



# CTM600, CTM601, CTM611

## 10Mbit/s 5-Pin Mini-Flat Logic Gate Optocoupler

### Features

- High speed 10MBit/s
- High isolation voltage between input and output (Viso=3750 Vrms )
- Guaranteed CTR performance from 0°C to 70°C
- Wide operating temperature range of -40°C to 85°C
- Green Package
- Regulatory Approvals
  - UL - UL1577 (E364000)
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC – GB4943.1, GB8898
  - IEC60065, IEC60950

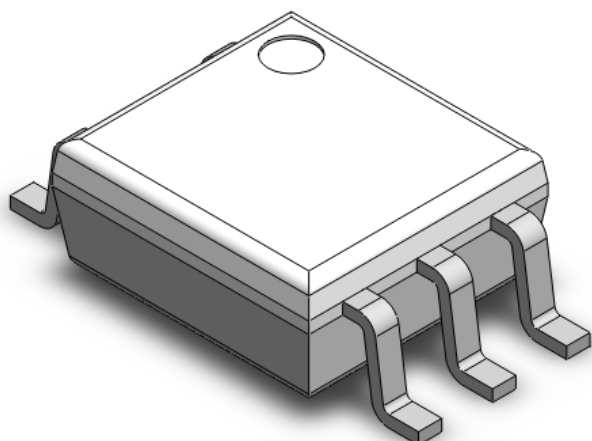
### Description

The CTM600, CTM601, and CTM611 optocouplers consist of an AlGaAs LED, optically coupled to a very high speed integrated photo-detector logic gate with a strobe able output. The switching parameters are guaranteed over the temperature range of -40°C to +85°C. A maximum input signal of 5mA will provide a minimum output sink current of 13mA (fan out of 8).

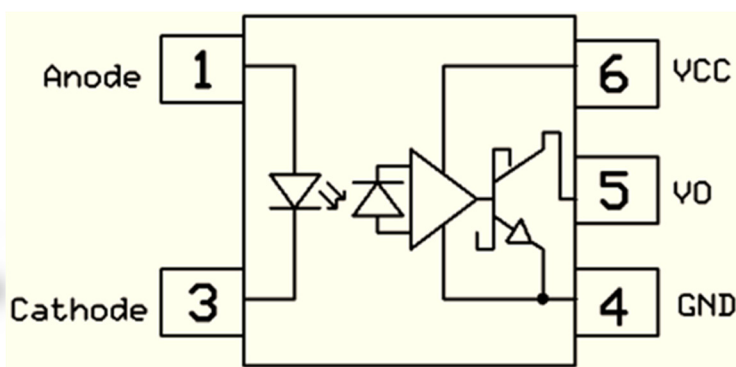
### Applications

- Line receivers
- Telecommunication equipment
- High speed logic ground isolation
- Feedback loop in switch-mode power supplies
- Home appliances

### Package Outline



### Schematic



Note: Different bending options available. See package dimension.



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### Absolute Maximum Rating at 25°C

| <i>Symbol</i>         | <i>Parameters</i>                        | <i>Ratings</i> | <i>Units</i>     | <i>Notes</i> |
|-----------------------|--|----------------|------------------|--------------|
| V <sub>ISO</sub>      | Isolation voltage                        | 3750           | V <sub>RMS</sub> | <b>1</b>     |
| T <sub>OPR</sub>      | Operating temperature                    | -40 ~ +85      | °C               |              |
| T <sub>STG</sub>      | Storage temperature                      | -55 ~ +150     | °C               |              |
| T <sub>SOL</sub>      | Soldering temperature                    | 260            | °C               | <b>2</b>     |
| <b>Emitter</b>        |  |                |                  |              |
| I <sub>F</sub>        | Forward current                          | 25             | mA               |              |
| I <sub>FP</sub>       | Peak forward current (50% duty, 1ms P.W) | 50             | mA               |              |
| I <sub>F(TRANS)</sub> | Peak transient current (≤1μs P.W,300pps) | 1              | A                |              |
| V <sub>R</sub>        | Reverse voltage                          | 5              | V                |              |
| P <sub>D</sub>        | Power dissipation                        | 45             | mW               |              |
| <b>Detector</b>       |  |                |                  |              |
| P <sub>D</sub>        | Power dissipation                        | 100            | mW               |              |
| I <sub>O(AVG)</sub>   | Average Output current                   | 8              | mA               |              |
| I <sub>O(Peak)</sub>  | Peak Output current                      | 16             | mA               |              |
| V <sub>O</sub>        | Output voltage                           | -0.5 to 20     | V                |              |
| V <sub>CC</sub>       | Supply voltage                           | -0.5 to 30     | V                |              |

#### Notes

1. AC for 1 minute, RH = 40 ~ 60%.
2. For 10 second peak



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### Electrical Characteristics

$T_A = 0 - 70^\circ\text{C}$  (unless otherwise specified). Typical values are measured at  $T_A = 25^\circ\text{C}$  and  $V_{CC}=5\text{V}$

