

Features

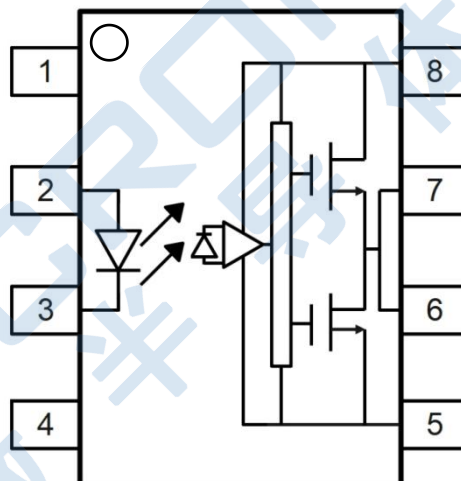
- High isolation 5000 VRMS
- DC input with a high speed driver
- Operating temperature range - 40 °C to 100 °C
- Rail to rail output
- REACH & RoHS compliance
- Halogen free (Optional)
- MSL class 1
- Regulatory Approvals
 - UL - UL1577
 - VDE - EN60747-5-5(VDE0884-5)
 - CQC - GB4943.1

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.


RoHS

ORDERING INFORMATION

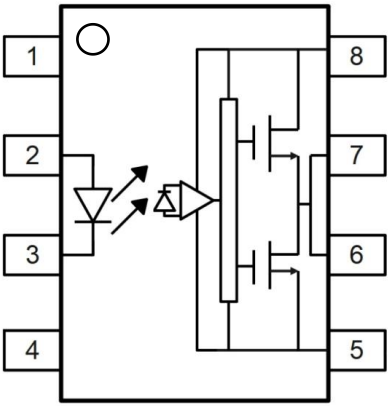
Outline	Part Number	Package	Marking	Packing	Packing Size	Quantity
	ICPL-3120-000E	DIP8	ICPL 3120 /YYWW A	Tube	500mm	45
	ICPL-3120-100E	DIP8-M		Tube	500mm	45
	ICPL-3120-500E	DIP8-SL		Reel	13 "	1000

CONTENTS

Pin Configuration And Functions.	3
Truth Table.	3
Recommended Operation Conditions.	3
Absolute Maximum Ratings.	4
Electrical Optical Characteristics.	5
Characteristic Curves.	7
Test Circuits.	10
Package Dimensions.	13
Carrier Tape Specifications.	15
Ordering And Marking Information.	16
Reflow Information.	17
Temperature Profile Of Soldering.	18
Disclaimer.	19

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

 ($V_{CC}=30V$, $V_{EE}=GND$, $T_a=25^{\circ}C$ 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

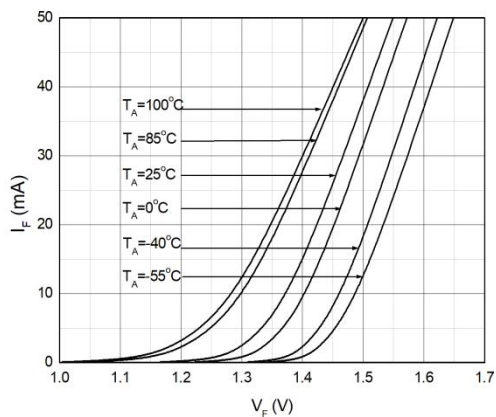
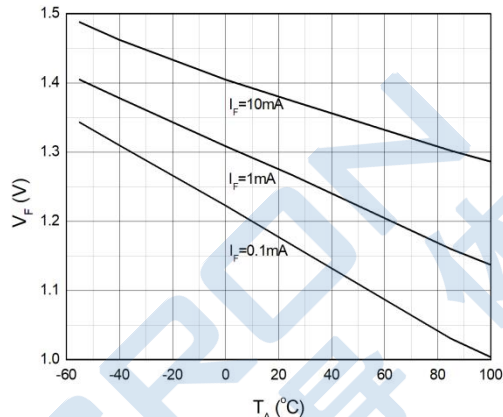
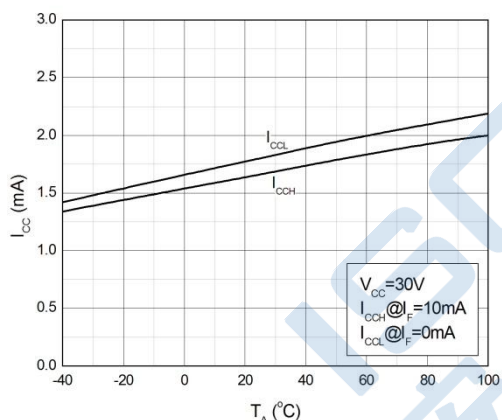
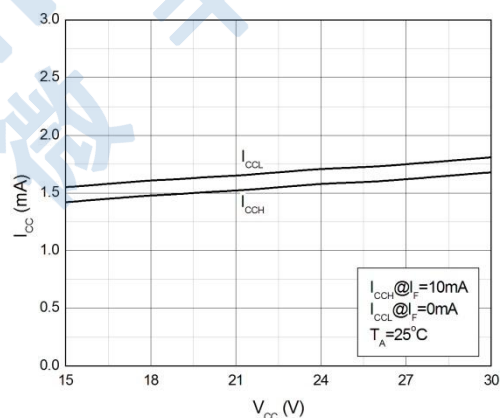
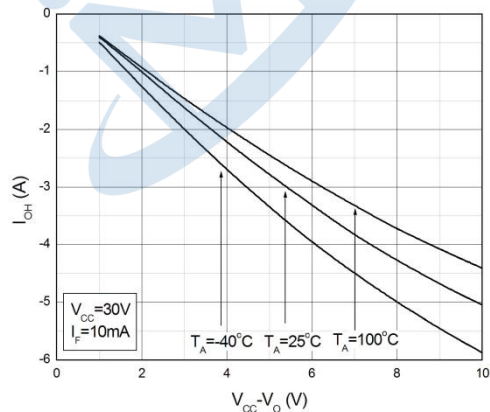
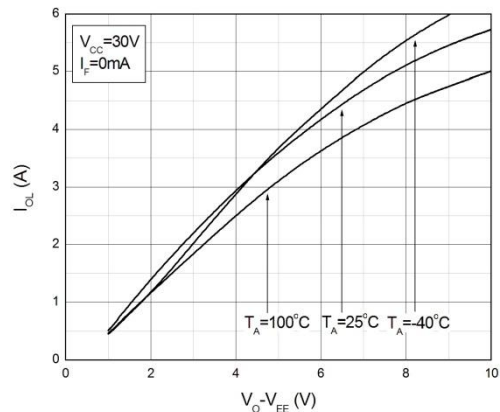
Fig.1 Forward Current vs. Forward Voltage

