IXYS
INTEGRATED CIRCUITS DIVISION

# PLA190
## Single Pole, Normally Open OptoMOS® Relay

| Parameter | Rating | Units |
|---|---|---|
| Blocking Voltage | 400 | $V_P$ |
| Load Current | 150 | $mA_{rms}$ / $mA_{DC}$ |
| On-Resistance (max) | 22 | Ω |

## Features
- 5000$V_{rms}$ Input/Output Isolation
- Low Drive Power Requirements (TTL/CMOS Compatible)
- No Moving Parts
- High Reliability
- Arc-Free With No Snubbing Circuits
- FCC Compatible
- VDE Compatible
- No EMI/RFI Generation
- Small 6-Pin Package
- Machine Insertable, Wave Solderable
- Surface Mount Tape & Reel Version Available

## Applications
- Telecommunications
  - Telecom Switching
  - Tip/Ring Circuits
  - Modem Switching (Laptop, Notebook, Pocket Size)
  - Hook Switch
  - Dial Pulsing
  - Ground Start
  - Ringing Injection
- Instrumentation
  - Multiplexers
  - Data Acquisition
  - Electronic Switching
  - I/O Subsystems
- Meters (Watt-Hour, Water, Gas)
- Medical Equipment—Patient/Equipment Isolation
- Security Systems
- Aerospace
- Industrial Controls

## Description
The PLA190 is a 400V, single-pole, normally open (1-Form-A) solid state relay that uses optically coupled relay technology to provide an enhanced 5000$V_{rms}$ isolation barrier between the input and output of the relay.

Its optically coupled outputs, which use the patented OptoMOS architecture, are controlled by a highly efficient GaAIAs infrared LED.

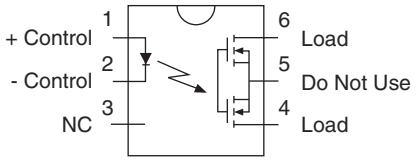
## Approvals
- UL Recognized Component: File E76270
- CSA Certified Component: Certificate 1175739
- EN/IEC 60950-1 Certified Component: TUV Certificate B 09 07 49410 004

## Ordering Information

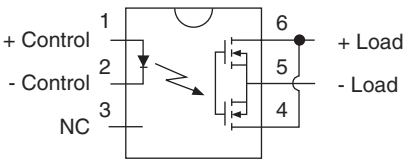
| Part Number | Description |
|---|---|
| PLA190 | 6-Pin DIP (50/Tube) |
| PLA190S | 6-Pin Surface Mount (50/Tube) |
| PLA190STR | 6-Pin Surface Mount (1,000/Reel) |

## Pin Configuration

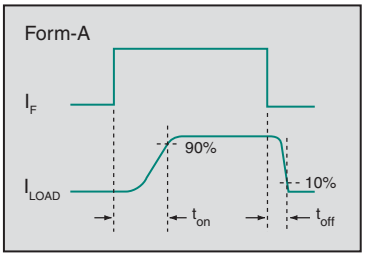
AC/DC Configuration




DC-Only Configuration




**Switching Characteristics of Normally Open Devices**



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## Absolute Maximum Ratings @ 25°C

| Parameter | Ratings | Units |
|---|---|---|
| Blocking Voltage | 400 | $V_P$ |
| Reverse Input Voltage | 5 | V |
| Input Control Current | 50 | mA |
| Peak (10ms) | 1 | A |
| Input Power Dissipation [1] | 150 | mW |
| Total Power Dissipation [2] | 800 | mW |
| Isolation Voltage, Input to Output | 5000 | $V_{rms}$ |
| Operational Temperature | -40 to +85 | °C |
| Storage Temperature | -40 to +125 | °C |

