



# ORIENT

## Photo coupler Product

### Data Sheet

Part Number: OR-10XX-(GK)

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

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

**SHENZHEN ORIENT COMPONENTS CO., LTD**

Block A 3rd Floor No.4 Building, Tian'an Cyber Park, Huangge Rd, LongGang Dist, Shenzhen, GD

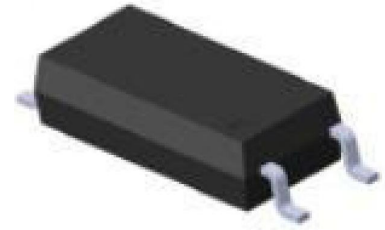
TEL: 0755-29681816

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

## 1. Features

- (1) Current transfer ratio: (CTR: 50~600% at  $I_F = 5\text{mA}$ ,  $V_{CE} = 5\text{V}$ )  
(CTR: 63~320% at  $I_F = 10\text{mA}$ ,  $V_{CE} = 5\text{V}$ )
- (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  $-55\text{ }^\circ\text{C}$  to  $125\text{ }^\circ\text{C}$
- (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



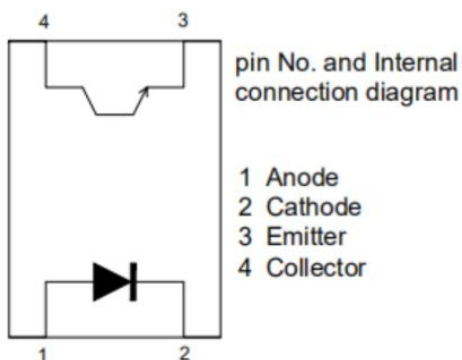
## 2. Description

The OR-10XX-(GK) 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	$V_{peak}$
Working Temperature		$T_{opr}$	-55 to + 125	°C
Deposit Temperature		$T_{stg}$	-55 to + 150	
*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	$\mu\text{A}$	$V_R=5\text{V}$
	Collector 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 attenuation Voltage	$BV_{CEO}$	80	---	---	V	$I_C=1\text{mA}$ $I_F=0\text{mA}$
	Emitter and Collector attenuation 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	$R_{iso}$	$10^{12}$	---	---	$\Omega$	DC500V 40~60%R.H.
	Floating Capacitance	$C_f$	---	0.3	---	pF	$V=0, f=1\text{MHz}$
	Response Time	$t_r$	---	3	18	$\mu\text{s}$	$V_{CC}=5\text{V},$ $I_C=2\text{mA}$ $R_L=100\Omega$
	Descend 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.	Typ.	Max.	Unit	Condition
OR-1000	50	—	600	%	IF=5mA, V <sub>CE</sub> =5V, Ta=25°C
OR-1001	100	—	160		
OR-1004	100	—	200		
OR-1005	50	—	150		
OR-1006	100	—	300		
OR-1007	80	—	160		
OR-1008	130	—	260		
OR-1009	200	—	400		
OR-1010	150	—	300		
OR-1019	250	—	500		
OR-1020	300	—	450		
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-(GK)**

**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).

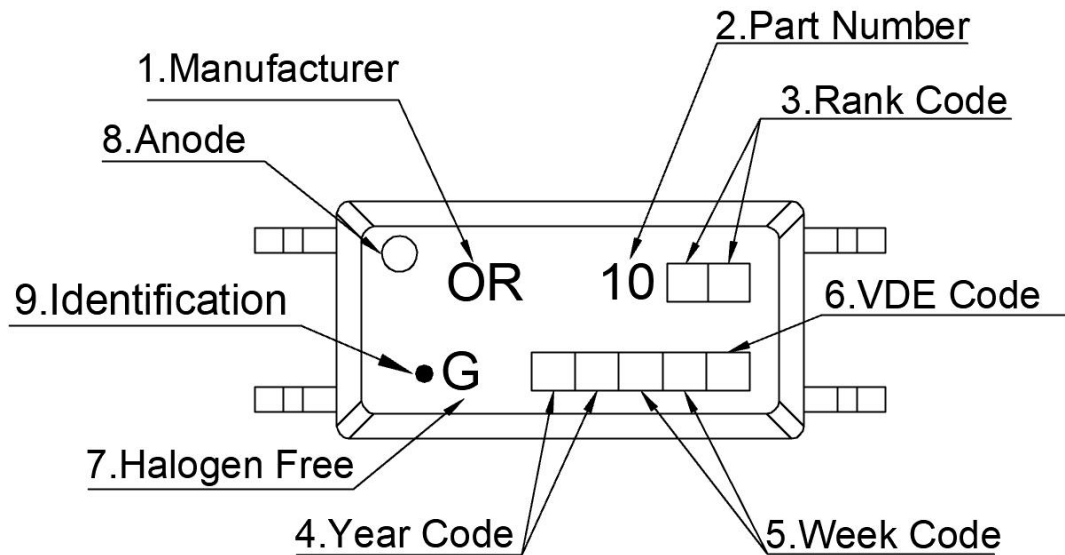
Z = 'G' code for Halogen free.

