

Features

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

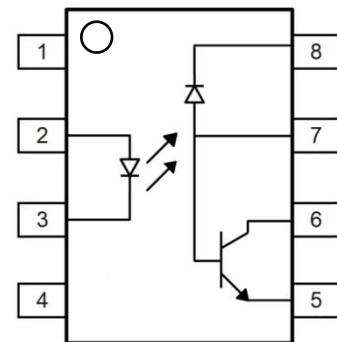
Applications

- Line receivers
- Telecommunication equipment
- Out interface to CMOS-LSTTL-TTL
- Wide bandwidth analog coupling
- Pulse transformer replacement
- Computer-peripheral interface

Description

The 6N135, 6N136 series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon high speed photo transistor in a plastic DIP8 package with different lead forming options.

A separate design between photodiode and transistor reduces the base collector capacitance of the input transistor which improves the speed by several orders of magnitude over conventional phototransistor optocouplers.



Truth Table

LED	Vo
ON	L
OFF	H



ORDERING INFORMATION

Outline	Part Number	Package	Marking	Packing	Packing Size	Quantity
	6N135-000E 6N136-000E	DIP8	6N13X /YYWW A	Tube	500mm	45
	6N135-100E 6N136-100E	DIP8-M		Tube	500mm	45
	6N135-500E 6N136-500E	DIP8-SL		Reel	13 "	1000

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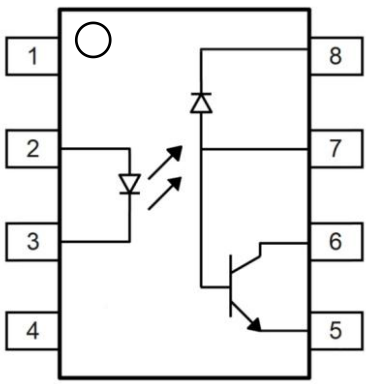
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PIN CONFIGURATION AND FUNCTIONS

	Pin	Name
	1	NC
	2	Anode
	3	Cathode
	4	NC
	5	GND
	6	V _O
	7	V _B
	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	
Input Power Dissipation	P _I	100	mW	
OUTPUT				
Supply Voltage	V _{CC}	-0.5~30	V	
Output Voltage	V _O	-0.5~20	V	
Output Current	I _O	50	mA	
Emitter-Base Reverse Voltage	V _{EBR}	5	V	
Base Current	I _B	5	mA	
Output Power Dissipation	P _O	100	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. ≤1μs P.W,300pps

Note 3. AC For 1 Minute, R.H. = 40 ~ 60%

Note 4. For 10 seconds

ELECTRICAL OPTICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Forward Voltage	V_F	-	1.45	1.8	V	$I_F=16\text{mA}$
Reverse Current	I_R	-	-	10	μA	$V_R=5\text{V}$
Input Capacitance	C_{in}	-	60	-	pF	$V=0, f=1\text{MHz}$
High Level Supply Current	I_{CCH}	-	0.01	1	μA	$I_F=0\text{mA}, V_O=\text{Open}, V_{CC}=15\text{V}, T_a=25^\circ\text{C}$
		-	-	2	μA	$I_F=0\text{mA}, V_O=\text{Open}, V_{CC}=15\text{V}$
Low Level Supply Current	I_{CCL}	-	200	-	μA	$I_F=16\text{mA}, V_O=\text{Open}, V_{CC}=15\text{V}$
Logic High Output Current	I_{OH}	-	0.001	0.5	μA	$I_F=0\text{mA}, V_O=V_{CC}=5.5\text{V}, T_a=25^\circ\text{C}$
		-	0.01	1	μA	$I_F=0\text{mA}, V_O=V_{CC}=15\text{V}, T_a=25^\circ\text{C}$
		-	-	50	μA	$I_F=0\text{mA}, V_O=V_{CC}=15\text{V}$

TRANSFER CHARACTERISTICS ($T_a=25^{\circ}\text{C}$)

Parameter		Symbol	Min	Typ	Max	Unit	Test Condition
Current Transfer Ratio	6N135	CTR	7	-	50	%	$I_F = 16\text{mA}$, $V_O = 0.4\text{V}$, $V_{CC}=4.5\text{V}$, $T_a=25^{\circ}\text{C}$
	6N136		19	-	50		
	6N135		5	-	-		$I_F = 16\text{mA}$, $V_O = 0.5\text{V}$, $V_{CC}=4.5\text{V}$
	6N136		15	-	-		
Logic Low Output Voltage	6N135	V_{OL}	-	0.18	0.4	V	$I_F = 16\text{mA}$, $I_O = 1.1\text{mA}$, $V_{CC}=4.5\text{V}$, $T_a=25^{\circ}\text{C}$
	6N136		-	0.25	0.4		$I_F = 16\text{mA}$, $I_O = 3\text{mA}$, $V_{CC}=4.5\text{V}$, $T_a=25^{\circ}\text{C}$
	6N135		-	-	0.5		$I_F = 16\text{mA}$, $I_O = 0.8\text{mA}$, $V_{CC}=4.5\text{V}$
	6N136		-	-	0.5		$I_F = 16\text{mA}$, $I_O = 2.4\text{mA}$, $V_{CC}=4.5\text{V}$
Isolation Resistance		R_{iso}	10^{12}	10^{14}	-	Ω	DC500V, 40 ~ 60% R.H.
Floating Capacitance		C_{io}	-	0.3	1	pF	$V=0$, $f=1\text{MHz}$