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


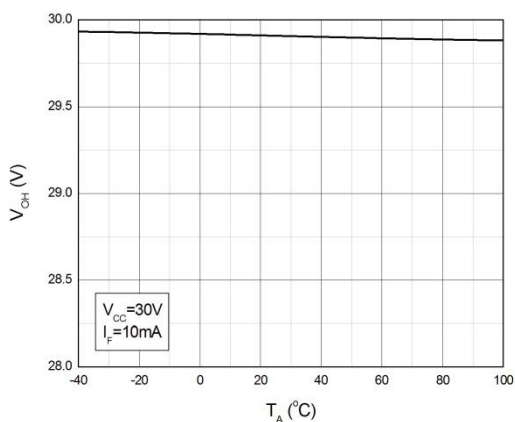
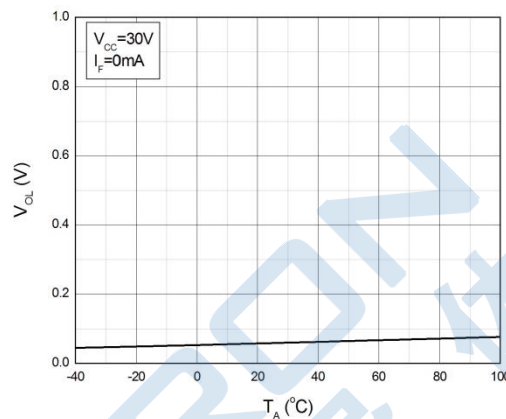
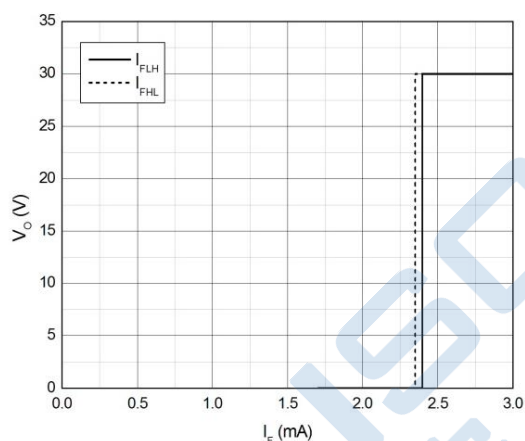
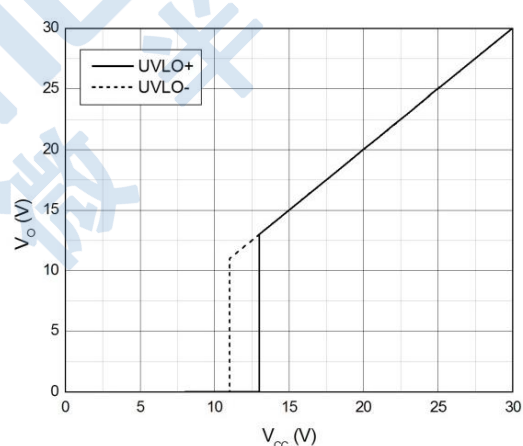
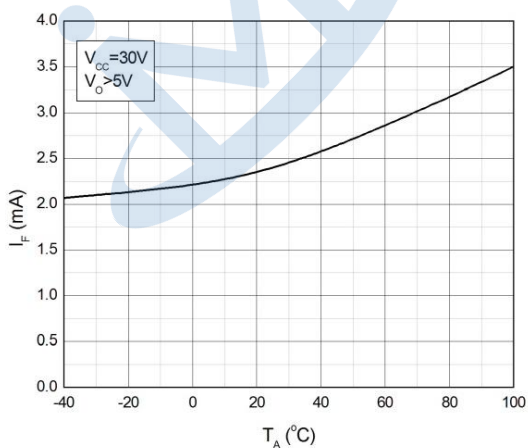
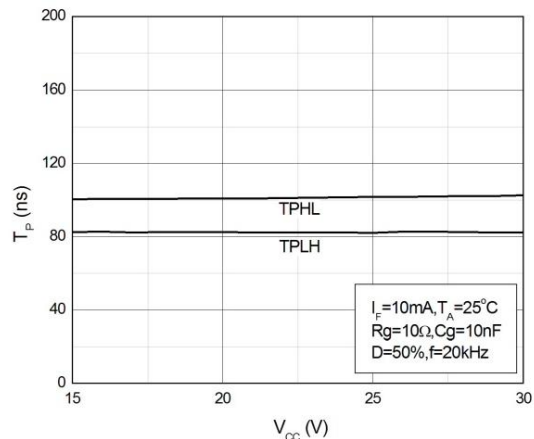
Fig.7 High Level Output Voltage vs. Ambient Temperature

