

## Low Voltage H-Bridge Motor Drive

### FEATURES

- Support the input voltage range:  
Motor power: 1.8V~11V  
Control power supply: 1.8V~7V
- LDMOS  $R_{DS(ON)}$  (HS+LS) 650m $\Omega$  (typical)
- Ultra-low power sleep mode
- 45nA (typical) VM sleep mode current
- 17nA (typical) VCC sleep mode current
- Up to 1.5A Peak current output capacity
- Built-in UVLO Protection
- Built-in Over Temperature Protection
- Built-in Short Circuit Protection
- Built-in Over Current Protection
- Built-in Charge Pump
- TMI8837: DFN2x2-8 package
- TMI8837S: SOP8 package

### GENERAL DESCRIPTION

TMI8837 and TMI8837S are low voltage DC motor driver IC. Internal integration 650m $\Omega$  (HS+LS typical) H bridge NMOS switch, which can support the 1.8V~11V input voltage range. The Peak current capacity is up to 1.5A, support for ultra-low power sleep mode; built-in UVLO, Thermal Shutdown, OCP protection circuit. TMI8837 and TMI8837S can be used in camera, toys and consumer products.

### APPLICATIONS

- Cameras
- Toys
- Consumer Products

### TYPICAL APPLICATION

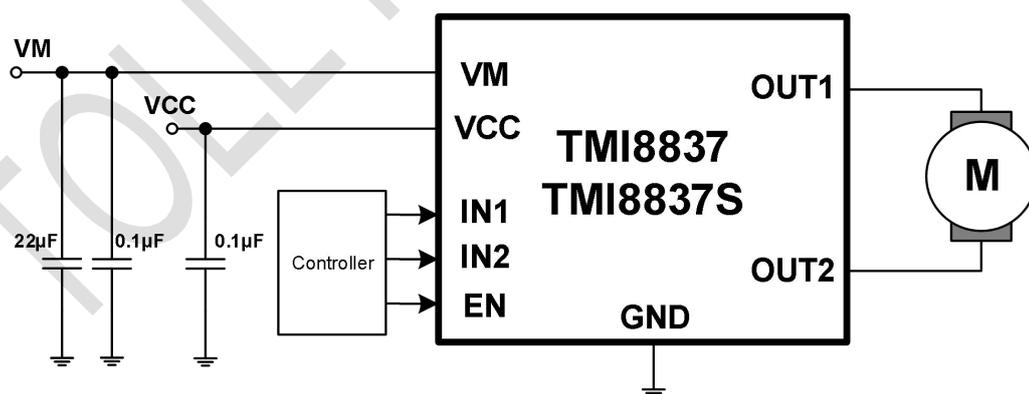
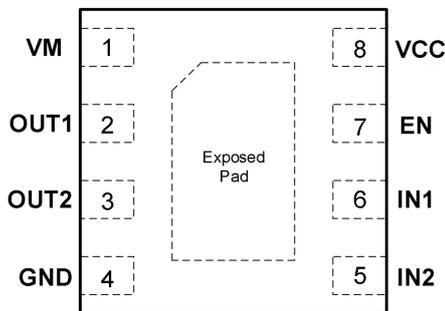


