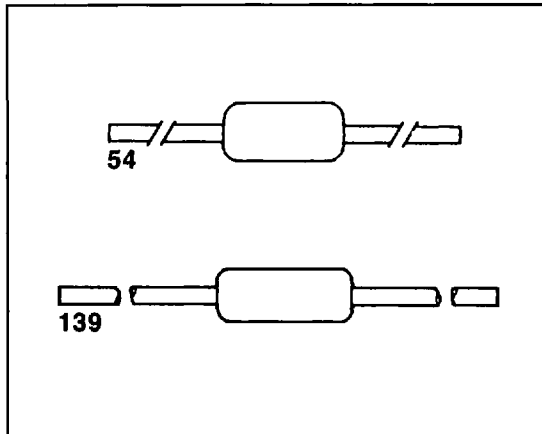


Axial Lead PIN Diodes



Description

M/A-COM's series of glass, hermetically sealed axial lead PIN diodes are designed for switch and attenuator applications from HF through S-Band. The manufacturing methods employed to construct these devices are suitable to meet high volume production requirements.

These PIN diodes are applicable for use in industrial and military applications. Their inherent ruggedness and reliability allows them to be screened to JAN-TX level and to meet other military standards.

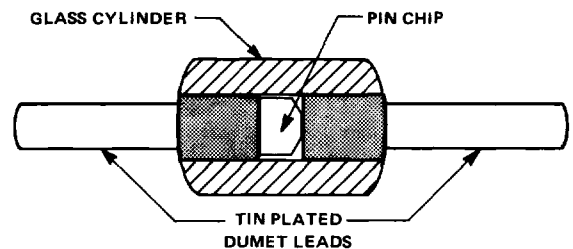
Applications for M/A-COM's axial lead PIN diode products include electrically tuned digital filter circuits, AGC attenuators, antenna switches as well as general purpose PIN diode applications. These PIN diodes are particularly useful in distortion sensitive circuit environments.

This series of PIN diodes are available in three glass packages. The ODS 54 is the most suitable to meet low total capacitance requirements for high isolation in series connected switches at VHF frequencies. The ODS 139 and ODS 146 are most suitable for moderate power applications requiring low package inductance.

Features

- GLASS HERMETIC SEALED PACKAGES
- SCREENABLE TO JANTXV AND MILITARY SPECIFICATIONS
- LARGE SIGNAL SWITCH DESIGN
- LOW CAPACITANCE (0.1 pF) PIN DIODES
- HIGH VOLUME MANUFACTURING CAPABILITY
- TAPE AND REEL PACKAGING AVAILABLE

Case Style



Specifications @ $T_A = 25^\circ\text{C}$

General Purpose PIN Diodes

Model Number	Case Style	Voltage ¹ Rating (Volts)	Maximum ² Series Resistance R_S @ I_F (mA) (Ohms)	Maximum ³ Total Capacitance C_T @ V_R (Volts) (pF)	Nominal Characteristics	
					Carrier Lifetime ⁴ (μs)	I-Region Thickness (mils)
MA47120	54	35	0.5 @ 10	1.00 @ 20	0.3	0.4
MA4P270	139	35	0.5 @ 10	1.20 @ 20	0.3	0.4
MA4PH401	54	50	1.5 @ 10	0.30 @ 20	0.2	0.4
MA4PH151	139	100	0.6 @ 10	1.20 @ 50	1.0	0.8
1N5719	54	100	1.5 @ 50	0.25 @ 50	1.0	2.0
MA47047	54	200	3.0 @ 10	0.30 @ 50	1.0	2.0
MA47123	139	200	3.0 @ 10	0.50 @ 50	1.0	2.0
1N5767*	54	200	2.5 @ 100	0.40 @ 50	1.0	4.0

*Additional specifications for 1N5767: R_S @20 mA = 8 Ω (Max.); R_S @10 mA = 400 Ω (Min.)

