



1 Mbit/s High Speed Transistor Coupler

Features

- High speed 1Mbit/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 100°C
- Green Package
- Regulatory Approvals
 - UL - UL1577 (E364000)
 - VDE - EN60747-5-5(VDE0884-5)
 - CQC – GB4943.1, GB8898
 - IEC60065, IEC60950

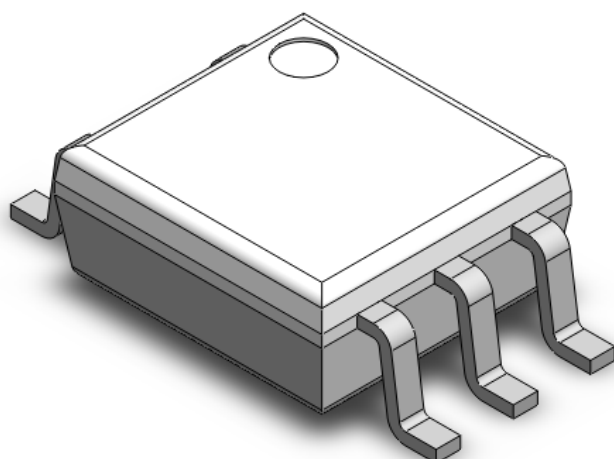
Description

The CTM452 and CTM453 devices each consist of an infrared emitting diode, optically coupled to a high speed photo detector transistor. A separate connection for the photodiode bias and output-transistor collector increase the speed by several orders of magnitude over conventional phototransistor couplers by reducing the base-collector capacitance of the input transistor. The devices are packaged in a Mini-Flat package .

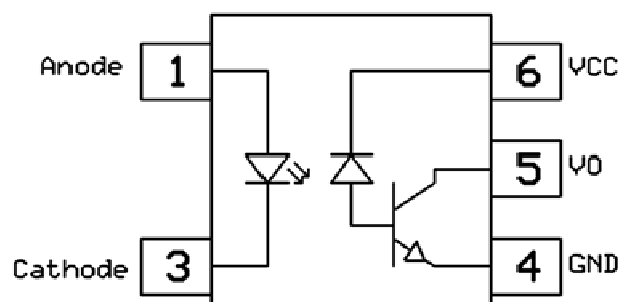
Applications

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

Package Outline



Schematic



**Absolute Maximum Rating at 25°C**

Symbol	Parameters	Ratings	Units	Notes
V _{ISO}	Isolation voltage *1	3750	V _{RMS}	
T _{OPR}	Operating temperature	-55 ~ +100	°C	
T _{STG}	Storage temperature	-55 ~ +125	°C	
T _{SOL}	Soldering temperature *2	260	°C	
Emitter				
I _F	Forward current	25	mA	
I _{FP}	Peak forward current (50% duty, 1ms P.W)	50	mA	
I _{F(TRANS)}	Peak transient current (≤1μs P.W,300pps)	1	A	
V _R	Reverse voltage	5	V	
P _D	Power dissipation	45	mW	
Detector				
P _D	Power dissipation	100	mW	
I _{O(AVG)}	Average Output current	8	mA	
I _{O(Peak)}	Peak Output current	16	mA	
V _O	Output voltage	-0.5 to 20	V	
V _{CC}	Supply voltage	-0.5 to 30	V	

**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	$I_F = 16\text{mA}$	-	1.45	1.6	V	
V_R	Reverse Voltage	$I_R = 10\mu\text{A}$	5.0	-	-	V	
$\Delta V_F/\Delta T_A$	Temperature coefficient of forward voltage	$I_F = 16\text{mA}$	-	-1.6	-	mV/ $^\circ\text{C}$	

