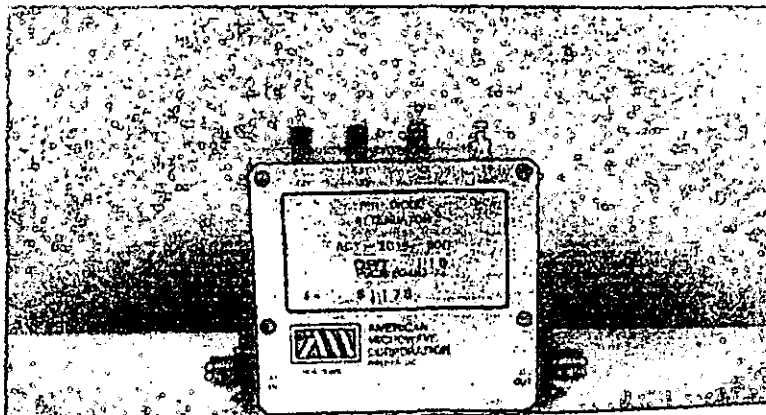
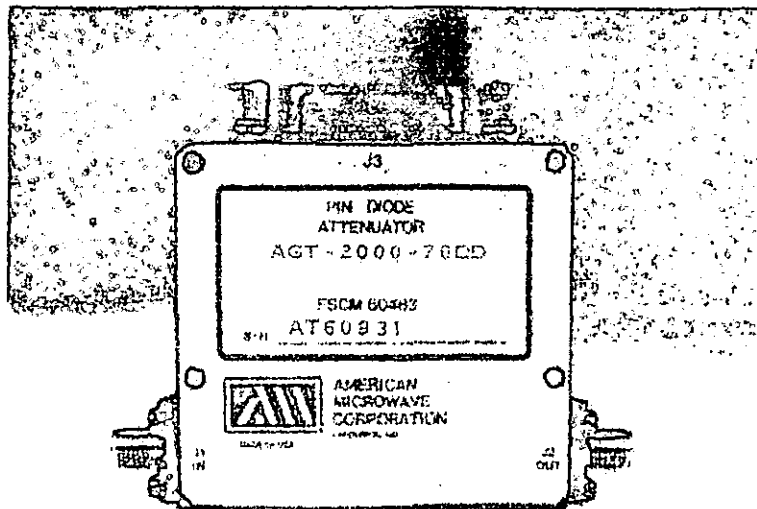
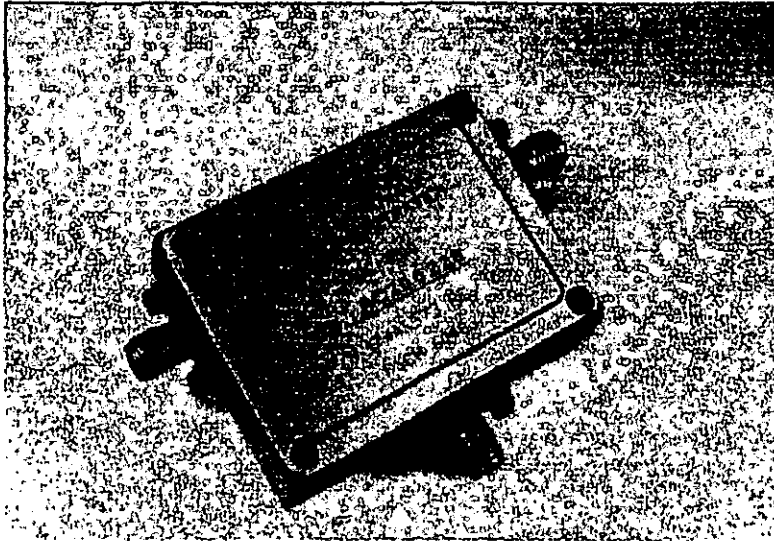


SECTION

PRODUCT DESCRIPTION

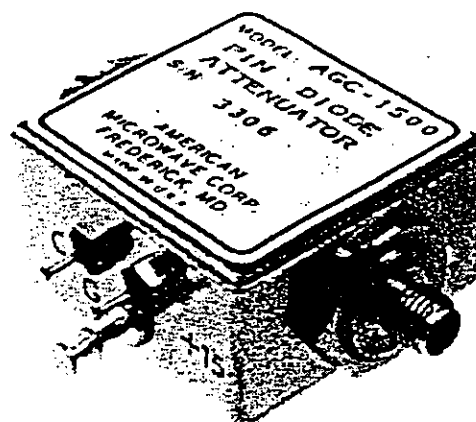
PAGES

9.0	0.5 TO 8 GHz	<u>AGC SERIES, OCTAVE BAND, CURRENT CONTROLLED ATTENUATORS</u> 9-0	
9.1	5 TO 2000 MHz	25 dB VOLTAGE CONTROLLED ATTENUATOR • AGC-1500 9-2 TO 9-3	
9.2	0.5 TO 1 GHz	50/60 dB <u>HIGH SPEED</u> , CURRENT CONTROLLED ATTENUATOR • AGC-0510 9-4 TO 9-5	
9.3	1 TO 8 GHz	<u>AGC SERIES CURRENT CONTROLLED, 30 dB RANGE, NON-REFLECTIVE PIN DIODE ATTENUATORS/ MODULATORS</u>	
		<u>FREQUENCY</u>	<u>MODEL NO</u>
		• 1 TO 2 GHz	AGC-1020
		• 1.5 TO 3 GHz	AGC-1530
		• 2 TO 4 GHz	AGC-2040
		• 2.5 TO 5 GHz	AGC-2550
		• 3 TO 6 GHz	AGC-3060
		• 4 TO 8 GHz	AGC-4080 9-6 TO 9-7



AMERICAN Microwave
corporation

BROADBAND SOLID-STATE ATTENUATOR MODEL AGC-1500 5-2000 MHz



FEATURES

- Absorptive Attenuator
- Solid-State Reliability
- Single Control
- 5 to 2000 MHz Frequency Range
- 25 dB Attenuation

SPECIFICATIONS

- Frequency Range: 5 to 2000 MHz
- Insertion Loss: 3.5 dB, Max
- Attenuation Range: 20 dB, worst case
- VSWR: 2.5 to 1, worst case
- Intercept Point (3rd order): +30 dBm
- Response Time: 75 μ sec, Typical
- Bias: +15 Volts @ 15 ma
- Control: 1 to 15 Volts @ 7 ma, Max
- RF Connectors: SMA, BNC, TNC, N

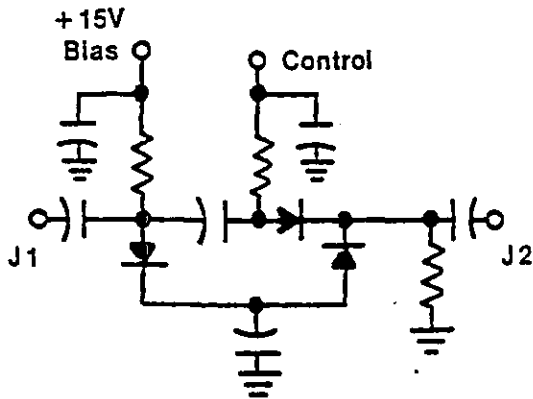
DESCRIPTION

The AGC-1500 is an all Solid-State, Absorptive Type Pin Attenuator that covers the 5 to 2000 MHz band. The attenuation is voltage controlled by a single control providing up to 35 dB of power variation. Rugged microstrip construction makes this unit suitable for military environments.