Figure 1. Basic Application Circuit

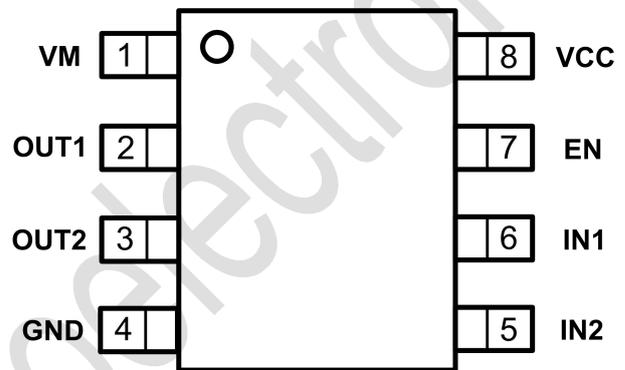
## ABSOLUTE MAXIMUM RATINGS

Parameter	Value	Unit
VM Voltage Range	-0.3~11	V
VCC, IN1, IN2, EN Voltages Range	-0.3~7	V
OUT1, OUT2 Voltage Range	-0.3~Vin+0.3	V
Storage Temperature Range	-50~150	°C
Junction Temperature	-40~150	°C
Package Thermal Resistance $\theta_{JA}$ of DFN2x2-8	70	°C/W
Package Thermal Resistance $\theta_{JA}$ of SOP8	90	°C/W

## PACKAGE/ORDER INFORMATION



**DFN2x2-8 (Top View)**  
**TMI8837**



**SOP8 (Top View)**  
**TMI8837S**

**Top Mark: TFCX/XX (TFC: Device Code, X/XX: Inside Code) for TMI8837**

**Top Mark: T8837S/XXXXX (T8837S: Device Code, XXXXX: Inside Code) for TMI8837S**

Part Number	Package	Top Mark	Quantity/ Reel
TMI8837	DFN2x2-8	TFCX/XX	3000
TMI8837S	SOP8	T8837S/XXXXX	3000

TMI8837 and TMI8837S devices are Pb-free and RoHS compliant.

## PIN FUNCTIONS

Pin	Name	Function
1	VM	Power Supply for Driver. Connect a 0.1μF bypass ceramic capacitor to GND. A bulk capacitor with at least 22μF capacitance on VM to GND is needed and helpful to stabilize VM voltage during motor operation.
2	OUT1	Motor Driver output 1
3	OUT2	Motor Driver output 2
4	GND	Ground pin
5	IN2	PWM input2
6	IN1	PWM input1
7	EN	Chip Enable Input Pin. When this pin is in logic low, the device enters low-power sleep mode. The device operates normally when this pin is logic high. The pin has an internal pull-down resistor to GND.
8	VCC	Power Supply for Logic Input. Connect a 0.1μF bypass ceramic capacitor to GND

## ESD RATING

Items	Description	Value	Unit
V <sub>ESD</sub>	Human Body Model for all pins	±2000	V

JEDEC specification JS-001

## RECOMMENDED OPERATING CONDITIONS

Items	Description	Min	Max	Unit
Voltage Range	VM	1.8	11	V
T <sub>J</sub>	Operating Junction Temperature Range	-40	125	°C

## ELECTRICAL CHARACTERISTICS

( $V_M=5V$ ,  $T_A = 25^\circ C$ , unless otherwise noted.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Input Power Supplies (VM and VCC)</b>						
VM Voltage Range	$V_{VM}$		1.8		11	V
VM Supply Current	$I_{VM}$	VM=5V, VCC=3V No PWM		124		$\mu A$
		VM=5V, VCC=3V 50kHz PWM		0.53		mA
VM sleep mode supply current	$I_{VMQ}$	VM=5V, VCC=3V Sleep Mode		45	95	nA
VCC Voltage Range	$V_{VCC}$		1.8		7	V
VCC Supply Current	$I_{VCC}$	VM=5V, VCC=3V No PWM		180		$\mu A$
		VM=5V, VCC=3V 50kHz PWM		0.32		mA
VCC sleep mode supply current	$I_{VCCQ}$	VM=5V, VCC=3V Sleep Mode		17	35	nA
<b>PWM Control Logic Inputs (IN1, IN2 and EN)</b>						
Input Logic Low Voltage Falling Threshold	$V_{IL\_F}$		0.25x VCC	0.4x VCC		V
Input Logic High Voltage Rising Threshold	$V_{IH\_R}$			0.5x VCC	0.6x VCC	V
Input logic Hysteresis	$V_{HYS}$			0.1x VCC		V
Input Logic Low Current	$I_{IL}$		-5		5	$\mu A$
Input Logic High Current	$I_{IH}$				40	$\mu A$
Input Pull Down Resistor	$R_{IN}$			100		k $\Omega$
<b>Motor Driver Outputs (OUT1 and OUT2)</b>						
Output Switch On-Resistance (HS+LS)	$R_{ON}$	VM=5V, VCC=3V $I_{load}=800mA$		0.65		$\Omega$
Output Switch Leakage Current	$I_{LEAK}$		-200		200	nA
<b>Protection Function</b>						
VCC UVLO Voltage	$V_{UVLO}$			1.7		V
UVLO Hysteresis	$V_{UVLO\_HY}$			100		mV
Over Current Protection	$I_{OCP}$		1.6	1.75		A
Over Current Retry Time	$T_{OCP\_RT}$			1		ms
Thermal Shutdown Threshold	$T_{SDN}$			160		$^\circ C$
Thermal Shutdown Hysteresis	$T_{SDN\_HY}$			20		$^\circ C$

