

**4N47**

**4N48**

JAN, JANTX, JANTXV, AND JANS SINGLE CHANNEL OPTOCOUPLERS

**4N49**



06/23/03

**Features:**

- Certified to MIL-PRF-19500/548
- Collector in electrical contact with case
- 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**

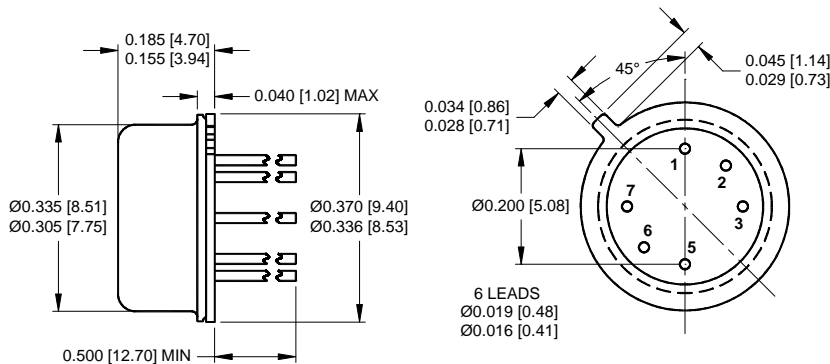
Input to Output Voltage .....	1kV
Emitter-Collector Voltage .....	7V
Collector-Emitter Voltage .....	40V
Collector-Base Voltage .....	45V
Reverse Input Voltage .....	2V
Input Diode Continuous Forward Current at (or below) 25°C Free-Air Temperature (see note 1) .....	40mA
Peak Forward Input Current (Value 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 (10 seconds, 1/16" from case) .....	240°C

**Notes:**

1. Derate linearly to 125°C free-air temperature at the rate of 0.40 mA/°C above 65°C.
2. Derate linearly to 125°C free-air temperature at the rate of 3 mW/°C.

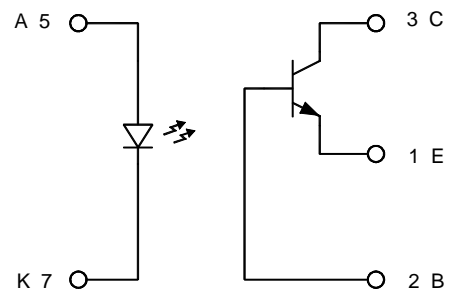
\*JEDEC registered data

**Package Dimensions**



ALL LINEAR DIMENSIONS ARE IN INCHES [MILLIMETERS].

**Schematic Diagram**



COLLECTOR IS COMMON TO CASE.

**4N47, 4N48, and 4N49**

**JAN, JANTX, JANTXV, AND JANS SINGLE CHANNEL OPTOCOUPLEDERS**

06/23/03

**\*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	nA	$V_R = 2V$	
Input Diode Static Forward Voltage	$V_F$	1.0	1.4	1.7	V	$I_F = 10\text{mA}$	
		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	$I_C = 100\mu\text{A}, I_E = 0, I_F = 0$	
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	40			V	$I_C = 1\text{mA}, I_B = 0, I_F = 0$	
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	7			V	$I_B = 0, I_E = 100\mu\text{A}, I_F = 0$	

**\*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	$V_{CE} = 5V, I_B = 0, I_F = 1\text{mA}$	
		1.0		10			
		2.0					
On State Collector Current	$I_{C(ON)}$	0.7			mA	$V_{CE} = 5V, I_B = 0, I_F = 2\text{mA}$	
-55°C		1.4					
		2.8					
On State Collector Current	$I_{C(ON)}$	0.5			mA	$V_{CE} = 5V, I_B = 0, I_F = 2\text{mA}$	2
+100°C		1.0					
		2.0					
Off State Collector Current	$I_{C(OFF)}$			100	nA	$V_{CE} = 20V, I_B = 0, I_F = 0\text{mA}$	
+25°C							
Off State Collector Current	$I_{C(OFF)}$			100	μA	$V_{CE} = 20V, I_B = 0, I_F = 0\text{mA}$	
+100°C							
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	$R_{I-O}$	$10^{11}$		Ω		$V_{IN-OUT} = 1\text{kV}$	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	μs	$V_{CC} = 10V, I_F = 10\text{mA}, R_L = 100\Omega$	
Phototransistor Operation	$t_r / t_f$			25	μs		
	$t_r / t_f$			25	μs		
Rise Time/ Fall Time	$t_r / t_f$			0.85	μs	$V_{CC} = 10V, I_F = 10\text{mA}, R_L = 100\Omega$	
Photodiode Operation	$t_r / t_f$			0.85	μs		
	$t_r / t_f$			0.85	μs		

**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	$I_{FL}$	0	100	μA
Input Current, High Level	$I_{FH}$	2	10	mA
Supply Voltage	$V_{CC}$	5	35	V

**SELECTION GUIDE**

PART NUMBER	PART DESCRIPTION
4N47	Commercial
4N48	Commercial
4N49	Commercial
JAN4N47	JAN Screened
JAN4N48	JAN Screened
JAN4N49	JAN Screened
JANTX4N47	JANTX Screened
JANTX4N48	JANTX Screened
JANTX4N49	JANTX Screened
JANTXV4N47	JANTXV Screened
JANTXV4N48	JANTXV Screened
JANTXV4N49	JANTXV Screened
JANS4N47	JANS Screened
JANS4N48	JANS Screened
JANS4N49	JANS Screened

\*JEDEC registered data