CTM452, CTM453

5 Pin Mini-Flat

1 Mbit/s High Speed Transistor Coupler

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
- Green Package
- Regulatory Approvals
  - UL - UL1577 (E364000)
  - VDE - EN60747-5-5(VDE0884-5)
  - CQC – GB4943.1, GB8898
  - IEC60065, IEC60950

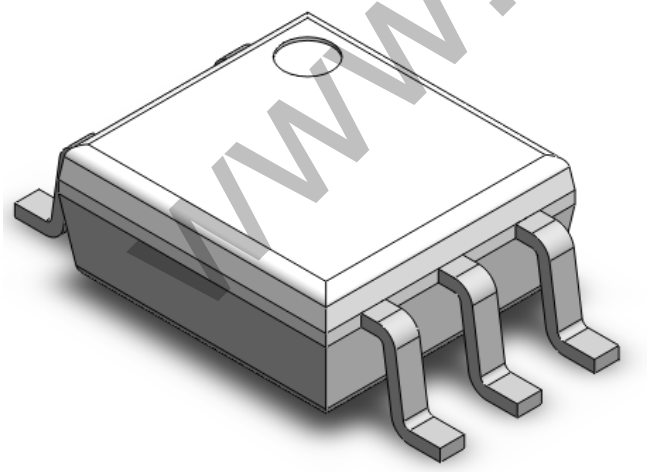
Description

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.

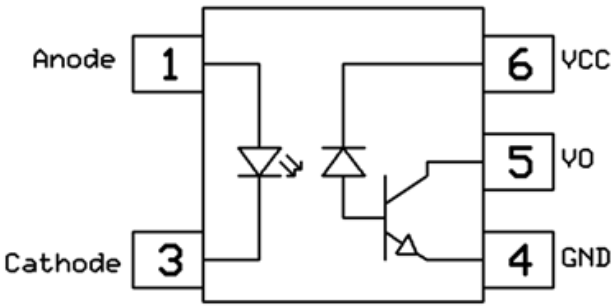
Applications

- 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 ~ +125	°C	
T_{STG}	Storage temperature	-55 ~ +150	°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°C (unless otherwise specified). Typical values are measured at T_A = 25^{0}C and V_{CC}=5V

Emitter Characteristics

Symbol	*Parameters*	*Test Conditions*	*Min*	*Typ*	*Max*	*Units*	*Notes*
V_F	Forward voltage	IF = 16mA	-	1.6	1.8	V	
V_R	Reverse Voltage	IR = 10µA	5.0	-	-	V	
$\Delta V_F/\Delta T_A$	Temperature coefficient of forward voltage	IF =16mA	-	-1.6	-	mV/°C	

Detector Characteristics

Symbol	*Parameters*	*Test Conditions*	*Min*	*Typ*	*Max*	*Units*	*Notes*
I_{OH}	Logic High Output Current	I_F=0mA, V_O=V_{CC}=5.5V, T_A=25°C	-	0.001	0.5	µA	
		I_F=0mA, V_O=V_{CC}=3.3V, T_A=25°C		0.001	0.4		
		I_F=0mA, V_O=V_{CC}=15V, T_A=25°C	-	0.01	1		
		I_F=0mA, V_O=V_{CC}=15V	-	-	50		
I_{CCL}	Logic Low Supply Current	I_F=16mA, V_O=Open, V_{CC}=15V	-	120	200	µA	
I_{CCH}	Logic High Supply Current	I_F=0mA, V_O=Open, V_{CC}=15V, T_A=25°C	-	0.01	1	µA	
		IF=0mA, VO=Open, V_{CC} =15V	-	-	2		

Electrical Characteristics

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

Transfer Characteristics

Symbol	*Parameters*	*Test Conditions*	*Min*	*Typ*	*Max*	*Units*	*Notes*
CTR	Current Transfer Ratio	I_F=16mA, V_O=0.4V, V_{CC}=4.5V, T_A=25°C	20	-	50	%	
		I_F=16mA, V_O=0.5V, V_{CC}=4.5V	15	-	-		
		I_F=16mA, V_O=0.4V, V_{CC}=3.3V, T_A=25°C	18		51		
		I_F=16mA, V_O=0.5V, V_{CC}=3.3V	13				
V_{OL}	Logic Low Output Voltage	I_F=16mA, I_O=3mA, V_{CC}=4.5V, T_A=25°C	-	-	0.4	V	
		I_F=16mA, I_O=3mA, V_{CC}=3.3V, T_A=25°C			0.4		
		I_F=16mA, I_O=2.4mA, V_{CC}=4.5V	-	-	0.5		
		I_F=16mA, I_O=2.4mA, V_{CC}=3.3V			0.5		

