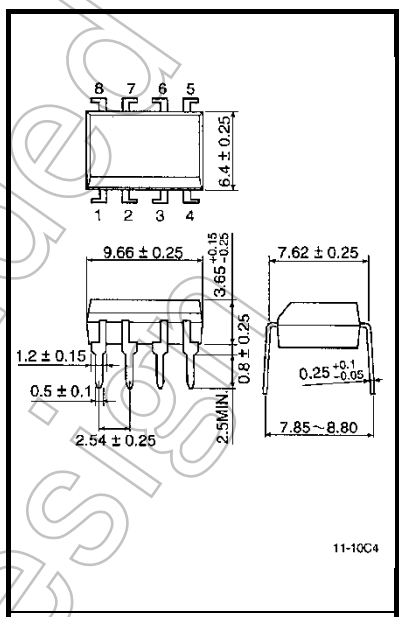
TOSHIBA Photocoupler GaAℓAs IRED & Photo IC

TLP552

Isolated Line Receiver
Simplex/Multiplex Data Transmission
Computer-Peripheral Interface
Microprocessor System Interface
Digital Isolation for A-D, D-A Conversion

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	11-10C4

Weight: 0.54 g (typ.)

The TOSHIBA TLP552 is a photocoupler which combines a GaAℓAs IRED LED as the emitter and an 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.

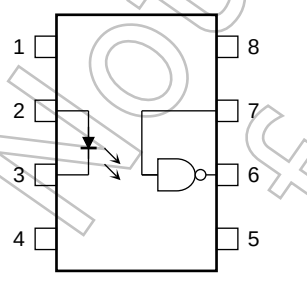
- TTL/LSTTL compatible: V_{CC} = 5 V
- Isolation voltage: 2500 V_{rms} (min)
- Switching speed: t_{pHL}, t_{pLH} = 60 ns (typ.) (@R_L = 350 Ω)
- Guaranteed performance over temp.: 0 to 70°C
- UL recognized: UL1577, file no. E67349

Truth Table (positive logic)

Input	Enable	Output
H	H	L
L	H	H
H	L	H
L	L	H

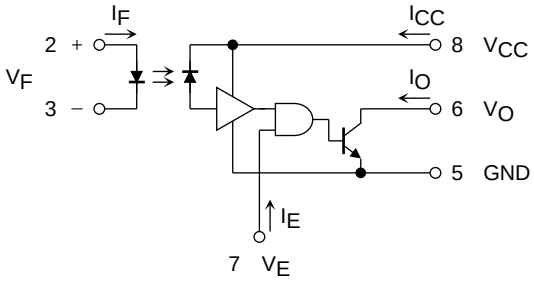
Note: A 0.1 μF bypass capacitor must be connected between pins 8 and 5 (see "Instruction for use" on page 3).

Pin Configurations (top view)



1: N.C.
2: Anode
3: Cathode
4: N.C.
5: GND
6: Output (open collector)
7: Enable
8: V_{CC}

Schematic



Note: A 0.1 μF bypass capacitor must be connected between pins 8 and 5 (see "Instruction for use" on page 3)

Start of commercial production
1982-08

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
LED	Forward current	I_F	20	mA
	Forward current derating (Ta ≥ 53°C)	ΔIF/ΔTa	-0.28	mA/°C
	Pulse forward current (Note 1)	I_{FP}	40	mA
	Peak transient forward current (Note 2)	I_{FPT}	0.5	A
	Reverse voltage	V_R	5	V
	Diode power dissipation	P_D	40	mW
	Input power dissipation derating(Ta ≥ 53°C)	ΔP_D/°C	-0.56	mW/°C
Detector	Output current	I_O	50	mA
	Output voltage	V_O	7	V
	Supply voltage (Note 3)	V_{CC}	7	V
	Enable input voltage (Note 4)	V_E	5.5	V
	Output collector power dissipation	P_O	85	mW
	Output power dissipation derating (Ta ≥ 53°C)	ΔPo/ ΔTa	-1.2	mW/°C
Operating temperature range		T_{opr}	0 to 70	°C
Storage temperature range		T_{stg}	−55 to 125	°C
Lead solder temperature (10 s) (Note 5)		T_{sol}	260	°C
Isolation voltage (AC, 1 minute, R.H. ≤ 60%) (Note 6)		BV_S	2500	V_{rms}

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods“) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: 50% duty cycle, 1 ms pulse width.

