



# 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

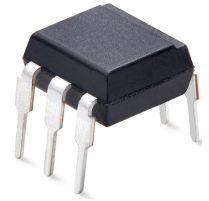
TEL: 0755-29681816

FAX: 0755-29681200

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

### 1. Features

- (1) 4N2X series: 4N25, 4N26, 4N27, 4N28; 4N3X series: 4N35, 4N36, 4N37, 4N38
- (2) High isolation voltage between input and output (Viso=5000 V rms)
- (3) Creepage distance >7.62 mm
- (4) Operating temperature up to +115°C
- (5) Compact dual-in-line package
- (6) Safety approval



UL approved(No.E323844)

VDE approved(No.40029733)

CQC approved (No.CQC19001231480 )

- (7) In compliance with RoHS, REACH standards.
- (8) MSL Class I

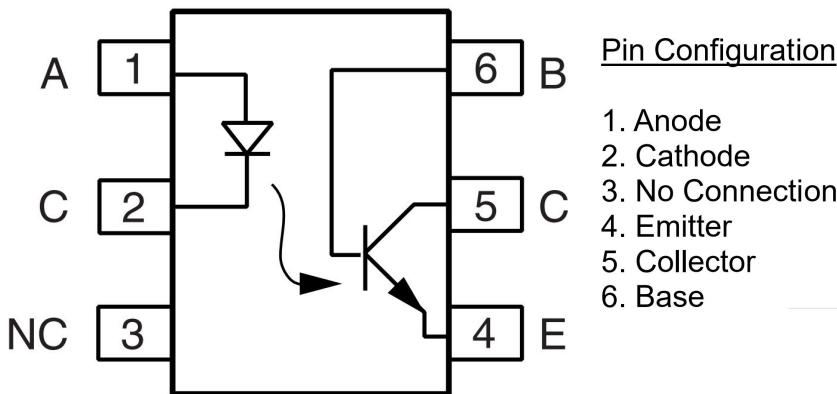
### 2. Instructions

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

- (1) Power supply regulators
- (2) Digital logic inputs
- (3) Microprocessor inputs

### 4. Functional Diagram



**5. 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	mW
			3.8	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	mW
			9.0	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.

## 6. Opto-electronic Characteristics

Parameter		Symbol	Min	Typ.*	Max	Unit	Condition	
Input	Forward Voltage	$V_F$	---	1.2	1.5	V	$I_F=10\text{mA}$	
	Reverse Current	$I_R$	---	---	10	$\mu\text{A}$	$V_R=6\text{V}$	
	Collector capacitance	$C_{in}$	---	30	---	pF	$V=0, f=1\text{MHz}$	
Output	Collector-Base dark current		$I_{CBO}$	---	---	20	nA	$V_{CB}=10\text{V}$
	Collector to emitter Current	4N2X	$I_{CEO}$	---	---	50	nA	$V_{CE}=10\text{V}, I_F=0\text{mA}$
		4N3X		---	---	50		$V_{CE}=60\text{V}, I_F=0\text{mA}$
	Collector-Emitter attenuation Voltage		$BV_{CEO}$	80	---	---	V	$I_C=1\text{mA}$
	Collector-Base breakdown voltage		$BV_{CBO}$	80				$I_C=0.1\text{mA}$
	Emitter-Collector attenuation Voltage		$BV_{ECO}$	7	---	---	V	$I_E=0.1\text{mA}$
	Emitter-Base breakdown voltage		$BV_{EBO}$	7				$I_E=0.1\text{mA}$
Transforming Characteristics	Current Transfer ratio	4N35, 4N36, 4N37	CTR	100	---	---	%	$I_F=10\text{mA}$ $V_{CE}=10\text{V}$
		4N25, 4N26, 4N38		20	---	---		
		4N27, 4N28		10	---	---		
	Collector and Emitter Saturation Voltage	4N25, 4N26, 4N27, 4N28	$V_{CE(sat)}$	---	---	0.5	V	$I_F=50\text{mA}$ $I_C=2\text{mA}$
		4N35, 4N36, 4N37		---	---	0.3		$I_F=10\text{mA},$ $I_C=0.5\text{mA}$
		4N38		---	---	1.0		$I_F=20\text{mA},$ $I_C=4\text{mA}$
	Isolation resistance		$R_{iso}$	$10^{11}$	---	---	$\Omega$	DC500V 40~60%R.H.
	Floating Capacitance		$C_f$	---	0.2	---	pF	$V=0, f=1\text{MHz}$
	Response Time		$t_r$	---	3	10	$\mu\text{s}$	$V_{CC}=10\text{V}, I_C=10\text{mA}$ $R_L=100\Omega$
Descend Time		$t_f$	---	6	10	$\mu\text{s}$		

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



## 7. Order Information

### Part Number

# OR-4NXXU-Y-Z

### Note

4NXX = Part Number, 4N25,4N26,4N27,4N28,4N35,4N36,4N37 or 4N38.