Detector Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
I_{OH}	Logic High Output Current	$I_F=0\text{mA}$, $V_O=V_{CC}=5.5\text{V}$, $T_A=25^\circ\text{C}$	-	0.001	0.5	μA	
		$I_F=0\text{mA}$, $V_O=V_{CC}=15\text{V}$, $T_A=25^\circ\text{C}$	-	0.01	1		
		$I_F=0\text{mA}$, $V_O=V_{CC}=15\text{V}$	-	-	50		
I_{CCL}	Logic Low Supply Current	$I_F=16\text{mA}$, $V_O=\text{Open}$, $V_{CC}=15\text{V}$	-	120	200	μA	
I_{CCH}	Logic High Supply Current	$I_F=0\text{mA}$, $V_O=\text{Open}$, $V_{CC}=15\text{V}$, $T_A=25^\circ\text{C}$	-	0.01	1	μA	
		$I_F=0\text{mA}$, $V_O=\text{Open}$, $V_{CC}=15\text{V}$	-	-	2		



Electrical Characteristics

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

Transfer Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
CTR	Current Transfer Ratio	$I_F=16\text{mA}$, $V_O=0.4\text{V}$, $V_{CC}=4.5\text{V}$, $T_A=25^\circ\text{C}$	20	-	50	%	
		$I_F=16\text{mA}$, $V_O=0.5\text{V}$, $V_{CC}=4.5\text{V}$	15	-	-		
V_{OL}	Logic Low Output Voltage	$I_F=16\text{mA}$, $I_O=3\text{mA}$, $V_{CC}=4.5\text{V}$, $T_A=25^\circ\text{C}$	-	-	0.4	V	
		$I_F=16\text{mA}$, $I_O=2.4\text{mA}$, $V_{CC}=4.5\text{V}$	-	-	0.5		

