

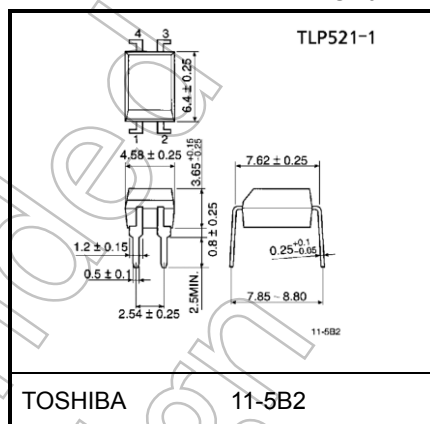
TLP521-1, TLP521-2, TLP521-4

Unit: mm

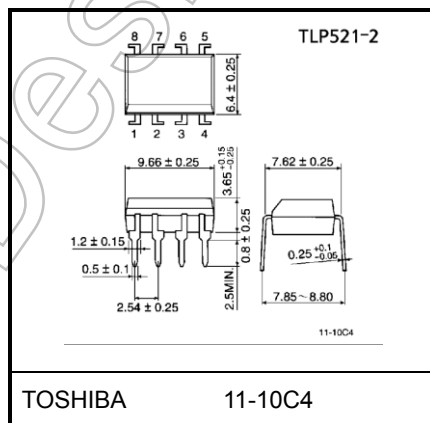
Programmable Controllers
AC/DC-Input Module
Solid State Relay

The TOSHIBA TLP521-1, -2 and -4 consist of a photo-transistor optically coupled to an infrared emitting diode.
The TLP521-2 offers two isolated channels in an eight lead plastic DIP package, while the TLP521-4 provides four isolated channels in a sixteen plastic DIP package.

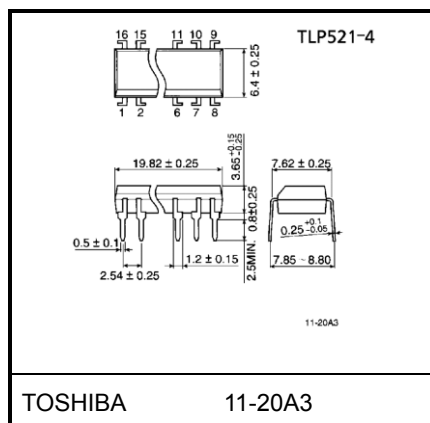
- Collector-emitter voltage: 55 V (min)
- Current transfer ratio: 50 % (min)
Rank GB: 100 % (min)
- Isolation voltage: 2500 Vrms (min)
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A
File No.E67349



Weight: 0.26 g (typ.)



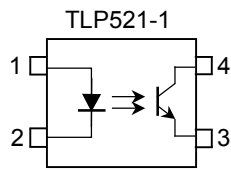
Weight: 0.54 g (typ.)



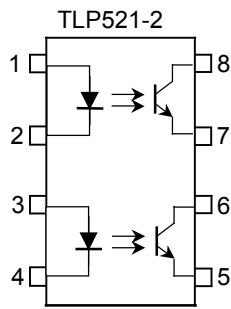
Weight: 1.1 g (typ.)

Start of commercial production
1979-05

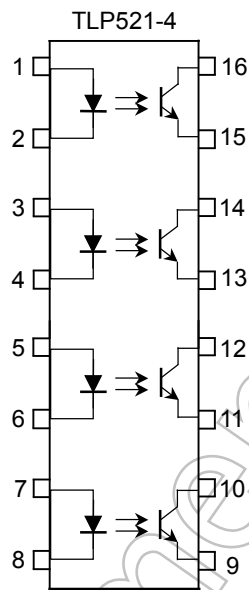
Pin Configurations (top view)



1 : Anode
 2 : Cathode
 3 : Emitter
 4 : Collector



1, 3 : Anode
 2, 4 : Cathode
 5, 7 : Emitter
 6, 8 : Collector



1, 3, 5, 7 : Anode
 2, 4, 6, 8 : Cathode
 9, 11, 13, 15 : Emitter
 10, 12, 14, 16 : Collector

