

DESCRIPTION

The 4N29, 4N30, 4N31, 4N32, 4N33 have a gallium arsenide infrared emitter optically coupled to a silicon planar photodarlington.

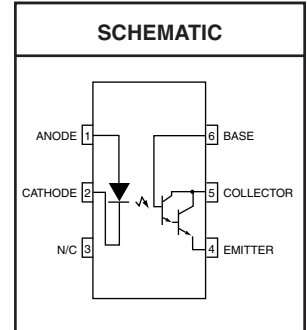
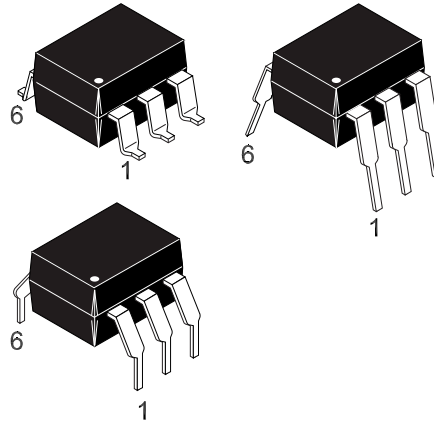
4N29 4N30 4N31 4N32 4N33

FEATURES

- High sensitivity to low input drive current
- Meets or exceeds all JEDEC Registered Specifications
- VDE 0884 approval available as a test option
-add option .300. (e.g., 4N29.300)

APPLICATIONS

- Low power logic circuits
- Telecommunications equipment
- Portable electronics
- Solid state relays
- Interfacing coupling systems of different potentials and impedances.



Datasheet.Global

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C Unless otherwise specified.)

| Parameter | 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 Device Power Dissipation @ T _A = 25°C | P _D | 250 | mW |
| Derate above 25°C | | 3.3 | mW/°C |
| EMITTER | | | |
| Continuous Forward Current | I _F | 80 | mA |
| Reverse Voltage | V _R | 3 | V |
| Forward Current - Peak (300 μs, 2% Duty Cycle) | I _{F(pk)} | 3.0 | A |
| LED Power Dissipation @ T _A = 25°C | P _D | 150 | mW |
| Derate above 25°C | | 2.0 | mW/°C |
| DETECTOR | | | |
| Collector-Emitter Breakdown Voltage | BV _{CEO} | 30 | V |
| Collector-Base Breakdown Voltage | BV _{CBO} | 30 | V |
| Emitter-Collector Breakdown Voltage | BV _{ECO} | 5 | V |
| Detector Power Dissipation @ T _A = 25°C | P _D | 150 | mW |
| Derate above 25°C | | 2.0 | mW/°C |
| Continuous Collector Current | I _C | 150 | mA |

| | | | | |
|-------------|-------------|-------------|-------------|-------------|
| 4N29 | 4N30 | 4N31 | 4N32 | 4N33 |
|-------------|-------------|-------------|-------------|-------------|

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

INDIVIDUAL COMPONENT CHARACTERISTICS

| Parameter | Test Conditions | Symbol | Min | Typ | Max | Unit |
|--------------------------------------|--------------------------------------------------------|------------|-----|-------|-----|---------------|
| EMITTER | | | | | | |
| *Input Forward Voltage | ($I_F = 10\text{ mA}$) | V_F | | 1.2 | 1.5 | V |
| *Reverse Leakage Current | ($V_R = 3.0\text{ V}$) | I_R | | 0.001 | 100 | μA |
| *Capacitance | ($V_F = 0\text{ V}$, $f = 1.0\text{ MHz}$) | C | | 150 | | pF |
| DETECTOR | | | | | | |
| *Collector-Emitter Breakdown Voltage | ($I_C = 100\ \mu\text{A}$, $I_B = 0$) | BV_{CEO} | 30 | 60 | | |
| *Collector-Base Breakdown Voltage | ($I_C = 100\ \mu\text{A}$, $I_E = 0$) | BV_{CBO} | 30 | 100 | | V |
| *Emitter-Collector Breakdown Voltage | ($I_E = 100\ \mu\text{A}$, $I_B = 0$) | BV_{ECO} | 5.0 | 8 | | V |
| *Collector-Emitter Dark Current | ($V_{CE} = 10\text{ V}$, Base Open) | I_{CEO} | | 1 | 100 | nA |
| DC Current Gain | ($V_{CE} = 5.0\text{ V}$, $I_C = 500\ \mu\text{A}$) | h_{FE} | | 5000 | | |