Note 2: Pulse width ≤ 1μs, 300 pps.

Note 3: 1 minute maximum.

Note 4: Not to exceed V_{CC} by more than 500 mV.

Note 5: Soldering portion of lead: up to 2 mm from the body of the device.

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

Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Input current, low level	I_{FL}	0	—	250	μA
Input current, high level	I_{FH}	7	—	20	mA
Supply voltage, output	V_{CC}	4.5	—	5.5	V
High level enable voltage	V_{EH}	2.0	—	V_{CC}	V
Low level enable voltage	V_{EL}	0	—	0.8	V
Fan out (TTL load)	N	—	—	8	—
Operating temperature	T_{opr}	0	—	70	°C

Note: The recommended operating conditions are given as a design guideline to obtain expected performance of the device. In addition, each item is an independent guideline. In developing designs using this product, please confirm the specified characteristics shown in this document.

Electrical Characteristics (unless otherwise specified, for 0°C ≤ Ta ≤ 70°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Input forward voltage	V_F	I_F = 10 mA, Ta = 25°C	—	1.65	1.8	V
Input diode temperature coefficient	$\Delta V_F/\Delta Ta$	I_F = 10 mA	—	−2.0	—	mV/°C
Input reverse current	I_R	V_R = 5 V, Ta = 25°C	—	—	10	μA
Input capacitance	C_T	V_F = 0 V, f = 1 MHz, Ta = 25°C	—	45	—	pF
High level output current	I_{OH}	V_{CC} = 5.5 V, V_O = 5.5 V I_F = 250 μA, V_E = 2.0 V	—	10	250	μA
Low level output voltage	V_{OL}	V_{CC} = 5.5 V, I_F = 5 mA V_{EH} = 2.0 V, I_{OL} = 13 mA (sinking)	—	0.4	0.6	V
Input current logic low output level	I_{FH}	I_{OL} = 13 mA (sinking), V_O = 0.6 V, V_{CC} = 5.5 V, V_{EH} = 2.0 V	—	—	5	mA
High level enable current	I_{EH}	V_{CC} = 5.5 V, V_E = 2.0 V	—	−1.0	—	mA
Low level enable current	I_{EL}	V_{CC} = 5.5 V, V_E = 0.5 V	—	−1.6	−2.0	mA
High level supply current	I_{CCH}	V_{CC} = 5.5 V, I_F = 0 mA, V_E = 0.5 V	—	7	15	mA
Low level supply current	I_{CCL}	V_{CC} = 5.5 V, I_F = 10 mA, V_E = 0.5 V	—	12	18	mA
Current transfer ratio	CTR	I_F = 5.0 mA, R_L = 100 Ω V_{CC} = 5.0 V, Ta = 25°C	—	1000	—	%
Resistance (input-output)	R_S	V_S = 500 V, R.H. ≤ 60%, Ta = 25°C	5×10^{10}	10^{14}	—	Ω
Capacitance (input-output)	C_S	V_S = 0 V, f = 1 MHz, Ta = 25°C	—	0.6	—	pF

