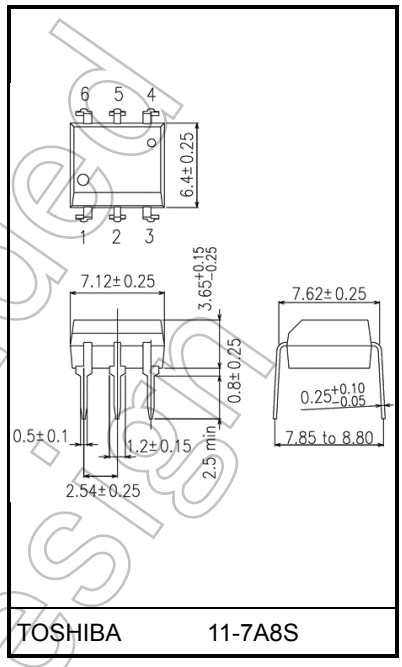
TOSHIBA Photocoupler Photo Relay

TLP798GA

Telecommunication
Data Acquisition
Measurement Instrumentation

Unit: mm



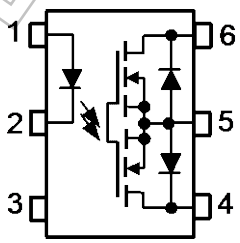
TOSHIBA 11-7A8S

Weight: 0.4 g (typ.)

The TOSHIBA TLP798GA consists of an infrared emitting diode optically coupled to a photo-MOS FET in a six lead plastic DIP package (DIP6). The TLP798GA is a bi-directional switch which can replace mechanical relays in many applications.

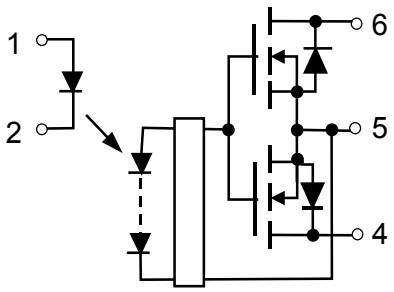
- Peak off-state voltage: 400 V (min)
- On-state current: 150 mA (max)
- On-state resistance: 12 Ω (max)
- Isolation voltage: 5000 Vrms (min)
- UL-recognized: UL 1577, File No.E67349
- cUL-recognized: CSA Component Acceptance Service No.5A
  File No.E67349

Pin Configuration (top view)



1: ANODE
2: CATHODE
3: N.C.
4: DRAIN D1
5: SOURCE
6: DRAIN D2

Schematic



Start of commercial production
2004-08

Absolute Maximum Ratings (Ta = 25°C)

Characteristic			Symbol	Rating	Unit
LED	Forward current		I_F	30	mA
	Forward current derating (Ta ≥ 25°C)		ΔI_F / °C	-0.3	mA / °C
	Peak forward current (100 μs pulse, 100 pps)		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}	400	V
	On-state RMS current	A connection	I_{ON}	150	mA
		B connection		200	
		C connection		300	
	On-state current derating (Ta ≥ 25°C)	A connection	ΔI_{ON} / °C	-1.5	mA / °C
		B connection		-2.0	
		C connection		-3.0	
	Output power dissipation	A connection	P_O	270	mW
		B connection		135	
		C connection		270	
	Output power dissipation derating (Ta ≥ 25°C)	A connection	ΔP_O / °C	-2.7	mW / °C
		B connection		-1.35	
		C connection		-2.7	
	Junction temperature		T_j	125	°C
Storage temperature range			T_{stg}	-55 to 125	°C
Operating temperature range			T_{opr}	-40 to 85	°C
Lead soldering temperature (10 s)			T_{sol}	260	°C
Isolation voltage (AC, 60 s, R.H. ≤ 60 %)		(Note 1)	BV_S	5000	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).