Fig.8 Low Level Output Voltage vs. Ambient Temperature

Fig.9 Output Voltage vs. Forward Current

Fig.10 Output Voltage vs. Supply Voltage

Fig.11 Forward Current vs. Ambient Temperature

Fig.12 Propagation Delay vs. Supply Voltage


Fig.13 Propagation Delay vs. Forward Current

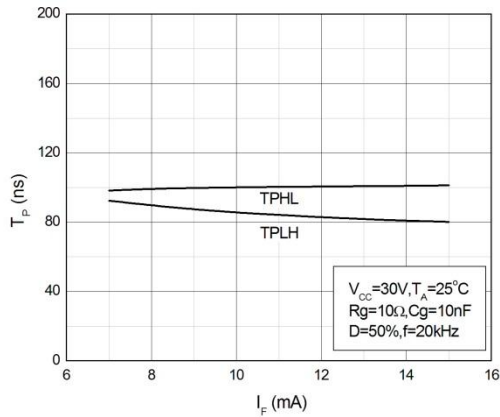


Fig.14 Propagation Delay vs. Ambient Temperature

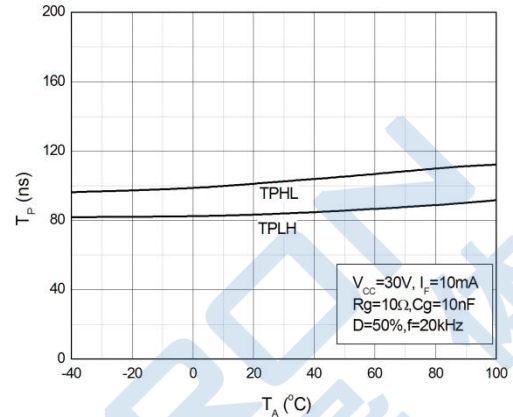


Fig.15 Propagation Delay vs. Load Resistance

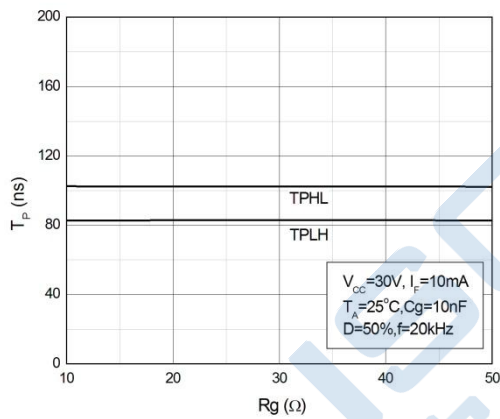
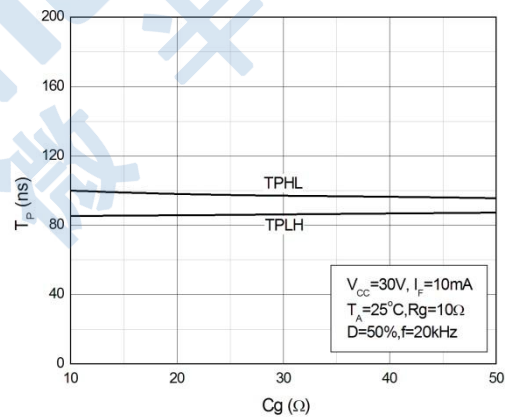


Fig.16 Propagation Delay vs. Load Capacitance



TEST CIRCUITS

Fig.17 Test Circuits for I_{OH}

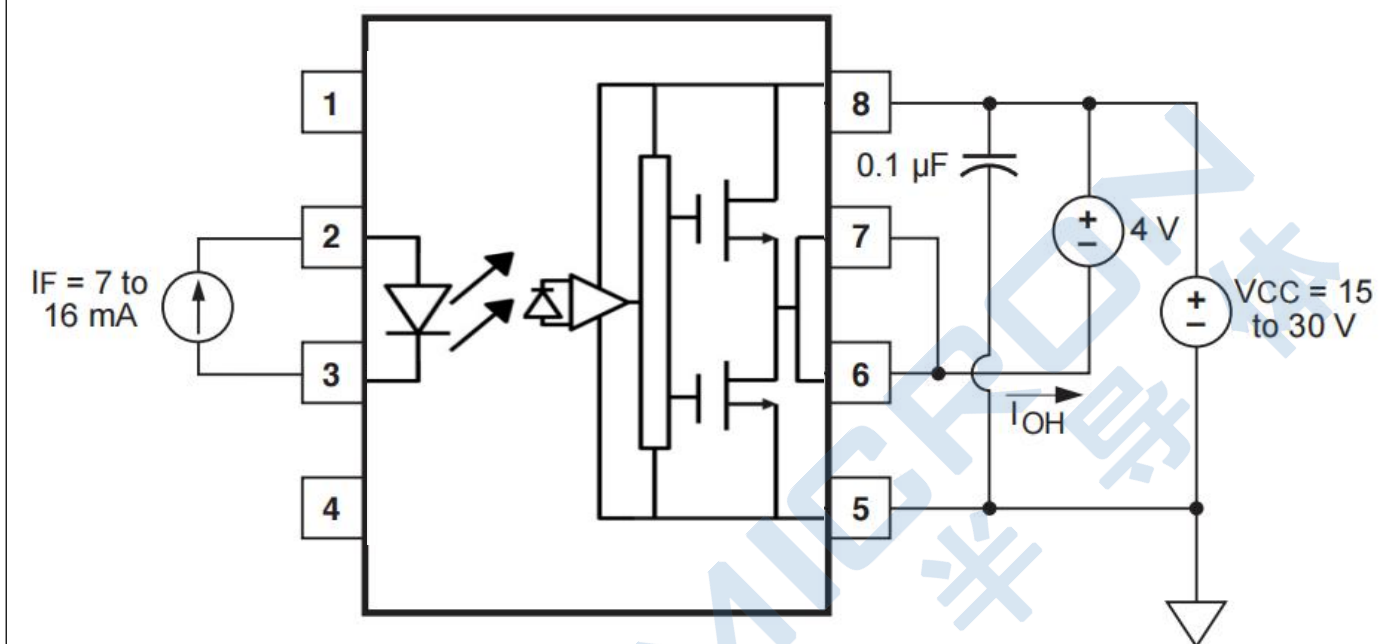
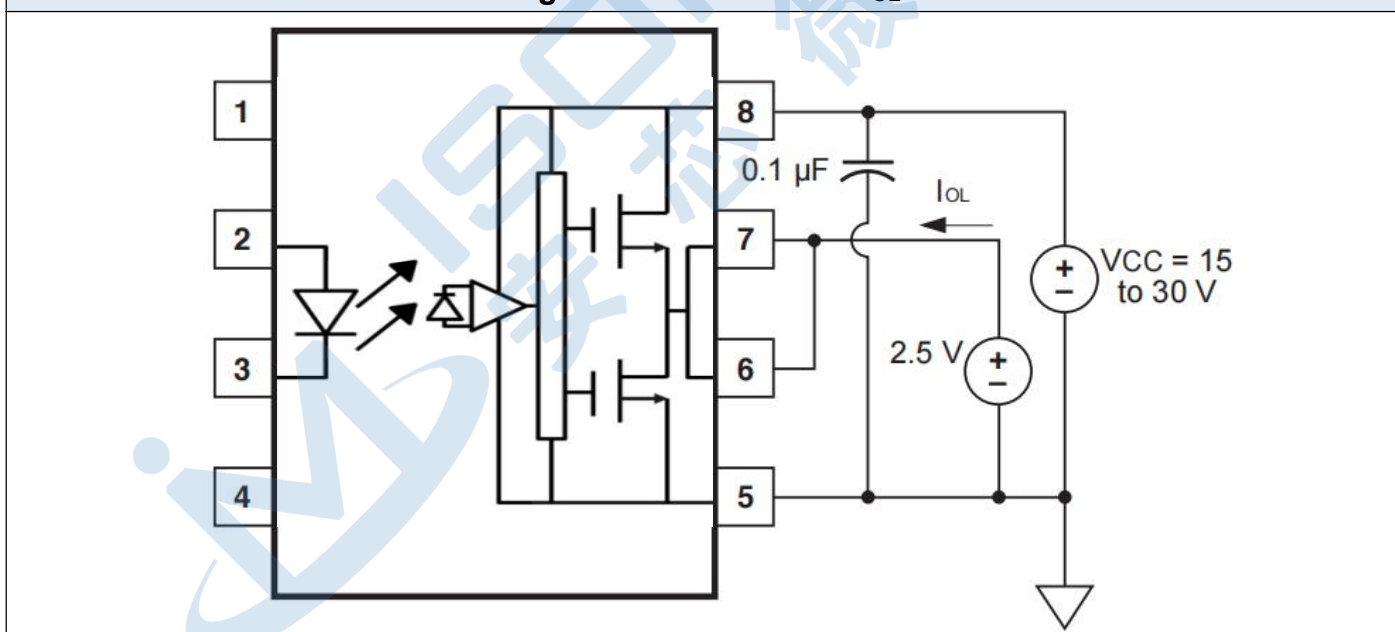


