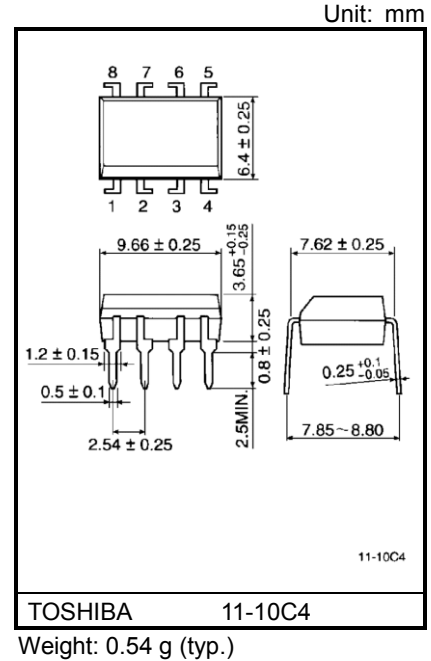


TLP557

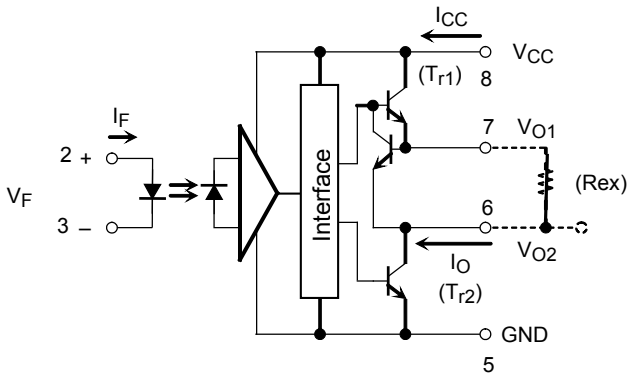
Industrial Inverter
 Inverter for Air Conditioner
 Power Transistor Base Drive

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

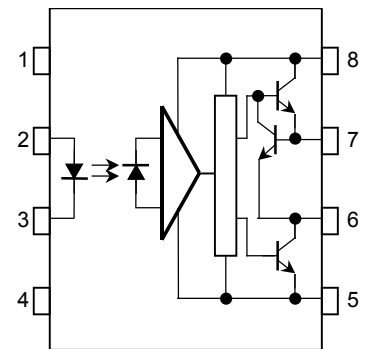
- Input threshold current: $I_F = 5 \text{ mA}$ (max)
- Guaranteed performance temperature range: -30 to 70°C
- Supply voltage: 16 V (max)
- Output current: $\pm 0.3 \text{ A}$ (max)
- Switching time (t_{pLH}/t_{pHL}): $5 \mu\text{s}$ (max)
- Isolation voltage: 2500 V_{rms} (min)
- UL approved: UL1577, file No. E67349
- c-UL approved : CSA Component Acceptance Service
 No. 5A, File No.E67349



Schematic



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
		ON	OFF
Input LED	ON	ON	OFF
	OFF	OFF	ON

Start of commercial production
 1987-06

Absolute Maximum Ratings

Characteristic		Symbol	Rating	Unit
LED	Forward current	I _F	25	mA
	Peak transient forward current (P _w ≤ 1 μs, 300 pps)	I _{FPT}	1	A
	Reverse voltage	V _R	5	V
	Diode power dissipation	P _D	45	mW
	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	P _O	0.5	W
	Power dissipation derating (Ta > 50 °C)	ΔP _O /ΔTa	-6.7	mW/°C
	Junction temperature	T _j	125	°C
Total package power dissipation		P _{OT}	0.55	W
Total package power dissipation derating (Ta > 50 °C)		ΔP _{OT} /ΔTa	-7.4	mW/°C
Operating temperature range		T _{opr}	-30 to 70	°C
Storage temperature range		T _{stg}	-55 to 125	°C
Lead solder temperature (10 s)		T _{sol}	260	°C
Isolation voltage (AC, 60 s, R.H.≤ 60%, Ta=25°C) (Note 1)		BV _S	2500	V _{rms}

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).

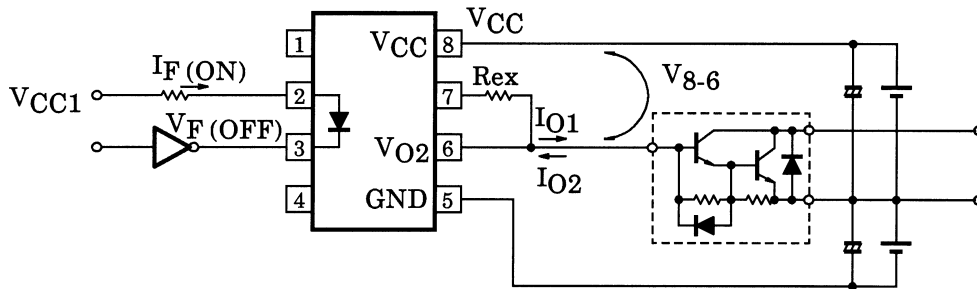
Note 1: Device considered a two terminal device: Pins 1, 2, 3 and 4 shorted together, and pins 5, 6, 7 and 8 shorted together.