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

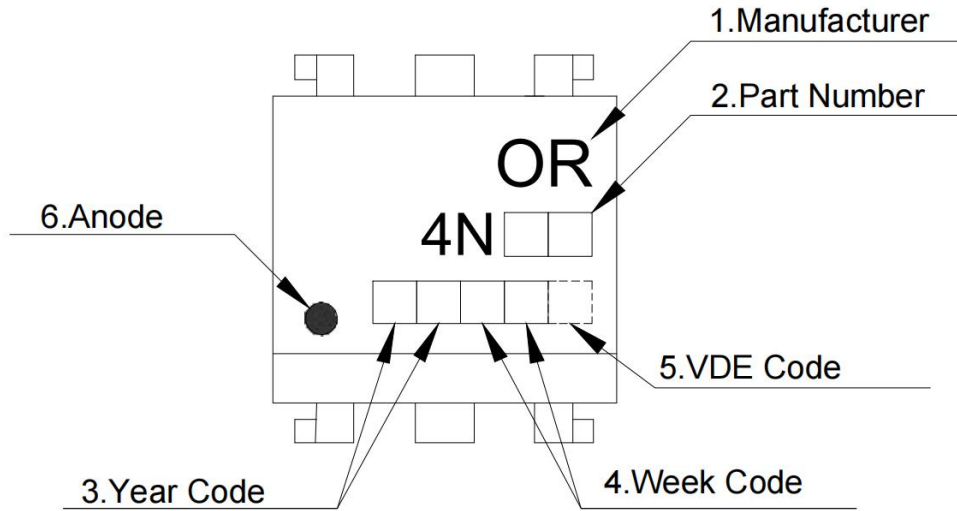
Y = Tape and reel option (TA,TA1 or none).

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

\* 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

## 8. Naming Rule



1. Manufacturer : ORIENT.

2. Part Number : 4N25,4N26,4N27,4N28,4N35,4N36,4N37 or 4N38.

3. Year Code   : '21' means '2021' and so on.

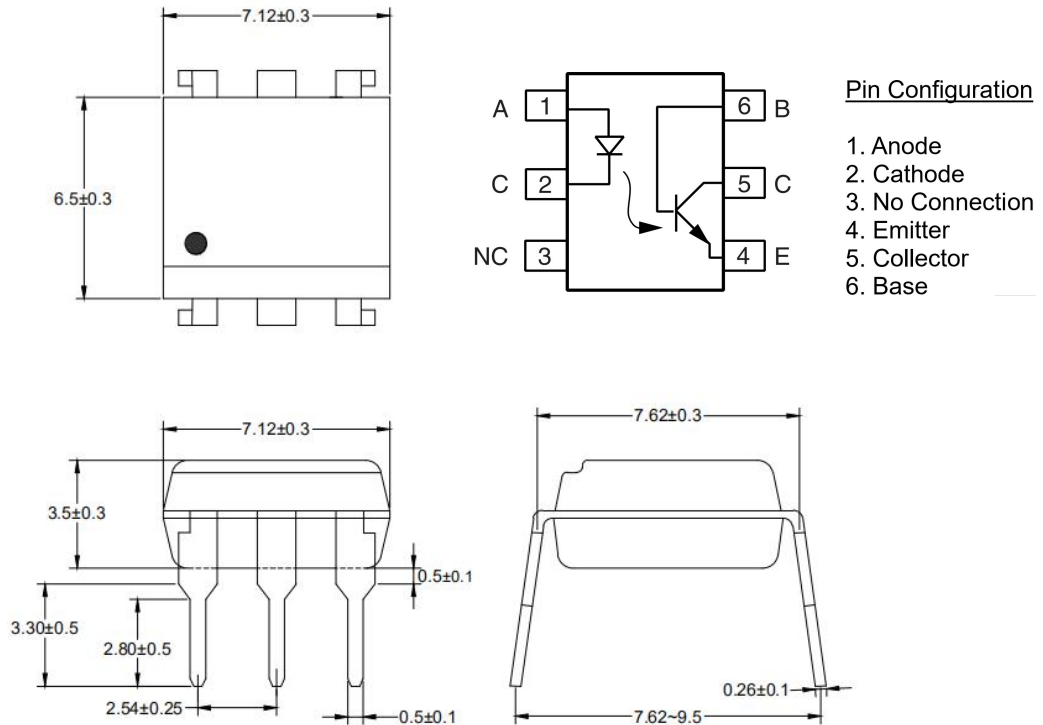
4. Week Code   : 01 means the first week, 02 means the second week and so on.

