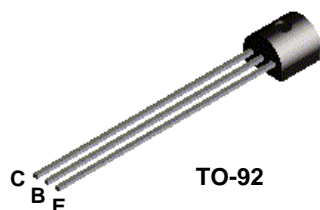
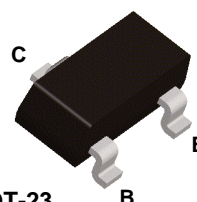


## 2N5551



TO-92

## MMBT5551



SOT-23  
Mark: 3S

### NPN General Purpose Amplifier

This device is designed for general purpose high voltage amplifiers and gas discharge display driving. Sourced from Process 16.

#### Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	160	V
V <sub>CBO</sub>	Collector-Base Voltage	180	V
V <sub>EBO</sub>	Emitter-Base Voltage	6.0	V
I <sub>C</sub>	Collector Current - Continuous	600	mA
T <sub>J</sub> , T <sub>stg</sub>	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
		2N5551	*MMBT5551	
P <sub>D</sub>	Total Device Dissipation	625	350	mW
	Derate above 25°C	5.0	2.8	mW/°C
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	83.3		°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	200	357	°C/W

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

# NPN General Purpose Amplifier

(continued)

## Electrical Characteristics

TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
--------	-----------	-----------------	-----	-----	-------

### OFF CHARACTERISTICS

V <sub>(BR)CEO</sub>	Collector-Emitter Sustaining Voltage*	I <sub>C</sub> = 1.0 mA, I <sub>B</sub> = 0	160		V
V <sub>(BR)CBO</sub>	Collector-Base Breakdown Voltage	I <sub>C</sub> = 100 µA, I <sub>E</sub> = 0	180		V
V <sub>(BR)EBO</sub>	Emitter-Base Breakdown Voltage	I <sub>E</sub> = 10 µA, I <sub>C</sub> = 0	6.0		V
I <sub>CBO</sub>	Collector Cutoff Current	V <sub>CB</sub> = 120 V, I <sub>E</sub> = 0, V <sub>CB</sub> = 120 V, I <sub>E</sub> = 0, T <sub>A</sub> = 100°C		50 50	nA µA
I <sub>EBO</sub>	Emitter Cutoff Current	V <sub>EB</sub> = 4.0 V, I <sub>C</sub> = 0		50	nA

### ON CHARACTERISTICS

h <sub>FE</sub>	DC Current Gain	I <sub>C</sub> = 1.0 mA, V <sub>CE</sub> = 5.0 V I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 5.0 V I <sub>C</sub> = 50 mA, V <sub>CE</sub> = 5.0 V	80 80 30	250	
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1.0 mA I <sub>C</sub> = 50 mA, I <sub>B</sub> = 5.0 mA		0.15 0.20	V V
V <sub>BE(sat)</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1.0 mA I <sub>C</sub> = 50 mA, I <sub>B</sub> = 5.0 mA		1.0 1.0	V V

### SMALL SIGNAL CHARACTERISTICS

f <sub>T</sub>	Current Gain - Bandwidth Product	I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 10 V, f = 100 MHz	100	300	MHz
C <sub>obo</sub>	Output Capacitance	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0, f = 1.0 MHz		6.0	pF
C <sub>ibo</sub>	Input Capacitance	V <sub>BE</sub> = 0.5 V, I <sub>C</sub> = 0, f = 1.0 MHz		20	pF
h <sub>fe</sub>	Small-Signal Current Gain	I <sub>C</sub> = 1.0 mA, V <sub>CE</sub> = 10 V, f = 1.0 kHz	50	250	
NF	Noise Figure	I <sub>C</sub> = 250 µA, V <sub>CE</sub> = 5.0 V, R <sub>S</sub> = 1.0 kΩ, f = 10 Hz to 15.7 kHz		8.0	dB

