

Features

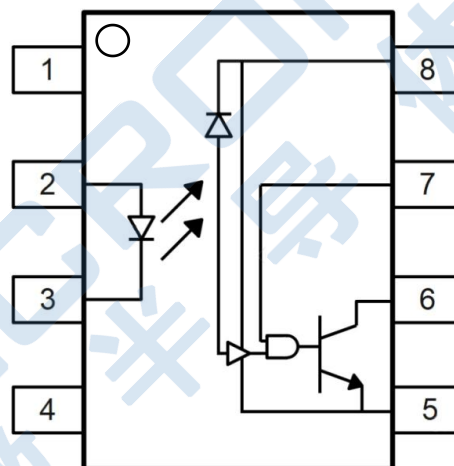
- High isolation 3750 V_{RMS}
- DC input with logic gate output
- Operating temperature range - 40 °C to 100 °C
- REACH compliance
- Halogen free (Optional)
- MSL class 1
- Regulatory Approvals (Pending Approved)
 - UL - UL1577
 - VDE - EN60747-5-5(VDE0884-5)
 - CQC - GB4943.1

Applications

- Ground loop elimination
- LSTTL to TTL, LSTTL or CMOS
- Line receiver, data transmission
- Data multiplexing
- Switching power supply
- Pulse transformer replacement

Description

The ICPL-060X series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon high speed integrated photo-detector logic gate with a strobable output in a plastic SO8 package with different lead forming options.

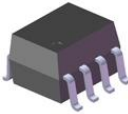


TRUTH TABLE

LED	ENABLE	OUTPUT
ON	H	L
OFF	H	H
ON	L	H
OFF	L	H
ON	NC	L
OFF	NC	H



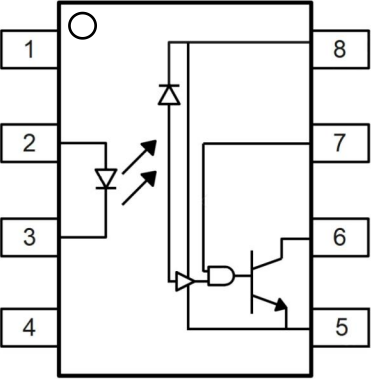
ORDERING INFORMATION

Outline	Part Number	Package	Marking	Packing	Packing Size	Quantity
	ICPL-0600-500E	SOP8	ICPL 060X /YYWW B	Reel	13 "	2000
	ICPL-0601-500E					

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PIN CONFIGURATION AND FUNCTIONS

	Pin	Name
	1	NC
	2	Anode
	3	Cathode
	4	NC
	5	GND
	6	V_O
	7	V_E
	8	V_{CC}

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit	Note
INPUT				
Forward Current	I_F	25	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	100	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	85	mW	
COMMON				
Total Power Dissipation	P_{tot}	200	mW	
Isolation Voltage	V_{iso}	5000	V _{rms}	3
Operating Temperature	T_{opr}	-40~100	°C	
Storage Temperature	T_{stg}	-55~125	°C	
Soldering Temperature	T_{sol}	260	°C	4

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

Note 2. $\leq 1\mu s$ 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	100	°C
Supply Voltage	V_{CC}	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	-	1.38	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}	-	6.5	8	mA	$I_F=0mA, V_E=0.5V, V_{CC}=5.5V$
Low Level Supply Current	I_{CCL}	-	9.0	10	mA	$I_F=10mA, V_{CC}=5.5V$
High Level Enable Current	I_{EH}	-	-0.6	-1.6	mA	$V_E=2.0V, V_{CC}=5.5V$
Low Level Enable Current	I_{EL}	-	-0.8	-1.6	mA	$V_E=0.5V, V_{CC}=5.5V$
High Level Enable Voltage	V_{EH}	2.0	-	-	V	$I_F=10mA, V_{CC}=5.5V$
Low Level Enable Voltage	V_{EL}	-	-	0.8	V	$I_F=10mA, V_{CC}=5.5V$
TRANSFER CHARACTERISTICS ($T_a=-40$ to $85^\circ C$)						
High Level Output Current	I_{OH}	-	1.6	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}	-	45	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}	-	45	75	ns	$C_L = 15\text{pF}$, $R_L = 350\Omega$, $T_a = 25^\circ\text{C}$
Pulse Width Distortion		$ t_{PHL} - t_{PLH} $	-	5	35	ns	$C_L = 15\text{pF}$, $R_L = 350\Omega$
Rise Time		t_r	-	30	-	ns	$C_L = 15\text{pF}$, $R_L = 350\Omega$
Fall Time		t_f	-	10	-	ns	$C_L = 15\text{pF}$, $R_L = 350\Omega$
Enable Propagation Delay Time to Output Low Level		t_{EHL}	-	40	-	ns	$I_F = 7.5\text{mA}$, $V_{EH} = 3.5\text{V}$, $C_L = 15\text{pF}$, $R_L = 350\Omega$
Enable Propagation Delay Time to Output High Level		t_{ELH}	-	15	-	ns	$I_F = 7.5\text{mA}$, $V_{EH} = 3.5\text{V}$, $C_L = 15\text{pF}$, $R_L = 350\Omega$
Common Mode Transient Immunity at Logic High	ICPL-0600	CM_H	5000	-	-	V/ μs	$I_F = 7.5\text{mA}$, $V_{OH} = 2.0\text{V}$, $R_L = 350\Omega$, $T_a = 25^\circ\text{C}$ $V_{CM} = 50\text{Vp-p}$
	ICPL-0601		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	ICPL-0600	CM_L	5000	-	-	V/ μs	$I_F = 0\text{mA}$, $V_{OH} = 0.8\text{V}$, $R_L = 350\Omega$, $T_a = 25^\circ\text{C}$ $V_{CM} = 50\text{Vp-p}$
	ICPL-0601		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

