

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.

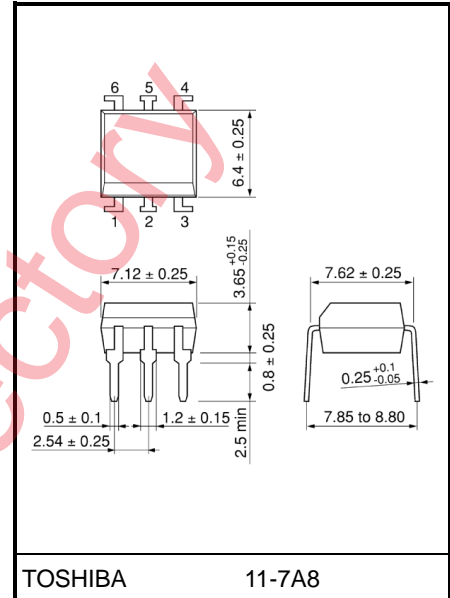
TLP732 is no-base internal connection for high-EMI environments.

- Collector-emitter voltage: 55V (min)
- Current transfer ratio: 50% (min)
Rank GB: 100% (min)
- UL recognized: UL1577, file No. E67349
- Isolation voltage: 4000 Vrms (min)
- c-UL recognized: CSA Component Acceptance Service No. 5A
File No. E67349
- Option (D4) type
VDE approved: EN 60747-5-5,
Certificate No. 40009302
Maximum operating insulation voltage: 630VPK
Highest permissible over voltage: 6000VPK

Note: When a EN 60747-5-5 approved type is needed, please designate the "Option (D4)"

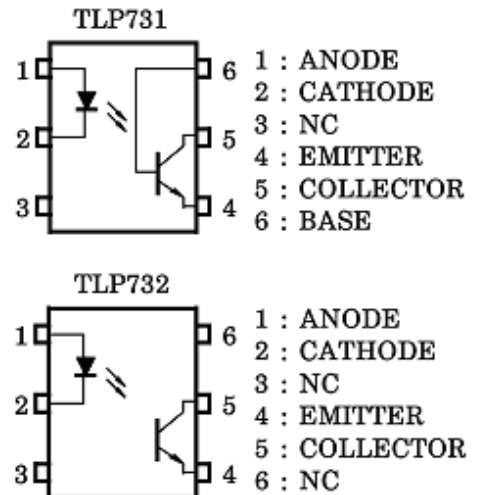
- Creepage distance : 7.0mm (min)
- Clearance : 7.0 mm (min)
- Insulation thickness : 0.5 mm (min)

Unit: mm



Weight: 0.35 g (typ.)

Pin Configurations (top view)



Start of commercial production
1985-02

Current Transfer Ratio

Classification (Note 1)	Current Transfer Ratio (%) (I _c / I _F)		Marking Of Classification
	I _F = 5 mA, V _{CE} = 5 V, T _a = 25°C		
	Min	Max	
Blank	50	600	Blank, Y [■] , YE, G, G [■] , GR, B, BL, GB
Rank Y	50	150	YE, Y [■]
Rank GR	100	300	GR, G, G [■]
Rank BL	200	600	BL, B
Rank GB	100	600	GB, GR, G, G [■] , BL, B,

Note: The product with the Rank Y and BL are limited in production.

For details, please contact your nearest Toshiba sales representative.

Note 1: Ex. rank GB: TLP731 (GB)

Note: Application type name for certification test,
please use standard product type name, i.e.

TLP731(GB): TLP731

TLP732(GB): TLP732

Absolute 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
	Power dissipation	P_D	70	mW
	Power dissipation derating (Ta ≥ 39°C)	$\Delta P_D / ^\circ\text{C}$	-0.82	mW / °C
	Reverse voltage	V_R	5	V
	Junction temperature	T_j	125	°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 (Ta ≥ 25°C)	$\Delta P_C / ^\circ\text{C}$	-1.5	mW / °C
	Junction temperature	T_j	125	°C
Storage temperature range		T_{stg}	-55 to 125	°C
Operating temperature range		T_{opr}	-55 to 100	°C
Lead soldering temperature (10 s)		T_{sol}	260	°C
Total package power dissipation		P_T	250	mW
Total package power dissipation derating (Ta ≥ 25°C)		$\Delta P_T / ^\circ\text{C}$	-2.5	mW / °C
Isolation voltage (AC, 60 s, R.H. ≤ 60%) (Note 1)		BV_S	4000	Vrms

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Device considered a two terminal device: LED side pins shorted together and detector side pins shorted together.

