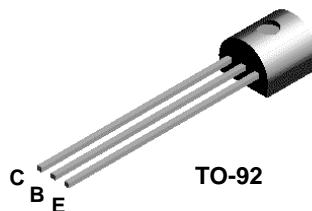
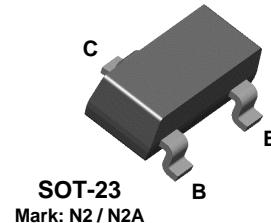




PN200 PN200A



MMBT200 MMBT200A



PNP General Purpose Amplifier

This device is designed for general purpose amplifier applications at collector currents to 300 mA. Sourced from Process 68.

Absolute Maximum Ratings*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V_{CEO}	Collector-Emitter Voltage	45	V
V_{CBO}	Collector-Base Voltage	60	V
V_{EBO}	Emitter-Base Voltage	6.0	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.
- 3) All voltages (V) and currents (A) are negative polarity for PNP transistors.

Thermal Characteristics

TA = 25°C unless otherwise noted

Symbol	Characteristic	Max		Units
		PN200 PN200A	*MMBT200 *MMBT200A	
P_D	Total Device Dissipation Derate above 25°C	625 5.0	350 2.8	mW mW/°C
$R_{θJC}$	Thermal Resistance, Junction to Case	83.3		°C/W
$R_{θJA}$	Thermal Resistance, Junction to Ambient	200	357	°C/W

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

PNP General Purpose Amplifier

(continued)

Electrical Characteristics

TA = 25°C unless otherwise noted

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

OFF CHARACTERISTICS

BV_{CBO}	Collector-Base Breakdown Voltage	$I_C = 10 \mu A, I_B = 0$	60		V
BV_{CEO}	Collector-Emitter Breakdown Voltage*	$I_C = 1.0 \text{ mA}, I_E = 0$	45		V
BV_{EBO}	Emitter-Base Breakdown Voltage	$I_E = 10 \mu A, I_C = 0$	6.0		V
I_{CBO}	Collector Cutoff Current	$V_{CB} = 50 \text{ V}, I_E = 0$		50	nA
I_{CES}	Collector Cutoff Current	$V_{CE} = 40 \text{ V}, I_E = 10$		50	nA
I_{EBO}	Emitter Cutoff Current	$V_{EB} = 4.0 \text{ V}, I_C = 0$		50	nA

ON CHARACTERISTICS

h_{FE}	DC Current Gain	$I_C = 100 \mu A, V_{CE} = 1.0 \text{ V}$	200	80	
		$I_C = 10 \text{ mA}, V_{CE} = 1.0 \text{ V}$	200	240	
		$I_C = 10 \text{ mA}, V_{CE} = 1.0 \text{ V}$	200	100	
		$I_C = 100 \text{ mA}, V_{CE} = 1.0 \text{ V}^*$	200A	300	
$V_{CE(\text{sat})}$	Collector-Emitter Saturation Voltage	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$	200A	100	
		$I_C = 200 \text{ mA}, I_B = 20 \text{ mA}^*$	200A	100	
$V_{BE(\text{sat})}$	Base-Emitter Saturation Voltage	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$	200	350	
		$I_C = 200 \text{ mA}, I_B = 20 \text{ mA}^*$	200A	100	

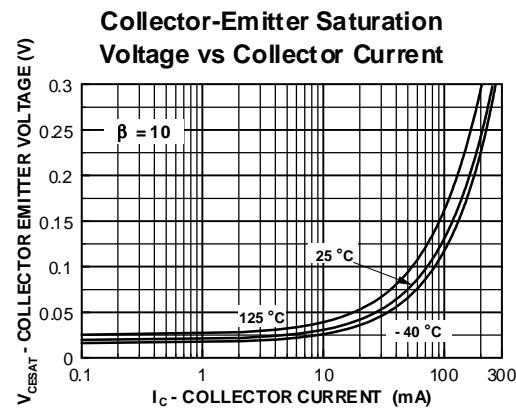
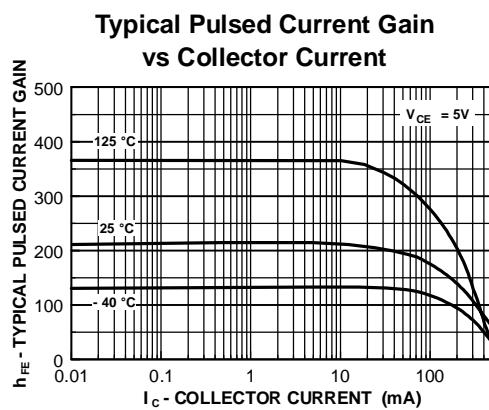
SMALL SIGNAL CHARACTERISTICS

