

Features

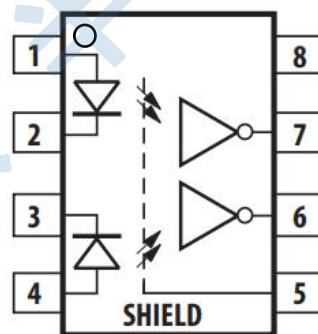
- 3.3V/5V dual-supply voltages
- Low power consumption
- High speed: 10 MBd typical
- TTL/LVTTL/LVCMOS compatible
- Low input current capability: 5 mA
- Guaranteed AC and DC performance over temperature: -40°C to $+85^{\circ}\text{C}$
- Storable output (single-channel products only)
- Safety approvals: UL、VDE、CQC

Applications

- Isolated line receiver
- Computer-peripheral interfaces
- Microprocessor system interfaces
- Digital isolation for A/D, D/A conversion
- Switching power supply
- Instrument input/output isolation
- Ground loop elimination

Description

ICPL-0630/0631 are optically coupled gates that combine a GaAsP light-emitting diode and an integrated high gain photo detector. An enable input allows the detector to be strobed. The output of the detector IC is an open collector Schottky-clamped transistor. The internal shield provides a guaranteed common mode transient immunity specification of 10 kV/ μs at 3.3V. This unique design provides maximum AC and DC circuit isolation while achieving LVTTL/LVCMOS compatibility. The optocoupler AC and DC operational parameters are guaranteed from -40°C to $+85^{\circ}\text{C}$ allowing trouble-free system performance.



Truth table

Input	Output
H	L
L	H



RoHS

ORDERING INFORMATION

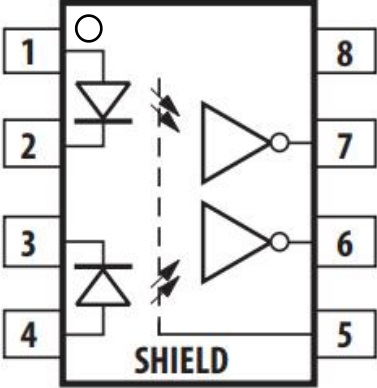
Outline	Part Number	Package	Marking	Packing	Packing Size	Quantity
	ICPL-0630-500E	SOP8	ICPL 063X /YYWW B	Reel	13 "	2000
	ICPL-0631-500E					

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PIN CONFIGURATION AND FUNCTIONS

Pin		Name
1		Anode
2		Cathode
3		Cathode
4		Anode
5		GND
6		V _{O2}
7		V _{O1}
8		V _{CC}



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit	Note
INPUT				
Forward Current	I _F	15	mA	
Peak Forward Current	I _{FP}	50	mA	1
Peak Transient Current	I _{F(trans)}	1	A	2
Reverse Voltage	V _R	5	V	
Enable Voltage	V _E	V _{CC} +0.5	V	
Input Power Dissipation	P _I	27	mW	
OUTPUT				
Supply Voltage	V _{CC}	7	V	
Output Voltage	V _O	7	V	
Output Current	I _O	50	mA	
Output Power Dissipation	P _O	60	mW	
COMMON				
Isolation Voltage	V _{iso}	3750	V _{rms}	3
Operating Temperature	T _{opr}	-40~85	°C	
Storage Temperature	T _{stg}	-55~125	°C	
Soldering Temperature	T _{sol}	260	°C	4

Note 1. 50% duty, 1ms P.W

Note 2. ≤1μs P.W,300pps

Note 3. AC For 1 Minute, R.H. = 40 ~ 60%

Note 4. For 10 seconds

RECOMMENDED OPERATION CONDITIONS

Parameter	Symbol	Min.	Max.	Unit
Operating Temperature	T_a	-40	85	°C
Supply Voltage	V_{CC}	2.7	3.6	V
		4.5	5.5	V
Low Level Input Current	I_{FL}	0	250	μA
High Level Input Current	I_{FH}	5	15	mA
Low Level Enable Voltage	V_{EL}	0	0.8	V
High Level Enable Voltage	V_{EH}	2	V_{CC}	V
Output Pull-up Resistor	R_L	330	4k	Ω
Fan Out (at $R_L=1k\Omega$ per channel)	N	-	8	TTL Loads

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
INPUT						
Forward Voltage	V_F	1.3	1.35	1.8	V	$I_F=10mA$
Reverse Current	I_R	-	-	10	μA	$V_R=5V$
Input Capacitance	C_{in}	-	60	-	pF	$V=0, f=1MHz$
OUTPUT						
High Level Supply Current	I_{CCH}	-	10	15	mA	$I_F=0mA, V_E=0.5V, V_{CC}=5.5V$
Low Level Supply Current	I_{CCL}	-	13	21	mA	$I_F=10mA, V_{CC}=5.5V$
TRANSFER CHARACTERISTICS ($T_a=-40$ to $85^\circ C$)						
High Level Output Current	I_{OH}	-	5.5	100	μA	$V_{CC}=5.5V, V_O=5.5V, I_F=250\mu A, V_E=2.0V$
Low Level Output Voltage	V_{OL}	-	0.35	0.6	V	$V_{CC}=5.5V, I_F=5mA, V_E=2.0V, I_{CL}=13mA$
Input Threshold Current	I_{FT}	-	3	5	mA	$V_{CC}=5.5V, V_O=0.6V, V_E=2.0V, I_{OL}=13mA$
Isolation Resistance	R_{iso}	10^{12}	10^{14}	-	Ω	DC500V, 40 ~ 60% R.H.
Floating Capacitance	C_{IO}	-	1.0	-	pF	$V=0, f=1MHz$