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	°C

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

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 V, f = 1MHz	—	30	—	pF
Detector	Collector-emitter breakdown voltage	V _{(BR)CEO}	I _C = 0.5mA	55	—	—	V
	Emitter-collector breakdown voltage	V _{(BR)ECO}	I _E = 0.1mA	7	—	—	V
	Collector-base breakdown voltage (TLP731)	V _{(BR)CBO}	I _C = 0.1mA	80	—	—	V
	Emitter-base breakdown voltage (TLP731)	V _{(BR)EBO}	I _E = 0.1mA	7	—	—	V
	Collector dark current	I _{CEO}	V _{CE} = 24V	—	10	100	nA
			V _{CE} = 24V, Ta = 85°C	—	2	50	μA
	Collector dark current (TLP731)	I _{CER}	V _{CE} = 24V, Ta = 85°C R _{BE} = 1MΩ	—	0.5	10	μA
	Collector dark current (TLP731)	I _{CBO}	V _{CB} = 10V	—	0.1	—	nA
	DC forward current gain (TLP731)	h _{FE}	V _{CE} = 5V, I _C = 0.5mA	—	400	—	—
Capacitance collector to emitter	C _{CE}	V = 0 V, 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 = 5mA, V _{CE} = 5V Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	I _C / I _F (sat)	I _F = 1mA, V _{CE} = 0.4V Rank GB	—	60	—	%
			30	—	—	
Base photo-current (TLP731)	I _{PB}	I _F = 5mA, V _{CB} = 5V	—	10	—	μA
Collector-emitter saturation voltage	V _{CE} (sat)	I _C = 2.4mA, I _F = 8mA	—	—	0.4	V
		I _C = 0.2mA, I _F = 1mA Rank GB	—	0.2	—	
			—	—	0.4	

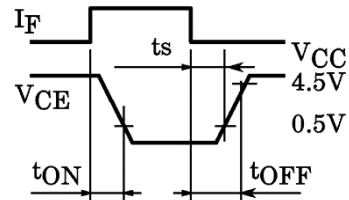
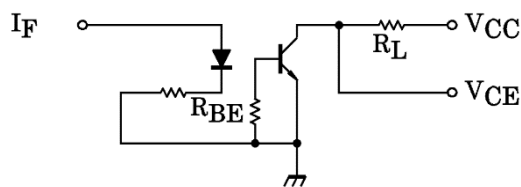
Isolation Characteristics (Ta = 25°C)

