TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP331,TLP332

Office Machine
Household Use Equipment
Programmable Controllers
AC / DC-Input Module
Telecommunication

The TOSHIBA TLP331 and TLP332 consists of a gallium arsenide infrared emitting diode optically coupled to a photo–transistor in a six lead plastic DIP package.

This photocoupler provides the unique feature of high current transfer ratio at both low output voltage and low input current. This makes it ideal for use in low power logic circuits, telecommunications equipment and portable electronics isolation applications.

TLP332 is no-base internal connection for high-EMI environments.

• Collector-emitter voltage: 55V (min.)

• Isolation voltage: 5000Vrms (min.)

• UL recognized: UL1577, file no. E67349

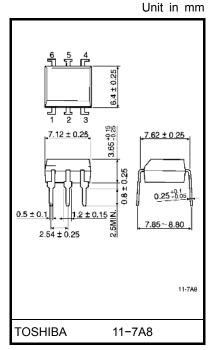
• Current transfer ratio

Classi–	Curr	Marking		
fication	Ta =	Of		
(*)	I _F = 1mA	$I_F = 0.5 \text{mA}$	$I_F = 1mA$	Classi–
	V _{CE} = 0.5V	$V_{CE} = 1.5 \text{V}$	$V_{CE} = 0.5V$	Fication
Rank BV	200%	100%	100%	BV
Standard	100%	50%	50%	BV, blank

(*) Ex. Standard: TLP331 Rank BV: TLP331(BV)

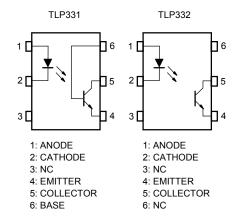
(Note) Application type name for certification test, please use standard product type name, i.e.

TLP331(BV): TLP331



Weight: 0.4 g

Pin Configurations (top view)





Absolute Maximum Ratings (Ta = 25°C)

	Characteristic		Symbol	Rating	Unit
	Forward current		lF	50	mA
	Forward current derating (Ta ≥ 39°C)		ΔI _F /°C	-0.7	mA / °C
LED	Peak forward current (100µs pulse, 100pps)		IFP	1	Α
	Reverse Voltage		V _R	5	٧
	Junction temperature		Tj	125	°C
	Collector-emitter voltage		V _{CEO}	55	٧
	Collector-base voltage (TLP331)		V _{CBO}	80	٧
	Emitter–collector voltage		V _{ECO}	7	٧
ctor	Emitter-base voltage (TLP331)		V _{EBO}	7	V
Detector	Collector current		IC	50	mA
	Power dissipation		PC	150	mW
	Power dissipation derating (Ta ≥ 25°C)		ΔP _C / °C	-1.5	mW / °C
	Junction temperature		Tj	125	°C
Stor	age temperature range		T _{stg}	-55~125	°C
Ope	rating temperature range		T _{opr}	-55~100	°C
Lea	d soldering temperature (10s)		T _{sol}	260	°C
Tota	al package power dissipation		P _T	250	mW
Tota	al package power dissipation derating (Ta≥25°C)		P _T /°C	-2.5	mW / °C
Isola	ation voltage (AC, 1min., RH ≤ 60%)	(Note 1)	BVS	5000	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: Pins 1, 2 and 3 shorted together and pins 4, 5 and 6 shorted together.

