



ORIENT

Photo coupler

Product Data Sheet

Part Number: OR-3H7-4

Customer: _____

Date: _____

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1. Features

1. Current transfer ratio(CTR) : MIN. 50% at $I_F = 5\text{mA}$, $V_{CE} = 5\text{V}$, $T_a=25^\circ\text{C}$
2. High input-output isolation voltage. ($V_{ISO}=3,750\text{Vrms}$)
3. Collector and emitter Voltage : 80V(MIN)
4. Operating Temperature :-55 °C to 125 °C
5. In compliance with RoHS, REACH standards
6. MSL Class I

2. Instructions

The OR-3H7-4 series device contains four infrared led and four photo transistor detector.
They are encapsulated in a 16-pin SOP, free of halogens and Sb_2O_3

3. Application Range

1. Mixed PCB substrate requiring high density installation
2. Programmable controller
3. System apparatus and measuring instruments

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

Parameter		Symbol	Rated Value	Unit
Input	Forward Current	I_F	50	mA
	Peak forward current($t=10\mu\text{s}$)	I_{FM}	1	A
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	70	mW
	Junction Temperature	T_j	125	°C
Output	Collector and emitter Voltage	V_{CEO}	80	V
	Emitter and collector Voltage	V_{ECO}	7	
	Collector Current	I_C	50	mA
	Power Dissipation	P_C	100	mW
	Junction Temperature	T_j	125	°C
Total Power Dissipation		P_{tot}	170	mW
*1 Insulation Voltage		V_{iso}	3750	Vrms
Rated Impulse Insulation Voltage		V_{IORM}	630	V
Operating Temperature		T_{opr}	-55 to + 125	°C
Storage Temperature		T_{stg}	-55 to + 150	
*2 Soldering Temperature		T_{sol}	260	

*1. AC For 1 Minute, R.H. = 40 ~ 60%

Isolation voltage shall be measured using the following method.

- (1) Short between anode and cathode on the primary side and between collector and emitter on the secondary side
- (2) The isolation voltage tester with zero-cross circuit shall be used.
- (3) The waveform of applied voltage shall be a sine wave.

*2.soldering time is 10 seconds

5. Opto-electronic Characteristics(Normal Temperature=25°C)

	Parameter	Symbol	Min	Typ.*	Max	Unit	Condition
Input	Forward Voltage	V_F	---	1.2	1.4	V	$I_F=20\text{mA}$
	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 Dark Current	I_{CEO}	---	---	100	nA	$V_{CE}=20\text{V}$ $I_F=0\text{mA}$
	Collector-Emitter Breakdown Voltage	BV_{CEO}	80	---	---	V	$I_C=0.1\text{mA}$ $I_F=0\text{mA}$
	Emitter-Collector Breakdown Voltage	BV_{ECO}	7	---	---	V	$I_E=0.1\text{mA}$ $I_F=0\text{mA}$
Transforming Characteristics	*1 Current Transfer Ratio	CTR	50	---	600	%	$I_F=5\text{mA}$ $V_{CE}=5\text{V}$
	Collector Current	I_C	2.5	---	30	mA	
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	---	---	0.4	V	$I_F=8\text{mA}$ $I_C=2.4\text{mA}$
	Insulation Impedance	R_{iso}	5×10^{10}	1×10^{11}	---	Ω	DC 500V 40~60%R.H.
	Floating Capacitance	C_f	---	0.6	1	pF	$V=0, f=1\text{MHz}$
	Response Time	t_r	---	2	18	μs	$V_{CE}=5\text{V},$ $I_C=2\text{mA},$ $R_L=100\Omega,$ $f=100\text{Hz}$
	Descend Time	t_f	---	3	18	μs	

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

6. Rank table of current transfer ratio CTR

MODEL NO.	CTR Rank	Min.	Max.	Condition	Unit
OR-3H7-4	GB	100	400	IF=5mA, V _{CE} =5V, Ta=25°C	%
	No Mark	50	600	IF=5mA, V _{CE} =5V, Ta=25°C	%

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

7. Order Information

Part Number

OR-3H7-4X-W-Y-Z

Note

X = CTR Rank(GB or None).

W = Tape and reel option (TA1 or TA).

