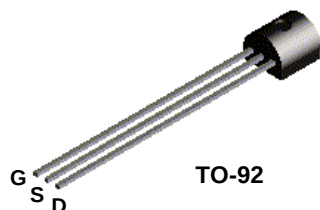


**J309
J310**



**MMBFJ309
MMBFJ310**



N-Channel RF Amplifier

This device is designed for VHF/UHF amplifier, oscillator and mixer applications. As a common gate amplifier, 16 dB at 100 MHz and 12 dB at 450 MHz can be realized. Sourced from Process 92.

Absolute Maximum Ratings*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V _{DS}	Drain-Source Voltage	25	V
V _{GS}	Gate-Source Voltage	- 25	V
I _{GF}	Forward Gate Current	10	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.

Thermal Characteristics

TA = 25°C unless otherwise noted

Symbol	Characteristic	Max		Units
		J309 / J310	*MMBFJ309	
P _D	Total Device Dissipation	350	225	mW
	Derate above 25°C	2.8	1.8	mW/°C
R _{θJC}	Thermal Resistance, Junction to Case	125		°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient	357	556	°C/W

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

N-Channel RF Amplifier

(continued)

Electrical Characteristics

TA = 25°C unless otherwise noted

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

OFF CHARACTERISTICS

$V_{(BR)GSS}$	Gate-Source Breakdown Voltage	$I_G = -1.0 \mu A, V_{DS} = 0$	-25			V
I_{GSS}	Gate Reverse Current	$V_{GS} = -15 V, V_{DS} = 0$ $V_{GS} = -15 V, V_{DS} = 0, T_A = 125^\circ C$			-1.0 -1.0	nA μA
$V_{GS(off)}$	Gate-Source Cutoff Voltage	$V_{DS} = 10 V, I_D = 1.0 nA$ J309 J310	-1.0 -2.0		-4.0 -6.5	V V

ON CHARACTERISTICS

I_{DSS}	Zero-Gate Voltage Drain Current*	$V_{DS} = 10 V, V_{GS} = 0$ J309 J310	12 24		30 60	mA mA
$V_{GS(f)}$	Gate-Source Forward Voltage	$V_{DS} = 0, I_G = 1.0 mA$			1.0	V

SMALL SIGNAL CHARACTERISTICS

$Re(Y_{is})$	Common-Source Input Conductance	$V_{DS} = 10, I_D = 10 mA, f = 100 MHz$ J309 J310		0.7 0.5		mmhos mmhos
$Re(Y_{os})$	Common-Source Output Conductance	$V_{DS} = 10, I_D = 10 mA, f = 100 MHz$		0.25		mmhos
G_{pg}	Common-Gate Power Gain	$V_{DS} = 10, I_D = 10 mA, f = 100 MHz$		16		dB
$Re(Y_{fs})$	Common-Source Forward Transconductance	$V_{DS} = 10, I_D = 10 mA, f = 100 MHz$		12		mmhos
$Re(Y_{fg})$	Common-Gate Input Conductance	$V_{DS} = 10, I_D = 10 mA, f = 100 MHz$		12		mmhos
g_{fs}	Common-Source Forward Transconductance	$V_{DS} = 10, I_D = 10 mA, f = 1.0 kHz$ J309 J310	10,000 8000		20,000 18,000	$\mu mhos$ $\mu mhos$
g_{os}	Common-Source Output Conductance	$V_{DS} = 10, I_D = 10 mA, f = 1.0 kHz$			150	$\mu mhos$
g_{fg}	Common-Gate Forward Conductance	$V_{DS} = 10, I_D = 10 mA, f = 1.0 kHz$ J309 J310		13,000 12,000		$\mu mhos$ $\mu mhos$
g_{og}	Common-Gate Output Conductance	$V_{DS} = 10, I_D = 10 mA, f = 1.0 kHz$ J309 J310		100 150		$\mu mhos$ $\mu mhos$
C_{dg}	Drain-Gate Capacitance	$V_{DS} = 0, V_{GS} = -10, f = 1.0 MHz$		2.0	2.5	pF
C_{sg}	Source-Gate Capacitance	$V_{DS} = 0, V_{GS} = -10, f = 1.0 MHz$		4.1	5.0	pF
NF	Noise Figure	$V_{DS} = 10 V, I_D = 10 mA,$ $f = 450 MHz$		3.0		dB
e_n	Equivalent Short-Circuit Input Noise Voltage	$V_{DS} = 10 V, I_D = 10 mA,$ $f = 100 Hz$		6.0		nV/ $\sqrt{Hz}$

