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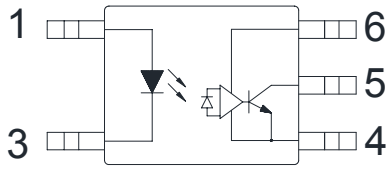
KPC410 Series

5PIN HIGH-SPEED OUTPUT PHOTOCOUPLER

Description

The KPC410 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 5pin mini-flat package.

Schematic



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

Features

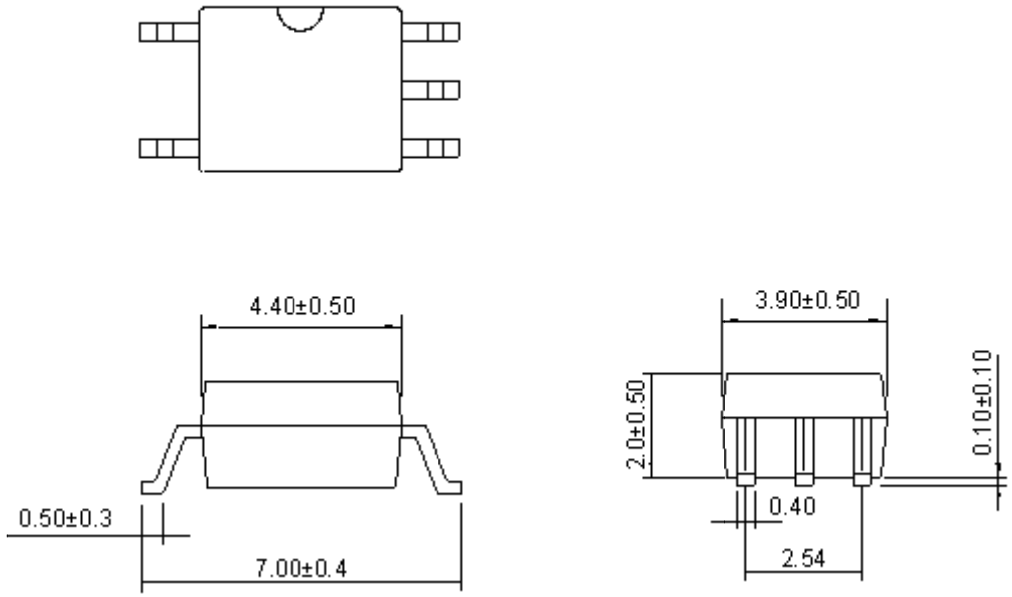
1. Pb free and RoHS compliant
2. 5 pin mini-flat package
3. Super high speed response (t_{PLH},t_{PHL}:typ.45ns at R_L=350 ohm)
4. Instantaneous common mode rejection voltage (CM_H: typ. 500V/us)
5. High isolation voltage between input and output (Viso: 3750Vrms)
6. Low input current drive (I_{FHL}: 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:

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410
YWW Y: Year code / WW: Week code

● Absolute Maximum Ratings

(Ta=25℃)

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	℃
Storage temperature		Tstg	-55 to +125	℃
Soldering temperature 10 seconds		Tsol	260	℃

● Electro-optical Characteristics

(Ta= 25℃)

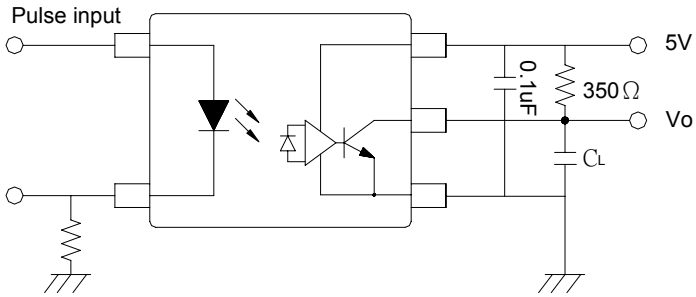
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input forward voltage (*4)	V_F	I_F=10mA,Ta=25℃	–	1.6	1.75	V
Input reverse voltage	V_{BR}	I_R=10uA,Ta=25℃	5	–	-	V
Input capacitance	C_{IN}	VF=0, f=1MHz	–	60	-	pF
Logic (1) output current	I_{OH}	Vcc=5.5V,V_O=5.5V,I_F=250uA	-	2	250	μA
Logic (0) output voltage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

