

TLP3419

1. Applications

- ATE (Automatic Test Equipment)
- High-Speed Logic IC Testers
- High-Speed Memory Testers
- Measuring Instruments

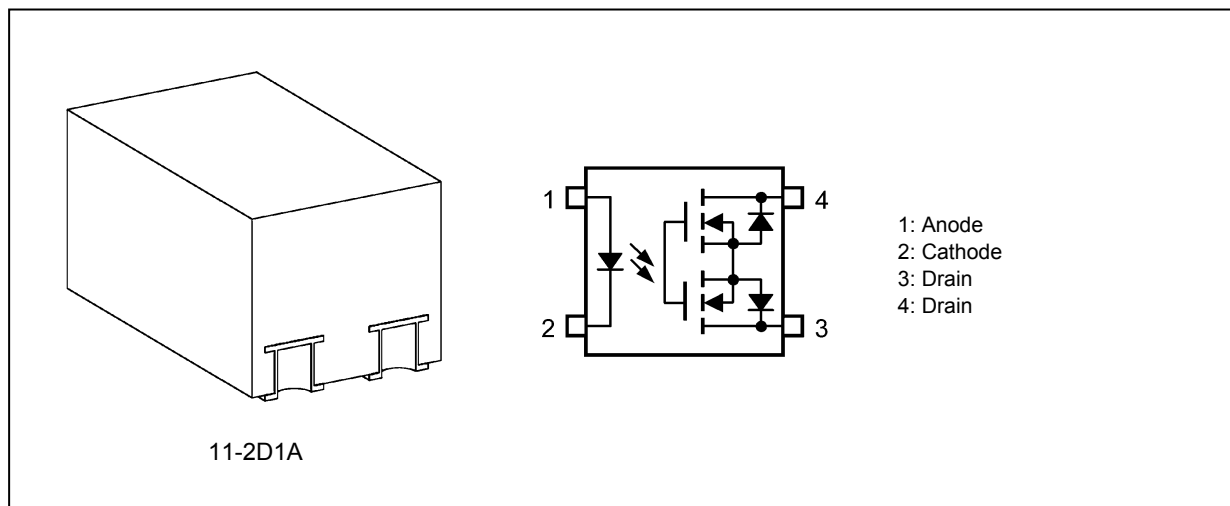
2. General

The TOSHIBA TLP3419 is a very small outline non-leaded photorelay suitable for surface-mount assembly. The TLP3419 consists of an infrared-emitting diode optically coupled to a photo-MOSFET and is housed in a VSON 4-pin package. The TLP3419 is suitable for applications that require low output capacitance and high withstand voltage, such as LCD testers.

3. Features

- (1) Normally opened (1-Form-A)
- (2) OFF-state output terminal voltage: 80 V (min)
- (3) Trigger LED current: 3 mA (max)
- (4) ON-state current: 200 mA (max)
- (5) ON-state resistance: 6 Ω (typ.), 8 Ω (max)
- (6) Output capacitance: 6.5 pF(typ.), 11 pF(max)
- (7) Isolation voltage: 500 Vrms (min)

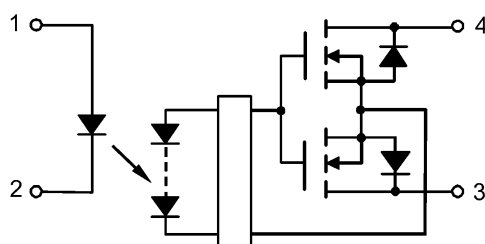
4. Packaging and Pin Assignment



Start of commercial production

2015-02

5. Internal Circuit



6. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$)

