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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
Chairman

ASH K. GORWARA
President and CEO
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 warranties 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 awaits 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  **HIGH SPEED (≤ 1μSec) AGTN SERIES, MULTI OCTAVE BAND, DIGITAL OR ANALOG VOLTAGE CONTROLLED ATTENUATORS** ................................................. 3-0

**HIGH SPEED DIGITAL CONTROLLED ATTENUATORS**

3.1 2 GHz TO 18 GHz (0.2 TO 18 GHz OPTIONAL)  60dB, **HIGH SPEED (≤ 1μSec), 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, **HIGH SPEED (≤ 1μSec), 8 BIT DIGITAL**
  - AGTN-2018-60DD .................................................. 3-4 TO 3-5

3.3 2 GHz TO 18 GHz (0.3 TO 18 GHz OPTIONAL)  80dB, **HIGH SPEED (≤ 1μSec), SLIM LINE, 9 BIT DIGITAL**
  - AGTN-2018-80DD-100 ........................................... 3-6 TO 3-7

3.4 2 GHz TO 18 GHz (0.2 TO 18 GHz OPTIONAL)  120dB, **HIGH SPEED (≤ 1μSec), 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, **HIGH SPEED (≤ 1μSec), 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, **HIGH SPEED (≤ 1μSec), 10dB/VOLT**
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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 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**
  - SMA FEMALE RF INPUT/OUTPUT
  - 15 PIN MICRO-D SUBMINIATURE (MALE) POWER AND CONTROLS
- **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**: BUNDLED MATE CONNECTORS
- **A04**: ANALOG CONTROLLED UNIT OF 10dB/VOLT. PIN 2 IS USED AS CONTROL (OTHER CONTROL VOLTAGES AVAILABLE).
- **A05**: ±15VDC POWER SUPPLY
- **A06**: 0 TO 30 dB RANGE
- **FLATNESS**: 0 - 15dB: ±0.5dB
- **ACCURACY**: 0 - 10dB: ±2.0dB
- **A07**: EXTENDED FREQUENCY RANGE UNITS AND OPTIONS
  - 200MHz OPTION: EXTENDED BANDWIDTH (200 MHz - 18 GHz)
  - 300MHz OPTION: EXTENDED BANDWIDTH (300 MHz - 18 GHz)
  - 10MHz OPTION: EXTENDED BANDWIDTH (10 MHz - 18 GHz) WITH SLOWER SPEED
- **A08**: FREQUENCY BAND OF 2 - 8 GHz
- **A09**: 12 BIT TRUE BINARY LOGIC
- **A10**: 10 BIT TRUE BINARY LOGIC
- **A11**: 12 BIT TRUE BINARY LOGIC
- **A12**: 12 BIT TRUE BINARY LOGIC
- **A13**: FREQUENCY BAND OF 10 MHz - 2 GHz REFER TO DATA SHEET AGTN-2000-60DD-100 (SUM LINE), FOR DIGITAL VERSION REFER TO DATA SHEET AGTN-2000-60DD-100 (SUM LINE)
- **A14**: MOUNTING SURFACE UNPAINTED
- **SCS**: SPECIAL CUSTOMER SPECIFICATIONS

NOTES: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION.
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 (+/- 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 nsec (500 nsec typical)
- VSWR: 2.2:1 maximum
- RF Power Ratings:
  - Operating: +20 dBm CW maximum
  - Survival: +10 dBm (0.3 GHz or below)
- Control: 8 bit true binary logic
- Power Supply: +12VDC @ 250 mA maximum, 210 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 PAINTED
A05: +/-15VDC POWER SUPPLY
A06: 0 TO 30 dB RANGE
  - Flatness: 0 - 15 dB: +/-0.5 dB
  - Accuracy: 0 - 10 dB: +/-2.0 dB
  - 15 - 20 dB: +/-1.0 dB
  - 20 - 25 dB: +/-1.5 dB
  - 25 - 30 dB: +/-2.0 dB
A07: EXTENDED FREQUENCY RANGE UNITS AND OPTIONS
  - 200MHz Option: EXTENDED BANDWIDTH (200 MHz <= 18 GHz)
  - 300MHz Option: EXTENDED BANDWIDTH (300 MHz <= 18 GHz)
  - 10MHz Option: EXTENDED BANDWIDTH (10 MHz <= 18 GHz) WITH SLOWER SPEED REFER TO DATA SHEET AGTN-2018-600-100 (DIGITAL CONTROL) OR AGTN-2018-600-100 (SOLDER PIN ANALOG CONTROLLED).
  - 219 Option: EXTENDED BANDWIDTH (2 GHz <= 19 GHz)
A09: FREQUENCY BAND OF 2 - 8 GHz
A09: 8 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 AGTN-2000-600-100 (SUM LINE). FOR DIGITAL VERSION REFER TO DATA SHEET AGTN-2000-600-100 (SUM LINE) AND SPECIAL CUSTOMER SPECIFICATIONS

ENVIRONMENTAL RATINGS
- Temperature: -55°C TO +125°C (OPERATING)
- -55°C TO +125°C (STORAGE)
- Humidity: MIL-STD-202F, METHOD 1033 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
7316 GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

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

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

DATE: 09/03/97
APPROVED: AKG
**DESCRIPTION**

AUC MODEL AGT-2018-80DD-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**: 6.0 dB MAXIMUM
- **ATTENUATION FLATNESS** (± dB MAXIMUM) 0-30 dB ±1.0 dB MAXIMUM
  30-40 dB ±1.5 dB MAXIMUM
  40-50 dB ±2.5 dB MAXIMUM
  50-60 dB ±4.0 dB MAXIMUM
  60-70 dB ±6.0 dB MAXIMUM
  70-80 dB ±8.0 dB MAXIMUM
  80-90 dB ±10.0 dB MAXIMUM

- **ATTENUATION ACCURACY**: ±2 dB MAXIMUM
- **SWITCHING TIME**: <1 µsec (500 nsec TYPICAL)
- **VSWR**: 2.1:1 MAXIMUM
- **RF POWER RATINGS**
  - **OPERATING**: +20 dBm CW MAXIMUM
  - **SURVIVAL**: +10 dBm (0.3 GHz OR BELOW)
- **CONTROL**: 9 BIT TRUE BINARY LOGIC
- **POWER SUPPLY**: ±12VDC @ 375 mA MAXIMUM
- **CONNECTORS**: SMA FEMALE
- **POWER AND CONTROLS**: 15 PIN MICRO D SUBMINIATURE (MALE)
- **SOLDERING NOTES**: 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 AS CONTROL (OTHER CONTROL VOLTAGES AVAILABLE). 
  FOR SOLDER PIN UNITS REFER TO DATA SHEET AGT-2018-80DD-100.

**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 2040 COND B
- **ALTITUDE**: MIL-STD-202F, METHOD 103C 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**
AGT-2018-80DD-100
2-18 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

**NOTES:**
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES: XXX ±0.020
3) WEIGHT: APPROX. 4.0 OZ

**REV. A**
8/10/97

**SCS**: SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION
**DESCRIPTION**

AMC Model AGTN-2018-120DD-100 is a broad band, mobile 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** (±1 dB maximum):
  - 0-30 dB ±1.0 dB maximum
  - 30-60 dB ±1.5 dB maximum
  - 60-120 dB ±2.5 dB maximum
- **Attenuation accuracy**: 0-20 dB ±2.5 dB maximum
- **Switching time**: <1 μsec (500 nsec typical)
- **VSWR**: 2.2:1 maximum
- **RF power ratings**:
  - Operating: +20 dBm CW maximum
  - Survivability: +30 dBm CW maximum
- **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)
- **Size**: 3.00" x 2.50" x 0.5"

**AVAILABLE OPTIONS**

**AD1**: Two SMA MALE RF Connectors
**AD2**: J1 SMA MALE, J2 SMA FEMALE
**AD3**: Mounting surface unpainted
**AD4**: 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-2018-120DD-100.
**AD5**: ±10VDC POWER SUPPLY
**AD6**: 0-30 dB RANGE
- **FLATNESS**: 0 - 15dB: ±0.5dB
- **ACCURACY**: 0 - 10dB: ±2.5dB
- 15 - 20dB: ±1.0dB
- 20 - 25dB: ±1.5dB
- 25 - 30dB: ±2.0dB
**AD7**: Extended frequency range units and options
  - 200MHz Option: Extended bandwidth (200 MHz to 18 GHz)
  - 300MHz Option: Extended bandwidth (300 MHz to 18 GHz)
  - 10MHz Option: Extended bandwidth (10 MHz to 18 GHz) with slower speed
  - Refer to data sheets AGTN-2018-120DD-100 (digital control)
**AD8**: 219 Option: Extended bandwidth (2 GHz to 19 GHz)
**AD9**: 8-bit true binary logic
**AD10**: Frequency band of 2 - 8 GHz
**AD11**: 10 bit true binary logic
**AD12**: 11 bit true binary logic
**AD13**: Frequency band of 10 MHz - 2 GHz refer to data sheet AGTN-2000-120DD-100 (SLIM LINE), for digital version refer to data sheet AGTN-2000-120DD-100 (SLIM LINE)
**AD14**: Latching strobe (not available with option AD12)
**SCS**: Special customer specifications

**NOTES**

1. Dimensions are in inches
2. Tolerances: X.XX ±0.020
3. Weight: Approx. 4.0 oz

**ENVIRONMENTAL RATING**

- **Temperature**: -55°C TO +125°C (OPERATING)
- **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**

7316 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

**SIZE** A

**SHEET** 1 OF 2

**DWG.** # 100-4259
DESCRIPTION

AUC 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 30-60 dB ±1.0 dB MAXIMUM
- ATTENUATION FLATNESS 40-90 dB ±2.0 dB MAXIMUM
- ATTENUATION FLATNESS 50-60 dB ±3.0 dB MAXIMUM
- ATTENUATION FLATNESS 0-30 dB ±4.5 dB MAXIMUM
- ATTENUATION FLATNESS 10-20 dB ±1.0 dB MAXIMUM
- ATTENUATION FLATNESS 20-40 dB ±1.5 dB MAXIMUM
- ATTENUATION FLATNESS 40-60 dB ±2.0 dB MAXIMUM
- ATTENUATION FLATNESS 0-10 dB ±2.0 dB MAXIMUM
- ATTENUATION FLATNESS 0-100 dB ±5.0 dB MAXIMUM
- SWITCHING TIME <1 nsec (500 nsec TYPICAL)
- VSWR 2.2:1 MAXIMUM
- RF POWER RATINGS
  - OPERATING +20 dBm CW MAXIMUM
  - SURVIVAL +10 dBm (0.3 GHz OR BELOW)
  - +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 ±15VDC POWER SUPPLY
A06 0 TO 30 dB RISE TIME
A07 15dB: ±0.5dB ACCURACY: 0 - 10dB: ±2.0dB
A08 20dB: ±1.0dB 10 - 20dB: ±1.0dB
A09 25dB: ±1.5dB 20 - 30dB: ±1.5dB
A10 30dB: ±2.0dB
A11 EXTENDED FREQUENCY RANGE UNIT AND OPTIONS
  - 20MHz OPTION EXTENDED BANDWIDTH (20 MHz - 18 GHz)
  - 30MHz OPTION EXTENDED BANDWIDTH (30 MHz - 18 GHz)
  - 10MHz OPTION EXTENDED BANDWIDTH (10 MHz - 18 GHz), WITH SLOWER SPEED REFER TO ACT-2018-600-100 (SLIM LINE). FOR DIGITAL CONTROLLED UNIT REFER TO ACT-2018-600-100 (SLIM LINE).
  - 219 OPTION EXTENDED BANDWIDTH (2 MHz - 19 GHz)
A12 FREQUENCY BAND OF 2-6 GHz
A13 FREQUENCY BAND OF 10 MHz - 2 GHz REFER TO DATA SHEET ACT-2000-600-100 (SLIM LINE), FOR DIGITAL VERSION REFER TO DATA SHEET ACT-2000-600-100 (SLIM LINE)
A14 FOR HIGH SPEED <1 nsec DIGITAL CONTROLLED UNITS AND EXTENDED FREQUENCY RANGE REFER TO DATA SHEET ACT-2018-600-100 (SLIM LINE).
A15 MOUNTING SURFACE UNPAINTED
A16 SPECIAL CUSTOMER SPECIFICATIONS

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

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

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

REVOCABLE SMA F (2 PLACES)
RF PIN 2 PLACES

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

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

AMC Model AGTN-2018-600 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 (± 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: ±5.0 dB maximum
- Attenuation Accuracy:
  - 0-10 dB: ±2.0 dB maximum
  - 10-20 dB: ±1.5 dB maximum
  - 20-40 dB: ±1.0 dB maximum
  - 40-60 dB: ±2.0 dB maximum
- Switching Time: ≤1 µsec (500 msec typical)
- VSWR: 2.2:1 maximum
- RF Power Ratings:
  - Operating: +20 dBm CW maximum
  - Survival: +10 dBm (0.3 GHz or below)
  - +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 0.86"

AVAILABLE OPTIONS

- A01: Two SMA male RF connectors
- A02: J1 SMA male, J2 SMA female
- A03: Mounting surface unainted
- A04: 5dB/Volt sensitivity
- A05: ±15VDC power supply
- A06: 0 to 30 dB range
- A07: Extended frequency range unit and options
  - 200MHz option: Extended bandwidth (200 MHz to 18 GHz)
  - 300MHz option: Extended bandwidth (300 MHz to 18 GHz)
  - 10MHz option: Extended bandwidth (10 MHz to 18 GHz), with slower speed refer to AGTN-2018-600-100 (SLIM LINE), for digital controlled unit refer to AGTN-2018-600-100 (SLIM LINE)
- A08: 219 option: Extended bandwidth (2 GHz to 19 GHz)
- A09: Frequency band of 2 - 8 GHz
- A10: Frequency band of 10 MHz to 2 GHz refer to data sheet AGTN-2000-600-100 (SLIM LINE), for digital version refer to data sheet AGTN-2000-600-100 (SLIM LINE)
- A11: For high speed ≤1 µsec digital controlled units and extended frequency range refer to data sheet AGTN-2018-600-100 (SLIM LINE)
- SCS: Special customer specifications

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION.
## DIGITAL CONTROLLED ATTENUATORS

<table>
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<td>60dB, 8 BIT DIGITAL</td>
<td>AGT-2000-60DD</td>
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<td>60dB, 8 BIT DIGITAL</td>
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## VOLTAGE CONTROLLED ATTENUATORS

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<td>60dB, SLIM LINE, 10dB/VOLT</td>
<td>AGT-2000-60D-100</td>
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<td>4.7</td>
<td>10 MHz TO 2.0 GHz</td>
<td>60dB, 10dB/VOLT</td>
<td>AGT-2000-60D</td>
<td>4-16 TO 4-17</td>
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<td>4.8</td>
<td>10 MHz TO 2.0 GHz</td>
<td>70dB, 10dB/VOLT</td>
<td>AGT-2000-70D</td>
<td>4-18 TO 4-19</td>
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<tr>
<td>4.9</td>
<td>2.0 GHz TO 18 GHz (10 MHz TO 18 GHz OPTIONAL)</td>
<td>60dB, SLIM LINE, 10dB/VOLT</td>
<td>AGT-2000-60D-100</td>
<td>4-20 TO 4-21</td>
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<td>4.10</td>
<td>0.3 GHz TO 18 GHz</td>
<td>60dB, 10dB/VOLT</td>
<td>AGT-2000-60D</td>
<td>4-22 TO 4-24</td>
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</table>

4-0
**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** .............. 0-30 db ±0.5 db MAXIMUM
  (± 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 μsec OFF: 10 μsec
- **VSFR** .......................... 2.0:1 MAXIMUM, 1.75 TYPICAL
  (@ 0 db ATTENUATION)
- **RF POWER RATING** ................. 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**

**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-2000-60DD-100
10 MHz - 2 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

**NOTES:**

1) DIMENSIONS ARE IN INCHES
2) TOLERANCES: XXX ±0.020
XXX ±0.010

**DIAGRAM:**

[Diagram of the attenuator showing pin configurations and dimensions]

**REVISIONS:**

[Revision history]

**APPROVED:**

[Approval details]

[Signature]

[Date]
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 (± 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 μsec
  - OFF: 10 μsec
- **VSWR**:
  - 2.0:1 MAXIMUM, 1.75 TYPICAL
  - (20 dB ATTENUATION)
- **RF POWER RATINGS**
  - OPERATING: +10 dBm CW MAXIMUM
  - SURVIVAL: +20 dBm TYPICAL
- **CONTROL**:
  - 8 BIT TRUE BINARY LOGIC
- **POWER SUPPLY**:
  - 12VDC @ 250 mA MAXIMUM (210 mA TYPICAL)
  - 5VDC @ 50 mA MAXIMUM (30 mA TYPICAL)
- **CONNECTORS**
  - RF INPUT/OUTPUT: SMA FEMALE
  - POWER AND CONTROLS: 15 PIN D-SUBMINIATURE CONNECTOR (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 UNITS OF 2–18 GHz, 2–19 GHz, 0.3–18 GHz, 0.2–18 GHz:
  - 10 MHz–18 GHz REFER TO AGT-2000-60DD-100 (SLIM LINE)
  - DATA SHEET FOR ANALOG VOLTAGE CONTROLLED UNITS WITH SOLDER PINS REFER TO AGT-2000-60DD (SLIM LINE).
- A04: MOUNTING SURFACE UNPAINTED
- A05: ±5 VDC POWER SUPPLY
- A06: 0 TO 30 dB RANGE
- A07: FOR HIGH SPEED UNITS OF 11 μsec 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-2000-60DD-100 (SLIM LINE), FOR ANALOG VOLTAGE CONTROLLED UNIT WITH SOLDER PINS REFER TO AGT-2000-60DD-100 (SLIM LINE)
- A08: ANALOG CONTROLLED UNIT-T0 DBVOLT PINS 2 IS USED AS CONTROL, OTHER VOLTAGES AVAILABLE FOR SOLDER PIN UNITS REFER TO AGT-2000-60DD-100 (SLIM LINE).
- A09: 4 BIT TRUE BINARY LOGIC
- A10: 8 BIT TRUE BINARY LOGIC
- A11: 12 BIT TRUE BINARY LOGIC
- A12: 16 BIT TRUE BINARY LOGIC
- SCS: SPECIAL CUSTOMER SPECIFICATION

NOTES: 1) DIMENSIONS ARE IN INCHES
2) TOLERANCES: ±0.020
3) WEIGHT: APPROX. 4.0 OZ

ENVIRONMENTAL RATING

- **TEMPERATURE**: −55°C TO +125°C (OPERATING)
- **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 205C COND. B
- **TEMPERATURE CYCLE**: MIL-STD-202F, METHOD 1070 COND. A

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

PRODUCT FEATURE

AGT-2000-60DD
10 MHz – 2.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR
AMC MODEL AGT-2000-70DD IS A BROAD BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 10 BIT TRUE POSITIVE TRUE BINARY LOGIC.

