

Control Devices: MMP 7000 Series

Low - High Power PIN Diodes

Description

The **MicroMetrics** MMP 7000 series PIN diodes are manufactured using very high resistivity silicon epitaxial material grown on a highly doped low resistivity substrate. Combined with a grown junction P++ layer, this yields a very abrupt structured "I" region with minimum outdoping and low voltage punchthrough characteristics.

Our high temperature passivation and state of the art metallization produce diodes that are designed to cover a wide range of applications that fall into the general categories of switching, phase switching, attenuating and limiting. These devices are rugged and able to meet all visual criteria in space and military applications.

Applications

The MMP series are used in switch applications which include high speed low power switches, medium speed higher power switches, high power switches and attenuators, TR switches, digital phase shifters and duplexers.

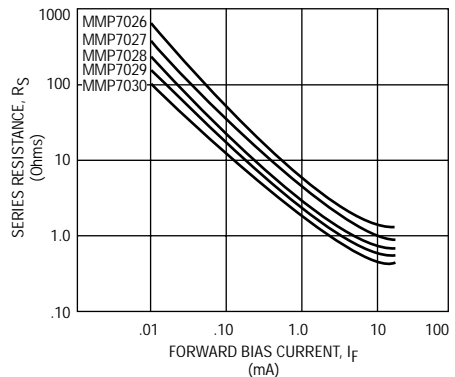
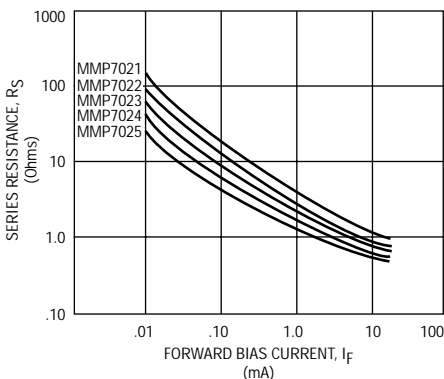
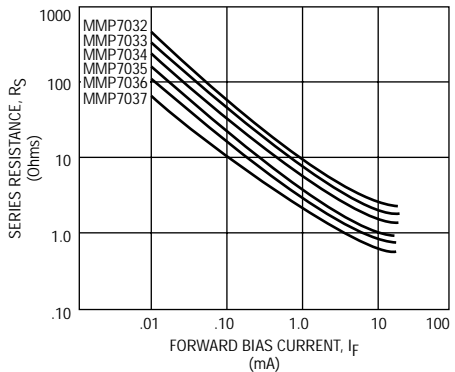
Features

- High Temperature Passivation for Reliability
- Grown Junction for sharp "I" Region Interface
- Full Area Gold Contact for the Lowest Capacitance and Largest Bonding Pad Available
- Lot Traceability and Lot Control, Assuring High Reproducibility

Packaging

- Chip, Glass, Ceramic

Typical Performance



Electrical Characteristics

Ultra Fast Switching

| V _{br} ¹ MIN (V) | C _{j-10} V ² MAX (pF) | T _f ³ TYP (nS) | ∅ _{jc} MAX °C/W | TS. Max. NS | RS@ 50 MA OHMS MAX | RS@ 10 MA OHMS TYP | Part Number |
|--|---|--|--------------------------------|-------------------|--------------------------|--------------------------|----------------|
| 25 | .1 | 10 | 60 | 1.5 | .7 | 1 | MMP7010 |
| 25 | .15 | 10 | 50 | 1.5 | .55 | .8 | MMP7011 |
| 25 | .2 | 10 | 40 | 1.5 | .45 | .7 | MMP7012 |
| 25 | .25 | 10 | 35 | 1.5 | .4 | .6 | MMP7013 |

Fast Switching, Low Power

| Vbr1 MIN (V) | C _{j-10} V2 MAX (pF) | Tf3 TYP (nS) | Δ _{jc} MAX °C/W | TS. MAX. NS | RS@ 75 MA OHMS MAX | RS@ 20 MA OHMS TYP | Part Number |
|--------------------|-------------------------------------|--------------------|--------------------------------|-------------------|--------------------------|--------------------------|----------------|
| 70 | .05 | 60 | 80 | 5 | .9 | 1.2 | MMP7020 |
| 70 | .1 | 60 | 70 | 5 | .7 | 1.0 | MMP7021 |
| 70 | .15 | 60 | 60 | 5 | .6 | .9 | MMP7022 |
| 70 | .2 | 60 | 55 | 5 | .5 | .7 | MMP7023 |
| 70 | .25 | 60 | 50 | 5 | .45 | .5 | MMP7024 |
| 100 | .03 | 100 | 90 | 10 | 1.2 | 1.9 | MMP7025 |
| 100 | .07 | 100 | 80 | 10 | .9 | 1.5 | MMP7026 |
| 100 | .1 | 100 | 70 | 10 | .7 | 1.2 | MMP7027 |
| 100 | .15 | 100 | 60 | 10 | .6 | 1.0 | MMP7028 |
| 100 | .2 | 100 | 55 | 10 | .5 | .9 | MMP7029 |
| 100 | .3 | 100 | 50 | 15 | .45 | .8 | MMP7030 |
| 200 | .03 | 225 | 90 | 15 | 1.9 | 3.0 | MMP7031 |
| 200 | .07 | 225 | 80 | 15 | 1.2 | 2.2 | MMP7032 |
| 200 | .1 | 225 | 70 | 15 | .9 | 1.6 | MMP7033 |
| 200 | .15 | 225 | 60 | 15 | .8 | 1.0 | MMP7034 |
| 200 | .2 | 225 | 55 | 15 | .7 | .8 | MMP7035 |
| 200 | .3 | 225 | 50 | 15 | .6 | .7 | MMP7036 |

Notes:

- Reverse Breakdown Voltage measured at 10μA.
- Junction Capacitance measured at -10 volts at 1 MHz.
- Minority Carrier lifetime measured with IF = 10 mA IR = 6mA.
- RF Switching speed measured from 90% to 10% and 10% to 90% transmission.
Drive output = +20 mA and -4 volts, 200 mA spike with a rise time of 2 nS.
- Series Resistance is measured at 1 GHz using transmission loss techniques.