#### Emitter Characteristics

| Symbol                  | Parameters                                 | Test Conditions      | Min | Typ  | Max | Units | Notes |
|-------------------------|--|----------------------|-----|------|-----|-------|-------|
| $V_F$                   | Forward voltage                            | $I_F = 10\text{mA}$  | -   | 1.4  | 1.6 | V     |       |
| $V_R$                   | Reverse Voltage                            | $I_R = 5\mu\text{A}$ | 5.0 | -    | -   | V     |       |
| $\Delta V_F/\Delta T_A$ | Temperature coefficient of forward voltage | $I_F = 10\text{mA}$  | -   | -1.6 | -   | mV/°C |       |

#### Detector Characteristics

| Symbol    | Parameters                | Test Conditions  | Min | Typ | Max | Units | Notes |
|-----------|---------------------------|--|-----|-----|-----|-------|-------|
| $I_{CCL}$ | Logic Low Supply Current  | $I_F = 10\text{mA}$ , $V_O = \text{Open}$ , $V_{CC} = 5\text{V}$ | -   | 9   | 13  | mA    |       |
| $I_{CCH}$ | Logic High Supply Current | $I_F = 0\text{mA}$ , $V_O = \text{Open}$ , $V_{CC} = 5\text{V}$  | -   | 6   | 9   | mA    |       |

#### Transfer Characteristics

| Symbol   | Parameters                | Test Conditions  | Min | Typ  | Max | Units         | Notes |
|----------|---------------------------|--|-----|------|-----|---------------|-------|
| $I_{OH}$ | Logic High Output Current | $I_F = 250\mu\text{A}$ , $V_O = 5.5\text{V}$ ,                         |     | 2    | 100 | $\mu\text{A}$ |       |
| $I_{FT}$ | Input Threshold Current   | $V_{CC} = 5.5\text{V}$ , $V_O = 0.6\text{V}$ ,<br>$I_O = 13\text{mA}$  | -   | 3.3  | 5   | mA            |       |
| $V_{OL}$ | Logic Low Output Voltage  | $I_F = 5\text{mA}$ , $I_O = 13\text{mA}$ ,<br>$V_{CC} = 5.5\text{V}$ , | -   | 0.35 | 0.6 | V             |       |



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### Switching Characteristics

| Symbol    | Parameters                                     |        | Test Conditions  | Min   | Typ | Max | Units      | Notes |
|-----------|--|--------|--|-------|-----|-----|------------|-------|
| $T_{PHL}$ | Propagation Delay Time Logic High to Logic Low |        | $C_L=15pF, R_L=350\Omega$  | -     | 40  | 75  | ns         |       |
| $T_{PLH}$ | Propagation Delay Time Logic Low to Logic High |        |  | -     | 35  | 75  | ns         |       |
| $T_r$     | Output Rise Time                               |        |  | -     | 40  | -   | ns         |       |
| $T_f$     | Output Fall Time                               |        |  | -     | 10  | -   | ns         |       |
| $CM_H$    | Common Mode Transient Immunity at Logic High   | CTM600 | $I_F = 7.5mA, V_{OH}=2.0V, R_L=350\Omega, T_A=25^\circ C, V_{CM}=10Vp-p$   | -     | -   | -   | V/ $\mu s$ |       |
|           |  | CTM601 | $I_F = 7.5mA, V_{OH}=2.0V, R_L=350\Omega, T_A=25^\circ C, V_{CM}=50Vp-p$   | 5000  | -   | -   |            |       |
|           |  | CTM611 | $I_F = 7.5mA, V_{OH}=2.0V, R_L=350\Omega, T_A=25^\circ C, V_{CM}=1000Vp-p$ | 20000 | -   | -   |            |       |
| $CM_L$    | Common Mode Transient Immunity at Logic Low    | CTM600 | $I_F = 0mA, V_{OL}=0.8V, R_L=350\Omega, T_A=25^\circ C, V_{CM}=10Vp-p$     | -     | -   | -   | V/ $\mu s$ |       |
|           |  | CTM601 | $I_F = 0mA, V_{OL}=0.8V, R_L=350\Omega, T_A=25^\circ C, V_{CM}=50Vp-p$     | 5000  | -   | -   |            |       |
|           |  | CTM611 | $I_F = 0mA, V_{OL}=0.8V, R_L=350\Omega, T_A=25^\circ C, V_{CM}=1000Vp-p$   | 20000 | -   | -   |            |       |



