Unit in mm

Transistor Inverter

Inverter for Air Conditioner

IGBT Gate Drive

Power MOSFET Gate Drive

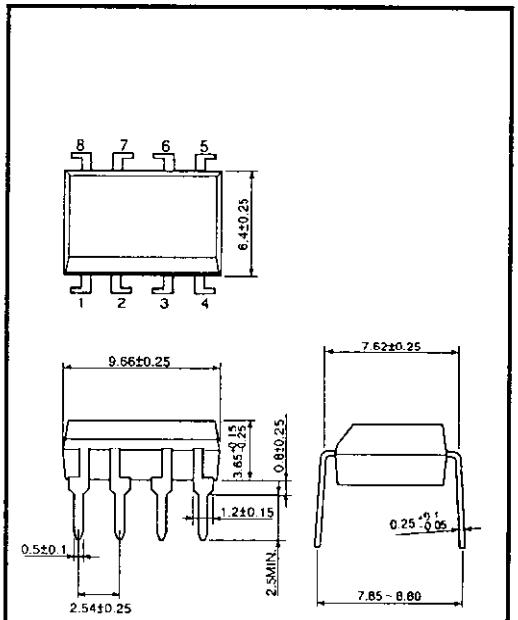
The Toshiba TLP250 consists of a GaAℓAs light emitting diode and an integrated photodetector. This unit is in an 8-lead DIP package. TLP250 is suitable for the gate driving circuit of an IGBT or power MOSFET.

- Input Threshold Current : I_F = 5mA (Max.)
- Supply Current (I_{CC}) : 11mA (Max.)
- Supply Voltage (V_{CC}) : 10-35V
- Output Current (I_O) : ±0.5A (Min.)
- Switching Time (t_{pLH}/t_{pHL}) : 0.5μs (Max.)
- Isolation Voltage : 2500V_{rms} (Min.)
- UL Recognized : UL1577, File No. E67349

(Note) When a VDE0884 approved type is needed, please designate the "Option (D4)"

- Option (D4) type
  VDE Approved: DIN VDE0884/06.92, Certificate No. 76823
  Maximum Operating Insulation Voltage: 630 V_{PK}
  Highest Permissible Over Voltage : 4000 V_{PK}

- Creepage Distance : 6.4mm (Min.)
  Clearance : 6.4mm (Min.)

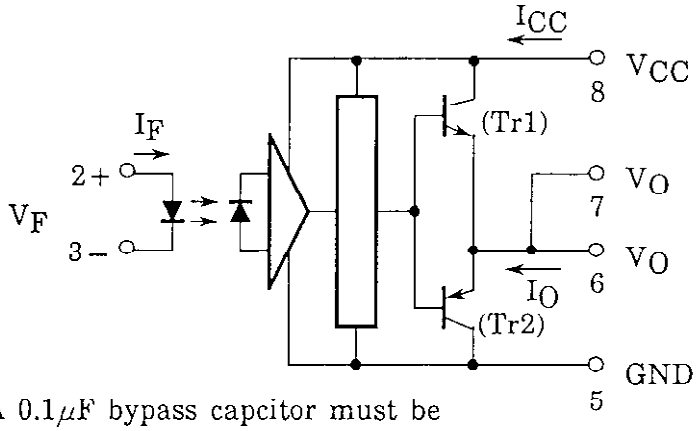


JEDEC	—
EIAJ	—
TOSHIBA	11-10C4

Weight : 0.54g

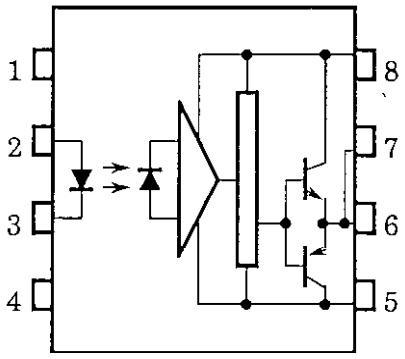
Supplementary Information	Page (s)
Lead Form Options	31-32
Tape and Reel	39-40

Schematic



A 0.1μF bypass capcitor must be connected between pin 8 and 5 (See more 5).

