

Features

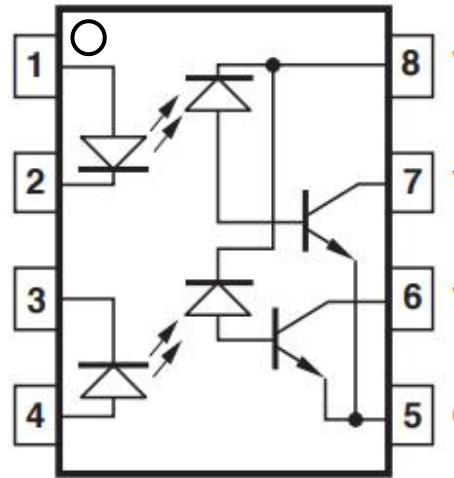
- TTL compatible
- High density packaging
- 3 MHz bandwidth
- Open collector outputs
- Guaranteed AC and DC performance over temperature: -40°C to $+85^{\circ}\text{C}$
- Strobable output (single-channel products only)
- Safety approvals: UL、VDE、CQC

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-0530/0531/053L contain a pair of light emitting diodes and integrated photo-detectors with electrical insulation between input and output. Separate connection for the photodiode bias and output transistor collectors increase the speed up to a hundred times that of a conventional phototransistor




Truth Table

LED	V_o
ON	L
OFF	H



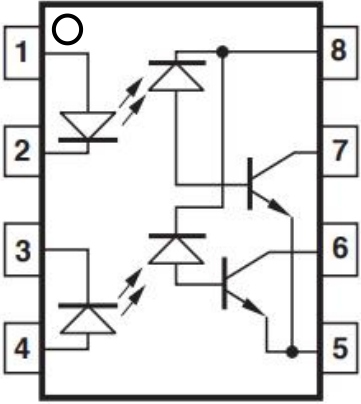
ORDERING INFORMATION

Outline	Part Number	Package	Marking	Packing	Packing Size	Quantity
	ICPL-0530-500E	SOP8	ICPL 053X /YYWW B	Reel	13 "	2000
	ICPL-0531-500E					
	ICPL-053L-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	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	45	mW	
OUTPUT				
Supply Voltage	V _{CC}	-0.5(Min.) 30(Max.)	V	
Output Voltage	V _O	-0.5(Min.) 20(Max.)	V	
Output Current	I _O	8(Max.)	mA	
Peak Output Current	I _{O(PEAK)}	16(Max.)	mA	
Output Power Dissipation	P _O	35	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	VCC	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°C)

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition	Note
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	
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°C)							
High Level Output Current	I _{OH}	-	5.5	100	μA	V _{CC} =5.5V, V _O =5.5V, I _F =250μA, 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	Note
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	$C_L=15\text{pF}$, $R_L=350\Omega$	
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	0530 053L	CM_H	5000	-	-	$V/\mu\text{s}$	$I_F = 7.5\text{mA}$, $V_{OH}=2.0\text{V}$, $R_L=350\Omega$, $T_a=25^{\circ}\text{C}$ $V_{CM}=50\text{Vp-p}$	
	0531		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	0530 053L	CM_L	5000	-	-	$V/\mu\text{s}$	$I_F = 0\text{mA}$, $V_{OH}=0.8\text{V}$, $R_L=350\Omega$, $T_a=25^{\circ}\text{C}$ $V_{CM}=50\text{Vp-p}$	
	0531		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

