CTS600, CTS601, CTS611

SDIP-6 10Mbit/s High Speed Logic Gate Optocoupler

Features

- High speed 10MBit/s
- High isolation voltage between input and output (V_{ISO}=5000 V_{RMS})
- Guaranteed performance from -40°C to 85°C
- Operating Temperature range of -55°C to 100°C
- Wide operating voltage range of 3.3V to 5.5V
- 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)

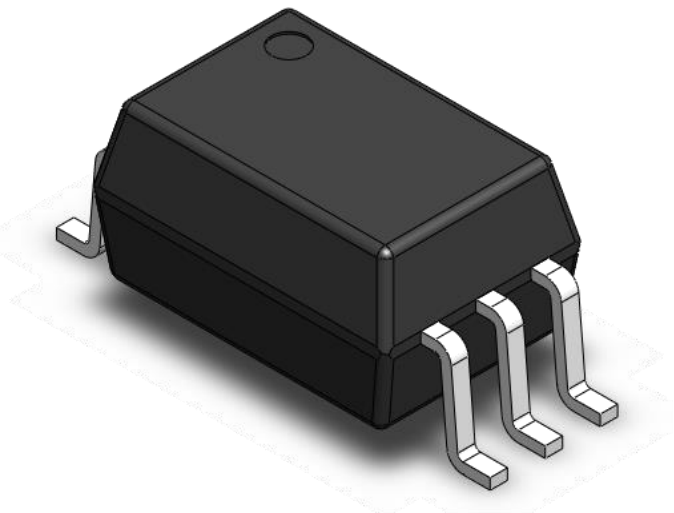
Description

The CTS600, CTS601, and CTS611 optocouplers consist of an AlGaAS LED, optically coupled to a very high speed integrated photo-detector logic gate with a strobe able output. The output of the detect IC is a high speed logic gate integrated with a photo detector. A maximum input signal of 5mA will provide a minimum output sink current of 13mA.

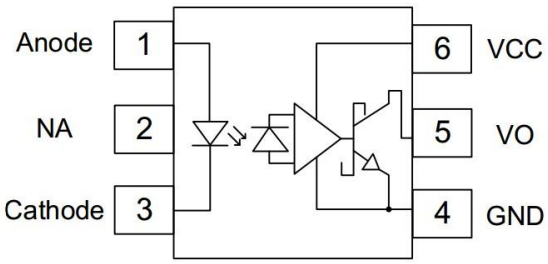
Applications

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

Package Outline



Schematic



Truth Table

Input	Output
L	H
H	L

Note: Different bending options available. See package dimension.

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.)	5000	V_{RMS}	
T_{OPR}	Operating temperature	-55 ~ +100	°C	
T_{STG}	Storage temperature	-55 ~ +125	°C	
T_{SOL}	Soldering temperature (For 10 seconds)	260	°C	
Emitter				
I_F	Forward current	50	mA	
V_R	Reverse voltage	5	V	
P_I	Power dissipation	100	mW	
Detector				
P_O	Power dissipation	85	mW	
I_O	Average Output current	50	mA	
V_O	Output voltage	3.0 ~ 7.0	V	1min(Max.)
V_{CC}	Supply voltage	3.0 ~ 7.0	V	
VE	Enable Input Voltage Not to Exceed VCC by more than 500mV	5.5	V	

Electrical Characteristics

T_A = -40 - 85°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	I_F = 10mA	-	1.4	1.6	V	
V_R	Reverse Voltage	I_R = 5μA	5.0	-	-	V	
$\Delta V_F/\Delta T_A$	Temperature coefficient of forward voltage	I_F =10mA	-	-1.6	-	mV/°C	

Detector Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
I_{CCH}	Logic High Supply Current	I_F=0mA, V_{CC}=3.3V	-	4.0	10	mA	
		I_F=0mA, V_{CC}=5.5V	-	6.5	10		
I_{CCL}	Logic Low Supply Current	I_F=10mA, V_{CC}=3.3V	-	5.5	13	mA	
		I_F=10mA, V_{CC}=5.5V	-	8.8	13		

Transfer Characteristics

Symbol	Parameters	Test Conditions	Min	Typ	Max	Units	Notes
I_{FT}	Input Threshold Current	V_{CC}=3.3V, V_O=0.6V, I_O=13mA	-	1.6	5	mA	
		V_{CC}=5.5V, V_O=0.6V, I_O=13mA	-	2.5	5		
I_{OH}	Logic High Output Current	I_F=250μA, V_O=V_{CC}=3.3V	-	7.0	100	μA	
		I_F=250μA, V_O=V_{CC}=5.5V	-	2.0	100		
V_{OL}	Low Level Output Voltage	I_F=5mA, V_{CC}=3.3V, I_O=13mA	-	0.45	0.6	V	
		I_F=5mA, V_{CC}=5.5V, I_O=13mA	-	0.35	0.6		

Electrical Characteristics

T_A = -40 - 85°C (unless otherwise specified). Typical values are measured at T_A = 25°C, V_{CC}=5V and I_F= 7.5mA

Switching Characteristics

Symbol	*Parameters*		*Test Conditions*	*Min*	*Typ*	*Max*	*Units*	*Notes*
T_{PHL}	Propagation Delay Time Logic High to Logic Low		C_L=15pF,R_L=350Ω	-	34	75	ns	
T_{PLH}	Propagation Delay Time Logic Low to Logic High			-	39	75	ns	
Tr	Output Rise Time			-	37	-	ns	
Tf	Output Fall Time			-	10	-	ns	
CM_H	Common Mode Transient Immunity at Logic High	CTS600	I_F = 0mA , V_{OH}=2.0V, R_L=350Ω, TA=25°C, V_{CM}=10Vp-p	-	-	-	V/μs	
		CTS601	I_F = 0mA , V_{OH}=2.0V, R_L=350Ω, TA=25°C, V_{CM}=50Vp-p	5000	-	-		
		CTS611	I_F = 0mA , V_{OH}=2.0V, R_L=350Ω, TA=25°C, V_{CM}=1000Vp-p	20000	-	-		
CM_L	Common Mode Transient Immunity at Logic Low	CTS600	I_F = 7.5mA , V_{OL}=0.8V, R_L=350Ω, TA=25°C, V_{CM}=10Vp-p	-	-	-	V/μs	
		CTS601	I_F = 7.5mA , V_{OL}=0.8V, R_L=350Ω, TA=25°C, V_{CM}=50Vp-p	5000	-	-		
		CTS611	I_F = 7.5mA , V_{OL}=0.8V, R_L=350Ω, TA=25°C, V_{CM}=1000Vp-p	20000	-	-		

