

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 Ω (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 Ω (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 APPILCATION

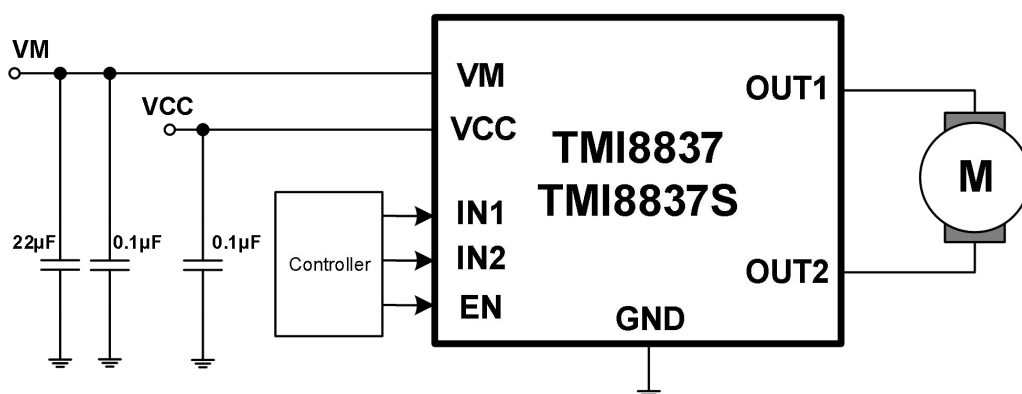
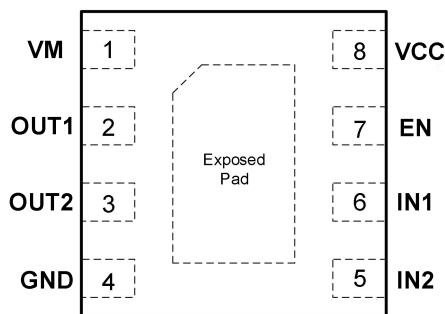


Figure 1. Basic Application Circuit

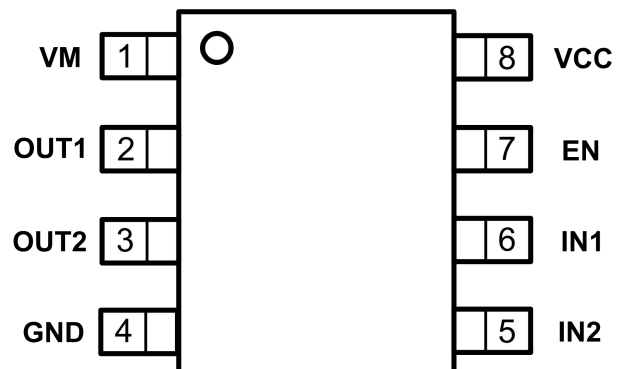
ABSOLUTE MAXIMUM RATINGS

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 θ_{JA} of DFN2x2-8	70	°C/W
Package Thermal Resistance θ_{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	TMI8837S 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 _{ESD}	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 _J	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
Input Power Supplies (VM and VCC)						
VM Voltage Range	V_{VM}		1.8		11	V
VM Supply Current	I_{VM}	VM=5V, VCC=3V No PWM		124		μA
		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		μA
		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
PWM Control Logic Inputs (IN1, IN2 and EN)						
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	μA
Input Logic High Current	I_{IH}				40	μA
Input Pull Down Resistor	R_{IN}			100		k Ω
Motor Driver Outputs (OUT1 and OUT2)						
Output Switch On-Resistance (HS+LS)	R_{ON}	VM=5V, VCC=3V $I_{load}=800mA$		0.65		Ω
Output Switch Leakage Current	I_{LEAK}		-200		200	nA
Protection Function						
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

