



# ORIENT

## Photo coupler Product

### Data Sheet

MPN: OR-10XX series

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

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

#### SHENZHEN ORIENT COMPONENTS CO., LTD

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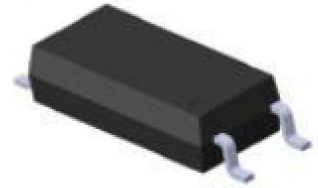
[www.orient-opto.com](http://www.orient-opto.com)

**Preliminary**

This datasheet is a preliminary design specification, and the formal specifications are subject to the recognition letter with jointly signed

## 1. Features

- (1) Current transfer ratio: (CTR: 50~600% at  $I_F = 5\text{mA}$ ,  $V_{CE} = 5\text{V}$ )
- (2) High input-output isolation voltage (  $V_{iso} = 5,000\text{Vrms}$  )
- (3) High collector-emitter voltage (  $V_{CEO} = 80\text{V}$  )
- (4) Temperature range  $-55^\circ\text{C}$  to  $110^\circ\text{C}$
- (5) Creepage distance  $> 8\text{mm}$
- (6) Employs double transfer mold technology
- (7) Long Mini-flat package : 2.3mm profile :OR-10XX series
- (8) ESD pass HBM 8000V/MM 2000V
- (9) Safety approval
  - UL approved(No.E323844)
  - VDE approved(No.40029733)
  - CQC approved (No.CQC18001190940 )
- (10) In compliance with RoHS, REACH standards
- (11) MSL Class I



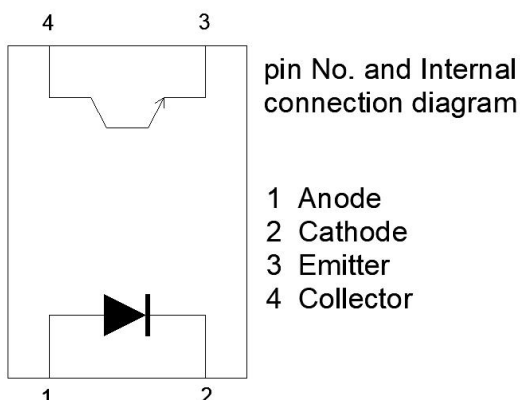
## 2. Description

The OR-10XX series devices consist of an infrared emitting diode, optically coupled to a photo transistor detector. They are packaged in a 4-pin SOP package.

## 3. Applications

- (1) Programmable controllers
- (2) System appliances, measuring instruments
- (3) Telecommunication equipments
- (4) Home appliances, such as fan heaters, etc.
- (5) Signal transmission between circuits of different potentials and impedances

## 4. Functional Diagram



## 5. Absolute Maximum Ratings (Ta=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
	Consume Power	$P$	100	mW
Output	Collector and emitter Voltage	$V_{CEO}$	80	V
	Emitter and collector Voltage	$V_{ECO}$	7	
	Collector Current	$I_C$	50	mA
	Consume Power	$P_C$	150	mW
Total Consume Power		$P_{tot}$	250	mW
*1 Insulation Voltage		$V_{ISO}$	5000	$V_{rms}$
*2 Maximum transient isolation voltage		$V_{IOTM}$	8000	$V_{peak}$
Tracking resistance		CTI	175	V
Operation Temperature		$T_{opr}$	-55 to + 110	°C
Storage Temperature		$T_{stg}$	-55 to + 125	
*3 Soldering Temperature		$T_{sol}$	260	

### Notes:

\*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2 are shorted together, and pins 3, 4 are shorted together.

\*2 With VDE testing condition

\*3 For 10 seconds

**6. Electrical Optical Characteristics at Ta=25°C**

Parameter		Symbol	Min	Typ.*	Max	Unit	Condition
Input	Forward Voltage	$V_F$	---	1.25	1.6	V	$I_F=50\text{mA}$
	Reverse Current	$I_R$	---	---	5	$\mu\text{A}$	$V_R=5\text{V}$
	Terminal capacitance	$C_t$	---	50	---	pF	$V=0, f=1\text{MHz}$
Output	Collector to emitter Current	$I_{CEO}$	---	10	100	nA	$V_{CE}=20\text{V},$ $I_F=0\text{mA}$
	Collector and Emitter Breakdown Voltage	$BV_{CEO}$	80	---	---	V	$I_C=1\text{mA}$ $I_F=0\text{mA}$
	Emitter and Collector Breakdown Voltage	$BV_{ECO}$	7	---	---	V	$I_E=0.1\text{mA}$ $I_F=0\text{mA}$
Transforming Characteristics	*1 Current conversion ratio	CTR	50	---	600	%	$I_F=5\text{mA}$ $V_{CE}=5\text{V}$
	Collector Current	$I_C$	2.5	---	30	mA	
	Collector and Emitter Saturation Voltage	$V_{CE(sat)}$	---	---	0.3	V	$I_F=10\text{mA}$ $I_C=1\text{mA}$
	Insulation Impedance	$R_{iso}$	10 <sup>12</sup>	---	---	$\Omega$	DC500V 40~60%R.H.
	Floating Capacitance	$C_f$	---	0.3	---	pF	$V=0, f=1\text{MHz}$
	Rise Time	$t_r$	---	3	18	$\mu\text{s}$	$V_{CC}=5\text{V},$ $I_C=2\text{mA}$ $R_L=100\Omega$
	Fall Time	$t_f$	---	4.7	18	$\mu\text{s}$	

\*1 Current Conversion Ratio =  $I_C / I_F \times 100\%$ , CTR Tolerance:  $\pm 3\%$ .