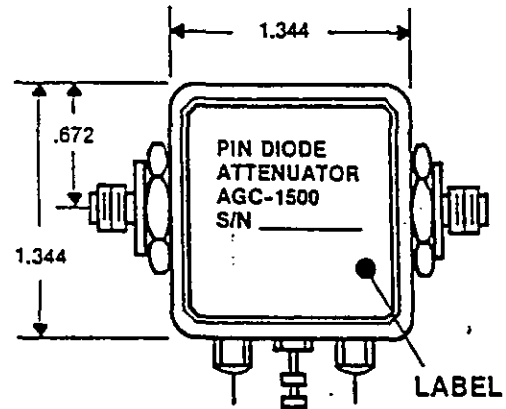
6/85

7311G GROVE ROAD, FREDERICK, MARYLAND 21704 (301) 662-4700

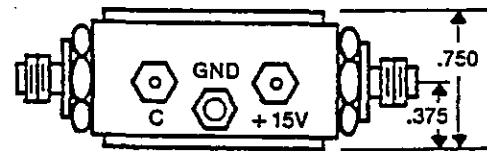
FUNCTIONAL SCHEMATIC



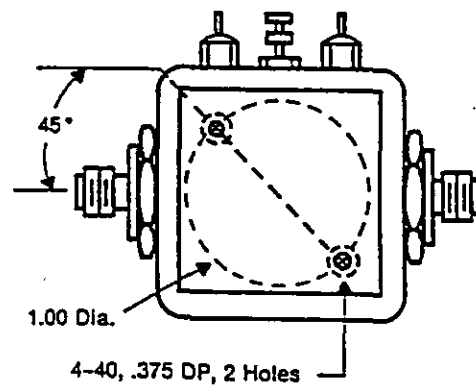
MECHANICAL DATA



TOP VIEW



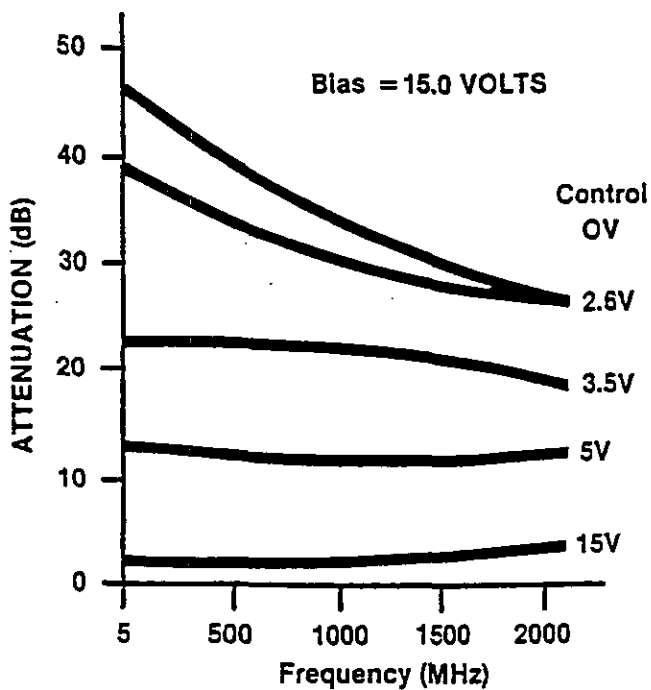
SIDE VIEW



BOTTOM VIEW

DIMENSIONS: INCHES

TYPICAL PERFORMANCE



DESCRIPTION

AMC MODEL AGC-0510 IS AN ABSORPTIVE CURRENT CONTROLLED ATTENUATOR MODULE CAPABLE OF HANDLING 1W OF CW RF POWER OVER 0.5-1.0 GHz FREQUENCY BAND.

SPECIFICATIONS

- FREQUENCY RANGE 0.5-1.0 GHz MINIMUM
- INSERTION LOSS 1.0 dB MAXIMUM
- VSWR 1.7:1 MAXIMUM
- ATTENUATION FLATNESS 0-10 dB ± 0.5 dB MAXIMUM
10-20 dB ± 1.0 dB MAXIMUM
20-40 dB ± 1.5 dB MAXIMUM
40-50 dB ± 2.5 dB MAXIMUM

ATTENUATION VS CURRENT TRANSFER FUNCTION

INSERTION LOSS AT 0 MA

10 dB	(A)	-0.28 mA (TYP)
20 dB	(A)	-0.77 mA (TYP)
30 dB	(A)	-1.68 mA (TYP)
40 dB	(A)	-3.48 mA (TYP)
50 dB	(A)	-7.94 mA (TYP)

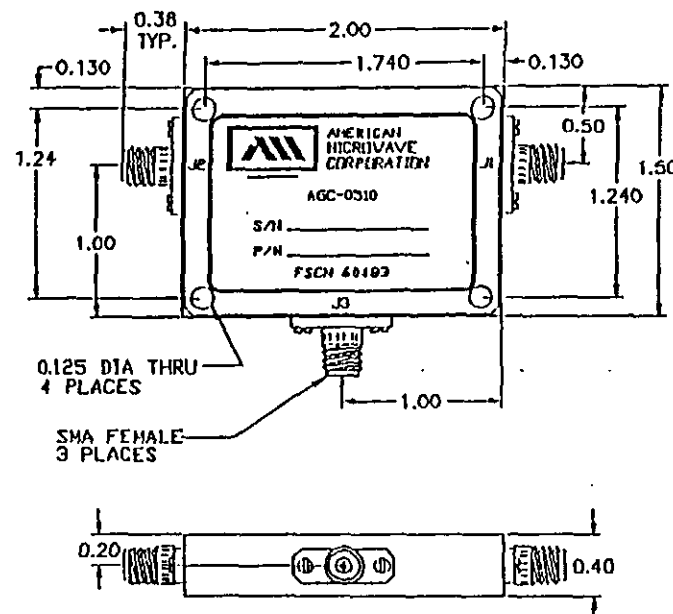
- SWITCHING TIME
RISE (10% RF TO 90% RF) 150 nS MAXIMUM
FALL (90% RF TO 10% RF) 150 nS MAXIMUM
- RF POWER RATING 1W CW, MAXIMUM
- CONNECTORS
RF INPUT/OUTPUT SMA (FEMALE)
CONTROL SMA (FEMALE)
- SIZE 2.0" x 1.5" x 0.4"

AVAILABLE OPTIONS

- A01 ONE SMA MALE, ONE SMA FEMALE RF CONNECTORS
- A02 2 SMA MALE RF CONNECTORS
- A03 SOLDER PIN CONTROL CONNECTOR
- A04 SMC CONTROL CONNECTOR
- A05 REVERSE CONTROL CURRENT (POSITIVE)

REVISIONS				DATE	APPROVED
ZONE	REV.	DESCRIPTION			
	A	ORIGINAL RELEASE		11/17/91	

MECHANICAL OUTLINE



NOTES:

- DIMENSIONS ARE IN INCHES
- TOLERANCES: X.XX ± 0.020
X.XXX ± 0.010
- WEIGHT: APPROX. 4 OZ

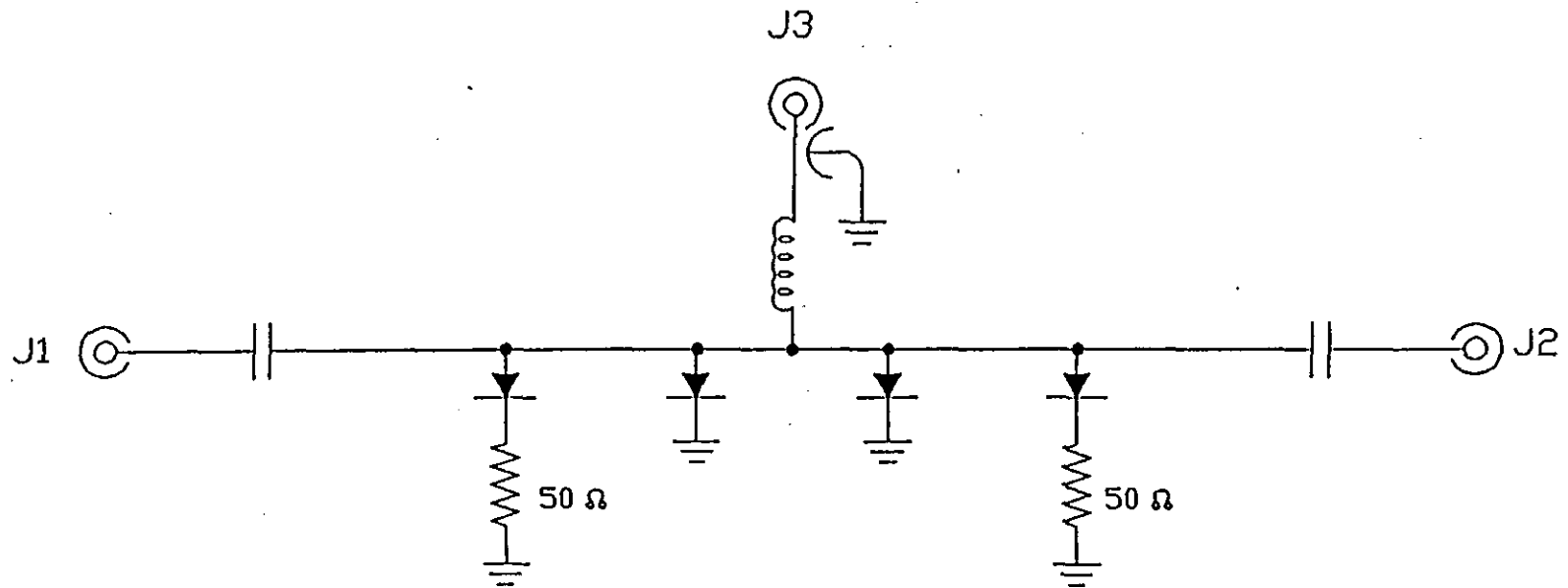
ENVIRONMENTAL RATINGS

- TEMPERATURE -55°C TO + 95°C (OPERATING)
-65°C TO +125°C (STORAGE)
- HUMIDITY MIL-STD-202F, METHOD 103B COND. B
- SHOCK MIL-STD-202F, METHOD 213B COND. B
- VIBRATION MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE MIL-STD-202F, METHOD 107D COND. C

