

TLP250

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

The TOSHIBA TLP250 consists of a GaAlAs light emitting diode and a integrated photodetector.

This unit is 8-lead DIP package.

TLP250 is suitable for gate driving circuit of IGBT or power MOS FET.

- Input threshold current: $I_F=5\text{mA}(\text{max.})$
- Supply current (I_{CC}): $11\text{mA}(\text{max.})$
- Supply voltage (V_{CC}): $10\text{--}35\text{V}$
- Output current (I_O): $\pm 1.5\text{A}(\text{max.})$
- Switching time (t_{pLH}/t_{pHL}): $1.5\mu\text{s}(\text{max.})$
- Isolation voltage: $2500V_{\text{rms}}(\text{min.})$
- UL recognized: UL1577, file No.E67349
- Option(D4)

VDE Approved : DIN EN60747-5-2

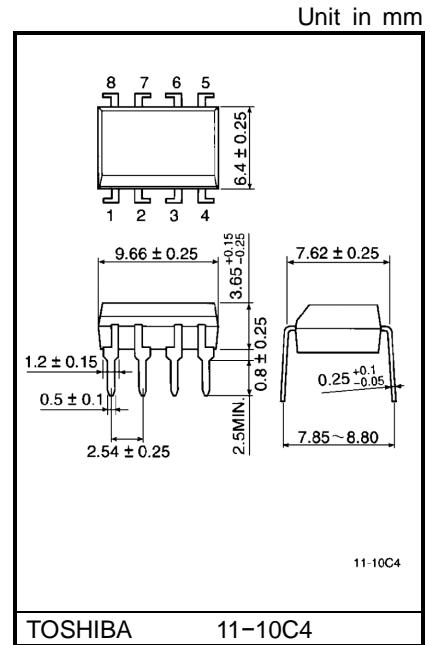
Maximum Operating Insulation Voltage : $890V_{\text{PK}}$

Highest Permissible Over Voltage : $4000V_{\text{PK}}$

(Note):When a EN60747-5-2 approved type is needed,
 Please designate "Option(D4)"

Truth Table

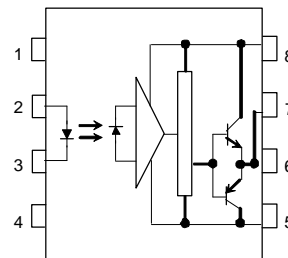
		Tr1	Tr2
Input LED	On	On	Off
	Off	Off	On



TOSHIBA 11-10C4

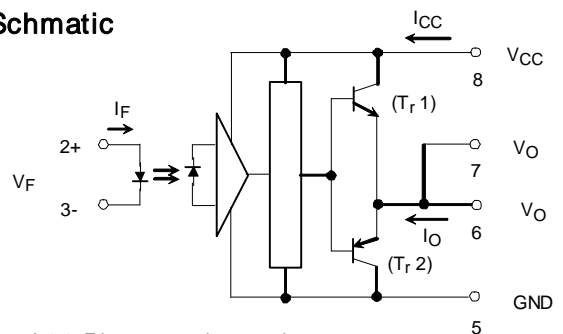
Weight: 0.54 g(Typ.)

Pin Configuration (top view)



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

Schematic



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

Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit	
LED	Forward current	I_F	20	mA	
	Forward current derating (Ta ≥ 70°C)	$\Delta I_F / \Delta T_a$	-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 ($P_W \leq 2.5\mu s, f \leq 15kHz$) (Note 2)	I_{OPH}	-1.5	A	
	"L" peak output current ($P_W \leq 2.5\mu s, f \leq 15kHz$) (Note 2)	I_{OPL}	+1.5	A	
	Output voltage	(Ta ≤ 70°C)	V_O	35	V
		(Ta = 85°C)		24	
	Supply voltage	(Ta ≤ 70°C)	V_{CC}	35	V
		(Ta = 85°C)		24	
	Output voltage derating (Ta ≥ 70°C)		$\Delta V_O / \Delta T_a$	-0.73	V / °C
	Supply voltage derating (Ta ≥ 70°C)		$\Delta V_{CC} / \Delta T_a$	-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 (10 s)		T_{sol}	260	°C	
Isolation voltage (AC, 1 min., R.H. ≤ 60%) (Note 4)		BV_S	2500	Vrms	

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

(Note 2) Exponential waveform

(Note 3) Exponential waveform, $I_{OPH} \leq -1.0A (\leq 2.5\mu s), I_{OPL} \leq +1.0A (\leq 2.5\mu s)$

(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.

