

TOSHIBA PHOTOCOUPLER GaAs IRED & PHOTO IC

TLP2630

DEGITAL LOGIC ISOLATION

TELE-COMMUNICATION

ANALOG DATA EQUIPMENT CONTROL

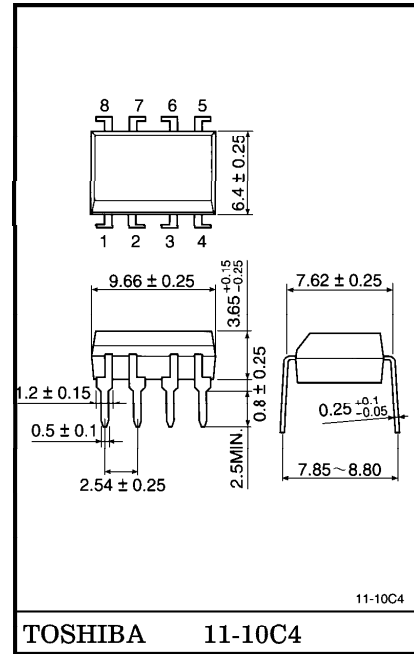
MICROPROCESSOR SYSTEM INTERFACE

The TOSHIBA TLP2630 dual photocoupler consists of a pair of GaAs 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 : $I_F = 5\text{mA}$ (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

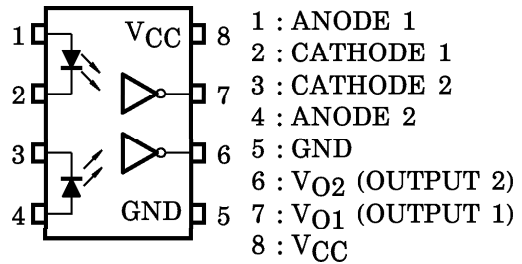
Unit in mm



TOSHIBA 11-10C4

Weight : 0.54g

PIN CONFIGURATION (TOP VIEW)

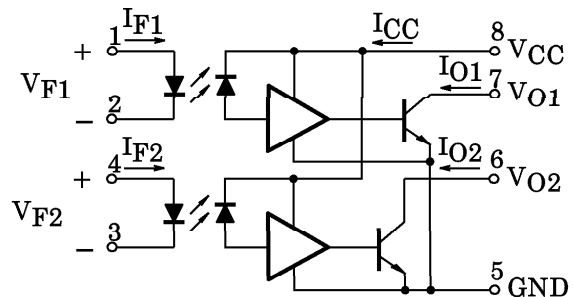


TRUTH TABLE
(Positive Logic)

INPUT	OUTPUT
H	L
L	H

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

SCHMATIC



961001EBC2

- TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.
- Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.
- The products described in this document are subject to foreign exchange and foreign trade control laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

MAXIMUM RATINGS (No derating required up to 70°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current (Each Channel)	I_F	15	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 (10s) (Note 1)		T_{sol}	260	°C
Isolation Voltage (AC, 1min., R.H. ≤ 60%, Note 3)		BV_S	2500	V_{rms}

* $t \leq 1$ 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)	ΔV _F / ΔTa	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, VCC = 5V)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Propagation Delay Time to Low Output Level	t_{pHL}	1	$I_F=0 \rightarrow 7.5\text{mA}$, $R_L=350\Omega$ $C_L=15\text{pF}$ (Each Channel)	—	60	75	ns
Propagation Delay Time to High Output Level	t_{pLH}	1	$I_F=7.5\text{mA} \rightarrow 0$, $R_L=350\Omega$ $C_L=15\text{pF}$ (Each Channel)	—	60	75	ns
Output Rise a Time, Output Fall Time (10~90%)	t_r, t_f	1	$I_F=0 \Rightarrow 7.5\text{mA}$, $R_L=350\Omega$ $C_L=15\text{pF}$ (Each Channel)	—	30	—	ns
Common Mode Transient Immunity at High Output Level	CM_H	2	$I_F=0$, $R_L=350\Omega$ $V_{CM}=200\text{V}$ $V_O(\text{MIN.})=2\text{V}$ (Each Channel, Note 4)	—	200	—	V / μs
Common Mode Transient Immunity at Low Output Level	CM_L	2	$I_F=7.5\text{mA}$, $R_L=350\Omega$ $V_{CM}=200\text{V}$ $V_O(\text{MAX.})=0.8\text{V}$ (Each Channel, Note 5)	—	-500	—	V / μs

(Note 1) 2mm below seating plane.