**7. Rank Table of Current Transfer Ratio**

CTR Rank	Min.	Max.	Condition	Unit
OR-1000	50	600	IF=5mA, V <sub>CE</sub> =5V, Ta=25°C	%
	20	400	IF=1mA, V <sub>CE</sub> =5V, Ta=25°C	
OR-1001	100	160	IF=5mA, V <sub>CE</sub> =5V, Ta=25°C	
	40	100	IF=1mA, V <sub>CE</sub> =5V, Ta=25°C	
OR-1004	100	200	IF=5mA, V <sub>CE</sub> =5V, Ta=25°C	
	40	150	IF=1mA, V <sub>CE</sub> =5V, Ta=25°C	
OR-1005	50	150	IF=5mA, V <sub>CE</sub> =5V, Ta=25°C	
	20	90	IF=1mA, V <sub>CE</sub> =5V, Ta=25°C	
OR-1006	100	300	IF=5mA, V <sub>CE</sub> =5V, Ta=25°C	
	40	250	IF=1mA, V <sub>CE</sub> =5V, Ta=25°C	
OR-1007	80	160	IF=5mA, V <sub>CE</sub> =5V, Ta=25°C	
	30	100	IF=1mA, V <sub>CE</sub> =5V, Ta=25°C	
OR-1008	130	260	IF=5mA, V <sub>CE</sub> =5V, Ta=25°C	
	50	180	IF=1mA, V <sub>CE</sub> =5V, Ta=25°C	
OR-1009	200	400	IF=5mA, V <sub>CE</sub> =5V, Ta=25°C	
	80	300	IF=1mA, V <sub>CE</sub> =5V, Ta=25°C	
OR-1010	150	300	IF=5mA, V <sub>CE</sub> =5V, Ta=25°C	
	60	200	IF=1mA, V <sub>CE</sub> =5V, Ta=25°C	
OR-1019	250	500	IF=5mA, V <sub>CE</sub> =5V, Ta=25°C	
	100	350	IF=1mA, V <sub>CE</sub> =5V, Ta=25°C	
OR-1020	300	450	IF=5mA, V <sub>CE</sub> =5V, Ta=25°C	
	120	300	IF=1mA, V <sub>CE</sub> =5V, Ta=25°C	
OR-1002	22	—	IF=1mA, V <sub>CE</sub> =5V, Ta=25°C	%
OR-1003	34	—		
OR-1014	56	—		
OR-1015	63	125		
OR-1018	100	200		
OR-1002	63	125	IF=10mA, V <sub>CE</sub> =5V, Ta=25°C	%
OR-1003	100	200		
OR-1014	160	320		



## 8. Order Information

Part Number

**OR-10XX-W-Y-Z**

### Note

XX = CTR Rank (00 , 01 ,02 ,03 ...18 ,19 , 20.)

W = Tape and reel option (TP or TP1).

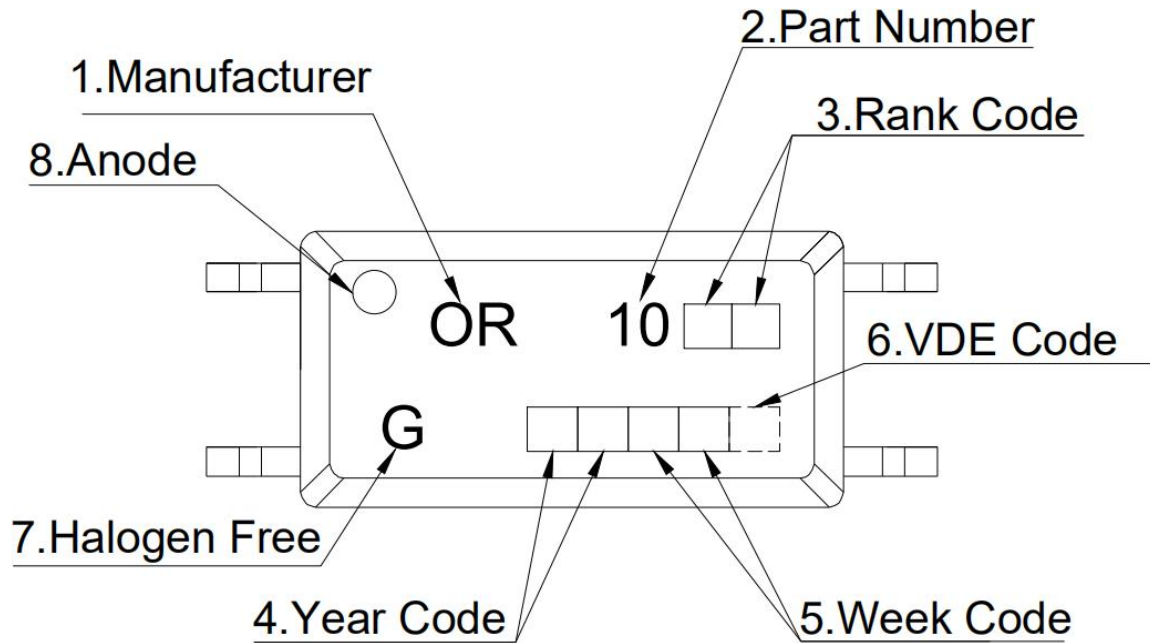
Y = 'V' code for VDE safety (This options is not necessary).

