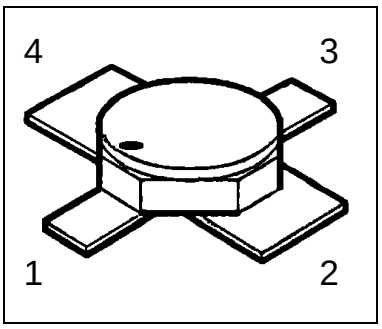
HiRel NPN Silicon RF Transistor

BFY650B-12(ES)



Features

- For high power amplifiers
- Ideal for low phase noise oscilators
- Maximum available gain: G_{ma} = 18 dB at 1.8 GHz
  Noise figure F = 0.8 dB at 1.8 GHz
- Hermetically sealed microwave package

Product validation

- esa **Space Qualified**
  ESCC Detail Spec. No.: 5611/010
  Type Variant No. 05

Description

ESD: **E**lectro**s**tatic **d**ischarge sensitive device,
observe handling precautions!

Table 1 Product information

Type	Comment	Pin Configuration				Package
		1	2	3	4	
BFY650B-12(ES)	For flight use	C	E	B	E	Micro-X
BFY650B-12(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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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	$T_A > 0$ °C $T_A \leq 0$ °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	$T_S \leq 76$ °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 $T_S > 76$ °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°C, unless otherwise specified

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Collector emitter leakage current	I_{CES}	-	-	10	µA	V_{CEB} = 13V, E-B short circuited
Collector emitter leakage current	I_{CES}	-	-	5	µA	V_{CEB} = 10.5V, E-B short circuited
Collector emitter leakage current	I_{CES}	-	-	2	µA	V_{CEB} = 5V, E-B short circuited
Collector-emitter cutoff current [1]	I_{CEX}	-	-	160	µA	V_{CE} = 4V, I_B = 0.1µA
Emitter base cuttoff current	I_{EBO}	-	-	15	µA	V_{EB} = 1.2V, I_C = 0A
DC current gain	h_{FE}	100	190	250	-	I_C = 80mA, V_{CE} = 3V

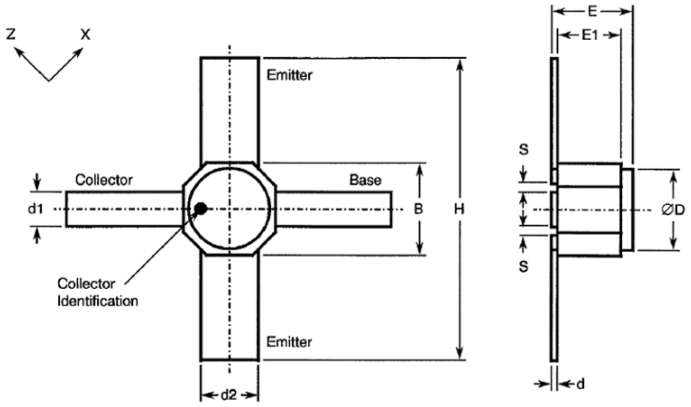
Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Collector-base capacitance	C_{CB}	-	0.26	0.36	pF	V_{CB}= 2V, V_{BE}= vbe= 0, f= 1MHz
Collector-emitter capacitance	C_{CE}	-	0.57	0.8	pF	V_{CE}= 2V, V_{BE}= vbe= 0, f= 1MHz
Emitter-base capacitance	C_{EB}	-	1.4	1.8	pF	V_{EB}=0.5V, V_{CB}= vcb= 0, f= 1MHz
Noise Figure	F	- -	0.8 1.25	- -	dB	I_C= 10mA, V_{CE}= 3V, f = 1.8GHz, Z_S= Z_{Sopt} I_C= 10mA, V_{CE}= 3V, f = 6.0GHz, Z_S= Z_{Sopt}
Insertion power gain	$\|S_{21e}\|^2$	14.5 5.5	18 7.3	- -	dB	I_C= 80mA, V_{CE}= 3V, f = 1.8GHz, Z_S = Z_L = 50Ω I_C= 80mA, V_{CE}= 3V, f = 6.0GHz, Z_S = Z_L = 50Ω
Power Gain [2]	G_{ms}	18	19.2	-	dB	I_C= 80mA, V_{CE}= 3V, f = 1.8GHz, Z_S = Z_{Sopt}, Z_L = Z_{Lopt}
Power Gain [2]	G_{ma}	8	9.3	-	dB	I_C= 80mA, V_{CE}= 3V, f = 6.0GHz, Z_S = Z_{Sopt}, Z_L = Z_{Lopt}
Output Power	$Pout$	16		-	dBm	I_C= 80mA, V_{CE}= 3V, f = 1.8GHz, P_{in} = 0dBm

[1] This test assures $V_{(BR)CE0}$ > 4V

[2] $G_{ma} = \left|\frac{S21}{S12}\right|(k - \sqrt{k^2 - 1})$, $G_{ms} = \left|\frac{S21}{S12}\right|$

4 Package outlines



Symbols	Dimensions mm	
	Min	Max
B	1.68	1.88
d	0.07	0.15
d1	0.4	0.6
d2	0.92	1.12
ØD	1.55	1.85
E	0.85	1.25
E1	0.66	0.86
H	4	4.4
S	0.08	0.3

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