

66168

PROTON RADIATION TOLERANT OPTOCOUPLER
(Pin-for-Pin Replacement for 4N49)



**OPTOELECTRONIC PRODUCTS
DIVISION**

Features:

- High Reliability
- Base lead provided for conventional transistor biasing
- Rugged package
- Stability over wide temperature
- +1000V electrical isolation

Applications:

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

DESCRIPTION

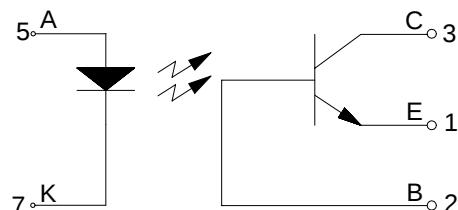
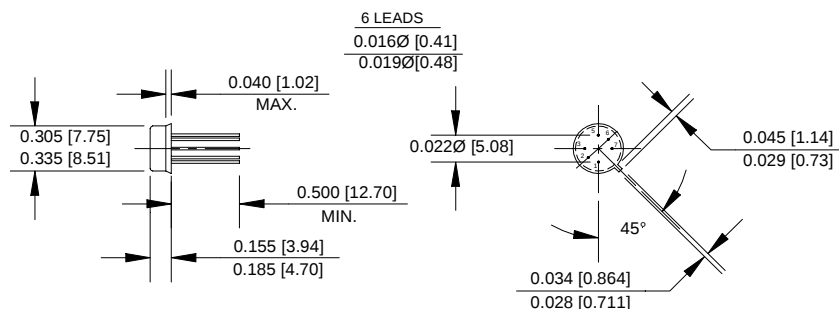
The **66168** is a modified 4N49 (LED) designed to be more tolerant to proton radiation. The 66168 optocoupler is packaged in a hermetically sealed TO-5. This device can be supplied to customer specifications as well as tested in accordance with MIL-PRF-19500/548 (4N49) to JAN, JANTX, JANTXV and JANS levels.

ABSOLUTE MAXIMUM RATINGS

Input to Output Voltage	±1kV
Emitter-Base 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 +100°C
Lead Solder Temperature (10 seconds max.)	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.

Package Dimensions**Schematic Diagram**

NOTE: ALL LINEAR DIMENSIONS ARE IN INCHES (MILLIMETERS)

ELECTRICAL CHARACTERISTICST_A = 25°C unless otherwise specified.

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
Input Diode Static Reverse Current	I _R			100	μA	V _R = 2V	
Input Diode Static Forward Voltage -55°C	V _F	1.0		2.4	V	I _F = 10mA	
Input Diode Static Forward Voltage +25°C	V _F	0.8	1.7	2.0	V	I _F = 10mA	
Input Diode Static Forward Voltage +100°C	V _F	0.7		1.8	V	I _F = 10mA	

OUTPUT TRANSISTORT_A = 25°C unless otherwise specified.

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
Collector-Base Breakdown Voltage	V _{(BR)CBO}	45			V	I _C = 100μA, I _B = 0, I _F = 0	
Collector-Emitter Breakdown Voltage	V _{(BR)CEO}	40			V	I _C = 1mA, I _B = 0, I _F = 0	
Emitter-Base Breakdown Voltage	V _{(BR)EBO}	7			V	I _C = 0mA, I _E = 100μA, I _F = 0	
Off-State Collector Current +100°C	I _{C(OFF)}			100	nA	V _{CE} = 20V, I _F = 0mA, I _B = 0	
	I _{C(OFF)}			100	μA	V _{CE} = 20V, I _F = 0mA, I _B = 0	

COUPLED CHARACTERISTICST_A = 25°C unless otherwise specified.

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
On State Collector Current	I _{C(ON)}	2.0			mA	V _{CE} = 5V, I _F = 1mA	
On State Collector Current +100°C	I _{C(ON)}	0.5			mA	V _{CE} = 0.4V, I _F = 2mA	2
On State Collector Current -55°C	I _{C(ON)}	0.7			mA	V _{CE} = 5V, I _F = 2mA	
Collector-Emitter Saturation Voltage	V _{CE(SAT)}			0.3	V	I _F = 2mA, I _C = 2mA, I _B = 0	
Input to Output Internal Resistance	R _{IO}	10 ¹¹			Ω	V _{IN-OUT} = 500V	1
Input to Output Capacitance	C _{IO}		2.5	5	pF	f = 1MHz, V _{IN-OUT} = 1kV	1
Rise Time-Phototransistor Operation	t _r		10	25	μs	V _{CC} = 10V, I _F = 5mA, R _L = 100Ω, I _B = 0	
Fall Time-Phototransistor Operation	t _f		10	25	μs	V _{CC} = 10V, I _F = 5mA, R _L = 100Ω, I _B = 0	
Rise Time-Photodiode Operation	t _r		0.85	3	μs	V _{CC} = 10V, I _F = 5mA, R _L = 100Ω, I _E = 0	
Fall Time-Photodiode Operation	t _f		0.85	3	μs	V _{CC} = 10V, I _F = 5mA, R _L = 100Ω, I _E = 0	

NOTES:

- These parameters are measured between all phototransistor leads shorted together and with both input diode leads shorted together.
- This parameter must be measured using pulse techniques (t_w = 100μs duty cycle ≤ 1%).

RECOMMENDED OPERATING CONDITIONS:

PARAMETER	SYMBOL	MIN	MAX	UNITS
Input Current, Low Level	I _{FL}	0	90	μA
Input Current, High Level	I _{FH}	2	10	mA
Supply Voltage	V _{CE}	5	10	V
Operating Temperature	T _A	-55	100	°C

SELECTION GUIDE

PART NUMBER	PART DESCRIPTION
66168-001	Single Channel Commercial Proton Radiation Tolerant (4N49) Optocoupler (0° to 70°C)
66168-101	Single Channel Proton Radiation Tolerant (4N49) Screened to JAN level
66168-103	Single Channel Proton Radiation Tolerant (4N49) Screened to JANTX level
66168-105	Single Channel Proton Radiation Tolerant (4N49) Screened to JANTXV level
66168-300	Single Channel Proton Radiation Tolerant (4N49) Screened to JANS level