TOSHIBA Photocoupler GaAℓAs Ired & Photo IC

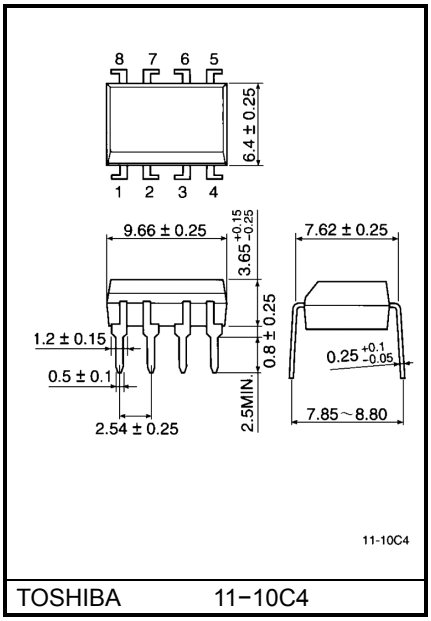
TLP2630

Degital Logic Isolation
Tele−Communication
Analog Data Equipment Control
Microprocessor System Interface

The TOSHIBA TLP2630 dual photocoupler consists of a pair of GaAℓAs light emitting diode and integrated high gain, high speed photodetector.
The output of the detector circuit is an open collector, schottky clamped transistor.This unit is 8−lead DIP.

- Input current threshold: I_F = 5mA(max.)
- LSTTL/TTL compatible: 5V supply
- Switching speed: 10MBd(typ.)
- Guaranteed performance over temperature: 0~70°C
- Isolation voltage: 2500V_{rms}(min.)
- UL recognized:UL1577, file no. E67349

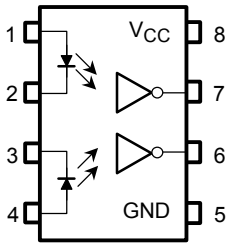
Unit in mm



TOSHIBA 11−10C4

Weight: 0.54 g

Pin Configuration (top view)



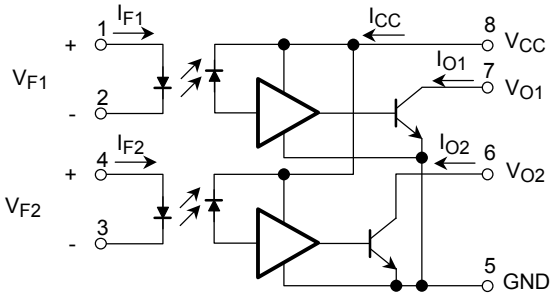
1: Anode 1
2: Cathode 1
3: Cathode 2
4: Anode 2
5: GND
6: V_{O2} (output 2)
7: V_{O1} (output 1)
8: V_{CC}

Truth Table (positive logic)

Input	Output
H	L
L	H

A 0.01 to 0.1μF bypass capacitor must connected between pins 8 and 5 (see Note 1).

Schematic



Maximum Ratings (no derating required up to 70°C)

Characteristic		Symbol	Rating	Unit
LED	Forward current(each channel)	I_F	20	mA
	Pulse forward current (each channel)*	I_{FP}	30	mA
	Reverse voltage(each channel)	V_R	5	V
Detector	Output current(each channel)	I_O	16	mA
	Output voltage(each channel)	V_O	−0.5~7	V
	Supply voltage (1 minute maximum)	V_{CC}	7	V
	Output collector power dissipation(each channel)	P_O	40	mW
Operating temperature range		T_{stg}	−55~125	°C
Storage temperature range		T_{opr}	−40~85	°C
Lead soldering temperature (10 s) (Note 1)		T_{sol}	260	°C
Isolation voltage (AC, 1 min., R.H.≤ 60%, Note 3)		BV_S	2500	Vrms

* t ≤ 1 msec duration.

Recommended Operating Conditions

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Input current, low level, each channel	I_{FL}	0	—	250	μA
Input current, high level, each channel	I_{FH}	6.3*	—	15	mA
Supply voltage, output	V_{CC}	4.5	5	5.5	V
Fan out(TTL load, each channel)	N	—	—	8	
Operating temperature	T_{opr}	0	—	70	°C

* 6.3mA is a guard banded value which allows for at least 20% CTR degradation. Initial input current threshold value is 5.0mA or less.