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

## Spice Model

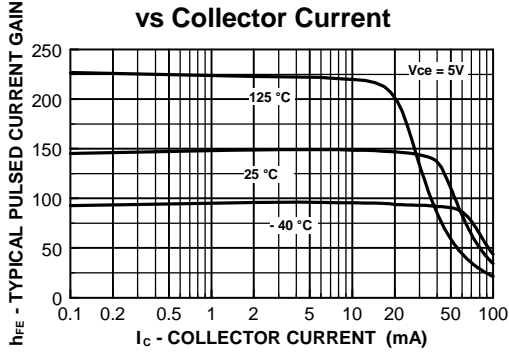
NPN (Is=2.511f Xti=3 Eg=1.11 Vaf=100 Bf=242.6 Ne=1.249 Ise=2.511f Ikf=.3458 Xtb=1.5 Br=3.197 Nc=2 Isc=0 Ikr=0 Rc=1 Cjc=4.883p Mjc=.3047 Vjc=.75 Fc=.5 Cje=18.79p Mje=.3416 Vje=.75 Tr=1.202n Tf=560p Itf=50m Vtf=5 Xtf=8 Rb=10)

# NPN General Purpose Amplifier (continued)

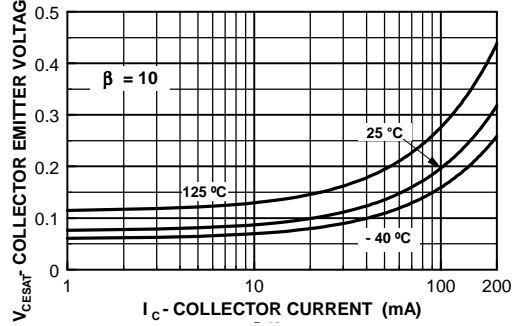
2N5551 / MMBT5551

## Typical Characteristics

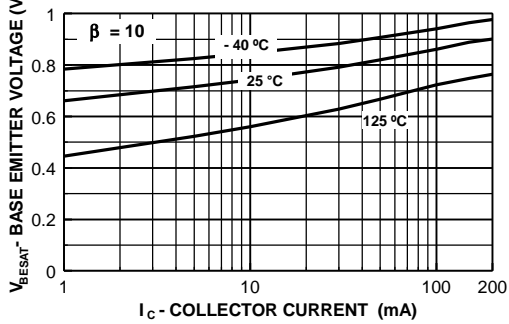
Typical Pulsed Current Gain  
vs Collector Current



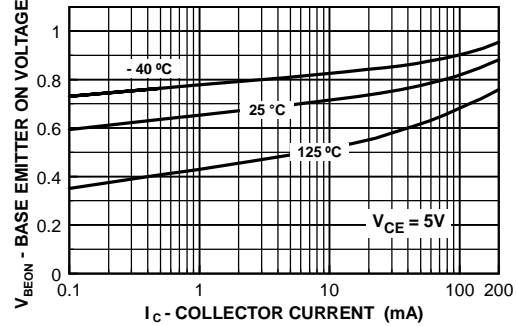
Collector-Emitter Saturation  
Voltage vs Collector Current



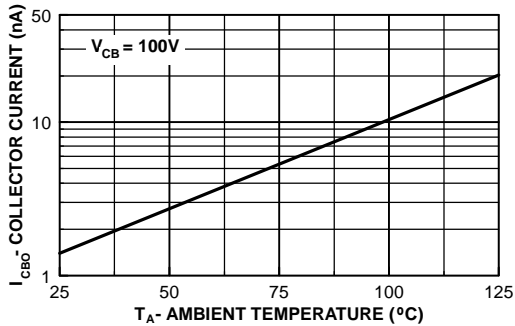
Base-Emitter Saturation  
Voltage vs Collector Current



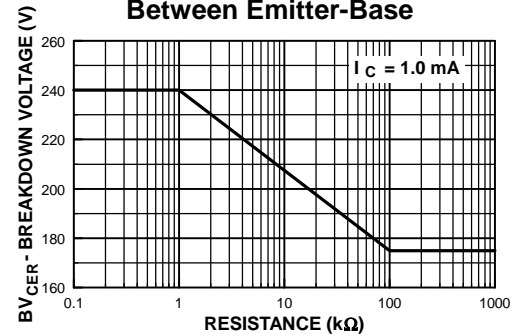
Base Emitter ON Voltage vs  
Collector Current



