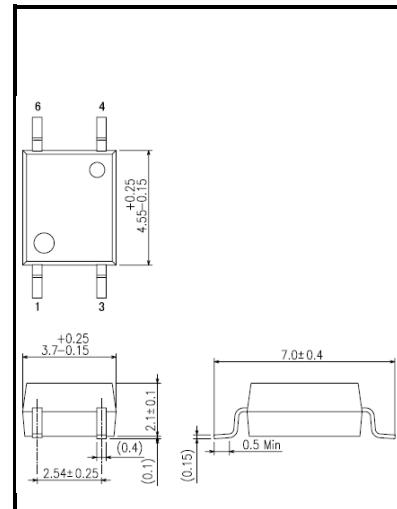


TOSHIBA Photocoupler IRLED & Photo-Transistor
TLX9300

- Various Controllers
- Signal transmission between different circuit potential
- HEV (Hybrid Electric Vehicle) and
EV (Electric Vehicle) Applications

Unit: mm



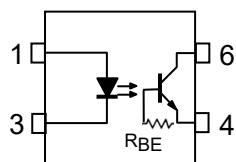
The TOSHIBA TLX9300 mini-flat photocoupler is suitable for surface-mount assembly. The TLX9300 consists of an infrared LED optically coupled to a photo-transistor.

This photocoupler can be used to the extensive applications.

It is generic speed transistor output.

- Collector-emitter voltage: 40 V (min)
- Current transfer ratio: 100% (min) to 900% (max)
- Isolation voltage: 3750 Vrms (min)
- AEC-Q101 qualified

Pin Configuration



- 1: Anode
- 3: Cathode
- 4: Emitter
- 6: Collector

JEDEC	—
JEITA	—
TOSHIBA	11-4M1S

Weight: 0.08 g (typ.)

Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25^\circ\text{C}$)

Characteristic	Symbol	Rating	Unit
LED	Forward current	I_F	30
	Forward current ($T_a = 125^\circ\text{C}$)	I_F	18
	Forward current derating ($T_a \geq 108^\circ\text{C}$)	$\Delta I_F/\text{ }^\circ\text{C}$	-0.7
	Pulse forward current (Note 1)	I_{FP}	1
	Input Power Dissipation	PD	50
	Input Power Dissipation Derating ($T_a \geq 50^\circ\text{C}$)	$\Delta PD/\text{ }^\circ\text{C}$	-0.5
Detector	Reverse voltage	V_R	5
	Collector-emitter voltage	V_{CEO}	40
	Emitter-collector voltage	V_{ECO}	5
	Collector current	I_C	50
	Collector power dissipation	P_C	150
	Collector power dissipation derating ($T_a \geq 50^\circ\text{C}$)	$\Delta P_C/\text{ }^\circ\text{C}$	-1.5
Operating temperature range		T_{opr}	-40 to 125
Storage temperature range		T_{stg}	-55 to 150
Lead soldering temperature (10 s)		T_{sol}	260
Total package power dissipation		P_T	200
Total package power dissipation derating ($T_a \geq 50^\circ\text{C}$)		$\Delta P_T/\text{ }^\circ\text{C}$	-2.0
Isolation voltage (AC, 60 s, R.H. $\leq 60\%$) (Note 2)		BV_S	3750
			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: Pulse width $PW \leq 100\mu\text{s}$, $f = 100\text{ Hz}$

Note 2: This device is considered as a two terminal device: Pins 1 and 3 are shorted together, and pins 4 and 6 are shorted together.

Recommended Operating Conditions (Note)

Characteristic	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{CC}	—	5	24	V
Forward current	I_F	—	10	15	mA
Collector current	I_C	—	1	10	mA
Operating temperature	T_{opr}	-40	—	125	$^\circ\text{C}$

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.

