

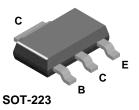
2N3906

MMBT3906

PZT3906







PNP General Purpose Amplifier

This device is designed for general purpose amplifier and switching applications at collector currents of 10 μA to 100 mA.

Absolute Maximum Ratings*

T_A = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V _{CEO}	Collector-Emitter Voltage	40	V
V _{CBO}	Collector-Base Voltage	40	V
V _{EBO}	Emitter-Base Voltage	5.0	V
I _C	Collector Current - Continuous	200	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.

- 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 T_A = 25°C unless otherwise noted

Symbol	Characteristic		Units		
		2N3906	*MMBT3906	**PZT3906	
P _D	Total Device Dissipation	625	350	1,000	mW
	Derate above 25°C	5.0	2.8	8.0	mW/°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	83.3			°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	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 36 mm X 18 mm X 1.5 mm; mounting pad for the collector lead min. 6 cm².

(continued)

Electrical Characteristics	$T_{\Delta} = 25$ °C unless otherwise noted
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Units	Max	Min	Test Conditions	Parameter	Symbol				
				RACTERISTICS	OFF CHAF				
V		40	$I_C = 1.0 \text{ mA}, I_B = 0$	Collector-Emitter Breakdown Voltage*	$V_{(BR)CEO}$				
V		40	$I_C = 10 \mu A, I_E = 0$	Collector-Base Breakdown Voltage	$V_{(BR)CBO}$				
V		5.0	$I_E = 10 \mu\text{A}, I_C = 0$	Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$				
nA	50		$V_{CE} = 30 \text{ V}, V_{BE} = 3.0 \text{ V}$	Base Cutoff Current	I _{BL}				
nA	50		$V_{CE} = 30 \text{ V}, V_{BE} = 3.0 \text{ V}$	Collector Cutoff Current	I _{CEX}				
_									

ON CHARACTERISTICS

h _{FE}	DC Current Gain *	$I_C = 0.1 \text{ mA}, V_{CE} = 1.0 \text{ V}$	60		
		$I_C = 1.0 \text{ mA}, V_{CE} = 1.0 \text{ V}$	80		
		$I_C = 10 \text{ mA}, V_{CE} = 1.0 \text{ V}$	100	300	
		$I_C = 50 \text{ mA}, V_{CE} = 1.0 \text{ V}$	60		
		$I_C = 100 \text{ mA}, V_{CE} = 1.0 \text{ V}$	30		
V _{CE(sat)}	Collector-Emitter Saturation Voltage	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$		0.25	V
, ,	_	$I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$		0.4	V
V _{BE(sat)}	Base-Emitter Saturation Voltage	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$	0.65	0.85	V
. ,	_	$I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$		0.95	V

SMALL SIGNAL CHARACTERISTICS

f⊤	Current Gain - Bandwidth Product	$I_C = 10 \text{ mA}, V_{CE} = 20 \text{ V},$ f = 100 MHz	250		MHz
C _{obo}	Output Capacitance	$V_{CB} = 5.0 \text{ V}, I_{E} = 0,$ f = 100 kHz		4.5	pF
Cibo	Input Capacitance	$V_{EB} = 0.5 \text{ V}, I_{C} = 0,$ f = 100 kHz		10.0	pF
NF	Noise Figure	$I_C = 100 \mu A$, $V_{CE} = 5.0 V$, $R_S = 1.0 k \Omega$. $f = 10 Hz$ to 15.7 kHz		4.0	dB

SWITCHING CHARACTERISTICS

t _d	Delay Time	$V_{CC} = 3.0 \text{ V}, V_{BE} = 0.5 \text{ V},$	35	ns
t _r	Rise Time	$I_C = 10 \text{ mA}, I_{B1} = 1.0 \text{ mA}$	35	ns
t _s	Storage Time	$V_{CC} = 3.0 \text{ V}, I_{C} = 10\text{mA}$	225	ns
t _f	Fall Time	$I_{B1} = I_{B2} = 1.0 \text{ mA}$	75	ns

^{*}Pulse Test: Pulse Width \leq 300 μ s, Duty Cycle \leq 2.0%

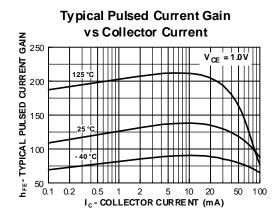
NOTE: All voltages (V) and currents (A) are negative polarity for PNP transistors.