ELECTRICAL OPTICAL CHARACTERISTICS

Parameter		Symbol	Min.	Typ.	Max.	Unit	Test Condition
switching characteristics ($T_a = -40$ to 85°C , $V_{cc} = 5\text{V}$, $I_F = 7.5\text{mA}$ unless specified otherwise)							
Propagation Delay Time to Output Low Level		t_{PHL}	-	50	75	ns	$C_L = 15\text{pF}$, $R_L = 350\Omega$, $T_a = 25^\circ\text{C}$
Propagation Delay Time to Output High Level		t_{PLH}	-	48	75	ns	$C_L = 15\text{pF}$, $R_L = 350\Omega$, $T_a = 25^\circ\text{C}$
Pulse Width Distortion		$ t_{PHL} - t_{PLH} $	-	3.5	35	ns	$C_L = 15\text{pF}$, $R_L = 350\Omega$
Rise Time		t_r	-	24	-	ns	$C_L = 15\text{pF}$, $R_L = 350\Omega$
Fall Time		t_f	-	10	-	ns	$C_L = 15\text{pF}$, $R_L = 350\Omega$
Common Mode Transient Immunity at Logic High	0630	CM_H	5000	-	-	$\text{V}/\mu\text{s}$	$I_F = 7.5\text{mA}$, $V_{OH} = 2.0\text{V}$, $R_L = 350\Omega$, $T_a = 25^\circ\text{C}$ $V_{CM} = 50\text{Vp-p}$
	0631		10000	-	-		$I_F = 7.5\text{mA}$, $V_{OH} = 2.0\text{V}$, $R_L = 350\Omega$, $T_a = 25^\circ\text{C}$ $V_{CM} = 400\text{Vp-p}$
Common Mode Transient Immunity at Logic Low	0630	CM_L	5000	-	-	$\text{V}/\mu\text{s}$	$I_F = 0\text{mA}$, $V_{OH} = 0.8\text{V}$, $R_L = 350\Omega$, $T_a = 25^\circ\text{C}$ $V_{CM} = 50\text{Vp-p}$
	0631		10000	-	-		$I_F = 0\text{mA}$, $V_{OH} = 0.8\text{V}$, $R_L = 350\Omega$, $T_a = 25^\circ\text{C}$ $V_{CM} = 400\text{Vp-p}$

