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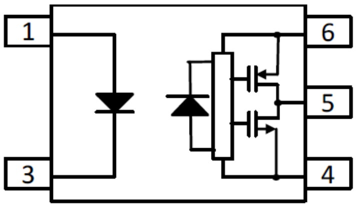
KPC315 Series
5PIN IGBT GATE DRIVE PHOTOCOUPLER

● Description

The KPC315 series consists of an infrared light emitter diode and an integrated circuit with a power output stage.

This unit is SOP 5pin package. KPC315 series is suitable for gate driving circuit of IGBT or power MOSFET.

● Schematic



1. Anode
3. Cathode
4. GND
5. Vo (Voltage Output)
6. Vcc

● Features

1. Input threshold current: I_F=5mA
2. Supply current (Icc): 3 mA (max.)
3. Supply voltage (Vcc): 10 – 30V
4. Output current (IO): 1.0A (max.)
5. Switching time (tpLH/tpHL): 0.5μs(max.)
6. Isolation voltage: 3750Vrms(min.)
7. Safety Approvals:

   CQC GB4943.1-2022

● Applications

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

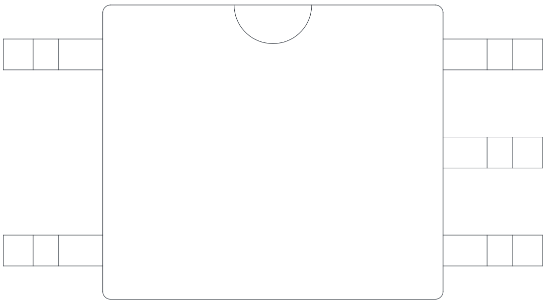
● Truth Table

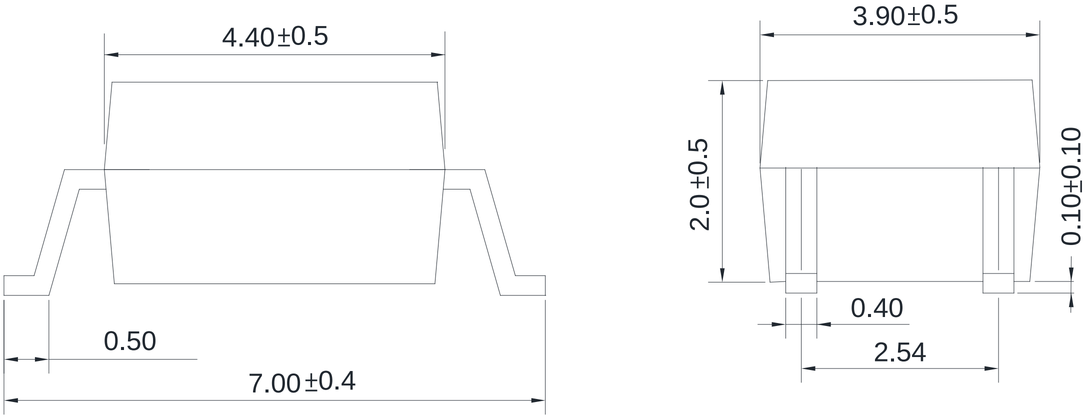
LED	OUTPUT	Q1	Q2
ON	HIGH LEVEL	ON	OFF
OFF	LOW LEVEL	OFF	ON

∗The use of a 0.1μF bypass capacitor must be connected between pins 4 and 6 is recommended.

● Outside Dimension

Unit : mm





TOLERANCE: ±0.2mm

● Device Marking

Notes:

Cosmo
315
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}	-1	A
	"L"Peak output current (*Note 2)	I_{OPL}	+1	A
	Output voltage	V_O	30	V
	Supply voltage	Vcc	30	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	3750	Vrms