TRANSFER CHARACTERISTICS

| DC Characteristic | Test Conditions | Symbol | Min | Typ | Max | Units |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------|----------|-----|-----|--------|
| *Collector Output Current ^(1,2) (4N32, 4N33) (4N29, 4N30) (4N31) | (I _F = 10 mA, V _{CE} = 10 V, I _B = 0) | I_C (CTR) | 50 (500) | | | mA (%) |
| | | | 10 (100) | | | |
| | | | 5 (50) | | | |
| *Saturation Voltage ⁽²⁾ (4N29, 4N30, 4N32, 4N33) (4N31) | (I _F = 8.0 mA, I _C = 2.0 mA) | $V_{CE(sat)}$ | | | 1.0 | V |
| | | | | | 1.2 | |

TRANSFER CHARACTERISTICS

| AC Characteristic | Test Conditions | Symbol | Min | Typ | Max | Units |
|-------------------------------------------|--------------------------------------------------------------------------------------|----------|-----------|-----|-----|---------------|
| Turn-on Time ⁽³⁾ | (I _F = 200 mA, I _C = 50 mA, V _{CC} = 10 V) (Fig.7) | t_{on} | | | 5.0 | μs |
| Turn-off Time ⁽³⁾ (4N32, 4N33) | | | | | 100 | |
| (4N29, 4N30, 4N31) | | | t_{off} | | 40 | |
| Bandwidth ^(4,5) | | BW | | 30 | | KHz |

ISOLATION CHARACTERISTICS

| Characteristic | Test Conditions | Symbol | Min | Typ | Max | Units |
|---------------------------------------------------------------------------------|----------------------------------------------------------------------|------------------|------|------------------|-----|----------|
| Input-Output Isolation Voltage ⁽⁶⁾ (4N29, 4N30, 4N31, 4N32, 4N33) | (I _{I-O} ≤ 1 μA , V _{rms} , t = 1 min.) | V_{ISO} | 5300 | | | Vac(rms) |
| * (4N32) | | | VDC | 2500 | | V |
| * (4N33) | | | VDC | 1500 | | |
| Isolation Resistance ⁽⁶⁾ | (V _{I-O} = 500 VDC) | R _{ISO} | | 10 ¹¹ | | Ω |
| Isolation Capacitance ⁽⁶⁾ | (V _{I-O} = \emptyset , f = 1 MHz) | C _{ISO} | | 0.8 | | pf |

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Fig. 1 Output Current vs. Input Current

