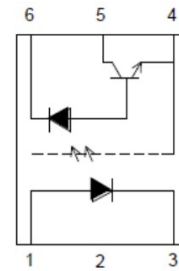


● Description

The KT050L series consists of a high efficient AlGaAs Light Emitting Diode and a high speed optical detector. This design provides excellent AC and DC isolation between the input and output sides of the photo coupler. The output of the optical detector features an open collector Schottky clamped transistor. The internal shield ensures high common mode transient immunity. A guaranteed common mode transient immunity is up to 15KV/ μ s (min.). The photo coupler operational parameters are guaranteed over the temperature range from -55°C ~ +110°C.

● Schematic



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

● Features

1. High speed – 1MBd typical
2. Package creepage at 8mm
3. Compatible with infrared vapor phase reflow and wave soldering process
4. Very high common mode transient immunity:
15K V/ μ s at VCM = 1500 V
5. Guarantee performance from temperature range: -55°C to 110°C
6. TTL compatible
7. Open collector output

● Applications

- Digital signal isolation
- Communications interface
- Micro-controller interface
- Feedback elements in switching power supplies
- Digital isolation for A/D, D/A conversion Digital field

● Truth Table

LED	OUT
ON	L
OFF	H

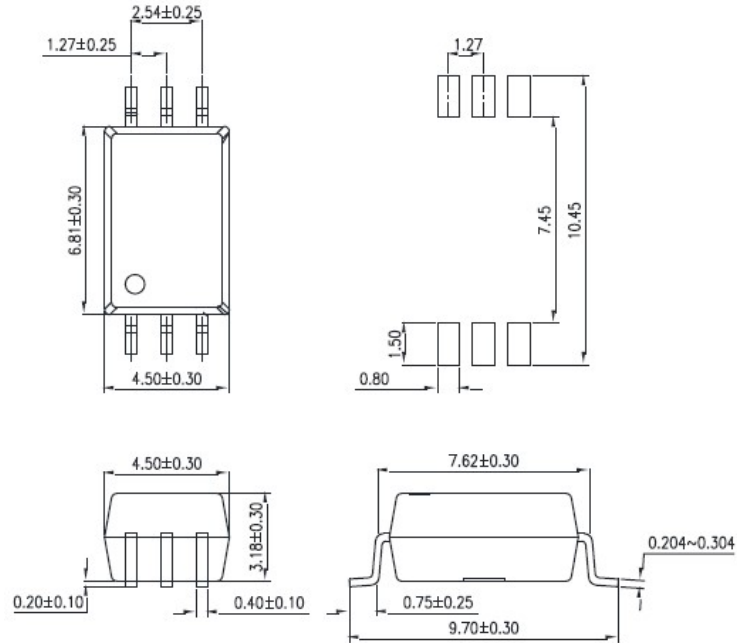
Note: A 0.1 μ F bypass capacitor must be connected between Pin 4 and 6.

● **Outside Dimension**

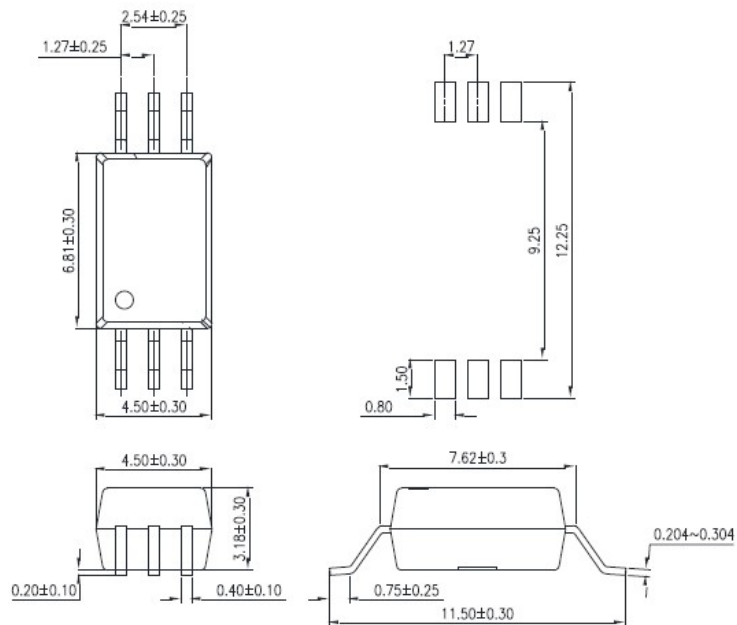
Surface Mount Lead Forming

1. P Type

Unit : mm



2. W Type



● **Device Marking**



Notes:

COSMO
050L
YWW

Y: Year code / WW: Week code
 V or None : VDE option

● **Absolute Maximum Ratings**

(Ta = 25°C)

Parameter		Symbol	Rating	Unit
Input	Forward current	I _F	20	mA
	Reverse voltage	V _R	5	V
Output	Output current	I _O	8	mA
	Output voltage	V _O	20	V
	Peak Output Current	I _o	16	mA
	Supply Voltage	V _{CC}	30	V
Junction temperature		T _j	125	°C
Storage Temperature		T _{stg}	125	°C
Operating Temperature		T _{opr}	110	°C
Total Package Power Dissipation		P _T	145	mW
Lead soldering temperature(10s) (Note 2)		T _{sol}	260	°C
Isolation voltage (AC,1min.,R.H≤60%) (Note 3)		BVs	5000	V _{rms}

Note 1: Pulse width Pw ≤ 1μs,300pps.

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

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

● Electrical Characteristics

(Ta = 25°C)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input Forward Voltage	V _F	I _F = 16mA, T _A = 25 °C	1.2	1.4	1.8	V
Input Reverse Voltage	BV _R	I _R = 10μA	5	-	-	V
Logic high supply current	I _{CCH}	I _F = 0mA, V _O = open ; T _A = 25°C (V _{CC} = 30V)	-	0.002	1	μA
Logic low supply current	I _{CCL}	I _F = 16mA, V _O = open (V _{CC} = 30V)	-	165	-	μA
Logic high output current	I _{OH}	I _F = 0mA, V _O = V _{CC} = 5.5V, T _A = 25°C	-	0.002	0.5	μA
		I _F = 0mA, V _O = V _{CC} = 15V T _A = 25°C	-	0.005	1	μA
		T _A = 0 ~ 70°C	-	-	50	μA
Logic low output voltage output voltage	V _{OL}	I _F = 16mA; V _{CC} = 4.5V; I _O = 3.0mA; T _A = 25°C	-	0.2	0.4	V
		I _F = 16mA; V _{CC} = 4.5V; I _O = 2.4mA; T _A = 25°C	-	-	0.5	V
Current transfer ratio	CTR	I _F = 16mA; V _{CC} = 4.5V; T _A = 25 °C; V _O = 0.4V	20	32	-	%
		I _F = 16mA; V _{CC} = 4.5V; T _A = 25°C; V _O = 0.5V	15	33	-	

Specified over recommended temperature (TA = -40°C to +110°C, +4.5V ≤ VCC ≤ 30V), IF(ON) = 1.6mA to 5mA, VF(OFF) = 0V to 0.8V, unless otherwise specified. All typicals at TA = 25°C.

Note 1: Duration of output short circuit time should not exceed 10 μs.

Note 2: Input capacitance is measured between pin 1 and pin 3.

● Switching Characteristics

(Ta = 25°C)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Propagation Delay Time to Output Low Level	t_{PHL}	VCC = 5V, IF = 7.5 mA, RL = 350Ω, CL = 15 pF	-	35	75	ns
Propagation Delay Time to Output High Level	t_{PLH}		-	60	75	
Pulse Width Distortion	PWD		-	25	40	
Rise Time	t_r		-	30	-	
Fall Time	t_f		-	3	-	
Common mode transient immunity at high level output	$ C_{MH} $	VCC = 5V, IF = 0 mA, VO(MIN) = 2V, RL = 350Ω, VCM = 1000V	10	15	-	KV / μs
Common mode transient immunity at low level output	$ C_{ML} $	VCC = 5V, IF = 7.5 mA, VO(MAX) = 0.8V, RL = 350Ω, VCM = 1000V	10	15	-	KV / μs

Over recommended operating conditions TA = -40° C to 105° C, VCC = +4.5 V to 30 V, IF(ON) = 1.6 mA to 5 mA, VF(OFF) = 0 V to 0.8 V, unless otherwise specified. All typicals at TA = 25°C.