SWITCHING CHARACTERISTICS ($T_a=25^{\circ}\text{C}$, $I_F=16\text{mA}$, $V_{CC}=5\text{V}$)

Parameter		Symbol	Min	Typ	Max	Unit	Test Condition
Propagation Delay Time to Logic Low	6N135	t _{PHL}	-	0.35	1.5	μs	R _L =4.1kΩ,T _a =25°C
			-	-	2		R _L =4.1kΩ
	6N136		-	0.35	0.8		R _L =1.9kΩ,T _a =25°C
			-	-	1.0		R _L =1.9kΩ
Propagation Delay Time to Logic High	6N135	t _{PLH}	-	0.5	1.5	μs	R _L =4.1kΩ,T _a =25°C
			-	-	2		R _L =4.1kΩ
	6N136		-	0.3	0.8		R _L =1.9kΩ,T _a =25°C
			-	-	1.0		R _L =1.9kΩ
Common Mode Transient Immunity at Logic High	6N135	CM _H	1000	-	-	V/μs	I _F = 0mA , V _{CM} =10Vpp, R _L =4.1kΩ, T _a =25°C
	6N136		1000	-	-		I _F = 0mA , V _{CM} =10Vpp, R _L =1.9kΩ, T _a =25°C
Common Mode Transient Immunity at Logic Low	6N135	CM _L	1000	-	-	V/μs	I _F = 16mA , V _{CM} =10Vpp, R _L =4.1kΩ, T _a =25°C
	6N136		1000	-	-		I _F = 16mA , V _{CM} =10Vpp, R _L =1.9kΩ, T _a =25°C