Note: All typical values are at Ta=25°C

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

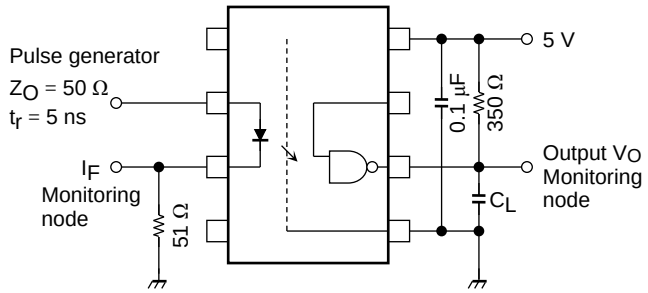
Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Propagation delay time to high output level (L → H)	t_{pLH}	1	R_L = 350 Ω, C_L = 15 pF I_F = 7.5 mA	—	60	120	ns
Propagation delay time to low output level (H → L)	t_{pHL}	1	R_L = 350 Ω, C_L = 15 pF I_F = 7.5 mA	—	60	120	ns
Output rise fall time (10 to 90%)	t_r, t_f	1	R_L = 350 Ω, C_L = 15 pF I_F = 7.5 mA	—	30	—	ns
Propagation delay time of enable from V_{EH} to V_{EL}	t_{ELH}	2	R_L = 350 Ω, C_L = 15 pF I_F = 7.5 mA, V_{EH} = 3.0 V	—	25	—	ns
Propagation delay time of enable from V_{EL} to V_{EH}	t_{EHL}	2	R_L = 350 Ω, C_L = 15 pF I_F = 7.5 mA, V_{EH} = 3.0 V	—	25	—	ns
Common mode transient immunity at logic high output level	CM_H	3	V_{CM} = 200 V, R_L = 350 Ω V_O (min) = 2 V, I_F = 0 mA	—	200	—	V / μs
Common mode transient immunity at logic low output level	CM_L	3	V_{CM} = 200 V, R_L = 350 Ω V_O (max) = 0.8 V, I_F = 5 mA	—	−500	—	V / μs

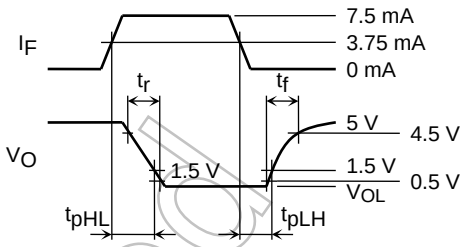
Instruction for use

1. A ceramic capacitor (0.1 μF) should be connected from pin 8 and pin 5 to stabilize the operation of the high gain linear amplifier. Failure to provide the bypassing may impair the switching properties. The total lead length between the capacitor and coupler should not exceed 1 cm.

2. Maximum electrostatic discharge voltage for any pins: 180 V (C = 200 pF, R = 0).

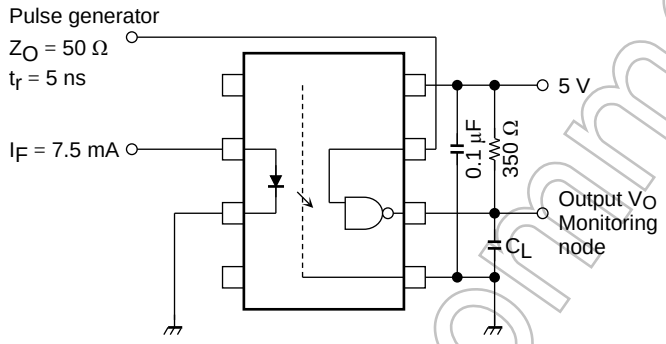
Test Circuit 1: Switching Time Test Circuit

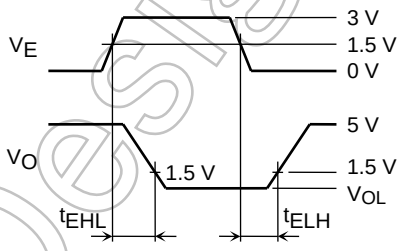




C_L is approximately 15 pF which includes probe and stray wiring capacitance.

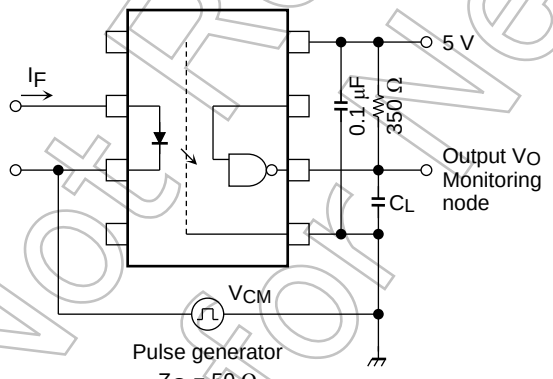
Test Circuit 2: Switching Time Test Circuit

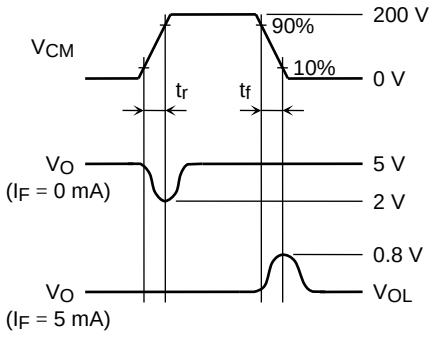




C_L is approximately 15 pF which includes probe and stray wiring capacitance.

