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[^0]PN918


MMBT918


Mark: 3B

## 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* ${ }^{\text {tA }} 25^{\circ} \mathrm{C}$ unless ontemisen noed

| Symbol | Parameter | Value | Units |
| :--- | :--- | :---: | :---: |
| $\mathrm{V}_{\text {CEO }}$ | Collector-Emitter Voltage | 15 | V |
| $\mathrm{~V}_{\text {CBO }}$ | Collector-Base Voltage | 30 | V |
| $\mathrm{~V}_{\text {EBO }}$ | Emitter-Base Voltage | 3.0 | V |
| $\mathrm{I}_{\mathrm{C}}$ | Collector Current - Continuous | 50 | mA |
| $\mathrm{~T}_{\mathrm{J}}, \mathrm{T}_{\mathrm{stg}}$ | Operating and Storage Junction Temperature Range | -55 to +150 | ${ }^{\circ} \mathrm{C}$ |

*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 $T \mathrm{~A}=25^{\circ} \mathrm{C}$ unless otherwise noted

| Symbol | Characteristic | Max |  | Units |
| :--- | :---: | :---: | :---: | :---: |
|  |  | PN918 | ${ }^{*}$ MMBT918 |  |
| $\mathrm{P}_{\mathrm{D}}$ | Total Device Dissipation | 350 | 225 | mW |
|  | Derate above $25^{\circ} \mathrm{C}$ | 2.8 | 1.8 | $\mathrm{~mW} /{ }^{\circ} \mathrm{C}$ |
| $\mathrm{R}_{\text {өJC }}$ | Thermal Resistance, Junction to Case | 125 |  | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |
| $\mathrm{R}_{\text {өJA }}$ | Thermal Resistance, Junction to Ambient | 357 | 556 | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |

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

Electrical Characteristics
TA $=25^{\circ} \mathrm{C}$ unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Max | Units |
| :--- | :--- | :--- | :--- | :--- | :--- |

OFF CHARACTERISTICS

| $\mathrm{V}_{\text {CEO(sus) }}$ | Collector-Emitter Sustaining Voltage $^{*}$ | $\mathrm{I}_{\mathrm{C}}=3.0 \mathrm{~mA}, \mathrm{I}_{\mathrm{B}}=0$ | 15 |  | V |
| :--- | :--- | :--- | :---: | :---: | :---: |
| $\mathrm{~V}_{\text {(BR)CBO }}$ | Collector-Base Breakdown Voltage | $\mathrm{I}_{\mathrm{C}}=1.0 \mu \mathrm{~A}, \mathrm{I}_{\mathrm{E}}=0$ | 30 |  | V |
| $\mathrm{~V}_{\text {(BR)EBO }}$ | Emitter-Base Breakdown Voltage | $\mathrm{I}_{\mathrm{E}}=10 \mu \mathrm{~A}, \mathrm{I}_{\mathrm{C}}=0$ | 3.0 |  | V |
| $\mathrm{I}_{\text {CBO }}$ | Collector Cutoff Current | V <br>  | CB <br>  | $\mathrm{V}_{\mathrm{CB}}=15 \mathrm{~V}, \mathrm{I}_{\mathrm{E}}=0$ |  |
| $\mathrm{E}, \mathrm{T}_{\mathrm{A}}=150^{\circ} \mathrm{C}$ |  | 0.01 | $\mu \mathrm{~A}$ |  |  |

ON CHARACTERISTICS

| $\mathrm{h}_{\text {FE }}$ | DC Current Gain | $\mathrm{I}_{\mathrm{C}}=3.0 \mathrm{~mA}, \mathrm{~V}_{\mathrm{CE}}=1.0 \mathrm{~V}$ | 20 |  |  |
| :--- | :--- | :--- | :---: | :---: | :---: |
| $\mathrm{~V}_{\mathrm{CE}(\text { sat })}$ | Collector-Emitter Saturation Voltage | $\mathrm{I}_{\mathrm{C}}=10 \mathrm{~mA}, \mathrm{I}_{\mathrm{B}}=1.0 \mathrm{~mA}$ |  | 0.4 | V |
| $\mathrm{~V}_{\mathrm{BE}(\text { sat })}$ | Base-Emitter Saturation Voltage | $\mathrm{I}_{\mathrm{C}}=10 \mathrm{~mA}, \mathrm{I}_{\mathrm{B}}=1.0 \mathrm{~mA}$ |  | 1.0 | V |

