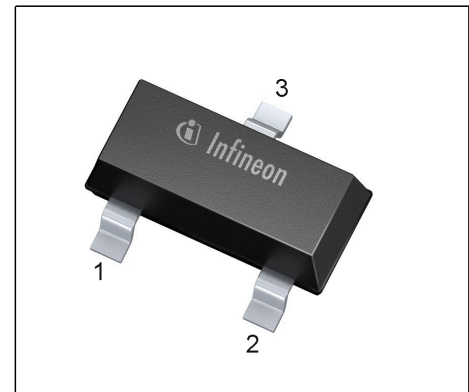


## Low Noise Silicon Bipolar RF Transistor

- High linearity low noise RF transistor
- 22 dBm OP1dB and 31 dBm OIP3  
@ 900 MHz, 8 V, 70 mA
- For UHF / VHF applications
- Driver for multistage amplifiers
- For linear broadband and antenna amplifiers
- Collector design supports 5 V supply voltage
- Pb-free (RoHS compliant) package
- Qualification report according to AEC-Q101 available



**ESD (Electrostatic discharge) sensitive device, observe handling precaution!**

| Type   | Marking | Pin Configuration |     |     | Package |
|--------|---------|-------------------|-----|-----|---------|
| BFR106 | R7s     | 1=B               | 2=E | 3=C | SOT23   |

**Maximum Ratings** at  $T_A = 25\text{ °C}$ , unless otherwise specified

| Parameter                                                                   | Symbol    | Value       | Unit |
|-----------------------------------------------------------------------------|-----------|-------------|------|
| Collector-emitter voltage,<br>$T_A = 25\text{ °C}$<br>$T_A = -55\text{ °C}$ | $V_{CEO}$ | 16<br>15    | V    |
| Collector-emitter voltage                                                   | $V_{CES}$ | 20          |      |
| Collector-base voltage                                                      | $V_{CBO}$ | 20          |      |
| Emitter-base voltage                                                        | $V_{EBO}$ | 3           |      |
| Collector current                                                           | $I_C$     | 210         | mA   |
| Base current                                                                | $I_B$     | 21          |      |
| Total power dissipation <sup>1)</sup><br>$T_S \leq 76\text{ °C}$            | $P_{tot}$ | 700         | mW   |
| Junction temperature                                                        | $T_J$     | 150         | °C   |
| Storage temperature                                                         | $T_{Stg}$ | -55 ... 150 |      |

### Thermal Resistance

| Parameter                                | Symbol     | Value | Unit |
|------------------------------------------|------------|-------|------|
| Junction - soldering point <sup>2)</sup> | $R_{thJS}$ | 105   | K/W  |

<sup>1)</sup>  $T_S$  is measured on the collector lead at the soldering point to the pcb

<sup>2)</sup> For calculation of  $R_{thJS}$  please refer to Application Note AN077 (Thermal Resistance Calculation)

**Electrical Characteristics** at  $T_A = 25\text{ °C}$ , unless otherwise specified

| Parameter                                                                                                          | Symbol        | Values |            |           | Unit          |
|--------------------------------------------------------------------------------------------------------------------|---------------|--------|------------|-----------|---------------|
|                                                                                                                    |               | min.   | typ.       | max.      |               |
| DC Characteristics                                                                                                 |               |        |            |           |               |
| Collector-emitter breakdown voltage<br>$I_C = 1\text{ mA}$ , $I_B = 0$                                             | $V_{(BR)CEO}$ | 15     | -          | -         | V             |
| Collector-emitter cutoff current<br>$V_{CE} = 20\text{ V}$ , $V_{BE} = 0$<br>$V_{CE} = 10\text{ V}$ , $V_{BE} = 0$ | $I_{CES}$     | -<br>- | -<br>0.001 | 1<br>0.03 | $\mu\text{A}$ |
| Collector-base cutoff current<br>$V_{CB} = 10\text{ V}$ , $I_E = 0$                                                | $I_{CBO}$     | -      | 1          | 30        | nA            |
| Emitter-base cutoff current<br>$V_{EB} = 2\text{ V}$ , $I_C = 0$                                                   | $I_{EBO}$     | -      | 1          | 30        |               |
| DC current gain<br>$I_C = 70\text{ mA}$ , $V_{CE} = 8\text{ V}$ , pulse measured                                   | $h_{FE}$      | 70     | 100        | 140       | -             |

