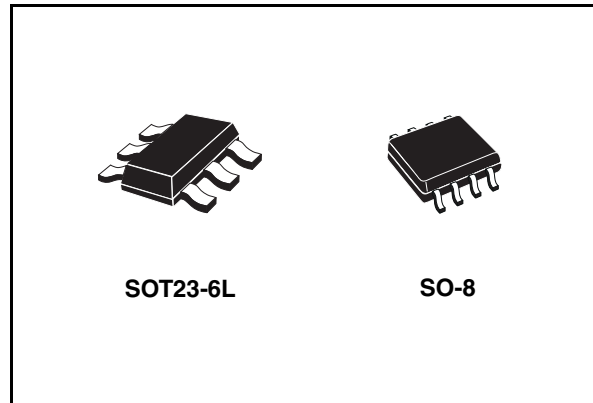


Feature summary

- Controls ESBT base current in every line/load condition
- Supply voltage range: 8V to 20 V
- Storage time controlled by closed loop architecture (from 150ns to 1.5 μ s)
- Under voltage lockout with hysteresis

Description

The STESB01 is a dedicated base current biasing transistor for the Emitter-Switched Bipolar Transistor (ESBT) family of power switches. The device is able to control the ESBT storage time (from 150ns to 1.5 μ s) using closed loop architecture. This guarantees proper operation of the ESBT in every line and load condition, avoiding oversaturation of the device and, at the same time, ensuring the correct base current



when a higher load is required. The storage time can be adjusted with an external resistor, which allows maximum flexibility in different applications.

The optimization of the base current value also reduces the base current losses to minimum level.

Order code

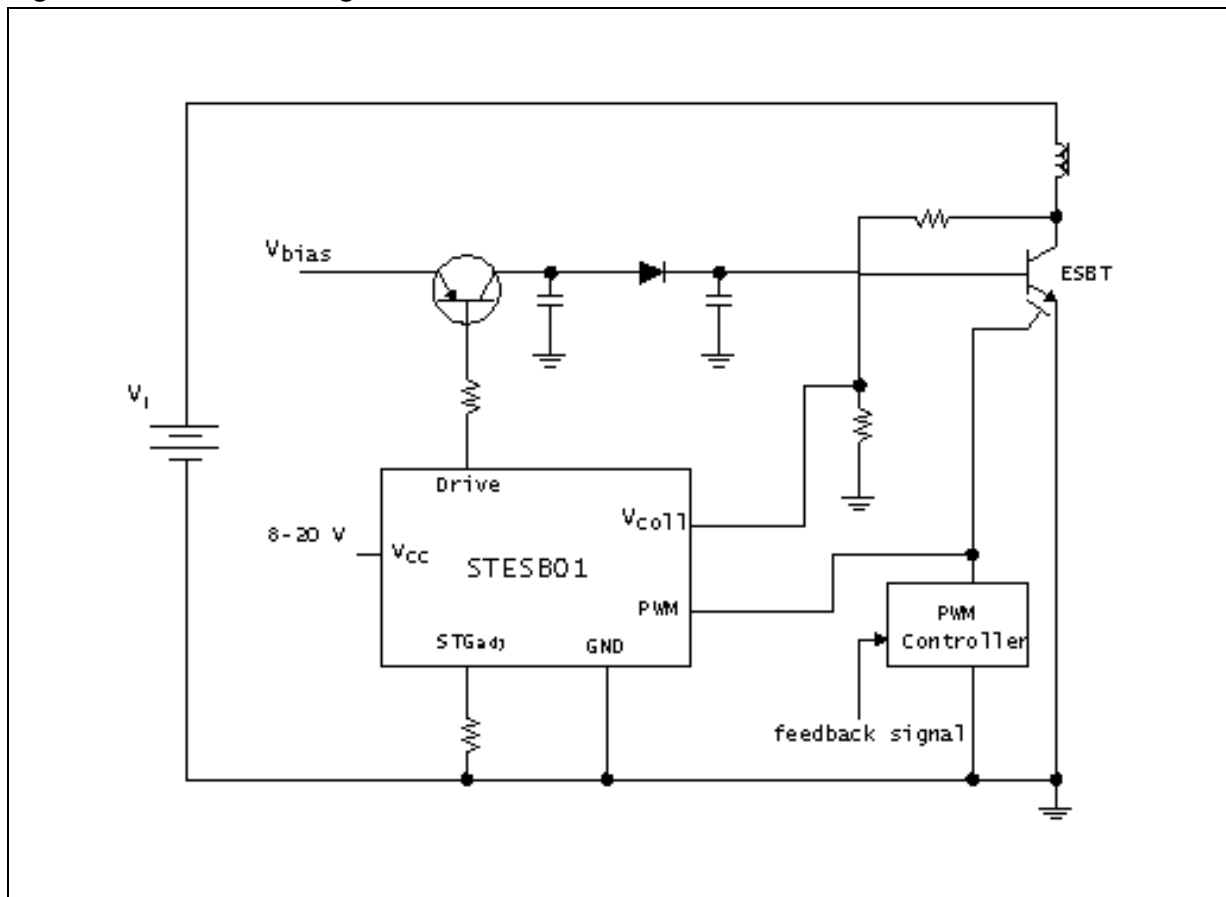
Part number	Package	Packaging
STESB01STR	SOT23-6L	3000 Parts per Reel
STESB01DR	SO-8	2500 Parts per Reel