	Characteristics	Symbol	Note	Rating	Unit
LED	Input forward current	I_F		30	mA
	Input forward current derating ($T_a \geq 25\text{ }^{\circ}\text{C}$)	$\Delta I_F / \Delta T_a$		-0.3	mA/ $^{\circ}\text{C}$
	Input reverse voltage	V_R		5	V
	Junction temperature	T_j		125	$^{\circ}\text{C}$
Detector	OFF-state output terminal voltage	V_{OFF}		80	V
	ON-state current	I_{ON}		200	mA
	ON-state current derating ($T_a \geq 25\text{ }^{\circ}\text{C}$)	$\Delta I_{ON} / \Delta T_a$		-2	mA/ $^{\circ}\text{C}$
	ON-state current (pulsed) ($t = 100\text{ ms}$, Duty = 1/10)	I_{ONP}		600	mA
	Junction temperature	T_j		125	$^{\circ}\text{C}$
Common	Storage temperature	T_{stg}		-40 to 125	$^{\circ}\text{C}$
	Operating temperature	T_{opr}		-40 to 110	
	Lead soldering temperature (10 s)	T_{sol}		260	
	Isolation voltage AC, 60 s, R.H. $\leq 60\%$	BV_S	(Note 1)	500	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 2 are shorted together, and pins 3 and 4 are shorted together.

Note: This device is sensitive to electrostatic discharge (ESD). Extreme ESD conditions should be guarded against by using proper antistatic precautions for the worktable, operator, solder iron, soldering equipment and so on.

7. Recommended Operating Conditions (Note)

Characteristics	Symbol	Note	Min	Typ.	Max	Unit
Supply voltage	V_{DD}		—	—	64	V
Input forward current	I_F		5	7.5	20	mA
ON-state current	I_{ON}		—	—	200	mA
Operating temperature	T_{opr}		-20	—	85	$^{\circ}\text{C}$

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, $T_a = 25\text{ }^{\circ}\text{C}$)

	Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
LED	Input forward voltage	V_F		$I_F = 10\text{ mA}$	1.1	1.27	1.4	V
	Input reverse current	I_R		$V_R = 5\text{ V}$	—	—	10	μA
	Input capacitance	C_t		$V = 0\text{ V}$, $f = 1\text{ MHz}$	—	30	—	pF
Detector	OFF-state current	I_{OFF}		$V_{OFF} = 80\text{ V}$	—	—	1	nA
	Output capacitance	C_{OFF}		$V = 0\text{ V}$, $f = 100\text{ MHz}$, $t < 1\text{ s}$	—	6.5	11	pF

9. Coupled Electrical Characteristics (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$)

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Trigger LED current	I_{FT}		$I_{ON} = 100\text{ mA}$	—	1.1	3	mA
Return LED current	I_{FC}		$I_{OFF} = 10\text{ }\mu\text{A}$	0.1	—	—	
ON-state resistance	R_{ON}		$I_{ON} = 200\text{ mA}$, $I_F = 5\text{ mA}$, $t < 1\text{ s}$	—	6	8	Ω

10. Isolation Characteristics (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$)

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Total capacitance (input to output)	C_S	(Note 1)	$V_S = 0\text{ V}$, $f = 1\text{ MHz}$	—	1	—	pF
Isolation resistance	R_S	(Note 1)	$V_S = 500\text{ V}$, R.H. $\leq 60\%$	—	10^{14}	—	Ω
Isolation voltage	BV_S	(Note 1)	AC, 60 s	500	—	—	Vrms
			AC, 1 s in oil	—	1000	—	
			DC, 60 s, in oil	—	1000	—	Vdc

Note 1: This device is considered as a two-terminal device: Pins 1 and 2 are shorted together, and pins 3 and 4 are shorted together.

