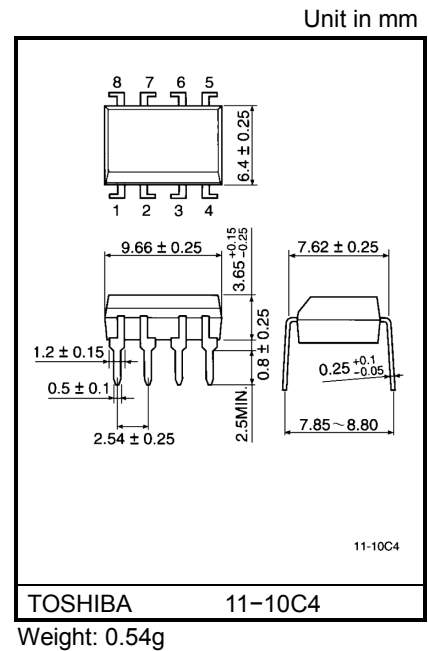


TLP651

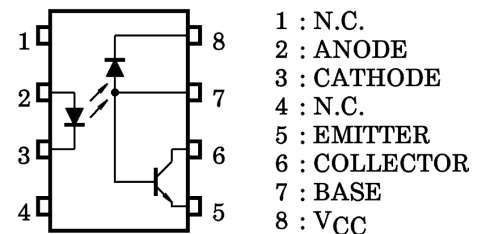
Digital Logic Ground Isolation
 Line Receiver
 Microprocessor System Interfaces
 Switching Power Supply Feedback Control
 Analog Signal Isolation

The TOSHIBA TLP651 consists of a GaAlAs high-output light emitting diode and a high speed detector of one chip photo diode-transistor. This unit is 8-lead DIP.
 TLP651 has internal base connection. This base pin should be used for analog application or enable operation. If base pin is open, output signal will be noisy by enviromental condition. For this case, TLP650 is suitable.

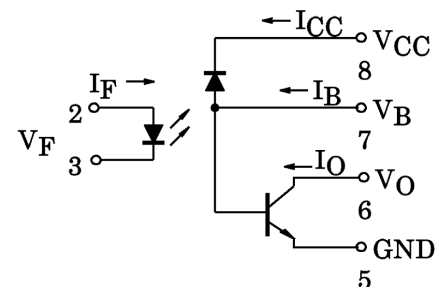
- Isolation voltage: 5000V_{rms} (min.)
- Switching speed: t_{pHL} = 0.3μs (typ.)
 t_{pLH} = 0.5μs (typ.) (R_L = 1.9kΩ)
- TTL compatible
- UL recognized: UL1577, file no. E67349
- BSI approved: BS EN60065: 1994
 Certificate no. 7613
 BS EN60950: 1992
 Certificate no. 7614



Pin Configuration (top view)



Schematic



Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current (Note 1)	I_F	25	mA
	Pulse forward current (Note 2)	I_{FP}	50	mA
	Peak transient forward current (Note 3)	I_{FPT}	1	A
	Reverse voltage	V_R	5	V
	Diode power dissipation (Note 4)	P_D	45	mW
Detector	Output current	I_O	8	mA
	Peak output current	I_{OP}	16	mA
	Output voltage	V_O	-0.5~15	V
	Supply voltage	V_{CC}	-0.5~15	V
	Base current	I_B	5	mA
	Emitter-base reverse voltage	V_{EB}	5	V
	Output power dissipation (Note 5)	P_O	100	mW
Operating temperature range		T_{opr}	-55~100	°C
Storage temperature range		T_{stg}	-55~125	°C
Lead solder temperature (10s) (Note 6)		T_{sol}	260	°C
Isolation voltage (AC, 1min., R.H. ≤ 60%) (Note 7)		BV_S	5000	V_{rms}

(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 2mW / °C above 70°C.

(Note 6) Soldering portion of lead: Up to 2mm from the body of the device.

(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.

Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit	
LED	Forward voltage	V_F	$I_F = 16\text{mA}$	—	1.65	1.85	V	
	Forward voltage temperature coefficient	$\Delta V_F / \Delta T_a$	$I_F = 16\text{mA}$	—	-2	—	mV / °C	
	Reverse current	I_R	$V_R = 5\text{V}$	—	—	10	μA	
	Capacitance between terminal	C_T	$V_F = 0, f = 1\text{MHz}$	—	45	—	pF	
Detector	High level output current	$I_{OH(1)}$	$I_F = 0\text{mA}, V_{CC} = V_O = 5.5\text{V}$	—	3	500	nA	
		$I_{OH(2)}$	$I_F = 0\text{mA}, V_{CC} = V_O = 15\text{V}$	—	—	5	μA	
		I_{OH}	$I_F = 0\text{mA}, V_{CC} = V_O = 15\text{V}$ $T_a = 70^\circ\text{C}$	—	—	250	μA	
	High level supply voltage	I_{CCH}	$I_F = 0\text{mA}, V_{CC} = 15\text{V}$	—	0.01	1	μA	
Coupled	Current transfer ratio	I_O / I_F	$I_F = 16\text{mA}$ $V_{CC} = 4.5\text{V}$ $V_O = 0.4\text{V}$	$T_a = 25^\circ\text{C}$	10	30	—	%
				Rank: O	19	30	—	
				$T_a = 0\sim 70^\circ\text{C}$	5	—	—	
	Low level output voltage	V_{OL}	$I_F = 16\text{mA}, V_{CC} = 4.5\text{V},$ $I_O = 1.1\text{mA}$ (Rank 0: $I_O = 2.4\text{mA}$)	—	—	0.4	V	
				—	—	—	—	
Isolation resistance	R_S	$R.H. \leq 60\%, V_S = 500\text{V}_{DC}$ (Note 7)	5×10^{10}	10^{14}	—	Ω		
Capacitance between input to output	C_S	$V_S = 0, f = 1\text{MHz}$ (Note 7)	—	0.8	—	pF		

Switching Characteristics (Ta = 25°C, VCC = 5V)

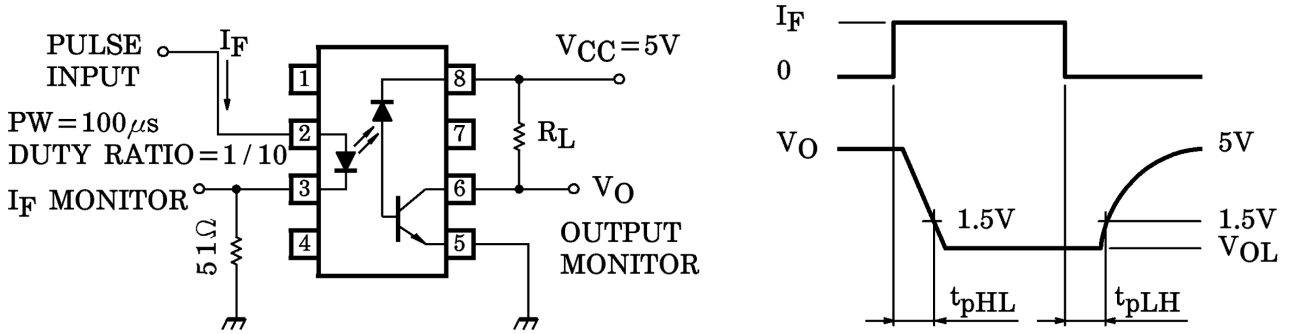
Characteristic	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time (H→L)	t_{pHL}	1	$I_F = 0 \rightarrow 16\text{mA}, V_{CC} = 5\text{V},$ $R_L = 4.1\text{k}\Omega$ Rank O: $R_L = 1.9\text{k}\Omega$	—	0.2	0.8	μs
Propagation delay time (L→H)	t_{pLH}		$I_F = 16 \rightarrow 0\text{mA}, V_{CC} = 5\text{V},$ $R_L = 4.1\text{k}\Omega$ Rank O: $R_L = 1.9\text{k}\Omega$	—	1.0	2.0	
Common mode transient immunity at logic high output (Note 8)	C_{MH}	2	$I_F = 0\text{mA}, V_{CM} = 200\text{V}_{p-p}$ $R_L = 4.1\text{k}\Omega$ (Rank O: $R_L = 1.9\text{k}\Omega$)	—	400	—	$\text{V} / \mu\text{s}$
Common mode transient immunity at logic low output (Note 8)	C_{ML}		$I_F = 16\text{mA}, V_{CM} = 200\text{V}_{p-p}$ $R_L = 4.1\text{k}\Omega$ (Rank O: $R_L = 1.9\text{k}\Omega$)	—	-1000	—	$\text{V} / \mu\text{s}$

