FAIRCHILD SEMICONDUCTOR®

February 2006

MPSA56/MMBTA56/PZTA56
PNP General Purpose Amplifier

Description

This device is designed for general purpose amplifier applications at collector currents to 300mA. Sourced from Process 73

Absolute Maximum Ratings*

T_A = 25°C unless otherwise specified.

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	-80	V
Collector-Base Voltage	V_{CBO}	-80	V
Emitter-Base Voltage	V_{EBO}	-4.0	V
Collector Current – Continuous	I_C	-500	mA
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-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°C.
2. These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
3. All voltages (V) and currents (A) are negative polarity for PNP transistors.

Thermal Characteristics

T_A = 25°C unless otherwise noted.

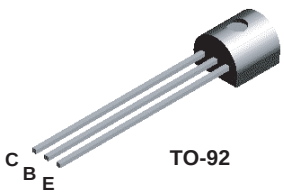
Characteristic	Symbol	Max			Units
		MPSA56	*MMBTA56	**PZTA56	
Total Device Dissipation, Derate above 25°C	P_D	625 5.0	350 2.8	1,000 8.0	mW mW/°C
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3			°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	357	125	°C/W

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

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

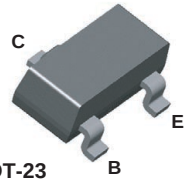
Packages

MPSA56



TO-92

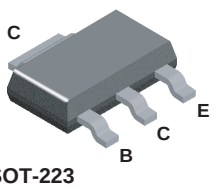
MMBTA56



SOT-23

Mark: 2G

PZTA56



SOT-223

Electrical Characteristics

T_A = 25°C unless otherwise specified.

Parameter	Symbol	Test Condition	Min.	Max.	Units
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage*	$V_{(BR)CEO}$	I_C = -1.0mA, I_B = 0	-80		V
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = -100µA, I_E = 0	-80		V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = -100µA, I_C = 0	-4.0		V
Collector-Cutoff Current	I_{CEO}	V_{CE} = -60V, I_B = 0		-0.1	µA
Collector-Cutoff Current	I_{CBO}	V_{CB} = -80V, I_E = 0		-0.1	µA
ON CHARACTERISTICS					
DC Current Gain	h_{FE}	I_C = -10mA, V_{CE} = -1.0V I_C = -100mA, V_{CE} = -1.0V	100 100		
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = -100mA, I_B = -10mA		-0.2	V
Base-Emitter On Voltage	$V_{BE(on)}$	I_C = -100mA, V_{CE} = -1.0V		-1.2	V
SMALL SIGNAL CHARACTERISTICS					
Current Gain – Bandwidth Product	f_T	I_C = -100mA, V_{CE} = -1.0V, f = 100MHz	50		MHz

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

Note:
All voltages (V) and currents (A) are negative polarity for PNP transistors.

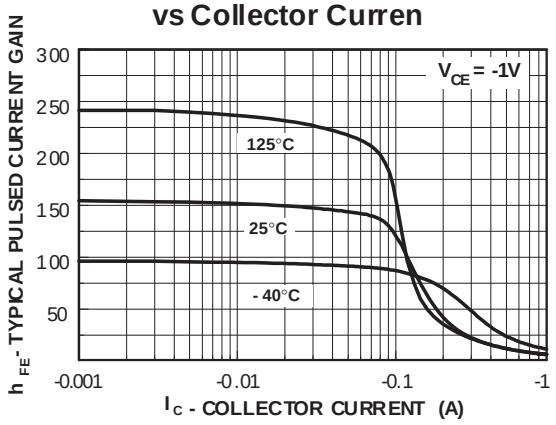
Spice Model

PNP

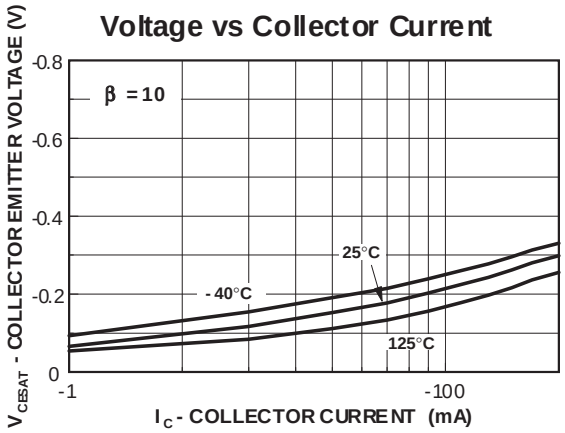
(Is=12.27p Xti=3 Eg=1.11 Vaf=100 Bf=91.63 Ne=1.531 Ise=12.27p Ikf=1.009 Xtb=1.5 Br=1.287 Nc=2 Isc=0 Ikr=0 Rc=.6 Cjc=48.28p Mjc=.5615 Vjc=.75 Fc=.5 Cje=106.7p Mje=.5168 Vje=.75 Tr=496.3n Tf=865.8p Itf=.2 Vtf=2 Xtf=.8 Rb=10)

Typical Characteristics

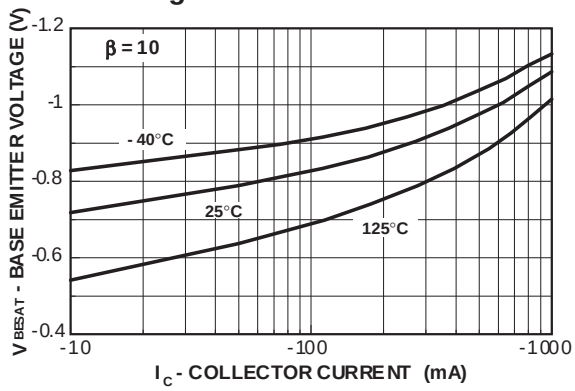
Typical Pulsed Current Gain vs Collector Curren



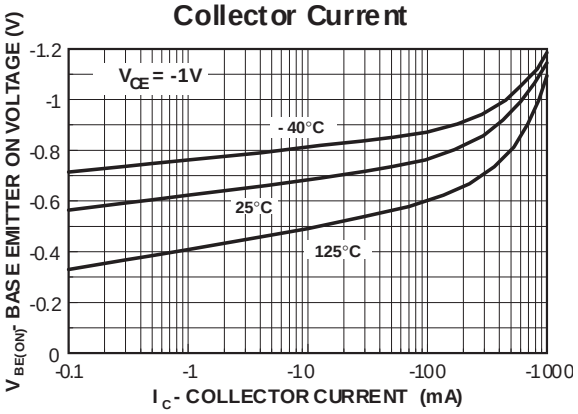
Collector-Emitter Saturation Voltage vs Collector Current



