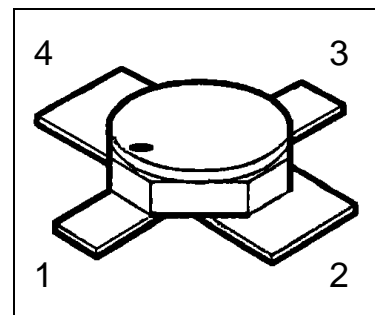


# HiRel NPN Silicon RF Transistor


## BFY181(ES)

### Features

- For low noise, high-gain broadband amplifiers at collector currents from 0.5 mA to 12 mA
- Hermetically sealed microwave package
- $f_T = 8\text{GHz}$   
 $F = 2.2\text{ dB at } 2\text{ GHz}$



### Product validation

-  **ESA Space Qualified**  
ESCC Detail Spec. No.: 5611/006  
Type Variant No. 03

### Description

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

**Table 1** Product information

Type	Comment	Pin Configuration				Package
		1	2	3	4	
BFY181(ES)	For flight use	C	E	B	E	Micro-X1
BFY181(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	$V_{CEO}$	-	-	12	V	
Collector-emitter voltage	$V_{CES}$	-	-	20	V	$V_{BE}=0$
Collector-base voltage	$V_{CBO}$	-	-	20	V	
Emitter-base voltage	$V_{EBO}$	-	-	2	V	
Collector current	$I_C$	-	-	20	mA	
Base current <sup>1</sup>	$I_B$	-	-	2	mA	
Total power dissipation <sup>2</sup>	$P_{tot}$	-	-	175	mW	$T_S \leq 137\text{ °C}$
Junction temperature	$T_j$	-	-	200	°C	
Operating temperature	$T_{op}$	-65	-	200	°C	
Storage temperature	$T_{stg}$	-65	-	200	°C	

<sup>1</sup> The maximum permissible base current for  $V_{FBE}$  measurements is 15mA (spot-measurement duration < 1s)

<sup>2</sup> For  $T_S > 137\text{ °C}$  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, junction –soldering point	$R_{th,JS}$	-	-	360	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	$I_{CBO}$	-	-	100	$\mu\text{A}$	$V_{CB} = 20\text{V}, I_E = 0\text{A}$
Collector-emitter cutoff current <sup>1</sup>	$I_{CEX}$	-	-	100	$\mu\text{A}$	$V_{CE} = 12\text{V}, I_B = 0.1\mu\text{A}$
Collector-base cutoff current	$I_{CBO}$	-	-	50	nA	$V_{CB} = 10\text{V}, I_E = 0\text{A}$
Emitter base cutoff current	$I_{EBO}$	-	-	25	$\mu\text{A}$	$V_{EB} = 2\text{V}, I_C = 0\text{A}$
Emitter base cutoff current	$I_{EBO}$	-	-	0.5	$\mu\text{A}$	$V_{EB} = 1\text{V}, I_C = 0\text{A}$
Base-Emitter forward voltage	$V_{FBE}$	-	-	1	V	$I_E = 15\text{mA}, I_C = 0\text{A}$
DC current gain	$h_{FE}$	55	100	175	-	$I_C = 5\text{mA}, V_{CE} = 6\text{V}$