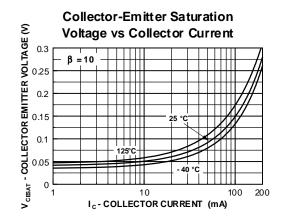
Spice Model

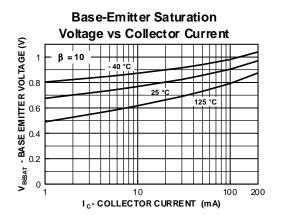
PNP (Is=1.41f Xti=3 Eg=1.11 Vaf=18.7 Bf=180.7 Ne=1.5 Ise=0 Ikf=80m Xtb=1.5 Br=4.977 Nc=2 Isc=0 Ikr=0 Rc=2.5 Cjc=9.728p Mjc=.5776 Vjc=.75 Fc=.5 Cje=8.063p Mje=.3677 Vje=.75 Tr=33.42n Tf=179.3p Itf=.4 Vtf=4 Xtf=6 Rb=10)

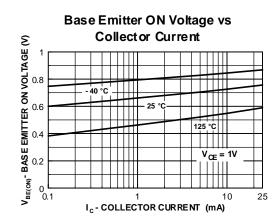
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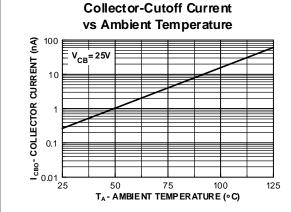
Typical Characteristics

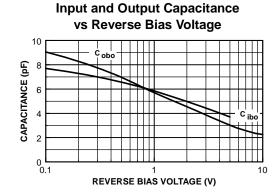








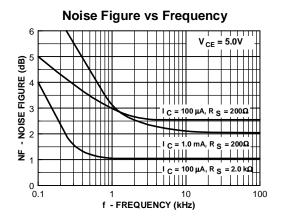


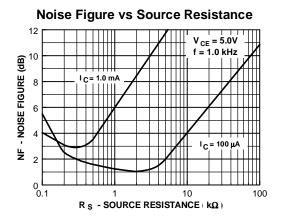


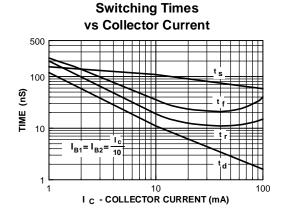
Common-Base Open Circuit

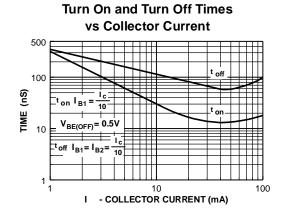
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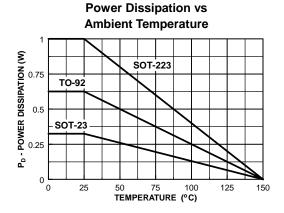
Typical Characteristics (continued)





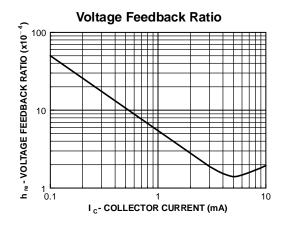


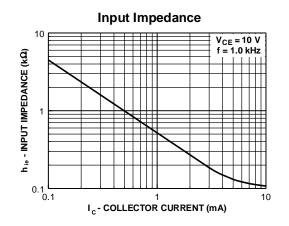


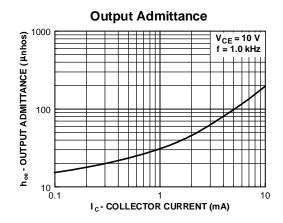


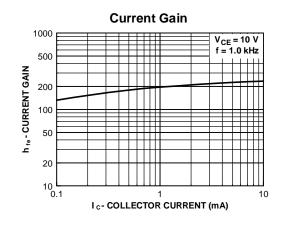
(continued)