Switching Characteristics

Symbol	*Parameters*		*Test Conditions*	*Min*	*Typ*	*Max*	*Units*	*Notes*
T_{PHL}	Propagation Delay Time Logic High to Logic Low		I_F=16mA, R_L=1.9KΩ, T_A=25°C	-	0.35	0.8	µs	
			I_F=16mA, R_L=1.9KΩ	-	-	1.0		
			I_F=16mA, V_{CC}=3.3V R_L=1.9KΩ, T_A=25°C		0.4	1		
			I_F=16mA, V_{CC}=3.3V R_L=1.9KΩ			1.4		
T_{PLH}	Propagation Delay Time Logic Low to Logic High		I_F=16mA, R_L=1.9KΩ, T_A=25°C	-	0.3	0.8	µs	
			I_F=16mA, R_L=1.9KΩ	-	-	1.0		
			I_F=16mA, V_{CC}=3.3V R_L=1.9KΩ, T_A=25°C			1.5		
			I_F=16mA, V_{CC}=3.3V R_L=1.9KΩ			2.0		
CM_H	Common Mode Transient Immunity at Logic High	CTM452	I_F = 0mA , V_{CM}=10Vp-p, R_L=1.9KΩ, T_A =25°C	5,000	-	-	V/µs	
		CTM453	I_F = 0mA , V_{CM}=1500Vp-p, R_L=1.9KΩ, T_A =25°C	15,000	-			
CM_L	Common Mode Transient Immunity at Logic Low	CTM452	I_F = 16mA , V_{CM}=10Vp-p, R_L=1.9KΩ, T_A=25°C	5,000	-	-	V/µs	
		CTM453	I_F = 16mA , V_{CM}=1500Vp-p, R_L=1.9KΩ, T_A=25°C	15,000	-			