		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRODUCT FEATURE AGC-0510 0.50-1.0 GHz CURRENT CONTROLLED PIN DIODE ATTENUATOR	
APPROVALS DRAWN W.S.P. CHECKED J.H.	DATE 11/17/91 10/11/91	SIZE A	SHEET 1 OF 2

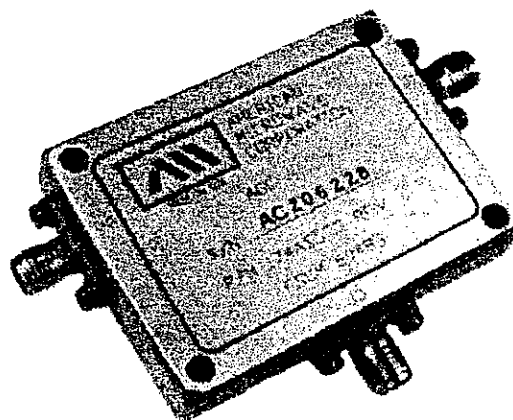
DWG. # 100-7430

FUNCTIONAL SCHEMATIC



		AMERICAN MICROWAVE CORPORATION 7311G GROVE RD., FREDERICK, MD. 21701 TEL: (301) 662-4700 FAX: (301) 662-4938	
		PRODUCT FEATURE AGC-0510 0.50-1.0 GHz CURRENT CONTROLLED PIN DIODE ATTENUATOR	
APPROVALS DESIGNED BY <i>W.S.P.</i> CHECKED	DATE 11/17/02	SIZE A	SHEET 2 OF 2

AGC SERIES NON-REFLECTIVE PIN DIODE ATTENUATOR/MODULATOR 1-8 GHz, 30 dB



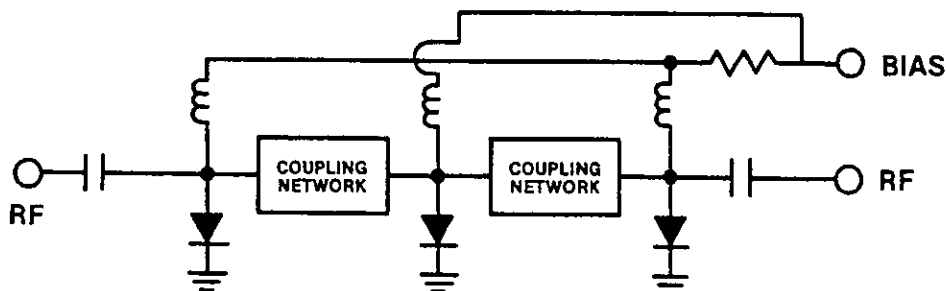
FEATURES

- Low Insertion Loss
- Solid State Reliability
- Absorptive Type

DESCRIPTION

The AGC Series are fast pin diode modulators that are current controlled and operate in a non-reflective mode at all attenuation levels. The units are available in octave bandwidths from 1 to 8 GHz. Units feature a unique coupling between diodes that eliminates the use of hybrids and allows for lower loss, higher reliability units in a small package size.

FUNCTIONAL SCHEMATIC



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OCTOBER 9, 1997

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SPECIFICATIONS

MODEL	FREQUENCY RANGE (GHz)	INSERTION LOSS, MAX.(dB)	VSWR MAX.	MAX. ATTEN.(dB)	FLATNESS' (dB)
AGC-1020	1-2	0.8	1.8:1	30	±1
AGC-1530	1.5-3	0.8	1.8:1	30	±1
AGC-2040	2-4	1.1	1.8:1	30	±1
AGC-2550	2.5-5	1.2	1.8:1	30	±1
AGC-3060	3-6	1.3	2.0:1	25	±1.5
AGC-4080	4-8	1.7	2.0:1	25	±1.5

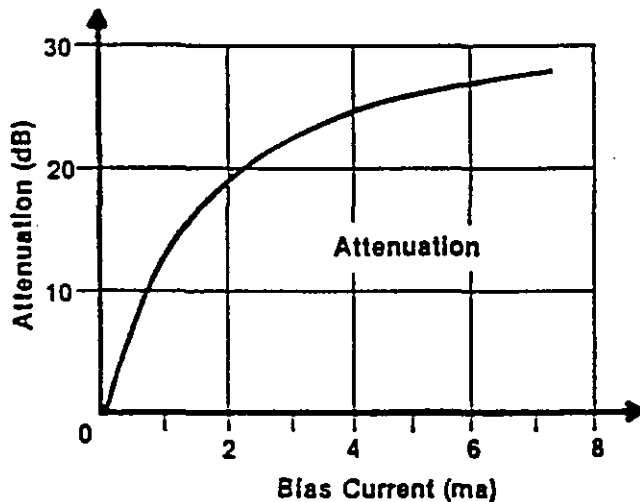
NOTES:

1. Flatness at 10dB attenuation
2. Minimum attenuation at 0 bias
3. Maximum attenuation is at 15 ma
4. Maximum input level +30dBm
5. +25dBm intercept point at -20dBm Input level
6. SMA connectors, input and output
7. Bias connector SMC male
8. Temperature Range: +10° to 70° C

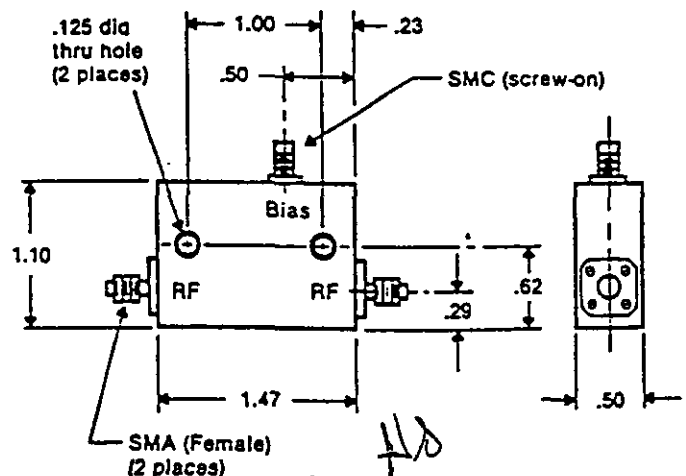
AVAILABLE OPTIONS

- 001- ONE MALE, ONE FEMALE RF CONNECTOR
- 002- TWO MALE RF CONNECTORS
- 003- SMA FEMALE BIAS CONNECTOR

TYPICAL PERFORMANCE



MECHANICAL DATA



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OCTOBER 9, 1997

SECTION 10.0

Application Notes

How To Specify

Pin Diode Variable

Attenuators

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OCTOBER 9, 1997

RA. WP EIC
EG MW HWA

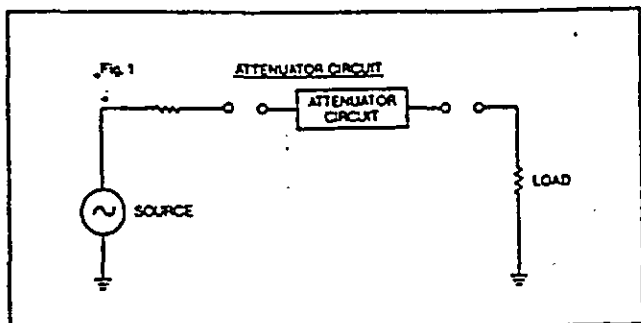
7311G GROVE ROAD, FREDERICK, MARYLAND 21704

Tel.: (301) 662-4700
Fax: (301) 662-4938

INTRODUCTION TO ATTENUATORS

Attenuators are transmission line components with at least two ports used to reduce the input power in a system by a predetermined amount. A switch is generally used in only two states "on" or "off". In contrast the variable attenuator is operated throughout its entire dynamic range. Consider the following circuit (Fig. 1):

(Fig. 1)



The attenuation, α , of a circuit inserted in a transmission line is defined as the ratio in decibels of power incident to the diode, P_i , to power transmitted past the circuit to the load, P_t .

$$\text{Therefore } \alpha = 10 \log \frac{P_i}{P_t}$$

There are two major categories of attenuators: Fixed and variable. Fixed attenuators are those whose attenuation is factory preset at some nominal level. It is a fixed value and cannot be changed. Variable attenuators, on the other hand, can be controlled by the user to vary the attenuation level of the device. This can be done by a number of different methods.

