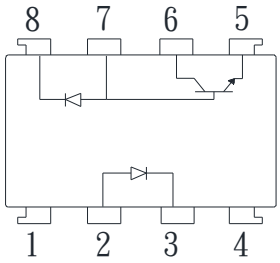
KPC6N136 Series

8PIN HIGH-SPEED OUTPUT PHOTOCOUPLER

Description

The KPC6N136 series consist of an LED optically coupled to an OPIC chip. It is a high-speed digital output type photocoupler designed specifically for low circuit current. And 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 speed response t_{PHL}, t_{PLH} (Max. 0.8us at R_L=1.9KΩ)
3. High common mode rejection voltage (CM_H : TYP. 1KV/us)
4. Standard dual-in-line package
5. MSL class 1
6. Agency Approvals:
   - UL Approved (No. E169586): UL1577
   - c-UL Approved (No. E169586)
   - FIMKO Approved: EN60065, EN60950

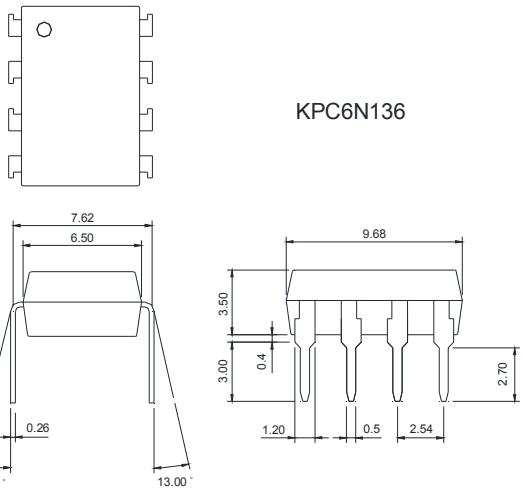
Applications

- Computers, measuring instruments, control equipment
- High speed line receivers, high speed logic
- Telephone sets
- Signal transmission between circuits of different potentials and impedances

