

## Current Transfer Ratio

Part Number	Classification (Note 1)	Current Transfer Ratio (%) (I <sub>C</sub> / I <sub>F</sub> )		Marking of Classification
		I <sub>F</sub> = 5 mA, V <sub>CE</sub> = 5 V, T <sub>a</sub> = 25°C		
		min	max	
TLP280	Blank	50	600	Blank, YE, GR, BL, GB
	Rank Y	50	150	YE
	Rank GR	100	300	GR
	Rank BL	200	600	BL
	Rank GB	100	600	GB, GR, BL
TLP280-4	Blank	50	600	Blank, GB
	Rank GB	100	600	GB

Note : For the supply status of TLP280 rank Y and BL products, please contact with our sales representative.

Note 1: When ordering product, please specify both the part number and the classification, e.g. TLP280(GB).

Note: Application type name for certification test, please use standard product type name, i.e.  
TLP280(GB): TLP280, TLP280-4(GB): TLP280-4.

Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristic		Symbol	Rating		Unit
			TLP280	TLP280-4	
LED	Forward current	$I_F(\text{RMS})$	$\pm 50$		mA
	Forward current derating ( $T_a \geq 25^\circ\text{C}$ )	$\Delta I_F/^\circ\text{C}$	-0.7	-0.5	mA/ $^\circ\text{C}$
	Pulse forward current (100 $\mu\text{s}$ pulse, 100 pps)	$I_{FP}$	$\pm 1$		A
	Diode power dissipation	$P_D$	100	70	mW
	Diode power dissipation derating ( $T_a \geq 25^\circ\text{C}$ )	$\Delta P_D/^\circ\text{C}$	-1	-0.7	mW/ $^\circ\text{C}$
	Junction temperature	$T_j$	125		$^\circ\text{C}$
Detector	Collector-emitter voltage	$V_{CEO}$	80		V
	Emitter-collector voltage	$V_{ECO}$	7		V
	Collector current	$I_C$	50		mA
	Collector power dissipation (1 circuit)	$P_C$	150	100	mW
	Collector power dissipation derating ( $T_a \geq 25^\circ\text{C}$ ) (1 circuit)	$\Delta P_C/^\circ\text{C}$	-1.5	-1.0	mW/ $^\circ\text{C}$
	Junction temperature	$T_j$	125		$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55 to 125		$^\circ\text{C}$
Operating temperature range		$T_{opr}$	-55 to 100		$^\circ\text{C}$
Lead soldering temperature (10 s)		$T_{sol}$	260		$^\circ\text{C}$
Total package power dissipation (1 circuit)		$P_T$	200	170	mW
Total package power dissipation derating ( $T_a \geq 25^\circ\text{C}$ ) (1 circuit)		$\Delta P_T/^\circ\text{C}$	-2.0	-1.7	mW/ $^\circ\text{C}$
Isolation voltage (AC, 60 s, R.H. $\leq 60\%$ ) (Note 1)		$BV_S$	2500		Vrms

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc)

Note 1: Device considered a two terminal device: LED side pins shorted together and detector side pins shorted together.

## Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ	Max	Unit
LED	Forward voltage	V <sub>F</sub>	I <sub>F</sub> = ±10 mA	1.0	1.15	1.3	V
	Capacitance	C <sub>T</sub>	V = 0 V, f = 1 MHz	—	60	—	pF
Detector	Collector-emitter breakdown voltage	V <sub>(BR)CEO</sub>	I <sub>C</sub> = 0.5 mA	80	—	—	V
	Emitter-collector breakdown voltage	V <sub>(BR)ECO</sub>	I <sub>E</sub> = 0.1 mA	7	—	—	V
	Collector dark current (Note 1)	I <sub>CEO</sub>	V <sub>CE</sub> = 48 V	—	0.01	0.1	μA
			Ambient light below (100 lx)	—	2	10	
			V <sub>CE</sub> = 48 V, Ta = 85°C	—	2	50	μA
			Ambient light below (100 lx)	—	4	50	
	Capacitance (collector to emitter)	C <sub>CE</sub>	V = 0 V, f = 1 MHz	—	10	—	pF

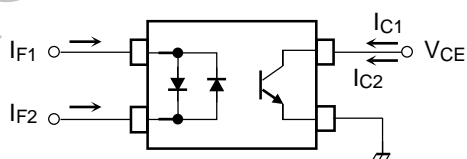
Note 1: Because of the construction, leak current might be increased by ambient light. Please use photocoupler with less ambient light.

## Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Current transfer ratio	I <sub>C</sub> /I <sub>F</sub>	I <sub>F</sub> = ±5 mA, V <sub>CE</sub> = 5 V	50	—	600	%
		Rank GB	100	—	600	
Saturated CTR	I <sub>C</sub> /I <sub>F(sat)</sub>	I <sub>F</sub> = ±1 mA, V <sub>CE</sub> = 0.4 V	—	60	—	%
		Rank GB	30	—	—	
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> = 2.4 mA, I <sub>F</sub> = ±8 mA	—	—	0.4	V
		I <sub>C</sub> = 0.2 mA, I <sub>F</sub> = ±1 mA	—	0.2	—	
		Rank GB	—	—	0.4	
Off-state collector current	I <sub>C(off)</sub>	V <sub>F</sub> = ±0.7 V, V <sub>CE</sub> = 48 V	—	—	10	μA
CTR symmetry	I <sub>C(ratio)</sub>	I <sub>C</sub> (I <sub>F</sub> = -5 mA) / I <sub>C</sub> (I <sub>F</sub> = 5 mA) (Note 1)	0.33	—	3	—

Note 1:

$$I_{C(ratio)} = \frac{I_{C2}(I_F = I_{F2}, V_{CE} = 5V)}{I_{C1}(I_F = I_{F1}, V_{CE} = 5V)}$$



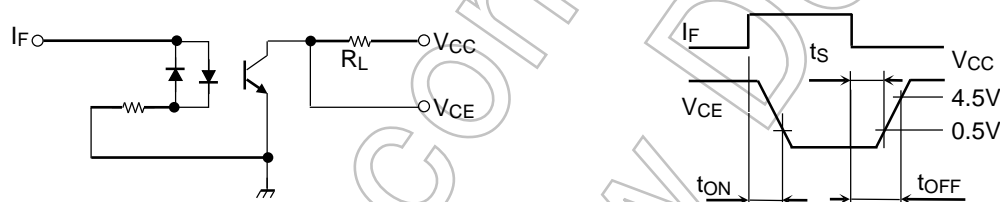
Isolation Characteristics ( $T_a = 25^\circ\text{C}$ )