f_T	Current Gain - Bandwidth Product	$V_{CE} = 20 \text{ V}, I_C = 20 \text{ mA}$	250		MHz
C_{obo}	Output Capacitance	$V_{CB} = 10 \text{ V}, f = 1.0 \text{ MHz}$		6.0	pF
NF	Noise Figure	$I_C = 100 \mu A, V_{CE} = 5.0 \text{ V}, R_G = 2.0 \text{ k}\Omega, f = 1.0 \text{ kHz}$		4.0	dB

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

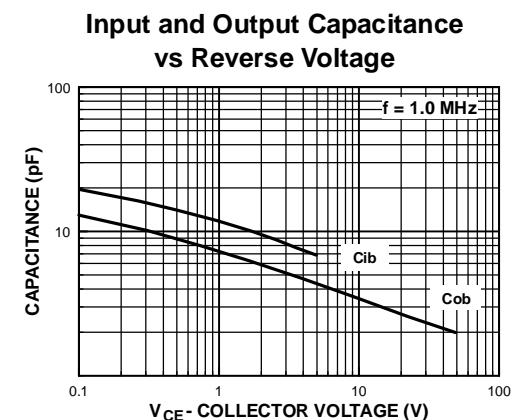
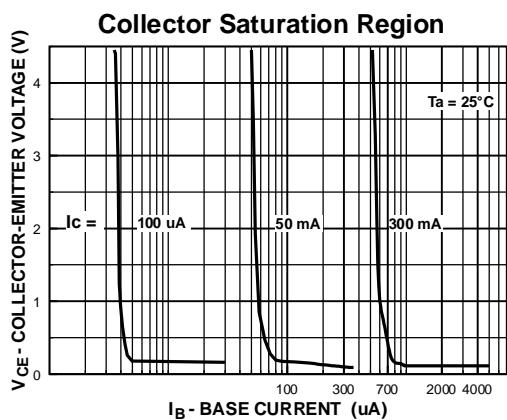
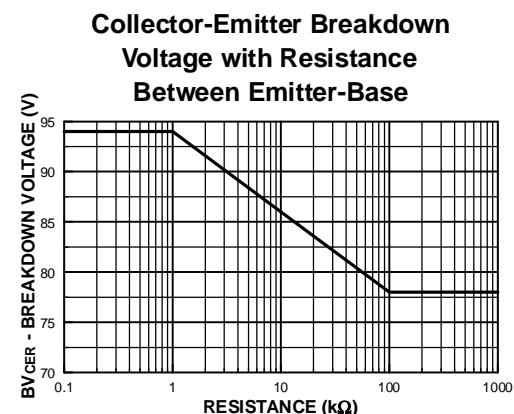
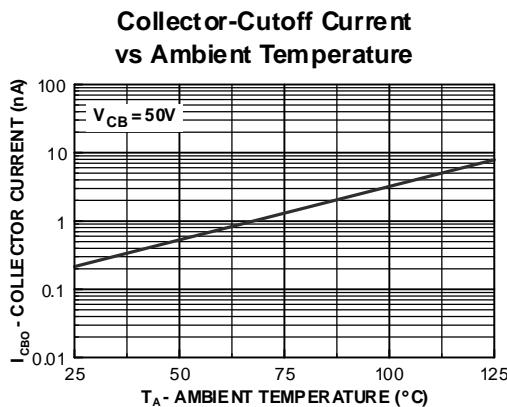
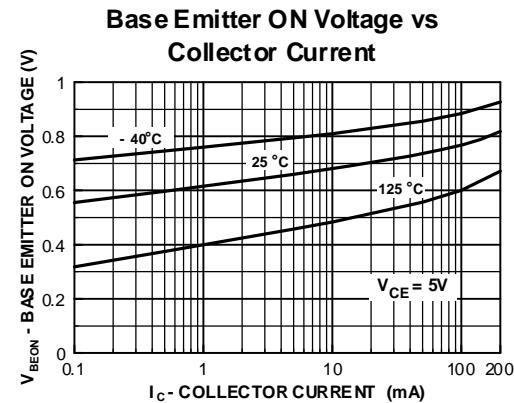
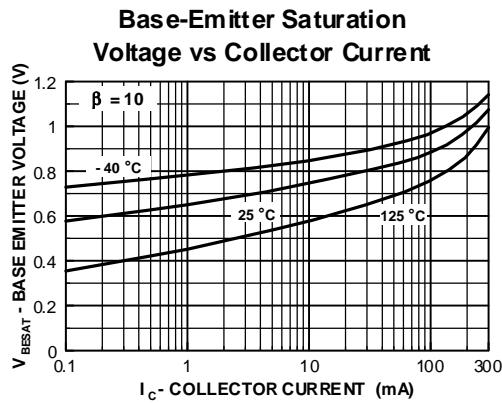
NOTE: All voltages (V) and currents (A) are negative polarity for PNP transistors.

