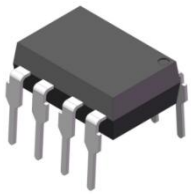
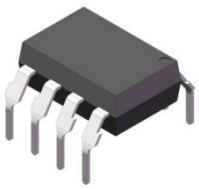
XL6N138,XL6N139

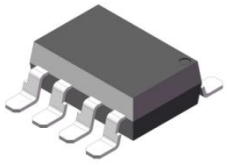
Product packaging logic diagram



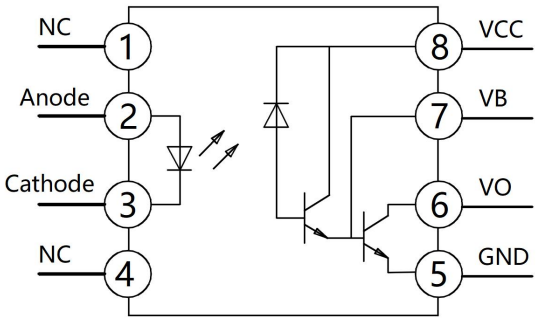
DIP8



DIP8-M



SMD8



Pin Configuration

Features

- High current transfer ratio (CTR:2000% typical)
- High isolation voltage between input and output (Viso =5000V rms)
- Operating Temperature: -40℃~85℃
- Low input current requirements: 0.5 mA
- TTL compatible output : 0.1 V ; VOL typical
- Base access allows gain bandwidth adjustment
- High output current: 60 mA
- Environmentally friendly products, compliant with CQC, UL, and VDE requirements

Mechanical Data

- Case: DIP8,DIP8-M, SMD8
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solder ability-per MIL-STD-202, Method 208

Applications

- It is widely used in the feedback control loops of switching power supplies and the isolation between main circuits and control circuits, ensuring stable output voltage and quickly transmitting fault signals to trigger protection mechanisms in the event of overload or short circuit.
- Photovoltaic energy storage system
- Data collection, inverter control, protection circuit
- Industrial automation control
- Relay drive, motor control, PLC interface
- Power management
- Switching power supply feedback isolation、Home appliance power control

Ordering Information

XL	6N13X	(X)	(X)	(X)	-	(U)	(N)	(Y)
①	②	③	④	⑤		⑥	⑦	⑧

① Brand(XL)

② Product series (6N138 , 6N139)

③ Package type(None: (DIP8、DIP8-M、SMD8)

④ Halogen option(None :Halogen free)

⑤ CTR Bank(None)

⑥ Lead frame (None: Copper)

⑦ Customer option 1 (0-9 or A- Z or none)

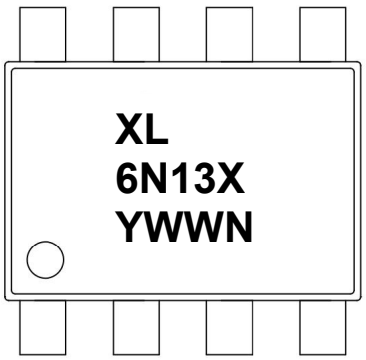
⑧ Customer option 2 (0-9 or A- Z or none)

Part Number	Package	Shipping Quantity	Marking Code
XL6N13X	DIP8	45pcs / Tube	XL6N13X
XL6N13XM	DIP8-M	45pcs / Tube	XL6N13X
XL6N13XS	SMD8	1000pcs / Tape & Reel	XL6N13X

Notes 1：X denotes product series:8,9

Marking Information

- " XL" denotes brand
- " 6N13X" denotes product series: 8, 9.
- " Y" denotes Year : A(2024), B(2025), C(2026)
- " WW" denotes Week' s number
- " N" denotes the day of Week.



Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter		Symbol		Value	Unit
Input	Average Forward Input Curren	$I_{F(AVG)}$		20	mA
	Peak Forward Input Current*1	I_{FPK}		40	mA
	Peak Transient Input Current *2	$I_{F(TRAN)}$		1.0	A
	Reverse Voltage	V_R		5	V
	Power Dissipation	P_I		35	mW
Output	Output Power Dissipation	P_O		100	mW
	Output Current	I_O		60	mA
	Supply Voltage and Output Voltage*3	V_{CC}	6N138	7	V
			6N139	18	
	Emitter Base Reverse Voltage (Pin 5-7)	V_{EB}		0.5	V

Thermal Characteristics

Parameter	Symbol	Value	Unit
Isolation Voltage *4	V_{ISO}	5000	Vrms
Total Power Dissipation	P_T	135	mW
Operating Temperature	T_{OPR}	-40 ~ +85	°C
Storage Temperature Range	T_{STG}	-55 ~ +125	°C

Notes:

1. 50% Duty Cycle, 1 ms Pulse Width
2. < 1 us Pulse Width ,300 pps
3. Min.:-0.5 v
4. RH < 50%, t = 1 min., TA = 25°C

Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Units
Power Supply Voltage	V_{CC}	4.5	18	V
Forward Input Current (ON)	$I_{F(ON)}$	0.5	12.0	mA
Forward Input Voltage (OFF)	$V_{F(OFF)}$	0	0.8	V

Electrical Characteristics (@ T_A = 25°C unless otherwise specified)

Parameter		Symbol		Test Condition	Min.	Typ.	Max.	Unit
Input	Forward Voltage	V_F		I_F = 1.6mA	-	1.40	1.75	V
				T_A=25°C,I_F=1.6mA	1.25	1.40	1.70	
	Reverse Breakdown Voltage	B_{VR}		I_R=10μA,T_A = 25°C	5	-	-	V
	Capacitance	C_{in}		V_R = 0V, f = 1MHz	-	60	-	pF
	Diode Temperature Coefficient	$\Delta V_F/\Delta T_A$		I_F=1.6mA	-	-1.8	-	mV/°C
Output	High Level Supply Current	I_{CCH}	6N138	V_{CC}=18V,I_F=0mA V_O=Open	-	0.05	10	uA
			6N139					
	Low Level Supply Current	I_{CCL}	6N138	V_{CC}=18V,I_F=1.6mA V_O=Open	-	0.6	1.5	mA
			6N139					
Transfer Characteristics	High Level Output Current	I_{OH}	6N138	V_O=V_{CC}=18V, I_F=0mA	-	0.01	100	μA
			6N139			-	250	
	Low Level Output Voltage	V_{OL}	6N139	I_F=0.5mA,I_O=2mA, V_{CC}=4.5V	-	0.05	0.4	V
				I_F=1.6mA,I_O=8mA, V_{CC}=4.5V	-	0.09		
				I_F=5.0mA,I_O=15mA, V_{CC}=4.5V	-	0.12		
				I_F=12mA,I_O=24mA, V_{CC}=4.5V	-	0.17		
			6N138	I_F=1.6mA,I_O=4.8mA, V_{CC}=4.5V	-	0.06		
	Current Transfer Ratio	CTR	6N139	I_F=0.5mA,V_{CC}=4.5V, V_O=0.4V	400	2500	-	%
				I_F=1.6mA,V_{CC}=4.5V, V_O=0.4V	500	2000	-	
			6N138		300	2000	-	
	Isolation Resistance	R_{IO}		V_{IO} = 500Vdc 40~60% R.H.	-	1×10^{12}	-	Ω
	Floating Capacitance	C_{IO}		f = 1MHz	-	0.6	-	pF

Switching Characteristics (@ T_A = 0°C～70°C, V_{CC}= 5V, unless otherwise specified)

Parameter	Symbol		Test Condition	Min.	Typ.	Max.	Unit
Propagation Delay Time to Output High Level	T_{PHL}	6N139	I_F = 0.5 mA, R_L = 4.7 KΩ	-	5	30	us
			I_F = 0.5 mA, R_L = 4.7 KΩ, T_A =25°C	-	5	25	
			I_F = 12 mA, R_L = 270 Ω	-	0.2	2	
			I_F = 12 mA, R_L = 270 Ω T_A =25°C	-	0.2	1	
		6N138	I_F = 1.6 mA, R_L = 2.2 KΩ	-	-	15	
			I_F = 1.6 mA, R_L = 2.2 KΩ T_A =25°C	-	1.4	10	
Propagation Delay Time to Output Low Level	T_{PLH}	6N139	I_F = 0.5 mA, R_L = 4.7 KΩ	-	-	90	us
			I_F = 0.5 mA, R_L = 4.7 KΩ, T_A =25°C	-	16	60	
			I_F = 12 mA, R_L = 270 Ω	-	-	10	
			I_F = 12mA, R_L = 270 Ω, T_A =25°C	-	1.7	7	
		6N138	I_F = 1.6 mA, R_L = 2.2 KΩ	-	-	50	
			I_F = 1.6 mA, R_L = 2.2 KΩ T_A =25°C	-	8	35	
Common Mode Transient Immunity (at Output HIGH Level)	$\|CM_H\|$		I_F = 0 mA, T_A = 25°C, Rl = 2.2 KΩ, $\|V_{CM}\|$ = 10Vp-p	1000	10000	-	V/μs
Common Mode Transient Immunity (at Output LOW Level)	$\|CM_L\|$		I_F =1.6 mA, T_A = 25°C Rl = 2.2 KΩ, $\|V_{CM}\|$ = 10Vp-p	1000	10000	-	V/μs

Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

Fig.1 Output current vs. Output Voltage

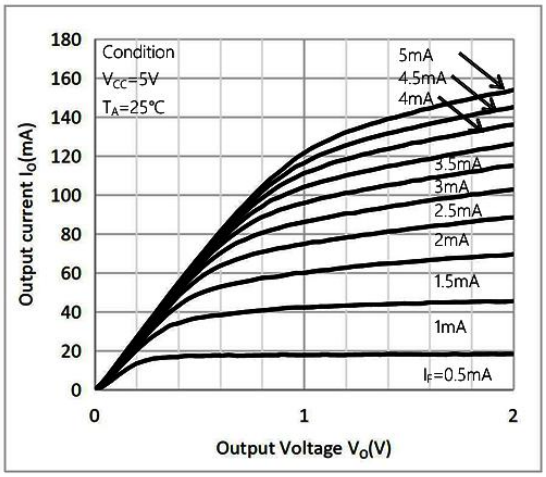


Fig.2 Current transfer ratio vs. Input current

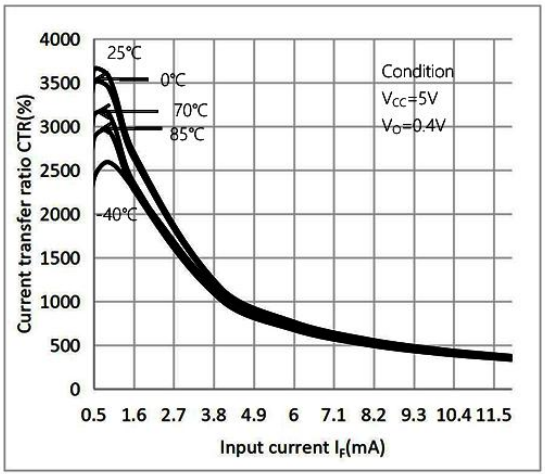


Fig.3 Output current vs. Input current

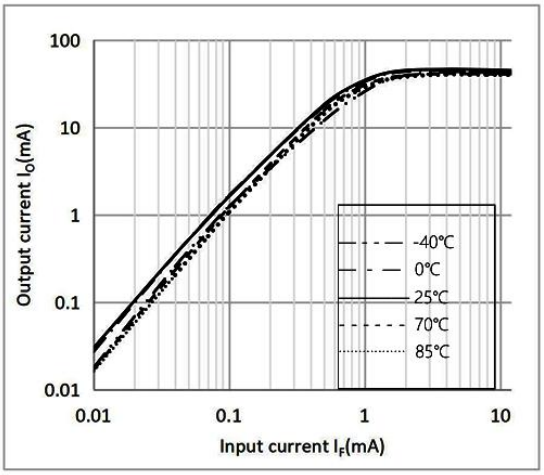


Fig.4 Input current vs. Forward Voltage

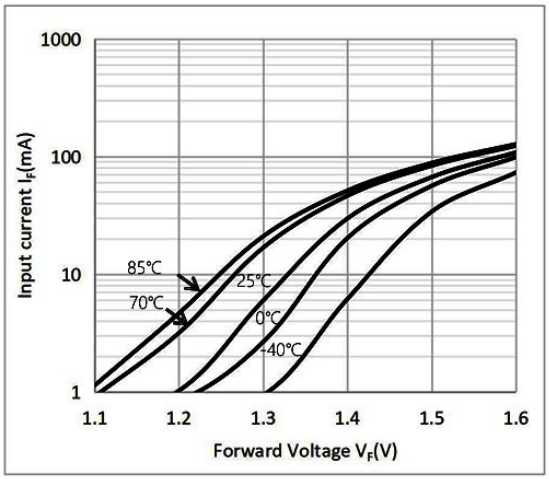


Fig.5 Propagation delay vs. Ambient temperature

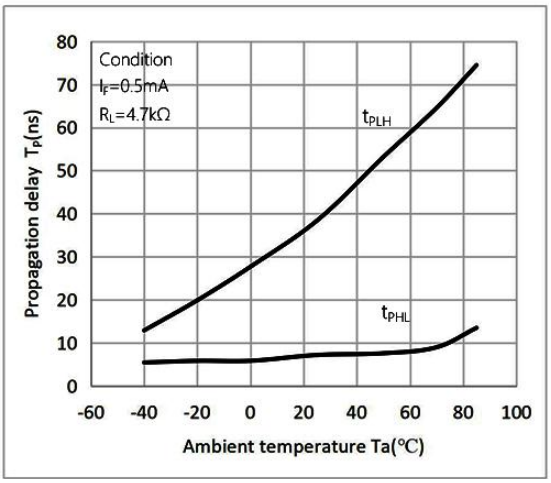
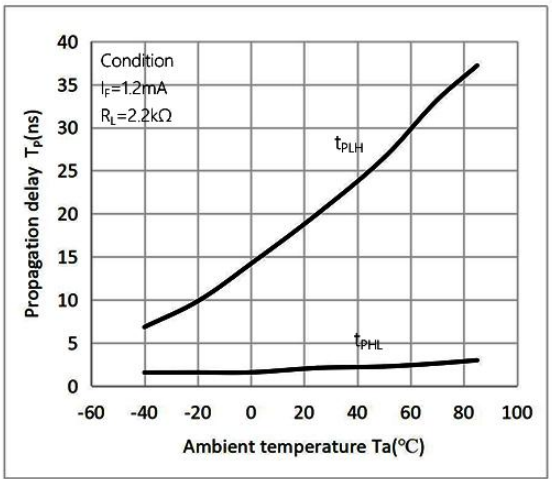