(Note 8) CM_L is the maximum rate of fall of the common mode voltage that can be sustained with the output voltage in the logic low state ($V_O < 0.8V$).

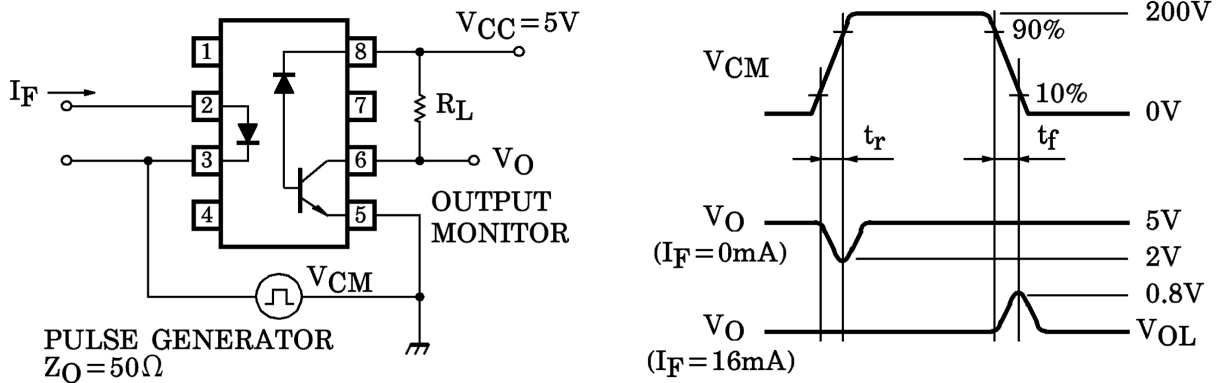
CM_H is the maximum rate of rise of the common mode voltage that can be sustained with the output voltage in the logic high state ($V_O > 2.0V$).

(Note 9) Maximum electrostatic discharge voltage for any pins: 100V ($C = 200pF, R = 0$).