CHARACTERISTIC CURVES

Fig.1 Forward Current vs. Forward Voltage

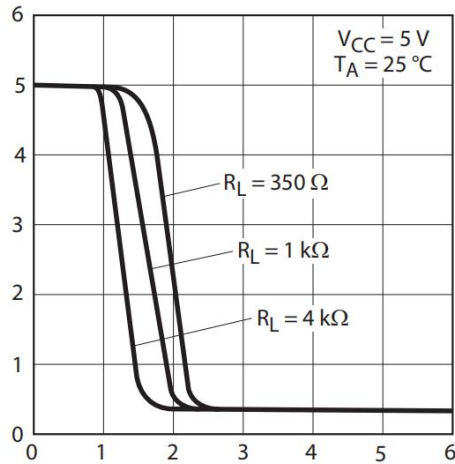


Fig.2 Input Threshold Current vs. Ambient Temperature

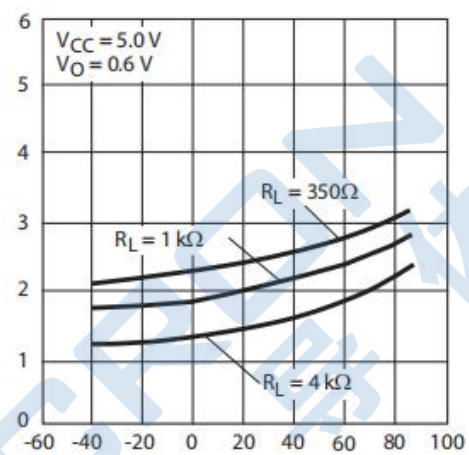


Fig.3 Low Level Output Current vs. Ambient Temperature

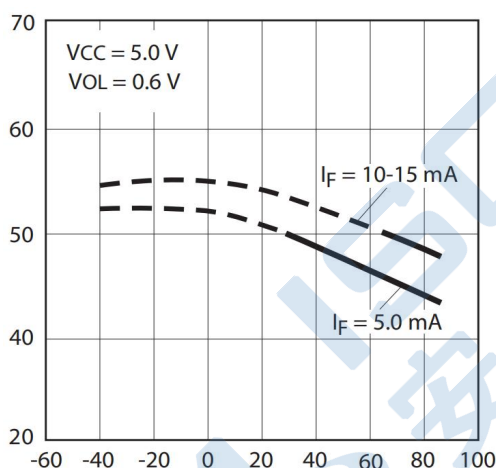


Fig.4 Low Level Output Voltage vs. Ambient Temperature

