



2.5A MOSFET/IGBT Gate Driver Optocoupler

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Features

- Peak Output Current: $I_{OP} = \pm 2.5A$ (max)
- Threshold Input Current: $I_{FLH} = 5\text{ mA}$ (max)
- Common mode transient immunity : $\pm 25kV/\mu s$ (min)
- Under voltage lock out (UVLO) protection with hysteresis
- RoHS and REACH Compliance
- MSL class 1
- Regulatory Approvals
 - ✓ UL - UL1577 (E364000)
 - ✓ VDE - EN60747-5-5(VDE0884-5)
 - ✓ CQC – GB4943.1, GB8898(14001104999)
 - ✓ IEC62368 (FI/41119)

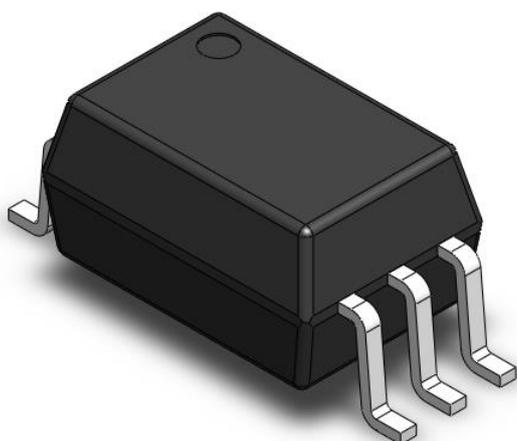
Description

The CTS700 consists of a LED optically coupled to an integrated circuit with a power output stage. This optocoupler is ideally suited for driving power IGBTs and MOSFETs used in motor control inverter applications. The high operating voltage range of the output stage provides the drive voltages required by gate-controlled devices.

Applications

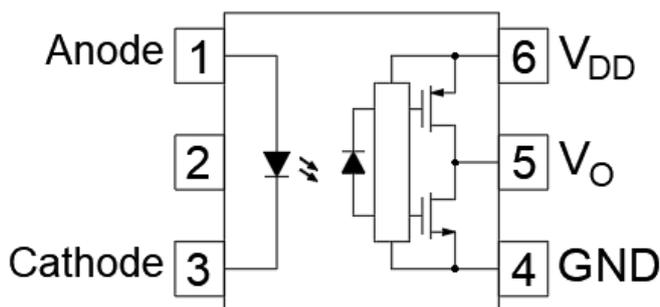
- Isolated IGBT/Power MOSFET gate drive
- Industrial Inverter
- AC brushless and DC motor drives
- Induction Heating

Package Outline



Note: Different lead forming options available. See package dimension.

Schematic



Truth Table

LED	$V_{CC-V_{EE}}$		Output
	Positive Going	Negative Going	
Off	0 to 30 V	0 to 30V	Low
On	0 to 11.0V	0 to 9.5V	Low
On	11.0 to 13.5V	9.5 to 12V	Transition
On	13.5 to 30V	12 to 30V	High



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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 _{ISO}	Isolation voltage (AC, 1 minute, 40 ~ 60% R.H.)	5000	V _{RMS}	1
T _{OPR}	Operating temperature	-40 ~ +110	°C	
T _{STG}	Storage temperature	-55 ~ +125	°C	
T _{SOL}	Soldering temperature (For 10 seconds)	260	°C	2
P _T	Total Power Dissipation	300	mW	
Emitter				
I _F	Forward current	25	mA	
I _{FP}	Peak forward current (50% duty, 1ms P.W)	1	A	
V _R	Reverse voltage	5	V	
Detector				
P _D	Power dissipation	250	mW	
V _{O(PEAK)}	Peak Output Voltage	0 to 30	V	3
I _{OPH}	Output High Peak Current	2.5	A	4
I _{OPL}	Output Low Peak Current	2.5	A	4
V _{CC}	Supply voltage	0 to 30	V	

Notes

1. AC for 1 minute, RH = 40 ~ 60%.
2. For 10 second peak
3. The V_{O(PEAK)} voltage CAN NOT BE high than V_{CC}.
4. The I_O maximum pulse width = 10 μs, maximum duty cycle = 0.2%.



Electrical Characteristics

Over recommended operating conditions $T_A = -40$ to 110 °C.

Typical values are measured at $V_{CC}=30V$, $V_{EE}=GND$, $T_A = 25^\circ C$ (unless otherwise stated)

Emitter Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
V_F	Forward voltage	$I_F = 10mA$	-	1.45	1.8	V	
V_R	Reverse Voltage	$I_R = 10\mu A$	5.0	-	-	V	
$\Delta V_F/\Delta T_A$	Temperature coefficient of forward voltage	$I_F = 10mA$	-	-1.8	-	mV/°C	

Detector Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
I_{CCL}	Logic Low Supply Current	$V_F = 0$ to $0.8V$, $V_O = \text{Open}$	-	1.5	5	mA	
I_{CCH}	Logic High Supply Current	$I_F = 7mA$ to $10mA$, $V_O = \text{Open}$	-	1.5	5		

Transfer Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
V_{OH}	High Level Output Voltage	$I_F = 10mA$, $I_O = -2.5A$	$V_{CC} - 6$	-	-	V	
		$I_F = 10mA$, $I_O = -100mA$	$V_{CC} - 4$	-	-		
V_{OL}	Low Level Output Voltage	$I_F = 0mA$, $I_O = 2.5A$	-	-	$V_{EE} + 6$	V	
		$I_F = 0mA$, $I_O = 100mA$	-	-	$V_{EE} + 4$		
I_{OPH}	High Level Output Current	$V_O = V_{CC} - 3V$	-	-	-1	A	1
		$V_O = V_{CC} - 6V$	-	-	-2		1
I_{OPL}	Low Level Output Current	$V_O = V_{EE} + 3V$	1	-	-	A	1
		$V_O = V_{EE} + 6V$	2	-	-		1
I_{FLH}	Input Threshold Current	$I_O = 0mA$, $V_O > 5V$	-	1.4	5.0	mA	
V_{FHL}	Input Threshold Voltage	$I_O = 0mA$, $V_O < 5V$	0.8	-	-	V	
V_{UVLO+}	Under Voltage Lockout Threshold	$I_O = 10mA$, $V_O > 5V$	11	-	13.5	V	
V_{UVLO-}		$I_O = 10mA$, $V_O < 5V$	9.5	-	12.0		

Notes

- The I_O maximum pulse width = 10 μs , maximum duty cycle = 0.2%.



