

Date : November 25, 2022
Specification number : H22294307

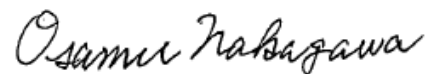
SPECIFICATION

Product number : TLP185(GB-TPL,SE(T

This specification is approved and confirmed by both
ELECTRONICS SOURCE CO., LTD.
and TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION.

ELECTRONICS SOURCE CO., LTD.

TOSHIBA ELECTRONIC DEVICES &
STORAGE CORPORATION



Osamu Nakagawa

Senior Manager
Semiconductor Quality Promotion Dept.
Semiconductor Quality Center

Photocouplers Infrared LED & Photo Transistor

TLP185(SE)

1. Applications

- Office Equipment
- Programmable Logic Controllers (PLCs)
- AC Adapters
- I/O Interface Boards

2. General

The TLP185(SE) consist of a photo transistor optically coupled to an infrared LED. The TLP185(SE) photocoupler is housed in the very small and thin SO6 package. Since TLP185(SE) is smaller than DIP package, it's suitable for high-density surface mounting application such as programmable controllers.

3. Features

- (1) Collector-emitter voltage: 80 V (min)
- (2) Current transfer ratio
GB Rank: 100% (min)
- (3) Isolation voltage: 3750 Vrms (min)
- (4) Operating temperature: -55 to 110 °C
- (5) Safety standards

UL-recognized: UL1577, File No.E67349

cUL-recognized: CSA Component Acceptance Service No.5A File No.E67349

VDE-approved: EN 60747-5-5, EN 62368-1 (**Note 1**)

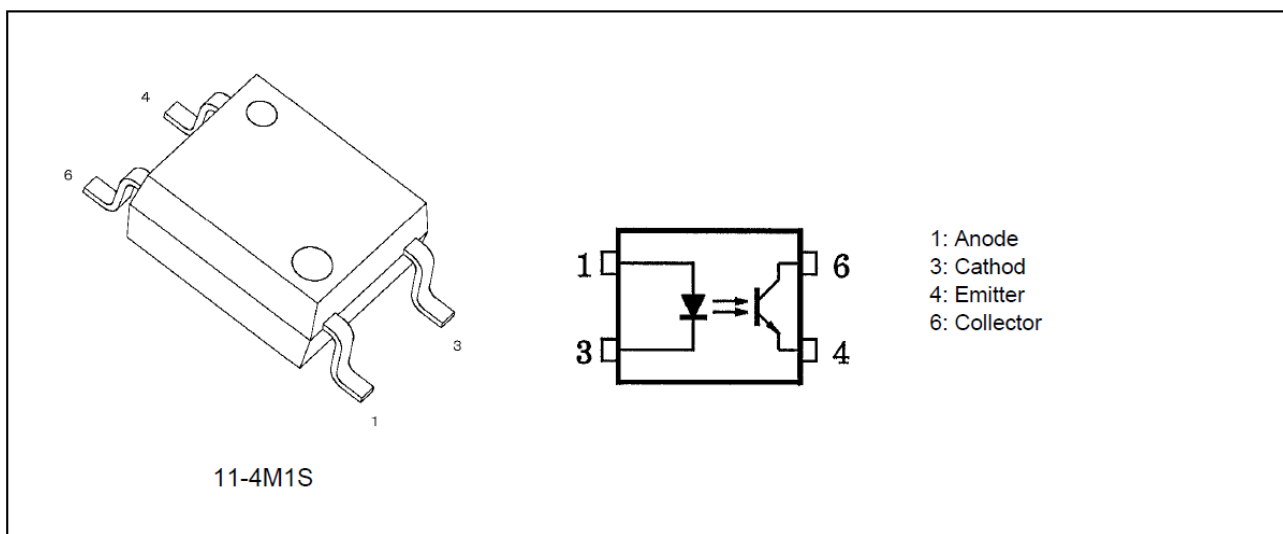
CQC-approved: GB4943.1, GB8898 Thailand Factory



仅适用于海拔 2000m 以下地区安全使用

Note 1: When a VDE approved type is needed, please designate the **Option (V4)**.

