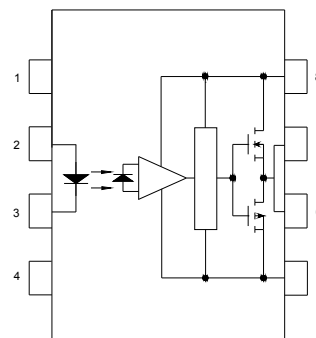


● Description

The KTLP350 series consists of an GaAlAs light emitter diode and an integrated. This unit is 8-lead DIP package. KTLP350 series is suitable for gate driving circuit of IGBT or power MOSFET.

● Schematic



- | | |
|------------|------------------------|
| 1. N.C. | 5. GND |
| 2. Anode | 6. Vo (Voltage Output) |
| 3. Cathode | 7. Vo (Voltage Output) |
| 4. N.C. | 8. Vcc |

● Features

1. This unit is 8.lead DIP package.
2. Input threshold current: $I_F=5\text{mA}(\text{max.})$
3. Supply current (I_{CC}): 3 mA (max.)
4. Supply voltage (V_{CC}): 10 – 30V
5. Output current (I_O): $\pm 2.5\text{A}(\text{max.})$
6. Switching time (t_{pLH}/t_{pHL}): $0.5\mu\text{s}(\text{max.})$
7. Isolation voltage: 5000Vrms(min.)
8. MSL class 1
9. Agency Approvals:
 - UL Approved (No. E169586): UL1577
 - c-UL Approved (No. E169586)
 - VDE Approved (No. 40020973): DIN EN60747-5-5

● Applications

- Transistor inverter
- Inverter for air conditioner
- IGBT gate drive
- Power MOSFET gate drive
- IH(Induction Heating)

● Truth Table

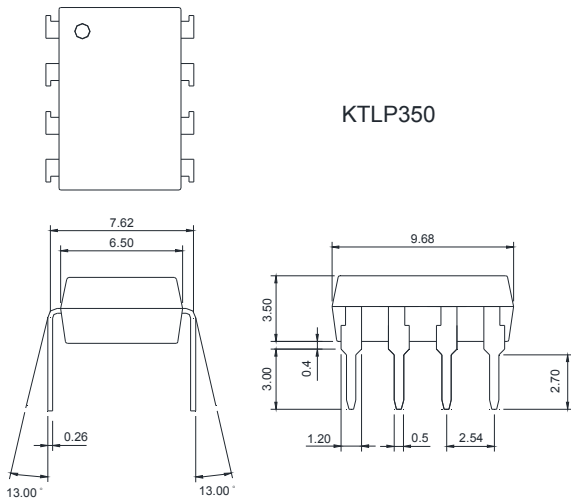
LED	OUTPUT	Q1	Q2
ON	HIGH LEVEL	ON	OFF
OFF	LOW LEVEL	OFF	ON

* The use of a 0.1 μF bypass capacitor must be connected between pins 8 and 5 is recommended.

