

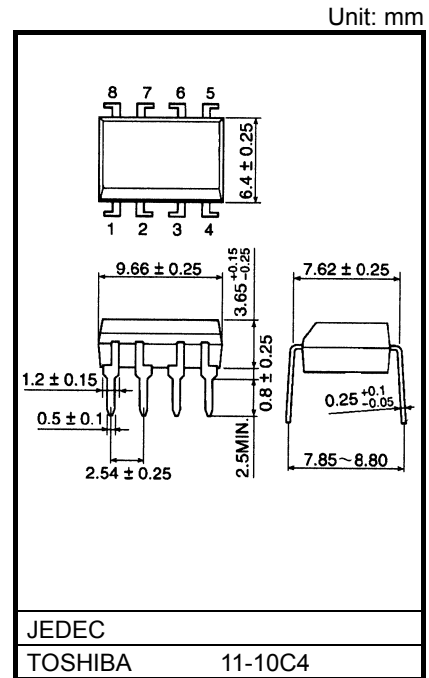
TLP554

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

The TOSHIBA TLP554 a photocoupler which combines a GaAIAsIRED as the emitter and an integrated high gain, high speed photodetector. 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/us.

- Input Current Threshold : IF=5mA (max)
- Switching Speed : 10MBd (typ. @NRZ)
- Common mode transient immunity : ±1000V/μs (min)
- Guaranteed Performance Over Temperature : 0 to 70°C
- Isolation Voltage : 2500 Vrms (min)
- UL Recognized : UL1577,File No.E67349

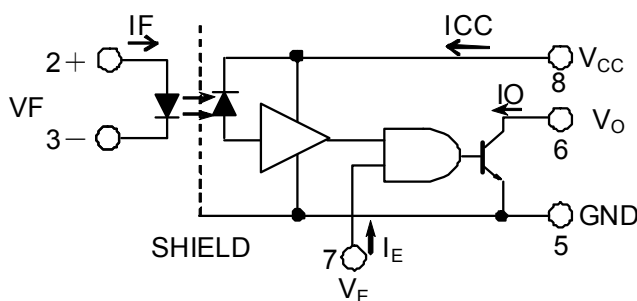


Weight: 0.54 g (typ.)

Truth Table (Positive Logic)

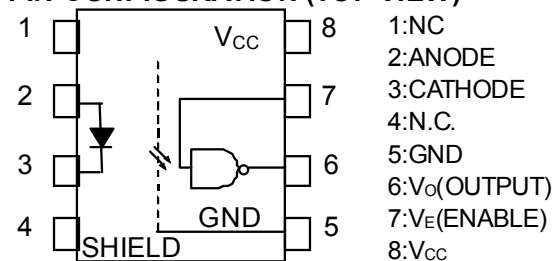
INPUT	ENABLE	OUTPUT
H	H	L
L	H	H
H	L	H
L	L	H

Schematic



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

PIN CONFIGURATION (TOP VIEW)



Recommended Operating Conditions

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Low Level input Voltage	VFL	-3	0	1.0	V
High Level input current	IFH	6.3*	—	20	mA
Supply Voltage	VCC	4.5	5	5.5	V
High-Level Enable Voltage	VEH	2.0	—	VCC	V
Low-Level Enable Voltage	VEL	0	—	0.8	V
Fan Out(TTL Load)	N	—	—	8	—
Operating Temperature	Topr	0	—	70	°C

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

*6.3mA condition permits at least 20% CTR degradation

Initial switching threshold is 5.0mA or less.

Absolute Maximum Ratings (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	IF	20	mA
	Reverse Voltage	VR	5	V
DETECTOR	Output Current	IO	25	mA
	Output Voltage	VO	-0.5~7	V
	Supply Voltage (Note 2)	VCC	7	V
	Enable Voltage (Note 3)	VE	5.5	V
	Output Power Dissipation	PO	40	mW
Storage Temperature Range		Tstg	-55~125	°C
Operating Temperature Range		Topr	-40~85	°C
Lead Soldering Temperature (10 s) (Note 4)		Tsol	260	°C
Isolation Voltage (AC, 1 minute, R.H.≤ 60%) (Note 5)		BVS	2500	Vrms

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) The VCC supply voltage to each TLP554 isolator must be bypassed by a 0.1μF 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 2) 1 Minute Maximum.