(Note 5) 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 switching 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 6)	$I_{F(ON)}$	7	8	10	mA
Input voltage, off	$V_{F(OFF)}$	0	—	0.8	V
Supply voltage	V_{CC}	15	—	30 20	V
Peak output current	I_{OPH}/I_{OPL}	—	—	±0.5	A
Operating temperature	T_{opr}	-20	25	70 85	°C

Note 6: Input signal rise time (fall time) < 0.5μs.

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

Characteristic		Symbol	Test Circuit	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}	1	V _{CC} = 30V (*1)	I _F = 10 mA V ₈₋₆ = 4V	-0.5	-1.5	—	A
	"L" level	I _{OPL}	2		I _F = 0 V ₆₋₅ = 2.5V	0.5	2	—	
Output voltage	"H" level	V _{OH}	3	V _{CC1} = +15V, V _{EE1} = -15V R _L = 200Ω, I _F = 5mA	11	12.8	—	V	
	"L" level	V _{OL}	4	V _{CC1} = +15V, V _{EE1} = -15V R _L = 200Ω, V _F = 0.8V	—	-14.2	-12.5		
Supply current	"H" level	I _{CCH}	—	V _{CC} = 30V, I _F = 10mA Ta = 25°C	—	7	—	mA	
				V _{CC} = 30V, I _F = 10mA	—	—	11		
	"L" level	I _{CCL}	—	V _{CC} = 30V, I _F = 0mA Ta = 25°C	—	7.5	—		
				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 _{FHL}	—	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	—	V _S = 0, f = 1MHz Ta = 25	—	1.0	2.0	pF	
Resistance(input-output)		R _S	—	V _S = 500V, Ta = 25°C R.H. ≤ 60%	1×10 ¹²	10 ¹⁴	—	Ω	

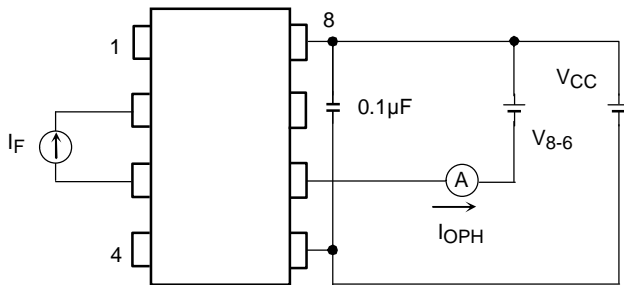
* All typical values are at Ta = 25°C (*1): Duration of I_O time ≤ 50μs

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

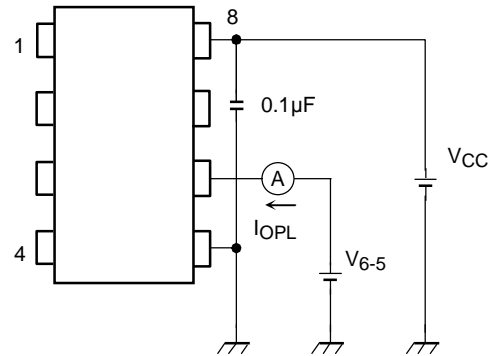
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.*	Max	Unit
Propagation delay time	L→H	5	I _F = 8mA V _{CC1} = +15V, V _{EE1} = -15V R _L = 200Ω	—	0.15	0.5	μs
	H→L			—	0.15	0.5	
Output rise time	t _r	5	I _F = 8mA V _{CC1} = +15V, V _{EE1} = -15V R _L = 200Ω	—	—	—	μs
Output fall time	t _f			—	—	—	
Common mode transient immunity at high level output	C _{MH}	6	V _{CM} = 600V, I _F = 8mA V _{CC} = 30V, T _a = 25°C	-5000	—	—	V / μs
Common mode transient immunity at low level output	C _{ML}		V _{CM} = 600V, I _F = 0mA V _{CC} = 30V, T _a = 25°C	5000	—	—	V / μs