Recommended Operating Conditions

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
IB1 Drive current	I_{O1}	—	0.15	0.25	A
IB2 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 (Note 1)	V_{8-6}	2.3	3 ($I_{O1} = 0.15A$)	2.5 ($I_{O1} = 0.25A$)	V
Operating temperature	T_{opr}	-30	25	70	$^{\circ}C$

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.

Note 1:



Electrical Characteristics (Ta = -30 to 70°C, unless otherwise specified)

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit	
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 V, f = 1MHz, Ta = 25°C	—	—	250	pF	
O ₁ Output leakage current	I _{O1L}	1	V _{CC} = 16V, V _{O1} = 0 V, V _F = 0.8V	—	0.01	200	μA	
O ₂ Output leakage current	I _{O2L}	2	V _{CC} = 16V, V _{O2} = 16V, I _F = 5mA	—	0.2	200	μA	
O ₁ Output current	I _O	3	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
				V _{CC} = 16V	0.22	0.27	0.32	
O ₂ High level output voltage	V _{OH}	4	V _{CC} = 6V, R _{ex} = 2.7Ω I _F = 5mA	3.5	5.5	—	V	
O ₂ Low level output voltage	V _{OL}	5	V _F = 0.8V, R _{ex} = 2.7Ω I _O = 0.25A, Ta = 25°C	V _{CC} = 6V	—	0.2	0.4	V
				V _{CC} = 16V	—	0.2	0.4	
			V _F = 0.8V, R _{ex} = 2.7Ω I _O = 0.5A (Note 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	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 hysteresis	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 V, 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 ¹²	—	Ω	

Note: All typical values are at Ta = 25°C

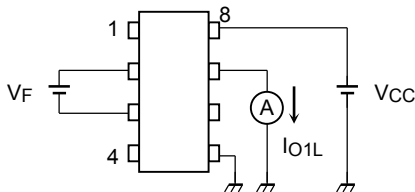
Note 1: Duration of I_O time ≤ 100μs

Switching Characteristics (Ta = -30 to 70°C unless otherwise specified)

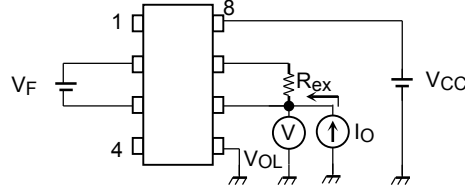
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Propagation delay time, L→H	tpLH	6	VCC = 6V, IF = 8mA Rex = 2.7Ω f = 5kHz, Duty = 10%	—	1	5	μs
Propagation delay time, H→L	tpHL			—	1	5	μs
Output rise time	tr			—	0.05	—	μs
Output fall time	tf			—	0.05	—	μs
Common mode transient immunity at high level output	CMH	7	VCM = 600V, IF = 8mA VCC = 6V, Rex = 270Ω R = 1kΩ, Ta = 25°C	-2000	—	—	V/μs
Common mode transient immunity at low level output	CML	7	VCM = 600V, IF = 0mA VCC = 6V, Rex = 270Ω R = 1kΩ, Ta = 25°C	2000	—	—	V/μs

Note: All typical values are at Ta = 25°C.