Z = 'G' code for Halogen free.

\* VDE Code can be selected.

Option	Description	Packing quantity
TP	Surface mount lead form (low profile) + TP tape & reel option	3000 units per reel
TP1	Surface mount lead form (low profile) + TP1 tape & reel option	3000 units per reel

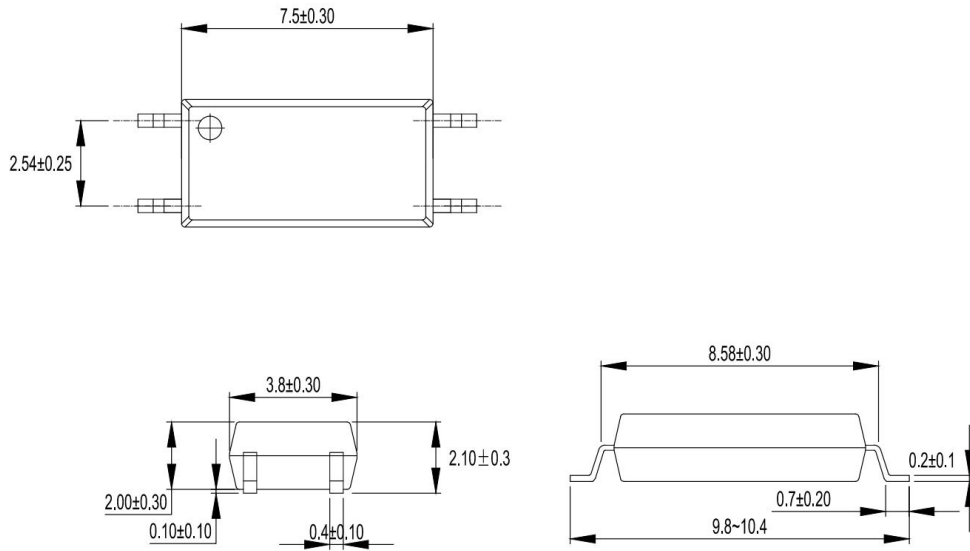
## 9. Naming Rule



1. Manufacturer : ORIENT.
2. Part Number : 10XX.
3. Rank Code   : CTR Rank
4. Year Code   : '21' means '2021' and so on.
5. Week Code   : 01 means the first week, 02 means the second week and so on.
6. VDE Code   (Optional)
7. HF Code 'G': Halogen Free.
8. Anode.

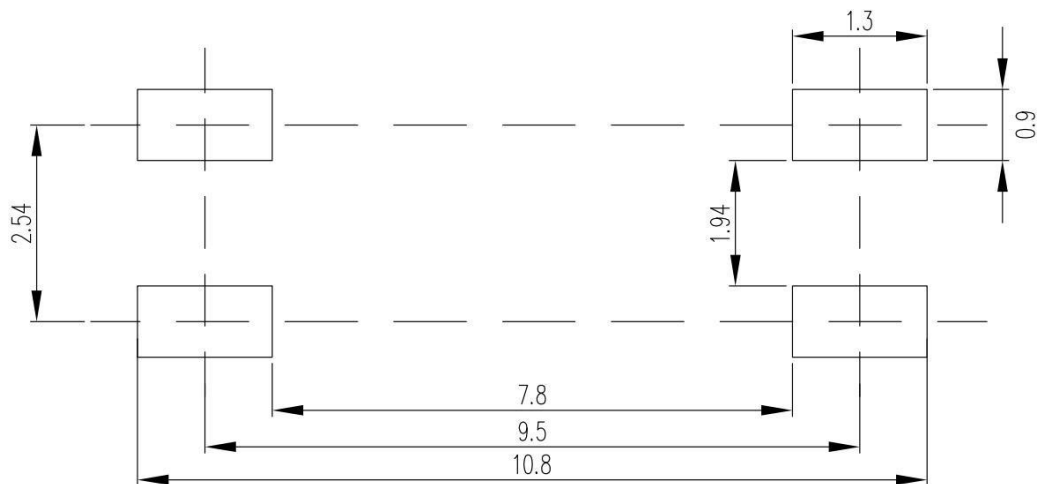
\* VDE Mark can be selected.

