

TOSHIBA PHOTOCOUPLER PHOTO RELAY

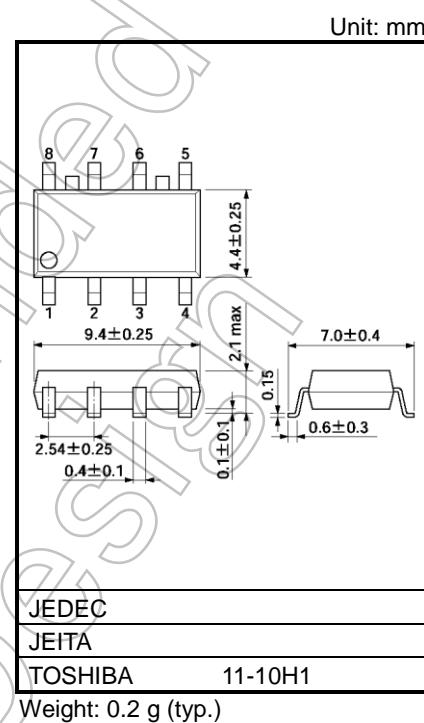
TLP209D

MEASUREMENT INSTRUMENTS
 LOGIC IC TESTERS / MEMORY TESTERS
 BOARD TESTERS / SCANNERS

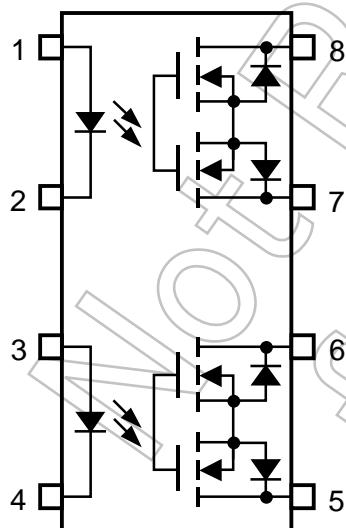
The TOSHIBA TLP209D consists of a gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a plastic SOP package. Its characteristics include low OFF-state current and low output pin capacitance, enabling it to be used in high-frequency measurement instruments.

Features

- 8 pin SOP (2.54SOP8) : 2.1 mm high, 2.54 mm pitch
- 2-Form-A
- Peak Off-State Voltage : 200 V (min)
- Trigger LED Current : 3 mA (max)
- On-State Current : 50 mA (max)
- On-State Resistance : 50 Ω (max)
- Output Capacitance : 20 pF (max)
- Isolation Voltage : 1500 Vrms (min)
- UL approved: UL1577, File No.E67349 Under application

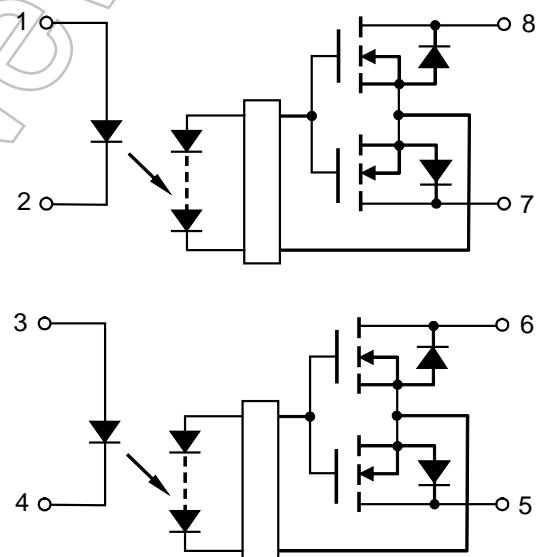


Pin Configuration (top view)