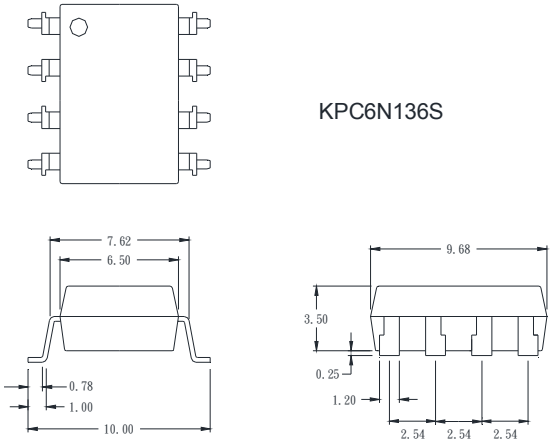
Outside Dimension

Unit : mm

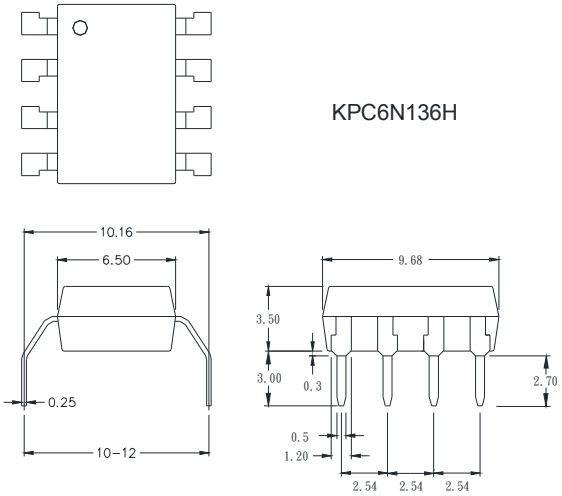
1.Dual-in-line type



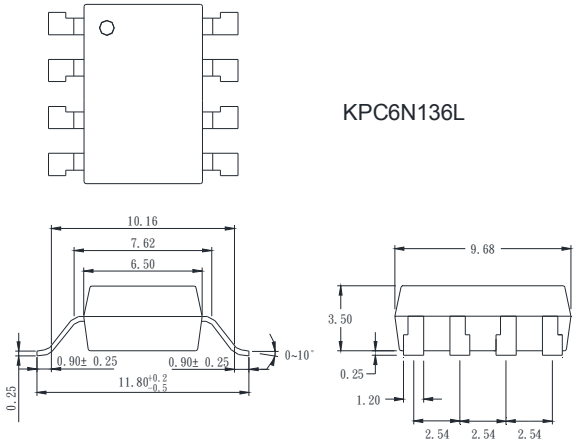
2.Surface mount type



3.Long creepage distance type

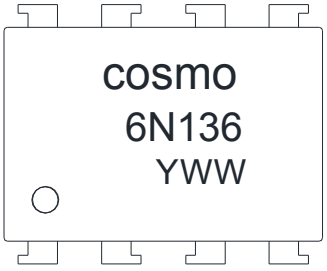


4.Long creepage distance for surface mount type



TOLERANCE: ±0.2mm

Device Marking



Notes:

cosmo
6N136
YWW Y: Year code / WW: Week code

● Absolute Maximum Ratings

(Ta = 25°C)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	25	mA
	***1** Peak forward current	I_F	50	mA
	***2** Peak transient forward current	I_{FM}	1	A
	Reverse voltage	V_R	5	V
	Power dissipation	P	45	mW
Output	Supply voltage	V_{CC}	-0.5 to 15	V
	Output voltage	V_O	-0.5 to 15	V
	Emitter-base reverse with stand voltage (Pin5 to 7)	V_{EBO}	5	V
	Average output current	I_O	8	mA
	Peak output current	I_{OP}	16	mA
	Base current (Pin7)	I_B	5	mA
	Power dissipation	P_O	100	mW
***3** Isolation voltage 1 minute		V_{iso}	5000	V
Operating temperature		T_{opr}	-55 to +100	℃
Storage temperature		T_{stg}	-55 to +125	℃
***4** Soldering temperature 10 seconds		T_{sol}	260	℃

***1** 50% duty cycle, Pulse width：1mS
Decreases at the rate of 1.6mA/℃ if the external temperature is 70℃ or more.
***2** Pulse width≦1uS, 300pulse/sec
***3** 40 to 60% RH, AC for 1 minute
***4** For 10 seconds

● Electrical Characteristics

(Ta = 25℃)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
***5** Current transfer ratio	CTR(1)	Ta=25℃, I_F=16mA V_O=0.4V, V_{CC}=4.5V	19	40	-	%
	CTR(2)	I_F=16mA V_O=0.5V, V_{CC}=4.5V	15	43	-	%
Logic (0) output voltage	V_{OL}	***6** V_{CC}=4.5V, I_F=16mA	-	0.1	0.4	V
Logic (1) output current	I_{OH}(1)	Ta=25℃, I_F=0 V_O=V_{CC}=5.5V	-	3.0	500	nA
	I_{OH}(2)	Ta=25℃, I_F=0 V_O=V_{CC}=15V	-	0.01	1.0	uA
	I_{OH}(3)	V_{CC}=V_O=15V, I_F=0	-	-	50	uA
Logic (0) supply current	I_{CCL}	I_F=16mA V_O=open, V_{CC}=15V	-	200	-	uA
Logic (1) supply current	I_{CCH}(1)	Ta=25℃, I_O=0 V_F=open, V_{CC}=15V	-	0.02	1.0	uA
	I_{CCH}(2)	I_O=0 V_O=open, V_{CC}=15V	-	-	2.0	uA
Input forward voltage	V_F	Ta=25℃, I_F=16mA	-	1.7	1.95	V
Input forward voltage temperature coefficient	△V_F/△Ta	I_F=16mA	-	-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
Transistor current amplification factor	h_{FE}	V_O=5V, I_O=3mA	-	70	-	

***5** Current transfer ratio is the ratio of input current and output current expressed in %
***6** I_O=2.4mA
***7** Measured as 2-pin element (Short 1, 2, 3, 4 and 5, 6, 7, 8)

