

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

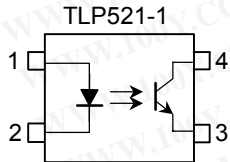
TLP521-1, TLP521-2, TLP521-4

Programmable Controllers
AC/DC-Input Module
Solid State Relay

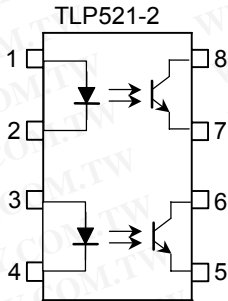
The TOSHIBA TLP521-1, -2 and -4 consist of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode. The TLP521-2 offers two isolated channels in an eight lead plastic DIP package, while the TLP521-4 provides four isolated channels in a sixteen plastic DIP package.

- Collector-emitter voltage: 55 V (min)
- Current transfer ratio: 50% (min)
Rank GB: 100% (min)
- Isolation voltage: 2500 Vrms (min)
- UL recognized
made in Japan: UL1577, file No. E67349
made in Thailand: UL1577, file No. E152349

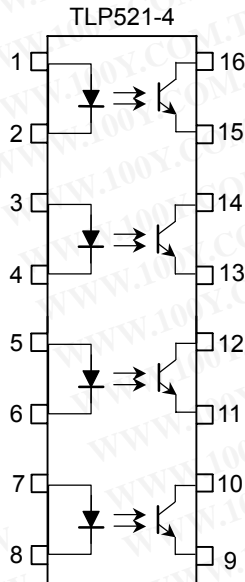
Pin Configurations (top view)



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

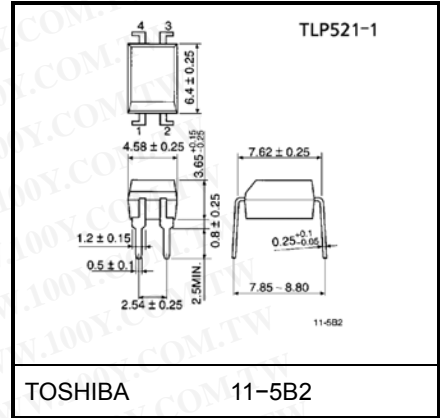


1, 3 : Anode
2, 4 : Cathode
5, 7 : Emitter
6, 8 : Collector

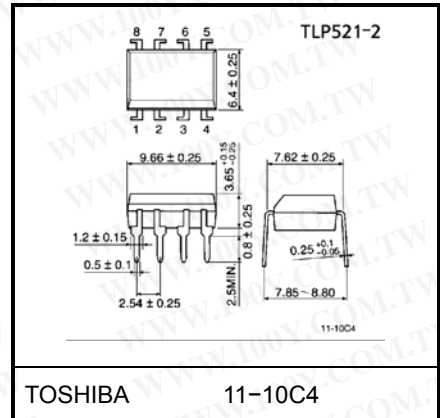


1, 3, 5, 7 : Anode
2, 4, 6, 8 : Cathode
9, 11, 13, 15 : Emitter
10, 12, 14, 16 : Collector

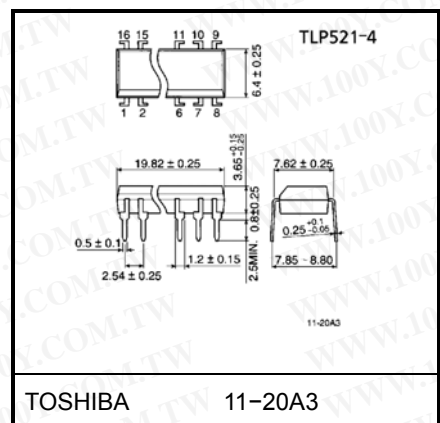
Unit in mm



Weight: 0.26 g



Weight: 0.54 g



Weight: 1.1 g

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Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating		Unit	
		TLP521-1	TLP521-2 TLP521-4		
LED	Forward current	I _F	70	50	mA
	Forward current derating	ΔI _F /°C	-0.93 (Ta ≥ 50°C)	-0.5 (Ta ≥ 25°C)	mA /°C
	Pulse forward current	I _{FP}	1 (100μ pulse, 100pps)		A
	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}	-55~125		°C	
Operating temperature range	T _{opr}	-55~100		°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	BV _S	2500 (AC, 1min., R.H. ≤ 60%) (Note 1)		Vrms	

