



# ORIENT

## Photo coupler

### Product Data Sheet

Part Number: OR-6N135&6N136/450X

Customer: \_\_\_\_\_

Date: \_\_\_\_\_

**SHENZHEN ORIENT COMPONENTS CO., LTD**

Block A 3rd Floor No.4 Building, Tian'an Cyber Park, Huangge Rd, LongGang Dist, Shenzhen, GD

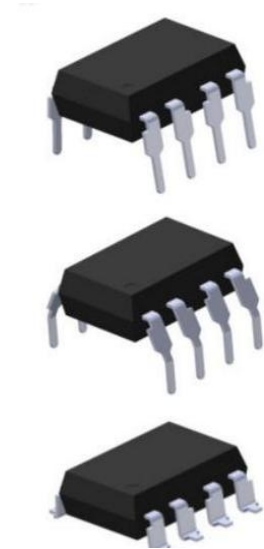
TEL: 0755-29681816

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[www.orient-opto.com](http://www.orient-opto.com)

### 1. Features

- (1). High speed - 1MBd model
- (2). Adapted to the dual-in-line, lead spacing width, surface installation.
- (3). Store output.
- (4). UL, VDE approval.
- (5). In compliance with RoHS, REACH standards
- (6). MSL Class I



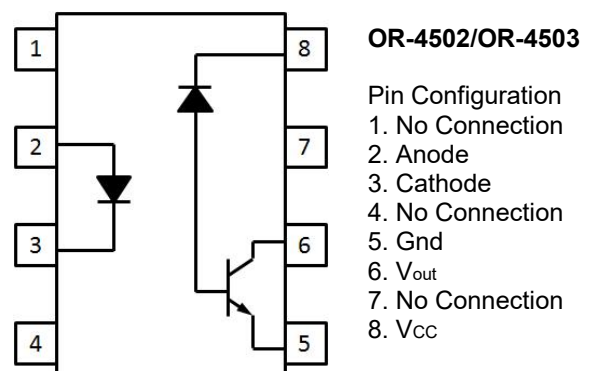
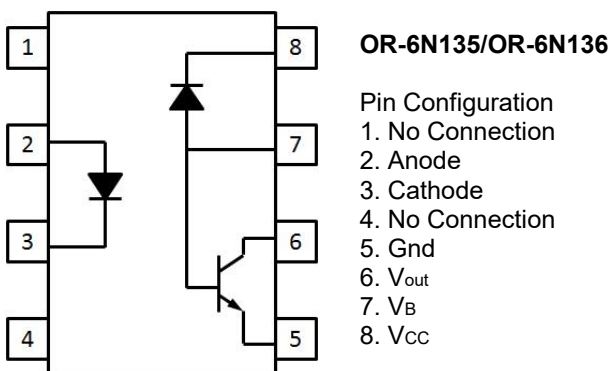
### 2. Instructions

OR-6N135/6N136/450X consists of highly efficient AlGaAs light-emitting diodes and high-speed optical detectors. The design provides good ac and dc isolation at the input and output ends of the photoelectric coupler. Connections related to photo diode biasing can improve the speed of conventional photo transistor couplers by reducing the capacitance of the matrix collector. Internal shielding ensures high transient immunity in general mode. Ensure the common-mode transient immunity to 1 kv/μsec.

### 3. Application Range

- line receiver isolation
- A/ D, D/A converted digital signal isolation
- eliminate noise from the ground loop
- switching power supply
- alternative pulse transformers
- motor control system
- interface of microprocessor system, computer and peripheral equipment

### 4. Functional Diagram



## 5. Absolute Maximum Ratings (Ta=25°C) \*1

Parameter		Symbol	Rated Value	Unit
Input	Average Forward Input Current	$I_F$	25	mA
	Reverse Input Voltage	$V_R$	5	V
	Power Dissipation	$P_I$	45	mW
Output	Output Collector Current	$I_O$	8	mA
	Output Collector Voltage	$V_O$	20	V
	Output Collector Power Dissipation	$P_O$	100	mW
Supply Voltage		$V_{CC}$	30	V
Insulation Voltage		$V_{iso}$	5000	Vrms
Working Temperature		$T_{opr}$	-40 ~ + 110	°C
Storage Temperature		$T_{stg}$	-55 ~ + 125	
*2 Soldering Temperature		$T_{sol}$	260	

\*1. Room temperature = 25 °C. Exceeding the maximum absolute rating can permanently damage the device.

Working long hours at the maximum absolute rating can affect reliability.