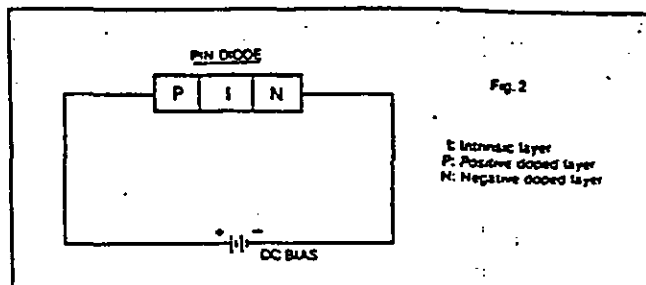
Mechanically variable attenuators are normally adjusted through the use of a tuning screw or knob adjustment. Electronically variable attenuators respond to the application of either current (current-controlled) or voltage (voltage-controlled) to the device. Mechanically variable attenuators, due to the necessity of mechanical adjustment are generally not suited to system requirements. Electronic attenuators are more applicable to these applications and are used in many systems, test and lab situations. The balance of this note is concerned with electronically variable attenuators, their characteristics and how to specify them.

PIN Diode

The control element used in most electronically variable attenuators is the PIN Diode. PIN Diodes are used primarily for control of microwave power from the low MHz frequencies up to millimeter waves. Some typical applications of PIN Diodes are switches, attenuators, limiters, etc. In order to understand the PIN Diode attenuators it is essential to investigate the PIN Diode itself.

The PIN Diode is a semiconductor device comprised of three layers: the high resistance Intrinsic layer surrounded by positive and negatively doped low resistance layers. (See Fig. 2):

(Fig. 2)



Forward bias current carries charges from the conductive layers into the intrinsic layer.

The I layer resistance is determined by

$$R_s = \frac{W^2}{(\mu n + \mu p) I F \times \tau} \text{ (OHMS)}$$

where W = I region width
 $I F$ = Forward Bias Current
 τ = Carrier Lifetime
 μn = Electron Mobility
 μp = Hole Mobility

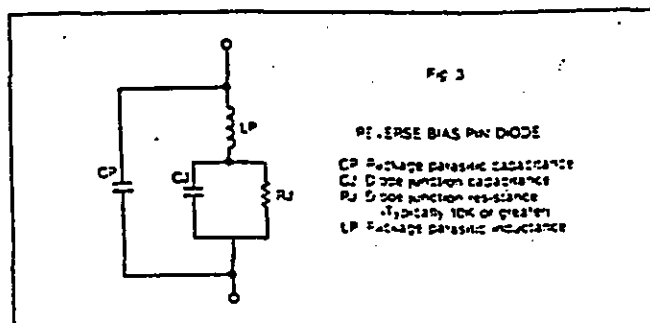
R_s is inversely proportional to the forward bias current.

PIN Diode Model

PIN Diodes derive their switching and attenuation characteristics from this variation of the I layer resistance.

At zero or reverse bias, R_J is high and the diode acts as a fairly high-Q capacitor at microwave frequencies. (See Fig. 3)

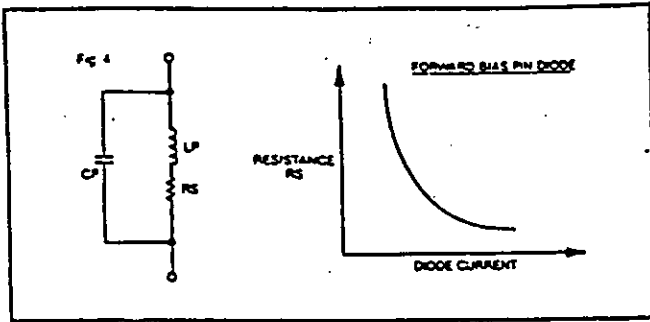
(Fig. 3)



In the forward bias state the I layer resistance is lowered.

In Figure 4, we can see how the PIN Diode acts as a current controlled RF resistor. An increase in bias current will result in a decrease in RF resistance. It is this factor which makes the PIN Diode so useful in attenuator circuits.

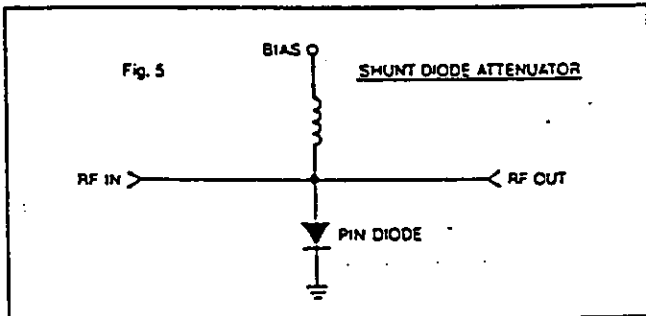
(Fig. 4)



Simple Diode Attenuators

One of the simplest forms of variable attenuators is the simple shunt diode type seen below. (Fig. 5)

(Fig. 5)



With this type of attenuator the user will supply bias current to the PIN Diode. As current increases the PIN Diode resistance will decrease and the attenuation will increase. At zero or reserve bias the diode will be in its "off" state and the attenuator will be in its low loss state.

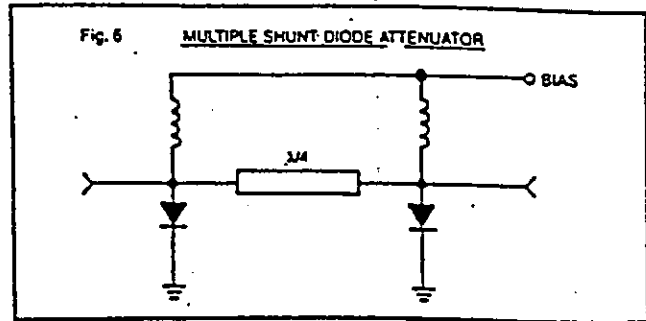
Multiple Shunt Diode Attenuator

A single shunt element attenuator has obvious limitations. For example, a diode of 1.0 ohm resistance will give about 28 dB of attenuation. It is clear that some other means must be used to achieve higher attenuation.

When a second shunt element is placed 90 degrees (electric spacing), (see Figure 6), from the first the maximum attenuation achievable can be dramatically improved. For example, two diodes each capable of 28 dB attenuation spaced 90 degrees apart will give an attenuation level of 62 dB.

This technique can be extended to three or more elements and is extensively used in PIN Diode attenuator design.

(Fig. 6)



Limitation of Simple Attenuators

Though these simple circuits can operate usefully as attenuators, they share common performance limitations: they are reflective in the attenuation range. As attenuation is increased, the VSWR will degrade. For example, a three shunt diode attenuator biased for 40 dB of attenuation will have a VSWR of about 6.0:1. Reflected power can occasionally be a serious problem for a systems designer. Where high VSWR during attenuation levels is a problem, an absorptive attenuator design is a better choice for the system designer.

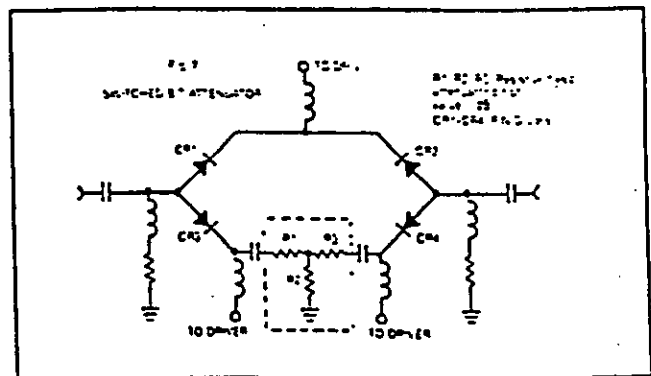
Absorptive Attenuators

The absorptive attenuator offers the system designer low VSWR through its entire dynamic range. Examples of absorptive attenuator circuits include switched-bit, Hybrid coupled, and T Pad (both shunt transformed and classical).

