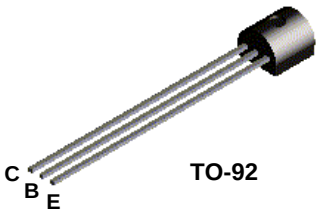
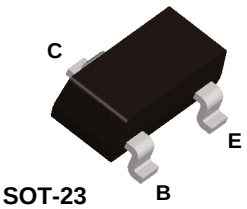
FAIRCHILD
SEMICONDUCTOR TM

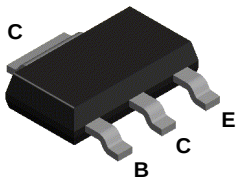
# MPSA92 MMBTA92 PZTA92




TO-92




SOT-23
Mark: 2D




SOT-223

## PNP High Voltage Amplifier

This device is designed for high voltage driver applications.
Sourced from Process 76.

### Absolute Maximum Ratings*

TA = 25°C unless otherwise noted

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $V_{CEO}$ | Collector-Emitter Voltage | 300 | V |
| $V_{CBO}$ | Collector-Base Voltage | 300 | V |
| $V_{EBO}$ | Emitter-Base Voltage | 5.0 | V |
| $I_C$ | Collector Current - Continuous | 500 | mA |
| $T_J$, $T_{stg}$ | Operating and Storage Junction Temperature Range | -55 to +150 | °C |

*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

**NOTES**:
**1)** These ratings are based on a maximum junction temperature of 150 degrees C.
**2)** These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

### Thermal Characteristics

TA = 25°C unless otherwise noted

| Symbol | Characteristic | Max | | | Units |
|---|---|---|---|---|---|
| | | MPSA92 | *MMBTA92 | **PZTA92 | |
| $P_D$ | Total Device Dissipation<br>Derate above 25°C | 625<br>5.0 | 350<br>2.8 | 1,000<br>8.0 | mW<br>mW/°C |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 83.3 | | | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 200 | 357 | 125 | °C/W |

*Device mounted on FR-4 PCB 1.6" X 1.6" X 0.06."

**Device mounted on FR-4 PCB 36 mm X 18 mm X 1.5 mm; mounting pad for the collector lead min. 6 $cm^2$.

## PNP High Voltage Amplifier
(continued)

### Electrical Characteristics
TA = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Max | Units |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage* | $I_C$ = 1.0 mA, $I_B$ = 0 | 300 | | V |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage | $I_C$ = 100 μA, $I_E$ = 0 | 300 | | V |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage | $I_E$ = 100 μA, $I_C$ = 0 | 5.0 | | V |
| $I_{CBO}$ | Collector-Cutoff Current | $V_{CB}$ = 200 V, $I_E$ = 0 | | 0.25 | μA |
| $I_{EBO}$ | Emitter-Cutoff Current | $V_{EB}$ = 3.0 V, $I_C$ = 0 | | 0.1 | μA |
| **ON CHARACTERISTICS*** | | | | | |
| $h_{FE}$ | DC Current Gain | $I_C$ = 1.0 mA, $V_{CE}$ = 10 V<br>$I_C$ = 10 mA, $V_{CE}$ = 10 V<br>$I_C$ = 30 mA, $V_{CE}$ = 10 V | 25<br>40<br>25 | | |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C$ = 20 mA, $I_B$ = 2.0 mA | | 0.5 | V |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage | $I_C$ = 20 mA, $I_B$ = 2.0 mA | | 0.9 | V |
| **SMALL SIGNAL CHARACTERISTICS** | | | | | |
| $f_T$ | Current Gain - Bandwidth Product | $I_C$ = 10 mA, $V_{CE}$ = 20 V,<br>f = 100 MHz | 50 | | MHz |
| $C_{cb}$ | Collector-Base Capacitance | $V_{CB}$ = 20 V, $I_E$ = 0, f = 1.0 MHz | | 6.0 | pF |

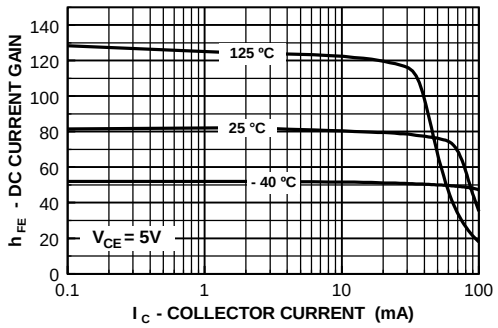
*Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

### Spice Model

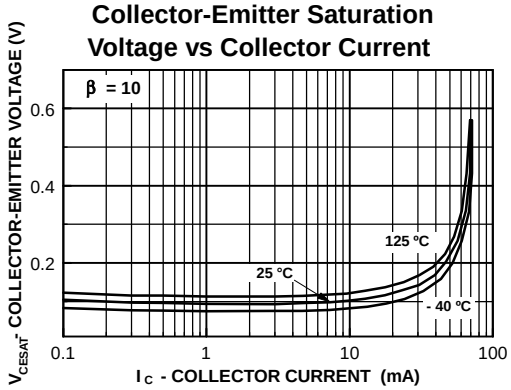
PNP (Is=218.9f Xti=3 Eg=1.11 Vaf=100 Bf=99 Ne=1.307 Ise=218.9f Ikf=.2016 Xtb=1.5 Br=24.67 Nc=2 Isc=0 Ikr=0 Rc=7 Cjc=19.88p Mjc=.4876 Vjc=.75 Fc=.5 Cje=81.49p Mje=.3493 Vje=.75 Tr=516.9p Tf=1.395n Itf=1.5 Vtf=22 Xtf=270 Rb=10)

### Typical Characteristics

**DC Current Gain vs Collector Current**

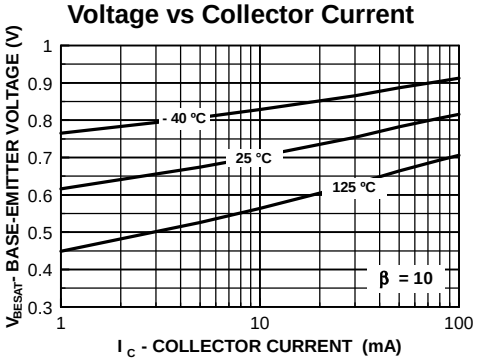



**Collector-Emitter Saturation Voltage vs Collector Current**

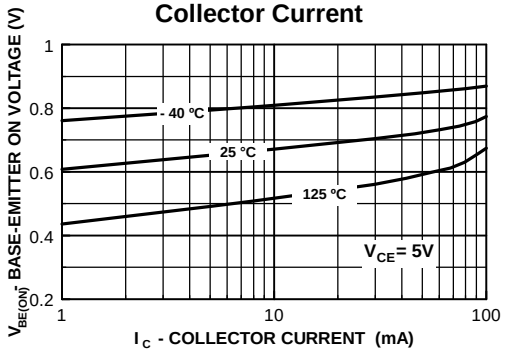


## Typical Characteristics (continued)

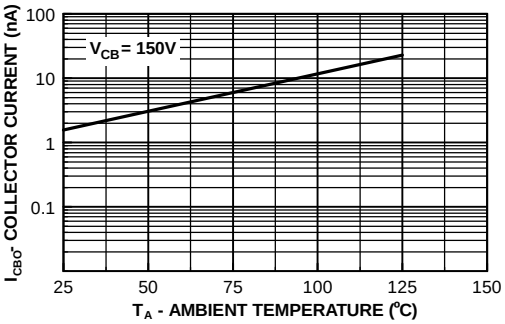
### Base-Emitter Saturation Voltage vs Collector Current