*Pulse Test: Pulse Width $\leq 300 ms$, Duty Cycle $\leq 2.0\%$

J309 / J310 / MMBFJ309 / MMBFJ310

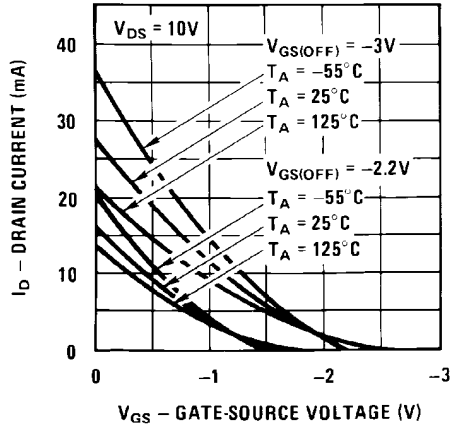
N-Channel RF Amplifier

(continued)

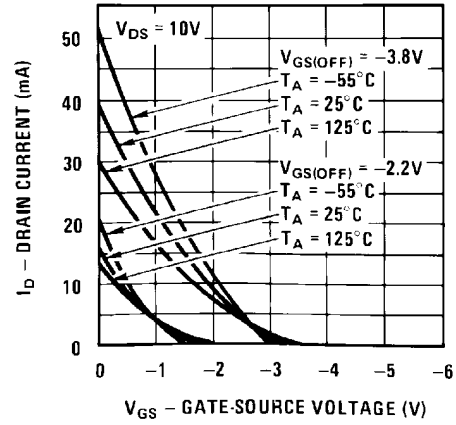
J309 / J310 / MMBFJ309 / MMBFJ310

Typical Characteristics

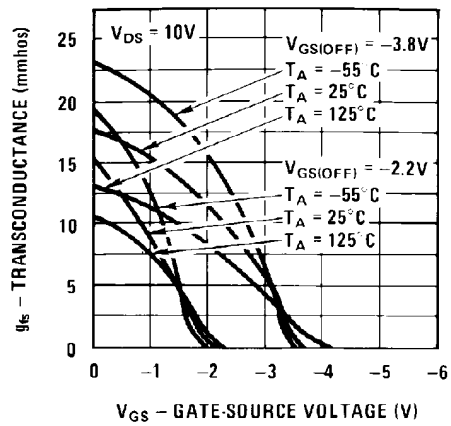
Transfer Characteristics



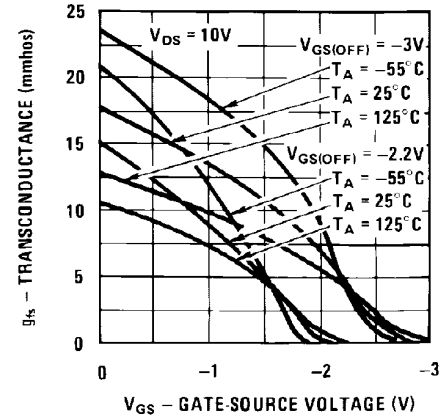
Transfer Characteristics



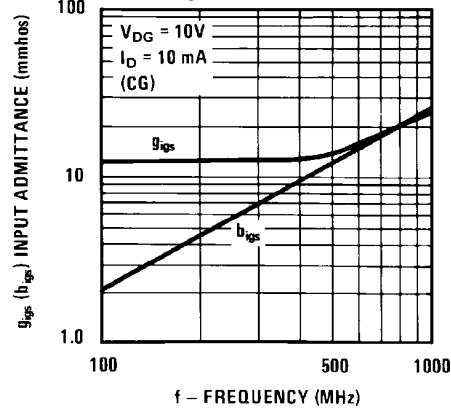
Transfer Characteristics



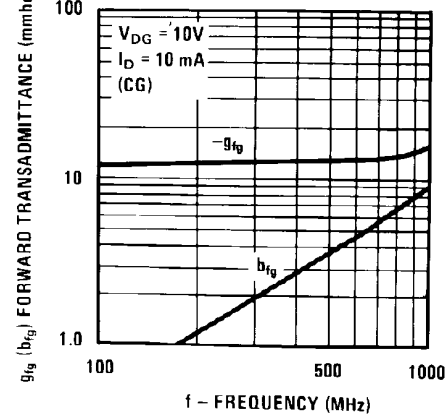
Transfer Characteristics



Input Admittance



Forward Transadmittance

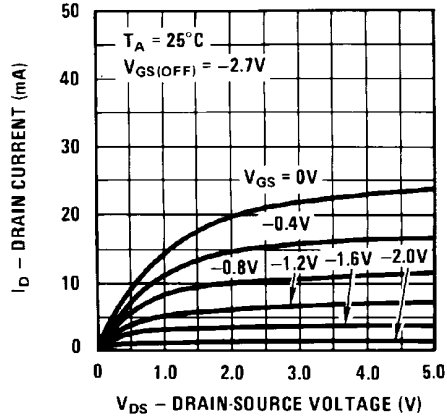


N-Channel RF Amplifier (continued)