*Note1: Pulse width Pw ≦ 1 ㎲,300pps.
*Note2: Exporenential waveform pulse width Pw≦2us,f≦10kHz, Vcc=20V.
*Note3: Exporenential waveform,IOPH ≧ -2.0A (≦0.3 ㎲),IOPL ≦ +2.0A (≦0.3 ㎲).
*Note4: It is 2 mm or more from a lead root.
*Note5: Device is considered as a two terminal device: Pin1 and 3 shorted together, and pins 4, 5 and 6shorted 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 Condition	Min.	Typ.	Max.	Unit
Input forward voltage		V_F	I_F=10mA	**1.0**	1.4	1.8	V
Temperature coefficient of forward voltage		$\triangle V_F/\triangle Ta$	I_F=10mA	—	-1.4	—	mV/°C
Input reverse current		I_R	V_R=5V	—	—	10	μA
Input capacitance		C_T	V=0,f=1MHz	—	45	250	pF
Output current*	"H" level	I_{OH}	V_{CC}=30V I_F=5mA Vo=Vcc-1	—		-0.3	A
			V_{CC}=30V I_F=5mA Vo=Vcc-4	—	—	-1.0	
	"L" level	I_{OL}	V_{CC}=30V I_F=0mA Vo=Vcc+1	0.3		—	
			V_{CC}=30V I_F=0mA Vo=Vcc+4	1.0	—	—	
Output voltage	"H" level	V_{OH}	I_F =10mA, IO=-100 mA	VCC-0.3	Vcc-0.1	—	V
	"L" level	V_{OL}	I_F =0mA, IO=100 mA	—	0.3	1.0	
Supply current	"H" level	I_{CCH}	V_{CC}=30V,I_F=10mA	—	1.7	3.0	mA
	"L" level	I_{CCL}	V_{CC}=30V,I_F=0mA	—	2.1	3.0	
Threshold input current	"Output L→H"	I_{FLH}	V_{CC}=15V, Vo>1V	—	2.6	5	mA
Threshold input voltage	"Output H→L"	V_{FHL}	V_{CC}=15V, Vo>1V	0.8	—	—	V
Under voltage lockout threshold		V_{UVLO+}	I_F =10mA ,V_O>5V	6.9	7.8	8.7	V
		V_{UVLO-}	I_F =10mA ,V_O<5V	5.9	6.7	7.5	
Under voltage lockout threshold hysteresis		$UVLO_{HYS}$		—	1.1	—	V
Supply voltage		Vcc		10	—	30	V

*Maximum pulse width= 10us, maximum duty cycle =1.1%.

Switching Characteristics

(Ta = 25°C)

Parameter		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time	"L→H"	t_{pLH}	I_F=5mA V_{CC}=30V Rg=20Ω,Cg=10nF	50	130	500	ns
	"H→L"	t_{pHL}		50	110	500	
Output rise time		t_r		—	8	—	
Output fall time		t_f		—	5	—	
Common mode transient immunity at high level output		$\|C_{MH}\|$	V_{CM}=1000Vp-p,I_F=5mA V_{CC}=30V,Vo(min)=26V	20	—	—	KV/μs
Common mode transient immunity at low level output		$\|C_{ML}\|$	V_{CM}=1000Vp-p,I_F=0 V_{CC}=30V, Vo(max)=1V	20	—	—	KV/μs