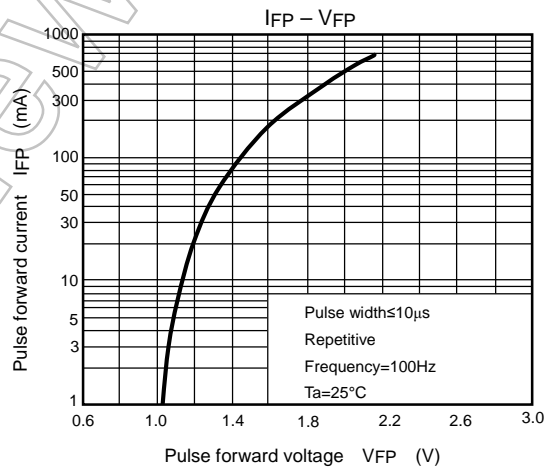
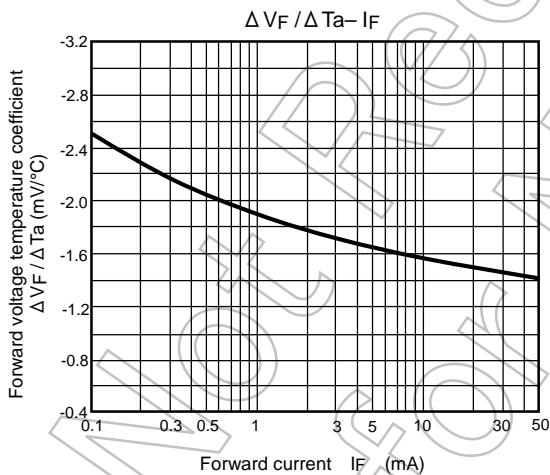
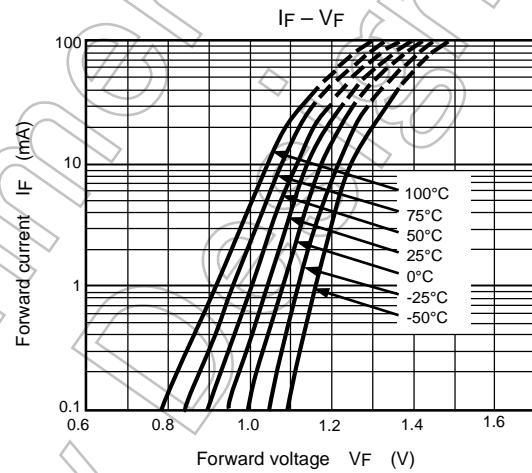
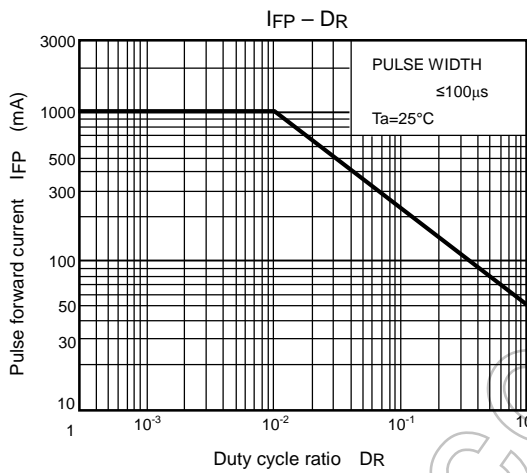
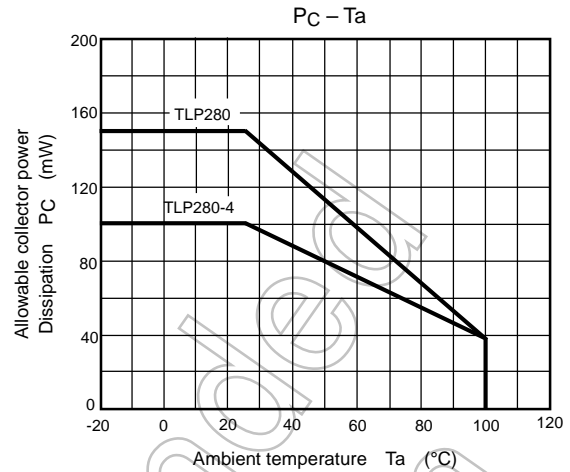
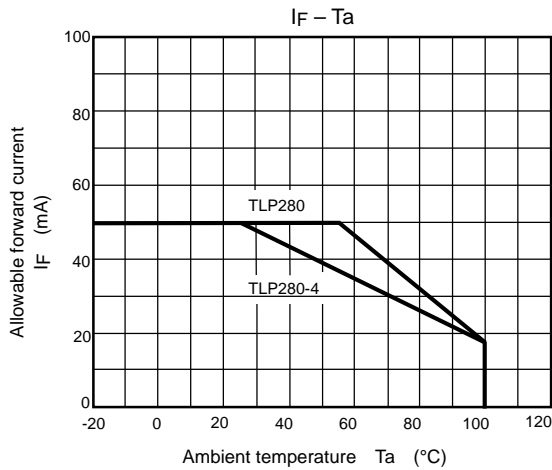
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	$C_S$	$V_S = 0\text{ V}$ , $f = 1\text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500\text{ V}$ , R.H. $\leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	BV <sub>S</sub>	AC, 60 s	2500	—	—	$V_{\text{rms}}$
		AC, 1 s, in oil	—	5000	—	
		DC, 60 s, in oil	—	5000	—	$V_{\text{dc}}$

Switching Characteristics ( $T_a = 25^\circ\text{C}$ )

