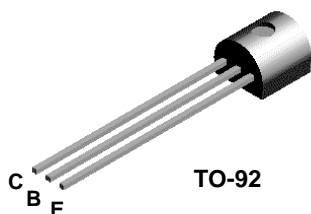
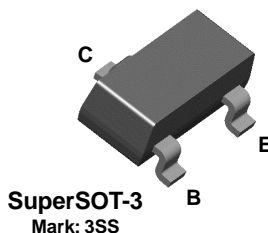


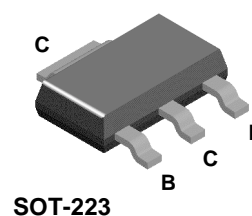
MPSA28



MMBTA28



PZTA28



NPN Darlington Transistor

This device is designed for applications requiring extremely high current gain at collector currents to 500 mA. Sourced from Process 03.

Absolute Maximum Ratings*

TA = 25°C unless otherwise noted

| Symbol | Parameter | Value | Units |
|-----------------------------------|--------------------------------------------------|-------------|-------|
| V _{CES} | Collector-Emitter Voltage | 80 | V |
| V _{CBO} | Collector-Base Voltage | 80 | V |
| V _{EBO} | Emitter-Base Voltage | 12 | V |
| I _C | Collector Current - Continuous | 800 | 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 |
|------------------|-----------------------------------------|--------|----------|----------|-------|
| | | MPSA28 | *MMBTA28 | **PZTA28 | |
| P _D | Total Device Dissipation | 625 | 350 | 1,000 | mW |
| | Derate above 25°C | 5.0 | 2.8 | 8.0 | mW/°C |
| R _{θJC} | Thermal Resistance, Junction to Case | 83.3 | | | °C/W |
| R _{θJA} | 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 cm².

NPN Darlington Transistor
(continued)

Electrical Characteristics TA = 25°C unless otherwise noted

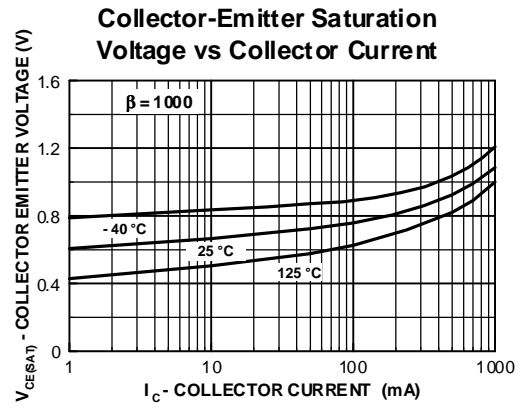
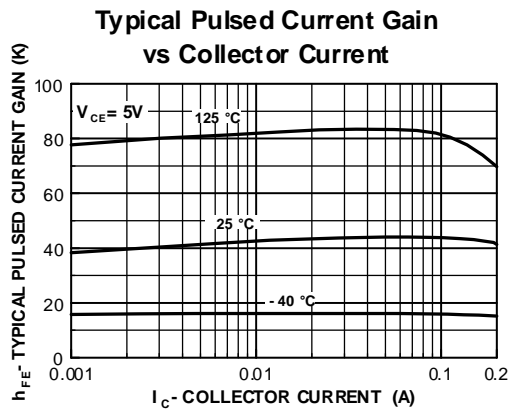
| Symbol | Parameter | Test Conditions | Min | Max | Units |
|----------------------------|-------------------------------------|-------------------------------|-----|-----|-------|
| OFF CHARACTERISTICS | | | | | |
| $V_{(BR)CES}$ | Collector-Emitter Breakdown Voltage | $I_C = 100 \mu A, V_{BE} = 0$ | 80 | | V |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage | $I_C = 100 \mu A, I_E = 0$ | 80 | | V |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage | $I_E = 10 \mu A, I_C = 0$ | 12 | | V |
| I_{CBO} | Collector Cutoff Current | $V_{CB} = 60 V, I_E = 0$ | | 100 | nA |
| I_{CES} | Collector Cutoff Current | $V_{CE} = 60 V, V_{BE} = 0$ | | 500 | nA |
| I_{EBO} | Emitter Cutoff Current | $V_{EB} = 10 V, I_C = 0$ | | 100 | nA |

