

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO-TRANSISTOR

TLP731, TLP732

OFFICE MACHINE
HOUSEHOLD USE EQUIPMENT
SOLID STATE RELAY
SWITCHING POWER SUPPLY

The TOSHIBA TLP731 and TLP732 consist of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode in a six lead plastic DIP package.

TLP732 is no-base internal connection for high-EMI environments.

- Collector-Emitter Voltage : 55V (Min.)
- Current Transfer Ratio : 50% (Min.)
Rank GB : 100% (Min.)
- UL Recognized : UL1577, File No. E67349
- BSI Approved : BS EN60065 : 1994
Certificate No. 6617
BS EN60950 : 1992
Certificate No. 7366

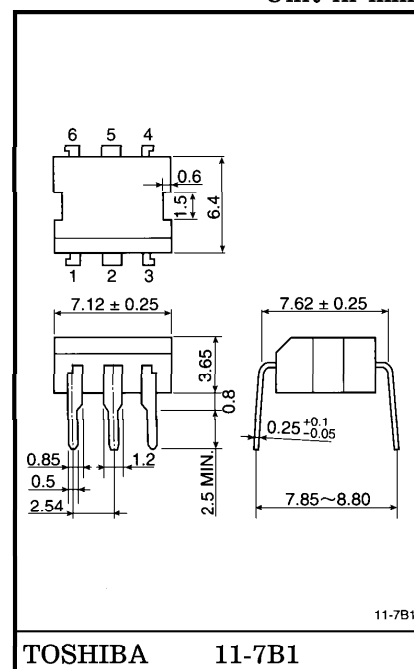
Isolation Voltage : 4000V_{rms} (Min.)

- Option (D4) type
VDE Approved : DIN VDE0884 / 08.87,
Certificate No. 65640
Maximum Operating Insulation Voltage : 630V_{PK}
Highest Permissible Over Voltage : 6000V_{PK}

(Note) When a VDE0884 approved type is needed,
please designate the "Option (D4)"

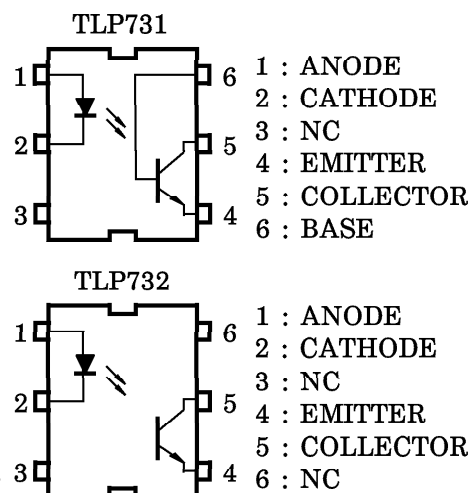
- | | 7.62mm pitch
standard type | 10.16mm pitch
(LF2) type |
|----------------------|-------------------------------|-----------------------------|
| Creepage Distance | : 7.0mm (Min.) | 8.0mm (Min.) |
| Clearance | : 7.0mm (Min.) | 8.0mm (Min.) |
| Insulation Thickness | : 0.5mm (Min.) | 0.5mm (Min.) |

Unit in mm



Weight : 0.35g

PIN CONFIGURATIONS (TOP VIEW)



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, 100pps)	I_{FP}	1	A
	Power Dissipation	P_D	100	mW
	Power Dissipation Derating ($T_a \geq 25^\circ\text{C}$)	$\Delta P_D / ^\circ\text{C}$	-1.0	mW / $^\circ\text{C}$
	Reverse Voltage	V_R	5	V
	Junction Temperature	T_j	125	$^\circ\text{C}$
DETECTOR	Collector-Emitter Voltage	V_{CEO}	55	V
	Collector-Base Voltage (TLP731)	V_{CBO}	80	V
	Emitter-Collector Voltage	V_{ECO}	7	V
	Emitter-Base Voltage (TLP731)	V_{EBO}	7	V
	Collector Current	I_C	50	mA
	Power Dissipation	P_C	150	mW
	Power Dissipation Derating ($T_a \geq 25^\circ\text{C}$)	$\Delta P_C / ^\circ\text{C}$	-1.5	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 (10s)		T_{sol}	260	$^\circ\text{C}$
Total Package Power Dissipation		P_T	250	mW
Total Package Power Dissipation Derating ($T_a \geq 25^\circ\text{C}$)		$\Delta P_T / ^\circ\text{C}$	-2.5	mW / $^\circ\text{C}$
Isolation Voltage (AC, 1 min., R.H. $\leq 60\%$)		BV_S	4000	V_{rms}

