

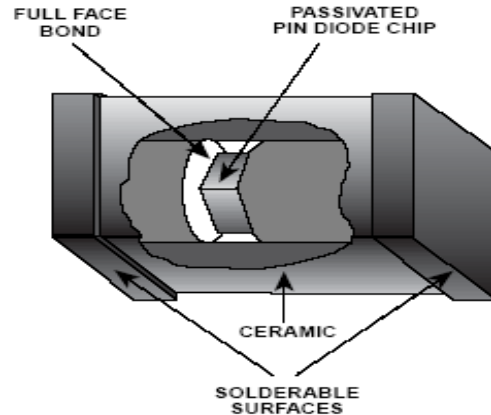
Features

- Non-Magnetic Package Suitable for MRI Applications
- Rectangular MELF SMQ Ceramic Package
- Hermetically Sealed
- Lower R_s for Lower Series Loss
- Longer τ_L for Lower Intermodulation Distortion
- Lower C_j for Higher Series Isolation
- Higher Average Incident Power Handling Capability

Description and Applications

The MA4P7441F-1091T is a surface mountable PIN diode in a Non-Magnetic (patent pending) Metal Electrode Leadless Faced (MELF) package. The device incorporates M/A-COM's proven HIPAX technology to produce a low inductance ceramic package with no ribbons or whisker wires. The package utilizes M/A-COM's new non-magnetic plating process to provide an extremely low permeability, hermetically sealed package. Incorporated in the package is a passivated PIN diode that is full face bonded on both the cathode and anode of the chip to maximize surface area for lower electrical and thermal resistance. The MA4P7441F-1091T has been comprehensively characterized both electrically and mechanically to ensure repeatable and predictable performance. This MA4P7441F-1091T Non-Magnetic device is similar in electrical performance to the MA4P4001F-1091T Magnetic part number.

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 lower thermal resistance of this device provides excellent higher average performance at RF power incident levels up to 200 watts CW. This device is designed to meet the most rigorous electrical and mechanical requirements of MRI testing 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 solderable surfaces are tin plated and compatible with reflow and vapor phase soldering methods.

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 | 20,000 G's, 60 Hz, x, y, z axis |
| Solderability | 2026 | Test Temperature = +245 °C |

Ordering Information

| Part Number | Package |
|-----------------|---------------|
| MA4P7441F-1091T | Tape and Reel |

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 | $I_r = -10 \text{ uA}$ | $ -100 V_{DC}$ |
| Total Capacitance (Maximum) | C_T | $-100 \text{ V @ } 100 \text{ MHz}$ | 2.2 pF |
| Series Resistance (Maximum) | R_S | $+100 \text{ mA @ } 100 \text{ MHz}$ | 0.5 Ohms |
| Parallel Resistance (Minimum) | R_P | $-10 \text{ V @ } 100 \text{ MHz}$ | $10 \text{ K } \Omega$ |
| Carrier Lifetime (Nominal) | τ_L | $+6 \text{ mA} / -10 \text{ mA @}$ $(50\% - 90\% \text{ Voltage})$ | 18 us |
| I-Region Length (Nominal) | μm | - | $175 \mu\text{m}$ |
| C.W. Thermal Resistance (Maximum) | θ | $I_H = 1\text{A}, I_L = 10 \text{ mA},$ $T = 1 \text{ mS}$ | $5 \text{ }^\circ\text{C/W}$ |
| Power Dissipation in Free Air (Maximum) | W | $I_F = +100 \text{ mA}$ | 9 W |
| Power Dissipation with Diode Case at Tambient (Maximum) | P_D | $I_F = +100 \text{ mA}$ | 30 W |