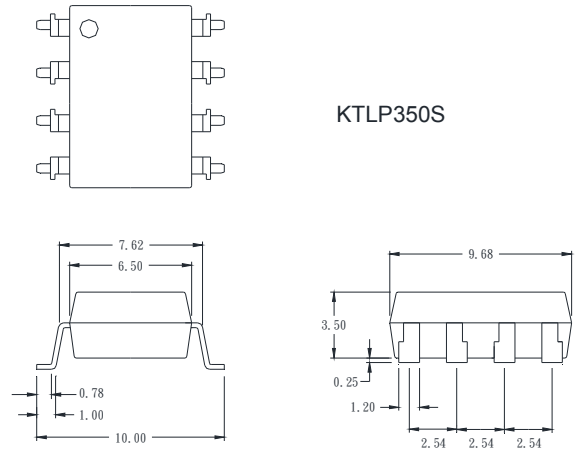
● **Outside Dimension**

Unit : mm

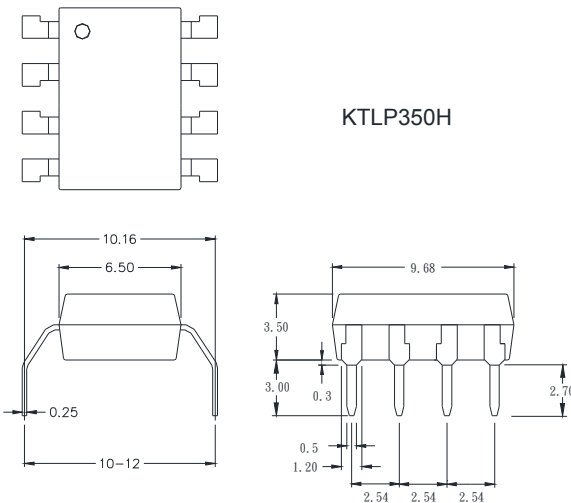
1. Dual-in-line type



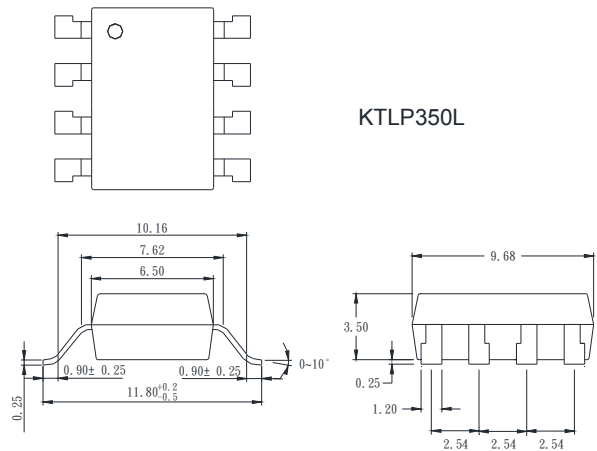
2. Surface mount type



3. Long creepage distance type

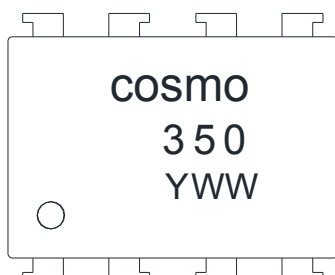


4. Long creepage distance for surface mount type



TOLERANCE: $\pm 0.2\text{mm}$

● **Device Marking**



Notes:

cosmo
350
YWW

Y: Year code / WW: Week code

● Absolute Maximum Ratings

(Ta = 25°C)

Parameter		Symbol	Rating	Unit	
Input	Forward current	I_F	20	mA	
	Forward current derating(Ta ≥ 70°C)	$\Delta I_F / \Delta Ta$	-0.54	mA/°C	
	Peak transient forward current (*Note 1)	I_{FPT}	1	A	
	Reverse voltage	V_R	5	V	
	Junction temperature	T_j	125	°C	
Output	“H” Peak output current (*Note 2)		I_{OPH}	-2.5	A
	“L” Peak output current (*Note 2)		I_{OPL}	+2.5	A
	Output voltage	(Ta < 95°C)	V_O	35	V
	Supply voltage	(Ta < 95°C)	V_{CC}	35	V
	Output voltage derating (Ta ≥ 95°C)		$\Delta V_O / \Delta Ta$	-1.0	V/°C
	Supply Voltage derating(Ta ≥ 95°C)		$\Delta V_{CC} / \Delta Ta$	-1.0	V/°C
	Junction temperature		T_j	125	°C
Operating frequency (*Note 3)		f	50	KhZ	
Operating temperature range		T_{opr}	-40~115	°C	
Storage temperature range		T_{stg}	-55~125	°C	
Lead soldering temperature(10s) (*Note 4)		T_{sol}	260	°C	
Isolation voltage (AC,1min.,R.H ≤ 60%) (*Note 5)		BVs	5000	Vrms	

*Note1: Pulse width $Pw \leq 1\mu s, 300pps$.

*Note2: Exponential waveform pulse width $Pw \leq 0.3\mu s, f \leq 15kHz$.

*Note3: Exponential waveform, $I_{OPH} \geq -2.0A (\leq 0.3\mu s), I_{OPL} \leq +2.0A (\leq 0.3\mu s)$.

*Note4: It is 2 mm or more from a lead root.

*Note5: Device is considered as a two terminal device: Pin1,2,3 and 4 shorted together, and pins 5,6,7 and 8 shorted together.

● Electrical Characteristics

(Ta = 25°C)

Parameter	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit	
Input forward voltage	V_F	—	$I_F=10mA, Ta=25^\circ C$	—	1.6	1.8	V	
Temperature coefficient of forward voltage	$\Delta V_F / \Delta Ta$	—	$I_F=10mA$	—	-2.0	—	mV/°C	
Input reverse current	I_R	—	$V_R=5V, Ta=25^\circ C$	—	—	10	μA	
Input capacitance	C_T	—	$V=0, f=1MHz, Ta=25^\circ C$	—	45	250	pF	
Output current	“H” level	I_{OPH}	3	$V_{CC}=30V, I_F=5mA$	—	-1.6	-1.0	A
				$V_{CC}=15V, I_F=5mA$	—	—	-2.0	
				$V_b=3.5V$				
				$V_b=7.0V$				

	“L” level	I_{OPL}	2	$V_{CC}=30V, I_F=0mA$ $V_a=2.5V$	1.0	1.6	—	
				$V_{CC}=15V, I_F=0mA$ $V_a=7.5V$	2.0	—	—	
Output voltage	“H” level	V_{OH}	4	$V_{CC1}=15V, V_{EE1}=-15V$ $R_L=200\Omega, I_F=5mA$	11	13.7	—	V
	“L” level	V_{OL}	5	$V_{CC1}=15V, V_{EE1}=-15V$ $R_L=200\Omega, V_F=0.8V$	—	-14.9	-12.5	
Supply current	“H” level	I_{CCH}	—	$V_{CC}=30V, I_F=10mA,$ $T_a=25^\circ C$	—	2	3.0	mA
	“L” level	I_{CCL}	—	$V_{CC}=30V, I_F=0mA,$ $T_a=25^\circ C$	—	2	3.0	
Threshold input current	“Output L→H”	I_{FLH}	—	$V_{CC1}=15V,$ $V_o>1V, I_o=0mA$	—	1.8	5	mA
Threshold input voltage	“Output H→L”	V_{FHL}	—	$V_{CC1}=15V,$ $V_o>1V, I_o=0mA$	0.8	—	—	V
Supply voltage		V_{CC}	—		10	—	30	V
Capacitance (input-output)		C_s	—	$V_s=0, f=1MHz, T_a=25^\circ C$	—	1.0	2.0	pF
Resistance (input-output)		R_s	—	$V_s=500V, T_a=25^\circ C,$ $R.H. \leq 60\%$	1×10^{12}	10^{14}	—	Ω

