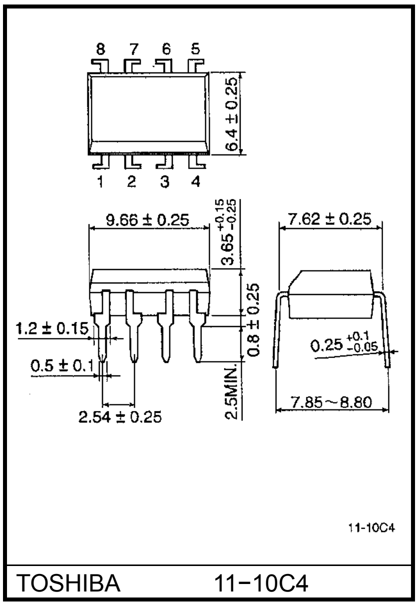
TOSHIBA PHOTOCOUPLER GaAlAs IRED & PHOTO-IC

TLP250(INV)

TRANSISTOR INVERTER
INVERTERS FOR AIR CONDITIONER
IGBT GATE DRIVE
POWER MOS FET GATE DRIVE

Unit in mm



Weight: 0.54 g

The TOSHIBA TLP250(INV) consists of a GaAlAs light emitting diode and a integrated photodetector.
This unit is 8-lead DIP.
TLP250(INV) is suitable for gate driving circuit of IGBT or power MOS FET.

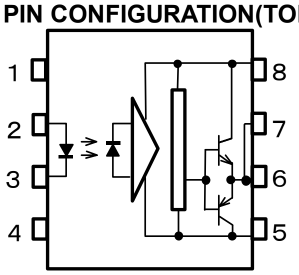
- Input Threshold Current : I_F=5mA(MAX)
- Supply Current(ICC) : 11mA(MAX)
- Supply Voltage(VCC) : 10~35V
- Output Current(IO) : ±2.0A(MAX)
- Switching Time(tpLH/tpHL) : 0.5μs(MAX)
- Isolation Voltage : 2500Vrms
- UL Recognized : UL1577,File No.E67349
- Option(D4)
  VDE Approved : DIN VDE0884/06.92 Certificate No.76823
  Maximum Operating Insulation Voltage : 630V_{PK}
  Highest Permissible Over Voltage : 4000V_{PK}

  (Note):When a VDE0884 approved type is needed,
  Please designate the "Option(D4)"
- Creepage Distance : 6.4mm(MIN)
  Clearance : 6.4mm(MIN)

TRUTH TABLE

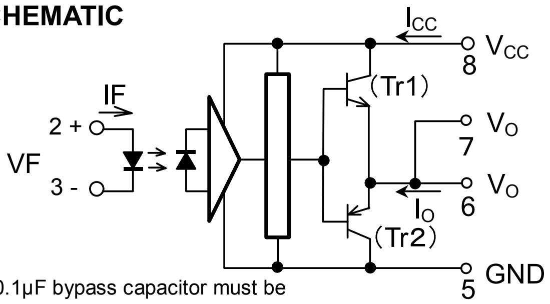
		Tr 1	Tr 2
INPUT LED	ON	ON	OFF
	OFF	OFF	ON

PIN CONFIGURATION(TOP VIEW)



1:N.C.
2: ANODE
3:CATHODE
4:N.C.
5:GND
6:VO(OUTPUT)
7:VO
8:VCC

SCHEMATIC



A 0.1μF 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)			$\Delta I_F / \Delta Ta$	−0.36	mA /°C
	Peak Transient Forward Current		(Note 1)	I_{FPT}	1	A
	Reverse Voltage			V_R	5	V
	Junction Temperature			Tj	125	°C
DETECTOR	"H" Peak Output Current	PW ≤2.5µs , f≤15 kHz	(Note 2)	I_{OPH}	−1.5	A
		PW≤1.0µs , f≤15 kHz			−2.0	
	"L" Peak Output Current	PW≤2.5µs , f≤15 kHz		I_{OPL}	+1.5	A
		PW ≤1.0µs , f≤15 kHz			+2.0	
	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 Soldering 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) : Exporenential Waveform

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

(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.

(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 proparty.The total lead length between capacitor and coupler should not exceed 1cm.

