

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP731, TLP732

- Office Machine
- Household Use Equipment
- Solid State Relay
- Switching Power Supply

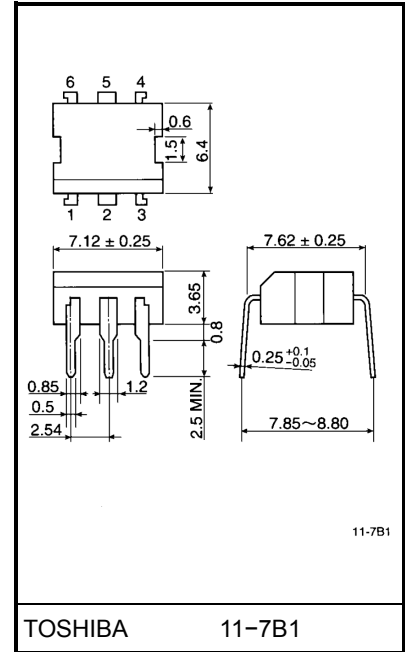
The TOSHIBA TLP731 and TLP732 consist of a photo-transistor optically coupled to a gallium arsenide infrared emitting diode in a six lead plastic DIP package.
 TLP732 is no-base internal connection for high-EMI environments.

- 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)"

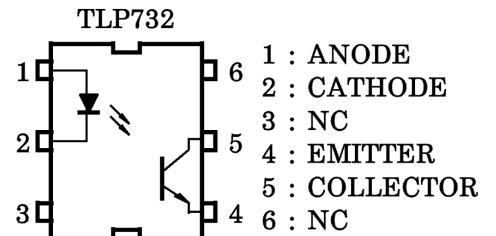
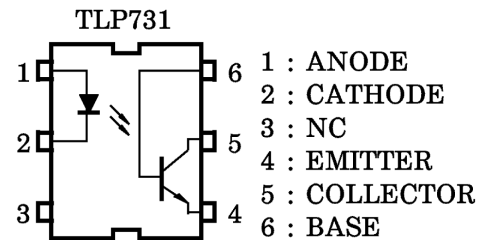
	7.62mm pich <u>standard type</u>	10.16mm pich <u>(LF2) type</u>
• Creepage distance	: 7.0mm (min.)	8.0 mm (min.)
Clearance	: 7.0 mm (min.)	8.0 mm (min.)
Insulation thickness	: 0.5 mm (min.)	0.5 mm (min.)

Unit in mm



Weight: 0.35 g

Pin Configurations (top view)



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}	-55~125	°C
Operating temperature range		T_{opr}	-55~100	°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, 1min., R.H. ≤ 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	°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}	$V_{CE} = 24\text{V}$	$T_a = 25^\circ\text{C}$	—	10	100	nA
				$T_a = 85^\circ\text{C}$	—	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	

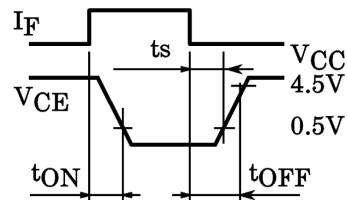
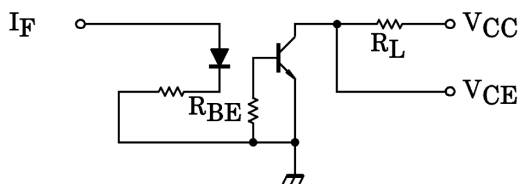
Isolation Characteristics (Ta = 25°C)

