

TLP3312

Battery Control

Measuring Instruments

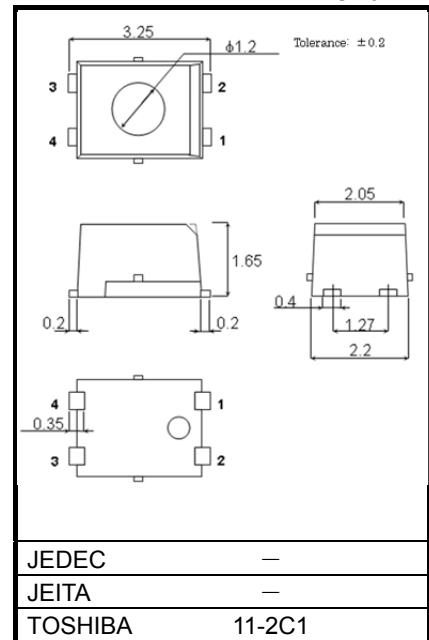
Logic IC Testers / Memory Testers

The TOSHIBA TLP3312 is an ultra-small photorelay suitable for surface-mount assembly. The TLP3312 consists of a GaAs infrared-emitting diode optically coupled to a photo-MOSFET and is housed in a 4-pin package. Its features include low Off-state current and low output pin capacitance.

Features

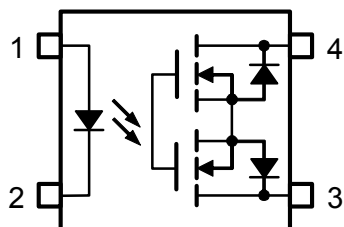
- 4-pin USOP (SSOP4): height=1.65 mm, pitch=1.27 mm
- 1-Form-A
- Peak Off-State Voltage: 60 V (min)
- Trigger LED Current: 3 mA (max)
- On-State Current: 400 mA (max)
- On-State Resistance: 1.5 Ω (max), 1.0 Ω (typ.)
- Isolation Voltage: 500 Vrms (min)

Unit: mm



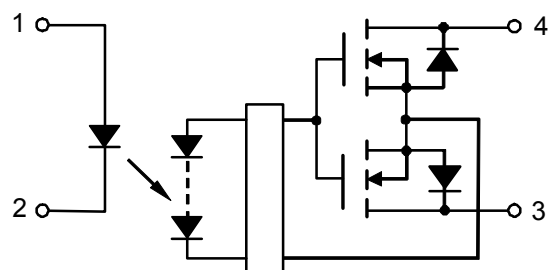
Weight: 0.03 g (typ.)

Pin Configuration (Top View)



- 1 : ANODE
- 2 : CATHODE
- 3 : DRAIN
- 4 : DRAIN

Schematic



Start of commercial production
2009/03

Absolute Maximum Ratings (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
LED	Forward Current	I_F	50	mA
	Forward Current Derating (Ta ≥ 25°C)	$\Delta I_F/^\circ\text{C}$	-0.5	mA/°C
	Reverse Voltage	V_R	5	V
	Junction Temperature	T_j	125	°C
DETECTOR	Off-State Output Terminal Voltage	V_{OFF}	60	V
	On-State Current	I_{ON}	400	mA
	On-State Current Derating (Ta ≥ 25°C)	$\Delta I_{ON}/^\circ\text{C}$	-4.0	mA/°C
	Junction Temperature	T_j	125	°C
Storage Temperature Range		T_{stg}	-40 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%) (Note 1)		BV_S	500	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.

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).

Note1: Device considered a two-terminal device: Pins 1 and 2 shorted together, and pins 3 and 4 shorted together.

Caution

This device is sensitive to electrostatic discharge. When using this device, please ensure that all tools and equipment are earthed.