TYPICAL PERFORMANCE CURVES & TEST CIRCUITS

Fig.1 High output rail voltage vs. Temperature

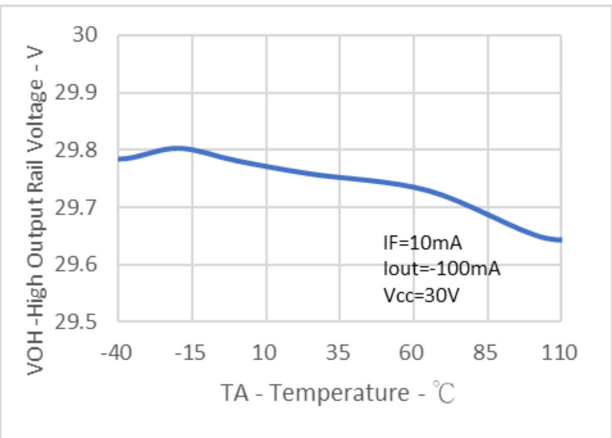


Fig.2 V_{OH} vs. Temperature

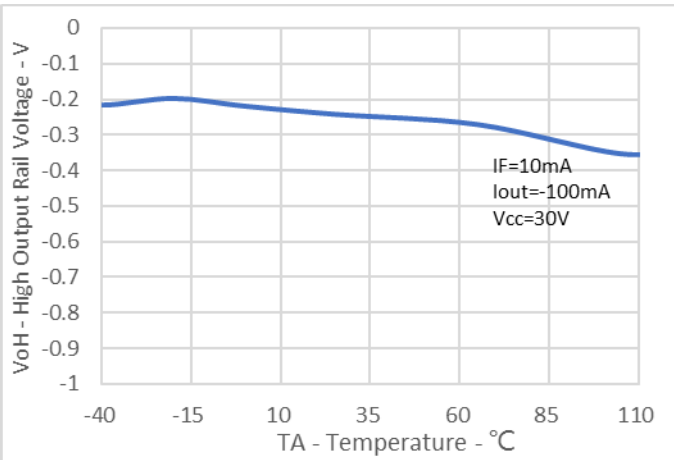


Fig.3 VOL vs. Temperature

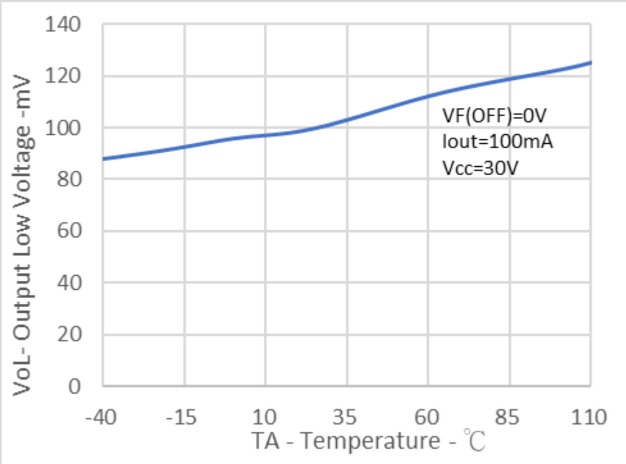


Fig.4 ICC vs. Temperature

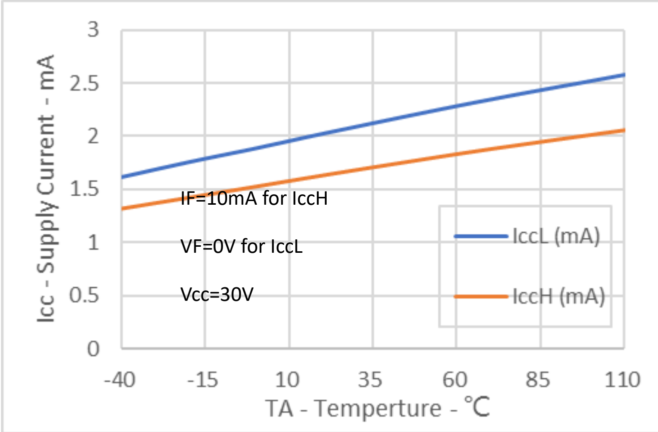


