

**4N47**

**4N48** JAN, JANTX, JANTXV, SINGLE CHANNEL OPTOCOUPPLERS

**4N49**

**Mii**

OPTOELECTRONIC  
PRODUCTS{PRIVATE}  
DIVISION

**Features:**

- High Reliability
- Base lead provided for conventional transistor biasing
- Rugged package
- High gain, high voltage transistor
- +1kV electrical isolation

**Applications:**

- Eliminate ground loops
- Level shifting
- Line receiver
- Switching power supplies
- Motor control

**DESCRIPTION**

Gallium Aluminum Arsenide (GaAlAs) infrared LED and a high gain N-P-N silicon phototransistor packaged in a hermetically sealed TO-5 metal can. The **4N47**, **4N48** and **4N49**'s can be tested to customer specifications, as well as to MIL-PRF-19500 JAN, JANTX, JANTXV and JANS quality levels.

**\*ABSOLUTE MAXIMUM RATINGS**

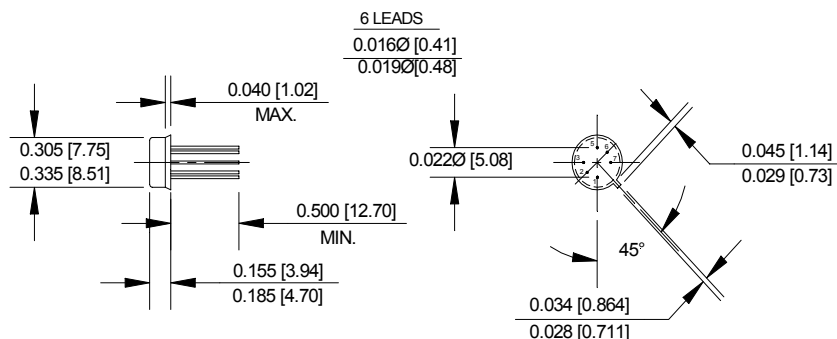
|  |                 |
|--|-----------------|
| Input to Output Voltage .....  | 1kV             |
| Emitter-Collector Voltage .....  | 7V              |
| Collector-Emitter Voltage (Value applies to emitter-base open-circuited & the input-diode equal to zero) ..... | 40V             |
| Collector-Base Voltage .....   | 45V             |
| Reverse Input Voltage .....  | 2V              |
| Input Diode Continuous Forward Current at (or below) 65°C Free-Air Temperature (see note 1) .....              | 40mA            |
| Peak Forward Input Current (Value applies for $t_w \leq 1\mu s$ , PRR < 300 pps) .....                         | 1A              |
| Continuous Collector Current .....   | 50mA            |
| Continuous Transistor Power Dissipation at (or below) 25°C Free-Air Temperature (see Note 2) .....             | 300mW           |
| Storage Temperature .....  | -65°C to +125°C |
| Operating Free-Air Temperature Range .....   | -55°C to +125°C |
| Lead Solder Temperature (1/16" (1.6mm) from case for 10 seconds) .....   | 240°C           |

**Notes:**

1. Derate linearly to 125°C free-air temperature at the rate of 0.67 mA/°C above 65°C.
2. Derate linearly to 125°C free-air temperature at the rate of 3 mW/°C.

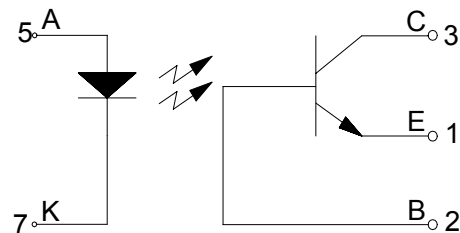
\*JEDEC registered data

**Package Dimensions**



NOTE: ALL LINEAR DIMENSIONS ARE IN INCHES (MILLIMETERS)

**Schematic Diagram**



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

| PARAMETER                          | SYMBOL | MIN | TYP | MAX | UNITS         | TEST CONDITIONS     | NOTE |
|------------------------------------|--------|-----|-----|-----|---------------|---------------------|------|
| Input Diode Static Reverse Current | $I_R$  |     |     | 100 | $\mu\text{A}$ | $V_R = 2\text{V}$   |      |
| Input Diode Static Forward Voltage | $V_F$  | 1.0 | 1.4 | 1.7 | V             | $I_E = 10\text{mA}$ |      |
|                                    |        | 0.8 |     | 1.5 |               |                     |      |
|                                    |        | 0.7 |     | 1.3 |               |                     |      |

**\*OUTPUT TRANSISTOR**  $T_A = 25^\circ\text{C}$  Unless otherwise specified

| PARAMETER                           | SYMBOL        | MIN | TYP | MAX | UNITS | TEST CONDITIONS                          | NOTE |
|-------------------------------------|---------------|-----|-----|-----|-------|--|------|
| Collector-Base Breakdown Voltage    | $V_{(BR)CBO}$ | 45  |     |     | V     | $I_C = 100\mu\text{A}, I_B = 0, I_F = 0$ |      |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | 40  |     |     | V     | $I_C = 1\text{mA}, I_B = 0, I_F = 0$     |      |
| Emitter-Collector Breakdown Voltage | $V_{(BR)EBO}$ | 7   |     |     | V     | $I_C = 0, I_E = 100\mu\text{A}, I_F = 0$ |      |