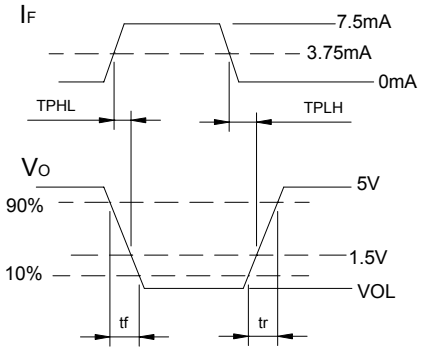
Note) Typical values are all at Vcc = 5V, Ta= 25°C
*1 Ta=25°C.
*2 Pulse width <= 1ms
*3 40 to 80%RH AC for 1 minute, f=60HZ.
*4 At Iin =10mA, V_F decreases at the rate of 1.6mV/°C if the temperature goes up.
*5 Measured as 2-pin element. Connect pins 2 and 3, connect pins 5, 6, 7 and 8.
*6 Refer to the 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

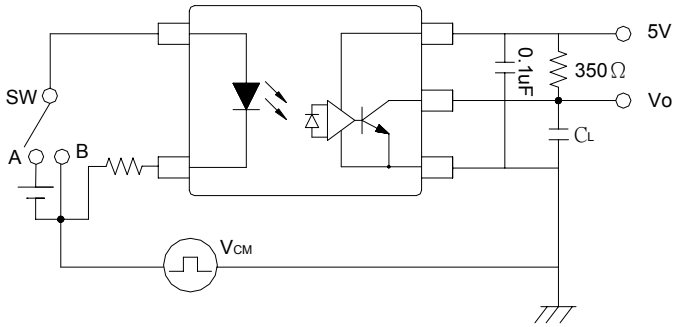
Parameter	Symbol	Min	Max	Unit
Low level input current	I_{FL}	0	250	μA
High level input current	I_{FH}	7.0	15	mA
Supply voltage	V_{CC}	4.5	5.5	V
Fanout (TTL load)	N	-	8	-
Operating temperature	T_{opr}	-40	+85	℃