| ON CHARACTERISTICS | | | | | |
|---------------------------|--------------------------------------|-----------------------------------------------------------------|------------------|------------|---|
| h_{FE} | DC Current Gain | $I_C = 10 mA, V_{CE} = 5.0 V$ $I_C = 100 mA, V_{CE} = 5.0 V$ | 10,000 10,000 | | |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C = 10 mA, I_B = 0.01 mA$ $I_C = 100 mA, I_B = 0.1 mA$ | | 1.2 1.5 | V |
| $V_{BE(on)}$ | Base-Emitter On Voltage | $I_C = 100 mA, V_{CE} = 5.0 V$ | | 2.0 | V |

| SMALL SIGNAL CHARACTERISTICS | | | | | |
|-------------------------------------|----------------------------------|-----------------------------------------------|-----|-----|-----|
| f_T | Current Gain - Bandwidth Product | $I_C = 10 mA, V_{CE} = 5.0,$ $f = 100 MHz$ | 125 | | MHz |
| C_{obo} | Output Capacitance | $V_{CB} = 1.0 V, I_E = 0, f = 1.0 MHz$ | | 8.0 | pF |

*Pulse Test: Pulse Width $\leq 300 \mu s$, Duty Cycle $\leq 2.0\%$

Typical Characteristics



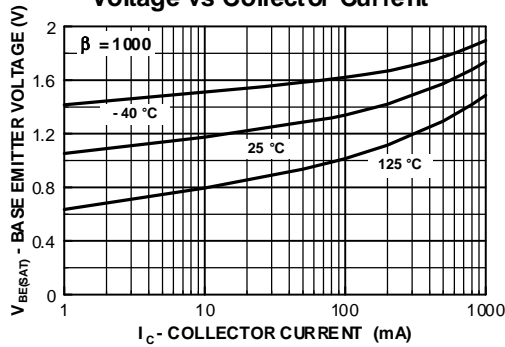
NPN Darlington Transistor

(continued)

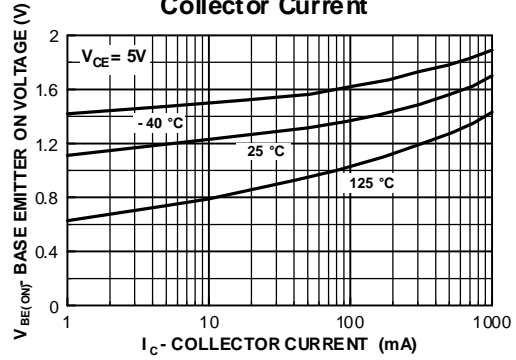
MPSA28 / MMBTA28 / PZTA28

Typical Characteristics (continued)

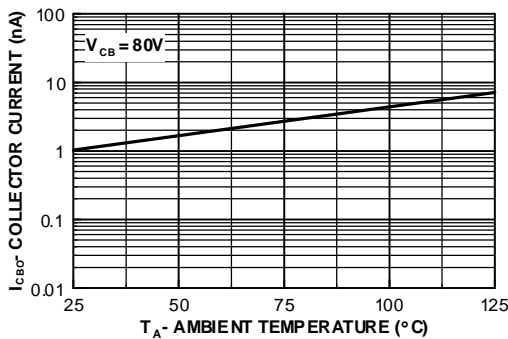
Base-Emitter Saturation Voltage vs Collector Current



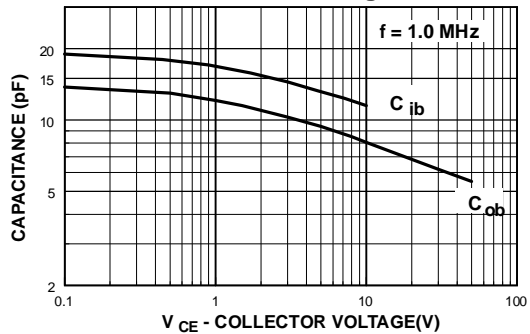
Base Emitter ON Voltage vs Collector Current



