

(TLP2530)

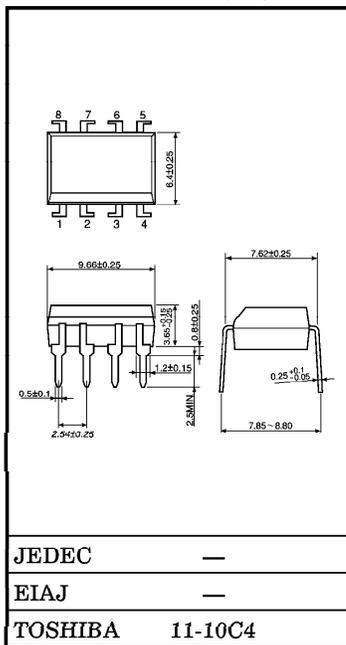
DEGITAL LOGIC ISOLATION  
 LINE RECEIVER  
 POWER SUPPLY CONTROL  
 SWITCHING POWER SUPPLY  
 TRANSISTOR INVERTER

The TOSHIBA TLP2530 and TLP2531 dual photocouplers consist of a pair of GaAs light emitting diode and integrated photodetector. This unit is 8-lead DIP package.

Separate connection for the photodiode bias and output transistor collectors improve the speed up to a hundred times that of a conventional phototransistor coupler by reducing the base-collector capacitance.

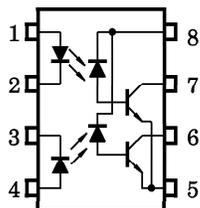
- TTL Compatibel
- Switching Speed :  $t_{pHL}=0.3\mu s$ ,  $t_{pLH}=0.3\mu s$  (Typ.)  
 (@ $R_L=1.9k\Omega$ )
- Guaranteed Performance Over Temp : 0~70°C
- Isolation Voltage : 2500Vrms (Min.)
- UL Recognized : UL1577, File No. E67349

Unit in mm



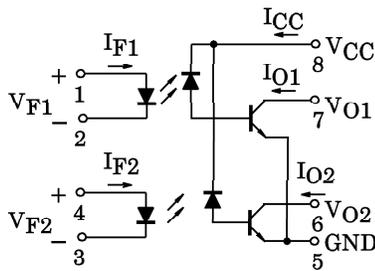
Weight : 0.54g

PIN CONFIGURATION (TOP VIEW)



- 1. : ANODE.1
- 2. : CATHODE.1
- 3. : CATHODE.2
- 4. : ANODE.2
- 5. : GND
- 6. :  $V_{O2}$  (OUTPUT 2)
- 7. :  $V_{O1}$  (OUTPUT 1)
- 8. :  $V_{CC}$

SCHEMATIC



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RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V <sub>CC</sub>	0	—	12	V
Forward Current, Each Channel	I <sub>F</sub>	—	16	25	mA
Operating Temperature	T <sub>opr</sub>	-25	—	85	°C

ABSOLUTE MAXIMUM RATINGS

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current (Each channel) (Note 1)	I <sub>F</sub>	25	mA
	Pulse Forward Current (Each channel) (Note 2)	I <sub>FP</sub>	50	mA
	Total Pulse Forward Current (Each channel) (Note 3)	I <sub>FPT</sub>	1	A
	Reverse Voltage (Each channel)	V <sub>R</sub>	5	V
	Diode Power Dissipation (Each channel) (Note 4)	P <sub>D</sub>	45	mW
DETECTOR	Output Current (Each channel)	I <sub>O</sub>	8	mA
	Peak Output Current (Each channel)	I <sub>OP</sub>	16	mA
	Supply Voltage	V <sub>CC</sub>	-0.5~15	V
	Output Voltage (Each channel)	V <sub>O</sub>	-0.5~15	V
	Output Power Dissipation (Each channel) (Note 5)	P <sub>o</sub>	35	mW
Operating Temperature Range		T <sub>opr</sub>	-55~100	°C
Storage Temperature Range		T <sub>stg</sub>	-55~125	°C
Lead Solder Temperature (10s)**		T <sub>sol</sub>	260	°C
Isolation Voltage (AC, 1min., R.H. ≤ 60%) (Note 7)		BV <sub>S</sub>	2500	V <sub>rms</sub>

Note 1 : Derate 0.8mA above 70°C.

Note 2 : 50% duty cycle, 1ms pulse width. Derate 1.6mA/°C above 70°C.

