



# ORIENT

## Photo coupler

### Product Data Sheet

Part Number: OR-4N2X\_OR-4N3X

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

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

**SHENZHEN ORIENT COMPONENTS CO., LTD**

Block A3rd Floor No.4 Building, Tian'an Cyber Park, Huangge Rd, LongGang Dist, Shenzhen, GD

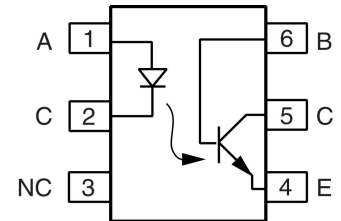
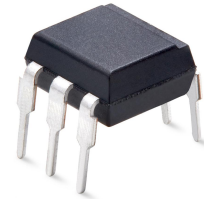
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[www.orient-opto.com](http://www.orient-opto.com)

### 1. Features

- 4N2X series: 4N25, 4N26, 4N27, 4N28
- 4N3X series: 4N35, 4N36, 4N37, 4N38
- High isolation voltage between input and output (Viso=5000 V rms)
- Creepage distance >7.62 mm
- Operating temperature up to +115°C
- Compact dual-in-line package
- Pb free and RoHS compliant.



Pin Configuration

- 1. Anode
- 2. Cathode
- 3. No Connection
- 4. Emitter
- 5. Collector
- 6. Base

### 2. Instructions

The 4N2X, 4N3X, series of devices each consist of an infrared emitting diode optically coupled to a photo transistor. They are packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.

### 3. Application Range

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs

### 4. Max Absolute rated Value (Normal Temperature=25°C)

Parameter		Symbol	Rated Value	Unit
Input	Forward Current	$I_F$	60	mA
	Junction Temperature	$T_J$	125	°C
	Reverse Voltage	$V_R$	6	V
	Power dissipation ( $T_A = 25^\circ\text{C}$ ) Derating factor (above $100^\circ\text{C}$ )	$P_D$	100 3.8	mW mW/°C
Output	Collector-emitter Voltage	$V_{CEO}$	80	V
	Collector-Base voltage	$V_{CBO}$	80	
	Emitter-Collector voltage	$V_{ECO}$	7	
	Emitter-Base voltage	$V_{EBO}$	7	
	Power dissipation ( $T_A = 25^\circ\text{C}$ ) Derating factor (above $100^\circ\text{C}$ )	$P_C$	150 9.0	mW mW/°C
Total Consume Power	$P_{tot}$	200	mW	
*1 Insulation Voltage	$V_{iso}$	5000	Vrms	
Working Temperature	$T_{opr}$	-55 to + 115	°C	
Deposit Temperature	$T_{STG}$	-55 to + 150		
*2 Soldering Temperature	$T_{SOL}$	260		

\*1. AC Test, 1 minute, humidity = 40~60%  
Insulation test method as below:  
(1) Short circuit both terminals of photocoupler.

- (2) No Current when testing insulation voltage.  
 (3) Adding sine wave voltage when testing.

\*2. soldering time is 10 seconds.

## 5. Opto-electronic Characteristics

Parameter		Symbol	Condition	Min	Typ.*	Max	Unit		
Input	Forward Current	$V_F$	$I_F=10\text{mA}$	---	1.2	15	V		
	Reverse Voltage	$I_R$	$V_R=6\text{V}$	---	---	10	$\mu\text{A}$		
	Collector capacitance	$C_{in}$	$V=0, f=1\text{MHz}$	---	30	---	pF		
Output	Collector-Base dark current		$I_{CBO}$	$V_{CB}=10\text{V}$	---	---	20	nA	
	Collector to emitter Current	4N2X	$I_{CEO}$	$V_{CE}=10\text{V}, I_F=0\text{mA}$	---	---	50	nA	
		4N3X			$V_{CE}=60\text{V}, I_F=0\text{mA}$	---	---		50
	Collector-Emitter attenuation Voltage		$BV_{CEO}$	$I_C=1\text{mA}$	80	---	---	V	
	Collector-Base breakdown voltage		$BV_{CBO}$	$I_C=0.1\text{mA}$	80				
	Emitter-Collector attenuation Voltage		$BV_{ECO}$	$I_E=0.1\text{mA}$	7	---	---	V	
	Emitter-Base breakdown voltage		$BV_{EBO}$	$I_E=0.1\text{mA}$	7				
Transforming Characteristics	Current Transfer ratio	4N35, 4N36, 4N37	CTR	$I_F=10\text{mA}$ $V_{CE}=10\text{V}$	100	---	---	%	
		4N25, 4N26, 4N38			20	---	---		
		4N27, 4N28			10	---	---		
	Collector and Emitter Saturation Voltage	4N25, 4N26, 4N27, 4N28	$V_{CE(sat)}$	$I_F=50\text{mA}$ $I_C=2\text{mA}$	---	---	0.5	V	
		4N35, 4N36, 4N37			$I_F=10\text{mA}, I_C=0.5\text{mA}$	---	---		0.3
		4N38			$I_F=20\text{mA}, I_C=4\text{mA}$	---	---		1.0
	Isolation resistance		$R_{iso}$	DC500V 40~60%R.H.	$10^{11}$	---	---	$\Omega$	
	Floating Capacitance		$C_f$	$V=0, f=1\text{MHz}$	---	0.2	---	pF	
	Response Time		$t_r$	$V_{CC}=10\text{V}, I_C=10\text{mA}$ $R_L=100\Omega$	---	3	10	$\mu\text{s}$	
	Descend Time		$t_f$		---	6	10	$\mu\text{s}$	

