



# CTM600, CTM601, CTM611

## 5 Pin Mini-Flat DMC-Isolator®

### 10 Mbit/s High Speed Logic Gate Optocoupler

[www.ct-micro.com](http://www.ct-micro.com)

#### 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
- RoHS and REACH compliance
- Halogen Free compliance
- MSL class 1
- Regulatory Approvals
  - ✓ UL - UL1577 (E364000)
  - ✓ VDE - EN60747-5-5(VDE0884-5)
  - ✓ CQC – GB4943.1, GB8898 (14001105803)
  - ✓ IEC62368 (FI/41119)

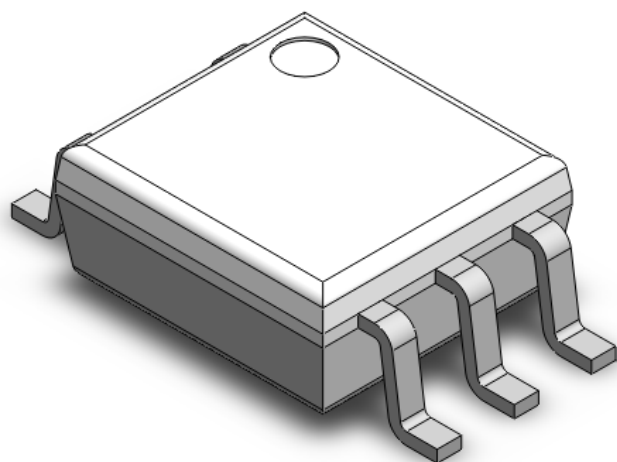
#### Description

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).

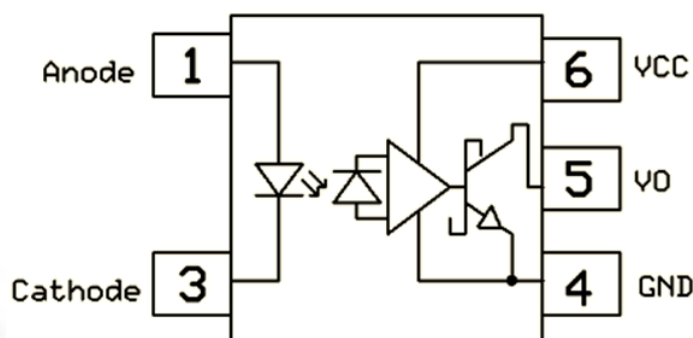
#### Applications

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

#### Package Outline



#### Schematic





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#### Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ , unless otherwise specified

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameters	Ratings	Units	Notes
V <sub>ISO</sub>	Isolation voltage (AC, 1 minute, 40 ~ 60% R.H.)	3750	V <sub>RMS</sub>	
T <sub>OPR</sub>	Operating temperature	-55 ~ +125	°C	
T <sub>STG</sub>	Storage temperature	-55 ~ +150	°C	
T <sub>SOL</sub>	Soldering temperature (For 10 seconds)	260	°C	
<b>Emitter</b>				
I <sub>F</sub>	Forward current	50	mA	
V <sub>R</sub>	Reverse voltage	5	V	
P <sub>D</sub>	Power dissipation	100	mW	
<b>Detector</b>				
P <sub>D</sub>	Power dissipation	85	mW	
I <sub>O</sub>	Average Output current	50	mA	
V <sub>CC</sub>	Supply voltage	7	V	
V <sub>O</sub>	Output voltage	7	V	



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#### Electrical Characteristics

Over recommended temperature ( $T_A = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ) unless otherwise specified. All Typicals at  $T_A = 25^{\circ}\text{C}$ .

##### Emitter Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
$V_F$	Forward voltage	$I_F = 10\text{mA}$	-	1.6	1.8	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/ $^{\circ}\text{C}$	

##### 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	
$R_{IO}$	Isolation Resistance	$V_{IO} = 500\text{V}_{DC}$	$5 \times 10^{10}$	-	-	$\Omega$	
$C_{IO}$	Isolation Capacitance	$f = 1\text{MHz}$	-	0.5	1.2	pF	

##### 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	$V_{CC} = 5.5\text{V}$ , $V_O = 0.6\text{V}$ , $I_O = 13\text{mA}$	-	2	5	mA	
$V_{OL}$	Logic Low Output Voltage	$I_F = 5\text{mA}$ , $I_O = 13\text{mA}$ , $V_{CC} = 5.5\text{V}$ ,	-	0.35	0.6	V	



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#### Electrical Characteristics Over recommended temperature (TA = -40°C to +85°C) unless otherwise specified. All Typicals at TA = 25°C.