Low Distortion Attenuator PIN Diodes

Model Number	Case Style	Voltage ¹ Rating (Volts)	Maximum ² Series Resistance R_S @ I_F - 10 mA (Ohms)	Maximum ³ Total Capacitance C_T @ 50V (pF)	Nominal Characteristics			
					R_S		Carrier Lifetime (μs)	I-Region Thickness (mils)
					I_F - 1 mA (Ohms)	I_F - 10 μA (Ohms)		
MA47600	54	200	6	.30	30	2,000	2	4
MA47110	139	200	6	.50	30	2,000	2	4
MA47100	54	200	8	.30	50	3,000	2.5	7
MA4PH001	54	100	20	.25	100	6,500	1.5	9
MA4P208	139	100	20	.35	100	6,500	1.5	9
MA4PH451	146	100	8	1.00	50	2,500	3	9
MA47111	146	200	25	.80	75*	4,000	4	14

* I_F = 1.5-2.5 mA

Large Signal Switch PIN Diodes

Model Number	Case Style	Voltage ¹ Rating (Volts)	Maximum ² Series Resistance R_S @ I_F - 50 mA (Ohms)	Maximum ³ Total Capacitance C_T @ 50V (pF)	Nominal Characteristics	
					Carrier Lifetime ⁴ (μs)	I-Region Thickness (mils)
MA4PH201	146	100	0.4	2.0	2.0	1.0
MA47266	146	200	0.6	1.5	3.0	3.0
MA4PH301	146	200	1.0	1.1	5.0	5.0

MAXIMUM RATINGS

Temperature Range	
Operating	- 65°C to + 175°C
Storage	- 65°C to + 175°C
Voltage	Voltage Rating
Power Dissipation	(derate linearly to zero at 175°C)
Case Style 54	250 mW (Free Air)
Case Style 139	500 mW (Free Air)
Case Style 146	1.0 W (Free Air) 1.5 W (0.5 inch total length to 25°C contact)

ENVIRONMENTAL CAPABILITY (Per MIL-STD-750 and MIL-S-202)

	Method	Level
Storage Temperature	1031	See Maximum Ratings
Operating Temperature	— —	See Maximum Ratings
Temperature Cycling	1051	5 cycles, - 65°C to 150°C
Shock	2016	500 g's
Vibration	2056	15 g's
Constant Acceleration	2006	20,000 g's
Humidity	1021	10 days

Screened Diodes**Typical 100% Preconditioning and Screening Program for TX Level Screening Per MIL-S-202**

Inspections	Method	Condition
Internal Visual and/or X-ray	2072/2076	See note 1
High Temperature Life	1032	48 hours minimum at maximum storage temperature
Thermal Shock	1051	10 cycles
Constant Acceleration	2006	20,000 g's, Y1
Fine Leak	1071	H
Gross Leak	1071	C or E
Electrical	— —	See note 2
Burn-In	1038	See note 2
Stability Verification	— —	See note 2

NOTES:

1. Internal visual on TXV screening programs only. X-ray is optional for any screening plan.
2. Conditions and details of test depend on specific part number. Information available on request.

