www.ct-micro.com

CTM452, CTM453

5 Pin Mini-Flat DMC-Isolator®

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
- 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

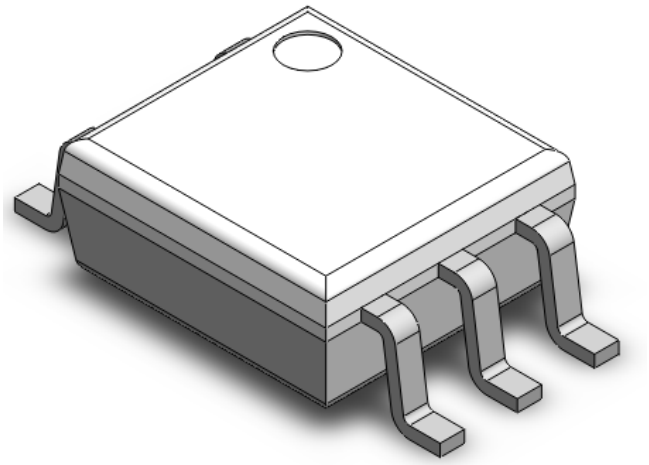
The CTM452 and CTM453 devices each consist of an infrared emitting diode, optically coupled to a high speed photo detector transistor.

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.

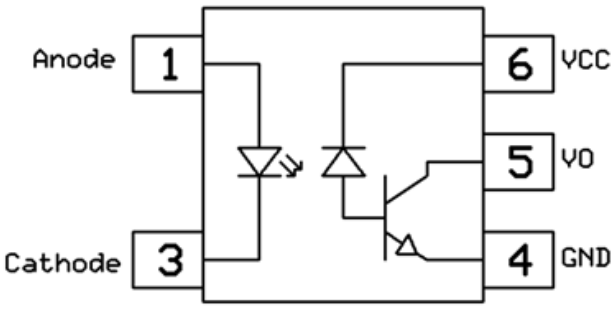
Applications

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

Package Outline



Schematic



Absolute Maximum Ratings T_A = 25°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	°C	
T_{STG}	Storage temperature	-55 ~ +150	°C	
T_{SOL}	Soldering temperature (For 10 seconds)	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°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°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		

Electrical Characteristics

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

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 *T_A = 25°C, unless otherwise specified*

