FAIRCHILD
SEMICONDUCTOR TM

September 1996

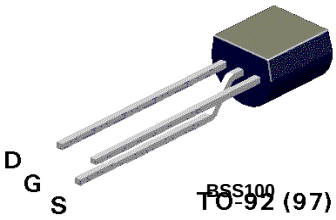
BSS100 / BSS123
N-Channel Logic Level Enhancement Mode Field Effect Transistor

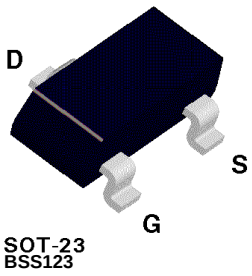
General Description

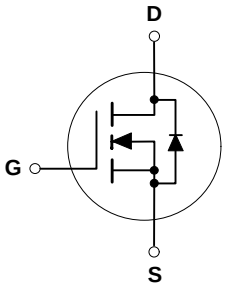
These N-Channel logic level enhancement mode power field effect transistors are produced using Fairchild's proprietary, high cell density, DMOS technology. This very high density process has been especially tailored to minimize on-state resistance, provide superior switching performance. This product is particularly suited to low voltage, low current applications, such as small servo motor controls, power MOSFET gate drivers, and other switching applications.

Features

- BSS100: 0.22A, 100V. $R_{DS(ON)}$ = 6Ω @ V_{GS} = 10V.
  BSS123: 0.17A, 100V. $R_{DS(ON)}$ = 6Ω @ V_{GS} = 10V
- High density cell design for extremely low $R_{DS(ON)}$.
- Voltage controlled small signal switch.
- Rugged and reliable.







Absolute Maximum Ratings

T_A = 25°C unless otherwise noted

Symbol	Parameter	BSS100	BSS123	Units
V_{DSS}	Drain-Source Voltage	100		V
V_{DGR}	Drain-Gate Voltage (R_{GS} ≤ 20KΩ)	100		V
V_{GSS}	Gate-Source Voltage - Continuous	± 14		V
	- Non Repetitive (T_P < 50 µS)	± 20		
I_D	Drain Current - Continuous	0.22	0.17	A
	- Pulsed	0.9	0.68	
P_D	Total Power Dissipation @ T_A = 25°C	0.63	0.36	W
T_J,T_{STG}	Operating and Storage Temperature Range	-55 to 150		°C
T_L	Maximum Lead Temperature for Soldering Purposes, 1/16" from Case for 10 Seconds	300		°C
THERMAL CHARACTERISTICS				
$R_{\theta JA}$	Thermal Resistacne, Junction-to-Ambient	200	350	°C/W

Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Conditions	Type	Min	Typ	Max	Units
OFF CHARACTERISTICS							
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 µA	All	100			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 100 V, V_{GS} = 0 V	BSS100			15	µA
		V_{DS} = 100 V, V_{GS} = 0 V	BSS123			1	µA
		V_{DS} = 100 V, V_{GS} = 0 V, T_J=125°C	All			60	µA
		V_{DS} = 60 V, V_{GS} = 0 V	BSS100			10	nA
		V_{DS} = 20 V, V_{GS} = 0 V	BSS123			10	nA
I_{GSSF}	Gate - Body Leakage, Forward	V_{GS} = 20 V, V_{DS} = 0 V	BSS100			10	nA
		V_{GS} = 20 V, V_{DS} = 0 V	BSS123			50	nA
ON CHARACTERISTICS (Note 1)							
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 1 mA	All	0.8	1.4	2	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 0.22 A	BSS100		2.8	6	Ω
		V_{GS} = 10 V, I_D = 0.17 A	BSS123		2.8	6	
		V_{GS} = 4.5 V, I_D = 0.22 A	BSS100		3.2	10	
		V_{GS} = 4.5 V, I_D = 0.17 A	BSS123		3.2	10	
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 0.22 A	BSS100	0.08	0.4		S
		V_{DS} = 10 V, I_D = 0.17 A	BSS123	0.08	0.4		
DYNAMIC CHARACTERISTICS							
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	All		29	60	pF
C_{oss}	Output Capacitance		All		10	15	pF
C_{rss}	Reverse Transfer Capacitance		All		2	6	pF
SWITCHING CHARACTERISTICS (Note 1)							
$t_{D(on)}$	Turn - On Delay Time	V_{DD} = 30 V, I_D = 0.28 A, V_{GS} = 10 V, R_{GEN} = 50 Ω	All			8	ns
t_r	Turn - On Rise Time		All			8	ns
$t_{D(off)}$	Turn - Off Delay Time		All			13	ns
t_f	Turn - Off Fall Time		All			16	ns
Q_g	Totall Gate Charge	V_{DS} = 10 V, I_D = 0.22 A, V_{GS} = 10 V,	All		1.4	2	nC
Q_{gs}	Gate-Source Charge		All		0.15	0.25	nC
Q_{gd}	Gate-Drain Charge		All		0.2	0.4	nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
I_S	Maximum Continuous Source Current		BSS100			0.22	A
			BSS123			0.17	
I_{SM}	Maximum Pulse Source Current (Note 1)		BSS100			0.9	A
			BSS123			0.68	
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 0.44 A	BSS100		0.9	1.3	V
		V_{GS} = 0 V, I_S = 0.34 A	BSS123		0.9	1.3	