11. Switching Characteristics (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$)

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Turn-on time	t_{ON}		See Fig. 11.1.	—	130	400	μs
Turn-off time	t_{OFF}		$R_L = 200\text{ }\Omega$, $V_{DD} = 20\text{ V}$, $I_F = 5\text{ mA}$	—	20	400	

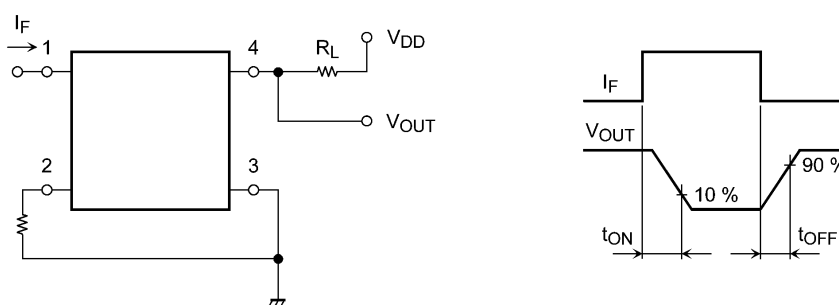


Fig. 11.1 Switching Time Test Circuit and Waveform

12. Characteristics Curves (Note)

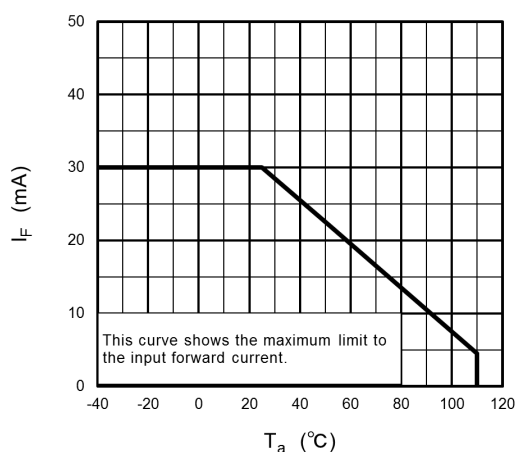


Fig. 12.1 $I_F - T_a$

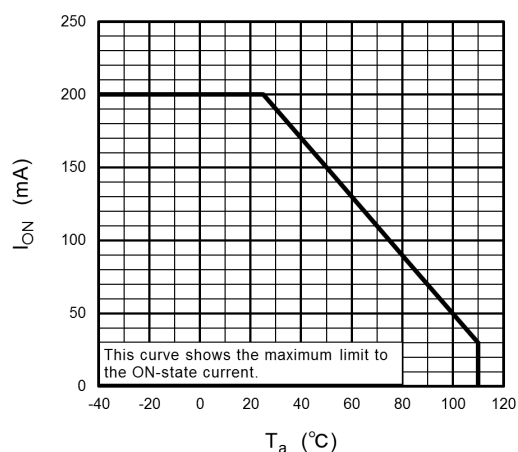