● Switching Characteristics

(Ta=25℃, V_{CC}=5V, I_F=16mA Ta = 25℃)

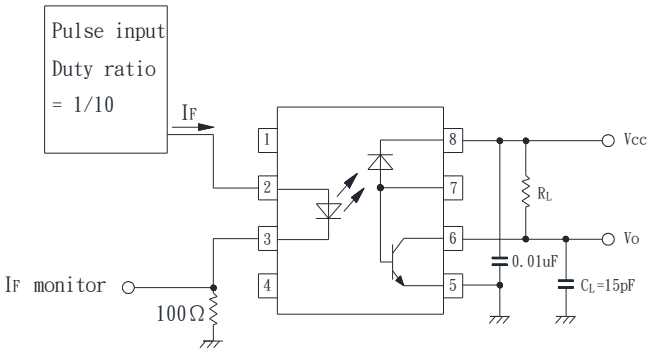
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
*8 Propagation delay time *9 Output (1) → (0)	t_{PHL}	R_L=1.9KΩ	-	0.3	0.8	uS
*8 Propagation delay time *9 Output (0) → (1)	t_{PLH}	R_L=1.9KΩ	-	0.3	0.8	uS
*10 *11 Instantaneous common mode rejection voltage " Output (1) "	CM_H	I_F=0, V_{CM}=10V_{P-P}	-	1000	-	V/uS
*10 *11 Instantaneous common mode rejection voltage " Output (0) "	CM_L	I_F=16mA, V_{CM}=10V_{P-P}	-	-1000	-	V/uS
*12 Bandwidth	BW	R_L=100Ω	-	2.0	-	MHz

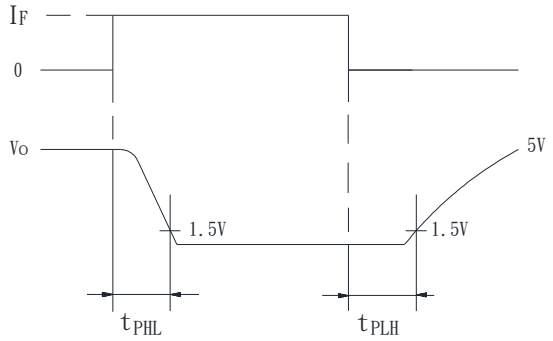
*8 R_L=1.9KΩ is equivalent to one LSTTL and 5.6KΩ pull-up resistor.

*10 Instantaneous common mode rejection voltage " output (1) " represents a common mode voltage variation that can hold the output above (1) level (Vo > 2.0V) Instantaneous common mode rejection voltage " output (0) " represents a common mode voltage variation that can hold the output above (0) level (Vo < 0.8V)

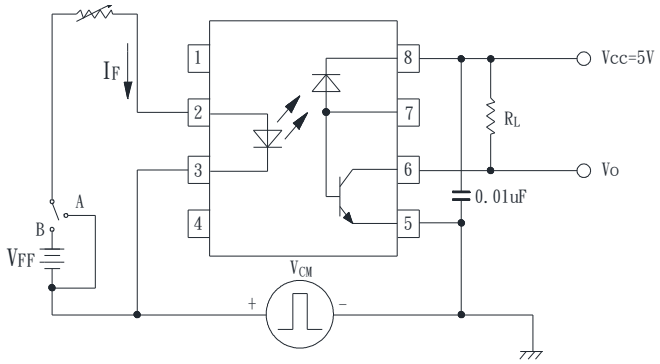
*12 Bandwidth represents a point where AC input goes down by 3dB.