- Current Conversion Ratio =  $I_C / I_F \times 100\%$



## 6. Order Information

Part Number

# OR-4NXX-Y-Z

### Note

XX = Part Number for 4NXX series(25,26,27,28,35,36,37 or 38).

Y = Lead form option (S, M or None)

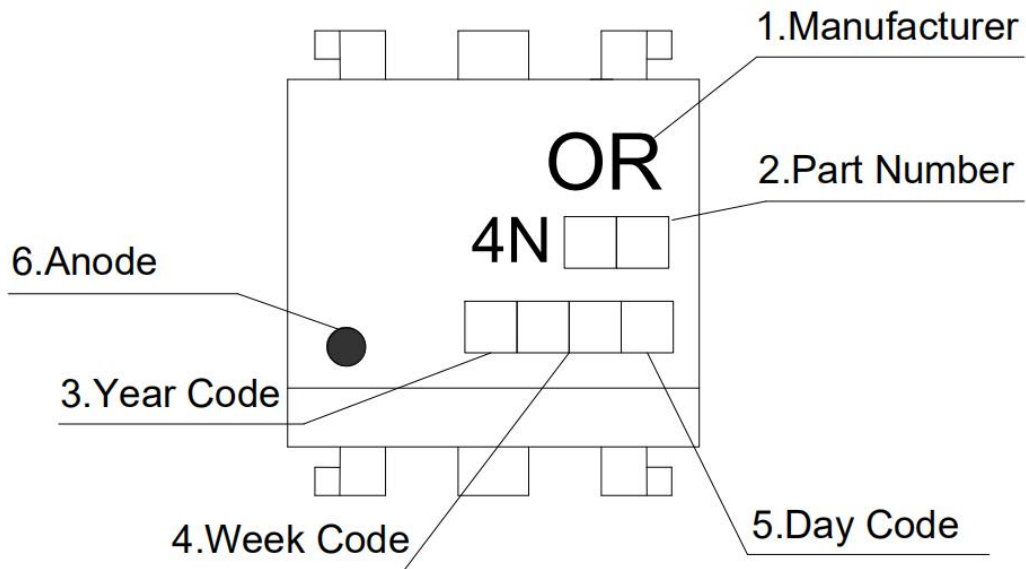
Z = Tape and reel option (TA,TA1 or none).

\* Halogen Free can be selected.

\* VDE Code can be selected.

Option	Description	Packing quantity
None	Standard DIP-6	66 units per tube
M	Wide lead bend (0.4 inch spacing)	66 units per tube
S(TA)	Surface mount lead form (low profile) + TA tape & reel option	1000 units per reel
S(TA1)	Surface mount lead form (low profile) + TA1 tape & reel option	1000 units per reel

## 7. Naming Rule



1. ORIENT.

2. 4NXX denotes Device Part Number.

3.  denotes Year code.

4.  denotes Week code.

5.  denotes Day code.