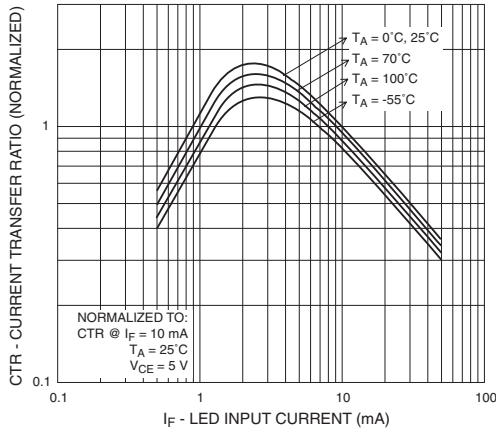


Fig. 2 Current Transfer Ratio vs. Ambient Temperature

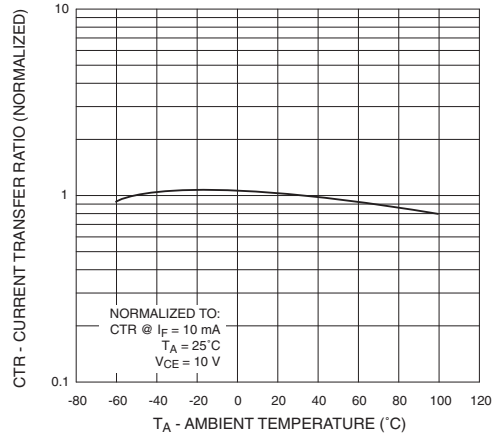


Fig. 3 Collector Current vs. Collector-Emitter Voltage

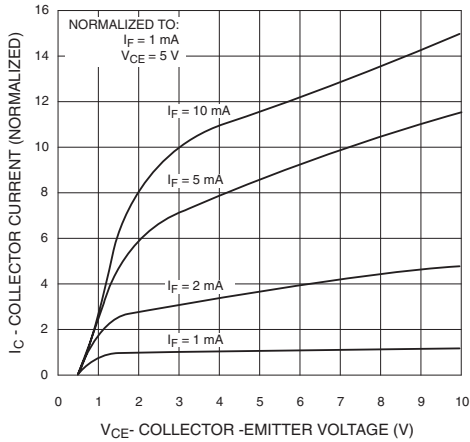


Fig. 4 Dark Current vs. Ambient Temperature

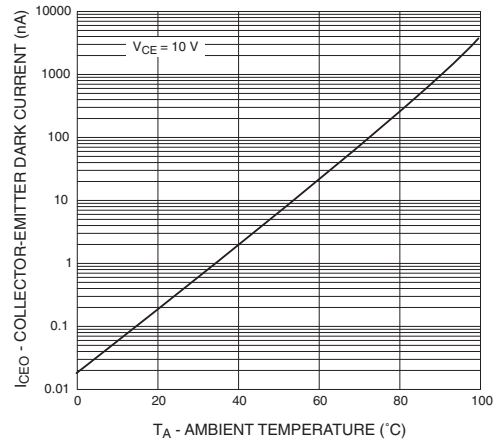


Fig. 5 Turn-On Time vs. Input Current

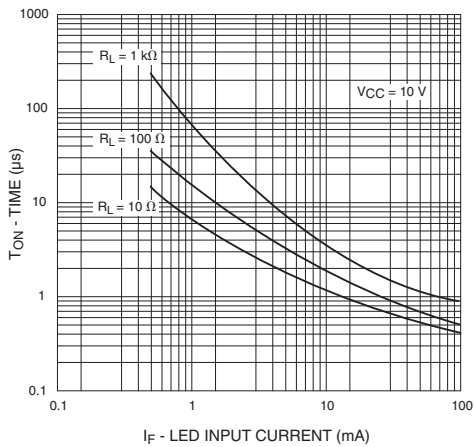
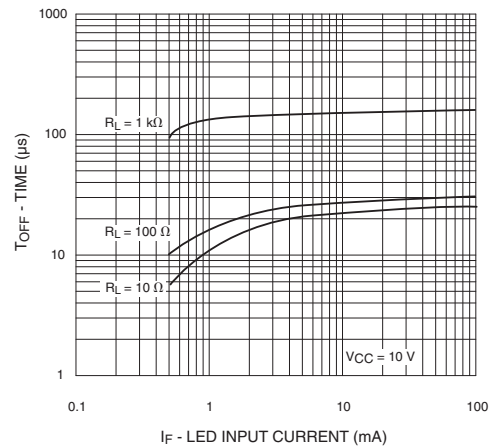


Fig. 6 Turn-Off Time vs. Input Current



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TYPICAL ELECTRO-OPTICAL CHARACTERISTIC CURVES

(25°C Free air temperature unless otherwise specified) (Cont.)

