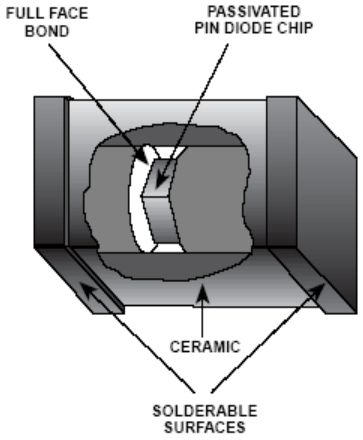
# MA4P7446F-1091T

## Non Magnetic SMQ HIPAX PIN Diode
## RoHS Compliant

Rev. V3

### Features

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




### Description

The MA4P7446F-1091T is a surface mountable PIN diode in a non-magnetic, **M**etal **E**lectrode **L**eadless **F**aced (MELF) package. The device incorporates M/A-COM'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 diode 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 MA4P7446F-1091T has been comprehensively characterized both electrically and mechanically to ensure repeatable and predictable performance. The non-magnetic MA4P7446F-1091T is the electrical equivalent of its magnetic counterparts the MA4P4002F-1091T and MA4P4006F-1091T .

### Applications

The diodes are well suited for use in low loss, low distortion, and high power switching circuits applicable for high magnetic field environments from HF through UHF frequencies. The low thermal resistance of this device provides excellent performance at high RF power incident levels, up to 500 watts CW. This device is designed to meet the most rigorous electrical and mechanical requirements of MRI environments.

### 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 techniques. All solder able surfaces are tin plated and compatible with reflow and vapor phase soldering methods.

### Absolute Maximum Ratings[1] @ 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 | + 57dBm C.W. |
| Forward D.C. Current | +500 mA |
| Reverse D.C. Voltage @ -10 uA | - 650V |

1. Exceeding these limits may cause permanent damage.



**ADVANCED:** Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.
**PRELIMINARY:** Data Sheets contain information regarding a product M/A-COM Technology Solutions has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

• **North America** Tel: 800.366.2266 • **Europe** Tel: +353.21.244.6400
• **India** Tel: +91.80.43537383 • **China** Tel: +86.21.2407.1588
Visit www.macomtech.com for additional data sheets and product information.

*M/A-COM Technology Solutions Inc. and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice.*

## Electrical Specifications @ $T_{AMBIENT}$ = +25°C

| Parameter | Symbol | Condition | Unit Value |
|---|---|---|---|
| Forward Voltage | $V_F$ | $I_F$ = +100mA | 1.0 $V_{DC}$ (Max.) |
| Reverse Voltage | $V_R$ | $I_R$ = -10µA | 600$V_{DC}$ (Min.) |
| Total Capacitance | $C_T$ | -100V @ 1MHz | 2.2pF (Max.) |
| Series Resistance | $R_S$ | +100mA @ 100MHz | 0.5Ω (Max) |
| Parallel Resistance | $R_P$ | -10V @ 100MHz | . 10kW (Min.) |
| Carrier Lifetime | $t_L$ | $I_F$ = +6mA , $I_R$ = -10mA (50% - 90% Voltage) | 19µs (Typ.) |
| I-Region Length | µM | —— | 175µM (Typ.) |
| C.W. Thermal Resistance | θ | $I_{HIGH}$ = 1A, $I_{LOW}$ = 10mA, T = 1mS | 6°C/W (Max.) |
| Power Dissipation in Free Air | W | $I_F$ = +100mA | 8W (Max.) |
| Power Dissipation | $P_{DISS}$ | $I_F$ = +100mA | 25W (Max.) |

## Environmental Capability

HIPAX devices are applicable 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.

| MIL-STD-750 | | |
|---|---|---|
| **Test** | **Method** | **Description** |
| High Temperature Storage | 1031 | +150°C, for 340 Hours |
| Temperature Shock | 1051 | -65°C to +125°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 |