5. VDE Code  . (Optional)

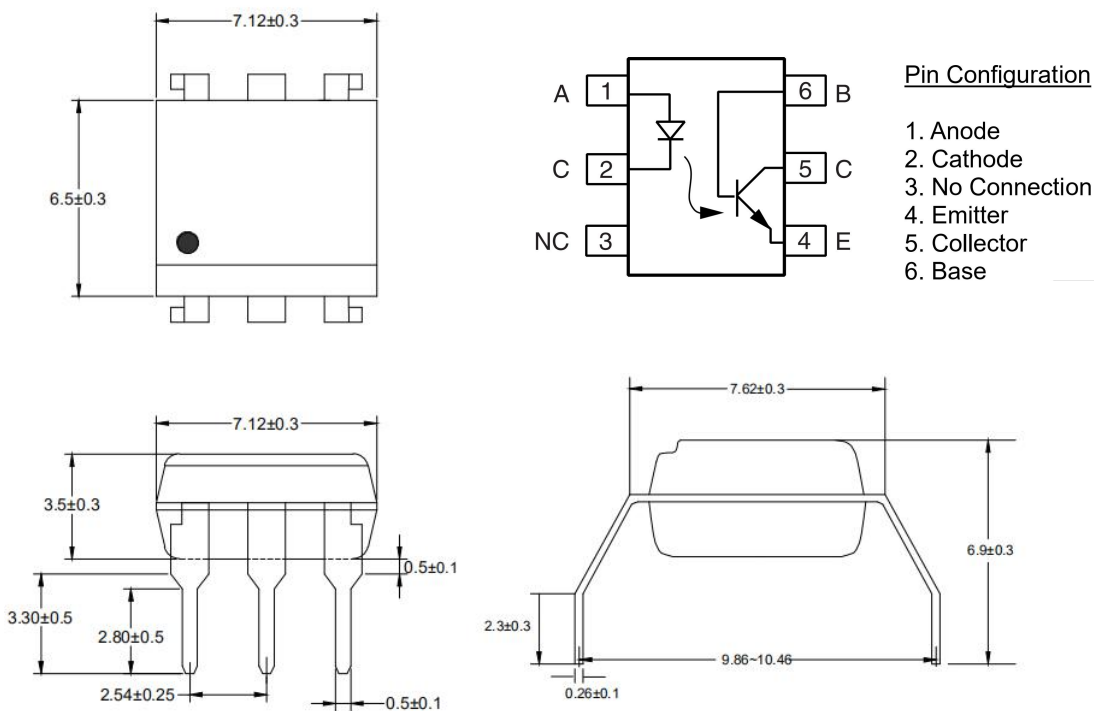
6. Anode.

