

TLP220A

1. Applications

- Mechanical relay replacements
- Security Systems
- Measuring Equipment
- Factory Automation (FA)
- Amusement Equipment
- Smart Meters
- Electricity Meters

2. General

The TLP220A photorelay consists of a photo MOSFET optically coupled to an infrared light emitting diode. It is housed in a 4-pin DIP package. It provides an isolation voltage of 5000 Vrms, making it suitable for applications that require reinforced insulation.

3. Features

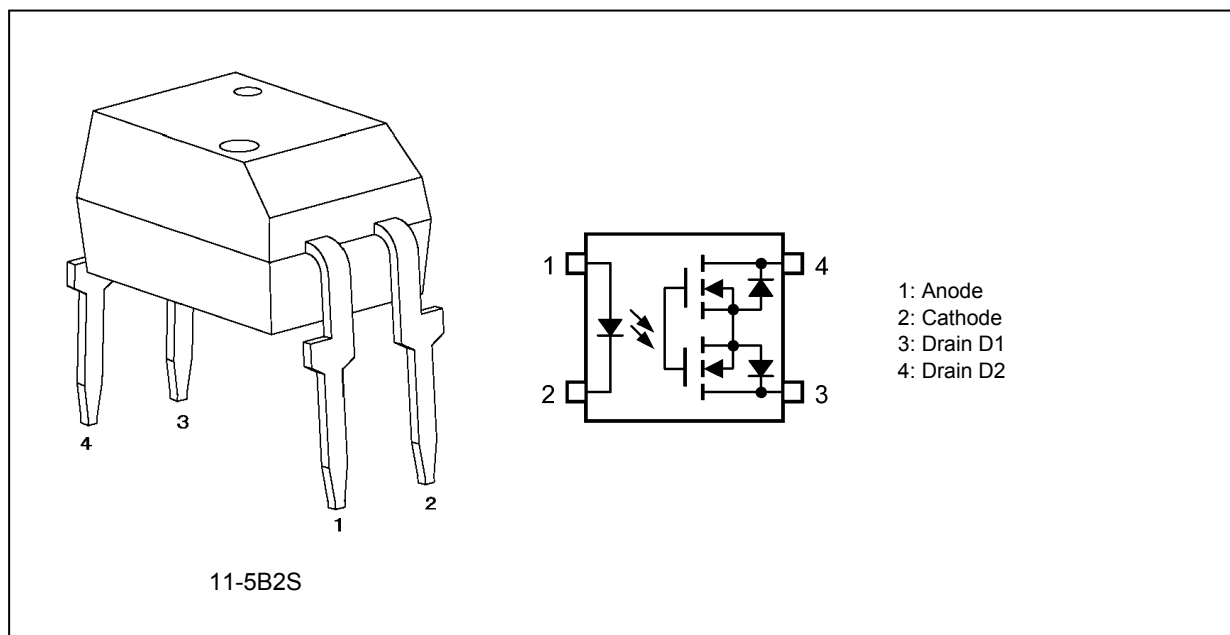
- (1) Normally open (1-Form-A)
- (2) OFF-state output terminal voltage: 60 V (min)
- (3) Trigger LED current: 2 mA (max)
- (4) ON-state current: 500 mA (max)
- (5) ON-state resistance: 2 Ω (max)
- (6) Isolation voltage: 5000 Vrms (min)
- (7) Safety standards

UL-under application: UL1577 File No.E67349

cUL-under application: CSA Component Acceptance Service No.5A, File No.E67349

VDE-under application: Option (D4) EN60747-5-2

4. Packaging and Pin Configuration



5. Internal Circuit

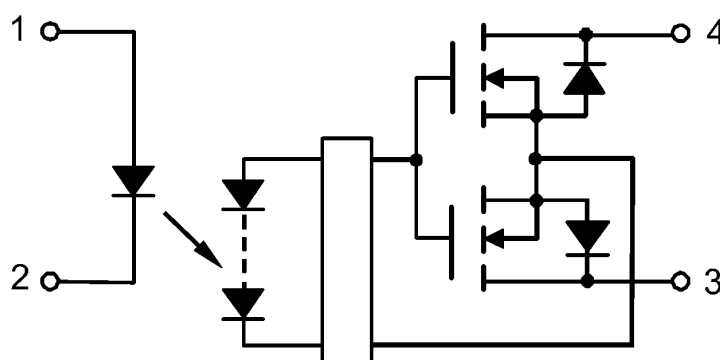


Fig. 5.1 Internal Circuit

6. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25^\circ\text{C}$)