Fig. 12.2 $I_{ON} - T_a$

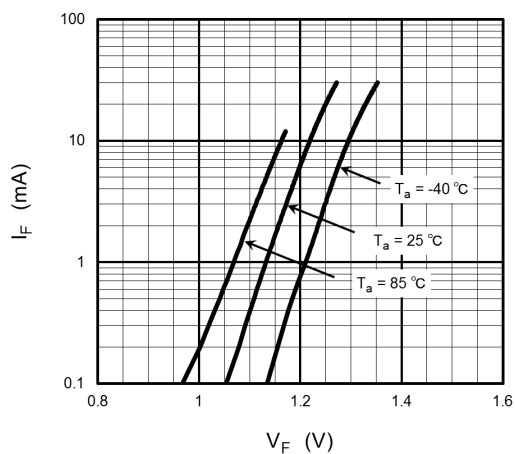


Fig. 12.3 $I_F - V_F$

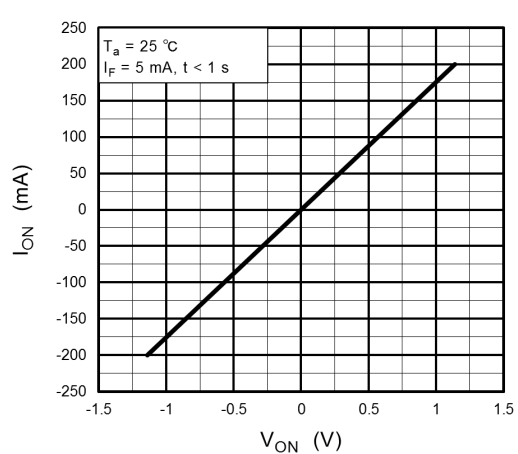


Fig. 12.4 $I_{ON} - V_{ON}$

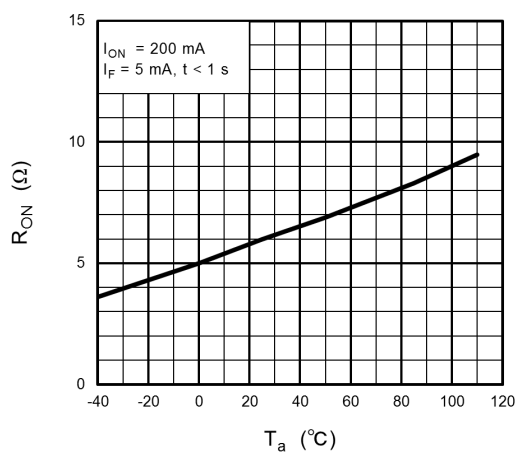


Fig. 12.5 $R_{ON} - T_a$

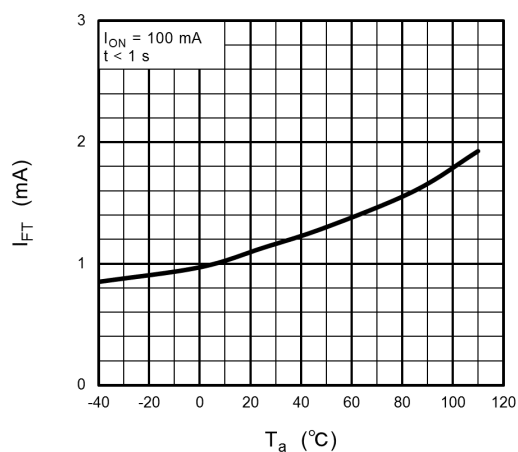
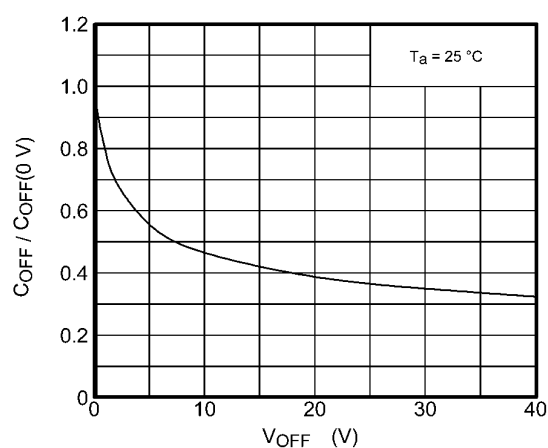
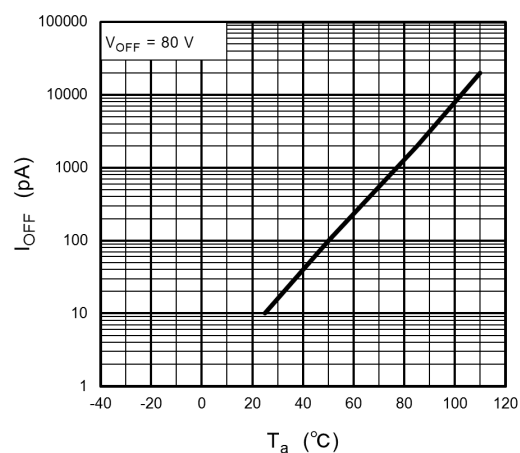
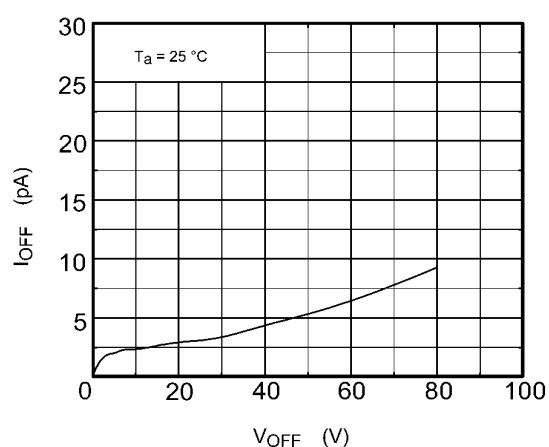
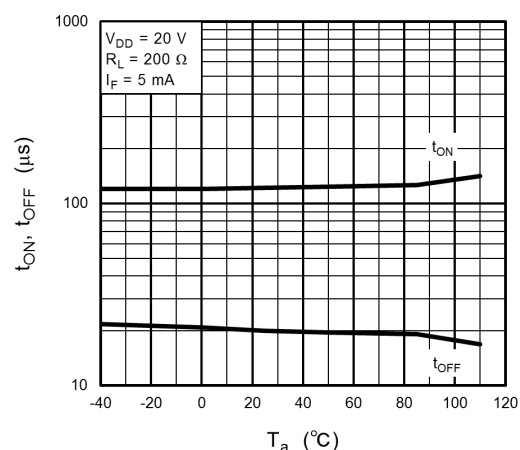
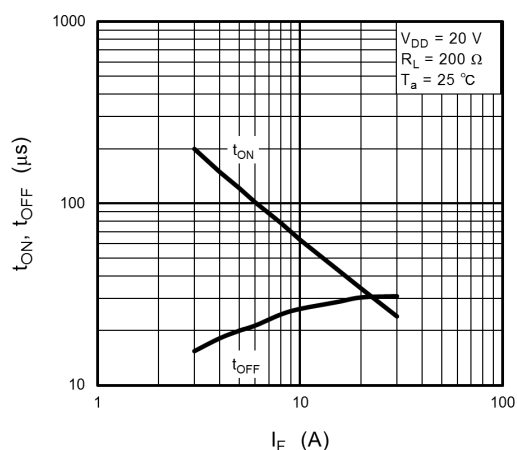
