

# MTL4N22 MTL4N23 MTL4N24

## SINGLE CHANNEL OPTOCOUPLER



**MINCO**  
TECHNOLOGY LABS, INC.

### Features:

- Overall current gain ... 1.5 typical
- Base lead provided for conventional transistor biasing
- Rugged package
- High gain, high voltage transistor
- +1kV electrical isolation

### Applications:

- Eliminate ground loops
- Level shifting
- Line receiver
- Switching power supplies
- Motor control

### DESCRIPTION:

The **MTL4N22-4's** are very high gain optocouplers that utilize a GaAlAs infrared LED optically coupled to an N-P-N silicon phototransistor packaged in a hermetically sealed T0-5 package. The MTL4N22, MTL4N23 and MTL4N24 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 .....	4V
Collector-Emitter Voltage (Value applies to emitter-base open-circuited & the input-diode equal to zero).....	35V
Collector-Base Voltage .....	35V
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 $t_w \leq 1\mu s$ , 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 <sub>FL</sub>	0	1	μA
Input Current, High Level	I <sub>FH</sub>	2	10	mA
Supply Voltage	V <sub>CE</sub>	5	10	V

### SELECTION GUIDE

PART NUMBER	PART DESCRIPTION
MTL4N22.001X	Single Channel Commercial Optocoupler (0° to +70°C operating temperature range)
MTL4N22.002X	Single Channel Commercial Optocoupler (-40° to +85°C operating temperature range)
MTL4N22.003X	Single Channel Commercial Optocoupler (-55° to 125°C operating temperature range)
MTL4N22.004X	Single Channel Optocoupler Screened to JANTX level (-55° to 125°C operating temperature range)
MTL4N23.001X	Single Channel Commercial Optocoupler (0° to +70°C operating temperature range)
MTL4N23.002X	Single Channel Commercial Optocoupler (-40° to +85°C operating temperature range)
MTL4N23.003X	Single Channel Commercial Optocoupler (-55° to 125°C operating temperature range)
MTL4N23.004X	Single Channel Optocoupler Screened to JANTX level (-55° to 125°C operating temperature range)
MTL4N24.001X	Single Channel Commercial Optocoupler (0° to +70°C operating temperature range)
MTL4N24.002X	Single Channel Commercial Optocoupler (-40° to +85°C operating temperature range)
MTL4N24.003X	Single Channel Commercial Optocoupler (-55° to 125°C operating temperature range)
MTL4N24.004X	Single Channel 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.

# MTL4N22, MTL4N23 & MTL4N24

SINGLE CHANNEL OPTOCOUPLER

## ELECTRICAL CHARACTERISTICS

T<sub>A</sub> = 25°C unless otherwise specified.

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
Input Diode Static Reverse Current	I <sub>R</sub>			100	µA	V <sub>R</sub> = 2V	
Input Diode Static Forward Voltage -55°C	V <sub>F</sub>	1.0		1.5	V	I <sub>F</sub> = 10mA	
Input Diode Static Forward Voltage +25°C	V <sub>F</sub>	0.8		1.3	V	I <sub>F</sub> = 10mA	
Input Diode Static Forward Voltage +100°C	V <sub>F</sub>	0.7		1.2	V	I <sub>F</sub> = 10mA	

## OUTPUT TRANSISTOR

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	35			V	I <sub>C</sub> = 100µA, I <sub>B</sub> = 0, I <sub>F</sub> = 0	
Collector-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	35			V	I <sub>C</sub> = 1mA, I <sub>B</sub> = 0, I <sub>F</sub> = 0	
Emitter-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	4			V	I <sub>C</sub> = 0mA, I <sub>E</sub> = 100µA, I <sub>F</sub> = 0	
Off-State Collector Current +25°C	I <sub>C(OFF)</sub>			100	nA	V <sub>CE</sub> = 20V, I <sub>F</sub> = 0mA, I <sub>B</sub> = 0	
Off-State Collector Current +100°C	I <sub>C(OFF)</sub>			100	µA	V <sub>CE</sub> = 20V, I <sub>F</sub> = 0mA, I <sub>B</sub> = 0	

## COUPLED CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS	NOTE
On State Collector Current MTL4N22	I <sub>C(ON)</sub>	0.15			mA	V <sub>CE</sub> = 5V, I <sub>F</sub> = 2mA	
On State Collector Current MTL4N23		0.2					
On State Collector Current MTL4N24		0.4					
On State Collector Current MTL4N22	I <sub>C(ON)</sub>	2.5			mA	V <sub>CE</sub> = 5V, I <sub>F</sub> = 10mA	
On State Collector Current MTL4N23		6					
On State Collector Current MTL4N24		10					
On State Collector Current -55°C & +100°C	I <sub>C(ON)</sub>	1			mA	V <sub>CE</sub> = 5V, I <sub>F</sub> = 10mA	
On State Collector Current MTL4N23		2.5					
On State Collector Current MTL4N24		4					
Collector-Emitter Saturation Voltage MTL4N22	V <sub>CE(SAT)</sub>			0.3	V	I <sub>F</sub> = 20mA, I <sub>C</sub> = 2.5mA, I <sub>B</sub> = 0	
Collector-Emitter Saturation Voltage MTL4N23	V <sub>CE(SAT)</sub>			0.3	V	I <sub>F</sub> = 20mA, I <sub>C</sub> = 5mA, I <sub>B</sub> = 0	
Collector-Emitter Saturation Voltage MTL4N24	V <sub>CE(SAT)</sub>			0.3	V	I <sub>F</sub> = 20mA, I <sub>C</sub> = 10mA, I <sub>B</sub> = 0	
Input to Output Internal Resistance	R <sub>IO</sub>	10 <sup>11</sup>				V <sub>IN-OUT</sub> = 1kV	1
Input to Output Capacitance	C <sub>IO</sub>			5	pF	f = 1MHz, V <sub>IN-OUT</sub> = 1kV	1
Rise Time-Phototransistor Operation MTL4N22	t <sub>r</sub>			15	µs	V <sub>CC</sub> = 10V, I <sub>F</sub> = 10mA, R <sub>L</sub> = 100Ω,	
Rise Time-Phototransistor Operation MTL4N23		15					
Rise Time-Phototransistor Operation MTL4N24		20					
Fall Time-Phototransistor Operation MTL4N22	t <sub>f</sub>			15	µs	V <sub>CC</sub> = 10V, I <sub>F</sub> = 10mA, R <sub>L</sub> = 100Ω,	
Fall Time-Phototransistor Operation MTL4N23		15					
Fall Time-Phototransistor Operation MTL4N24		20					

### NOTES:

- These parameters are measured between all phototransistor leads shorted together and with both input diode leads shorted together.

### Package Dimensions



NOTE: ALL LINEAR DIMENSIONS ARE IN INCHES (MILLIMETERS)

### Schematic Diagram