CHARACTERISTIC CURVES

Fig.1 Forward Current vs. Forward Voltage

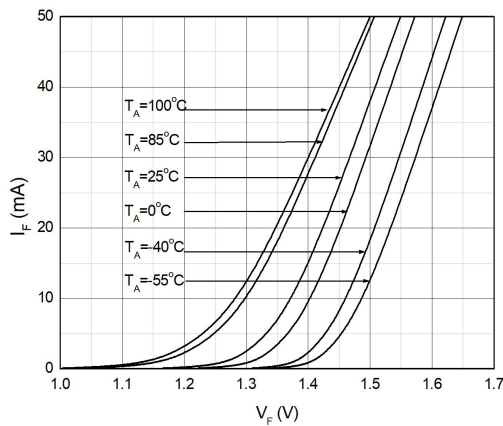


Fig.2 Forward Voltage vs. Ambient Temperature

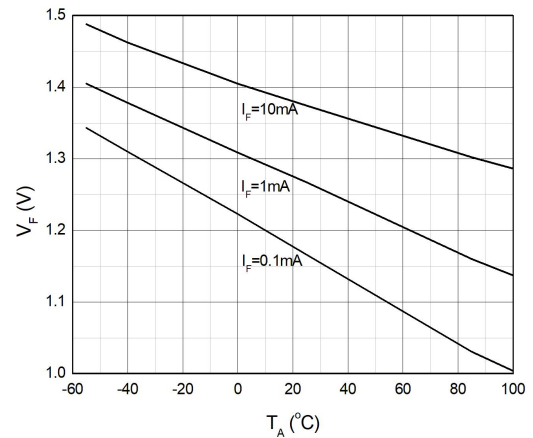


Fig.3 Input Threshold Current vs. Ambient Temperature

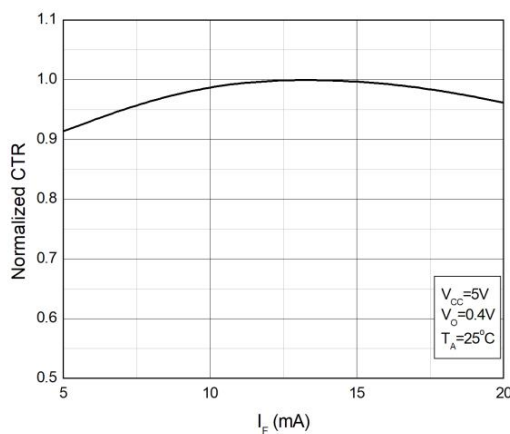


Fig.4 Input Threshold Current vs. Ambient Temperature

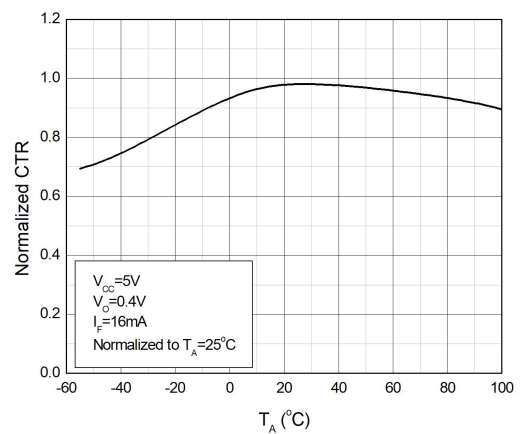


Fig.5 Low Level Output Current vs. Ambient Temperature

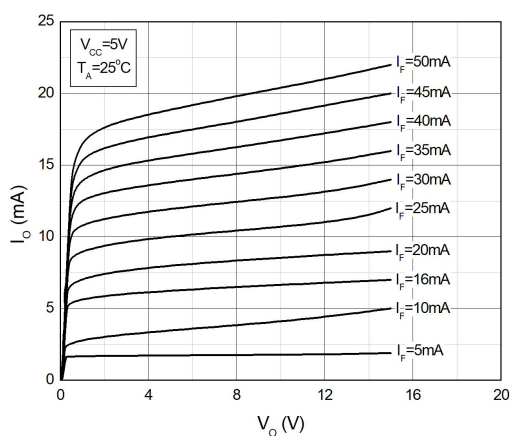


Fig.6 Low Level Output Current vs. Ambient Temperature

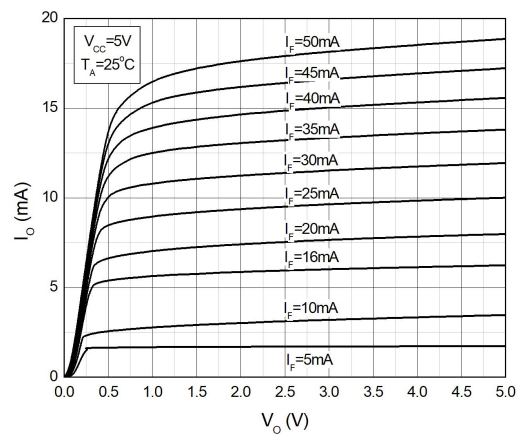


Fig.7 Low Level Output Voltage vs. Ambient Temperature

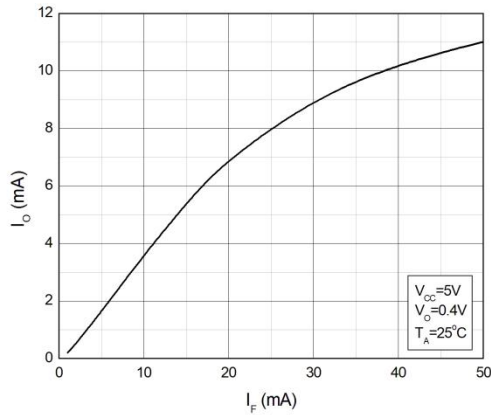


Fig.8 Low Level Output Voltage vs. Ambient Temperature

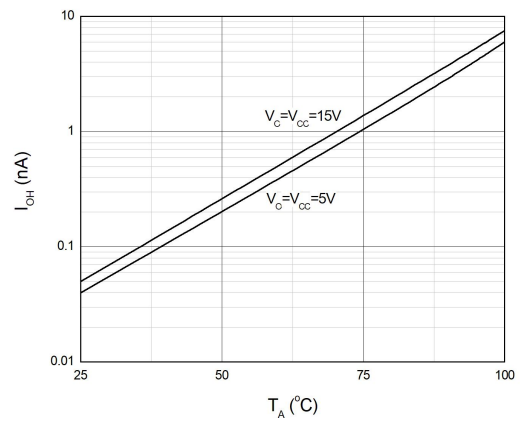


Fig.9 High Level Output Current vs. Ambient Temperature

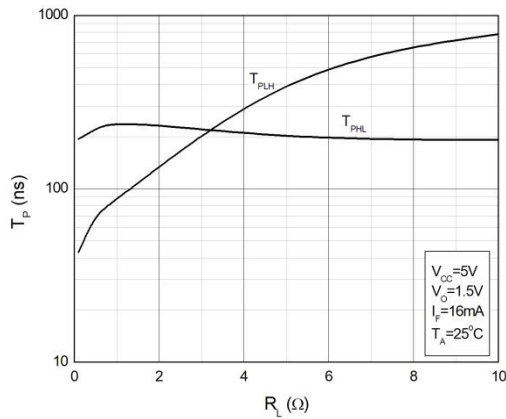


Fig.10 High Level Output Current vs. Ambient Temperature

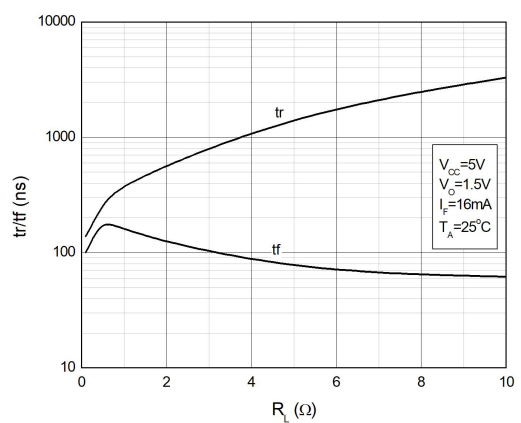


Fig.11 Output Voltage vs. Forward Current

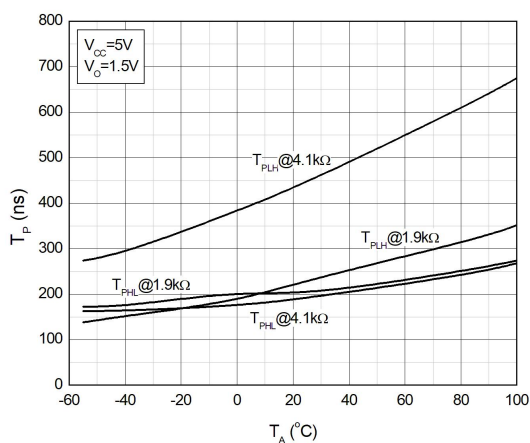
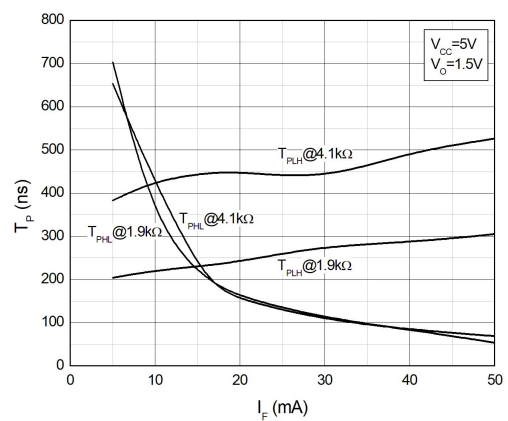