Fig.5 ICC vs. VCC

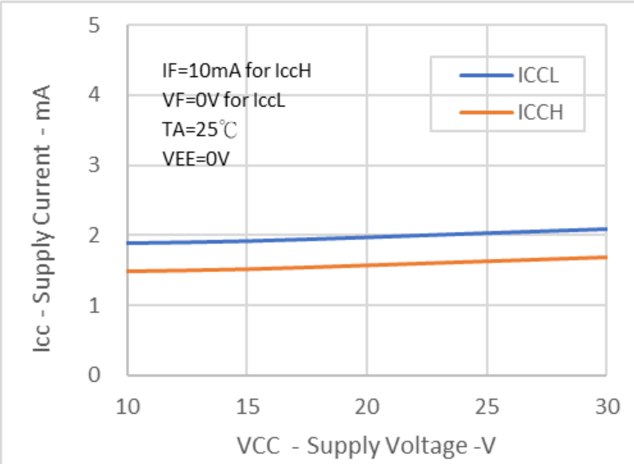


Fig. 6 IFLH Hysteresis

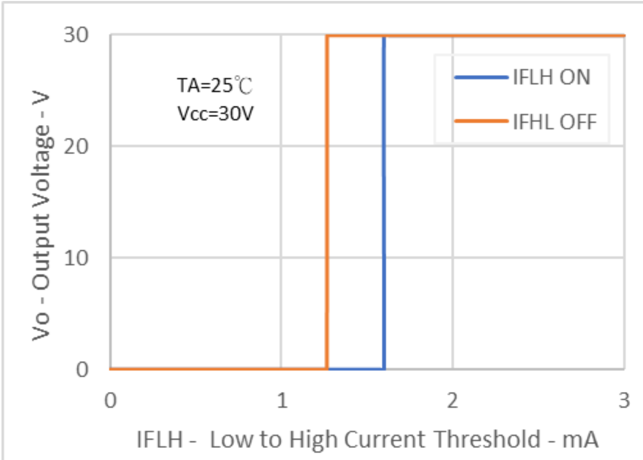


Fig.7 IFLH vs. Temperature

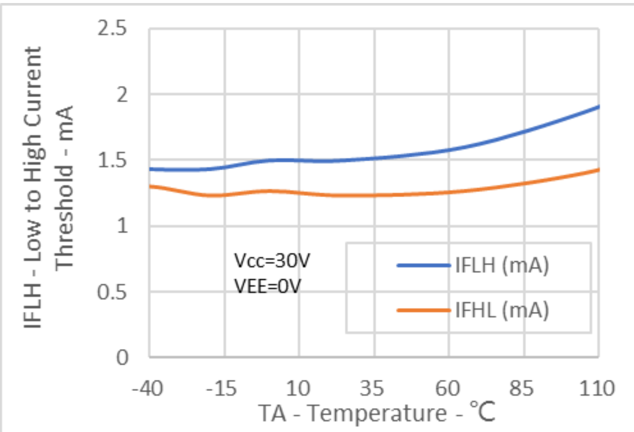


Fig.8 Propagation Delays vs. VCC

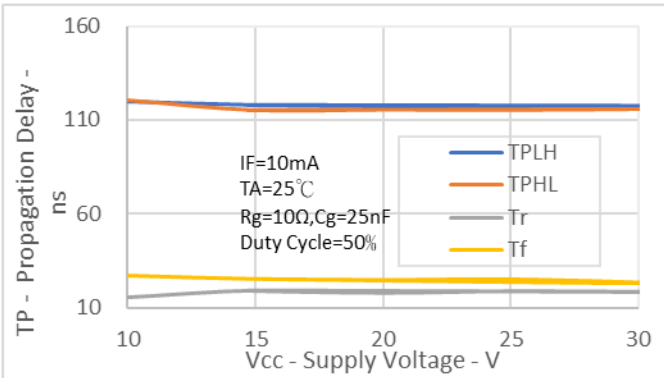


Fig.9 Propagation Delays vs. IF

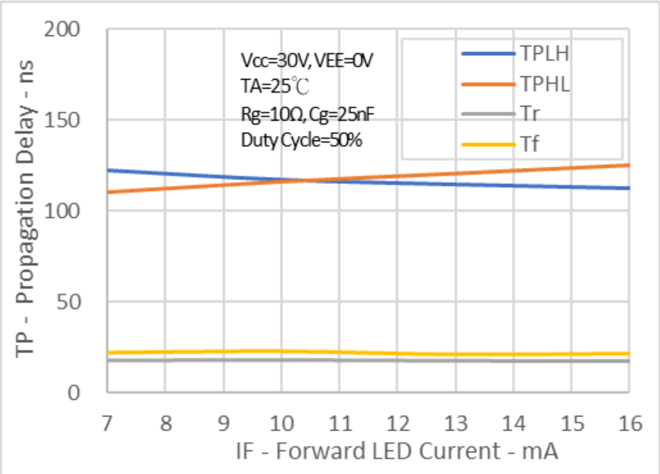