## ELECTRICAL CHARACTERISTICS (continued)

( $V_{IN}=5V$ ,  $T_A = 25^{\circ}C$ , unless otherwise noted.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Enable time	$T_1$			180	265	ns
Output Disable time	$T_2$			70	100	ns
Delay Time IN1 low to OUT2 high IN2 low to OUT1 high	$T_3$			140	215	ns
Delay Time IN2 high to OUT1 low IN1 high to OUT2 low	$T_4$			160	240	ns
Output rise time	$T_5$			60	120	ns
Output fall time	$T_6$			38	100	ns

## FUNCTIONAL BLOCK DIAGRAM

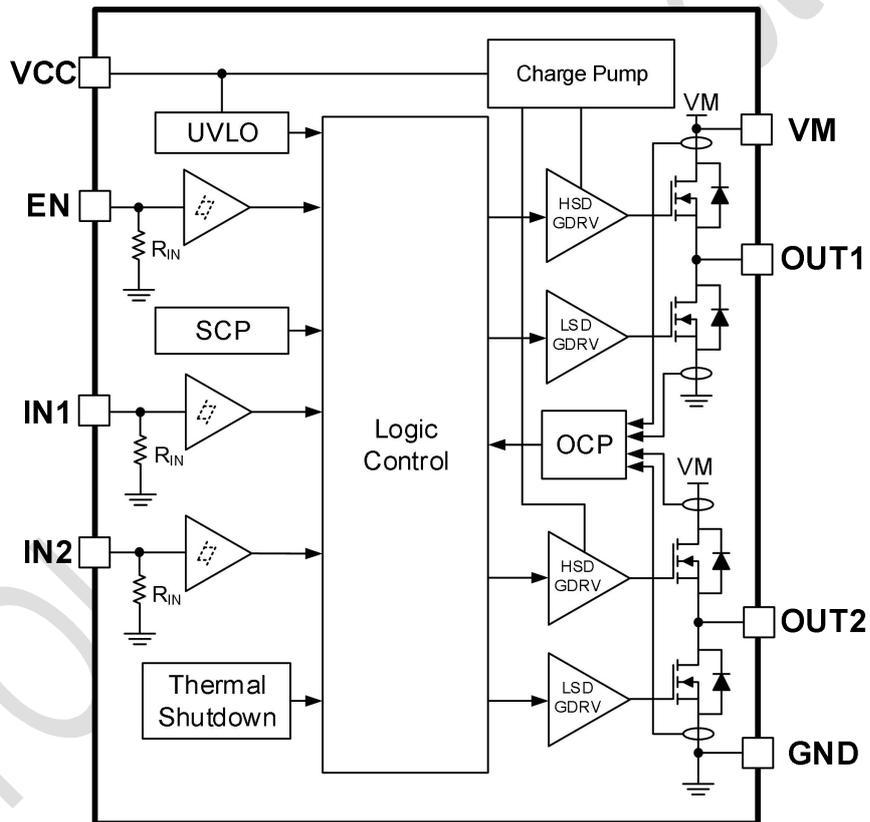
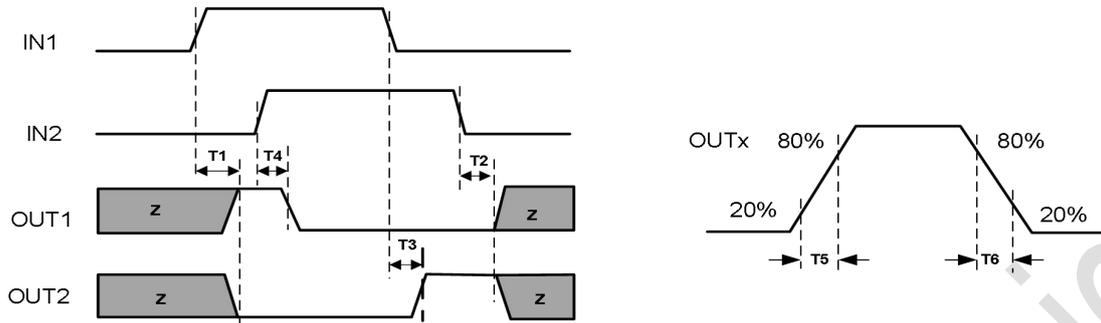


