



ORIENT

Photo coupler

Product Data Sheet

Part Number: OR-4NXX_OR-TIL113

Customer: _____

Date: _____

SHENZHEN ORIENT COMPONENTS CO., LTD

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1. Features

(1) 4NXX series: 4N29, 4N30, 4N31, 4N32, 4N33

TIL113 series: TIL113.

(2) High isolation voltage between input and output ($V_{iso}=5000\text{ V rms}$)

(3) Creepage distance $>7.62\text{ mm}$

(4) Operating temperature up to $+115^{\circ}\text{C}$

(5) Compact dual-in-line package

(6) Safety approval

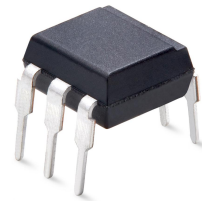
UL approved(No.E323844)

VDE approved(No.40029733)

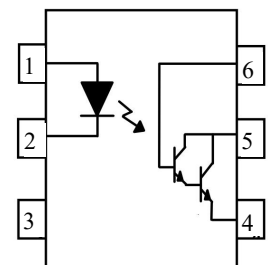
CQC approved (No.CQC19001231480)

(7) In compliance with RoHS, REACH standards.

(8) MSL Class I



Schematic



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

2. Instructions

The TIL113, 4NXX series of devices each consist of an infrared emitting diode optically coupled to a darlington detector. They are packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.

3. Application Range

(1) Low power logic circuits

(2) Telecommunications equipment

(3) Portable electronics

(4) Interfacing coupling systems of different potentials and impedances

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°C)	P_D	120 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°C)	P_C	150 6.5	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) Current when testing insulation voltage.
- (3) Adding sine wave voltage when testing

*2. soldering time is 10 seconds.

5. 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	μA	$V_R=6\text{V}$	
	Collector capacitance	C_{in}	---	50	---	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	I_{CEO}	---	---	100	nA	$V_{CE}=10\text{V}, I_F=0\text{mA}$	
	Collector-Emitter attenuation Voltage	BV_{CEO}	55	---	---	V	$I_C=1\text{mA}$	
	Collector-Base breakdown Voltage	BV_{CBO}	55	---	---	V	$I_C=0.1\text{mA}$	
	Emitter-Collector attenuation Voltage	BV_{ECO}	7	---	---	V	$I_E=0.1\text{mA}$	
Transforming Characteristics	Current Transfer ratio	4N32,4N33	CTR	500	---	---	%	$I_F=10\text{mA}$ $V_{CE}=10\text{V}$
		4N29,4N30		100	---	---		
		4N31		50	---	---		
		TIL113		300	---	---		
	Collector and Emitter Saturation Voltage	4N29, 4N30, 4N32, 4N33	$V_{CE(sat)}$	---	---	1.0	V	$I_F=8\text{mA}$ $I_C=2\text{mA}$
		4N31, TIL113		---	---	1.2		
	Isolation Resistance		R_{iso}	10^{11}	---	---	Ω	DC500V 40~60%R.H.
	Input-output Capacitance		C_{io}	---	0.8	---	pF	$V_{io}=0, f=1\text{MHz}$
	Response Time		t_r	---	3	10	μs	$V_{CC}=10\text{V}, I_C=10\text{mA}$ $R_L=100\Omega$
	Descend Time		t_f	---	6	10	μs	

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



6. Order Information

Part Number

OR-4NXXY-Z-W

or **OR-TIL113Y-Z-W**

Note

4NXX = Part Number (4N29,4N30,4N31,4N32 or 4N33)