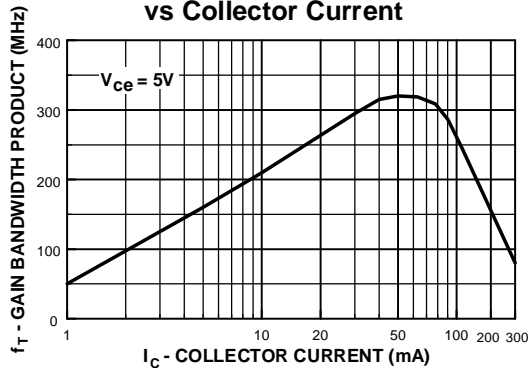
Collector-Cutoff Current vs Ambient Temperature



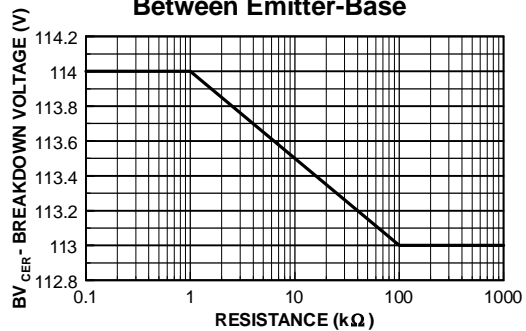
Input and Output Capacitance vs Reverse Voltage



Gain Bandwidth Product vs Collector Current



Collector-Emitter Breakdown Voltage with Resistance Between Emitter-Base

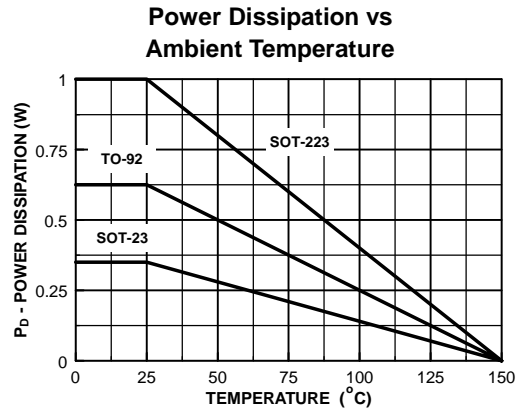


NPN Darlington Transistor

(continued)

MPSA28 / MMBTA28 / PZTA28

Typical Characteristics (continued)