Figure 2. TMI8837/S Block Diagram

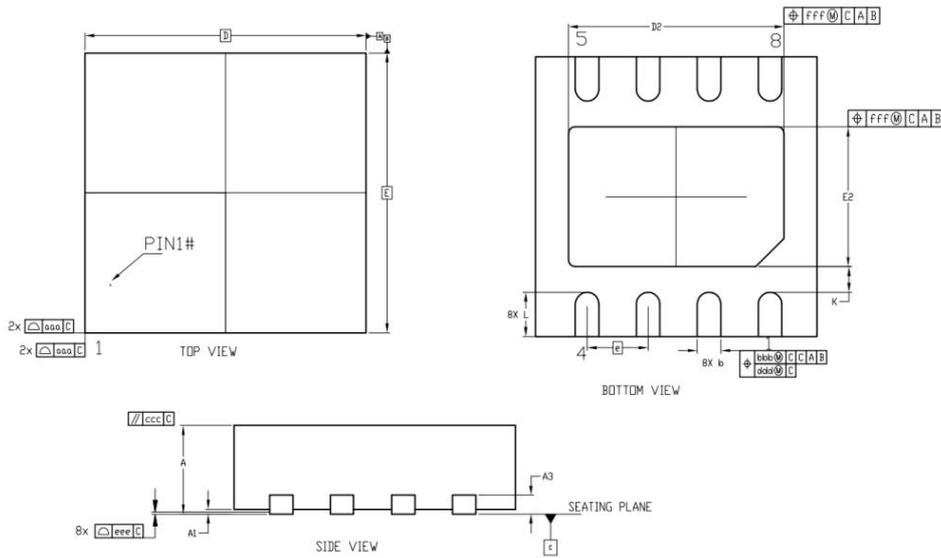
**INPUT OUTPUT LOGIC**



EN	IN1	IN2	OUT1	OUT2	Function
0	X	X	Z	Z	Coast
1	0	0	Z	Z	Coast
1	1	0	H	L	Forward
1	0	1	L	H	Reverse
1	1	1	L	L	Brake

