

Digital Transistors (Built-in Resistors)

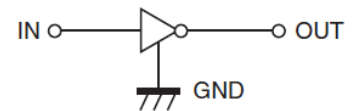
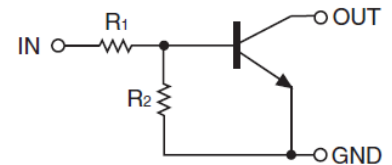
DTC143ZM/DTC143ZE/DTC143ZUA DTC143ZKA /DTC143ZCA/DTC143ZSA

DIGITAL TRANSISTOR (NPN)

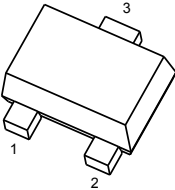
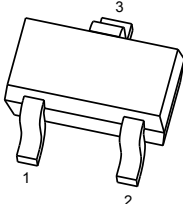
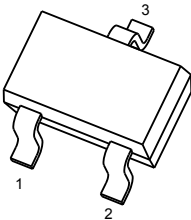
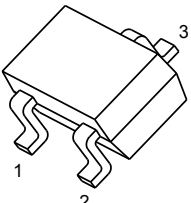
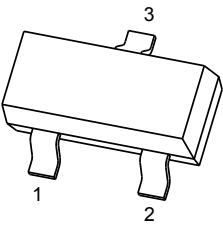
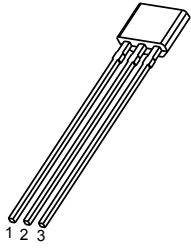
FEATURES

- Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors(see equivalent circuit)
- 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
- Only the on/off conditions need to be set for operation, making device design easy
- AEC-Q101 qualified (Automotive grade with suffix "Q".)

• Equivalent Circuit



PIN CONNENCTIONS and MARKING

| | |
|--|--|
| <p>DTC143ZM</p>  <p>SOT-723</p> <p>1. IN 2. GND 3. OUT</p> | <p>DTC143ZE</p>  <p>SOT-523</p> <p>1. IN 2. GND 3. OUT</p> |
| <p>DTC143ZUA</p>  <p>SOT-323</p> <p>1. IN 2. GND 3. OUT</p> | <p>DTC143ZKA</p>  <p>SOT-23-3L</p> <p>1. IN 2. GND 3. OUT</p> |
| <p>DTC143ZCA</p>  <p>SOT-23</p> <p>1. IN 2. GND 3. OUT</p> | <p>DTC143ZSA</p>  <p>TO-92S</p> <p>1. GND 2. OUT 3. IN</p> |

ORDERING INFORMATION

| Part Number | MARKING ⁽¹⁾ | Package | Packing Method | Pack Quantity |
|--------------|------------------------------|-----------|----------------|---------------|
| DTC143ZM | E23 | SOT-723 | Reel | 8000pcs/Reel |
| DTC143ZE | E23 | SOT-523 | Reel | 3000pcs/Reel |
| DTC143ZUA | E23 | SOT-323 | Reel | 3000pcs/Reel |
| DTC143ZKA | E23 | SOT-23-3L | Reel | 3000pcs/Reel |
| DTC143ZCA | E23 | SOT-23 | Reel | 3000pcs/Reel |
| DTC143ZSA | C143 ⁽²⁾ Z·XXX | TO-92S | Bulk | 1000pcs/Bag |
| DTC143ZSA-TA | C143 ⁽²⁾ Z·XXX | TO-92S | Tape | 3000pcs/Box |

Notes: (1). Solid dot= Green molding compound device, if none, the normal device.