Fig.12 Output Voltage vs. Forward Current



TEST CIRCUITS

Fig.13 Test Circuits for t_{PHL} , t_{PLH} , t_r , t_f

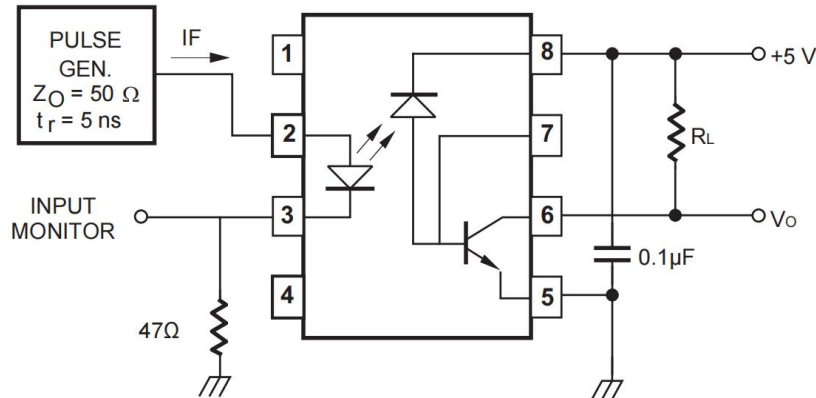


Fig.14 Waveforms of t_{PHL} , t_{PLH} , t_r , t_f



Fig.15 Test Circuits for Common Mode Transient Immunity

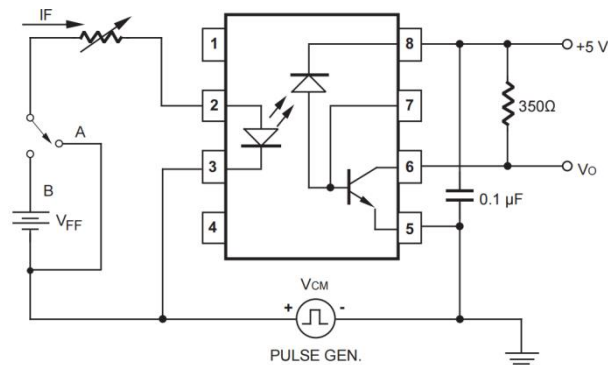
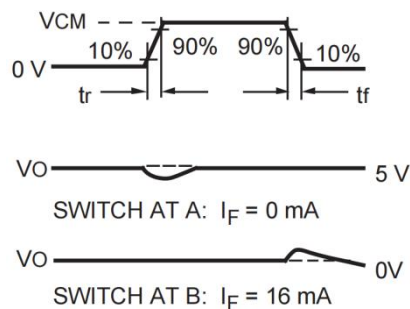
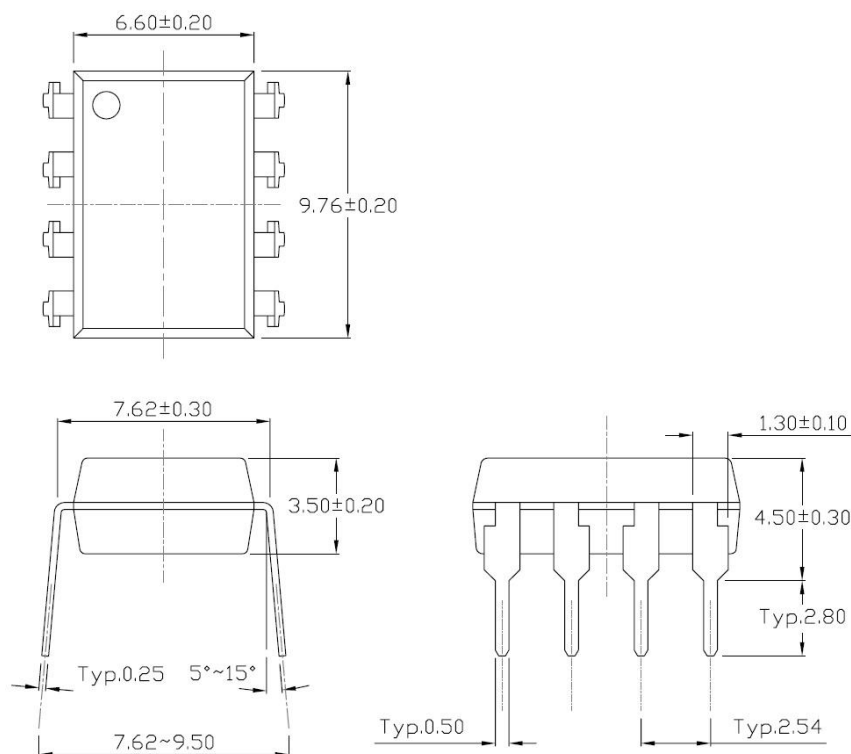