### Typical Characteristic Curves

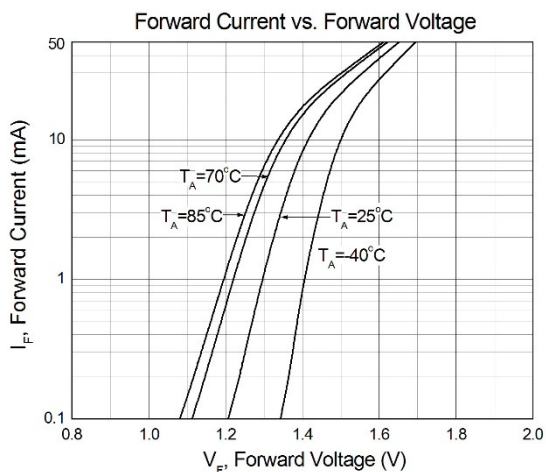


Figure 1

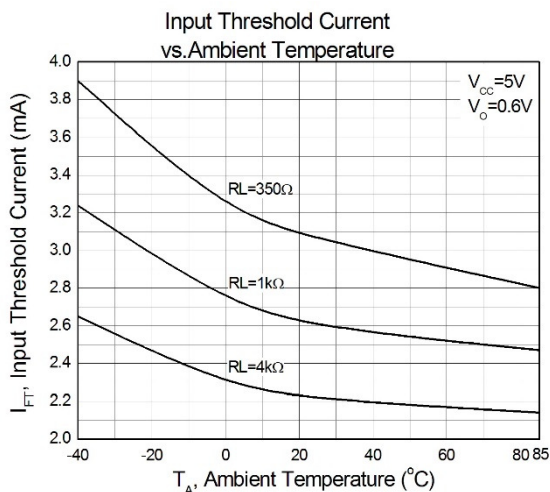


Figure 2

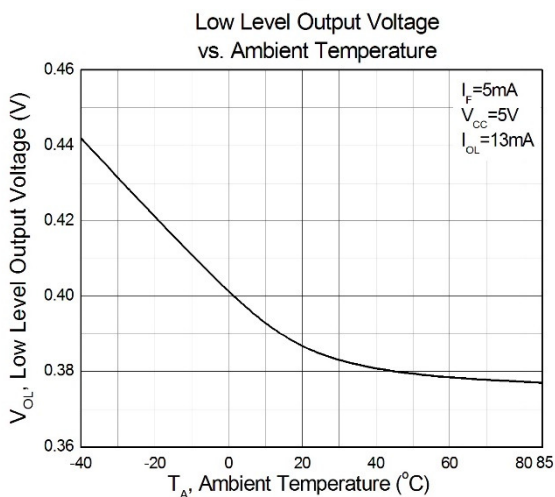


Figure 3

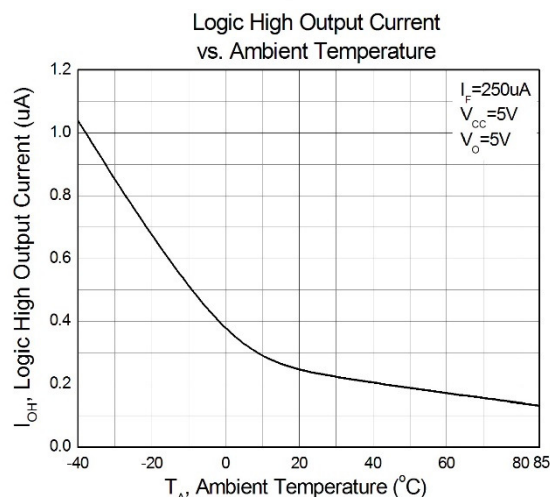


Figure 4

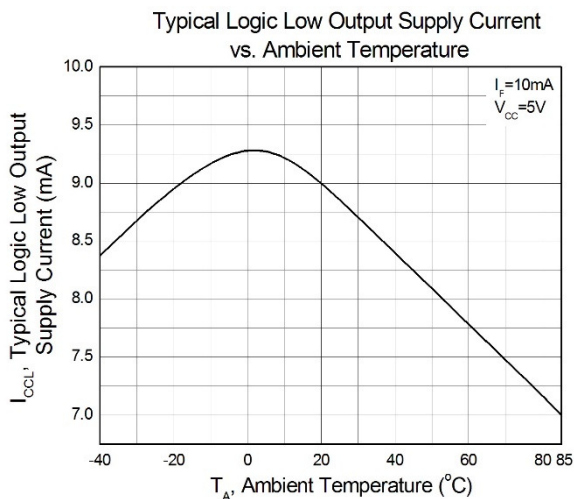


Figure 5

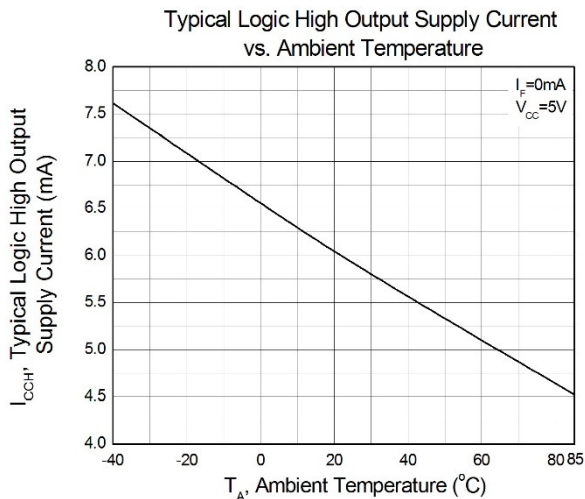


Figure 6



