

# 24–31 GHz GaAs MMIC High Isolation SPDT Reflective PIN Switch



AP640R6-00

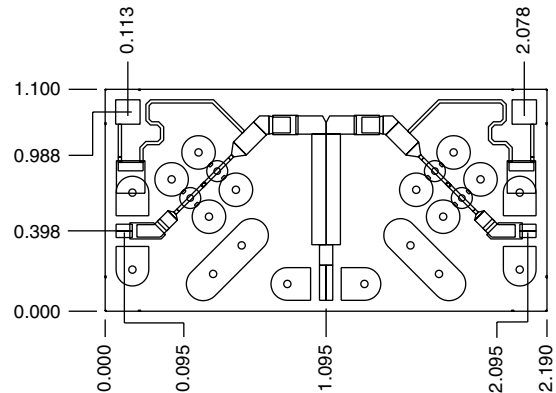
## Features

- Low Loss, < 1.2 dB
- High Isolation, > 34 dB
- Return Loss, < -12 dB
- Fast Switching Speed, < 4 ns
- High Power Handling, 37 dBm Peak, 33 dBm CW

## Description

Alpha's high isolation, single pole, double throw PIN diode switch is a robust, high performance switch. It is ideal for low loss, high isolation applications, particularly where high power handling is required. The chip uses Alpha's proven PIN diode technology, and is based upon MBE layers for the highest uniformity and repeatability. The diodes employ surface passivation to ensure a rugged, reliable part with through-substrate via holes and gold-based backside metallization to facilitate an epoxy die attach process. The GaAs MMIC employs two shunt PIN diodes in each arm and an on-chip bias network. Chips are measured on a 100% basis at 24, 28, and 30 GHz for insertion loss, isolation, input and output return losses, and also at DC for diode breakdown voltage and turn on voltage.

## Chip Outline



Dimensions indicated in mm.  
All pads are  $\geq 0.07$  mm wide.  
Chip thickness = 0.1 mm.

## Absolute Maximum Ratings

Characteristic	Value
Operating Temperature	-55°C to +125°C
Storage Temperature	-65°C to +150°C
DC Reverse Bias	-70 V (-20 mA)
DC Forward Bias	+1.3 V (100 mA)
$P_{IN}$	10 W

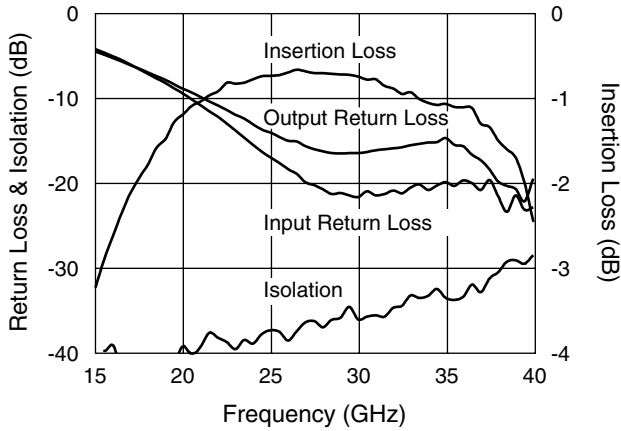
## Electrical Specifications at 25°C

Parameter	Symbol	Condition	Min.	Typ. <sup>2</sup>	Max.	Unit
Insertion Loss	IL	F = 24, 28, 31 GHz		1	1.2	dB
Isolation	ISO	F = 24, 28, 31 GHz	34	37		dB
Input Return Loss	$RL_I$	F = 24, 28, 31 GHz		20	15	dB
Output Return Loss (Insertion State)	$RL_O$	F = 24, 28, 31 GHz		15	12	dB
Leakage Current	$I_{DD}$	V = -50 V		2	20	$\mu A$
Switching Speed <sup>1</sup>				4		ns
Output Power at 1 dB Compression <sup>1</sup>	$P_{1\text{ dB}}$	F = 35 GHz		33		dBm

1. Not measured on a 100% basis.

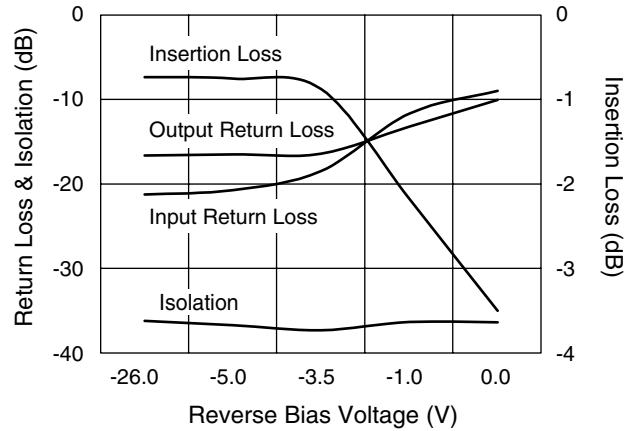
2. Typical represents the median parameter value across the specified frequency range for the median chip.

### Typical Performance Data



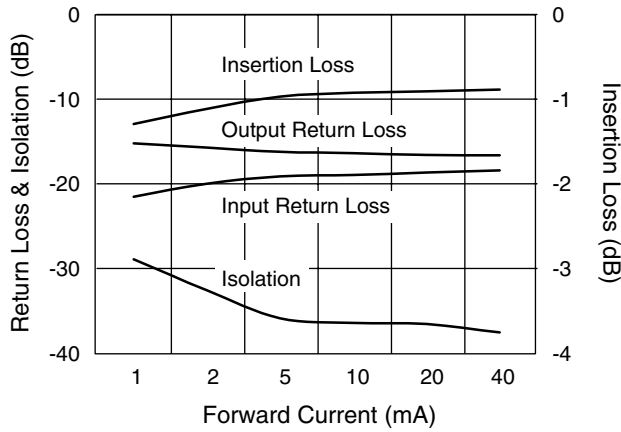
**Performance vs. Frequency**

Bias Conditions:  $I_F = 20 \text{ mA}$ ,  $V_R = -3.5 \text{ V}$



**Performance vs. DC Bias**

$F = 28 \text{ GHz}$ , Forward Current = 20 mA



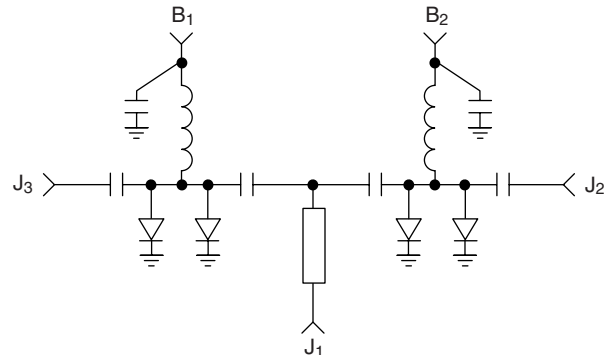
**Performance vs. DC Bias**

$F = 28 \text{ GHz}$ , Reverse Voltage = -3.5 V

### Truth Table

$B_1$	$B_2$	$J_1$ – $J_2$
+20 mA	-5 V	Insertion Loss
-5 V	+20 mA	Isolation

### Circuit Schematic



### Bias Arrangement