Electrical Characteristics

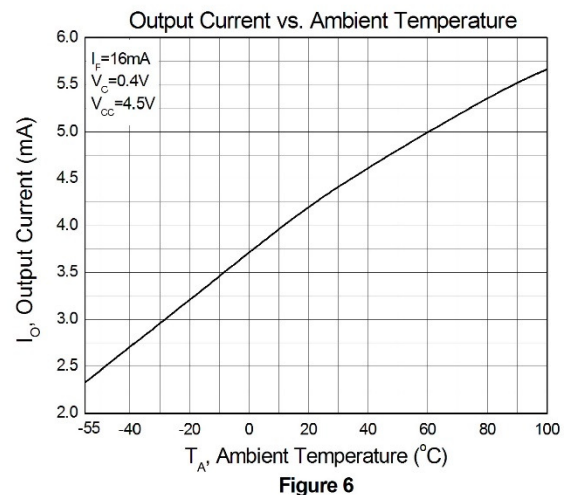
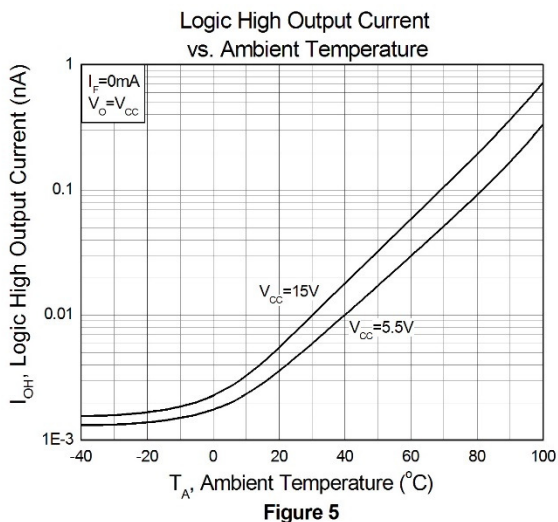
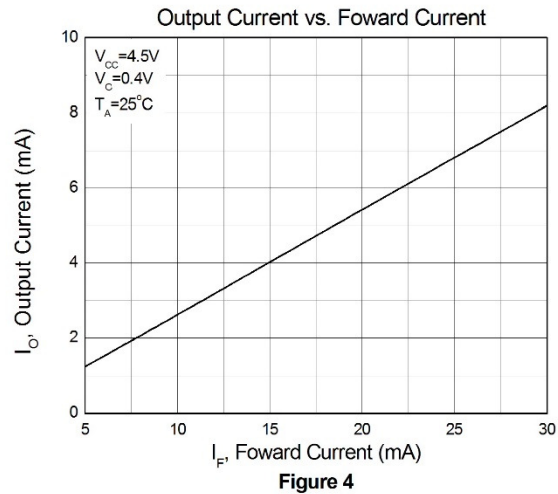
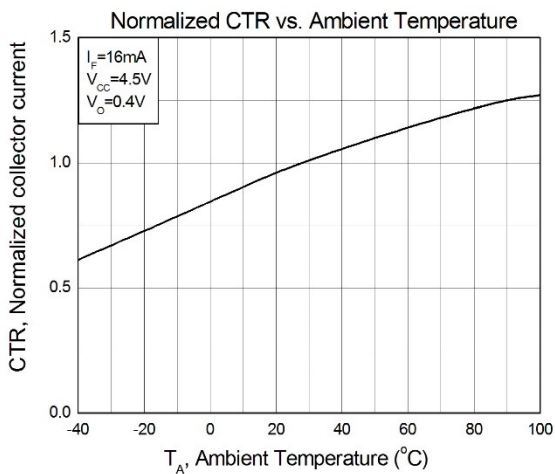
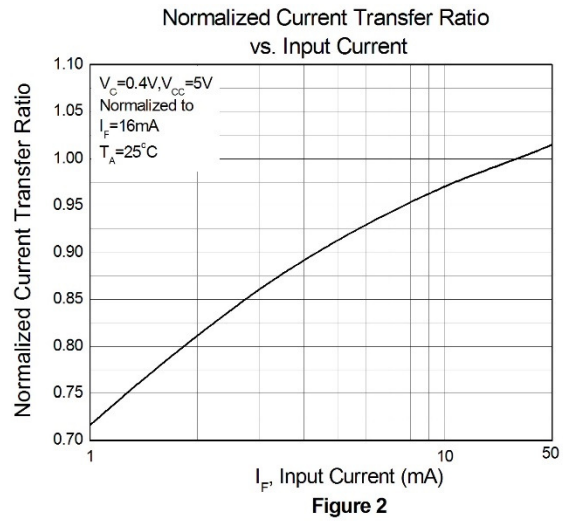
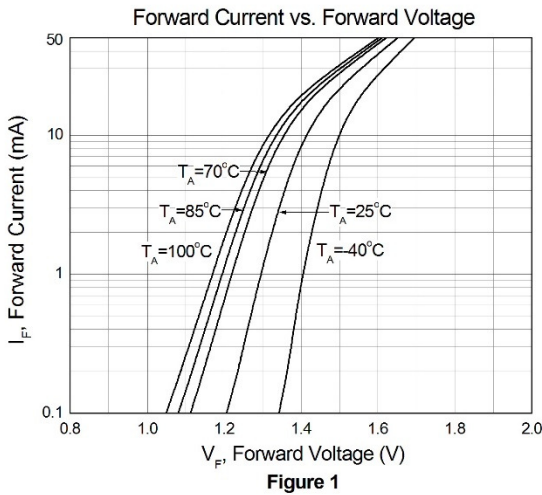
$T_A = 0 - 70^\circ\text{C}$ (unless otherwise specified). Typical values are measured at $T_A = 25^\circ\text{C}$ and $V_{CC}=5\text{V}$