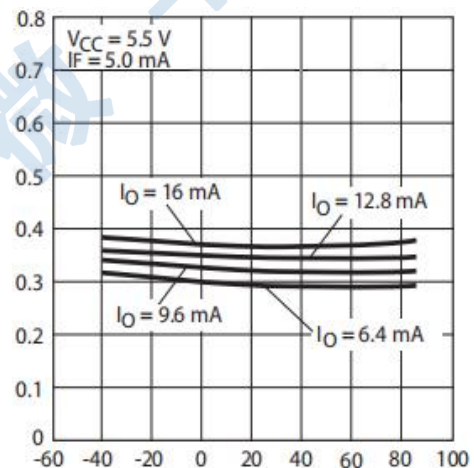


Fig.5 High Level Output Current vs. Ambient Temperature

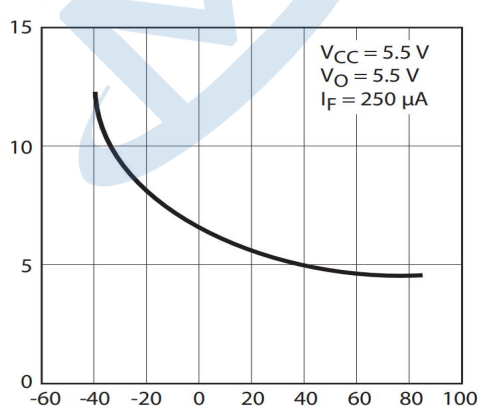


Fig.6 Output Voltage vs. Forward Current

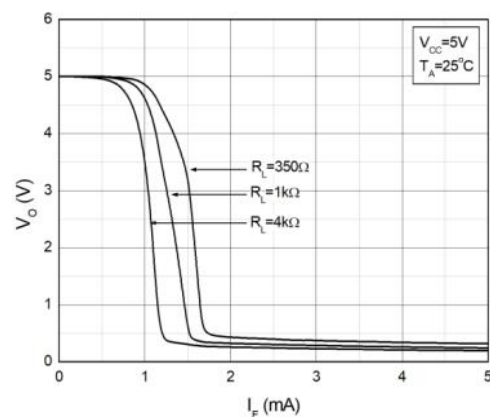


Fig.7 Propagation Delay vs. Forward Current

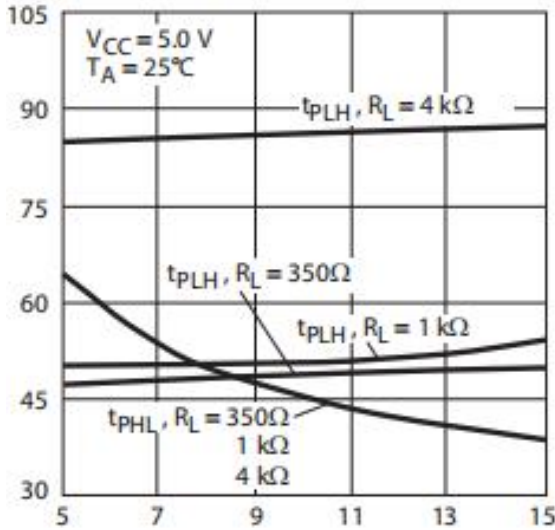


Fig.8 Rise and Fall Time vs. Ambient Temperature