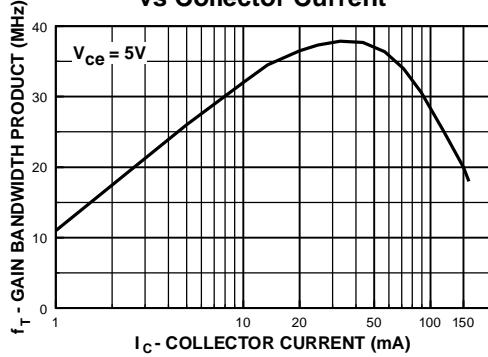
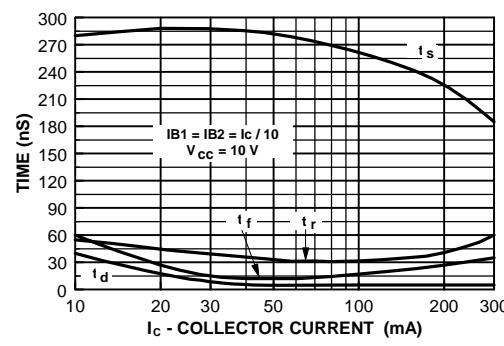
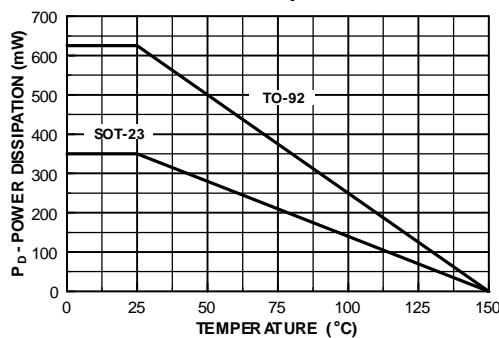
Typical Characteristics



PNP General Purpose Amplifier
(continued)

Typical Characteristics (continued)

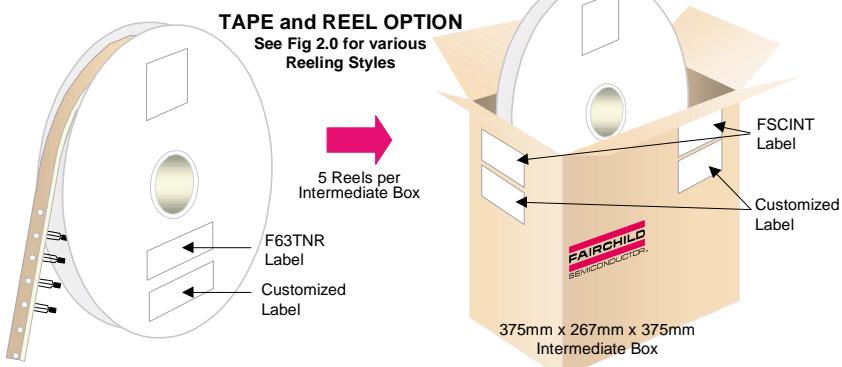
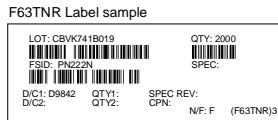
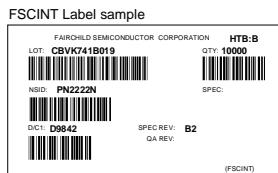