Note:
1. Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2.0%.

Typical Electrical Characteristics

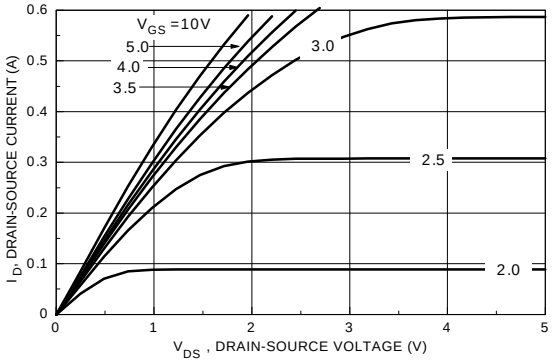


Figure 1. On-Region Characteristics.

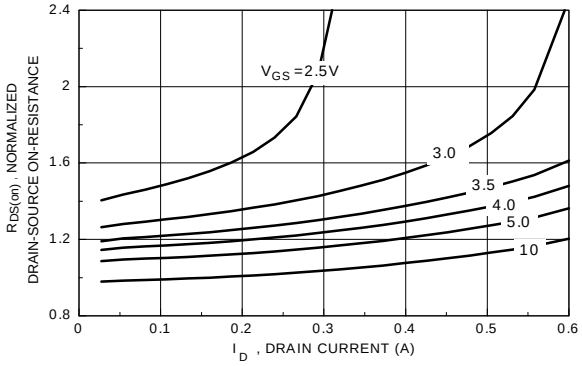


Figure 2. On-Resistance Variation with Gate Voltage and Drain Current.

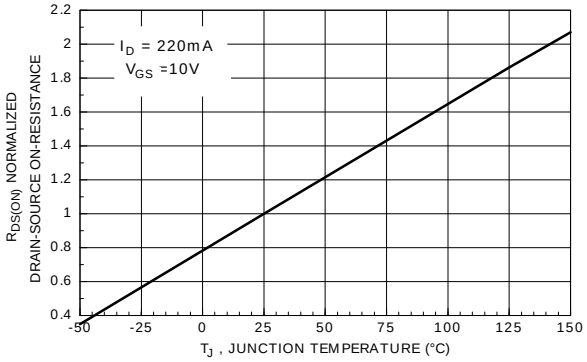


Figure 3. On-Resistance Variation with Temperature.

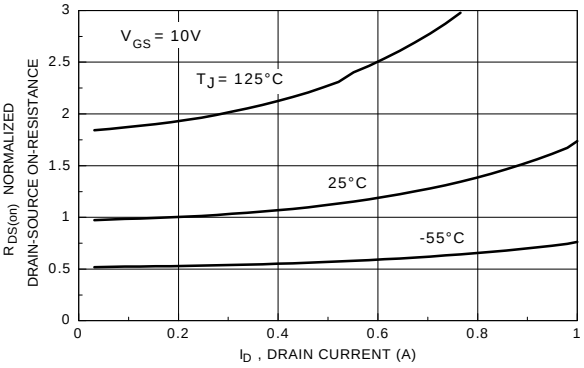


Figure 4. On-Resistance Variation with Drain Current and Temperature.

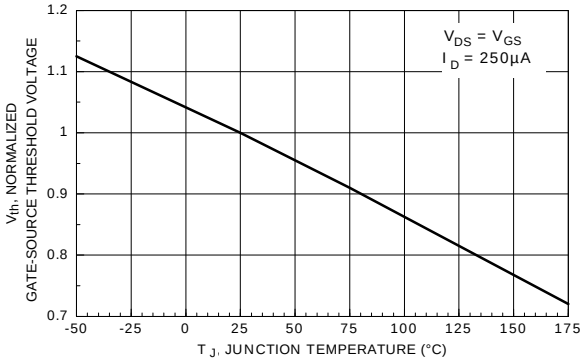


Figure 5. Gate Threshold Variation with Temperature.

