



Features

- High speed: 1 Mbit/s
- High isolation voltage between input and output (Viso=3750 Vrms)
- Guaranteed performance from 0°C to 70°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, 2022 (14001105803)
 - ✓ IEC62368 (FI/41119)

Description

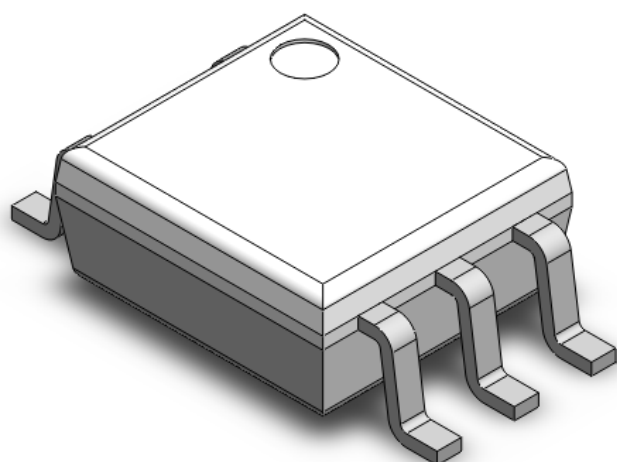
The CTM452 and CTM453 devices each consist of an infrared emitting diode, optically coupled to a high speed photo detector transistor.

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.

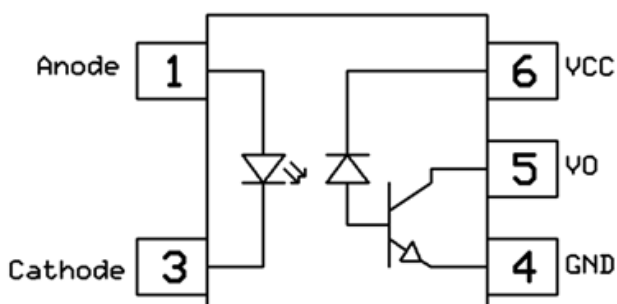
Applications

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

Package Outline



Schematic





CTM452, CTM453

5 Pin Mini-Flat DMC-Isolator®

1 Mbit/s High Speed Transistor Coupler

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_{ISO}	Isolation voltage (AC, 1 minute, 40 ~ 60% R.H.)	3750	V_{RMS}	
T_{OPR}	Operating temperature	-55 ~ +125	$^{\circ}\text{C}$	
T_{STG}	Storage temperature	-55 ~ +150	$^{\circ}\text{C}$	
T_{SOL}	Soldering temperature (For 10 seconds)	260	$^{\circ}\text{C}$	
Emitter				
I_{F}	Forward current	25	mA	
I_{FP}	Peak forward current (50% duty, 1ms P.W)	50	mA	
$I_{\text{F(TRANS)}}$	Peak transient current ($\leq 1\mu\text{s}$ P.W, 300pps)	1	A	
V_{R}	Reverse voltage	5	V	
P_{D}	Power dissipation	45	mW	
Detector				
P_{D}	Power dissipation	100	mW	
$I_{\text{O(AVG)}}$	Average Output current	8	mA	
$I_{\text{O (Peak)}}$	Peak Output current	16	mA	
V_{O}	Output voltage	-0.5 to 20	V	
V_{CC}	Supply voltage	-0.5 to 30	V	



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5 Pin Mini-Flat DMC-Isolator®

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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	$I_F = 16\text{mA}$	-	1.6	1.8	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	
		$I_F=0\text{mA}$, $V_O=V_{CC}=3.3\text{V}$, $T_A=25^{\circ}\text{C}$		0.001	0.4		
		$I_F=0\text{mA}$, $V_O=V_{CC}=15\text{V}$, $T_A=25^{\circ}\text{C}$	-	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		



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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	-	-		
		$I_F=16\text{mA}$, $V_O=0.4\text{V}$, $V_{CC}=3.3\text{V}$, $T_A=25^\circ\text{C}$	18		51		
		$I_F=16\text{mA}$, $V_O=0.5\text{V}$, $V_{CC}=3.3\text{V}$	13				
VOL	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	
		$I_F=16\text{mA}$, $I_O=3\text{mA}$, $V_{CC}=3.3\text{V}$, $T_A=25^\circ\text{C}$			0.4		
		$I_F=16\text{mA}$, $I_O=2.4\text{mA}$, $V_{CC}=4.5\text{V}$	-	-	0.5		
		$I_F=16\text{mA}$, $I_O=2.4\text{mA}$, $V_{CC}=3.3\text{V}$			0.5		