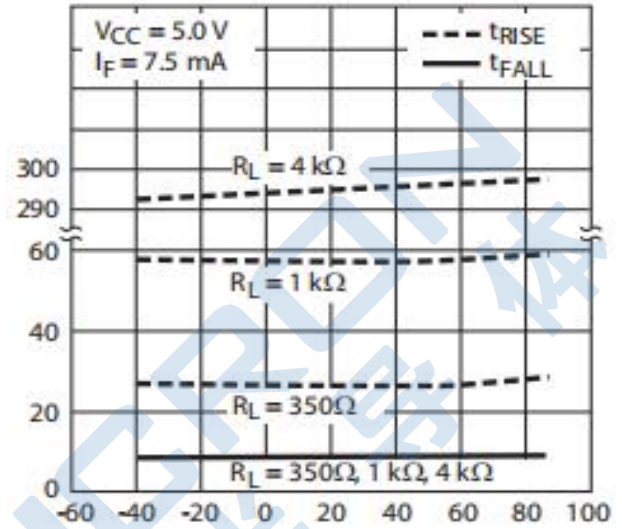


Fig.9 Propagation Delay vs. Ambient Temperature

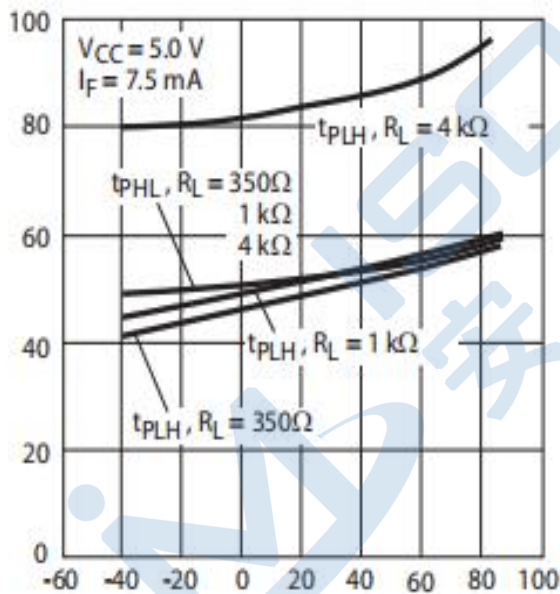
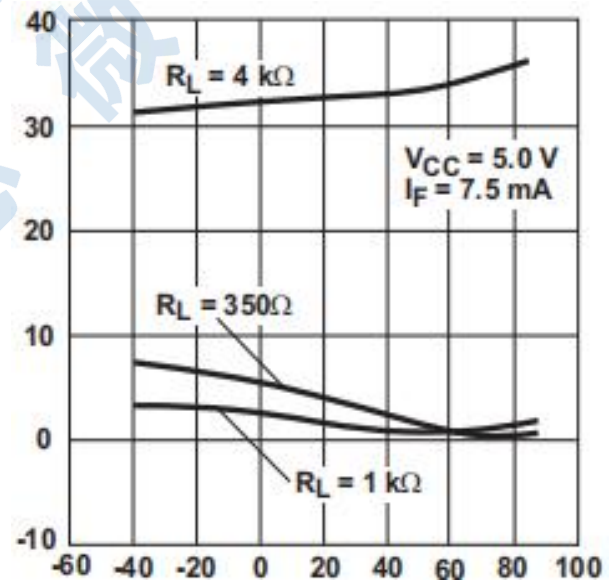


Fig.10 Propagation Delay vs. Ambient Temperature



TEST CIRCUITS

Fig.11 Test Circuits for t_{PHL} , t_{PLH} , t_r , t_f

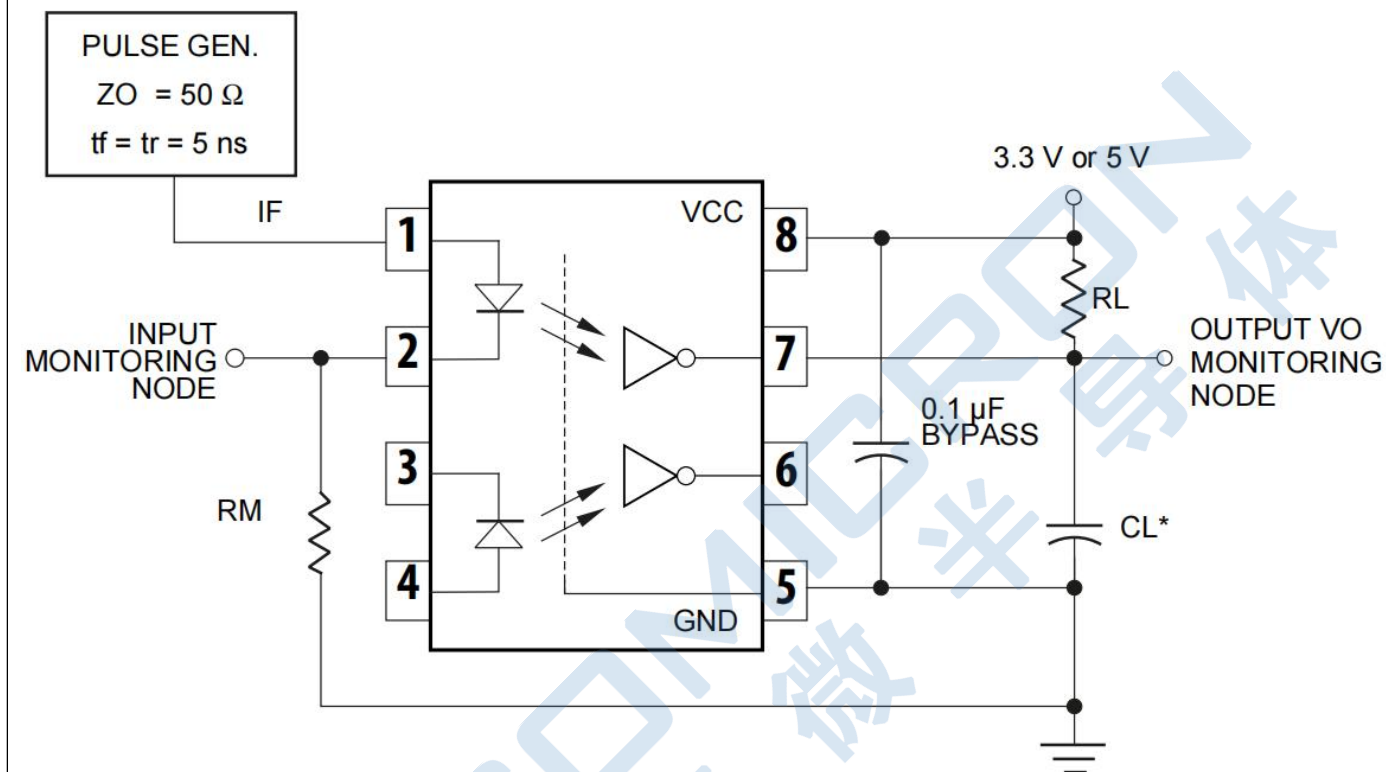
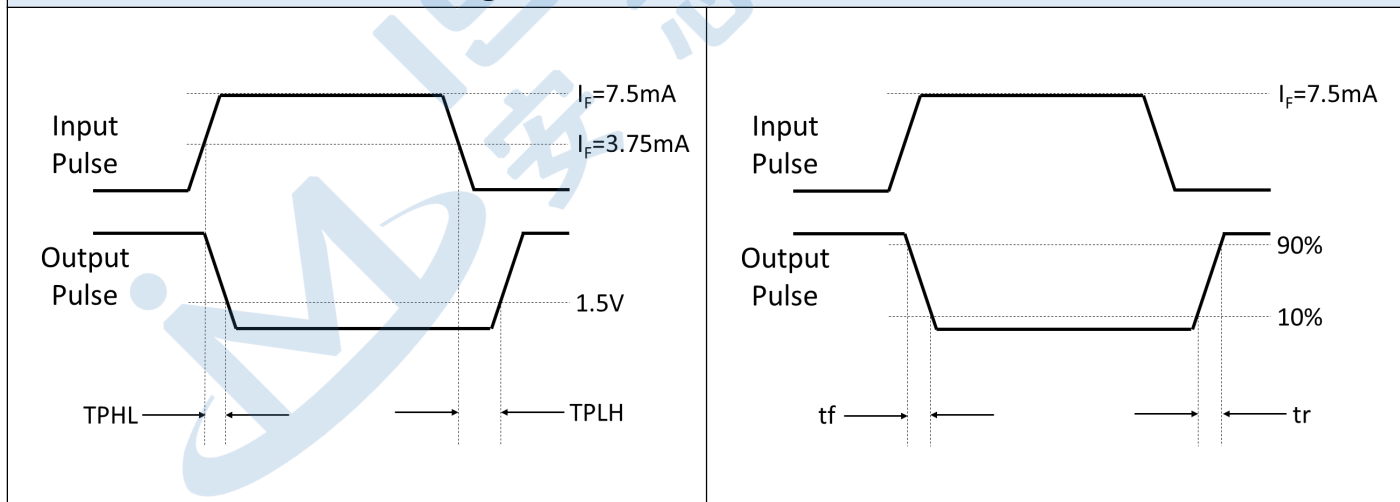