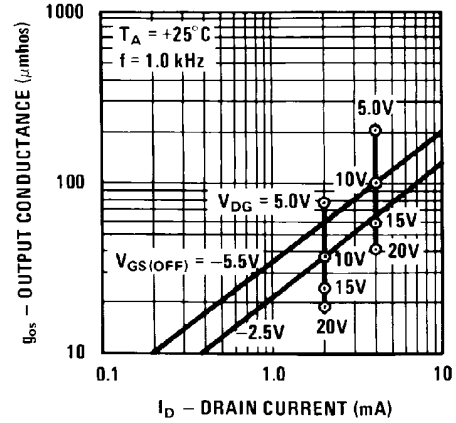
J309 / J310 / MMBFJ309 / MMBFJ310

Typical Characteristics (continued)

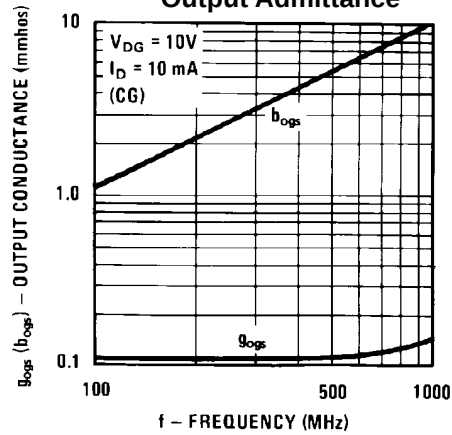
Common Drain-Source



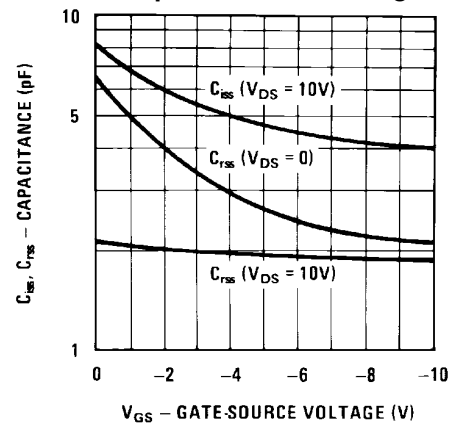
Output Conductance vs. Drain Current



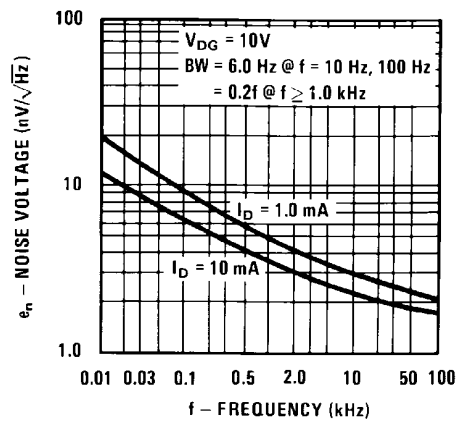
Output Admittance



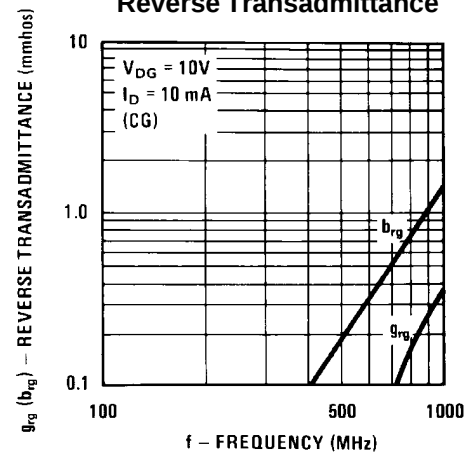
Capacitance vs. Voltage



Noise Voltage vs. Frequency



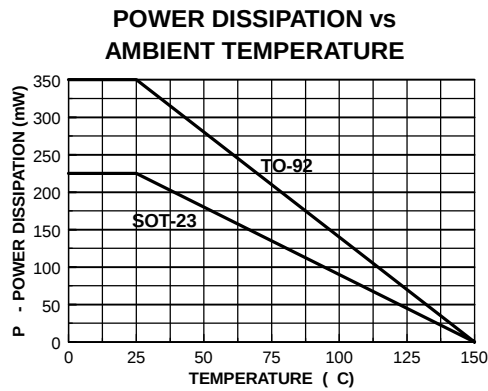
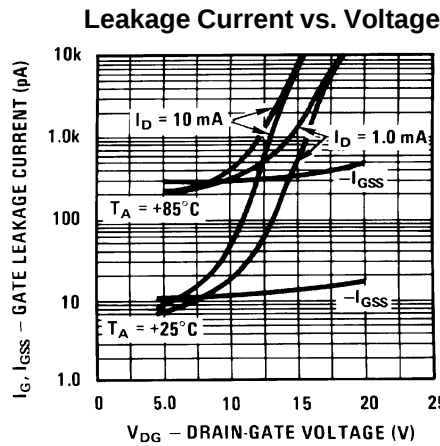
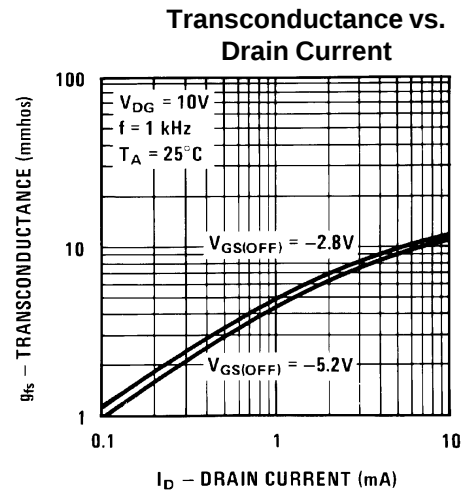
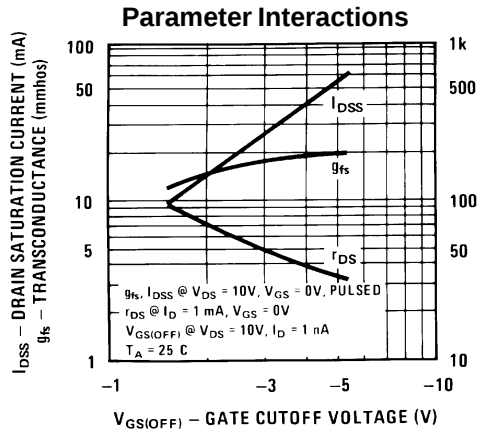
Reverse Transadmittance



N-Channel RF Amplifier (continued)

J309 / J310 / MMBFJ309 / MMBFJ310

Typical Characteristics (continued)



