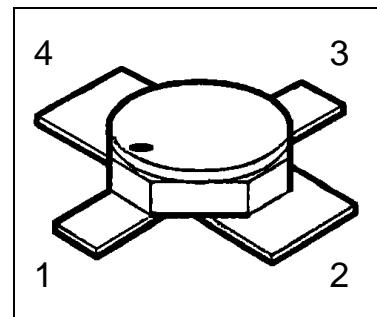


# HiRel NPN Silicon RF Transistor


## BFY405(ES)

### Features

- 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
- Transition Frequency  $f_T = 20$  GHz
- **SIEGET<sup>®</sup> 25-Line**  
**Infineon Technologies Grounded Emitter Transistor-**  
**25 GHz  $f_T$ -Line**



### Product validation

-  **ESa Space Qualified**  
ESCC Detail Spec. No.: 5611/008  
Type Variant No. 01

### Description

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

**Table 1**      **Product information**

| Type                   | Comment                         | Pin Configuration |   |   |   | Package |
|------------------------|---------------------------------|-------------------|---|---|---|---------|
|                        |                                 | 1                 | 2 | 3 | 4 |         |
| BFY405(ES)             | For flight use                  | C                 | E | B | E | Micro-X |
| BFY405(P) <sup>1</sup> | Not for flight use <sup>1</sup> |                   |   |   |   |         |

<sup>1</sup> (P) parts have the same fit, form and function as (ES) parts,  
no screening acc. to Chart F3 in ESCC Generic Specification No. 5010

Table of contents

|                                       |   |
|---------------------------------------|---|
| Features .....                        | 1 |
| Product validation .....              | 1 |
| Description .....                     | 1 |
| Table of contents .....               | 2 |
| 1    Maximum ratings .....            | 3 |
| 2    Thermal characteristics .....    | 4 |
| 3    Electrical characteristics ..... | 5 |
| 4    Package outlines .....           | 6 |

Maximum ratings

## 1 Maximum ratings

Table 2 Maximum ratings

| Parameter                            | Symbol    | Values |      |      | Unit | Note / Test Condition    |
|--------------------------------------|-----------|--------|------|------|------|--------------------------|
|                                      |           | Min.   | Typ. | Max. |      |                          |
| Collector-emitter voltage            | $V_{CE0}$ | -      | -    | 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    | mA   |                          |
| Total power dissipation <sup>1</sup> | $P_{tot}$ | -      | -    | 55   | mW   | $T_S \leq 145\text{ °C}$ |
| Junction temperature                 | $T_j$     | -      | -    | 175  | °C   |                          |
| Operating temperature                | $T_{op}$  | -65    | -    | 175  | °C   |                          |
| Storage temperature                  | $T_{stg}$ | -65    | -    | 175  | °C   |                          |

<sup>1</sup> For  $T_S > 145\text{ °C}$  derating is required.  $T_S$  is measured on the collector lead at the soldering point to the PCB

Thermal characteristics

## 2 Thermal characteristics

Table 3 Thermal characteristics

| Parameter  | Symbol      | Values |      |      | Unit | Note / Test Condition  |
|--|-------------|--------|------|------|------|--|
|  |             | Min.   | Typ. | Max. |      |  |
| Thermal resistance,<br>junction –soldering point | $R_{th,JS}$ | -      | -    | 545  | K/W  | $T_s$ is measured on the collector lead at the soldering point to the PCB  |
| Soldering Temperature                            | $T_{sol}$   | -      | -    | 250  | °C   | Duration 5 seconds maximum at a distance of not less than 0.5mm from the device body and the same lead shall not be resoldered until 3 minutes have elapsed. |