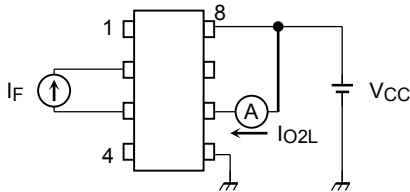
Test Circuit 1: IO1L



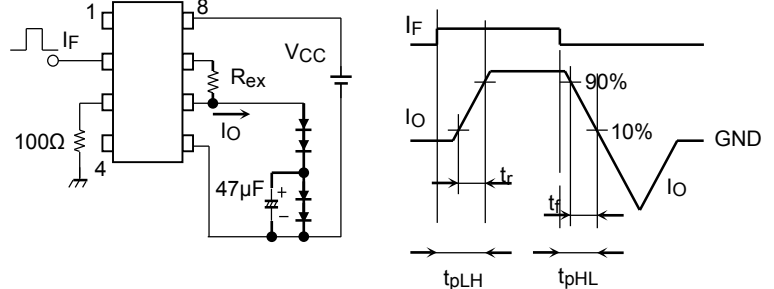
Test Circuit 5: VOL



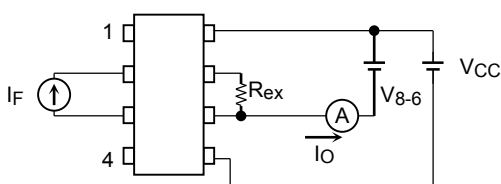
Test Circuit 2: IO2L



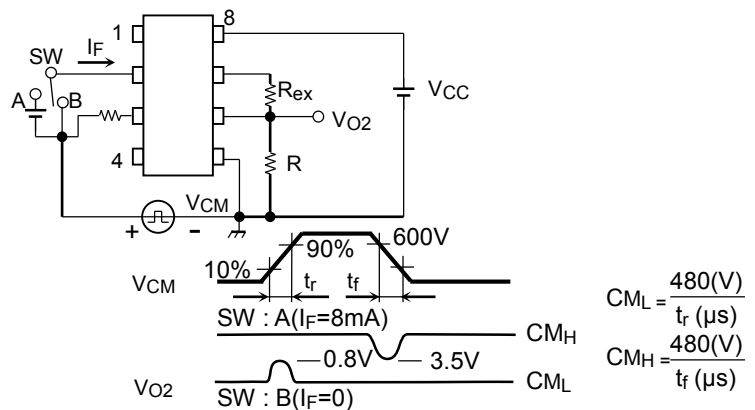
Test Circuit 6: tpLH, tpHL, tr, tf



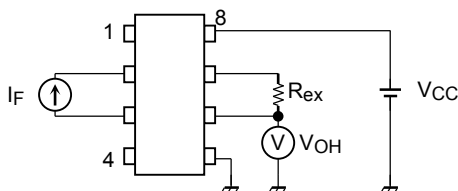
Test Circuit 3: IO



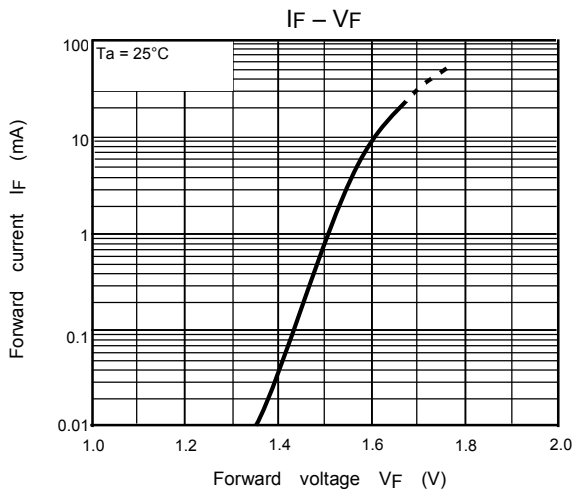
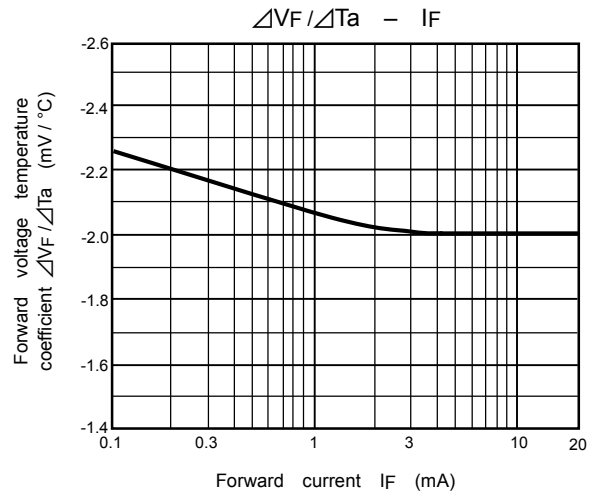
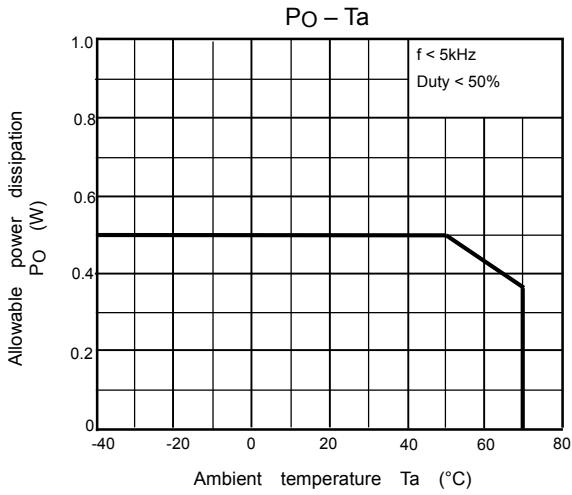
Test Circuit 7: CMH, CML



Test Circuit 4: VOH



Note: CML (CMH) 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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