

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

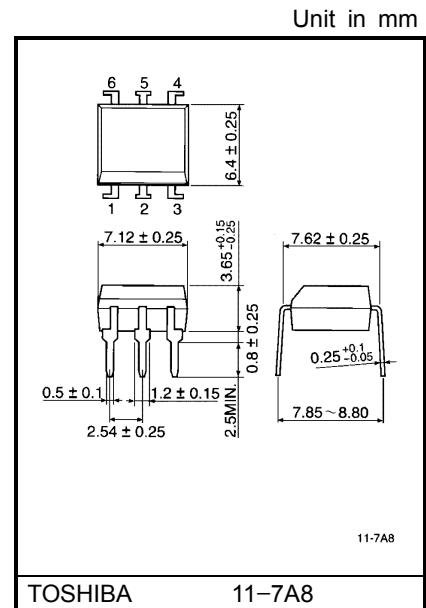
TLP371, TLP372

- Office Machine
- Household Use Equipment
- Telecommunication
- Solid State Relay
- Programmable Controllers

The TOSHIBA TLP371 and TLP372 consists of a gallium arsenide infrared emitting diode optically coupled to a darlington connected photo-transistor which has an integrated base-emitter resistor to optimize switching speed and elevated temperature characteristics in a six lead plastic DIP package.

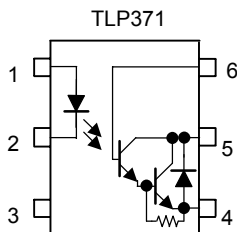
TLP372 is no-base internal connection for high-EMI environments.

- Current transfer ratio: 1000% (min) ($I_F = 1\text{mA}$)
- Isolation voltage: 5000 Vrms (min)
- UL recognized: UL1577, file no. E67349

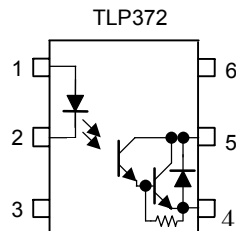


Weight: 0.4g

Pin Configurations (top view)



- 1 : Anode
- 2 : Cathode
- 3 : NC
- 4 : Emitter
- 5 : Collector
- 6 : Base



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Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current	I_F	60	mA
	Forward current derating (Ta ≥ 39°C)	$\Delta I_F / ^\circ\text{C}$	-0.7	mA / °C
	Peak forward current (100µs pulse, 100pps)	I_{FP}	1	A
	Reverse voltage	V_R	5	V
	Junction temperature	T_j	125	°C
Detector	Collector-emitter voltage	V_{CEO}	300	V
	Collector-base voltage (TLP371)	V_{CBO}	300	V
	Emitter-collector voltage	V_{ECO}	0.3	V
	Emitter-base voltage (TLP371)	V_{EBO}	7	V
	Collector current	I_C	150	mA
	Power dissipation	P_C	300	mW
	Power dissipation derating (Ta ≥ 25°C)	$\Delta P_C / ^\circ\text{C}$	-3.0	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 (10 s)		T_{sold}	260	°C
Total package power dissipation		P_T	350	mW
Total package power dissipation derating (Ta ≥ 25°C)		$\Delta P_T / ^\circ\text{C}$	-3.5	mW / °C
Isolation voltage (AC, 1min., R.H. ≤ 60%) (Note 1)		BV_S	5000	Vrms

(Note 1): Device considered a two terminal device: Pins 1, 2 and 3 shorted together and pins 4,5 and 6 shorted together.

Recommended Operating Conditions

Characteristic	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{CC}	—	—	200	V
Forward current	I_F	—	16	25	mA
Collector current	I_C	—	—	120	mA
Operating temperature	T_{opr}	-25	—	85	°C

