TOSHIBA PHOTOCOUPLER GaAℓAs IRED & PHOTO IC

TLP2631

ISOLATED LINE RECEIVER

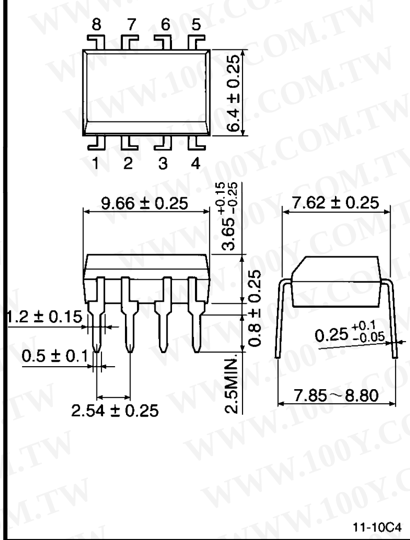
SIMPLEX / MULTIPLEX DATA TRANSMISSION

COMPUTER-PERIPHERAL INTERFACE

MICROPROCESSOR SYSTEM INTERFACE

DIGITAL ISOLATION FOR A / D, D / A CONVERSION

Unit in mm



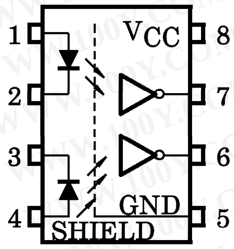
TOSHIBA 11-10C4

Weight : 0.54g

The TOSHIBA TLP2631 dual photocoupler consists of a pair of GaAℓAs light emitting diode and integrated high gain, high speed photodetector.
This unit is 8-lead DIP.
The output of the detector circuit is an open collector, Schottky clamped transistor.
A Faraday shield integrated on the photodetector chip reduces the effects of capacitive coupling between the input LED emitter and the high gain stages of the detector. This provides an effective common mode transient immunity of 1000V / μs.

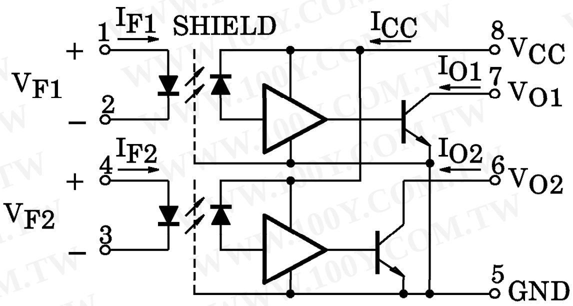
- Input Current Threshold : I_F = 5mA (MAX.)
- Switching Speed : 10MBd (TYP.)
- Common Mode Transient Immunity : ±1000V / μs (MIN.)
- Guaranteed Performance Over Temperature : 0~70°C
- Isolation Voltage : 2500V_{rms} (MIN.)
- UL Recognized : UL1577, File No. E67349

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



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).

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

	CHARACTERISTIC	SYMBOL	RATING	UNIT
LED	Foward Current (Each Channel)	I_F	20	mA
LED	Pulse Forward Current (Each Channel)*	I_{FP}	30	mA
LED	Reverse Voltage (Each Channel)	V_R	5	V
DETECTOR	Output Current (Each Channel)	I_O	16	mA
DETECTOR	Output Voltage (Each Channel)	V_O	−0.5~7	V
DETECTOR	Supply Voltage (1 Minute Maximum)	V_{CC}	7	V
DETECTOR	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)**		T_{sol}	260	°C
Isolation Voltage (AC, 1min., R.H.≦60%, Note 3)		BV_S	2500	Vrms

* t≦1 msec Duration.
** 2mm below seating plane.

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*	—	20	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	38	mA
Isolation Voltage	R_S	V_S=500V, R.H.≦60%(Note 3)	5×10^{10}	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	$I_F = 0 \rightarrow 7.5mA$, $R_L = 350\Omega$ $C_L = 15pF$ (Each Channel)	—	60	75	ns
Propagation Delay Time to High Output Level	t_{pLH}	1	$I_F = 7.5mA \rightarrow 0$, $R_L = 350\Omega$ $C_L = 15pF$ (Each Channel)	—	60	75	ns
Output Rise time, Output Fall time (10~90%)	t_r, t_f	1	$I_F = 0 \rightleftharpoons 7.5mA$, $R_L = 350\Omega$ $C_L = 15pF$ (Each Channel)	—	30	—	ns
Common Mode Transient Immunity at High Output Level	CM_H	2	$I_F = 0$, $R_L = 350\Omega$ $V_{CM} = 400V$, V_O (MIN.) $= 2V$ (Each Channel, Note 4)	1000	10000	—	V / μs
Common Mode Transient Immunity at Low Output Level	CM_L	2	$I_F = 7.5mA$, $R_L = 350\Omega$ $V_{CM} = 400V$ V_O (MAX.) $= 0.8V$ (Each Channel, Note 5)	−1000	−10000	—	V / μs

