1. Features

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

2. Instructions

The SL-247-4 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℃)

Parameter		Symbol	Rated Value	Unit
Input	Forward Current	I_F	50	mA
	Peak forward current(t=10us)	I_{FM}	1	A
	Reverse Voltage	V_R	6	V
	Power Dissipation	P	70	mW
	Junction Temperature	T_j	125	℃
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	℃
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	℃
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.

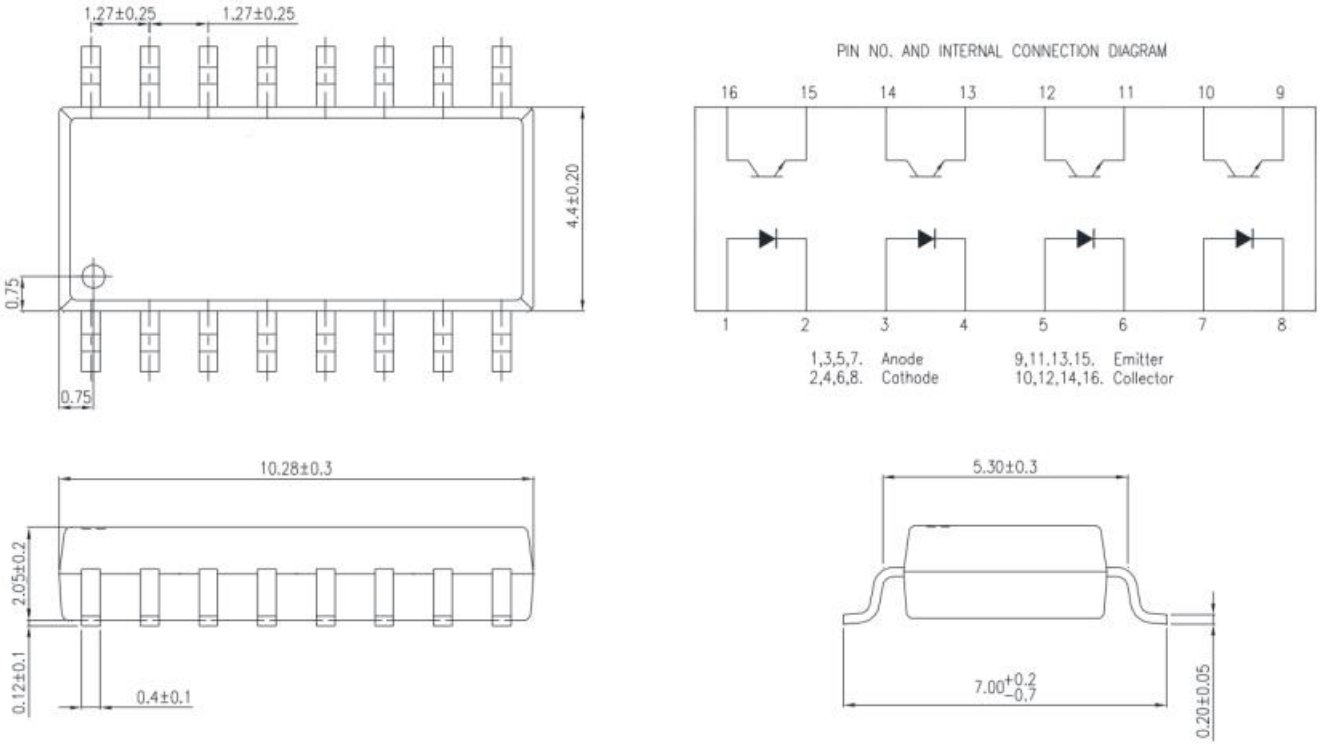
*2.soldering time is 10 seconds

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

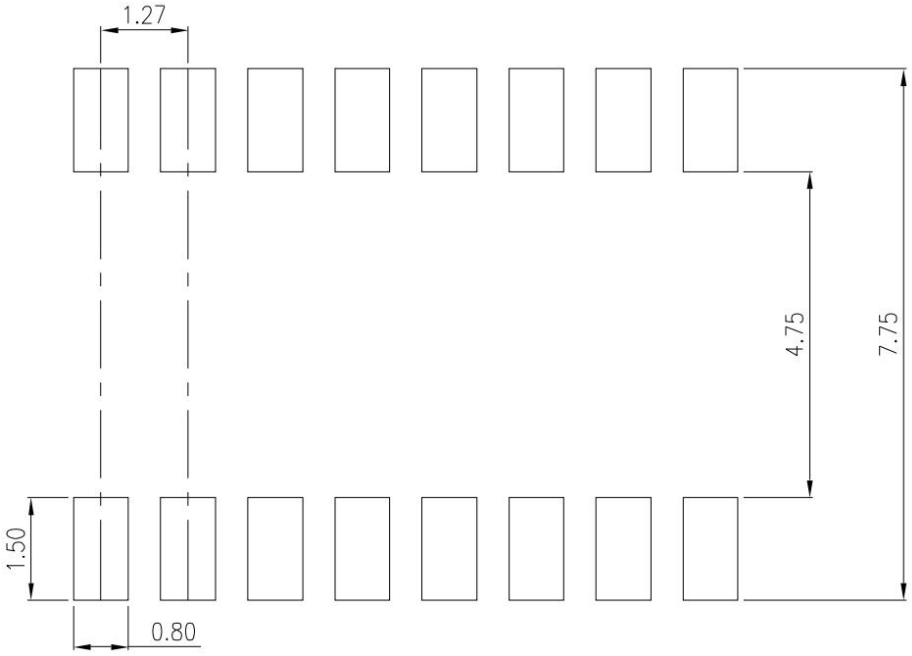
Parameter		Symbol	Min	Typ.*	Max	Unit	Condition
Input	Forward Voltage	V_F	---	1.2	1.4	V	I_F=20mA
	Reverse Current	I_R	---	---	5	μA	V_R=5V
	Terminal Capacitance	C_t	---	30	250	pF	V=0, f=1KHz