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

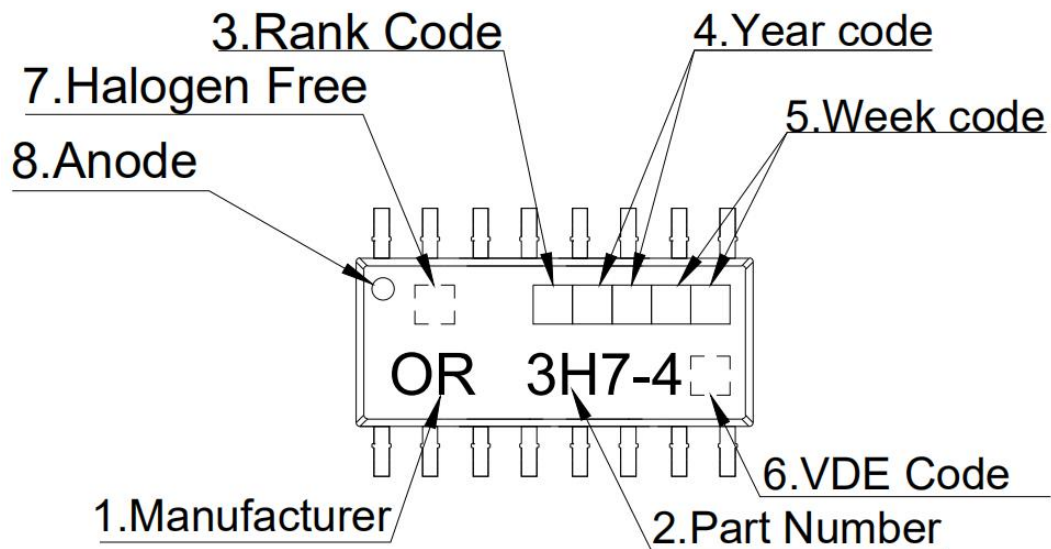
Z = 'G' code for Halogen free (This options is not necessary).

* VDE Code can be selected.

* Halogen Free Code can be selected.

Option	Description	Packing quantity
TA1	Surface mount lead form (low profile) + TA1 tape & reel option	2000 units per reel
TA	Surface mount lead form (low profile) + TA tape & reel option	2000 units per reel

8. Naming Rule

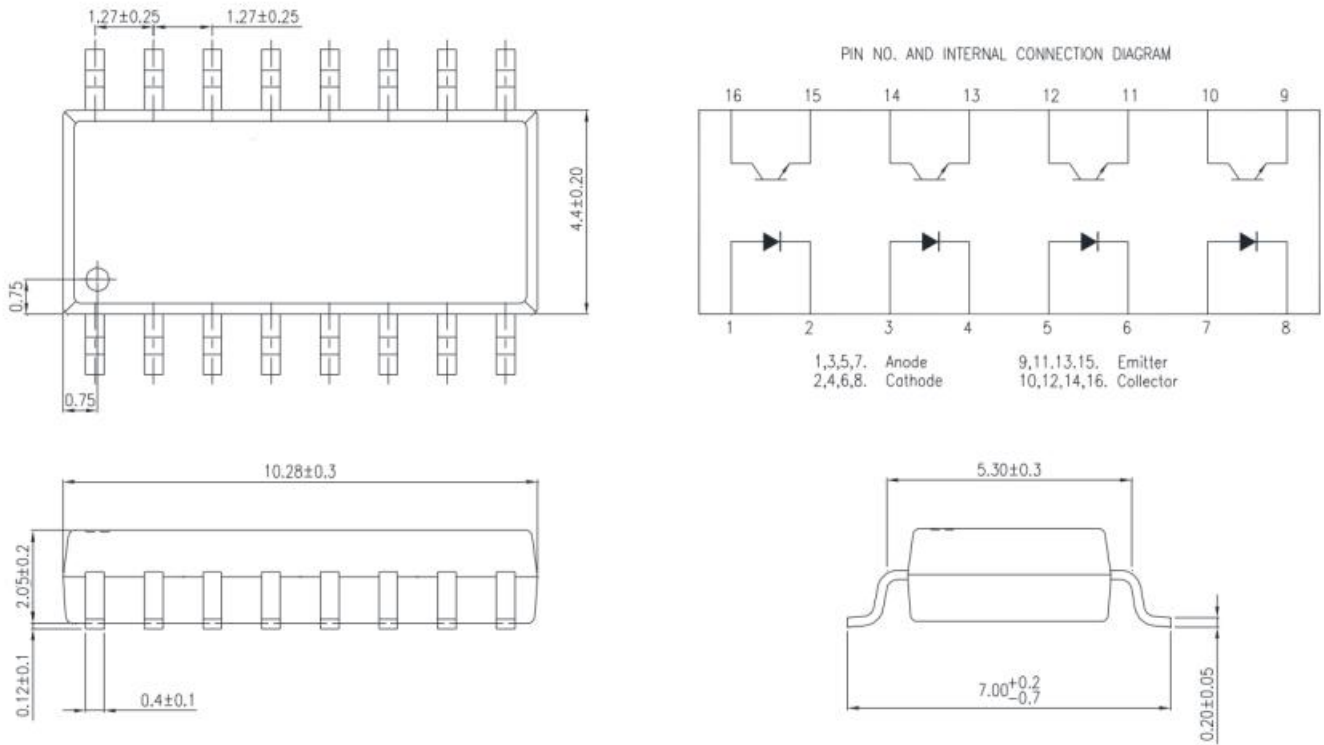


1. Manufacturer : ORIENT.
2. Part Number : 3H7-4.
3. Rank Code : CTR Rank
4. Year Code : '21' means '2021' and so on.
5. Week Code : 01 means the first week, 02 means the second week and so on.
6. VDE Code .
7. HF Code : Halogen Free.
8. Anode.