Fig.18 Test Circuits for I_{OL}



TEST CIRCUITS

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

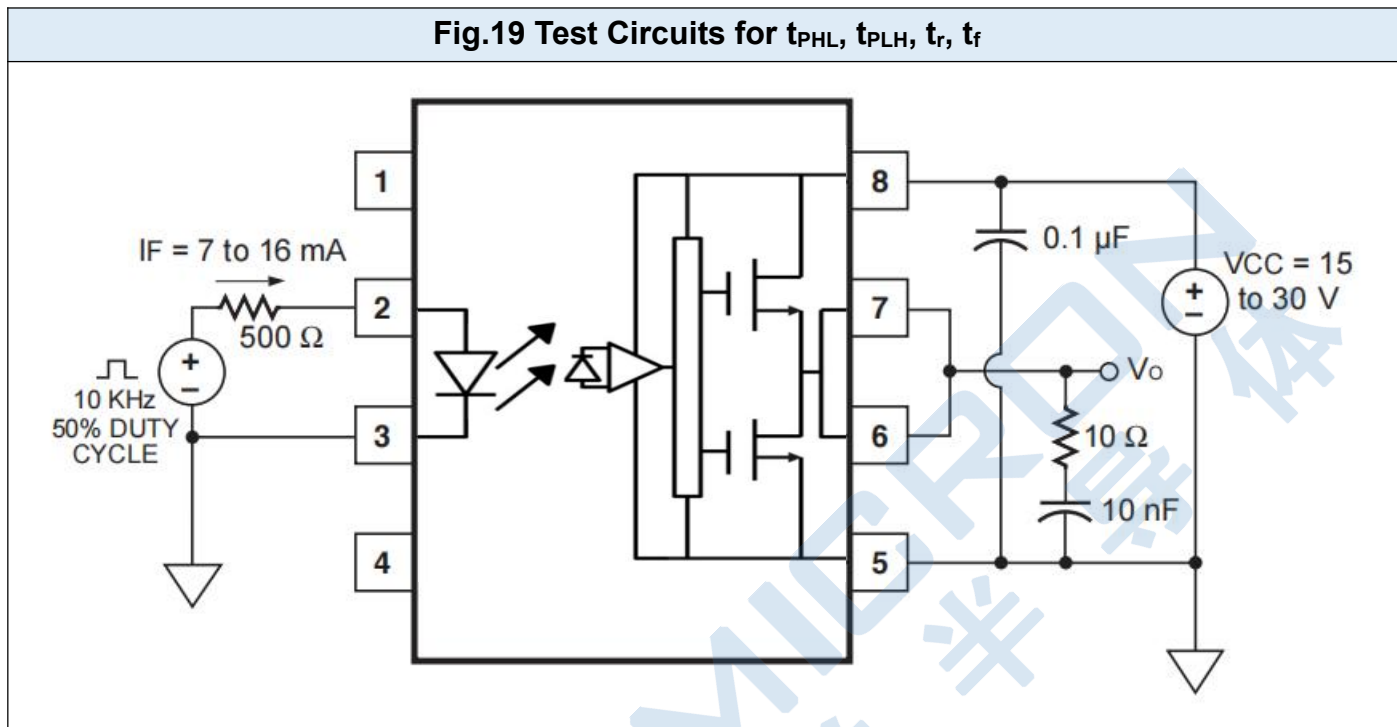
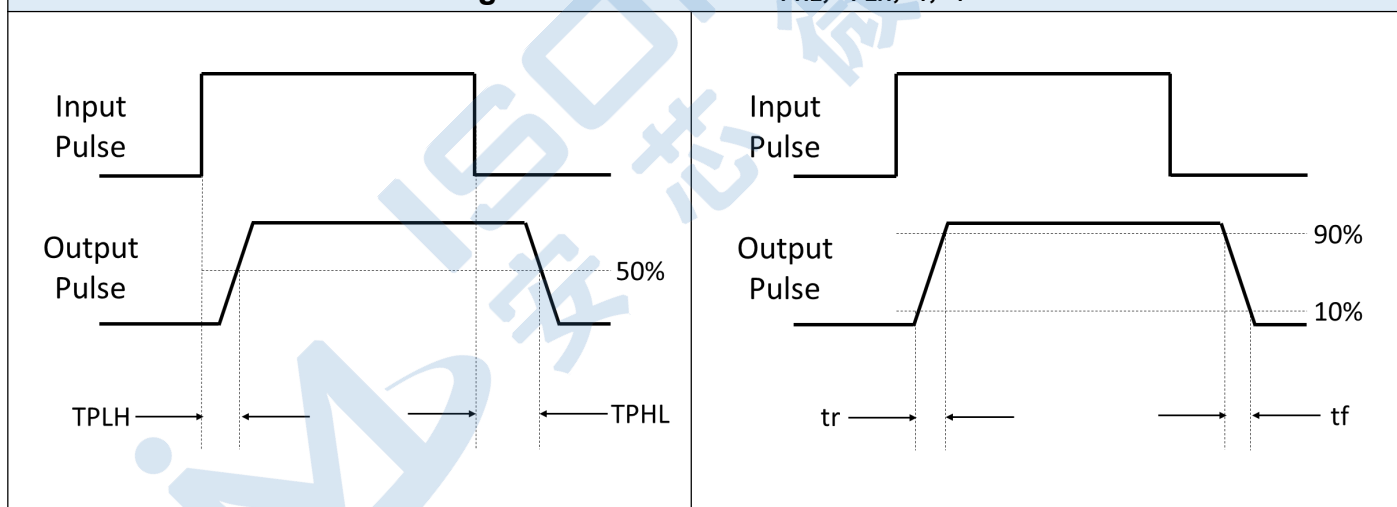