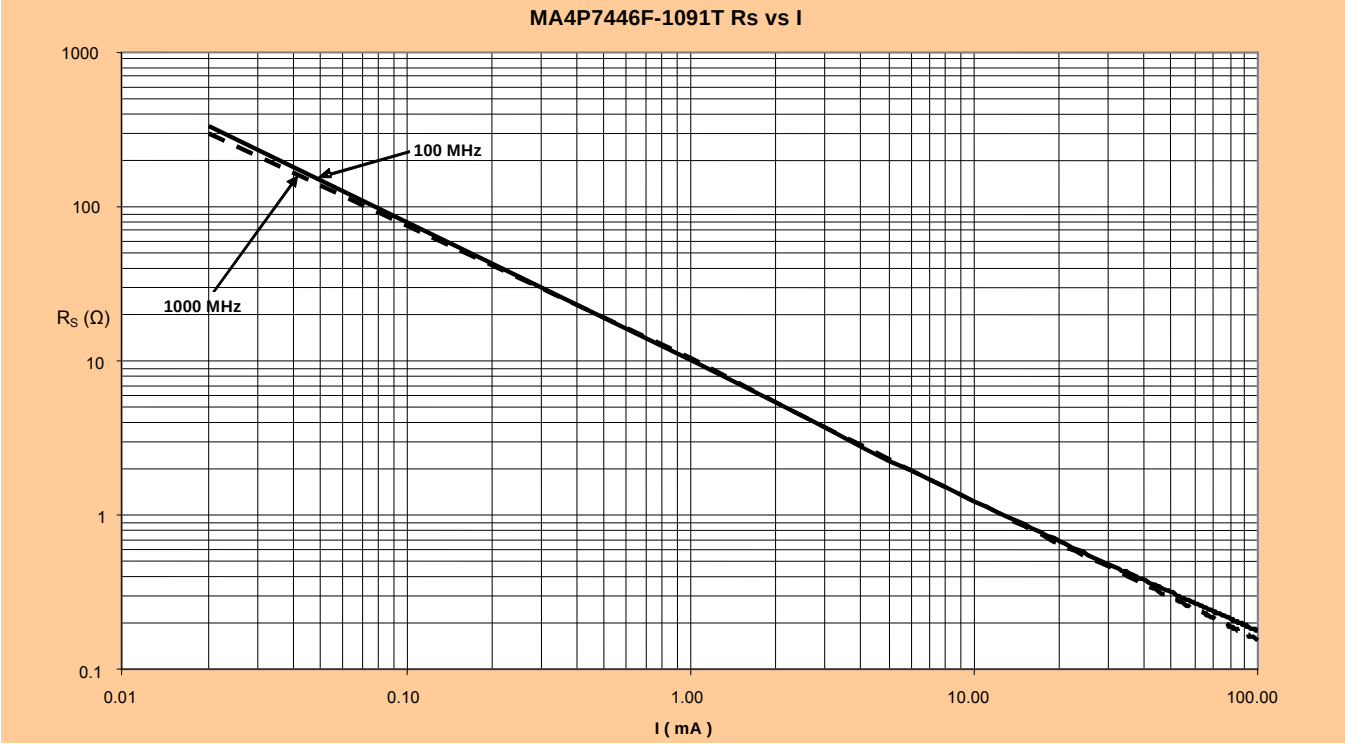


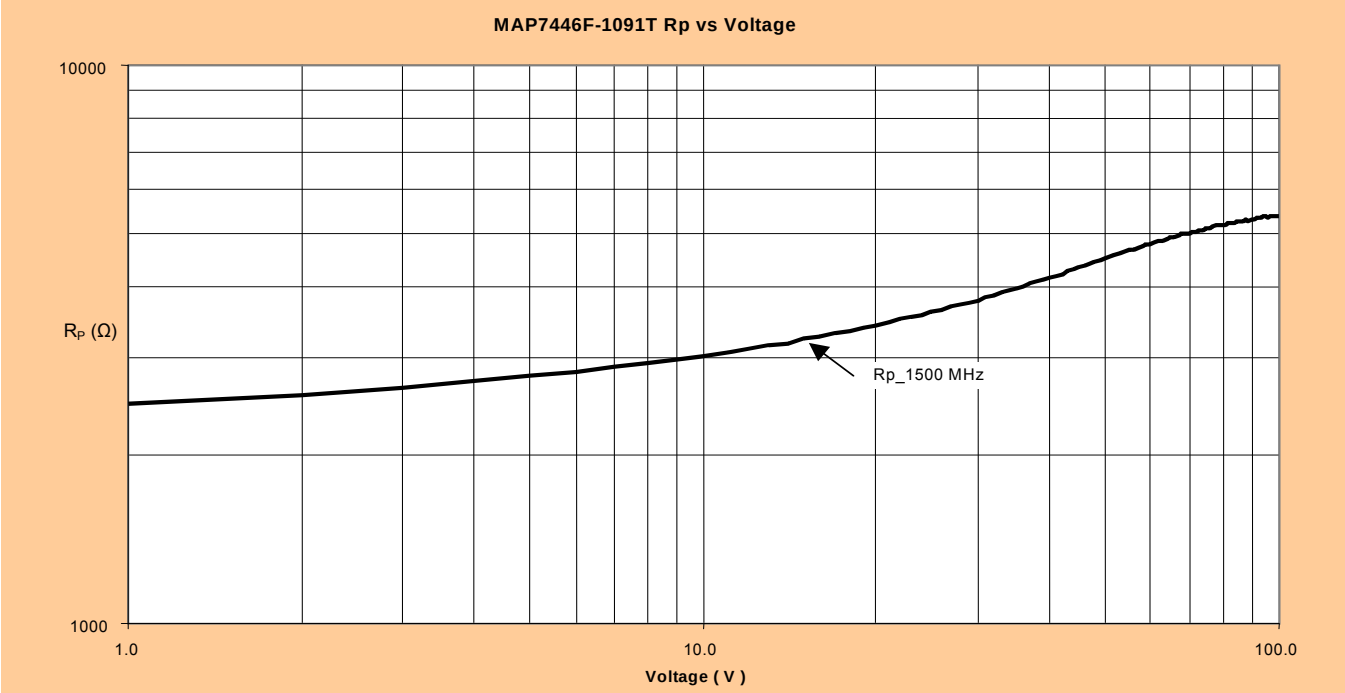
**ADVANCED:** Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.
**PRELIMINARY:** Data Sheets contain information regarding a product M/A-COM Technology Solutions has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

• **North America** Tel: 800.366.2266 • **Europe** Tel: +353.21.244.6400
• **India** Tel: +91.80.43537383 • **China** Tel: +86.21.2407.1588
Visit www.macomtech.com for additional data sheets and product information.

*M/A-COM Technology Solutions Inc. and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice.*

