



| Parameter  | Rating | Units             |
|--|--------|-------------------|
| AC Operating Voltage   | 120    | V <sub>rms</sub>  |
| Load Current   | 500    | mA <sub>rms</sub> |
| On-State Voltage Drop<br>(I <sub>L</sub> =500mA <sub>rms</sub> ) | 1.4    | V <sub>rms</sub>  |

### Features

- Load Current up to 0.5A<sub>rms</sub>
- Blocking Voltages up to 400V<sub>P</sub>
- 5mA Sensitivity
- Zero-Crossing Detection
- DC Control, AC Output
- Optically Isolated
- TTL and CMOS Compatible
- Low EMI and RFI Generation
- High Noise Immunity
- VDE compatible
- Machine Insertable, Wave Solderable

### Applications

- Programmable Control
- Process Control
- Power Control Panels
- Remote Switching
- Gas Pump Electronics
- Contactors
- Large Relays
- Solenoids
- Motors
- Heaters

### Description

The PM1204 is an AC Solid State Switch using optical coupling with dual power SCR outputs to produce an alternative to optocoupler and Triac circuits. The PM1204 switches are robust enough to provide a blocking voltage of up to 400V<sub>P</sub>. In addition, tightly controlled zero-cross circuitry ensures switching of AC loads without the generation of transients. The input and output circuits are optically coupled to provide 3750V<sub>rms</sub> of isolation and noise immunity between control and load circuits. As a result, the PM1204 is well suited for industrial environments where electromagnetic interference could disrupt the operation of electromechanical relays.

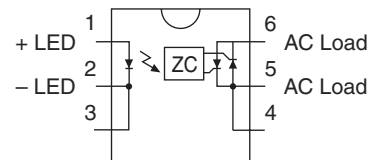
### Approvals

- UL Recognized Component: UL 508 File E69938
- CSA Certified Component: File 043639

### Ordering Information

| Part #    | Description                      |
|-----------|----------------------------------|
| PM1204    | 6-Lead DIP (50/Tube)             |
| PM1204S   | 6-Lead Surface Mount (50/Tube)   |
| PM1204STR | 6-Lead Surface Mount (1000/Reel) |

### Pin Configuration



**Absolute Maximum Ratings @ 25°C**

| Parameter                              | Min  | Max  | Units            |
|--|------|------|------------------|
| Blocking Voltage                       | -    | 400  | V <sub>P</sub>   |
| Reverse Input Voltage                  | -    | 5    | V                |
| Input Control Current                  | -    | 100  | mA               |
| Peak (10ms)                            | -    | 1    | A                |
| Input Power Dissipation <sup>1</sup>   | -    | 150  | mW               |
| Total Package Dissipation <sup>2</sup> | -    | 800  | mW               |
| Isolation Voltage, Input to Output     | 3750 | -    | V <sub>rms</sub> |
| Operational Temperature                | -40  | +85  | °C               |
| Storage Temperature                    | -40  | +125 | °C               |

*Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at conditions beyond those indicated in the operational sections of this data sheet is not implied.*

<sup>1</sup> Derate linearly 1.33 mW / °C

<sup>2</sup> Derate linearly 6.67 mW / °C

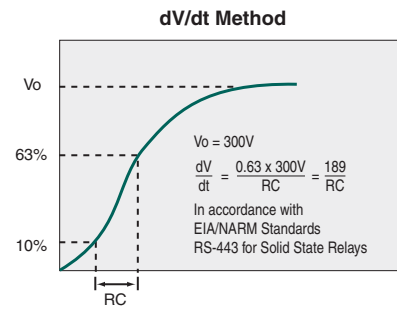
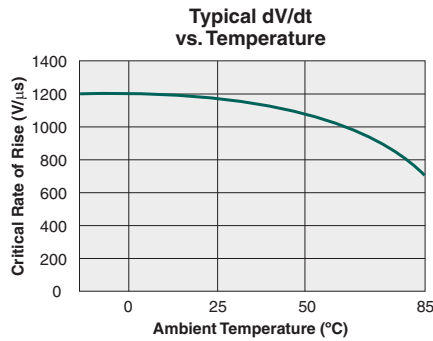
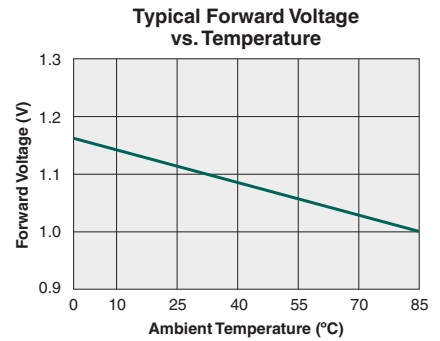
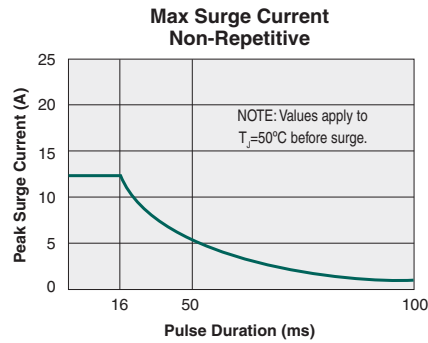
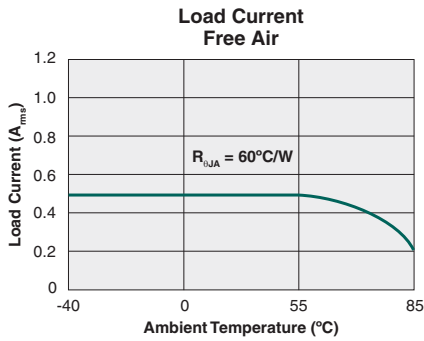
**Electrical Characteristics @ 25°C**