Electrical Characteristics

Over recommended operating conditions $T_A = -40$ to 110 °C.

Typical values are measured at $V_{CC}=30V$, $V_{EE}=GND$, $T_A = 25^\circ C$ (unless otherwise stated)

Switching Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
T_{PHL}	High to Low Propagation Delay	$I_F = 7$ to $16mA$, $C_L = 10nF$, $R_L = 10\Omega$, $f = 10kHz$, Duty = 50%, $T_A = 25^\circ C$	100	180	500	ns	
T_{PLH}	Low to High Propagation Delay		100	140	500	ns	
P_{WD}	Pulse Width Distortion		40	300	ns		
t_{PSK}	Propagation Delay Skew		40	ns			
t_r	Rise Time		20	ns			
t_f	Fall Time		20	ns			
$t_{UVLO(ON)}$	UVLO Turn On Delay	$I_F = 10mA$, $V_O > 5V$		3.5		μs	
$t_{UVLO(OFF)}$	UVLO Turn Off Delay	$I_F = 10mA$, $V_O < 5V$		3		μs	
$ CM_H $	Common Mode Transient High	$V_{CC} = 30V$, $T_A = 25^\circ C$, $I_F = 7$ to $16mA$	25			$kV/\mu s$	
$ CM_L $	Common Mode Transient Low	$V_{CM} = 1.5kV$, $I_F = 0mA$	25			$kV/\mu s$	



