

Features

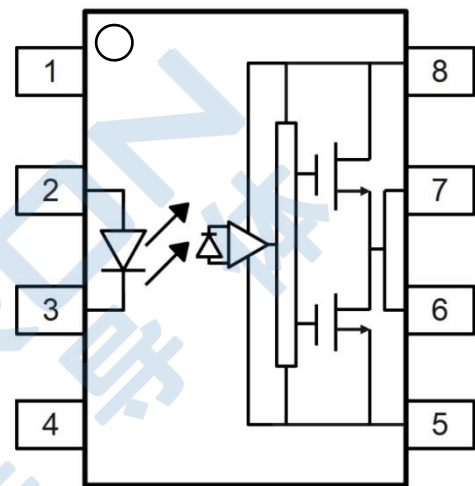
- High isolation 5000 VRMS
- DC input with a high speed driver
- Operating temperature range - 40 °C to 100 °C
- Rail to rail output
- REACH & RoHS compliance
- Halogen free (Optional)
- MSL class 1
- Regulatory Approvals
 - UL - UL1577
 - VDE - EN60747-5-5(VDE0884-5)
 - CQC - GB4943.1

Applications

- Isolated IGBT/Power MOSFET gate drive
- Industrial Inverter
- AC brushless and DC motor drives
- Induction Heating

Description

The ICPL-3120 series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to an integrated circuit with a power output stage in a plastic DIP8 package with different lead forming options.



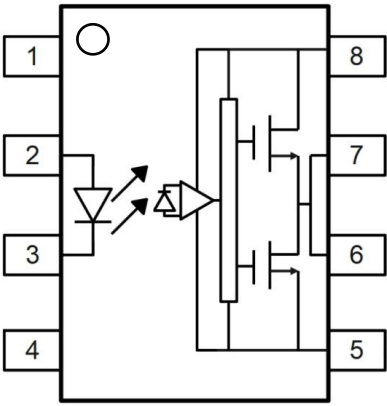
ORDERING INFORMATION

Outline	Part Number	Package	Marking	Packing	Packing Size	Quantity
	ICPL-3120-000E	DIP8	ICPL 3120 /YYWW A	Tube	500mm	45
	ICPL-3120-100E	DIP8-M		Tube	500mm	45
	ICPL-3120-500E	DIP8-SL		Reel	13 "	1000

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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 _O
	8	V _{CC}

TRUTH TABLE

LED	V _{DD} -V _{SS} "Positive Going" (Turn-on)	V _{DD} -V _{SS} "Negative Going" (Turn-off)	V _O
Off	0V to 30V	0V to 30V	Low
On	0V to 11.5V	0V to 10V	Low
On	11.5V to 13.5V	10V to 12V	Transition
On	13.5V to 30V	12V to 30V	High

RECOMMENDED OPERATION CONDITIONS

Parameter	Symbol	Min.	Max.	Unit
Operating Temperature	T _a	-40	100	°C
Supply Voltage	V _{CC}	15	30	V
Input Current (ON)	I _{F(ON)}	7	16	mA
Input Voltage (OFF)	V _{F(OFF)}	0	0.8	V

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
Operating Frequency	f	50	kHz	
Reverse Voltage	V_R	5	V	
Input Power Dissipation	P_I	100	mW	
OUTPUT				
Supply Voltage	V_{CC}	35	V	
Output Voltage	V_O	35	V	
Peak Output Current	I_O	2.5	A	
Output Power Dissipation	P_O	250	mW	
COMMON				
Total Power Dissipation	P_{tot}	295	mW	
Isolation Voltage	V_{iso}	5000	Vrms	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

ELECTRICAL OPTICAL CHARACTERISTICS

(V_{CC}=30V, V_{EE}=GND, T_a=25°C unless specified otherwise)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition	Note
INPUT CHARACTERISTICS							
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}	-	13	-	pF	V=0, f=1MHz	
OUTPUT CHARACTERISTICS							
High Level Supply Current	I _{CCH}	-	1.66	3	mA	I _F = 7mA to 10mA, V _O = Open	
Low Level Supply Current	I _{CCL}	-	1.8	3	mA	V _F = 0 to 0.8V, V _O = Open	
TRANSFER CHARACTERISTICS							
High Level Output Voltage	V _{OH}	V _{CC} -0.3	V _{CC} -0.1	-	V	I _F = 10mA, I _O = -100mA	
Low Level Output Voltage	V _{OL}	-	V _{EE} +0.1	V _{EE} +0.25	V	I _F = 0mA, I _O = 100mA	
High Level Output Current	I _{OPH}	-1	-	-	A	V _O = V _{CC} -1.5V	
		-2.5	-	-	A	V _O = V _{CC} -4V	
Low Level Output Current	I _{OPL}	1	-	-	A	V _O = V _{EE} +1.5V	
		2.5	-	-	A	V _O = V _{EE} +4V	
Input Threshold Current	I _{FLH}	-	2.38	5	mA	I _O = 0mA, V _O > 5V	
Input Threshold Voltage	V _{FHL}	0.8	-	-	V	I _O = 0mA, V _O < 5V	
Under Voltage Lockout Threshold	V _{UVLO+}	11	13.01	13.5	V	I _O = 10mA, V _O > 5V	
	V _{UVLO-}	9.5	11.01	12	V	I _O = 10mA, V _O < 5V	
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

(V_{CC}=30V, V_{EE}=GND, T_a=25°C unless specified otherwise)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition	Note
SWITCHING CHARACTERISTICS							
Propagation Delay Time to Output Low Level	t _{PHL}	50	103	500	ns	I _F = 7 to 16mA, C _L = 10nF, R _L = 10Ω, f= 10kHz, Duty = 50%, T _a = 25°C	
Propagation Delay Time to Output High Level	t _{PLH}	50	83	500	ns		
Pulse Width Distortion	t _{PHL} -t _{PLH}	-	20	200	ns		
Propagation Delay Skew	t _{PSK}	-100	-	100	ns		
Rise Time	t _r	-	13	-	ns		
Fall Time	t _f	-	13	-	ns		
UVLO Turn On Delay	t _{UVLO(ON)}	-	1.6	-	μs	I _F = 10mA, V _O > 5V	
UVLO Turn Off Delay	t _{UVLO(OFF)}	-	0.4	-	μs	I _F = 10mA, V _O < 5V	
Common Mode Transient Immunity at Logic High	CM _H	20	-	-	kV/μs	I _F =7 to 16mA V _{CC} = 30V, T _a = 25°C, V _{CM} = 2kV	
Common Mode Transient Immunity at Logic Low	CM _L	20	-	-	kV/μs	I _F =0mA V _{CC} = 30V, R _L , T _a = 25°C, V _{CM} = 2kV	

