Features

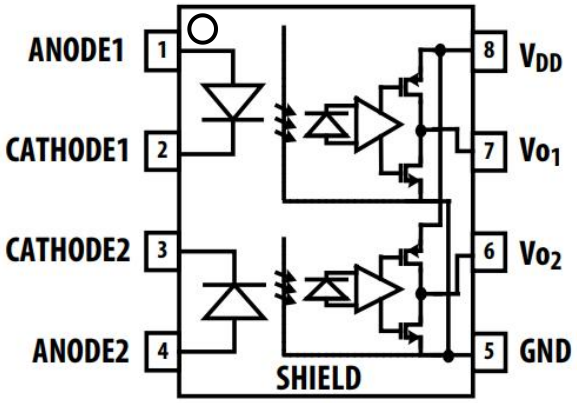
- +3.3V and +5V CMOS compatibility
- 30 ns max. pulse width distortion
- 40 ns max. propagation delay (3.3V supply voltage)
- 30 ns max. propagation delay skew
- High speed: 25 MBd min.
- 10 kV/μs minimum common mode rejection
- –40°C to 105°C temperature range
- Regulatory Approvals:
  - UL - UL1577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

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

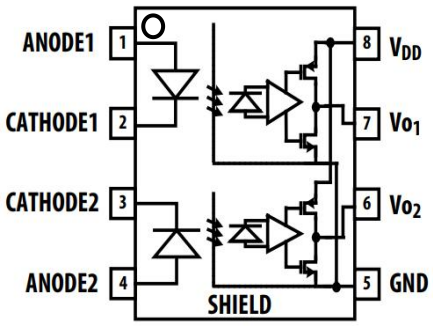
LED	OUTPUT
OFF	H
ON	L

ORDERING INFORMATION

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

CONTENTS

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	℃
Ambient Operating Temperature	T_a	-40	+105	℃
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℃ 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°C)