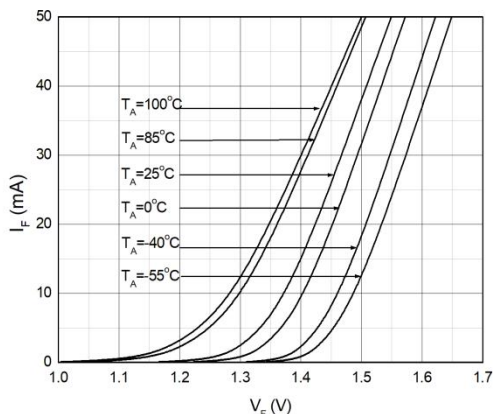


Fig.2 Forward Voltage vs. Ambient Temperature

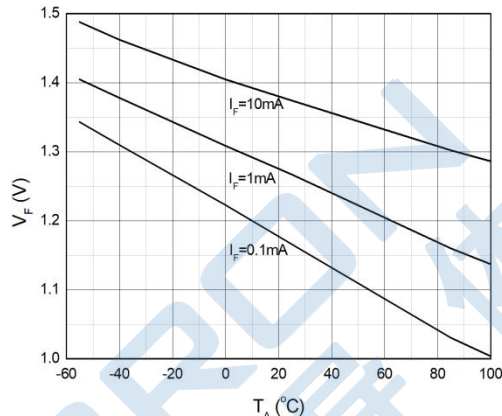


Fig.3 Input Threshold Current vs. Ambient Temperature

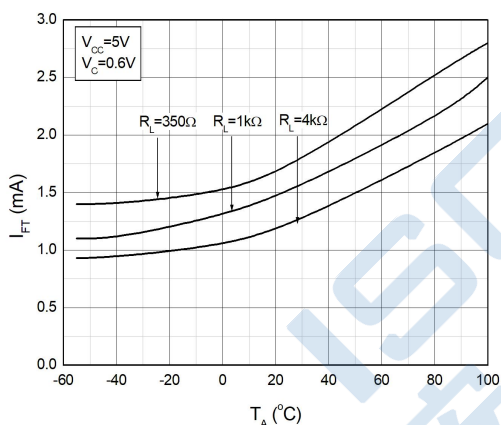


Fig.4 Input Threshold Current vs. Ambient Temperature

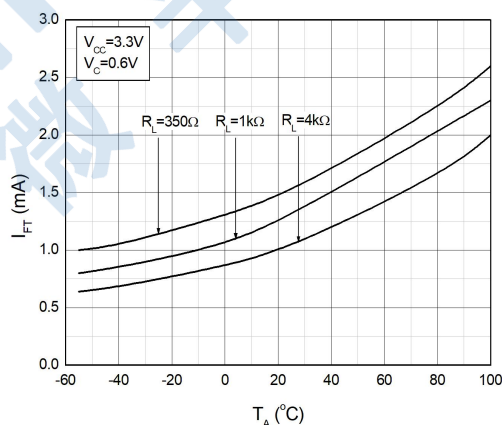


Fig.5 Low Level Output Current vs. Ambient Temperature

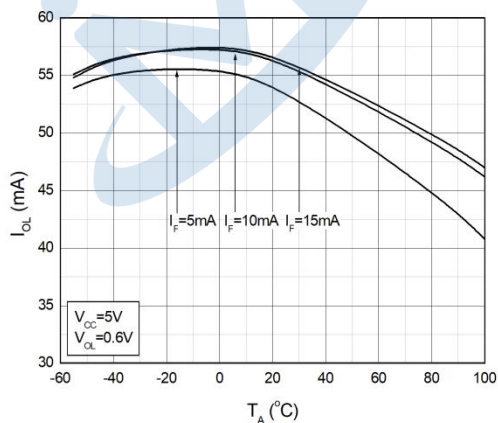