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

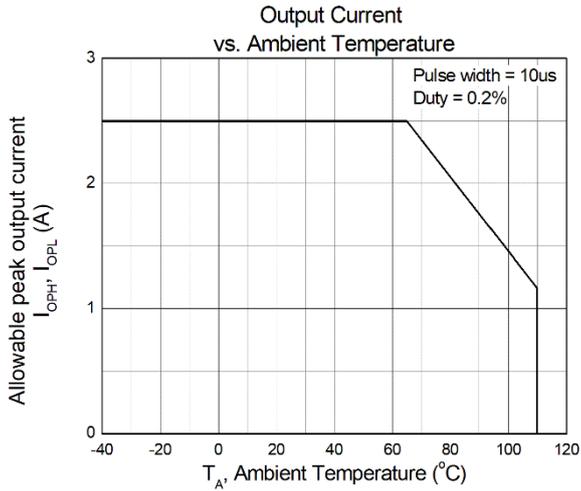


Figure 1

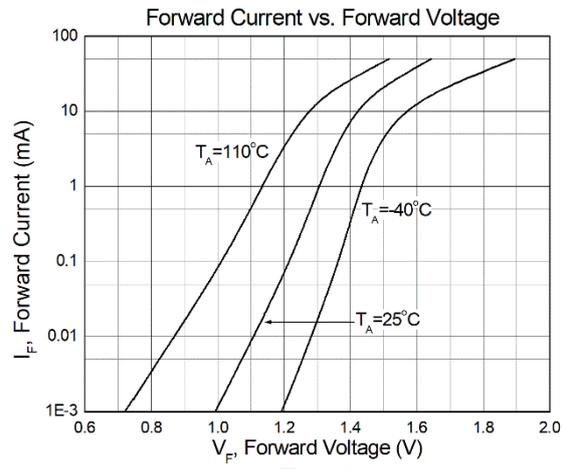


Figure 2

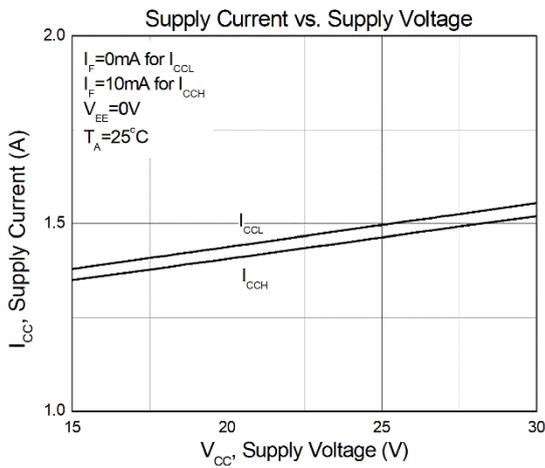


Figure 3

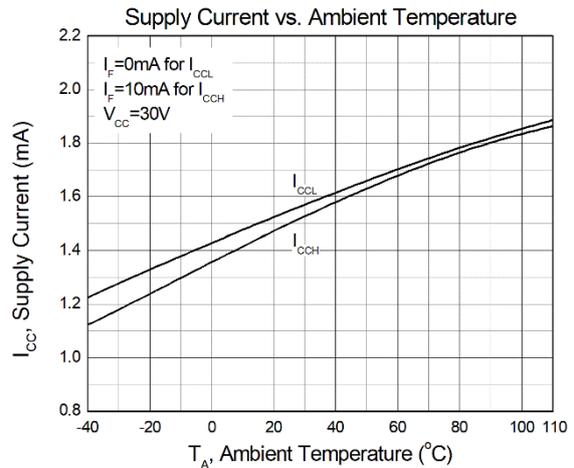


Figure 4

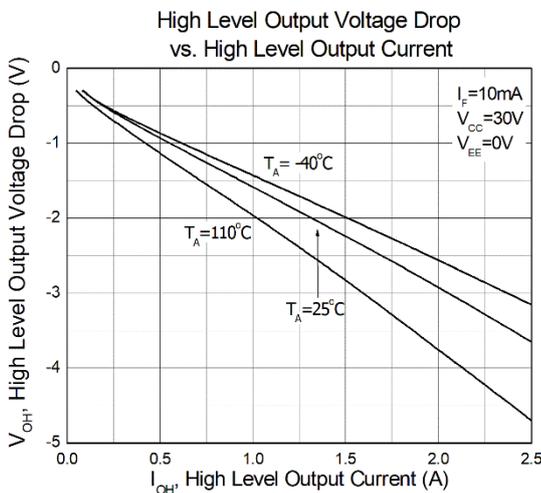


Figure 5

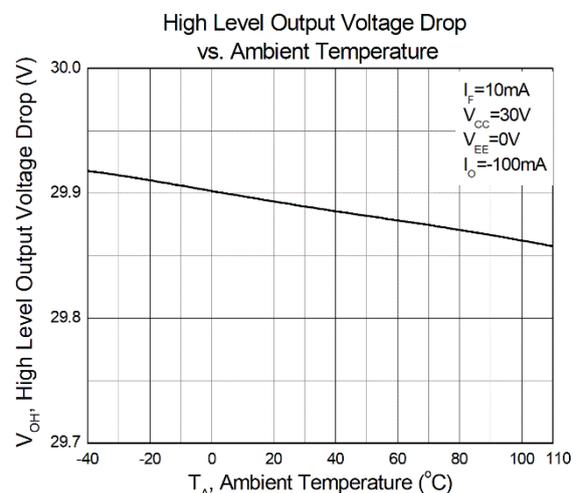


Figure 6



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

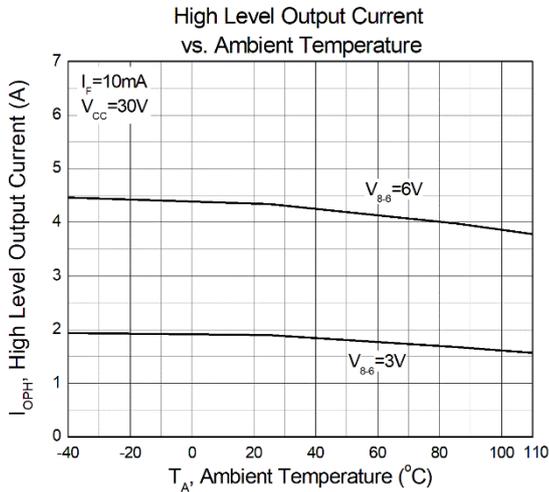


Figure 7

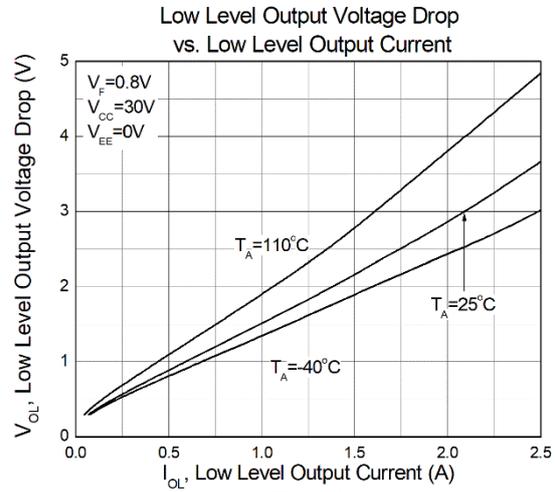


Figure 8

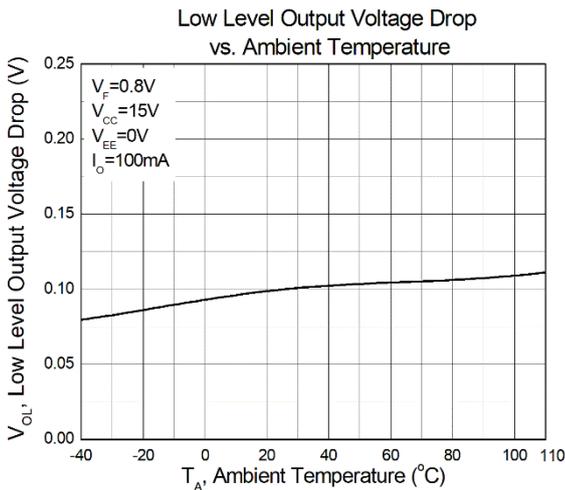


Figure 9