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

SWITCHING CHARACTERISTICS

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

CHARACTERISTIC CURVES

Fig.1 Typical Input Diode Forward Characteristic

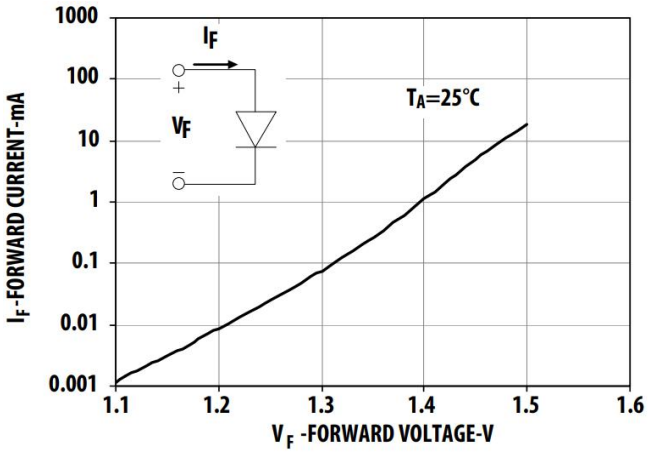


Fig.2 Typical Input Threshold Current vs. Temperature

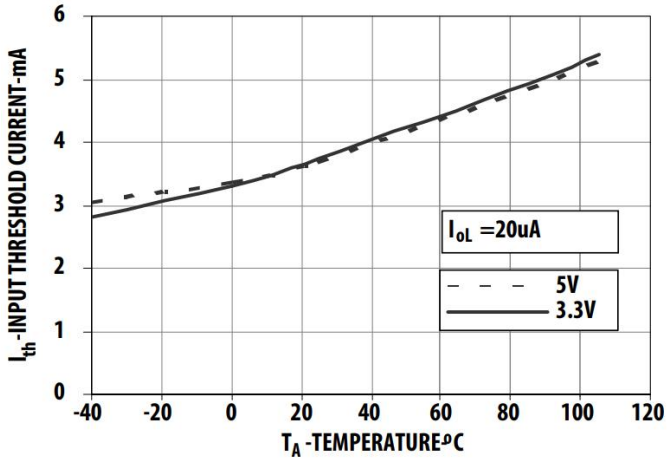


Fig.3 Typical Logic High O/P Supply Current vs.Temperature

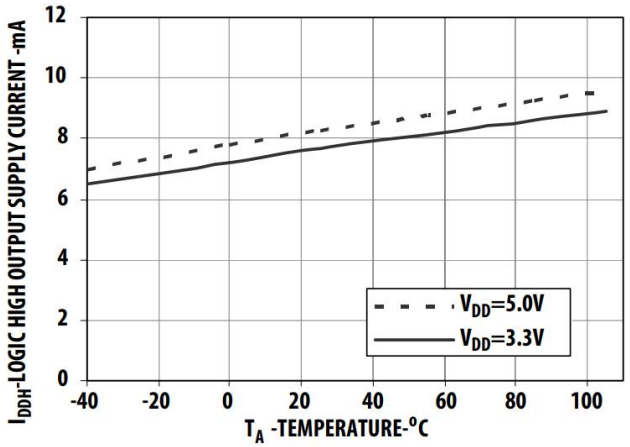


Fig.4 Typical Logic Low O/P Supply Current vs.Temperature

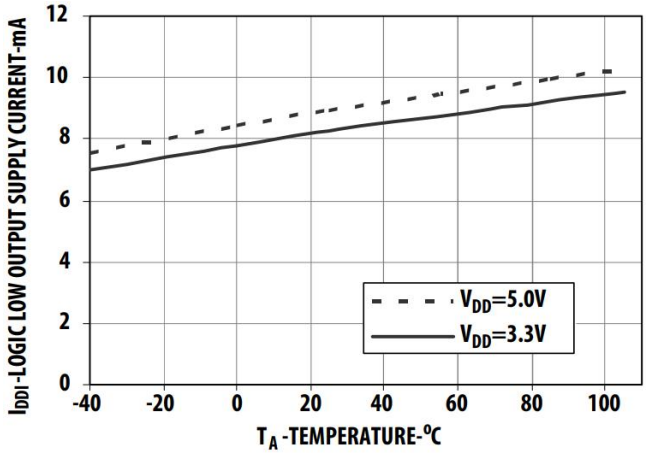


Fig.5 Typical Switching speed vs. Pulse Input Current at 5V Supply Voltage

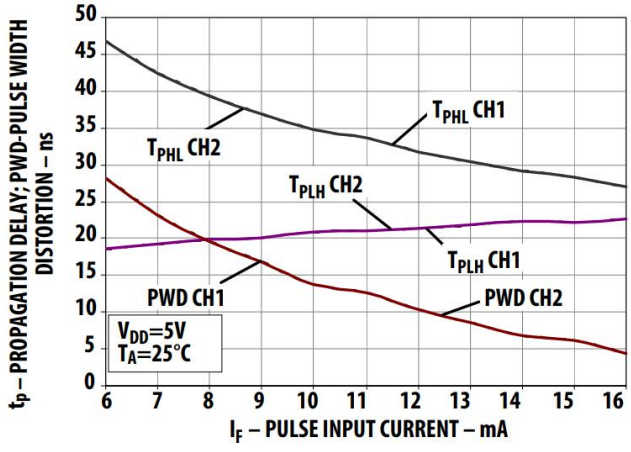
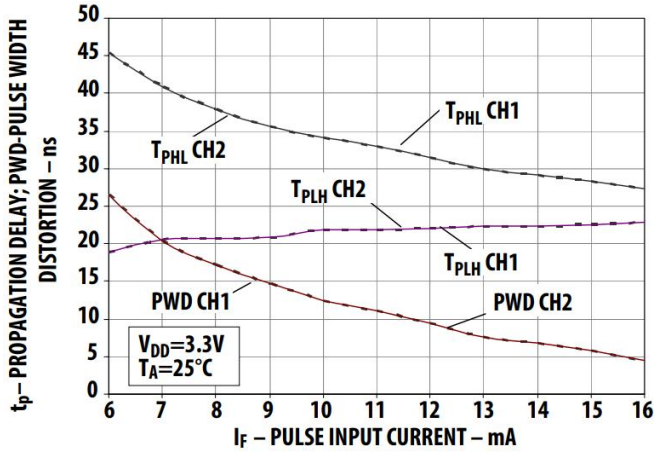
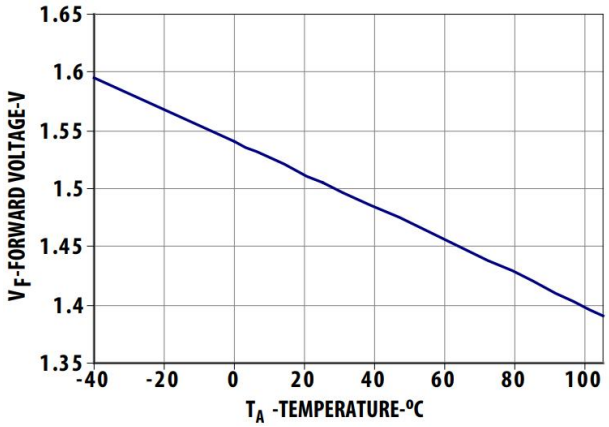