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	—	5	24	V
Forward Current	I_F	—	16	25	mA
Collector Current	I_C	—	1	10	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	$V_{(BR)CEO}$	$I_C = 0.5\text{mA}$	55	—	—	V
	Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector-Base Breakdown Voltage (TLP731)	$V_{(BR)CBO}$	$I_C = 0.1\text{mA}$	80	—	—	V
	Emitter-Base Breakdown Voltage (TLP731)	$V_{(BR)EBO}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector Dark Current	I_{CEO}	$V_{CE} = 24\text{V}$	—	10	100	nA
			$V_{CE} = 24\text{V}, T_a = 85^\circ\text{C}$	—	2	50	μA
	Collector Dark Current (TLP731)	I_{CER}	$V_{CE} = 24\text{V}, T_a = 85^\circ\text{C}$ $R_{BE} = 1\text{M}\Omega$	—	0.5	10	μA
	Collector Dark Current (TLP731)	I_{CBO}	$V_{CB} = 10\text{V}$	—	0.1	—	nA
	DC Forward Current Gain (TLP731)	h_{FE}	$V_{CE} = 5\text{V}, I_C = 0.5\text{mA}$	—	400	—	—
	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	$I_F = 5\text{mA}, V_{CE} = 5\text{V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C / I_F (\text{sat})$	$I_F = 1\text{mA}, V_{CE} = 0.4\text{V}$ Rank GB	—	60	—	%
			30	—	—	
Base Photo-Current (TLP731)	I_{PB}	$I_F = 5\text{mA}, V_{CB} = 5\text{V}$	—	10	—	μA
Collector-Emitter Saturation Voltage	$V_{CE} (\text{sat})$	$I_C = 2.4\text{mA}, I_F = 8\text{mA}$	—	—	0.4	V
		$I_C = 0.2\text{mA}, I_F = 1\text{mA}$ Rank GB	—	0.2	—	
			—	—	0.4	

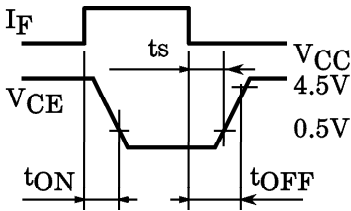
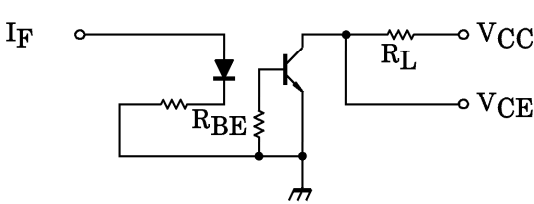
ISOLATION CHARACTERISTICS (Ta = 25°C)