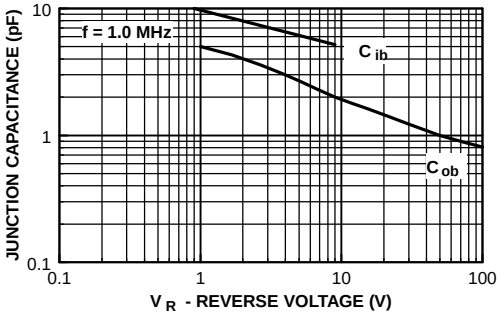

### Base-Emitter ON Voltage vs Collector Current



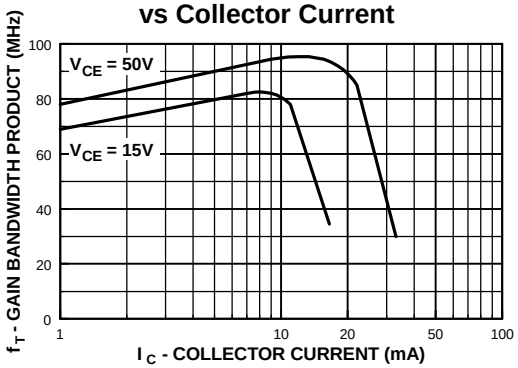

### Collector-Cutoff Current vs Ambient Temperature



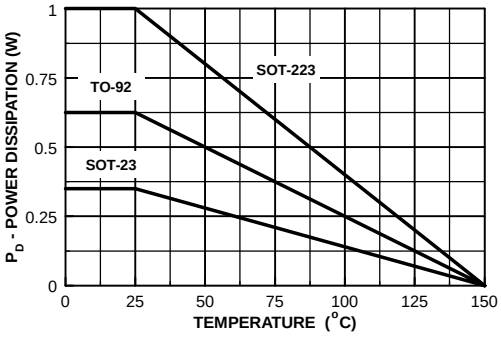

### Junction Capacitance vs Reverse Bias Voltage




### Gain Bandwidth Product vs Collector Current




### Power Dissipation vs Ambient Temperature

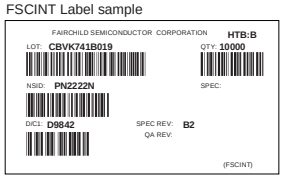


# TO-92 Tape and Reel Data and Package Dimensions

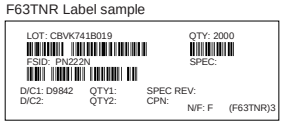
FAIRCHILD SEMICONDUCTOR™

## TO-92 Packaging
**Configuration:** Figure 1.0

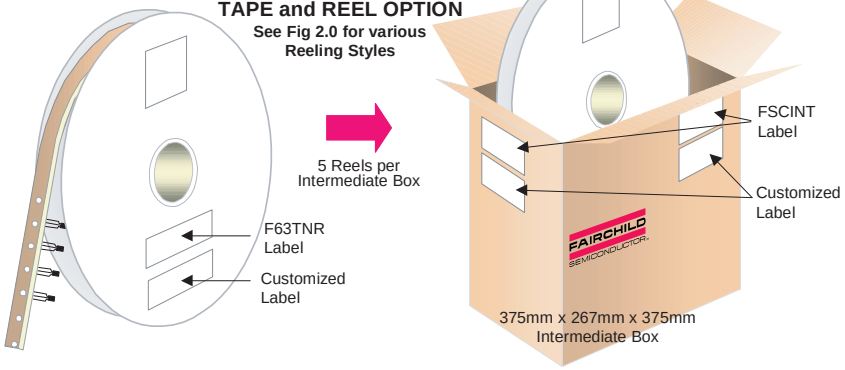
FSCINT Label sample




F63TNR Label sample




### TAPE and REEL OPTION
**See Fig 2.0 for various Reeling Styles**

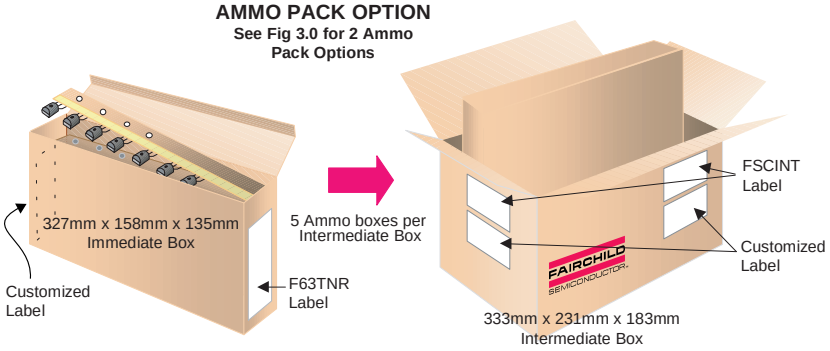



**TO-92 TNR/AMMO PACKING INFROMATION**

| Packing | Style | Quantity | EOL code |
|---|---|---|---|
| Reel | A | 2,000 | D26Z |
| | E | 2,000 | D27Z |
| Ammo | M | 2,000 | D74Z |
| | P | 2,000 | D75Z |

Unit weight = 0.22 gm
Reel weight with components = 1.04 kg
Ammo weight with components = 1.02 kg
Max quantity per intermediate box = 10,000 units

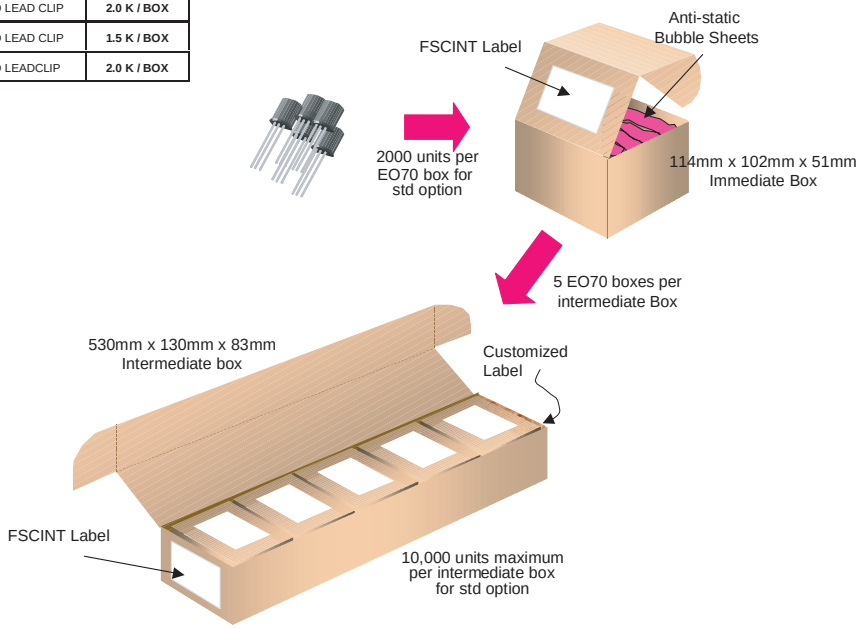
### AMMO PACK OPTION
**See Fig 3.0 for 2 Ammo Pack Options**