(Note 1) 2mm below seating plane

(Note 2) The V_{CC} supply voltage to each TLP2631 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., $V_{OUT} > 2.0V$).
Measured in volts per microsecond (V / μs).
Volts / microsecond can be translated to sinusoidial voltages :

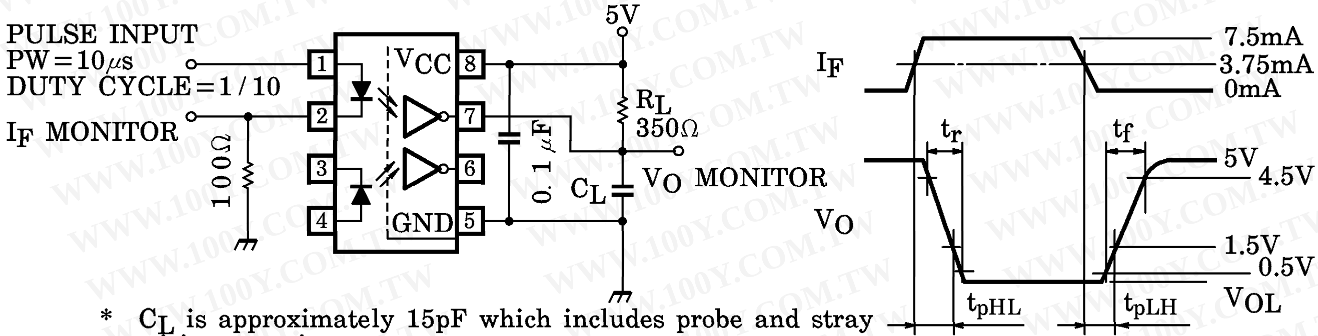
$$V/\mu s = \frac{(dVCM)}{dt} \text{ Max.} = f_{CM}\ V_{CM}\ (p.p.)$$

Example :
$V_{CM} = 319Vpp$ when $f_{CM} = 1MHz$ using CM_L and $CM_H = 1000V/\mu s$ data sheet specified minimum.

(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).

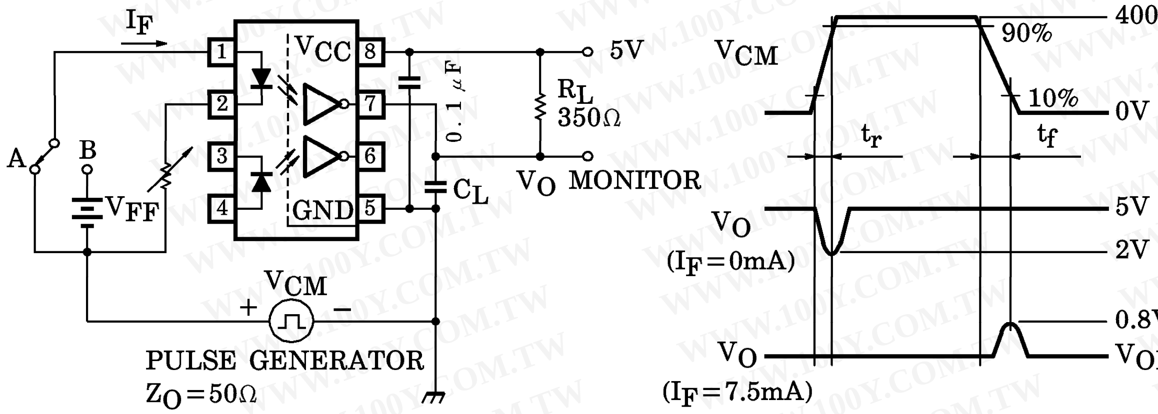
(Note 6) Measured between pins 1 and 2 shorted together, and pins 3 and 4 shorted together.

