

TLP224GA-2

Applications

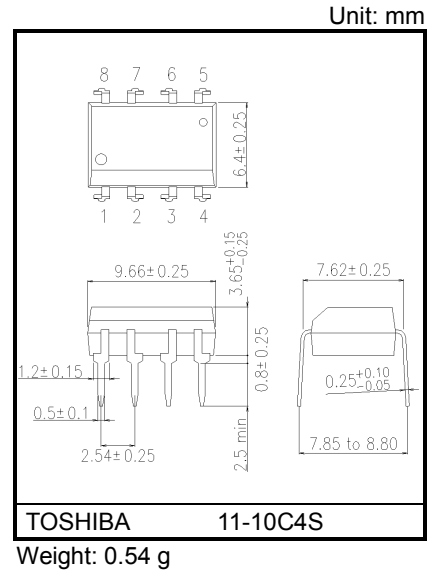
Mechanical relay replacements
 Factory Automation (FA)
 Measuring Instrument

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.

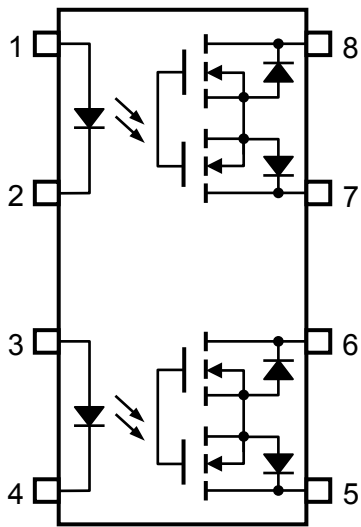
Features

- 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



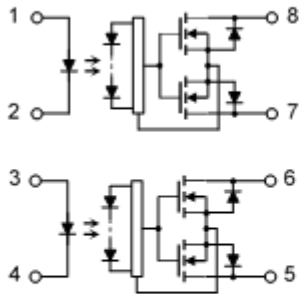
Start of commercial production
 1999-09

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) B _{Vs}	2500	V _{rms}		

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)

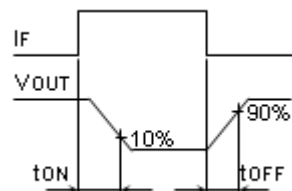
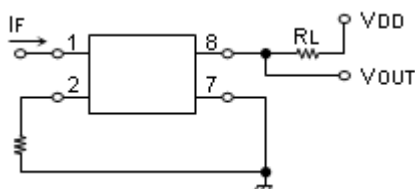
Characteristics	Symbol	Note	Test Condition	Min.	Typ.	Max.	Unit
Capacitance Input to Output	C _S	(Note 1)	V _S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation Resistance	R _S	(Note 1)	V _S = 500 V, R.H. ≤ 60%	5 × 10 ¹⁰	10 ¹⁴	—	Ω
Isolation Voltage	BV _S	(Note 1)	AC, 60 s	2500	—	—	V _{rms}

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

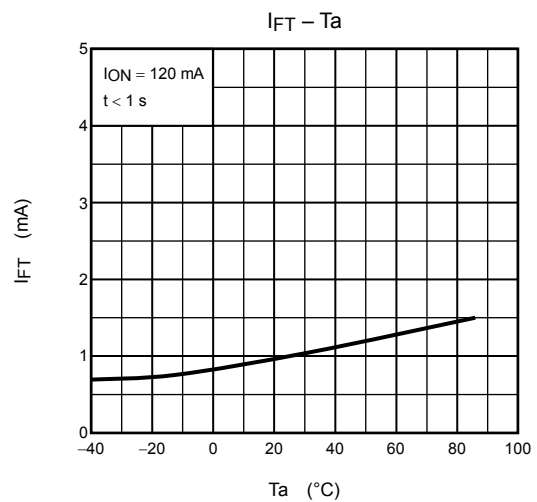
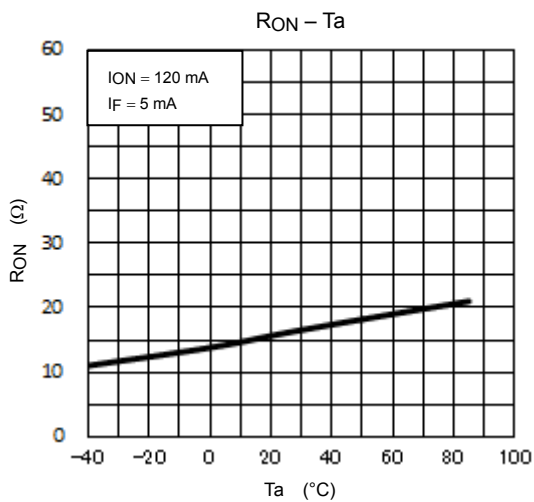
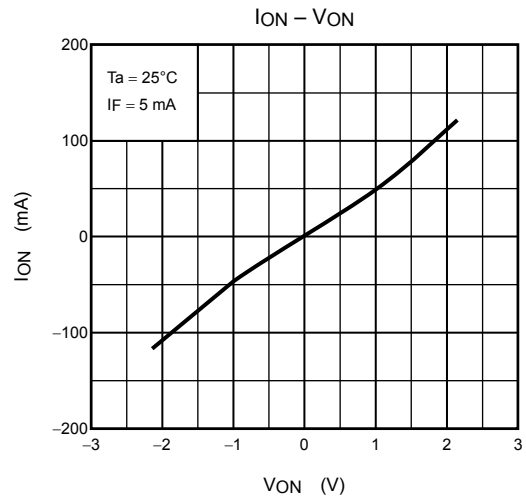
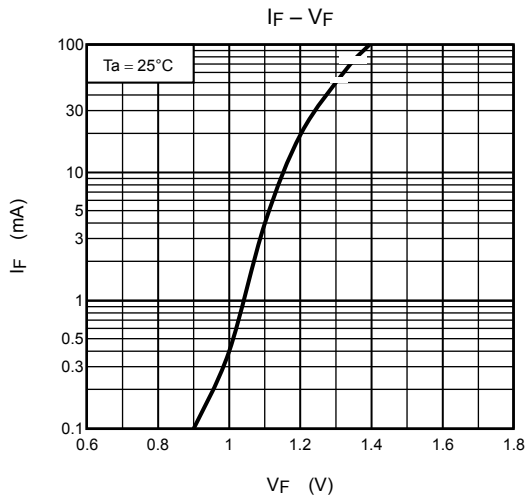
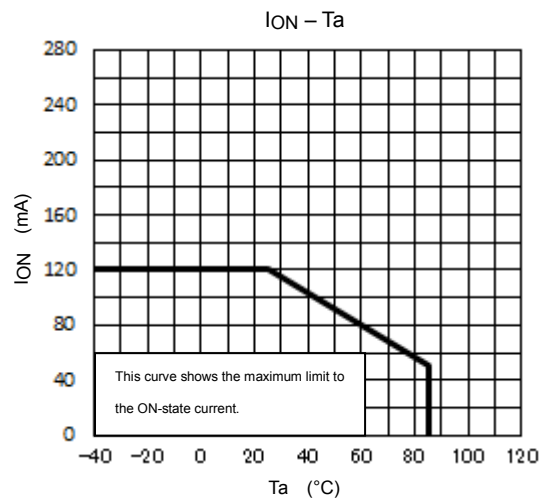
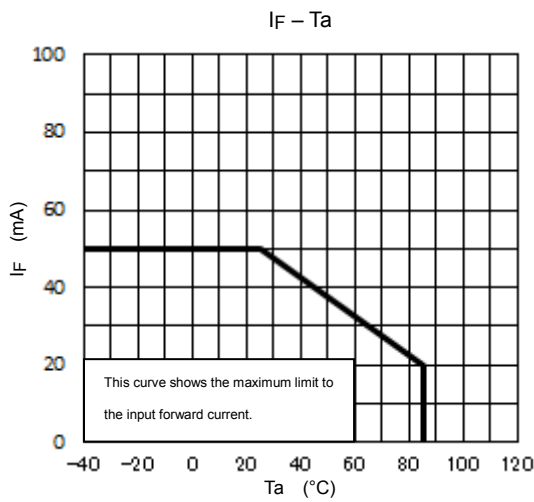
Switching Characteristics (Unless otherwise specified, Ta = 25°C)