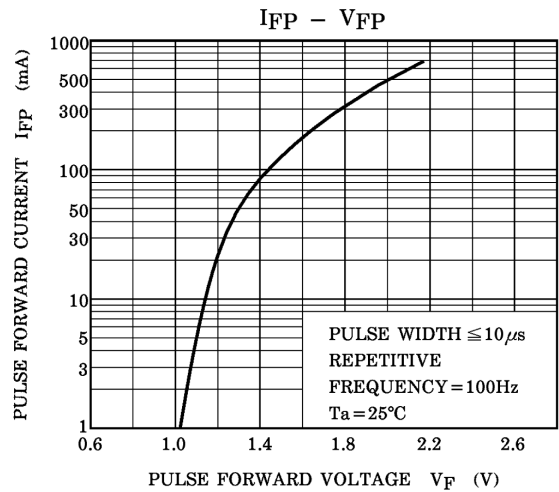
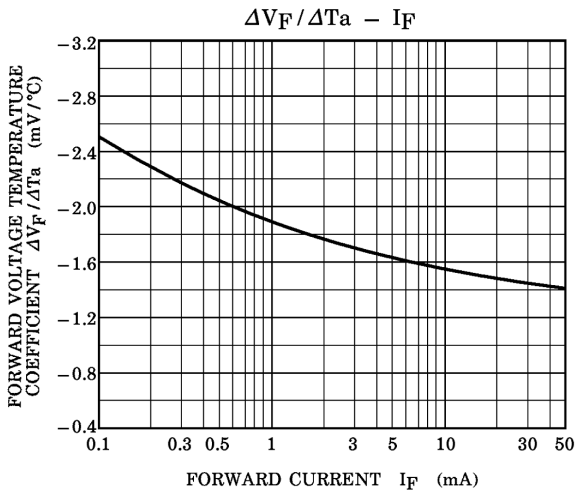
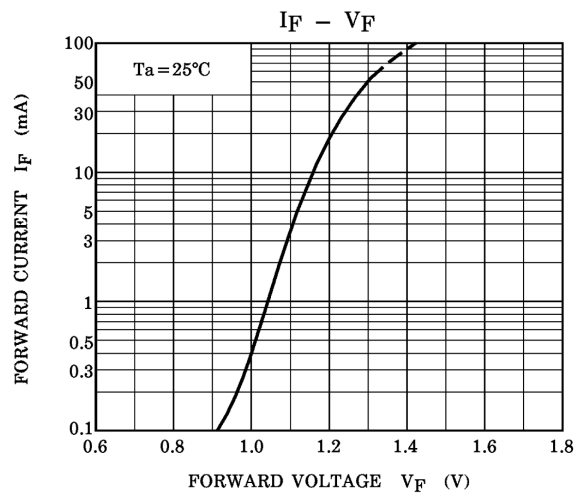
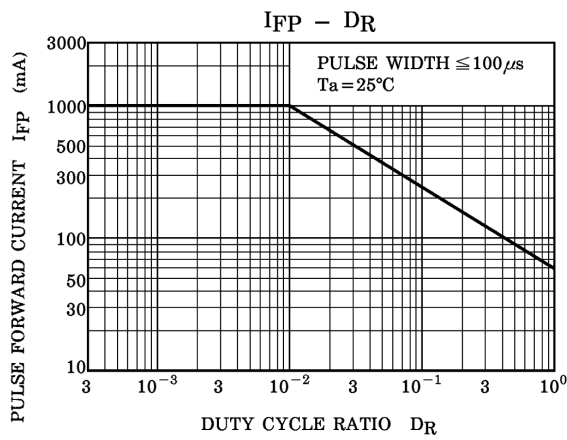
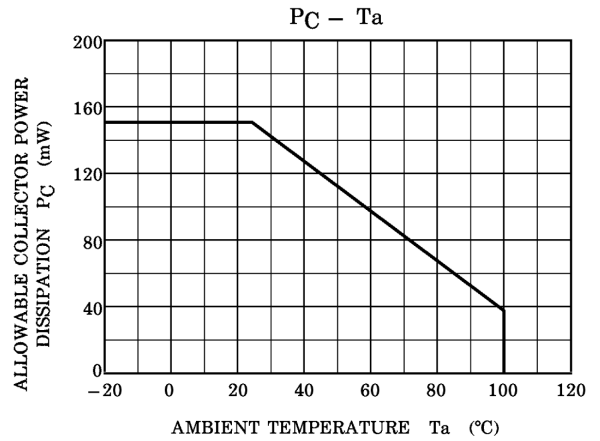
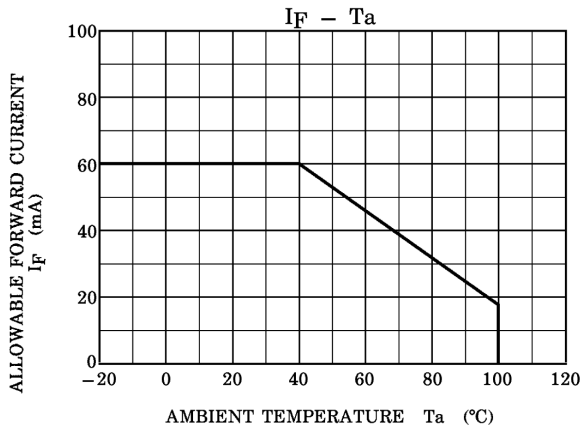
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance (input to output)	C _S	V _S = 0, f = 1MHz	—	0.8	—	pF
Isolation resistance	R _S	V _S = 500V	1×10 ¹²	10 ¹⁴	—	Ω
Isolation voltage	BV _S	AC, 1 minute	4000	—	—	V _{rms}
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	V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