Fig.6 Propagation delay vs. Ambient temperature



Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

Fig.7 Propagation delay vs. Ambient temperature

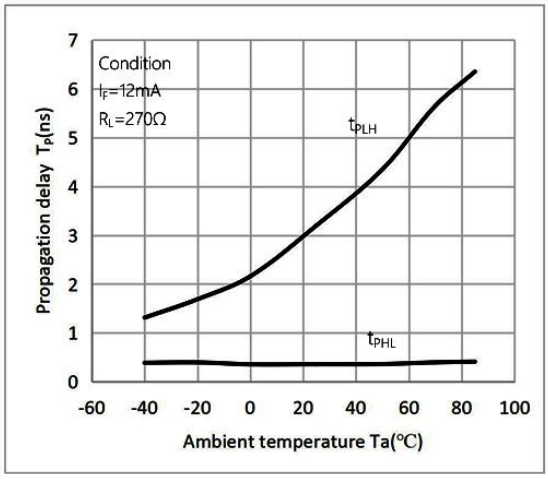


Fig.8 Forward Voltage vs. Ambient temperature

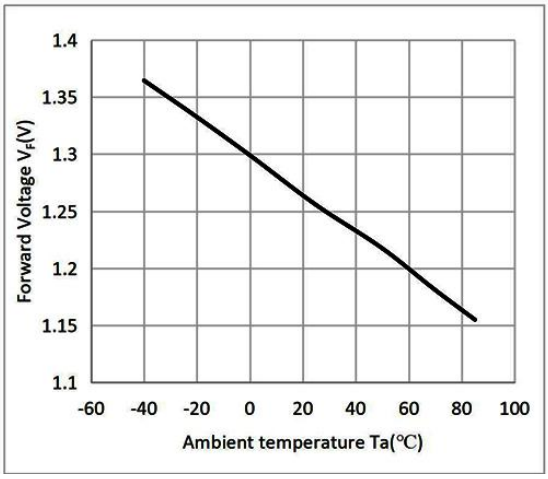