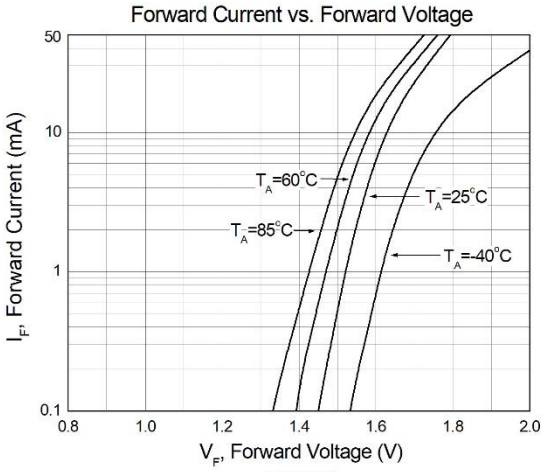


Figure 1

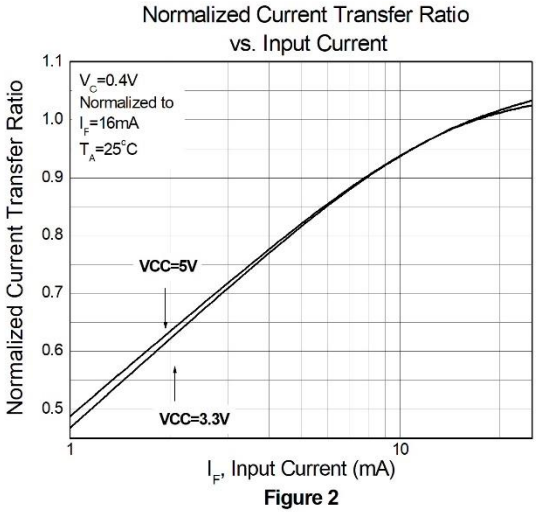


Figure 2

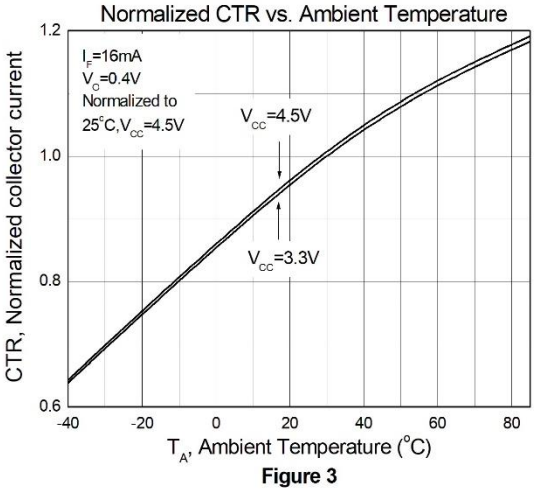


Figure 3

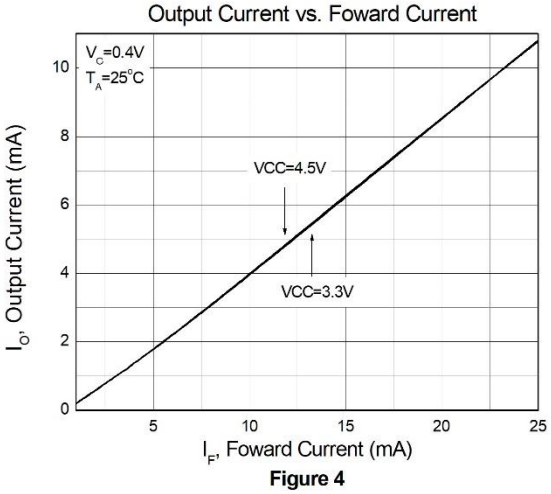


Figure 4

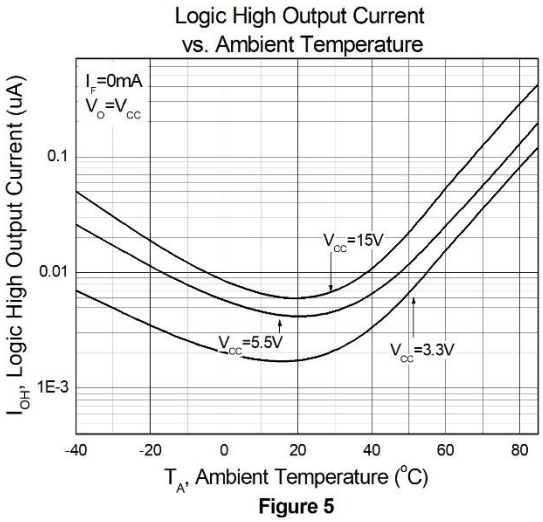


Figure 5

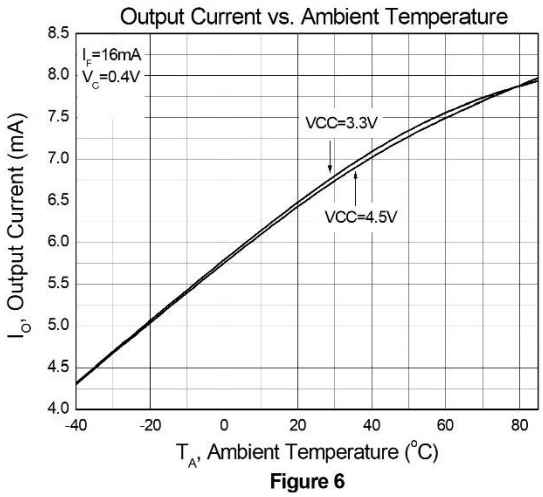


