KPC6N138 Series

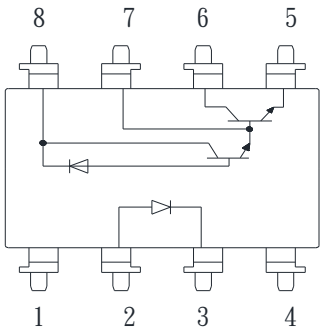
8PIN HIGH-SPEED DARLINGTON OUTPUT PHOTOCOUPLER

cosmo

Description

The KPC6N138 series consist of an LED, optically coupled to a photodarlington and high-speed digital output. It is packaged in a 8 pin DIP package and available in wide-lead spacing and SMD option.

Schematic



1. N.C.	5. GND
2. Anode	6. Vo
3. Cathode	7. V_B
4. N.C.	8. Vcc

Features

1. Pb free and RoHS compliant
2. High current transfer ratio (CTR:Min.300% at I_F =1.6mA)
3. High-speed response (tPLH,tPHL: typ.2us at R_L=2.2KΩ)
4. Instantaneous common mode rejection voltage(CMH:typ. 500V/us)
5. TTL compatible output
6. Compact surface mount type package
7. MSL class 1
8. Agency Approvals:
   - UL Approved (No. E169586): UL1577
   - c-UL Approved (No. E169586)
   - FIMKO Approved: EN60065, EN60950

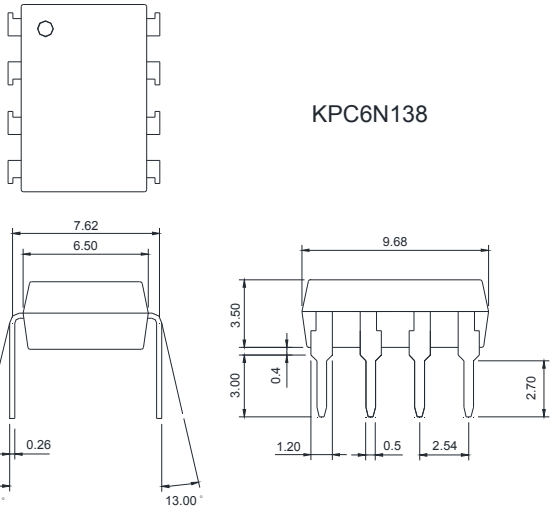
Applications

- Interfaces for computer peripherals
- Electronic calculators, measuring instruments, control equipment
- Telephone sets
- Signal transmission between circuits of different potentials and impedances

