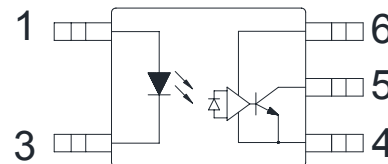


● Description

The KPC410 series consist of an LED optically coupled to an OPIC chip. It is a high-speed digital output type photocopler designed specifically for low circuit current. And it is packaged in a 5pin mini-flat package.

● Schematic



- 1. Anode
- 3. Cathode
- 4. GND
- 5. Vo
- 6. Vcc

● Features

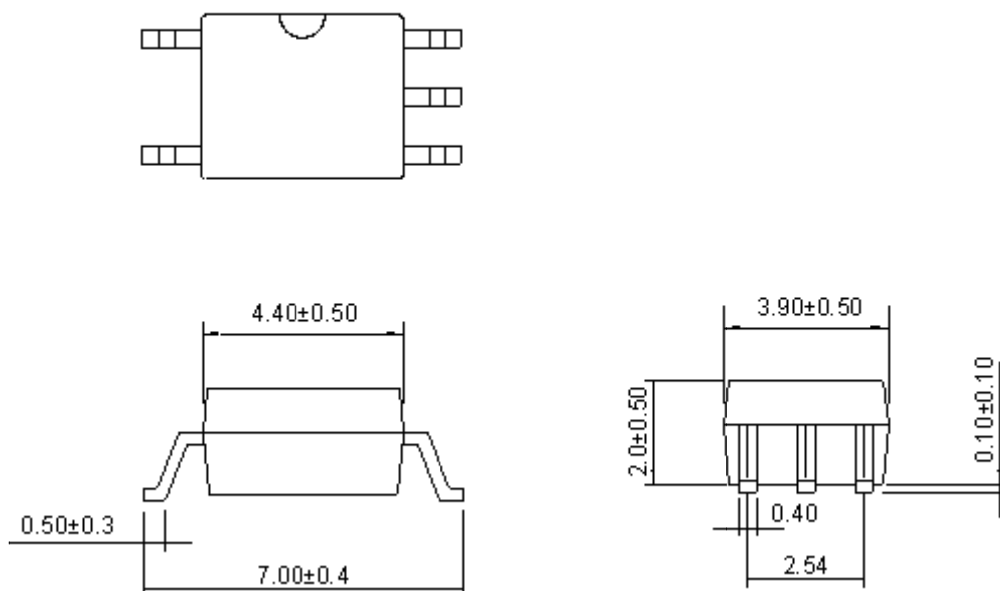
1. Pb free and RoHS compliant
2. 5 pin mini-flat package
3. Super high speed response (t_{PLH}, t_{PHL} : typ. 45ns at $R_L=350\ \Omega$)
4. Instantaneous common mode rejection voltage (CM_H : typ. 500V/us)
5. High isolation voltage between input and output (V_{iso} : 3750Vrms)
6. Low input current drive (I_{FHL} : Max. 5mA)
7. LSTTL and TTL compatible output
8. MSL class 1
9. Agency Approvals:
 - UL Approved (No. E169586): UL1577
 - c-UL Approved (No. E169586)
 - VDE Approved (No. 40020973): DIN EN60747-5-5

● Applications

- High speed interfaces for computer peripherals, microcomputer systems
- High speed line receivers
- Noise reduction
- Interfaces for data transmission equipment.
- Inverter

● Outside Dimension

Unit : mm



TOLERANCE: ±0.2mm

● Device Marking



Notes:

cosmo
410
YWW

Y: Year code / WW: Week code

● Absolute Maximum Ratings

(Ta=25°C)

Parameter		Symbol	Rating	Unit
Input	Forward current (*1)	I_F	25	mA
	Peak forward current (*2)	I_{FM}	40	mA
	Reverse voltage	V_R	5	V
	Power dissipation	P_D	45	mW
Output	Supply voltage	V_{CC}	7	V
	High level output voltage	V_{OIL}	7	V
	Low level output current	I_{OL}	50	mA
	Output collector power dissipation	P_C	85	mW
Isolation voltage 1 minute (*3)		Viso	3750	Vrms
Operating temperature		Topr	-40 to +85	°C
Storage temperature		Tstg	-55 to +125	°C
Soldering temperature 10 seconds		Tsol	260	°C

