

### Features

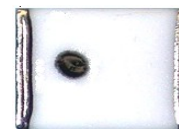
- ◆ Non-Magnetic Package Suitable for MRI Applications
- ◆ Rectangular MELF SMQ Ceramic Package
- ◆ Hermetically Sealed
- ◆ Low  $R_s$  for Low Series Loss
- ◆ Long  $\tau_L$  for Lower Intermodulation Distortion
- ◆ Low  $C_j$  for High Series Isolation
- ◆ High Average Incident Power Handling
- ◆ RoHS Compliant

### Description

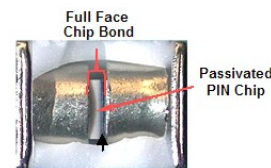
The MA4P7452F-1072T is a surface mountable PIN diode in a non-magnetic, **Metal Electrode Leadless Faced (MELF)** package. The device incorporates M/A-COM Technology Solutions time proven HIPAX technology to produce a low inductance ceramic package with no ribbons or whisker wires. Incorporated in the 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. The MA4P7452F-1072T has been comprehensively characterized both electrically and mechanically to ensure repeatable and predictable performance. The non-magnetic MA4P7452F-1072T is the electrical equivalent of its magnetic counterpart the MA4P7002F-1072T.

### Applications

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.

### Absolute Maximum Ratings<sup>1</sup> @ 25°C

| Parameter                    | Absolute Maximum      |
|------------------------------|-----------------------|
| Operating Temperature        | -65 °C to +125°C      |
| Storage Temperature          | -65 °C to +150°C      |
| Diode Junction Temperature   | +175 °C Continuous    |
| Diode Mounting Temperature   | +235°C for 10 seconds |
| RF C.W. Incident Power       | + 50 dBm C.W.         |
| Forward D.C. Current         | + 250 mA              |
| Reverse D.C. Voltage @ -10uA | 1 - 150 V I           |

