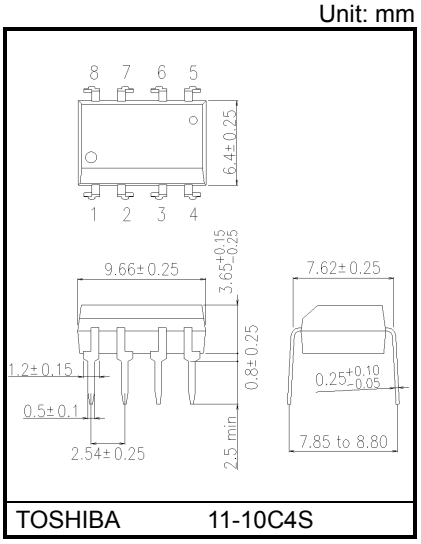
TOSHIBA PHOTOCOUPLER PHOTO RELAY

TLP224GA-2

Applications

Mechanical relay replacements
Factory Automation (FA)
Measuring Instrument

Unit: mm



TOSHIBA	11-10C4S

Weight: 0.54 g

General

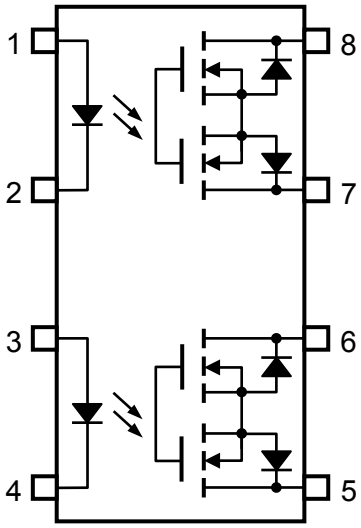
The TLP224GA-2 consists of a gallium arsenide infrared emitting diode optically coupled to a photo-MOS FET in an 8-pin DIP package.
The TLP224GA-2 has a performance to protect against external surge with the current limiting function that is included in Output-MOS FET.

Features

- Normally opened (2- Form- A).
- Peak Off-State Voltage : 400 V (MIN.)
- Trigger LED Current : 3 mA (MAX.)
- On-State Current : 120 mA (MAX.)
- Limit Current : 150 mA to 300 mA (t = 5 ms)
- On-State Resistance : 35 Ω (MAX.)
- Isolation Voltage : 2500 Vrms (MIN.)
- UL recognized : UL 1577, File No.E67349
- cUL recognized : CSA Component Acceptance Service No.5A File No. E67349

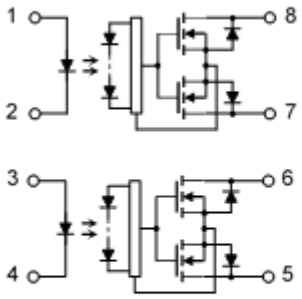
Start of commercial production
1999-09

Pin Configuration (Top View)



1, 3 : ANODE
2, 4 : CATHODE
5 : DRAIN 1
6 : DRAIN 2
7 : DRAIN 3
8 : DRAIN 4

Internal Circuit



Absolute Maximum Ratings (Note) (Unless otherwise specified, 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 (100μs pulse, 100 pps)		I_{FP}	1	A
	Reverse Voltage		V_R	5	V
	Junction Temperature		T_j	125	°C
DETECTOR	Off-State Output Terminal Voltage		V_{OFF}	400	V
	On-State Current	One Channel	I_{ON}	120	mA
		Both Channel (Note 1)			
	On-State Current Derating (Ta ≧ 25°C)	One Channel	ΔI_{ON}/°C	−1.2	mA/°C
		Both Channel (Note 1)			
	Output power dissipation		P_O	504	mW
	Output power dissipation derating (Ta ≥ 25°C)		ΔP_O / °C	-5.04	mW / °C
	Junction Temperature		T_j	125	°C
Storage Temperature Range			T_{stg}	−55~125	°C
Operating Temperature Range			T_{opr}	−40~85	°C
Lead Soldering Temperature (10 s)			T_{sol}	260	°C
Isolation Voltage (AC, 60 s, R.H. ≦ 60%)		(Note 2)	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 : Two channels operating simultaneously.

Note 2 : Device considered a two-terminal device : LED side pins shorted together, and DETECTOR side pins shorted together.

Recommended Operating Conditions (Note)

Characteristics	Symbol	Note	Min.	Typ.	Max.	Unit
Supply Voltage	V_{DD}		—	—	320	V
Forward Current	I_F		5	7.5	25	mA
On-State Current	I_{ON}		—	—	120	mA
Operating Temperature	T_{opr}		−20	—	65	°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 data sheet should also be considered.