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}

Truth Table

		Tr1	Tr2
Input LED	ON	ON	OFF
	OFF	OFF	ON

Absolute Maximum Ratings (Ta = 25°C)

CHARACTERISTIC			SYMBOL	RATING	UNIT
LED	Forward Current		I_F	20	mA
	Forward Current Derating (Ta ≥ 70°C)		$\Delta I_F/\Delta Ta$	-0.36	mA/°C
	Peak Transient Forward Current	(Note 1)	I_{PFT}	1	A
	Reverse Voltage		V_R	5	V
	Junction Temperature		T_j	125	°C
DETECTOR	"H" Peak Output Current (P_W≤2.5μs, f≤15kHz)	(Note 2)	I_{OPH}	-1.5	A
	"L" Peak Output Current (P_W≤2.5μs, f≤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)		$\Delta V_O/\Delta Ta$	-0.73	V/°C
	Supply Voltage Derating (Ta ≥ 70°C)		$\Delta V_{CC}/\Delta Ta$	-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 Solder Temperature (10s)			T_{sol}	260	°C
Isolation Voltage (AC, 1 min., R.H. ≤ 60%, Ta = 25°C)		(Note 4)	BV_S	2500	V_{rms}

Note 1: Pulse width P_W ≤ 1μs, 300pps

Note 2: Exporential Waveform

Note 3: Exporential Waveform, I_{OPH} ≤ -1.0A (≤2.5μs), I_{OPL} ≤ + 1.0A (≤ 2.5μs)

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 betwene capacitor and coupler should not exceed 1 cm.

Recommended Operating Conditions

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MX.		UNIT
Input Current, ON	$I_{F(ON)}$	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

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

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.*	MX.	UNIT
Input Forward Voltage		V_F	–	I_F = 10mA, Ta = 25°C		–	1.6	1.8	V
Temperature Coefficient of Forward Voltage		$\Delta V_F/\Delta Ta$	–	I_F = 10mA		–	-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	-0.5	-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}	4	V_{CC1} = +15V, V_{EE1} = -15V R_L = 200Ω, I_F = 5mA		11	12.8	–	V
	"L" Level	V_{OL}	5	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, $V_O \geq 0V$		–	1.2	5	mA
Threshold Input Voltage	"Output H→L"	V_{FHL}	–	V_{CC1} = +15V, V_{EE1} = -15V R_L = 200Ω, $V_O \leq 0V$		0.8	–	–	V
Supply Voltage		V_{CC}	–			10	–	35	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

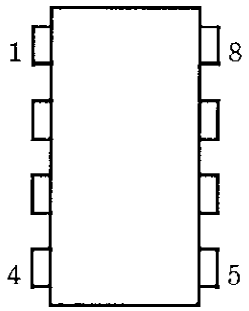
*All typical values are at Ta = 25°C
(*1) : Duration of I_O time ≤ 50μs

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

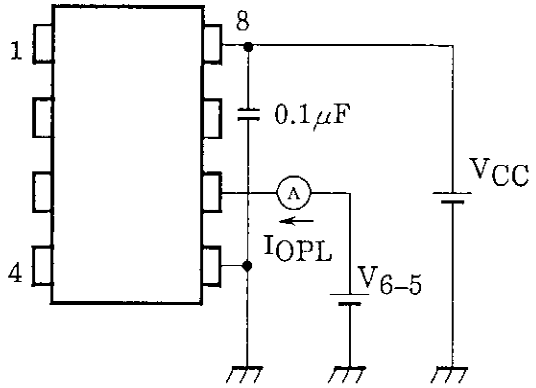
CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.*	MX.	UNIT
Propagation Delay Time	L→H	t_{pLH}	6	I_F = 8mA V_{CC1} = +15V, V_{EE1} = -15V R_L = 200Ω	–	0.15	0.5	μs
	H→L	t_{pHL}			–	0.15	0.5	
Output Rise Time		t_r			–	–	–	
Output Fall Time		t_f			–	–	–	
Common Mode Transient Immunity at High Level Output		C_{MH}	7	V_{CM} = 600V, I_F = 8mA V_{CC} = 30V, Ta = 25°C	-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°C	5000	–	–	V/μs

*All typical values are at Ta = 25°C

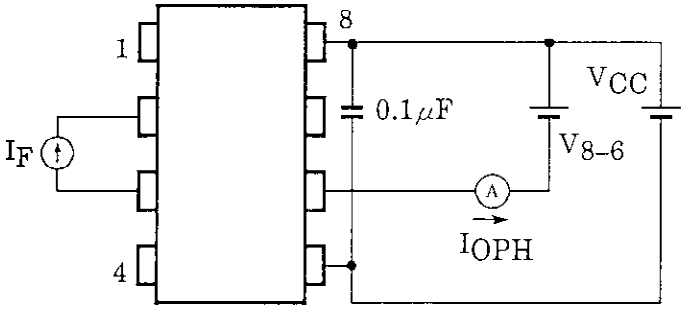
TEST CIRCUIT 1 :