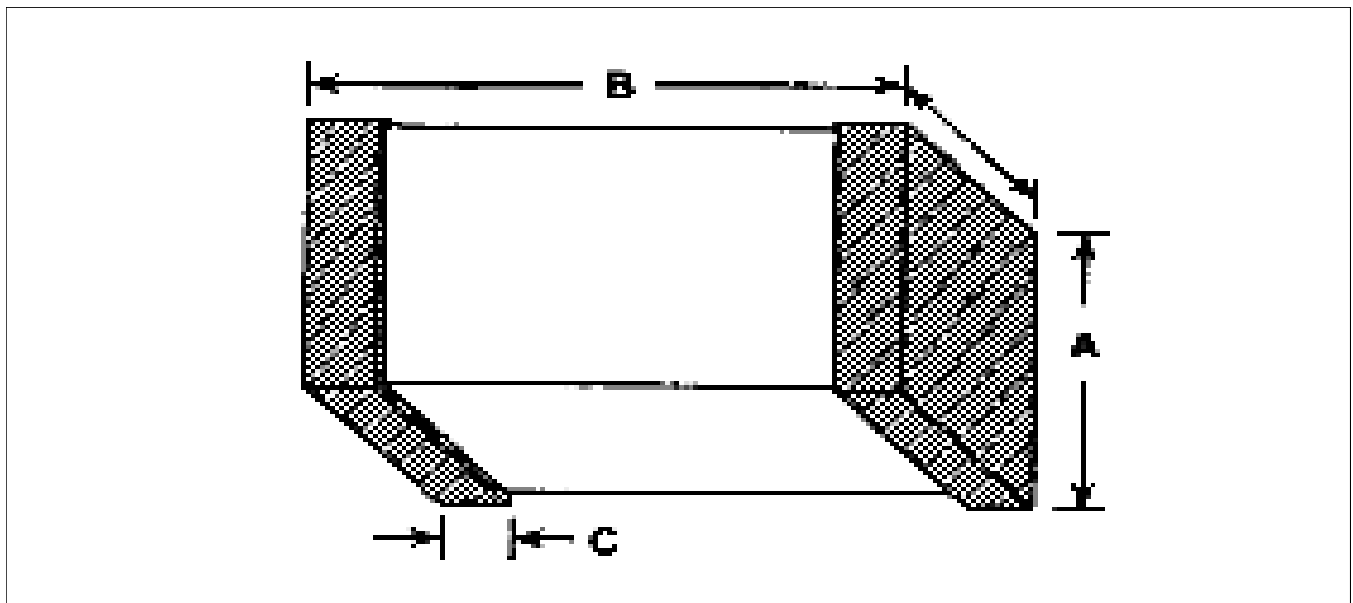
Absolute Maximum Ratings¹ @ 25°C

| Parameter | Absolute Maximum |
|---|---|
| Operating Temperature | $-65 \text{ }^\circ\text{C}$ to $+125 \text{ }^\circ\text{C}$ |
| Storage Temperature | $-65 \text{ }^\circ\text{C}$ to $+150 \text{ }^\circ\text{C}$ |
| Diode Junction Temperature | $+175 \text{ }^\circ\text{C}$ Continuous |
| Diode Mounting Temperature | $+235 \text{ }^\circ\text{C}$ for 10 seconds |
| RF C.W. Incident Power | $+ 53 \text{ dBm C.W.}$ |
| Forward D.C. Current | $+ 500 \text{ mA}$ |
| Reverse D.C. Voltage @ -10 uA | $ - 150 \text{ V} $ |

