

TOSHIBA Photocoupler Photorelay

# TLP225A

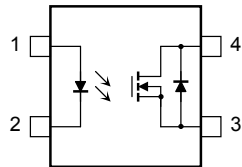
Programmable Controllers  
 I/O Board Interface  
 DC-Output Module  
 Replacement for DC Mechanical Relay

The TOSHIBA TLP225A consists of gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a four lead plastic DIP package (DIP4).

The TLP225A is MOSFET output and can control a current of 0.5 A which is suitable for DC output module.

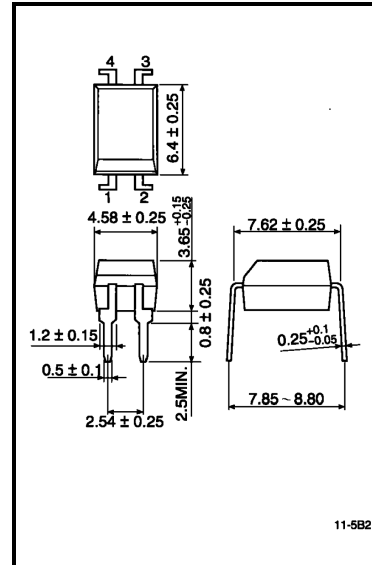
- Peak off-state voltage: 60 V (min)
- Trigger LED current: 5 mA (max)
- On-state current: 500 mA (max)
- On-state resistance: 1.1 Ω (max)
- Isolation voltage: 2500 Vrms (min)
- UL recognized: UL1577, file No. E67349

### Pin Configuration (top view)



- 1: Anode
- 2: Cathode
- 3: Source
- 4: Drain

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	11-5B2

Weight: 0.27 g (typ.)

## Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
LED	Forward current	$I_F$	50	mA
	Forward current derating (Ta ≥ 53°C)	$\Delta I_F/^\circ\text{C}$	-0.5	mA/°C
	Peak forward current (100 μs pulse, 100 pps)	$I_{FP}$	1	A
	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	$I_{ON}$	500	mA
	On-state current derating (Ta ≥ 25°C)	$\Delta I_{ON}/^\circ\text{C}$	-5.0	mA/°C
	Junction temperature	$T_j$	125	°C
Storage temperature range		$T_{stg}$	-55 to 125	°C
Operating temperature range		$T_{opr}$	-20 to 85	°C
Lead soldering temperature (10 s)		$T_{sol}$	260	°C
Isolation voltage (AC, 1 min., R.H. ≤ 60%) (Note)		$BV_S$	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.

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: Pins 1 and 2 shorted together and pins 3 and 4 shorted together.

## Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	$V_{DS}$	—	—	48	V
Forward current	$I_F$	12	20	30	mA
On-state current	$I_{ON}$	—	—	300	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)

Characteristics		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	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0, f = 1 \text{ MHz}$	—	30	—	pF
Detector	Off-state current	$I_{OFF}$	$V_{OFF} = 60 \text{ V}$	—	—	1	$\mu\text{A}$
	Capacitance	$C_{OFF}$	$V = 0, f = 1 \text{ MHz}$	—	—	—	pF

## Coupled Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	$I_{FT}$	$I_{ON} = 500 \text{ mA}$	—	3	5	mA
On-state resistance	$R_{ON}$	$I_{ON} = 500 \text{ mA}, I_F = 10 \text{ mA}$	—	0.8	1.1	$\Omega$

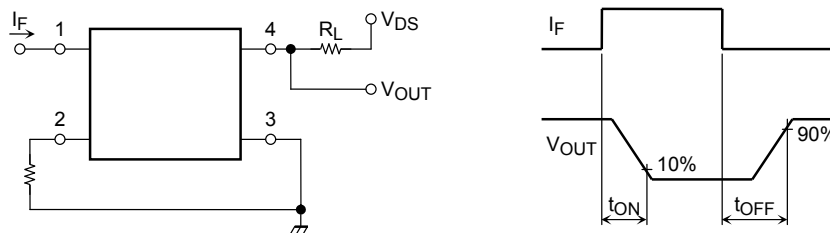
## Isolation Characteristics (Ta = 25°C)