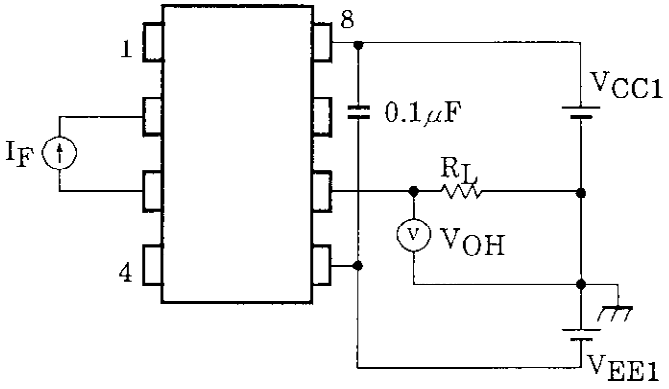
TEST CIRCUIT 2 : IOPL



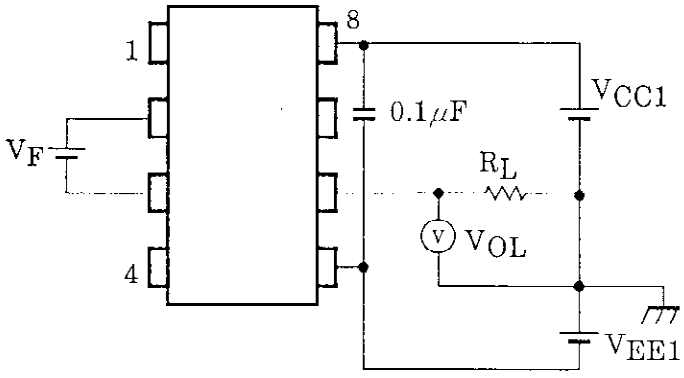
TEST CIRCUIT 3 : IOPH



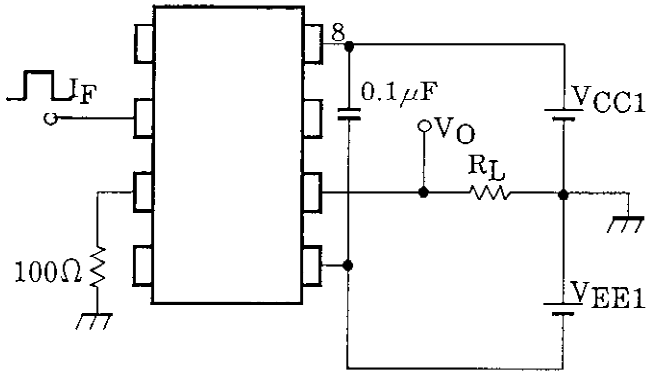
TEST CIRCUIT 4 : VOH

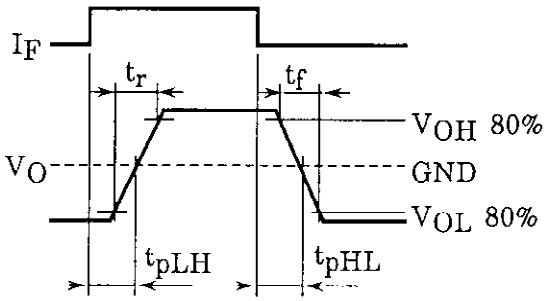


TEST CIRCUIT 5 : V_{OL}

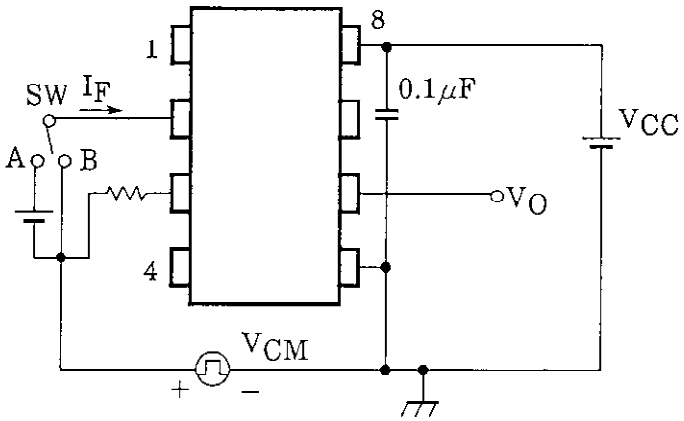


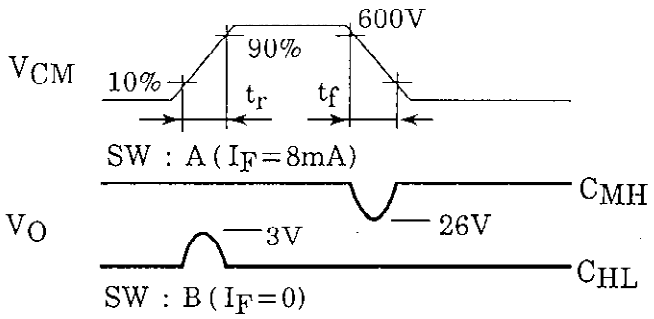
TEST CIRCUIT 6 : t_{pLH}, t_{pHL}, t_r, t_f