1. Exceeding these limits may cause permanent damage.

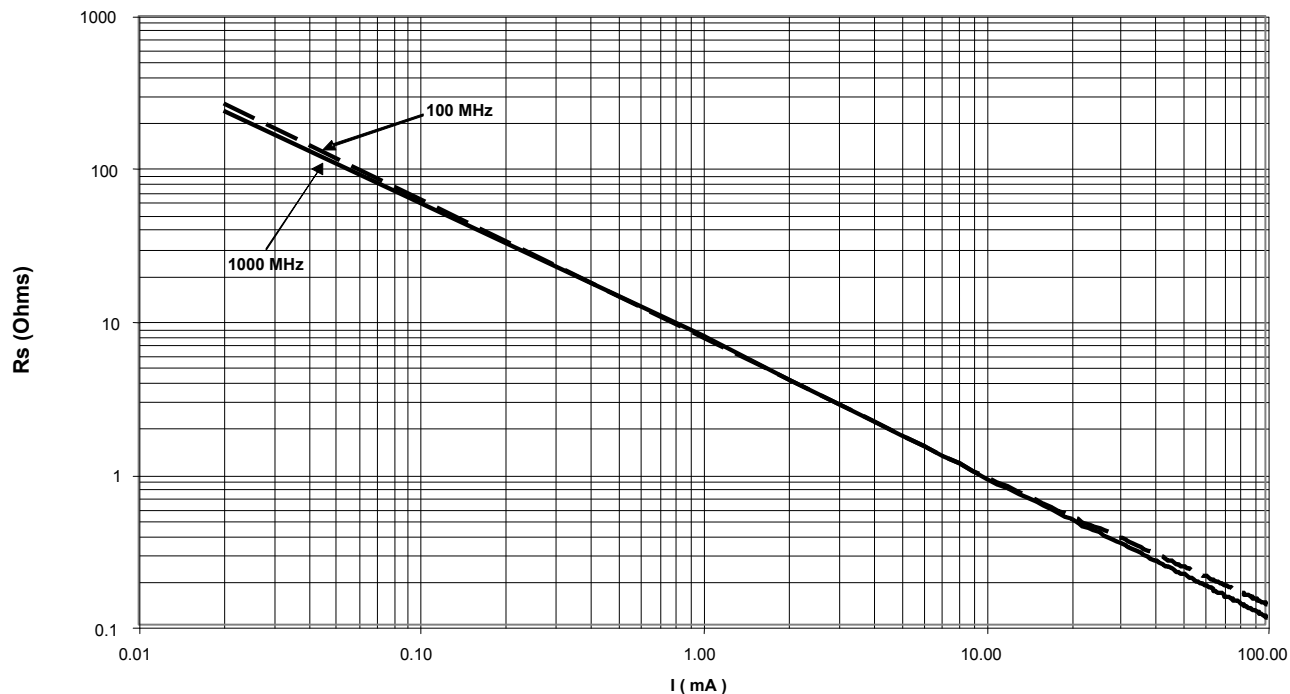
Mechanical Outline

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