TIL113= Part Number

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

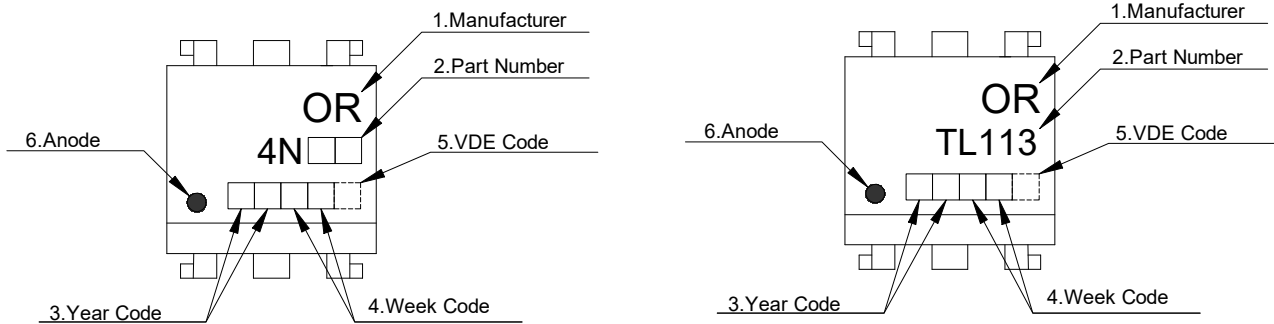
Z = Tape and reel option (TA,TA1 or none).

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

*VDE Code can be elected.

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. Manufacturer : ORIENT.

2. Part Number : 4N29,4N30,4N31,4N32 ,4N33 or TIL113

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.

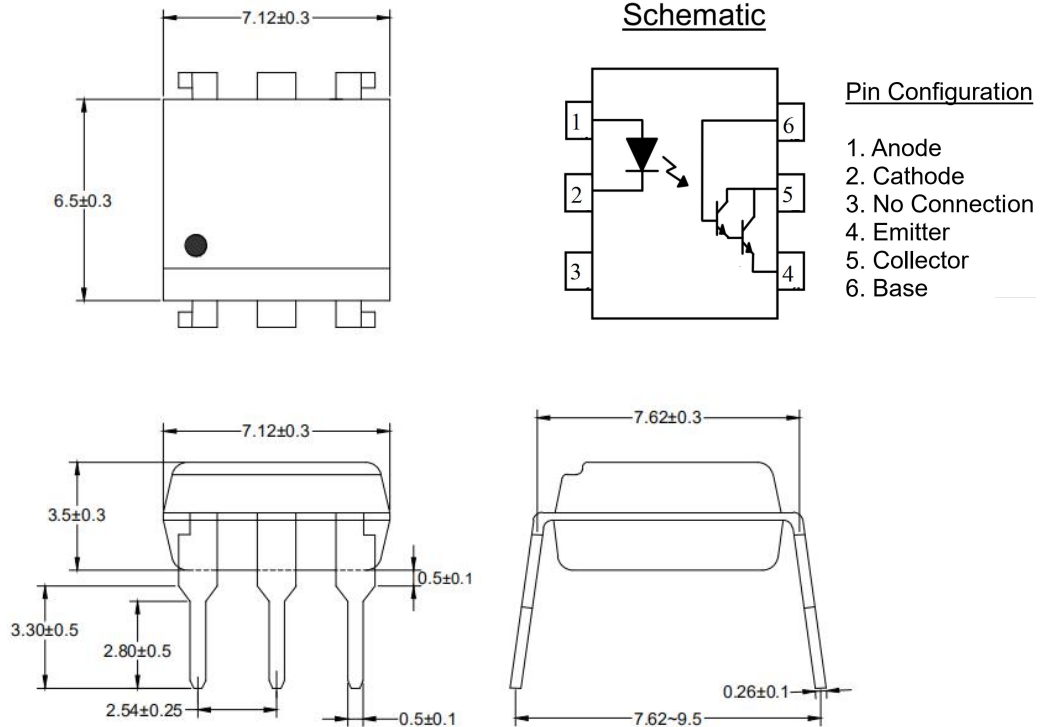
5. VDE Code :