Fig.16 Waveforms of Common Mode Transient Immunity

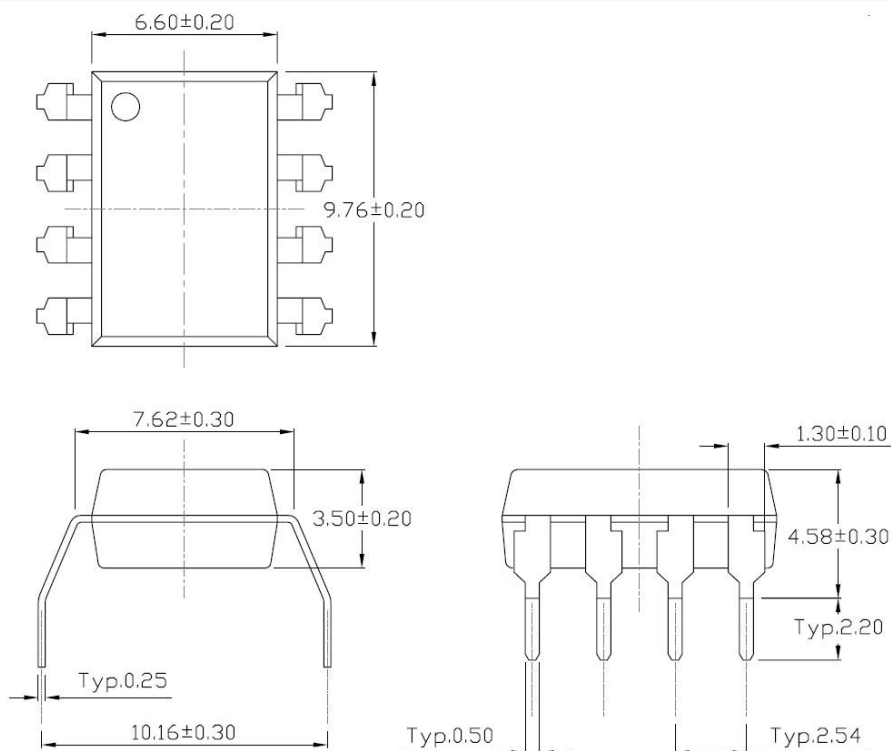


PACKAGE DIMENSIONS

Standard DIP – Through Hole (DIP Type)

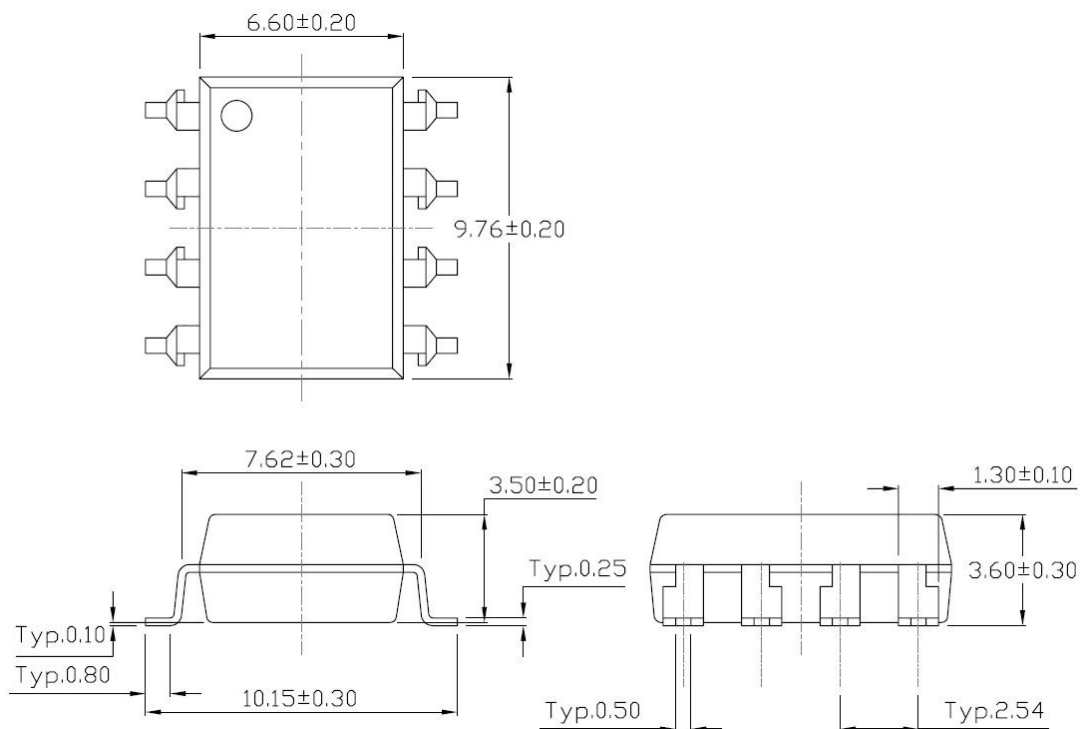


Gullwing (400mil) Lead Forming – Through Hole (M Type)