4. Packaging and Pin Assignment



Start of commercial production
2013-01

5. Principle of Operation

5.1. Mechanical Parameters

Characteristics	Min	Unit
Creepage distances	5.0	mm
Clearance	5.0	
Internal isolation thickness	0.4	

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

	Characteristics	Symbol	Note	Rating	Unit
LED	Input forward current	I_F		50	mA
	Input forward current derating (Ta ≥ 90 °C)	$\Delta I_F/\Delta T_a$		-1.5	mA/°C
	Input forward current (pulsed)	I_{FP}	(Note 1)	1	A
	Input reverse voltage	V_R		5	V
	Input power dissipation	P_D		100	mW
	Input power dissipation derating (Ta ≥ 90 °C)	$\Delta P_D/\Delta T_a$		-2.86	mW/°C
	Junction temperature	T_j		125	°C
Detector	Collector-emitter voltage	V_{CEO}		80	V
	Emitter-collector voltage	V_{ECO}		7	
	Collector current	I_C		50	mA
	Collector power dissipation	P_C		150	mW
	Collector power dissipation derating (Ta ≥ 25 °C)	$\Delta P_C/\Delta T_a$		-1.5	mW/°C
	Junction temperature	T_j		125	°C
Common	Operating temperature	T_{opr}		-55 to 110	
	Storage temperature	T_{stg}		-55 to 125	
	Lead soldering temperature (10 s)	T_{sol}		260	
	Total power dissipation	P_T		200	mW
	Isolation voltage AC, 60 s, R.H. ≤ 60 %	BV_S	(Note 2)	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: Pulse width (PW) ≤ 100 μs, f = 100 Hz

Note 2: 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. Electrical Characteristics (Unless otherwise specified, Ta = 25 °C)

	Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
LED	Input forward voltage	V_F	$I_F = 10 \text{ mA}$	1.1	1.25	1.4	V	
	Input reverse current	I_R	$V_R = 5 \text{ V}$	-	-	5	μA	
	Input capacitance	C_t	$V = 0 \text{ V}, f = 1 \text{ MHz}$	-	30	-	pF	
Detector	Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 0.5 \text{ mA}$	80	-	-	V	
	Emitter-collector breakdown voltage	$V_{(BR)ECO}$	$I_E = 0.1 \text{ mA}$	7	-	-		
	Dark Current		I_{DARK}	$V_{CE} = 48 \text{ V}$	-	0.01	0.08	μA
				$V_{CE} = 48 \text{ V}, T_a = 85 \text{ °C}$	-	2	50	
	Collector-emitter capacitance	C_{CE}		$V = 0 \text{ V}, f = 1 \text{ MHz}$	-	10	-	pF

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

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Current transfer ratio	I_C / I_F	(Note 1)	$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$	100	-	600	%
Saturated current transfer ratio	$I_C / I_{F(sat)}$		$I_F = 1 \text{ mA}, V_{CE} = 0.4 \text{ V}$	30	-	-	
Collector-emitter saturation voltage	$V_{CE(sat)}$		$I_F = 8 \text{ mA}, I_C = 2.4 \text{ mA}$	-	-	0.3	V
			$I_F = 1 \text{ mA}, I_C = 0.2 \text{ mA}$	-	-	0.3	
OFF-state collector current	$I_{C(off)}$		$V_F = 0.7 \text{ V}, V_{CE} = 48 \text{ V}$	-	1	10	μA

Note 1: See Table 8.1 for current transfer ratio.

Table 8.1 Current Transfer Ratio (CTR) Rank (Note) (Unless otherwise specified, Ta = 25 °C)

Rank	Test Condition	Current transfer ratio I_C / I_F Min	Current transfer ratio I_C / I_F Max	Marking of Classification	Unit
					%
GB	$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$	100	600	GB, GR, BL, G, G+, B	

Note: Specify both the part number and a rank in this format when ordering.

Example: TLP185(GB-TPL,SE)

For safety standard certification, however, specify the part number alone.

