KTLP350 Series

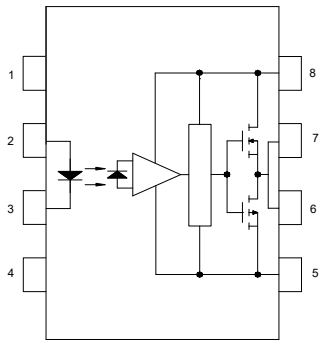
8PIN IGBT GATE DRIVE PHOTOCOUPLER

Description

The KTLP350 contain a GaAlAs light emitter diode optically coupled to an integrated circuit with a power output stage.

. KTLP350 series photo coupler is ideally suited for driving IGBT and power MOSFET used in motor control inverter application and inverter power system.

Schematic



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

Features

1. Input threshold current: I_F=5mA(max.)
2. Supply current (Icc): 3 mA (max.)
3. Supply voltage (Vcc): 10 – 30V
4. Output current (IO): ±2.5A (max.)
5. Switching time (tpLH/tpHL): 0.5μs(max.)
6. Isolation voltage: 5000Vrms(min.)
7. 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

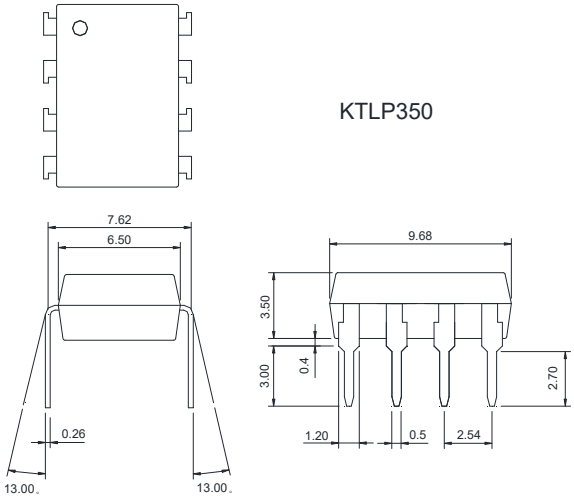
LED	OUTPUT	Q1	Q2
ON	HIGH LEVEL	ON	OFF
OFF	LOW LEVEL	OFF	ON