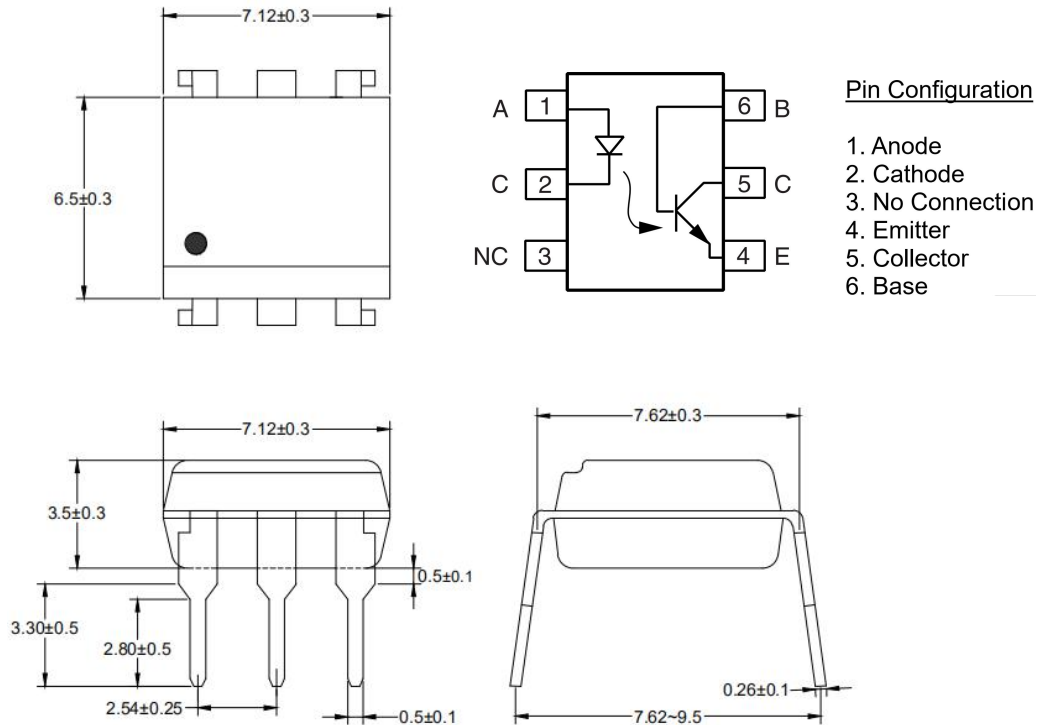
6. Anode.

\* If the photo coupler is Free from Halogen, there will be a ' G ' mark in the upper left corner.

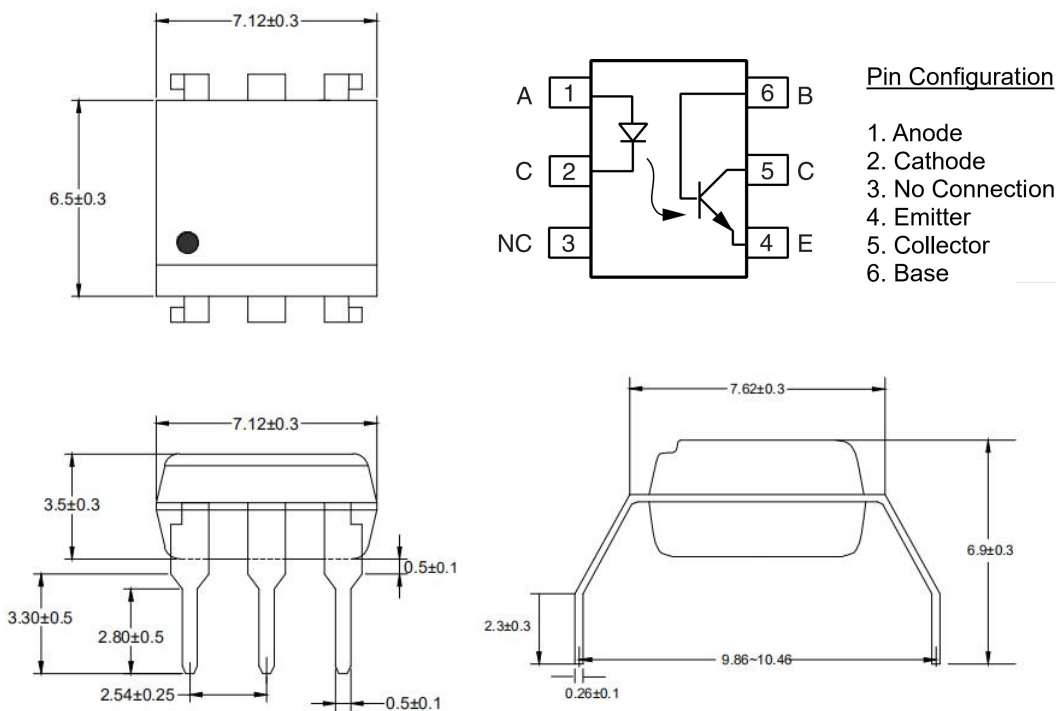
\* VDE Code can be selected.