GK = Field code.

\* 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

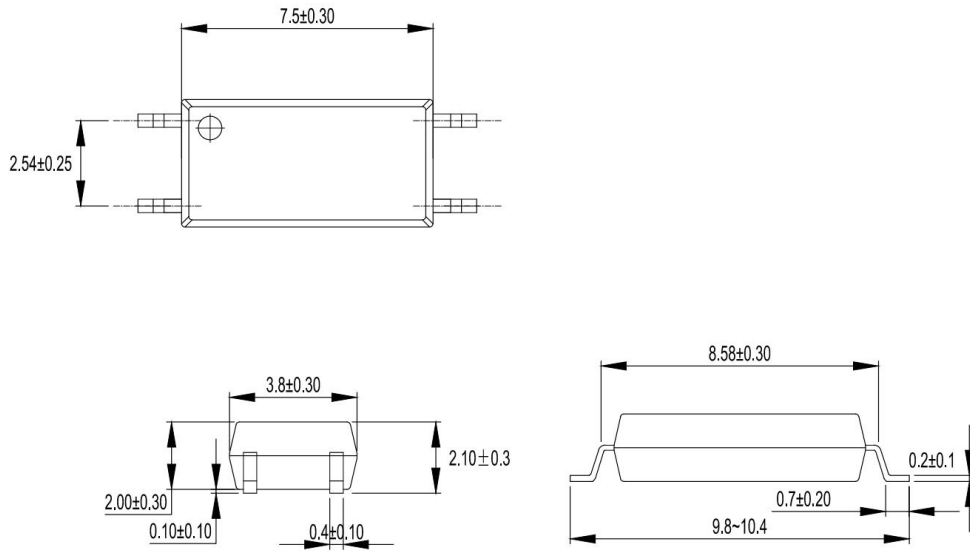
## 9. Naming Rule



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.
9. Identification.

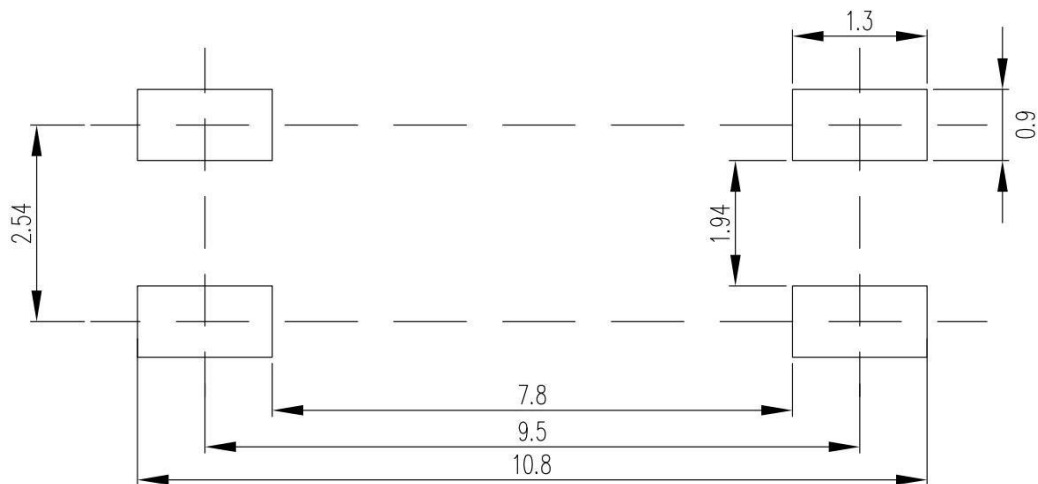
\* VDE Mark can be selected.

