



# THE DATASHEET OF DTC123JUA

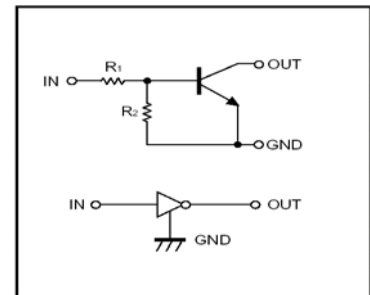


DIGITAL TRANSISTOR (NPN)

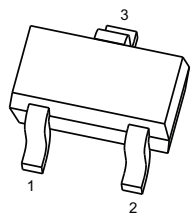
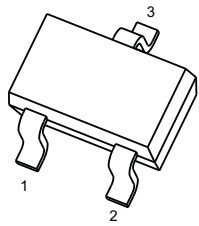
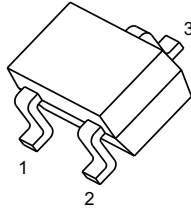
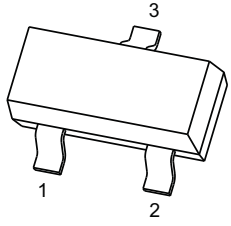
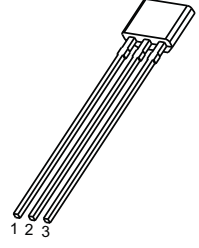
**Features**

- 1) Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors(see equivalent circuit).
- 2) The bias resistors consist of thin-film resistors with complete isolation to allow negative biasing of the input. They also have the advantage of almost completely eliminating parasitic effects.
- 3) Only the on/off conditions need to be set for operation, making device design easy.

● **Equivalent circuit**



**PIN CONNENCTIONS**

		<b>DTC123JE</b>		<b>SOT-523</b>
				1. IN 2. GND 3. OUT
<b>DTC123JUA</b>		<b>SOT-323</b>		
				1. IN 2. GND 3. OUT
		<b>DTC123JKA</b>		<b>SOT-23-3L</b>
				1. IN 2. GND 3. OUT
<b>DTC123JCA</b>		<b>SOT-23</b>		
				1. IN 2. GND 3. OUT
		<b>DTC123JSA</b>		<b>TO-92S</b>
				1. GND 2. OUT 3. IN

## ORDERING INFORMATION

Part Number	MARKING <sup>(1)</sup>	Package	Packing Method	Pack Quantity
DTC123JE	E42	SOT-523	Reel	3000pcs/Reel
DTC123JUA	E42	SOT-323	Reel	3000pcs/Reel
DTC123JKA	E42	SOT-23-3L	Reel	3000pcs/Reel
DTC123JCA	E42	SOT-23	Reel	3000pcs/Reel
DTC123JSA-B		TO-92S	Bulk	1000pcs/Bag
DTC123JSA-T		TO-92S	Tape	3000pcs/Box

## Absolute maximum ratings(Ta=25°C)

Symbol	Parameter	Limits(DTC144JX)					Unit
		E	UA	CA	KA	SA	
V <sub>CC</sub>	Supply Voltage	50					V
V <sub>IN</sub>	Input Voltage	-5~+12					V
I <sub>O</sub>	Output Current	100					mA
I <sub>CM</sub>	Peak Collector Current	100					mA
P <sub>D</sub>	Power Dissipation	150	200	200	200	300	mW
T <sub>J</sub>	Junction Temperature	150					°C
T <sub>stg</sub>	Storage Temperature	-55~+150					°C

## Electrical characteristics (Ta=25°C)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input voltage	V <sub>I(off)</sub>	V <sub>CC</sub> =5V, I <sub>O</sub> =100μA			0.5	V
	V <sub>I(on)</sub>	V <sub>O</sub> =0.3V, I <sub>O</sub> =5mA	1.1			V
Output voltage	V <sub>O(on)</sub>	I <sub>O</sub> /I <sub>I</sub> =5mA/0.25mA		0.1	0.3	V
Input current	I <sub>I</sub>	V <sub>I</sub> =5V			3.6	mA
Output current	I <sub>O(off)</sub>	V <sub>CC</sub> =50V, V <sub>I</sub> =0			0.5	μA
DC current gain	G <sub>I</sub>	V <sub>O</sub> =5V, I <sub>O</sub> =10mA	80			
Input resistance	R <sub>1</sub>		1.54	2.2	2.86	kΩ
Resistance ratio	R <sub>2</sub> /R <sub>1</sub>		17	21	26	
Transition frequency	f <sub>T</sub>	V <sub>O</sub> =10V, I <sub>O</sub> =5mA, f=100MHz		250		MHz

## RATING AND CHARACTERISTICS CURVES (DTC123JE/JUA/JKA/JCA/JSA)

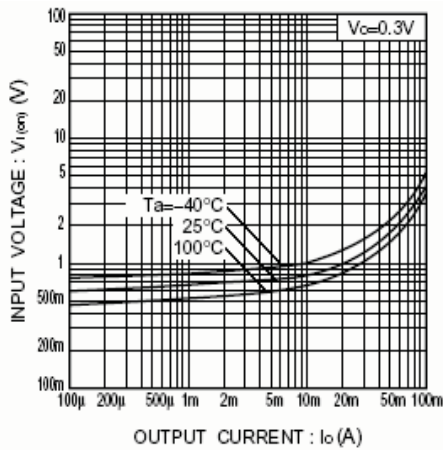


Fig.1 Input voltage vs. output current (ON characteristics)