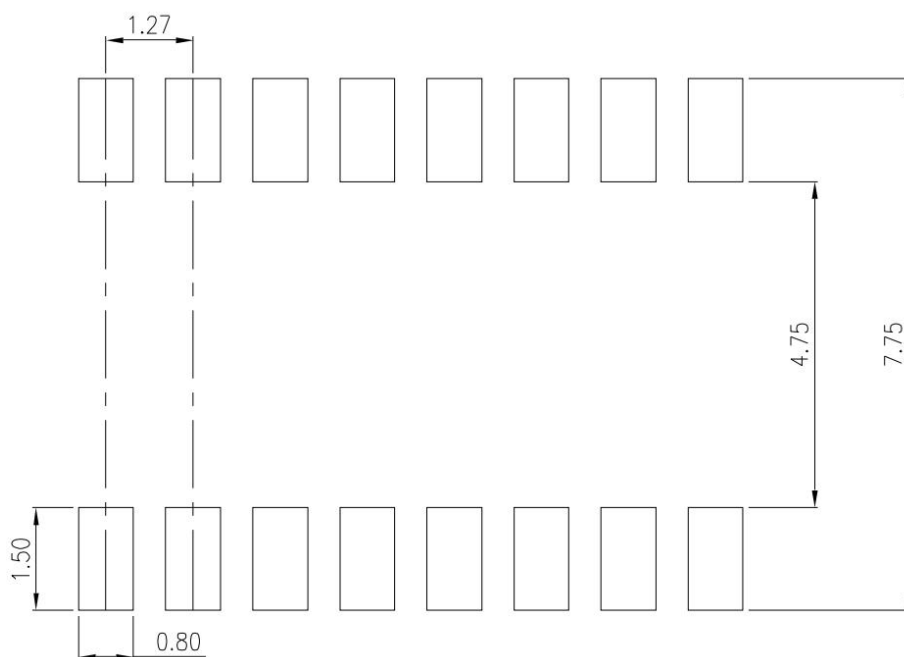
* Halogen Free Mark can be selected.

* VDE Mark can be selected.