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

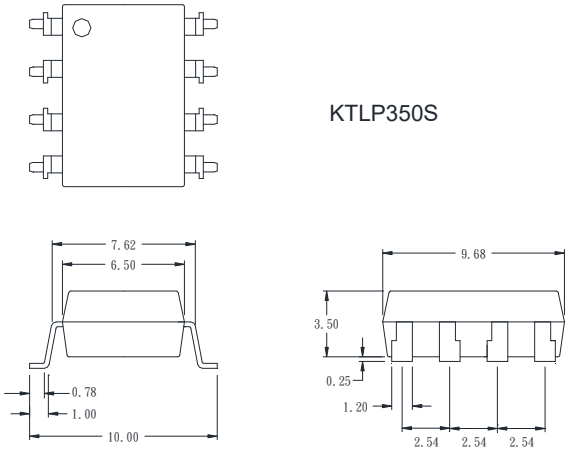
Outside Dimension

Unit : mm

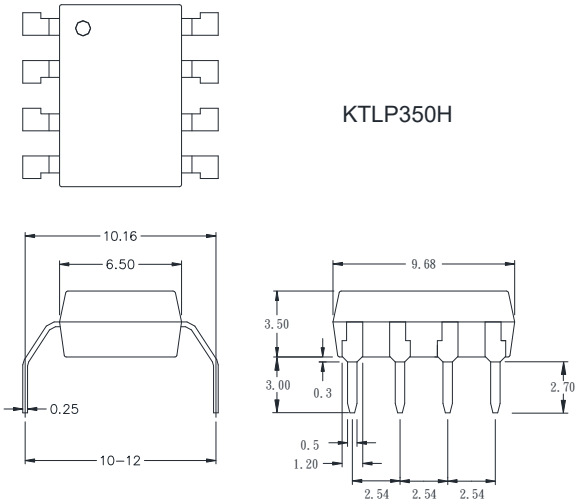
1.Dual-in-line type



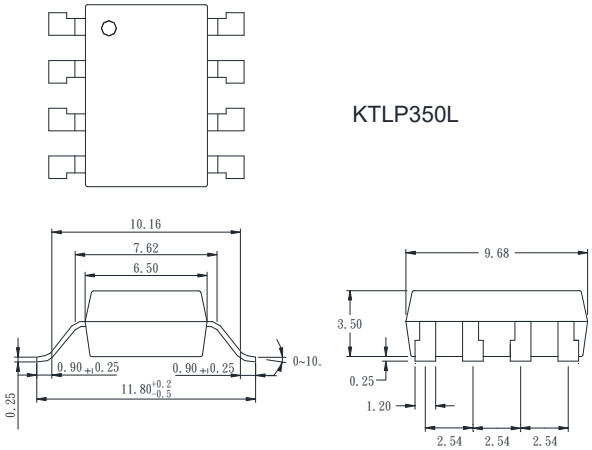
2.Surface mount type



3.Long creepage distance type

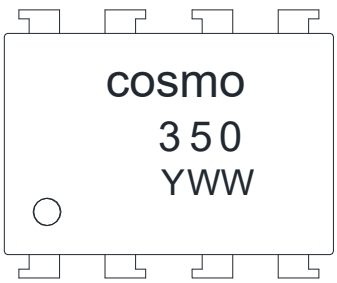


4.Long creepage distance
for surface mount type



TOLERANCE: ±0.2mm

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
	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		V_O	35	V
	Supply voltage		Vcc	35	V
	Junction temperature		T_j	125	°C
Operating frequency		(*Note 3)	f	50	KhZ
Operating temperature range			T_{opr}	-40~110	°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 ≦ 1μs,300pps.
*Note2: Exporenential waveform pulse width Pw≦0.3us,f≦15kHz.
*Note3: Exporenential waveform,IOPH ≧ -2.0A (≦0.3μs),IOPL ≦ +2.0A (≦0.3μs).
*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.

● Recommend Operation Conditions

Parameter	Symbol	Min.	Max.	Unit
Operating Temperature	T_A	-40	110	°C
Supply Voltage	V_{CC}	10	30	V
Input Current (ON)	$I_{F(ON)}$	7	16	mA
Input Voltage (OFF)	$V_{F(OFF)}$	0	0.8	V

● Electrical Characteristics

(Ta = 25℃)

Parameter		Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Input forward voltage		V_F	—	I_F=10mA,Ta=25°C	—	1.4	1.8	V
Input reverse current		I_R	—	V_R=5V,Ta=25°C	—	—	10	μA
Input capacitance		C_T	—	V=0,f=1MHz,Ta=25°C	—	45	250	pF
Output current	"H" level	I_{OPH}	3	V_{CC}=30V I_F=5mA Vb=3.5V	—	-1.6	-1.0	A
				V_{CC}=15V I_F=5mA Vb=7.0V	—	—	-2.0	

	"L" level	I_{OPL}	2	V_{CC}=30V I_F=0mA Va=2.5V	1.0	1.6	—	
				V_{CC}=15V I_F=0mA Va=7.5V	2.0	—	—	
Output voltage	"H" level	V_{OH}	4	I_F =10mA, IO=-100 mA	29.7	29.88	—	V
	"L" level	V_{OL}	5	I_F =0mA, IO=100 mA	—	0.1	0.3	
Supply current	"H" level	I_{CCH}	—	V_{CC}=30V,I_F=10mA, Ta=25°C	—	1.7	3.0	mA
	"L" level	I_{CCL}	—	V_{CC}=30V,I_F=0mA, Ta=25°C	—	2.1	3.0	
Threshold input current	"Output L→H"	I_{FLH}	—	V_{CC1}=15V, Vo>1V,Io=0mA	—	2.6	5	mA
Threshold input voltage	"Output H→L"	V_{FHL}	—	V_{CC1}=15V, Vo>1V,Io=0mA	0.8	—	—	V
Supply voltage		V_{CC}	—		10	—	30	V

*All typical values are at Ta=25°C (*A):Duration of I_O time ≦ 50μs(1 Pulse)

● Switching Characteristics

(Ta = 25°C)

Parameter		Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time	"L→H"	t_{pLH}	6	I_F=5mA (Note8) V_{CC}=30V Rg=20Ω,Cg=10nF	50	120	500	ns
	"H→L"	t_{pHL}			50	120	500	
Output rise time		t_r			—	20	—	
Output fall time		t_f			—	15	—	
Common mode transient immunity at high level output		$\|C_{MH}\|$	7	V_{CM}=1000Vp-p,I_F=5mA V_{CC}=30V,Vo(min)=26V Ta=25°C	20	—	—	KV / μs
Common mode transient immunity at low level output		$\|C_{ML}\|$	7	V_{CM}=1000Vp-p,I_F=0 V_{CC}=30V, Vo(max)=1V Ta=25°C	20	—	—	KV / μs

*All typical values are at Ta=25°C.

*Note 8: Input signal rise time (fall time) < 0.5μs.