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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		$I_F=16\text{mA}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$	-	0.35	0.8	μs	
			$I_F=16\text{mA}$, $R_L=1.9\text{K}\Omega$	-	-	1.0		
			$I_F=16\text{mA}$, $V_{CC}=3.3\text{V}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$		0.4	1		
			$I_F=16\text{mA}$, $V_{CC}=3.3\text{V}$, $R_L=1.9\text{K}\Omega$			1.4		
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		
			$I_F=16\text{mA}$, $V_{CC}=3.3\text{V}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$			1.5		
			$I_F=16\text{mA}$, $V_{CC}=3.3\text{V}$, $R_L=1.9\text{K}\Omega$			2.0		
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	-			



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

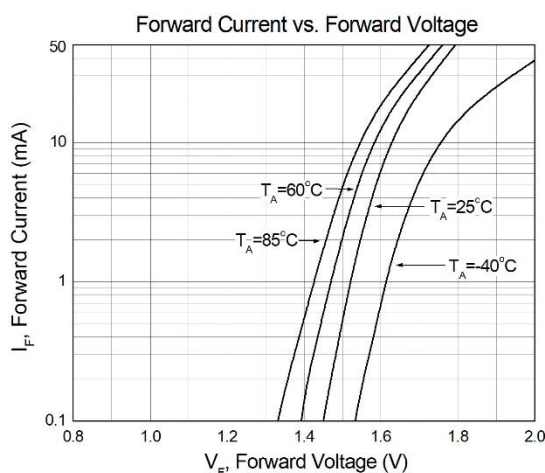


Figure 1

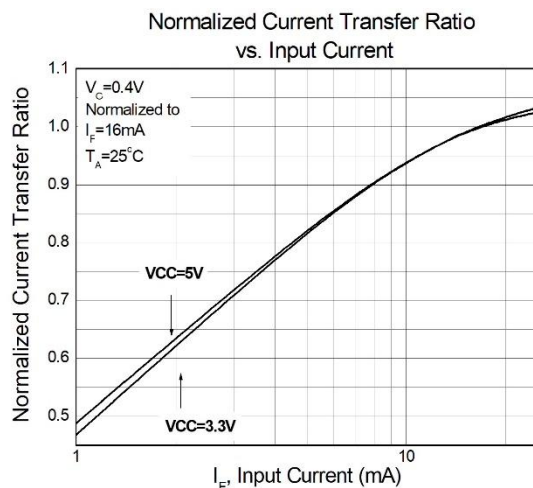


Figure 2

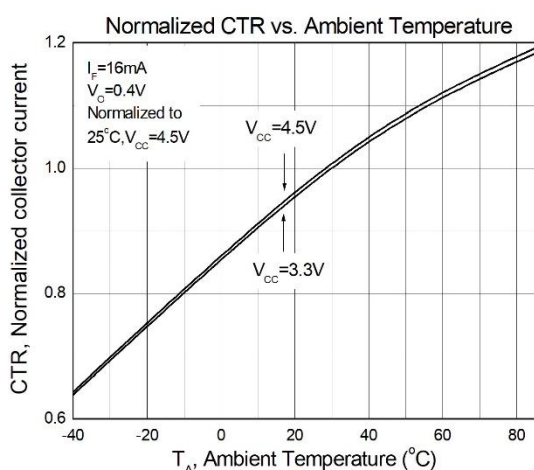


Figure 3

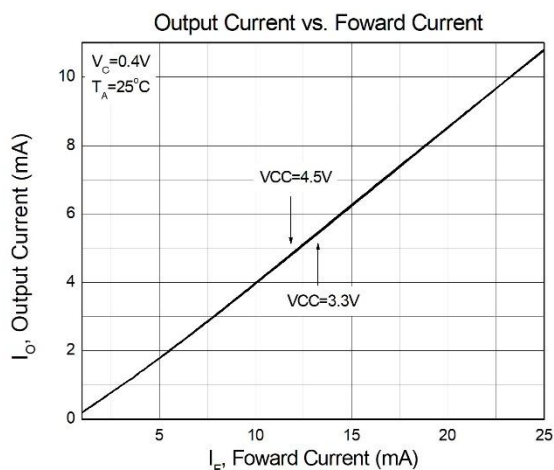


Figure 4

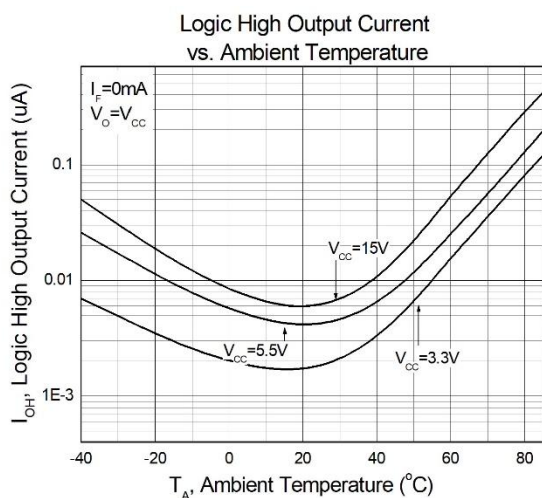


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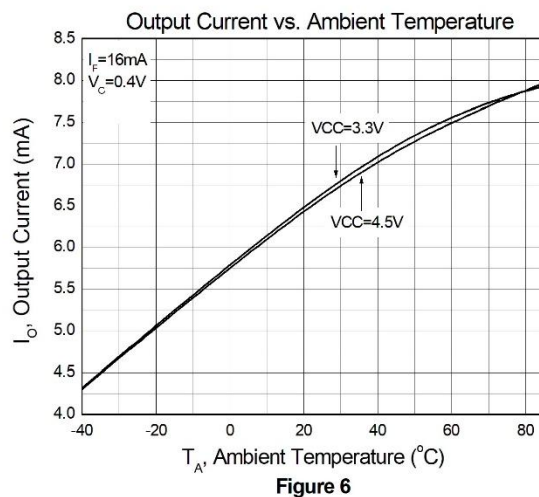


