

TOSHIBA Photocoupler Photo Relay

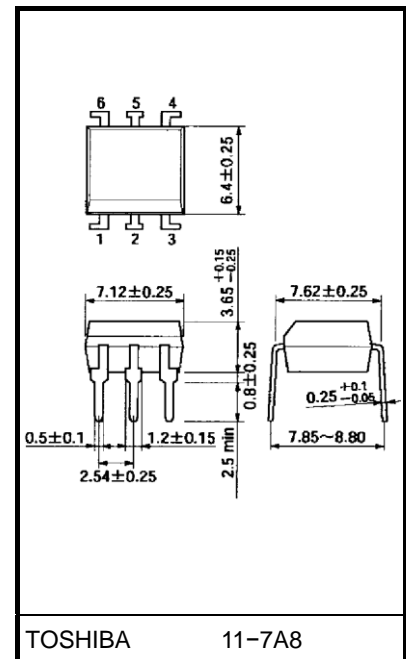
# TLP598AA

Telecommunication  
 Data Acquisition  
 Measurement Instrumentation  
 Power line control

The TOSHIBA TLP598AA consists of an aluminum gallium arsenide infrared emitting diode optically coupled to a photo-MOS FET in a six lead plastic DIP package (DIP6).  
 The TLP598AA is a bi-directional switch which can replace mechanical relays in many applications. And its high on-state current maximum rating is suitable to control a power line.

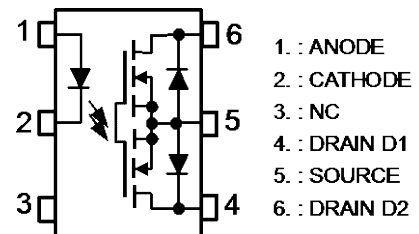
- Peak off-state voltage: 60 V (min)
- On-state current: 500 mA (max) (A connection)
- On-state resistance: 2 Ω (max) (A connection)
- Isolation voltage: 2500 Vrms (min) (A connection)
- UL recognized: UL1577, File No.E67349

Unit: mm

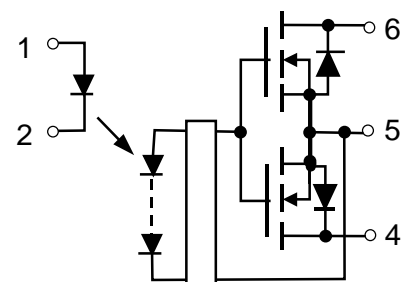


Weight: 0.4 g (typ.)

### Pin Configuration (top view)



### Schematic



Start of commercial production  
 2004/08

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

Characteristic		Symbol	Rating	Unit	
LED	Forward current	I <sub>F</sub>	30	mA	
	Forward current derating (Ta ≥ 25°C)	ΔI <sub>F</sub> / °C	-0.3	mA / °C	
	Peak forward current (100 μs pulse, 100 pps)	I <sub>FP</sub>	1	A	
	Reverse voltage	V <sub>R</sub>	5	V	
	Diode power dissipation	P <sub>D</sub>	50	mW	
	Diode power dissipation derating (Ta ≥ 25°C)	ΔP <sub>D</sub> / °C	-0.5	mW/°C	
	Junction temperature	T <sub>j</sub>	125	°C	
Detector	Off-state output terminal voltage	V <sub>OFF</sub>	60	V	
	On-state RMS current	A connection	I <sub>ON</sub>	500	mA
		B connection		500	
		C connection		1000	
	On-state current derating (Ta ≥ 25°C)	A connection	ΔI <sub>ON</sub> / °C	-5.0	mA / °C
		B connection		-5.0	
		C connection		-10.0	
	Output power dissipation	A connection	P <sub>O</sub>	500	mW
		B connection		250	
		C connection		500	
	Output power dissipation derating (Ta ≥ 25°C)	A connection	ΔP <sub>O</sub> / °C	-5.0	mW/°C
B connection		-2.5			
C connection		-5.0			
Junction temperature	T <sub>j</sub>	125	°C		
Storage temperature range	T <sub>stg</sub>	-55 to 125	°C		
Operating temperature range	T <sub>opr</sub>	-40 to 85	°C		
Lead soldering temperature (10 s)	T <sub>sol</sub>	260	°C		
Isolation voltage (AC, 1 minute, R.H. ≤ 60%)	(Note 2) B <sub>Vs</sub>	2500	V <sub>rms</sub>		

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).