Electrical Characteristics (Ta = 0~70°C, unless otherwise noted)

Characteristic	Symbol	Test Condition	Min.	Typ.*	Max.	Unit
Input forward voltage (each channel)	V_F	I_F = 10mA, Ta = 25°C	—	1.65	1.75	V
Input diode temperature coefficient(each channel)	$\Delta V_F / \Delta Ta$	I_F = 10mA	—	−2.0	—	mV / °C
Input reverse breakdown voltage(each channel)	BV_R	I_R = 10μA, Ta = 25°C	5	—	—	V
Input capacitance (each channel)	C_T	V_F = 0, f = 1MHz	—	45	—	pF
High level output current (each channel)	I_{OH}	V_{CC} = 5.5V, V_O = 5.5V I_F = 250μA	—	1	250	μA
Low level output voltage (each channel)	V_{OL}	V_{CC} = 5.5V, I_F = 5mA I_{OL}(sinking) = 13mA	—	0.4	0.6	V
High level supply current (both channels)	I_{CCH}	V_{CC} = 5.5V, I_F = 0	—	14	30	mA
Low level supply current (both channels)	I_{CCL}	V_{CC} = 5.5V, I_F = 10mA	—	24	36	mA
Isolation voltage	R_S	V_S = 500V, R.H.≤ 60% (Note 3)	—	10^{14}	—	Ω
Capacitance(input−output)	C_S	f = 1MHz (Note 3)	—	0.6	—	pF
Input−input leakage current	I_{I-I}	R.H.≤ 60%, t = 5s V_{I-I} = 500V (Note 6)	—	0.005	—	μA
Resistance(input−input)	R_{I-I}	V_{I-I} = 500V (Note 6)	—	10^{11}	—	Ω
Capacitance(input−input)	C_{I-I}	f = 1MHz (Note 6)	—	0.25	—	pF

* All typical values are at V_{CC} = 5V, Ta = 25°C.

Switching Characteristics (Ta =25°C , V_{CC}=5V)

Characteristic	Symbol	Test Cir- cuit	Test Condition	Min.	Typ.	Max.	Unit
Propagation delay time to low output level	t_{pHL}	1	I_F = 0→7.5mA, R_L = 350Ω C_L = 15pF (each channel)	—	60	75	ns
Propagation delay time to high output level	t_{pLH}	1	I_F = 7.5mA→0, R_L = 350Ω C_L = 15pF (each channel)	—	60	75	ns
Output rise a time,output fall time(10~90%)	t_r,t_f	1	I_F = 0⇄7.5mA, R_L = 350Ω C_L = 15pF (each channel)	—	30	—	ns
Common mode transient immunity at high output level	CM_H	2	I_F = 0, R_L = 350Ω V_{CM} = 200V V_O(min.) = 2V (each channel, Note 4)	—	200	—	V / μs
Common mode transient immunity at low output level	CM_L	2	I_F = 7.5mA, R_L = 350Ω V_{CM} = 200V V_O(max.) = 0.8V (each channel, Note 5)	—	−500	—	V / μs

(Note 1) 2mm below seating plane.

(Note 2) The V_{CC} supply voltage to each TLP2630 isolator must be bypassed by a 0.01μF capacitor or larger.This can be either a ceramic or solid tantalum capacitor with good high frequency characteristic and should be connected as close as possible to the package V_{CC} and GND pins each device.

