

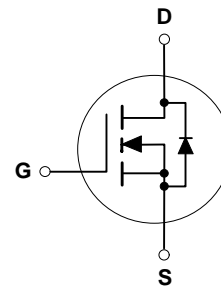
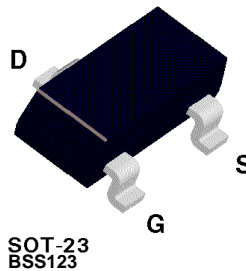
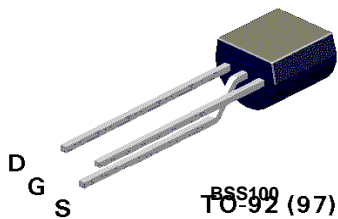
## BSS100 / BSS123 N-Channel Logic Level Enhancement Mode Field Effect Transistor

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



### Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	BSS100	BSS123	Units
$V_{DS}$	Drain-Source Voltage		100	V
$V_{DGR}$	Drain-Gate Voltage ( $R_{GS} \leq 20K\Omega$ )		100	V
$V_{GSS}$	Gate-Source Voltage - Continuous		$\pm 14$	V
	- Non Repetitive ( $T_p < 50 \mu\text{S}$ )		$\pm 20$	
$I_D$	Drain Current - Continuous	0.22	0.17	A
	- Pulsed	0.9	0.68	
$P_D$	Total Power Dissipation @ $T_A = 25^\circ\text{C}$	0.63	0.36	W
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to 150		$^\circ\text{C}$
$T_L$	Maximum Lead Temperature for Soldering Purposes, 1/16" from Case for 10 Seconds	300		$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Symbol	Parameter	BSS100	BSS123	Units
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	200	350	$^\circ\text{C/W}$

**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Type	Min	Typ	Max	Units
<b>OFF CHARACTERISTICS</b>							
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	All	100			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$	BSS100			15	$\mu\text{A}$
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$	BSS123			1	$\mu\text{A}$
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$	All			60	$\mu\text{A}$
		$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$	BSS100			10	nA
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$	BSS123			10	nA
$I_{GSSF}$	Gate - Body Leakage, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$	BSS100			10	nA
		$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$	BSS123			50	nA
<b>ON CHARACTERISTICS</b> (Note 1)							
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 1\text{ mA}$	All	0.8	1.4	2	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 0.22\text{ A}$	BSS100		2.8	6	$\Omega$
		$V_{GS} = 10\text{ V}, I_D = 0.17\text{ A}$	BSS123		2.8	6	
		$V_{GS} = 4.5\text{ V}, I_D = 0.22\text{ A}$	BSS100		3.2	10	
		$V_{GS} = 4.5\text{ V}, I_D = 0.17\text{ A}$	BSS123		3.2	10	
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 0.22\text{ A}$	BSS100	0.08	0.4		S
		$V_{DS} = 10\text{ V}, I_D = 0.17\text{ A}$	BSS123	0.08	0.4		
<b>DYNAMIC CHARACTERISTICS</b>							
$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	All		29	60	pF
$C_{oss}$	Output Capacitance		All		10	15	pF
$C_{riss}$	Reverse Transfer Capacitance		All		2	6	pF
<b>SWITCHING CHARACTERISTICS</b> (Note 1)							
$t_{D(on)}$	Turn - On Delay Time	$V_{DD} = 30\text{ V}, I_D = 0.28\text{ A},$ $V_{GS} = 10\text{ V}, R_{GEN} = 50\ \Omega$	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
$Q_g$	Total Gate Charge		$V_{DS} = 10\text{ V}, I_D = 0.22\text{ A},$ $V_{GS} = 10\text{ V},$	All		1.4	2
$Q_{gs}$	Gate-Source Charge	All			0.15	0.25	nC
$Q_{gd}$	Gate-Drain Charge	All			0.2	0.4	nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>							
$I_S$	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	$V_{GS} = 0\text{ V}, I_S = 0.44\text{ A}$	BSS100		0.9	1.3	V
		$V_{GS} = 0\text{ V}, I_S = 0.34\text{ A}$	BSS123		0.9	1.3	

Note:

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

## Typical Electrical Characteristics

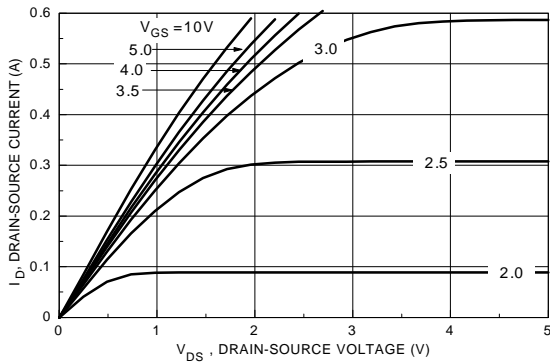


Figure 1. On-Region Characteristics.

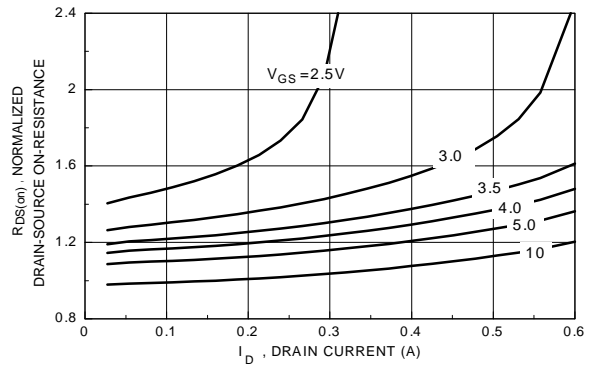


Figure 2. On-Resistance Variation with Gate Voltage and Drain Current.

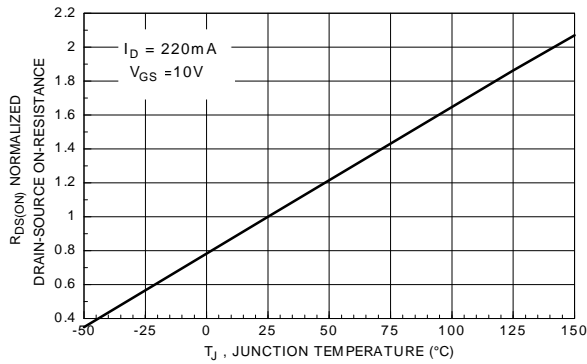


Figure 3. On-Resistance Variation with Temperature.

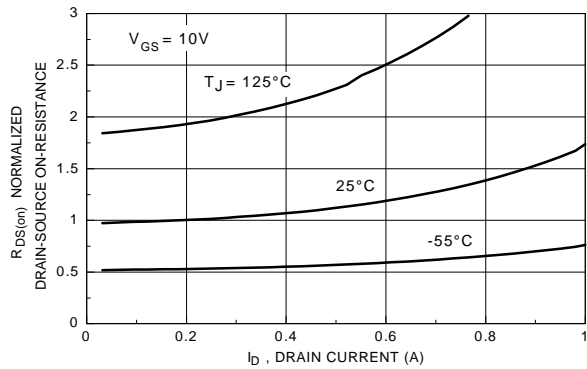


Figure 4. On-Resistance Variation with Drain Current and Temperature.

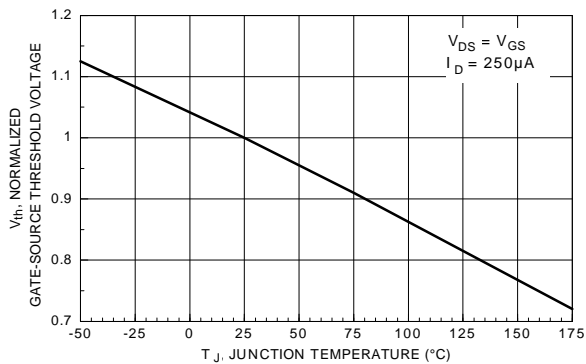


Figure 5. Gate Threshold Variation with Temperature.