## 9. Outer Dimension

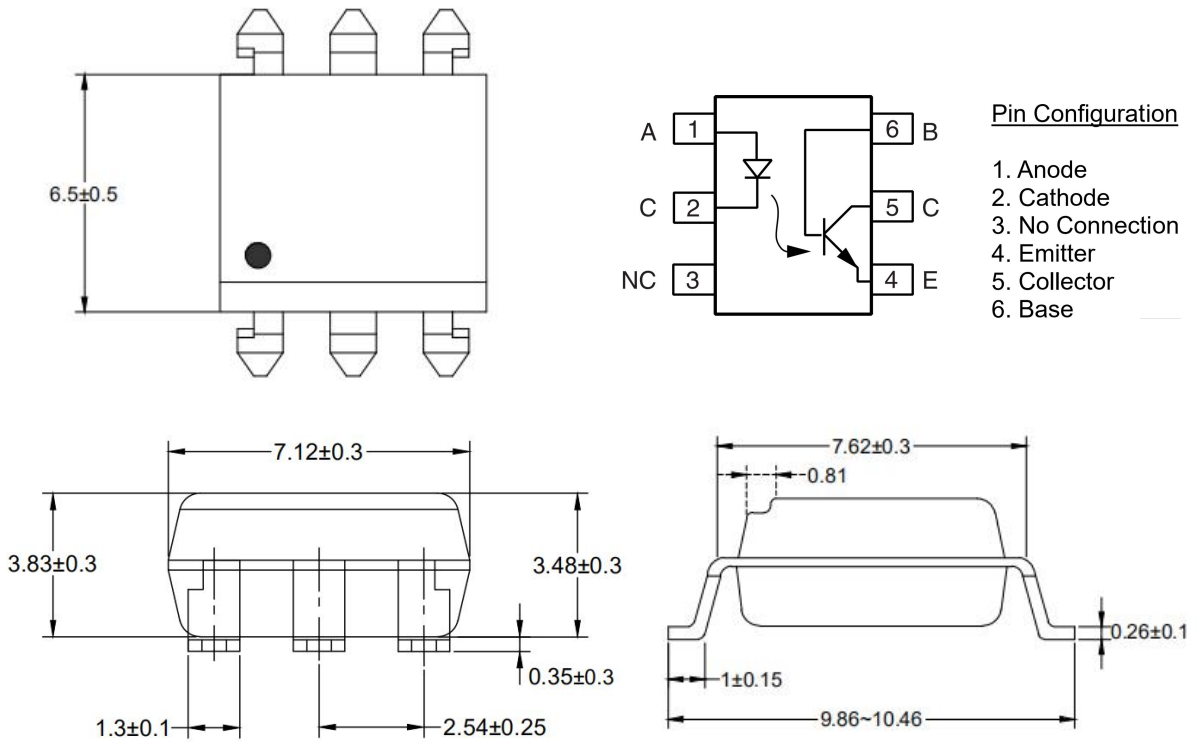
### (1) OR-4NXX



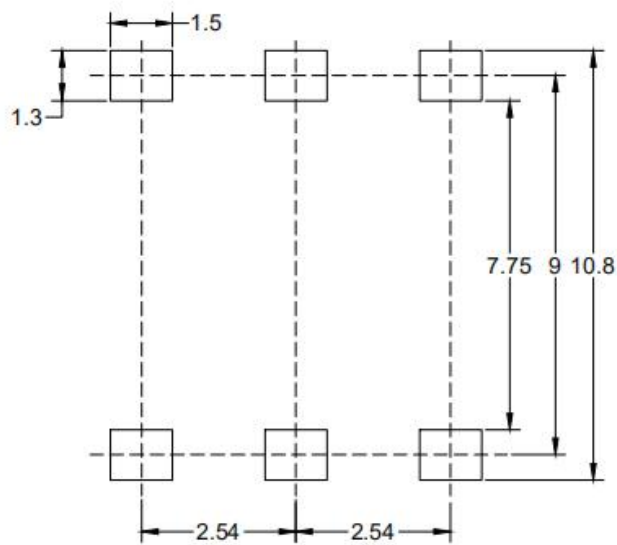
### (2) OR-4NXXM



(3) OR-4NXXS



10. Recommended Foot Print Patterns (Mount Pad)

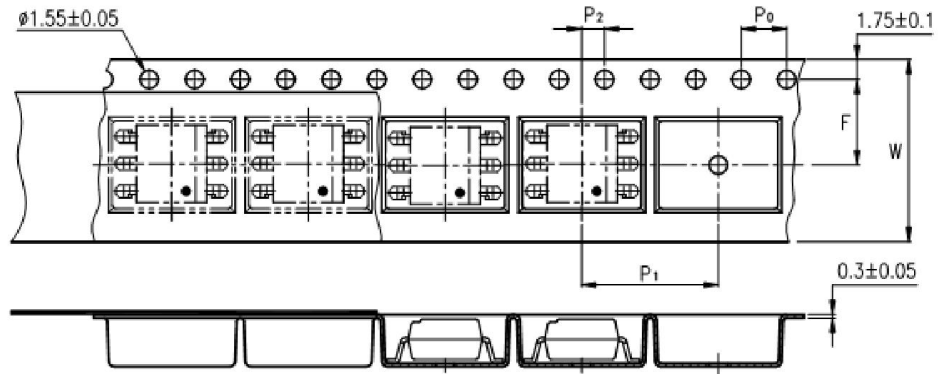


unit: mm

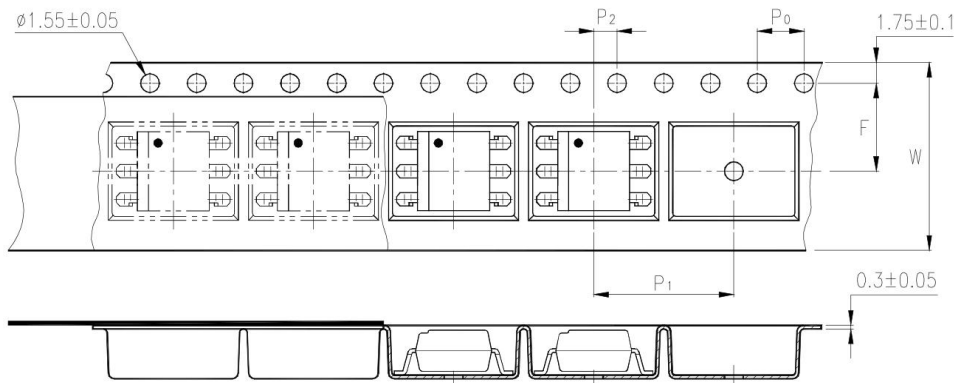


### 11. Taping Dimensions

(1) OR-4NXXS-TA



(2) OR-4NXXS-TA1



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

Package Type	TA/TA1
Quantities(pcs)	1000

## 12. Package Dimension

### (1) package dimension

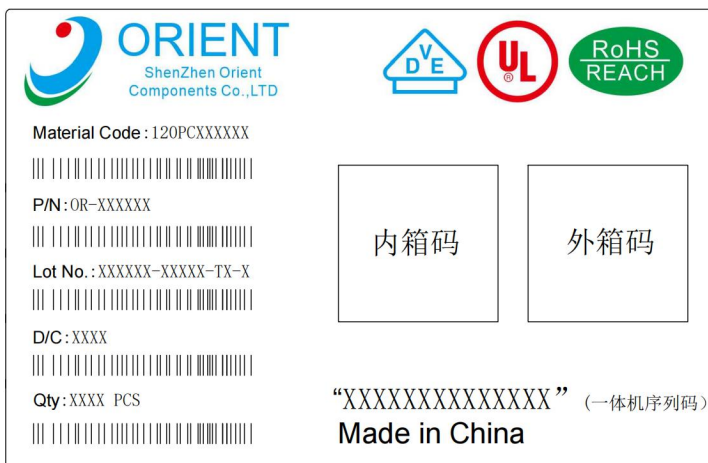
DIP/M type

Packing Information	
Packing type	Tube
Qty per Tube	66pcs
Small box (Inner) Dimension	525*128*60mm
Large box (Outer) Dimension	545*290*335mm
The Amount per Inner Box	3,300pcs
The Amount per Outer Box	33,000pcs