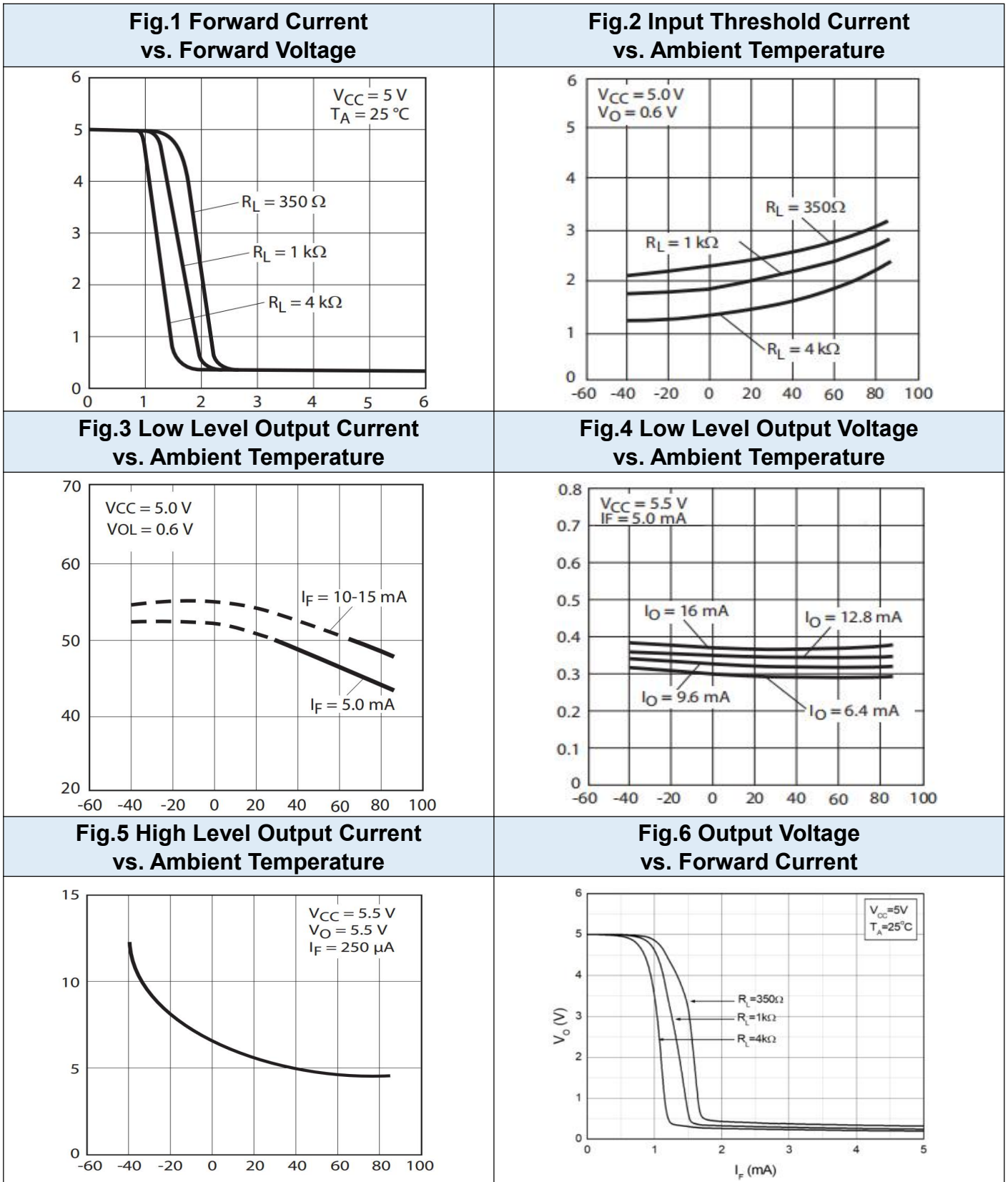


Fig.7 Propagation Delay vs. Forward Current

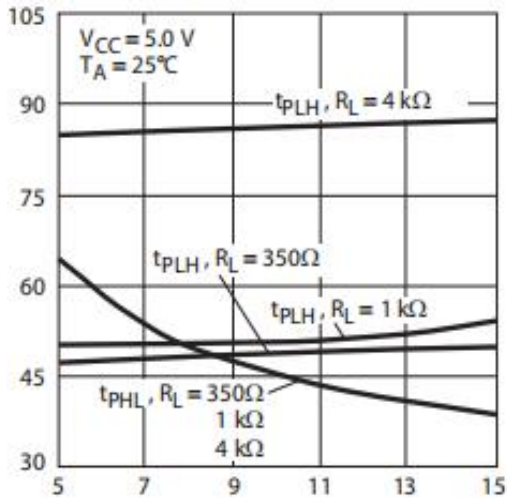


Fig.8 Rise and Fall Time vs. Ambient Temperature