1. Exceeding these limits may cause permanent damage.

## Non Magnetic SMQ MELF PIN Diode

Rev. V3

## Electrical Specifications @ +25 °C

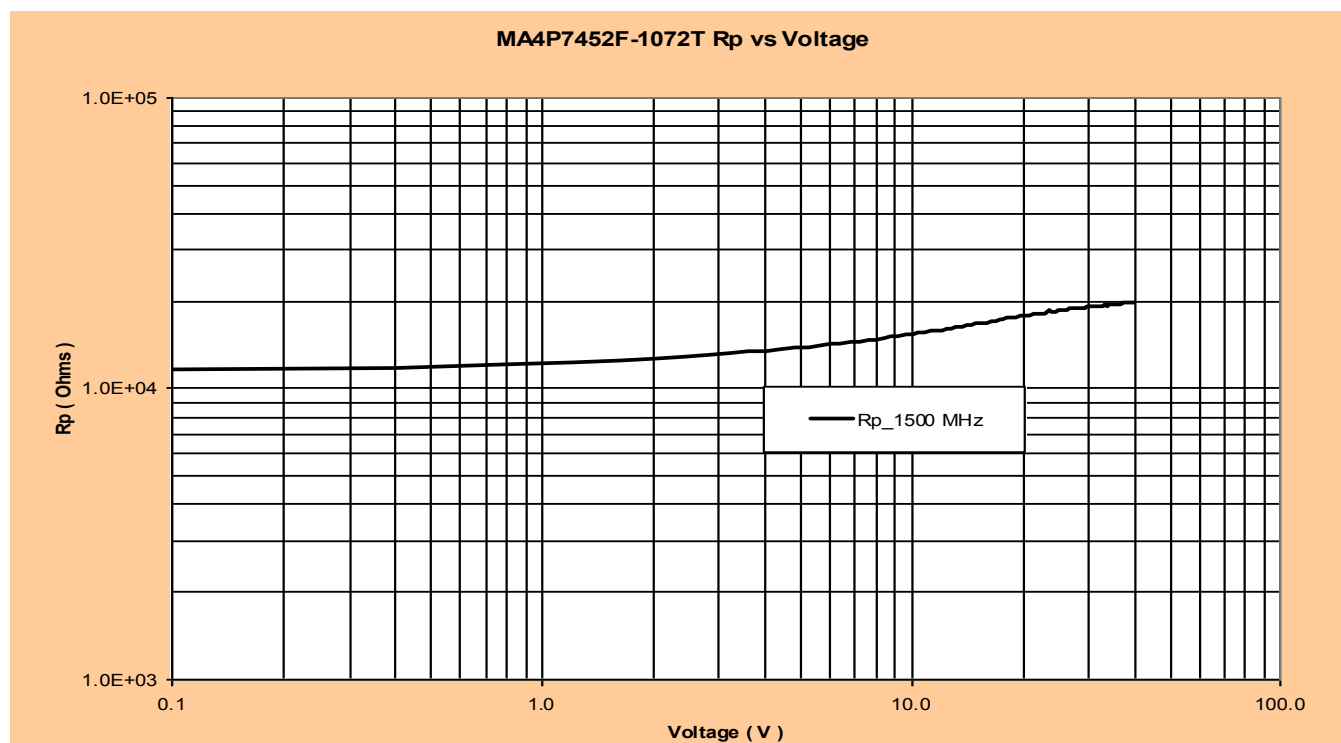
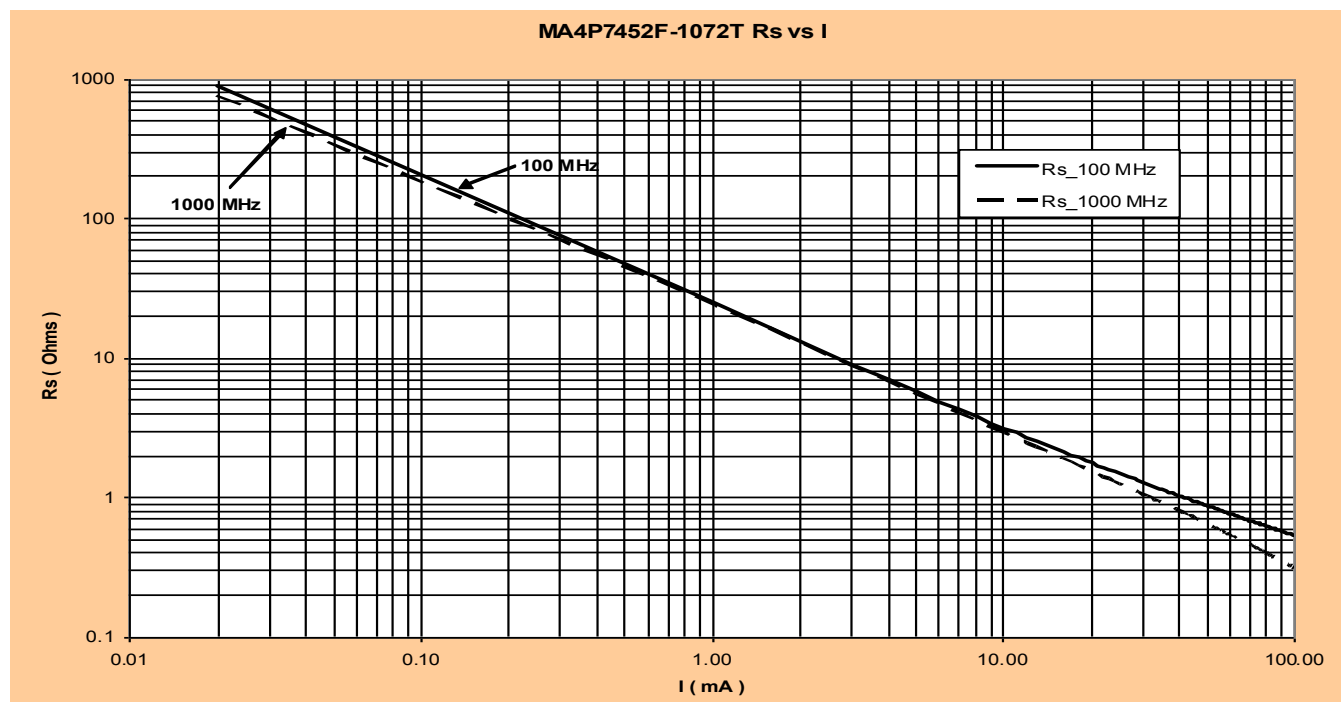
| Parameter                               | Symbol        | Condition   | Unit Value                     |
|---|---------------|---|--------------------------------|
| Forward Voltage (Maximum)               | $V_F$         | $I_F = +100 \text{ mA}$   | $1.0 V_{DC}$                   |
| Voltage Rating (Minimum)                | $V_R$         | $I_r = -10 \text{ uA}$  | $I - 150 I V_{DC}$             |
| Total Capacitance (Maximum)             | $C_T$         | $-100 \text{ V @ } 100 \text{ MHz}$                                   | $0.7 \text{ pF}$               |
| Series Resistance (Maximum)             | $R_S$         | $+100 \text{ mA @ } 100 \text{ MHz}$                                  | $0.9 \text{ Ohms}$             |
| Parallel Resistance (Minimum)           | $R_P$         | $-10 \text{ V @ } 100 \text{ MHz}$                                    | $75 \text{ K } \Omega$         |
| Carrier Lifetime (Nominal)              | $\tau_L$      | $+6 \text{ mA} / -10 \text{ mA @}$<br>$(50\% - 90\% \text{ Voltage})$ | $9 \text{ } \mu\text{s}$       |
| I-Region Length (Nominal)               | $\mu\text{m}$ | -   | $175 \text{ } \mu\text{m}$     |
| C.W. Thermal Resistance (Maximum)       | $\theta$      | $I_H = 1 \text{ A}, I_L = 10 \text{ mA},$<br>$T = 1 \text{ mS}$       | $15 \text{ } ^\circ\text{C/W}$ |
| Power Dissipation in Free Air (Maximum) | $W$           | $I_F = +100 \text{ mA}$   | $4 \text{ W}$                  |
| Power Dissipation (Maximum)             | $P_D$         | $I_F = +100 \text{ mA}$   | $10 \text{ W}$                 |