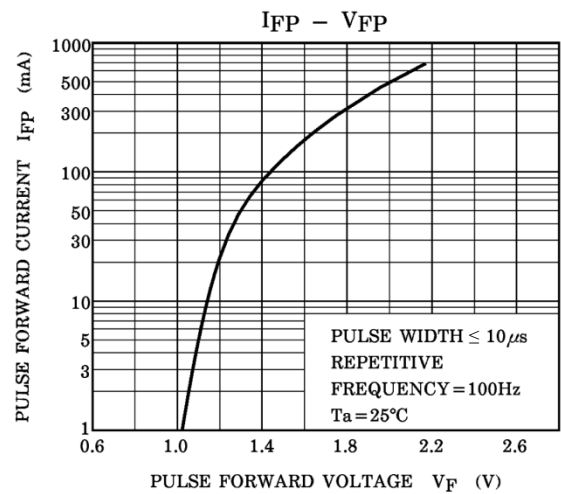
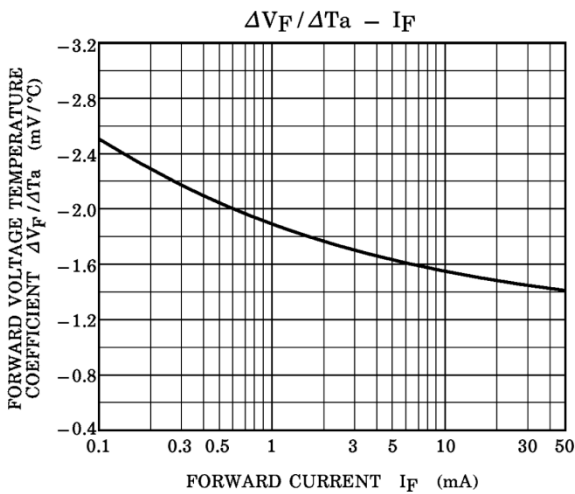
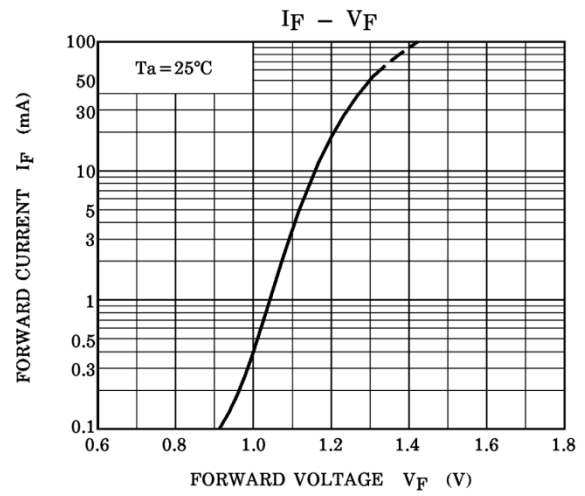
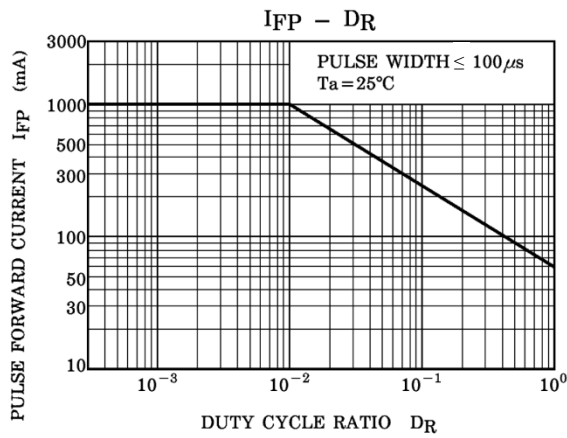
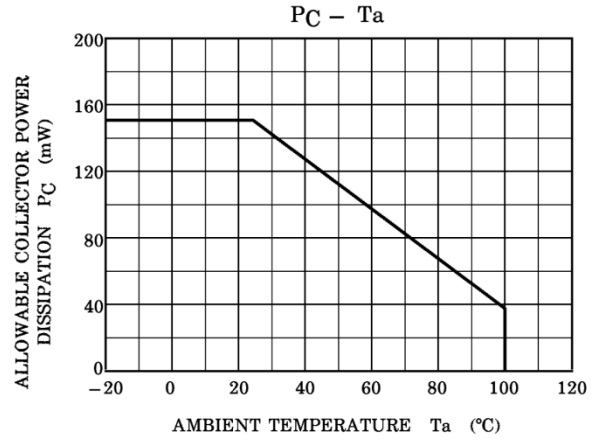
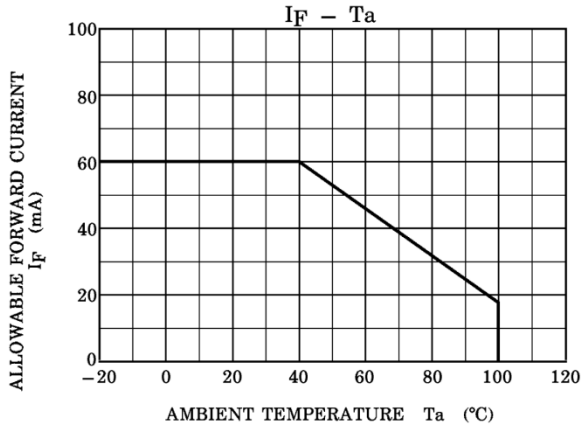
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance (input to output)	Cs	Vs = 0 V, f = 1MHz	—	0.8	—	pF
Isolation resistance	Rs	Vs = 500V, R.H.≤60%	1×10 ¹²	10 ¹⁴	—	Ω
Isolation voltage	BVs	AC, 60 s	4000	—	—	Vrms
		AC, 1 s, in oil	—	10000	—	
		DC, 60 s, in oil	—	10000	—	Vdc