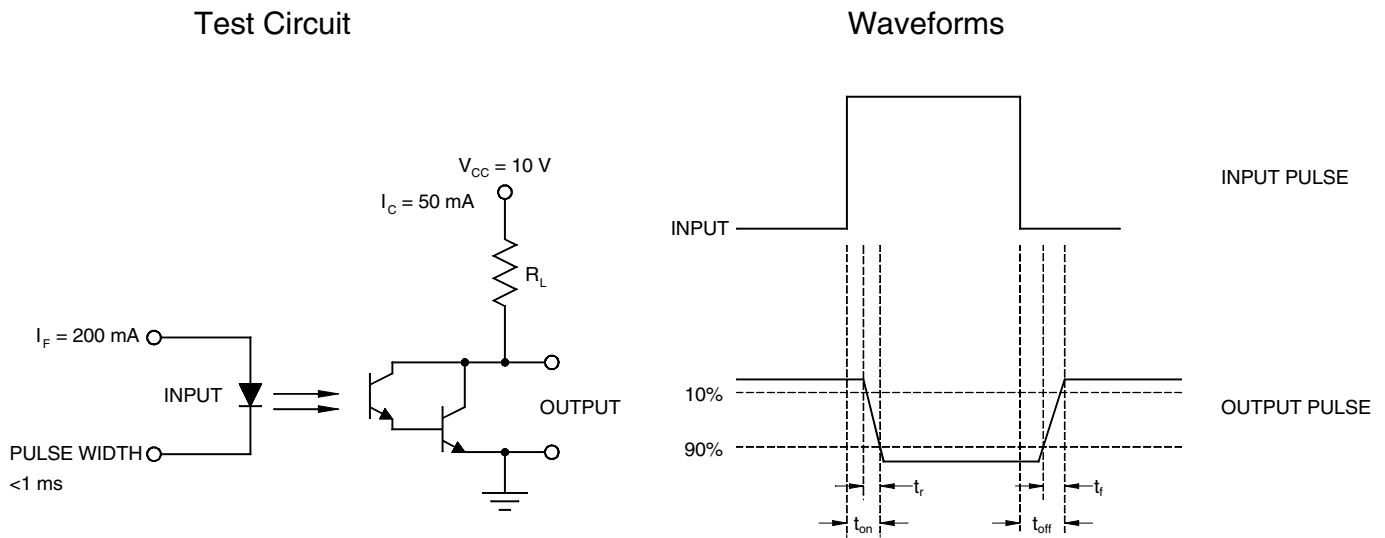


Fig. 7 Switching Time Test Circuit and Waveforms

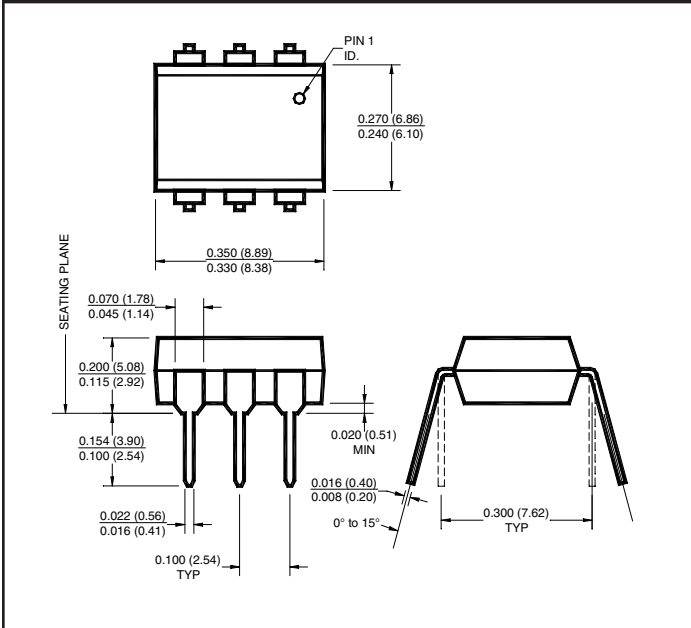
Notes

* Indicates JEDEC registered data.

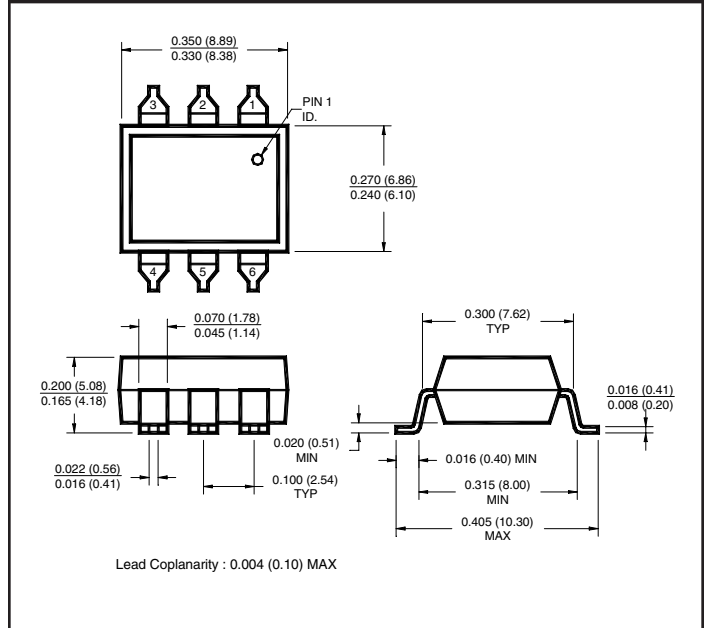
1. The current transfer ratio (I_C/I_F) is the ratio of the detector collector current to the LED input current with $V_{CE} @ 10 \text{ V}$.
2. Pulse test: pulse width = $300 \mu\text{s}$, duty cycle $\leq 2.0\%$.
3. For test circuit setup and waveforms, refer to figure 7..
4. I_F adjusted to $I_C = 2.0 \text{ mA}$ and $I_C = 0.7 \text{ mA rms}$.
5. The frequency at which I_C is 3dB down from the 1 KHz value.
6. For this test, LED pins 1 and 2 are common, and phototransistor pins 4,5 and 6 are common.

