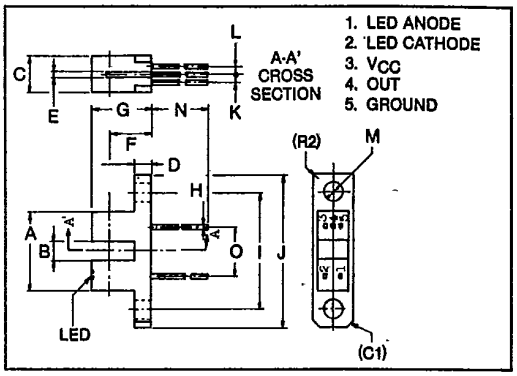
# SLOTTED SWITCH

T-41-73

## MTSS10000
## INFRARED LED+ PHOTO IC

MTSS10000 contains a gallium arsenide infrared emitting diode coupled to a monolithic integrated circuit, which incorporates a photodiode, a linear amplifier and a Schmitt trigger on a single silicon chip.




### APPLICATIONS

- OPTICAL SWITCH
- SHAFT POSITION AND VELOCITY SENSOR

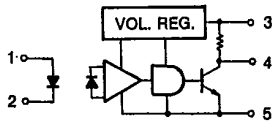
### FEATURES

- TTL, LSTTL compatible.
- Wide supply voltage ($V_{CC}$=4.5~16V)
- Non sensitivity for visible light.
- High speed ($t_{on}$ 3$\mu$s, $t_{off}$ 5$\mu$s typ.)
- Output terminal contains a high voltage limiting diode.

| SYMBOL | INCHES | MM |
|---|---|---|
| A | 0.512±0.010 | 13±0.25 |
| B | 0.118±0.010 | 3±0.25 |
| C | 0.244 | 6.2 |
| D | 0.098±0.010 | 2.5±0.25 |
| E | 0.039 | 1.0 |
| F | 0.270±0.012 | 6.85±0.3 |
| G | 0.394±0.010 | 10±0.25 |
| H | 0.197±0.018 | 5±0.45 |
| I | 0.748±0.010 | 19±0.25 |
| J | 0.984 | 25.0 |
| K | 0.075 | 1.9 |
| L | 0.075 | 1.9 |
| M | 0.130 | 3.3 |
| N | 0.709 MIN | 18 MIN |
| O | 0.300 | 7.62 |

### MAXIMUM RATINGS (Ta = 25°C)

| | CHARACTERISTIC | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| A | Forward Current | $I_F$ | 50 | mA |
| A | Reverse Voltage | $V_R$ | 5 | V |
| A | Forward Current Derating | $\Delta I_F$/°C | -0.67 | mA/°C |
| B | Supply Voltage | $V_{CC}$ | 16 | V |
| B | Low Level Output Current | $I_{OL}$ | 50 | mA |
| B | Total Output Power Dissipation | $P_O$ | 250 | mW |
| | Operating Temperature Range | $T_{opr}$ | -25~85 | °C |
| | Storage Temperature Range | $T_{stg}$ | -40~100 | °C |
| | Soldering Temperature and Time | $T_{sol}$ | 260°C, 3sec | |




### RECOMMENDED OPERATING CONDITIONS

| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|
| Supply Voltage | $V_{CC}$ | 4.5 | 5 | NOTE | V |
| Forward Current | $I_F$ | 11 | 13 | 15 | mA |
| Operating Temperature | $T_{opr}$ | 0 | — | 70 | °C |

Note: Limited by total output power dissipation.

A - LED B - DETECTOR

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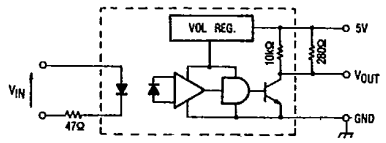
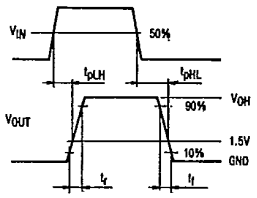
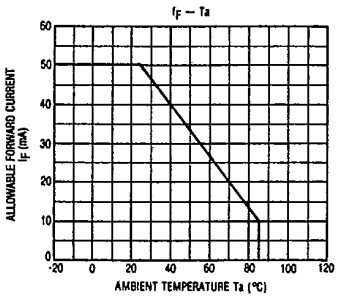
## OPTO-ELECTRICAL CHARACTERISTICS (Ta=25°C)
## (Over recommended temperature Ta=0~70°C unless otherwise noted.)