PACKAGE DIMENSIONS

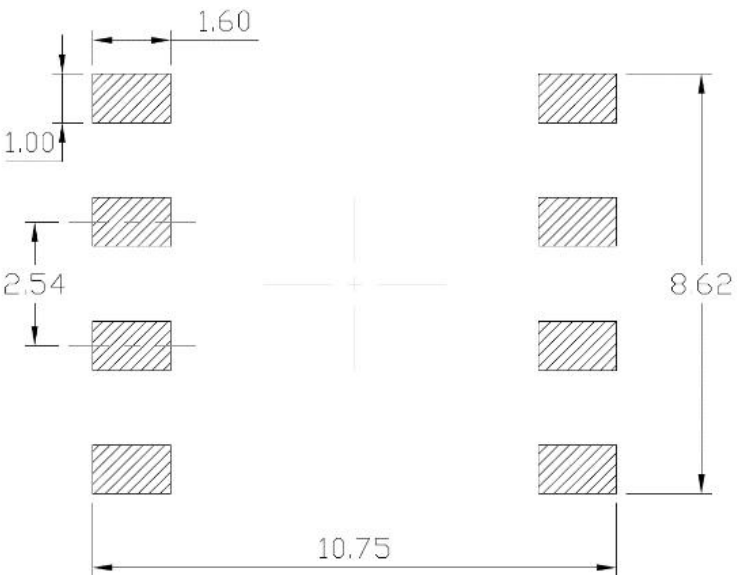
Surface Mount (Low Profile) Lead Forming (SL Type)



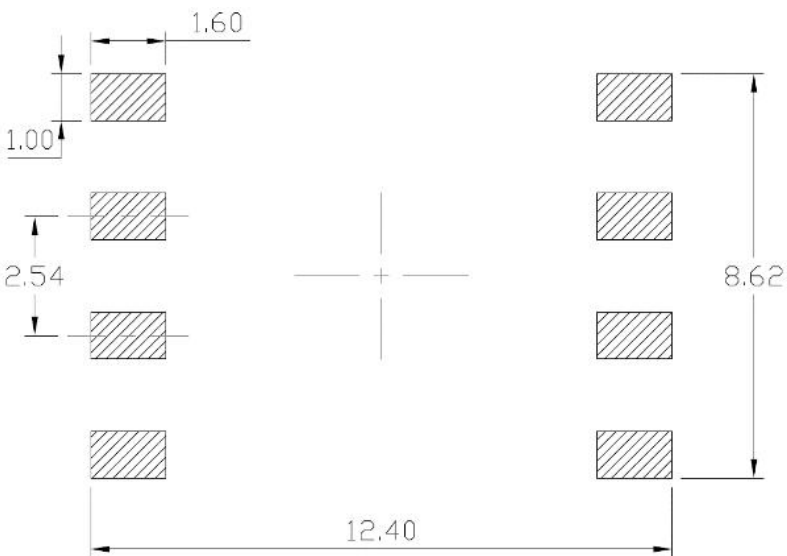
- Dimensions in mm unless otherwise stated

RECOMMENDED SOLDER MASK

Surface Mount (Low Profile) Lead Forming



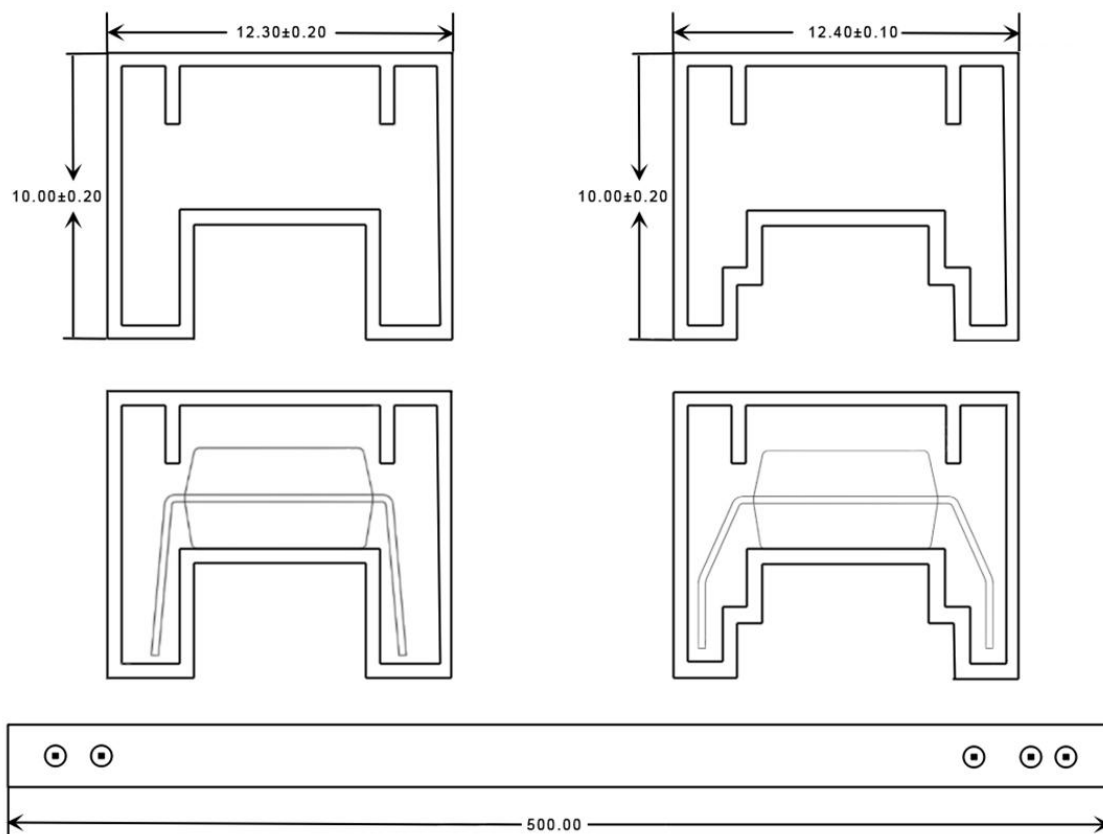
Lead Forming(Gullwing)