Fig.6 Low Level Output Current vs. Ambient Temperature

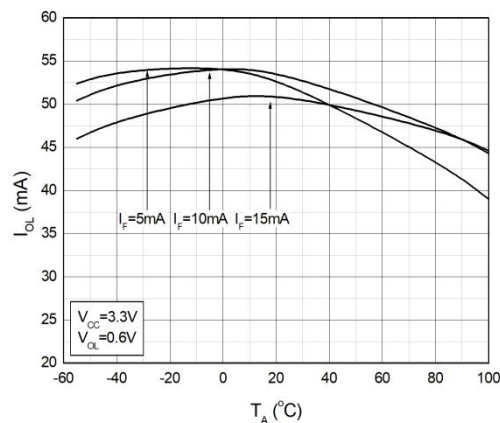


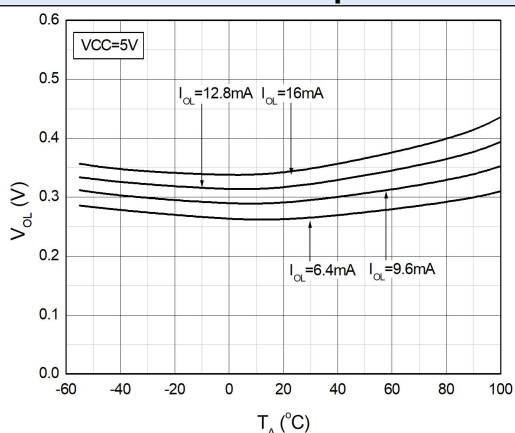
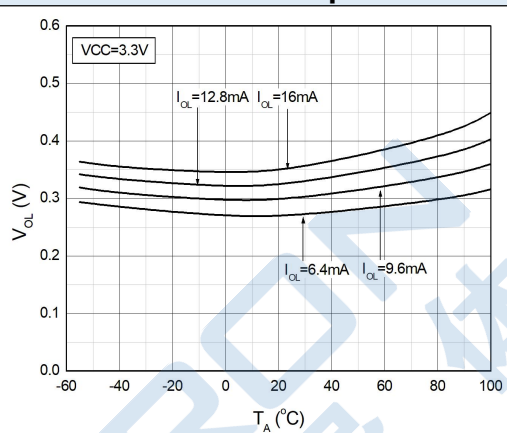
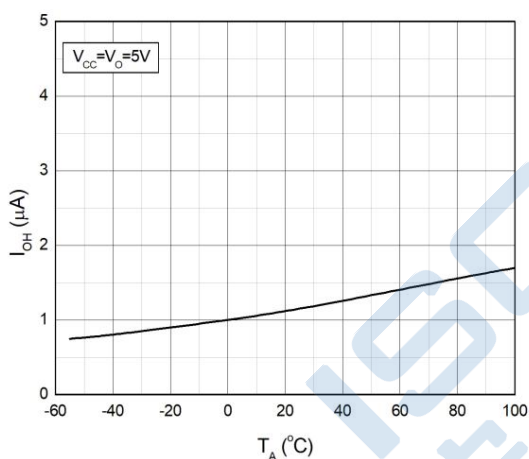
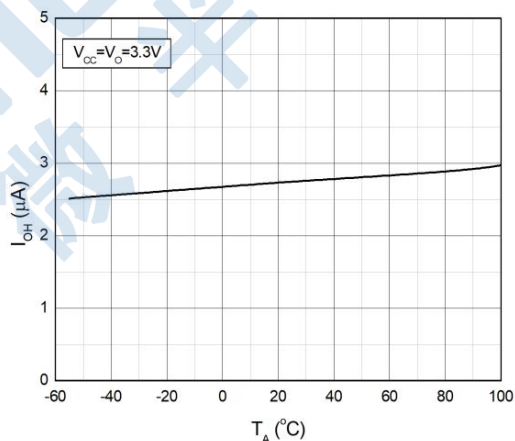
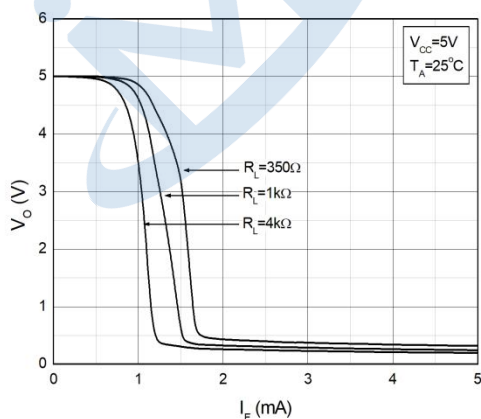
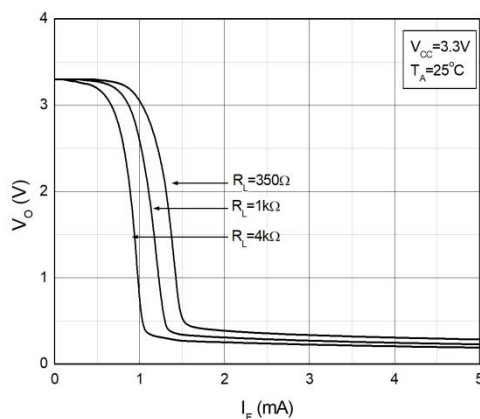
Fig.7 Low Level Output Voltage vs. Ambient Temperature

