

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP731, TLP732

Office Machine
Household Use Equipment
Solid State Relay
Switching Power Supply

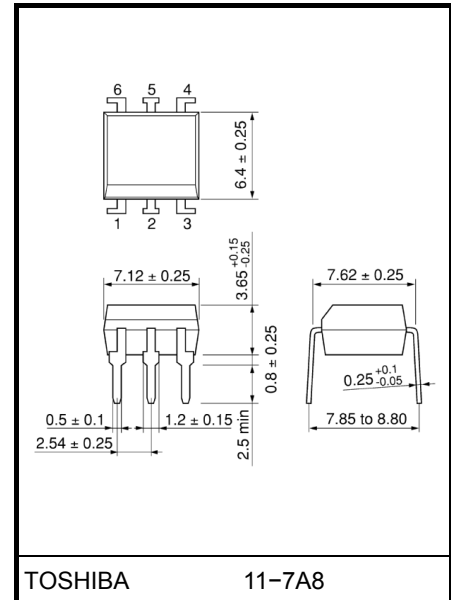
The TOSHIBA TLP731 and TLP732 consist of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode in a six lead plastic DIP package.
TLP732 is no-base internal connection for high-EMI environments.

- Collector-emitter voltage: 55V (min)
- Current transfer ratio: 50% (min)
Rank GB: 100% (min)
- UL recognized: UL1577, file No. E67349
- c-UL recognized: CSA Component Acceptance Service No. 5A
File No. E67349
- BSI approved: BS EN60065: 2002
Certificate No. 8877
BS EN60950-1: 2002
Certificate No. 8878
- Isolation voltage: 4000 V_{rms} (min)
- Option (D4) type
VDE approved: DIN EN 60747-5-2,
Certificate No. 40009302
Maximum operating insulation voltage: 630V_{PK}
Highest permissible over voltage: 6000V_{PK}

(Note) When a EN 60747-5-2 approved type is needed, please designate the "Option (D4)"

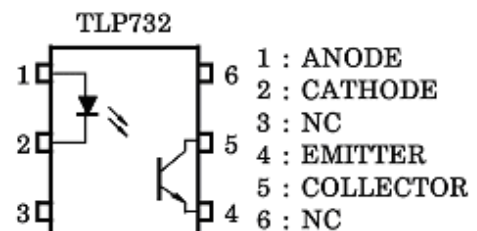
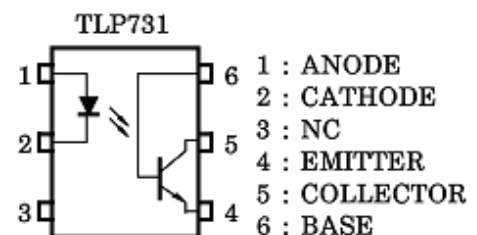
	7.62mm pich standard type	10.16mm pich (LF2) type
• Creepage distance	: 7.0mm (min)	8.0 mm (min)
Clearance	: 7.0 mm (min)	8.0 mm (min)
Insulation thickness	: 0.5 mm (min)	0.5 mm (min)

Unit: mm



Weight: 0.35 g (typ.)

Pin Configurations (top view)



Start of commercial production
1985/02

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	100	mW
	Power dissipation derating (Ta ≥ 25°C)	$\Delta P_D / ^\circ\text{C}$	-1.0	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 (10s)		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, 1minute, R.H. ≤ 60%)		BV_S	4000	V_{rms}

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).

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.

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}	$V_{CE} = 24\text{V}$	$V_{CE} = 24\text{V}$	—	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	%	
			Rank GB	100	—	600		
Saturated CTR	$I_C / I_F (\text{sat})$	$I_F = 1\text{mA}, V_{CE} = 0.4\text{V}$	Rank GB	—	60	—	%	
			Rank GB	30	—	—		
Base photo-current (TLP731)	I_{PB}	$I_F = 5\text{mA}, V_{CB} = 5\text{V}$	—	10	—	μA		
Collector-emitter saturation voltage	$V_{CE} (\text{sat})$	$I_C = 2.4\text{mA}, I_F = 8\text{mA}$	Rank GB	—	—	0.4	V	
			Rank GB	$I_C = 0.2\text{mA}, I_F = 1\text{mA}$	—	0.2		—
				$I_C = 0.2\text{mA}, I_F = 1\text{mA}$	—	—		0.4