9. Outer Dimension

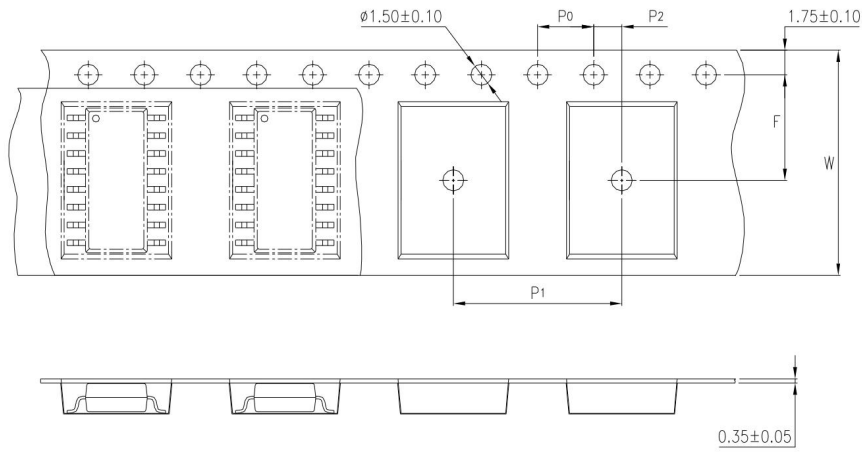


10. Recommended Foot Print Patterns (Mount Pad) (Unit:mm)

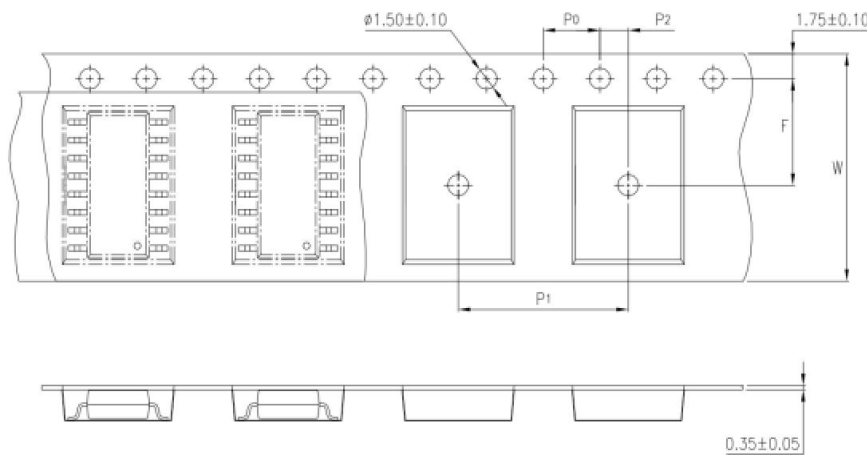


11. Taping Dimensions

(1)OR-3H7-4-TA1



(2)OR-3H7-4-TA



type	Symbol	Dimensions: mm (in.)
bandwidth	W	16±0.3 (0.47)
pitch	P0	4±0.1 (0.15)
pitch	F	7.5±0.1 (0.217)
	P2	2±0.1 (0.079)
interval	P1	12±0.1 (0.315)

Encapsulation type	TA1/TA
Quantity (pieces)	2000

12. Package Dimension

(1) package dimension

Packing Information	
Packing type	Reel type
Tape Width	16mm
Qty per Reel	2000
Small box (inner) Dimenaion	345*345*60mm
Max qty per small box	4000
Large box (Outer) Dimenaion	620x360x360mm
Max qty per large box	40000

(2)Packing Label Sample



1. MTL NO:Contents with "Order Information" in the specification.
2. LOT NO:The production cycle of the product.
3. BATCH:The CTR RANK of the product.
4. Quantity:Product packaging quantity.
5. Product Data: The data when product be made.

13. Reliability Test

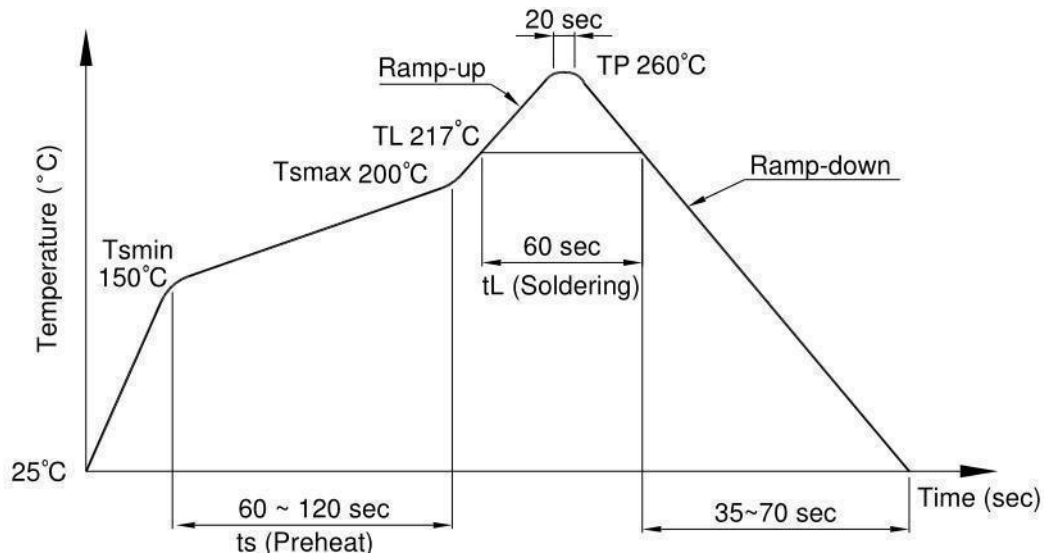
NO.	Reliability Testing				
	ITEMS	QTY. (Pcs)	Condition	Process	Standard
1	RSH	22	260±5°C	10s/3 times	JESD22-A106
2	HTSL	77	125°C	168 hrs	JESD22-A103
				500 hrs	
				1000 hrs	
3	LTSL	77	-55°C	168 hrs	JESD22-A119
				500 hrs	
				1000 hrs	
4	TC	77	H:125°C 15min ∫ 5min L:-55°C 15min	300 cycle	JESD22-A104
5	TS	77	H:100°C 5min ∫ 15s L:-40°C 5min	300 cycle	JESD22-A106
6	HTOL	77	110°C IF=10mA Vce=5V	168 hrs	JESD22-A108
				500 hrs	
				1000 hrs	
7	ESD-HBM	22	≥8KV 1Cycle	1 time	JESD22-A114
8	SD	22	Pb-free 260±5°C	5S/1 time	JESD22-B102
9	HTRB	77	@125°C Vce=80v	168 hrs	JESD22-A103
				500 hrs	
				1000 hrs	
10	H3TRB	77	85°C,85%RH Vce=80v	168 hrs	JESD22-A101
				500 hrs	
				1000 hrs	
11	Autoclave	77	Ta=121°C,100%RH,2atm	168h	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.