Example: TLP185(GB-TPL,SE) → TLP185

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

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Total capacitance (input to output)	C_s	(Note 1)	$V_s = 0 \text{ V}, f = 1 \text{ MHz}$	-	0.8	-	pF
Isolation resistance	R_s		$V_s = 500 \text{ V}, \text{ R.H.} \leq 60 \%$	10^{12}	10^{14}	-	Ω
Isolation voltage	BV_s		AC, 60 s	3750	-	-	Vrms

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.

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	t_r	$V_{CC} = 10\text{ V}$, $I_C = 2\text{ mA}$, $R_L = 100\ \Omega$	-	2	-	μs
Fall time	t_f		-	3	-	
Turn-on time	t_{on}		-	3	-	
Turn-off time	t_{off}		-	3	-	
Turn-on time	t_{on}	See Fig 10.1 $V_{CC} = 5\text{ V}$, $I_F = 16\text{ mA}$, $R_L = 1.9\text{ k}\Omega$	-	0.5	-	
Storage time	t_s		-	25	-	
Turn-off time	t_{off}		-	40	-	

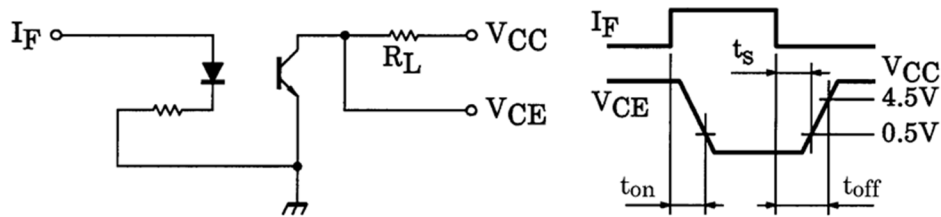
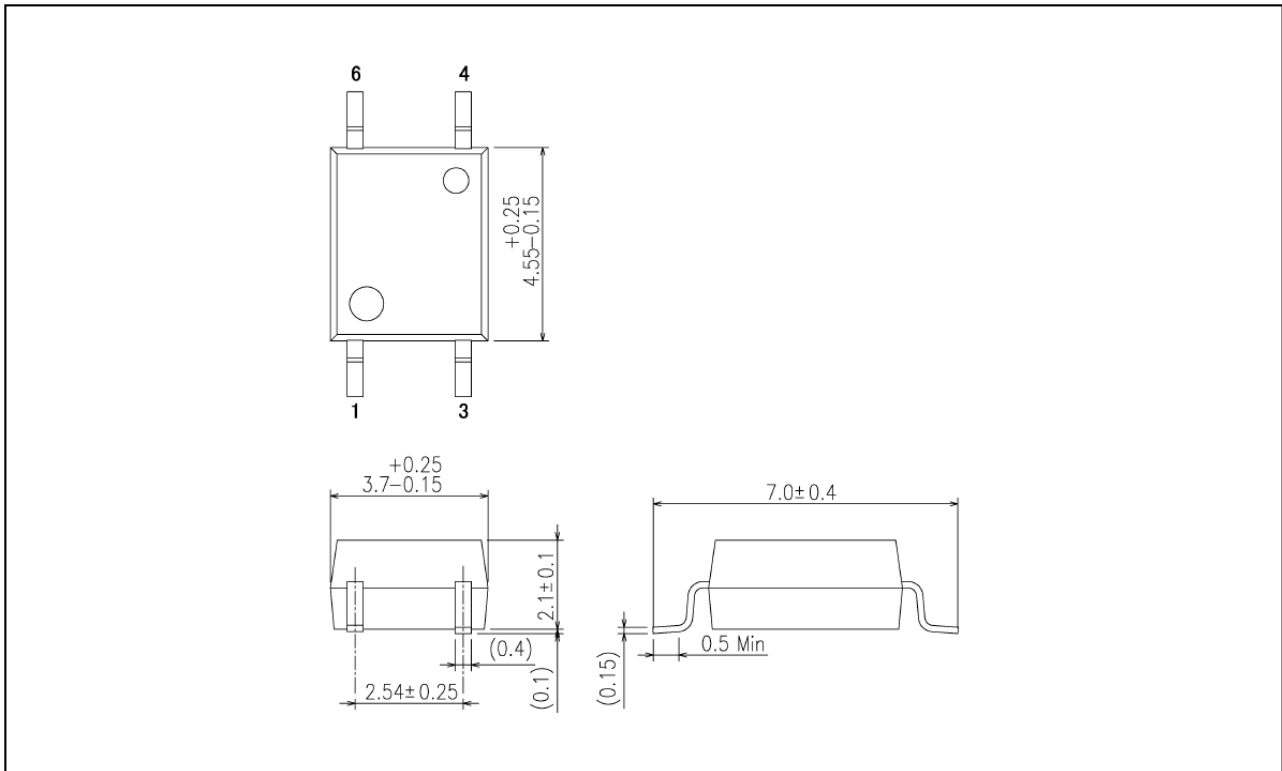


