

**4N22**

**4N23** JAN, JANTX, JANTXV, AND JANS SINGLE CHANNEL OPTOCOUPLERS

**4N24**



07/07/03

**Features:**

- Qualified to MIL-PRF-19500/486
- Collector in electrical contact with case
- Overall current gain: 1.5 typical (4N24)
- 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**

A Gallium Aluminum Arsenide (GaAlAs) infrared LED and a high gain N-P-N silicon phototransistor packaged in a hermetically sealed metal case. The **4N22**, **4N23** and **4N24**'s can be tested to customer specifications.

**\*ABSOLUTE MAXIMUM RATINGS**

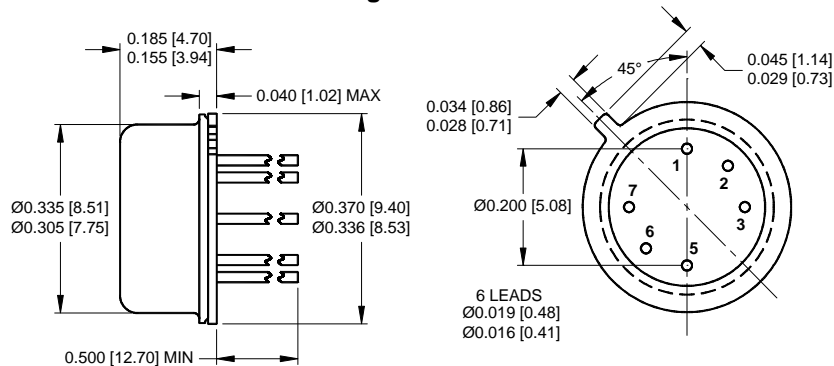
Input to Output Voltage .....	±1kV
Emitter-Collector Voltage .....	4V
Collector-Emitter Voltage .....	35V
Collector-Base Voltage .....	35V
Reverse Input Voltage .....	2V
Input Diode Continuous Forward Current at (or below) 25°C Free-Air Temperature (see note 1) .....	40mA
Peak Forward Input Current (Value 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 max., 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 5 mW/°C above 65°C.

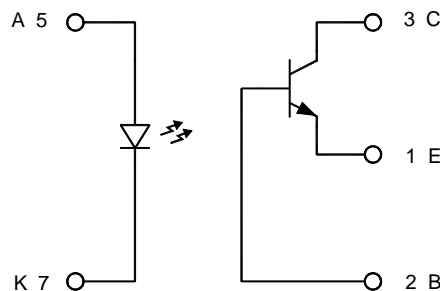
- JEDEC registered data

**Package Dimensions**



ALL LINEAR DIMENSIONS ARE IN INCHES [MILLIMETERS].

**Schematic Diagram**



COLLECTOR IS COMMON TO CASE.

**4N22, 4N23, and 4N24**

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

PARAMETER	SYMBOL	MIN	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	1.5	V	$I_F = 10\text{mA}$	
		0.8	1.3			
		0.7	1.2			