#### Switching Characteristics

Symbol	Parameters		Test Conditions	Min	Typ	Max	Units	Notes
T <sub>PHL</sub>	Propagation Delay Time Logic High to Logic Low		C <sub>L</sub> =15pF,R <sub>L</sub> =350Ω	-	40	75	ns	
T <sub>PLH</sub>	Propagation Delay Time Logic Low to Logic High			-	35	75	ns	
Tr	Output Rise Time			-	40	-	ns	
Tf	Output Fall Time			-	10	-	ns	
CM <sub>H</sub>	Common Mode Transient Immunity at Logic High	CTM600	I <sub>F</sub> = 0mA , V <sub>OH</sub> =2.0V, R <sub>L</sub> =350Ω, TA=25°C, V <sub>CM</sub> =10Vp-p	-	-	-	V/μs	
		CTM601	I <sub>F</sub> = 0mA , V <sub>OH</sub> =2.0V, R <sub>L</sub> =350Ω, TA=25°C, V <sub>CM</sub> =50Vp-p	5000	-	-		
		CTM611	I <sub>F</sub> = 0mA , V <sub>OH</sub> =2.0V, R <sub>L</sub> =350Ω, TA=25°C, V <sub>CM</sub> =1000Vp-p	20000	-	-		
CM <sub>L</sub>	Common Mode Transient Immunity at Logic Low	CTM600	I <sub>F</sub> = 7.5mA , V <sub>OL</sub> =0.8V, R <sub>L</sub> =350Ω, TA=25°C, V <sub>CM</sub> =10Vp-p	-	-	-	V/μs	
		CTM601	I <sub>F</sub> = 7.5mA , V <sub>OL</sub> =0.8V, R <sub>L</sub> =350Ω, TA=25°C, V <sub>CM</sub> =50Vp-p	5000	-	-		
		CTM611	I <sub>F</sub> = 7.5mA , V <sub>OL</sub> =0.8V, R <sub>L</sub> =350Ω, TA=25°C, V <sub>CM</sub> =1000Vp-p	20000	-	-		



