

**DATA SHEET**

# AA116-72, AA116-72LF: GaAs IC 1-Bit Digital Attenuator

## 15 dB LSB 4 MHz–2 GHz


**Features**

- 3 V control
- Low loss
- Low-cost SOT-5 plastic package
- Available lead (Pb)-free and RoHS-compliant, MSL-1 @ 260 °C per JEDEC J-STD-020

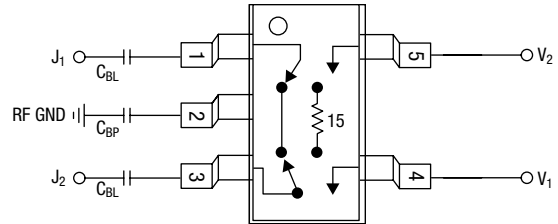
**Description**

The AA116-72 is a 1-bit GaAs IC FET digital attenuator in a low-cost package. This attenuator has an LSB of 15 dB. The AA116-72 is particularly suited where high attenuation accuracy, low insertion loss, and low intermodulation products are required. Typical applications include cellular radio, wireless data, and wireless local loop gain level control circuits.

**NEW** Skyworks offers lead (Pb)-free, RoHS (Restriction of Hazardous Substances)-compliant packaging.



**Pin Out**



DC blocking capacitors ( $C_{BL}$ ), bypass capacitor ( $C_{BP}$ ), must be supplied externally for positive voltage operation.  
 $C_{BL} = 33 \text{ pF}$ ,  $C_{BP} = 39 \text{ pF}$  for operation @ 900 MHz.  
 $C_{BL} = 100 \text{ nF}$ ,  $C_{BP} = 100 \text{ nF}$  for operation @ 0.004–0.05 GHz.

**Electrical Specifications at 25 °C (0, 3 V)**

**$Z_0 = 50 \Omega$ , unless otherwise noted**

Parameter <sup>(1)</sup>	Frequency	Min.	Typ.	Max.	Unit
Insertion loss <sup>(2)</sup>	0.004–0.05 GHz		0.35	0.45	dB
	0.50–1.00 GHz		0.35	0.45	dB
	0.85–0.94 GHz		0.30	0.38	dB
	1.00–2.00 GHz		0.40	0.50	dB
Attenuation range			15		dB
Attenuation accuracy <sup>(3)</sup>	0.004–0.05 GHz	14.0	14.6	16.0	dB
	0.50–2.00 GHz	14.0	15.0	16.0	dB
	0.85–0.94 GHz	14.5	15.0	15.5	dB
Return loss	0.004–0.05 GHz		30		dB
	0.50–1.00 GHz		24		dB

1. All measurements made in a 50  $\Omega$  system, unless otherwise specified.  
 2. Insertion loss changes by 0.003 dB/°C.  
 3. Maximum attenuation includes insertion loss.

### Operating Characteristics at 25 °C (0, 3 V)

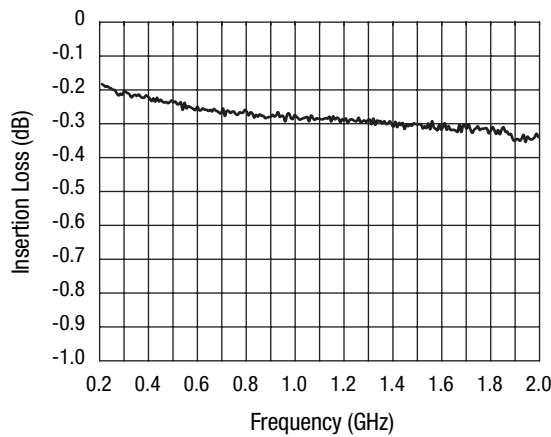
$Z_0 = 50 \Omega$ , unless otherwise noted

Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching characteristics <sup>(1)</sup>						
Rise, fall	10/90% or 90/10% RF			150		ns
On, off	50% CTL to 90/10% RF			300		ns
Video feedthru	$T_{RISE} = 1 \text{ ns}$ , BW = 500 MHz			70		mV
Input power for 1 dB compression	$V_S = 5 \text{ V}$ $V_S = 3 \text{ V}$ $V_S = 5 \text{ V}$	4–50 MHz 0.5–2.5 GHz 0.5–2.5 GHz	9	12 20 26		dBm dBm dBm
Intermodulation intercept point (IP3)	For two-tone input power 10 dBm $V_S = 3 \text{ V}$ $V_S = 5 \text{ V}$	0.5–2.5 GHz 0.5–2.5 GHz		41 45		dBm dBm
Control voltages	$V_{LOW} = 0 \text{ to } 0.2 \text{ V}$ $V_{HIGH} = 3 \text{ V @ } 25 \mu\text{A typ. to } 5 \text{ V @ } 50 \mu\text{A typ.}$					