### 10.Package Dimension



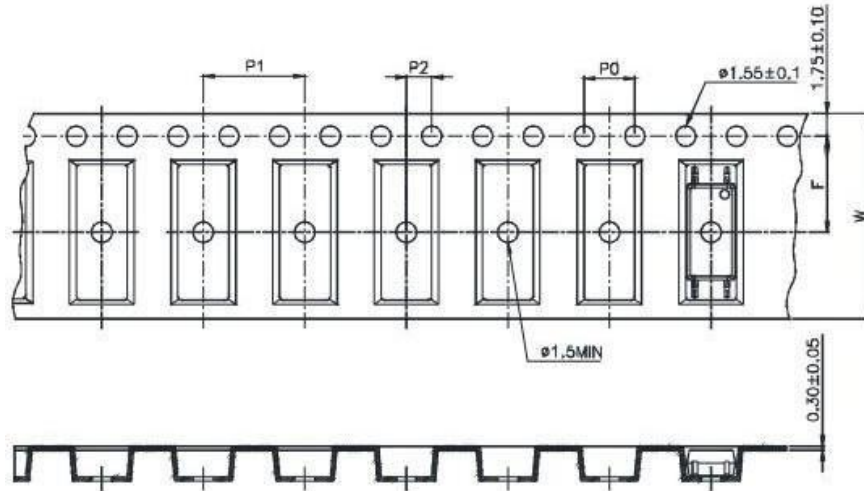
### 11.RRECOMMENDED FOOT PRINT PATTERNS (MOUNT PAD)

Unit:mm

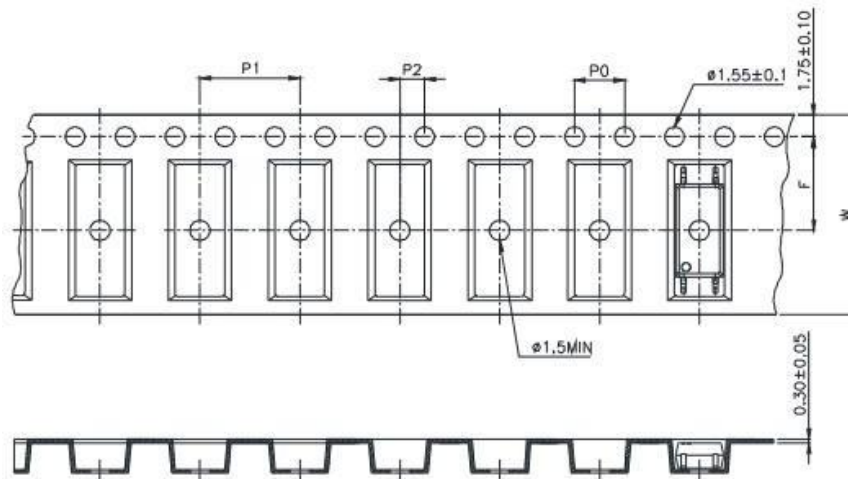


## 12. Taping Dimensions

### (1) OR-10XX-TP



### (2) OR-10XX-TP1



Description	Symbol	Dimension in mm (inch)
Tape wide	W	16±0.3 (0.63)
Pitch of sprocket holes	P <sub>0</sub>	4±0.3 (0.15)
Distance of compartment	F	7.5±0.1 (0.295)
	P <sub>2</sub>	2±0.1 (0.079)
Distance of compartment to compartment	P <sub>1</sub>	8±0.1 (0.315)

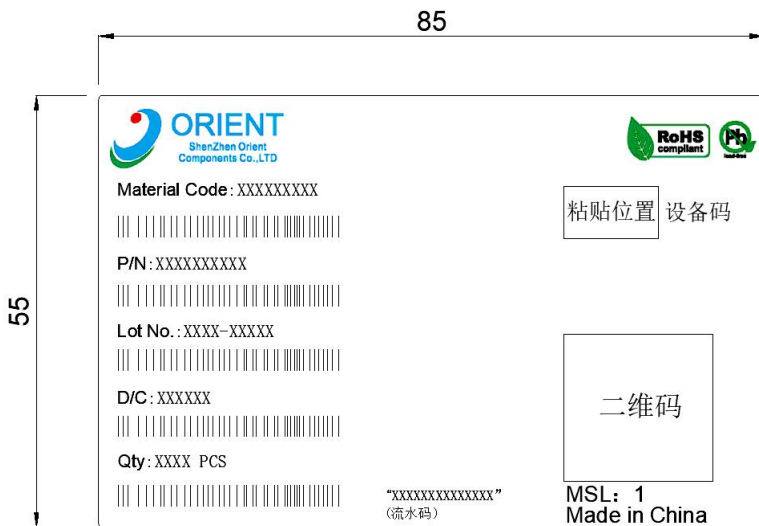
Package Type	TP/TP1
Quantities(pcs)	3000

### 13.Package Dimension

#### (1) package dimension

Packing Information	
Packing type	Reel type
Tape Width	16mm
Qty per Reel	3,000pcs
Small box (inner) Dimension	345*345*58.5mm
Large box (Outer) Dimension	620x360x360mm
Max qty per small box	6,000pcs
Max qty per large box	60,000pcs