\*2. soldering time is 10 seconds

## 6. Electrical optical characteristics (at TA=25°C)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	
Input	Forward voltage	$V_F$	$I_F = 16\text{mA}$	---	1.4	1.7	V	
	Reverse voltage	$V_R$	$I_R = 10\mu\text{A}$	5	---	---	V	
Output	High Level Output Current	$I_{OH}$	$V_{CC}=5.5\text{V}, V_O=5.5\text{V}, I_F=0\text{mA}$	---	---	0.5	uA	
			$V_{CC}=15\text{V}, V_O=15\text{V}, I_F=0\text{mA}$	---	---	1		
	High Level Supply Current	$I_{CCL}$	$I_F=16\text{mA}, V_O=\text{open}, (V_{CC}=15\text{V})$	---	400	---	uA	
	Low Level Supply Current	$I_{CCH}$	$I_F=0\text{mA}, V_O=\text{open}, (V_{CC}=15\text{V})$	---	---	1	uA	
Transfer Characteristics	Current Transfer Ratio	CTR	$I_F = 16\text{mA}, V_O = 0.4\text{V}, V_{CC}=4.5\text{V}, TA=25^\circ\text{C}$	OR-6N135	7	---	50	%
				OR-6N136 OR-4502 OR-4503	19	---	50	
			$I_F = 16\text{mA}, V_O = 0.5\text{V}, V_{CC}=4.5\text{V}$	OR-6N135	5	---	---	
				OR-6N136 OR-4502 OR-4503	15	---	---	
	Logic Low Output Voltage	$V_{OL}$	$I_F = 16\text{mA}, I_O = 1.1\text{mA}, V_{CC}=4.5\text{V}, TA=25^\circ\text{C}$	OR-6N135	---	0.18	0.4	V
				OR-6N136 OR-4502 OR-4503	---	0.25	0.4	
			$I_F = 16\text{mA}, I_O = 0.8\text{mA}, V_{CC}=4.5\text{V}$	OR-6N135	---	---	0.5	
				OR-6N136 OR-4502 OR-4503	---	---	0.5	

## 7. Switching Characteristics ( at TA=25°C )

Parameter	Symbol	Condition	Device	Min	Typ	Max	Unit
Propagation delay time to output Low level	t <sub>PHL</sub>	R <sub>L</sub> =4.1kΩ I <sub>F</sub> =16mA	OR-6N135	---	0.09	1.5	us
		R <sub>L</sub> =1.9kΩ I <sub>F</sub> =16mA	OR-6N136 OR-4502 OR-4503	---	0.1	0.8	us
Propagation delay time to output High level	t <sub>PLH</sub>	R <sub>L</sub> =4.1kΩ I <sub>F</sub> =16mA	OR-6N135	---	0.8	1.5	us
		R <sub>L</sub> =1.9kΩ I <sub>F</sub> =16mA	OR-6N136 OR-4502 OR-4503	---	0.4	0.8	us
Logic High Common Mode Transient Immunity	CM <sub>H</sub>	V <sub>CM</sub> =10Vp-p, R <sub>L</sub> =4.1kΩ, I <sub>F</sub> =0mA	OR-6N135	1	10	---	kV/μs
		V <sub>CM</sub> =10Vp-p, R <sub>L</sub> =1.9kΩ, I <sub>F</sub> =0mA	OR-6N136 OR-4502 OR-4503				
Logic Low Common Mode Transient Immunity)	CM <sub>L</sub>	V <sub>CM</sub> =10Vp-p, R <sub>L</sub> =4.1kΩ, I <sub>F</sub> =0mA	OR-6N135	1	10	---	kV/μs
		V <sub>CM</sub> =10Vp-p, R <sub>L</sub> =1.9kΩ, I <sub>F</sub> =0mA	OR-6N136 OR-4502 OR-4503				

Recommended temperature range (TA = 0 °C -- 70 °C), unless otherwise specified power supply for 5 v.

Typical values of TA = 25 °C.

## 8. Isolation characteristics ( at TA=25°C )

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input-Output Insulation Leakage Current	$I_{I-O}$	45% RH, t=5s, $V_{I-O} = 3\text{kV DC}, T_A = 25\text{ C}$	—	—	1	$\mu\text{A}$
Withstand Insulation Test Voltage	$V_{ISO}$	RH $\leq$ 50%, t = 1min, $T_A = 25^\circ\text{C}$	5000	—	—	$V_{RMS}$
Input-Output Resistance	$R_{I-O}$	$V_{I-O} = 5000\text{V DC}$	$5 \times 10^{10}$	$10^{12}$	—	$\Omega$

Typical values of TA = 25 °C

## 9. Order Information

Part Number

**OR-6N13XV-W-Y-Z**  
or **OR-450XV-W-Y-Z**

**Note**

X = Part number option (5 or 6 for 6N13X ; 2 or 3 for 450X)

V = Lead form option (S, M or none)

W = Tape and reel option ( TA, TA1 or none).

Y = 'V' code for VDE safety (This options is not necessary).