**(TO-92) BULK PACKING INFORMATION**

| EOL CODE | DESCRIPTION | LEADCLIP DIMENSION | QUANTITY |
|---|---|---|---|
| J18Z | TO-18 OPTION STD | NO LEAD CLIP | 2.0 K / BOX |
| J05Z | TO-5 OPTION STD | NO LEAD CLIP | 1.5 K / BOX |
| NO EOL CODE | TO-92 STANDARD STRAIGHT | NO LEADCLIP | 2.0 K / BOX |

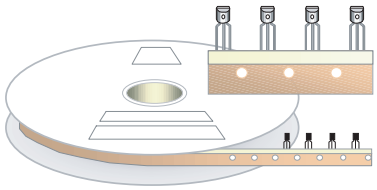
### BULK OPTION
**See Bulk Packing Information table**



## TO-92 Tape and Reel Data and Package Dimensions, continued

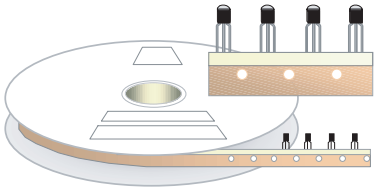
**TO-92 Reeling Style**
**Configuration:** Figure 2.0

**Machine Option “A” (H)**



**Style “A”, D26Z, D70Z (s/h)**

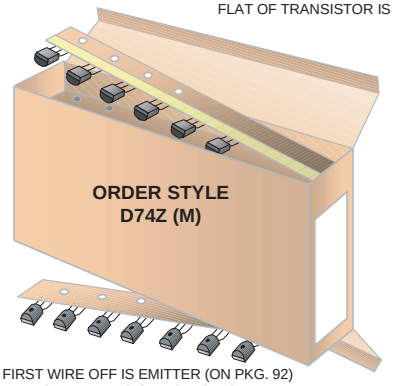
**Machine Option “E” (J)**



**Style “E”, D27Z, D71Z (s/h)**

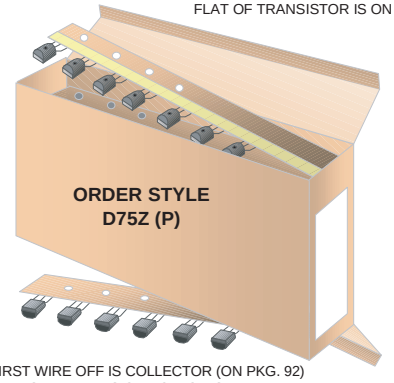
**TO-92 Radial Ammo Packaging**
**Configuration:** Figure 3.0

FIRST WIRE OFF IS COLLECTOR
ADHESIVE TAPE IS ON THE TOP SIDE
FLAT OF TRANSISTOR IS ON TOP




FIRST WIRE OFF IS EMITTER (ON PKG. 92)
ADHESIVE TAPE IS ON BOTTOM SIDE
FLAT OF TRANSISTOR IS ON BOTTOM

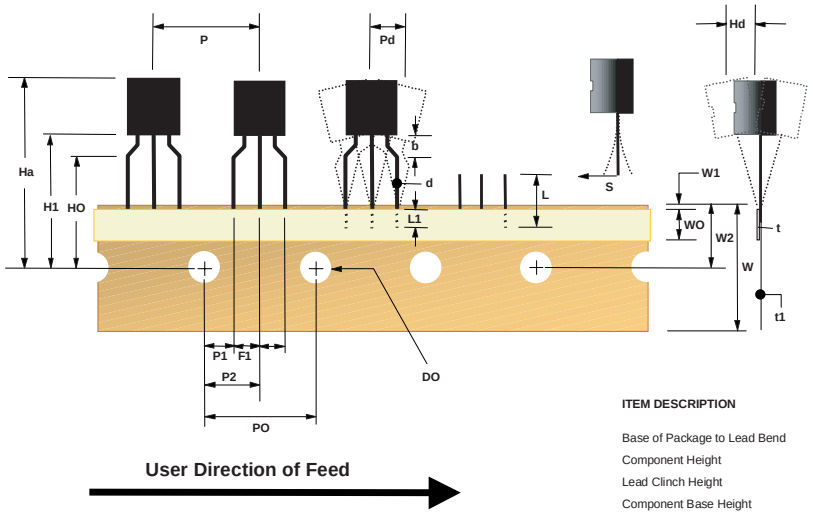
FIRST WIRE OFF IS EMITTER
ADHESIVE TAPE IS ON THE TOP SIDE
FLAT OF TRANSISTOR IS ON BOTTOM




FIRST WIRE OFF IS COLLECTOR (ON PKG. 92)
ADHESIVE TAPE IS ON BOTTOM SIDE
FLAT OF TRANSISTOR IS ON TOP

# TO-92 Tape and Reel Data and Package Dimensions, continued

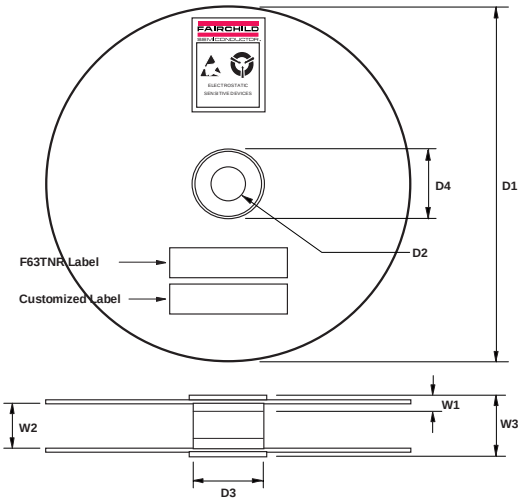
## TO-92 Tape and Reel Taping
**Dimension Configuration:** Figure 4.0




