

6-PIN PHOTOTRANSISTOR OPTOCOUPLEDERS

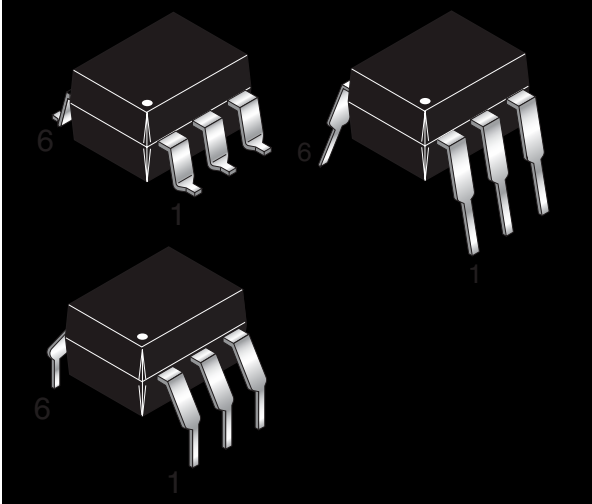
SL5500

SL5501

SL5504

SL5511

PACKAGE



SCHEMATIC



DESCRIPTION

The SL5500, SL5501, SL5504 and SL5511 are optically coupled isolators each consisting of an infrared emitting GaAs diode and a silicon NPN phototransistor with accessible base. These devices are housed in 6-pin dual-in-line packages (DIP).

FEATURES

- High output/input DC current transfer ratio
- Low saturation voltage
- High isolation voltage of 5.3 kV RMS
- UL recognized (File # E90700)
- VDE recognized (File # 94766)
- Ordering option '300' (e.g. SL5500.300)

APPLICATIONS

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs
- Appliance sensor systems
- Industrial controls

6-PIN PHOTOTRANSISTOR OPTOCOUPLEDERS

SL5500
SL5501
SL5504
SL5511

| Parameters | | Symbol | Value | Units |
|--|------------------------|------------------|----------------|-------|
| TOTAL DEVICE | | | | |
| Storage Temperature | | T_{STG} | -55 to +150 | °C |
| Operating Temperature | | T_{OPR} | -55 to +100 | °C |
| Lead Solder Temperature | | T_{SOL} | 260 for 10 sec | °C |
| Total Power Dissipation at $T_A = 25^\circ\text{C}$ Ambient Derate Linearly from 25°C | | P_D | 260 | mW |
| | | | 3.3 | mW/°C |
| EMITTER | | | | |
| Continuous Reverse Voltage | | V_R | 3 | V |
| Continuous Forward Current | | I_F | 100 | mA |
| Forward Current - Peak (10 μs pulse, $\delta = 0.01$) | | $I_F(\text{pk})$ | 3.0 | A |
| Total Power Dissipation $T_A = 25^\circ\text{C}$ Ambient Derate Linearly from 25°C | | P_D | 150 | mW |
| | | | 2.0 | mW/°C |
| DETECTOR | | | | |
| Collector to Emitter Voltage (open base) | SL5500, SL5501, SL5511 | V_{CEO} | 30 | V |
| | SL5504 | | 80 | |
| Collector to Base Voltage (open emitter) | SL5500, SL5501, SL5511 | V_{CBO} | 70 | V |
| | SL5504 | | 120 | |
| Emitter to Collector Voltage (open base) | | V_{ECO} | 7 | V |
| Emitter to Base Voltage (open collector) | | V_{EBO} | 7 | V |
| DC Collector Current | | I_C | 100 | mA |
| Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ Ambient Derate Linearly from 25°C | | P_D | 150 | mW |
| | | | 2.0 | mW/°C |

6-PIN PHOTOTRANSISTOR OPTOCOUPERS

SL5500

SL5501

SL5504

SL5511

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)