Figure 6

Typical Characteristic Curves *T_A = 25°C, unless otherwise specified*

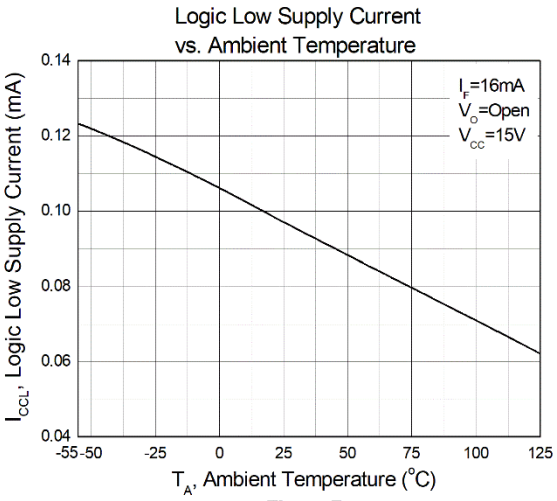


Figure 7

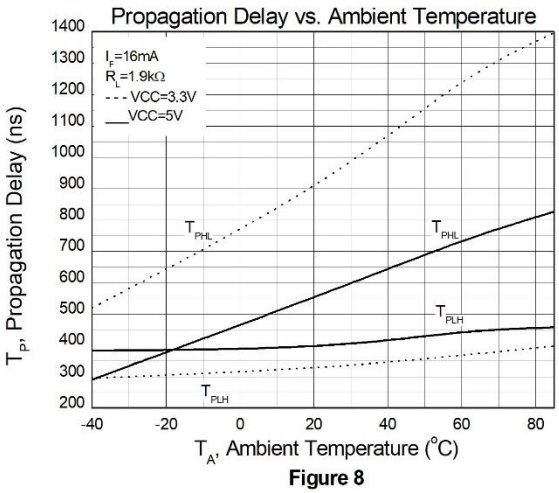


Figure 8

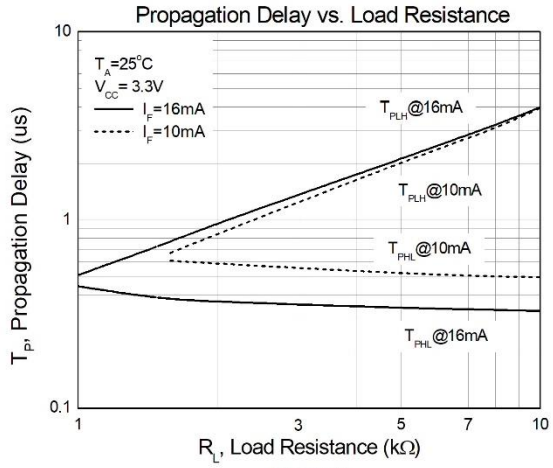


Figure 9

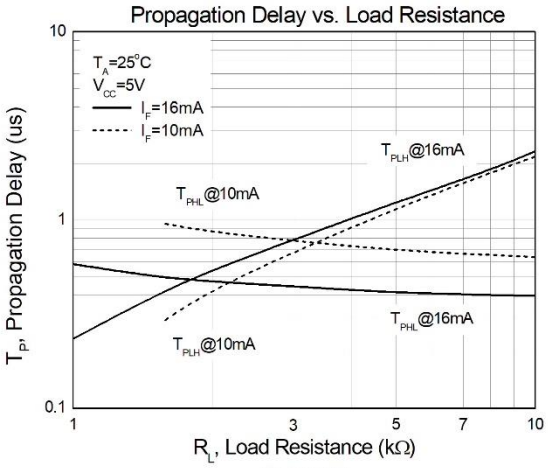


Figure 10

Test Circuits