Recommended Operating Conditions

Characteristic	Symbol	Min.	Тур.	Max.	Unit
Supply voltage	V _{CC}	_	5	25	V
Forward current	lF	_	1.6	25	mA
Collector current	IC	_	1	10	mA
Operating temperature	T _{opr}	-25	_	75	°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.	Тур.	Max.	Unit
	Forward voltage	V _F	I _F = 10mA	1.0	1.15	1.3	V
LED	Reverse current	I _R	V _R = 5V	_	_	10	μA
	Capacitance	C _T	V = 0, f = 1MHz	_	30	_	pF
	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	_	_	٧
	Collector-base breakdown voltage (TLP331)	V _{(BR)CBO}	I _C = 0.1mA	80	_	-	V
	Emitter-base breakdown voltage (TLP331)	V _{(BR)EBO}	I _E = 0.1mA	7	_	_	٧
Detector	Collector dark current	lana	V _{CE} = 24V	_	10	100	nA
Det	Collector dark current	ICEO	V _{CE} = 24V, Ta = 85°C	_	2	50	μA
	Collector dark current (TLP331)	ICER	V_{CE} = 24V, Ta = 85°C R _{BE} = 1M Ω	_	0.5	10	μΑ
	Collector dark current (TLP331)	I _{CBO}	V _{CB} = 10V	_	0.1	_	nA
	DC forward current gain (TLP331)	h _{FE}	V _{CE} = 5V, I _C = 0.5mA	_	1000	_	_
	Capacitance (collector to emitter)	C _{CE}	V = 0 , f = 1MHz	_	12	_	pF

Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Тур.	Max.	Unit		
Current transfer ratio	Ic / I _E	I _F = 1mA, V _{CE} = 0.5V	100	_	1200	%		
Current transfer ratio	Rank BV	Rank BV		Rank BV	200	I	1200	70
Low input CTR	lo/le#	I _F = 0.5mA, V _{CE} = 1.5V	50	_	-	%		
Low Input CTR	I _C / I _{F(low)}	Rank BV	100	_	_	70		
Base photo-current (TLP331)	I _{PB}	I _F = 1mA, V _{CB} = 5V	_	10	_	μΑ		
		I _C = 0.5mA I _F = 1mA	_	_	0.4			
Collector-emitter saturation voltage	V _{CE(sat)}	I _C = 1mA I _F = 1mA	_	0.2	_	V		
		Rank BV	_	_	0.4			

Coupled Electrical Characteristics (Ta = 25~75°C)

Characteristic	Symbol	Test Condition	Min.	Тур.	Max.	Unit
Current transfer ratio	I _C / I _F	I _F = 1mA, V _{CE} = 0.5V	50	1	ı	%
	IC / IF	Rank BV	100	-	_	/0
Low input CTR	la / l= »	I _F = 0.5mA, V _{CE} = 1.5V	-	50	ı	%
	I _C / I _{F(low)}	Rank BV	_	100	_	/0



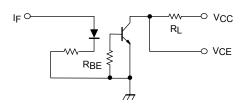
Isolation Characteristics (Ta = 25°C)

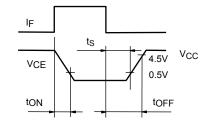
Characteristic	Symbol	Test Condition	Min.	Тур.	Max.	Unit
Capacitance (input to output)	Cs	V _S = 0, f = 1MHz	_	0.8	_	pF
Isolation resistance	R _S	V = 500V	5×10 ¹⁰	10 ¹⁴	_	Ω
Isolation voltage	BVS	AC, 1 minute	5000	_	_	Vrms
		AC, 1 second, in oil	_	10000	_	VIIIIS
		DC, 1 minute, in oil	_	10000		Vdc

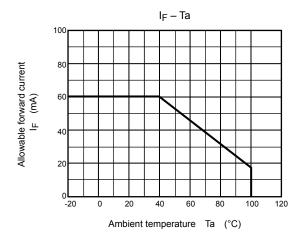
Switching Characteristics (Ta = 25°C)

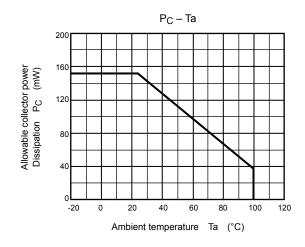
Characteristic	Symbol	Test Condition	Min.	Тур.	Max.	Unit
Rise time	t _r		_	8	_	
Fall time	tf	V _{CC} = 10V	_	8	_	
Turn-on time	t _{on}	$I_C = 2\text{mA}$ $R_L = 100\Omega$	_	10	_	μs
Turn-off time	t _{off}		_	8	_	
Turn-on time	t _{ON}	R_L = 4.7k Ω (Fig.1) - RBE = OPEN V_{CC} = 5V, I_F = 1.6mA	_	10	_	
Storage time	t _S		_	50	_	μs
Turn-off time	t _{OFF}		_	300	_	
Turn-on time	t _{ON}	$R_L = 4.7k\Omega$ (Fig.1) $R_{BE} = 470k\Omega$ (TLP331)	_	12	_	
Storage time	t _S		_	30	_	μs
Turn-off time	toff	V _{CC} = 5V, I _F = 1.6mA	_	100	_	