Typical Characteristics (continued)







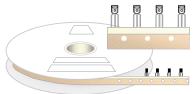


TO-92 Tape and Reel Data FAIRCHILD SEMICONDUCTOR TM **TO-92 Packaging** Configuration: Figure 1.0 **TAPE and REEL OPTION** FSCINT Label sample See Fig 2.0 for various Reeling Styles CBVK//418019 **FSCINT** Label 5 Reels per Intermediate Box Customized F63TNR Label sample Label F63TNR LOT: CBVK741B019 QTY: 2000 FSID: PN222N Customized QTY1: QTY2: Label 375mm x 267mm x 375mm Intermediate Box TO-92 TNR/AMMO PACKING INFROMATION **AMMO PACK OPTION** See Fig 3.0 for 2 Ammo Packing Style Quantity EOL code **Pack Options** 2,000 D26Z Е 2,000 D27Z Ammo М 2,000 D74Z D75Z 2,000 **FSCINT** 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 Label 5 Ammo boxes per Intermediate Box 327mm x 158mm x 135mm Immediate Box Customized F63TNR Customized Label Label 333mm x 231mm x 183mm Intermediate Box (TO-92) BULK PACKING INFORMATION **BULK OPTION** See Bulk Packing DESCRIPTION QUANTITY Information table J18Z TO-18 OPTION STD 2.0 K / BOX Anti-static Bubble Sheets TO-5 OPTION STD NO LEAD CLIP 1.5 K / BOX J05Z **FSCINT Label** NO EOL TO-92 STANDARD STRAIGHT FOR: PKG 92, NO LEADCLIP 2.0 K / BOX 94 (NON PROELECTRON SERIES), 96 TO-92 STANDARD STRAIGHT FOR: PKG 94 (PROELECTRON SERIES BCXXX, BFXXX, BSRXXX), 97, 98 L34Z NO LEADCLIP 2.0 K / BOX 2000 units per 114mm x 102mm x 51mm EO70 box for std option Immediate Box 5 EO70 boxes per intermediate Box 530mm x 130mm x 83mm Customized Intermediate box Label FSCINT Label 10,000 units maximum per intermediate box for std option

TO-92 Tape and Reel Data, continued

TO-92 Reeling Style Configuration: Figure 2.0

Machine Option "A" (H)

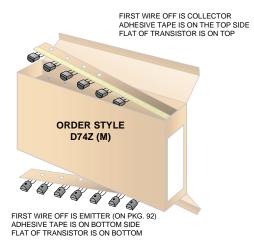


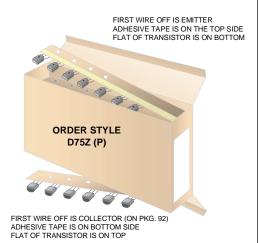
Style "A", D26Z, D70Z (s/h)

Machine Option "E" (J)

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

TO-92 Radial Ammo Packaging Configuration: Figure 3.0



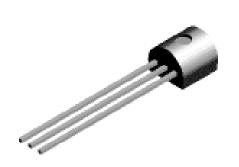


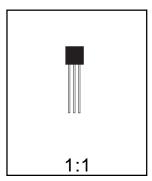


TO-92 Package Dimensions



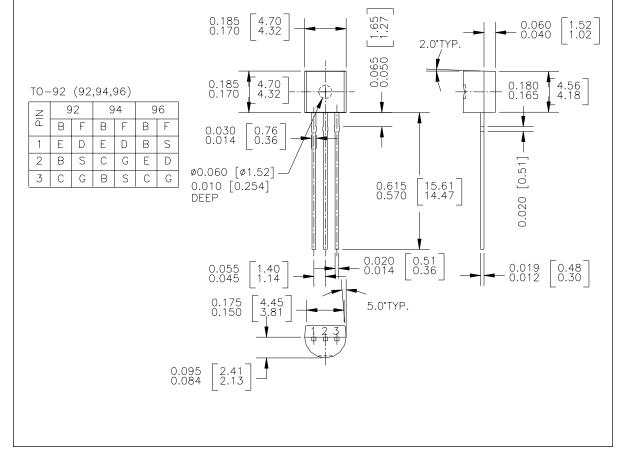
TO-92 (FS PKG Code 92, 94, 96)