INDIVIDUAL COMPONENT CHARACTERISTICS

| Parameters | Test Conditions | Symbol | Device | Min | Typ* | Max | Units |
|---|--|------------|------------------------|-----|-------|-----|---------------|
| EMITTER | | | | | | | |
| Input Forward Voltage | $I_F = 20\text{ mA}$, $T_A = 25\text{ to }70^\circ\text{C}$ | V_F | All | | 1.23 | 1.3 | V |
| | $I_F = 2\text{ mA}$ | | | | 1.10 | 1.2 | V |
| Reverse Current | $V_R = 3\text{ V}$, $T_A = 25\text{ to }70^\circ\text{C}$ | I_R | All | | 0.001 | 10 | μA |
| DETECTOR | | | | | | | |
| Leakage Current Collector to Emitter | $V_{CE} = 10\text{ V}$ | I_{CEO} | All | | 1 | 50 | nA |
| | $V_{CE} = 30\text{ V}$ | | | | 0.005 | 10 | μA |
| | $V_{CE} = 10\text{ V}$, $T_A = 70^\circ\text{C}$ | | | | | 500 | nA |
| | $V_{CB} = 30\text{ V}$ | I_{CBO} | | | 0.001 | 50 | μA |
| Breakdown Voltage | | | | | | | |
| Collector to Emitter | $I_C = 10\text{ }\mu\text{A}$, $I_F = 0$ | BV_{CEO} | SL5500, SL5501, SL5511 | 30 | 100 | | V |
| | | | SL5504 | 80 | 110 | | |
| Collector to Base | $I_C = 10\text{ }\mu\text{A}$, $I_F = 0$ | BV_{CBO} | SL5500, SL5501, SL5511 | 30 | 120 | | V |
| | | | SL5504 | 120 | 150 | | |
| Emitter to Collector | $I_E = 10\text{ }\mu\text{A}$, $I_F = 0$ | BV_{ECO} | All | 7 | 10 | | V |
| Emitter to Base | $I_E = 10\text{ }\mu\text{A}$, $I_F = 0$ | BV_{EBO} | All | 7 | 10 | | V |

ISOLATION CHARACTERISTICS

| Characteristic | Test Conditions | Symbol | Min | Typ* | Max | Units |
|---|--|-----------|------|------|-----|---------------|
| Input-Output Isolation Voltage (note 1) | $f = 60\text{ Hz}$, $T = 1\text{ min.}$ | V_{ISO} | 5300 | | | $V_{AC(RMS)}$ |
| Isolation Resistance | $V_{I-O} = \pm 500\text{ VDC}$ | R_{ISO} | 1 | 10 | | $T\Omega$ |
| Isolation Capacitance | $f = 1\text{ MHz}$, $V = 0\text{ V}$ | C_{ISO} | | 0.6 | 1.3 | pF |

*Typical values at $T_A = 25^\circ\text{C}$

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TRANSFER CHARACTERISTICS (TA = 25°C Unless otherwise specified.)

