

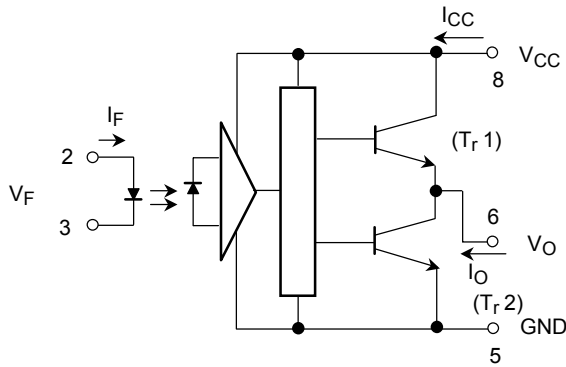
TLP251

Inverter For Air Conditionor
 Induction Heating
 Transistor Inverter
 Power MOS FET Gate Drive
 IGBT Gate Drive

The TOSHIBA TLP251 consists of a GaAlAs light emitting diode and a integrated photodetector.
 This unit is 8-lead DIP package.
 TLP251 is suitable for gate driving circuit of IGBT or power MOS FET.
 Especially TLP251 is capable of “direct” gate drive of lower power IGBTs.
 (~15A)

- Input threshold current: $I_F=5\text{mA}(\text{max.})$
- Supply current (I_{CC}): $11\text{mA}(\text{max.})$
- Supply voltage (V_{CC}): $10\sim35\text{V}$
- Output current (I_O): $\pm0.4\text{A}(\text{max.})$
- Switching time (t_{pLH} / t_{pHL}): $1\mu\text{s}(\text{max.})$
- Isolation voltage: $2500\text{Vrms}(\text{min.})$
- UL recognized: UL1577, file no.E67349

Schematic

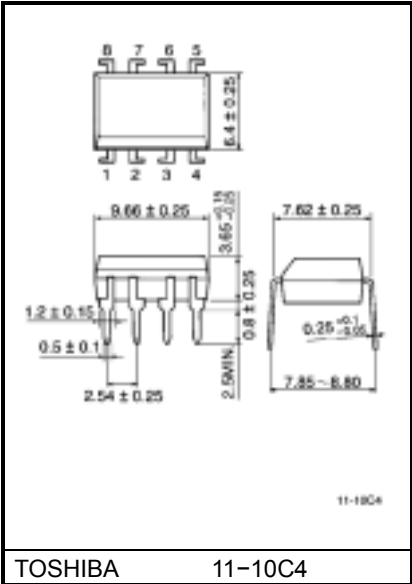


A $0.1\mu\text{F}$ bypass capacitor must be connected
 between pin 8 and 5(see Note 5).

Truth Table

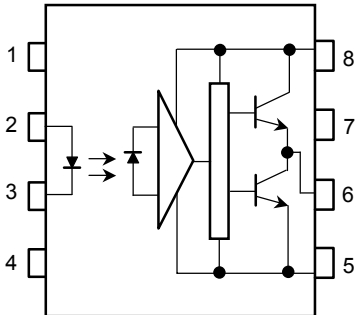
		Tr1	Tr2
Input LED	On	On	Off
	Off	Off	On

Unit in mm



Weight: 0.54g

Pin Configuration (top view)



- 1 : N.C.
- 2 : Anode
- 3 : Cathode
- 4 : N.C.
- 5 : Gnd
- 6 : V_O (Output)
- 7 : N.C.
- 8 : V_{CC}

Maximum Ratings (Ta = 25°C)

