



ORIENT

Photo coupler

Product Data Sheet

MPN: _____ OR-351 series

Customer: _____

Date: _____

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Preliminary

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

1. Features

- (1) High collector-emitter voltage ($V_{CEO} = 350V$)
- (2) Current transfer ratio (CTR : MIN. 50% at $I_F = 5mA$, $V_{CE} = 5V$, $T_a = 25^\circ C$)
- (3) High input-output isolation voltage ($V_{ISO} = 3,750V_{rms}$)
- (4) SOP-4 package
- (5) Operating Temperature $-55^\circ C$ to $100^\circ C$
- (6) ESD pass HBM 8000V/MM 2000V
- (7) Safety approval
 - UL approved (No. E323844)
 - VDE approved (No. 40029733)
 - CQC approved (No. CQC19001231256)
- (8) In compliance with RoHS, REACH standards
- (9) MSL Class I



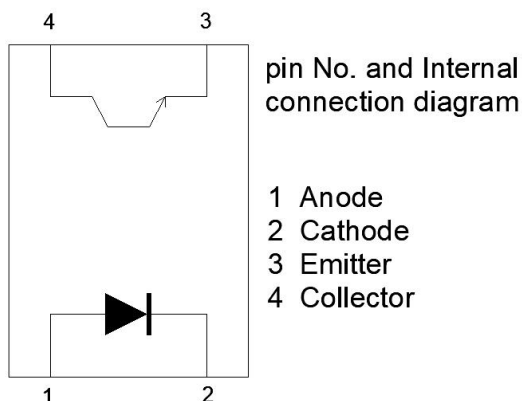
2. Instructions

- The OR-351 series device consists of an infrared led, photo transistor detector. They are encapsulated in a 4 pin SOP encapsulation.
- Pin pitch of OR-351 is 2.54mm

3. Application Range

- (1) Telephone line interface
- (2) Interface to power supply circuit
- (3) Controller for SSRs. DC motor
- (4) Programmable Controllers

4. Functional Diagram



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

Parameter		Symbol	Rated Value	Unit
Input	Forward Current	I_F	50	mA
	Junction Temperature	T_J	125	°C
	Reverse Voltage	V_R	6	V
	Consume Power	P	70	mW
Output	Collector and emitter Voltage	V_{CEO}	350	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}	170	mW
*1 Insulation Voltage		V_{iso}	3750	Vrms
Operation Temperature		T_{opr}	-55 to + 100	°C
Storage Temperature		T_{stg}	-55 to + 125	
*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 photo coupler.
- (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	1.4	V	$I_F=10\text{mA}$
	Reverse Current	I_R	---	---	5	μA	$V_R=5\text{V}$
	Terminal capacitance	C_t	---	30	250	pF	$V=0, f=1\text{KHz}$
Output	Collector to emitter Current	I_{CEO}	---	---	100	nA	$V_{CE}=200\text{V}, I_F=0\text{mA}$
	Collector and Emitter Breakdown Voltage	BV_{CEO}	350	---	---	V	$I_C=0.1\text{mA}, I_F=0\text{mA}$
	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	5	---	30	mA	
	Collector and Emitter Saturation Voltage	$V_{CE(sat)}$	---	0.1	0.3	V	$I_F=20\text{mA}, I_C=1\text{mA}$
	Insulation Impedance	R_{iso}	5×10^{10}	1×10^{11}	---	Ω	DC500V 40~60%R.H.
	Floating Capacitance	C_f	---	0.6	1	pF	$V=0, f=1\text{MHz}$
	Rise Time	t_r	---	4	18	μs	$V_{CC}=2\text{V}, I_C=2\text{mA}, R_L=100\Omega$
	Fall Time	t_f	---	3	18	μs	

