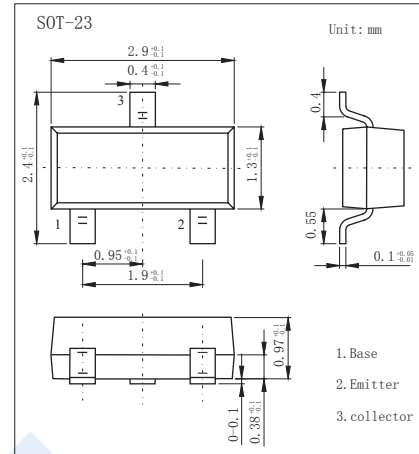


## NPN Transistors

## 2SC2223-HF

## ■ Features

- Collector Current Capability  $I_c=20\text{mA}$
- Collector Emitter Voltage  $V_{CE0}=20\text{V}$
- Pb-Free Package May be Available. The G-Suffix Denotes a Pb-Free Lead Finish

■ Absolute Maximum Ratings  $T_a = 25^\circ\text{C}$ 

Parameter	Symbol	Rating	Unit
Collector - Base Voltage	$V_{CBO}$	30	V
Collector - Emitter Voltage	$V_{CEO}$	20	
Emitter - Base Voltage	$V_{EBO}$	4	
Collector Current - Continuous	$I_c$	20	mA
Collector Power Dissipation	$P_c$	150	mW
Junction Temperature	$T_J$	125	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55 to 125	

■ Electrical Characteristics  $T_a = 25^\circ\text{C}$ 

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{CBO}$	$I_c = 100 \mu\text{A}, I_E = 0$	30			V
Collector-emitter breakdown voltage	$V_{CEO}$	$I_c = 1 \text{ mA}, I_B = 0$	20			
Emitter - base breakdown voltage	$V_{EBO}$	$I_E = 100 \mu\text{A}, I_C = 0$	4			
Collector-base cut-off current	$I_{CBO}$	$V_{CB} = 25 \text{ V}, I_E = 0$			100	nA
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 3 \text{ V}, I_C = 0$			100	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 10 \text{ mA}, I_B = 1 \text{ mA}$			0.3	V
Base - emitter saturation voltage	$V_{BE(sat)}$	$I_C = 10 \text{ mA}, I_B = 1 \text{ mA}$			1.2	
Base - emitter voltage	$V_{BE}$	$V_{CE} = 6 \text{ V}, I_C = 1 \text{ mA}$		0.72		
DC current gain	$h_{FE}$	$V_{CE} = 6 \text{ V}, I_C = 1 \text{ mA}$	40		180	
Noise Figure	NF	$V_{CE} = 6 \text{ V}, I_E = -1 \text{ mA}, R_G = 50 \Omega, f = 100 \text{ MHz}$		3		dB
Collector output capacitance	$C_{ob}$	$V_{CB} = 6 \text{ V}, I_E = 0, f = 1 \text{ MHz}$		1		pF
Collector to base time constant	$C_{crb/b}$	$V_{CE} = 6 \text{ V}, I_E = -1 \text{ mA}, f = 31.9 \text{ MHz}$		12		pS
Transition frequency	$f_T$	$V_{CE} = 6 \text{ V}, I_E = -1 \text{ mA}$	400	600		MHz