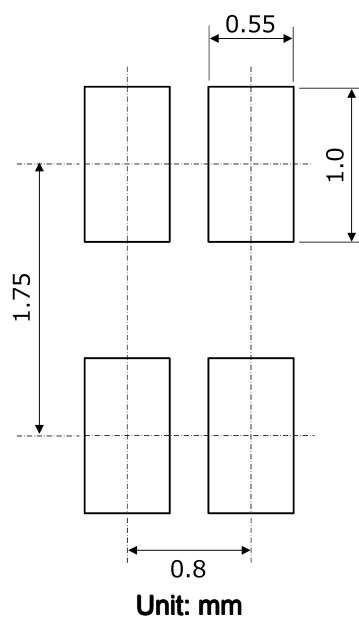


Fig. 12.6 $I_{FT} - T_a$

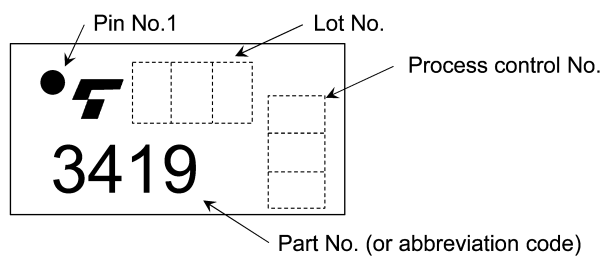


Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

14. Land Pattern Dimensions (for reference only)



15. Marking



16. Embossed-Tape Packing (TP) Specification for Mini-Flat Photorelays

16.1. Applicable Package

Package Name	Product Type
VSON4	Photorelay

16.2. Product Naming Conventions

Type of package used for shipment is denoted by a symbol suffix after a part number. The method of classification is as below.