Fig.9 Logic low supply current vs. Input current

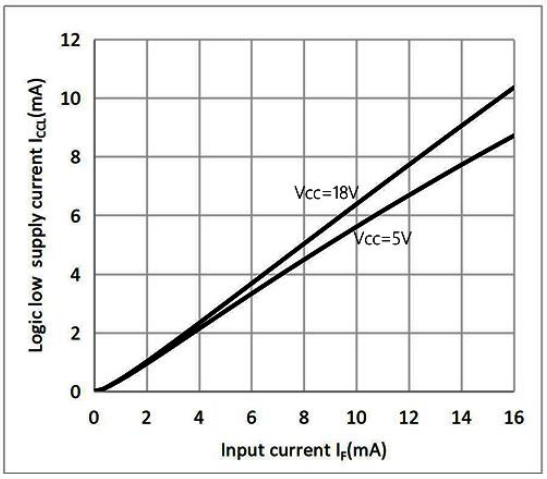


Fig.10 Switching Time Test Circuit

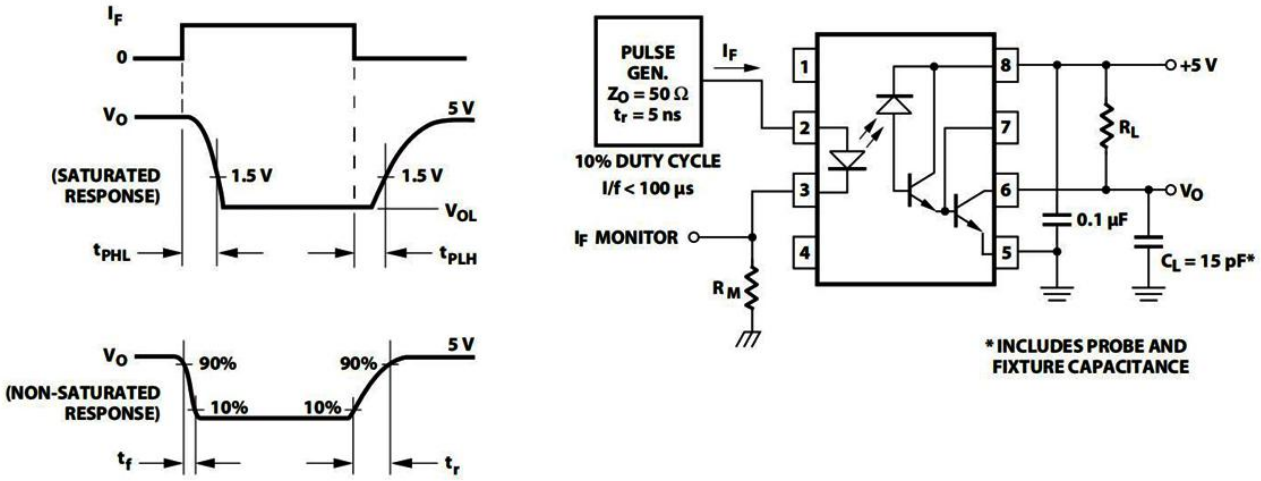
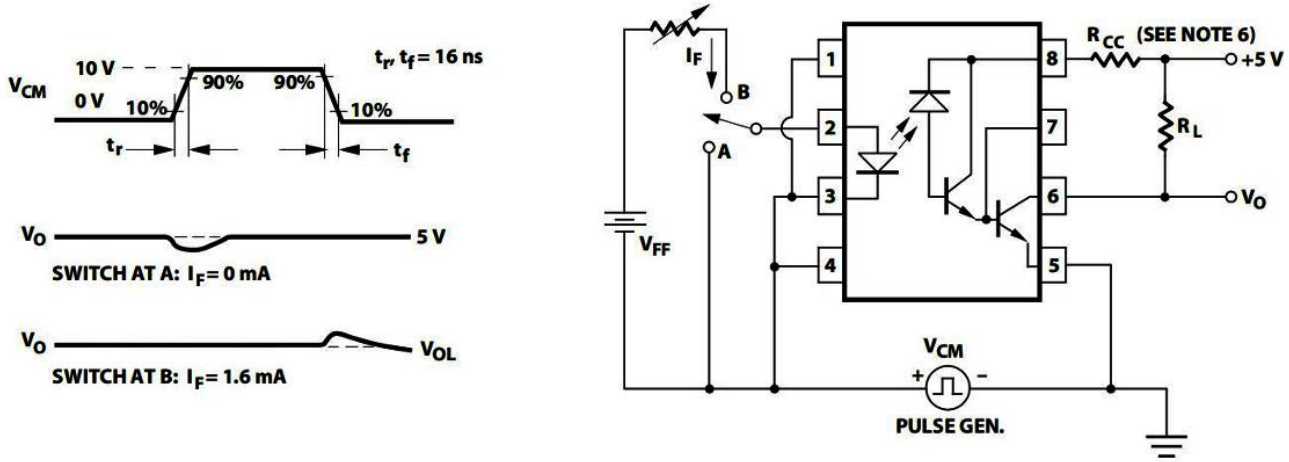
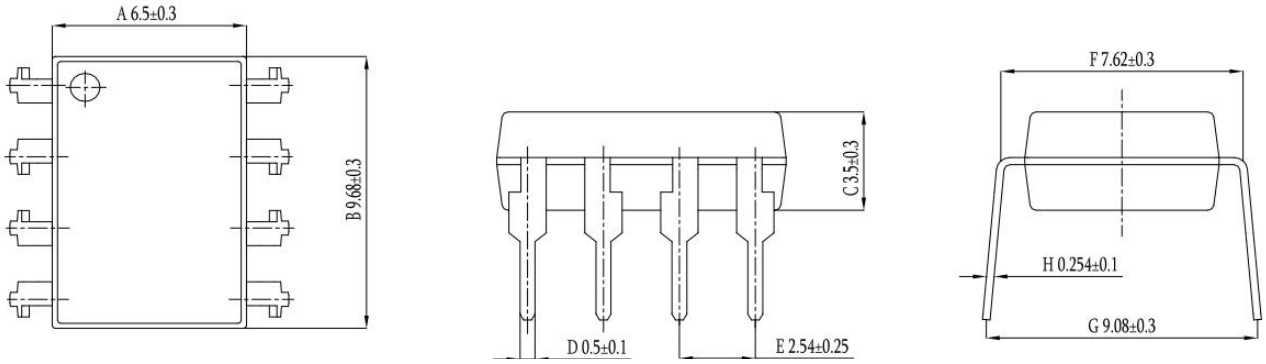