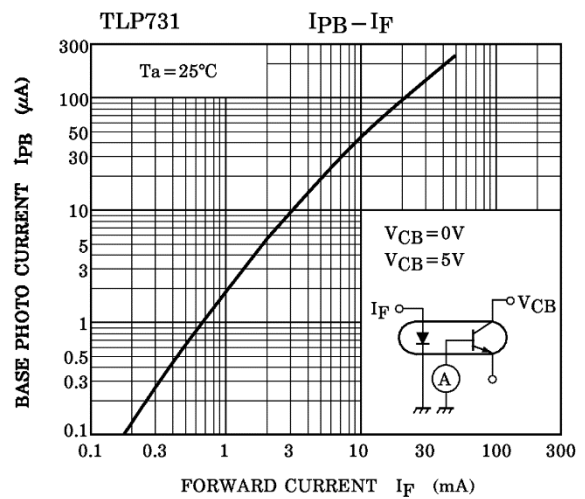
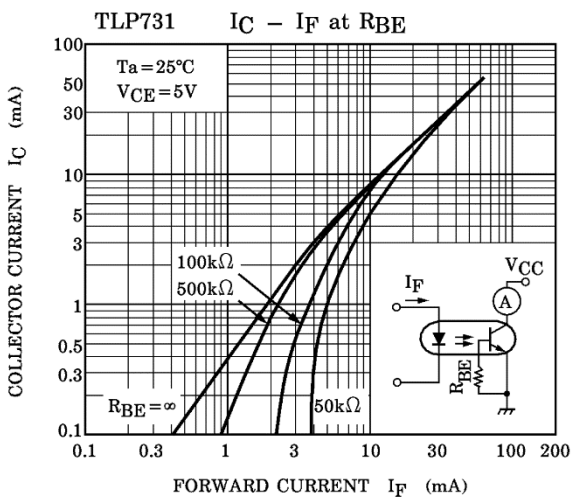
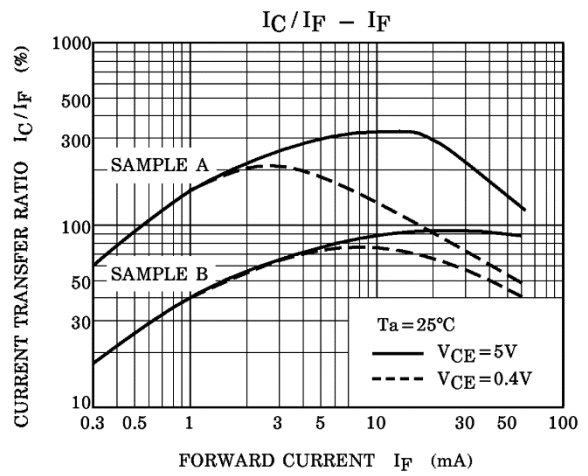
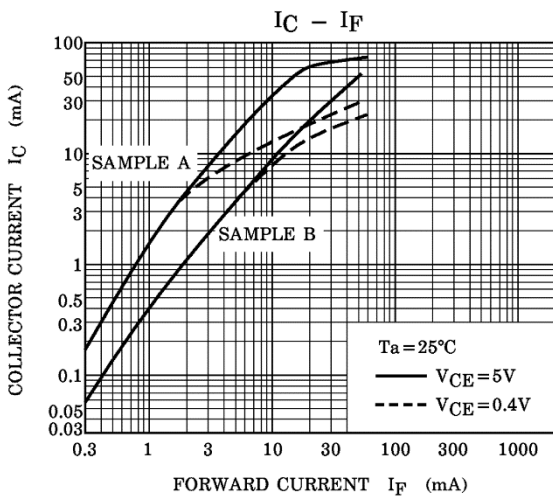
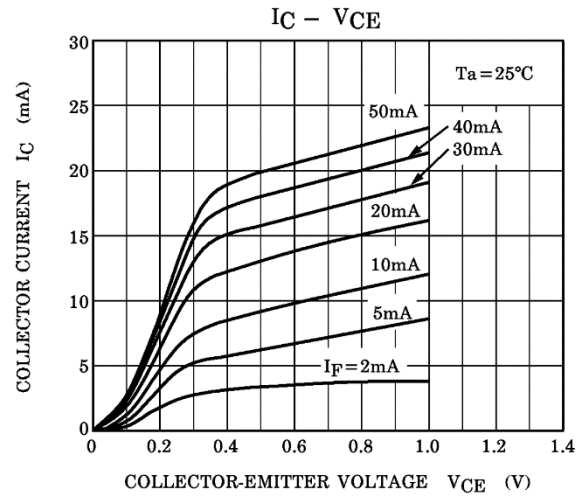
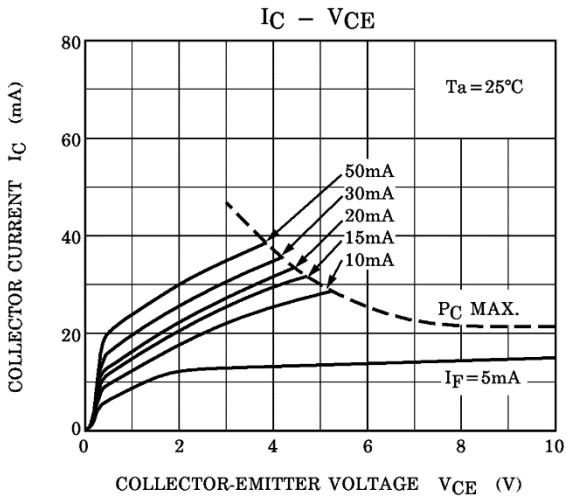
Switching Characteristics (Ta = 25°C)