Characteristic			Symbol	Rating	Unit
LED	Forward current		I _F	20	mA
	Forward current derating (T _a ≥ 70°C)		ΔI _F / ΔT _a	− 0.36	mA / °C
	Peak transient forward current (Note 1)		I _{FPT}	1	A
	Reverse voltage		V _R	5	V
	Junction temperature		T _j	125	°C
Detector	“H” peak output current (P _W ≤ 2.0μs, f ≤ 15kHz) (Note 2)		I _{OPH}	− 0.4	A
	“L” peak output current (P _W ≤ 2.0μs, f ≤ 15kHz) (Note 2)		I _{OPL}	0.4	A
	Output voltage	(T _a ≤ 70°C)	V _O	35	V
		(T _a = 85°C)		24	
	Supply voltage	(T _a ≤ 70°C)	V _{CC}	35	V
		(T _a = 85°C)		24	
	Output voltage derating (T _a ≥ 70°C)		ΔV _O / ΔT _a	− 0.73	V / °C
	Supply voltage derating (T _a ≥ 70°C)		ΔV _{CC} / ΔT _a	− 0.73	V / °C
	Junction temperature		T _j	125	°C
	Operating frequency (Note 3)		f	25	kHz
	Operating temperature range		T _{opr}	−20~85	°C
Storage temperature range		T _{stg}	−55~125	°C	
Lead soldering temperature(10s) (Note 4)		T _{sol}	260	°C	
Isolation voltage (AC, 1min., R.H.≤ 60%) (Note 5)		BV _S	2500	Vrms	

Note 1: Pulse width $P_W \leq 1\mu s$, 300pps

Note 2: Exponential waveform

Note 3: Exponential waveform, $I_{OPH} \leq -0.25A(\leq 2.0\mu s)$, $I_{OPL} \leq +0.25A(\leq 2.0\mu s)$

Note 4: It is 2 mm or more from a lead root.

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

Note 6: A ceramic capacitor(0.1μF)should be connected from pin 8 to pin 5 to stabilize the operation of the high gain linear amplifier. Failure to provide the bypassing may impair the swiching property.The total lead length between capacitor and coupler should not exceed 1cm.

Recommended Operating Conditions

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Input current, on (Note 7)	$I_{F(ON)}$	7	8	10	mA
Input voltage, off	$V_{F(OFF)}$	0	—	0.8	V
Supply voltage	V_{CC}	10	—	30 20	V
Peak output current	I_{OPH} / I_{OPL}	—	—	± 0.1	A
Operating temperature	T_{opr}	-20	25	70 85	°C

Note 7: Input signal rise time (fall time) < 0.5 μ s.

Electrical Characteristics ($T_a = -20 \sim 70^\circ\text{C}$, unless otherwise specified)

Characteristic		Symbol	Test Cir- cuit	Test Condition		Min.	Typ.*	Max.	Unit
Input forward voltage		V _F	—	I _F = 10 mA , Ta = 25°C		—	1.6	1.8	V
Temperature coefficient of forward voltage		ΔV _F / ΔTa	—	I _F = 10 mA		—	−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		—	45	250	pF
Output current	“H” level	I _{OPH}	3	V _{CC} =30V (*1)	I _F = 10mA V ₈₋₆ = 4V	−0.1	−0.25	—	A
	“L” level	I _{OPL}	2		I _F = 0 V ₆₋₅ = 2.5V	0.1	0.2	—	
Output voltage	“H” level	V _{OH}	4	V _{CC1} = +15V, V _{EE1} = −15V R _L = 200Ω, I _F = 5mA		11	13.2	—	V
	“L” level	V _{OL}	5	V _{CC1} = +15V, V _{EE1} = −15V R _L = 200Ω, V _F = 0.8V		—	−14.5	−12.5	
Supply current	“H” level	I _{CCH}	—	V _{CC} = 30V, I _F = 10mA Ta = 25°C		—	7.5	—	mA
				V _{CC} = 30V, I _F = 10mA		—	—	11	
	“L” level	I _{CCL}	—	V _{CC} = 30V, I _F = 0mA Ta = 25°C		—	8	—	
				V _{CC} = 30V, I _F = 0mA		—	—	11	
Threshold input current	“Output L → H”	I _{FLH}	—	V _{CC1} = +15V, V _{EE1} = −15V R _L = 200Ω, V _O > 0V		—	1.2	5	mA
Threshold input voltage	“Output H → L”	V _{FLH}	—	V _{CC1} = +15V, V _{EE1} = −15V R _L = 200Ω, V _O < 0V		0.8	—	—	V
Supply voltage		V _{CC}	—			10	—	35	V
Capacitance (input–output)		C _s	—	Vs = 0 , f = 1MHz Ta = 25		—	1.0	2.0	pF
Resistance (input–output)		R _s	—	Vs = 500V, Ta = 25 R.H. ≤ 60%		1×10 ¹²	10 ¹⁴	—	Ω

