

Features

- +3.3V and +5V CMOS compatibility
- 30 ns max. pulse width distortion
- 40 ns max. propagation delay (3.3V supply voltage)
- 30 ns max. propagation delay skew
- High speed: 25 MBd min.
- 10 kV/ μ s minimum common mode rejection
- -40°C to 105°C temperature range
- Regulatory Approvals:
 - UL - UL1577
 - VDE - EN60747-5-5(VDE0884-5)
 - CQC - GB4943.1

Applications

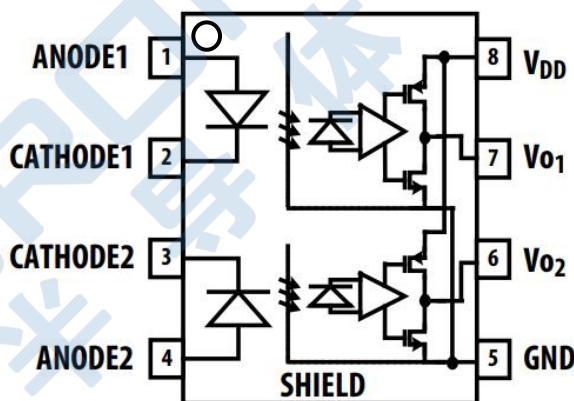
- Digital field bus isolation:
- CANBus, RS485, USB
- Multiplexed data transmission
- Computer peripheral interface
- Microprocessor system interface



RoHS

Description

ICPL-074L (dual-channel) are 25MBd CMOS optocouplers in SOIC-8 package. The optocouplers use the latest CMOS IC technology to achieve outstanding performance with very low power consumption. Basic building blocks of ICPL-074L are high speed LEDs and CMOS detector ICs. Each detector incorporates an integrated photodiode, a high-speed transimpedance amplifier, and a voltage comparator with an output driver.



Truth Table

LED	OUTPUT
OFF	H
ON	L

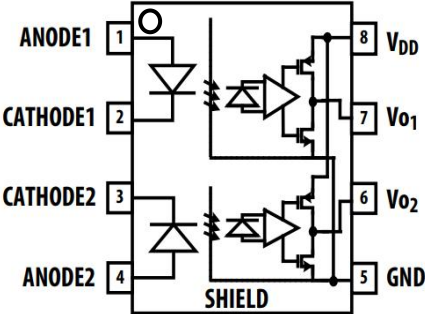
ORDERING INFORMATION

Outline	Part Number	Package	Marking	Packing	Packing Size	Quantity
	ICPL-074L-500E	SOP8	ICPL 074L /YYWW B	Reel	13 "	2000

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PIN CONFIGURATION AND FUNCTIONS

	Pin	Name
	1	ANODE1
	2	CATHODE1
	3	CATHODE2
	4	ANODE2
	5	GND
	6	V _{O2}
	7	V _{O1}
	8	V _{DD}

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Storage Temperature	T _S	-55	+125	°C
Ambient Operating Temperature	T _a	-40	+105	°C
Supply Voltages	V _{DD}	0	6.0	Volts
Output Voltage	V _O	-0.5	V _{DD} +0.5	Volts
Average Forward Input Current	I _F	-	20.0	mA
Average Output Current	I _O	-	10.0	mA
Input Power Dissipation	P _I	-	35	mW
Output Power Dissipation	P _O	-	100	mW
Lead Solder Temperature	260°C for 10s., 1.6 mm below seating plane			
Solder Reflow Temperature Profile	See Reflow Soldering Profile			

RECOMMENDED OPERATION CONDITIONS

Parameter	Symbol	Min.	Max.	Unit
Operating Temperature	T _a	-40	105	°C
Supply Voltage	V _{DD}	4.5	5.5	V
	V _{DD}	3.0	3.6	V
Input Current(ON)	I _F	9	18	mA
Supply Voltage Slew Rate	S _R	0.5	500	V/ms

ELECTRICAL OPTICAL CHARACTERISTICS ($T_a=25^{\circ}\text{C}$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
INPUT						
Forward Voltage	V_F	1.3	1.5	1.8	V	$I_F=14\text{mA}$
Input Reverse Breakdown Voltage	BV_R	5.0	-	-	V	$I_R = 10\text{ }\mu\text{A}$
OUTPUT						
Logic High Output Voltage	V_{OH}	$V_{DD}-1$	$V_{DD}-0.3$		V	$I_F = 0, I_O = -4\text{ mA}, V_{DD} = 3.3\text{V}$
		$V_{DD}-1$	$V_{DD}-0.2$		V	$I_F = 0, I_O = -4\text{ mA}, V_{DD} = 5.0\text{V}$
Logic Low Output Voltage	V_{OL}	-	0.35	0.8	V	$I_F=14\text{mA}, I_O = 4\text{ mA}, V_{DD} = 3.3\text{V}$
		-	0.2	0.8	V	$I_F=14\text{mA}, I_O = 4\text{ mA}, V_{DD} = 5.0\text{V}$
Input Threshold Current	I_{TH}	-	4.5	8.8	mA	$I_{OL} = 20\text{ }\mu\text{A}$
Low Output Supply Current	I_{DDL}	-	8.3	12	mA	$I_F=14\text{mA}$
High Output Supply Current	I_{DDH}	-	7.6	12	mA	$I_F=0\text{mA}$