[1] Derate linearly 1.33 mW / °C
[2] Derate linearly 6.67 mW / °C

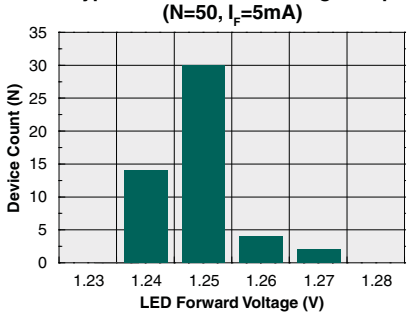
*Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at conditions beyond those indicated in the operational sections of this data sheet is not implied.*

## Electrical Characteristics @ 25°C

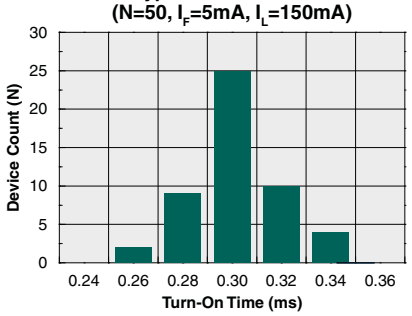
| Parameter | Conditions | Symbol | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Output Characteristics** | | | | | | |
| Load Current (Continuous) | | | | | | |
| AC/DC Configuration | - | $I_L$ | - | - | 150 | $mA_{rms}$ / $mA_{DC}$ |
| DC Configuration | | | - | - | 250 | $mA_{DC}$ |
| Peak Load Current | t=10ms | $I_{LPK}$ | - | - | ±400 | $mA_P$ |
| On-Resistance | | | | | | |
| AC/DC Configuration | $I_F$=150mA | $R_{ON}$ | - | - | 22 | Ω |
| DC Configuration | $I_F$=250mA | | - | - | 7 | |
| Off-State Leakage Current | $V_L$=400$V_P$ | $I_{LEAK}$ | - | - | 1 | µA |
| Switching Speeds | | | | | | |
| Turn-On | $I_F$=5mA, $V_L$=10V | $t_{on}$ | - | - | 1 | ms |
| Turn-Off | | $t_{off}$ | - | - | 0.5 | |
| Output Capacitance | $V_L$=50V, f=1mHz | $C_{OUT}$ | - | 25 | - | pF |
| **Input Characteristics** | | | | | | |
| Input Control Current to Activate | $I_L$=150mA | $I_F$ | - | - | 5 | mA |
| Input Control Current to Deactivate | - | $I_F$ | 0.4 | 0.7 | - | mA |
| Input Voltage Drop | $I_F$=5mA | $V_F$ | 0.9 | 1.2 | 1.4 | V |
| Reverse Input Current | $V_R$=5V | $I_R$ | - | - | 10 | µA |
| **Common Characteristics** | | | | | | |
| Input to Output Capacitance | - | $C_{I/O}$ | - | 3 | - | pF |

## PERFORMANCE DATA @ 25ºC (Unless Otherwise Noted) *

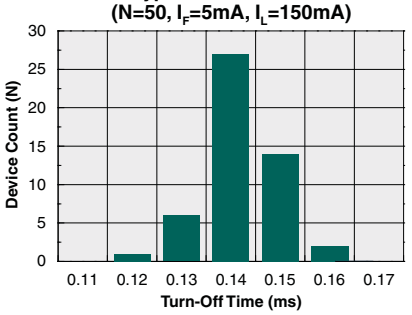
**Typical LED Forward Voltage Drop (N=50, $I_F$=5mA)**



