
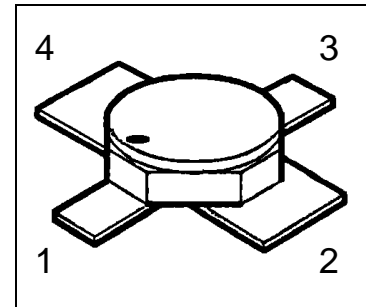


## HiRel NPN Silicon RF Transistor

- **HiRel Discrete and Microwave Semiconductor**
- For low noise, high-gain broadband amplifiers at collector currents from 2mA to 30mA.
- Hermetically sealed microwave package
- $f_T = 8$  GHz  
F = 2.3 dB at 2 GHz
-  **ESA Space Qualified**  
ESA/SCC Detail Spec. No.: 5611/006  
Type Variant No. 05



**ESD:** Electrostatic discharge sensitive device, observe handling precautions!

| Type        | Marking | Ordering Code | Pin Configuration |   |   |   | Package  |
|-------------|---------|---------------|-------------------|---|---|---|----------|
|             |         |               | C                 | E | B | E |          |
| BFY183 (ql) | -       | see below     | C                 | E | B | E | Micro-X1 |

(ql) Quality Level: P: Professional Quality  
H: High Rel Quality  
S: Space Quality  
ES: ESA Space Quality

(see order instructions for ordering example)

**Maximum Ratings**

| Parameter  | Symbol    | Values           | Unit |
|--|-----------|------------------|------|
| Collector-emitter voltage  | $V_{CEO}$ | 12               | V    |
| Collector-emitter voltage, $V_{BE}=0$                                  | $V_{CES}$ | 20               | V    |
| Collector-base voltage   | $V_{CBO}$ | 20               | V    |
| Emitter-base voltage   | $V_{EBO}$ | 2                | V    |
| Collector current  | $I_C$     | 65               | mA   |
| Base current   | $I_B$     | 5 <sup>1.)</sup> | mA   |
| Total power dissipation,<br>$T_S \leq 99^\circ\text{C}$ <sup>2.)</sup> | $P_{tot}$ | 450              | mW   |
| Junction temperature   | $T_j$     | 200              | °C   |
| Operating temperature range  | $T_{op}$  | -65...+200       | °C   |
| Storage temperature range  | $T_{stg}$ | -65...+200       | °C   |

**Thermal Resistance**

|   |             |       |     |
|---|-------------|-------|-----|
| Junction-soldering point <sup>2.)</sup> | $R_{th JS}$ | < 225 | K/W |
|---|-------------|-------|-----|

**Notes.:**

- 1) The maximum permissible base current for  $V_{FBE}$  measurements is 20mA (spot-measurement duration < 1s)
- 2)  $T_S$  is measured on the collector lead at the soldering point to the pcb.

**Electrical Characteristics**

 at  $T_A=25^\circ\text{C}$ ; unless otherwise specified

| Parameter | Symbol | Values |      |      | Unit |
|-----------|--------|--------|------|------|------|
|           |        | min.   | typ. | max. |      |

**DC Characteristics**

|   |           |   |   |     |               |
|---|-----------|---|---|-----|---------------|
| Collector-base cutoff current<br>$V_{CB} = 20\text{ V}, I_E = 0$                                | $I_{CBO}$ | - | - | 100 | $\mu\text{A}$ |
| Collector-emitter cutoff current<br>$V_{CE} = 12\text{ V}, I_B = 0,3\mu\text{A}$ <sup>1.)</sup> | $I_{CEX}$ | - | - | 300 | $\mu\text{A}$ |
| Collector-base cutoff current<br>$V_{CB} = 10\text{ V}, I_E = 0$                                | $I_{CBO}$ | - | - | 50  | nA            |
| Emitter base cutoff current<br>$V_{EB} = 2\text{ V}, I_C = 0$                                   | $I_{EBO}$ | - | - | 25  | $\mu\text{A}$ |
| Emitter base cutoff current<br>$V_{EB} = 1\text{ V}, I_C = 0$                                   | $I_{EBO}$ | - | - | 0.5 | $\mu\text{A}$ |