## 8. Outer Dimension

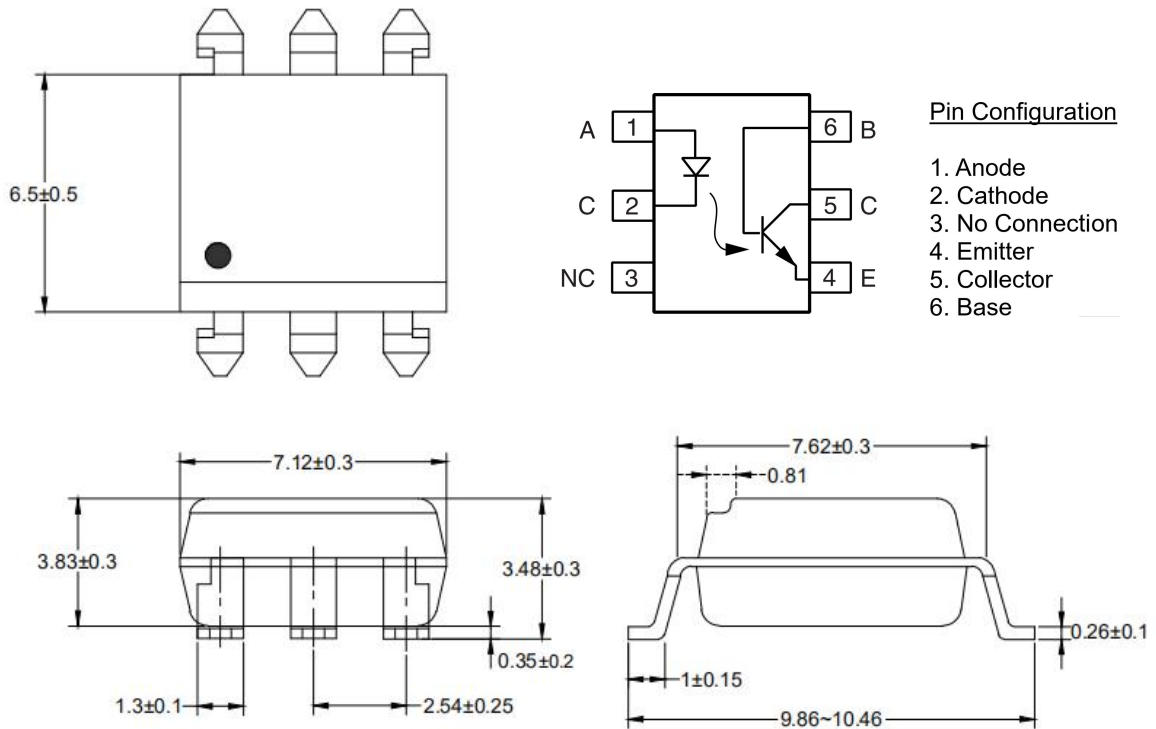
### (1) OR-4NXX



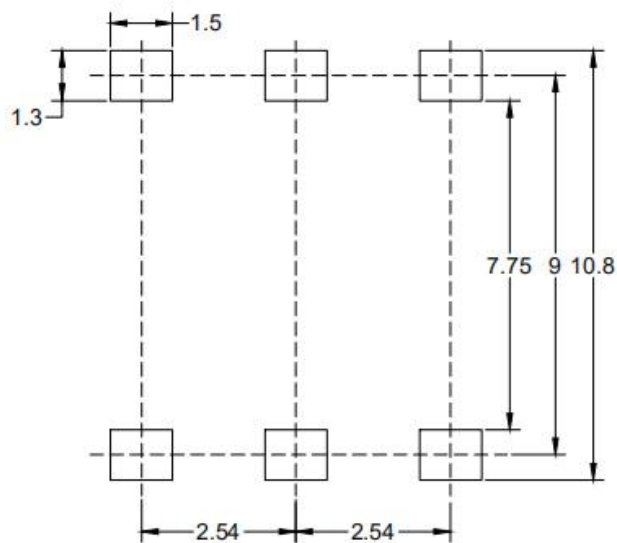
### (2) OR-4NXXM



(3) OR-4NXXS



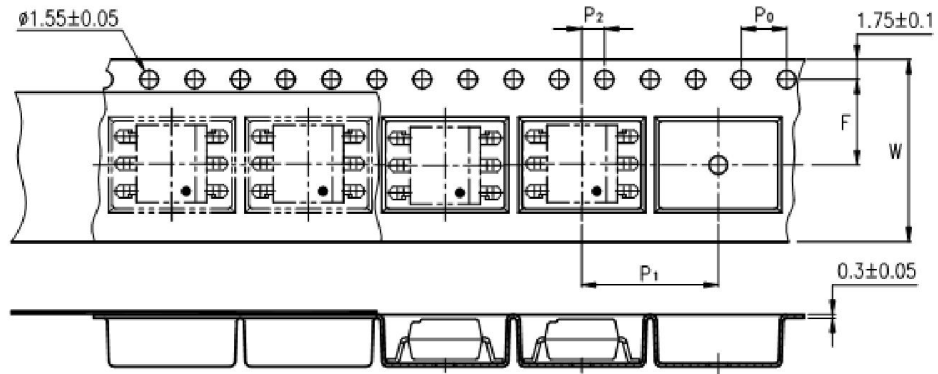
9. Recommended Foot Print Patterns (Mount Pad)