TO-92 Tape and Reel Data and Package Dimensions



TO-92 Packaging Configuration: Figure 1.0

FSCINT Label sample



F63TNR Label sample



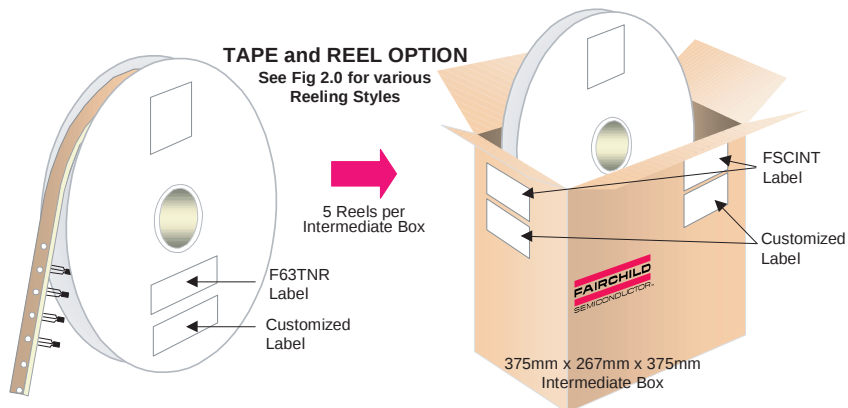
TO-92 TNR/AMMO PACKING INFORMATION

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

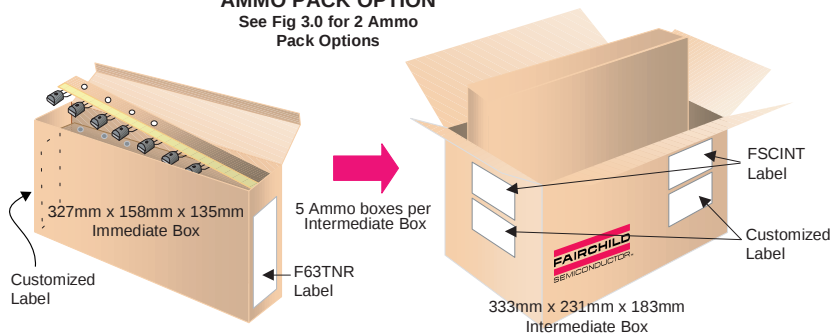
TAPE and REEL OPTION

See Fig 2.0 for various Reeling Styles



AMMO PACK OPTION

See Fig 3.0 for 2 Ammo Pack Options

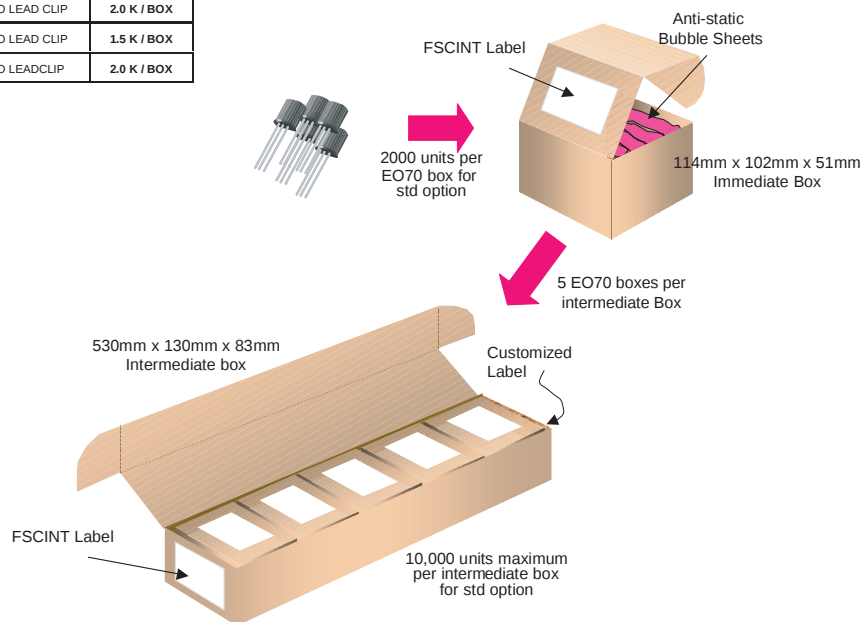


(TO-92) BULK PACKING INFORMATION

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	NO LEADCLIP	2.0 K / BOX

BULK OPTION

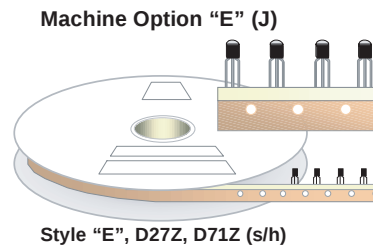
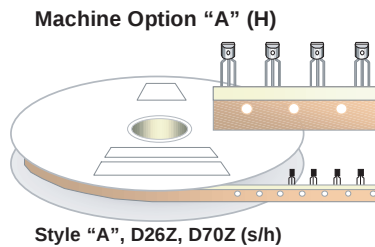
See Bulk Packing Information table



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

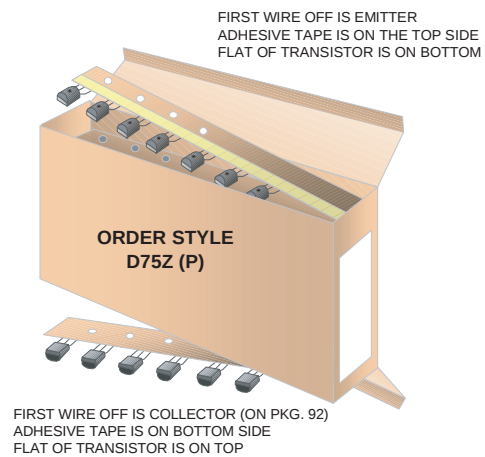
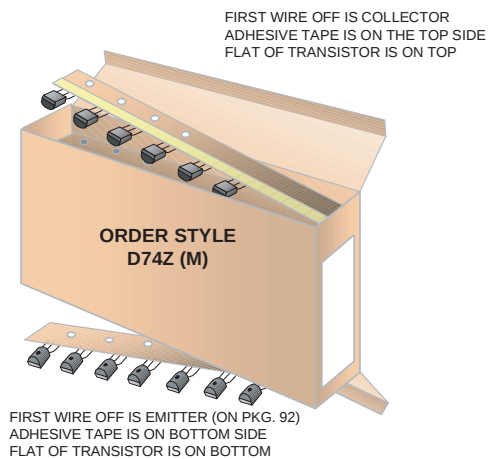
TO-92 Reeling Style

