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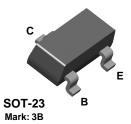
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## **PN918**

## **MMBT918**





#### **NPN RF Transistor**

This device is designed for use as RF amplifiers, oscillators and multipliers with collector currents in the 1.0 mA to 30 mA range. Sourced from Process 43.

#### **Absolute Maximum Ratings\***

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	15	V
V <sub>CBO</sub>	Collector-Base Voltage	30	V
V <sub>EBO</sub>	Emitter-Base Voltage	3.0	V
I <sub>C</sub>	Collector Current - Continuous	50	mA
T <sub>J</sub> , T <sub>stg</sub>	Operating and Storage Junction Temperature Range	-55 to +150	°C

<sup>\*</sup>These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

#### **Thermal Characteristics**

TA = 25°C unless otherwise noted

Symbol	Characteristic Max			Units
		PN918	*MMBT918	
P <sub>D</sub>	Total Device Dissipation	350	225	mW
	Derate above 25°C	2.8	1.8	mW/°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	125		°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	357	556	°C/W

<sup>\*</sup>Device mounted on FR-4 PCB 1.6" X 1.6" X 0.06."

<sup>1)</sup> 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.

(continued)

Symbol	Parameter	Test Conditions	Min	Max	Units	
OFF CHA	RACTERISTICS					
$V_{CEO(sus)}$	Collector-Emitter Sustaining Voltage*	$I_C = 3.0 \text{ mA}, I_B = 0$	15		V	
V <sub>(BR)CBO</sub>	Collector-Base Breakdown Voltage	$I_C = 1.0 \mu\text{A},  I_E = 0$	30		V	
V <sub>(BR)EBO</sub>	Emitter-Base Breakdown Voltage	$I_E = 10  \mu A,  I_C = 0$	3.0		V	
І <sub>сво</sub>	Collector Cutoff Current	$V_{CB} = 15 \text{ V}, I_E = 0$ $V_{CB} = 15 \text{ V}, T_A = 150^{\circ}\text{C}$		0.01 1.0	μA μA	
	RACTERISTICS					
n <sub>FE</sub>	DC Current Gain	$I_C = 3.0 \text{ mA}, V_{CE} = 1.0 \text{ V}$	20			
1 <sub>FE</sub>	DC Current Gain  Collector-Emitter Saturation Voltage	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$	20	0.4	V	
∩ <sub>FE</sub> V <sub>CE(sat)</sub>	DC Current Gain		20	0.4	V	
N <sub>FE</sub> V <sub>CE(sat)</sub> V <sub>BE(sat)</sub>	DC Current Gain  Collector-Emitter Saturation Voltage	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$	20			
N <sub>FE</sub> V <sub>CE(sat)</sub> V <sub>BE(sat)</sub>	DC Current Gain  Collector-Emitter Saturation Voltage  Base-Emitter Saturation Voltage	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$	20			
n <sub>FE</sub> √ <sub>CE(sat)</sub> √ <sub>BE(sat)</sub> SMALL SI	DC Current Gain Collector-Emitter Saturation Voltage Base-Emitter Saturation Voltage GNAL CHARACTERISTICS	$I_{C} = 10 \text{ mA}, I_{B} = 1.0 \text{ mA}$ $I_{C} = 10 \text{ mA}, I_{B} = 1.0 \text{ mA}$ $I_{C} = 4.0 \text{ mA}, V_{CE} = 10 \text{ V},$ $f = 100 \text{ MHz}$ $V_{CB} = 10 \text{ V}, I_{E} = 0, f = 1.0 \text{ MHz}$		1.0	V MHz	
MFE /CE(sat) /BE(sat)  SMALL SI	DC Current Gain Collector-Emitter Saturation Voltage Base-Emitter Saturation Voltage  GNAL CHARACTERISTICS Current Gain - Bandwidth Product	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ $I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$ $I_C = 4.0 \text{ mA}, V_{CE} = 10 \text{ V},$ $f = 100 \text{ MHz}$		1.0	V	