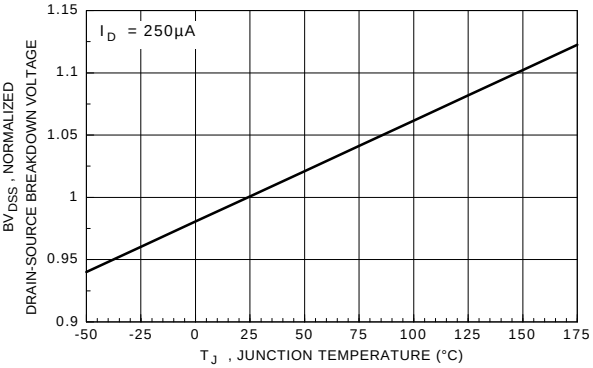


Figure 6. Breakdown Voltage Variation with Temperature.

Typical Electrical Characteristics (continued)

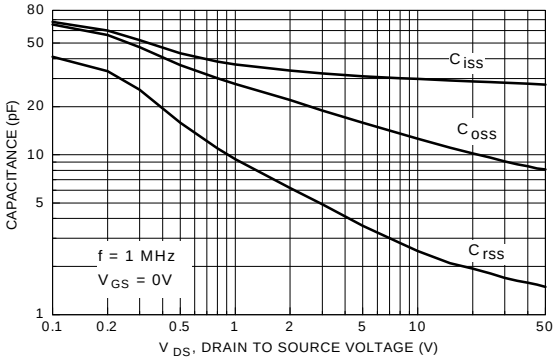


Figure 7. Capacitance Characteristics.

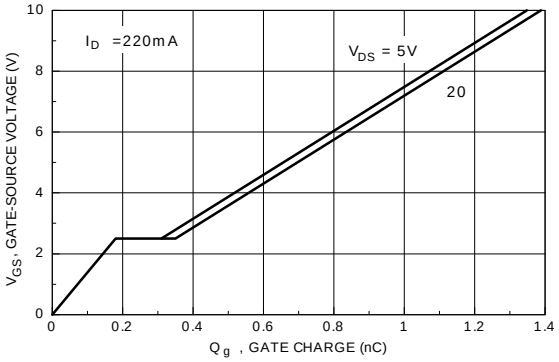


Figure 8. Gate Charge Characteristics.

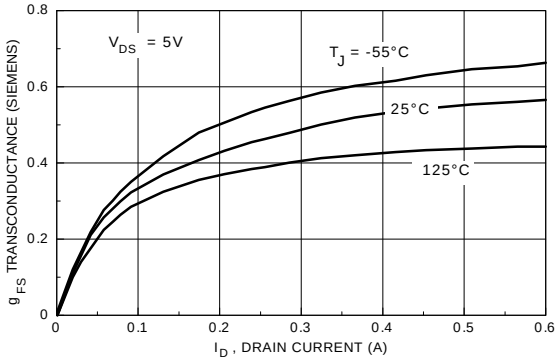


Figure 9. Transconductance Variation with Drain Current and Temperature.

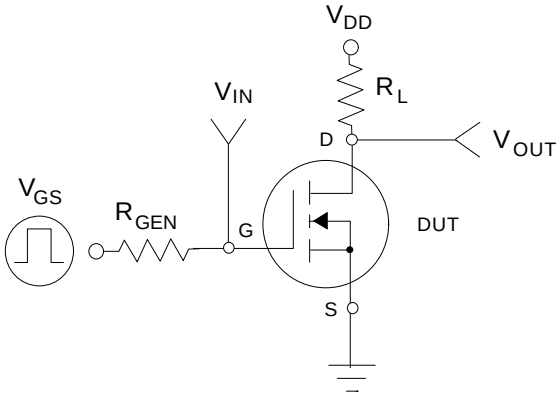


Figure 10. Switching Test Circuit.