Note 1: The tPLH propagation delay is measured from the 50% point on the leading edge of the input pulse to the 1.3 V point on the leading edge of the output pulse. The tPHL propagation delay is measured from the 50% point on the trailing edge of the input pulse to the 1.3 V point on the trailing edge of the output pulse.

Note 2: Pulse Width Distortion (PWD) is defined as $|t_{PHL} - t_{PLH}|$ for any given device.

Note 3: The difference of tPLH and tPHL between any two devices under the same test condition.

Note 4: CMH is the maximum slew rate of the common mode voltage that can be sustained with the output voltage in the logic high state, VO > 2.0 V. CML is the maximum slew rate of the common mode voltage that can be sustained with the output voltage in the logic low state, VO < 0.8 V. Note: Equal value split resistors (Rin/2) must be used at both ends of the LED.

TYPICAL PERFORMANCE CURVES & TEST CIRCUITS

Fig.1 DC and Pulsed Transfer Characteristics

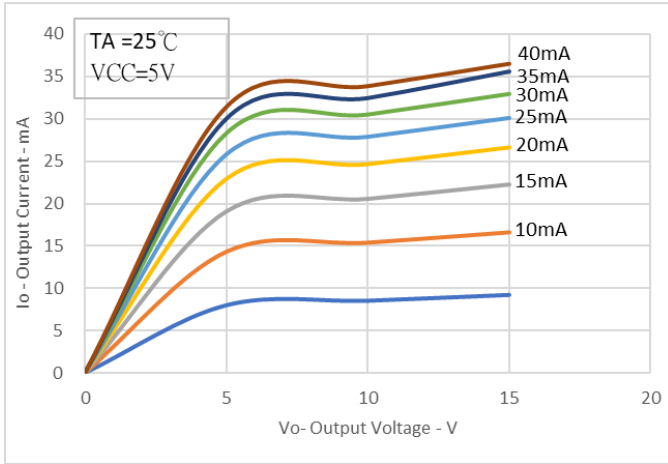


Fig.2 Input Current vs. Forward Voltage

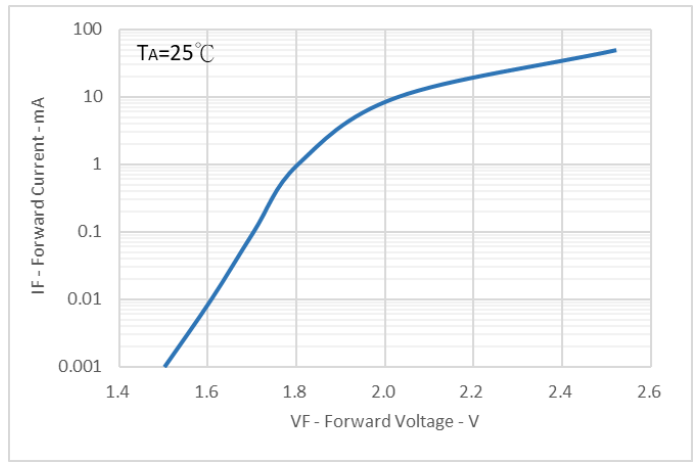


Fig.3 Propagation Delay vs. Load Resistance **Fig.4 Current Transfer Ratio vs. Input Current**

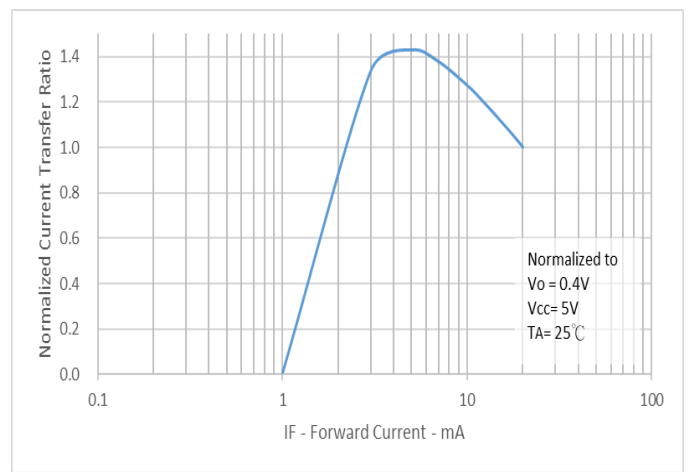
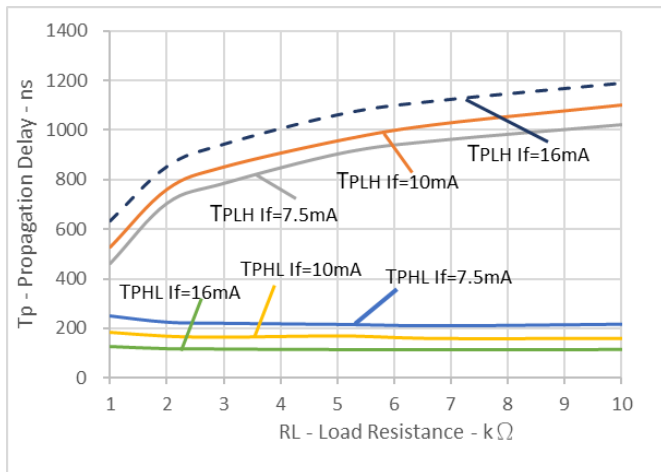