TO-92 Tape and Reel Data



TO-92 Packaging Configuration: Figure 1.0

FSCINT Label sample



F63TNR Label sample



TO-92 TNR/AMMO PACKING INFORMATION

| 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

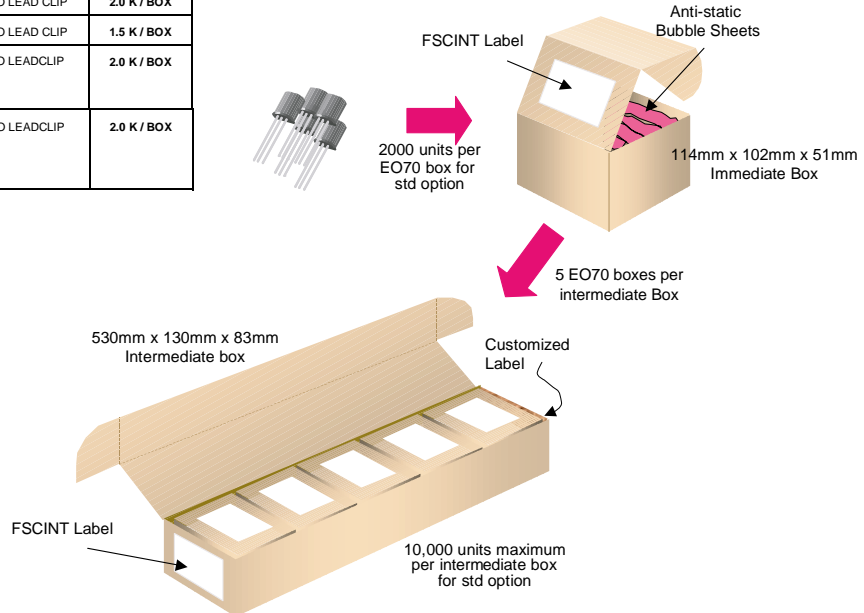


(TO-92) BULK PACKING INFORMATION

| 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 FOR: PKG 92, 94 (NON PROELECTRON SERIES), 96 | NO LEADCLIP | 2.0 K / BOX |
| L34Z | TO-92 STANDARD STRAIGHT FOR: PKG 94 (PROELECTRON SERIES BCXXX, BFXXX, BSRXXX), 97, 98 | NO LEADCLIP | 2.0 K / BOX |

BULK OPTION

See Bulk Packing Information table



TO-92 Tape and Reel Data, 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



ORDER STYLE
D74Z (M)

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

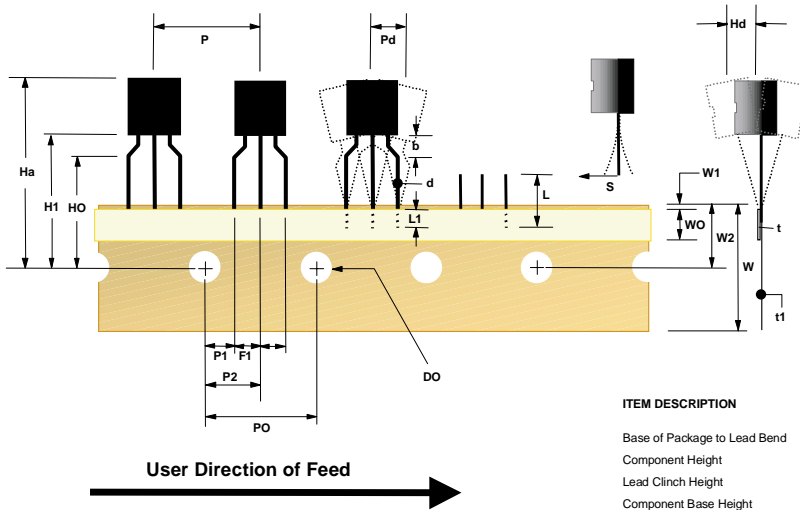


ORDER STYLE
D75Z (P)

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, continued

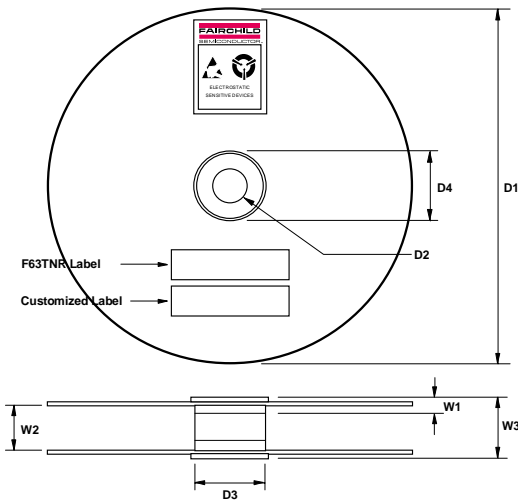
**TO-92 Tape and Reel Taping
Dimension Configuration: Figure 4.0**



| 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 | SYMBOL | 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 in inches

TO-92 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)