Fig. 10.1 Switching Time Test Circuit and Waveform

Package Dimensions

Unit: mm



Weight: 0.08 g (typ.)

Package Name(s)
TOSHIBA: 11-4M1S

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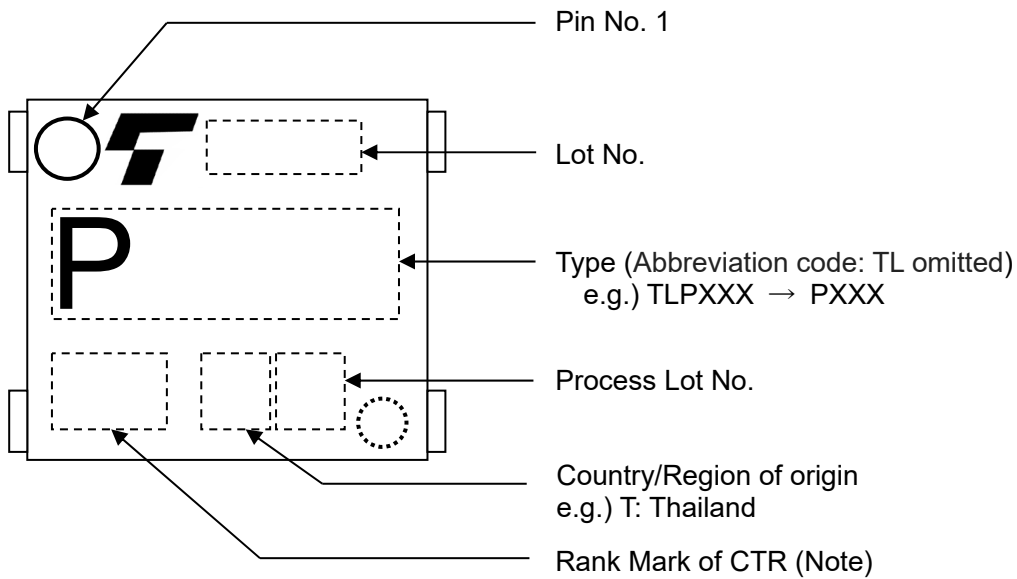
TOSHIBA ELECTRONIC DEVICES & STORAGE CORPORATION

