TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

# TLP628,TLP628-2,TLP628-4

Programmable Controllers
DC-Output Module
Telecommunication

The TOSHIBA TLP628, -2, and -4 consists of a gallium arsenide infrared emitting diode optically coupled to a phototransistor which has a 350V high voltage of collector-emitter breakdown voltage.

The TLP628-2 offers two isolated channels in a eight lead plastic DIP package, while the TLP628-4 provide four isolated channels per package.

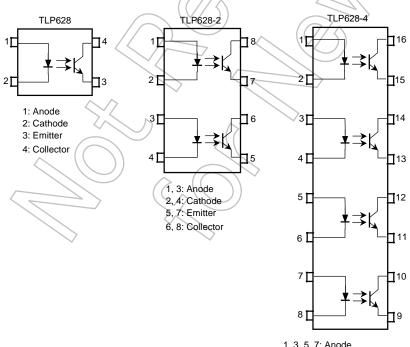
- Collector-emitter voltage: 350 V (min.)
- Current transfer ratio: 50% (min.)
- Isolation voltage: 5000Vrms (min.)
- UL recognized: UL1577, file No. E67349
- cUL approved: CSA Component Acceptance Service No.5A,

file No. E67349

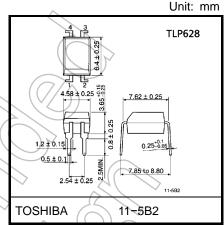
• Option (D4) VDE approved : DIN EN60747-5-5 (Note1)

(Note 1): When a EN60747-5-5 approved type is needed, please designate "Option(D4)"

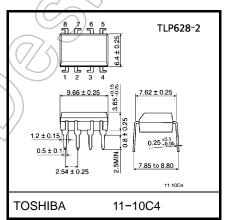
#### Pin Configurations (top view)



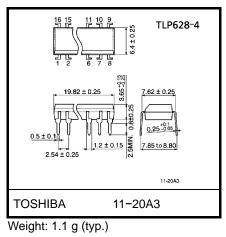
1, 3, 5, 7: Anode 2, 4, 6, 8: Cathode 9, 11, 13, 15: Emitter 10, 12, 14, 16: Collector



Weight: 0.26 g (typ.)



Weight: 0.54 g (typ.)



Start of commercial production 1993/10



#### Absolute Maximum Ratings (Ta = 25°C)

			Rat		
	Characteristic	Symbol	TLP628	TLP628-2 TLP628-4	Unit
	Forward current	lF	60	50	mA
	Forward current derating	ΔIF / °C	-0.7 (Ta ≥ 39°C)	–0.5 (Ta ≥ 25°C)	mA / °C
	Pulse forward current	IFP	1 (100µs pu	A	
LED	Reverse voltage	VR	Ę	V	
	Input power dissipation	PD	100	70	mVV
	Input power dissipation derating (Ta ≥ 25°C, 1 circuit)	ΔP <sub>D</sub> / °C	-1.0	-0.7	mW/°C
	Collector-emitter voltage	VCEO	35	50	V
	Emitter-collector voltage	VECO	7		V
tor	Collector current	Ic	5	mA (	
Detector	Collector power dissipation (1 circuit)	PC	150	100	mW
	Collector power dissipation derating (Ta ≥ 25°C, 1 circuit)	ΔPC / °C	-1.5	-1.0	mW/°C
	Junction temperature	Tj	12	25	\%C\\
Stor	age temperature range	T <sub>stg</sub>	-55 to	o 125	,c>
Оре	rating temperature range	T <sub>opr</sub>	55 to	)%c	
Lead soldering temperature		T <sub>sol</sub> (	260	(10s)	°C
Total package power dissipation (1 circuit)		PT	200	150	mW
Total package power dissipation derating (Ta ≥ 25°C, 1 circuit)		ΔP <sub>T</sub> /°C	-2.0	-1.5	mW / °C
Isolation voltage		BVs	5000 (AC, 1mir	n., R.H. ≤ 60%) (Note 1)	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.	Тур.	Max.	Unit
Supply voltage	Vcc	_	_	200	V
Forward current	lF	_	16	25	mA
Collector current	IC	_	_	10	mA
Operating temperature	T <sub>opr</sub>	-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.