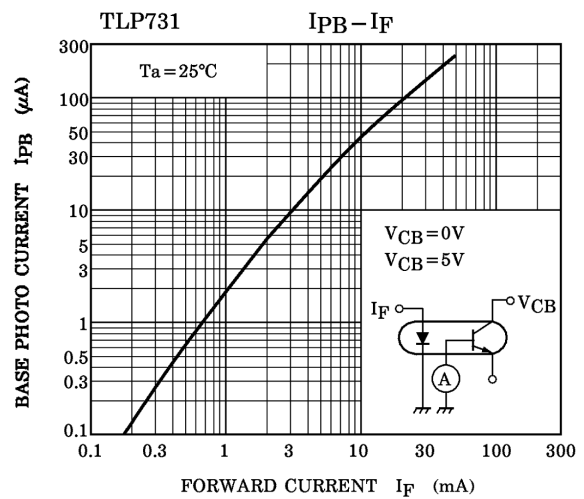
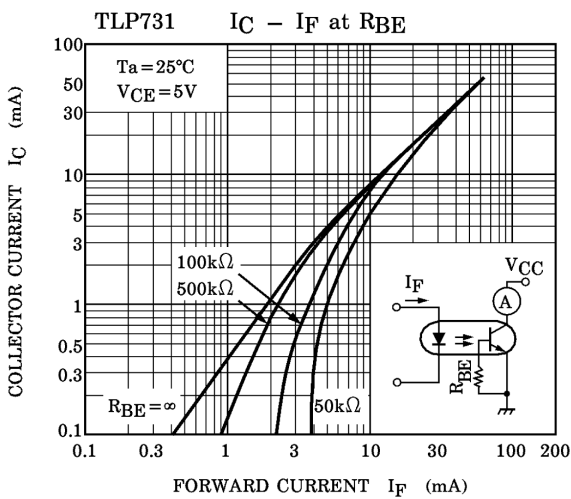
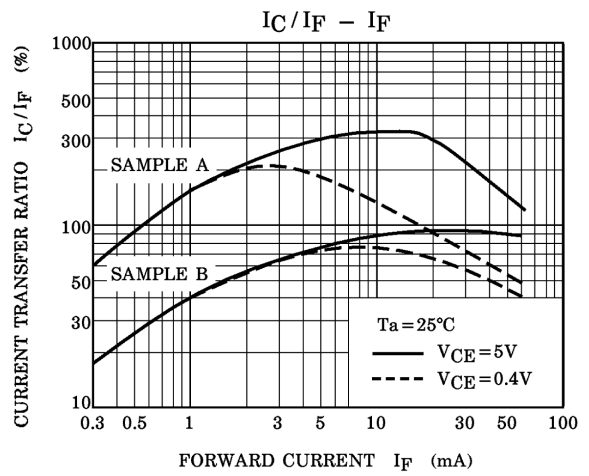
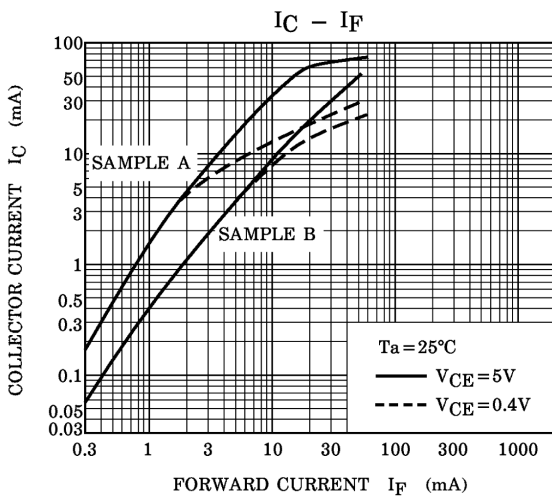
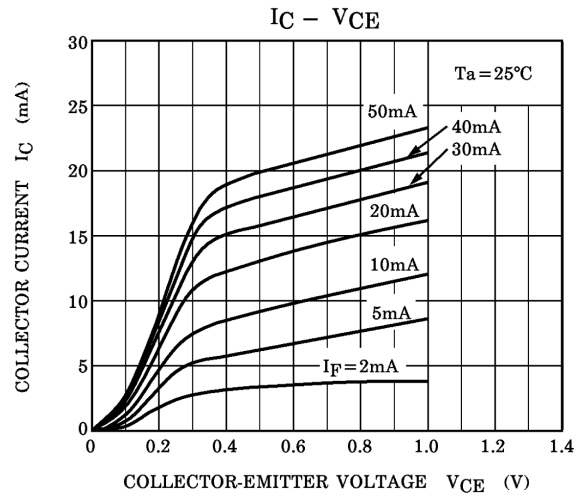
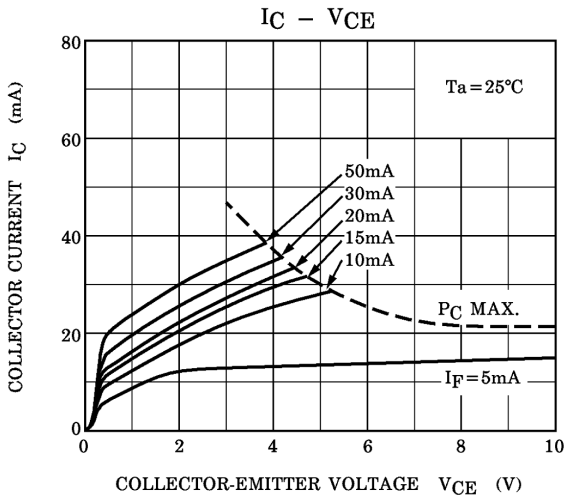
Switching Characteristics (Ta = 25°C)