Switching Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
T_{PHL}	Propagation Delay Time Logic High to Logic Low	$I_F=16\text{mA}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$	-	0.35	0.8	μs	
		$I_F=16\text{mA}$, $R_L=1.9\text{K}\Omega$	-	-	1.0		
T_{PLH}	Propagation Delay Time Logic Low to Logic High	$I_F=16\text{mA}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$	-	0.3	0.8	μs	
		$I_F=16\text{mA}$, $R_L=1.9\text{K}\Omega$	-	-	1.0		
CM_H	Common Mode Transient Immunity at Logic High	CTM452 $I_F = 0\text{mA}$, $V_{CM}=10\text{Vp-p}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$	5,000	-	-	$\text{V}/\mu\text{s}$	
		CTM453 $I_F = 0\text{mA}$, $V_{CM}=1500\text{Vp-p}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$	15,000	-	-		
CM_L	Common Mode Transient Immunity at Logic Low	CTM452 $I_F = 16\text{mA}$, $V_{CM}=10\text{Vp-p}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$	5,000	-	-	$\text{V}/\mu\text{s}$	
		CTM453 $I_F = 16\text{mA}$, $V_{CM}=1500\text{Vp-p}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$	15,000	-	-		



Typical Characteristic Curves





Typical Characteristic Curves

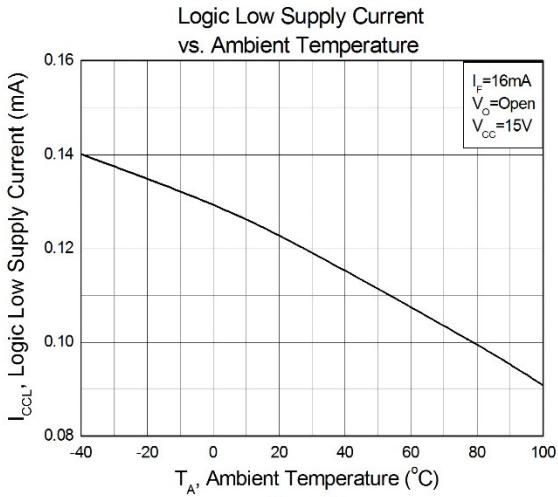


Figure 7

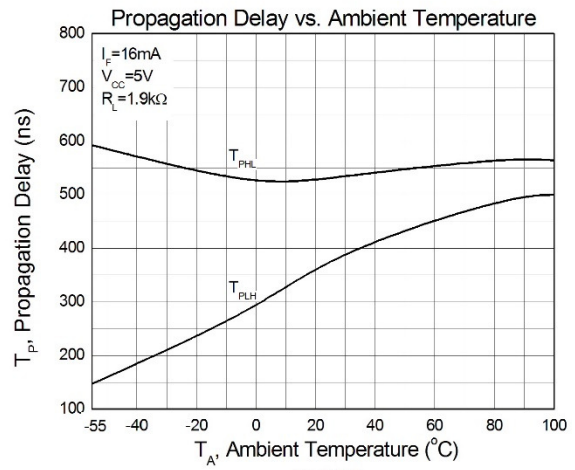


Figure 8

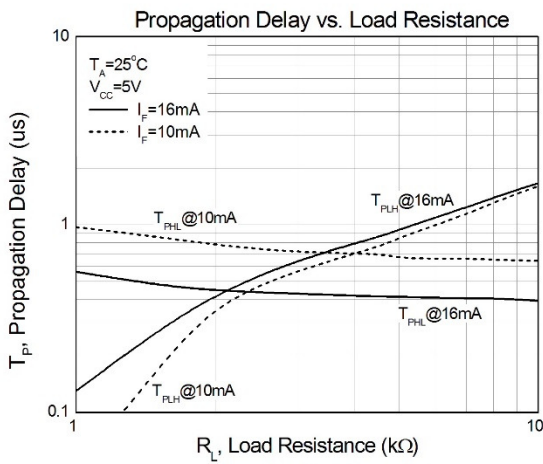


Figure 9

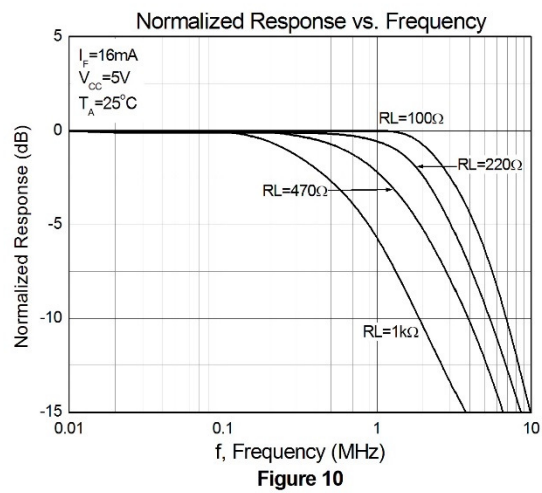
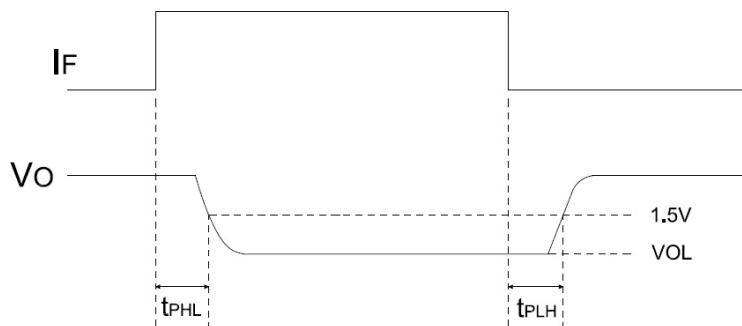
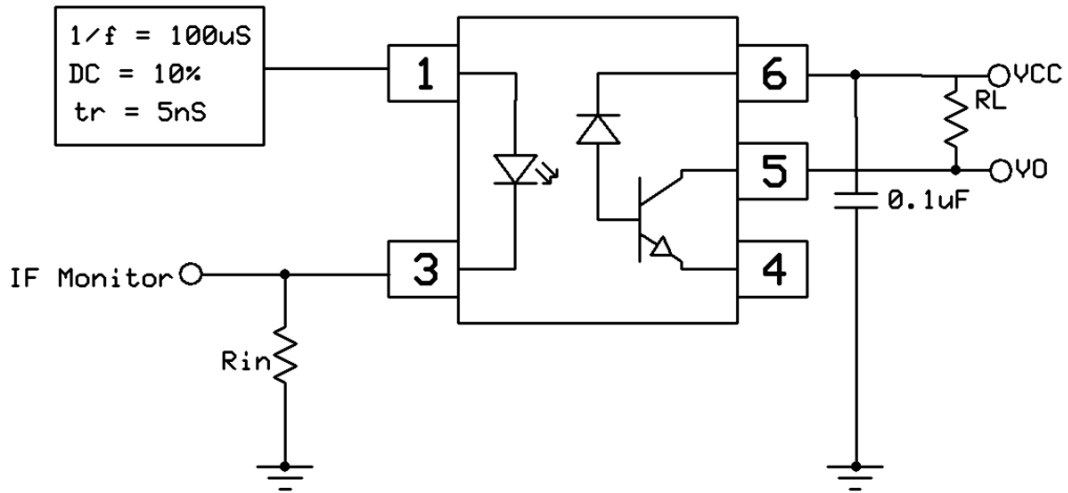