SMALL SIGNAL CHARACTERISTICS
$\left.\begin{array}{l|l|l|c|c|c}\hline \mathrm{f}_{\mathrm{T}} & \text { Current Gain - Bandwidth Product } & \begin{array}{l}\mathrm{I} \\ \mathrm{C}\end{array}=4.0 \mathrm{~mA}, \mathrm{~V}_{\mathrm{CE}}=10 \mathrm{~V}, & 600 \\ \mathrm{f}=100 \mathrm{MHz}\end{array}\right)$

FUNCTIONAL TEST

| $\mathrm{G}_{\mathrm{pe}}$ | Amplifier Power Gain | $\mathrm{V}_{\mathrm{CB}}=12 \mathrm{~V}, \mathrm{I}_{\mathrm{C}}=6.0 \mathrm{~mA}$, <br> $\mathrm{f}=200 \mathrm{MHz}$ | 15 | dB |  |
| :--- | :--- | :--- | :---: | :---: | :---: |
| $\mathrm{P}_{\circ}$ | Power Output | $\mathrm{V}_{\mathrm{CB}}=15 \mathrm{~V}, \mathrm{I}_{\mathrm{C}}=8.0 \mathrm{~mA}$, <br> $\mathrm{f}=500 \mathrm{MHz}$ | 30 |  | mW |
| $\eta$ | Collector Efficiency | $\mathrm{V}_{\mathrm{CB}}=15 \mathrm{~V}, \mathrm{I}_{\mathrm{C}}=8.0 \mathrm{~mA}$, <br> $\mathrm{f}=500 \mathrm{MHz}$ | 25 |  | $\%$ |

*Pulse Test: Pulse Width $\leq 300 \mu \mathrm{~s}$, Duty Cycle $\leq 2.0 \%$

## Typical Characteristics






Collector-Cutoff Current vs Ambient Temperature


## Typical Characteristics (continued)



Contours of Constant Noise Figure



Common Emitter Y Parameters vs. Frequency



Input Admittance vs
Frequency-Output Short Circuit


Common Emitter Y Parameters vs. Frequency (continued)


## Reverse Transfer Admittance vs




Reverse Transfer Admittance vs Collector Current-Input Short Circuit



Output Admittance vs



## TO-92 Tape and Reel Data

## TO-92 Packaging

Configuration: Figure 1.0
TO-92 TNR/AMMO PACKING INFROMATION

| Packing | Style | Quantity | EOL code |
| :---: | :---: | :---: | :---: |
| Reel | A | 2,000 | D26Z |
|  | E | 2,000 | D27Z |
| Ammo | M | 2,000 | D $74 Z$ |
|  | P | 2,000 | D75Z | | Unit weight |
| :--- |
| Reel weight with components <br> Ammo weight with components <br> Max quantity per intermediate box <br> $=1.22 \mathrm{gm}$ <br> $=1.04 \mathrm{~kg}$ <br> $=10,000$ <br> kg units |


(TO-92) BULK PACKING INFORMATION

| $\begin{aligned} & \hline \text { EOL } \\ & \text { CODE } \\ & \hline \end{aligned}$ | DESCRIPTION | LEADCLIP DIMENSION | QUANTITY |
| :---: | :---: | :---: | :---: |
| J182 | TO-18 OPTION STD | NO LEAD CLIP | 2.0 K/BOX |
| J05z | TO-5 OPTION STD | NO LEAD CLIP | $1.5 \mathrm{~K} / \mathrm{BOX}$ |
| NO EOL | TO-92 STANDARD STRAIGHT FOR: PKG 92, 94 (NON PROELECTRON SERIES), 96 | NO LEADCLIP | 2.0 K / BOX |
| L342 | TO-92 STANDARD STRAIGHT FOR: PKG 94 (PROELECTRON SERIES BCXXX, BFXXX, BSRXXX), 97, 98 | NO LEADCLIP | 2.0 K / BOX |