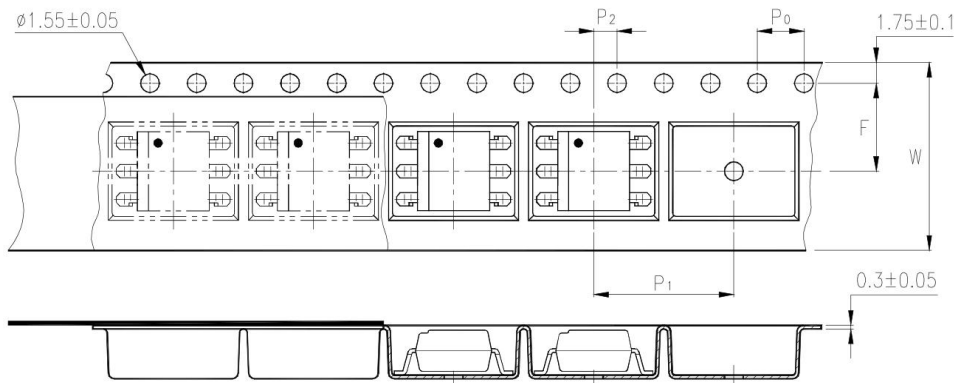
unit: mm

## 10. Taping Dimensions

### (1) OR-4NXXS-TA



### (2) OR-4NXXS-TA1



Description	Symbol	Dimension in mm(inch)
Tape wide	W	$16 \pm 0.3$ (0.63)
Pitch of sprocket holes	P0	$4 \pm 0.1$ (0.15)
Distance of compartment	F	$7.5 \pm 0.1$ (0.295)
	P2	$2 \pm 0.1$ (0.079)
Distance of compartment to compartment	P1	$12 \pm 0.1$ (0.472)

Package Type	TATA1
Quantities(pcs)	1000



## 11. Package Dimension

### (1) package dimension

DIP/M type

Packing Information	
Packing type	Tube(Plug)
Qty per Tube	66
Small box (inner) Dimenaion	525*132*60mm
Max qty per small box	3300
Large box (Outer) Dimenaion	530*290*335mm
Max qty per large box	26400

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.

## 12. Reliability Test

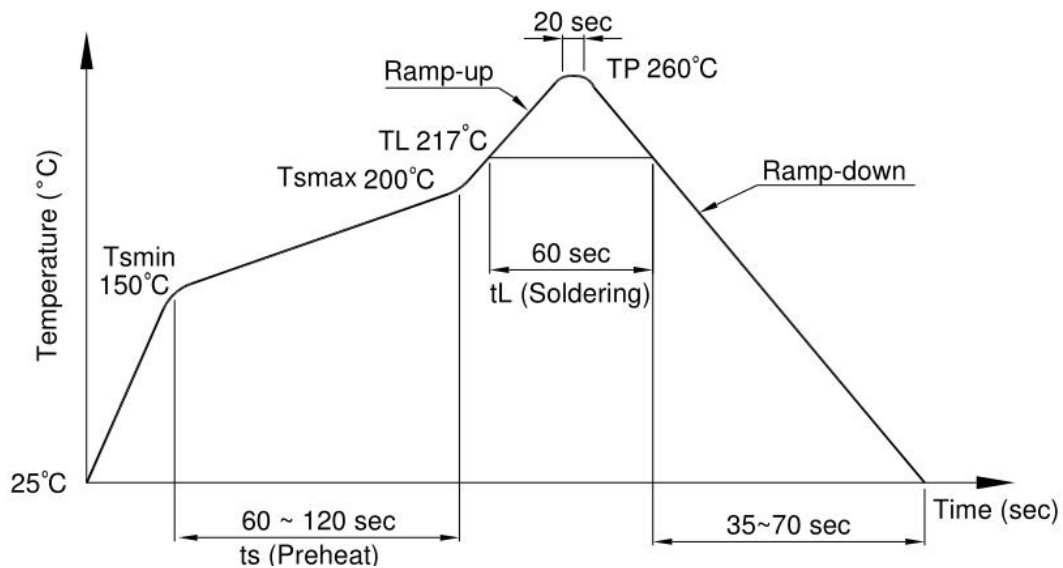
N0.	Item	Condition	Quantity	Cycle	Reference Standards
1	RSH, Resistance to Solder Heat	260±5°C, 10s/cycle	22	3cycles	JESC22A-106
2	SD, Solderability	260±5°C, 2-3s/cycle	22	1cycle	JESD22-B102
3	TC, Temperature Cycle	H: 125°C 15min ∫ 5min L: -55°C 15min	77	300cycles	JESC22A-104
4	TS, Thermal Shock	H:100°C 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	1cycle	JESD22-A114

### 13. Temperature Profile Of Soldering

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

One time soldering reflow is recommended within the condition of temperature and time profile shown below. Do not solder more than three times.