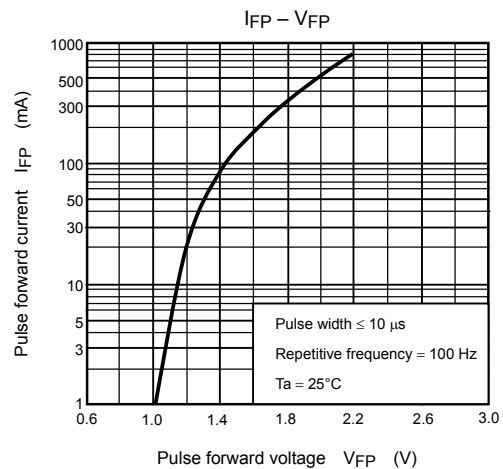
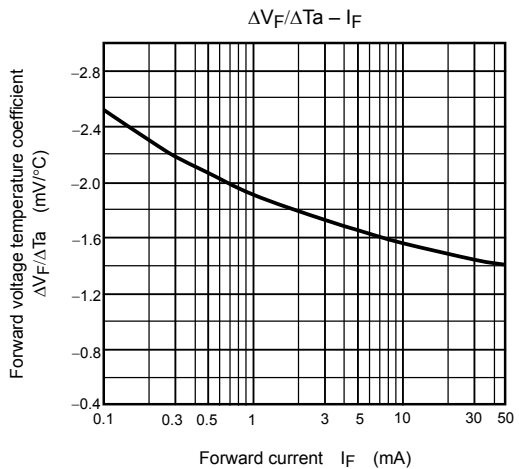
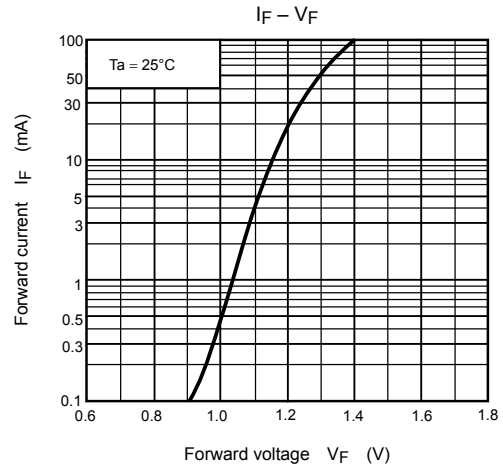
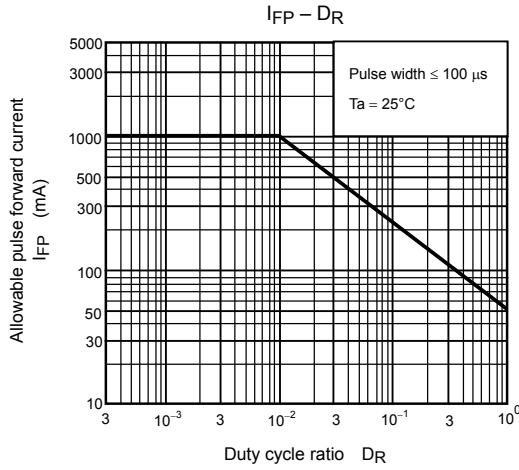
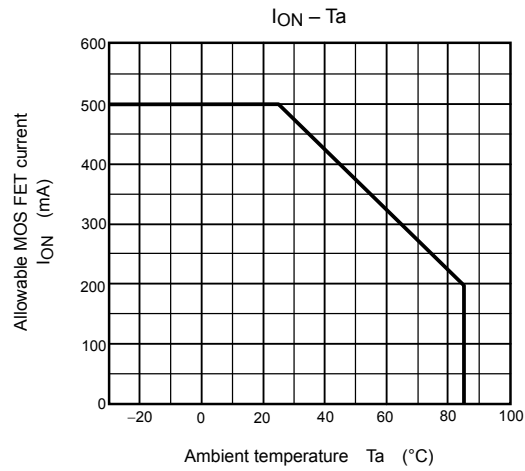
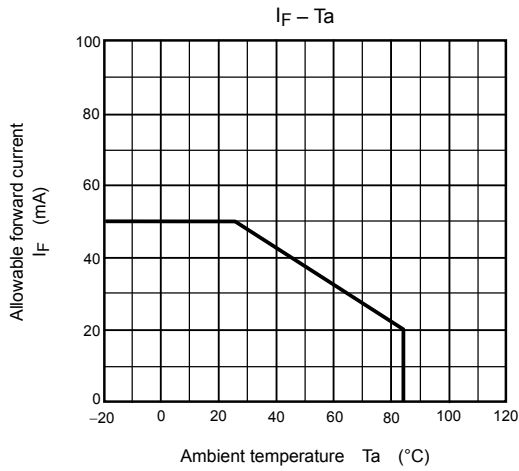
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	$C_S$	$V_S = 0, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	2500	—	—	Vrms
		AC, 1 second, in oil	—	5000	—	
		DC, 1 minute, in oil	—	5000	—	Vdc

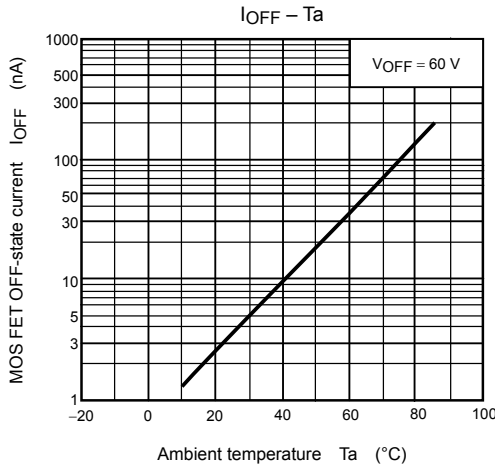
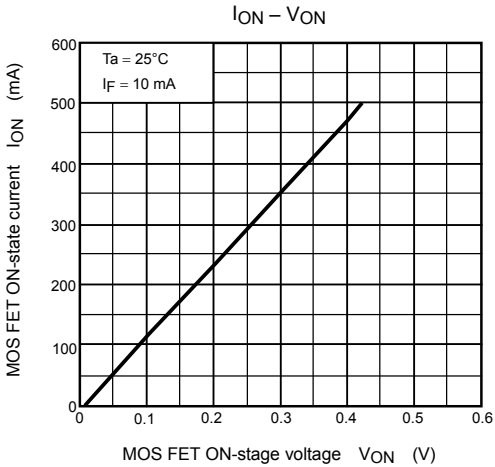
## Switching Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	$t_{ON}$	$R_L = 200 \Omega$ $V_{DS} = 20 \text{ V}, I_F = 10 \text{ mA}$ (Note)	—	—	2	ms
Turn-off time	$t_{OFF}$	$R_L = 200 \Omega$ $V_{DS} = 20 \text{ V}, I_F = 10 \text{ mA}$ (Note)	—	—	2	ms

Note: Switching time test circuit







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