

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO IC

TLP582

MOS FET GATE DRIVER

TRANSISTOR INVERTER

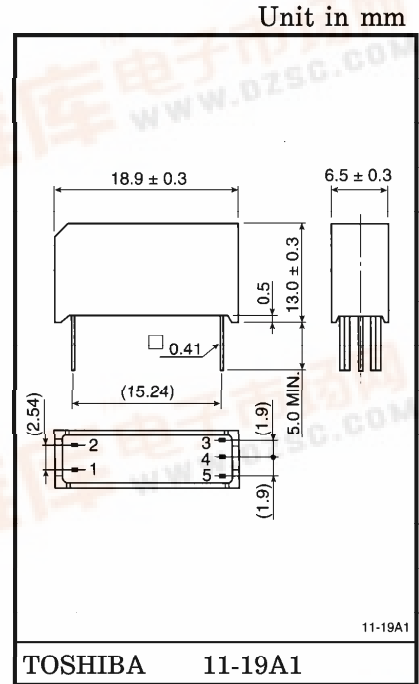
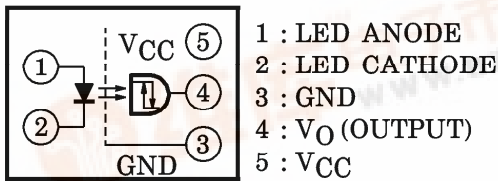
The TOSHIBA TLP582 consists of a GaAs light emitting diode and integrated high gain, high speed photodetector.

The detector has a totem pole output circuit that provides source drive and sink drive, and built-in Schmitt trigger.

A fiber is used for light-coupling between LED and detector, and for sufficient separation between input side and output side.

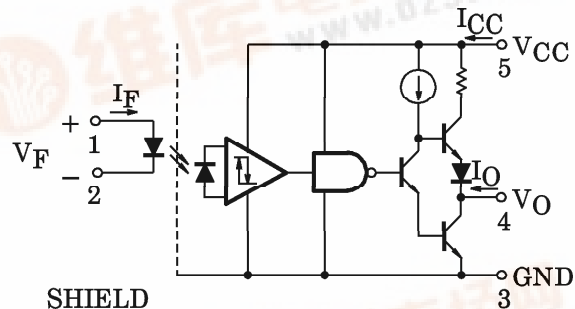
- Input Current : $I_F = 5\text{mA (MAX.)}$
- Power Supply Voltage : $V_{CC} = 4.5 \sim 20\text{V}$
- Switching Speed : $t_{pHL}, t_{pLH} = 400\text{ns (MAX.)}$
- Common Mode Transient Immunity : $\pm 5000\text{V} / \mu\text{s (MIN.)}$
- Guaranteed Performance Over Temperature : $-25 \sim 85^\circ\text{C}$
- Isolation Voltage : $5000\text{V}_{\text{rms (MIN.)}}$
- UL Recognized : UL1577, File No. E67349

PIN CONFIGURATION (TOP VIEW)



Weight : 1.55g

SCHEMATIC



SHIELD

A $0.1\mu\text{F}$ bypass capacitor must be connected between pins 3 and 5.

TRUTH TABLE (Positive Logic)

INPUT	OUTPUT
H	L
L	H

961001EBC2

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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

(No Derating Required up to 85°C unless otherwise noted)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	I_F	25	mA
	Peak Transient Forward Current (Note 1)	I_{FPT}	1	A
	Reverse Voltage	V_R	5	V
DETECTOR	Output Current	I_O	40 / -25	mA
	Peak Output Current (Note 2)	I_{OP}	80 / -50	mA
	Output Voltage	V_O	-0.5~20	V
	Supply Voltage	V_{CC}	-0.5~20	V
	Output Power Dissipation (Note 3)	P_O	100	mW
	Total Package Power Dissipation (Note 4)	P_T	200	mW
Operating Temperature Range		T_{opr}	-40~85	°C
Storage Temperature Range		T_{stg}	-40~100	°C
Lead Solder Temperature (10s)		T_{sol}	260	°C
Isolation Voltage (AC, 1min., R.H. ≤ 60%, $T_a = 25^\circ\text{C}$) (Note 5)		BVS	5000	V_{rms}

(Note 1) Pulse Width $\leq 1\mu\text{s}$, 300pps.(Note 2) Pulse Width $\leq 5\mu\text{s}$, Duty Ratio ≤ 0.025 .

(Note 3) Derate 1.8mW/°C above 70°C ambient temperature.

(Note 4) Derate 3.6mW/°C above 70°C ambient temperature.

(Note 5) Device considered a two terminal device : pins 1, 2 shorted together, and pins 3, 4 and 5 shorted together.