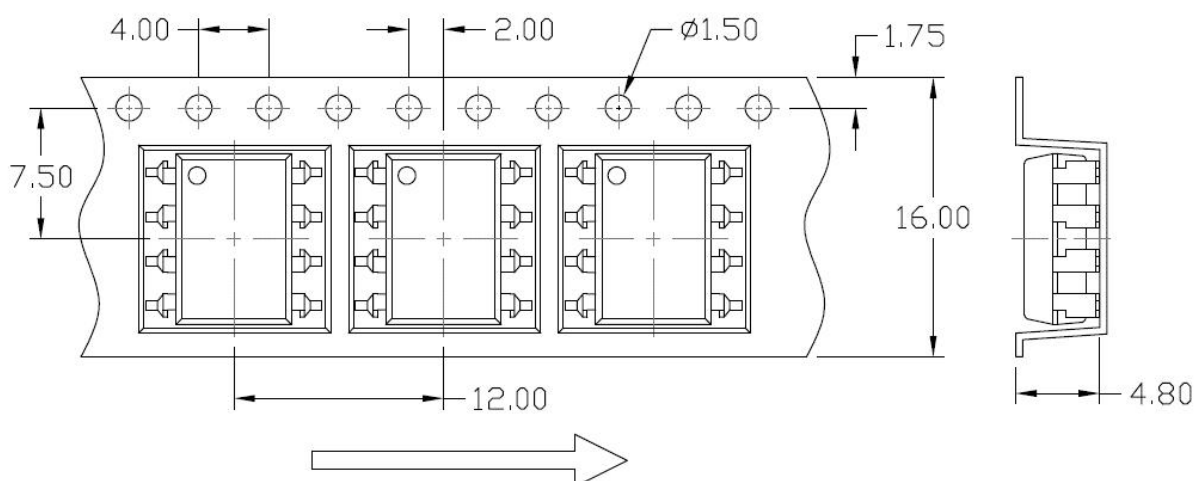
● Dimensions in mm unless otherwise stated

