# 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 performance from -40°C to 85°C
- Wide operating temperature range of -55°C to 125°C
- Green Package
- Regulatory Approvals
  - UL - UL1577 (E364000)
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC – GB4943.1, GB8898
  - IEC60065, IEC60950

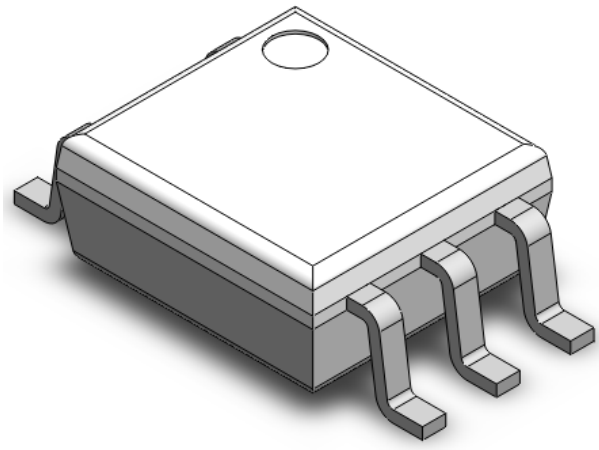
## Description

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 output of the detect IC is a high speed logic gate integrated with a photo detector. 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).

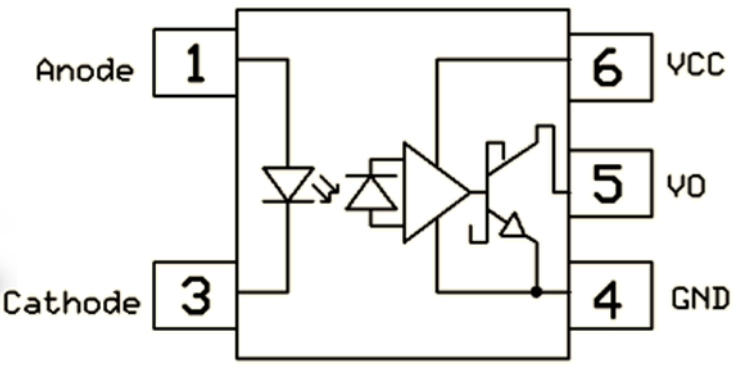
## Applications

- 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.*

## Absolute Maximum Rating at 25°C

| *Symbol* | *Parameters* | *Ratings* | *Units* | *Notes* |
|---|---|---|---|---|
| $V_{ISO}$ | Isolation voltage | 3750 | $V_{RMS}$ | ***1*** |
| $T_{OPR}$ | Operating temperature | -55 ~ +125 | °C | |
| $T_{STG}$ | Storage temperature | -55 ~ +150 | °C | |
| $T_{SOL}$ | Soldering temperature | 260 | °C | ***2*** |
| **Emitter** | | | | |
| $I_F$ | Forward current | 50 | mA | |
| $V_R$ | Reverse voltage | 5 | V | |
| $P_D$ | Power dissipation | 100 | mW | |
| **Detector** | | | | |
| $P_D$ | Power dissipation | 85 | mW | |
| $I_O$ | Average Output current | 50 | mA | |
| $V_{CC}$ | Supply voltage | 7 | V | |
| $V_O$ | Output voltage | 7 | V | |

Notes

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

# Electrical Characteristics

*Over recommended temperature (TA = –40°C to +85°C) unless otherwise specified. All Typicals at TA = 25°C.*

## Emitter Characteristics

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes |
|---|---|---|---|---|---|---|---|
| $V_F$ | Forward voltage | $I_F$ = 10mA | - | 1.6 | 1.8 | V | |
| $V_R$ | Reverse Voltage | $I_R$ = 5μA | 5.0 | - | - | V | |
| $\Delta V_F/\Delta T_A$ | Temperature coefficient of forward voltage | $I_F$ =10mA | - | -1.6 | - | mV/°C | |

## Detector Characteristics

| Symbol | Parameters | Test Conditions | Min | Typ | Max | Units | Notes |
|---|---|---|---|---|---|---|---|
| $I_{CCL}$ | Logic Low Supply Current | $I_F$=10mA, $V_O$=Open, $V_{CC}$=5V | - | 9 | 13 | mA | |
| $I_{CCH}$ | Logic High Supply Current | $I_F$=0mA, $V_O$=Open, $V_{CC}$=5V | - | 6 | 9 | mA | |
| $R_{IO}$ | Isolation Resistance | $V_{IO}$= 500$V_{DC}$ | $5x10^{10}$ | - | - | Ω | |
| $C_{IO}$ | Isolation Capacitance | f= 1MHz | - | 0.5 | 1.2 | pF | |