Test Circuit 3: Common Mode Noise Immunity Test Circuit





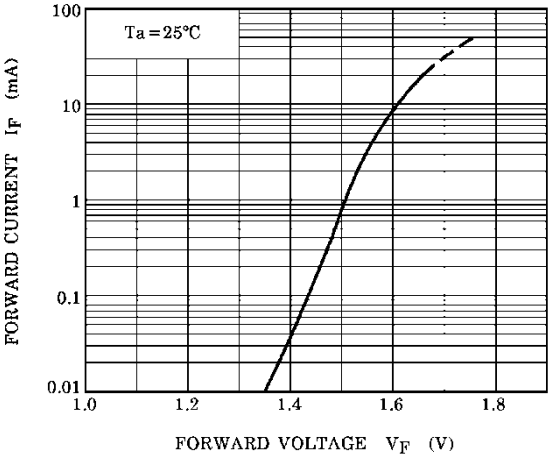
$$CM_H = \frac{160\ (V)}{t_r\ (\mu s)},\ CM_L = \frac{160\ (V)}{t_f\ (\mu s)}$$

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

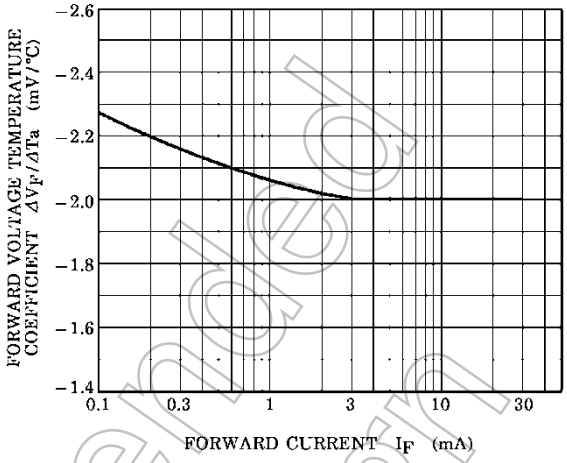
CM_H: The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the high output state (i.e., $V_O > 2.0$ V). Measured in volts per microsecond (V / μs).

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., $V_O < 0.8$ V). Measured in volts per microsecond (V / μs).