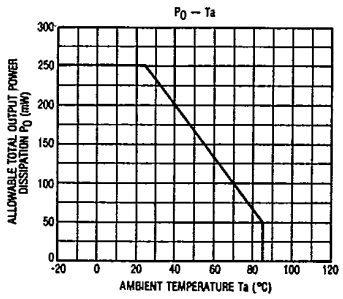
| | CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|---|
| A | Forward Voltage | | $V_F$ | $I_F$=8mA | — | 1.15 | 1.4 | V |
| | Reverse Current | | $I_R$ | $V_R$=5V, Ta=25°C | — | — | 10 | μA |
| | Capacitance | | $C_T$ | V=0, f=1MHz, Ta=25°C | — | 30 | — | pF |
| B | Supply Voltage | | $V_{CC}$ | Ta=25°C | 4.5 | — | 16 | V |
| | Low Level Supply Current | | $I_{CCL}$ | $V_{CC}$=5V, $I_F$=0 | — | 6 | 15 | mA |
| | High Level Supply Current | | $I_{CCH}$ | $V_{CC}$=5V, $I_F$=8mA | — | 4 | 10 | mA |
| | Low Level Output Voltage | | $V_{OL}$ | $I_{OL}$=16mA, $V_{CC}$=5V, $I_F$=0 | — | 0.15 | 0.4 | V |
| | High Level Output Voltage | | $V_{OH}$ | $V_{CC}$=5V, $I_F$=8mA | 4.0 | — | — | V |
| | 'H→L' LED Threshold Current | | $I_{FLH}$ | $V_{CC}$=5V, Ta=25°C | — | 2 | 5 | mA |
| | | | | $V_{CC}$=5V | — | — | 8 | mA |
| | Hysteresis Ratio | | $I_{FHL}/I_{FLH}$ | $V_{CC}$=5V | — | 0.9 | — | — |
| C | Propagation Delay | L→H | $t_{PLH}$ | Ta=25°C | — | 3 | — | μS |
| | (NOTE) | H→L | $t_{PHL}$ | $V_{CC}$=5V, $I_F$=0←→8mA | — | 5 | — | |
| | Rise Time (NOTE) | | $t_r$ | $R_L$=280Ω | — | 0.1 | — | |
| | Fall Time (NOTE) | | $t_f$ | (NOTE) | — | 0.05 | — | |

Note: Switching time test circuit and voltage waveform.
A - LED B - DETECTOR C - COUPLED



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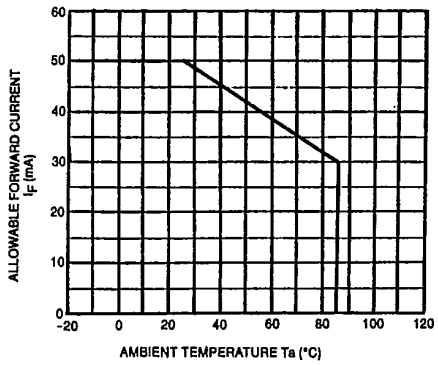
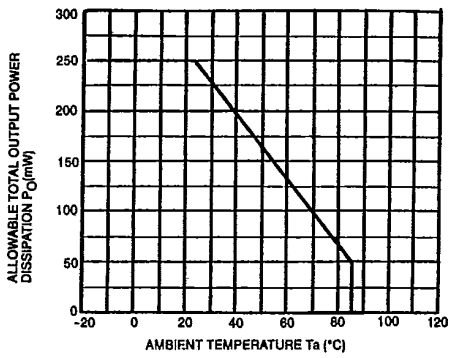
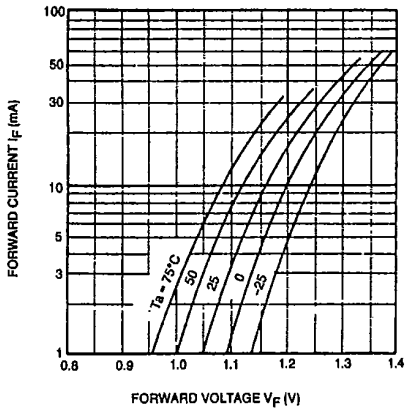
$I_F - Ta$



