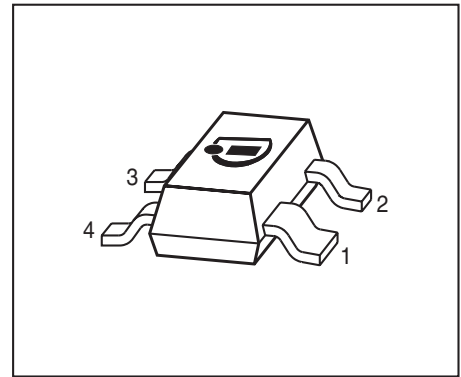


**Low Noise Silicon Bipolar RF Transistor**

- For low noise, high-gain broadband amplifiers at collector currents from 0.5 mA to 12 mA
- $f_T = 8$  GHz,  $NF_{min} = 0.9$  dB at 900 MHz
- 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 |
|--------|---------|-------------------|-------|-------|-------|---|---|---------|
| BFP181 | RFs     | 1 = C             | 2 = E | 3 = B | 4 = E | - | - | SOT143  |

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

| Parameter   | Symbol    | Value       | Unit |
|---|-----------|-------------|------|
| Collector-emitter voltage                                 | $V_{CEO}$ | 12          | V    |
| Collector-emitter voltage                                 | $V_{CES}$ | 20          |      |
| Collector-base voltage                                    | $V_{CBO}$ | 20          |      |
| Emitter-base voltage                                      | $V_{EBO}$ | 2           |      |
| Collector current   | $I_C$     | 20          | mA   |
| Base current  | $I_B$     | 2           |      |
| Total power dissipation <sup>1)</sup><br>$T_S \leq 75$ °C | $P_{tot}$ | 175         | 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> | $R_{thJS}$ | 430   | K/W  |

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

<sup>2)</sup> For the definition 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. |               |
| <b>DC Characteristics</b>  |               |        |      |      |               |
| Collector-emitter breakdown voltage<br>$I_C = 1\text{ mA}, I_B = 0$          | $V_{(BR)CEO}$ | 12     | -    | -    | V             |
| Collector-emitter cutoff current<br>$V_{CE} = 20\text{ V}, V_{BE} = 0$       | $I_{CES}$     | -      | -    | 100  | $\mu\text{A}$ |
| Collector-base cutoff current<br>$V_{CB} = 10\text{ V}, I_E = 0$             | $I_{CBO}$     | -      | -    | 100  | nA            |
| Emitter-base cutoff current<br>$V_{EB} = 1\text{ V}, I_C = 0$                | $I_{EBO}$     | -      | -    | 1    | $\mu\text{A}$ |
| DC current gain<br>$I_C = 5\text{ mA}, V_{CE} = 8\text{ V}$ , pulse measured | $h_{FE}$      | 70     | 100  | 140  | -             |

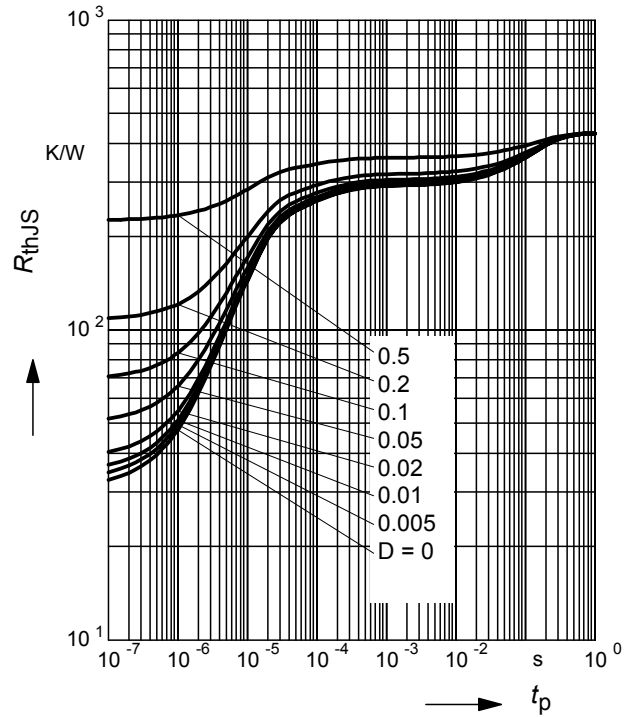
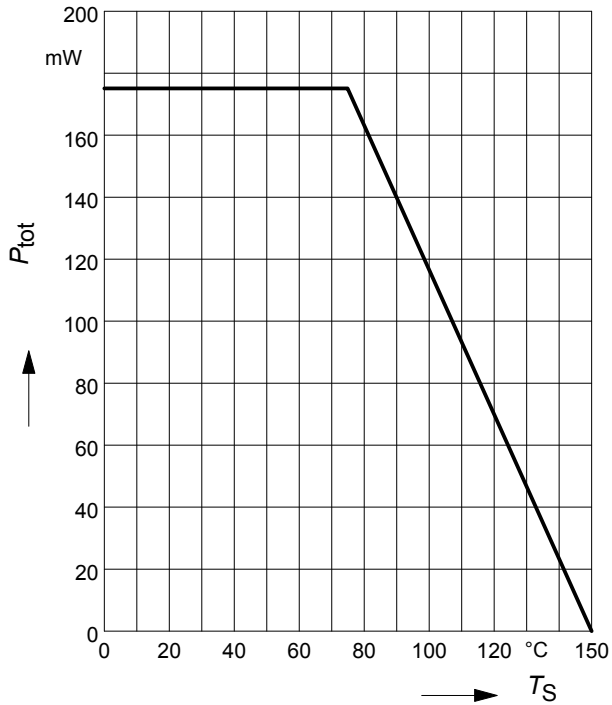
**Electrical Characteristics at  $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise specified**