TYPICAL PERFORMANCE CURVES & TEST CIRCUITS

Fig.1 High output rail voltage vs. Temperature

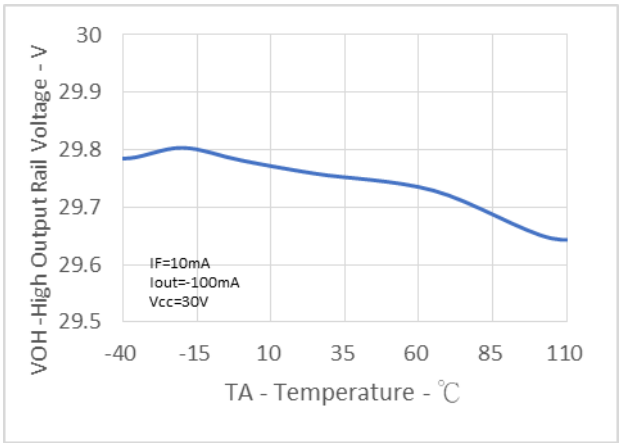


Fig.2 V_{OH} vs. Temperature

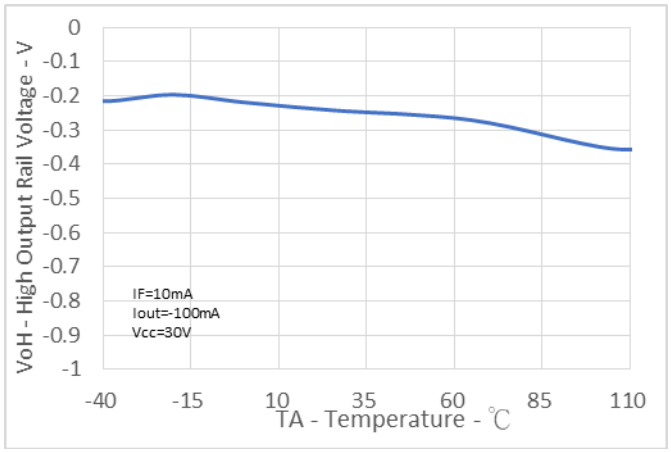


Fig.3 VOL vs. Temperature

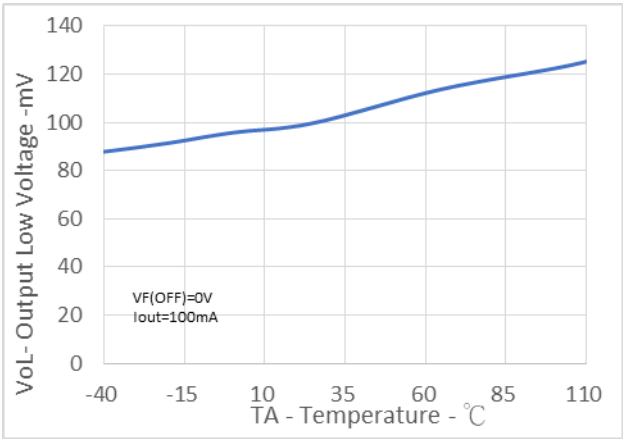


Fig.4 ICC vs. Temperature

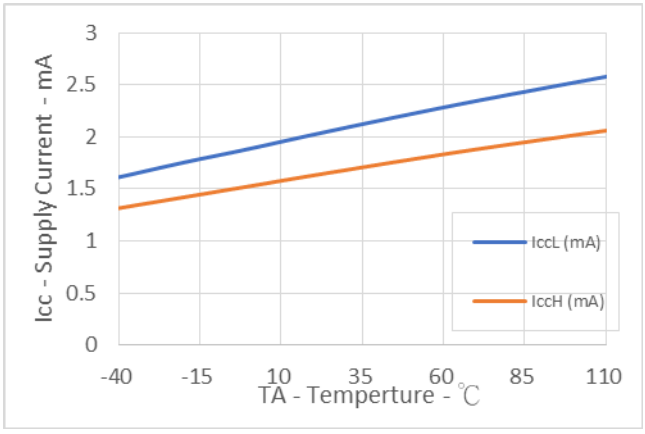