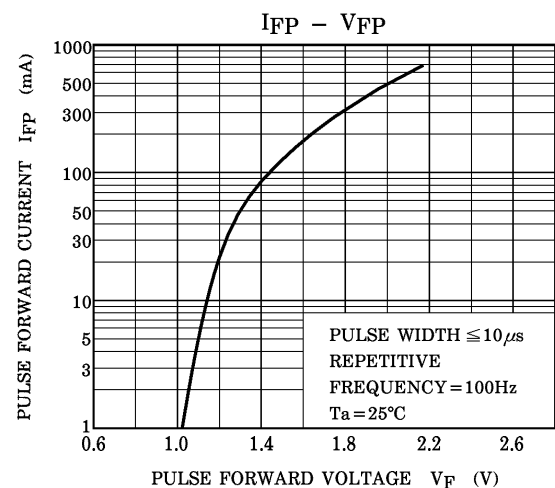
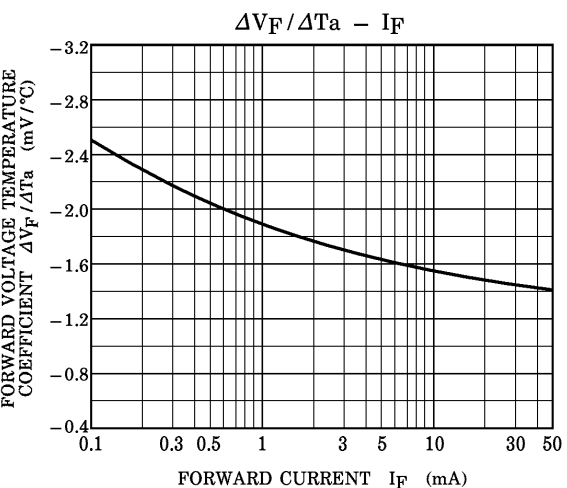
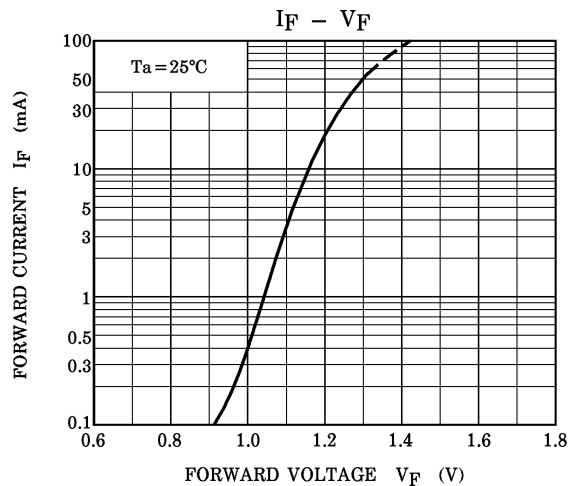
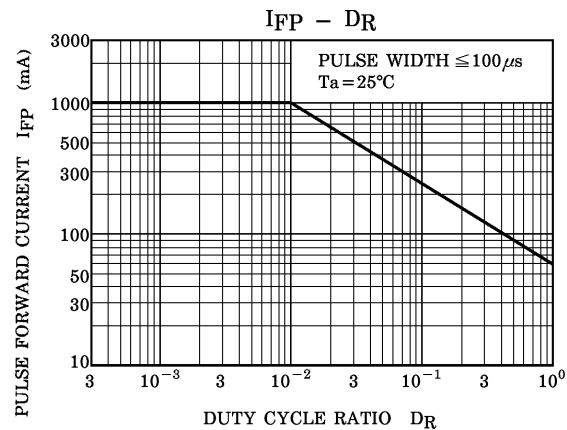
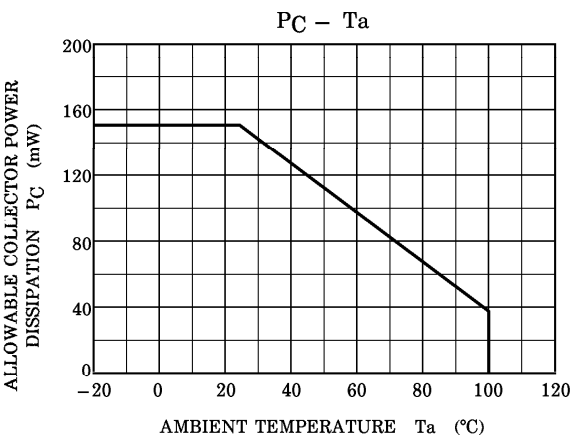
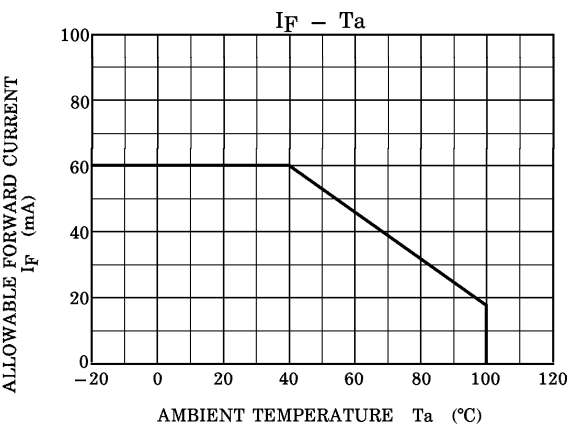
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance (Input to Output)	CS	VS=0, f=1MHz	—	0.8	—	pF
Isolation Resistance	RS	VS=500V	1×10 ¹²	10 ¹⁴	—	Ω
Isolation Voltage	BVS	AC, 1 minute	4000	—	—	Vrms
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