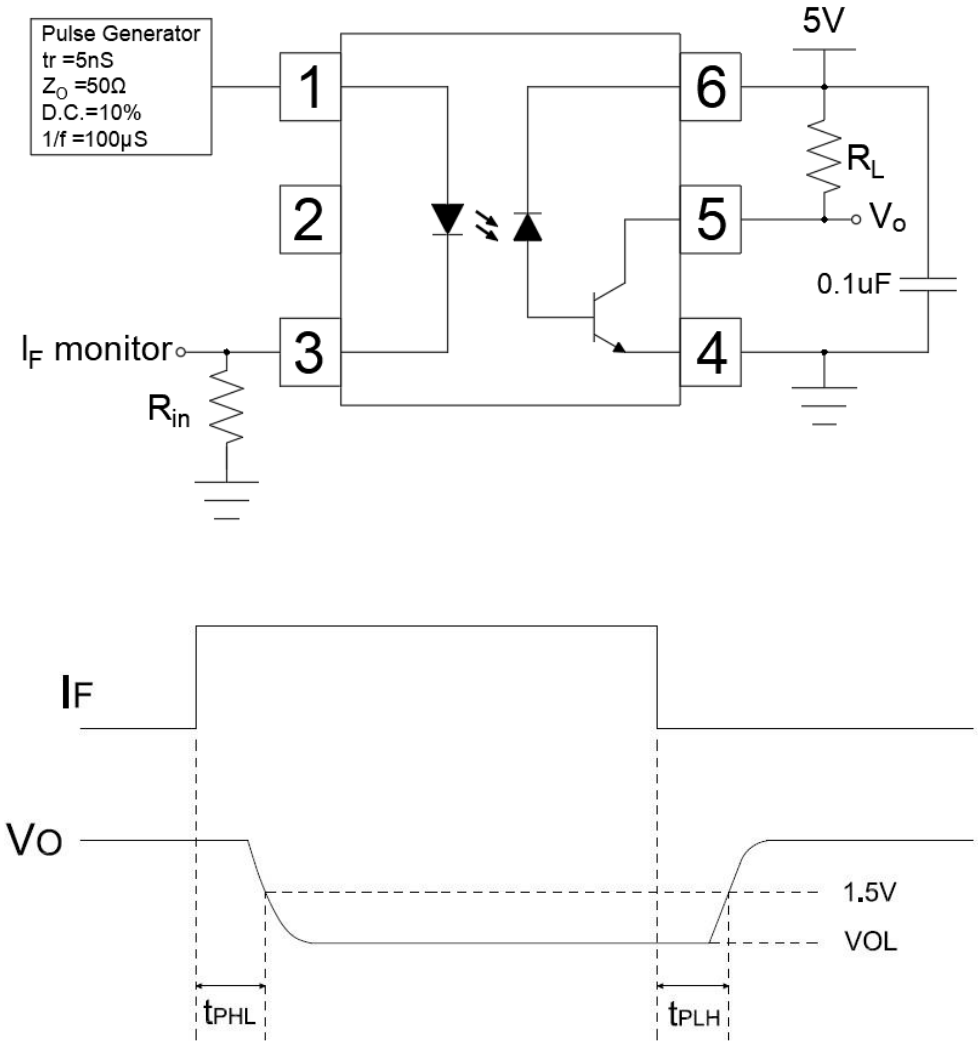


Figure 11: Switching Time Test Circuits

Test Circuits

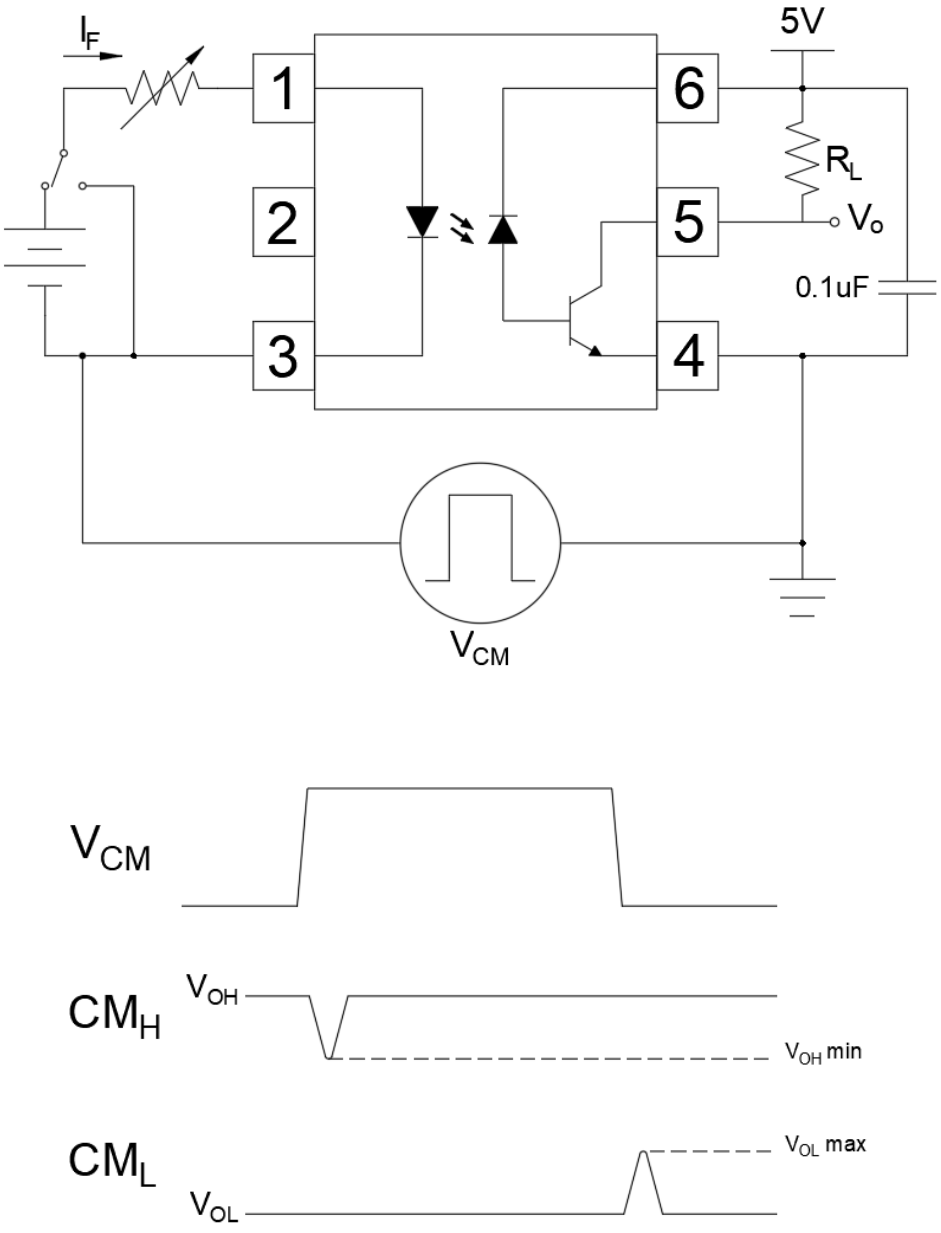
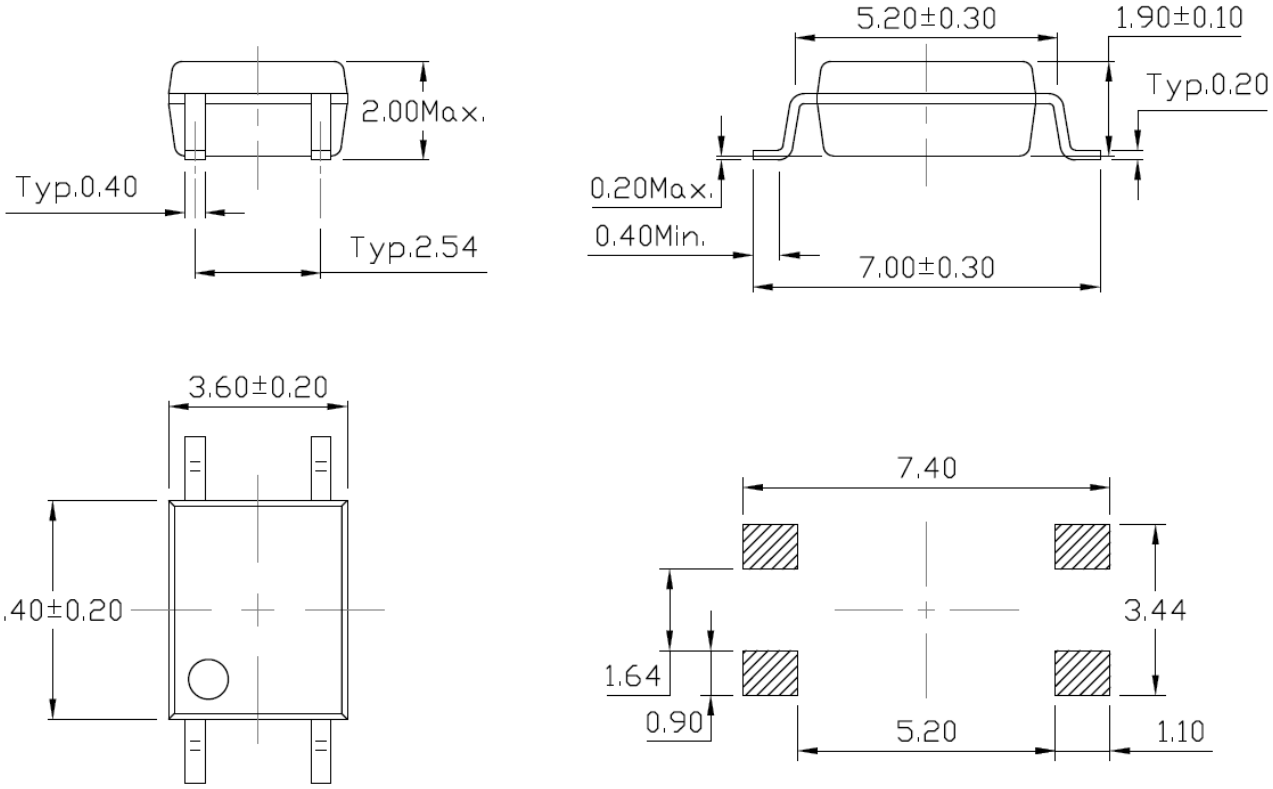
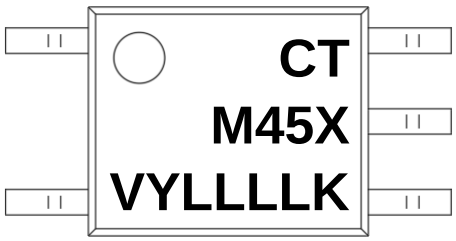


Figure 12: CMR Test Circuits

Package Dimension *Dimensions in mm unless otherwise stated*



Marking Information



Note:

CT	: Denotes “CT Micro”
M45X	: Product Number (X= 2, or 3)
V	: VDE Safety Mark Option (Blank or V)
Y	: One Digit Year Code
WW	: Two Digit Work Week
K	: Manufacturing Code

Ordering Information

CT45X (V)(Z)

CT = Denotes “CT Micro”

451 = Product Number (X= 2, or 3)