## Transfer Characteristics

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

## Switching Characteristics

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

## Typical Characteristic Curves

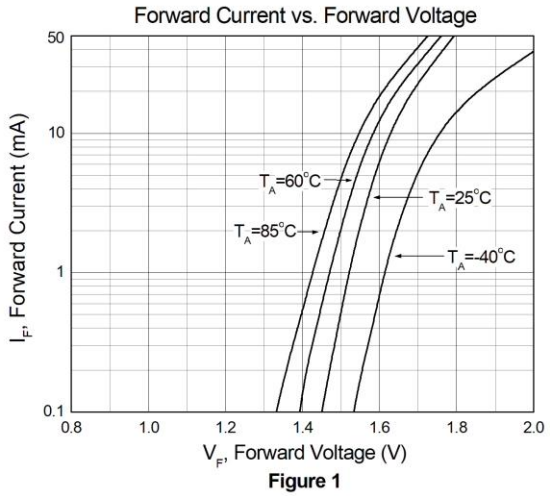



**Figure 1**

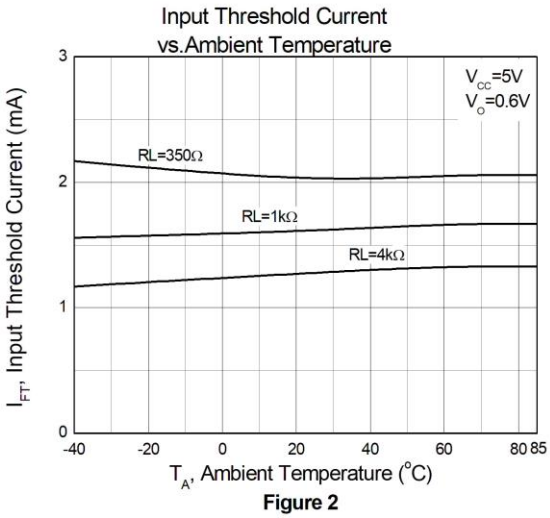



**Figure 2**

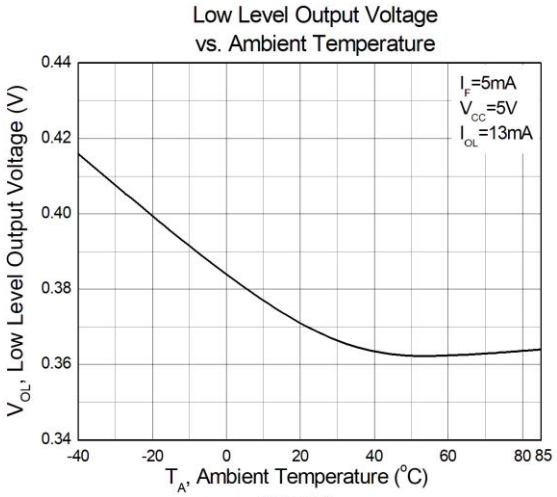



**Figure 3**

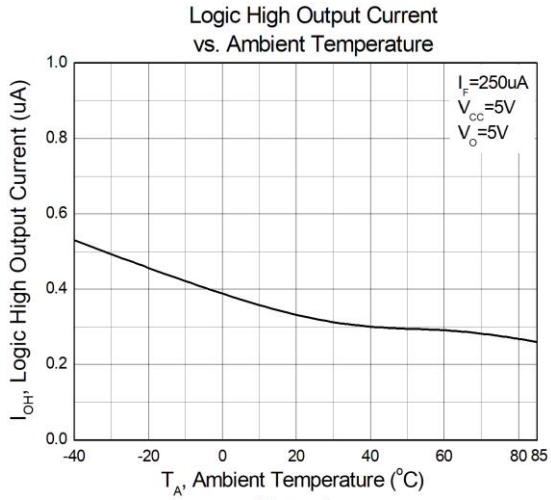



**Figure 4**

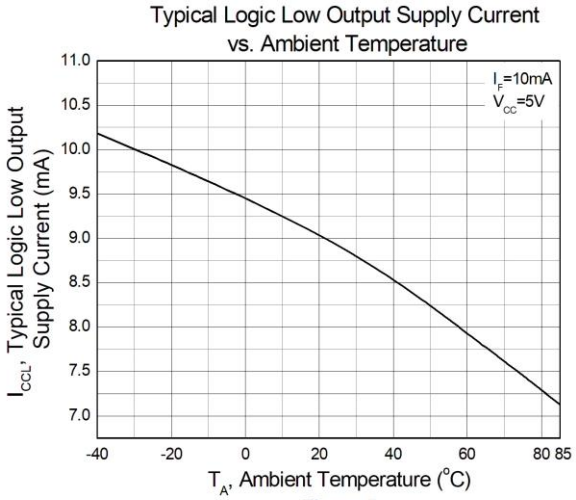



**Figure 5**

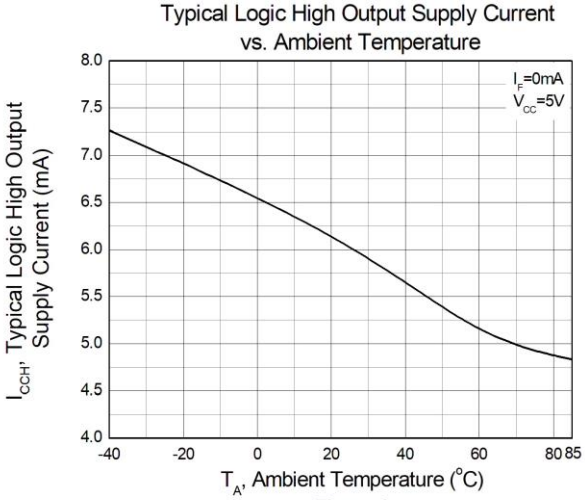



