TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP371, TLP372

OFFICE MACHINE

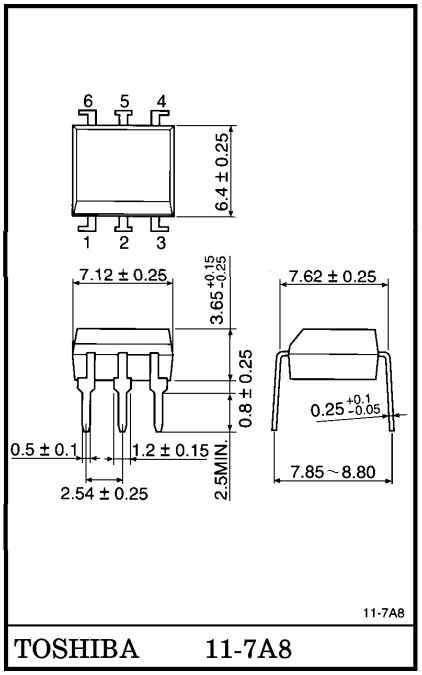
HOUSEHOLD USE EQUIPMENT

TELECOMMUNICATION

SOLID STATE RELAY

PROGRAMMABLE CONTROLLERS

Unit in mm



TOSHIBA 11-7A8

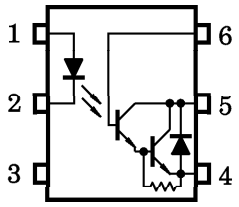
Weight : 0.4 g

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

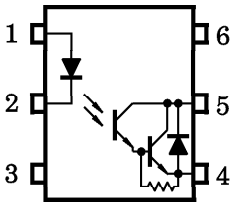
PIN CONFIGURATIONS (TOP VIEW)

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

000707EBC2

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 (100 μs pulse, 100 pps)	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 (10 s)		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., 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 mA	1.0	1.15	1.3	V
	Reverse Current	I_R	V_R = 5 V	—	—	10	μA
	Capacitance	C_T	V = 0, f = 1 MHz	—	30	—	pF
DETECTOR	Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 0.1 mA	300	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	I_E = 0.1 mA	0.3	—	—	V
	Collector-Base Breakdown Voltage (TLP371)	$V_{(BR)CBO}$	I_C = 0.1 mA	300	—	—	V
	Emitter-Base Breakdown Voltage (TLP371)	$V_{(BR)EBO}$	I_E = 0.1 mA	7	—	—	V
	Collector Dark Current	I_{CEO}	V_{CE} = 200 V	—	10	200	nA
			V_{CE} = 200 V, Ta = 85°C	—	—	20	μA
	Collector Dark Current (TLP371)	I_{CER}	V_{CE} = 200 V, Ta = 85°C, R_{BE} = 10 MΩ	—	0.5	10	μA
	Collector Dark Current (TLP371)	I_{CBO}	V_{CE} = 200 V	—	0.1	—	nA
	DC Forward Current Gain (TLP371)	h_{FE}	V_{CE} = 5 V, I_C = 10 mA	—	7000	—	—
	Capacitance (Collector to Emitter)	C_{CE}	V = 0, f = 1 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 mA, V_{CE} = 1 V	1000	4000	—	%
Saturated CTR	$I_C / I_{F(sat)}$	I_F = 10 mA, V_{CE} = 1 V	500	—	—	%
Base Photo-Current (TLP371)	I_{PB}	I_F = 1 mA, V_{CB} = 1 V	—	6	—	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 10 mA, I_F = 1 mA	—	—	1.0	V
		I_C = 100 mA, I_F = 10 mA	0.3	—	1.2	

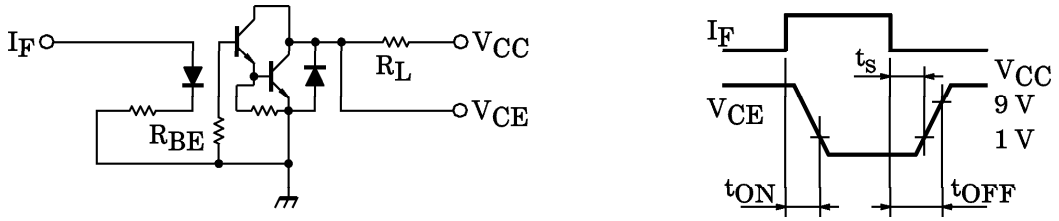
ISOLATION CHARACTERISTICS (Ta = 25°C)

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	—	—	Vrms
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