Fig.5 ICC vs. VCC

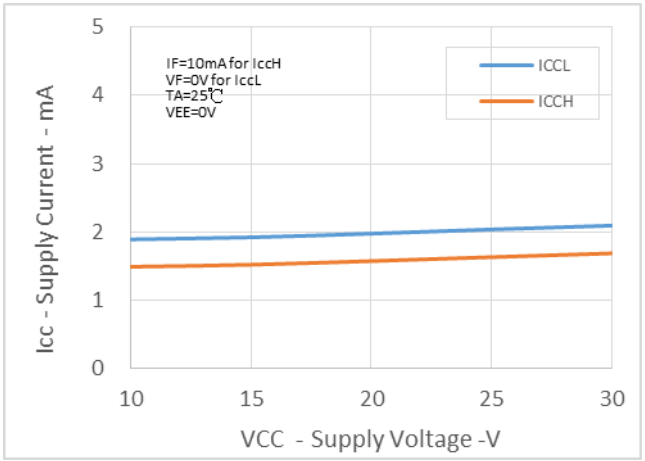


Fig. 6 IFLH Hysteresis

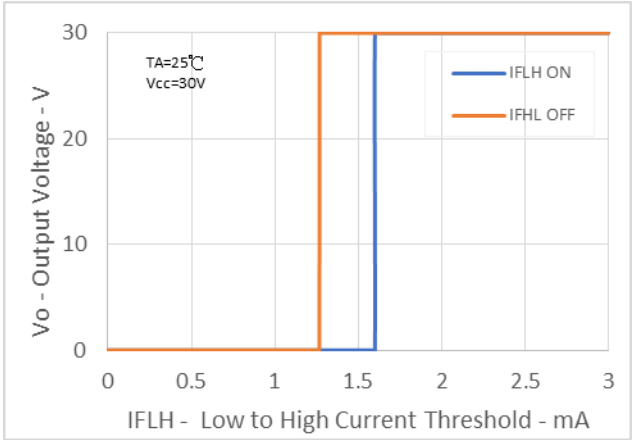


Fig.7 IFLH vs. Temperature

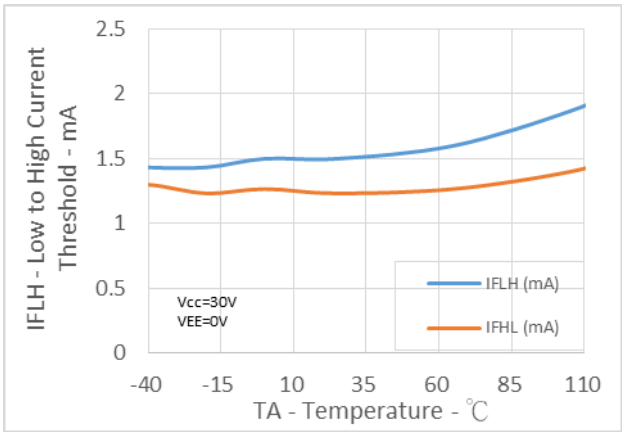


Fig.8 Propagation Delays vs. VCC

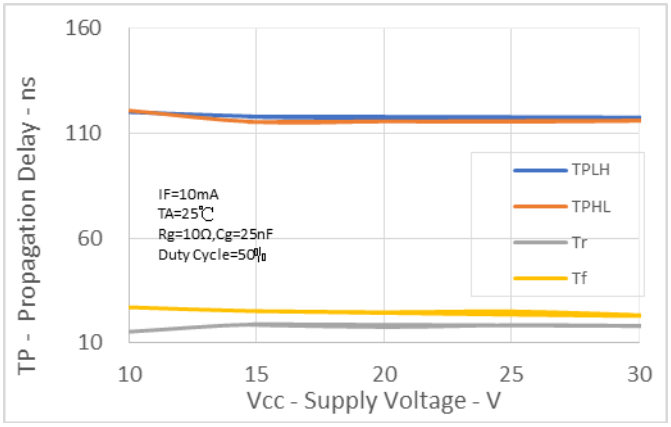


Fig.9 Propagation Delays vs. IF

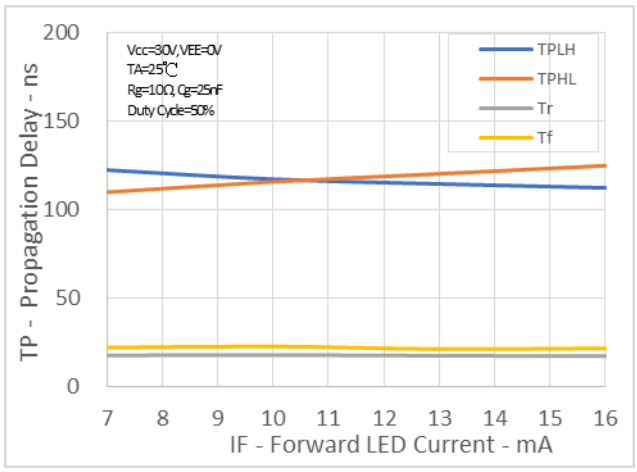