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

7. Order Information

Part Number

OR-351-X-Y-Z

Note

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

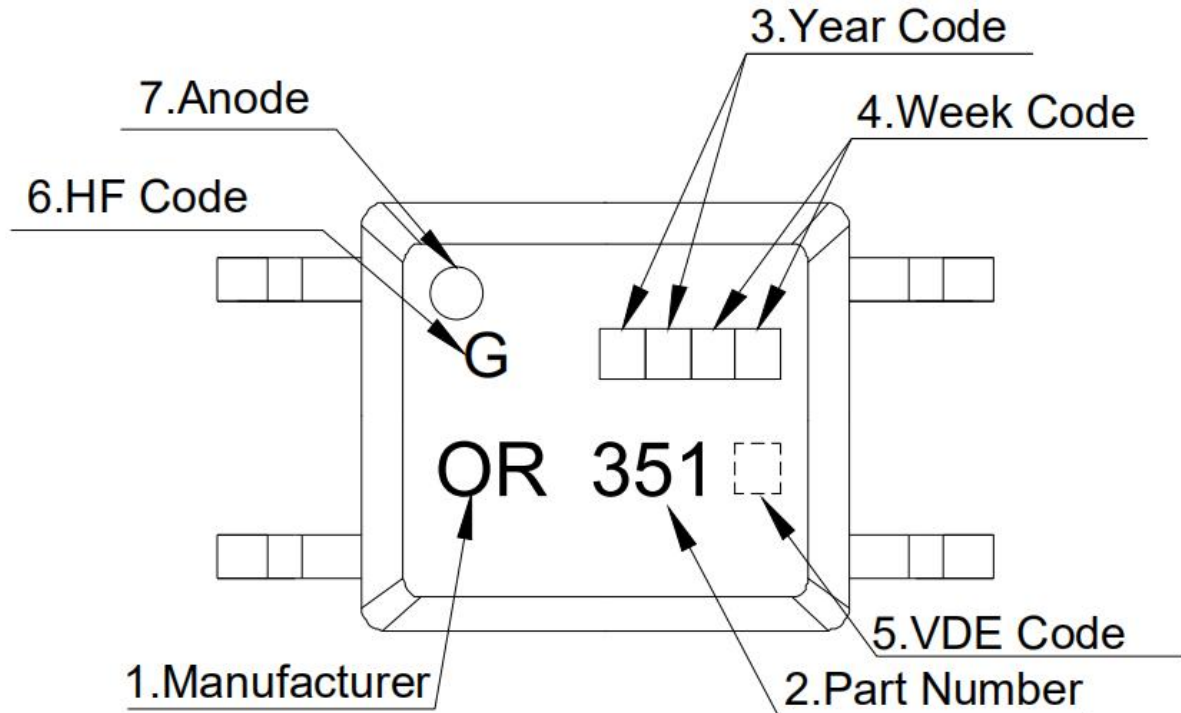
Y = 'V' code for VDE safety (This options is not necessary).