Fig.5 Current Transfer Ratio vs. Temperature

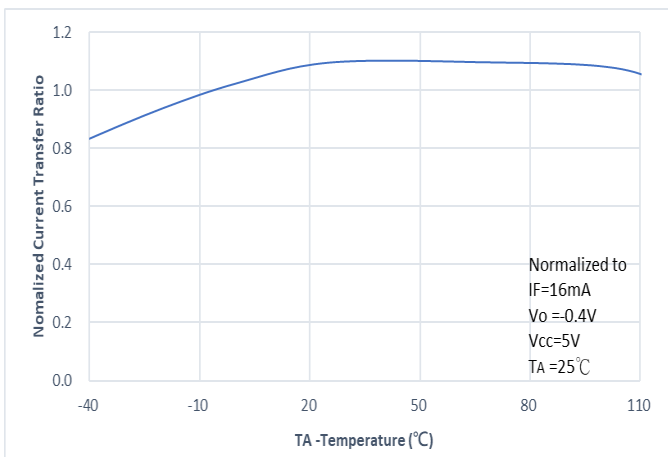


Fig.6 Propagation Delay Time vs. Temperature

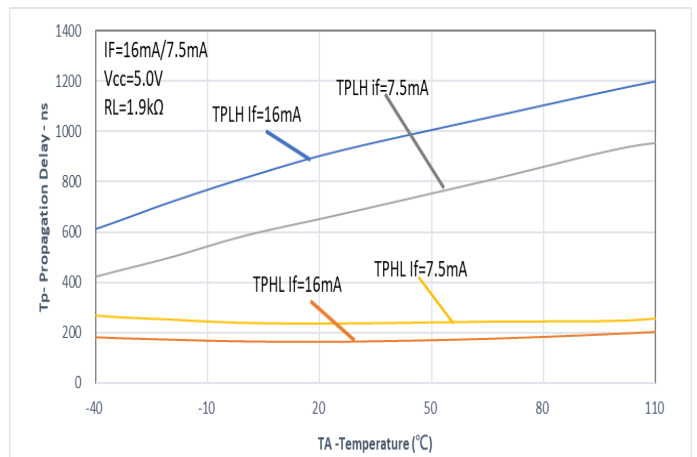


Fig.7 Logic High Output Current vs. Temperature

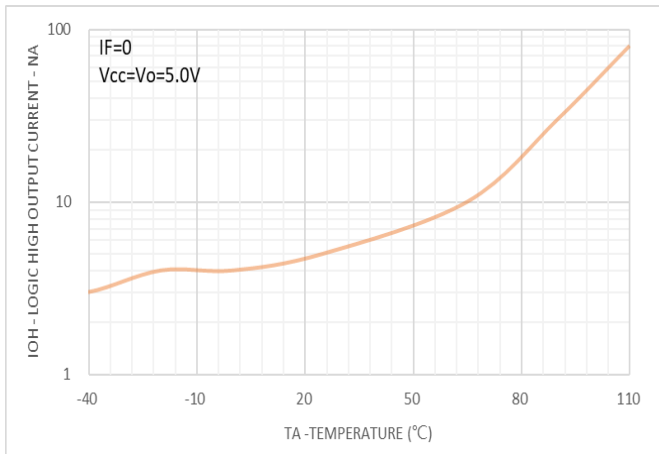
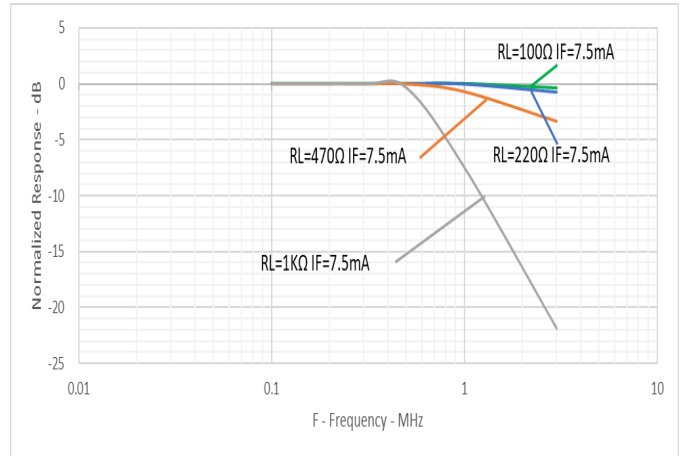
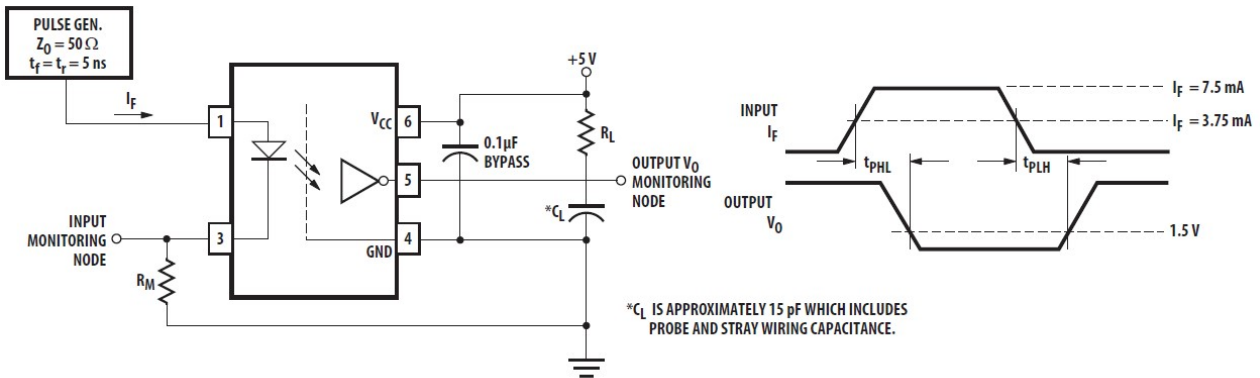