SOP type

Packing Information	
Packing type	Reel type
Tape Width	16mm
Qty per Reel	1,000pcs
Small box (inner) Dimension	345*345*58.5mm
Large box (Outer) Dimension	620x360x360mm
Max qty per small box	2,000pcs
Max qty per large box	20,000pcs

### (2)Packing Label Sample



The label sample includes the ORIENT logo, VDE, UL, and RoHS REACH certification marks. It features a barcode and the following text: Material Code : 120PCXXXXXX, P/N: OR-XXXXXX, Lot No. : XXXXXX-XXXXX-TX-X, D/C: XXXX, Qty: XXXX PCS, and a placeholder for the body sequence code: "XXXXXXXXXXXXXXXXXX" (一体机序列码). The label also indicates "Made in China" and contains two boxes labeled "内箱码" (Inner Box Code) and "外箱码" (Outer Box Code).

#### Note:

1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product data.
4. D/C :Product weeks.
5. Quantity :Packaging quantity.

### 13. Reliability Test

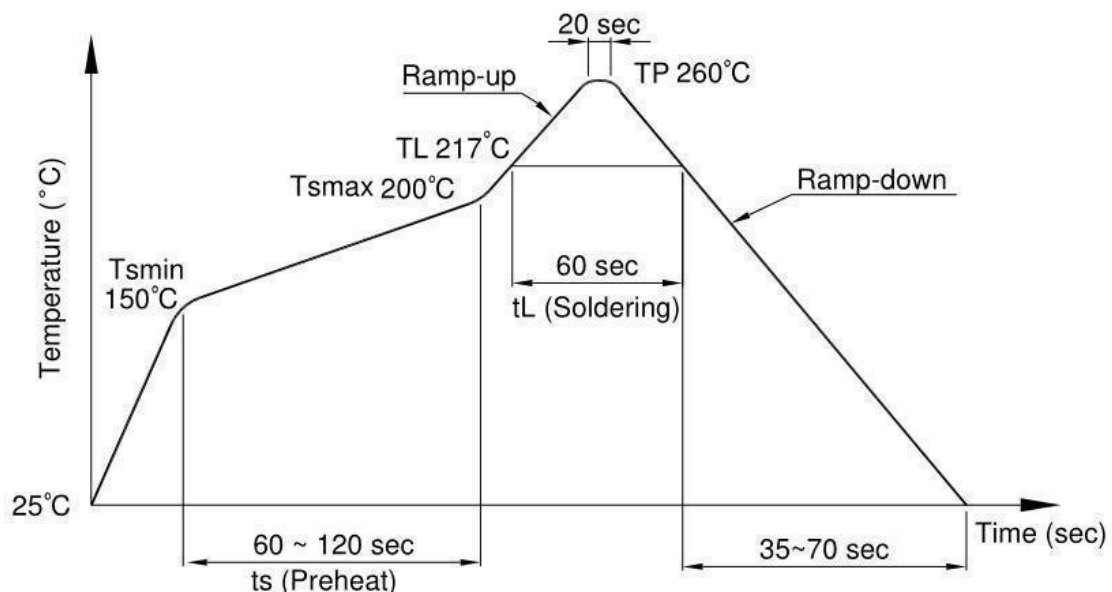
NO.	ITEMS	Reliability Testing				
		QTY (Pcs)	Condition	Process	Device	Standard
1	RSH 耐焊接热	22	260±5℃	10s/3 次	锡炉	JESD22-A106
2	HTSL 高温存储	77	125℃	168 hrs	高温烤箱 测试仪	JESD22-A103
				500 hrs		
				1000 hrs		
3	LTSL 低温存储	77	-55℃	168 hrs	低温箱 测试仪	JESD22-A119
				500 hrs		
				1000 hrs		
4	TC 温度循环	77	H:125℃ 15min ∫ 5min L:-55℃ 15min	300 cycle	冷热冲击 机	JESD22-A104
5	TS 温度冲击	77	H:100℃ 5min ∫ 15s L:-40℃ 5min	300 cycle	冷热冲击 机	JESD22-A106
6	HTOL 高温操作	77	110℃ IF=10mA Vce=5V	168 hrs	高温烤箱 测试仪、老 化电路板	JESD22-A108
				500 hrs		
				1000 hrs		
7	ESD-HBM 人体模式	22	≥8KV 1Cycle	1 次	ESD 静电测 试仪	JESD22-A114
8	SD 可焊性	22	Pb-free 245±5℃	5S/1 次	锡炉	JESD22-B102
9	HTRB 高温反向偏压	77	HTRB @125℃ Vce=80v	168 hrs	高温烤箱 , 测试仪	JESD22-A103
				500 hrs		
				1000 hrs		
10	H3TRB 温湿度反向偏 压, 寿命试验	77	H3TRB 85℃,85%RH Vce=80v	168 hrs	恒温恒湿机, 测试仪	JESD22-A101
				500 hrs		
				1000 hrs		
11	Autoclave 压力锅	77	Ta=121 ℃,100%RH,2atm	96hrs	压力锅	JESD22-A102

