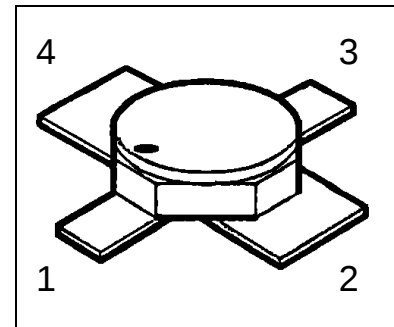


HiRel NPN Silicon Germanium RF Transistor

- **HiRel Discrete and Microwave Semiconductor**
- High gain low noise RF transistor
- High maximum stable gain: G_{ms} 24dB at 1.8 GHz
- Noise figure $F = 0.8$ dB at 1.8 GHz
Noise figure $F = 1.1$ dB at 6 GHz
- Hermetically sealed microwave package
-  **ESA Space Qualified**
ESCC Detail Spec. No.: 5611/009



ESD: Electrostatic discharge sensitive device,
observe handling precautions!

Type	Marking	Pin Configuration				Package
		1	2	3	4	
BFY640-04	-	C	E	B	E	Micro-X

Maximum Ratings

Parameter	Symbol	Values	Unit
Collector-emitter voltage $T_a > 0^\circ\text{C}$ $T_a \leq 0^\circ\text{C}$	V_{CEO}	4.0 3.7	V V
Collector-base voltage	V_{CBO}	13	V
Emitter-base voltage	V_{EBO}	1.2	V
Collector current ¹⁾	I_C	50	mA
Base current	I_B	3	mA
Junction temperature	T_j	175	$^\circ\text{C}$
Operating temperature range	T_{op}	-65...+175	$^\circ\text{C}$
Storage temperature range	T_{stg}	-65...+175	$^\circ\text{C}$

Thermal Resistance

Junction-soldering point ²⁾	R_{thJS}	325	K/W
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Notes.:

1) For $T_S \leq 110^\circ\text{C}$. For $T_S > 110^\circ\text{C}$ derating is required.

2) T_S is measured on the emitter lead at the soldering point to the pcb.

Electrical Characteristics

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

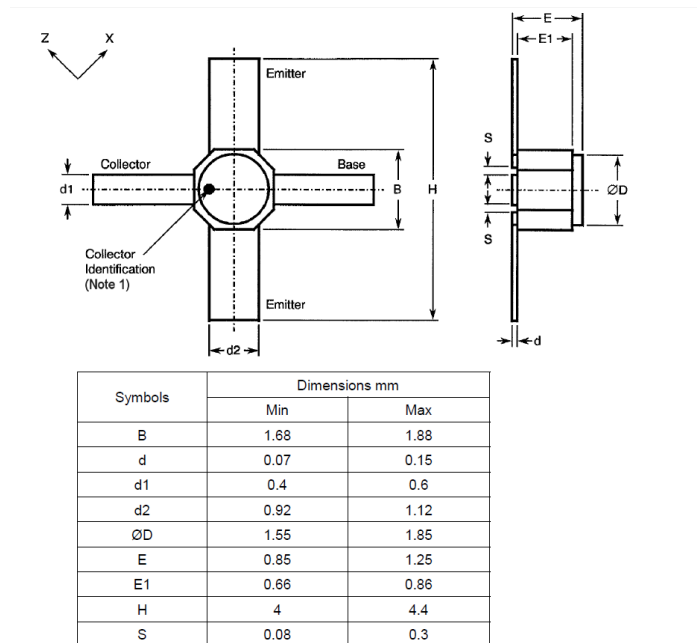
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Collector-base cutoff current $V_{CB} = 5\text{ V}, I_E = 0$	I_{CBO}	-	-	10	μA
Collector-emitter cutoff current ¹⁾ $V_{CE} = 4.0\text{ V}, I_B = 0.1\text{ }\mu\text{A}$	I_{CEX}	-	-	200	μA
Emitter-base cutoff current $V_{EB} = 1.2\text{ V}, I_C = 0$	I_{EBO}	-	-	5	μA
DC current gain $I_C = 30\text{ mA}, V_{CE} = 3\text{ V}$	h_{FE}	135	180	250	-
AC Characteristics					
Collector-base capacitance $V_{CB} = 2\text{ V}, V_{BE} = v_{be} = 0, f = 1\text{ MHz}$	C_{CB}	-	0.07	-	pF
Collector-emitter capacitance $V_{CE} = 2\text{ V}, V_{BE} = v_{be} = 0, f = 1\text{ MHz}$	C_{CE}	-	0.45	-	pF
Emitter-base capacitance $V_{EB} = 0.5\text{V}, V_{CB} = v_{cb} = 0, f = 1\text{ MHz}$	C_{EB}	-	0.6	-	pF
Noise Figure ($Z_S = Z_{\text{sopt}}$) $I_C = 5\text{ mA}, V_{CE} = 3\text{ V}, f = 1.8\text{ GHz}$ $I_C = 5\text{ mA}, V_{CE} = 3\text{ V}, f = 6.0\text{ GHz}$	F	- -	0.8 1.1	- -	dB
Insertion power gain ($Z_S = Z_L = 50\text{ }\Omega$) $I_C = 30\text{ mA}, V_{CE} = 3\text{ V}, f = 1.8\text{ GHz}$ $I_C = 30\text{ mA}, V_{CE} = 3\text{ V}, f = 6.0\text{ GHz}$	$ S_{21e} ^2$	- -	22.5 12.5	- -	dB
Power gain ($Z_S = Z_{\text{Sopt}}, Z_L = Z_{\text{Lopt}}$) $I_C = 30\text{ mA}, V_{CE} = 3\text{ V}, f = 1.8\text{ GHz}$	$G_{\text{ms}}^{2)}$	-	24	-	dB
Power gain ($Z_S = Z_{\text{Sopt}}, Z_L = Z_{\text{Lopt}}$) $I_C = 30\text{ mA}, V_{CE} = 3\text{ V}, f = 6.0\text{ GHz}$	$G_{\text{ma}}^{2)}$	-	14	-	dB

Notes.:

1) This Test assures $V(\text{BR})_{CE0} > 4.0\text{ V}$

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

Micro-X Package



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