Fig.8 Frequency Response

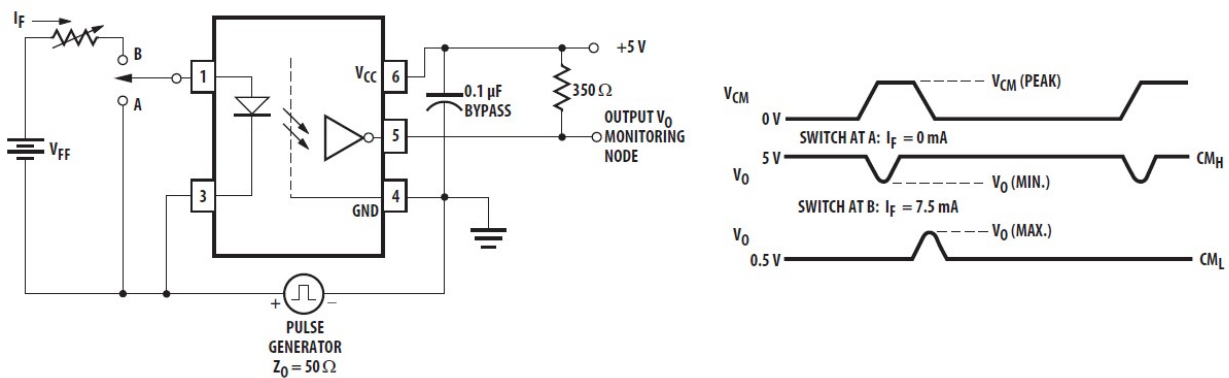


● Test Circuit

Propagation delay time t_{PLH} 、 t_{PHL} 、and rise time t_r , fall time t_f



Common Mode Transient Immunity Test Circuit and Typical Waveforms



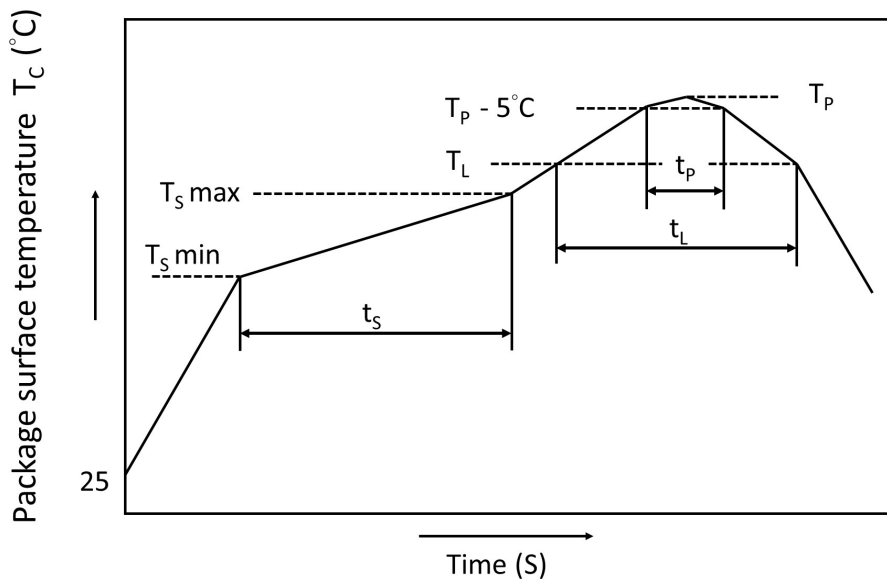
* $C_{ML}(C_{MH})$ is the maximum rate of rise (fall) of the common mode voltage that can be sustained with the output voltage in the low (high) state.

● **Recommended Soldering Conditions**

IR Reflow soldering

One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.