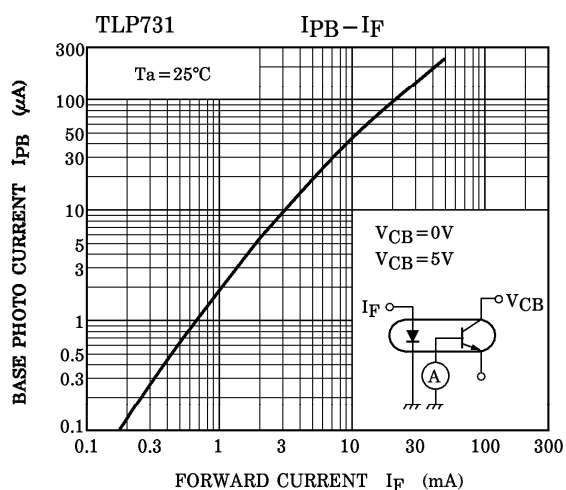
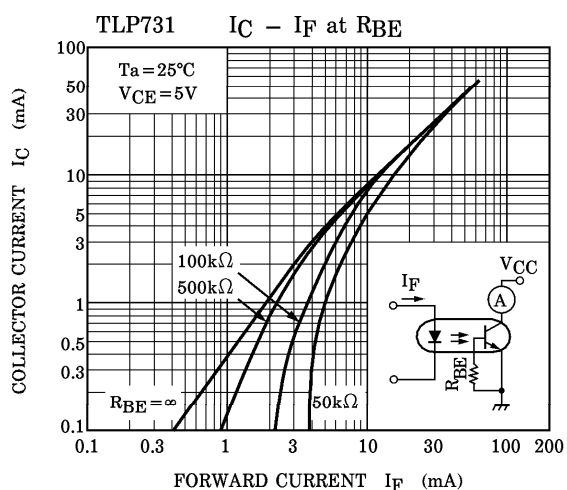
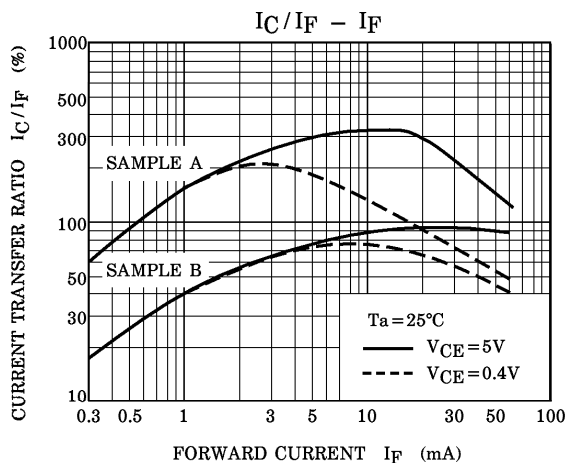
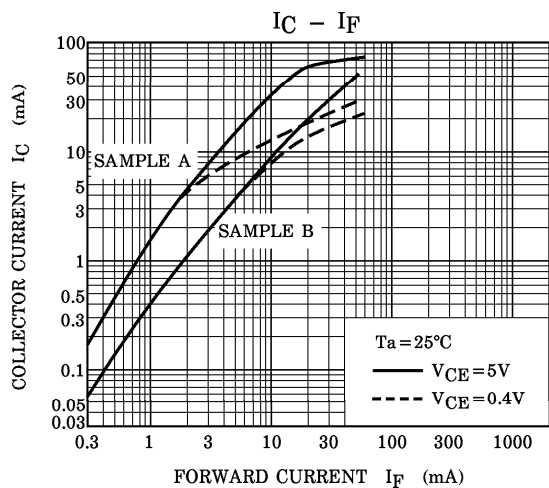
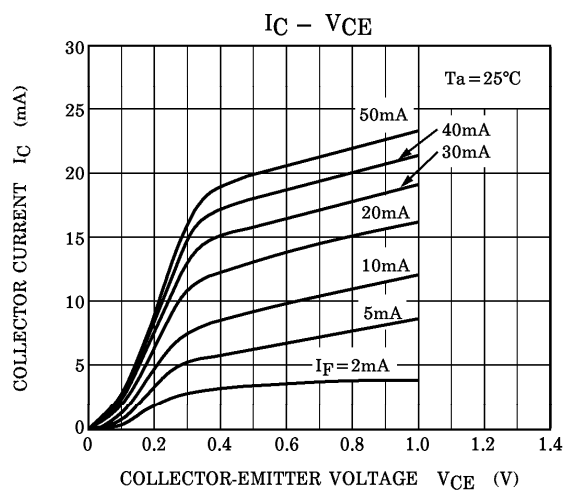
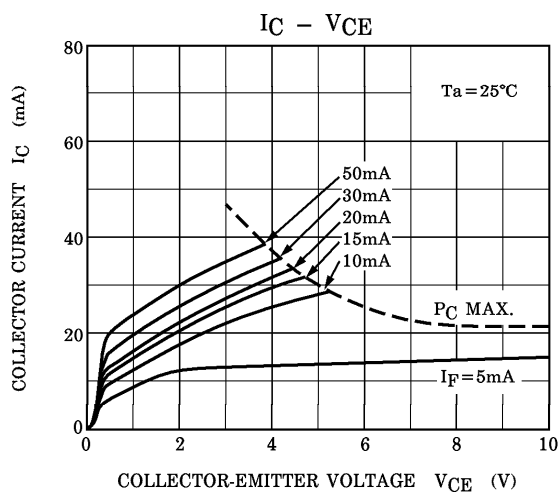
SWITCHING CHARACTERISTICS (Ta = 25°C)