#### (2)Packing Label Sample



**Note:**

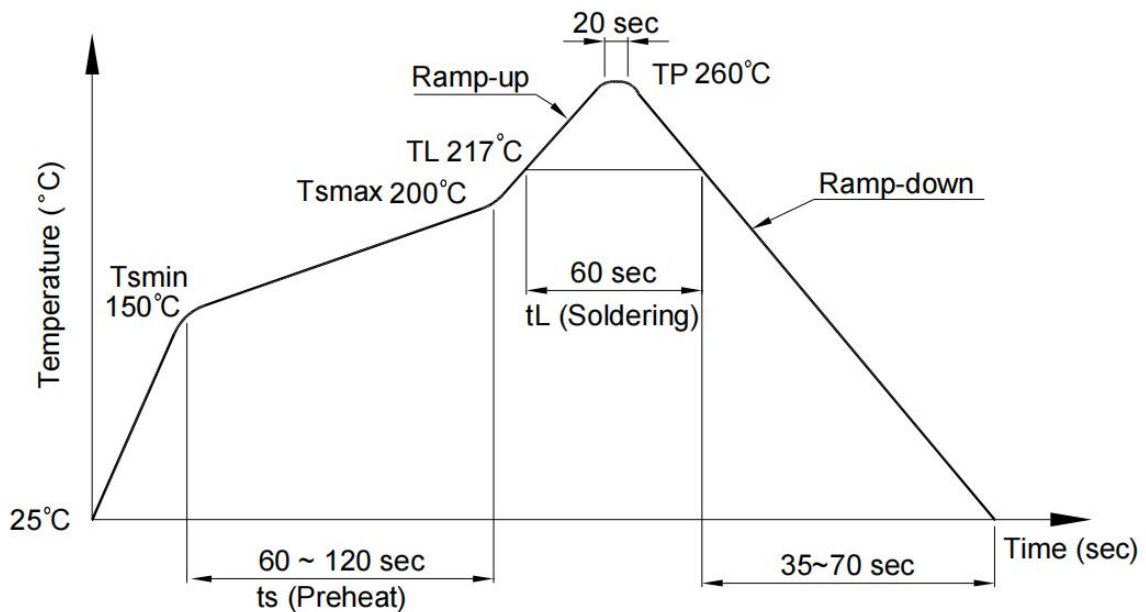
1. Material Code :Product ID.
2. P/N :Contents with "Order Information" in the specification.
3. Lot No. :Product weeks.
4. D/C :Product data.
5. Quantity :Packaging quantity.

### 14. Temperature Profile Of Soldering

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

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

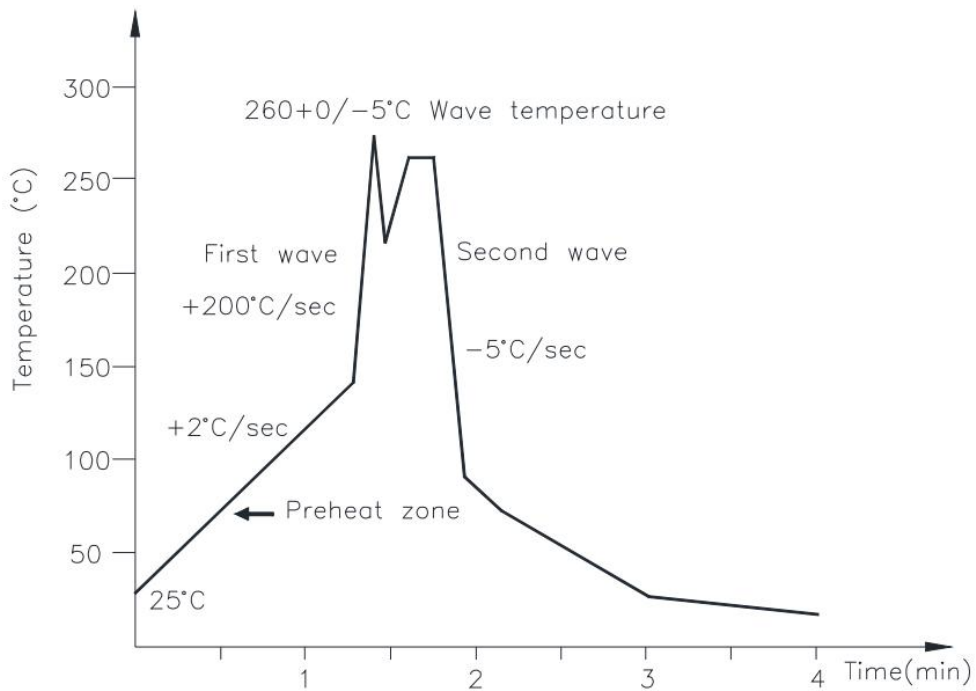
Profile item	Conditions
Preheat	
- Temperature Min (T Smin )	150°C
- Temperature Max (T Smax )	200°C
- Time (min to max) (ts)	90±30 sec
Soldering zone	
- Temperature (TL )	217°C
- Time (t L )	60 sec
Peak Temperature	260°C
Peak Temperature time	20 sec
Ramp-up rate	3°C / sec max.
Ramp-down rate from peak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