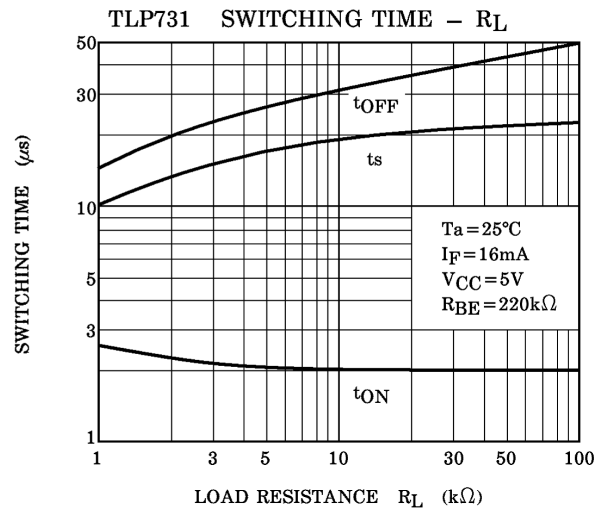
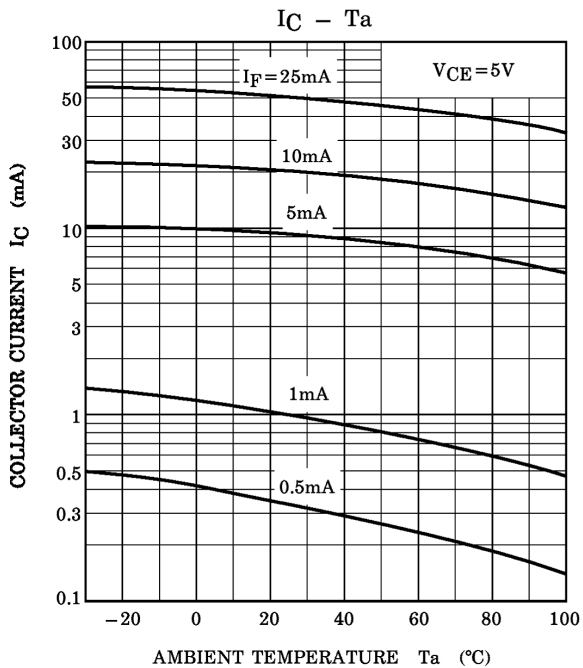
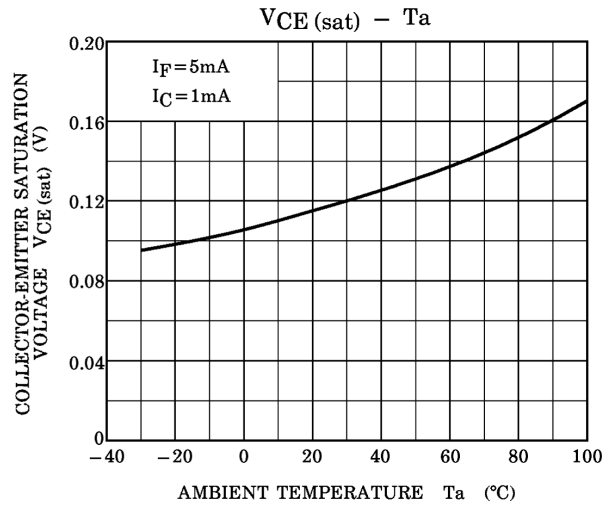
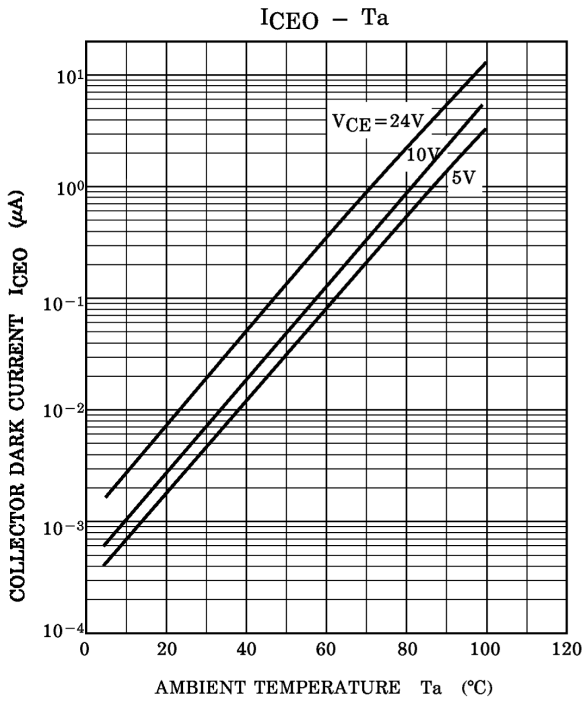
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	t _r	V _{CC} = 10V, I _C = 2mA R _L = 100Ω	—	2	—	μs
Fall time	t _f		—	3	—	
Turn-on time	t _{on}		—	3	10	
Turn-off time	t _{off}		—	3	10	
Turn-on time	t _{ON}	R _L = 1.9kΩ (Fig.1) R _{BE} = open V _{CC} = 5V, I _F = 16mA	—	2	—	μs
Storage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

