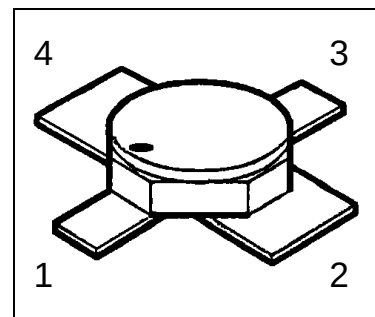


HiRel NPN Silicon RF Transistor

BFY650B-11(ES)

Features

- For high power amplifiers
- Ideal for low phase noise oscillators
- Maximum available gain: $G_{ma} = 19$ dB at 1.8 GHz
Noise figure $F = 0.9$ dB at 1.8 GHz
- Hermetically sealed microwave package



Product validation

-  **ESA Space Qualified**
ESCC Detail Spec. No.: 5611/010
Type Variant No. 04

Description

ESD: Electrostatic discharge sensitive device,
observe handling precautions!

Table 1 **Product information**

Type	Comment	Pin Configuration				Package
		1	2	3	4	
BFY650B-11(ES)	For flight use	C	E	B	E	Micro-X
BFY650B-11(P) ¹	Not for flight use ¹					

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

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Maximum ratings

1 Maximum ratings

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Collector-emitter voltage	V_{CEO}	-	-	4 3.7	V	$T_A > 0\text{ °C}$ $T_A \leq 0\text{ °C}$
Collector-base voltage	V_{CBO}	-	-	13	V	
Emitter-base voltage	V_{EBO}	-	-	1.2	V	
Collector current	I_C	-	-	150	mA	
Base current ¹	I_B	-	-	10	mA	
Total power dissipation ²	P_{tot}	-	-	600	mW	$T_S \leq 76\text{ °C}$
Junction temperature	T_j	-	-	175	°C	
Operating temperature	T_{op}	-65	-	175	°C	
Storage temperature	T_{stg}	-65	-	175	°C	

¹ Maximum ratings must not be exceeded under any combination of DC ratings and RF voltage/current swings except as specified in §3

² For $T_S > 76\text{ °C}$ derating is required. T_S is measured on the collector lead at the soldering point to the PCB

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction –soldering point	$R_{th,JS}$	-	-	165	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.

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	μA	$V_{CB} = 5\text{V}, I_E = 0\text{A}$
Collector-emitter cutoff current ¹	I_{CEX}	-	-	200	μA	$V_{CE} = 4\text{V}, I_B = 0.1\mu\text{A}$
Emitter base cutoff current	I_{EBO}	-	-	10	μA	$V_{EB} = 1.2\text{V}, I_C = 0\text{A}$
DC current gain	h_{FE}	110	180	270	-	$I_C = 80\text{mA}, V_{CE} = 3\text{V}$

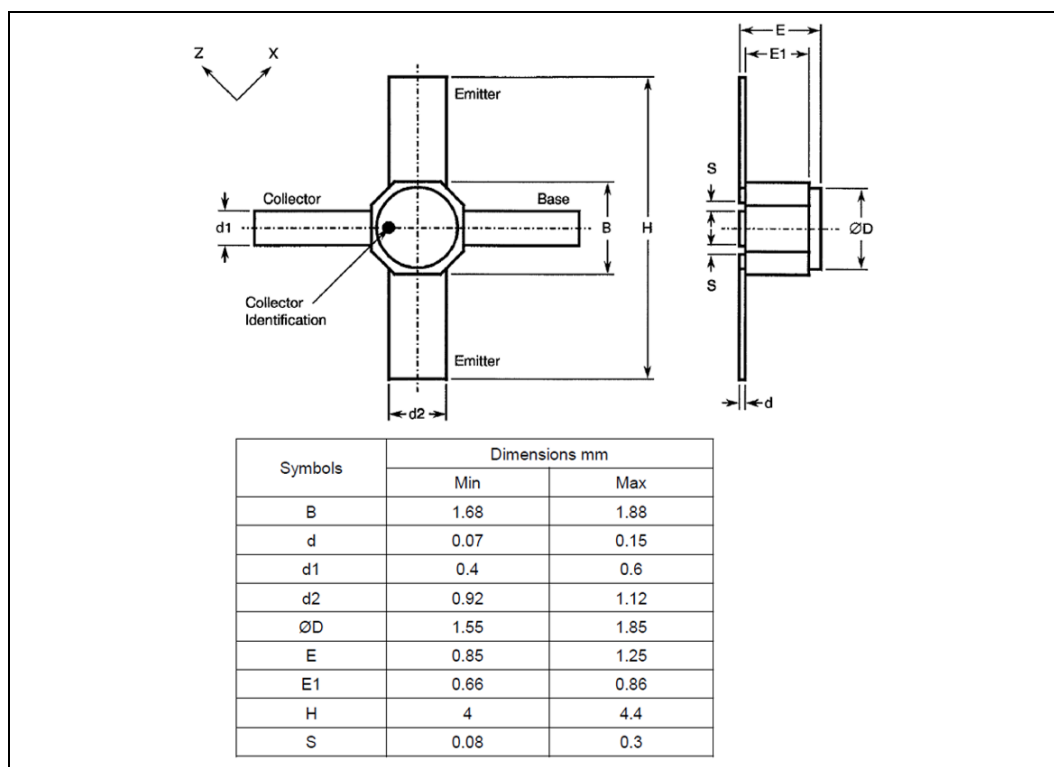
Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Collector-base capacitance	C_{CB}	-	0.26	-	pF	$V_{CB} = 2\text{V}, V_{BE} = v_{be} = 0, f = 1\text{MHz}$
Collector-emitter capacitance	C_{CE}	-	0.55	-	pF	$V_{CE} = 2\text{V}, V_{BE} = v_{be} = 0, f = 1\text{MHz}$
Emitter-base capacitance	C_{EB}	-	1.4	-	pF	$V_{EB} = 0.5\text{V}, V_{CB} = v_{cb} = 0, f = 1\text{MHz}$
Noise Figure	F	-	0.9	-	dB	$I_C = 10\text{mA}, V_{CE} = 3\text{V}, f = 1.8\text{GHz}, Z_S = Z_{Sopt}$
		-	1.4	-		$I_C = 10\text{mA}, V_{CE} = 3\text{V}, f = 6.0\text{GHz}, Z_S = Z_{Sopt}$
Insertion power gain	$ S_{21e} ^2$	-	16.5	-	dB	$I_C = 80\text{mA}, V_{CE} = 3\text{V}, f = 1.8\text{GHz}, Z_S = Z_L = 50\Omega$
		-	6.7	-		$I_C = 80\text{mA}, V_{CE} = 3\text{V}, f = 6.0\text{GHz}, Z_S = Z_L = 50\Omega$
Power Gain ²	G_{ms}	-	19.2	-	dB	$I_C = 80\text{mA}, V_{CE} = 3\text{V}, f = 1.8\text{GHz}, Z_S = Z_{Sopt}, Z_L = Z_{Lopt}$
Power Gain ²	G_{ma}	-	9.3	-	dB	$I_C = 80\text{mA}, V_{CE} = 3\text{V}, f = 6.0\text{GHz}, Z_S = Z_{Sopt}, Z_L = Z_{Lopt}$

¹ This test assures $V_{(BR)CE0} > 4\text{V}$

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

4 Package outlines



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