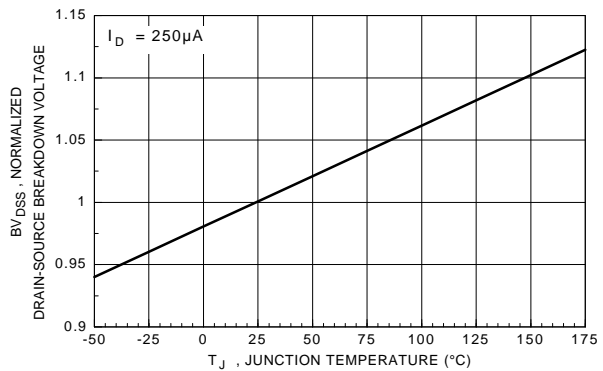


Figure 6. Breakdown Voltage Variation with Temperature.

## Typical Electrical Characteristics (continued)

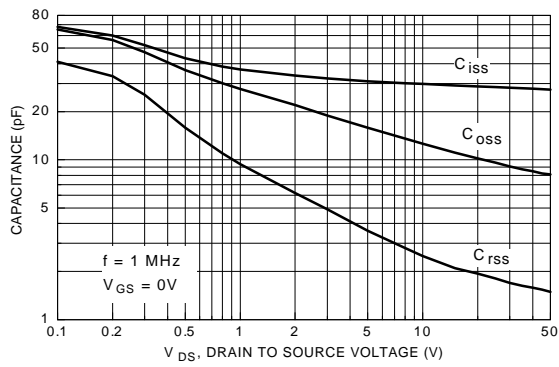


Figure 7. Capacitance Characteristics.

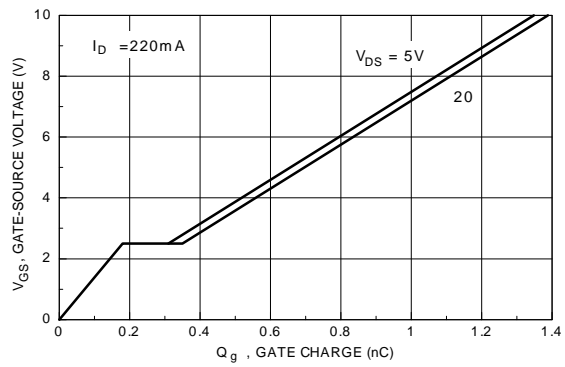


Figure 8. Gate Charge Characteristics.

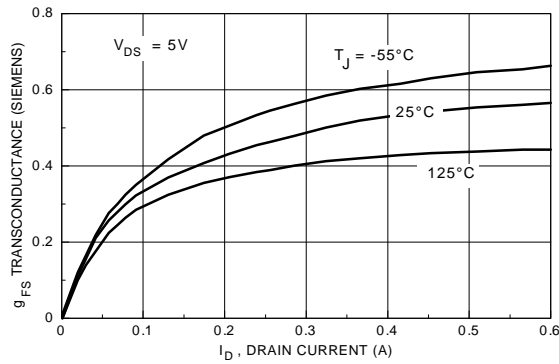


Figure 9. Transconductance Variation with Drain Current and Temperature.

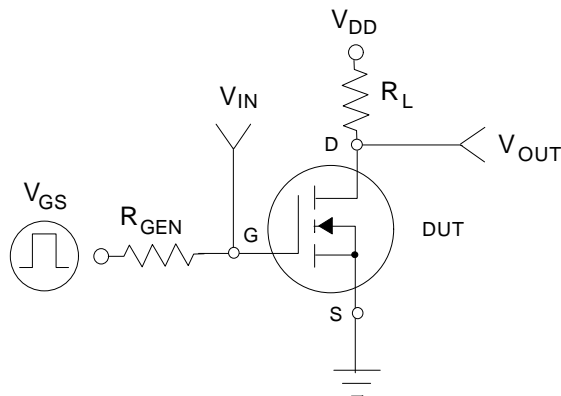


Figure 10. Switching Test Circuit.

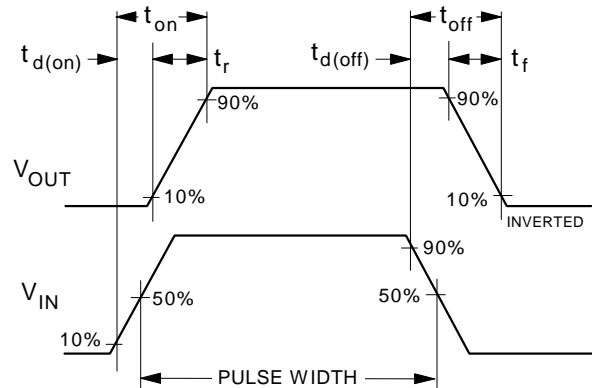


Figure 11. Switching Waveforms.