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Input Current, ON	$I_F(\text{ON})$	7	8	20	mA
Input Voltage, OFF	$V_F(\text{OFF})$	0	—	0.8	V
Supply Voltage	V_{CC}	4.5	—	20	V
Operating Temperature	T_{opr}	-25	—	85	°C

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $T_a = -25 \sim 85^\circ\text{C}$, $V_{CC} = 4.5 \sim 20\text{V}$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.*	MAX.	UNIT	
Input Forward Voltage	V_F	$I_F = 5\text{mA}$, $T_a = 25^\circ\text{C}$	—	1.35	1.85	V	
Temperature Coefficient of Forward Voltage	$\Delta V_F / \Delta T_a$	$I_F = 5\text{mA}$	—	-2	—	mV/°C	
Input Reverse Current	I_R	$V_R = 3\text{V}$, $T_a = 25^\circ\text{C}$	—	—	100	μA	
Input Capacitance	C_T	$V_F = 0$, $f = 1\text{MHz}$, $T_a = 25^\circ\text{C}$	—	170	—	pF	
Output Leakage Current ($V_O > V_{CC}$)	I_{OHH}	$V_F = 0\text{V}$ $V_{CC} = 4.5\text{V}$	$V_O = 5.5\text{V}$	—	—	100	μA
			$V_O = 20\text{V}$	—	0.01	500	
Logic Low Output Voltage	V_{OL}	$I_{OL} = 6.4\text{mA}$, $I_F = 5\text{mA}$	—	0.4	0.5	V	
Logic High Output Voltage	V_{OH}	$I_{OH} = -2.6\text{mA}$, $V_F = 0.8\text{V}$	2.4	3.3	—	V	
Logic Low Supply Current	I_{CCL}	$I_F = 7.5\text{mA}$	$V_{CC} = 5.5\text{V}$	—	4.0	6.0	mA
			$V_{CC} = 20\text{V}$	—	4.6	7.5	
Logic High Supply Current	I_{CCH}	$V_F = 0\text{V}$	$V_{CC} = 5.5\text{V}$	—	4.2	6.0	mA
			$V_{CC} = 20\text{V}$	—	4.7	7.5	
Logic Low Short Circuit Output Current (Note 6)	I_{OSL}	$I_F = 7.5\text{mA}$	$V_O = V_{CC} = 5.5\text{V}$	25	55	—	mA
			$V_O = V_{CC} = 20\text{V}$	40	80	—	
Logic High Short Circuit Output Current (Note 6)	I_{OSH}	$V_F = 0\text{V}$ $V_O = \text{GND}$	$V_{CC} = 5.5\text{V}$	-10	-25	—	mA
			$V_{CC} = 20\text{V}$	-25	-60	—	
Input Current Logic Low Output	I_{FL}	$I_O = 6.4\text{mA}$, $V_O < 0.4\text{V}$	—	—	5	mA	
Input Voltage Logic High Output	V_{FH}	$I_O = -2.6\text{mA}$, $V_O > 2.4\text{V}$	0.8	—	—	V	
Input Current Hysteresis	I_{HYS}	$V_{CC} = 5\text{V}$	—	0.05	—	mA	
Resistance (Input-Output)	R_S	$V_S = 500\text{V}$, R.H. $\leq 60\%$ $T_a = 25^\circ\text{C}$ (Note 5)	5×10^{10}	10^{14}	—	Ω	
Capacitance (Input-Output)	C_S	$V_S = 0$, $f = 1\text{MHz}$, $T_a = 25^\circ\text{C}$ (Note 5)	—	0.15	0.3	pF	

* All typical values are at $T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$, $I_F(\text{ON}) = 7.5\text{mA}$ unless otherwise specified.

SWITCHING CHARACTERISTICS (Unless Otherwise specified, $V_{CC} = 4.5\sim 20V$, $T_a = 25^\circ C$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.*	MAX.	UNIT
Propagation Delay Time to Logic High Output (Note 7)	t_{pLH}	1	$I_F = 7.5 \rightarrow 0mA$	—	250	400	ns
Propagation Delay Time to Logic Low Output (Note 7)	t_{pHL}		$I_F = 0 \rightarrow 7.5mA$	—	270	400	ns
Output Rise Time (10-90%)	t_r		$I_F = 7.5 \rightarrow 0mA$, $V_{CC} = 5V$	—	35	75	ns
Output Fall Time (90-10%)	t_f		$I_F = 0 \rightarrow 7.5mA$, $V_{CC} = 5V$	—	20	75	ns
Common Mode Transient Immunity at Logic High Output (Note 8)	C_{MH}	2	$I_F = 0mA$, $V_{CM} = 400V$ $V_O (Min.) = 2V$	5	10	—	kV / μs
Common Mode Transient Immunity at Logic Low Output (Note 8)	C_{ML}		$I_F = 7.5mA$, $V_{CM} = 400V$ $V_O (Max.) = 0.8V$	-5	-10	—	kV / μs