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

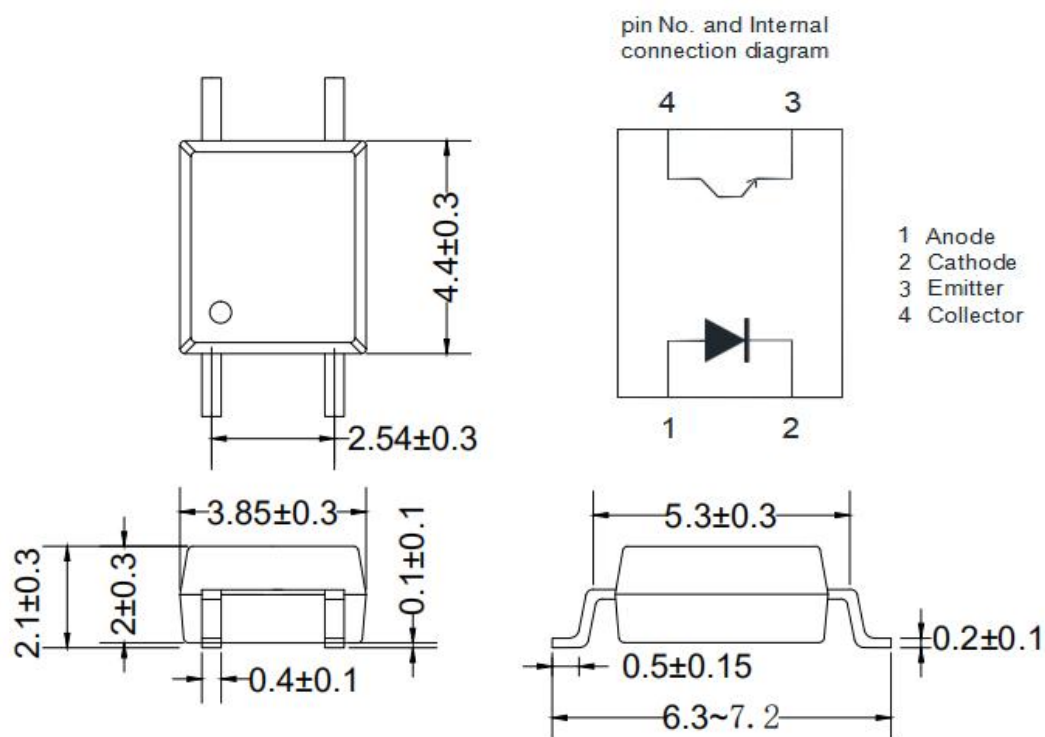
8. Naming Rule



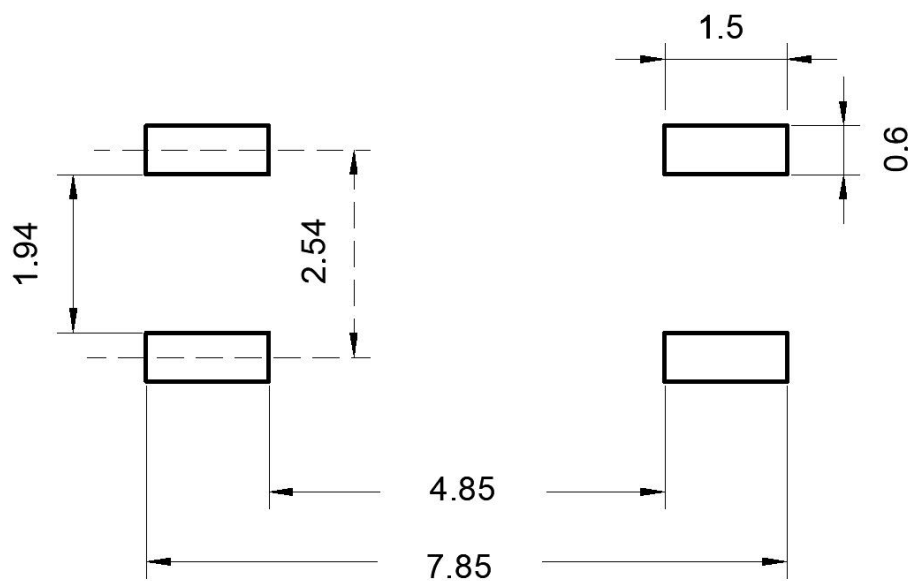
1. Manufacturer : ORIENT.
2. Part Number : 351.
3. Year Code : '21' means '2021' and so on.
4. Week Code : 01 means the first week, 02 means the second week and so on.
5. VDE Code . (Optional)
6. HF Code 'G': Halogen Free.
7. Anode.

* VDE Code can be selected.