Switched-Bit Attenuator

This circuit differs from the other circuits discussed so far in that a resistive 'Y' or 'X' attenuation circuit is switched in and out of the network. (See Fig. 7)

(Fig. 7)

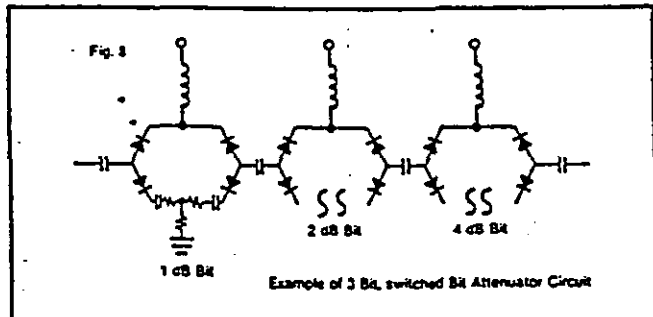


For low loss (insertion loss) state, CR1 and CR2 are biased "on" (low-loss state); CR3 and CR4 are biased "off". When attenuation is programmed, CR1 and CR2 are shut off; CR3 and CR4 are biased on. This introduces an attenuation bit comprised of R1-R3 into the through-line path yielding α dB of attenuation. Essentially the attenuator bit is switched in and out of the circuit, thus giving the name "Switched-bit".

In this note, Switched-bit attenuators differ from other electronic attenuators in the fact that the attenuation elements are fixed resistive T-Pad bits not Pin Diodes.

Many sections like that above can be cascaded to give higher levels of attenuation. (See Fig. 8)

(Fig. 8)



The lowest value attenuation bit is referred to as the least significant bit and the highest value as the most significant bit.

Switched bit attenuators offer a number of features to the system designer. Distortion generated by the attenuator is low since the power is absorbed in resistive elements and not in the PIN Diodes. The switched-bit attenuator is very temperature-stable because the PIN Diodes are not used over their entire dynamic resistance range, they are simply used as switch elements, switching the attenuation bits in and out of the circuits.

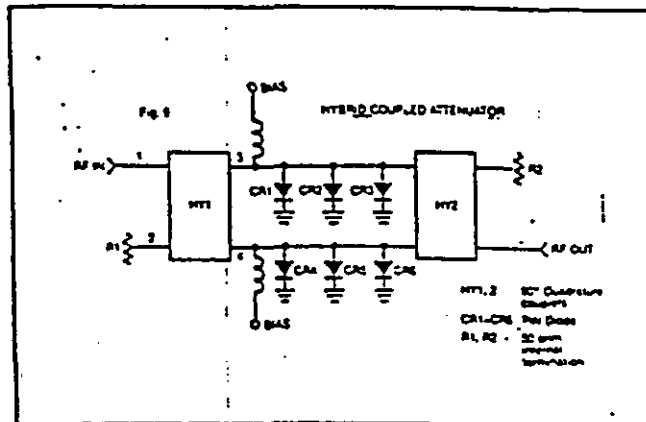
One major drawback with this circuit is that it will have a high insertion loss. As shown in figure 8, there are two series elements per attenuation bit. The more series elements involved the higher the resulting insertion loss. For example, a 6 bit attenuator with a 3 ohm PIN Diode would have 36 ohms of resistance exclusive of other circuit losses. Also, when the least significant bit is 0.5 dB or less, monotonicity is difficult to achieve due to differences in coil resonances, diode loss and other considerations between the insertion loss path and the attenuation path. The switched-bit attenuator is limited in its resolution, being limited by the value of the least significant bit.

Hybrid Coupled Attenuator

The attenuator offers good VSWR at any level of attenuation, and its operation is fairly simple. (See Fig. 9)

RF power is incident to HY1. Power is split between the two transmissions paths (one comprised of CR1-CR3, and the other through CR4-CR6). As forward bias is sent to the diodes they conduct and reflect back power to port 3 and 4. Due to the design of this coupler the power from ports 3 and 4 are combined to port 2 and absorbed in the internal termination R1. This results in very low reflected power at port 1.

(Fig. 9)



American Microwave AGH series attenuators use this circuit topology. The use of low-loss large couplers manufactured to $\pm .0001''$ tolerance Silica substrates ensure superior performance.

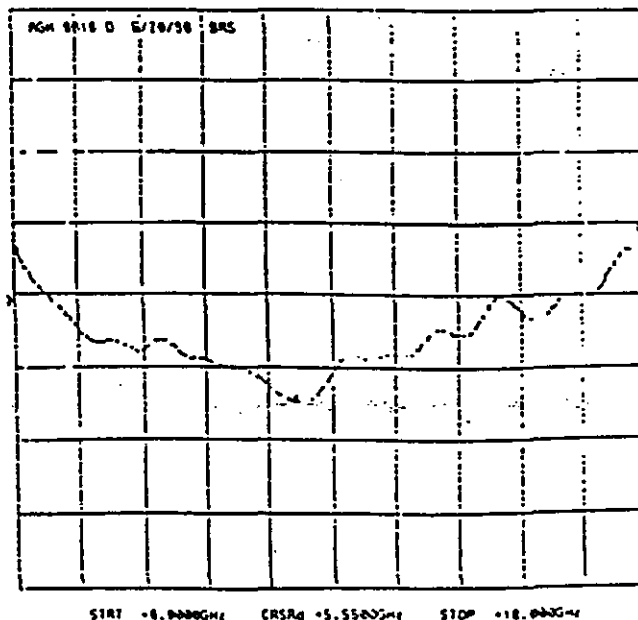
This kind of attenuator has a practical bandwidth limitation of 3.0:1. Application of this technique in a well designed attenuator circuit will yield excellent and repeatable performance. For example AMC is manufacturing sizeable quantities of these attenuators in the 6-18 GHz bandwidth with typical insertion losses of under 3.0 dB and return loss of greater than 11 dBr across the full bandwidth. The American Microwave AGH series also offers good frequency flatness (3 dB P-P at 60 dB) with well-behaved Phase shift characteristics. (See Figs. 10 and 11).

(Figs. 10 and 11)

AGH-8018D - Typical flatness at 60 dB attenuation.

CH11 A - 10 SA - 2.33 dB
1.0 dB/ REF - 54.00 dB

Fig. 10



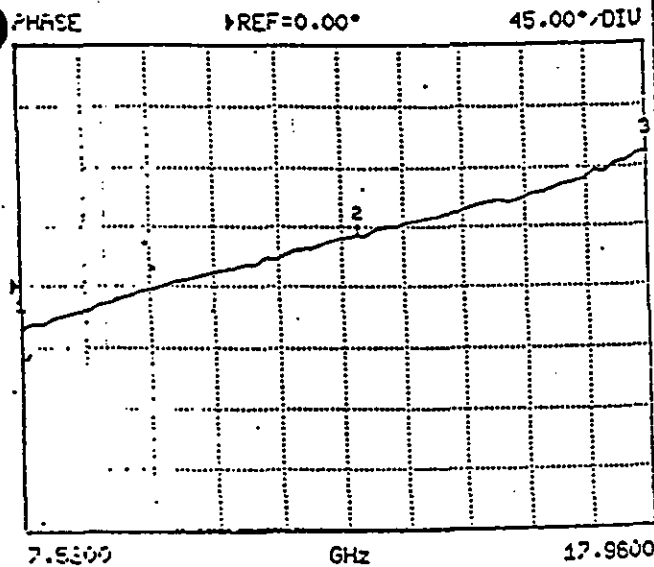
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R.A. WP EK M/15
BB

Typical AGH-8018D - Phase shift at 50 dB
Referenced to insertion loss

S21 FORWARD TRANSMISSION

Fig. 11



T-PAD WITH PIN DIODE ELEMENTS

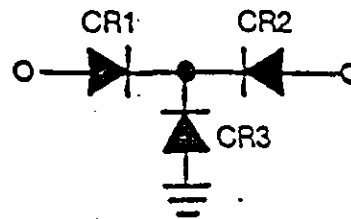


Fig. 13

Direct synthesis of the T-Pad circuit can be difficult and costly to achieve. A much simpler approach is to mount all three PIN Diodes in shunt, making the outside diodes (CR1, CR2) the shunt transformed equivalent of R1, R2 in Fig. 12. This circuit is the so-called folded T-Pad or shunt transformed T-Pad circuit shown in Fig. 14. The shunt impedances are the transformed equivalents of the circuit elements of the classical T-Pad.

