SEMICONDUCTOR

TOSHIBA

TECHNICAL DATA

TOSHIBA PHOTOCOUPLER

TLP371, TLP372

GaAs IRED & PHOTO-TRANSISTOR

(TLP371)

OFFICE MACHINE

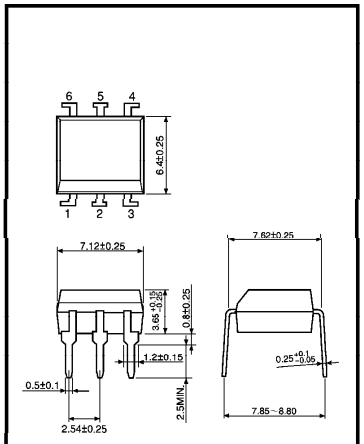
HOUSEHOLD USE EQUIPMENT

TELECOMMUNICATION

SOLID STATE RELAY

PROGRAMMABLE CONTROLLERS

Unit in mm



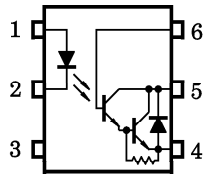
JEDEC	—
EIAJ	—
TOSHIBA	11-7A8

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 = 1mA)
- Isolation Voltage : 5000Vrms (Min.)
- UL Recognized : UL1577, File No. E67349

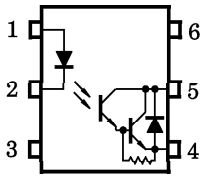
PIN CONFIGURATIONS (TOP VIEW)

TLP371



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

TLP372



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

(TLP371)

MAXIMUM RATINGS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	RATING	UNIT
LED	Forward Current	I_F	60	mA
	Forward Current Derating (Ta ≧ 39°C)	ΔI_F / °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)	ΔP_C / °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 (10sec.)		T_{sold}	260	°C
Total Package Power Dissipation		P_T	350	mW
Total Package Power Dissipation Derating (Ta ≧ 25°C)		ΔP_T / °C	−3.5	mW / °C
Isolation Voltage (AC, 1 min., RH ≦ 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.

(TLP371)

INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta = 25°C)

	CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
LED	Forward Voltage	V_F	I_F = 10mA	1.0	1.15	1.3	V
	Reverse Current	I_R	V_R = 5V	—	—	10	μA
	Capacitance	C_T	V = 0, f = 1MHz	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 0.1mA	300	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	I_E = 0.1mA	0.3	—	—	V
	Collector-Base Breakdown Voltage (TLP371)	$V_{(BR)CBO}$	I_C = 0.1mA	300	—	—	V
	Emitter-Base Breakdown Voltage (TLP371)	$V_{(BR)EBO}$	I_E = 0.1mA	7	—	—	V
	Collector Dark Current	I_{CEO}	V_{CE} = 200V	—	10	200	nA
			V_{CE} = 200V, Ta = 85°C	—	—	20	μA
	Collector Dark Current (TLP371)	I_{CER}	V_{CE} = 200V, Ta = 85°C, R_{BE} = 10MΩ	—	0.5	10	μA
	Collector Dark Current (TLP371)	I_{CBO}	V_{CE} = 200V	—	0.1	—	nA
	DC Forward Current Gain (TLP371)	h_{FE}	V_{CE} = 5V, I_C = 10mA	—	7000	—	—
	Capacitance (Collector to Emitter)	C_{CE}	V = 0, f = 1MHz	—	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 = 1mA, V_{CE} = 1V	1000	4000	—	%
Saturated CTR	$I_C / I_{F(sat)}$	I_F = 10mA, V_{CE} = 1V	500	—	—	%
Base Photo-Current (TLP371)	I_{PB}	I_F = 1mA, V_{CB} = 1V	—	6	—	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 10mA, I_F = 1mA	—	—	1.0	V
		I_C = 100mA, I_F = 10mA	0.3	—	0.2	

(TLP371)