#### Typical Characteristic Curves $T_A = 25^\circ\text{C}$ , unless otherwise specified

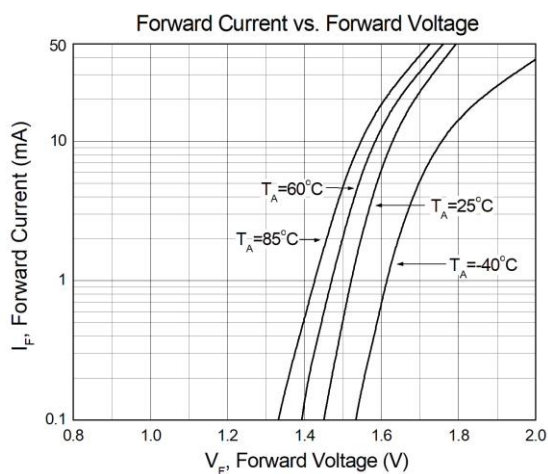


Figure 1

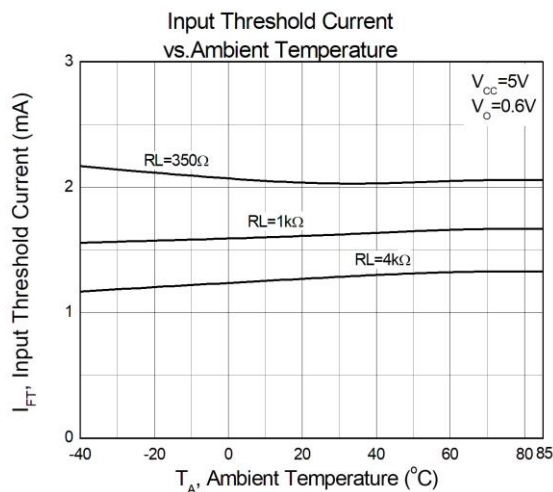


Figure 2

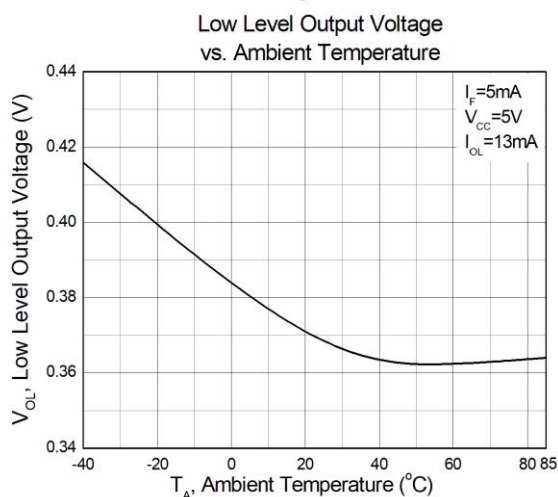


Figure 3

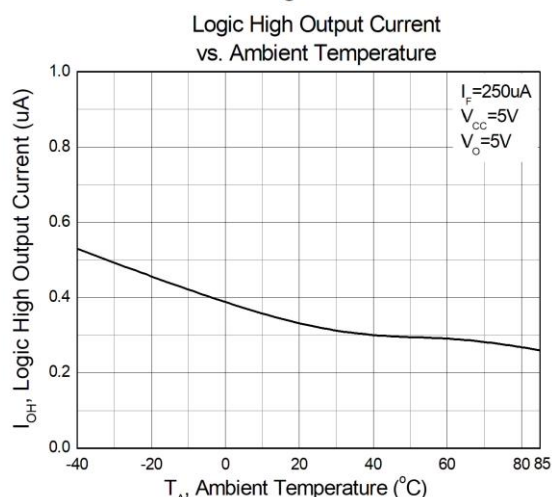


Figure 4

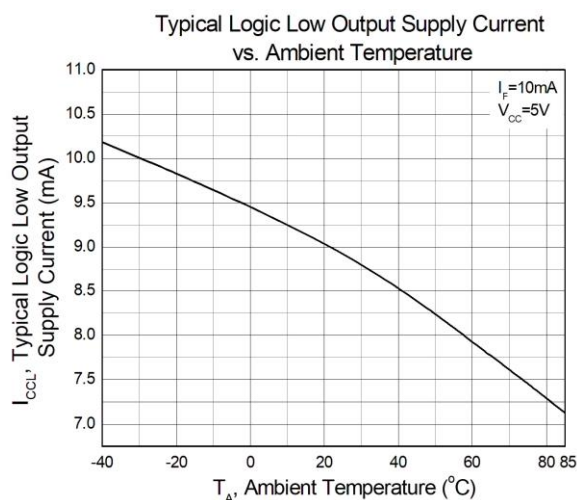


Figure 5

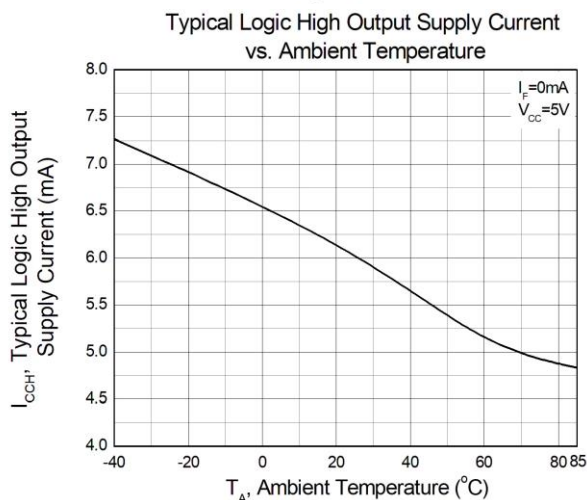


Figure 6



#### Typical Characteristic Curves $T_A = 25^\circ\text{C}$ , unless otherwise specified

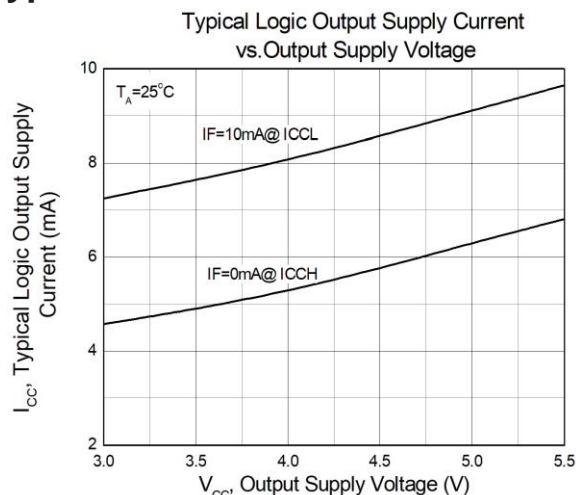


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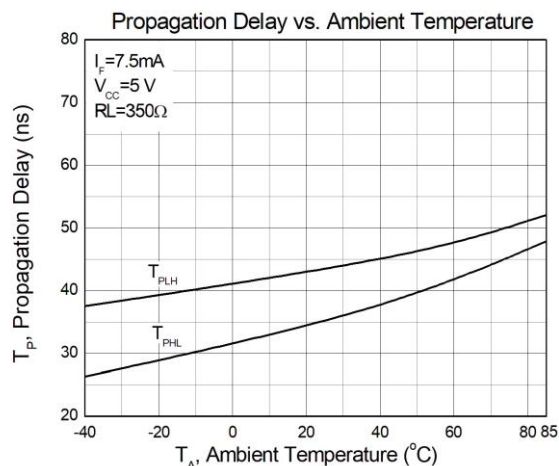