Fig.10 Propagation Delays vs. Temperature

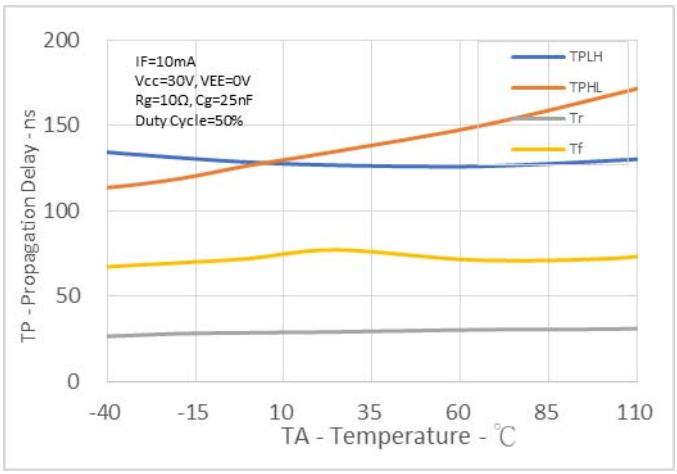


Fig.11 Propagation Delay vs Rg

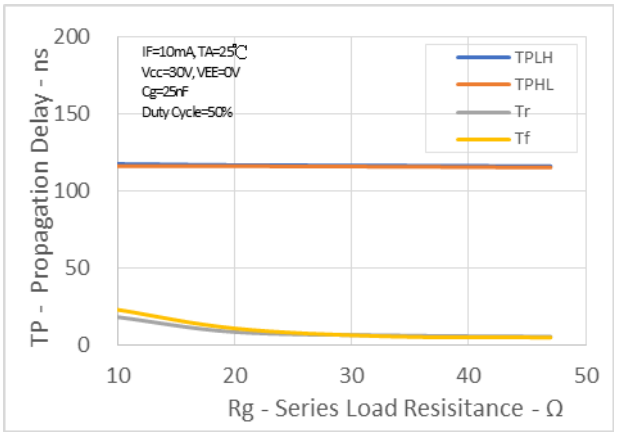


Fig. 12 Propagation Delay vs. Cg

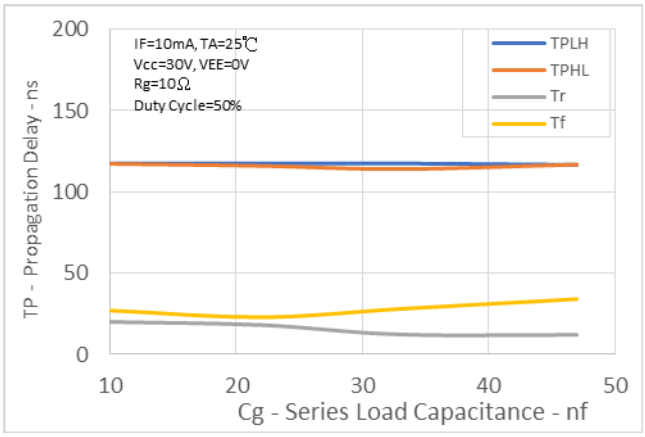
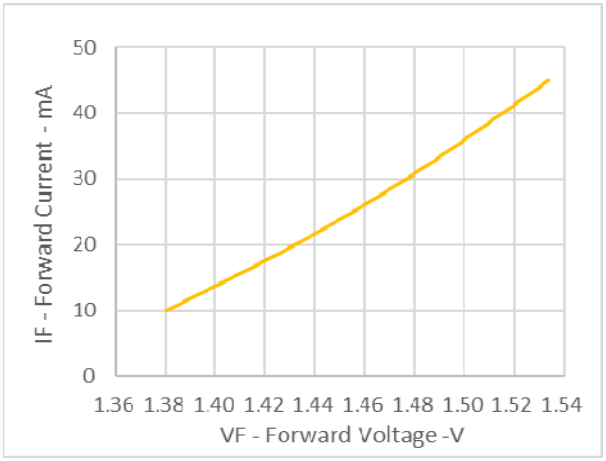
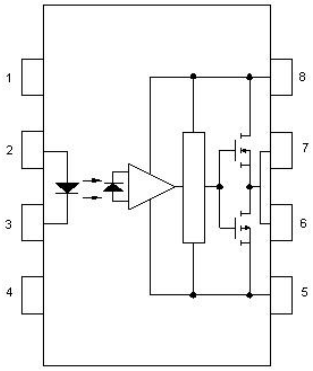