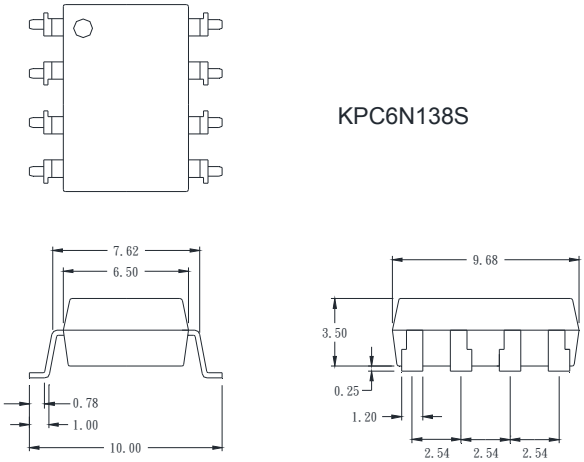
● Outside Dimension

Unit : mm

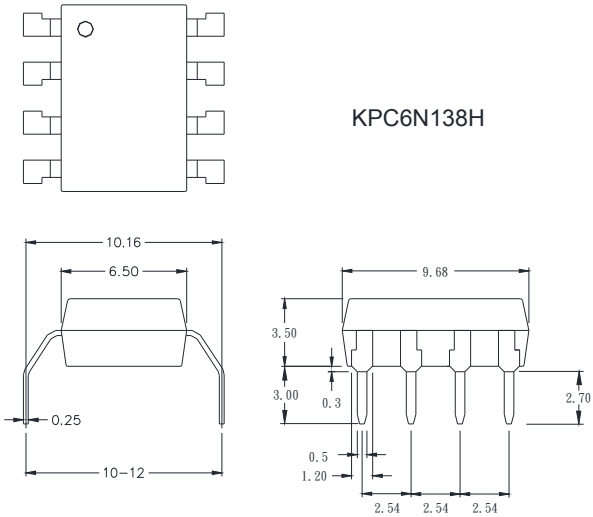
1.Dual-in-line type



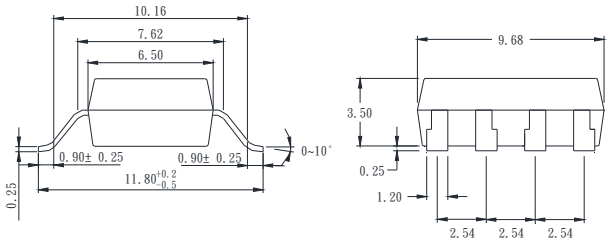
2.Surface mount type



3.Long creepage distance type

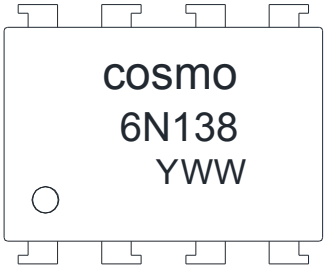


4.Long creepage distance for surface mount type



TOLERANCE：±0.2mm

● Device Marking



Notes:

cosmo
6N138
YWW

Y: Year code / WW: Week code

● Absolute Maximum Ratings

(Ta = 25°C)

Parameter			Symbol	Rating	Unit
Input		Forward current	I_F	20	mA
	*1	Peak forward current	I_F	40	mA
	*2	Peak transient forward current	I_{FM}	1	A
		Reverse voltage	V_R	5	V
		Power dissipation	P_D	35	mW
Output		Supply voltage	Vcc	-0.5 to 7	V
		Output voltage	Vo	-0.5 to 7	V
		Emitter-Base reverse with-stand voltage (Pin 5 to 7)	V_{EBO}	0.5	V
	*3	Average output current	Io	60	mA
		Power dissipation	Po	100	mW
*4		Isolation voltage 1 minute	Viso	5000	Vrms
		Operating temperature	Topr	-40 to +100	℃
		Storage temperature	Tstg	-55 to +125	℃
*5		Soldering temperature 10 seconds	Tsol	260	℃

***1** 50% duty cycle, pulse width : 1mS
***2** Pulse width<=1uS,300 pulse/sec
***3** Decreases at the rate of 0.7mA/℃ if the external temperature is 25℃ or more
***4** 40% to 60% RH, AC for 1 minute
***5** For 10 seconds

● Electro-optical Characteristics

(Ta = 25℃)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
***6** Current transfer ratio	CTR	I_F=1.6mA Vo=0.4V,Vcc=4.5V	300	1600	-	%
Logic (0) output volage	V_{OL}	I_F=1.6mA Io=4.8mA,Vcc=4.5V	–	0.1	0.4	V
Logic (1) output current	I_{OH}	I_F=0,Vo=Vcc=7V	-	0.1	250	uA
Logic (0) supply current	I_{CCL}	I_F=1.6mA,Vo=open, Vcc=5V	–	0.5	-	mA
Logic (1) supply current	I_{CCH}	I_F=0,VO=open, Vcc=5V	-	10	-	nA
Input forward voltage	VF	Ta=25℃,I_F=1.6mA	-	1.5	1.7	V
Input forward voltage temperature coefficient	△VF/△Ta	I_F=1.6mA	-	-1.9	-	mV/℃
Input reverse voltage	BV_R	Ta=25℃,I_R=10uA	5.0	-	-	V
Input capacitance	C_{IN}	V_F=0,f=1MHz	-	60	-	pF
*7 Leak current(input-output)	I_{I-O}	Ta=25℃,45% RH V_{I-O}=3kVDC,t=5s	-	-	1.0	uA
*7 Isolation resistance(input-output)	R_{I-O}	V_{I-O}=500VDC	–	10^{12}	-	Ω
*7 Capacitance(input-output)	C_{I-O}	f=1MHz	-	0.6	-	pF

***6** Current transfer ratio is the ratio is the ratio of input current and output current expressed in %
***7** Measured as 2-pin element (Short 1,2,3,4 and 5,6,7,8)

