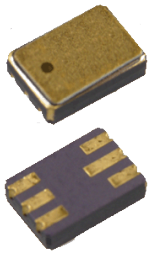
Surface Mount Optically Coupled Isolator

4N22U, 4N23U, 4N24U (TX, TXV)
4N47U, 4N48U, 4N49U (TX, TXV)



Features:

- Surface Mount (SM), Leadless Chip Carrier (LCC)
- 1 kV electrical isolation
- Base contact provided for conventional transistor biasing

Description:

Each isolator in this series consists of an infrared emitting diode and a NPN silicon phototransistor, which are mounted in a hermetically sealed Surface Mount, 6 Pin package. Devices are designed for military and/or harsh environments.

The 4N22U, 4N23U and 4N24U (TX, TXV) devices are processed to MIL-PRF-19500/486. The 4N47U, 4N48U and 4N48U (TX, TXV) devices are processed to MIL-PRF-19500/548.

Please contact your local representative or OPTEK for more information.

Applications:

- Military equipment
- High-Reliability environments
- High voltage isolation between input and output
- Electrical isolation in dirty environments
- Industrial equipment
- Medical equipment
- Office equipment

Ordering Information

Part Number	Isolation Voltage (kV)	I_F (mA) Typ / Max	V_{CE} (Volts) Max	Processing MIL-PRF-195000
4N22U	1	10 / 40	35	486
4N22UTX				
4N22UTXV				
4N23U				
4N23UTX				
4N23UTXV				
4N24U				
4N24UTX				
4N24UTXV				
4N47U			45	548
4N47UTX				
4N47UTXV				
4N48U				
4N48UTX				
4N48UTXV				
4N49U				
4N49UTX				
4N49UTXV				

General Note
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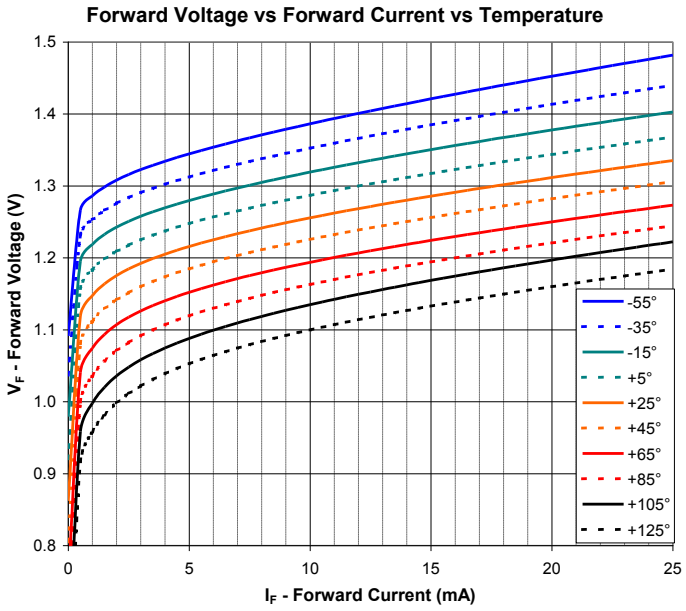
Surface Mount Optically Coupled Isolator

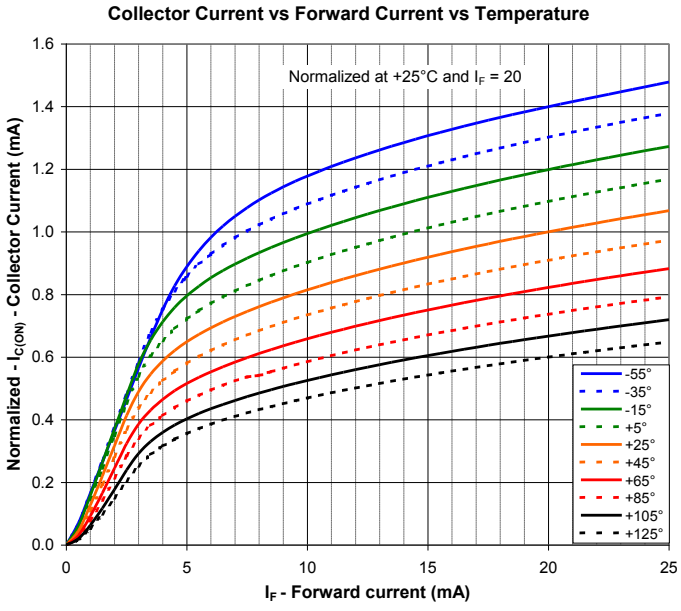
4N22U, 4N23U, 4N24U (TX, TXV)
4N47U, 4N48U, 4N49U (TX, TXV)