Collector-Cutoff Current  
vs. Ambient Temperature

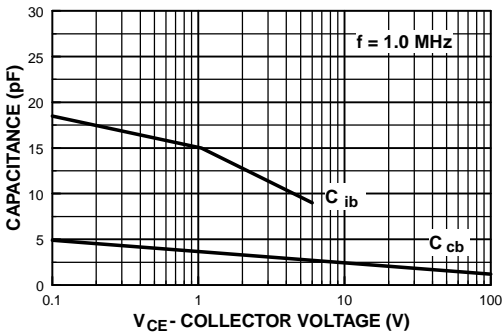


Collector-Emitter Breakdown  
Voltage with Resistance  
Between Emitter-Base

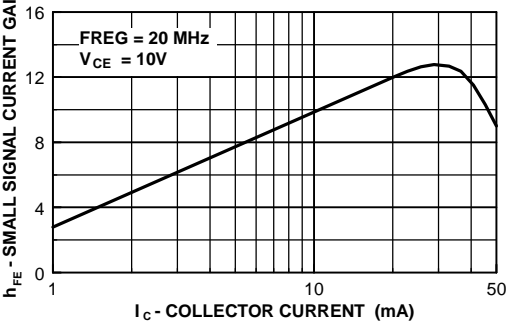


Typical Characteristics (continued)

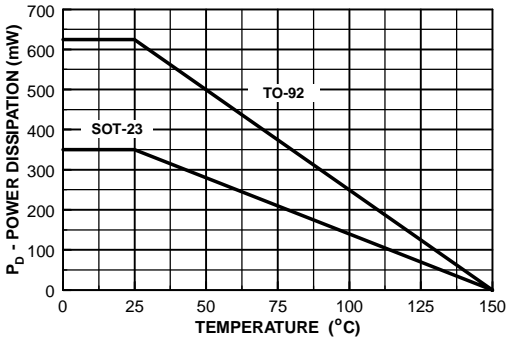
Input and Output Capacitance  
vs Reverse Voltage



Small Signal Current Gain  
vs Collector Current



Power Dissipation vs  
Ambient Temperature



# TO-92 Tape and Reel Data and Package Dimensions



## 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

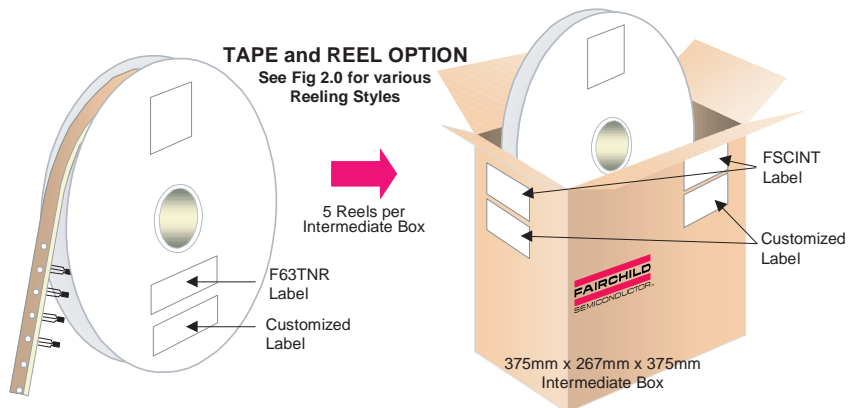
Unit weight = 0.22 gm  
 Reel weight with components = 1.04 kg  
 Ammo weight with components = 1.02 kg  
 Max quantity per intermediate box = 10,000 units