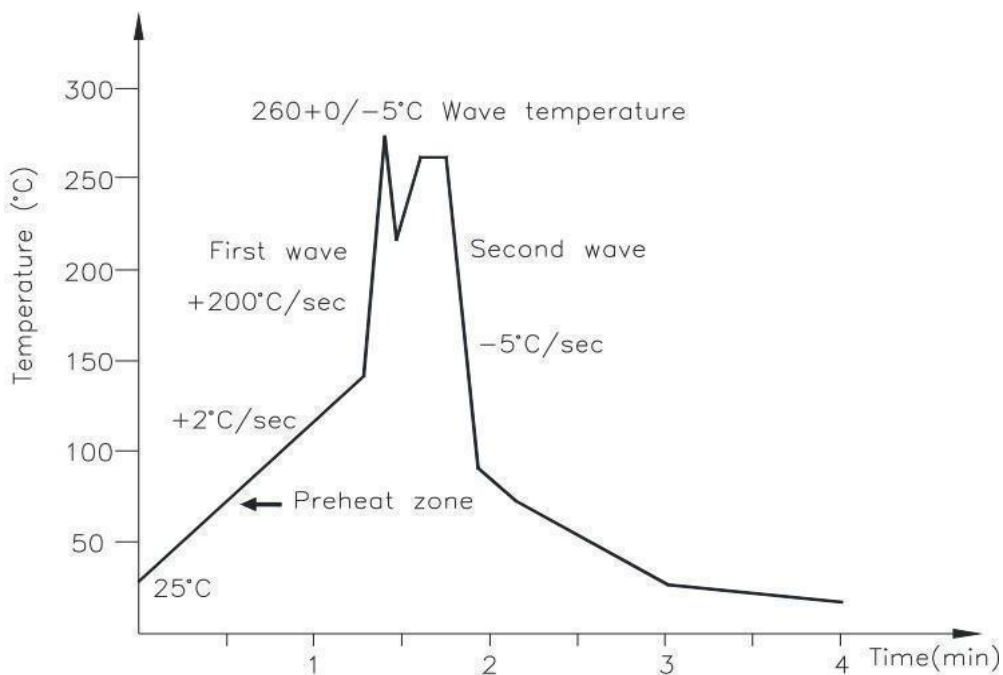
Profile item	Conditions
Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts)	150°C 200°C 90±30 sec
Soldering zone - Temperature (TL) - Time (t L)	217°C 60 sec
Peak Temperature	260°C
Peak Temperature time	20 sec
Ramp-up rate	3°C / sec max.
Ramp-down rate from peak temperature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