Recommended Operating Conditions

CHARACTERISTIC	SYMBOL	MIN	TYP.	MAX	UNIT
Supply Voltage	V_{DD}	—	—	48	V
Forward Current	I_F	—	—	20	mA
On-State Current	I_{ON}	—	—	400	mA
Operating Temperature	T_{opr}	-20	—	65	°C

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the devices. Each item also has its own independent guideline document. In developing designs using these products, please confirm the specified characteristics shown in these documents.

Individual Electrical Characteristics (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
LED	Forward Voltage	V_F	$I_F = 10\text{ mA}$	1.0	1.15	1.3	V
	Reverse Current	I_R	$V_R = 5\text{ V}$	—	—	10	μA
	Capacitance	C_T	$V = 0\text{ V}, f = 1\text{ MHz}$	—	15	—	pF
DETECTOR	Off-State Current	I_{OFF}	$V_{OFF} = 60\text{ V}$	—	—	1	nA
	Capacitance	C_{OFF}	$V = 0\text{ V}, f = 1\text{ MHz}, t < 1\text{ s}$	—	20	—	pF

Coupled Electrical Characteristics (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Trigger LED Current	I_{FT}	$I_{ON} = 100 \text{ mA}$	—	—	3	mA
Close LED Current	I_{FC}	$I_{OFF} = 10 \text{ } \mu\text{A}$	0.2	—	—	mA
On-State Resistance	R_{ON}	$I_{ON} = 400 \text{ mA}, I_F = 5 \text{ mA}$	—	1.0	1.5	Ω

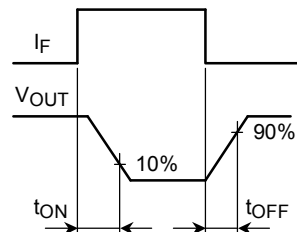
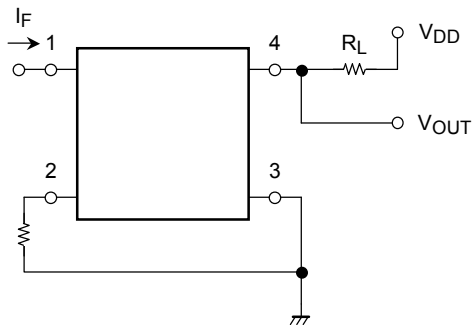
Isolation Characteristics (Ta = 25°C)