CHARACTERISTIC CURVES

Fig.1 Forward Current vs. Forward Voltage

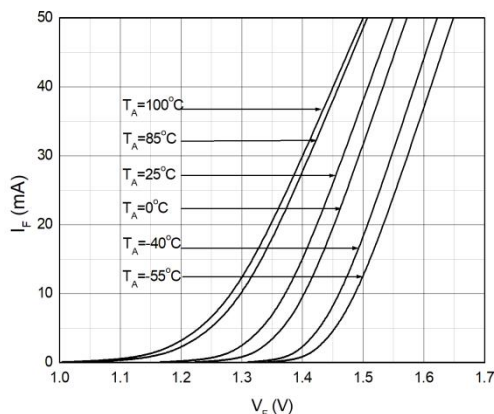


Fig.2 Forward Voltage vs. Ambient Temperature

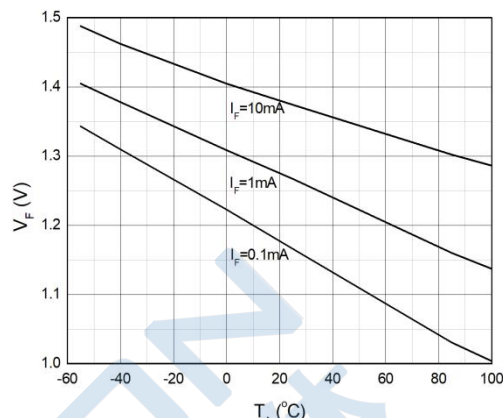


Fig.3 Supply Current vs. Ambient Temperature

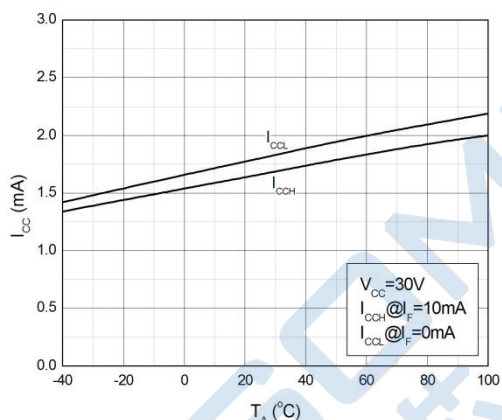


Fig.4 Supply Current vs. Supply Voltage

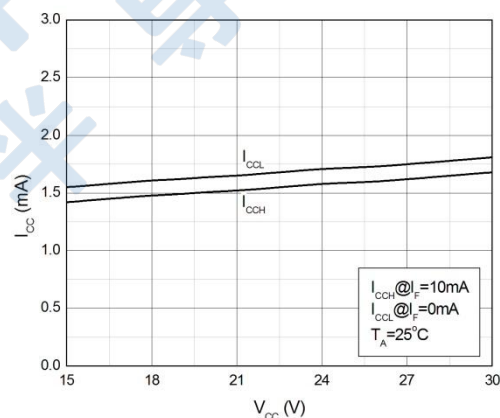


Fig.5 High Level Output Voltage vs. High Level Output Current

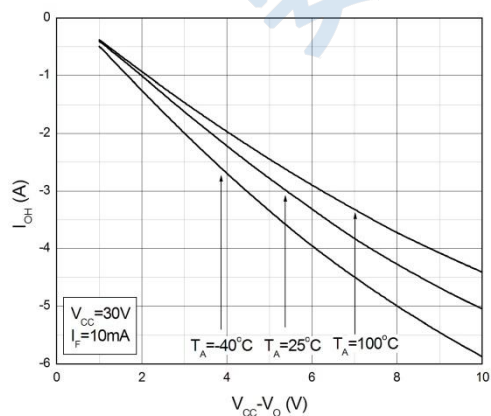
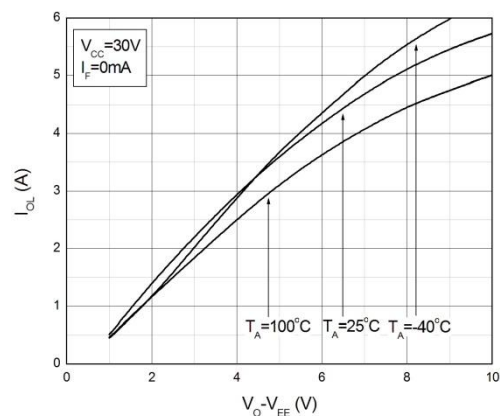