Figure 6



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

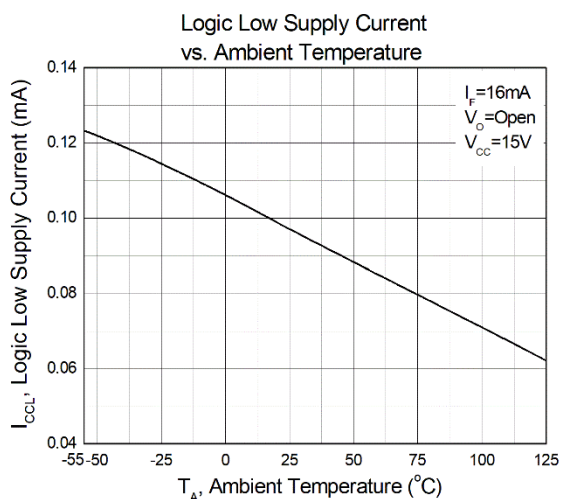


Figure 7

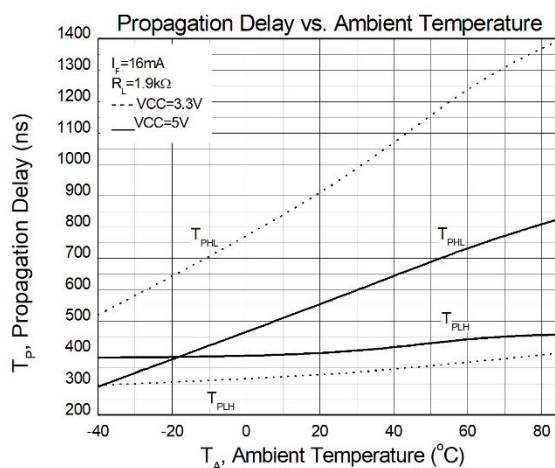


Figure 8

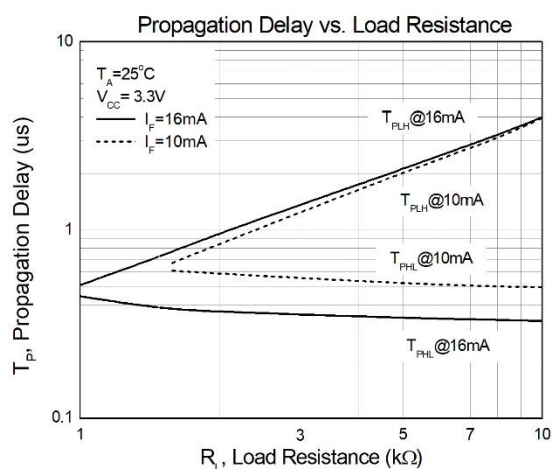


Figure 9