Figure 10



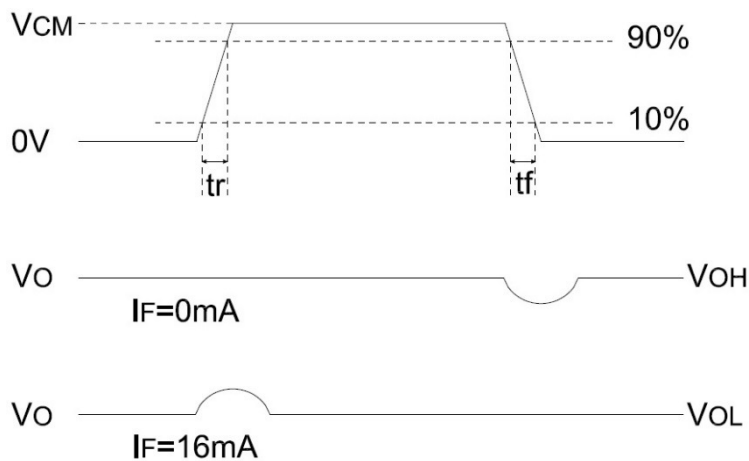
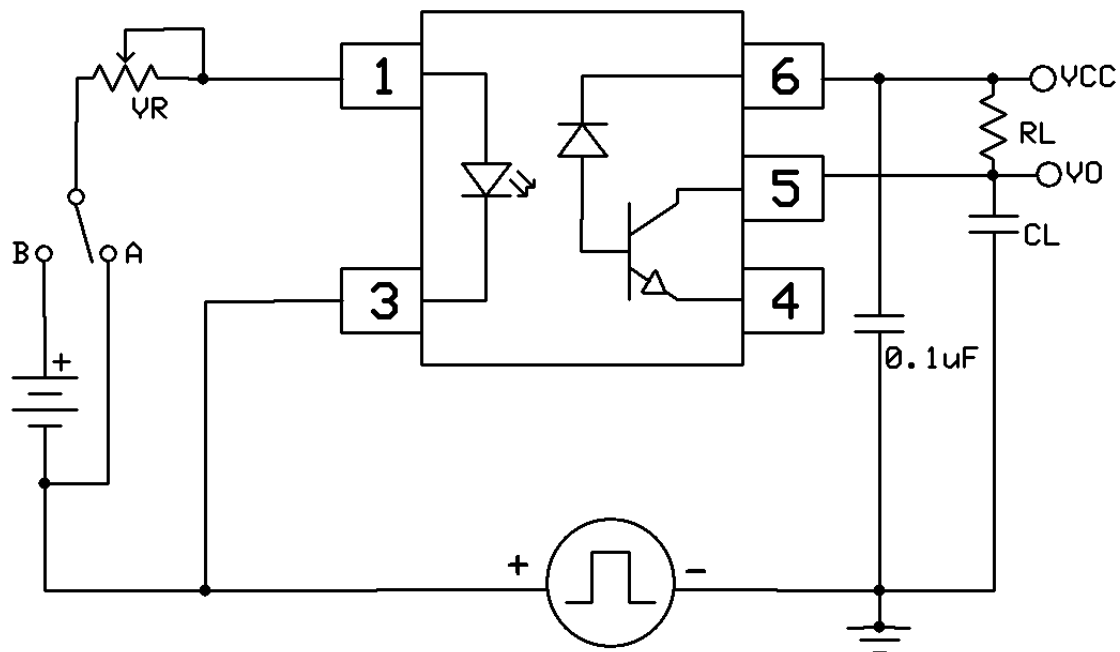
Test Circuits