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1 Schematic diagram

Figure 1. Schematic diagram



2 Pin configuration

Figure 2. Pin Connections (Top View)

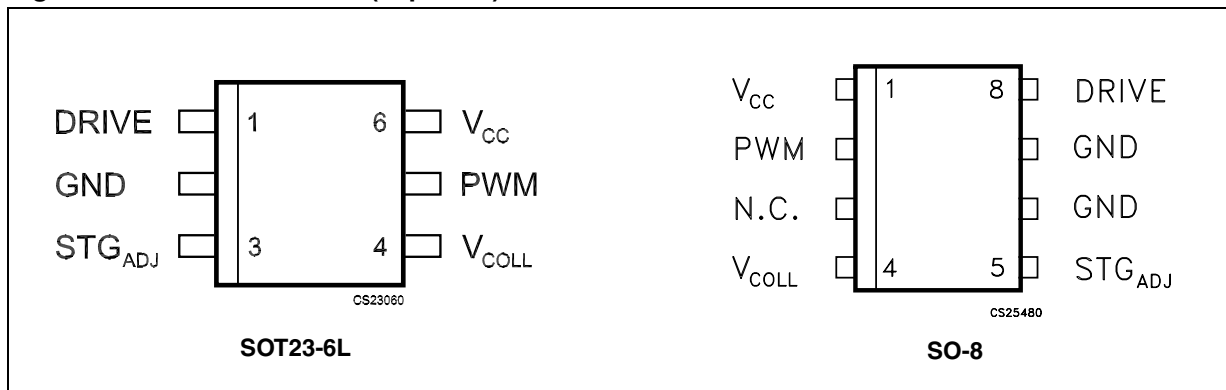


Table 1. Pin description

Pin N° for SO-8	Pin N° for SOT23	Symbol	Name and function
8	1	DRIVE	This is the base current driver for the external PNP transistor (see Application Schematic) which determines the ESBT base current value.
6, 7	2	GND	Ground. Reference for all the signal of the IC.
5	3	STG _{ADJ}	Adjustable Storage (adjusted by connecting a resistor between this pin and GND pin). A minimum value of 150ns can be achieved with 10kΩ resistor. See note 4.
4	4	V _{COLL}	Collector Voltage. This pin must be connected to the ESBT collector through a resistor divider. The rising edge of this signal provides end-of-storage time information.
2	5	PWM	Pulse Width Modulation. This pin must be connected to the PWM controller output. The falling edge of this signal provides beginning-of-storage time information.
1	6	V _{CC}	Supply Voltage. It range is from 8V to 20V. A ceramic Bypass capacitor must be connected between V _{CC} and GND.
3		N.C.	Not Connected.