SWITCHING CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition	Note
Over recommended temperature ($T_a = -40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$), $3.0\text{V} \leq V_{DD} \leq 3.6\text{V}$ and $4.5\text{V} \leq V_{DD} \leq 5.5\text{V}$. All typical specifications are at $T_a = +25^{\circ}\text{C}$, $V_{DD} = +3.3\text{V}$.							
Propagation Delay Time to Output Low Level	t_{PHL}	-	28	40	ns	$I_F=14\text{mA}$, $C_L=15\text{pF}$, $V_{DD}=3.3\text{V}$	
		-	-	50	ns	$I_F=14\text{mA}$, $C_L=15\text{pF}$, $V_{DD}=5\text{V}$	
Propagation Delay Time to Output High Level	t_{PLH}	-	22	40	ns	$I_F=14\text{mA}$, $C_L=15\text{pF}$, $V_{DD}=3.3\text{V}$	
		-	-	50	ns	$I_F=14\text{mA}$, $C_L=15\text{pF}$, $V_{DD}=5\text{V}$	
Pulse Width	TPW	66.7			ns		
Pulse Width Distortion	$ t_{PHL}-t_{PLH} $	0	7	25	ns	$I_F=14\text{mA}$, $C_L=15\text{pF}$, $V_{DD}=3.3\text{V}$	
		-	-	30	ns	$I_F=14\text{mA}$, $C_L=15\text{pF}$, $V_{DD}=5\text{V}$	
Propagation Delay Skew	t_{PSK}	-	-	30	ns	$I_F=14\text{mA}$, $C_L=15\text{pF}$	
Output Rise Time (10% – 90%)	t_r	-	20	-	ns	$I_F=14\text{mA}$, $C_L=15\text{pF}$	
Output Fall Time (90% - 10%)	t_f	-	25	-	ns	$I_F=14\text{mA}$, $C_L=15\text{pF}$	
Common Mode Transient Immunity at Logic High Output	$ CM_H $	10	15	-	kV/ μs	$I_F=0\text{mA}$, $T_a=25^{\circ}\text{C}$, $ V_{CM} =1\text{kV}$	
Common Mode Transient Immunity at Logic Low Output	$ CM_L $	10	15	-	kV/ μs	$I_F=14\text{mA}$, $T_a=25^{\circ}\text{C}$, $ V_{CM} =1\text{kV}$	
Input-Output Resistance	R_{I-O}	-	10^{12}	-	Ω	$V_{I-O}=500\text{V}$, 40~60%R.H.	
Input-Output Capacitance	C_{I-O}	-	0.6	-	pF	$V=0$, $F=1\text{MHz}$	