PNP General Purpose Amplifier
(continued)**Typical Characteristics** (continued)**Gain Bandwidth Product
vs Collector Current****Switching Times vs
Collector Current****Power Dissipation vs
Ambient Temperature**

TO-92 Tape and Reel Data



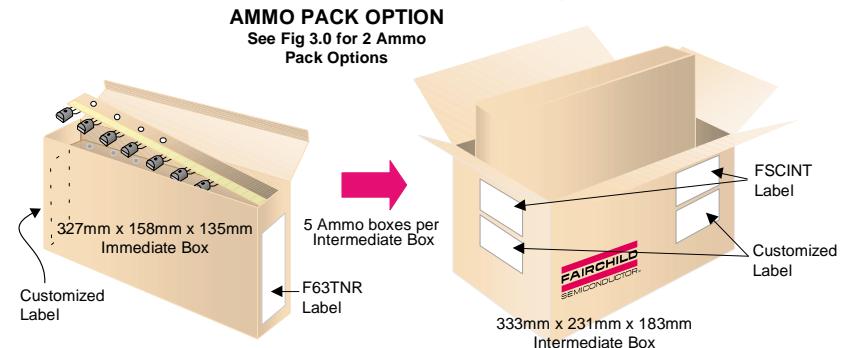
TO-92 Packaging Configuration: Figure 1.0



TO-92 TNR/AMMO PACKING INFORMATION

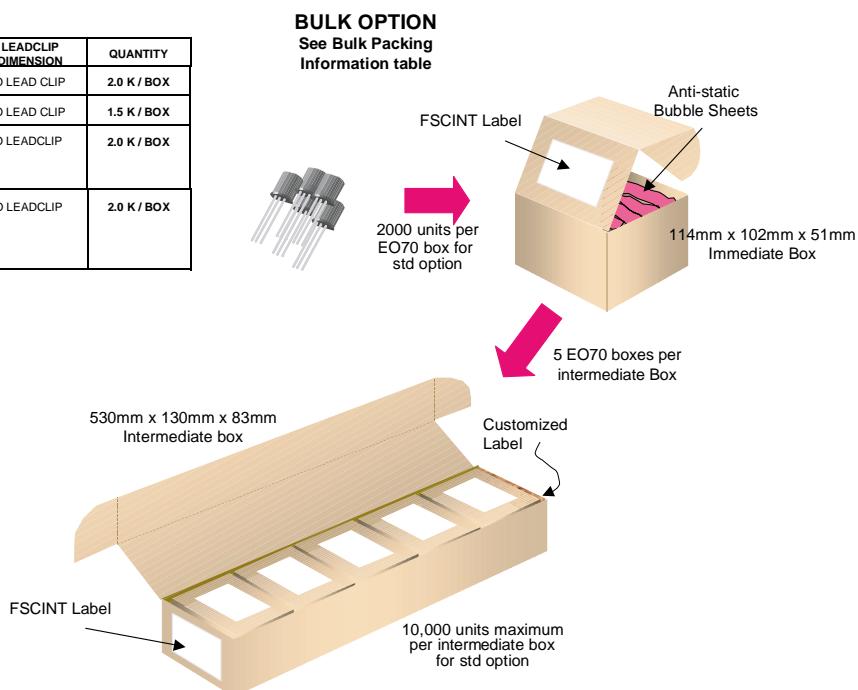
Packing	Style	Quantity	EOL code
Reel	A	2,000	D26Z
	E	2,000	D27Z
Ammo	M	2,000	D74Z
	P	2,000	D75Z

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

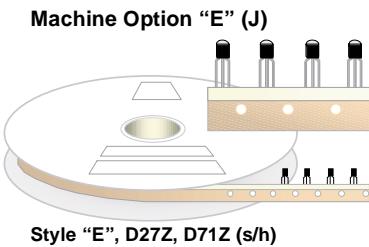
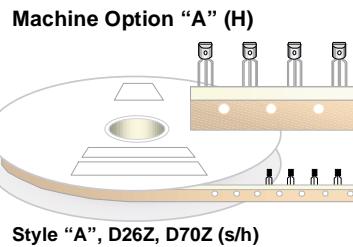
EOL CODE	DESCRIPTION	LEADCLIP DIMENSION	QUANTITY
J18Z	TO-18 OPTION STD	NO LEAD CLIP	2.0 K / BOX
J05Z	TO-5 OPTION STD	NO LEAD CLIP	1.5 K / BOX
NO EOL CODE	TO-92 STANDARD STRAIGHT FOR: PKG 92, 94 (NO PROELECTRON SERIES), 96	NO LEADCLIP	2.0 K / BOX
L34Z	TO-92 STANDARD STRAIGHT FOR: PKG 94 (PROELECTRON SERIES BCXXX, BFXXX, BSXXX), 97, 98	NO LEADCLIP	2.0 K / BOX