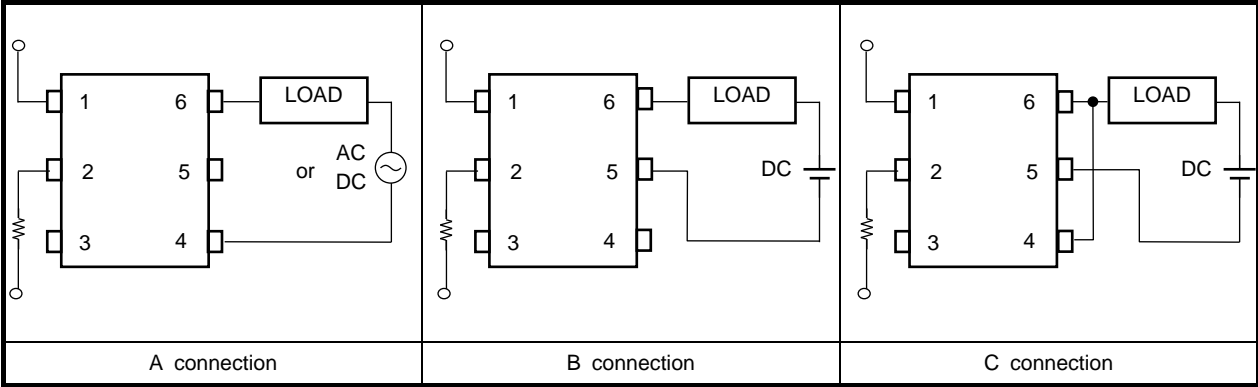
Note 2: Device considered a two-terminal device: Pins 1, 2 and 3 shorted together, and pins 4, 5 and 6 shorted together.

## Recommended Operating Conditions

Characteristic	Symbol	Min	Typ.	Max	Unit
Supply voltage	V <sub>DD</sub>	—	—	48	V
Forward current	I <sub>F</sub>	5	7.5	20	mA
On-state current (A connection)	I <sub>ON</sub>	—	—	400	mA
Operating temperature	T <sub>opr</sub>	-20	—	80	°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.

**Circuit Connections**



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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	$V_F$	$I_F = 10 \text{ mA}$	1.18	1.33	1.48	V
	Reverse current	$I_R$	$V_R = 5 \text{ V}$	—	—	10	$\mu\text{A}$
	Capacitance	$C_T$	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	30	—	pF
Detector	Off-state current	$I_{OFF}$	$V_{OFF} = 60 \text{ V}$	—	—	1	$\mu\text{A}$
	Capacitance	$C_{OFF}$	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	130	—	pF

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

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current		$I_{FT}$	$I_{ON} = 500 \text{ mA}$	—	1	3	mA
On-state resistance	A connection	$R_{ON}$	$I_{ON} = 500 \text{ mA}, I_F = 5 \text{ mA}$	—	1	2	$\Omega$
	B connection		$I_{ON} = 500 \text{ mA}, I_F = 5 \text{ mA}$	—	0.5	1	
	C connection		$I_{ON} = 1000 \text{ mA}, I_F = 5 \text{ mA}$	—	0.25	0.5	

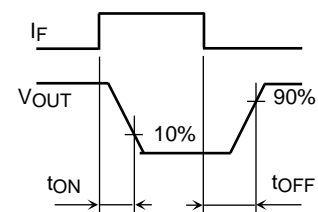
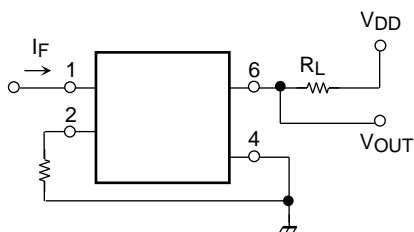
## Isolation Characteristics (Ta = 25°C)