Fig.20 Waveforms of t_{PHL} , t_{PLH} , t_r , t_f



TEST CIRCUITS

Fig.21 Test Circuits for Common Mode Transient Immunity

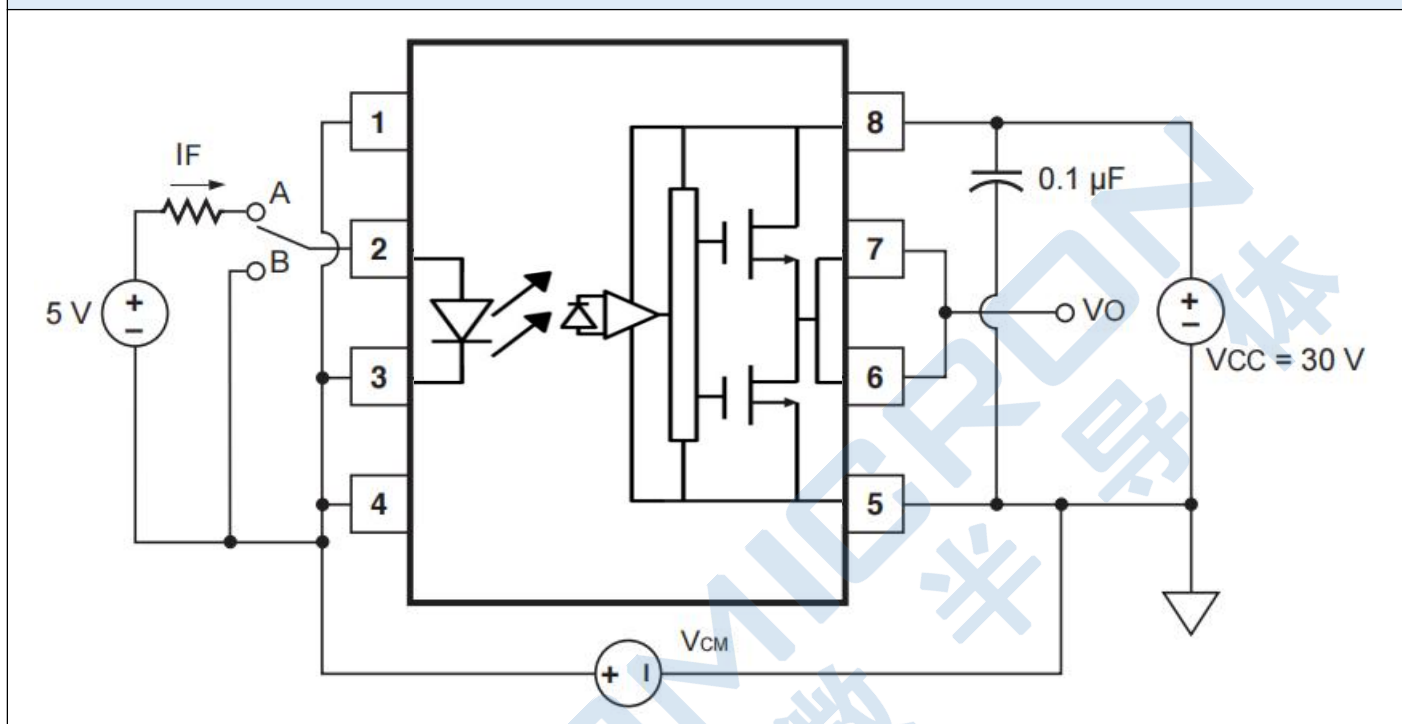
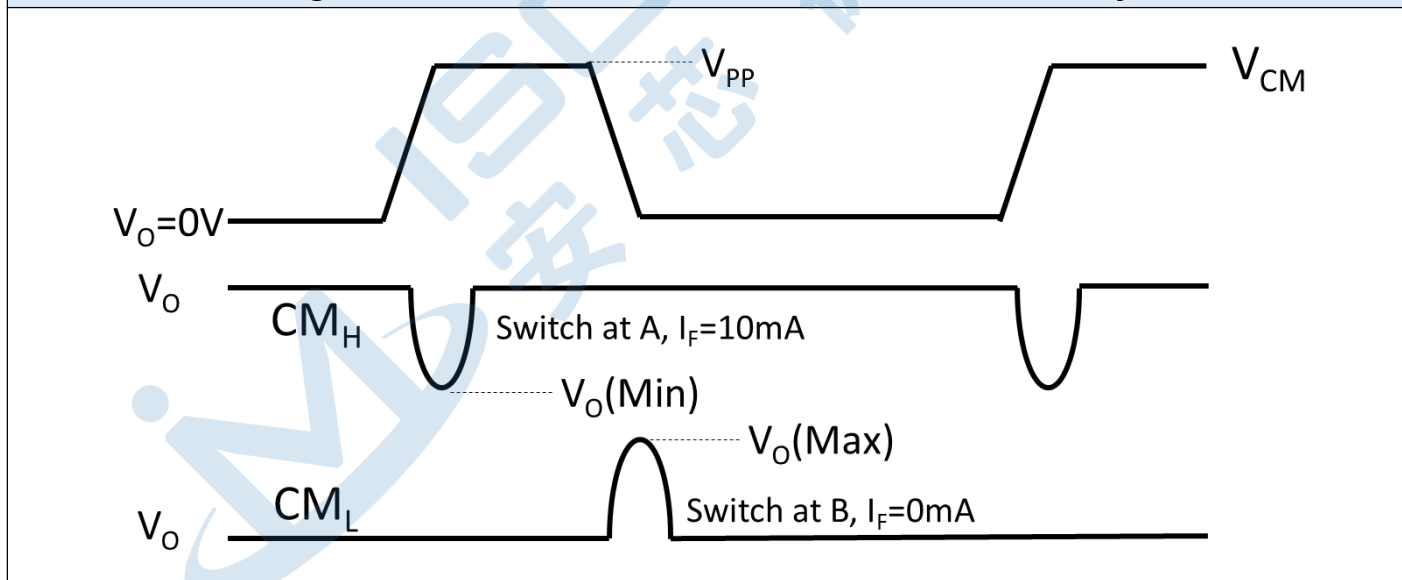
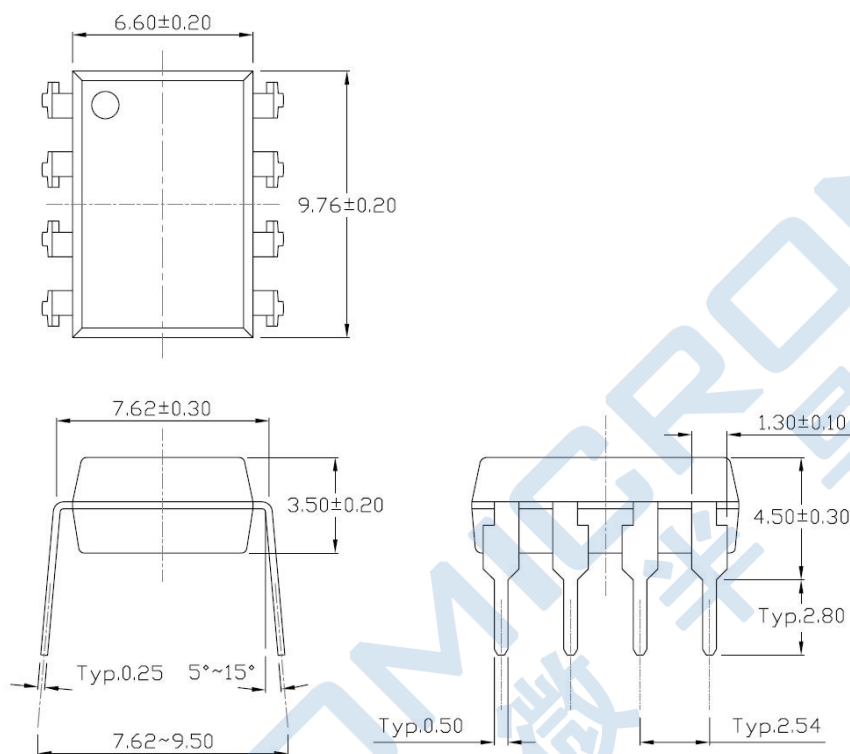