● Test Circuit for Propagation Delay time





● Test Circuit for Instantaneous Common Mode Rejection Voltage



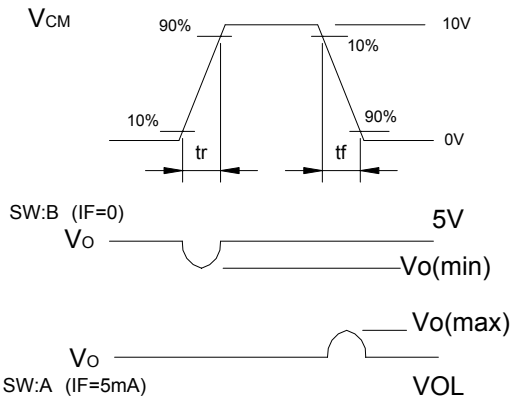


Fig.1 Low Level Output Voltage vs. Ambient Temperature

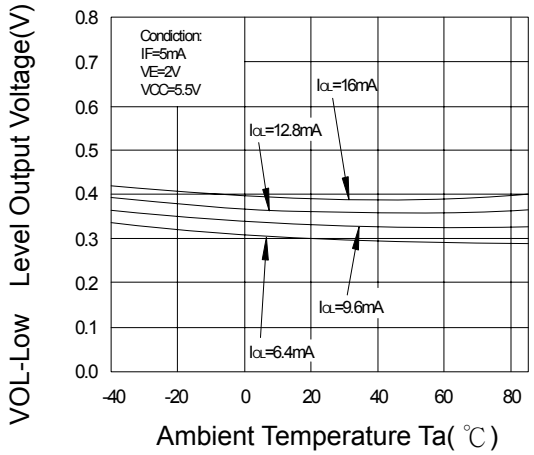


Fig.2 Forward Current vs. Input Diode Forward Voltage

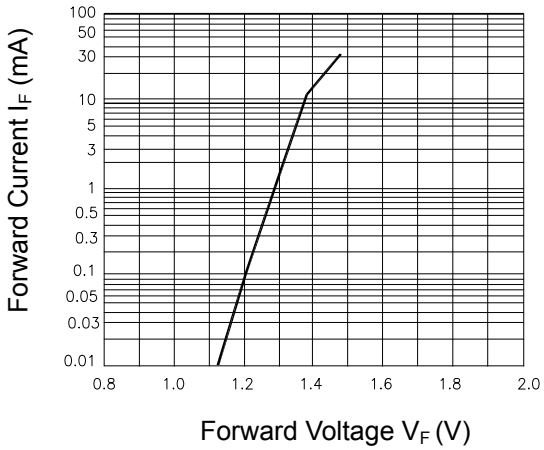


Fig.3 Switching Time vs. Forward Current

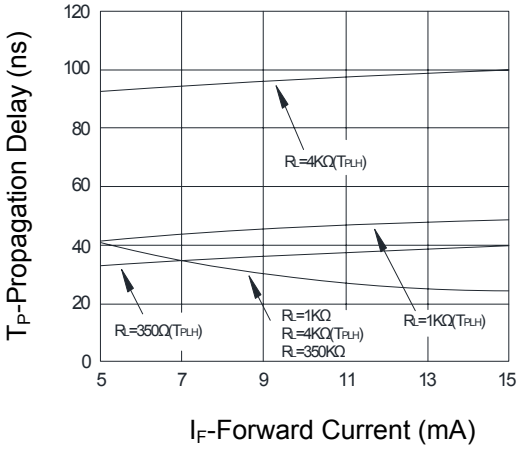


Fig.4 Low Level Output Current vs. Ambient Temperature

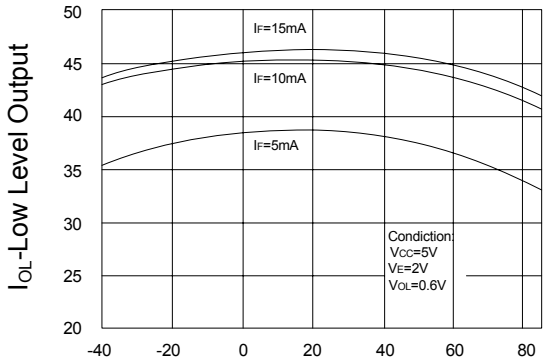


