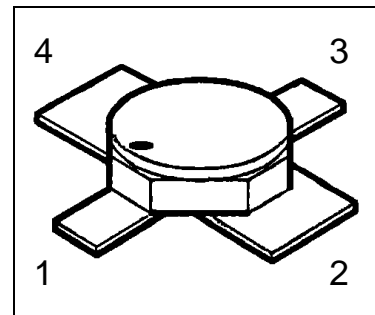


HiRel NPN Silicon RF Transistor

BFY193C(ES)

Features

- For low noise, high-gain amplifiers up to 2GHz
- For linear broadband amplifiers
- Specified 1/f Noise
- Hermetically sealed microwave package
- $f_T = 8\text{GHz}$
 $F = 2.3\text{ dB at } 2\text{ GHz}$



Product validation

- **ESA Space Qualified**
 ESCC Detail Spec. No.: 5611/006
 Type Variant No. 08

Description

ESD: Electrostatic discharge sensitive device, observe handling precautions!

Table 1 Product information

Type	Comment	Pin Configuration				Package
		1	2	3	4	
BFY193C(ES)	For flight use	C	E	B	E	Micro-X1
BFY193C(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}	-	-	12	V	
Collector-emitter voltage	V_{CES}	-	-	20	V	$V_{BE}=0$
Collector-base voltage	V_{CBO}	-	-	20	V	
Emitter-base voltage	V_{EBO}	-	-	2	V	
Collector current	I_C	-	-	80	mA	
Base current ¹	I_B	-	-	10	mA	
Total power dissipation ²	P_{tot}	-	-	580	mW	$T_S \leq 104\text{ °C}$
Junction temperature	T_j	-	-	200	°C	
Operating temperature	T_{op}	-65	-	200	°C	
Storage temperature	T_{stg}	-65	-	200	°C	

¹ The maximum permissible base current for V_{FBE} measurements is 30mA (spot-measurement duration < 1s)

² For $T_S > 104\text{ °C}$ derating is required. T_S is measured on the collector lead at the soldering point to the PCB

Thermal characteristics

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.

Electrical characteristics

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}	-	-	100	μA	$V_{CB} = 20\text{V}, I_E = 0\text{A}$
Collector-emitter cutoff current ¹	I_{CEX}	-	-	600	μA	$V_{CE} = 12\text{V}, I_B = 0.5\mu\text{A}$
Collector-base cutoff current	I_{CBO}	-	-	50	nA	$V_{CB} = 10\text{V}, I_E = 0\text{A}$
Emitter base cutoff current	I_{EBO}	-	-	25	μA	$V_{EB} = 2\text{V}, I_C = 0\text{A}$
Emitter base cutoff current	I_{EBO}	-	-	0.5	μA	$V_{EB} = 1\text{V}, I_C = 0\text{A}$
Base-Emitter forward voltage	V_{FBE}	-	-	1	V	$I_E = 30\text{mA}, I_C = 0\text{A}$
DC current gain	h_{FE}	50	100	175	-	$I_C = 30\text{mA}, V_{CE} = 8\text{V}$