Not Recommended for New Design

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating		Unit
			TLP521-1	TLP521-2 TLP521-4	
LED	Forward current	I_F	70	50	mA
	Forward current derating	$\Delta I_F/^\circ\text{C}$	-0.93 (Ta ≥ 50°C)	-0.5 (Ta ≥ 25°C)	mA/°C
	Pulse forward current (100 μs pulse, 100 pps)	I_{FP}	1		A
	Reverse voltage	V_R	5		V
	Diode power dissipation	P_D	150	100	mW
	Diode power dissipation derating	$\Delta P_D/^\circ\text{C}$	-2.0 (Ta ≥ 50°C)	-1.0 (Ta ≥ 25°C)	mW/°C
	Junction temperature	T_j	125		°C
Detector	Collector-emitter voltage	V_{CEO}	55		V
	Emitter-collector voltage	V_{ECO}	7		V
	Collector current	I_C	50		mA
	Collector power dissipation (1 circuit)	P_C	100		mW
	Collector power dissipation derating (1 circuit) (Ta ≥ 25°C)	$\Delta P_C/^\circ\text{C}$	-1.0		mW/°C
	Junction temperature	T_j	125		°C
Storage temperature range		T_{stg}	-55 to 125		°C
Operating temperature range		T_{opr}	-55 to 100		°C
Lead soldering temperature (10 s)		T_{sol}	260		°C
Total package power dissipation (1 circuit)		P_T	250	150	mW
Total package power dissipation derating (1 circuit) (Ta ≥ 25°C)		$\Delta P_T/^\circ\text{C}$	-2.5	-1.5	mW/°C
Isolation voltage (AC, 60 s, R.H. ≤ 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.

Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{CC}	—	5	24	V
Forward current	I_F	—	16	25	mA
Collector current	I_C	—	1	10	mA
Operating temperature	T_{opr}	-25	—	85	°C

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

Current transfer ratio

Type	Classification (Note 1)	Current Transfer Ratio (%) (I _C /I _F)		Marking Of Classification
		I _F = 5mA, V _{CE} = 5V, T _a = 25°C		
		Min	Max	
TLP521-1	Blank	50	600	Blank, Y [■] , YE, G, G [■] , GR, B, BL, GB
	Rank Y	50	150	YE, Y [■]
	Rank GR	100	300	GR, G, G [■]
	Rank BL	200	600	BL, B
	Rank GB	100	600	GB, GR, G, G [■] , BL, B
	Rank YH	75	150	Y [■]
	Rank GRL	100	200	G
	Rank GRH	150	300	G [■]
	Rank BLL	200	600	B
TLP521-2	Blank	50	600	Blank, GR, BL, GB
	Rank GB	100	600	GB, GR, BL
	Rank GR	100	300	GR
	Rank BL	200	600	BL
TLP521-4	Blank	50	600	Blank, GB
	Rank GB	100	600	GB

Note 1: Ex. rank GB: TLP521-1 (GB)

Note: Application type name for certification test, please use standard product type name, i.e.
TLP521-1 (GB): TLP521-1, TLP521-2 (GB): TLP521-2

Not Recommended for New Design

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V_F	$I_F = 10 \text{ mA}$	1.0	1.15	1.3	V
	Reverse current	I_R	$V_R = 5 \text{ V}$	—	—	10	μA
	Capacitance	C_T	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	30	—	pF
Detector	Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 0.5 \text{ mA}$	55	—	—	V
	Emitter-collector breakdown voltage	$V_{(BR)ECO}$	$I_E = 0.1 \text{ mA}$	7	—	—	V
	Collector dark current	I_{CEO}	$V_{CE} = 24 \text{ V}$	—	10	100	nA
			$V_{CE} = 24 \text{ V}, T_a = 85 \text{ }^\circ\text{C}$	—	2	50	μA
Capacitance (collector to emitter)	C_{CE}	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	10	—	pF	