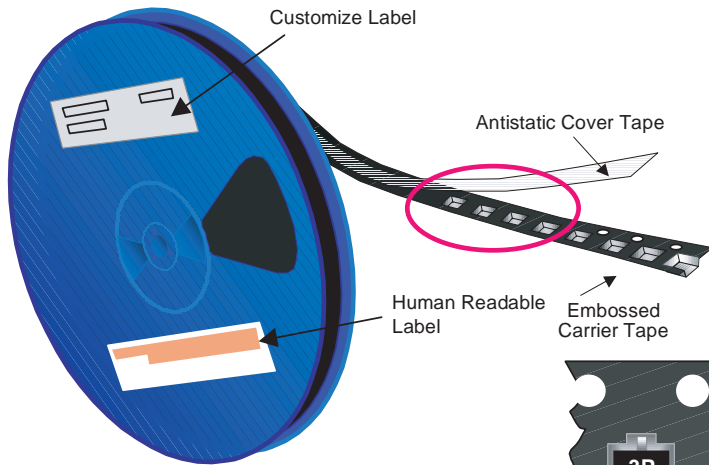
| PIN | 92 | | 94 | | 96 | |
|-----|----|---|----|---|----|---|
| | B | F | B | F | B | F |
| 1 | E | D | E | D | B | S |
| 2 | B | S | C | G | E | D |
| 3 | C | G | B | S | C | G |



SuperSOT™-3 Tape and Reel Data



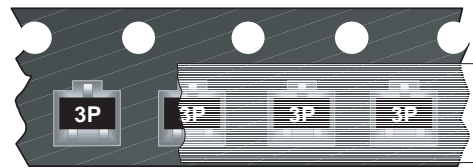
SSOT-3 Packaging Configuration: Figure 1.0



Packaging Description:

SSOT-3 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.



SSOT-3 Std Unit Orientation

| SSOT-3 Std 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) | 0.0097 | 0.0097 |
| Weight per Reel (kg) | 0.1230 | 0.4150 |
| Note/Comments | | |

343mm x 342mm x 64mm Intermediate box for D87Z Option

Human Readable Label

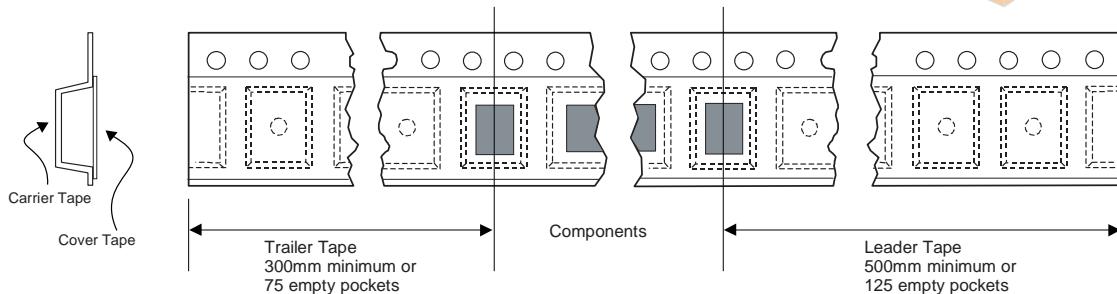
Human Readable Label sample



Human Readable Label

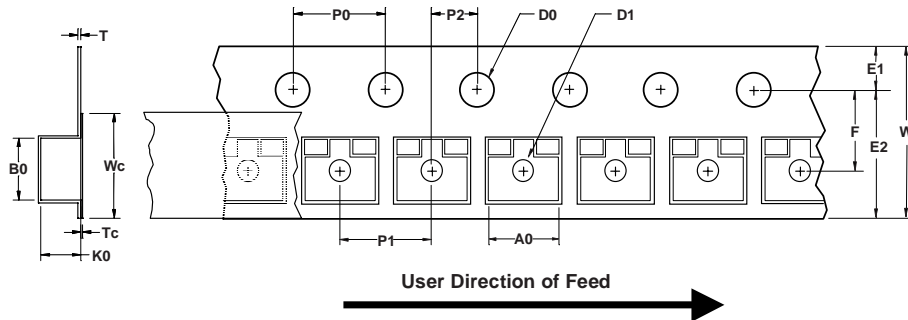
187mm x 107mm x 183mm Intermediate Box for Standard Option