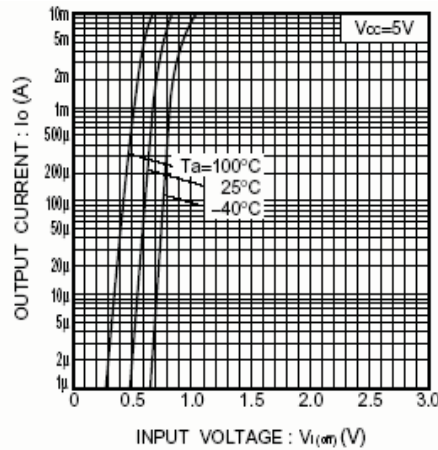


Fig.2 Output current vs. input voltage (OFF characteristics)

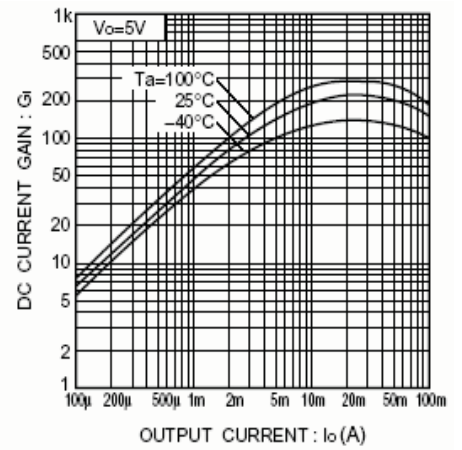


Fig.3 DC current gain vs. output current

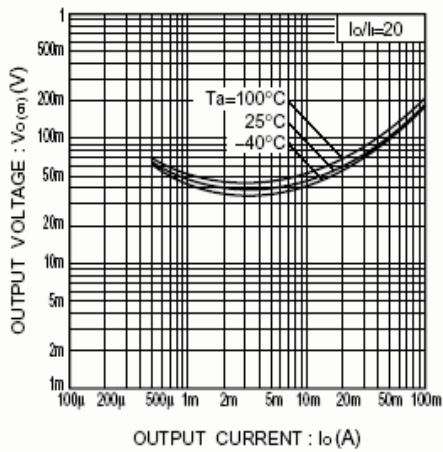
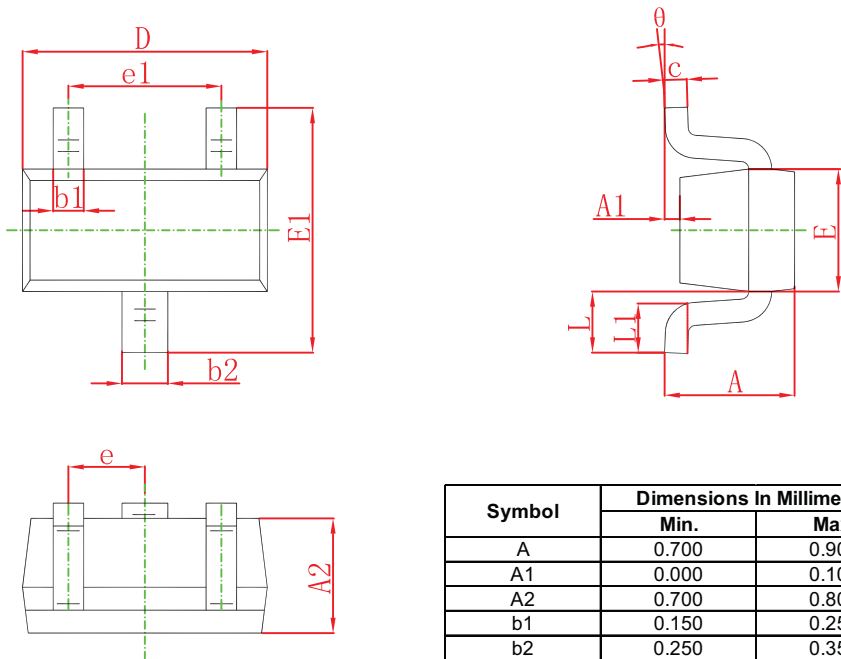


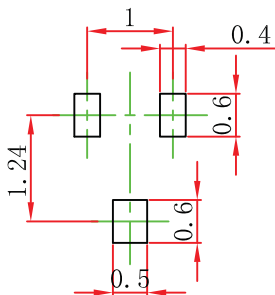
Fig.4 Output voltage vs. output current

## SOT-523 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.900	0.028	0.035
A1	0.000	0.100	0.000	0.004
A2	0.700	0.800	0.028	0.031
b1	0.150	0.250	0.006	0.010
b2	0.250	0.350	0.010	0.014
c	0.100	0.200	0.004	0.008
D	1.500	1.700	0.059	0.067
E	0.700	0.900	0.028	0.035
E1	1.450	1.750	0.057	0.069
e	0.500 TYP.		0.020 TYP.	
e1	0.900	1.100	0.035	0.043
L	0.400 REF.		0.016 REF.	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

