

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP621, TLP621-2, TLP621-4

Programmable Controller
AC / DC-Input Module
Solid State Relay

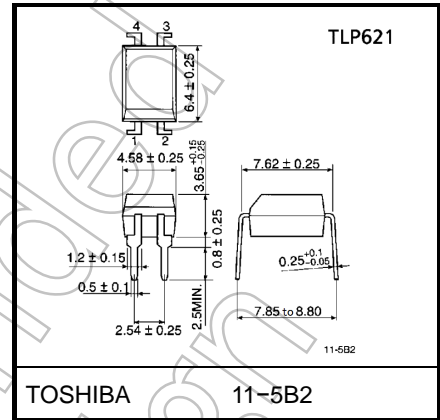
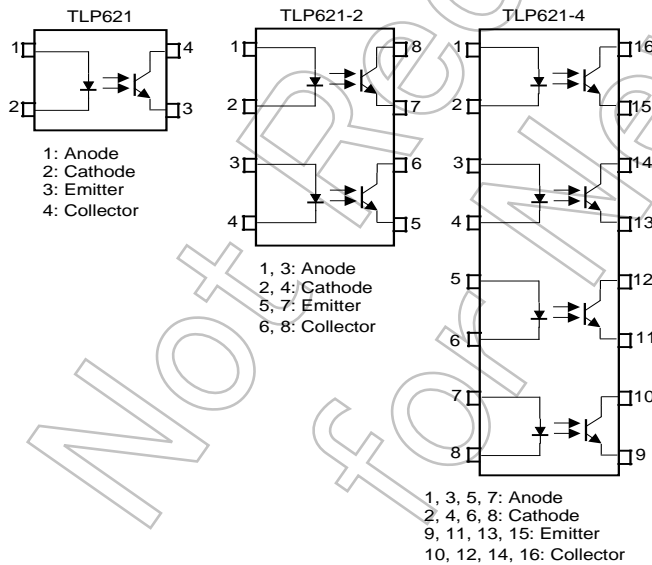
Unit: mm

The TOSHIBA TLP621, -2 and -4 consists of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode. The TLP621-2 offers two isolated channels in an eight lead plastic DIP, which the TLP621-4 provides four isolated channels in a sixteen plastic DIP.

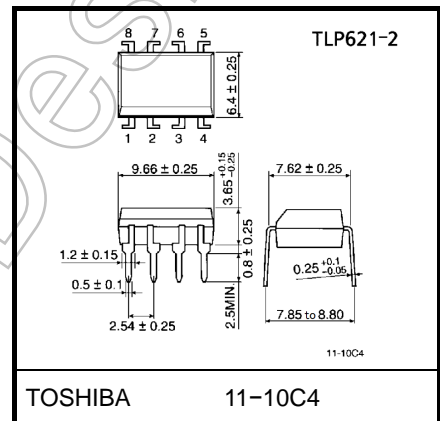
- Collector-emitter voltage: 55 V (min.)
- Current transfer ratio: 50% (min.)
Rank GB: 100% (min.)
- Isolation voltage : 5000Vrms(min)
- UL recognized: UL1577, file No. E67349
- cUL approved: CSA Component Acceptance Service No.5A,
file No. E67349
- Option (D4) type VDE approved : DIN EN60747-5-5 (Note 1)

(Note 1) When an EN60747-5-5 approved type is needed, please designate "Option (D4)."

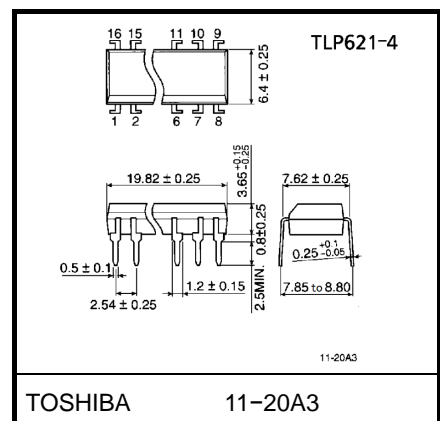
Pin Configurations (top view)



TOSHIBA 11-5B2
Weight: 0.26 g (typ.)



TOSHIBA 11-10C4
Weight: 0.54 g (typ.)