All typical values are at Ta = 25°C

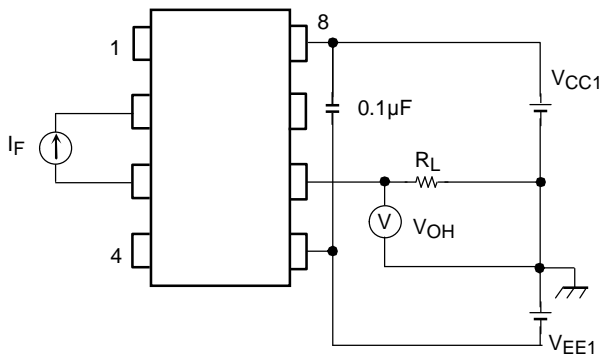
Test Circuit 1 : I_{OPH}



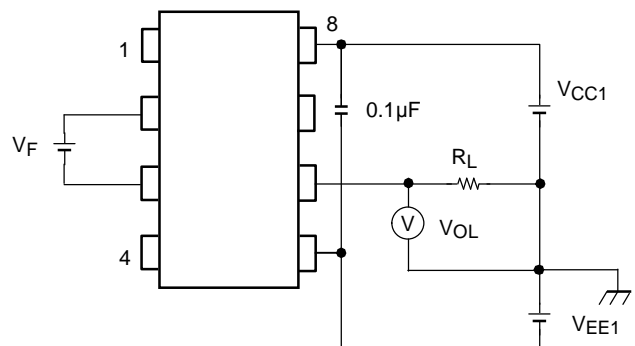
Test Circuit 2 : I_{OPL}



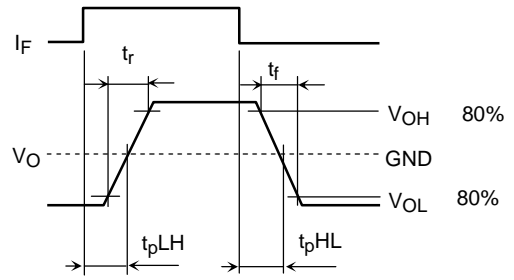
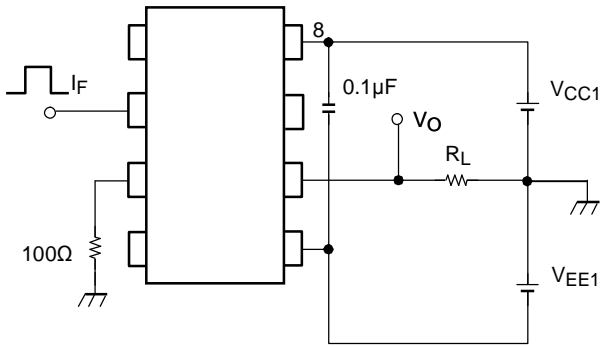
Test Circuit 3 : V_{OH}



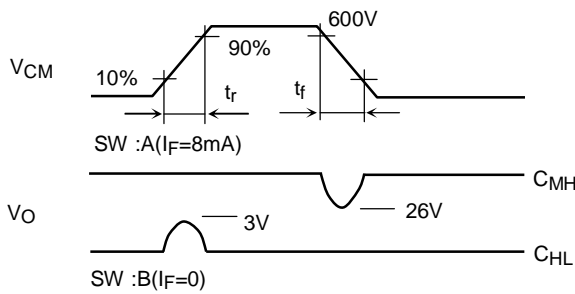
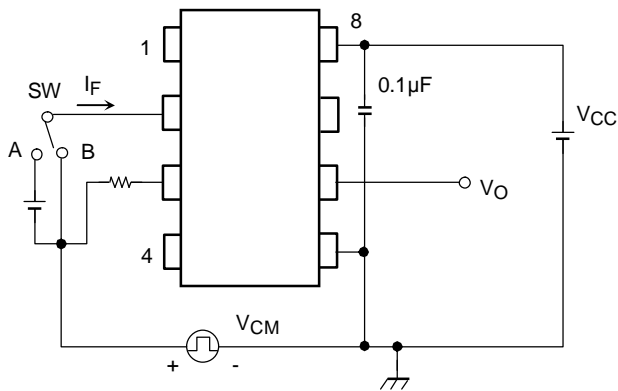
Test Circuit 4 : V_{OL}