## 14. 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.

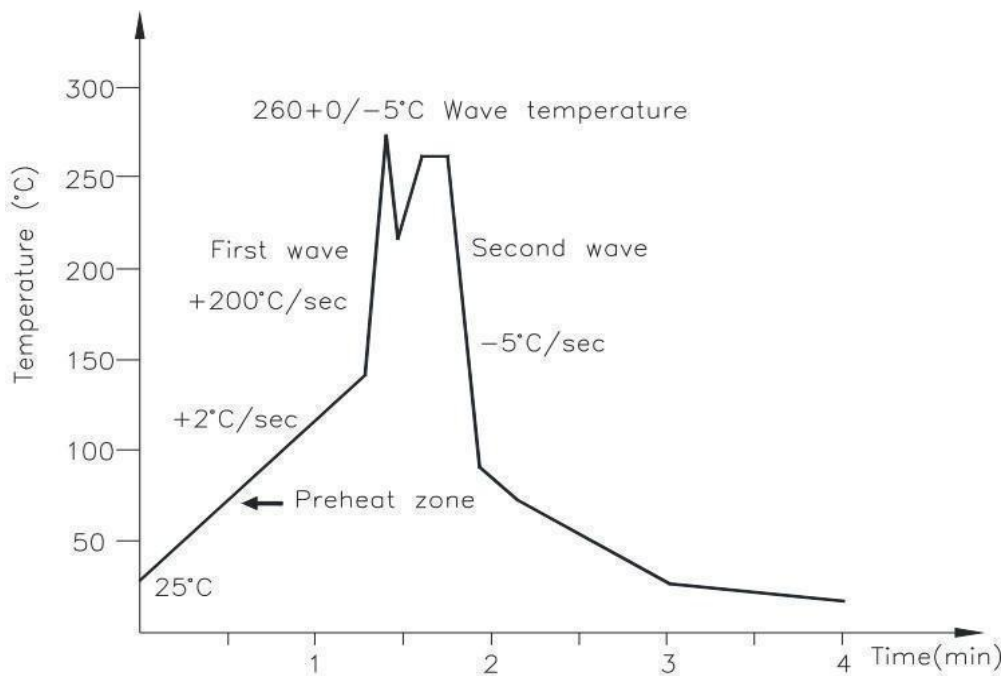
Profile item	Conditions
Preheat	
- Temperature Min (T Smin )	150°C
- Temperature Max (T Smax )	200°C
- Time (min to max) (ts)	90±30 sec
Soldering zone	
- Temperature (TL )	217°C
- Time (t L)	60 sec
Peak Temperature	260°C
Peak Temperature time	20 sec
Ramp-up rate	3°C / sec max.
Ramp-down rate from peak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



**(2) Wave soldering (JEDEC22A111 compliant)**

One time soldering is recommended within the condition of temperature.

Temperature	260+0/-5°C
Time	10 sec
Preheat temperature	25 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