CHARACTERISTIC CURVES

Fig.1 Typical Input Diode Forward Characteristic

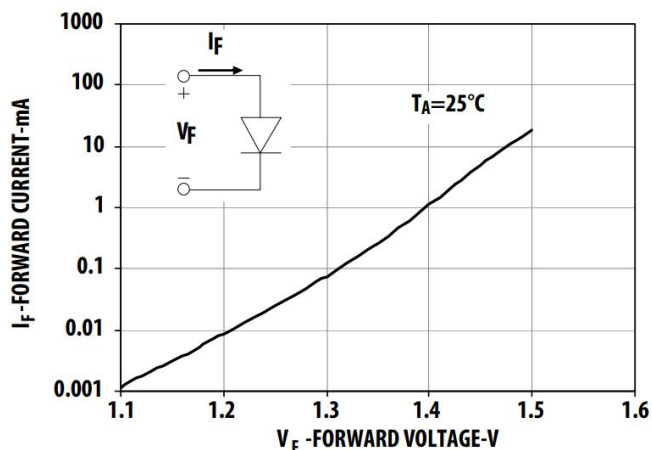


Fig.2 Typical Input Threshold Current vs. Temperature

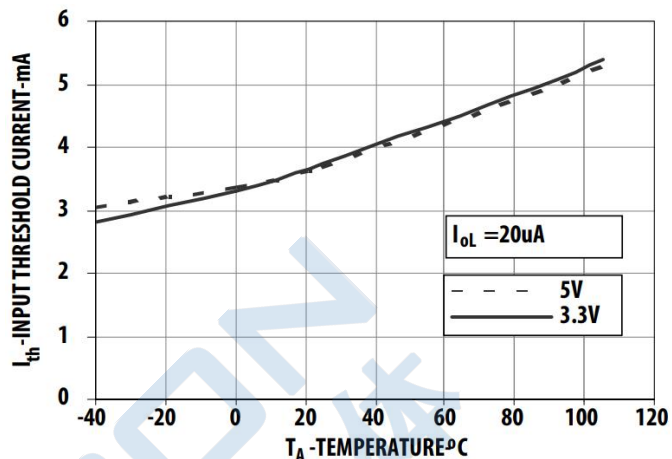


Fig.3 Typical Logic High O/P Supply Current vs. Temperature

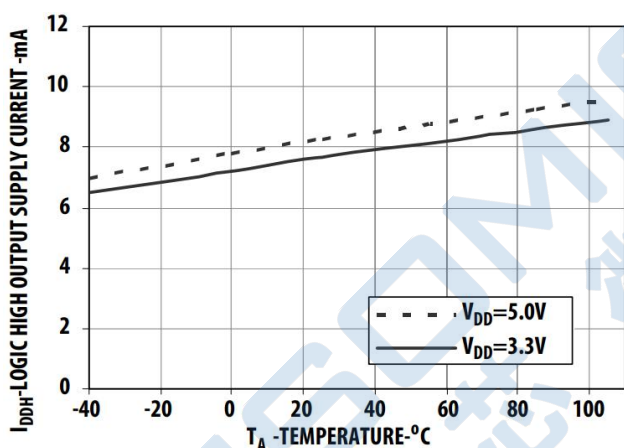


Fig.4 Typical Logic Low O/P Supply Current vs. Temperature

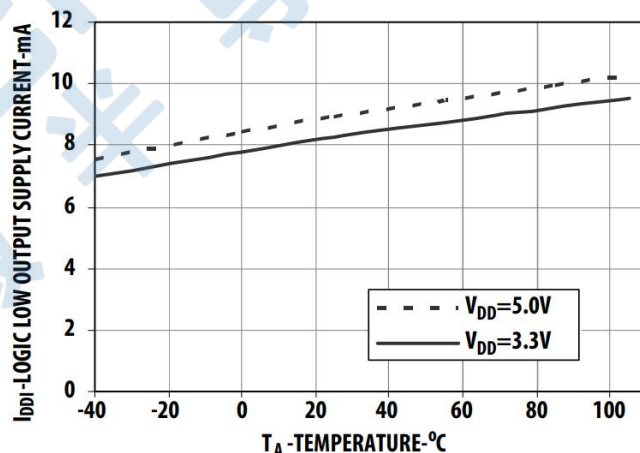


Fig.5 Typical Switching speed vs. Pulse Input Current at 5V Supply Voltage

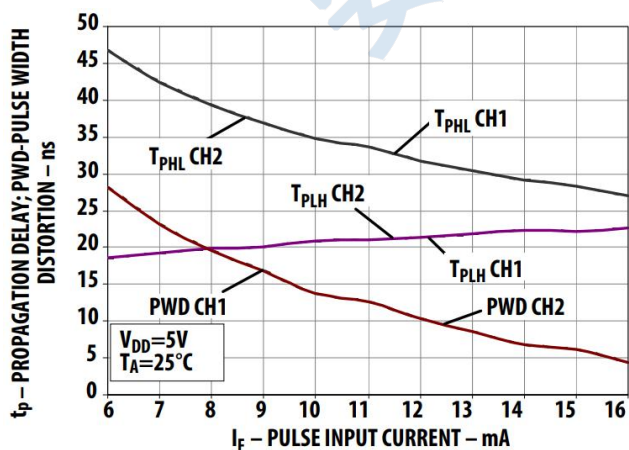
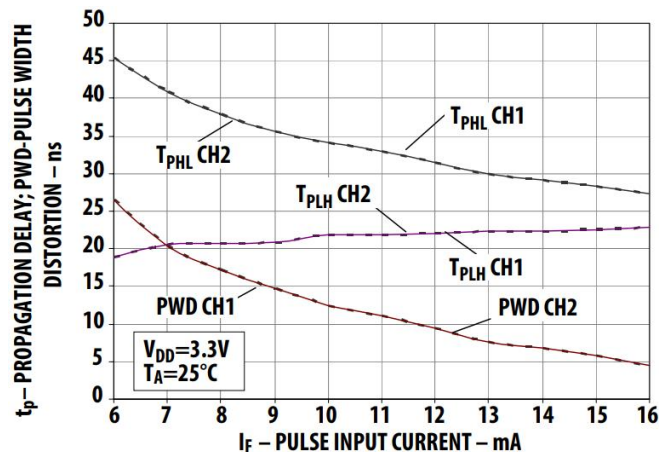
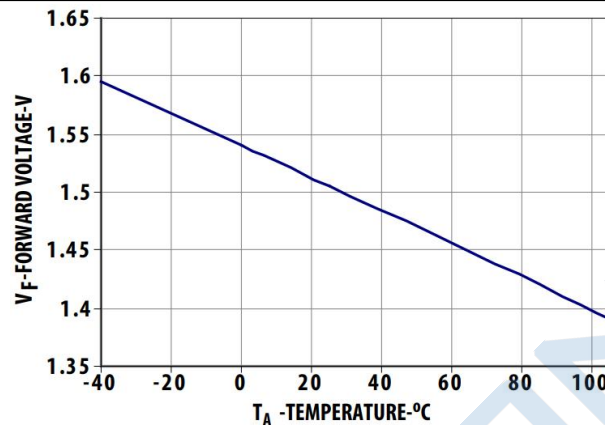