● Switching Characteristics

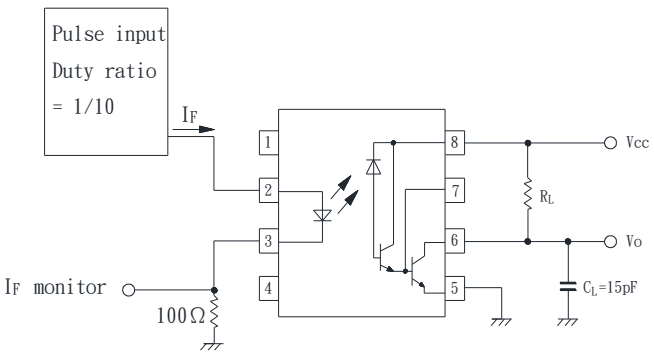
(Ta=25℃ ,Vcc=5V)

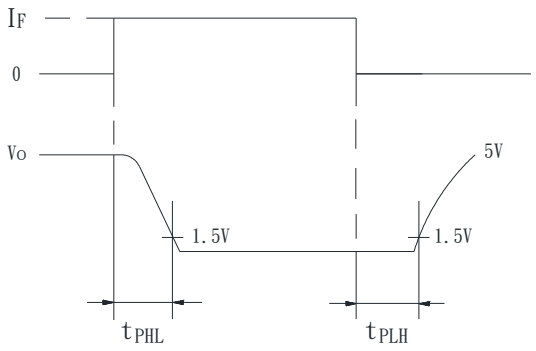
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
***8** Propagation delay time Output (1)-->(0)	t_{PHL}	R_L=2.2kΩ,I_F=1.6mA	-	2	10	uS
***8** Propagation delay time Output (0)-->(1)	t_{PLH}	R_L=2.2kΩ,I_F=1.6mA	-	7	35	uS
***9** Instantaneous common ***10** mode rejection voltage "Output (1)"	C_{MH}	I_F=0,V_{CM}=10Vp-p,R_L=2.2kΩ	-	500	-	V/uS
***9** Instantaneous common ***10** mode rejection voltage "Output (0)"	C_{ML}	I_F=1.6mA,V_{CM}=10Vp-p,R_L=2.2kΩ	-	-500	-	V/uS

***9** Instantaneous common mode rejection voltage " output (1) " represents a common mode voltage variation that can hold the output above (1) level (Vo > 2.0V)

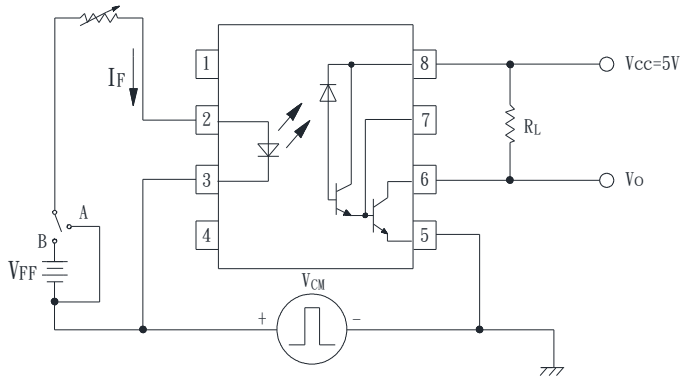
***10** Instantaneous common mode rejection voltage " output (0) " represents a common mode voltage variation that can hold the output above (0) level (Vo < 0.8V)

