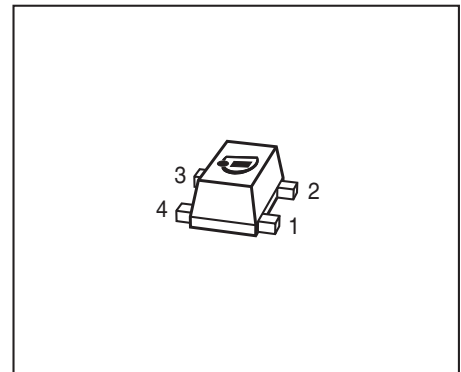


**Low Noise Silicon Bipolar RF Transistor**

- For low current applications
- Minimum noise figure  $NF_{\min} = 1.25$  dB at 1.8 GHz  
Outstanding  $G_{ms} = 22.5$  dB at 1.8 GHz
- Transition frequency  $f_T = 25$  GHz
- Pb-free (RoHS compliant) and halogen-free thin small flat package (1.4 x 0.8 x 0.59 mm) with visible leads
- Qualification report according to AEC-Q101 available



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

| Type    | Marking | Pin Configuration |     |     |     |   |   | Package |
|---------|---------|-------------------|-----|-----|-----|---|---|---------|
| BFP405F | ALs     | 1=B               | 2=E | 3=C | 4=E | - | - | TSFP-4  |

**Maximum Ratings** at  $T_A = 25$  °C, unless otherwise specified

| Parameter                             | Symbol    | Value       | Unit |
|---------------------------------------|-----------|-------------|------|
| Collector-emitter voltage             | $V_{CEO}$ |             | V    |
| $T_A = 25$ °C                         |           | 4.5         |      |
| $T_A = -55$ °C                        |           | 4.1         |      |
| Collector-emitter voltage             | $V_{CES}$ | 15          |      |
| Collector-base voltage                | $V_{CBO}$ | 15          |      |
| Emitter-base voltage                  | $V_{EBO}$ | 1.5         |      |
| Collector current                     | $I_C$     | 25          | mA   |
| Base current                          | $I_B$     | 3           |      |
| Total power dissipation <sup>1)</sup> | $P_{tot}$ | 75          | mW   |
| $T_S \leq 112$ °C                     |           |             |      |
| Junction temperature                  | $T_J$     | 150         | °C   |
| Storage temperature                   | $T_{Stg}$ | -55 ... 150 |      |

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

**Thermal Resistance**

| Parameter                                | Symbol     | Value | Unit |
|------------------------------------------|------------|-------|------|
| Junction - soldering point <sup>1)</sup> | $R_{thJS}$ | 500   | K/W  |

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

| Parameter                                                                    | Symbol        | Values |      |      | Unit          |
|------------------------------------------------------------------------------|---------------|--------|------|------|---------------|
|                                                                              |               | min.   | typ. | max. |               |
| <b>DC Characteristics</b>                                                    |               |        |      |      |               |
| Collector-emitter breakdown voltage<br>$I_C = 1\text{ mA}, I_B = 0$          | $V_{(BR)CEO}$ | 4      | 5    | -    | V             |
| Collector-emitter cutoff current<br>$V_{CE} = 15\text{ V}, V_{BE} = 0$       | $I_{CES}$     | -      | -    | 10   | $\mu\text{A}$ |
| Collector-base cutoff current<br>$V_{CB} = 5\text{ V}, I_E = 0$              | $I_{CBO}$     | -      | -    | 100  | nA            |
| Emitter-base cutoff current<br>$V_{EB} = 0.5\text{ V}, I_C = 0$              | $I_{EBO}$     | -      | -    | 1    | $\mu\text{A}$ |
| DC current gain<br>$I_C = 5\text{ mA}, V_{CE} = 4\text{ V}$ , pulse measured | $h_{FE}$      | 60     | 95   | 130  | -             |

<sup>1</sup>For the definition of  $R_{thJS}$  please refer to Application Note AN077 (Thermal Resistance Calculation)

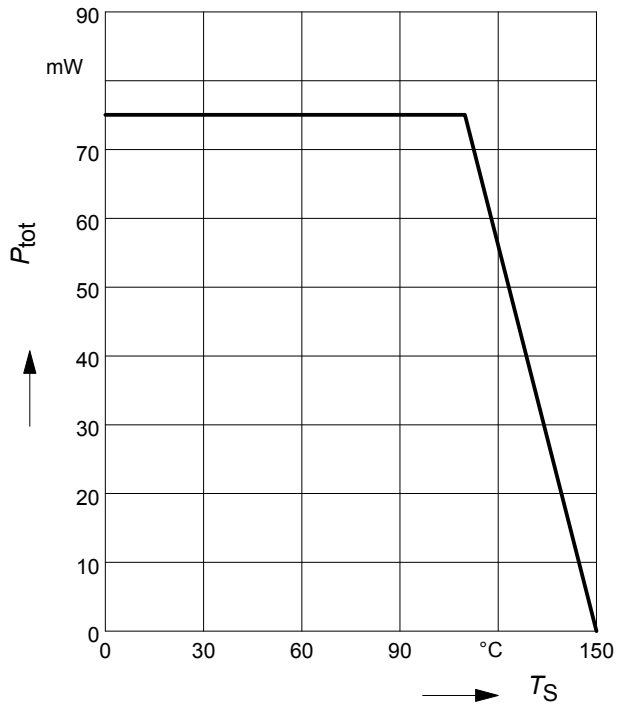
**Electrical Characteristics at  $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise specified**