Fig.22 Waveforms of Common Mode Transient Immunity

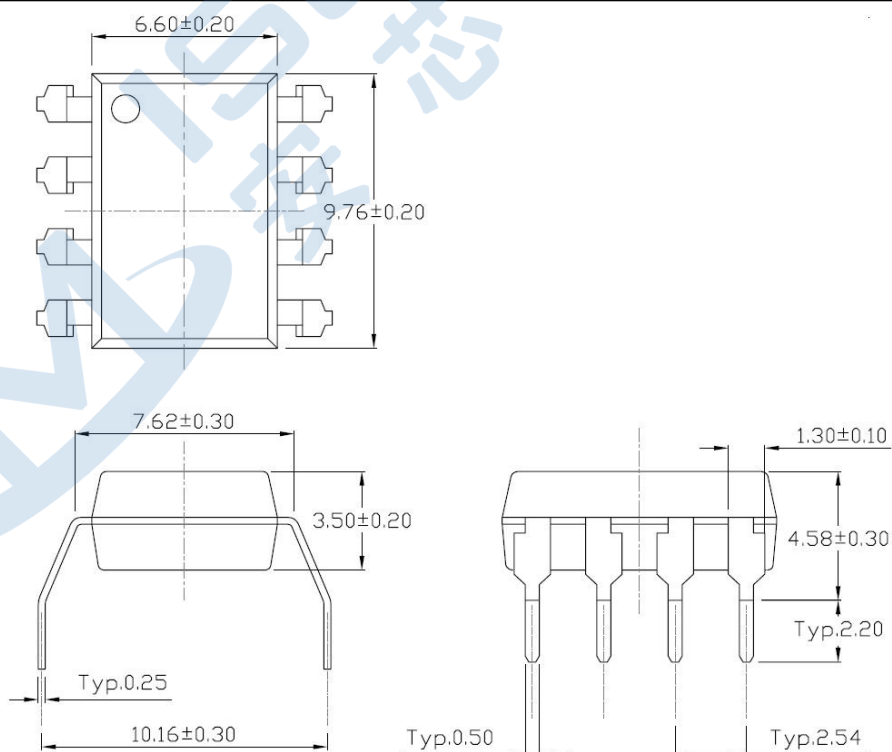


PACKAGE DIMENSIONS

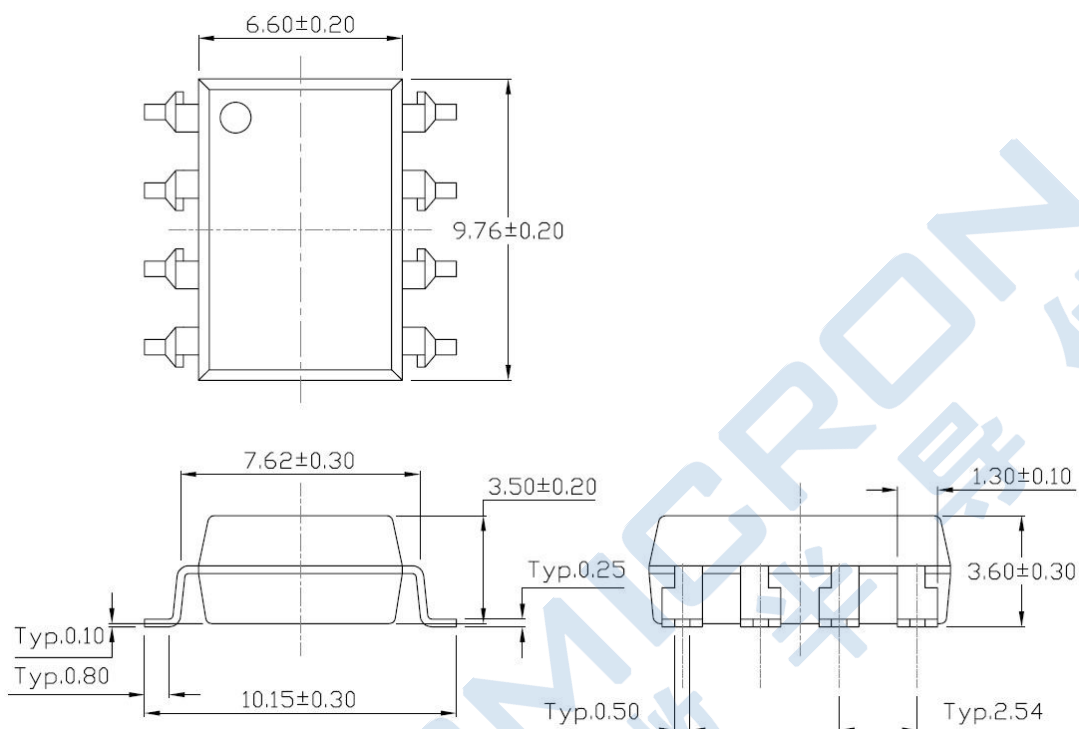
Standard DIP – Through Hole (DIP Type)