| DC Characteristics | Test Conditions | Symbol | Device | Min | Typ | Max | Units |
|--------------------------------------|---|---------------|------------------------|-----|-----|-----|---------------|
| Output/Input Current Transfer Ratio | $I_F = 10 \text{ mA}, V_{CE} = 0.4 \text{ V}$ | CTR | SL5500 | 50 | | 300 | % |
| | $I_F = 10 \text{ mA}, V_{CE} = 0.4 \text{ V}, T_A = 70^\circ\text{C}$ | | SL5500 | 40 | | 300 | |
| | $I_F = 10 \text{ mA}, V_{CE} = 0.4 \text{ V}, T_A = 25^\circ\text{C to } 70^\circ\text{C}$ | | SL5501, SL5504 | 25 | | 400 | |
| | $I_F = 2 \text{ mA}, V_{CE} = 5 \text{ V}$ | | SL5500 | 40 | | | |
| | $I_F = 2 \text{ mA}, V_{CE} = 5 \text{ V}, T_A = 70^\circ\text{C}$ | | SL5500 | 30 | | | |
| | $I_F = 2 \text{ mA}, V_{CE} = 5 \text{ V}, T_A = 25^\circ\text{C to } 70^\circ\text{C}$ | | SL5501, SL5504 | 15 | | | |
| | $I_F = 2 \text{ mA}, V_{CE} = 5 \text{ V}, T_A = 25^\circ\text{C to } 70^\circ\text{C}$ | | SL5511 | 25 | | | |
| | $I_F = 0.5 \text{ mA}, V_{CE} = 0.4 \text{ V}, T_A = 25^\circ\text{C to } 70^\circ\text{C}$ | | SL5511 | 20 | | | |
| Collector-Emitter Saturation Voltage | $I_F = 50 \text{ mA}, I_C = 10 \text{ mA}$ | $V_{CE(SAT)}$ | SL5500 | | | 0.4 | V |
| | $I_F = 20 \text{ mA}, I_C = 2 \text{ mA}$ | | SL5501, SL5504, SL5511 | | | 0.4 | |
| AC Characteristics | Test Conditions | Symbol | Device | Min | Typ | Max | Units |
| Turn-On Time | $R_L = 1 \text{ k}\Omega, I_F = 16 \text{ mA}, V_{CC} = 5 \text{ V}$ | t_{on} | SL5500, SL5501, SL5511 | | | 20 | μs |
| | | | SL5504 | | | 50 | |
| Turn-Off Time | See Fig. 1 and Fig. 2 | t_{off} | SL5500, SL5501, SL5511 | | | 50 | μs |
| | | | SL5504 | | | 150 | |

Note

1. Device considered a two-terminal device: pins 1, 2 and 3 shorted together and pins 4, 5 and 6 shorted together.

6-PIN PHOTOTRANSISTOR OPTOCOUPLEDERS

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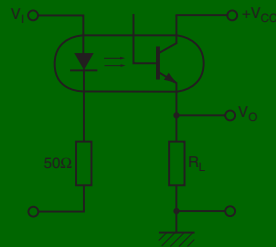