(2). XXX=Code

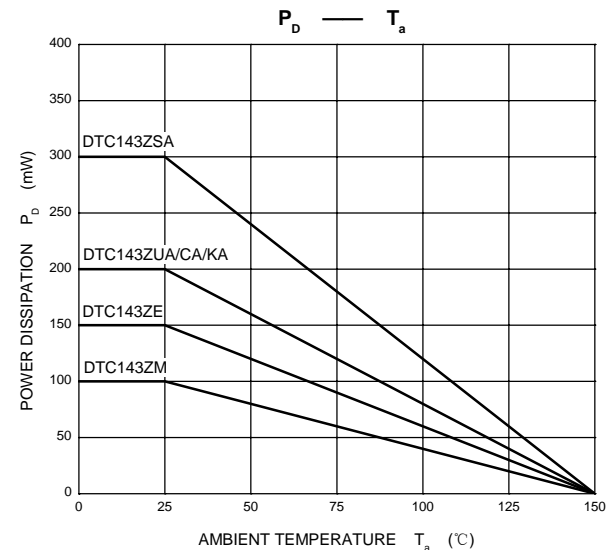
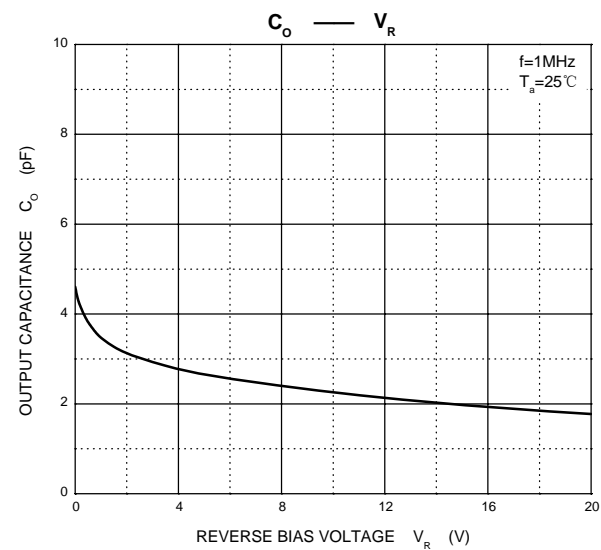
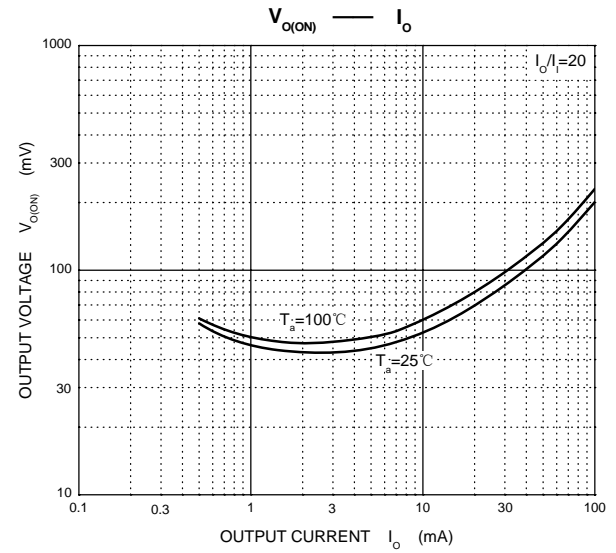
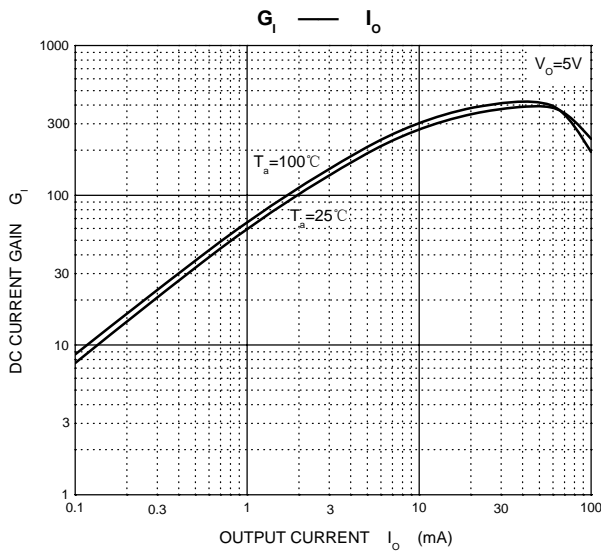
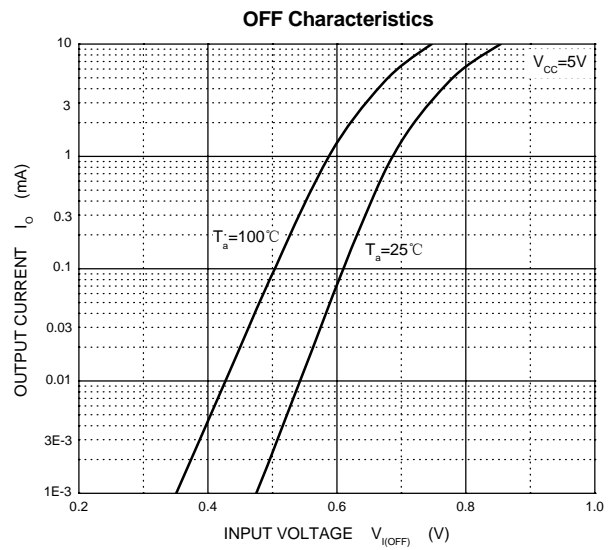
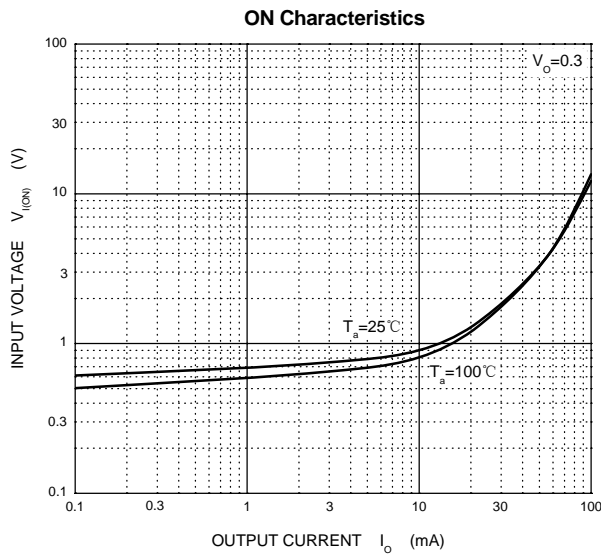
MAXIMUM RATINGS(Ta=25°C unless otherwise noted)

| Symbol | Parameter | Limits(DTC143Z□) | | | | | | Unit |
|-----------------------------------|--|------------------|-----|-----|-----|-----|-----|------|
| | | M | E | UA | CA | KA | SA | |
| V _{CC} | Supply Voltage | 50 | | | | | | V |
| V _{IN} | Input Voltage | -5~+30 | | | | | | V |
| I _O | Output Current | 100 | | | | | | mA |
| P _D | Power Dissipation | 100 | 150 | 200 | 200 | 200 | 300 | mW |
| T _J , T _{stg} | Operation Junction and Storage Temperature Range | -55~+150 | | | | | | °C |

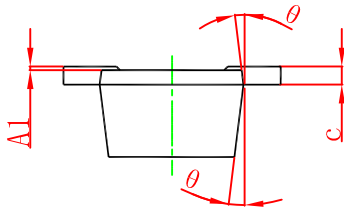
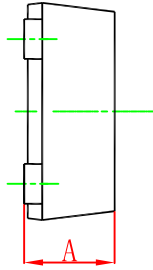
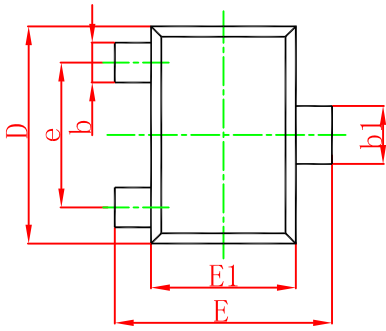
ELECTRICAL CHARACTERISTICS (Ta=25°C unless otherwise specified)

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|----------------------|--------------------------------|--|------|-----|------|------|
| Input voltage | V _{I(off)} | V _{CC} =5V, I _O =100μA | 0.5 | | | V |
| | V _{I(on)} | V _O =0.3V, I _O =5mA | | | 1.3 | V |
| Output voltage | V _{O(on)} | I _O /I _I =5mA/0.25mA | | 0.1 | 0.3 | V |
| Input current | I _I | V _I =5V | | | 1.8 | mA |
| Output current | I _{O(off)} | V _{CC} =50V, V _I =0 | | | 0.5 | μA |
| DC current gain | G _I | V _O =5V, I _O =10mA | 80 | | | |
| Input resistance | R ₁ | | 3.29 | 4.7 | 6.11 | kΩ |
| Resistance ratio | R ₂ /R ₁ | | 8 | 10 | 12 | |
| Transition frequency | f _T | V _O =10V, I _O =5mA, f=100MHz | | 250 | | MHz |