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	$V_{(BR) CEO}$	$I_C = 0.1 \text{ mA}$	300	—	—	V
	Emitter-collector breakdown voltage	$V_{(BR) ECO}$	$I_E = 0.1 \text{ mA}$	0.3	—	—	V
	Collector-base breakdown voltage (TLP371)	$V_{(BR) CBO}$	$I_C = 0.1 \text{ mA}$	300	—	—	V
	Emitter-base breakdown voltage (TLP371)	$V_{(BR) EBO}$	$I_E = 0.1 \text{ mA}$	7	—	—	V
	Collector dark current	I_{CEO}	$V_{CE} = 200 \text{ V}$	—	10	200	nA
			$V_{CE} = 200 \text{ V}$ $T_a = 85^\circ\text{C}$	—	—	20	μA
	Collector dark current (TLP371)	I_{CER}	$V_{CE} = 200 \text{ V}$ $T_a = 85^\circ\text{C}$, $R_{BE} = 10 \text{ M}\Omega$	—	0.5	10	μA
	Collector dark current (TLP371)	I_{CBO}	$V_{CE} = 200 \text{ V}$	—	0.1	—	nA
	DC forward current gain (TLP371)	h_{FE}	$V_{CE} = 5 \text{ V}$, $I_C = 10 \text{ mA}$	—	7000	—	—
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	$I_F = 1 \text{ mA}, V_{CE} = 1 \text{ V}$	1000	4000	—	%
Saturated CTR	$I_C / I_F (\text{sat})$	$I_F = 10 \text{ mA}, V_{CE} = 1 \text{ V}$	500	—	—	%
Base photo-current (TLP371)	I_{PB}	$I_F = 1 \text{ mA}, V_{CB} = 1 \text{ V}$	—	6	—	μA
Collector-emitter saturation voltage	$V_{CE} (\text{sat})$	$I_C = 10 \text{ mA}, I_F = 1 \text{ mA}$	—	—	1.0	V
		$I_C = 100 \text{ mA}, I_F = 10 \text{ mA}$	0.3	—	1.2	

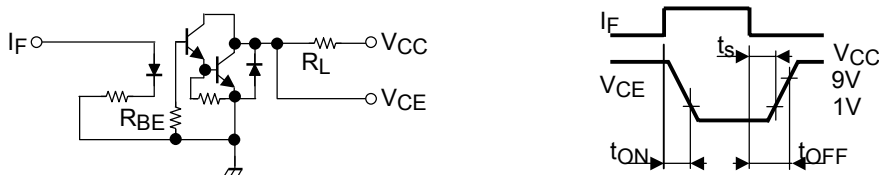
Isolation Characteristics (Ta = 25°C)