## Environmental Capability

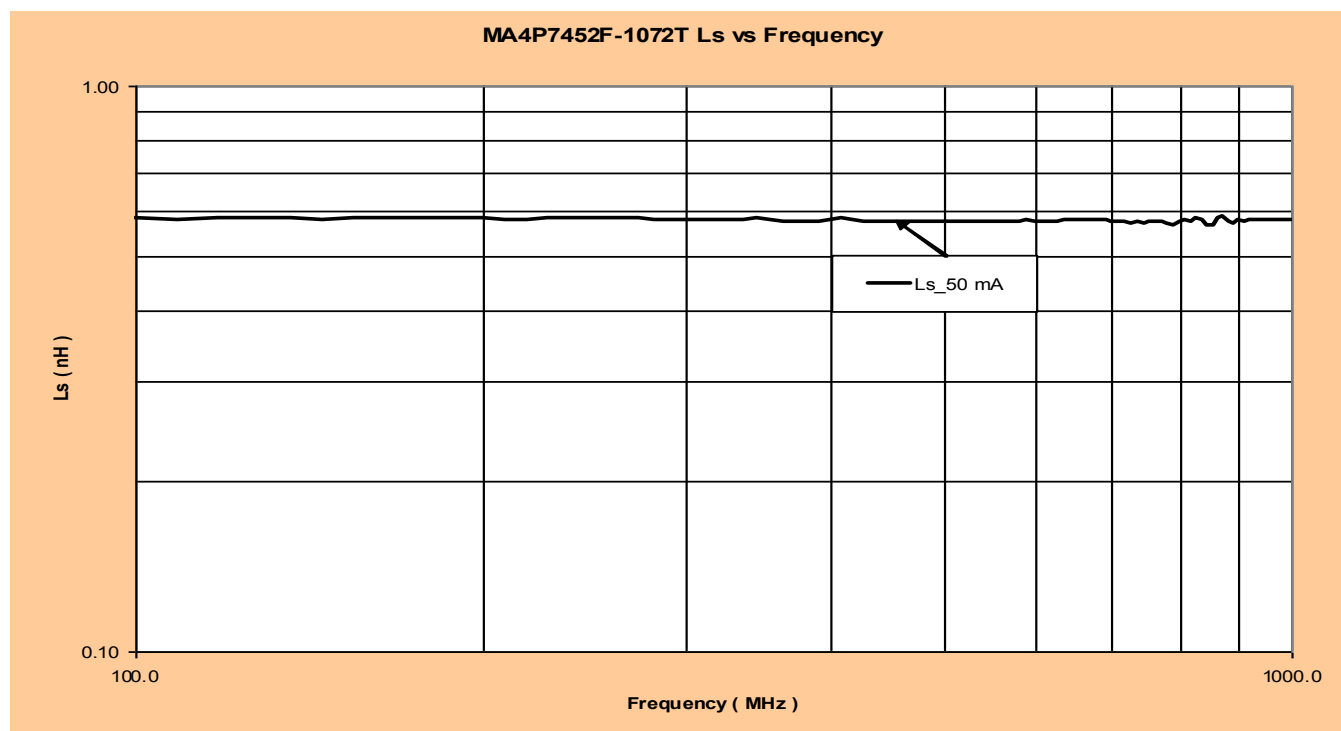
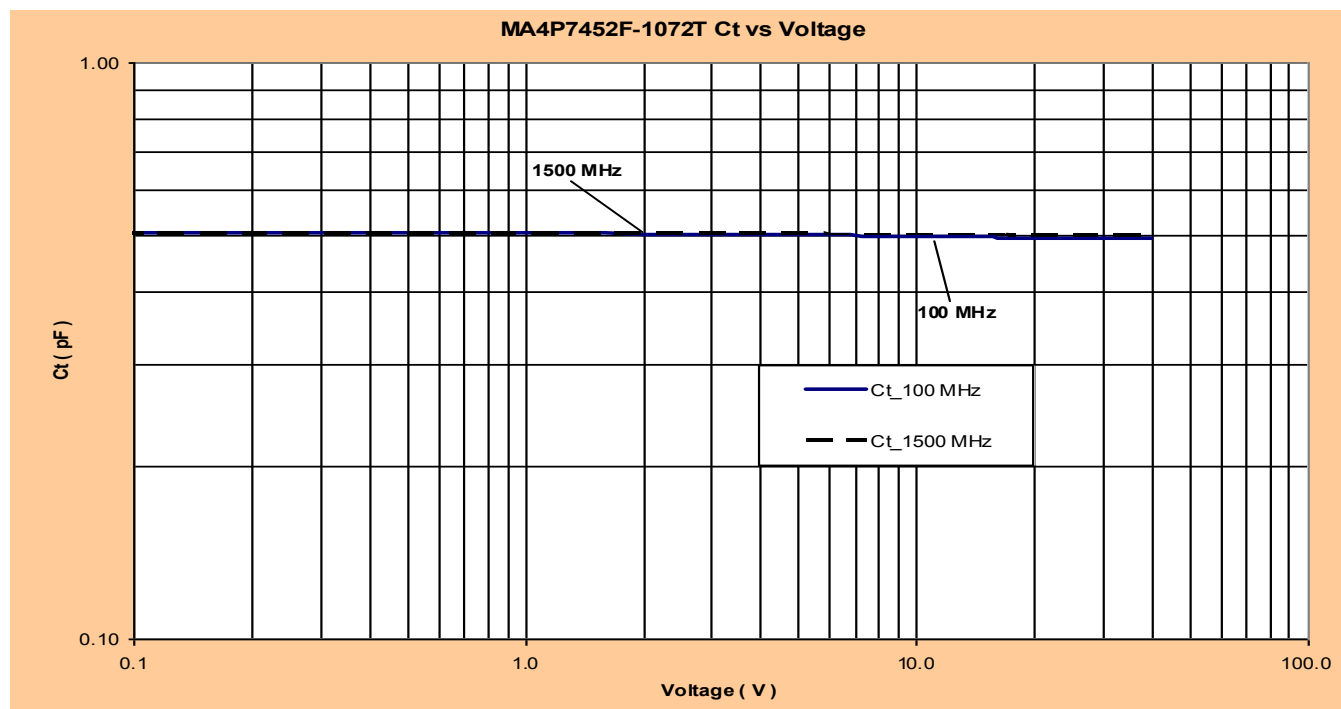
MELF devices are appropriate for use in industrial and military applications and can be screened to meet the environmental requirements of MIL-STD-750, MIL-STD-202 as well as other military standards. The table below lists some of the MIL-STD 750 tests the device is designed to meet.

