

## ULTRA LOW CAPACITANCE MULTI-LINE STEERING DIODE ARRAY



**SO-14 PACKAGE**

### DESCRIPTION

The MMAD Series are low distortion steering diodes. These devices are intended for use in high frequency analog or digital data I/O ports for protection against Electrostatic Discharge (ESD) and Electrical Fast Transients (EFT). The MMAD Series is connected between rail-to-rail voltage bus or rail-to-ground for clamping and diverting overvoltage transients for the protection of sensitive network interface circuits.

This series provides low capacitance, which insures signal integrity up to 900MHz, while complete isolation between adjacent diodes keeps cross-talk to a minimum. The MMAD Series is available in a SO-14 package and meets the IEC 61000-4-2, IEC 61000-4-4 and IEC 61000-4-5 requirements.

### FEATURES

- Compatible with IEC 61000-4-2 (ESD): Air - 15kV, Contact - 8kV
- Compatible with IEC 61000-4-4 (EFT): 40A - 5/50ns
- Compatible with IEC 61000-4-5 (Surge): 12A, 8/20 $\mu$ s - Level 1(Line-Gnd) & Level 2(Line-Line)
- 500 Milliwatt Continuous Power Dissipation
- Monolithic Design
- ESD Protection > 25 kilovolts
- Protects up to 7 to 10 I/O Lines
- Working Voltage > 50 Volts
- Low Leakage Current < 0.1 $\mu$ A
- Ultra Low Capacitance: 5pF per Diode
- RoHS Compliant
- REACH Compliant

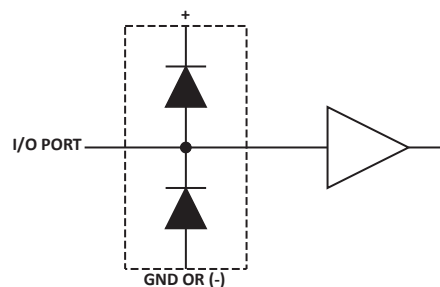
### APPLICATIONS

- High Frequency Data Lines
- RS-232 & RS-422 Interface Networks
- Ethernet 10/100 Base T
- Computer I/O Ports

### MECHANICAL CHARACTERISTICS

- Molded JEDEC SO-14 Package
- Approximate Weight: 0.15 grams
- Lead-Free Pure-Tin Plating (Annealed)
- Solder Reflow Temperature:  
Pure-Tin - Sn, 100: 260-270°C
- 16mm Tape and Reel Per EIA Standard 481
- Flammability Rating UL 94V-0

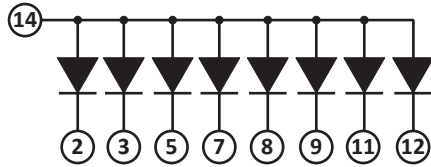
### CIRCUIT DIAGRAM



Does Not Apply to the MMAD1109

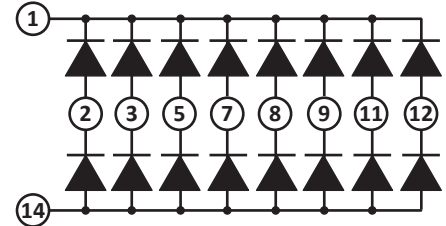
## PIN IDENTIFICATION AND CONFIGURATION

MMAD1106



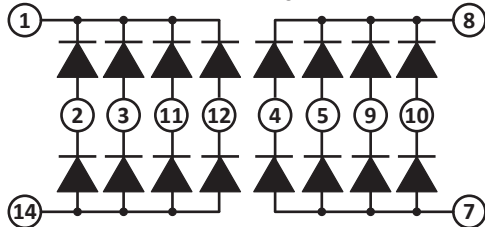
8 Diode Common Anode Array  
 NC Pins 1, 4, 6, 10 & 13  
 8 Lines of Protection