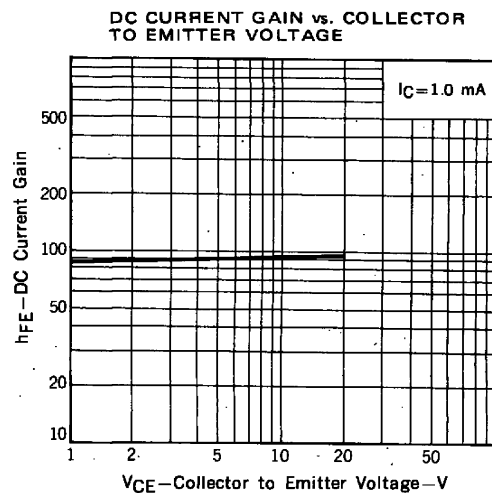
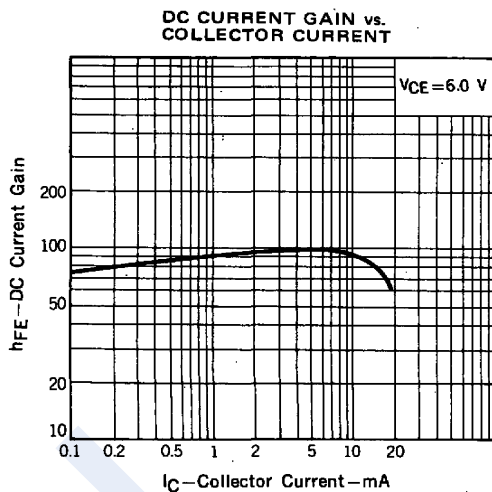
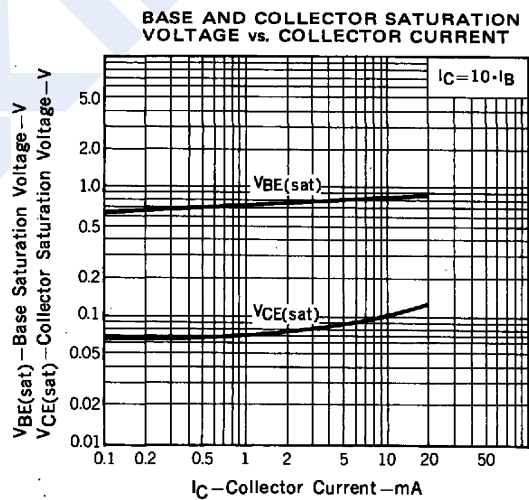
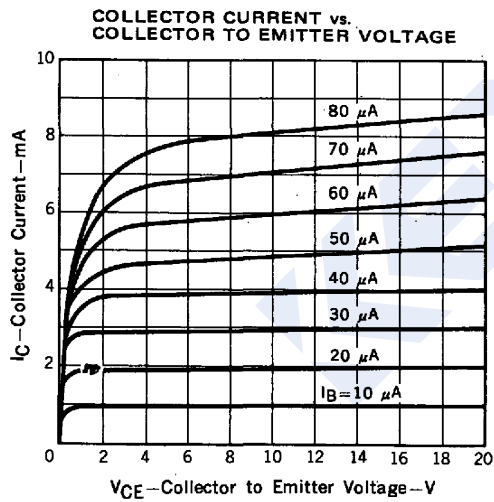
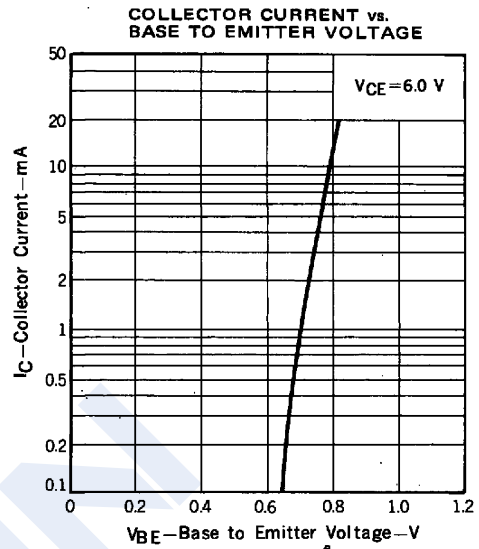
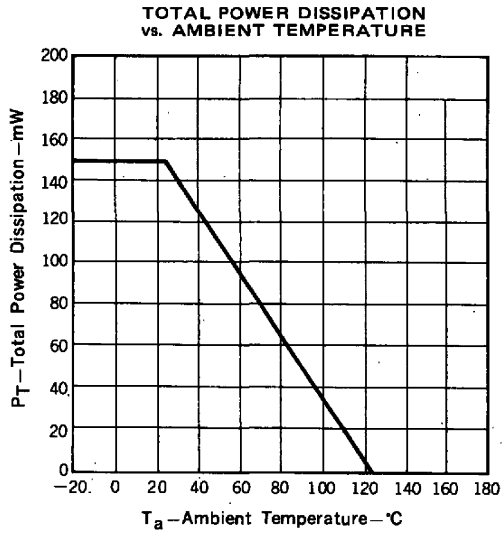
■ Classification of  $h_{FE}$ 

