# *MTL6400U*

**SINGLE CHANNEL OPTOCOUPLER**

**(Electrically similar to 6N140)**

MINCO
TECHNOLOGY LABS, INC.

| **Features:** | **Applications:** |
|---|---|
| • High Reliability<br>• High Current Ration: 300% Typical<br>• Rugged surface mount package<br>• Low Input current requirement: 0.5mA<br>• +1.5kV electrical isolation | • Military and Space<br>• Level shifting<br>• Line receiver<br>• Switching power supplies<br>• Communication Systems |

**DESCRIPTION**

The ***MTL6400U*** contains a gallium aluminum arsenide LED optically coupled to a silicon photodarlington detector. The optocoupler is built in a 6-pin leadless chip carrier. This optocoupler is capable of transmitting signals between two galvanic sources. The potential difference between transmitter and receiver should not go over the maximum isolation voltage. Also available screened to MIL-STD-883.

**ABSOLUTE MAXIMUM RATINGS**

**Input Diode**

Peak Forward Input Current (Value applies for tw ≤ 1ms, 500 pps) ..... 20mA
Average Input Current, $I_F$ (Note 1)..... 10mA
Reverse Input Voltage, $V_R$..... 5V

**Output Photodetector**

Output Current, $I_O$..... 40mA
Output Voltage, $V_O$..... -0.5V to 18V
Supply Voltage, $V_{CC}$..... -0.5V to 20V
Output Power Dissipation (Note 2)..... 75mW

Storage Temperature..... -65°C to +150°C
Operating Free-Air Temperature Range..... -55°C to +125°C
Lead Solder Temperature (vapor phase reflow for 30 sec.) ..... 215°C

**Notes:**

1. Derate $I_F$ at 0.66mA/°C above 110°C
2. Output power is collector output power plus one half of the total supply power. Derate at 5mW/°C above 110°C.

**RECOMMENDED OPERATING CONDITIONS:**

| PARAMETER | SYMBOL | MIN | MAX | UNITS |
|---|---|---|---|---|
| Input Current, Low Level | $I_{FL}$ | 0 | 1 | µA |
| Input Current, High Level | $I_{FH}$ | 0.5 | 5 | mA |
| Supply Voltage | $V_{CE}$ | 5 | 18 | V |
| Operating Temperature | $T_A$ | -55 | 125 | °C |

**SELECTION GUIDE**

| PART NUMBER | PART DESCRIPTION |
|---|---|
| MTL64X0U.001.X | Single Channel optocoupler, commercial (0° to+70°C operating temperature range) |
| MTL64XOU.002.X | Single Channel optocoupler, commercial (-40° to +85°C operating temperature range) |
| MTL64X0U.003.X | Single Channel optocoupler, commercial (-55° to +125 operating temperature range) |
| MTL64X0U.004.X | Single Channel optocoupler, w/100% device screening -55° to +125°Coperating temperature range) |

**NOTE: Replace first X with 0 or 2 to indicate type of part required.**
**X at end of part number represents lead finish. Replace with A for gold or S for solder.**

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## ELECTRICAL CHARACTERISTICS

### INPUT DIODE

$T_A$ = 25°C unless otherwise specified.

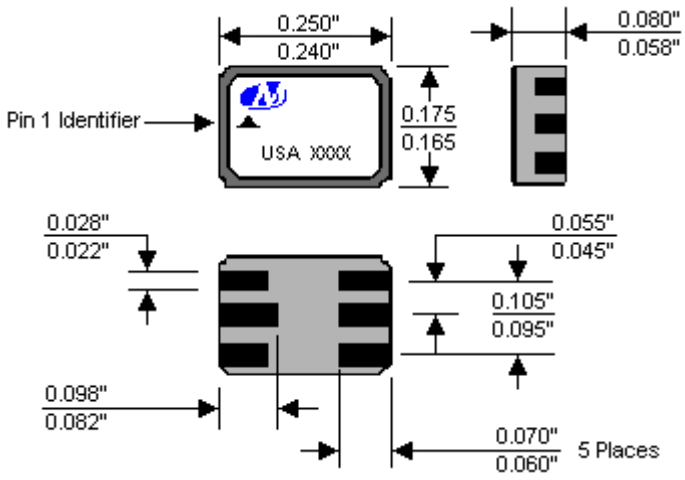
| PARAMETER | SYMBOL | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| Input Reverse Breakdown Voltage | $BV_R$ | 5 | | | V | $I_R$ = 10µA |
| Input Diode Static Forward Voltage | $V_F$ | | | 1.8 | V | $I_F$ = 1.6mA |
| Input Diode Static Forward Voltage -55°C | $V_F$ | | 1.5 | 1.8 | V | $I_F$ = 1.6mA |
| Input Diode Static Forward Voltage +100°C | $V_F$ | | 1.2 | 1.8 | V | $I_F$ = 1.6mA |