* All typical values are at $T_a=25^\circ\text{C}$ (*1): Duration of I_O time $\leq 50\mu\text{s}$

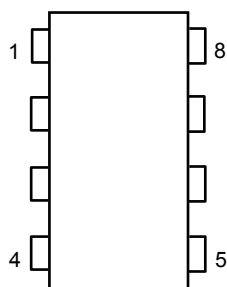
Switching Characteristics (Ta = -20~70°C, unless otherwise specified)

Characteristic		Symbol	Test Cir-cuit	Test Condition	Min.	Typ.*	Max.	Unit
Propagation delay time	L→H	t _{PLH}	6	I _F = 8mA (Note 7) V _{CC1} = +15V, V _{EE1} = -15V R _L = 200 Ω	—	0.25	1.0	μs
	H→L	t _{pHL}			—	0.25	1.0	
Output rise time		t _r			—	—	—	
Output fall time		t _f			—	—	—	
Common mode transient immunity at high level output		C _{MH}	7	V _{CM} = 600V, I _F = 8mA, V _{CC} = 30V, Ta = 25	-5000	—	—	V / μs
Common mode transient immunity at low level output		C _{ML}	7	V _{CM} = 600V, I _F = 0mA, V _{CC} = 30V, Ta = 25	5000	—	—	V / μs

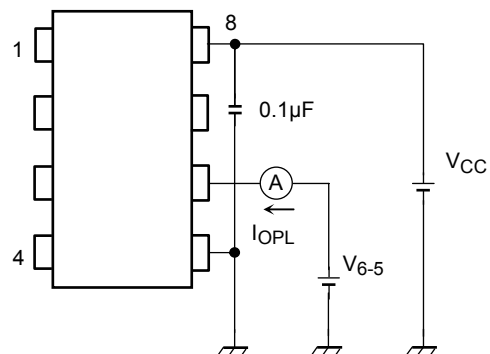
*All typical values are at Ta=25

Note 7: Input signal rise time (fall time) < 0.5 μs.

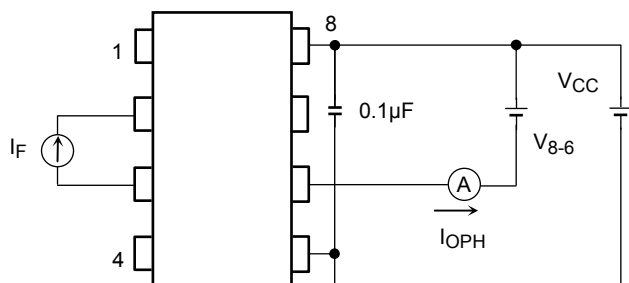
Test Circuit 1:



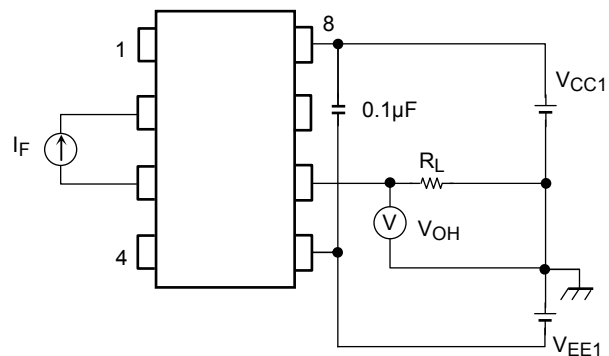
Test Circuit 2: I_{OPL}



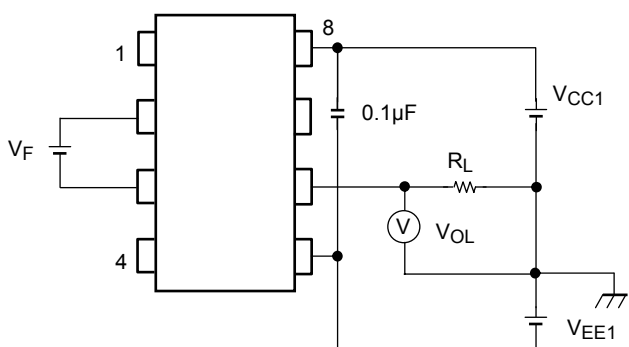
Test Circuit 3: I_{OPH}



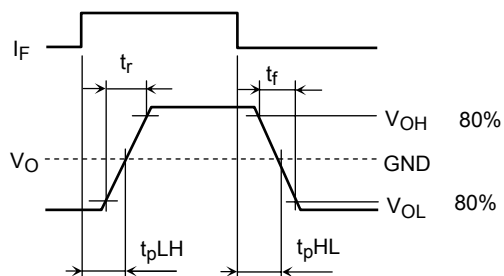
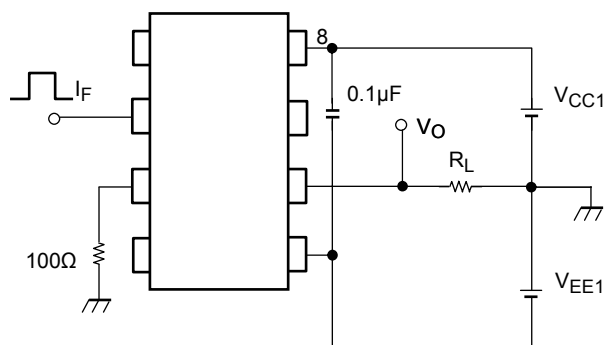
Test Circuit 4: V_{OH}



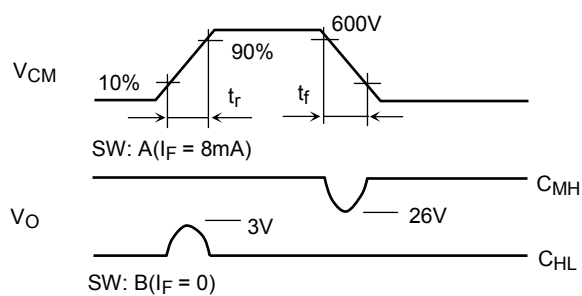
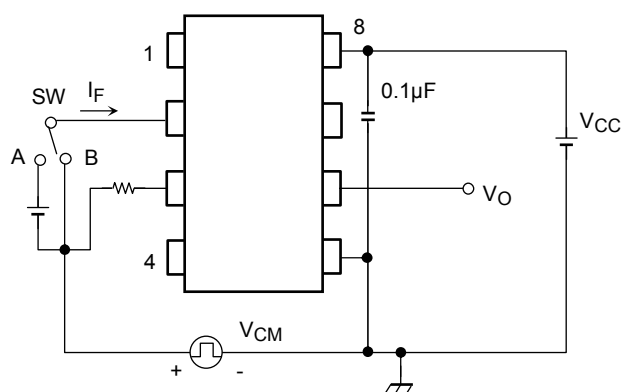
Test Circuit 5: V_{OL}