Electrical characteristics

### 3 Electrical characteristics

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

**Table 4 Static characteristics**

| Parameter                                     | Symbol    | Values |      |      | Unit          | Note / Test Condition                        |
|---|-----------|--------|------|------|---------------|--|
|   |           | Min.   | Typ. | Max. |               |  |
| Collector-base cutoff current                 | $I_{CBO}$ | -      | -    | 10   | nA            | $V_{CB} = 5\text{V}, I_E = 0\text{A}$        |
| Collector-emitter cutoff current <sup>1</sup> | $I_{CEX}$ | -      | -    | 20   | $\mu\text{A}$ | $V_{CE} = 4.5\text{V}, I_B = 0.1\mu\text{A}$ |
| Emitter base cutoff current                   | $I_{EBO}$ | -      | -    | 5    | $\mu\text{A}$ | $V_{EB} = 1.5\text{V}, I_C = 0\text{A}$      |
| DC current gain                               | $h_{FE}$  | 50     | 90   | 150  | -             | $I_C = 5\text{mA}, V_{CE} = 1\text{V}$       |

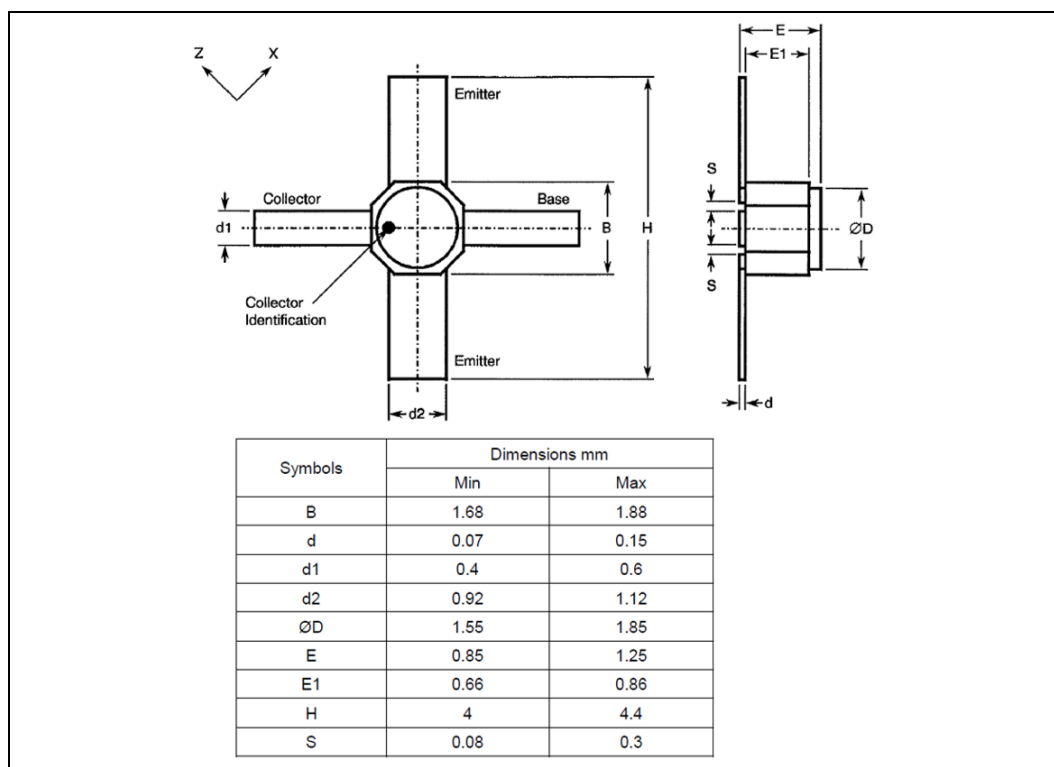
**Table 5 Dynamic characteristics**

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

<sup>1</sup> This test assures  $V_{(BR)CE0} > 4.5\text{V}$

<sup>2</sup>  $G_{ms} = \left| \frac{S_{21}}{S_{12}} \right|$

## 4 Package outlines



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Edition 5, January 2022

Published by

Infineon Technologies AG  
81726 München, Germany

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