Coupled Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	I_C/I_F	$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C/I_F(\text{sat})$	$I_F = 1 \text{ mA}, V_{CE} = 0.4 \text{ V}$ Rank GB	—	60	—	%
			30	—	—	
Collector-emitter saturation voltage	$V_{CE(\text{sat})}$	$I_C = 2.4 \text{ mA}, I_F = 8 \text{ mA}$	—	—	0.4	V
		$I_C = 0.2 \text{ mA}, I_F = 1 \text{ mA}$ Rank GB	—	0.2	—	
			—	—	0.4	

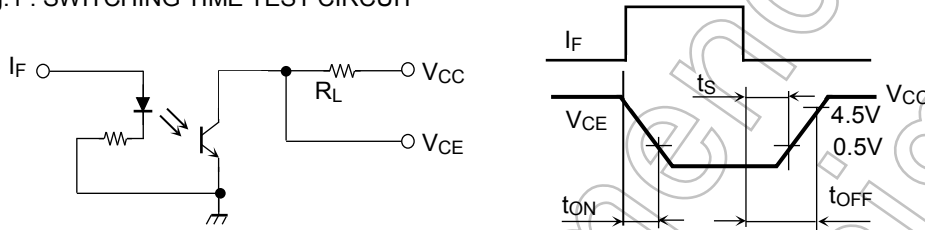
Isolation Characteristics (Ta = 25°C)

Characteristics	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	$V_S = 500 \text{ V}, \text{R.H.} \leq 60 \%$	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 60 s	2500	—	—	Vrms