SPECIFICATIONS

- **FREQUENCY RANGE**: 10 MHz – 2.0 GHz MINIMUM
- **INSERTION LOSS**: 2.5 dB MAXIMUM
- **ATTENUATION FLATNESS** (±0.5 dB MAXIMUM):
  - 0–30 dB ±0.5 dB MAXIMUM
  - 30–70 dB ±1.5 dB MAXIMUM
  - 70–120 dB ±2.5 dB MAXIMUM
- **ATTENUATION ACCURACY**:
  - 0–10 dB ±2.0 dB MAXIMUM
  - 10–50 dB ±1.5 dB MAXIMUM
  - 50–120 dB ±2.0 dB MAXIMUM
- **SWITCHING TIME**: 0N: 25 μsec OFF: 10 μsec
- **VSWR**: 2.6:1 MAXIMUM, 1.75 TYPICAL (4dB 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
- **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 (SUM LINE).
  FOR ANALOG VOLTAGE CONTROLLED UNIT WITH SOLDER PINS REFER TO AGT-2018-60DD-100 (SUM 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
  10N18: 10 MHz TO 18 GHz
- **A08**: ANALOG CONTROLLED UNIT – 10/AVOLT PIN 2 IS USED AS CONTROL
  (OTHER CONTROL VOLTAGES AVAILABLE). FOR SOLDER PIN UNITS
  REFER TO AGT-2000-70DD.
- **A09**: HIGH SPEED UNIT ≤ 1 nSEC, DIGITAL CONTROLLED, EXTENDED BANDWIDTH AND 60 dB ATTENUATION RANGE REFER TO DATA SHEET AGT-2018-60DD-100 (SUM LINE).
  FOR ANALOG VOLTAGE CONTROLLED UNITS WITH SOLDER PINS REFER TO
  AGT-2018-60DD-100 (SUM LINE). (SPECIFY FREQUENCY 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!
**SPECIFICATIONS**

- **Frequency Range**: 2.0-18.0 GHz minimum
- **Insertion Loss**: 4.5 dB maximum
- **Attenuation Flatness**: 0-30 dB ±1.0 dB maximum
- **Attenuation Accuracy**: 0-10 dB ±2.0 dB maximum
- **Rise & Fall Time**: 3 ns MAXIMUM
- **VSWR**: 2.2:1 MAXIMUM
- **RF Power Ratings**: 10 dBm CW MAXIMUM, 20 dBm 18 GHz or below
- **Power Supply**: +12VDC @ 50mA MAXIMUM, 210mA TYPICAL
- **Connectors**: SMA FEMALE
- **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
- A05: ±15VDC POWER SUPPLY
- A06: 0 TO 30 DB RANGE FLATNESS: 0 - 10dB: ±0.5dB ACCURACY: 10 - 20dB: ±1.0dB 20 - 25dB: ±1.5dB 25 - 30dB: ±2.0dB
- A07: EXTENDED FREQUENCY RANGE UNITS AND OPTIONS
  - 200MHz OPTION: EXTENDED BANDWIDTH (200 MHz - 18 GHz)
  - 300MHz OPTION: EXTENDED BANDWIDTH (300 MHz - 18 GHz)
  - 10MHz OPTION: EXTENDED BANDWIDTH (10 MHz - 18 GHz) REFER TO DATA SHEETS AGT-2018-60DD-100 (DIGITAL CONTROL) OR AGT-2018-60DD-100 (SOLDER PIN ANALOG CONTROLLED).
- 219 OPTION: EXTENDED BANDWIDTH (2 GHz - 19 GHz)
- A09: ±10 BIT TRUE BINARY LOGIC
- A10: ±11 BIT TRUE BINARY LOGIC
- A11: ±12 BIT TRUE BINARY LOGIC
- A12: ±13 BIT TRUE BINARY LOGIC
- A13: FREQUENCY BAND OF 10 MHz - 18 GHz REFER TO DATA SHEET AGT-2000-60DD-100 (SLIM LINE), FOR DIGITAL VERSION REFER TO DATA SHEET AGT-2000-60DD-100 (SLIM LINE).
- A14: FOR HIGH SPEED ±10 VOLT AND EXTENDED FREQUENCY RANGE REFER TO DATA SHEET AGT-2018-60DD-100 (SLIM LINE). FOR ANALOG CONTROLLED UNITS REFER TO AGT-2018-60DD-100 (SLIM LINE).
- A15: SPECIAL CUSTOMER SPECIFICATIONS

**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 107C Cond. A

**PRODUCT FEATURES**

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

**SCS**: SPECIAL CUSTOMER SPECIFICATIONS

**NOTES**

1. Dimensions are in inches
2. Tolerances: ±0.020
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

7311 G 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)  
Power Handling (Survival): +10 dBm, (0.3 - 2 GHz) Option 007 only  
          +30 dBm, Survival  
Rise and Fall Time: 3 microseconds, Maximum  
Monotonicity: Guaranteed  
Control Characteristics: 8 Bit Positive, True Binary. See Table 1  
Power Supply Requirements: +12V, ±5% @ 250 mA Maximum, 210 mA Typical  
          -12V, ±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:
   Insertion Loss: 3.5 dB Maximum  
   Flatness: 0 - 15 dB ±0.5 dB  
          15 - 20 dB ±1.0 dB  
          20 - 25 dB ±1.5 dB  
          25 - 30 dB ±2.0 dB  
   Accuracy: 0 - 10 dB ±2.0 dB  
          10 - 20 dB ±1.0 dB  
          20 - 30 dB ±1.5 dB

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

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<td>PIN NO.</td>
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<tr>
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<td>14.</td>
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PROGRAMMING: POSITIVE TRUE, BINARY

REVISED  
OCTOBER 9, 1997  

4-11
**AVAILABLE OPTIONS**

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<tr>
<th>Option No.</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>001</td>
<td>Two SMA male RF connectors</td>
</tr>
<tr>
<td>002</td>
<td>One SMA male and one SMA female RF connector</td>
</tr>
<tr>
<td>003</td>
<td>SMA female control connector</td>
</tr>
<tr>
<td>005</td>
<td>± 15V DC power supply</td>
</tr>
<tr>
<td>006</td>
<td>0 – 30 dB range (see Note 2)</td>
</tr>
<tr>
<td>007</td>
<td>Extend frequency band 0.3 – 18 GHz (see Note 3)</td>
</tr>
<tr>
<td>008</td>
<td>Frequency Band 2 – 8 GHz</td>
</tr>
</tbody>
</table>

**MECHANICAL DATA**

ITT CANNON
DA-15P WITH
D11051 JACKPOSTS.
MATING CONNECTOR
FURNISHED.

WEIGHT: 85 Grams (307) approx.
TOLERANCES: XX ± .02 inches
XXX ± .005 inches

**ENVIRONMENTAL RATINGS**

Temperature Range:
- Operating: -55°C to +125°C
- Storage: -65°C to +125°C

(95 Hrs. @ 95%)

(75G, 6 msec)

(.06" double amplitude or 15G whichever is less).

(50,000 ft.)


REVISED
OCTOBER 9, 1997
**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**: 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 μsec OFF: 10 μsec
- **VSWR**: 2.0:1 MAXIMUM, 1.75 TYPICAL (@ 0dB ATTENUATION)
- **RF POWER RATINGS**
  - OPERATING SURVIVAL:
  - +10 dBm CW MAXIMUM, +20 dBm TYPICAL
  - +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, 10 MHz-18 GHz REFER TO AGT-2000-60D-100 (SLIM LINE) DATA SHEET. FOR DIGITAL CONTROLLED UNITS REFER TO AGT-2000-60D-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 μsec AND EXTENDED FREQUENCY RANGE UNITS OF 2-18 GHz, 2-19 GHz, 0.3-18 GHz AND 0.2-18 GHz REFER TO AGT-2000-60D-100 (SLIM LINE). FOR DIGITAL CONTROLLED UNITS REFER TO AGT-2000-60D-100 (SLIM LINE).
A08: FOR DIGITAL CONTROLLED UNIT REFER TO AGT-2000-60D-100 DATA SHEET
A09: MOUNTING SURFACE UNPAINTED
A10: BLIND MATE CONNECTORS
SCS: SPECIAL CUSTOMER SPECIFICATIONS

**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**
7311 G GROVE RD., FREDERICK, MD. 21701
TEL: (301) 682-4700 FAX: (301) 682-4938

**PRODUCT FEATURE**

AGT-2000-60D-100
10 MHz - 2 GHz, VOLTAGE VARIABLE ATTENUATOR

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

**NOTE:** THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION.
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: 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 µsec OFF: 10 µsec
- 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-2018-600-100 (SLIM LINE VERSION) DATA SHEETS. FOR DIGITAL CONTROL REFER TO AGT-2018-600D-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 µsec AND EXTENDED FREQUENCY RANGE UNITS OF 2-18 GHz, 2-19 GHz, 0.3-18 GHz AND 0.2-18 GHz REFER TO AGT-2018-600-100 (SLIM LINE). FOR DIGITAL CONTROLLED UNITS REFER TO DATA SHEETS AGT-2018-600D-100 (SLIM LINE)
A08: FOR DIGITAL CONTROL UNITS REFER TO AGT-2000-600D-100 (SLIM LINE VERSION) DATA SHEETS.
A09: MOUNTING SURFACE UNPAINTED
SCS: SPECIAL CUSTOMER SPECIFICATIONS (WHICH SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION)

ENVIRONMENTAL RATINGS

- TEMPERATURE: -55°C TO +125°C (OPERATING)
  -65°C TO +125°C (STORAGE)
- HUMIDITY: MIL-STD-202F, METHOD 1038 COND. B
- SHOCK: MIL-STD-202F, METHOD 213B COND. B
- VIBRATION: MIL-STD-202F, METHOD 214D 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
10 MHz - 2 GHz, VOLTAGE VARIABLE ATTENUATOR
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**:
  - Maximum: 0 - 30 dB ±0.5 dB MAXIMUM
  - Maximum: 30 - 50 dB ±1.5 dB MAXIMUM
  - Maximum: 50 - 70 dB ±2.5 dB MAXIMUM
- **Attenuation Accuracy**:
  - Maximum: 0 - 10 dB ±2.0 dB MAXIMUM
  - Maximum: 10 - 20 dB ±1.0 dB MAXIMUM
  - Maximum: 20 - 50 dB ±1.5 dB MAXIMUM
  - Maximum: 50 - 70 dB ±2.0 dB MAXIMUM
- **Switching Time**: On: 25 μsec Off: 10 μsec
- **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 Power**: 10dB/VOLT ANALOG CONTROLLED (other control voltages available)
- **Power Supply**: +15VDC @ 250 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-2000-70DD 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-2016-600-100 (SLIM LINE). FOR DIGITAL CONTROLLED UNIT REFER TO AGT-2016-600-100 (SLIM LINE). (SPECIFY FREQUENCY)
  - 218: 2 GHz TO 18 GHz
  - 219: 2 GHz TO 19 GHz
  - 300M18: 200 MHz TO 18 GHz
  - 300M19: 300 MHz TO 18 GHz
  - 10M18: 10 MHz TO 18 GHz
- A07: HIGH SPEED UNIT (≤1μSEC) AND 60 dB ATTENUATION RANGE REFER TO DATA SHEETS AGT-2016-600-100 (SLIM LINE). FOR DIGITAL CONTROLLED UNITS REFER TO AGT-2016-600-100 (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

ENVIRONMENTAL RATINGS

- **Temperature**: -55°C TO +125°C (OPERATING)
  - -65°C TO +125°C (STORAGE)
- **Humidity**: MIL-STD-202F, METHOD 1038, 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
7311 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 1

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION.
DESCRIPTION

AMC model ACT-2018-600-100 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 (± 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 ± 4.5 dB maximum
  - 60 – 80 dB ± 6.0 dB maximum
  - 80 – 100 dB ± 7.0 dB maximum
- **Attenuation Accuracy**: 10 dB (0.3 GHz or below)
- **Rise & Fall Time**: 3 μsec maximum
- **VSWR**: 2.2:1 maximum
- **RF Power Ratings**: 20 dBm CW maximum
- **Survival**: +30 dBm CW maximum
- **Control**: 10dB/Volt analog controlled
- **Power Supply**:
  - +12VDC @ 250 mA maximum, 210 mA typical
  - -12VDC @ 50 mA maximum, 30 mA typical
- **Connectors**: 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**: ±5 dB/Volt sensitivity
- **A05**: ±15VDC power supply
- **A06**: 0 to 30 dB range
  - Flatness: 0 – 10 dB: ±0.5 dB
  - Accuracy: 10 – 20 dB: ±1.0 dB
  - 20 – 30 dB: ±1.5 dB
  - 30 – 40 dB: ±2.0 dB
- **A07**: Extended frequency range unit and options
  - 200 MHz option
  - 300 MHz option
  - 600 MHz option
- **A08**: Frequency band of 2 – 18 GHz
- **A09**: Frequency band of 10 MHz – 2 GHz refer to data sheet AGT-2000-600-100 (SLIM LINE), for digital version refer to data sheet AGT-2000-600D-100 (SLIM LINE)
- **A10**: For high speed ±1 μsec digital controlled units and extended frequency range refer to data sheet AGT-2018-6000-100 (SLIM LINE)
- **A11**: Mounting surface unpainted
- **A12**: For digital controlled units refer to AGT-2018-6000-100
- **SCS**: Special customer specifications

Notes:

1) Dimensions are in inches
2) Tolerances: ±0.020 in ±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 1070 Cond. A

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

PRODUCT FEATURE

ACT-2018-600-100
2-18 GHz, voltage variable attenuator
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

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OCTOBER 9, 1997

7311 G 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, ±5% @ 250 mA Maximum, 210 mA Typical
-12V, ±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
   15 - 20 dB ±1.0 dB
   20 - 25 dB ±1.5 dB
   25 - 30 dB ±2.0 dB
   Accuracy: 0 - 10 dB ±2.0 dB
   10 - 20 dB ±1.0 dB
   20 - 30 dB ±1.5 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°C
Storage: -65°C to +125°C
(96 Hrs. @ 95%)
(75G, 6 msec)
(.05" double amplitude or 15G whichever is less).
(50,000 ft.)

REVISED
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AVAILABLE OPTIONS

<table>
<thead>
<tr>
<th>Option No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>Two SMA male RF connectors</td>
</tr>
<tr>
<td>002</td>
<td>One SMA male and one SMA female RF connector</td>
</tr>
<tr>
<td>003</td>
<td>SMA female control connector</td>
</tr>
<tr>
<td>004</td>
<td>5 dB/Volt sensitivity</td>
</tr>
<tr>
<td>005</td>
<td>± 15V DC power supply</td>
</tr>
<tr>
<td>006</td>
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</tr>
<tr>
<td>007</td>
<td>Extend frequency band 0.3 - 1.8 GHz (see Note 3)</td>
</tr>
<tr>
<td>008</td>
<td>Frequency Band 2 - 8 GHz</td>
</tr>
</tbody>
</table>

MECHANICAL DATA
Dimensions and Weights

WEIGHT: 35 GRAMS (3 OZ.) APPROX.