Fig.8 Low Level Output Voltage vs. Ambient Temperature

Fig.9 High Level Output Current vs. Ambient Temperature

Fig.10 High Level Output Current vs. Ambient Temperature

Fig.11 Output Voltage vs. Forward Current

Fig.12 Output Voltage vs. Forward Current


Fig.13 Propagation Delay vs. Forward Current

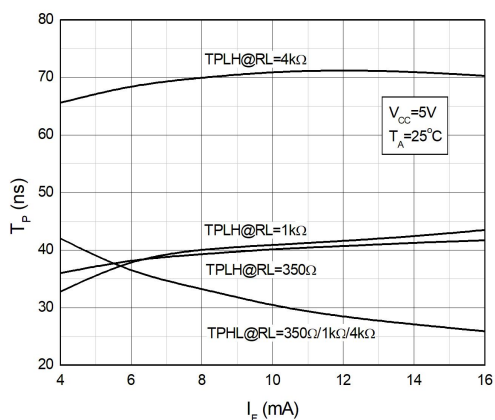


Fig.14 Propagation Delay vs. Forward Current

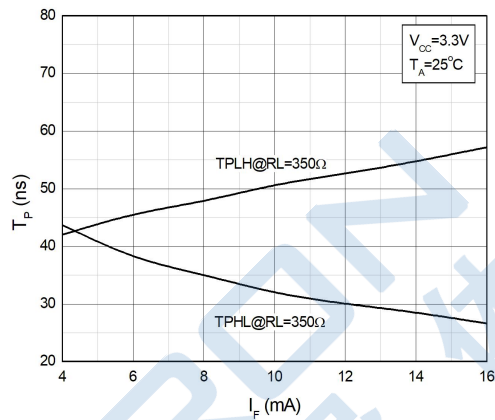


Fig.15 Rise and Fall Time vs. Ambient Temperature

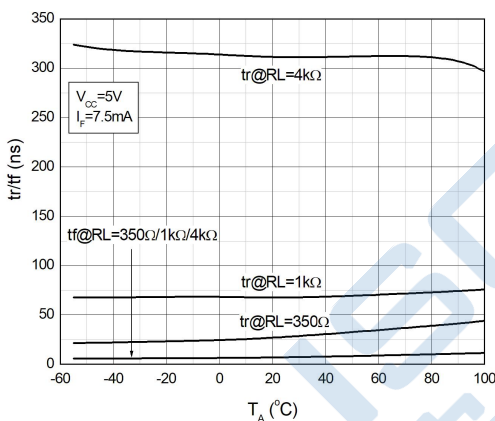


Fig.16 Rise and Fall Time vs. Ambient Temperature

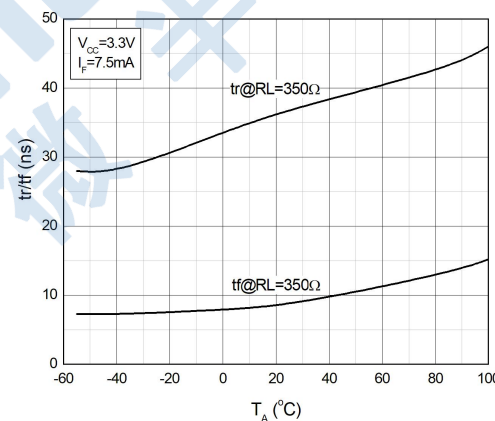


Fig.17 Propagation Delay vs. Ambient Temperature

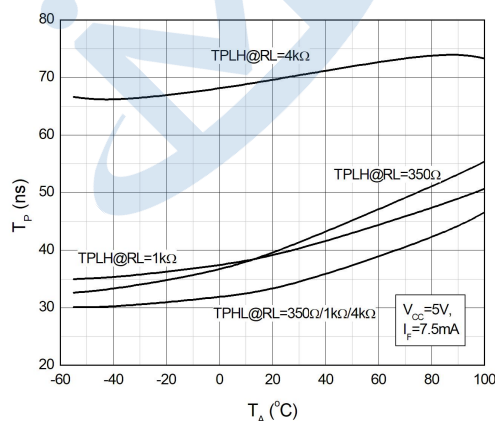


Fig.18 Propagation Delay vs. Ambient Temperature

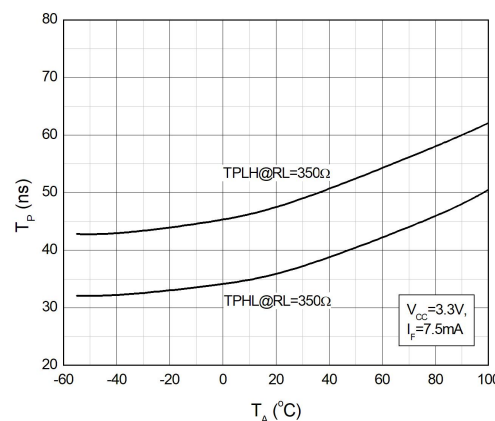
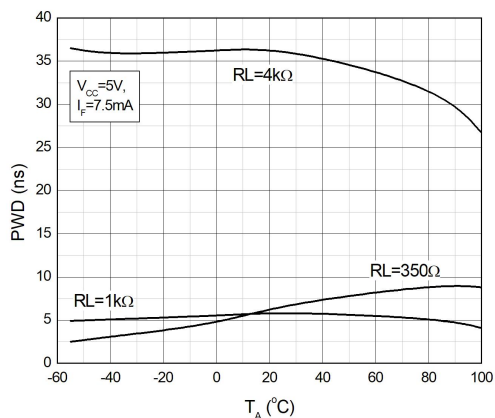
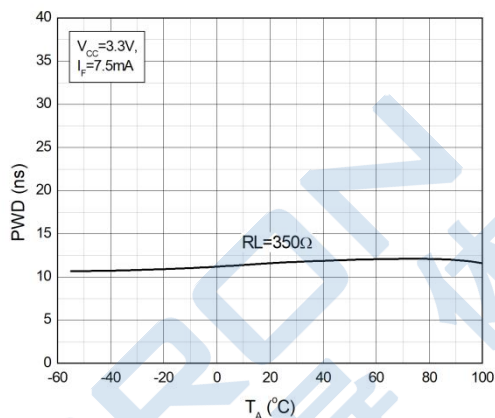
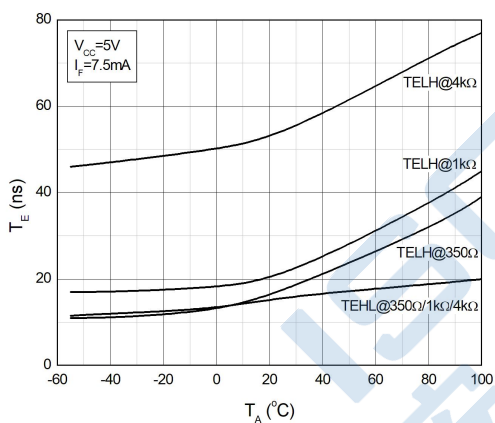
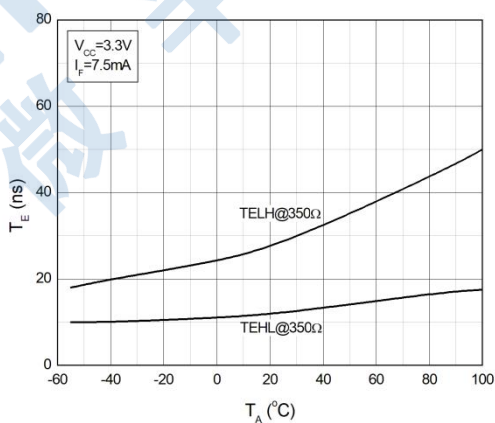