3 Maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	DC Input voltage	-0.3 to 22	V
Drive	Drive output voltage	-0.3 to V_{CC}	V
STG_{ADJ}	Storage time adjust voltage	-0.3 to 5	V
PWM	PWM Input voltage	-0.3 to 15	V
V_{COLL}	Collector input voltage	-0.6 to 5	V
ESD	Human body model	± 2	kV
P_{TOT}	Continuous power dissipation (at $T_A = 105^\circ\text{C}$)	TBD	mW
T_{STG}	Storage temperature range	-40 to 150	$^\circ\text{C}$
T_{OP}	Operating junction temperature range	-40 to 125	$^\circ\text{C}$

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

Table 3. Thermal data

Symbol	Parameter	SOT23-6L	SO-8	Unit
R_{thJC}	Thermal resistance junction-case	81	20	$^\circ\text{C}/\text{W}$
R_{thJA}	Thermal resistance junction-ambient	255	55	$^\circ\text{C}/\text{W}$

This value is referred to 1 layer PCB board with minimum copper connections for the leads.

4 Electrical characteristics

Table 4. Electrical characteristics

($V_{CC} = 20V$, $C_1 = 3.3\mu F$, $T_J = -40^\circ C$ to $125^\circ C$ unless otherwise specified.)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Supply Input and Under Voltage Lock Out						
V_{CC}	Turn On Threshold	V_{CC} rising		7.5	8	V
	Turn Off Threshold after Turn On	V_{CC} falling	6.5	7		
I_{CC}	Supply Current	PWM= $V_{COLL}=0V$		2		mA
		See Note 1		2		
Driver Output ($T_J = 27^\circ C$)						
V_{OL}	Low Level Voltage	$I_{DRIVE} = 10mA$		50		mV
$I_{DRIVE(OL)}$	Drive Current in open loop	$V_{DRIVE} = 1.25V$, $R_{STGadj} = 150 k\Omega$ See Note 2 , Note 4		0.25		A
Storage Control						
V_{PWML}	PWM Low Level Threshold	See Note 3			1.5	V
V_{PVMH}	PWM High Level Threshold	See Note 3	3.5			V
I_{PWM}	PWM input bias current	PWM = 0V to 15V	-0.1		0.1	μA
$V_{COLL(L)}$	Collector Low Level Threshold	See Note 3			0.8	V
$V_{COLL(H)}$	Collector High Level Threshold	See Note 3	2.5			V
I_{COLL}	V_{COLL} input bias current	$V_{COLL} = 0V$ to 5V	-0.1		0.1	μA

- 1 To the PWM pin must be applied a 5V to 0V falling edge while the voltage level on the V_{COLL} pin must be 0V. After 300 ns, to the V_{COLL} pin must be applied a 0V to 5V rising edge. The maximum frequency of signals applied to PWM and V_{COLL} pins must be 300 kHz.
- 2 To the PWM pin must be applied a 5V to 0V falling edge while the voltage level on the V_{COLL} pin must be 0V. After 200 ns, to the V_{COLL} pin must be applied a 0V to 5V raising edge. The maximum frequency of signals applied to PWM and V_{COLL} pins must be 300 kHz.
- 3 Guaranteed by Design.
- 4 In parallel to the resistor a low-leakage/low-ESR capacitor could be necessary for bypassing purpose.