	Characteristics	Symbol	Note	Rating	Unit
LED	Input forward current	I_F		30	mA
	Input forward current derating ($T_a \geq 25^\circ\text{C}$)	$\Delta I_F / \Delta T_a$		-0.3	mA/ $^\circ\text{C}$
	Input forward current (pulsed) (100 μs pulse, 100 pps)	I_{FP}		1	A
	Input reverse voltage	V_R		5	V
	Junction temperature	T_j		125	$^\circ\text{C}$
Detector	OFF-state output terminal voltage	V_{OFF}		60	V
	ON-state current	I_{ON}		500	mA
	ON-state current derating ($T_a \geq 25^\circ\text{C}$)	$\Delta I_{ON} / \Delta T_a$		-5	mA/ $^\circ\text{C}$
	ON-state current (pulsed) ($t = 100 \text{ ms}$, Duty = 1/10)	I_{ONP}		1.5	A
	Junction temperature	T_j		125	$^\circ\text{C}$
Common	Storage temperature	T_{stg}		-55 to 125	$^\circ\text{C}$
	Operating temperature	T_{opr}		-40 to 85	
	Lead soldering temperature (10 s)	T_{sol}		260	
	Isolation voltage AC, 1 min, R.H. $\leq 60\%$	BV_S	(Note 1)	5000	

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: This device is considered as a two-terminal device: Pins 1 and 2 are shorted together, and pins 3 and 4 are shorted together.

7. Recommended Operating Conditions (Note)

Characteristics	Symbol	Note	Min	Typ.	Max	Unit
Supply voltage	V_{DD}		—	—	48	V
Input forward current	I_F		3	5	15	mA
ON-state current	I_{ON}		—	—	500	
Operating temperature	T_{opr}		-20	—	65	$^\circ\text{C}$

Note: The recommended operating conditions are given as a design guide necessary to obtain the intended performance of the device. Each parameter is an independent value. When creating a system design using this device, the electrical characteristics specified in this datasheet should also be considered.

8. Electrical Characteristics (Unless otherwise specified, $T_a = 25^\circ\text{C}$)

	Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
LED	Input forward voltage	V_F		$I_F = 10\text{ mA}$	1.45	1.63	1.75	V
	Input reverse current	I_R		$V_R = 5\text{ V}$	—	—	10	μA
	Input capacitance	C_t		$V = 0\text{ V}$, $f = 1\text{ MHz}$	—	40	—	pF
Detector	OFF-state current	I_{OFF}		$V_{\text{OFF}} = 60\text{ V}$	—	—	1	μA
	Output capacitance	C_{OFF}		$V = 0\text{ V}$, $f = 1\text{ MHz}$	—	130	—	pF

9. Coupled Electrical Characteristics (Unless otherwise specified, $T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	I_{FT}		$I_{\text{ON}} = 500\text{ mA}$	—	0.3	2	mA
Return LED current	I_{FC}		$I_{\text{OFF}} = 10\text{ }\mu\text{A}$	0.1	—	—	mA
ON-state resistance	R_{ON}	(Note 1)	$I_{\text{ON}} = 500\text{ mA}$, $I_F = 5\text{ mA}$, Continuous	—	0.6	2	Ω

Note 1: Thermally saturated state.

10. Isolation Characteristics (Unless otherwise specified, $T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Total capacitance (input to output)	C_S	(Note 1)	$V_S = 0\text{ V}$, $f = 1\text{ MHz}$	—	0.8	—	pF
Isolation resistance	R_S	(Note 1)	$V_S = 500\text{ V}$, R.H. $\leq 60\%$	1×10^{12}	10^{14}	—	Ω
Isolation voltage	BV_S		AC, 1 min	5000	—	—	Vrms
			AC, 1s in oil	—	10000	—	
			DC, 1 min, in oil	—	10000	—	Vdc

Note 1: This device is considered as a two-terminal device: Pins 1 and 2 are shorted together, and pins 3 and 4 are shorted together.