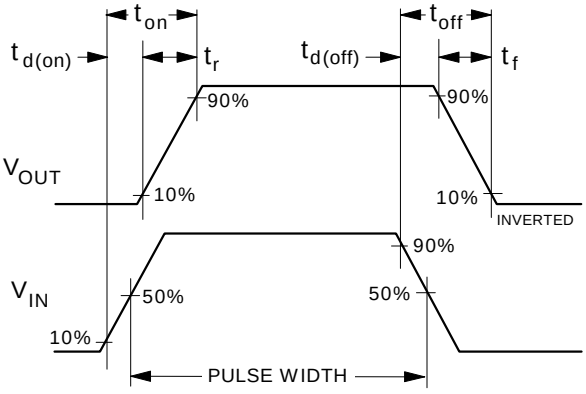


Figure 11. Switching Waveforms.

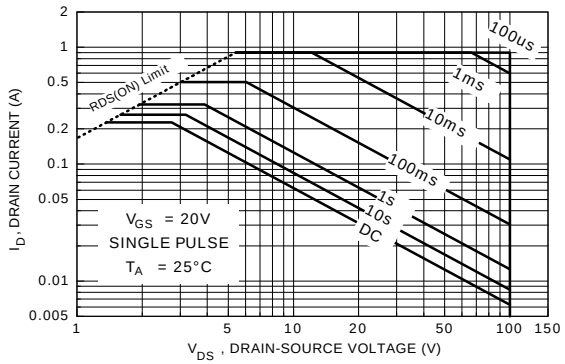


Figure 12. BSS100 Maximum Safe Operating Area.

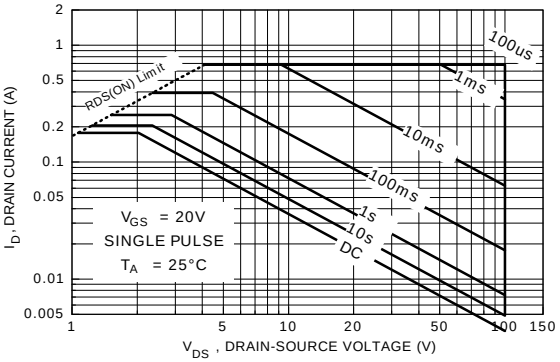


Figure 13. BSS123 Maximum Safe Operating Area.

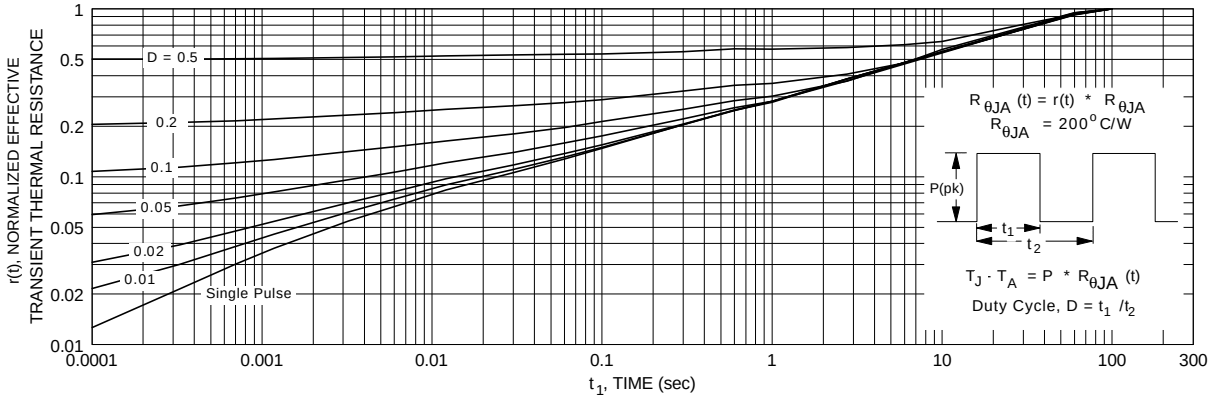


Figure 14. BSS100 Transient Thermal Response Curve.