* All typical values are at $T_a=25^\circ C$ (*A): Duration of I_o time $\leq 50\mu s$ (1 Pulse)

● Switching Characteristics

($T_a = 25^\circ C$)

Parameter	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time	“L→H”	6	$I_F=5mA$ (Note8) $V_{CC}=30V$ $R_g=20\Omega, C_g=10nF$	50	260	500	ns
	“H→L”			50	260	500	
Output rise time	t_r			—	15	—	
Output fall time	t_f			—	8	—	
Common mode transient immunity at high level output	C_{MH}	7	$V_{CM}=1000Vp-p, I_F=5mA$ $V_{CC}=30V, V_o(\min)=26V$ $T_a=25^\circ C$	-15	—	—	KV / μs
Common mode transient immunity at low level output	C_{ML}	7	$V_{CM}=1000Vp-p, I_F=0$ $V_{CC}=30V, V_o(\max)=1V$ $T_a=25^\circ C$	15	—	—	KV / μs

* All typical values are at $T_a=25^\circ C$.

*Note 8: Input signal rise time (fall time) $< 0.5\mu s$.

Fig.1 Forward Current vs. Forward Voltage

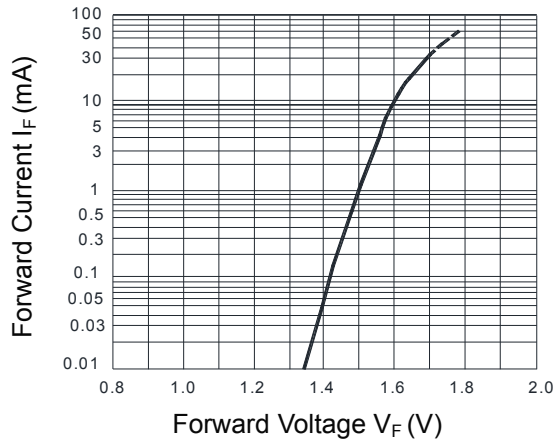


Fig.2 Output Voltage vs. Forward Current

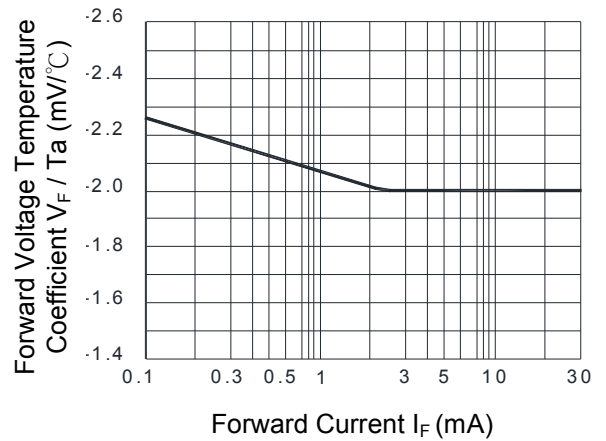


Fig.3 Allowable Forward Current vs. Ambient Temperature

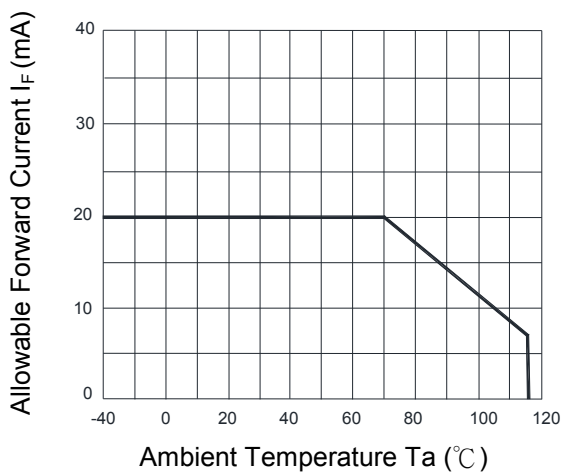


Fig.4 Supply Voltage vs. Ambient Temperature

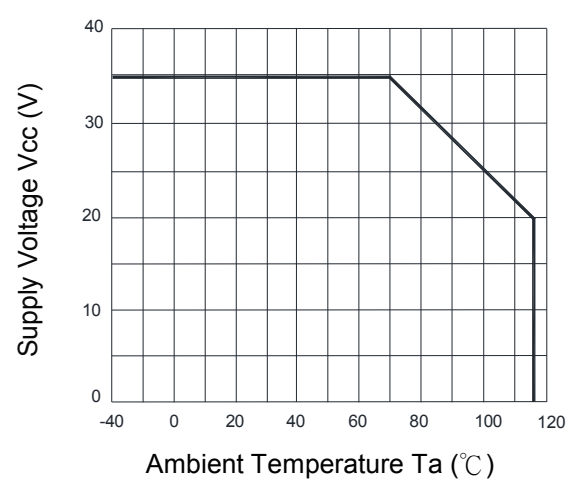


Fig.5 Low Level Output Voltage vs. Ambient Temperature

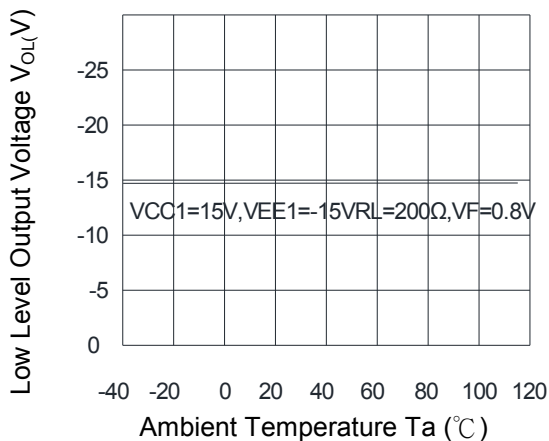


Fig.6 High Level Output Voltage vs. Ambient Temperature

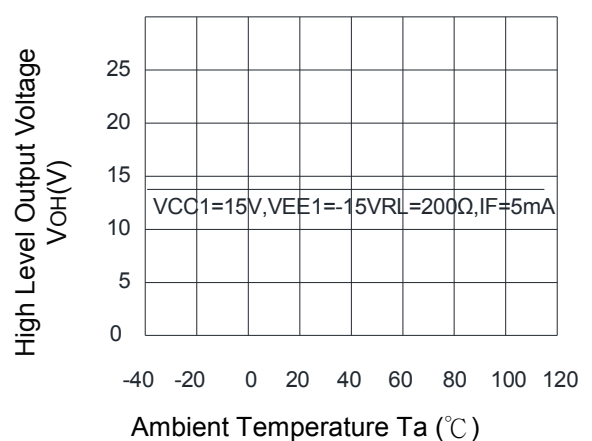


Fig.7 Low Level Supply Current vs. Ambient Temperature

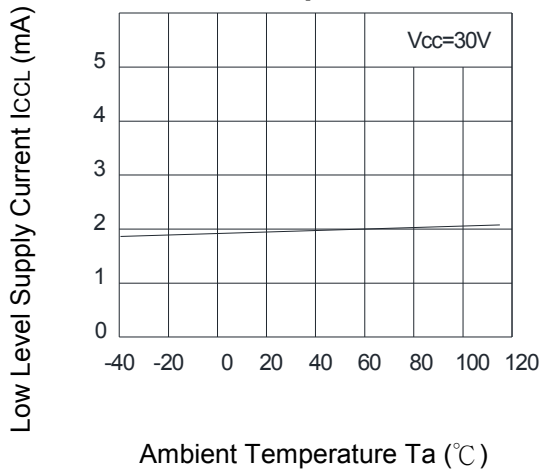


Fig.8 High Level Supply Current vs. Ambient Temperature

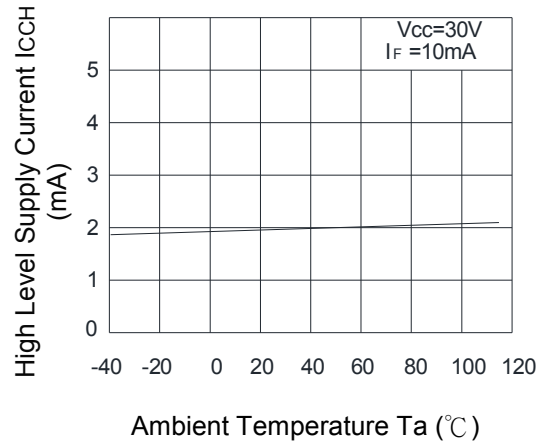
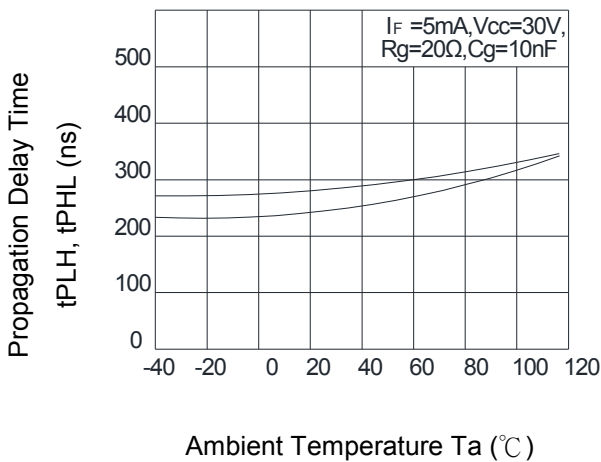
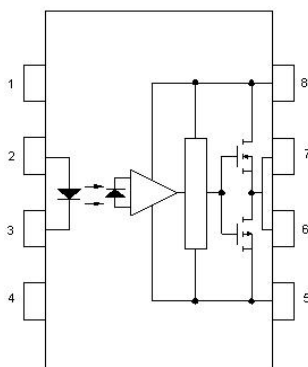