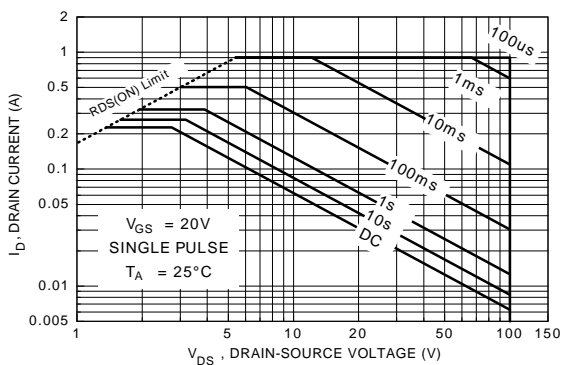


Figure 12. BSS100 Maximum Safe Operating Area.

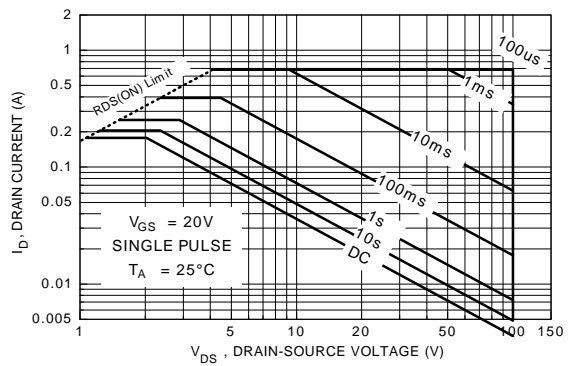


Figure 13. BSS123 Maximum Safe Operating Area.

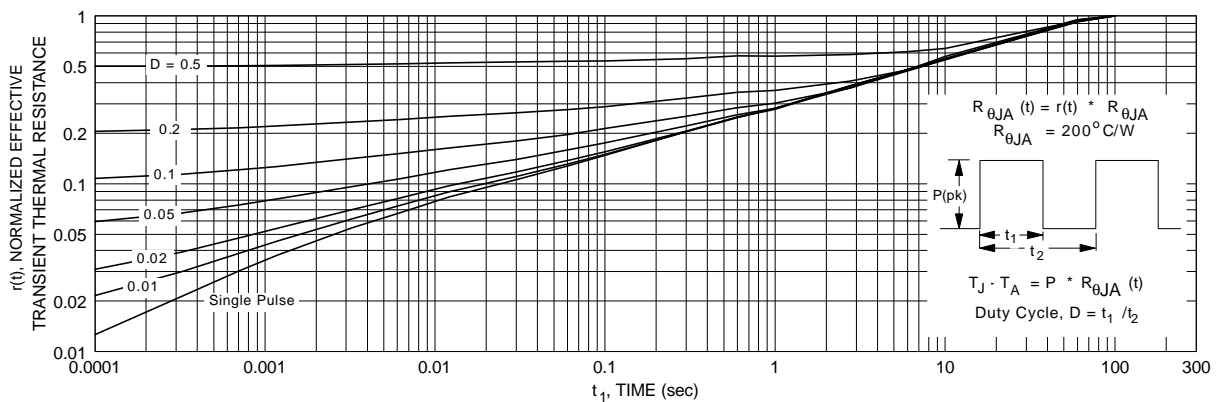


Figure 14. BSS100 Transient Thermal Response Curve.

