

NPN Bipolar RF Transistor

- For low noise, high-gain amplifiers up to 2 GHz
- For linear broadband amplifiers
- $f_T = 8 \text{ GHz}$, $NF_{\min} = 1 \text{ dB}$ at 900 MHz
- Pb-free (RoHS compliant) and halogen-free product
- Qualification report according to AEC-Q101 available



ESD (Electrostatic discharge) sensitive device, observe handling precaution!

Type	Marking	Pin Configuration			Package
BFR193F	RCs	1 = B	2 = E	3 = C	TSFP-3

Maximum Ratings at $T_A = 25 \text{ }^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}	12	V
Collector-emitter voltage	V_{CES}	20	
Collector-base voltage	V_{CBO}	20	
Emitter-base voltage	V_{EBO}	2	
Collector current	I_C	80	mA
Base current	I_B	10	
Total power dissipation ¹⁾ $T_S \leq 72^\circ\text{C}$	P_{tot}	580	mW
Junction temperature	T_J	150	$^\circ\text{C}$
Storage temperature	T_{Stg}	-55 ... 150	

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point ²⁾	R_{thJS}	135	K/W

¹⁾ T_S is measured on the collector lead at the soldering point to the pcb

²⁾ For calculation of R_{thJA} please refer to Application Note AN077 (Thermal Resistance Calculation)

Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Collector-emitter breakdown voltage $I_C = 1\text{ mA}, I_B = 0$	$V_{(BR)CEO}$	12	-	-	V
Collector-emitter cutoff current $V_{CE} = 20\text{ V}, V_{BE} = 0$	I_{CES}	-	-	100	μA
Collector-base cutoff current $V_{CB} = 10\text{ V}, I_E = 0$	I_{CBO}	-	-	100	nA
Emitter-base cutoff current $V_{EB} = 1\text{ V}, I_C = 0$	I_{EBO}	-	-	1	μA
DC current gain $I_C = 30\text{ mA}, V_{CE} = 8\text{ V}, \text{pulse measured}$	h_{FE}	70	100	140	-

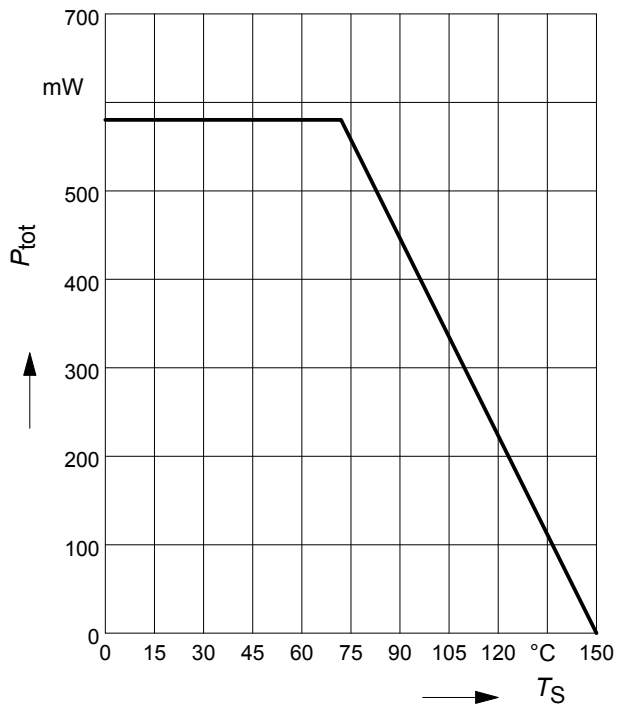
Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics (verified by random sampling)					
Transition frequency $I_C = 50\text{ mA}$, $V_{CE} = 8\text{ V}$, $f = 500\text{ MHz}$	f_T	6	8	-	GHz
Collector-base capacitance $V_{CB} = 10\text{ V}$, $f = 1\text{ MHz}$, $V_{BE} = 0$, emitter grounded	C_{cb}	-	0.63	1	pF
Collector emitter capacitance $V_{CE} = 10\text{ V}$, $f = 1\text{ MHz}$, $V_{BE} = 0$, base grounded	C_{ce}	-	0.25	-	
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$, $f = 1\text{ MHz}$, $V_{CB} = 0$, collector grounded	C_{eb}	-	2.25	-	
Minimum noise figure $I_C = 10\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_{Sopt}$, $f = 900\text{ MHz}$ $f = 1.8\text{ GHz}$	NF_{min}	- -	1 1.6	- -	dB
Power gain, maximum stable ¹⁾ $I_C = 30\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 900\text{ MHz}$	G_{ms}	-	12.5	-	dB
Power gain, maximum available ¹⁾ $I_C = 30\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 1.8\text{ GHz}$	G_{ma}	-	19	-	dB
Transducer gain $I_C = 30\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_L = 50\Omega$, $f = 900\text{ MHz}$ $f = 1.8\text{ GHz}$	$ S_{21e} ^2$	- -	14.5 8.5	- -	dB
Third order intercept point at output ²⁾ $V_{CE} = 8\text{ V}$, $I_C = 30\text{ mA}$, $f = 900\text{ MHz}$, $Z_S = Z_L = 50\ \Omega$	IP_3	-	29	-	dBm
1dB compression point at output ³⁾ $I_C = 30\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_L = 50\ \Omega$, $f = 900\text{ MHz}$	P_{-1dB}	-	14.5	-	

¹⁾ $G_{ma} = |S_{21} / S_{12}| (k - (k^2 - 1)^{1/2})$, $G_{ms} = |S_{21} / S_{12}|$
²⁾ IP_3 value depends on termination of all intermodulation frequency components.
Termination used for this measurement is 50Ω from 0.1 MHz to 6 GHz

³⁾ DC current at no input power

Total power dissipation $P_{\text{tot}} = f(T_S)$



The technical drawing shows two views of the M80-100 sensor:

- Front View (Left):** Shows a rectangular component with three pins labeled 1, 2, and 3. Dimensions include a total width of 1.2 ± 0.05 , a pin pitch of 0.2 ± 0.05 , and individual pin widths of 0.2 ± 0.05 . Pin 1 has a length of 0.4 ± 0.05 , while pins 2 and 3 have a combined length of 0.4 ± 0.05 .
- Side View (Right):** Shows the profile of the sensor. It features a top flange with a thickness of 0.55 ± 0.04 and a base height of 0.8 ± 0.05 . The main body has a height of 1.2 ± 0.05 and a central slot with a depth of 0.2 ± 0.05 . A chamfer at the bottom right is specified as 10° MAX. with a radius of 0.15 ± 0.05 .

Technical drawing of a mechanical part. The drawing shows a top view and a side view. The top view is a rectangle with a width of 0.4 and a height of 0.45. The side view is a rectangle with a width of 0.4 and a height of 1.05. The drawing is labeled with dimensions: 0.4, 0.45, 1.05, and 0.4.

Technical drawing of a mechanical part showing top and side views with dimensions. The top view shows a rectangular part with a total width of 4 and a total height of 8. There are three circular features (holes) along the top edge, with a center-to-center distance of 1.35 between the first two and 1.5 between the last two. A vertical slot is located 0.3 units from the right edge. The side view shows a thickness of 0.2 and a base height of 0.7. A label 'Pin 1' points to a feature on the left side.

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