| ITEM DESCRIPTION | SYMBOL | DIMENSION |
|---|---|---|
| Base of Package to Lead Bend | b | 0.098 (max) |
| Component Height | Ha | 0.928 (+/- 0.025) |
| Lead Clinch Height | HO | 0.630 (+/- 0.020) |
| Component Base Height | H1 | 0.748 (+/- 0.020) |
| Component Alignment ( side/side ) | Pd | 0.040 (max) |
| Component Alignment ( front/back ) | Hd | 0.031 (max) |
| Component Pitch | P | 0.500 (+/- 0.020) |
| Feed Hole Pitch | PO | 0.500 (+/- 0.008) |
| Hole Center to First Lead | P1 | 0.150 (+0.009, -0.010) |
| Hole Center to Component Center | P2 | 0.247 (+/- 0.007) |
| Lead Spread | F1/F2 | 0.104 (+/- 0 .010) |
| Lead Thickness | d | 0.018 (+0.002, -0.003) |
| Cut Lead Length | L | 0.429 (max) |
| Taped Lead Length | L1 | 0.209 (+0.051, -0.052) |
| Taped Lead Thickness | t | 0.032 (+/- 0.006) |
| Carrier Tape Thickness | t1 | 0.021 (+/- 0.006) |
| Carrier Tape Width | W | 0.708 (+0.020, -0.019) |
| Hold - down Tape Width | WO | 0.236 (+/- 0.012) |
| Hold - down Tape position | W1 | 0.035 (max) |
| Feed Hole Position | W2 | 0.360 (+/- 0.025) |
| Sprocket Hole Diameter | DO | 0.157 (+0.008, -0.007) |
| Lead Spring Out | S | 0.004 (max) |

Note : All dimensions are in inches.

## TO-92 Reel
**Configuration:** Figure 5.0

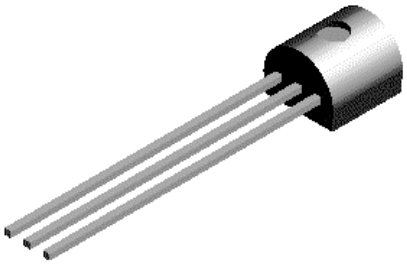


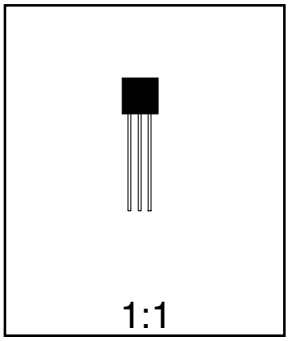

| ITEM DESCRIPTION | SYSMBOL | MINIMUM | MAXIMUM |
|---|---|---|---|
| Reel Diameter | D1 | 13.975 | 14.025 |
| Arbor Hole Diameter (Standard) | D2 | 1.160 | 1.200 |
| (Small Hole) | D2 | 0.650 | 0.700 |
| Core Diameter | D3 | 3.100 | 3.300 |
| Hub Recess Inner Diameter | D4 | 2.700 | 3.100 |
| Hub Recess Depth | W1 | 0.370 | 0.570 |
| Flange to Flange Inner Width | W2 | 1.630 | 1.690 |
| Hub to Hub Center Width | W3 | | 2.090 |

Note: All dimensions are inches

## TO-92 Tape and Reel Data and Package Dimensions

# TO-92 (FS PKG Code 92, 94, 96)





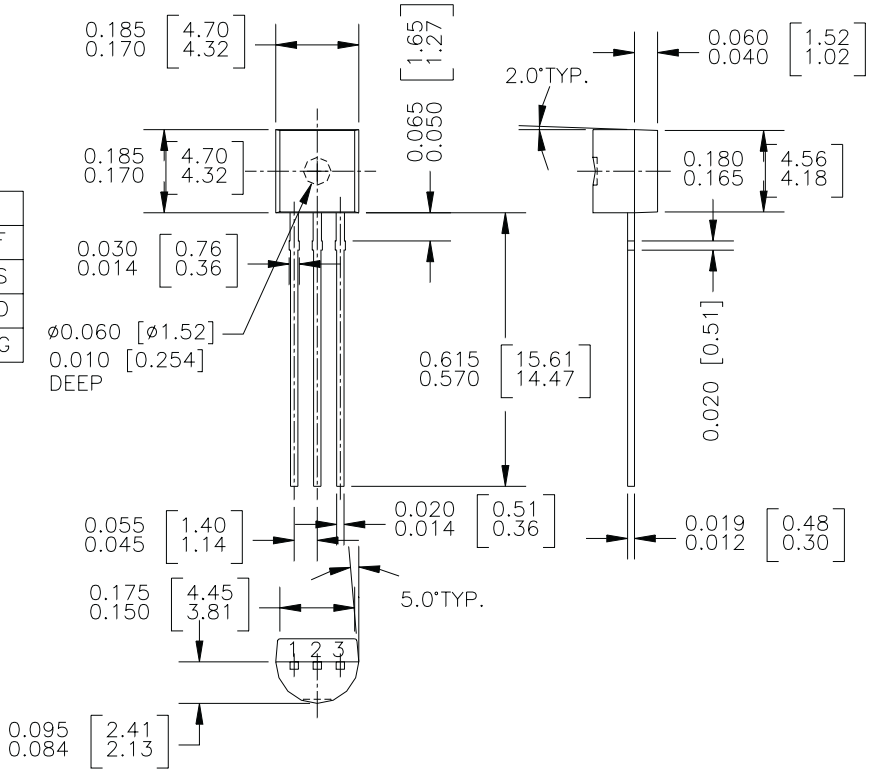

Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.1977

TO−92 (92,94,96)

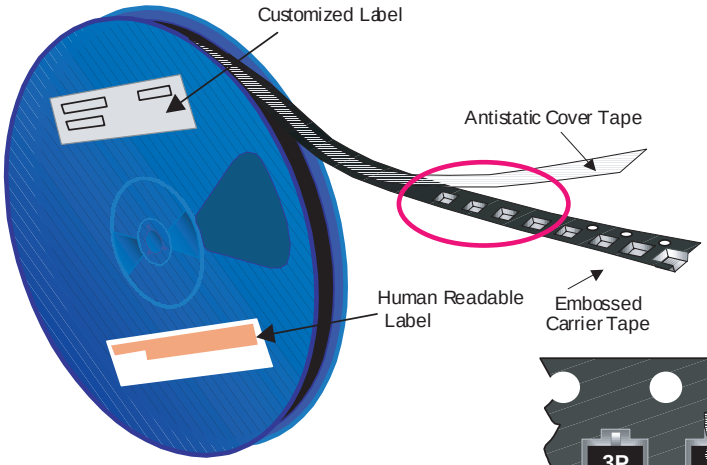
| PIN | 92 | | 94 | | 96 | |
|---|---|---|---|---|---|---|
| | B | F | B | F | B | F |
| 1 | E | D | E | D | B | S |
| 2 | B | S | C | G | E | D |
| 3 | C | G | B | S | C | G |