Fig.6 Typical Switching Speed vs. Pulse Input Current at 3.3V Supply Voltage



CHARACTERISTIC CURVES

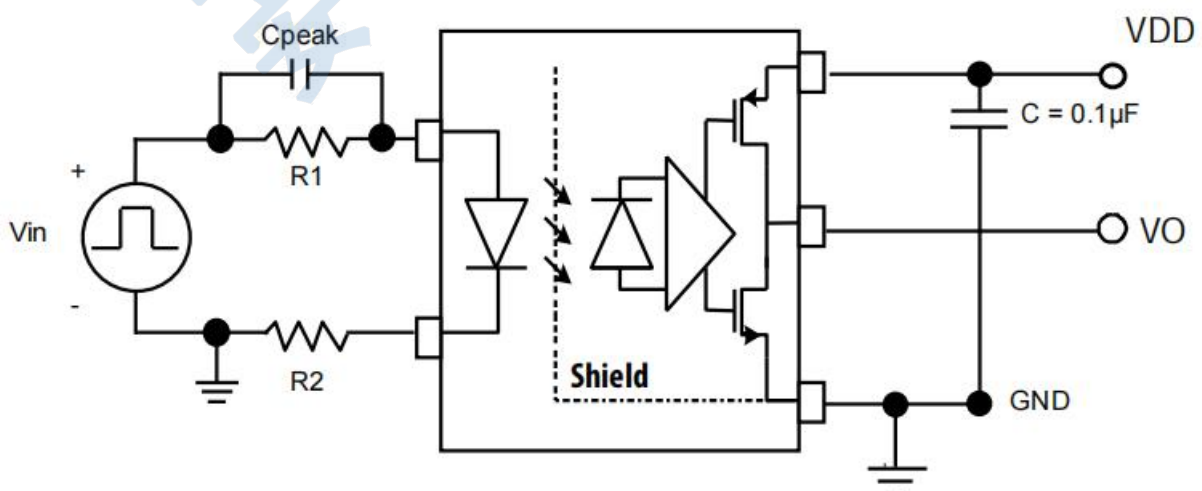
Fig.7 Typical V_F vs. Temperature



Input Limiting Resistors

ICPL-074L is direct current driven (Figure 8), and thus eliminate the need for input power supply. To limit the amount of current flowing through the LED, it is recommended that a 210 Ω resistor is connected in series with anode of LED (that is, Pins 1 and 4 for ICPL-074L) at 5V input signal. At 3.3V input signal, it is recommended to connect a 80 Ω resistor in series with anode of LED. The recommended limiting resistors are based on the assumption that the driver output impedance is 50 (as shown in Figure 9).

Connection of Peaking capacitor (C_{peak}) in Parallel of the Input Limiting Resistor (R_{limit}) to Improve Speed Performance



TEST CIRCUITS

Fig.8 Test circuit for Common Mode Transient Immunity and Typical Waveforms. R_{total} is the total resistance of the driver output impedance (which is assumed to be 50Ω) and the limiting resistor ($R_{total} = R_{drv} + R_{limit}$).

