

Features

- Non-Magnetic Package Suitable for MRI Applications
- Rectangular MELF SMQ Ceramic Package
- Hermetically Sealed
- Low R_s for Low Series Loss
- Long t_L for Lower Intermodulation Distortion
- Low C_J for High Series Isolation
- High Average Incident Power Handling
- RoHS* Compliant

Applications

- Aerospace & Defense
- ISM

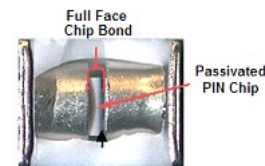
Description

The MA4P7452F-1072T is a surface mountable PIN diode in a non-magnetic, Metal Electrode Leadless Faced (MELF) package. The device incorporates Macom's time proven HIPAX technology to produce a low inductance ceramic package with no ribbons or whisker wires. Incorporated in the package is a hard glass passivated, CERMACHIP™ PIN chip that is full face bonded on both the cathode and anode to maximize surface area for the lowest electrical and thermal resistance. The package utilizes a non-magnetic plating process that provides for a package with extremely low permeability. This device has been comprehensively characterized both electrically and mechanically to ensure repeatable & predictable performance. The non-magnetic MA4P7452F-1072T is the electrical equivalent of its magnetic counterpart the MA4P7002F-1072T.

This diode is well suited for use in low loss, low distortion, high power switching circuits and can be used in high magnetic field environments at HF through UHF frequencies. The low thermal resistance of this device provides excellent performance at high RF power incident levels, up to 100 watts CW. This device is designed to meet the most demanding electrical and mechanical MRI environments.



1072



Diode Cross Section

Designed for Automated Assembly

These SMQ PIN diodes are designed for high volume tape and reel assembly. The rectangular package design provides for highly efficient automatic pick and place assembly techniques. The parallel flat surfaces are suitable for key jaw or vacuum pickup. All solderable surfaces are tin plated and compatible with reflow and vapor phase soldering methods.

Ordering Information

| Part Number | Package |
|-----------------|---------------|
| MA4P7452F-1072T | Tape and Reel |

Electrical Specifications @ +25°C

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|-------------------------------|---|----------------------|------|------|------|
| Forward Voltage | $I_F = +100 \text{ mA}$ | V_{DC} | — | — | 1 |
| Voltage Rating | $I_r = -10 \mu\text{A}$ | V_{DC} | 150 | — | — |
| Total Capacitance | -100 V @ 100 MHz | pF | — | — | 0.7 |
| Series Resistance | +100 mA @ 100 MHz | Ω | — | — | 0.9 |
| Parallel Resistance | -10 V @ 100 MHz | k Ω | 75 | — | — |
| Carrier Lifetime | +6 mA / -10 mA @ (50% - 90% Voltage) | μs | — | 9 | — |
| I-Region Length | - | μm | — | 175 | — |
| CW Thermal Resistance | $I_H = 1\text{A}, I_L = 10 \text{ mA},$ $T = 1 \text{ ms}$ | $^{\circ}\text{C/W}$ | — | — | 15 |
| Power Dissipation in Free Air | $I_F = +100 \text{ mA}$ | W | — | — | 4 |
| Power Dissipation | $I_F = +100 \text{ mA}$ | W | — | — | 10 |

Absolute Maximum Ratings¹ @ 25°C

| Parameter | Absolute Maximum |
|--|-----------------------|
| RF CW Incident Power | 50 dBm CW |
| Forward DC Current | + 250 mA |
| Reverse DC Voltage @ -10 μA | - 150 V |
| Operating Temperature | -65°C to +125°C |
| Storage Temperature | -65°C to +150°C |
| Junction Temperature | +175°C Continuous |
| Mounting Temperature | +235°C for 10 seconds |

1. Exceeding these limits may cause permanent damage.

Environmental Capability

MELF devices are appropriate for use in industrial and military applications and can be screened to meet the environmental requirements of MIL-STD-750, MIL-STD-202 as well as other military standards. The table below lists some of the MIL-STD 750 tests the device is designed to meet.