(Note 1): Device considered a two terminal device: 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	25	mA
Collector current	I _C	—	1	10	mA
Operating temperature	T _{opr}	-25	—	85	°C

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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	
TLP521	A	50	600	Blank, Y, Y [■] , G, G [■] , B, B [■] , GB
	Rank Y	50	150	Y, Y [■]
	Rank GR	100	300	G, G [■]
	Rank BL	200	600	B, B [■]
	Rank GB	100	600	G, G [■] , B, B [■] , GB
TLP521-2 TLP521-4	A	50	600	Blank, GR, BL, GB
	Rank GB	100	600	GR, BL, GB

*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

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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	$V = 0, f = 1 \text{ MHz}$	—	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}	$V_{CE} = 24 \text{ V}$ $V_{CE} = 24 \text{ V}, T_a = 85^\circ\text{C}$	—	10 2	100 50	nA μA
	Capacitance (collector to emitter)	C_{CE}	$V = 0, f = 1 \text{ MHz}$	—	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	$V_{CE(\text{sat})}$	$I_C = 2.4 \text{ mA}, I_F = 8 \text{ mA}$ $I_C = 0.2 \text{ mA}, I_F = 1 \text{ mA}$ Rank GB	—	—	0.4	V
			—	0.2	—	
			—	—	0.4	

Isolation Characteristics (Ta = 25°C)

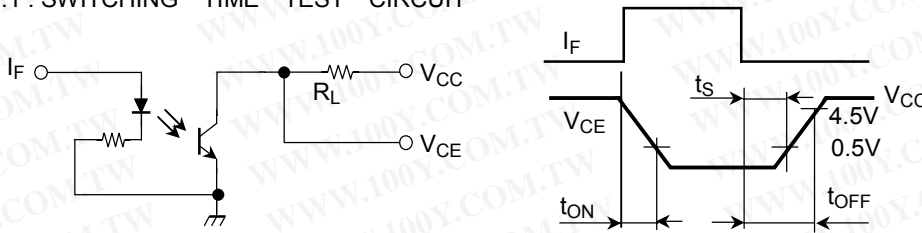
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance (input to output)	C_S	$V_S = 0, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	R_S	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	—	10^{11}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	2500	—	—	Vrms
		AC, 1 second, in oil	—	5000	—	
		DC, 1 minute, in oil	—	5000	—	Vdc