**(2) Wave soldering (JEDEC22 A111 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 Curves

Fig.1 Forward current vs Ambient temperature

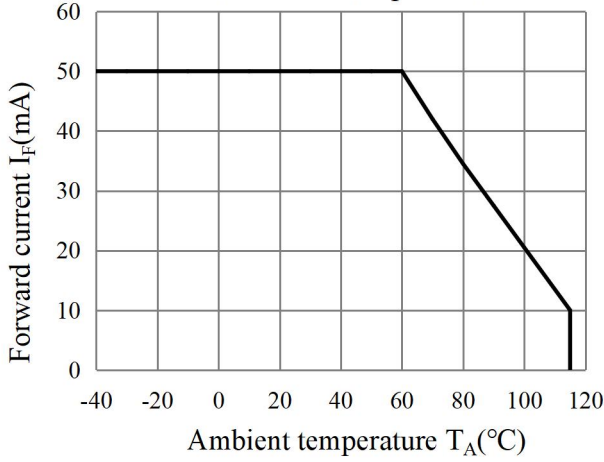


Fig.2 Collector Power Dissipation vs. Ambient temperature

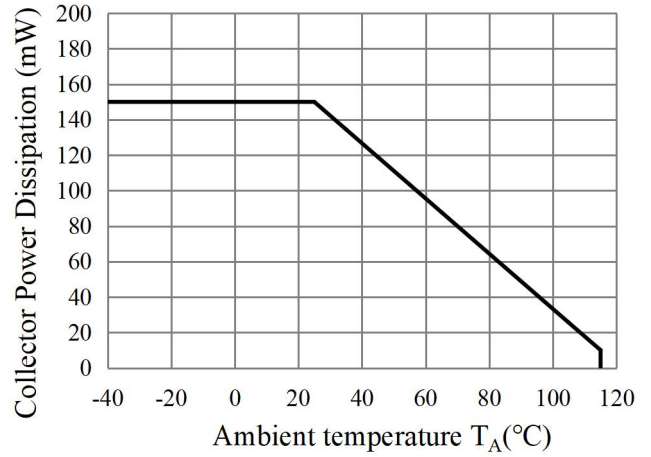


Fig.3 Forward Current vs. Forward Voltage

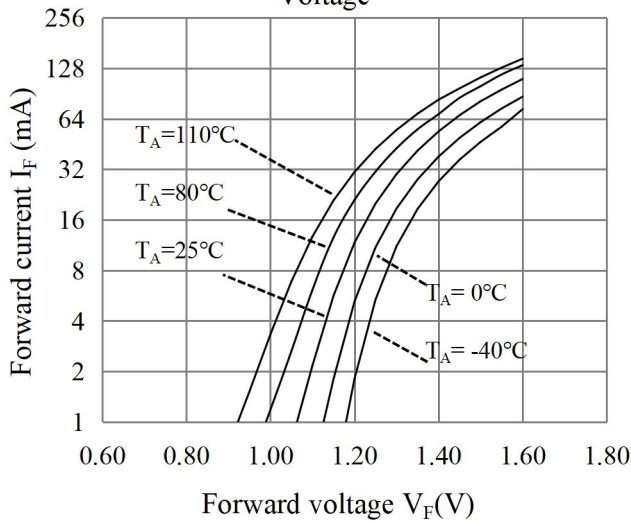


Fig.4 Collector-emitter Saturation Voltage vs. Forward Current

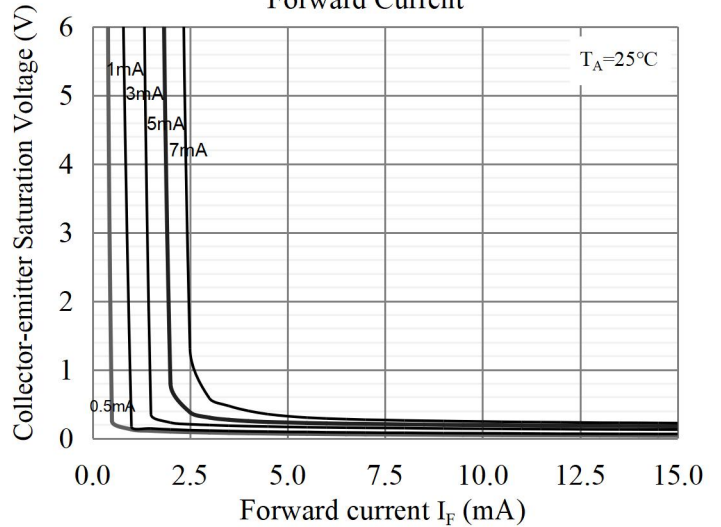


fig.5 Collector Current vs. Non-Saturated Collector Emitter Voltage

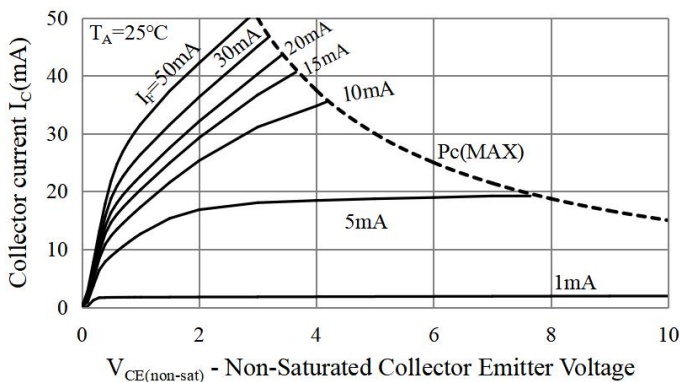


fig.6 Collector Current vs. Non-Saturated Collector Emitter Voltage

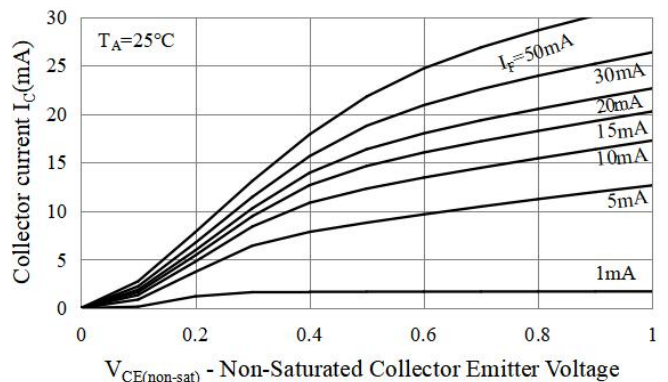


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