Configuration: Figure 2.0



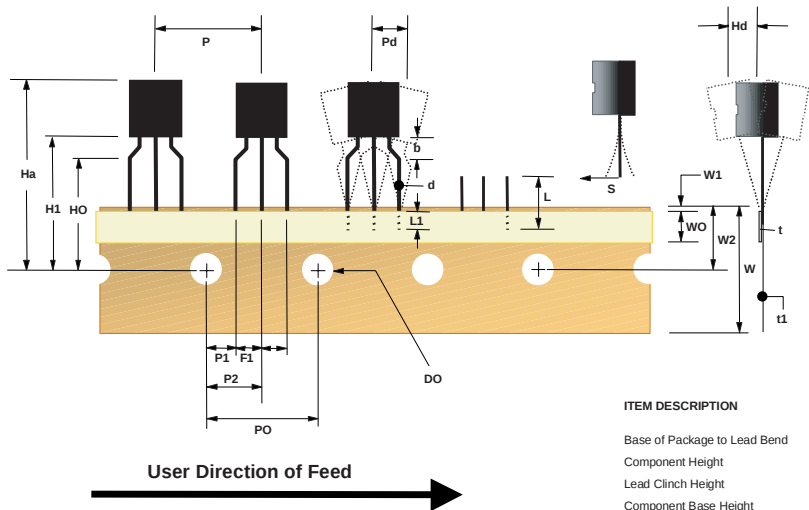
TO-92 Radial Ammo Packaging

Configuration: Figure 3.0



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

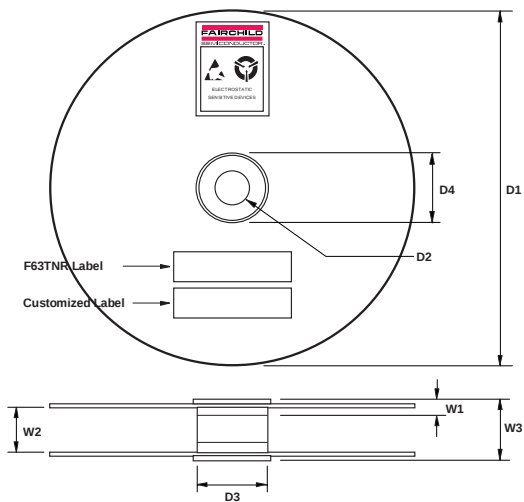
TO-92 Tape and Reel Taping
Dimension Configuration: Figure 4.0



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

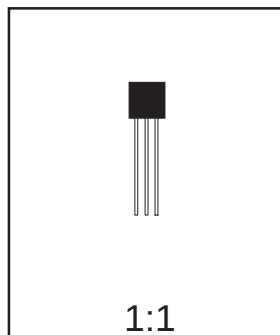
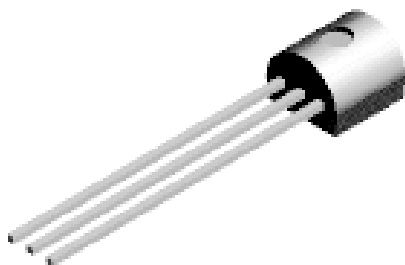


ITEM DESCRIPTION	SYMBOL	MINIMUM	MAXIMUM
Reel Diameter	D1	13.975	14.025
Arbor Hole Diameter (Standard)	D2	1.160	1.200
(Small Hole)	D2	0.650	0.700
Core Diameter	D3	3.100	3.300
Hub Recess Inner Diameter	D4	2.700	3.100
Hub Recess Depth	W1	0.370	0.570
Flange to Flange Inner Width	W2	1.630	1.690
Hub to Hub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