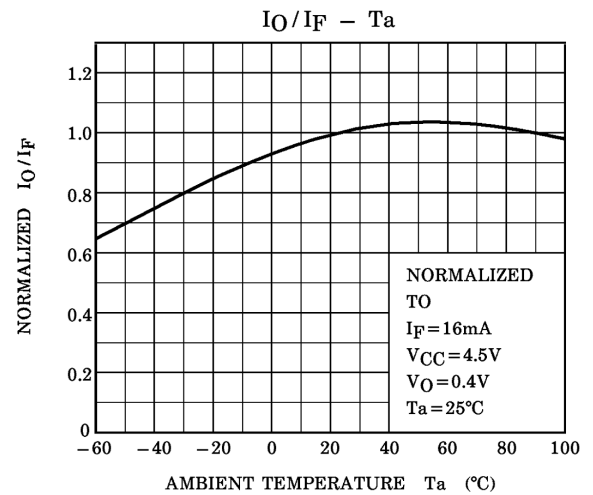
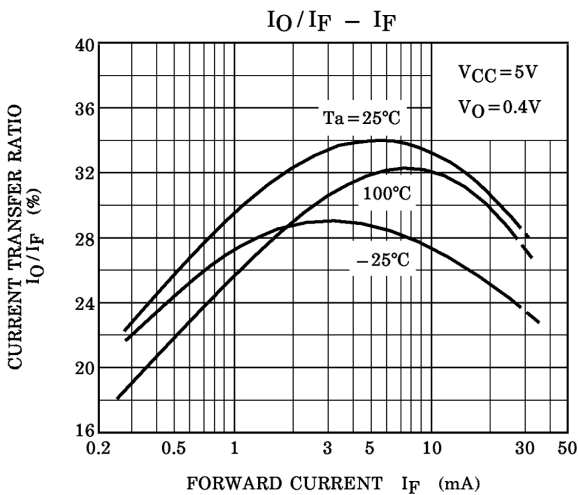
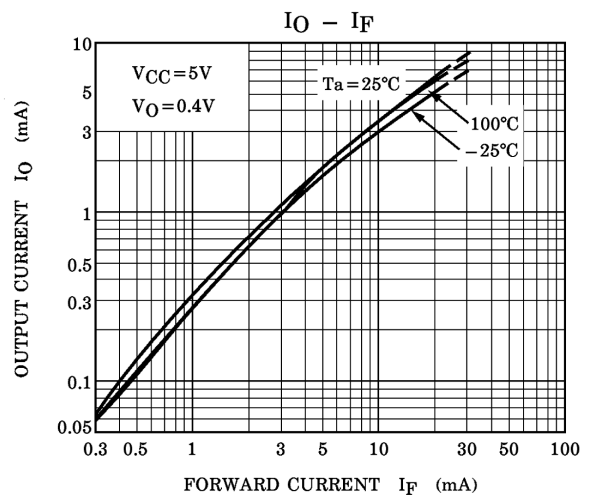
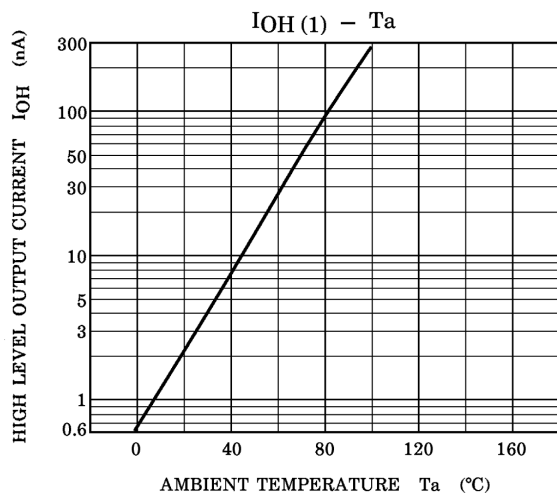
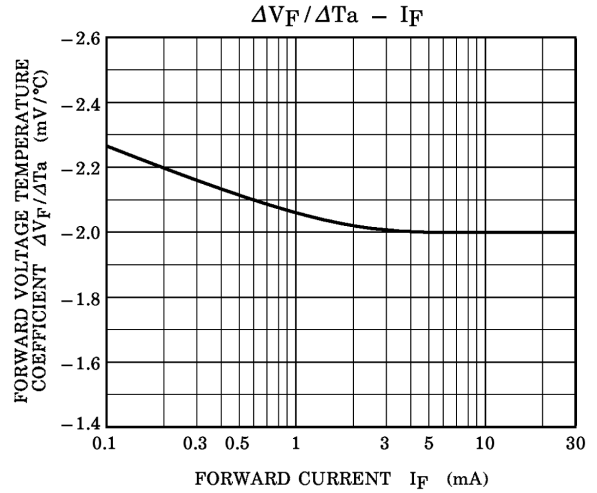
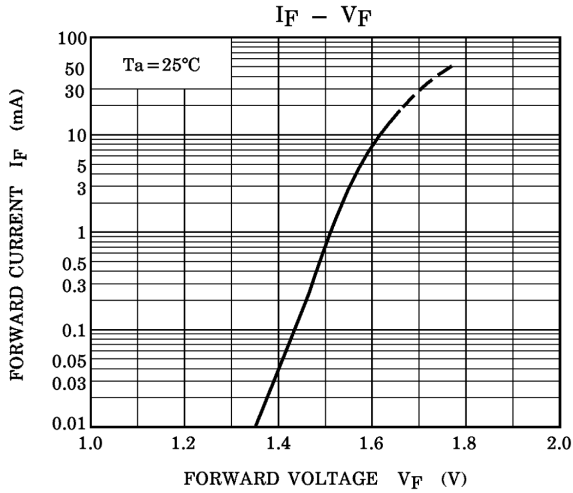
Test Circuit 1: Switching Time Test Circuit