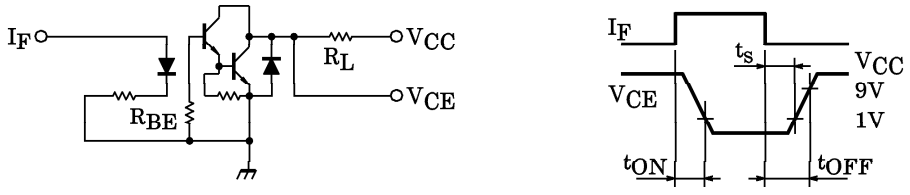
ISOLATION CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance (Input to Output)	C_S	V_S=0, f=1MHz	—	0.8	—	pF
Isolation Resistance	R_S	V_S=500V	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 1 minute	5000	—	—	Vrms
		AC, 1 second	—	10000	—	
		DC, 1 minute	—	10000	—	Vdc

SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	t_r	V_{CC}=10V, I_C=10mA, 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}=10V, I_F=16mA	—	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}=10MΩ (TLP371), V_{CC}=10V, I_F=16mA	—	5	—	μs
Storage Time	t_s		—	40	—	
Turn-off Time	t_{OFF}		—	80	—	

Fig.1 SWITCHING TIME TEST CIRCUIT

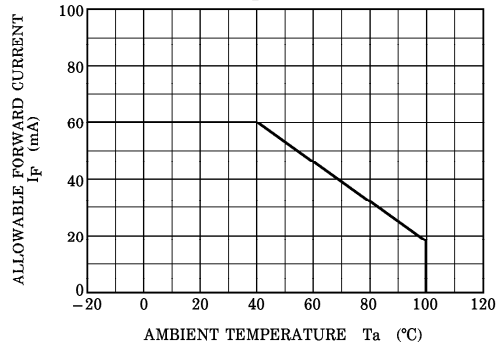


RECOMMENDS OPERATING CONDITIONS

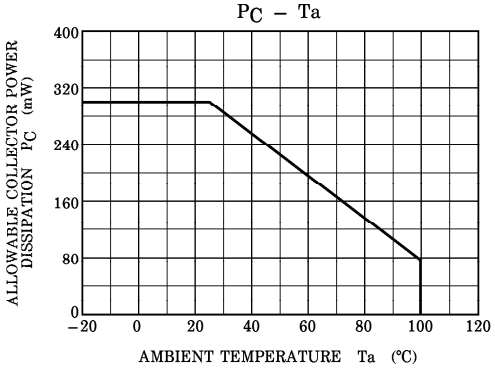
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	—	—	200	V
Forward Current	I_F	—	16	25	mA
Collector Current	I_C	—	—	120	mA
Operating Temperature	T_{opr}	−25	—	85	°C

(TLP371)