Note: All dimensions are inches

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

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



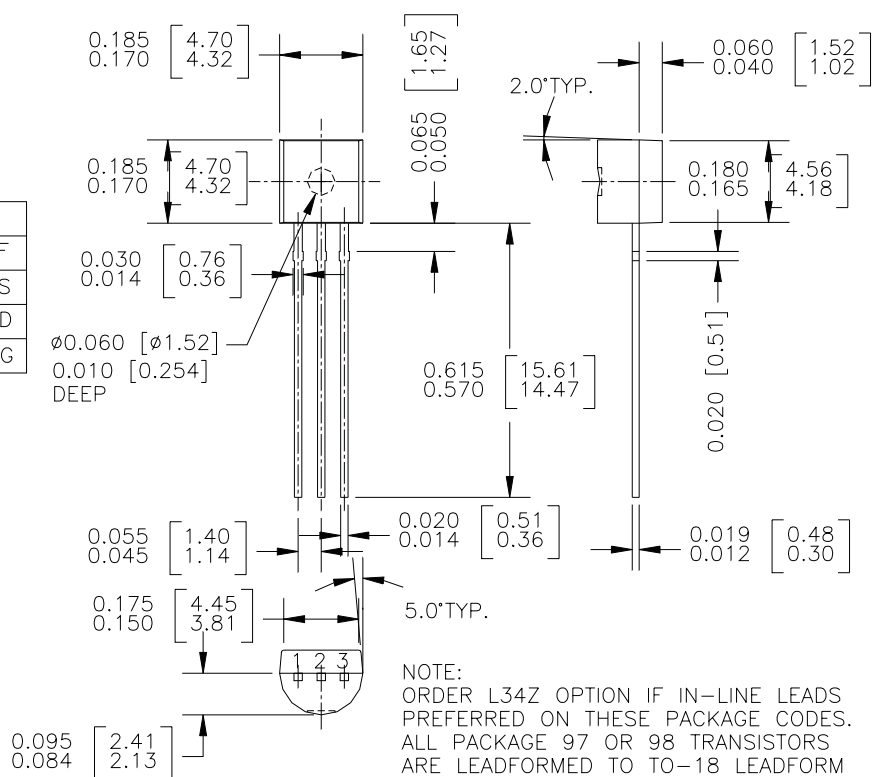
Scale 1:1 on letter size paper

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

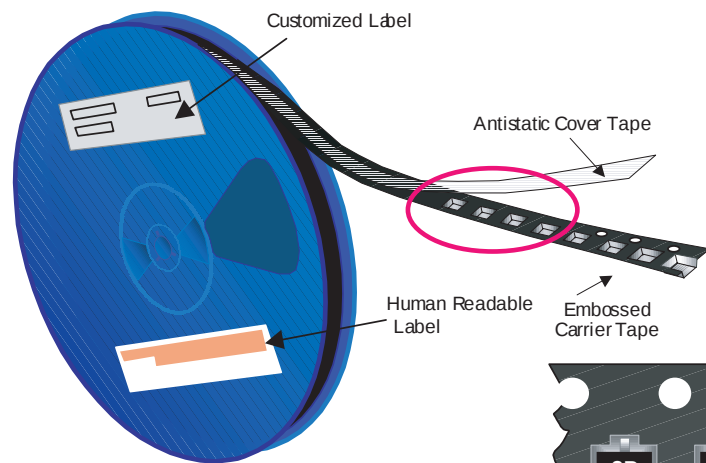


NOTE:
ORDER L34Z OPTION IF IN-LINE LEADS
PREFERRED ON THESE PACKAGE CODES.
ALL PACKAGE 97 OR 98 TRANSISTORS
ARE LEADFORMED TO TO-18 LEADFORM
REV.* CONFIGURATION (J35Z) PRIOR TO
BULK SHIPMENT.

SOT-23 Tape and Reel Data and Package Dimensions



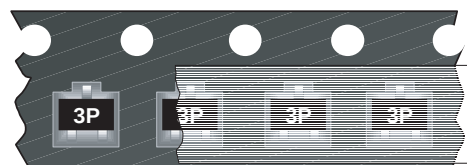
SOT-23 Packaging Configuration: Figure 10



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 are made of polystyrene plastic (anti-static coated). Other option comes in 10000 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		

343mm x 342mm x 64mm