### 10.Package Dimension



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

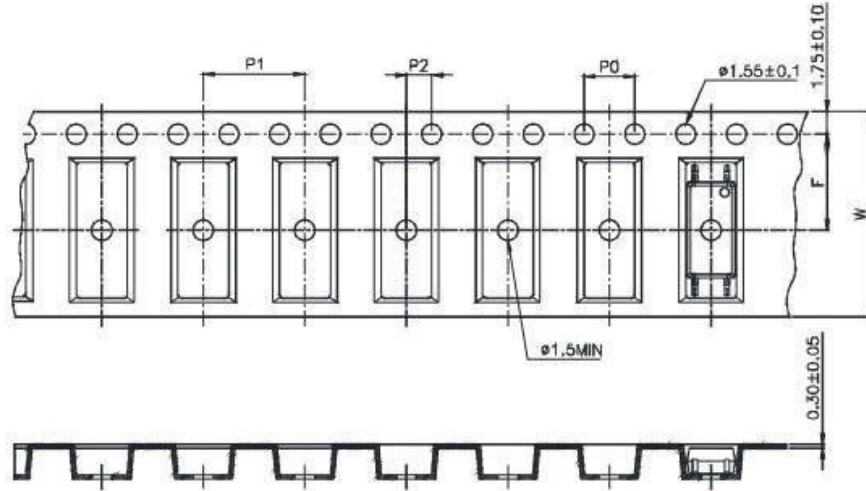
Unit:mm



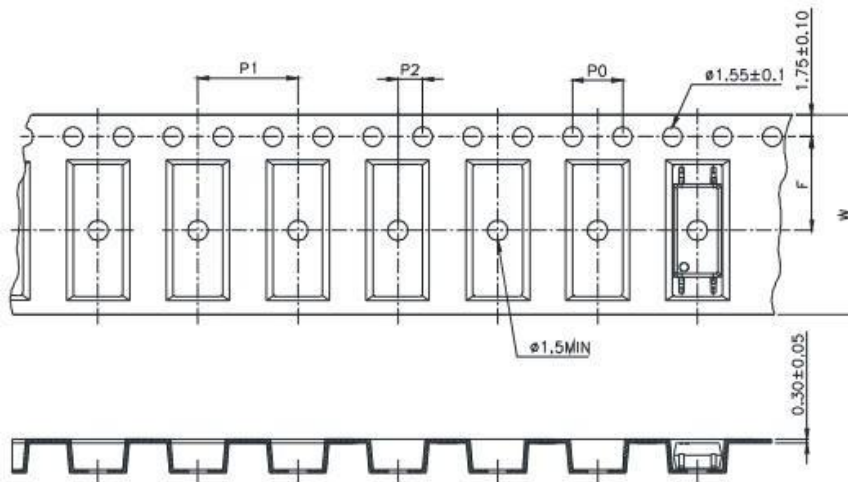


## 12. Taping Dimensions

### (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



The label sample includes the following elements:

- Logos:** ORIENT ShenZhen Orient Components Co.,LTD; VDE; UL; RoHS REACH.
- Material Code:** 120PCXXXXXX
- P/N:** OR-XXXXXX
- Lot No.:** XXXXXX-XXXX-TX-X
- D/C:** XXXX
- Qty:** XXXX PCS
- Inner Box Code:** 内箱码
- Outer Box Code:** 外箱码
- Barcode:** "XXXXXXXXXXXXXXXXXX" (一体机序列码)
- Origin:** Made in China