Electrical Characteristics (Unless otherwise specified, $T_a = -40$ to 125°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V_F	$I_F = 10 \text{ mA}, T_a = 25^\circ\text{C}$	1.1	1.25	1.4	V
			$I_F = 10 \text{ mA}$	1.0	—	1.55	V
	Reverse current	I_R	$V_R = 5 \text{ V}$	—	—	10	μA
Capacitance		C_T	$V = 0 \text{ V}, f = 1 \text{ MHz}, T_a = 25^\circ\text{C}$	—	35	—	pF
Detector	Collector-emitter breakdown voltage	$V_{(\text{BR}) \text{ CEO}}$	$I_C = 0.5 \text{ mA}$	40	—	—	V
	Emitter-collector breakdown voltage	$V_{(\text{BR}) \text{ ECO}}$	$I_E = 0.5 \text{ mA}$	5	—	—	V
	Collector dark current	I_{CEO}	$V_{CE} = 24 \text{ V}, T_a = 25^\circ\text{C}$	—	—	100	nA
			$V_{CE} = 24 \text{ V}, T_a = 105^\circ\text{C}$	—	0.1	5	μA
			$V_{CE} = 24 \text{ V}, T_a = 125^\circ\text{C}$	—	1	10	μA
Capacitance (collector to emitter)		C_{CE}	$V = 0 \text{ V}, f = 1 \text{ MHz}, T_a = 25^\circ\text{C}$	—	10	—	pF

Coupled Electrical Characteristics (Unless otherwise specified, $T_a = -40$ to 125°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	I_C / I_F		$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$	20	—	900	%
			$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}, T_a = 25^\circ\text{C}$	100	—	900	
Saturated CTR	$I_C / I_F \text{ (sat)}$		$I_F = 1 \text{ mA}, V_{CE} = 0.4 \text{ V}, T_a = 25^\circ\text{C}$	30	—	—	%
Collector-emitter saturation voltage	$V_{CE} \text{ (sat)}$		$I_C = 2.4 \text{ mA}, I_F = 8 \text{ mA}, T_a = 25^\circ\text{C}$	—	—	0.4	V
			$I_C = 0.2 \text{ mA}, I_F = 1 \text{ mA}, T_a = 25^\circ\text{C}$	—	—	0.4	
Off-state collector current	$I_C \text{ (off)}$		$V_F = 0.7 \text{ V}, V_{CE} = 24 \text{ V}, T_a = 25^\circ\text{C}$	—	—	10	μA

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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance (input to output)		C_S	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.5	—	pF
Isolation resistance		R_S	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	5×10^{10}	10^{14}	—	Ω
Isolation voltage		B_VS	AC, 60 s	3750	—	—	Vrms

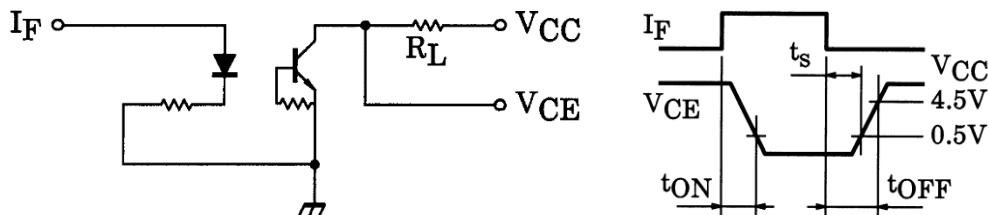
Note : This device is considered as a two terminal device: Pins 1 and 3 are shorted together, and pins 4 and 6 are shorted together.

Switching Characteristics (Note) (Unless otherwise specified, $T_a = -40$ to 125°C)