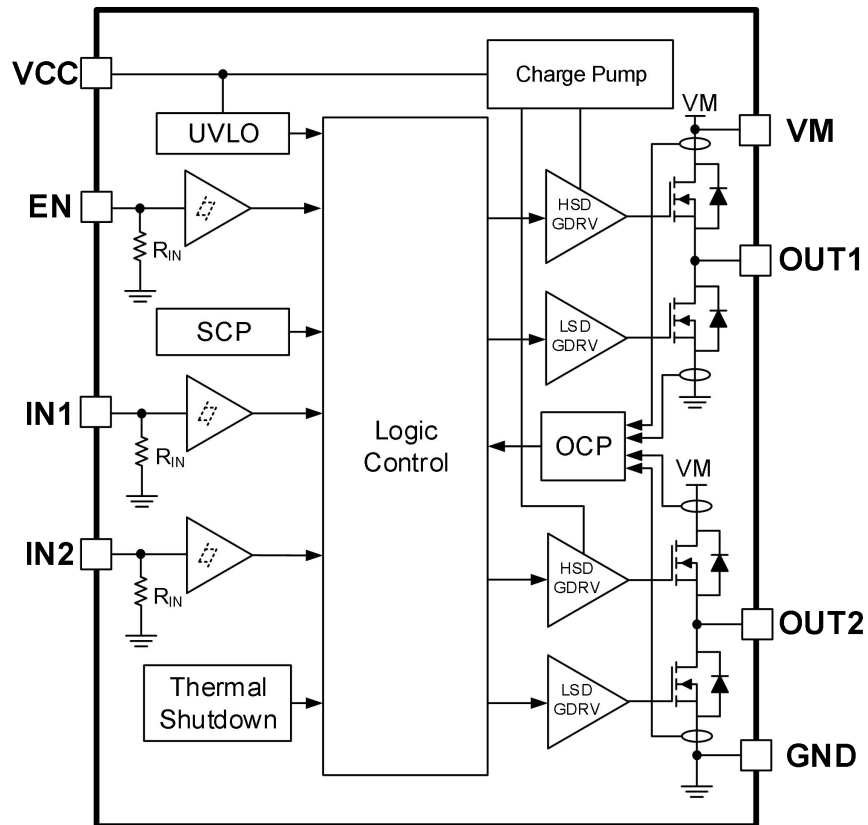
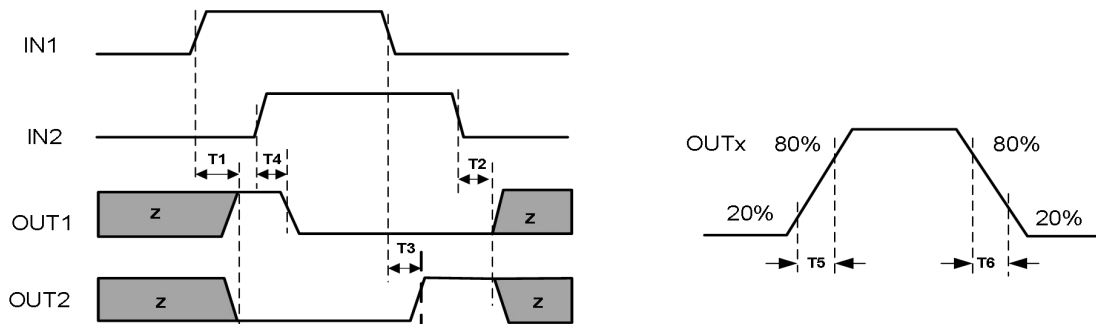