Example) TLP3419(TP,F(O

Part number: TLP3419

Tape type: TP

[[G]]/RoHS COMPATIBLE: F (Note 1)

Domestic ID (Country / Region of origin: JAPAN): (O

Note 1: Please contact your Toshiba sales representative for details on environmental information such as the product's RoHS compatibility.

RoHS is the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

16.3. Tape Dimensions Specification

Tape Type	Division	Packing Amount (A unit per reel)
TP	—	3000

16.3.1. Orientation of Device in Relation to Direction of Feed

Device orientation in the carrier cavities as shown in the following figure.

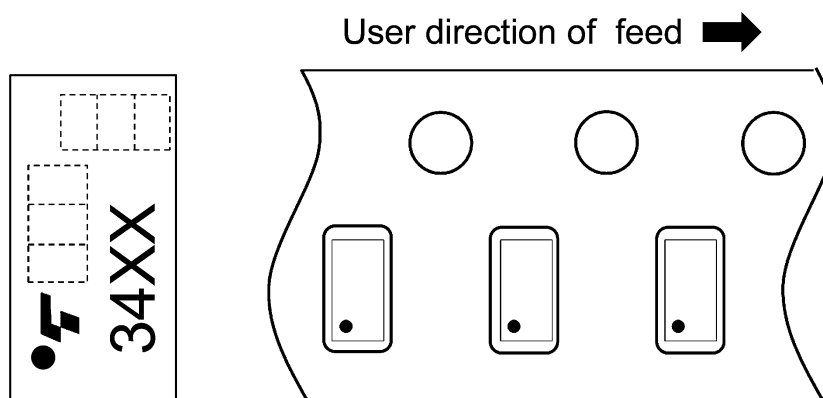


Fig. 16.3.1.1 Device Orientation

16.3.2. Empty Cavities

Characteristics	Criterion	Remarks
Occurrences of 2 or more successive empty cavities	0 device	Within any given 40-mm section of tape, not including leader and trailer
Single empty cavity	6 devices (max) per reel	Not including leader and trailer

16.3.3. Tape Leader and Trailer

The start end of the tape has 40 or more empty cavities. The hub end of the tape has 40 or more empty cavities and approximately one-third empty turn only for a cover tape.

16.3.4. Tape Dimensions

Tape material: Plastic (for protection against static electricity)

Unit: mm

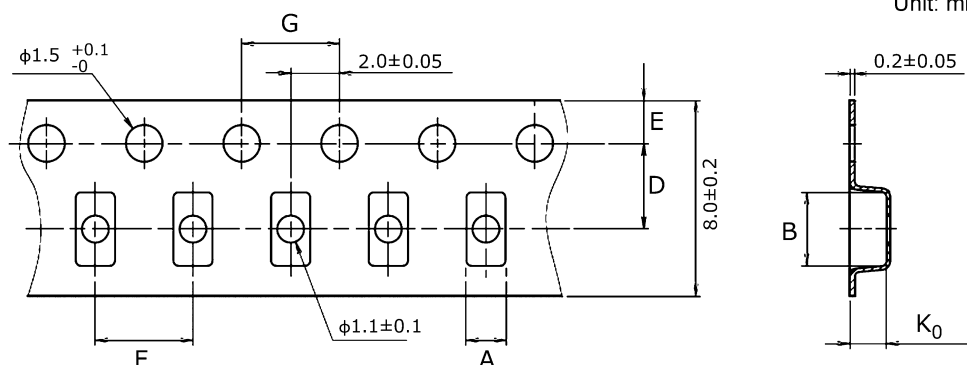


Table Tape Dimensions (unit: mm, tolerance: ± 0.1)