Typical Characteristics

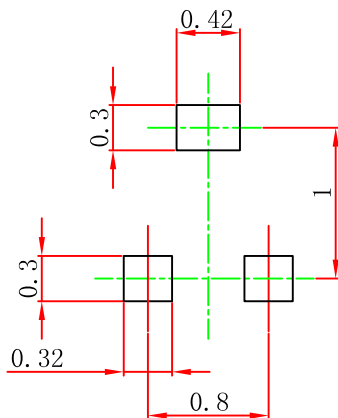


SOT-723 Package Outline Dimensions



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 0.430 | 0.500 | 0.017 | 0.020 |
| A1 | 0.000 | 0.050 | 0.000 | 0.002 |
| b | 0.170 | 0.270 | 0.007 | 0.011 |
| b1 | 0.270 | 0.370 | 0.011 | 0.015 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 1.150 | 1.250 | 0.045 | 0.049 |
| E | 1.150 | 1.250 | 0.045 | 0.049 |
| E1 | 0.750 | 0.850 | 0.030 | 0.033 |
| e | 0.800TYP. | | 0.031TYP. | |
| theta | 7° REF. | | 7° REF. | |

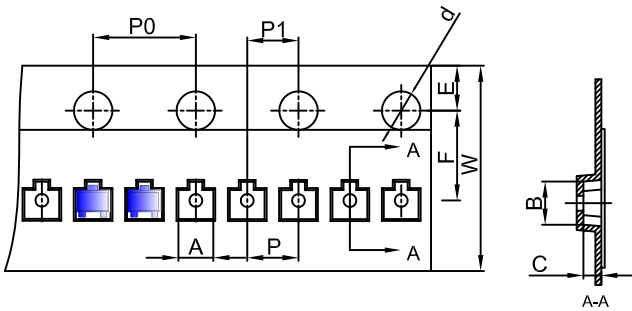
SOT-723 Suggested Pad Layout



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

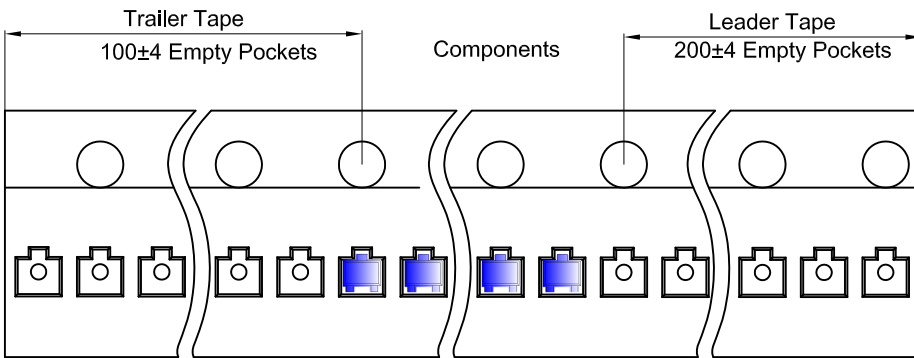
SOT-723 Tape and Reel

SOT-723 Embossed Carrier Tape

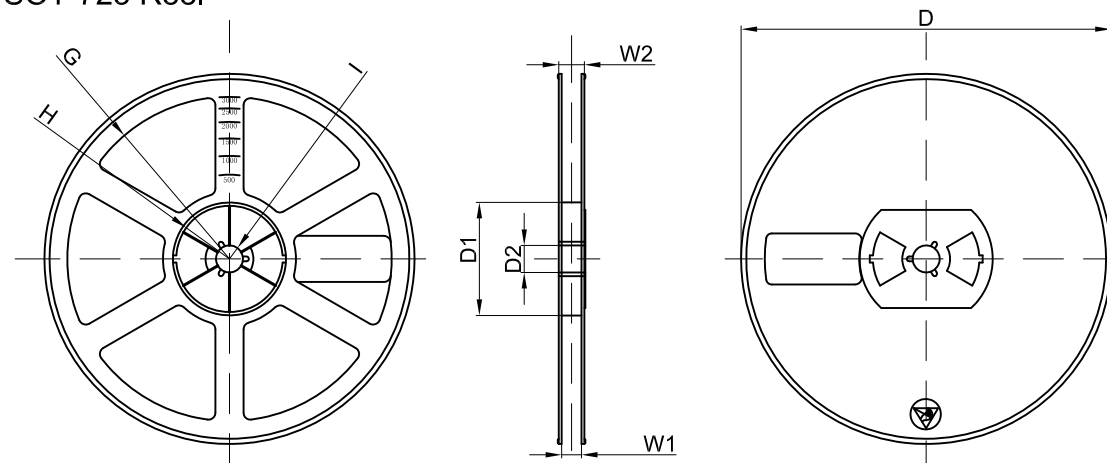


| Dimensions are in millimeter | | | | | | | | | | |
|------------------------------|------|------|------|-------|------|------|------|------|------|------|
| Pkg type | A | B | C | d | E | F | P0 | P | P1 | W |
| SOT-723 | 1.33 | 1.45 | 0.61 | Ø1.50 | 1.75 | 3.50 | 4.00 | 2.00 | 2.00 | 8.00 |