Fig.13 Input Current vs. Forward Voltage

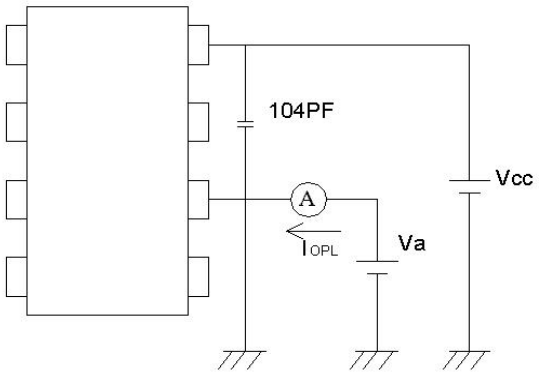


● Test Circuit

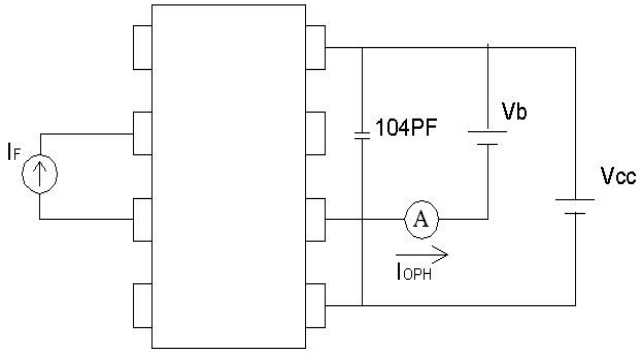
1. Top View



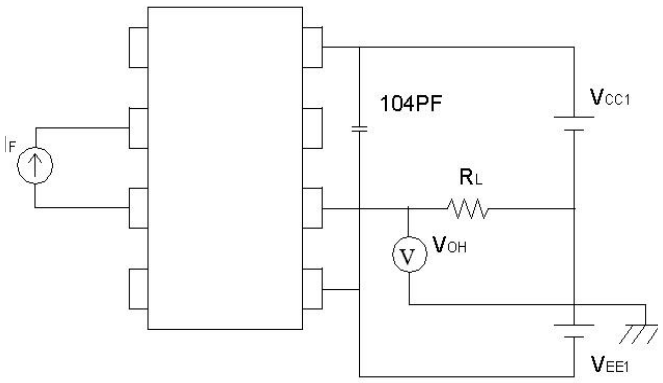
2. I_{OPL} Measure



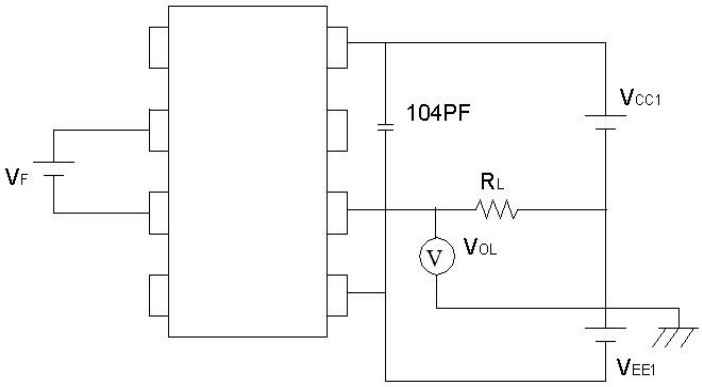
3. I_{OPH} Measure



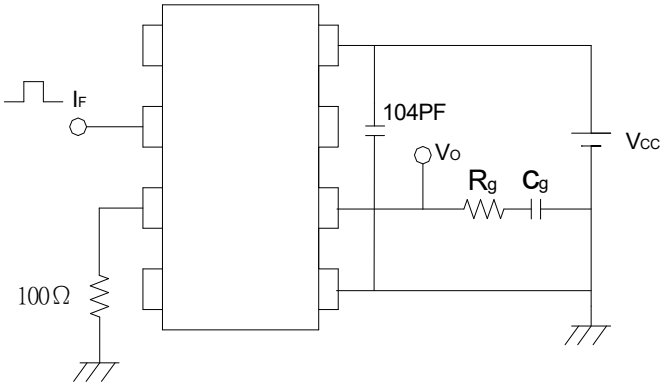
4. V_{OH} Measure

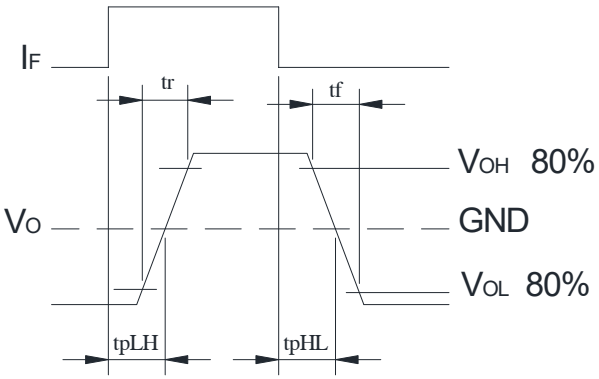


5. V_{OL} Measure

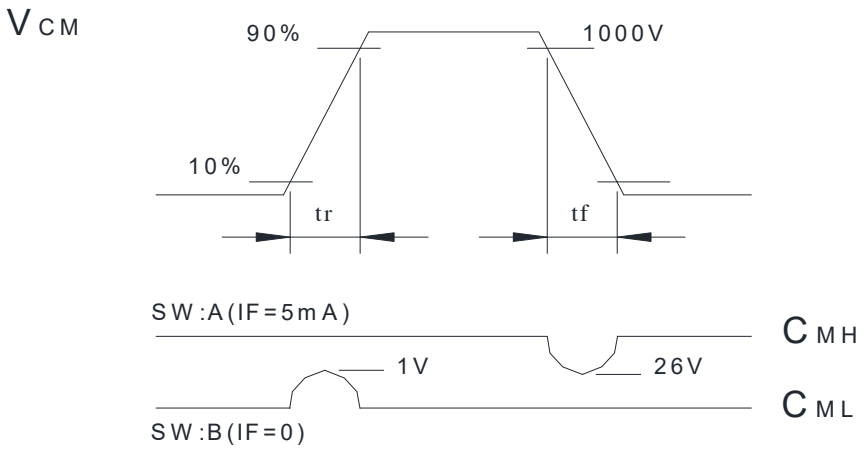


6. tp_{LH}, tp_{HL}, t_r, t_f,Measure





