TOSHIBA Photocoupler Photorelay

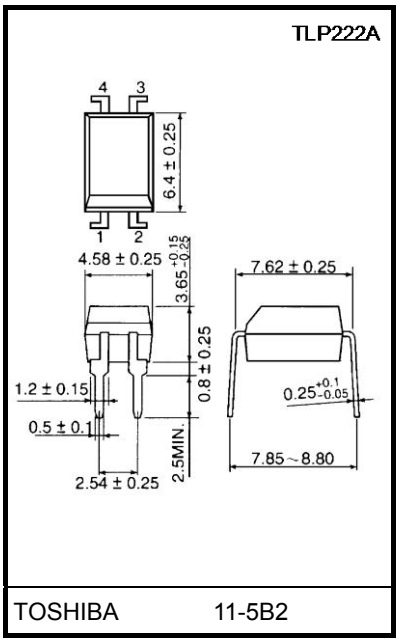
TLP222A, TLP222A-2

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.

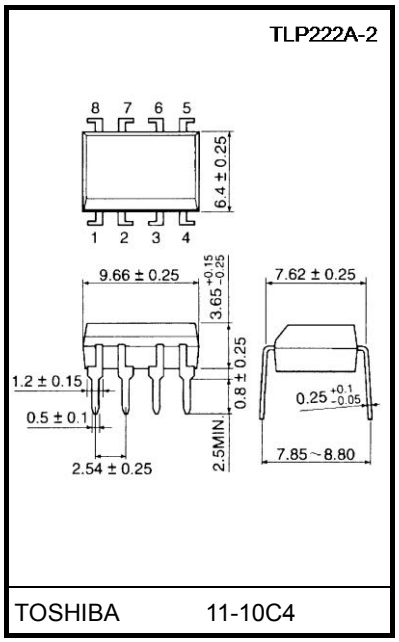
- Normally open (1-form-A and 2-form-A) devices
- Peak off-state voltage: 60 V (min)
- Trigger LED current: 3 mA (max)
- On-state current: 500 mA (max)
- On-state resistance: 2 Ω (max)
- Isolation voltage: 2500 Vrms (min)
- UL approval: UL1577, File No.E67349
- cUL approved :CSA Component Acceptance Service No. 5A, File No.E67349

Unit: mm



TOSHIBA 11-5B2

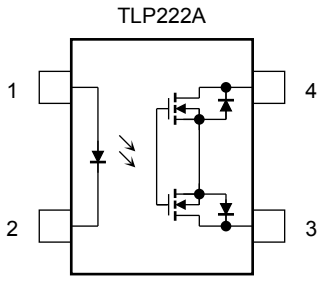
Weight: 0.26 g (typ.)



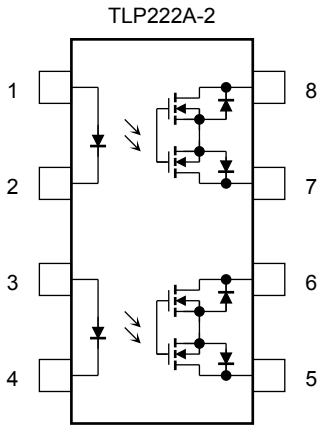
TOSHIBA 11-10C4

Weight: 0.54 g (typ.)

Pin Configuration (top view)



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



1, 3 : Anode
2, 4 : Cathode
5 : Drain D1
6 : Drain D2
7 : Drain D3
8 : Drain D4

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)			ΔI_F/°C	−0.5	mA/°C
	Peak forward current			I_{FP}	1	A
	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}	60	V
	On-state current	TLP222A		I_{ON}	500	mA
		TLP222A-2	One channel operation			
			Two channel operations			
	Forward current derating (Ta ≥ 25°C)	TLP222A		ΔI_{ON}/°C	−5.0	mA/°C
		TLP222A-2	One channel operation			
			Two channel operations			
	Output power dissipation			P_O	400	mW
	Output power dissipation derating (Ta ≥ 25°C)			ΔP_O / °C	−4.0	mW / °C
	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 mA	1.0	1.15	1.3	V
	Reverse current	I_R	V_R = 5 V	—	—	10	μA
	Capacitance	C_T	VF = 0 V, f = 1 MHz	—	30	—	pF
Detector	Off-state current	I_{OFF}	V_{OFF} = 60 V	—	—	1	μA
	Capacitance	C_{OFF}	V = 0 V, f = 1 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 mA	—	1.6	3	mA
Return LED current	I_{FC}	I_{OFF} = 100 μA	0.1	—	—	mA
On-state resistance	R_{ON}	I_{ON} = 500 mA, I_F= 5 mA	—	1	2	Ω