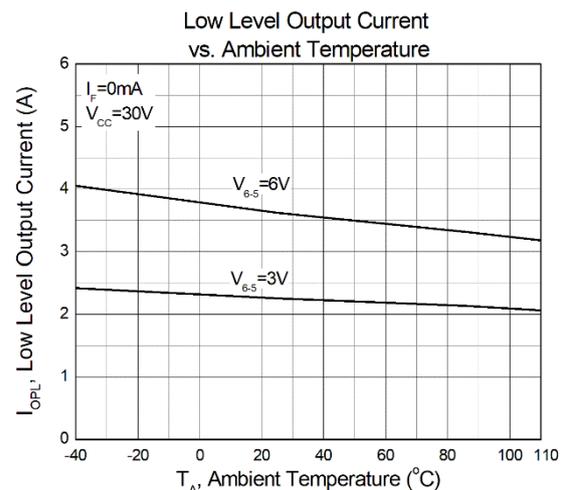


Figure 10

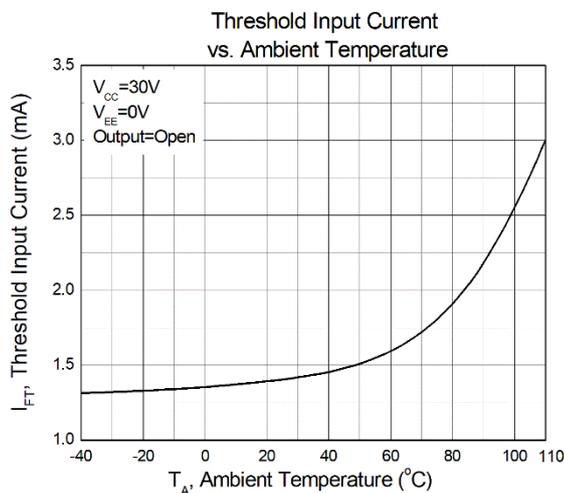


Figure 11

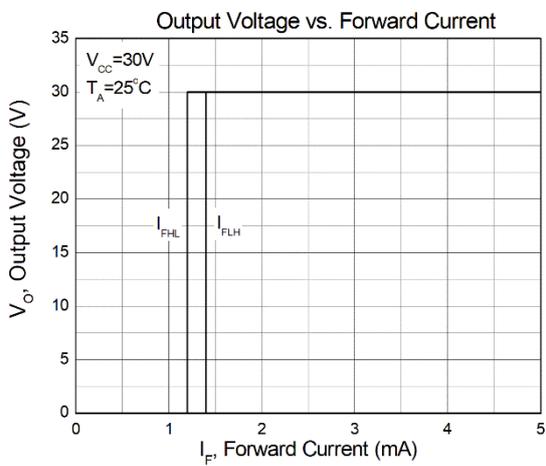


Figure 12



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

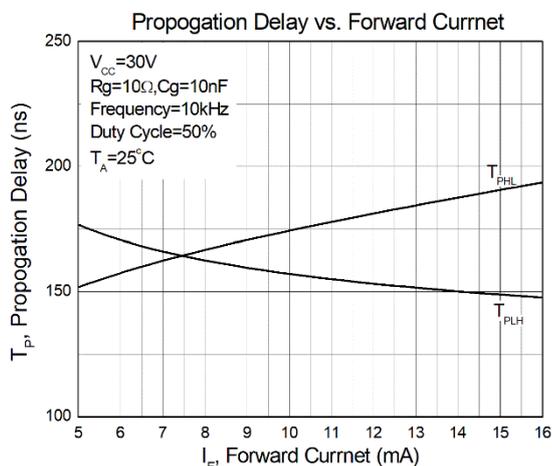


Figure 13

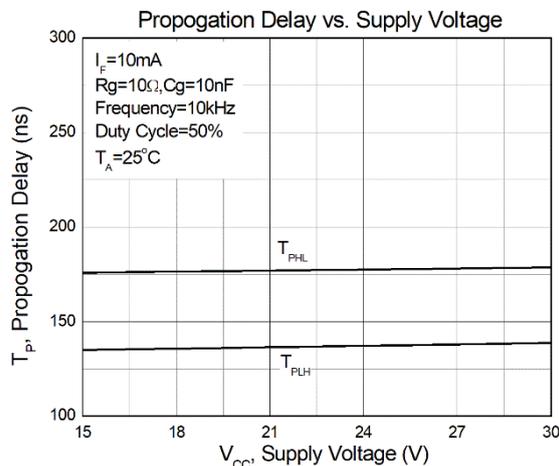


Figure 14

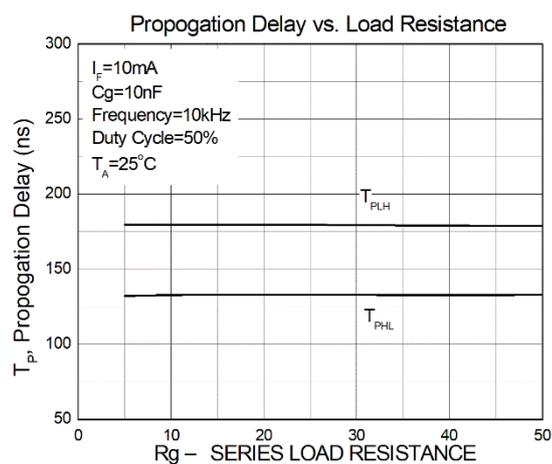


Figure 15

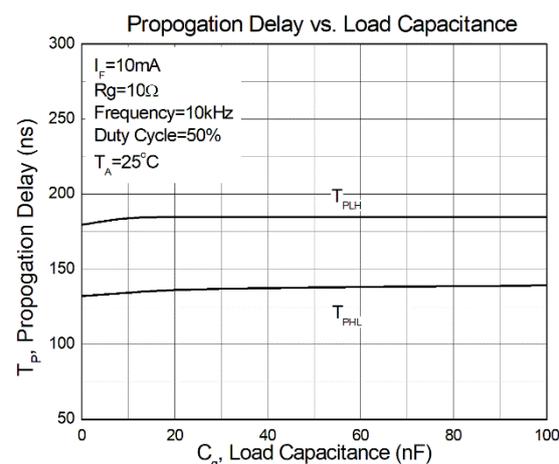


Figure 16

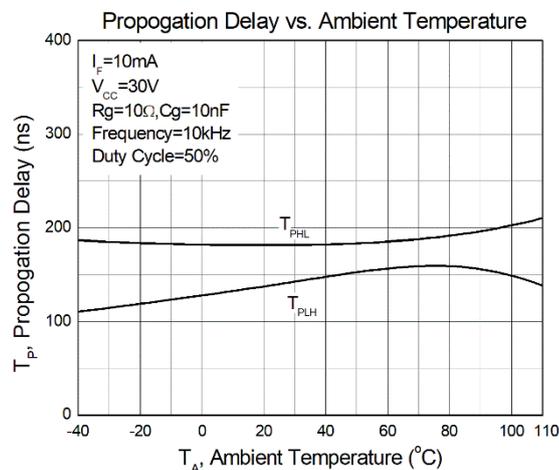
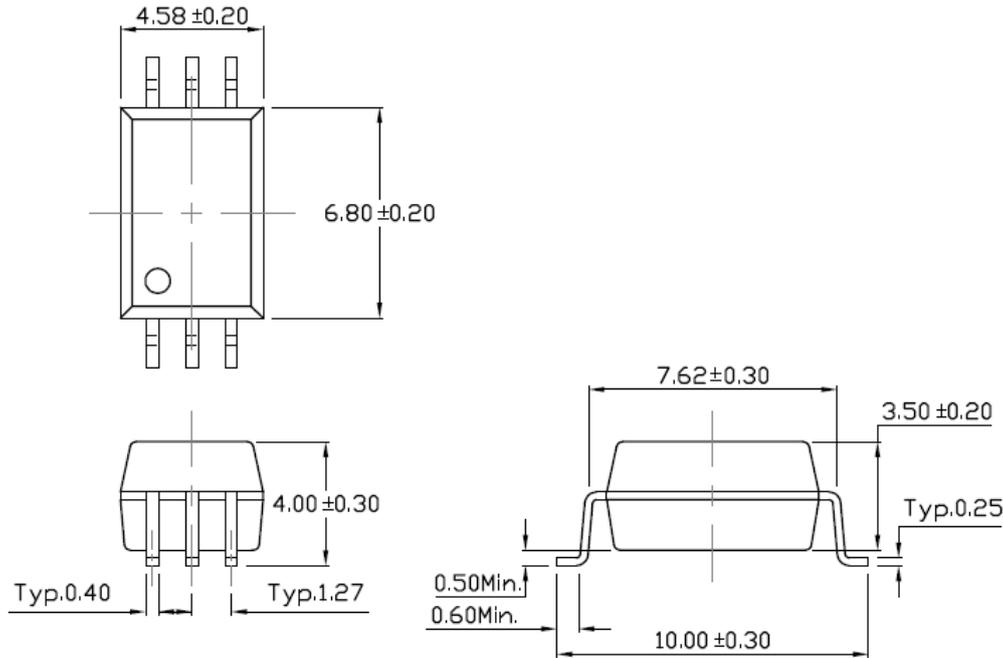


Figure 17



Package Dimension *Dimensions in mm unless otherwise stated*

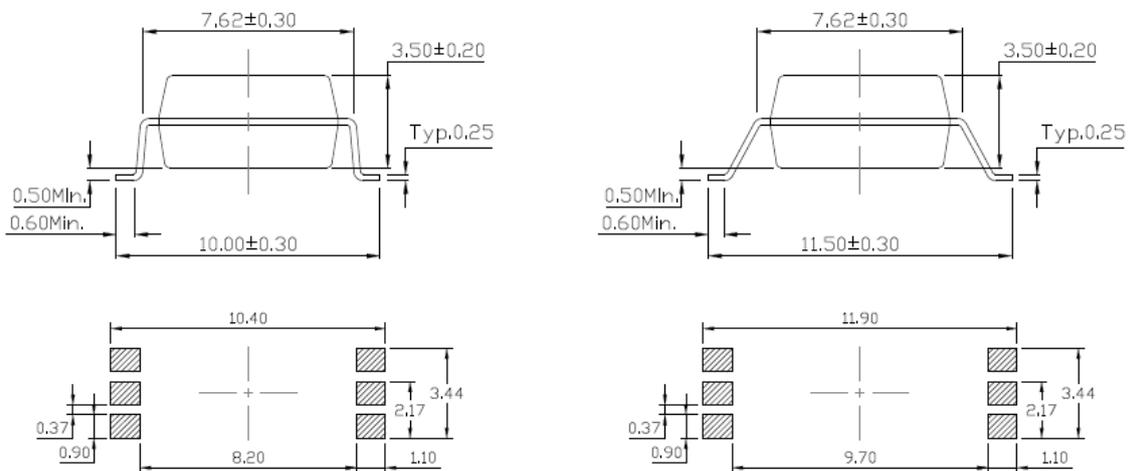