Fig.19 Pulse Width Distortion vs. Ambient Temperature

Fig.20 Pulse Width Distortion vs. Ambient Temperature

Fig.21 Enable Propagation Delay vs. Ambient Temperature

Fig.22 Enable Propagation Delay vs. Ambient Temperature


TEST CIRCUITS

Fig.23 Test Circuits for t_{PHL} , t_{PLH} , t_r , t_f

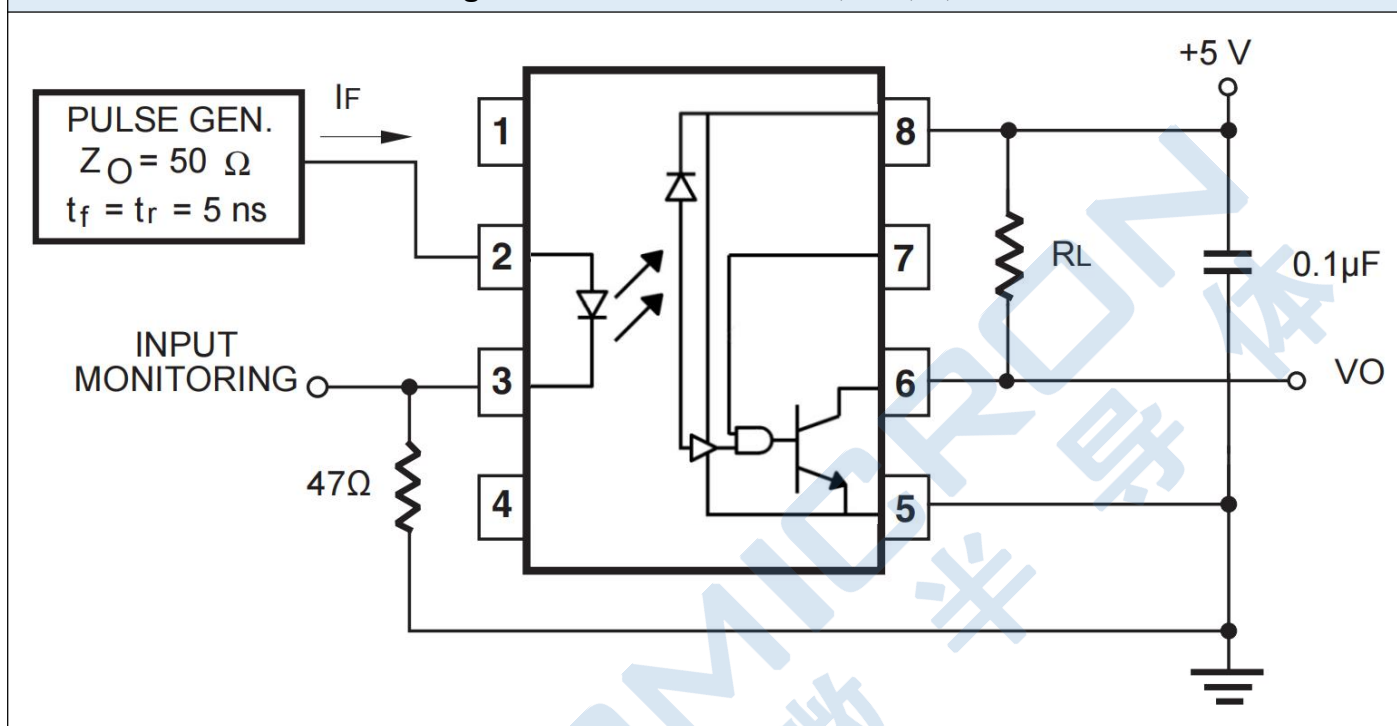
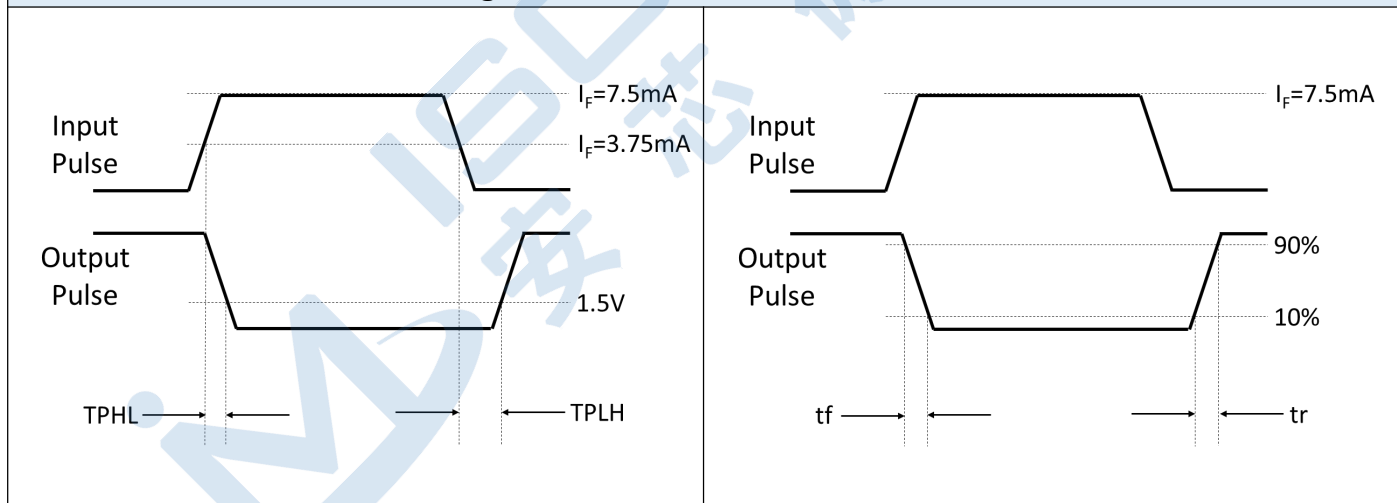


Fig.24 Waveforms of t_{PHL} , t_{PLH} , t_r , t_f



TEST CIRCUITS

Fig.25 Test Circuits for t_{EHL} , t_{ELH}

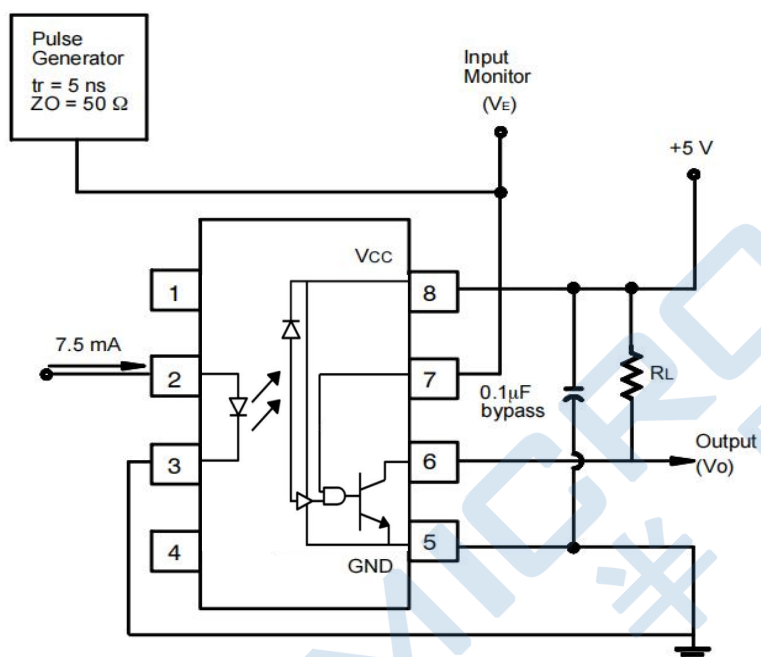
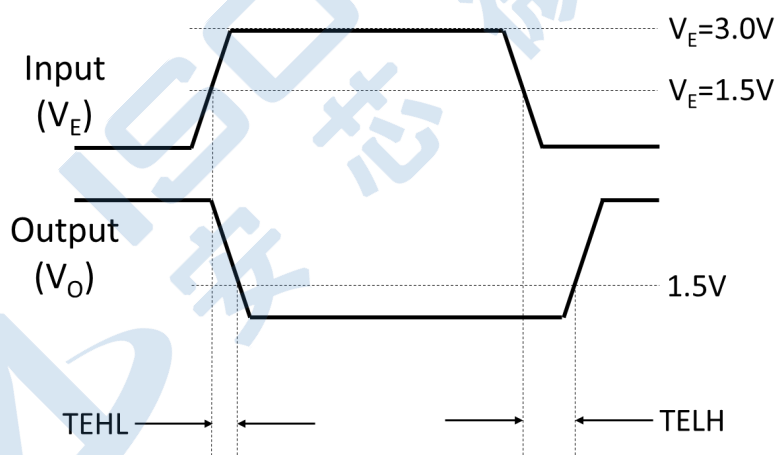