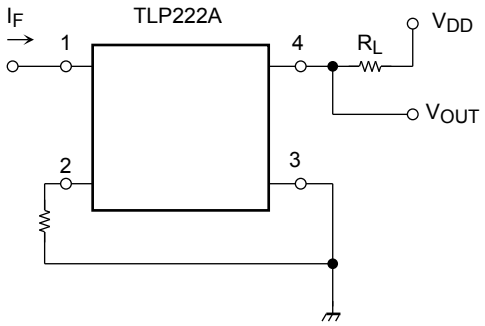
Isolation Characteristics (Ta = 25°C)

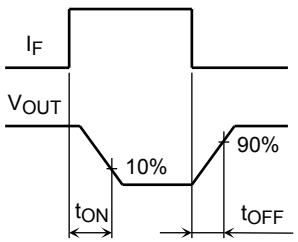
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	V_S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500 V, R.H. ≤ 60%	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	2500	—	—	Vrms
		AC, 1 second, in oil	—	5000	—	
		DC, 1 minute, in oil	—	5000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

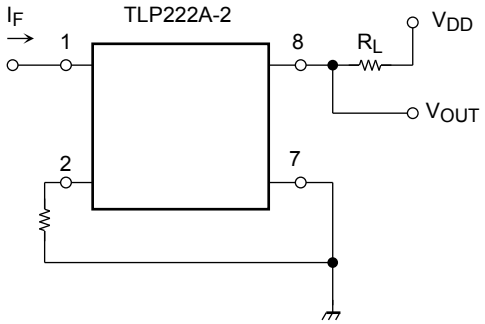
Switching Characteristics (Ta = 25°C)