Output	Collector Dark Current	I_{CEO}	---	---	100	nA	V_{CE}=20V I_F=0mA
	Collector-Emitter Breakdown Voltage	BV_{CEO}	80	---	---	V	I_C=0.1mA I_F=0mA
	Emitter-Collector Breakdown Voltage	BV_{ECO}	7	---	---	V	I_E=0.1mA I_F=0mA
Transforming Characteristics	*1 Current Transfer Ratio	CTR	50	---	600	%	I_F=5mA V_{CE}=5V
	Collector Current	I_C	2.5	---	30	mA	
	Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	---	---	0.4	V	I_F=8mA I_C= 2.4mA
	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=1MHz
	Response Time	t_r	---	2	18	μs	V_{CE}=5V, I_C=2mA, R_L=100Ω, f=100Hz
	Descend Time	t_f	---	3	18	μs	

- Current Conversion Ratio = I_C / I_F × 100%

6. Outer Dimension

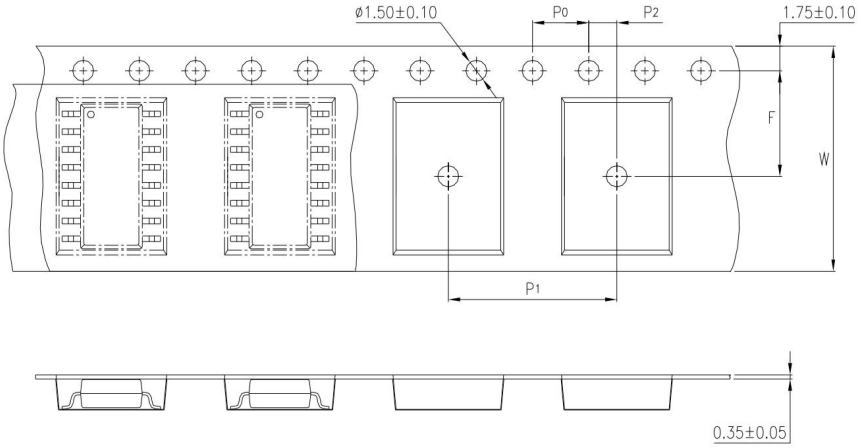


7. Recommended Foot Print Patterns (Mount Pad) (Unit:mm)



8. Taping Dimensions

SL-247-4



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)

