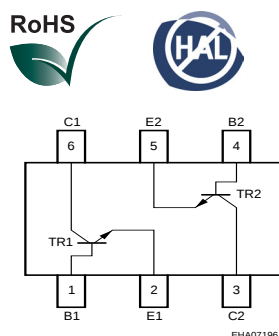
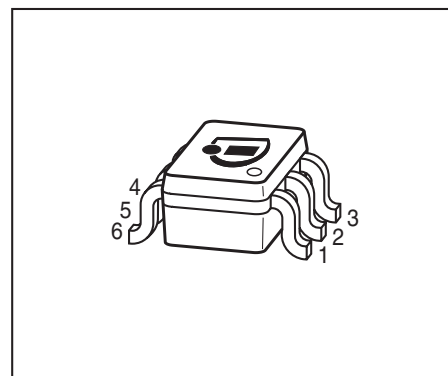


## Low Noise Silicon Bipolar RF Transistor

- For low noise, high-gain broadband amplifiers at collector currents from 0.5 mA to 12 mA
- $f_T = 8 \text{ GHz}$ ,  $NF_{\min} = 0.9 \text{ dB}$  at 900 MHz
- Two (galvanic) internal isolated Transistors in one package
- For orientation in reel see package information below
- Easy to use Pb-free (RoHS compliant) and halogen free industry standard package with visible leads
- Qualification report according to AEC-Q101 available



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

| Type   | Marking | Pin Configuration |     |     |     |     |     | Package |
|--------|---------|-------------------|-----|-----|-----|-----|-----|---------|
| BFS481 | RFs     | 1=B               | 2=E | 3=C | 4=B | 5=E | 6=C | SOT363  |

**Maximum Ratings** at  $T_A = 25\text{ °C}$ , 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>$T_S \leq 83\text{ °C}$ | $P_{tot}$ | 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> | $R_{thJS}$ | 380   | K/W  |

**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>$I_C = 1\text{ mA}$ , $I_B = 0$          | $V_{(BR)CEO}$ | 12 | -   | -   | V  |
| Collector-emitter cutoff current<br>$V_{CE} = 20\text{ V}$ , $V_{BE} = 0$       | $I_{CES}$     | -  | -   | 100 | μA |
| 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   | μA |
| DC current gain<br>$I_C = 5\text{ mA}$ , $V_{CE} = 8\text{ V}$ , pulse measured | $h_{FE}$      | 70 | 100 | 140 | -  |

<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)

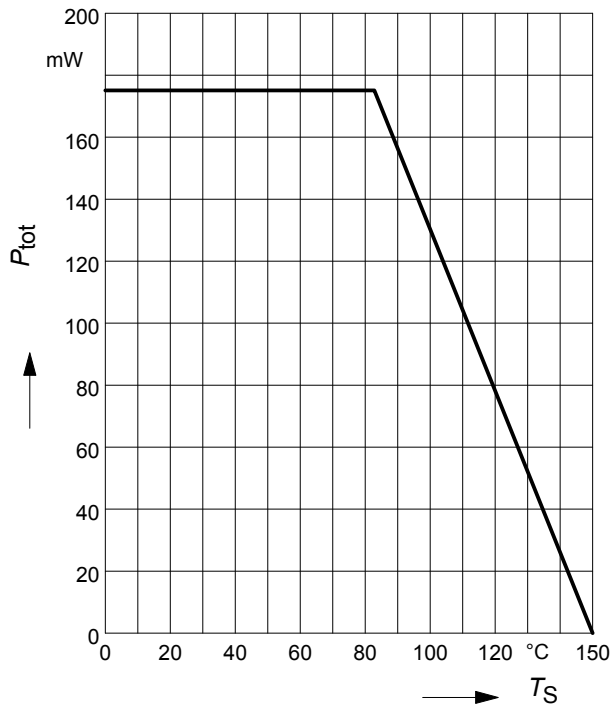
**Electrical Characteristics at  $T_A = 25\text{ °C}$ , unless otherwise specified**

| Parameter                                                                                                                                                                                                                           | Symbol        | Values |            |        | Unit |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|------------|--------|------|
|                                                                                                                                                                                                                                     |               | min.   | typ.       | max.   |      |
| AC Characteristics (verified by random sampling)                                                                                                                                                                                    |               |        |            |        |      |
| 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                                                                                                                      | $C_{cb}$      | -      | 0.23       | 0.4    | pF   |
| Collector emitter capacitance<br>$V_{CE} = 10\text{ V}$ , $f = 1\text{ MHz}$ , $V_{BE} = 0$ ,<br>base grounded                                                                                                                      | $C_{ce}$      | -      | 0.13       | -      |      |
| 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>$f = 1.8\text{ GHz}$                        | $NF_{min}$    | -<br>- | 0.9<br>1.2 | -<br>- | 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>$f = 900\text{ MHz}$                                                                             | $G_{ms}$      | -      | 20         | -      | dB   |
| Power gain, maximum available <sup>2)</sup><br>$I_C = 5\text{ mA}$ , $V_{CE} = 8\text{ V}$ , $Z_S = Z_{Sopt}$ , $Z_L = Z_{Lopt}$ ,<br>$f = 1.8\text{ GHz}$                                                                          | $G_{ma}$      | -      | 15         | -      | 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>$f = 1.8\text{ MHz}$ | $ S_{21e} ^2$ | -<br>- | 16<br>11   | -<br>- | dB   |