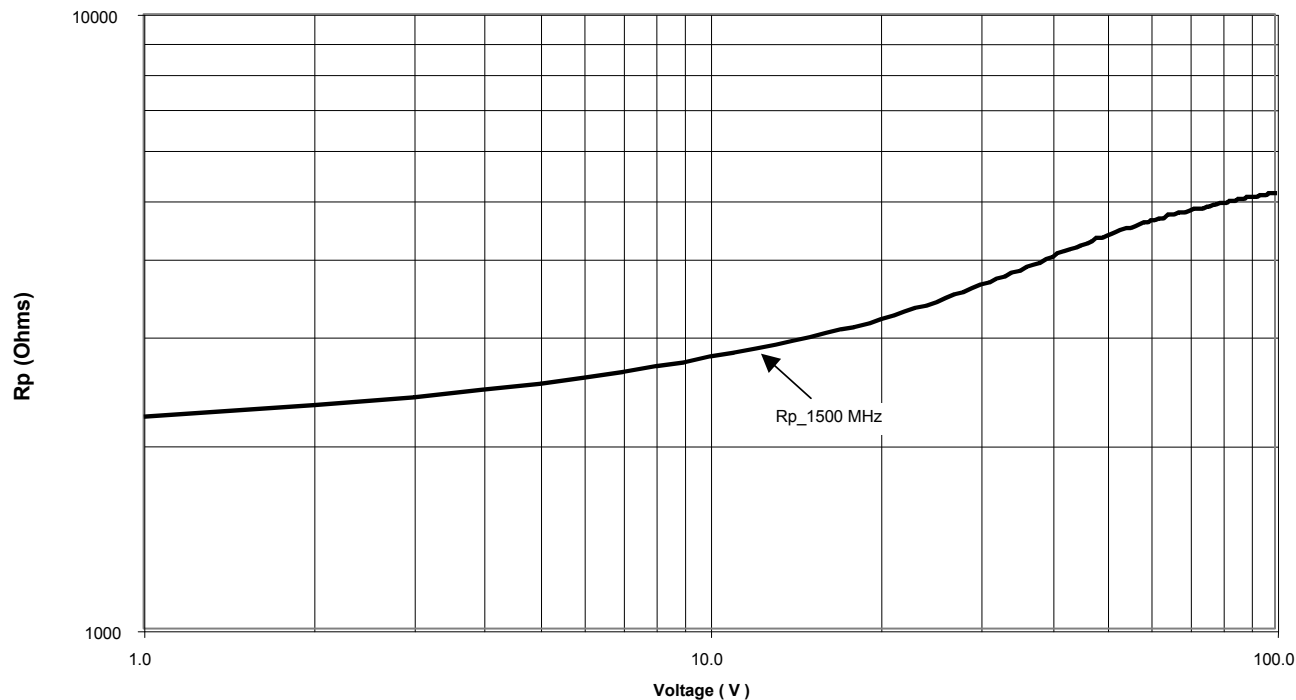


Typical Electrical Performance

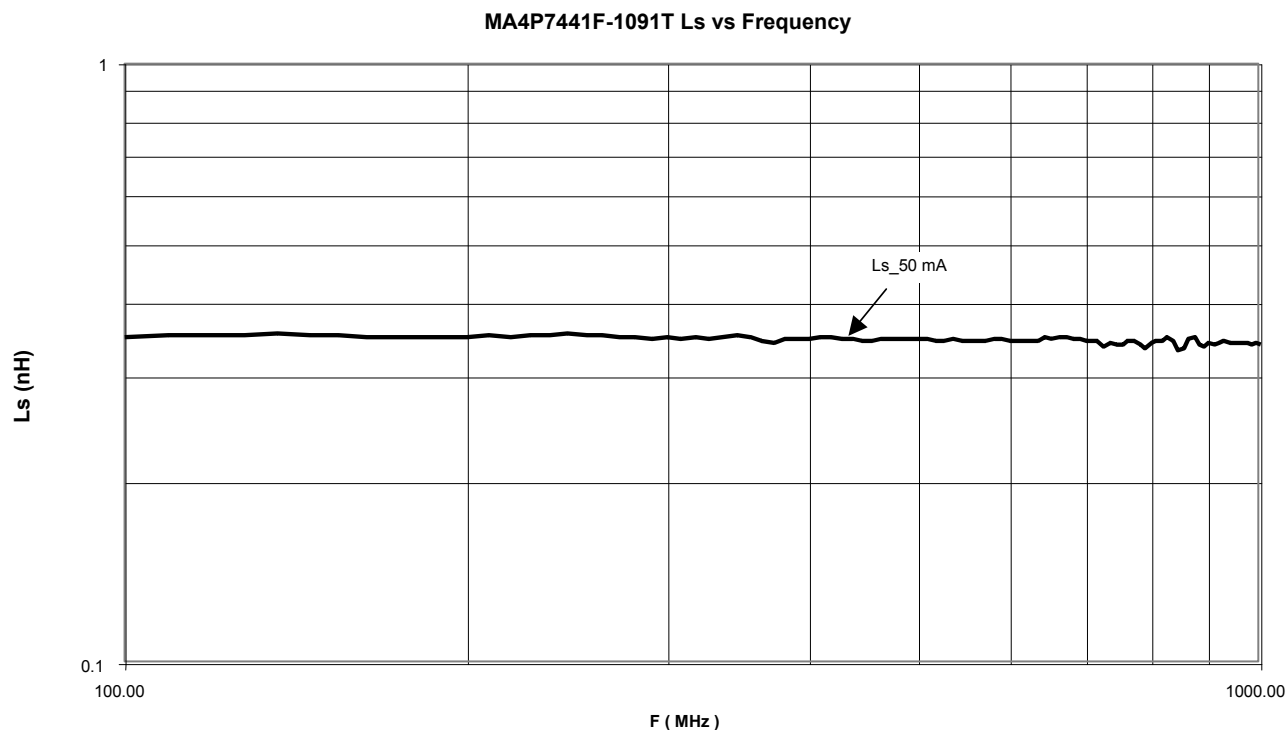
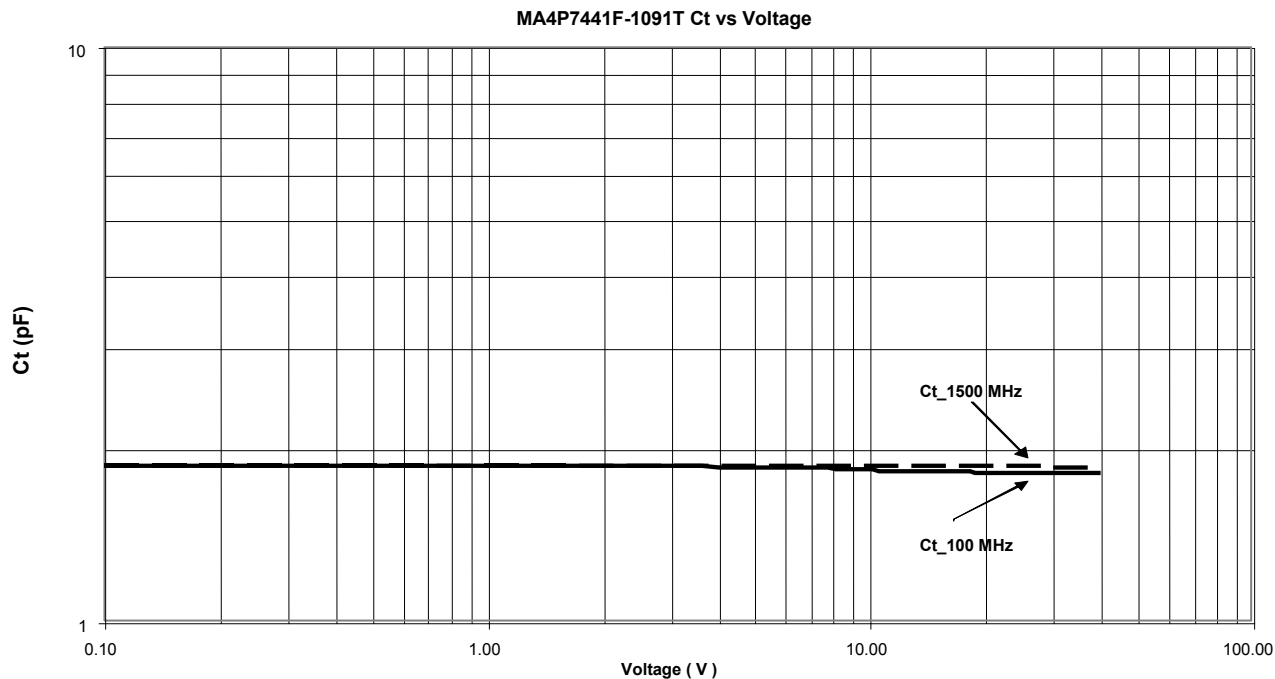
MA4P7441F-1091T Rs vs I



MA4P7441F-1091T Rp vs Voltage



Typical Electrical Performance



Typical Non-Magnetic Performance

Comparison of Magnetic Moment for MA4P7400F-1091T Non-Magnetic & MA4P4001F-1091T Magnetic Devices