● Electro-optical Characteristics

(Ta= 25°C)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input forward voltage (*4)	V_F	$I_F=10\text{mA}$, $T_a=25^\circ\text{C}$	—	1.6	1.75	V
Input reverse voltage	V_{BR}	$I_R=10\mu\text{A}$, $T_a=25^\circ\text{C}$	5	—	—	V
Input capacitance	C_{IN}	$V_F=0$, $f=1\text{MHz}$	—	60	—	pF
Logic (1) output current	I_{OH}	$V_{CC}=5.5\text{V}$, $V_O=5.5\text{V}$, $I_F=250\mu\text{A}$	—	2	250	μA
Logic (0) output voltage	V_{OL}	$V_{CC}=5.5\text{V}$, $I_F=5\text{mA}$, $I_{OL}(\text{Sinking})=13\text{mA}$	—	0.4	0.6	V
Logic (1) supply current	I_{CCH}	$V_{CC}=5.5\text{V}$, $I_F=0\text{mA}$	—	7	15	mA
Logic (0) supply current	I_{CCL}	$V_{CC}=5.5\text{V}$, $I_F=10\text{mA}$	—	13	18	mA
Leak current (*5)	I_{I-O}	45%RH, $T_a=25^\circ\text{C}$, $t=5\text{s}$, VI-O=3000VDC	—	—	1.0	mA
Isolation resistance (input-output) (*5)	R_{I-O}	$V_{I-O}=500\text{V}$, $T_a=25^\circ\text{C}$	—	10^{12}	—	Ω
Capacitance (input-output) (*5)	C_{I-O}	$f=1\text{MHz}$, $T_a=25^\circ\text{C}$	—	0.6	—	pF
Propagation delay time Output (0)→(1) (*6)	t_{PLH}	$I_F=7.5\text{mA}$, $V_{CC}=5\text{V}$, $R_L=350\Omega$, $C_L=15\text{pF}$, $T_a=25^\circ\text{C}$	—	45	75	ns
Propagation delay time Output (1)→(0) (*6)	t_{PHL}		—	45	75	ns
Output rise-fall time (10 to 90%)	t_r, t_f	$I_F=7.5\text{mA}$, $V_{CC}=5\text{V}$, $R_L=350\Omega$, $C_L=15\text{pF}$	—	30	—	ns
Instantaneous common mode rejection voltage “output(0)” (*7)	CM_H	$I_F=0\text{mA}$, $V_{CM}=10\text{V}$, $V_O(\text{Min})=2.0\text{V}$ $R_L=350\Omega$	—	500	—	V/us
Instantaneous common mode rejection voltage “output(1)” (*7)	CM_L	$I_F=5\text{mA}$, $V_{CM}=10\text{V}$, $V_O(\text{Max})=0.8\text{V}$ $R_L=350\Omega$	—	-500	—	V/us

Note) Typical values are all at $V_{CC} = 5V$, $T_a = 25^\circ C$

*1 $T_a = 25^\circ C$.

*2 Pulse width $\leq 1ms$

*3 40 to 80%RH AC for 1 minute, $f=60HZ$.

*4 At $I_{in} = 10mA$, V_F decreases at the rate of $1.6mV/^\circ C$ if the temperature goes up.

*5 Measured as 2-pin element. Connect pins 2 and 3, connect pins 5, 6, 7 and 8.

*6 Refer to the Fig. 1.

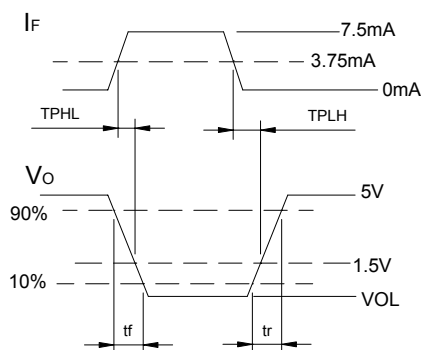
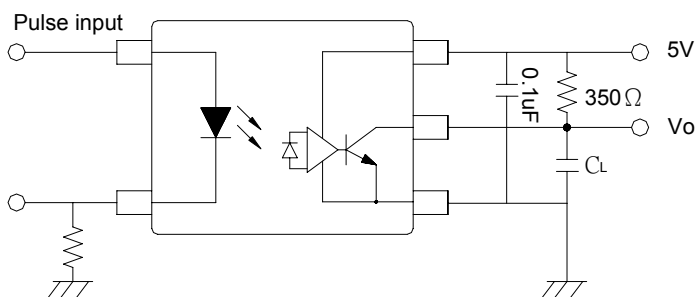
*7 C_{MH} represents a common mode voltage ignorable rise time ratio that can hold logic (1) state in output.