Surface Mount Lead Forming



Forming Option *Dimensions in mm unless otherwise stated*

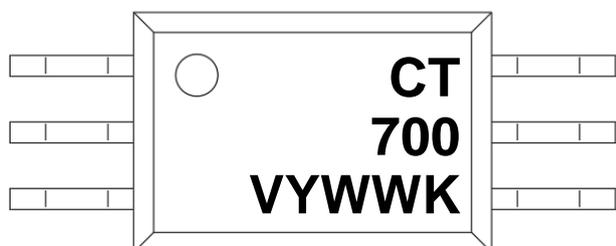
S Type

SM Type





Marking Information



Note:

- CT : Denotes “CT Micro”
- 700 : Part Number
- V : VDE Safety Mark Option (Blank or V)
- Y : One Digit Year Code
- WW : Two Digit Work Week
- K : Manufacturing Code

Ordering Information

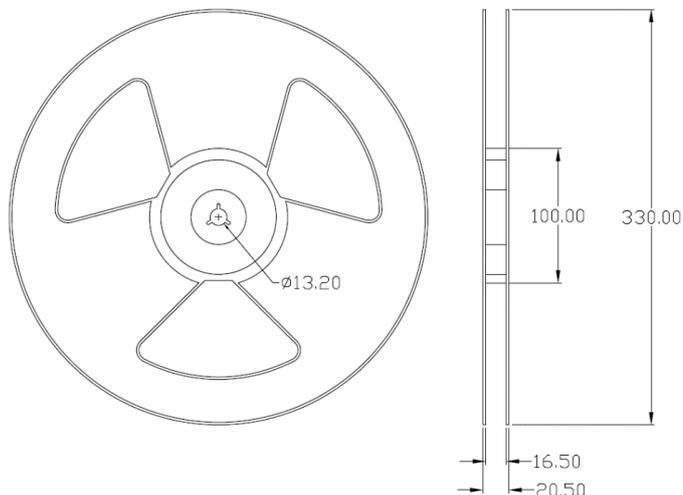
CTS700(V)(Y)(Z)

- CT = Denotes “CT Micro”
- S700 = Part Number
- V = VDE Safety Mark Option (Blank or V)
- Y = Lead Form Option (S or SM)
- Z = Tape and Reel Option (T1 or T2)