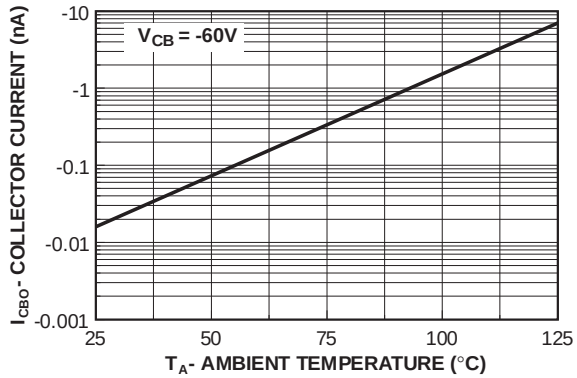
Base-Emitter Saturation Voltage vs Collector Current



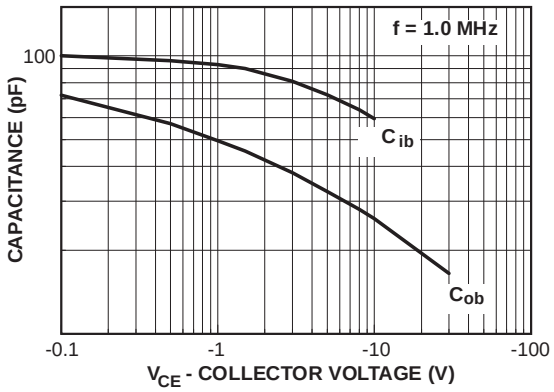
Base Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs Ambient Temperature

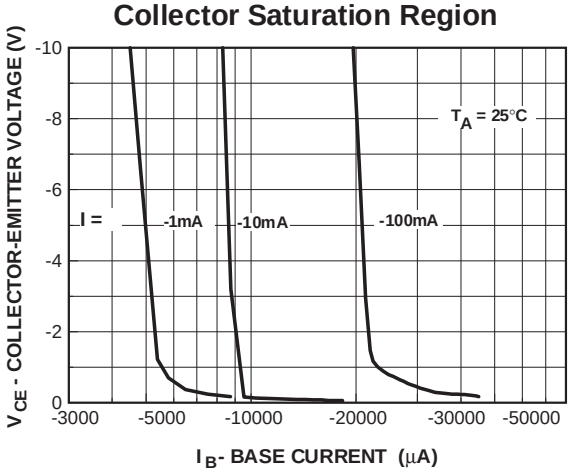


Input and Output Capacitance vs Reverse Voltage

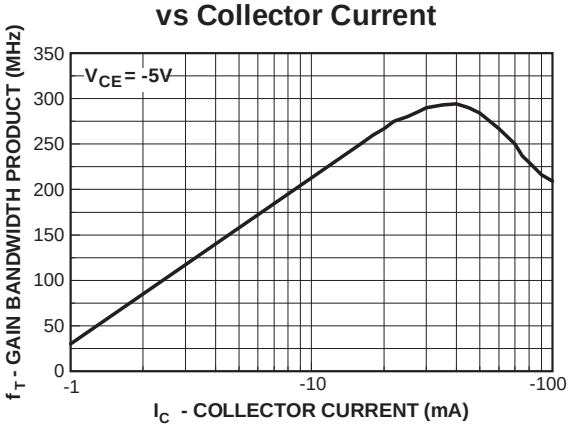


Typical Characteristics (Continued)

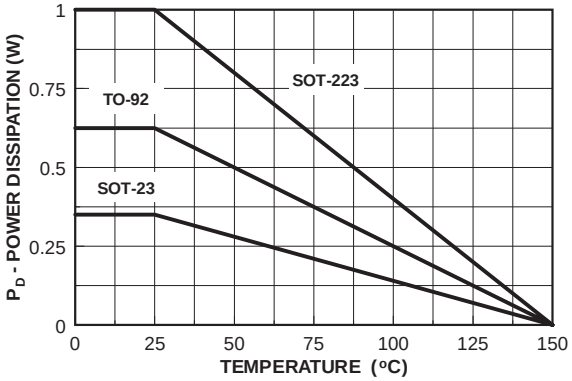
Collector Saturation Region



Gain Bandwidth Product vs Collector Current



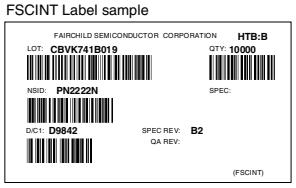
Power Dissipation vs Ambient Temperature