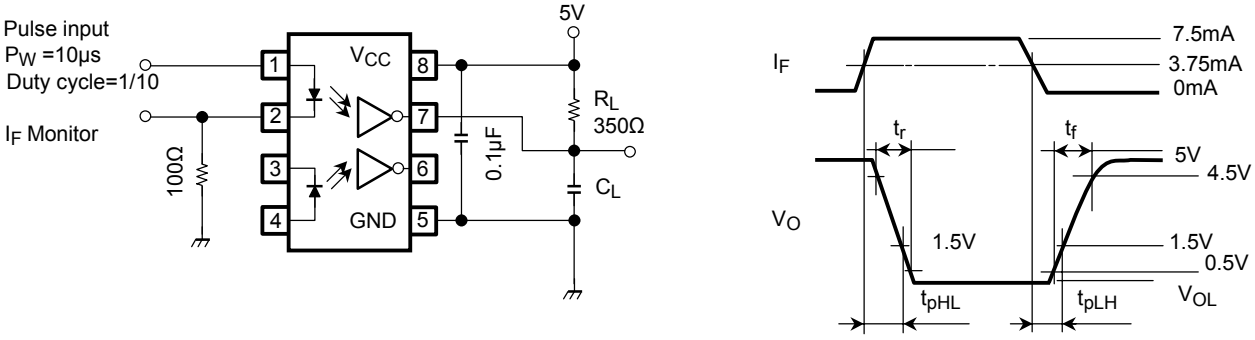
(Note 3) Device considered a two−terminal device: Pins 1, 2, 3 and 4 shorted together, and pins 5, 6, 7 and 8 shorted together.

(Note 4) CM_H・the maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the high state(i.e., V_{OUT} > 2.0V)

(Note 5) CM_L・the maximum tolerable rate of fall of the common mode voltage to ensure the output will remain in the low output state(i.e., V_{OUT} > 0.8V)
Measured in volts per microsecond(V / μs).

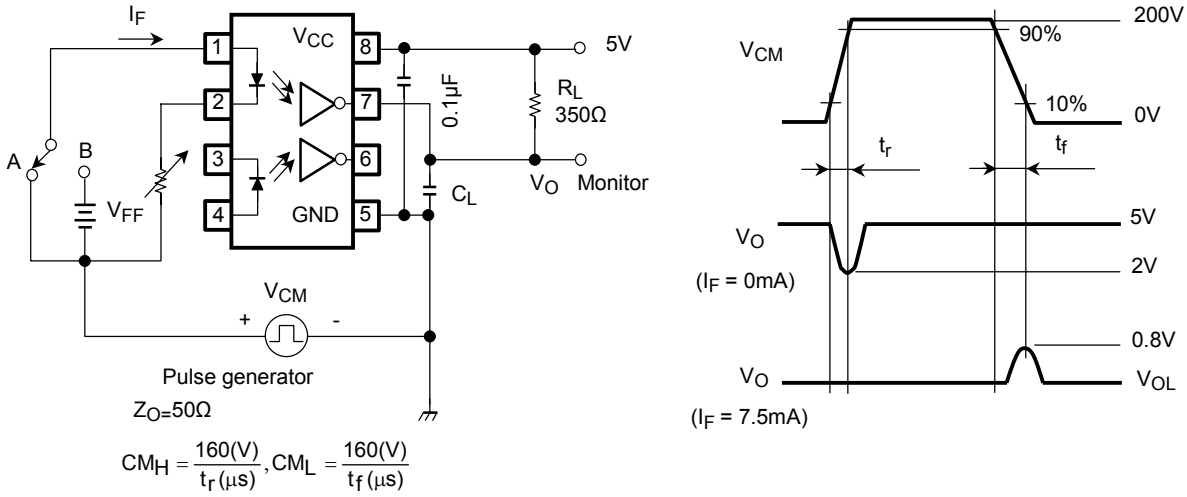
(Note 6) Measured between pins 1 and 2 shorted together, and pins 3 and 4 shorted together.

Test Circuit 1. t_{pHL} And t_{pLH}



* C_L is approximately 15pF which includes probe and stray wirng capacitance.