***8** Test Circuit Propagation Delay Time





***10** Test Circuit for Instantaneous Common Mode Rejection Voltage



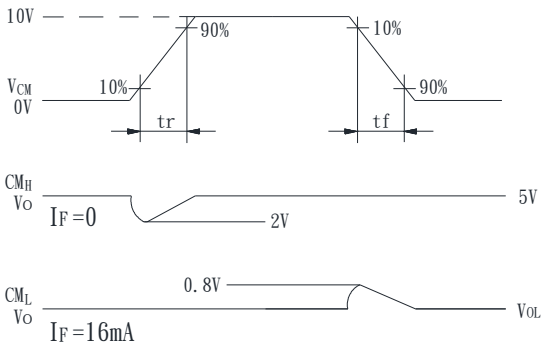


Fig.1 Forward Current vs. Forward Voltage

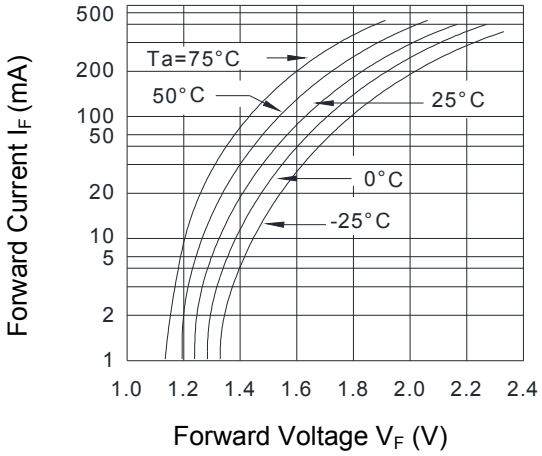


Fig.2 Forward Current vs. Ambient Temperature

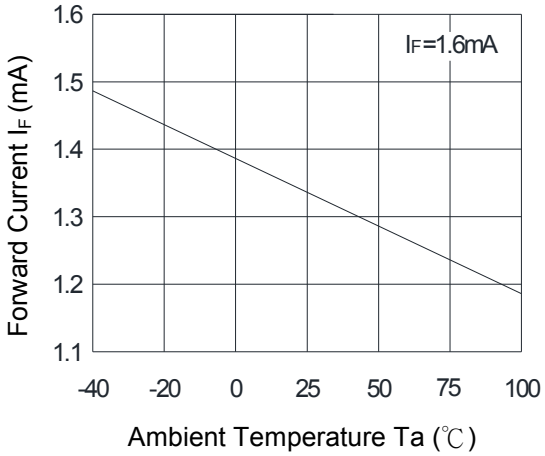


Fig.3 Response and Fall Time vs. Load Resistance

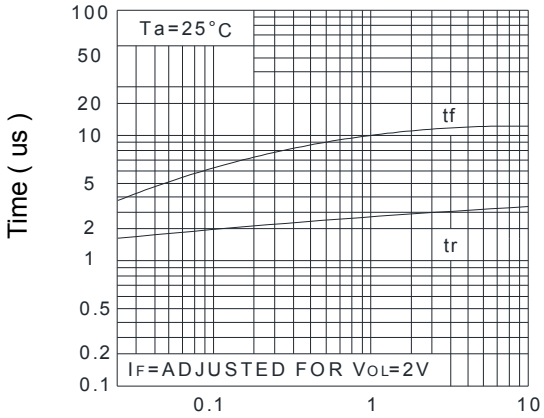


Fig.4 Current Transfer Ratio vs. Forward Current

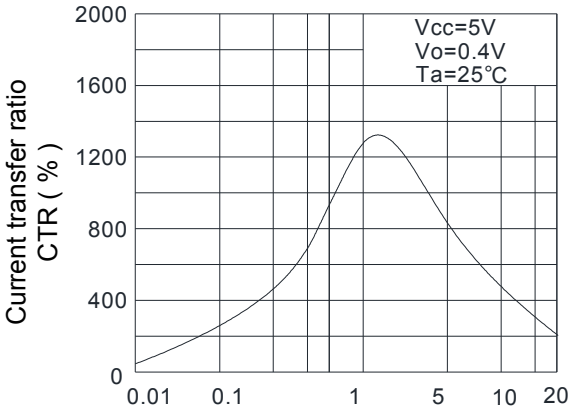