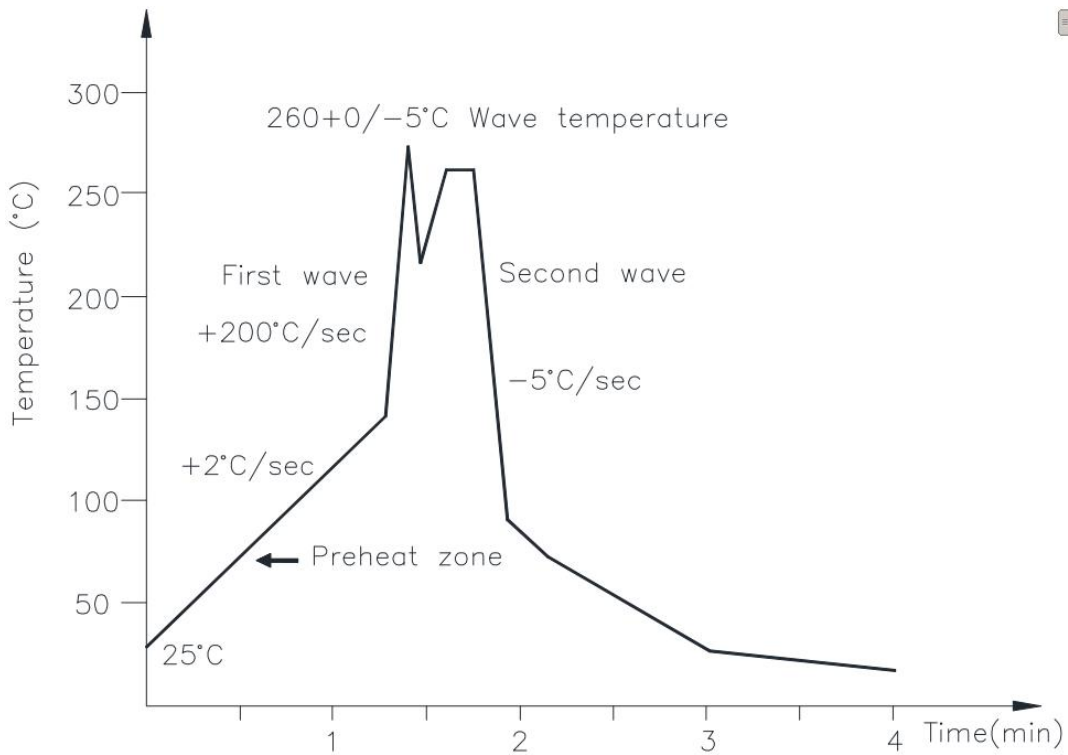
Profile item	Conditions
Preheat	
- Temperature Min (T Smin )	150°C
- Temperature Max (T Smax )	200°C
- Time (min to max) (ts)	90±30 sec
Soldering zone	
- Temperature (TL )	217°C
- Time (t L )	60 sec
Peak Temperature	260°C
Ramp-up rate	3°C / sec max.
3°C / sec max.	3~6°C / sec



(2) Wave soldering (JEDEC22A111 compliant)

One time soldering is recommended within the condition of temperature.