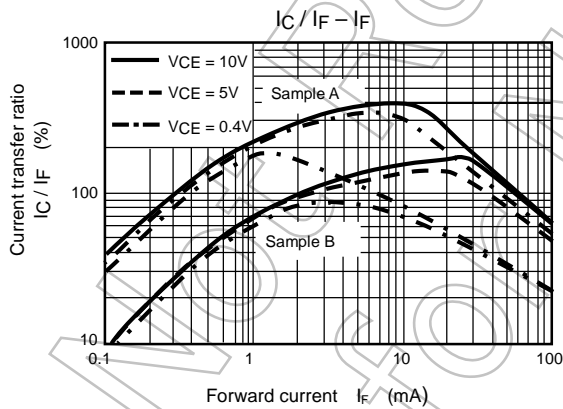
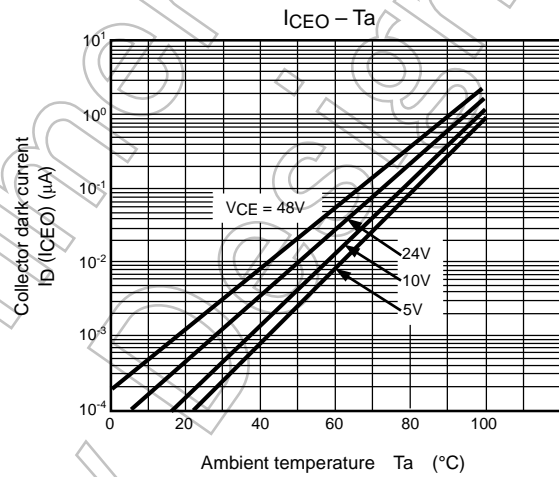
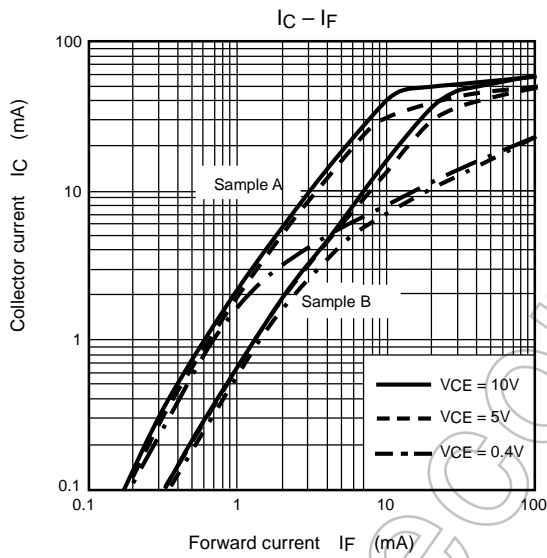
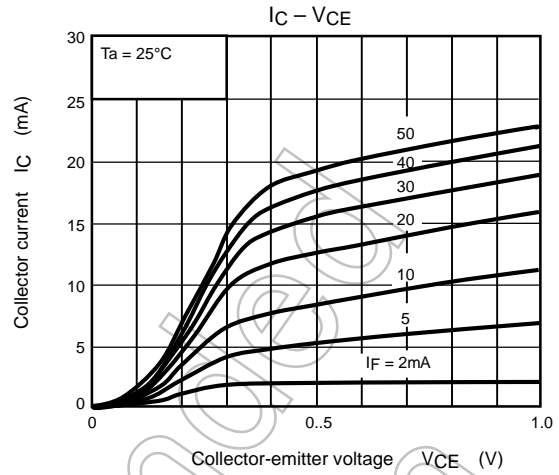
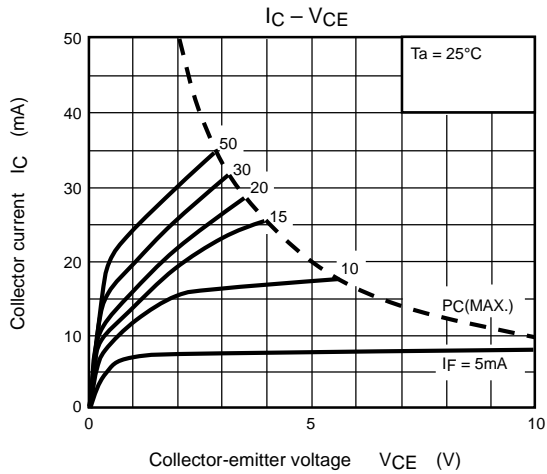
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	$t_r$	$V_{\text{CC}} = 10\text{ V}$ , $I_C = 2\text{ mA}$ $R_L = 100\ \Omega$	—	2	—	$\mu\text{s}$
Fall time	$t_f$		—	3	—	
Turn-on time	$t_{\text{on}}$		—	3	—	
Turn-off time	$t_{\text{off}}$		—	3	—	
Turn-on time	$t_{\text{ON}}$	$R_L = 1.9\text{ k}\Omega$ $V_{\text{CC}} = 5\text{ V}$ , $I_F = \pm 16\text{ mA}$ (Fig.1)	—	2	—	$\mu\text{s}$
Storage time	$t_s$		—	25	—	
Turn-off time	$t_{\text{OFF}}$		—	40	—	