**PACKAGE INFORMATION**

**DFN2x2-8**



Unit: mm

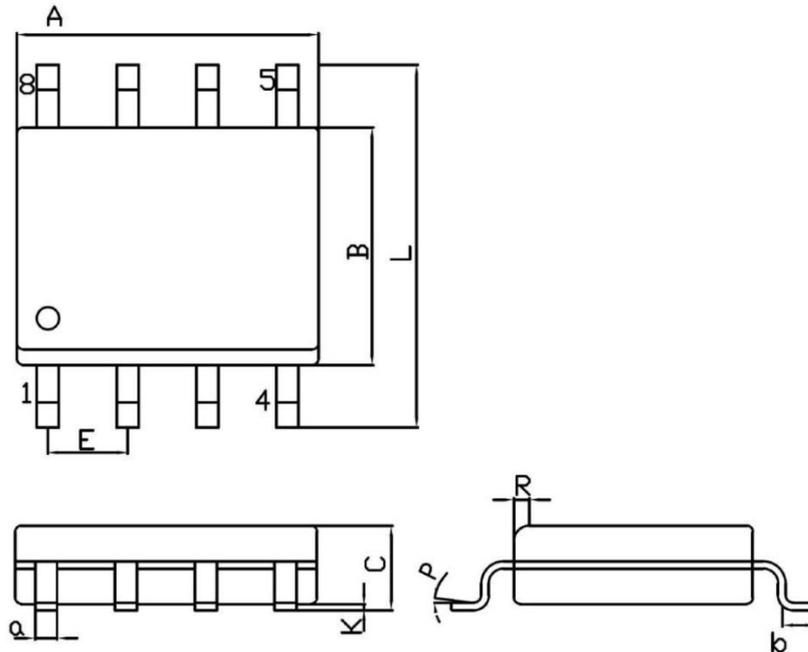
Symbol	Dimensions In Millimeters			Symbol	Dimensions In Millimeters		
	Min	Typ	Max		Min	Typ	Max
A	0.70	0.75	0.80	L	0.30	0.35	0.40
A1	0	0.02	0.05	K	0.20	-	-
A3	-	0.20 REF	-	aaa	-	0.15	-
b	0.19	0.24	0.29	bbb	-	0.10	-
D	2.00 BSC			ccc	-	0.10	-
E	2.00 BSC			ddd	-	0.05	-
D2	1.25	1.30	1.35	eee	-	0.08	-
E2	0.75	0.80	0.85	fff	-	0.10	-
e	0.50 BSC						

**Note:**

- 1) All dimensions are in millimeters.

**PACKAGE INFORMATION**

**SOP8**



Unit: mm

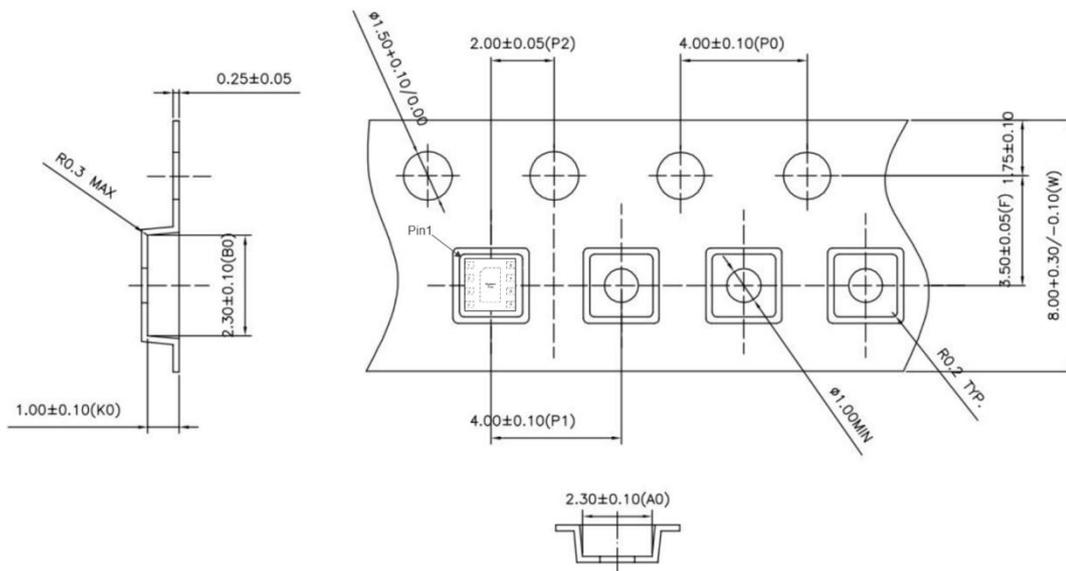
Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	4.70	5.10	C	1.35	1.75
B	3.70	4.10	a	0.35	0.49
L	6.00	6.40	R	0.30	0.60
E	1.27 BSC		P	0°	7°
K	0.12	0.22	b	0.40	1.25