Fig.5 Input Threshold Current vs. Ambient Temperature

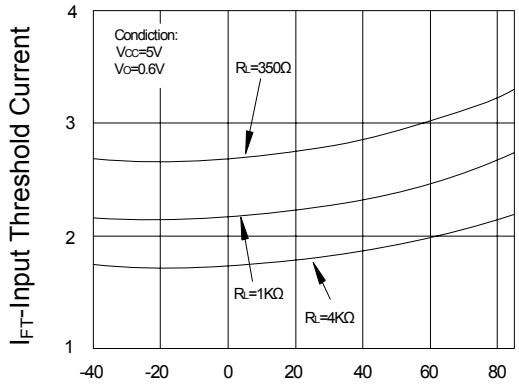


Fig.6 Output Voltage vs. Input Forward Current

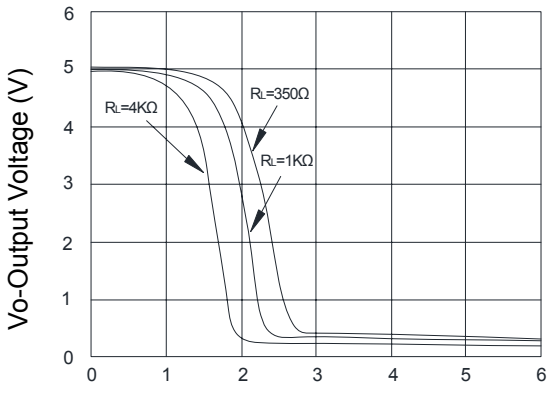


Fig.7 Pulse Width Distortion vs. Ambient Temperature

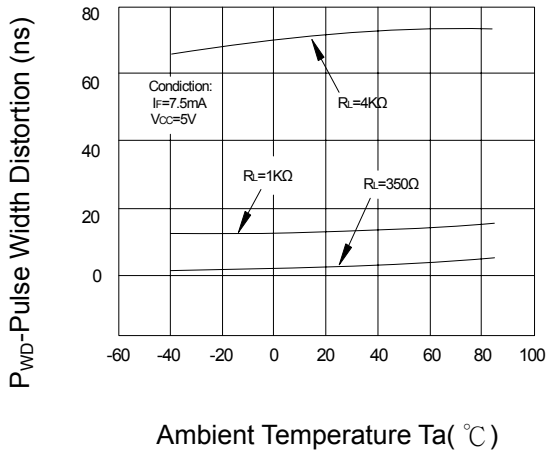


Fig.8 Rise and Fall Time vs. Ambient Temperature

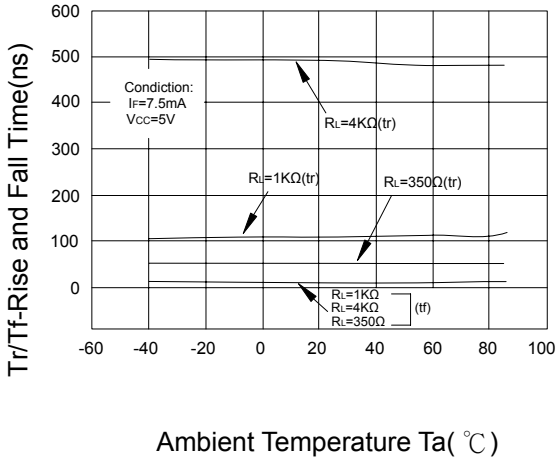


Fig.9 Switch Time vs. Ambient Temperature

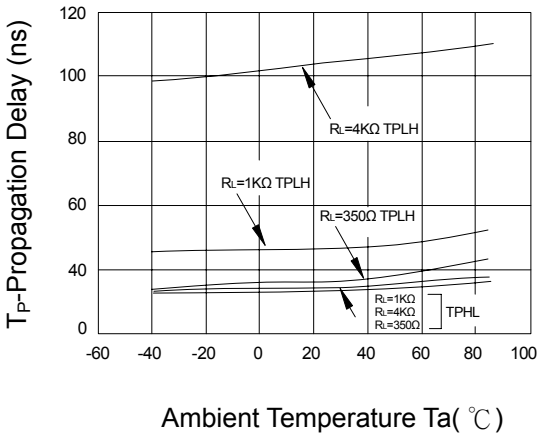
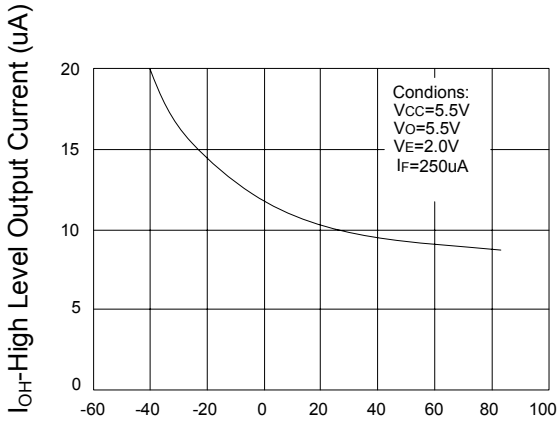