| Parameter   | Conditions                          | Symbol            | Min   | Typ  | Max | Units            |
|---|-------------------------------------|-------------------|-------|------|-----|------------------|
| <b>Output Characteristics</b>                         |                                     |                   |       |      |     |                  |
| AC Operating Voltage                                  | I <sub>F</sub> =5mA                 | V <sub>OP</sub>   | 20    | -    | 120 | V <sub>rms</sub> |
| Load Current (Continuous)                             | V <sub>L</sub> =120-240VAC          | I <sub>L</sub>    | 0.005 | -    | 0.5 | A <sub>rms</sub> |
| Maximum Surge Current                                 | t <sub>≤</sub> 16ms                 | I <sub>PEAK</sub> | -     | -    | 12  | A                |
| Off-State Leakage Current                             | V <sub>L</sub> =400V <sub>DC</sub>  | I <sub>LEAK</sub> | -     | -    | 1   | mA               |
| On-State Voltage Drop                                 | I <sub>L</sub> =0.5A <sub>rms</sub> | -                 | -     | -    | 1.4 | V <sub>rms</sub> |
| Critical Rate of Rise                                 | -                                   | dV/dt             | 1000  | 1200 | -   | V/μs             |
| Switching Speeds                                      |                                     |                   |       |      |     |                  |
| Turn-On   | I <sub>F</sub> =5mA                 | t <sub>on</sub>   | -     | -    | 0.5 | Cycles           |
| Turn-Off  |                                     | t <sub>off</sub>  | -     | -    | 0.5 |                  |
| Zero-Cross Turn-On Voltage <sup>1</sup>               | 1 <sup>st</sup> half-cycle          | -                 | -     | 2    | 5   | V                |
|   | Subsequent half-cycle               | -                 | -     | -    | 1   | V                |
| Operating Frequency                                   | -                                   | -                 | 20    | -    | 500 | Hz               |
| Load Power Factor for Guaranteed Turn-On <sup>2</sup> | -                                   | PF                | 0.25  | -    | -   | -                |
| Capacitance Input-To-Output                           | -                                   | C <sub>I/O</sub>  | -     | 3    | -   | pF               |
| <b>Input Characteristics</b>                          |                                     |                   |       |      |     |                  |
| Input Control Current                                 |                                     |                   |       |      |     |                  |
| For Normal Environment                                | -                                   | I <sub>F</sub>    | -     | -    | 5   | mA               |
| For High Noise Environment                            | -                                   |                   | -     | -    | 10  |                  |
| Input Voltage Drop                                    | I <sub>F</sub> =5mA                 | V <sub>F</sub>    | 0.9   | 1.2  | 1.4 | V                |
| Input Dropout Voltage                                 | -                                   | -                 | 0.8   | -    | -   | V                |
| Reverse Input Current                                 | V <sub>R</sub> =5V                  | I <sub>R</sub>    | -     | -    | 10  | μA               |

<sup>1</sup> Zero Cross 1<sup>st</sup> half-cycle @ < 100Hz.

<sup>2</sup> Snubber circuits may be required at low power factors.

PERFORMANCE DATA\*



\*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

**Manufacturing Information**

**Moisture Sensitivity**



All plastic encapsulated semiconductor packages are susceptible to moisture ingress. IXYS Integrated Circuits Division classified all of its plastic encapsulated devices for moisture sensitivity according to the latest version of the joint industry standard, **IPC/JEDEC J-STD-020**, in force at the time of product evaluation. We test all of our products to the maximum conditions set forth in the standard, and guarantee proper operation of our devices when handled according to the limitations and information in that standard as well as to any limitations set forth in the information or standards referenced below.

Failure to adhere to the warnings or limitations as established by the listed specifications could result in reduced product performance, reduction of operable life, and/or reduction of overall reliability.