#### 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.

## 14. Reliability Test

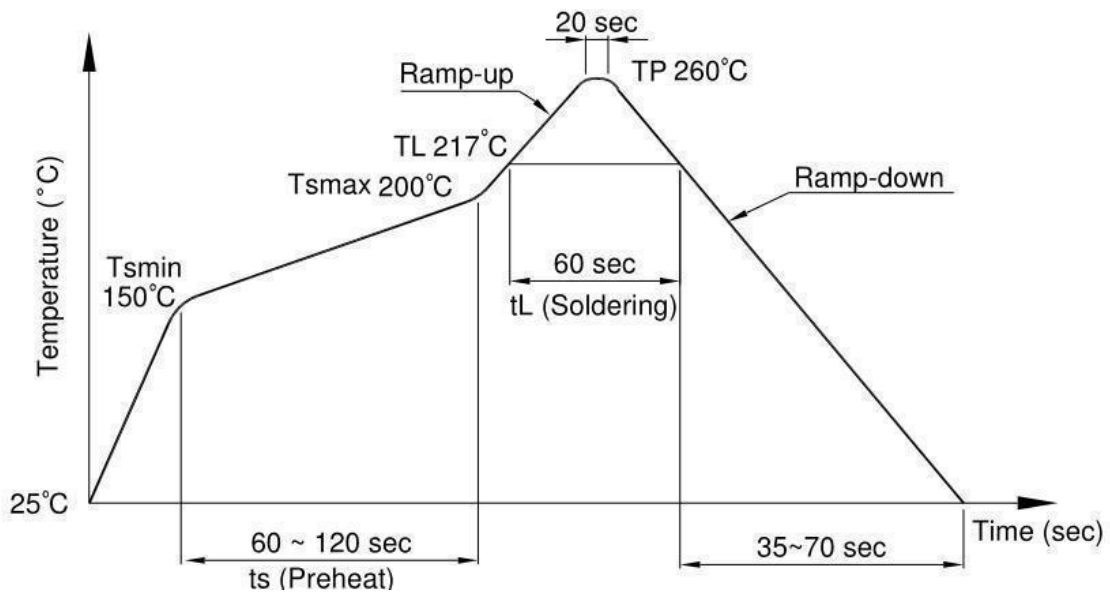
NO.	ITEMS	Reliability Testing				
		QTY. (Pcs)	Condition	Process	Device	Standard
1	RSH 耐焊接热	22	260±5℃	10s/3 次	锡炉	JESD22-A106
2	HTSL 高温存储	77	125℃	168 hrs	高温烤箱 测试仪	JESD22-A103
				500 hrs		
				1000 hrs		
3	LTSL 低温存储	77	-55℃	168 hrs	低温箱 测试仪	JESD22-A119
				500 hrs		
				1000 hrs		
4	TC 温度循环	77	H:125℃ 15min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

### 15. 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.

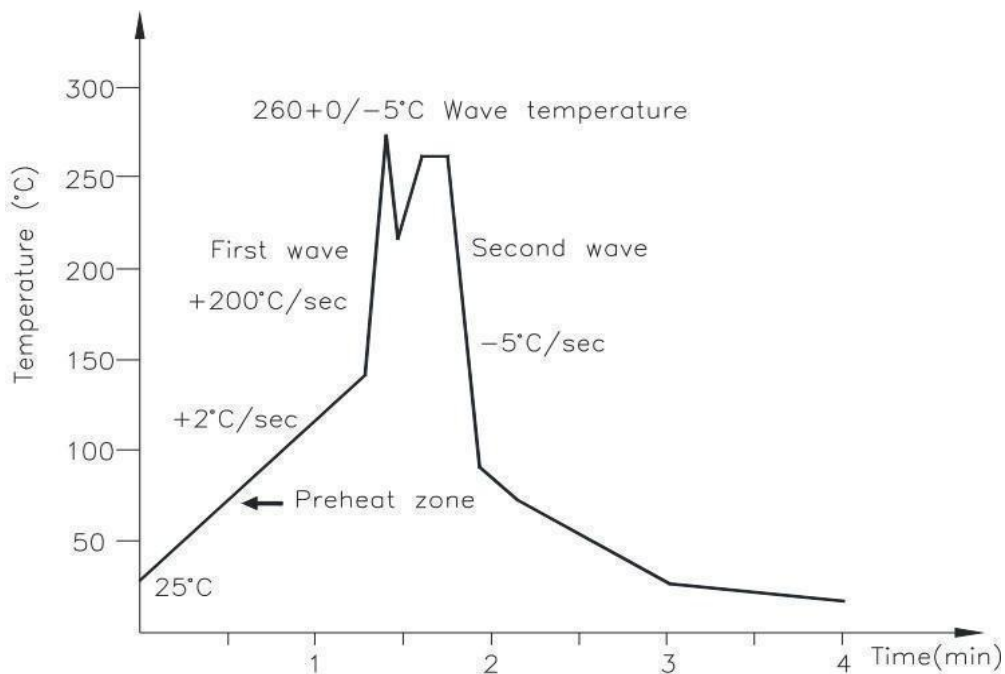
Profile item	Conditions
Preheat	
- Temperature Min (T Smin )	150°C
- Temperature Max (T Smax )	200°C
- Time (min to max) (ts)	90±30 sec
Soldering zone	
- Temperature (TL )	217°C
- Time (t L )	60 sec
Peak Temperature	260°C
Peak Temperature time	20 sec
Ramp-up rate	3°C / sec max.
Ramp-down rate from peak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