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

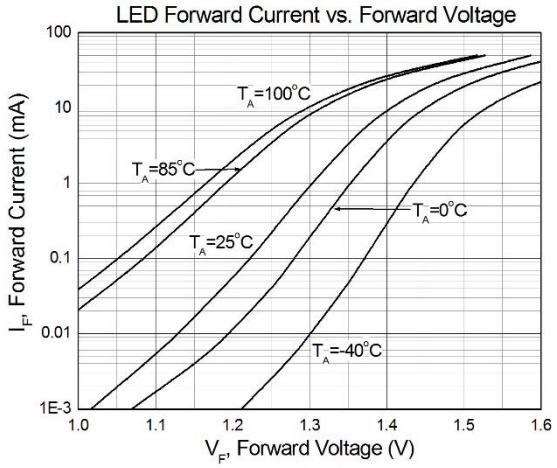


Figure 1

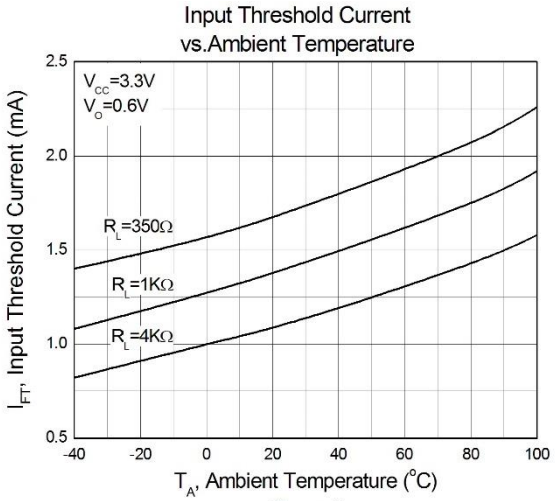


Figure 2

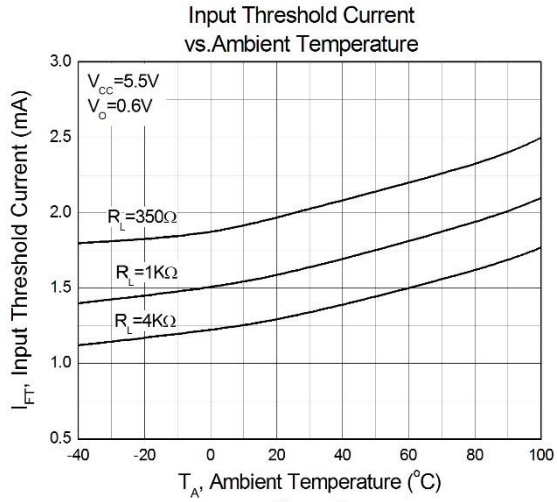


Figure 3

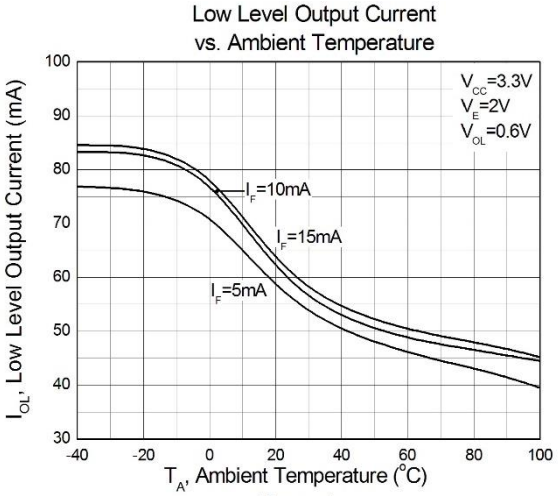
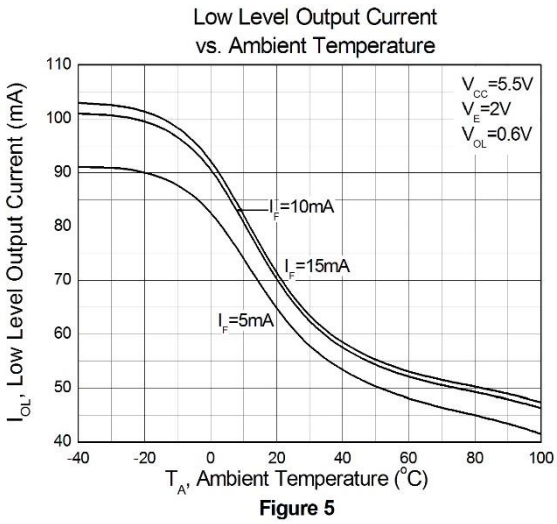


Figure 4



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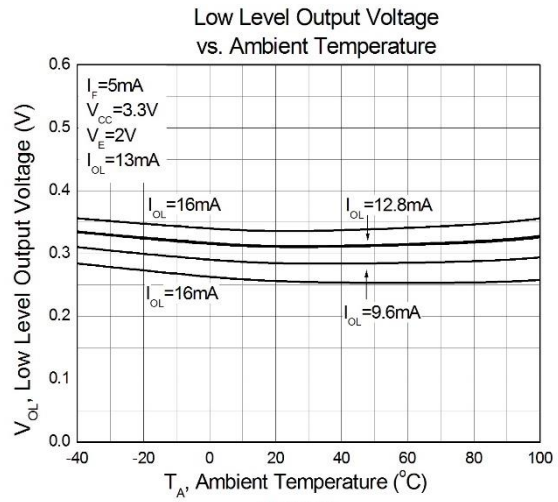


Figure 6

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

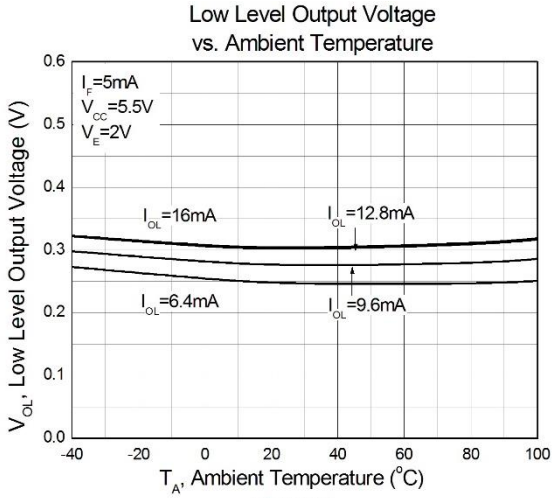


Figure 7

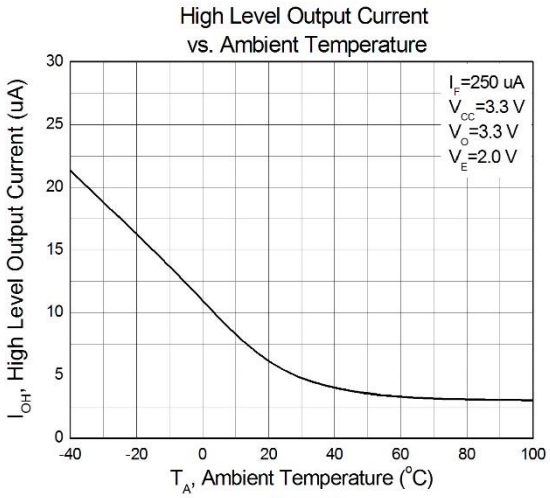
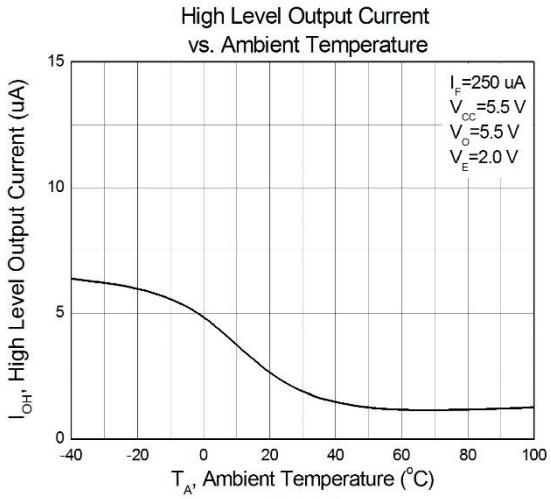