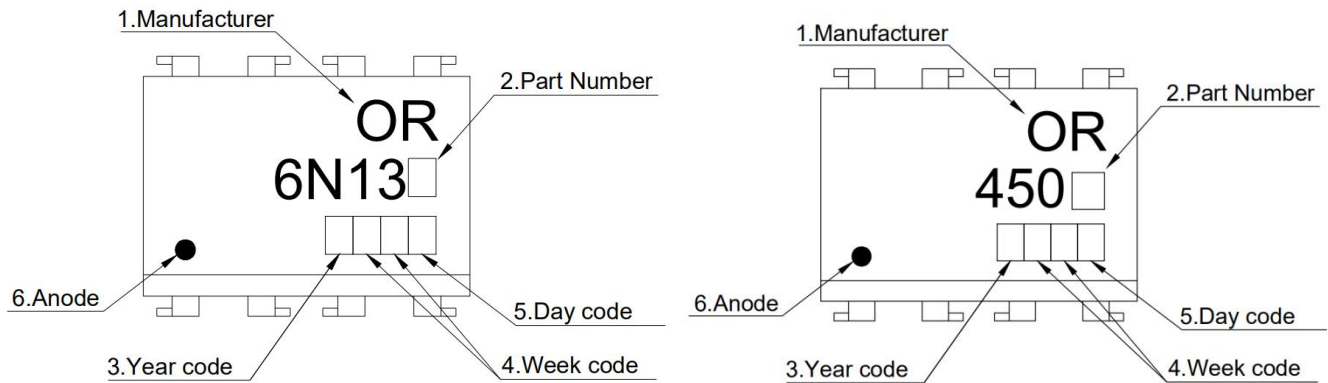
Z = 'G' code for Halogen free (This options is not necessary).

\* VDE Code can be selected.

\* Halogen Free can be selected.

Option	Description	Packing quantity
None	Standard SMD Option	45 units per tube
M	Wide lead bend (0.4 inch spacing)	45 units per tube
TA	Surface mount lead form (low profile) + TA tape & reel option	1000 units per reel
TA1	Surface mount lead form (low profile) + TA1 tape & reel option	1000 units per reel

## 10. Naming Rule



### NOTE:

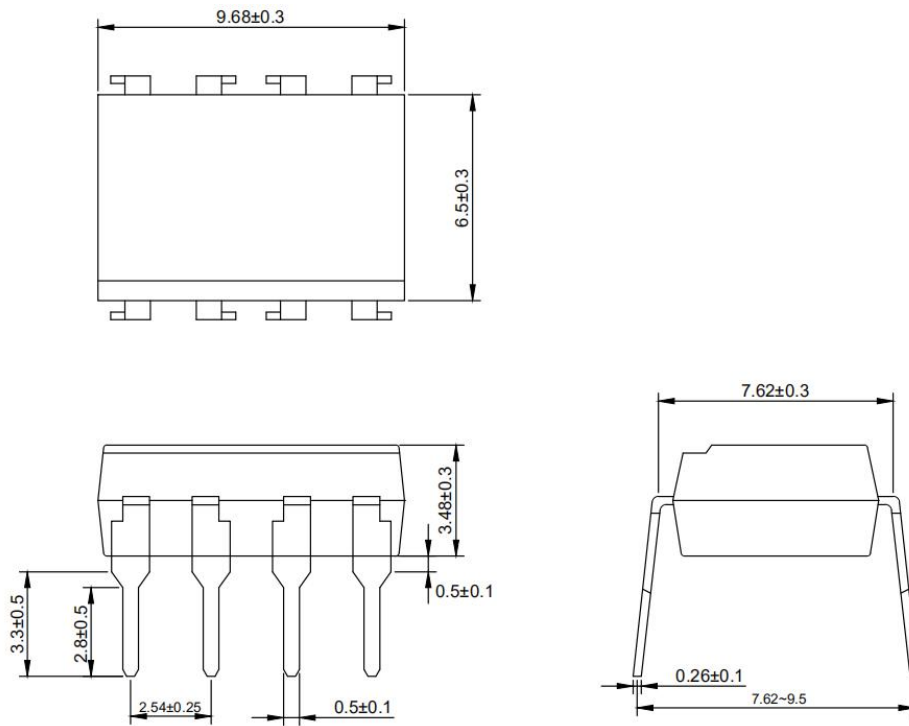
1. ORIENT
2. Part Number: '5' or '6' for 6N13X ; '2' or '3' for 450X.
3. Year Code: '0' means '2020' and so on.
4. Week Code: 01 represents the first week, 02 represents the second week, and so on.
5. Day Code: 'A to F' means 'Monday to Sunday'.
6. Anode.

\* Halogen Free Mark can be selected.

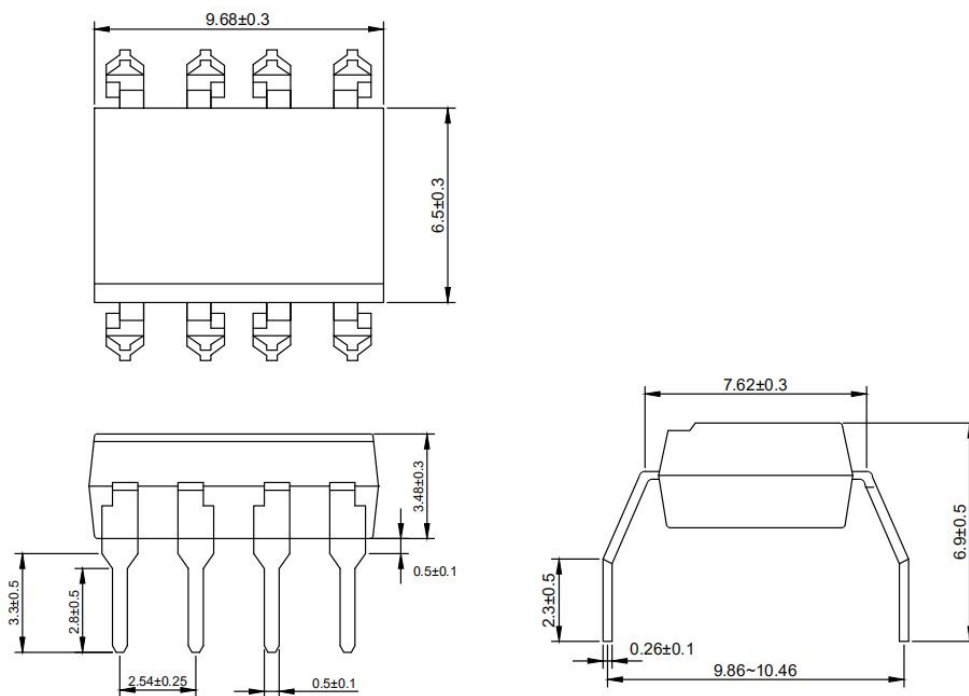
\* VDE Mark can be selected.