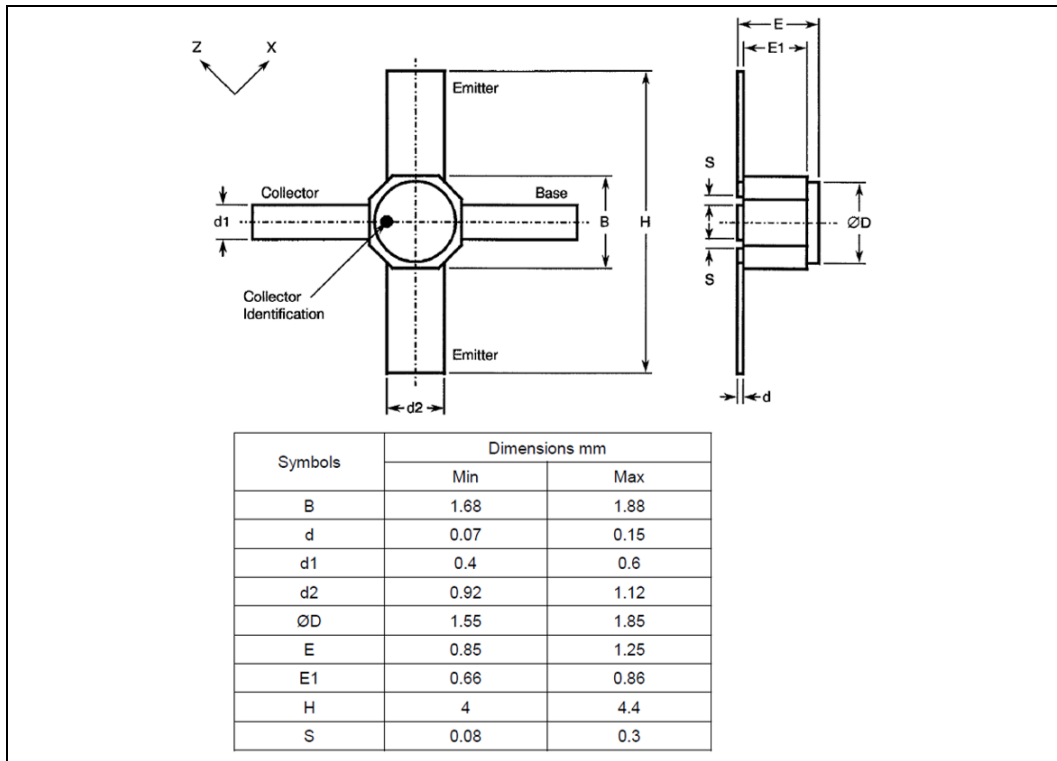
**Table 5 Dynamic characteristics**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Transition frequency	$f_T$	6.5 -	7.5 8	- -	GHz	$I_C = 10\text{mA}, V_{CE} = 5\text{V}, f = 500\text{MHz}$ $I_C = 10\text{mA}, V_{CE} = 8\text{V}, f = 500\text{MHz}$
Collector-base capacitance	$C_{CB}$	-	0.21	0.29	pF	$V_{CB} = 10\text{V}, V_{BE} = v_{be} = 0, f = 1\text{MHz}$
Collector-emitter capacitance	$C_{CE}$	-	0.34	-	pF	$V_{CE} = 10\text{V}, V_{BE} = v_{be} = 0, f = 1\text{MHz}$
Emitter-base capacitance	$C_{EB}$	-	0.45	0.6	pF	$V_{EB} = 0.5\text{V}, V_{CB} = v_{cb} = 0, f = 1\text{MHz}$
Noise Figure	$F$	-	2.2	2.9	dB	$I_C = 4\text{mA}, V_{CE} = 5\text{V}, f = 2\text{GHz},$ $Z_S = Z_{Sopt}$
Power Gain <sup>2</sup>	$G_{ma}$	13.5	14.5	-	dB	$I_C = 10\text{mA}, V_{CE} = 5\text{V}, f = 2\text{GHz},$ $Z_S = Z_{Sopt}, Z_L = Z_{Lopt}$
Transducer gain	$ S_{21e} ^2$	10	11	-	dB	$I_C = 10\text{mA}, V_{CE} = 5\text{V}, f = 2\text{GHz},$ $Z_S = Z_L = 50\Omega$

<sup>1</sup> This test assures  $V_{(BR)CE0} > 12\text{V}$

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

## 4 Package outlines



### Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

Edition 5, January 2022  
Published by  
Infineon Technologies AG  
81726 München, Germany

© 2022 Infineon Technologies AG.  
All Rights Reserved.

Do you have a question about this document?

Email: [erratum@infineon.com](mailto:erratum@infineon.com)

### IMPORTANT NOTICE

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office ([www.infineon.com](http://www.infineon.com)).

### WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Infineon Technologies Components may only be used in life-support devices or systems with the expressed written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system.

Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.