23–26 GHz GaAs MMIC
6 Port Reflective PIN Switch

SKYWORKS

AP025R6-00

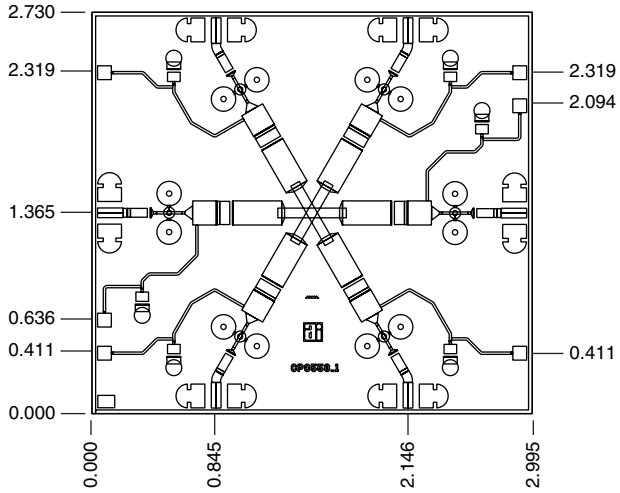
Features

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

Description

Skyworks' 6 port PIN diode switch is a robust, high performance switch which allows signal routing between any two RF ports. It is ideal for low loss, high isolation applications, particularly where high power handling is required. The chip uses Skyworks' 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

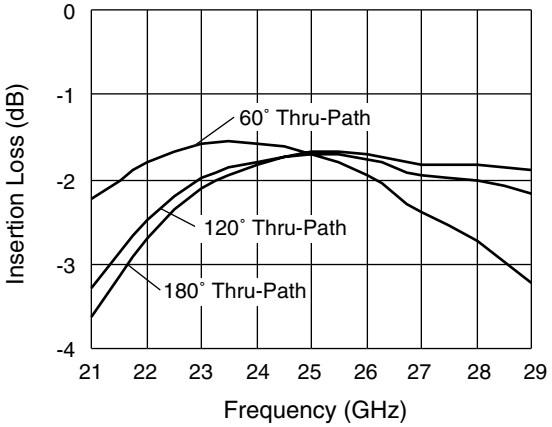
Characteristic	Value
Operating Temperature (T_C)	-55°C to +125°C
Storage Temperature (T_{ST})	-65°C to +150°C
DC Reverse Bias	-70 V (-10 μA)
DC Forward Bias	1.3 V (50 mA)
P_{IN}	10 W

Electrical Specifications at 25°C

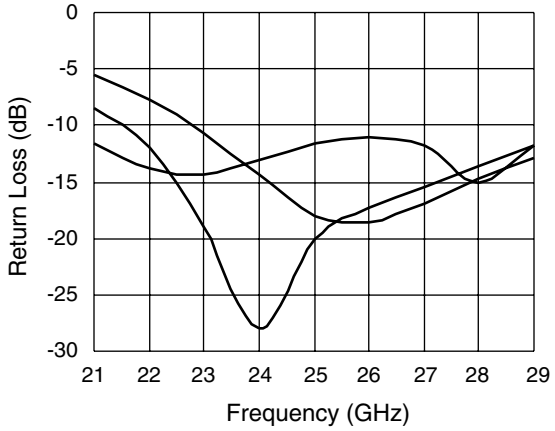
Parameter	Condition	Symbol	Min.	Typ.[2]	Max.	Unit
Insertion Loss	F = 23–26 GHz	IL		1.5	2.3	dB
Isolation	F = 23–26 GHz	Iso	28	30		dB
Input Return Loss	F = 23–26 GHz	RL_I	10	15		dB
Output Return Loss	F = 23–26 GHz	RL_O	10	15		dB
Breakdown Voltage	I_R = 10 μA	V_{BR}	20	60		V
Forward Voltage	I_F = 10 mA	V_F	0.9	1.25	1.3	V
Switching Speed[1]				2		ns
Output Power at 1 dB Compression[1]	F = 23–26 GHz	$P_{1\ dB}$		33		dBm
Two-Tone Input Third-Order Intercept[1]	F = 28 GHz	IIP3	45			dBm

1. Not measured on a 100% basis.
2. Typical represents the median parameter valve across the specified frequency range for the median chip.