# SOT-23 Tape and Reel Data and Package Dimensions

FAIRCHILD SEMICONDUCTOR™

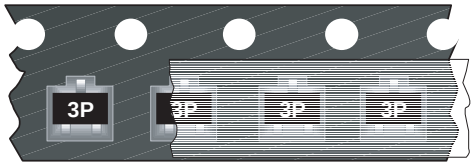
## SOT-23 Packaging Configuration: Figure 10




**Packaging Description:**

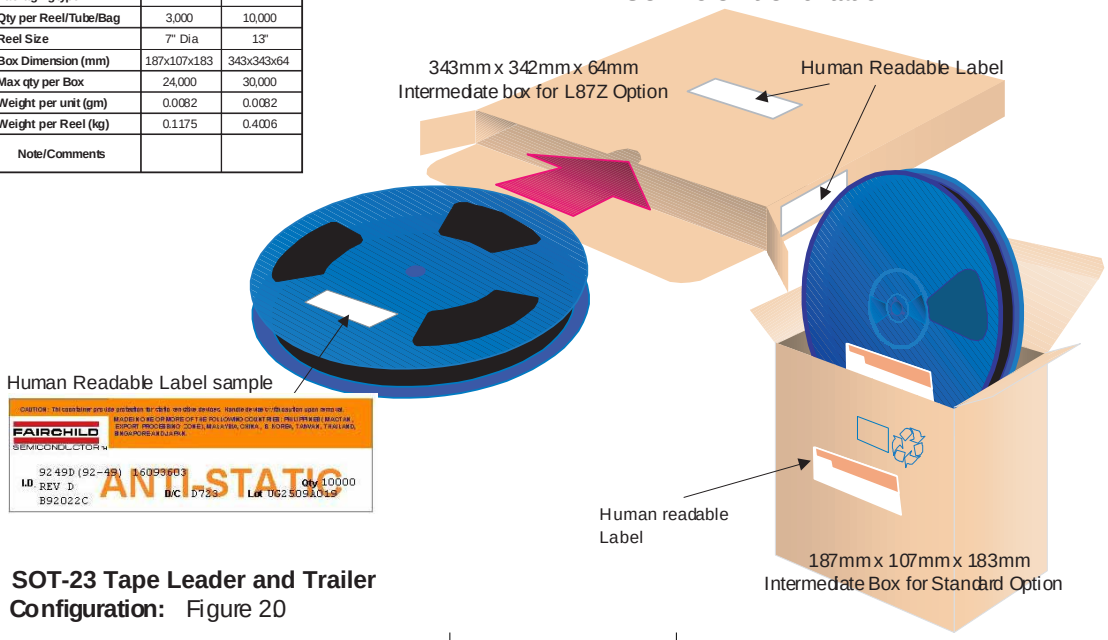
SOT-23 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 177cm diameter reel. The reels are dark blue in color and is made of polystyrene plastic (anti-static coated). Other option comes in 10,000 units per 13" or 330cm diameter reel. This and some other options are described in the Packaging Information table.

These full reels are individually labeled and placed inside a standard intermediate made of recyclable corrugated brown paper with a Fairchild logo printing. One pizza box contains eight reels maximum. And these intermediate boxes are placed inside a labeled shipping box which comes in different sizes depending on the number of parts shipped.

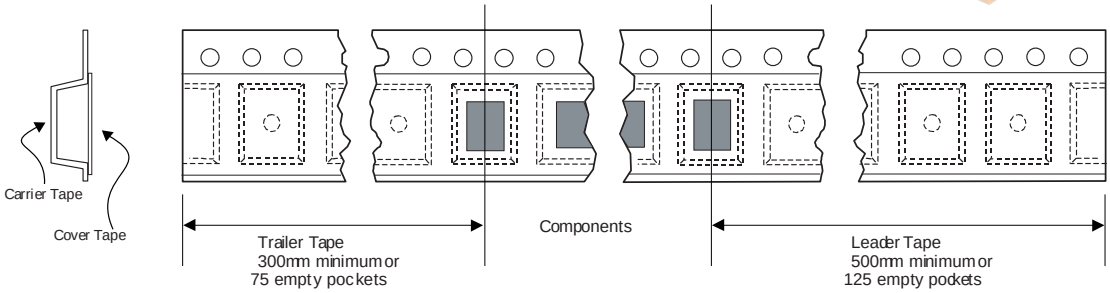



| SOT-23 Packaging Information | | |
|---|---|---|
| Packaging Option | Standard (no flow code) | D87Z |
| Packaging type | TNR | TNR |
| Qty per Reel/Tube/Bag | 3,000 | 10,000 |
| Reel Size | 7" Dia | 13" |
| Box Dimension (mm) | 187x107x183 | 343x343x64 |
| Max qty per Box | 24,000 | 30,000 |
| Weight per unit (gm) | 0.0082 | 0.0082 |
| Weight per Reel (kg) | 0.1175 | 0.4006 |
| Note/Comments | | |

## SOT-23 Unit Orientation

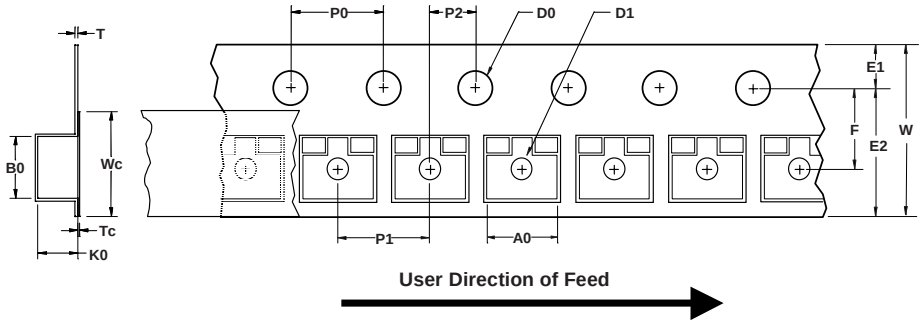



## SOT-23 Tape Leader and Trailer Configuration: Figure 20



# SOT-23 Tape and Reel Data and Package Dimensions, continued

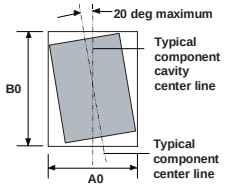
## SOT-23 Embossed Carrier Tape
**Configuration:** Figure 3.0



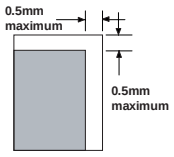

| Dimensions are in millimeter | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pkg type** | **A0** | **B0** | **W** | **D0** | **D1** | **E1** | **E2** | **F** | **P1** | **P0** | **K0** | **T** | **Wc** | **Tc** |
| **SOT-23** (8mm) | 3.15 +/-0.10 | 2.77 +/-0.10 | 8.0 +/-0.3 | 1.55 +/-0.05 | 1.125 +/-0.125 | 1.75 +/-0.10 | 6.25 min | 3.50 +/-0.05 | 4.0 +/-0.1 | 4.0 +/-0.1 | 1.30 +/-0.10 | 0.228 +/-0.013 | 5.2 +/-0.3 | 0.06 +/-0.02 |

Notes: A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).


