

**HiRel NPN Silicon RF Transistor**

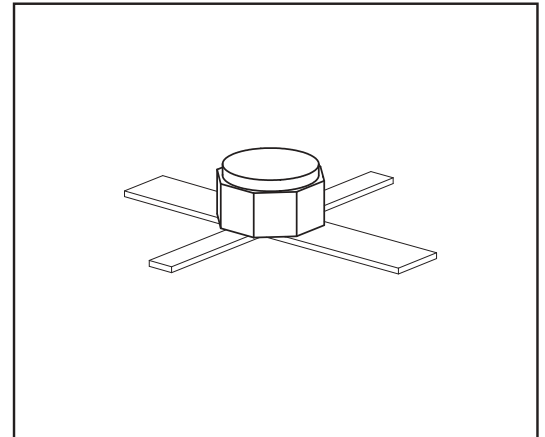
- **HiRel Discrete and Microwave Semiconductor**

- For low noise, high-gain amplifiers up to 2 GHz
- For linear broadband amplifiers
- Hermetically sealed microwave package
- $f_T = 6,5$  GHz
- $F = 3$  dB at 2 GHz

- **ESA Space Qualification Expected 1998**

ESA/SCC Detail Spec. No.: 5611/006

Type Variant No. 07 (tbc.)



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

Type	Marking	Pin Configuration						Package
BFY196 (ql)	-	1=C	2=E	3=B	4=E	-	-	MICRO-X1

(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	$V_{CEO}$	12	V
Collector-emitter voltage, $V_{BE} = 0$	$V_{CES}$	20	
Collector-base voltage	$V_{CBO}$	20	
Emitter-base voltage	$V_{EBO}$	2	
Collector current	$I_C$	100	mA
Base current	$I_B$	12 <sup>1)</sup>	
Total power dissipation <sup>2)</sup> $T_S \leq 105^\circ\text{C}$ <sup>2)3)</sup>	$P_{tot}$	700	mW
Junction temperature	$T_j$	200	$^\circ\text{C}$
Operating temperature range	$T_{op}$	-65 ... 200	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-65 ... 200	$^\circ\text{C}$

<sup>1</sup>The maximum permissible base current for  $V_{FBE}$  measurements is 50mA (spotmeasurement duration < 1s)

<sup>2</sup>At  $T_S = 105^\circ\text{C}$ . For  $T_S > 105^\circ\text{C}$  derating is required

<sup>3</sup>For calculation of  $R_{thJA}$  please refer to Application Note Thermal Resistance

**Thermal Resistance**

Parameter	Symbol	Value	Unit
Junction - soldering point <sup>1)</sup>	$R_{thJS}$	< 135	K/W

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

**DC Characteristics**

Base-emitter forward voltage $I_E = 50\text{ mA}, I_C = 0$	$V_{FBE}$	-	-	1	V
Collector-emitter cutoff current $V_{CE} = 12\text{ V}, I_B = 1\mu\text{A}$ <sup>2)</sup>	$I_{CEX}$	-	-	1000	$\mu\text{A}$
Collector -base cutoff current $V_{CB} = 20\text{ V}, I_E = 0$ $V_{CB} = 10\text{ V}, I_E = 0$	$I_{CBO}$	-	-	100 0.05	$\mu\text{A}$
Emitter-base cutoff current $V_{EB} = 2\text{ V}, I_C = 0$ $V_{EB} = 1\text{ V}, I_C = 0$	$I_{EBO}$	-	-	25 0.5	
DC current gain $I_C = 50\text{ mA}, V_{CE} = 8\text{ V}$	$h_{FE}$	50	100	175	-

<sup>1)</sup>For calculation of  $R_{thJA}$  please refer to Application Note Thermal Resistance

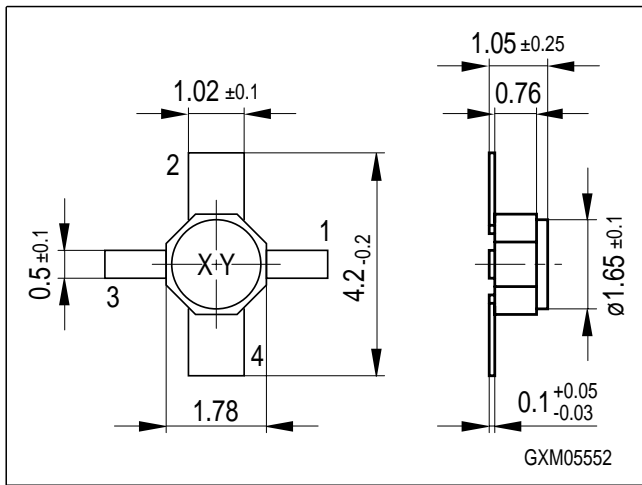
<sup>2)</sup>This test assures  $V_{(BR)CE0} > 12\text{V}$

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics (verified by random sampling)</b>					
Transition frequency $I_C = 70 \text{ mA}, V_{CE} = 5 \text{ V}, f = 500 \text{ MHz}$	$f_T$	6	6.5	-	GHz
Collector-base capacitance $V_{CB} = 10 \text{ V}, V_{BE} = v_{be} = 0, f = 1 \text{ MHz}$	$C_{cb}$	-	1	1.3	pF
Collector emitter capacitance $V_{CE} = 10 \text{ V}, V_{BE} = v_{be} = 0, f = 1 \text{ MHz}$	$C_{ce}$	-	0.44	-	
Emitter-base capacitance $V_{EB} = 0.5 \text{ V}, V_{CB} = v_{cb} = 0, f = 1 \text{ MHz}$	$C_{eb}$	-	3.6	4.3	
Noise figure $I_C = 20 \text{ mA}, V_{CE} = 5 \text{ V}, Z_S = Z_{Sopt}, f = 2 \text{ GHz}$	$F$	-	3	3.5	dB
Power gain, maximum available $I_C = 70 \text{ mA}, V_{CE} = 5 \text{ V}, Z_S = Z_{Sopt}, Z_L = Z_{Lopt}, f = 2 \text{ GHz}$	$G_{ma}^{1)}$	10	11	-	
Transducer gain $I_C = 70 \text{ mA}, V_{CE} = 5 \text{ V}, Z_S = Z_L = 50 \Omega, f = 2 \text{ GHz}$	$ S_{21e} ^2$	4	5	-	dB
Output power $I_C = 80 \text{ mA}, V_{CE} = 5 \text{ V}, P_{IN} = 15 \text{ dBm}, Z_S = Z_L = 50 \Omega, f = 2 \text{ GHz}$	$P_{OUT}$	18.5	19.5	-	dBm

$$^1G_{ma} = |S_{21e} / S_{12e}| (k - (k^2 - 1)^{1/2}), G_{ms} = |S_{21e} / S_{12e}|$$

Micro-X1 Package



Edition 2006-02-01

Published by

Infineon Technologies AG

81726 München, Germany

© Infineon Technologies AG 2007.

All Rights Reserved.

### **Attention please!**

The information given in this dokument shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie"). With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, 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.

### **Information**

For further information on 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 components 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 express 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.