Note 3 : Pulse width 1μs, 300pps.

Note 4 : Derate 0.9mW/°C above 70°C.

Note 5 : Derate 1mW/°C above 70°C.

\*\* 1.6mm below seating plane.

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**ELECTRICAL CHARACTERISTICS**  
 OVER RECOMMENDED TEMPERATURE (Ta = 0°C~70°C, Unless otherwise noted)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.**	MAX.	UNIT
Current Transfer Ratio (Each Channel)	TLP2530	IF = 16mA, VO = 0.4V VCC = 4.5V, Ta = 25°C (Note 6)	7	30	—	%
	TLP2531		19	30	—	
	TLP2530	IF = 16mA, VO = 0.5V VCC = 4.5V (Note 6)	5	—	—	%
	TLP2531		15	—	—	
Logic Low Output Voltage (Each Channel)	TLP2530	IF = 16mA, IO = 1.1mA VCC = 4.5V	—	0.1	0.4	V
	TLP2531	IF = 16mA, IO = 2.4mA VCC = 4.5V	—	0.1	0.4	V
Logic High Output Current (Each Channel)	IOH	IF = 0mA, VO = VCC = 5.5V Ta = 25°C	—	3	500	nA
		IF = 0mA, VO = VCC = 15V	—	—	50	μA
Logic Low Supply Current	ICCL	IF1 = IF2 = 16mA VO1 = VO2 = Open VCC = 15V	—	160	—	μA
Logic High Supply Current	ICCH	IF1 = IF2 = 0mA VO1 = VO2 = Open VCC = 15V	—	0.05	4	μA
Input Forward Voltage (Each Channel)	VF	IF = 16mA, Ta = 25°C	—	1.65	1.7	V
Temperature Coefficient of Forward Voltage (Each Channel)	ΔVF / ΔTa	IF = 16mA	—	-2	—	mV / °C
Input Reverse Breakdown Voltage (Each Channel)	BVR	IR = 10μA, Ta = 25°C	5	—	—	V
Input Capacitance (Each Channel)	CIN	f = 1MHz, VF = 0	—	60	—	pF
Input-Output Insulation Leakage Current	II-O	Relative Humidity = 45% t = 5s, VI-O = 3000Vdc Ta = 25°C (Note 7)	—	—	1.0	μA
Resistance (Input-Output)	RI-O	VI-O = 500Vdc (Note 7)	—	10 <sup>12</sup>	—	Ω
Capacitance (Input-Output)	CI-O	f = 1MHz (Note 7)	—	0.6	—	pF
Input-Input Leakage Current	II-I	Relative Humidity = 45% t = 5s, VI-I = 500V (Note 8)	—	0.005	—	μA
Resistance (Input-Input)	RI-I	VI-I = 500Vdc (Note 8)	—	10 <sup>11</sup>	—	Ω
Capacitance (Input-Input)	CI-I	f = 1MHz (Note 8)	—	0.25	—	pF

\*\* All typicals at Ta = 25°C.

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SWITCHING CHARACTERISTICS (Unless otherwise specified,  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 5\text{V}$ ,  $I_F = 16\text{mA}$ )

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Propagation Delay Time to Logic Low at Output (Each Channel)	TLP2530	$t_{pHL}$	1	$R_L = 4.1\text{k}\Omega$	—	0.3	1.5	$\mu\text{s}$
	TLP2531			$R_L = 1.9\text{k}\Omega$	—	0.2	0.8	
Propagation Delay Time to Logic High at Output (Each Channel)	TLP2530	$t_{pLH}$	1	$R_L = 4.1\text{k}\Omega$	—	0.5	1.5	$\mu\text{s}$
	TLP2531			$R_L = 1.9\text{k}\Omega$	—	0.3	0.8	
Common Mode Transient Immunity at Logic High Level Output (Each Channel, Note 9)	TLP2530	$CM_H$	2	$I_F = 0\text{mA}$ , $V_{CM} = 400V_{p-p}$ $R_L = 4.1\text{k}\Omega$	—	1000	—	$V / \mu\text{s}$
	TLP2531			$I_F = 0\text{mA}$ , $V_{CM} = 400V_{p-p}$ $R_L = 1.9\text{k}\Omega$	—	1000	—	
Common Mode Transient Immunity at Logic Low Level Output (Each Channel, Note 9)	TLP2530	$CM_L$	2	$V_{CM} = 400V_{p-p}$ $R_L = 4.1\text{k}\Omega$ , $I_F = 16\text{mA}$	—	-1000	—	$V / \mu\text{s}$
	TLP2531			$V_{CM} = 400V_{p-p}$ $R_L = 1.9\text{k}\Omega$ , $I_F = 16\text{mA}$	—	-1000	—	
Bandwidth (Each Channel, Note 10)	BW	3	$R_L = 100\Omega$	—	2	—	MHz	