Figure 8



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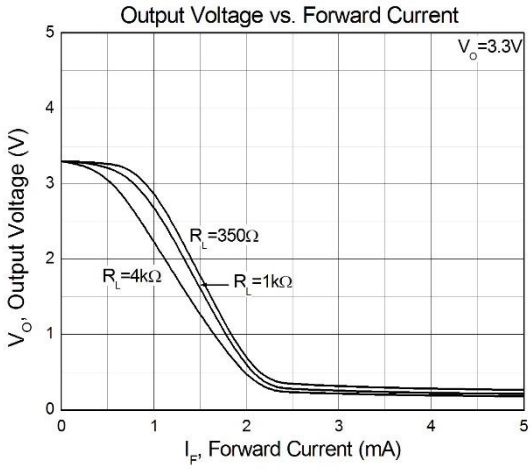


Figure 10

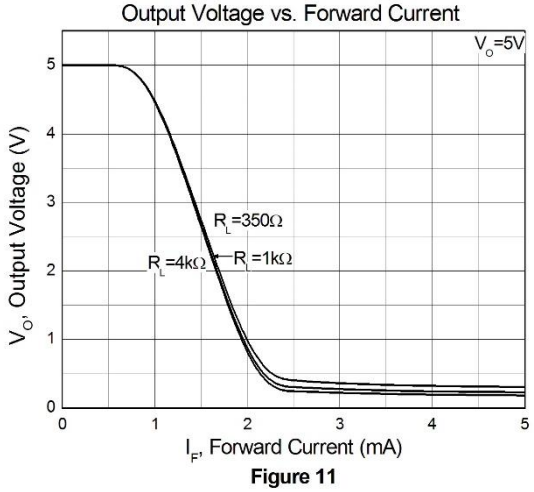


Figure 11

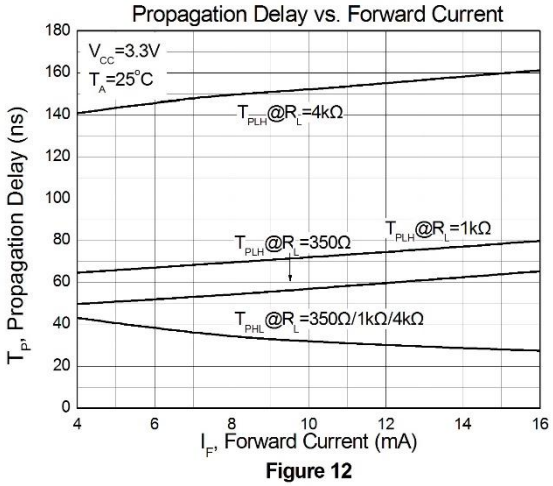


Figure 12

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

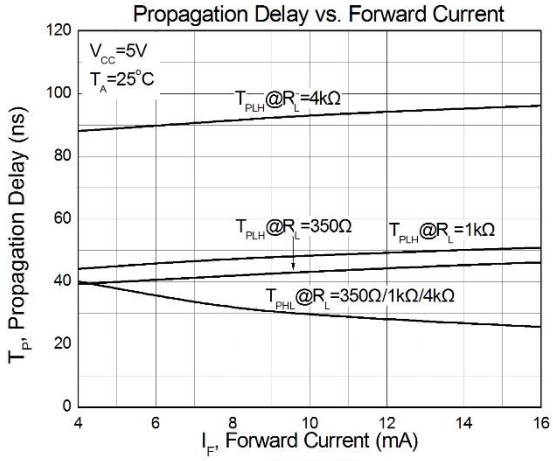
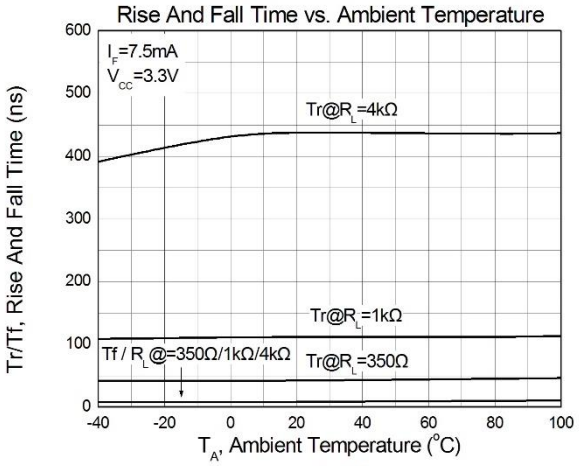
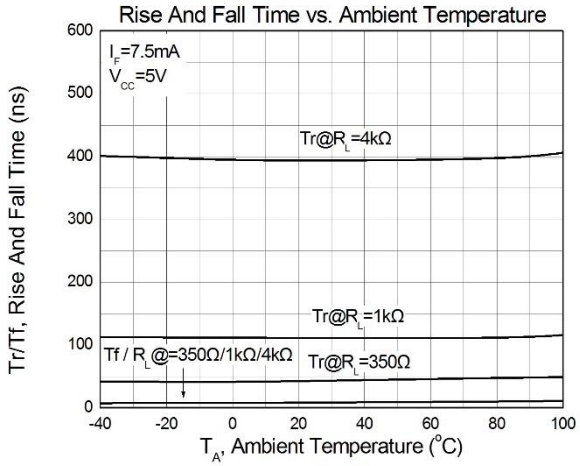