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

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### PRODUCT DESCRIPTION

#### 5.0 0.5 TO 18 GHz

**HIGH SPEED (< 1µSec) DVAN, VVAN, CVAN-OCTAVE BAND, VARIABLE ATTENUATOR SERIES. SIZE: 1.8" x 2.0" x 0.5")**

- **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, 500ns HIGH SPEED, 60dB DYNAMIC RANGE,**

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

ABSORPTIVE PIN DIODE ATTENUATORS WITH REMOVABLE SMA RF CONNECTORS FOR SURFACE MOUNT CAPABILITY .......................... 5-4

#### 5.2 0.5 TO 18 GHz

**(DVAN/VVAN/CVAN) SPECIFICATIONS: (E : EXTENDED BAND)**

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<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>MODEL NUMBER</th>
</tr>
</thead>
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<td>5.2.1 0.5 TO 1 GHz</td>
<td>0510</td>
</tr>
<tr>
<td>0.4 TO 1.25 GHz</td>
<td>0510E</td>
</tr>
<tr>
<td>5.2.2 1 TO 2 GHz</td>
<td>1020</td>
</tr>
<tr>
<td>0.75 TO 2.25 GHz</td>
<td>1020E</td>
</tr>
<tr>
<td>5.2.3 2 TO 4 GHz</td>
<td>2040</td>
</tr>
<tr>
<td>1.5 TO 4.5 GHz</td>
<td>2040E</td>
</tr>
<tr>
<td>5.2.4 2.5 TO 5 GHz</td>
<td>2550</td>
</tr>
<tr>
<td>1.9 TO 5.6 GHz</td>
<td>2550E</td>
</tr>
<tr>
<td>5.2.5 4 TO 8 GHz</td>
<td>4080</td>
</tr>
<tr>
<td>3 TO 9 GHz</td>
<td>4080E</td>
</tr>
<tr>
<td>5.2.6 5 TO 10 GHz</td>
<td>5010</td>
</tr>
<tr>
<td>3.75 TO 11.25 GHz</td>
<td>5010E</td>
</tr>
<tr>
<td>5.2.7 6 TO 12 GHz</td>
<td>6012</td>
</tr>
<tr>
<td>4.5 TO 13 GHz</td>
<td>6012E</td>
</tr>
<tr>
<td>5.2.8 8 TO 18 GHz</td>
<td>8018</td>
</tr>
<tr>
<td>6 TO 18 GHz</td>
<td>8018E</td>
</tr>
</tbody>
</table>

#### 5.3 0.5 TO 18 GHz

**DVAN/VVAN/CVAN 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:**

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>MODEL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.4.1 0.5 TO 1.0 GHz</td>
<td>DVAN-0510-60-8</td>
</tr>
<tr>
<td>1.0 TO 2.0 GHz</td>
<td>DVAN-1020-60-8</td>
</tr>
<tr>
<td>5.4.2 2.0 TO 4.0 GHz</td>
<td>DVAN-2040-60-8</td>
</tr>
<tr>
<td>2.5 TO 5.0 GHz</td>
<td>DVAN-2550-60-8</td>
</tr>
</tbody>
</table>

5-0
5.4.3 | 4.0 TO 8.0 GHz | DVAN-4080-60-8
| 5.0 TO 10.0 GHz | DVAN-5010-60-8
| 6.0 TO 12.0 GHz | 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 VVAN (VOLTAGE VARIABLE ATTENUATOR) MODELS WITH MULTIPIN CONNECTORS:

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<th>FREQUENCY RANGE</th>
<th>MODEL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
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<td>VVAN-0510-60-MP</td>
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<tr>
<td>1.0 TO 2.0 GHz</td>
<td>VVAN-1020-60-MP ............................................. 5-13</td>
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<tr>
<td>5.5.2 2.0 TO 4.0 GHz</td>
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<tr>
<td>2.5 TO 5.0 GHz</td>
<td>VVAN-2550-60-MP ............................................. 5-13</td>
</tr>
<tr>
<td>5.5.3 4.0 TO 8.0 GHz</td>
<td>VVAN-4080-60-MP</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>VVAN-5010-60-MP</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>VVAN-6012-60-MP ............................................. 5-14</td>
</tr>
<tr>
<td>5.5.4 8.0 TO 18.0 GHz</td>
<td>VVAN-8018-60-MP ............................................. 5-14</td>
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</tbody>
</table>

5.6 | 0.5 TO 18 GHz | OTHER CONTROL CONNECTOR OPTIONS AVAILABLE ON VVAN (VOLTAGE VARIABLE) 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 VVAN (VOLTAGE VARIABLE ATTENUATOR) MODELS WITH OPTIONAL CONTROL CONNECTORS:
- SOLDER PIN CONTROL CONNECTOR

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>MODEL NUMBER</th>
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<tbody>
<tr>
<td>5.7.1 0.5 TO 1.0 GHz</td>
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<tr>
<td>1.0 TO 2.0 GHz</td>
<td>VVAN-1020-60-SP ............................................. 5-17</td>
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<tr>
<td>5.7.2 2.0 TO 4.0 GHz</td>
<td>VVAN-2040-60-SP</td>
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<tr>
<td>2.5 TO 5.0 GHz</td>
<td>VVAN-2550-60-SP ............................................. 5-18</td>
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<tr>
<td>5.7.3 4.0 TO 8.0 GHz</td>
<td>VVAN-4080-60-SP</td>
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<tr>
<td>5.0 TO 10.0 GHz</td>
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<td>6.0 TO 12.0 GHz</td>
<td>VVAN-6012-60-SP ............................................. 5-19</td>
</tr>
<tr>
<td>5.7.4 8.0 TO 18.0 GHz</td>
<td>VVAN-8018-60-SP ............................................. 5-20</td>
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</tbody>
</table>
### PRODUCT DESCRIPTION

#### SMA CONTROL CONNECTOR

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

#### SMC CONTROL CONNECTOR

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>MODEL NUMBER</th>
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<td>5.7.9 0.5 TO 1.0 GHz</td>
<td>VVAN-0510-60-SMC</td>
<td>5-21</td>
</tr>
<tr>
<td>1.0 TO 2.0 GHz</td>
<td>VVAN-1020-60-SMC</td>
<td></td>
</tr>
<tr>
<td>5.7.10 2.0 TO 4.0 GHz</td>
<td>VVAN-2040-60-SMC</td>
<td></td>
</tr>
<tr>
<td>2.5 TO 5.0 GHz</td>
<td>VVAN-2550-60-SMC</td>
<td>5-22</td>
</tr>
<tr>
<td>5.7.11 4.0 TO 8.0 GHz</td>
<td>VVAN-4080-60-SMC</td>
<td></td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>VVAN-5010-60-SMC</td>
<td></td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>VVAN-6012-60-SMC</td>
<td>5-23</td>
</tr>
<tr>
<td>5.7.12 8.0 TO 18.0 GHz</td>
<td>VVAN-8018-60-SMC</td>
<td>5-24</td>
</tr>
</tbody>
</table>
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. E. GorwarA
REPORTED BY
P. D. Wood
JANUARY 29, 1996

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

<table>
<thead>
<tr>
<th>MODEL # (DVAN/VVAN)</th>
<th>FREQUENCY RANGE</th>
<th>INSERTION LOSS dB</th>
<th>VSWR (Max)</th>
<th>FLATNESS @ 10dB</th>
<th>FLATNESS @ 20dB</th>
<th>FLATNESS @ 40dB</th>
<th>FLATNESS @ 60dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>0510</td>
<td>0.5 to 1.0 GHz</td>
<td>2.0 dB</td>
<td>2.0:1</td>
<td>±0.45 dB</td>
<td>±0.3 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>0510E (Extended Bandwidth)</td>
<td>0.4 to 1.25 GHz</td>
<td>2.5 dB</td>
<td>2.2:1</td>
<td>±0.45 dB</td>
<td>±0.3 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>1020</td>
<td>1.0 to 2.0 GHz</td>
<td>2.0 dB</td>
<td>2.0:1</td>
<td>±0.45 dB</td>
<td>±0.8 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>1020E (Extended Bandwidth)</td>
<td>0.75 to 2.25 GHz</td>
<td>2.5 dB</td>
<td>2.2:1</td>
<td>±0.45 dB</td>
<td>±0.3 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>2040</td>
<td>2.0 to 4.0 GHz</td>
<td>2.0 dB</td>
<td>2.0:1</td>
<td>±0.45 dB</td>
<td>±0.8 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>2040E (Extended Bandwidth)</td>
<td>1.5 to 4.5 GHz</td>
<td>2.5 dB</td>
<td>2.2:1</td>
<td>±0.45 dB</td>
<td>±0.3 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>2550</td>
<td>2.5 to 5.0 GHz</td>
<td>2.1 dB</td>
<td>2.0:1</td>
<td>±0.47 dB</td>
<td>±0.87 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>2550E (Extended Bandwidth)</td>
<td>1.9 to 5.6 GHz</td>
<td>2.6 dB</td>
<td>2.3:1</td>
<td>±0.7 dB</td>
<td>±1.5 dB</td>
<td>±3.0 dB</td>
<td>±3.5 dB</td>
</tr>
<tr>
<td>4050</td>
<td>4.0 to 8.0 GHz</td>
<td>2.5 dB</td>
<td>2.0:1</td>
<td>±0.55 dB</td>
<td>±0.87 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>4050E (Extended Bandwidth)</td>
<td>3.0 to 9.0 GHz</td>
<td>2.7 dB</td>
<td>2.2:1</td>
<td>±0.75 dB</td>
<td>±1.5 dB</td>
<td>±3.0 dB</td>
<td>±3.5 dB</td>
</tr>
<tr>
<td>5010</td>
<td>5.0 to 10.0 GHz</td>
<td>2.7 dB</td>
<td>2.0:1</td>
<td>±0.6 dB</td>
<td>±0.9 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>5010E (Extended Bandwidth)</td>
<td>3.75 to 11.25 GHz</td>
<td>2.9 dB</td>
<td>2.2:1</td>
<td>±0.8 dB</td>
<td>±1.5 dB</td>
<td>±3.0 dB</td>
<td>±3.5 dB</td>
</tr>
<tr>
<td>6012</td>
<td>6.0 to 12.0 GHz</td>
<td>2.8 dB</td>
<td>2.0:1</td>
<td>±0.7 dB</td>
<td>±1.5 dB</td>
<td>±3.0 dB</td>
<td>±3.5 dB</td>
</tr>
<tr>
<td>6012E (Extended Bandwidth)</td>
<td>4.5 to 13.5 GHz</td>
<td>3.0 dB</td>
<td>2.2:1</td>
<td>±0.9 dB</td>
<td>±1.6 dB</td>
<td>±3.0 dB</td>
<td>±3.5 dB</td>
</tr>
<tr>
<td>8018</td>
<td>8.0 to 16.0 GHz</td>
<td>2.7 dB**</td>
<td>2.0:1</td>
<td>±0.8 dB</td>
<td>±1.1 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>8018E (Extended Bandwidth)</td>
<td>6.0 to 18.0 GHz</td>
<td>3.7 dB**</td>
<td>2.2:1</td>
<td>±0.9 dB</td>
<td>±1.6 dB</td>
<td>±3.0 dB</td>
<td>±3.5 dB</td>
</tr>
</tbody>
</table>

** 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

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

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

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

<table>
<thead>
<tr>
<th>MP-MULTIPIN</th>
<th>CONNECTOR PINOUT FOR VOLTAGE VARIABLE ATTENUATORS (VVAN UNITS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN 3</td>
<td>ANALOG INPUT</td>
</tr>
<tr>
<td>PIN 4</td>
<td>GROUND</td>
</tr>
<tr>
<td>PIN 13</td>
<td>+12 or +15 VDC</td>
</tr>
<tr>
<td>PIN 14</td>
<td>-12 or -15 VDC</td>
</tr>
<tr>
<td></td>
<td>ALL OTHER PINS NOT USED</td>
</tr>
</tbody>
</table>

AMERICAN MICROWAVE CORPORATION
SPECIFICATIONS:

- 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

- CONTROL : 8-BIT (STANDARD) POSITIVE TRUE BINARY (DVAN)
  (10-BIT, 11-BIT OR 12-BIT ALSO AVAILABLE) - OR -
  10dB/VOLT (STANDARD) ANALOG TRANSFER FUNCTION (V VAN)
  (5dB/VOLT TRANSFER FUNCTION ALSO AVAILABLE)

- DC POWER SUPPLY : ± 12vdc (STANDARD) OR ± 15vdc,
  @ +150 mA, -75 mA MAX (3-BIT DVAN MODEL)
  @ +125 mA, -50 mA MAX (ANALOG VVAN MODEL)

- CONNECTORS : REMOVABLE SMA FEMALE (STANDARD) FOR RF
  15-PIN MULTIPIN (STANDARD, OPTION "SP") FOR POWER AND CONTROL (SOLDER PIN CONTROLS,
  OPTION "SP", AND OTHER OPTIONS AVAILABLE)

- SIZE : 2.0" X 1.50" X 0.5"

- WEIGHT : ≤ 4 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 204D 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
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. 3, 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 Cannum 15-Pin Multiple Connector MDM-15PSF).
   • 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

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

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

5-8
# STANDARD DVAN MODELS AVAILABLE

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>MODEL NUMBER</th>
<th>CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 TO 1.0 GHz</td>
<td>DVAN-0510-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)</td>
</tr>
<tr>
<td>1.0 TO 2.0 GHz</td>
<td>DVAN-1020-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)</td>
</tr>
<tr>
<td>2.0 TO 4.0 GHz</td>
<td>DVAN-2040-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)</td>
</tr>
<tr>
<td>4.0 TO 8.0 GHz</td>
<td>DVAN-4080-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>DVAN-5010-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>DVAN-5012-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)</td>
</tr>
<tr>
<td>8.0 TO 18.0 GHz</td>
<td>DVAN-3018-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSP)</td>
</tr>
</tbody>
</table>

DVAN: DIGITALLY VARIABLE ATTENUATOR

AMERICAN MICROWAVE CORPORATION
STANDARD VVAN MODELS AVAILABLE

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

VVAN: VOLTAGE VARIABLE ATTENUATOR

AMERICAN MICROWAVE CORPORATION

5-10
TYPICAL DATA
DVAN & VVAN SERIES
60dB ABSORPTIVE ATTENUATORS

STANDARD MODEL
DVAN-0510/1020-60-8
DIGITALLY VARIABLE ATTENUATOR
(0.5 TO 1.0 GHz & 1.6 TO 2.0 GHz)

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

AMERICAN MICROWAVE CORPORATION
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 ±0.010, X.XXX ±0.010

AMERICAN MICROWAVE CORPORATION
TYPICAL DATA
DVAN & VVAN SERIES
60dB ABSORPTIVE ATTENUATORS

STANDARD MODELS
VVAN-0510/1020-60-MP
VOLTAGE VARIABLE ATTENUATOR
(0.5 TO 1.0 GHz & 1.0 TO 2.0 GHz)

STANDARD MODEL
VVAN-2040/2550-60-MP
VOLTAGE VARIABLE ATTENUATOR
(2.0 TO 4.0 GHz & 2.5 TO 5.9 GHz)

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

AMERICAN MICROWAVE CORPORATION

5-13
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.XX ±0.025, X.XXX ±0.010

AMERICAN MICROWAVE CORPORATION
AVAILABLE OPTIONS ON VVAN ATTENUATORS

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>MODEL NUMBER</th>
<th>CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 TO 1.0 GHz</td>
<td>VVAN-0510-60-SP</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; Control</td>
</tr>
<tr>
<td>0.5 TO 1.0 GHz</td>
<td>VVAN-0510-60-SMA</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMA Female Control Connector</td>
</tr>
<tr>
<td>0.5 TO 1.0 GHz</td>
<td>VVAN-0510-60-SMC</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMC Male Control Connector</td>
</tr>
<tr>
<td>1.0 TO 2.0 GHz</td>
<td>VVAN-1020-60-SP</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; Control</td>
</tr>
<tr>
<td>1.0 TO 2.0 GHz</td>
<td>VVAN-1020-60-SMA</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMA Female Control Connector</td>
</tr>
<tr>
<td>1.0 TO 2.0 GHz</td>
<td>VVAN-1020-60-SMC</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMC Male Control Connector</td>
</tr>
<tr>
<td>2.0 TO 4.0 GHz</td>
<td>VVAN-2040-60-SP</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; Control</td>
</tr>
<tr>
<td>2.0 TO 4.0 GHz</td>
<td>VVAN-2040-60-SMA</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMA Female Control Connector</td>
</tr>
<tr>
<td>2.0 TO 4.0 GHz</td>
<td>VVAN-2040-60-SMC</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMC Male Control Connector</td>
</tr>
</tbody>
</table>

VVAN : VOLTAGE VARIABLE ATTENUATOR
## AVAILABLE OPTIONS ON VVAN ATTENUATORS

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>MODEL NUMBER</th>
<th>CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0 TO 8.0 GHz</td>
<td>VVAN-4080-60-SP</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; Control</td>
</tr>
<tr>
<td>4.0 TO 8.0 GHz</td>
<td>VVAN-4080-60-SMA</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMA Female Control Connector</td>
</tr>
<tr>
<td>4.0 TO 8.0 GHz</td>
<td>VVAN-4080-60-SMC</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMC Male Control Connector</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>VVAN-5010-60-SP</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; Control</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>VVAN-5010-60-SMA</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMA Female Control Connector</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>VVAN-5010-60-SMC</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMC Male Control Connector</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>VVAN-6012-60-SP</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; Control</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>VVAN-6012-60-SMA</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMA Female Control Connector</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>VVAN-6012-60-SMC</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMC Male Control Connector</td>
</tr>
<tr>
<td>8.0 TO 18.0 GHz</td>
<td>VVAN-8018-60-SP</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; Control</td>
</tr>
<tr>
<td>8.0 TO 18.0 GHz</td>
<td>VVAN-8018-60-SMA</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMA Female Control Connector</td>
</tr>
<tr>
<td>8.0 TO 18.0 GHz</td>
<td>VVAN-8018-60-SMC</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMC Male Control Connector</td>
</tr>
</tbody>
</table>