9. Reliability Test

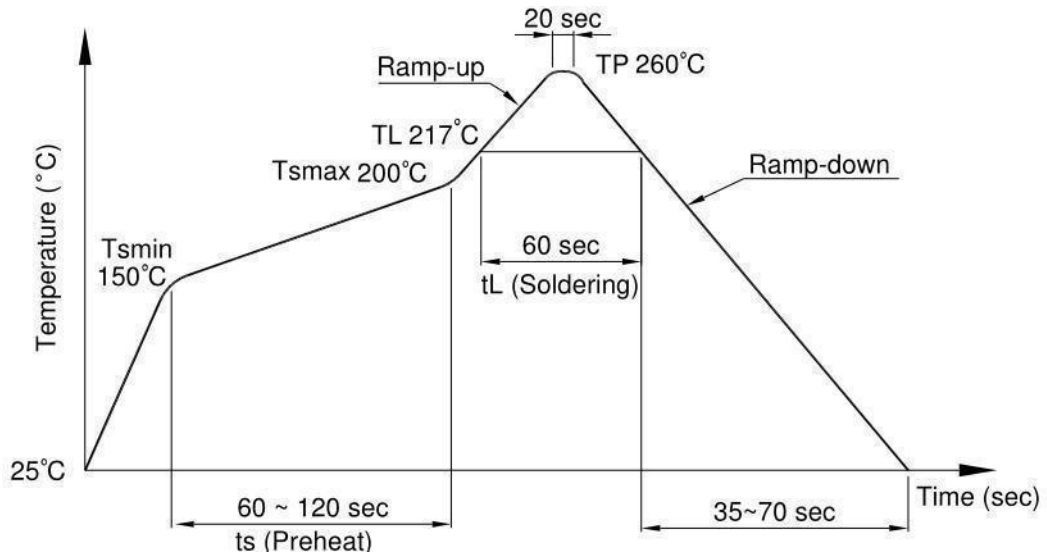
NO.	ITEMS	Reliability Testing				
		QTY. (Pcs)	Condition	Process	Device	Standard
1	RSH 耐焊接热	22	260±5℃	10s/3 次	锡炉	JESD22-A106
2	HTSL 高温存储	77	125℃	168 hrs 500 hrs 1000 hrs	高温烤箱 测试仪	JESD22-A103
3	LTSL 低温存储	77	-55℃	168 hrs 500 hrs 1000 hrs	低温箱 测试仪	JESD22-A119
4	TC 温度循环	77	H:125℃ 15min ∫ 5min L:-55℃ 15min	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 500 hrs 1000 hrs	高温烤箱 测试仪、老 化电路板	JESD22-A108
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 500 hrs 1000 hrs	高温烤箱 ，测试仪	JESD22-A103
10	H3TRB 温湿度反向偏 压，寿命试验	77	H3TRB 85℃,85%RH Vce=80v	168 hrs 500 hrs 1000 hrs	恒温恒湿 机，测试仪	JESD22-A101
11	Autoclave 压力锅	77	Ta=121 ℃,100%RH,2atm	96hrs	压力锅	JESD22-A102

10. 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.

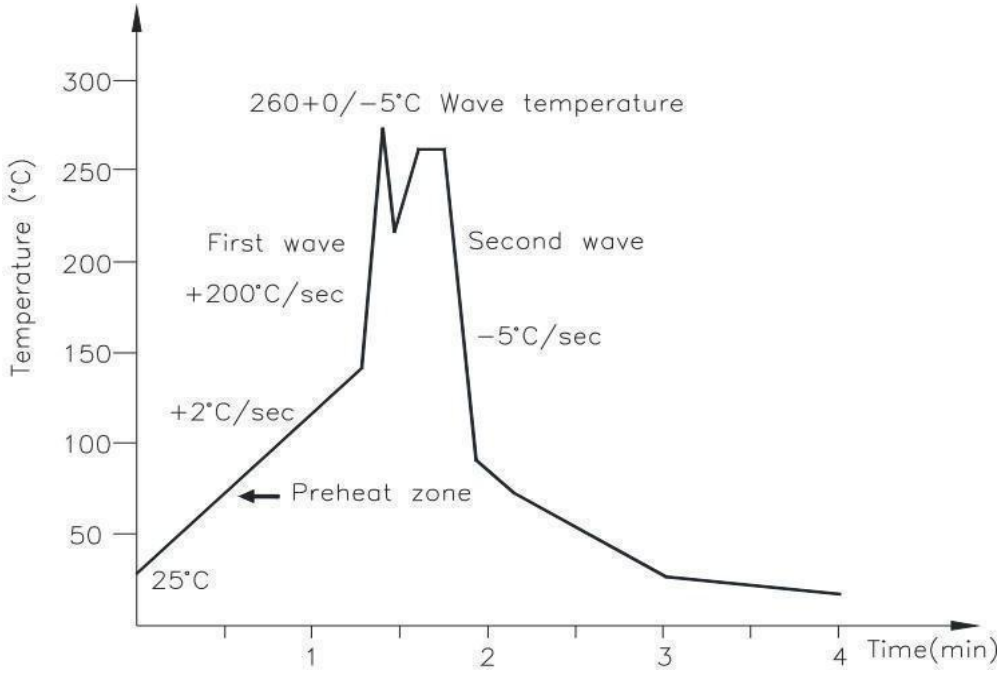
Profile item	Conditions
Preheat - Temperature Min (T Smin) - Temperature Max (T Smax) - Time (min to max) (ts)	 150˚C 200˚C 90±30 sec
Soldering zone - Temperature (TL) - Time (t L)	 217˚C 60 sec
Peak Temperature	260˚C
Peak Temperature time	20 sec
Ramp-up rate	3˚C / sec max.
Ramp-down rate from peak temperature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