Fig.11 Test Circuit Common Mode Transient Immunity

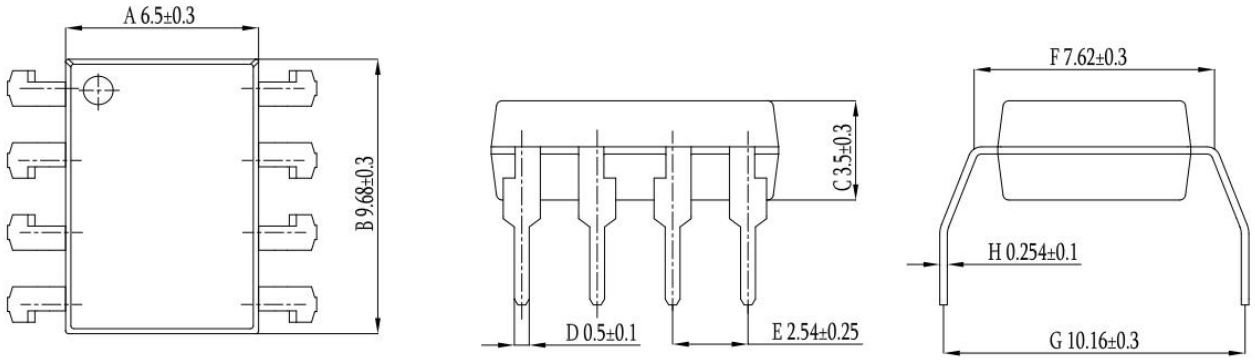


Package Outline Dimensions (unit: mm)