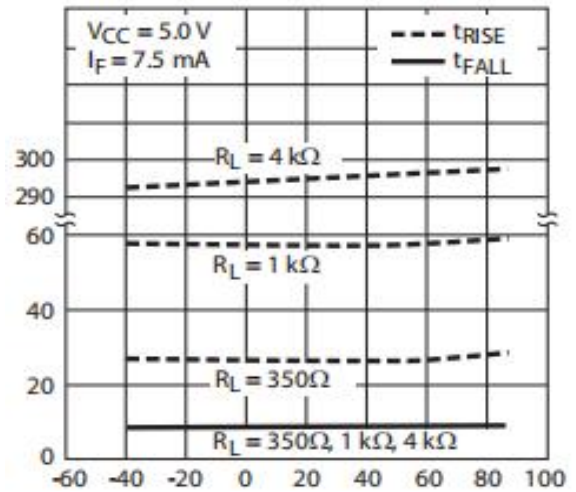


Fig.9 Propagation Delay vs. Ambient Temperature

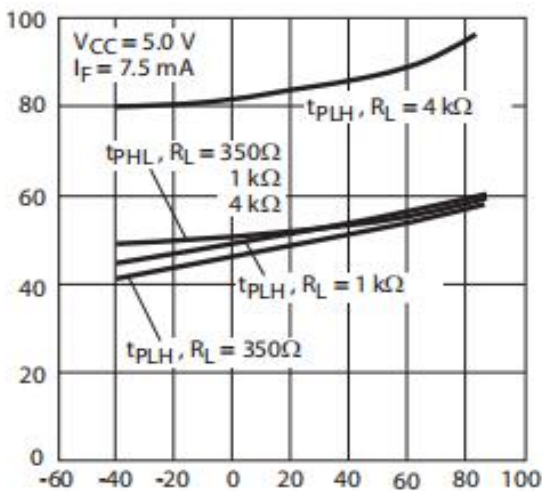
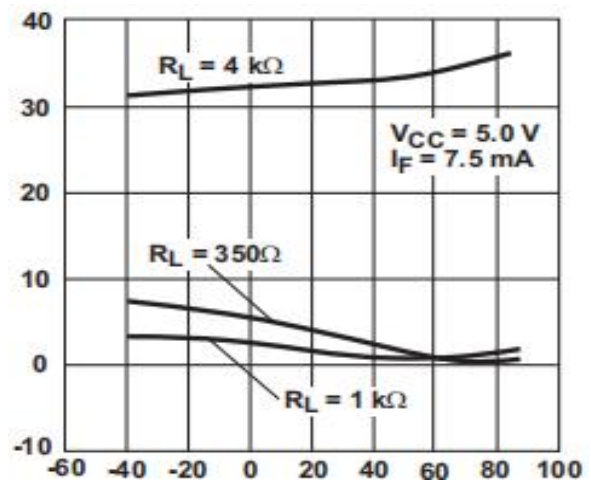


