

Features

- Hermetic 6-pin LCC package
- 1000Vdc isolation voltage
- High CTR
- Small package outline
- High reliability and rugged construction
- High reliability screening available
- Radiation tolerant
- DC input with transistor output
- Operating temperature range -55°C to +125°C

Applications

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

Description

The 4N4XU consists of a phototransistor optically coupled to an AlGaAs infrared-emitting diode in a leadless hermetic surface mount package.

Schematic Diagram

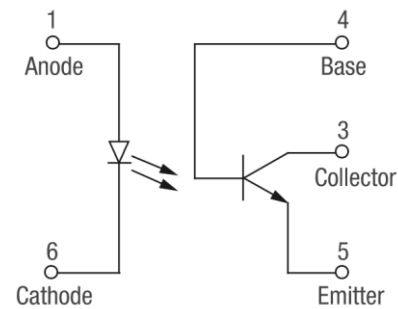


Figure 1. 4N4XU Schematic Diagram

Package Dimensions in inches (mm)

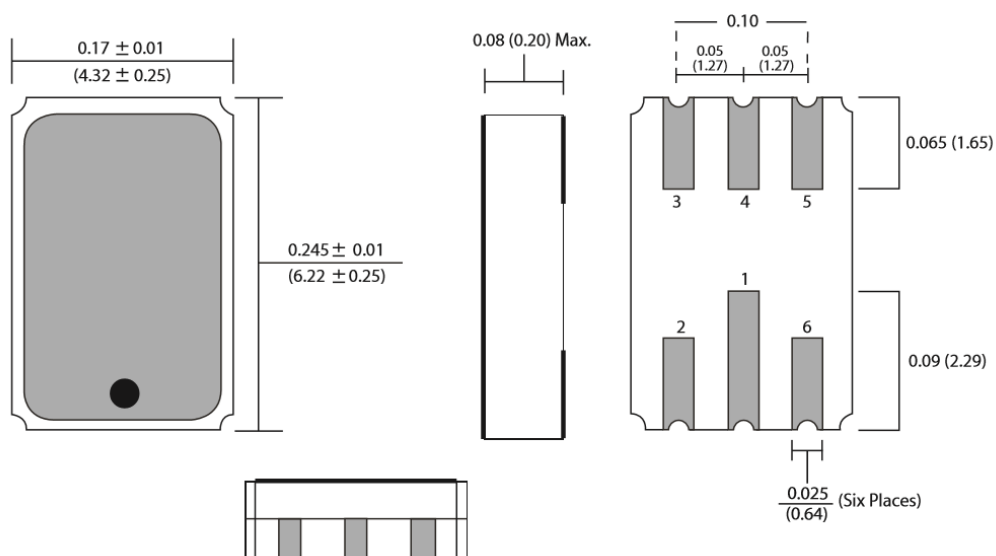


Figure 2. 4N4XU Package Dimensions

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 +125	°C	
T _{STG}	Storage temperature	-65 to +150	°C	
T _{SOL}	Soldering temperature (10 seconds maximum)	240	°C	
Emitter				
P _D	Emitter power dissipation	100	mW	
I _F	Forward current	40	mA	3
I _{F(TRANS)}	Peak transient current (≤1μs P.W., 300pps)	1	A	
V _R	Reverse voltage	2	V	
Detector				
P _D	Detector power dissipation	300	mW	4
V _{CE}	Collector-Emitter Voltage	40	V	
V _{EC}	Emitter-Collector Voltage	7	V	
V _{CB}	Collector-Base Voltage	45	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 1, 2, and 6 shorted together, and output pins 3, 4, and 5 shorted together. T_A = 25°C and duration = 1sec.
3. Linear derating factor: 0.67 mA/°C above 65°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)

Emitter Characteristics

Symbol	Parameters	Test Conditions	Min	Max	Units	Notes
V_F	Forward Voltage	$I_F = 10\text{mA}$, $T_A = -55^\circ\text{C}$	1.0	1.7	V	
		$I_F = 10\text{mA}$	0.8	1.5	V	
		$I_F = 10\text{mA}$, $T_A = 100^\circ\text{C}$	0.7	1.3	V	
I_R	Reverse Current	$V_R = 2\text{V}$	-	100	μA	

Detector Characteristics

Symbol	Parameters	Test Conditions	Min	Max	Units	Notes	
BV_{CEO}	Collector-Emitter Breakdown Voltage	$I_{CE} = 1\text{mA}$	40	-	V		
BV_{CBO}	Collector-Base Breakdown Voltage	$I_{CB} = 100\mu\text{A}$	45	-	V		
BV_{ECO}	Emitter-Collector Breakdown Voltage	$I_{EC} = 100\mu\text{A}$	7	-	V		
I_{C_ON}	Collector Current, On-state	4N47U	$V_{CE} = 5\text{V}$, $I_F = 1\text{mA}$	0.5	-	mA	
		4N48U		1.0	-		
		4N49U		2.0	-		
		4N47U	$V_{CE} = 5\text{V}$, $I_F = 2\text{mA}$, $T_A = -55^\circ\text{C}$	0.7	-	mA	
		4N48U		1.4	-		
		4N49U		2.8	-		
		4N47U	$V_{CE} = 5\text{V}$, $I_F = 2\text{mA}$, $T_A = 100^\circ\text{C}$	0.5	-	mA	
		4N48U		1.0	-		
		4N49U		2.0	-		
I_{CB_ON}	Collector Base Current, On-state	$V_{CB} = 5\text{V}$, $I_F = 10\text{mA}$	30	-	μA		
I_{CE_OFF}	Collector-Emitter Dark Current, Off-state	$V_{CE} = 20\text{V}$	-	100	nA		
		$V_{CE} = 20\text{V}$, $T_A = 100^\circ\text{C}$	-	100	μA		