## Typical Electrical Performance @ +25˚C



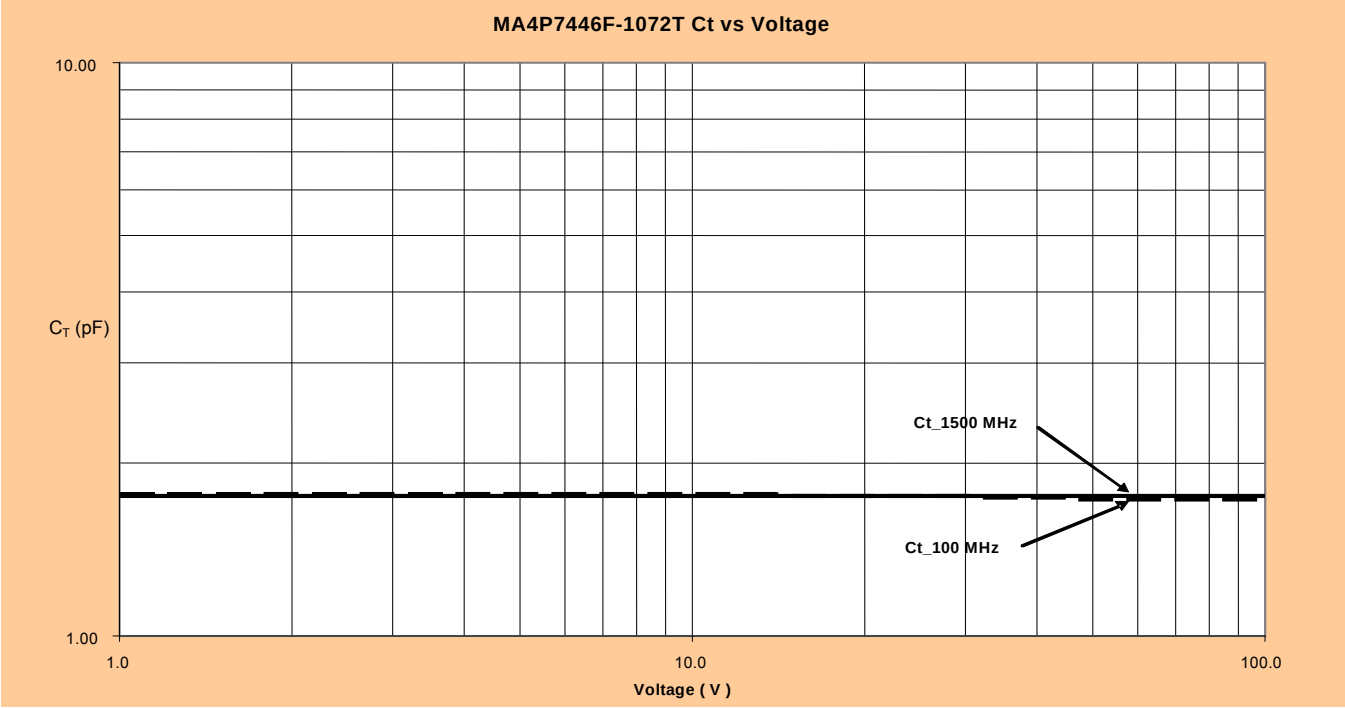


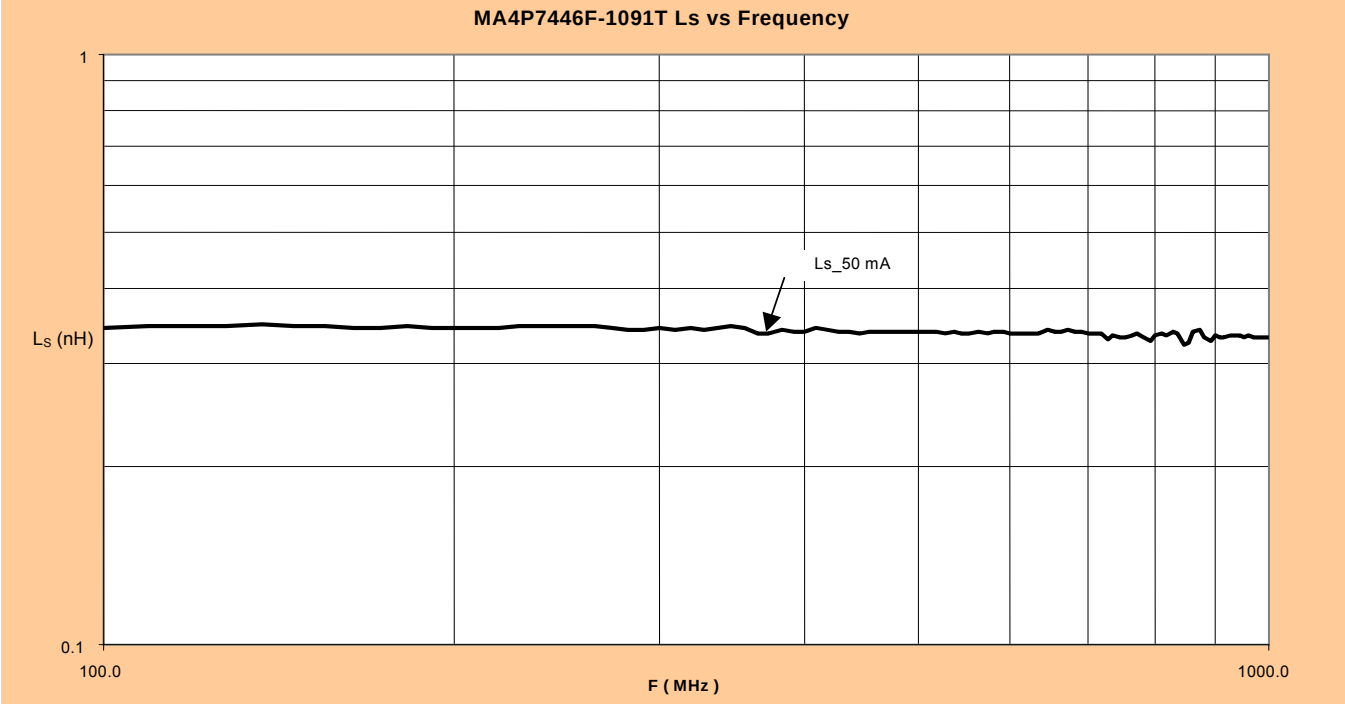

**ADVANCED:** Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.
**PRELIMINARY:** Data Sheets contain information regarding a product M/A-COM Technology Solutions has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

• **North America** Tel: 800.366.2266 • **Europe** Tel: +353.21.244.6400
• **India** Tel: +91.80.43537383 • **China** Tel: +86.21.2407.1588
Visit www.macomtech.com for additional data sheets and product information.

*M/A-COM Technology Solutions Inc. and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice.*

## Typical Electrical Performance @ +25˚C






**ADVANCED:** Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.
**PRELIMINARY:** Data Sheets contain information regarding a product M/A-COM Technology Solutions has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

- **North America** Tel: 800.366.2266
- **Europe** Tel: +353.21.244.6400
- **India** Tel: +91.80.43537383
- **China** Tel: +86.21.2407.1588

Visit www.macomtech.com for additional data sheets and product information.

*M/A-COM Technology Solutions Inc. and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice.*

## Mechanical Outline

| Case Style | Dimensions in Inches (*mm*) | | |
|---|---|---|---|
| | A Square<br>Min / Max | B<br>Min / Max | C<br>Min / Max |
| 1091 | 0.138 / 0.155<br>(3.50/ 3.94) | 0.180 / 0.200<br>(4.57/ 5.08) | 0.008 / 0.030<br>(.203 / .762) |