SOT-723 Tape Leader and Trailer



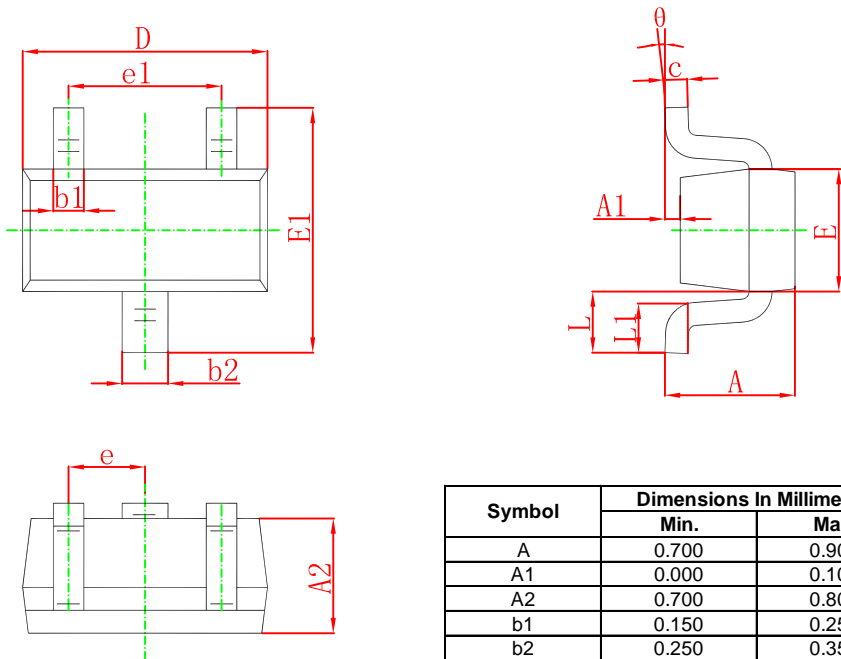
SOT-723 Reel



| 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 |

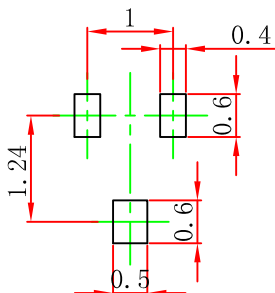
| REEL | Reel Size | Box | Box Size(mm) | Carton | Carton Size(mm) | G.W.(kg) |
|----------|-----------|-------------|--------------|-------------|-----------------|----------|
| 8000 pcs | 7 inch | 120,000 pcs | 203×203×195 | 480,000 pcs | 438×438×220 | |

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

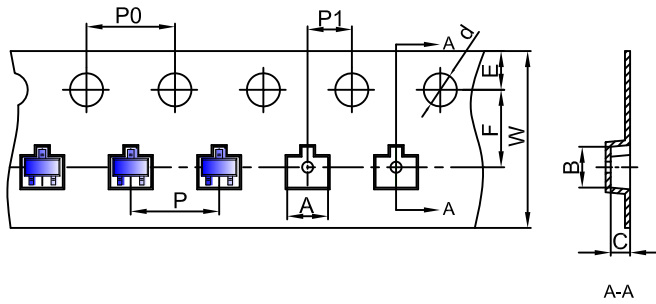


Note:

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

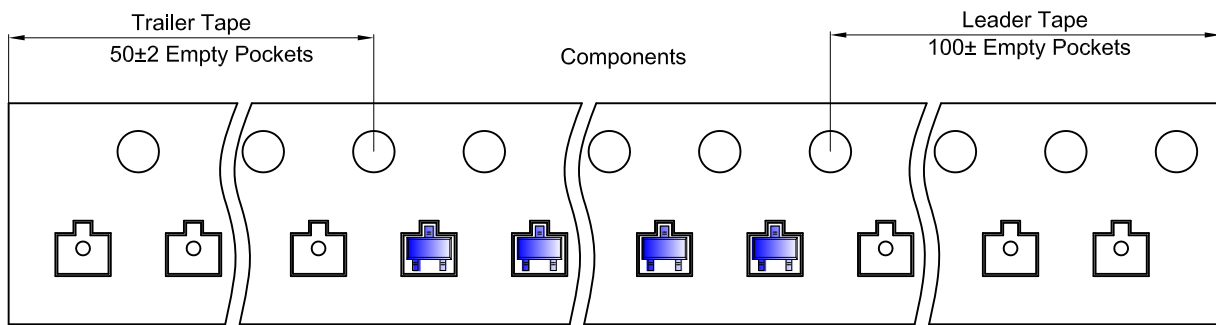
SOT-523 Tape and Reel

SOT-523 Embossed Carrier Tape

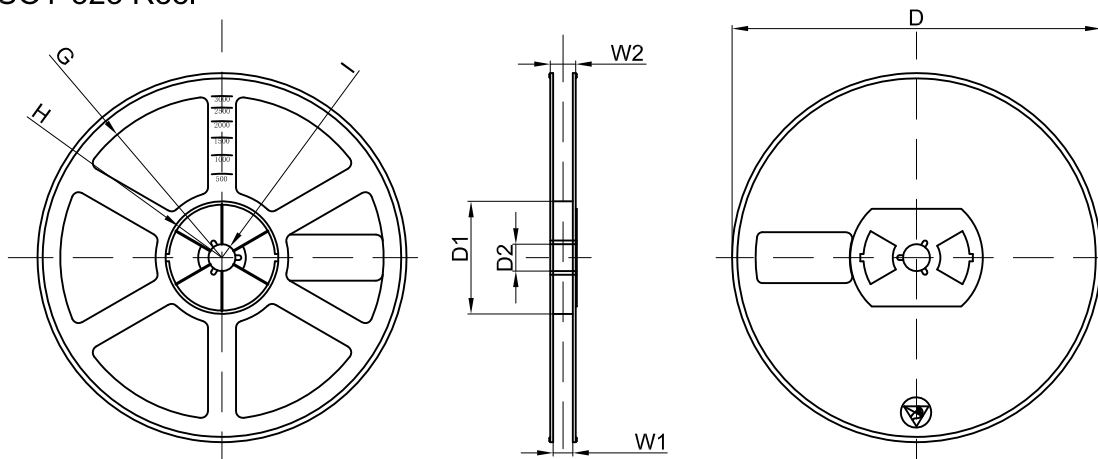


| Dimensions are in millimeter | | | | | | | | | | |
|------------------------------|------|------|-------|-------|------|------|------|------|------|------|
| Pkg type | A | B | C | d | E | F | P0 | P | P1 | W |
| SOT-523 | 1.85 | 1.85 | 0.875 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |

SOT-523 Tape Leader and Trailer



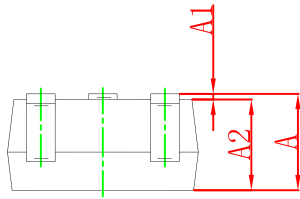
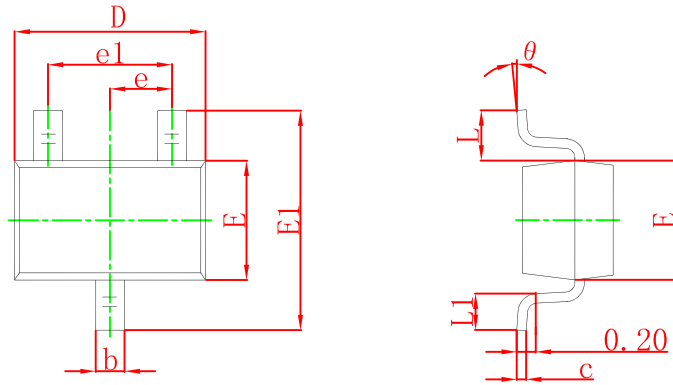
SOT-523 Reel



| 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 |

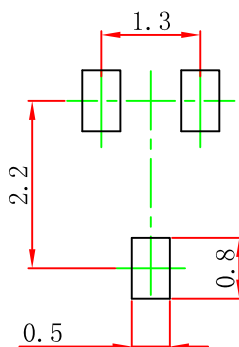
| REEL | Reel Size | Box | Box Size(mm) | Carton | Carton Size(mm) | G.W.(kg) |
|----------|-----------|------------|--------------|-------------|-----------------|----------|
| 3000 pcs | 7 inch | 45,000 pcs | 203×203×195 | 180,000 pcs | 438×438×220 | |

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

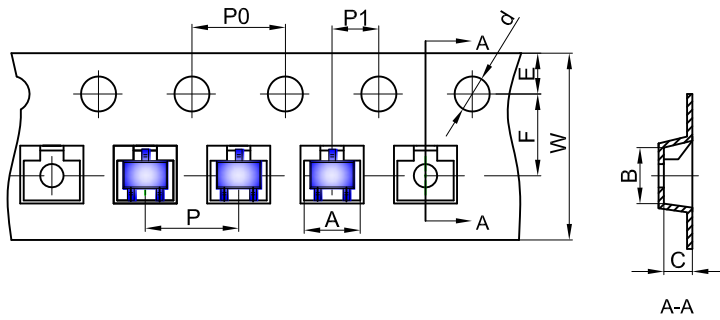


Note:

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

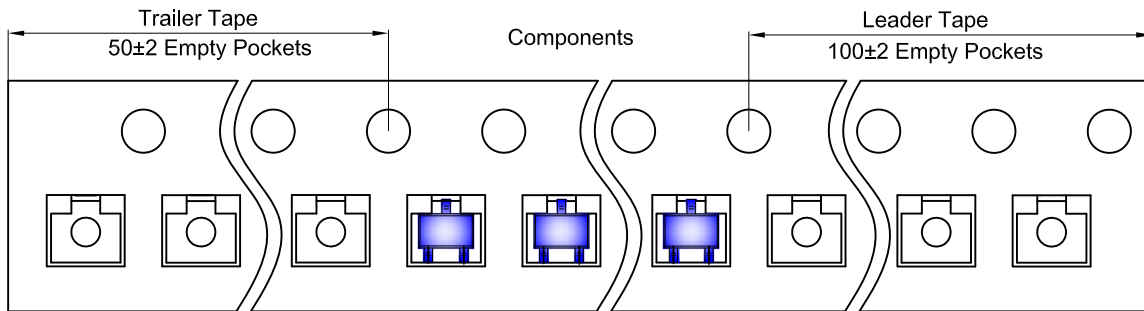
SOT-323 Tape and Reel

SOT-323 Embossed Carrier Tape

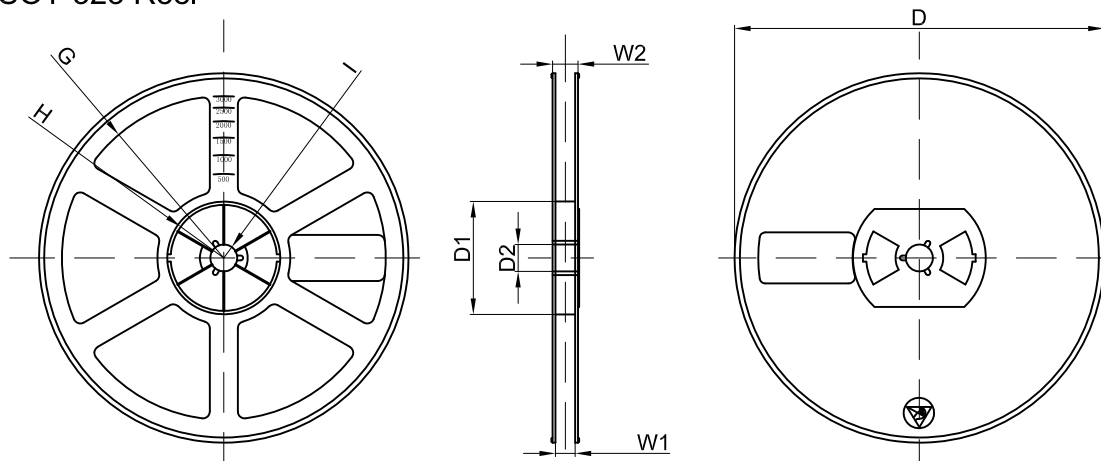


| Dimensions are in millimeter | | | | | | | | | | |
|------------------------------|------|------|------|-------|------|------|------|------|------|------|
| Pkg type | A | B | C | d | E | F | P0 | P | P1 | W |
| SOT-323 | 2.25 | 2.55 | 1.19 | Ø1.55 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |

SOT-323 Tape Leader and Trailer



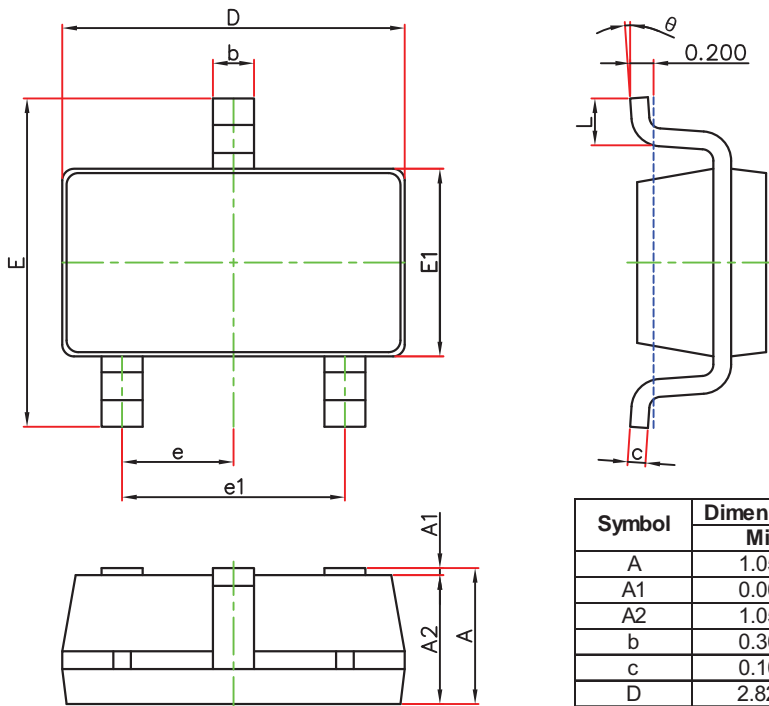
SOT-323 Reel



| 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 |

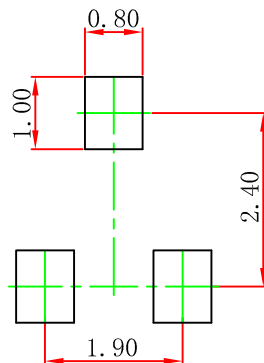
| REEL | Reel Size | Box | Box Size(mm) | Carton | Carton Size(mm) | G.W.(kg) |
|----------|-----------|------------|--------------|-------------|-----------------|----------|
| 3000 pcs | 7 inch | 45,000 pcs | 203×203×195 | 180,000 pcs | 438×438×220 | |

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

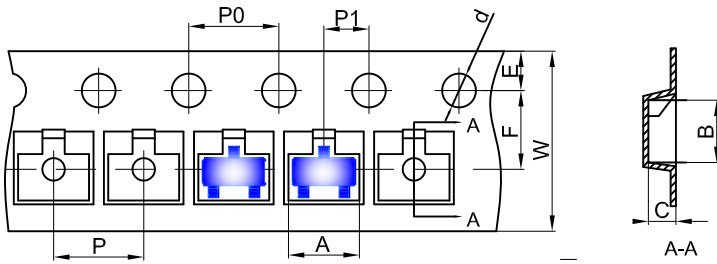


Note:

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

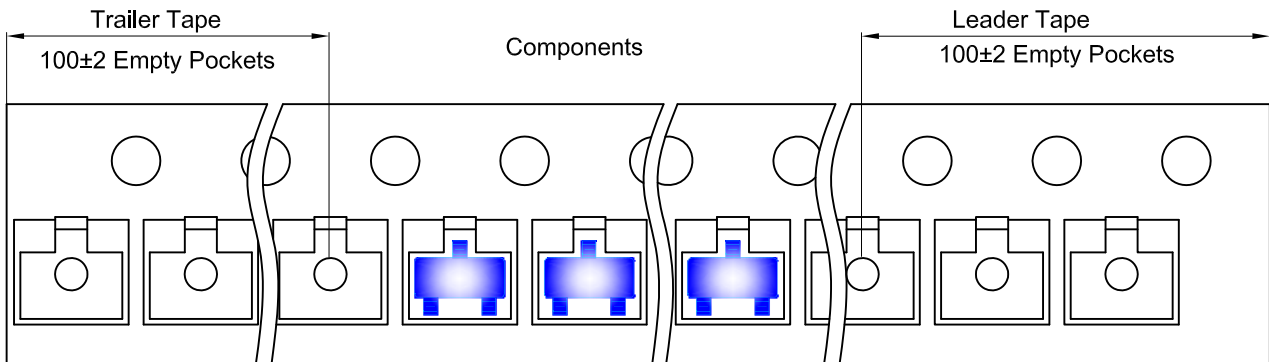
SOT-23-3L Tape and Reel

SOT-23-3L Embossed Carrier Tape

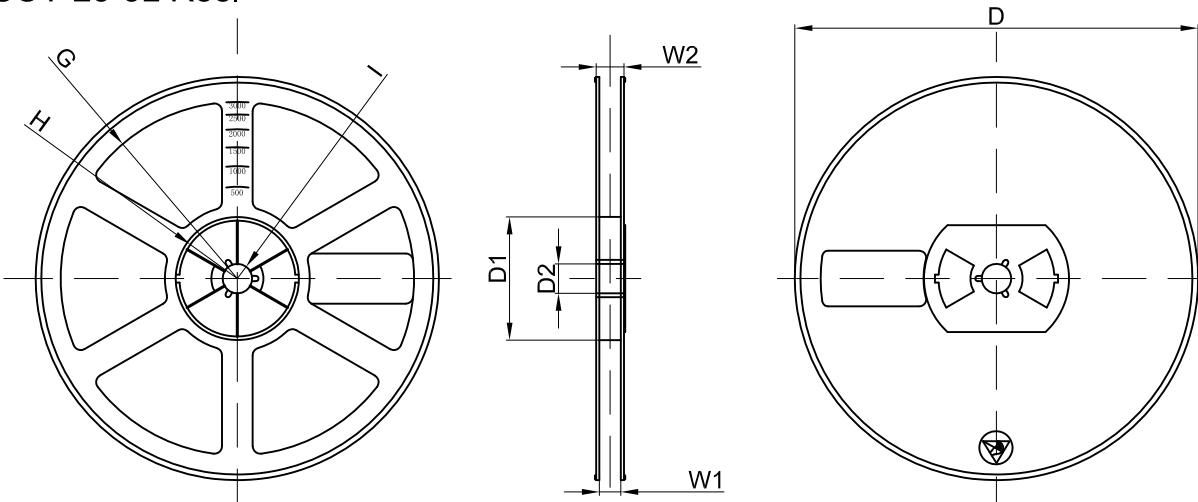


| Dimensions are in millimeter | | | | | | | | | | |
|------------------------------|------|------|------|-------|------|------|------|------|------|------|
| Pkg type | A | B | C | d | E | F | P0 | P | P1 | W |
| SOT-23-3L | 3.18 | 3.28 | 1.32 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |