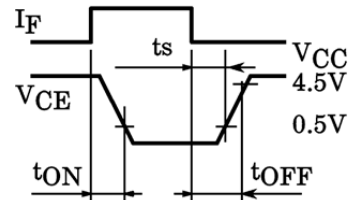
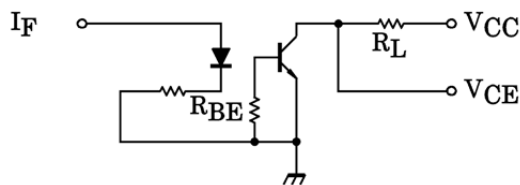
Isolation Characteristics (Ta = 25°C)

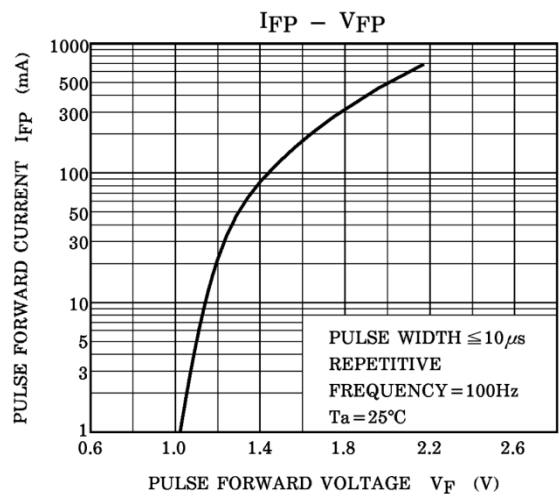
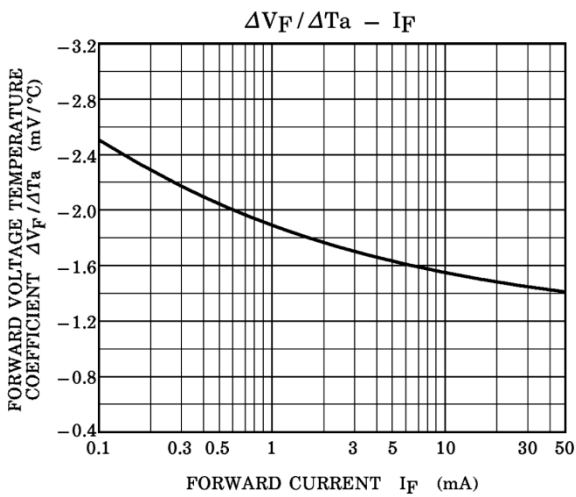
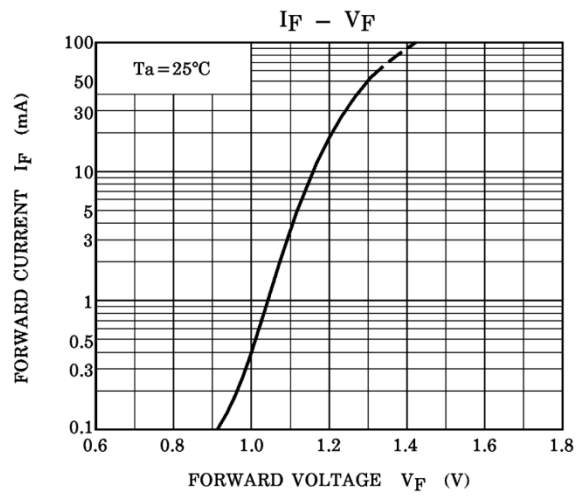
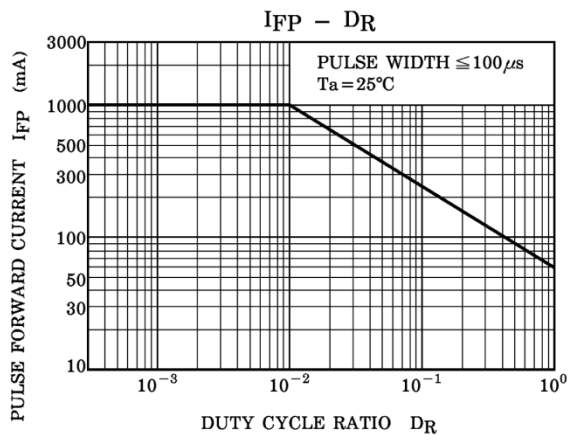
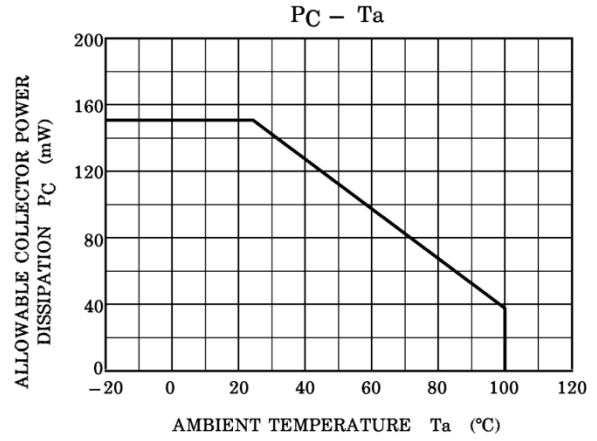
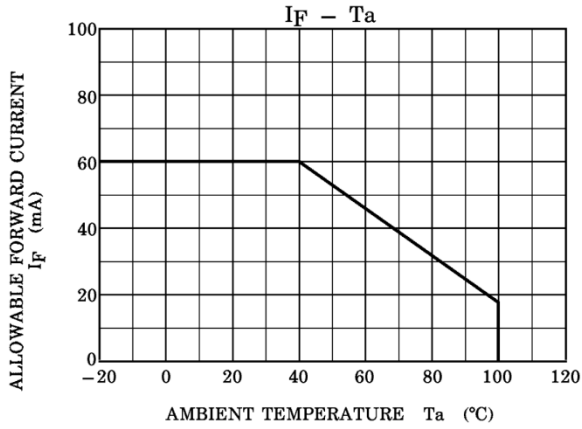
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance (input to output)	C _S	V _S = 0, f = 1MHz	—	0.8	—	pF
Isolation resistance	R _S	V _S = 500V, R.H. ≤ 60%	1×10 ¹²	10 ¹⁴	—	Ω
Isolation voltage	BV _S	AC, 1 minute	4000	—	—	V _{rms}
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V _{dc}