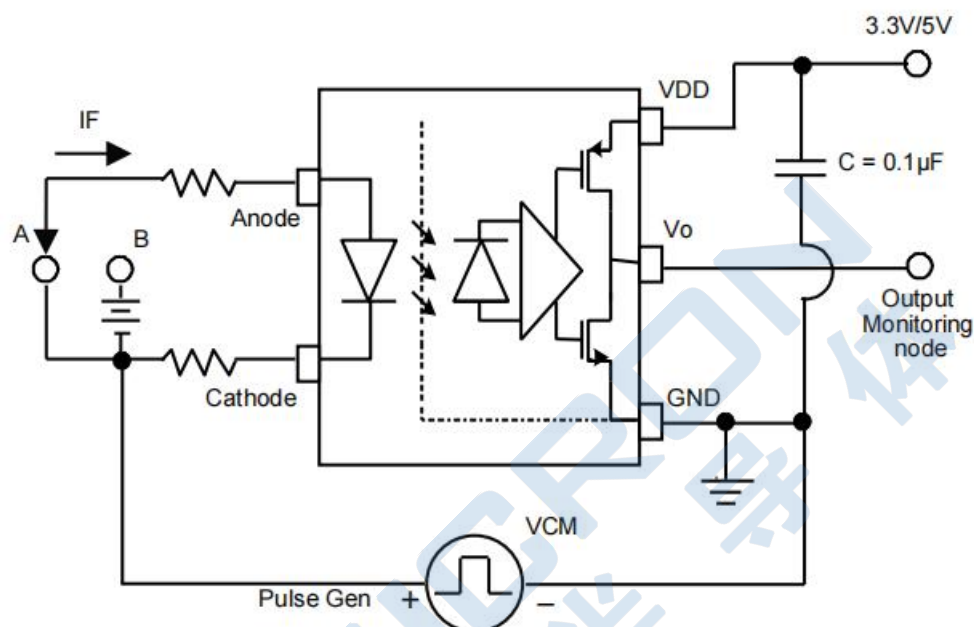
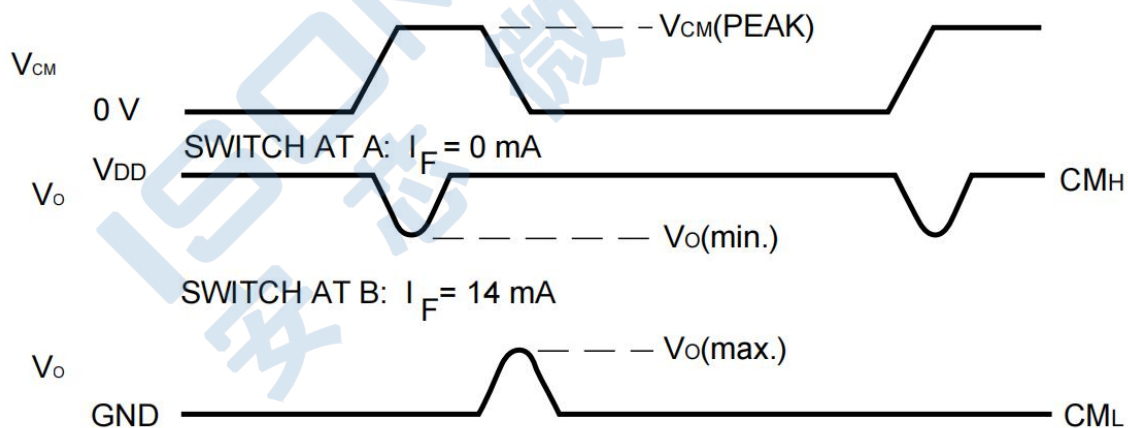
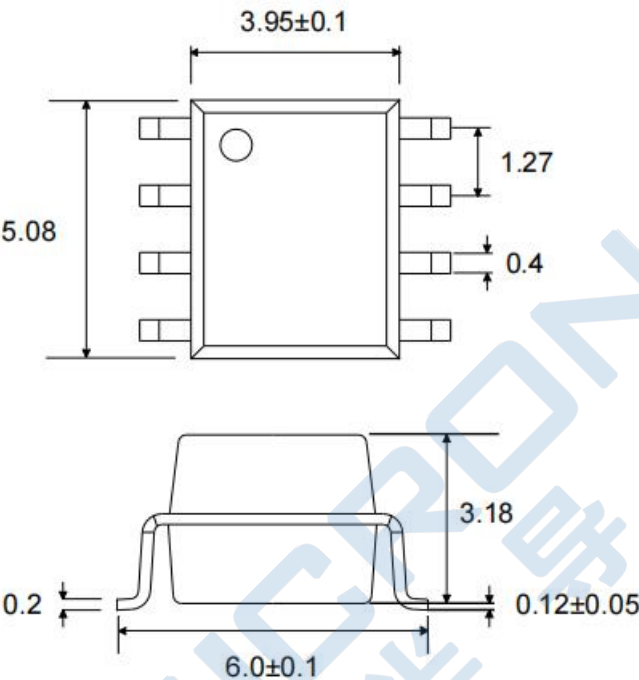