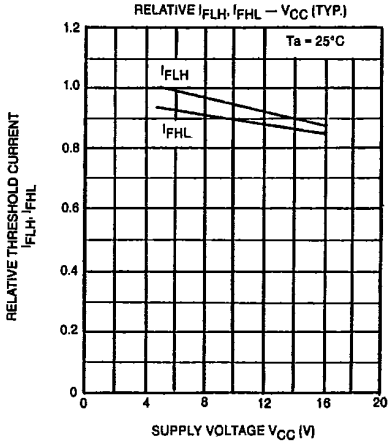

$P_O - Ta$



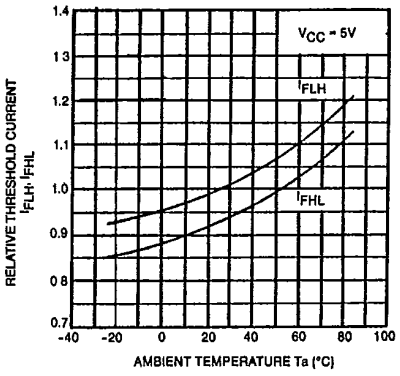

$I_F - V_F$ (TYP.)



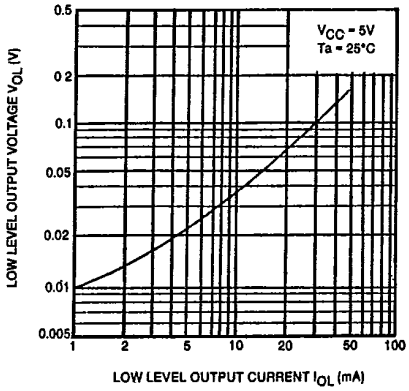

RELATIVE $I_{FLH}$, $I_{FHL} - V_{CC}$ (TYP.)




RELATIVE $I_{FLH}$, $I_{FHL} - Ta$ (TYP.)




$V_{OL} - I_{OL}$ (TYP.)



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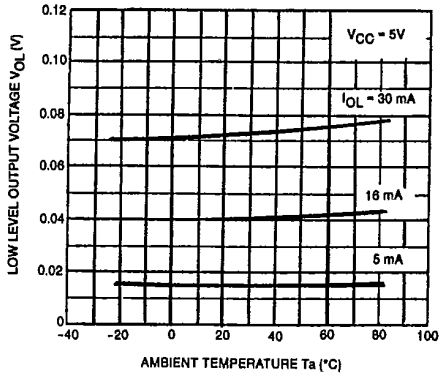
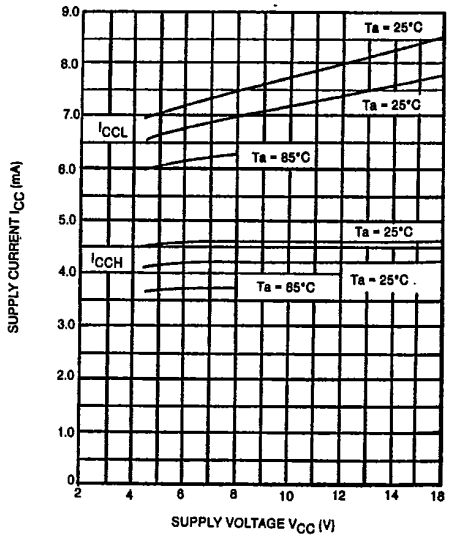
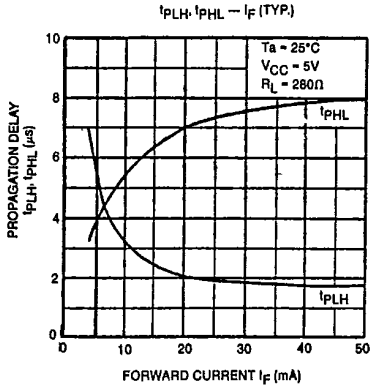
$V_{OL}$ — Ta (TYP.)




$I_{CC}$ — $V_{CC}$ (TYP.)




$t_{PLH}$, $t_{PHL}$ — $I_F$ (TYP.)




$t_r$, $t_f$ — $R_L$ (TYP.)