**Figure 6**

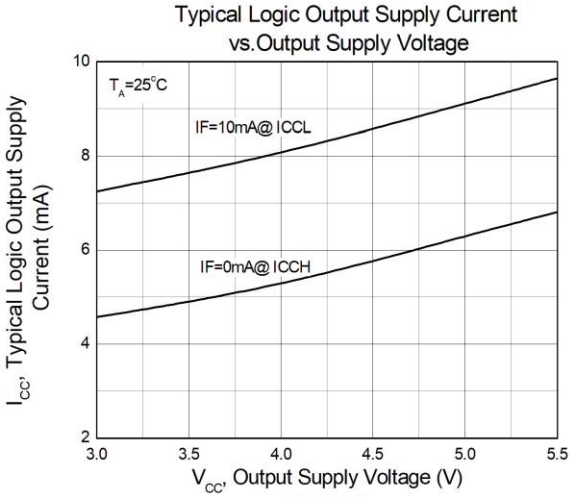



**Figure 7**

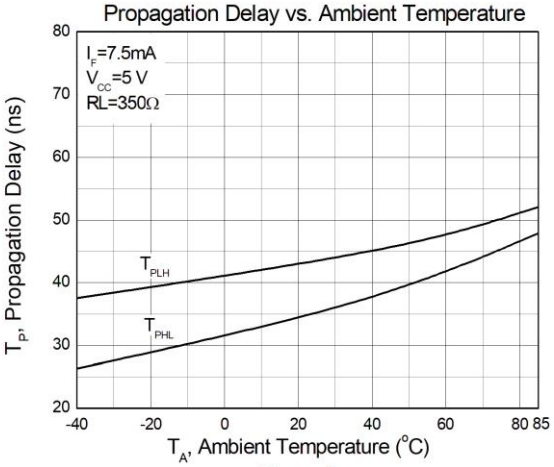



**Figure 8**

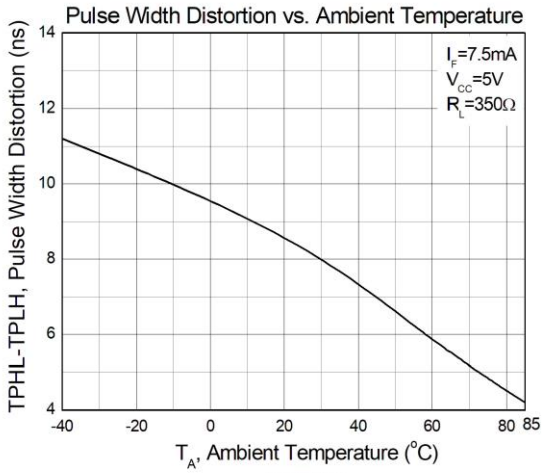



**Figure 9**

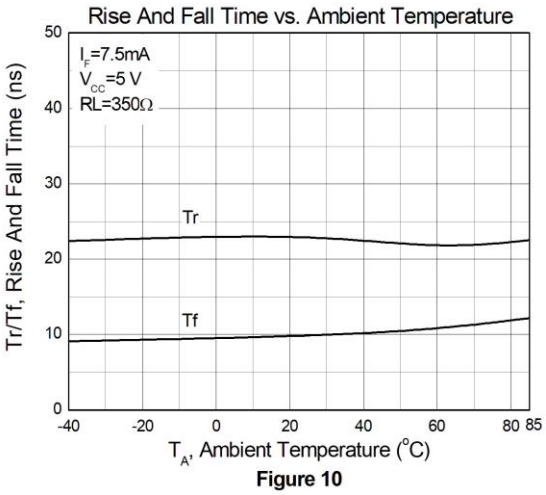



**Figure 10**

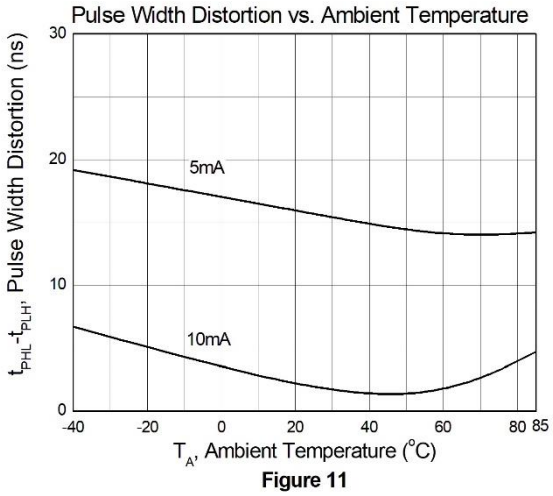