Symbol	Dimension	Remark
A	1.6	—
B	3.0	—
D	3.5	Center line of embossed cavity and sprocket hole
E	1.75	Distance between tape edge and sprocket hole center
F	4.0	Cumulative error $+0.2/-0.2$ (max) per 10 empty cavities holes
G	4.0	Cumulative error $+0.2/-0.2$ (max) per 10 sprocket holes
K_0	1.5	Internal space

16.3.5. Reel Specification

Material: Plastic (for protection against static electricity)

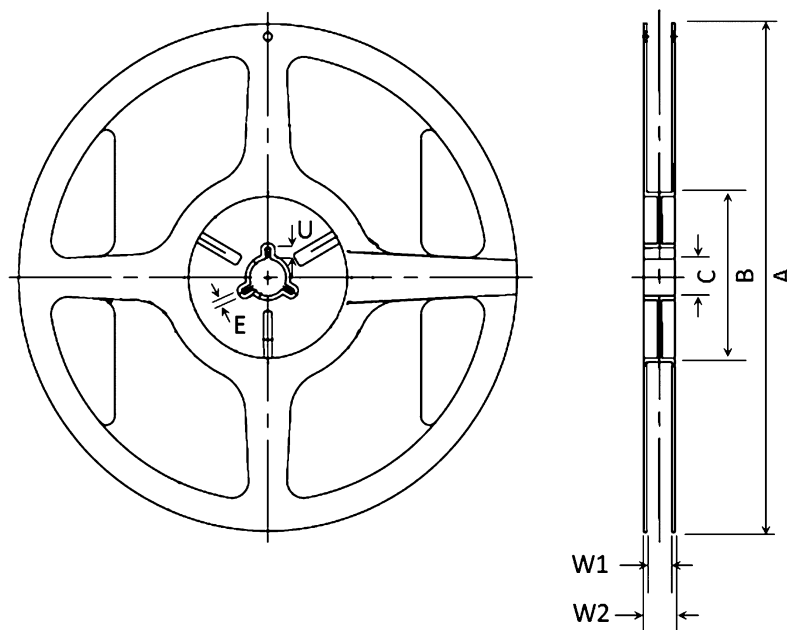


Table Reel Dimensions (unit: mm)

Symbol	Dimension
A	$\phi 180 \pm 3$
B	$\phi 60 \pm 1$
C	$\phi 13 \pm 0.5$
E	2.0 ± 0.5
U	4.0 ± 0.5
W1	9.0 ± 0.3
W2	11.4 ± 1.0

16.4. Packing (Note)

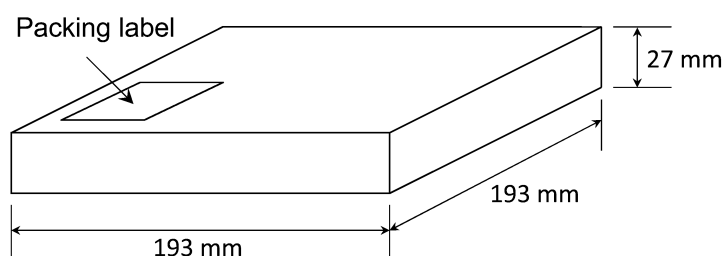


Fig. 16.4.1 1 reel/carton (unit: mm)

Note: Taping reel diameter: $\phi 180$ mm

16.5. Label Format

The carton bears a label indicating the product number, the symbol representing classification of standard, the quantity, the lot number and the Toshiba company name.

16.6. Ordering Information

When placing an order, please specify the part number, tape type and quantity as shown in the following example.