Switching Time Test Circuit



Test Circuits



CMR Test Circuit

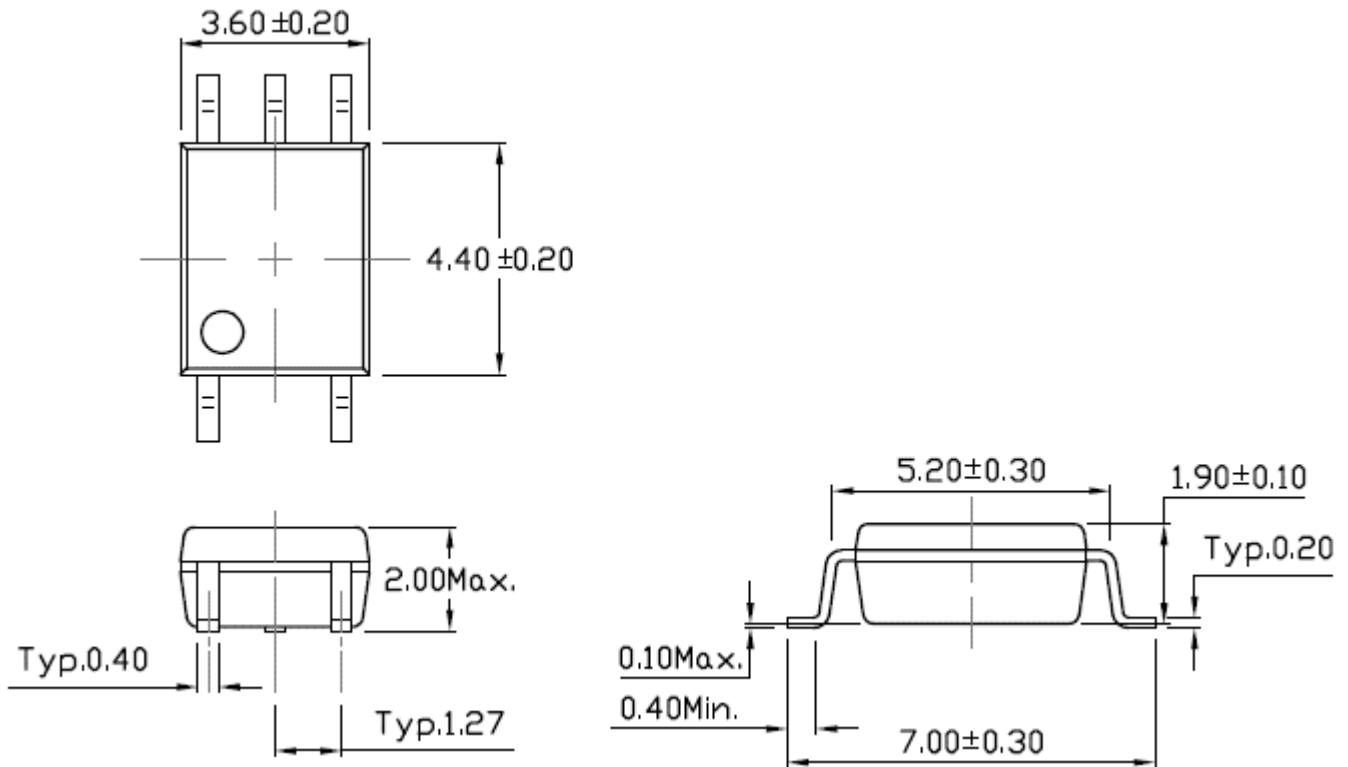


CTM452, CTM453

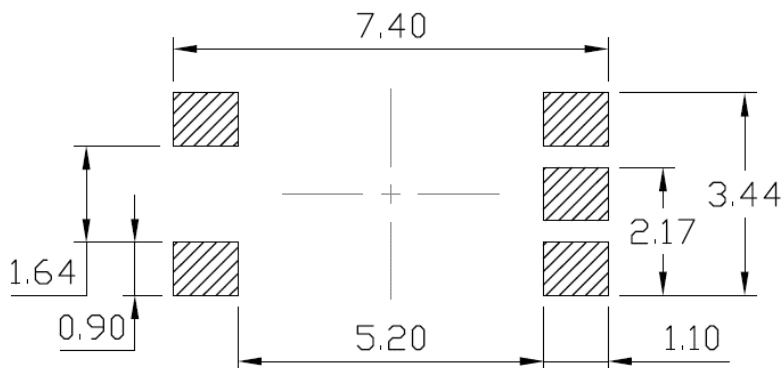
5 Pin Mini-Flat

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Package Dimension *Dimensions in mm unless otherwise stated*