Absolute Maximum Ratings (T_A = 25° C unless otherwise noted)	
Storage Temperature	-65° C to +150° C
Operating Temperature	-55° C to +125° C
Input-to-Output Isolation Voltage(1)	± 1 kVDC
Lead Soldering Temperature (1/16" (1.6 mm) from case for 5 seconds with soldering iron)(2)	260° C
Input Diode	
Forward DC Current(3)	50 mA
Reverse DC Voltage	2 V
Power Dissipation(4)	100 mW
Output Photosensor	
Collector-Emitter Voltage	35 V
Emitter-Collector Voltage	7.0 V
Power Dissipation(5)	300 mW

Notes:

(1) Measured with input leads shorted together and output leads shorted together. Typical input/output capacitance is 0.06 pF.
(2) RMA flux is recommended. The duration can be extended to 10 seconds maximum when flow soldering.
(3) Derate linearly 0.67 mW/°C above 65°C.
(4) Derate linearly 0.83 mW/°C above 25°C.
(5) Derate linearly 1.67 mW/°C above 25°C.





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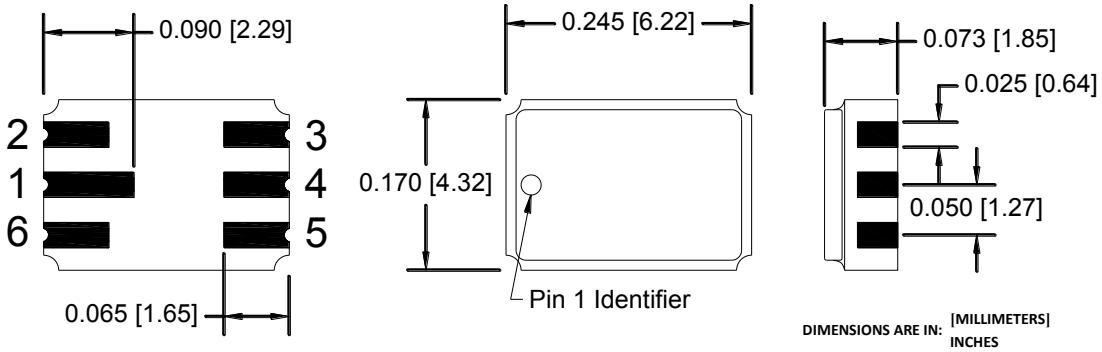
Surface Mount Optically Coupled Isolator

4N22U, 4N23U, 4N24U (TX, TXV)
4N47U, 4N48U, 4N49U (TX, TXV)

Electrical Characteristics (T_A = 25° C unless otherwise noted)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Input LED						
V_F	Forward Voltage 4N22U, 4N23U, 4N24U (TX, TXV) 4N22U, 4N23U, 4N24U (TX, TXV) 4N22U, 4N23U, 4N24U (TX, TXV) 4N47U, 4N48U, 4N49U (TX, TXV) 4N47U, 4N48U, 4N49U (TX, TXV) 4N47U, 4N48U, 4N49U (TX, TXV)	 0.80 1.00 0.70 0.80 1.00 0.70	 - - - - - -	 1.30 1.50 1.20 1.50 1.70 1.30	 V 	 I_F = 10.0 mA I_F = 10.0 mA, T_A = -55° C(1) I_F = 10.0 mA, T_A = -100° C(1) I_F = 10.0 mA I_F = 10.0 mA, T_A = -55° C(1) I_F = 10.0 mA, T_A = -100° C(1)
I_R	Reverse Current	-	-	100	µA	V_R = 2.0 V
Output Phototransistor						
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage 4N22U Series 4N47U Series	 35 40	 80 90	 - -	 V	 I_C = 100 µA, I_F = 0
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage 4N22U Series 4N47U Series	 4 7	 6 10	 - -	 V	 I_E = 100 µA, I_F = 0
I_{CEO}	Collector-Emitter Dark Current	- -	20 -	100 100	nA µA	V_{CE} = 20 V, I_F = 0 I_B= 0 T_A = 25°C V_{CE} = 20 V, I_F = 0 I_B= 0 T_A = 100°C
$V_{CE(SAT)}$	Collector Saturation Voltage	-	0.2	0.3	V	I_F = 20 mA, I_C = 2 mA