Fig.12 Waveforms of t_{PHL} , t_{PLH} , t_r , t_f



TEST CIRCUITS

Fig.15 Test Circuits for Common Mode Transient Immunity

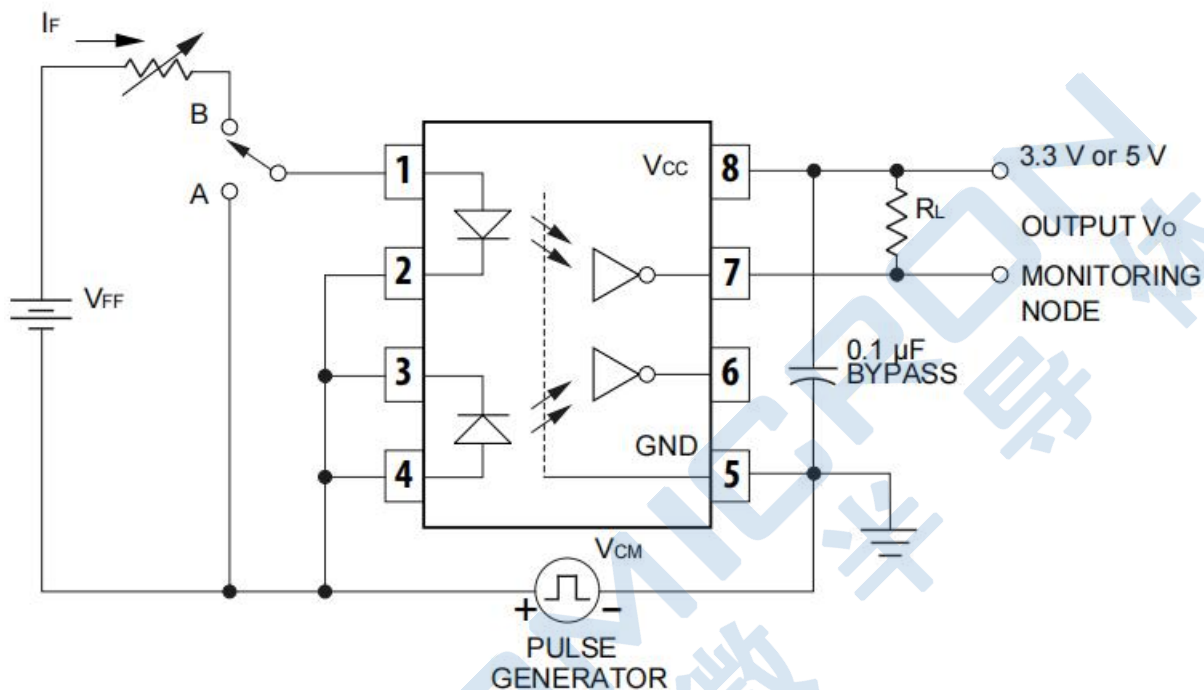
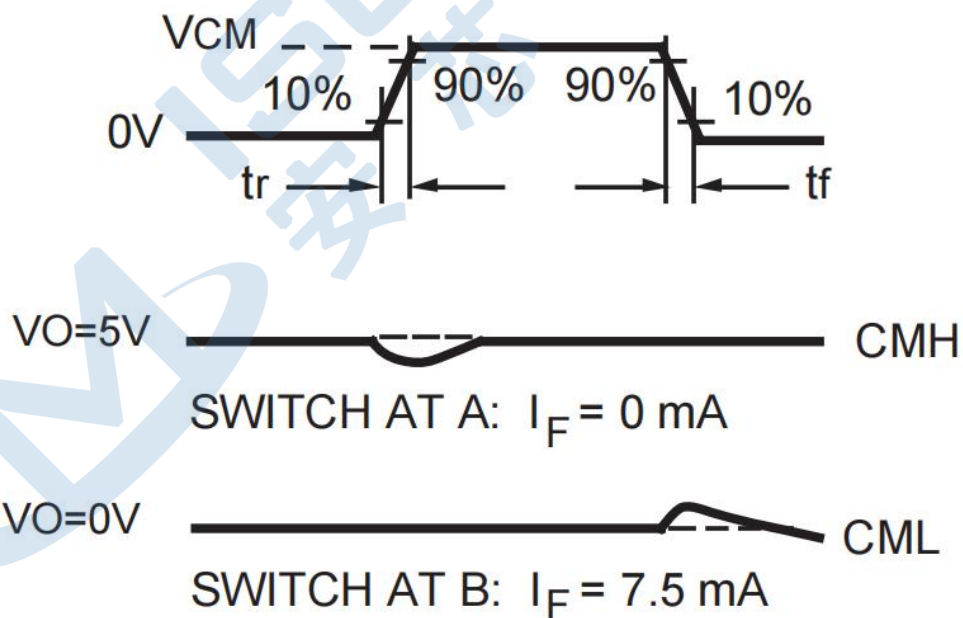
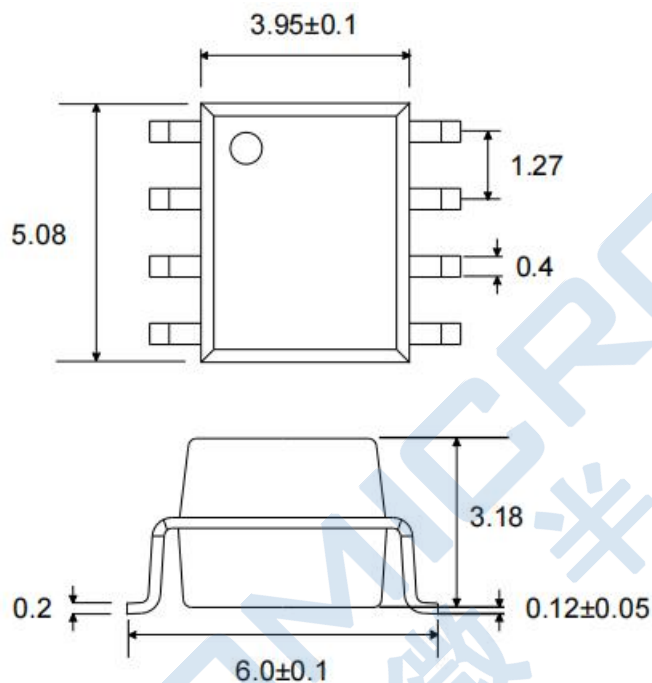


Fig.16 Waveforms of Common Mode Transient Immunity



PACKAGE DIMENSIONS

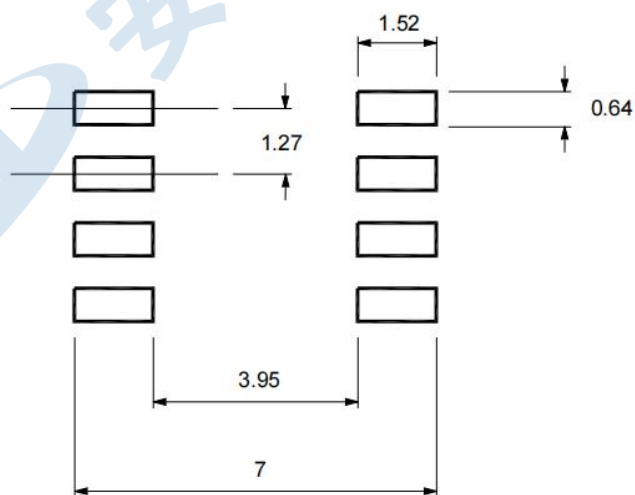
Surface Mount (Low Profile) Lead Forming (SOP8)