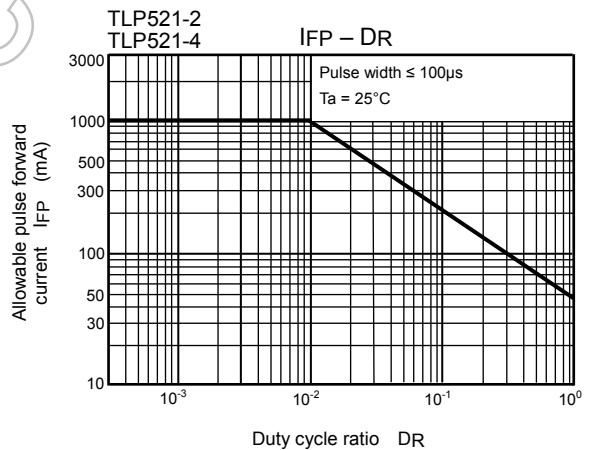
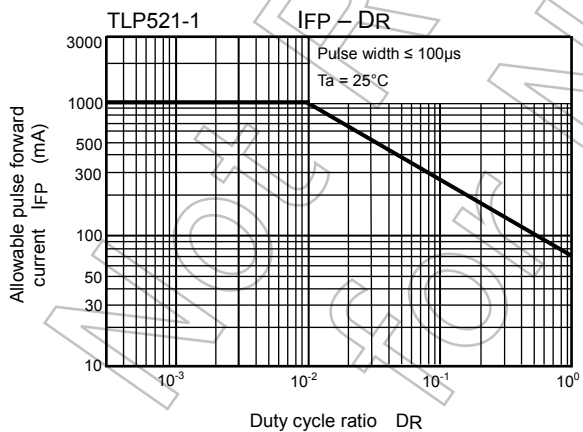
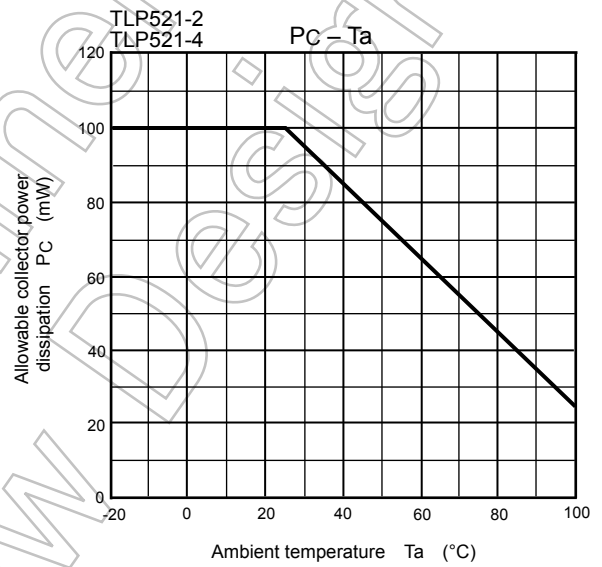
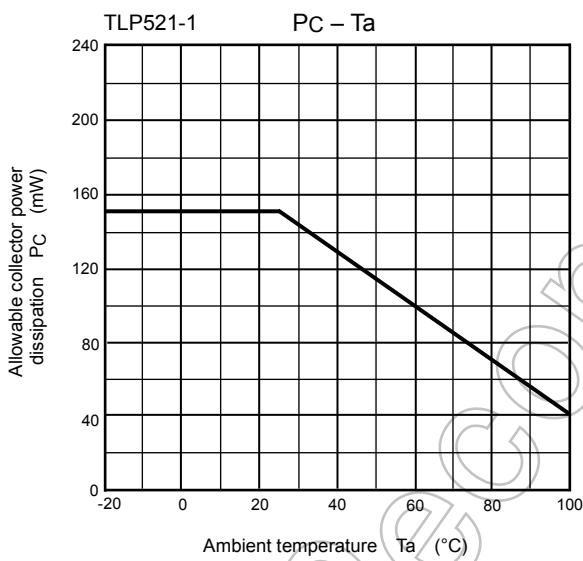
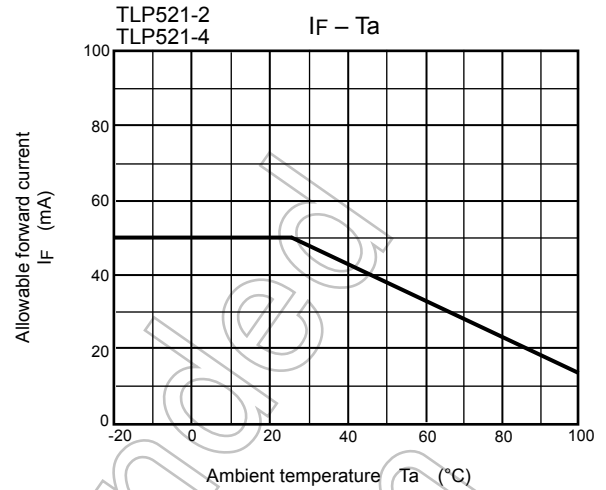
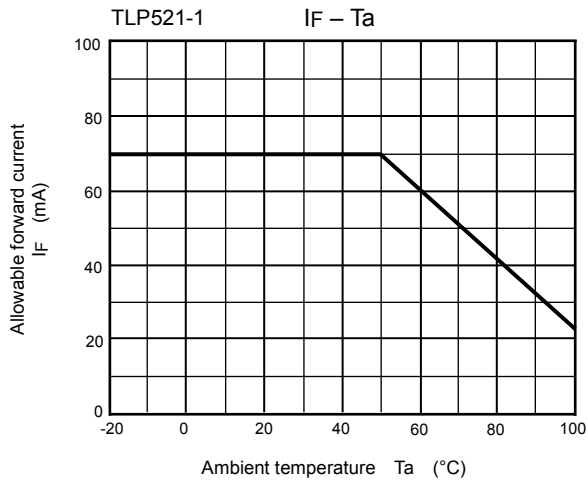
Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	t_r	$V_{CC} = 10\text{ V}$ $I_C = 2\text{ mA}$ $R_L = 100\ \Omega$	—	2	—	μs
Fall time	t_f		—	3	—	
Turn-on time	t_{on}		—	3	—	
Turn-off time	t_{off}		—	3	—	
Turn-on time	t_{ON}	$R_L = 1.9\text{ k}\Omega$ $V_{CC} = 5\text{ V}, I_F = 16\text{ mA}$ (Fig.1)	—	2	—	μs
Storage time	t_s		—	15	—	
Turn-off time	t_{OFF}		—	25	—	