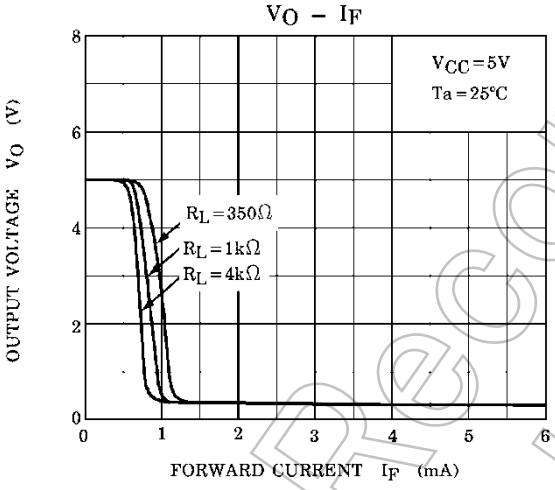
$I_F - V_F$



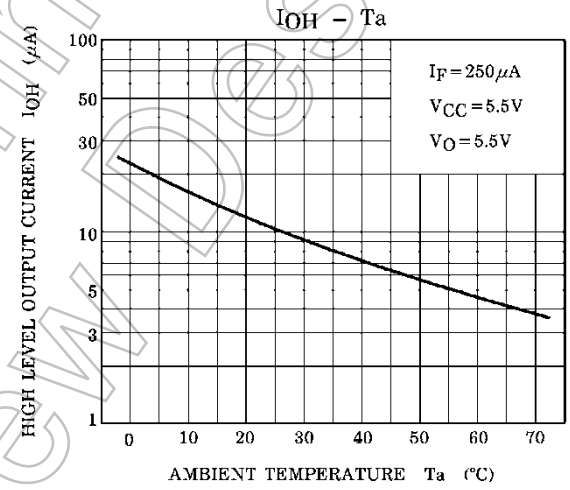
$\Delta V_F / \Delta Ta - I_F$



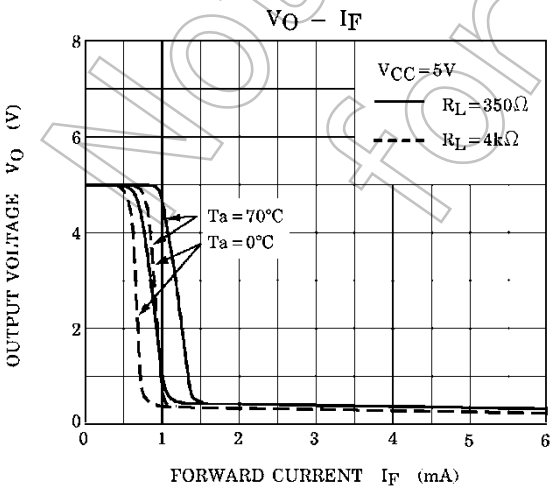
$V_O - I_F$



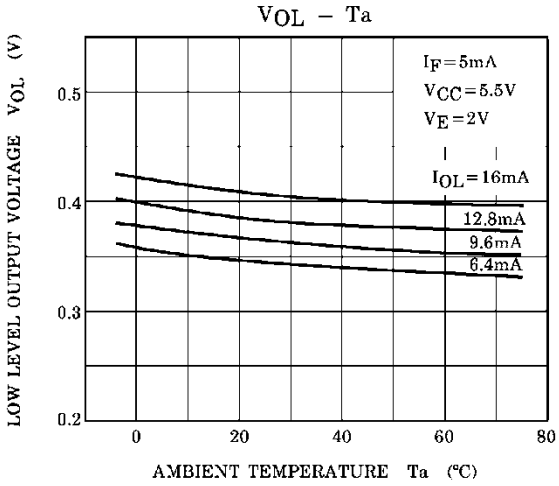
$I_{OH} - Ta$



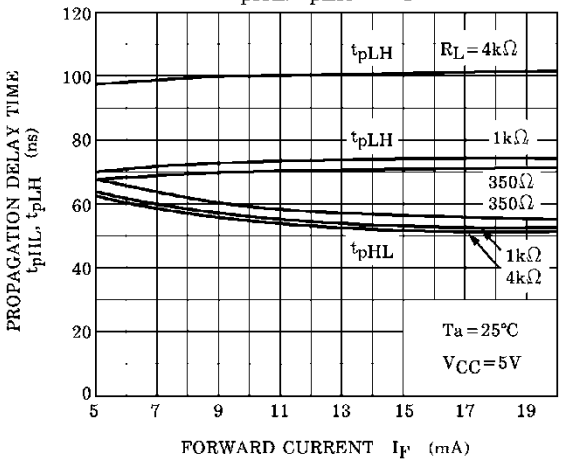
$V_O - I_F$



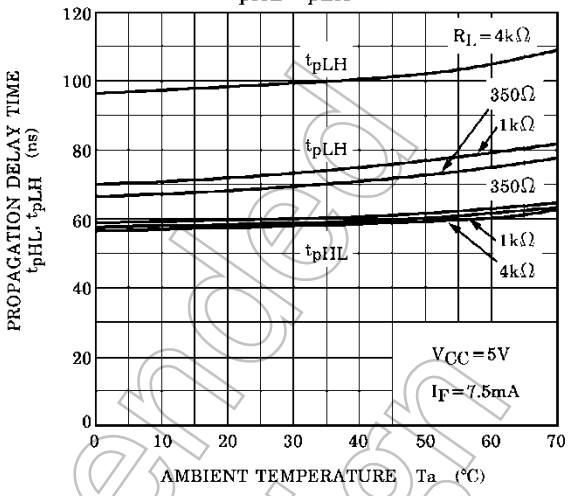
$V_{OL} - Ta$



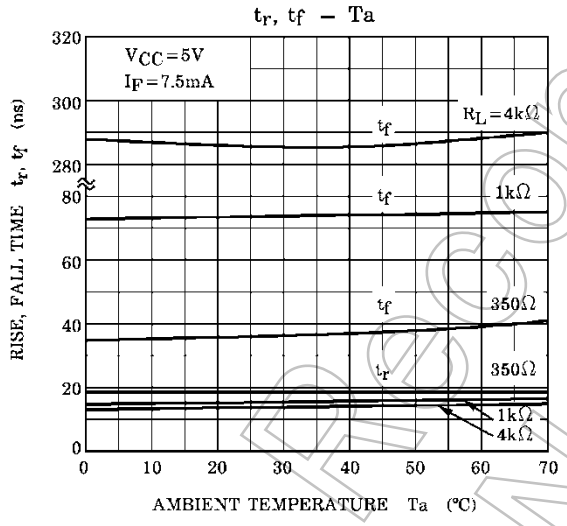