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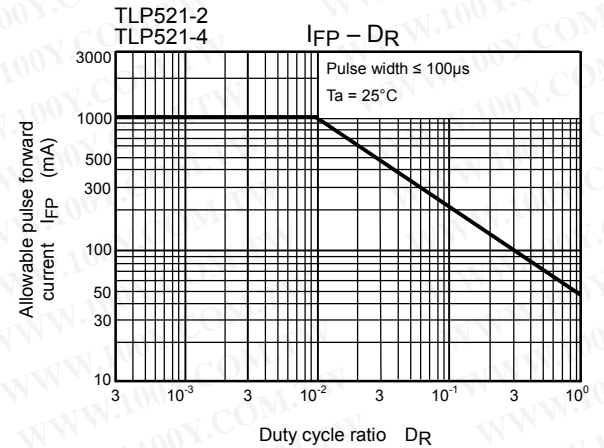
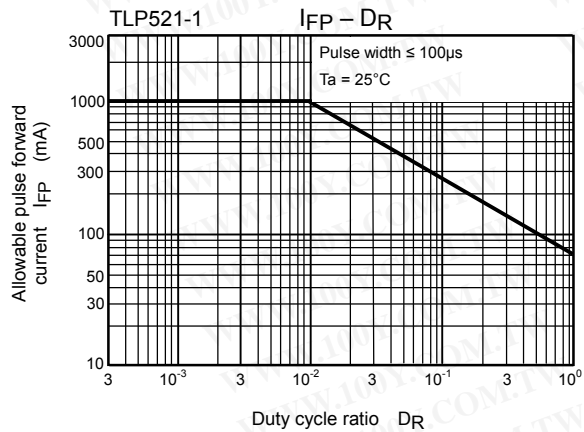
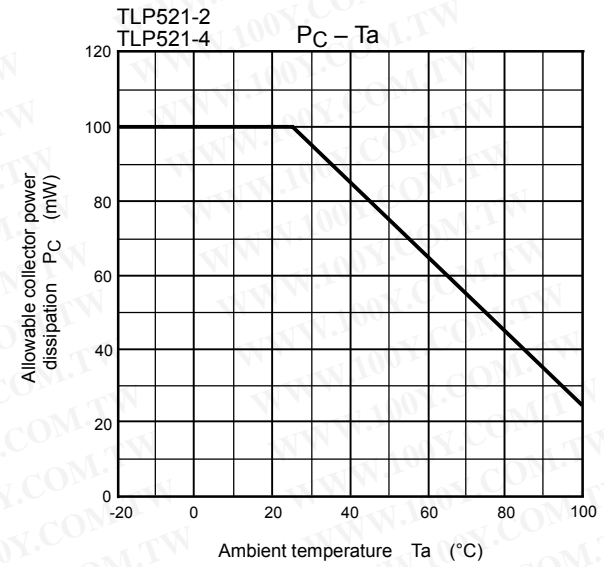
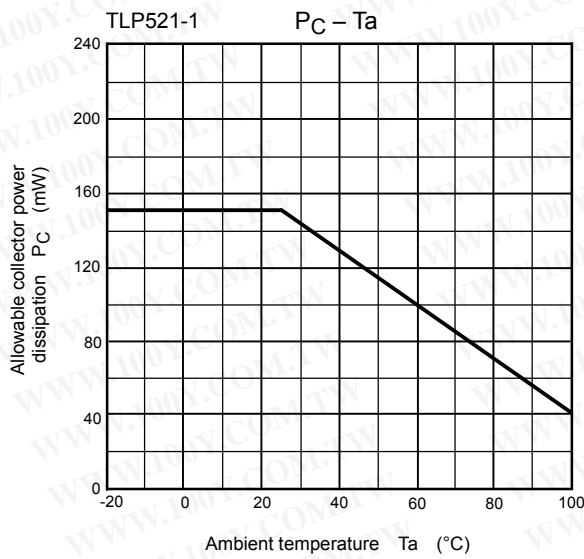
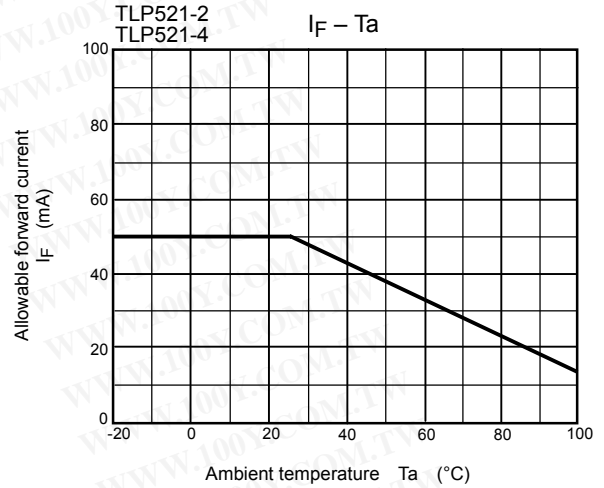
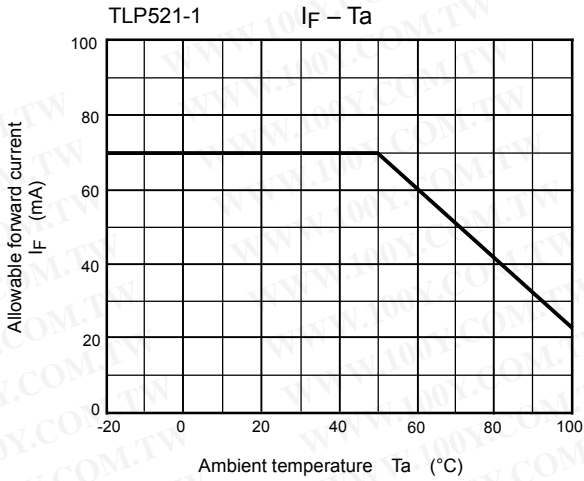
Switching Characteristics (Ta = 25°C)

