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TOSHIBA Photocoupler Photorelay

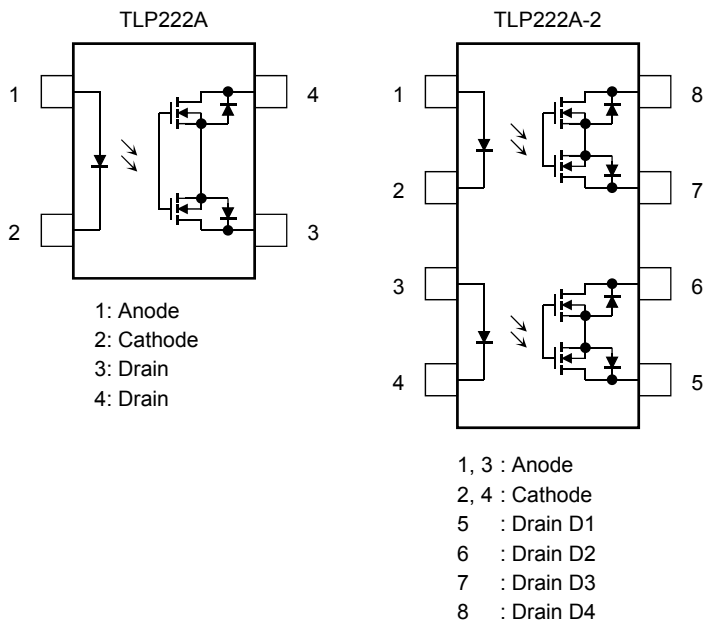
# TLP222A, TLP222A-2

Telecommunications  
 Measurement and Control Equipment  
 Data Acquisition System  
 Measurement Equipment

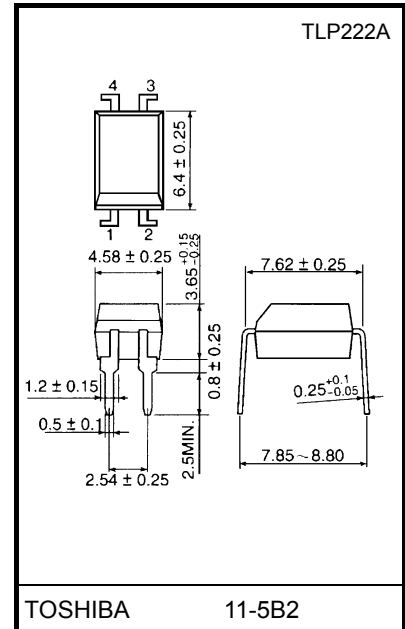
The Toshiba TLP222A and TLP222A-2 consist of a gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a DIP package whose withstanding voltage is 60 V. These photorelays have higher output current rating than phototransistor-type photocoupler; hence, they are suitable for use as On/Off control for high current.

- Normally open (1-form-A and 2-form-A) devices
- Peak off-state voltage: 60 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 500 mA (max)
- On-state resistance: 2 Ω (max)
- Isolation voltage: 2500 Vrms (min)
- UL recognized: UL1557, File No.E67349

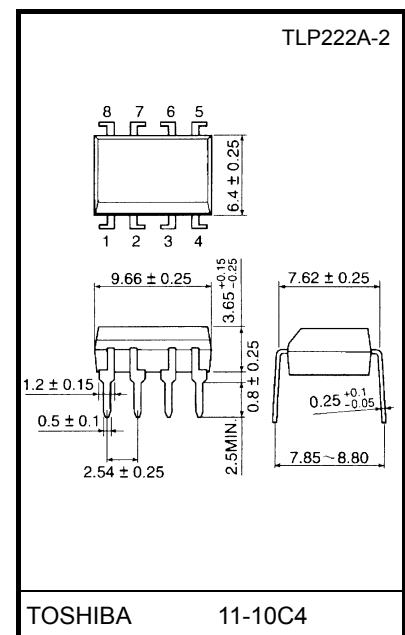
### Pin Configuration (top view)



Unit: mm



Weight: 0.26 g (typ.)