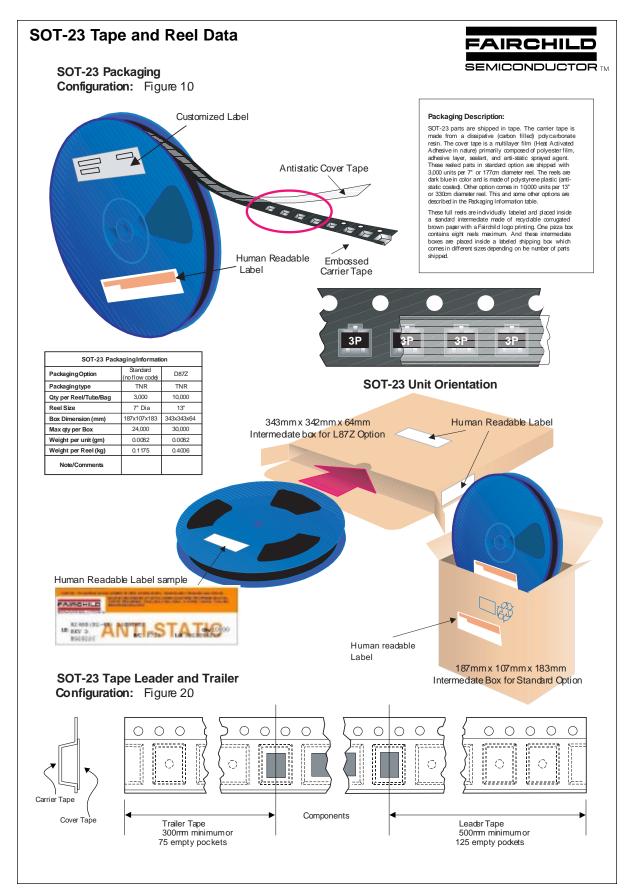




Scale 1:1 on letter size paper
Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.1977

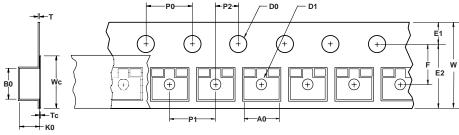




SOT-23 Tape and Reel Data, continued

SOT-23 Embossed Carrier Tape

Configuration: Figure 3.0



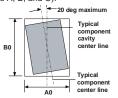
User Direction of Feed

	Dimensions are in millimeter													
Pkg type	Α0	В0	w	D0	D1	E1	E2	F	P1	P0	K0	Т	Wc	Тс
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

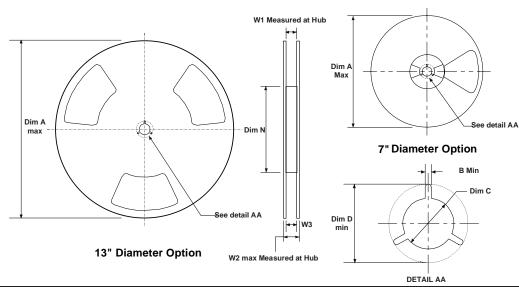


Sketch B (Top View)
Component Rotation



Sketch C (Top View)
Component lateral movement

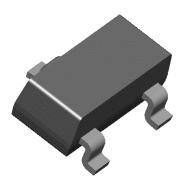
SOT-23 Reel Configuration: Figure 4.0

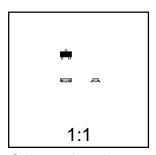


	Dimensions are in inches and millimeters								
Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim W1	Dim W2	Dim W3 (LSL-USL)
8mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	2.165 55	0.331 +0.059/-0.000 8.4 +1.5/0	0.567 14.4	0.311 - 0.429 7.9 - 10.9
8mm	13" Dia	13.00 330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