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



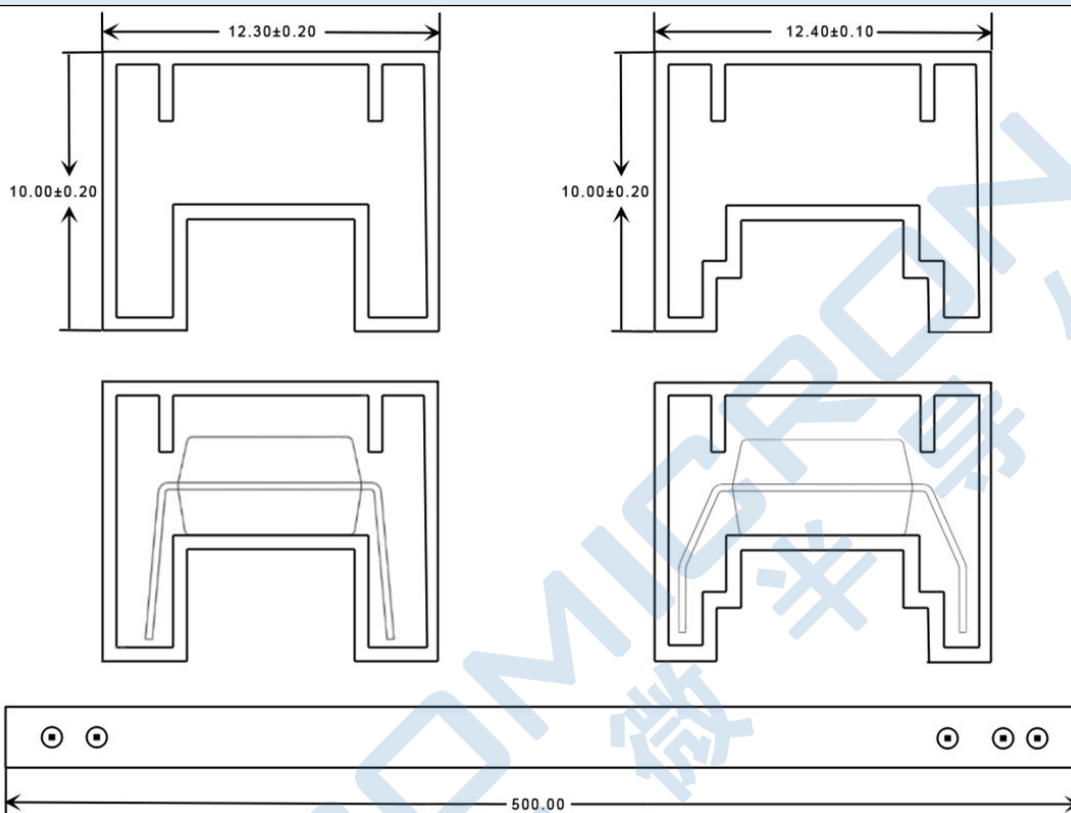
Surface Mount (Low Profile) Lead Forming (SL Type)



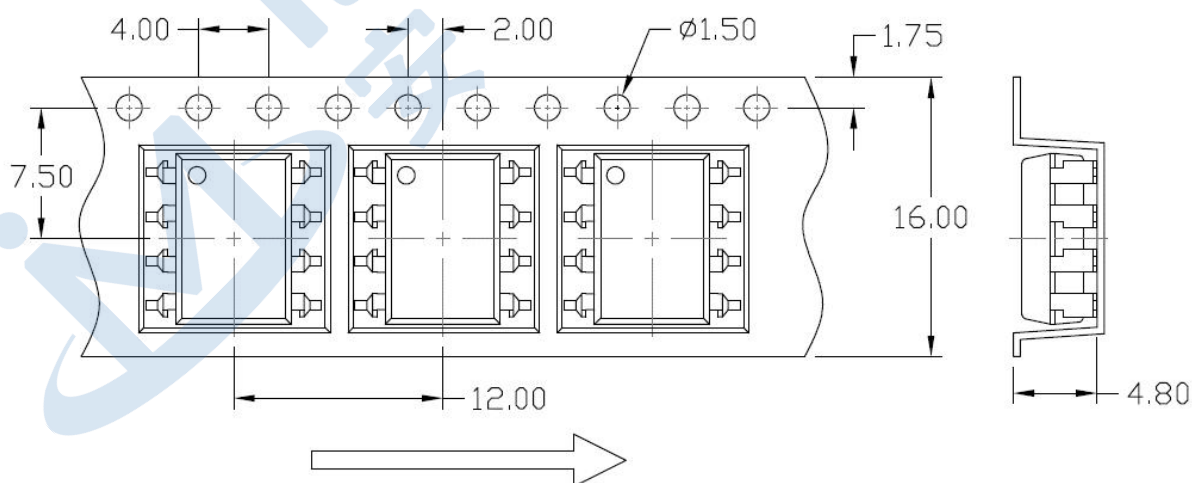
- Dimensions in mm unless otherwise stated