VVAN : VOLTAGE VARIABLE ATTENUATOR

AMERICAN MICROWAVE CORPORATION

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OPTIONAL MODELS
VVAN-0510/1020-60-SP
VOLTAGE VARIABLE ATTENUATOR
WITH SOLDER PIN CONTROL CONNECTORS
(0.5 TO 1.0 GHz & 1.8 TO 2.0 GHz)

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

VVAN-0510/1020-60-SP
OPTIONAL MODELS
VVAN-2040/2550-60-SP
VOLTAGE VARIABLE ATTENUATOR
WITH SOLDER PIN CONTROL CONNECTORS
(2.0 TO 4.0 GHz & 1.5 TO 5.0 GHz)

ALL DIMENSIONS ARE IN INCHES, XXX ± 0.020, X-XXX ± 0.010

VVAN-2040/2550-60-SP

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

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

VVAN-4080/5010/6012-60-SP

AMERICAN MICROWAVE CORPORATION
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 ±.020, X.XXX ±.010

AMERICAN MICROWAVE CORPORATION

5-21
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 & 1.5 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)

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

AMERICAN MICROWAVE CORPORATION
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

5-24
SECTION

PRODUCT DESCRIPTION

6.0 4 TO 18 GHz
(SIZE: 1.34" x 1.34" x 0.50")
HIGH SPEED (< 1uSec), 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)

FREQUENCY RANGE  MODEL NUMBER

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:

FREQUENCY RANGE  MODEL NUMBER

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 18.9 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 MULTI PIN CONNECTORS:

FREQUENCY RANGE  MODEL NUMBER

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

6-0
### PRODUCT DESCRIPTION

**SECTION 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

**SECTION 6.7 4 TO 18 GHz**

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

- **SOLDER PIN CONTROL CONNECTOR**

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>MODEL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0 TO 8.0 GHz</td>
<td>M-VVAN-4080-60-SP</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>M-VVAN-5010-60-SP</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>M-VVAN-6012-60-SP</td>
</tr>
</tbody>
</table>

- **SMA CONTROL CONNECTOR**

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>MODEL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0 TO 8.0 GHz</td>
<td>M-VVAN-4080-60-SMA</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>M-VVAN-5010-60-SMA</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>M-VVAN-6012-60-SMA</td>
</tr>
</tbody>
</table>

- **SMC CONTROL CONNECTOR**

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>MODEL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0 TO 8.0 GHz</td>
<td>M-VVAN-4080-60-SMC</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>M-VVAN-5010-60-SMC</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>M-VVAN-6012-60-SMC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>MODEL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0 TO 18.0 GHz</td>
<td>M-VVAN-8018-60-SP</td>
</tr>
<tr>
<td></td>
<td>M-VVAN-8018-60-SMA</td>
</tr>
<tr>
<td></td>
<td>M-VVAN-8018-60-SMC</td>
</tr>
</tbody>
</table>
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
- 3, 10, 11 & 12-BIT DIGITALLY VARIABLE MODELS (DVAN)
- 5dB & 10dB/VOLT, VOLTAGE VARIABLE MODELS (VVAN)
- REMOVABLE SMA RF CONNECTORS FOR SURFACE MOUNT CAPABILITY

**SPECIFICATIONS:**

<table>
<thead>
<tr>
<th>MODEL #</th>
<th>FREQUENCY RANGE</th>
<th>INSERTION LOSS (MAX)</th>
<th>VSWR (MAX)</th>
<th>FLATNESS @ 1dB</th>
<th>FLATNESS @ 2dB</th>
<th>FLATNESS @ 4dB</th>
<th>FLATNESS @ 6dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>4080</td>
<td>4.0 TO 8.0 GHz</td>
<td>2.5 dB</td>
<td>2.0:1</td>
<td>± 0.5 dB</td>
<td>± 0.87 dB</td>
<td>± 1.5 dB</td>
<td>± 1.6 dB</td>
</tr>
<tr>
<td>4080E</td>
<td>3.0 TO 9.0 GHz</td>
<td>2.7 dB</td>
<td>2.2:1</td>
<td>± 0.75 dB</td>
<td>± 1.5 dB</td>
<td>± 3.0 dB</td>
<td>± 3.5 dB</td>
</tr>
<tr>
<td>5910</td>
<td>5.0 TO 10.0 GHz</td>
<td>2.7 dB</td>
<td>2.0:1</td>
<td>± 0.6 dB</td>
<td>± 0.9 dB</td>
<td>± 1.5 dB</td>
<td>± 1.6 dB</td>
</tr>
<tr>
<td>5010E</td>
<td>3.75 TO 11.25 GHz</td>
<td>2.9 dB</td>
<td>2.2:1</td>
<td>± 0.8 dB</td>
<td>± 1.5 dB</td>
<td>± 3.0 dB</td>
<td>± 3.5 dB</td>
</tr>
<tr>
<td>6012</td>
<td>6.0 TO 11.0 GHz</td>
<td>2.8 dB</td>
<td>2.0:1</td>
<td>± 0.7 dB</td>
<td>± 1.0 dB</td>
<td>± 1.5 dB</td>
<td>± 1.6 dB</td>
</tr>
<tr>
<td>6012E</td>
<td>4.5 TO 13.5 GHz</td>
<td>3.0 dB</td>
<td>2.2:1</td>
<td>± 0.9 dB</td>
<td>± 1.6 dB</td>
<td>± 3.0 dB</td>
<td>± 3.5 dB</td>
</tr>
<tr>
<td>8018</td>
<td>8.0 TO 18.0 GHz</td>
<td>2.7 dB **</td>
<td>2.0:1</td>
<td>± 0.8 dB</td>
<td>± 1.1 dB</td>
<td>± 1.5 dB</td>
<td>± 1.6 dB</td>
</tr>
<tr>
<td>8018E</td>
<td>6.0 TO 18.0 GHz</td>
<td>3.7 dB **</td>
<td>2.2:1</td>
<td>± 0.9 dB</td>
<td>± 1.6 dB</td>
<td>± 3.0 dB</td>
<td>± 3.5 dB</td>
</tr>
</tbody>
</table>

** 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
- MONOTONICITY: GUARANTEED
- SWITCHING SPEED: 500 nS MAX. (BETWEEN ATTENUATION SETTINGS)
- TEMPERATURE COEFFICIENT: ± 0.025 dB/°C
- RF POWER RATINGS: +20 dBm OPERATING, +30 dBm SURVIVAL
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
  : ±12v dc (STANDARD) OR ± 15v dc,
  @ +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), -55°C to +125°C (Storage)
- HUMIDITY ............ : MIL-STD-202F, METHOD 103B CONDITION B
- SHOCK ................ : MIL-STD-202F, METHOD 312B CONDITION B
- TEMPERATURE CYCLING : MIL-STD-202F, METHOD 106D CONDITION A

AMERICAN MICROWAVE CORPORATION

6-4
**TYPICAL DATA**  
**M-DVAN & M-VVAN SERIES**  
**60dB ABSORPTIVE ATTENUATORS**

**AVAILABLE M-DVAN DIGITAL CONTROL PINOUTS**

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

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

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

<table>
<thead>
<tr>
<th>MP-MULTIPIN</th>
<th>CONNECTOR PINOUT FOR VOLTAGE VARIABLE ATTENUATORS (VVAN UNITS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN 3</td>
<td>ANALOG INPUT</td>
</tr>
<tr>
<td>PIN 4</td>
<td>GROUND</td>
</tr>
<tr>
<td>PIN 13</td>
<td>+12 or +15 VDC</td>
</tr>
<tr>
<td>PIN 14</td>
<td>-12 or -15 VDC</td>
</tr>
</tbody>
</table>

AMERICAN MICROWAVE CORPORATION
AVAILABLE OPTIONS
AND
HOW TO ORDER

EXAMPLE

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

EXAMPLE

M-VVAN - 6012 - 60 - MP - 3 - 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-bit)
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

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
   • FT : 25-Pole Female Connector, 15-Pin Male Multiplexer, 15-Pin Male Connector
   • 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

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

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

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>MODEL NUMBER</th>
<th>CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0 TO 8.0 GHz</td>
<td>M-DVAN-4080-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSF)</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>M-DVAN-5010-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSF)</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>M-DVAN-6012-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSF)</td>
</tr>
<tr>
<td>8.0 TO 18.0 GHz</td>
<td>M-DVAN-8018-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON MDM-15PSF)</td>
</tr>
</tbody>
</table>

**M-DVAN**: MINIATURE DIGITALLY VARIABLE ATTENUATOR

## STANDARD M-VVAN MODELS AVAILABLE

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>MODEL NUMBER</th>
<th>CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0 TO 8.0 GHz</td>
<td>M-VVAN-4080-60-MP</td>
<td>Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSF)</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>M-VVAN-5010-60-MP</td>
<td>Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSF)</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>M-VVAN-6012-60-MP</td>
<td>Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSF)</td>
</tr>
<tr>
<td>8.0 TO 18.0 GHz</td>
<td>M-VVAN-8018-60-MP</td>
<td>Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON MDM-15PSF)</td>
</tr>
</tbody>
</table>

**M-VVAN**: MINIATURE VOLTAGE VARIABLE ATTENUATOR

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

MOUNTING SURFACE
GP-GOLD PLATED
P-PAINTED

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

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

AMERICAN MICROWAVE CORPORATION
6-8
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
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
STANDARD MODEL
M-VVAN-8018-60-MP
MINIATURE VOLTAGE VARIABLE ATTENUATOR
WITH MULTIPIN CONNECTOR
(2.0 TO 18.0 GHz)

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

M-VVAN-8018-60-MP
<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>MODEL NUMBER</th>
<th>CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0 TO 8.0 GHz</td>
<td>M-VVAN-4080-60-SP</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; Control</td>
</tr>
<tr>
<td>4.0 TO 8.0 GHz</td>
<td>M-VVAN-4080-60-SMA</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMA Female Control Connector</td>
</tr>
<tr>
<td>4.0 TO 8.0 GHz</td>
<td>M-VVAN-4080-60-SMC</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMC Male Control Connector</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>M-VVAN-5010-60-SP</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; Control</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>M-VVAN-5010-60-SMA</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMA Female Control Connector</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>M-VVAN-5010-60-SMC</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMC Male Control Connector</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>M-VVAN-6012-60-SP</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; Control</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>M-VVAN-6012-60-SMA</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMA Female Control Connector</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>M-VVAN-6012-60-SMC</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMC Male Control Connector</td>
</tr>
<tr>
<td>8.0 TO 18.0 GHz</td>
<td>M-VVAN-8018-60-SP</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; Control</td>
</tr>
<tr>
<td>8.0 TO 18.0 GHz</td>
<td>M-VVAN-8018-60-SMA</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMA Female Control Connector</td>
</tr>
<tr>
<td>8.0 TO 18.0 GHz</td>
<td>M-VVAN-8018-60-SMC</td>
<td>10dB/Volt Analog Control with Solder Pin Voltage &amp; SMC Male Control Connector</td>
</tr>
</tbody>
</table>

M-VVAN: MINIATURE VOLTAGE VARIABLE ATTENUATOR

AMERICAN MICROWAVE CORPORATION

6-12
OPTIONAL MODEL
M-VVAN-4080/5010/6012-60-SP
MINIATURE 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

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

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

MOUNTING SURFACE
GP—GOLD PLATED
P—PAINTED

REMOVABLE SMA FEMALE
CONNECTORS
2 PLS.

0.015 PIN DIA
1 PLS.

0.630 DIA SOLDER PIN
3 PLS.

0.089 DIA THRU 5 PLS.

0.223
0.525
0.750

0.29 FOR SMA FEMALE
0.25 FOR SMA MALE

0.30 FOR SMA MALE
0.33 FOR SMA FEMALE

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

M-VVAN-8018-60-SP

AMERICAN MICROWAVE CORPORATION
OPTIONAL MODEL
M-VVAN-4080/5010/6012-60-SMA
MINIATURE VOLTAGE VARIABLE ATTENUATOR
WITH SMA FEMALE CONTROL CONNECTOR
(4.0 TO 8.0 GHz, 5.5 TO 10.0 GHz & 6.3 TO 12.0 GHz)

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

M-VVAN-4080/5010/6012-SMA

AMERICAN MICROWAVE CORPORATION
OPTIONAL MODEL
M-VVAN-8018-60-SMA

MINIATURE VOLTAGE VARIABLE ATTENUATOR
WITH SMA FEMALE CONTROL CONNECTOR
(8.0 TO 18.0 GHz)

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

M-VVAN-8018-60-SMA
OPTIONAL MODEL

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

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)

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

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

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

OPTIONAL MODEL
M-VVAN-8018-60-SMC
MINIATURE VOLTAGE VARIABLE ATTENUATOR
WITH SMC MALE CONTROL CONNECTOR
(5.0 TO 20.0 GHz)

MOUNTING SURFACE
GP-COLD PLATED
P—PAINTED

SOLID STATE
VARIABLE ATTENUATOR

SMC CONTROL
CONNECTOR

REMOVABLE SMA FEMALE
CONNECTORS 2 PLS.

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

M-VVAN-8018-60-SMC

AMERICAN MICROWAVE CORPORATION

6-18
## PRODUCT DESCRIPTION

### SECTION 7.0 2 TO 18 Ghz

**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

CONTROLL ED ATTENUATORS ................................................. 7-0 TO 7-1

### SECTION 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

### SECTION 7.2 2 TO 18 GHz

**(A-DVAN/A-VVAN/A-CVAN) SPECIFICATIONS:**

(E = EXTENDED BAND)

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>MODEL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2.1 2 TO 4 Ghz</td>
<td>2040</td>
</tr>
<tr>
<td>1.5 TO 4.5 Ghz</td>
<td>2040E</td>
</tr>
<tr>
<td></td>
<td>7-3 TO 7-5</td>
</tr>
<tr>
<td>7.2.2 2.5 TO 5 Ghz</td>
<td>2550</td>
</tr>
<tr>
<td>1.9 TO 5.6 Ghz</td>
<td>2550E</td>
</tr>
<tr>
<td></td>
<td>7-3 TO 7-5</td>
</tr>
<tr>
<td>7.2.3 4 TO 8 Ghz</td>
<td>4080</td>
</tr>
<tr>
<td>3 TO 9 Ghz</td>
<td>4080E</td>
</tr>
<tr>
<td></td>
<td>7-3 TO 7-5</td>
</tr>
<tr>
<td>7.2.4 5 TO 10 Ghz</td>
<td>5010</td>
</tr>
<tr>
<td>3.75 TO 11.25 Ghz</td>
<td>5010E</td>
</tr>
<tr>
<td></td>
<td>7-3 TO 7-5</td>
</tr>
<tr>
<td>7.2.5 6 TO 12 Ghz</td>
<td>6012</td>
</tr>
<tr>
<td>4.5 TO 13 Ghz</td>
<td>6012E</td>
</tr>
<tr>
<td></td>
<td>7-3 TO 7-5</td>
</tr>
<tr>
<td>7.2.6 8 TO 18 Ghz</td>
<td>8018</td>
</tr>
<tr>
<td>6 TO 18 Ghz</td>
<td>8018E</td>
</tr>
<tr>
<td></td>
<td>7-3 TO 7-5</td>
</tr>
</tbody>
</table>

### SECTION 7.3 2 TO 18 GHz

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

### SECTION 7.4 2 TO 18 GHz

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

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>MODEL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.4.1 2.0 TO 4.0 Ghz</td>
<td>A-DVAN-2040-60-8</td>
</tr>
<tr>
<td>2.5 TO 5.0 Ghz</td>
<td>A-DVAN-2550-60-8</td>
</tr>
<tr>
<td></td>
<td>7-8</td>
</tr>
<tr>
<td>7.4.2 4.0 TO 8.0 Ghz</td>
<td>A-DVAN-4080-60-8</td>
</tr>
<tr>
<td>5.0 TO 10.0 Ghz</td>
<td>A-DVAN-5010-60-8</td>
</tr>
<tr>
<td>6.0 TO 12.0 Ghz</td>
<td>A-DVAN-5012-60-8</td>
</tr>
<tr>
<td></td>
<td>7-9</td>
</tr>
<tr>
<td>7.4.3 8.0 TO 18.0 Ghz</td>
<td>A-DVAN-8018-60-8</td>
</tr>
<tr>
<td></td>
<td>7-9</td>
</tr>
</tbody>
</table>
### PRODUCT DESCRIPTION

#### 7.5 2 TO 18 GHz

Mechanical outlines for standard A-VVAN (Voltage Variable Attenuator) models with multipin connectors:

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>MODEL NUMBER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.5.1</td>
<td>2.0 TO 4.0 Ghz</td>
<td>A-VVAN-2040-60-MP</td>
</tr>
<tr>
<td></td>
<td>2.5 TO 5.0 Ghz</td>
<td>A-VVAN-2550-60-MP</td>
</tr>
<tr>
<td>7.5.2</td>
<td>4.0 TO 8.0 Ghz</td>
<td>A-VVAN-4080-60-MP</td>
</tr>
<tr>
<td></td>
<td>5.0 TO 10.0 Ghz</td>
<td>A-VVAN-5010-60-MP</td>
</tr>
<tr>
<td></td>
<td>6.0 TO 12.0 Ghz</td>
<td>A-VVAN-6012-60-MP</td>
</tr>
<tr>
<td>7.5.3</td>
<td>8.0 TO 18.0 Ghz</td>
<td>A-VVAN-8018-60-MP</td>
</tr>
</tbody>
</table>
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
- 3,10,11 & 12-BIT DIGITALLY VARIABLE MODELS (A-DVAN)
- 5dB & 10dB/VOLT, VOLTAGE VARIABLE MODELS (A-VVAN)

SPECIFICATIONS:

<table>
<thead>
<tr>
<th>MODEL #</th>
<th>FREQUENCY RANGE</th>
<th>INSERTION LOSS</th>
<th>VSWR</th>
<th>FLATNESS @ 10dB</th>
<th>FLATNESS @ 30dB</th>
<th>FLATNESS @ 40dB</th>
<th>FLATNESS @ 60dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>2040</td>
<td>2.0 to 4.0 GHz</td>
<td>2.0 dB</td>
<td>2.01</td>
<td>±0.45 dB</td>
<td>±0.3 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>2040E</td>
<td>1.5 to 4.5 GHz</td>
<td>2.5 dB</td>
<td>2.21</td>
<td>±0.45 dB</td>
<td>±0.3 dB</td>
<td>±1.5 dB</td>
<td>±1.5 dB</td>
</tr>
<tr>
<td>2550</td>
<td>2.5 to 5.0 GHz</td>
<td>2.1 dB</td>
<td>2.01</td>
<td>±0.47 dB</td>
<td>±0.37 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>2550E</td>
<td>1.9 to 5.6 GHz</td>
<td>2.6 dB</td>
<td>2.21</td>
<td>±0.7 dB</td>
<td>±0.5 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>4080</td>
<td>4.0 to 8.0 GHz</td>
<td>2.5 dB</td>
<td>2.01</td>
<td>±0.5 dB</td>
<td>±0.37 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>4080E</td>
<td>3.0 to 9.0 GHz</td>
<td>2.7 dB</td>
<td>2.21</td>
<td>±0.75 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
<td>±3.5 dB</td>
</tr>
<tr>
<td>5010</td>
<td>5.0 to 10.0 GHz</td>
<td>2.7 dB</td>
<td>2.01</td>
<td>±0.6 dB</td>
<td>±0.9 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>5010E</td>
<td>3.75 to 11.25 GHz</td>
<td>2.9 dB</td>
<td>2.21</td>
<td>±0.3 dB</td>
<td>±1.5 dB</td>
<td>±3.0 dB</td>
<td>±3.5 dB</td>
</tr>
<tr>
<td>6012</td>
<td>6.0 to 12.0 GHz</td>
<td>2.8 dB</td>
<td>2.01</td>
<td>±0.7 dB</td>
<td>±1.0 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>6012E</td>
<td>4.5 to 13.5 GHz</td>
<td>3.0 dB</td>
<td>2.21</td>
<td>±0.9 dB</td>
<td>±1.6 dB</td>
<td>±3.0 dB</td>
<td>±3.5 dB</td>
</tr>
<tr>
<td>8018</td>
<td>8.0 to 18.0 GHz</td>
<td>2.7 dB**</td>
<td>2.01</td>
<td>±0.3 dB</td>
<td>±1.1 dB</td>
<td>±1.5 dB</td>
<td>±1.6 dB</td>
</tr>
<tr>
<td>8018E</td>
<td>6.0 to 18.0 GHz</td>
<td>3.7 dB**</td>
<td>2.21</td>
<td>±0.9 dB</td>
<td>±1.6 dB</td>
<td>±3.0 dB</td>
<td>±3.5 dB</td>
</tr>
</tbody>
</table>

** 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 ± 0.5 dB
  - 30 TO 50 dB ± 1.0 dB
  - 50 TO 60 dB ± 1.5 dB
  - GUARANTEED
  - 500 nA MAX. (BETWEEN ATTENUATION SETTINGS)
  - ± 0.025 dB/°C
  - + 20 dBm OPERATING, + 30 dBm SURVIVAL
  - 8-BIT (STANDARD) POSITIVE TRUE BINARY (A-DVAN)
  - OR-
  - 10dB/VOLT (STANDARD) ANALOG TRANSFER FUNCTION (A-VVAN)
  - 5dB/VOLT TRANSFER FUNCTION ALSO AVAILABLE

- MONOTONICITY

- SWITCHING SPEED

- TEMPERATURE COEFFICIENT

- RF POWER RATINGS

- CONTROL

- DC POWER SUPPLY
  - ± 12v (STANDARD) OR ± 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
  - ≤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

AMERICAN MICROWAVE CORPORATION
## AVAILABLE A-DVAN DIGITAL CONTROL PINOUTS

<table>
<thead>
<tr>
<th>PINOUT</th>
<th>8-BIT (STANDARDS)</th>
<th>10-BIT</th>
<th>11-BIT</th>
<th>12-BIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN 1</td>
<td>NOT USED</td>
<td>NOT USED</td>
<td>0.06 dB</td>
<td>0.03 dB</td>
</tr>
<tr>
<td>PIN 2</td>
<td>LATCHING STROBE * (OPTIONAL)</td>
<td>LATCHING STROBE * (OPTIONAL)</td>
<td>LATCHING STROBE * (OPTIONAL)</td>
<td>0.06 dB</td>
</tr>
<tr>
<td>PIN 3</td>
<td>NOT USED</td>
<td>0.13 dB</td>
<td>0.13 dB</td>
<td>0.13 dB</td>
</tr>
<tr>
<td>PIN 4</td>
<td>GROUND</td>
<td>GROUND</td>
<td>GROUND</td>
<td>GROUND</td>
</tr>
<tr>
<td>PIN 5</td>
<td>0.25 dB (LSB)</td>
<td>0.25 dB</td>
<td>0.25 dB</td>
<td>0.25 dB</td>
</tr>
<tr>
<td>PIN 6</td>
<td>0.5 db</td>
<td>0.5 db</td>
<td>0.5 dB</td>
<td>0.5 dB</td>
</tr>
<tr>
<td>PIN 7</td>
<td>1.0 db</td>
<td>1.0 db</td>
<td>1.0 db</td>
<td>1.0 db</td>
</tr>
<tr>
<td>PIN 8</td>
<td>2.0 db</td>
<td>2.0 db</td>
<td>2.0 db</td>
<td>2.0 db</td>
</tr>
<tr>
<td>PIN 9</td>
<td>4.0 db</td>
<td>4.0 db</td>
<td>4.0 db</td>
<td>4.0 db</td>
</tr>
<tr>
<td>PIN 10</td>
<td>8.0 db</td>
<td>8.0 db</td>
<td>8.0 db</td>
<td>8.0 db</td>
</tr>
<tr>
<td>PIN 11</td>
<td>16.0 db</td>
<td>16.0 db</td>
<td>16.0 db</td>
<td>16.0 db</td>
</tr>
<tr>
<td>PIN 12</td>
<td>32.0 dB (MSB)</td>
<td>32.0 dB (MSB)</td>
<td>32.0 dB (MSB)</td>
<td>32.0 dB (MSB)</td>
</tr>
<tr>
<td>PIN 13</td>
<td>+12 OR +15 VDC</td>
<td>+12 OR +15 VDC</td>
<td>+12 OR +15 VDC</td>
<td>+12 OR +15 VDC</td>
</tr>
<tr>
<td>PIN 14</td>
<td>-12 OR -15 VDC</td>
<td>-12 OR -15 VDC</td>
<td>-12 OR -15 VDC</td>
<td>-12 OR -15 VDC</td>
</tr>
<tr>
<td>PIN 15</td>
<td>NOT USED</td>
<td>0.06 dB (LSB)</td>
<td>0.03 dB (LSB)</td>
<td>0.016 dB (LSB)</td>
</tr>
</tbody>
</table>

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

## STANDARD A-VVAN MULTIPIN ANALOG CONTROL PINOUTS

**(OPTION "MP")**

<table>
<thead>
<tr>
<th>MP-MULTIPIN</th>
<th>CONNECTOR PINOUT FOR VOLTAGE VARIABLE ATTENUATORS (A-VVAN UNITS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN 3</td>
<td>ANALOG INPUT</td>
</tr>
<tr>
<td>PIN 4</td>
<td>GROUND</td>
</tr>
<tr>
<td>PIN 13</td>
<td>+12 OR +15 VDC</td>
</tr>
<tr>
<td>PIN 14</td>
<td>-12 OR -15 VDC</td>
</tr>
</tbody>
</table>

ALL OTHER PINS NOT USED

AMERICAN MICROWAVE CORPORATION
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-bit)
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 Multipin 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

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

ORDERING:

AMERICAN MICROWAVE CORPORATION
7311 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

7-6
# Typical Data

## Standard A-DVAN Models Available

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Model Number</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 TO 4.0 GHz</td>
<td>A-DVAN-2040-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON per MIL-C-24308)</td>
</tr>
<tr>
<td>4.0 TO 8.0 GHz</td>
<td>A-DVAN-4080-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON per MIL-C-24308)</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>A-DVAN-5010-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON per MIL-C-24308)</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>A-DVAN-6012-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON per MIL-C-24308)</td>
</tr>
<tr>
<td>8.0 TO 18.0 GHz</td>
<td>A-DVAN-8018-60-8</td>
<td>8-Bit Digital Control (Standard) with 15-Pin Multipin Connector (ITT CANNON per MIL-C-24308)</td>
</tr>
</tbody>
</table>

**A-DVAN**: Digitally Variable Attenuator

## Standard A-VVAN Models Available

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Model Number</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 TO 4.0 GHz</td>
<td>A-VVAN-2040-60-MP</td>
<td>Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON per MIL-C-24308)</td>
</tr>
<tr>
<td>4.0 TO 8.0 GHz</td>
<td>A-VVAN-4080-60-MP</td>
<td>Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON per MIL-C-24308)</td>
</tr>
<tr>
<td>5.0 TO 10.0 GHz</td>
<td>A-VVAN-5010-60-MP</td>
<td>Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON per MIL-C-24308)</td>
</tr>
<tr>
<td>6.0 TO 12.0 GHz</td>
<td>A-VVAN-6012-60-MP</td>
<td>Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON per MIL-C-24308)</td>
</tr>
<tr>
<td>8.0 TO 18.0 GHz</td>
<td>A-VVAN-8018-60-MP</td>
<td>Analog, 10dB/Volt (Standard) with Multipin Connector (ITT CANNON per MIL-C-24308)</td>
</tr>
</tbody>
</table>

**A-VVAN**: Voltage Variable Attenuator

American Microwave Corporation
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: xxx ± 0.020, xxx ± 0.010

A-DVAN-2040/2550-60-8

AMERICAN MICROWAVE CORPORATION
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
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: XXX ±0.020, X.XXX ±0.010

A-VVAN-2040/2550-60-MP

AMERICAN MICROWAVE CORPORATION

7-10
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)

15 PIN D-SUBMINIATURE PLUG PER MIL-C-24308
INCLUDES JACK POST

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

AMERICAN MICROWAVE CORPORATION
SECTION 8.0 0.5 TO 18 GHz
AGH SERIES, OCTAVE BAND, VARIABLE ATTENUATORS

DIGITALLY CONTROLLED-HIGH SPEED ATTENUATORS

8.1 6 TO 12 GHz
125ns HIGH SPEED, 60dB, 8 BIT, PROGRAMMABLE

8.2 6 TO 18 GHz
125ns TO 500ns HIGH SPEED, 60dB, 8 BIT PROGRAMMABLE

8.3 8 TO 18 GHz
900ns, 60dB, 8 BIT PROGRAMMABLE

8.4 9 TO 10 GHz
500ns HIGH SPEED, 60dB, 8 BIT PROGRAMMABLE

60 dB DYNAMIC RANGE DIGITALLY CONTROLLED ATTENUATORS

8.5 2 TO 4 GHz
60dB, 8 BIT PROGRAMMABLE

8.6 1.9 TO 5.6 GHz
60dB, 10 BIT PROGRAMMABLE

8.7 4 TO 8 GHz
60dB, 8 BIT PROGRAMMABLE

8.8 8 TO 12 GHz
60dB, 8 BIT PROGRAMMABLE

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

120 dB DYNAMIC RANGE DIGITALLY CONTROLLED ATTENUATORS

8.10 1 TO 2 GHz
120dB, 8 BIT PROGRAMMABLE

8.11 2 TO 4 GHz
120dB, 8 BIT PROGRAMMABLE
SECTION | PRODUCT DESCRIPTION | PAGES
---|---|---
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

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.

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>(OPTIONAL)</th>
<th>MODEL NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 TO 2 GHz</td>
<td>(0.75 TO 2.25 GHz)</td>
<td>AGH-1020D</td>
</tr>
<tr>
<td>2 TO 4 GHz</td>
<td>(1.5 TO 4.5 GHz)</td>
<td>AGH-2040D</td>
</tr>
<tr>
<td>2.5 TO 5 GHz</td>
<td>(1.9 TO 5.6 GHz)</td>
<td>AGH-2550D</td>
</tr>
<tr>
<td>4 TO 8 GHz</td>
<td>(3.0 TO 9.0 GHz)</td>
<td>AGH-4080D</td>
</tr>
<tr>
<td>5 TO 10 GHz</td>
<td>(3.75 TO 11.25 GHz)</td>
<td>AGH-5010D</td>
</tr>
<tr>
<td>6 TO 12 GHz</td>
<td>(4.5 TO 13.5 GHz)</td>
<td>AGH-6012D</td>
</tr>
</tbody>
</table>
| 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 8-51
8.23 | 2.5 TO 5 GHz | 120dB, 20dB/VOLT
- AGH-2550-60D-120 .......................................... 8-52 TO 8-53

8-1
SECTION

PRODUCT DESCRIPTION

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

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>(OPTIONAL)</th>
<th>MODEL NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 TO 2 GHz</td>
<td>(0.75 TO 2.25 GHz)</td>
<td>AGH-1020</td>
</tr>
<tr>
<td>2 TO 4 GHz</td>
<td>(1.5 TO 4.5 GHz)</td>
<td>AGH-2040</td>
</tr>
<tr>
<td>2.5 TO 5 GHz</td>
<td>(1.9 TO 5.6 GHz)</td>
<td>AGH-2550</td>
</tr>
<tr>
<td>4 TO 8 GHz</td>
<td>(3.0 TO 9.0 GHz)</td>
<td>AGH-4080</td>
</tr>
<tr>
<td>5 TO 10 GHz</td>
<td>(3.75 TO 11.25 GHz)</td>
<td>AGH-5010</td>
</tr>
<tr>
<td>6 TO 12 GHz</td>
<td>(4.5 TO 13.5 GHz)</td>
<td>AGH-6012</td>
</tr>
<tr>
<td>8 TO 18 GHz</td>
<td>(6.0 TO 18.0 GHz)</td>
<td>AGH-8018  ......... 8-64 TO 8-67</td>
</tr>
</tbody>
</table>
DESCRIPTION
AMC MODEL AGH-0612-60DDSDF IS AN ULTRA HIGH
SPEED OCTAVE BAND ATTENUATOR/MODULATOR.
PROGRAMMABLE BY 8 BIT POSITIVE TRUE BINARY
LOGIC.

SPECIFICATIONS
- FREQUENCY RANGE ............. 5-12 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 ±1.8 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/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 ........ MINIATURE 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)

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

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

SIZE A
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 (±dB MAXIMUM)

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>10dB</th>
<th>20dB</th>
<th>40dB</th>
<th>60dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0–18 GHz</td>
<td>0.7</td>
<td>1.0</td>
<td>1.5</td>
<td>1.6</td>
</tr>
<tr>
<td>6.0–18 GHz</td>
<td>0.9</td>
<td>1.5</td>
<td>3.0</td>
<td>3.5</td>
</tr>
</tbody>
</table>

- ATTENUATION ACCURACY .......... 0–30dB ±0.5dB MAXIMUM
- MONOTONICITY .................. GUARANTEED
- TEMPERATURE COEFFICIENT ........ ±0.02 dB/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-STD-BB3)

ENVIRONMENTAL RATINGS

- TEMPERATURE ................. -55°C TO +110°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) 662-4936

PRODUCT FEATURE

AGH-0018-60DD-SF
HIGH SPEED, 6-18 GHz, PIN DIODE, VARIABLE ATTENUATOR

SP (STANDARD) VP (VERY FAST) UP (ULTRA FAST)
FUNCTIONAL SCHEMATIC

LINEARIZER DRIVER CIRCUIT

RF SECTION

<table>
<thead>
<tr>
<th>PIN</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>GND</td>
</tr>
<tr>
<td>B</td>
<td>LOGIC CONTROL</td>
</tr>
<tr>
<td>C</td>
<td>-12 to -15VDC</td>
</tr>
<tr>
<td>D</td>
<td>±5.0V (LSB)</td>
</tr>
<tr>
<td>E</td>
<td>0.5A</td>
</tr>
<tr>
<td>F</td>
<td>1.0A</td>
</tr>
<tr>
<td>G</td>
<td>4.5A</td>
</tr>
<tr>
<td>J</td>
<td>2.5A</td>
</tr>
<tr>
<td>K</td>
<td>15.0A</td>
</tr>
<tr>
<td>L</td>
<td>±2.00V (HSB)</td>
</tr>
<tr>
<td>M</td>
<td>±12 to +15VDC</td>
</tr>
<tr>
<td>N</td>
<td>0.5A</td>
</tr>
<tr>
<td>P</td>
<td>GND</td>
</tr>
<tr>
<td>Q</td>
<td>ANALOG OUTPUT</td>
</tr>
</tbody>
</table>

(JOIN QUOTER TO PIN B AND APPLY 0-6 VOLTS FOR ANALOG PROGRAMMING.