Fig. 1 Switching Circuit

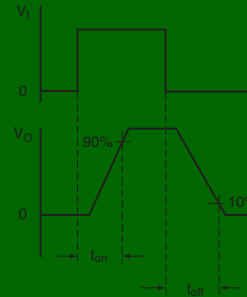


Fig. 2 Waveforms

Fig. 3 LED Forward Voltage vs. Forward Current

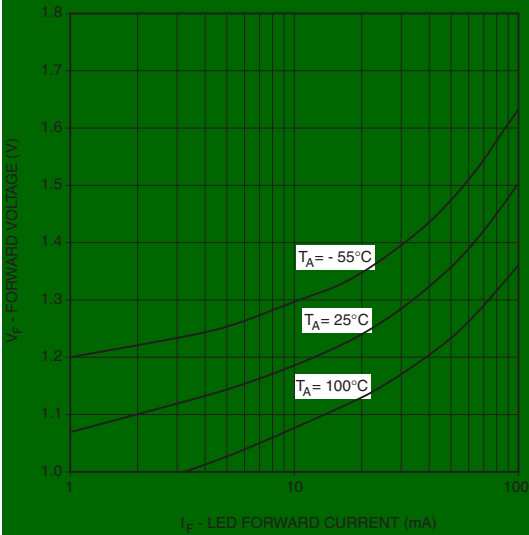


Fig. 4 Normalized CTR vs. Forward Current

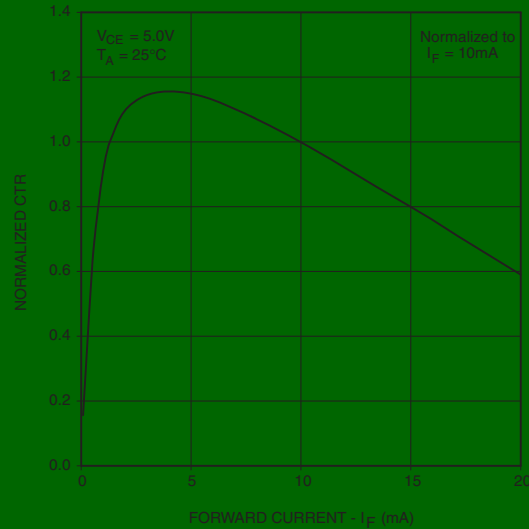


Fig. 5 Normalized CTR vs. Ambient Temperature

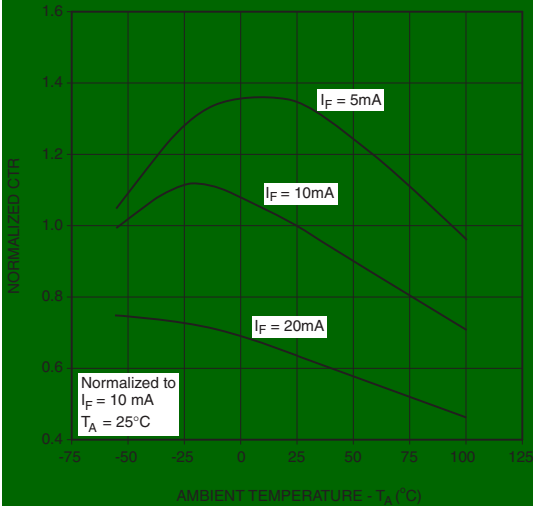
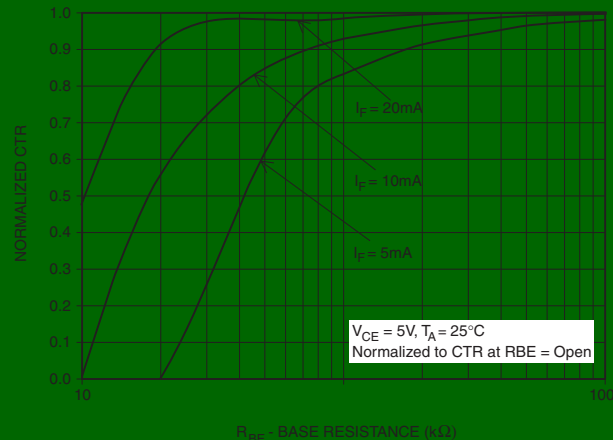


Fig. 7 CTR vs. R_{BE} (Unsaturated)