TO-92 Tape and Reel Data, continued

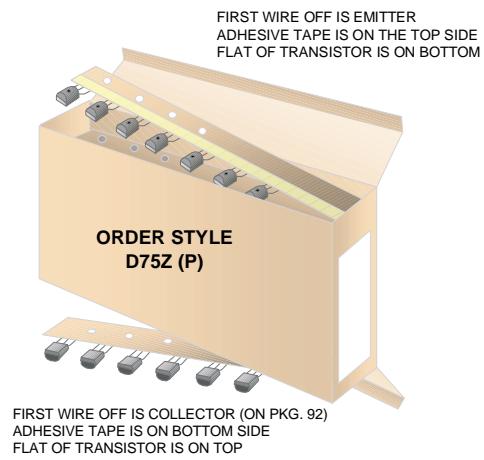
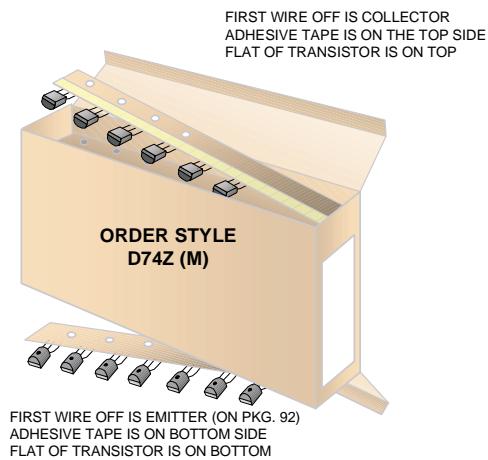
TO-92 Reeling Style

Configuration: Figure 2.0



TO-92 Radial Ammo Packaging

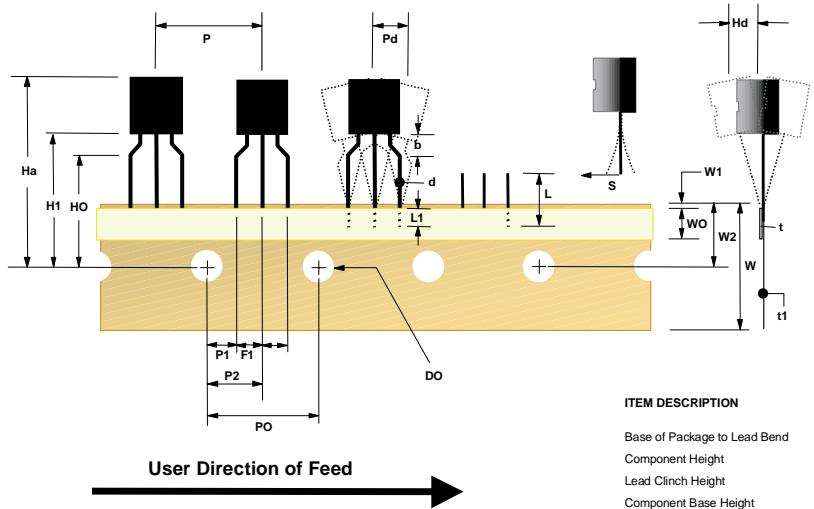
Configuration: Figure 3.0



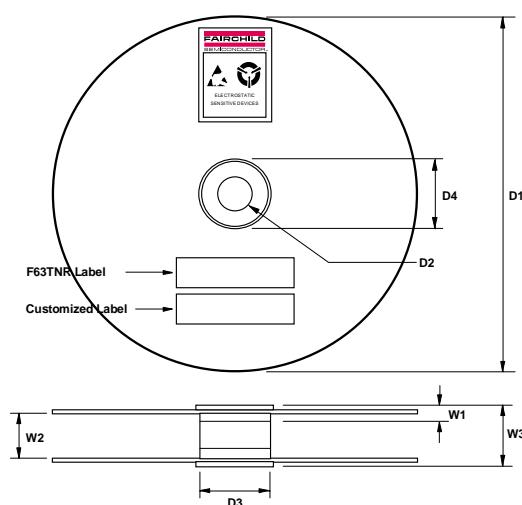
TO-92 Tape and Reel Data, continued

TO-92 Tape and Reel Taping

Dimension Configuration: Figure 4.0



TO-92 Reel
Configuration: Figure 5.0



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.