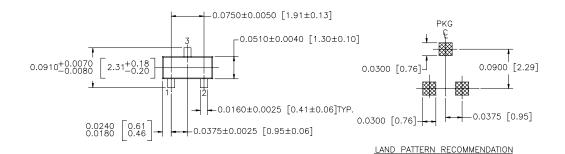
SOT-23 (FS PKG Code 49)

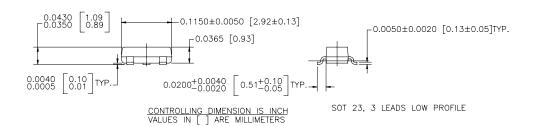




Scale 1:1 on letter size paper Dimensions shown below are in:

inches [millimeters]
Part Weight per unit (gram): 0.0082





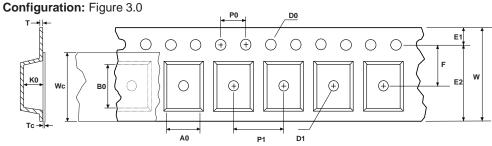
NOTE: UNLESS OTHERWISE SPECIFIED

- 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 FAIRCHILD SEMICONDUCTOR TM **SOT-223 Packaging** Configuration: Figure 1.0 Customized Label **Packaging Description:** Packaging Description: SOT-223 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate reason. 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° o 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. F63TNR Label Antistatic Cover Tape These full reles are individually barcode labeled and placed inside a standard intermediate box (flustrated 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 Static Dissipative shipped. **Embossed Carrier Tape** Packaging Option no flow code **SOT-223 Unit Orientation** TNR Packaging type 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 343mm x 342mm x 64mm Weight per unit (gm) 0.1246 0.1246 F63TNR Label Intermediate box for Standard Weight per Reel (kg) 0.7250 0.1532 F63TNR Label F63TNR Label sample 184mm x 184mm x 47mm QTY: 3000 Pizza Box for D84Z Option **SOT-223 Tape Leader and Trailer** SPEC REV: CPN: D/C1: D9842 D/C2: Configuration: Figure 2.0 QTY1 QTY2 (F63TNR)3 \bigcirc \bigcirc 0 0 \bigcirc \circ 0 \bigcirc 0 0 Components Trailer Tape Leader Tape 300mm minimum or 500mm minimum or 38 empty pockets 62 empty pockets



SOT-223 Embossed Carrier Tape



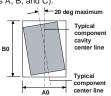


	Dimensions are in millimeter													
Pkg type	Α0	В0	w	D0	D1	E1	E2	F	P1	P0	K0	Т	Wc	Тс
SOT-223 (12mm)	6.83 +/-0.10	7.42 +/-0.10	12.0 +/-0.3	1.55 +/-0.05	1.50 +/-0.10	1.75 +/-0.10	10.25 min	5.50 +/-0.05	8.0 +/-0.1	4.0 +/-0.1	1.88 +/-0.10	0.292 +/- 0.0130	9.5 +/-0.025	0.06 +/-0.02

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

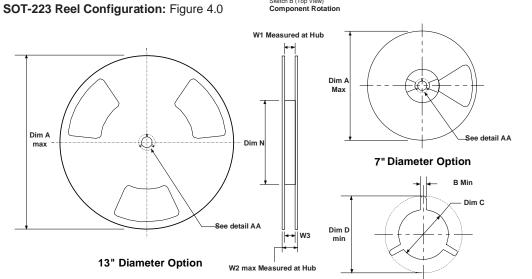


Sketch B (Top View)
Component Rotation



Sketch C (Top View)
Component lateral movement

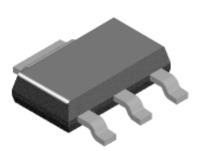
DETAIL AA

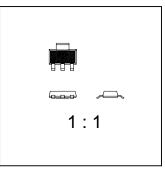


	Dimensions are in inches and millimeters									
Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim W1	Dim W2	Dim W3 (LSL-USL)	
12mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	5.906 150	0.488 +0.078/-0.000 12.4 +2/0	0.724 18.4	0.469 - 0.606 11.9 - 15.4	
12mm	13" Dia	13.00 330	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	