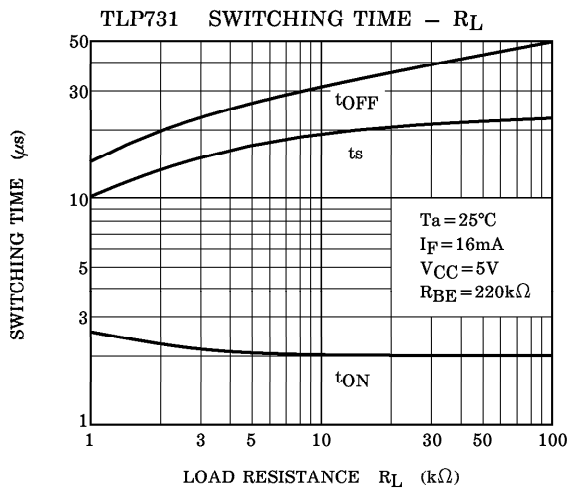
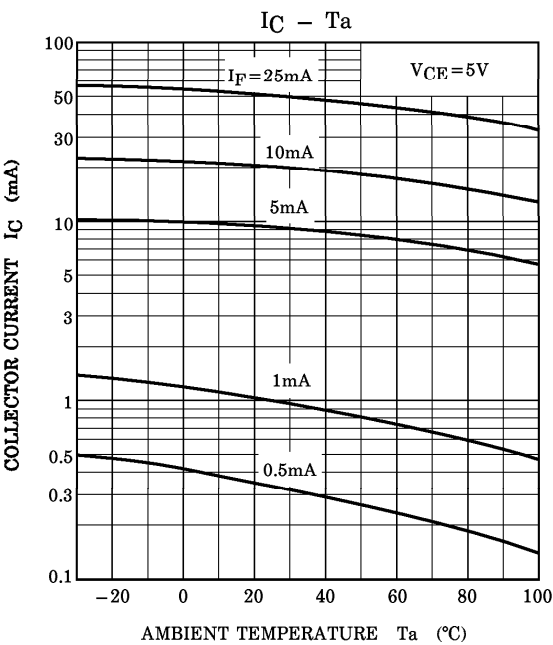
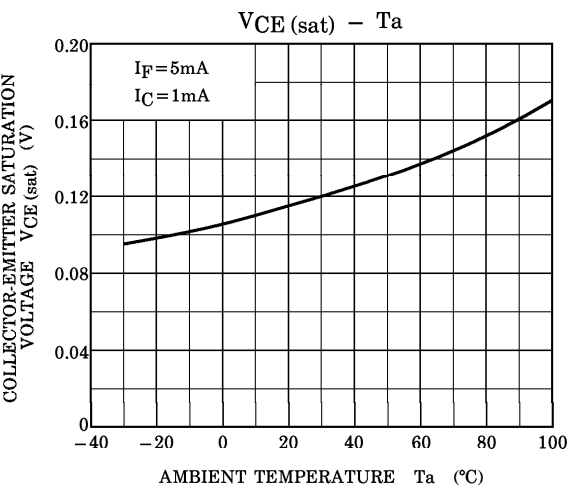
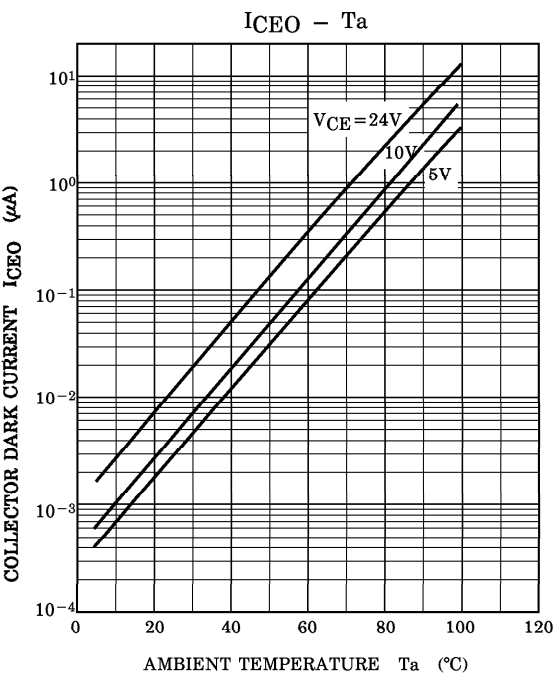
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Rise Time	tr	VCC=10V, IC=2mA RL=100Ω	—	2	—	μs
Fall Time	tf		—	3	—	
Turn-on Time	ton		—	3	10	
Turn-off Time	toff		—	3	10	
Turn-on Time	tON	RL=1.9kΩ (Fig.1) RBE=OPEN VCC=5V, IF=16mA	—	2	—	μs
Storage Time	ts		—	15	—	
Turn-off Time	tOFF		—	25	—	
Turn-on Time	tON	RL=1.9kΩ (Fig.1) RBE=220kΩ (TLP731) VCC=5V, IF=16mA	—	2	—	μs
Storage Time	ts		—	12	—	
Turn-off Time	tOFF		—	20	—	