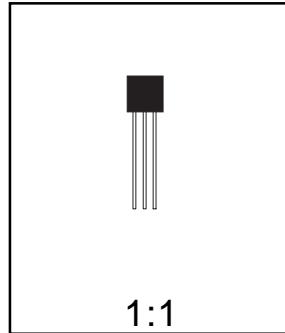
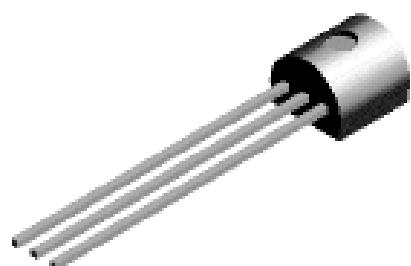
ITEM DESCRIPTION	SYMBOL	MINIMUM	MAXIMUM
Reel Diameter	D1	13.975	14.025
Arbor Hole Diameter (Standard) (Small Hole)	D2	1.160	1.200
Core Diameter	D3	3.100	3.300
Hub Recess Inner Diameter	D4	2.700	3.100
Hub Recess Depth	W1	0.370	0.570
Flange to Flange Inner Width	W2	1.630	1.690
Hub to Hub Center Width	W3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

Note: All dimensions are inches

TO-92 Package Dimensions

FAIRCHILD
SEMICONDUCTOR™

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



1:1

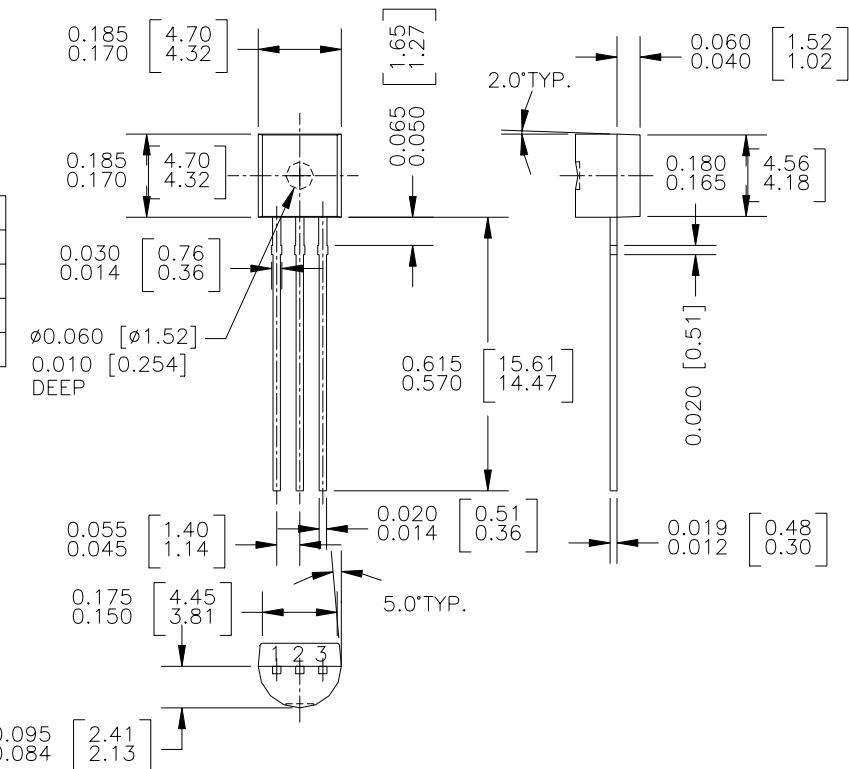
Scale 1:1 on letter size paper

Dimensions shown below are
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

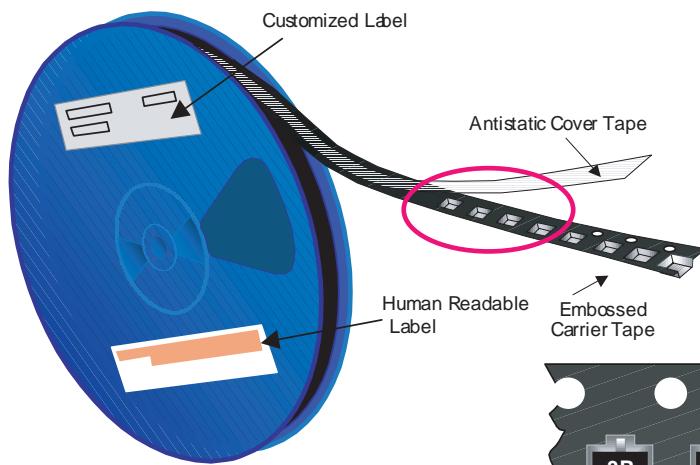


SOT-23 Tape and Reel Data

FAIRCHILD
SEMICONDUCTOR™

SOT-23 Packaging