Fig.9 Waveforms of Common Mode Transient Immunity



PACKAGE DIMENSIONS

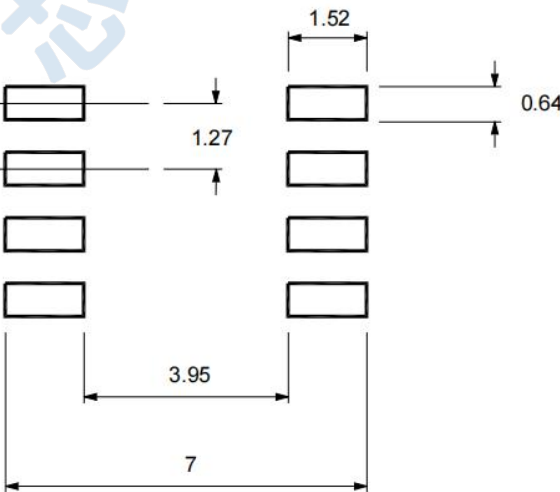
Surface Mount (Low Profile) Lead Forming (SOP8)



- Dimensions in mm unless otherwise stated

RECOMMENDED SOLDER MASK

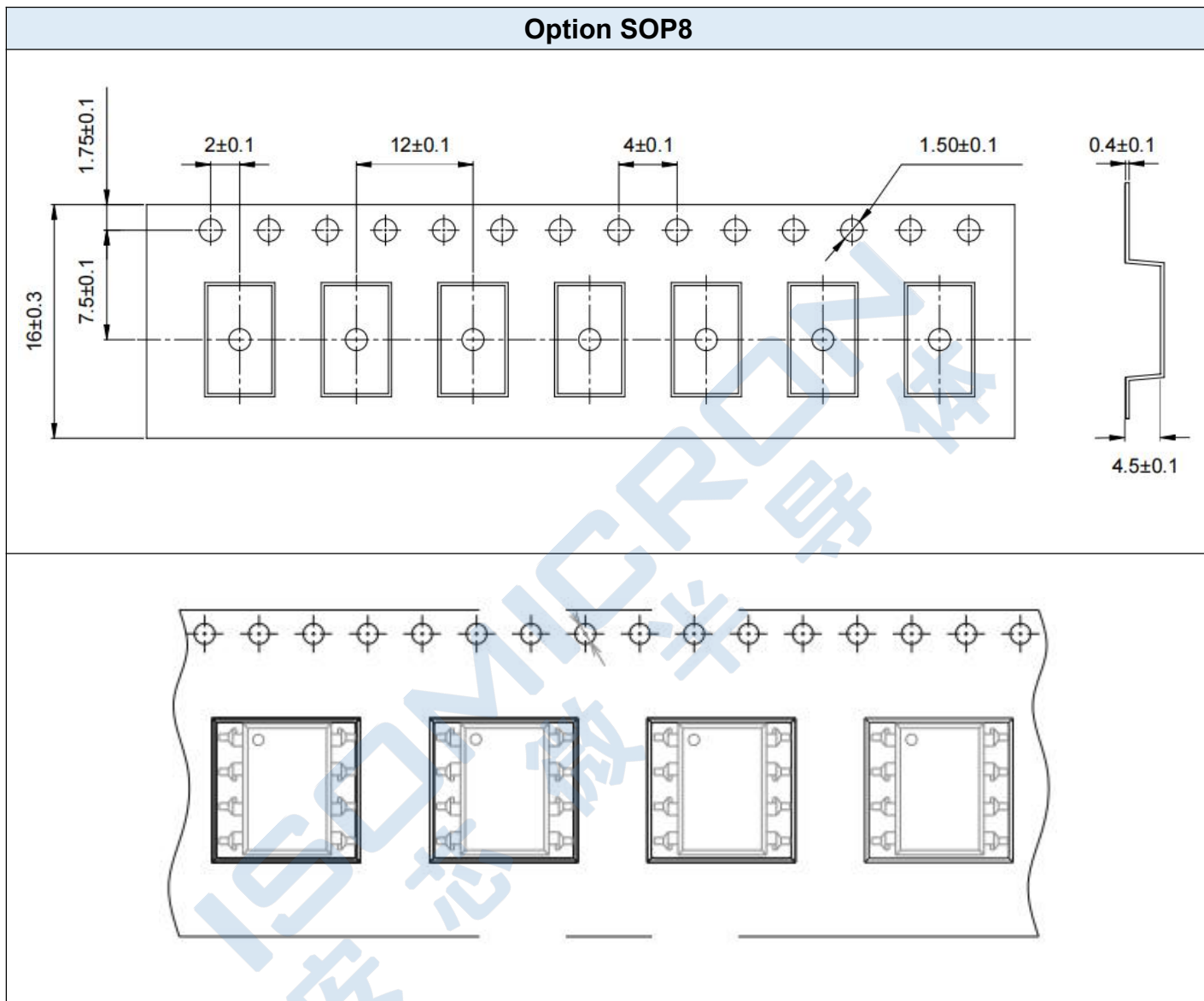
Surface Mount (Low Profile) Lead Forming