Fig.6 Low Level Output Voltage vs. Low Level Output Current



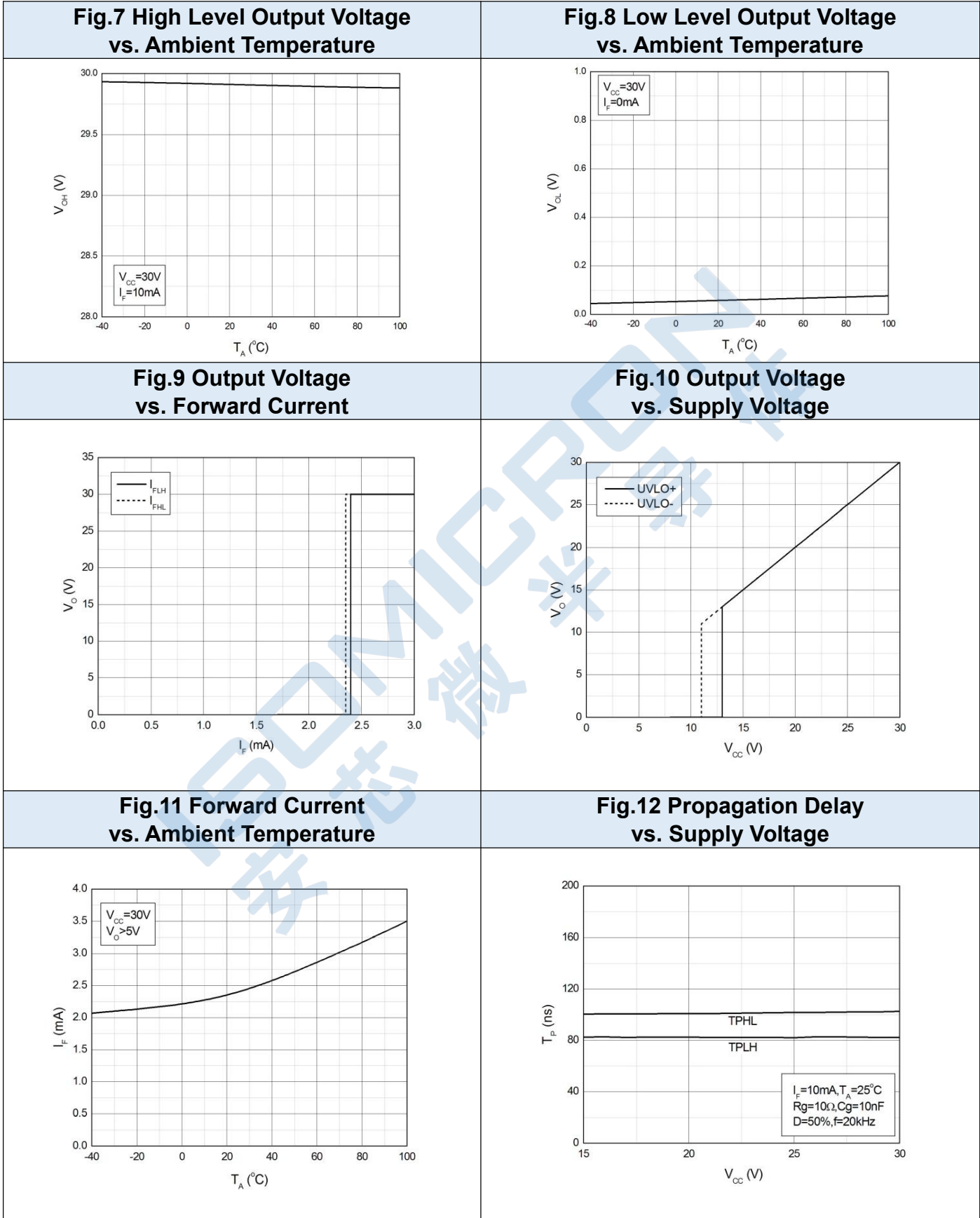


Fig.13 Propagation Delay
vs. Forward Current

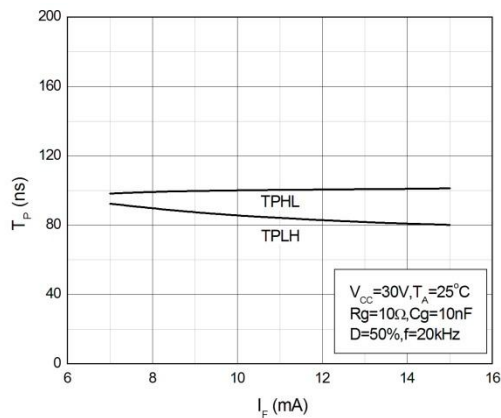


Fig.14 Propagation Delay
vs. Ambient Temperature

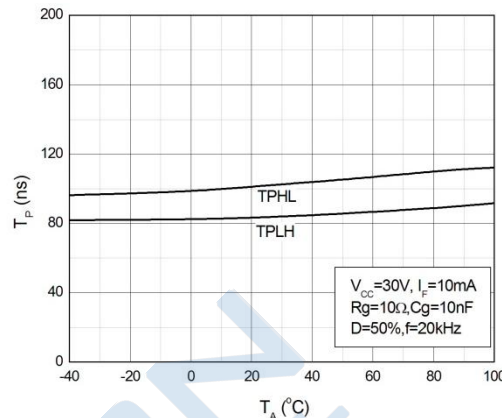


Fig.15 Propagation Delay
vs. Load Resistance

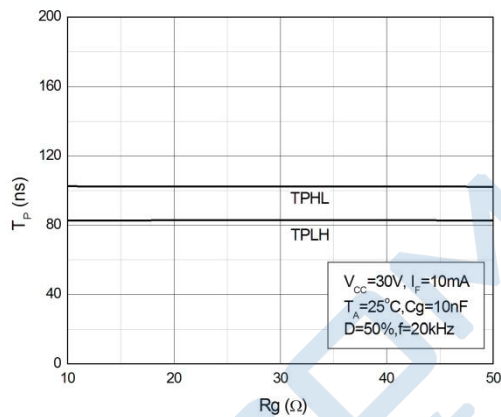
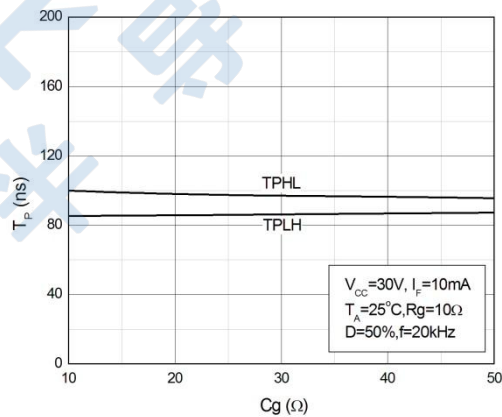