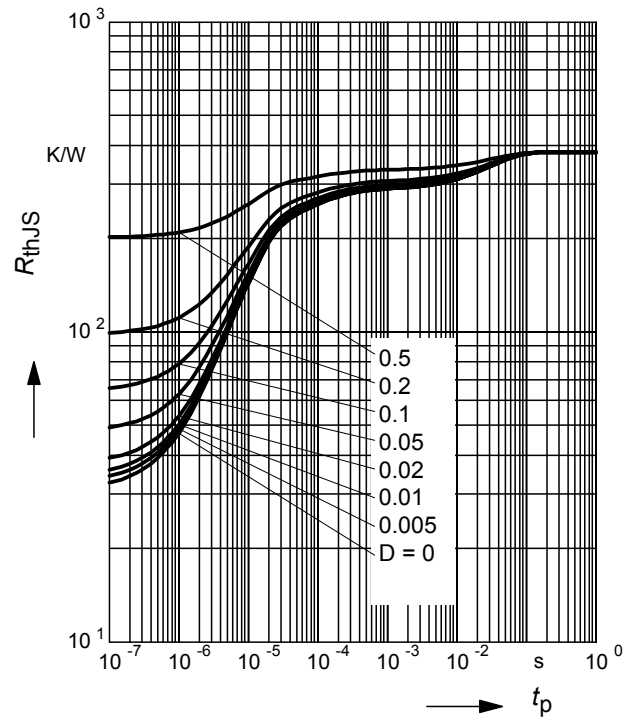
$$^1G_{ms} = |S_{21} / S_{12}|$$

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

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

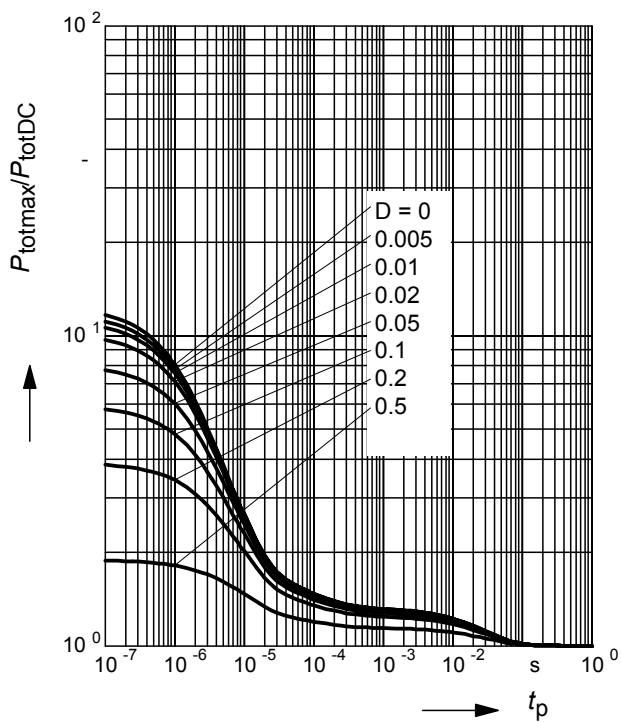


**Permissible Pulse Load**  $R_{\text{thJS}} = f(t_p)$

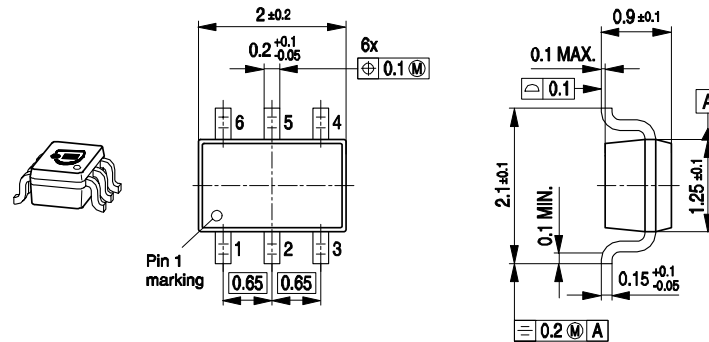


**Permissible Pulse Load**

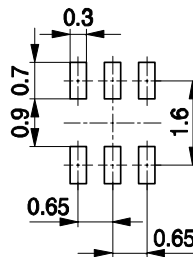
$P_{\text{totmax}}/P_{\text{totDC}} = f(t_p)$



## Package Outline

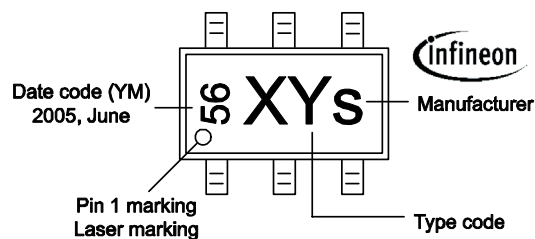


## Foot Print



## Marking Layout (Example)

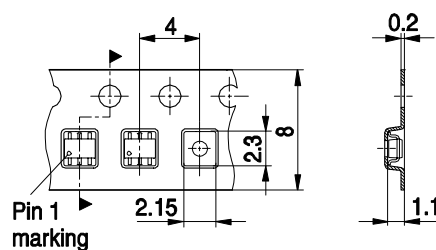
Small variations in positioning of Date code, Type code and Manufacturer are possible.



## Standard Packing

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

For symmetric types no defined Pin 1 orientation in reel.



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