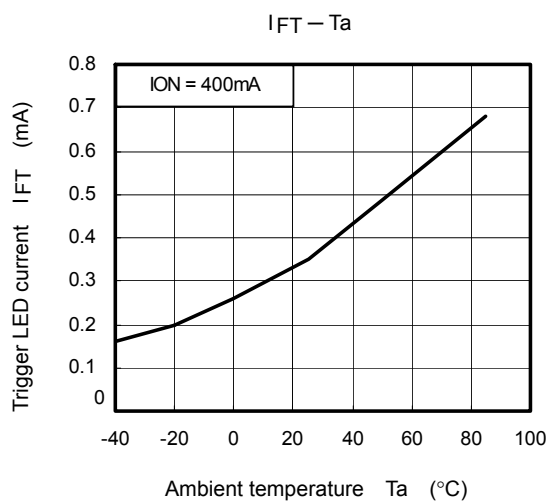
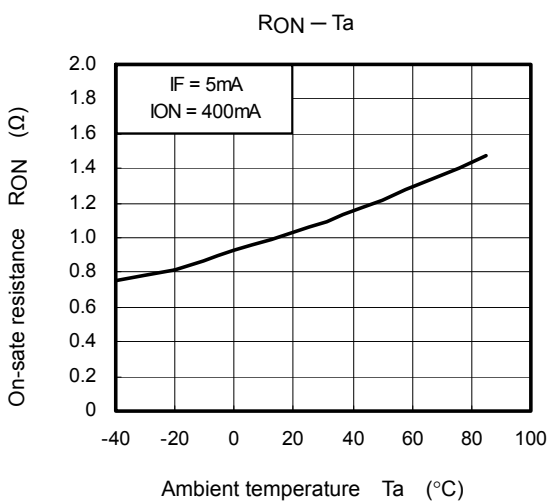
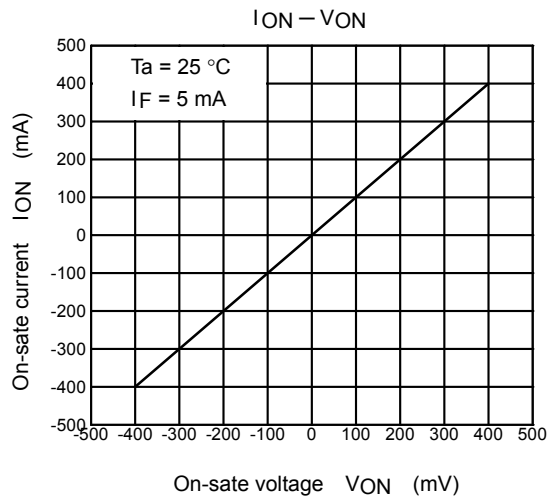
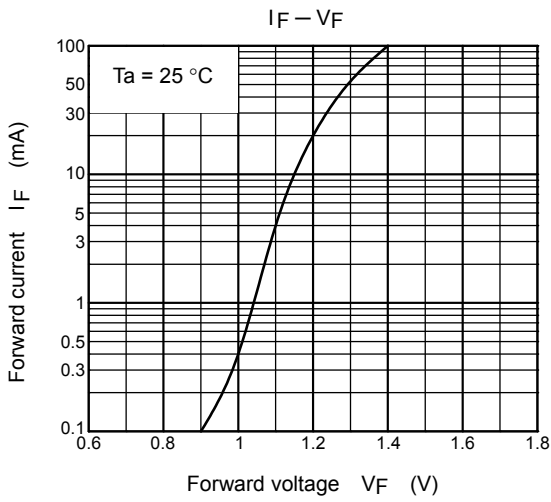
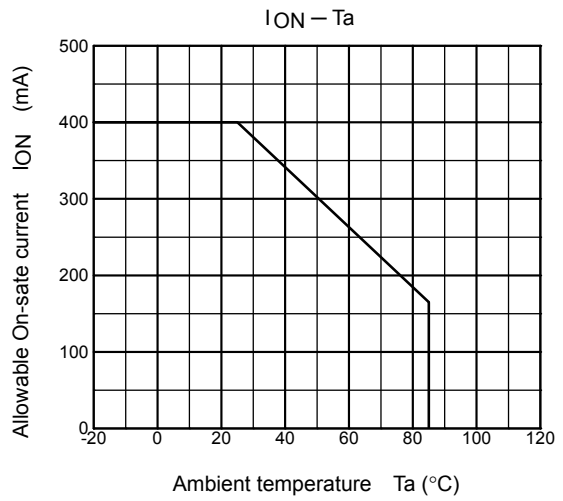
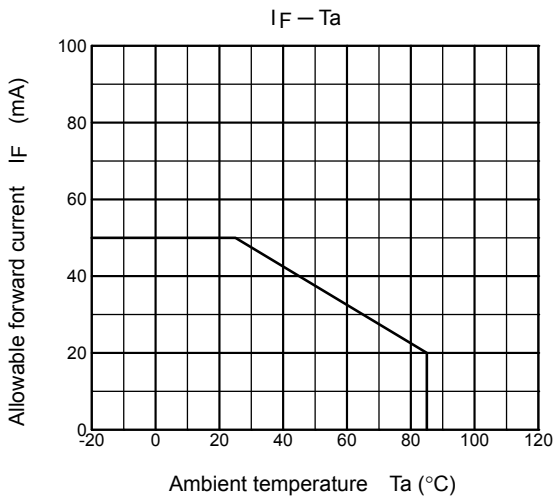
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Capacitance Input to Output	C_S	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.3	—	pF
Isolation Resistance	R_S	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 1 minute	500	—	—	Vrms
		AC, 1 second (in oil)	—	1000	—	—
		DC, 1 minute (in oil)	—	1000	—	Vdc

