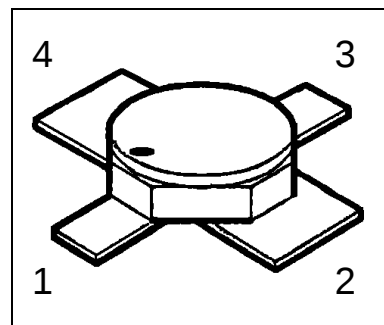


## HiRel NPN Silicon RF Transistor

- **HiRel Discrete and Microwave Semiconductor**
- For Low Current Applications
- For Oscillators up to 12 GHz
- Noise Figure  $F = 1.15$  dB at 1.8 GHz  
Outstanding Gms = 23dB at 1.8 GHz
- Hermetically sealed microwave package
- Transition Frequency  $f_T = 20$  GHz
- **SIEGET 25-Line**  
**Infineon Technologies Grounded Emitter Transistor-**  
**25 GHz  $f_T$ -Line**
-  **ESA Space Qualified**  
ESA/SCC Detail Spec. No.: 5611/008  
Type Variant No. 01



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

| Type        | Marking | Ordering Code | Pin Configuration |   |   |   | Package |
|-------------|---------|---------------|-------------------|---|---|---|---------|
|             |         |               | 1                 | 2 | 3 | 4 |         |
| BFY405 (ql) | -       | see below     | C                 | E | B | E | Micro-X |

|                     |                          |                |             |
|---------------------|--------------------------|----------------|-------------|
| (ql) Quality Level: | P: Professional Quality, | Ordering Code: | Q62702F1661 |
|                     | H: High Rel Quality,     | Ordering Code: | on request  |
|                     | S: Space Quality,        | Ordering Code: | on request  |
|                     | ES: ESA Space Quality,   | Ordering Code: | Q62702F1710 |

(see order instructions for ordering example)

**Maximum Ratings**

| Parameter                                                                  | Symbol    | Values     | Unit             |
|----------------------------------------------------------------------------|-----------|------------|------------------|
| Collector-emitter voltage                                                  | $V_{CEO}$ | 4.5        | V                |
| Collector-base voltage                                                     | $V_{CBO}$ | 15         | V                |
| Emitter-base voltage                                                       | $V_{EBO}$ | 1.5        | V                |
| Collector current                                                          | $I_C$     | 12         | mA               |
| Base current                                                               | $I_B$     | 1.0        | mA               |
| Total power dissipation,<br>$T_S \leq 145^\circ\text{C}$ <sup>1), 2)</sup> | $P_{tot}$ | 55         | mW               |
| Junction temperature                                                       | $T_j$     | 175        | $^\circ\text{C}$ |
| Operating temperature range                                                | $T_{op}$  | -65...+175 | $^\circ\text{C}$ |
| Storage temperature range                                                  | $T_{stg}$ | -65...+175 | $^\circ\text{C}$ |

**Thermal Resistance**

|                                        |             |       |     |
|----------------------------------------|-------------|-------|-----|
| Junction-soldering point <sup>2)</sup> | $R_{th JS}$ | < 545 | K/W |
|----------------------------------------|-------------|-------|-----|

**Notes.:**

- 1) At  $T_S = +145^\circ\text{C}$ . For  $T_S > +145^\circ\text{C}$  derating is required.  
 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>$V_{CB} = 5\text{ V}, I_E = 0$                                 | $I_{CBO}$ | -  | -  | 10             | nA            |
| Collector-emitter cutoff current <sup>1)</sup><br>$V_{CE} = 4.5\text{ V}, I_B = 0.1\mu\text{A}$ | $I_{CEX}$ | -  | -  | 20<br>(t.b.d.) | $\mu\text{A}$ |
| Emitter-base cutoff current<br>$V_{EB} = 1.5\text{ V}, I_C = 0$                                 | $I_{EBO}$ | -  | -  | 5.0            | $\mu\text{A}$ |
| DC current gain<br>$I_C = 5\text{ mA}, V_{CE} = 1\text{ V}$                                     | $h_{FE}$  | 50 | 90 | 150            | -             |