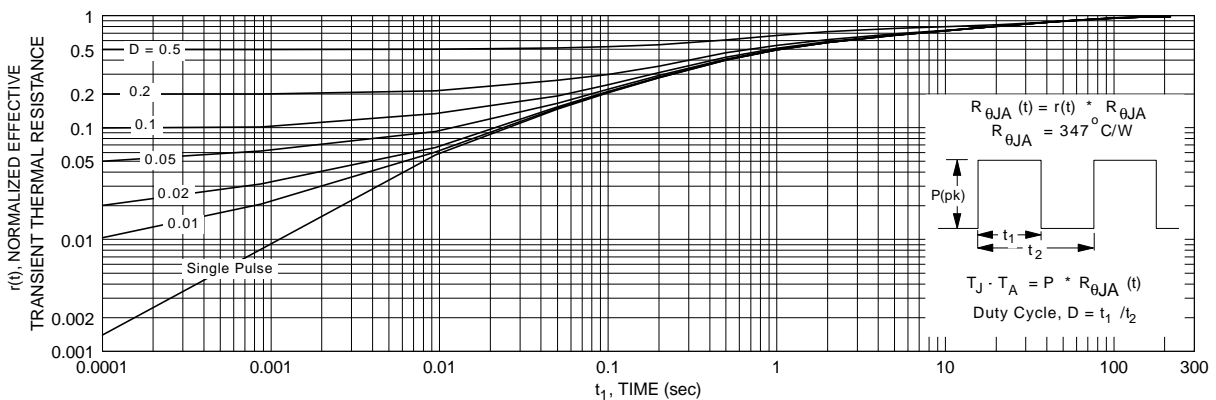
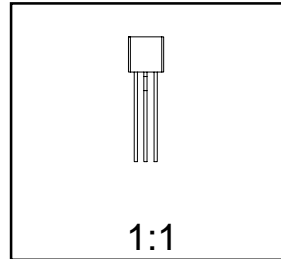
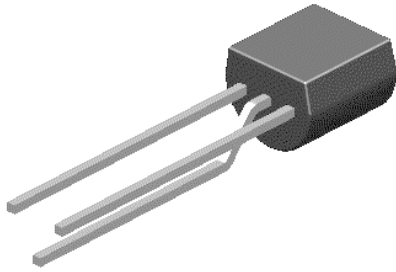


Figure 15. BSS123 Transient Thermal Response Curve.

# TO-92 Package Dimensions



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

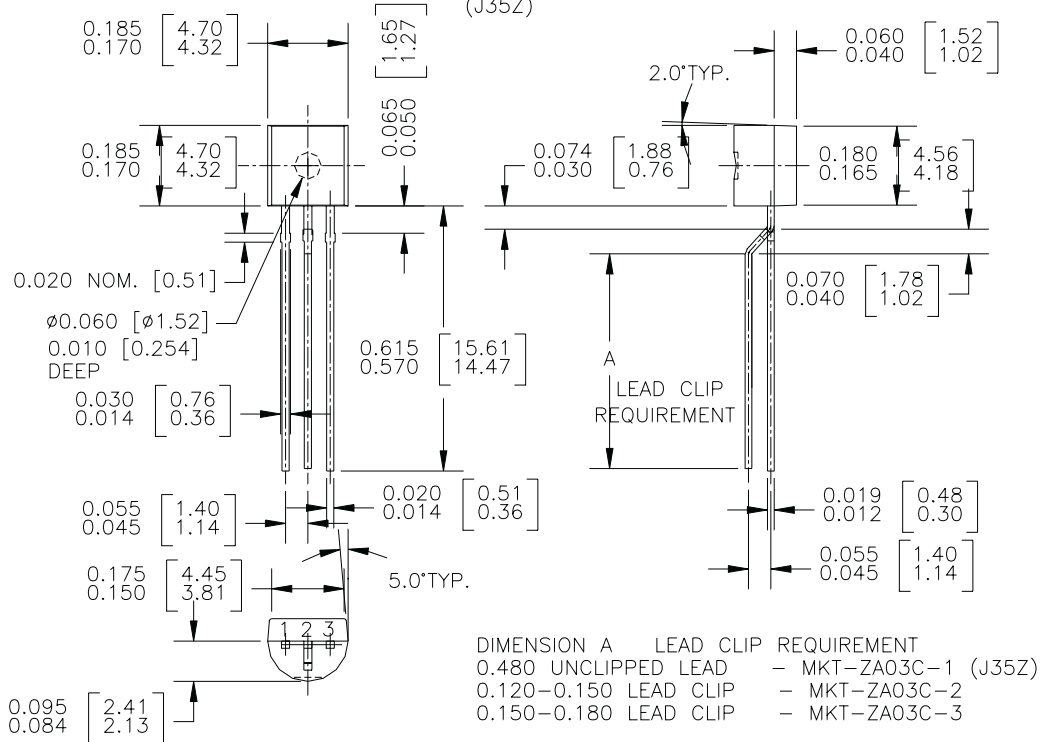


Scale 1:1 on letter size paper

Dimensions shown below are in:  
inches [millimeters]