Sketch A (Side or Front Sectional View)
**Component Rotation**

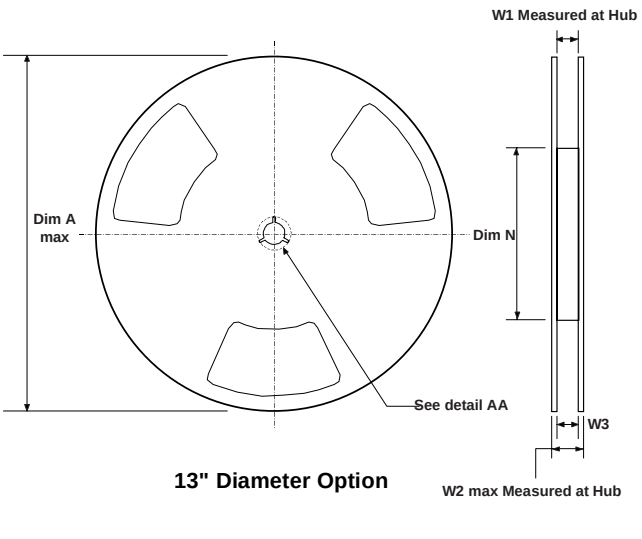



Sketch B (Top View)
**Component Rotation**

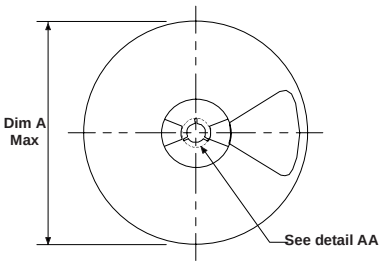



Sketch C (Top View)
**Component lateral movement**

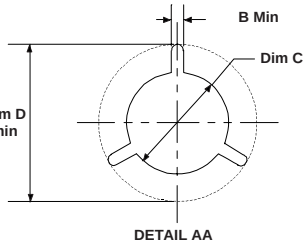
## SOT-23 Reel Configuration: Figure 4.0




**13" Diameter Option**



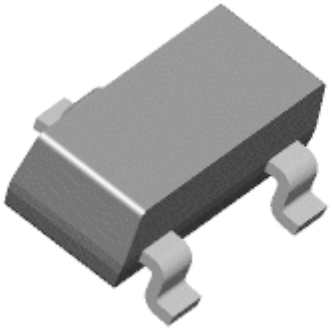

**7" Diameter Option**

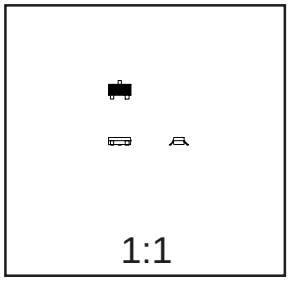



| Dimensions are in inches and millimeters | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tape Size** | **Reel Option** | **Dim A** | **Dim B** | **Dim C** | **Dim D** | **Dim N** | **Dim W1** | **Dim W2** | **Dim W3 (LSL-USL)** |
| 8mm | 7" Dia | 7.00 177.8 | 0.059 1.5 | 512 +0.020/-0.008 13 +0.5/-0.2 | 0.795 20.2 | 2.165 55 | 0.331 +0.059/-0.000 8.4 +1.5/0 | 0.567 14.4 | 0.311 – 0.429 7.9 – 10.9 |
| 8mm | 13" Dia | 13.00 330 | 0.059 1.5 | 512 +0.020/-0.008 13 +0.5/-0.2 | 0.795 20.2 | 4.00 100 | 0.331 +0.059/-0.000 8.4 +1.5/0 | 0.567 14.4 | 0.311 – 0.429 7.9 – 10.9 |

## SOT-23 Tape and Reel Data and Package Dimensions, continued

# SOT-23 (FS PKG Code 49)

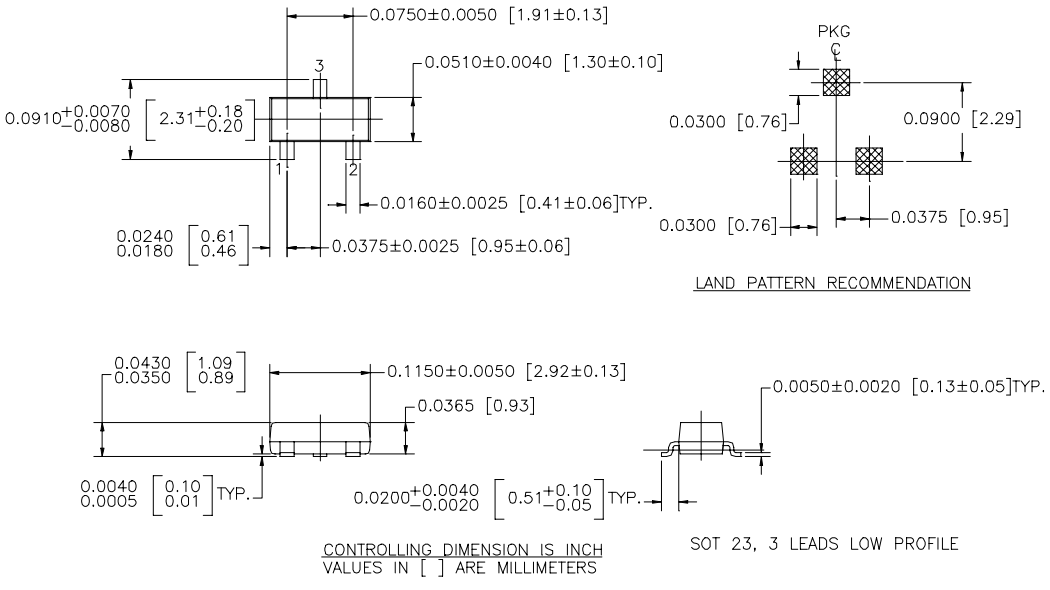





Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0082



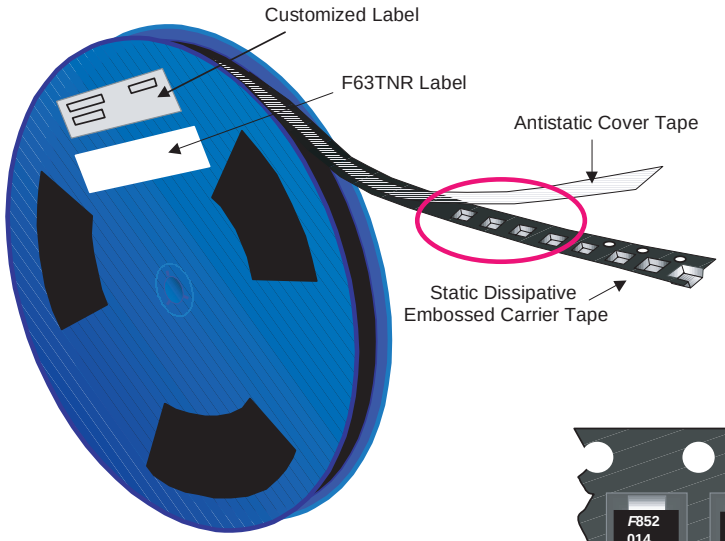

NOTE : UNLESS OTHERWISE SPECIFIED

1. STANDARD LEAD FINISH 150 MICROINCHES / 3.81 MICROMETERS MINIMUM TIN / LEAD (SOLDER) ON ALLOY 42
2. REFERENCE JEDEC REGISTRATION TO−236, VARIATION AB, ISSUE G, DATED JUL 1993