MMAD1103



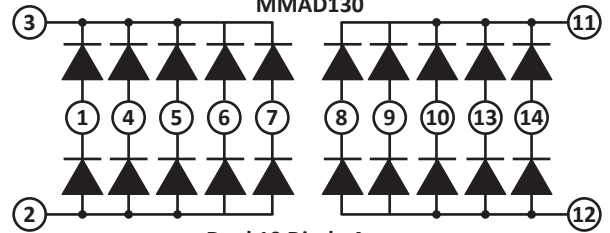
16 Diode Array  
 NC Pins 4, 6, 10 & 13  
 8 Lines of Protection

MMAD1107



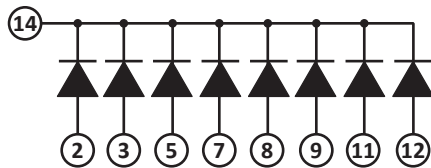
Dual 8 Diode Array  
 NC Pins 6 & 13  
 8 Lines of Protection

MMAD130



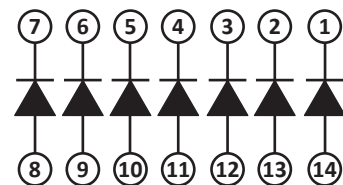
Dual 10 Diode Array  
 10 Lines of Protection

MMAD1105



8 Diode Common Cathode Array  
 NC Pins 1, 4, 6, 10 & 13  
 8 Lines of Protection

MMAD1109



7 Lines of Protection

## TYPICAL DEVICE CHARACTERISTICS

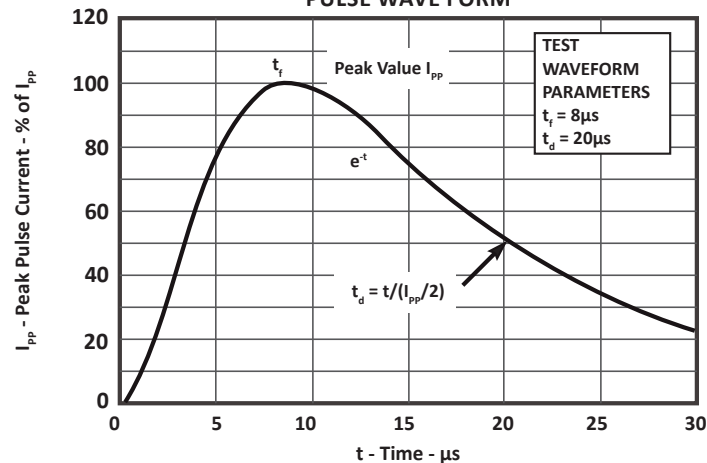
## MAXIMUM RATINGS @ 25°C Unless Otherwise Specified

| PARAMETER                                                      | SYMBOL    | VALUE      | UNITS      |
|----------------------------------------------------------------|-----------|------------|------------|
| Continuous Power Dissipation                                   | $P_{PK}$  | 500        | Milliwatts |
| Continuous Forward Current (Single Diode)                      | $I_P$     | 400        | mA         |
| Repetitive Peak Forward Current @ $t_p = 5\mu s$ , $F = 50kHz$ | $I_{FRM}$ | 700        | mA         |
| Operating Temperature                                          | $T_A$     | -55 to 150 | °C         |
| Storage Temperature                                            | $T_{STG}$ | -55 to 150 | °C         |

## ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified

| PART NUMBER | REPETITIVE PEAK REVERSE VOLTAGE    | MAXIMUM FORWARD PEAK PULSE CURRENT | MAXIMUM FORWARD VOLTAGE   | MAXIMUM REVERSE LEAKAGE CURRENT     | MAXIMUM CAPACITANCE (Per Diode) |
|-------------|------------------------------------|------------------------------------|---------------------------|-------------------------------------|---------------------------------|
|             | @ 10 $\mu A$<br>$V_{RRM}$<br>VOLTS | @ 8/20 $\mu s$<br>$I_{FM}$<br>AMPS | @ 100mA<br>$V_F$<br>VOLTS | $V_{RRM}$ @ 40V<br>$I_R$<br>$\mu A$ | @ 4V, 1MHz<br>$C_J$<br>pF       |
| MMAD1103    | 50                                 | 12                                 | 1.2                       | 0.1                                 | 5                               |
| MMAD1105    | 50                                 | 12                                 | 1.2                       | 0.1                                 | 5                               |
| MMAD1106    | 50                                 | 12                                 | 1.2                       | 0.1                                 | 5                               |
| MMAD1107    | 50                                 | 12                                 | 1.2                       | 0.1                                 | 5                               |
| MMAD1109    | 50                                 | 12                                 | 1.2                       | 0.1                                 | 5                               |
| MMAD130     | 50                                 | 12                                 | 1.2                       | 0.1                                 | 5                               |

