

(TLP557)

TRANSISTOR INVERTOR

INVERTER FOR AIR CONDITIONOR

POWER TRANSISTOR BASE DRIVE

The TOSHIBA TLP557 consists of a GaAlAs light emitting diode and a integrated photodetector.

This unit is 8-lead DIP package.

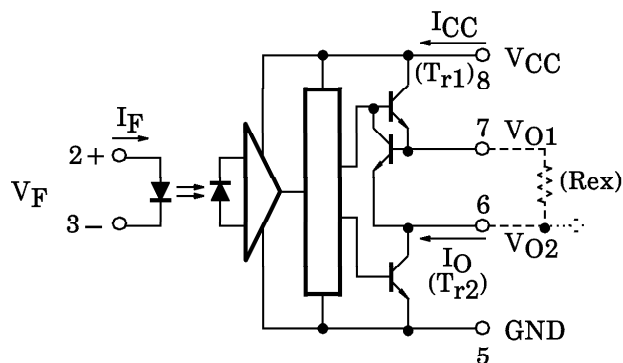
TLP557 is suitable for base driving circuit of power transistor module up to 20A.

External resistor needs to connect between pin 6 and pin 7.

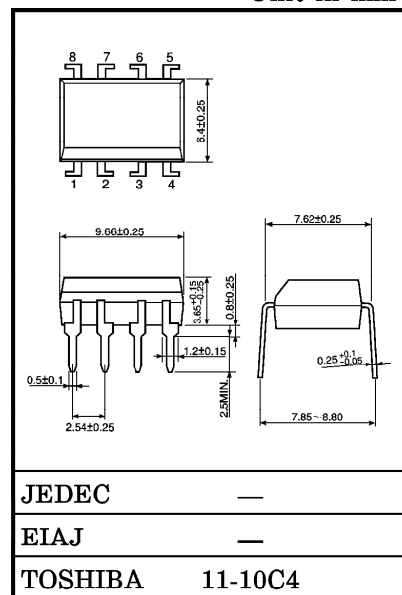
This is for constant current driving.

- Input Threshold Current : $I_F = 5\text{mA (Max.)}$
- Guaranteed Performance Temperature Range : $-30 \sim 70^\circ\text{C}$
- Supply Voltage : 16V (Max.)
- Output Current : $\pm 0.3\text{A (Max.)}$
- Switching Time (t_{pLH} / t_{pHL}) : $5\mu\text{s (Max.)}$
- Isolation Voltage : $2500\text{V}_{\text{rms (Min.)}}$
- UL Recognized : UL1577, File No. E67349

SCHMATIC

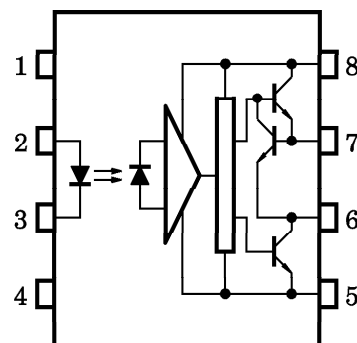


Unit in mm



Weight : 0.54g

PIN CONFIGURATION (TOP VIEW)



- 1 : N.C.
- 2 : ANODE
- 3 : CATHODE
- 4 : N.C.
- 5 : GND
- 6 : V_{O2} (OUTPUT)
- 7 : V_{O1} (Rex TERMINAL)
- 8 : V_{CC}

TRUTH TABLE

Input LED			Tr1	Tr2
	ON	OFF	ON	OFF
ON	ON	OFF	ON	ON
OFF	OFF	OFF	OFF	ON

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ABSOLUTE MAXIMUM RATINGS

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
	Junction Temperature	(T_j)	125	°C
DETECTOR	Output Current ($f \leq 5\text{kHz}$, Duty $\leq 50\%$)	I_O	+0.32 / -0.32	A
	Peak Output Current ($P_W \leq 10\mu\text{s}$, $f \leq 5\text{kHz}$)	I_{OP}	+2 / -0.5	A
	Output Voltage	V_O	16	V
	Supply Voltage	V_{CC}	16	V
	O ₁ Terminal to O ₂ Terminal (Pin 7 – Pin 6) Voltage	V_{1-2}	1.5	V
	O ₂ Terminal to O ₁ Terminal (Pin 6 – Pin 7) Voltage	V_{2-1}	5	V
	Power Dissipation (Note 2)	P_o	0.5	W
	Junction Temperature	(T_j)	125	°C
Total Package Power Dissipation (Note 3)		P_{OT}	0.55	W
Operating Temperature Range		T_{opr}	-30~70	°C
Storage Temperature Range		T_{stg}	-55~125	°C
Lead Solder Temperature (10s)		T_{sol}	260	°C
Isolation Voltage (AC, 1min., R.H. $\leq 60\%$, $T_a = 25^\circ\text{C}$) (Note 4)		BV_S	2500	Vrms

Note 1 : Pulse width $PW \leq 1\mu\text{s}$, 300pps

Note 2 : $\Delta P_o / ^\circ\text{C} = -6.7\text{mW}/^\circ\text{C}$ ($T_a \geq 50^\circ\text{C}$)

Note 3 : $\Delta P_{OT} / ^\circ\text{C} = -7.4\text{mW}/^\circ\text{C}$ ($T_a \geq 50^\circ\text{C}$)

Note 4 : Device considered a two terminal device : pins 1, 2, 3 and 4 shorted together, and pins 5, 6, 7 and 8 shorted together.