5 Diagram

Figure 3. Block diagram

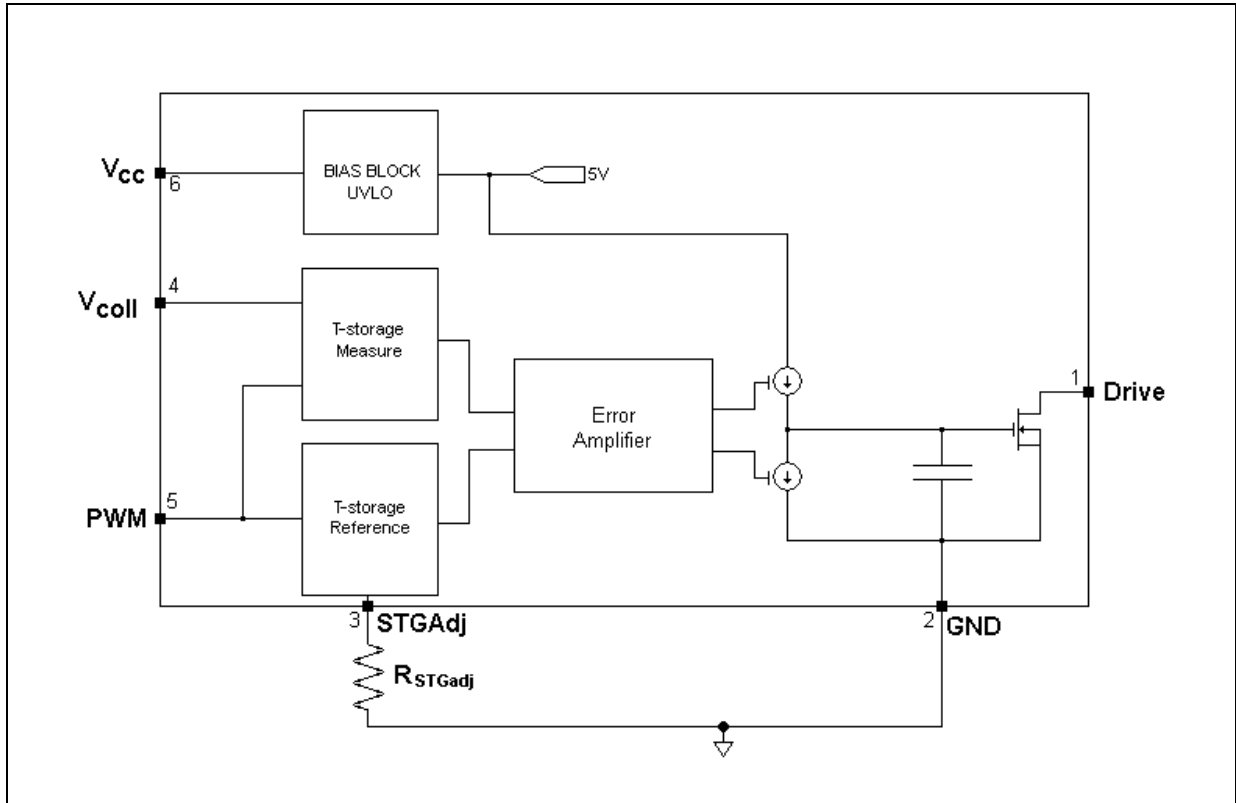
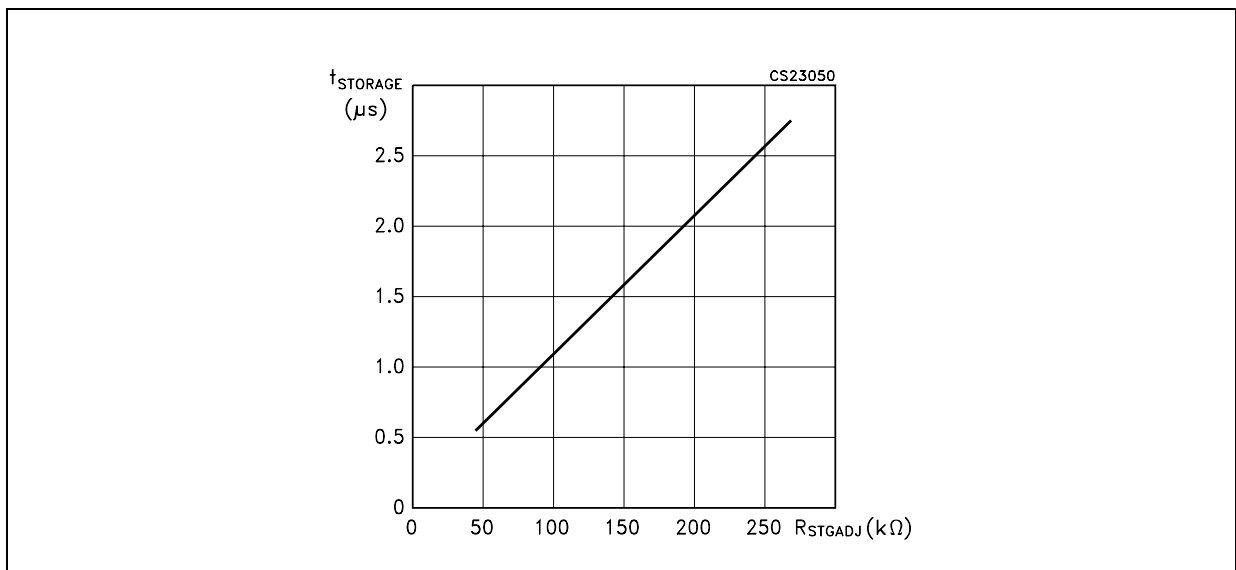


