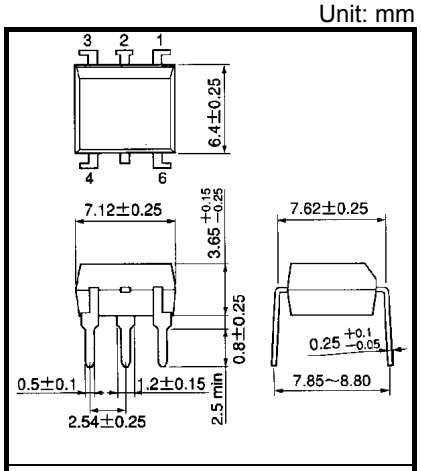
TOSHIBA PHOTOCOUPLER PHOTO RELAY

TLP3542

TESTERS
DATA RECORDING EQUIPMENTS
MEASUREMENT EQUIPMENTS

Unit: mm



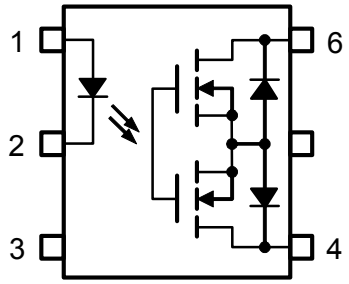
JEDEC	
JEITA	
TOSHIBA	11−7A9

Weight: 0.4 g (typ.)

The TOSHIBA TLP3542 consist of a aluminum gallium arsenide infrared emitting diode optically coupled to a photo-MOS FET in a plastic DIP package.
The TLP3452 series are 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.

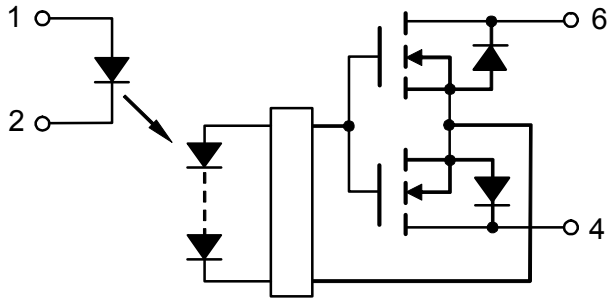
- 6 pin DIP (DIP6)
- 1-Form-A
- Peak Off-State Voltage : 60 V (MIN.)
- Trigger LED Current : 3 mA (MAX.)
- On-State Current : 2.5 A (MAX.)
- On-State Resistance : 100 mΩ (MAX.)
- Output capacitance : 600 pF (MAX.)
- Isolation Voltage : 2500 Vrms (MIN.)
-

Pin Configuration (top view)



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

Schematic



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
	Reverse Voltage	V_R	5	V
	Junction Temperature	T_j	125	°C
DETECTOR	Off-State Output Terminal Voltage	V_{OFF}	60	V
	On-State Current	I_{ON}	2.5	A
	On-State Current Derating(Ta ≧ 40°C)	ΔI_{ON}/°C	-22	mA/°C
	Junction Temperature	T_j	125	°C
Storage Temperature Range		T_{stg}	−40~125	°C
Operating Temperature Range		T_{opr}	−20~85	°C
Lead Soldering Temperature (10 s)		T_{sol}	260	°C
Isolation Voltage (AC, 1 minute, R.H. ≦ 60%) (NOTE1)		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: Device considered a two-terminal device : Pins 1, 2 and 3 shorted together, and pins 4 and 6 shorted together.

Recommended Operating Conditions

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{DD}	—	—	48	V
Forward Current	I_F	10	—	20	mA
On-State Current	I_{ON}	—	—	2.5	A
Operating Temperature	T_{opr}	-20	—	60	°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.