*9 Test Circuit Propagation Delay Time





*11 Test Circuit for Instantaneous Common Mode Rejection Voltage



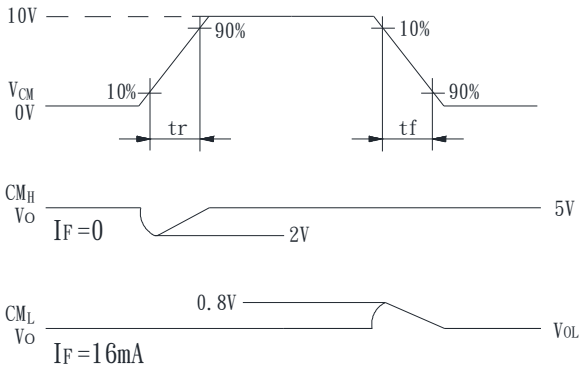


Fig.1 Forward Current vs. Ambient Temperature

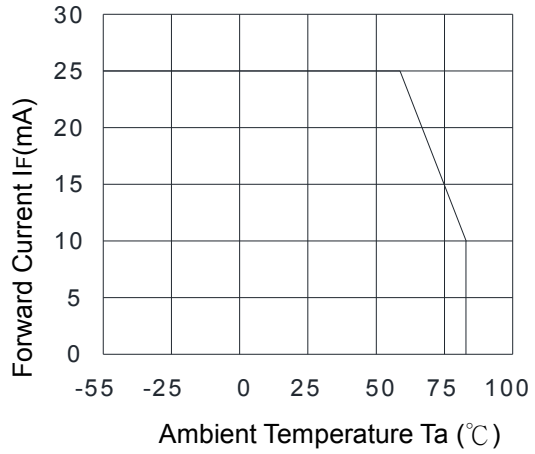


Fig.2 Power Dissipation vs. Ambient Temperature

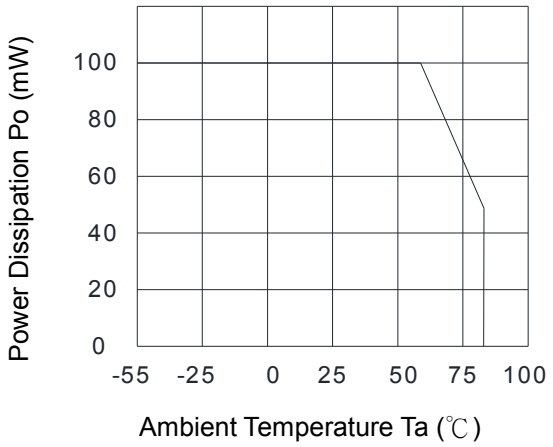


Fig.3 Forward Current vs. Forward Voltage

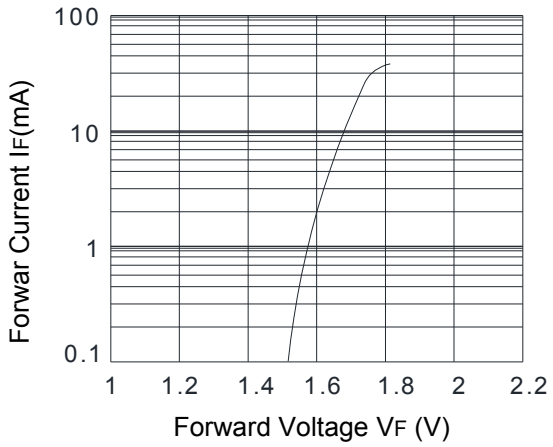