6. Anode.

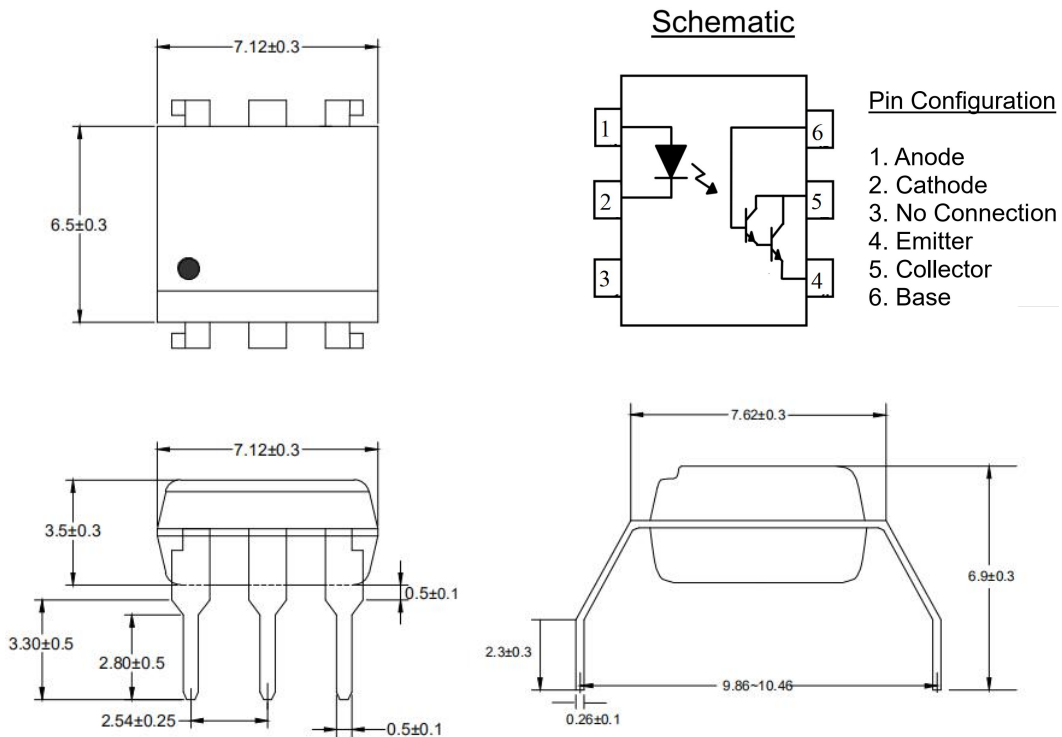
*VDE Mark can be selected.