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 ←

0: DIP-Standard
 1: DIP-M
 5: SM-SL

Halogen Free

E: Halogen-free, Lead-free
 Z: Halogen, Lead-free

None

Performance

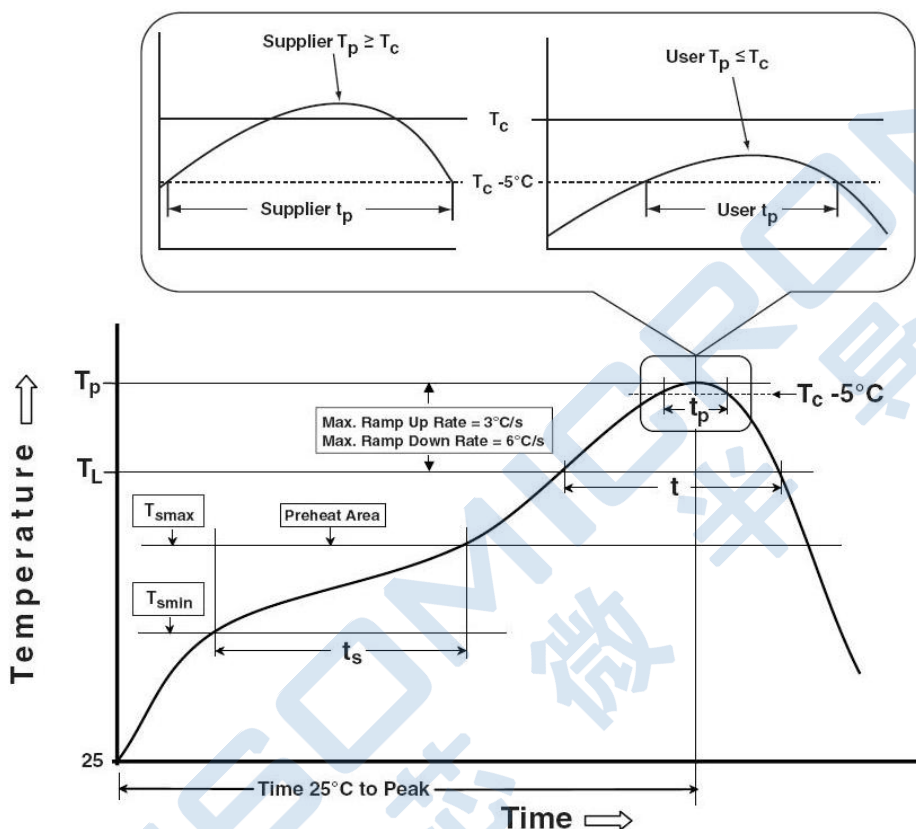
0: Normal
 1: Enhanced
 2: Industrial level
 3: Auto level
 4: Military level

Packing Quantity

Option	Quantity	Quantity – Inner box	Quantity – Outer box
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

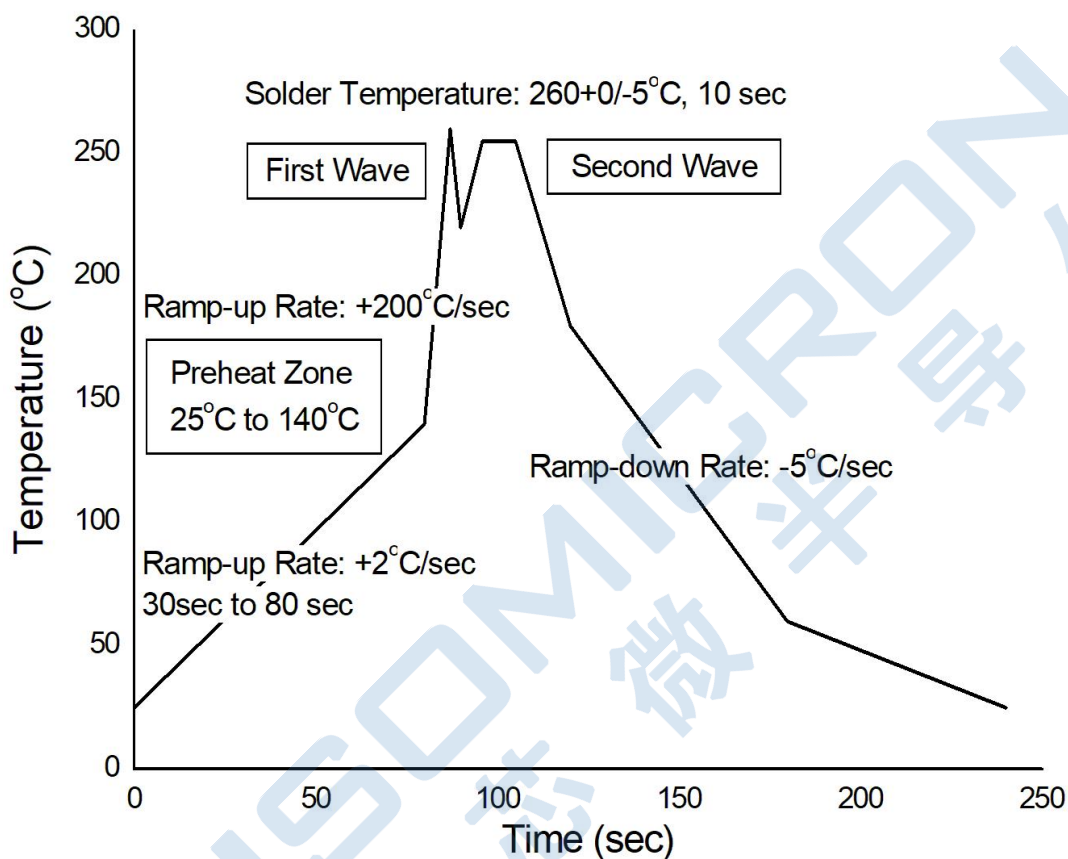
Reflow Profile



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.
- 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.