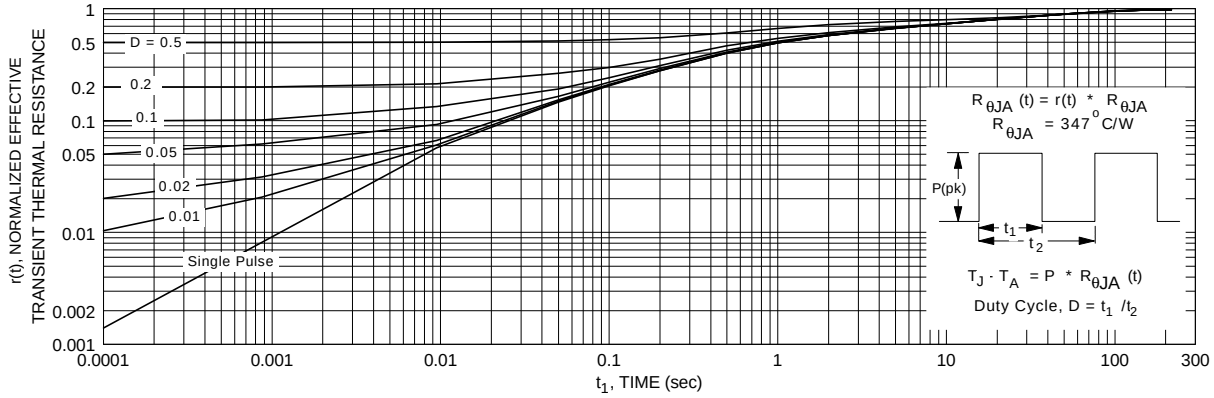


Figure 15. BSS123 Transient Thermal Response Curve.

TO-92 Package Dimensions

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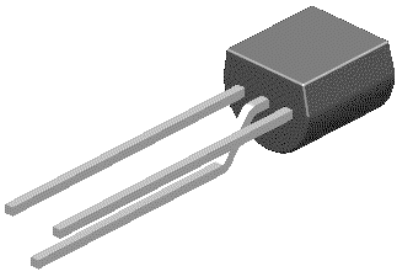
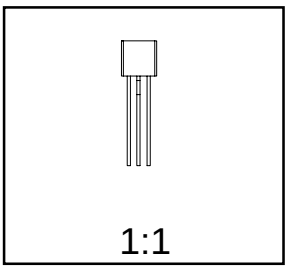
TO-92; TO-18 Reverse Lead Form (J35Z Option) (FS PKG Code 92, 94, 96)

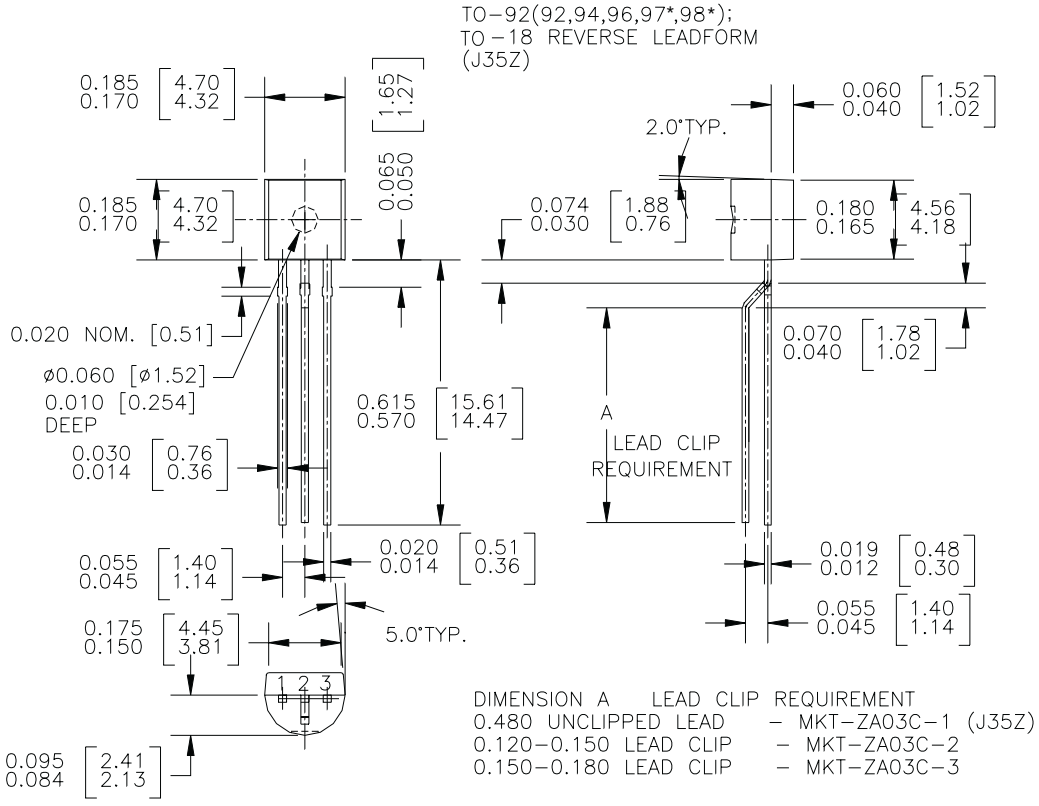




Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.22



DIMENSION A LEAD CLIP REQUIREMENT
0.480 UNCLIPPED LEAD – MKT−ZA03C−1 (J35Z)
0.120−0.150 LEAD CLIP – MKT−ZA03C−2
0.150−0.180 LEAD CLIP – MKT−ZA03C−3

Note: All package 97 or 98 transistors are leadformed to this configuration prior to bulk shipment. Order L34Z option if in-line leads are preferred on package 97 or 98.