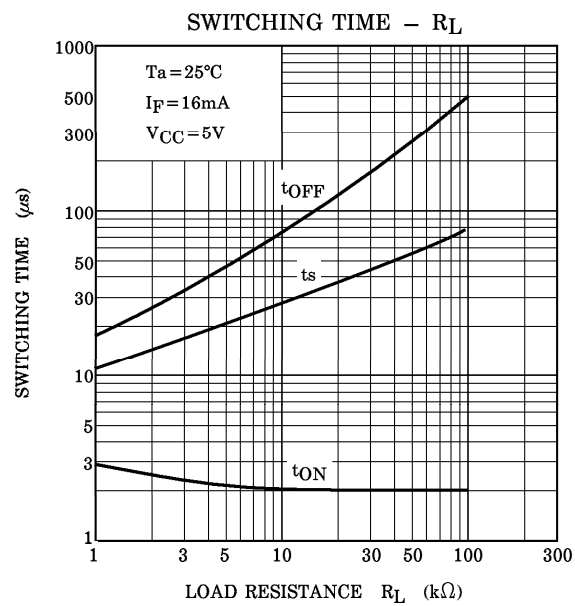
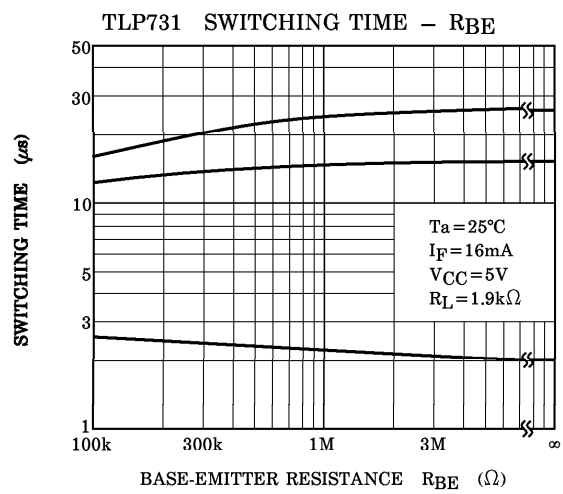
Fig. 1 SWITCHING TIME TEST CIRCUIT











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