Figure 2. TMI8837/S Block Diagram

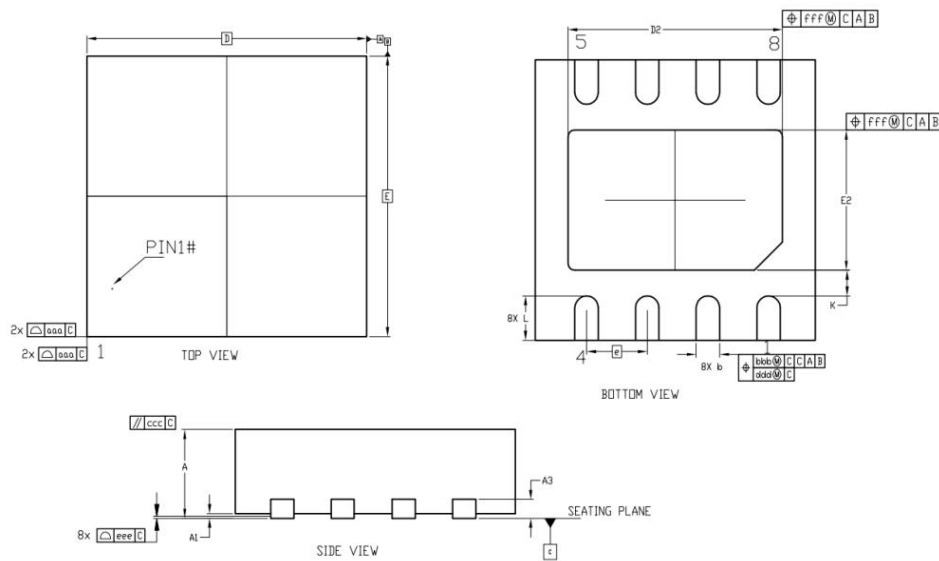
INPUT OUTPUT LOGIC



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

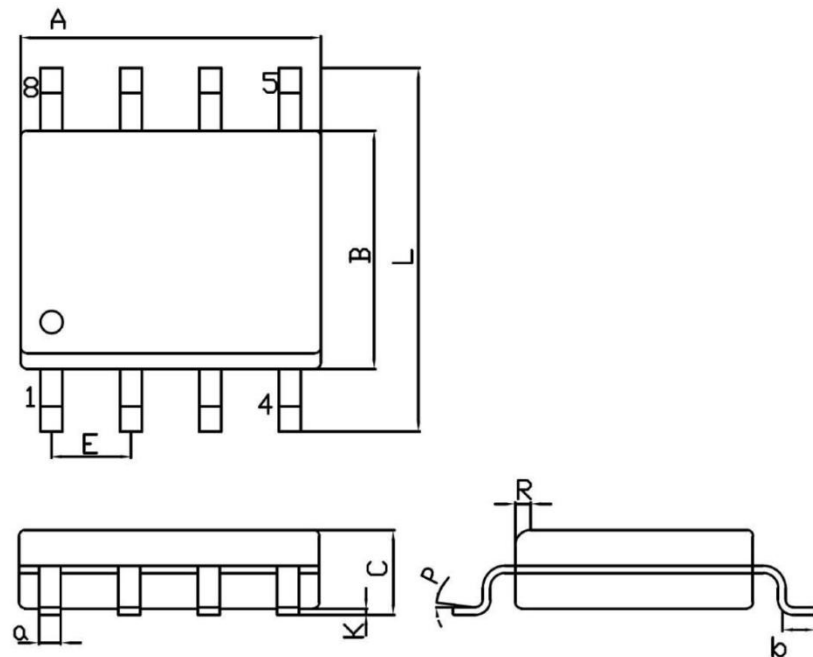
Symbol	Dimensions In Millimeters			Symbol	Dimensions In Millimeters		
	Min	Typ	Max		Min	Typ	Max
A	0.70	0.75	0.80	L	0.30	0.35	0.40
A1	0	0.02	0.05	K	0.20	-	-
A3	-	0.20 REF	-	aaa	-	0.15	-
b	0.19	0.24	0.29	bbb	-	0.10	-
D	2.00 BSC			ccc	-	0.10	-
E	2.00 BSC			ddd	-	0.05	-
D2	1.25	1.30	1.35	eee	-	0.08	-
E2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