(2).Wave soldering (JEDEC22A111 compliant)

One time soldering is recommended within the condition of temperature.

Temperature Time	260+0/-5˚C 10 sec
Preheat temperature Preheat time	25 to 140˚C 30 to 80 sec



(3).Hand soldering by soldering iron

Allow single lead soldering in every single process. One time soldering is recommended.

Temperature Time	380+0/-5˚C 3 sec max

11. Characteristics Curve

Figure 1. Collector Power Dissipation vs. Ambient Temperature

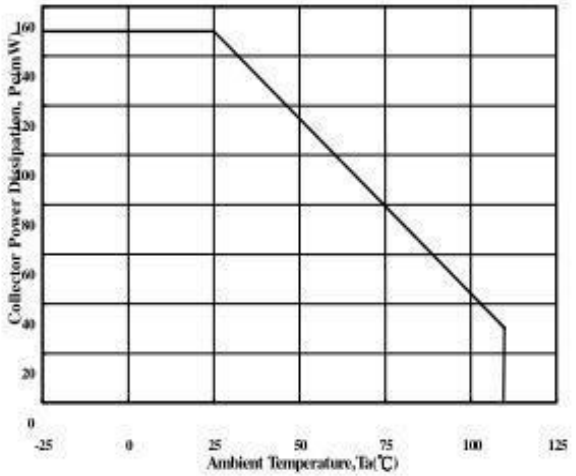