Fig.6 Typical Switching Speed vs. Pulse Input Current at 3.3V Supply Voltage



CHARACTERISTIC CURVES

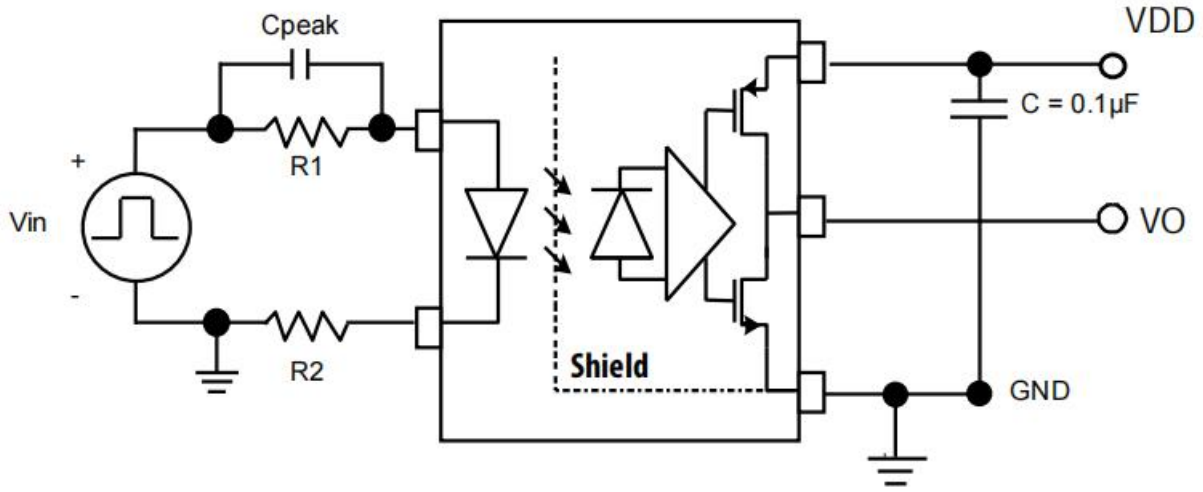
Fig.7 Typical V_F vs. Temperature



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 210Ω 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 80Ω resistor in series with anode of LED.
The recommended limiting resistors are based on the assumption that the driver output impedence is 50 (as shown in Figure 9).

Connection of Peaking capacitor (Cpeak) in Parallel of the Input Limiting Resistor (Rlimit) to Improve Speed Performance