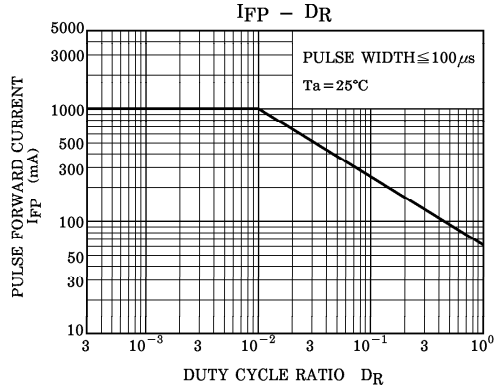
I_F – Ta



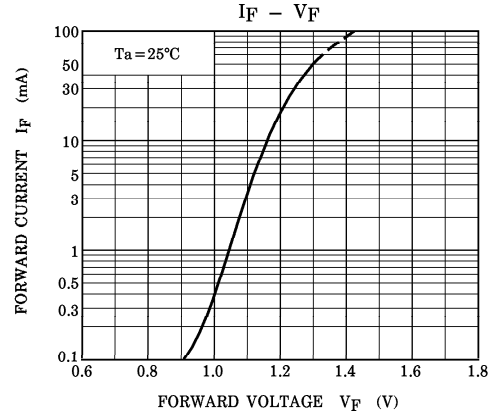
P_C – Ta



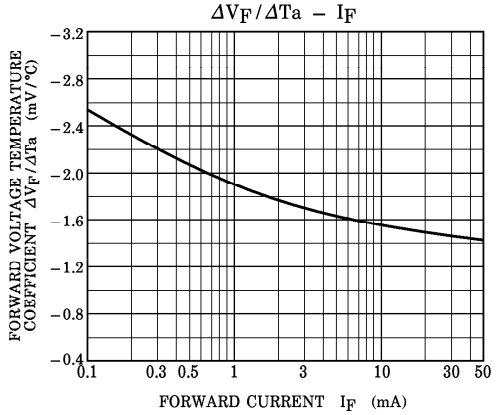
I_{FP} – D_R



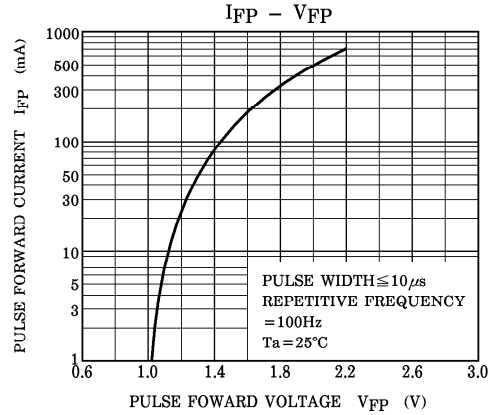
I_F – V_F



$\Delta V_F / \Delta Ta$ – I_F

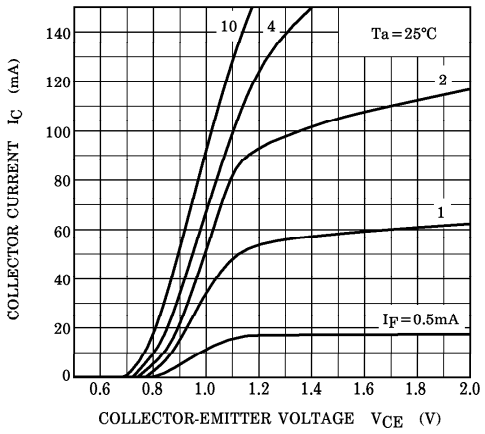


I_{FP} – V_{FP}

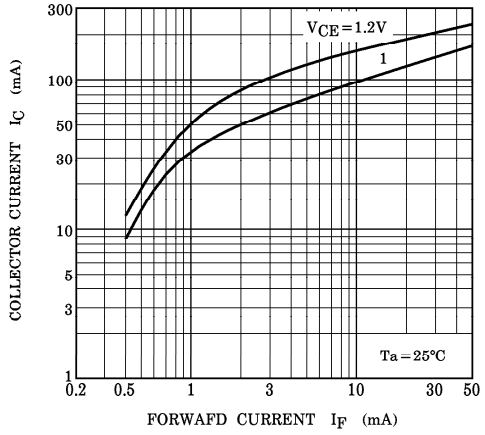


(TLP371)