## 11. Outer Dimension

### (1) OR-6N13X/OR-450X

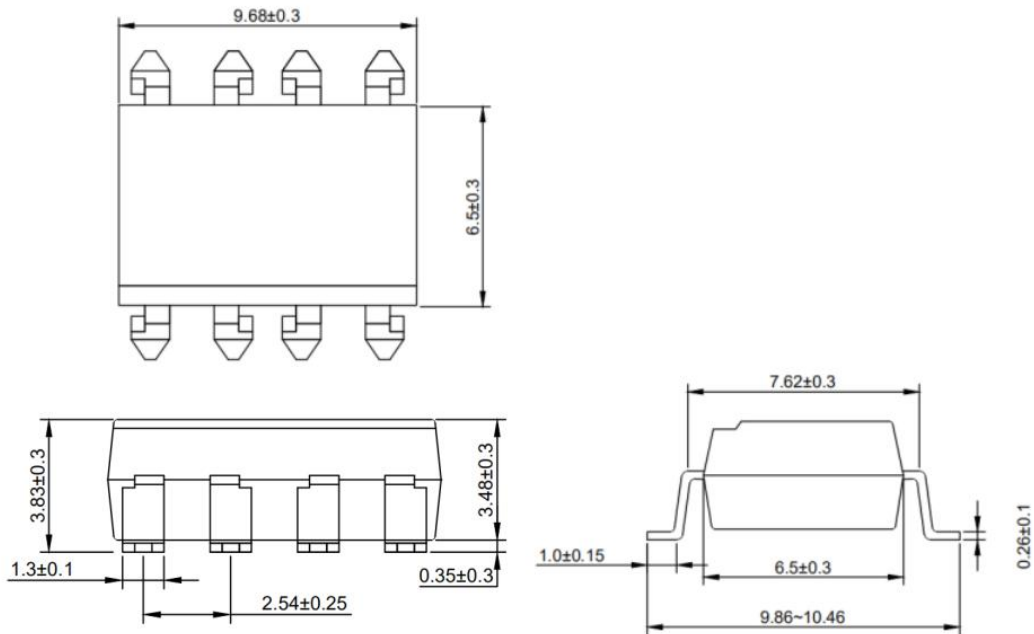


### (2) OR-6N13XM/OR-450XM



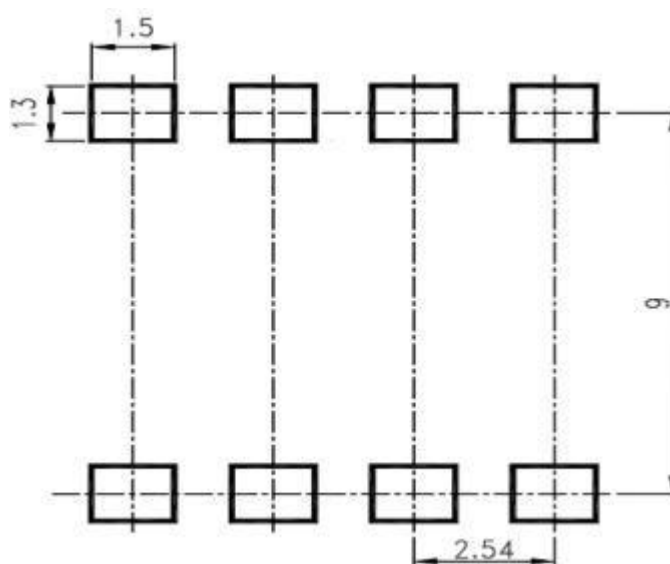


**(3) OR-6N13XS/OR-450XS**



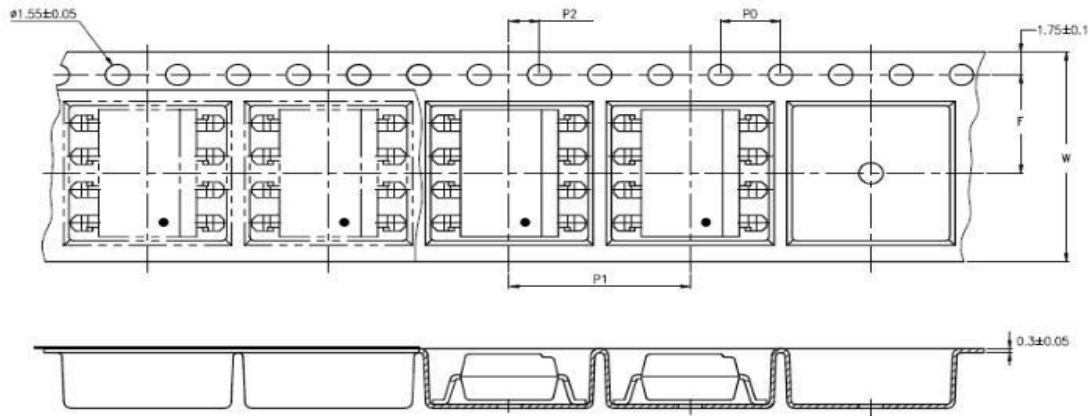
**12. Recommended Foot Print Patterns (Mount Pad)**

(unit: mm)

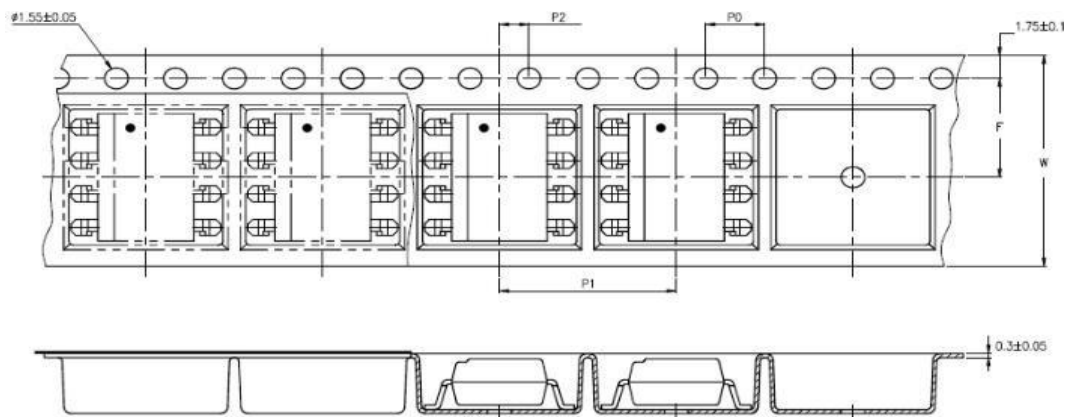


### 13. Taping Dimensions

#### (1) OR-6N13X-TA/OR-450X-TA



#### (2) OR-6N13X-TA1/OR-450X-TA1



type	symbol	Dimensions: mm ( inches)
bandwidth	W	16±0.3 (0.63)
pitch	P0	4±0.1 (0.15)
pitch	F	7.5±0.1 (0.295)
	P2	2±0.1 (0.079)
interval	P1	12±0.1 (0.472)

Encapsulation type	TA/TA1
Amount(pcs)	1000

## 14. Package Dimension

### (1) package dimension

DIP/M type

Packing Information	
Packing type	Tube(Plug)
Qty per Tube	45
Small box (inner) Dimenaion	525*132*60mm
Max qty per small box	2250
Large box (Outer) Dimenaion	530*290*335mm
Max qty per large box	22500

SOP type

Packing Information	
Packing type	Reel type
Tape Width	16mm
Qty per Reel	1000
Small box (inner) Dimenaion	345*345*60mm
Max qty per small box	2000
Large box (Outer) Dimenaion	620x360x360mm
Max qty per large box	20000

### (2)Packing Label Sample



1. MTL NO:Contents with "Order Information" in the specification.
2. LOT NO:The production cycle of the product.
3. BATCH:The CTR RANK of the product.
4. Quantity:Product packaging quantity.
5. Product Data: The data when product be made.