Fig.16 Propagation Delay
vs. Load Capacitance



TEST CIRCUITS

Fig.17 Test Circuits for I_{OH}

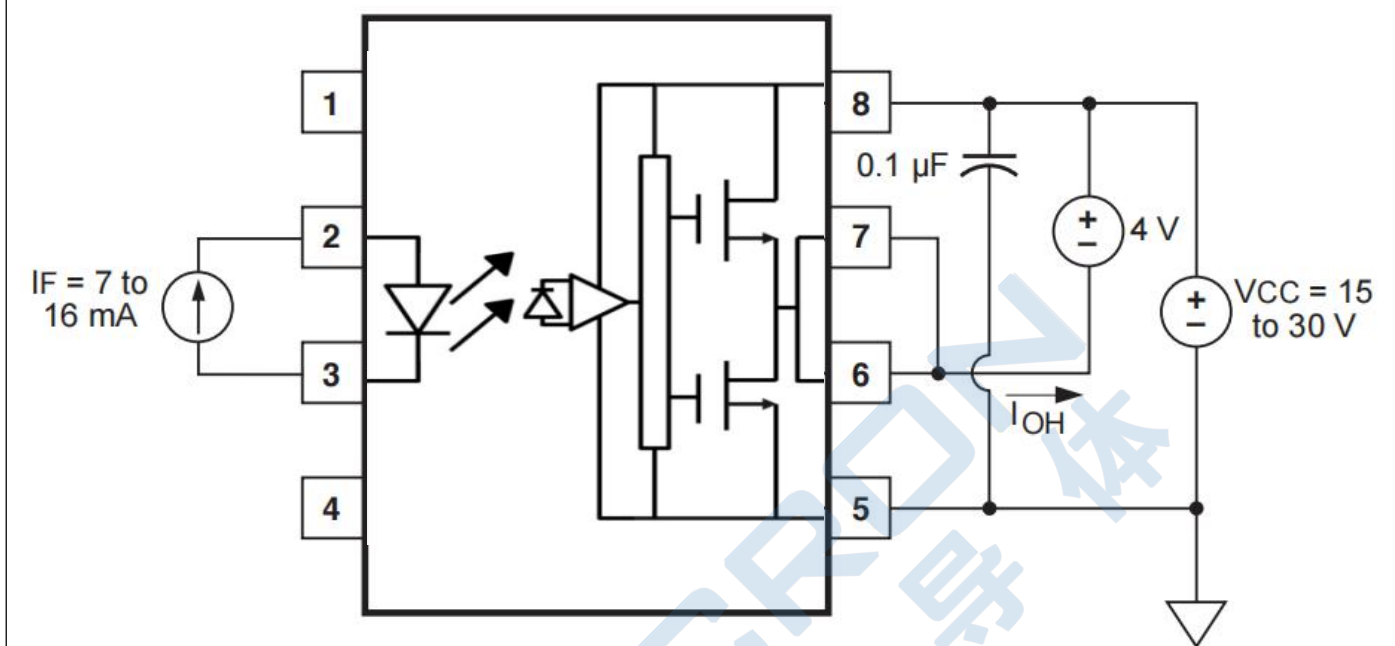
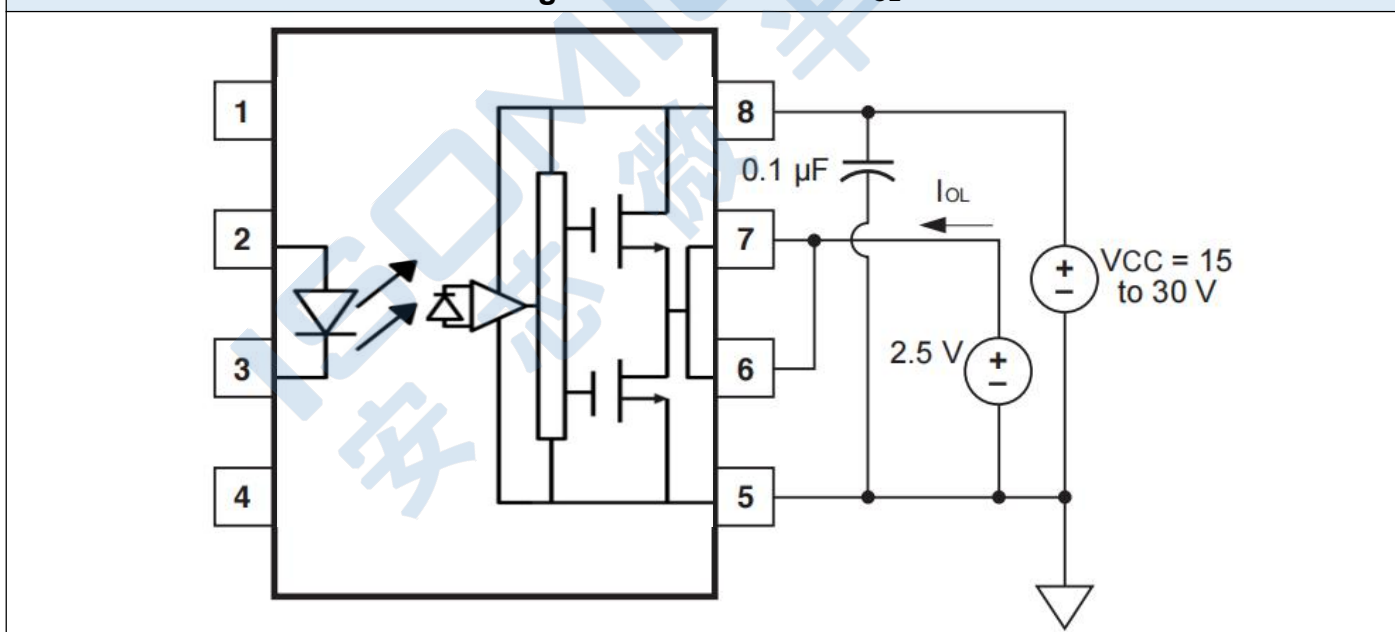


Fig.18 Test Circuits for I_{OL}



TEST CIRCUITS

Fig.19 Test Circuits for t_{PHL} , t_{PLH} , t_r , t_f

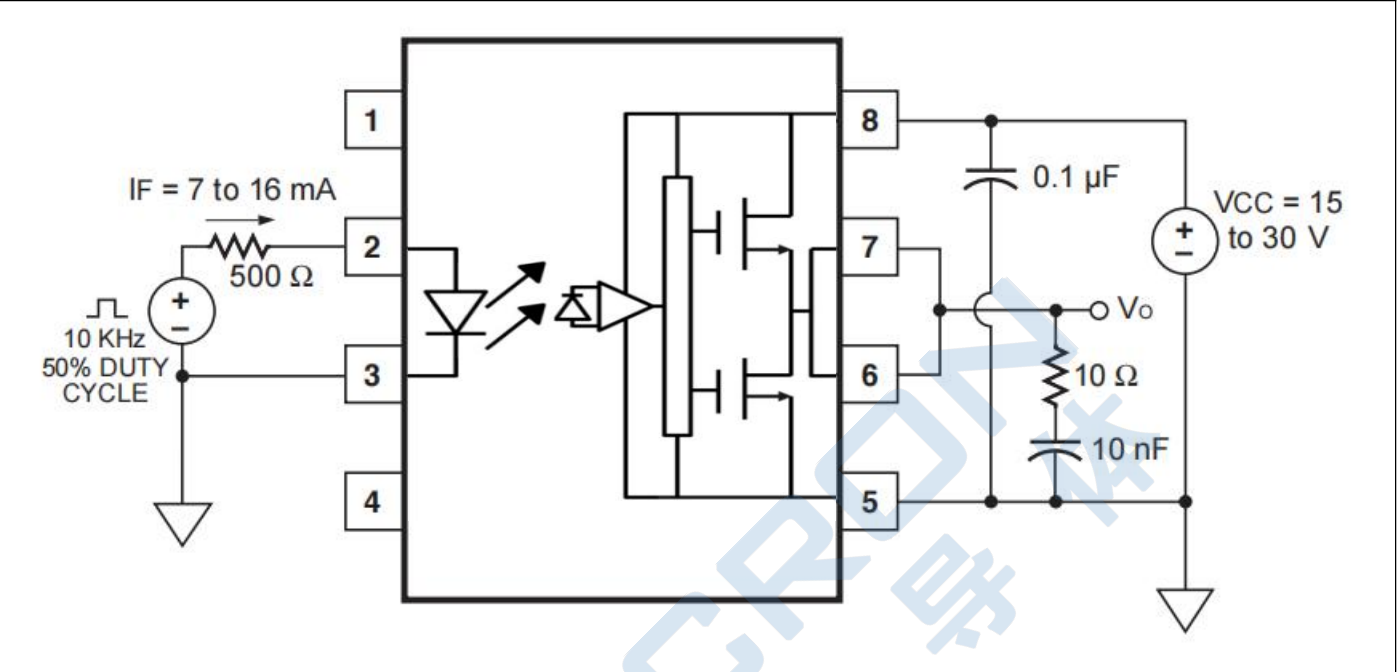
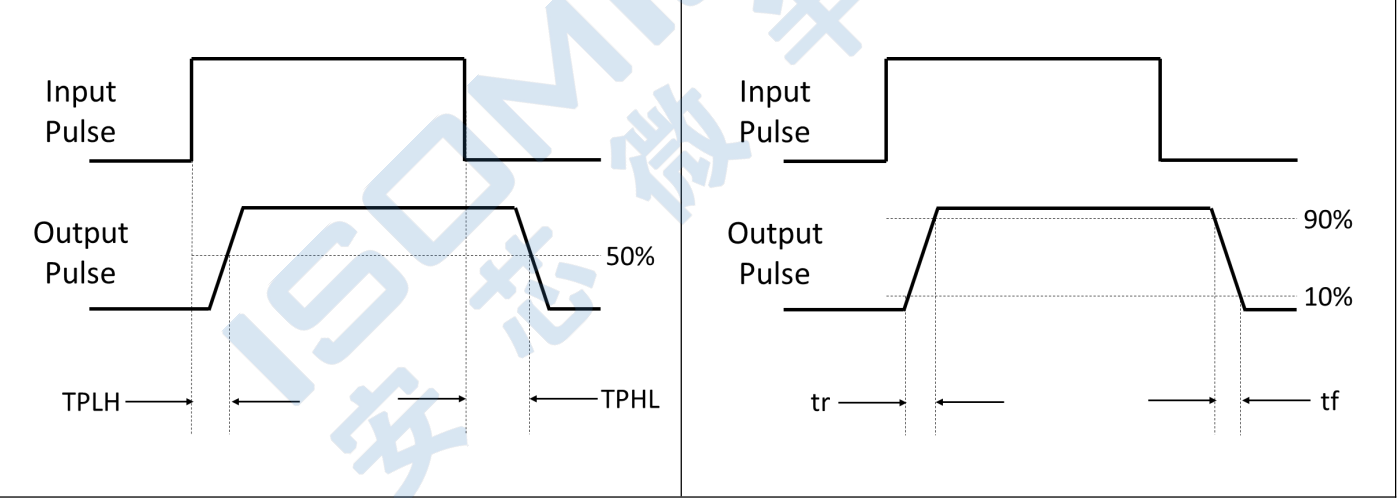