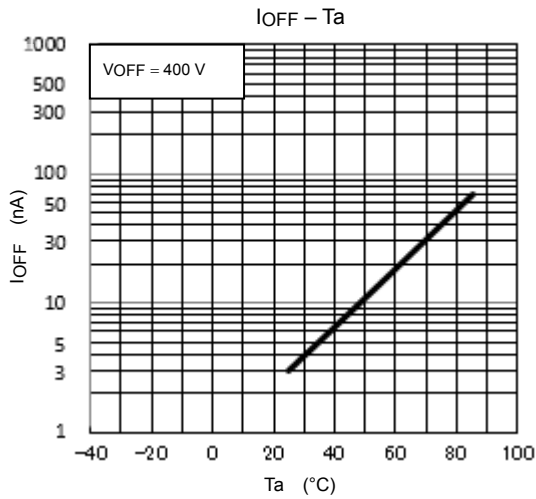
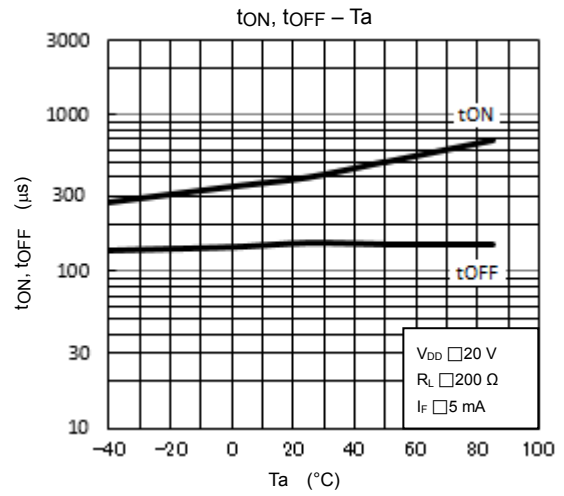
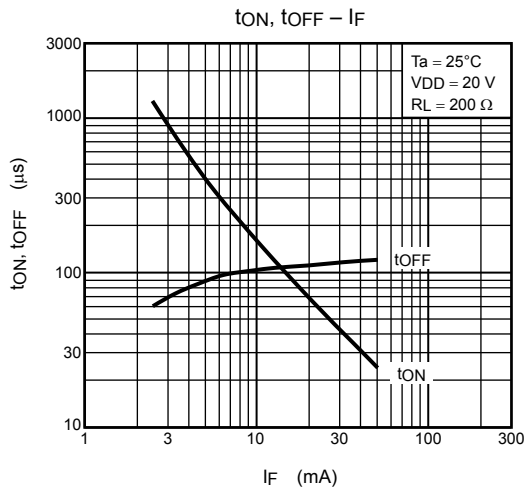
Characteristics	Symbol	Note	Test Condition	Min.	Typ.	Max.	Unit
Turn-on Time	t _{ON}	(Note 1)	R _L = 200 Ω V _{DD} = 20 V, I _F = 5 mA	—	0.3	1	ms
Turn-off Time	t _{OFF}	(Note 1)		—	0.1	1	

Note 1 : Switching Time Test Circuit



Characteristics Curves (Note)





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

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