Fig.9 Propagation Delay Time vs. Ambient Temperature

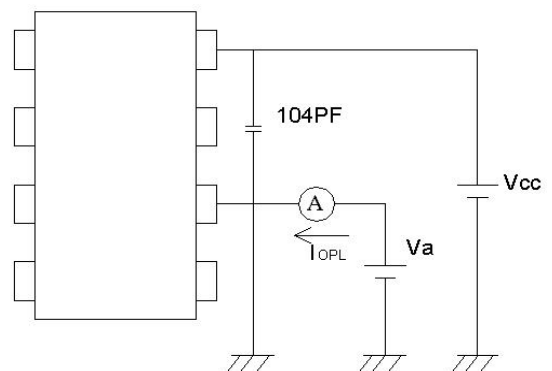


● **Test Circuit**

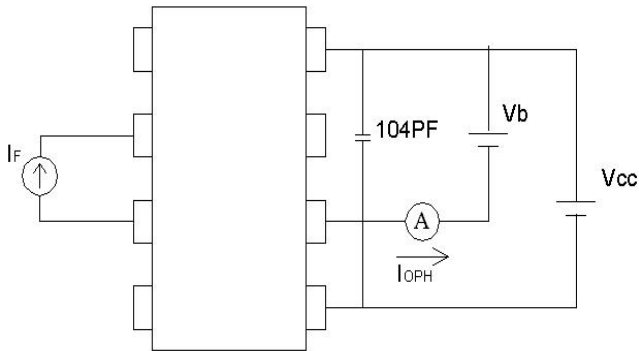
1. Top View



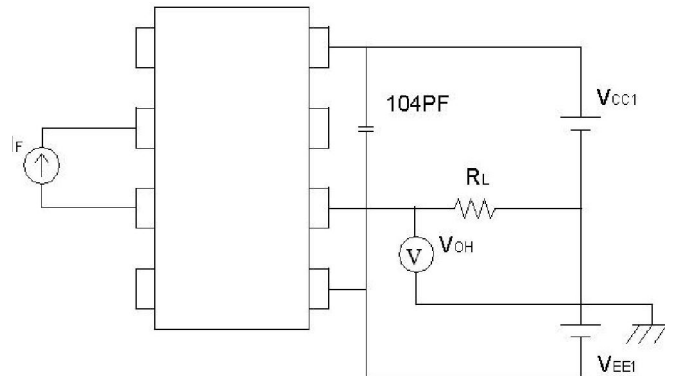
2. IOPL Measure



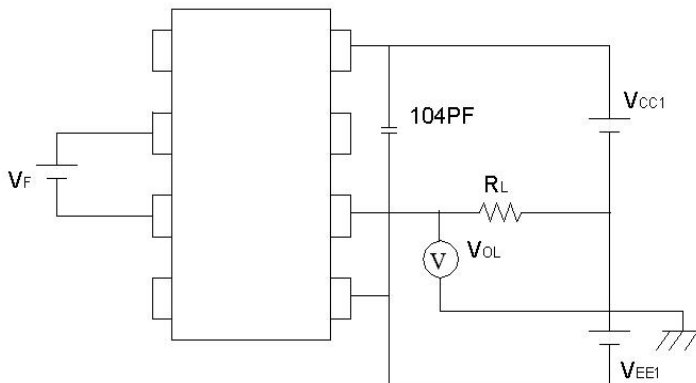
3. I_{OPH} Measure



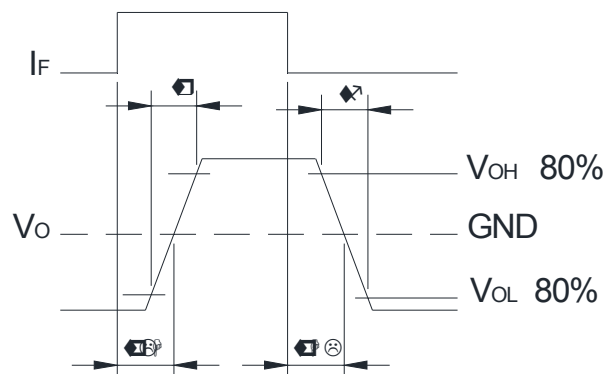
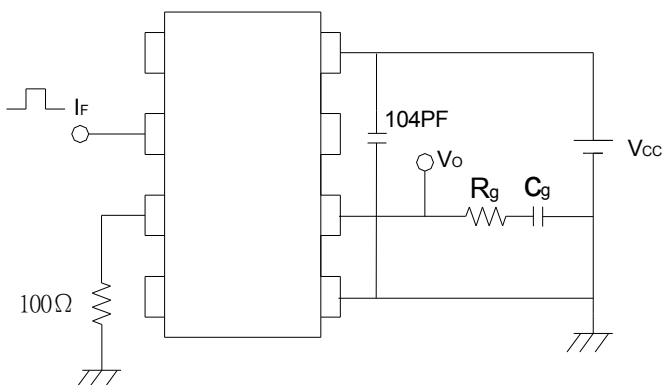
4. V_{OH} Measure