# CTM600, CTM601, CTM611

## 10Mbit/s 5-Pin Mini-Flat Logic Gate Optocoupler

Typical Logic Output Supply Current vs. Output Supply Voltage

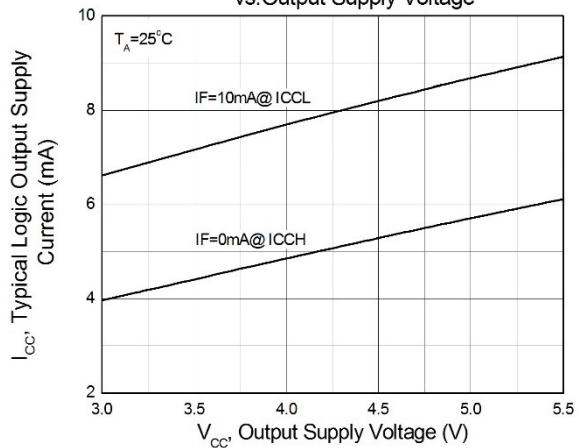


Figure 7

Propagation Delay vs. Ambient Temperature

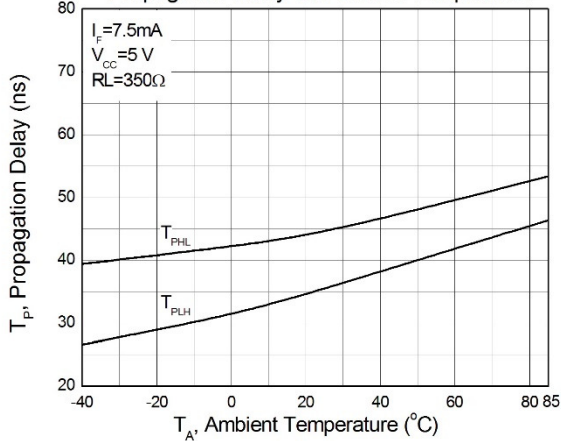


Figure 8

Pulse Width Distortion vs. Ambient Temperature

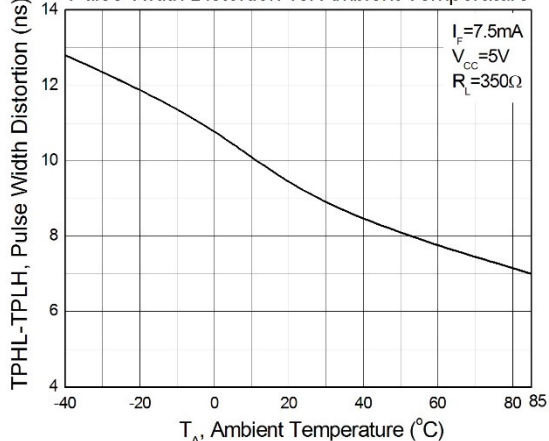


Figure 9

Rise And Fall Time vs. Ambient Temperature

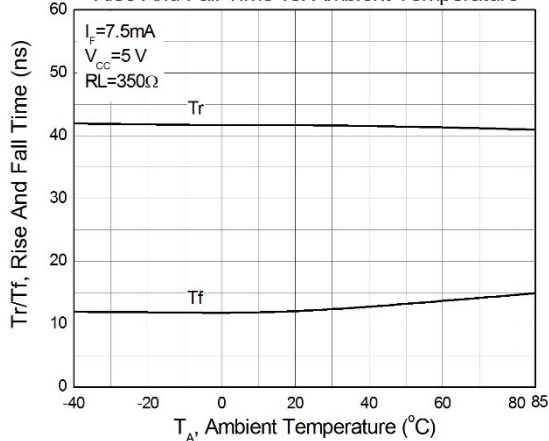


