## NPN RF Transistor

This device is designed for use in low noise UHF／VHF amplifiers with collector currents in the $100 \mu \mathrm{~A}$ to 30 mA range in common emitter or common base mode of operation，and in low frequency drift，high ouput UHF oscillators．Sourced from Process 40.

## Absolute Maximum Ratings＊

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

| Symbol | Parameter | Value | Units |
| :--- | :--- | :---: | :---: |
| $\mathrm{V}_{\mathrm{CEO}}$ | Collector－Emitter Voltage | 12 | V |
| $\mathrm{~V}_{\mathrm{CBO}}$ | Collector－Base Voltage | 20 | V |
| $\mathrm{~V}_{\mathrm{EBO}}$ | Emitter－Base Voltage | 2.5 | V |
| $\mathrm{I}_{\mathrm{C}}$ | Collector Current－Continuous | 50 | mA |
| $\mathrm{~T}_{\mathrm{J},} \mathrm{T}_{\text {stg }}$ | 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
TA $=25^{\circ} \mathrm{C}$ unless otherwise noted

| Symbol | Characteristic | Max |  | Units |
| :--- | :---: | :---: | :---: | :---: |
|  |  |  |  |  |
|  |  | PN／MPS5179 | ${ }^{*}$ MMBT5179 |  |
| PD | Total Device Dissipation | 250 | 225 | mW |
|  | Derate above $25^{\circ} \mathrm{C}$ | 3.8 | 1.8 | $\mathrm{~mW} /{ }^{\circ} \mathrm{C}$ |
| $\mathrm{R}_{\text {өJA }}$ | Thermal Resistance，Junction to Ambient | 556 | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |  |

＊Device mounted on FR－4 PCB 1．6＂X 1.6 ＂X 0．06．＂

## NPN RF Transistor

（continued）
Electrical Characteristics
$T A=25^{\circ} \mathrm{C}$ unless otherwise noted

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

OFF CHARACTERISTICS

| $\mathrm{V}_{\text {CEO（sus）}}$ | Collector－Emitter Sustaining Voltage $^{*}$ | $\mathrm{I}_{\mathrm{C}}=3.0 \mathrm{~mA}, \mathrm{I}_{\mathrm{B}}=0$ | 12 |  | V |
| :--- | :--- | :--- | :---: | :---: | :---: |
| $\mathrm{~V}_{\text {（BR）CBO }}$ | Collector－Base Breakdown Voltage | $\mathrm{I}_{\mathrm{C}}=1.0 \mu \mathrm{~A}, \mathrm{I}_{\mathrm{E}}=0$ | 20 |  | V |
| $\mathrm{~V}_{\text {（BR）EBO }}$ | Emitter－Base Breakdown Voltage | $\mathrm{I}_{\mathrm{E}}=10 \mu \mathrm{~A}, \mathrm{I}_{\mathrm{C}}=0$ | 2.5 |  | V |
| $\mathrm{I}_{\text {CBO }}$ | Collector Cutoff Current | $\mathrm{V}_{\mathrm{CB}}=15 \mathrm{~V}, \mathrm{I}_{\mathrm{E}}=0$ <br> $\mathrm{~V}_{\mathrm{CB}}=15 \mathrm{~V}, \mathrm{~T}_{\mathrm{A}}=150^{\circ} \mathrm{C}$ |  | 0.02 | $\mu \mathrm{~A}$ |
|  |  |  |  | 1.0 | $\mu \mathrm{~A}$ |

ON CHARACTERISTICS

| $\mathrm{h}_{\text {FE }}$ | DC Current Gain | $\mathrm{I}_{\mathrm{C}}=3.0 \mathrm{~mA}, \mathrm{~V}_{\mathrm{CE}}=1.0 \mathrm{~V}$ | 25 | 250 |  |
| :--- | :--- | :--- | :---: | :---: | :---: |
| $\mathrm{~V}_{\text {CE（sat）}}$ | 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