Figure 8

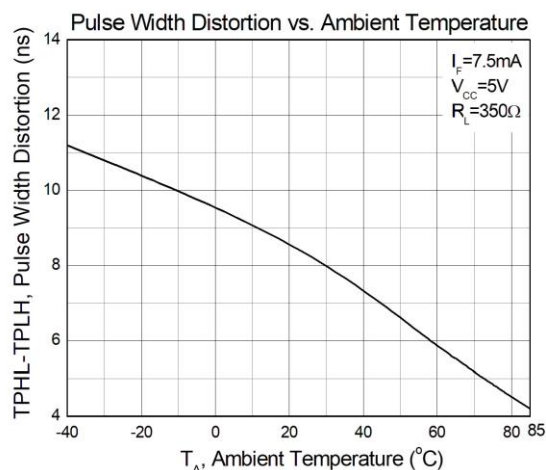


Figure 9

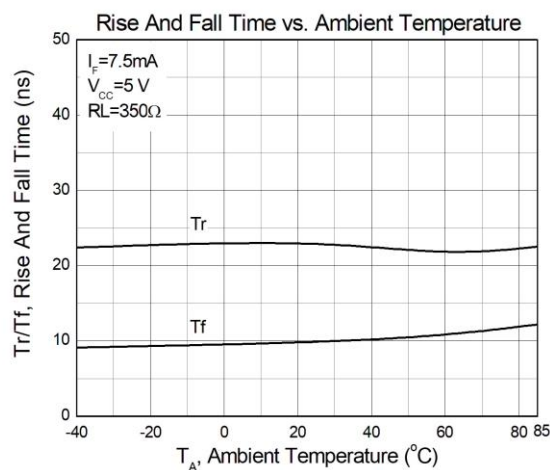


Figure 10

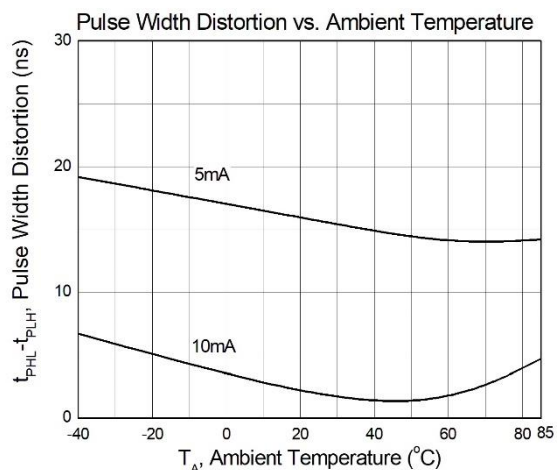


Figure 11



# CTM600, CTM601, CTM611

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## Test Circuits

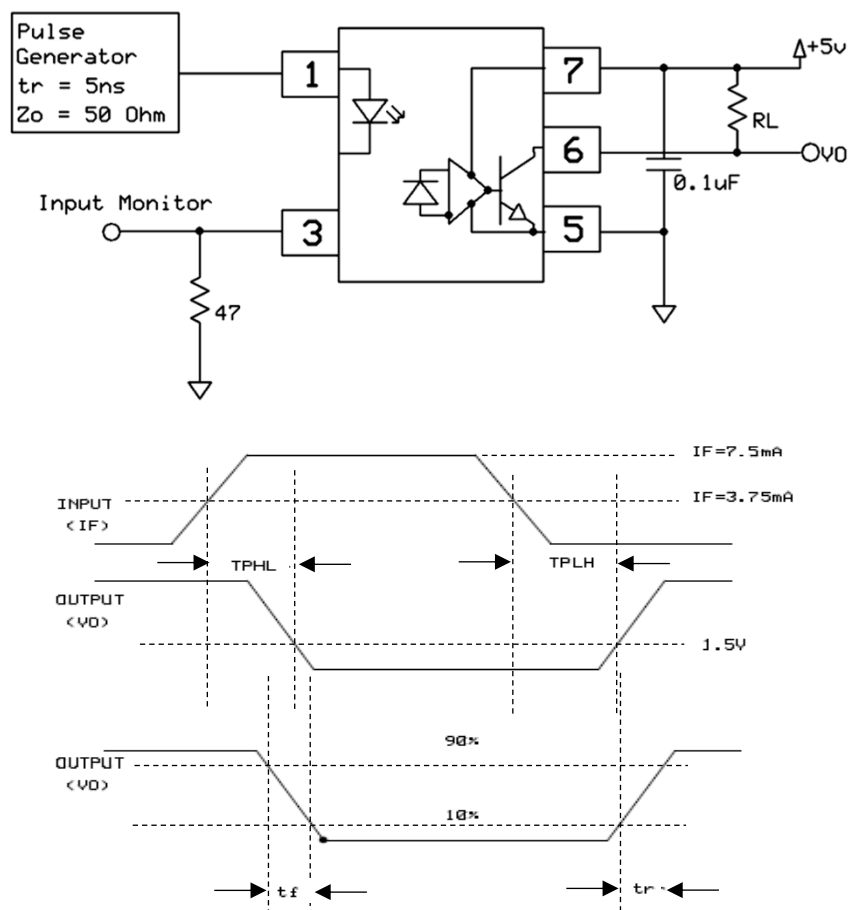