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}	$R_L = 1.9\text{ k}\Omega$ (Fig.1) $V_{CC} = 5\text{ V}$, $I_F = 16\text{ mA}$	—	2	—	μs
Storage time	t_s		—	15	—	
Turn-off time	t_{OFF}		—	25	—	

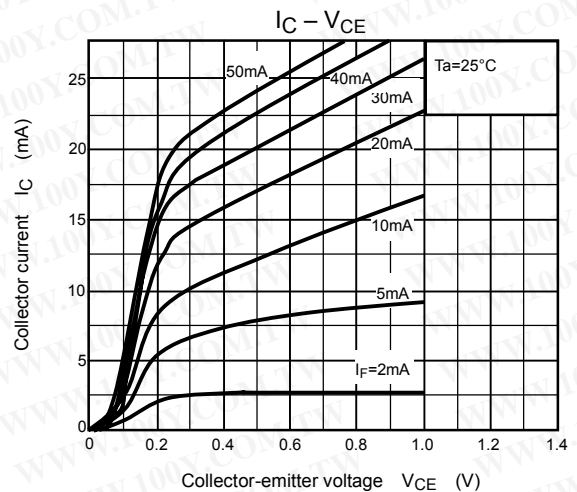
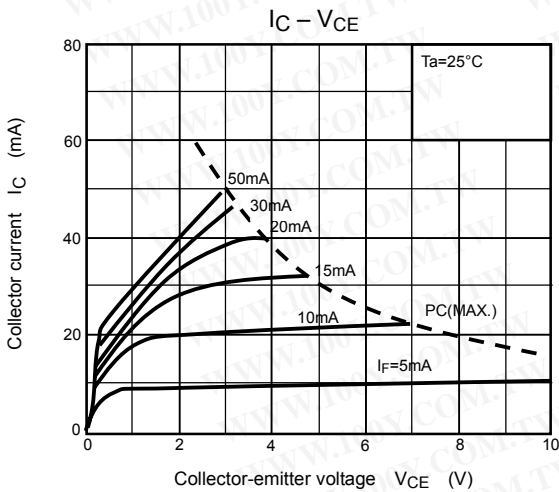
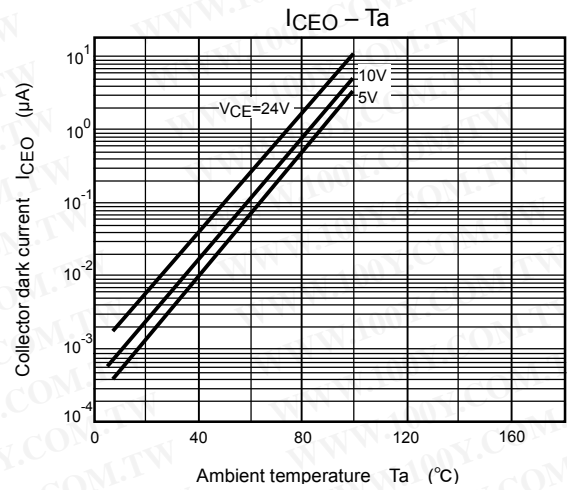
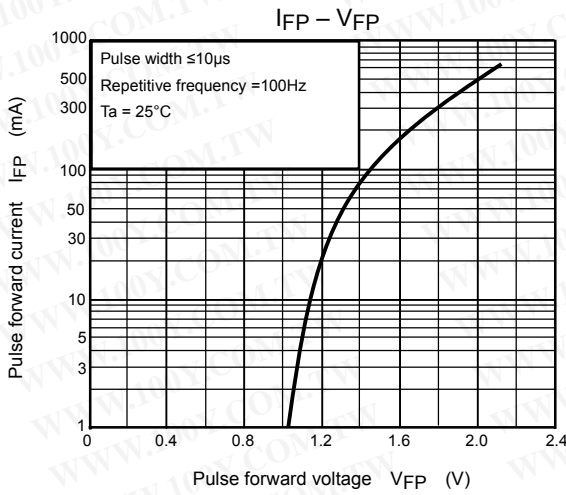
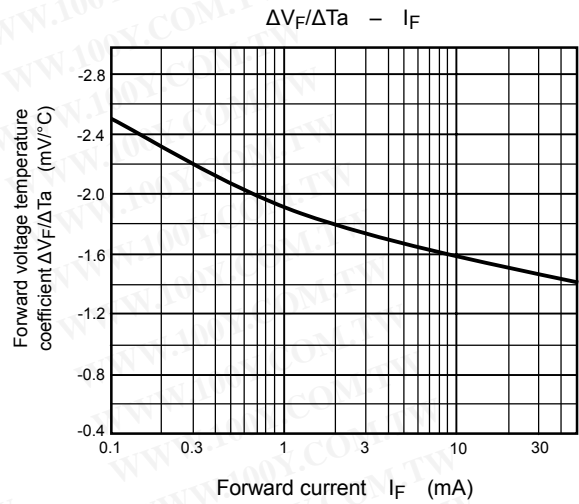
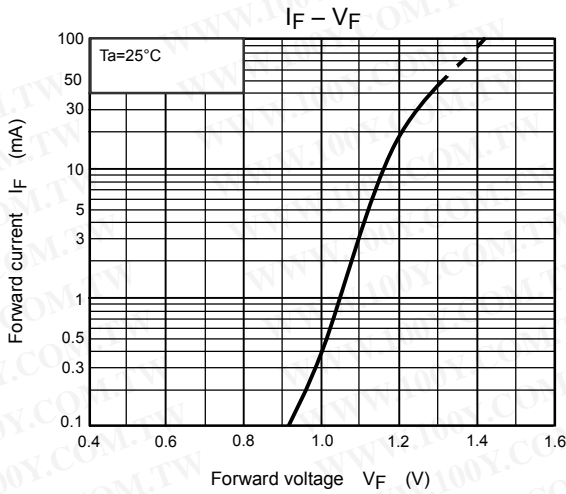
Fig.1 : SWITCHING TIME TEST CIRCUIT