Figure 2. Forward Current vs. Ambient Temperature

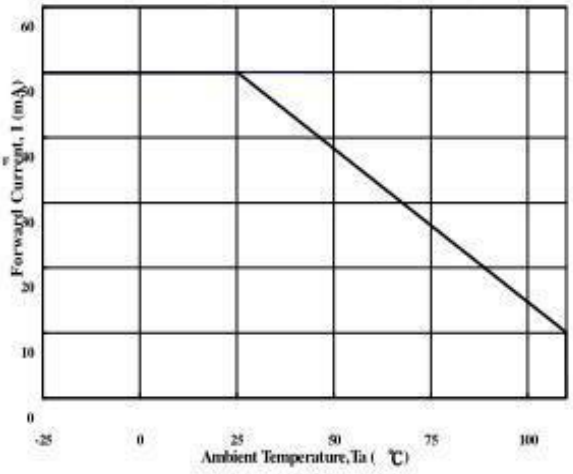


Figure 3. Forward Current vs. Forward Voltage

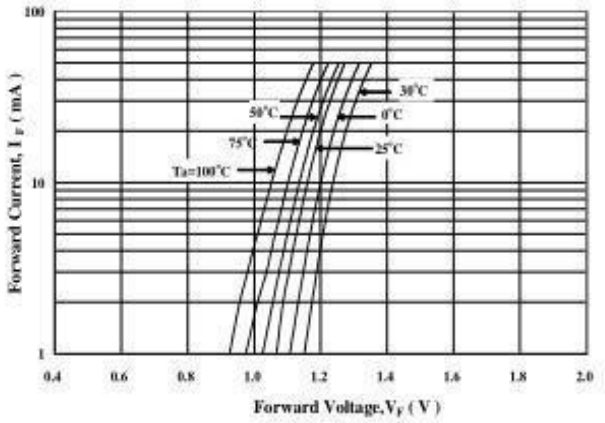


Figure 4. Forward Voltage Temperature Coefficient vs. Forward Current

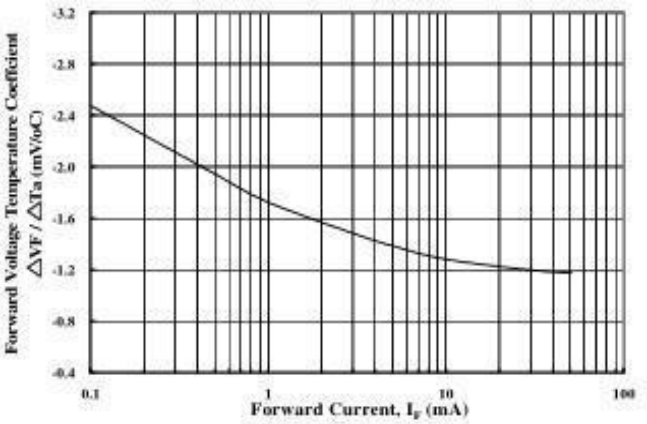


Figure 5. Pulse Forward Current vs. Duty Cycle Ratio

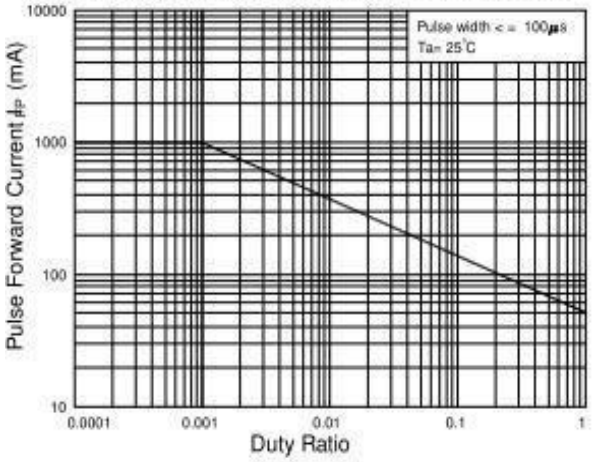


Figure 6. Pulse Forward Current vs. Pulse Forward

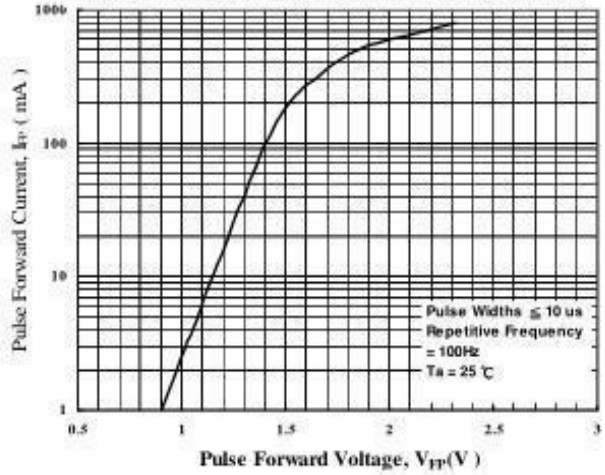


Figure 7. Collector-Emitter Saturation Voltage vs. Forward Current