Individual 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, f = 1 MHz	—	70	—	pF
DETECTOR	Off-State Current	I_{OFF}	V_{OFF} = 20 V	—	0.1	1.5	nA
			V_{OFF} = 60 V	—	1.0	10	nA
	Capacitance	C_{OFF}	V = 0, f = 1 MHz	—	400	600	pF

Coupled Electrical Characteristics (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Trigger LED Current	I_{FT}	I_{ON} = 1.0 A	—	1	3	mA
Return LED Current	I_{FC}	I_{OFF} = 10 μA	0.1	—	—	mA
On-State Resistance	R_{ON}	I_{ON} = 2.0 A, I_F = 10 mA, t = 10 ms	—	65	100	mΩ

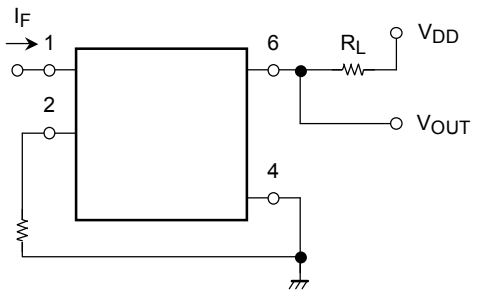
Isolation Characteristics (Ta = 25°C)

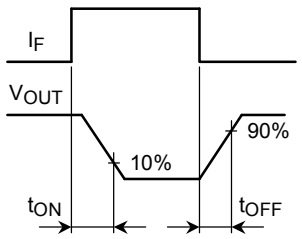
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Capacitance Input to Output	C_S	V_S = 0 V, f = 1 MHz	—	0.8	—	pF
Isolation Resistance	R_S	V_S = 500 V, R.H. ≦ 60%	5×10^{10}	10^{14}	—	Ω
Isolation Voltage	BV_S	AC, 1 minute	2500	—	—	Vrms
		AC, 1 second (in oil)	—	5000	—	Vrms
		DC, 1 minute (in oil)	—	5000	—	Vdc

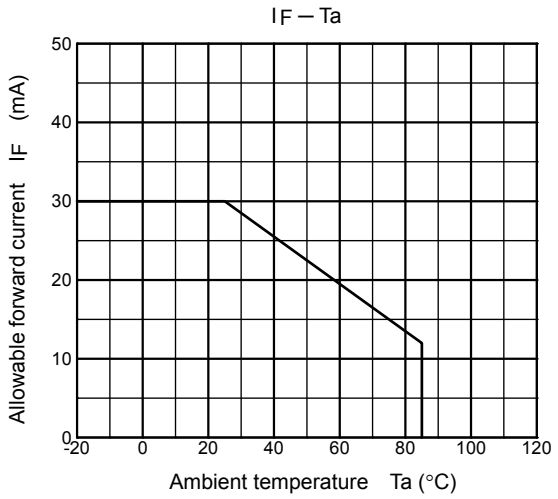
Switching Characteristics (Ta = 25°C)

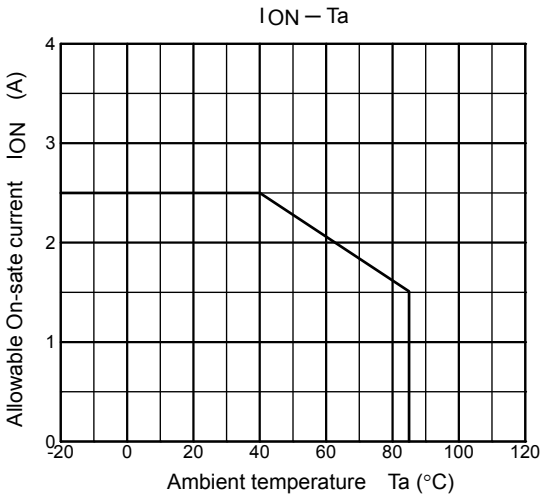
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Turn-on Time	t_{ON}	R_L = 200 Ω (NOTE 2) V_{DD} = 20 V, I_F = 5 mA	—	1.5	3.0	ms
Turn-off Time	t_{OFF}		—	0.2	0.6	
Turn-on Time	t_{ON}	R_L = 200 Ω (NOTE 2) V_{DD} = 20 V, I_F = 10 mA	—	1.0	1.5	ms
Turn-off Time	t_{OFF}		—	0.2	0.4	