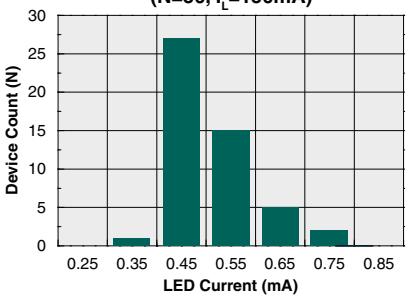

**Typical Turn-On Time (N=50, $I_F$=5mA, $I_L$=150mA)**



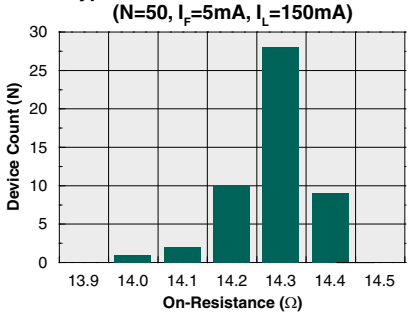

**Typical Turn-Off Time (N=50, $I_F$=5mA, $I_L$=150mA)**



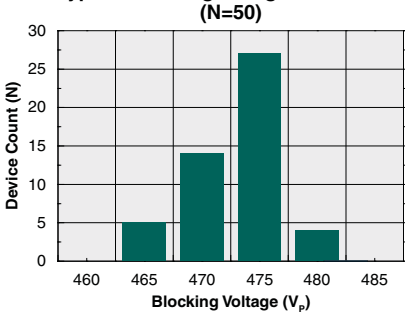

**Typical $I_F$ for Switch Operation (N=50, $I_L$=150mA)**



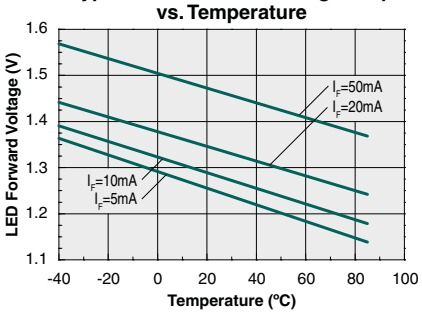

**Typical On-Resistance Distribution (N=50, $I_F$=5mA, $I_L$=150mA)**



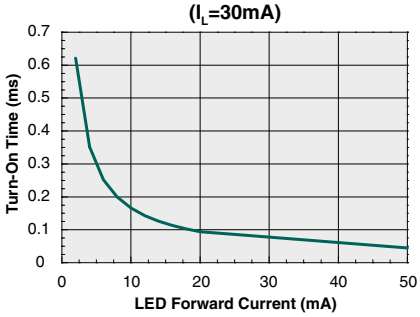

**Typical Blocking Voltage Distribution (N=50)**



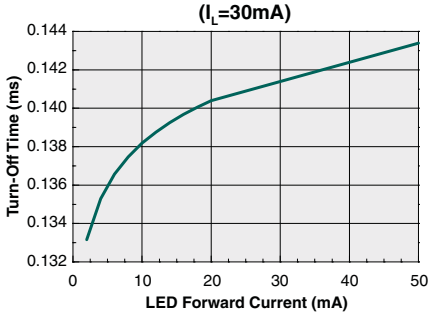

**Typical LED Forward Voltage Drop vs. Temperature**



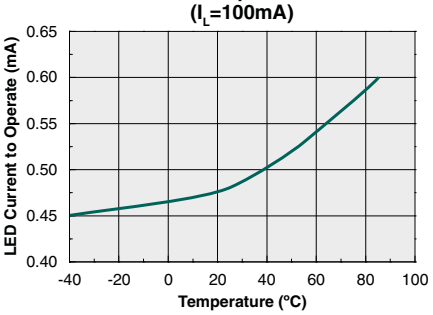