BULK OPTION
See Bulk Packing
Information table


## TO-92 Tape and Reel Data, continued

## TO-92 Reeling Style

## Configuration: Figure 2.0



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

## TO-92 Radial Ammo Packaging

## Configuration: Figure 3.0




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


## TO-92 Tape and Reel Data, continued

## TO-92 Tape and Reel Taping

Dimension Configuration: Figure 4.0


## TO－92 Package Dimensions <br> FAIRCHILD

SEMICロNロレСTロR

## 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

SOT-23 Packaging Configuration: Figure 10


| SOT-23 PackagingInformation |  |  |
| :--- | :---: | :---: |
| Packaging Option | Standard <br> (noflow code) | D87Z |
| Packagingtype | TNR | TNR |
| Qty per Reel/Tube/Bag | 3,000 | 10,000 |
| Reel Size | 7 " Dia | $13^{\prime \prime}$ |
| Box Dimension (mm) | $187 \times 107 \times 183$ | $343 \times 343 \times 64$ |
| 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 and Reel Data, continued

## SOT-23 Embossed Carrier Tape

## Configuration: Figure 3.0



| Dimensions are in millimeter |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Pkg type | A0 | во | w | Do | D1 | E1 | E2 | F | P1 | P0 | ко | T | Wc | Tc |
| $\underset{(8 \mathrm{~mm})}{\mathrm{SOT}-23}$ | $\underbrace{}_{\substack{3.15 \\+1-0.10}}$ | $\underbrace{2.77}_{2}+$ | ${ }_{+0.0}^{8.0}$ | $\underset{\substack{1.55 \\++0.05}}{ }$ | $\begin{aligned} & 1.125 \\ & +1-0.125 \end{aligned}$ | $\underset{\substack{1.75 \\+-0.10}}{ }$ | ${ }_{\substack{\text { min }}}^{6.25}$ | ${ }_{\substack{3.50 \\+-0.05}}$ | ${ }_{4}^{4.0}$ | ${ }_{4}^{4.0}$ | $\underset{\substack{1.30 \\++0.10}}{ }$ | $\xrightarrow[\substack{0.228 \\+1-0.013}]{ }$ | $\underset{\substack{5.2 \\+1-0.3}}{\text { c, }}$ | $\underbrace{}_{\substack{0.066 \\+-0.02}}$ |

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


SOT-23 Reel Configuration: Figure 4.0

Sketch B (Top View)
Component Rotation



13" Diameter Option


7"Diameter Option


DETAIL AA

| Dimensions are in inches and millimeters |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Tape Size | Reel Option | Dim A | Dim B | Dim C | Dim D | $\operatorname{Dim} \mathrm{N}$ | Dim W1 | Dim W2 | Dim W3 (LSL-USL) |
| 8 mm | 7" Dia | $\begin{aligned} & 7.00 \\ & 177.8 \end{aligned}$ | $\begin{aligned} & 0.059 \\ & 1.5 \end{aligned}$ | $\begin{aligned} & 512+0.020 /-0.008 \\ & 13+0.5 /-0.2 \end{aligned}$ | $\begin{aligned} & 0.795 \\ & 20.2 \end{aligned}$ | $\begin{aligned} & 2.165 \\ & 55 \end{aligned}$ | $\begin{aligned} & 0.331+0.059 /-0.000 \\ & 8.4+1.5 / 0 \end{aligned}$ | $\begin{aligned} & 0.567 \\ & 14.4 \end{aligned}$ | $\begin{aligned} & 0.311-0.429 \\ & 7.9-10.9 \end{aligned}$ |
| 8 mm | ${ }^{13}{ }^{\text {" Dia }}$ | $\begin{aligned} & 13.00 \\ & 330 \end{aligned}$ | $\begin{aligned} & 0.059 \\ & 1.5 \end{aligned}$ | $\begin{aligned} & 512+0.020 /-0.008 \\ & 13+0.5 /-0.2 \end{aligned}$ | $\begin{aligned} & 0.795 \\ & 20.2 \end{aligned}$ | $\begin{aligned} & 4.00 \\ & 100 \end{aligned}$ | $\begin{aligned} & 0.331+0.059 /-0.000 \\ & 8.4+1.5 / 0 \end{aligned}$ | $\begin{aligned} & 0.567 \\ & 14.4 \end{aligned}$ | $\begin{aligned} & 0.311-0.429 \\ & 7.9-10.9 \end{aligned}$ |

## 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


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