Figure 22: Switching Time Test Circuit



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## Test Circuits

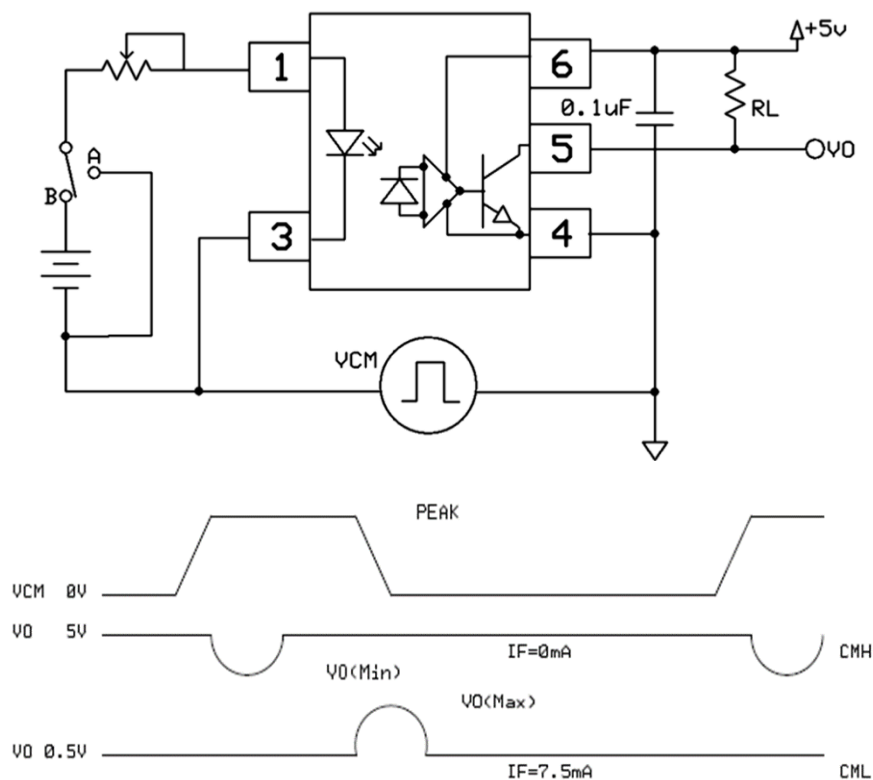


Figure 23: CMR Test Circuit





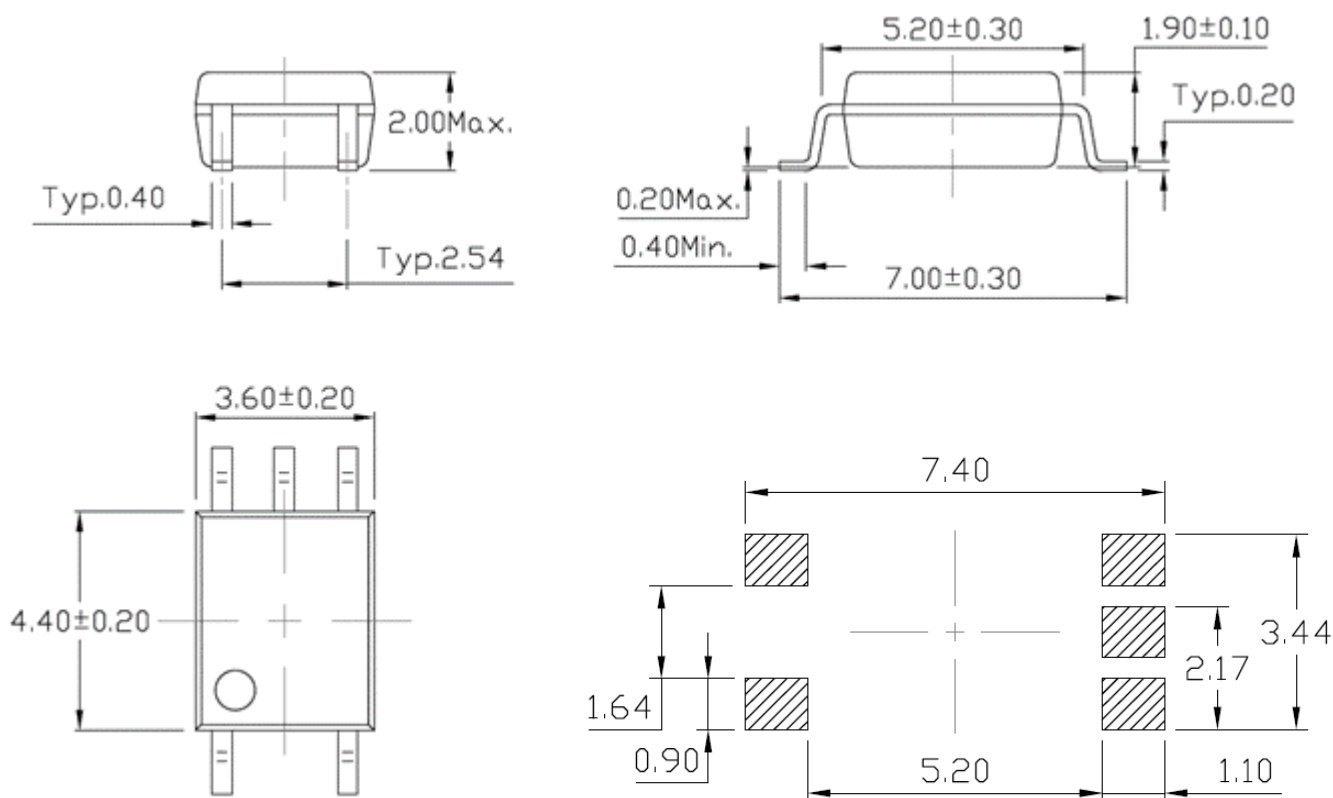
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## Package Dimension *Dimensions in mm unless otherwise stated*