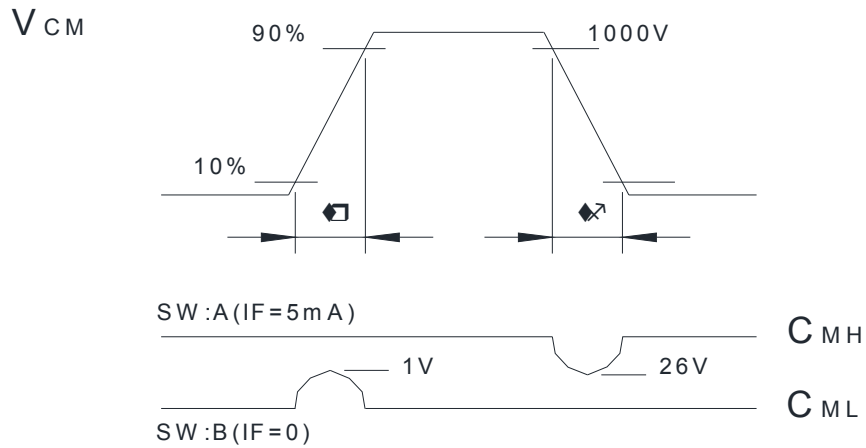
5. V_{OL} Measure



6. t_{pLH} , t_{pHL} , t_r , t_f Measure



7. C_{MH} , C_{ML} Measure



$$C_{ML} = \frac{800(V)}{t_r (\mu s)} \quad ; \quad C_{MH} = \frac{800(V)}{t_f (\mu s)}$$

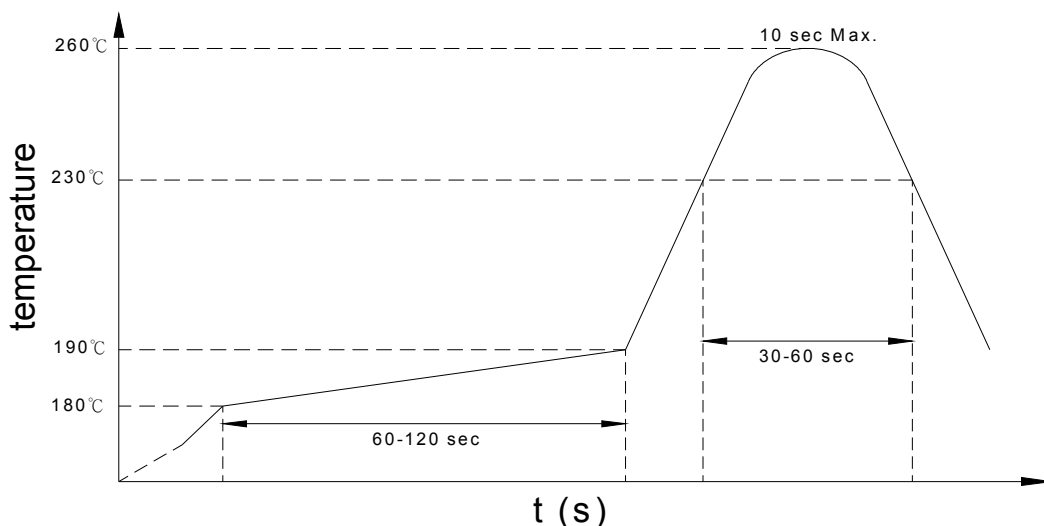
* C_{ML} (C_{MH}) is the maximum rate of rise (fall) of the common mode voltage that can be sustained with the output voltage in the low (high) state.

● Recommended Soldering Conditions

(a) Infrared reflow soldering :

- Peak reflow soldering : 260°C or below (package surface temperature)
- Time of peak reflow temperature : 10 sec
- Time of temperature higher than 230°C : 30-60 sec
- Time to preheat temperature from 180~190°C : 60-120 sec
- Time(s) of reflow : Two
- Flux : Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

Recommended Temperature Profile of Infrared Reflow



(b) Wave soldering :

- Temperature : 260°C or below (molten solder temperature)
- Time : 10 seconds or less
- Preheating conditions : 120°C or below (package surface temperature)
- Time(s) of reflow : One
- Flux : Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(c) Cautions :

- Fluxes : Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.
- Avoid shorting between portion of frame and leads.

- **Numbering System**

KTLP350 X (Y)

Notes:

KTLP350 = Part No.

X = Lead form option (blank · S · H · L)

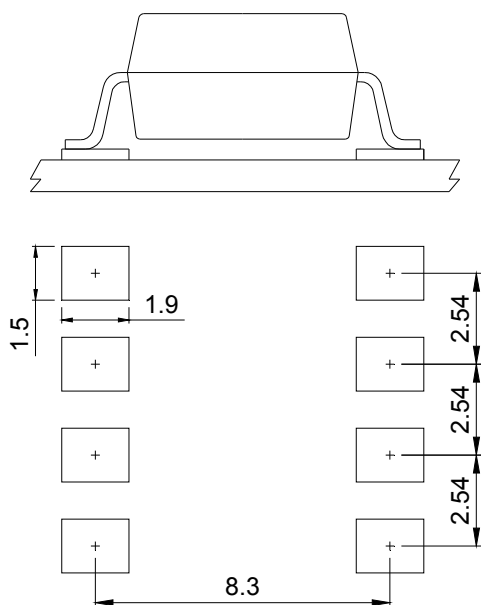
Y = Tape and reel option (TL · TR · TLD · TRU)