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN	TYP.	MAX		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.	MAX	UNIT
Input Forward Voltage		V_F	—	I_F = 10 mA, Ta = 25°C		—	1.6	1.8	V
Temperature Coefficient of Forward Voltage		$\Delta V_F / \Delta Ta$	—	I_F = 10 mA		—	−2.0	—	mV /°C
Input Reverse Current		I_R	—	V_R = 5 V, Ta = 25°C		—	—	10	μA
Input Capacitance		C_T	—	V = 0, f = 1 MHz, Ta = 25°C		—	45	250	pF
Output Current	"H" Level	I_{OPH}	2	V_{CC} = 30 V (*1)	I_F = 10 mA V_{8-6} = 4 V	−1.0	−1.5	—	A
	"L" Level	I_{OPL}	1		I_F = 0 V_{6-5} = 2.5 V	1.0	2	—	
Output Voltage	"H" Level	V_{OH}	3	V_{CC1} = +15 V V_{EE1} = −15 V R_L = 200Ω, I_F = 5 mA		11	12.8	—	V
	"L" Level	V_{OL}	4	V_{CC1} = +15 V V_{EE1} = −15 V R_L = 200Ω, V_F = 0.8 V		—	−14.2	−12.5	
Supply Current	"H" Level	I_{CCH}	—	V_{CC} = 30 V	I_F = 10 mA Ta = 25°C	—	7	—	mA
					I_F = 10 mA	—	—	11	
	"L" Level	I_{CCL}	—		I_F = 0 mA Ta = 25°C	—	7.5	—	mA
					I_F = 0 mA	—	—	11	
Threshold Input Current	L→H	I_{FLH}	—	V_{CC1} = +15 V V_{EE1} = −15 V R_L = 200Ω, V_O > 0V		—	1.2	5	mA
Threshold Input Voltage	H→L	V_{FHL}		V_{CC1} = +15 V V_{EE1} = −15 V 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 = 1 MHz, Ta = 25°C		—	1.0	2.0	pF
Resistance (Input-Output)		R_S	—	V_S = 500 V, Ta = 25°C R.H.≤60%		1×10^{12}	10^{14}	—	Ω

(*) : All typical values are at Ta=25°C
(*1) : Duration of IO 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	t_{pLH}	5	I_F = 8 mA, V_{CC} = 15 V, R_L = 20Ω, C_L = 10nF	0.05	0.15	0.5	μs
	H→L	t_{pHL}			0.05	0.15	0.5	
Switching Time Dispersion between ON and OFF		|tpHL-tpLH|			—	—	0.45	
Output Rise Time		t_r			—		—	
Output Fall Time		t_f			—		—	
Common Mode Transient Immunity at High Level Output		CM_H	6	V_{CM} = 1000 V, I_F = 8 mA V_{CC} = 30 V, Ta = 25°C	−15000	—	—	V /μs
Common Mode Transient Immunity at Low Level Output		CM_L		V_{CM} = 1000 V, I_F = 0 mA V_{CC} = 30 V, Ta = 25°C	15000	—	—	V /μs