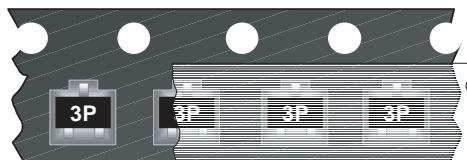
Configuration: Figure 10



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 177mm 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 330mm 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.



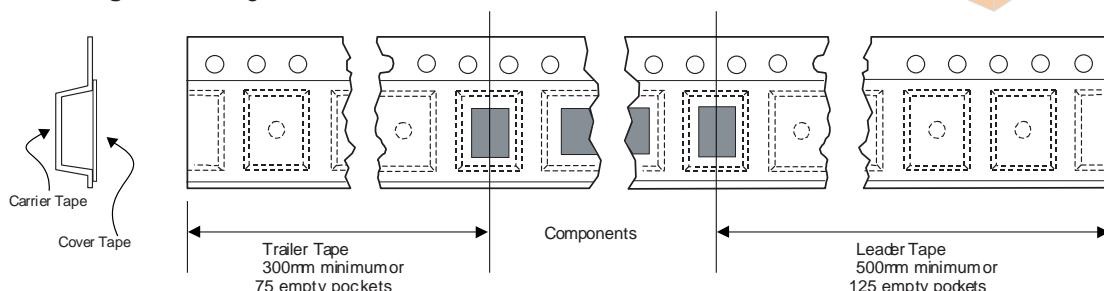
SOT-23 Unit Orientation

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		

Human Readable Label sample



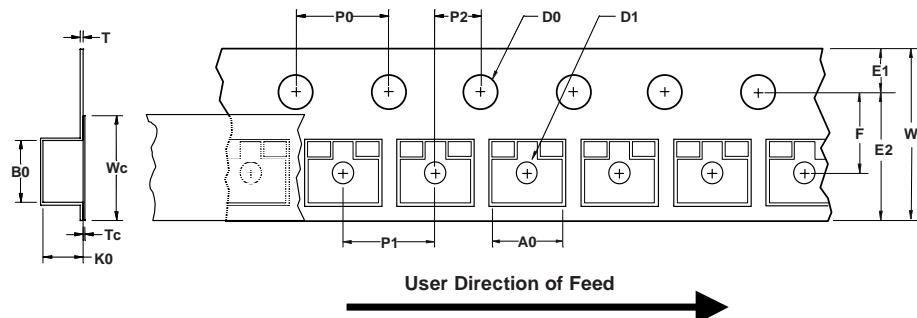
SOT-23 Tape Leader and Trailer
Configuration: Figure 20



SOT-23 Tape and Reel Data, continued

SOT-23 Embossed Carrier Tape

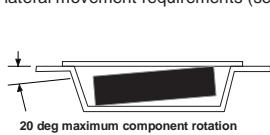
Configuration: Figure 3.0



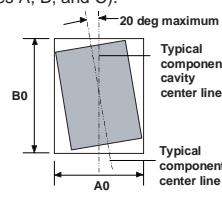
Dimensions are in millimeter

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

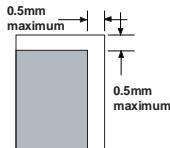
Notes: A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