Figure 4. Typical operating characteristics

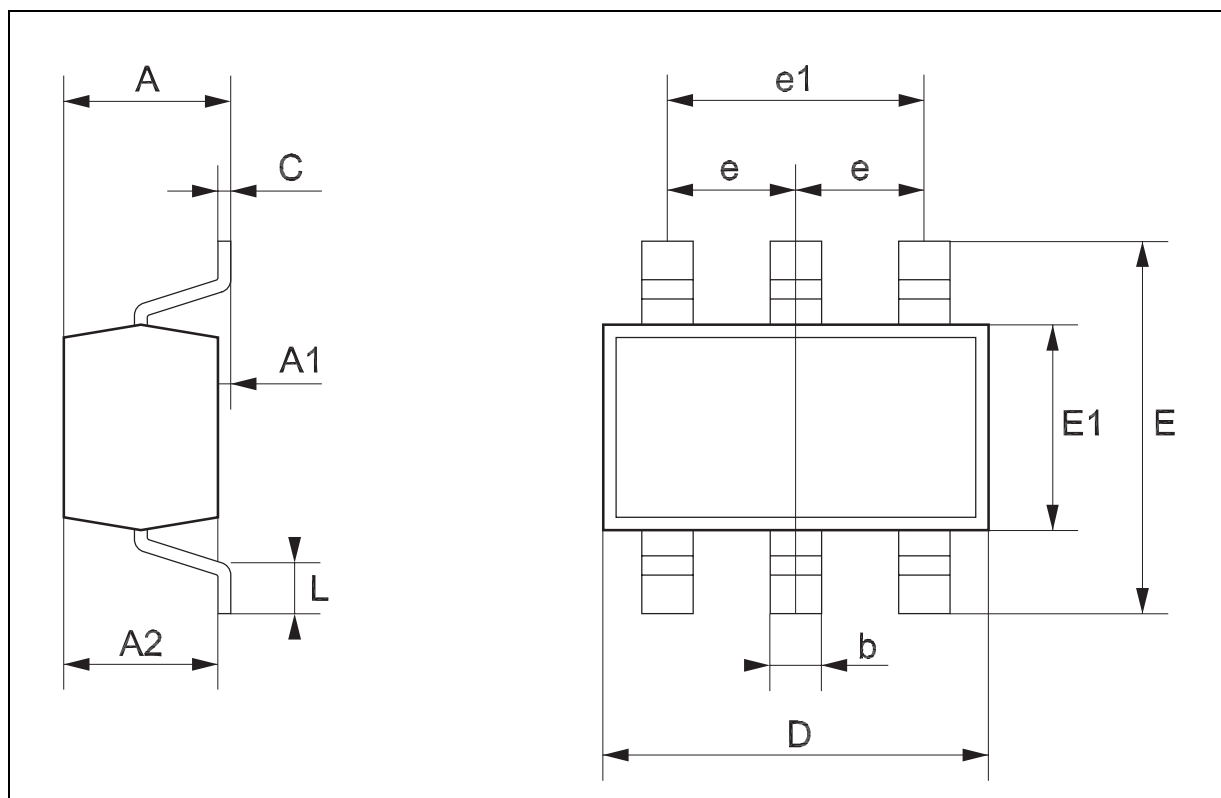


6 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

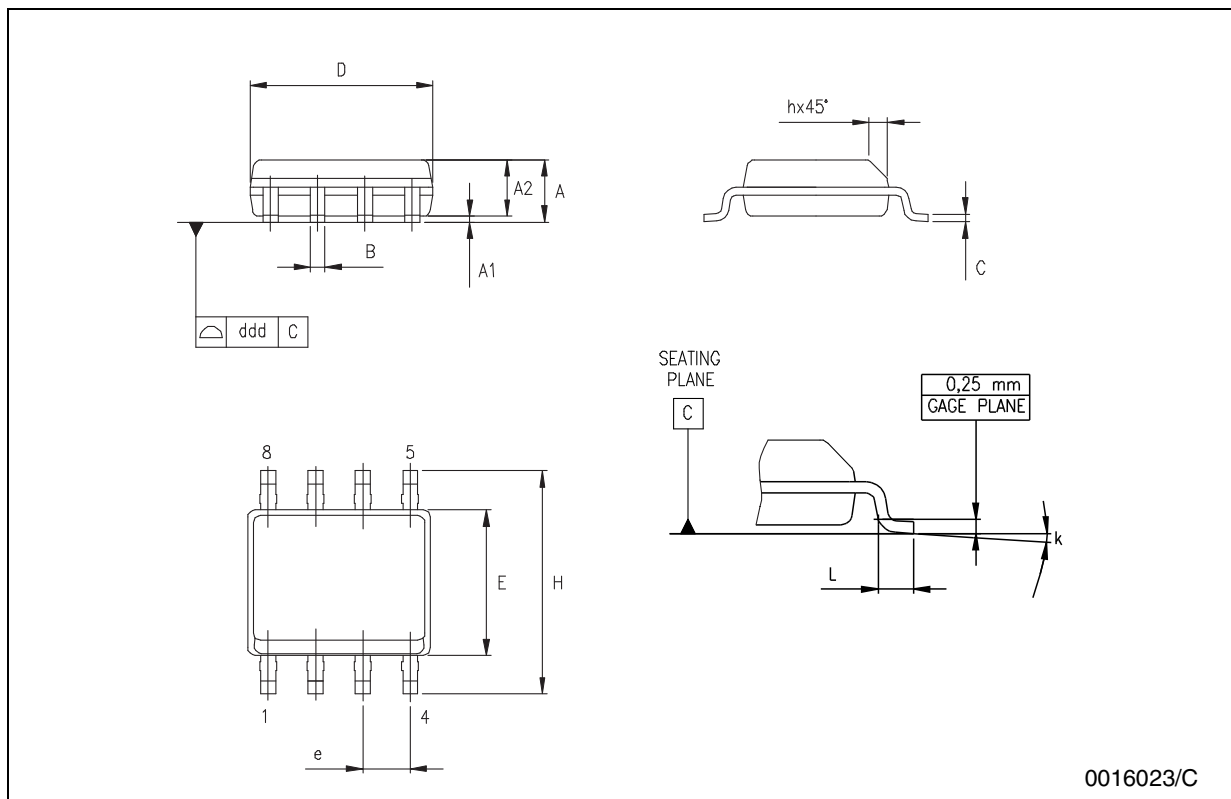
SOT23-6L MECHANICAL DATA

DIM.	mm.			mils		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	0.90		1.45	35.4		57.1
A1	0.00		0.15	0.0		5.9
A2	0.90		1.30	35.4		51.2
b	0.35		0.50	13.7		19.7
C	0.09		0.20	3.5		7.8
D	2.80		3.00	110.2		118.1
E	2.60		3.00	102.3		118.1
E1	1.50		1.75	59.0		68.8
e		0.95			37.4	
e1		1.9			74.8	
L	0.35		0.55	13.7		21.6



