MTL4N47U-MTL4N48U-MTL4N49U

SINGLE CHANNEL OPTOCOUPLER

MINCO TECHNOLOGY LABS. INC.

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 ***MTL4N47U, MTL4N48U, MTL4N49U*** are very high gain optocouplers that utilizes a GaAlAs infrared LED optically coupled to an N-P-N silicon phototransistor packaged in a hermetically sealed 6-pin leadless chip carrier. The 4N47U, 4N48U and 4N49U optocouplers can be supplied to customer specifications as well as tested and screened in accordance with MIL-PRF-19500 to JANTX level.

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 tw ≤1µs, 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 mW/°C above 65°C.
2. Derate linearly to 125°C free-air temperature at the rate of 3 mW/°C.

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
MTL4N47U.001X	Single Channel Commercial (4N47U) Optocoupler (0° to +70°C operating temperature range)
MTL4N47U.002X	Single Channel Commercial (4N47U) Optocoupler (-40° to +85°C operating temperature range)
MTL4N47U.003X	Single Channel Commercial (4N47U) Optocoupler (-55° to 125°C operating temperature range)
MTL4N47U.004X	Single Channel (4N47U) Optocoupler Screened to JANTX level (-55° to 125°C operating temperature range)
MTL4N48U.001X	Single Channel Commercial (4N48U) Optocoupler (0° to +70°C operating temperature range)
MTL4N48U.002X	Single Channel Commercial (4N48U) Optocoupler (-40° to +85°C operating temperature range)
MTL4N48U.003X	Single Channel Commercial (4N48U) Optocoupler (-55° to 125°C operating temperature range)
MTL4N48U.004X	Single Channel (4N48U) Optocoupler Screened to JANTX level (-55° to 125°C operating temperature range)
MTL4N49U.001X	Single Channel Commercial (4N49U) Optocoupler (0° to +70°C operating temperature range)
MTL4N49U.002X	Single Channel Commercial (4N49U) Optocoupler (-40° to +85°C operating temperature range)
MTL4N49U.003X	Single Channel Commercial (4N49U) Optocoupler (-55° to 125°C operating temperature range)
MTL4N49U.004X	Single Channel (4N49U) Optocoupler Screened to JANTX level (-55° to 125°C operating temperature range)

NOTE: X at end of part number represents lead finish. Replace with A for gold and S for solder

MTL4N47U, MTL4N48U, MTL4N49U

SINGLE CHANNEL OPTOCOUPLER

ELECTRICAL CHARACTERISTICS

T_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		1.7	V	I_F = 10mA	
Input Diode Static Forward Voltage +25°C	V_F	0.8		1.5	V	I_F = 10mA	
Input Diode Static Forward Voltage +100°C	V_F	0.7		1.3	V	I_F = 10mA	

OUTPUT TRANSISTOR

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 +25°C	$I_{C(OFF)}$			100	nA	V_{CE} = 20V, I_F = 0mA, I_B = 0	
+100°C	$I_{C(OFF)}$			100	µA	V_{CE} = 20V, I_F = 0mA, I_B = 0	

COUPLED CHARACTERISTICS

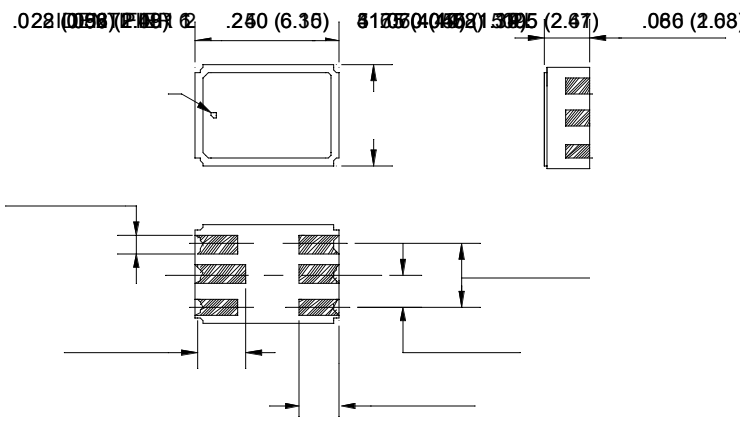
PARAMETER		SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
On State Collector Current +25°C	MTL4N47U	$I_{C(ON)}$	0.5			mA	V_{CE} = 5V, I_F = 1mA	
	MTL4N48U		1		5			
	MTL4N49U		2.0		10			
On State Collector Current +100°C	MTL4N47U	$I_{C(ON)}$	0.5			mA	V_{CE} = 5V, I_F = 2mA	
	MTL4N48U		1.0					
	MTL4N49U		2.0					
On State Collector Current -55°C	MTL4N47U	$I_{C(ON)}$	0.7			mA	V_{CE} = 5V, I_F = 2mA	
	MTL4N48U		1.4					
	MTL4N49U		2.8					
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/Fall Time-Phototransistor Operation	MTL4N47U	t_r,t_f		10	20	µs	V_{CC} = 10V, I_F = 5mA, R_L = 100Ω, I_B = 0	
	MTL4N48U			10	25			
	MTL4N49U			10	25			
Rise/Fall Time-Photodiode Operation	MTL4N47U	t_r/t_f			0.85	µs	V_{CC} = 10V, I_F = 5mA, R_L = 100Ω, I_E = 0	
	MTL4N48U				0.85			
	MTL4N49U				0.85			

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%).

Package Dimensions



Schematic Diagram