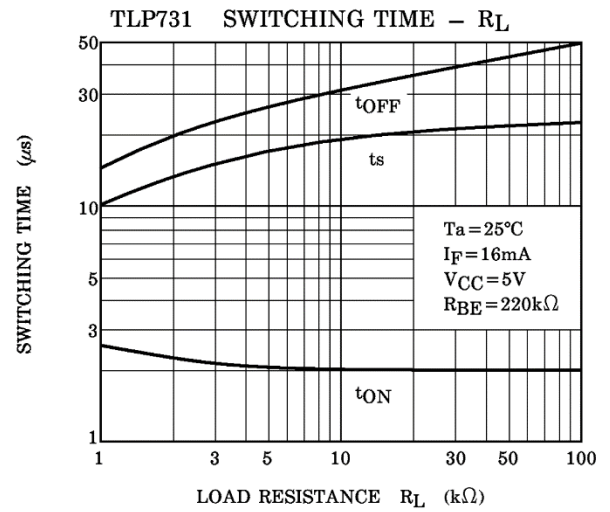
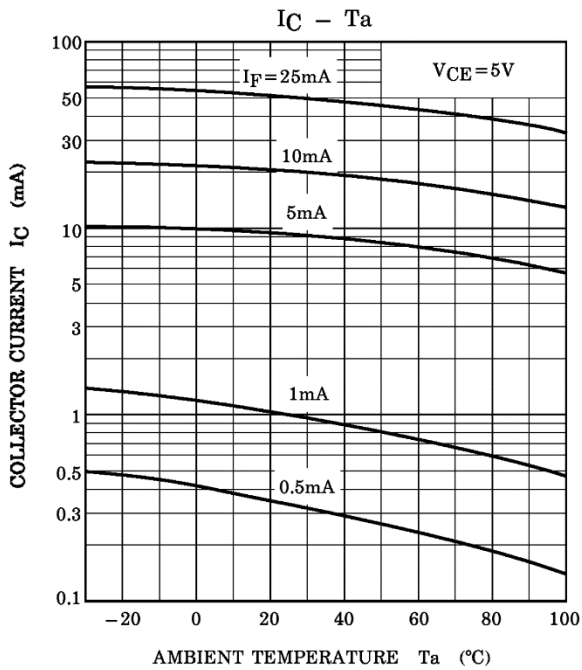
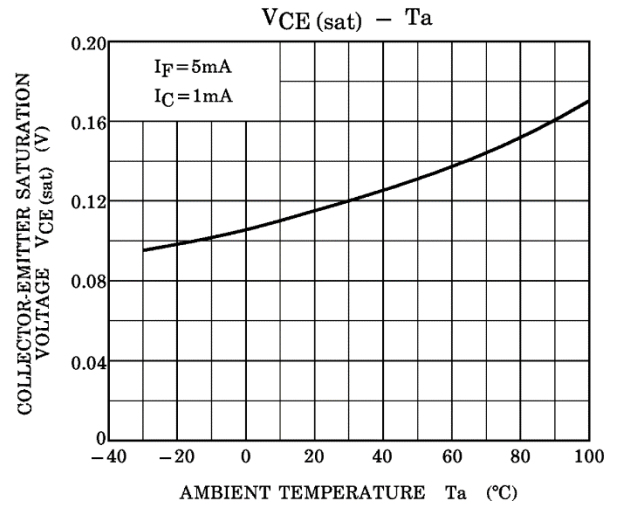
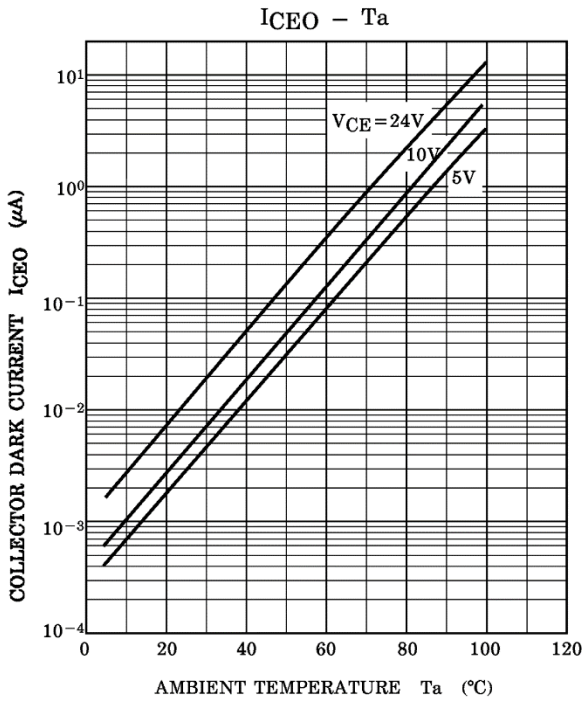
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	tr	VCC = 10V, IC = 2mA RL = 100Ω	—	2	—	μs
Fall time	tf		—	3	—	
Turn-on time	ton		—	3	10	
Turn-off time	toff		—	3	10	
Turn-on time	tON	RL = 1.9kΩ (Fig.1) RBE = open VCC = 5V, IF = 16mA	—	2	—	μs
Storage time	ts		—	15	—	
Turn-off time	tOFF		—	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	—	