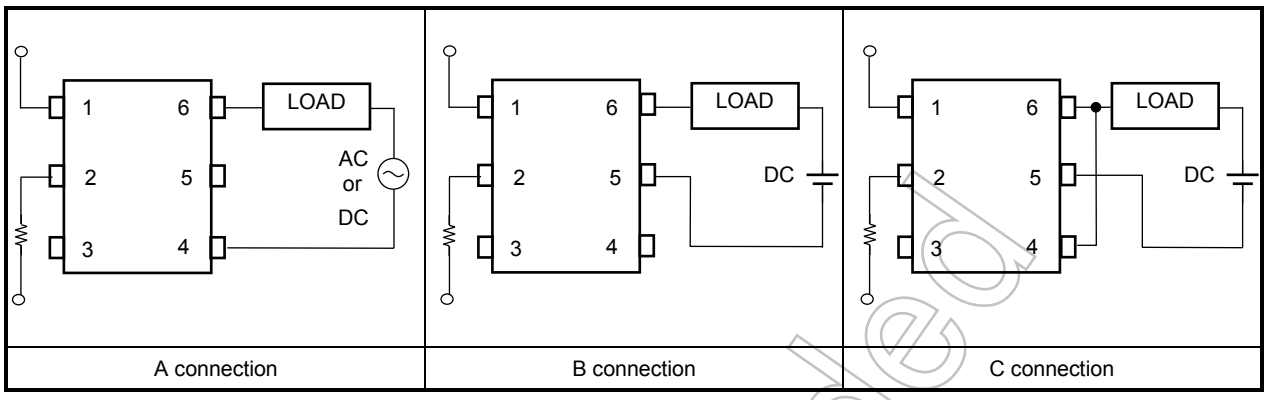
Note 1: Device considered a two-terminal device: Pins 1, 2 and 3 shorted together, and pins 4, 5 and 6 shorted together.

Recommended Operating Conditions

Characteristic	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{DD}	—	—	320	V
Forward current	I_F	5	7.5	20	mA
On-state current	I_{ON}	—	—	150	mA
Operating temperature	T_{opr}	-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



A connection	B connection	C connection

Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V_F	I_F = 10 mA	1.18	1.33	1.48	V
	Reverse current	I_R	V_R = 5 V	—	—	10	μA
	Capacitance	C_T	V = 0 V, f = 1 MHz	—	30	—	pF
Detector	Off-state current	I_{OFF}	V_{OFF} = 400 V	—	—	1	μA

Coupled Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Trigger LED current		I_{FT}	I_{ON} = 150 mA	—	1	3	mA
Return LED current		I_{FC}	I_{OFF} = 100 μA	0.1	—	—	mA
On-state resistance	A connection	R_{ON}	I_{ON} = 150 mA, I_F = 5 mA	—	8	12	Ω
	B connection		I_{ON} = 200 mA, I_F = 5 mA	—	4	6	
	C connection		I_{ON} = 300 mA, I_F = 5 mA	—	2	3	

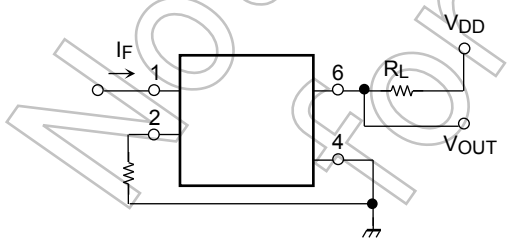
Isolation Characteristics (Ta = 25°C)

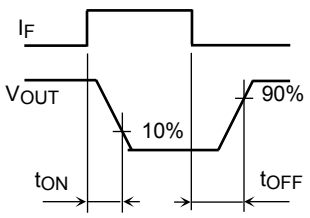
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	V_S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation resistance	R_S	V_S = 500 V, R.H. ≤ 60 %	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 60 s	5000	—	—	Vrms

Switching Characteristics (Ta = 25°C)

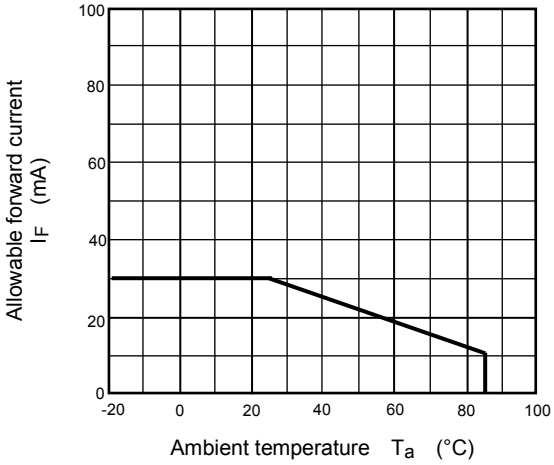
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Turn-on time	t_{ON}	V_{DD} = 20 V, R_L = 200 Ω, I_F = 5 mA (Note 1)	—	0.3	1.0	ms
Turn-off time	t_{OFF}		—	0.2	1.0	

