PIN Diodes for RF Switching and Attenuating

Technical Data

1N5719, 1N5767, 5082-3001, 5082-3039, 5082-3077, 5082-3080/81, 5082-3188, 5082-3379

Features

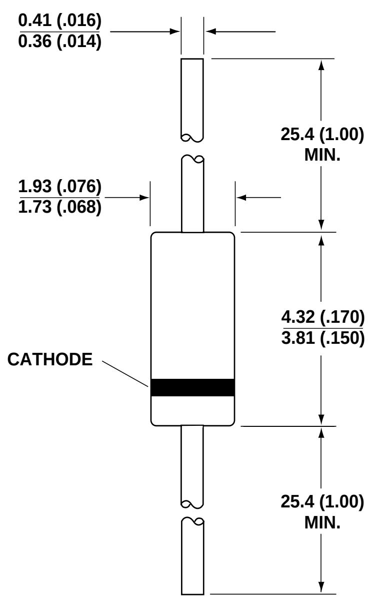
- **Low Harmonic Distortion**
- **Large Dynamic Range**
- **Low Series Resistance**
- **Low Capacitance**

Description/Applications

These general purpose switching diodes are intended for low power switching applications such as RF duplexers, antenna switching matrices, digital phase shifters, and time multiplex filters. The 5082-3188 is optimized for VHF/UHF bandswitching.

The RF resistance of a PIN diode is a function of the current flowing in the diode. These current controlled resistors are specified for use in control applications such as variable RF attenuators, automatic gain control circuits, RF modulators, electrically tuned filters, analog phase shifters, and RF limiters.

Outline 15 diodes are available on tape and reel. The tape and reel specification is patterned after RS-296-D.



DIMENSIONS IN MILLIMETERS AND (INCHES).

Outline 15

Maximum Ratings

Junction Operating and
Storage Temperature Range .... -65°C to +150°C
Power Dissipation 25°C .... 250 mW
(Derate linearly to zero at 150°C)
Peak Inverse Voltage (PIV) .... same as V_{BR}
Maximum Soldering Temperature .... 260°C for 5 sec

Mechanical Specifications

The Agilent Outline 15 package has a glass hermetic seal with dumet leads. The lead finish is 95-5 tin-lead (SnPb) for all PIN diodes. The leads on the Outline 15 package should be restricted so that the bend starts at least 1/16 inch (1.6 mm) from the glass body. Typical package inductance and capacitance are 2.5 nH and 0.13 pF, respectively. Marking is by digital coding with a cathode band.

General Purpose Diodes Electrical Specifications at $T_A = 25°C$

Part Number 5082-	Maximum Total Capacitance C_T (pF)	Minimum Breakdown Voltage V_{BR} (V)	Maximum Residual Series Resistance R_S (Ω)	Effective Carrier Lifetime τ (ns)	Reverse Recovery Time t_{rr} (ns)
General Purpose Switching and Attenuating					
3001	0.25	200	1.0	100 (min.)	100 (typ.)
3039	0.25	150	1.25	100 (min.)	100 (typ.)
1N5719	0.3**	150	1.25	100 (min.)	100 (typ.)
3077	0.3	200	1.5	100 (min.)	100 (typ)
Band Switching					
3188	1.0*	35	0.6**	70 (typ.)*	12 (typ.)
Test Conditions	V_R = 50 V *V_R = 20 V **V_R = 100 V f = 1 MHz	$V_R = V_{BR}$ Measure $I_R \le 10$ µA	I_F =100 mA *I_F = 20 mA **I_F = 10 mA f = 100 MHz	I_F = 50 mA I_R = 250 mA *I_F = 10 mA *I_R = 6 mA	I_F = 20 mA V_R = 10 V 90% Recovery

Notes:
Typical CW power switching capability for a shunt switch in a 50 Ω system is 2.5 W.

RF Current Controlled Resistor Diodes Electrical Specifications at $T_A = 25°C$

Part Number	Effective Carrier Lifetime t (ns)	Min. Breakdown Voltage V_{BR} (V)	Max. Residual Series Resistance R_S (Ω)	Max. Total Capacitance C_T (pF)	High Resistance Limit, R_H (W)		Low Resistance Limit, R_L (W)		Max. Difference in Resistance vs. Bias Slope, Dc
					Min.	Max.	Min.	Max.	
5082-3080	1300 (typ.)	100	2.5	0.4	1000			8**	
1N5767*	1300 (typ.)	100	2.5	0.4	1000			8**	
5082-3379	1300 (typ.)	50		0.4				8**	
5082-3081	2500 (typ.)	100	3.5	0.4	1500			8**	
Test Conditions	I_F = 50 mA I_R = 250 mA	$V_R = V_{BR}$, Measure $I_R \le 10$ µA	I_F = 100 mA f = 100 MHz	V_R = 50 V f = 1 MHz	I_F = 0.01 mA f = 100 MHz		I_F = 1.0 mA I_F = 20 mA** f = 100 MHz		Batch Matched at I_F = 0.01 mA and 1.0 mA f = 100 MHz

*The 1N5767 has the additional specifications:
τ = 1.0 msec minimum
I_R = 1 µA maximum at V_R = 50 V
V_F = 1 V maximum at I_F = 100 mA.

