
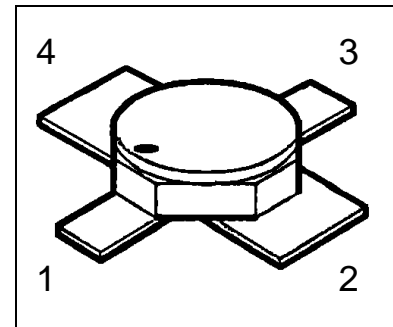


HiRel NPN Silicon Germanium RF Transistor

- **HiRel Discrete and Microwave Semiconductor**
- For high power amplifiers
- Ideal for low phase noise oscillators
- Maximum available gain: $G_{ma} = 19$ dB at 1.8 GHz
Noise figure $F = 0.9$ dB at 1.8 GHz
- Hermetically sealed microwave package
-  **ESA Space Qualified**
ESCC Detail Spec. No.: 5611/010



ESD: Electrostatic discharge sensitive device, observe handling precautions!

| Type | Marking | Pin Configuration | | | | Package |
|------------|---------|-------------------|---|---|---|---------|
| | | 1 | 2 | 3 | 4 | |
| BFY650B-11 | - | C | E | B | E | Micro-X |

Maximum Ratings

| Parameter | Symbol | Values | Unit |
|--|-----------|------------|--------|
| Collector-emitter voltage $T_a > 0$ °C $T_a \leq 0$ °C | V_{CEO} | 4.0 3.7 | V V |
| Collector-base voltage | V_{CBO} | 13 | V |
| Emitter-base voltage | V_{EBO} | 1.2 | V |
| Collector current ¹⁾ | I_C | 150 | mA |
| Base current | I_B | 10 | mA |
| Junction temperature | T_j | 175 | °C |
| Operating temperature range | T_{op} | -65...+175 | °C |
| Storage temperature range | T_{stg} | -65...+175 | °C |

Thermal Resistance

| | | | |
|--|------------|-----|-----|
| Junction-soldering point ²⁾ | R_{thJS} | 150 | K/W |
|--|------------|-----|-----|

Notes.:

1) For $T_S \leq 85$ °C. For $T_S > 85$ °C derating is required.

2) T_S is measured on the emitter 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 $V_{CB} = 5\text{ V}, I_E = 0$ | I_{CBO} | - | - | 10 | μA |
| Collector-emitter cutoff current ¹⁾ $V_{CE} = 4.0\text{ V}, I_B = 0.1\ \mu\text{A}$ | I_{CEX} | - | - | 200 | μA |
| Emitter-base cutoff current $V_{EB} = 1.2\text{ V}, I_C = 0$ | I_{EBO} | - | - | 10 | μA |
| DC current gain $I_C = 80\text{ mA}, V_{CE} = 3\text{ V}$ | h_{FE} | 110 | 180 | 270 | - |

AC Characteristics

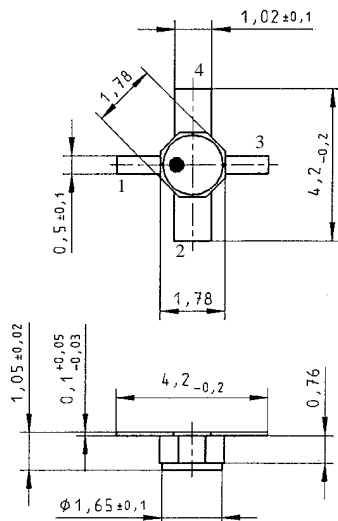
| | | | | | |
|---|---------------|---|-------------|---|-------------|
| Collector-base capacitance $V_{CB} = 2\text{ V}, V_{BE} = v_{be} = 0, f = 1\text{ MHz}$ | C_{CB} | - | 0.26 | - | pF |
| Collector-emitter capacitance $V_{CE} = 2\text{ V}, V_{BE} = v_{be} = 0, f = 1\text{ MHz}$ | C_{CE} | - | 0.55 | - | pF |
| Emitter-base capacitance $V_{EB} = 0.5\text{ V}, V_{CB} = v_{cb} = 0, f = 1\text{ MHz}$ | C_{EB} | - | 1.4 | - | pF |
| Noise Figure ($Z_S = Z_{\text{sopt}}$) $I_C = 10\text{ mA}, V_{CE} = 3\text{ V}, f = 1.8\text{ GHz}$ $I_C = 10\text{ mA}, V_{CE} = 3\text{ V}, f = 6.0\text{ GHz}$ | F | - | 0.9 1.4 | - | dB |
| Insertion power gain ($Z_S = Z_L = 50\ \Omega$) $I_C = 80\text{ mA}, V_{CE} = 3\text{ V}, f = 1.8\text{ GHz}$ $I_C = 80\text{ mA}, V_{CE} = 3\text{ V}, f = 6.0\text{ GHz}$ | $ S_{21e} ^2$ | - | 16.5 6.7 | - | dB |
| Power gain ($Z_S = Z_{\text{Sopt}}, Z_L = Z_{\text{Lopt}}$) $I_C = 80\text{ mA}, V_{CE} = 3\text{ V}, f = 1.8\text{ GHz}$ | $G_{ma}^{2)}$ | - | 19.2 | - | dB |
| Power gain ($Z_S = Z_{\text{Sopt}}, Z_L = Z_{\text{Lopt}}$) $I_C = 80\text{ mA}, V_{CE} = 3\text{ V}, f = 6.0\text{ GHz}$ | $G_{ma}^{2)}$ | - | 9.3 | - | dB |

Notes.:

 1) This Test assures $V(\text{BR})\text{CE0} > 4.0\text{ V}$

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

Micro-X Package



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