Switching Characteristics (Ta = 25°C)

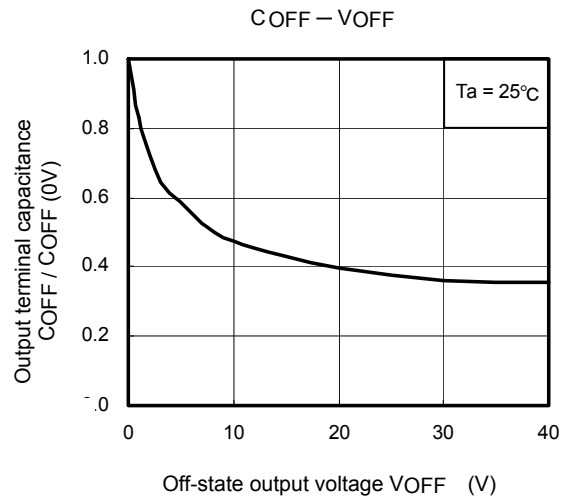
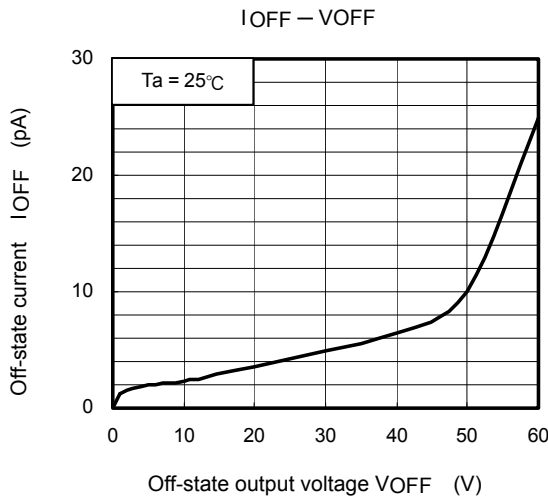
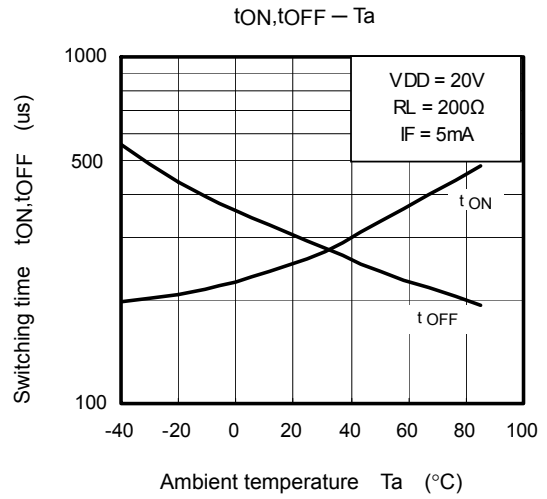
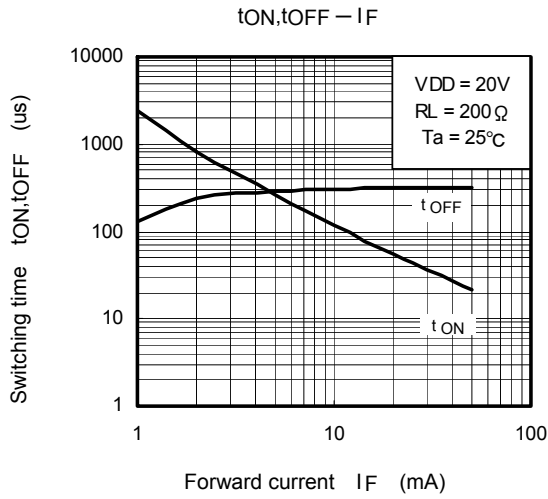
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Turn-on Time	t_{ON}	$R_L = 200 \text{ } \Omega$ $V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$ (Note 2)	—	—	500	μs
Turn-off Time	t_{OFF}		—	—	500	

Note 2: Switching time test circuit





*: The above graphs show typical characteristics.