Figure 10



# CTM600, CTM601, CTM611

## 10Mbit/s 5-Pin Mini-Flat Logic Gate Optocoupler

### Test Circuits

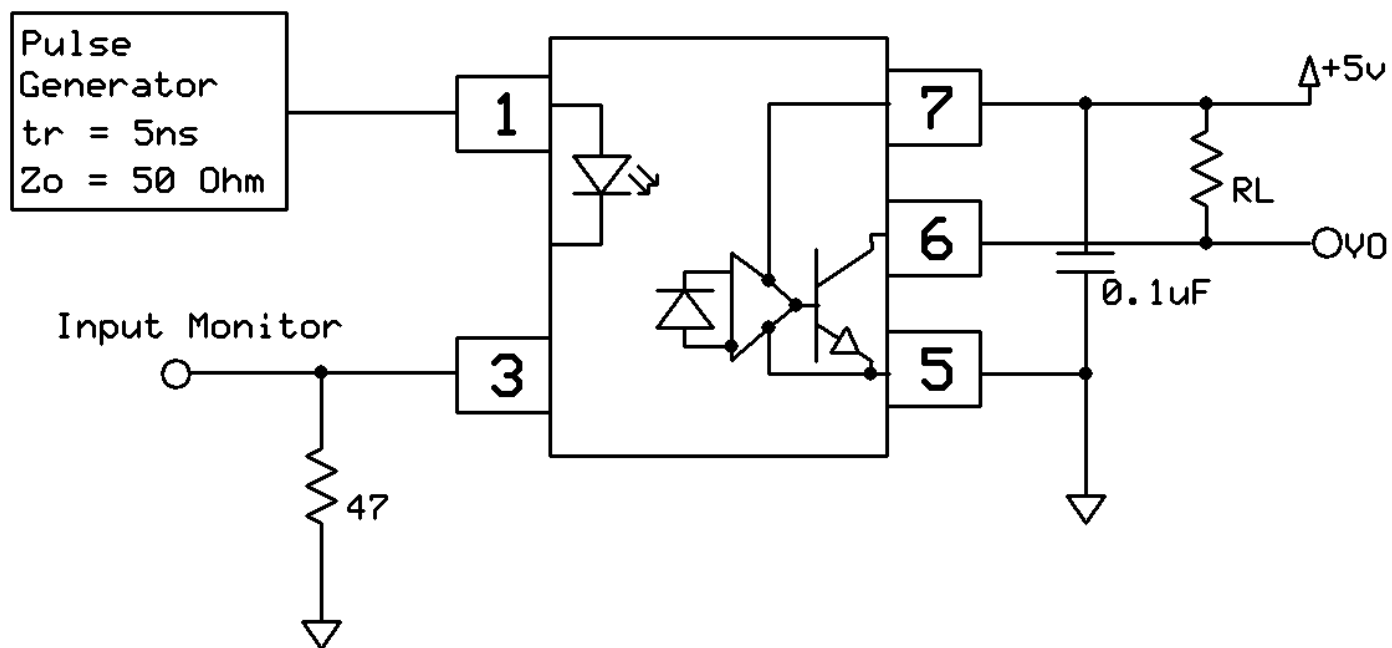


Figure 11

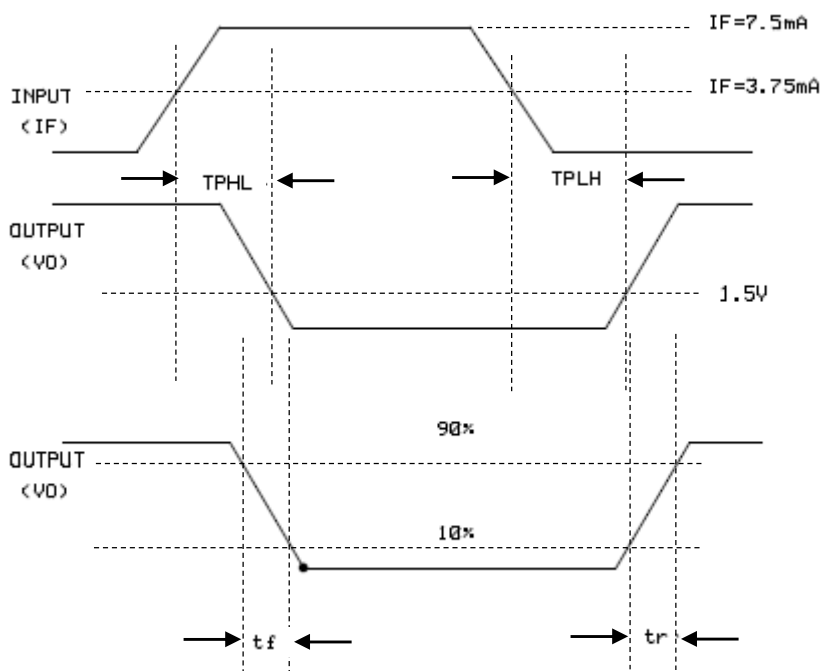


Figure 12



# CTM600, CTM601, CTM611

## 10Mbit/s 5-Pin Mini-Flat Logic Gate Optocoupler

### Test Circuits

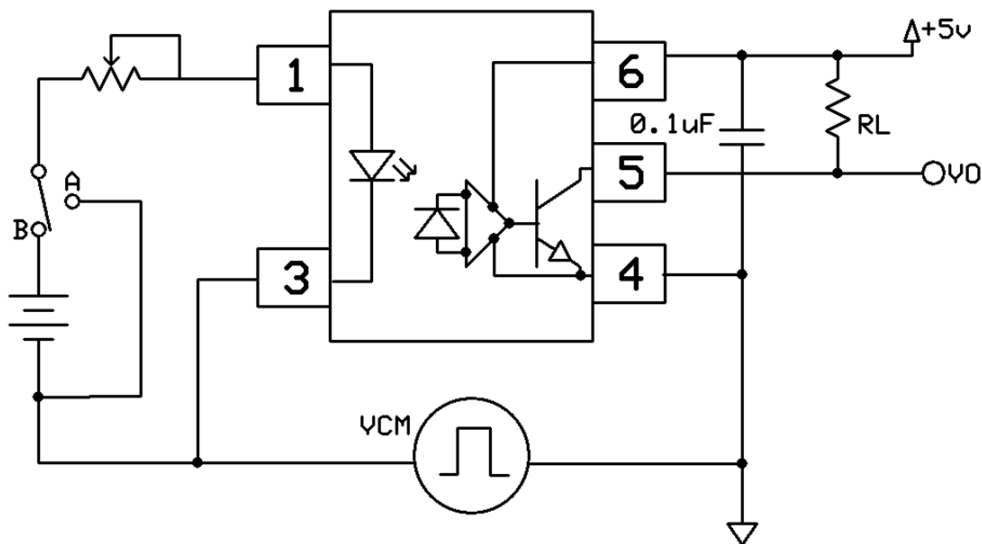
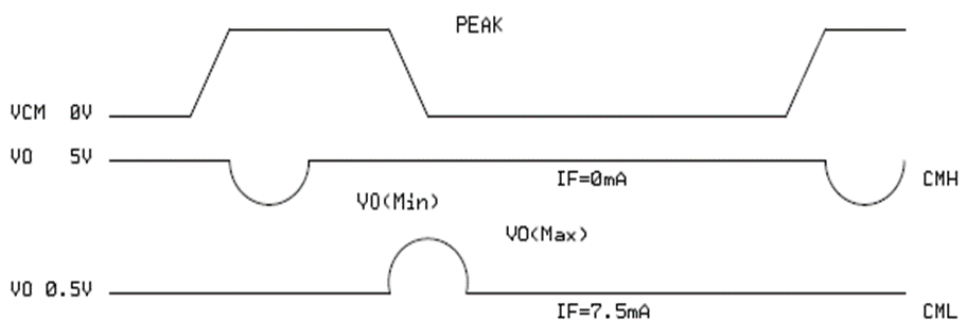