Notes:
(1) Measured with input leads shorted together and output leads shorted together. Typical input/output capacitance is 0.06 pF.



Pin #	LED	Pin #	Transistor
2	N/A	3	Collector
1	Anode	4	Base
6	Cathode	5	Emitter

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Surface Mount Optically Coupled Isolator

4N22U, 4N23U, 4N24U (TX, TXV)
4N47U, 4N48U, 4N49U (TX, TXV)

SYMBOL	PARAMETER	PART NUMBER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Coupled							
I_C/I_F	DC Current Transfer Ratio	4N22U	25	-	-	%	I_F = 10 mA, V_{CE} = 5 V
		4N23U	60	-	-		
		4N24U	100	-	-		
		4N47U	50	-	-	%	I_F = 2 mA, V_{CE} = 5 V
		4N48U	100	-	-		
		4N49U	200	-	-		
$I_{C(ON)}$	On-State Collector Current	4N22U	0.15	-	-	mA	V_{CE} = 10 V, I_B = 0, I_F = 2.0 mA T_A = 25°C
			2.50	-	-		V_{CE} = 10 V, I_B = 0, I_F = 10.0 mA T_A = 25°C
			1.00	-	-		V_{CE} = 10 V, I_B = 0, I_F = 10.0 mA T_A = -55°C
			1.00	-	-		V_{CE} = 10 V, I_B = 0, I_F = 10.0 mA T_A = 100°C
		4N23U	0.2	-	-	mA	V_{CE} = 10 V, I_B = 0, I_F = 2.0 mA T_A = 25°C
			6.0	-	-		V_{CE} = 10 V, I_B = 0, I_F = 10.0 mA T_A = 25°C
			2.5	-	-		V_{CE} = 10 V, I_B = 0, I_F = 10.0 mA T_A = -55°C
			2.5	-	-		V_{CE} = 10 V, I_B = 0, I_F = 10.0 mA T_A = 100°C
		4N24U	0.4	-	-	mA	V_{CE} = 10 V, I_B = 0, I_F = 2.0 mA T_A = 25°C
			10.0	-	-		V_{CE} = 10 V, I_B = 0, I_F = 10.0 mA T_A = 25°C
			4.0	-	-		V_{CE} = 10 V, I_B = 0, I_F = 10.0 mA T_A = -55°C
			4.0	-	-		V_{CE} = 10 V, I_B = 0, I_F = 10.0 mA T_A = 100°C
		4N47U	0.5	-	-	mA	V_{CE} = 5 V, I_B = 0, I_F = 1.0 mA T_A = 25°C
			0.7	-	-		V_{CE} = 5 V, I_B = 0, I_F = 2.0 mA T_A = -55°C
			0.5	-	-		V_{CE} = 5 V, I_B = 0, I_F = 2.0 mA T_A = 100°C
		4N48U	1.0	-	5.0	mA	V_{CE} = 5 V, I_B = 0, I_F = 1.0 mA T_A = 25°C
			1.4	-	-		V_{CE} = 5 V, I_B = 0, I_F = 2.0 mA T_A = -55°C
			1.0	-	-		V_{CE} = 5 V, I_B = 0, I_F = 2.0 mA T_A = 100°C
		4N49U	2.0	-	10.0	mA	V_{CE} = 5 V, I_B = 0, I_F = 1.0 mA T_A = 25°C
			2.8	-	-		V_{CE} = 5 V, I_B = 0, I_F = 2.0 mA T_A = -55°C
			2.0	-	-		V_{CE} = 5 V, I_B = 0, I_F = 2.0 mA T_A = 100°C
$V_{CE(SAT)}$	Collector Saturation Voltage	4N22U	-	-	0.3	V	I_C = 2.5 mA, I_B = 0, I_F = 20 mA
		4N23U	-	-	0.3		I_C = 5.0 mA, I_B = 0, I_F = 20 mA
		4N24U	-	-	0.3		I_C = 10.0 mA, I_B = 0, I_F = 20 mA
		4N47U	-	-	0.3	V	I_C = 0.5 mA, I_B = 0, I_F = 2.0 mA
		4N48U	-	-	0.3		I_C = 1.0 mA, I_B = 0, I_F = 2.0 mA
		4N49U	-	-	0.3		I_C = 2.0 mA, I_B = 0, I_F = 2.0 mA
h_{FE}	DC Current Gain	4N22U	200	-	-	-	V_{CE} = 5 V, I_C = 10 mA, I_F = 0 mA
		4N23U	300	-	-		
		4N24U	400	-	-		
		4N47U	100	-	-		
		4N48U	100	-	-		
		4N49U	100	-	-		
t_r & t_f	Rise and Fall Time	4N22U	-	-	15	µs	V_{CC} = 10 V, I_F = 10 mA, R_L = 100Ω, Pulse width = 100 ms, Duty cycle = 1%
		4N23U	-	-	15		
		4N24U	-	-	20		
		4N47U	-	-	20	µs	V_{CC} = 10 V, I_F = 5 mA, R_L = 100Ω, Pulse width = 100 ms, Duty cycle = 1%
		4N48U	-	-	20		
		4N49U	-	-	20		
R_{IO}	Resistance (Input to Output)		10^{11}	-	-	Ω	V_{I-O} = ±1,000 Vdc
C_{IO}	Capacitance (Input to Output)		-	-	5.0	pF	V_{I-O} = 0 Vdc, f = 1.0 MHz