Fig.10 High Level Output Current vs. Ambient Temperature

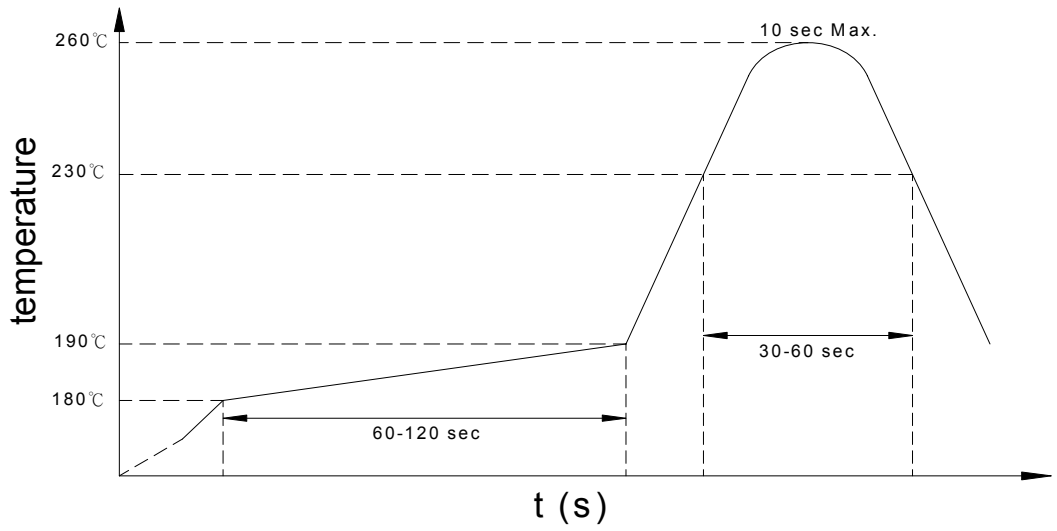


● Recommended Soldering Conditions

(a) Infrared reflow soldering：

- Peak reflow soldering： 260℃ 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**

KPC410 (Z)

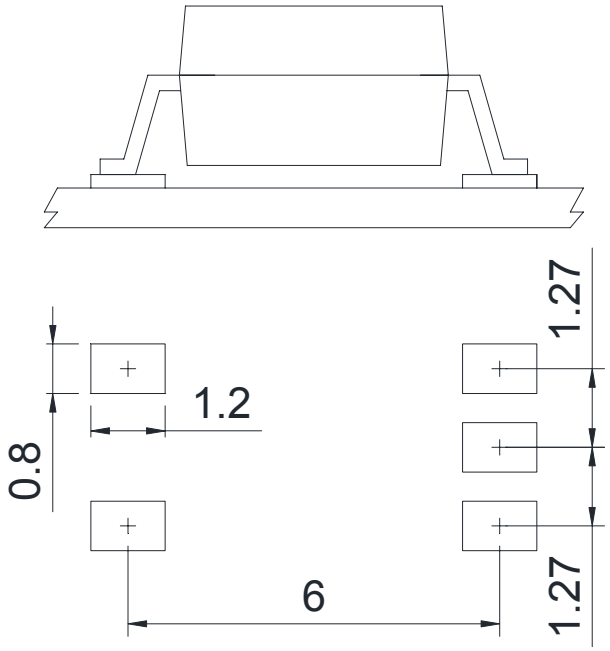
Notes:

KPC410 = Part No.