**Figure 11**

## Test Circuits

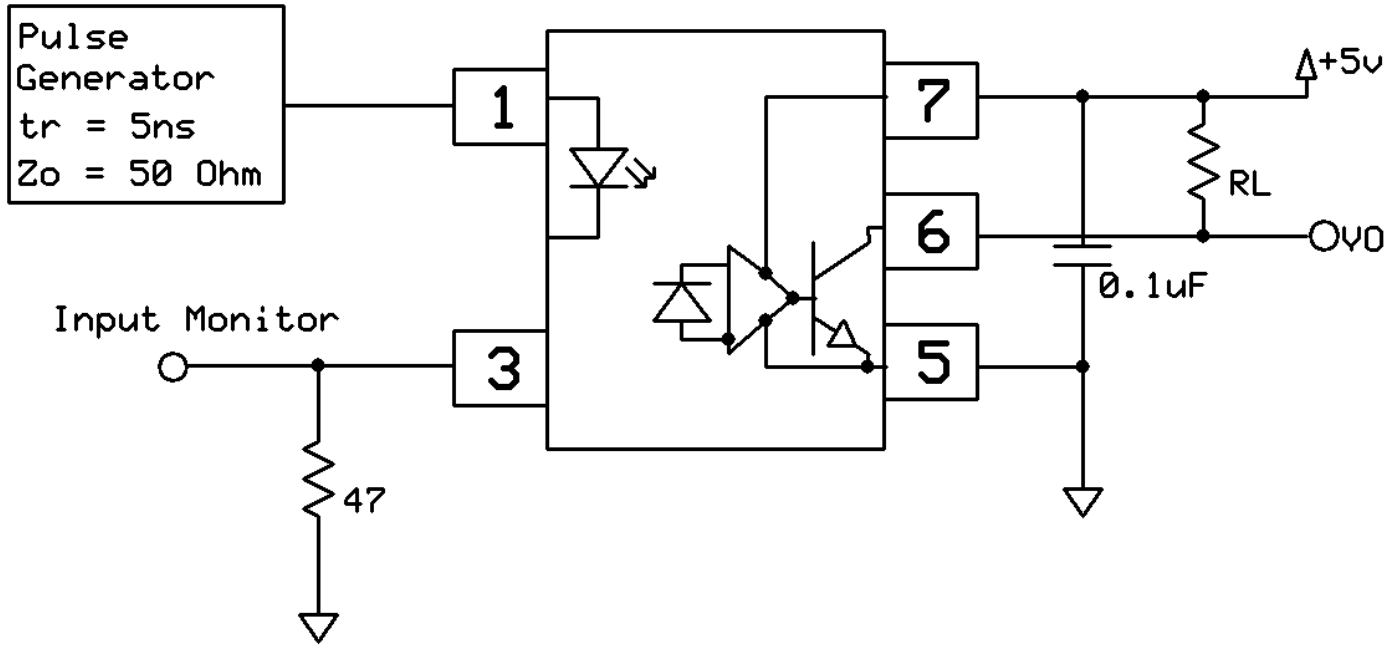



**Figure 12**

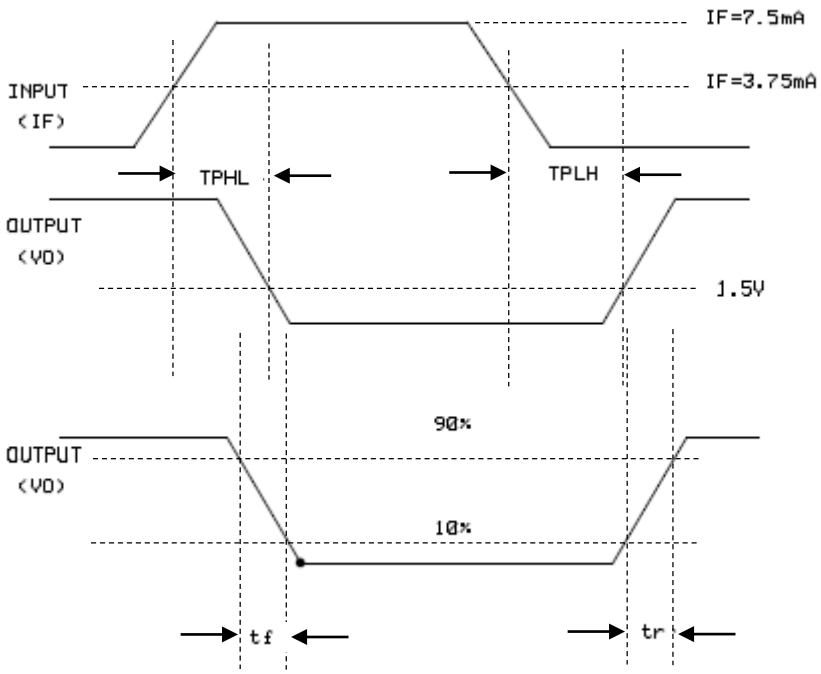



**Figure 13**

## Test Circuits

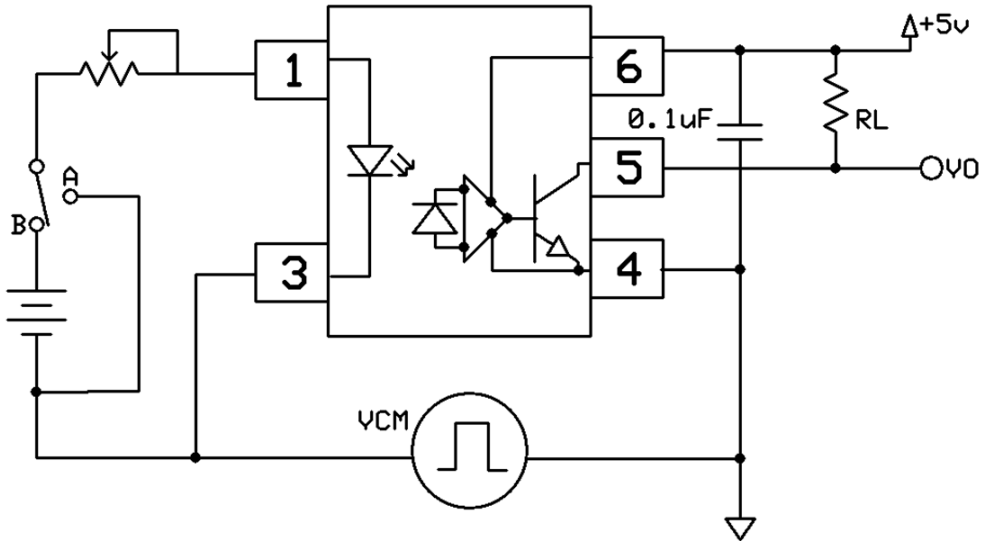
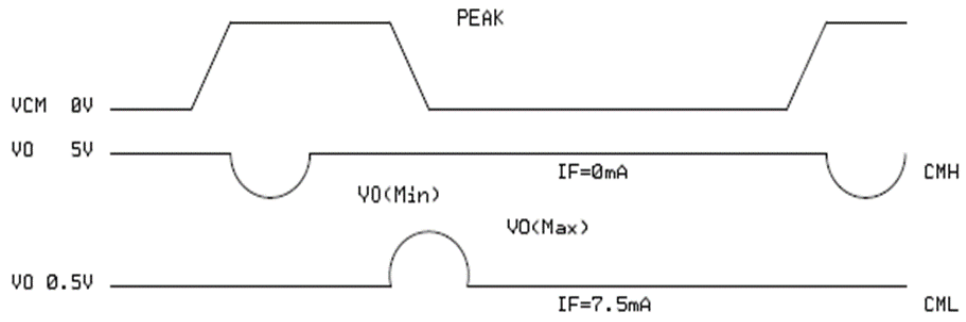