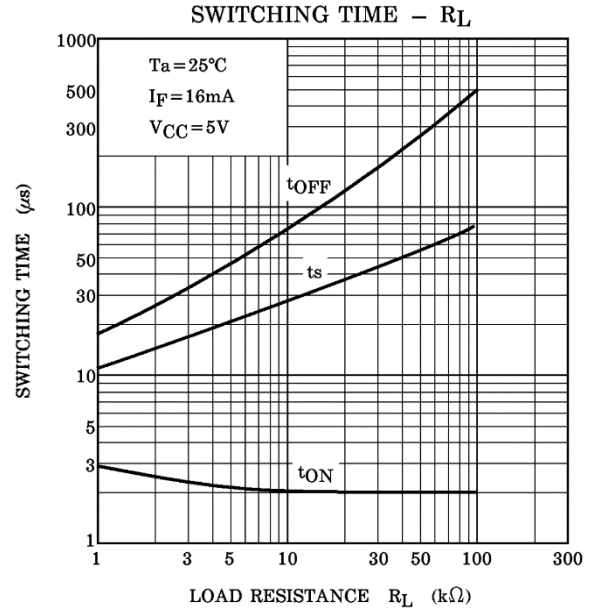
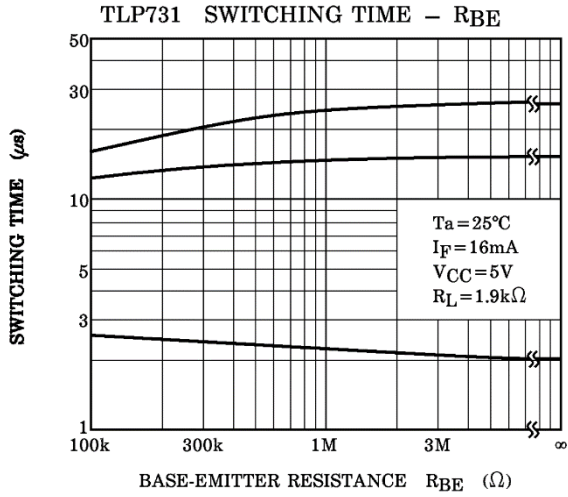
Fig. 1 Switching time test circuit











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