NPN diffused silicon planar transistor

BFR 21

High voltage, amplifier and switch

The BFR 21 is an NPN silicon planar epitaxial transistor designed primarily for amplifier and switching applications over a wide range of voltage and current. This device features a useful beta range from 100 μA to 500 mA and low saturation voltage permitting switching operation at 1 ampere. High collector-to-emitter voltage allows operation to 70V.

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

Symbol	Characteristic and test conditions		Min.	Typ.	Max.	Unit
h_{FE}	DC Current Gain (5)					
	I_C = 100 μA	V_{CE} = 1V	20	50		
	I_C = 10 mA	V_{CE} = 1V	50	85		
	I_C = 150 mA	V_{CE} = 1V	40	70		
	I_C = 500 mA	V_{CE} = 1V	20	35		
$V_{BE\ sat}$	Base Saturation Voltage (5)					
	I_C = 150 mA	I_B = 15 mA		0.85	1.1	V
	I_C = 500 mA	I_B = 50 mA		1.1		V
	I_C = 1A	I_B = 0.1 A		1.35	2	V
$V_{CE\ sat}$	Collector Saturation Voltage (5)					
	I_C = 150 mA	I_B = 15 mA		0.13	0.25	V
	I_C = 500 mA	I_B = 50 mA		0.30		V
	I_C = 1A	I_B = 0.1A		0.65	1	V
I_{CES}	Collector Reverse Current					
	V_{CE} = 80V	V_{EB} = 0		0.1	10	nA
$I_{CES\ (150°C)}$	Collector Reverse Current					
	V_{CE} = 80V	V_{EB} = 0		0.1	10	μA
I_{EBO}	Emitter Reverse Current					
	V_{EB} = 5V	I_C = 0		0.05	10	nA
BV_{CES}	Collector to Emitter Breakdown Voltage					
	I_C = 100 μA	V_{EB} = 0	120			V
BV_{EBO}	Emitter to Base Breakdown Voltage					
	I_E = 100 μA	I_C = 0	7			V
LV_{CEO}	Collector to Emitter Sustaining Voltage (4 and 5)					
	I_C = 30 mA	I_B = 0	70			V
h_{fe}	Small Signal Current Gain (f=1 kHz)					
	I_C = 1 mA	V_{CE} = 5V		80		
h_{ie}	Input Resistance (f=1 kHz)					
	I_C = 1 mA	V_{CE} = 5V		2		kΩ
h_{oe}	Output Conductance (f=1 KHz)					
	I_C = 1 mA	V_{CE} = 5V		8		μmho
h_{re}	Voltage Feedback Ratio (f=1 kHz)					
	I_C = 1 mA	V_{CE} = 5V		2.1		$\times 10^{-4}$
h_{fe}	High Freq. Current Gain (f=20 MHz)					
	I_C = 50 mA	V_{CE} = 10V	2.5	4.5		
C_{TE}	Emitter Transition Capacitance					
	I_C = 0	V_{EB} = 0.5V		50	80	pF
C_{obo}	Base Collector Capacitance					
	I_E = 0	V_{CB} = 10V		13	20	pF
t_{on}	Turn on Time					
	I_C = 150 mA	I_{B1} = 7.5 mA		130	200	ns
t_{off}	Turn Off Time					
	I_C = 150 mA	I_{B1} = 7.5 mA I_{B2} = 7.5 mA		450	800	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 35°C/W (derating factor of 28.6 mW/°C); junction - to - ambient thermal resistance of 219°C/W (derating factor of 4.57 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) Measured 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}	70 V
Collector to Emitter	V_{CES}	120 V
Emitter to Base	V_{EBO}	7 V

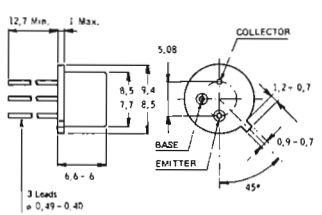
Temperatures

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

Power (2 - 3)

Dissipation at 25°C Case Temperature	P_D	5 W
Dissipation at 25°C Ambient Temperature	P_D	0.8 W

PHYSICAL DIMENSIONS
Similar to Jedec TO-5



Note: All dimensions are in mm.