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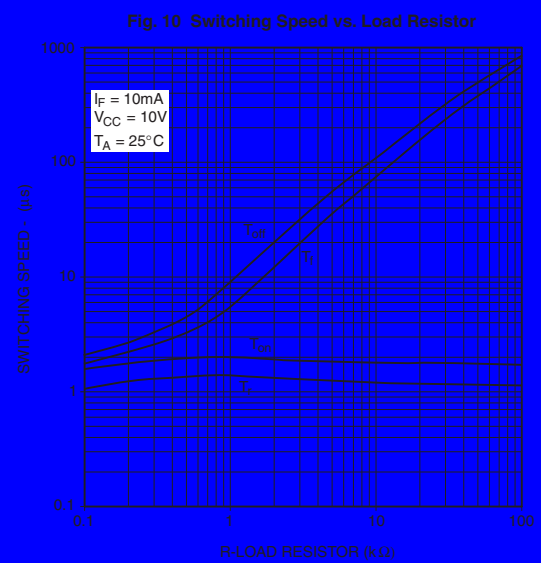
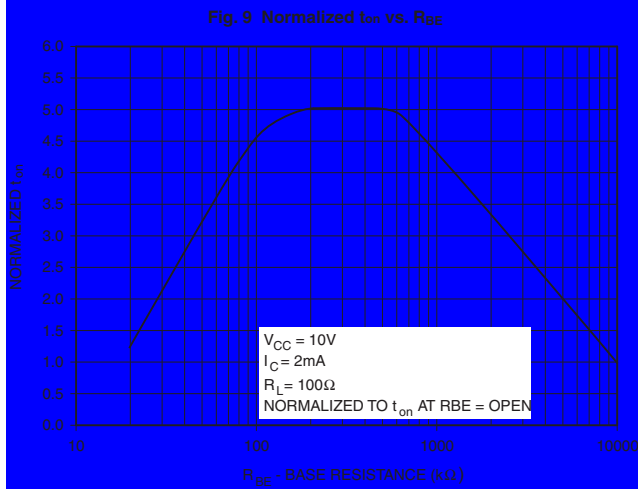
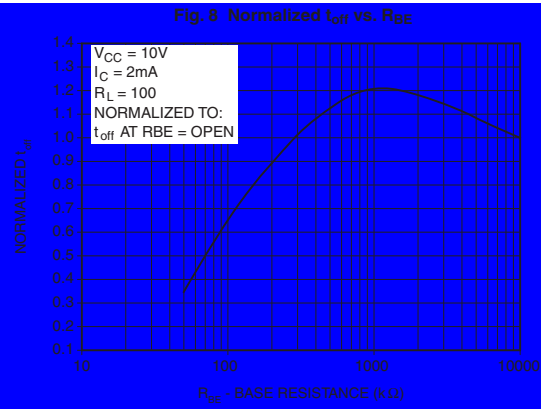
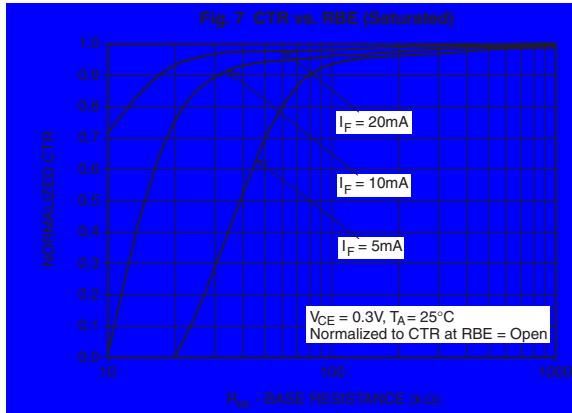


Fig. 11 Collector Emitter Saturation Voltage vs. Collector Current

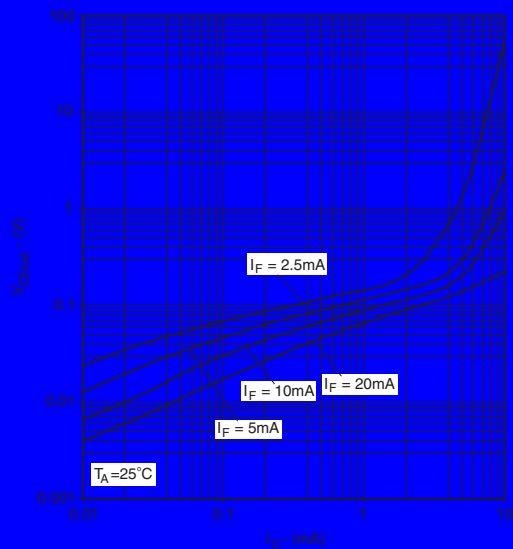
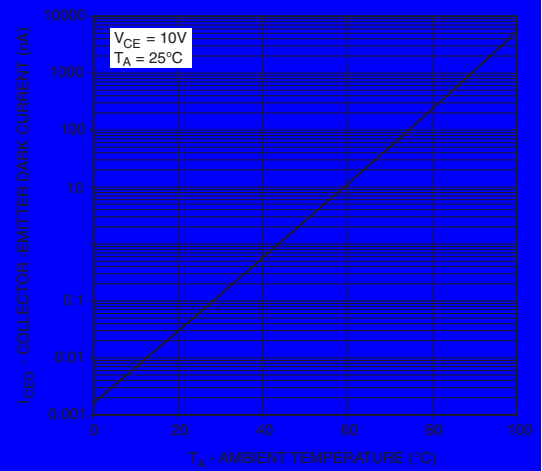