8. Outer Dimension

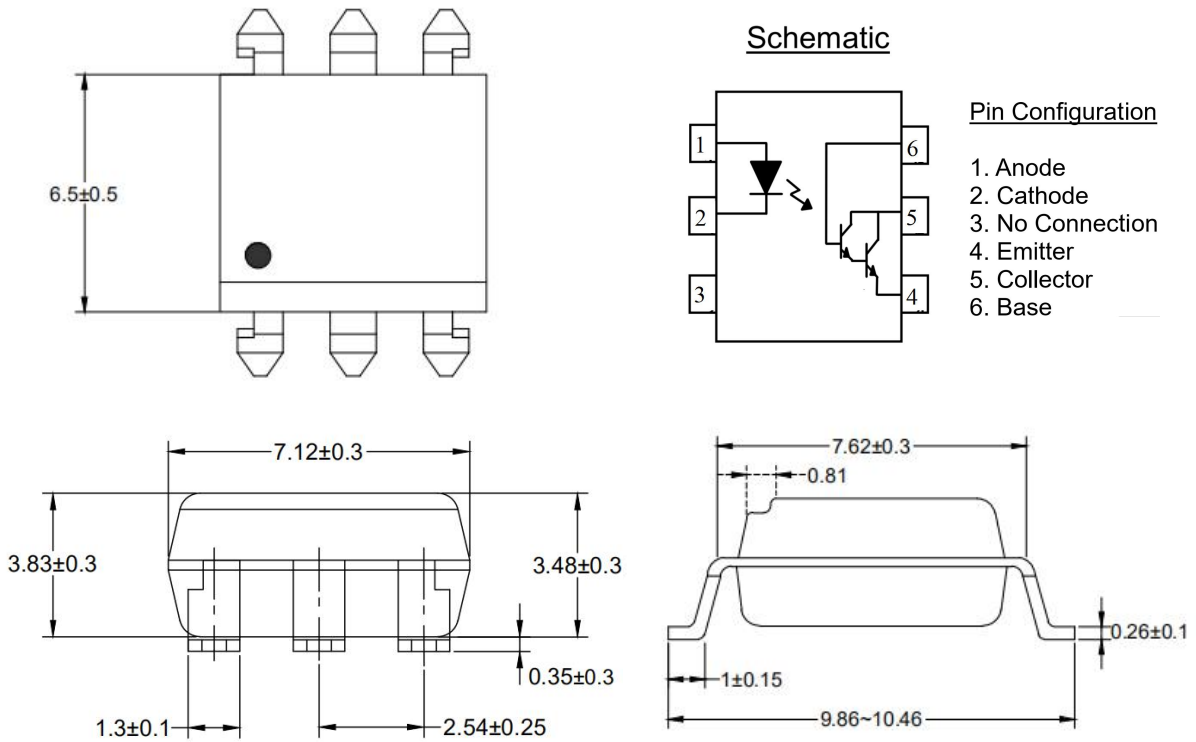
(1) OR-4NXX / OR-TIL113



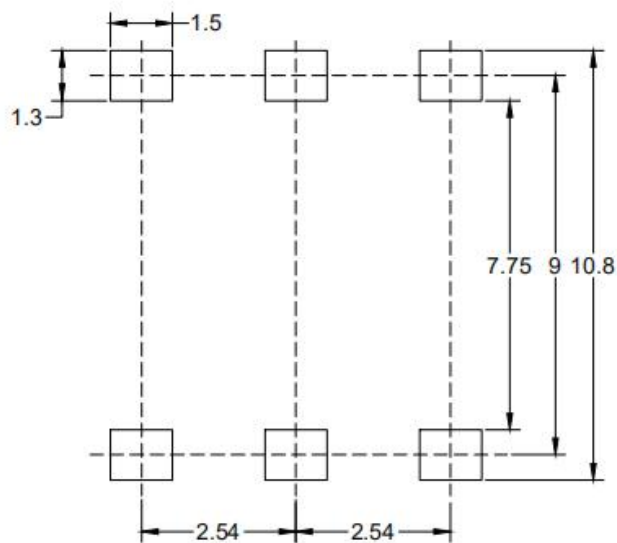
(2) OR-4NXXM / OR-TIL113M



(3) OR-4NXXS / OR-TIL113S



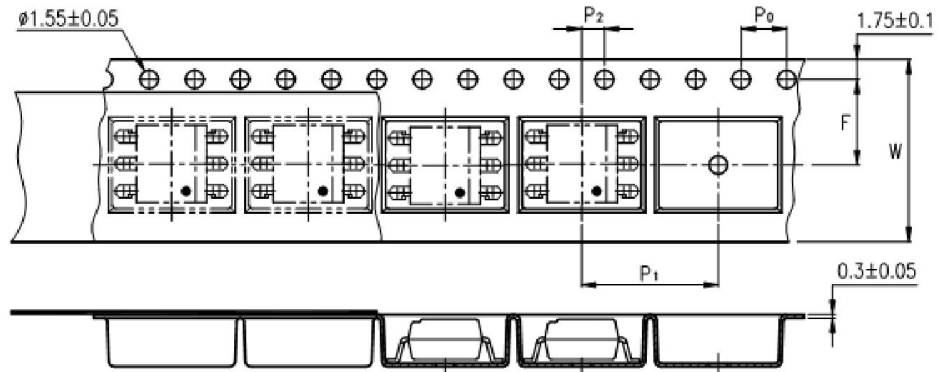
9. Recommended Foot Print Patterns (Mount Pad)