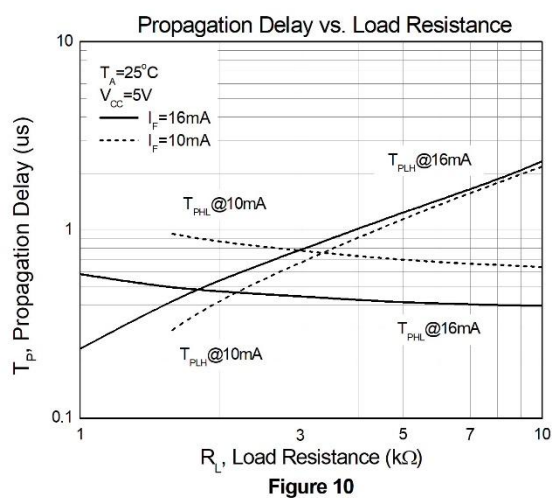


Figure 10



Test Circuits

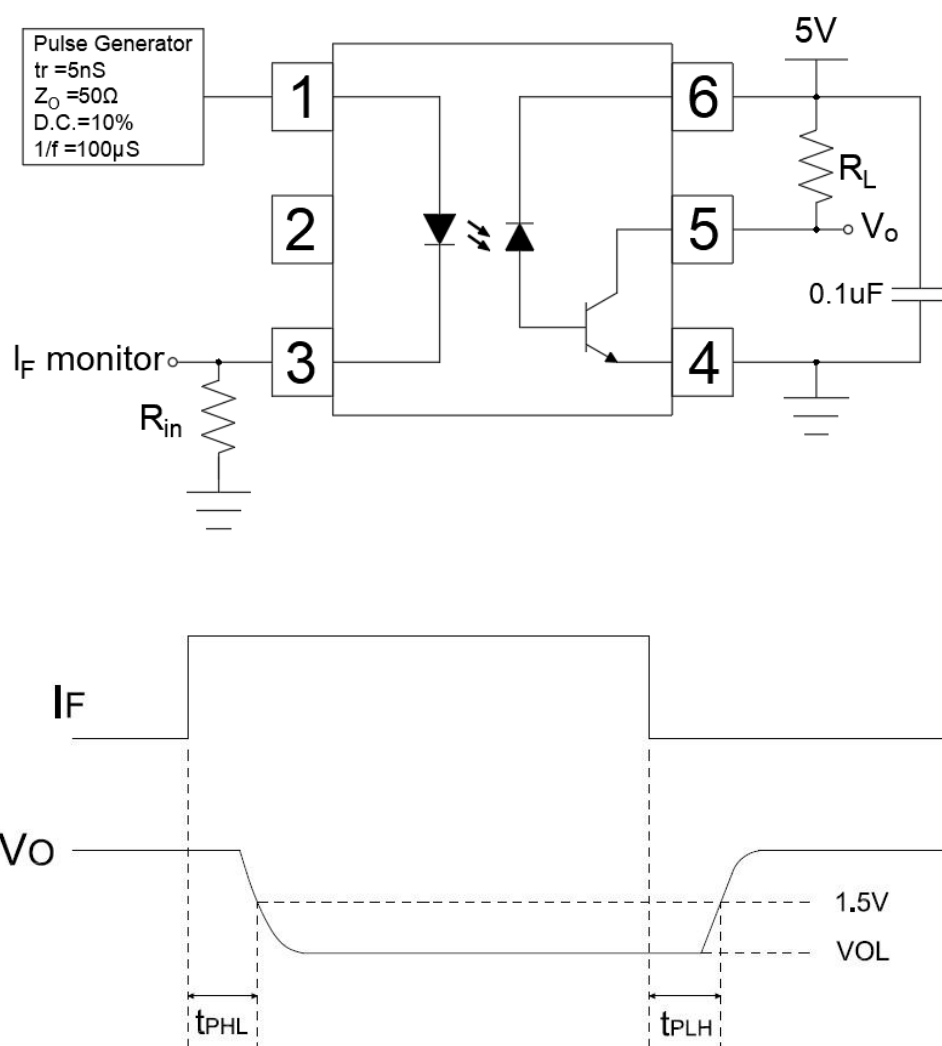


Figure 11: Switching Time Test Circuits



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Test Circuits