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

PARAMETER	SYMBOL	MIN	MAX	UNITS	TEST CONDITIONS	NOTE
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	35		V	$I_C = 100\mu\text{A}, I_E = 0, I_F = 0$	
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	35		V	$I_C = 1\text{mA}, I_B = 0, I_F = 0$	
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	4		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	MAX	UNITS	TEST CONDITIONS	NOTE
On State Collector Current	$I_{C(ON)}$	0.15		mA	$V_{CE} = 5V, I_B = 0, I_F = 2\text{mA}$	
		0.2				
		0.4				
On State Collector Current	$I_{C(ON)}$	2.5		mA	$V_{CE} = 5V, I_B = 0, I_F = 10\text{mA}$	
		6				
		10				
On State Collector Current	$I_{C(ON)}$	1		mA	$V_{CE} = 5V, I_B = 0, I_F = 10\text{mA}$	
-55°C		2.5				
		4				
On State Collector Current	$I_{C(ON)}$	1		mA	$V_{CE} = 5V, I_B = 0, I_F = 10\text{mA}$	
+100°C		2.5				
		4				
Off State Collector Current	$I_{C(OFF)}$		100	nA	$V_{CE} = 20V, I_B = 0, I_F = 0\text{mA}$	
+25°C			100	$\mu\text{A}$	$V_{CE} = 20V, I_B = 0, I_F = 0\text{mA}$	
Off State Collector Current	$I_{C(OFF)}$		100	$\mu\text{A}$	$V_{CE} = 20V, I_B = 0, I_F = 0\text{mA}$	
+100°C			100	$\mu\text{A}$	$V_{CE} = 20V, I_B = 0, I_F = 0\text{mA}$	
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$		0.3	V	$I_C = 2.5\text{mA}, I_B = 0, I_F = 20\text{mA}$	
			0.3	V	$I_C = 5\text{mA}, I_B = 0, I_F = 20\text{mA}$	
			0.3	V	$I_C = 10\text{mA}, I_B = 0, I_F = 20\text{mA}$	
Input to Output Resistance	$R_{I-O}$	$10^{11}$		$\Omega$	$V_{IN-OUT} = 1\text{kV}$	1
Input to Output Capacitance	$C_{I-O}$		5	pF	$F = 1\text{MHz}, V_{IN-OUT} = 1\text{kV}$	1
Rise Time	$t_r$		15	$\mu\text{s}$	$V_{CC} = 10V, I_F = 10\text{mA}, R_L = 100\Omega$	
			15	$\mu\text{s}$		
			20	$\mu\text{s}$		
Fall Time	$t_f$		15	$\mu\text{s}$	$V_{CC} = 10V, I_F = 10\text{mA}, R_L = 100\Omega$	
			15	$\mu\text{s}$		
			20	$\mu\text{s}$		

**NOTES:**

- These parameters are measured between all phototransistor leads shorted together and with both input diode leads shorted together.

**RECOMMENDED OPERATING CONDITIONS:**

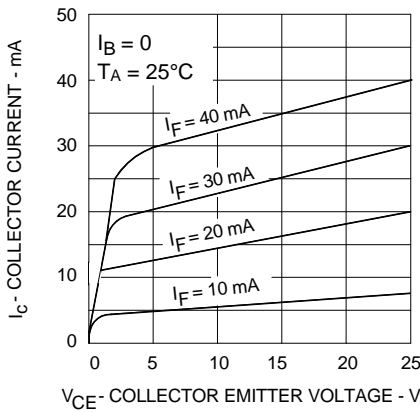
PARAMETER	SYMBOL	MIN	MAX	UNITS
Input Current, Low Level	$I_{FL}$	0	1	$\mu\text{A}$
Input Current, High Level	$I_{FH}$	2	10	mA
Supply Voltage	$V_{CC}$	5	10	V

**SELECTION GUIDE**

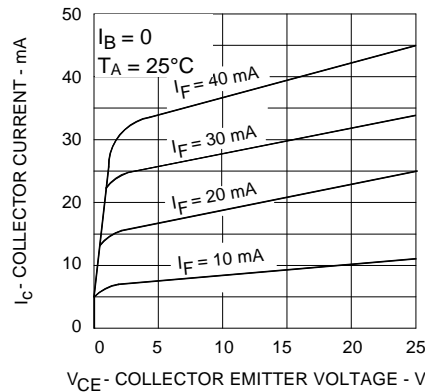
PART NUMBER	PART DESCRIPTION
4N22	Commercial
4N23	Commercial
4N24	Commercial
JAN4N22	JAN Screened
JAN4N23	JAN Screened
JAN4N24	JAN Screened
JANTX4N22	JANTX Screened
JANTX4N23	JANTX Screened
JANTX4N24	JANTX Screened
JANTXV4N22	JANTXV Screened
JANTXV4N23	JANTXV Screened
JANTXV4N24	JANTXV Screened
JANS4N22	JANS Screened
JANS4N23	JANS Screened
JANS4N24	JANS Screened

\* JEDEC registered

**4N22**  
**COLLECTOR CURRENT VS**  
**COLLECTOR-EMITTER VOLTAGE**



**4N23**  
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**4N24**  
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