Typical Characteristic Curves

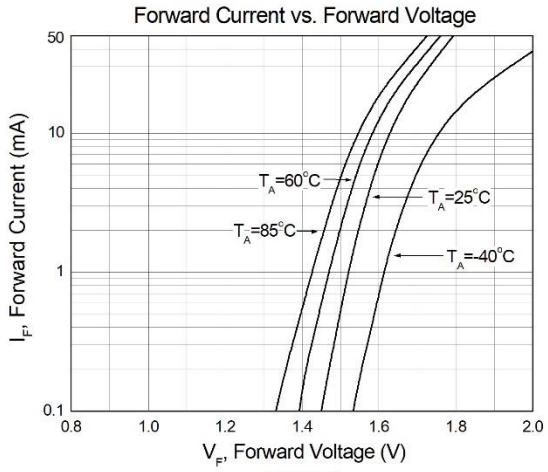


Figure 1

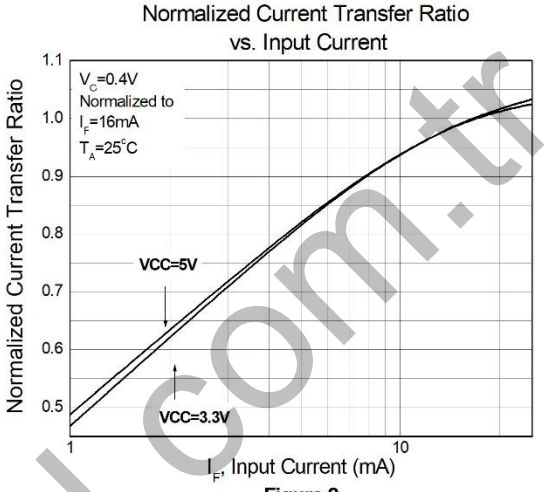


Figure 2

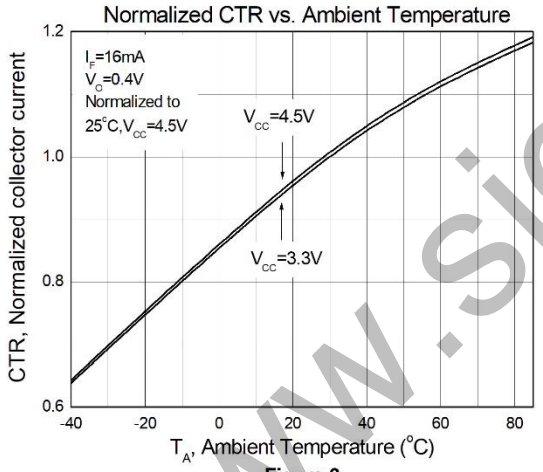


Figure 3

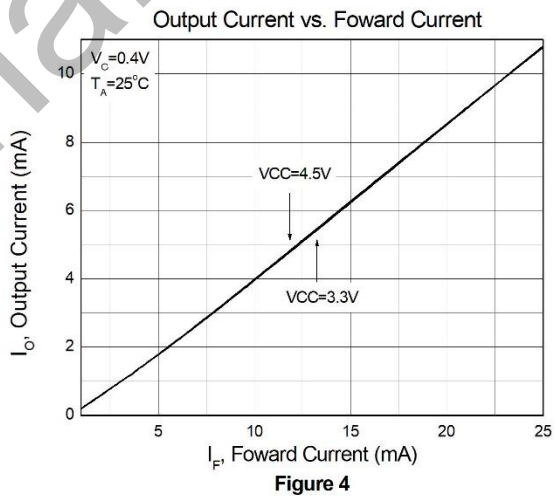


Figure 4

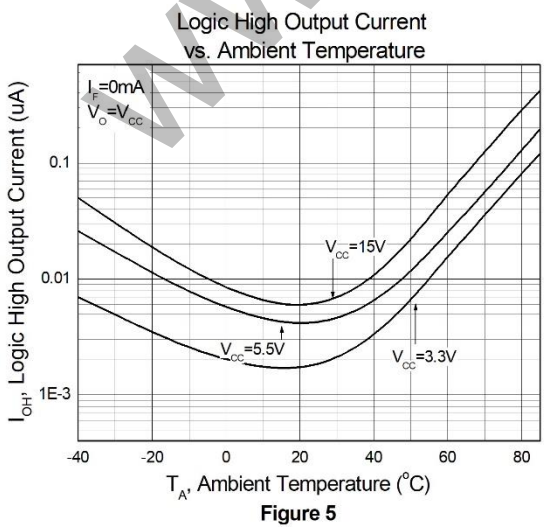


Figure 5