## **FUNCTIONAL TEST**

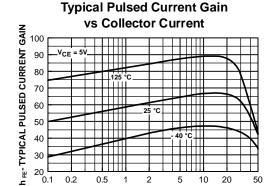
G <sub>pe</sub>	Amplifier Power Gain	$V_{CB} = 12 \text{ V}, I_{C} = 6.0 \text{ mA},$ f = 200 MHz	15	dB
Po	Power Output	$V_{CB} = 15 \text{ V}, I_{C} = 8.0 \text{ mA},$ f = 500 MHz	30	mW
η	Collector Efficiency	$V_{CB} = 15 \text{ V}, I_{C} = 8.0 \text{ mA},$ f = 500 MHz	25	%

<sup>\*</sup>Pulse Test: Pulse Width  $\leq$  300  $\mu$ s, Duty Cycle  $\leq$  2.0%

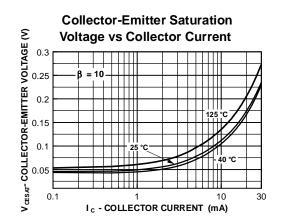
(continued)

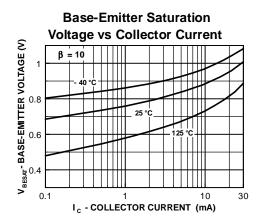
#### **Typical Characteristics**

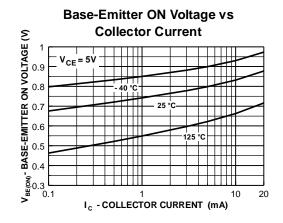
20 L 0.1

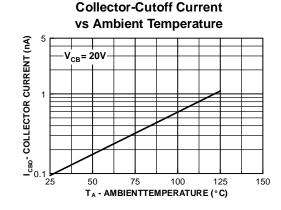


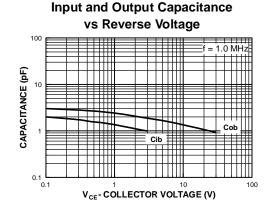
Ic - COLLECTOR CURRENT (mA)





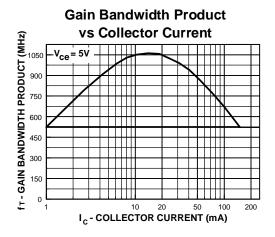




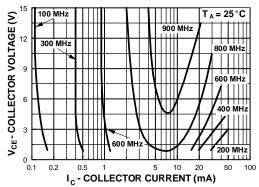


(continued)

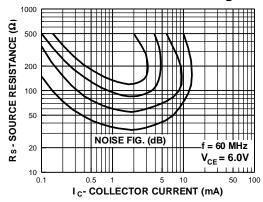
#### Typical Characteristics (continued)



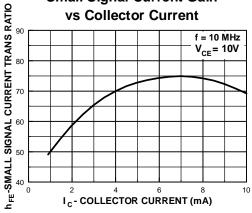
## **Contours of Constant Gain** Bandwidth Product $(f_T)$



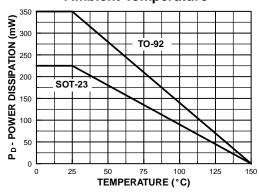




# **Small Signal Current Gain**



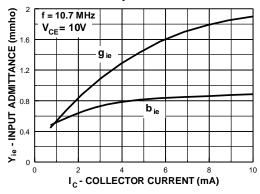
#### **Power Dissipation vs** Ambient Temperature



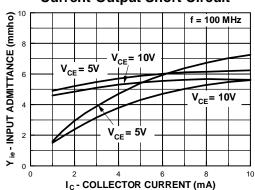
(continued)