Part Weight per unit (gram): 0.22

TO-92(92,94,96,97\*,98\*);  
TO-18 REVERSE LEADFORM  
(J35Z)



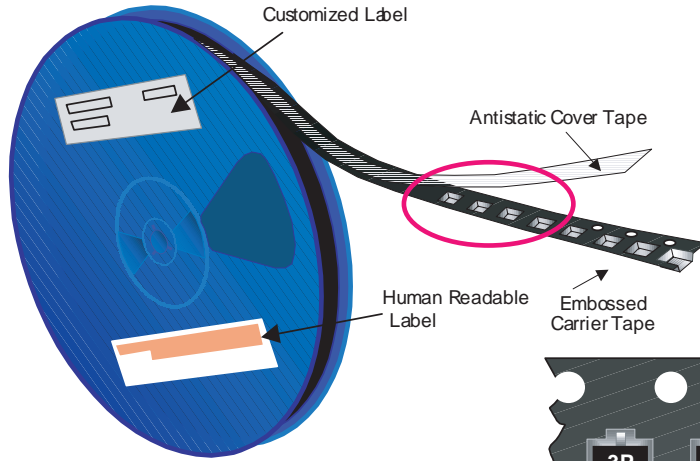
**Note:** All package 97 or 98 transistors are leadformed to this configuration prior to bulk shipment. Order L34Z option if in-line leads are preferred on package 97 or 98.

\* Standard Option on 97 & 98 package code

# SOT-23 Tape and Reel Data and Package Dimensions



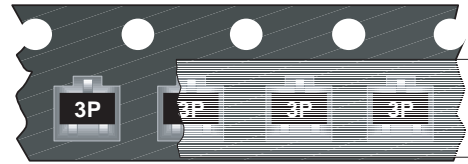
## SOT-23 Packaging Configuration: Figure 10



### Packaging Description:

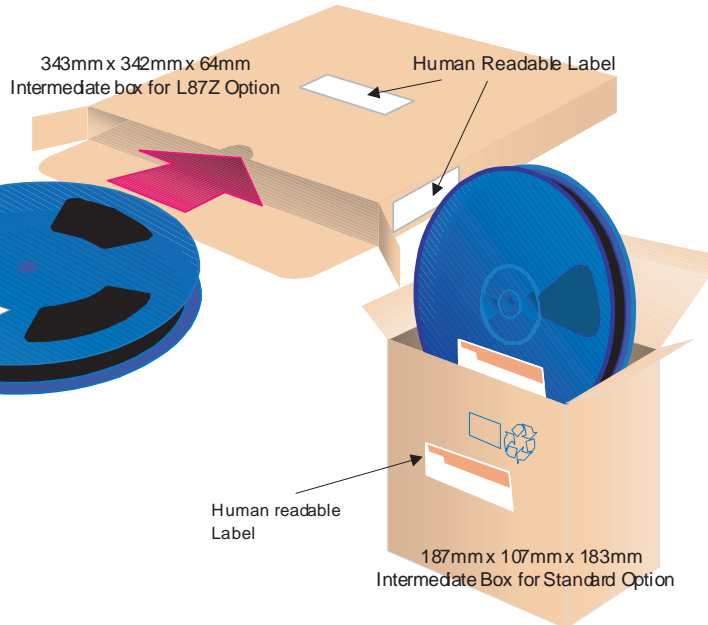
SOT-23 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 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 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		