### (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

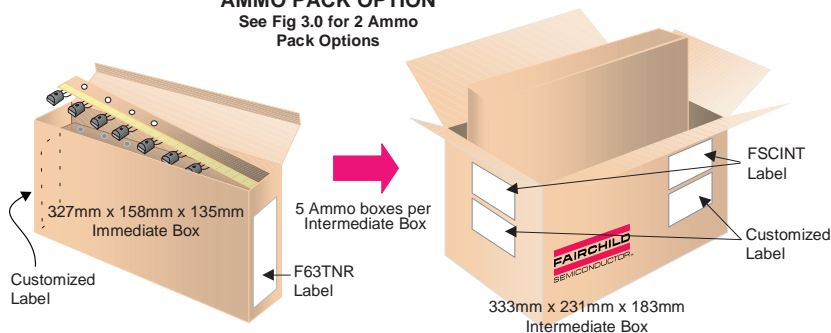
### TAPE and REEL OPTION

See Fig 2.0 for various Reeling Styles



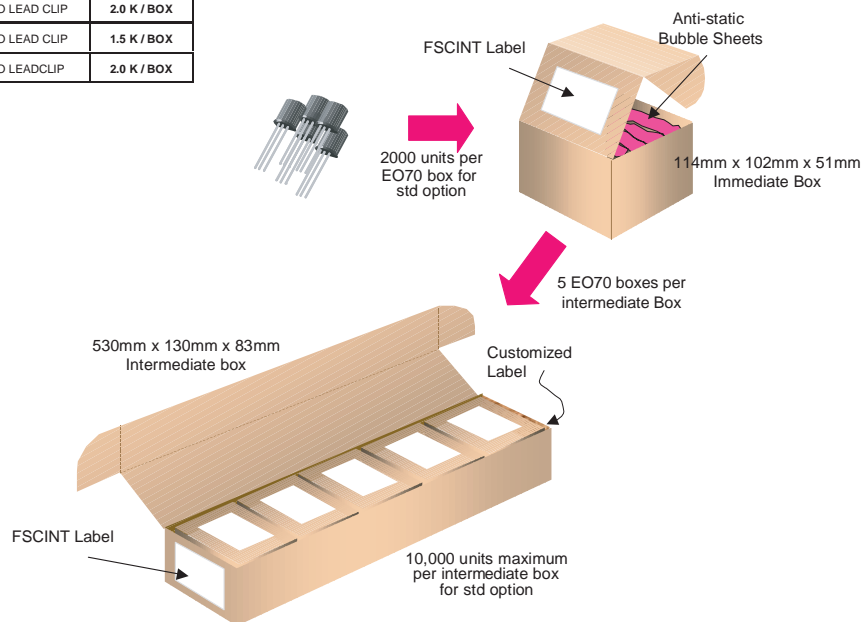
### AMMO PACK OPTION

See Fig 3.0 for 2 Ammo Pack Options



### BULK OPTION

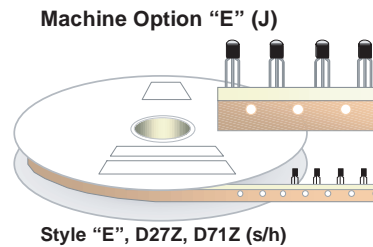
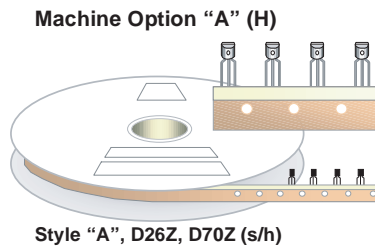
See Bulk Packing Information table



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

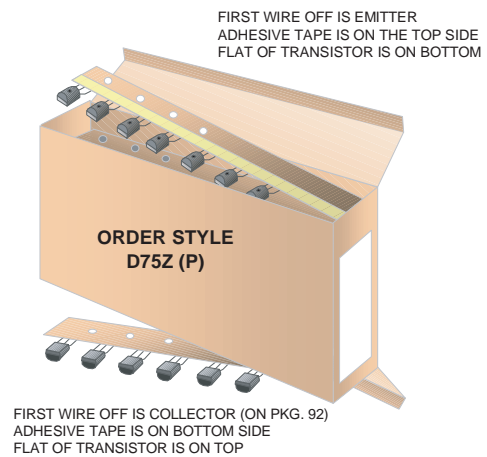
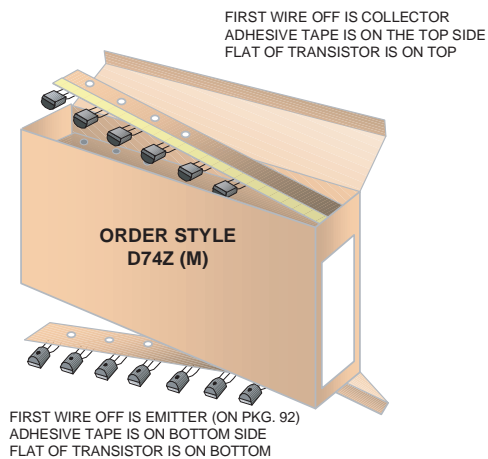
### TO-92 Reeling Style