## 15. Reliability Test

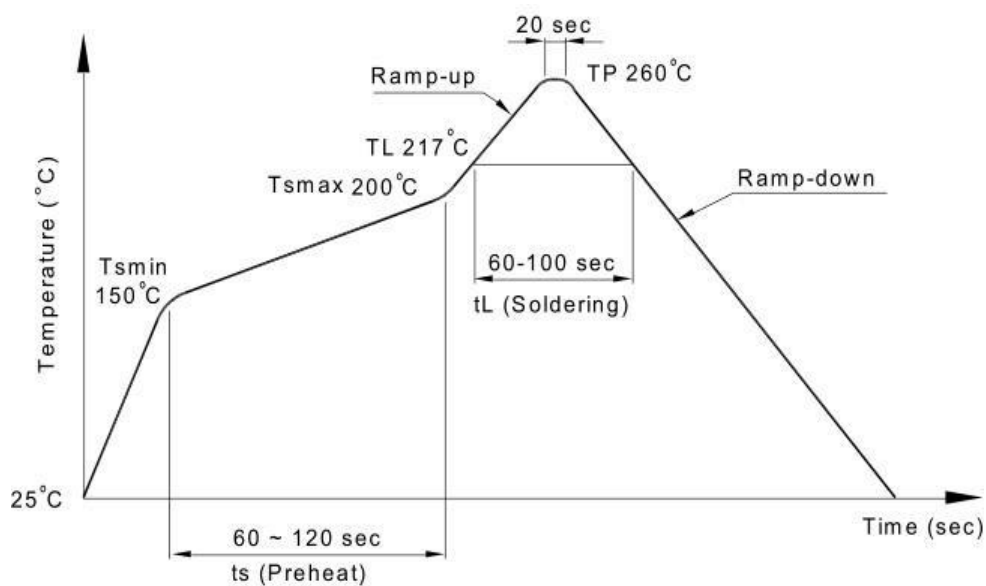
NO.	Item	Condition	Quantity	Cycle	Reference Standards
1	RSH, Resistance to Solder Heat	260±5°C, 20s/cycle	22	3 cycles	JESC22A-106
2	SD, Solderability	260±5°C, 10s/cycle	22	1 cycle	JESD22-B102
3	TC, Temperature Cycle	H: 125°C 15min ∫ 5min L: -55°C 15min	77	300cycles	JESC22A-104
4	TS, Thermal Shock	H: 100°C 5min ∫ 15s L: -10°C 5min	77	300cycles	JESC22A-106
5	LTSL, Low Temperature Storage	T: -55°C	77	1000h	JESD22-A119
6	HTSL, High Temperature Storage	T: 125°C	77	1000h	JESC22A-103
7	THB, High Temperature High Humidity	T: 85°C RH: 85%	77	1000h	JESC22A-101
8	HTOL DC Operating Life	T: 110°C IF=10mA VCC=5V	77	1000h	MIL-STD-750 Method 1037
9	ESD-HBM Human Body Model ESD	Ta=25°C, Reference JESD22-A114	6	1 cycle	JESD22-A114

## 16. Temperature Profile Of Soldering

### (1) IR Reflow soldering (JEDEC-STD-020C compliant)

Note: one solder backflow is recommended under the conditions described below in the temperature and time profile. Do not weld more than three times.

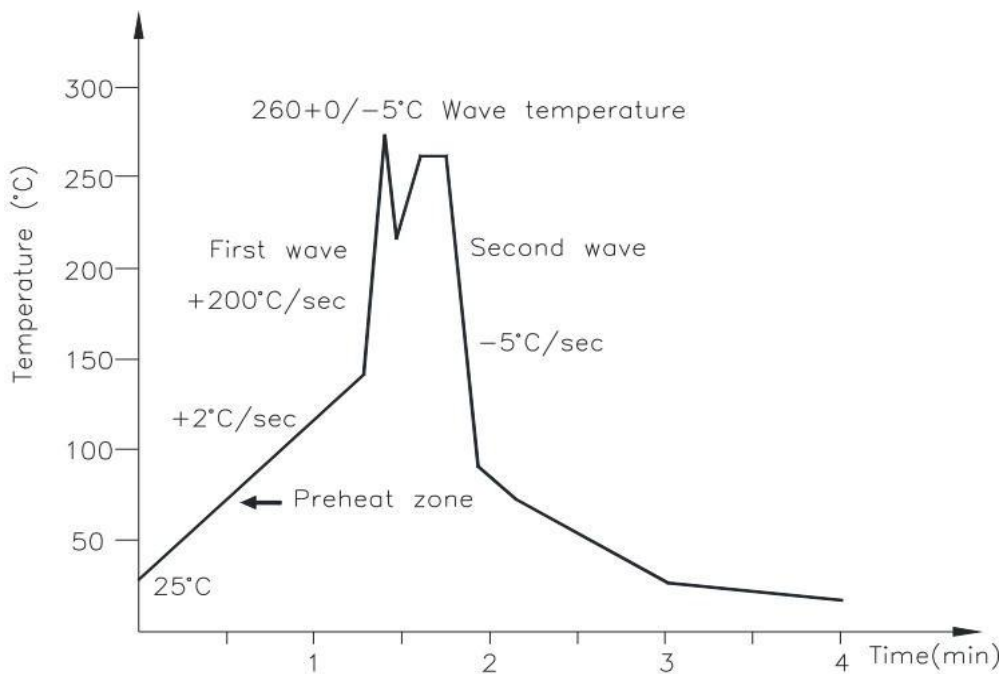
Profile item	Conditions
Preheat	
- Temperature Min (T Smin )	150°C
- Temperature Max (T Smax )	200°C
- Time (min to max) (ts)	90±30 sec
Soldering zone	
- Temperature (TL )	217°C
- Time (t L )	60 sec
Peak Temperature	260°C
Peak Temperature time	20 sec
Ramp-up rate	3°C / sec max.
Ramp-down rate from peak temperature	3~6°C / sec
Reflow times	≤3



(2) Wave soldering (JEDEC22A111 compliant)

One-time welding is recommended under the temperature condition.

Temperature	260+0/-5°C
Time	10 sec
Preheat temperature	5 to 140°C
Preheat time	30 to 80sec



(3) Hand soldering by soldering iron

Single lead welding is allowed in each process and one-time welding is recommended.