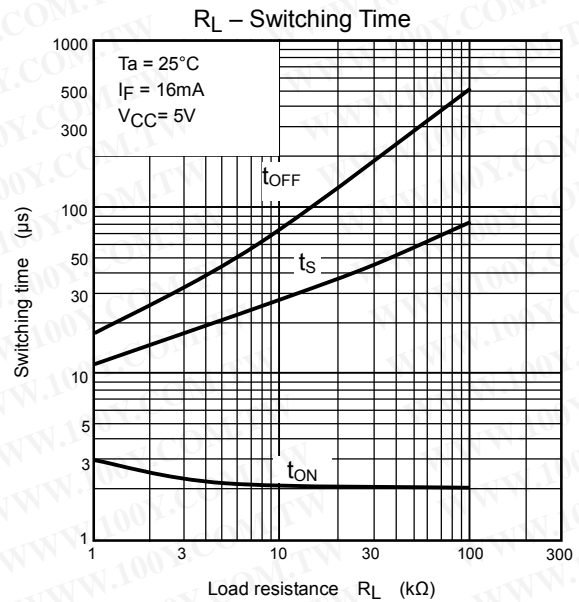
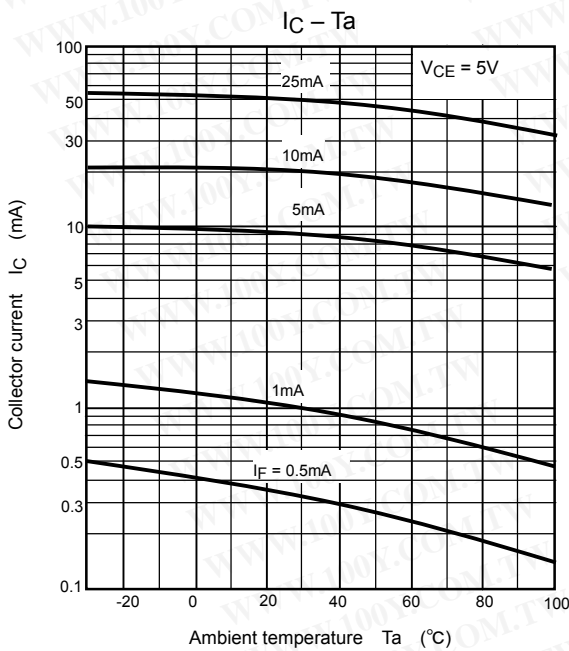
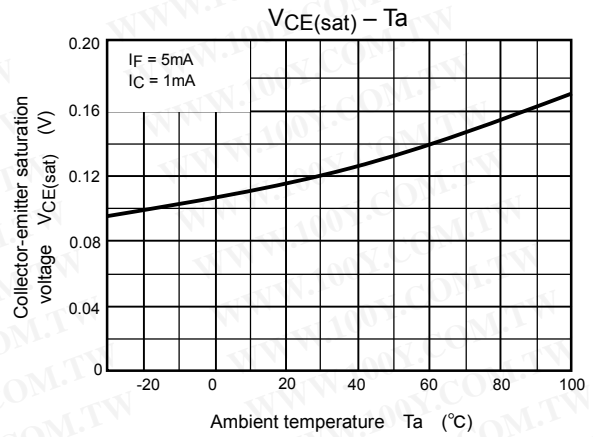
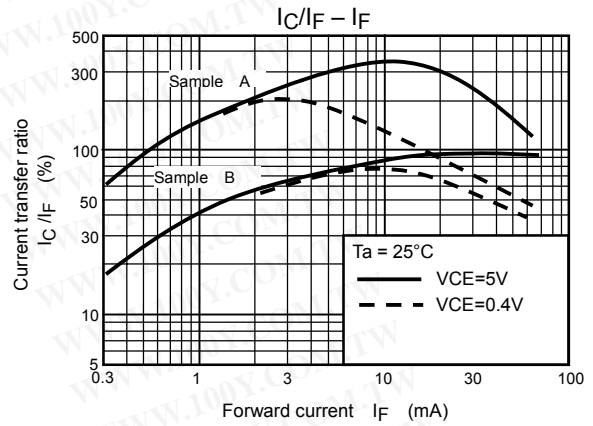
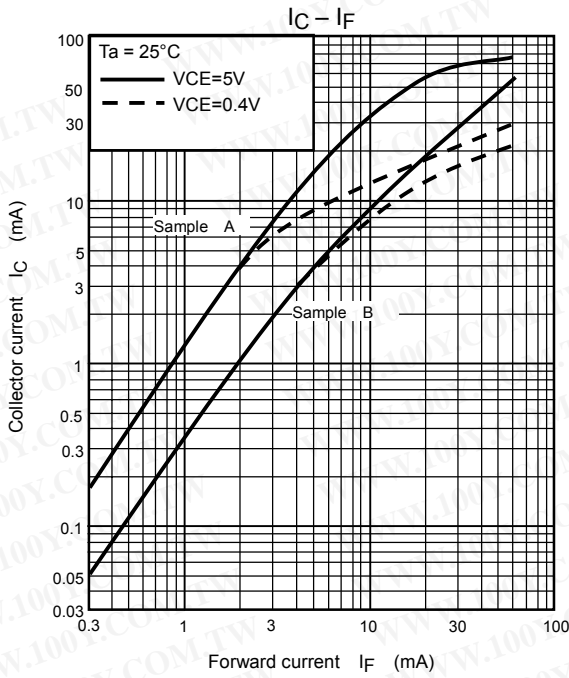
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