Intermediate box for L87Z Option

Human Readable Label

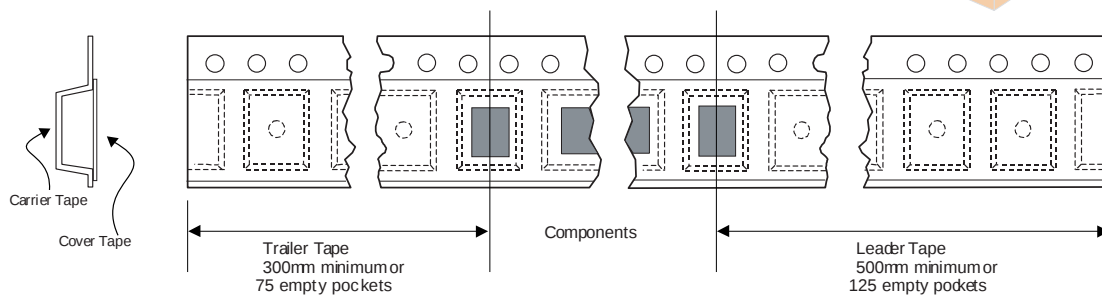
Human Readable Label sample



Human readable Label

187mm x 107mm x 183mm
Intermediate Box for Standard Option

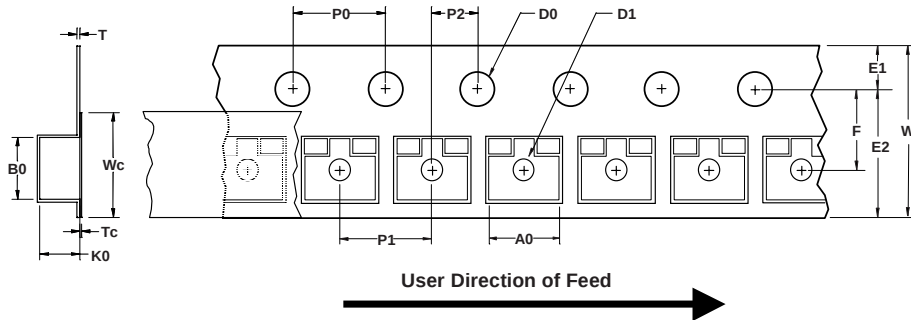
SOT-23 Tape Leader and Trailer Configuration: Figure 20



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

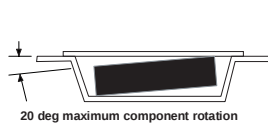
SOT-23 Embossed Carrier Tape

Configuration: Figure 3.0

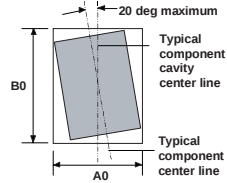


Dimensions are in millimeter														
Pkg type	A0	B0	W	D0	D1	E1	E2	F	P1	P0	K0	T	Wc	Tc
SOT-23 (8mm)	3.15 +/-0.10	2.77 +/-0.10	8.0 +/-0.3	1.55 +/-0.05	1.125 +/-0.125	1.75 +/-0.10	6.25 min	3.50 +/-0.05	4.0 +/-0.1	4.0 +/-0.1	1.30 +/-0.10	0.228 +/-0.013	5.2 +/-0.3	0.06 +/-0.02

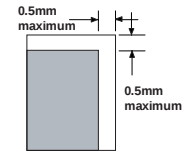
Notes: A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