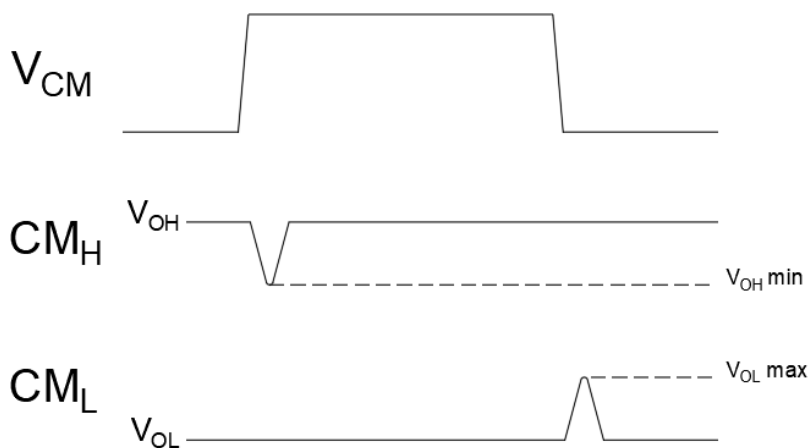
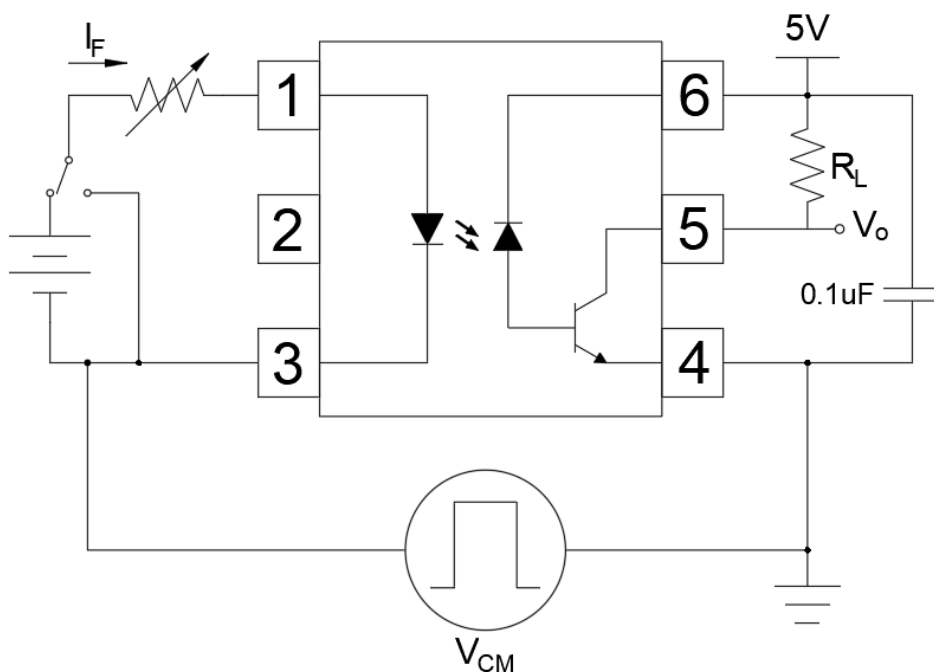


Figure 12: CMR Test Circuits



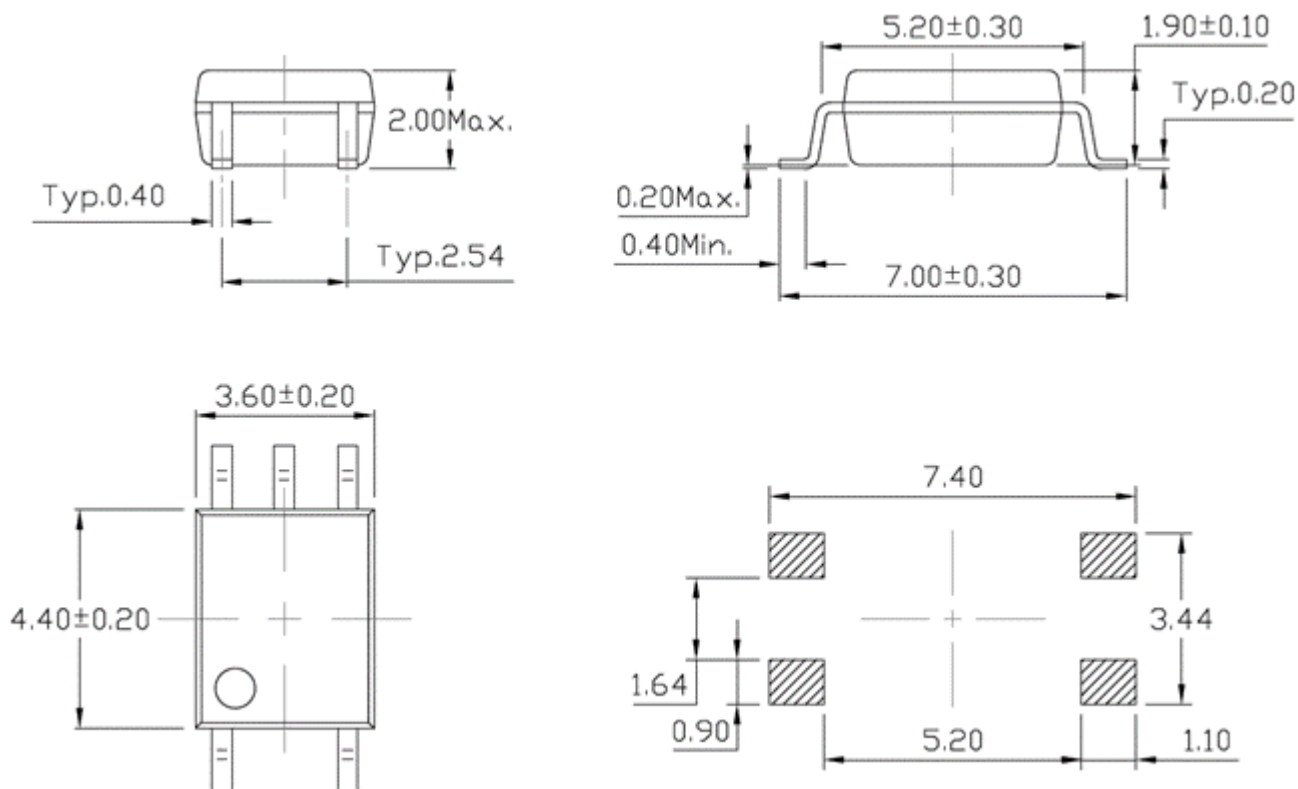
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5 Pin Mini-Flat DMC-Isolator®