Fig.26 Waveforms of t_{EHL} , t_{ELH}



TEST CIRCUITS

Fig.27 Test Circuits for Common Mode Transient Immunity

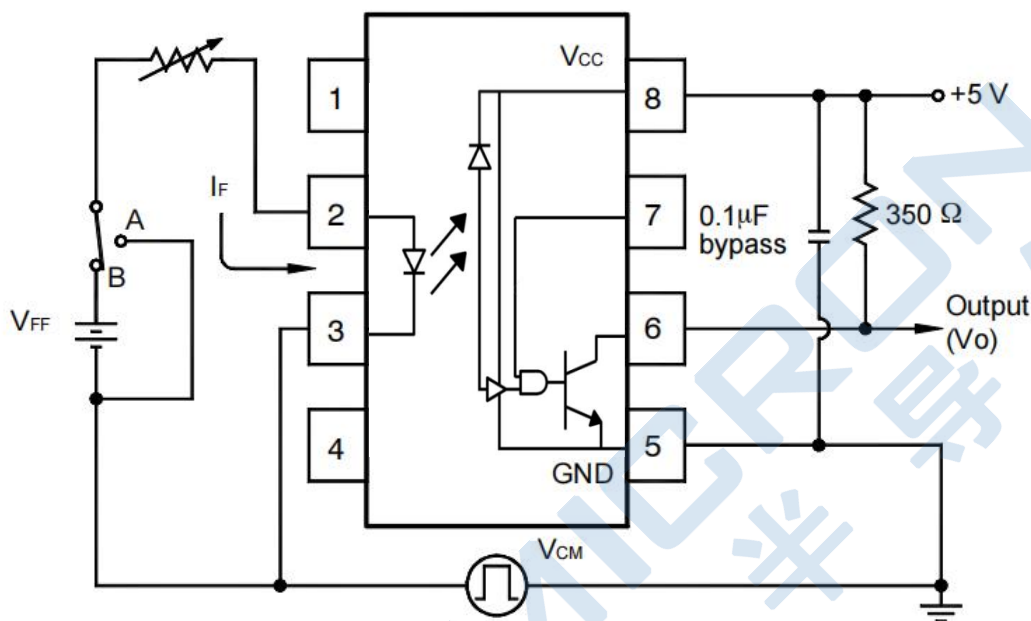
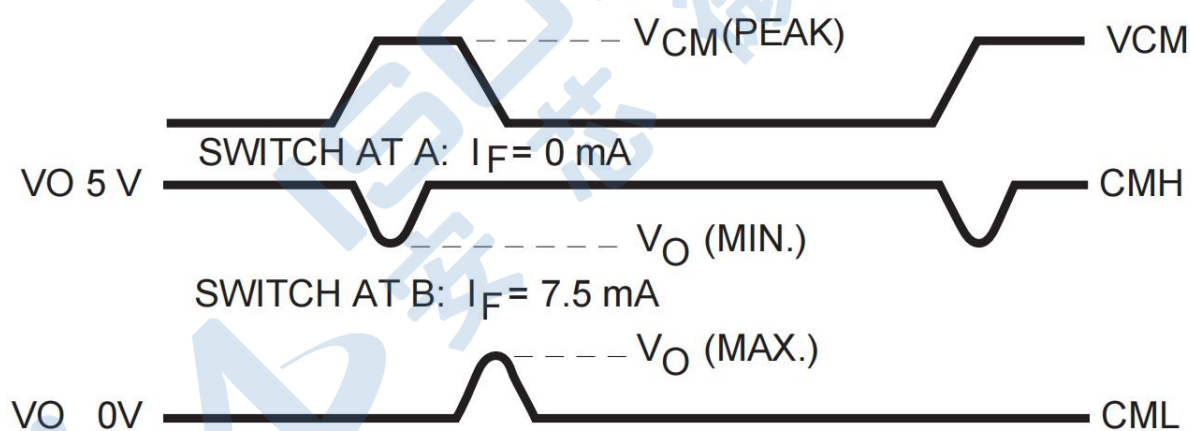
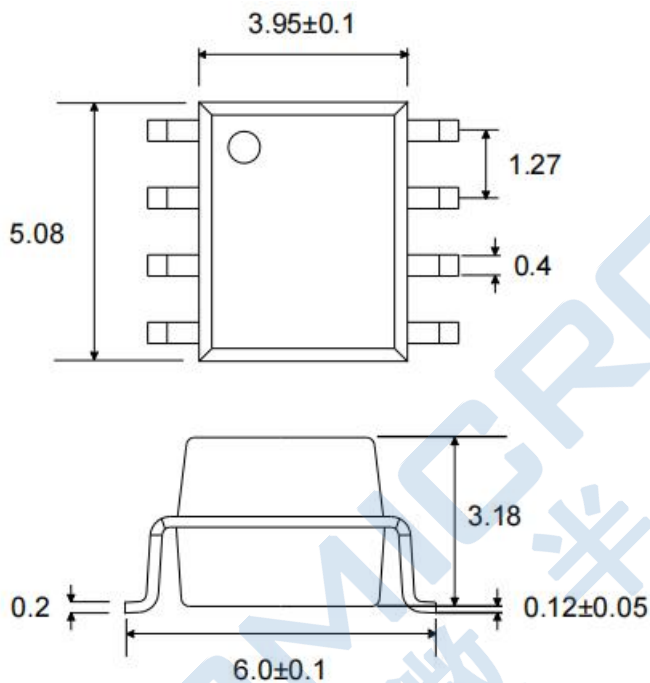