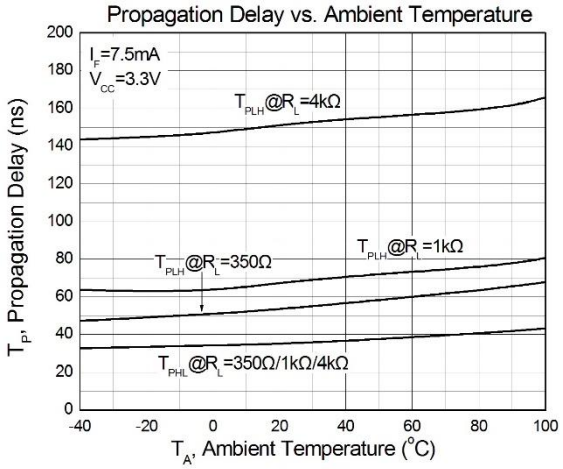
Figure 13



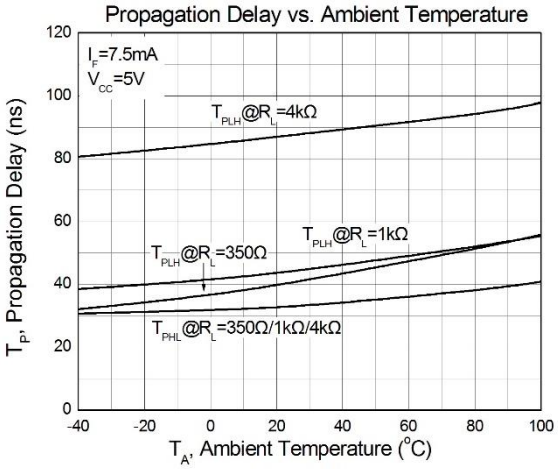
Fgure 14



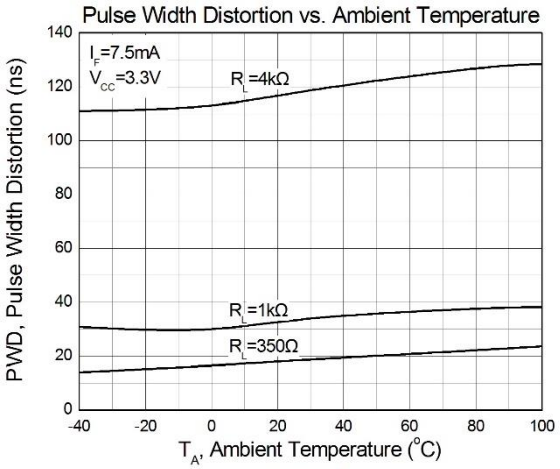
Fgure 15



Fgure 16

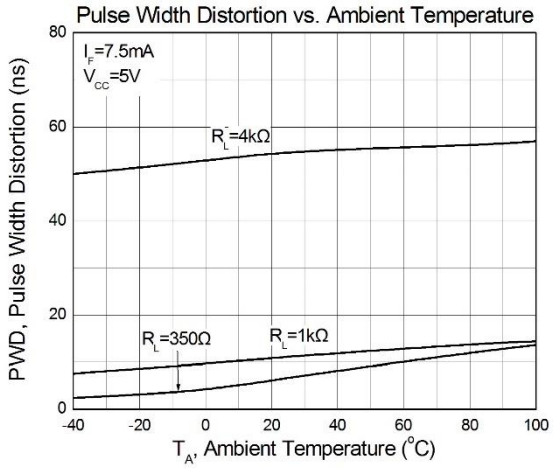


Fgure 17



Fgure 18

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



Fgure 19

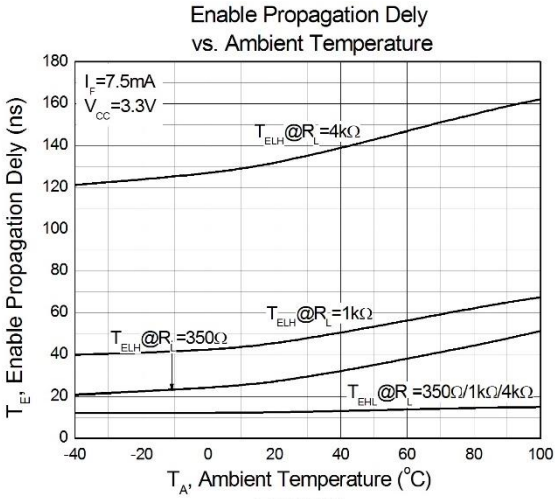


Figure 20

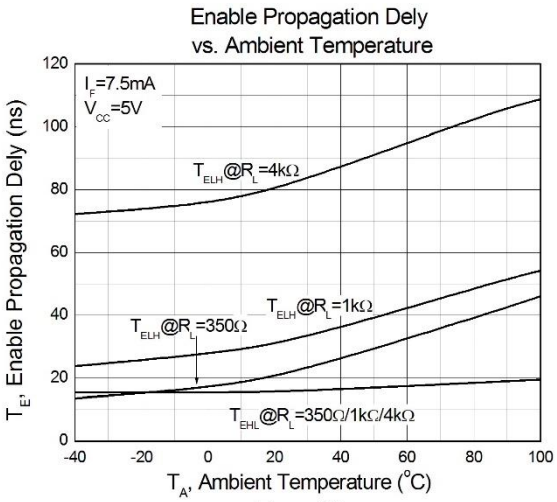


Figure 21

Test Circuits

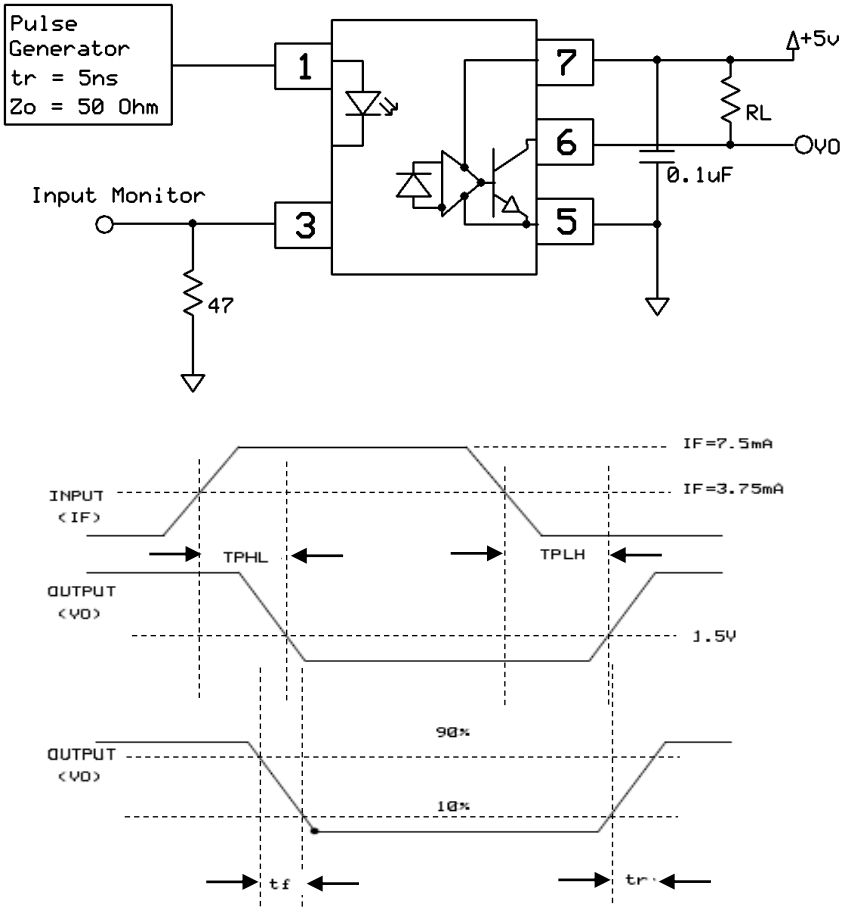