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Electrical Characteristics (T_A = 25°C unless otherwise noted)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Coupled						
$I_{C(ON)}$	On-State Collector Current				mA	
	4N22U, 4N22U (TX, TXV)	0.15	-	-		I_F = 2.0 mA , V_{CE} = 5 V, I_B = 0
	4N22U, 4N22U (TX, TXV)	2.50	-	-		I_F = 10.0 mA , V_{CE} = 5 V, I_B = 0
	4N22U, 4N22U (TX, TXV)	1.00	-	-		I_F = 10.0 mA , V_{CE} = 5 V, I_B = 0, T_A = -55° C[1]
	4N22U, 4N22U (TX, TXV)	1.00	-	-		I_F = 10.0 mA , V_{CE} = 5 V, I_B = 0, T_A = 100° C[1]
	4N23U, 4N23U (TX, TXV)	0.20	-	-		I_F = 2.0 mA , V_{CE} = 5 V, I_B = 0
	4N23U, 4N23U (TX, TXV)	6.00	-	-		I_F = 10.0 mA , V_{CE} = 5 V, I_B = 0
	4N23U, 4N23U (TX, TXV)	2.50	-	-		I_F = 10.0 mA , V_{CE} = 5 V, I_B = 0, T_A = -55° C[1]
	4N23U, 4N23U (TX, TXV)	2.50	-	-		I_F = 10.0 mA , V_{CE} = 5 V, I_B = 0, T_A = 100° C[1]
	4N24U, 4N24U (TX, TXV)	0.40	-	-		I_F = 2.0 mA , V_{CE} = 5 V, I_B = 0
	4N24U, 4N24U (TX, TXV)	10.0	-	-		I_F = 10.0 mA , V_{CE} = 5 V, I_B = 0
	4N24U, 4N24U (TX, TXV)	4.00	-	-		I_F = 10.0 mA , V_{CE} = 5 V, I_B = 0, T_A = -55° C[1]
	4N24U, 4N24U (TX, TXV)	4.00	-	-		I_F = 10.0 mA , V_{CE} = 5 V, I_B = 0, T_A = 100° C[1]
	4N47U, 4N47U (TX, TXV)	0.50	-	-		I_F = 1.0 Ma, V_{CE} = 5.0 V, I_B = 0
	4N47U, 4N47U (TX, TXV)	0.70	-	-		I_F = 2.0 mA, V_{CE} = 5.0 V, I_B = 0, T_A = -55° C[1]
	4N47U, 4N47U (TX, TXV)	0.50	-	-		I_F = 2.0 mA, V_{CE} = 5.0 V, I_B = 0, T_A = 100° C[1]
	4N48U, 4N48U (TX, TXV)	1.00	-	5		I_F = 1.0 mA, V_{CE} = 5.0 V, I_B = 0
	4N48U, 4N48U (TX, TXV)	1.40	-	-		I_F = 2.0 mA, V_{CE} = 5.0 V, I_B = 0, T_A = -55° C[1]
	4N48U, 4N48U (TX, TXV)	1.00	-	-		I_F = 2.0 mA, V_{CE} = 5.0 V, I_B = 0, T_A = 100° C[1]