Fig.10 Propagation Delays vs. Temperature

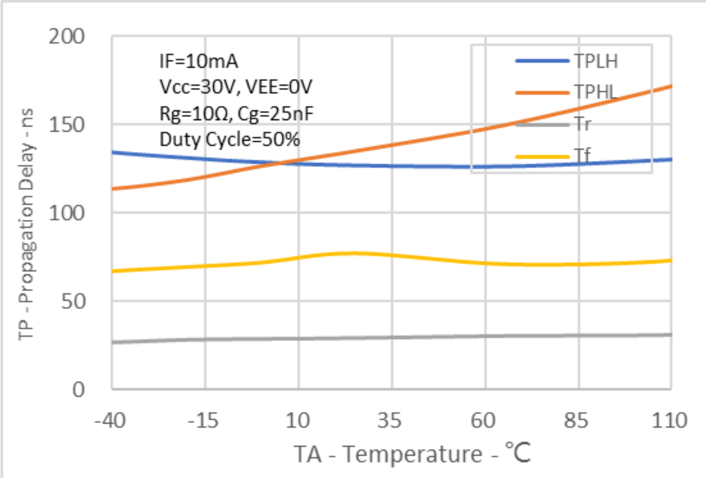


Fig.11 Propagation Delay vs Rg

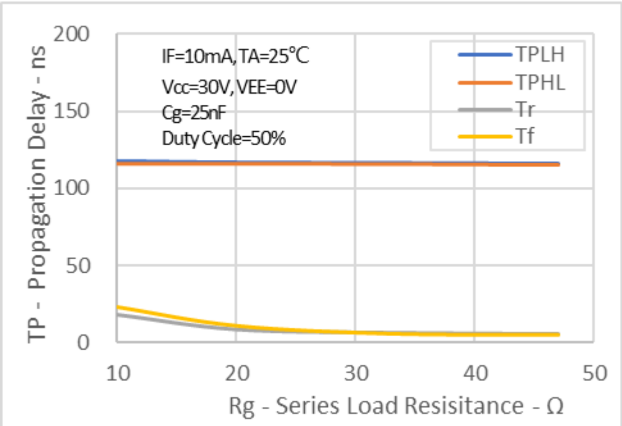


Fig. 12 Propagation Delay vs. Cg

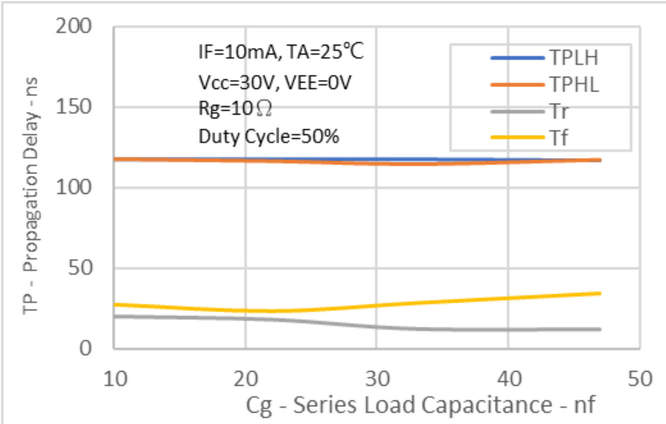
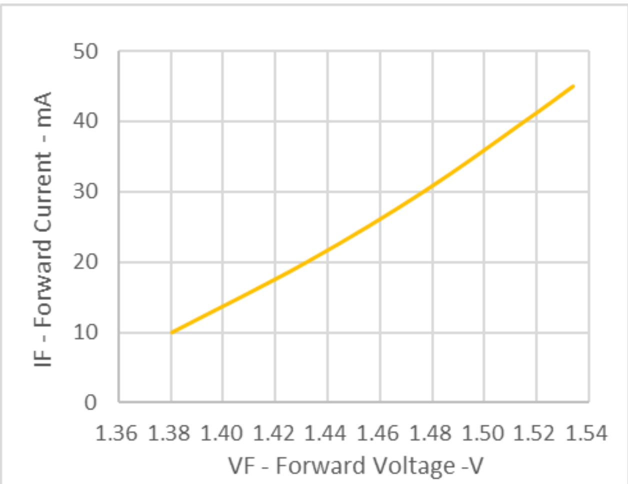
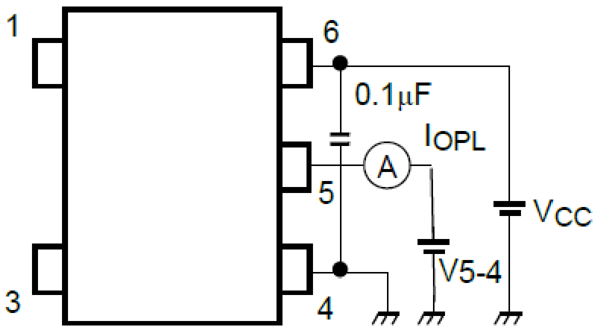