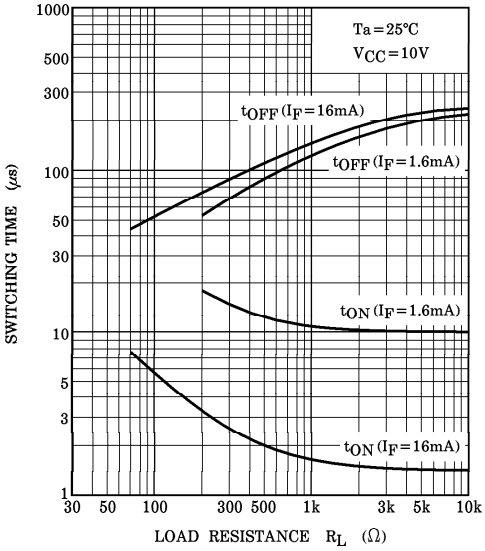
$I_C - V_{CE}$



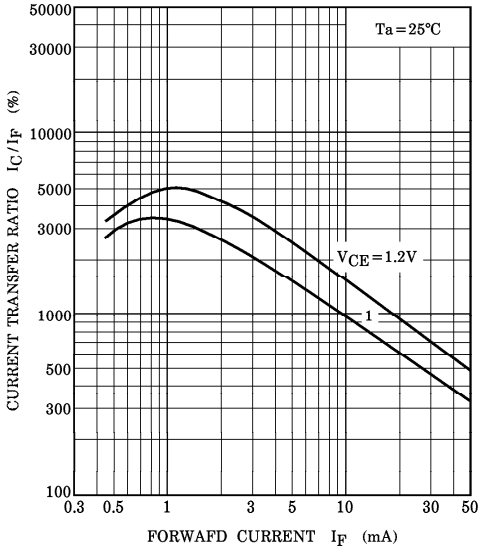
$I_C - I_F$



SWITCHING TIME – R_L

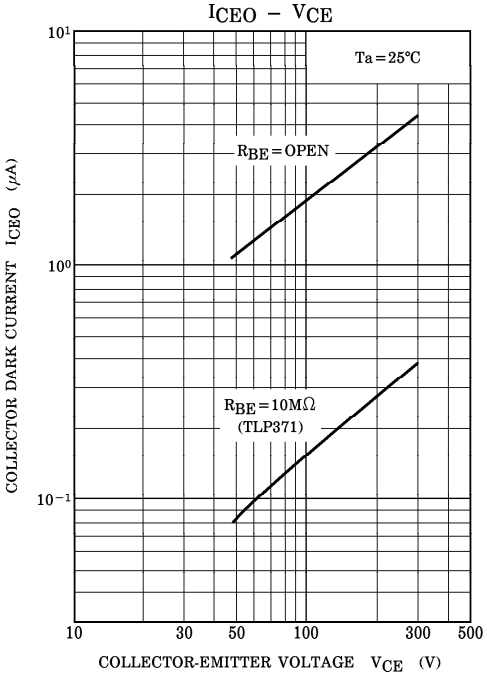


$I_C / I_F - I_F$

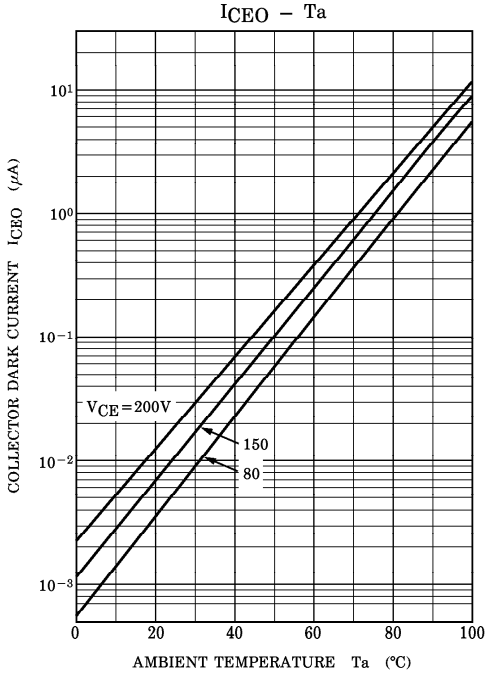


(TLP371)

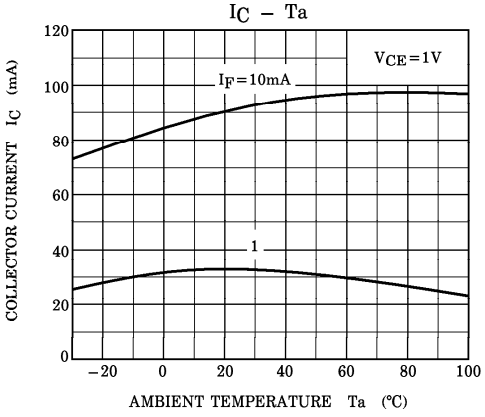
I_{CEO} – V_{CE}



I_{CEO} – Ta



I_C – Ta



I_C – Ta