C_{ML} represents a common mode voltage ignorable fall time ratio that can hold logic (0) state in output.

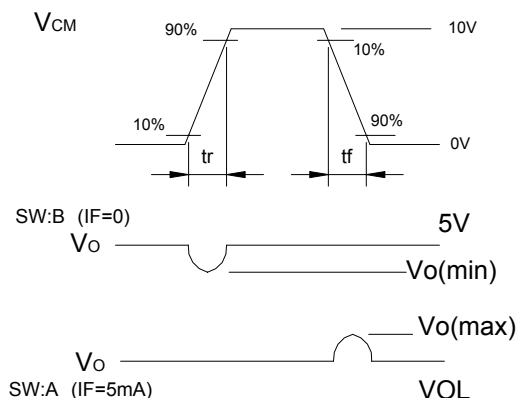
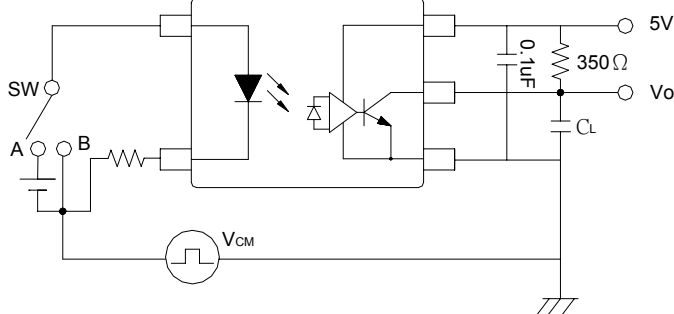
Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Low level input current	I_{FL}	0	250	μA
High level input current	I_{FH}	7.0	15	mA
Supply voltage	V_{CC}	4.5	5.5	V
Fanout (TTL load)	N	-	8	-
Operating temperature	T_{opr}	-40	+85	$^\circ C$

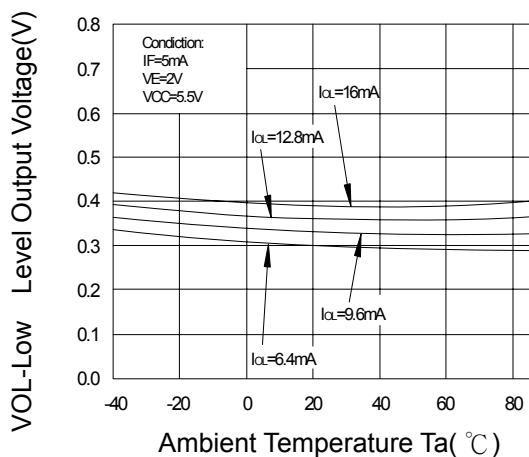
Test Circuit for Propagation Delay time



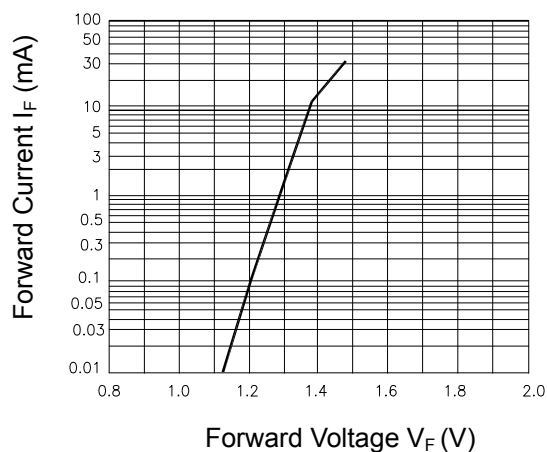
Test Circuit for Instantaneous Common Mode Rejection Voltage



