

4N47**4N48****4N49**

JAN, JANTX, JANTXV, AND JANS SINGLE CHANNEL OPTOCOUPPLERS

OPTOELECTRONIC PRODUCTS
DIVISION

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.

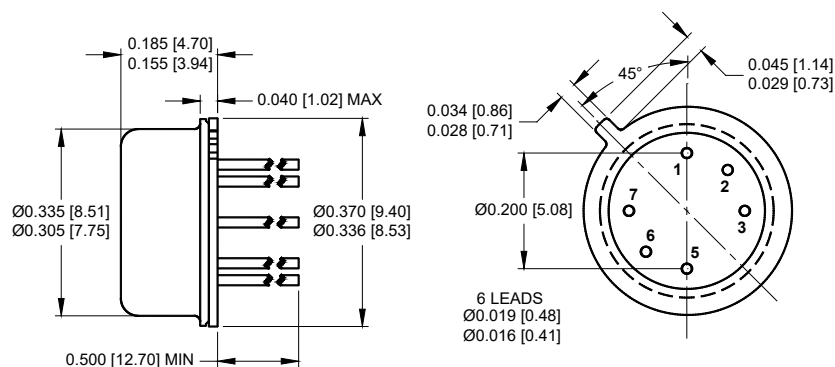
***ABSOLUTE MAXIMUM RATINGS**

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

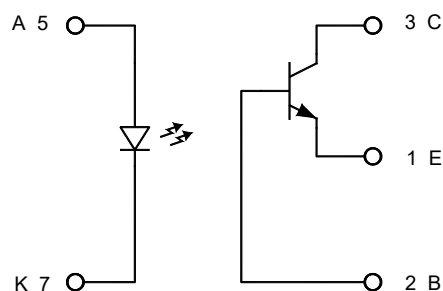
Notes:

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**

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***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	$I_F = 10\text{mA}$	
-55°C		0.8		1.5			
+25°C		0.7		1.3			
+100°C							

***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	$V_{CE} = 5V$, $I_B = 0$, $I_F = 1\text{mA}$	
4N47		1.0		10			
4N48		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					
4N49		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					
4N49		2.0					
Off State Collector Current	$I_{C(OFF)}$			100	nA	$V_{CE} = 20V$, $I_B = 0$, $I_F = 0\text{mA}$	
+25°C				100	μA	$V_{CE} = 20V$, $I_B = 0$, $I_F = 0\text{mA}$	
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	$I_C = 0.5\text{mA}$, $I_B = 0$, $I_F = 2\text{mA}$	
4N47				0.3	V	$I_C = 1\text{mA}$, $I_B = 0$, $I_F = 2\text{mA}$	
4N48				0.3	V	$I_C = 2\text{mA}$, $I_B = 0$, $I_F = 2\text{mA}$	
4N49				0.3	V		
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		
4N49				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		
4N48				0.85	μs		
4N49				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	MICROPAC PART NUMBER	PART DESCRIPTION
4N47	66092-017	Commercial
4N48	66092-018	Commercial
4N49	66092-019	Commercial
JAN4N47	66092-617	JAN Screened
JAN4N48	66092-618	JAN Screened
JAN4N49	66092-619	JAN Screened
JANTX4N47	66092-717	JANTX Screened
JANTX4N48	66092-718	JANTX Screened
JANTX4N49	66092-719	JANTX Screened
JANTXV4N47	66092-817	JANTXV Screened
JANTXV4N48	66092-818	JANTXV Screened
JANTXV4N49	66092-819	JANTXV Screened
JANS4N47	66092-337	JANS Screened
JANS4N48	66092-338	JANS Screened
JANS4N49	66092-339	JANS Screened

*JEDEC registered data