Temperature	380+0/-5°C
Time	3 sec max

## 17. Switching time test circuit

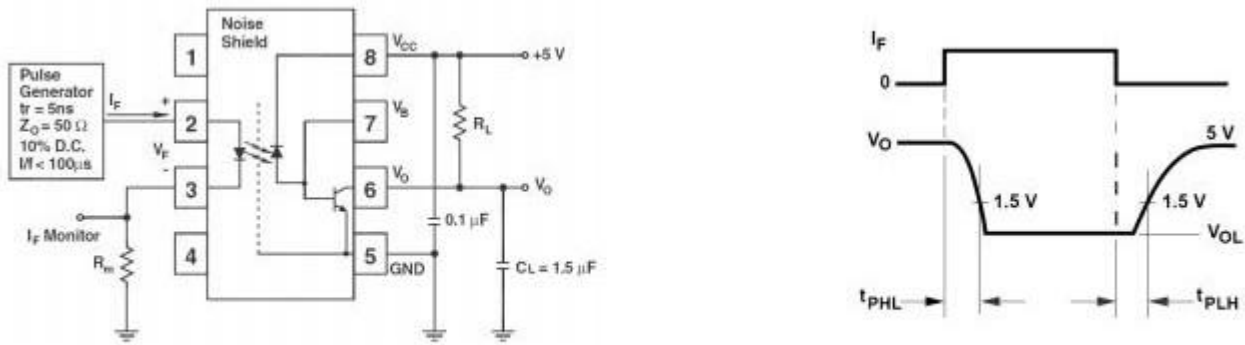


Figure 1: Test Circuit for  $t_{PHL}$  and  $t_{PLH}$

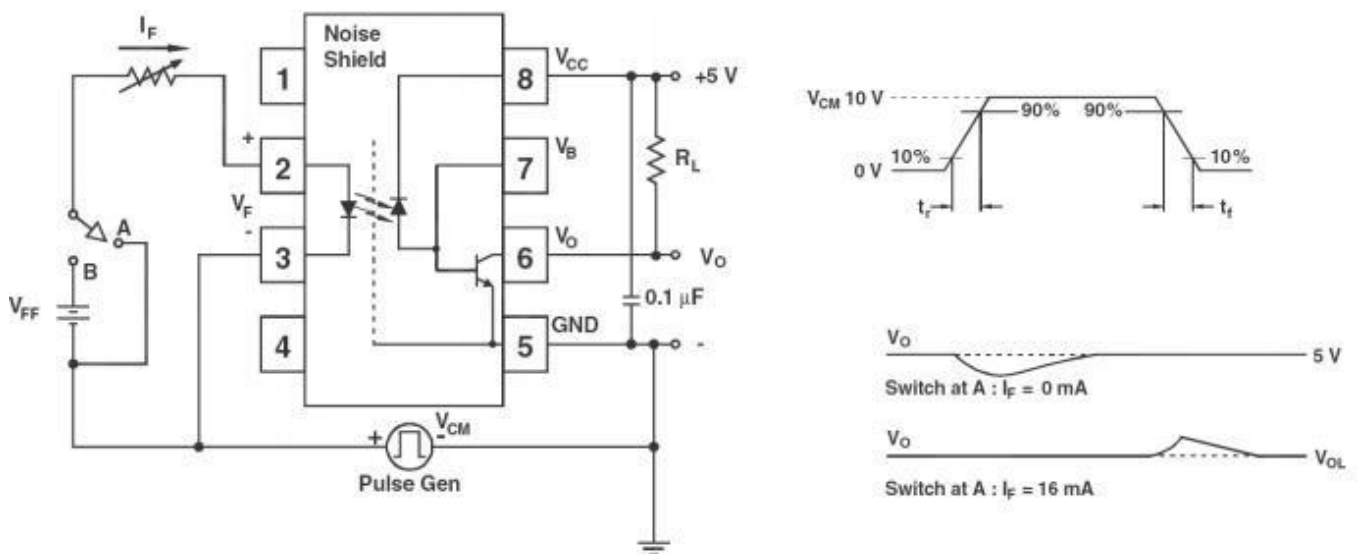


Figure 2: Single Channel Test Circuit for Common Mode Transient Immunity

## 18. Characteristics Curve

Figure 3: DC and pulsed transfer characteristics

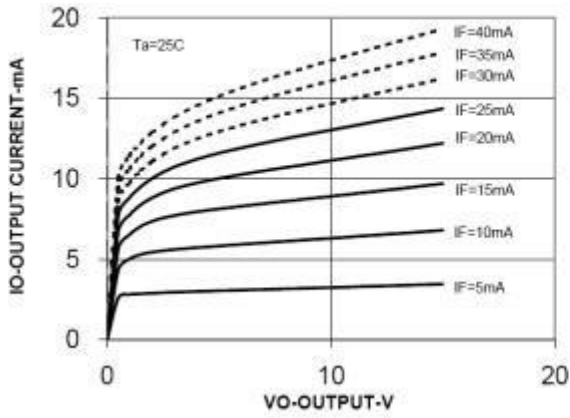


Figure 6: Current transfer ratio vs. input current

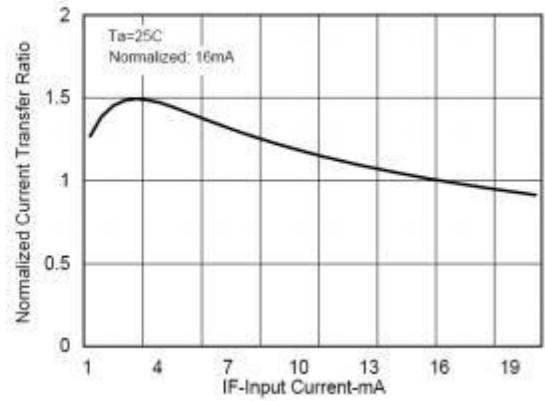


