

DATA SHEET

AA116-72, AA116-72LF: GaAs IC 1-Bit Digital Attenuator 15 dB LSB DC–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

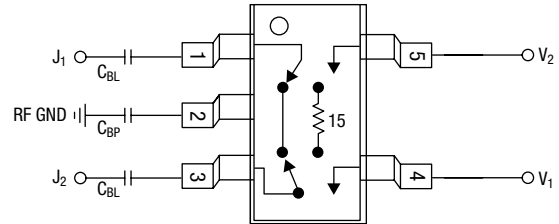
Description

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}), and biasing resistor must be supplied externally for positive voltage operation.
 $C_{BL} = 33$, $C_{BP} = 39$ pF for operation @ 900 MHz.

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

$Z_0 = 50 \Omega$, unless otherwise noted

Parameter ⁽¹⁾	Frequency	Min.	Typ.	Max.	Unit
Insertion loss ⁽²⁾	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 ⁽³⁾	0.50–2.00 GHz	14.0	15	16.0	dB
	0.85–0.94 GHz	14.5	15	15.5	dB
Return loss	0.50–1.00 GHz		24		

1. All measurements made in a 50 Ω 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)

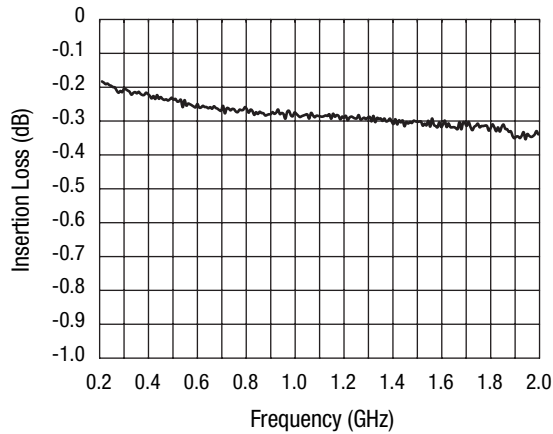
$Z_0 = 50 \Omega$, unless otherwise noted

Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching characteristics ⁽¹⁾						
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	$V_S = 3 \text{ V}$ $V_S = 5 \text{ V}$	0.5–2.5 GHz 0.5–2.5 GHz		20 26		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	$V_{LOW} = 0 \text{ to } 0.2 \text{ V}$ $V_{HIGH} = 3 \text{ V @ } 25 \mu\text{A typ. to } 5 \text{ V @ } 50 \mu\text{A typ.}$					

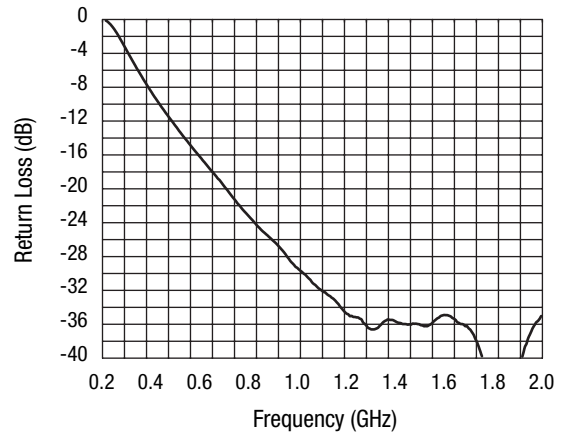
1. Switching characteristics will vary with value chosen for C_{BP} .

Typical Performance Data (0, 3 V)

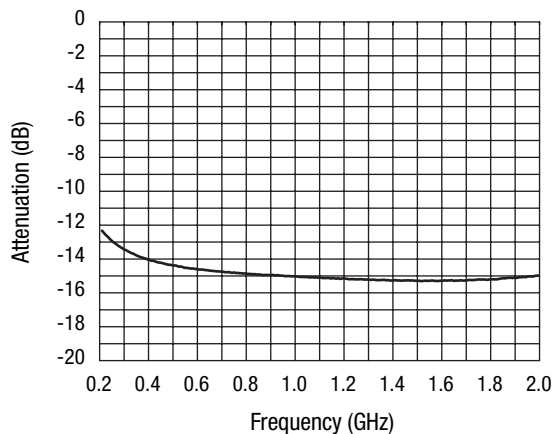
$Z_0 = 50 \Omega$, unless otherwise noted



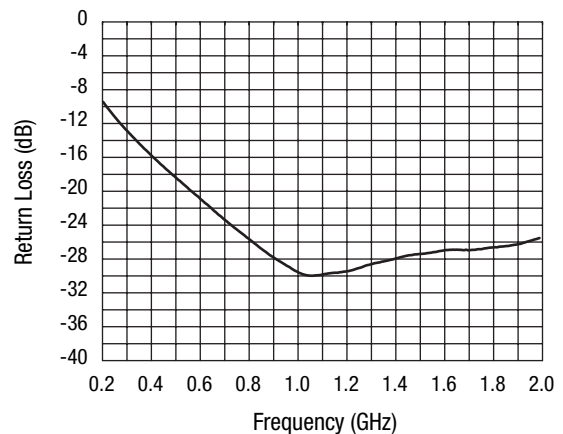
Insertion Loss



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 specifications. Exceeding any of the absolute maximum/minimum specifications may result in permanent damage to the device and will void the warranty.

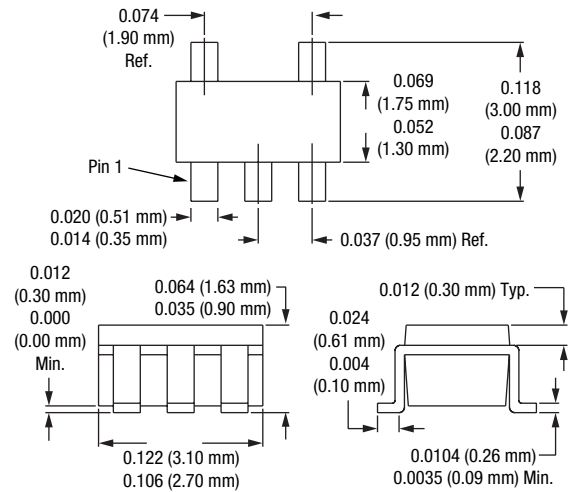
CAUTION: Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.

Truth Table

V ₁	V ₂	J ₁ -J ₂
V _{HIGH}	0	Insertion loss
0	V _{HIGH}	Attenuation

All other conditions not recommended.
V_{HIGH} = 3 to 5 V.

SOT-5



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