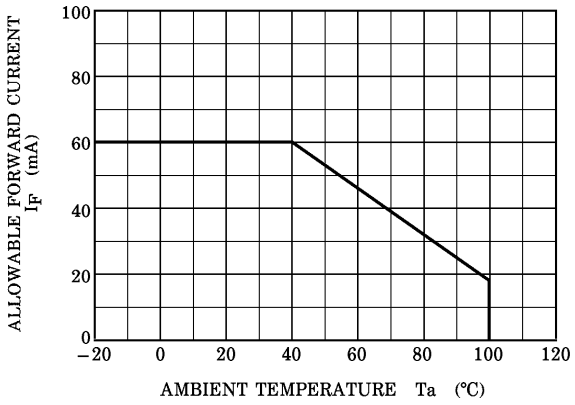
SWITCHING CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	Min	Typ.	Max	UNIT
Rise Time	t_r	V_{CC} = 10 V, I_C = 10 mA, R_L = 100 Ω	—	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 = 180 Ω (Fig.1), R_{BE} = OPEN, V_{CC} = 10 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 = 180 Ω (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	—	

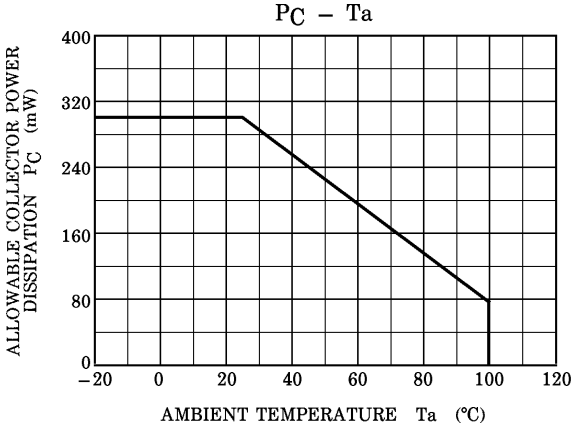
Fig.1 : SWITCHING TIME TEST CIRCUIT



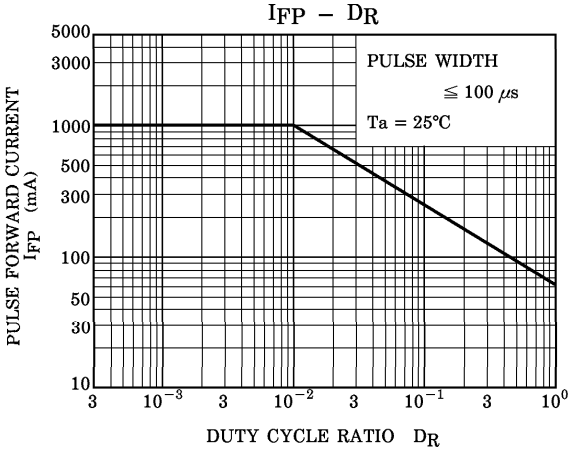
I_F – Ta



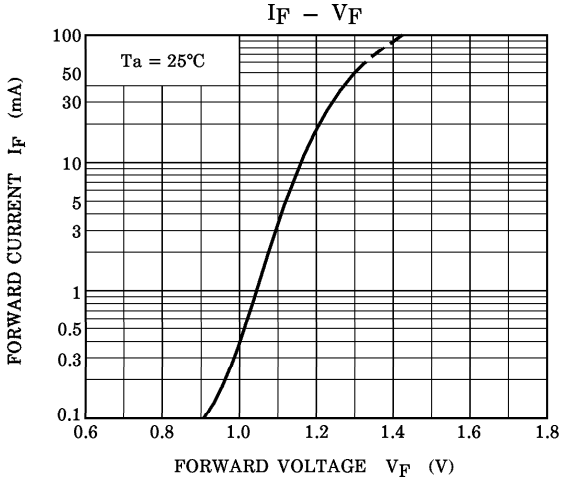
P_C – Ta



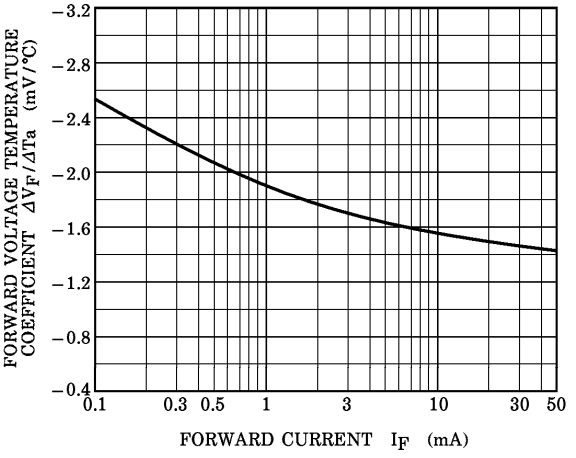
I_{FP} – D_R



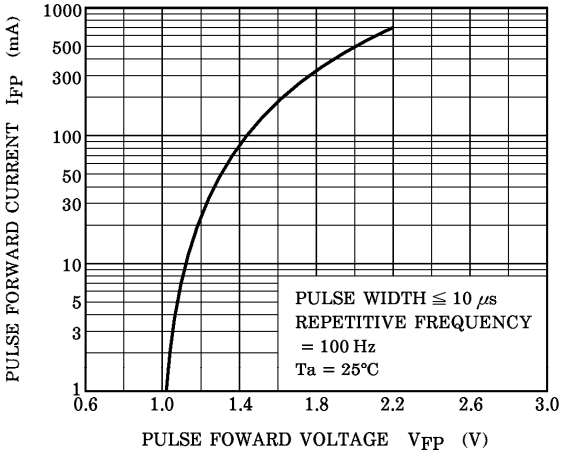
I_F – V_F



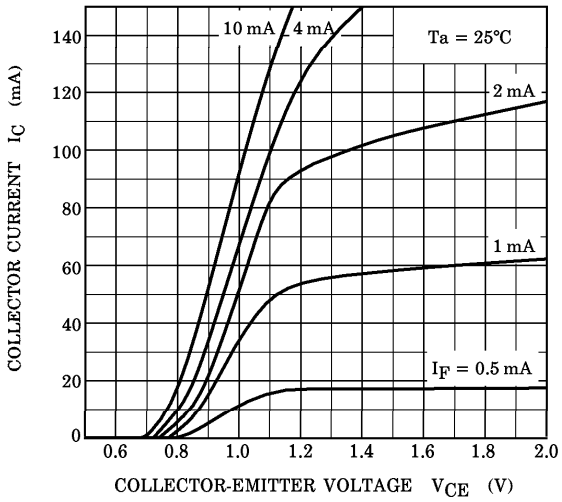
$\Delta V_F / \Delta Ta$ – I_F