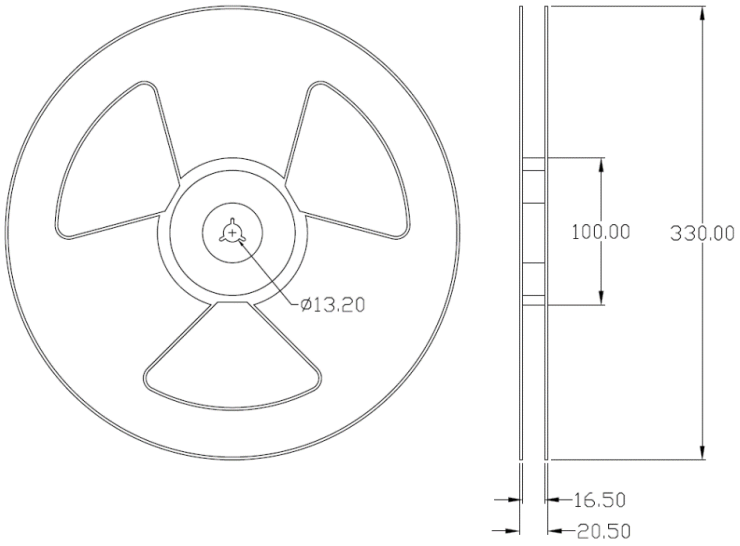
V = VDE Safety Mark Option (Blank or V)

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

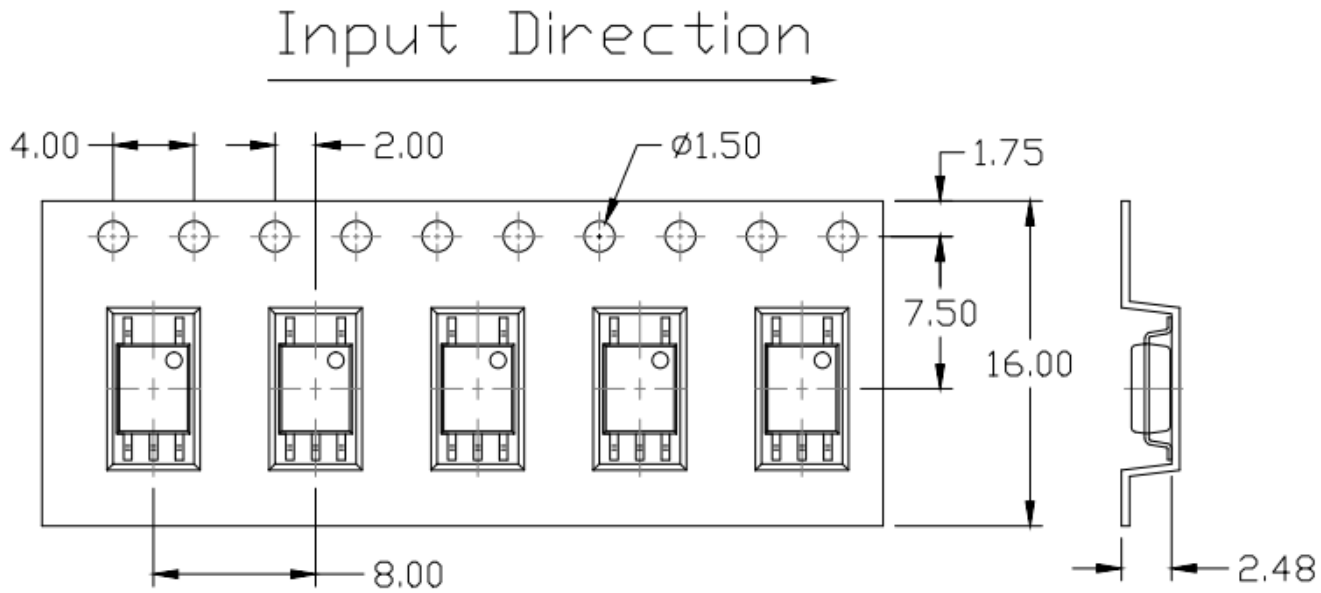
Reel Dimension *All dimensions are in mm, unless otherwise stated*