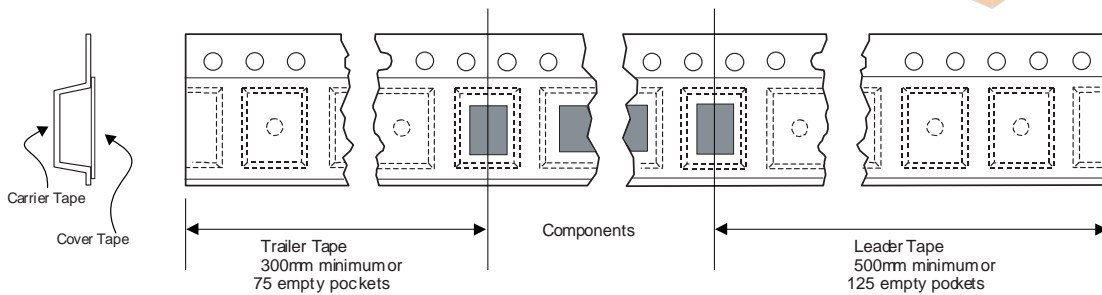
### SOT-23 Unit Orientation



### Human Readable Label sample

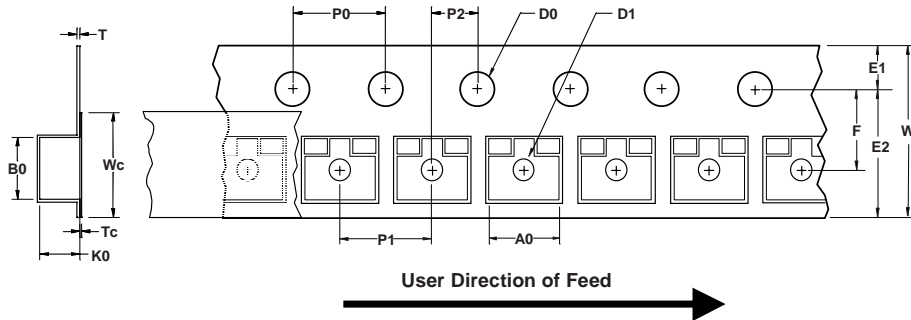


### SOT-23 Tape Leader and Trailer Configuration: Figure 20



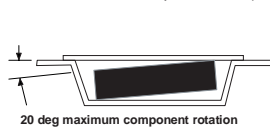
# SOT-23 Tape and Reel Data and Package Dimensions, continued

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

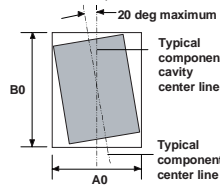


Dimensions are in millimeter														
Pkg type	A0	B0	W	D0	D1	E1	E2	F	P1	P0	K0	T	Wc	Tc
SOT-23 (8mm)	3.15 ±0.10	2.77 ±0.10	8.0 ±0.3	1.55 ±0.05	1.125 ±0.125	1.75 ±0.10	6.25 min	3.50 ±0.05	4.0 ±0.1	4.0 ±0.1	1.30 ±0.10	0.228 ±0.013	5.2 ±0.3	0.06 ±0.02

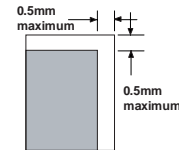
Notes: A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