Fig.10 Propagation Delay vs. Ambient Temperature



TEST CIRCUITS

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

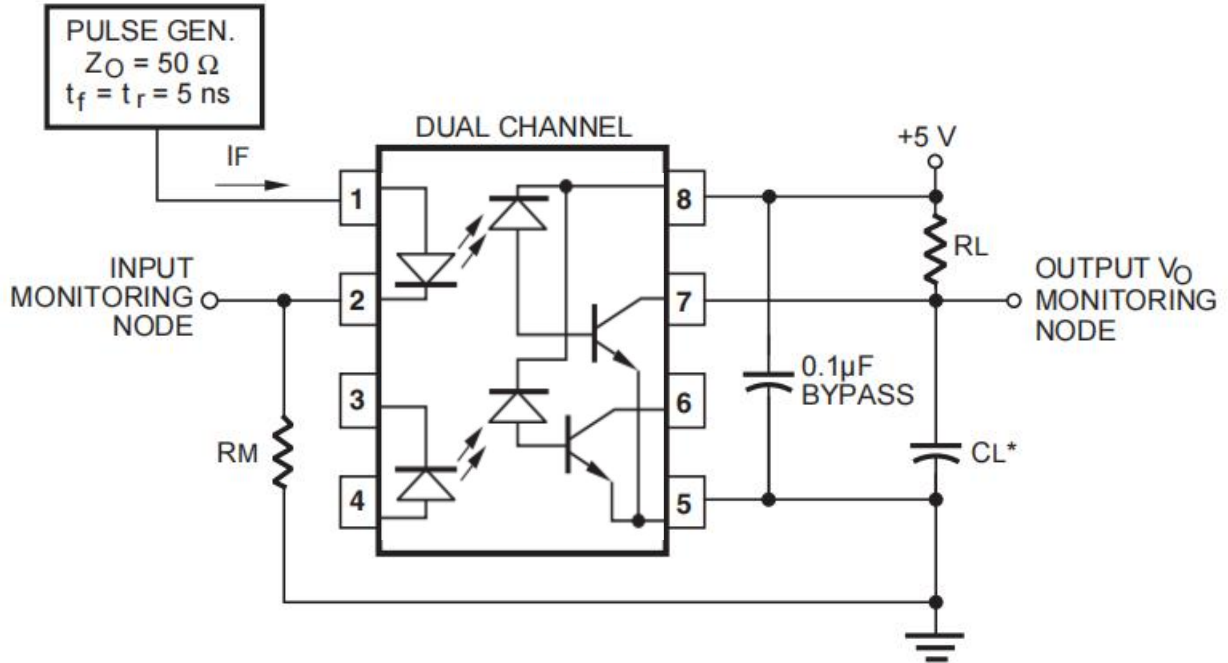
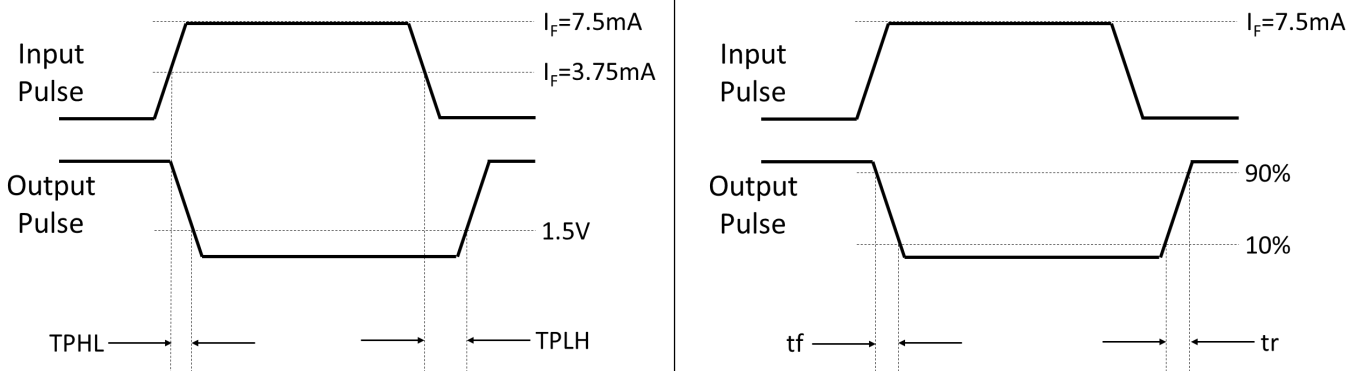