TOSHIBA 11-20A3
Weight: 1.1 g (typ.)

	7.62 mm pitch standard type	10.16 mm pitch TLPxxxF type
• Creepage distance	: 6.4 mm (min.)	8.0 mm (min)
Clearance	: 6.4 mm (min.)	8.0 mm (min)
Insulation thickness	: 0.4 mm (min.)	0.4 mm (min)

Start of commercial production
1983/02

• Current Transfer Ratio

Type	Classi- fication *1	Current Transfer Ratio (%) (I_C / I_F)		Marking Of Classification
		$I_F = 5\text{mA}, V_{CE} = 5\text{V}, T_a = 25^\circ\text{C}$		
		Min.	Max.	
TLP621	(None)	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	400	B
TLP621-2 TLP621-4	(None)	50	600	Blank, GR, BL, GB
	Rank GB	100	600	GB, GR, BL

*1: Ex. rank GB: TLP621 (GB)

(Note) Application type name for certification test, please use standard product type name, i.e.

TLP621 (GB): TLP621

TLP621-2 (GB): TLP621-2

Not Recommended for New Design

Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating		Unit	
		TLP621	TLP621-2 TLP621-4		
LED	Forward current	I _F	60	50	mA
	Forward current derating (Note 1)	ΔI _F /°C	-0.7 (Ta ≥ 39°C)	-0.5 (Ta ≥ 25°C)	mA /°C
	Pulse forward current	I _{FP}	1 (100μs pulse, 100pps)		A
	Power dissipation	P _D	100	70	mW
	Power dissipation derating	ΔP _D /°C	-1.0	-0.7	mW /°C
	Reverse voltage	V _R	5		V
	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	150	100	mW
	Collector power dissipation derating (1 circuit, Ta ≥ 25°C)	ΔP _C /°C	-1.5	-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	T _{sol}	260 (10 s)		°C	
Total package power dissipation	P _T	250	150	mW	
Total package power dissipation derating (Ta ≥ 25°C)	ΔP _T /°C	-2.5	-1.5	mW /°C	
Isolation voltage (Note 2)	BV _S	5000 (AC, 1min., R.H. ≤ 60%)		V _{rms}	

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 : P_w = 100 μs(max), f = 100 Hz

Note 2 : Device considered a two terminal: LED side pins shorted together, and detector side pins shorted together.

Recommended Operating Conditions

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V _{CC}	—	5	24	V
Forward current	I _F	—	16	20	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.

Individual Electrical Characteristics (Ta = 25°C)

Characteristic		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)

Characteristic	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	

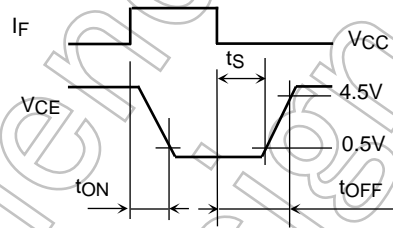
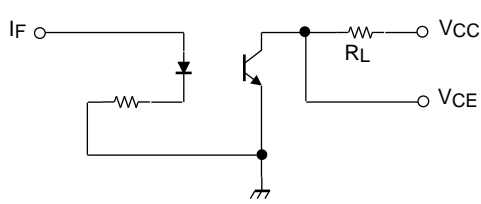
Isolation Characteristics (Ta = 25°C)

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	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	1×10^{12}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	5000	—	—	V_{rms}
		AC, 1 second, in oil	—	10000	—	V_{dc}
		DC, 1 minute, in oil	—	10000	—	