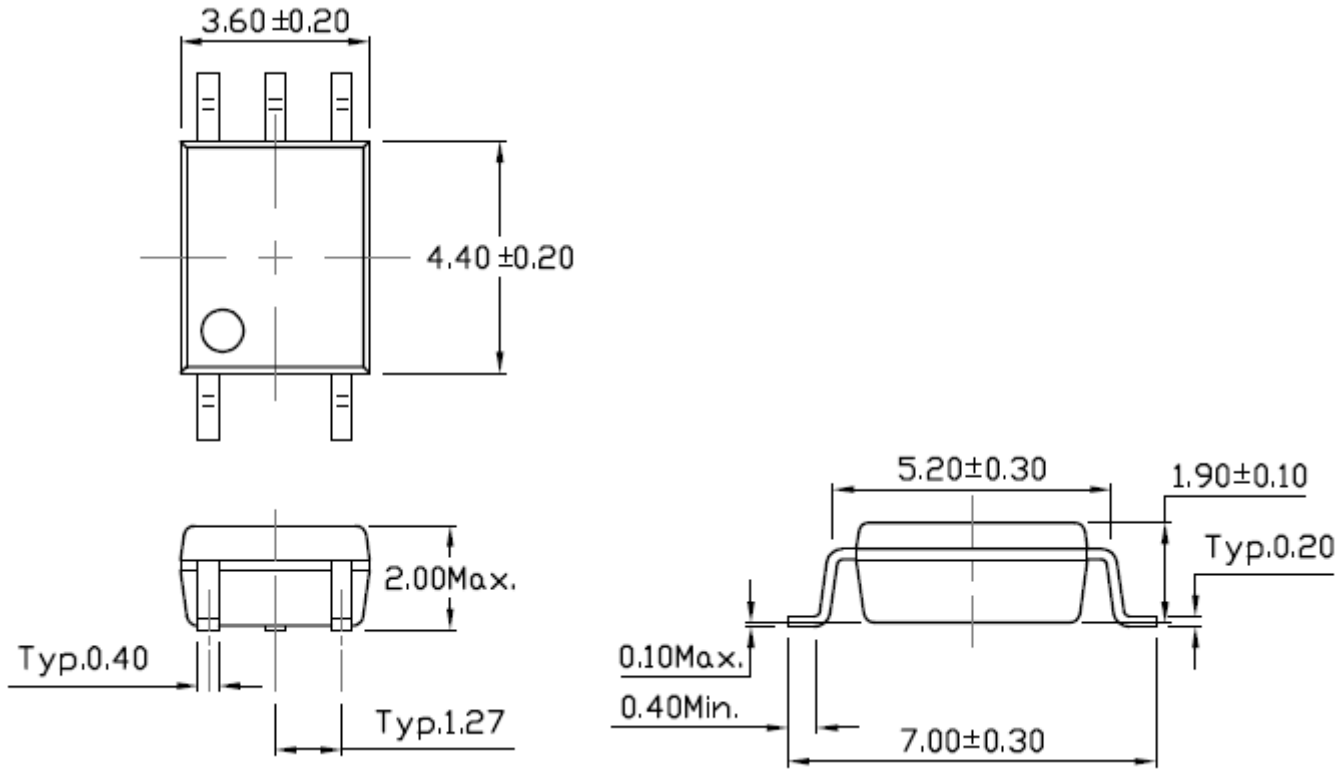

**Figure 14**



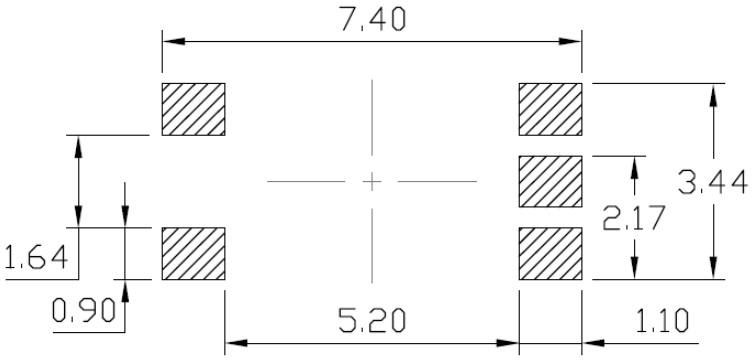

CMR Test Circuit

**Figure 15**

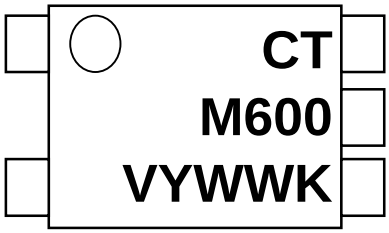
## Package Dimension *Dimensions in mm unless otherwise stated*




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



## Device Marking




CT : Denotes “CT Micro”
M600 : Product Number
V : VDE Option
Y : Fiscal Year
WW : Work Week
K : Production Code