### 16.Characteristics Curves

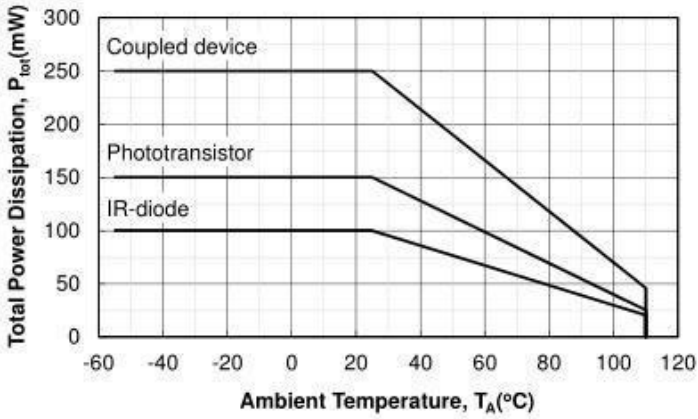


Figure 1.  $P_{tot}$  vs.  $T_A$

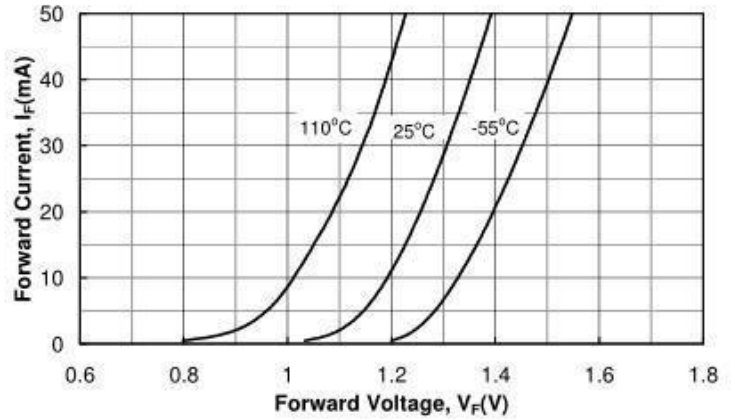


Figure 4.  $I_F$  vs.  $V_F$

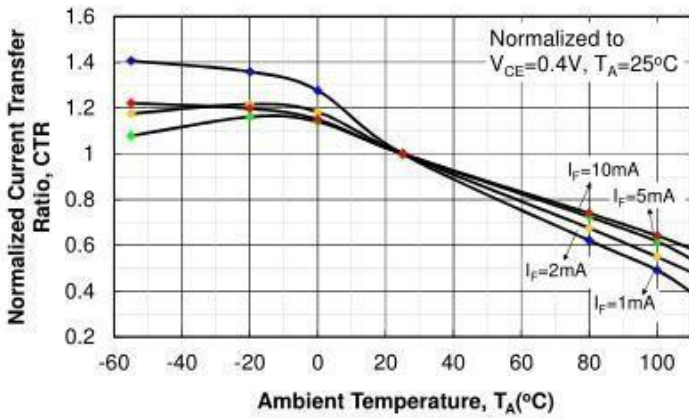


Figure 2. Saturated Normalized CTR vs.  $T_A$

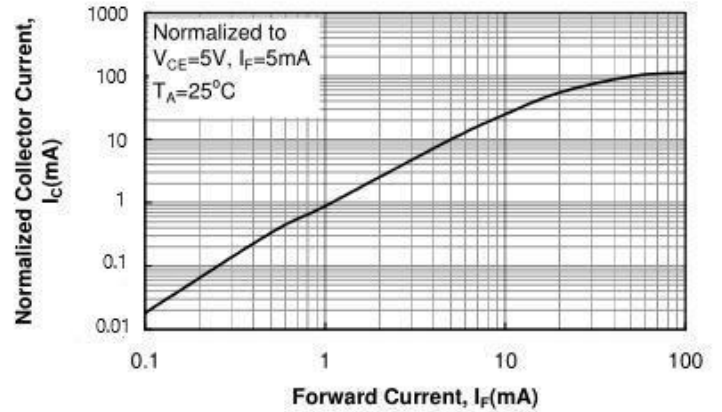


