Photocouplers Photorelay

TLP172AM

1. Applications

- Security Systems
- Factory Automation (FA)
- Measuring Instruments
- Battery Management System (BMS)
- Programmable Logic Controllers (PLCs)
- Mechanical relay replacements

2. General

The Toshiba TLP172AM consists of a gallium arsenide infrared emitting diode optically coupled to a photo-MOSFET in a 4-pin SO6 package. This photorelay has higher output current rating than phototransistor-type photocoupler; hence, it is suitable for use as On/Off control for high current.

3. Features

(1) Halogen-free
(2) Operating temperature range: 110℃(max)
(3) Normally opened (1-Form-A)
(4) OFF-state output terminal voltage: 60 V (min)
(5) Trigger LED current: 3 mA (max)
(6) ON-state current: 500 mA (max)
(7) ON-state resistance: 2 Ω (max)
(8) Isolation voltage: 3750 Vrms (min)
UL-approved: UL1577, File No.E67349 (Pending)

Note: Plan to be approved in May/2016

Table 3.1 Mechanical Parameters

Characteristics	TLP172AM	Unit
Creepage distances	5.0 (min)	mm
Clearance distances	5.0 (min)	
Internal isolation thickness	0.2 (min)	

Start of commercial production
2016-06

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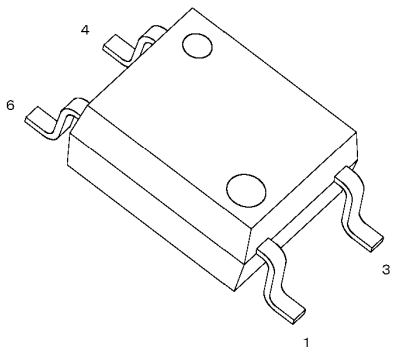
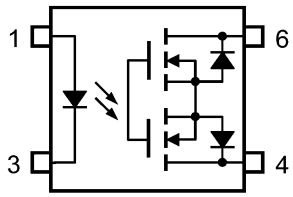
4. Packaging and Pin Assignment



11-4M1S



1: Anode
3: Cathode
4: Drain
6: Drain

5. Internal Circuit

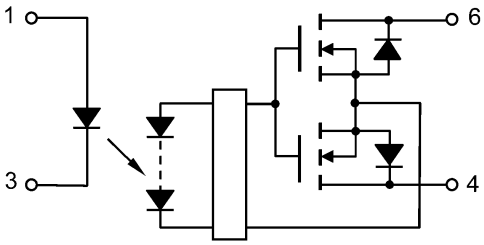


Fig. 5.1 Internal Circuit

6. Absolute Maximum Ratings (Note) (Unless otherwise specified, T_a = 25°C)

	Characteristics		Symbol	Note	Rating	Unit
LED	Input forward current		I_F		30	mA
	Input forward current derating	($T_a \geq 25$ °C)	$\Delta I_F/\Delta T_a$		-0.3	mA/°C
	Input forward current (pulsed)	(100 μs pulse, 100 pps)	I_{FP}		1	A
	Input reverse voltage		V_R		6	V
	Input power dissipation		P_D		50	mW
	Junction temperature		T_j		125	°C
Detector	OFF-state output terminal voltage		V_{OFF}		60	V
	ON-state current		I_{ON}		500	mA
	ON-state current derating	($T_a \geq 25$ °C)	$\Delta I_{ON}/\Delta T_a$		-5.0	mA/°C
	ON-state current (pulsed)	(t = 100 ms, Duty = 1/10)	I_{ONP}		1.5	A
	Output power dissipation		P_O		300	mW
	Junction temperature		T_j		125	°C
Common	Storage temperature		T_{stg}		-55 to 125	
	Operating temperature		T_{opr}		-40 to 110	
	Lead soldering temperature	(10 s)	T_{sol}		260	
	Isolation voltage	AC, 60 s, R.H. ≤ 60 %	BV_S	(Note 1)	3750	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: This device is considered as a two-terminal device: Pins 1 and 3 are shorted together, and pins 4 and 6 are shorted together.

7. Recommended Operating Conditions (Note)

Characteristics	Symbol	Note	Min	Typ.	Max	Unit
Supply voltage	V_{DD}		—	—	48	V
Input forward current	I_F		5	7.5	25	mA
ON-state current	I_{ON}		—	—	500	
Operating temperature	T_{opr}		-20	—	100	°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 datasheet should also be considered.

8. Electrical Characteristics (Unless otherwise specified, T_a = 25°C)

	Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
LED	Input forward voltage	V_F		I_F = 10 mA	1.1	1.27	1.4	V
	Input reverse current	I_R		V_R = 5 V	—	—	10	μA
	Input capacitance	C_t		V = 0 V, f = 1 MHz	—	30	—	pF
Detector	OFF-state current	I_{OFF}		V_{OFF} = 60 V	—	0.0001	1	μA
	Output capacitance	C_{OFF}		V = 0 V, f = 1 MHz	—	130	—	pF

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9. Coupled Electrical Characteristics (Unless otherwise specified, T_a = 25°C)

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	I_{FT}		I_{ON} = 500 mA	—	1	3	mA
Return LED current	I_{FC}		I_{OFF} = 100 μA	0.1	0.5	—	mA
ON-state resistance	R_{ON}		I_{ON} = 500 mA, I_F = 5 mA	—	1	2	Ω

10. Isolation Characteristics (Unless otherwise specified, T_a = 25°C)

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Total 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	3750	—	—	Vrms
			AC, 1 s in oil	—	10000	—	
			DC, 60 s, in oil	—	10000	—	Vdc

Note 1: This device is considered as a two-terminal device: Pins 1 and 3 are shorted together, and pins 4 and 6 are shorted together.