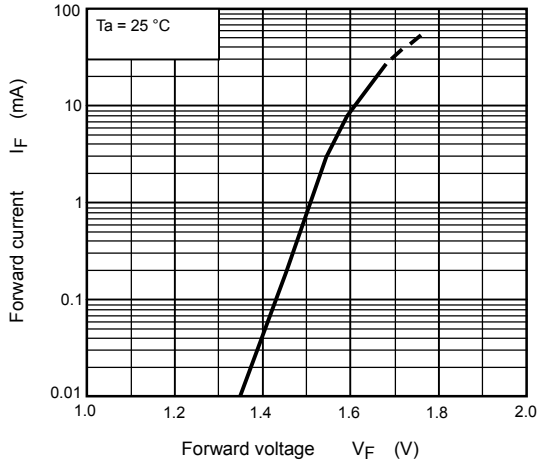
Test Circuit 2. Transient Immunity And Typical Waveforms.



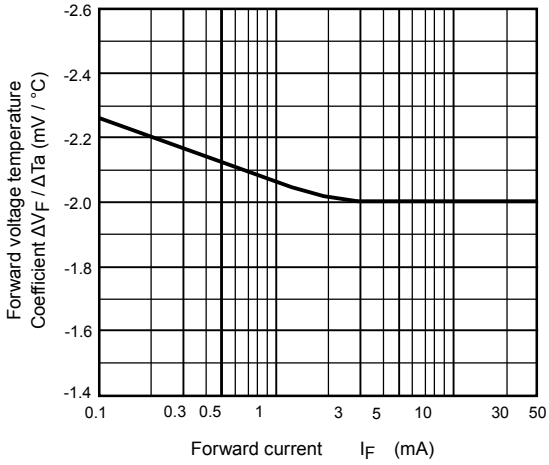
$$CM_H = \frac{160(V)}{t_r(\mu s)}, CM_L = \frac{160(V)}{t_f(\mu s)}$$

* C_L is approximately 15pF which includes probe and stray wirng capacitance.