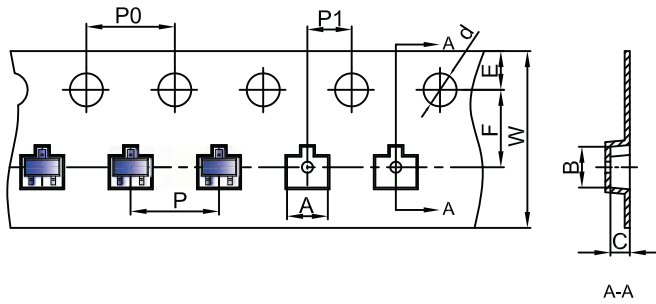
## SOT-523 Suggested Pad Layout



- Note:
1. Controlling dimension: in millimeters.
  2. General tolerance:  $\pm 0.05$ mm.
  3. The pad layout is for reference purposes only.

# SOT-523 Tape and Reel

## SOT-523 Embossed Carrier Tape



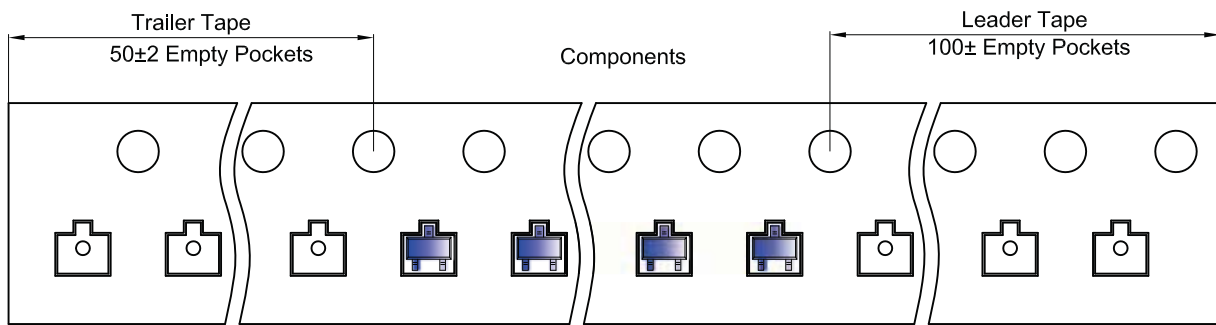
### Packaging Description:

SOT-523 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 17.8cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

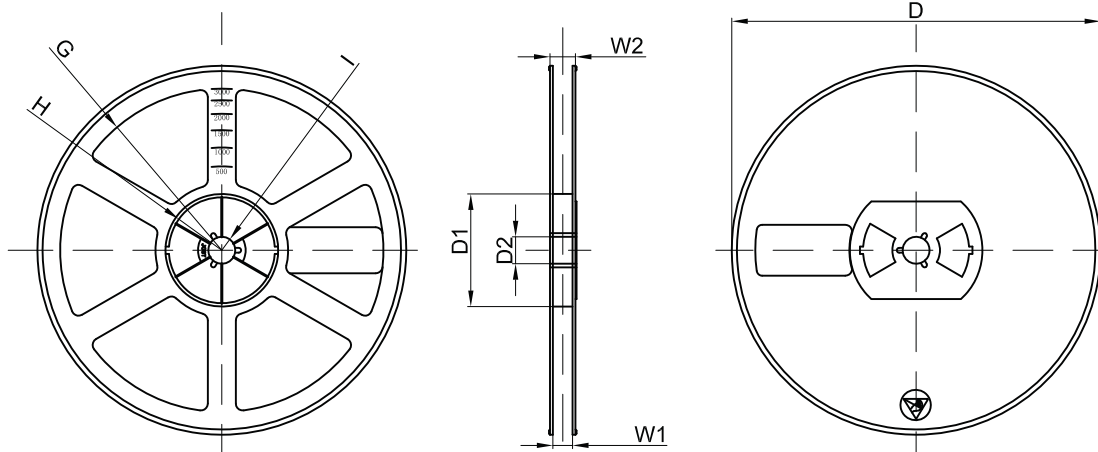
Dimensions are in millimeter

Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-523	1.85	1.85	0.875	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00

## SOT-523 Tape Leader and Trailer



## SOT-523 Reel

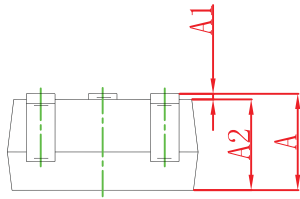
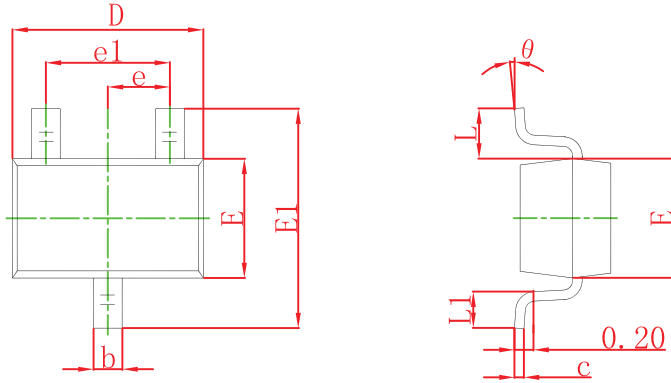