TEST CIRCUITS

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

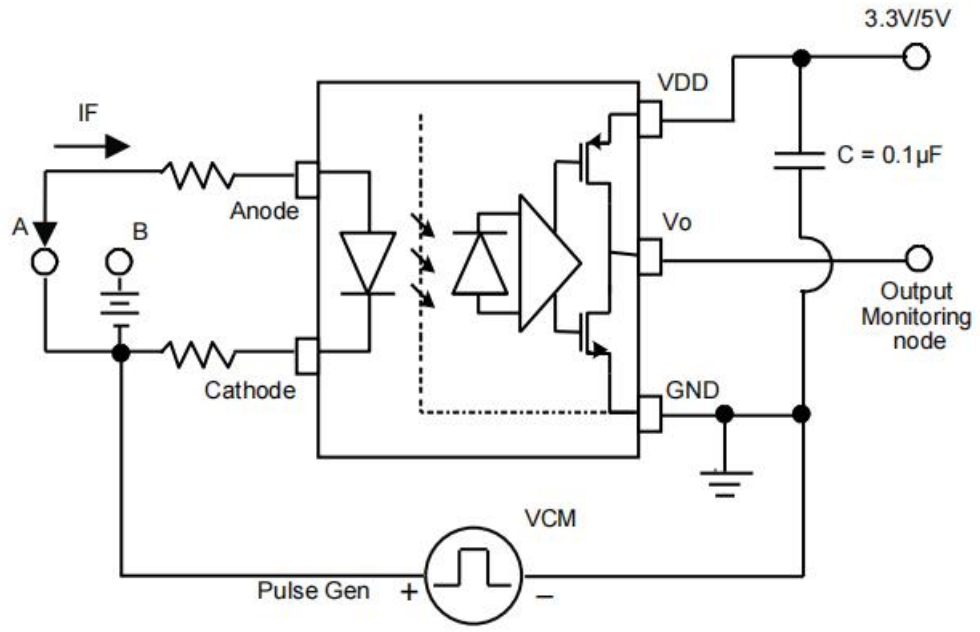
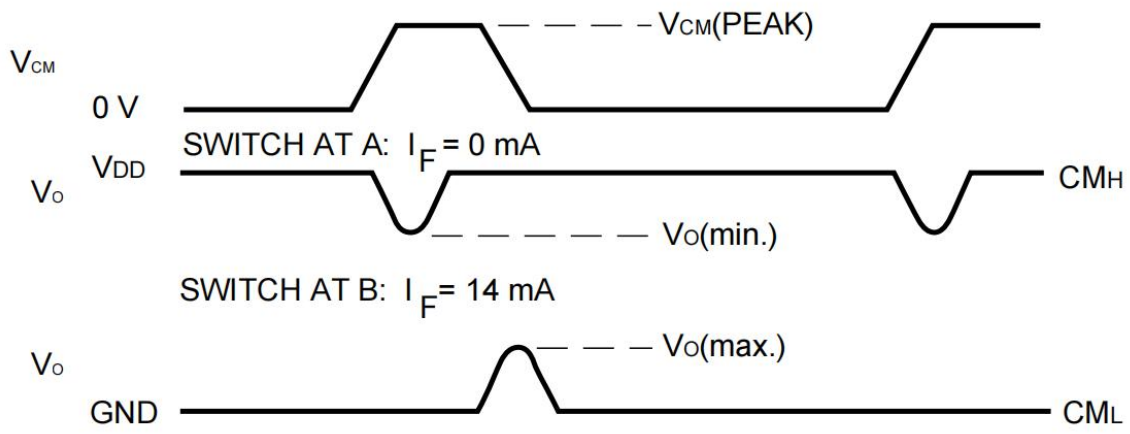
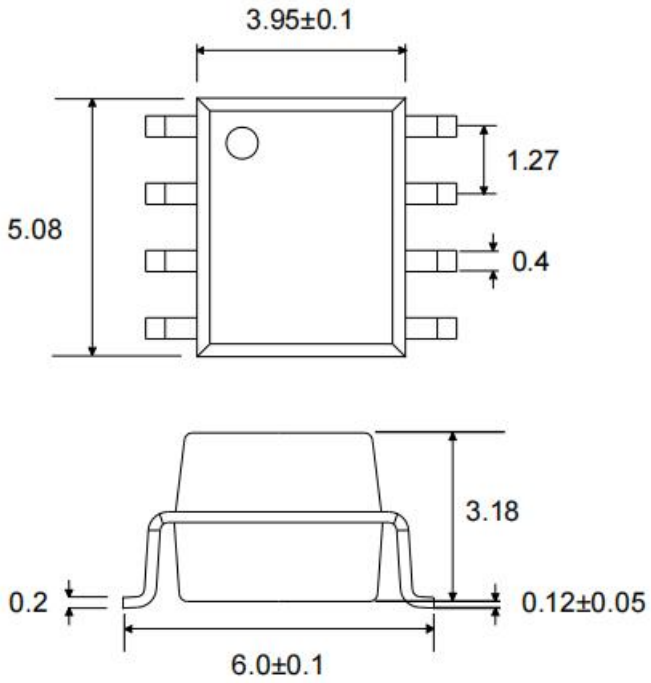