***** Standard Option on 97 & 98 package code

January 2000, Rev. B

SOT-23 Tape and Reel Data and Package Dimensions

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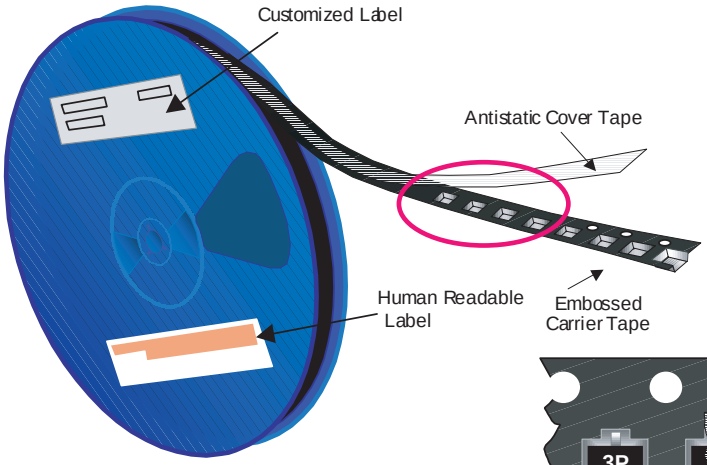
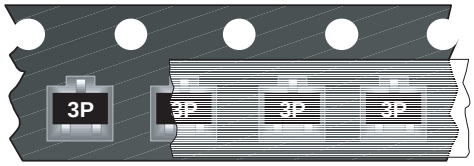
SOT-23 Packaging Configuration: Figure 10



Packaging Description:

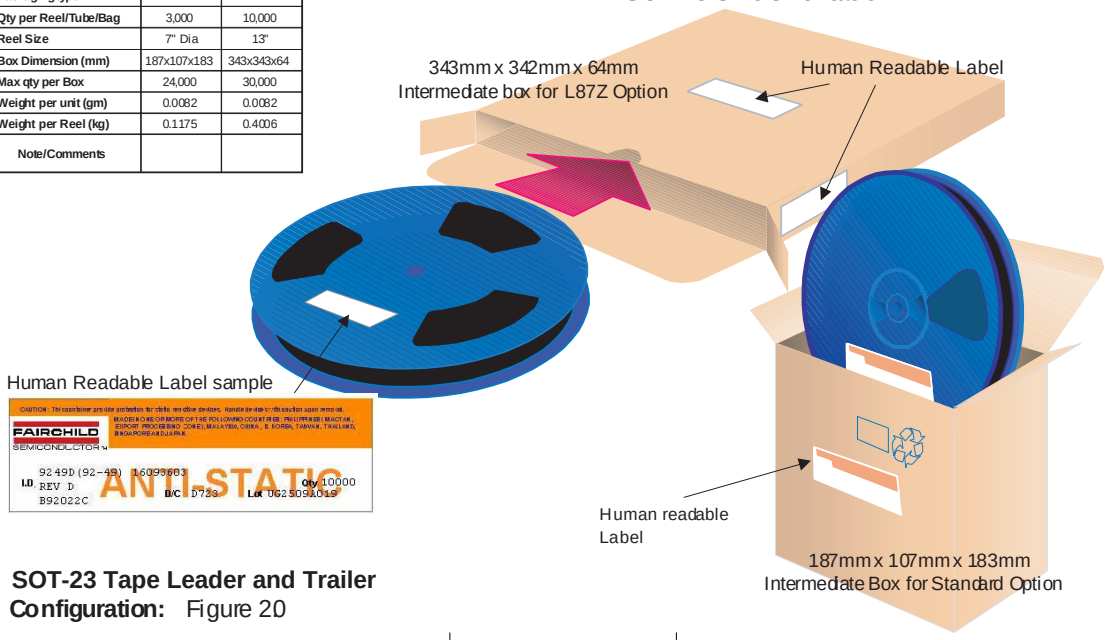
SOT-23 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in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