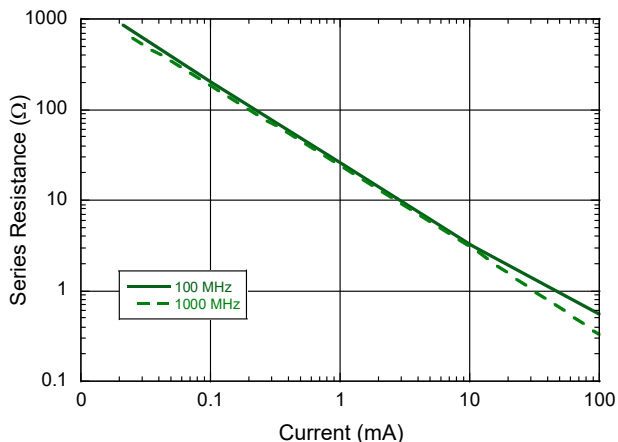
| Test | Method | Description |
|--------------------------|--------------|---|
| High Temperature Storage | 1031 | +150°C, for 340 Hours |
| Temperature Shock | 1051 | -65°C to +150°C, 20 Cycles |
| HTRB | 1038 | 80% of rated V_B , +150°C, for 96 Hours |
| Moisture Resistance | 1021 | No Initial Conditioning, 85% RH, +85°C |
| Gross Leak | 1071 Cond. E | Dye Penetrant Visual |
| Vibration Fatigue | 2046 | 20,000G's, 60Hz, x, y, z axis |
| Solderability | 2026 | Test Temperature = +245°C |

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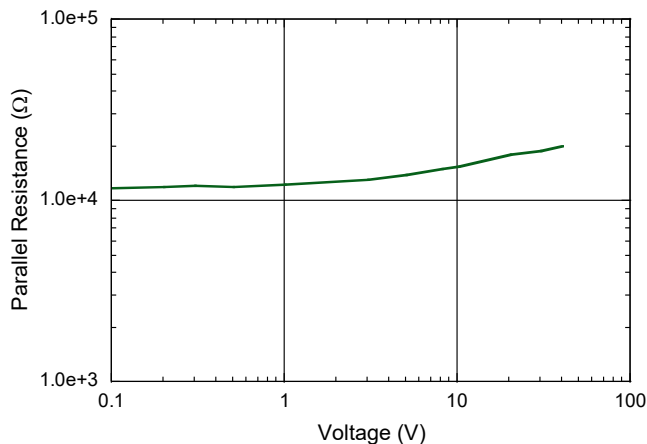
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Typical Electrical Performance @ +25°C