* All typical values are at $T_a = 25^\circ C$, $V_{CC} = 5V$

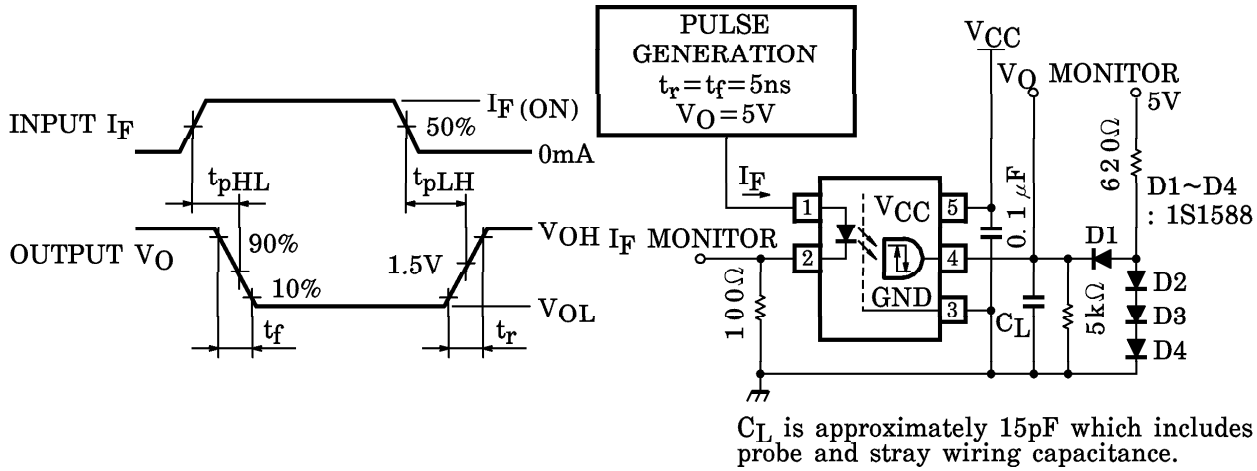
(Note 6) Duration of output short circuit time should not exceed 10ms.

(Note 7) The t_{pLH} propagation delay is measured from the 50% point on the trailing edge of the input pulse to the 1.5V point on the leading edge of the output pulse.
The t_{pHL} propagation delay is measured from the 50% point on the leading edge of the input pulse to the 1.5V point on the trailing edge of the output pulse.

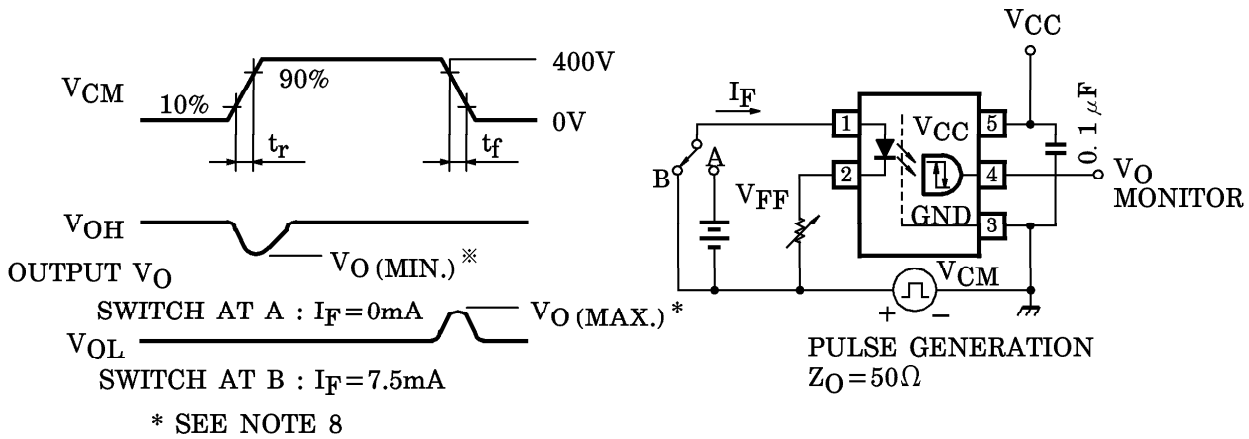
(Note 8) C_{ML} is the maximum rate of fall of the common mode voltage that can be sustained with the output voltage in the logic low state ($V_O < 0.8V$).
 C_{MH} is the maximum rate of rise of the common mode voltage that can be sustained with the output voltage in the logic low state ($V_O < 2.0V$).

(Note 9) A ceramic capacitor ($0.1\mu F$) should be connected from pin 3 to pin 5 to stabilize the operation of the high gain linear amplifier. Failure to provide the bypassing may impair the switching property. The total lead length between capacitor and coupler should not exceed 1cm.

TEST CIRCUIT 1 : t_{pHL} , t_{pLH} , t_r and t_f



TEST CIRCUIT 2 : Common Mode Transient Immunity



$$C_{MH} = \frac{320(V)}{t_r(\mu s)}, C_{ML} = \frac{320(V)}{t_f(\mu s)}$$

