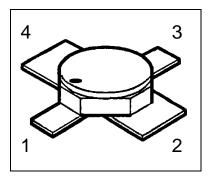


# HiRel NPN Silicon RF Transistor

- HiRel Discrete and Microwave Semiconductor
- For low noise, high-gain amplifiers up to 2GHz.
- For linear broadband amplifiers
- Hermetically sealed microwave package
- f<sub>T</sub>= 8 GHz
  F = 2.3 dB at 2 GHz
- CSA Space Qualified ESA/SCC Detail Spec. No.: 5611/006 Type Variant No. 06

**ESD**: Electrostatic discharge sensitive device, observe handling precautions!



Туре	Marking	Ordering Code	Pin C	Config	juratio	on	Package
			1	2	34		
BFY193 (ql)	-	see below	С	Е	В	Е	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 <sub>CEO</sub>	12	V
Collector-emitter voltage, $V_{BE}=0$	V <sub>CES</sub>	20	V
Collector-base voltage	V <sub>CBO</sub>	20	V
Emitter-base voltage	V <sub>EBO</sub>	2	V
Collector current	Ι <sub>C</sub>	80	mA
Base current	I <sub>B</sub>	10 <sup>1)</sup>	mA
Total power dissipation, T <sub>S</sub> $\leq$ 104°C <sup>2), 3)</sup>	P <sub>tot</sub>	580	mW
Junction temperature	Tj	200	°C
Operating temperature range	T <sub>op</sub>	-65+200	°C
Storage temperature range	T <sub>stg</sub>	-65+200	°C

### **Thermal Resistance**

Junction-soldering point <sup>3)</sup>	R <sub>th JS</sub>	< 165	K/W
Notoo			

#### Notes.:

1) The maximum permissible base current for V<sub>FBE</sub> measurements is 30mA (spot-

measurement duration < 1s)

2) At  $T_s = +104$  °C. For  $T_s > +104$  °C derating is required. 3)  $T_s$  is measured on the collector lead at the soldering point to the pcb.

### **Electrical Characteristics**

at T<sub>A</sub>=25°C; unless otherwise specified

Parameter	Symbol		Values		Unit
		min.	typ.	max.	

### **DC Characteristics**

Collector-base cutoff current	I <sub>CBO</sub>	-	-	100	μA
$V_{CB} = 20 \text{ V}, I_{E} = 0$					
Collector-emitter cutoff current	I <sub>CEX</sub>	-	-	600	μA
$V_{CE} = 12 \text{ V}, \text{ I}_{B} = 0.5 \mu \text{A}^{-1.3}$					
Collector-base cutoff current	I <sub>CBO</sub>	-	-	50	nA
$V_{CB} = 10 \text{ V}, \text{ I}_{E} = 0$					
Emitter base cuttoff current	I <sub>EBO</sub>	-	-	25	μA
$V_{EB} = 2 V, I_{C} = 0$					
Emitter base cuttoff current	I <sub>EBO</sub>	-	-	0.5	μA
$V_{EB} = 1 V, I_{C} = 0$					

### Notes:

1.) This Test assures V(BR)CE0 > 12V IFAG IMM RPD D HIR



### Electrical Characteristics (continued)

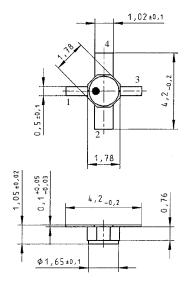
Parameter	Symbol		Values	6	Unit
		min.	typ.	max.	
DC Characteristics	·				
Base-Emitter forward voltage	V <sub>FBE</sub>	-	-	1	V
$I_{\rm E} = 30$ mA, $I_{\rm C} = 0$					
DC current gain	h <sub>FE</sub>	50	100	175	-
$I_{C} = 30$ mA, $V_{CE} = 8$ V					
AC Characteristics	·				
Transition frequency	f <sub>T</sub>				GHz
$I_{C}$ = 40mA, $V_{CE}$ = 5 V, f = 500 MHz		6,5	7.5	-	
$I_{\rm C}=50$ mA, $V_{\rm CE}=8$ V, $f=500$ MHz		-	8	-	
Collector-base capacitance	C <sub>CB</sub>	-	0.56	0.75	pF
$V_{CB}=10~V,~V_{BE}=vbe=0,~f=1~MHz$					
Collector-emitter capacitance	C <sub>CE</sub>	-	0.34	-	pF
$V_{CE} = 10 \text{ V},  V_{BE} = vbe = 0,  f = 1  MHz$					
Emitter-base capacitance	C <sub>EB</sub>	-	1.9	2.4	pF
$V_{\text{EB}} = 0.5 \text{V},  V_{\text{CB}} = \text{vcb} = 0,  \text{f} = 1  \text{MHz}$					
Noise Figure	F	-	2.3	2.9	dB
$I_{\rm C}$ = 15 mA, $V_{\rm CE}$ = 5 V, f = 2 GHz,					
$Z_{\rm S} = Z_{\rm Sopt}$					
Power gain	Gma <sup>1.)</sup>	12.5	13.5	-	dB
$I_{\rm C}$ = 40 mA, $V_{\rm CE}$ = 5V, f = 2 GHz					
$Z_{S} = Z_{Sopt}$ , $Z_{L} = Z_{Lopt}$					
Transducer gain	$ S_{21e} ^2$	8	9	-	dB
$I_{C}$ = 40 mA, $V_{CE}$ = 5 V, f = 2 GHz					
$Z_S = Z_L = 50 \ \Omega$					
Output Power	P <sub>OUT</sub>	16.5	17.5	-	dBm
$I_{C}$ = 50 mA, $V_{CE}$ = 5 V, f = 2GHz,					
$P_{IN}$ =10dBm, $Z_S$ = $Z_L$ = 50 $\Omega$					

### Notes.:

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



## Micro-X1 Package



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