Fig.12 Waveforms of t_{PHL} , t_{PLH} , t_r , t_f



TEST CIRCUITS

Fig.15 Test Circuits for Common Mode Transient Immunity

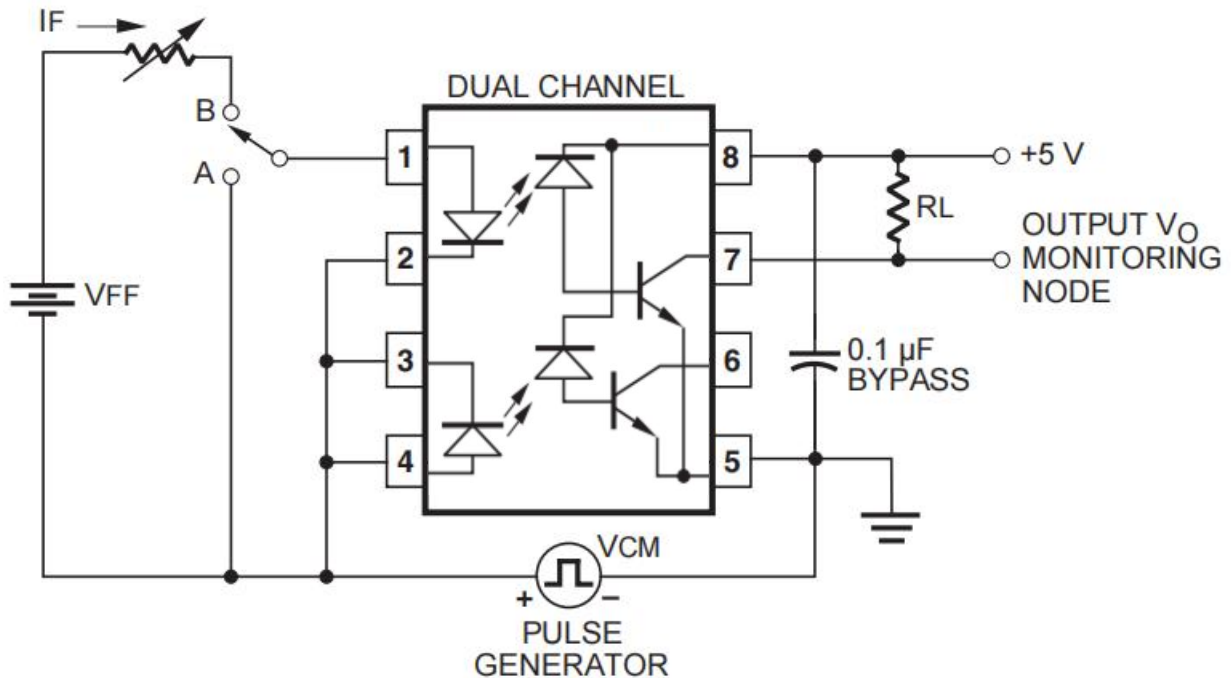
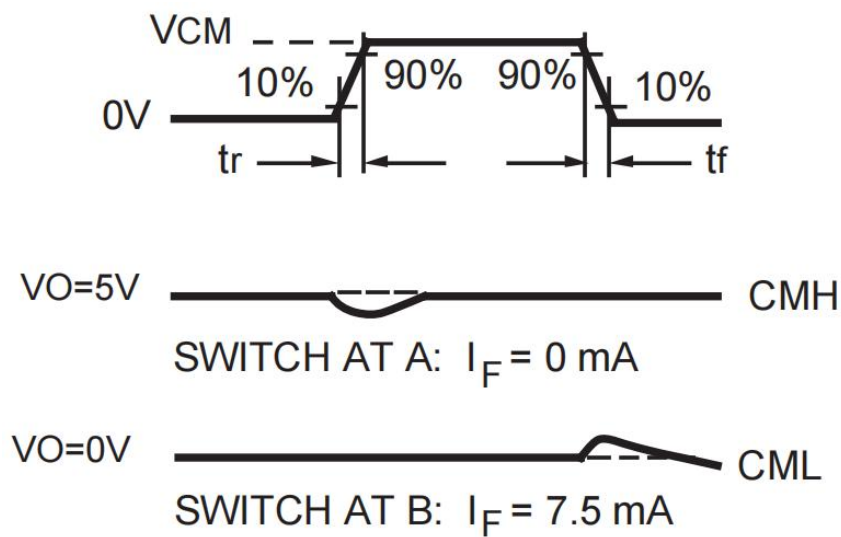
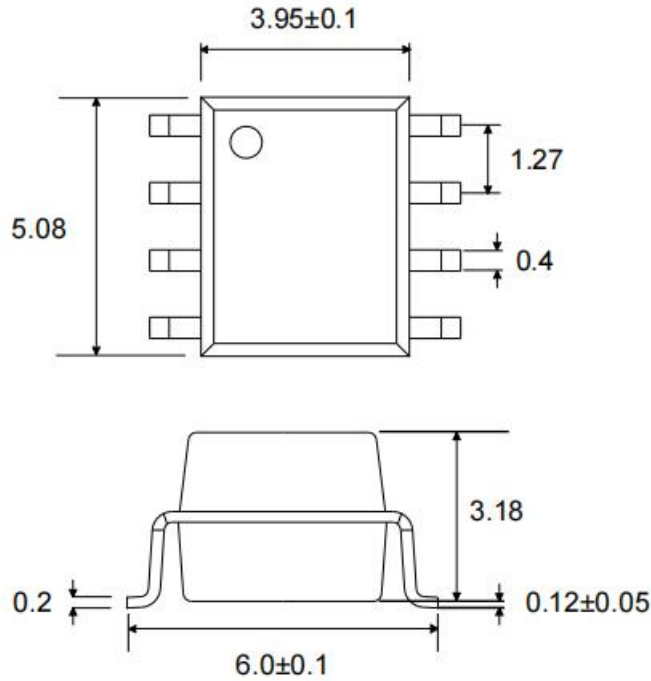


