

Features

- Hermetic 6-pin TO-5 package
- 1000Vdc isolation voltage
- High CTR
- High reliability and rugged construction
- High reliability screening available
- DC input with transistor output
- Operating temperature range -55°C to +100°C

Applications

- Switch mode power supplies
- Computer peripheral interface
- Motor control
- Ground signal isolation

Description

The 4N47/48/49 consists of a phototransistor optically coupled to an AlGaAs infrared-emitting diode in a hermetic TO-5 package.

Schematic Diagram

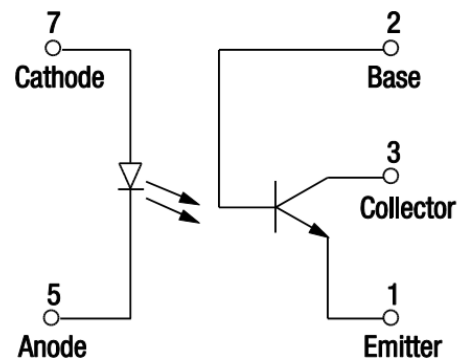


Figure 1. 4N47/48/49 Schematic Diagram

Package Dimensions in inches (mm)

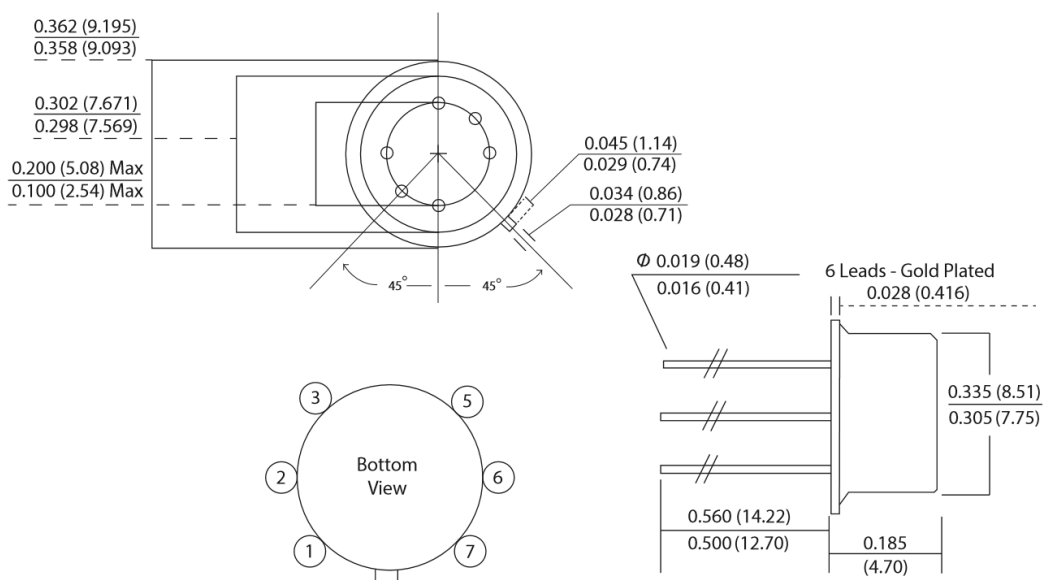


Figure 2. 4N47/48/49 Package Dimensions

Absolute Maximum Rating at 25°C (Note 1)

Symbol	Parameters	Ratings	Units	Notes
V _{DC}	Isolation voltage	-1000 to +1000	V	2
T _{OPR}	Operating temperature	-55 to +100	°C	
T _{STG}	Storage temperature	-65 to +150	°C	
T _{SOL}	Soldering temperature (10 seconds maximum)	240	°C	
Emitter				
P _D	Emitter power dissipation	60	mW	3
I _F	Forward current	40	mA	
I _{F(TRANS)}	Peak transient current (≤1ms)	1	A	
V _R	Reverse voltage	2	V	
Detector				
P _D	Detector power dissipation	300	mW	4
V _{CE}	Collector-Emitter Voltage	35	V	
V _{EB}	Emitter-Base Voltage	4	V	
V _{CB}	Collector-Base Voltage	35	V	
I _{CC}	Continuous Collector Current	50	mA	