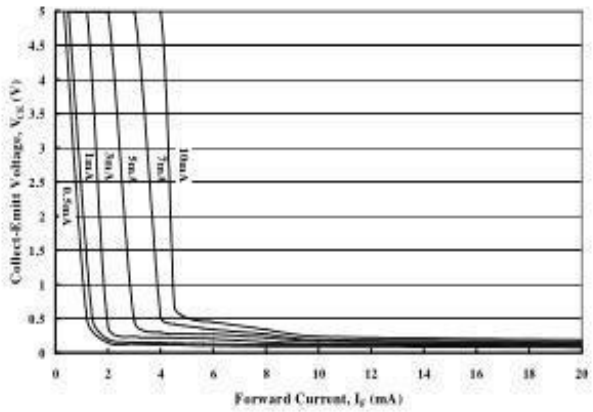


Figure 8. Collector Current vs. Collector-Emitter

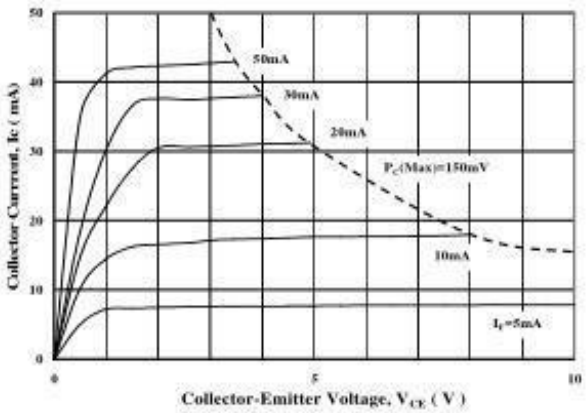


Figure 9. Collector Current vs. Small Collector-Emitter Voltage

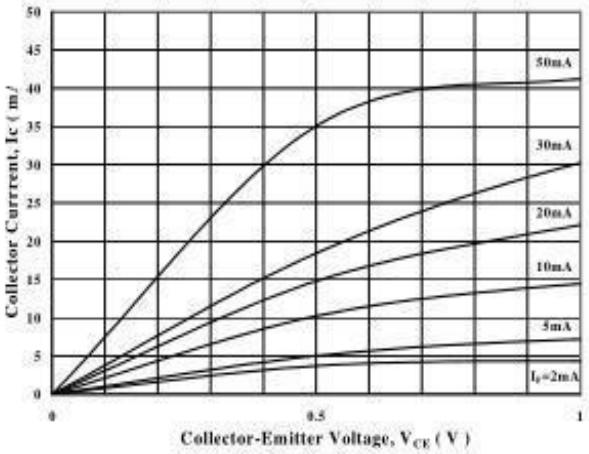


Figure 10. Normalized CTR vs. Forward Current

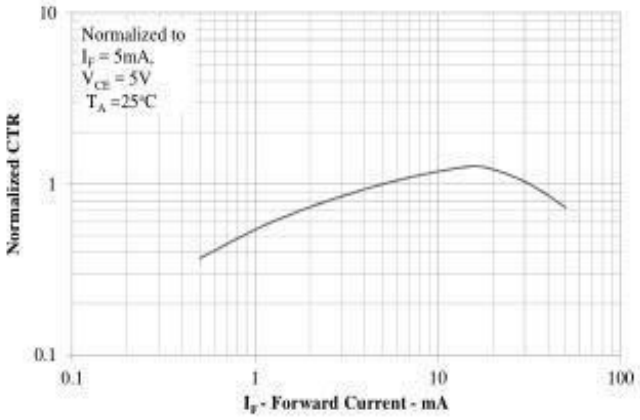


Figure 11. Collector Dark Current vs. Ambient Temperature

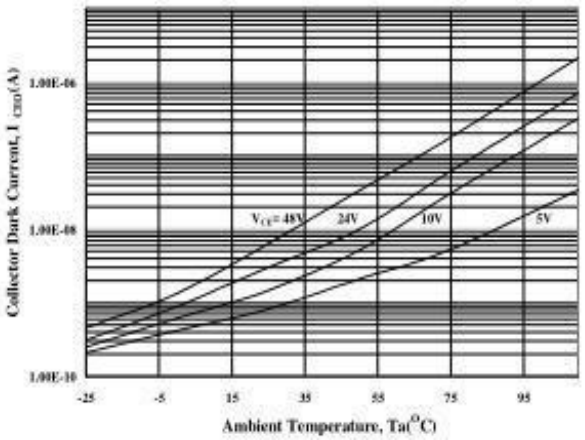


Figure 12. Current Transfer Ratio vs. Forward Current

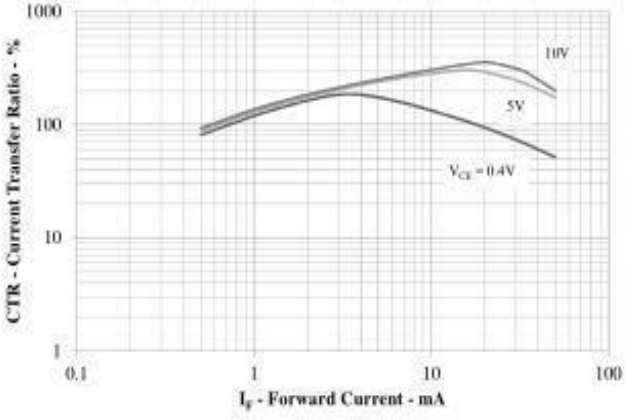