Fig.20 Waveforms of t_{PHL} , t_{PLH} , t_r , t_f



TEST CIRCUITS

Fig.21 Test Circuits for Common Mode Transient Immunity

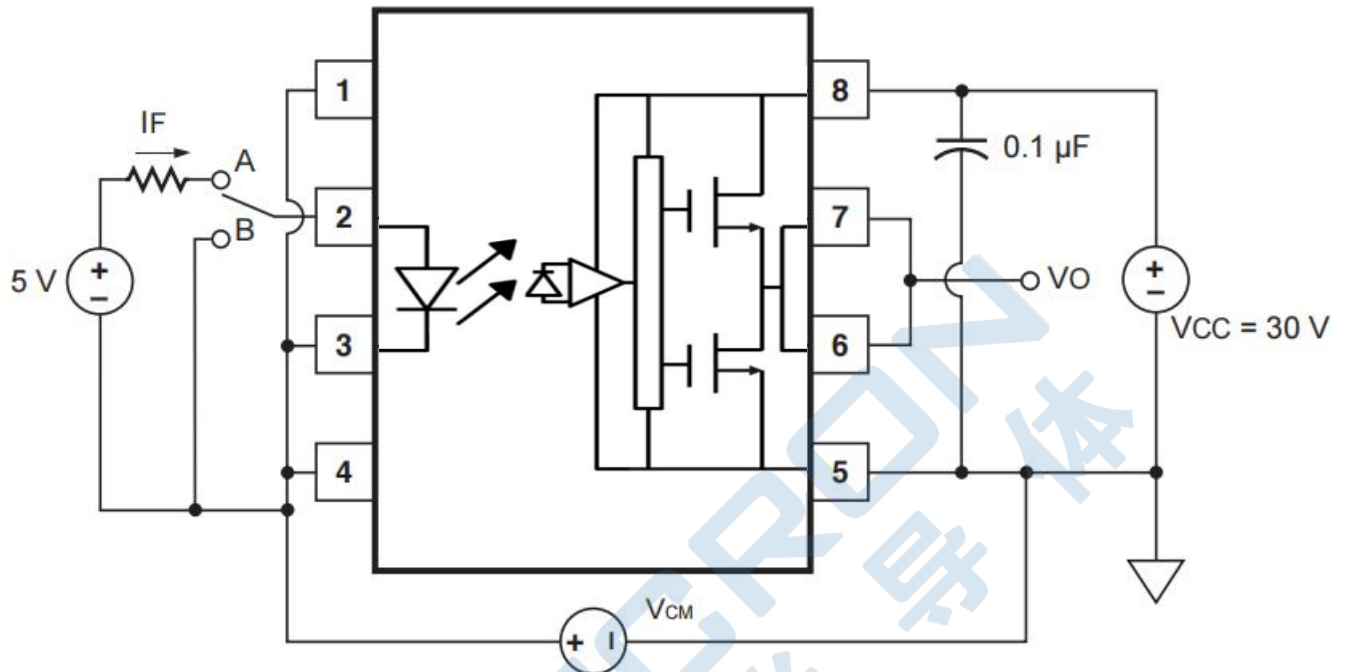
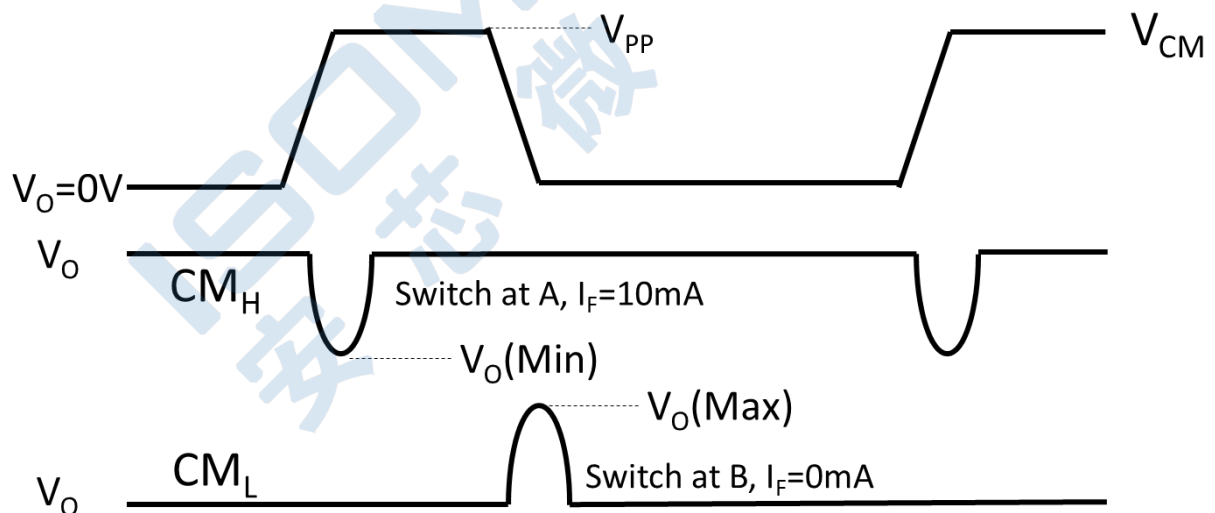
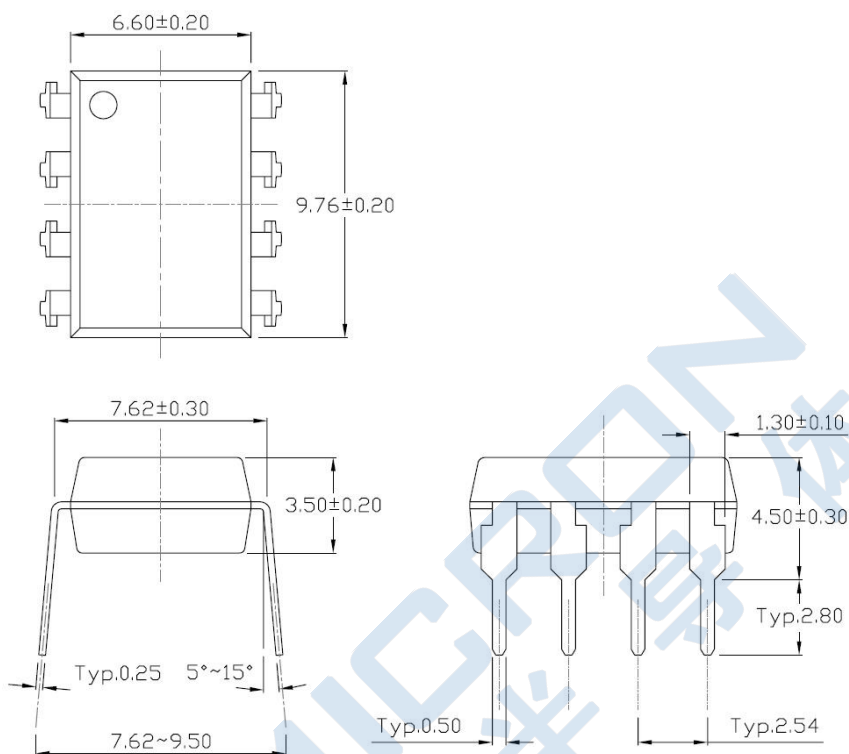