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

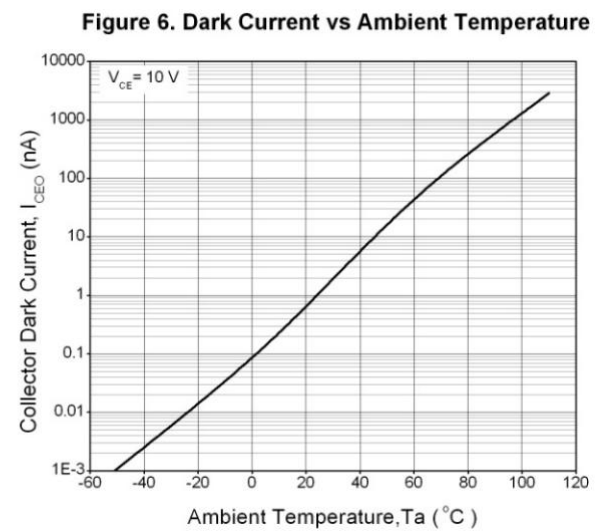
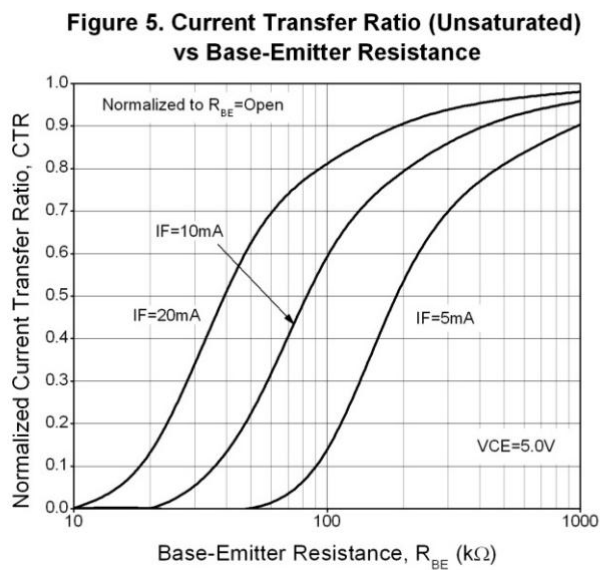
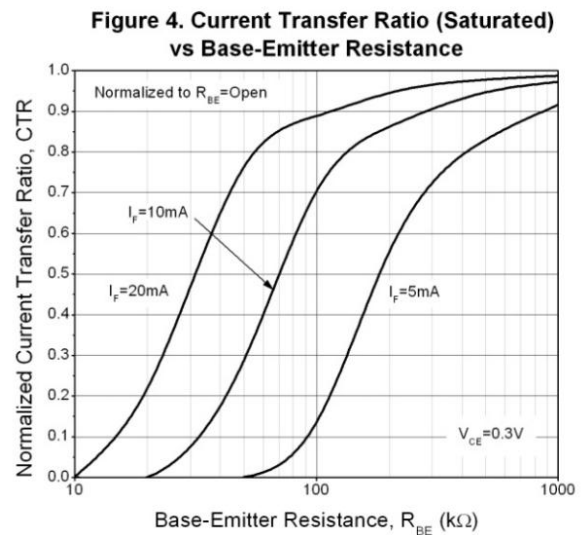
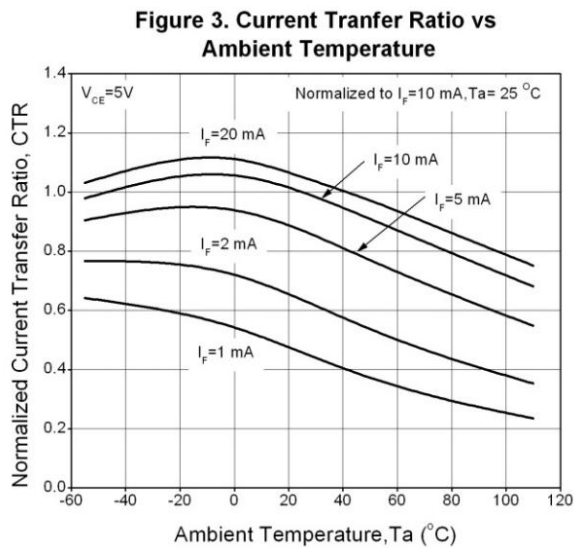
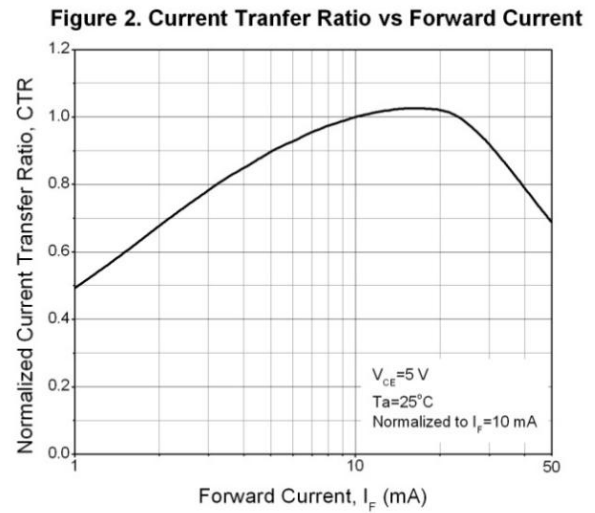
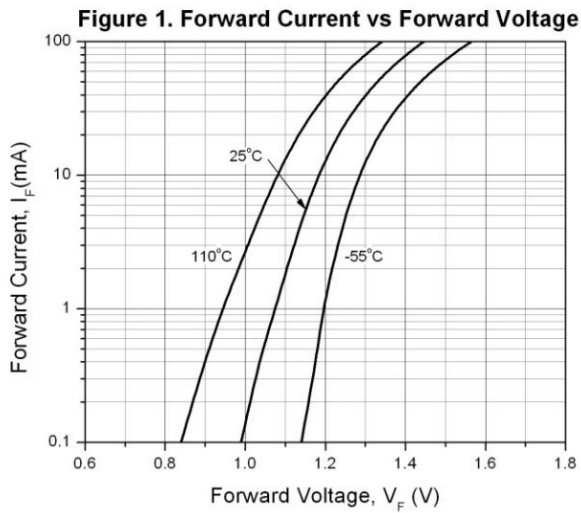