Fig.16 Waveforms of Common Mode Transient Immunity



PACKAGE DIMENSIONS

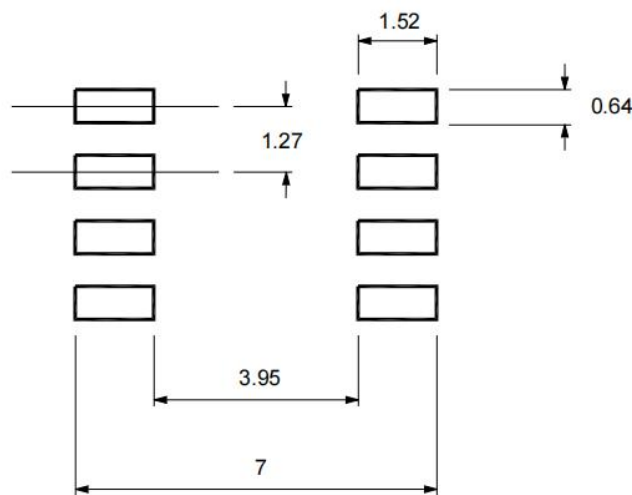
Surface Mount (Low Profile) Lead Forming (SOP8)



- Dimensions in mm unless otherwise stated

RECOMMENDED SOLDER MASK

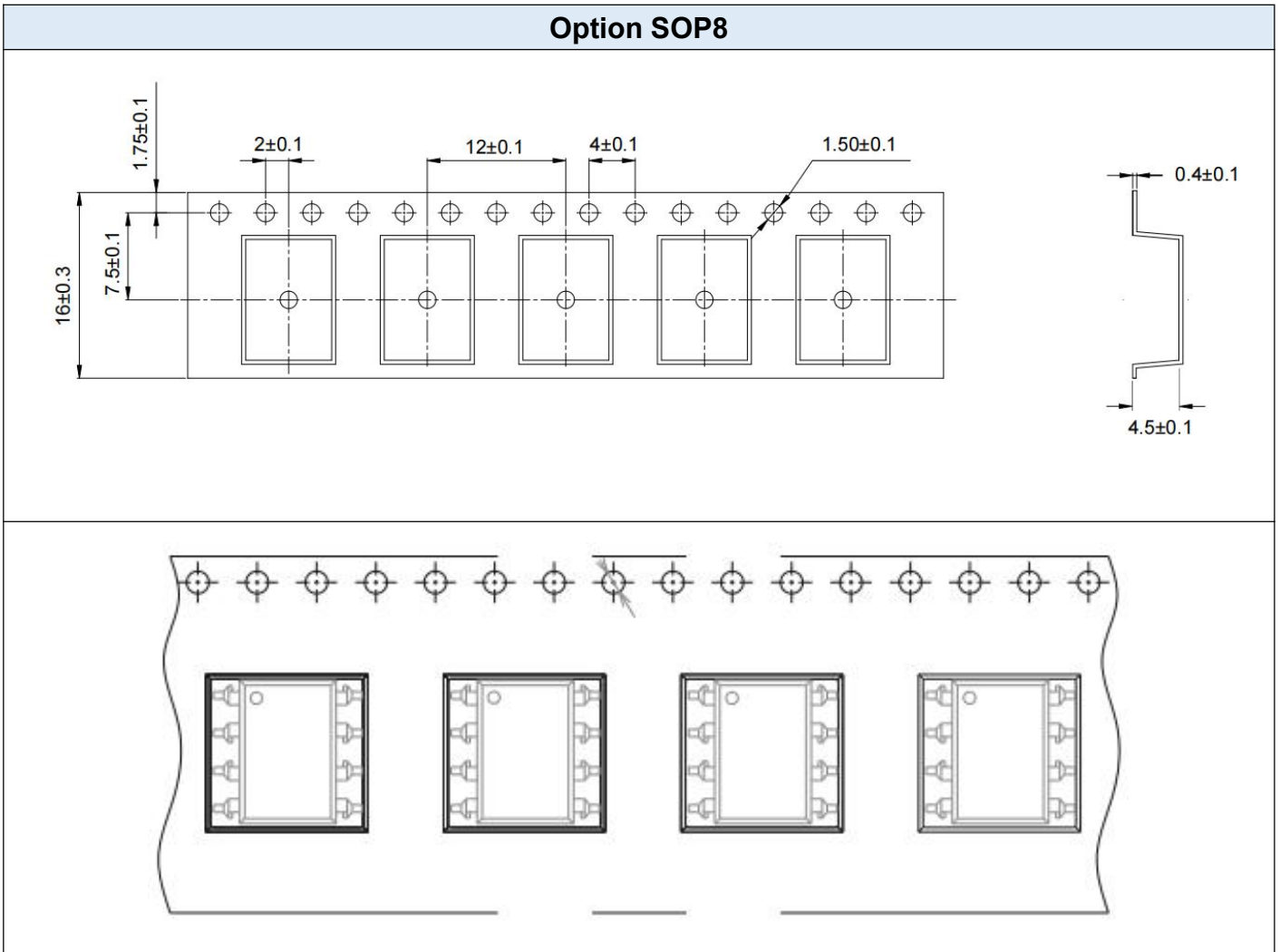
Surface Mount (Low Profile) Lead Forming