Fig.13 Input Current vs. Forward Voltage

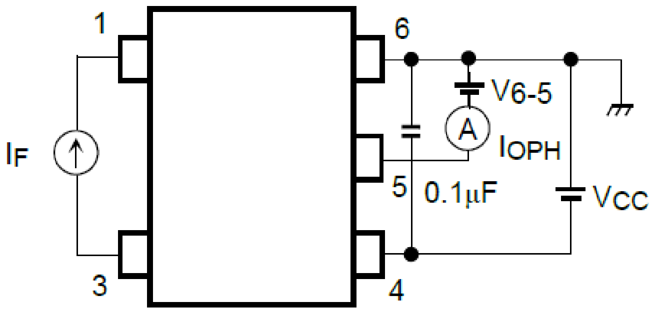


Test Circuit

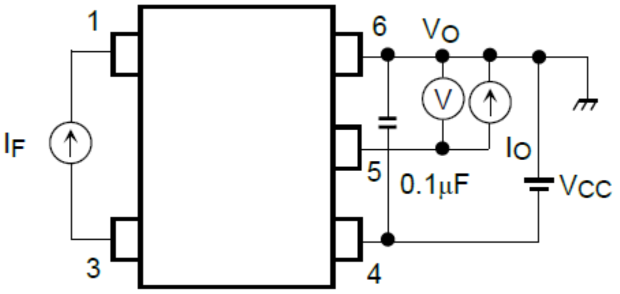
1. I_{OPL} Measure



2. I_{OPH} Measure

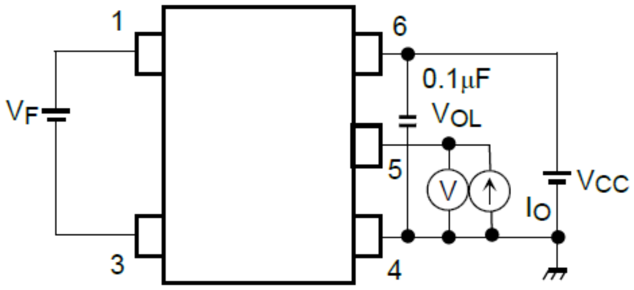


3. V_{OH} Measure

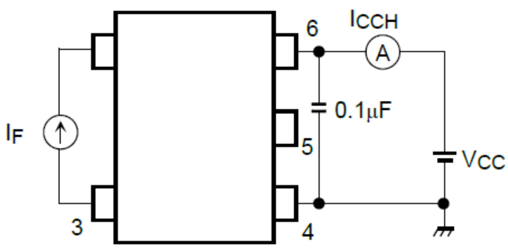


*$V_{OH} = V_{CC} - V_O$

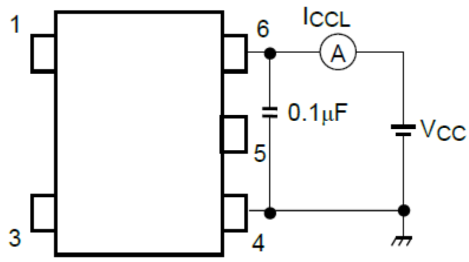
4. V_{OL} Measure



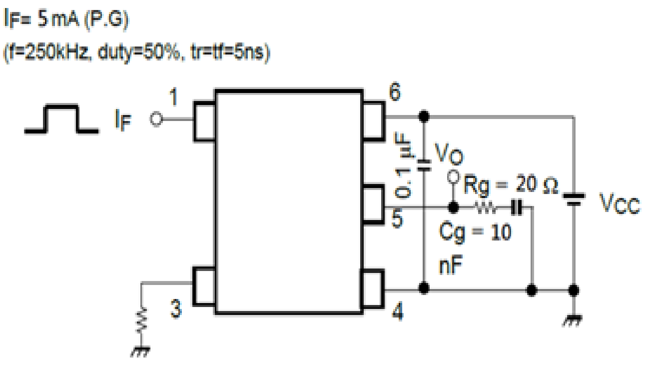
5. I_{CCH} Measure

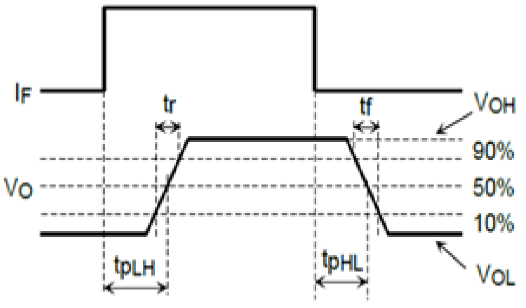


6. I_{CCH} Measure

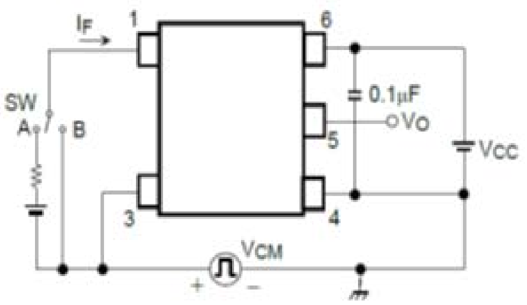