SOT-23-3L Tape Leader and Trailer



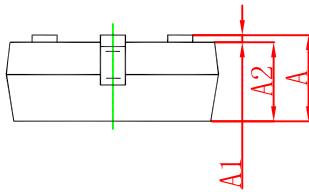
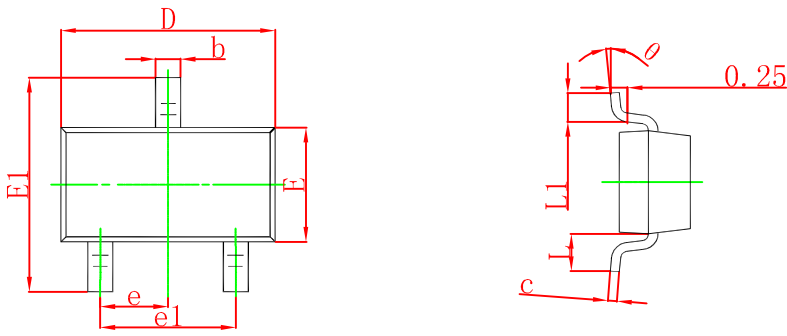
SOT-23-3L Reel



| 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 |

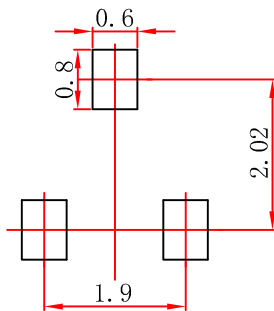
| REEL | Reel Size | Box | Box Size(mm) | Carton | Carton Size(mm) | G.W.(kg) |
|----------|-----------|------------|--------------|-------------|-----------------|----------|
| 3000 pcs | 7 inch | 30,000 pcs | 203×203×195 | 120,000 pcs | 438×438×220 | |

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 |
| θ | 0° | 8° | 0° | 8° |

SOT-23 Suggested Pad Layout

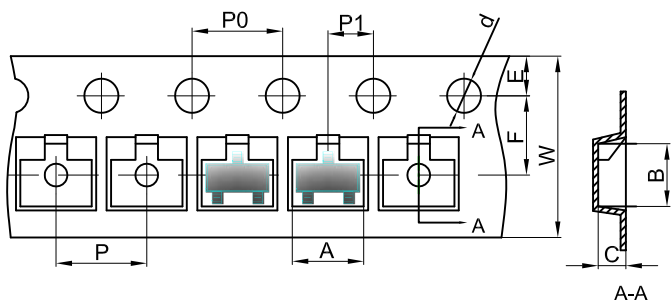


Note:

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

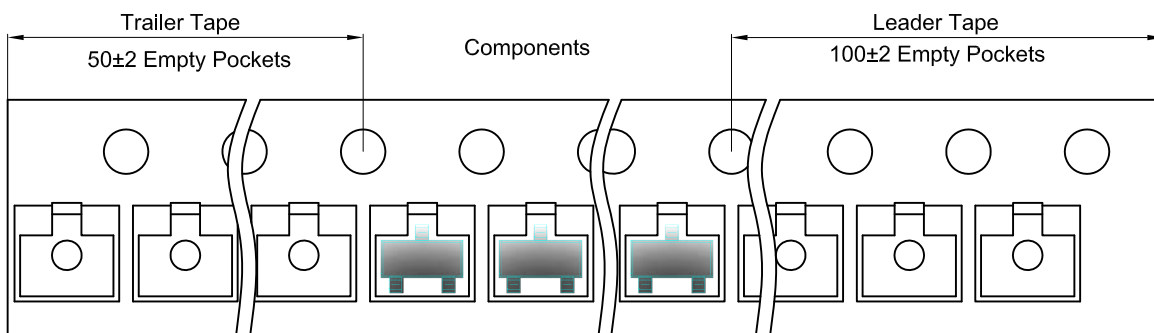
SOT-23 Tape and Reel

SOT-23 Embossed Carrier Tape

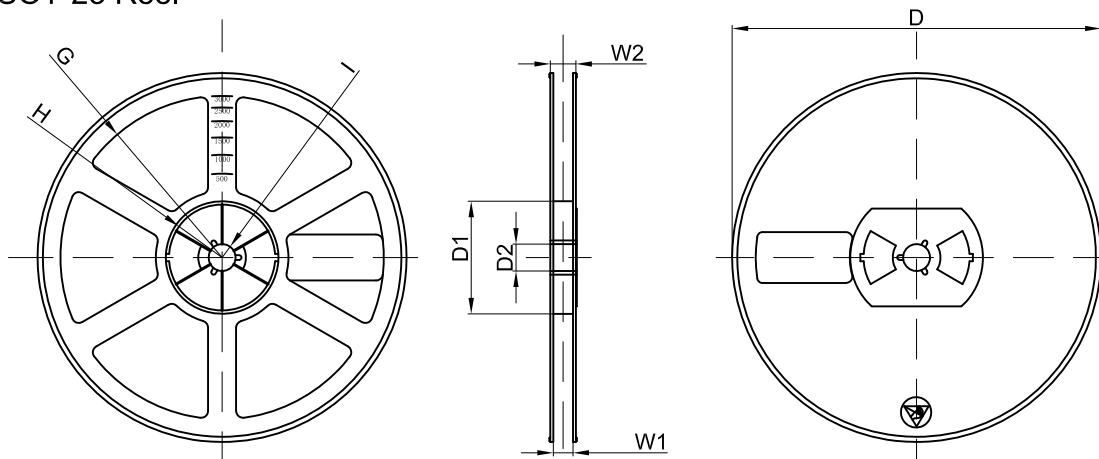


| Dimensions are in millimeter | | | | | | | | | | |
|------------------------------|------|------|------|-------|------|------|------|------|------|------|
| Pkg type | A | B | C | d | E | F | P0 | P | P1 | W |
| SOT-23 | 3.15 | 2.77 | 1.22 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |

SOT-23 Tape Leader and Trailer



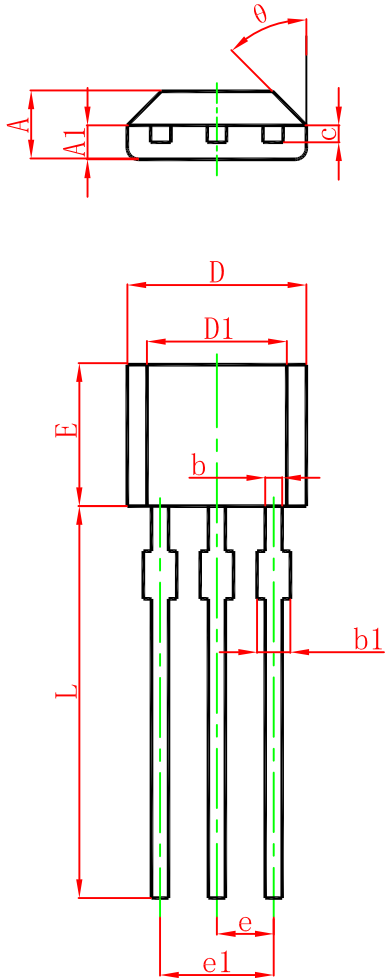
SOT-23 Reel



| 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 |

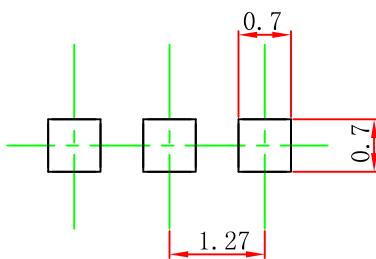
| REEL | Reel Size | Box | Box Size(mm) | Carton | Carton Size(mm) | G.W.(kg) |
|----------|-----------|------------|--------------|-------------|-----------------|----------|
| 3000 pcs | 7 inch | 45,000 pcs | 203×203×195 | 180,000 pcs | 438×438×220 | |

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. | |

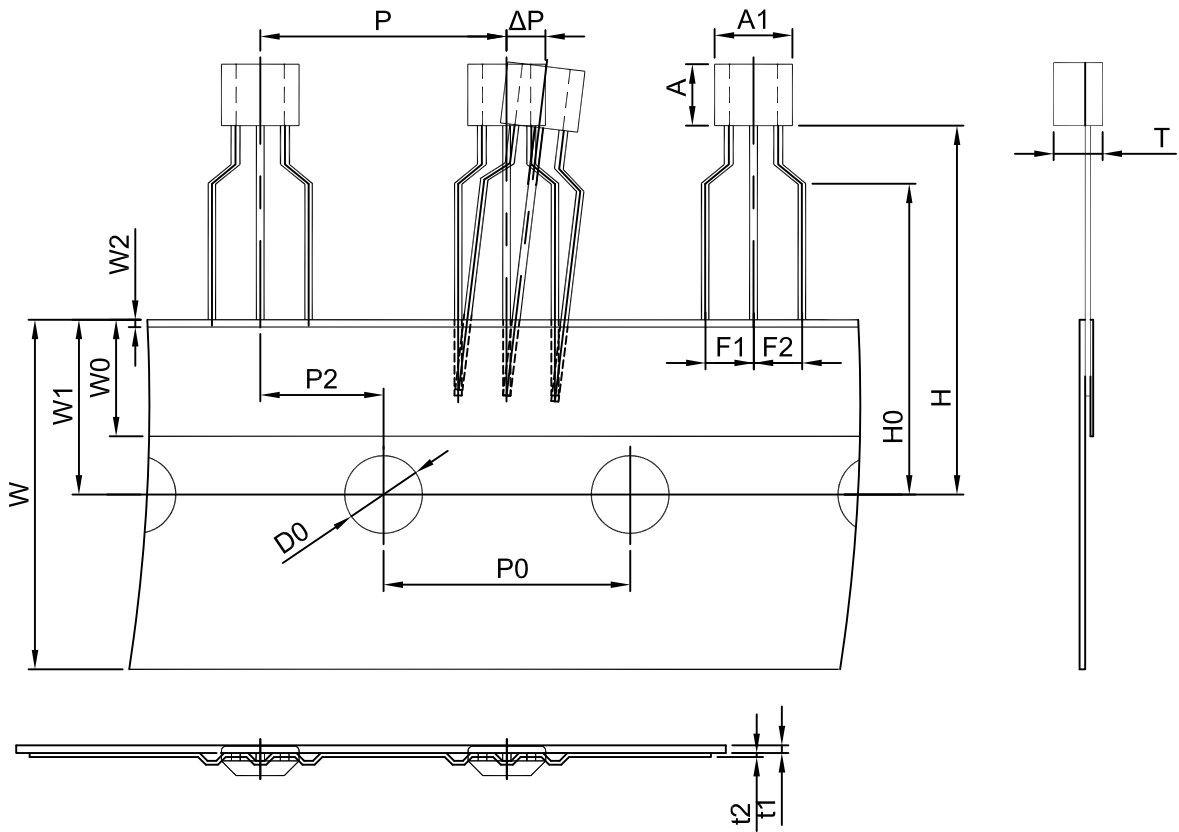
TO-92S Suggested Pad Layout



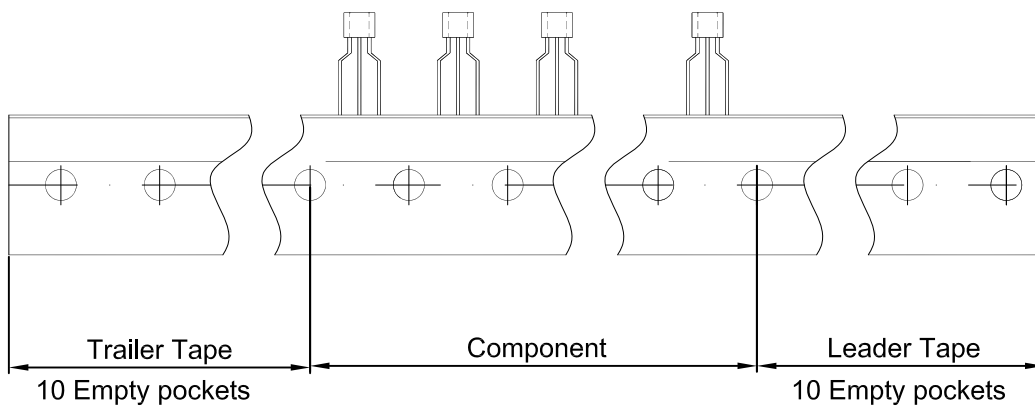
Note:

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

TO-92S PACKAGE TAPING 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 |