Fig.5 Current Transfer Ratio vs. Base-Emitter Resistance

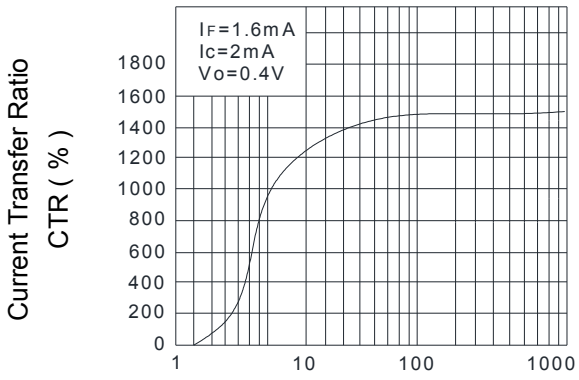


Fig.6 Output Current vs. Output Voltage

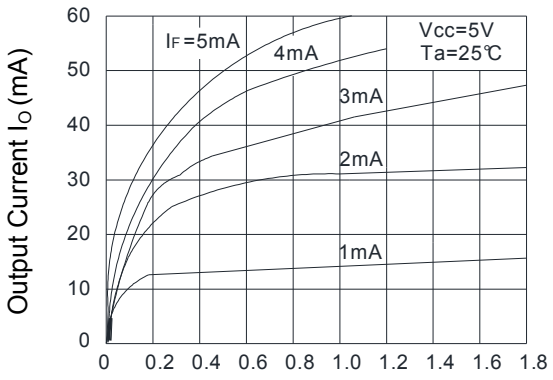


Fig.7 Output Current vs. Forward Current

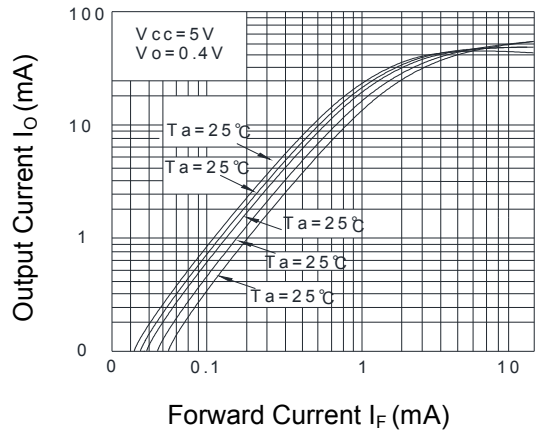


Fig.8 Logic Low Supply Current vs. Forward Current

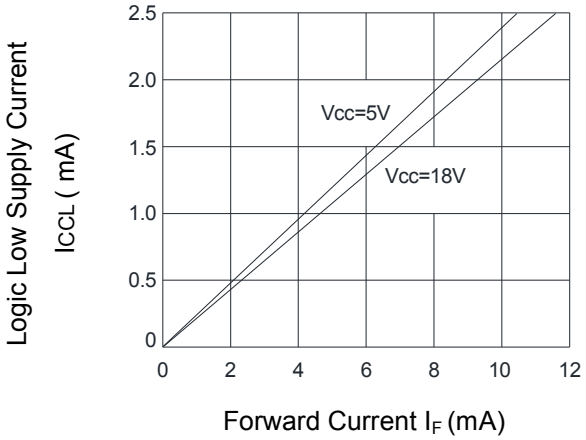


Fig.9 Propagation Delay vs. Forward Current

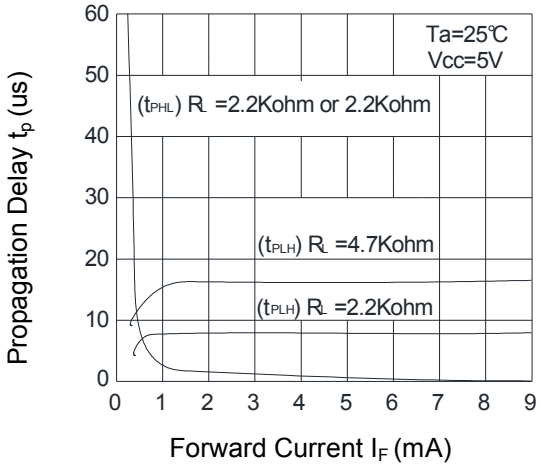
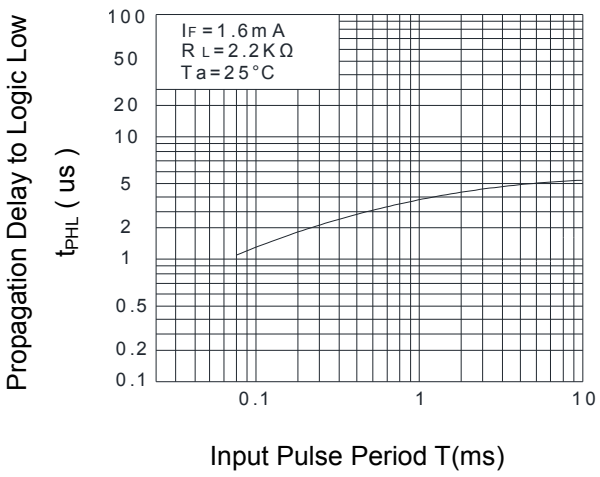