Fig.22 Waveforms of Common Mode Transient Immunity

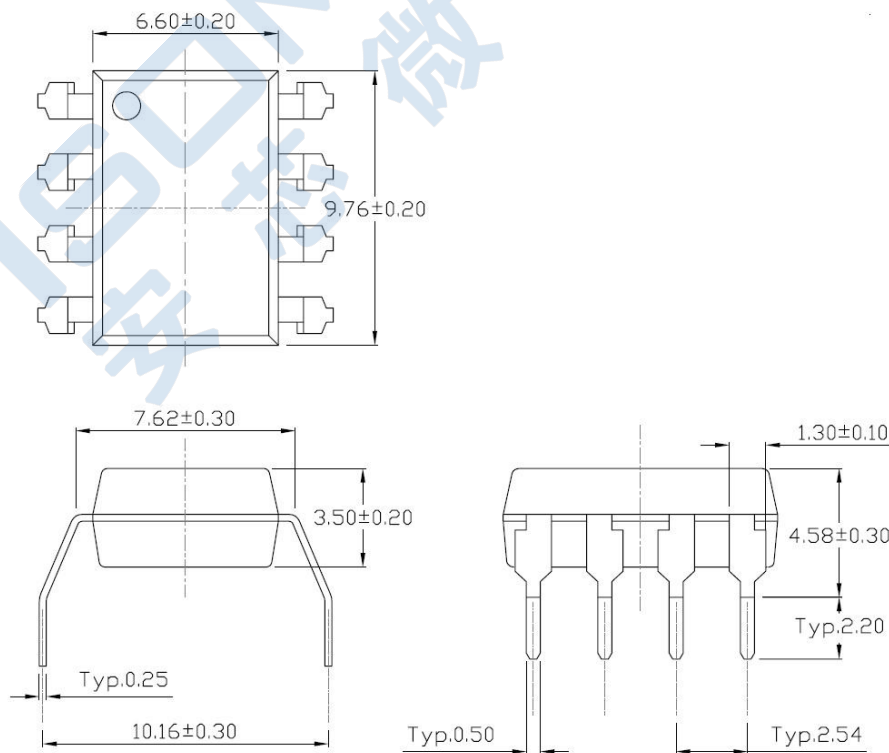


PACKAGE DIMENSIONS

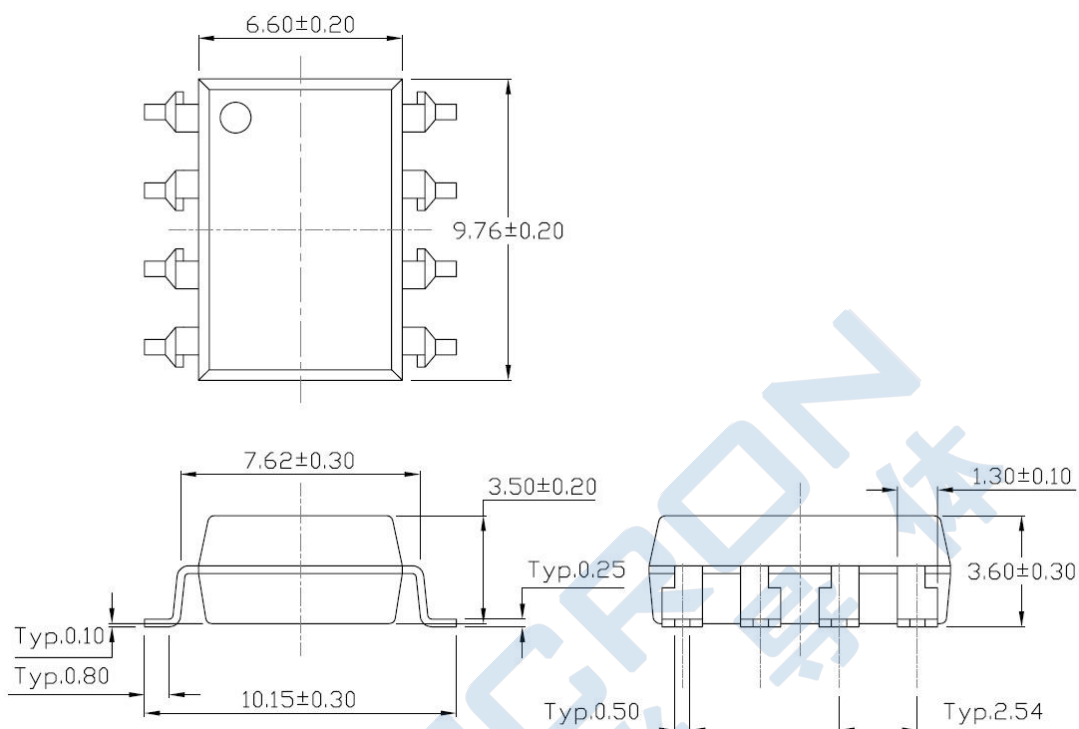
Standard DIP – Through Hole (DIP Type)