Test Circuit 5: t_{pLH} , t_{pHL} , t_r , t_f



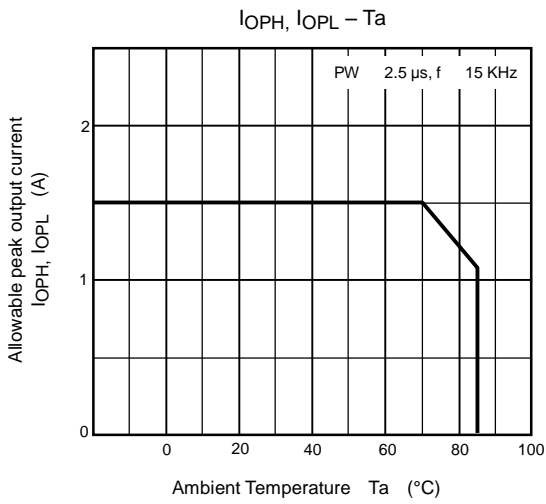
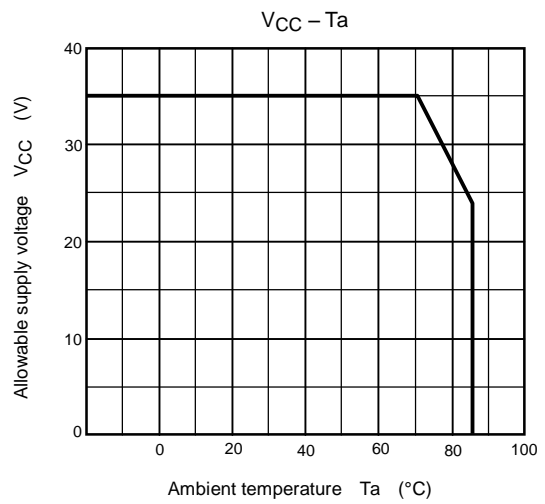
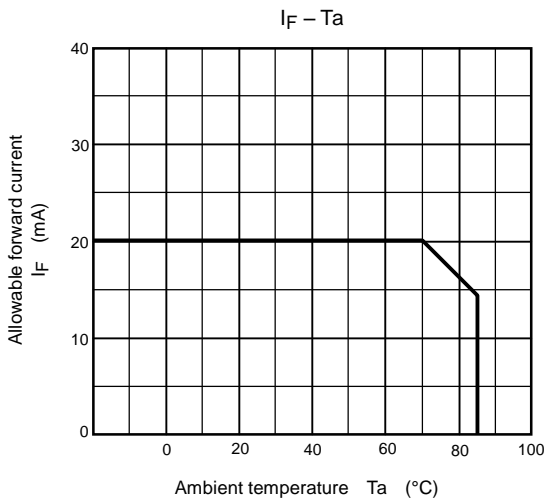
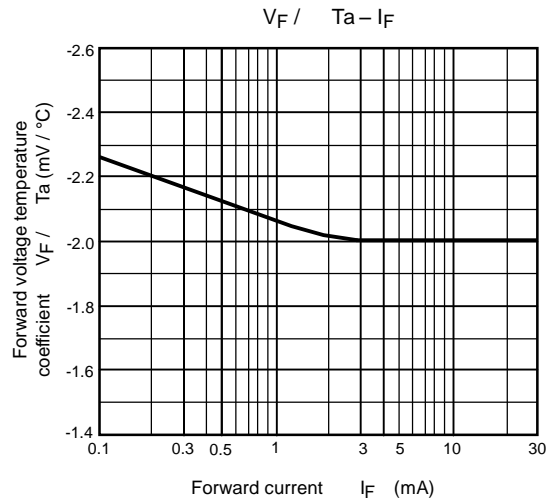
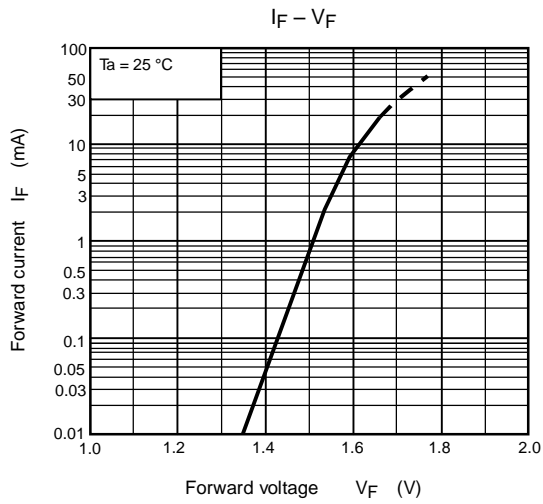
Test Circuit 6: C_{MH} , C_{ML}



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

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

$C_{ML}(C_{MH})$ 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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