NPN diffused silicon planar transistor

BFR11

RF amplifier and high speed switch

The BFR 11 is an NPN silicon planar epitaxial transistor designed for RF amplifiers and high speed switching applications.
This device features a minimum f_T of 250 MHz at 50 mA, V_{CE} = 10 V together with a maximum V_{CE} (sat) of 0.6 V at 500 mA.

ELECTRICAL CHARACTERISTICS
(T_A = 25°C unless otherwise noted)

Symbol	Characteristic and test conditions		Min.	Typ.	Max.	Unit
h_{FE}	DC Current Gain					
	I_C = 100 μA	V_{CE} = 10 V	25	50		
	I_C = 10 mA	V_{CE} = 10 V (5)	50	85		
	I_C = 150 mA	V_{CE} = 10 V (5)	60	90	120	
	I_C = 500 mA	V_{CE} = 10 V (5)	40	65		
$V_{BE\ sat}$	Base Saturation Voltage					
	I_C = 150 mA	I_B = 15 mA	0.7	0.85	1	V
	I_C = 500 mA	I_B = 50 mA		1.05	1.3	V
$V_{CE\ sat}$	Collector Saturation Voltage (5)					
	I_C = 150 mA	I_B = 15 mA		0.14	0.22	V
	I_C = 500 mA	I_B = 50 mA		0.40	0.60	V
I_{CES}	Collector Reverse Current					
	V_{CE} = 60 V	V_{EB} = 0		0.2	10	nA
	V_{CE} = 60 V	V_{EB} = 0 (150°C)		0.2	10	μA
I_{EBO}	Emitter Reverse Current					
	V_{EB} = 3 V	I_C = 0			10	nA
BV_{CES}	Collector to Emitter Breakdown Voltage					
	I_C = 10 μA	V_{EB} = 0	75			V
BV_{EBO}	Emitter to Base Breakdown Voltage					
	I_E = 10 μA	I_C = 0	6			V
LV_{CER}	Collector to Emitter Sustaining Voltage (4 and 5)					
	I_C = 30 mA	I_B = 0	40			V
h_{fe}	Small Signal Current Gain (f=1kHz)					
	I_C = 10 mA	V_{CE} = 10 V		90		
h_{ie}	Input Resistance (f=1kHz)					
	I_C = 10 mA	V_{CE} = 10 V		350		Ω
h_{oe}	Output Conductance (f=1kHz)					
	I_C = 10 mA	V_{CE} = 10 V		30		μmho
h_{re}	Voltage Feedback Ratio (f=1kHz)					
	I_C = 10 mA	V_{CE} = 10 V		12		x10-4
h_{fe}	High Freq. Current Gain (f=100MHz)					
	I_C = 50 mA	V_{CE} = 10 V	2.5	3.5		
C_{TE}	Emitter Transition Capacitance					
	I_C = 0	V_{EB} = 0.5 V		14	25	pF
C_{obo}	Base-Collector Capacitance					
	I_E = 0	V_{CB} = 10 V		5	8	pF
t_{on}	Turn On Time					
	I_C = 300 mA	I_{B1} = 30 mA		14	60	ns
t_{off}	Turn Off Time					
	I_C = 300 mA	I_{B1} = 30 mA I_{B2} = 30mA		80	150	ns

NOTES:
(1) These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
(2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
(3) These ratings give a maximum junction temperature of 200°C and junction - to - case thermal resistance of 117°C/W (derating factor of 8.6 mW/°C); junction to-ambient thermal resistance of 438°C/W (derating factor of 2.28 mW/°C).
(4) These ratings refer to a high-current point where collector-to-emitter voltage is lowest. For more information send for SGS AR 5.
(5) Mensured under pulse conditions: pulse length = 300 μsec; duty cycle 1%.

ABSOLUTE MAXIMUM RATINGS (1)
(T_A = 25°C unless otherwise noted)

Voltages

Collector to Emitter (4)	V_{CEO}	40 V
Collector to Emitter	V_{CES}	75 V
Emitter to Base	V_{EBO}	6 V

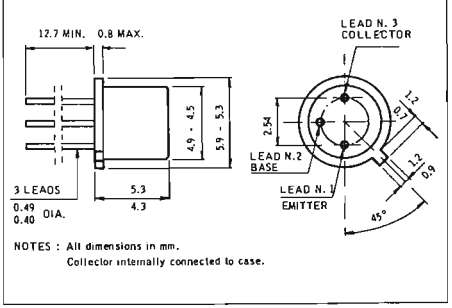
Temperatures

Storage Temperature Range	T_{STG}	-55°C to 200°C
Junction Temperature	T_J	200°C
Lead Temperature (Soldering, 10 sec.)	T_L	260°C

Power (2 and 3)

Dissipation at 25°C Case Temperature	P_D	1.5 W
Dissipation at 25°C Ambient Temperature	P_D	0.4 W

PHYSICAL DIMENSIONS
in accordance with JEDEC TO-18 outline



NOTES : All dimensions in mm.
Collector internally connected to case.