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Package Dimension *Dimensions in mm unless otherwise stated*



Marking Information



Note:

CT : Denotes "CT Micro"
M452 : Product Number
V : VDE Safety Mark Option
Y : One Digit Year Code
WW : Two Digit Work Week
K : Manufacturing Code



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Ordering Information

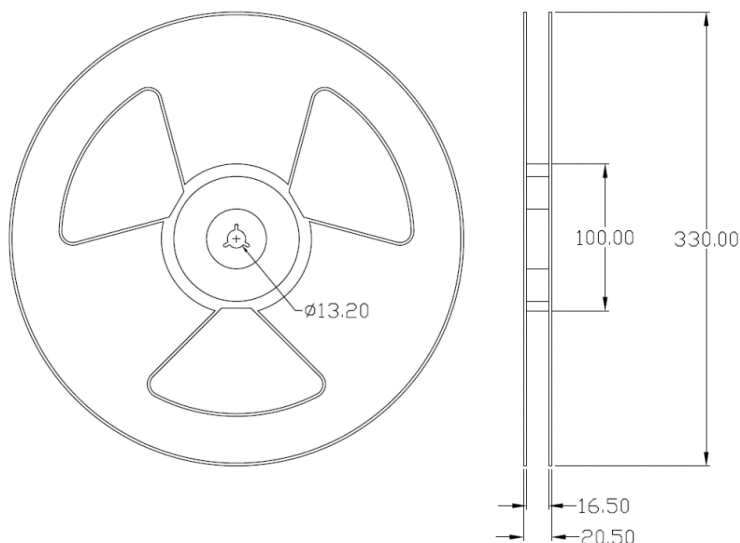
CTM45X (V)(Z)

- CT = Denotes “CT Micro”
M45X = Product Number (X= 2, or 3)
V = VDE Safety Mark Option (Blank or V)
Z = Tape and Reel Option (T1 or 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