Component Rotation

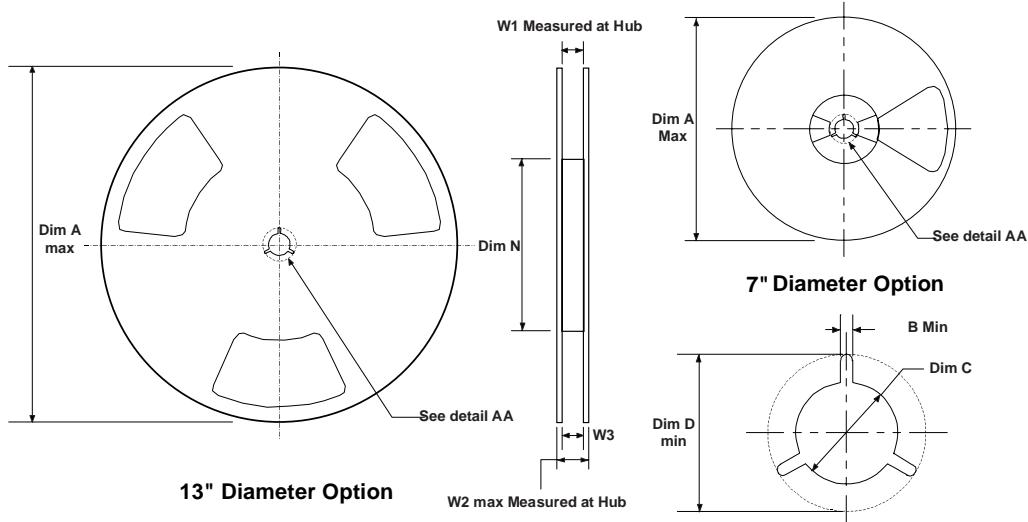


Component Rotation



Component lateral movement

SOT-23 Reel Configuration: Figure 4.0



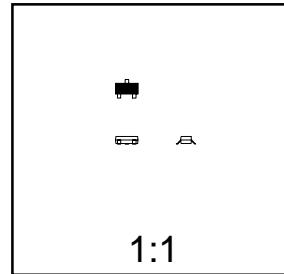
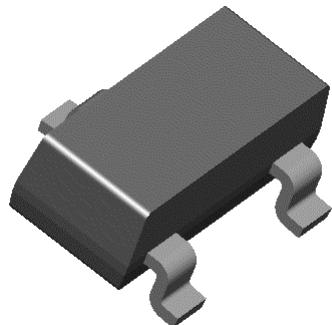
Dimensions are in inches and millimeters

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



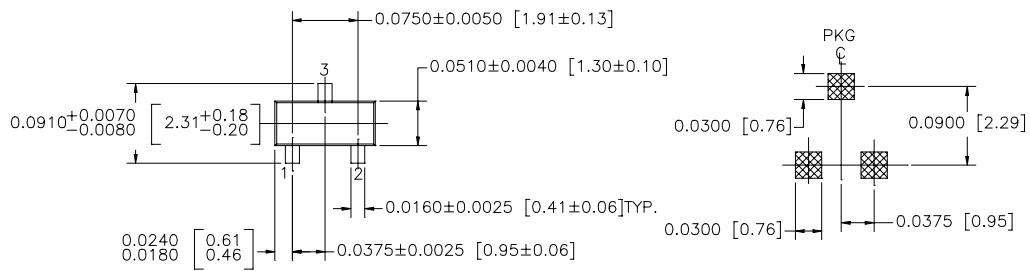
SOT-23 (FS PKG Code 49)



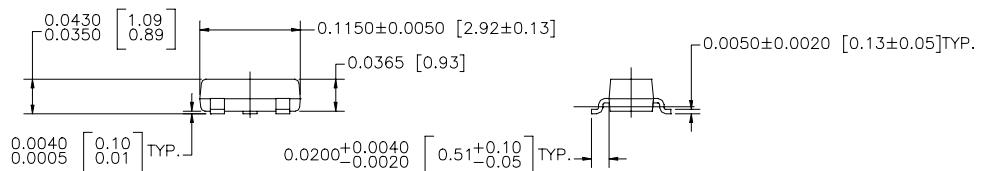
Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0082



LAND PATTERN RECOMMENDATION



CONTROLLING DIMENSION IS INCH
VALUES IN [] ARE MILLIMETERS

SOT 23, 3 LEADS LOW PROFILE

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

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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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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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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.

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