Fig.1 I_{OPL} TEST CIRCUIT

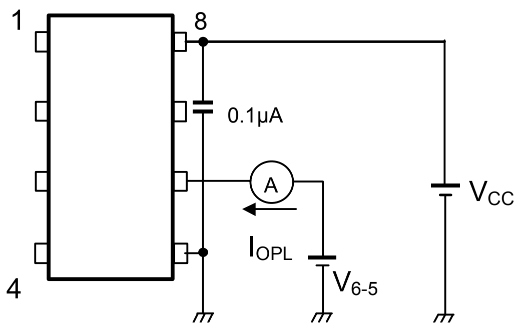


Fig.2 I_{OPH} TEST CIRCUIT

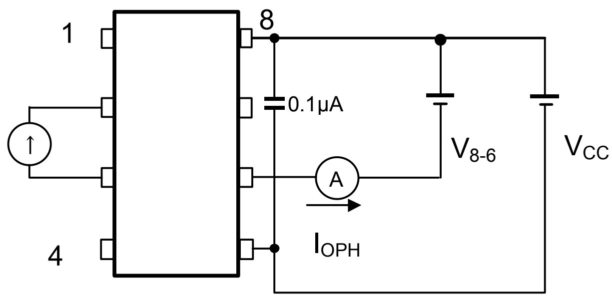


Fig.3 V_{OH} TEST CIRCUIT

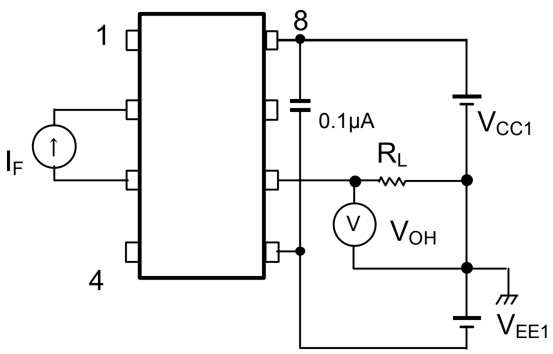


Fig.4 V_{OL} TEST CIRCUIT

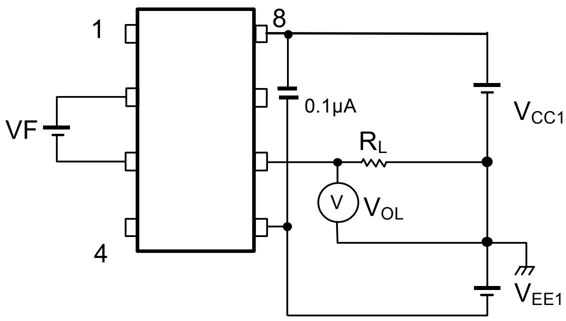


Fig.5 t_{pLH}、t_{pHL}、t_r、t_f TEST CIRCUIT

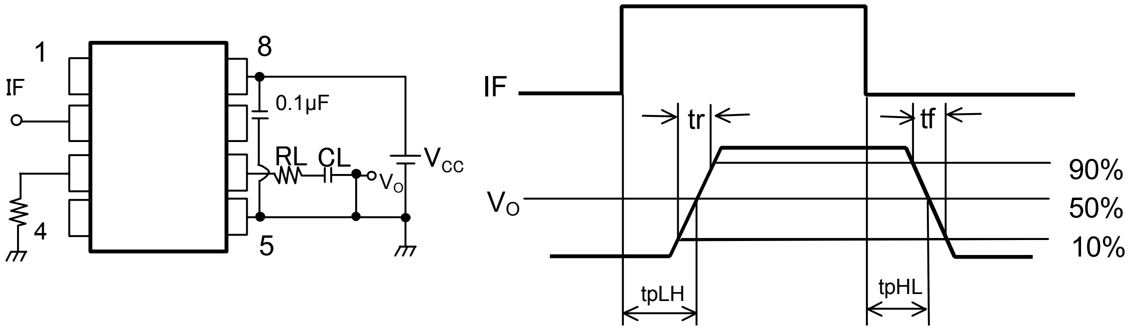
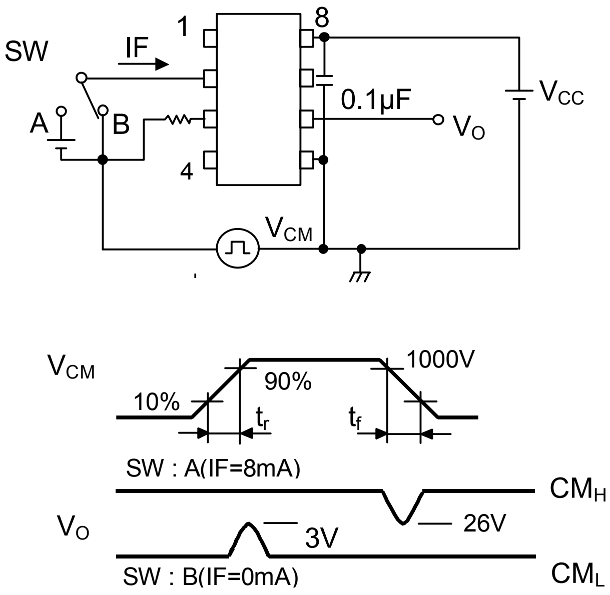


Fig.6 CM_H , CM_L TEST CIRCUIT



$$CM_H = \frac{800(V)}{t_f(\mu s)}$$

$$CM_L = \frac{800(V)}{t_r(\mu s)}$$

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.

RESTRICTIONS ON PRODUCT USE