9. Outer Dimension



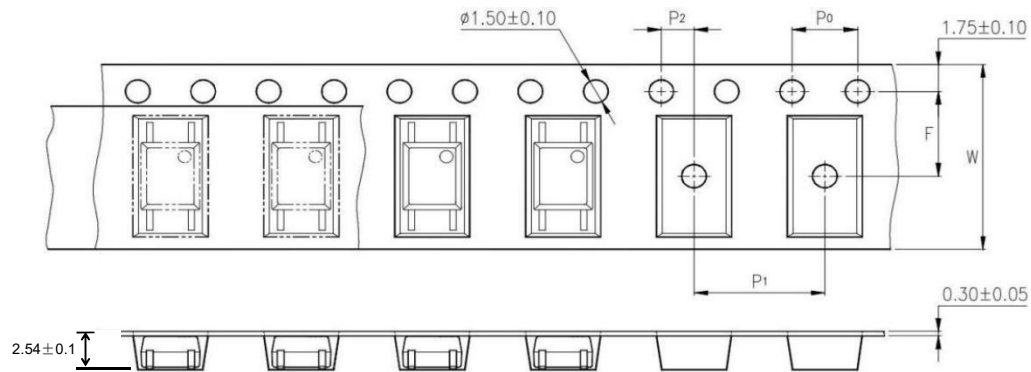
10. Recommended Foot Print Patterns (Mount Pad)



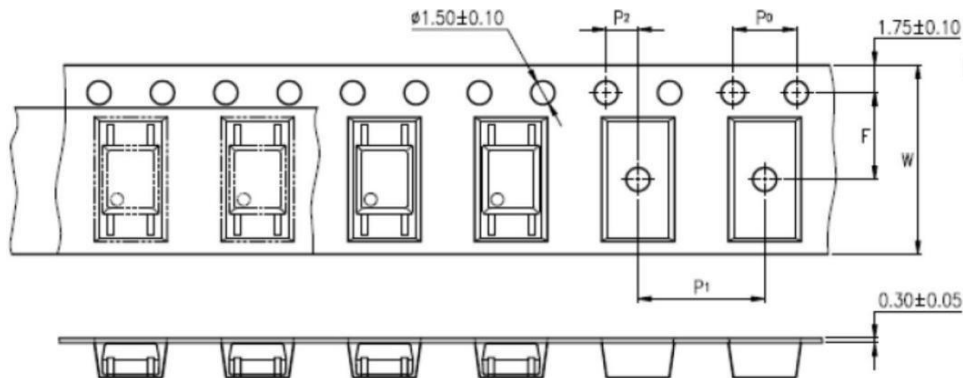
unit: mm

11. Taping Dimensions

(1) OR-351-TP



(2) OR-351-TP1



Description	Symbol	Dimension in mm(inch)
Tape wide	W	12 $\pm$ 0.3 (0.472)
Pitch of sprocket holes	P0	4 $\pm$ 0.1 (0.157)
Distance of compartment	F	5.5 $\pm$ 0.1 (0.217)
	P2	2 $\pm$ 0.1 (0.079)
Distance of compartment to compartment	P1	8 $\pm$ 0.1 (0.315)

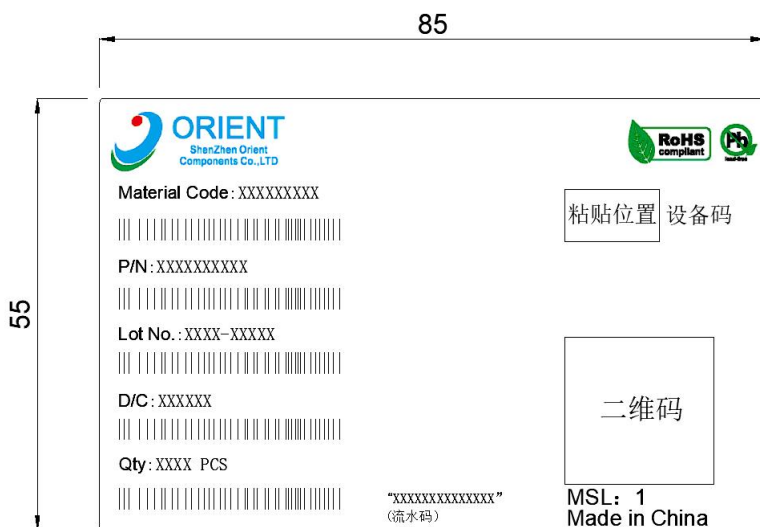
Package Type	TP/TP1
Quantities(pcs)	3000

12. Package Dimension

(1) package dimension

Packing Information	
Packing type	Reel type
Tape Width	12mm
Qty per Reel	3,000pcs
Small box (inner) Dimension	345*345*45mm
Large box (Outer) Dimension	480x360x360mm
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.