(Note 3) Not to exceed VCC by more than 500mV.

(Note 4) 2mm below seating plane.

(Note 5) 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 = 0~70°C , VCC=4.5~5.5V , VFL≤1.0V)

CHARACTERISTIC		SYMBOL	TEST CONDITION		MIN.	TYP.*	MAX.	UNIT
Forward Voltage		V _F	I _F = 10 mA , Ta=25°C			1.65	1.80	V
Temperature Coefficient of Forward Voltage		ΔV _F /ΔTa	I _F = 10 mA ,		—	-2.0	—	mV/°C
Input Reverse Current		I _R	V _R =5V, Ta=25°C		—	—	10	μA
Input Capacitance		C _T	V = 0 , f = 1MHz , Ta=25°C		—	45	—	pF
High-Level Output Current		IOH	V _F = 1.0V V _O = 5.5V V _E = 2.0V	Ta=0~70°C	—	10	250	μA
				Ta=25°C	—	0.5	10	
Low-Level Output Voltage		VOL	I _F =5mA , V _E =2.0V , IOL=13mA		—	0.4	0.6	V
High Level input current		IFH	IOL=13mA , V _E =2.0V , VOL=0.6V		—	—	5	mA
Supply Current	High Level	ICCH	VCC=5.5V V _E =0.5V	I _F =0mA	—	7	15	mA
	Low Level	ICCL		I _F =10mA	—	12	19	
Enable Current	High Level	IEH	VCC=5.5V	V _E =2.0V	—	-1.0	—	mA
	Low Level	IEL		V _E =0.5V	—	-1.6	-2.0	
Enable Voltage	High Level	VEH	— (Note 6)		2.0	—	—	V
	Low Level	VEL	—		—	—	0.8	
Capacitance (Input-Output)		CS	V _S =0 , f=1MHz , Ta=25°C		—	0.6	—	pF
Resistance (Input-Output)		RS	V _S =500V , Ta=25°C , R.H. ≤60%		5 × 10 ¹⁰	10 ¹⁴	—	Ω

(*)All typ.values are at Ta=25°C

(Note 6) No pull up resistor required as the device has an internal pull up resistor.

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

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT	
Propagation Delay Time	L→H	tpLH	1	RL=350Ω	IF=7.5→0mA	—	60	120	ns
	H→L	tpHL		CL=15pF	IF=0→7.5mA	—	60	120	
Output Rise Time(10-90%)	tr	IF=7.5→0 / 0→7.5mA RL=350Ω , CL=15pF		—	30	—	ns		
Output Fall Time(10-90%)	tf			—	30	—			
Enable Propagation Delay Time	tELH	2	RL=350Ω CL=15pF IF=7.5 mA	VE=0.5→3.0V	—	25	—	ns	
	tEHL			VE=3.0→0.5V	—	25	—		
Common Mode Transient Immunity at Hight Level Outout	CM _H	3	VCM=400V RL=350Ω (Note 7)	IF=0mA VO(Min)=2.0V	1000	10000	—	V/μs	
Common Mode Transient Immunity at Low Level Outout	CM _L			IF=7.5mA VO(Max)=0.8V	-1000	-10000	—		

(Note 7) 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.,VOUT>2.0V)

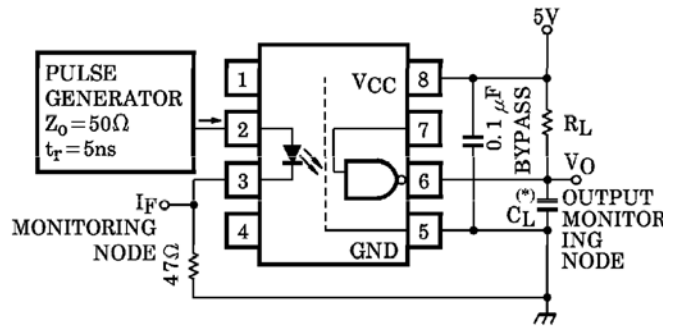
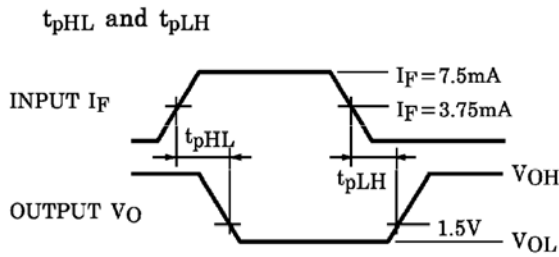
CM_L: The maximum tolerable rate of fall of the common mode voltage to ensure

the output will remain in the low output state(i.e.,VOUT<0.8V)

Measured in volts per microsecond(V/μs).