- Dimensions in mm unless otherwise stated

RECOMMENDED SOLDER MASK

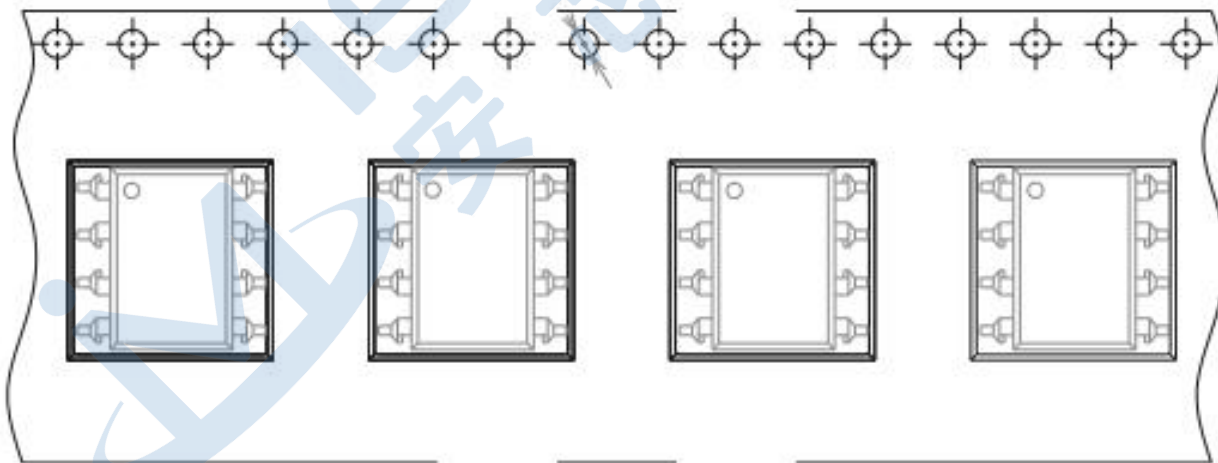
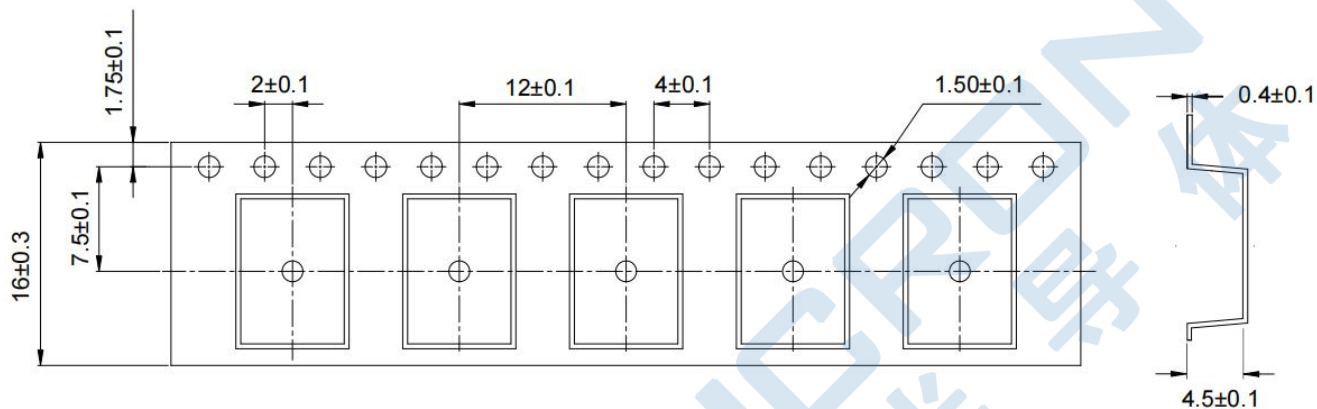
Surface Mount (Low Profile) Lead Forming



- 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.
 063X : Part Number
 / : ISOMICRON
 YY : Fiscal Year
 WW : Work Week
 B : Manufacturing Code

Order Code

ICPL - 063X - 5 0 0 E

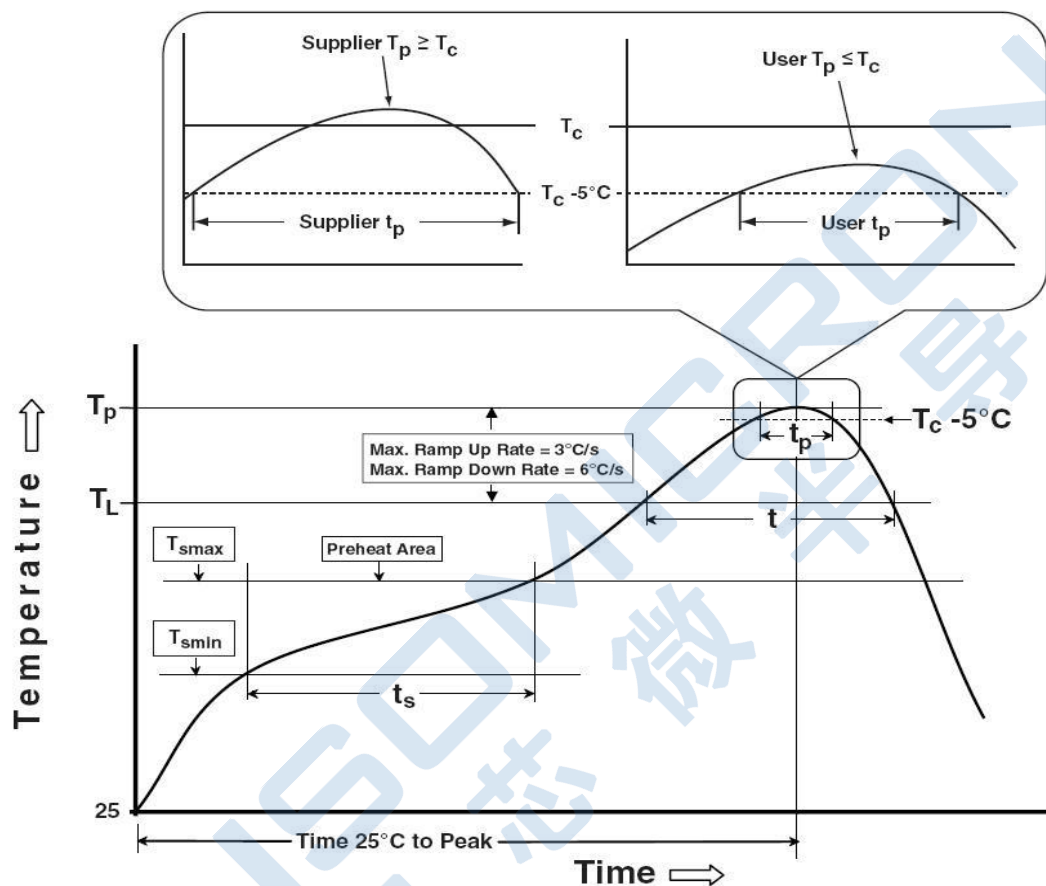
Company Abbr. ← Part Number ← Lead Forming ← 5: SM-SL	Halogen Free E: Halogen-free, Lead-free Z: Halogen, Lead-free CTR Rank: None Performance 0: Normal 1: Enhanced 2: Industrial level 3: Auto level 4: Military level
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Packing Quantity