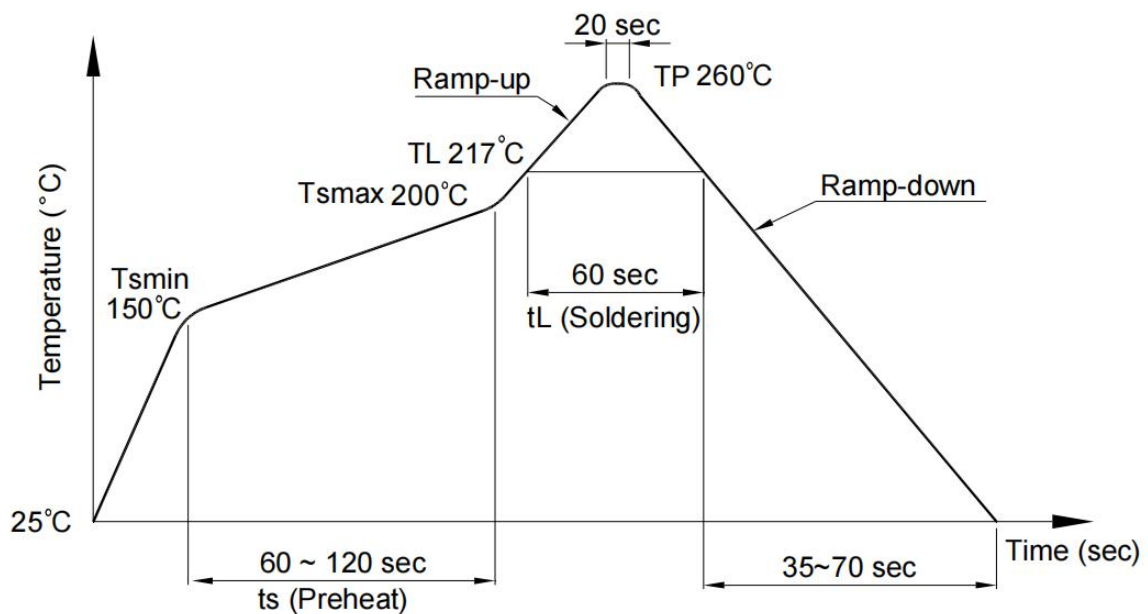
13. Temperature Profile Of Soldering

(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.