FIGURE 1  
PULSE WAVE FORM



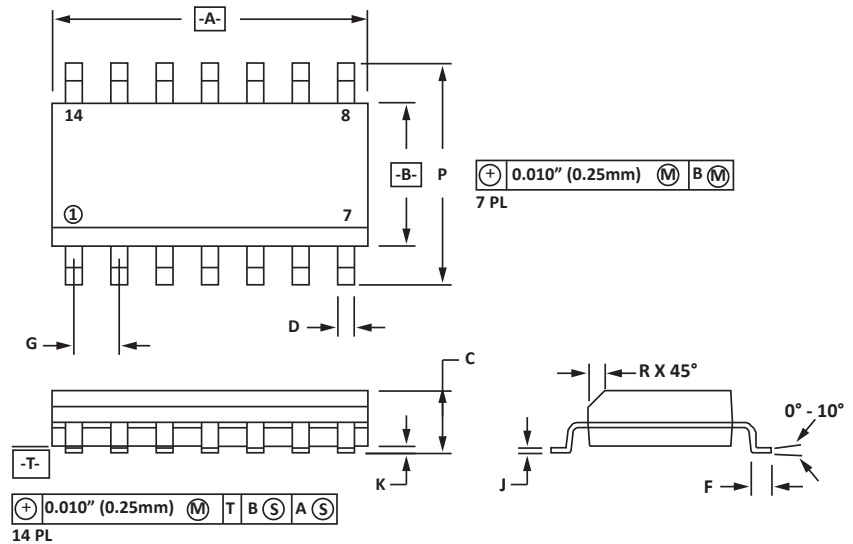
## SO-14 PACKAGE INFORMATION

## OUTLINE DIMENSIONS

| DIM | MILLIMETERS |      | INCHES   |       |
|-----|-------------|------|----------|-------|
|     | MIN         | MAX  | MIN      | MAX   |
| A   | 8.55        | 8.75 | 0.337    | 0.344 |
| B   | 3.80        | 4.00 | 0.150    | 0.157 |
| C   | 1.35        | 1.75 | 0.054    | 0.068 |
| D   | 0.35        | 0.49 | 0.014    | 0.019 |
| F   | 0.40        | 1.25 | 0.016    | 0.049 |
| G   | 1.27 BSC    |      | 0.05 BSC |       |
| J   | 0.18        | 0.25 | 0.007    | 0.009 |
| K   | 0.10        | 0.25 | 0.004    | 0.008 |
| P   | 5.80        | 6.20 | 0.229    | 0.244 |
| R   | 0.25        | 0.50 | 0.010    | 0.019 |

## NOTES

- T = Seating plane and datum surface.
- Dimensions "A" and "B" are datum.
- Dimensions "A" and "B" do not include mold protrusion.
- Maximum mold protrusion is 0.015" (0.380mm) per side.
- Dimensioning and tolerances per ANSI Y14.5M, 1982.
- Dimensions are exclusive of mold flash and metal burrs.