Example) TLP3419(TP,F(O 3000 pcs

Part number: TLP3419

Tape type: TP

[[G]]/RoHS COMPATIBLE: F (**Note 1**)

Domestic ID (Country/Region of origin: Japan): O

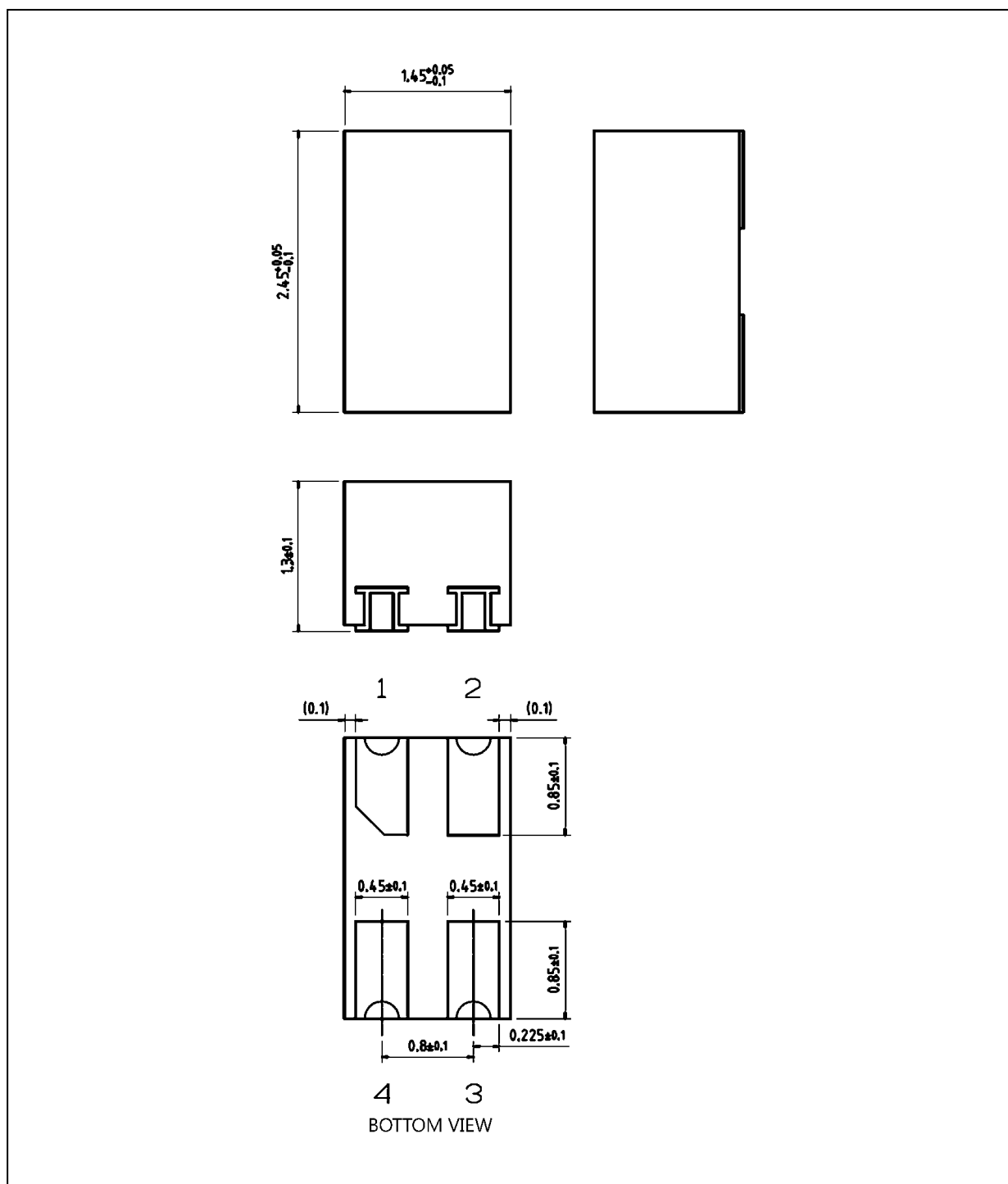
Quantity (must be a multiple of 3000): 3000 pcs

Note 1: Please contact your Toshiba sales representative for details on environmental information such as the product's RoHS compatibility.

RoHS is the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Package Dimensions

Unit: mm



Weight: 10 mg (typ.)

Package Name(s)
TOSHIBA: 11-2D1A

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