**Typical Turn-On Time vs. LED Forward Current ($I_L$=30mA)**



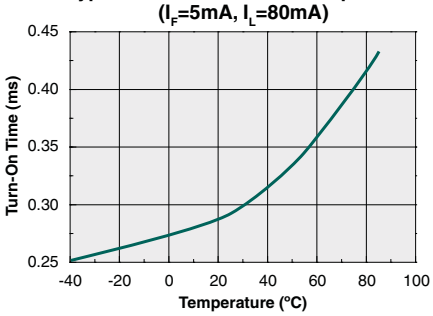

**Typical Turn-Off Time vs. LED Forward Current ($I_L$=30mA)**



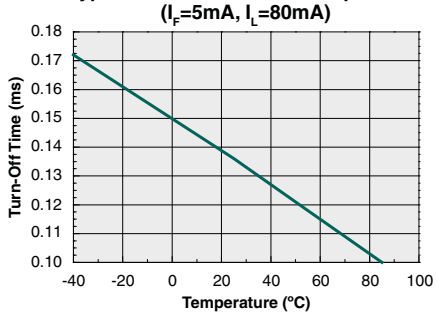

**Typical $I_F$ for Switch Operation vs. Temperature ($I_L$=100mA)**




**Typical Turn-On Time vs. Temperature ($I_F$=5mA, $I_L$=80mA)**



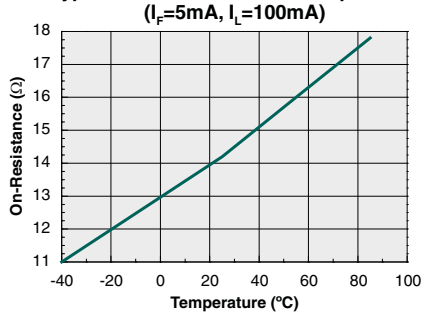

**Typical Turn-Off Time vs. Temperature ($I_F$=5mA, $I_L$=80mA)**



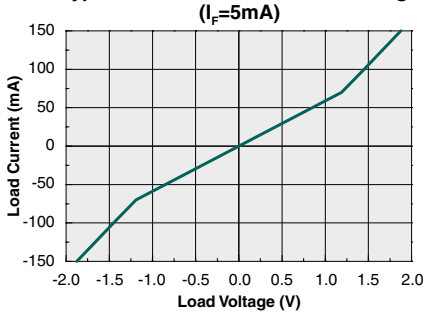

*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

## PERFORMANCE DATA @ 25ºC (Unless Otherwise Noted) *

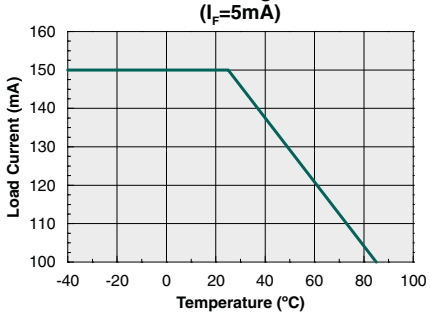
**Typical On-Resistance vs. Temperature ($I_F$=5mA, $I_L$=100mA)**