t_{pHL}, t_{pLH} – I_F



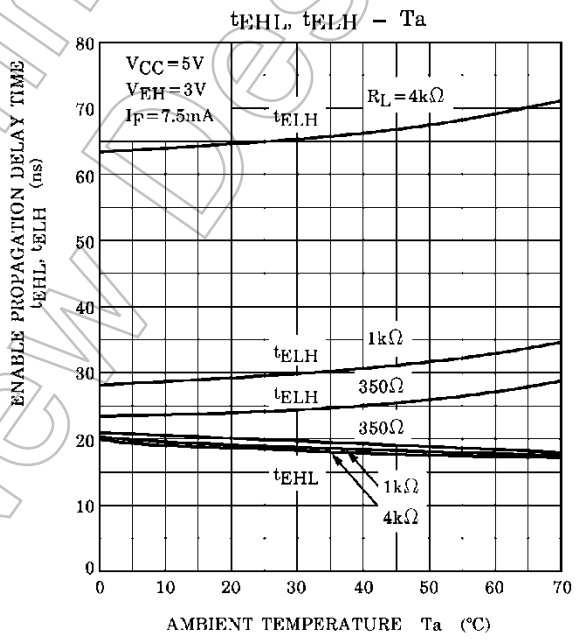
t_{pHL}, t_{pLH} – Ta



t_r, t_f – Ta



t_{EHL}, t_{ELH} – Ta



RESTRICTIONS ON PRODUCT USE

Toshiba Corporation and its subsidiaries and affiliates are collectively referred to as “TOSHIBA”.
Hardware, software and systems described in this document are collectively referred to as “Product”.