(Note 2) The VCC supply voltage to each TLP2630 isolator must be bypassed by a 0.01 μF 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 VCC and GND pins each device.

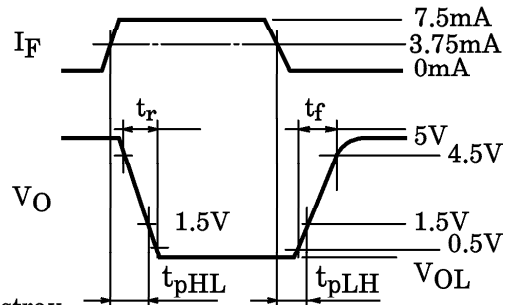
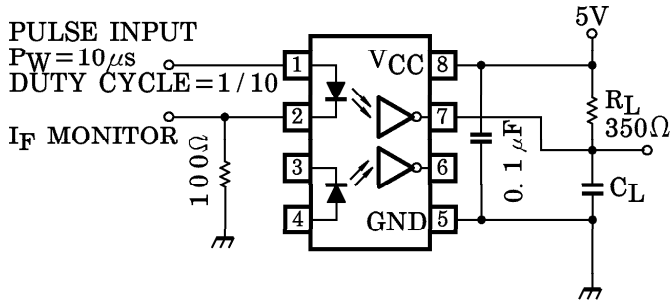
(Note 3) Device considered a two-terminal device : Pins 1, 2, 3 and 4 shorted together, and Pins 5, 6, 7 and 8 shorted together.

(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., $V_{OUT} > 2.0\text{V}$)

(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., $V_{OUT} > 0.8\text{V}$)
Measured in volts per microsecond (V / μs).

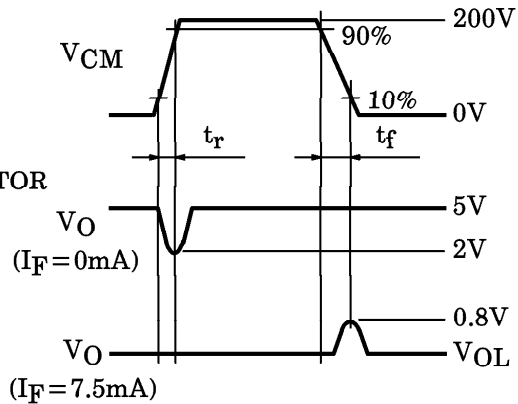
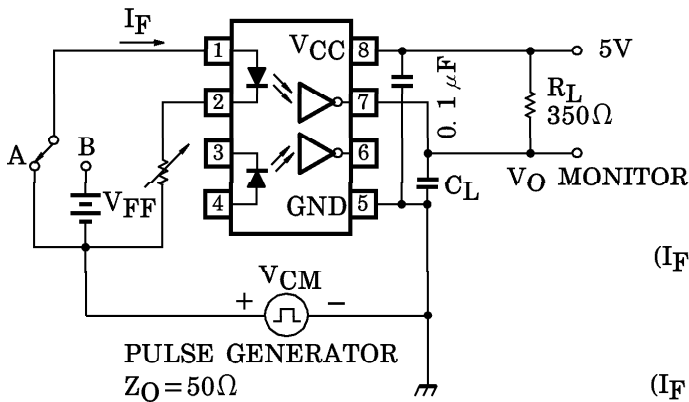
(Note 6) Measured between pins 1 and 2 shorted together, and pins 3 and 4 shorted together.

TEST CIRCUIT 1. t_{pHL} and t_{pLH}



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