Option	Description	Packing quantity
S (TL)	surface mount type package + TL tape & reel option	1000 units per reel
S (TR)	surface mount type package + TR tape & reel option	1000 units per reel
L (TLD)	long creepage distance for surface mount type package + TLD tape & reel option	800 units per reel
L (TRU)	long creepage distance for surface mount type package + TRU tape & reel option	800 units per reel

- **Recommended Pad Layout for Surface Mount Lead Form**

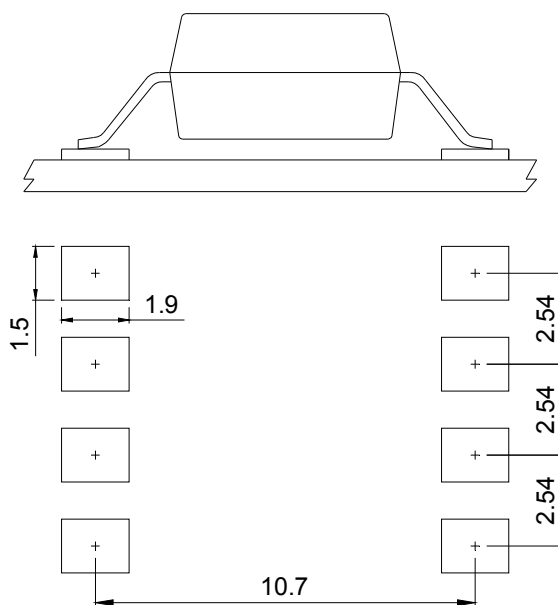
1.Surface mount type

8-pin SMD



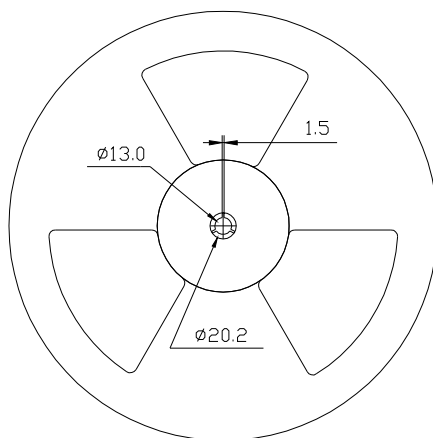
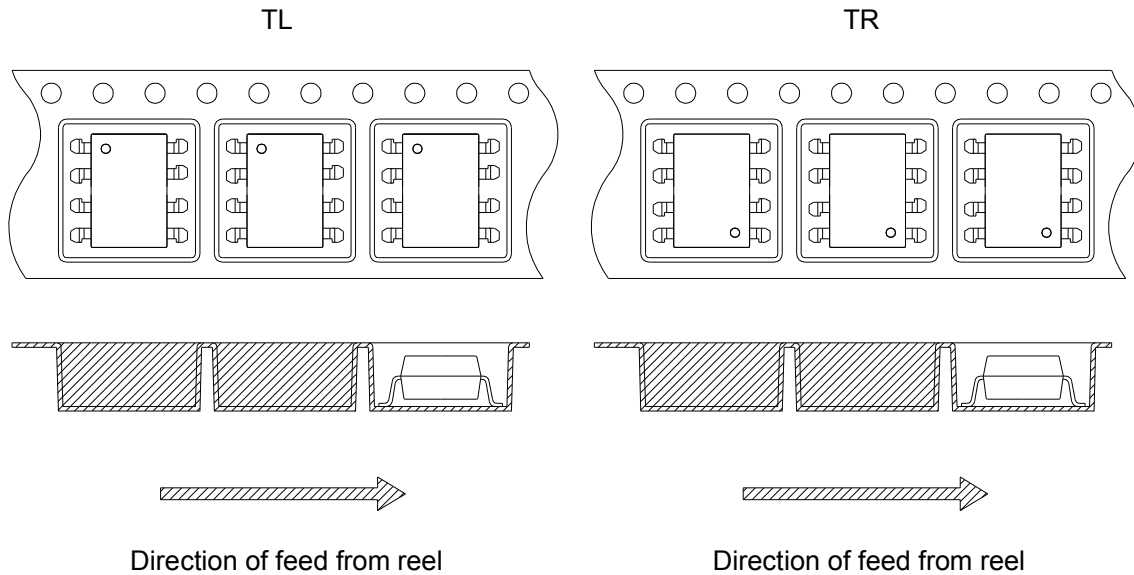
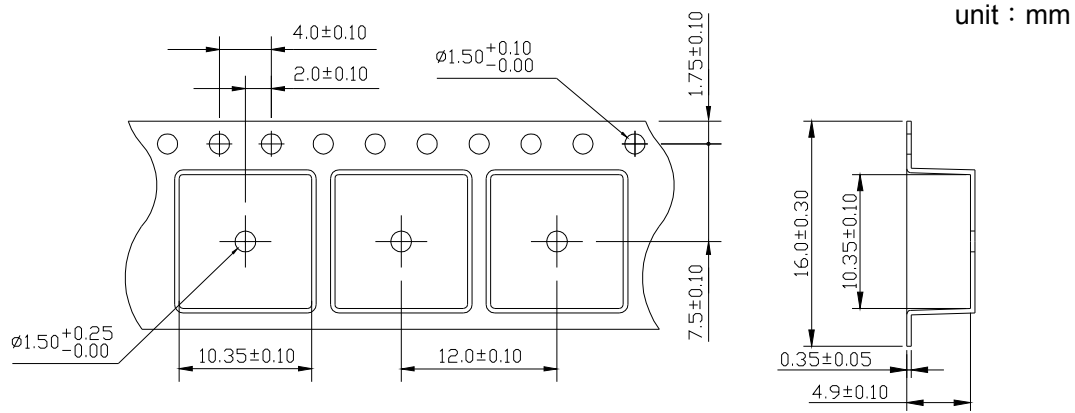
2.Long creepage distance for surface mount type