Fig. 12 Dark Current vs. Ambient Temperature



6-PIN PHOTOTRANSISTOR OPTOCOUPLEDERS

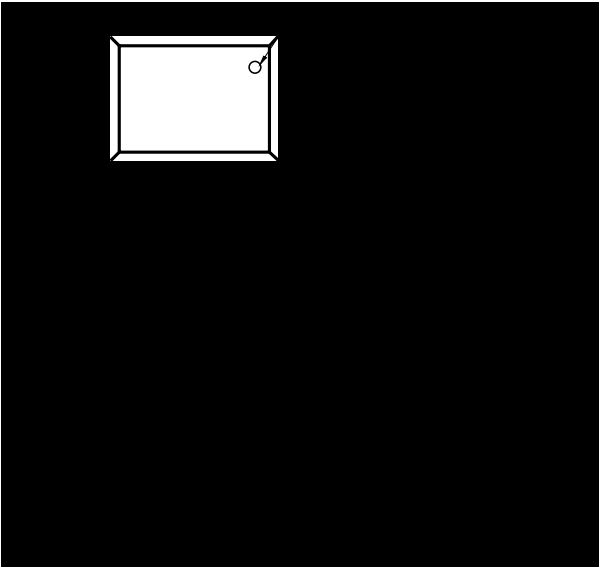
SL5500

SL5501

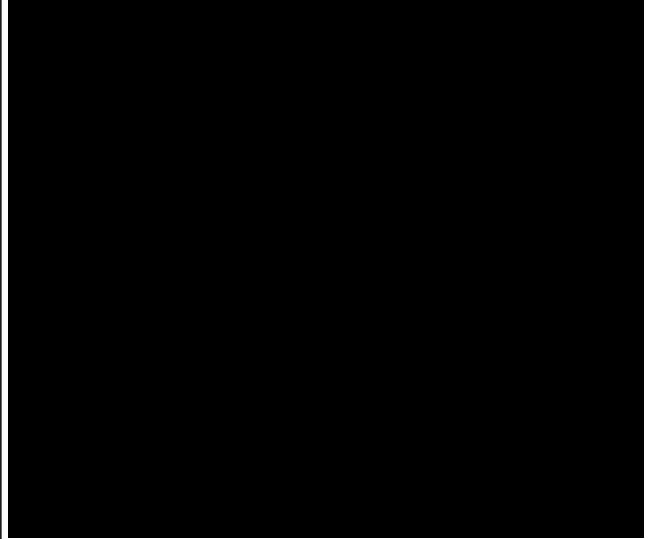
SL5504

SL5511

Package Dimensions (Through Hole)



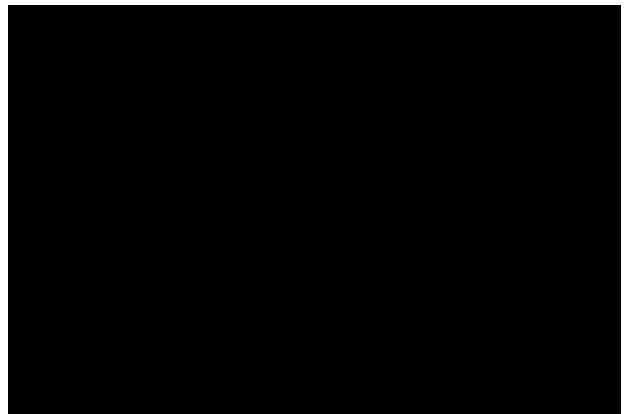
Package Dimensions (Surface Mount)