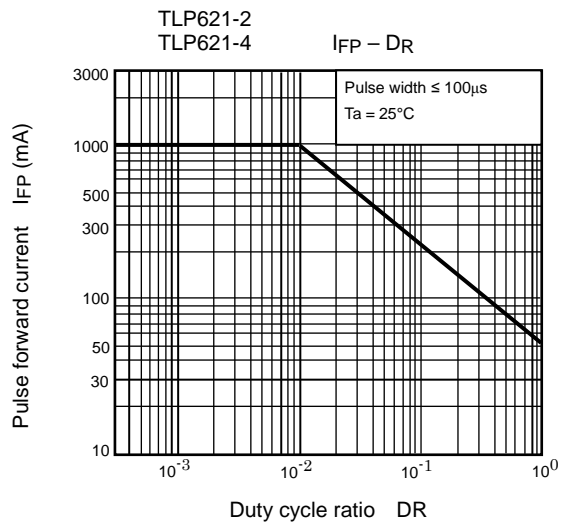
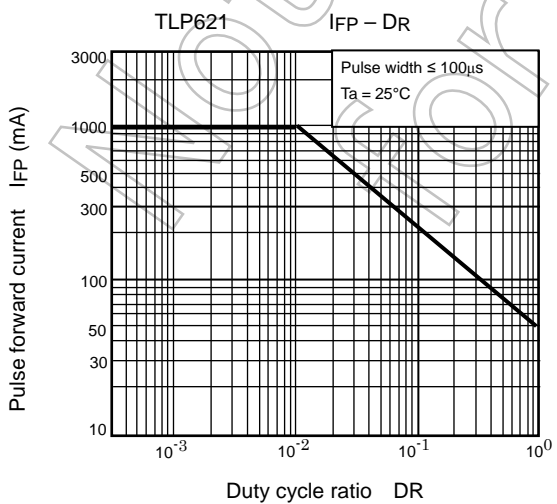
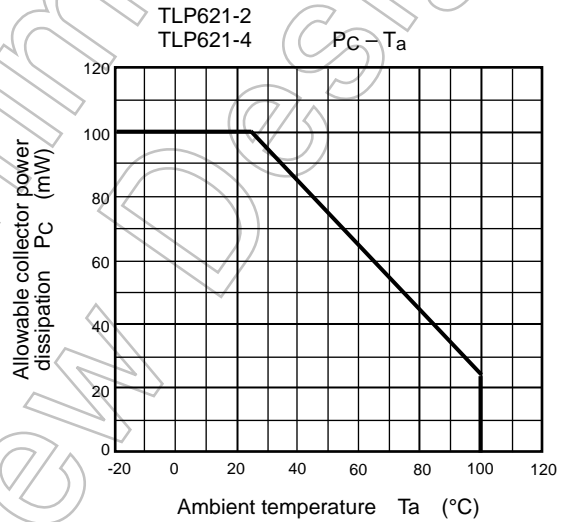
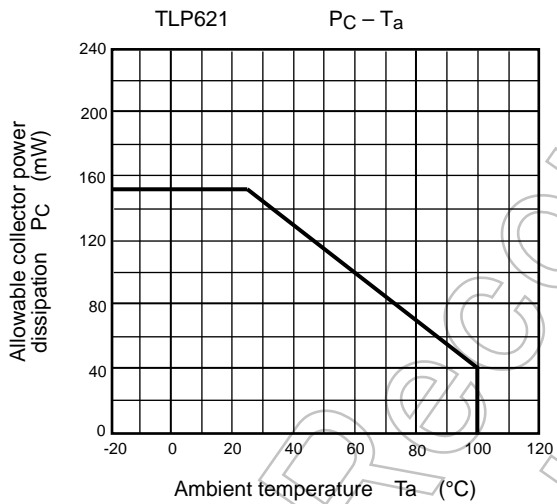
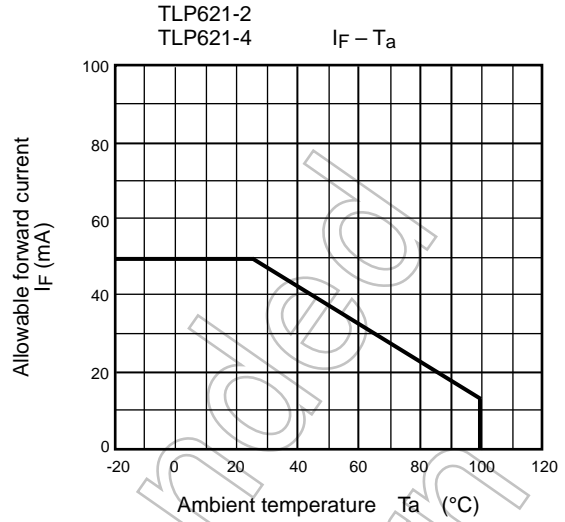
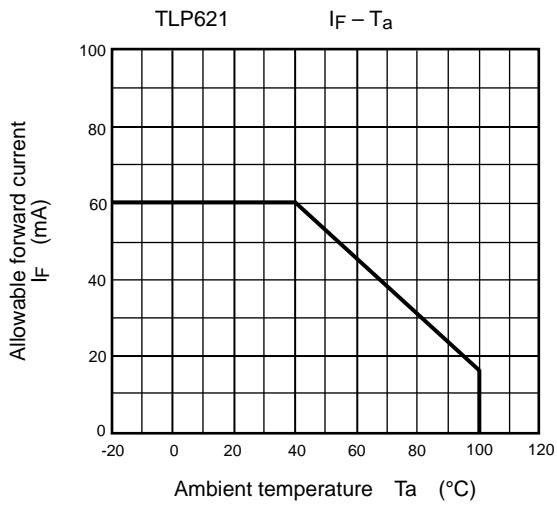
Switching Characteristics (Ta = 25°C)