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ELECTRICAL CHARACTERISTICS (Ta = -30~70°C, Unless otherwise specified)

CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	TYP.*	MAX.	UNIT	TEST CIR- CUIT
Input Forward Voltage	V _F	I _F =5mA, Ta=25°C		—	1.55	1.7	V	
Temperature Coefficient of Forward Voltage	ΔV _F / ΔTa	I _F =5mA		—	−2.0	—	mV / °C	
Input Reverse Current	I _R	V _R =5V, Ta=25°C		—	—	10	μA	
Input Capacitance	C _T	V=0, f=1MHz, Ta=25°C		—	—	250	pF	
O ₁ Output Leakage Current	I _{O1L}	V _{CC} =16V, V _{O1} =0, V _F =0.8V		—	0.01	200	μA	1
O ₂ Output Leakage Current	I _{O2L}	V _{CC} =16V, V _{O2} =16V, I _F =5mA		—	0.2	200	μA	2
O ₁ Output Current	I _O	V ₈₋₆ =2.3V R _{ex} =2.7Ω I _F =5mA, Ta=25°C	V _{CC} =6V	0.22	0.27	0.32	A	3
			V _{CC} =16V	0.22	0.27	0.32		
O ₂ High Level Output Voltage	V _{OH}	V _{CC} =6V, R _{ex} =2.7Ω I _F =5mA		3.5	5.5	—	V	4
O ₂ Low Level Output Voltage	V _{OL}	V _F =0.8V, R _{ex} =2.7Ω I _O =0.25A, Ta=25°C	V _{CC} =6V	—	0.2	0.4	V	5
			V _{CC} =16V	—	0.2	0.4		
		V _F =0.8V, R _{ex} =2.7Ω I _O =0.5A (*1) Ta=25°C	V _{CC} =6V	—	0.4	—	V	
			V _{CC} =16V	—	0.4	—		
High Level Supply Current	I _{CCH}	V _{CC} =6V, I _F =5mA R _{ex} =2.7Ω, Ta=25°C		—	3.8	10	mA	
		V _{CC} =6V, I _F =5mA, R _{ex} =2.7Ω		—	—	13		
		V _{CC} =16V, I _F =5mA, R _{ex} =2.7Ω		—	5.2	17		
Low Level Supply Current	I _{CCL}	V _{CC} =6V, I _F =0mA R _{ex} =2.7Ω, Ta=25°C		—	11	17	mA	
		V _{CC} =6V, I _F =0mA, R _{ex} =2.7Ω		—	—	22		
		V _{CC} =16V, I _F =0mA, R _{ex} =2.7Ω		—	13	25		
“Output L→H” Threshold Input Current	I _{FLH}	R _{ex} =2.7Ω I _O =0.25A V _{O2} >3V	V _{CC} =6V	—	2.5	5	mA	
			V _{CC} =16V	—	—	5		
“Output H→L” Threshold Input Current	V _{FHL}	R _{ex} =2.7Ω I _O =0.25A V _{O2} <0.4V	V _{CC} =6V	0.8	—	—	V	
			V _{CC} =16V	0.8	—	—		
Input Current Hysterisis	I _{HYS}	V _{CC} =6V, R _{ex} =2.7Ω, Ta=25°C		—	0.05	—	mA	
Supply Voltage	V _{CC}			5	—	16	V	
Capacitance (Input-Output)	C _S	V _S =0, f=1MHz, Ta=25°C		—	1.0	2.0	pF	
Resistance (Input-Output)	R _S	V _S =500V, Ta=25°C, R.H.≤60%		5×10 ¹⁰	10 ¹⁴	—	Ω	