Dimensions are in millimeter

Reel Option	D	D1	D2	G	H	I	W1	W2
7" Dia	Ø178.00	54.40	13.00	R78.00	R25.60	R6.50	9.50	12.30

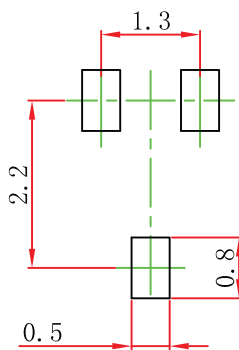
REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
3000 pcs	7 inch	45,000 pcs	203×203×195	180,000 pcs	438×438×220	

## SOT-323 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.200	0.400	0.008	0.016
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

## SOT-323 Suggested Pad Layout

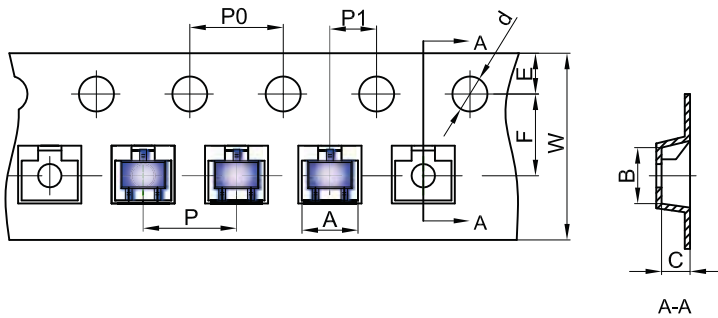


Note:

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05$  mm.
3. The pad layout is for reference purposes only.

# SOT-323 Tape and Reel

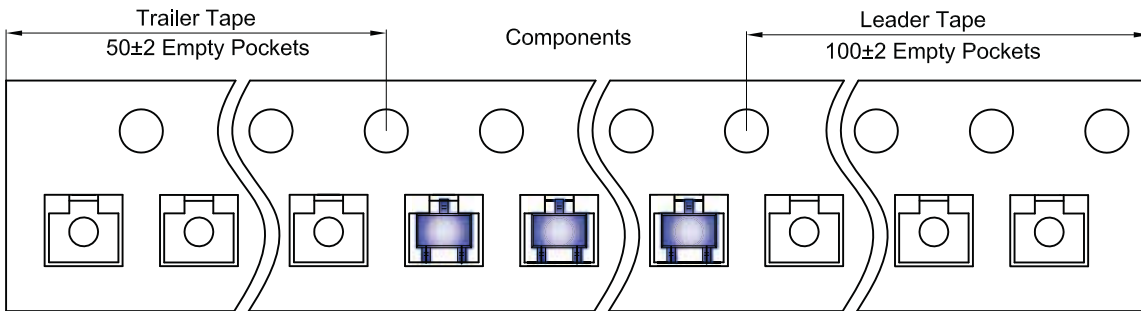
## SOT-323 Embossed Carrier Tape



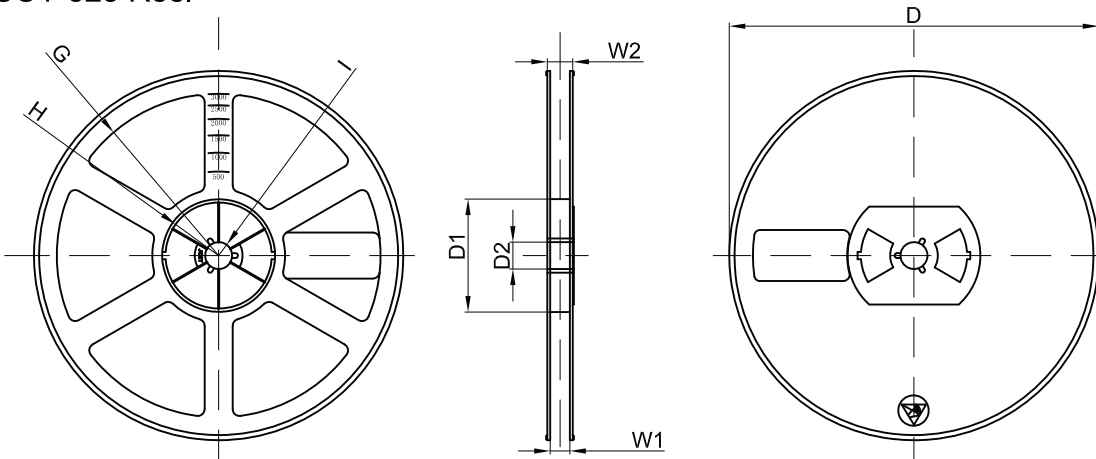
**Packaging Description:**  
 SOT-323 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 17.8cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-323	2.25	2.55	1.19	Ø1.55	1.75	3.50	4.00	4.00	2.00	8.00