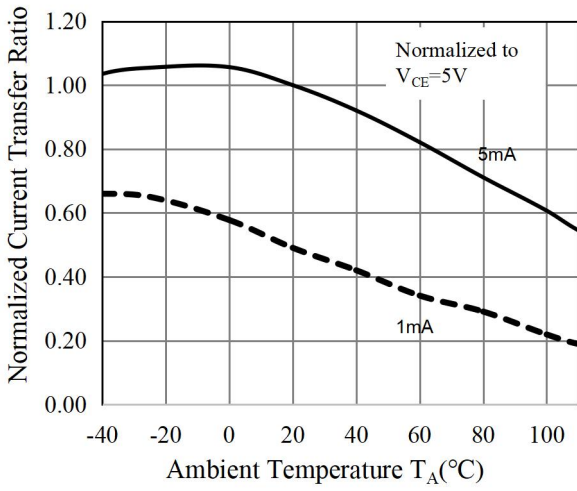


Fig.8 Relative Current Transfer Ratio vs. Ambient Temperature

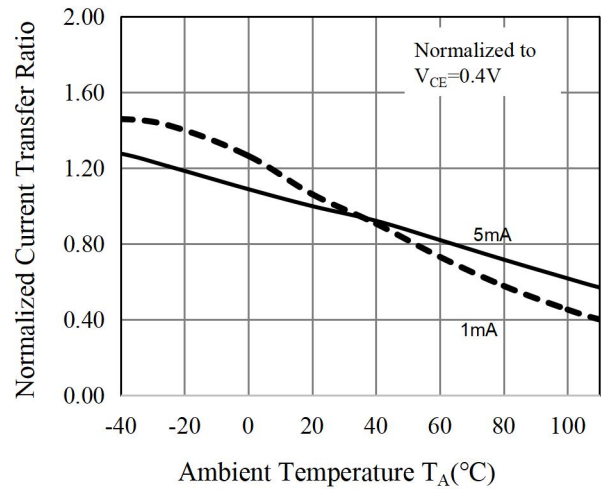


Fig.9 Forward Current vs. Current Transfer Ratio

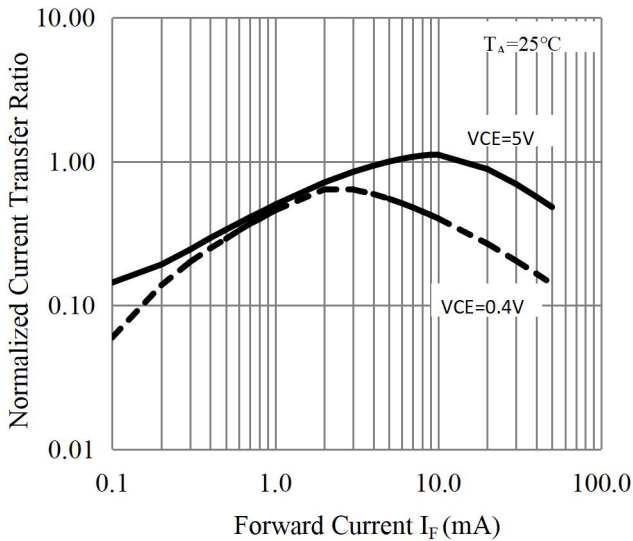


Fig.10 Collector Dark Current vs. Ambient Temperature

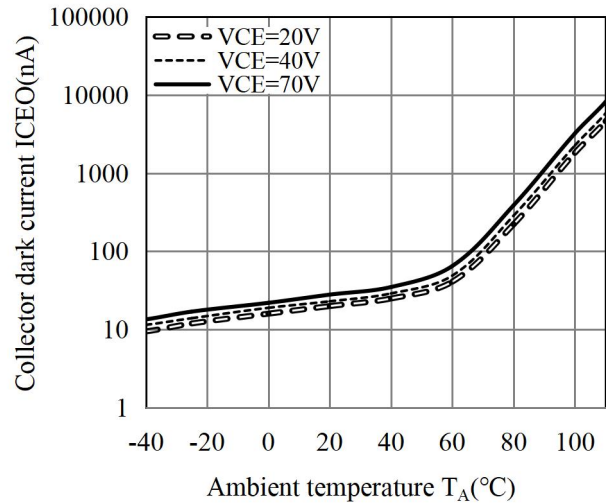


Fig.11 Collector-emitter Saturation Voltage vs. Ambient Temperature

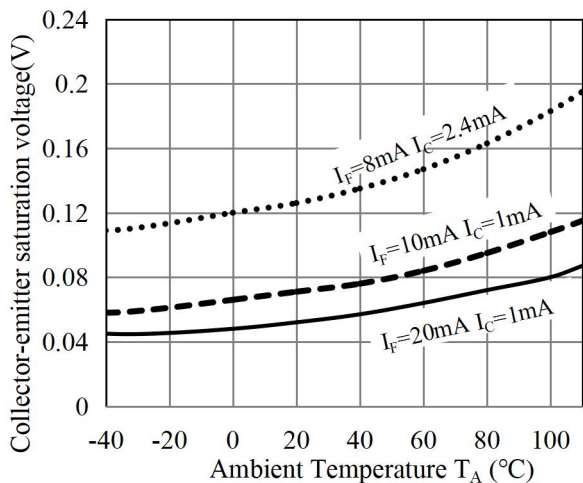


Fig.12 Switching Time vs. Load Resistance

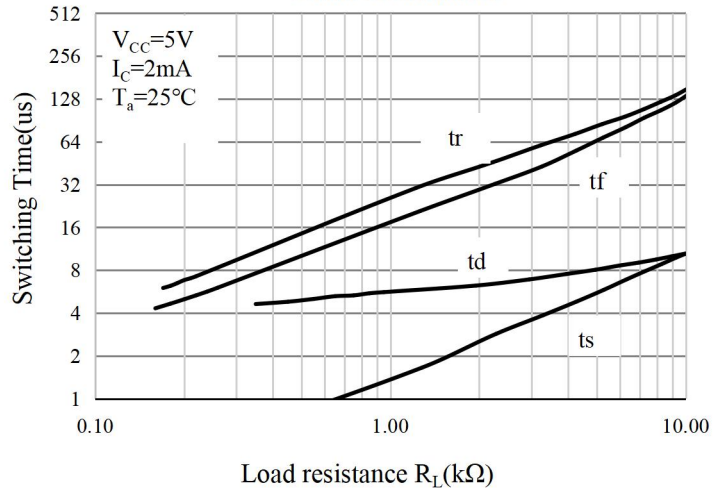


Fig.13 Respinse Time vs. Ambient temperature

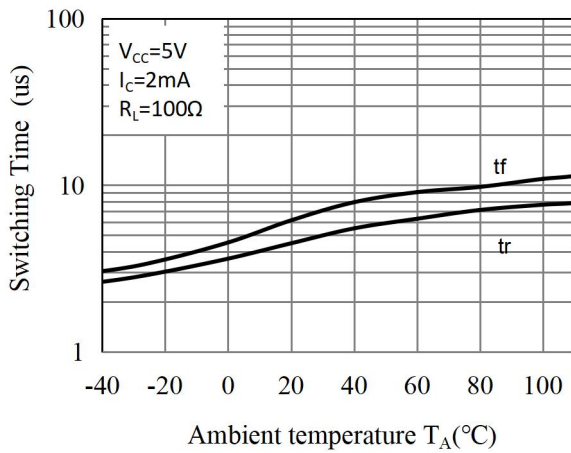
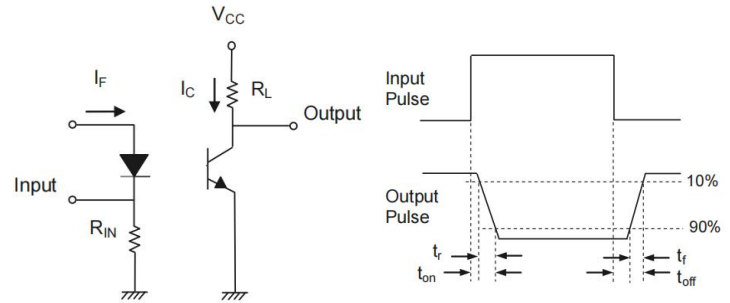


Fig.14 Switching Time Test Circuit & Waveforms



## 16.NOTES

1. Orient is continually improving the quality, reliability, function or design and Orient reserves the right to make changes without further notices.
2. 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.
3. For equipment/devices where high reliability or safety is required, such as space applications, nuclear power control equipment, medical equipment, etc, please contact our sales representatives.
4. When requiring a device for any "specific" application, please contact our sales in advice.
5. If there are any questions about the contents of this publication, please contact us at your convenience.
6. The contents described herein are subject to change without prior notice.
7. Immerge unit's body in solder paste is not recommended.