SO-8 MECHANICAL DATA

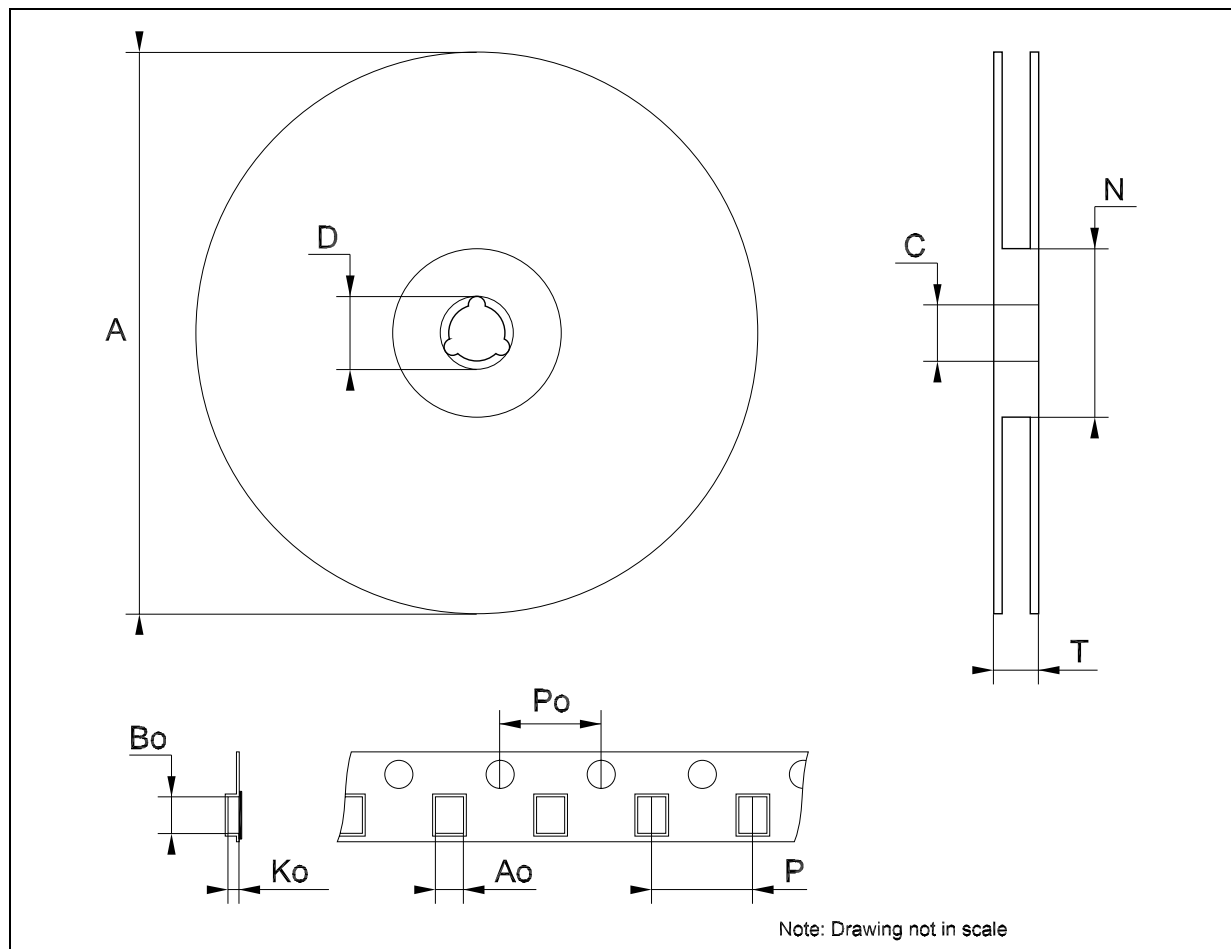
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.04		0.010
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D	4.80		5.00	0.189		0.197
E	3.80		4.00	0.150		0.157
e		1.27			0.050	
H	5.80		6.20	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
k	8° (max.)					
ddd			0.1			0.04