## Marking Information



### Note:

- CT : Denotes "CT Micro"
- M600 : Product Number (600,601,611)
- V : VDE Safety Mark Option (Blank or V)
- Y : One Digit Year Code
- WW : Two Digit Work Week
- K : Manufacturing Code



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## Ordering Information

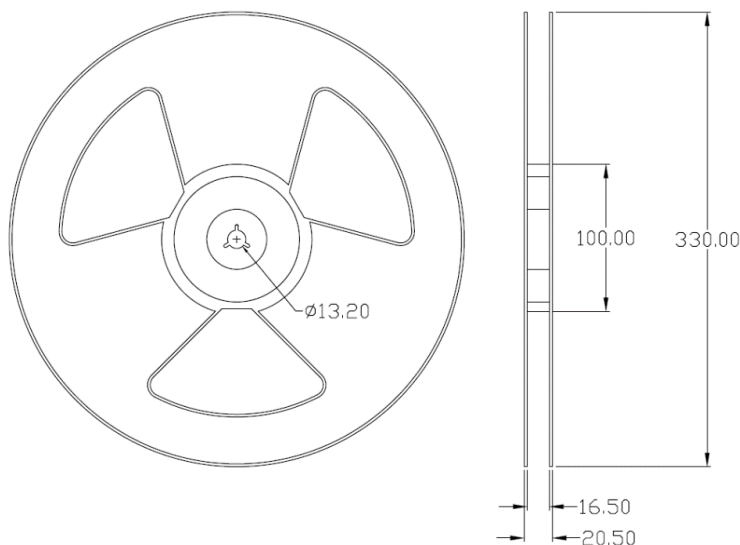
### CTM6XX(V)(Z)

CT	= Denotes "CT Micro"
X	= Part Number(00, 01, 11)
V	= VDE Safety Mark Option (Blank or V)
Z	= Tape and Reel Option (T1, T2)

Option	Description	Quantity
T1	Surface Mount Lead Forming – With Option 1 Tapping	3000 Units/Reel
T2	Surface Mount Lead Forming – With Option 2 Tapping	3000 Units/Reel