## Ordering Information

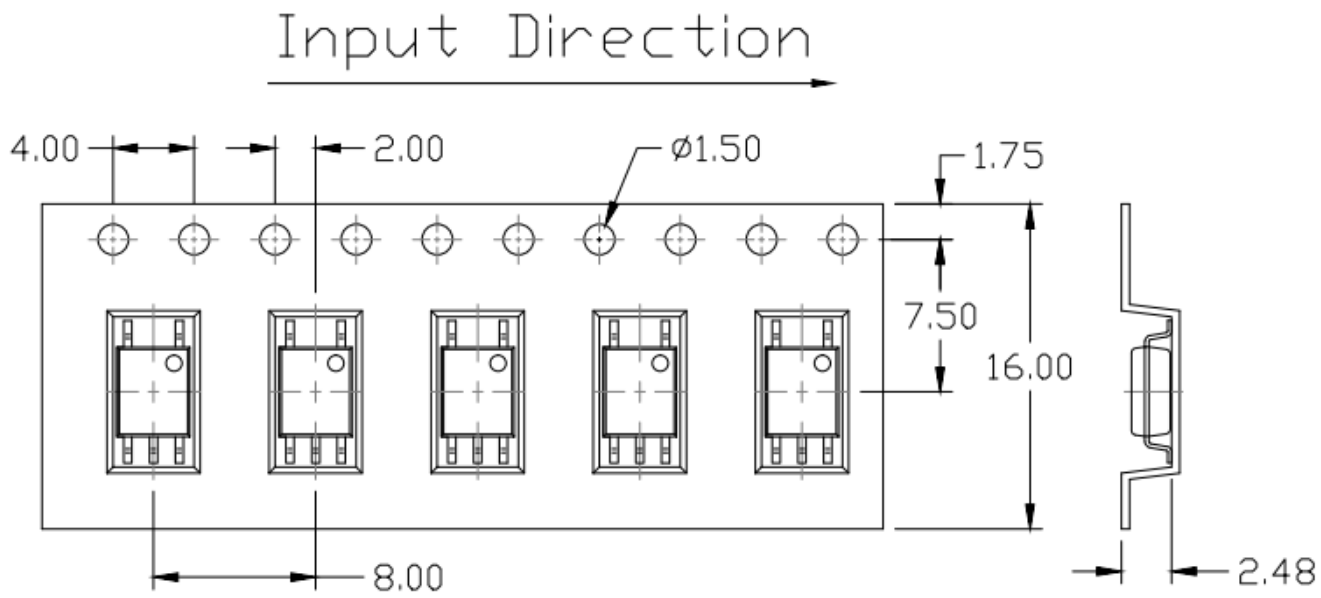
CTM6XX(V)(Z)

X = Part No. (00, 01, or 11)
V = VDE option (V or none)
Z = Tape and reel option (T1 or T2)

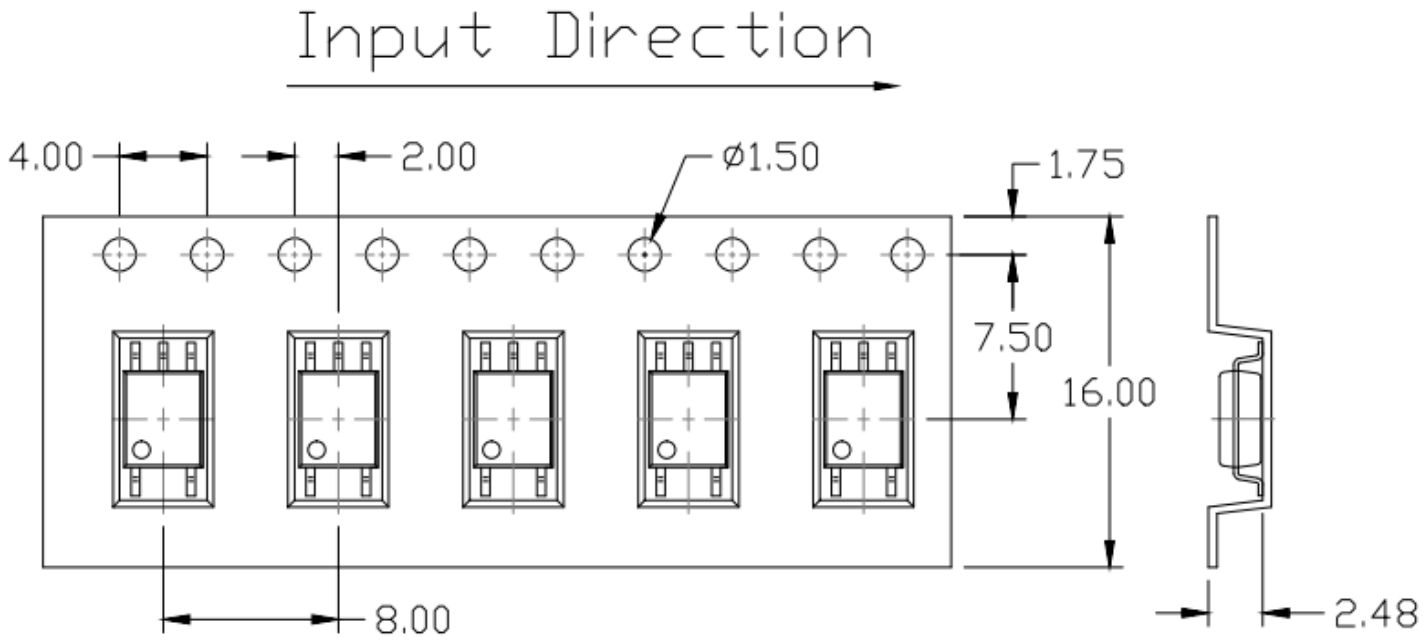
| *Option* | *Description* | *Quantity* |
|---|---|---|
| T1 | Surface Mount Lead Forming – With Option 1 Taping | 3000 Units/Reel |
| T2 | Surface Mount Lead Forming – With Option 2 Taping | 3000 Units/Reel |