SSOT-3 Tape Leader and Trailer Configuration: Figure 2.0



SuperSOT™-3 Tape and Reel Data, continued

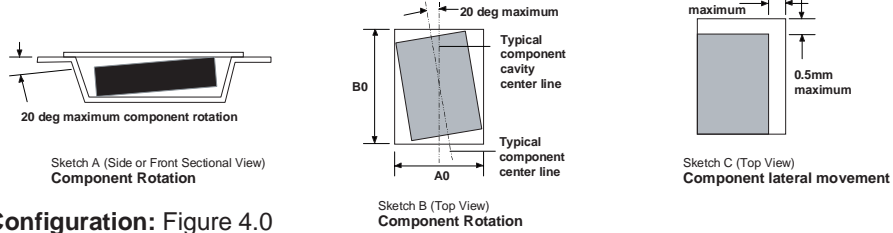
SSOT-3 Embossed Carrier Tape Configuration: Figure 3.0



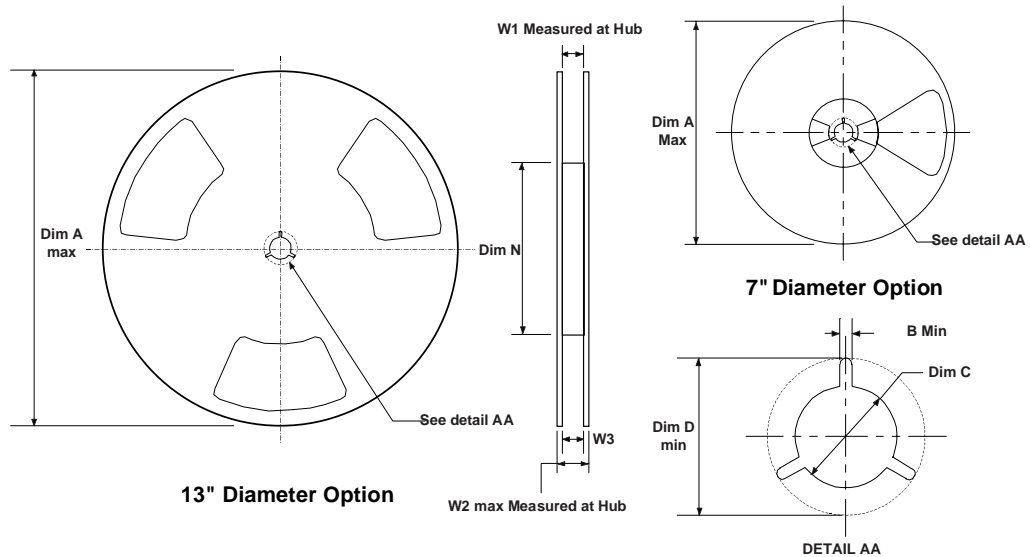
Dimensions are in millimeter

| Pkg type | A0 | B0 | W | D0 | D1 | E1 | E2 | F | P1 | P0 | K0 | T | Wc | Tc |
|--------------|-----------------|-----------------|---------------|-----------------|-------------------|-----------------|-------------|-----------------|---------------|---------------|-----------------|-------------------|---------------|-----------------|
| SSOT-3 (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).



SSOT-3 Reel Configuration: Figure 4.0



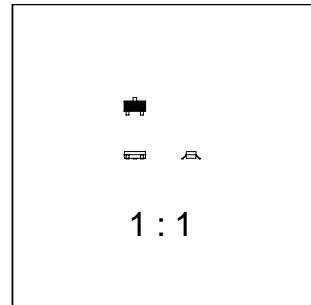
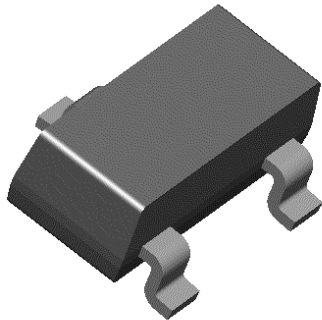
Dimensions are in inches and millimeters

| 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 |

SuperSOT™-3 Package Dimensions



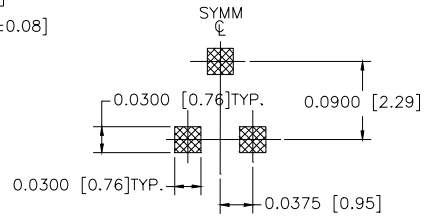
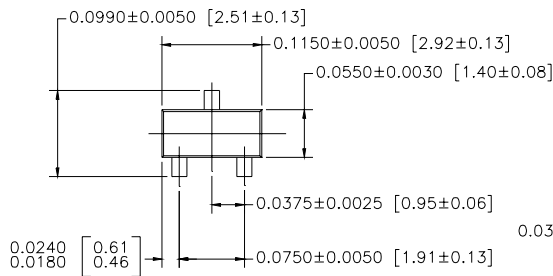
SuperSOT™-3 (FS PKG Code 32)