Fig. 1: Switching time test circuit

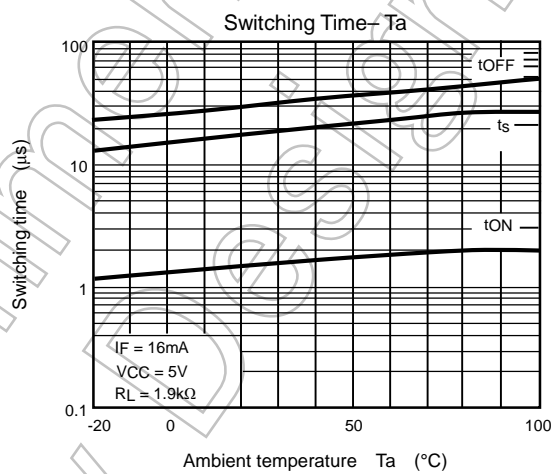
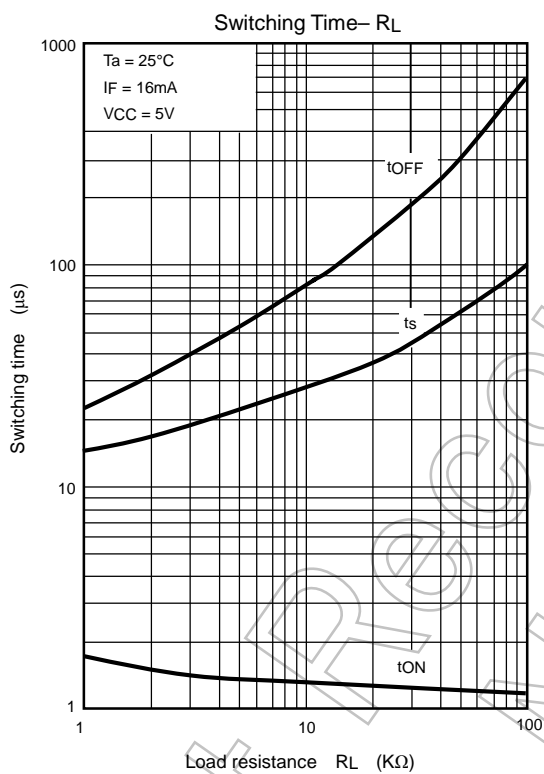
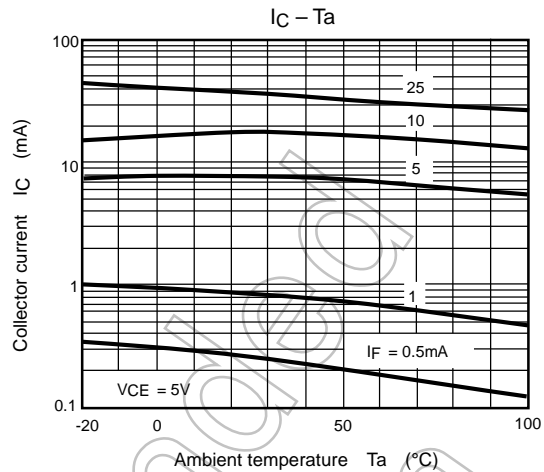
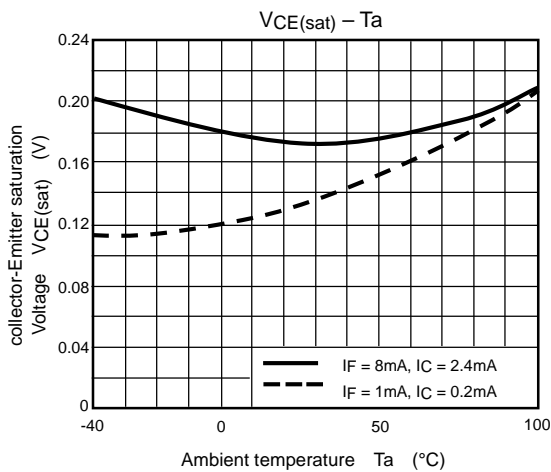




\*The above graphs show typical characteristic.



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