Fig.10 Propagation Delay to Logic Low vs. Pulse Period

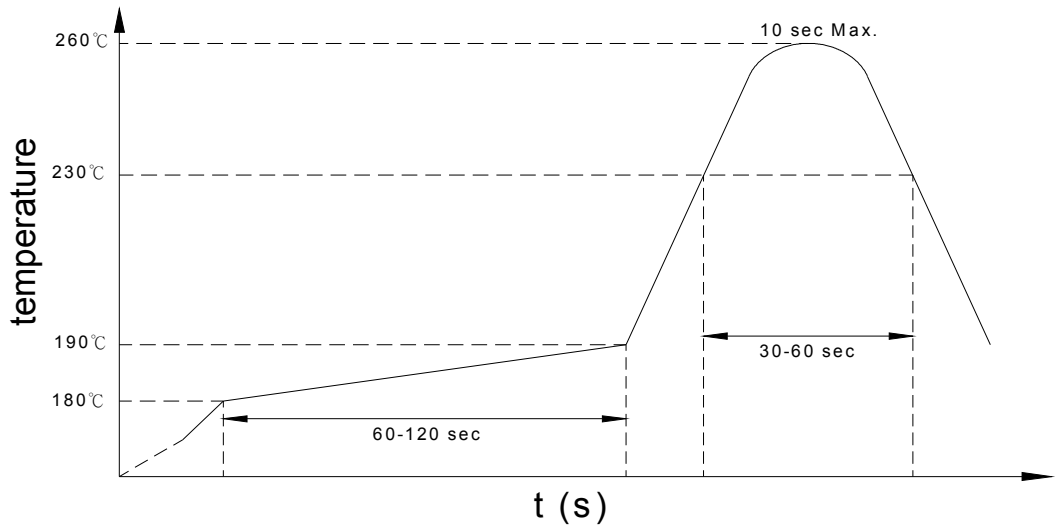


Recommended Soldering Conditions

(a) Infrared reflow soldering：

- Peak reflow soldering： 260℃ or below (package surface temperature)
- Time of peak reflow temperature： 10 sec
- Time of temperature higher than 230℃： 30-60 sec
- Time to preheat temperature from 180~190℃： 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℃ or below (molten solder temperature)
- Time： 10 seconds or less
- Preheating conditions： 120℃ 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

KPC6N138 X (Y)

Notes:

KPC6N138 = Part No.

X = Lead form option (blank、S、H、L)

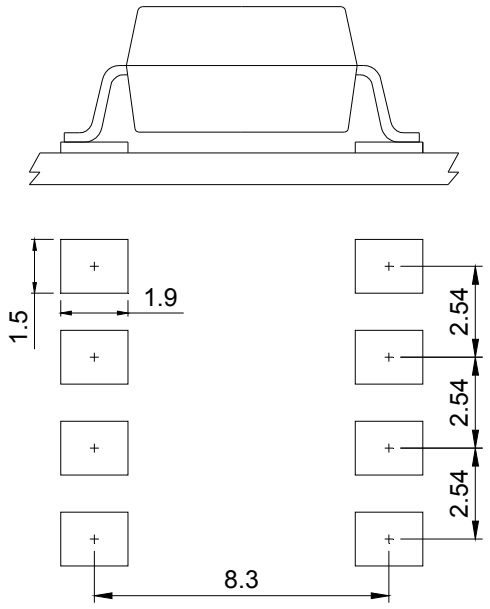
Y = Tape and reel option (TL、TR、TLD、TRU)