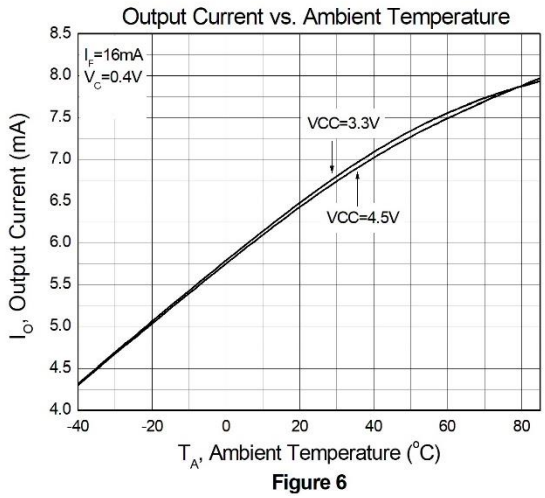


Figure 6

Typical Characteristic Curves

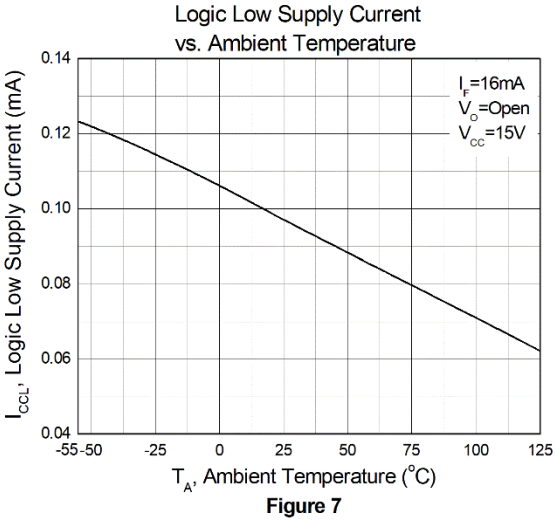


Figure 7

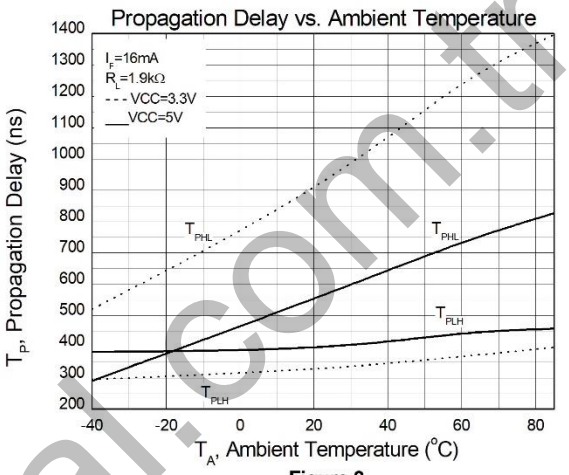


Figure 8

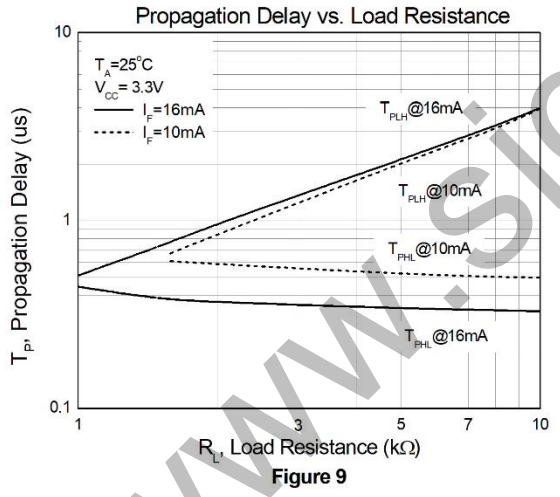


Figure 9

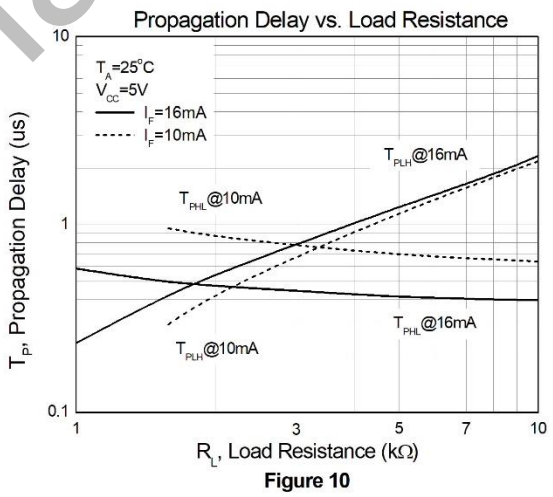
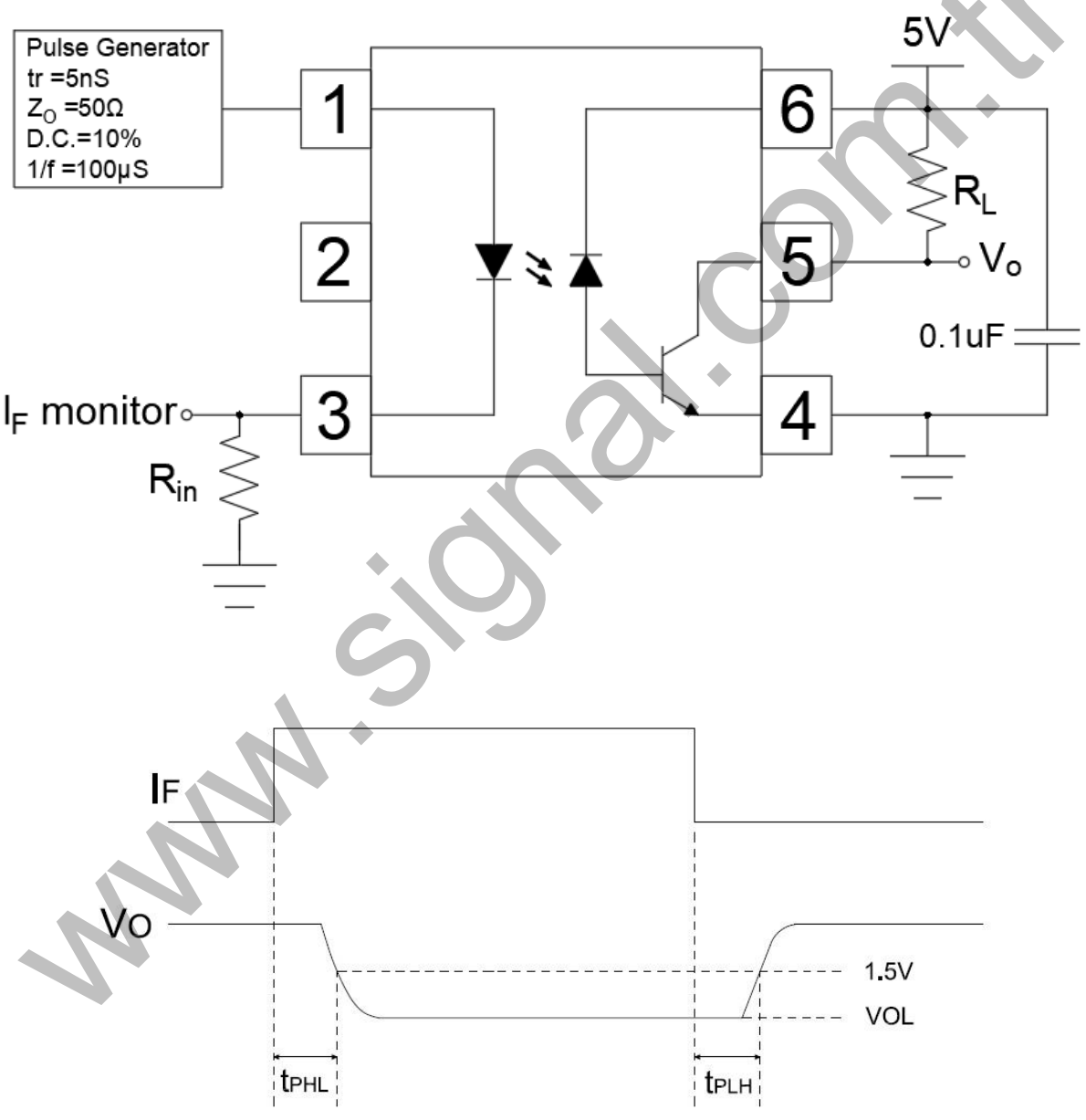