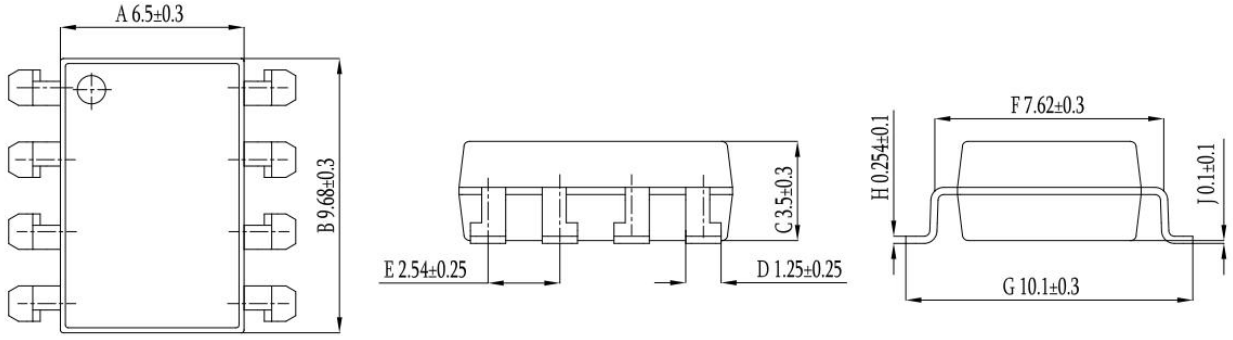
DIP8



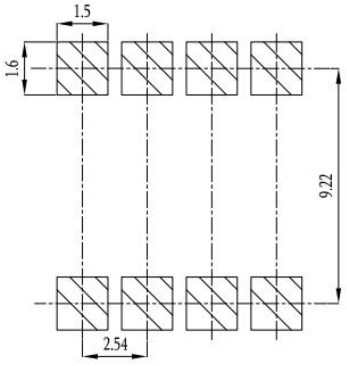
DIP8-M



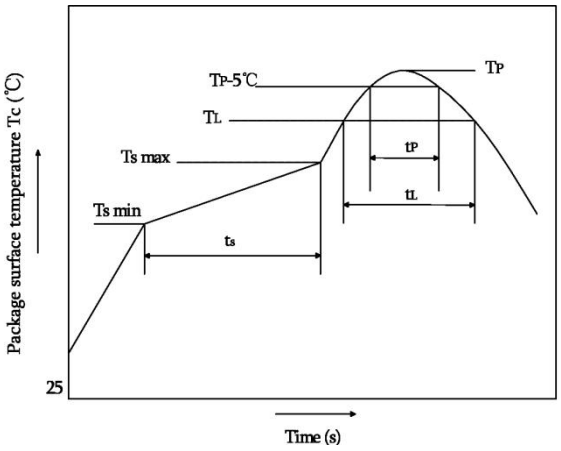
SMD8



SOLDERING FOOTPRINT (unit: mm)



Reflow soldering

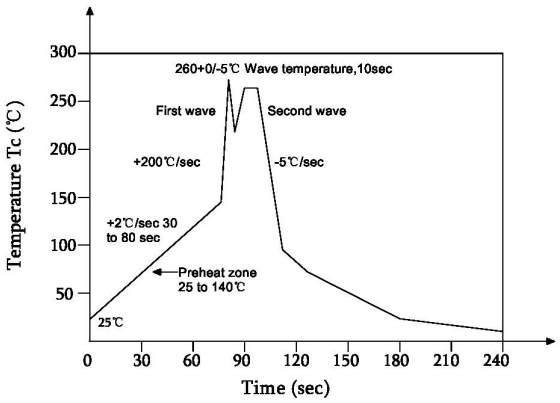


	Symbol	Min	Max	Unit
Preheat temperayure	Ts	150	200	℃
Preheat time	ts	60	120	s
Ramp-up ratea(T_L to T_P)			3	℃/s
Liquidus temperature	T_L	217		℃
Time above T_L	t_L	60	150	s
Peak temperature	Tp		260	℃
Time during which Tc is between (T_P-5) and T_P	t_p		30	s
Ramp-down rate(T_P to T_L)			6	℃/s

Note:

Reflow soldering is recommended at the temperatures and times shown, no more than three times.