| Parameter  | Symbol        | Values |      |      | Unit |
|--|---------------|--------|------|------|------|
|  |               | min.   | typ. | max. |      |
| <b>AC Characteristics (verified by random sampling)</b>  |               |        |      |      |      |
| Transition frequency<br>$I_C = 10\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $f = 500\text{ MHz}$  | $f_T$         | 6      | 8    | -    | GHz  |
| Collector-base capacitance<br>$V_{CB} = 10\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ ,<br>emitter grounded   | $C_{cb}$      | -      | 0.19 | 0.4  | pF   |
| Collector emitter capacitance<br>$V_{CE} = 10\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ ,<br>base grounded   | $C_{ce}$      | -      | 0.3  | -    |      |
| Emitter-base capacitance<br>$V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$ , $V_{CB} = 0$ ,<br>collector grounded  | $C_{eb}$      | -      | 0.4  | -    |      |
| Minimum noise figure<br>$I_C = 2\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ ,<br>$f = 900\text{ MHz}$<br>$I_C = 2\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ ,<br>$f = 1.8\text{ GHz}$   | $NF_{min}$    | -      | 0.9  | -    | dB   |
| Power gain, maximum stable <sup>1)</sup><br>$I_C = 5\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ ,<br>$f = 900\text{ MHz}$<br>$I_C = 5\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ ,<br>$f = 1.8\text{ GHz}$ | $G_{ms}$      | -      | 21   | -    | dB   |
| Transducer gain<br>$I_C = 5\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_L = 50\text{ }\Omega$ ,<br>$f = 900\text{ MHz}$<br>$I_C = 5\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_L = 50\text{ }\Omega$ ,<br>$f = 1.8\text{ GHz}$                                    | $ S_{21e} ^2$ | -      | 17.5 | -    |      |
|  |               | -      | 12.5 | -    |      |

<sup>1)</sup> $G_{ms} = |S_{21} / S_{12}|$

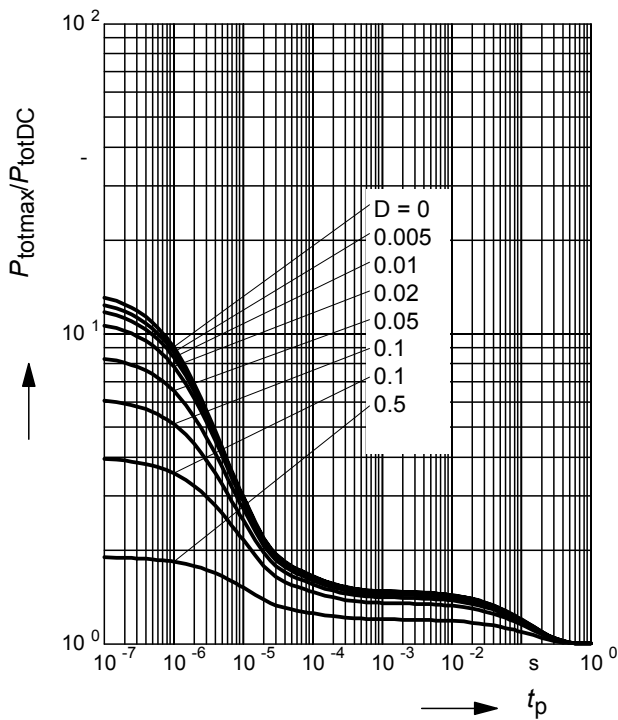
Total power dissipation  $P_{tot} = f(T_S)$

Permissible Pulse Load  $R_{thJS} = f(t_p)$



**Permissible Pulse Load**

$P_{totmax}/P_{totDC} = f(t_p)$



### Package Outline



Note: Mold flash, protrusions or gate burrs of 0,2 mm max. per side are not included

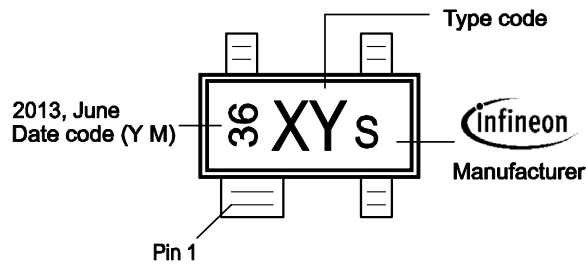
SOT143-PO V09

### Foot Print



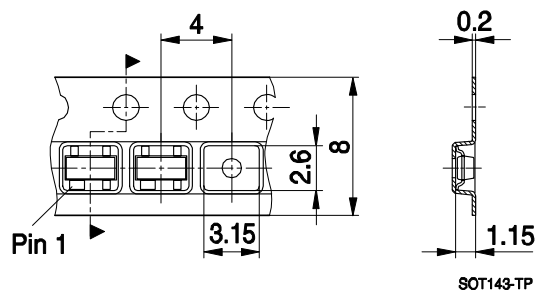
SOT143-FPR V09

### Marking Layout (Example)



### Standard Packing

Reel ø180 mm = 3.000 Pieces/Reel  
 Reel ø330 mm = 10.000 Pieces/Reel



SOT143-TP

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