Recommended Solder Mask *Dimensions in mm unless otherwise stated*





Marking Information



Note:

- CT : Denotes “CT Micro”
- M453 : Product Number
- V : VDE Option
- Y : Fiscal Year
- WW : Work Week
- K : Production Code

Ordering Information

CTM45X(V)(Z)

X = Part No. (X=2 or 3)

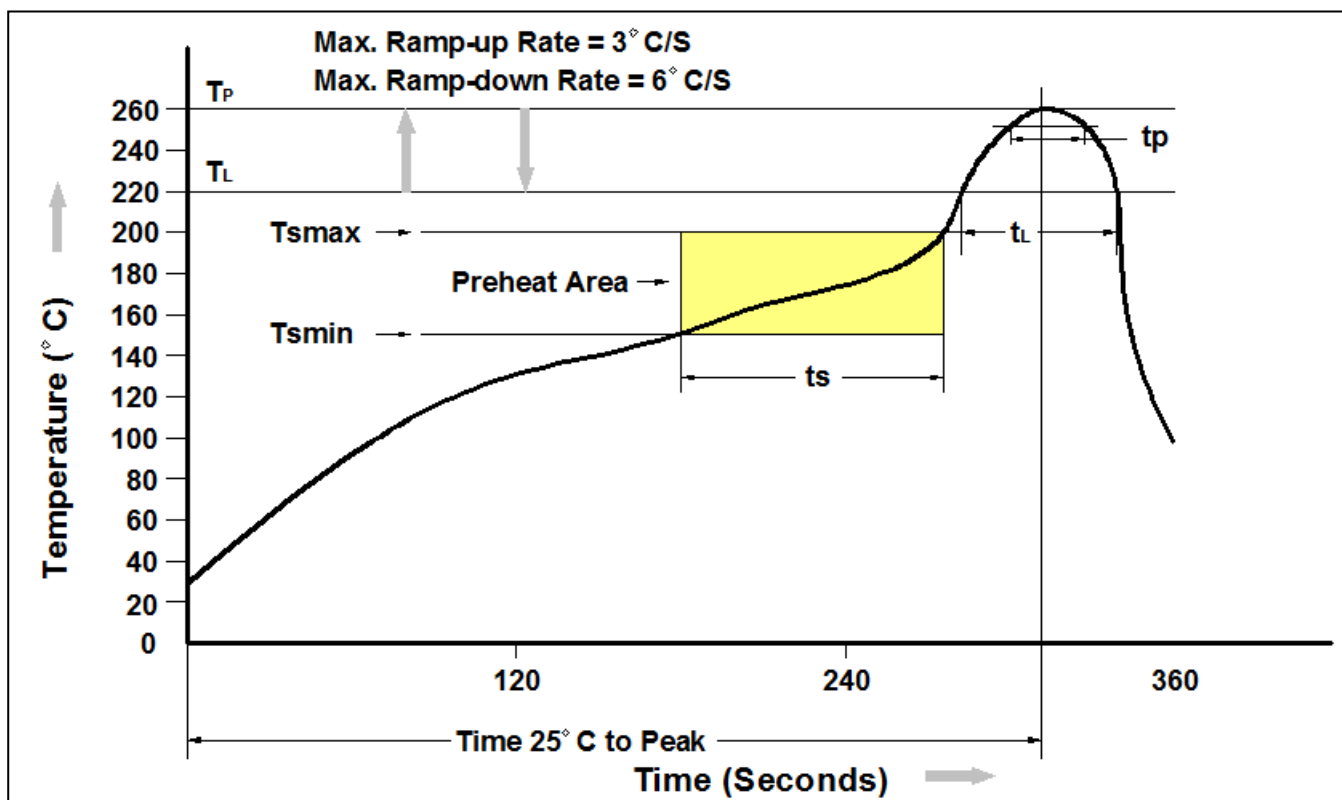
V = VDE Option (V or none)

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



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 (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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