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



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

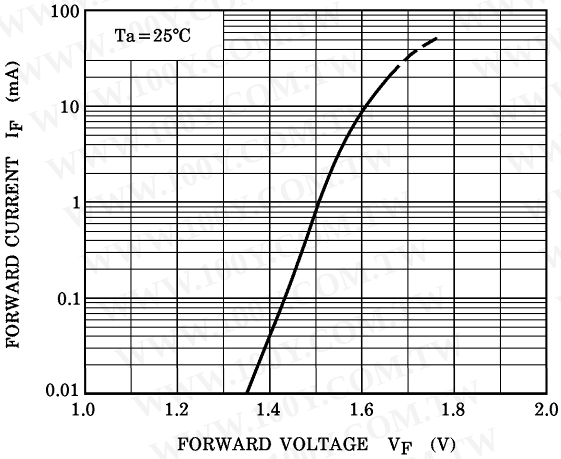
TEST CIRCUIT 2. Ttansient Immunity and Typical Waveforms.



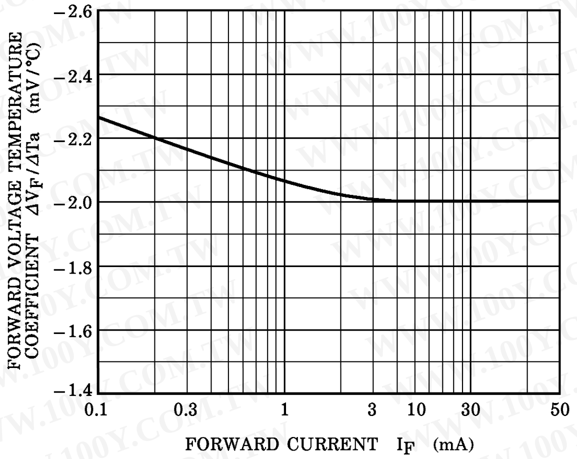
$$CM_H = \frac{320\,(V)}{t_r\,(\mu s)},\quad CM_L = \frac{320\,(V)}{t_f\,(\mu s)}$$