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

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

PRODUCT FEATURE
AGH-8018-60DD-SF
HIGH SPEED, 6-16 GHz, PIN DIODE, VARIABLE ATTENUATION
SF (STANDARD)
VF (VERY FAST)
UF (ULTRA FAST)
**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 (±dB Maximum)**
  
<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>10 dB</th>
<th>20 dB</th>
<th>40 dB</th>
<th>60 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0–18.0 GHz</td>
<td>0.7</td>
<td>1.0</td>
<td>1.5</td>
<td>1.6</td>
</tr>
<tr>
<td>6.0–18.0 GHz</td>
<td>0.9</td>
<td>1.5</td>
<td>3.0</td>
<td>3.5</td>
</tr>
</tbody>
</table>
- **Attenuation Accuracy** .................................. ±0.5 dB Maximum
- **Temperature Coefficient** .............................. ±0.025 dB/°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 +18 VDC @ 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

**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

**MECHANICAL OUTLINE**

[Diagram of mechanical outline]

**NOTES**

1. Dimensions are in inches.
2. Tolerances: ±0.020
3. Weight: APPROX. 7.0 OZ

**AMERICAN MICROWAVE CORPORATION**

73116 GROVE RD., FREDERICK, MD. 21701
TEL: (301) 662-4700 FAX: (301) 662-4938

**PRODUCT FEATURE**

AGH-8018-65DD-205
8.0–18 GHz, high speed programmable variable attenuator
DESCRIPTION

AMC MODEL AGH-0910-600DSF 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 .......... 0–60 db ±0.5 + 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 .............. MINIATURE 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)

MECHANICAL OUTLINE

DETAIL A

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

PRODUCT FEATURE

AGH-0910-600DSF
ULTRA HIGH SPEED, 9 TO 10 GHz PROGRAMMABLE ATTENUATOR

SIZE A  SHEET 1 OF 2  Dwg. # 100-2927-2
**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 (MONOTONICITY IS GUARANTEED)
                              30-50 dB ±1.0 dB MAXIMUM
                              50-63.75 dB ±1.5 dB MAXIMUM
- **SWITCHING TIME** .............. 2 µS MAXIMUM
- **TEMPERATURE COEFFICIENT** .... ±0.025 dB/°C MAXIMUM
- **VSWR (ALL ATTENUATION LEVELS)** .... 1.6:1 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 ±5% @ 100 mA MAXIMUM
- **CONNECTORS** ................. SMA FEMALE RF INPUT/OUTPUT
                              15 PIN D-SUBMINIATURE (MALE) POWER AND CONTROLS 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

**MECHANICAL OUTLINE**

**J3 PIN FUNCTION**

<table>
<thead>
<tr>
<th>PIN #</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
</tr>
<tr>
<td>2</td>
<td>ANALOG INPUT</td>
</tr>
<tr>
<td>3</td>
<td>CIF</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
</tr>
<tr>
<td>5</td>
<td>0.25 dB (LSB)</td>
</tr>
<tr>
<td>6</td>
<td>0.5 dB</td>
</tr>
<tr>
<td>7</td>
<td>1.0 dB</td>
</tr>
<tr>
<td>8</td>
<td>2.0 dB (MSB)</td>
</tr>
<tr>
<td>9</td>
<td>4.0 dB</td>
</tr>
<tr>
<td>10</td>
<td>8.0 dB</td>
</tr>
<tr>
<td>11</td>
<td>16.0 dB</td>
</tr>
<tr>
<td>12</td>
<td>32.0 dB (MSB)</td>
</tr>
<tr>
<td>13</td>
<td>15VDC</td>
</tr>
<tr>
<td>14</td>
<td>25VDC</td>
</tr>
<tr>
<td>15</td>
<td>GND</td>
</tr>
</tbody>
</table>

**ENVIROMENTAL 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**

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

**PRODUCT FEATURE**

AGH-2040-65DD

2-4 GHz PROGRAMMABLE ATTENUATOR

**APPROVALS**

<table>
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<th>WIP</th>
<th>10/19/91</th>
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<tr>
<td>REV</td>
<td>2</td>
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<tr>
<td>DATE</td>
<td>10/19/91</td>
</tr>
<tr>
<td>SHEET</td>
<td>1 OF 2</td>
</tr>
<tr>
<td>DOC.</td>
<td>100-311E</td>
</tr>
</tbody>
</table>
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 (±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 ±0.5 dB maximum
  30-50 dB ±1.0 dB maximum
  50-60 dB ±1.5 dB maximum
- **Temperature Coefficient**: ±0.025 dB/°C maximum
- **Switching Time**
  Delay On (50% TTL to 90% RF): 2.0 μs maximum
  Delay Off (50% TTL to 10% RF): 2.0 μs 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

MECHANICAL OUTLINE

<table>
<thead>
<tr>
<th>PIN</th>
<th>PIN FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
</tr>
<tr>
<td>2</td>
<td>ANALOG INPUT</td>
</tr>
<tr>
<td>3</td>
<td>0.1 μF (LSD)</td>
</tr>
<tr>
<td>4</td>
<td>0.2 μF</td>
</tr>
<tr>
<td>5</td>
<td>0.4 μF</td>
</tr>
<tr>
<td>6</td>
<td>0.8 μF</td>
</tr>
<tr>
<td>7</td>
<td>1.6 μF</td>
</tr>
<tr>
<td>8</td>
<td>3.2 μF</td>
</tr>
<tr>
<td>9</td>
<td>6.4 μF</td>
</tr>
<tr>
<td>10</td>
<td>12.8 μF</td>
</tr>
<tr>
<td>11</td>
<td>25.6 μF</td>
</tr>
<tr>
<td>12</td>
<td>51.2 μF (MSD)</td>
</tr>
<tr>
<td>13</td>
<td>AV</td>
</tr>
<tr>
<td>14</td>
<td>V</td>
</tr>
<tr>
<td>15</td>
<td>V/C</td>
</tr>
</tbody>
</table>

NOTES:
1) Dimensions are in inches
2) Tolerances: ±0.020
3) Weight: Approx. 6.0 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
7311 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

SIZE A

SHEET 1 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** (MONOTONICITY IS GUARANTEED):
  - 0-30 dB ±0.5 dB MAXIMUM
  - 30-50 dB ±1.0 dB MAXIMUM
  - 50-63.75 dB ±1.5 dB MAXIMUM
- **SWITCHING TIME**: 2 µS MAXIMUM
- **TEMPERATURE COEFFICIENT**: ±0.025 dB/°C MAXIMUM
- **VSWR (ALL ATTENUATION LEVELS)**: 1.6:1 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 ±5%@100 mA MAXIMUM
  - -15VDC ±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

MECHANICAL OUTLINE

ENVIRONMENTAL RATINGS

- **TEMPERATURE**: -55°C TO +85°C (OPERATING)
  - -55°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

AGH-4080-65DD
4-8 GHz PROGRAMMABLE ATTENUATOR

SIZE A SHEET 1 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
- (MONOTONICITY IS GUARANTEED)
- 30-50 dB ±1.0 dB MAXIMUM
- 50-63.75 dB ±1.5 dB MAXIMUM
- SWITCHING TIME ................. 2 μS MAXIMUM
- TEMPERATURE COEFFICIENT ...... ±0.025 dB/°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 ±5%/100 mA MAXIMUM
- −15VDC ±5%/100 mA MAXIMUM
- CONNECTORS ...................... SMA FEMALE
- 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

MECHANICAL OUTLINE

ENVIRONMENTAL RATINGS

- TEMPERATURE .......... −55°C TO +85°C (OPERATING)
- −65°C TO +125°C (STORAGE)
- HUMIDITY ............... MIL-STD-202F, METHOD 103B 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-0812-65DD
8-12 GHz PROGRAMMABLE ATTENUATOR
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 lange couplers for repeatable low loss performance.

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OCTOBER 9, 1997

7311 G GROVE ROAD, FREDERICK, MARYLAND 21701 Tel.: (301) 662-4700
Fax: (301) 662-4938

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FUNCTIONAL SCHEMATIC

SPECIFICATIONS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>FREQUENCY RANGE (GHz)</th>
<th>INSERTION LOSS, MAX (dB)</th>
<th>VSWR MAX.</th>
<th>FLATNESS (=dB) AT NOMINAL ATTENUATION TO LEVELS OF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10 dB</td>
</tr>
<tr>
<td>AGH-1020DD</td>
<td>1.0-2.0</td>
<td>1.8</td>
<td>1.5</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>0.75-2.25</td>
<td>1.9</td>
<td>2.0</td>
<td>0.6</td>
</tr>
<tr>
<td>AGH-2040DD</td>
<td>2.0-4.0</td>
<td>1.8</td>
<td>1.5</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>1.5-4.5</td>
<td>1.9</td>
<td>2.0</td>
<td>0.5</td>
</tr>
<tr>
<td>AGH-2550DD</td>
<td>2.5-5.0</td>
<td>2.0</td>
<td>1.6</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>1.9-5.6</td>
<td>2.1</td>
<td>2.1</td>
<td>0.5</td>
</tr>
<tr>
<td>AGH-4080DD</td>
<td>4.0-8.0</td>
<td>2.4</td>
<td>1.7</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>3.0-9.0</td>
<td>2.5</td>
<td>2.2</td>
<td>0.5</td>
</tr>
<tr>
<td>AGH-5010DD</td>
<td>5.0-10.0</td>
<td>2.6</td>
<td>1.7</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>3.75-11.25</td>
<td>2.7</td>
<td>2.2</td>
<td>0.7</td>
</tr>
<tr>
<td>AGH-6012DD</td>
<td>6.0-12.0</td>
<td>2.7</td>
<td>1.8</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>4.5-13.5</td>
<td>2.8</td>
<td>2.2</td>
<td>0.9</td>
</tr>
<tr>
<td>AGH-8018DD</td>
<td>8.0-18.0</td>
<td>2.7 (Note 1)</td>
<td>2.0</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>6.0-18.0</td>
<td>2.7 (Note 1)</td>
<td>2.0</td>
<td>0.9</td>
</tr>
</tbody>
</table>

NOTE: Extended Frequency Range Specifications Are Typical.
1. Maximum loss to 16 GHz. 3.7 dB Maximum loss from 16 - 18 GHz.

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ADDITIONAL SPECIFICATIONS

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 ...................... ± .025 dB°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 μsec, Max.
Fall Time: 50 ns, Max.

Control Characteristics .......... 8 Bit Positive
True Binary
(see Table 1)

Power Supply Requirements ..... ± 12 V ± 5% @ 100 mA
− 12 V ± 5% @ 20 mA

---

TABLE 1

<table>
<thead>
<tr>
<th>PIN</th>
<th>8 BIT BINARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
</tr>
<tr>
<td>2</td>
<td>ANALOG INPUT</td>
</tr>
<tr>
<td>3</td>
<td>NOT USED</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
</tr>
<tr>
<td>5</td>
<td>0.25 dB (LSB)</td>
</tr>
<tr>
<td>6</td>
<td>0.5 dB</td>
</tr>
<tr>
<td>7</td>
<td>1.0 dB</td>
</tr>
<tr>
<td>8</td>
<td>2.0 dB</td>
</tr>
<tr>
<td>9</td>
<td>4.0 dB</td>
</tr>
<tr>
<td>10</td>
<td>8.0 dB</td>
</tr>
<tr>
<td>11</td>
<td>16.0 dB</td>
</tr>
<tr>
<td>12</td>
<td>32.0 dB</td>
</tr>
<tr>
<td>13</td>
<td>+ V</td>
</tr>
<tr>
<td>14</td>
<td>− V</td>
</tr>
<tr>
<td>15</td>
<td>NOT USED</td>
</tr>
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</table>

---

AVAILABLE OPTIONS

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>Two SMA Male RF Connectors</td>
</tr>
<tr>
<td>002</td>
<td>One SMA Male and One SMA Female RF Connector</td>
</tr>
<tr>
<td>004</td>
<td>0 − 30 dB Range</td>
</tr>
<tr>
<td>005</td>
<td>± 15 Volt Power Supply</td>
</tr>
</tbody>
</table>

REVISED
OCTOBER 9, 1997

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MECHANICAL DATA

![Diagram with dimensions and notes]

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DIM 'A'</th>
<th>'B'</th>
<th>'C' ±.03</th>
<th>'D'</th>
<th>'E'</th>
<th>'F'</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGH-10200D</td>
<td>.58</td>
<td>.42</td>
<td>2.56</td>
<td>.56</td>
<td>1.53</td>
<td>.29</td>
</tr>
<tr>
<td>AGH-20400D</td>
<td>.30</td>
<td>.14</td>
<td>2.00</td>
<td>.50</td>
<td>1.29</td>
<td>.34</td>
</tr>
<tr>
<td>AGH-25500D</td>
<td>.30</td>
<td>.14</td>
<td>2.00</td>
<td>.50</td>
<td>1.29</td>
<td>.34</td>
</tr>
<tr>
<td>AGH-40800D</td>
<td>.30</td>
<td>.14</td>
<td>2.00</td>
<td>.75</td>
<td>1.19</td>
<td>.34</td>
</tr>
<tr>
<td>AGH-50100D</td>
<td>.30</td>
<td>.14</td>
<td>2.00</td>
<td>.75</td>
<td>1.19</td>
<td>.34</td>
</tr>
<tr>
<td>AGH-60120D</td>
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<td>.14</td>
<td>2.00</td>
<td>.75</td>
<td>1.19</td>
<td>.34</td>
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<tr>
<td>AGH-80180D</td>
<td>.30</td>
<td>.14</td>
<td>2.00</td>
<td>.75</td>
<td>1.00</td>
<td>.27</td>
</tr>
</tbody>
</table>

NOTES: Unless otherwise ruled, all dimensions are in inches.
Tolerances: XX ± .02 XXX ± .005 inches.

ENVIRONMENTAL RATINGS

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

REVISED
OCTOBER 9, 1997
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
- ATTENUATION FLATNESS (±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 (MONOTONICITY IS GUARANTEED)
  | FREQUENCY RANGE | 0-30 dB ±0.5 dB MAXIMUM |
  | 30-50 dB ±1.0 dB MAXIMUM |
  | 50-60 dB ±1.5 dB MAXIMUM |
  | 60-80 dB ±2.0 dB MAXIMUM |
  | 80-120 dB ±2.5 dB MAXIMUM |
- TEMPERATURE COEFFICIENT: ±0.025 dB/C MAXIMUM
- SWITCHING TIME: 3 µS MAXIMUM
- VSWR @ 0 dB ATTENUATION: 1.0-2.0 GHz 2.0:1 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-1020-60DD-120.
A05 ±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

ENVIRONMENTAL RATINGS
- TEMPERATURE: -55°C TO +85°C (OPERATING)
- 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
7311 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 # 100-1256
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 (±dB MAXIMUM)
<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>10 dB</th>
<th>20 dB</th>
<th>40 dB</th>
<th>60 dB</th>
<th>80 dB</th>
<th>120 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 - 4.0 GHz</td>
<td>0.5</td>
<td>1.0</td>
<td>1.5</td>
<td>2.0</td>
<td>2.5</td>
<td>3.2</td>
</tr>
<tr>
<td>1.5 - 4.5 GHz</td>
<td>0.7</td>
<td>1.5</td>
<td>3.0</td>
<td>5.0</td>
<td>5.0</td>
<td>7.0</td>
</tr>
</tbody>
</table>
- ATTENUATION ACCURACY: 0 - 30 dB ±0.5 dB MAXIMUM, 30 - 60 dB ±1.0 dB MAXIMUM, 60 - 80 dB ±1.5 dB MAXIMUM, 80 - 120 dB ±2.0 dB MAXIMUM
- TEMPERATURE COEFFICIENT: ±0.025 dB/°C MAXIMUM
- SWITCHING TIME: 3 μs 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: 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-2040-60DD-120.
- A05: ±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

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 106C 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
SIZE: A SHEET 1 OF 2 Dwg. 100-4284

APPROVALS

PRELIMINARY PRODUCT FEATURE
AGH-2040-60DD-120
2.0 - 4.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR
SIZE: A SHEET 1 OF 2 Dwg. 100-4284