Figure 13. Normalized CTR vs. Ambient Temperature

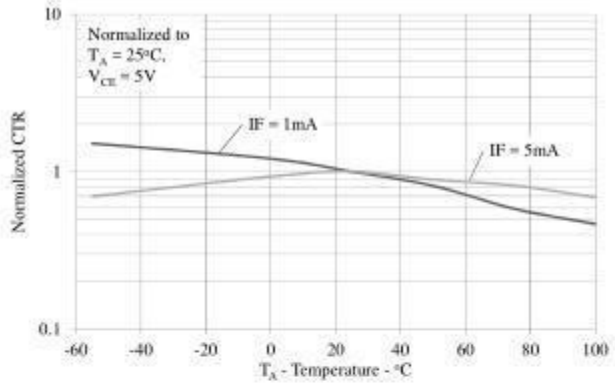


Figure 14. Collector-Emitter Saturation Voltage vs. Ambient Temperature

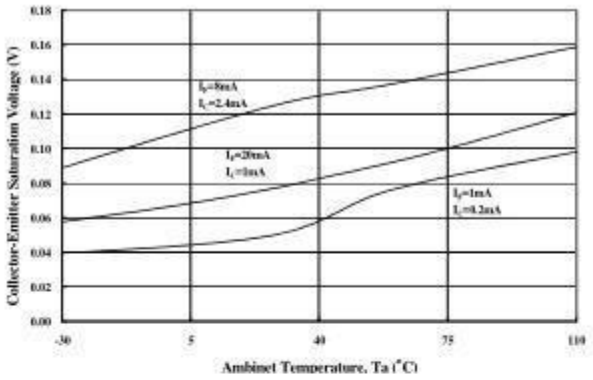


Figure 15. Collector Current vs. Ambient Temperature

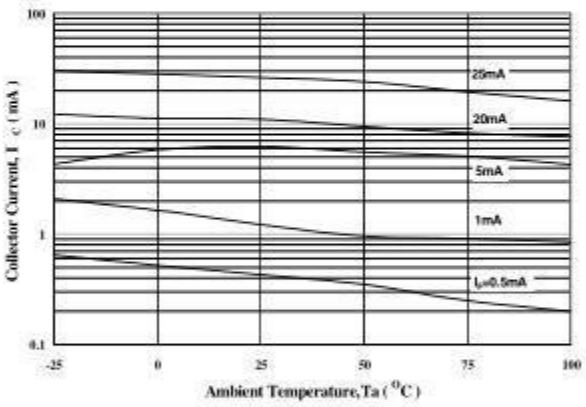


Figure 16. Switching Time vs. Load Resistance

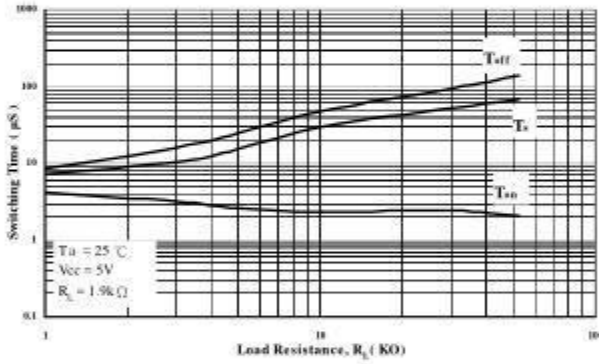


Figure 17. Switching Time vs. Ambient Temperature

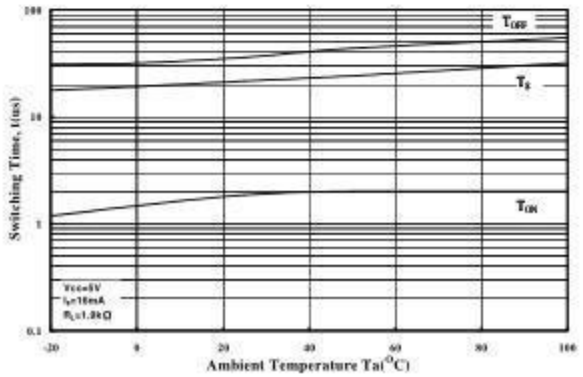


Figure 18. Frequency Response