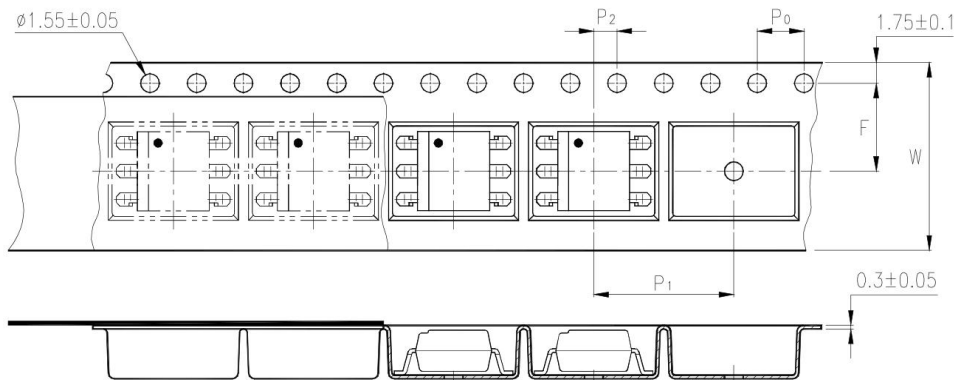
unit: mm

10. Taping Dimensions

(1) OR-4NXXS-TA / OR-TIL113S-TA



(2) OR-4NXXS-TA1 / OR-TIL113S-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

11. 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

 <p>Material Code : 120PCXXXXXX</p> <p> </p> <p>P/N : OR-XXXXXX</p> <p> </p> <p>Lot No. : XXXXXX-XXXXX-TX-X</p> <p> </p> <p>D/C : XXXX</p> <p> </p> <p>Qty : XXXX PCS</p> <p> </p>	  	<div style="border: 1px solid black; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center; margin: 10px;"> <p>内箱码</p> </div> <div style="border: 1px solid black; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center; margin: 10px;"> <p>外箱码</p> </div> <p>“XXXXXXXXXXXXXXXX” (一体机序列码)</p> <p>Made in China</p>
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Note:

1. P/N :Contents with "Order Information" in the specification.
2. LOT NO : The production lot.
3. BATCH : The Electrical rank.
4. Quantity :Packaging quantity.
5. Product Data :Date of manufacture.

12. Reliability Test

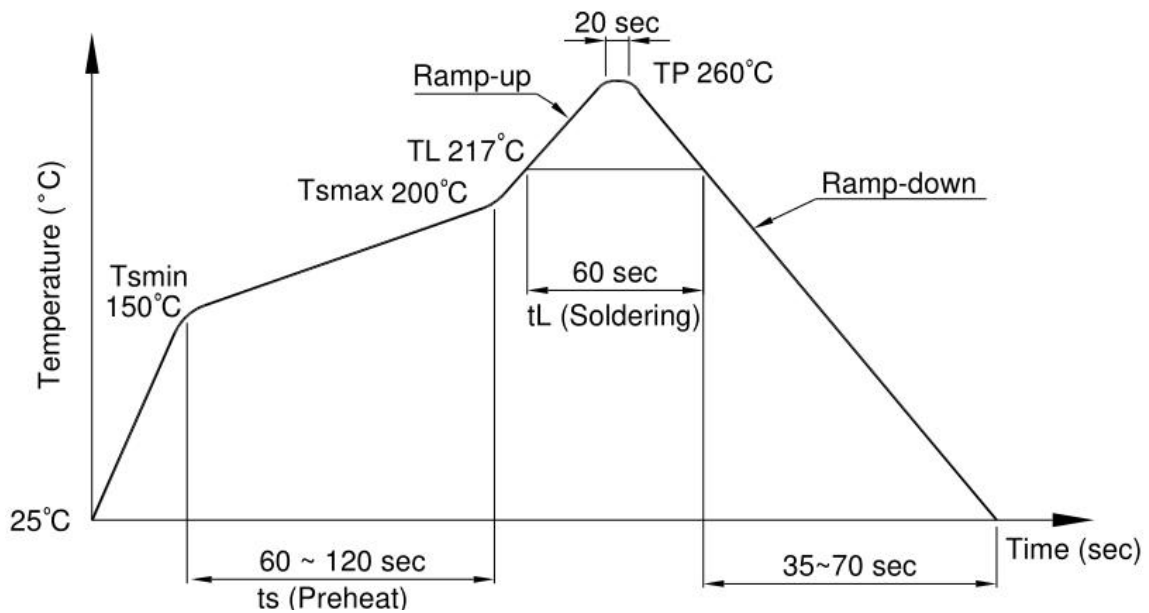
NO.	ITEMS	Reliability Testing				
		QTY (Pcs)	Condition	Process	Device	Standard
1	RSH 耐焊接热	22	260±5℃	10s/3 次	锡炉	JESD22-A106
2	HTSL 高温存储	77	125℃	168 hrs	高温烤箱 测试仪	JESD22-A103
				500 hrs		
				1000 hrs		
3	LTSL 低温存储	77	-55℃	168 hrs	低温箱 测试仪	JESD22-A119
				500 hrs		
				1000 hrs		
4	TC 温度循环	77	H:125℃ 15min ∫ 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