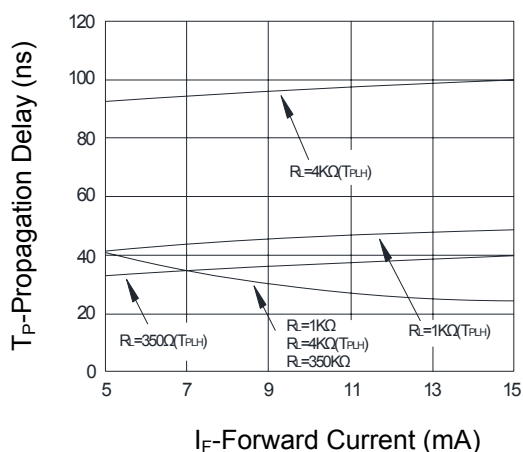
**Fig.1 Low Level Output Voltage
vs. Ambient Temperature**



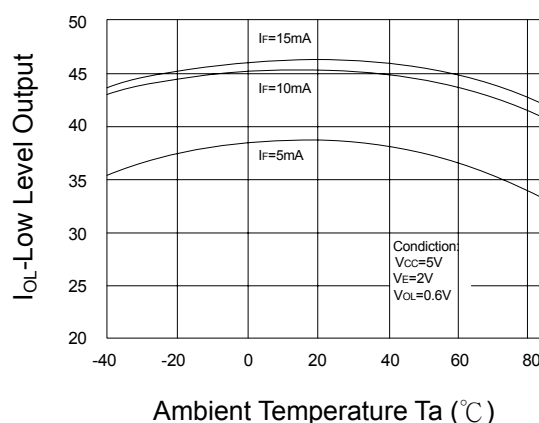
**Fig.2 Forward Current
vs. Input Diode Forward Voltage**



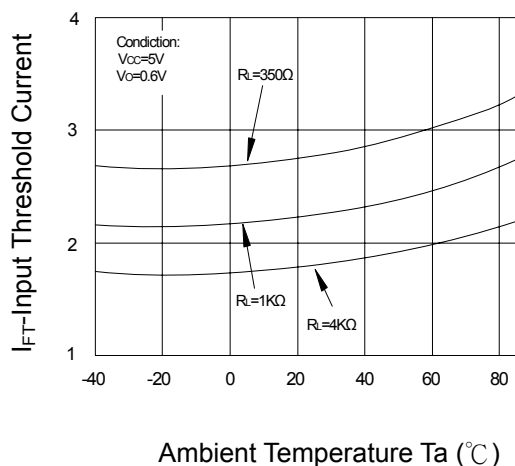
**Fig.3 Switching Time
vs. Forward Current**



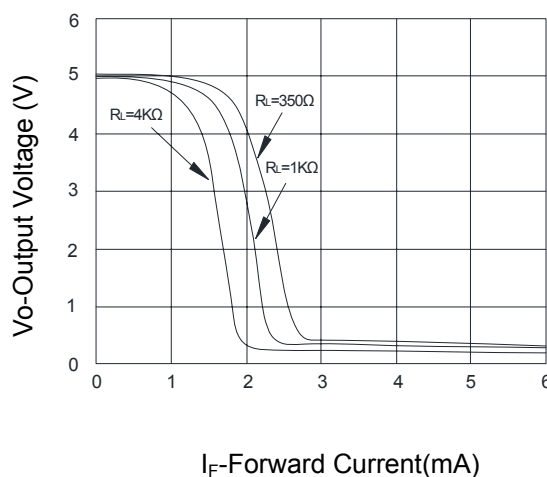
**Fig.4 Low Level Output Current
vs. Ambient Temperature**



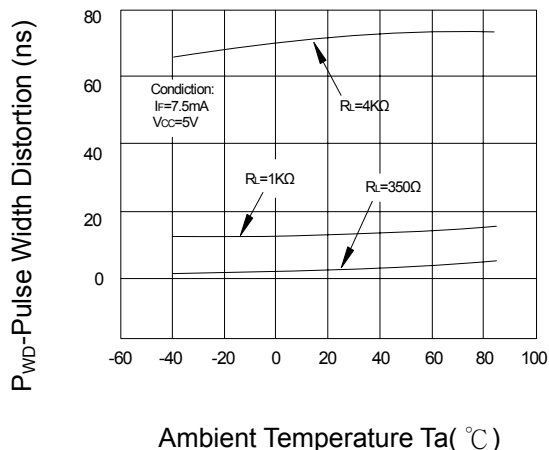
**Fig.5 Input Threshold Current
vs. Ambient Temperature**