Recommended Temperature Profile of Infrared Reflow



	Symbol	Min	Max	Unit
Preheat temperature	T_s	150	200	$^\circ\text{C}$
Preheat time	t_s	60	120	s
Ramp-up rate (T_L to T_P)			3	$^\circ\text{C/s}$
Liquidus temperature	T_L	217		$^\circ\text{C}$
Time above T_L	t_L	60	100	s
Peak Temperature	T_P		260	$^\circ\text{C}$
Time during which T_c is between ($T_P - 5$) and T_P	t_P		20	s
Ramp-down rate			6	$^\circ\text{C/s}$

- **Numbering System**

KT050L X (Y)-(Z)

Notes:

KT050 = Part No.

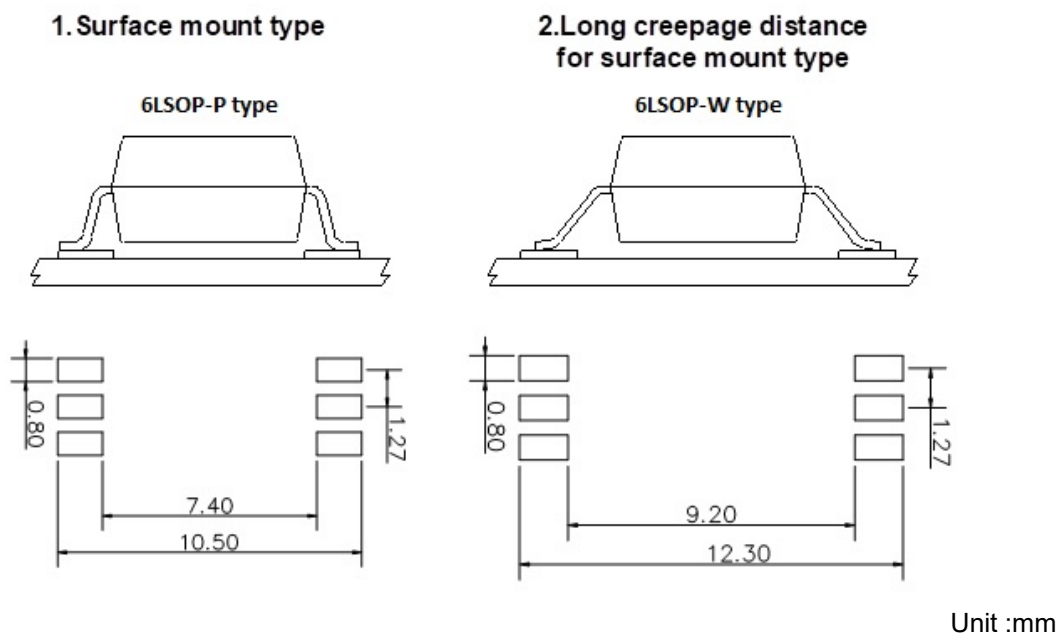
X = Lead form option (P or W)