Typical Parameters at T_A = 25°C (unless otherwise noted)

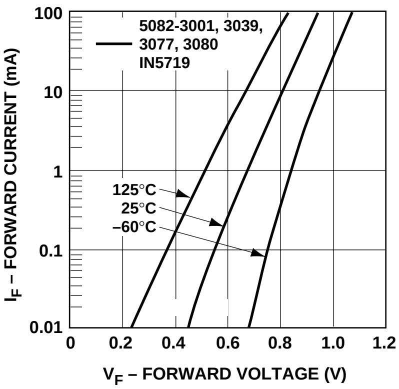


Figure 1. Forward Current vs. Forward Voltage.

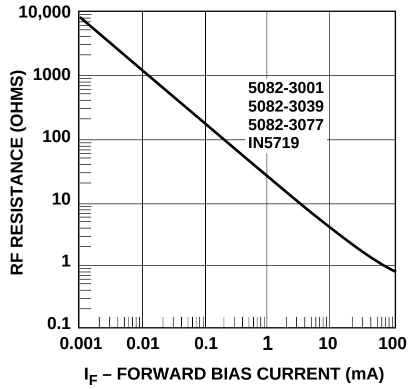


Figure 2. Typical RF Resistance vs. Forward Bias Current.

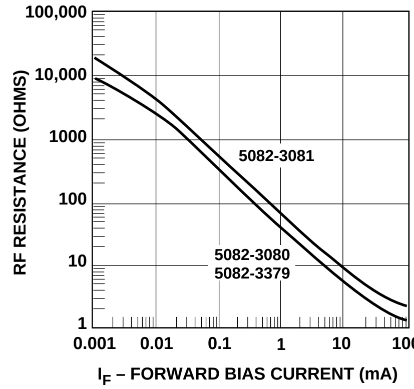


Figure 3. Typical RF Resistance vs. Forward Bias Current.

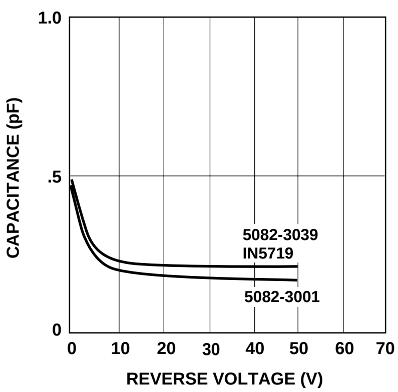


Figure 4. Typical Capacitance vs. Reverse Voltage.

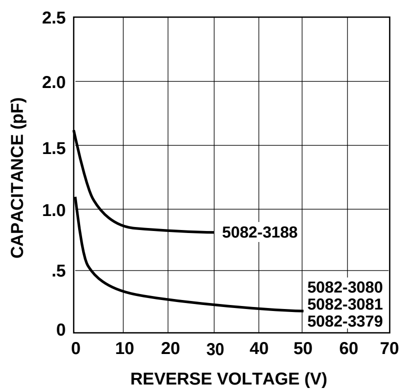


Figure 5. Typical Capacitance vs. Reverse Voltage.

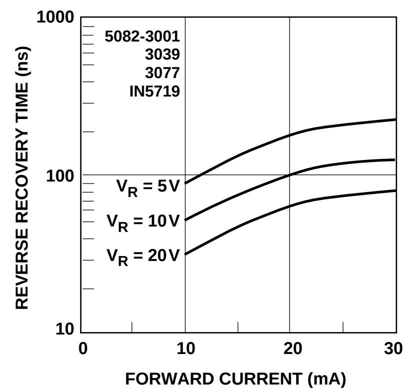


Figure 6. Typical Reverse Recovery Time vs. Forward Current for Various Reverse Driving Voltages.

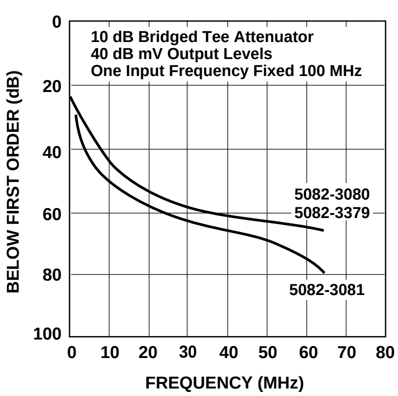


Figure 7. Typical Second Order Intermodulation Distortion.

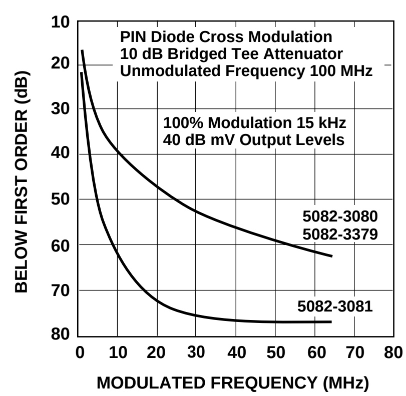


Figure 8. Typical Cross Intermodulation Distortion.

Diode Package Marking

1N5xxx	5082-xxxx

would be marked:

1Nx	xx
xxx	xx
YWW	YWW

where xxxx are the last four digits of the 1Nxxxx or the 5082-xxxx part number. Y is the last digit of the calendar year. WW is the work week of manufacture.

Examples of diodes manufactured during workweek 45 of 1999:

1N5712	5082-3080

would be marked:

1N5	30
712	80
945	945

www.semiconductor.agilent.com
Data subject to change.

Obsoletes 5967-5812E
5968-7182E (1/00)