#### **Common Emitter Y Parameters vs. Frequency**

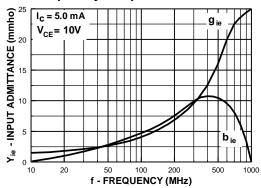
#### **Input Admittance vs Collector Current-Output Short Circuit**



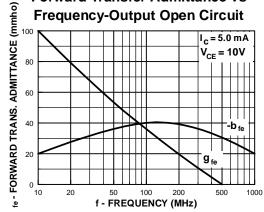
#### Input Admittance vs Collector **Current-Output Short Circuit**



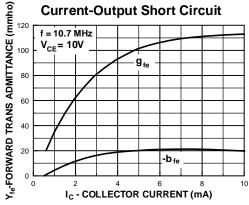
#### **Input Admittance vs Frequency-Output Short Circuit**



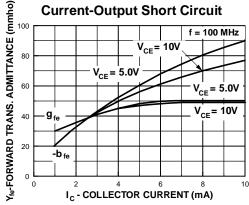
Forward Transfer Admittance vs **Frequency-Output Open Circuit** 



Forward Trans. Admittance vs Collector



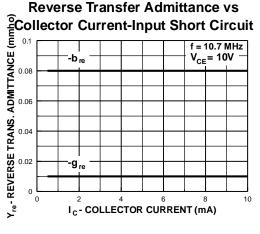
Forward Trans. Admittance vs Collector **Current-Output Short Circuit** 



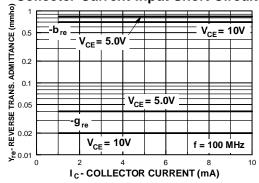
(continued)

#### Common Emitter Y Parameters vs. Frequency (continued)

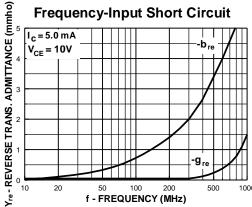
# **Reverse Transfer Admittance vs**



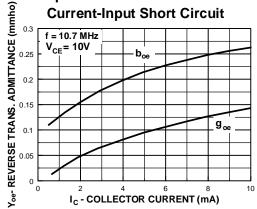
#### **Reverse Transfer Admittance vs Collector Current-Input Short Circuit**



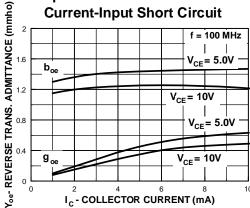
#### **Reverse Transfer Admittance vs Frequency-Input Short Circuit**



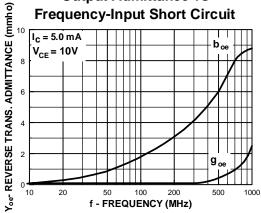
#### **Output Admittance vs Collector Current-Input Short Circuit**



#### **Output Admittance vs Collector Current-Input Short Circuit**



#### **Output Admittance vs Frequency-Input Short Circuit**



(continued)

## **Test Circuit**

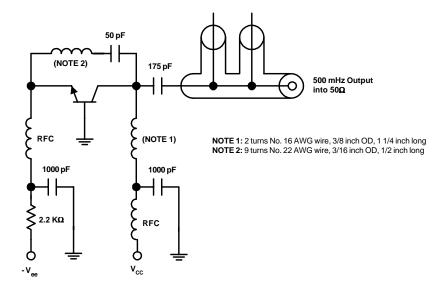


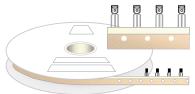
FIGURE 1: 500 MHz Oscillator Circuit

#### **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)



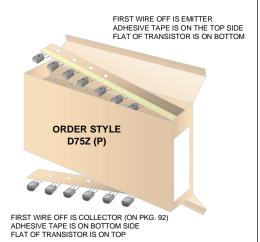
Style "A", D26Z, D70Z (s/h)

