2000 Volt & 3000 Volt PIN Diodes MA4PK2000, MA4PK3000

Features

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

Description and Applications

The MA4P7470F-1072T is a surface mountable PIN diode in a non-magnetic Metal Electrode Leadless Faced (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. 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 low electrical and thermal resistance. The MA4P7470F-1072T has been comprehensively characterized both electrically and mechanically to ensure repeatable and predictable performance. This MA4P7470F-1072T non-magnetic device is similar in electrical performance to the MA4P7417F-1072T magnetic part number.

The diode is 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.

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FULL FACE	PASSIVATED
BOND	PIN DIODE CHIP
\	
	CERAMIC SOLDERABLE SURFACES

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.

Absolute Maximum Ratings¹ @ +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	+265 °C for 10 seconds
RF C.W. Incident Power	+ 53dBm C.W.
Forward D.C. Current	+ 150mA
Reverse D.C. Voltage @ -10 uA	- 800V

1. Exceeding these limits may cause permanent damage.

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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
MA4P7470F-1072T	Tape and Reel

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Electrical Specifications @ +25 °C

Parameter	Symbol	Condition	Unit Value
Forward Voltage (Maximum)	V _F	I _F = +100mA	1.0V _{DC}
Voltage Rating (Minimum)	V _R	Ir = -10uA	I – 800 I V _{DC}
Total Capacitance (Maximum)	C _T	-100V @ 100MHz	0.7pF
Series Resistance (Maximum)	R _s	+100mA @ 100MHz	0.8 Ohms
Parallel Resistance (Minimum)	R _P	-10V @ 100MHz	50K Ω
Carrier Lifetime (Nominal)	τL	+6mA / -10mA @ (50% - 90% Voltage)	6.5 <i>u</i> s
I-Region Length (Nominal)	μm	-	140 μm
C.W. Thermal Resistance (Maximum)	θ	$I_H = 1A, I_L = 10mA,$ T = 1mS	13°C/W
Power Dissipation in Free Air (Maximum)	W	I _F = +100mA	4W
Power Dissipation with Diode Case at Tambient (Maximum)	P _D	I _F = +100mA	12W

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Mechanical Outline

Case Style	Dimensions in Inches (<i>mm</i>)		
	A Square	B	C
	Min / Max	Min / Max	Min / Max
1072	0.080 / 0.095	0.115 / 0.135	0.008 / 0.030
	(2.03 / 2.41)	(2.92/ 3.43)	(.203 / .762)



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Rev. V2

Typical Electrical Performance



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Typical Electrical Performance



MA4P7470F-1072T Ls vs Frequency

1 R Ls_50 mA Ls (nH) 0.1 100.0 1000.0 Frequency (MHz)

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Rev. V2

Typical Non-Magnetic Performance



Table 1 - Typical Magnetic Properties of Non-Magnetic MA4P7470F-1072T Devicevs.

A Conventional MA4P1250-1072T Magnetic Device

Magnetic Property	MA4P7470F-1072T Value	MA4P1250-1072T Value
Saturation Moment (EMU) @ H = H _{MAX} Oersteads	2.3 x E-4	2.1 x E-2
Remanance Moment (EMU) @ H = 0 Oersteads	4.2 x E-8	7.1 x E-3
Coercivity (Oersteads) @ EMU = 0 Moment	1	59.2

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