Individual Electrical Characteristics (Unless otherwise specified, Ta = 25°C)

	Characteristics	Symbol	Note	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		V = 0, f = 1 MHz	—	30	—	pF
DETECTOR	Off-State Current	I_{OFF}		V_{OFF} = 400 V	—	—	1	μA
	Capacitance	C_{OFF}		V = 0, f = 1 MHz	—	70	—	pF

Coupled Electrical Characteristics (Unless otherwise specified, Ta = 25°C)

Characteristics	Symbol	Note	Test Condition	Min.	Typ.	Max.	Unit
Trigger LED Current	I_{FT}		I_{ON} = 120 mA	—	1	3	mA
Return LED Current	I_{FC}		I_{OFF} = 100 μA	0.1	—	—	mA
Load Current Limiting	I_{LIM}		I_F = 5 mA, V_{DD} = 5 V, t = 5ms	150	—	300	mA
On-State Resistance	R_{ON}		I_{ON} = 120 mA, I_F = 5 mA	—	17	35	Ω

Isolation Characteristics (Unless otherwise specified, Ta = 25°C)

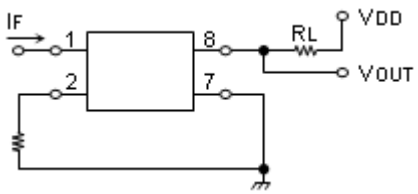
Characteristics	Symbol	Note	Test Condition	Min.	Typ.	Max.	Unit
Capacitance Input to Output	C_S	(Note 1)	V_S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation Resistance	R_S	(Note 1)	V_S = 500 V, R.H. ≦ 60%	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	(Note 1)	AC, 60 s	2500	—	—	Vrms

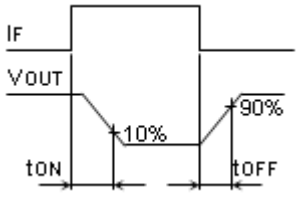
Note 1 : Device considered a two-terminal device : LED side pins shorted together, and DETECTOR side pins shorted together.

Switching Characteristics (Unless otherwise specified, Ta = 25°C)

Characteristics	Symbol	Note	Test Condition	Min.	Typ.	Max.	Unit
Turn-on Time	t_{ON}	(Note 1)	R_L = 200 Ω V_{DD} = 20 V, I_F = 5 mA	—	0.3	1	ms
Turn-off Time	t_{OFF}	(Note 1)		—	0.1	1	

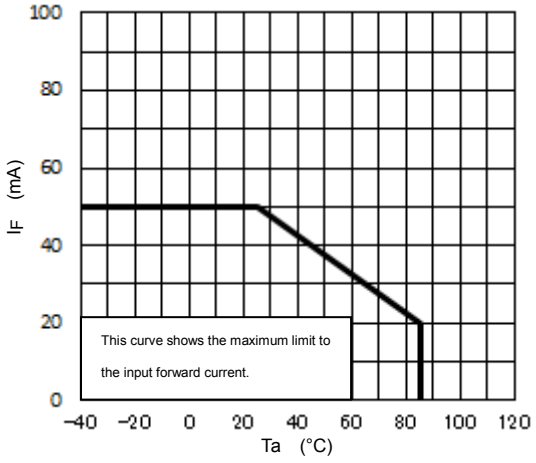
Note 1 : Switching Time Test Circuit



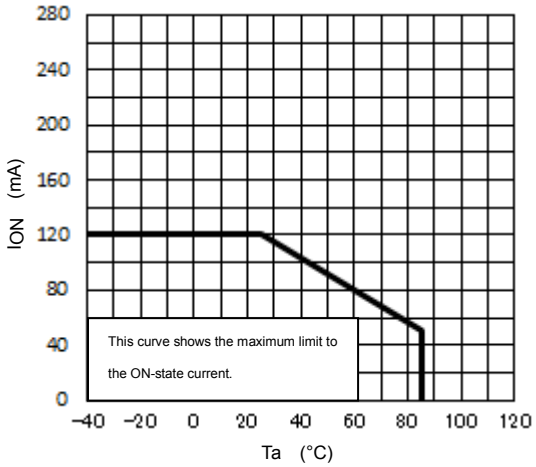


Characteristics Curves (Note)

