

(TLP557)

TRANSISTOR INVERTER

INVERTER FOR AIR CONDITIONER

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.

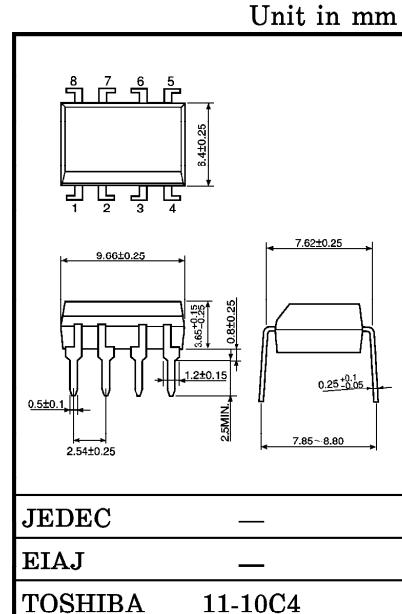
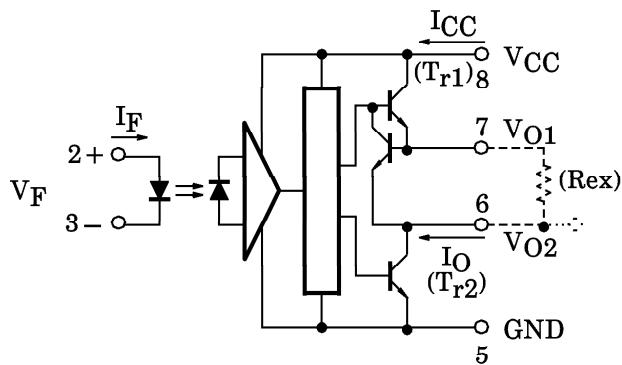
TLP557 is suitable for base driving circuit of power transistor module up to 20A.

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

This is for constant current driving.

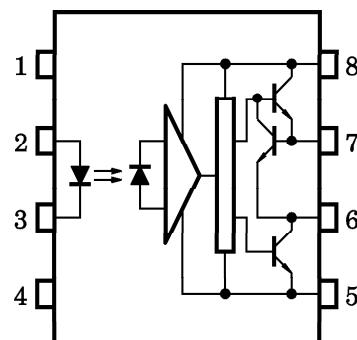
- Input Threshold Current : $I_F = 5\text{mA}$ (Max.)
- Guaranteed Performance Temperature Range : $-30\sim 70^\circ\text{C}$
- Supply Voltage : 16V (Max.)
- Output Current : $\pm 0.3\text{A}$ (Max.)
- Switching Time (t_{pLH} / t_{pHL}) : $5\mu\text{s}$ (Max.)
- Isolation Voltage : $2500\text{V}_{\text{rms}}$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

SCHMATIC



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

		Tr1	Tr2
Input LED	ON	ON	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 _{FPPT}	1	A
	Reverse Voltage	V _R	5	V
	Junction Temperature	(T _j)	125	°C
DETECTOR	Output Current (f≤5kHz, Duty≤50%)	I _O	+0.32 / -0.32	A
	Peak Output Current (P _W ≤10μs, f≤5kHz)	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.≤60%, Ta=25°C) (Note 4)		BV _S	2500	Vrms

Note 1 : Pulse width PW≤1μs, 300pps

Note 2 : ΔP_O/°C = -6.7mW/°C (Ta≥50°C)

Note 3 : ΔP_{OT}/°C = -7.4mW/°C (Ta≥50°C)

Note 4 : Device considerd 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 V _{CC} =16V	0.22 0.22	0.27 0.27	0.32 0.32	A	3
O ₂ High Level Output Voltage	V _{OH}	V _{CC} =6V, Rex=2.7Ω I _F =5mA	—	3.5	5.5	—	V	4
O ₂ Low Level Output Voltage	V _{OL}	V _F =0.8V, Rex=2.7Ω I _O =0.25A, Ta=25°C	V _{CC} =6V V _{CC} =16V	— —	0.2 0.2	0.4 0.4	V	5
High Level Supply Current	I _{CCH}	V _{CC} =6V, I _F =5mA R _{ex} =2.7Ω, Ta=25°C	V _{CC} =6V V _{CC} =16V	— —	0.4 0.4	— —	V	
Low Level Supply Current	I _{CCL}	V _{CC} =6V, I _F =0mA R _{ex} =2.7Ω, Ta=25°C	V _{CC} =6V, I _F =0mA, Rex=2.7Ω	—	3.8	10	mA	
“Output L→H” Threshold Input Current	I _{FLH}	R _{ex} =2.7Ω I _O =0.25A V _{O2} >3V	V _{CC} =6V V _{CC} =16V	— —	11 —	17 22	mA	
“Output H→L” Threshold Input Current	V _{FHL}	R _{ex} =2.7Ω I _O =0.25A V _{O2} <0.4V	V _{CC} =6V V _{CC} =16V	0.8 0.8	— —	— —	V	
Input Current Hysteresis	I _{HYS}	V _{CC} =6V, Rex=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		