Figure 13



CMR Test Circuit

Figure 14

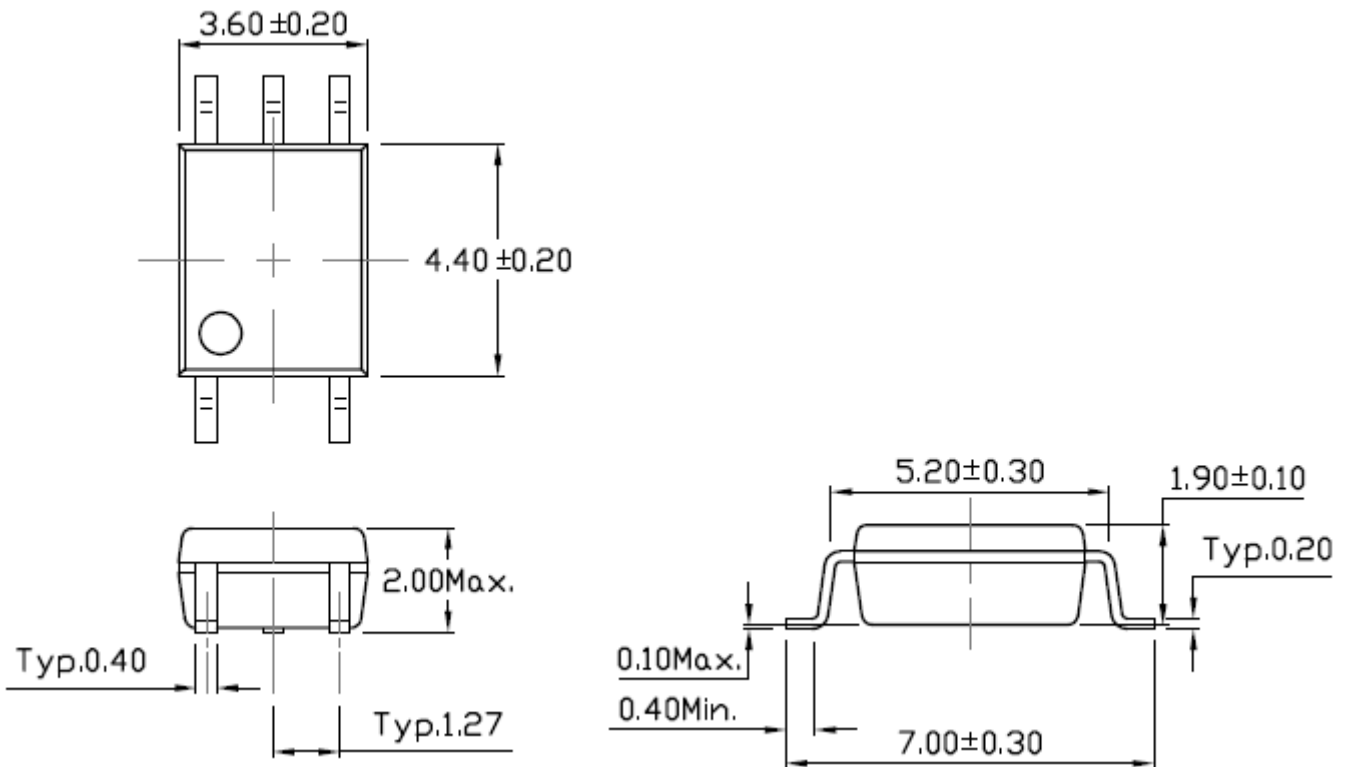




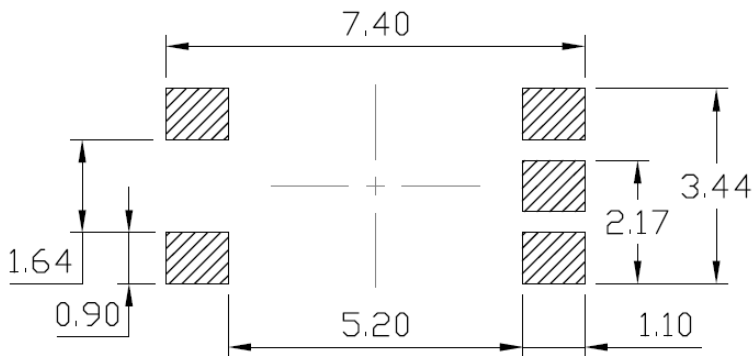
# CTM600, CTM601, CTM611

## 10Mbit/s 5-Pin Mini-Flat Logic Gate Optocoupler

### Package Dimension *Dimensions in mm unless otherwise stated*



### Recommended Solder Mask *Dimensions in mm unless otherwise stated*





# CTM600, CTM601, CTM611

## 10Mbit/s 5-Pin Mini-Flat Logic Gate Optocoupler

### Device Marking



- CT : Denotes “CT Micro”
- 600 : Product Number
- V : VDE Option
- Y : Fiscal Year
- WW : Work Week
- K : Production Code

### Ordering Information

CTM6XX(V)(Z)