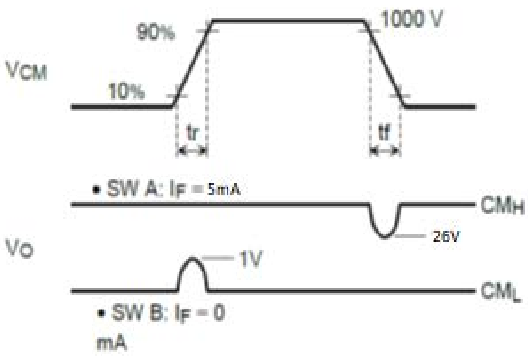
7. tp_{LH}, tp_{HL}, t_r, t_f Measure





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





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

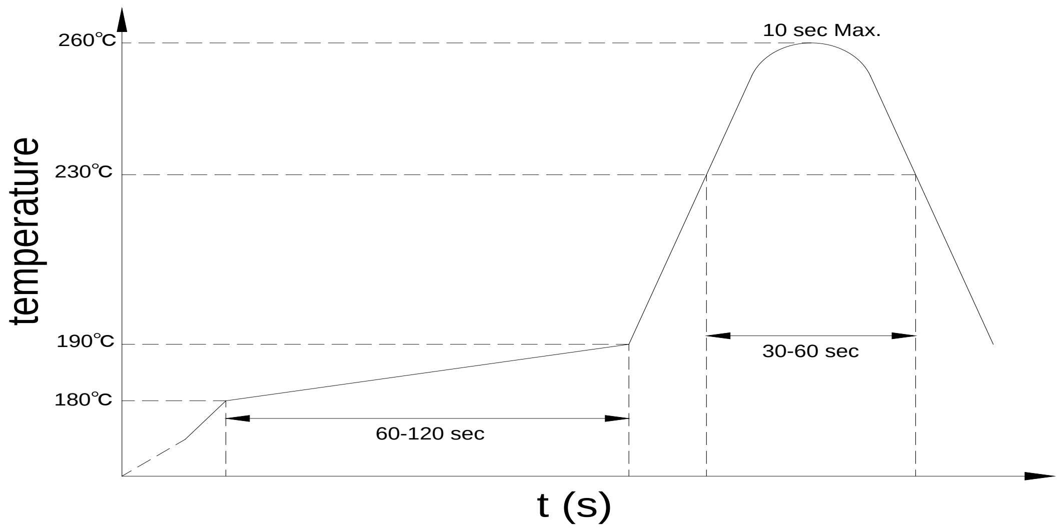
*C_{ML}(C_{MH}) is the maximum rate of rise (fall) of the common mode voltage that can be sustained with the output voltage in the low (high) state.

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

KPC315 (Y)

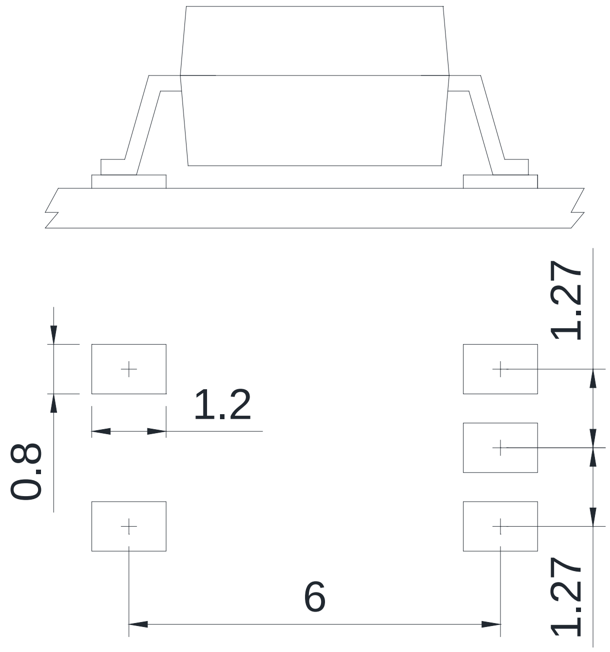
Notes:

KPC315 = Part No.