### 15. Characteristics Curve

Figure 1. Forward Current vs Forward Voltage

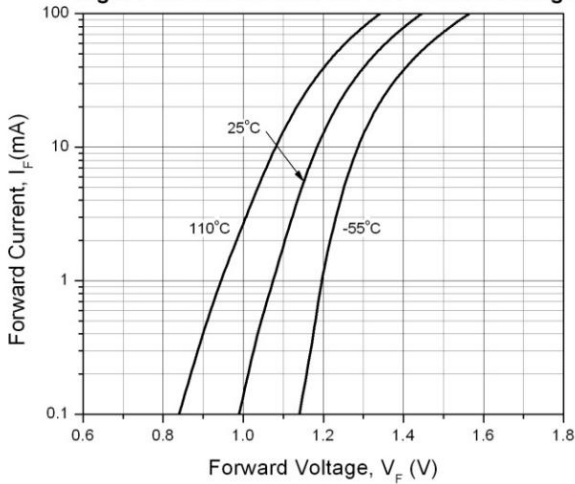


Figure 2. Current Transfer Ratio vs Forward Current

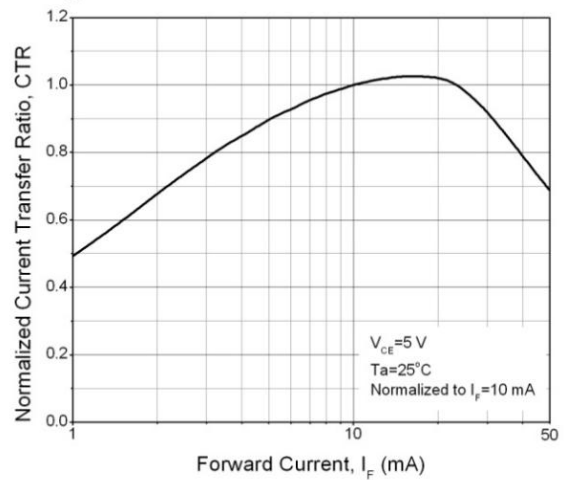


Figure 3. Current Transfer Ratio vs Ambient Temperature

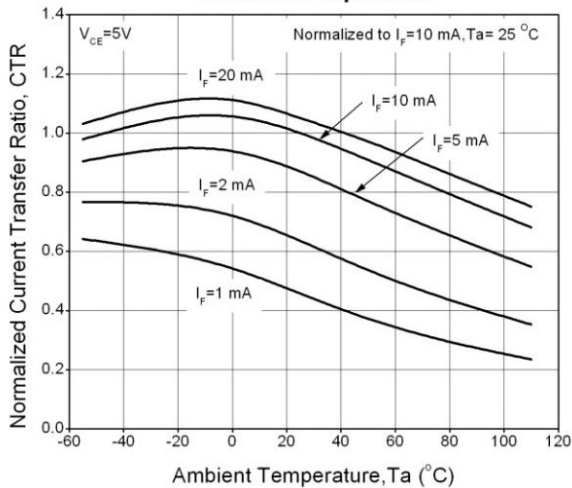


Figure 4. Current Transfer Ratio (Saturated) vs Base-Emitter Resistance

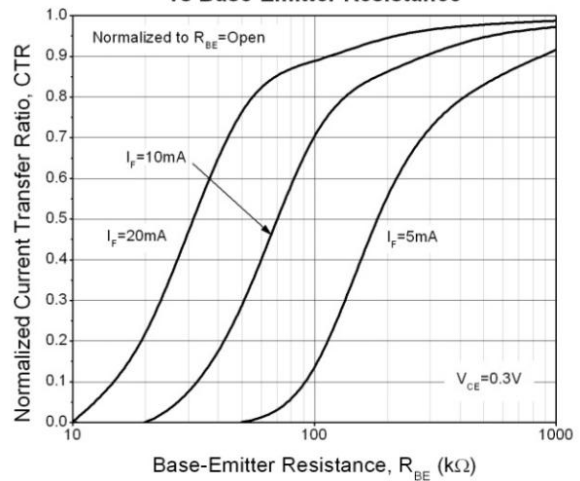


Figure 5. Current Transfer Ratio (Unsaturated) vs Base-Emitter Resistance

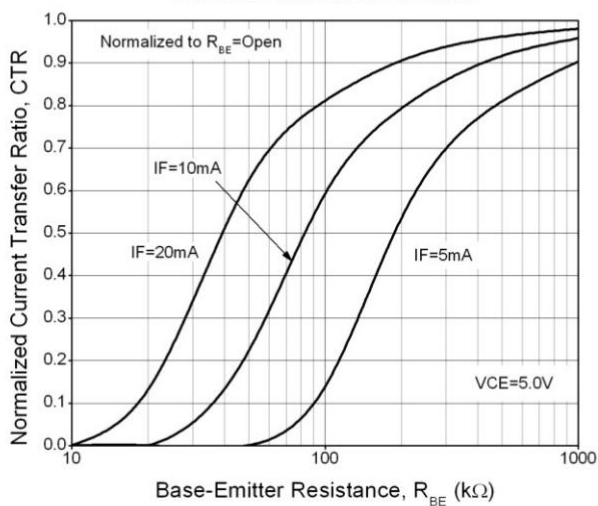
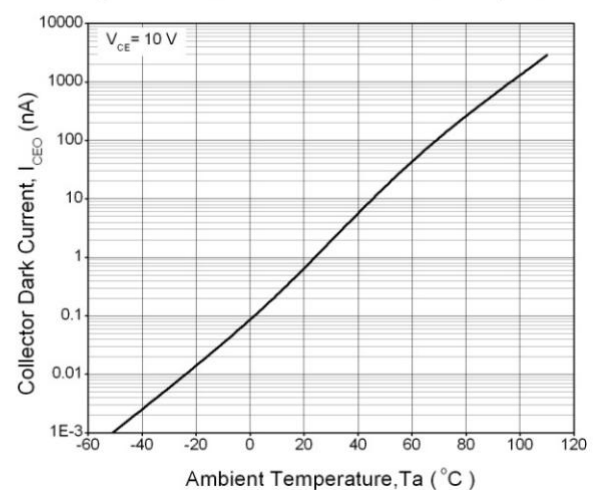
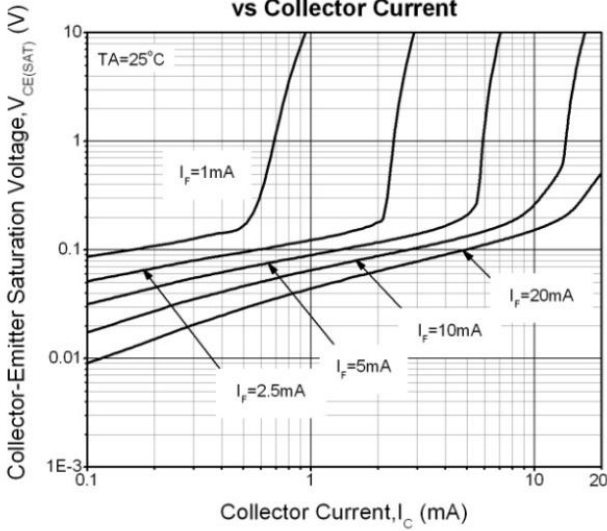