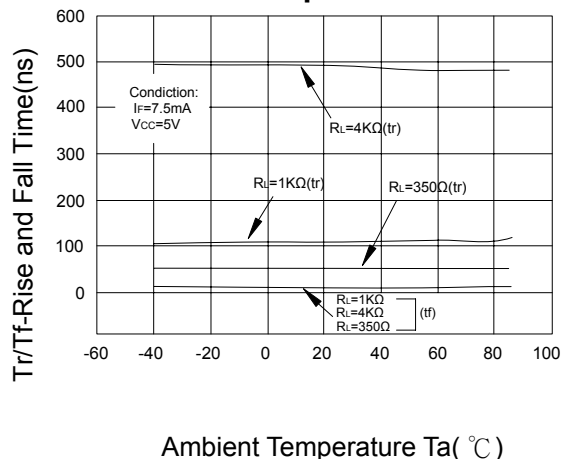
**Fig.6 Output Voltage
vs. Input Forward Current**



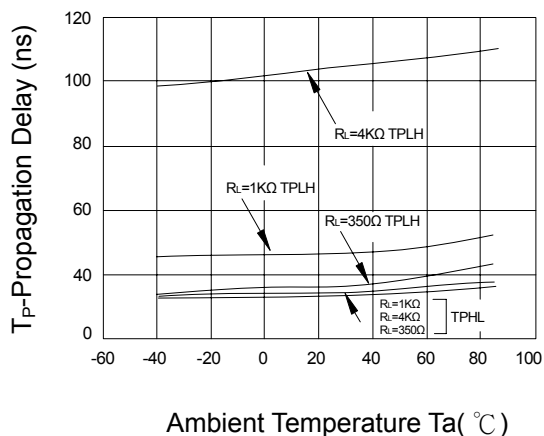
**Fig.7 Pulse Width Distortion
vs. Ambient Temperature**



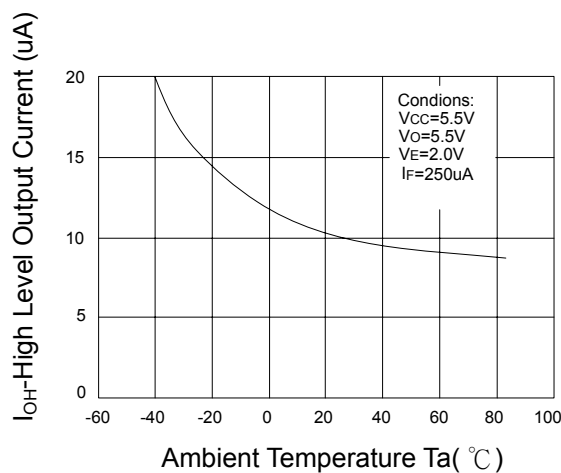
**Fig.8 Rise and Fall Time
vs. Ambient Temperature**



**Fig.9 Switch Time
vs. Ambient Temperature**



**Fig.10 High Level Output Current
vs. Ambient Temperature**

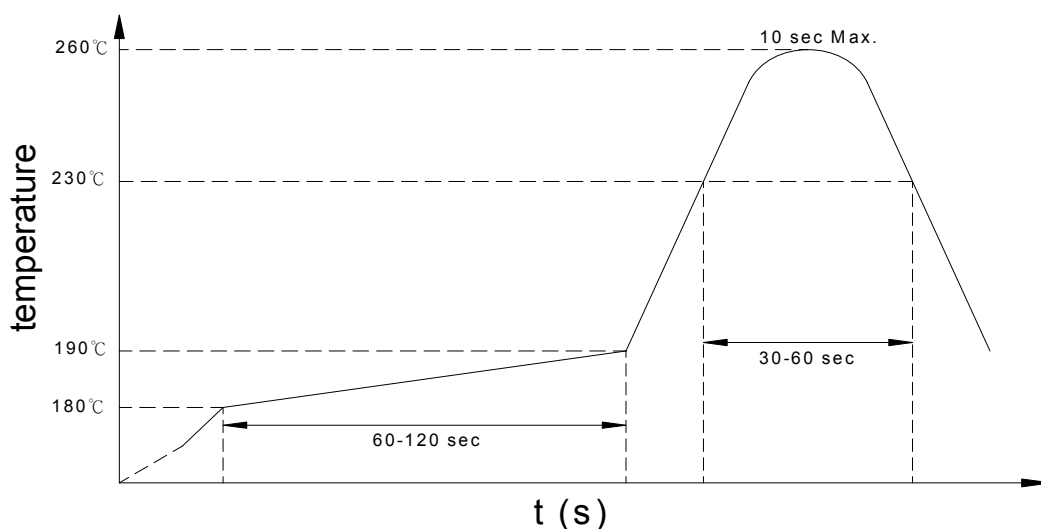


● Recommended Soldering Conditions

(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

KPC410 (Z)