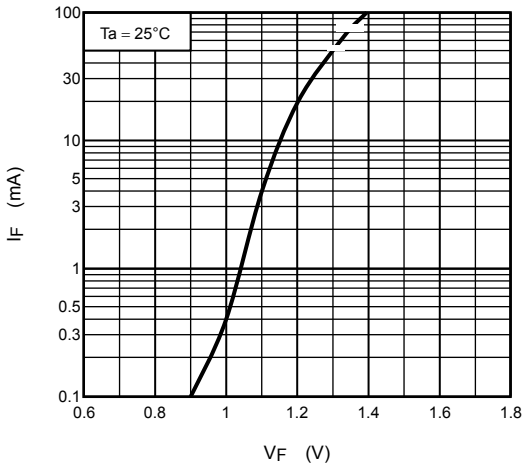
I_F – Ta



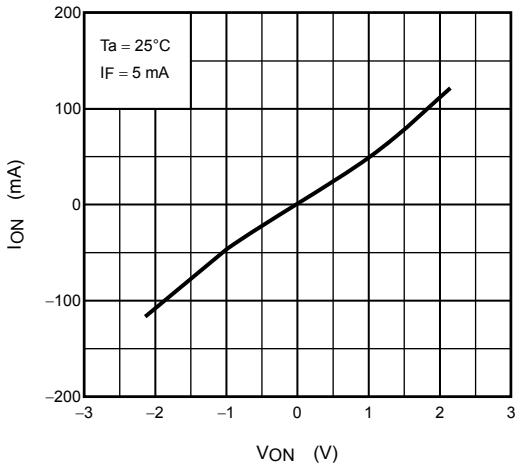
I_{ON} – Ta



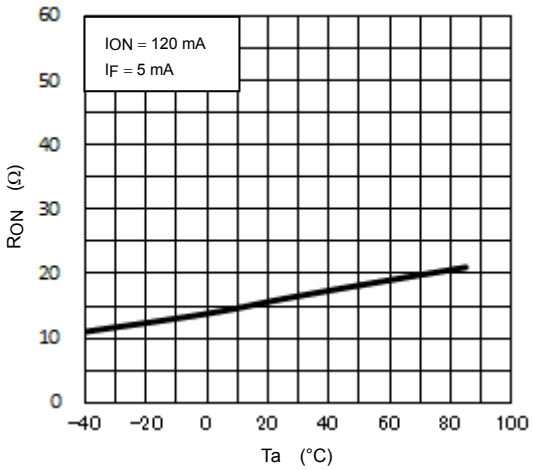
I_F – V_F



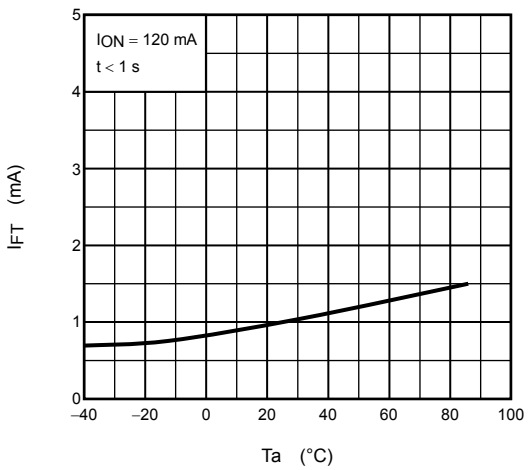
I_{ON} – V_{ON}

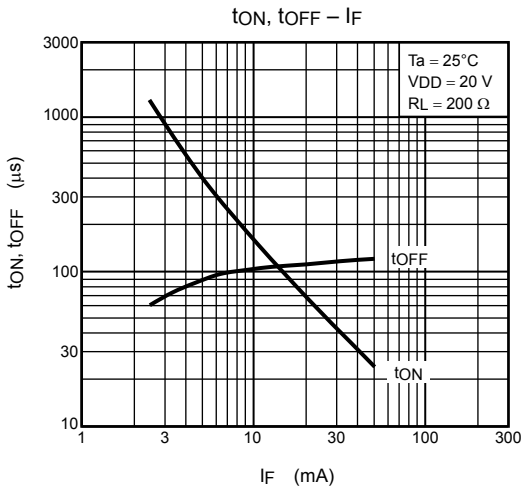


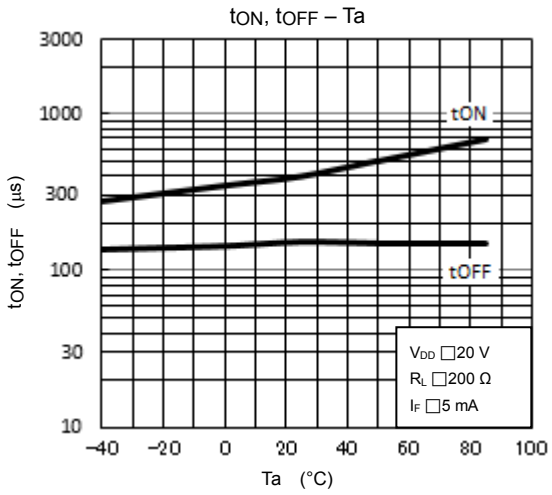
R_{ON} – Ta

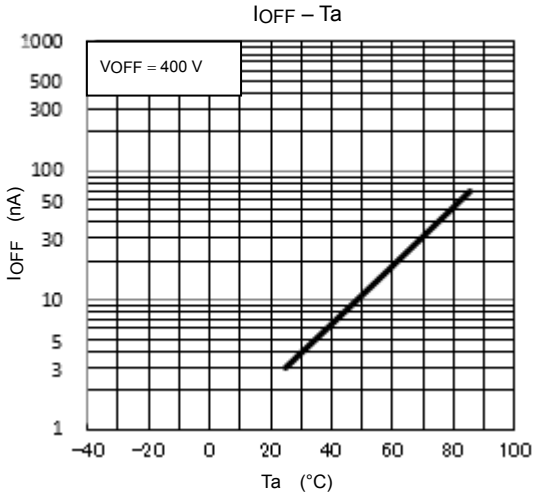


I_{FT} – Ta









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

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