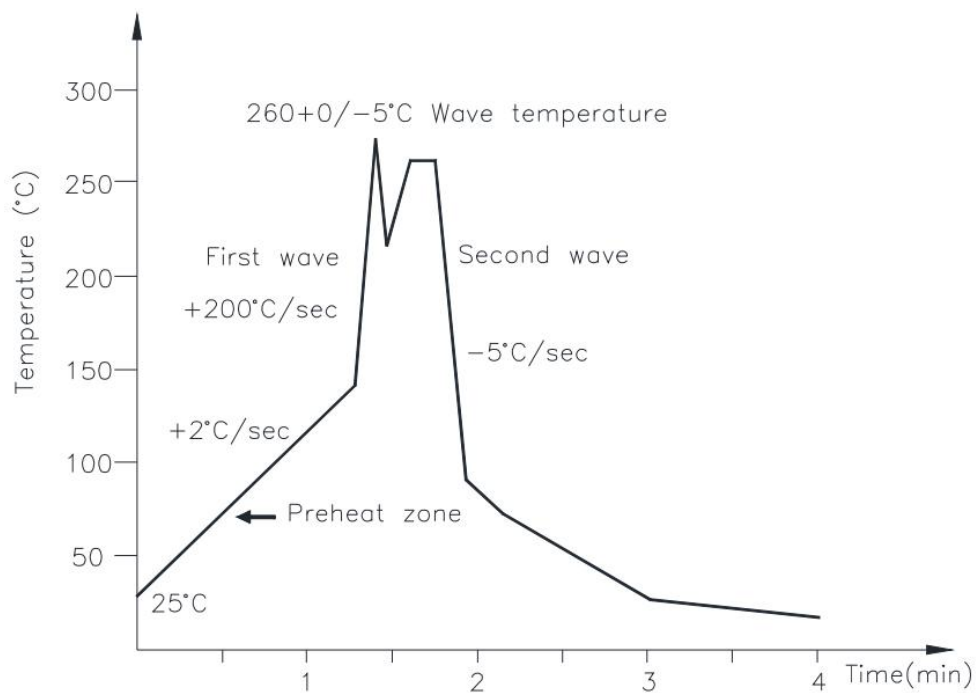
Profile item	Conditions
Preheat	
- Temperature Min (T Smin)	150°C
- Temperature Max (T Smax)	200°C
- Time (min to max) (ts)	90±30 sec
Soldering zone	
- Temperature (TL)	217°C
- Time (t L)	60 sec
Peak Temperature	260°C
Peak Temperature time	20 sec
Ramp-up rate	3°C / sec max.
Ramp-down rate from peak temperature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