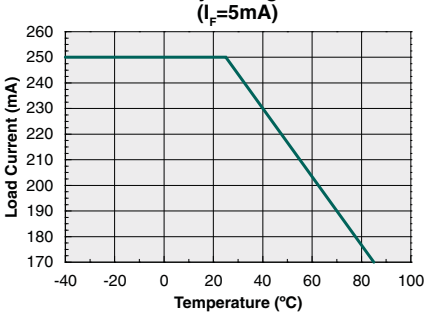

**Typical Load Current vs. Load Voltage ($I_F$=5mA)**



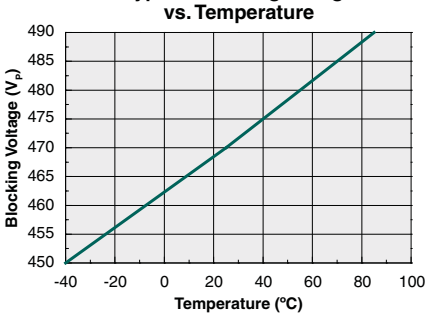

**Maximum Load Current vs. Temperature AC/DC Configuration ($I_F$=5mA)**



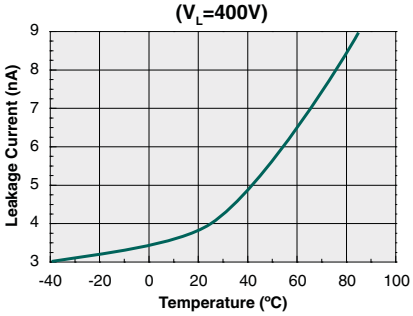

**Maximum Load Current vs. Temperature DC-Only Configuration ($I_F$=5mA)**



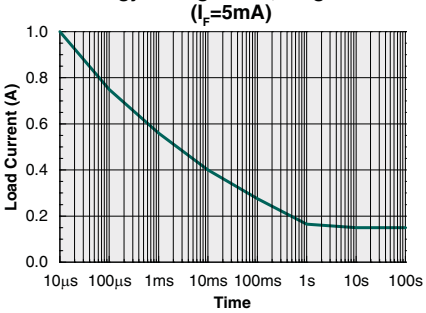

**Typical Blocking Voltage vs. Temperature**




**Leakage Current vs. Temperature Measured Across Pins 5&6 ($V_L$=400V)**




**Energy Rating Curve, Single Pole ($I_F$=5mA)**

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## Manufacturing Information

### Moisture Sensitivity

All plastic encapsulated semiconductor packages are susceptible to moisture ingression. 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 |
|---|---|
| PLA190 / PLA190S | 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.

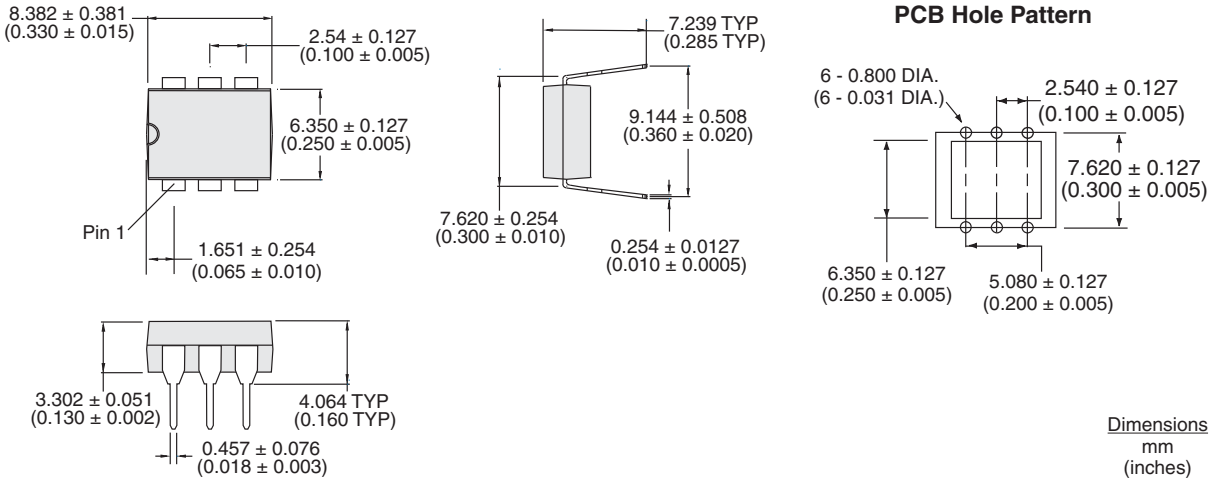
| Device | Maximum Temperature x Time |
|---|---|
| PLA190 / PLA190S | 250°C for 30 seconds |