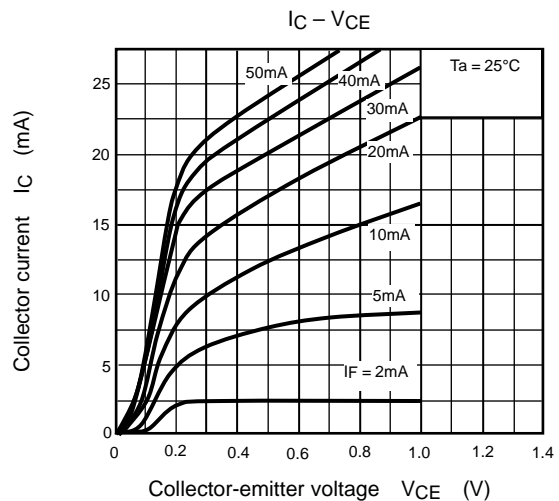
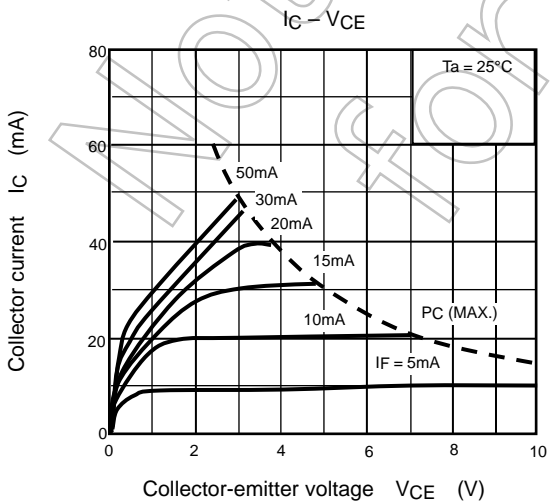
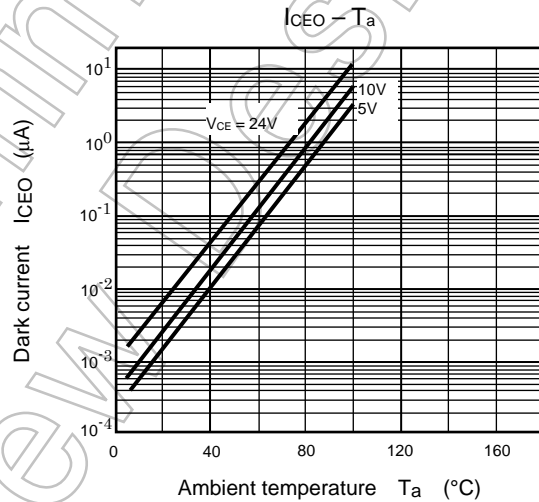
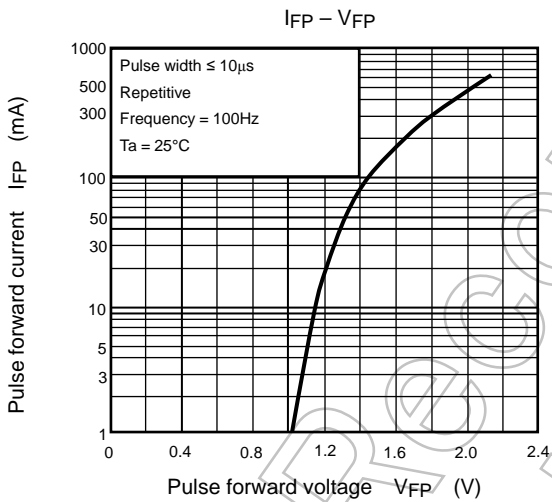
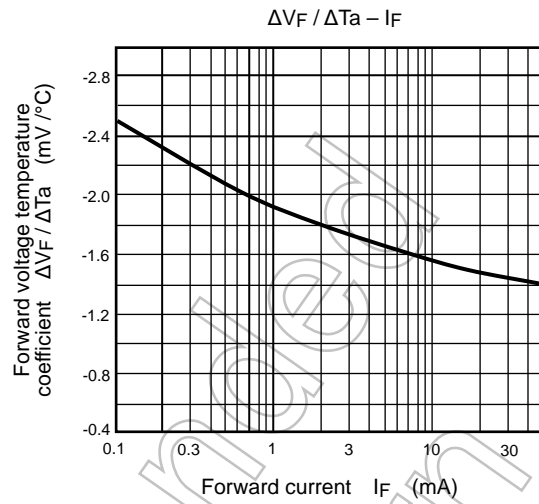
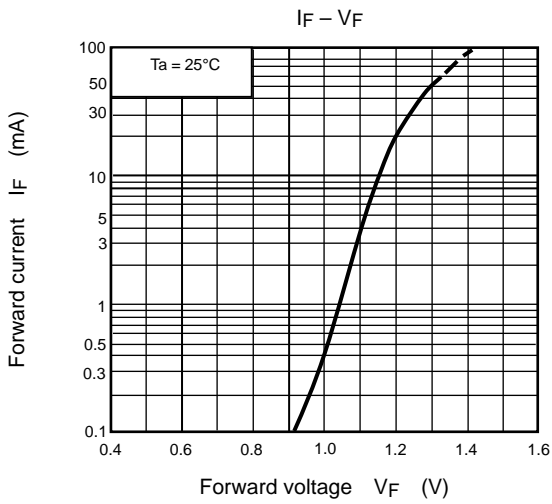
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	t_r	$V_{CC} = 10\text{ V}$, $I_C = 2\text{ mA}$ $R_L = 100\ \Omega$	—	2	—	μs
Fall time	t_f		—	3	—	
Turn-on time	t_{on}		—	3	—	
Turn-off time	t_{off}		—	3	—	
Turn-on time	t_{ON}	$R_L = 1.9\text{ k}\Omega$ (Note 1) $V_{CC} = 5\text{ V}$,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