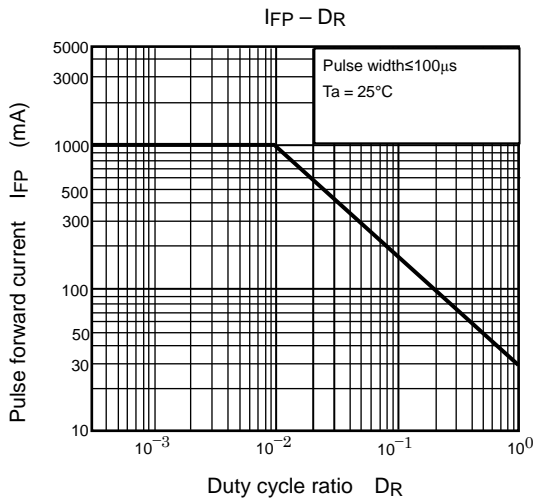
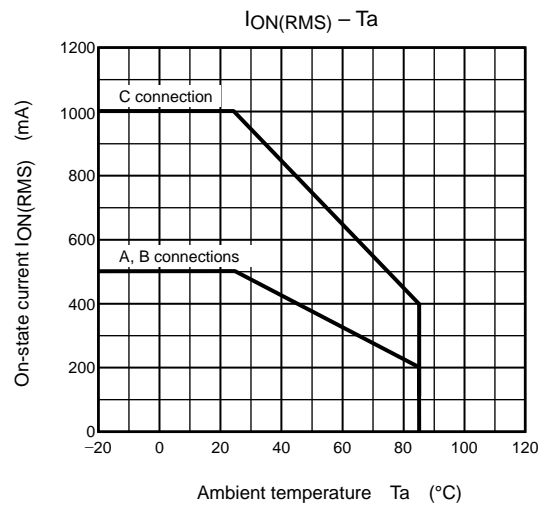
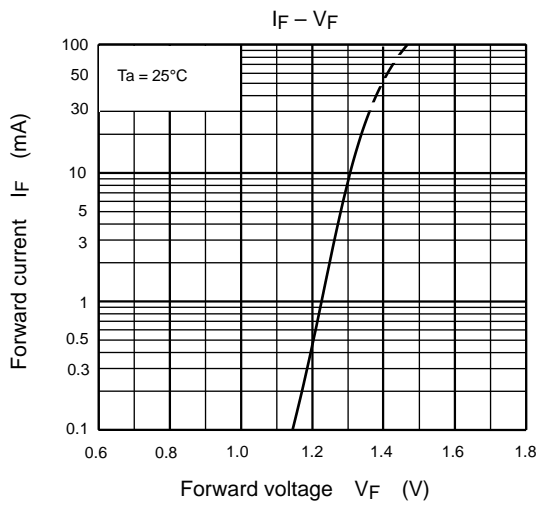
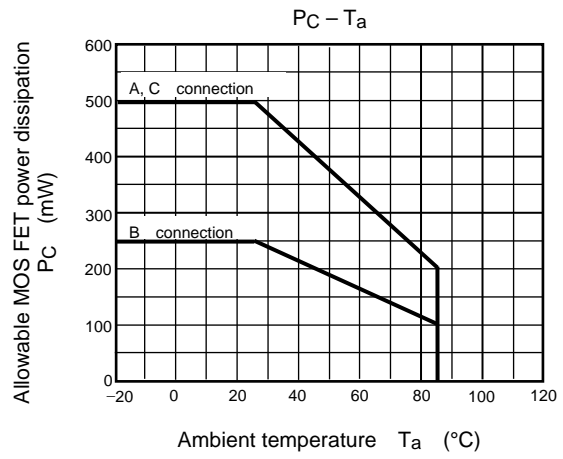
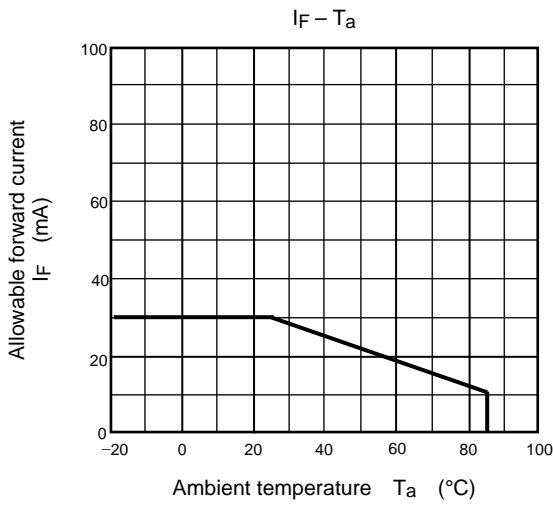
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	$C_S$	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	$R_S$	$V_S = 500 \text{ V}, \text{R.H.} \leq 60\%$	$5 \times 10^{10}$	$10^{14}$	—	$\Omega$
Isolation voltage	$BV_S$	AC, 1 minute	2500	—	—	Vrms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

## Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	$t_{ON}$	$V_{DD} = 20 \text{ V}, R_L = 200 \Omega$ $I_F = 5 \text{ mA}$ (Note 3)	—	0.2	0.5	ms
Turn-off time	$t_{OFF}$		—	0.2	0.5	

Note 3: Switching time test circuit





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