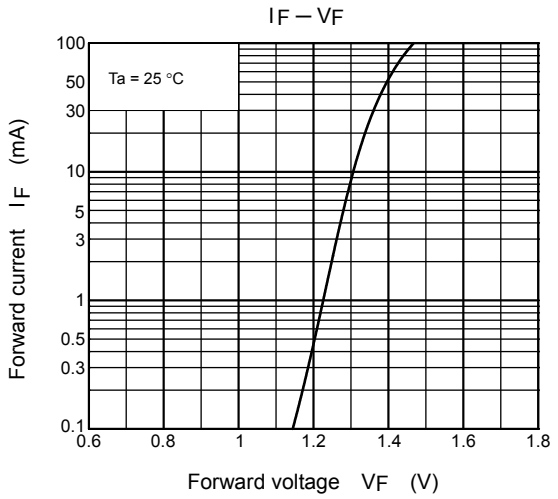
(NOTE 2) : SWITCHING TIME TEST CIRCUIT

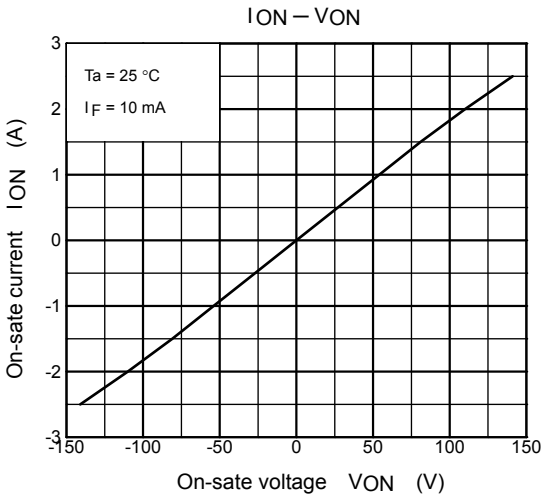


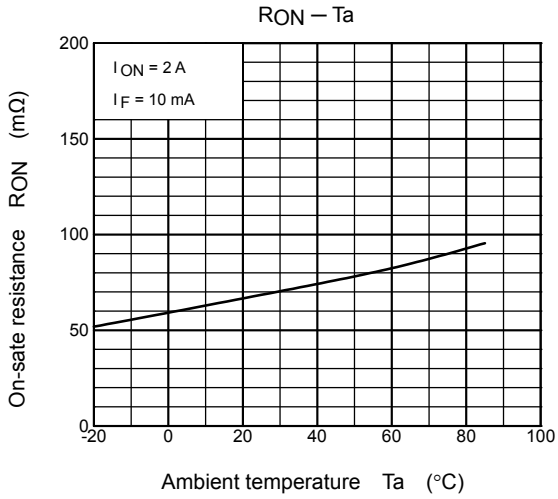


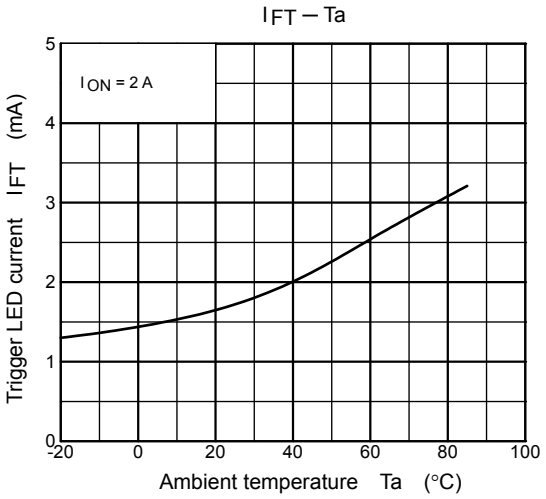

IF – Ta
Allowable forward current IF (mA)
Ambient temperature Ta (°C)