Figure 4: Input current vs. forward voltage

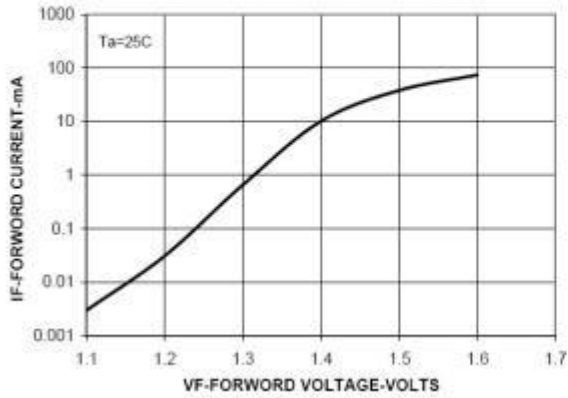


Figure 7: Current transfer ratio vs. temperature

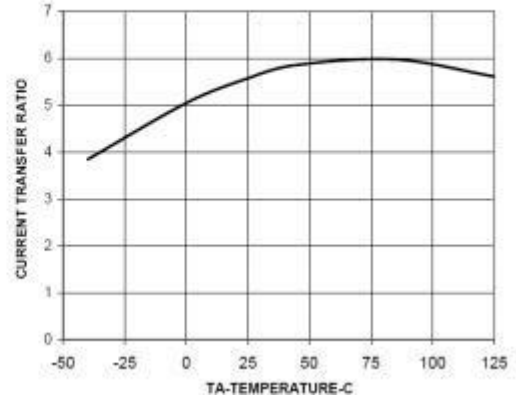


Figure 5: Logic high output current vs. temperature

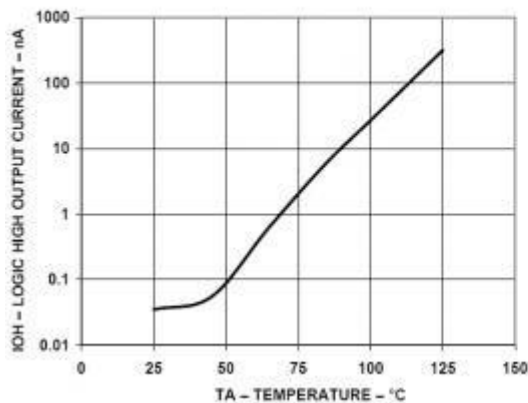


Figure 8: Small-signal current transfer ratio vs. quiescent current

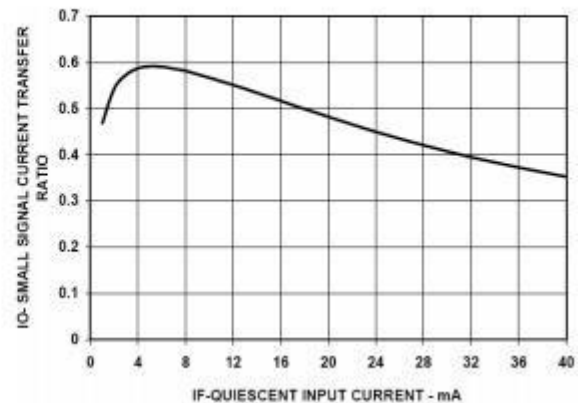




Figure 9: Propagation delay time vs. temperature

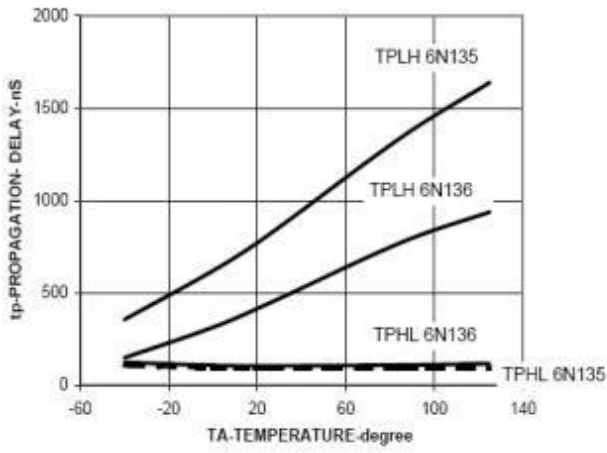


Figure 10: Propagation delay time vs. load resistance