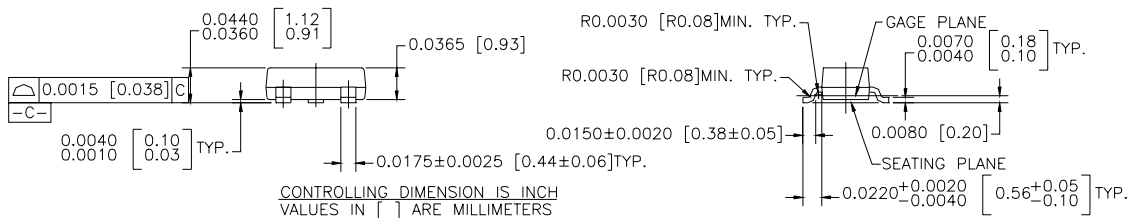
Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0097



LAND PATTERN RECOMMENDATION



NOTES : UNLESS OTHERWISE SPECIFIED

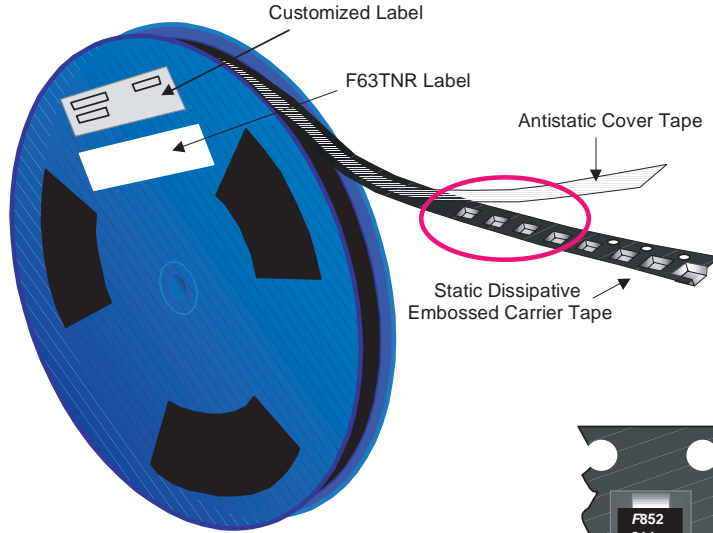
SUPER SOT , 3 LEADS

- STANDARD LEAD FINISH TO BE 150 MICRONS / 3.81 MICROMETERS MINIMUM TIN/LEAD (SOLDER) ON COPPER.
- NO JEDEC REGISTRATION AS OF DEC. 1995.

SOT-223 Tape and Reel Data



SOT-223 Packaging Configuration: Figure 1.0



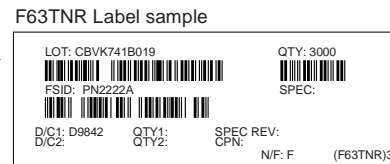
Packaging Description:
 SOT-223 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. 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.