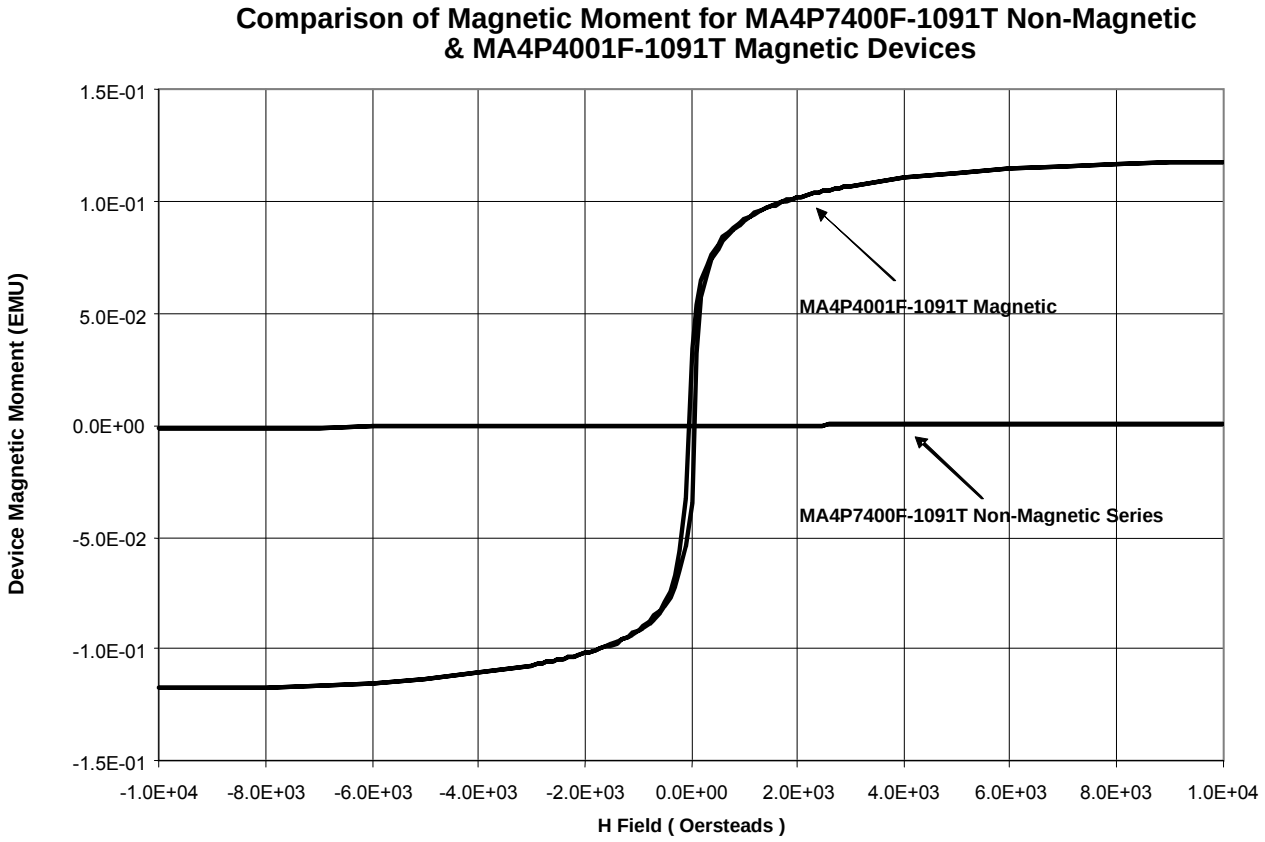


**ADVANCED:** Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.
**PRELIMINARY:** Data Sheets contain information regarding a product M/A-COM Technology Solutions has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

• **North America** Tel: 800.366.2266 • **Europe** Tel: +353.21.244.6400
• **India** Tel: +91.80.43537383 • **China** Tel: +86.21.2407.1588
Visit www.macomtech.com for additional data sheets and product information.

*M/A-COM Technology Solutions Inc. and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice.*

## Typical Non-Magnetic Performance




## Table 1 - Typical Magnetic Properties of Non-Magnetic MA4P7446F-1091T Device Vs. Conventional MA4P4001F-1091T Magnetic Device

| Magnetic Property | MA4P7446F-1091T Value | MA4P4001-1091T Value |
|---|---|---|
| Saturation Moment (EMU) @ H = $H_{MAX}$ Oersteads | 1.0 x E-3 | 1.2 x E-1 |
| Remanance Moment (EMU) @ H = 0 Oersteads | 1.5 x E-6 | 3.4 x E-2 |
| Coercivity (Oersteads) @ EMU = 0 Moment | 3.0 | 51.3 |



**ADVANCED:** Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.
**PRELIMINARY:** Data Sheets contain information regarding a product M/A-COM Technology Solutions has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

• **North America** Tel: 800.366.2266 • **Europe** Tel: +353.21.244.6400
• **India** Tel: +91.80.43537383 • **China** Tel: +86.21.2407.1588
Visit www.macomtech.com for additional data sheets and product information.

*M/A-COM Technology Solutions Inc. and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice.*

| Part Number | Package |
|---|---|
| MA4P7446F-1091T | Tape and Reel |

## Ordering Information



**ADVANCED:** Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results, and/or prototype measurements. Commitment to develop is not guaranteed.
**PRELIMINARY:** Data Sheets contain information regarding a product M/A-COM Technology Solutions has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

• **North America** Tel: 800.366.2266 • **Europe** Tel: +353.21.244.6400
• **India** Tel: +91.80.43537383 • **China** Tel: +86.21.2407.1588
Visit www.macomtech.com for additional data sheets and product information.

*M/A-COM Technology Solutions Inc. and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice.*