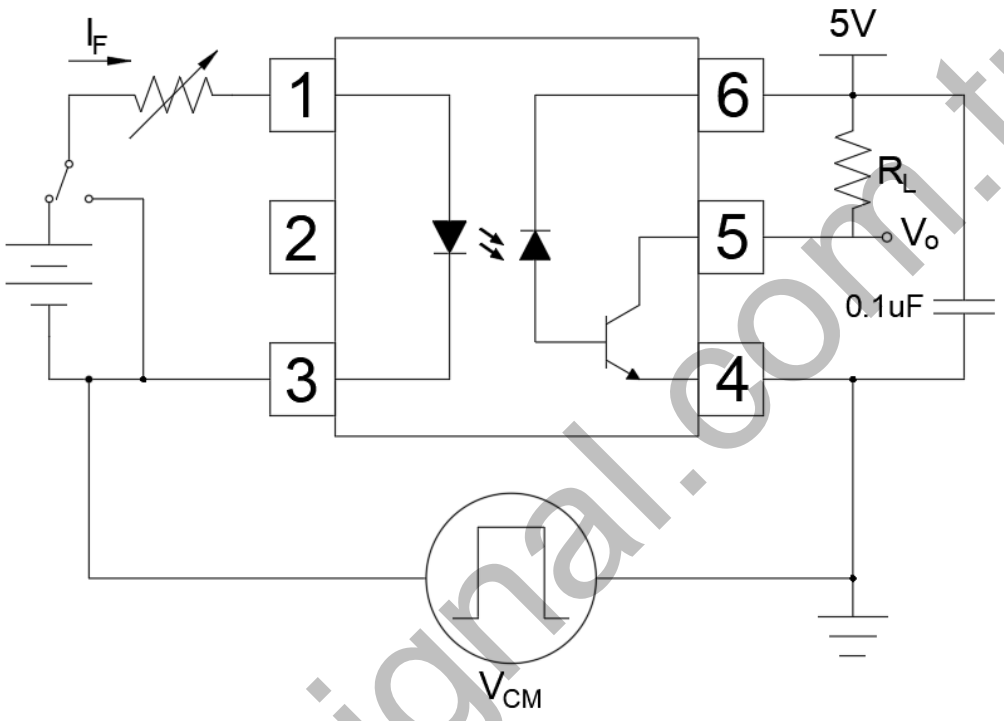
Figure 10

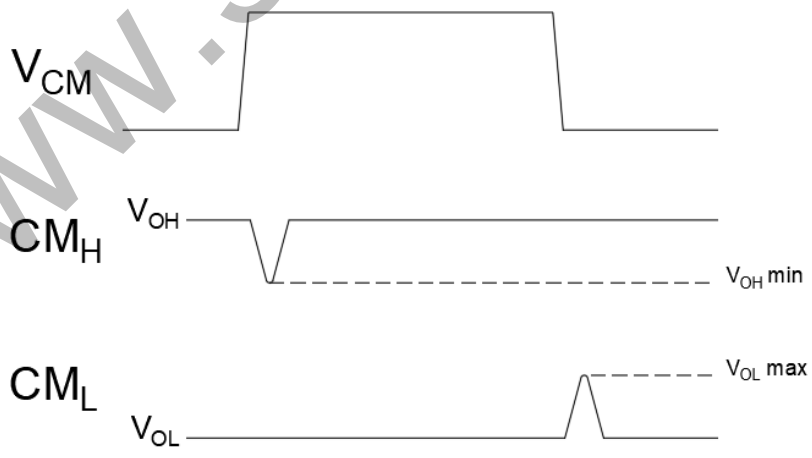
Test Circuits



Switching Time Test Circuit

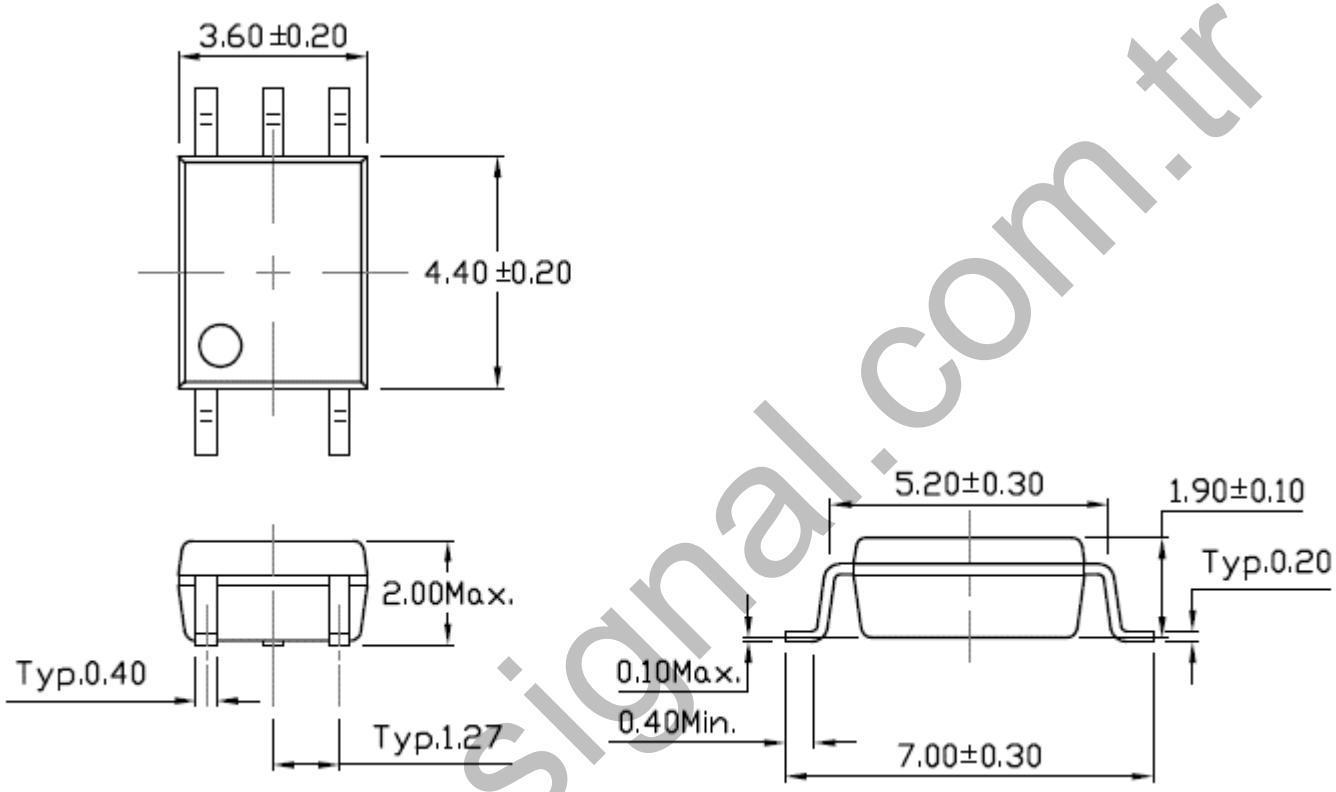
Test Circuits



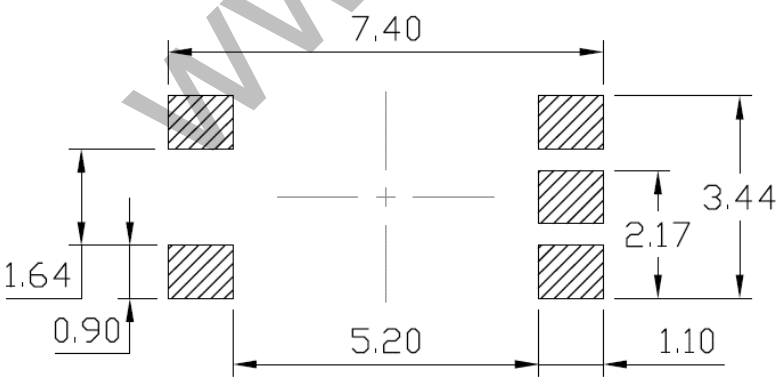


CMR Test Circuit

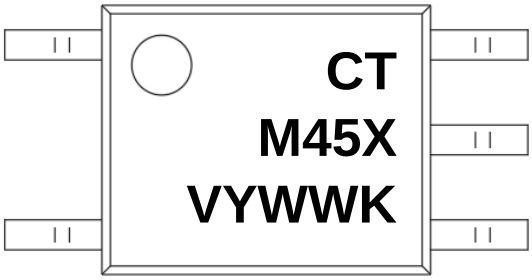
Package Dimension *Dimensions in mm unless otherwise stated*