X = Part No. (00, 01, or 11)

V = VDE option (V or none)

Z = Tape and reel option (T1 or T2)

| <b>Option</b> | <b>Description</b>                                | <b>Quantity</b> |
|---------------|---|-----------------|
| T1            | Surface Mount Lead Forming – With Option 1 Taping | 3000 Units/Reel |
| T2            | Surface Mount Lead Forming – With Option 2 Taping | 3000 Units/Reel |



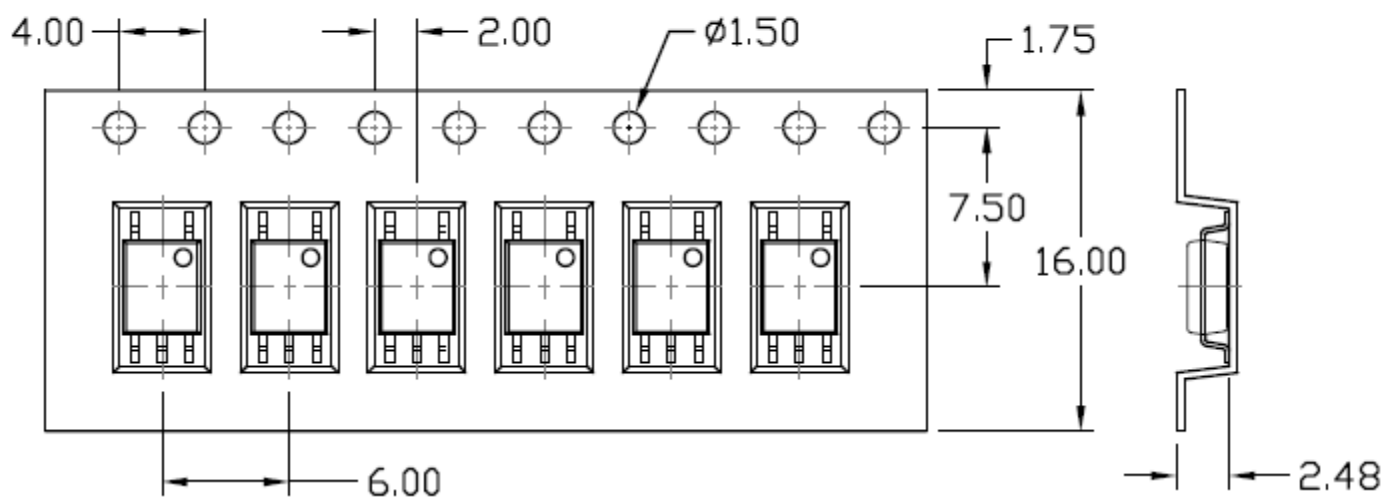
# CTM600, CTM601, CTM611

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### Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