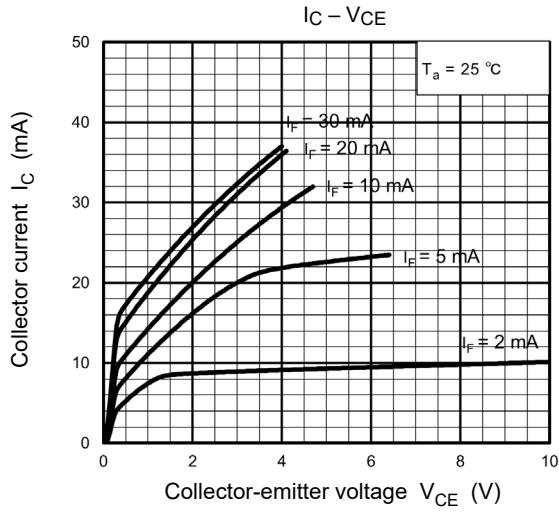
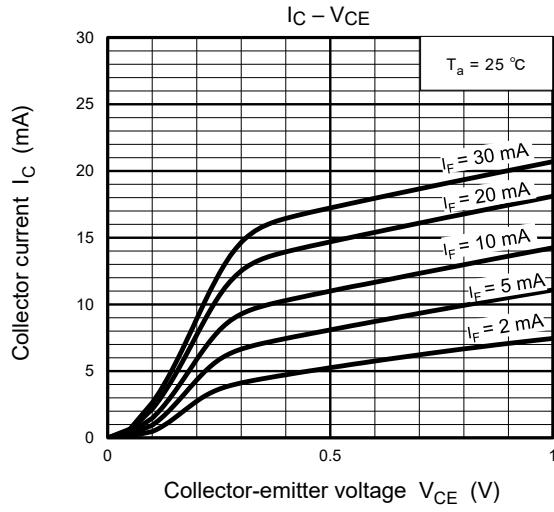
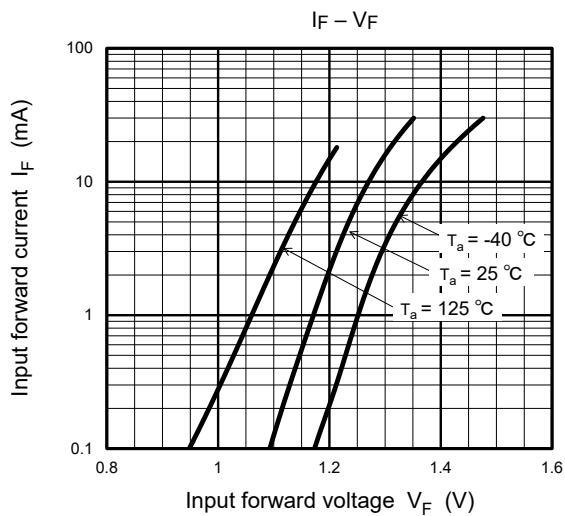
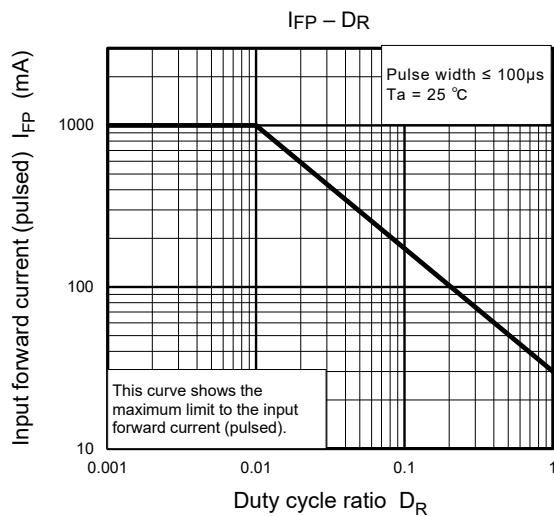
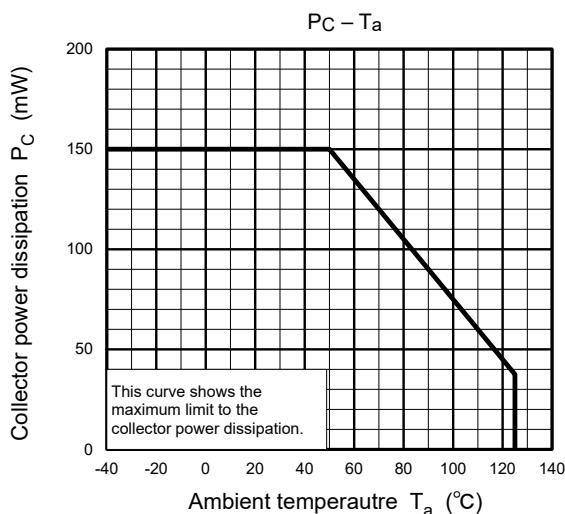
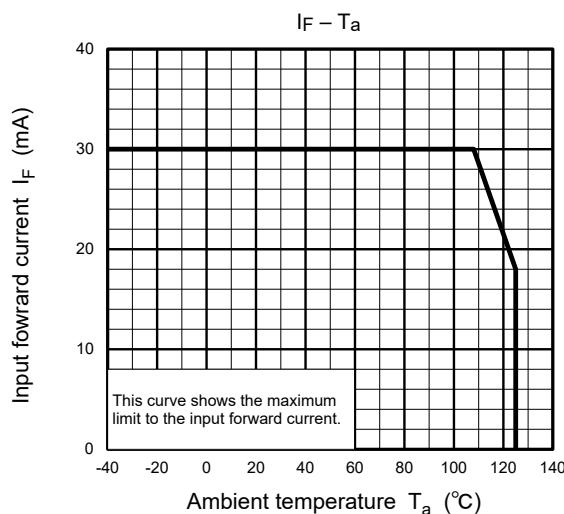
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	t_{ON}	$R_L = 10 \text{ k}\Omega$ $V_{CC} = 5 \text{ V}$, $I_F = 2 \text{ mA}$	1	15	100	μs
Storage time	t_s		—	20	200	
Turn-off time	t_{OFF}		1	50	300	