(Fig. 14)

T-PAD Attenuator

The circuit of Fig. 12 is comprised of three microwave resistors. For each value of attenuation there is an ideal value for R1, R2, R3 which (a) gives the correct level of attenuation and (b) maintains a 50 ohm impedance thus insuring a low VSWR. This circuit can be synthesized using PIN Diodes as the variable RF resistor (See Fig. 13). CR1 and CR2 are the series equivalent of R1 and R2.

(Figs. 12 and 13)

CLASSIC T-PAD

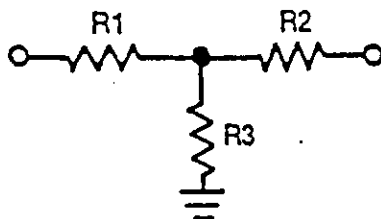
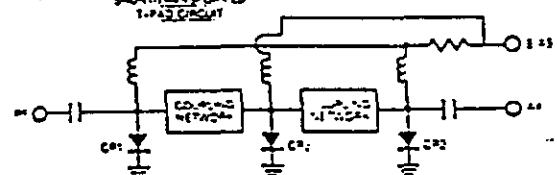


Fig. 12

Fig. 14



CR1 and CR2 are biased independently from CR3. By proper selection of bias current the folded T-Pad design can yield reflectionless attenuator performance.

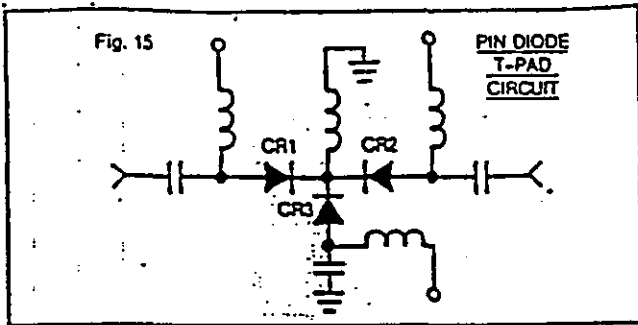
This circuit is very easy to manufacture. AMC has been manufacturing this type of attenuator for many years. It is inexpensive and offers reasonable performance for octave bandwidth requirements. However, this type of circuit has a number of limitations. The circuit is limited to an octave bandwidth. Beyond an octave the frequency flatness and VSWR become degraded. Also the unit-to-unit uniformity of this attenuator is not as good as other types of circuits. The maximum attenuation achievable is limited (usually to under 30 dB), and its frequency flatness is poor compared to a hybrid coupled attenuator.

"TEE PAD"

For applications requiring greater bandwidth AMC is manufacturing PIN Diode attenuators which are essentially variable T-Pads. (See Fig. 15)

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R.A. *wd* *ek* *HH* *AK*
B6 *wd* *ek* *HH* *AK*



CR1 and CR2 are equivalent to R1, R2, CR3, to R3. The PIN Diodes are varied by changing bias current. Series bias current is used to adjust CR1, CR2 until they reach the value of the series elements in the classical T-Pad of Fig. 12. Likewise CR3 is varied via shunt bias current. By properly selecting series and shunt currents, the attenuator can be varied and the match will be maintained as the resistance of the PIN Diodes will be equivalent to the values of the classical T-Pad. As attenuation is increased, the current through CR3 will increase and the current through CR1 and CR2 will decrease. Two sections of the above circuit are cascaded to achieve the 60 dB level.

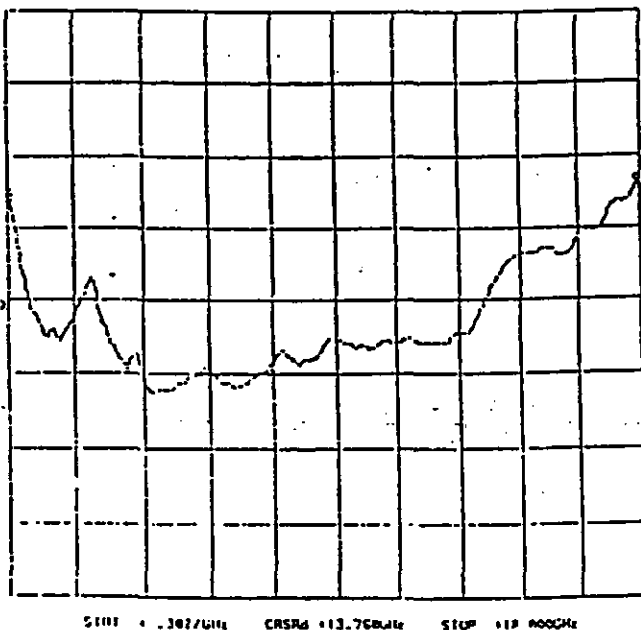
This attenuator, if properly designed, will give the widest bandwidth coverage of all the attenuator types discussed in this application note. American Microwave Corp. model AGT-2018-60D is a 60 dB attenuator covering the 2-18 GHz band. When ordered with option 7, this attenuator will cover the instantaneous bandwidth of 0.3-18 GHz with good flatness, low VSWR, and predictable phase performance. Figures 16 and 17 show typical performance on production units.

(Figs. 16 and 17)

AGT-2018-60D - Option 7 typical flatness at 60 dB attenuation.

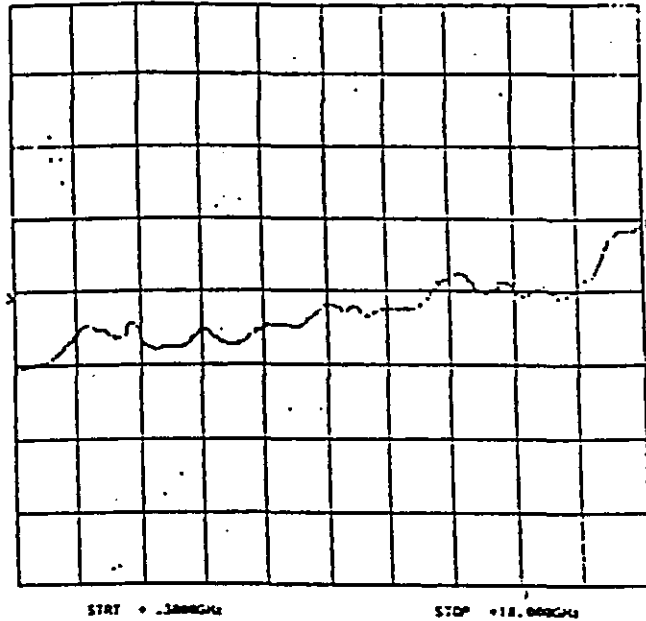
CH1: A - R S
2.0 dB/ REF = 60.00 dB

Fig. 16



CH1: A - R S
2.0 dB/ REF = 60.00 dB

Fig. 17

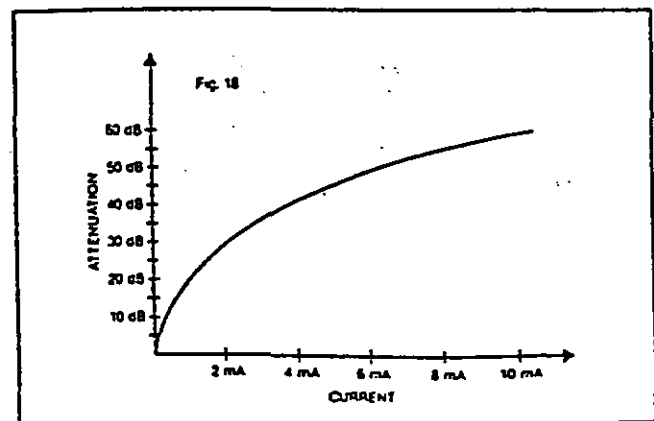


DRIVER CONSIDERATIONS

Current Controlled

This group of attenuators is driven by current supplied by the user. Some attenuator circuits are commonly sold as current controlled devices. For example, AGH series hybrid coupled devices are often driven directly from current sources. A typical attenuation vs. current curve can be seen in Figure 18.