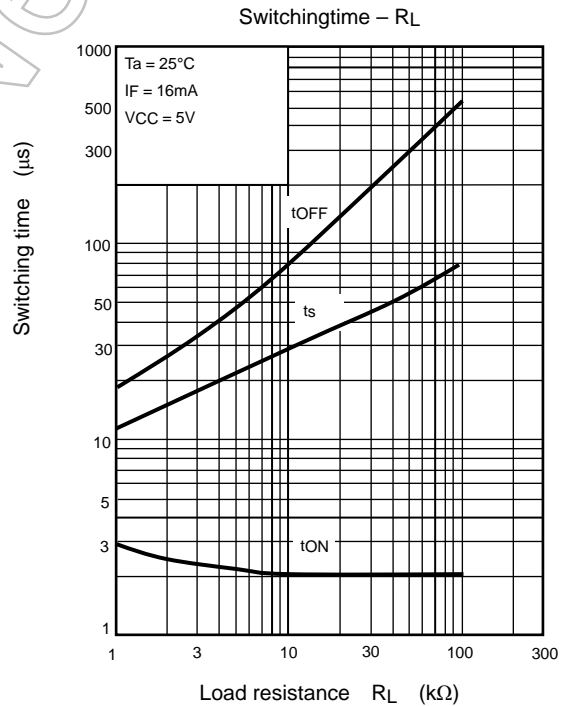
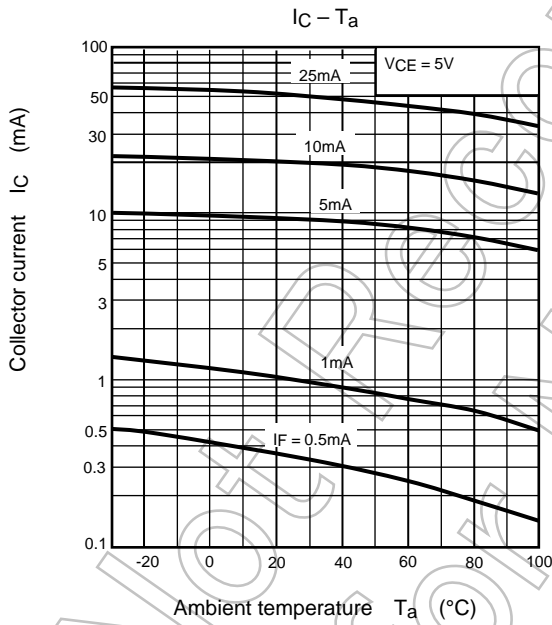
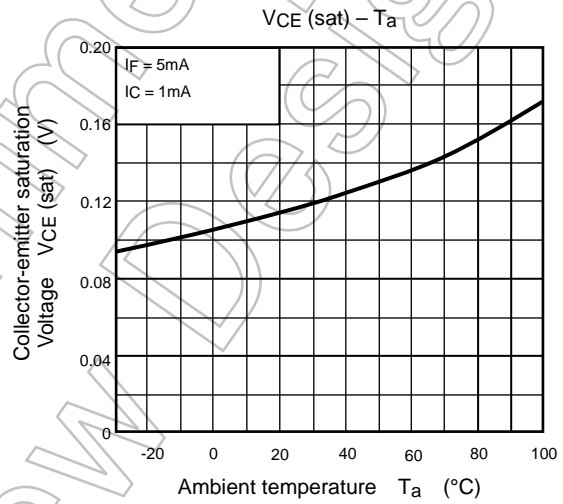
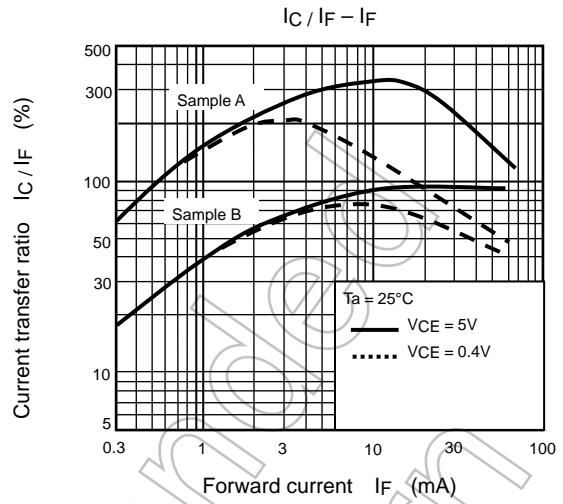
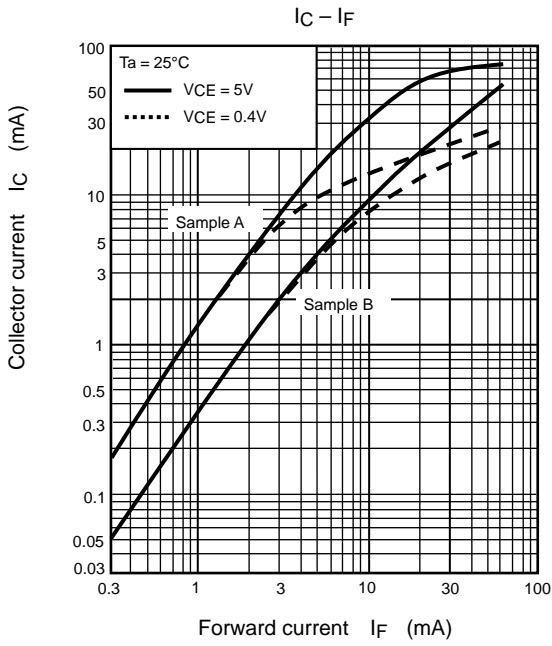
Note 1 Switching time test circuit



Not Recommended for New Designs







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