(3) Hand soldering by soldering iron

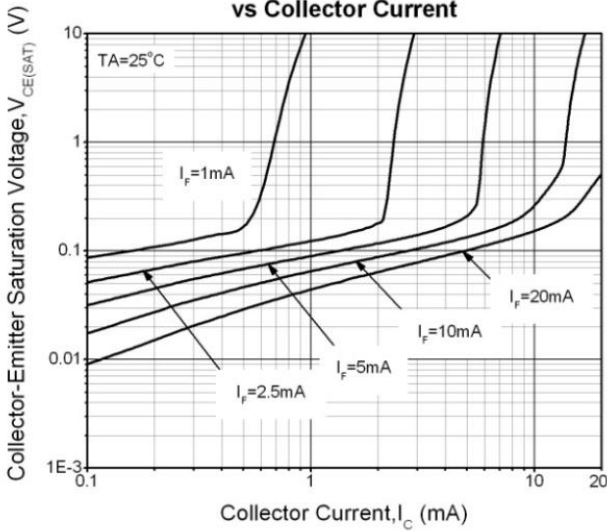
Allow single lead soldering in every single process. One time soldering is recommended.

Temperature	380+0/-5°C
Time	3 sec max

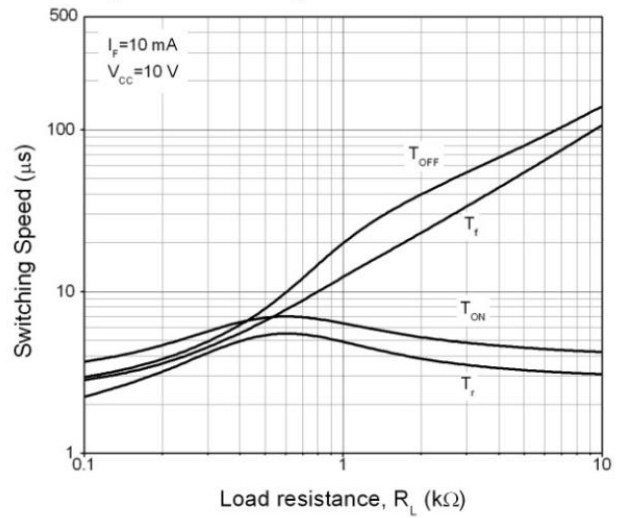
### 14. Characteristics Curve



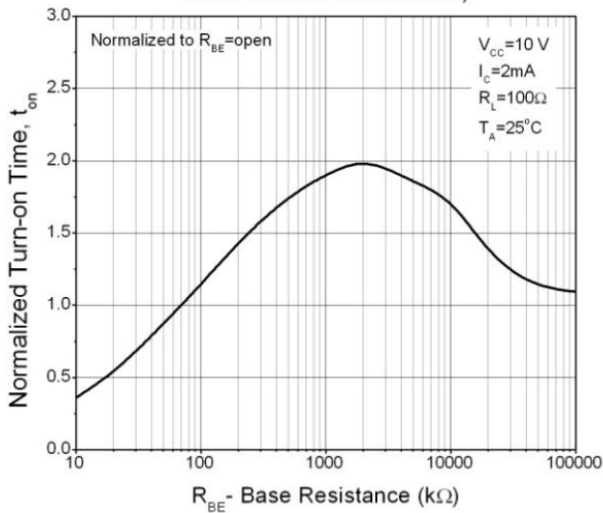
**Figure 7. Collector-Emitter Saturation Voltage vs Collector Current**



**Figure 8. Switching Time vs Load Resistance**



**Figure 9. Turn-on Time vs Base-Emitter Resistance**



**Figure 10. Turn-off Time vs Base-Emitter Resistance**

