

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 $G_{ms} = 23$ dB at 1.8 GHz
- Hermetically sealed microwave package
- Transistor frequency $f_T = 20$ GHz

- **SIEGET[®] 25 GHz f_T - Line**

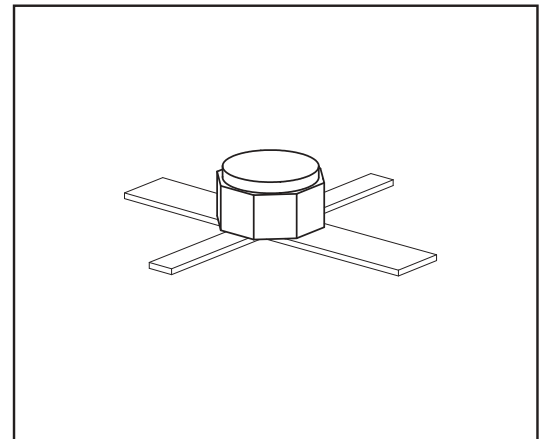
**Infineon Technologies Grounded Emitter Transistor-
25 GHz f_T - Line**

- **esa Space Qualified**

ESA/SCC Detail Spec. No.: 5611/008

Type Variant No. 01

ESD: Electrostatic discharge sensitive device, observe handling precaution!



| Type | Marking | Pin Configuration | | | | | | Package |
|-------------|---------|-------------------|-----|-----|-----|---|---|---------|
| | | 1=C | 2=E | 3=B | 4=E | - | - | |
| BFY405 (ql) | - | 1=C | 2=E | 3=B | 4=E | - | - | MICRO-X |

(ql) Testing level: P: Professional testing
H: High Rel quality
S: Space quality
ES: ESA qualified

Maximum Ratings

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

¹ T_S is measured on the collector lead at the soldering point to the pcb.

²At $T_S = 145^\circ\text{C}$. For $T_S > 145^\circ\text{C}$ derating is required.

Thermal Resistance

| Parameter | Symbol | Value | Unit |
|--|------------|-------|------|
| Junction - soldering point ¹⁾ | R_{thJS} | < 545 | K/W |

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

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

DC Characteristics

| | | | | | |
|---|-----------|----|----|-----|---------------|
| Collector-emitter cutoff current ²⁾ $V_{CE} = 4.5\text{ V}, I_B = 0.1\ \mu\text{A}$ | I_{CEX} | - | - | 20 | μA |
| Collector-emitter cutoff current $V_{CE} = 4.5\text{ V}, V_{BE} = 0.1\ \mu\text{A}$ | I_{CES} | - | - | ? | μA |
| Collector -base cutoff current $V_{CB} = 5\text{ V}, I_E = 0$ | I_{CBO} | - | - | 10 | nA |
| Emitter-base cutoff current $V_{EB} = 1.5\text{ V}, I_C = 0$ | I_{EBO} | - | - | 5.0 | μA |
| DC current gain $I_C = 5\text{ mA}, V_{CE} = 1\text{ V}$ | h_{FE} | 50 | 90 | 150 | - |

¹⁾ T_S is measured on the collector lead at the soldering point to the pcb.

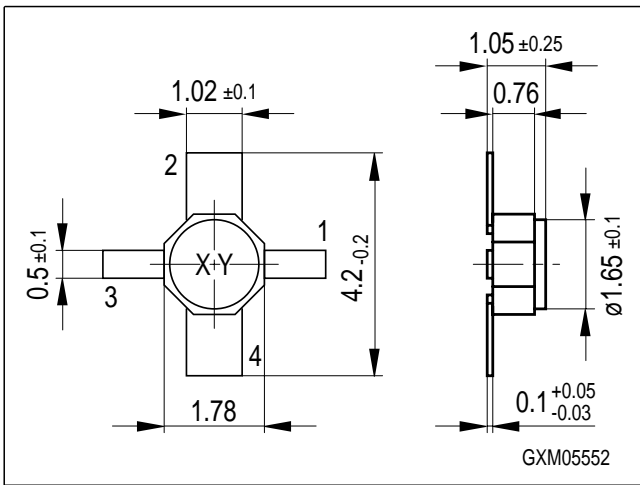
²⁾This Test assures $V_{(BR)CE0} > 4.5\text{ V}$

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

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

¹⁾ $G_{ms} = |S_{21}/S_{12}|$

Micro-X Package



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