<https://toshiba.semicon-storage.com/>

- Country / Region of origin : Diffused in Japan
Assembled in Thailand

• Marking

Up to around October, 2021

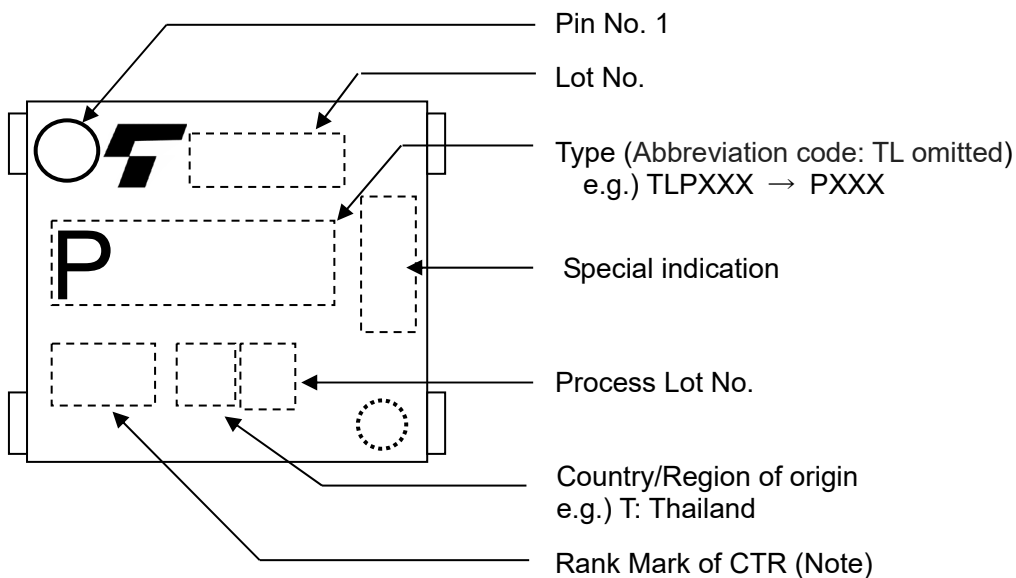
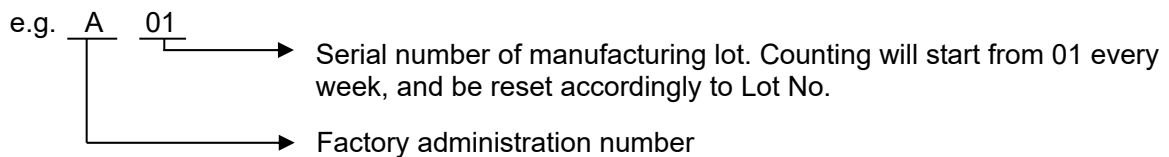


Note: Please refer to CTR rank table in the data sheet.

After October, 2021

(It is due to shift to the following one by one.)

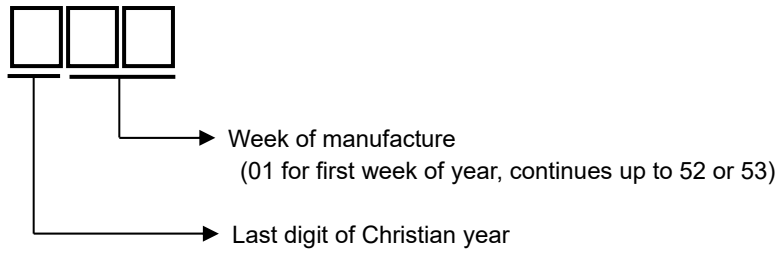
Information of special indication



Note: Please refer to CTR rank table in the data sheet.

Explanation for Lot No. indication system

Weekly 3 digits code table



For example, “841” means that the lot is manufactured at the 41th week of ***8 year.
(***8 year: A year that its last digit is 8.)

Embossed Carrier Tape Packaging specifications for 4pin SO6

Packaging of TOSHIBA semiconductor devices is compliant with IEC 60286-3.

1. Tape

1.1 Orientation of Device

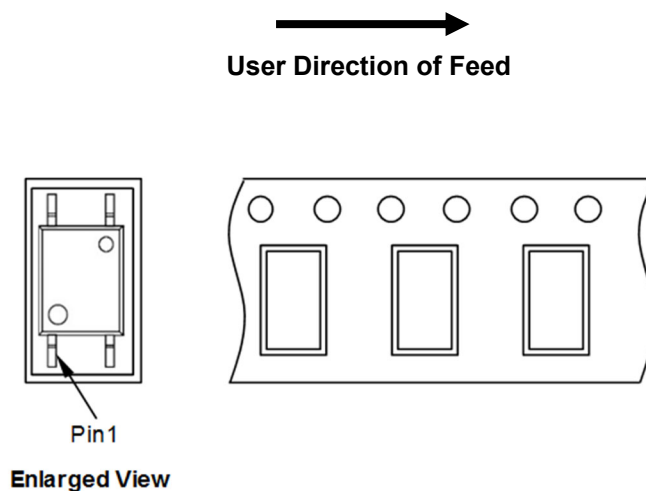


Figure 1 Orientation of Device

(The package is an example to show the orientation.)