Figure 22: Switching Time Test Circuit

Test Circuits

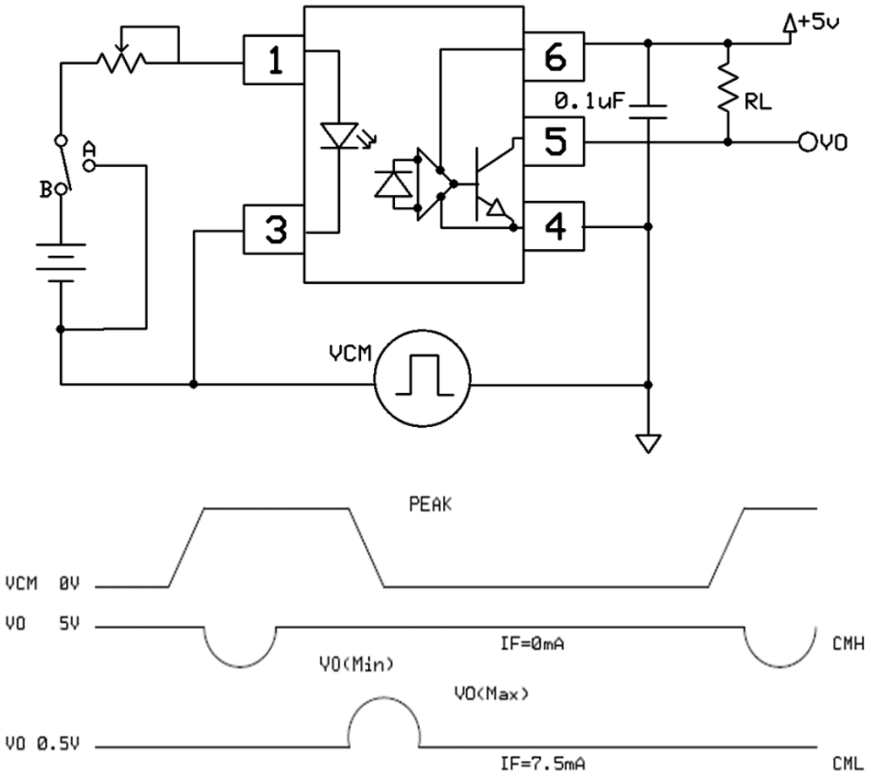
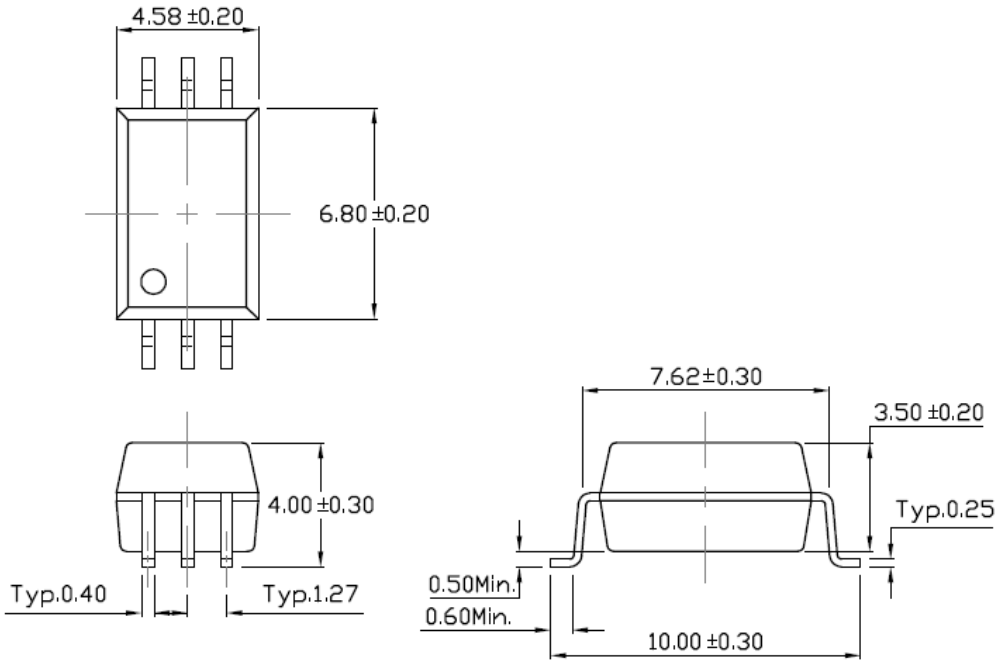


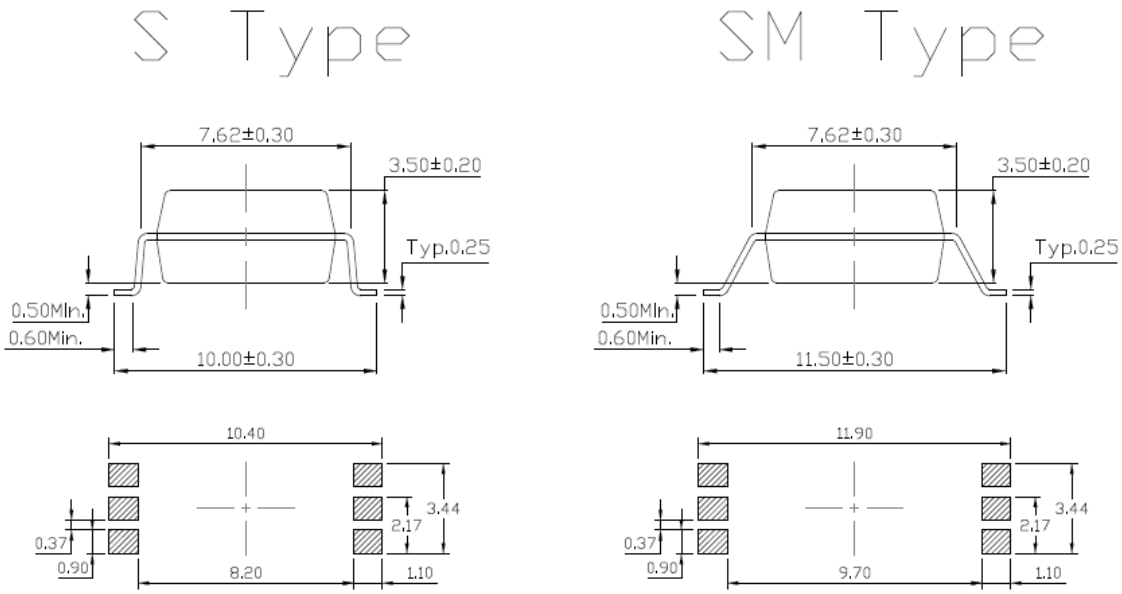
Figure 23: CMR Test Circuit

Package Dimension *Dimensions in mm unless otherwise stated*

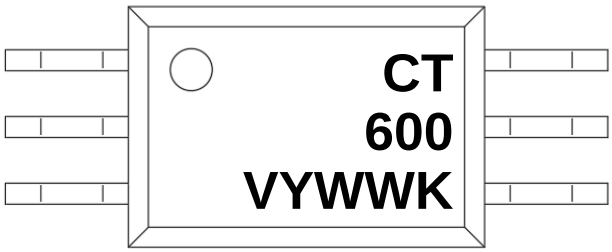
Surface Mount Lead Forming



Forming Option *Dimensions in mm unless otherwise stated*



Marking Information



Note:

CT	: Denotes “CT Micro”
600	: Part Number(600,601,611)
V	: VDE Safety Mark Option (Blank or V)
Y	: One Digit Year Code
WW	: Two Digit Work Week
K	: Manufacturing Code

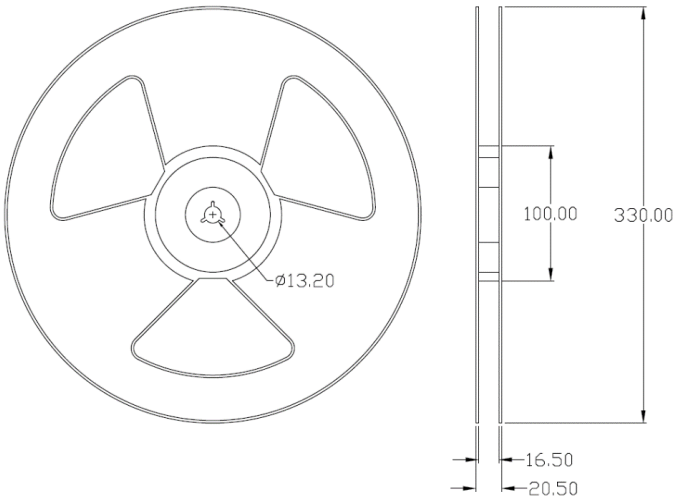
Ordering Information

CTS6XX(V)(Y)(Z)

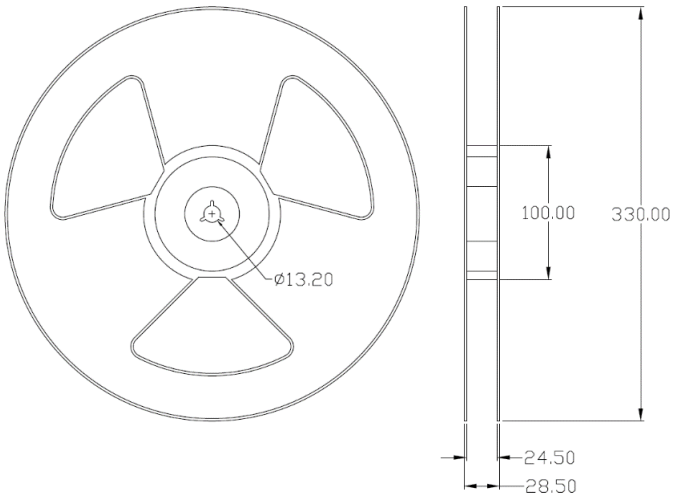
CT	= Denotes “CT Micro”
X	= Part Number(00, 01, 11)
V	= VDE Safety Mark Option (Blank or V)
Y	= Lead Form Option (Blank, M)
Z	= Tape and Reel Option (T1, T2)

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

Option S(T1/T2)

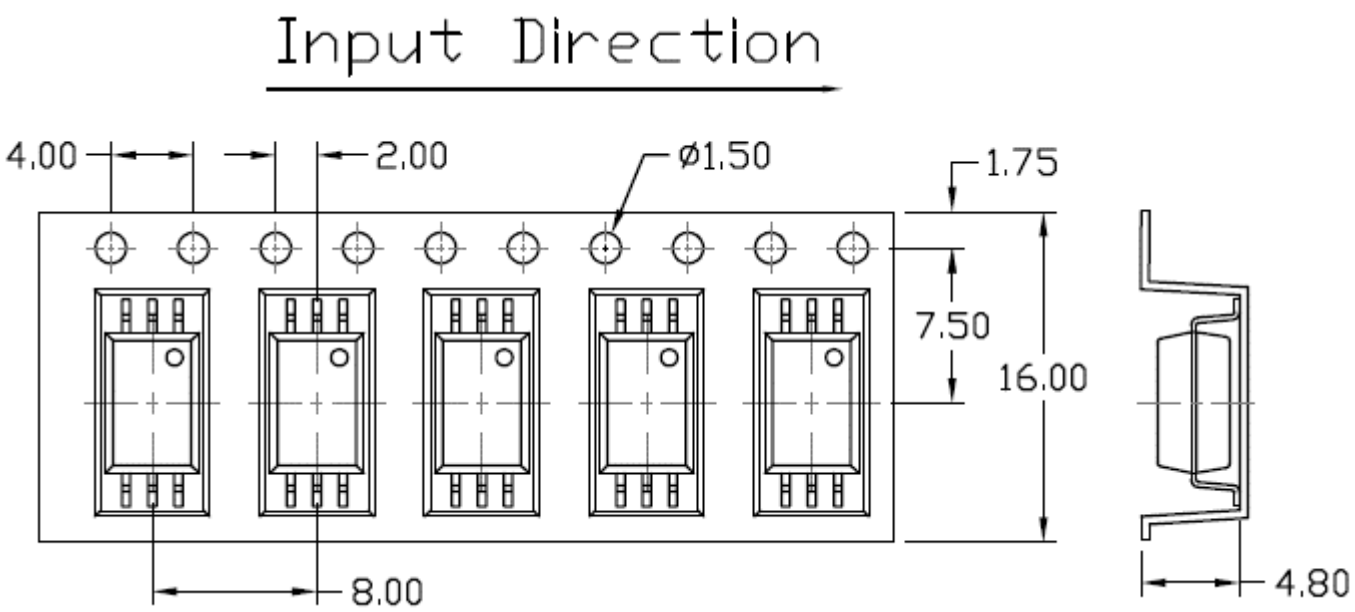


Option SM(T1/T2)