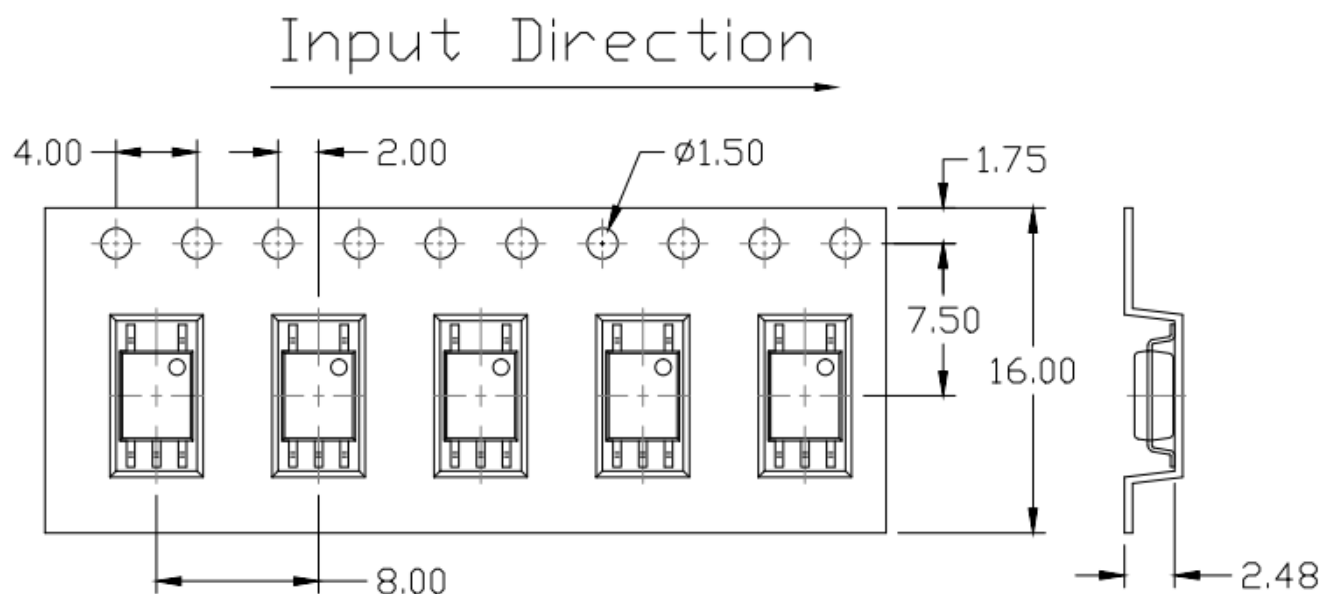
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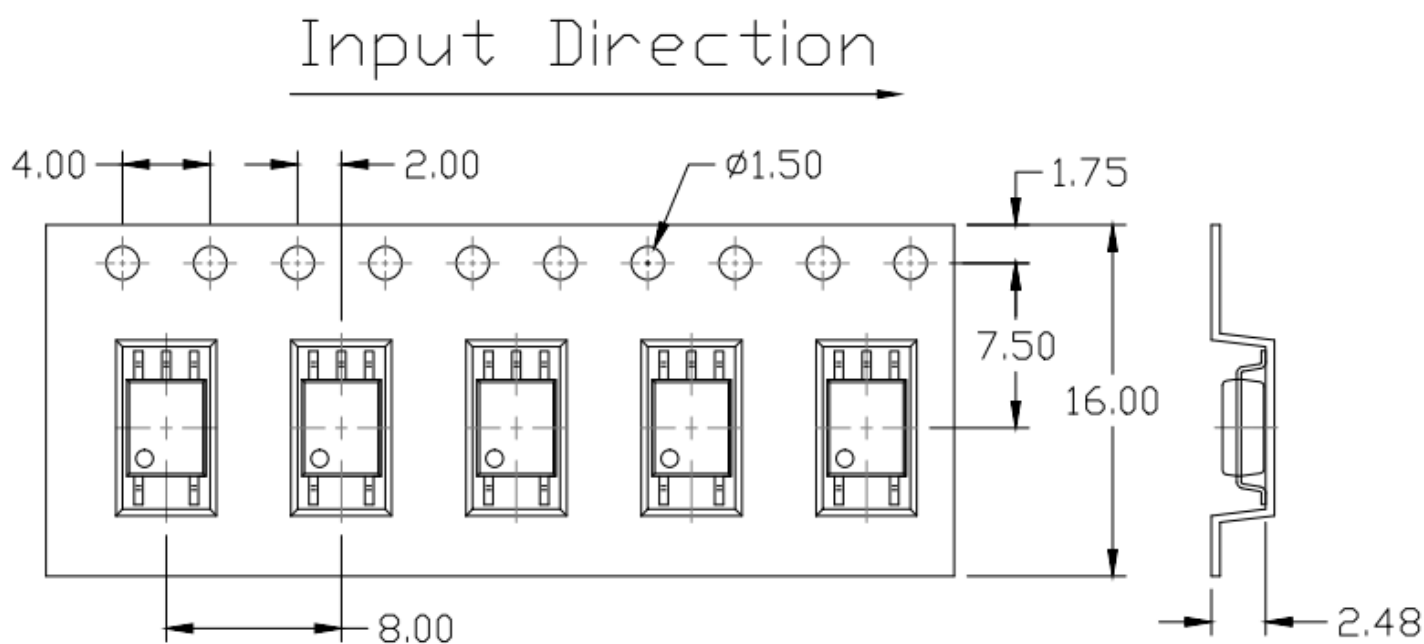
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Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

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)

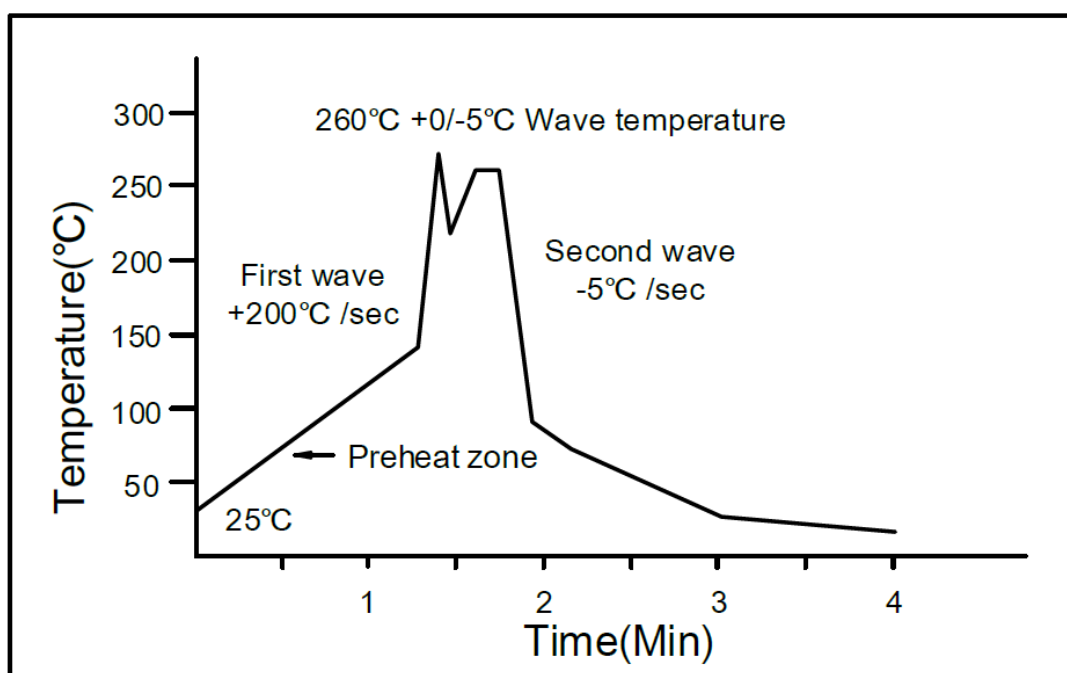
One time soldering is recommended within the condition of temperature.