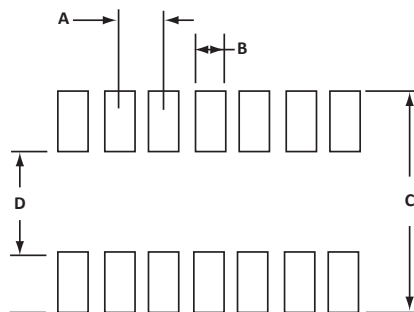


## PAD LAYOUT DIMENSIONS

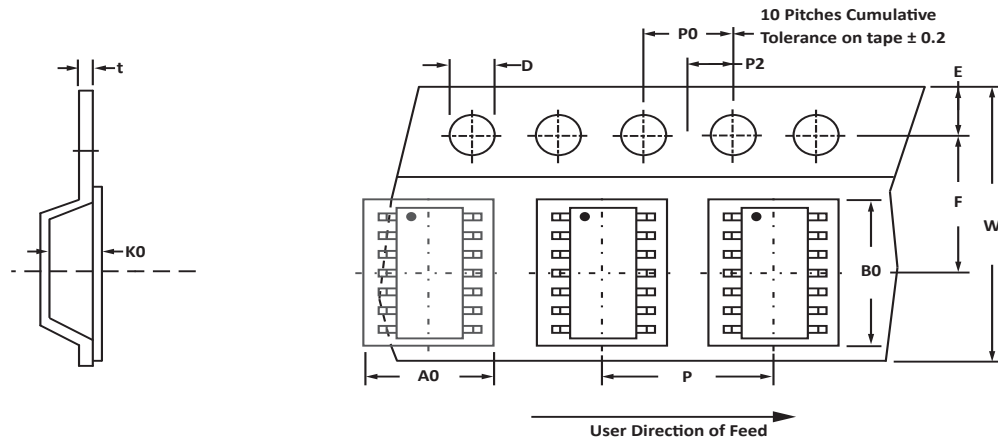
| DIM | MILLIMETERS |      | INCHES |       |
|-----|-------------|------|--------|-------|
|     | MIN         | MAX  | MIN    | MAX   |
| A   | 1.14        | 1.40 | 0.045  | 0.055 |
| B   | 0.64        | 0.89 | 0.025  | 0.035 |
| C   | 6.22        | -    | 0.245  | -     |
| D   | 3.94        | 4.17 | 0.155  | 0.165 |
| E   | 1.02        | 1.27 | 0.040  | 0.050 |

## NOTES

- Controlling dimension: inches.



## TAPE AND REEL



## SPECIFICATIONS

| REEL DIA.  | TAPE WIDTH | A0          | B0         | K0          | D           | E           | F           | W            | P0          | P2          | P           | tmax |
|------------|------------|-------------|------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|------|
| 178mm (7") | 16mm       | 6.70 ± 0.10 | 9.8 ± 0.10 | 2.10 ± 0.10 | 1.50 ± 0.10 | 1.75 ± 0.10 | 3.50 ± 0.05 | 16.00 ± 0.30 | 4.00 ± 0.12 | 2.00 ± 0.10 | 8.00 ± 0.10 | 0.25 |

## NOTES

- Dimensions are in millimeters.
- Surface mount product is taped and reeled in accordance with EIA-481.
- Suffix - T7 = 7" Reel - 1,000 pieces per 16mm tape.
- Suffix - T13 = 13" Reel - 2,500 pieces per 16mm tape.
- Bulk product shipped in tubes of 55 pieces per tube.
- Marking on Part - part number, date code, logo and pin one defined by dot on top of package.

## ORDERING INFORMATION

| BASE PART NUMBER<br>(xx = Voltage) | LEADFREE SUFFIX | TAPE SUFFIX | QTY/REEL | REEL SIZE | TUBE QTY |
|------------------------------------|-----------------|-------------|----------|-----------|----------|
| MMADxxxx                           | -LF             | -T7         | 1,000    | 7"        | 55       |
| MMADxxxx                           | -LF             | -T13        | 2,500    | 13"       | 55       |

This device is only available in a Lead-Free configuration.

## COMPANY INFORMATION

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### COMPANY PROFILE

In business more than 25 years, ProTek Devices™ is a privately held semiconductor company. The company offers a product line of overvoltage protection and overcurrent protection components. These include transient voltage suppressor array (TVS arrays) avalanche breakdown diode, steering diode TVS array and electronics SMD chip fuses. These components deliver circuit protection in electronic systems from numerous overvoltage and overcurrent events. They include lightning; electrostatic discharge (ESD); nuclear electromagnetic pulses (NEMP); inductive switching; and electromagnetic interference (EMI) / radio frequency interference (RFI). ProTek Devices also offers LED wafer die for ESD protection and related high frequency products. ProTek Devices is ISO 9001:2015 certified.

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