Y = Tape and reel option (TLD or TRU)

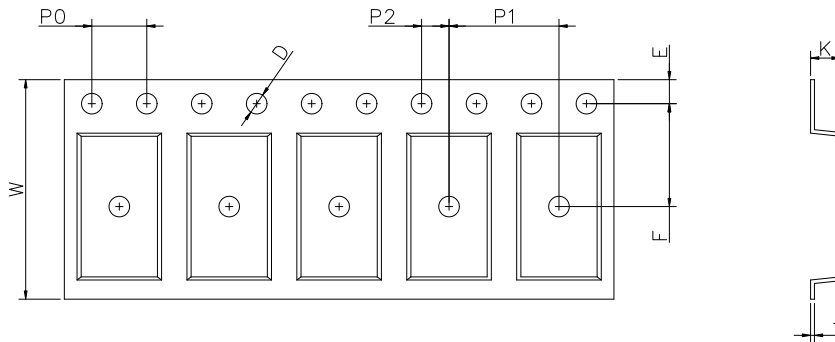
Z = VDE option (V or None)

Option	Description	Packing quantity
P (TLD)	surface mount type package + TL tape & reel option	3000 units per reel
P (TRU)	surface mount type package + TR tape & reel option	3000 units per reel
W (TLD)	long creepage distance for surface mount type package + TLD tape & reel option	3000 units per reel
W (TRU)	long creepage distance for surface mount type package + TRU tape & reel option	3000 units per reel

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

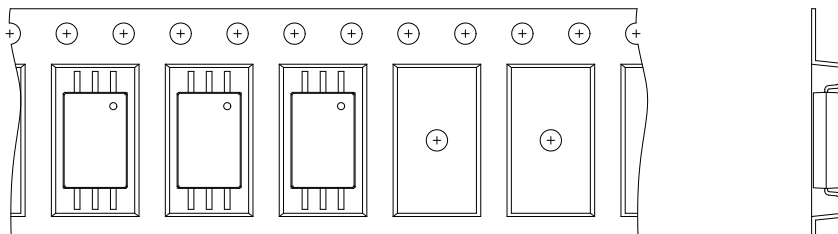


● LSOP 6 Carrier Tape & Reel

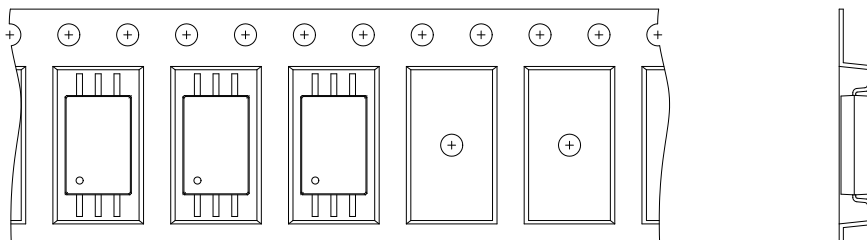


Dimension Symbol	D	E	F	P0	P1	P2	t	W	K
P type Dimension (mm)	1.5±0.1	1.75±0.1	7.5±0.1	4.0±0.1	8.0±0.1	2.0±0.1	0.3±0.1	16.0±0.3	2.15±0.1
W type Dimension (mm)	1.5±0.1	1.75±0.1	11.5±0.1	4.0±0.1	8.0±0.1	2.0±0.1	0.3±0.1	24.0±0.3	2.52±0.1

TRU



TLD



- **Application Notice**

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