**Note:**

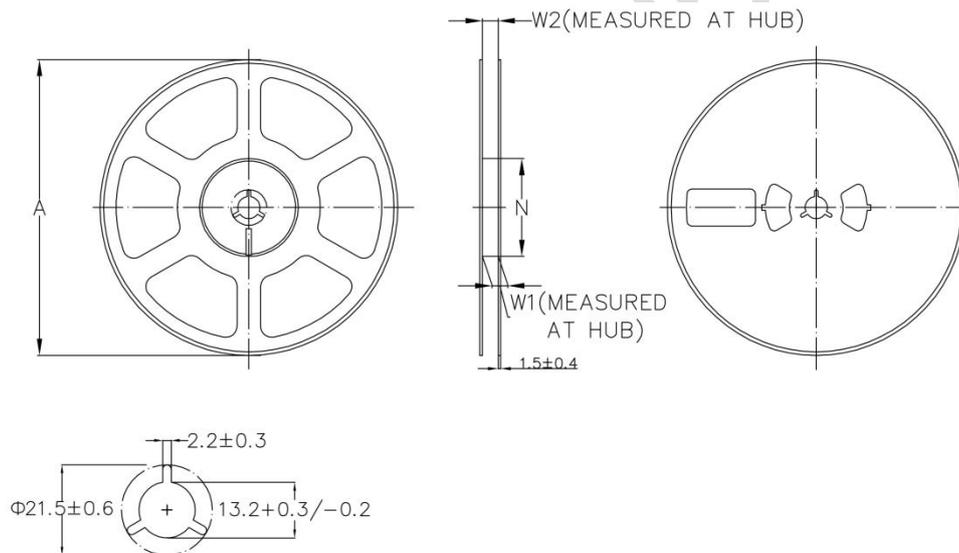
- 1) All dimensions are in millimeters.
- 2) Package length does not include mold flash, protrusion or gate burr.
- 3) Package width does not include inter lead flash or protrusion.
- 4) Lead popularity (bottom of leads after forming) shall be 0.10 millimeters max.
- 5) Pin 1 is lower left pin when reading top mark from left to right.

## TAPE AND REEL INFORMATION

### TAPE DIMENSIONS: DFN2x2-8



### REEL DIMENSIONS: DFN2x2-8



Unit: mm

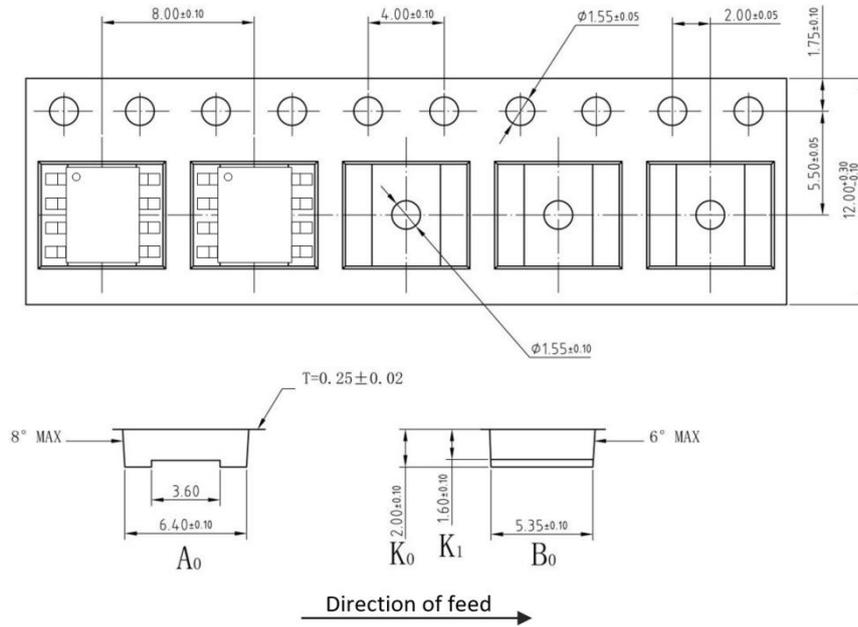
TAPE WIDTH	$\phi A (\pm 1.0)$	$\phi N (\pm 2.0)$	$W1 (+1.5/-0)$	$W2 (\text{Max})$
8MM	178	54	8.4	14.4