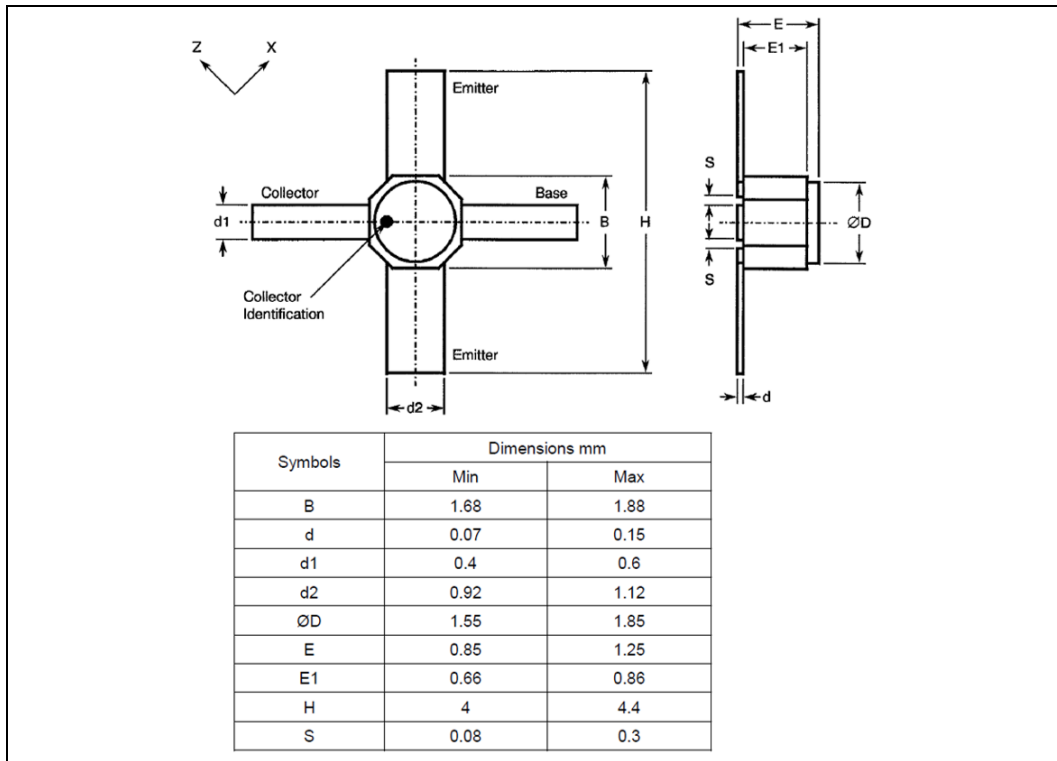
Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Transition frequency	f_T	6.5 -	7.5 8	- -	GHz	$I_C = 40\text{mA}, V_{CE} = 5\text{V}, f = 500\text{MHz}$ $I_C = 50\text{mA}, V_{CE} = 8\text{V}, f = 500\text{MHz}$
Collector-base capacitance	C_{CB}	-	0.56	0.75	pF	$V_{CB} = 10\text{V}, V_{BE} = v_{be} = 0, f = 1\text{MHz}$
Collector-emitter capacitance	C_{CE}	-	0.34	-	pF	$V_{CE} = 10\text{V}, V_{BE} = v_{be} = 0, f = 1\text{MHz}$
Emitter-base capacitance	C_{EB}	-	1.9	2.4	pF	$V_{EB} = 0.5\text{V}, V_{CB} = v_{cb} = 0, f = 1\text{MHz}$
Noise Figure	F	-	2.3	2.9	dB	$I_C = 15\text{mA}, V_{CE} = 5\text{V}, f = 2\text{GHz},$ $Z_S = Z_{Sopt}$
Power Gain ²	G_{ma}	12.5	13.5	-	dB	$I_C = 40\text{mA}, V_{CE} = 5\text{V}, f = 2\text{GHz},$ $Z_S = Z_{Sopt}, Z_L = Z_{Lopt}$
Transducer gain	$ S_{21e} ^2$	8	9	-	dB	$I_C = 40\text{mA}, V_{CE} = 5\text{V}, f = 2\text{GHz},$ $Z_S = Z_L = 50\Omega$
Output power	P_{OUT}	16.5	17.5	-	dBm	$I_C = 50\text{mA}, V_{CE} = 5\text{V}, f = 2\text{GHz},$ $P_{IN} = 10\text{dBm}, Z_S = Z_L = 50\Omega$
1/f Noise	$F_{10\text{Hz}}$	-	-	300	$\frac{\text{nV}}{\sqrt{\text{Hz}}}$	

¹ This test assures $V_{(BR)CE0} > 12\text{V}$

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

4 Package outlines



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