Option T1/T2

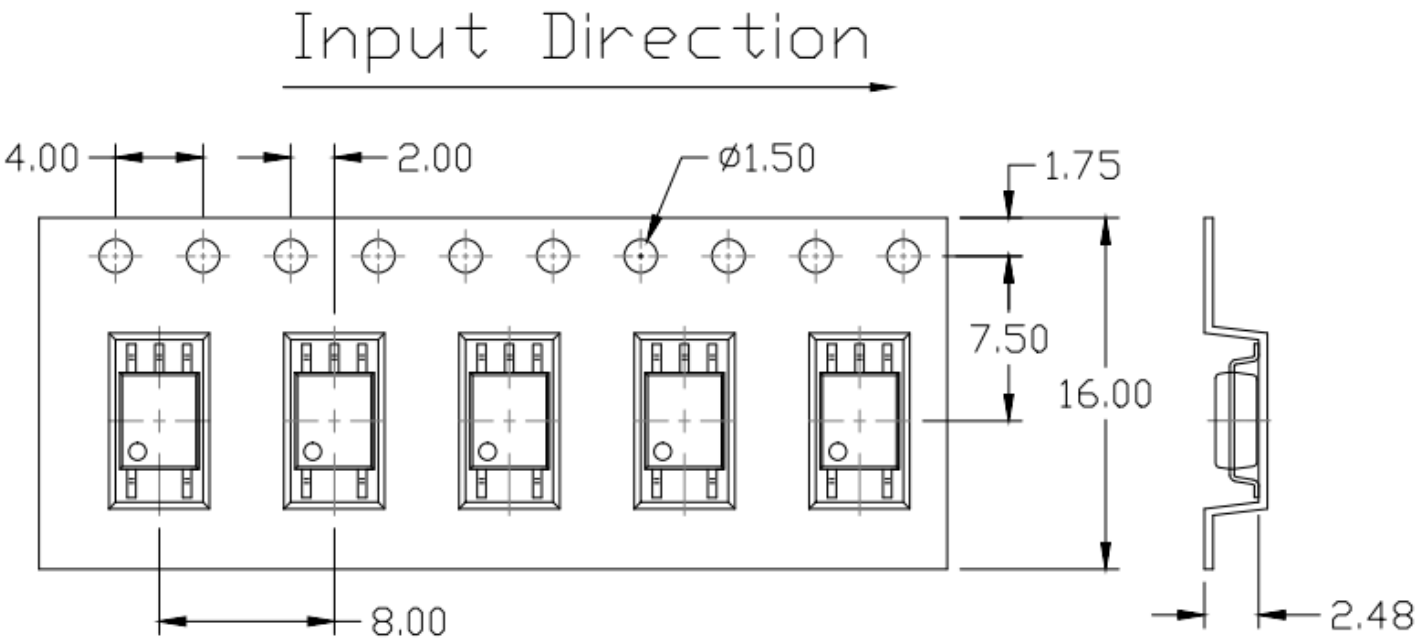


Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

Option T1



Option T2

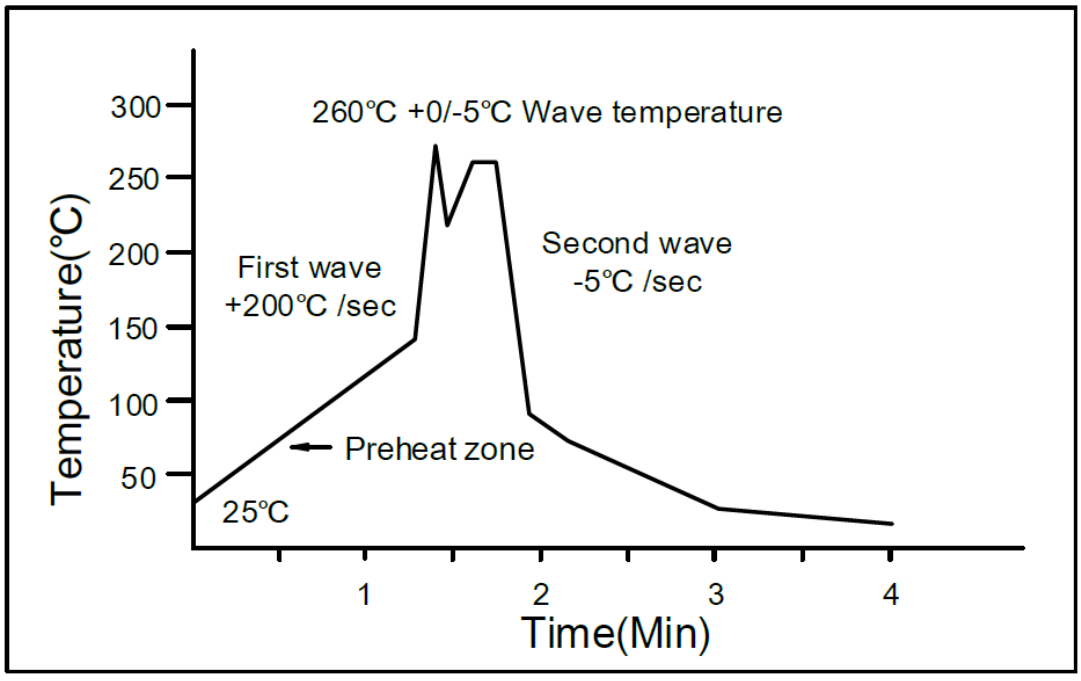


Solderability spec (Follow the JEDEC standard JESD22-B102)

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)