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.

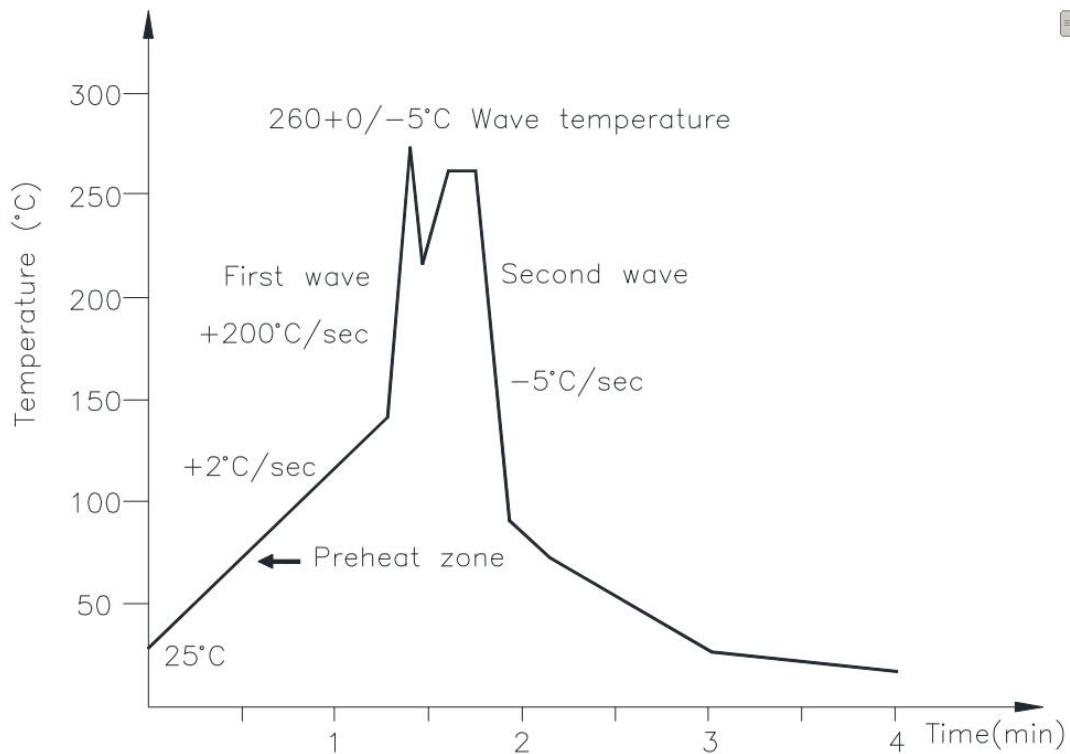
Profile item	Conditions
Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts)	150°C 200°C 90±30 sec
Soldering zone - Temperature (TL) - Time (t L)	217°C 60 sec
Peak Temperature	260°C
Peak Temperature time	20 sec
Ramp-up rate	3°C / sec max.
Ramp-down rate from peak temperature	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	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 1. Forward Current vs Forward Voltage