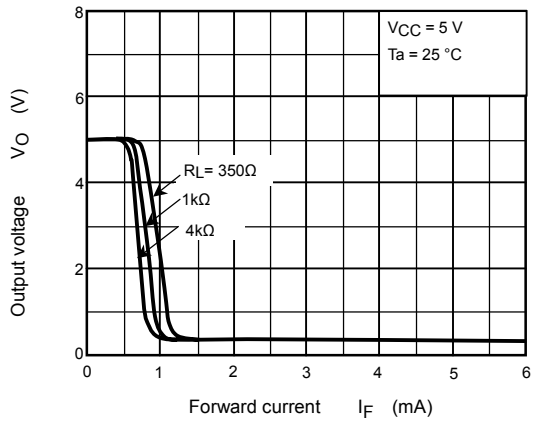
$I_F - V_F$



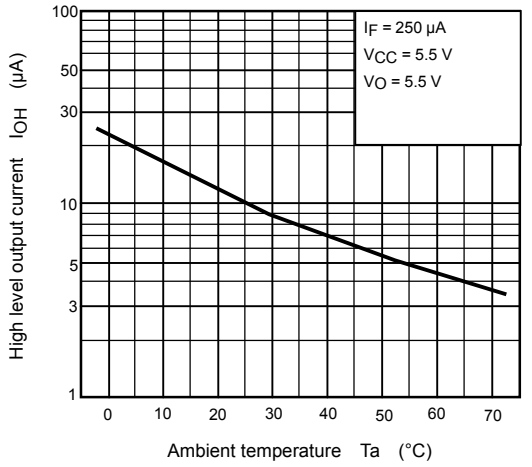
$\Delta V_F / \Delta Ta - I_F$



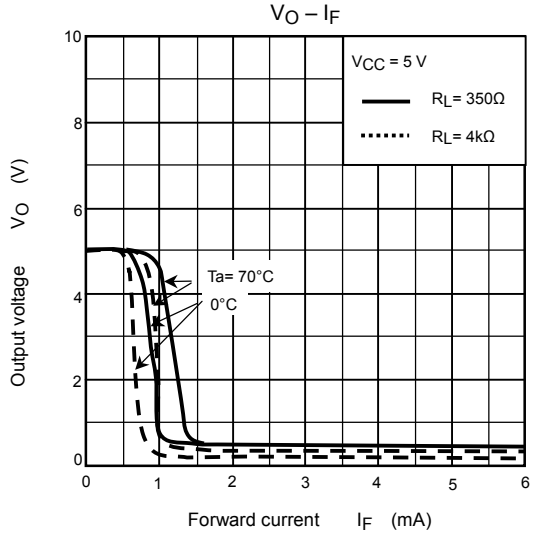
$V_O - I_F$



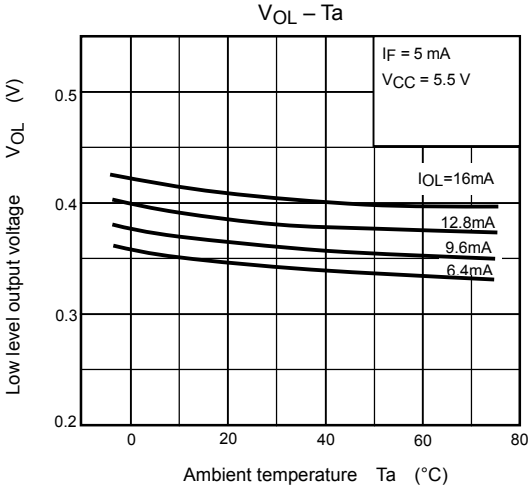
$I_{OH} - Ta$



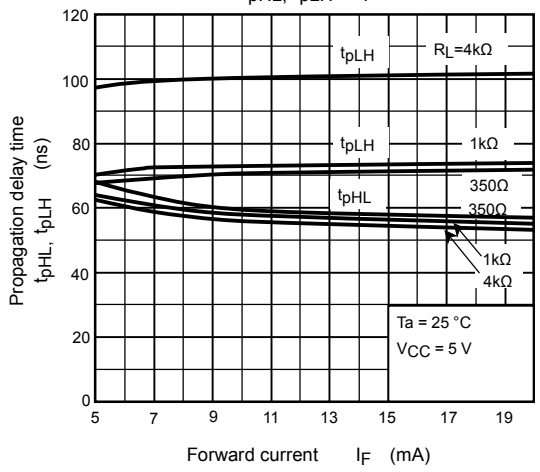
$V_O - I_F$



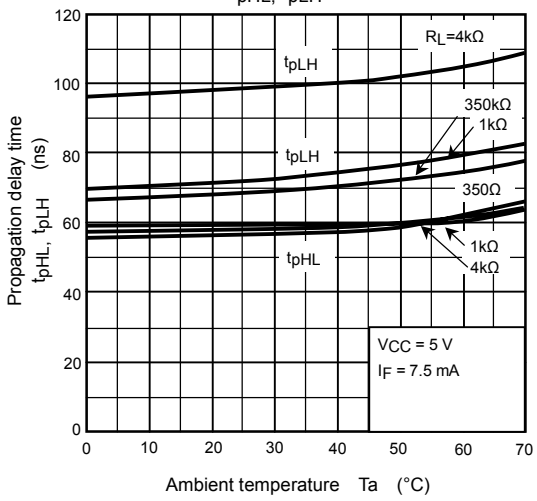
$V_{OL} - Ta$



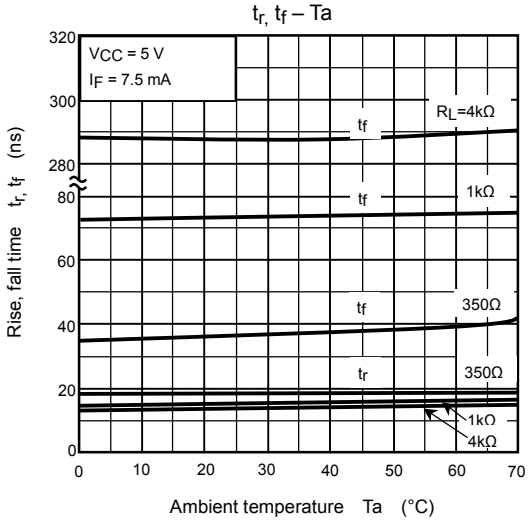
t_{pHL}, t_{pLH} – I_F



t_{pHL}, t_{pLH} – Ta



t_r, t_f – Ta



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