## SOT-323 Tape Leader and Trailer



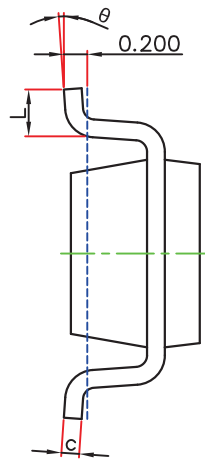
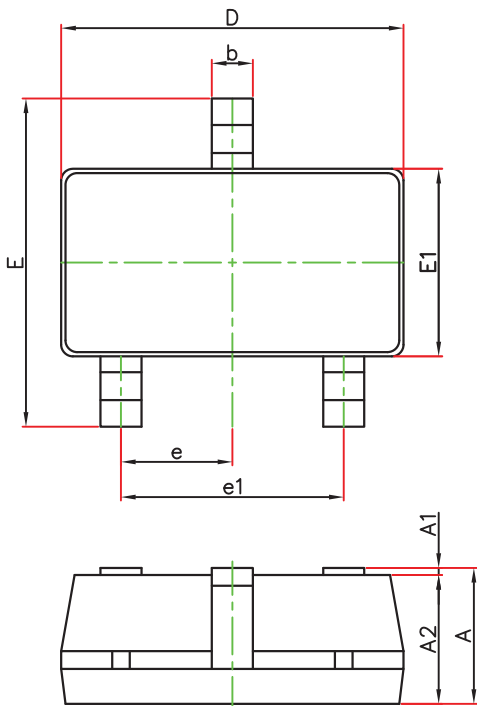
## SOT-323 Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7" Dia	Ø178.00	54.40	13.00	R78.00	R25.60	R6.50	9.50	12.30

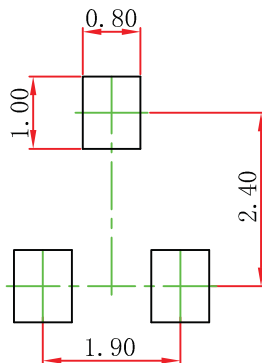
REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
3000 pcs	7 inch	45,000 pcs	203×203×195	180,000 pcs	438×438×220	

## SOT-23-3L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

## SOT-23-3L Suggested Pad Layout

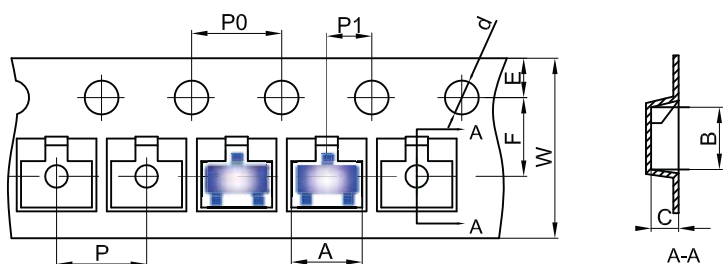


Note:

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.