APPROVALS
**DESCRIPTION**

ANC MODEL AGH-2550-60DD-120 IS A OVER-OCTAVE BAND VARIABLE ATTENUATOR/MODULATOR, CONTROLLED BY 8 BIT 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 (±dB MAXIMUM)**
  - Frequency Range
    - 10 dB: 0.5 dB
    - 20 dB: 0.9 dB
    - 40 dB: 1.5 dB
    - 60 dB: 3.0 dB
    - 80 dB: 3.5 dB
    - 120 dB: 5.0 dB
    - 19.5-5.6 GHz
    - 0.7 dB
    - 1.5 dB
    - 3.0 dB
    - 5.0 dB
    - 7.0 dB
- **ATTENUATION ACCURACY**: 0-30 dB ±0.5 dB MAXIMUM (MONOTONICITY IS GUARANTEED) 30-50 dB ±1.0 dB MAXIMUM 50-60 dB ±1.5 dB MAXIMUM 60-80 dB ±2.0 dB MAXIMUM 80-120 dB ±2.5 dB MAXIMUM
- **TEMPERATURE COEFFICIENT**: ±0.025 dB/°C MAXIMUM
- **SWITCHING TIME**: 3 μS 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-2550-60DD-120.
- **A05**: ±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
- **S03**: SPECIAL CUSTOMER SPECIFICATIONS

**ENVIRONMENTAL RATINGS**

- **TEMPERATURE**: -55°C TO +85°C (OPERATING)
- **HUMIDITY**: -65°C TO +125°C (STORAGE)
- **SHOCK**: MIL-STD-202F, METHOD 213B CONDITION B
- **VIBRATION**: MIL-STD-202F, METHOD 201D CONDITION B
- **ALTITUDE**: MIL-STD-202F, METHOD 105C CONDITION B
- **TEMPERATURE CYCLE**: MIL-STD-202F, METHOD 107D CONDITION 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

**SIZE A**

SHEET 1 OF 2

**DWG #: 100-4264**
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
- ATTENUATION FLATNESS (±dB MAXIMUM):
  - 4.0-8.0 GHz: 10 dB 0.5, 20 dB 0.8, 40 dB 1.5, 60 dB 1.6, 80 dB 2.5, 120 dB 3.2
  - 3.0-9.0 GHz: 10 dB 0.7, 20 dB 1.5, 40 dB 3.0, 60 dB 3.5, 80 dB 5.0, 120 dB 7.0
- ATTENUATION ACCURACY: 0-30 dB ±0.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT: ±0.025 dB/°C MAXIMUM
- SWITCHING TIME: 3 µS MAXIMUM
- VSWR @ 0 dB ATTENUATION: 4.0-8.0 GHz 2.0:1 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
- SIZE: 4.68” x 3.45” x 0.80”

AVAILABLE OPTIONS

- A01: TWO SMA MALE RF CONNECTORS
- A02: 2-5°C TO +125°C (STORAGE)
- 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 AHG-4080-600-120.
- A05: ±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

ENVIRONMENTAL RATINGS

- TEMPERATURE: -55°C TO +85°C (OPERATING)
- 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 1070, COND. A

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PRELIMINARY PRODUCT FEATURE

AGH-4000-60DD-120
4.0-8.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE: A
SHEET: 1 OF 2
Dwg. # 110-4263
DESCRIPTION
AMC MODEL AGH-5010-60DD-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: 5.0-10.0 GHz
- INSERTION LOSS: 5.0-10.0 GHz 5.4 dB MAXIMUM
- ATTENUATION FLATNESS (±dB MAXIMUM)

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>10 dB</th>
<th>20 dB</th>
<th>40 dB</th>
<th>60 dB</th>
<th>80 dB</th>
<th>120 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0-10.0 GHz</td>
<td>0.8</td>
<td>0.9</td>
<td>1.5</td>
<td>1.6</td>
<td>2.5</td>
<td>3.2</td>
</tr>
<tr>
<td>3.75-11.25 GHz</td>
<td>0.8</td>
<td>1.5</td>
<td>3.0</td>
<td>3.5</td>
<td>5.0</td>
<td>7.0</td>
</tr>
</tbody>
</table>
- ATTENUATION ACCURACY: ±0.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT: ±0.025 dB/C MAXIMUM
- SWITCHING TIME: 3 µs MAXIMUM
- VSWR @ 0 dB ATTENUATION: 5.0-10.0 GHz 2.0:1 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
- CONNECTORS: SMA FEMALE CONNECTOR
- MOUNTING SIZE: 8 PLACES
- 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-5010-60DD-120.
- A05: ±15VDC POWER SUPPLY
- A06: 0-90 dB DYNAMIC RANGE
- A07: EXTENDED BANDWIDTH (3.75-11.25 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

ENVIRONMENTAL RATINGS
- TEMPERATURE: -55°C TO +85°C (OPERATING)
- HUMIDITY: -65°C TO +125°C (STORAGE)
- SHOCK: MIL-STD-202F, METHOD 1038B COND. B
- VIBRATION: MIL-STD-202F, METHOD 204D COND. B
- ALTITUDE: MIL-STD-202F, METHOD 105C COND. B
- TEMPERATURE CYCLE: MIL-STD-202F, METHOD 1070 COND. A

AMERICAN MICROWAVE CORPORATION
7311 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

SIZE A  SHEET 1 OF 2  DWG. # 100-4262
AMC MODEL AGH-6012-600D-120 IS A OVER-OCTAVE (F*/F) 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
- ATTENUATION FLATNESS (±6 dB MAXIMUM)
  - FREQUENCY RANGE: 6.0-12.0 GHz 0.7 1.0 1.5 1.6 2.5 3.2
  - FREQUENCY RANGE: 4.5-13.5 GHz 0.9 1.6 3.0 3.5 5.0 7.0
- ATTENUATION ACCURACY: 0-30 dB ±0.5 dB MAXIMUM
  (MONOTONICITY IS GUARANTEED)
  - FREQUENCY RANGE: 30-50 db ±1.0 dB MAXIMUM
  - FREQUENCY RANGE: 50-60 db ±1.5 dB MAXIMUM
  - FREQUENCY RANGE: 60-80 db ±2.0 dB MAXIMUM
  - FREQUENCY RANGE: 80-120 db ±2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT: ±0.025 dB/C MAXIMUM
- SWITCHING TIME: 3 uS MAXIMUM
- VSWR @ 0 dB ATTENUATION: 6.0-12.0 GHz 2.0:1 MAXIMUM
  - FREQUENCY RANGE: 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: 4.66" 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-6012-600D-120.
- A05: ±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

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-202T, 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

PRELIMINARY PRODUCT FEATURE
AGH-6012-600D-120
6.0-12.0 GHz, PROGRAMMABLE VARIABLE ATTENUATOR

SIZE: A

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR MODIFICATION.
**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 (±dB MAXIMUM)**
  
<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>10 dB</th>
<th>20 dB</th>
<th>40 dB</th>
<th>60 dB</th>
<th>80 dB</th>
<th>120 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0–18.0 GHz</td>
<td>0.8</td>
<td>1.1</td>
<td>1.5</td>
<td>1.8</td>
<td>2.5</td>
<td>3.2</td>
</tr>
<tr>
<td>8.0–18.0 GHz</td>
<td>0.9</td>
<td>1.6</td>
<td>3.0</td>
<td>3.5</td>
<td>5.0</td>
<td>7.0</td>
</tr>
</tbody>
</table>
- **ATTENUATION ACCURACY** ........... 0–30 dB ±0.5 dB MAXIMUM
  (MONOTONICITY IS GUARANTEED)
  30–50 ‘dB ±1.0 dB MAXIMUM
  50–80 ‘dB ±1.5 dB MAXIMUM
  80–120 ‘dB ±2.0 dB MAXIMUM
- **TEMPERATURE COEFFICIENT** ........ ±0.025 °C/°C MAXIMUM
- **SWITCHING TIME** .................. 3 µS 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** ............... +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** ...................... SMA FEMALE
  RF INPUT/OUTPUT .................... SMA FEMALE
  POWER AND CONTROLS .................. 15 PIN D TYPE MINIATURE 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 UNEPAINTED
- 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-8018-60DD-120.
- A05: ± 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
- SGC: SPECIAL CUSTOMER SPECIFICATIONS

**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**

73116 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

**NOTE:** THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION
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)
  30–60 dB ±1.0 dB MAXIMUM
  Nominal Attenuation
  50–60 dB ±1.5 dB MAXIMUM
- **MC/IonTecy**: GUARANTEED
- **Temperature Coefficient**: ±0.025 dB/C MAXIMUM
- **Switching Time**:
  (-SF) 500 ns MAXIMUM
  (-VF) 200 ns MAXIMUM
  (-UP) 125 ns MAXIMUM
- **VSWR (All Attenuation Levels)**: 1.5:1 MAXIMUM (1–2 GHz)
- **Power Handling**: +20 dBm CW OR PEAK
  (-VF & -UP) +10 dBm CW OR PEAK
- **Control**: VOLTAGE CONTROLLED
  10 dB/VOLT TRANSFER FUNCTION SLOPE
- **Power Supply**: +12VDC ±5%@100 mA MAXIMUM
  -12VDC ±5%@ 20 mA MAXIMUM
- **Connectors**: SMA FEMALE
  RF Input/Output
  Power: SOLDER PIN
  J1: SMA MALE, J2: SMA FEMALE
  ±15VDC Supplies
  ±18 Volt Power Supply
  0–30 dB Range
  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
- **Available Options**:
  A01: SMA MALE, J2: SMA FEMALE
  A02: 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: ±15VDC SUPPLIES
  A09: ±18 VOLT POWER SUPPLY
  A10: 0–30 dB RANGE
  A11: 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
  A12: ±3.5 dB @60 dB
  A13: 8 BIT DIGITAL CONTROLLED AND LINEARIZED
  A14: OPTION 20, OPTIMIZED FOR 1355–1435 MHz

MECHANICAL OUTLINE

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) 662-4938

PRODUCT FEATURE

AGH-1020-60D-SF
1-2 GHz, VOLTAGE CONTROLLED, HIGH SPEED, VARIABLE ATTENUATOR/MODULATOR
SF (STANDARD) W (VERY FAST)
UP (ULTRA FAST)

SIZE A
SHPP 1 OF 2
DWD. # 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 ± 0.2 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)
- **Monotonicity**: Guaranteed
- **Temperature Coefficient**: ± 0.025 dB/°C maximum
- **Switching Time**: 1.5 μS 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 ± 5%/@ 100 mA maximum
  -12VDC ± 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**: ±15VDC 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)

**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°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 107C Cond. A

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7311 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
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/°C MAXIMUM
- SWITCHING TIME: 1.5 μS 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 ±5%@100 mA MAXIMUM
  -12VDC ±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: ±15VDC SUPPLIES
A04: SMC MALE CONTROL CONNECTOR
A05: SMA FEMALE CONTROL CONNECTOR
A08: 10 dB/VOLT TRANSFER FUNCTION SLOPE
  (OTHER TRANSFER FUNCTION SLOPES AVAILABLE)

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

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

PRODUCT FEATURE

AGH-2856-70D

4.2-4.4 GHz, VOLTAGE CONTROLLED VARIABLE ATTENUATOR MODULE

NOTES:
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES: XXX ±0.020
XXX ±0.010
3) WEIGHT: APPROX. 2.0 OZ
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 lange couplers for repeatable low loss performance.

REVISED
OCTOBER 9, 1997

7311 G GROVE ROAD, FREDERICK, MARYLAND 21701
Tel.: (301) 662-4700
Fax: (301) 662-4938
FUNCTIONAL SCHEMATIC

INPUT

50Ω

HYBRID

50Ω

CONTROL

+12 VDC
-12 VDC
GROUND

OUTPUT

SPECIFICATIONS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>FREQUENCY RANGE (GHz)</th>
<th>INSERTION LOSS, MAX (dB)</th>
<th>VSWR MAX</th>
<th>FLATNESS (± dB) AT Nominal ATTenuation TO Levels OF</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGH-1020D</td>
<td>1.0-2.0 0.75-2.25</td>
<td>1.8 1.9</td>
<td>1.5 2.0</td>
<td>0.45 0.3 0.8 1.5 1.6 3.5</td>
</tr>
<tr>
<td>AGH-2040D</td>
<td>2.0-4.0 1.5-4.5</td>
<td>1.8 1.9</td>
<td>1.5 2.0</td>
<td>0.5 0.5 0.8 1.5 1.6 3.5</td>
</tr>
<tr>
<td>AGH-2550D</td>
<td>2.5-5.0 1.9-5.6</td>
<td>2.0 2.1</td>
<td>1.6 2.1</td>
<td>0.5 0.5 0.8 1.5 1.6 3.5</td>
</tr>
<tr>
<td>AGH-4080D</td>
<td>4.0-8.0 3.0-9.0</td>
<td>2.4 2.5</td>
<td>1.7 2.2</td>
<td>0.5 0.5 0.8 1.5 1.6 3.5</td>
</tr>
<tr>
<td>AGH-5010D</td>
<td>5.0-10.0 3.75-11.25</td>
<td>2.6 2.7</td>
<td>1.7 2.2</td>
<td>0.7 0.7 0.9 1.5 1.6 3.5</td>
</tr>
<tr>
<td>AGH-6012D</td>
<td>6.0-12.0 4.5-13.5</td>
<td>2.7 2.8</td>
<td>1.8 2.2</td>
<td>0.7 0.7 1.0 1.5 1.6 3.5</td>
</tr>
<tr>
<td>AGH-8018D</td>
<td>8.0-18.0 6.0-18.0</td>
<td>2.7 (Note 1) 2.7 (Note 1)</td>
<td>2.0 2.0</td>
<td>0.7 0.7 1.0 1.5 1.6 3.5</td>
</tr>
</tbody>
</table>

NOTES: 1. Typical loss to 16 GHz.
3.7 dB, max loss 16-18 GHz.
2. Extended frequency range specifications are typical.
ADDITIONAL SPECIFICATIONS
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 ................ ≤ .025 dB/°C, Max.
Power Handling ................ + 20 dBm
(Rise and Fall Times ......... Rise Time: 1.5 μsec, Max.
Fall Time: 50 ns, Max.
Control Characteristics ....... Range: 0 to 6 volts:
≤ 15 volts, Maximum
Transfer Function: 10 dB/volt
Input Impedance: 10 k Ohms
Power Supply Requirements .... + 12 V ± 5% @ 100 Ma
- 12 V ± 5% @ 20 Ma

AVAILABLE OPTIONS

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>Two SMA Male RF Connectors</td>
</tr>
<tr>
<td>002</td>
<td>One SMA Male and One SMA Female RF Connector</td>
</tr>
<tr>
<td>003</td>
<td>5 dB/volt Sensitivity</td>
</tr>
<tr>
<td>004</td>
<td>0 – 30 dB Range</td>
</tr>
<tr>
<td>005</td>
<td>± 15 Volt Power Supply</td>
</tr>
<tr>
<td>006</td>
<td>SMA – F Control Connector</td>
</tr>
<tr>
<td>008</td>
<td>SMC – M Control Connector</td>
</tr>
<tr>
<td>102</td>
<td>± 18 Volt Power Supply</td>
</tr>
<tr>
<td>200</td>
<td>Removable SMA Female RF Connector</td>
</tr>
</tbody>
</table>

ENVIRONMENTAL RATINGS
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

REVISED
OCTOBER 9, 1997
8-46
MECHANICAL DATA

DIMENSIONS AND WEIGHTS

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

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

MODEL: AGH-4060D, 5010D, 6012D
Wt. 1 oz. (28 gm) approx.

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

Dimensional Tolerances unless otherwise indicated ±0.020 ±0.005

REVISED
OCTOBER 9, 1997
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 (±dB MAXIMUM)
<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>10 dB</th>
<th>20 dB</th>
<th>40 dB</th>
<th>60 dB</th>
<th>80 dB</th>
<th>120 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0–2.0 GHz</td>
<td>0.5</td>
<td>0.8</td>
<td>1.5</td>
<td>1.6</td>
<td>2.5</td>
<td>3.2</td>
</tr>
<tr>
<td>0.75–2.25 GHz</td>
<td>0.7</td>
<td>1.5</td>
<td>3.0</td>
<td>5.0</td>
<td>7.0</td>
<td></td>
</tr>
</tbody>
</table>
- ATTENUATION ACCURACY: 0–30 dB ±0.5 dB MAXIMUM
  (MONOTONICITY IS GUARANTEED)
- TEMPERATURE COEFFICIENT: ±0.025 dB/°C MAXIMUM
- SWITCHING TIME: 3 µS 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: +12 VDC @ 250 mA MAXIMUM, -12 VDC @ 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-1020-60D-120.
- A05: ±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.