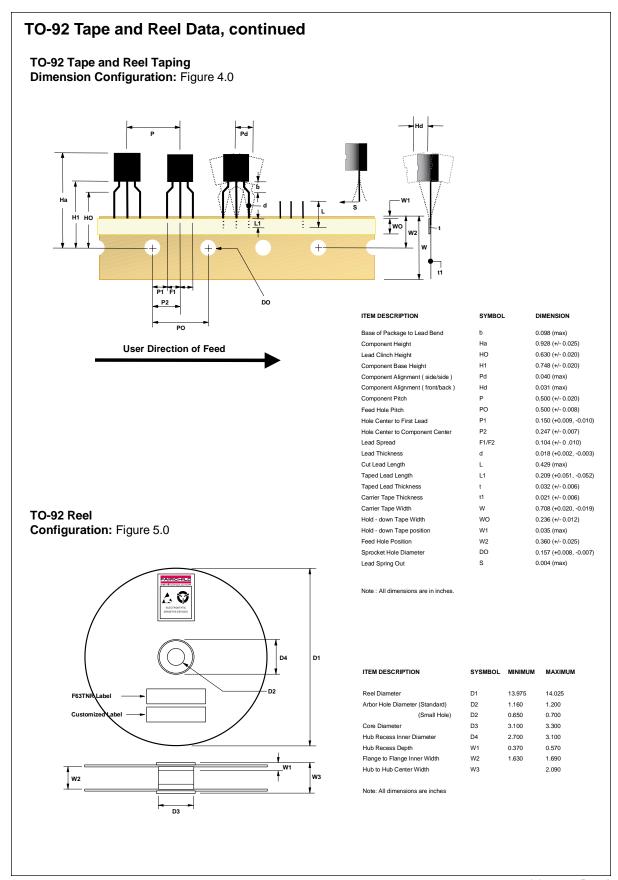
# Machine Option "E" (J)

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

# **TO-92 Radial Ammo Packaging Configuration:** Figure 3.0



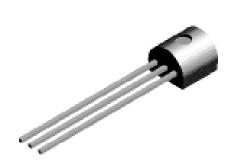


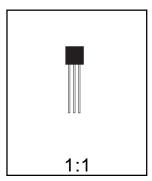


## **TO-92 Package Dimensions**



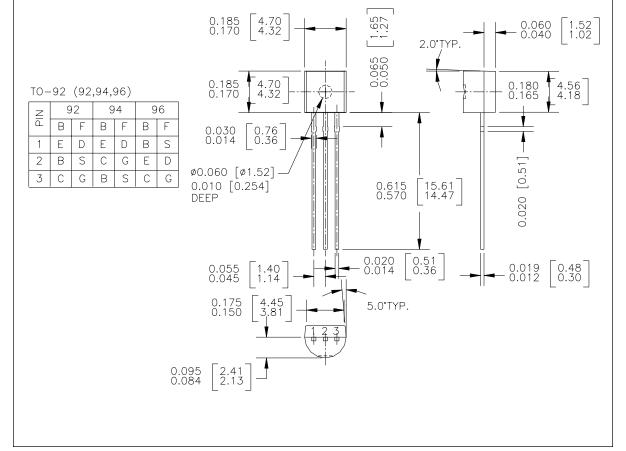
# TO-92 (FS PKG Code 92, 94, 96)