Configuration: Figure 2.0



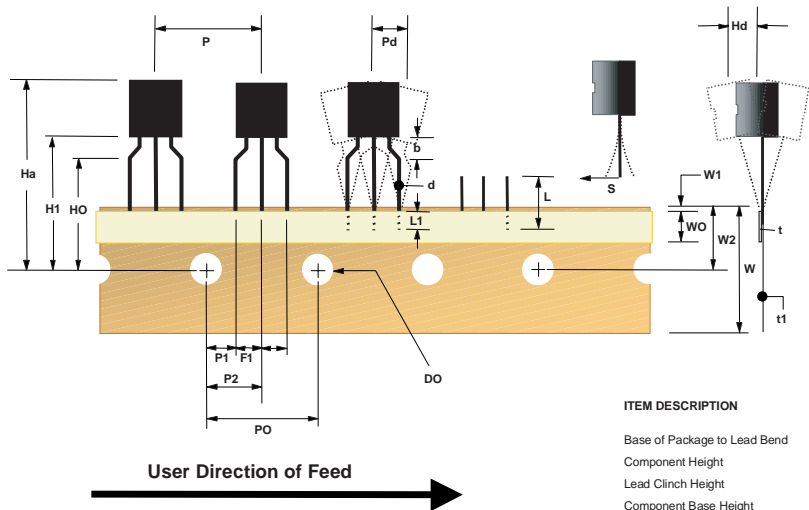
### TO-92 Radial Ammo Packaging

Configuration: Figure 3.0



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

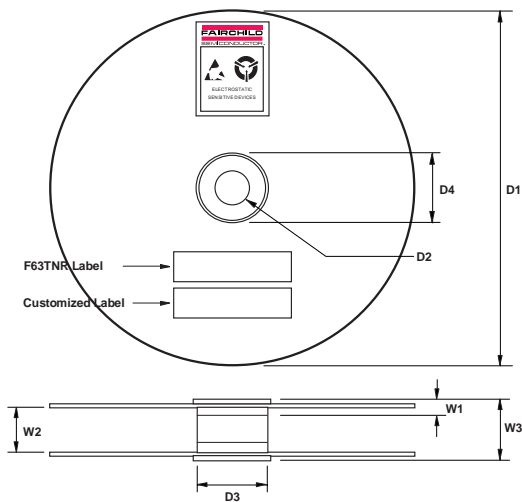
TO-92 Tape and Reel Taping  
Dimension Configuration: Figure 4.0



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

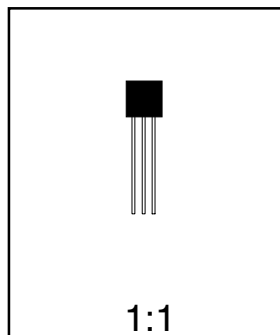
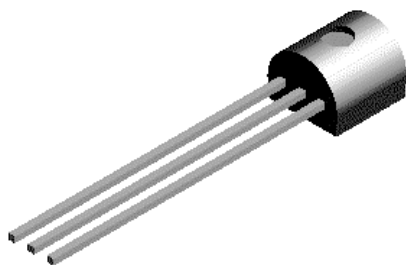


ITEM DESCRIPTION	SYMBOL	MINIMUM	MAXIMUM
Reel Diameter	D1	13.975	14.025
Arbor Hole Diameter (Standard)	D2	1.160	1.200
(Small Hole)	D2	0.650	0.700
Core Diameter	D3	3.100	3.300
Hub Recess Inner Diameter	D4	2.700	3.100
Hub Recess Depth	W1	0.370	0.570
Flange to Flange Inner Width	W2	1.630	1.690
Hub to Hub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