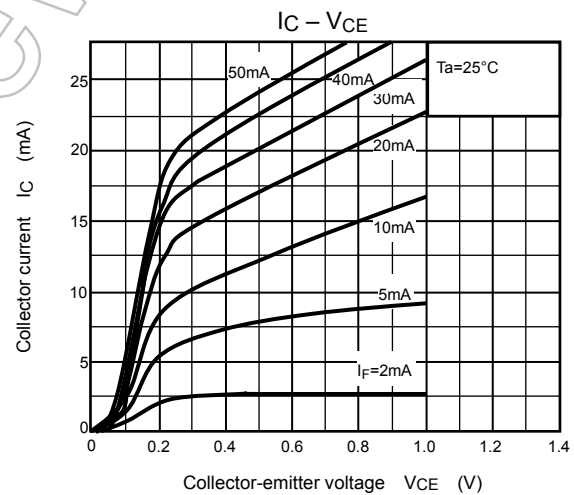
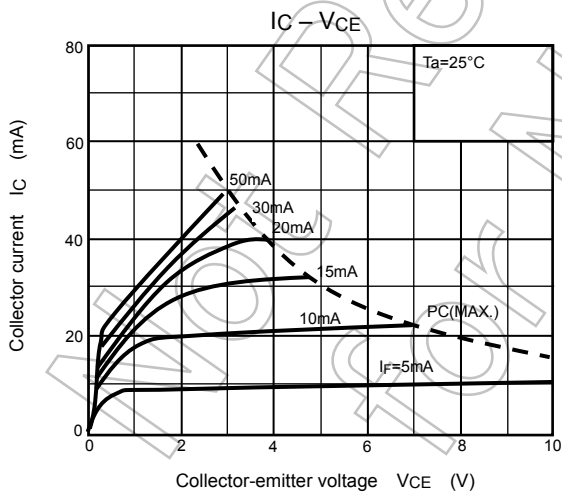
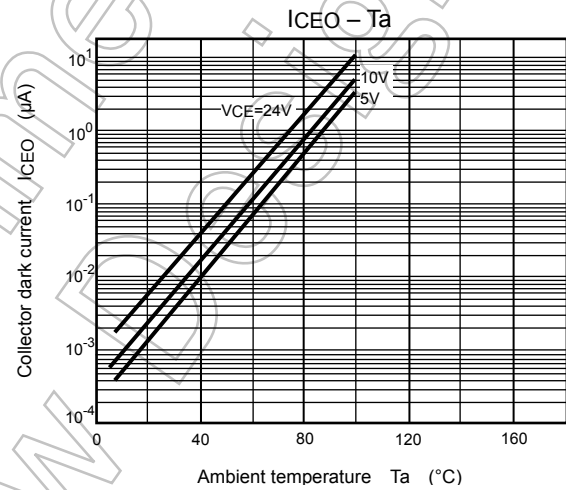
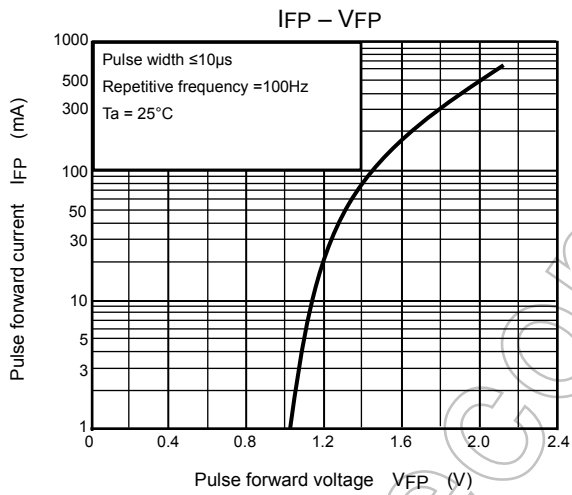
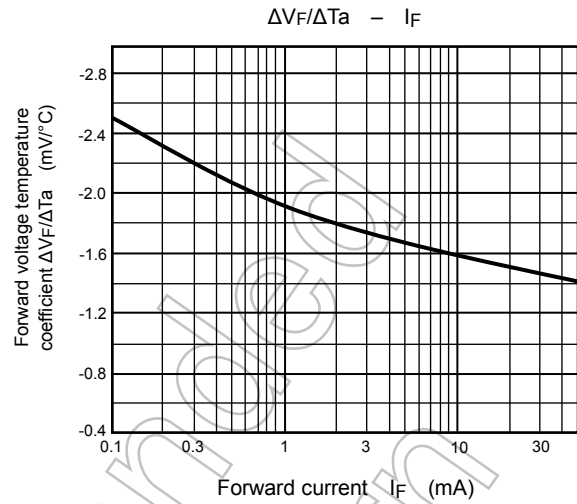
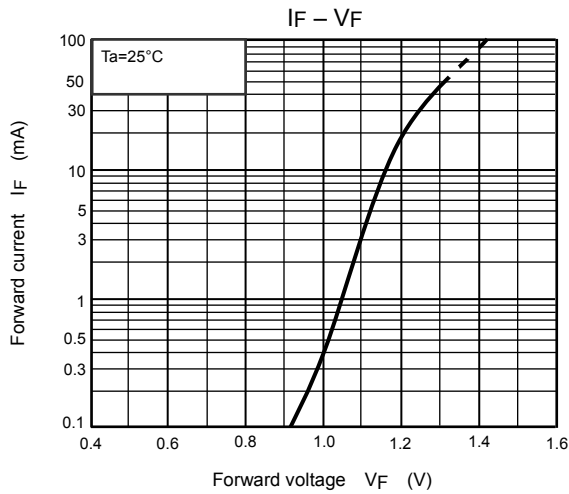
Fig.1 : SWITCHING TIME TEST CIRCUIT