Sketch A (Side or Front Sectional View)
Component Rotation

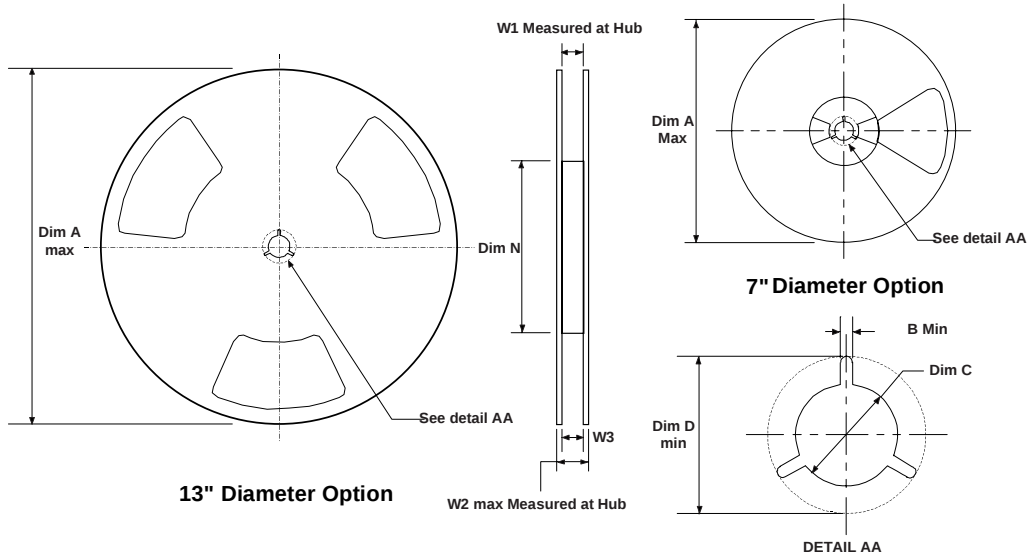


Sketch B (Top View)
Component Rotation



Sketch C (Top View)
Component lateral movement

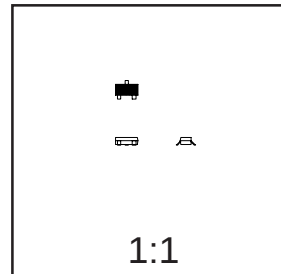
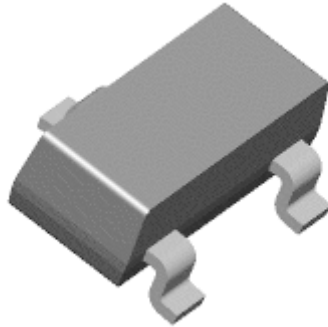
SOT-23 Reel Configuration: Figure 4.0



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

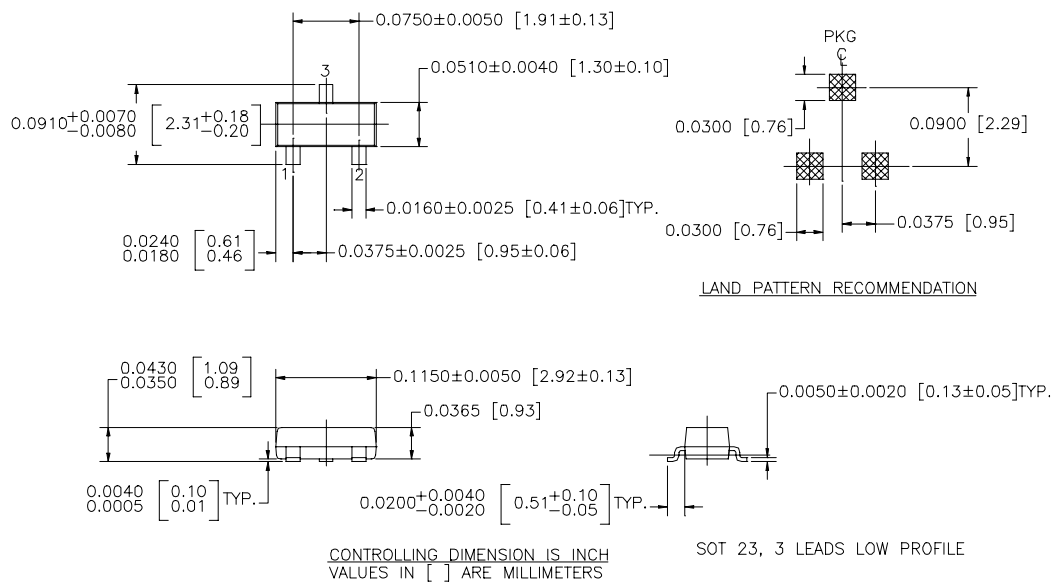
SOT-23 (FS PKG Code 49)



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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FAST[®]
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POP[™]
PowerTrench[™]
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SuperSOT[™]-6
SuperSOT[™]-8
TinyLogic[™]

UHC[™]
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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.
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