Note: All dimensions are inches

# TO-92 Tape and Reel Data and Package Dimensions

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



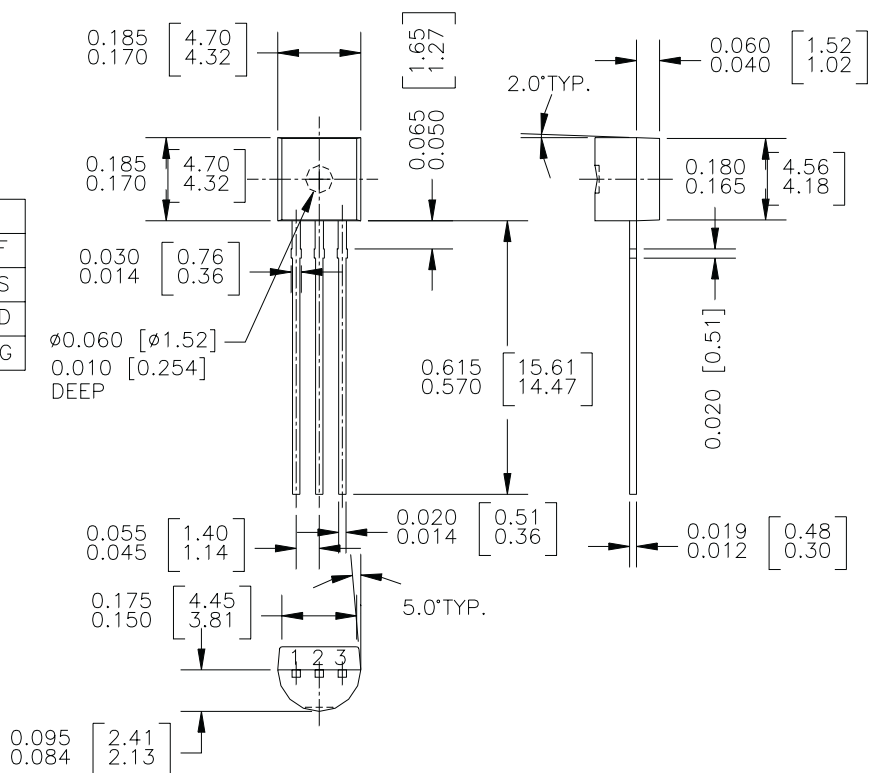
Scale 1:1 on letter size paper

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

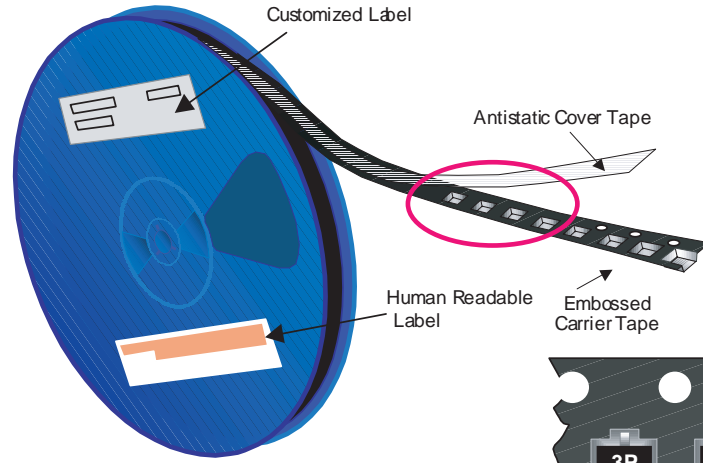




# SOT-23 Tape and Reel Data and Package Dimensions



**SOT-23 Packaging Configuration: Figure 10**



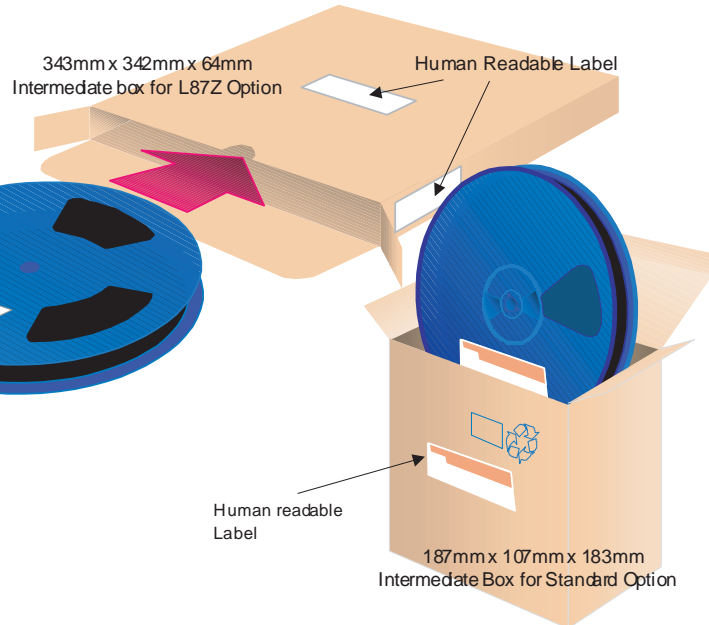
**Packaging Description:**

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 10000 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		