Fig.4 Current Transfer Ratio vs. Forward Current

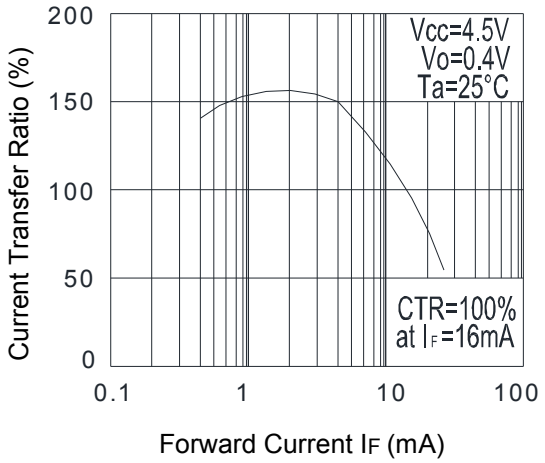


Fig.5 Output Current vs. Output Voltage

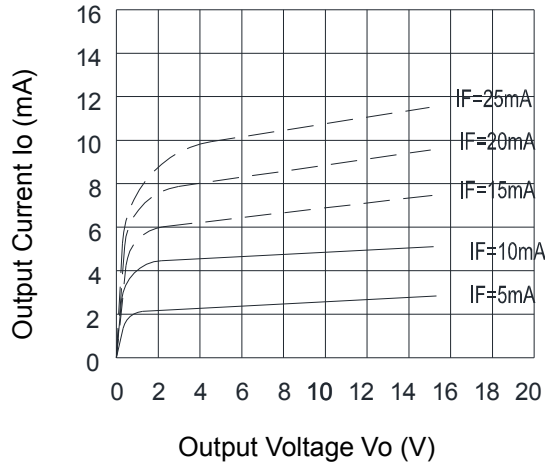


Fig.6 Current Transfer Ratio vs. Ambient Temperature

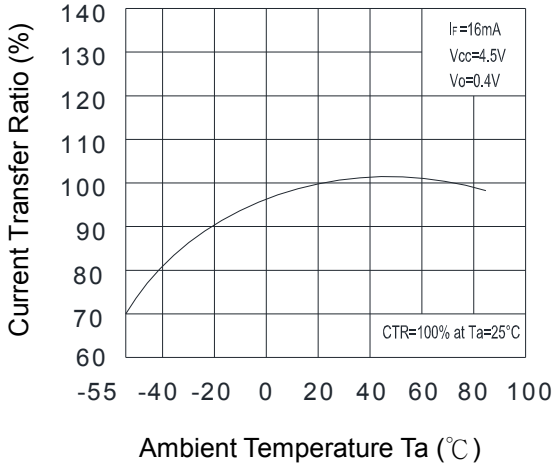


Fig.7 High Level Output Current vs. Ambient Temperature

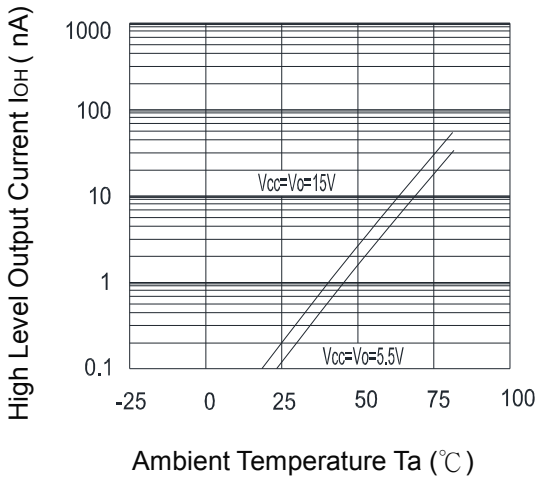
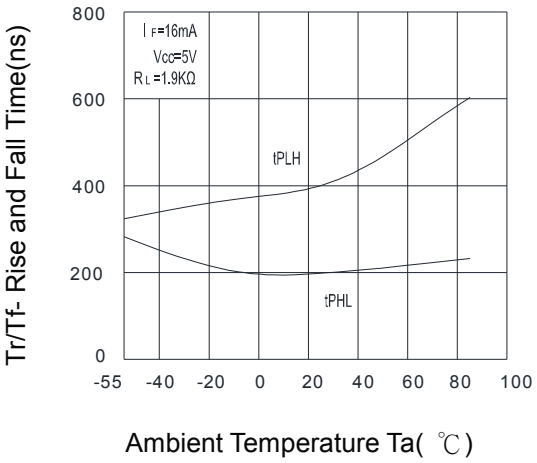