Test Circuit 6: t_{pLH} , t_{pHL} , t_r , t_f



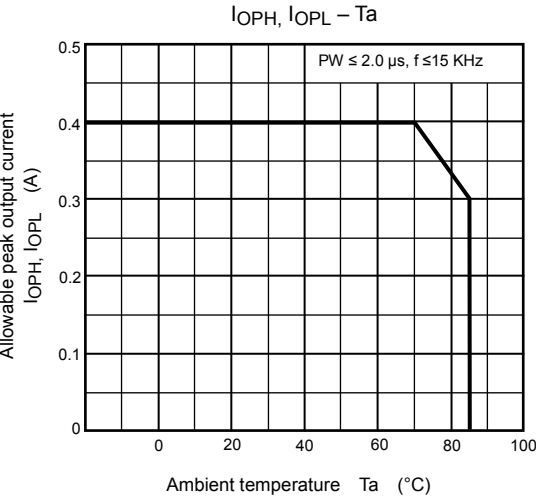
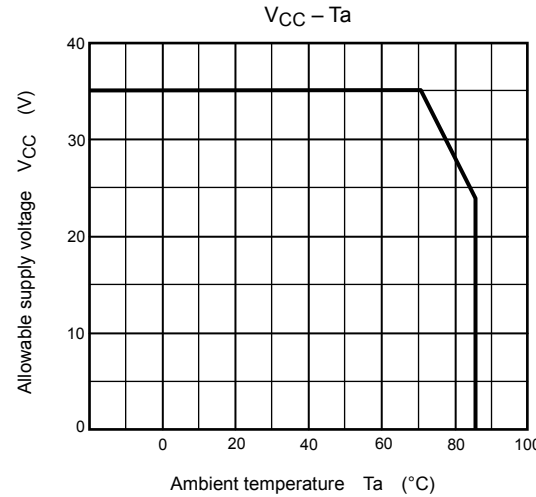
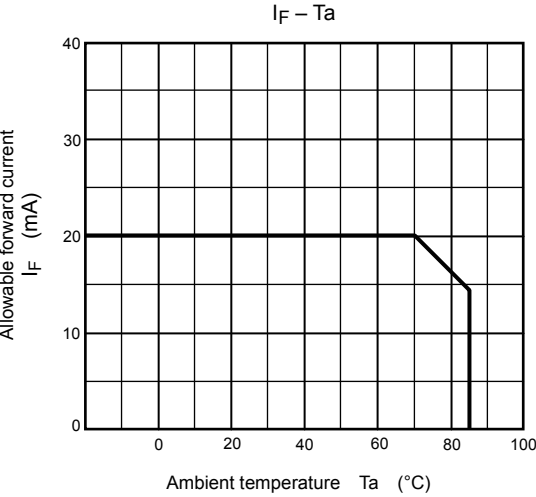
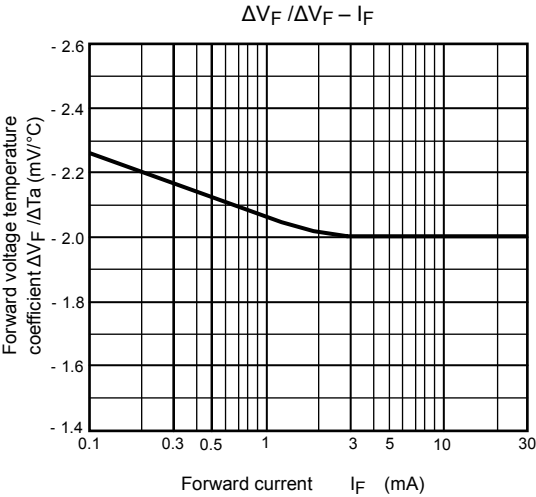
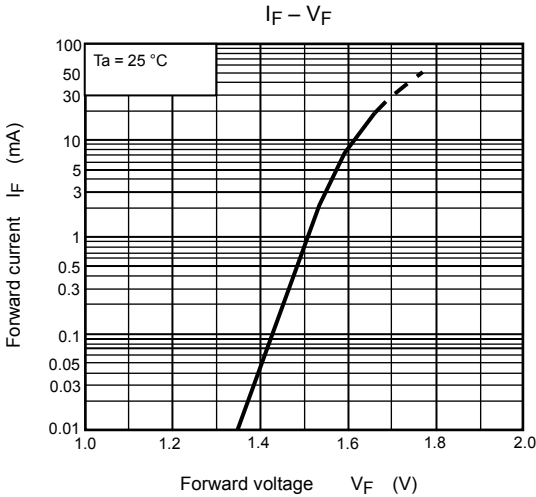
Test Circuit 7: C_{MH} , C_{ML}



$$C_{ML} = \frac{480(V)}{t_r(\mu s)}$$

$$C_{MH} = \frac{480(V)}{t_f(\mu s)}$$

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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