| Parameter                                                                                                                                               | Symbol       | Values |      |      | Unit |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------|------|------|------|
|                                                                                                                                                         |              | min.   | typ. | max. |      |
| <b>AC Characteristics (verified by random sampling)</b>                                                                                                 |              |        |      |      |      |
| Transition frequency<br>$I_C = 10\text{ mA}$ , $V_{CE} = 3\text{ V}$ , $f = 2\text{ GHz}$                                                               | $f_T$        | 18     | 25   | -    | GHz  |
| Collector-base capacitance<br>$V_{CB} = 2\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ ,<br>emitter grounded                                           | $C_{cb}$     | -      | 0.05 | 0.1  | pF   |
| Collector emitter capacitance<br>$V_{CE} = 2\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ ,<br>base grounded                                           | $C_{ce}$     | -      | 0.2  | -    |      |
| Emitter-base capacitance<br>$V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$ , $V_{CB} = 0$ ,<br>collector grounded                                         | $C_{eb}$     | -      | 0.25 | -    |      |
| Minimum noise figure<br>$I_C = 2\text{ mA}$ , $V_{CE} = 2\text{ V}$ , $f = 1.8\text{ GHz}$ , $Z_S = Z_{Sopt}$                                           | $NF_{min}$   | -      | 1.25 | -    | dB   |
| Power gain, maximum stable <sup>1)</sup><br>$I_C = 5\text{ mA}$ , $V_{CE} = 2\text{ V}$ , $Z_S = Z_{Sopt}$ ,<br>$Z_L = Z_{Lopt}$ , $f = 1.8\text{ GHz}$ | $G_{ms}$     | -      | 22.5 | -    | dB   |
| Insertion power gain<br>$V_{CE} = 2\text{ V}$ , $I_C = 5\text{ mA}$ , $f = 1.8\text{ GHz}$ ,<br>$Z_S = Z_L = 50\ \Omega$                                | $ S_{21} ^2$ | -      | 18   | -    |      |
| Third order intercept point at output <sup>2)</sup><br>$V_{CE} = 2\text{ V}$ , $I_C = 5\text{ mA}$ , $f = 1.8\text{ GHz}$ ,<br>$Z_S = Z_L = 50\ \Omega$ | $IP3$        | -      | 14   | -    | dBm  |
| 1dB compression point at output<br>$I_C = 5\text{ mA}$ , $V_{CE} = 2\text{ V}$ , $Z_S = Z_L = 50\ \Omega$ ,<br>$f = 1.8\text{ GHz}$                     | $P_{-1dB}$   | -      | 0    | -    |      |

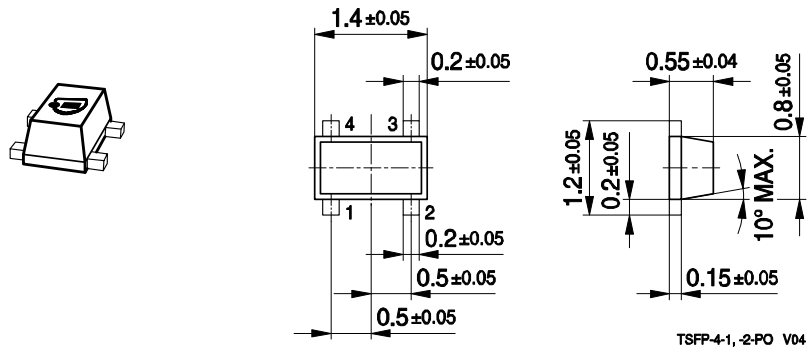
$$^1G_{ms} = |S_{21} / S_{12}|$$

<sup>2</sup>IP3 value depends on termination of all intermodulation frequency components.  
Termination used for this measurement is 50Ω from 0.1 MHz to 6 GHz

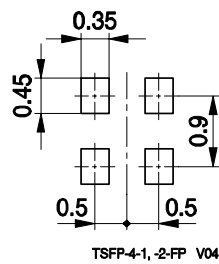
Total power dissipation  $P_{\text{tot}} = f(T_S)$



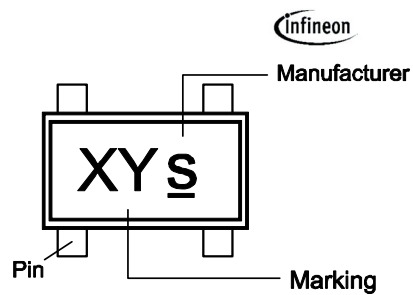
### Package Outline



### Foot Print

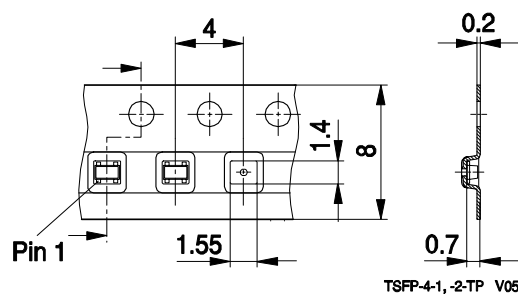


### Marking Layout (Example)



### Standard Packing

Reel  $\varnothing$ 180 mm = 3.000 Pieces/Reel  
 Reel  $\varnothing$ 330 mm = 10.000 Pieces/Reel



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