**\*COUPLED CHARACTERISTICS**  $T_A = 25^\circ\text{C}$  Unless otherwise specified

| PARAMETER                            | SYMBOL        | MIN       | TYP | MAX  | UNITS         | TEST CONDITIONS   | NOTE |
|--------------------------------------|---------------|-----------|-----|------|---------------|---|------|
| On State Collector Current           | $I_{C(ON)}$   | 0.5       |     | 5    | mA            | $V_{CE} = 5\text{V}, I_B = 0, I_F = 1\text{mA}$           |      |
|                                      |               | 1.0       |     | 10   |               |   |      |
|                                      |               | 2.0       |     |      |               |   |      |
| On State Collector Current           | $I_{C(ON)}$   | 0.7       |     |      | mA            | $V_{CE} = 5\text{V}, I_B = 0, I_F = 2\text{mA}$           |      |
|                                      |               | 1.4       |     |      |               |   |      |
|                                      |               | 2.8       |     |      |               |   |      |
| On State Collector Current           | $I_{C(ON)}$   | 0.5       |     |      | mA            | $V_{CE} = 5\text{V}, I_B = 0, I_F = 2\text{mA}$           | 2    |
|                                      |               | 1.0       |     |      |               |   |      |
|                                      |               | 2.0       |     |      |               |   |      |
| Off State Collector Current          | $I_{C(OFF)}$  |           |     | 100  | nA            | $V_{CE} = 20\text{V}, I_B = 0, I_F = 0\text{mA}$          |      |
| Off State Collector Current          | $I_{C(OFF)}$  |           |     | 100  | $\mu\text{A}$ | $V_{CE} = 20\text{V}, I_B = 0, I_F = 0\text{mA}$          |      |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ |           |     | 0.3  | V             | $I_C = 0.5\text{mA}, I_B = 0, I_F = 2\text{mA}$           |      |
|                                      |               |           |     | 0.3  | V             | $I_C = 1\text{mA}, I_B = 0, I_F = 2\text{mA}$             |      |
|                                      |               |           |     | 0.3  | V             | $I_C = 2\text{mA}, I_B = 0, I_F = 2\text{mA}$             |      |
| Input to Output Resistance           | $R_{I-O}$     | $10^{11}$ |     |      |               | $V_{IN-OUT} = 1\text{kV}$                                 | 1    |
| Input to Output Capacitance          | $C_{I-O}$     |           |     | 5    | pF            | $f = 1\text{MHz}, V_{IN-OUT} = 1\text{kV}$                | 1    |
| Rise Time/ Fall Time                 | $t_r / t_f$   |           |     | 20   | $\mu\text{s}$ | $V_{CC} = 10\text{V}, I_F = 10\text{mA}, R_L = 100\Omega$ |      |
| Phototransistor Operation            | $t_r / t_f$   |           |     | 25   | $\mu\text{s}$ |   |      |
|                                      |               |           |     | 25   | $\mu\text{s}$ |   |      |
| Rise Time/ Fall Time                 | $t_r / t_f$   |           |     | 0.85 | $\mu\text{s}$ | $V_{CC} = 10\text{V}, I_F = 10\text{mA}, R_L = 100\Omega$ |      |
| Photodiode Operation                 | $t_r / t_f$   |           |     | 0.85 | $\mu\text{s}$ |   |      |
|                                      |               |           |     | 0.85 | $\mu\text{s}$ |   |      |

**NOTES:**

- These parameters are measured between all phototransistor leads shorted together and with both input diode leads shorted together.
- This parameter measured using pulse techniques  $t_w = 100\mu\text{s}$ , duty cycle  $\leq 1\%$ .

**RECOMMENDED OPERATING CONDITIONS:**

| PARAMETER                 | SYMBOL          | MIN | MAX | UNITS |
|---------------------------|-----------------|-----|-----|-------|
| Input Current, Low Level  | I <sub>FL</sub> | 0   | 100 | μA    |
| Input Current, High Level | I <sub>FH</sub> | 2   | 10  | mA    |
| Supply Voltage            | V <sub>CE</sub> | 5   | 10  | V     |

**SELECTION GUIDE**

| PART NUMBER | PART DESCRIPTION                         |
|-------------|--|
| JAN4N47     | 4N47 Optocoupler, JAN Screening level    |
| JAN4N48     | 4N48 Optocoupler, JAN Screening level    |
| JAN4N49     | 4N49 Optocoupler, JAN Screening level    |
| JANTX4N47   | 4N47 Optocoupler, JANTX Screening level  |
| JANTX4N48   | 4N48 Optocoupler, JANTX Screening level  |
| JANTX4N49   | 4N49 Optocoupler, JANTX Screening level  |
| JANTXV4N47  | 4N47 Optocoupler, JANTXV Screening level |
| JANTXV4N48  | 4N48 Optocoupler, JANTXV Screening level |
| JANTXV4N49  | 4N49 Optocoupler, JANTXV Screening level |
| JANS4N47    | 4N47 Optocoupler, JANS Screening level   |
| JANS4N48    | 4N48 Optocoupler, JANS Screening level   |
| JANS4N49    | 4N49 Optocoupler, JANS Screening level   |

\*JEDEC registered data