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1. Recommended Soldering

Precautions about the Soldering of the SMD Type Photocoupler

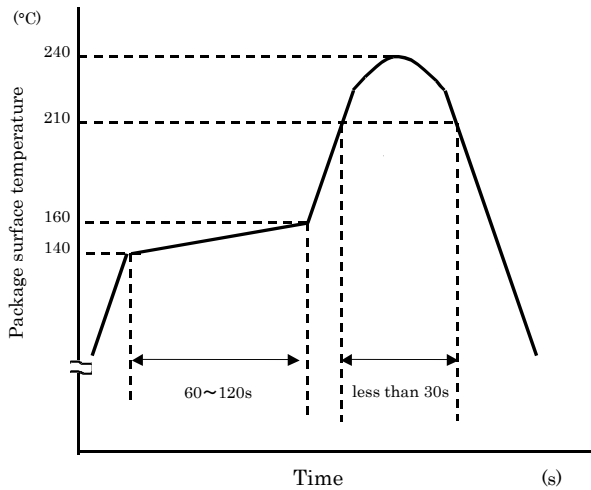
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TLP3312(F)

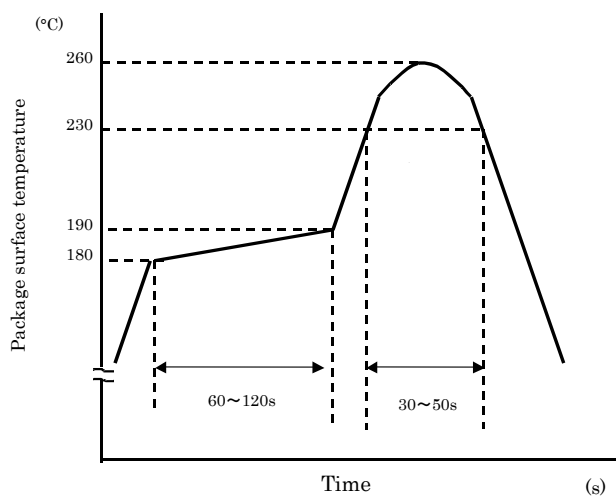
<Mounting Method>

1) Using Solder Reflow

- Temperature profile example of lead (Pb) solder



- Temperature profile example of using lead (Pb-free) solder



Reflow soldering must be performed once or twice.

2. Packing

Please use the device in a condition of the following because package breaking may occur when the USOP coupler catches the heat stress in the time of soldering in the state that exposure to moisture in the air.

1. This moisture-proof bag may be stored unopened for up to 12 months under the following conditions.
Temperature: 5°C~30°C
Humidity: 90% (max)
2. After the moisture-proof bag has been opened, the devices should be assembled within 168 hours in an environment of 5°C to 30°C/70% RH or below.
3. If, upon opening, the moisture indicator card shows humidity of 30% or above (when the indication color changes to pink) or the expiration date has passed, the devices should be baked while packed in the tape reel. After baking, use the baked devices within 72 hours, but perform baking only once.
Baking conditions: 60 ±5°C, for 64 to 72 hours.
Expiration date: 12 months from the sealing date, which is imprinted on the same side as this label.
4. Repeated baking may cause the peeling strength of the tape to change, leading to trouble in mounting. Also, be sure to prevent damage to the device from static electricity during the baking process.
5. Any breakage in the laminate packing material will cause the hermeticity of the product to deteriorate. Do not toss or drop the packed devices.

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