**Electrical Characteristics** at  $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

| Parameter                                                                                                                                                                                                      | Symbol     | Values     |              |            | Unit |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|--------------|------------|------|
|                                                                                                                                                                                                                |            | min.       | typ.         | max.       |      |
| AC Characteristics (verified by random sampling)                                                                                                                                                               |            |            |              |            |      |
| Transition frequency<br>$I_C = 70\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $f = 500\text{ MHz}$                                                                                                                    | $f_T$      | 3.5        | 5            | -          | GHz  |
| Collector-base capacitance<br>$V_{CB} = 10\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ ,<br>emitter grounded                                                                                                 | $C_{cb}$   | -          | 0.85         | 1.2        | pF   |
| Collector emitter capacitance<br>$V_{CE} = 10\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ ,<br>base grounded                                                                                                 | $C_{ce}$   | -          | 0.27         | -          |      |
| Emitter-base capacitance<br>$V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$ , $V_{CB} = 0$ ,<br>collector grounded                                                                                                | $C_{eb}$   | -          | 3.9          | -          |      |
| Minimum noise figure<br>$I_C = 20\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ ,<br>$f = 900\text{ MHz}$<br>$I_C = 20\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ ,<br>$f = 1.8\text{ GHz}$ | $NF_{min}$ | -<br><br>- | 1.8<br><br>3 | -<br><br>- | dB   |

**Electrical Characteristics** at  $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

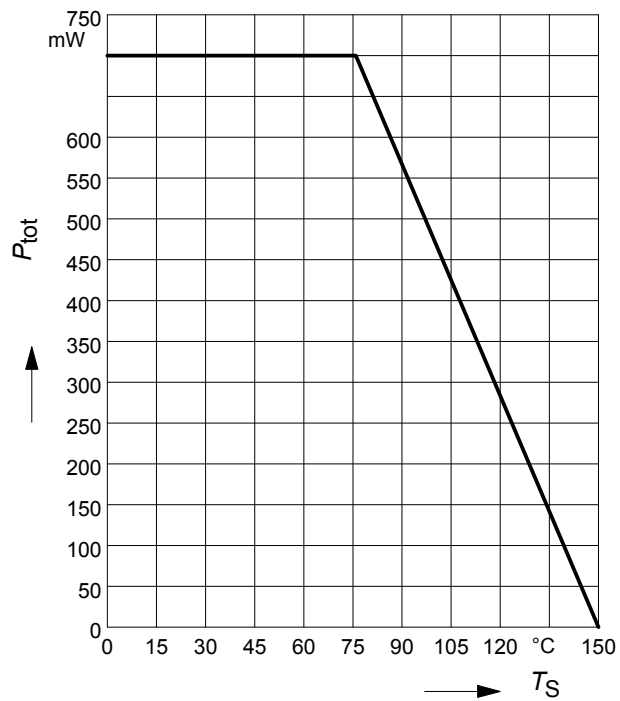
| Parameter                                                                                                                                                                                                                                                                   | Symbol        | Values |      |      | Unit |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|------|------|------|
|                                                                                                                                                                                                                                                                             |               | min.   | typ. | max. |      |
| AC Characteristics (verified by random sampling)                                                                                                                                                                                                                            |               |        |      |      |      |
| Power gain, maximum available <sup>1)</sup><br>$I_C = 70\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ ,<br>$f = 900\text{ MHz}$<br>$I_C = 70\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ ,<br>$f = 1.8\text{ GHz}$ | $G_{ma}$      | -      | 13   | -    | dB   |
| Transducer gain<br>$I_C = 70\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_L = 50\text{ }\Omega$ ,<br>$f = 900\text{ MHz}$<br>$I_C = 70\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_L = 50\text{ }\Omega$ ,<br>$f = 1.8\text{ GHz}$                                       | $ S_{21e} ^2$ | -      | 10.5 | -    | dB   |
| Third order intercept point at output <sup>2)</sup><br>$V_{CE} = 8\text{ V}$ , $I_C = 70\text{ mA}$ , $f = 0.9\text{ GHz}$ ,<br>$Z_S=Z_L=50\Omega$                                                                                                                          | $IP_3$        | -      | 31   | -    | dBm  |
| 1dB compression point<br>$I_C = 70\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S=Z_L=50\Omega$ ,<br>$f = 0.9\text{ GHz}$                                                                                                                                                        | $P_{-1dB}$    | -      | 22   | -    |      |