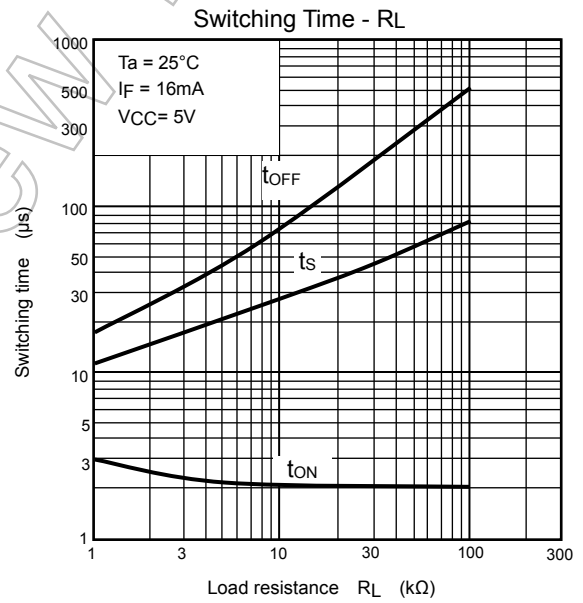
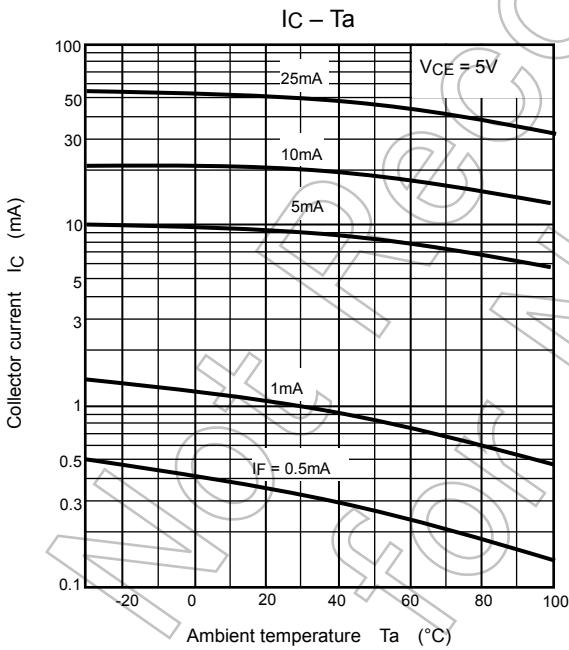
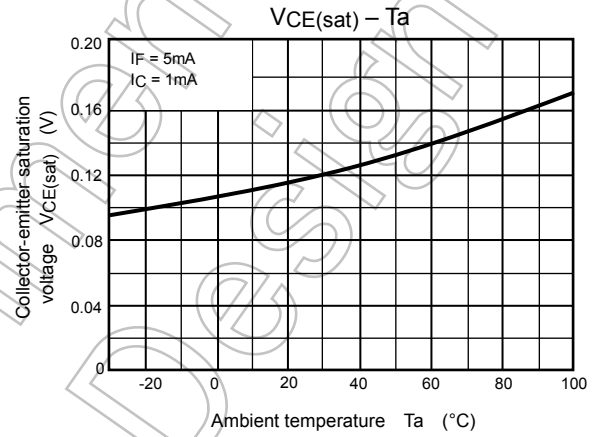
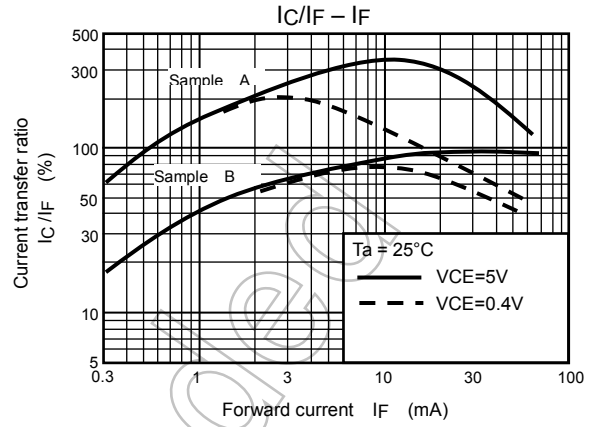
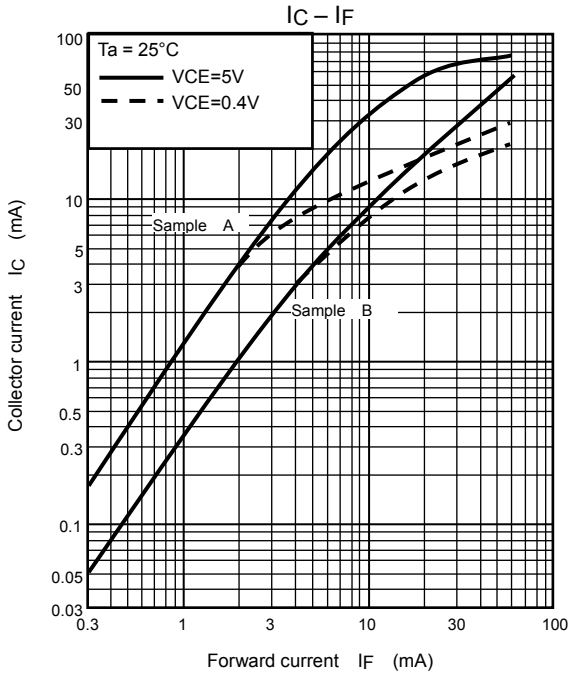
Not Recommended for New Design



NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



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