1.2 Quantity

3000 pcs./reel

1.3 Leader and Trailer

Leader is 400mm minimum that includes 100mm minimum of empty portion.
Trailer is 160mm minimum and sealed with cover tape.

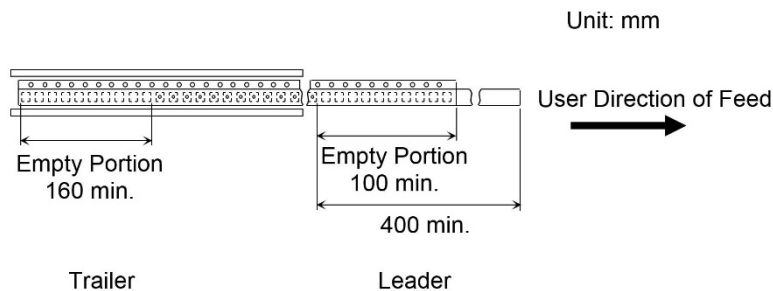


Figure 2 Leader and Trailer

1.4 Tape Dimensions

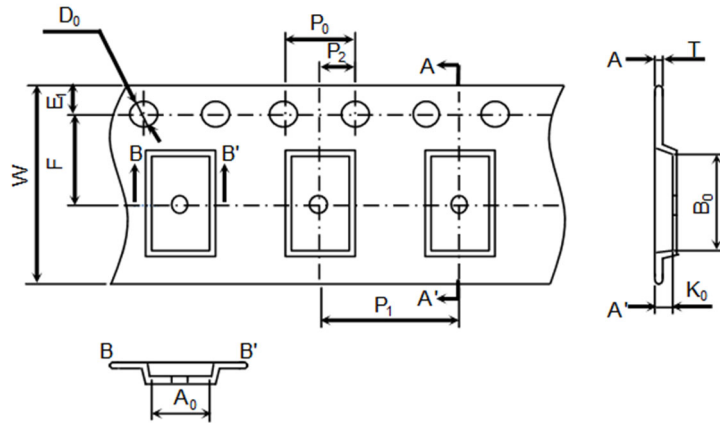


Figure 3 Tape Dimensions

(Figure 3 is an example and may differ from the actual tape. Refer to table 1 and 2 for dimensions.)

Table 1 Tape Dimensions -1

Unit: mm				
D ₀	E ₁	P ₀	T	P ₀ Cumulative Tolerance
1.5+0.1/0	1.75±0.1	4.0±0.1	0.6max.	±0.2/10pitch

Table 2 Tape Dimensions -2

Unit: mm						
F	P ₁	P ₂	W	A ₀	B ₀	K ₀
5.5±0.05	8.0±0.1	2.0±0.05	12.0	4.0	7.6	2.6

1.5 Peel Strength of Cover Tape

Table 3 Peel Test Condition and Strength

Test Condition	Peel Strength
Peeling Angle: 165 - 180° vs. Embossed Carrier Tape Peeling Velocity: 300mm/min.	0.1~1.3 N