Gullwing (400mil) Lead Forming – Through Hole (M Type)



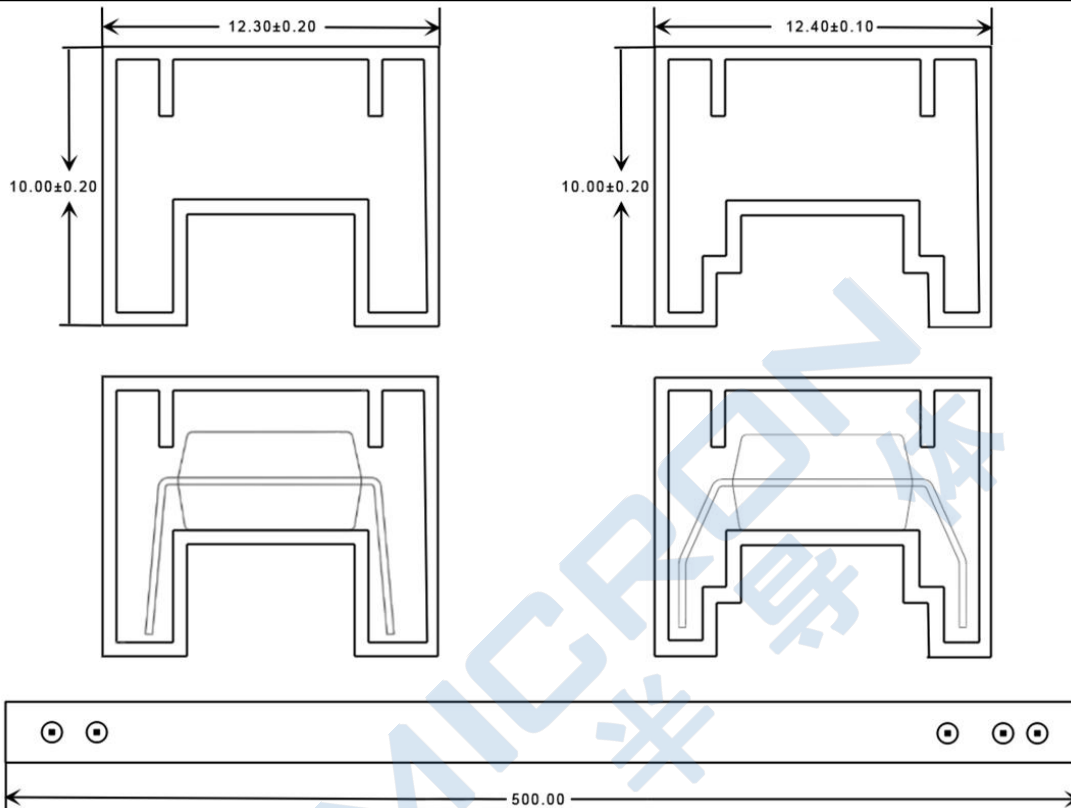
Surface Mount (Low Profile) Lead Forming (SL Type)



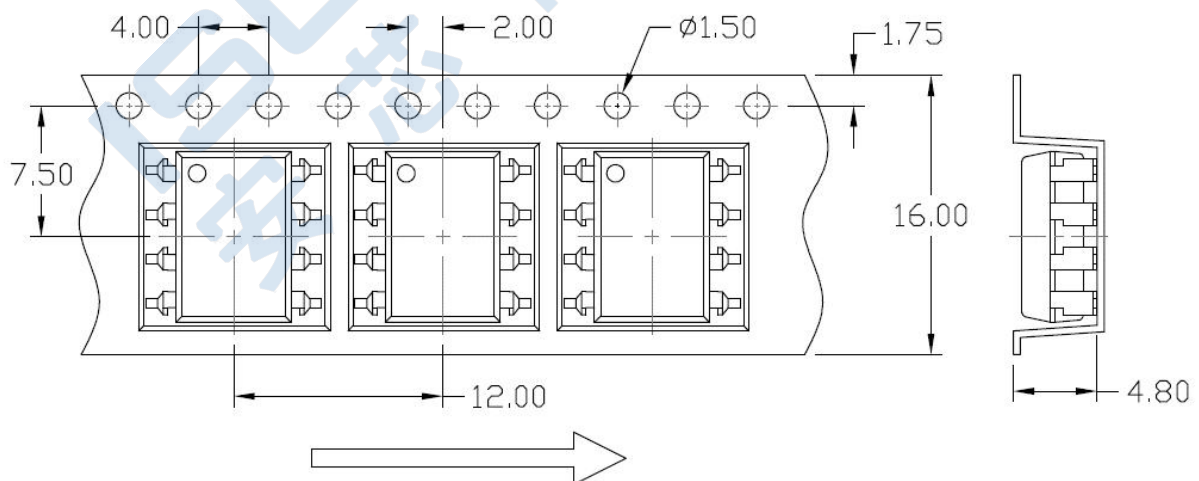
- Dimensions in mm unless otherwise stated