0016023/C

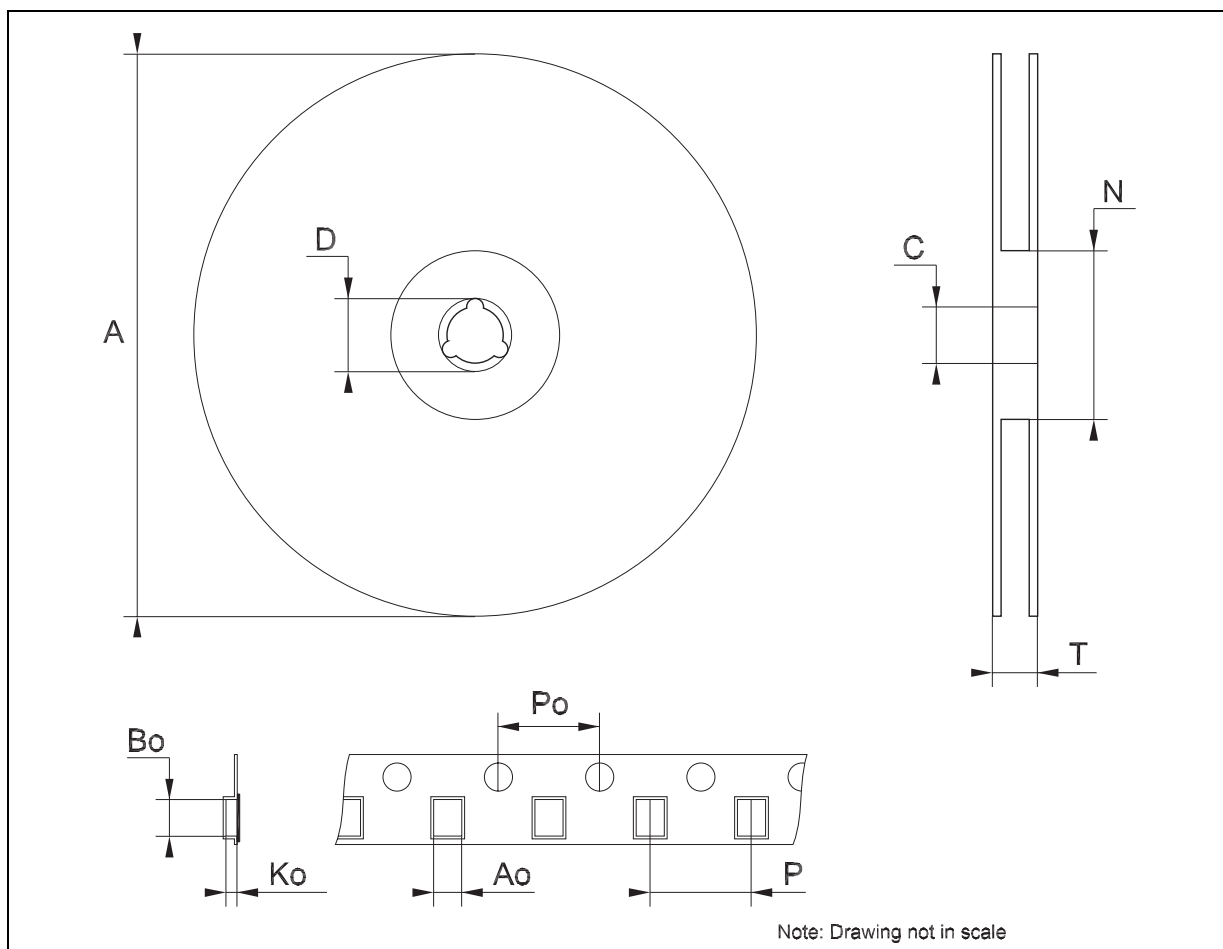
Tape & Reel SOT23-xL MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			180			7.086
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			14.4			0.567
Ao	3.13	3.23	3.33	0.123	0.127	0.131
Bo	3.07	3.17	3.27	0.120	0.124	0.128
Ko	1.27	1.37	1.47	0.050	0.054	0.058
Po	3.9	4.0	4.1	0.153	0.157	0.161
P	3.9	4.0	4.1	0.153	0.157	0.161



Tape & Reel SO-8 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	8.1		8.5	0.319		0.335
Bo	5.5		5.9	0.216		0.232
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319



7 Revision history

Table 5. Revision history

Date	Revision	Changes
16-Nov-2005	1	Initial release.
26-Jul-2006	2	Mistake on table 3 function of pin 3.
03-Oct-2006	3	Add new package SO-8.

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