# SOT-23-3L Tape and Reel

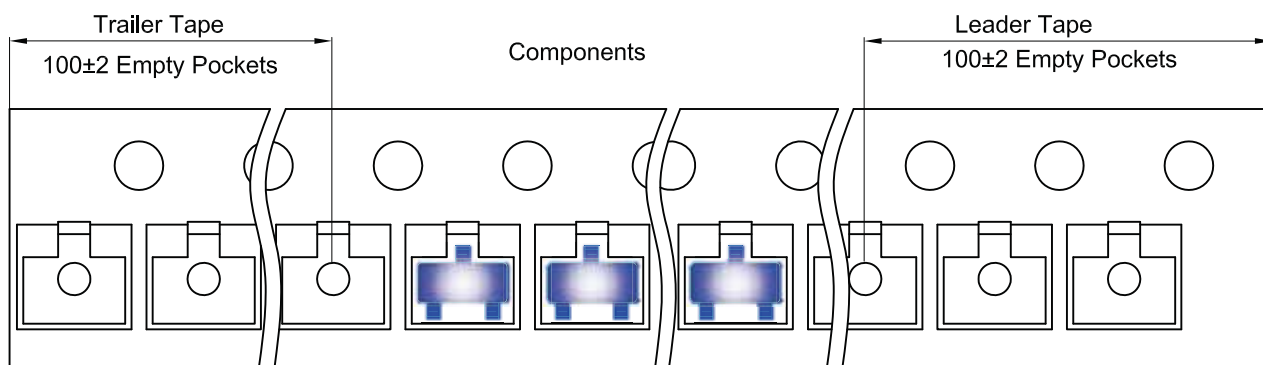
## SOT-23-3L Embossed Carrier Tape



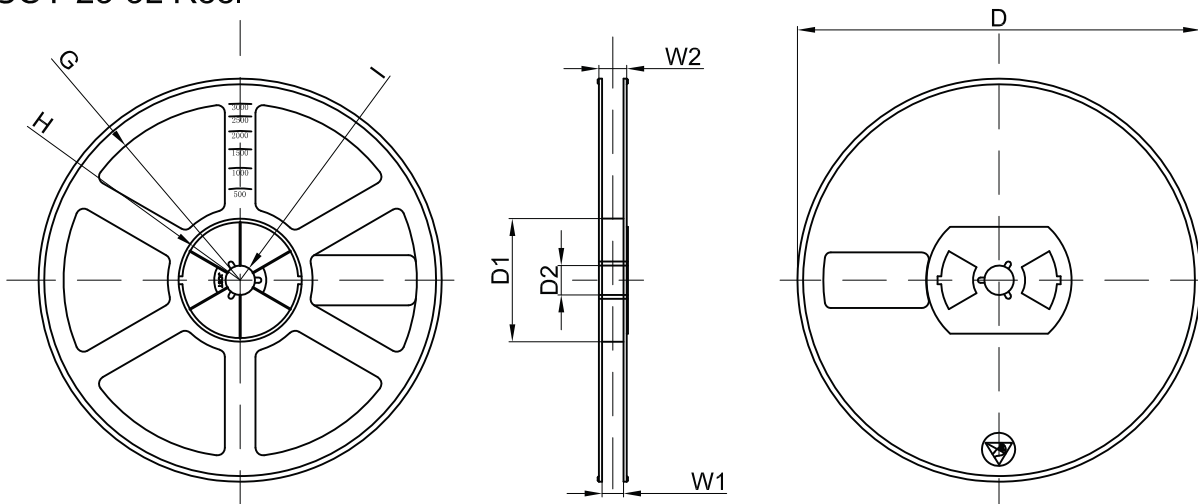
**Packaging Description:**  
 SOT-23-3L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 18.0cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-23-3L	3.18	3.28	1.32	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00

## SOT-23-3L Tape Leader and Trailer



## SOT-23-3L Reel

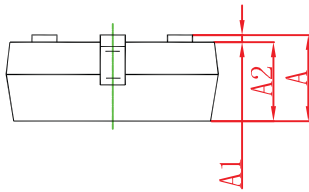
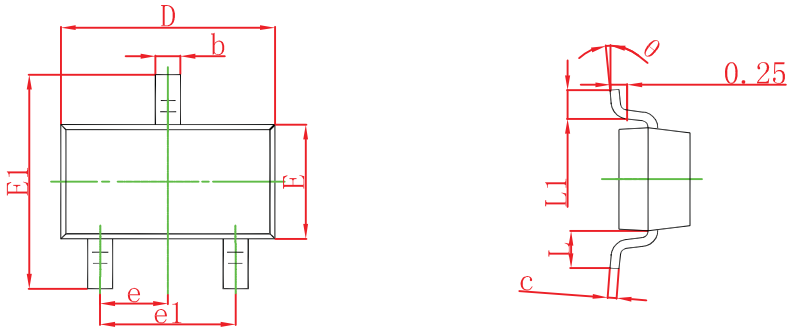


Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7" Dia	Ø180.00	60.00	13.00	R78.00	R25.60	R6.50	9.50	13.10

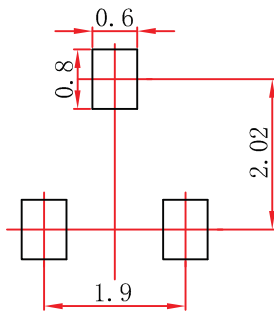
REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
3000 pcs	7 inch	30,000 pcs	203×203×195	120,000 pcs	438×438×220	

## SOT-23 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
theta	0°	8°	0°	8°

## SOT-23 Suggested Pad Layout

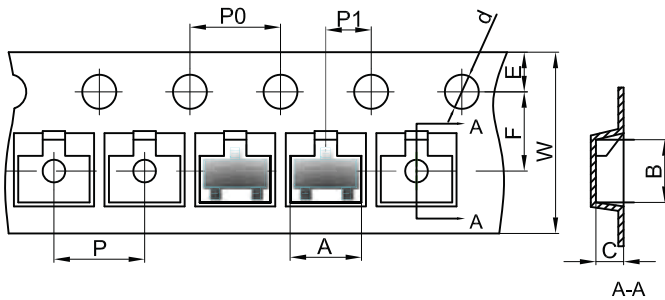


### Note:

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.

# SOT-23 Tape and Reel

## SOT-23 Embossed Carrier Tape



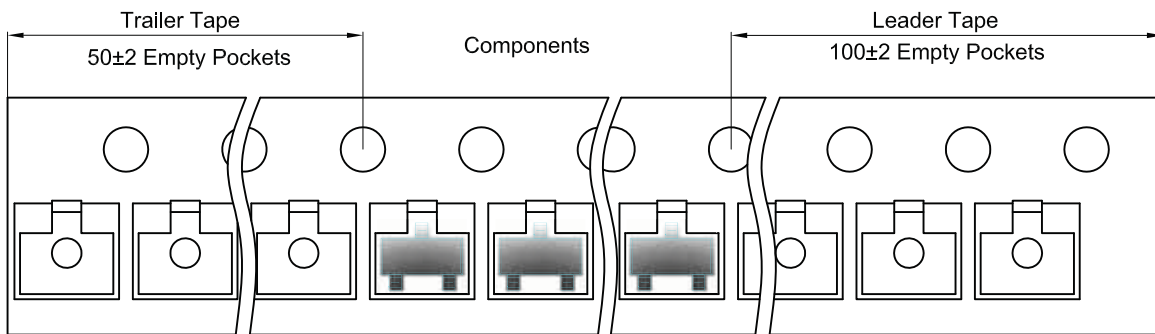
### Packaging Description:

SOT-23 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 17.8cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

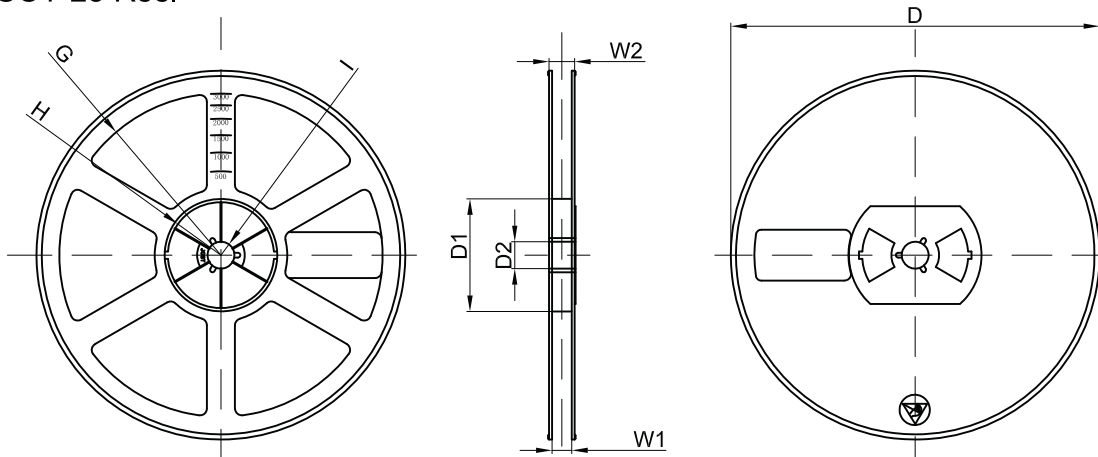
Dimensions are in millimeter

Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00

## SOT-23 Tape Leader and Trailer



## SOT-23 Reel

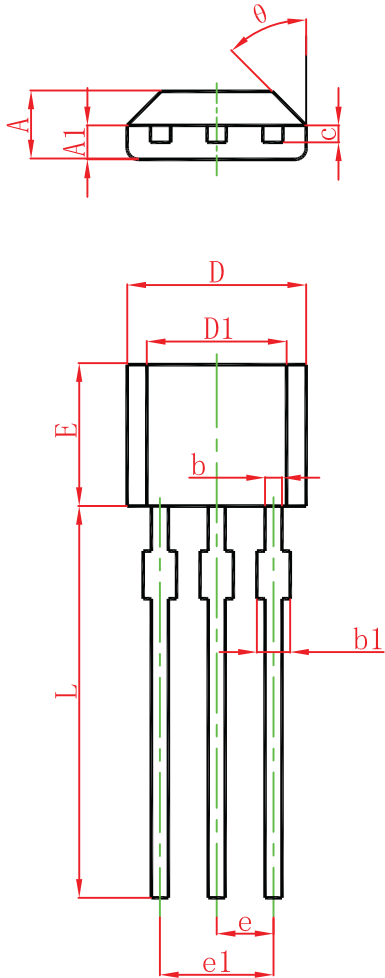


Dimensions are in millimeter

Reel Option	D	D1	D2	G	H	I	W1	W2
7" Dia	Ø178.00	54.40	13.00	R78.00	R25.60	R6.50	9.50	12.30

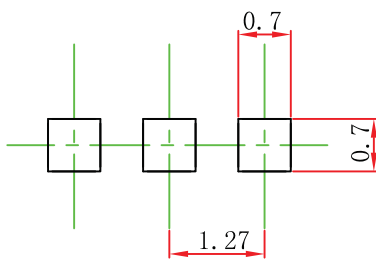
REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
3000 pcs	7 inch	45,000 pcs	203×203×195	180,000 pcs	438×438×220	

## TO-92S Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.420	1.620	0.056	0.064
A1	0.660	0.860	0.026	0.034
b	0.330	0.480	0.013	0.019
b1	0.400	0.510	0.016	0.020
c	0.330	0.510	0.013	0.020
D	3.900	4.100	0.154	0.161
D1	2.280	2.680	0.090	0.106
E	3.050	3.250	0.120	0.128
e	1.270 TYP.		0.050 TYP.	
e1	2.440	2.640	0.096	0.104
L	15.100	15.500	0.594	0.610
θ	45° TYP.		45° TYP.	