2. Reel Dimensions

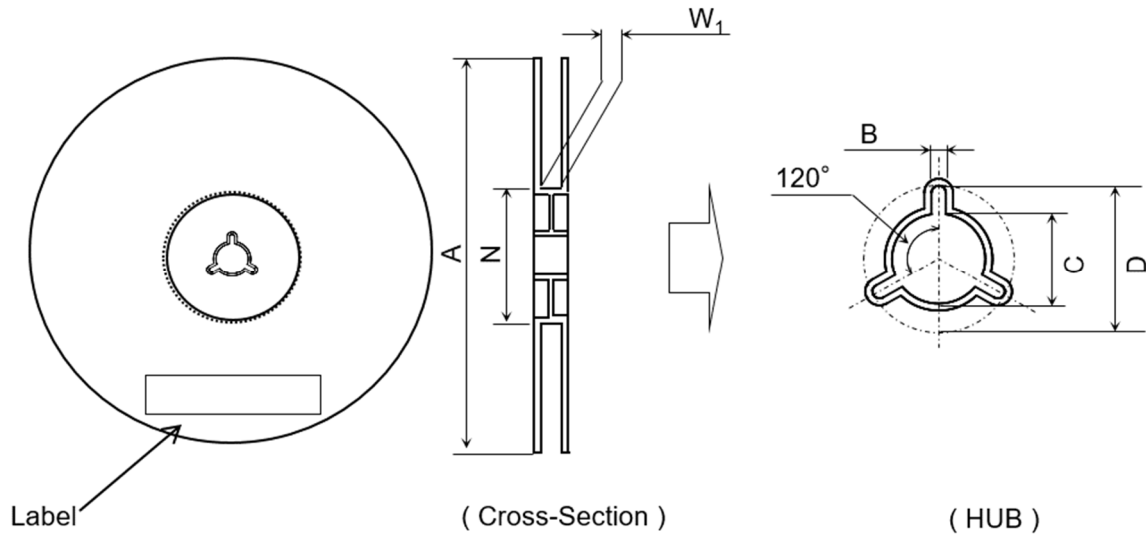


Figure 4 Reel

Table 4 Reel Dimensions

Unit: mm					
A	N	W ₁	C	D	B
330	100	13.5	13.0±0.2	21.0±0.8	2.0±0.5

3. Inner Carton

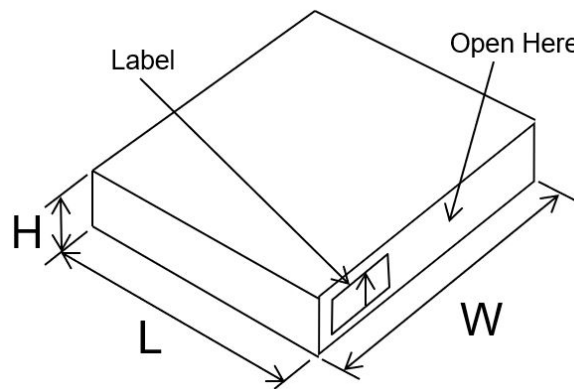


Figure 5 Inner Carton

Table 5 Inner Carton Dimensions(Outer Dimensions)

Unit: mm		
L	W	H
350	340	30

4. Label

Figure 6 is a label affixed to a reel and a carton.
 About ① to ⑨, refer to the following explanation.
 Refer to Figure 4 and 5 for the label position.

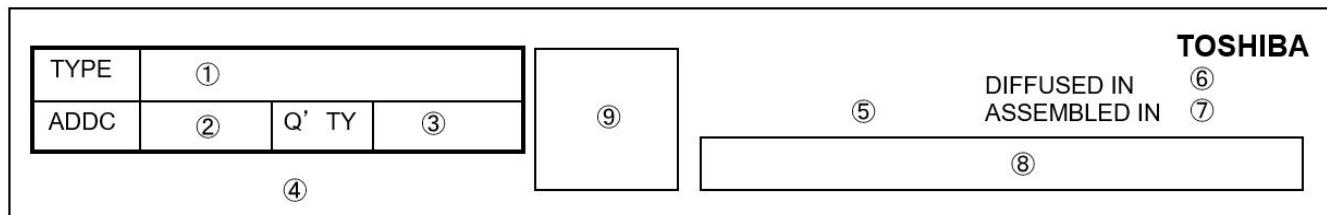


Figure 6 Label

- ① Part Number
- ② Additional Code
- ③ Quantity
- ④ Lot Code
- ⑤ Environmental Information
- ⑥ Country/Region of Origin(Pellet Process)
- ⑦ Country/Region of Origin(Assembly Process)
- ⑧ Bar Code
- ⑨ Matrix Code