

**DATA SHEET**

# AA100-59LF: GaAs 3 Bit Digital Attenuator, 4 dB LSB 0.75–2 GHz

## Applications

- Cellular
- Radio
- Wireless data
- Wireless local loop
- Other gain level control circuits

## Features

- Attenuation: 4 dB steps to 28 dB
- Single positive control voltage: 3 V to 5 V
- Small MSOP-8 package
- Available lead (Pb)-free and RoHS-compliant MSL-1 @ 260 °C per JEDEC J-STD-020

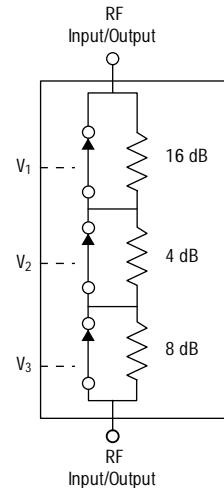
## Description

The AA100-59LF is a 3 bit, single positive control, 4 dB step GaAs IC FET digital attenuator in a low cost MSOP-8 plastic package. For positive operation external DC blocking capacitors are required on all RF ports. The AA100-59LF is particularly suited where high attenuation accuracy, low insertion loss and low intermodulation products are required.

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



## Block Diagram



## Electrical Specifications at 25 °C

**V<sub>CTL</sub> = 0, 3 V, Z<sub>0</sub> = 50 Ω, unless otherwise noted**

Parameter	Frequency	Min.	Typ.	Max.	Unit
Insertion loss <sup>(1)</sup>	0.75–2 GHz		1.8	2.1	dB
Attenuation range	0.75–2 GHz		28		dB
Attenuation accuracy <sup>(2)</sup>	0.75–1 GHz	± (0.2 + 3% of Attenuation setting in dB)			dB
	0.75–2 GHz	± (0.3 + 3% of Attenuation setting in dB)			dB
VSWR (I/O)	0.75–2 GHz		1.5:1	2.0:1	

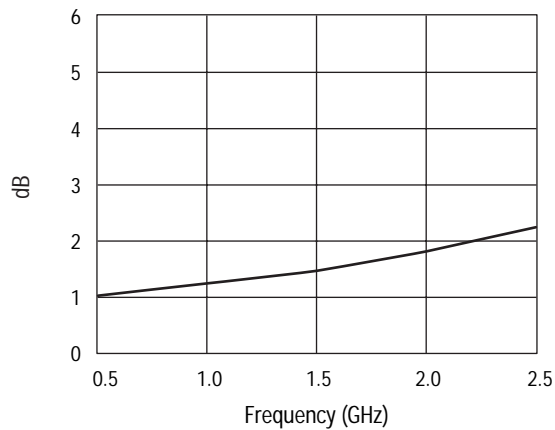
1. Insertion loss changes by 0.003 dB/°C.  
2. Attenuation referenced to insertion loss.

## Operating Characteristics at 25 °C

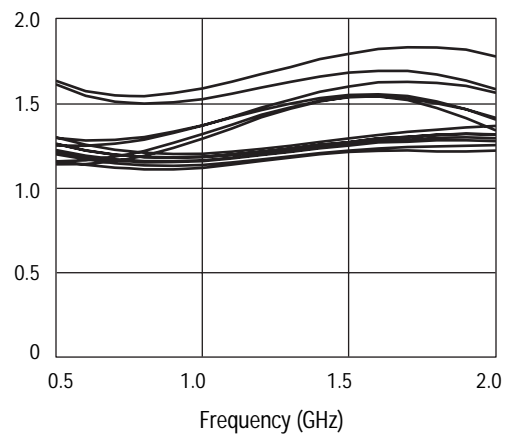
$V_{CTL} = 0, 3 V, Z_0 = 50 \Omega$ , unless otherwise noted

Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching characteristics						
Rise, fall	10/90% or 90/10% RF			0.7		$\mu s$
On, off	50% CTL to 90/10% RF			1.0		$\mu s$
Video feedthru	$T_{RISE} = 1 ns, BW = 500 MHz$			50		mV
Input power for 1 dB compression	$V_S = 3 V$ $V_S = 5 V$	0.75–2 GHz 0.75–2 GHz		20 26		dBm dBm
Intermodulation intercept point (IIP3)	For two-tone input power 10 dBm $V_{CTL} = 3 V$ $V_{CTL} = 5 V$	0.75–2 GHz 0.75–2 GHz		32 45		dBm dBm
Supply voltage			$V_{HIGH} - 0.2$		$V_{HIGH} + 0.2$	
Control voltages	$V_{LOW} = 0$ to 0.2 V @ 20 $\mu A$ max. $V_{HIGH} = 3 V$ @ 100 $\mu A$ max. to 5 V @ 200 $\mu A$ max. $V_S = V_{HIGH} \pm 0.2 V$					

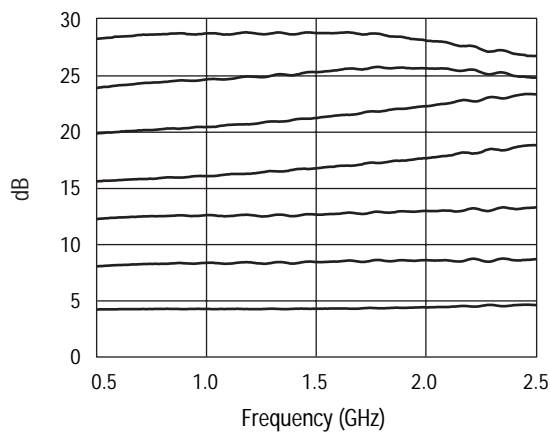
## Typical Performance Data



Insertion Loss vs. Frequency

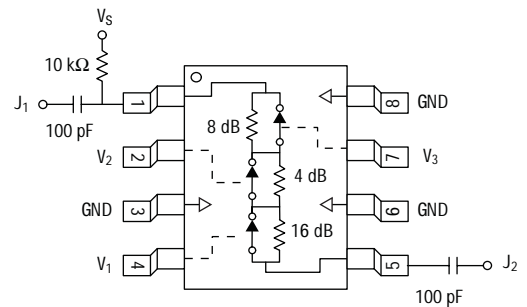


VSWR vs. Frequency (All States)



Attenuation vs. Frequency (All States)

## Pin Out (Top View)



### 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
Supply voltage	$V_{HIGH} \pm 0.2 V$

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.

### Recommended Solder Reflow Profiles

Refer to the [“Recommended Solder Reflow Profile”](#) Application Note.

### Tape and Reel Information

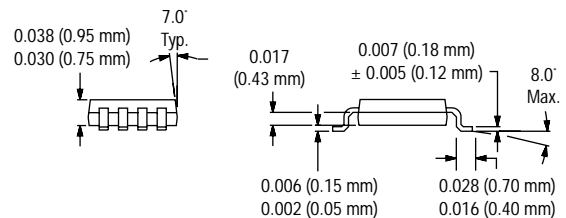
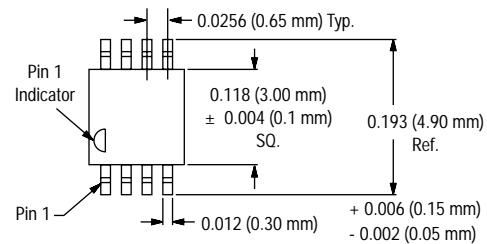
Refer to the [“Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation”](#) Application Note.

### Truth Table

$V_1$	$V_2$	$V_3$	Attenuation $J_1-J_2$
16 dB	4 dB	8 dB	Ins. loss
$V_{HIGH}$	$V_{HIGH}$	$V_{HIGH}$	4 dB
$V_{HIGH}$	0	$V_{HIGH}$	8 dB
$V_{HIGH}$	$V_{HIGH}$	0	12 dB
$V_{HIGH}$	0	0	16 dB
0	$V_{HIGH}$	$V_{HIGH}$	20 dB
0	0	$V_{HIGH}$	24 dB
0	$V_{HIGH}$	0	28 dB
0	0	0	28 dB

$V_{HIGH} = 3$  to  $5 V$  ( $V_S = V_{HIGH} \pm 0.2 V$ ).

### MSOP-8



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