Notes

1. When using this product, please observe the absolute maximum ratings. Only one parameter may be set at the limit to ensure no damage to the device. Exceeding any of the limits listed here may damage the device.
2. Measured between input pins 5, 6 and 7 shorted together, and output pins 1, 2 and 3 shorted together. T_A = 25°C and duration = 1sec.
3. Linear derating factor: 1.0 mW/°C above 25°C
4. Linear derating factor: 3.0 mW/°C above 25°C

ESD Precaution

Please be advised that normal static precautions should be taken in the handling and assembly of this device to prevent damage or degradation which may be induced by electrostatic discharge (ESD).

Electrical Characteristics $T_A = 25^\circ\text{C}$ (unless otherwise specified) (Note 1)

Symbol	Parameters	Test Conditions	4N47		4N48		4N49		Units	Notes
			Min	Max	Min	Max	Min	Max		
V _F	Forward Voltage	I _F =10mA, T _A = -55°C	1.0	1.7	1.0	1.7	1.0	1.7	V	
		I _F =10mA	0.8	1.5	0.8	1.5	0.8	1.5	V	
		I _F =10mA, T _A = 100°C	0.7	1.3	0.7	1.3	0.7	1.3	V	
I _R	Reverse Current	V _R = 2V	-	100	-	100	-	100	μA	
BV _{CEO}	Collector-Emitter Breakdown Voltage	I _{CE} = 1mA	40	-	40	-	40	-	V	
BV _{CBO}	Collector-Base Breakdown Voltage	I _{CB} = 100μA	45	-	45	-	45	-	V	
BV _{EBO}	Emitter-Base Breakdown Voltage	I _{EB} = 100μA	7	-	7	-	7	-	V	
I _{C_ON}	Collector Current, On-state	V _{CE} = 5V, I _F =1mA	0.5	-	1.0	5.0	2.0	10	mA	
		V _{CE} = 5V, I _F =2mA, T _A = -55°C	0.7	-	1.4	-	2.8	-	mA	
		V _{CE} = 5V, I _F =2mA, T _A = 100°C	0.5	-	1.0	-	2.0	-	mA	
I _{CB_ON}	Collector Base Current, On-state	V _{CB} = 5V, I _F =10mA	30	-	30	-	30	-	μA	
I _{CE_OFF}	Collector-Emitter Dark Current, Off-state	V _{CE} = 20V	-	100	-	100	-	100	nA	
		V _{CE} = 20V, T _A = 100°C	-	100	-	100	-	100	μA	
I _{CB_OFF}	Collector-Base Dark Current, Off-state	V _{CB} = 20V	-	10	-	10	-	10	nA	
V _{CE(SAT)}	Collector-Emitter Saturation Voltage	I _F = 2mA, I _C = 0.5mA	-	0.3	-	-	-	-	V	
		I _F = 2mA, I _C = 1.0mA	-	-	-	0.3	-	-	V	
		I _F = 2mA, I _C = 2.0mA	-	-	-	-	-	0.3	V	
R _{IO}	Isolation Resistance	V _{IO} = ±1000V _{DC}	10 ¹¹	-	10 ¹¹	-	10 ¹¹	-	Ω	2
C _{IO}	Isolation Capacitance	f= 1MHz, V _{IO} = 0V _{DC}	-	5	-	5	-	5	pF	2