11. Switching Characteristics (Unless otherwise specified, $T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Note	Test Condition	Min	Typ	Max	Unit
Turn-on time	t_{on}		See Fig. 11.1. $R_L = 200\text{ }\Omega$, $V_{\text{DD}} = 20\text{ V}$, $I_F = 5\text{ mA}$	—	0.5	1	ms
Turn-off time	t_{off}			—	0.2	1	

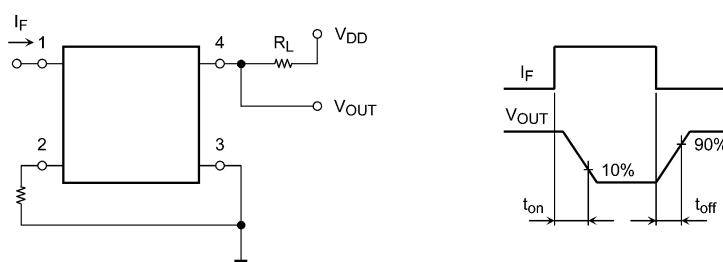


Fig. 11.1 Switching Time Test Circuit

12. Characteristics Curves and Circuit Connections

12.1. Characteristics Curves (Note)

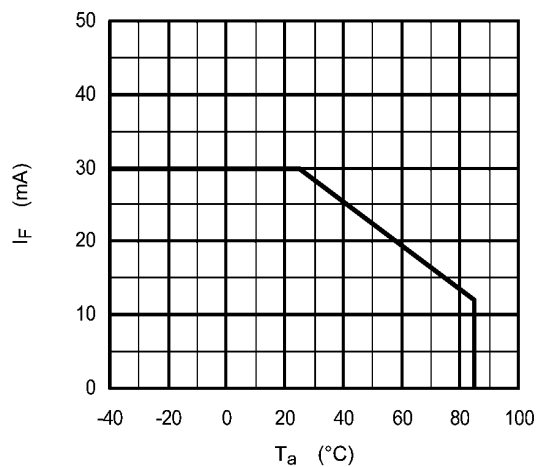


Fig. 12.1.1 $I_F - T_a$

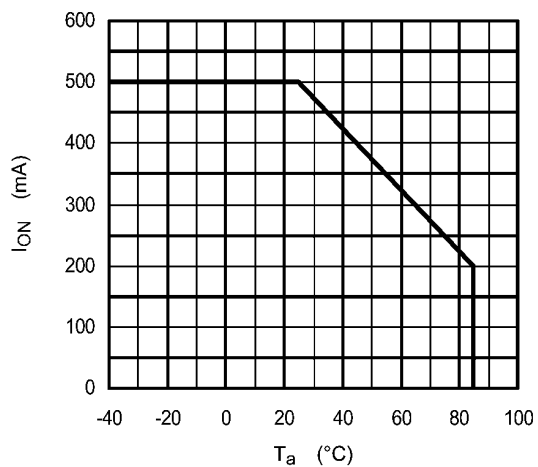


Fig. 12.1.2 $I_{ON} - T_a$

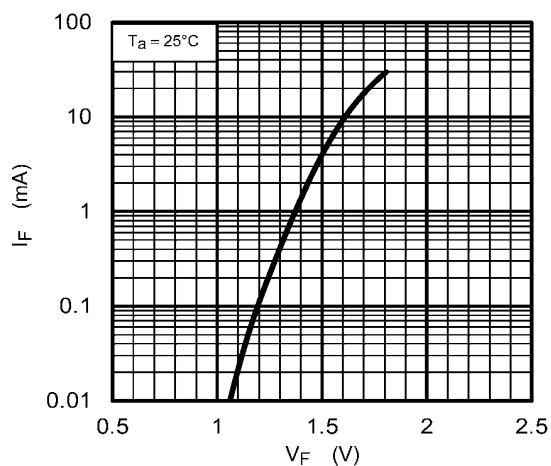


Fig. 12.1.3 $I_F - V_F$

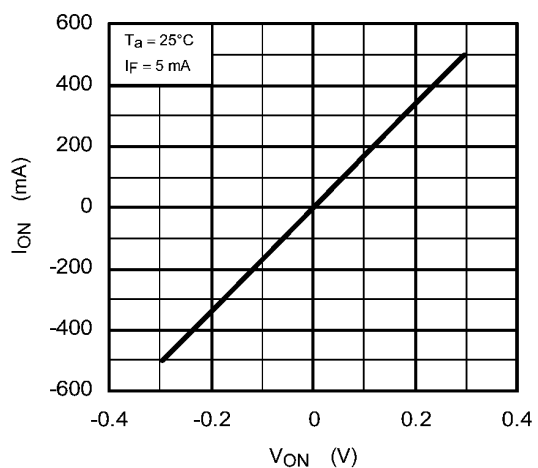


Fig. 12.1.4 $I_{ON} - V_{ON}$

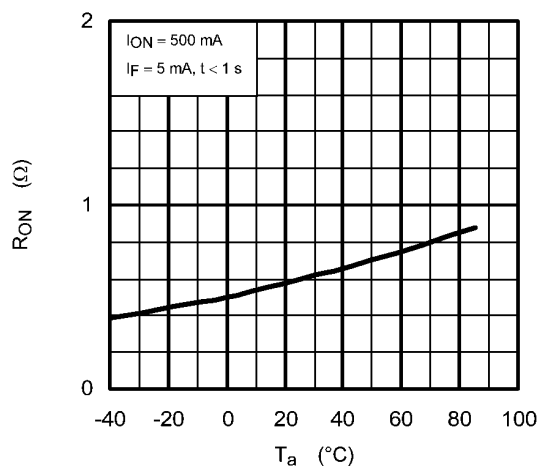


Fig. 12.1.5 $R_{ON} - T_a$

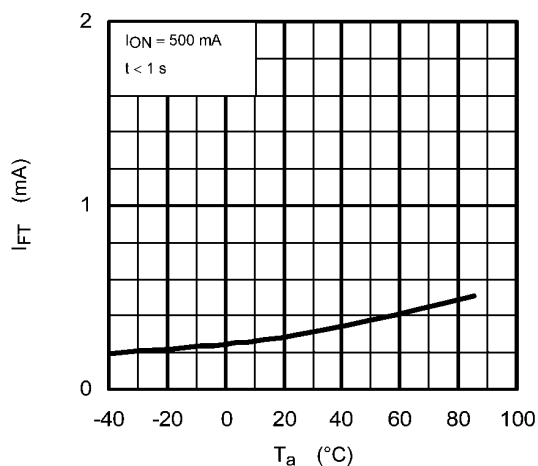
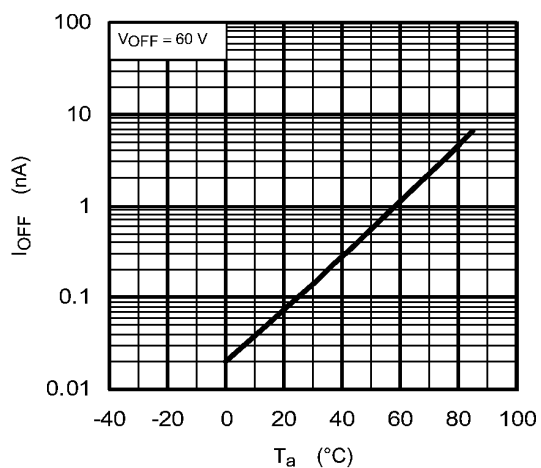
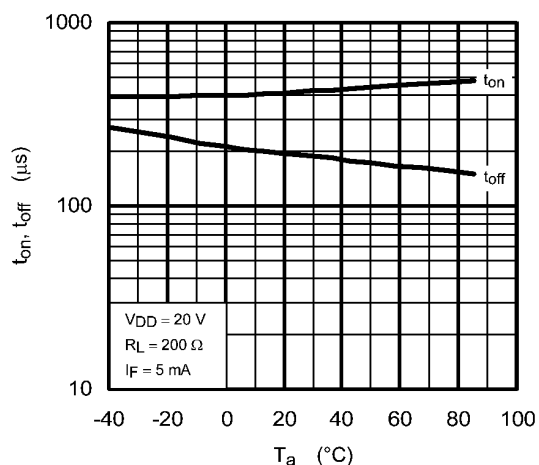
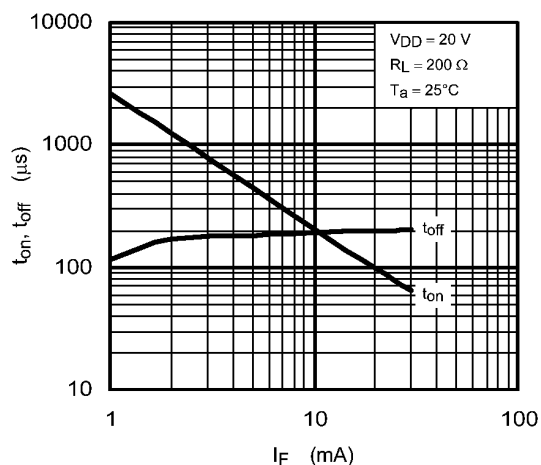


