Radiation Tolerant Phototransistor Hermetic Surface Mount Optocoupler

4N22U
4N23U
4N24U

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℃ to +125℃

Applications

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

Description

The 4N2XU consists of a phototransistor optically coupled to an AlGaAs infrared-emitting diode in a leadless hermetic surface mount package.

Schematic Diagram

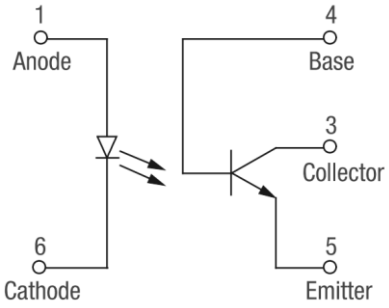

Figure 1. 4N2XU Schematic Diagram

Package Dimensions in inches (mm)

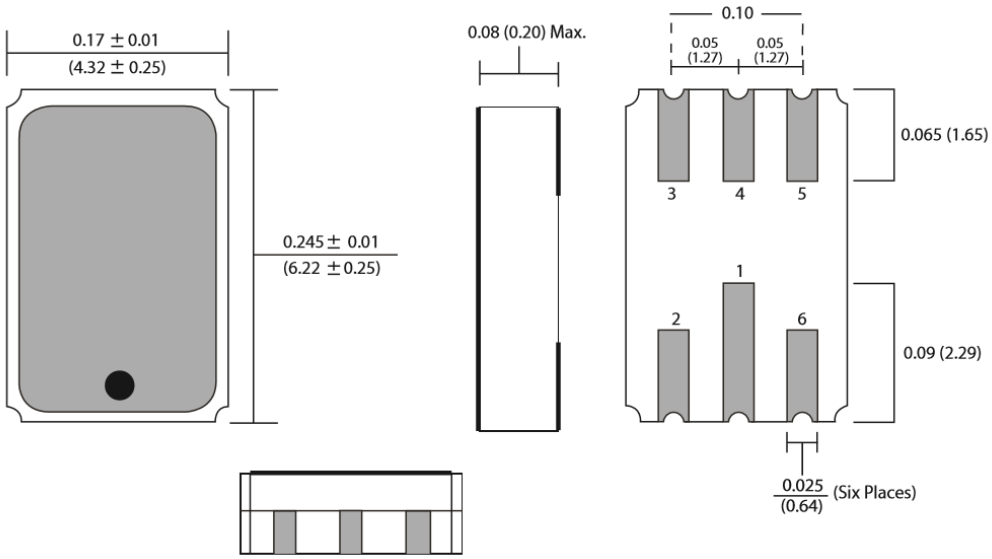

Figure 2. 4N2XU Package Dimensions

Absolute Maximum Rating at 25ºC (Note 1)

Symbol	*Parameters*	*Ratings*	*Units*	*Notes*
V_{DC}	Isolation voltage	-1000 to +1000	V	2
T_{OPR}	Operating temperature	-55 to +125	ºC	
T_{STG}	Storage temperature	-65 to +150	ºC	
T_{SOL}	Soldering temperature (10 seconds maximum)	240	ºC	
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	35	V	
V_{EC}	Emitter-Collector 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 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℃ *(unless otherwise specified)* (Note 1)

Emitter Characteristics

Symbol	*Parameters*	*Test Conditions*	*Min*	*Max*	*Units*	*Notes*
V_F	Forward Voltage	I_F= 10mA, T_A = -55°C	1.0	1.5	V	
		I_F= 10mA	0.8	1.3	V	
		I_F= 10mA, T_A = 100°C	0.7	1.2	V	
I_R	Reverse Current	V_R = 2V	-	100	µA	

Detector Characteristics

Symbol	*Parameters*		*Test Conditions*	*Min*	*Max*	*Units*	*Notes*
BV_{CEO}	Collector-Emitter Breakdown Voltage		I_{CE}= 1mA	35	-	V	
BV_{CBO}	Collector-Base Breakdown Voltage		I_{CB}= 100µA	35	-	V	
BV_{ECO}	Emitter-Collector Breakdown Voltage		I_{EC}= 100µA	4	-	V	
I_{C_ON}	Collector Current, On-state	4N22U	V_{CE}= 5V, I_F= 2mA	0.15	-	mA	
		4N23U		0.2	-		
		4N24U		0.4	-		
		4N22U	V_{CE}= 5V, I_F= 10mA	2.5	-	mA	
		4N23U		6.0	-		
		4N24U		10.0	-		
		4N22U	V_{CE}= 5V, I_F= 10mA, T_A= -55°C	1.0	-	mA	
		4N23U		2.5	-		
		4N24U		4.0	-		
		4N22U	V_{CE}= 5V, I_F=10mA, T_A= 100°C	1.0	-	mA	
		4N23U		2.5	-		
		4N24U		4.0	-		
I_{CB_ON}	Collector Base Current, On-state		V_{CB}= 5V, I_F= 10mA	30	-	µA	
I_{CE_OFF}	Collector-Emitter Dark Current, Off-state		V_{CE}= 20V	-	100	nA	
			V_{CE}= 20V, T_A= 100°C	-	100	µA	