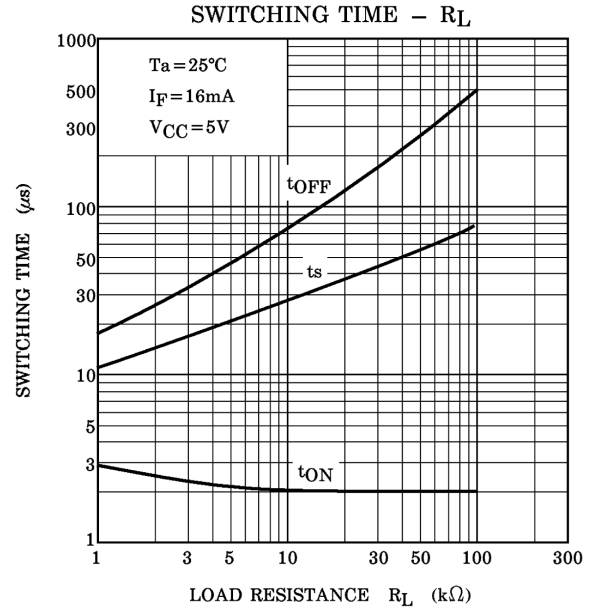
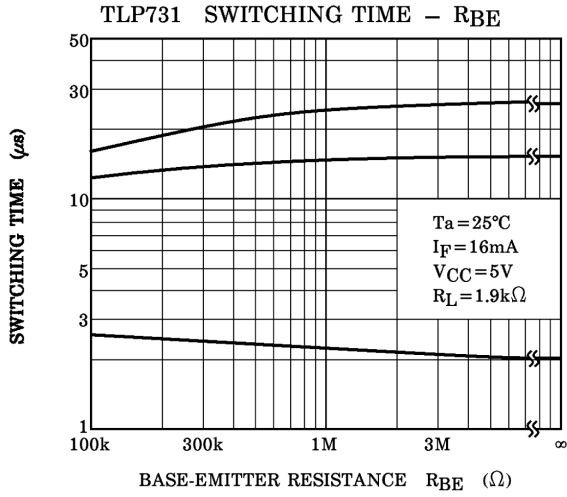
Fig. 1 Switching time test circuit











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