Note 1: Switching time test circuit

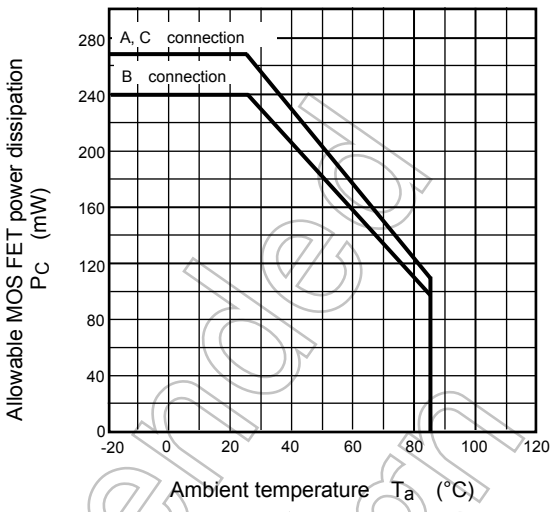




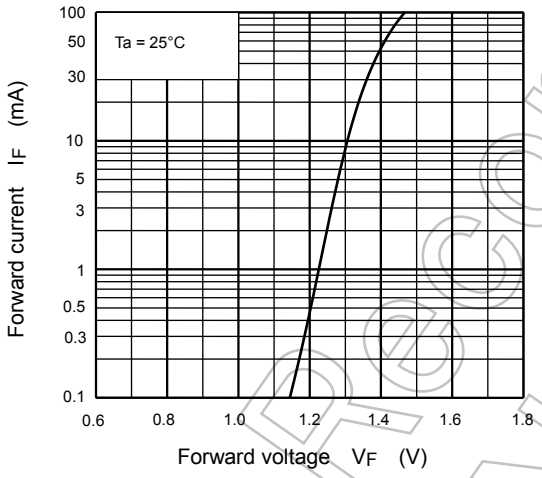
$I_F - T_a$



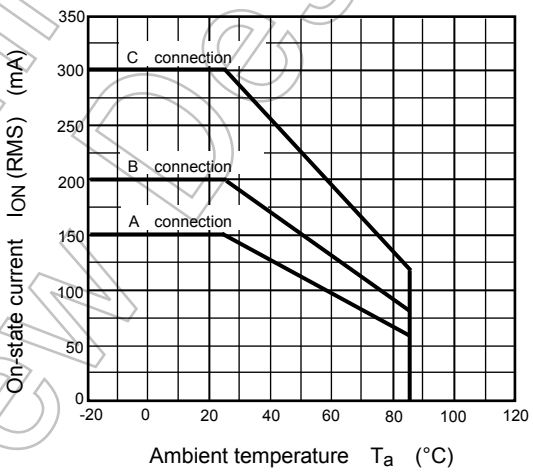
$P_C - T_a$



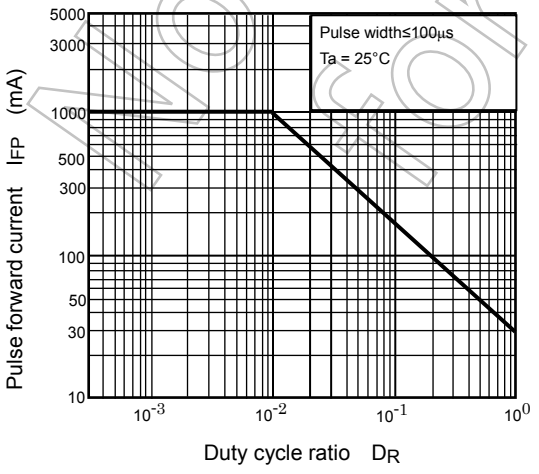
$I_F - V_F$



I_{ON} (RMS) – T_a



$I_{FP} - D_R$



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

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