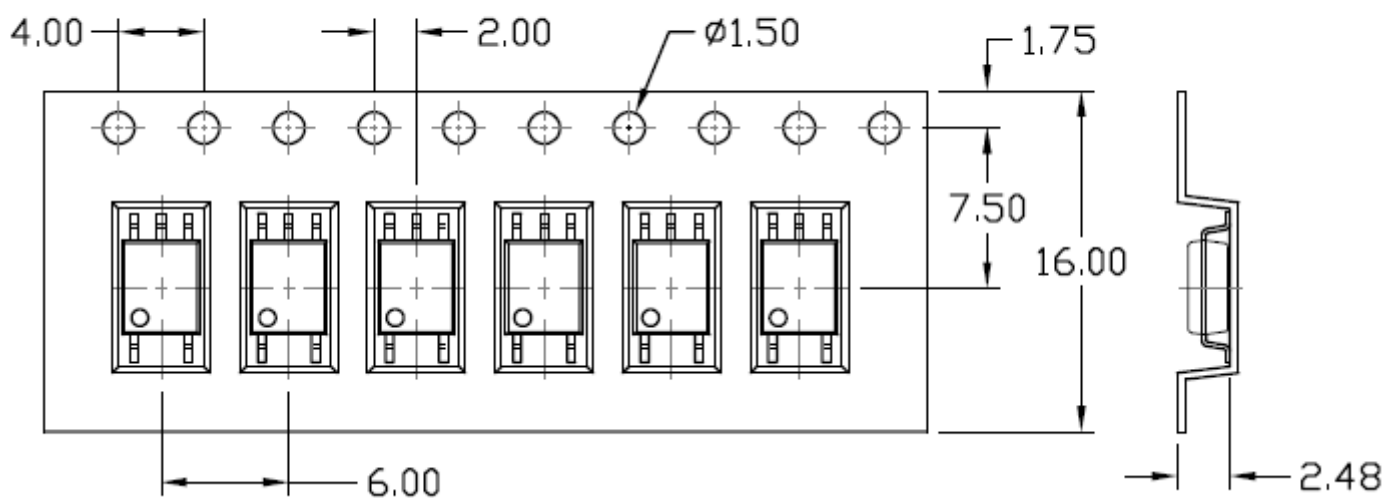
#### Option T1

Input Direction



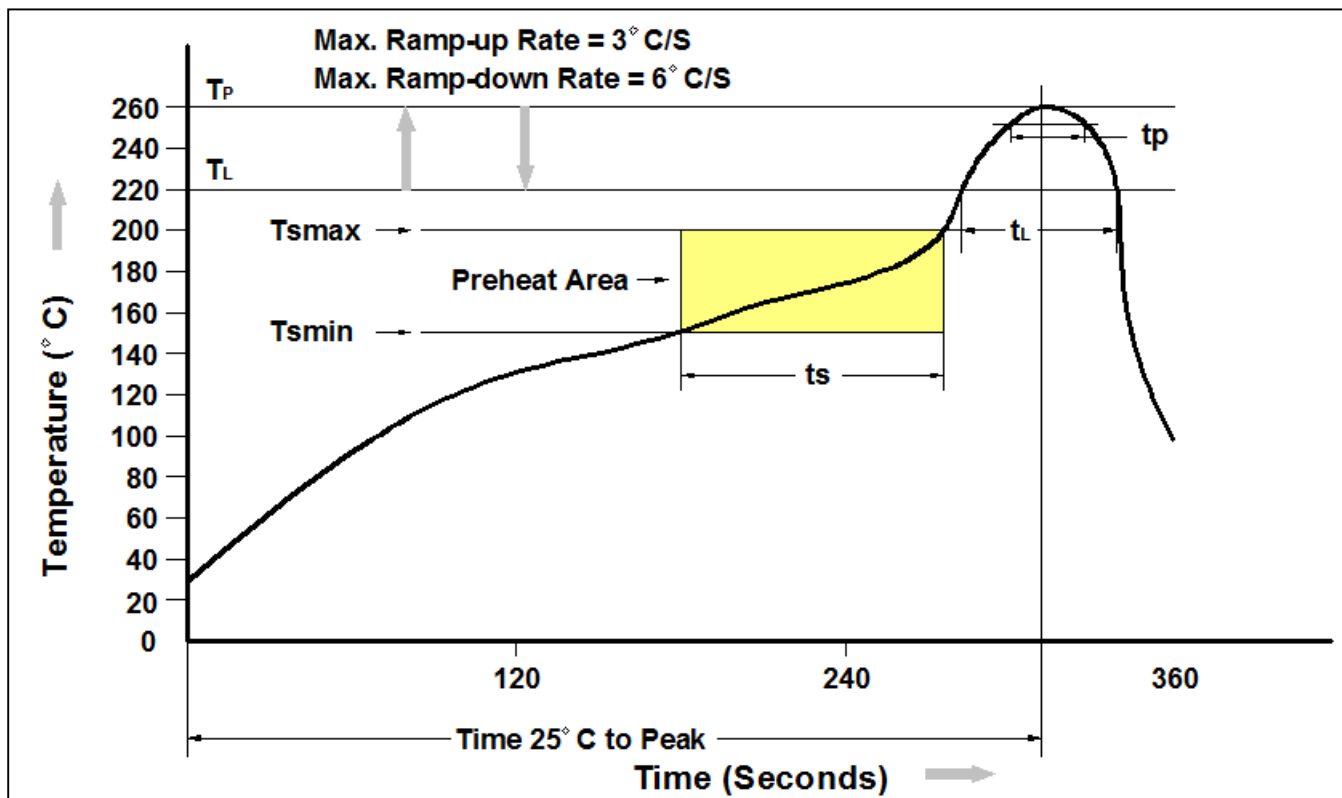
#### Option T2

Input Direction





Reflow Profile



| Profile Feature   | Pb-Free Assembly Profile |
|---|--------------------------|
| Temperature Min. (T <sub>smin</sub> )                                 | 150 °C                   |
| Temperature Max. (T <sub>smax</sub> )                                 | 200 °C                   |
| Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> ) | 60-120 seconds           |
| Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )                      | 3°C/second max.          |
| Liquidous Temperature (T <sub>L</sub> )                               | 217 °C                   |
| Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )             | 60 – 150 seconds         |
| Peak Body Package Temperature   | 260 °C +0 °C / -5 °C     |
| Time (t <sub>P</sub> ) within 5 °C of 260 °C                          | 30 seconds               |
| Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )                    | 6°C/second max           |
| Time 25 °C to Peak Temperature  | 8 minutes max.           |



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