Z = Tape and reel option (TLD, TRU)

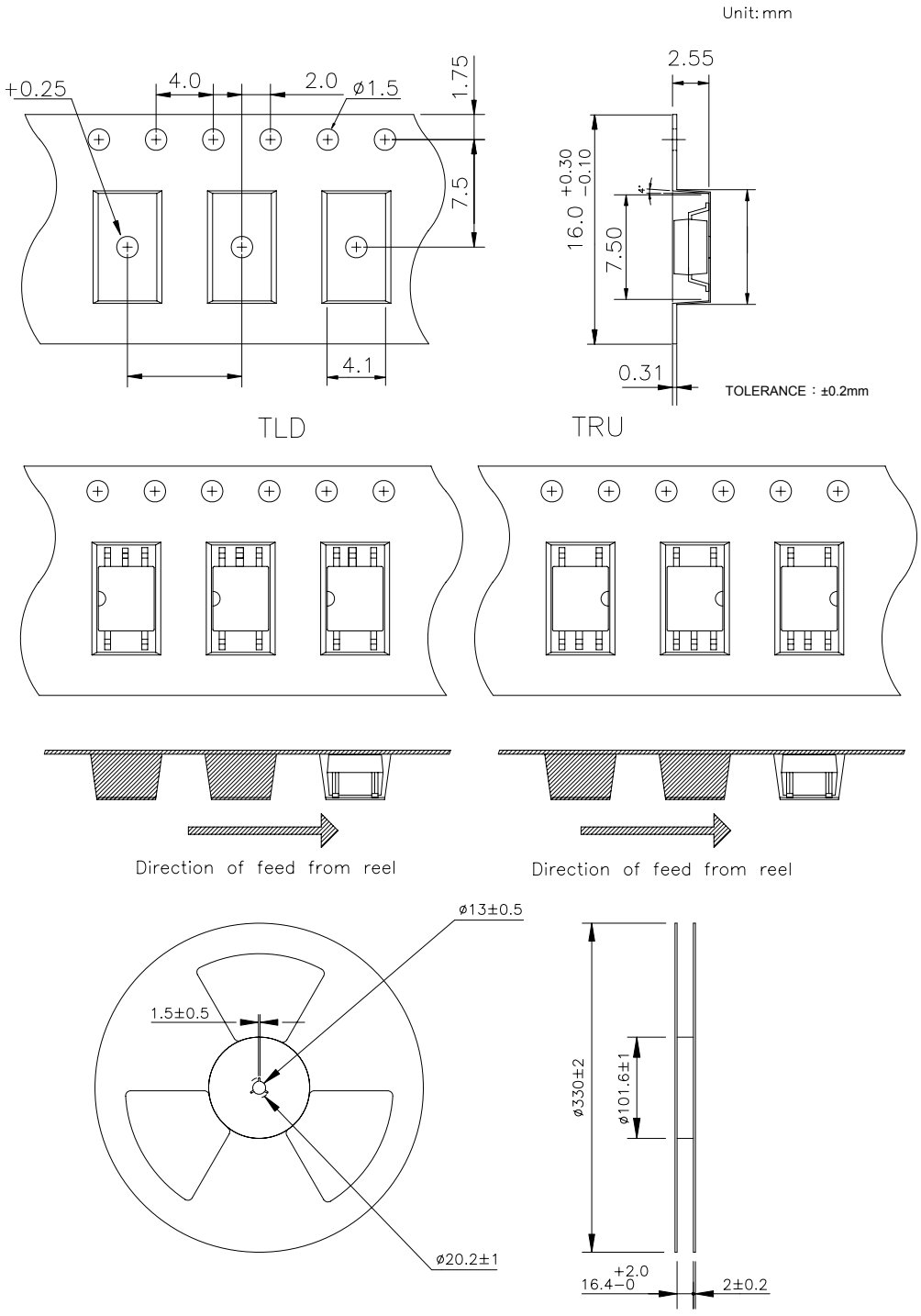
Option	Description	Packing quantity
TLD	TLD tape & reel option	3000 units per reel
TRU	TRU tape & reel option	3000 units per reel

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



Unit : mm

● SOP Carrier Tape & Reel



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