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

Time: 10 sec.

Preheat temperature: 25 to 140°C .

Preheat time: 30 to 80 sec.



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

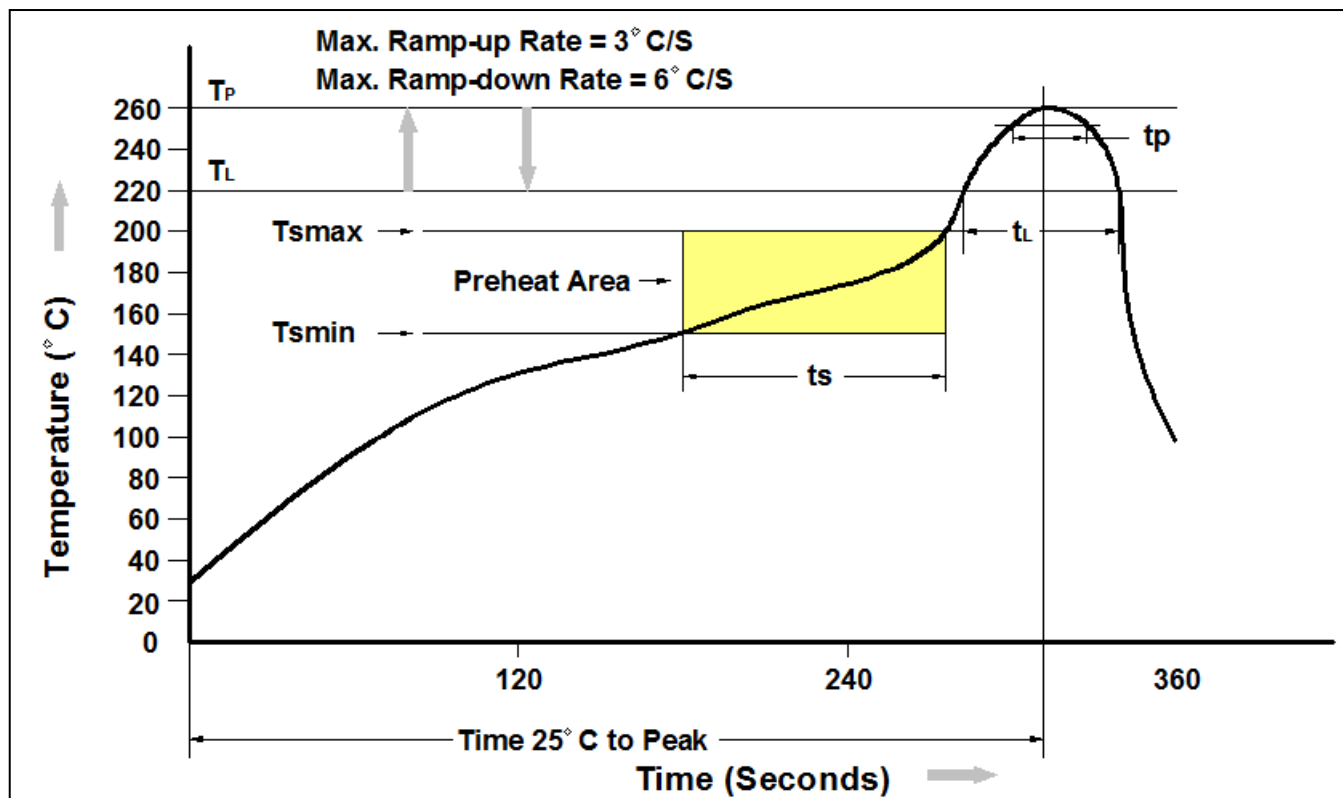
Allow single lead soldering in every single process.

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

Time: 5 sec max.



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



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T _{smin})	150°C
Temperature Max. (T _{smax})	200°C
Time (t _s) from (T _{smin} to T _{smax})	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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