

23–31 GHz GaAs MMIC SP4T Reflective PIN Switch



AP028R4-00

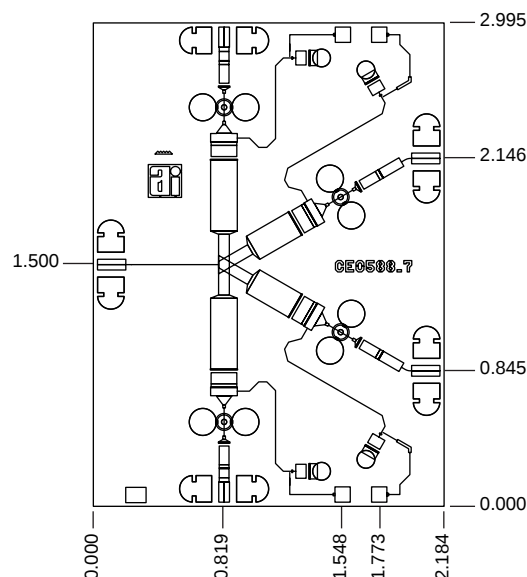
Features

- Low Loss
- Excellent Return Loss
- Fast Switching Speed
- High Power Handling

Description

Alpha's SP4T 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 a shunt PIN diode in each arm and an on-chip bias network. Chips are measured on a 100% basis for DC diode breakdown voltage, turn-on voltage and RF parameters on selected paths.

Chip Outline



Dimensions indicated in mm.
All RF pads are 0.07 x 0.150 mm. All DC pads are 0.1 x 0.1 mm.
Chip thickness = 0.1 mm.

Absolute Maximum Ratings

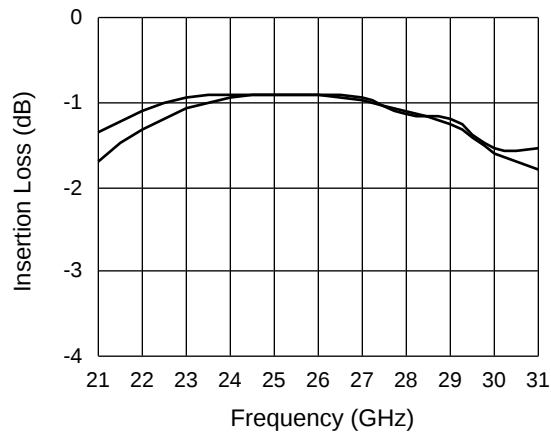
Characteristic	Value
Operating Temperature (T_C)	-55°C to +125°C
Storage Temperature (T_{ST})	-65°C to +150°C
DC Reverse Bias	-70 V (-10 μ A)
DC Forward Bias	1.3 V (50 mA)
P_{IN}	10 W

Electrical Specifications at 25°C

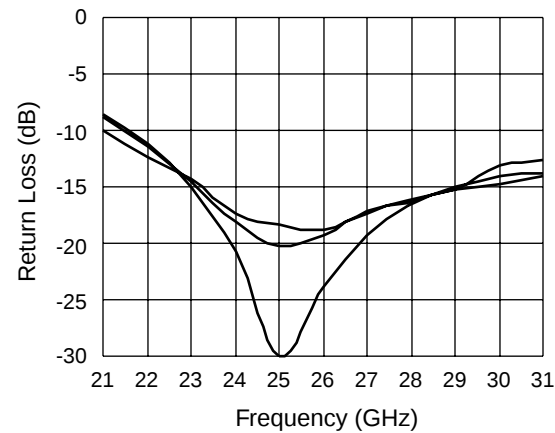
Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit
Insertion Loss	F = 23–31 GHz	IL		1.3	1.9	dB
Isolation	F = 23–31 GHz	Iso	30	34		dB
Input Return Loss	F = 23–31 GHz	RL _I	11	15		dB
Output Return Loss	F = 23–31 GHz	RL _O	12	15		dB
Breakdown Voltage	I _R = 10 μ A	V _{BR}	20	60		V
Forward Voltage	I _F = 10 mA	V _F	0.9	1.25	1.3	V
Switching Speed ¹				2		ns
Output Power at 1 dB Compression ¹	F = 23–31 GHz	P _{1 dB}		33		dBm

1. Not measured on a 100% basis.

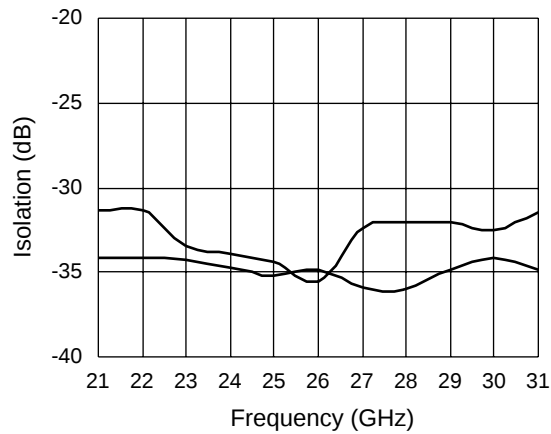
Typical Performance Data



Insertion Losses for Multiple Paths
Bias Conditions: $I_F = 10\text{ mA}$, $V_R = -5\text{ V}$



Return Losses for Multiple Paths
Bias Conditions: $I_F = 10\text{ mA}$, $V_R = -5\text{ V}$

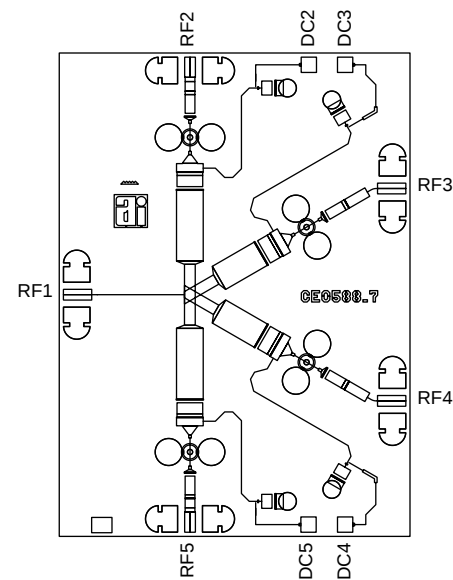


Isolation for Multiple Paths
Bias Conditions: $I_F = 10\text{ mA}$, $V_R = -5\text{ V}$

Truth Table

DC2	DC3	DC4	DC5	Insertion Loss Path
-5 V	10 mA	10 mA	10 mA	RF1 to RF2
10 mA	-5 V	10 mA	10 mA	RF1 to RF3
10 mA	10 mA	-5 V	10 mA	RF1 to RF4
10 mA	10 mA	10 mA	-5 V	RF1 to RF5

Bias Arrangement



Chip size: 2.184 x 2.995 mm.