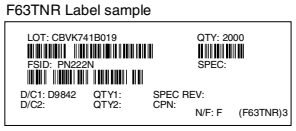
TO-92 Tape and Reel Data

TO-92 Packaging
Configuration: Figure 1.0

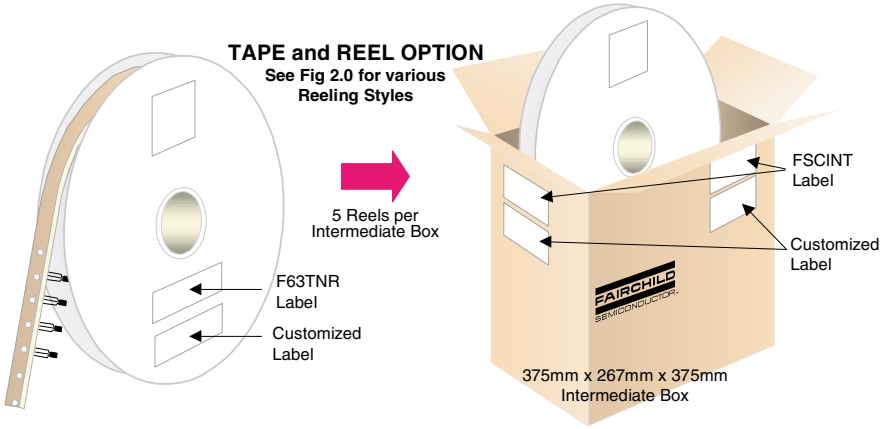
FSCINT Label sample



F63TNR Label sample



TAPE and REEL OPTION
See Fig 2.0 for various Reeling Styles

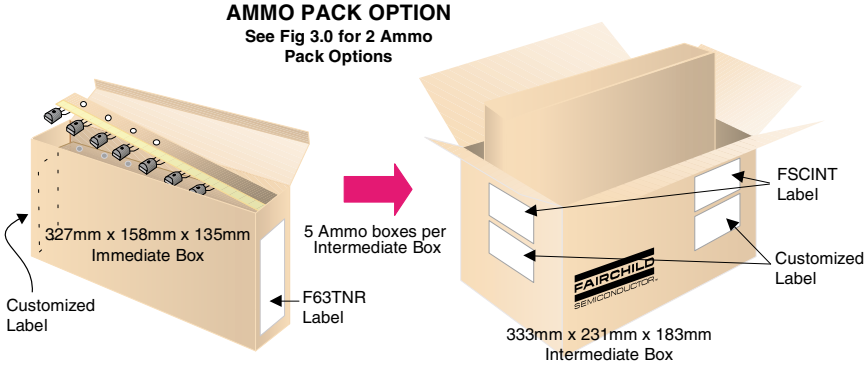


TO-92 TNR/AMMO PACKING INFROMATION

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

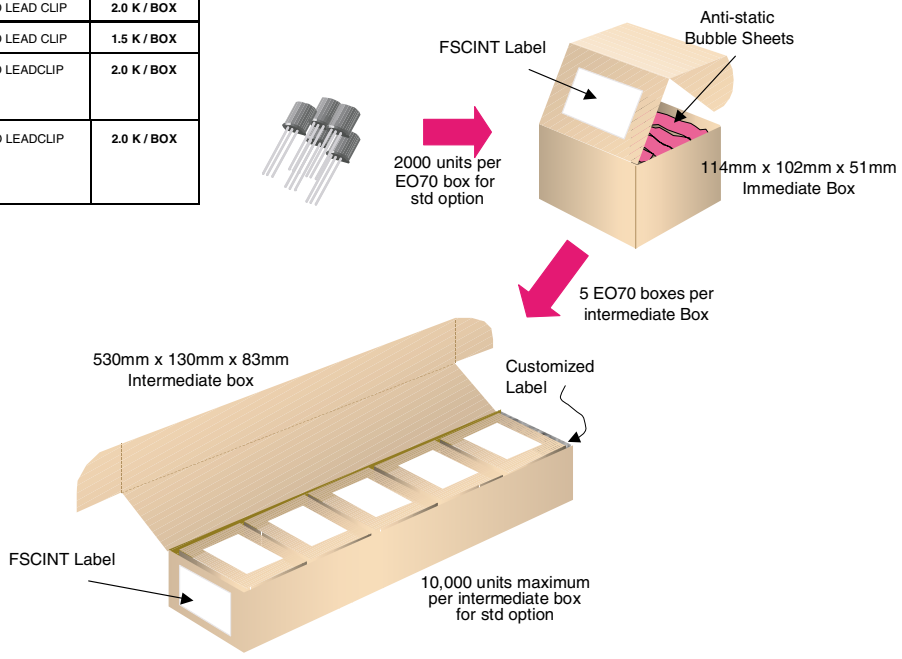
AMMO PACK OPTION
See Fig 3.0 for 2 Ammo Pack Options



(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 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

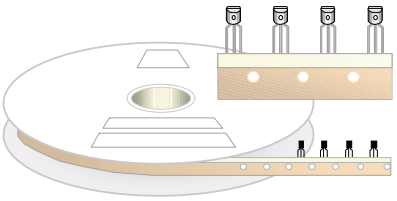
BULK OPTION
See Bulk Packing Information table



TO-92 Tape and Reel Data (Continued)

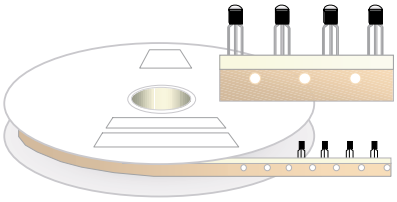
TO-92 Reeling Style
Configuration: Figure 2.0

Machine Option "A" (H)



Style "A", D26Z, D70Z (s/h)

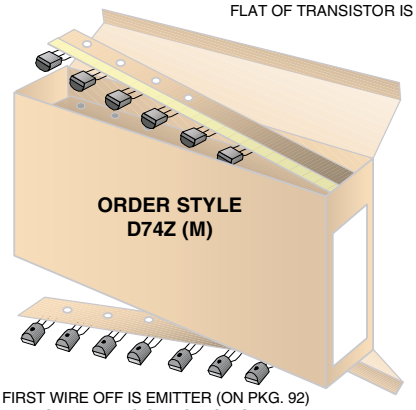
Machine Option "E" (J)



Style "E", D27Z, D71Z (s/h)

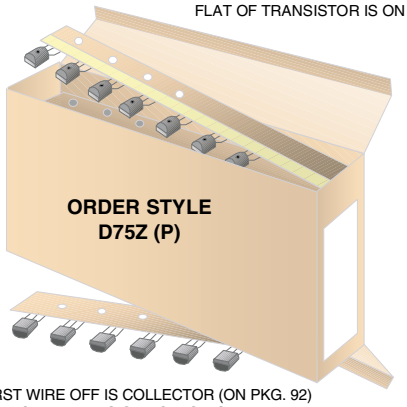
TO-92 Radial Ammo Packaging
Configuration: Figure 3.0

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



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

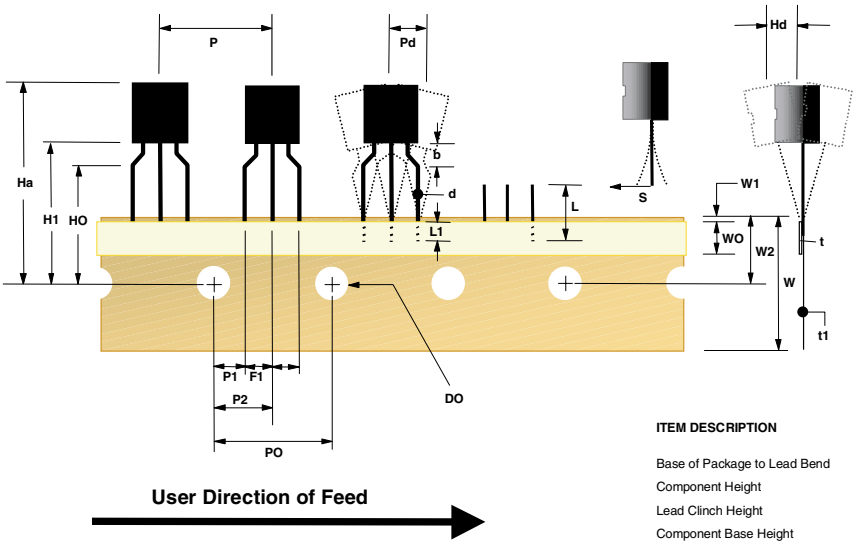
FIRST WIRE OFF IS EMITTER
ADHESIVE TAPE IS ON THE TOP SIDE
FLAT OF TRANSISTOR IS ON BOTTOM



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 (Continued)