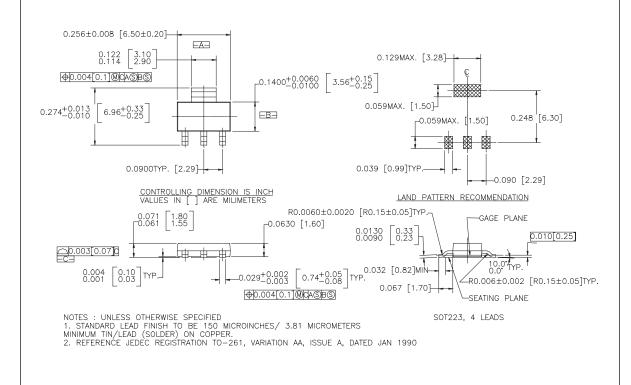
SOT-223 (FS PKG Code 47)





Scale 1:1 on letter size paper

Part Weight per unit (gram): 0.1246



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DOME™ ISOPLANAR™ Quiet Series™

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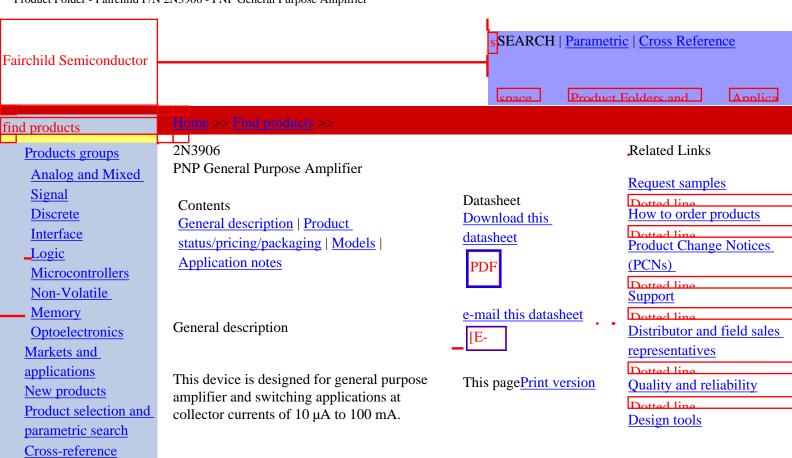
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- 2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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.



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Product status/pricing/packaging

Product	Product status	Pricing*	Package type	Leads	Package marking	Packing method
2N3906TF	Full Production	\$0.05	<u>TO-92</u>	3	N/A	TAPE REEL
2N3906IUTA	Full Production	\$0.05	<u>TO-92</u>	3	N/A	TAPE REEL
2N3906BU	Full Production	\$0.045	<u>TO-92</u>	3	N/A	BULK
2N3906	Full Production	\$0.073	TO-92	3	\$Y&3 2N 3906	BULK
2N3906RA	Full Production	\$0.073	TO-92	3	\$Y&3 2N 3906	TAPE REEL
2N3906TA	Full Production	\$0.05	<u>TO-92</u>	3	N/A	TAPE REEL

^{* 1,000} piece Budgetary Pricing

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Models

Package & leads	Condition	Temperature range	Software version	Revision date
PSPICE				

TO-92-3	Electrical	25°C	N/A	N/A

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Application notes

AN-3008: AN-3008 RC Snubber Networks for Thyristor Power Control

and Transient Suppression (930 K) Jul 19, 2002

AN-42043: AN-42043 ML4803 240W Off-Line Power Supply with PFC

(296 K) Jul 19, 2002

AN-42034: AN-42034 Synchronizing the ML4824 to Wide Frequency

Ranges (119 K) Jul 19, 2002

AN-42037: AN-42037 ML4423 Application Guidelines (295 K) Jul 19,

2002

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