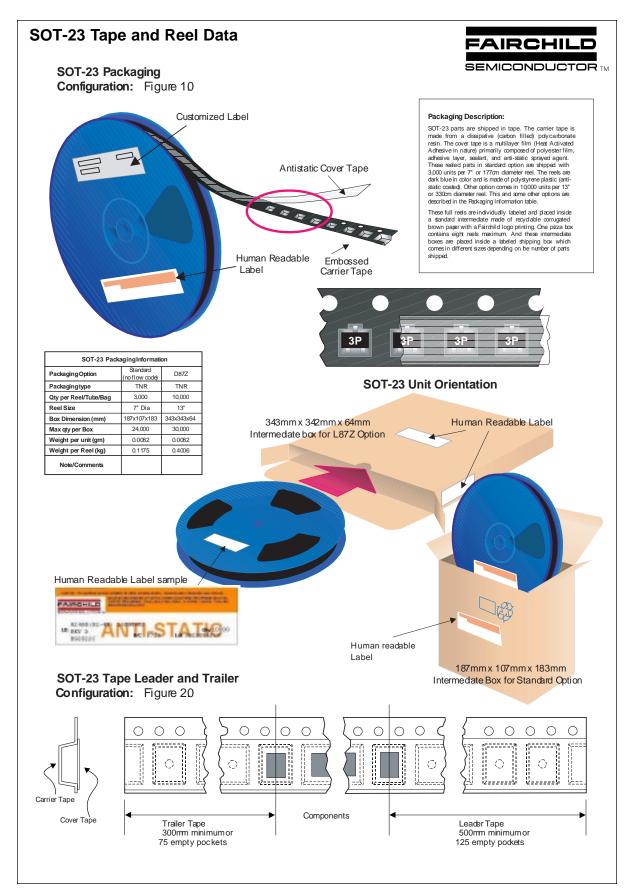




Scale 1:1 on letter size paper
Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.1977

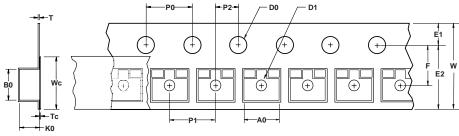




# SOT-23 Tape and Reel Data, continued

#### **SOT-23 Embossed Carrier Tape**

Configuration: Figure 3.0



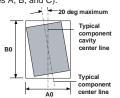
User Direction of Feed	

	Dimensions are in millimeter													
Pkg type	Α0	В0	w	D0	D1	E1	E2	F	P1	P0	K0	Т	Wc	Тс
<b>SOT-23</b> (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

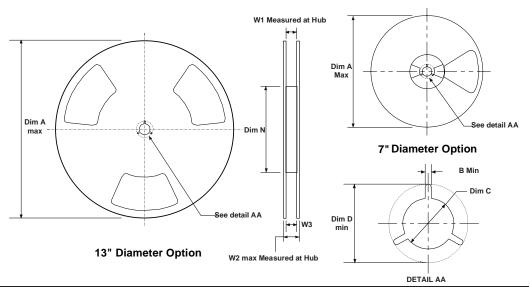


Sketch B (Top View)
Component Rotation



Sketch C (Top View)
Component lateral movement

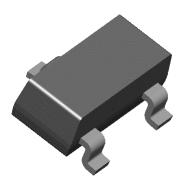
#### SOT-23 Reel Configuration: Figure 4.0

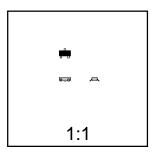


	Dimensions are in inches and millimeters								
Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim W1	Dim W2	Dim W3 (LSL-USL)
8mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	2.165 55	0.331 +0.059/-0.000 8.4 +1.5/0	0.567 14.4	0.311 - 0.429 7.9 - 10.9
8mm	13" Dia	13.00 330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

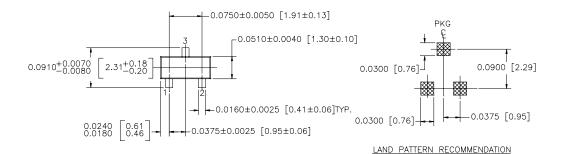


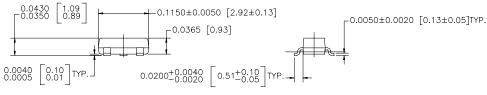


Scale 1:1 on letter size paper

Dimensions shown below are in: inches [millimeters]

Part Weight per unit (gram): 0.0082





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™ ISOPLANAR™ Quiet Series™

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