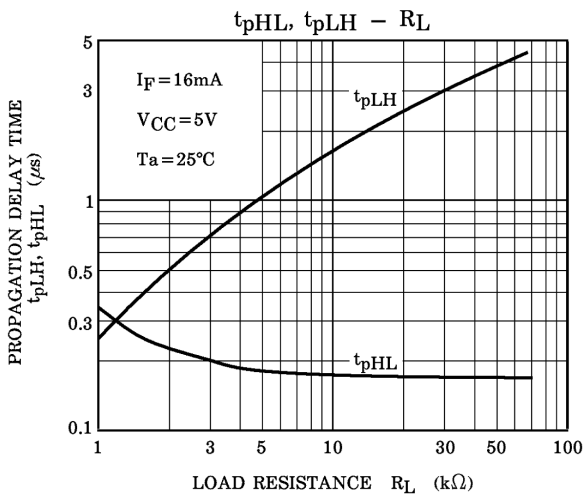
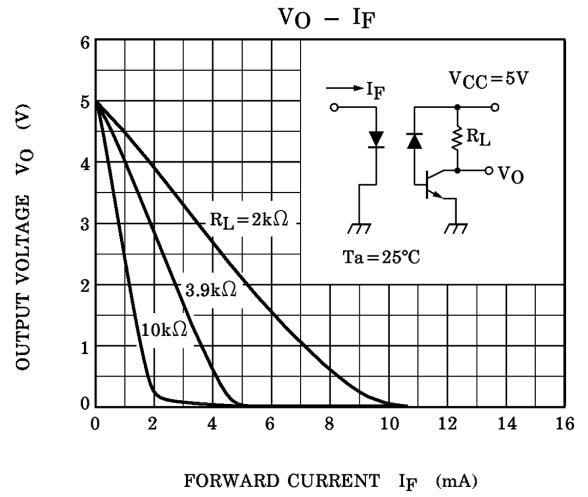
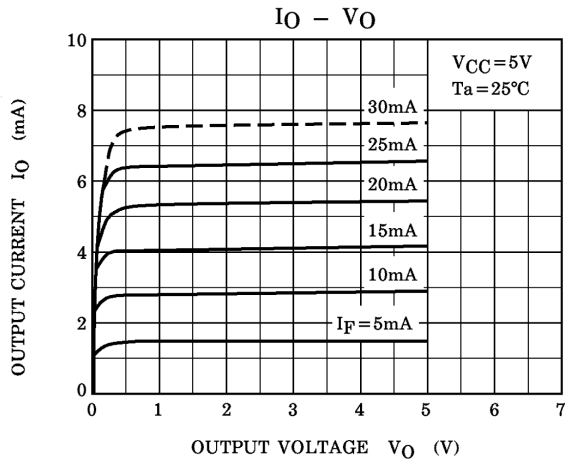


Test Circuit 2: Common Mode Noise Immunity Test Circuit



$$CM_H = \frac{160 (V)}{t_r (\mu s)}, \quad CM_L = \frac{160 (V)}{t_f (\mu s)}$$





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