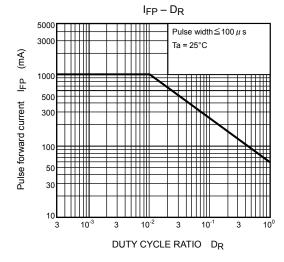
Fig. 1 Switching time test circuit

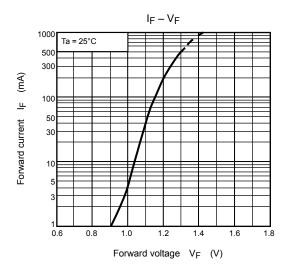


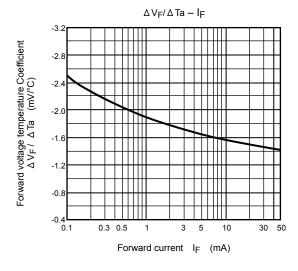


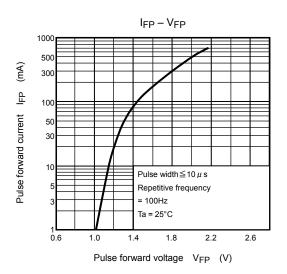


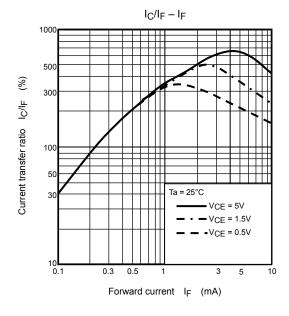


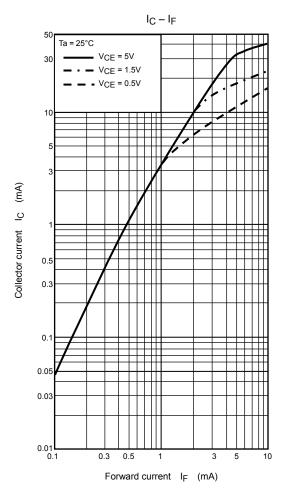


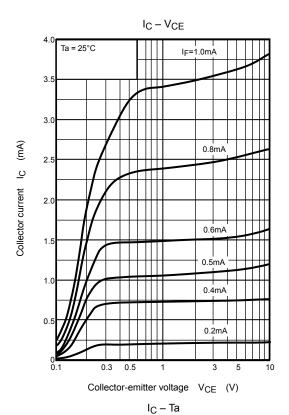


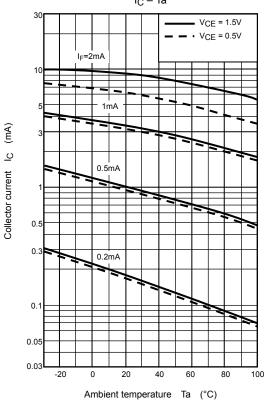




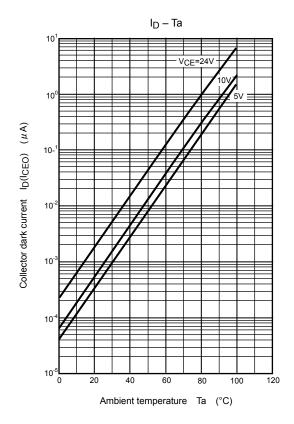


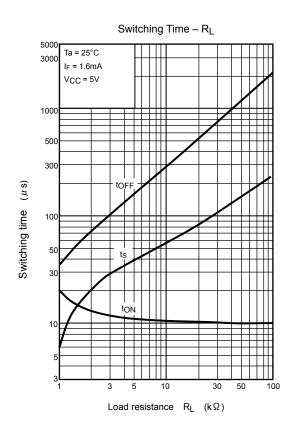






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