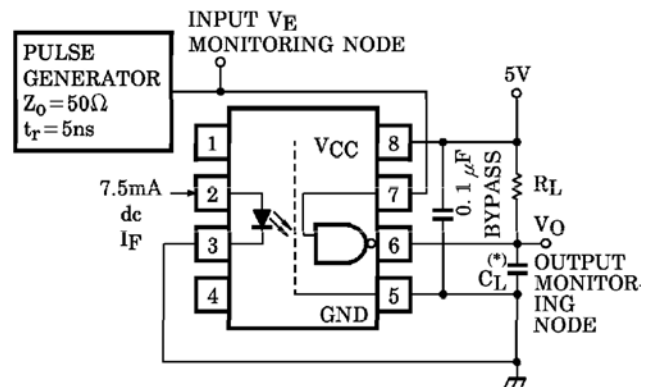
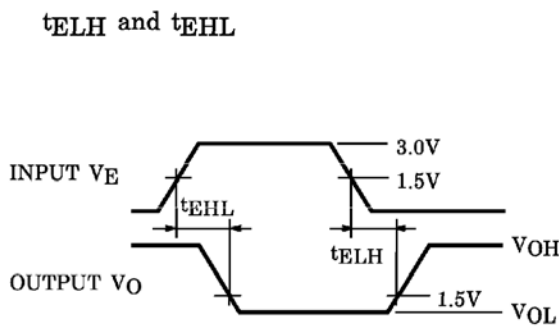
(Note 8) Maximum electrostatic discharge voltage for any pins:180V(C=200pF,R=0)

TEST CIRCUIT 1.



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

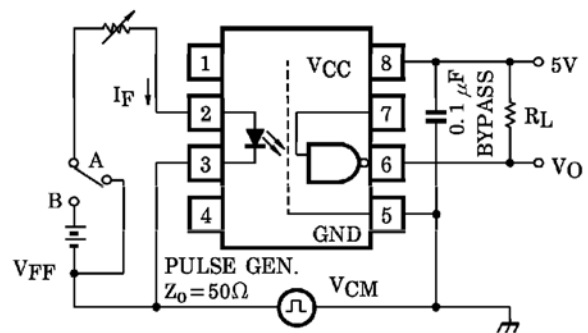
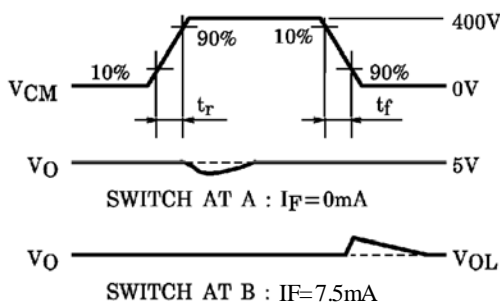
TEST CIRCUIT 2.