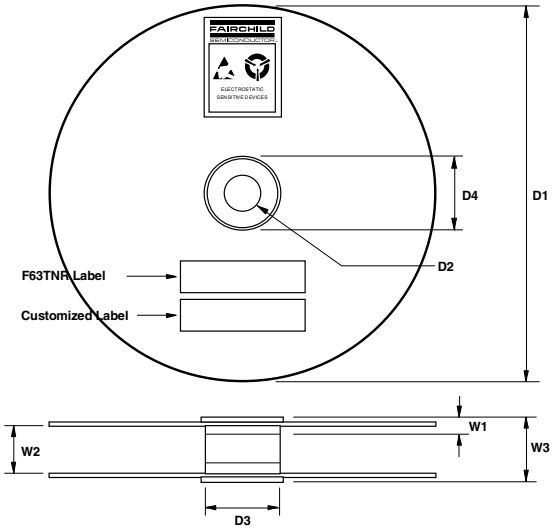
TO-92 Tape and Reel Taping
Dimension Configuration: Figure 4.0



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

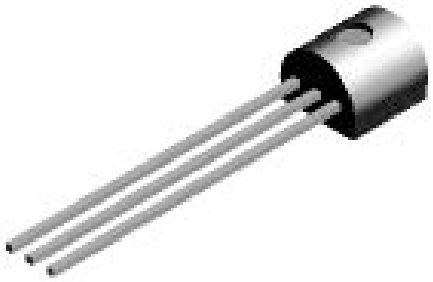


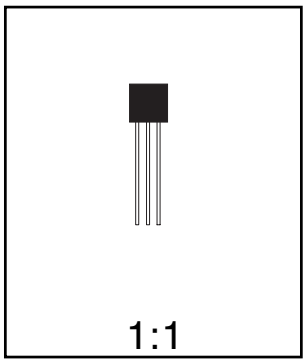
ITEM DESCRIPTION	SYSMBOL	MINIMUM	MAXIMUM
Reel Diameter	D1	13.975	14.025
Arbor Hole Diameter (Standard)	D2	1.160	1.200
(Small Hole)	D2	0.650	0.700
Core Diameter	D3	3.100	3.300
Hub Recess Inner Diameter	D4	2.700	3.100
Hub Recess Depth	W1	0.370	0.570
Flange to Flange Inner Width	W2	1.630	1.690
Hub to Hub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

Note: All dimensions are inches

TO-92 Package Dimensions

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





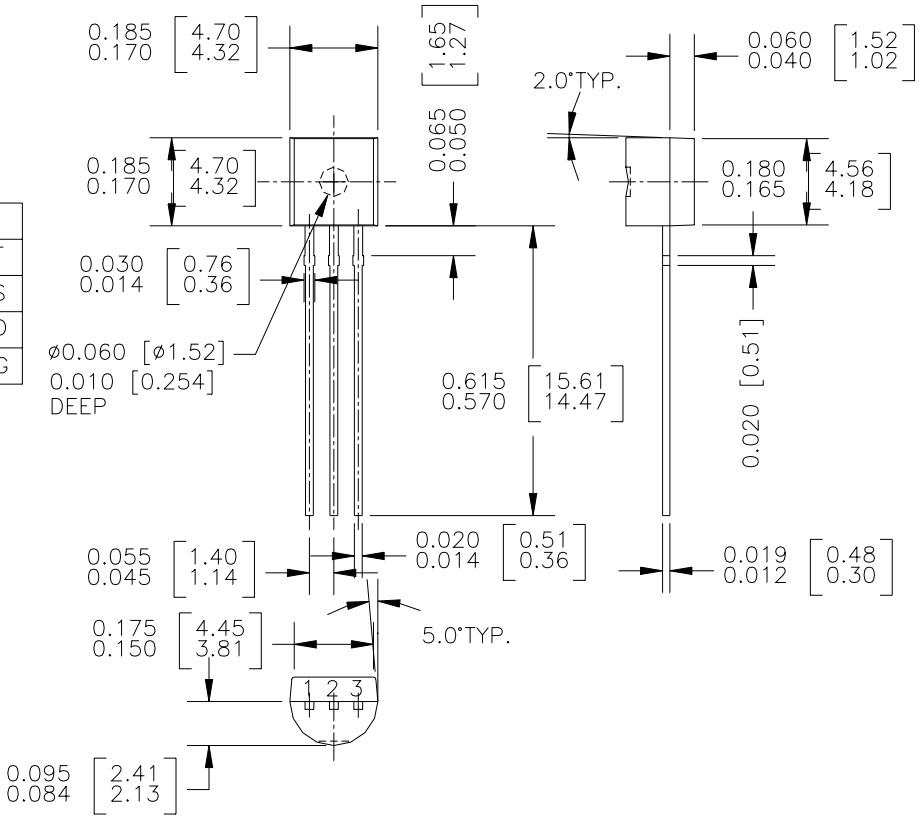
Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.1977

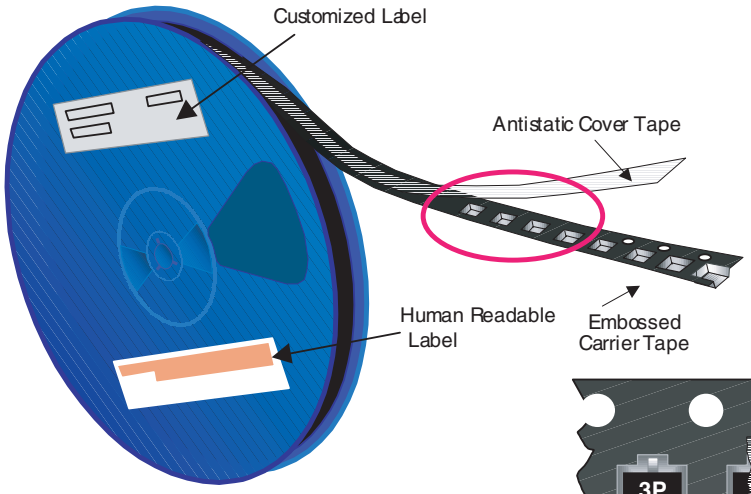
TO−92 (92,94,96)

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

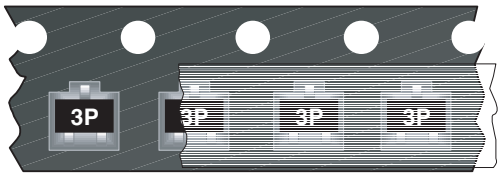
SOT-23 Packaging Configuration: Figure 10



Packaging Description:

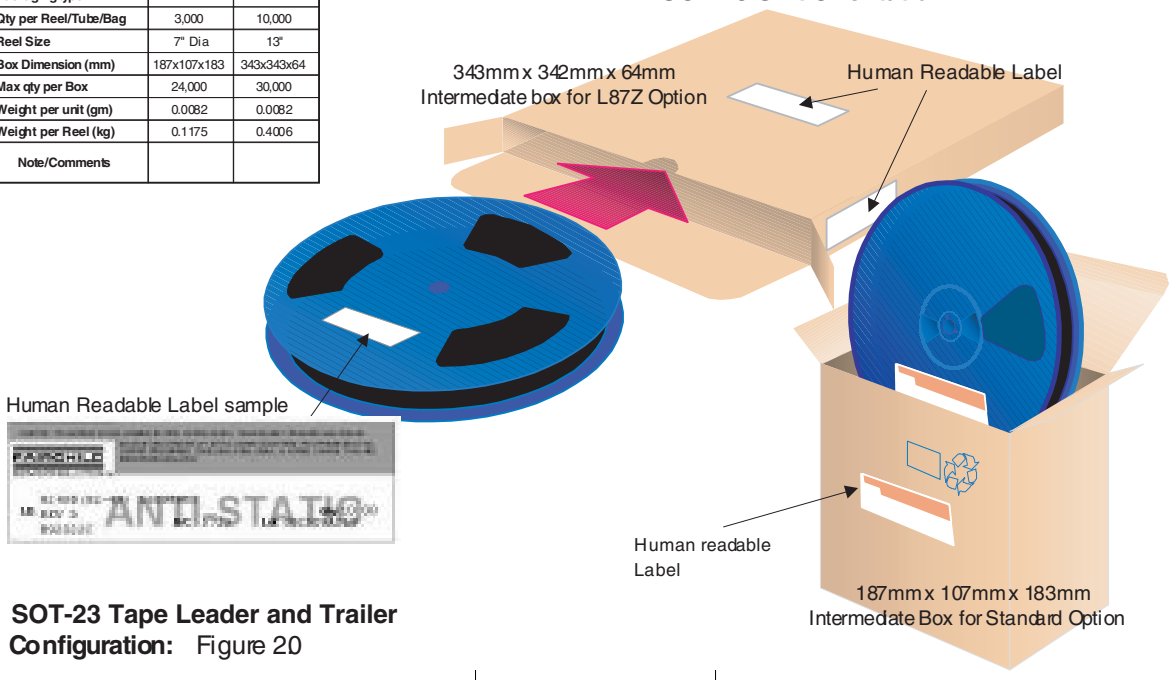
SOT-23 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in 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.

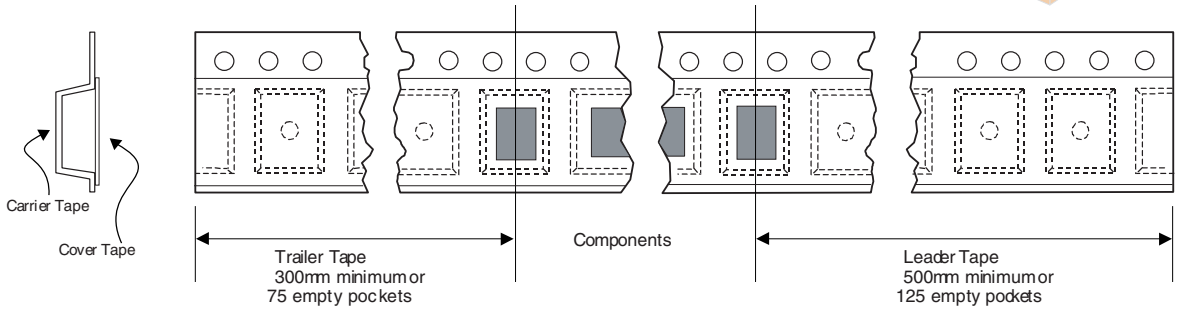


SOT-23 Packaging Information		
Packaging Option	Standard (no flow code)	D87Z
Packaging type	TNR	TNR
Qty per Reel/Tube/Bag	3,000	10,000
Reel Size	7" Dia	13"
Box Dimension (mm)	187x107x183	343x343x64
Max qty per Box	24,000	30,000
Weight per unit (gm)	0.0082	0.0082
Weight per Reel (kg)	0.1175	0.4006
Note/Comments		

SOT-23 Unit Orientation

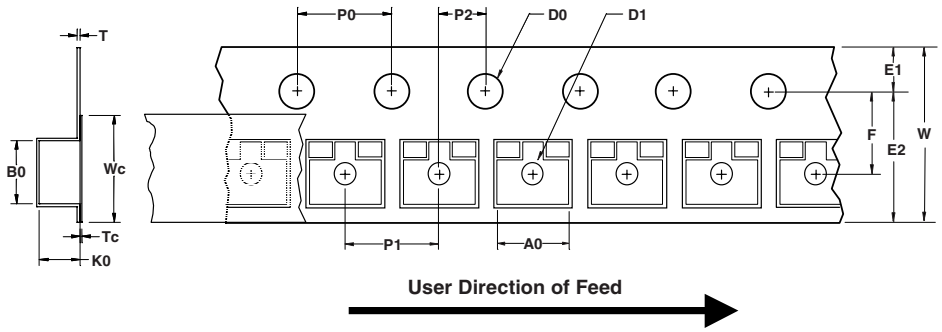


SOT-23 Tape Leader and Trailer Configuration: Figure 20



SOT-23 Tape and Reel Data (Continued)

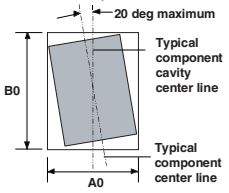
SOT-23 Embossed Carrier Tape
Configuration: Figure 3.0



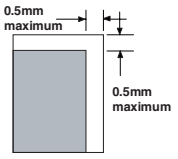
Dimensions are in millimeter														
Pkg type	**A0**	**B0**	**W**	**D0**	**D1**	**E1**	**E2**	**F**	**P1**	**P0**	**K0**	**T**	**Wc**	**Tc**
SOT-23 (8mm)	3.15 +/-0.10	2.77 +/-0.10	8.0 +/-0.3	1.55 +/-0.05	1.125 +/-0.125	1.75 +/-0.10	6.25 min	3.50 +/-0.05	4.0 +/-0.1	4.0 +/-0.1	1.30 +/-0.10	0.228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