# SOT-223 Tape and Reel Data and Package Dimensions

FAIRCHILD SEMICONDUCTOR™

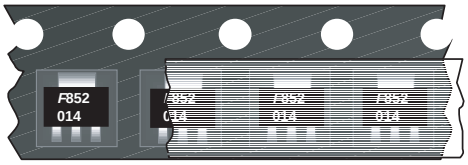
## SOT-223 Packaging Configuration: Figure 1.0




**Packaging Description:**

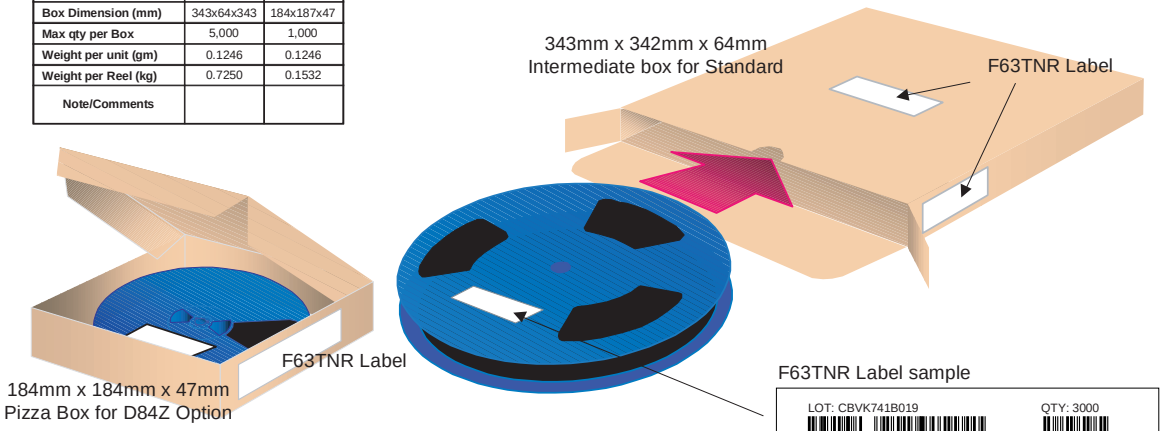
SOT-223 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 2,500 units per 13" or 330cm diameter reel. The reels are dark blue in color and is made of polystyrene plastic (anti-static coated). Other option comes in 500 units per 7" or 177cm diameter reel. This and some other options are further described in the Packaging Information table.

These full reels are individually barcode labeled and placed inside a standard intermediate box (illustrated in figure 1.0) made of recyclable corrugated brown paper. One box contains two reels maximum. And these boxes are placed inside a barcode labeled shipping box which comes in different sizes depending on the number of parts shipped.

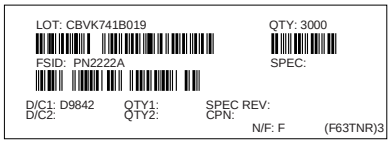



**SOT-223 Unit Orientation**

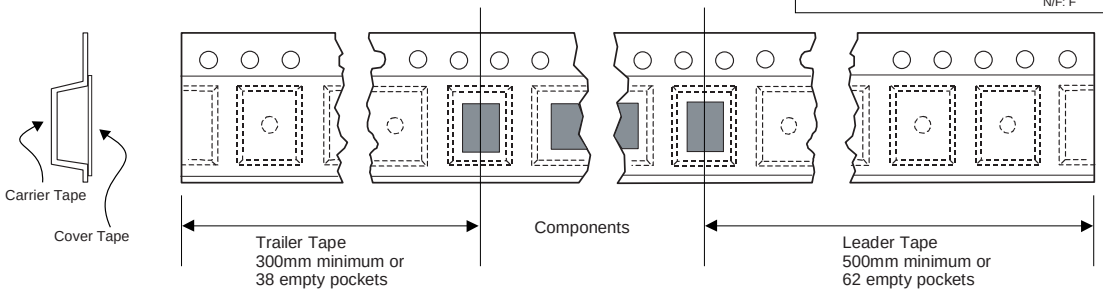
| SOT-223 Packaging Information | | |
|---|---|---|
| **Packaging Option** | Standard (no flow code) | D84Z |
| **Packaging type** | TNR | TNR |
| **Qty per Reel/Tube/Bag** | 2,500 | 500 |
| **Reel Size** | 13" Dia | 7" Dia |
| **Box Dimension (mm)** | 343x64x343 | 184x187x47 |
| **Max qty per Box** | 5,000 | 1,000 |
| **Weight per unit (gm)** | 0.1246 | 0.1246 |
| **Weight per Reel (kg)** | 0.7250 | 0.1532 |
| **Note/Comments** | | |




F63TNR Label sample

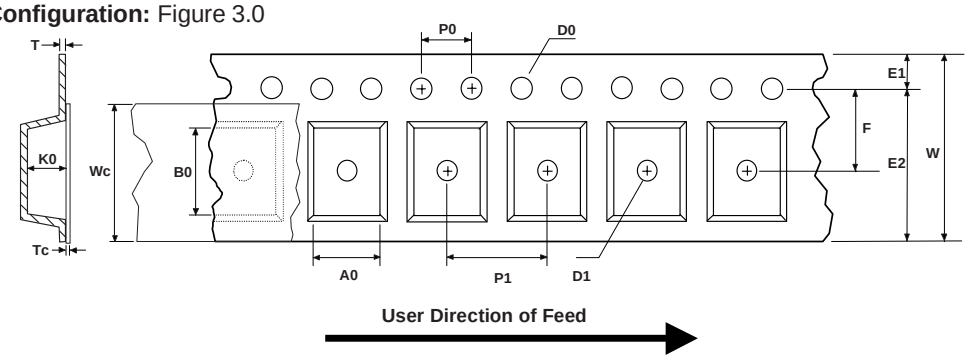



## SOT-223 Tape Leader and Trailer Configuration: Figure 2.0



# SOT-223 Tape and Reel Data and Package Dimensions, continued

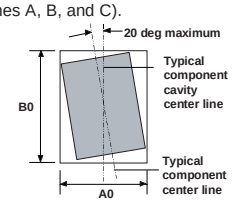
**SOT-223 Embossed Carrier Tape**
**Configuration:** Figure 3.0



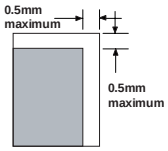

| Dimensions are in millimeter | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pkg type** | **A0** | **B0** | **W** | **D0** | **D1** | **E1** | **E2** | **F** | **P1** | **P0** | **K0** | **T** | **Wc** | **Tc** |
| **SOT-223** (12mm) | 6.83 +/-0.10 | 7.42 +/-0.10 | 12.0 +/-0.3 | 1.55 +/-0.05 | 1.50 +/-0.10 | 1.75 +/-0.10 | 10.25 min | 5.50 +/-0.05 | 8.0 +/-0.1 | 4.0 +/-0.1 | 1.88 +/-0.10 | 0.292 +/- 0.0130 | 9.5 +/-0.025 | 0.06 +/-0.02 |

Notes: A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).