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

PRELIMINARY PRODUCT FEATURE
AGH-1020-60D-120
1.0–2.0 GHz, VOLTAGE VARIABLE ATTENUATOR

SIZE A SHEET 1 OF 2 DWG. # 100-1291

NOTES:
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES: XXX 0.020
   XXXX ±0.010
   APPROX. 7.0 02
3) WEIGHT: XXXX 3.5

MECHANICAL OUTLINE
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
- ATTENUATION FLATNESS (±db MAXIMUM)
<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>10 dB</th>
<th>20 dB</th>
<th>40 dB</th>
<th>60 dB</th>
<th>80 dB</th>
<th>120 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0-4.0 GHz</td>
<td>0.5</td>
<td>0.8</td>
<td>1.5</td>
<td>1.6</td>
<td>2.5</td>
<td>3.2</td>
</tr>
<tr>
<td>1.5-4.5 GHz</td>
<td>0.7</td>
<td>1.5</td>
<td>3.0</td>
<td>3.5</td>
<td>5.0</td>
<td>7.0</td>
</tr>
</tbody>
</table>
- ATTENUATION ACCURACY (MONOTONICITY IS GUARANTEED)
<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>0-30 db</th>
<th>±0.5 db MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-50 dB</td>
<td>±1.0 db</td>
<td>MAXIMUM</td>
</tr>
<tr>
<td>60-80 dB</td>
<td>±1.5 db</td>
<td>MAXIMUM</td>
</tr>
<tr>
<td>80-120 dB</td>
<td>±2.5 db</td>
<td>MAXIMUM</td>
</tr>
</tbody>
</table>
- TEMPERATURE COEFFICIENT: ±0.025 dB/°C MAXIMUM
- SWITCHING TIME: 3 µS MAXIMUM
- VSWR @ 0 dB ATTENUATION: 2.0-4.0 GHz 2.0:1 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
- CONNECTORS
  | RF INPUT/OUTPUT | SMA FEMALE |
  | POWER AND CONTROLS | SOLDER PIN |
- SIZE: 4.30" x 2.47" x 0.60" (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-2040-600D-120.
A05: ±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.

MECHANICAL OUTLINE

ENVIRONMENTAL RATINGS
- TEMPERATURE: -55°C TO +85°C (OPERATING)
  | -65°C TO +125°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

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7311 GROVE RD., FREDERICK, MD. 21701
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PRELIMINARY PRODUCT FEATURE
AGH-2040-60D-120
2.0-4.0 GHz, VOLTAGE VARIABLE ATTENUATOR

SIZE A  SHEET 1 OF 2  DRAWING # 100-4790

APPROVED: RY 8/10/07
DRAWN: RY 8/10/07
CHECKED: RY 8/10/07
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
- ATTENUATION FLATNESS (±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 ±0.5 dB MAXIMUM
  (MONOTONICITY IS GUARANTEED)
  | FREQUENCY RANGE | 0-30 dB | 30-50 dB | 50-60 dB | 60-80 dB | 80-120 dB |
  | 2.5-5.0 GHz     | ±0.5 dB | ±1.0 dB   | ±1.5 dB   | ±2.0 dB   | ±2.5 dB   |
  | 1.9-5.6 GHz     | ±0.5 dB | ±1.0 dB   | ±1.5 dB   | ±2.0 dB   | ±2.5 dB   |
- TEMPERATURE COEFFICIENT ...... ±±0.025 dB/C MAXIMUM
- SWITCHING TIME ................ 3 μS 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 .................................. 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.

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 206D COND. B
- TEMPERATURE CYCLE .......... MIL-STD-202F, METHOD 107D COND. A

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PRELIMINARY PRODUCT FEATURE

AGH-2550-60D-120
2.5-5.0 GHz, VOLTAGE VARIABLE ATTENUATOR
DESCRIPTION
AMC MODEL AGH-4080-600-120 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 (±dB MAXIMUM)

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>10 dB</th>
<th>20 dB</th>
<th>40 dB</th>
<th>60 dB</th>
<th>80 dB</th>
<th>120 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0-8.0 GHz</td>
<td>0.5</td>
<td>0.8</td>
<td>1.5</td>
<td>1.6</td>
<td>2.5</td>
<td>3.2</td>
</tr>
<tr>
<td>3.0-9.0 GHz</td>
<td>0.7</td>
<td>1.5</td>
<td>3.0</td>
<td>3.5</td>
<td>5.0</td>
<td>7.0</td>
</tr>
</tbody>
</table>
- ATTENUATION ACCURACY: 0-30 dB ±0.5 dB MAXIMUM
(MONOTONICITY IS GUARANTEED)
- 30-50 dB ±1.0 dB MAXIMUM
- 50-60 dB ±1.5 dB MAXIMUM
- 60-80 dB ±2.0 dB MAXIMUM
- 80-120 dB ±2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT: ±0.025 d/B/C MAXIMUM
- SWITCHING TIME: 3 µS 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" or 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-4080-6000-120.
- A05: ±15VDC POWER SUPPLY
- A06: 0-90 dB DYNAMIC RANGE
- A07: EXTENDED BANDWIDTH (3.0-9.0 GHz)
- A08: LATCHING STROBE
- A09: HIGH SPEED 500 mS MAXIMUM
- SCS: SPECIAL CUSTOMER SPECIFICATIONS

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION.

MECHANICAL OUTLINE

ENVIRONMENTAL RATINGS
- TEMPERATURE: -55°C TO +85°C (OPERATING)
- -65°C TO +125°C (STORAGE)
- HUMIDITY: MIL-STD-202F, METHOD 103B COND. B
- 1/10GCK: 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-4080-600-120
4.0-8.0 GHz, VOLTAGE VARIABLE ATTENUATOR

SIZE: A
SHEET: 1 OF 2
DWG #: 100-4268
DESCRIPTION

AMC MODEL AGH-5010-600-120 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
- ATTENUATION FLATNESS (± 0 dB) MAXIMUM

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>10 dB</th>
<th>20 dB</th>
<th>40 dB</th>
<th>60 dB</th>
<th>80 dB</th>
<th>120 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0-10.0 GHz</td>
<td>0.6</td>
<td>0.9</td>
<td>1.5</td>
<td>1.6</td>
<td>2.5</td>
<td>3.2</td>
</tr>
<tr>
<td>3.75-11.25 GHz</td>
<td>0.8</td>
<td>1.0</td>
<td>1.5</td>
<td>2.2</td>
<td>3.5</td>
<td>5.0</td>
</tr>
</tbody>
</table>

- ATTENUATION ACCURACY .............. 0-30 dB ± 0.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT .............. ± 0.025 °C/°C MAXIMUM
- SWING TIME .............. 3 μS MAXIMUM
- VSWR @ 0 dB ATTENUATION .............. 5.0-10.0 GHz 2.0:1 MAXIMUM
- RF POWER RATINGS
  - OPERATING POWER .............. +20 dBm CW MAXIMUM
  - SURVIVAL POWER .............. +30 dBm CW MAXIMUM
- CONTROL .............. 20 dB/VOLT
- POWER SUPPLY .............. +12VDC @ 250 mA MAXIMUM
- -12VDC @ 100 mA MAXIMUM
- CONNECTORS
  - RF INPUT/OUTPUT .............. SMA FEMALE
  - POWER AND CONTROLS .............. SOLDER PIN
- SIZE .............. 3.25" x 1.85" x 0.60"
  - 4.88" 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-5010-600-120.
A05 .............. ±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 ON REVISION

ENVIRONMENTAL RATINGS

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

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PRELIMINARY PRODUCT FEATURE

AGH-5010-600-120
5.0-10.0 GHz, VOLTAGE VARIABLE ATTENUATOR
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 (±dB MAXIMUM)

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>10 dB</th>
<th>20 dB</th>
<th>40 dB</th>
<th>60 dB</th>
<th>80 dB</th>
<th>120 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0–12.0 GHz</td>
<td>0.7</td>
<td>1.0</td>
<td>1.5</td>
<td>1.8</td>
<td>2.5</td>
<td>3.2</td>
</tr>
<tr>
<td>4.5–13.5 GHz</td>
<td>0.9</td>
<td>1.6</td>
<td>3.0</td>
<td>3.5</td>
<td>5.0</td>
<td>7.0</td>
</tr>
</tbody>
</table>
- ATTENUATION ACCURACY: 0–30 dB ±0.5 dB MAXIMUM (MONOTONICITY IS GUARANTEED)
- SWITCHING TIME: 3 uS 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" 4.87" 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: ±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

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PRELIMINARY PRODUCT FEATURE

AGH-6012-60D-120
6.0–12.0 GHz, VOLTAGE VARIABLE ATTENUATOR

ENVIRONMENTAL RATINGS

- TEMPERATURE: -65°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. B

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

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION.
FUNCTIONAL SCHEMATIC

DRIVER CIRCUIT

+V
- V

LINEARIZER CIRCUIT

CONTROL

LATCHING STROBE (OPTIONAL)

GND

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
7311 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
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 (±dB MAXIMUM)

<table>
<thead>
<tr>
<th>FREQUENCY RANGE</th>
<th>10 dB</th>
<th>20 dB</th>
<th>40 dB</th>
<th>60 dB</th>
<th>80 dB</th>
<th>120 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0–18.0 GHz</td>
<td>0.8</td>
<td>1.1</td>
<td>1.5</td>
<td>1.6</td>
<td>2.5</td>
<td>3.2</td>
</tr>
<tr>
<td>6.0–18.0 GHz</td>
<td>0.9</td>
<td>1.6</td>
<td>3.0</td>
<td>3.5</td>
<td>5.0</td>
<td>7.0</td>
</tr>
</tbody>
</table>
- ATTENUATION ACCURACY ........... 0–30 dB ±0.5 dB MAXIMUM
(MONOTONICITY IS GUARANTEED)
30–50 dB ±1.0 dB MAXIMUM
50–60 dB ±1.5 dB MAXIMUM
60–80 dB ±2.0 dB MAXIMUM
80–120 dB ±2.5 dB MAXIMUM
- TEMPERATURE COEFFICIENT ........ ±0.025 dB/°C MAXIMUM
- SWITCHING TIME ................. 3 μs 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-8018-600D-120.
A05 ................................ ± 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.
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/°C MAXIMUM
- SWITCHING TIME
  RISE TIME (90% TO 10% RF) ...... 1.5 µs 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.

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
AGH-4080-N

4-8 GHz, CURRENT CONTROLLED NON-REFLECTIVE VARIABLE ATTENUATOR MODULATOR
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
### SPECIFICATIONS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>FREQUENCY RANGE (GHz)</th>
<th>INSERTION LOSS, MAX (dB)</th>
<th>VSWR MAX.</th>
<th>FLATNESS (± dB) AT MID-BAND ATTENUATION TO LEVELS OF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10 dB</td>
</tr>
<tr>
<td>AGH-1020</td>
<td>1.0-2.0</td>
<td>1.8</td>
<td>1.5</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>0.75-2.25</td>
<td>1.9</td>
<td>2.0</td>
<td>0.6</td>
</tr>
<tr>
<td>AGH-2040</td>
<td>2.0-4.0</td>
<td>1.8</td>
<td>1.5</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>1.5-4.5</td>
<td>1.9</td>
<td>2.0</td>
<td>0.5</td>
</tr>
<tr>
<td>AGH-2550</td>
<td>2.5-5.0</td>
<td>2.0</td>
<td>1.6</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>1.9-5.6</td>
<td>2.1</td>
<td>2.1</td>
<td>0.5</td>
</tr>
<tr>
<td>AGH-4080</td>
<td>4.0-8.0</td>
<td>2.4</td>
<td>1.7</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>3.0-9.0</td>
<td>2.5</td>
<td>2.2</td>
<td>0.5</td>
</tr>
<tr>
<td>AGH-5010</td>
<td>5.0-10.0</td>
<td>2.6</td>
<td>1.7</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>3.75-11.25</td>
<td>2.7</td>
<td>2.2</td>
<td>0.7</td>
</tr>
<tr>
<td>AGH-6012</td>
<td>6.0-12.0</td>
<td>2.7</td>
<td>1.8</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>4.5-13.5</td>
<td>2.8</td>
<td>2.2</td>
<td>0.9</td>
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<tr>
<td>AGH-8018</td>
<td>8.0-18.0</td>
<td>3.7</td>
<td>2.0</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>6.0-18.0</td>
<td>3.7</td>
<td>2.0</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Note: Extended Frequency Range Specifications Are Typical.
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
Temperature Cycling

} Per Mil-Std-202C
   Method 103B, 213, 204A, 105C and 102

OPTIONS

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>Two SMA Male RF Connectors</td>
</tr>
<tr>
<td>002</td>
<td>One SMA Male and One SMA Female RF Connector</td>
</tr>
<tr>
<td>003</td>
<td>SMA Female Control Connector</td>
</tr>
<tr>
<td>200</td>
<td>Removable SMA Female RF Connector</td>
</tr>
</tbody>
</table>

REVISED
OCTOBER 9, 1997

8-66
SECTION

PRODUCT DESCRIPTION

9.0 0.5 TO 8 GHz
AGC SERIES, OCTAVE BAND, CURRENT CONTROLLED ATTENUATORS ................................................. 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 HIGH SPEED, CURRENT CONTROLLED ATTENUATOR
• AGC-0510 .............................................................. 9-4 TO 9-5

9.3 1 TO 8 GHz
AGC SERIES CURRENT CONTROLLED, 30 dB RANGE, NON-REFLECTIVE PIN DIODE ATTENUATORS/ MODULATORS

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>MODEL NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 TO 2 GHz</td>
<td>AGC-1020</td>
</tr>
<tr>
<td>1.5 TO 3 GHz</td>
<td>AGC-1530</td>
</tr>
<tr>
<td>2 TO 4 GHz</td>
<td>AGC-2040</td>
</tr>
<tr>
<td>2.5 TO 5 GHz</td>
<td>AGC-2550</td>
</tr>
<tr>
<td>3 TO 6 GHz</td>
<td>AGC-3060</td>
</tr>
<tr>
<td>4 TO 8 GHz</td>
<td>AGC-4080 ...................................................... 9-6 TO 9-7</td>
</tr>
</tbody>
</table>
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 μsec, 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.
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 @ -0.28 mA (TYP)
  20 dB @ -0.77 mA (TYP)
  30 dB @ -1.68 mA (TYP)
  40 dB @ -3.48 mA (TYP)
  50 dB @ -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: Two SMA male RF connectors
- A03: Solder pin control connector
- A04: SMC control connector
- A05: Reverse control current (positive)

MECHANICAL OUTLINE

ENVIRONMENTAL RATING
- Temperature: -55°C to +95°C (operating)
  -65°C to +125°C (storage)
- Humidity: MIL-STD-202F, METHOD 103B, 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. B

AMERICAN MICROWAVE CORPORATION
7311 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

Size A
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

REVISED
OCTOBER 9, 1997

7311 G GROVE ROAD, FREDERICK, MARYLAND 21701
Tel.: (301) 662-4700
Fax: (301) 662-4938
SPECIFICATIONS

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

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

REVISED
OCTOBER 9, 1997

9-7
SECTION 10.0

Application Notes
How To Specify
Pin Diode Variable Attenuators
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 Circuit Diagram]

The attenuation, \( \alpha \), 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, \( P_l \).

Therefore \( \alpha = 10 \log \frac{P_l}{P_i} \)

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 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 Circuit Diagram]

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.

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Simple Diode Attenuators

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

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 6:1. 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 'r' or 's' attenuation circuit is switched in and out of the network. (See 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 a dB of attenuation. Essentially the attenuator bit is switched in and out of the circuit, thus giving the name "Switched-bit".

REVISED
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10-2
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)

![Example of 3 Bit, switched Bit Attenuator Circuit](image)

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)

![Hybrid Coupled Attenuator](image)

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

This kind of attenuator has a practical bandwidth limitation of 3.01. 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 dB 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).

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

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**REVISED**

**OCTOBER 9, 1997**
Typical AGH-0016D - Phase shift at 50 dB
Referenced to insertion loss

Fig. 11

T-PAD WITH PIN DIODE ELEMENTS

CR1: CR2

CR3

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 ensuring 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

R1 - R2

R3

Fig. 12

CR1 and CR2 are biased independently from CR3. By proper selection of bias current the folded T-Pad design can yield reflectonless 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)
CR1 and CR2 are equivalent to R1, R2, CR3, to R3. The PIN Diode circuit is 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-2018-600 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-2018-600 - Option 7 typical flatness at 60 dB attenuation.

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 Rs 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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OCTOBER 9, 1997
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 Rs 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 (2 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:

<table>
<thead>
<tr>
<th>DIGITAL WORD</th>
<th>MSB</th>
<th>2 dB</th>
<th>LSb</th>
<th>Attenuation Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>Insertion Loss</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>dB</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>dB</td>
</tr>
<tr>
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<td>0</td>
<td>0</td>
<td>4</td>
<td>dB</td>
</tr>
<tr>
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<td>0</td>
<td>1</td>
<td>5</td>
<td>dB</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>dB</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>dB</td>
</tr>
</tbody>
</table>

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)
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.

\[
\text{Nominal Attenuation} = \frac{\text{Max Attenuation} + \text{Min Attenuation}}{2}
\]

\[
\text{Accuracy (Linearity)} = \frac{\text{Programmed Attenuation (Assuming ideal transfer function)}}{\text{Nominal Attenuation}} - \text{Nominal Attenuation}
\]

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 an insertion loss. Measured by normalizing absolute phase shift of the unit at zero 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/°C. 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 (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).

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OCTOBER 9, 1997
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

7311 G GROVE ROAD, FREDERICK, MARYLAND 21704

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OCTOBER 9, 1997

11-0
WARRANTY AND SERVICE CONDITIONS

American Microwave Corporation (AMC) warrants each product of its 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: [Signature]
Peter Wood, QA/QC Administrator

Authorized and Approved by: [Signature]
Ash Gorwara, President & CEO
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 #:

<table>
<thead>
<tr>
<th>LINE ITEM</th>
<th>MODEL NUMBER</th>
<th>OPT NO.</th>
<th>PRODUCT DESCRIPTION</th>
<th>SERIAL NUMBERS</th>
<th>QUAN.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Approved by: ____________________________

Quality Assurance/Control Department

Date: ____________________________