$$^1G_{ma} = |S_{21e}| / |S_{12e}| (k - (k^2 - 1)^{1/2})$$

<sup>2)</sup> $IP_3$  value depends on termination of all intermodulation frequency components.

Termination used for this measurement is  $50\text{ }\Omega$  from  $0.1\text{ MHz}$  to  $6\text{ GHz}$

Total power dissipation  $P_{\text{tot}} = f(T_S)$

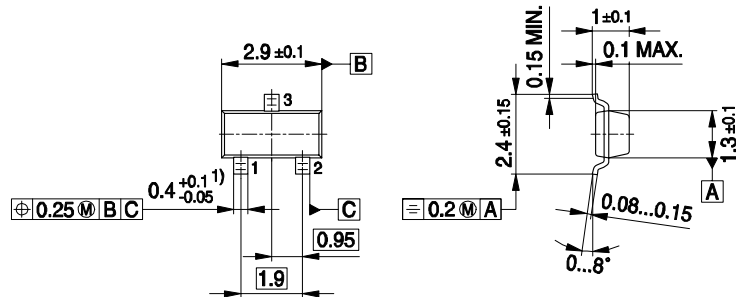
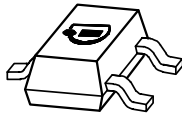


**SPICE GP Model**

For the SPICE Gummel Poon (GP) model as well as for the S-parameters (including noise parameters) please refer to our internet website [www.infineon.com/rf.models](http://www.infineon.com/rf.models).

Please consult our website and download the latest versions before actually starting your design.

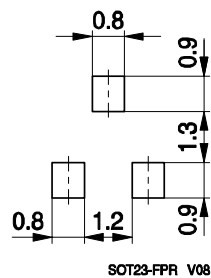
## Package Outline



1) Lead width can be 0.6 max. in dambar area

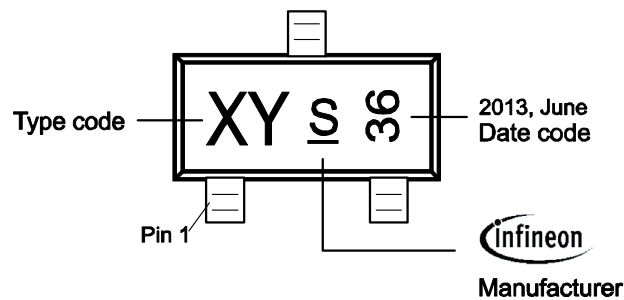
SOT23-PO V08

## Foot Print



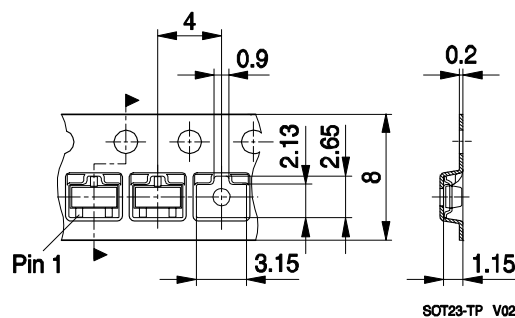
SOT23-FPR V08

## Marking Layout



## Standard Packing

Reel o 180 mm: 3.000 Pieces / Reel  
Reel o 330 mm = 10.000 Pieces / Reel



SOT23-TP V02

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