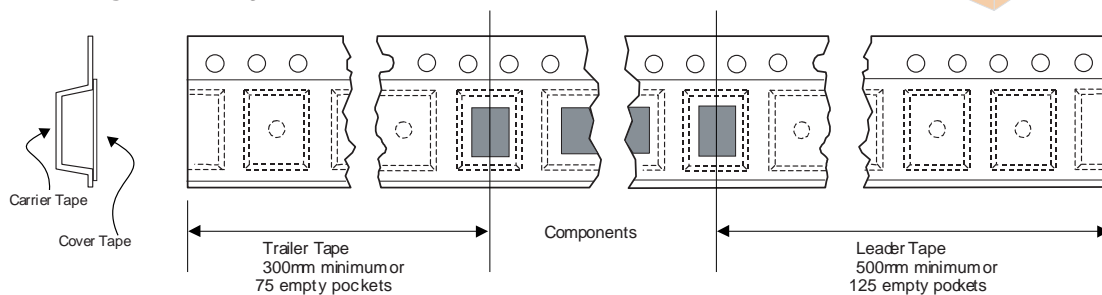
**SOT-23 Unit Orientation**



**Human Readable Label sample**

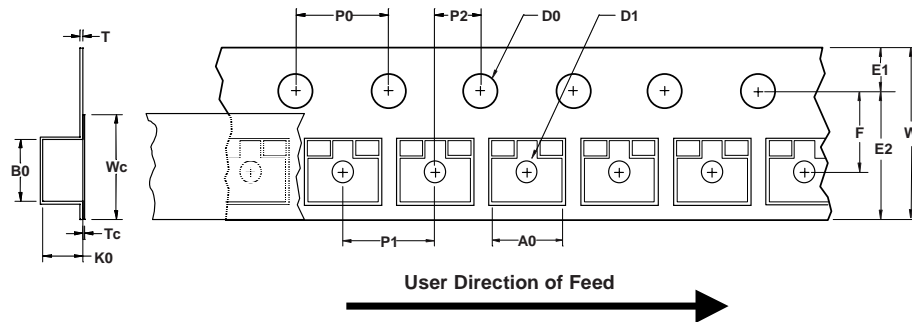


**SOT-23 Tape Leader and Trailer Configuration: Figure 20**



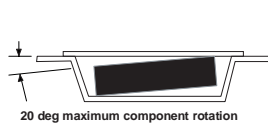
## SOT-23 Tape and Reel Data and Package Dimensions, continued

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

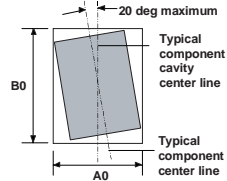


Dimensions are in millimeter														
Pkg type	A0	B0	W	D0	D1	E1	E2	F	P1	P0	K0	T	Wc	Tc
SOT-23 (8mm)	3.15 +/-0.10	2.77 +/-0.10	8.0 +/-0.3	1.55 +/-0.05	1.125 +/-0.125	1.75 +/-0.10	6.25 min	3.50 +/-0.05	4.0 +/-0.1	4.0 +/-0.1	1.30 +/-0.10	0.228 +/-0.013	5.2 +/-0.3	0.06 +/-0.02

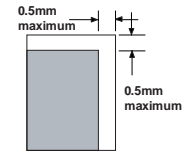
Notes: A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