**Notes:**

- 1.) This Test assures  $V(BR)_{CE0} > 4.5\text{V}$

**Electrical Characteristics** (continued)

| Parameter                                                                                                                                        | Symbol            | Values |      |      | Unit |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------|------|------|------|
|                                                                                                                                                  |                   | min.   | typ. | max. |      |
| AC Characteristics                                                                                                                               |                   |        |      |      |      |
| Transition frequency<br>$I_C = 10\text{mA}$ , $V_{CE} = 3\text{ V}$ , $f = 2.0\text{ GHz}$                                                       | $f_T$             | 20     | 22   | -    | GHz  |
| Collector-base capacitance<br>$V_{CB} = 2\text{ V}$ , $V_{BE} = v_{be} = 0$ , $f = 1\text{ MHz}$                                                 | $C_{CB}$          | -      | 0.05 | 0.9  | pF   |
| Collector-emitter capacitance<br>$V_{CE} = 2\text{ V}$ , $V_{BE} = v_{be} = 0$ , $f = 1\text{ MHz}$                                              | $C_{CE}$          | -      | 0.32 | 0.48 | pF   |
| Emitter-base capacitance<br>$V_{EB} = 0.5\text{V}$ , $V_{CB} = v_{cb} = 0$ , $f = 1\text{ MHz}$                                                  | $C_{EB}$          | -      | 0.36 | 3.0  | pF   |
| Noise Figure<br>$I_C = 2\text{ mA}$ , $V_{CE} = 2\text{ V}$ , $f = 1.8\text{ GHz}$ ,<br>$Z_S = Z_{\text{sopt}}$                                  | F                 | -      | 1.15 | 1.8  | dB   |
| Insertion power gain<br>$I_C = 5\text{ mA}$ , $V_{CE} = 2\text{ V}$ , $f = 1.8\text{ GHz}$<br>$Z_S = Z_L = 50\ \Omega$                           | $ S_{21e} ^2$     | 14     | 18   | -    | dB   |
| Power gain<br>$I_C = 5\text{ mA}$ , $V_{CE} = 2\text{ V}$ , $f = 1.8\text{ GHz}$<br>$Z_S = Z_{\text{Sopt}}$ , $Z_L = Z_{\text{Lopt}}$            | $G_{ms}^{1)}$     | -      | 23   | -    | dB   |
| 1dB Compression point<br>$I_C = 5\text{ mA}$ , $V_{CE} = 2\text{ V}$ , $f = 1.8\text{ GHz}$<br>$Z_S = Z_{\text{Sopt}}$ , $Z_L = Z_{\text{Lopt}}$ | $P_{-1\text{dB}}$ | -      | 5    | -    | dBm  |

**Notes.:**

$$1) \quad G_{ms} = \left| \frac{S_{21}}{S_{12}} \right|$$

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**Order Instructions:**

Full type variant including quality level must be specified by the orderer. For *HiRel* Discrete and Microwave Semiconductors the ordering code specifies device family and quality level.

**Ordering Form:**

Ordering Code: Q.....  
BFY405 (ql)  
(ql): Quality Level

**Ordering Example:**

Ordering Code: Q62702F1710  
BFY405 ES  
For BFY405 in ESA Space Quality Level

**Further Informations:**

See our WWW-Pages:

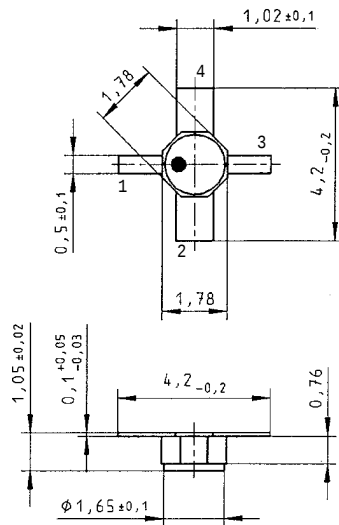
- Discrete and RF-Semiconductors (Small Signal Semiconductors)  
[www.infineon.com/products/discrete/hirel.htm](http://www.infineon.com/products/discrete/hirel.htm)

- *HiRel* Discrete and Microwave Semiconductors  
[www.infineon.com/products/discrete/hirel.htm](http://www.infineon.com/products/discrete/hirel.htm)

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## Micro-X Package



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