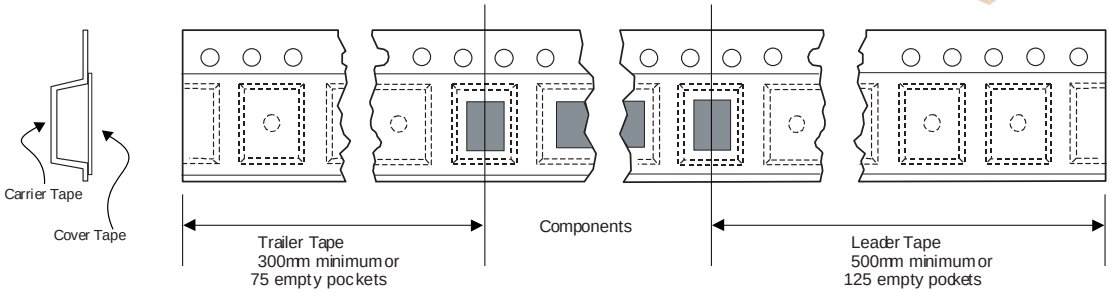


SOT-23 Packaging Information		
Packaging Option	Standard (no flow code)	D87Z
Packaging type	TNR	TNR
Qty per Reel/Tube/Bag	3,000	10,000
Reel Size	7" Dia	13"
Box Dimension (mm)	187x107x183	343x343x64
Max qty per Box	24,000	30,000
Weight per unit (gm)	0.0082	0.0082
Weight per Reel (kg)	0.1175	0.4006
Note/Comments		

SOT-23 Unit Orientation

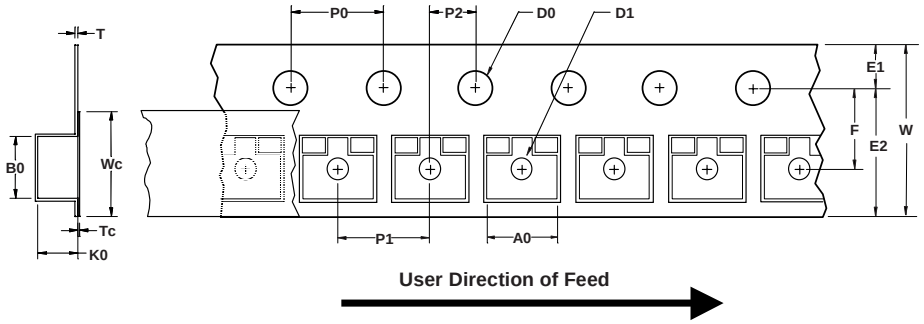


SOT-23 Tape Leader and Trailer Configuration: Figure 20



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

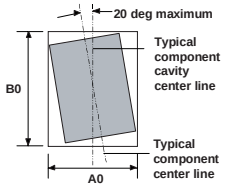
SOT-23 Embossed Carrier Tape
Configuration: Figure 3.0



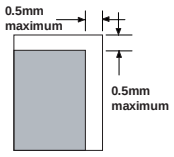
Dimensions are in millimeter														
Pkg type	**A0**	**B0**	**W**	**D0**	**D1**	**E1**	**E2**	**F**	**P1**	**P0**	**K0**	**T**	**Wc**	**Tc**
SOT-23 (8mm)	3.15 +/-0.10	2.77 +/-0.10	8.0 +/-0.3	1.55 +/-0.05	1.125 +/-0.125	1.75 +/-0.10	6.25 min	3.50 +/-0.05	4.0 +/-0.1	4.0 +/-0.1	1.30 +/-0.10	0.228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