Weight: 0.54 g (typ.)

Start of commercial production  
 2002/03

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

Characteristics		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	
	Peak forward current	$I_{FP}$	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	TLP222A	$I_{ON}$	500	mA
		TLP222A-2			
	Forward current derating (Ta ≥ 25°C)	TLP222A	$\Delta I_{ON}/^\circ\text{C}$	-5.0	mA/°C
		TLP222A-2			
	Junction temperature		$T_j$	125	°C
Storage temperature		$T_{stg}$	-55 to 125	°C	
Operating temperature		$T_{opr}$	-40 to 85	°C	
Lead soldering temperature (10 s)		$T_{sol}$	260	°C	
Isolation voltage (AC, 1 minute, R.H. ≤ 60%) (Note 1)		$BV_S$	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 1: LED pins are shorted together. Detector pins are also shorted together.

## Recommended Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit
Supply voltage	$V_{DD}$	—	—	48	V
Forward current	$I_F$	5	7.5	25	mA
On-state current	$I_{ON}$	—	—	500	mA
Operating temperature	$T_{opr}$	-20	—	65	°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.

## 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	μA
	Capacitance	$C_T$	$V = 0, f = 1 \text{ MHz}$	—	30	—	pF
Detector	Off-state current	$I_{OFF}$	$V_{OFF} = 60 \text{ V}$	—	—	1	μA
	Capacitance	$C_{OFF}$	$V = 0, f = 1 \text{ MHz}$	—	130	—	pF

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	$I_{FT}$	$I_{ON} = 500 \text{ mA}$	—	1.6	3	mA
Return LED current	$I_{FC}$	$I_{OFF} = 100 \mu\text{A}$	0.1	—	—	mA
On-state resistance	$R_{ON}$	$I_{ON} = 500 \text{ mA}, I_F = 5 \text{ mA}$	—	1	2	$\Omega$

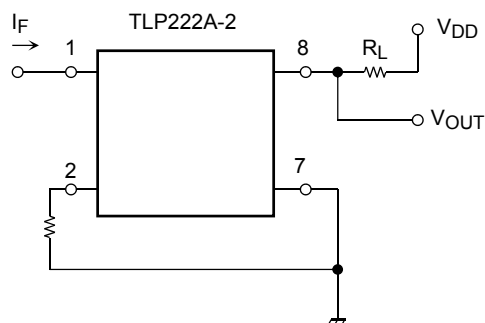
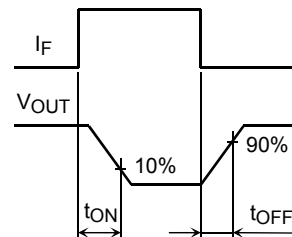
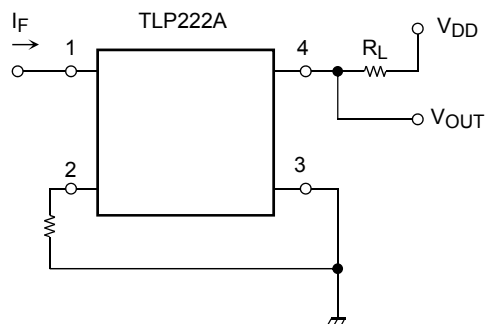
## Isolation Characteristics (Ta = 25°C)