- Dimensions in mm unless otherwise stated

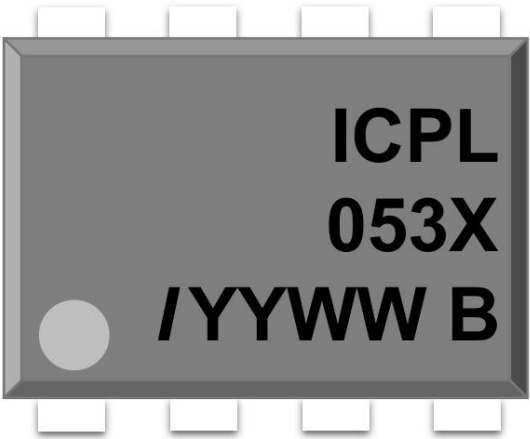
CARRIER TAPE SPECIFICATIONS

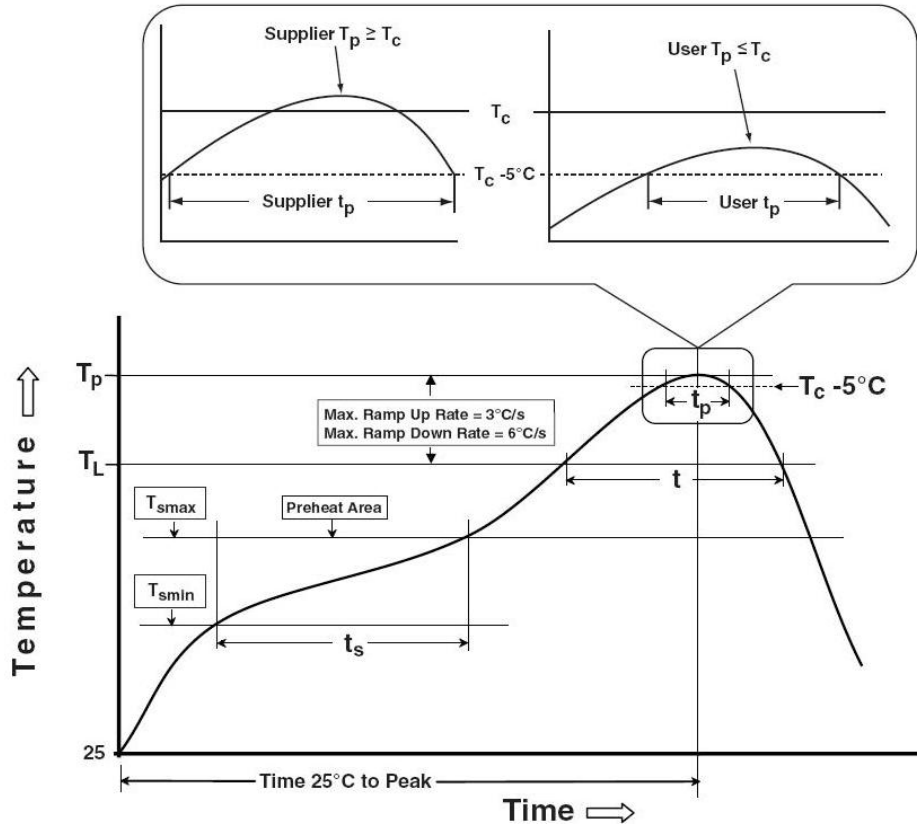
Option SOP8



- Dimensions in mm unless otherwise stated

ORDERING AND MARKING INFORMATION

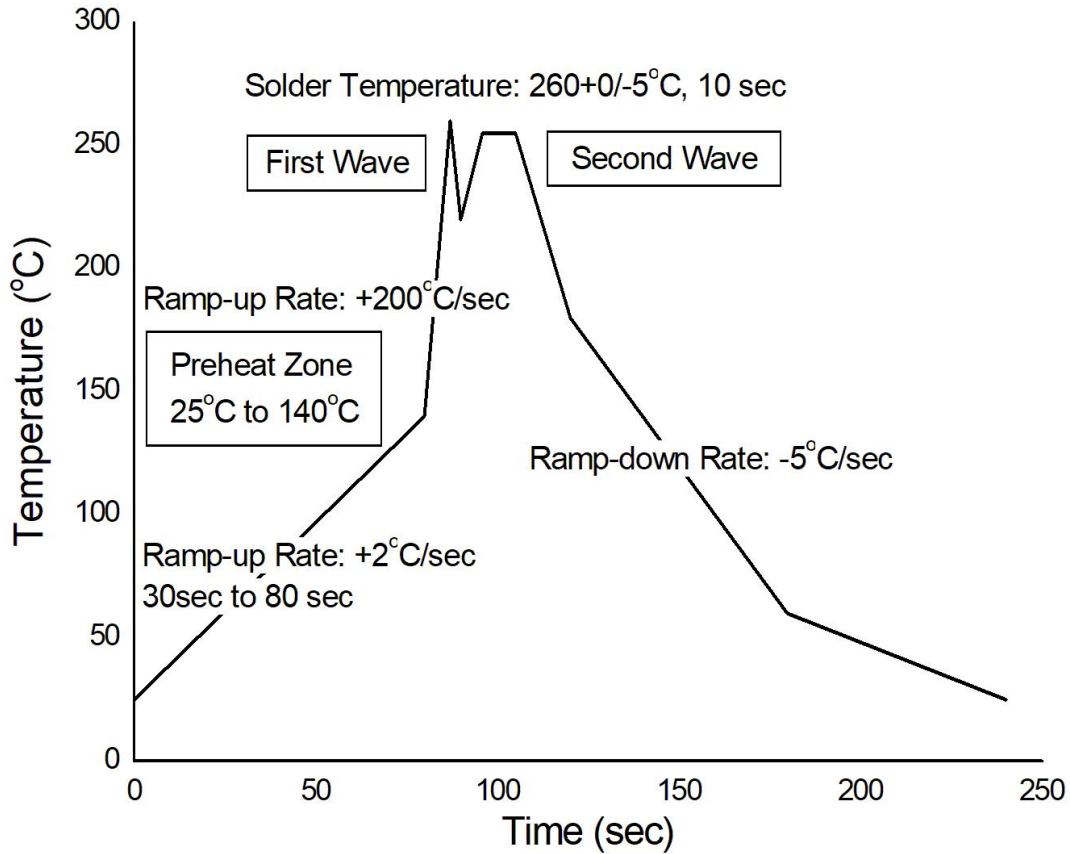
Marking Information			
		<p>ICPL : Company Abbr. 053X : Part Number / : ISOMICRON YY : Fiscal Year WW : Work Week B : Manufacturing Code</p>	
Order Code			
<p>ICPL - 053X - 5 0 0 E</p>			
<p>Company Abbr. ←</p> <p>Part Number ←</p> <p>Lead Forming ← 5: SM-SL</p>	<p>→ Halogen Free E: Halogen-free, Lead-free Z: Halogen, Lead-free</p> <p>→ CTR Rank: None</p> <p>→ Performance 0: Normal 1: Enhanced 2: Industrial level 3: Auto level 4: Military level</p>		
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+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

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- The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
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- Please contact ISOMICRON sales agent for special application request.
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- 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.