Transfer Characteristics

Symbol	*Parameters*		*Test Conditions*	*Min*	*Max*	*Units*	*Notes*
$V_{CE(SAT)}$	Saturation Voltage	4N22U	I_F= 20mA, I_C= 2.5mA	-	0.3	V	
		4N23U	I_F= 20mA, I_C= 5.0mA	-	0.3	V	
		4N24U	I_F= 20mA, I_C= 10mA	-	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	4N22U	I_F= 10mA, V_{CC}= 10V, R_L= 100Ω	-	15	µs	
		4N23U		-	15		
		4N24U		-	20		
t_f	Fall Time	4N22U	I_F= 10mA, V_{CC}= 10V, R_L= 100Ω	-	15	µs	
		4N23U		-	15		
		4N24U		-	20		

Notes

1. Performance guaranteed only under conditions listed in above tables.
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.

Typical Characteristic Curves

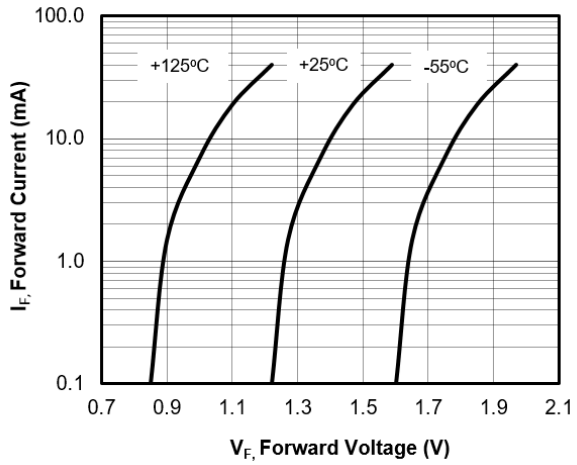

Figure 3. Forward Current vs Forward Voltage

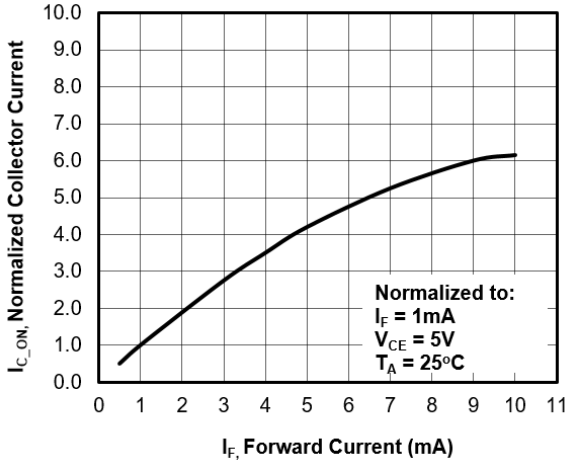

Figure 4. Collector Current vs Forward Current

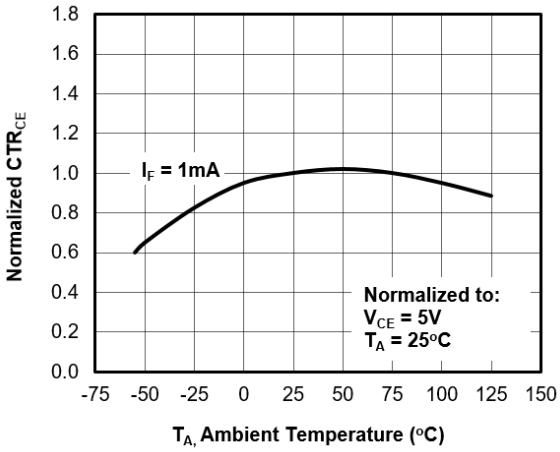

Figure 5. Normalized CTR_{CE} vs Temperature

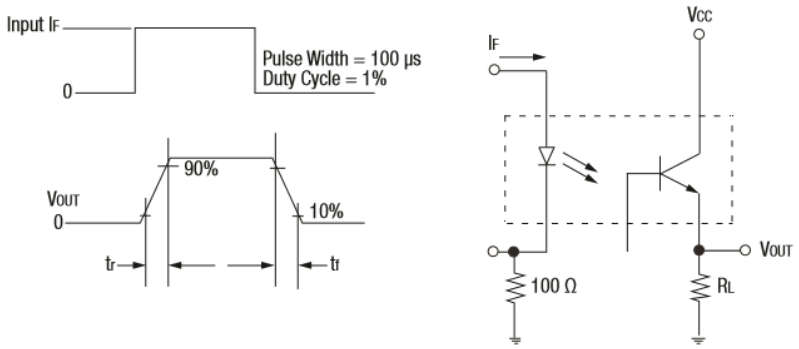

Figure 6. 4N2XU Switching Test Circuit

Ordering Information

Manufacturing Part Number	***Part Description***
4N22U	Radiation Tolerant Phototransistor Hermetic 6-pin LCC Package
4N23U	Radiation Tolerant Phototransistor Hermetic 6-pin LCC Package
4N24U	Radiation Tolerant Phototransistor Hermetic 6-pin LCC Package

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