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### Individual Electrical Characteristics (Ta = 25°C)

	Characteristic	Symbol	Test Condition	Min.	Тур.	Max.	Unit
	Forward voltage	VF	IF = 10 mA	1.0	1.15	1.3	V
LED	Reverse current	I <sub>R</sub>	V <sub>R</sub> = 5 V	_	_	10	μΑ
	Capacitance	Ст	V = 0 V, f = 1 MHz	7	30	_	pF
Detector	Collector-emitter breakdown voltage	V <sub>(BR)</sub> CEO	I <sub>C</sub> = 0.1 mA	350	1/2	1	V
	Emitter-collector breakdown voltage	V <sub>(BR)</sub> ECO	I <sub>E</sub> = 0.1 mA	7	)  -	_	V
	Collector dark current	V <sub>CE</sub> = 300 V	<del>)</del>	10	200	nA	
	Conector dark current	ICEO	VCE = 300 V, Ta = 85°C		_	50	μΑ
	Capacitance collector to emitter	CCE	V = 0 V, f = 1 MHz	_	10	_	pF

## Coupled Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min.	Тур.	) Max.	Unit
Current transfer ratio	Ic / I <sub>F</sub>	I <sub>F</sub> = 5 mA, V <sub>CE</sub> = 5 V	50		600	%
Carront transfer rate	1071	Raňk GB	100	<u> </u>	600	,,
Saturated CTR	I <sub>C</sub> / I <sub>F (sat)</sub>	IF = 1 mA, V <sub>CE</sub> = 0.4 V	1	60	_	%
Salurated CTIV	iC / iF (Sat)	Rank GB	30	_	_	70
	4	IC = 2.4 mA, IF = 8 mA	_	_	0.4	
Collector-emitter saturation voltage	VCE (sat)	IC = 0.2 mA, IF = 1 mA	_	0.2	_	V
S		Rank GB	_	_	0.4	

# Isolation Characteristics (Ta = 25°C)

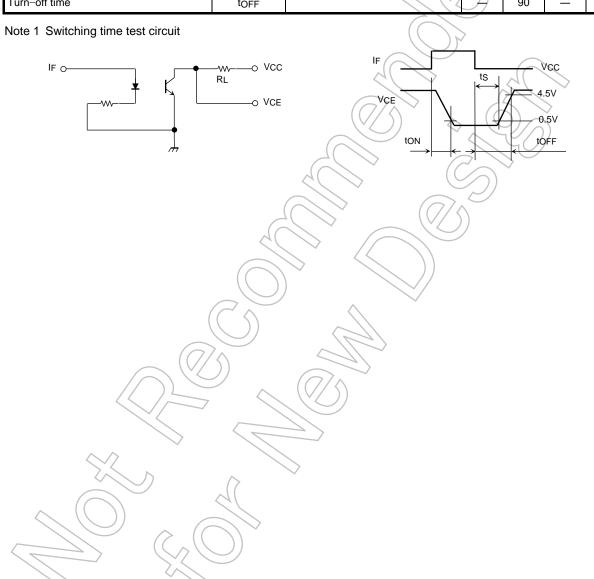
Characteristic	Symbol	Test Condition	Min.	Тур.	Max.	Unit
Capacitance input to output	Cs	$V_S = 0 V, f = 1 MHz$	_	0.8	_	pF
Isolation resistance	Rs	V <sub>S</sub> = 500 V R.H. ≤ 60%	5×10 <sup>10</sup>	10 <sup>14</sup>	_	Ω
	BVs	AC, 1 minute	5000	_	_	V <sub>rms</sub>
Isolation voltage		AC, 1 second, in oil	_	10000	_	
		DC, 1 minute, in oil	_	10000	_	$V_{dc}$