- Dimensions in mm unless otherwise stated

TAPING DIMENSIONS

Option SOP8



- Dimensions in mm unless otherwise stated

ORDERING AND MARKING INFORMATION

Marking Information



ICPL : Company Abbr.
074L : Part Number
/ : ISOMICRON
YY : Fiscal Year
WW : Work Week
B : Manufacturing Code

Order Code

ICPL - 074L - 5 0 0 E

Company Abbr. ← ICPL
Part Number ← 074L
Lead Forming ← 5
5: SM-SL

→ Halogen Free
E: Halogen-free, Lead-free
Z: Halogen, Lead-free

→ CTR Rank: None

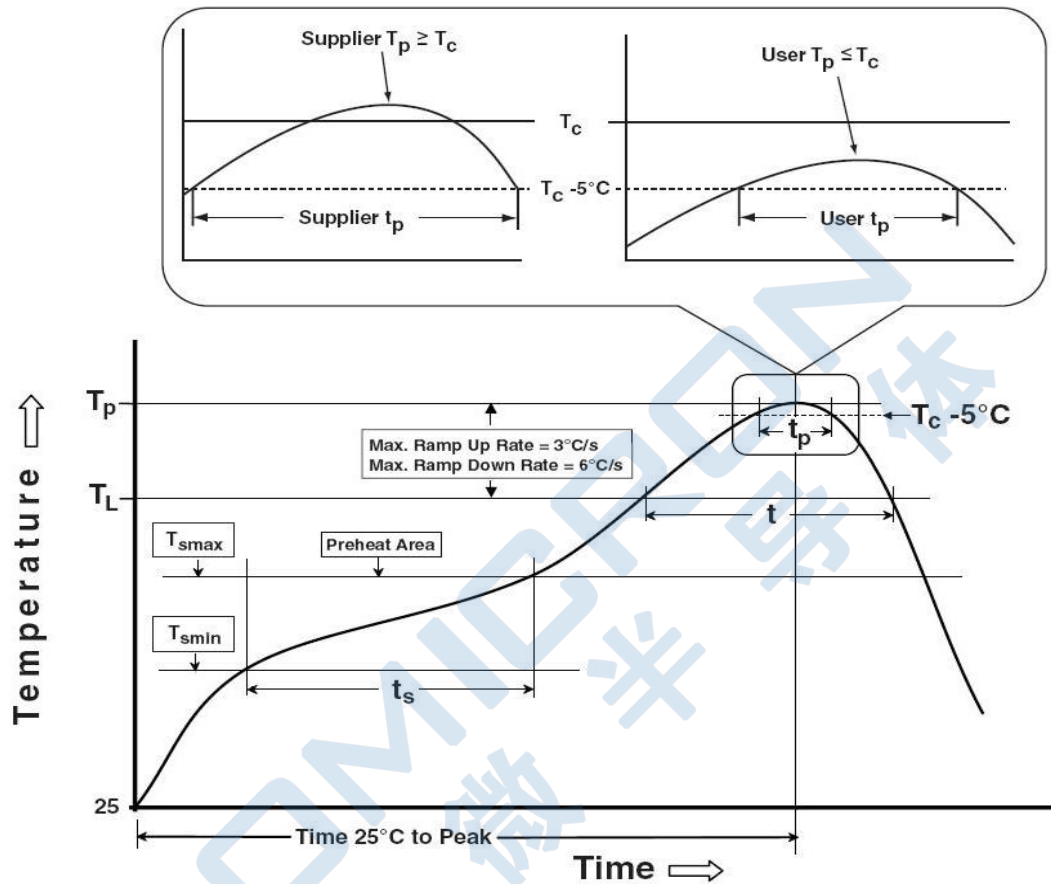
→ Performance
0: Normal
1: Enhanced

Packing Quantity

Option	Quantity	Quantity – Inner box	Quantity – Outer box
SM-SL	2000 Units/Reel	2 Reels/Inner box	5 Inner box/Outer box = 20k Units