CARRIER TAPE SPECIFICATIONS

Option DIP8 & DIP8-M

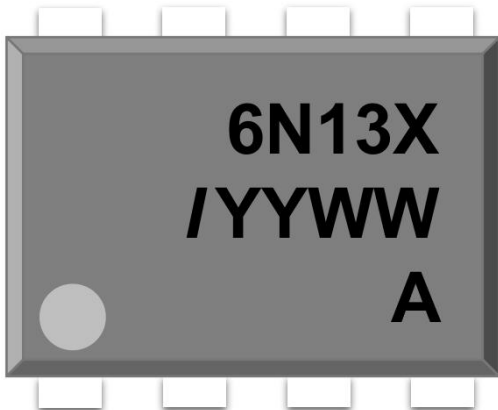


Option DIP8-SL

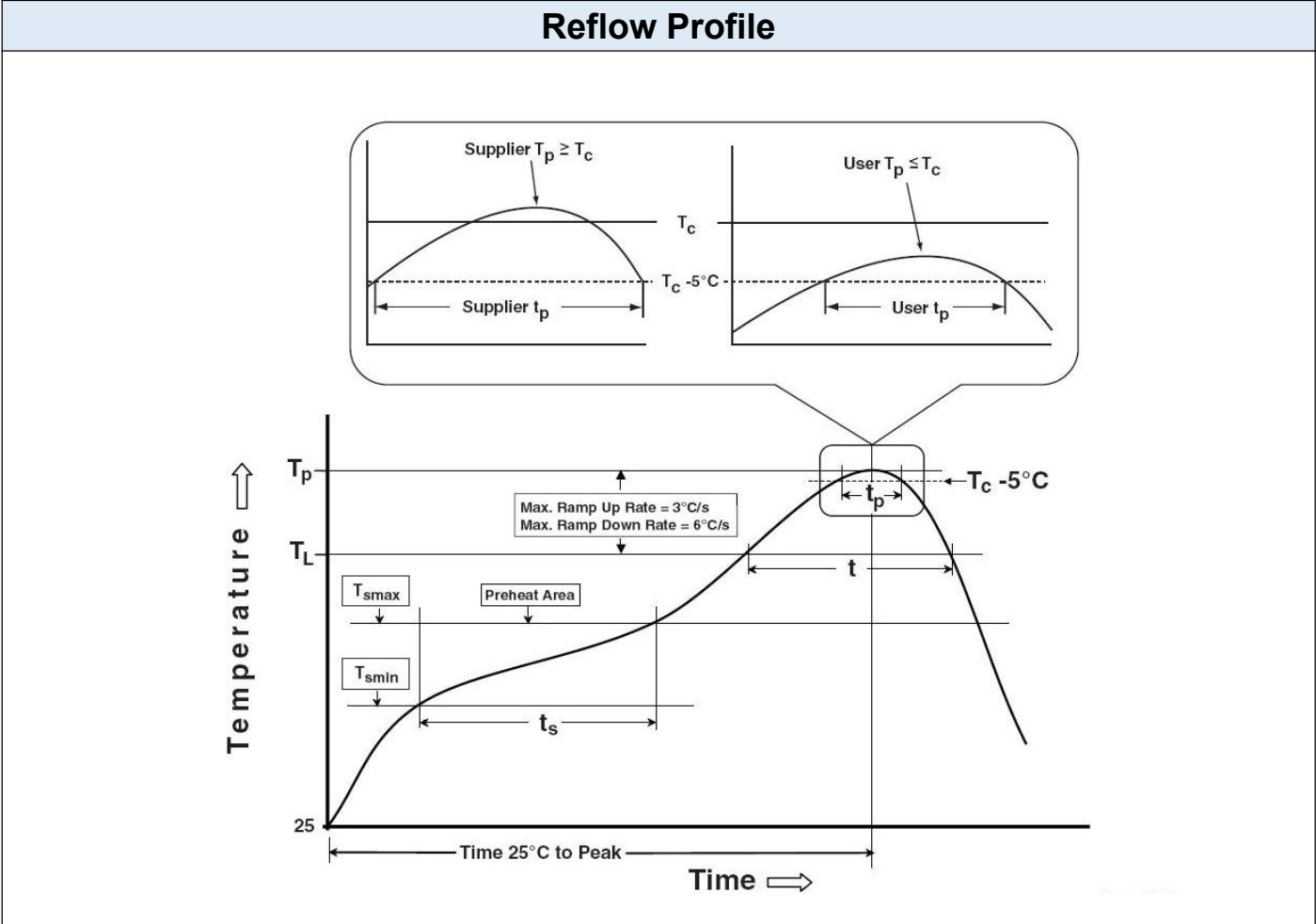


- Dimensions in mm unless otherwise stated

ORDERING AND MARKING INFORMATION

Marking Information			
		6N13X : Product Series&Rank / : ISOMICRON YY : Fiscal Year WW : Work Week A : Manufacturing Code	
Order Code			
6N13 X - 5 0 0 E Product Series Rank: 5/6/7/8/9 Lead Forming 0: DIP-Standard 1: DIP-M Type 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
DIP Standard	45 Units/Tube	25 Tube/ Inner box	6 Inner box/Outer box=6.75k Units
DIP M Type	45 Units/Tube	25 Tube/ 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

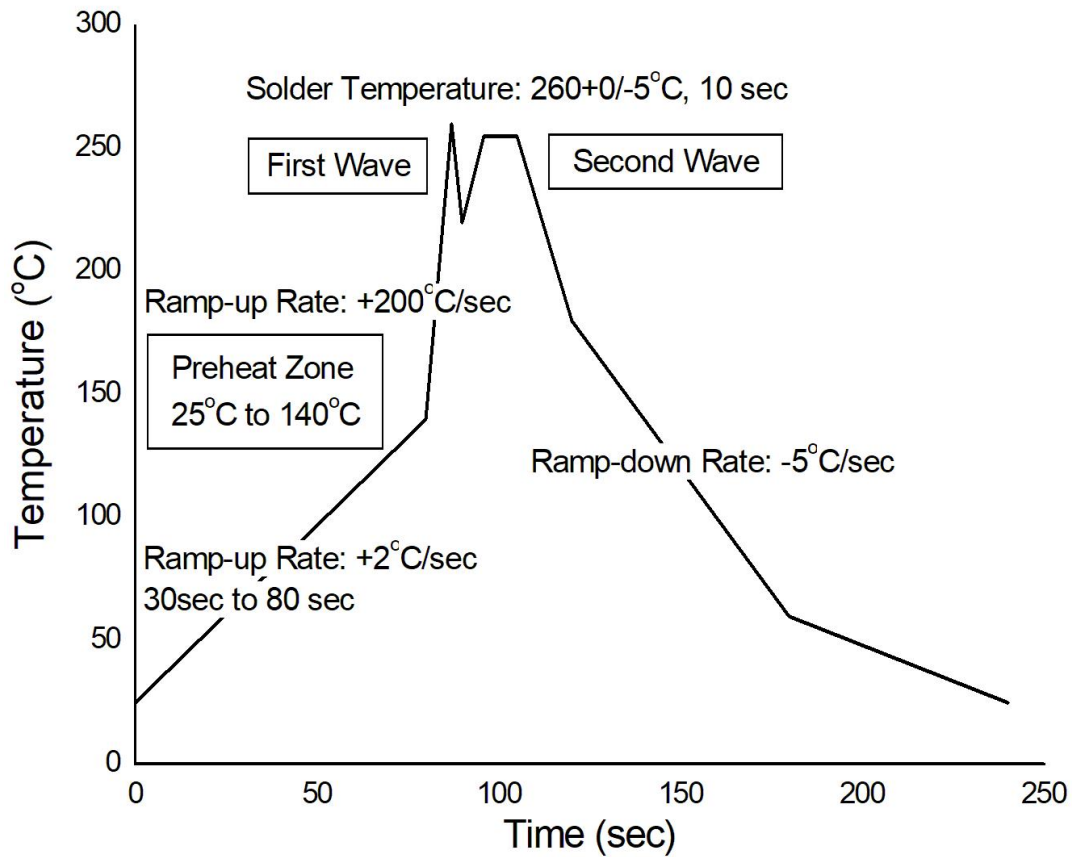
REFLOW INFORMATION



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.