Y = Tape and reel option (TLD、TRU)

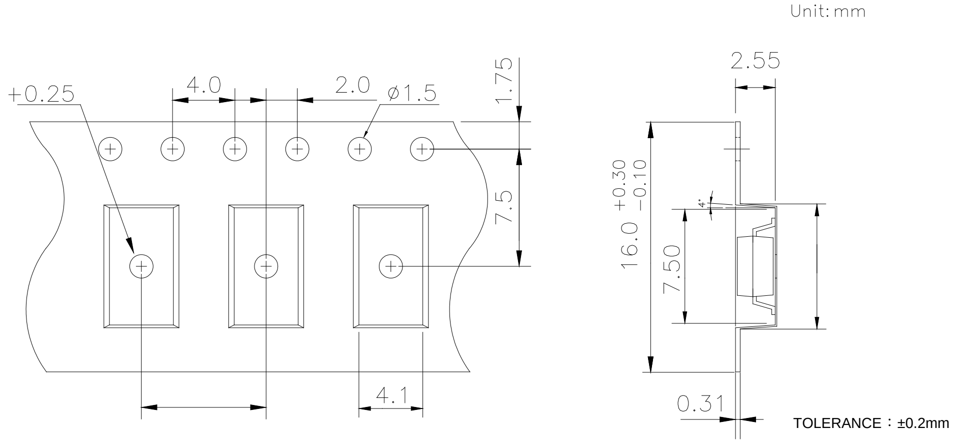
Option	Description	Packing quantity
(TLD)	surface mount type package + TL tape & reel option	3000 units per reel
(TRU)	surface mount type package + TR tape & reel option	3000 units per reel

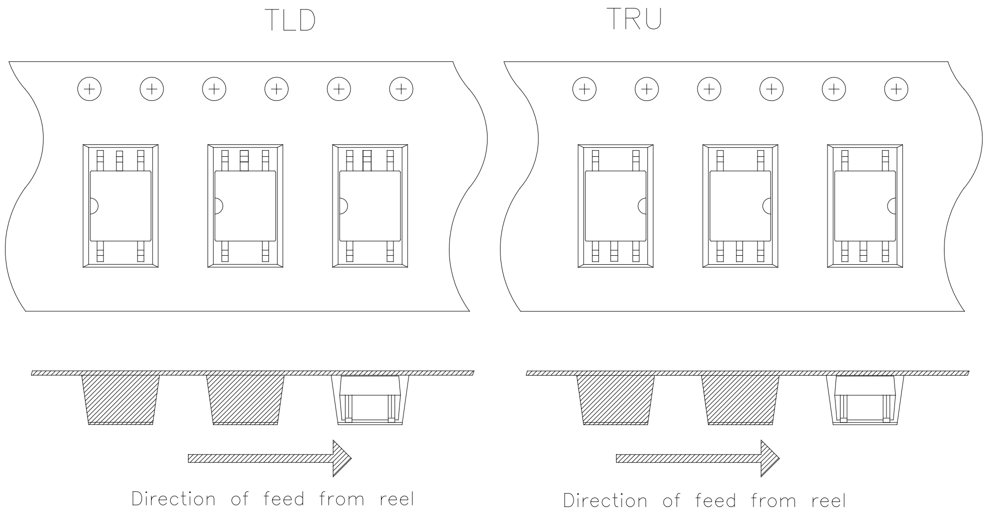
● Recommended Pad Layout for Surface Mount Lead Form

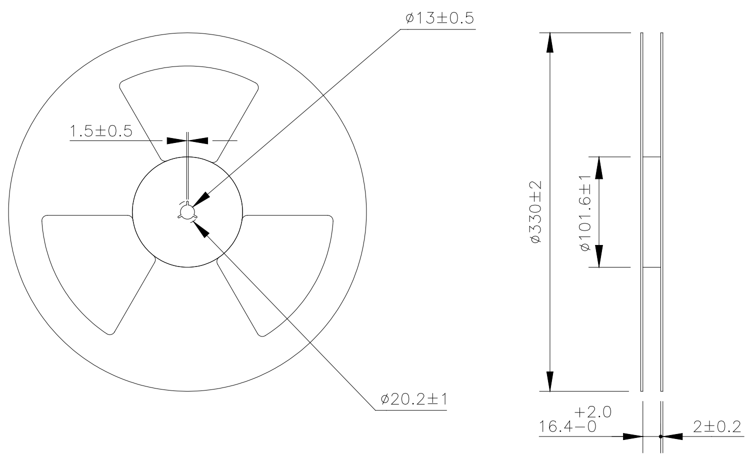


Unit :mm

- **SOP Carrier Tape & Reel**







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