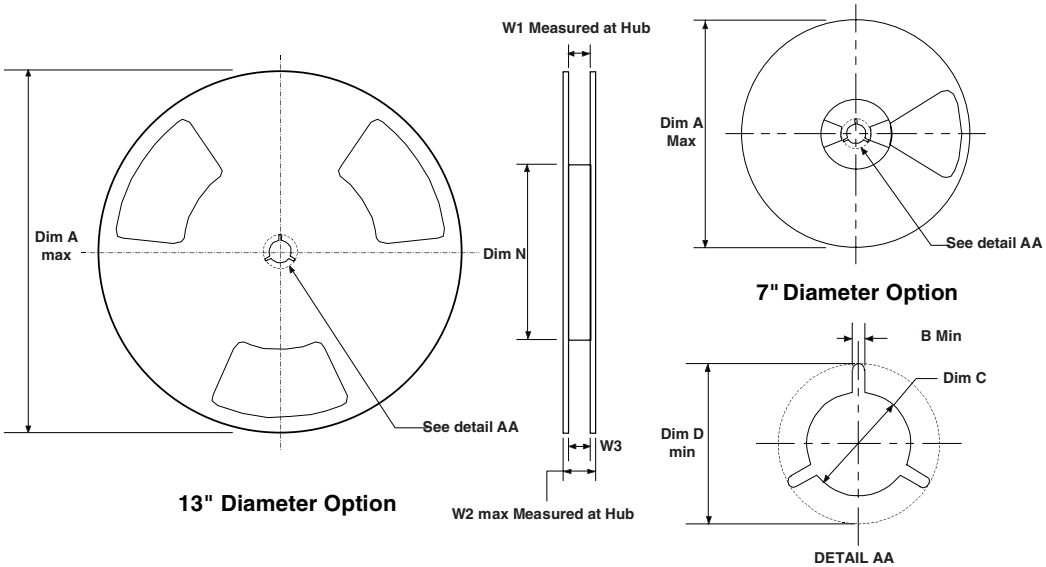


Sketch B (Top View)
Component Rotation



Sketch C (Top View)
Component lateral movement

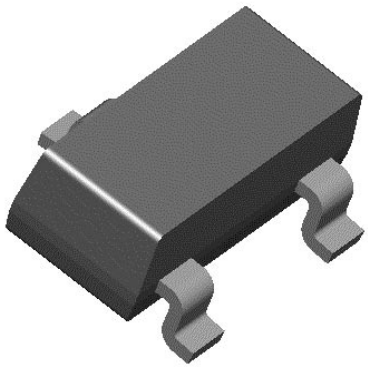
SOT-23 Reel Configuration: Figure 4.0

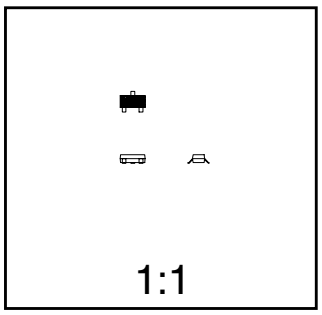


Dimensions are in inches and millimeters									
Tape Size	**Reel Option**	**Dim A**	**Dim B**	**Dim C**	**Dim D**	**Dim N**	**Dim W1**	**Dim W2**	**Dim W3 (LSL-USL)**
8mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	2.165 55	0.331 +0.059/-0.000 8.4 +1.5/0	0.567 14.4	0.311 –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

SOT-23 (FS PKG Code 49)

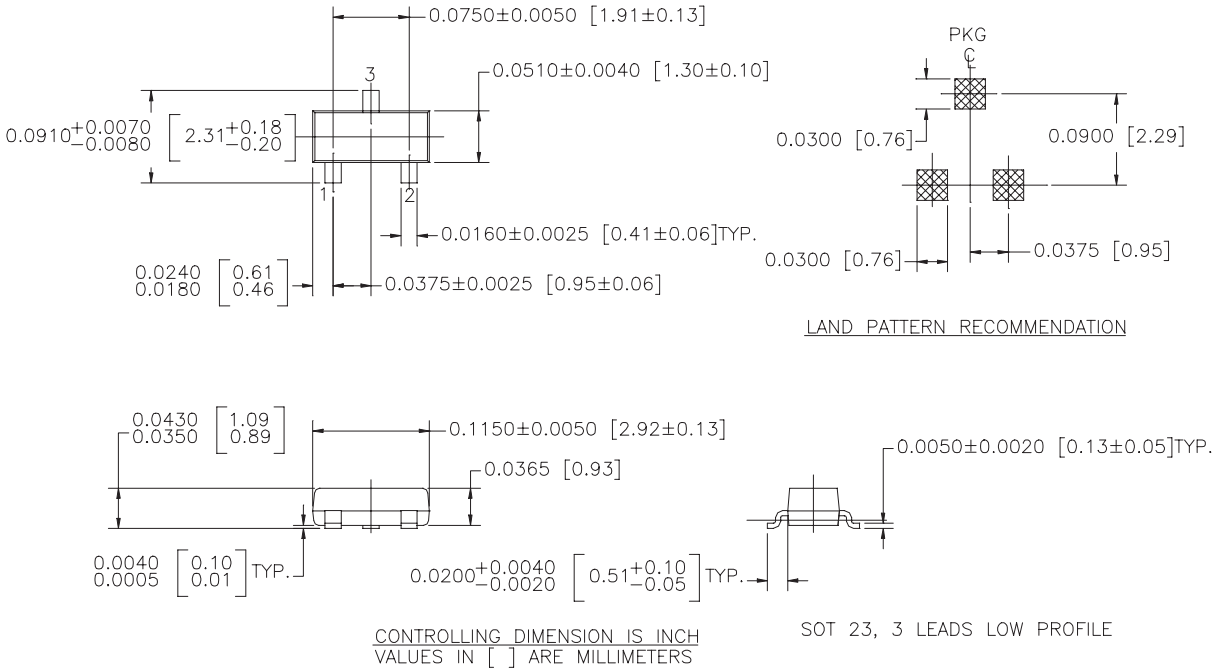




Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0082

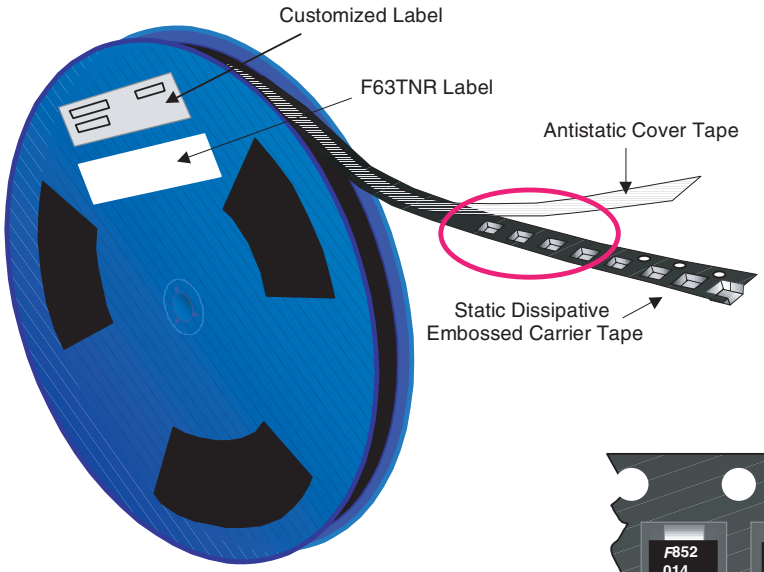


NOTE : UNLESS OTHERWISE SPECIFIED

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

SOT-223 Packaging
Configuration: Figure 1.0

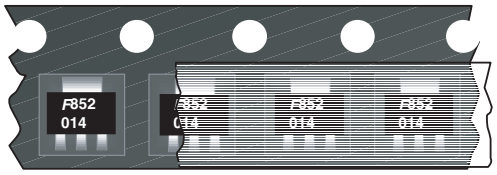


Packaging Description:

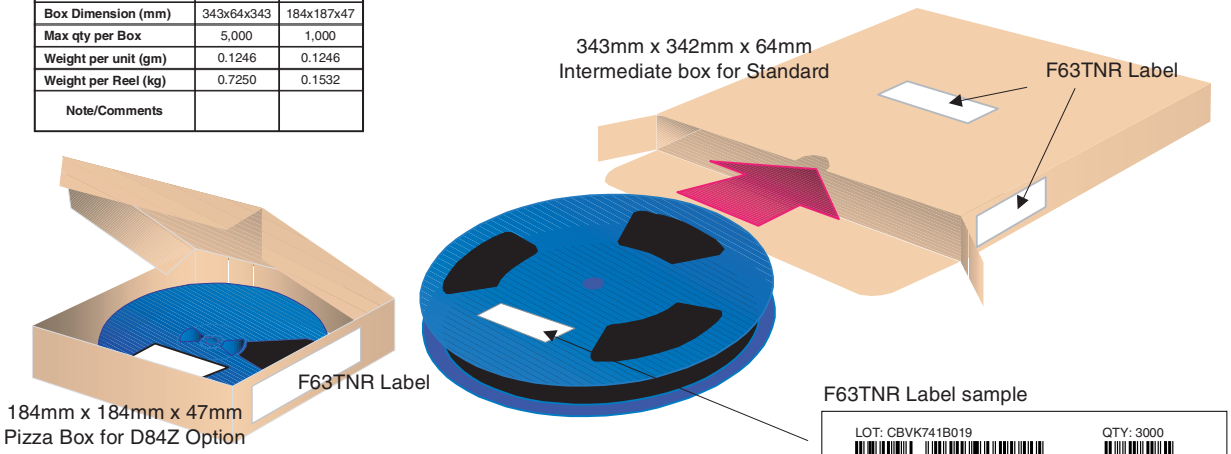
SOT-223 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts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

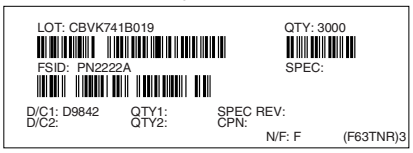
SOT-223 Packaging Information		
Packaging Option	Standard (no flow code)	D84Z
Packaging type	TNR	TNR
Qty per Reel/Tube/Bag	2,500	500
Reel Size	13" Dia	7" Dia
Box Dimension (mm)	343x64x343	184x187x47
Max qty per Box	5,000	1,000
Weight per unit (gm)	0.1246	0.1246
Weight per Reel (kg)	0.7250	0.1532
Note/Comments		



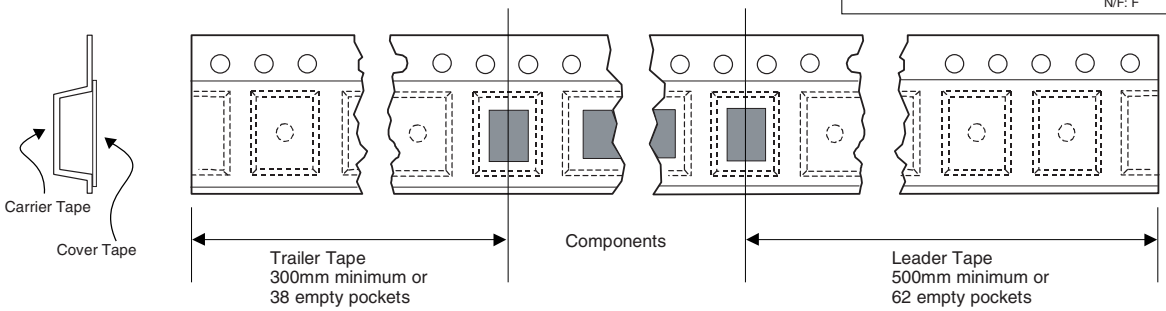
SOT-223 Unit Orientation



F63TNR Label sample

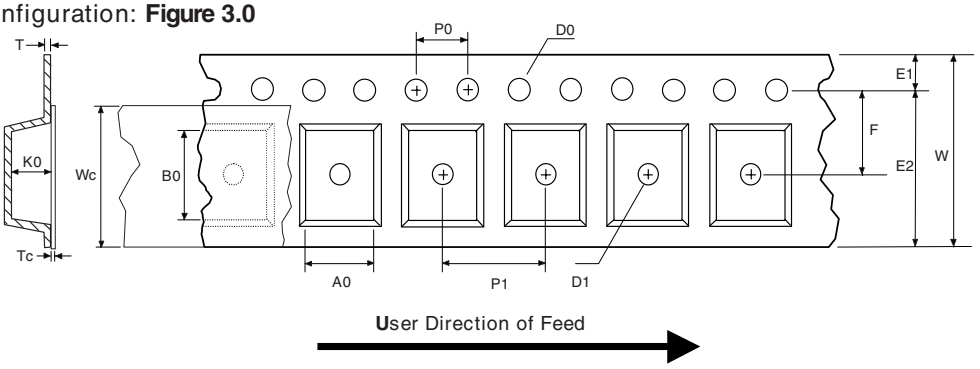


SOT-223 Tape Leader and Trailer
Configuration: Figure 2.0



SOT-223 Tape and Reel Data (Continued)

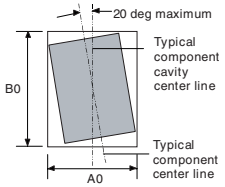
SOT-223 Embossed Carrier Tape
Configuration: **Figure 3.0**