8-pin L

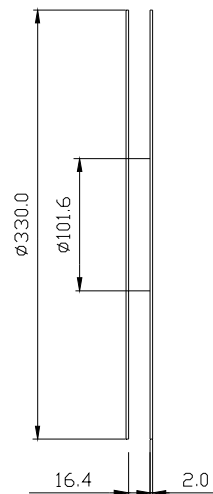


Unit :mm

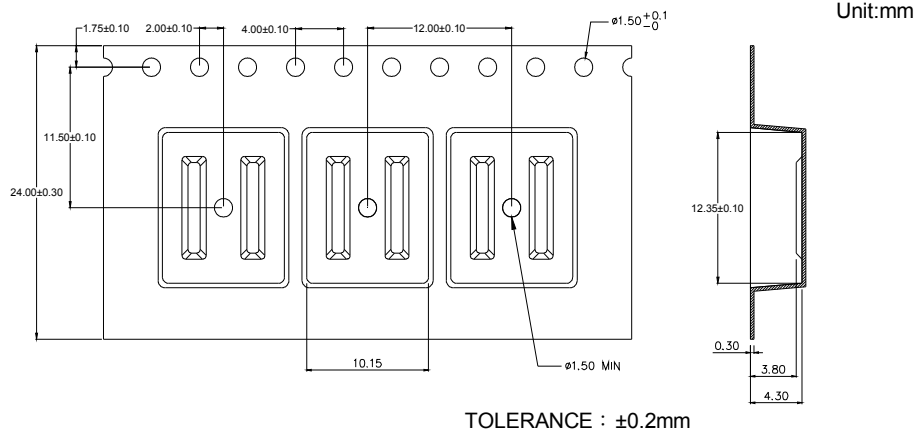
● 8-pin SMD Carrier Tape & Reel



Quantity : 1000pcs/reel

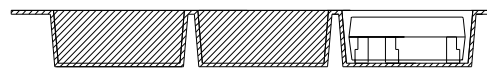
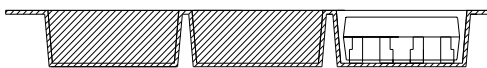
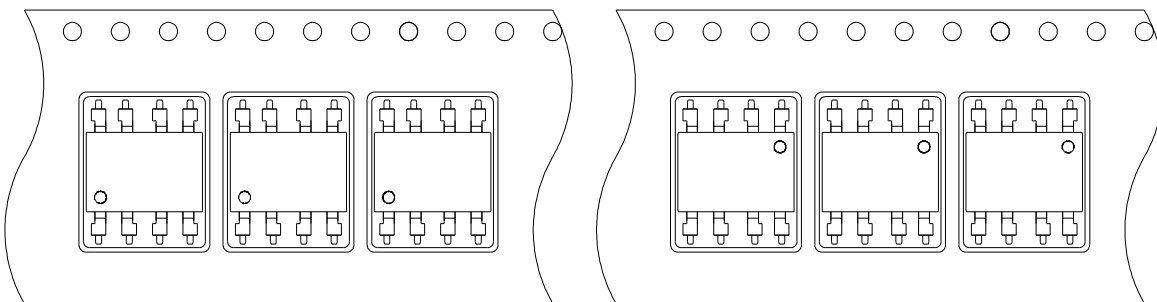


● 8-pin L Carrier Tape & Reel



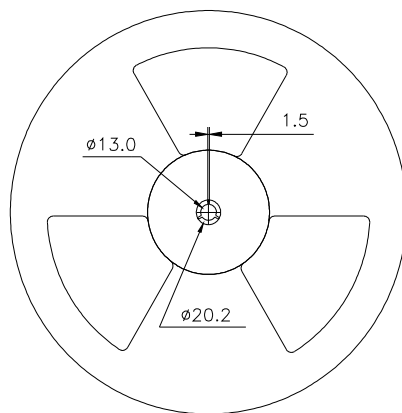
TLD

TRU

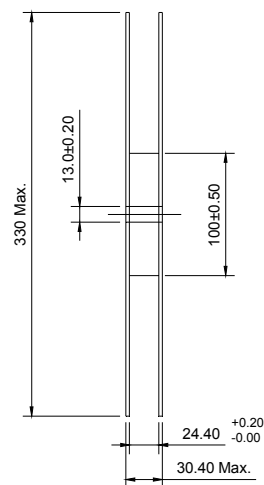


Direction of feed from reel

Direction of feed from reel



Quantity : 800pcs/reel



- **Application Notice**

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- f. Measurement equipment
- g. Consumer electronics
- h. Telecommunication

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