CARRIER TAPE SPECIFICATIONS

Option DIP-Standard & DIP-M



Option SM-SL

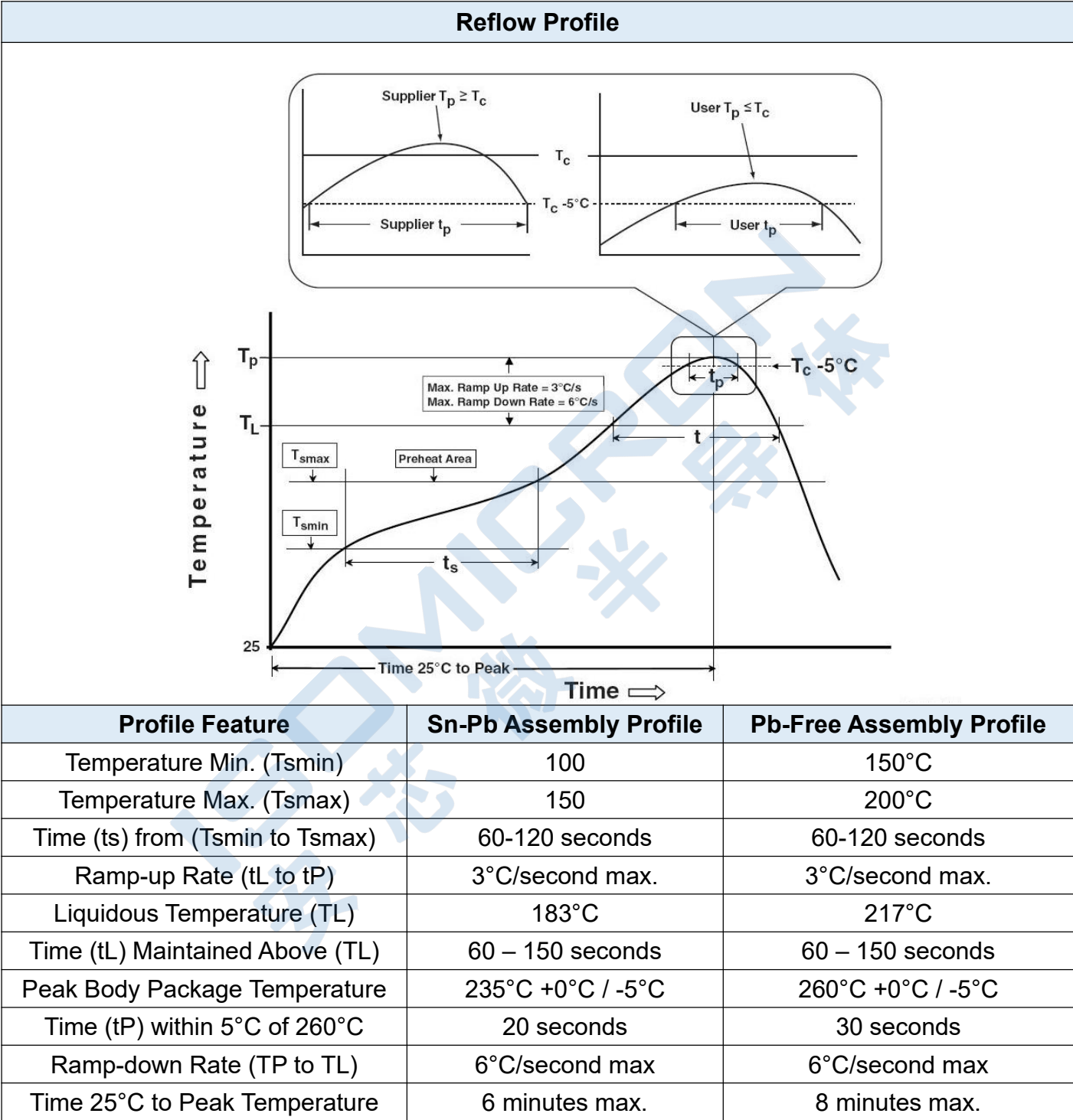


- Dimensions in mm unless otherwise stated

ORDERING AND MARKING INFORMATION

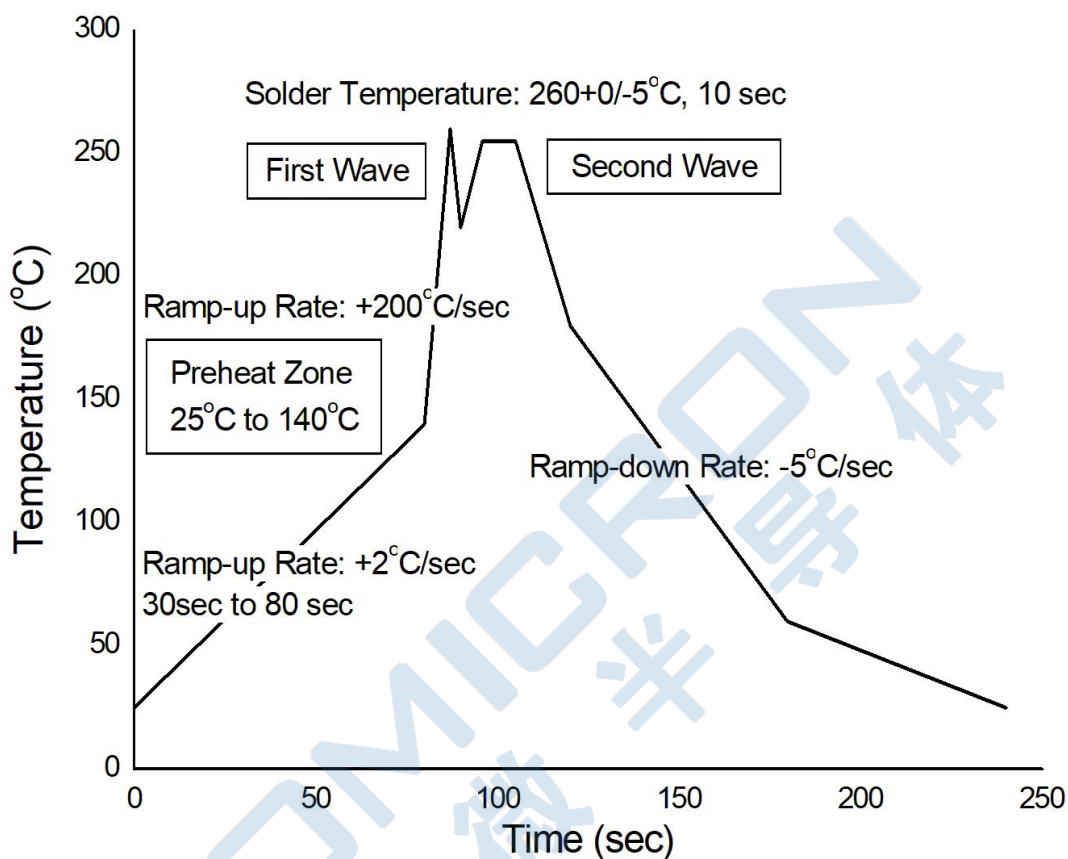
Marking Information			
		ICPL : Company Abbr. 3120 : Part Number / : ISOMICRON YY : Fiscal Year WW : Work Week A : Manufacturing Code	
Order Code			
ICPL – 3120 - 5 0 0 E Company Abbr. Part Number Lead Forming Halogen Free None Performance 0: DIP-Standard 1: DIP-M 5: SM-SL E: Halogen-free,Lead-free Z: Halogen, Lead-free 0: Normal 1: Enhanced			
Packing Quantity			
Option	Quantity	Quantity – Inner box	Quantity – Outer box
DIP-Standard	45 Units/Tube	25 Tubes/Inner box	6 Inner box/Outer box = 6.75k Units
DIP-M	45 Units/Tube	25 Tubes/Inner box	6 Inner box/Outer box = 6.75k Units
SM-SL	1000 Units/Reel	2 Reels/Inner box	5 Inner box/Outer box = 10k Units

REFLOW INFORMATION



TEMPERATURE PROFILE OF SOLDERING

Wave Soldering (JESD22-A111 Compliant)



Hand Soldering By Soldering Iron

Soldering Temperature	$380 \pm 5^{\circ}\text{C}$
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

- 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.