Fig.8 Propagation Delay Time vs. Ambient Temperature

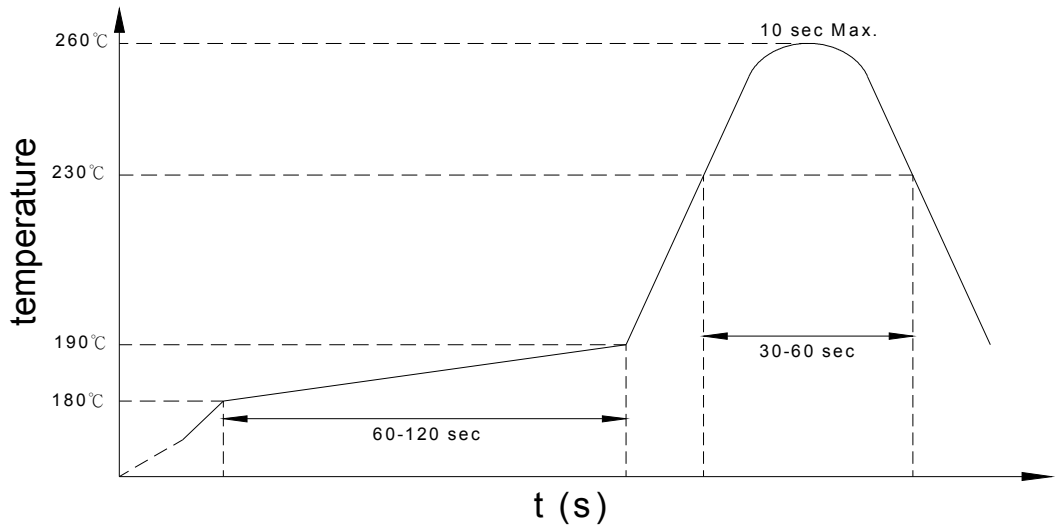


Recommended Soldering Conditions

(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

KPC6N136 X (Y)

Notes:

KPC6N135 = Part No.

X = Lead form option (blank、S、H、L)

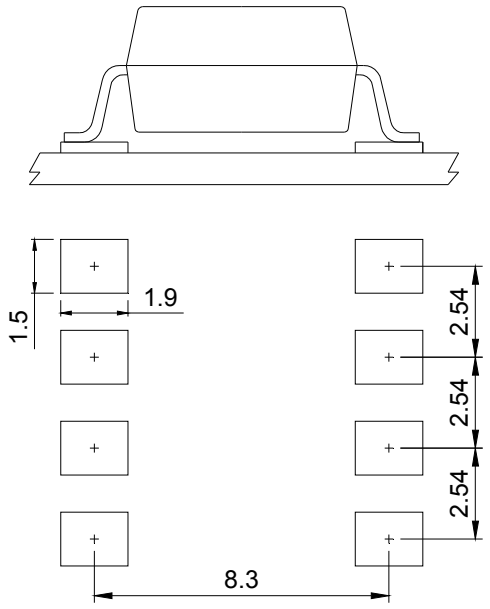
Y = Tape and reel option (TL、TR、TLD、TRU)