(Fig. 18)



Though this is the simplest drive requirement, it does have certain limitations. The current vs. attenuation curve will follow the PIN Diode exponential function of R_s vs. I . This works fine in a closed loop situation (such as a leveling application) however, its lack of linearity argues against its use in an open loop condition.

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B4 MW HH

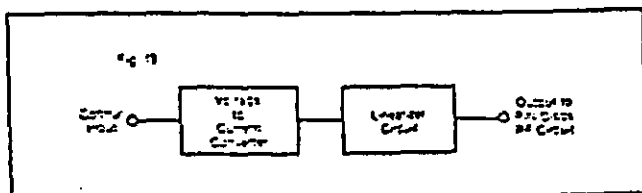
ANALOG VOLTAGE CONTROLLED DRIVER CONSIDERATIONS

Voltage-controlled attenuators are controlled by the application of control voltage by the user. They fall into two broad categories: linearized and non-linearized.

Linearized voltage controlled attenuators are those which follow a specified voltage-to-attenuation transfer function, and non-linearized do not. An example of a linearized attenuator is the American Microwave AGH-D series. This product has an integral voltage-to-current converter (linearizer) (see Fig. 14) which gives the unit a linear voltage to attenuation transfer function. Standard transfer function on this unit is 10 dB/volt, though many different curves can be accommodated.

The linear transfer function is accomplished by using a five break point piece-wise approximation to the diode R_s vs. I curve.

(Fig. 19)

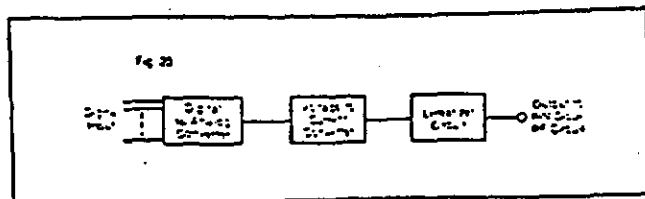


The T-Pad attenuator circuit of Fig. 15 requires two such driver circuits. (One to control the series diodes and one to control the shunts.)

DIGITAL VOLTAGE CONTROLLED DRIVER CONSIDERATIONS

Thus far our discussion has concentrated on analog voltage control drivers. PIN Diodes attenuators can also be controlled by digital methods. For example, the analog control signal used to control the linearized driver circuit of Fig. 19 can be derived from a digital source by means of a Digital-to-Analog Converter. Fig 20 shows such a driver circuit.

(Fig. 20)



Both AGH-series hybrid coupled and AGT-series T-Pad attenuators are available with an 8 bit digital driver, known respectively as the AGH-DD series and AGT-DD series.

DRIVER CONTROL FOR SWITCHED-BIT ATTENUATORS

Normally each attenuation bit is driven from an individual control line. Consider the circuit of Figure 8 (3 bit, 1 dB, LSB, 7 dB total attenuation). Assume that a logic '1' is used to enable the bit, the logic table would be as shown below:

DIGITAL WORD			Attenuation Achieved
MSB 4 dB	2 dB	LSB 1 dB	
0	0	0	Insertion Loss
0	0	1	1 dB
0	1	0	2 dB
0	1	1	3 dB
1	0	0	4 dB
1	0	1	5 dB
1	1	0	6 dB
1	1	1	7 dB

ATTENUATOR TERMS AND DEFINITIONS

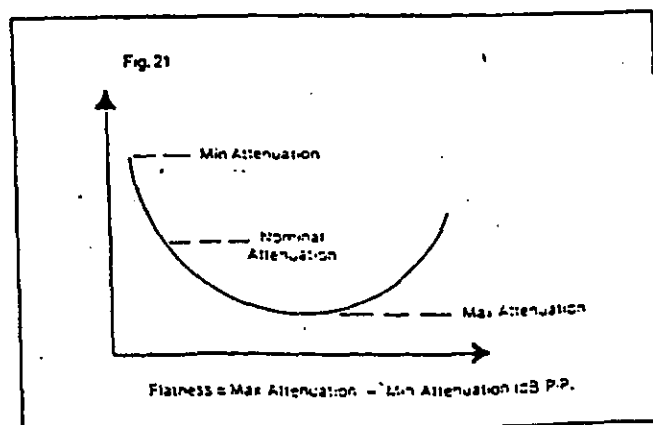
Attenuation: General term describing decrease of signal amplitude in transmission from the input to the output of the device the ratio of input to output power. It is commonly expressed in logarithmic terms (dB).

Insertion Loss: The ratio of the power delivered to the load without the attenuator to the power delivered to the load with the attenuator present. In the case of the variable attenuator its insertion loss is measured with the attenuator set to its low loss state.

VSWR: Voltage standing wave ratio (ratio of reflected to incident power) present at the input or output of the attenuator.

Flatness: Peak to peak variation of attenuation through the specified frequency range. Normally specified in dB. See Fig. 21.

(Fig. 21)

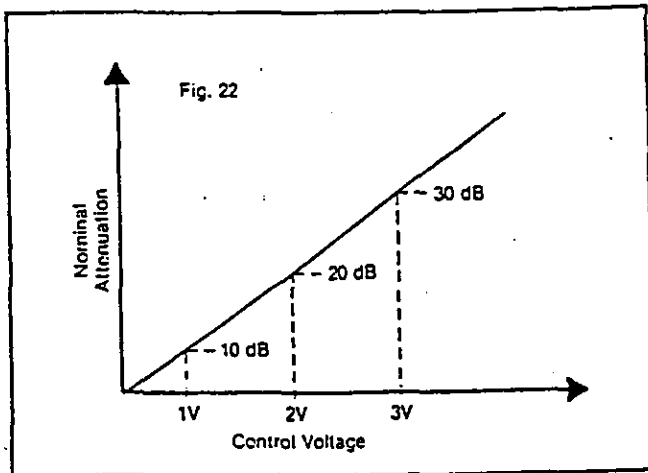


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BG MW Wb

Transfer Function: The relationship between attenuation and control voltage normally specified in dB/volt. This specification is applicable to analog voltage controlled attenuators only. See Fig. 22.

(Fig. 22)



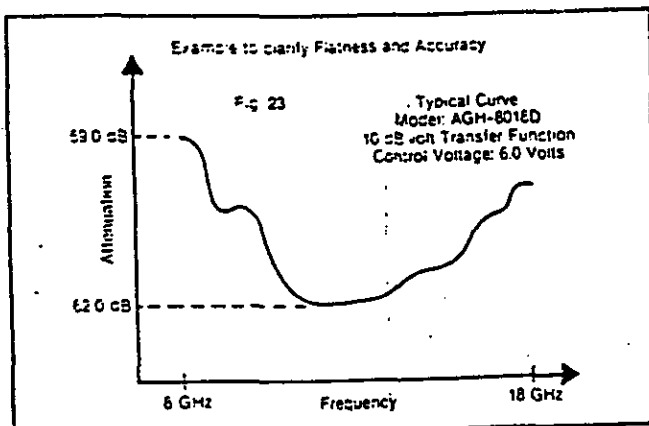
Accuracy (sometimes called "Linearity"): It is the maximum deviation of the nominal attenuation from the programmed attenuation, normally expressed in dB. This term is used to quantify how accurately the attenuator conforms to the specified transfer function.

$$\text{Nominal Attenuation} = \frac{\text{Max Attenuation} + \text{Min Attenuation}}{2}$$

$$\text{Accuracy (Linearity)} = \left| \begin{array}{cc} \text{Programmed Attenuation} & \text{Nominal Attenuation} \\ \text{(Assuming ideal transfer function)} & \end{array} \right|$$

Example to clarify Flatness and Accuracy

(Fig. 23)



Flatness	=	Maximum Attenuation	—	Minimum Attenuation
	=	62.0	—	59.0
	=	3.0 dB Peak-to-peak		
Accuracy	=	Programmed Attenuation	—	Nominal Attenuation
	=	60	—	$\frac{62 + 59}{2}$
	=	60	—	60.5
	=	0.5 dB		

Phase Shift (Absolute): The transmission phase angle of the signal at the output of the attenuator relative to the phase angle at the input of the device.

Phase Shift vs. Attenuation: The transmission phase angle of the signal at the output at a given frequency and attenuation relative to the phase angle at the output of the device at the same frequency with the attenuator set to insertion loss. Measured by normalizing absolute phase shift of the unit at insertion loss.

