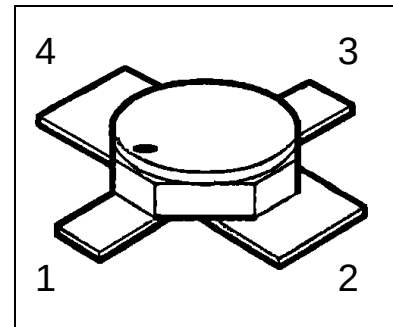


HiRel NPN Silicon RF Transistor

- **HiRel Discrete and Microwave Semiconductor**
- For low noise, high-gain broadband amplifiers at collector currents from 0,5 mA to 12 mA.
- Hermetically sealed microwave package
- $f_T = 8 \text{ GHz}$
 $F = 2.2 \text{ dB at } 2 \text{ GHz}$
-  **ESA Space Qualified**
ESA/SCC Detail Spec. No.: 5611/006
Type Variant No. 03



ESD: Electrostatic discharge sensitive device,
observe handling precautions!

Type	Marking	Ordering Code	Pin Configuration				Package
BFY181 (ql)	-	see below	C	E	B	E	Micro-X1

(ql) Quality Level: P: Professional Quality
 H: High Rel Quality
 S: Space Quality
 ES: ESA Space Quality

(see order instructions for ordering example)

Maximum Ratings

Parameter	Symbol	Values	Unit
Collector-emitter voltage	V_{CEO}	12	V
Collector-emitter voltage, $V_{BE}=0$	V_{CES}	20	V
Collector-base voltage	V_{CBO}	20	V
Emitter-base voltage	V_{EBO}	2	V
Collector current	I_C	20	mA
Base current	I_B	2 ¹⁾	mA
Total power dissipation, $T_S \leq 137^\circ\text{C}$ ^{2), 3)}	P_{tot}	175	mW
Junction temperature	T_j	200	$^\circ\text{C}$
Operating temperature range	T_{op}	-65...+200	$^\circ\text{C}$
Storage temperature range	T_{stg}	-65...+200	$^\circ\text{C}$

Thermal Resistance

Junction-soldering point ³⁾	$R_{th JS}$	< 360	K/W
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Notes.:

- 1) The maximum permissible base current for V_{FBE} measurements is 15mA (spot-measurement duration < 1s)
 2) At $T_S = +137^\circ\text{C}$. For $T_S > +137^\circ\text{C}$ derating is required.
 3) T_S is measured on the collector 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 $V_{CB} = 20\text{ V}, I_E = 0$	I_{CBO}	-	-	100	μA
Collector-emitter cutoff current $V_{CE} = 12\text{ V}, I_B = 0,1\mu\text{A}$ ¹⁾	I_{CEX}	-	-	100	μA
Collector-base cutoff current $V_{CB} = 10\text{ V}, I_E = 0$	I_{CBO}	-	-	50	nA
Emitter base cutoff current $V_{EB} = 2\text{ V}, I_C = 0$	I_{EBO}	-	-	25	μA
Emitter base cutoff current $V_{EB} = 1\text{ V}, I_C = 0$	I_{EBO}	-	-	0.5	μA

Notes:

- 1.) This Test assures $V(BR)_{CE0} > 12\text{V}$

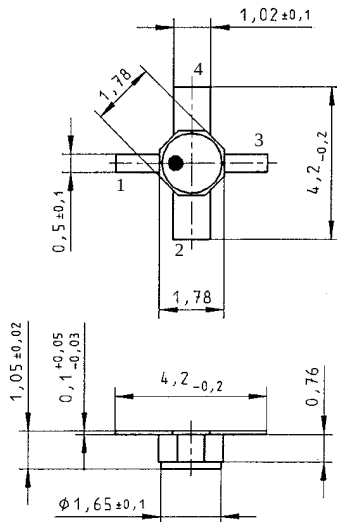
Electrical Characteristics (continued)

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Base-Emitter forward voltage $I_E = 15\text{ mA}, I_C = 0$	V_{FBE}	-	-	1	V
DC current gain $I_C = 5\text{ mA}, V_{CE} = 6\text{ V}$	h_{FE}	55	100	175	-
AC Characteristics					
Transition frequency $I_C = 10\text{ mA}, V_{CE} = 5\text{ V}, f = 500\text{ MHz}$ $I_C = 10\text{ mA}, V_{CE} = 8\text{ V}, f = 500\text{ MHz}$	f_T	 6.5 -	 7.5 8	 - -	GHz
Collector-base capacitance $V_{CB} = 10\text{ V}, V_{BE} = v_{be} = 0, f = 1\text{ MHz}$	C_{CB}	-	0.21	0.29	pF
Collector-emitter capacitance $V_{CE} = 10\text{ V}, V_{BE} = v_{be} = 0, f = 1\text{ MHz}$	C_{CE}	-	0.34	-	pF
Emitter-base capacitance $V_{EB} = 0.5\text{V}, V_{CB} = v_{cb} = 0, f = 1\text{ MHz}$	C_{EB}	-	0.45	0.6	pF
Noise Figure $I_C = 4\text{ mA}, V_{CE} = 5\text{ V}, f = 2\text{ GHz},$ $Z_S = Z_{Sopt}$	F	-	2.2	2.9	dB
Power gain $I_C = 10\text{ mA}, V_{CE} = 5\text{V}, f = 2\text{ GHz}$ $Z_S = Z_{Sopt}, Z_L = Z_{Lopt}$	$G_{ma}^{1)}$	13.5	14.5	-	dB
Transducer gain $I_C = 10\text{ mA}, V_{CE} = 5\text{ V}, f = 2\text{ GHz}$ $Z_S = Z_L = 50\text{ }\Omega$	$ S_{21e} ^2$	10	11	-	dB

Notes.:

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

Micro-X1 Package



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