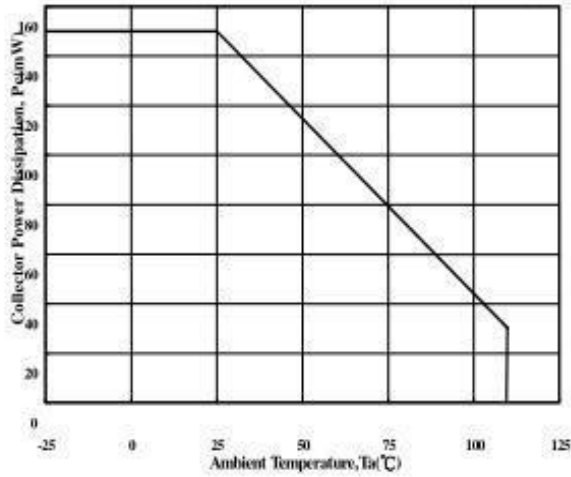


Figure 2. Forward Current vs. Ambient Temperature

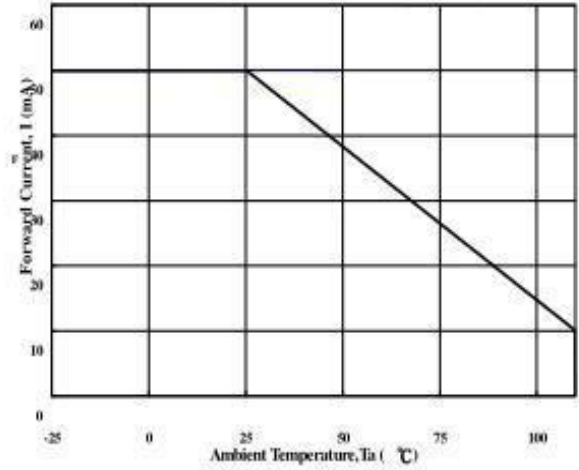


Figure 3. Forward Current vs. Forward Voltage

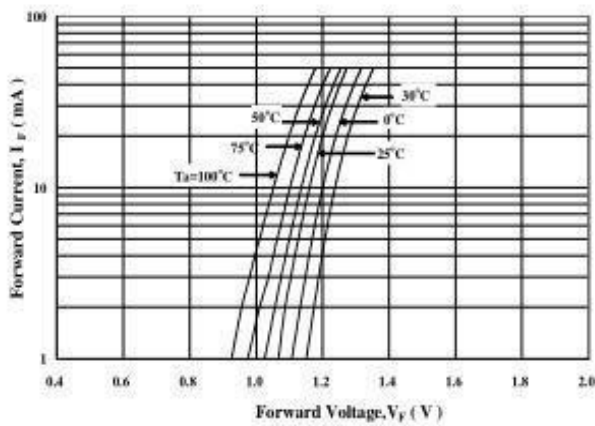


Figure 4. Forward Voltage Temperature Coefficient vs. Forward Current

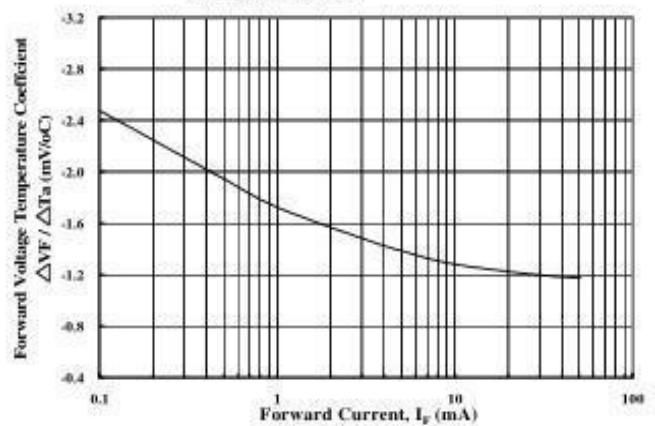


Figure 5. Pulse Forward Current vs. Duty Cycle Ratio

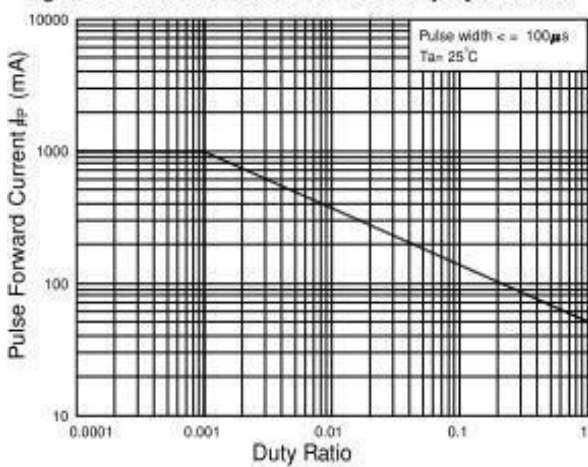


Figure 6. Pulse Forward Current vs. Pulse Forward

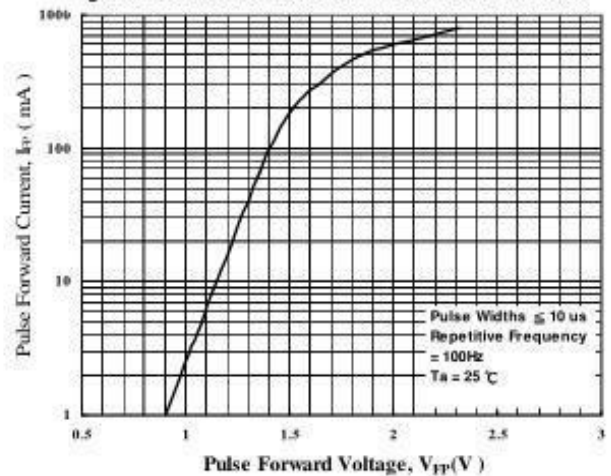