Transfer Characteristics

Symbol	Parameters		Test Conditions	Min	Max	Units	Notes
V _{CE(SAT)}	Saturation Voltage	4N47U	I _F = 2mA, I _C = 0.5mA	-	0.3	V	
		4N48U	I _F = 2mA, I _C = 1.0mA	-	0.3	V	
		4N49U	I _F = 2mA, I _C = 2.0mA	-	0.3	V	
R _{IO}	Isolation Resistance		V _{IO} = ±1000V _{DC}	10 ¹¹	-	Ω	2
C _{IO}	Isolation Capacitance		f= 1MHz, V _{IO} = 0V _{DC}	-	5	pF	2

Switching Characteristics

Symbol	Parameters		Test Conditions	Min	Max	Units	Notes
t _r	Rise Time	4N47U	I _F = 10mA, V _{CC} = 10V, R _L = 100Ω	-	20	μs	
		4N48U		-	25		
		4N49U		-	25		
t _f	Fall Time	4N47U	I _F = 10mA, V _{CC} = 10V, R _L = 100Ω	-	20	μs	
		4N48U		-	25		
		4N49U		-	25		

Notes

- Performance guaranteed only under conditions listed in above tables.
- Measured between input pins 1, 2, and 6 shorted together, and output pins 3, 4, and 5 shorted together. T_A = 25°C and duration = 1sec.

Typical Characteristic Curves

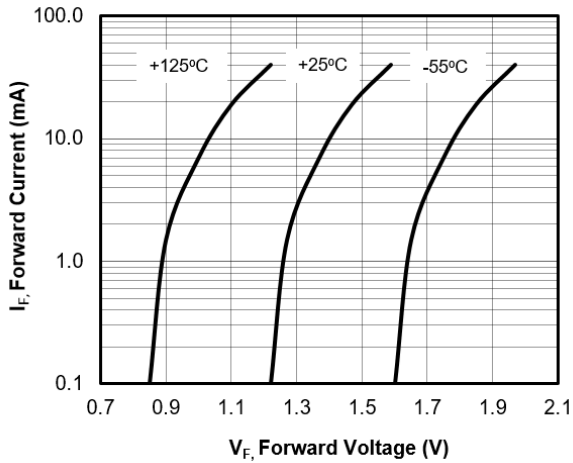


Figure 3. Forward Current vs Forward Voltage

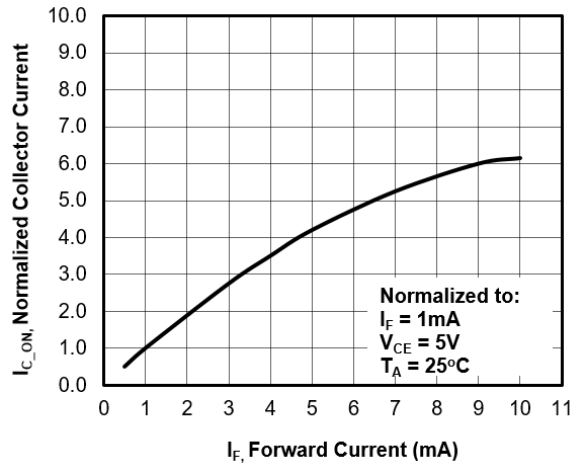


Figure 4. Collector Current vs Forward Current

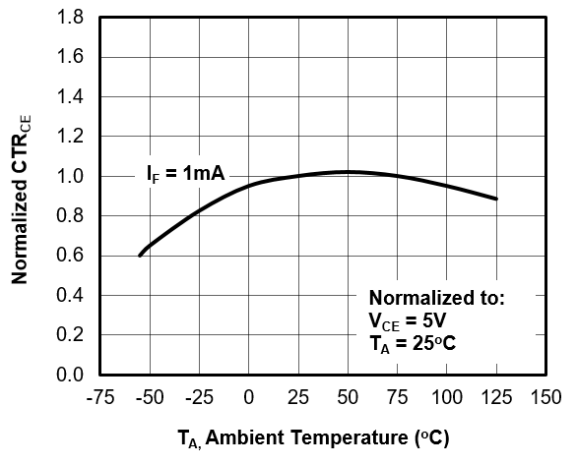


Figure 5. Normalized CTR_{CE} vs Temperature

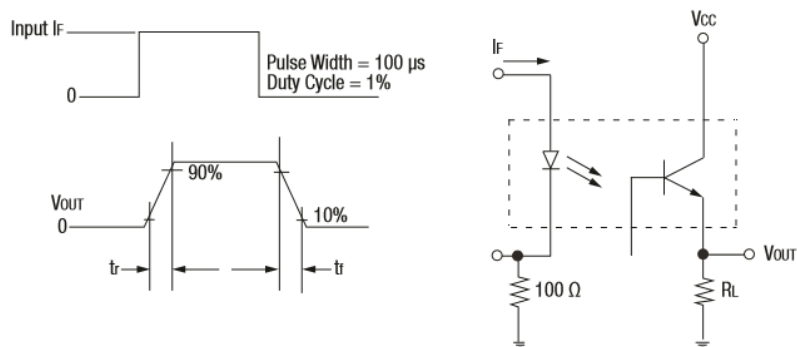


Figure 6. 4N4XU Switching Test Circuit



Ordering Information

<i>Manufacturing Part Number</i>	<i>Part Description</i>
4N47U	Radiation Tolerant Phototransistor Hermetic 6-pin LCC Package
4N48U	Radiation Tolerant Phototransistor Hermetic 6-pin LCC Package
4N49U	Radiation Tolerant Phototransistor Hermetic 6-pin LCC Package

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