	4N49U, 4N49U (TX, TXV)	2.00	-	10		I_F = 1.0 mA, V_{CE} = 5.0 V, I_B = 0
	4N49U, 4N49U (TX, TXV)	2.80	-	-		I_F = 2.0 mA, V_{CE} = 5.0 V, I_B = 0, T_A = -55° C[1]
	4N49U, 4N49U (TX, TXV)	2.00	-	-		I_F = 2.0 mA, V_{CE} = 5.0 V, I_B = 0, T_A = 100° C[1]
$I_{CB(ON)}$	On-State Collector Base				µA	
	4N47U, 4N48U, 4N49U (TX, TXV)	30	-	-		V_{CB} = 5 V, I_E = 0, I_F = 10 mA
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage				V	
	4N22U, 4N23U, 4N24U (TX, TXV)	-	-	0.30		I_F = 20 mA , I_C = 2.5 mA, I_B = 0
	4N22U, 4N23U, 4N24U (TX, TXV)	-	-	0.30		I_F = 20 mA , I_C = 5.0 mA, I_B = 0
	4N22U, 4N23U, 4N24U (TX, TXV)	-	-	0.30		I_F = 20 mA , I_C = 10.0 mA, I_B = 0
	4N47U, 4N47U (TX, TXV)	-	-	0.30		I_F = 2.0 mA, I_C = 0.5 mA, I_B = 0
	4N48U, 4N48U (TX, TXV)	-	-	0.30		I_F = 2.0 mA, I_C = 1.0 mA, I_B = 0
	4N49U, 4N49U (TX, TXV)	-	-	0.30		I_F = 2.0 mA, I_C = 2.0 mA, I_B = 0
H_{FE}	DC Current Gain				V	
	4N22U, 4N22U (TX, TXV)	200	-	-		V_{CE} = 5.0 V , I_C = 10.0 mA, I_F = 0 mA
	4N23U, 4N23U (TX, TXV)	300	-	-		V_{CE} = 5.0 V , I_C = 10.0 mA, I_F = 0 mA
	4N24U, 4N24U (TX, TXV)	400	-	-		V_{CE} = 5.0 V , I_C = 10.0 mA, I_F = 0 mA
	4N47U, 4N48U, 4N49U (TX, TXV)	100	-	-		V_{CE} = 5.0 V , I_C = 10.0 mA, I_F = 0 mA
R_{IO}	Resistance (Input-to-Output)				Ω	
	4N22U, 4N23U, 4N24U (TX, TXV)	10^{11}	-	-		V_{I-O} = ± 1,000 VDC[2]
	4N47U, 4N48U, 4N49U (TX, TXV)	10^{11}	-	-		V_{I-O} = ± 1,000 VDC[2]
C_{IO}	Capacitance (Input-to-Output)	-	-	5	pF	V_{I-O} = 0 V, f = 1.0 MHz[2]

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AVIC JONHON

«JONHON» (основан в 1970 г.)

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FORSTAR®

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