- Note 6 : DC CURRENT TRANSFER RATIO is defined as the ratio of output collector current,  $I_O$ , to the forward LED input current,  $I_F$ , times 100%.
- Note 7 : Device considered a two-terminal device : Pins 1, 2, 3 and 4 shorted together and Pins 5, 6, 7, and 8 shorted together.
- Note 8 : Measured between pins 1 and 2 shorted together, and pins 3 and 4 shorted together.
- Note 9 : Common mode transient immunity in Logic High level is the maximum tolerable (Positive)  $dV_{cm}/dt$  on the leading edge of the common mode pulse,  $V_{cm}$ , to assure that the output will remain in a Logic High state (i.e.,  $V_O > 2.0\text{V}$ ). Common mode transient immunity in Logic Low level is the maximum tolerable (negative)  $dV_{cm}/dt$  on the trailing edge of the common mode pulse signal,  $V_{cm}$ , to assure that the output will remain in a Logic Low state (i.e.,  $V_O > 0.8\text{V}$ ).
- Note 10 : The frequency at which the ac output voltage is 3dB below the low frequency asymptote.

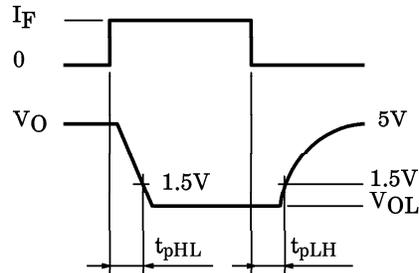
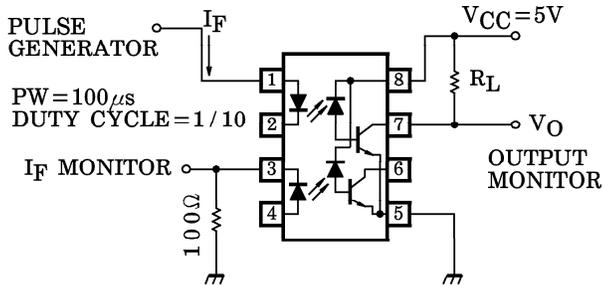
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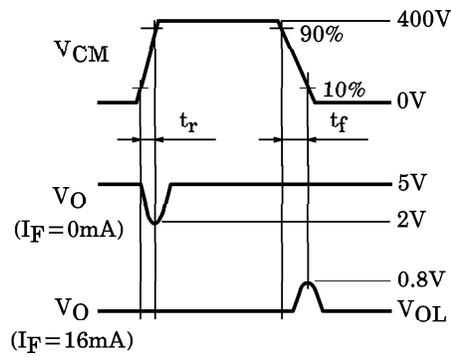
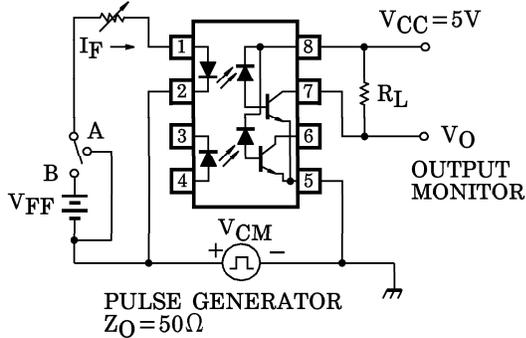
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TEST CIRCUIT 1 : SWITCHING TIME,  $t_{pHL}$ ,  $t_{pLH}$