This product carries a **Moisture Sensitivity Level (MSL) rating** as shown below, and should be handled according to the requirements of the latest version of the joint industry standard **IPC/JEDEC J-STD-033**.

| Device | Moisture Sensitivity Level (MSL) Rating |
|--------|---|
| PM1204 | MSL 1                                   |

**ESD Sensitivity**



This product is **ESD Sensitive**, and should be handled according to the industry standard **JESD-625**.

**Reflow Profile**

This product has a maximum body temperature and time rating as shown below. All other guidelines of **J-STD-020** must be observed.

| Device | Maximum Temperature x Time |
|--------|----------------------------|
| PM1204 | 250°C for 30 seconds       |

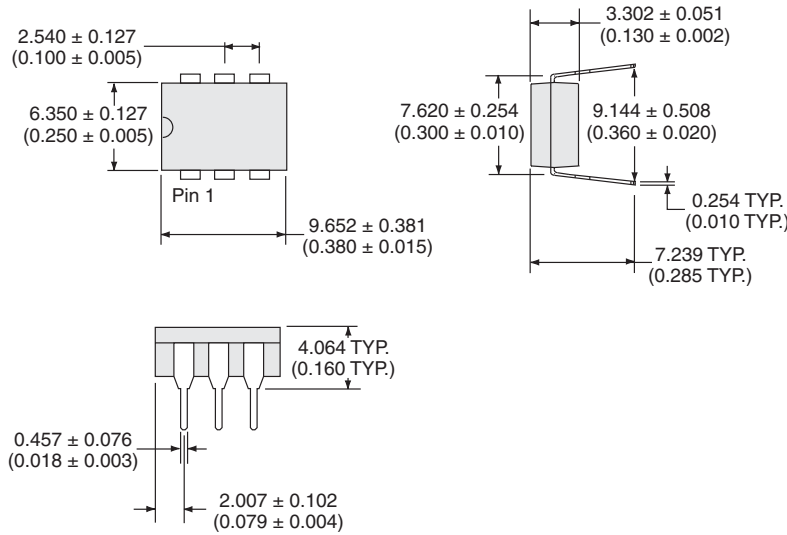
**Board Wash**

IXYS Integrated Circuits Division recommends the use of no-clean flux formulations. However, board washing to remove flux residue is acceptable. Since IXYS Integrated Circuits Division employs the use of silicone coating as an optical waveguide in many of its optically isolated products, the use of a short drying bake could be necessary if a wash is used after solder reflow processes. Chlorine- or Fluorine-based solvents or fluxes should not be used. Cleaning methods that employ ultrasonic energy should not be used.

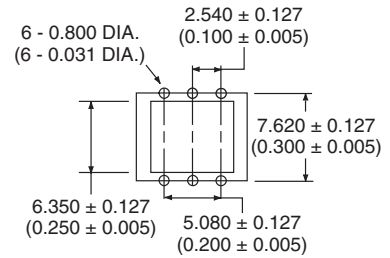


**Mechanical Dimensions**

**PM1204**

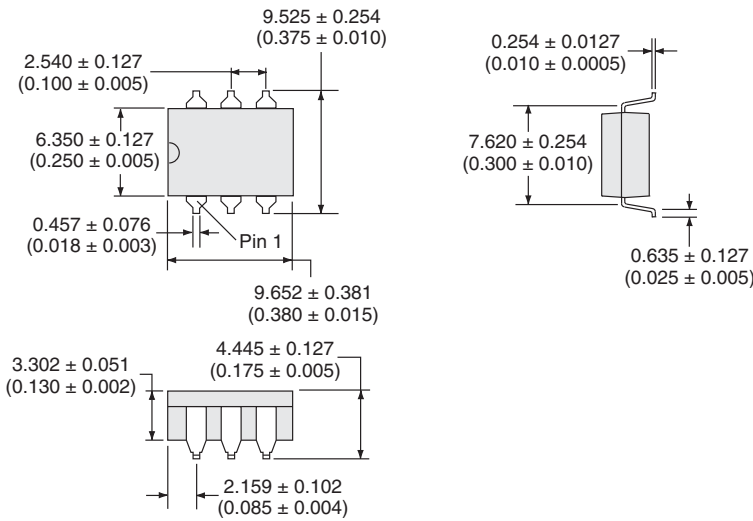


**PCB Hole Pattern**

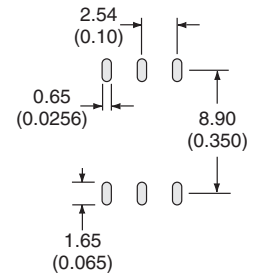


Dimensions  
mm  
(inches)

**PM1204S**



**PCB Land Pattern**



Dimensions  
mm  
(inches)