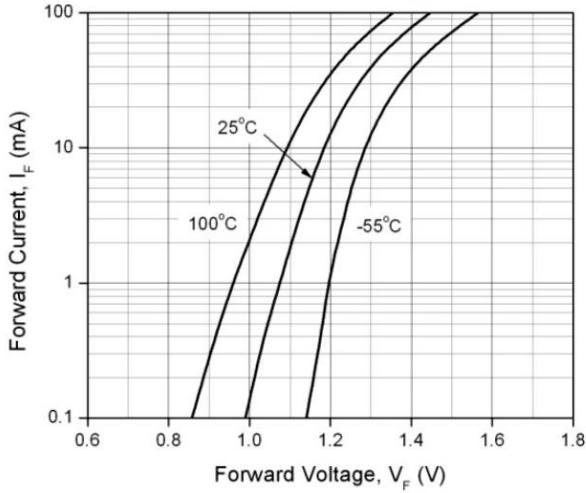


Figure 2. Current Transfer Ratio vs. Ambient Temperature

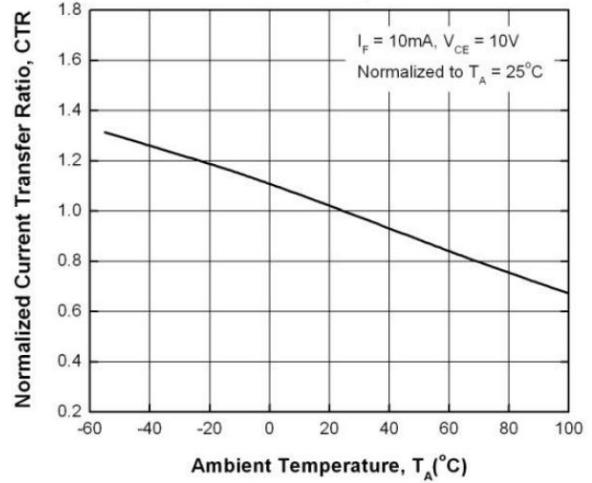


Figure 3. Normalized Current Transfer Ratio vs Forward Current

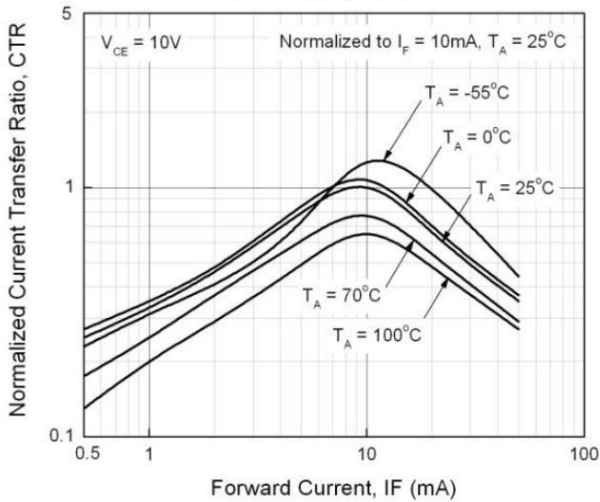


Figure 4. Collector Dark Current vs Ambient Temperature