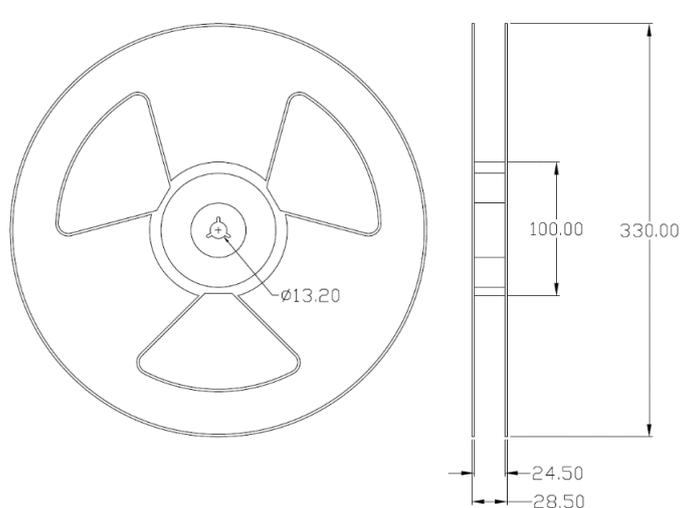
Option	Description	Quantity
T1	Surface Mount Lead Forming with Option 1 Taping	1500 Units/Reel
T2	Surface Mount Lead Forming with Option 2 Taping	1500 Units/Reel
M(T1)	Surface Mount (Gullwing) Lead Forming with Option 1 Taping	1500 Units/Reel
M(T2)	Surface Mount (Gullwing) Lead Forming with Option 2 Taping	1500 Units/Reel

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

Option S(T1/T2)



Option M(T1/T2)

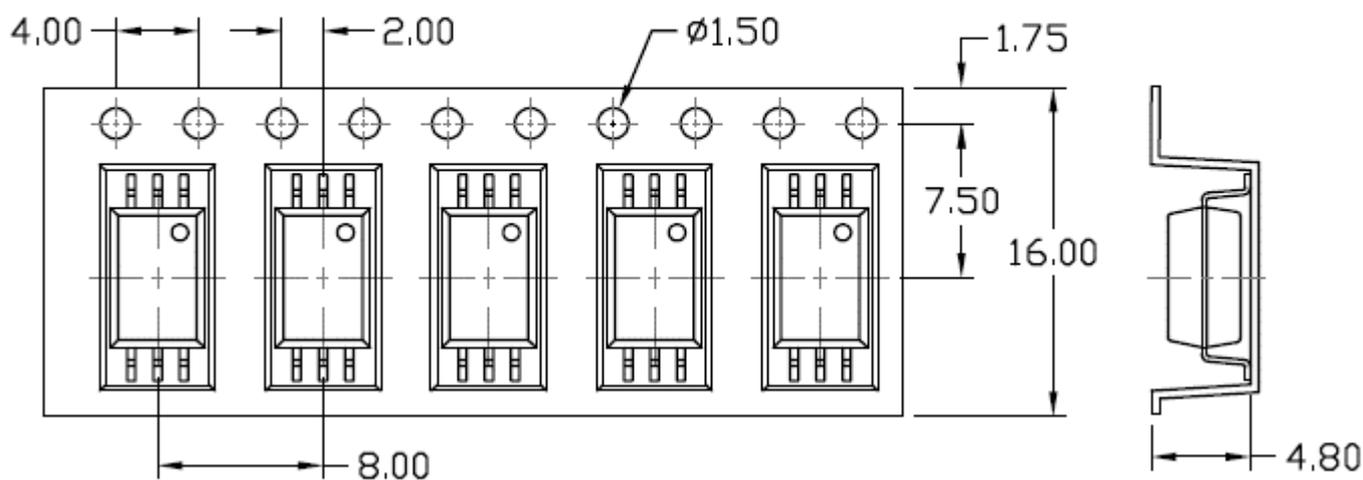




Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

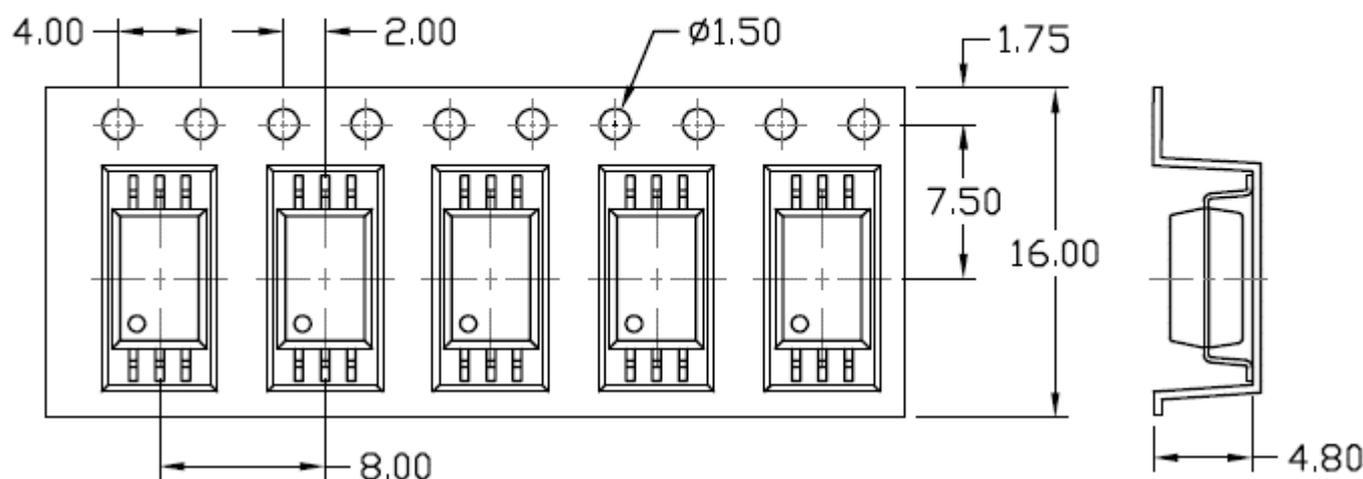
Option S(T1)