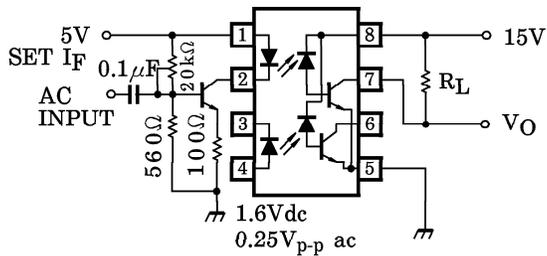


TEST CIRCUIT 2 : TRANSIENT IMMUNITY AND TYPICAL WAVEFORM



$$CM_H = \frac{320(V)}{t_r(\mu s)}, \quad CM_L = \frac{320(V)}{t_f(\mu s)}$$

TEST CIRCUIT 3 : FREQUENCY RESPONSE

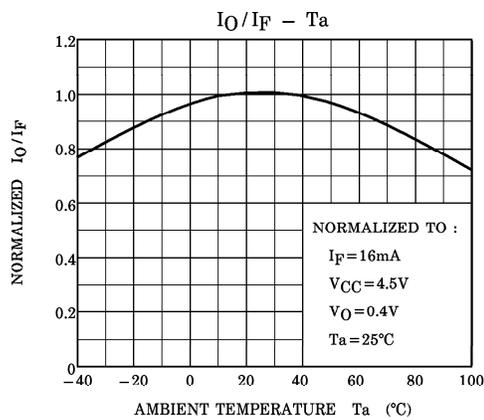
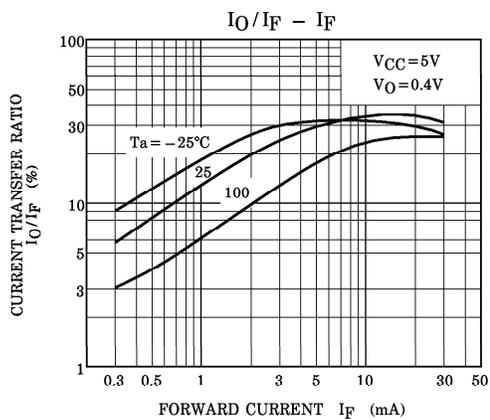
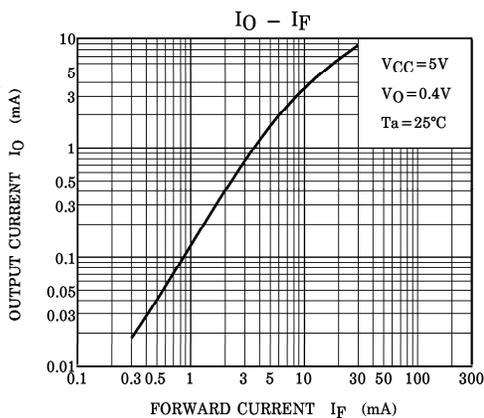
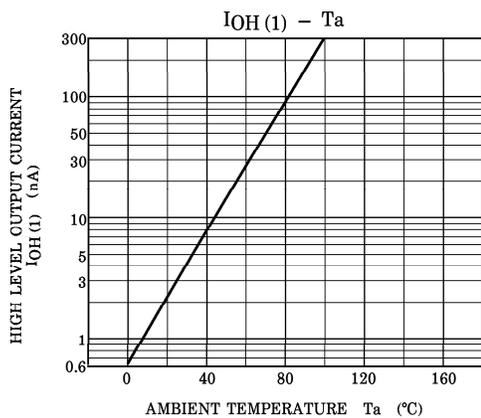
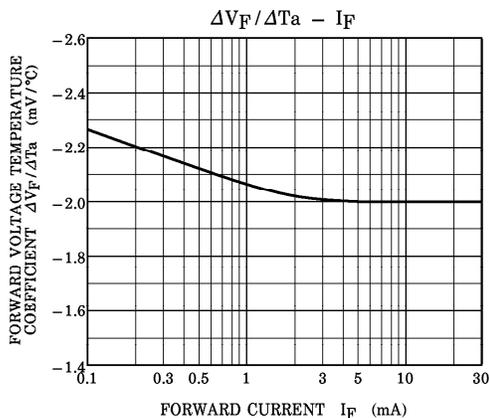
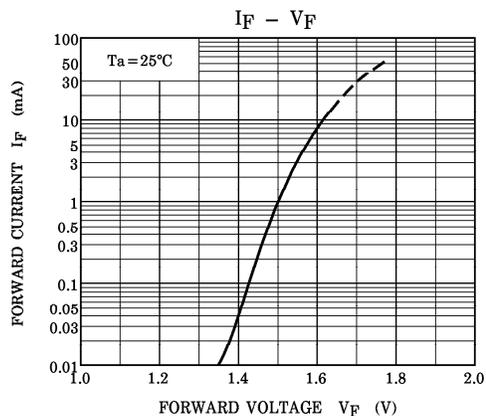


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