Figure 7. Collector-Emitter Saturation Voltage vs. Forward

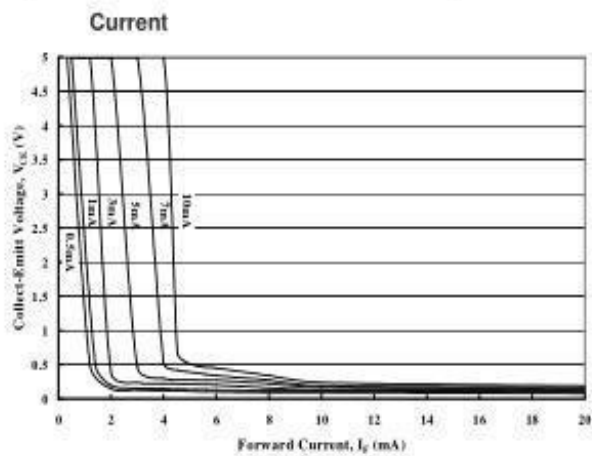


Figure 8. Collector Current vs. Collector-Emitter

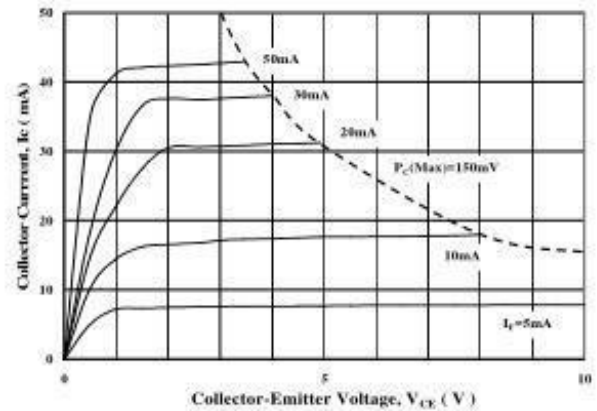


Figure 9. Collector Current vs. Small Collector-Emitter

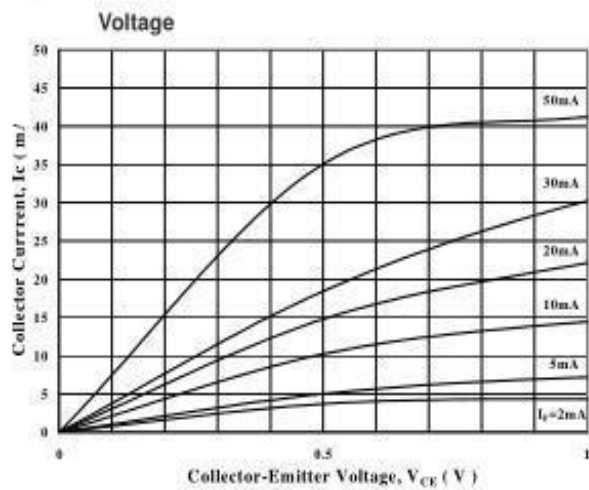


Figure 10. Normalized CTR vs. Forward Current

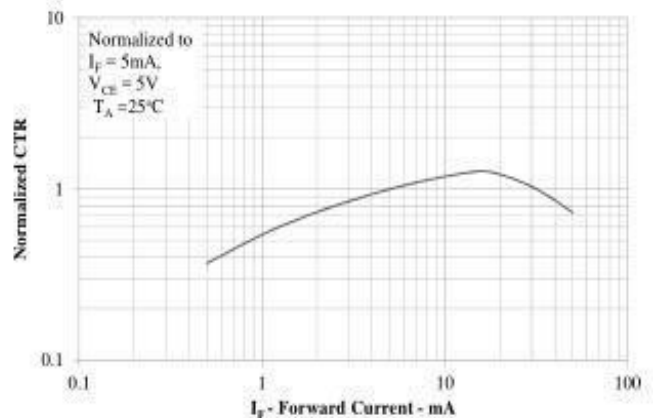


Figure 11. Collector Dark Current vs. Ambient Temperature

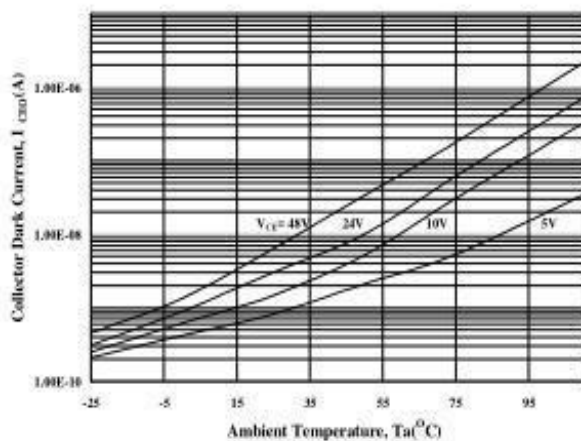


Figure 12. Current Transfer Ratio vs. Forward