- TOSHIBA reserves the right to make changes to the information in this document and related Product without notice.
- This document and any information herein may not be reproduced without prior written permission from TOSHIBA. Even with TOSHIBA's written permission, reproduction is permissible only if reproduction is without alteration/omission.
- Though TOSHIBA works continually to improve Product's quality and reliability, Product can malfunction or fail. Customers are responsible for complying with safety standards and for providing adequate designs and safeguards for their hardware, software and systems which minimize risk and avoid situations in which a malfunction or failure of Product could cause loss of human life, bodily injury or damage to property, including data loss or corruption. Before customers use the Product, create designs including the Product, or incorporate the Product into their own applications, customers must also refer to and comply with (a) the latest versions of all relevant TOSHIBA information, including without limitation, this document, the specifications, the data sheets and application notes for Product and the precautions and conditions set forth in the "TOSHIBA Semiconductor Reliability Handbook" and (b) the instructions for the application with which the Product will be used with or for. Customers are solely responsible for all aspects of their own product design or applications, including but not limited to (a) determining the appropriateness of the use of this Product in such design or applications; (b) evaluating and determining the applicability of any information contained in this document, or in charts, diagrams, programs, algorithms, sample application circuits, or any other referenced documents; and (c) validating all operating parameters for such designs and applications. **TOSHIBA ASSUMES NO LIABILITY FOR CUSTOMERS' PRODUCT DESIGN OR APPLICATIONS.**
- **PRODUCT IS NEITHER INTENDED NOR WARRANTED FOR USE IN EQUIPMENTS OR SYSTEMS THAT REQUIRE EXTRAORDINARILY HIGH LEVELS OF QUALITY AND/OR RELIABILITY, AND/OR A MALFUNCTION OR FAILURE OF WHICH MAY CAUSE LOSS OF HUMAN LIFE, BODILY INJURY, SERIOUS PROPERTY DAMAGE AND/OR SERIOUS PUBLIC IMPACT ("UNINTENDED USE").** Except for specific applications as expressly stated in this document, Unintended Use includes, without limitation, equipment used in nuclear facilities, equipment used in the aerospace industry, medical equipment, equipment used for automobiles, trains, ships and other transportation, traffic signaling equipment, equipment used to control combustions or explosions, safety devices, elevators and escalators, devices related to electric power, and equipment used in finance-related fields. **IF YOU USE PRODUCT FOR UNINTENDED USE, TOSHIBA ASSUMES NO LIABILITY FOR PRODUCT.** For details, please contact your TOSHIBA sales representative.
- Do not disassemble, analyze, reverse-engineer, alter, modify, translate or copy Product, whether in whole or in part.
- Product shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable laws or regulations.
- The information contained herein is presented only as guidance for Product use. No responsibility is assumed by TOSHIBA for any infringement of patents or any other intellectual property rights of third parties that may result from the use of Product. No license to any intellectual property right is granted by this document, whether express or implied, by estoppel or otherwise.
- **ABSENT A WRITTEN SIGNED AGREEMENT, EXCEPT AS PROVIDED IN THE RELEVANT TERMS AND CONDITIONS OF SALE FOR PRODUCT, AND TO THE MAXIMUM EXTENT ALLOWABLE BY LAW, TOSHIBA (1) ASSUMES NO LIABILITY WHATSOEVER, INCLUDING WITHOUT LIMITATION, INDIRECT, CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OR LOSS, INCLUDING WITHOUT LIMITATION, LOSS OF PROFITS, LOSS OF OPPORTUNITIES, BUSINESS INTERRUPTION AND LOSS OF DATA, AND (2) DISCLAIMS ANY AND ALL EXPRESS OR IMPLIED WARRANTIES AND CONDITIONS RELATED TO SALE, USE OF PRODUCT, OR INFORMATION, INCLUDING WARRANTIES OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, ACCURACY OF INFORMATION, OR NONINFRINGEMENT.**
- GaAs (Gallium Arsenide) is used in Product. GaAs is harmful to humans if consumed or absorbed, whether in the form of dust or vapor. Handle with care and do not break, cut, crush, grind, dissolve chemically or otherwise expose GaAs in Product.
- Do not use or otherwise make available Product or related software or technology for any military purposes, including without limitation, for the design, development, use, stockpiling or manufacturing of nuclear, chemical, or biological weapons or missile technology products (mass destruction weapons). Product and related software and technology may be controlled under the applicable export laws and regulations including, without limitation, the Japanese Foreign Exchange and Foreign Trade Law and the U.S. Export Administration Regulations. Export and re-export of Product or related software or technology are strictly prohibited except in compliance with all applicable export laws and regulations.
- Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. Please use Product in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. **TOSHIBA ASSUMES NO LIABILITY FOR DAMAGES OR LOSSES OCCURRING AS A RESULT OF NONCOMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS.**

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for High Speed Optocouplers ***category:***

Click to view products by Toshiba ***manufacturer:***

Other Similar products are found below :

PS8502L2-AX ACNW261L-000E ACPL-344JT-000E ACPL-K49T-500E ACPL-K74T-000E ACPL-K75T-000E ACPL-W21L-560E ACPL-K44T-500E TLP187(TPL,E(T TLP2601(TP1,F) 610737H 6N137A-X001 6N137A-X017T 6N139-X007T HCPL2630M HCPL2731SM TLP555(F) HCPL2630SM PS2841-4A-F3-AX PS9817A-1-F3-AX PS9821-2-F3-AX ORPC-817D ORPC-817M/C ORPC-817M/B PT17-51C/L129(BIN2) TLP521-4GBSM UMW817C 6N137S1(TA) TLP521GB TLP521GB-S PS2501 PS2501-S TLP785GB TLP785GB-S LTV-214-G TLP2766A(E TLP2766A(LF4,E LCR-0202 EL814S1(TA)-V PC817X4NSZ2B CYPC817 OR-MOC3023 TLP267J(TPL,E(T TLP109(TPL,E(O EL2514S1(TU)(CLW)-G EL816S2(C)(TU)-F TLP281-4 MOC3023M ACPL-K49T-060E ACPL-K75T-500E