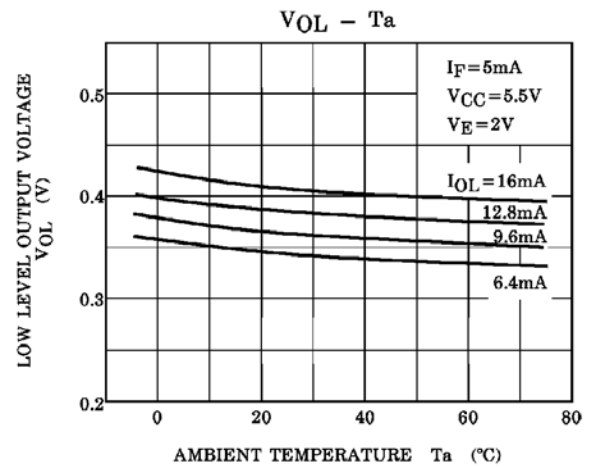
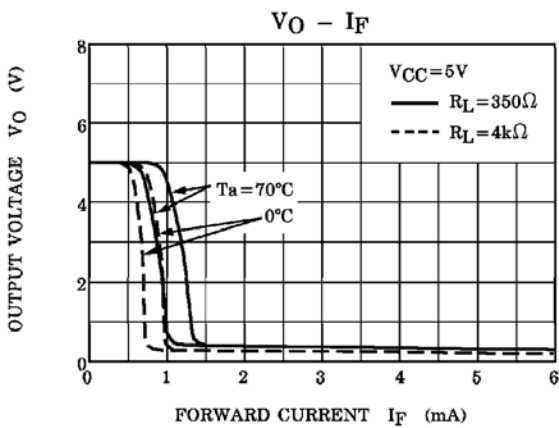
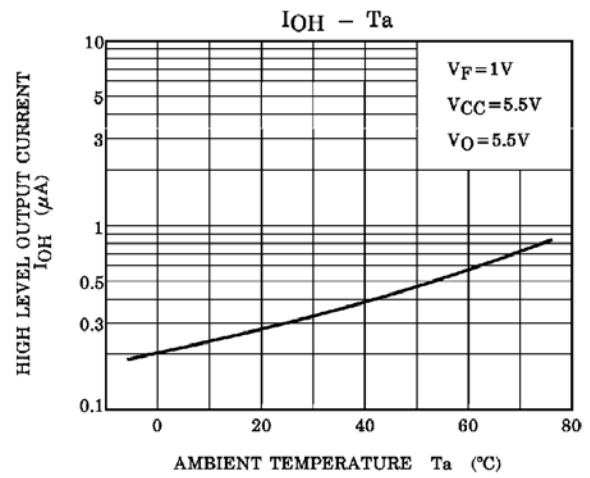
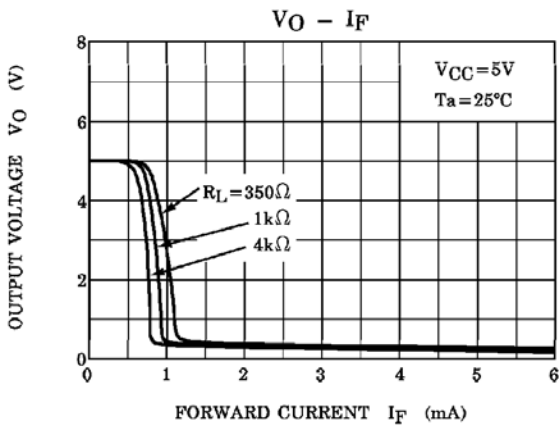
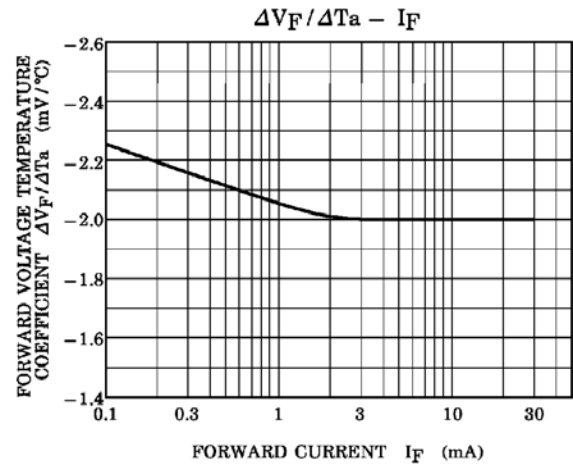
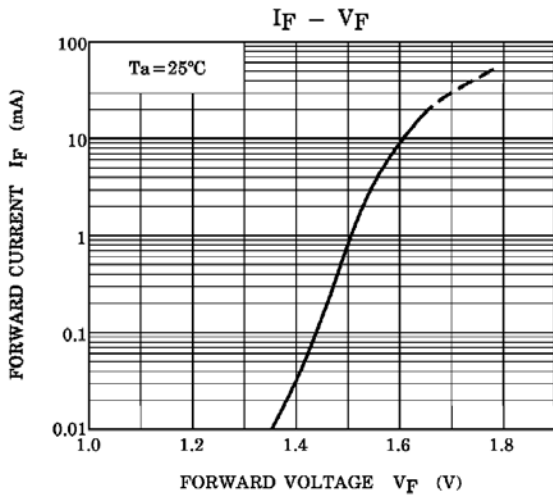