Package Dimensions (0.4" Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform



Note

All dimensions are in inches (millimeters)

6-PIN PHOTOTRANSISTOR OPTOCOUPLEDERS

SL5500

SL5501

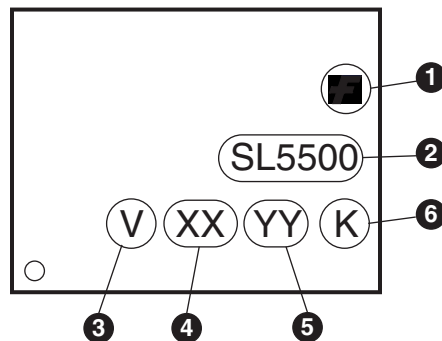
SL5504

SL5511

ORDERING INFORMATION

| Option | Order Entry Identifier | Description |
|--------|------------------------|--|
| S | .S | Surface Mount Lead Bend |
| SD | .SD | Surface Mount; Tape and Reel |
| W | .W | 0.4" Lead Spacing |
| 300 | .300 | VDE 0884 |
| 300W | .300W | VDE 0884, 0.4" Lead Spacing |
| 3S | .3S | VDE 0884, Surface Mount |
| 3SD | .3SD | VDE 0884, Surface Mount, Tape and Reel |

MARKING INFORMATION



| Definitions | |
|-------------|--|
| 1 | Fairchild logo |
| 2 | Device number |
| 3 | VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table) |
| 4 | Two digit year code, e.g., '03' |
| 5 | Two digit work week ranging from '01' to '53' |
| 6 | Assembly package code |

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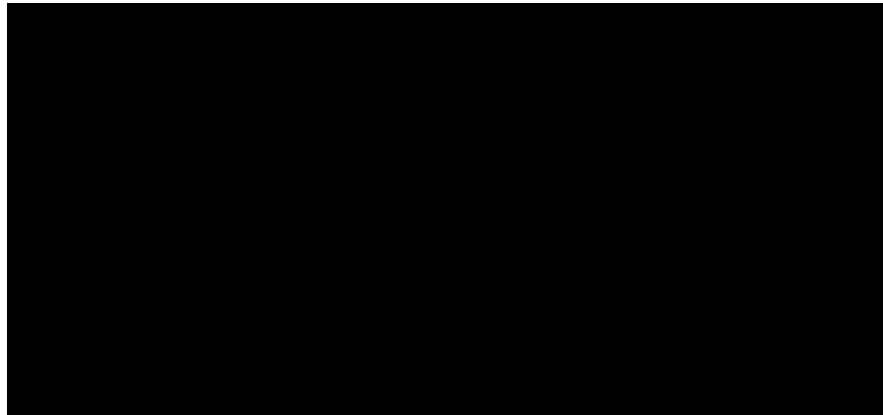
SL5500

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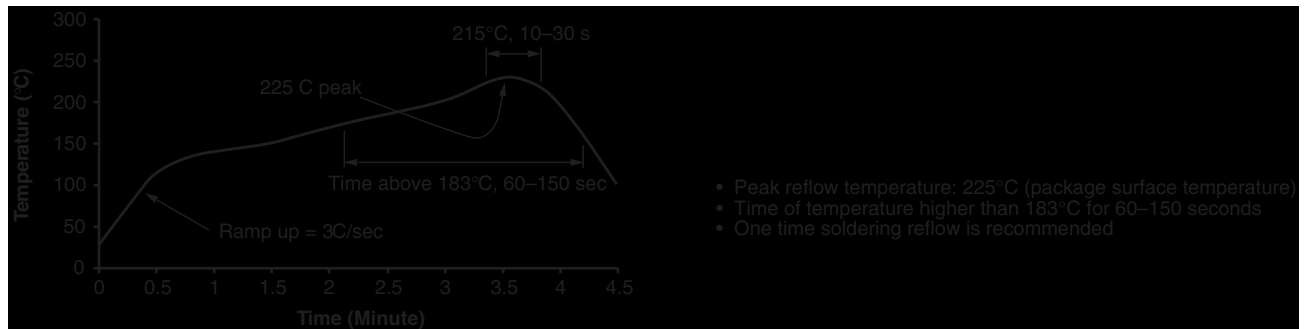
Carrier Tape Specifications ("D" Taping Orientation)