Type	2SC2223-F12-HF	2SC2223-F13-HF	2SC2223-F14-HF
Range	40-80	60-120	90-180
Marking	F12 <sub>F</sub>	F13 <sub>F</sub>	F14 <sub>F</sub>

# NPN Transistors

## 2SC2223-HF

■ Typical Characteristics

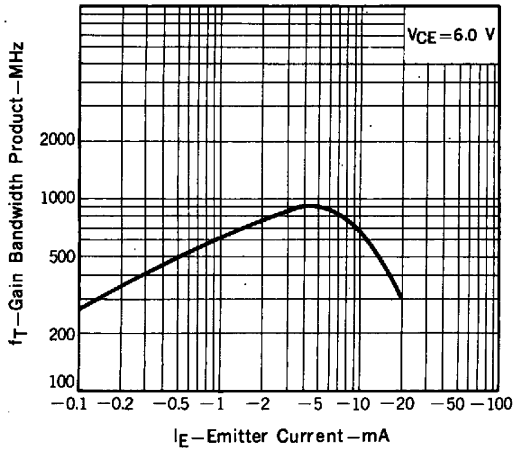


### NPN Transistors

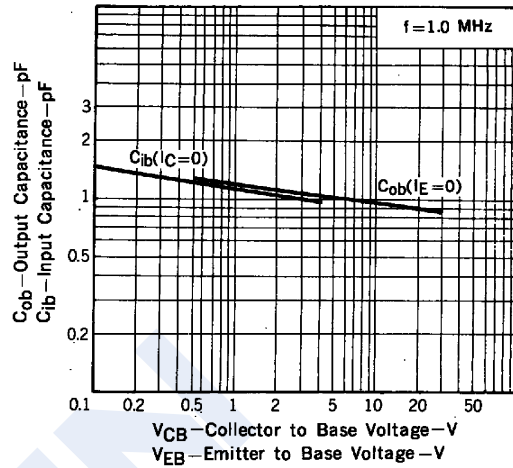
### 2SC2223-HF

■ Typical Characteristics

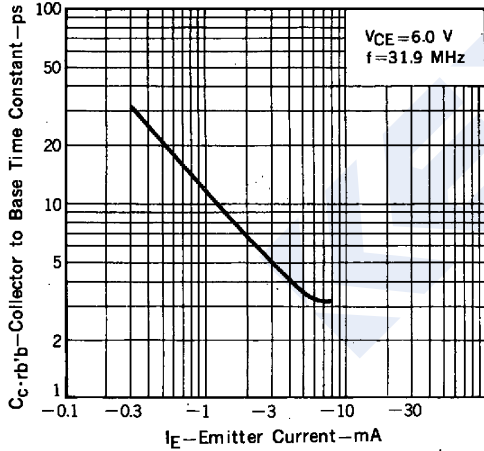
GAIN BANDWIDTH PRODUCT vs. EMITTER CURRENT



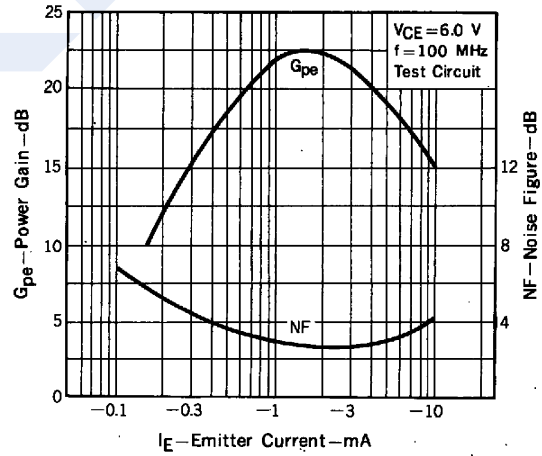
INPUT CAPACITANCE vs. EMITTER TO BASE VOLTAGE, OUTPUT CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



COLLECTOR TO BASE TIME CONSTANT vs. EMITTER CURRENT



POWER GAIN, NOISE FIGURE vs. EMITTER CURRENT



100 MHz  $G_{pe}$ , NF TEST CIRCUIT