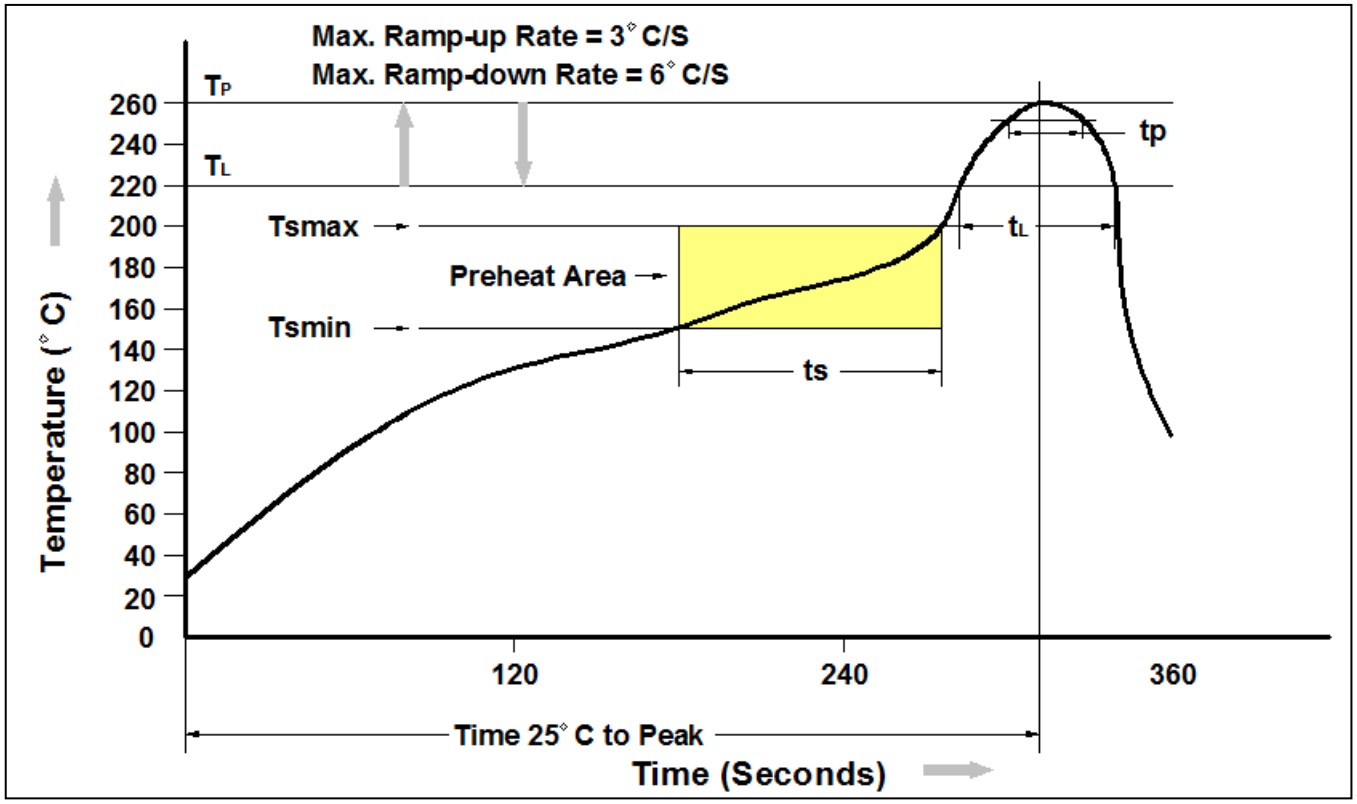
One time soldering is recommended within the condition of temperature.
Temperature: 260+0/-5˚C.
Time: 10 sec.
Preheat temperature: 25 to 140˚C.
Preheat time: 30 to 80 sec.



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±10˚C
Time: 5 sec max.

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 (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.

DISCLAIMER

DMC-Isolator® IS A TRADEMARK OF CT MICRO INTERNATIONAL CORPORATION AND/OR ITS SUBSIDIARIES. CT MICRO OWNS THE RIGHTS TO A NUMBER OF PATENTS, TRADEMARKS, COPYRIGHTS AND OTHER INTELLECTUAL PROPERTY.

CT MICRO RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. CT MICRO DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

DISCOLORATION MIGHT OCCUR ON THE PACKAGE SURFACE AFTER SOLDERING, REFLOW OR LONG TERM USE. THIS DOES NOT IMPACT THE PRODUCT PERFORMANCE NOR THE PRODUCT RELIABILITY.

CT MICRO ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT EXPRESS WRITTEN APPROVAL OF CT MICRO INTERNATIONAL CORPORATION.

1. *Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instruction for use provided in the labelling, can be reasonably expected to result in significant injury to the user.*
2. *A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.*