Fig.9 Waveforms of Common Mode Transient Immunity



PACKAGE DIMENSIONS

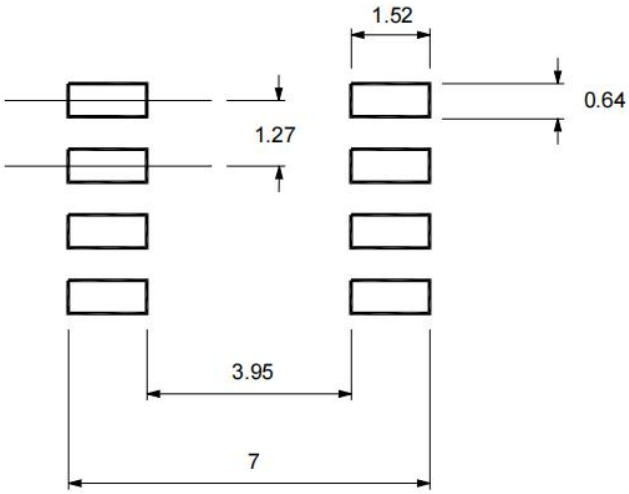
Surface Mount (Low Profile) Lead Forming (SOP8)



- **Dimensions in mm unless otherwise stated**

RECOMMENDED SOLDER MASK

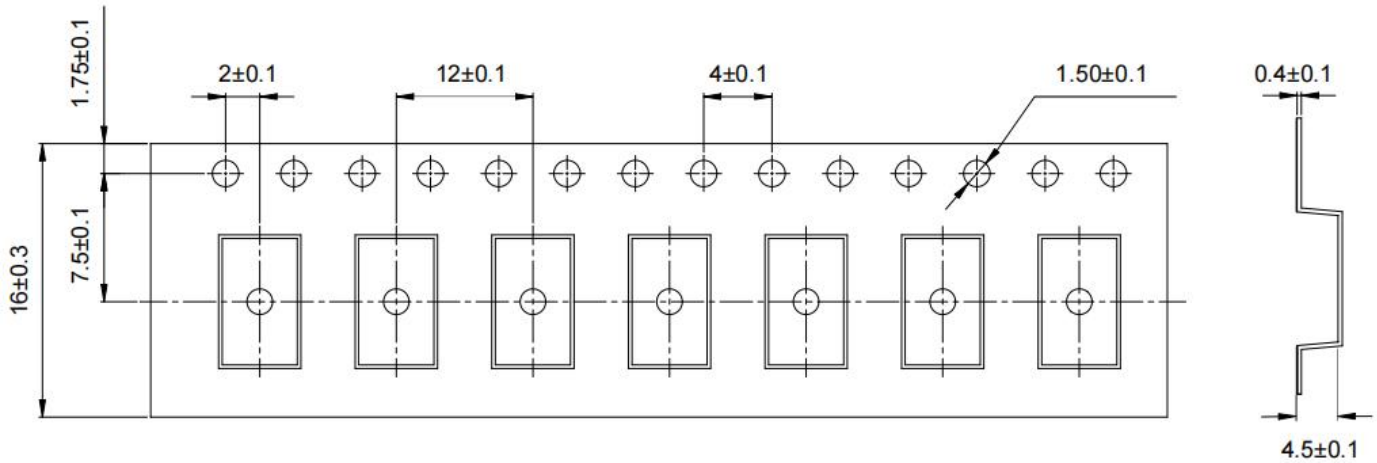
Surface Mount (Low Profile) Lead Forming