Sketch A (Side or Front Sectional View)  
Component Rotation

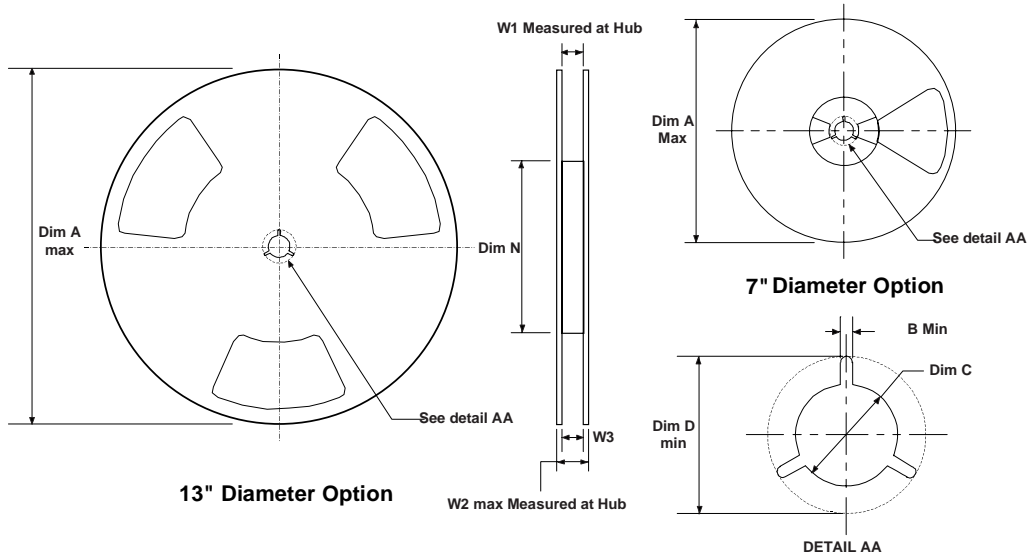


Sketch B (Top View)  
Component Rotation



Sketch C (Top View)  
Component lateral movement

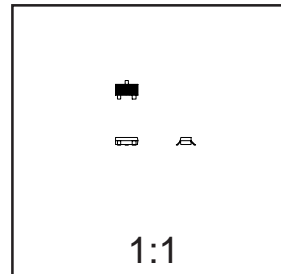
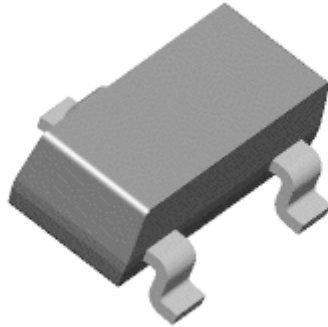
### SOT-23 Reel Configuration: Figure 4.0



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

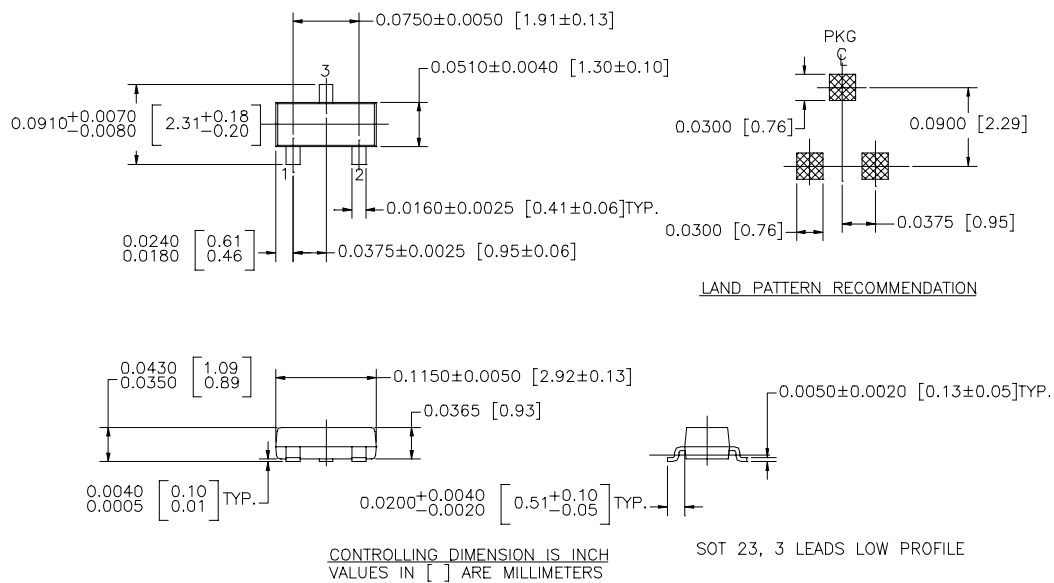
### SOT-23 (FS PKG Code 49)



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

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

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E<sup>2</sup>CMOS<sup>™</sup>  
FACT<sup>™</sup>  
FACT Quiet Series<sup>™</sup>  
FAST<sup>®</sup>  
FAST<sup>r</sup><sup>™</sup>  
GTO<sup>™</sup>

HiSeC<sup>™</sup>  
ISOPLANAR<sup>™</sup>  
MICROWIRE<sup>™</sup>  
POP<sup>™</sup>  
PowerTrench<sup>®</sup>  
QFET<sup>™</sup>  
QS<sup>™</sup>  
Quiet Series<sup>™</sup>  
SuperSOT<sup>™</sup>-3  
SuperSOT<sup>™</sup>-6

SuperSOT<sup>™</sup>-8  
SyncFET<sup>™</sup>  
TinyLogic<sup>™</sup>  
UHC<sup>™</sup>  
VCX<sup>™</sup>

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.