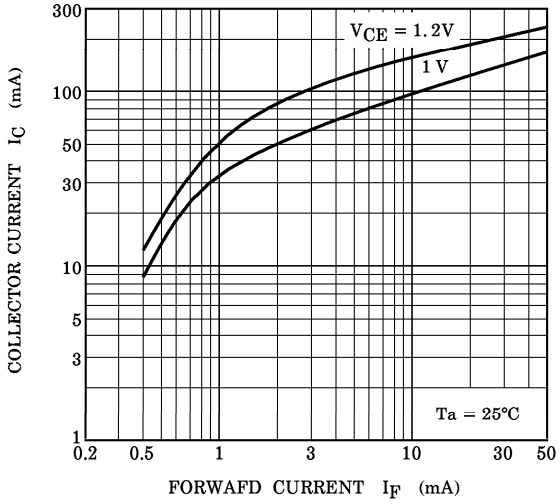
I_{FP} – V_{FP}



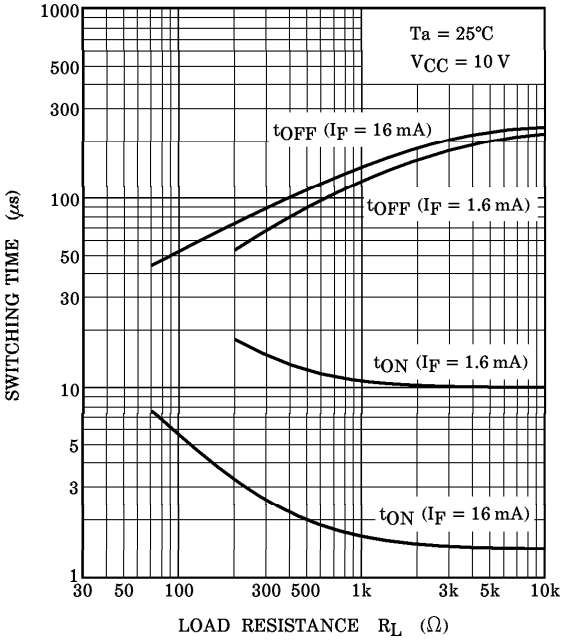
$I_C - V_{CE}$



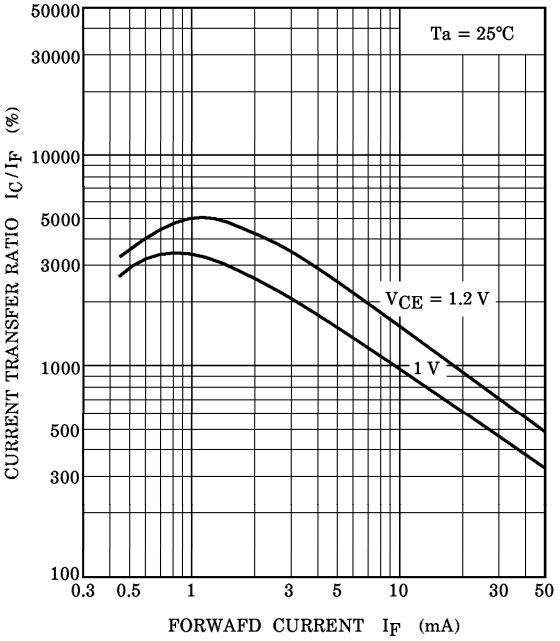
$I_C - I_F$



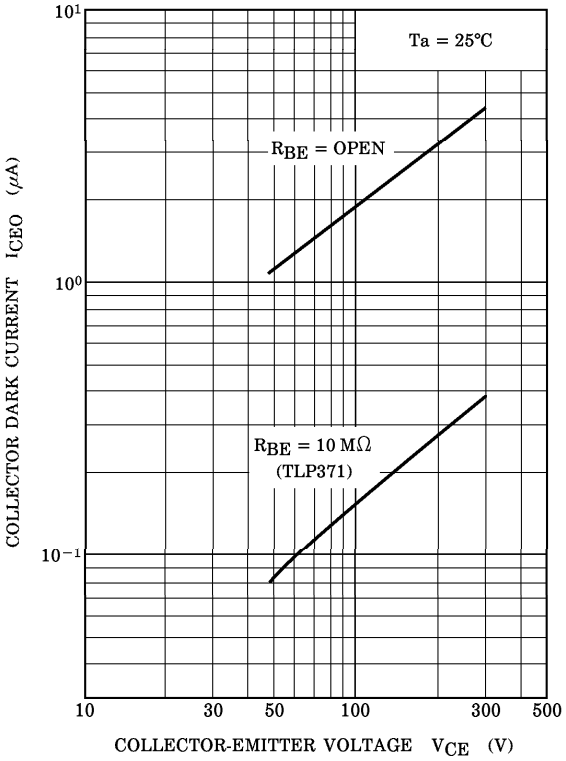
SWITCHING TIME – R_L



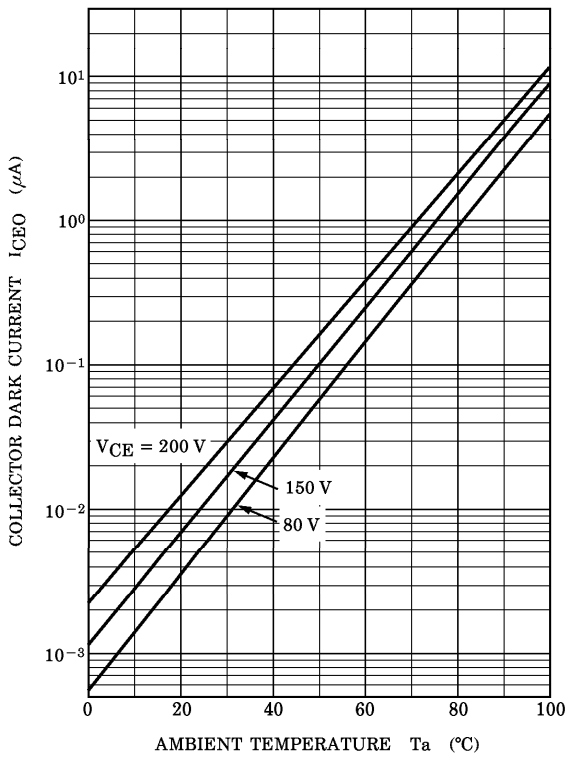
$I_C / I_F - I_F$



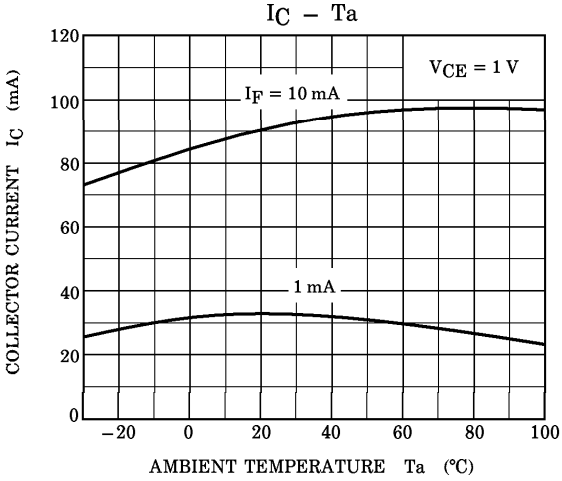
I_{CEO} – V_{CE}



I_{CEO} – Ta



I_C – Ta



I_C – Ta