Fig.28 Waveforms of Common Mode Transient Immunity



PACKAGE DIMENSIONS

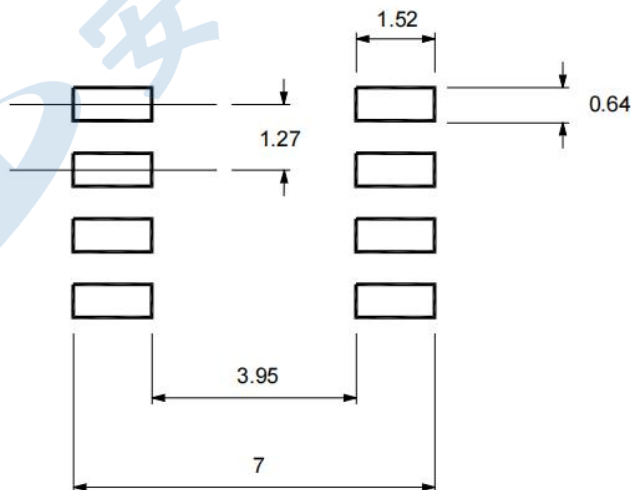
Surface Mount (Low Profile) Lead Forming (SOP8)



- Dimensions in mm unless otherwise stated

RECOMMENDED SOLDER MASK

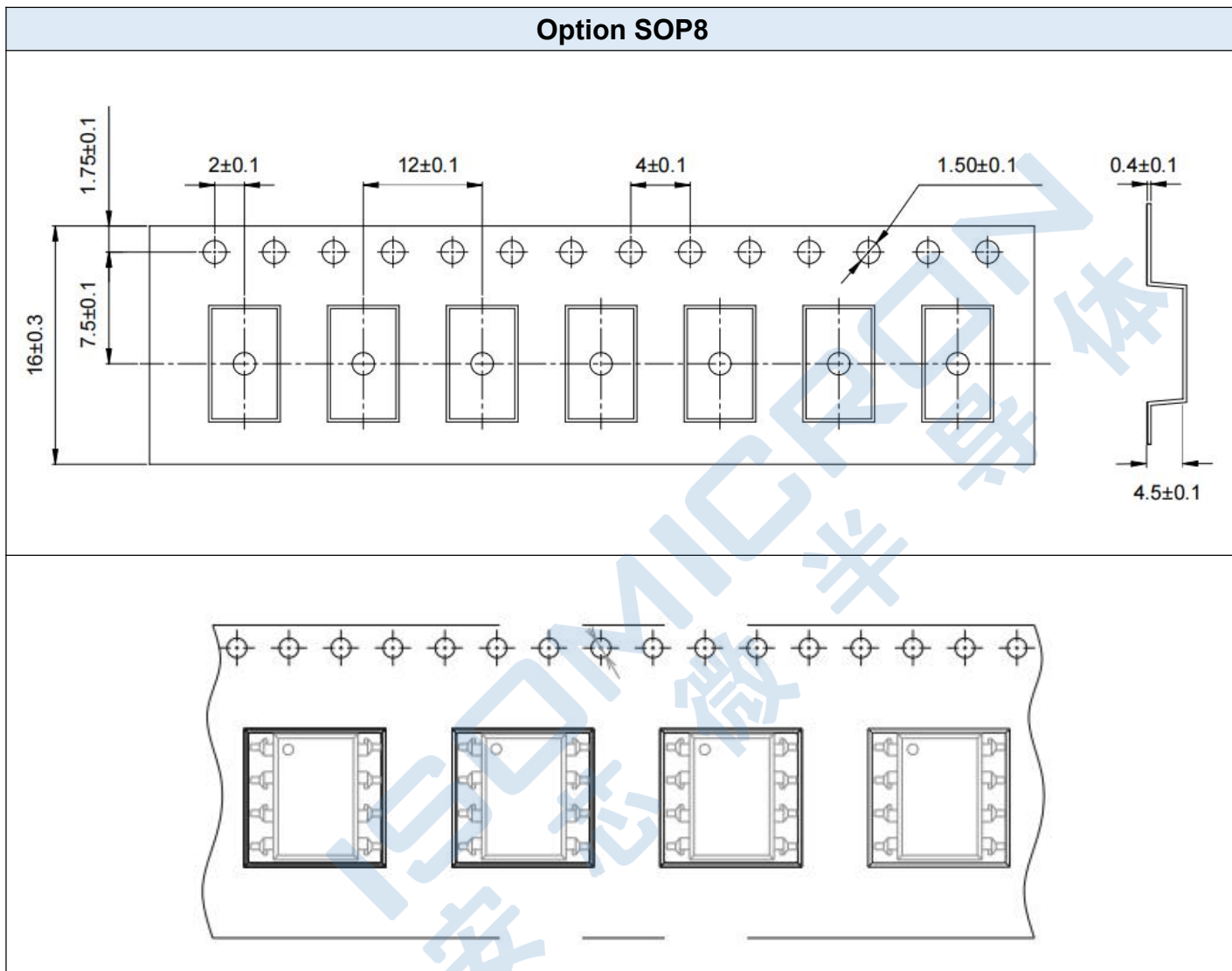
Surface Mount (Low Profile) Lead Forming



- 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.
060X : Part Number
/ : ISOMICRON
YY : Fiscal Year
WW : Work Week
B : Manufacturing Code