Temperature Coefficient of Attenuation: Measure of how the attenuation changes at a given voltage (current) and frequency as temperature is varied. Normally expressed in dB/° Centigrade. Compensation networks can be designed to minimize the attenuation drift over temperature. For example, a thermistor circuit in the AMC AGH-D series keeps the typical drift to under .01 dB/°C.

Switching Speed: The time it takes for the attenuator to switch states from one attenuation level to another. Usually referenced from a point on the drive control waveform. Linearized voltage controlled attenuators are generally slow switching from attenuation to insertion loss because the drive circuit presents a high impedance current source to PIN Diodes that are trying to discharge.

Monotonicity: The condition that exists when every increase in control voltage (or current) will *always* result in an increase in attenuation at *all* frequencies. Under no conditions will an increase in voltage result in a decrease in attenuation.

Power Handling: The highest incident power level the attenuator can see without performance degradation (max operating power) or without permanent degradation or destruction (max survival power).

REVISED
OCTOBER 9, 1997

P.A. WED EIK
36 PW HB

SECTION 11.0



AMERICAN
MICROWAVE
CORPORATION

HOW TO REQUEST TECHNICAL INFORMATION AND SPECIFY VARIABLE ATTENUATORS

CUSTOMER: _____ MODEL: _____ OPT.: _____

1.0 TYPE:

2.0 FREQUENCY BAND (GHZ):

3.0 INSERTION LOSS:

3.1) MAXIMUM:

3.2) VARIATION:

4.0 ATTENUATION RANGE:

4.1) MINIMUM:

4.2) TYPICAL:

5.0 ATTENUATION FLATNESS:

6.0 VSWR:

6.1) INPUT

6.2) OUTPUT

7.0 RF POWER:

7.1) CW

7.2) PEAK POWER

7.3) PULSE DUTY RATIO

8.0 CONTROL:

9.0 CONNECTORS:

10.1) RF: SMA N BNC TNC

10.2) POWER: MULTI-PIN SOLDER PIN

10.3) CONTROL: SOLDER PIN SMC SMA

7311G GROVE ROAD, FREDERICK, MARYLAND 21704

Tel.: (301) 662-4700
Fax: (301) 662-4938

REVISED
OCTOBER 9, 1997

SECTION 12.0



AMERICAN MICROWAVE CORPORATION

7311-G GROVE ROAD, FREDERICK, MD 21704 •USA•

TEL (301)662-4700 , FAX (301)662-4938

WARRANTY AND SERVICE CONDITIONS

American Microwave Corporation(AMC) warrants each product of it's manufacture to be free from any defect in material or workmanship for a period of one(1) year after the delivery to the original purchaser.

The limit of the liability under this warranty shall be to repair or to replace any product, or part thereof, which proves to be defective after inspection by AMC. This warranty shall not apply to any AMC product that has been disassembled, modified, physically or electrically damaged or any product that has been subjected to conditions exceeding the applicable specifications or ratings.

AMC shall not be liable for any direct or consequential injury, loss or damage incurred through the use, or the inability to use, any AMC product.

AMC reserves the right to make design changes in any AMC product without incurring any obligations to make the same changes in previously purchased units.

This warranty is the full extent of the obligation and liability assumed by AMC with respect to any and all AMC products. AMC neither makes, nor authorizes any person to make, any other guarantee or warranty concerning AMC products.

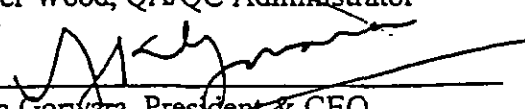
All AMC products returned under warranty clause or conditions must have a Return Material Authorization(RMA) number which is obtainable from the AMC Quality Assurance/Quality Control Department. Original products must be returned to the American Microwave Corporation with transportation charges prepaid FOB AMC factory at Frederick, Maryland 21704, USA. If repair is applicable under warranty, the unit will be returned freight prepaid, FOB purchaser's destination.

If warranty repair is not applicable, the purchaser will be advised of the repair charges and their authorization to proceed will be awaited before any repair costs other than evaluation charges are incurred.

Authorized and Approved by: _____


Peter Wood, QA/QC Administrator

Authorized and Approved by: _____


Ash Gorwara, President & CEO

SECTION 13.0



AMERICAN MICROWAVE CORPORATION

7311-G GROVE ROAD, FREDERICK, MD 21704 •USA•

TEL (301)662-4700 , FAX (301)662-4938

FORM: ADM-1/0491

CERTIFICATE OF COMPLIANCE

We certify that all the units produced or repaired on this Purchase Order are in conformance (except as waived) with applicable American Microwave Corporation specifications, workmanship standards and/or contractual requirements as specified in the Purchase Order. Inspection test records, and other evidence of conformance are available for examination upon request.

CUSTOMER:

CUSTOMER P.O. #:

DATE ORDERED:

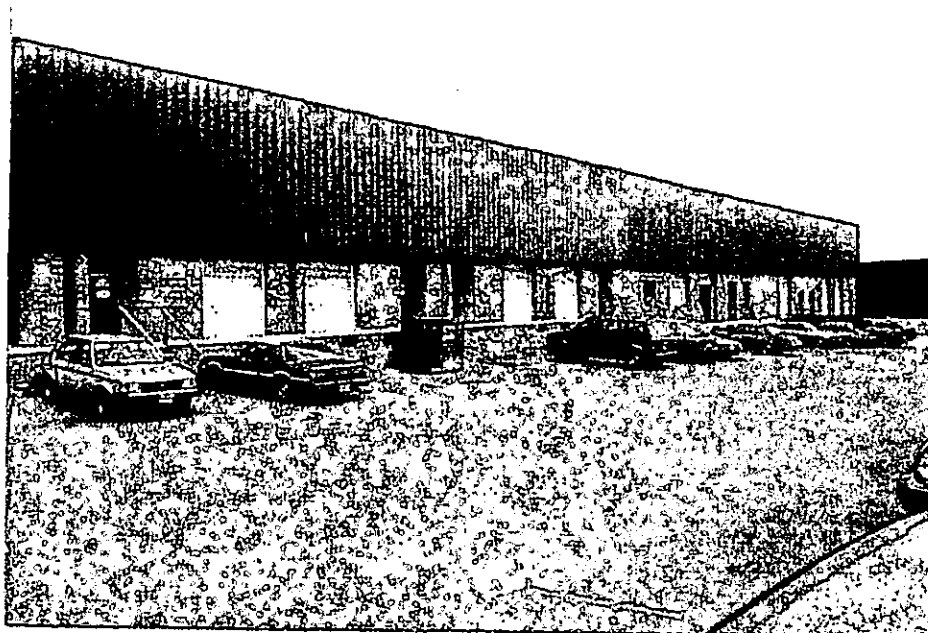
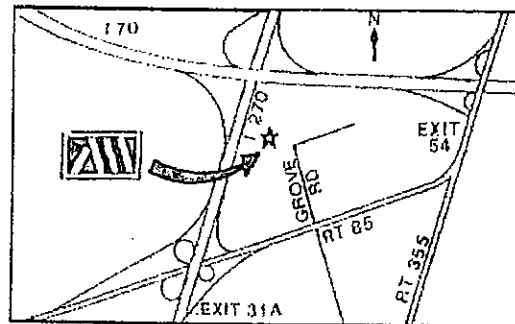
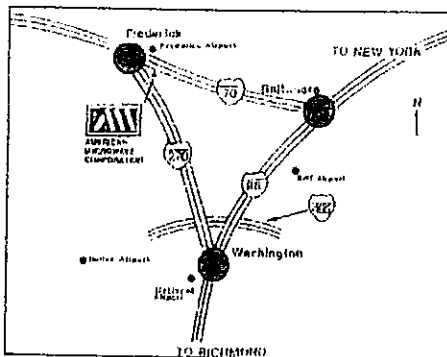
AMC JOB #:

ITEMS SUPPLIED

LINE ITEM	MODEL NUMBER	OPT NO.	PRODUCT DESCRIPTION	SERIAL NUMBERS	QUAN.

Approved by: _____
Quality Assurance/Control Department

Date: _____



**AMERICAN MICROWAVE
CORPORATION**

7311-G GROVE RD., FREDERICK MD. 21704

TEL: 301-662-4700 FAX: 301-662-4938

WEB PAGE: [HTTP://WWW.AMAVE.COM](http://WWW.AMAVE.COM) E-MAIL ADDRESS: AMCPMI@AOL.COM