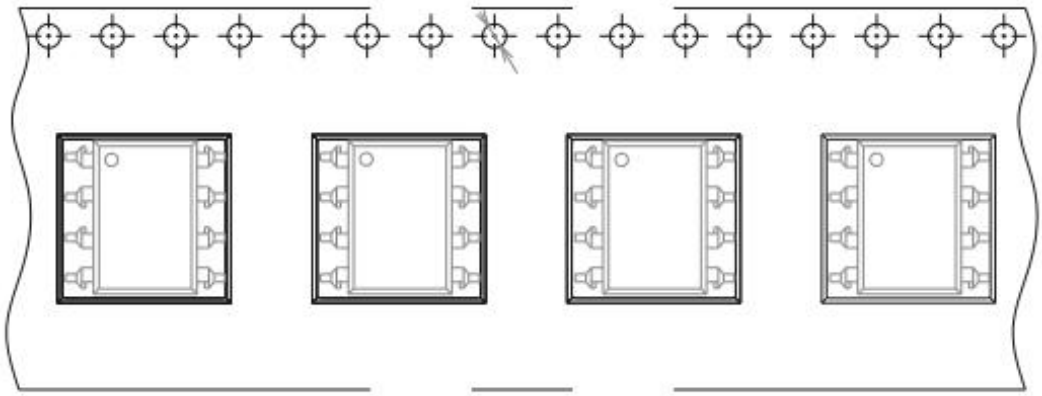


- **Dimensions in mm unless otherwise stated**

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

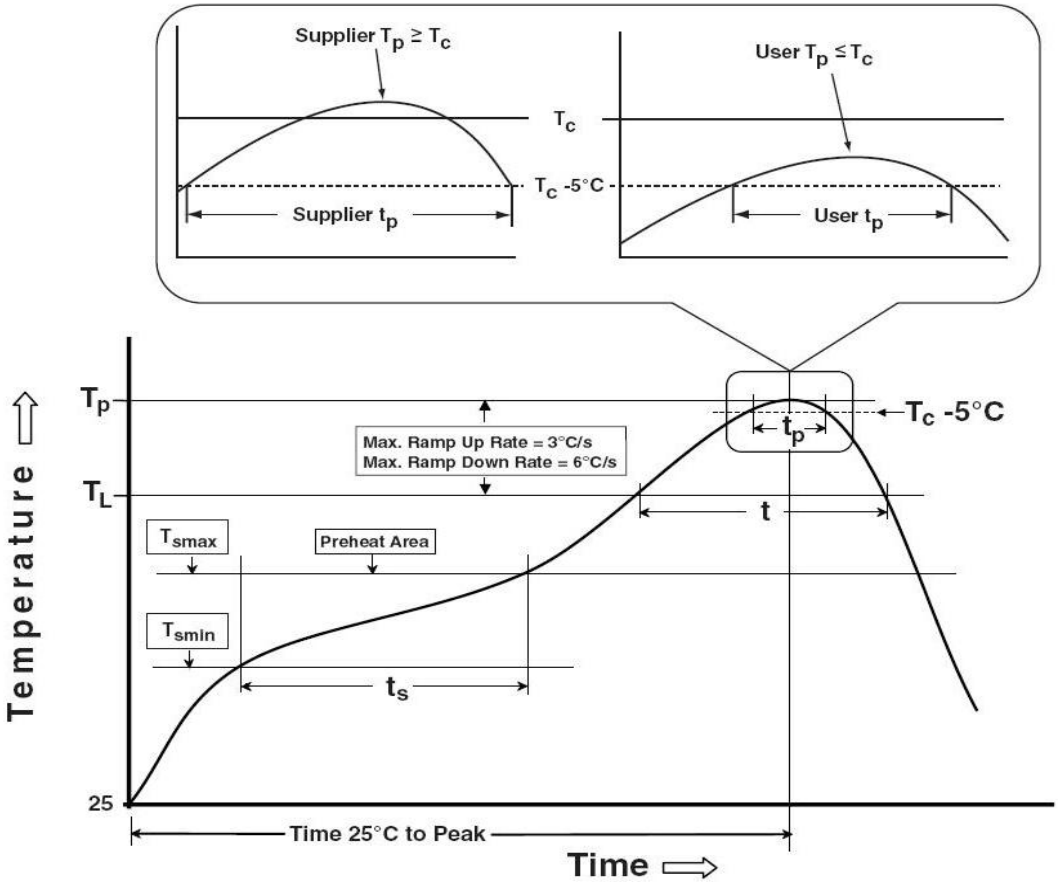
- **Company Abbr.**
- **Part Number**
- **Lead Forming**
  5: SM-SL
- **Halogen Free**
  E: Halogen-free,Lead-free
  Z: Halogen, Lead-free
- **CTR Rank:** None
- **Performance**
  0: Normal
  1: Enhanced
  2: Industrial level
  3: Auto level
  4: Military level