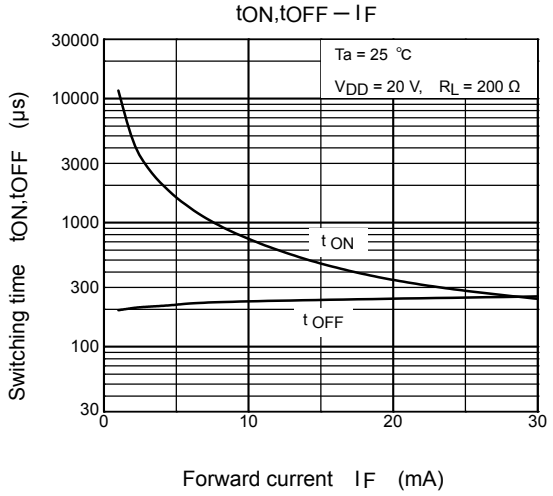

ION – Ta
Allowable On-sate current ION (A)
Ambient temperature Ta (°C)

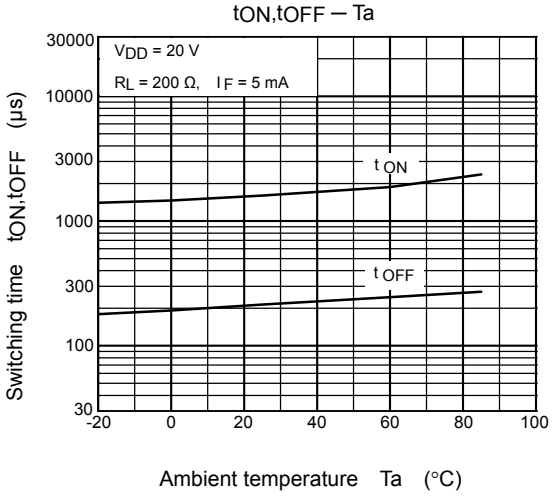

IF – VF
Ta = 25 °C
Forward current IF (mA)
Forward voltage VF (V)

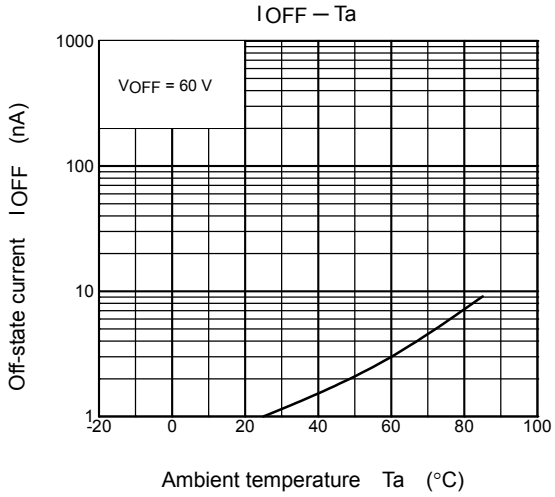

ION – VON
Ta = 25 °C
IF = 10 mA
On-sate current ION (A)
On-sate voltage VON (V)


RON – Ta
ION = 2 A
IF = 10 mA
On-sate resistance RON (mΩ)
Ambient temperature Ta (°C)


IFT – Ta
ION = 2 A
Trigger LED current IFT (mA)
Ambient temperature Ta (°C)


tON,tOFF — IF
Ta = 25 °C
VDD = 20 V, RL = 200 Ω
t ON
t OFF
Switching time tON,tOFF (μs)
30000
10000
3000
1000
300
100
30
0
10
20
30
Forward current IF (mA)


tON,tOFF — Ta
VDD = 20 V
RL = 200 Ω, IF = 5 mA
t ON
t OFF
Switching time tON,tOFF (μs)
30000
10000
3000
1000
300
100
30
-20
0
20
40
60
80
100
Ambient temperature Ta (°C)


IOFF — Ta
VOFF = 60 V
Off-state current IOFF (nA)
1000
100
10
1
-20
0
20
40
60
80
100
Ambient temperature Ta (°C)

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