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



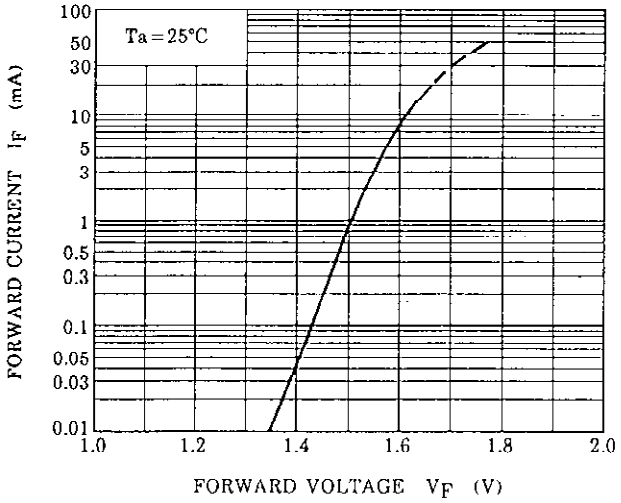


$$C_{ML} = \frac{480\,(V)}{t_r\,(\mu s)}$$

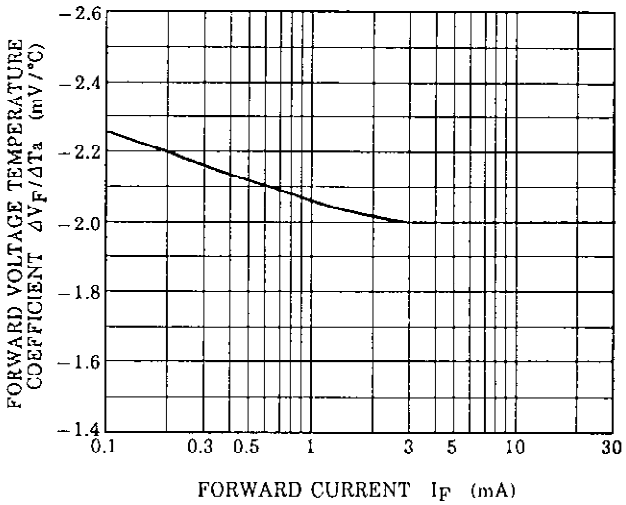
$$C_{MH} = \frac{480(V)}{t_f\,(\mu s)}$$

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.

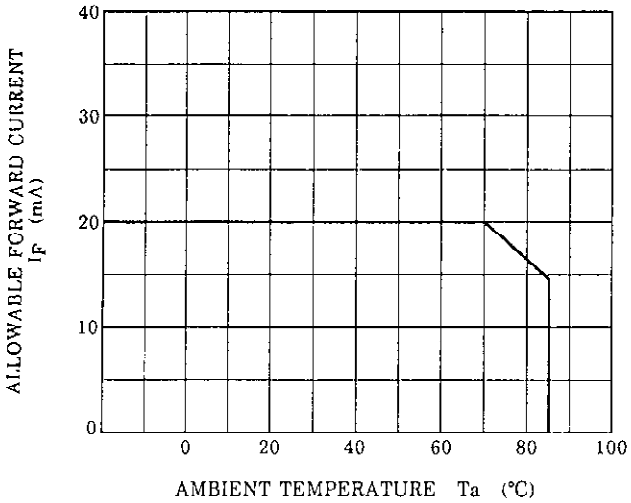
$I_F - V_F$



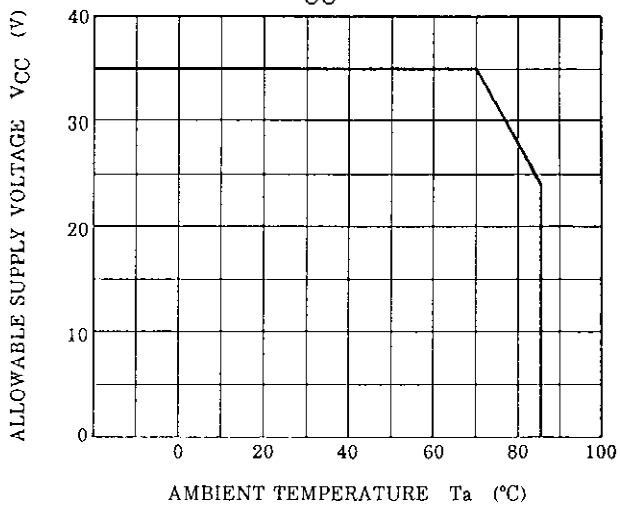
$\Delta V_F / \Delta Ta - I_F$



$I_F - Ta$



$V_{CC} - Ta$



$I_{OPH}, I_{OPL} - Ta$