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



$$C_{ML}=\frac{1000(v)}{t_r(\mu s)} \quad ; \quad C_{MH}=\frac{1000(v)}{t_f(\mu s)}$$

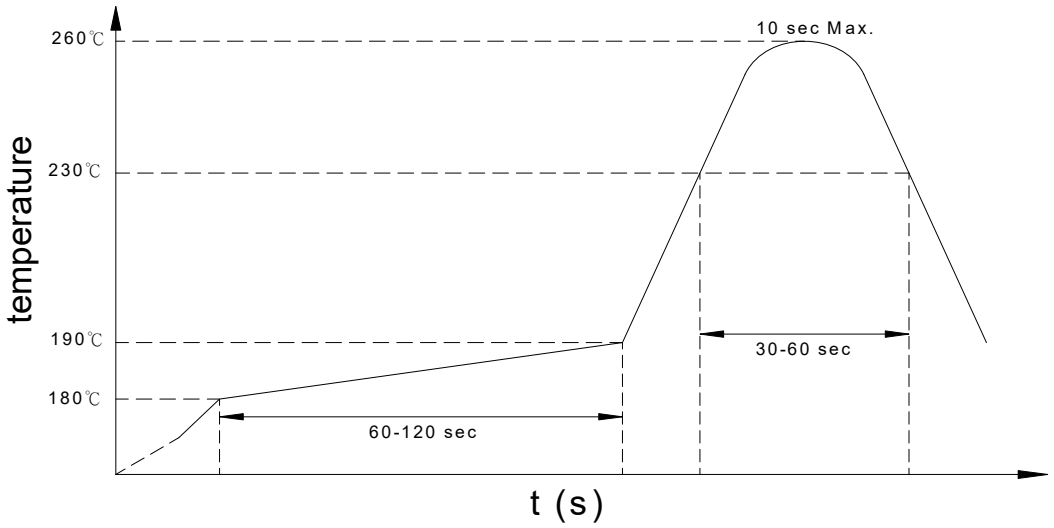
*C_{ML}(C_{MH}) is the maximum rate of rise (fall) of the common mode voltage that can be sustained with the output voltage in the low (high) state.

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)

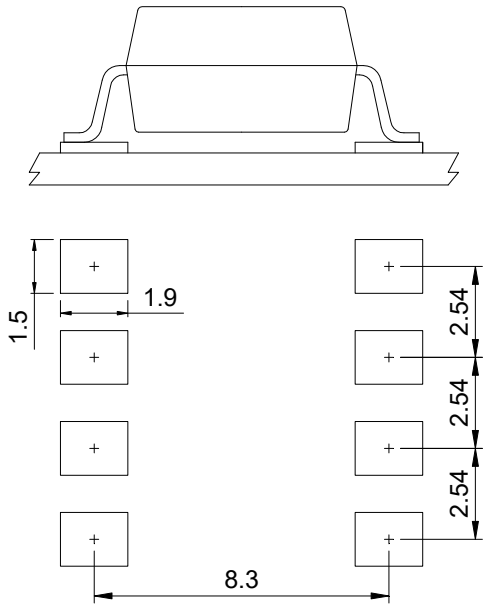
Y = Tape and reel option (TL、TR)