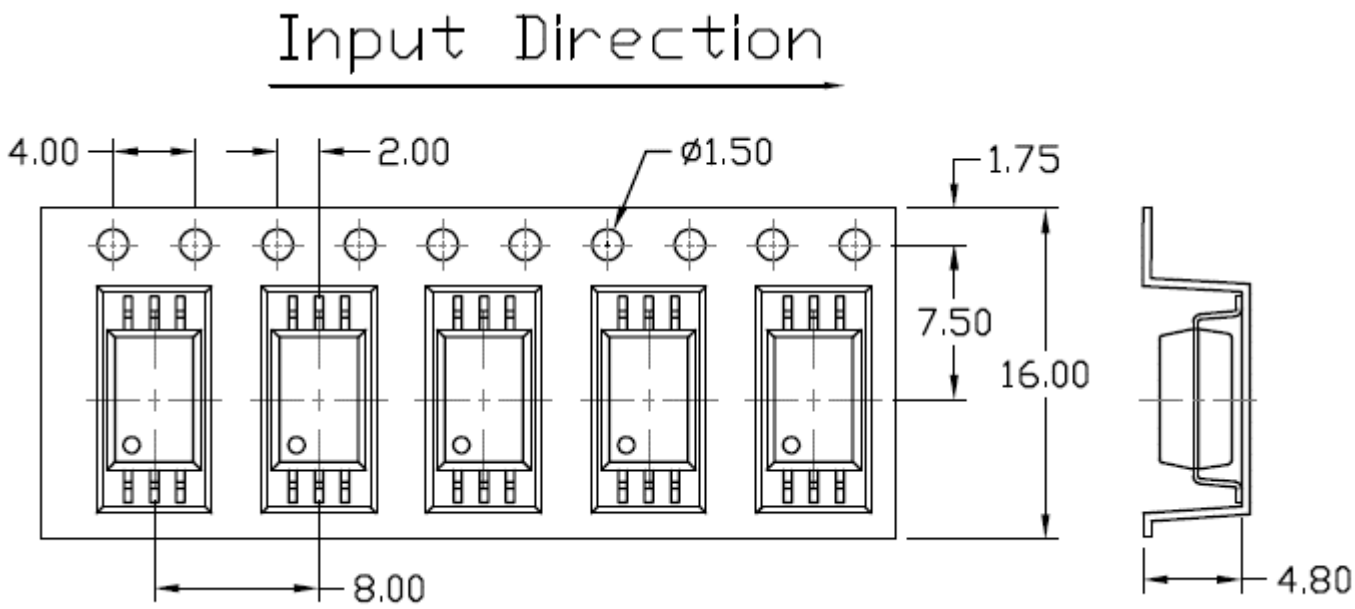


Carrier Tape Specifications *Dimensions in mm unless otherwise stated*

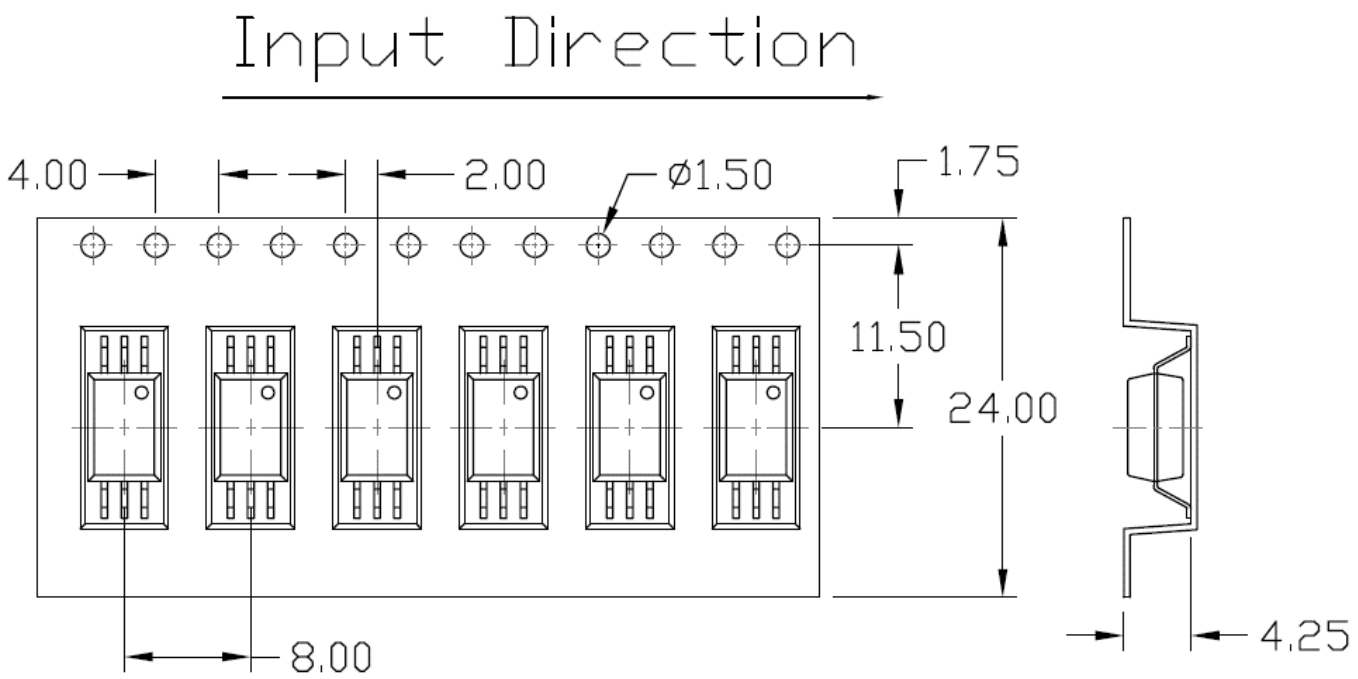
Option S(T1)



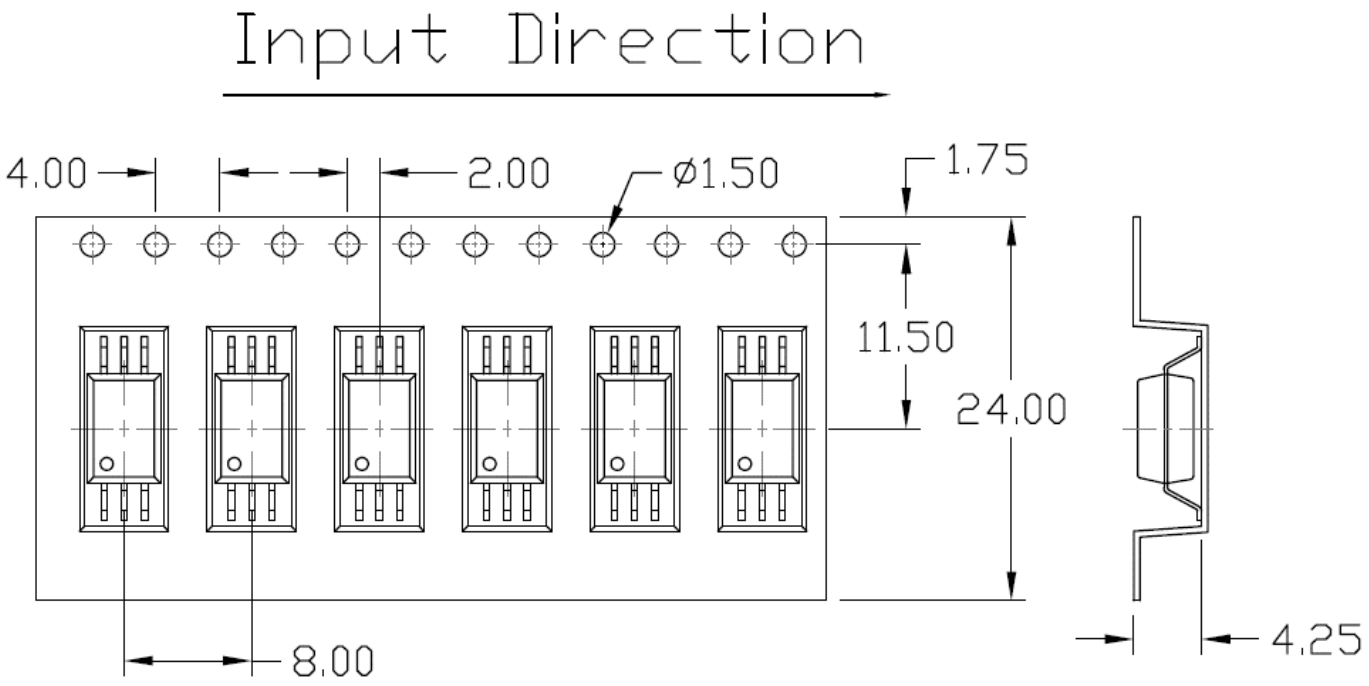
Option S(T2)