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

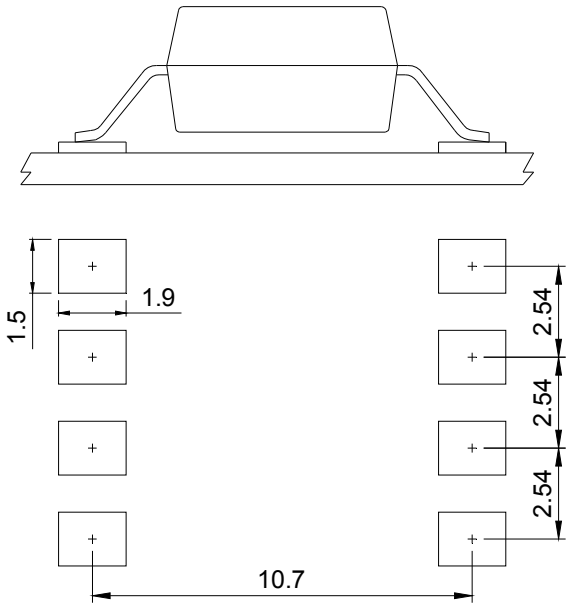
1.Surface mount type

8-pin SMD



2.Long creepage distance for surface mount type

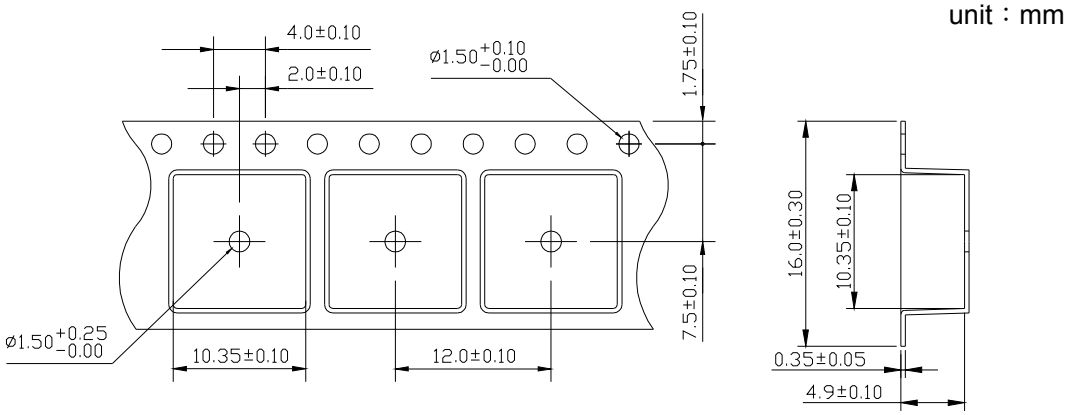
8-pin L



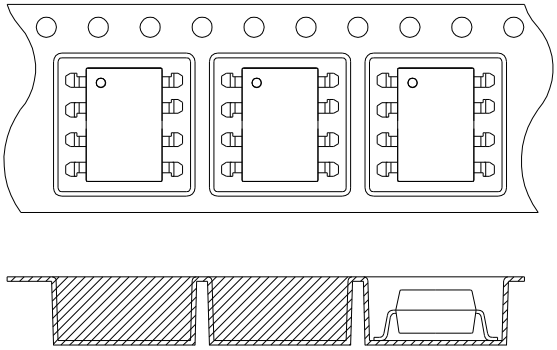
Unit :mm

● 8-pin SMD Carrier Tape & Reel

unit：mm

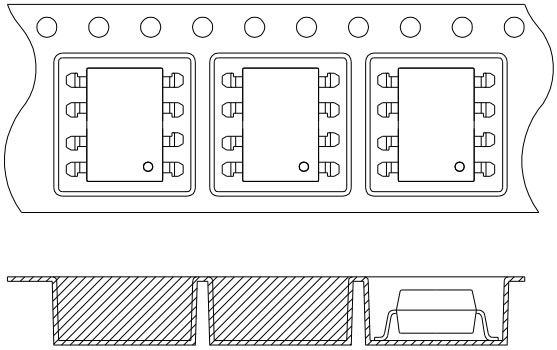


TL

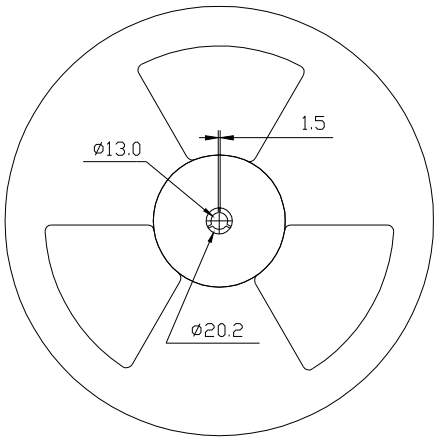


Direction of feed from reel

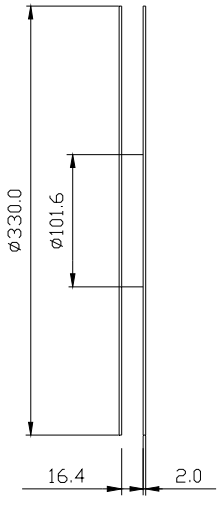
TR



Direction of feed from reel

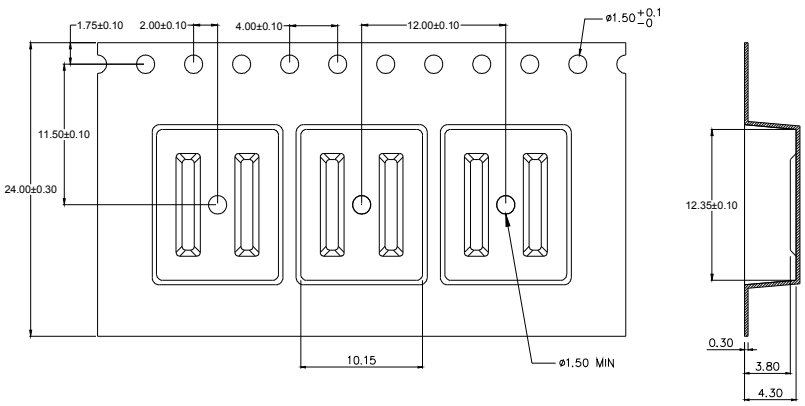


Quantity：1000pcs/reel



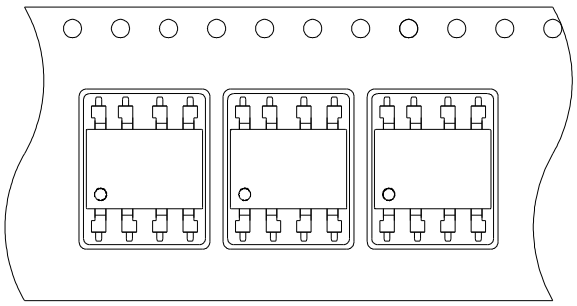
● 8-pin L Carrier Tape & Reel

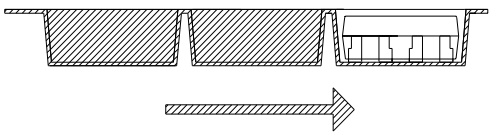
Unit:mm



TOLERANCE：±0.2mm

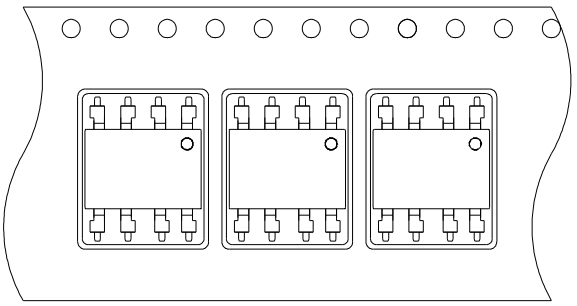
TLD

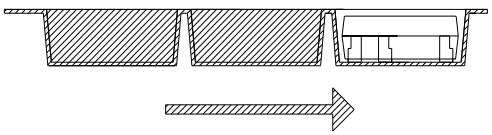




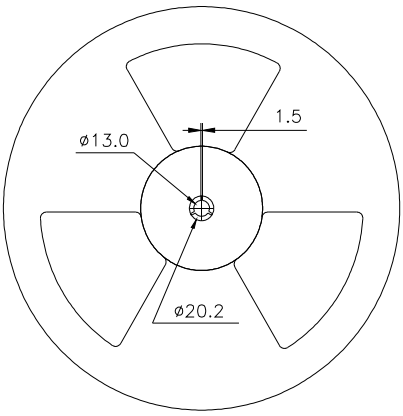
Direction of feed from reel

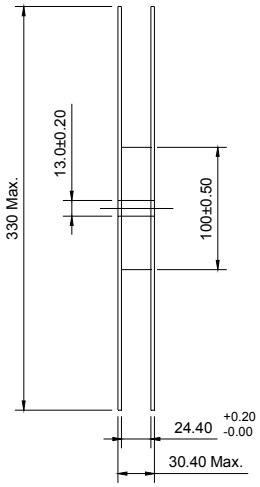
TRU





Direction of feed from reel





Quantity：800pcs/reel

Application Notice

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It would be required to comply with the absolute maximum ratings listed in the specification. cosmo has no liability and responsibility to the damage caused by improper use of the products.

cosmo products are intended to be designed for use in general electronics application list below:

a. Personal computer
b. OA machine
c. Audio / Video
d. Instrumentation
e. Electrical application
f. Measurement equipment
g. Consumer electronics
h. Telecommunication

cosmo devices shall not be used or related with equipment requiring higher level of quality / reliability, or malfunction, or failure which may cause loss of human life, bodily injury, includes, without limitation:

a. Medical and other life supporting equipments
b. Space application
c. Telecommunication equipment (trunk lines)
d. Nuclear power control
e. Equipment used for automotive vehicles, trains, ships...etc.