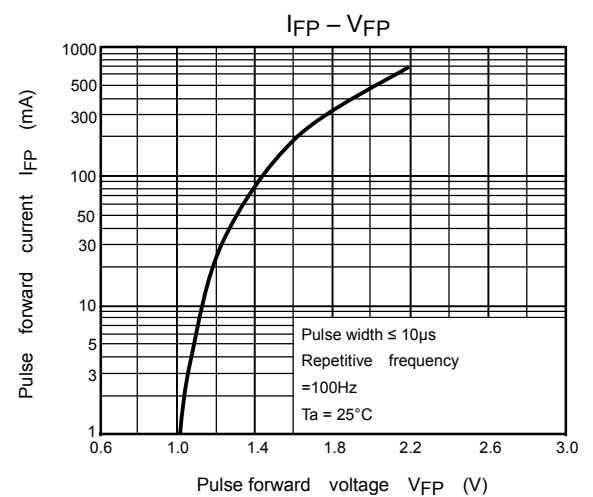
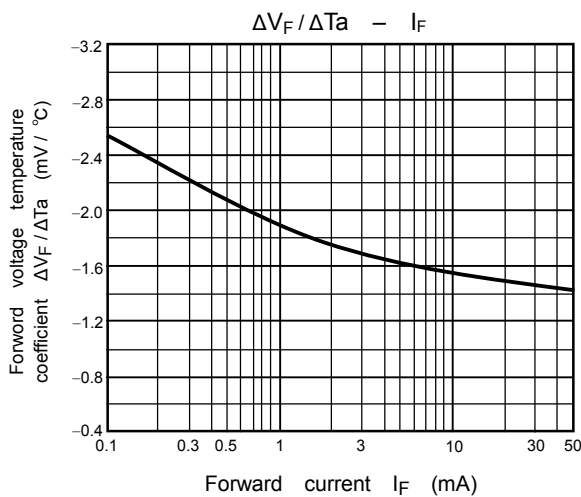
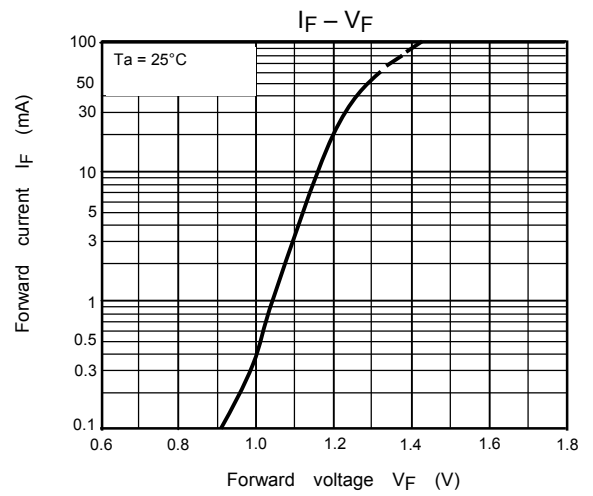
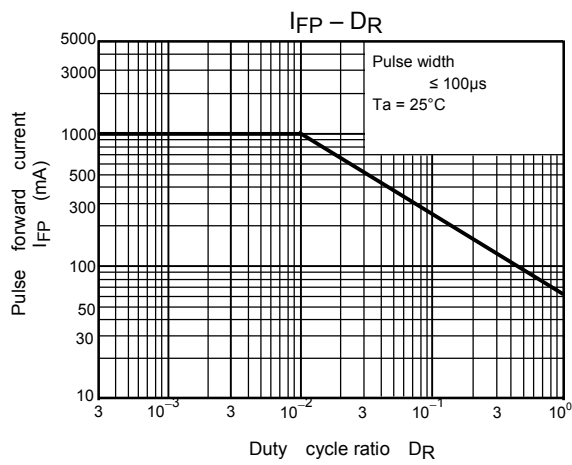
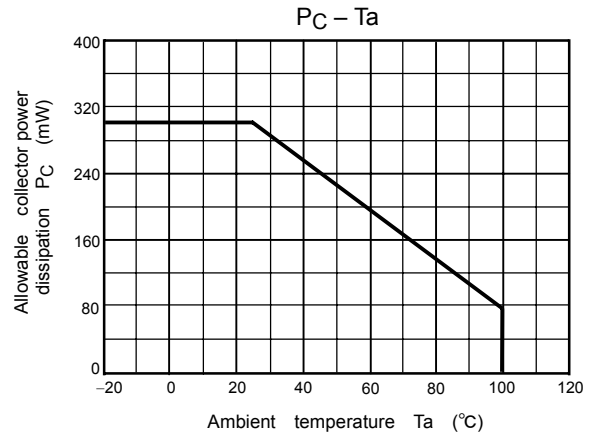
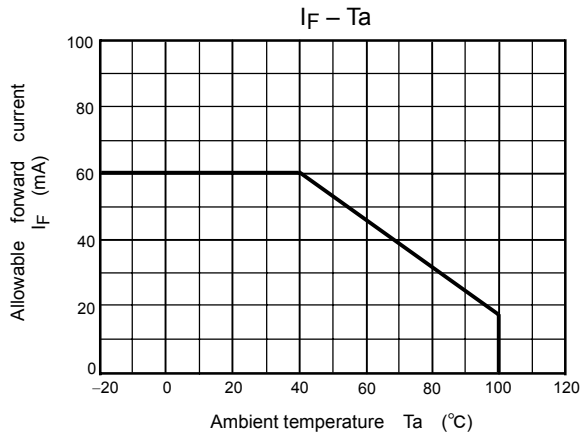
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance (input to output)	C _S	V _S = 0, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R _S	V _S = 500 V	5×10 ¹⁰	10 ¹⁴	—	Ω
Isolation voltage	BV _S	AC, 1 minute	5000	—	—	V _{rms}
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V _{dc}