REFLOW INFORMATION

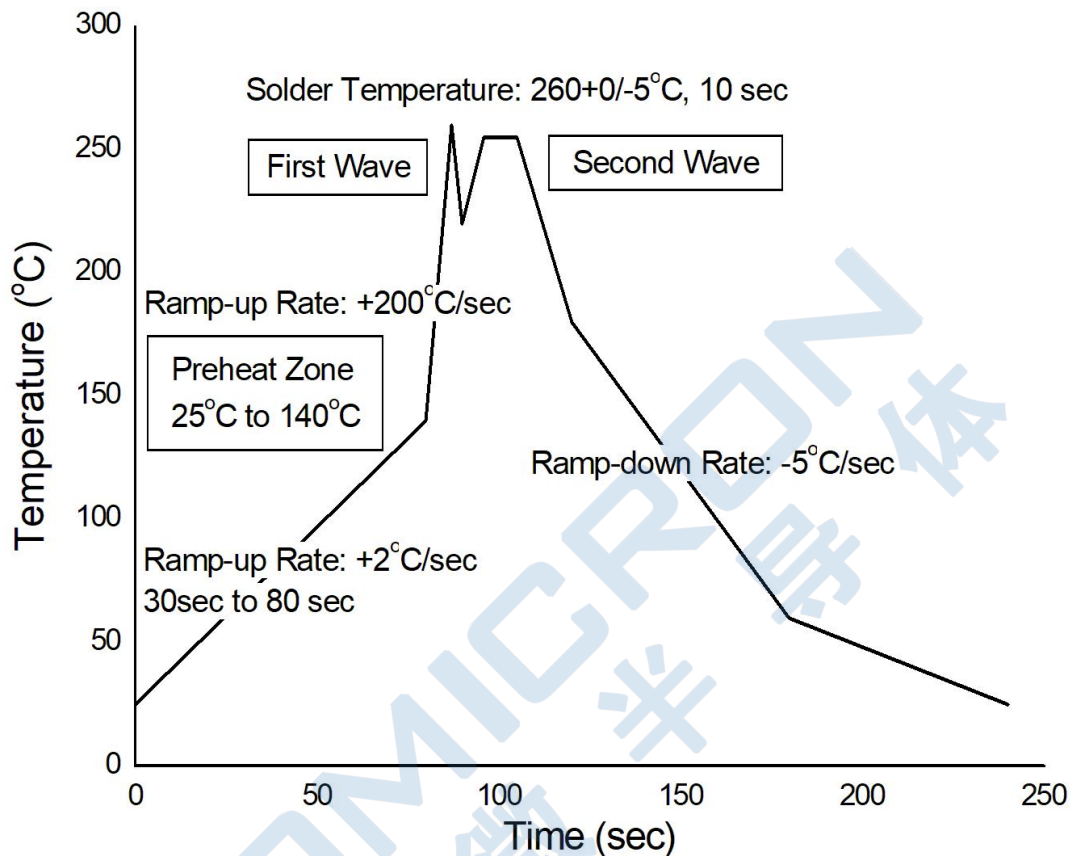
Reflow Profile



Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (Tsmmin)	100	150°C
Temperature Max. (Tsmmax)	150	200°C
Time (ts) from (Tsmmin to Tsmmax)	60-120 seconds	60-120 seconds
Ramp-up Rate (tL to tP)	3°C/second max.	3°C/second max.
Liquidous Temperature (TL)	183°C	217°C
Time (tL) Maintained Above (TL)	60 – 150 seconds	60 – 150 seconds
Peak Body Package Temperature	235°C +0°C / -5°C	260°C +0°C / -5°C
Time (tP) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (TP to TL)	6°C/second max	6°C/second max
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

TEMPERATURE PROFILE OF SOLDERING

Wave Soldering (JESD22-A111 Compliant)



Hand Soldering By Soldering Iron

Soldering Temperature	$380 \pm 0/-5^{\circ}\text{C}$
Soldering Time	3 sec max.

- One time soldering is recommended for all soldering method.
- Do not solder more than three times for IR reflow soldering.

DISCLAIMER

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- The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
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- This product is not intended to be used for military, aircraft, automotive, medical, life sustaining or lifesaving applications or any other application which can result in human injury or death.
- Please contact ISOMICRON sales agent for special application request.
- Immerge unit's body in solder paste is not recommended.
- Parameters provided in datasheets may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated in each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify ISOMICRON's terms and conditions of purchase, including but not limited to the warranty expressed therein.
- Discoloration might be occurred on the package surface after soldering, reflow or long-time use. It neither impacts the performance nor reliability.