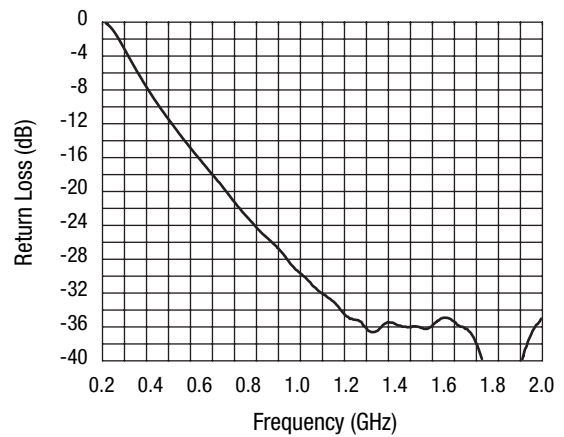
1. Switching characteristics will vary with value chosen for  $C_{BP}$ .

### Typical Performance Data (0, 3 V)

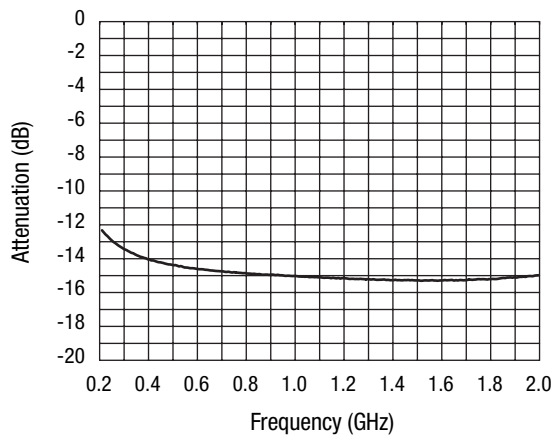
$Z_0 = 50 \Omega$ , unless otherwise noted



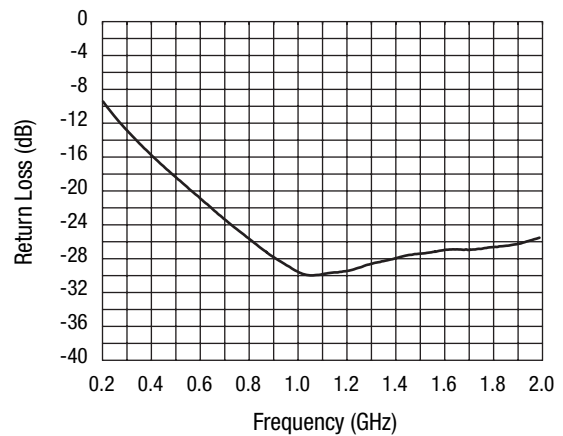
**Insertion Loss**



**Return Loss in Insertion Loss State**



**Attenuation**



**Return Loss in Attenuation State**

### Absolute Maximum Ratings

Characteristic	Value
RF input power	1 W > 500 MHz 0/8 V 0.5 W @ 50 MHz 0/8 V
Supply voltage	8 V
Control voltage	-0.2 V, +8 V
Operating temperature	-40 °C to +85 °C
Storage temperature	-65 °C to +150 °C

Performance is guaranteed only under the conditions listed in the specifications table and is not guaranteed under the full range(s) described by the Absolute Maximum Ratings. Exceeding any of the absolute maximum/minimum specifications may result in permanent damage to the device and will void the warranty.

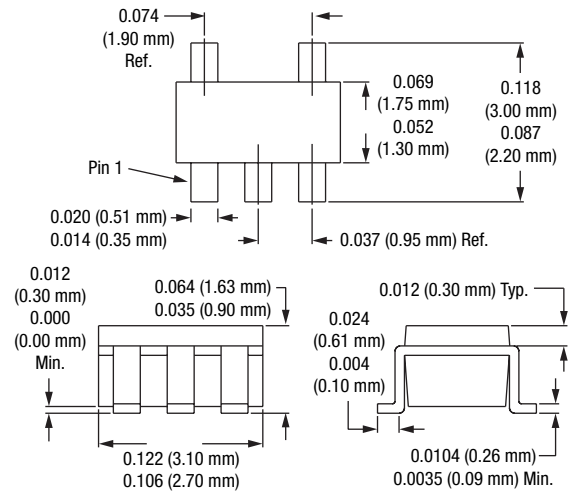
**CAUTION:** Although these devices are designed to be robust, ESD (Electrostatic Discharge) can cause permanent damage. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.

### Truth Table

V <sub>1</sub>	V <sub>2</sub>	J <sub>1</sub> -J <sub>2</sub>
V <sub>HIGH</sub>	0	Insertion loss
0	V <sub>HIGH</sub>	Attenuation

All other conditions not recommended.  
V<sub>HIGH</sub> = 3 to 5 V.

### SOT-5



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