11. Switching Characteristics (Unless otherwise specified, T_a = 25°C)

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Turn-on time	t_{ON}		See Fig. 11.1 R_L = 200 Ω, V_{DD} = 20 V, I_F = 5 mA	—	0.6	2	ms
Turn-off time	t_{OFF}			—	0.1	0.5	

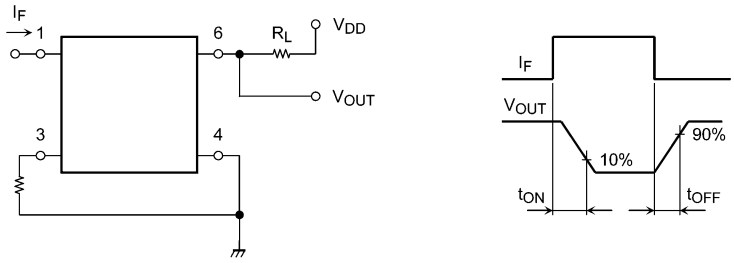

Fig. 11.1 Switching Time Test Circuit

12. Ordering Information (Example of Item Name)

Item Name	Packaging (Note 1)	Packing (MOQ)
TLP172AM(E(O	SMD	Magazine (125 pcs)
TLP172AM(TPL,E(O	SMD	Tape and reel (3000 pcs)
TLP172AM(TPR,E(O	SMD	Tape and reel (3000 pcs)

Note 1: SMD: Surface Mount Device

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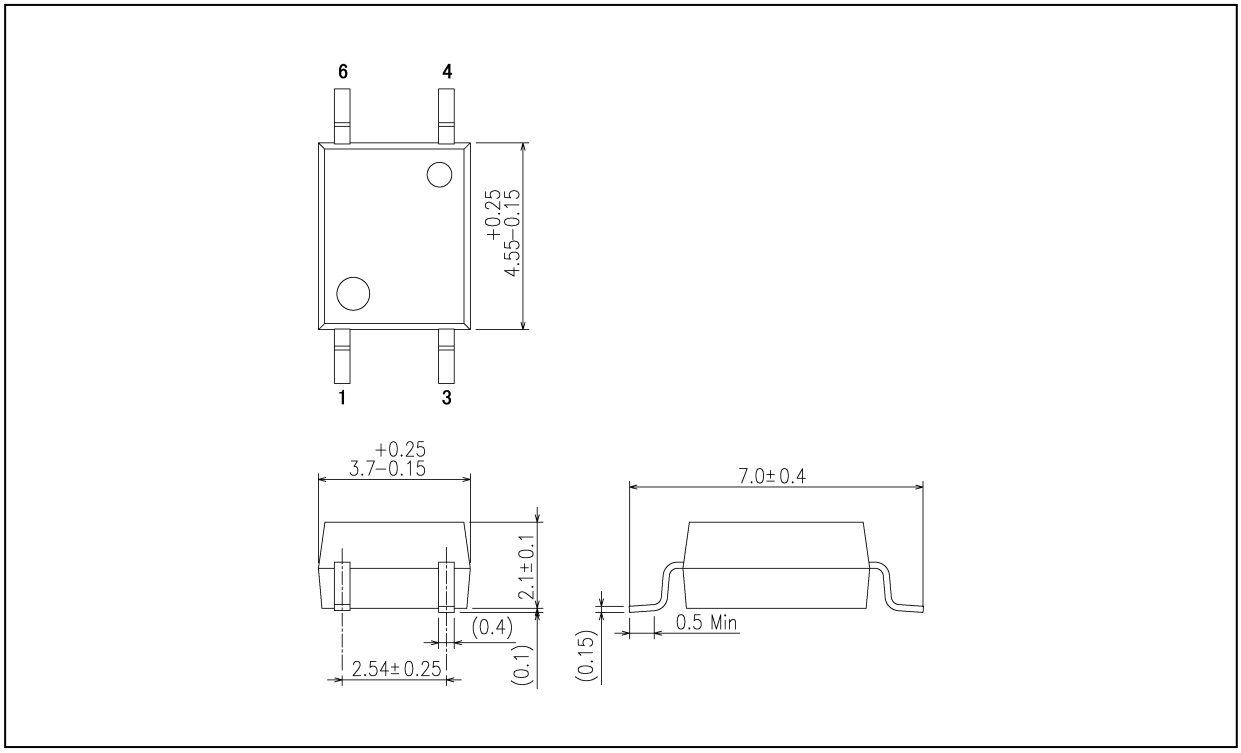
Package Dimensions

Unit: mm



Weight: 0.1 g (typ.)

Package Name(s)
TOSHIBA: 11-4M1S

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