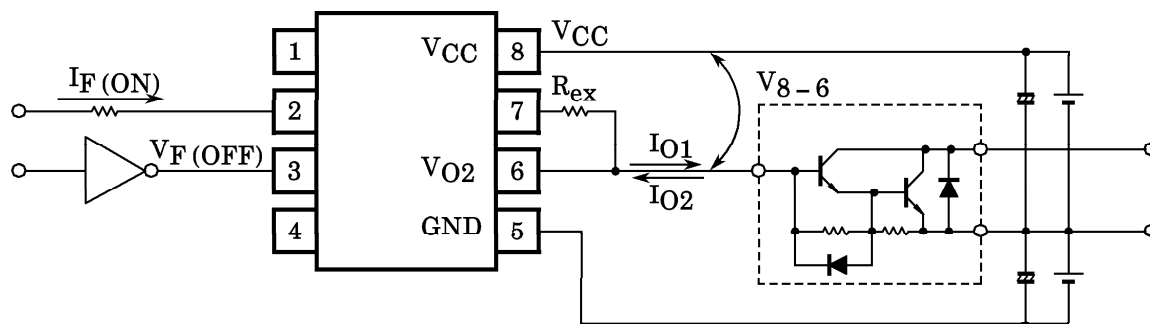
* All typical values are at Ta=25°C (*1): Duration of I_O time ≤ 100μs

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RECOMMENDED OPERATING CONDITION

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Input Current ON	I_F (ON)	7	8	20	mA
Input Voltage OFF	V_F (OFF)	0	—	0.8	V
Supply Voltage	V_{CC}	5	6	13	V
I_{B1} Drive Current	I_{O1}	—	0.15	0.25	A
I_{B2} Drive Current	I_{O2}	—	—	0.5	A
External Resistance	R_{ex}	2.7	4.3	—	Ω
$V_{CC} - V_{O2}$ (Pin 8 – Pin 6) ON Voltage	V_{8-6}	2.3	3 ($I_{O1}=0.15A$)	2.5 ($I_{O1}=0.25A$)	V
Operating Temperature	T_{opr}	−30	25	70	°C

(R_{ex} is for constant current driving)



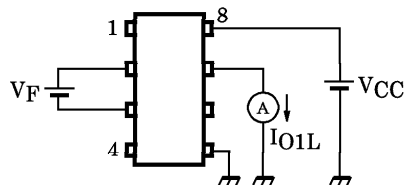
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SWITCHING CHARACTERISTICS ($T_a = -30 \sim 70^\circ\text{C}$ Unless otherwise specified)

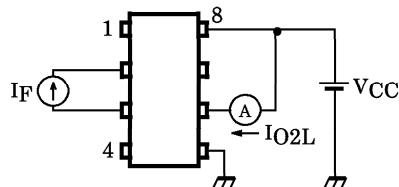
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.*	MAX.	UNIT	TEST CIR-CUIT
Propagation Delay Time, L $\rightarrow$ H	t_{pLH}	$V_{CC}=6\text{V}$, $I_F=8\text{mA}$ $R_{ex}=2.7\Omega$ $f=5\text{kHz}$, Duty = 10%	—	1	5	μs	6
Propagation Delay Time, H $\rightarrow$ L	t_{pHL}		—	1	5	μs	
Output Rise Time	t_r		—	0.05	—	μs	
Output Fall Time	t_f		—	0.05	—	μs	
Common Mode Transient Immunity at High Level Output	C_{MH}	$V_{CM}=600\text{V}$, $I_F=8\text{mA}$ $V_{CC}=6\text{V}$, $R_{ex}=270\Omega$ $R=1\text{k}\Omega$, $T_a=25^\circ\text{C}$	-2000	—	—	$\text{V}/\mu\text{s}$	7
Common Mode Transient Immunity at Low Level Output	C_{ML}	$V_{CM}=600\text{V}$, $I_F=0\text{mA}$ $V_{CC}=6\text{V}$, $R_{ex}=270\Omega$ $R=1\text{k}\Omega$, $T_a=25^\circ\text{C}$	2000	—	—	$\text{V}/\mu\text{s}$	7

* All typical values are at $T_a=25^\circ\text{C}$.