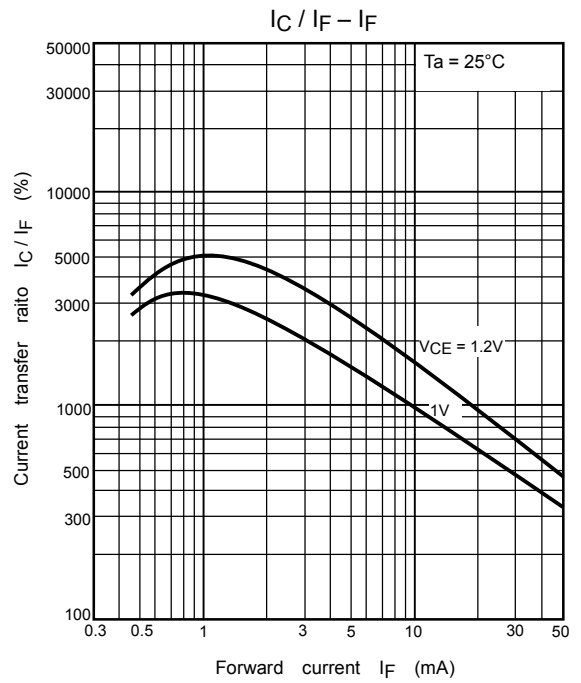
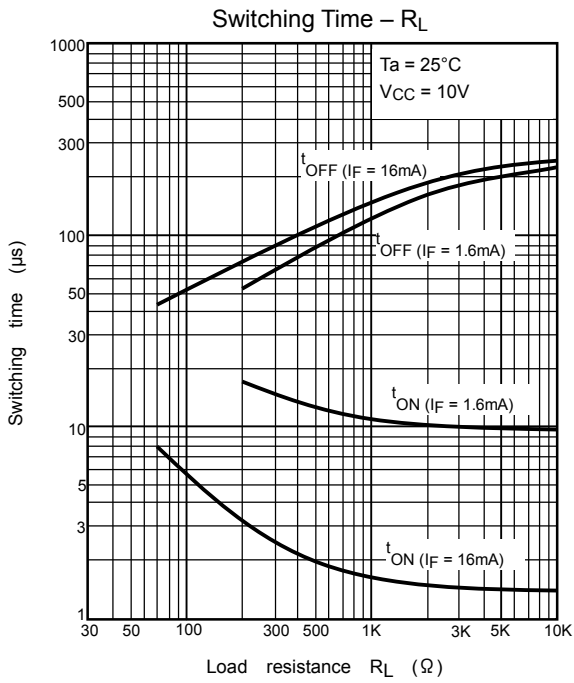
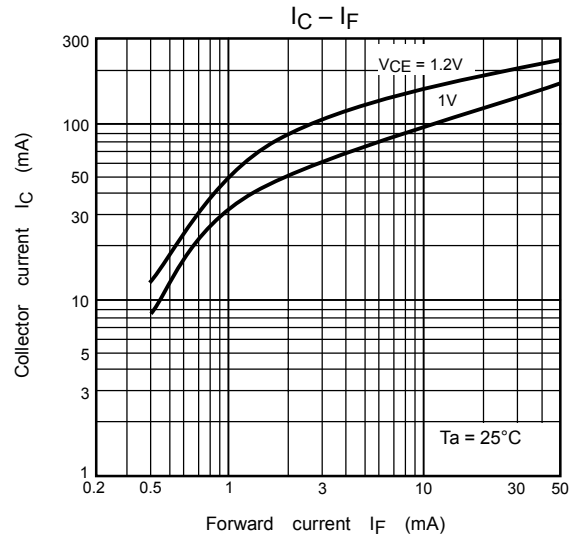
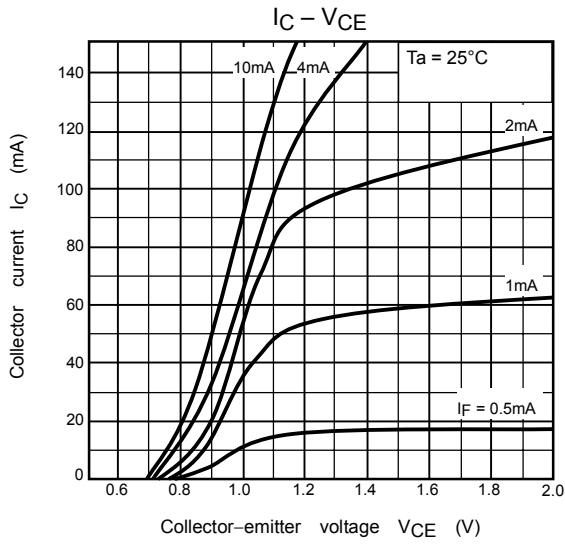
Switching Characteristics (Ta = 25°C)