Figure 5. Normalized  $I_C$  vs.  $I_F$

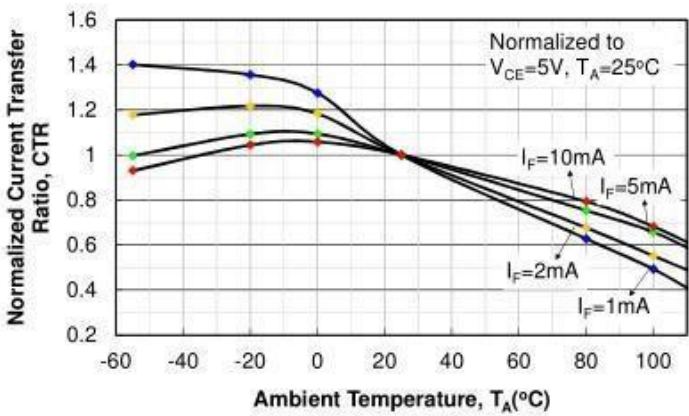


Figure 3. Non-saturated Normalized CTR vs.  $T_A$

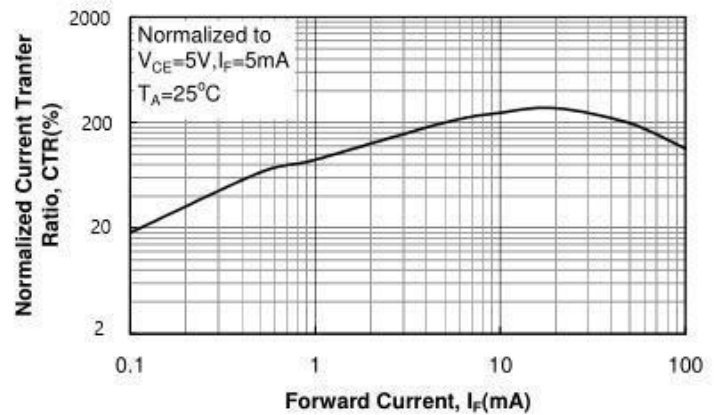


Figure 6. Normalized CTR vs.  $I_F$



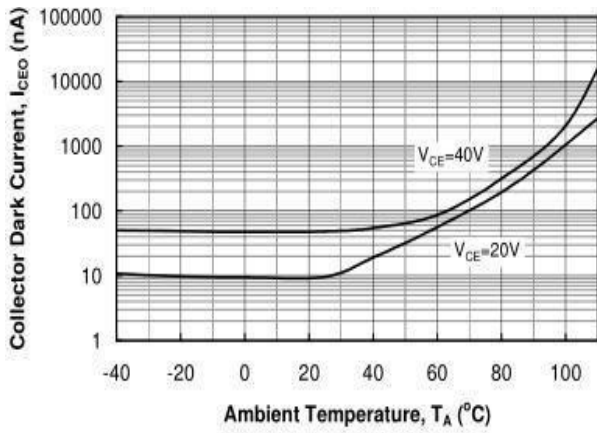


Figure 7.  $I_{CEO}$  vs.  $T_A$