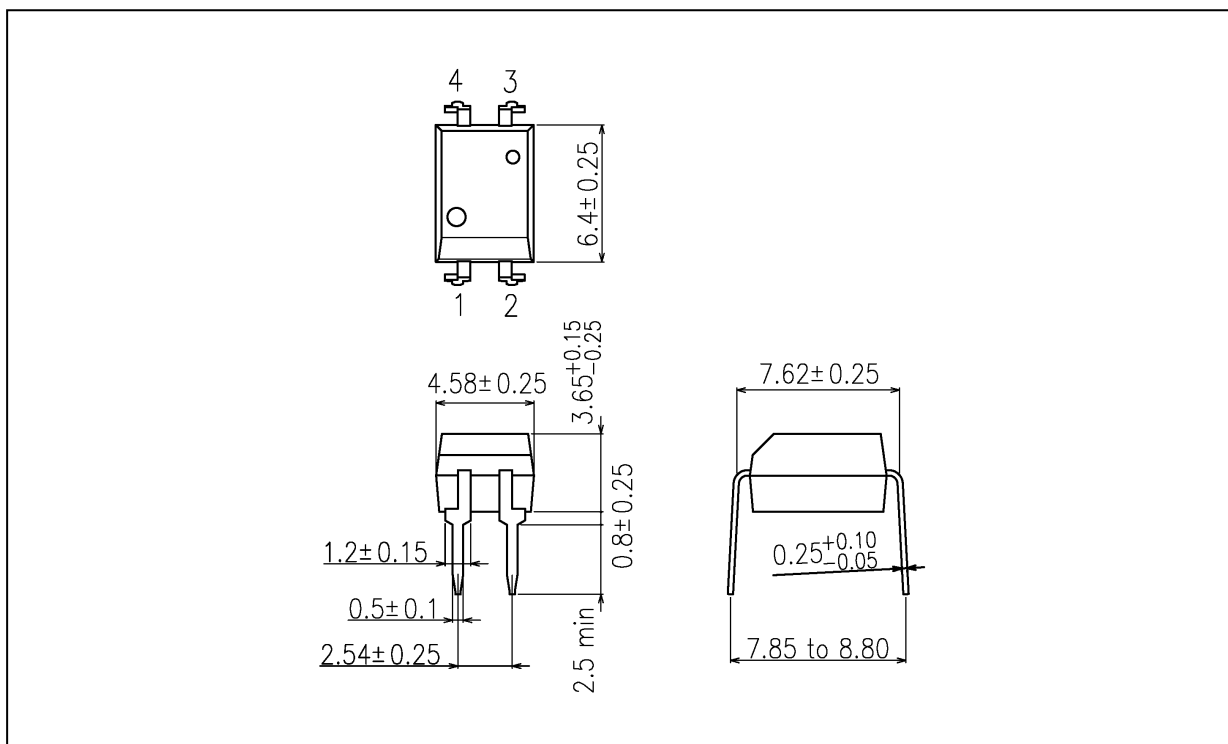
Fig. 12.1.6 $I_{FT} - T_a$



Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Package Dimensions

Unit: mm



Weight: 0.26 g (typ.)

Package Name(s)
TOSHIBA: 11-5B2S

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