

TLP331, TLP332

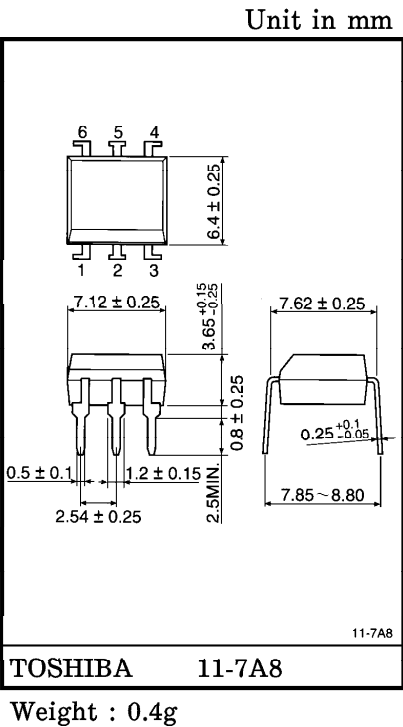
OFFICE MACHINE
HOUSEHOLD USE EQUIPMENT
PROGRAMMABLE CONTROLLERS
AC / DC-INPUT MODULE
TELECOMMUNICATION

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.

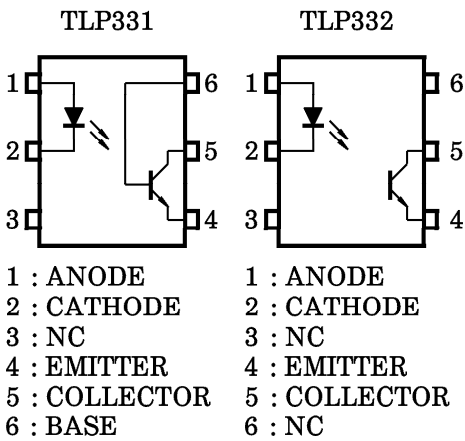
- Collector-Emitter Voltage : 55V (Min.)
- Isolation Voltage : 5000Vrms (Min.)
- UL Recognized : UL1577, File No. E67349
- Current Transfer Ratio

CLASSI- FICATION (*)	CURRENT TRANSFER RATIO (Min.)			MARKING OF CLASSI- FICATION
	Ta = 25°C		Ta = - 25~75°C	
	If = 1mA VCE = 0.5V	If = 0.5mA VCE = 1.5V	If = 1mA VCE = 0.5V	
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



PIN CONFIGURATIONS (TOP VIEW)



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- Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.
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MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	I _F	60	mA
	Forward Current Derating (Ta ≥ 39°C)	ΔI _F / °C	−0.7	mA / °C
	Peak Forward Current (100 μs pulse, 100pps)	I _{FP}	1	A
	Reverse Voltage	V _R	5	V
	Junction Temperature	T _j	125	°C
DETECTOR	Collector-Emitter Voltage	V _{CEO}	55	V
	Collector-Base Voltage (TLP331)	V _{CBO}	80	V
	Emitter-Collector Voltage	V _{ECO}	7	V
	Emitter-Base Voltage (TLP331)	V _{EBO}	7	V
	Collector Current	I _C	50	mA
	Power Dissipation	P _C	150	mW
	Power Dissipation Derating (Ta ≥ 25°C)	ΔP _C / °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)		P _T / °C	−2.5	mW / °C
Isolation Voltage (AC, 1 min., RH ≤ 60%) (Note 1)		BV _S	5000	Vrms

(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.	TYP.	MAX.	UNIT
Supply Voltage	V _{CC}	—	5	25	V
Forward Current	I _F	—	1.6	25	mA
Collector Current	I _C	—	1	10	mA
Operating Temperature	T _{opr}	−25	—	75	°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 (TLP331)	$V_{(BR)CBO}$	$I_C = 0.1\text{mA}$	80	—	—	V
	Emitter-Base Breakdown Voltage (TLP331)	$V_{(BR)EBO}$	$I_E = 0.1\text{mA}$	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 (TLP331)	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 (TLP331)	I_{CBO}	$V_{CB} = 10\text{V}$	—	0.1	—	nA
	DC Forward Current Gain (TLP331)	h_{FE}	$V_{CE} = 5\text{V}, I_C = 0.5\text{mA}$	—	1000	—	—
	Capacitance (Collector to Emitter)	C_{CE}	$V = 0, f = 1\text{MHz}$	—	12	—	pF

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I_C / I_F	$I_F = 1\text{mA}, V_{CE} = 0.5\text{V}$ Rank BV	100	—	1200	%
			200	—	1200	
Low Input CTR	$I_C / I_F (\text{low})$	$I_F = 0.5\text{mA}, V_{CE} = 1.5\text{V}$ Rank BV	50	—	—	%
			100	—	—	
Base Photo-current (TLP331)	I_{PB}	$I_F = 1\text{mA}, V_{CB} = 5\text{V}$	—	10	—	μA
Collector-Emitter Saturation Voltage	$V_{CE} (\text{sat})$	$I_C = 0.5\text{mA}, I_F = 1\text{mA}$	—	—	0.4	V
		$I_C = 1\text{mA}, I_F = 1\text{mA}$ Rank BV	—	0.2	—	
			—	—	0.4	

COUPLED ELECTRICAL CHARACTERISTICS (Ta = 25~75°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Transfer Ratio	I_C / I_F	$I_F = 1\text{mA}, V_{CE} = 0.5\text{V}$ Rank BV	50	—	—	%
			100	—	—	
Low Input CTR	$I_C / I_F (\text{low})$	$I_F = 0.5\text{mA}, V_{CE} = 1.5\text{V}$ Rank BV	—	50	—	%
			—	100	—	

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	V=500V	5×10 ¹⁰	10 ¹⁴	—	Ω
Isolation Voltage	BVS	AC, 1 minute	5000	—	—	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	—	8	—	μs
Fall Time	tf		—	8	—	
Turn-on Time	ton		—	10	—	
Turn-off Time	toff		—	8	—	
Turn-on Time	tON	RL=4.7kΩ (Fig.1) RBE=OPEN VCC=5V, IF=1.6mA	—	10	—	μs
Storage Time	tS		—	50	—	
Turn-off Time	tOFF		—	300	—	
Turn-on Time	tON	RL=4.7kΩ (Fig.1) RBE=470kΩ (TLP331) VCC=5V, IF=1.6mA	—	12	—	μs
Storage Time	tS		—	30	—	
Turn-off Time	tOFF		—	100	—	

Fig.1 SWITCHING TIME TEST CIRCUIT