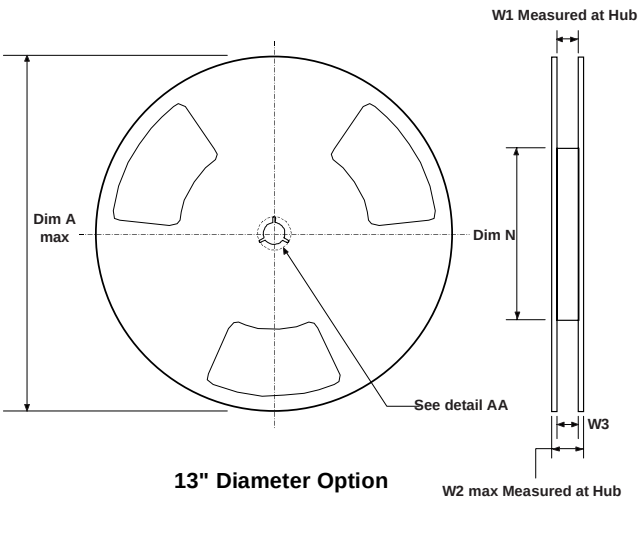


Sketch B (Top View)
Component Rotation

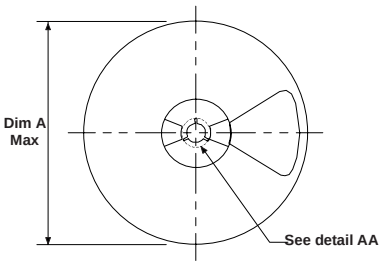


Sketch C (Top View)
Component lateral movement

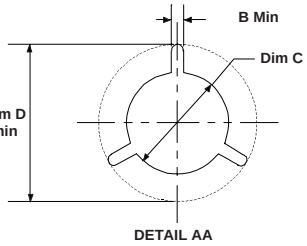
SOT-23 Reel Configuration: Figure 4.0



13" Diameter Option



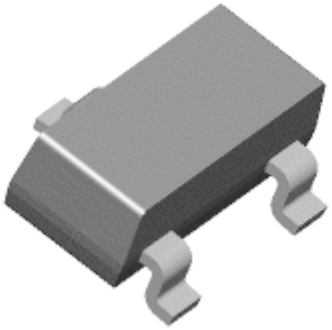
7" Diameter Option

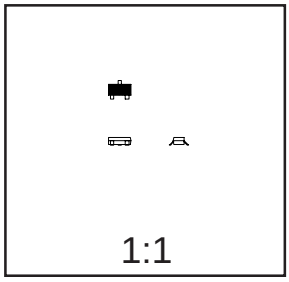


Dimensions are in inches and millimeters									
Tape Size	**Reel Option**	**Dim A**	**Dim B**	**Dim C**	**Dim D**	**Dim N**	**Dim W1**	**Dim W2**	**Dim W3 (LSL-USL)**
8mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	2.165 55	0.331 +0.059/-0.000 8.4 +1.5/0	0.567 14.4	0.311 –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

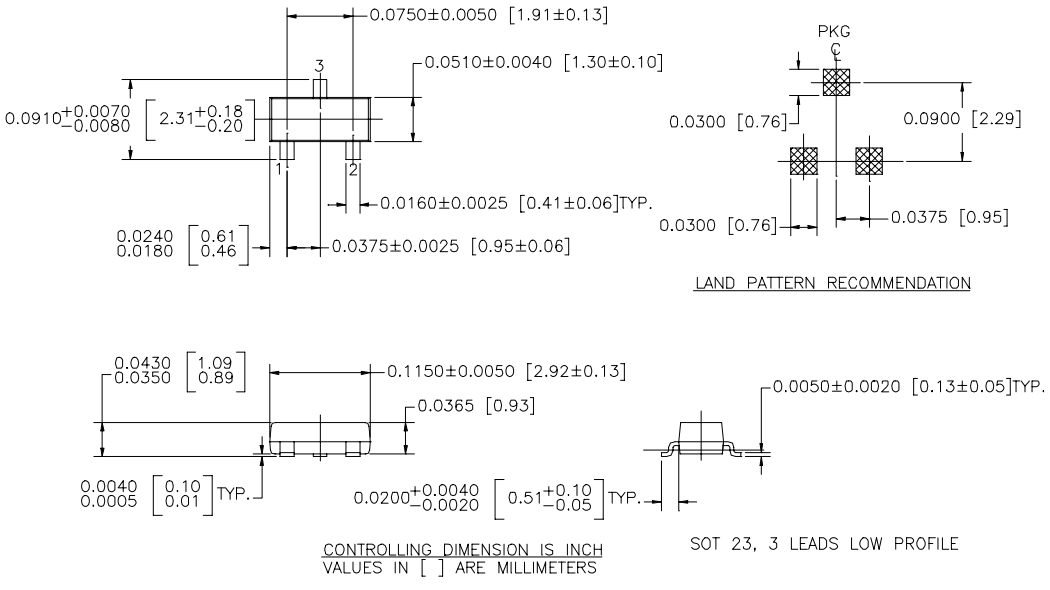




Scale 1:1 on letter size paper

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

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SuperSOT™-6
SuperSOT™-8
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UHC™
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As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

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.

PRODUCT STATUS DEFINITIONS

Definition of Terms

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.