14. Characteristics Curve

Fig.1 Forward Current vs. Ambient Temperature

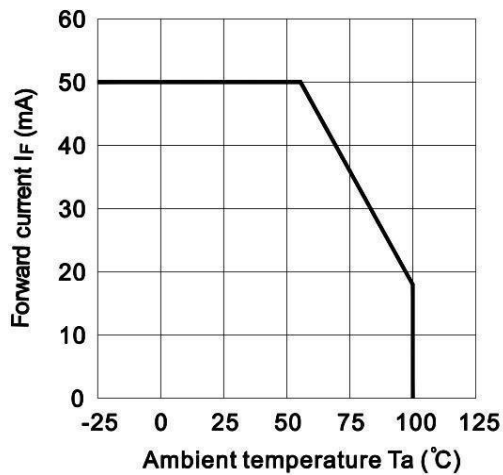


Fig.2 Collector Power Dissipation vs. Ambient Temperature

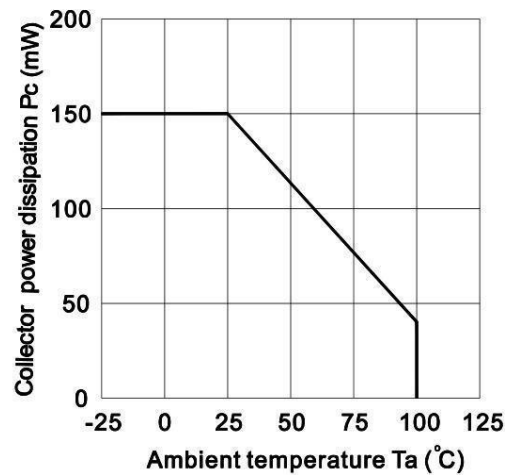


Fig.3 Collector-emitter saturation Voltage vs. Forward current

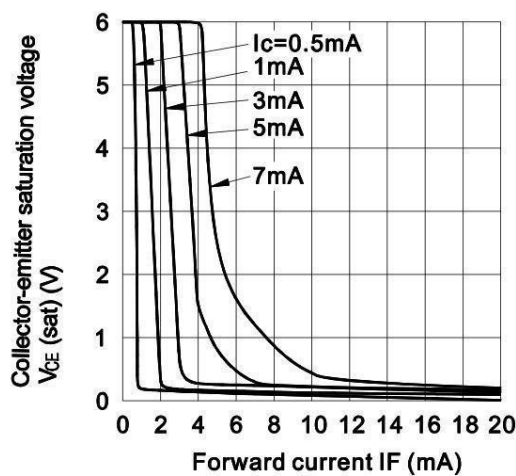


Fig.4 Forward Current vs. Forward Voltage

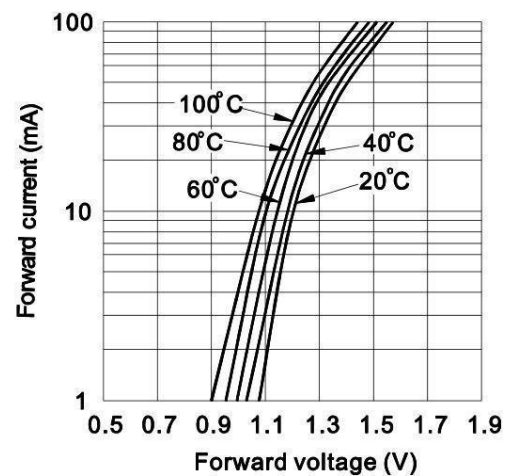


Fig.5 Current Transfer Ratio vs. Forward Current

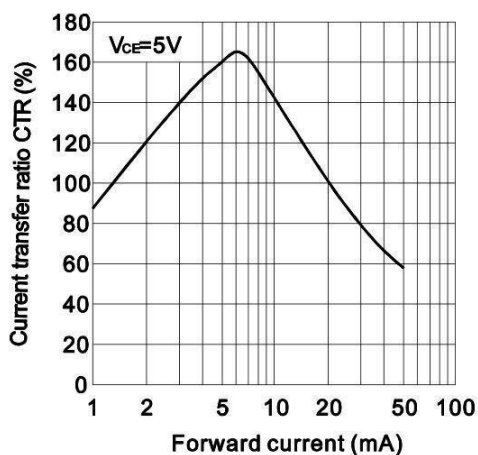


Fig.6 Collector Current vs. Collector-emitter Voltage

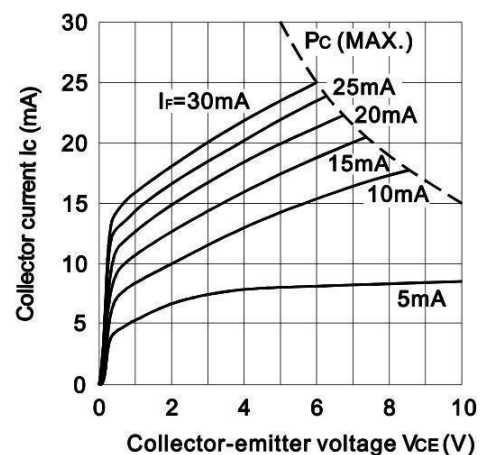


Fig.7 Relative Current Transfer Ratio vs. Ambient Temperature