Input Direction →



Option S(T2)

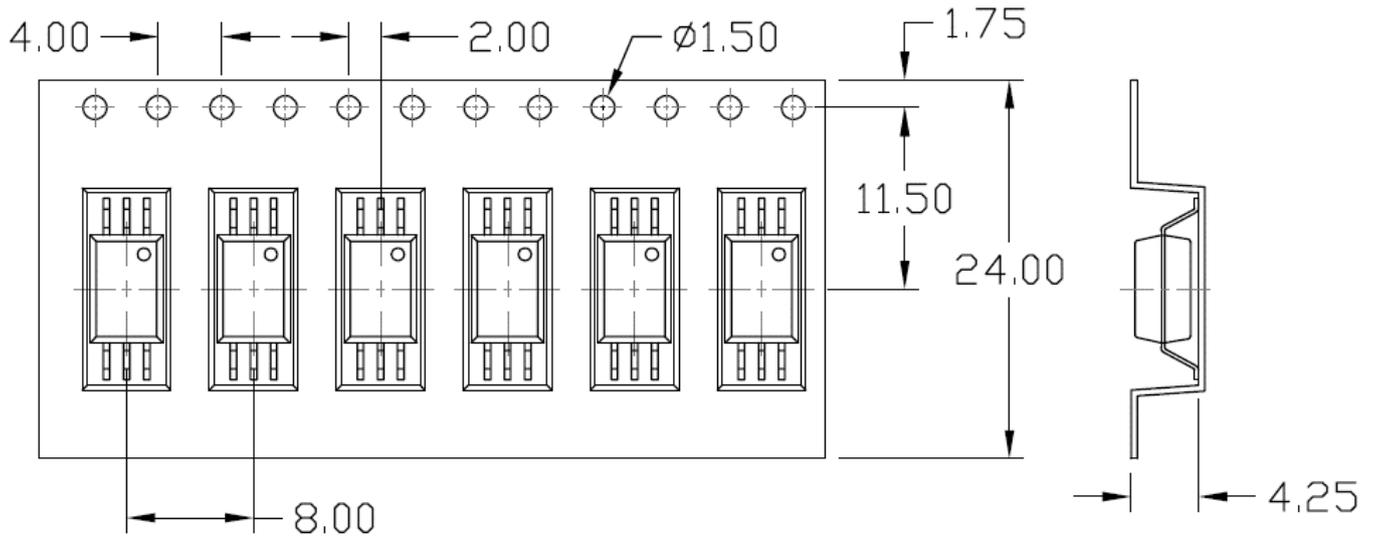
Input Direction →





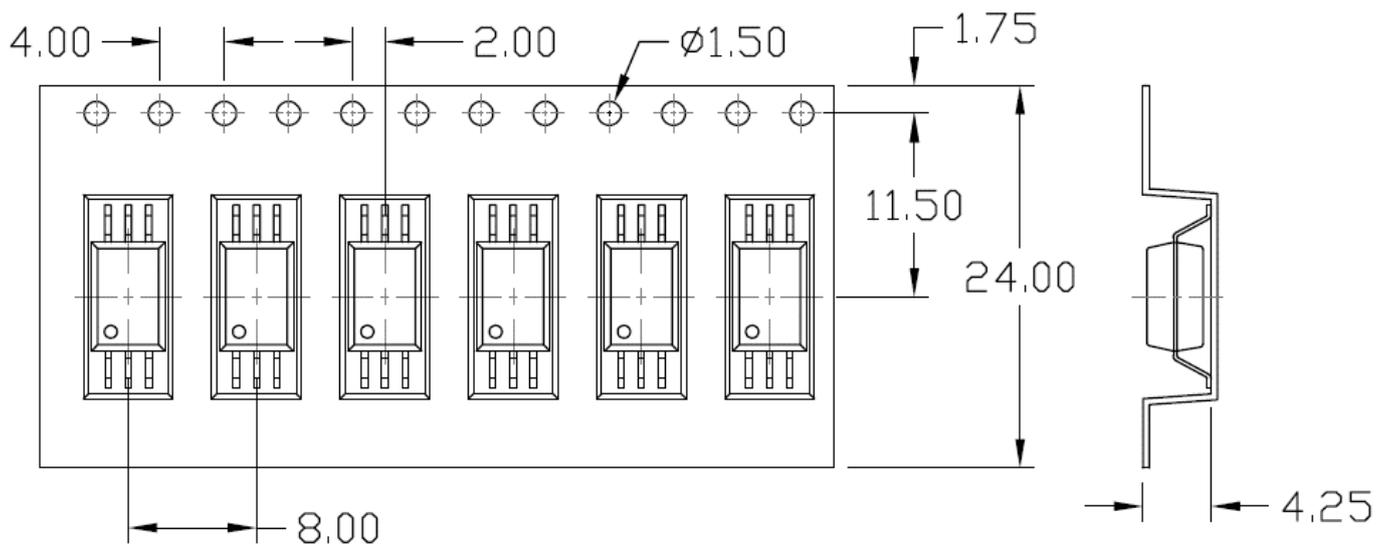
Option SM(T1)

Input Direction



Option SM(T2)

Input Direction





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)