**Notes:**

- 1.) This Test assures  $V(BR)CE0 > 12\text{V}$

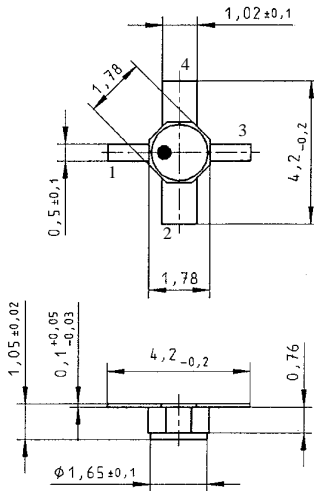
**Electrical Characteristics** (continued)

| Parameter  | Symbol        | Values   |          |        | Unit |
|--|---------------|----------|----------|--------|------|
|  |               | min.     | typ.     | max.   |      |
| <b>DC Characteristics</b>  |               |          |          |        |      |
| Base-Emitter forward voltage<br>$I_E = 30 \text{ mA}, I_C = 0$   | $V_{FBE}$     | -        | -        | 1      | V    |
| DC current gain<br>$I_C = 5 \text{ mA}, V_{CE} = 6 \text{ V}$  | $h_{FE}$      | 55       | 90       | 160    | -    |
| <b>AC Characteristics</b>  |               |          |          |        |      |
| Transition frequency<br>$I_C = 20 \text{ mA}, V_{CE} = 5 \text{ V}, f = 500 \text{ MHz}$<br>$I_C = 25 \text{ mA}, V_{CE} = 8 \text{ V}, f = 500 \text{ MHz}$ | $f_T$         | 6,5<br>- | 7.5<br>8 | -<br>- | GHz  |
| Collector-base capacitance<br>$V_{CB} = 10 \text{ V}, V_{BE} = v_{be} = 0, f = 1 \text{ MHz}$  | $C_{CB}$      | -        | 0.32     | 0.44   | pF   |
| Collector-emitter capacitance<br>$V_{CE} = 10 \text{ V}, V_{BE} = v_{be} = 0, f = 1 \text{ MHz}$   | $C_{CE}$      | -        | 0.34     | -      | pF   |
| Emitter-base capacitance<br>$V_{EB} = 0.5 \text{ V}, V_{CB} = v_{cb} = 0, f = 1 \text{ MHz}$   | $C_{EB}$      | -        | 1.1      | 1.4    | pF   |
| Noise Figure<br>$I_C = 8 \text{ mA}, V_{CE} = 5 \text{ V}, f = 2 \text{ GHz},$<br>$Z_S = Z_{Sopt}$   | F             | -        | 2.3      | 2.9    | dB   |
| Power gain<br>$I_C = 20 \text{ mA}, V_{CE} = 5 \text{ V}, f = 2 \text{ GHz}$<br>$Z_S = Z_{Sopt}, Z_L = Z_{Lopt}$   | $G_{ma}^{1)}$ | 12.5     | 14       | -      | dB   |
| Transducer gain<br>$I_C = 20 \text{ mA}, V_{CE} = 5 \text{ V}, f = 2 \text{ GHz}$<br>$Z_S = Z_L = 50 \Omega$   | $ S_{21e} ^2$ | 9        | 10,5     | -      | dB   |
| Output Power<br>$I_C = 30 \text{ mA}, V_{CE} = 5 \text{ V}, f = 2 \text{ GHz},$<br>$P_{IN} = 7 \text{ dBm}$<br>$Z_S = Z_L = 50 \Omega$                       | $P_{OUT}$     | 13.5     | 14.5     | -      | dBm  |

**Notes.:**

$$1) \quad G_{ma} = \frac{|S_{21}|}{|S_{12}|} (k - \sqrt{k^2 - 1}), \quad G_{ms} = \frac{|S_{21}|}{|S_{12}|}$$

## Micro-X1 Package



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