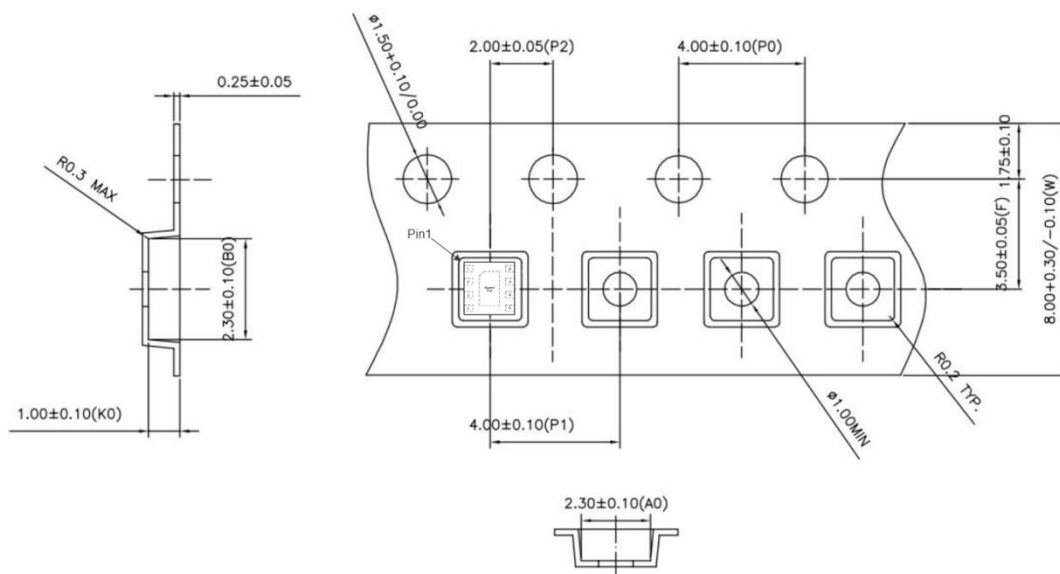
Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	4.70	5.10	C	1.35	1.75
B	3.70	4.10	a	0.35	0.49
L	6.00	6.40	R	0.30	0.60
E	1.27 BSC		P	0°	7°
K	0.12	0.22	b	0.40	1.25

Note:

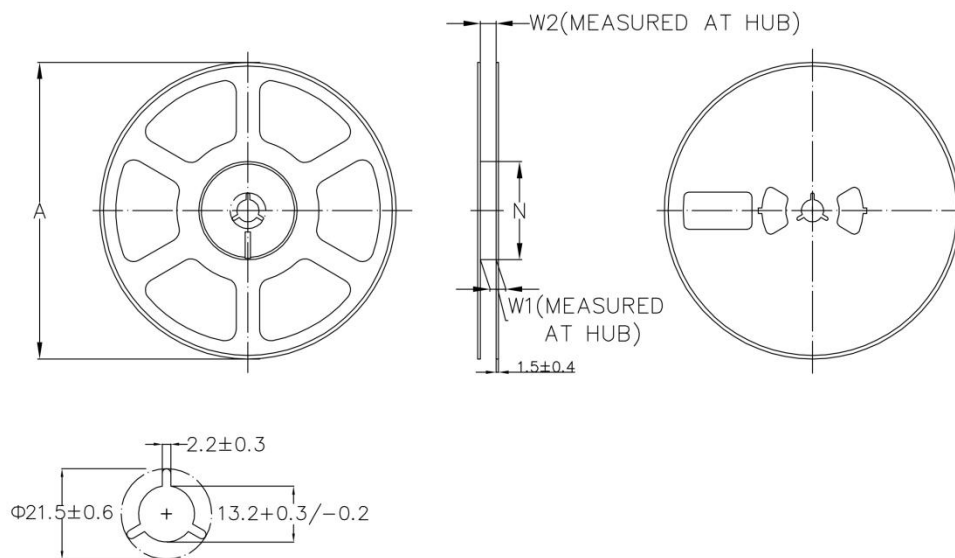
- 1) All dimensions are in millimeters.
- 2) Package length does not include mold flash, protrusion or gate burr.
- 3) Package width does not include inter lead flash or protrusion.
- 4) Lead popularity (bottom of leads after forming) shall be 0.10 millimeters max.
- 5) Pin 1 is lower left pin when reading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