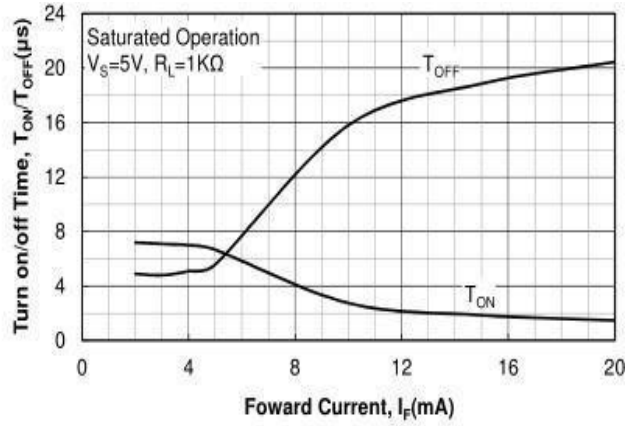


Figure 10.  $T_{ON} / T_{OFF}$  vs.  $I_F$

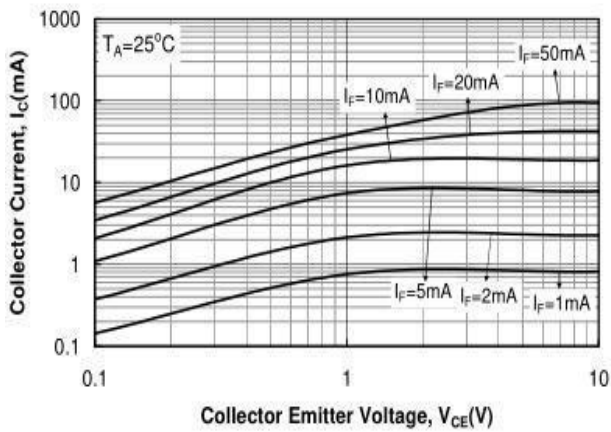


Figure 8.  $I_C$  vs.  $V_{CE}$

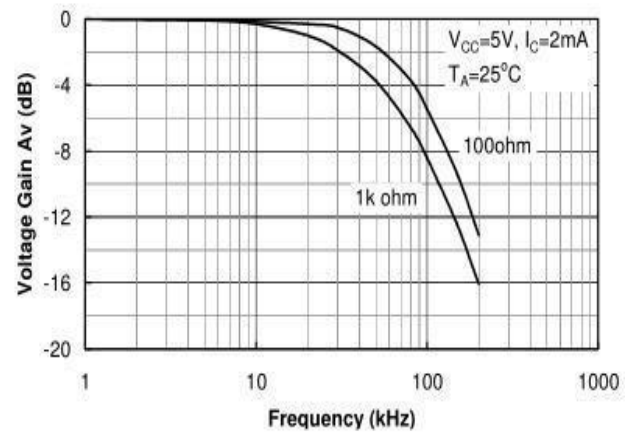


Figure 11. Frequency Response

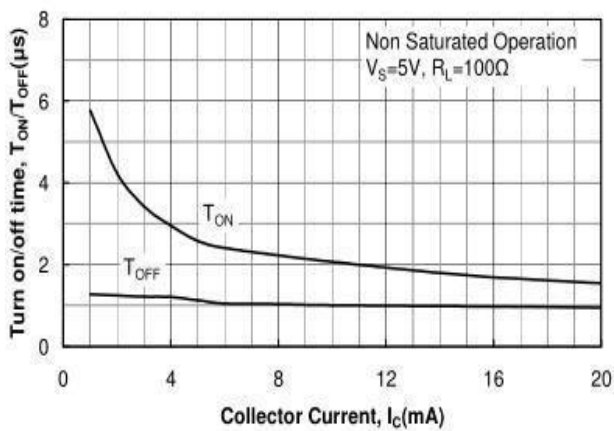


Figure 9.  $T_{ON} / T_{OFF}$  vs.  $I_C$