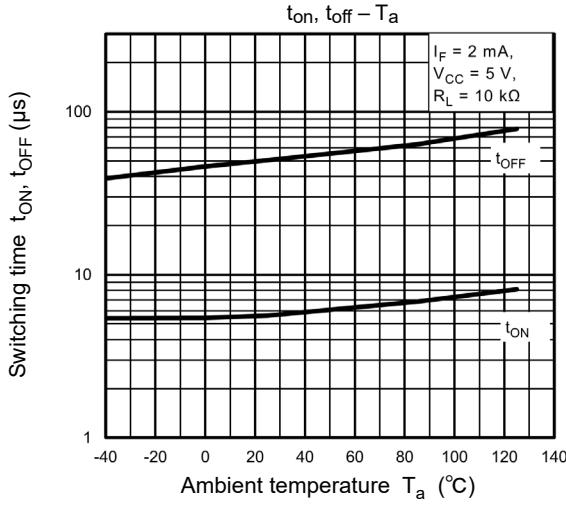
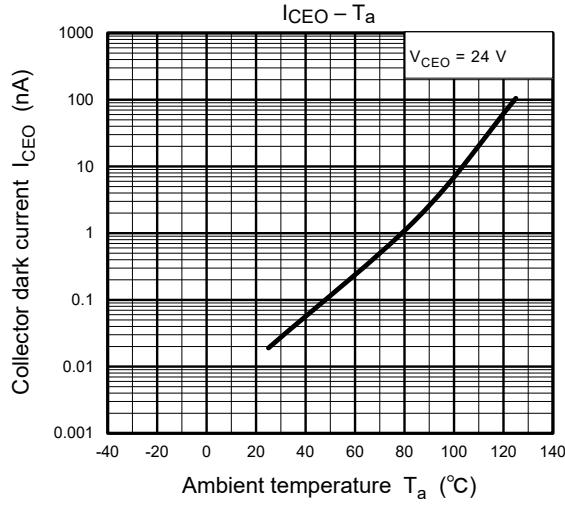
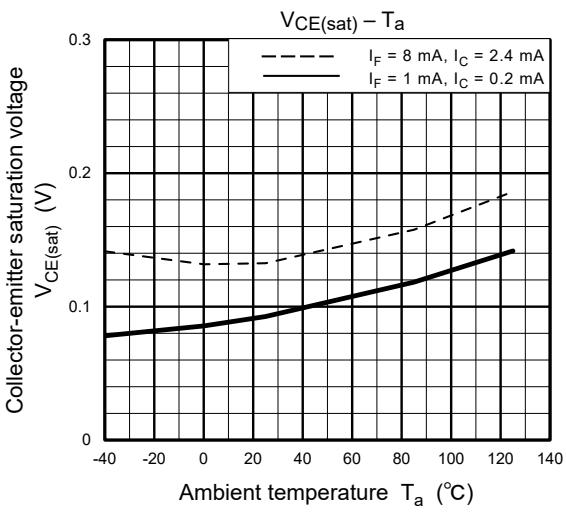
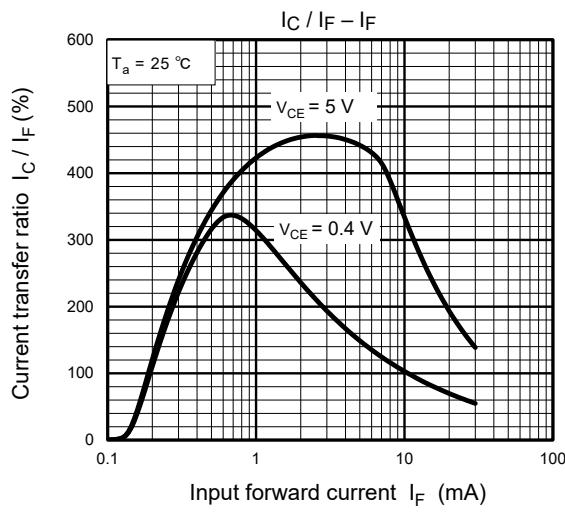
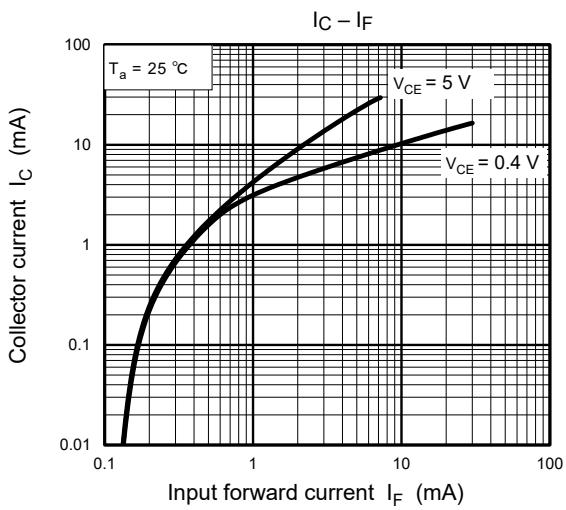
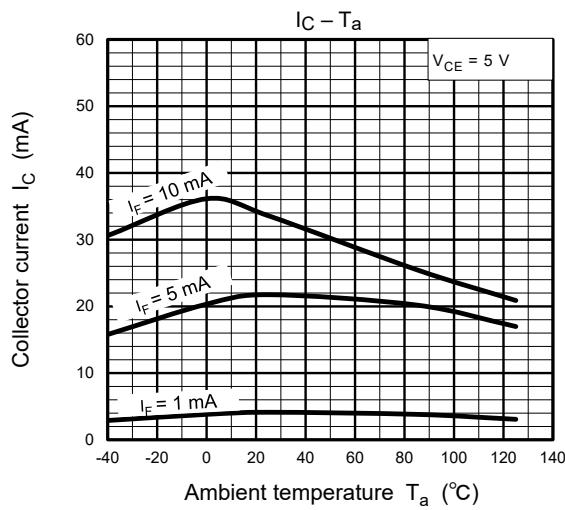
Note: All typical values at $T_a = 25^\circ\text{C}$.