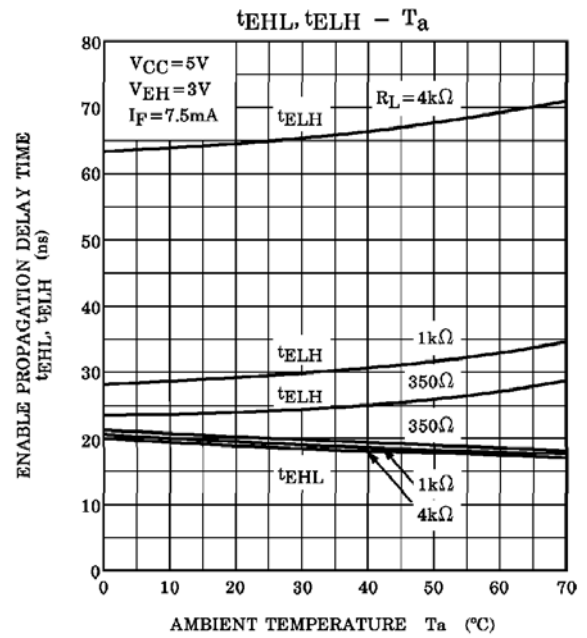
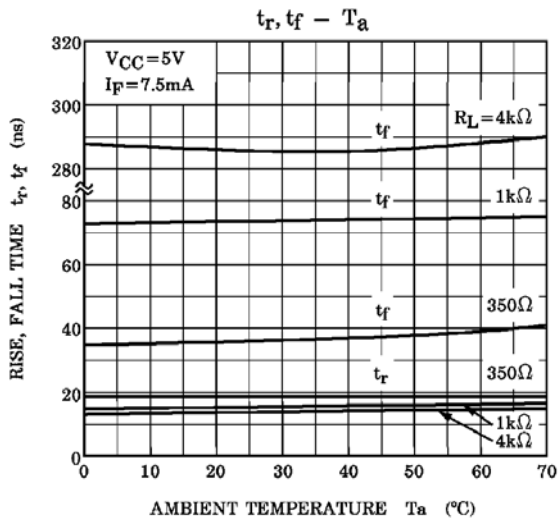
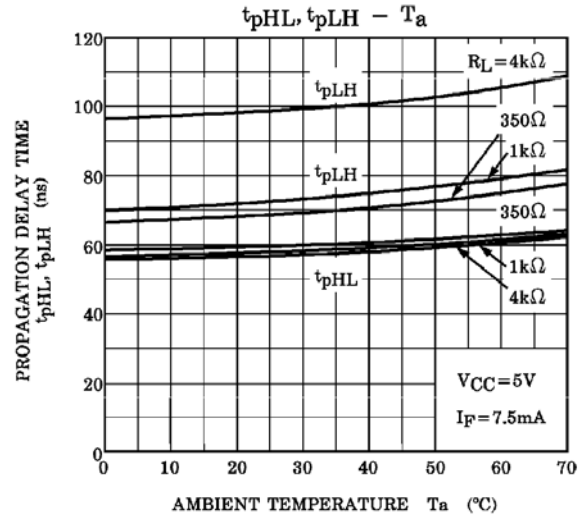
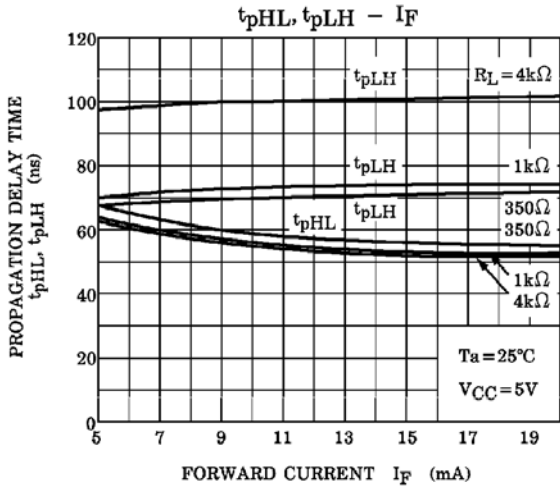
(*) C_L is approximately 15pF which includes probe and stray wiring capacitance.

TEST CIRCUIT 3.

Transient Immunity and Typ. Waveforms.







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