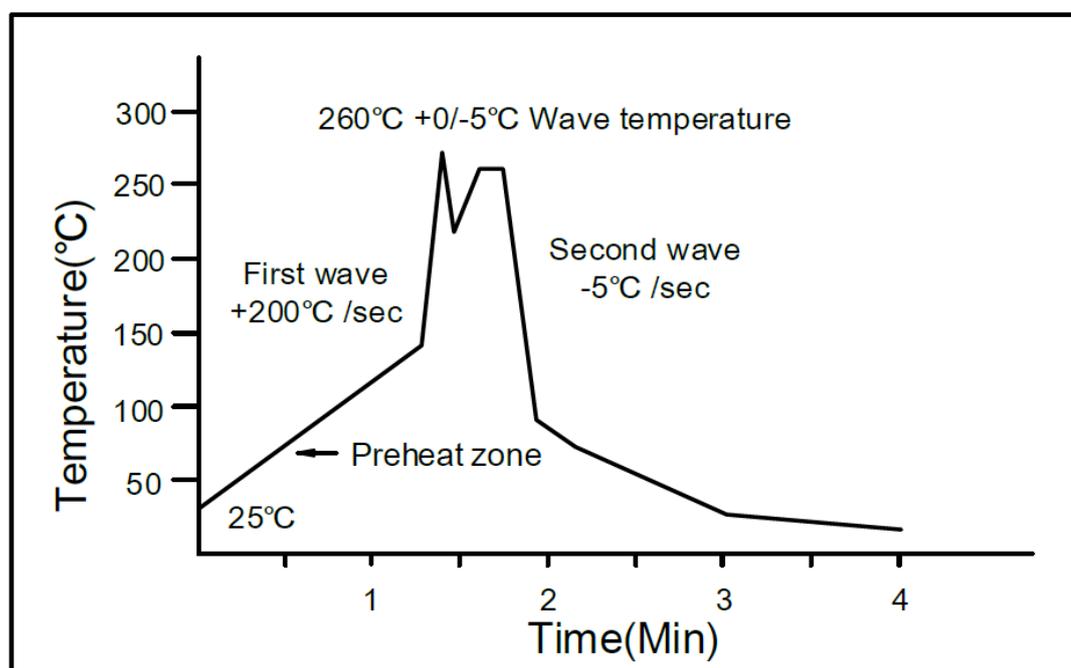
One time soldering is recommended within the condition of temperature.

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: $350 \pm 10^\circ\text{C}$

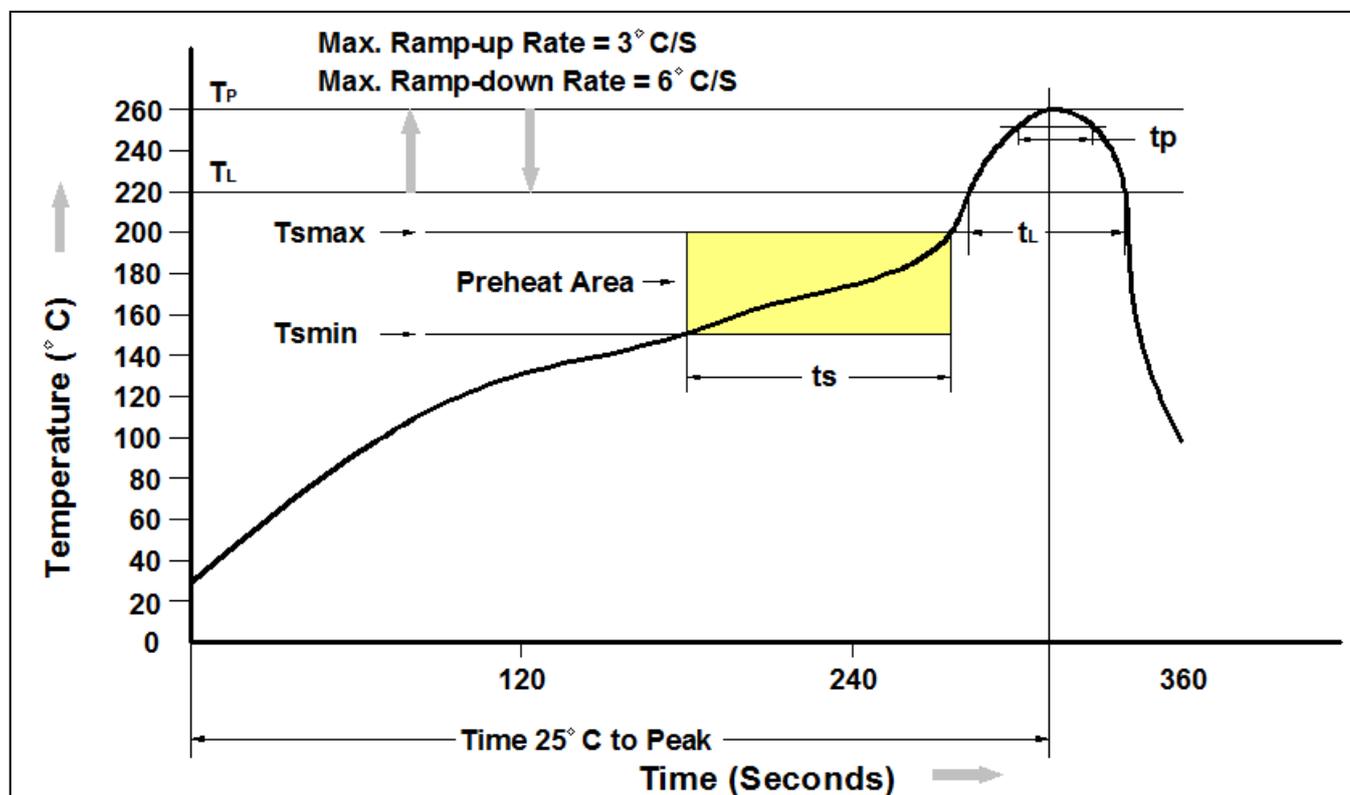
Time: 5 sec max.



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



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T _{sm})	150°C
Temperature Max. (T _{smx})	200°C
Time (t _s) from (T _{sm} to T _{smx})	60-120 seconds
Ramp-up Rate (t _L to t _p)	3°C/second max.
Liquidous Temperature (T _{sl})	217°C
Time (t _L) Maintained Above (T _{sl})	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 _{sl})	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.



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