Recommended Solder Mask *Dimensions in mm unless otherwise stated*



Marking Information



Note:

CT : Denotes “CT Micro”
M45X : Product Number (X= 2, or 3)
V : VDE Option
Y : Fiscal Year
WW : Work Week
K : Production Code

Ordering Information

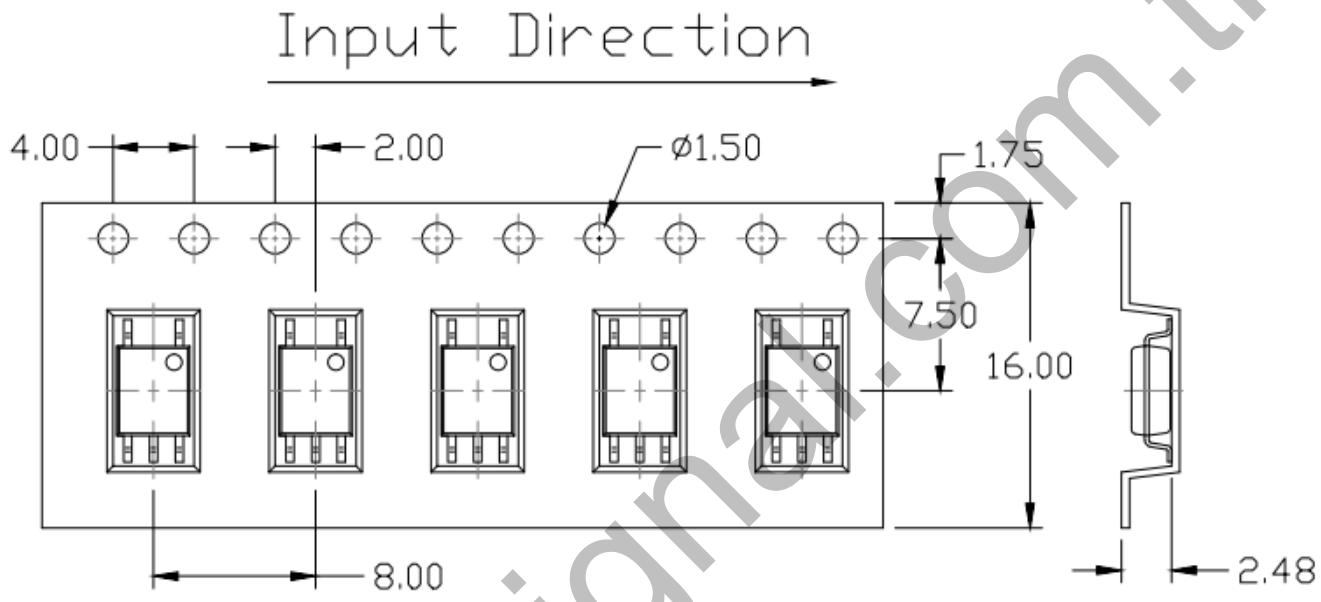
CTM45X(V)(Z)

X = Part No. (X=2 or 3)
V = VDE Option (V or none)
Z = Tape and reel option (T1, T2, T3, or T4)