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

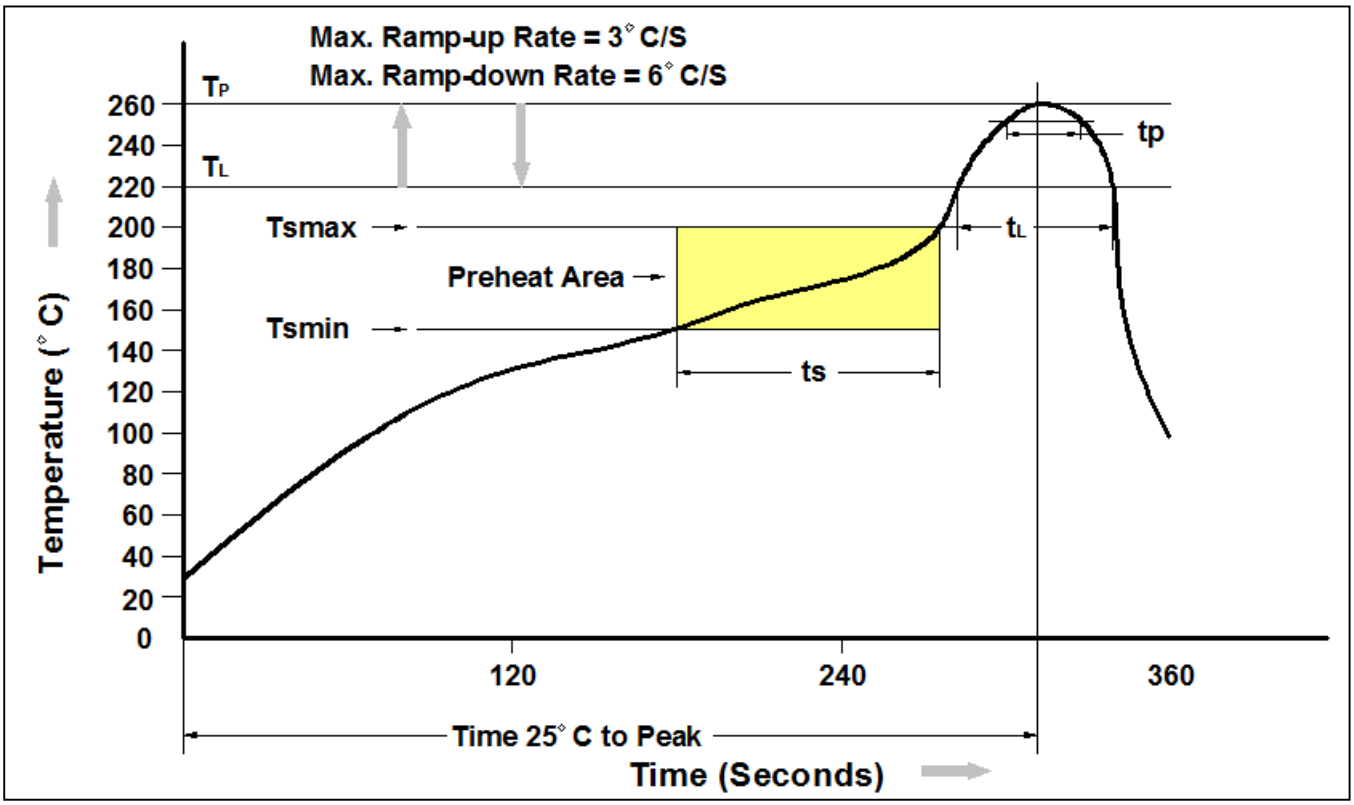
### Option T1




### Option T2



## Reflow Profile




| Profile Feature | Pb-Free Assembly Profile |
|---|---|
| Temperature Min. (Tsmin) | 150°C |
| Temperature Max. (Tsmax) | 200°C |
| Time (ts) from (Tsmin to Tsmax) | 60-120 seconds |
| Ramp-up Rate ($t_L$ to $t_P$) | 3°C/second max. |
| Liquidous Temperature ($T_L$) | 217°C |
| Time ($t_L$) Maintained Above ($T_L$) | 60 – 150 seconds |
| Peak Body Package Temperature | 260°C +0°C / -5°C |
| Time ($t_P$) within 5°C of 260°C | 30 seconds |
| Ramp-down Rate ($T_P$ to $T_L$) | 6°C/second max |
| Time 25°C to Peak Temperature | 8 minutes max. |

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