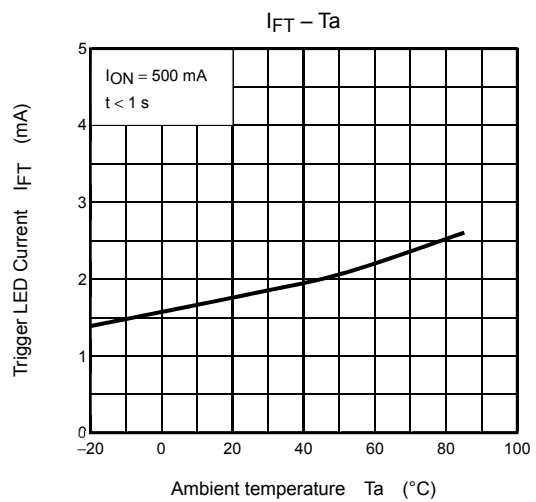
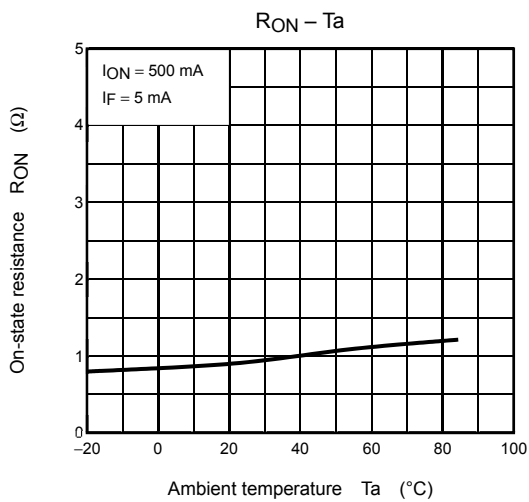
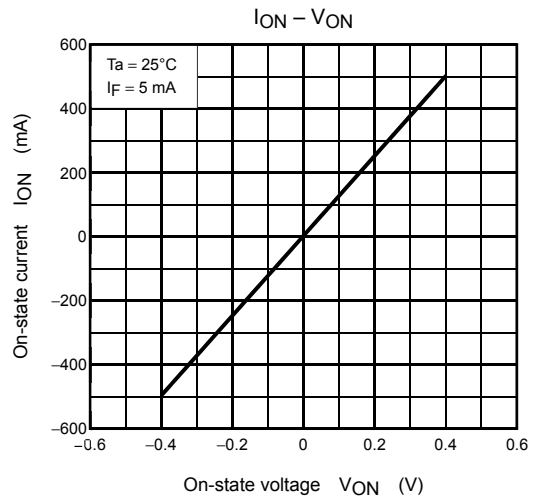
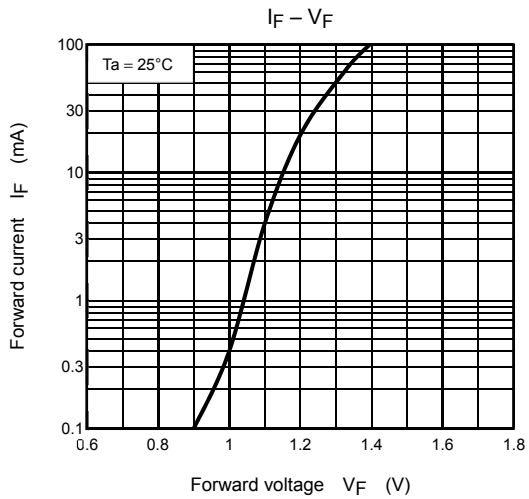
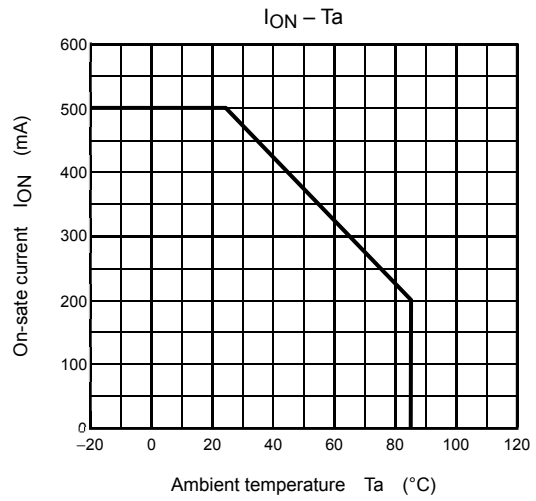
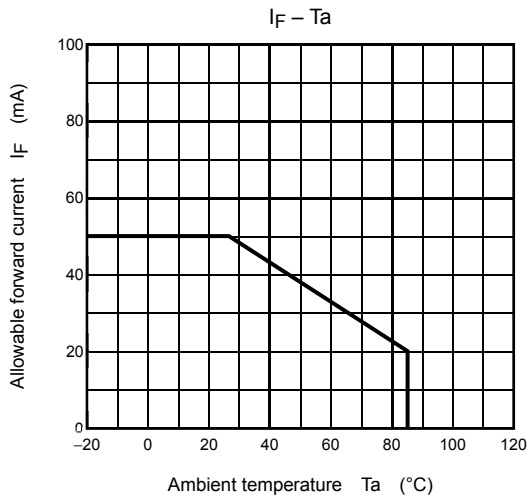
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	$C_S$	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	2500	—	—	Vrms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