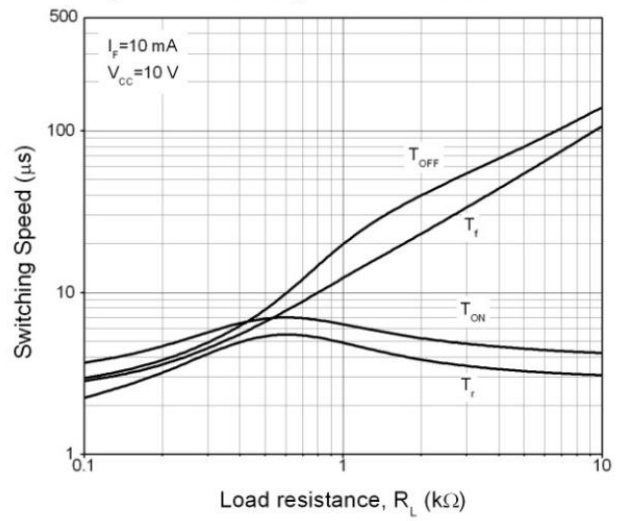
Figure 6. Dark Current vs Ambient Temperature



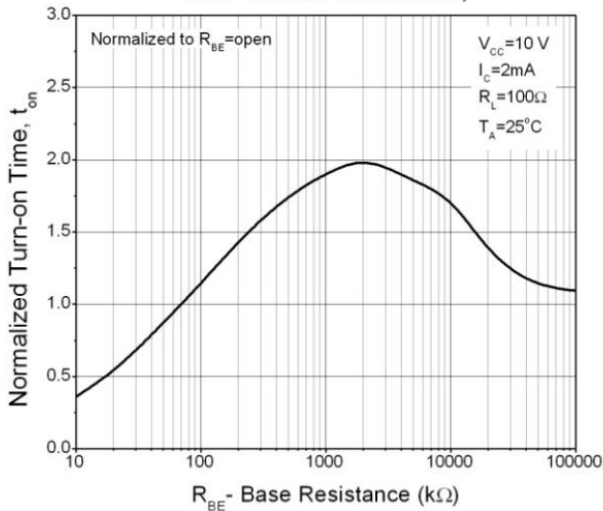
**Figure 7. Collector-Emitter Saturation Voltage vs Collector Current**



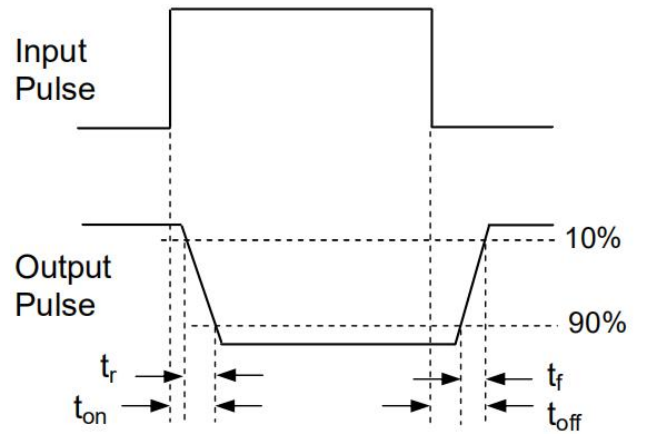
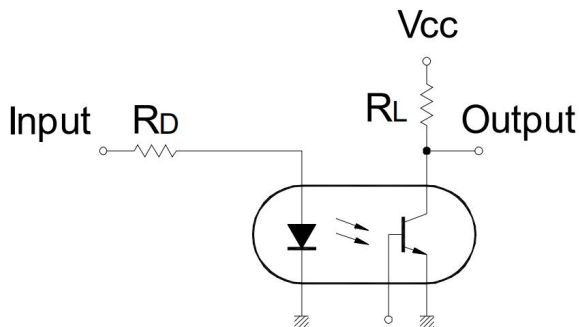
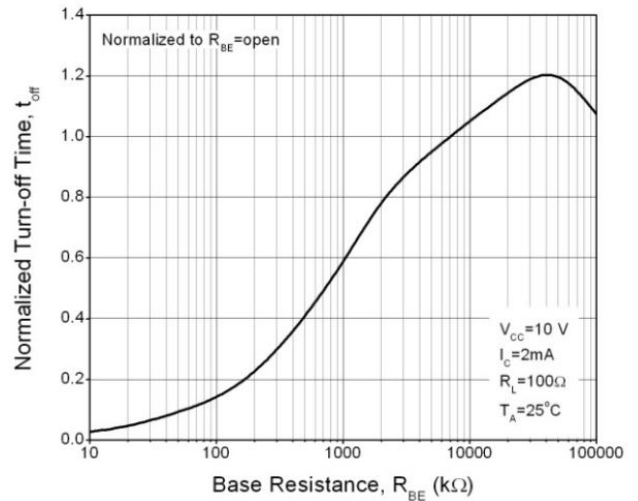
**Figure 8. Switching Time vs Load Resistance**



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



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





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