1, 3 : ANODE
 2, 4 : CATHODE
 5 : DRAIN D1
 6 : DRAIN D2
 7 : DRAIN D3
 8 : DRAIN D4

Schematic



Start of commercial production
 2008-10

Absolute Maximum Ratings (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	I _F	50	mA
	Forward Current Derating (Ta ≥ 25°C)	ΔI _F /°C	-0.5	mA/°C
	Reverse Voltage	V _R	5	V
	Diode Power Dissipation	P _D	50	mW
	Diode Power Dissipation Derating (Ta > 25°C)	ΔP _D / °C	-0.5	mW/°C
	Junction Temperature	T _j	125	°C
DETECTOR	Off-State Output Terminal Voltage	V _{OFF}	200	V
	On-State Current	I _{ON}	50	mA
	On-State Current Derating (Ta ≥ 25°C)	ΔI _{ON} /°C	-0.5	mA/°C
	Output Power Dissipation	P _O	125	mW
	Output Power Dissipation Derating (Ta ≥ 25°C)	ΔP _O / °C	-1.25	mW / °C
	Junction Temperature	T _j	125	°C
Storage Temperature Range		T _{stg}	-55 to 125	°C
Operating Temperature Range		T _{opr}	-40 to 85	°C
Lead Soldering Temperature (10 s)		T _{sol}	260	°C
Isolation Voltage (AC, 1 minute, R.H. ≤ 60%) (NOTE1)		B _{VS}	1500	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.

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 : Device considered a two-terminal device : LED side pins shorted together, and DETECTOR side pins shorted together.

Recommended Operating Conditions

CHARACTERISTIC	SYMBOL	Min	Typ.	Max	UNIT
Supply Voltage	V _{DD}	—	—	160	V
Forward Current	I _F	5	7.5	15	mA
On-State Current	I _{ON}	—	—	50	mA
Operating Temperature	T _{opr}	-20	—	60	°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.

Individual Electrical Characteristics (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	Min	Typ.	Max	UNIT
LED	Forward Voltage	V _F	I _F = 10 mA	1.0	1.15	1.3	V
	Reverse Current	I _R	V _R = 5 V	—	—	10	μA
	Capacitance	C _T	V = 0 V, f = 1 MHz	—	30	—	pF
DETECTOR	Off-State Current	I _{OFF}	V _{OFF} = 160 V	—	—	1	nA
	Capacitance	C _{OFF}	V = 0 V, f = 1 MHz	—	15	20	pF

Coupled Electrical Characteristics ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	Min	Typ.	Max	UNIT
Trigger LED Current	I_{FT}	$I_{ON} = 50 \text{ mA}$	—	1	3	mA
Return LED Current	I_{FC}	$I_{OFF} = 100 \mu\text{A}$	0.1	—	—	mA
On-State Resistance	R_{ON}	$I_{ON} = 50 \text{ mA}, I_F = 5 \text{ mA}$	—	40	50	Ω

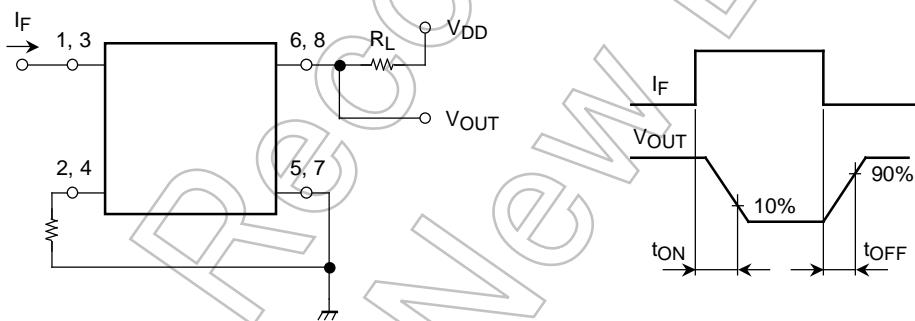
Isolation Characteristics ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	Min	Typ.	Max	UNIT
Capacitance Input to Output	C_S	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation Resistance	R_S	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	B_VS	AC, 60 s	1500	—	—	V_{rms}
		AC, 1 s (in oil)	—	3000	—	
		DC, 60 s (in oil)	—	3000	—	V_{dc}

Switching Characteristics ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CONDITION	Min	Typ.	Max	UNIT
Turn-on Time	t_{ON}	$R_L = 200 \Omega$ $V_{DD} = 10 \text{ V}, I_F = 5 \text{ mA}$	—	0.03	0.5	ms
Turn-off Time	t_{OFF}		—	0.07	0.2	

Note 2: SWITCHING TIME TEST CIRCUIT



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