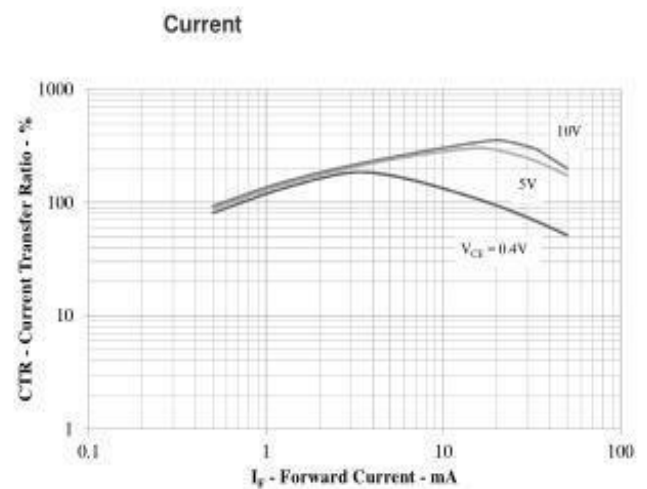


Figure 13. Normalized CTR vs. Ambient Temperature

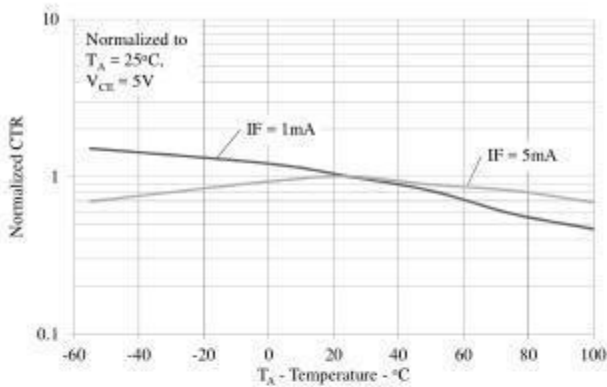


Figure 14. Collector-Emitter Saturation Voltage vs. Ambient Temperature

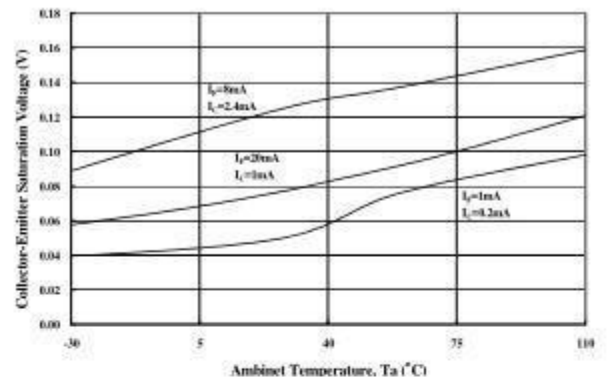


Figure 15. Collector Current vs. Ambient Temperature

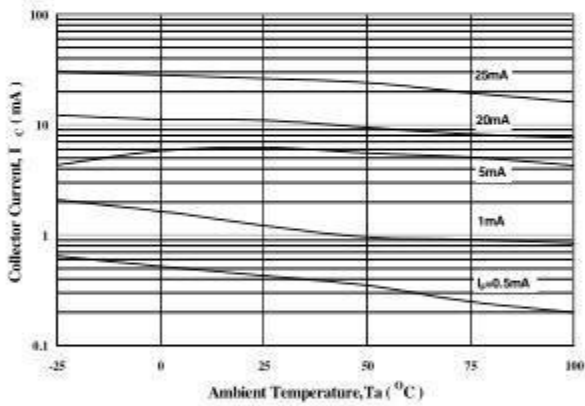


Figure 16. Switching Time vs. Load Resistance

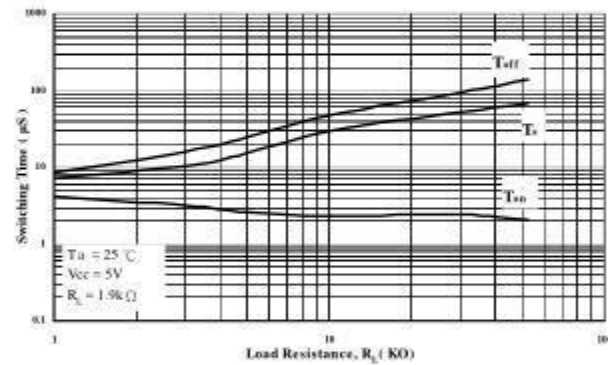


Figure 17. Switching Time vs. Ambient Temperature

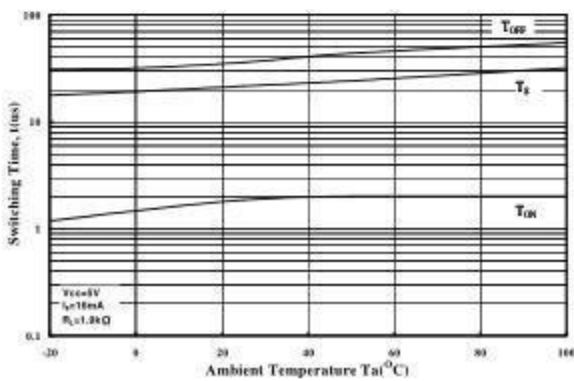


Figure 18. Frequency Response