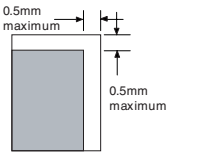
Dimensions are in millimeter														
Pkg type	A0	B0	W	D0	D1	E1	E2	F	P1	P0	K0	T	Wc	Tc
SOT-223 **(12mm)**	**6.83 +/-0.10**	**7.42 +/-0.10**	**12.0 +/-0.3**	**1.55 +/-0.05**	**1.50 +/-0.10**	**1.75 +/-0.10**	**10.25 min**	**5.50 +/-0.05**	**8.0 +/-0.1**	**4.0 +/-0.1**	**1.88 +/-0.10**	**0.292 +/-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

Sketch A (Side or Front Sectional View)
Component Rotation

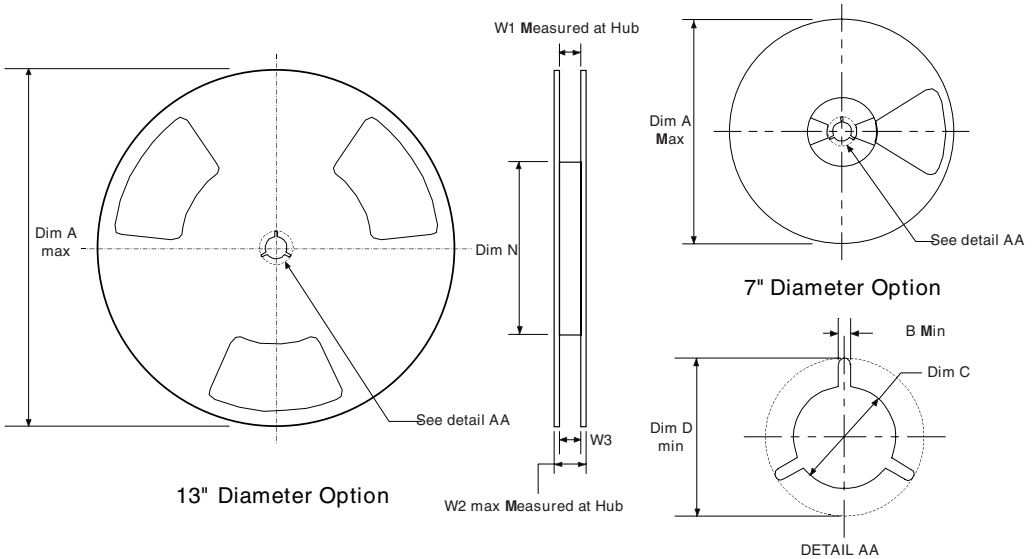


Sketch B (Top View)
Component Rotation



Sketch C (Top View)
Component lateral movement

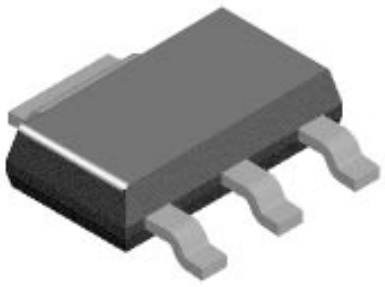
SOT-223 Reel Configuration: **Figure 4.0**

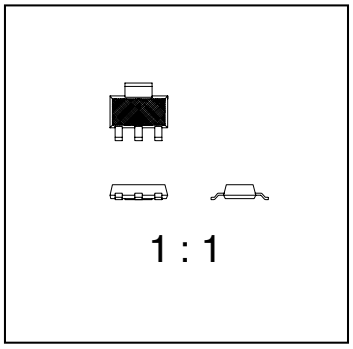


Dimensions are in inches and millimeters									
Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim W1	Dim W2	Dim W3 (LSL-USL)
12mm	**7" Dia**	**7.00 177.8**	**0.059 1.5**	**512 +0.020/-0.008 13 +0.5/-0.2**	**0.795 20.2**	**5.906 150**	**0.488 +0.078/-0.000 12.4 +2/0**	**0.724 18.4**	**0.469 –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

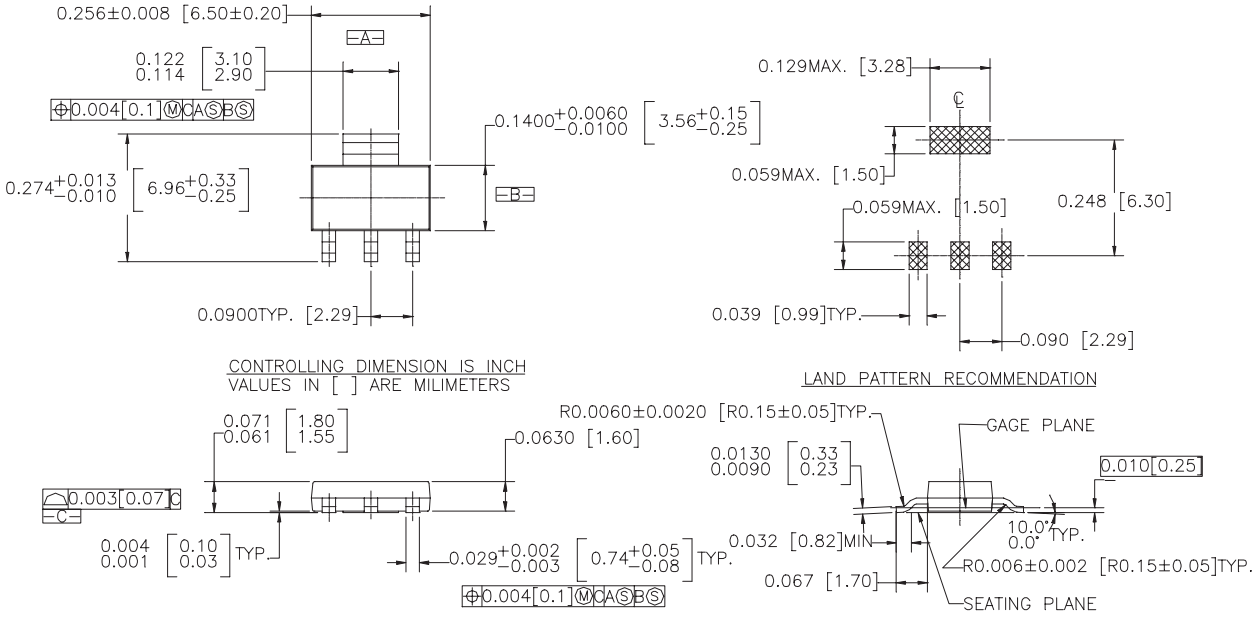
SOT-223 (FS PKG Code 47)





Scale 1:1 on letter size paper

Part Weight per unit (gram): 0.1246



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2. REFERENCE JEDEC REGISTRATION TO−261, VARIATION AA, ISSUE A, DATED JAN 1990

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