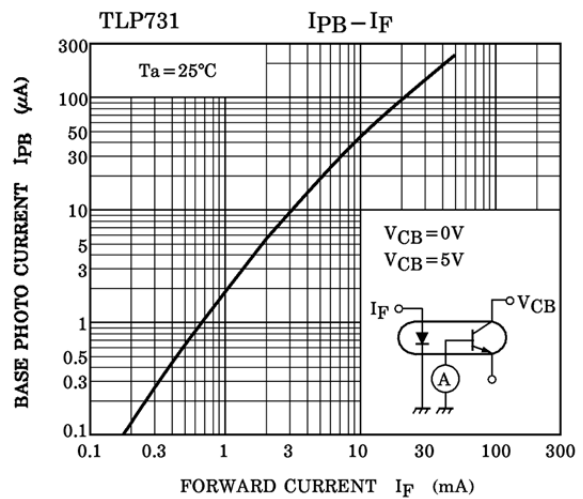
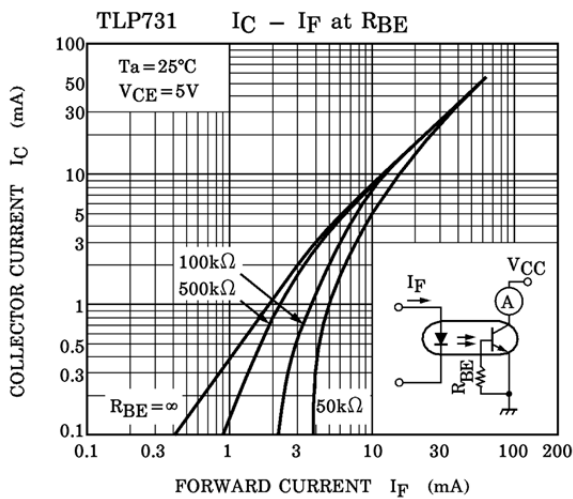
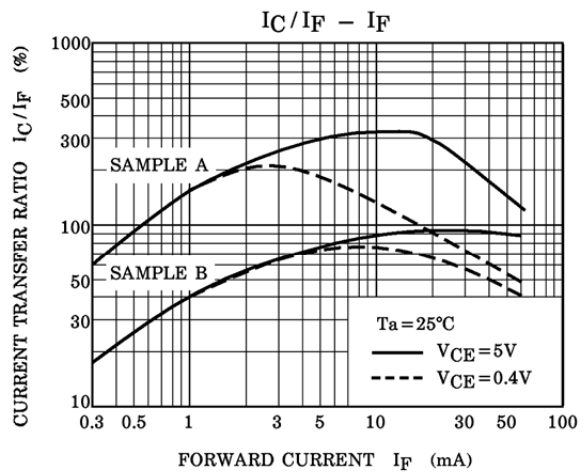
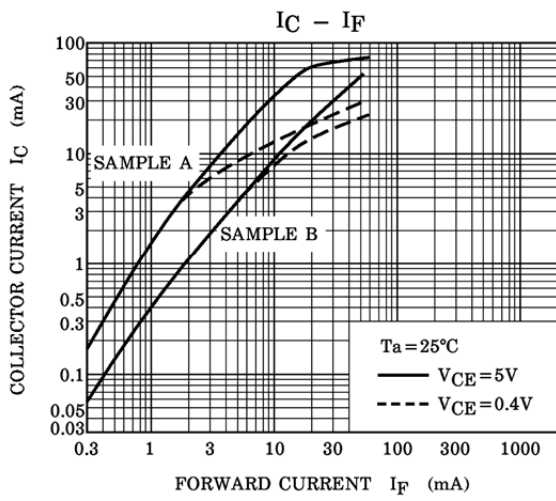
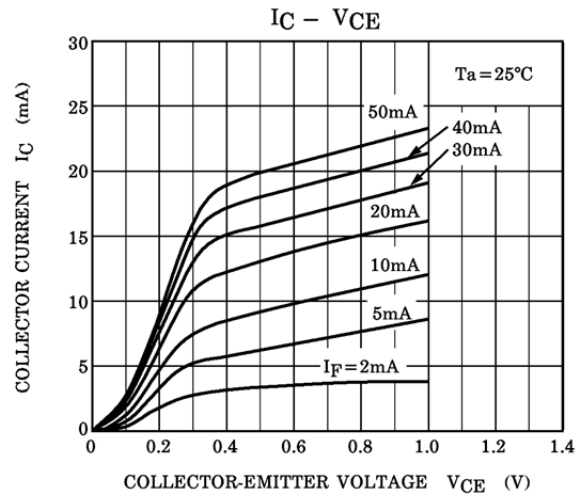
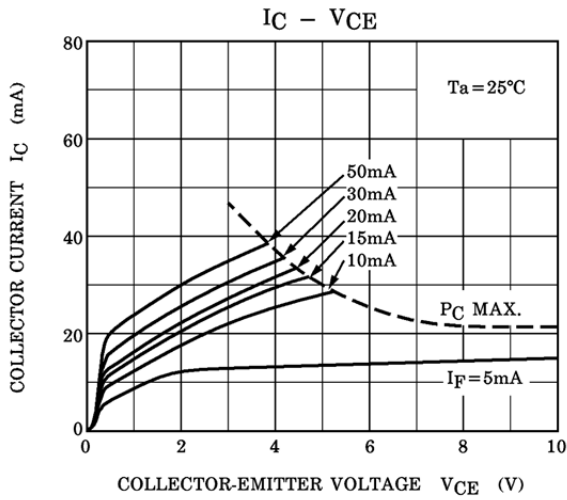
Switching Characteristics (Ta = 25°C)