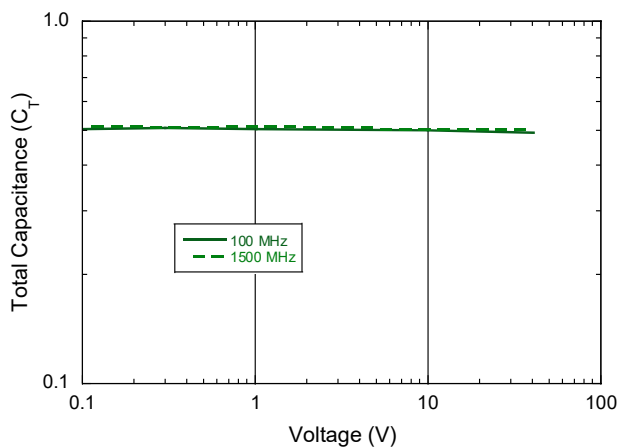
Series Resistance vs. Current



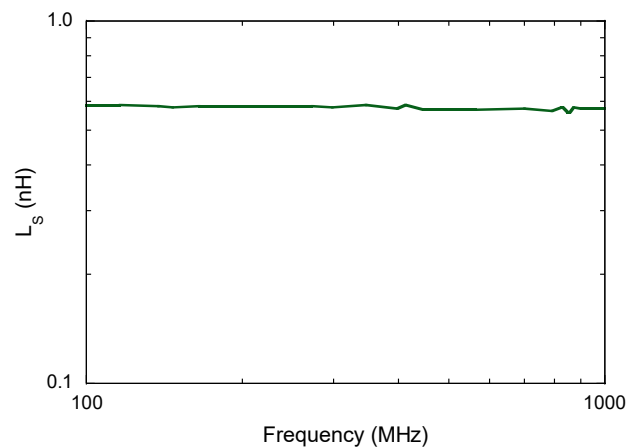
Parallel Resistance vs. Voltage



Total Capacitance vs. Voltage

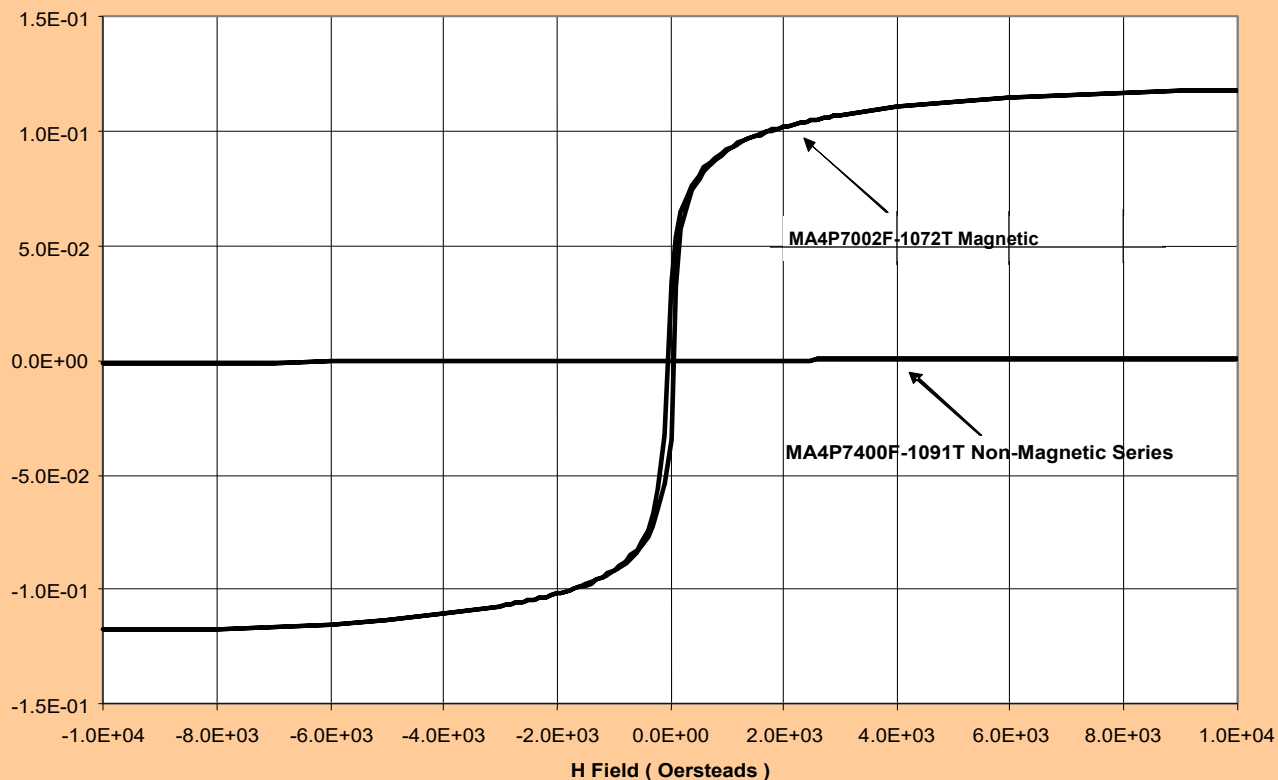


L_s (50 mA) vs. Frequency



Typical Non-Magnetic Performance

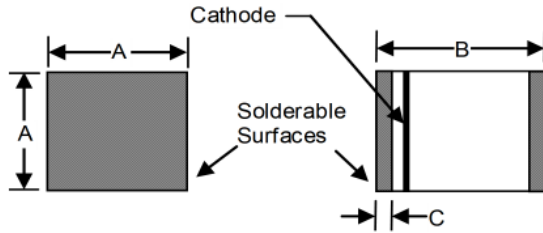
Comparison of Magnetic Moment for MA4P7400F-1072T & MA4P7002F-1072T Magnetic Devices



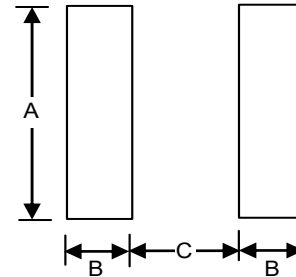
Typical Magnetic Properties of Non-Magnetic MA4P7452F-1072T Device vs. Conventional MA4P7002F-1072T Magnetic Device

| Magnetic Property | MA4P7452F-1072T | MA4P7002F-1072T |
|---|-----------------|-----------------|
| Saturation Moment (EMU) @ H = H _{MAX} Oersteds | 2.3 x E-4 | 2.1 x E-2 |
| Remanance Moment (EMU) @ H = 0 Oersteds | 4.2 x E-8 | 7.1 x E-3 |
| Coercivity (Oersteds) @ EMU = 0 Moment | 1.0 | 59.2 |

1072 MELF Surface Mount Package



Circuit Pad Layout for 1072 MELF



| Dimension | inches | | mm | |
|-----------|--------|-------|-------|-------|
| | Min. | Max. | Min. | Max. |
| A | 0.080 | 0.095 | 2.032 | 2.413 |
| B | 0.115 | 0.135 | 2.921 | 3.429 |
| C | 0.008 | 0.030 | 0.203 | 0.762 |

1072 Package
(tape and reel only)
1500 pcs/reel

| Dimension | Package Style 1072 | |
|-----------|--------------------|------|
| | inches | mm |
| A | 0.093 | 2.36 |
| B | 0.050 | 1.27 |
| C | 0.060 | 1.52 |

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