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

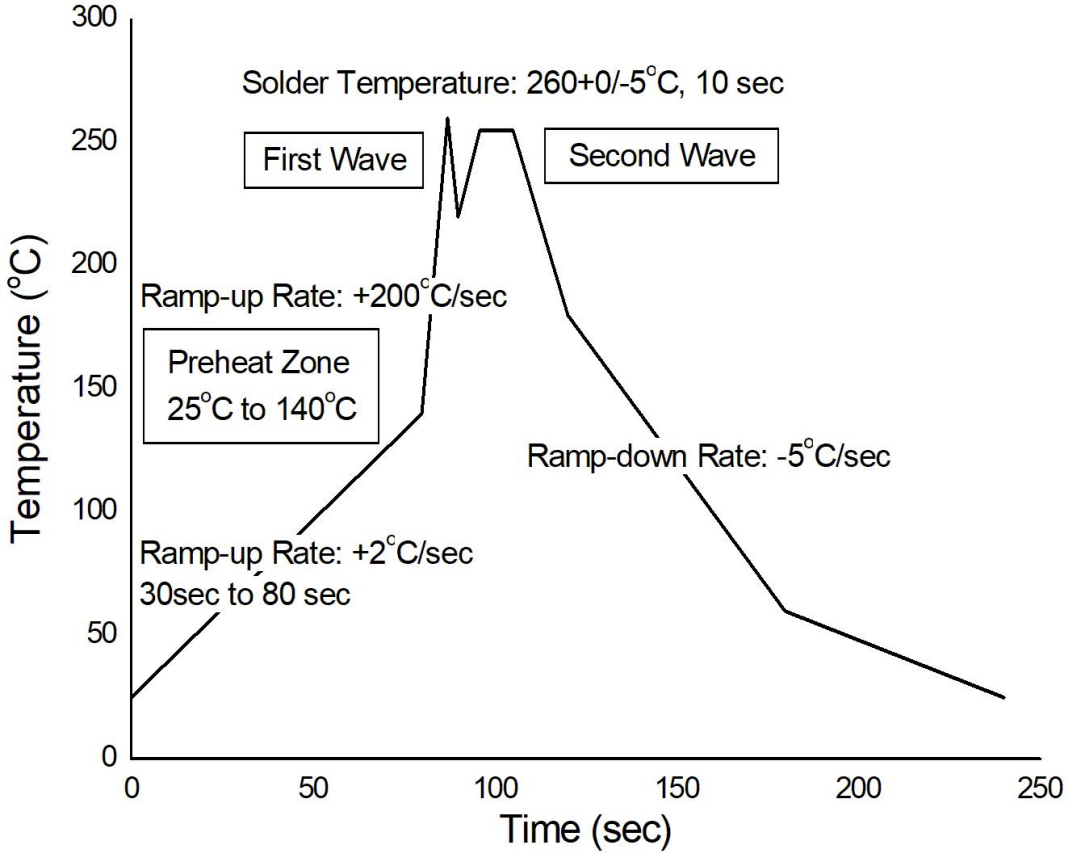
REFLOW INFORMATION

Reflow Profile



Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	100	150°C
Temperature Max. (Tsmax)	150	200°C
Time (ts) from (Tsmin to Tsmax)	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+0/-5°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

- ISOMICRON is continually improving the quality, reliability, function and design. ISOMICRON reserves the right to make changes without further notices.
- The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
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- Discoloration might be occurred on the package surface after soldering, reflow or long-time use. It neither impacts the performance nor reliability.