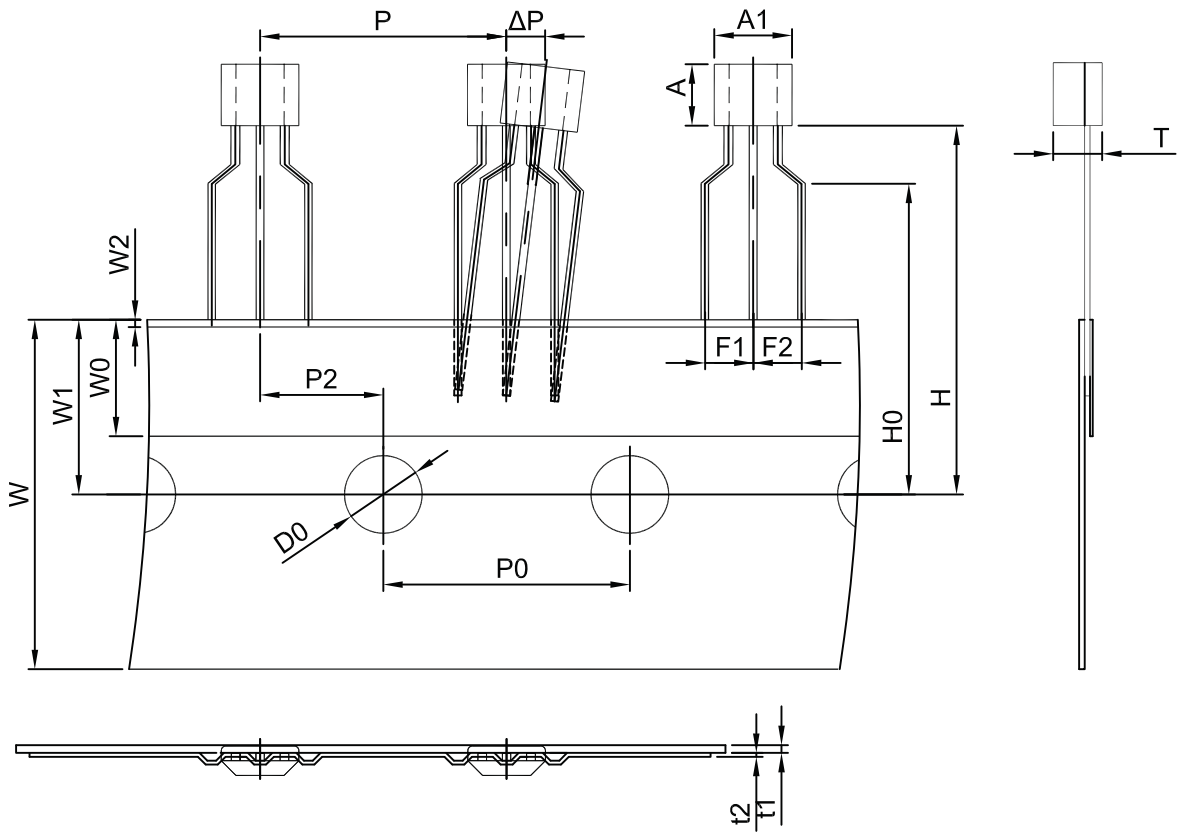
## TO-92S Suggested Pad Layout



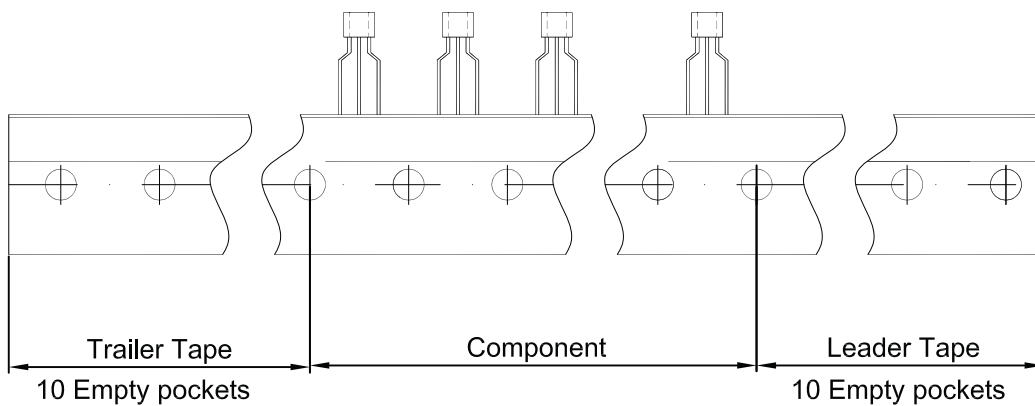
**Note:**

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.

# TO-92S PACKAGE TAPEING DIMENSION



Dimensions are in millimeter								
A1	A	T	P	P0	P2	F1	F2	W
4.0	3.15	1.52	12.7	12.7	6.35	2.5	2.5	18.0
W0	W1	W2	H	H0	D0	t1	t2	ΔP
6.0	9.0	1.0	19.0	16.0	4.0	0.4	0.2	0



Package	Box	Box Size(mm)	Carton	Carton Size(mm)
TO-92S	3000 pcs	333×162×43	30,000 pcs	350×340×250



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