Sketch A (Side or Front Sectional View)  
Component Rotation

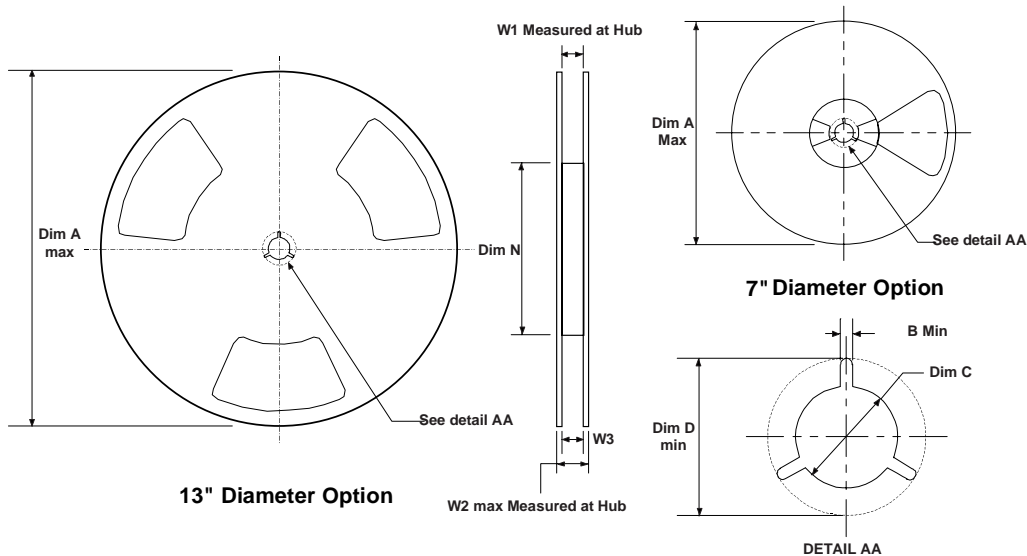


Sketch B (Top View)  
Component Rotation



Sketch C (Top View)  
Component lateral movement

## SOT-23 Reel Configuration: Figure 4.0

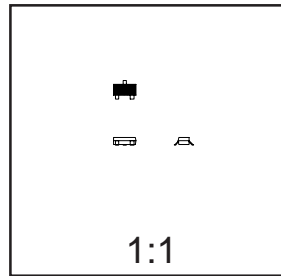
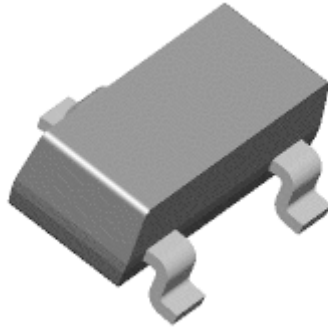


Dimensions are in inches and millimeters									
Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim W1	Dim W2	Dim W3 (LSL-USL)
8mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	2.165 55	0.331 +0.059/-0.000 8.4 +1.5/0	0.567 14.4	0.311 -0.429 7.9 - 10.9
8mm	13" Dia	13.00 330	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

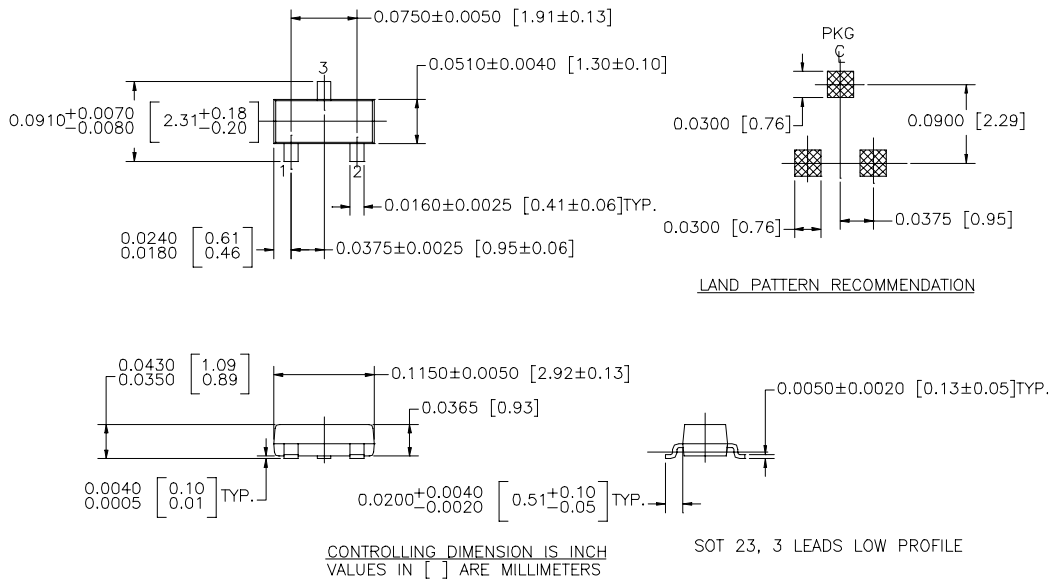
## SOT-23 (FS PKG Code 49)



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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CROSSVOLT™	POP™	UHC™
E <sup>2</sup> CMOS™	PowerTrench®	VCX™
FACT™	QFET™	
FACT Quiet Series™	QS™	
FAST®	Quiet Series™	
FASTr™	SuperSOT™-3	
GTO™	SuperSOT™-6	
HiSeC™	SuperSOT™-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.

## 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.