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

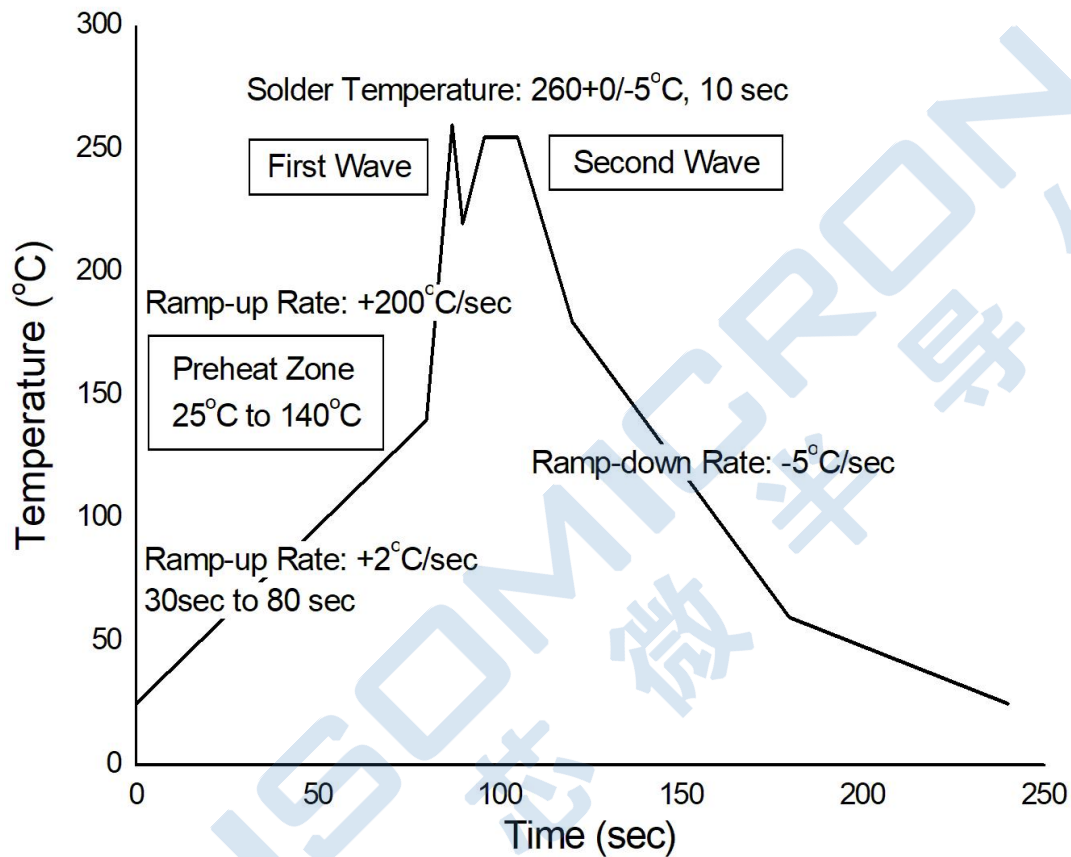
Reflow Profile



Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T_{smin})	100	150°C
Temperature Max. (T_{smax})	150	200°C
Time (t_s) from (T_{smin} to T_{smax})	60-120 seconds	60-120 seconds
Ramp-up Rate (t_L to t_P)	$3^\circ\text{C/second max.}$	$3^\circ\text{C/second max.}$
Liquidous Temperature (T_L)	183°C	217°C
Time (t_L) Maintained Above (T_L)	60 – 150 seconds	60 – 150 seconds
Peak Body Package Temperature	$235^\circ\text{C} +0^\circ\text{C} / -5^\circ\text{C}$	$260^\circ\text{C} +0^\circ\text{C} / -5^\circ\text{C}$
Time (t_P) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (T_P to T_L)	$6^\circ\text{C/second max}$	$6^\circ\text{C/second max}$
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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- 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.