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

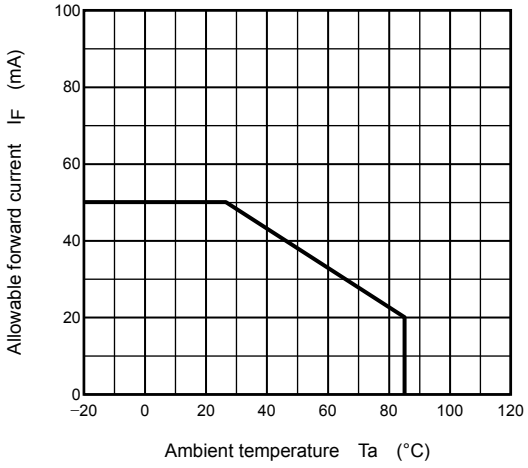
Note 2: Switching time test circuit



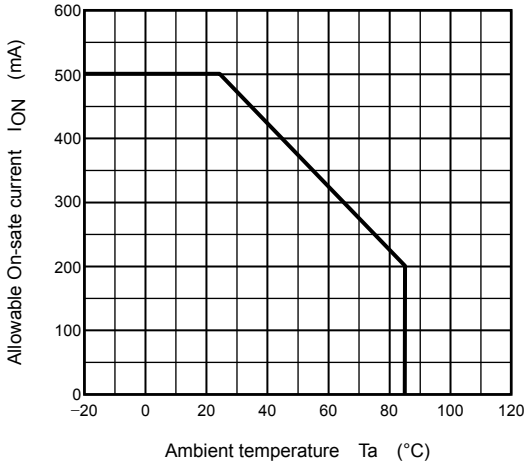




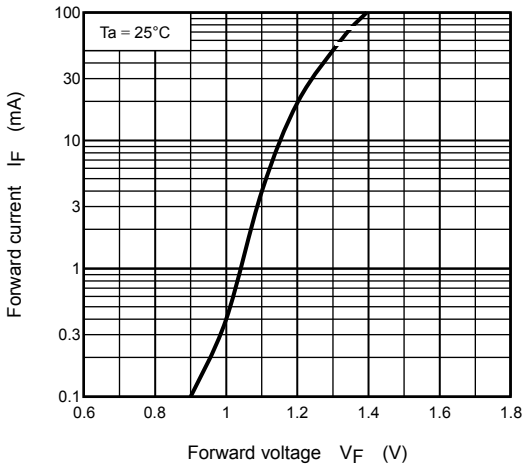
I_F – Ta



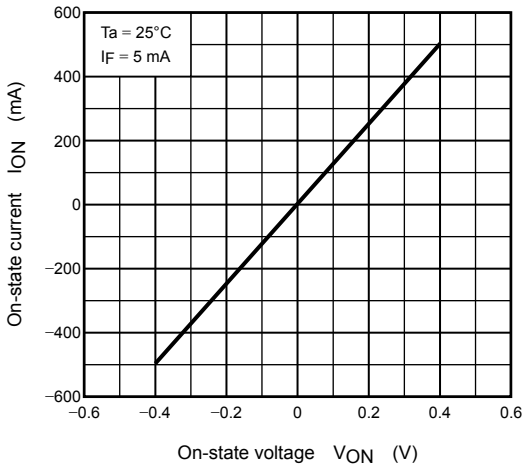
I_{ON} – Ta



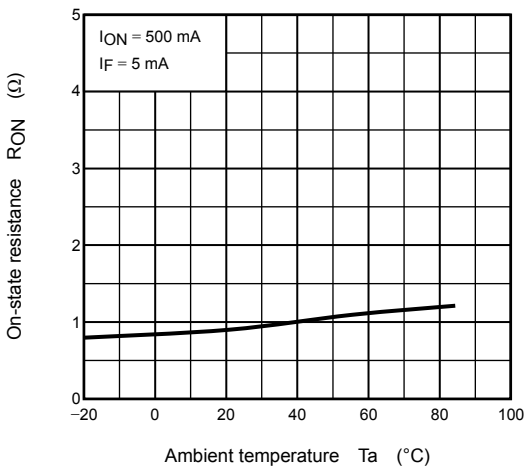
I_F – V_F



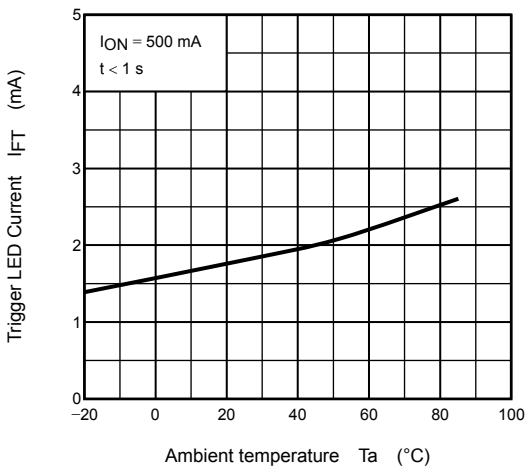
I_{ON} – V_{ON}



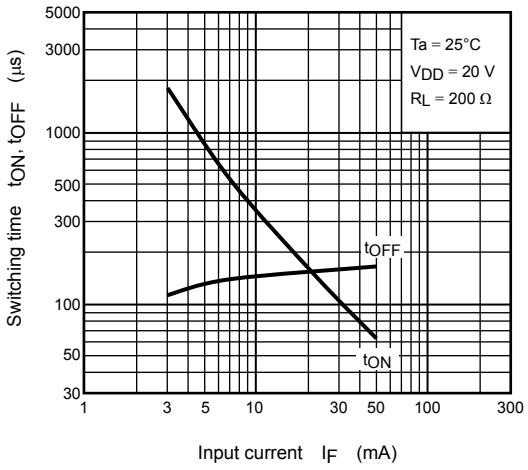
R_{ON} – Ta



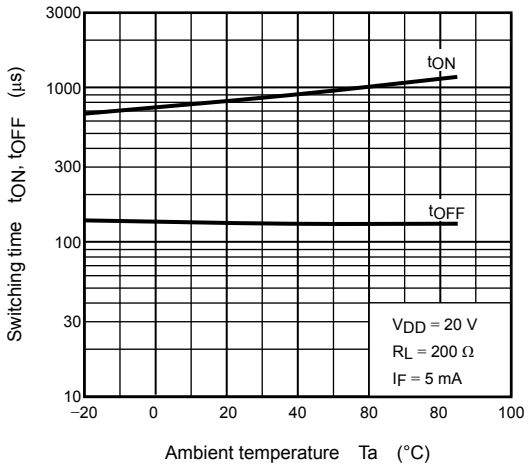
I_{FT} – Ta



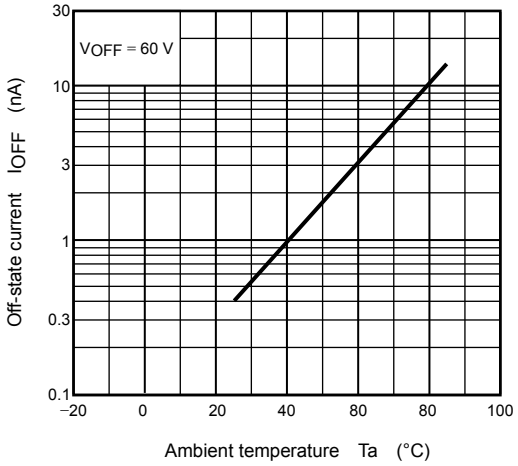
t_{ON}, t_{OFF} – I_F



t_{ON}, t_{OFF} – Ta



I_{OFF} – Ta



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