NOTE

All dimensions are in inches (millimeters)

Reflow Profile (Black Package, No Suffix)





6-PIN PHOTOTRANSISTOR OPTOCOUPERS

SL5500**SL5501****SL5504****SL5511**

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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SL5504

6-Pin DIP High BVceo Phototransistor Output Optocoupler

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General description

The SL5500, SL5501 SL5504 and SL5511 are optically coupled isolators each consisting of an infrared emitting GaAs diode and a silicon NPN phototransistor with accessible base. These devices are housed in 6-pin dual-in-line packages (DIP).

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Features

- High output/input DC current transfer ratio
- Low saturation voltage
- High isolation voltage of 5.3 kV RMS
- UL recognized (File #E90700)
- VDE recognized - File #94766
 - Ordering option '300' (e.g. SL5500.300)

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Applications

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs
- Appliance sensor systems
- Industrial controls

BUY

Datasheet

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Ordering information









The following options can be ordered with this part:

| Option | Order Entry Identifier | Description |
|--------|------------------------|--|
| S | .S | Surface Mount Lead Bend |
| SD | .SD | Surface Mount; Tape and Reel |
| W | .W | 0.4" Lead Spacing |
| 300 | .300 | VDE 0884 |
| 300W | .300W | VDE 0884, 0.4" Lead Spacing |
| 3S | .3S | VDE 0884, Surface Mount |
| 3SD | .3SD | VDE 0884, Surface Mount, Tape and Reel |

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Product status/pricing/packaging

BUY

| Product | Product status | Pb-free Status | Package type | Leads | Packing method |
|------------|----------------|---|--------------|-------|----------------|
| SL5504 | Lifetime Buy |  | DIP-B | 6 | BULK |
| SL5504300 | Lifetime Buy |  | DIP-B | 6 | BULK |
| SL5504300W | Lifetime Buy |  | DIP-B | 6 | BULK |
| SL55043S | Lifetime Buy |  | SMDIP-B | 6 | BULK |
| SL55043SD | Lifetime Buy |  | SMDIP-B | 6 | TAPE REEL |
| SL5504S | Lifetime Buy |  | SMDIP-B | 6 | BULK |
| SL5504SD | Lifetime Buy |  | SMDIP-B | 6 | TAPE REEL |
| SL5504W | Lifetime Buy |  | DIP-B | 6 | BULK |



Indicates product with Pb-free second-level interconnect. For more information [click here](#).

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Safety agency certificates

| Certificate | Agency | |
|--|-----------|--------------------------------------|
| E90700, Vol. 1 (936 K) | UL (1577) | Underwriters Laboratories Inc. |
| E90700, Vol. 1 (936 K) | C-UL | Underwriters Laboratories Inc. |
| 0122085 (677 K) | SEMKO | SEMKO |
| P01101067 (1638 K) | NEMKO | NEMKO |
| FI 16812 (964 K) | FIMKO | FIMKO |
| 310684-02 (623 K) | DEMKO | DEMKO Testing & Certification |
| 1027742 (2305 K) | CSA | Canadian Standards Association |
| 94766 (1673 K) | VDE | VDE Pruf-und Zertifizierungsinstitut |

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Qualification Support

Click on a product for detailed qualification data

| Product |
|----------------------------|
| SL5504 |
| SL5504300 |
| SL5504300W |
| SL55043S |
| SL55043SD |
| SL5504S |
| SL5504SD |
| SL5504W |

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