Sketch A (Side or Front Sectional View)
**Component Rotation**

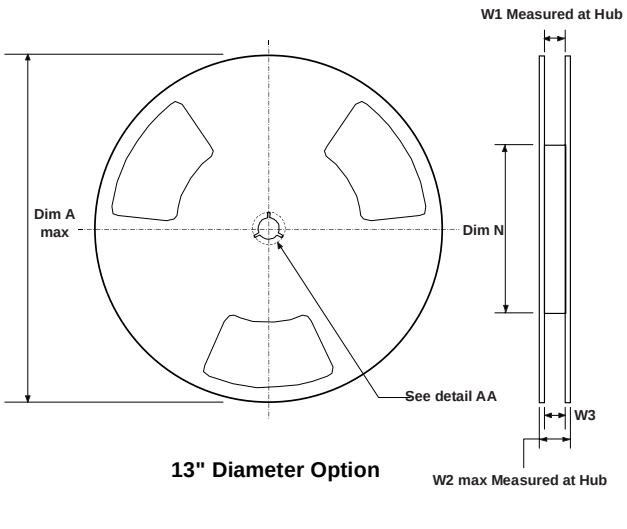



Sketch B (Top View)
**Component Rotation**

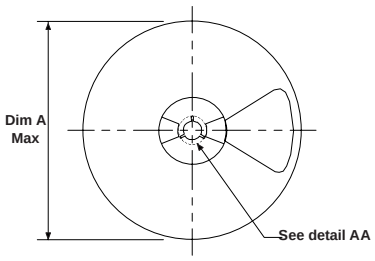



Sketch C (Top View)
**Component lateral movement**

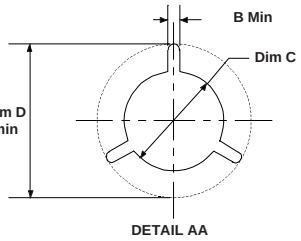
**SOT-223 Reel Configuration:** Figure 4.0




**13" Diameter Option**




**7" Diameter Option**

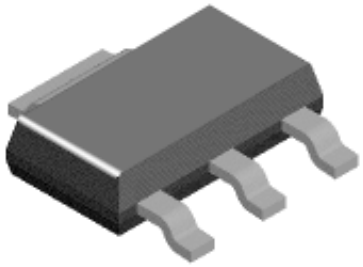


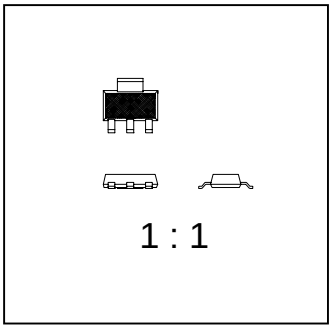

**DETAIL AA**

| Dimensions are in inches and millimeters | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tape Size** | **Reel Option** | **Dim A** | **Dim B** | **Dim C** | **Dim D** | **Dim N** | **Dim W1** | **Dim W2** | **Dim W3 (LSL-USL)** |
| 12mm | 7" Dia | 7.00 177.8 | 0.059 1.5 | 512 +0.020/-0.008 13 +0.5/-0.2 | 0.795 20.2 | 5.906 150 | 0.488 +0.078/-0.000 12.4 +2/0 | 0.724 18.4 | 0.469 – 0.606 11.9 – 15.4 |
| 12mm | 13" Dia | 13.00 330 | 0.059 1.5 | 512 +0.020/-0.008 13 +0.5/-0.2 | 0.795 20.2 | 7.00 178 | 0.488 +0.078/-0.000 12.4 +2/0 | 0.724 18.4 | 0.469 – 0.606 11.9 – 15.4 |

## SOT-223 Tape and Reel Data and Package Dimensions, continued

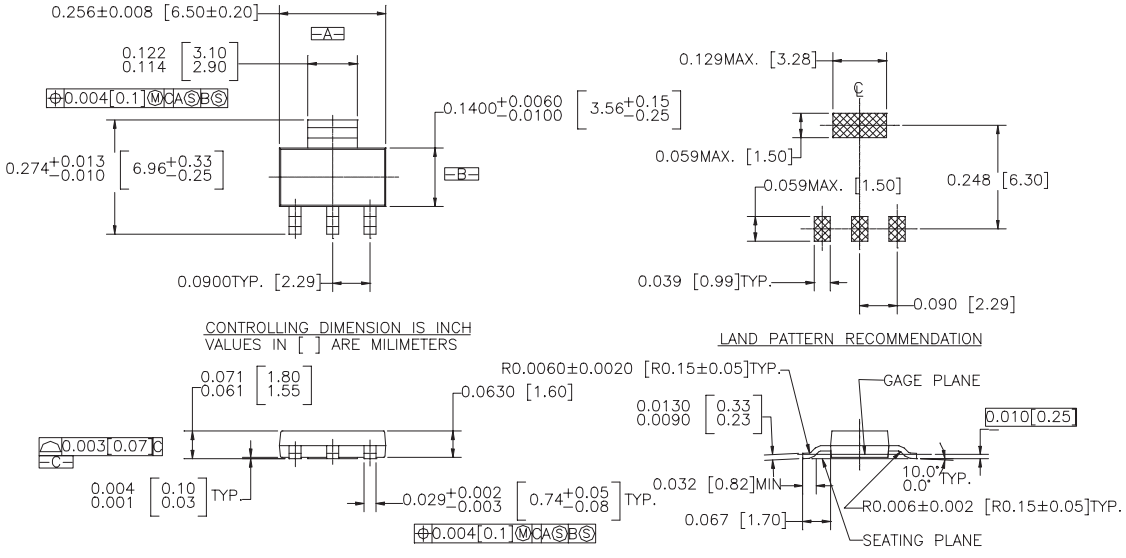
# SOT-223 (FS PKG Code 47)






Scale 1:1 on letter size paper

Part Weight per unit (gram): 0.1246




NOTES : UNLESS OTHERWISE SPECIFIED
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2. REFERENCE JEDEC REGISTRATION TO−261, VARIATION AA, ISSUE A, DATED JAN 1990

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