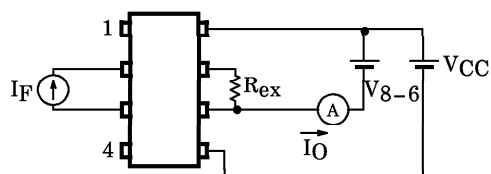
TEST CIRCUIT 1 : I_{O1L}



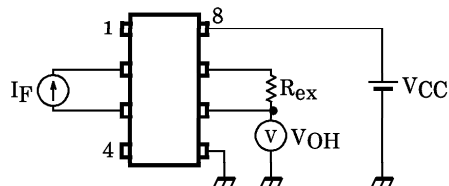
TEST CIRCUIT 2 : I_{O2L}



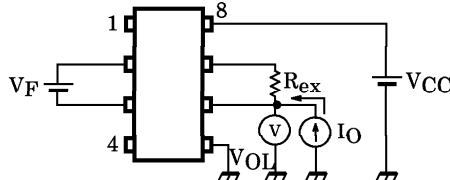
TEST CIRCUIT 3 : I_O



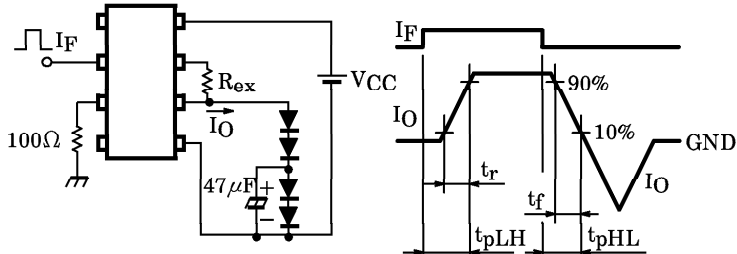
TEST CIRCUIT 4 : V_{OH}



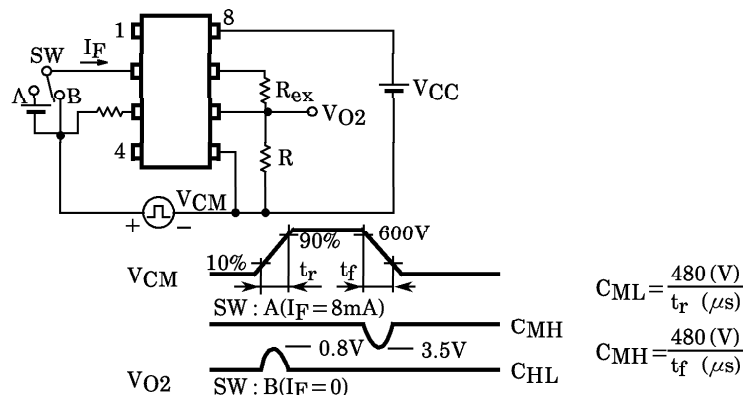
TEST CIRCUIT 5 : V_{OL}



TEST CIRCUIT 6 : t_{pLH} , t_{pHL} , t_r , t_f



TEST CIRCUIT 7 : C_{MH} , C_{ML}



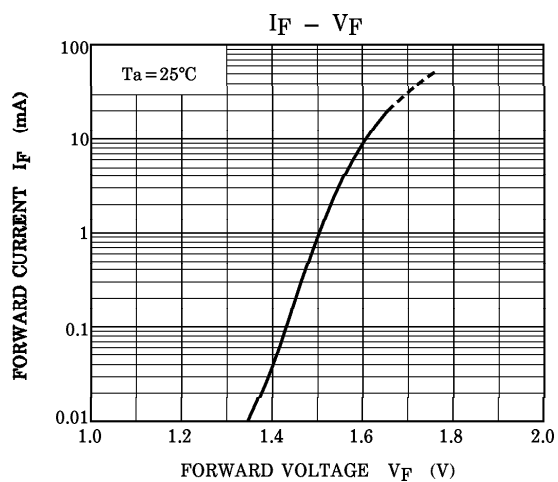
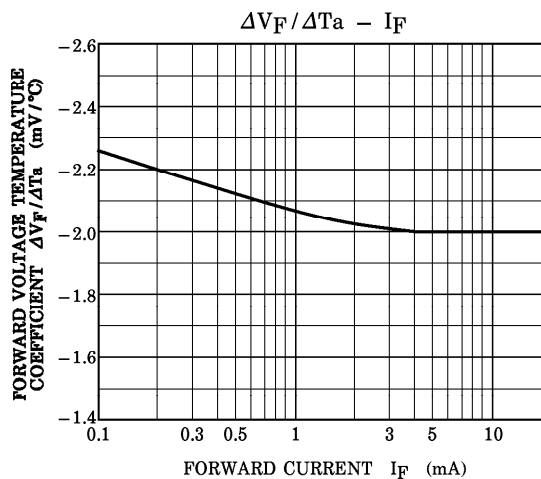
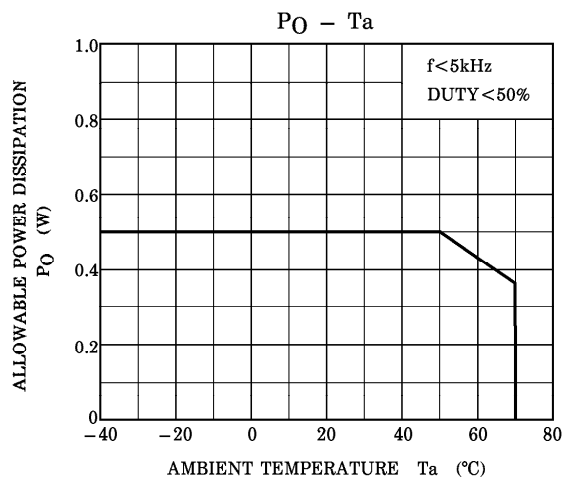
C_{ML} (C_{MH}) is the maximum rate of rise (fall) of the common mode voltage that can be sustained with the output voltage in the low (high) state.

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