TAPE AND REEL INFORMATION

TAPE DIMENSIONS: DFN2x2-8



REEL DIMENSIONS: DFN2x2-8



Unit: mm

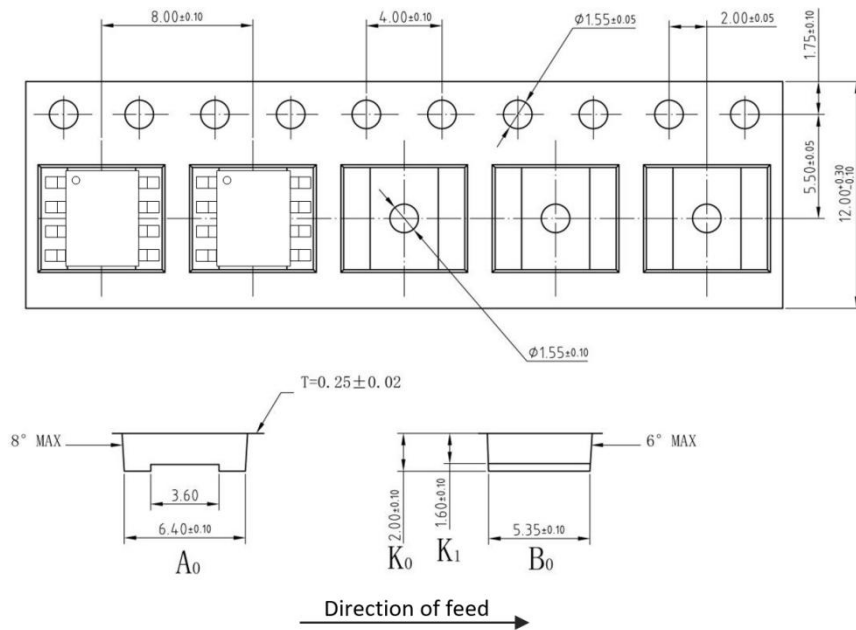
TAPE WIDTH	Ø A (±1.0)	Ø N (±2.0)	W1 (+1.5/-0)	W2 (Max)
8MM	178	54	8.4	14.4

Note:

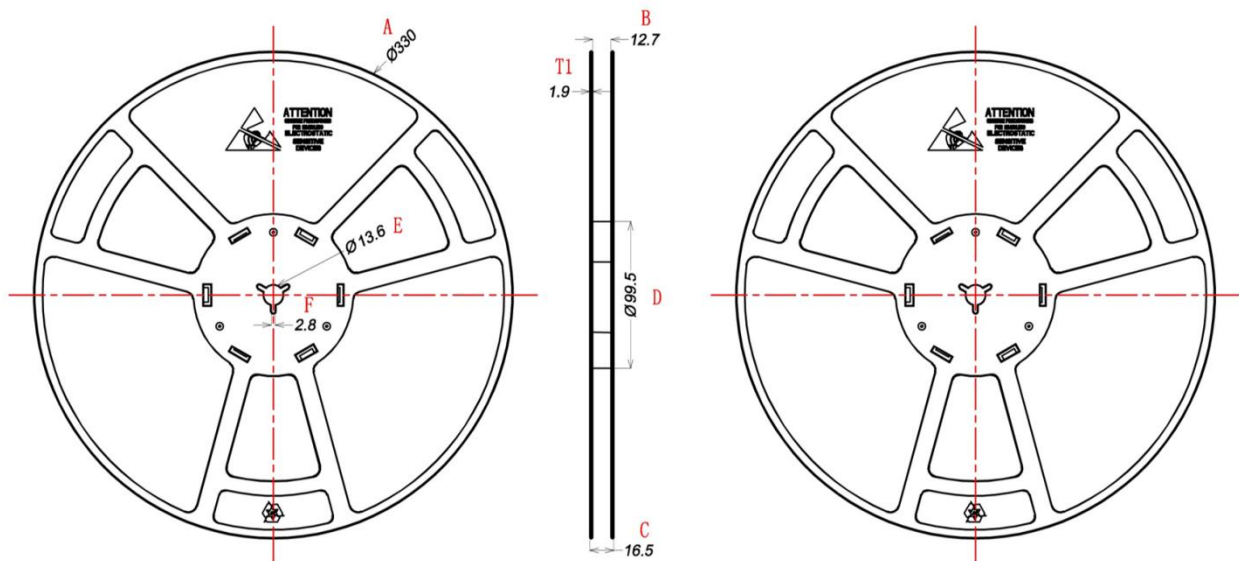
- 1) All Dimensions are in Millimeter
- 2) Quantity of Units per Reel is 3000
- 3) MSL level is level 3.

TAPE AND REEL INFORMATION

TAPE DIMENSIONS:



REEL DIMENSIONS:



Unit: mm

A	B	C	D	E	F	T1
$\phi 330 \pm 1$	12.7 ± 0.5	16.5 ± 0.3	$\phi 99.5 \pm 0.5$	$\phi 13.6 \pm 0.2$	2.8 ± 0.2	1.9 ± 0.2

Note:

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