Wave soldering



Profile feature	
Average ramp-up rate	~200℃/s
Heating rate during preheat	1℃/s to 2℃/s typical;4℃/s maximum
Final preheat temperature Ts	~130℃
Preheat time (25℃ to Ts)	>60s
Peak temperature Tp	260℃
Time within peak temperature tp	10s
Ramp-down rate	5℃/s maximum

Soldering with hand soldering iron

A. Hand soldering iron is only used for product rework or sample testing.

B. Hand soldering iron requirements:Temperature:360 ℃+5℃ within 3s.

Packing

Package Type	Packing Form	Quantity per Tube &Reel	Quantity per Box	Quantity per Carton	Antistatic Bag Specification	Box Specification	Carton Specification	Note
DIP8	Tube(500mm)	45pcs/tube	50 tubes /box	10 boxes /ctn	190*670mm	520*105*50mm	545*372*235mm	Straight insert type material tube
DIP8-M	Tube(500mm)	45pcs/tube	50 tubes /box	10 boxes /ctn	190*670mm	520*105*50mm	545*372*235mm	Seagull foot (M foot) tube
SMD8	Reel(ϕ330mm)	1000pcs/reel	2 reels /box	10 boxes /ctn	380*420mm	350*340*60mm	365*330*370mm	Guard band 200mm /min.

■ **Summary table**

■ **DI8/DIP8-M（Tube）**

Qty/ tube：45pcs.　Qty/box：2250pcs.

Qty/ctn：22500pcs.

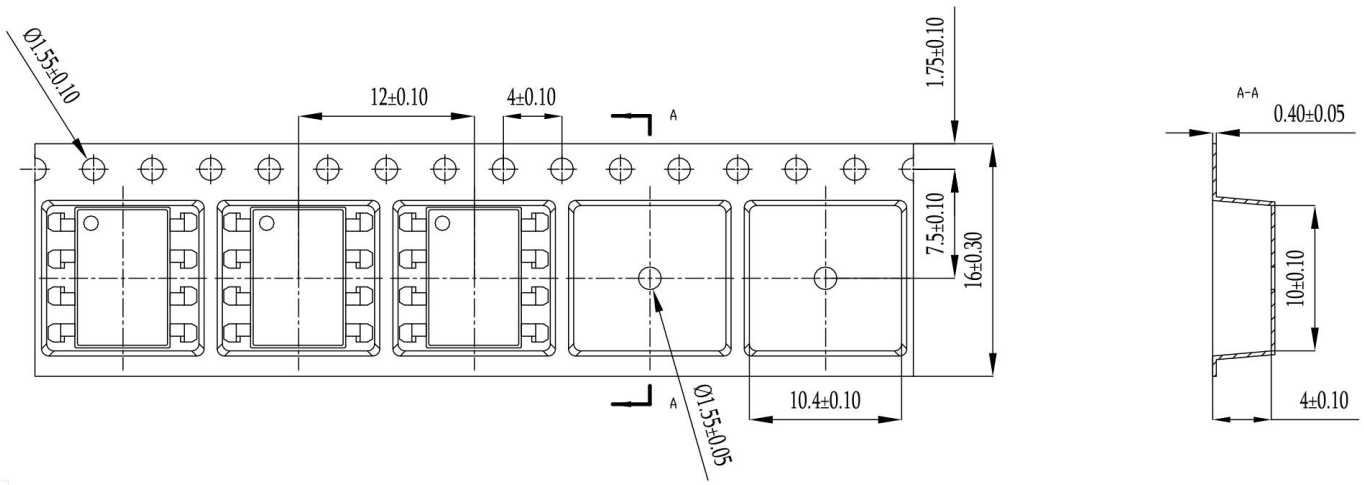
Schematic：　(unit:mm)

■ **SMD8　(Reel)**

Qty/reel：1000pcs.　Qty/box：2000pcs.

Qty/ctn：20000pcs.

Schematic：　(unit:mm)



Attention

■ XINGLIGHT implements dynamic technical updates. Specifications are subject to change. Refer to the official website for the latest version.

■ Users must strictly adhere to specified conditions. Failures caused by misuse (overload, high temperature, incompatible circuits) are excluded from warranty.

■ Contact technical support for customized validation in critical applications (medical devices, industrial control).

■ This document is valid until Dec 31, 2026. Updates will be notified on the official website.

■ For further clarification on technical specifications or application solutions, please contact us through official channels.