## Reel Dimension *All dimensions are in mm, unless otherwise stated*

### Option T1/T2





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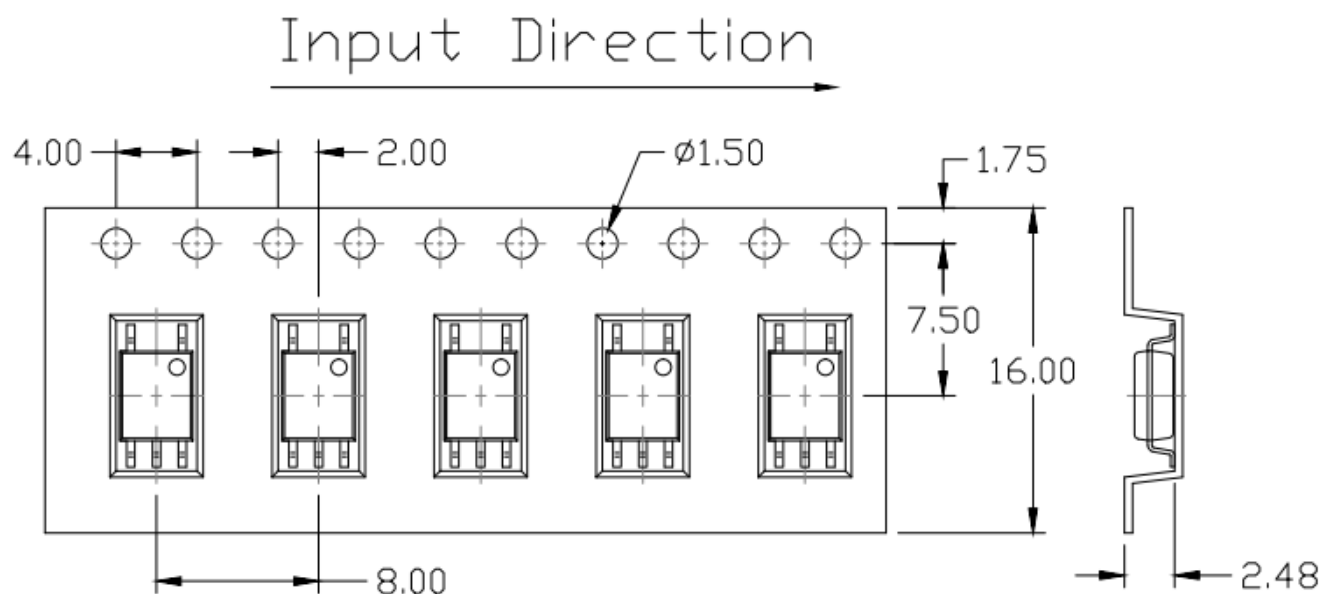
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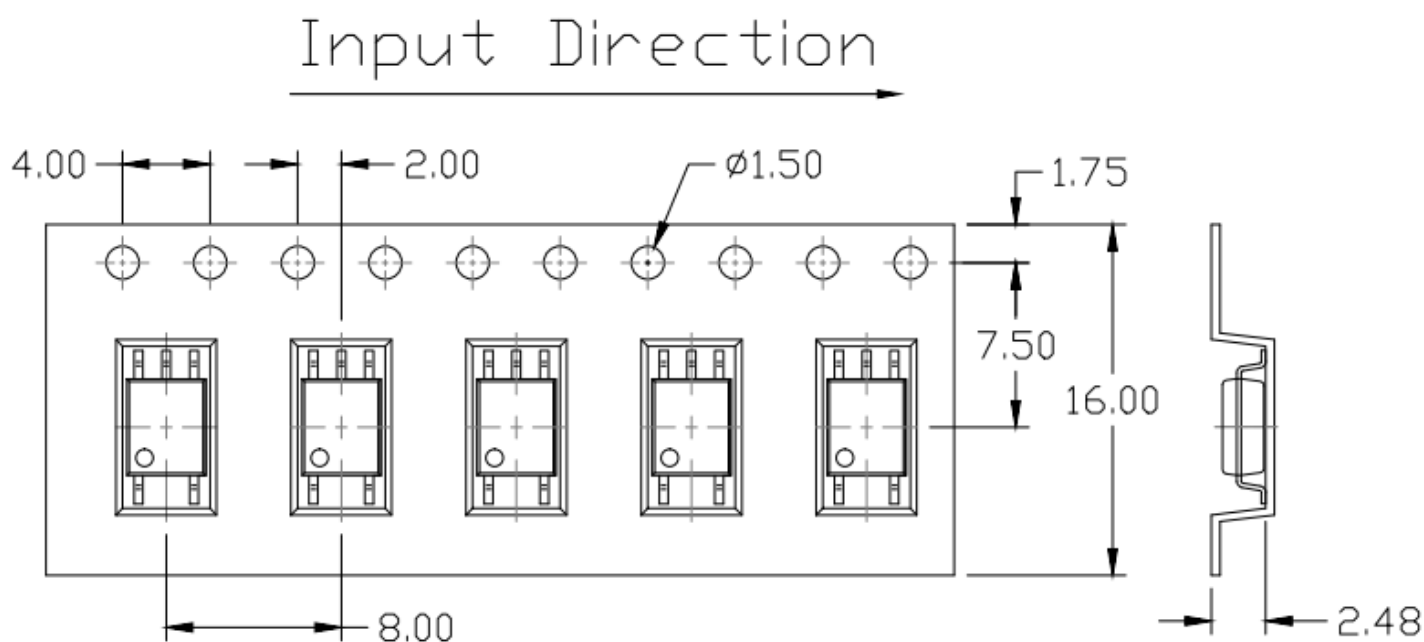
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## Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

### Option T1



### Option T2





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### **Solderability spec (Follow the JEDEC standard JESD22-B102)**

Reflow Soldering: Immersed surface, other than the end of pin as cut-surface, must be covered by solder.

Solder-Bath: More than 95% of the electrode must be covered with solder.

### **Wave soldering (Follow the JEDEC standard JESD22-A111)**

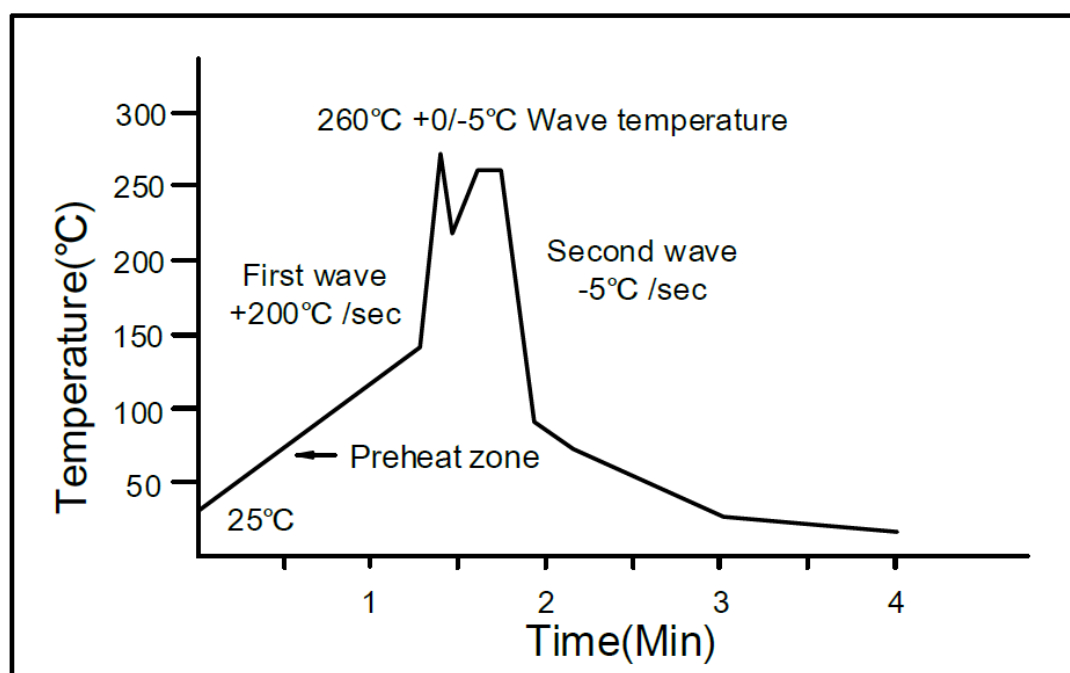
One time soldering is recommended within the condition of temperature.

