

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP371, TLP372

OFFICE MACHINE

HOUSEHOLD USE EQUIPMENT

TELECOMMUNICATION

SOLID STATE RELAY

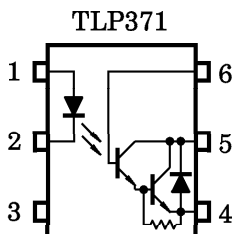
PROGRAMMABLE CONTROLLERS

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.

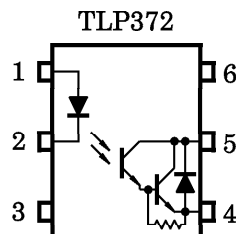
TLP372 is no-base internal connection for high-EMI environments.

- Current Transfer Ratio : 1000% (min) ($I_F = 1 \text{ mA}$)
- Isolation Voltage : 5000 Vrms (min)
- UL Recognized : UL1577, File No. E67349

PIN CONFIGURATIONS (TOP VIEW)

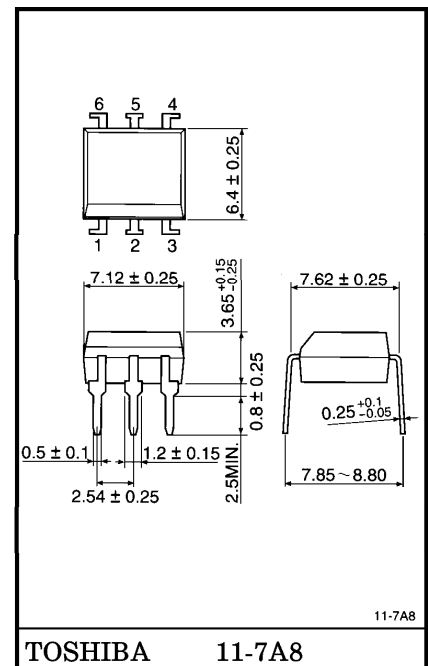


- 1 : ANODE
2 : CATHODE
3 : NC
4 : EMITTER
5 : COLLECTOR
6 : BASE



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Unit in mm



TOSHIBA

11-7A8

Weight : 0.4 g

000707EBC2

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MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	I_F	60	mA
	Forward Current Derating ($T_a \geq 39^\circ\text{C}$)	$\Delta I_F / ^\circ\text{C}$	-0.7	mA / $^\circ\text{C}$
	Peak Forward Current (100 μs pulse, 100 pps)	I_{FP}	1	A
	Reverse Voltage	V_R	5	V
	Junction Temperature	T_j	125	$^\circ\text{C}$
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 ($T_a \geq 25^\circ\text{C}$)	$\Delta P_C / ^\circ\text{C}$	-3.0	mW / $^\circ\text{C}$
	Junction Temperature	T_j	125	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55~125	$^\circ\text{C}$
Operating Temperature Range		T_{opr}	-55~100	$^\circ\text{C}$
Lead Soldering Temperature (10 s)		T_{sold}	260	$^\circ\text{C}$
Total Package Power Dissipation		P_T	350	mW
Total Package Power Dissipation Derating ($T_a \geq 25^\circ\text{C}$)		$\Delta P_T / ^\circ\text{C}$	-3.5	mW / $^\circ\text{C}$
Isolation Voltage (AC, 1 min., R.H. $\leq 60\%$) (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	$^\circ\text{C}$

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)	CS	VS = 0, f = 1 MHz	—	0.8	—	pF
Isolation Resistance	RS	VS = 500 V	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BVS	AC, 1 minute	5000	—	—	Vrms
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	Min	Typ.	Max	UNIT
Rise Time	tr	VCC = 10 V IC = 10 mA RL = 100 Ω	—	40	—	μ s
Fall Time	tf		—	15	—	
Turn-on Time	ton		—	50	—	
Turn-off Time	toff		—	15	—	
Turn-on Time	tON	RL = 180 Ω (Fig.1) RBE = OPEN VCC = 10 V, IF = 16 mA	—	3	—	μ s
Storage Time	ts		—	45	—	
Turn-off Time	tOFF		—	90	—	
Turn-on Time	tON	RL = 180 Ω (Fig.1) RBE = 10 M Ω (TLP371) VCC = 10 V, IF = 16 mA	—	5	—	μ s
Storage Time	ts		—	40	—	
Turn-off Time	tOFF		—	80	—	

Fig.1 : SWITCHING TIME TEST CIRCUIT