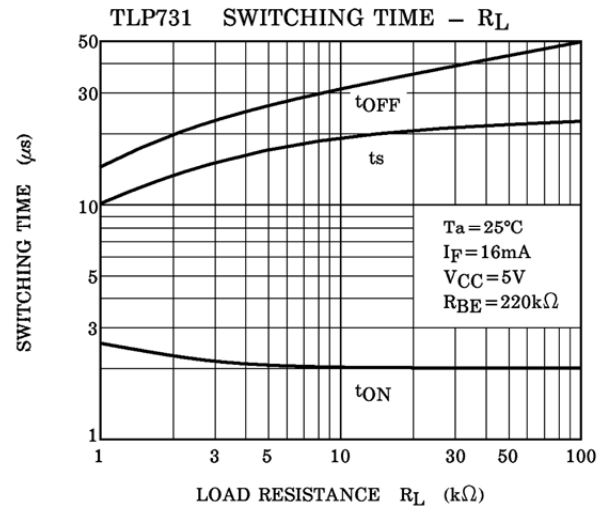
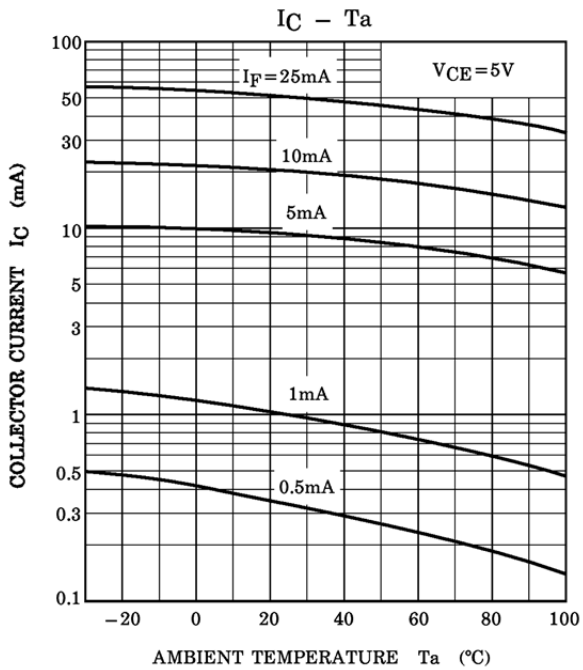
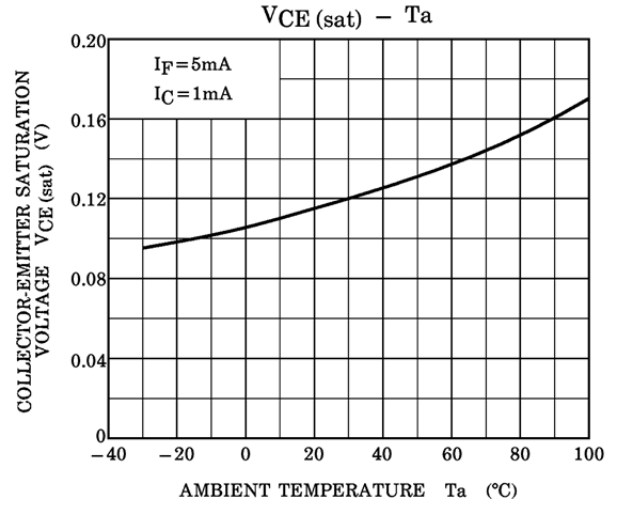
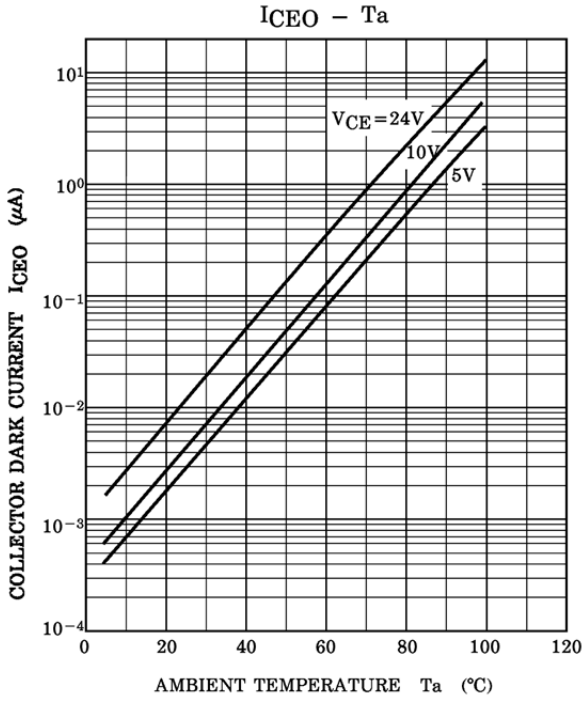
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	t _r	V _{CC} = 10V, I _C = 2mA R _L = 100Ω	—	2	—	μs
Fall time	t _f		—	3	—	
Turn-on time	t _{on}		—	3	10	
Turn-off time	t _{off}		—	3	10	
Turn-on time	t _{ON}	R _L = 1.9kΩ (Fig.1) R _{BE} = open V _{CC} = 5V, I _F = 16mA	—	2	—	μs
Storage time	t _s		—	15	—	
Turn-off time	t _{OFF}		—	25	—	
Turn-on time	t _{ON}	R _L = 1.9kΩ (Fig.1) R _{BE} = 220kΩ (TLP731) V _{CC} = 5V, I _F = 16mA	—	2	—	μs
Storage time	t _s		—	12	—	
Turn-off time	t _{OFF}		—	20	—	