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

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

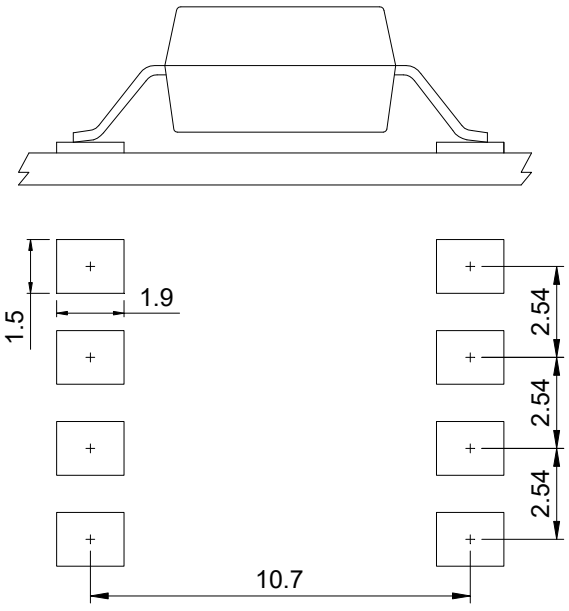
1.Surface mount type

8-pin SMD



2.Long creepage distance for surface mount type

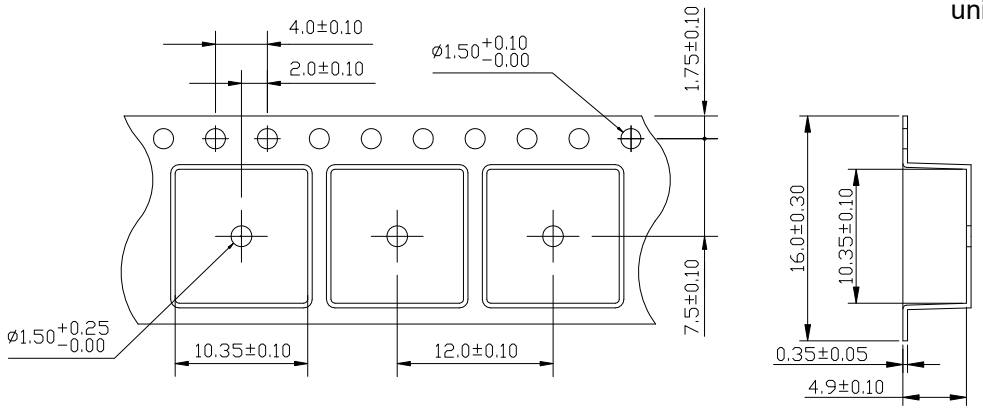
8-pin L



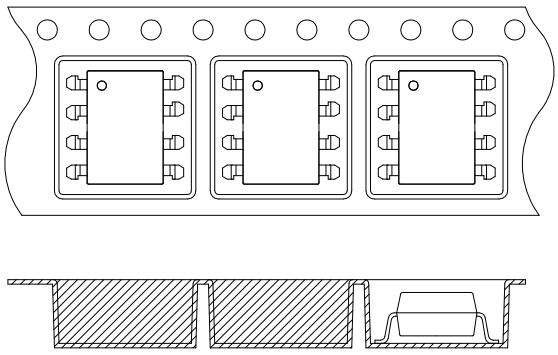
Unit :mm

● 8-pin SMD Carrier Tape & Reel

unit：mm

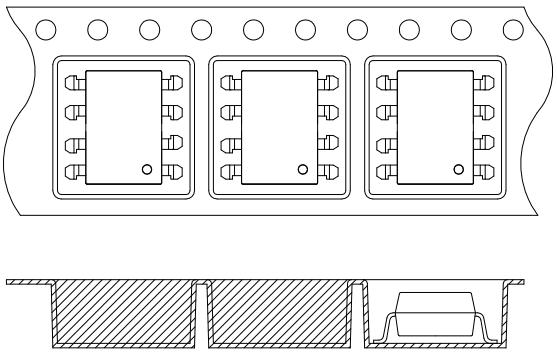


TL

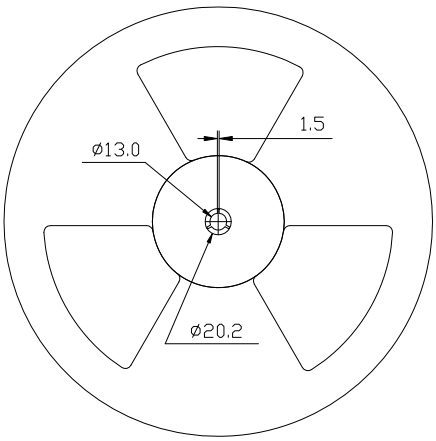


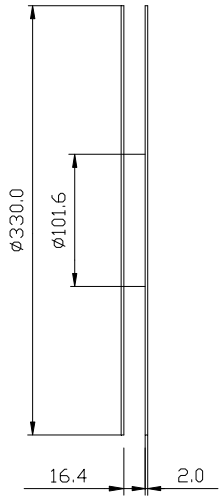
Direction of feed from reel

TR



Direction of feed from reel





Quantity：1000pcs/reel

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