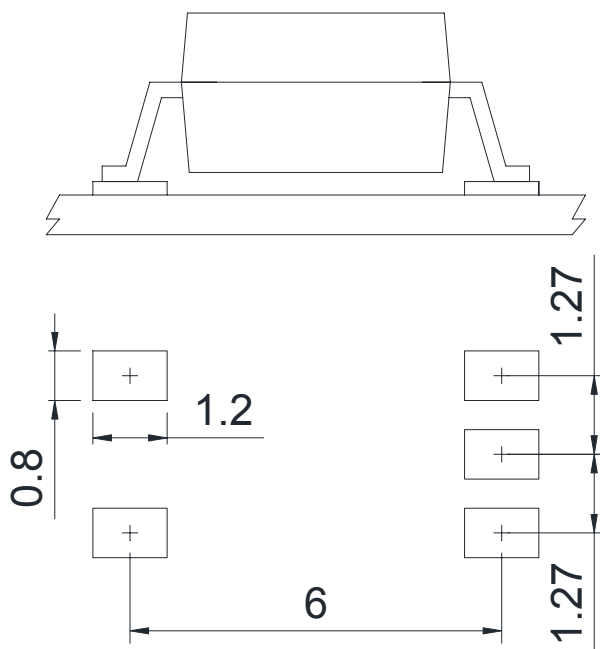
Notes:

KPC410 = Part No.

Z = Tape and reel option (TLD, TRU)

Option	Description	Packing quantity
TLD	TLD tape & reel option	3000 units per reel
TRU	TRU tape & reel option	3000 units per reel

● Recommended Pad Layout for Surface Mount Lead Form



Unit : mm



Unit: mm

TLD

Dimensions for TLD (Top Left Drive):

- Top edge offset: +0.25
- Horizontal spacing between top pins: 4.0
- Horizontal spacing between bottom pins: 2.0
- Pin diameter: $\phi 1.5$
- Top edge thickness: 1.75
- Vertical spacing between pin rows: 7.5
- Bottom edge offset: 4.1

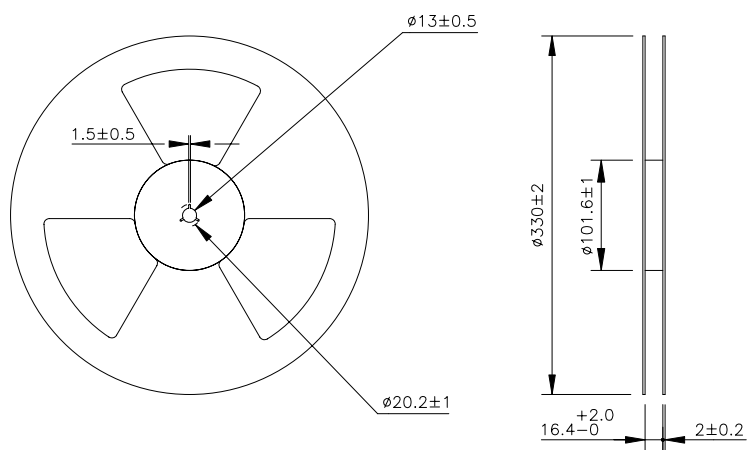
TRU

Dimensions for TRU (Top Right Unit):

- Top edge offset: 2.55
- Vertical spacing between top pins: 16.0 (+0.30, -0.10)
- Vertical spacing between bottom pins: 7.50
- Pin diameter: $\phi 1.5$
- Bottom edge offset: 0.31
- Tolerance: $\pm 0.2\text{mm}$

Direction of feed from reel

The bottom row of the drawing shows the internal structure of the TLD and TRU components, including the feed direction from the reel, indicated by arrows pointing right.



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