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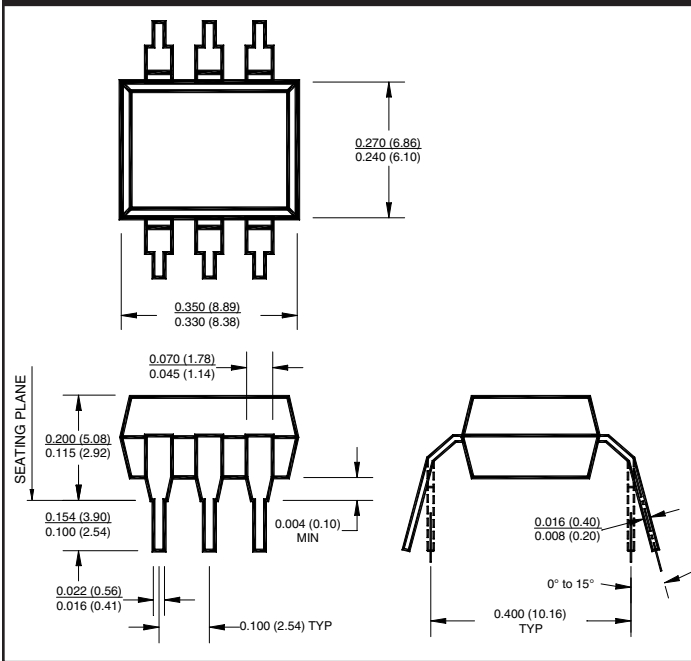
Package Dimensions (Through Hole)



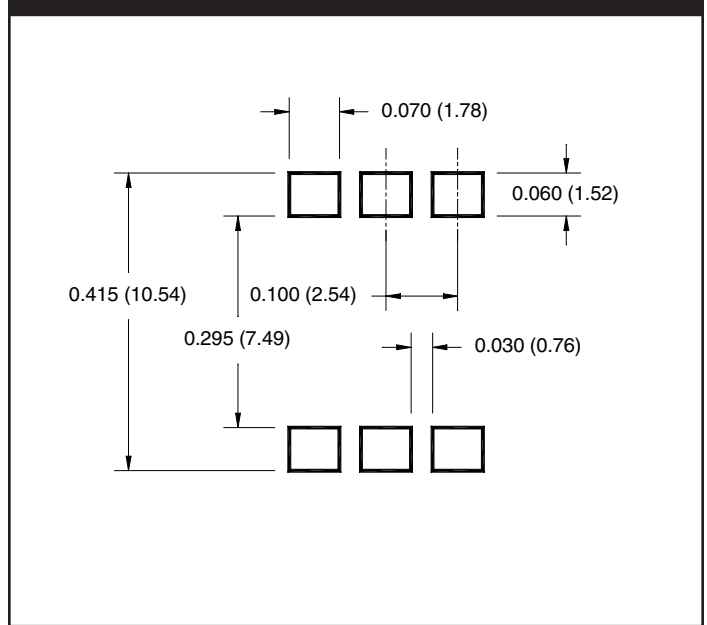
Package Dimensions (Surface Mount)



Package Dimensions (0.4" Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform



NOTE

All dimensions are in inches (millimeters)

Call QT Optoelectronics for more information or the phone number of your nearest distributor.

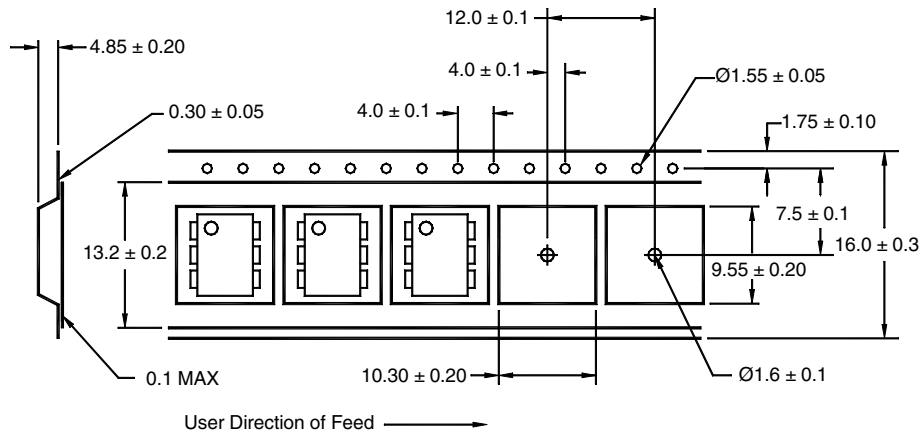
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ORDERING INFORMATION

| 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 & Reel |

QT Carrier Tape Specifications ("D" Taping Orientation)



NOTE

All dimensions are in millimeters

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