Typical Resistance Curves at 100 MHz

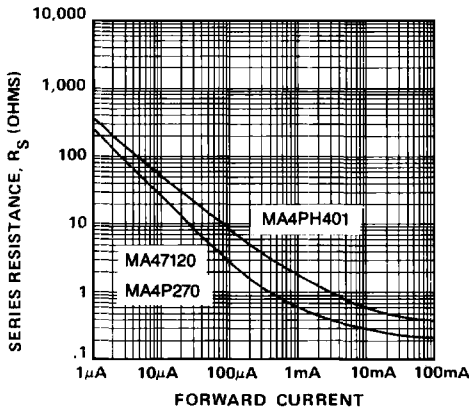


FIGURE 1. Series Resistance vs. Forward Current for General Purpose PIN Diodes

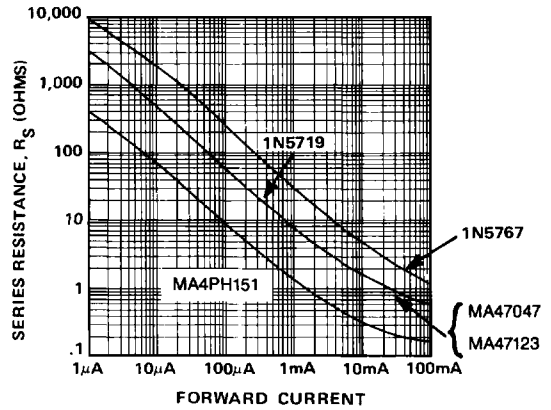


FIGURE 2. Series Resistance vs. Forward Current for General Purpose PIN Diodes

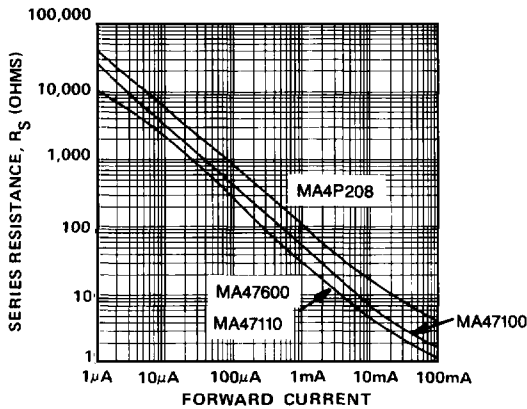


FIGURE 3. Series Resistance vs. Forward Current for Low Distortion Attenuator PIN Diodes

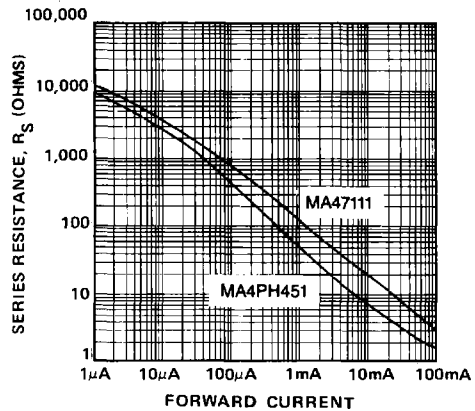


FIGURE 4. Series Resistance vs. Forward Current for Low Distortion Attenuator PIN Diodes

Typical Resistance Curves at 100 MHz

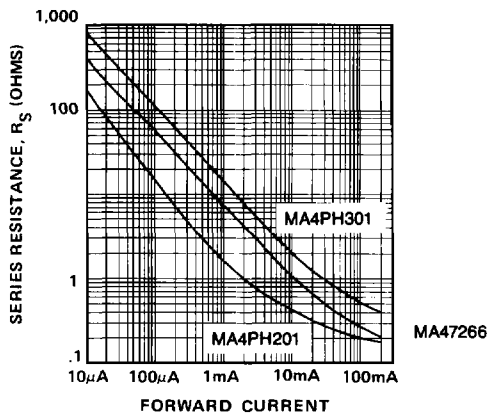


FIGURE 5. Series Resistance vs. Forward Current for Large Signal Switch PIN Diodes

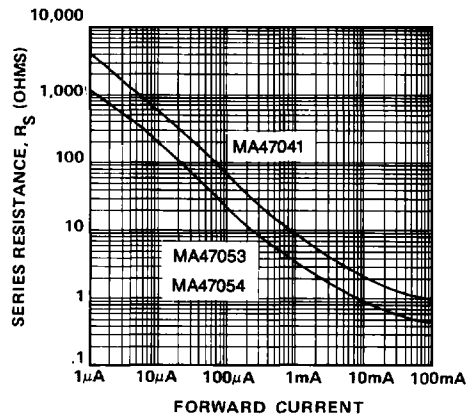


FIGURE 6. Series Resistance vs. Forward Current for Fast Switching PIN Diodes

Cross Reference

Many of M/A-COM's axial lead hermetic surface mount (MELF) and SOT-23 PIN diodes use similar chips and have the same electrical characteristics.

The following table lists the axial lead PIN diode by model number and the equivalent hermetic surface mount PIN and SOT-23 PIN diode counterparts.

Axial Lead Glass Diode	Hermetic Surface Mount	SOT-23
MA47100	MA47056	MA4P278
MA47110	MA47057	MA4P277
MA47111	MA4PH601	—
MA47123	MA47055	MA4P274
MA47266	MA47059	—
MA4P270	MA47058	MA4P275
MA4PH151	MA4PH152	MA4P282
MA4PH401	MA4PH101	MA4P789