| 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                 |

### Typical Electrical Performance @ +25°C

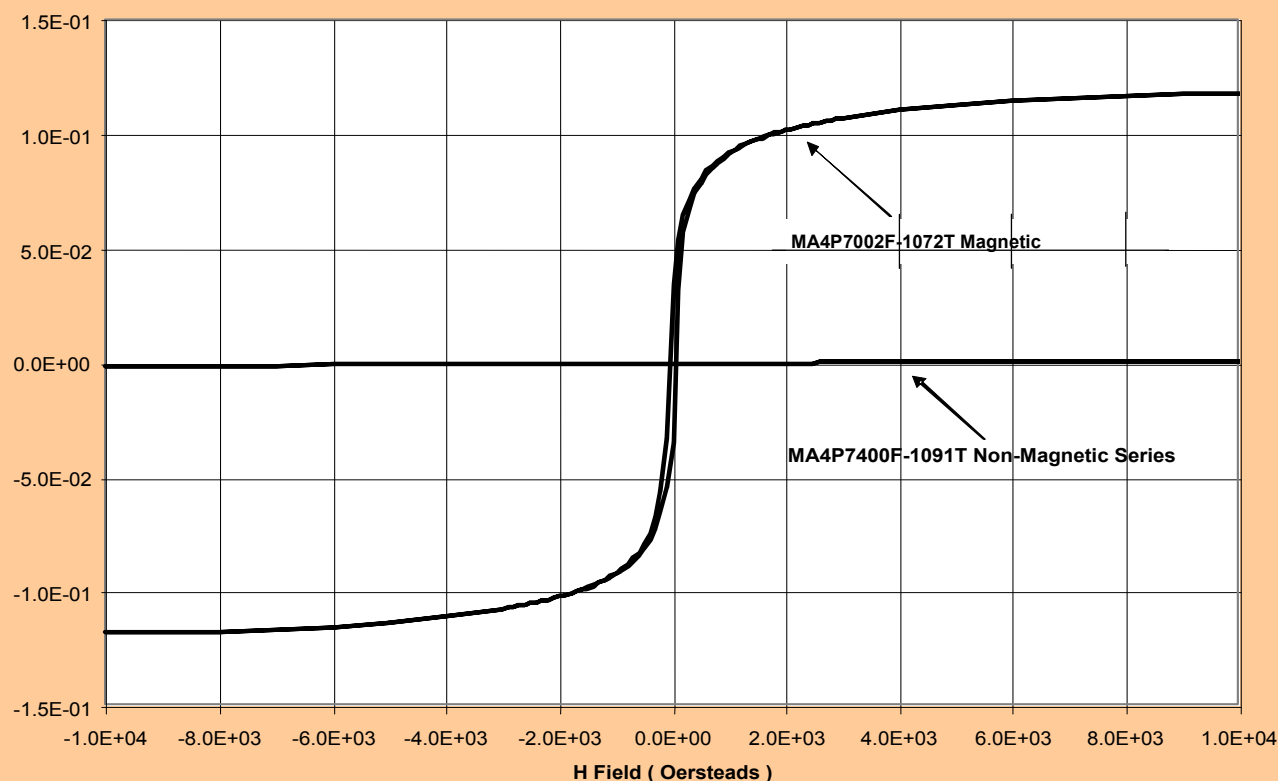


### Typical Electrical Performance @ +25°C



### Typical Non-Magnetic Performance

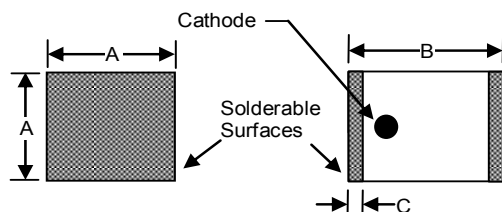
Comparison of Magnetic Moment for MA4P7400F-1072T & MA4P7002F-1072T Magnetic Devices



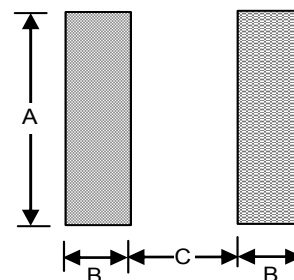
### Typical Magnetic Properties of Non-Magnetic MA4P7452F-1072T Device vs. Conventional MA4P7002F-1072T Magnetic Device

| Magnetic Property                                | MA4P7452F-1072T  | MA4P7002F-1072T  |
|--|------------------|------------------|
| Saturation Moment (EMU) @ $H = H_{MAX}$ Oersteds | $2.3 \times E-4$ | $2.1 \times E-2$ |
| Remanance Moment (EMU) @ $H = 0$ Oersteds        | $4.2 \times E-8$ | $7.1 \times E-3$ |
| 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<br>(tape and reel only)<br>1500pcs/reel |        |       |       |       |

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

### Ordering Information

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

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