| $\mathrm{f}_{\mathrm{T}}$ | Current Gain－Bandwidth Product | $\mathrm{I}=5.0 \mathrm{~mA}, \mathrm{~V}_{\mathrm{CE}}=6.0 \mathrm{~V}$, <br> $\mathrm{f}=100 \mathrm{MHz}$ | 900 | 2000 | MHz |
| :--- | :--- | :--- | :---: | :---: | :---: |
| $\mathrm{C}_{\mathrm{cb}}$ | Collector－Base Capacitance | $\mathrm{V}_{\mathrm{CB}}=10 \mathrm{~V}, \mathrm{I}_{\mathrm{E}}=0$, <br> $\mathrm{f}=0.1 \mathrm{to} \mathrm{1.0} \mathrm{MHz}$ |  | 1.0 | pF |
| $\mathrm{h}_{\mathrm{fe}}$ | Small－Signal Current Gain | $\mathrm{I}_{\mathrm{C}}=2.0 \mathrm{~mA}, \mathrm{~V}_{\mathrm{CE}}=6.0 \mathrm{~V}$, <br> $\mathrm{f}=1.0 \mathrm{kHz}$ | 25 | 300 |  |
| rb＇C $\mathrm{C}_{\mathrm{c}}$ | Collector Base Time Constant | $\mathrm{I}_{\mathrm{C}}=2.0 \mathrm{~mA}, \mathrm{~V}_{\mathrm{CB}}=6.0 \mathrm{~V}$, <br> $\mathrm{f}=31.9 \mathrm{MHz}$ | 3.0 | 14 | ps |
| NF | Noise Figure | $\mathrm{I}=1.5 \mathrm{~mA}, \mathrm{~V}_{\mathrm{CE}}=6.0 \mathrm{~V}$, <br> $\mathrm{R}_{\mathrm{S}}=50 \Omega, \mathrm{f}=200 \mathrm{MHz}$ |  | 5.0 | dB |

FUNCTIONAL TEST

| $\mathrm{G}_{\mathrm{pe}}$ | Amplifier Power Gain | $\mathrm{V}_{\mathrm{CE}}=6.0 \mathrm{~V}, \mathrm{I}_{\mathrm{C}}=5.0 \mathrm{~mA}$, <br> $\mathrm{f}=200 \mathrm{MHz}$ | 15 | dB |  |
| :--- | :--- | :--- | :---: | :---: | :---: |
| $\mathrm{P}_{\circ}$ | Power Output | $\mathrm{V}_{\mathrm{CB}}=10 \mathrm{~V}, \mathrm{I}_{\mathrm{E}}=12 \mathrm{~mA}$, <br> $\mathrm{f} \geq 500 \mathrm{MHz}$ | 20 |  | mW |

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

## Spice Model

NPN（Is＝69．28E－18 Xti＝3 $\mathrm{Eg}=1.11 \mathrm{Vaf}=100 \mathrm{Bf}=282.1 \mathrm{Ne}=1.177 \mathrm{Ise}=69.28 \mathrm{E}-18 \mathrm{lkf}=22.03 \mathrm{~m} \quad \mathrm{Xtb}=1.5 \mathrm{Br}=1.176$ $\mathrm{Nc}=2 \quad \mathrm{Isc}=0 \quad \mathrm{lkr}=0 \quad \mathrm{Rc}=4 \quad \mathrm{Cjc}=1.042 \mathrm{p} \quad \mathrm{Mjc}=.2468 \quad \mathrm{Vjc}=.75 \quad \mathrm{Fc}=.5 \quad \mathrm{Cje}=1.52 \mathrm{p} \quad \mathrm{Mje}=.3223 \quad \mathrm{Vje}=.75 \quad \mathrm{Tr}=1.588 \mathrm{n}$ $\mathrm{Tf}=135.6 \mathrm{p} \quad \mathrm{ltf}=.27 \mathrm{Vtf}=10 \quad \mathrm{Xtf}=30 \quad \mathrm{Rb}=10)$

Typical Characteristics



Collector-Cut off Current vs Ambient Temperature




Power Dissipation vs Ambient Temperature



FIGURE 1： 500 MHz Oscillator Circuit

勝 特 力 材 料 886－3－5753170
胜特力 电子（上海）86－21－34970699
胜特力 电子（深圳）86－755－83298787
Http：／／www．100y．com．tw

## TO－92 Tape and Reel Data

## FAIRCHILD

SEMICONDUCTOR тм $^{\text {S }}$

## TO－92 Packaging

Configuration：Figure 1.0


## 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）


> 勝 特 力 材 料 $886^{-} 3^{-5753170}$
> 胜特力电子(上海) $86^{-21-34970699}$
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