Maximum Ratings

| | |
|--|----------------------------------|
| Operating Temperature | -55°C to 150°C |
| Storage Temperature | -65°C to 200°C |
| Reverse Breakdown Voltage (V _{br}) | from 25 volts to 500 volts |
| Junction Capacitance (C _{j-10}) | from .03 pF to .5 pF at 10 volts |
| Switching Speed (TS) | from 1 nS to 25 nS |
| Lifetime (T _f) | from 5 nS to 2.0 μS |
| Chip Thickness | .004 - .007" thick |

Continued on next page.



Control Devices: MMP 7000 Series (Continued)

Electrical Characteristics

Medium Power, General Purpose

| V _{br} ¹ MIN (V) | C _{j-10} V ² MAX (pF) | TL ³ TYP (nS) | Δj _c MAX °C/W | TS. MAX. NS | RS@ 75 MA OHMS MAX | RS@ 20MA OHMS TYP | Part Number |
|--|---|--------------------------------|--------------------------------|-------------------|--------------------------|-------------------------|----------------|
| 200 | .03 | 400 | 65 | 20 | 2.6 | 3.5 | MMP7040 |
| 200 | .07 | 400 | 60 | 20 | 1.5 | 2.2 | MMP7041 |
| 200 | .1 | 400 | 55 | 20 | 1.3 | 2.0 | MMP7042 |
| 200 | .15 | 400 | 50 | 20 | 1.0 | 1.9 | MMP7043 |
| 200 | .2 | 400 | 45 | 20 | .8 | 1.7 | MMP7044 |
| 200 | .3 | 400 | 40 | 20 | .7 | 1.4 | MMP7045 |
| 200 | .5 | 400 | 20 | 20 | .6 | 1.2 | MMP7046 |
| 200 | .03 | 600 | 60 | 25 | 2.6 | 3.5 | MMP7047 |
| 200 | .07 | 600 | 55 | 25 | 1.6 | 3.2 | MMP7048 |
| 200 | .1 | 600 | 50 | 25 | 1.2 | 2.0 | MMP7049 |
| 200 | .15 | 600 | 45 | 25 | .9 | 1.9 | MMP7050 |
| 200 | .2 | 600 | 40 | 25 | .8 | 1.7 | MMP7051 |
| 200 | .3 | 600 | 35 | 25 | .7 | 1.4 | MMP7052 |
| 200 | .5 | 600 | 15 | 25 | .6 | 1.2 | MMP7053 |

High Power Switching & Attenuation

| V _{br} ¹ MIN (V) | C _{j-10} V ² MAX (pF) | TL ³ TYP (μS) | R _s ⁵ @ 1 mA MAX (Ohms) | R _s ⁵ @ 10 mA MAX (Ohms) | R _s ⁵ @ 100 mA MAX (Ohms) | ∅j _c MAX °C/W | Part Number |
|--|---|--------------------------------|--|---|--|--------------------------------|----------------|
| 250 | .05 | 1.0 | 25 | 10 | 2.0 | 20 | MMP7060 |
| 250 | .08 | 1.0 | 20 | 8 | 1.5 | 20 | MMP7061 |
| 250 | .1 | 1.0 | 15 | 6 | 1.2 | 20 | MMP7062 |
| 250 | .2 | 1.0 | 8 | 3.5 | 1.0 | 15 | MMP7063 |
| 250 | .3 | 1.5 | 6 | 2.0 | 0.8 | 15 | MMP7064 |
| 500 | .08 | 1.5 | 40 | 8 | 1.5 | 15 | MMP7065 |
| 500 | .1 | 1.5 | 15 | 5 | 1.2 | 15 | MMP7066 |
| 500 | .2 | 1.5 | 10 | 4 | 1.0 | 12 | MMP7067 |
| 500 | .3 | 2.0 | 8 | 3.5 | 0.8 | 10 | MMP7068 |
| 500 | .5 | 2.0 | 6 | 2.0 | 0.7 | 10 | MMP7069 |

Notes:

- Reverse Breakdown Voltage measured at 10 μA.
- Junction Capacitance measured at -10 volts at 1 MHz.
- Minority Carrier lifetime measured with IF = 10 mA, IR = 6 mA.
- RF Switching speed measured from 90% to 10% and 10% to 90% transmission. Drive output = +20 mA and -4 volts, 200 mA spike with a rise time of 2 nS.
- Series Resistance is measured at 1 GHz using transmission loss techniques.

Maximum Ratings

| | |
|--|--|
| Operating Temperature | -55°C to 150°C |
| Storage Temperature | -65°C to 200°C |
| Reverse Breakdown Voltage (V _{br}) | from 25 volts to 500 volts volts at 10 μA |
| Junction Capacitance (C _{j-10}) | from .03 pF to .5 pF at 10 volts |
| Switching Speed (T _s) | from 1 nS to 25 nS |
| Lifetime (TL) | from 5 nS to 2.0 μS |
| Chip Thickness | .004" - .007" thick |