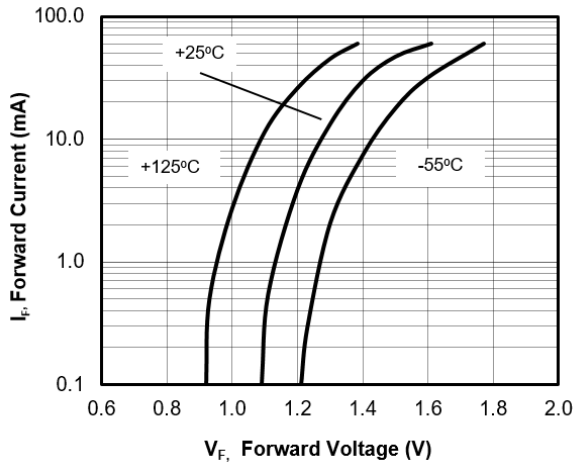
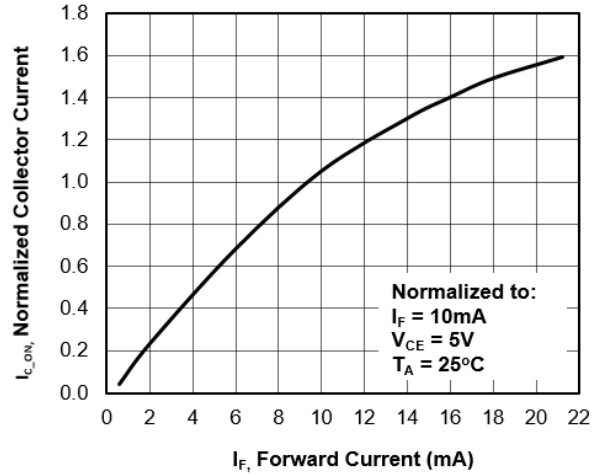
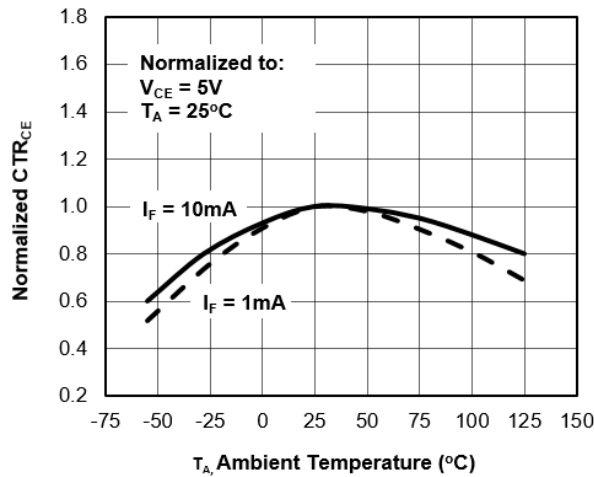
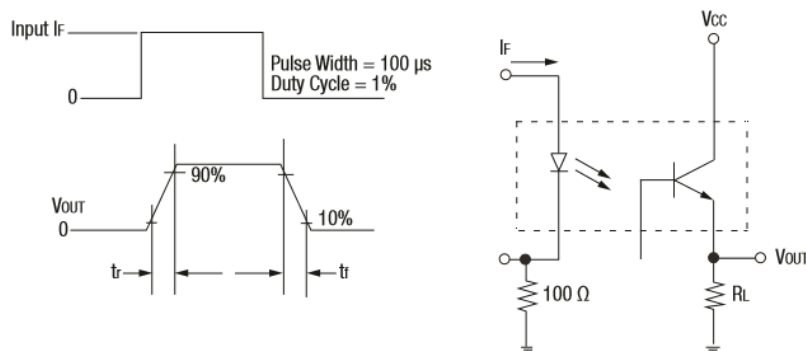
Switching Characteristics

Symbol	Parameters	Test Conditions	4N47		4N48		4N49		Units	Notes
			Typ	Max	Typ	Max	Typ	Max		
t _r	Rise Time	I _F = 5mA, V _{CC} = 10V, R _L = 100Ω	10	20	10	20	15	25	μs	
t _f	Fall Time		10	20	10	20	15	25		

Notes

- Performance guaranteed only under conditions listed in above tables.
- Measured between input pins 5, 6 and 7 shorted together, and output pins 1, 2 and 3 shorted together. T_A = 25°C and duration = 1sec.

Typical Characteristic Curves


Figure 3. Forward Current vs Forward Voltage

Figure 4. Collector Current vs Forward Current

Figure 5. Normalized CTR_{CE} vs Temperature

Figure 6. 4N47/48/49 Switching Test Circuit

Ordering Information

<i>Manufacturing Part Number</i>	<i>Part Description</i>
4N47	Phototransistor Hermetic TO-5 Package
4N48	Phototransistor Hermetic TO-5 Package
4N49	Phototransistor Hermetic TO-5 Package

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