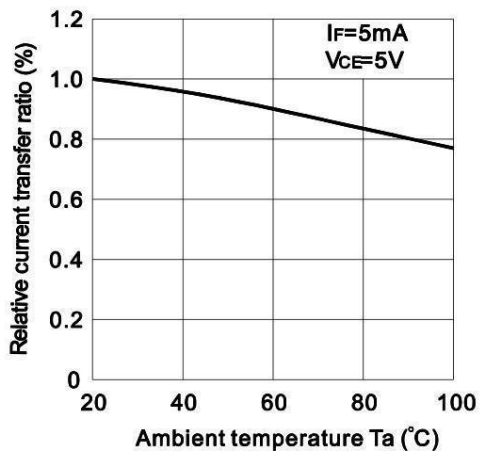


Fig.8 Collector-emitter Saturation Voltage vs. Ambient Temperature

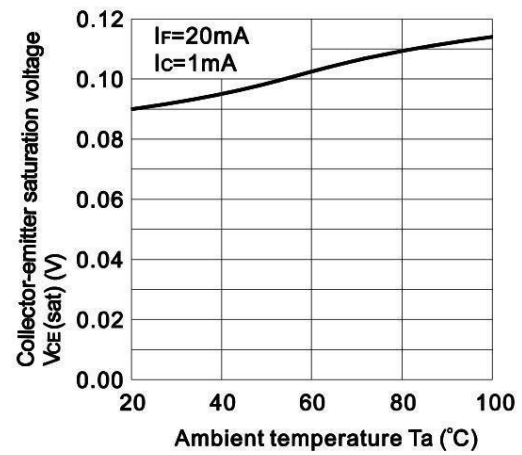


Fig.9 Collector Dark Current vs. Ambient Temperature

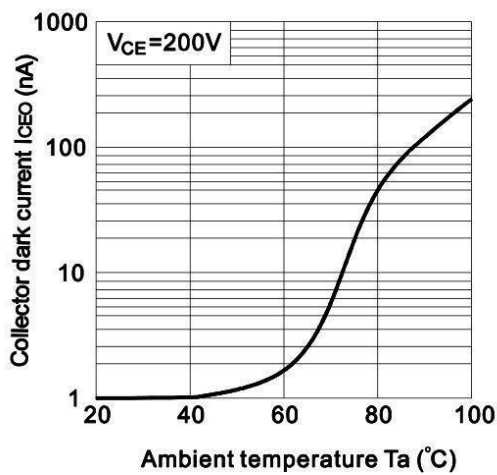


Fig.10 Response Time vs. Load Resistance

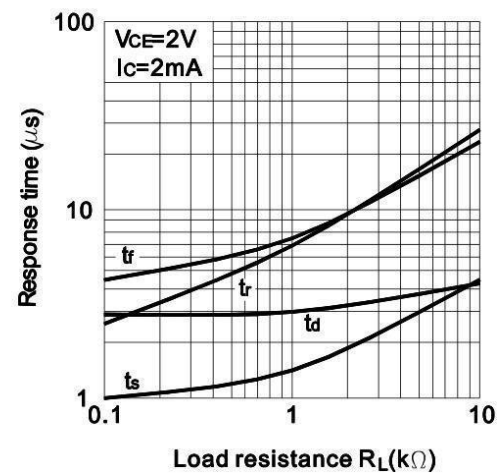
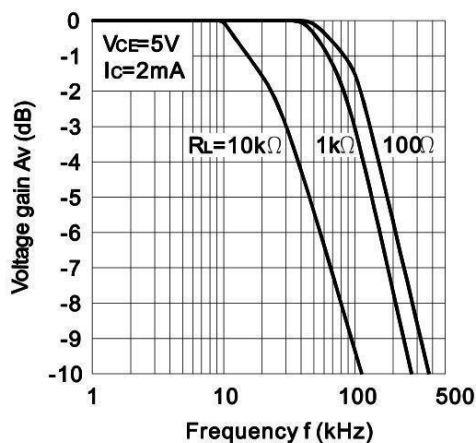
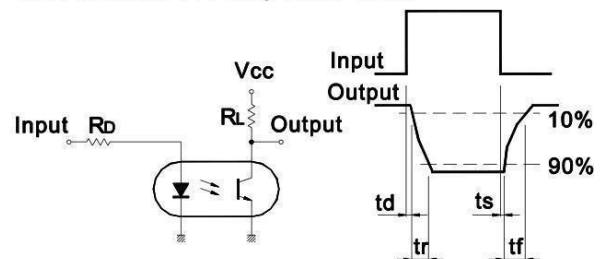


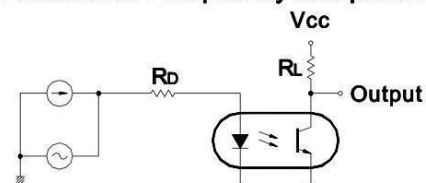
Fig.11 Frequency Response



Test Circuit for Response Time



Test Circuit for Frequency Response





15. 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.