#### Note:

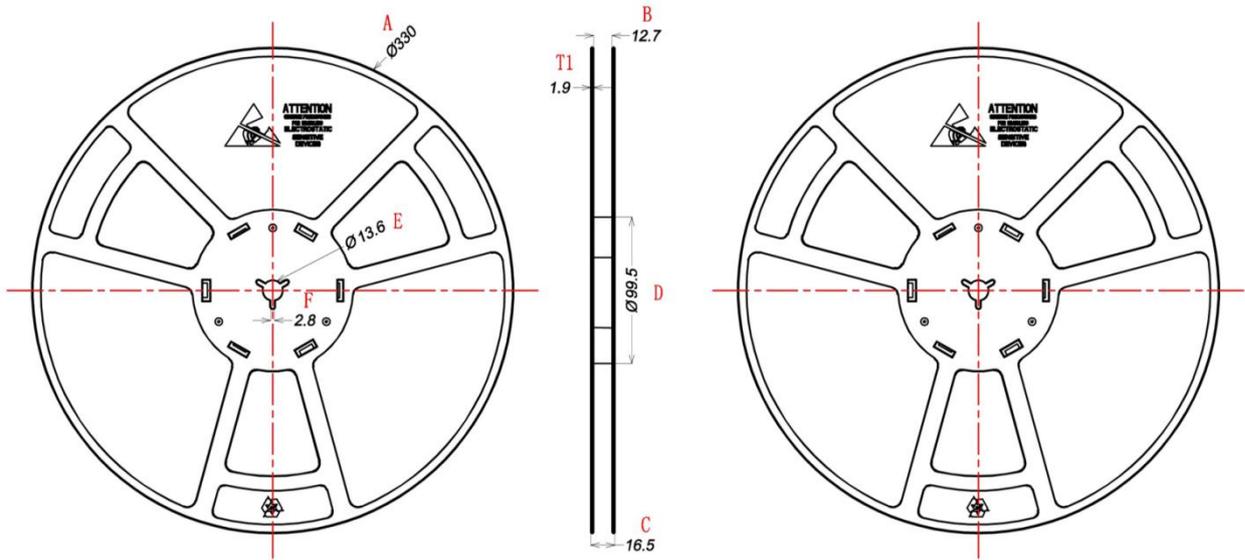
- 1) All Dimensions are in Millimeter
- 2) Quantity of Units per Reel is 3000
- 3) MSL level is level 3.

**TAPE AND REEL INFORMATION**

**TAPE DIMENSIONS:**



**REEL DIMENSIONS:**



Unit: mm

A	B	C	D	E	F	T1
Ø 330±1	12.7±0.5	16.5±0.3	Ø 99.5±0.5	Ø 13.6±0.2	2.8±0.2	1.9±0.2

**Note:**

- 4) All Dimensions are in Millimeter
- 5) Quantity of Units per Reel is 3000
- 6) MSL level is level 3.