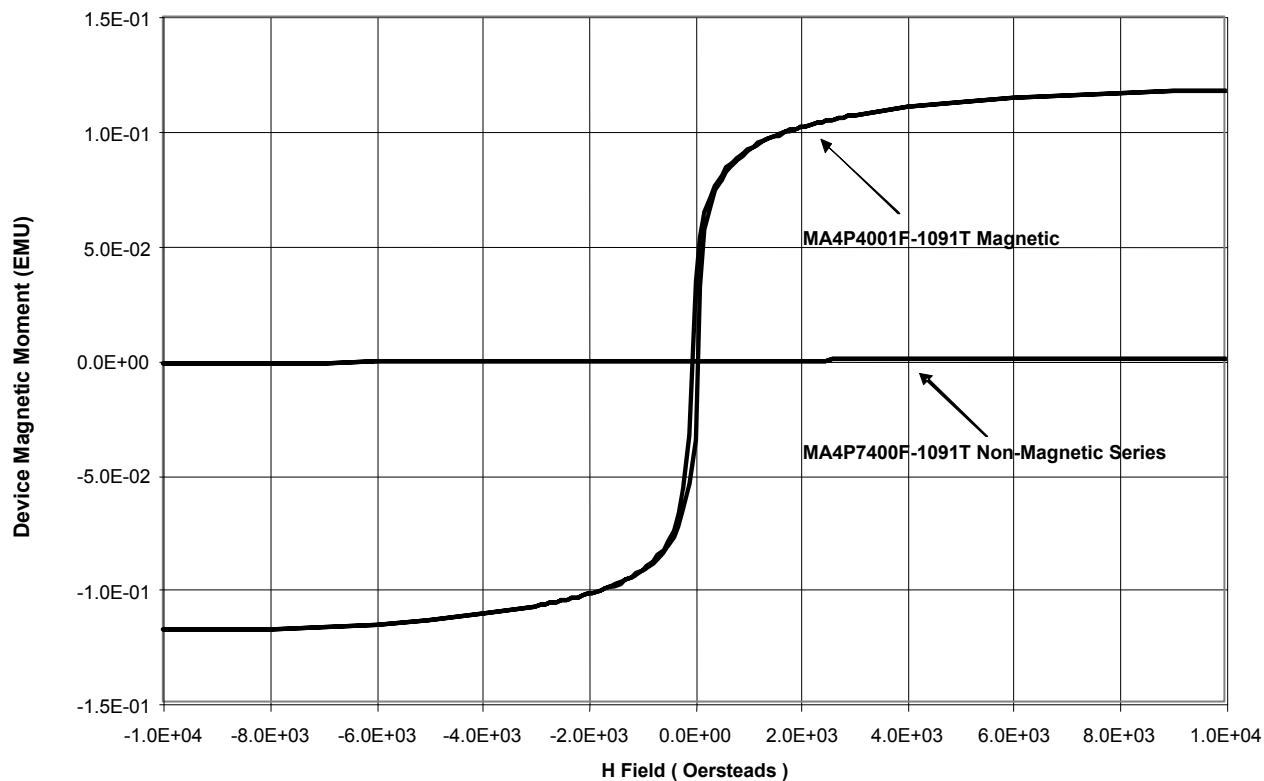


Table 1 - Typical Magnetic Properties of Non-Magnetic MA4P7441F-1091T Device Vs. Conventional MA4P4001F-1091T Magnetic Device

| Magnetic Property | MA4P7441F-1091T Value | MA4P4001-1091T Value |
|--|-----------------------|----------------------|
| Saturation Moment (EMU) @ H = H _{MAX} Oersteds | 1.0 x E-3 | 1.2 x E-1 |
| Remanance Moment (EMU) @ H = 0 Oersteds | 1.5 x E-6 | 3.4 x E-2 |
| Coercivity (Oersteds) @ EMU = 0 Moment | 3.0 | 51.3 |

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