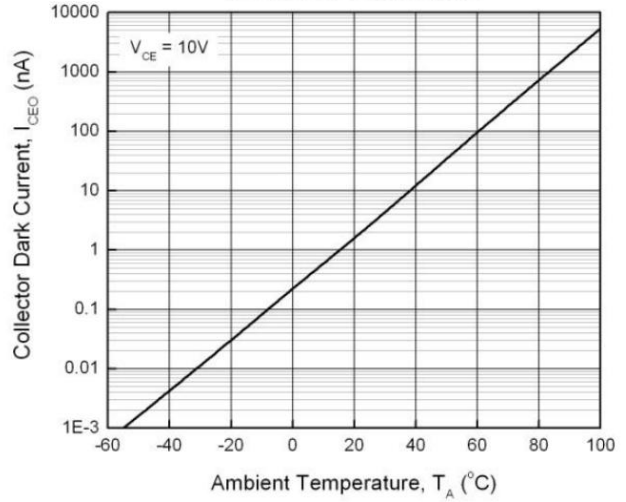


Figure 5. Turn-on Time vs Forward Current

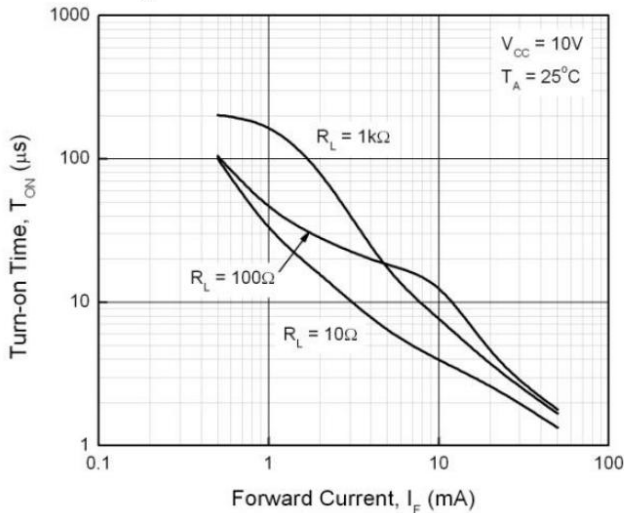
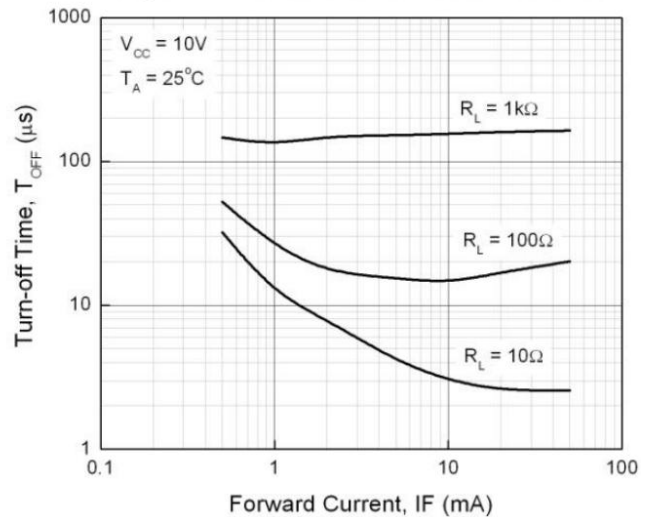


Figure 6. Turn-off Time vs Forward Current



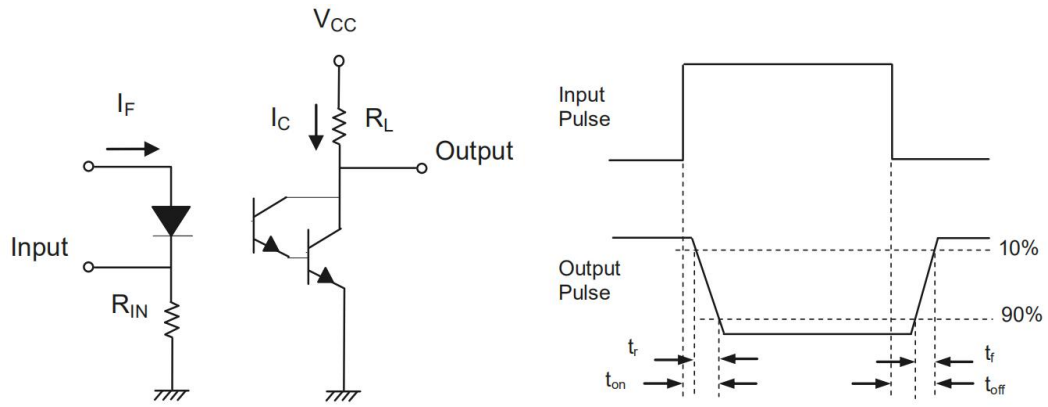


Figure 7. Switching Time Test Circuit & Waveforms