### Board Wash

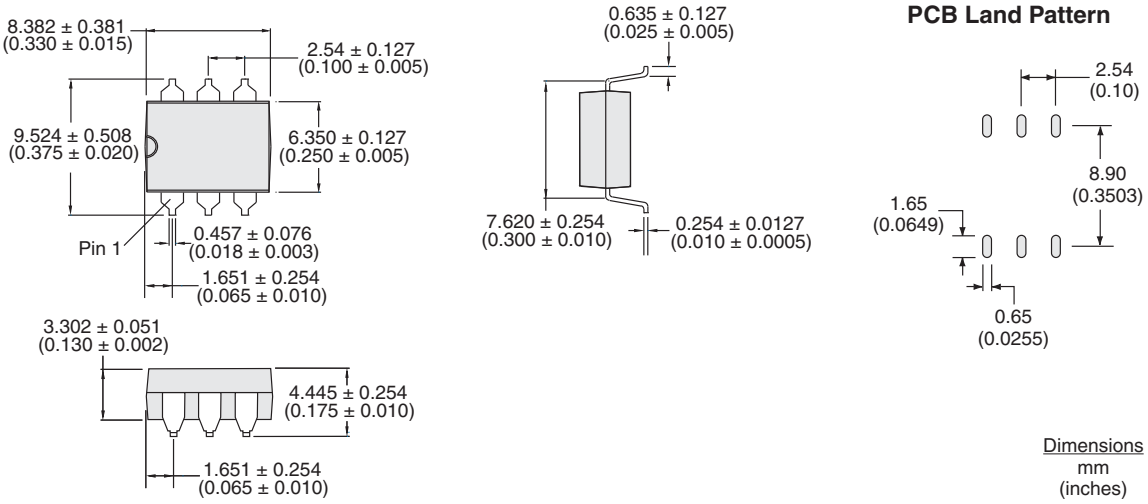
IXYS Integrated Circuits Division recommends the use of no-clean flux formulations. However, board washing to remove flux residue is acceptable. Since IXYS Integrated Circuits Division employs the use of silicone coating as an optical waveguide in many of its optically isolated products, the use of a 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

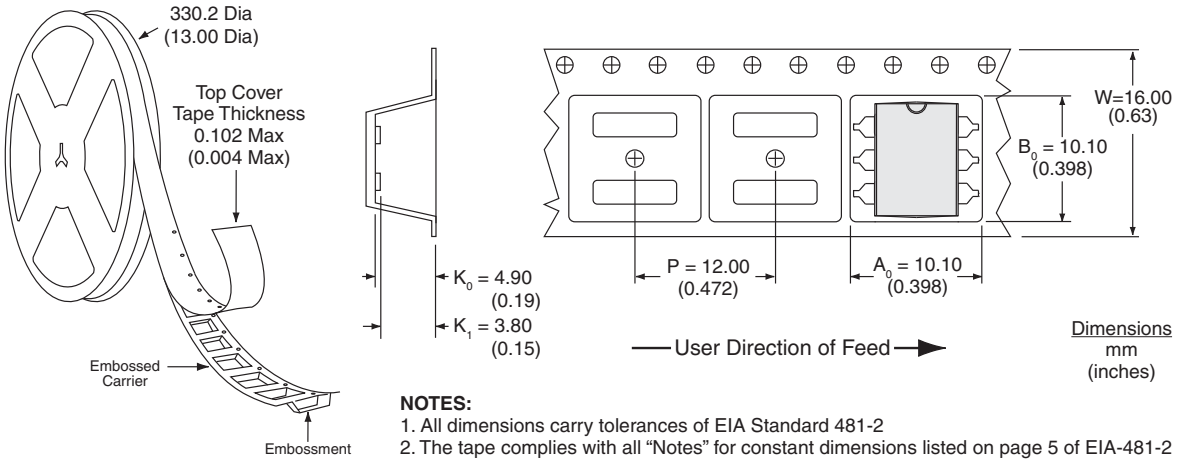
### PLA190




### PLA190S



## PLA190STR Tape & Reel




**NOTES:**
1. All dimensions carry tolerances of EIA Standard 481-2
2. The tape complies with all "Notes" for constant dimensions listed on page 5 of EIA-481-2

**For additional information please visit our website at: www.ixysic.com**

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# Mouser Electronics

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