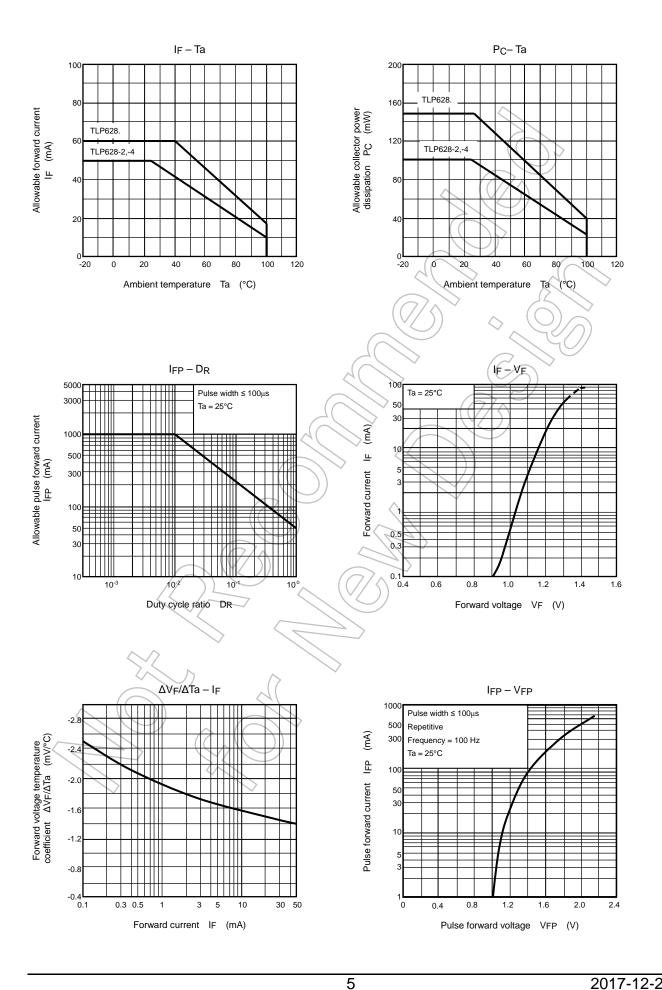
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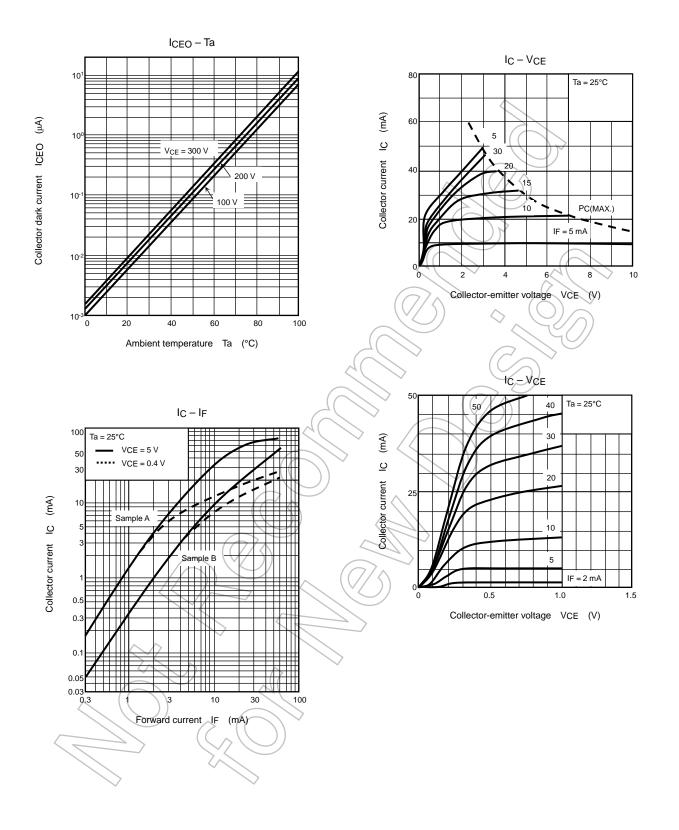


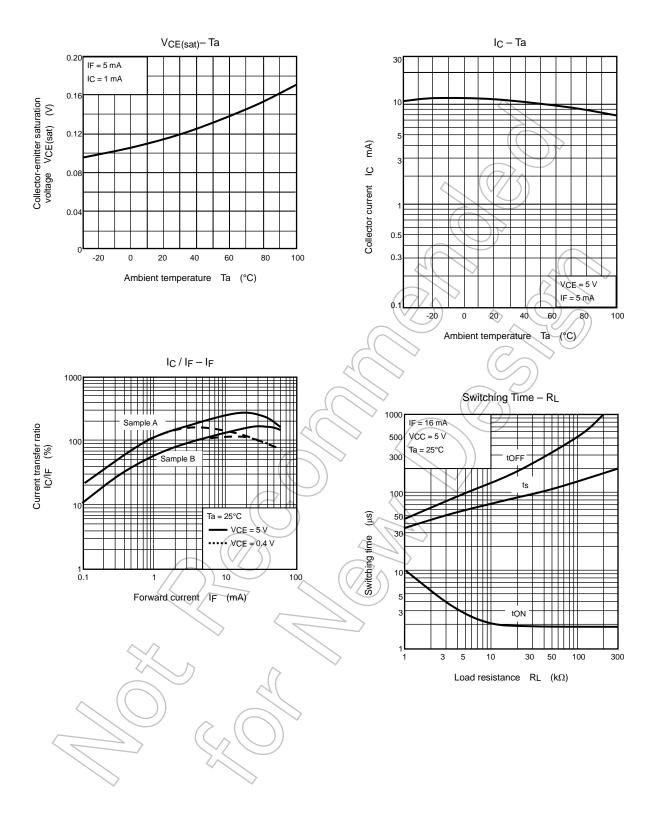
### **Switching Characteristics (Ta = 25°C)**

Characteristic	Symbol	Test Condition	Min.	Тур.	Max.	Unit
Rise time	t <sub>r</sub>	$V_{CC} = 10 \text{ V}, I_{C} = 2 \text{ mA}$ $AR_{L} = 100\Omega$	_	2	_	
Fall time	tf		_	3	_	
Turn-on time	ton		/_	3	_	μS
Turn-off time	t <sub>off</sub>			3	_	
Turn-on time	ton	R <sub>L</sub> = 1.9 k $\Omega$ (Note 1) V <sub>CC</sub> = 5 V, I <sub>F</sub> = 16 mA	1	))/3	_	
Storage time	ts		77	40	_	μS
Turn-off time	toff		$\bigcirc )$	90	_	









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