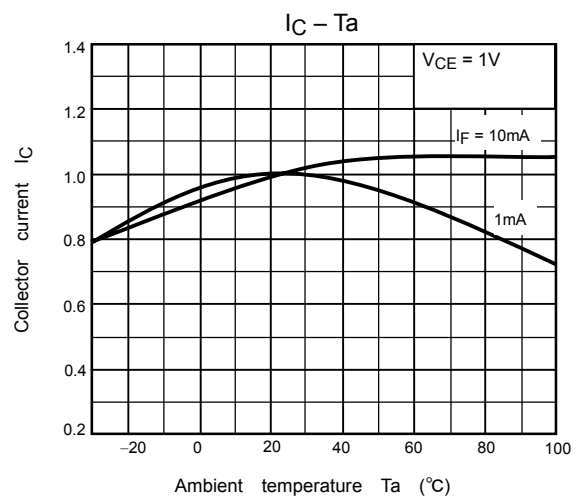
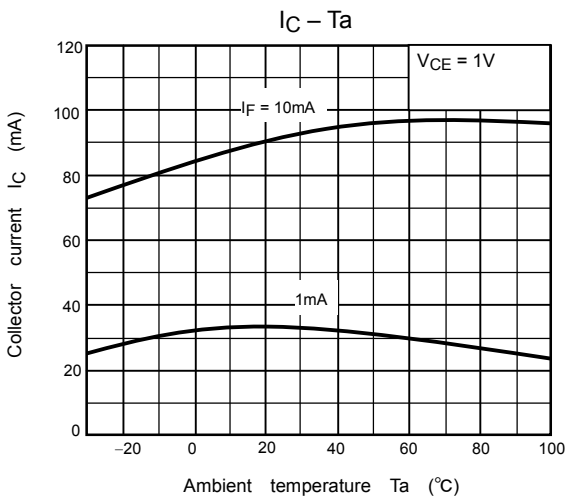
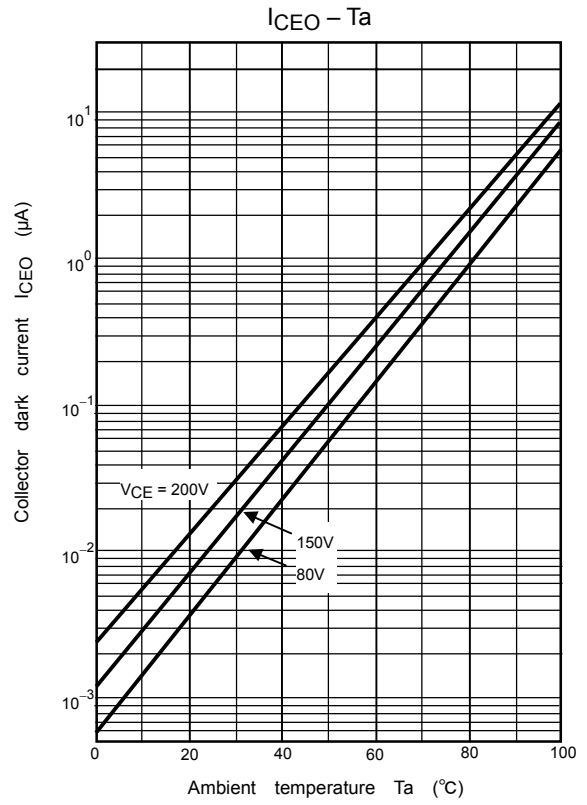
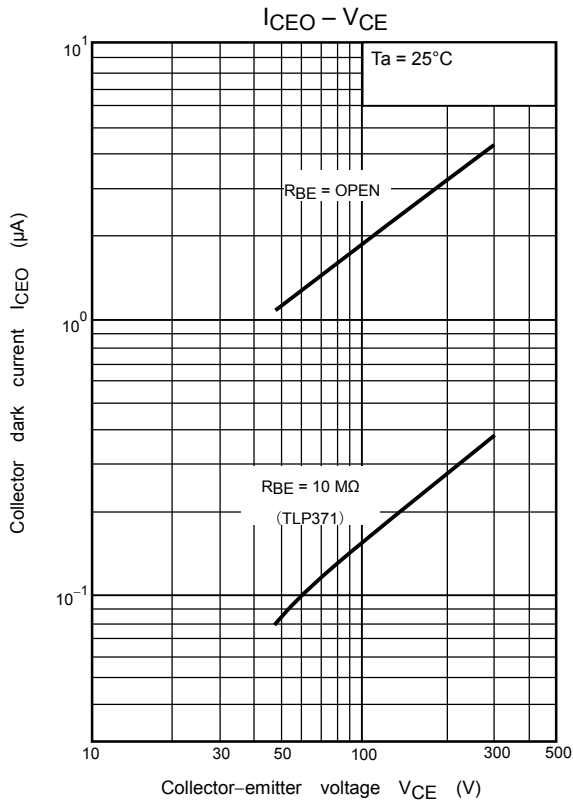
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	t _r	V _{CC} = 10 V I _C = 10 mA R _L = 100Ω	—	40	—	μs
Fall time	t _f		—	15	—	
Turn-on time	t _{on}		—	50	—	
Turn-off time	t _{off}		—	15	—	
Turn-on time	t _{ON}	R _L = 180Ω (Fig.1) R _{BE} = OPEN V _{CC} = 5 V, I _F = 16 mA	—	3	—	μs
Storage time	t _s		—	45	—	
Turn-off time	t _{OFF}		—	90	—	
Turn-on time	t _{ON}	R _L = 180Ω (Fig.1) R _{BE} = 10 MΩ(TLP371) V _{CC} = 10 V, I _F = 16 mA	—	5	—	μs
Storage time	t _s		—	40	—	
Turn-off time	t _{OFF}		—	80	—	

Fig. 1: Switching time test circuit









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