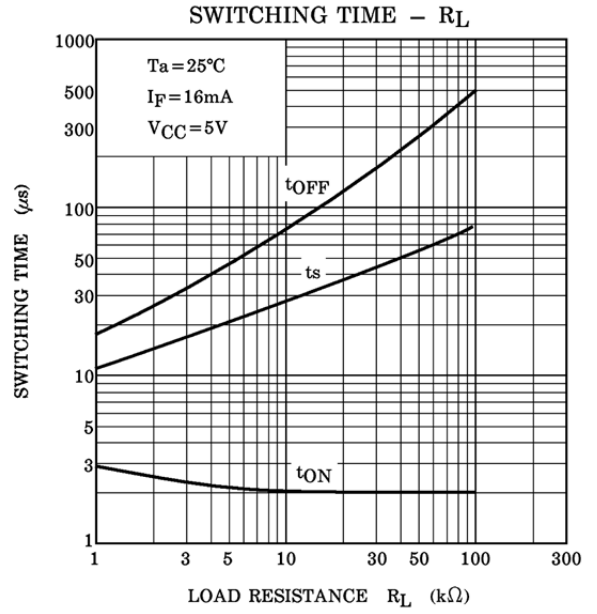
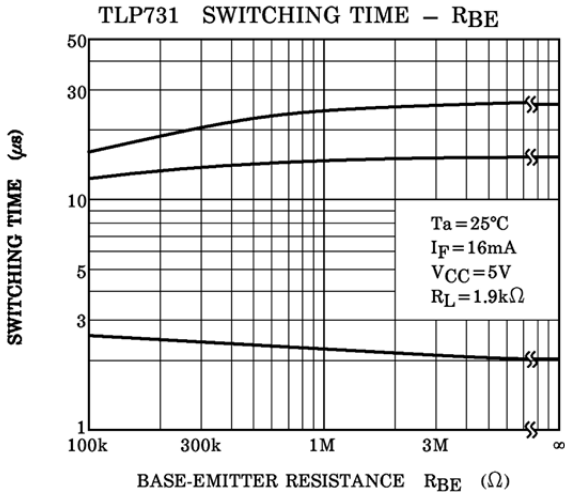
Fig. 1 Switching time test circuit











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