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

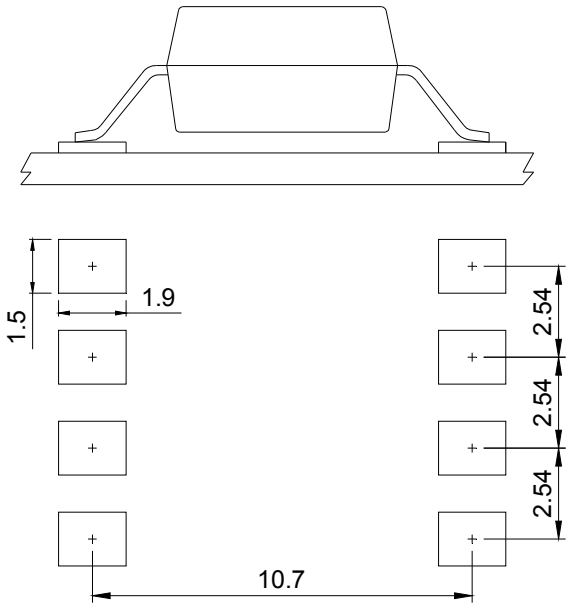
1.Surface mount type

8-pin SMD



2.Long creepage distance for surface mount type

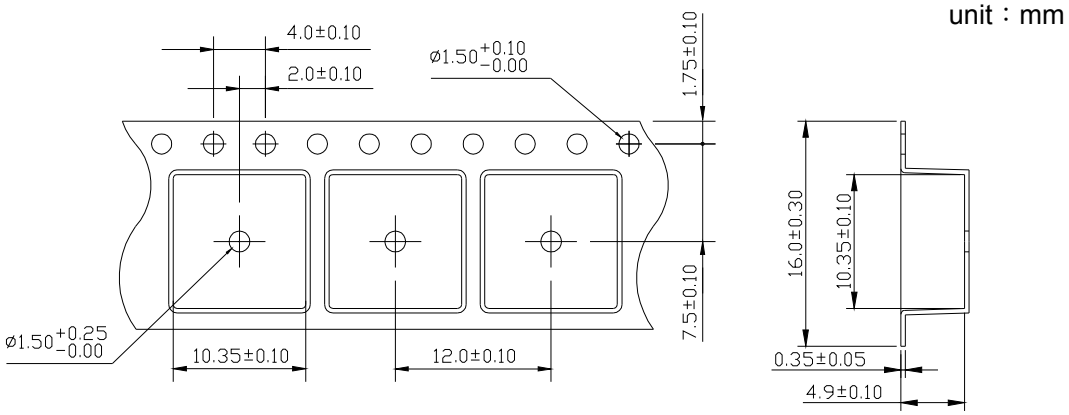
8-pin L



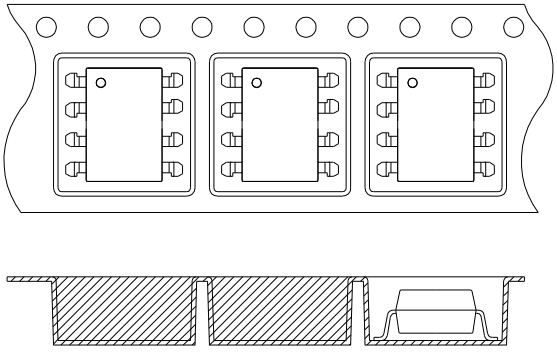
Unit :mm

● 8-pin SMD Carrier Tape & Reel

unit：mm

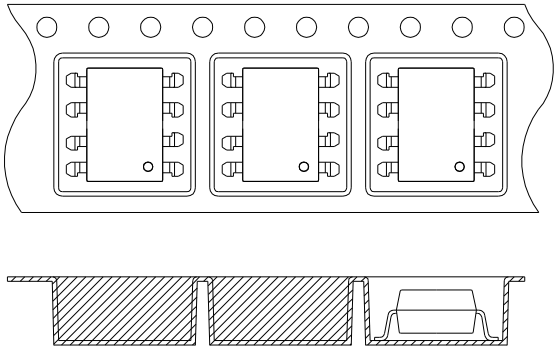


TL

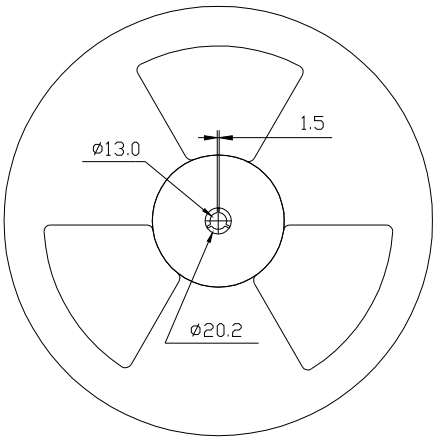


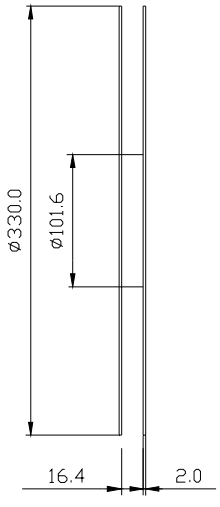
Direction of feed from reel

TR



Direction of feed from reel

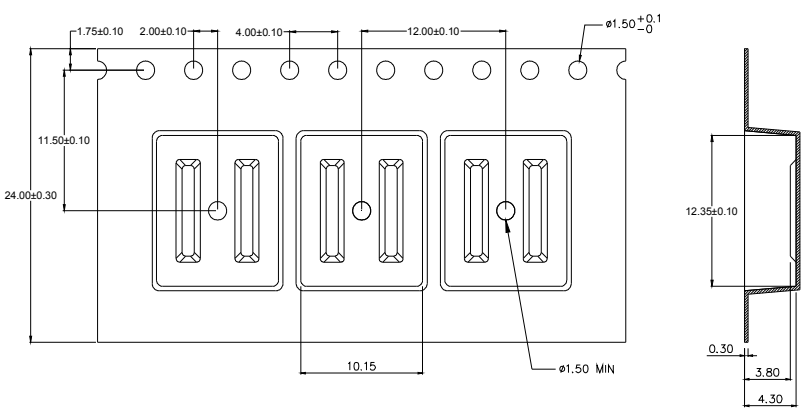




Quantity：1000pcs/reel

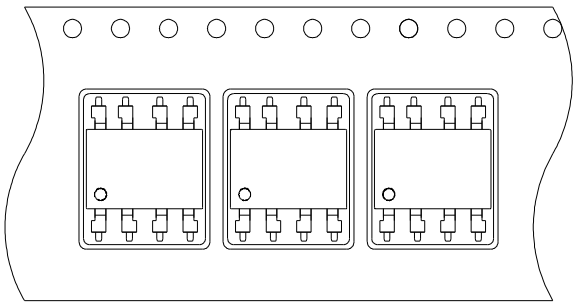
● 8-pin L Carrier Tape & Reel

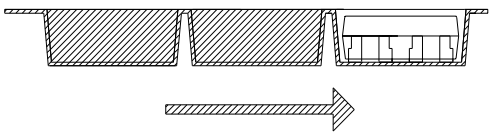
Unit:mm



TOLERANCE：±0.2mm