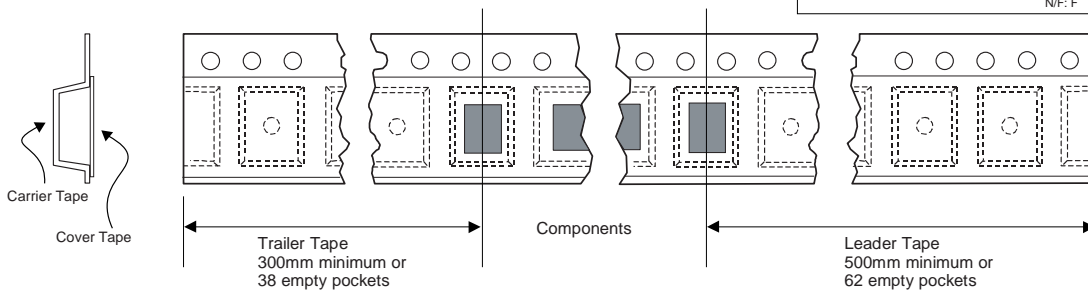
| SOT-223 Packaging Information | | |
|-------------------------------|-------------------------|------------|
| Packaging Option | Standard (no flow code) | D84Z |
| Packaging type | TNR | TNR |
| Qty per Reel/Tube/Bag | 2,500 | 500 |
| Reel Size | 13" Dia | 7" Dia |
| Box Dimension (mm) | 343x64x343 | 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 | | |



SOT-223 Unit Orientation



SOT-223 Tape Leader and Trailer Configuration: Figure 2.0



SOT-223 Tape and Reel Data, continued

SOT-223 Embossed Carrier Tape Configuration: Figure 3.0

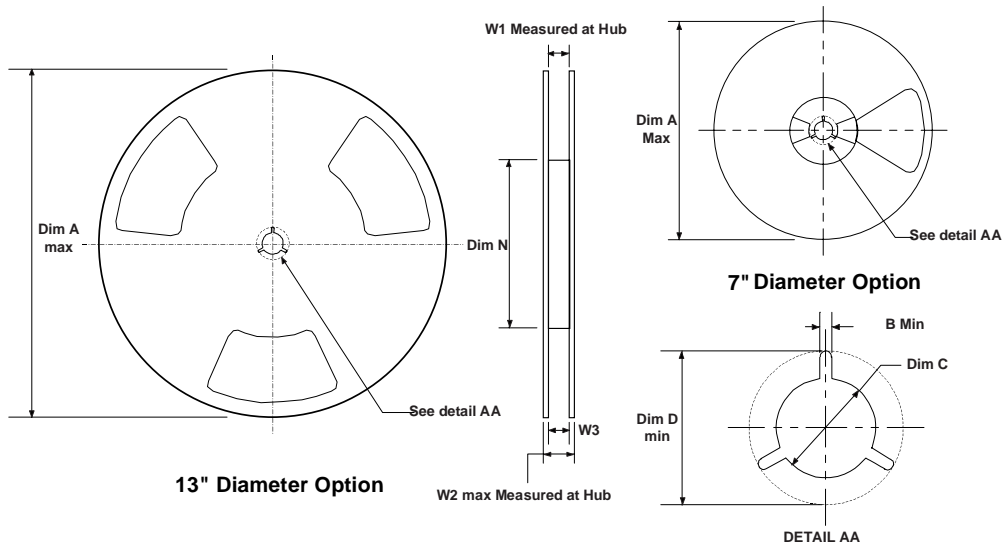


| Dimensions are in millimeter | | | | | | | | | | | | | | |
|------------------------------|-----------------|-----------------|----------------|-----------------|-----------------|-----------------|--------------|-----------------|---------------|---------------|-----------------|------------------------|-----------------|-----------------|
| 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).



SOT-223 Reel Configuration: Figure 4.0



| 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 |

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| Bottomless TM | GlobalOptoisolator TM | QFET TM | TinyLogic TM |
| CoolFET TM | GTO TM | QS TM | UHC TM |
| CROSSVOLT TM | HiSeC TM | QT Optoelectronics TM | VCX TM |
| DOME TM | ISOPLANAR TM | Quiet Series TM | |
| E ² CMOS TM | MICROWIRE TM | SILENT SWITCHER [®] | |
| EnSigna TM | OPTOLOGIC TM | SMART START TM | |
| FACT TM | OPTOPLANAR TM | SuperSOT TM -3 | |
| FACT Quiet Series TM | PACMAN TM | SuperSOT TM -6 | |
| FAST [®] | POP TM | SuperSOT TM -8 | |

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Definition of Terms

| Datasheet Identification | Product Status | Definition |
|--------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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