### COUPLED CHARACTERISTICS

$T_A$ = 25°C unless otherwise specified.

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNITS | TEST CONDITIONS |
|---|---|---|---|---|---|---|
| Current Transfer Ration | CTR | 300 | 1500 | | % | $I_F$ = 0.5mA, $V_O$ = 0.4V, $V_{CC}$ = 4.5V |
| | | 300 | 1000 | | % | $I_F$ = 1.6mA, $V_O$ = 0.4V, $V_{CC}$ = 4.5V |
| | | 200 | 500 | | % | $I_F$ = 5.0mA, $V_O$ = 0.4V, $V_{CC}$ = 4.5V |
| Logic Low Output Voltage | $V_{OL}$ | | 0.1 | 0.4 | V | $I_F$ = 0.5mA, $I_{OL}$ = 1.5mA, $V_{CC}$ = 4.5V |
| Logic Low Output Voltage | $V_{OL}$ | | 0.2 | 0.4 | V | $I_F$ = 0.5mA, $I_{OL}$ = 10mA, $V_{CC}$ = 4.5V |
| Logic High Output Current | $I_{OH}$ | | 0.01 | 250 | µA | $V_O$ = $V_{CC}$ = 18V |
| Logic Low Supply Current | $I_{CCL}$ | | 0.4 | 1.0 | mA | $I_F$ = 1.6mA, $V_{CC}$ = 18V |
| Logic High Supply Current | $I_{CCH}$ | | 0.01 | 10 | µA | $I_F$ = 0mA, $V_{CC}$ = 18V |
| Input-Output Insulation Leakage Current | $I_{I-O}$ | | | 1.0 | µA | 45% Relative Humidity, $T_A$ = 25°C<br>t = 5 sec, $V_{I-O}$ = 1500Vdc |
| Resistance (Input-Output) | $R_{I-O}$ | $10^{12}$ | | | Ω | $V_{IN-OUT}$ = 500V |
| Input to Output Capacitance | $C_{IO}$ | | 1.5 | | pF | f = 1MHz, $T_A$ = 25°C |
| Propagation Delay Time to High Output Level | $t_{PLH}$ | | 6.0 | 60 | µs | $V_{CC}$ = 5V, $I_F$ = 0.5mA, $R_L$ = 4.7kΩ |
| | | | 4.0 | 20 | µs | $V_{CC}$ = 5V, $I_F$ = 5mA, $R_L$ = 680Ω |
| Propagation Delay Time to Low Output Level | $t_{PHL}$ | | 30 | 100 | µs | $V_{CC}$ = 5V, $I_F$ = 0.5mA, $R_L$ = 4.7kΩ |
| | | | 2.0 | 5.0 | µs | $V_{CC}$ = 5V, $I_F$ = 5mA, $R_L$ = 680Ω |
| Common Mode Transient Immunity At High Output Level | $CM_H$ | 500 | 1000 | | V/µs | $V_{CM}$ = 50$V_{P-P}$, $V_{CC}$ = 5.0V<br>$R_L$ = 1.5KΩ, $I_F$ = 0mA |
| Common Mode Transient Immunity At Low Output Level | $CM_L$ | 500 | 1000 | | V/µs | $V_{CM}$ = 50$V_{P-P}$, $V_{CC}$ = 5.0V<br>$R_L$ = 1.5KΩ, $I_F$ = 1.69mA |

**Package Dimensions**




**Schematic Diagram**