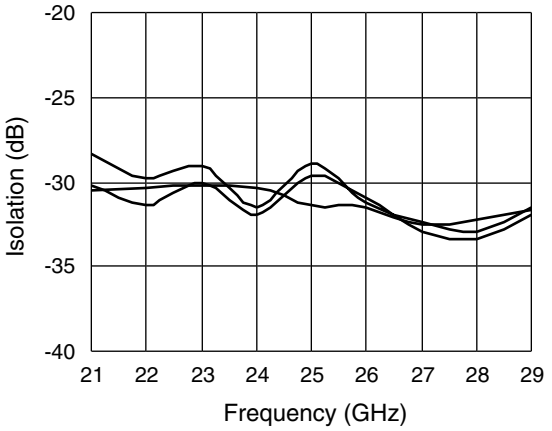
Typical Performance Data



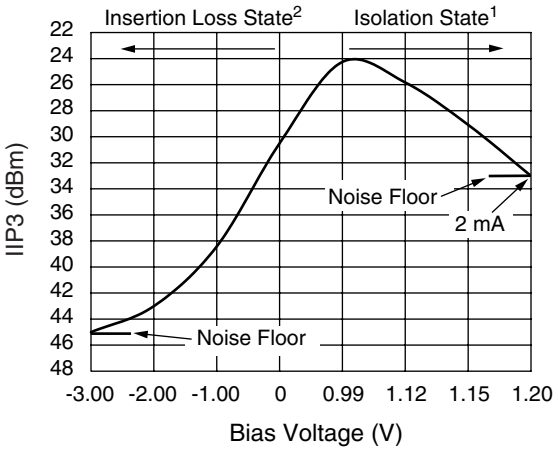
Insertion Losses for Multiple Paths
Bias Conditions: I_F = 10 mA, V_R = -5 V



Return Losses for Multiple Paths
Bias Conditions: I_F = 10 mA, V_R = -5 V



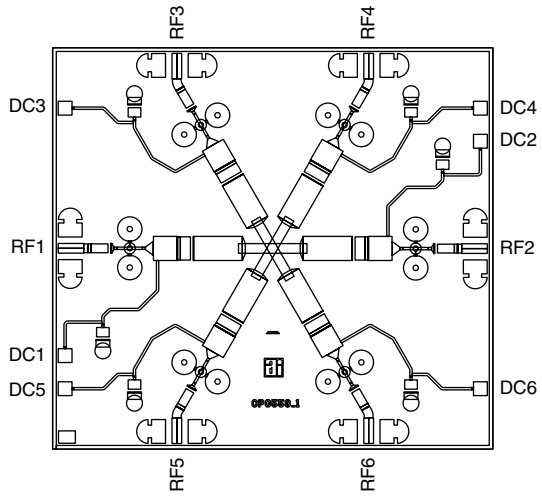
Isolation Losses for Multiple Paths
Bias Conditions: I_F = 10 mA, V_R = -5 V



Two-Tone Input Third-Order Intercept @ 28 GHz

1. Isolation arms are biased with 10 mA (1.25 V) where IIP3 is below the noise floor.
2. Insertion loss arms are biased with -5 V where IIP3 is below the noise floor.

Bias Arrangement



Truth Table

DC1	DC2	DC3	DC4	DC5	DC6	Insertion Loss Path
-5 V	-5 V	10 mA	10 mA	10 mA	10 mA	RF1–RF2
-5 V	10 mA	-5 V	10 mA	10 mA	10 mA	RF1–RF3
-5 V	10 mA	10 mA	-5 V	10 mA	10 mA	RF1–RF4
-5 V	10 mA	10 mA	10 mA	-5 V	10 mA	RF1–RF5
-5 V	10 mA	10 mA	10 mA	10 mA	-5 V	RF1–RF6
10 mA	-5 V	-5 V	10 mA	10 mA	10 mA	RF2–RF3
10 mA	-5 V	10 mA	-5 V	10 mA	10 mA	RF2–RF4
10 mA	-5 V	10 mA	10 mA	-5 V	10 mA	RF2–RF5
10 mA	-5 V	10 mA	10 mA	10 mA	-5 V	RF2–RF6
10 mA	10 mA	-5 V	-5 V	10 mA	10 mA	RF3–RF4
10 mA	10 mA	-5 V	10 mA	-5 V	10 mA	RF3–RF5
10 mA	10 mA	-5 V	10 mA	10 mA	-5 V	RF3–RF6
10 mA	10 mA	10 mA	-5 V	-5 V	10 mA	RF4–RF5
10 mA	10 mA	10 mA	-5 V	10 mA	-5 V	RF4–RF6
10 mA	10 mA	10 mA	10 mA	-5 V	-5 V	RF5–RF6