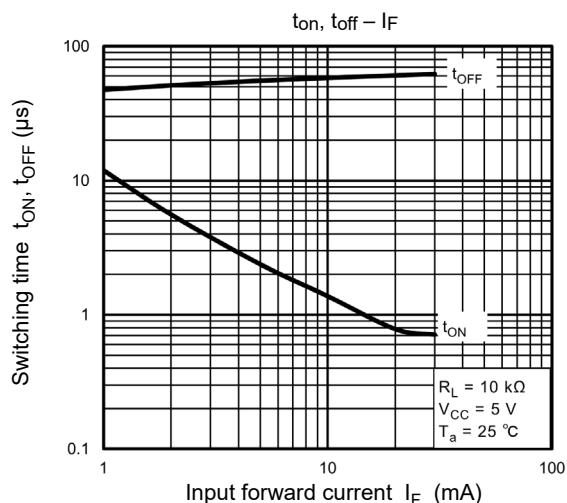
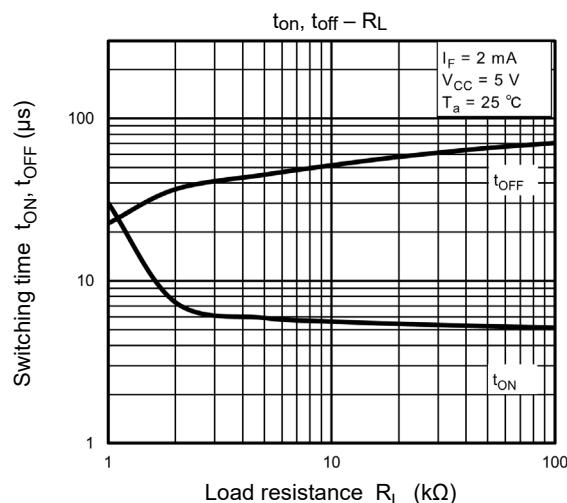
Note 1: Switching time test circuit and waveform.



Characteristic Curves (Note)







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

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