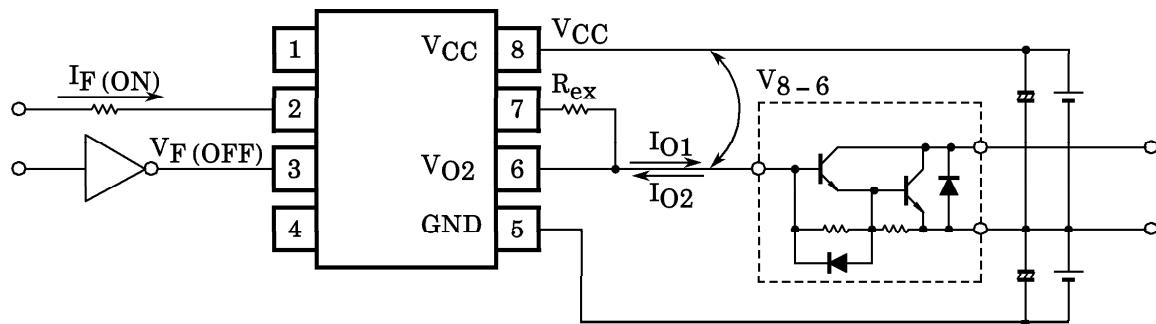
* All typical values are at Ta=25°C (*1): Duration of I_O time ≤ 100μs

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RECOMMENDED OPERATING CONDITION

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Input Current ON	$I_F(\text{ON})$	7	8	20	mA
Input Voltage OFF	$V_F(\text{OFF})$	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 ($I_{O1}=0.15\text{A}$)	2.5 ($I_{O1}=0.25\text{A}$)	V
Operating Temperature	T_{opr}	-30	25	70	$^{\circ}\text{C}$

(R_{ex} is for constant current driving)



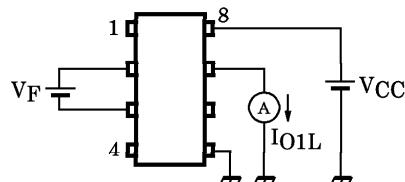
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SWITCHING CHARACTERISTICS ($T_a = -30 \sim 70^\circ\text{C}$ Unless otherwise specified)

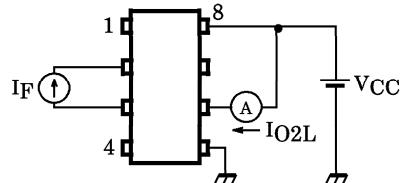
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.*	MAX.	UNIT	TEST CIRCUIT
Propagation Delay Time, L→H	t_{pLH}	$V_{CC} = 6\text{V}$, $I_F = 8\text{mA}$ $R_{ex} = 2.7\Omega$ $f = 5\text{kHz}$, Duty = 10%	—	1	5	μs	6
Propagation Delay Time, H→L	t_{pHL}		—	1	5	μs	
Output Rise Time	t_r		—	0.05	—	μs	
Output Fall 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 $T_a = 25^\circ\text{C}$.

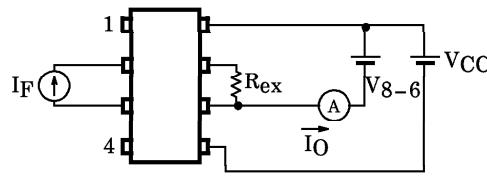
TEST CIRCUIT 1 : I_{O1L}



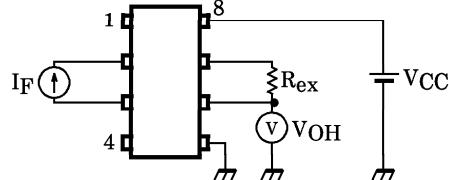
TEST CIRCUIT 2 : I_{O2L}



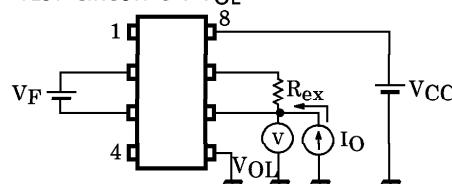
TEST CIRCUIT 3 : I_O



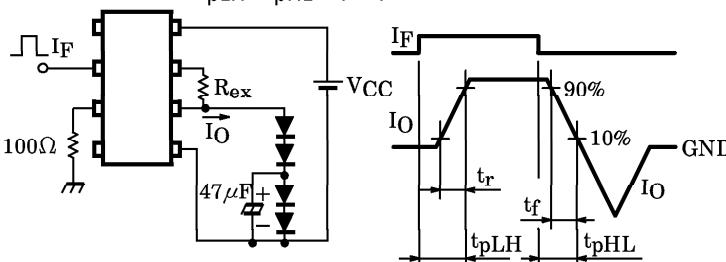
TEST CIRCUIT 4 : V_{OH}



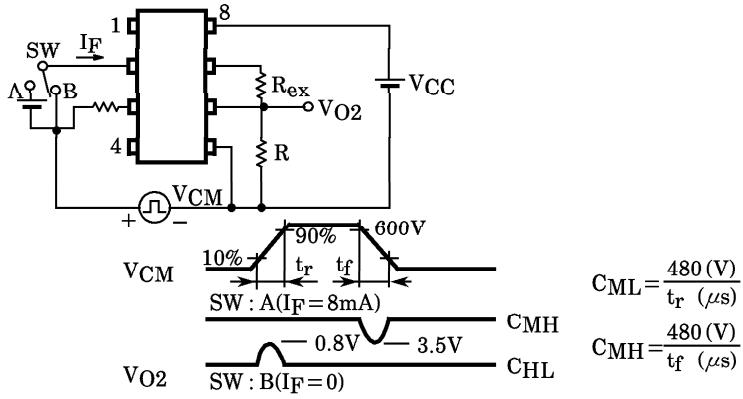
TEST CIRCUIT 5 : V_{OL}



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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