Option SM (T1)



Option SM (T2)

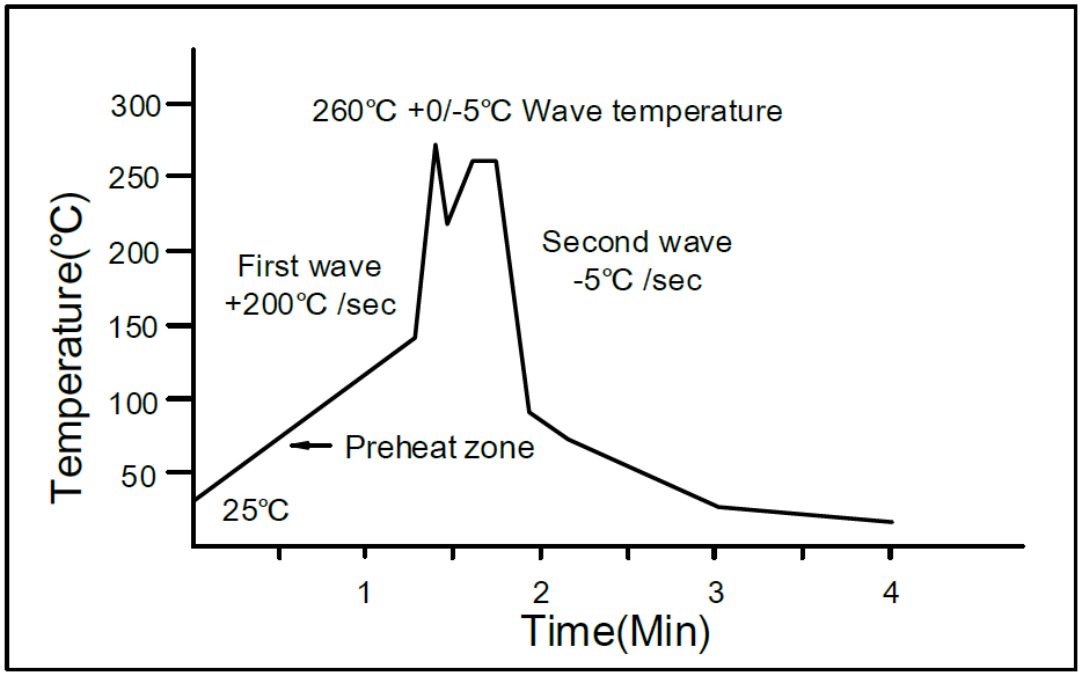


Solderability spec (Follow the JEDEC standard JESD22-B102)

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)

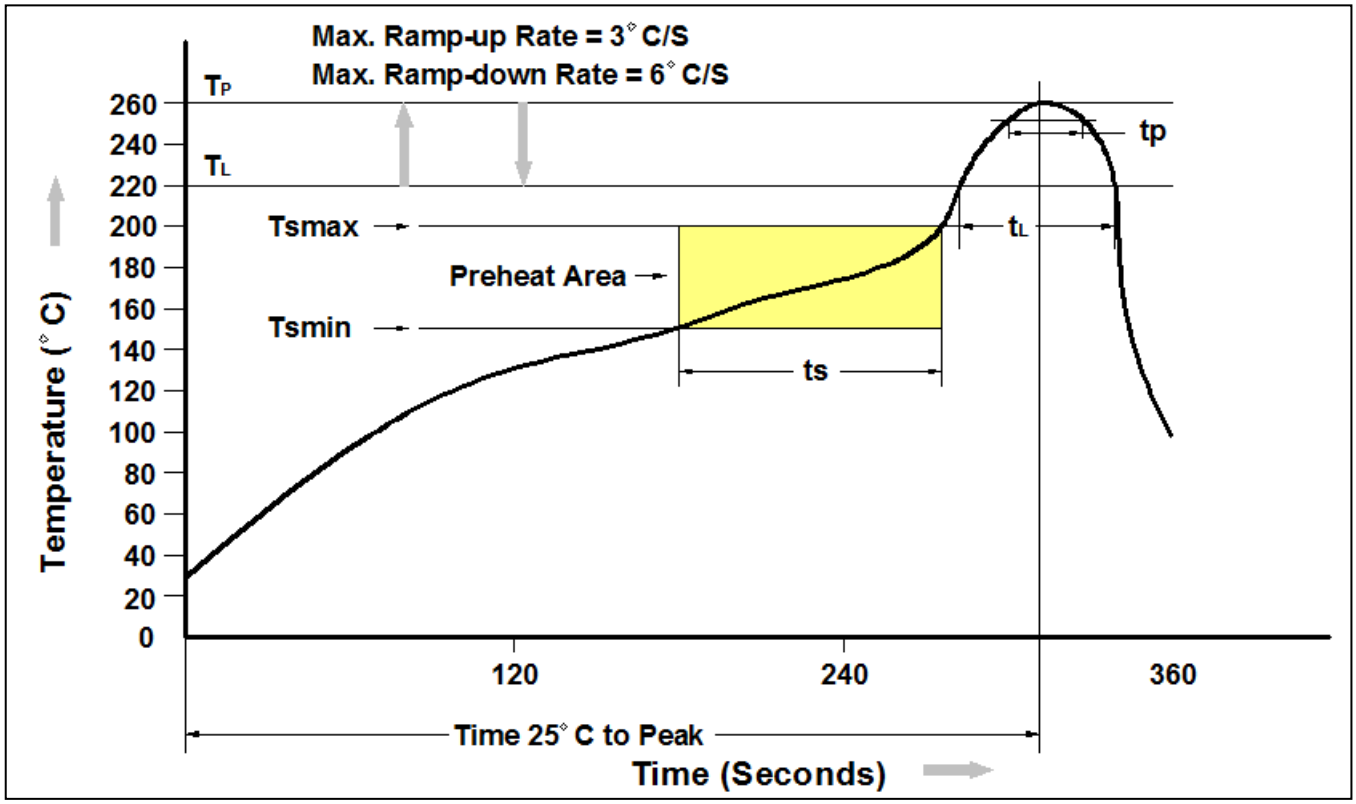
One time soldering is recommended within the condition of temperature.
Temperature: 260+0/-5˚C.
Time: 10 sec.
Preheat temperature: 25 to 140˚C.
Preheat time: 30 to 80 sec.



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.

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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.*