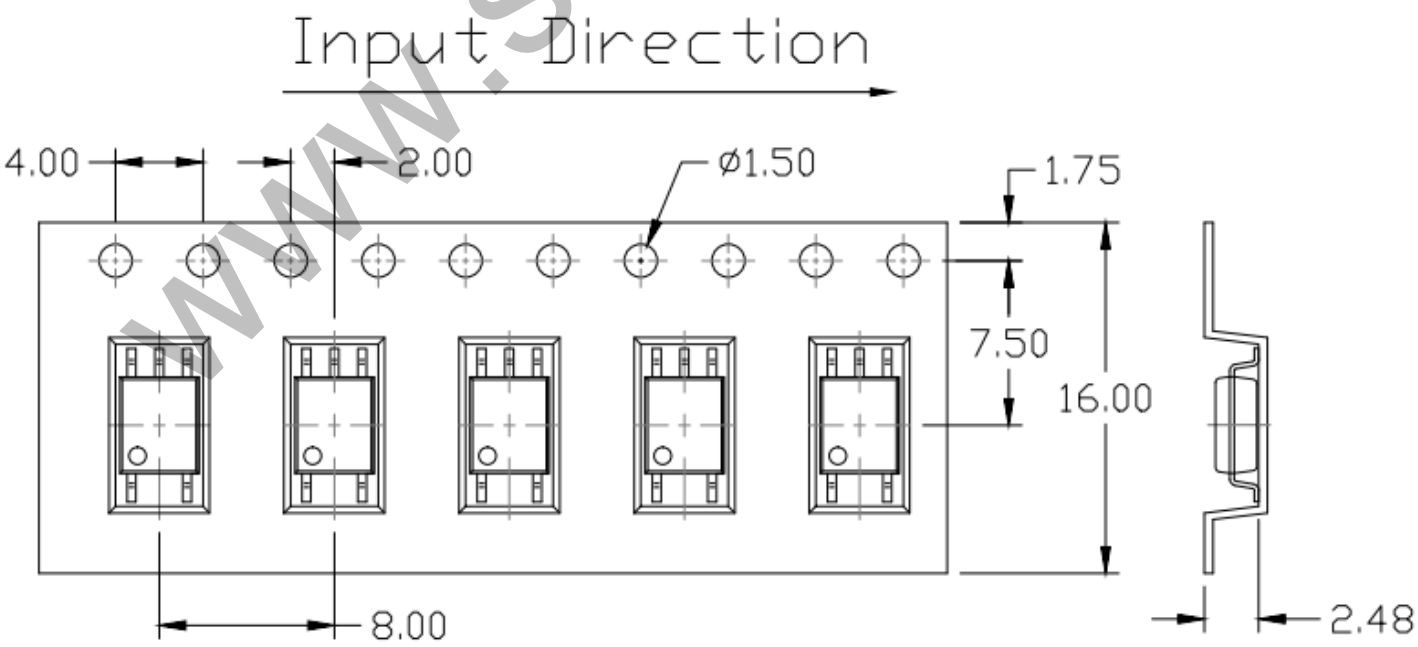
Option	*Description*	*Quantity*
T1	Surface Mount Lead Forming – With Option 1 Tapping	3000 Units/Reel
T2	Surface Mount Lead Forming – With Option 2 Tapping	3000 Units/Reel
T3	Surface Mount Lead Forming – With Option 3 Tapping	3000 Units/Reel
T4	Surface Mount Lead Forming – With Option 4 Tapping	3000 Units/Reel

Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

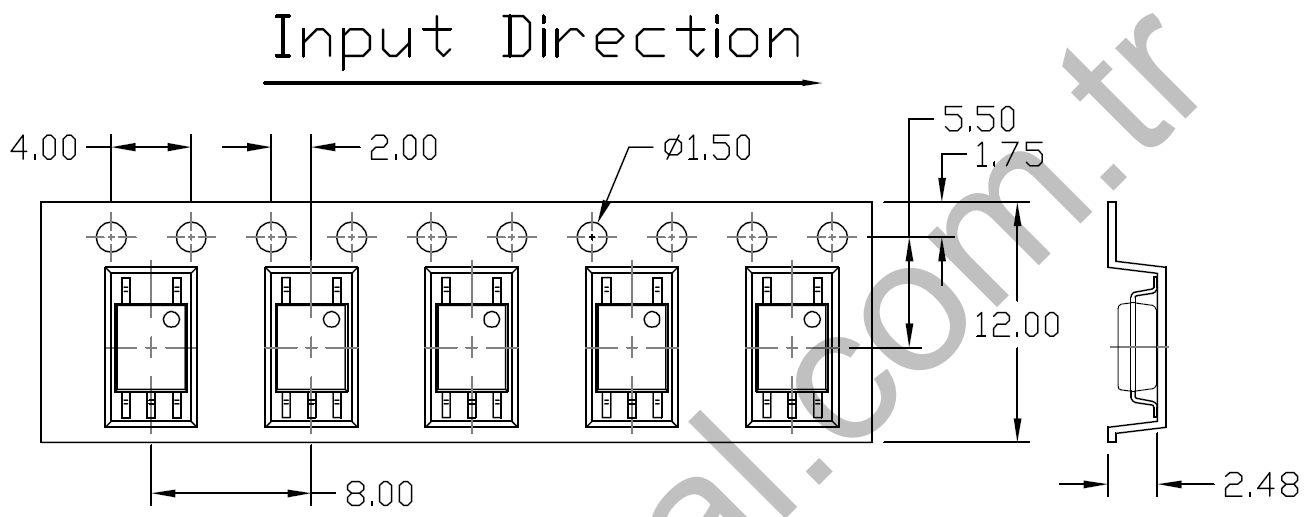
Option T1



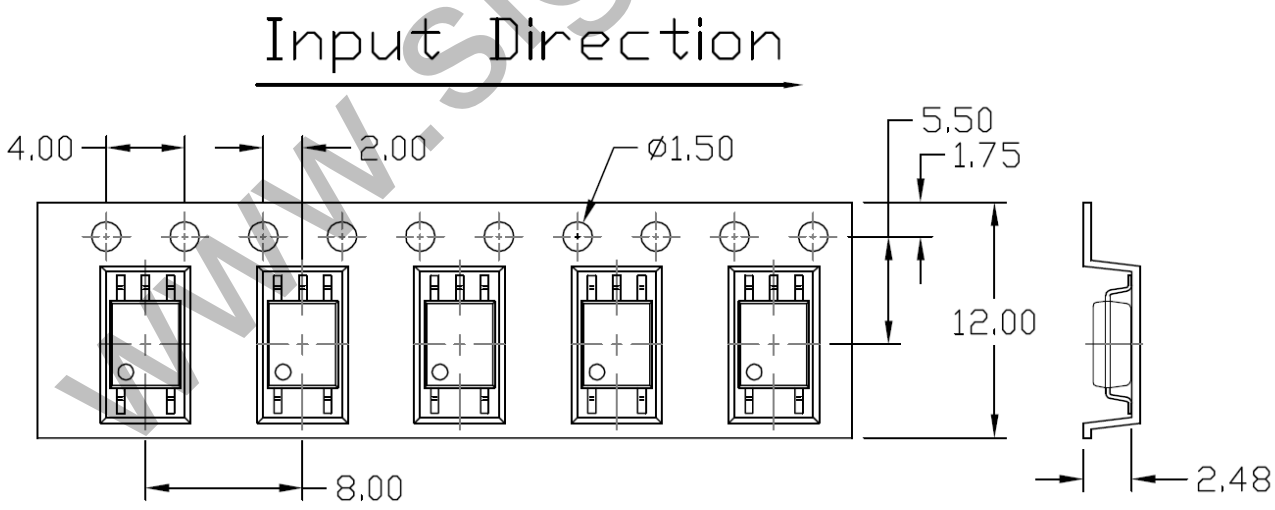
Option T2



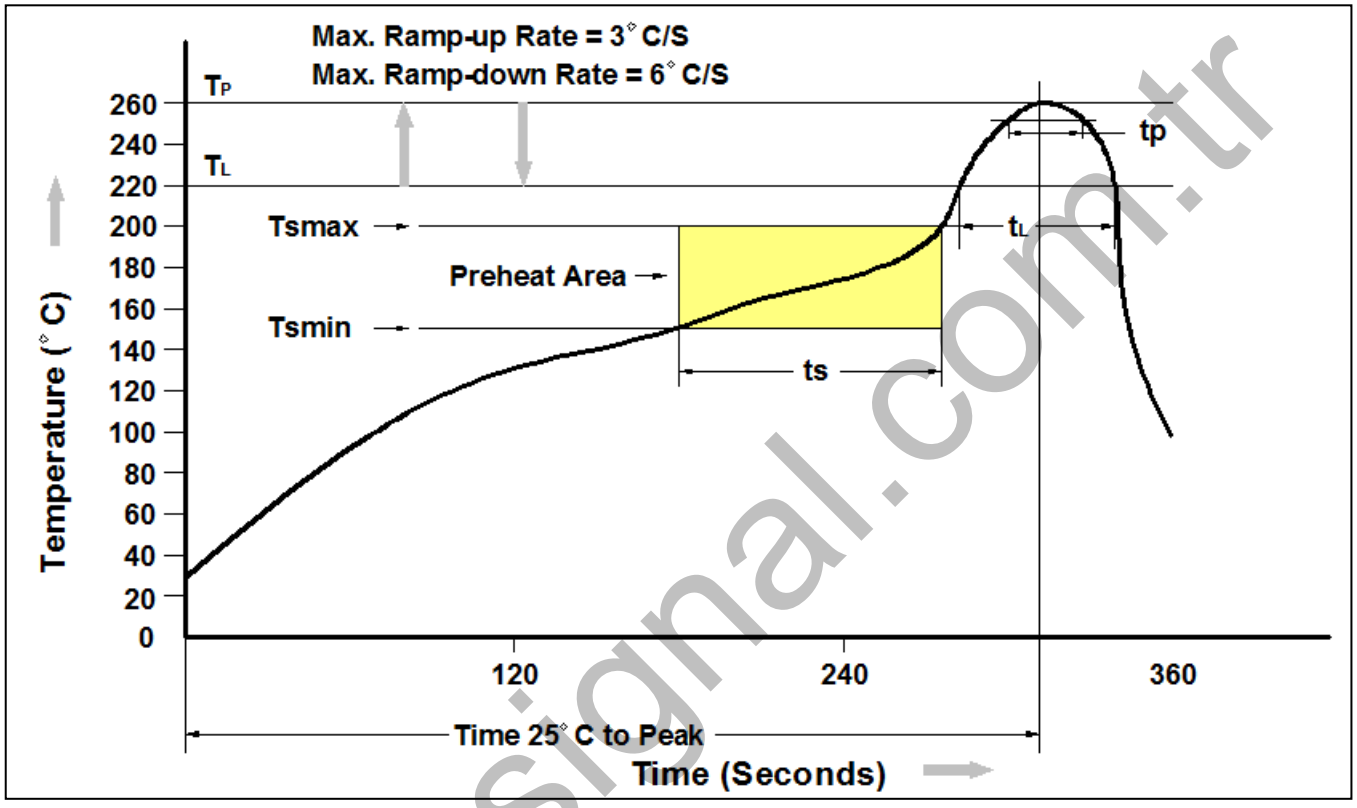
Option T3



Option T4



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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