Order Code

ICPL – 060X – 5 0 0 E

Company Abbr. ← ICPL
Part Number ← 060X
Lead Forming ← 5
 5: SM-SL

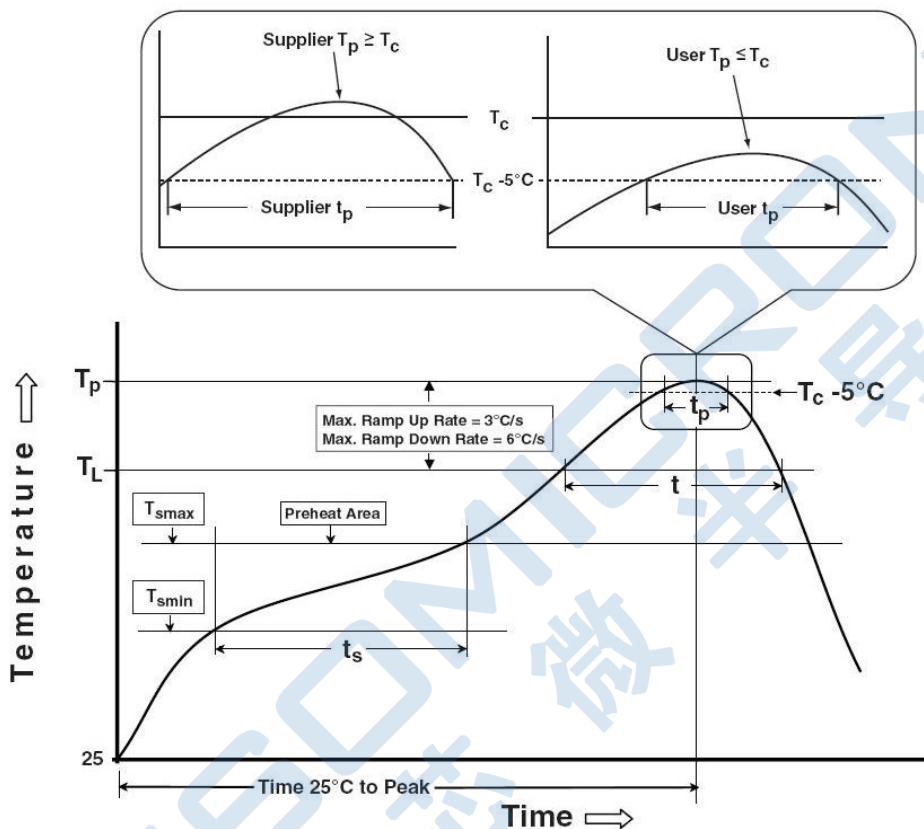
Halogen Free:
 E: Halogen-free, Lead-free
 Z: Halogen, Lead-free
CTR Rank: None
Performance:
 0: Normal
 1: Enhanced
 2: Industrial level
 3: Auto level
 4: Military level

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

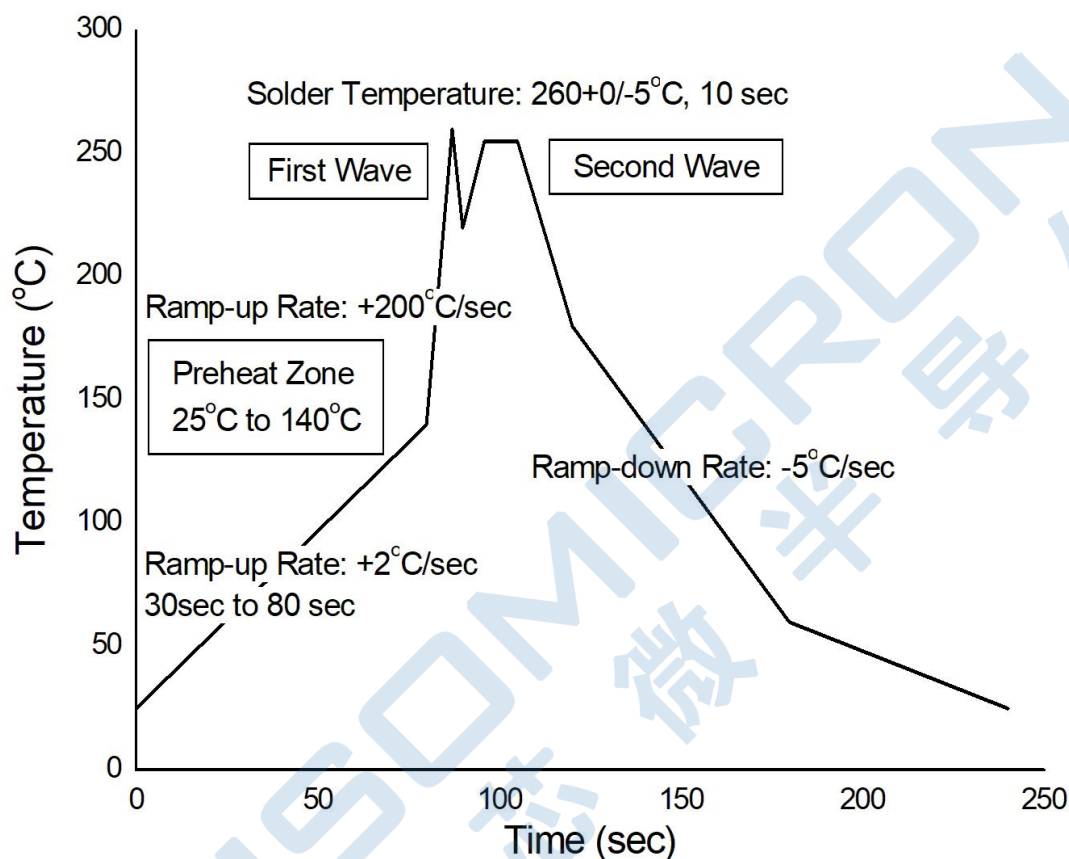
Reflow Profile



Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (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°C/second max.	3°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°C +0°C / -5°C	260°C +0°C / -5°C
Time (t_P) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (T_P to T_L)	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°C ± 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.
- ISOMICRON makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, ISOMICRON disclaims (a) any and all liability arising out of the application or use of any product, (b) any and all liability, including without limitation special, consequential or incidental damages, and (c) any and all implied warranties, including warranties of fitness for particular
- The products shown in this publication are designed for the general use in electronic applications such as office automation, equipment, communications devices, audio/visual equipment, electrical application and instrumentation purpose, non-infringement and merchantability.
- 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.