Temperature:  $260 \pm 0/-5^{\circ}\text{C}$ .

Time: 10 sec.

Preheat temperature: 25 to  $140^{\circ}\text{C}$ .

Preheat time: 30 to 80 sec.



### **Iron soldering (Follow the standard MIL-STD 202G, Method 210F)**

Allow single lead soldering in every single process.

One time soldering is recommended. Temperature:  $350 \pm 10^{\circ}\text{C}$

Time: 5 sec max.



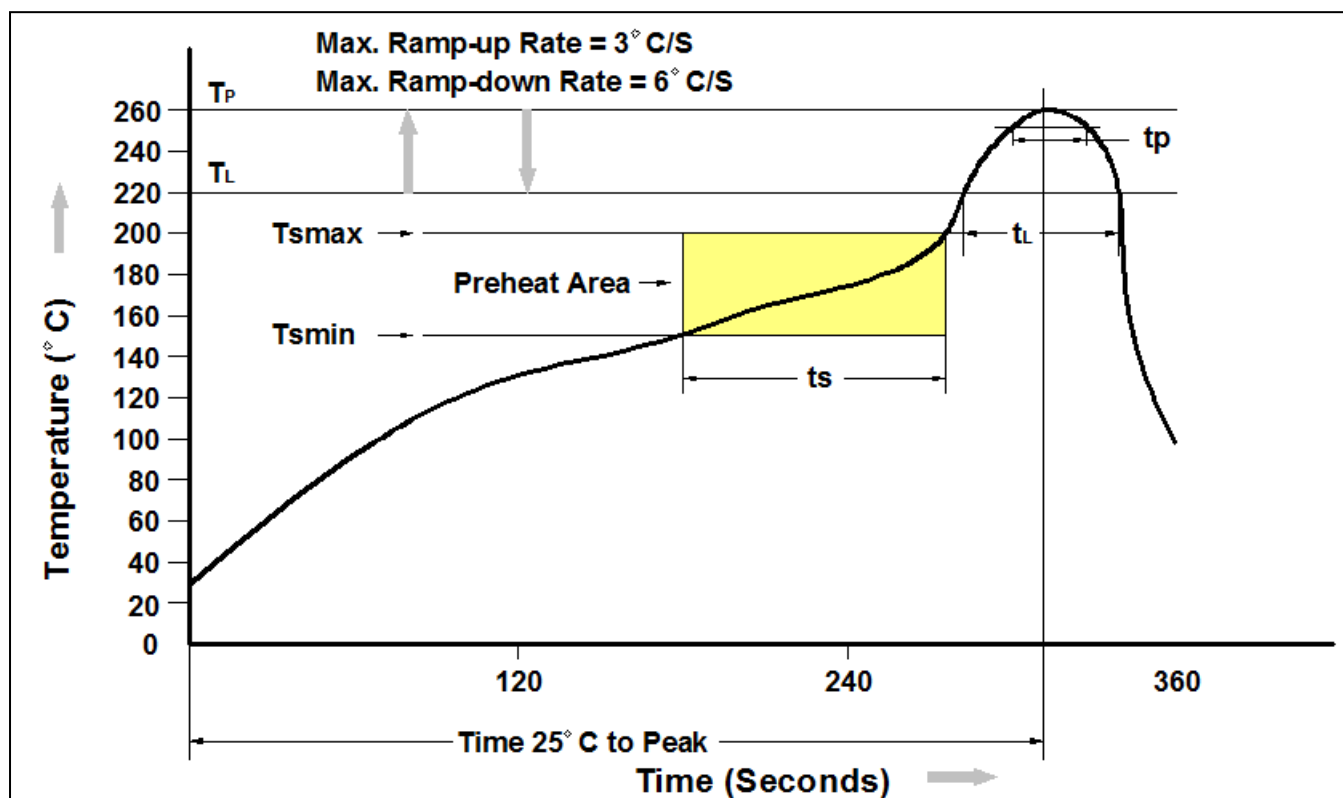
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## Reflow Profile (Follow the JEDEC standard J-STD-020)



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 (tL to tp)	3°C/second max.
Liquidous Temperature (TL)	217°C
Time (tL) Maintained Above (TL)	60 – 150 seconds
Peak Body Package Temperature	260°C +0°C / -5°C
Time (tp) within 5°C of 260°C	30 seconds
Ramp-down Rate (TP to TL)	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.



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