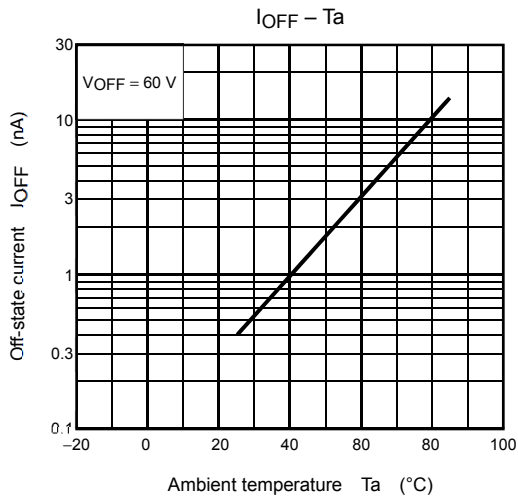
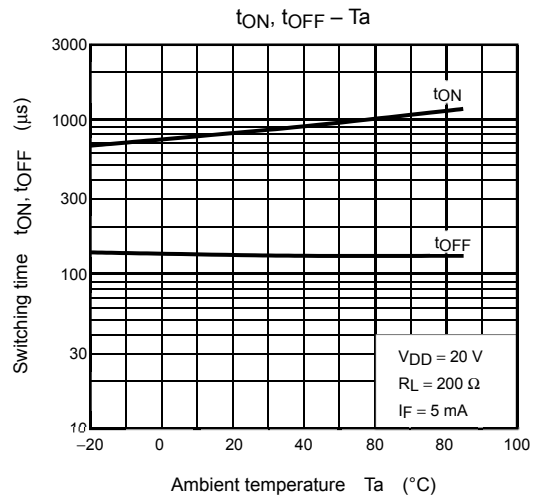
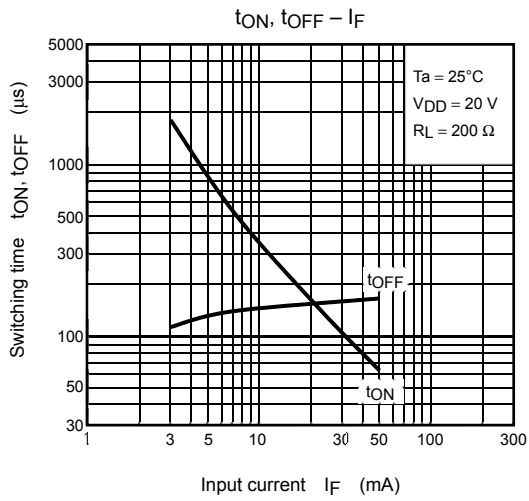
## Switching Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	$t_{ON}$	$R_L = 200 \Omega$ $V_{DD} = 20 \text{ V}, I_F = 5 \text{ mA}$ (Note 2)	—	0.8	2	ms
Turn-off time	$t_{OFF}$		—	0.1	0.5	

Note 2: Switching time test circuit







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