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

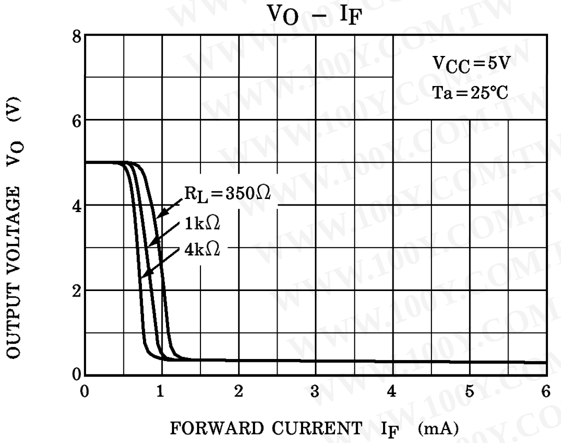
I_F – V_F



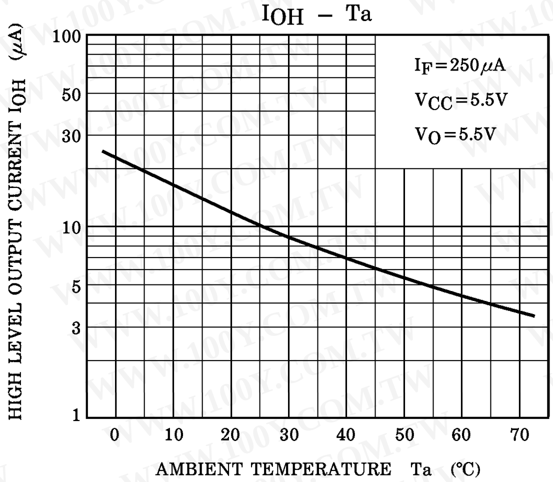
$\Delta V_F / \Delta Ta$ – I_F



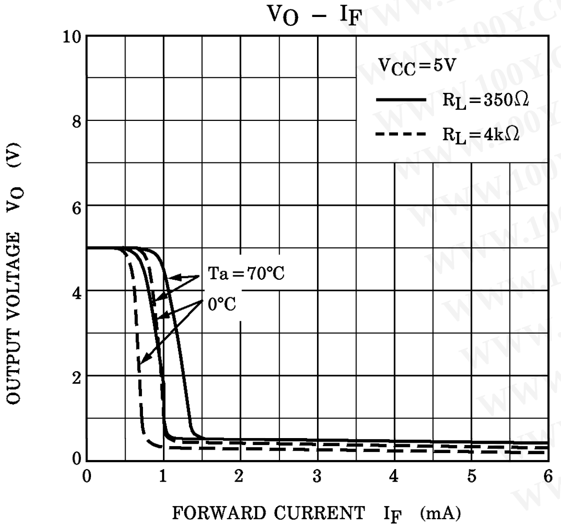
V_O – I_F



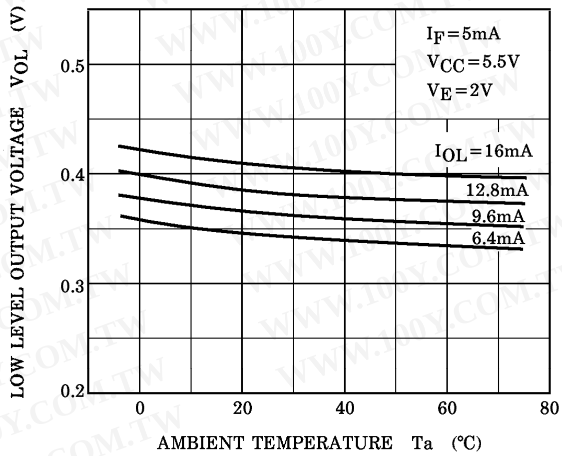
I_{OH} – Ta



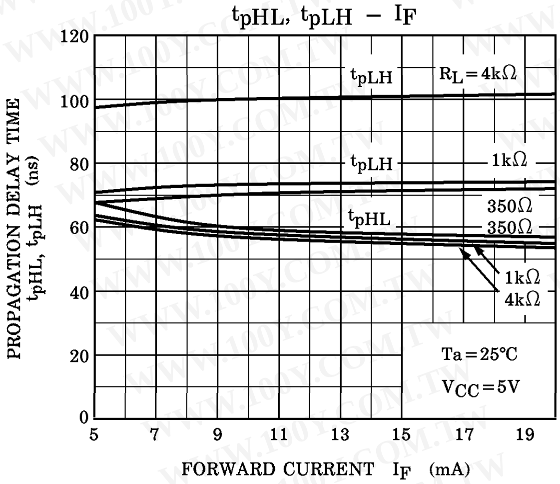
V_O – I_F



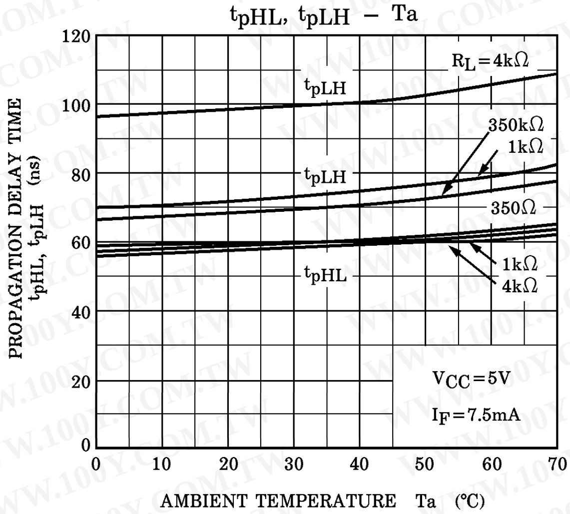
V_{OL} – Ta



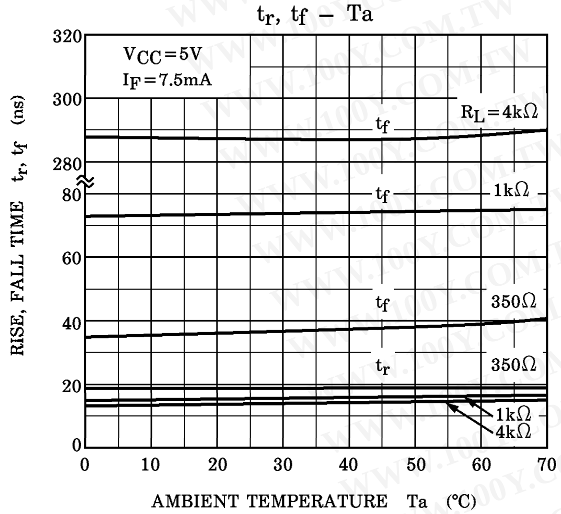
t_{pHL}, t_{pLH} – I_F



t_{pHL}, t_{pLH} – Ta



t_r, t_f – Ta



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