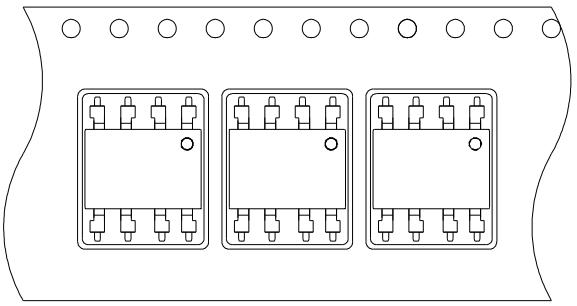
TLD

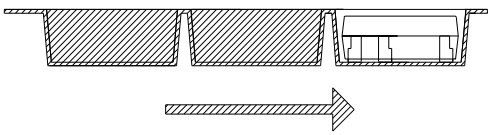




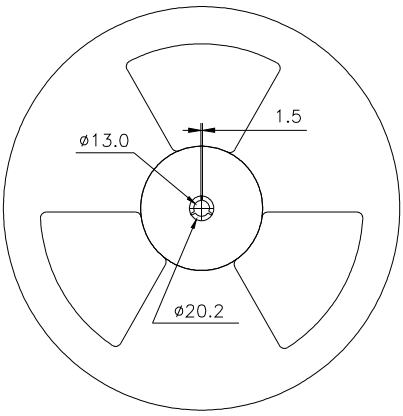
Direction of feed from reel

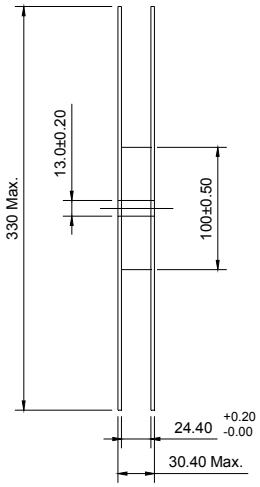
TRU





Direction of feed from reel





Quantity：800pcs/reel

Application Notice

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c. Audio / Video
d. Instrumentation
e. Electrical application
f. Measurement equipment
g. Consumer electronics
h. Telecommunication

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b. Space application
c. Telecommunication equipment (trunk lines)
d. Nuclear power control
e. Equipment used for automotive vehicles, trains, ships...etc.

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