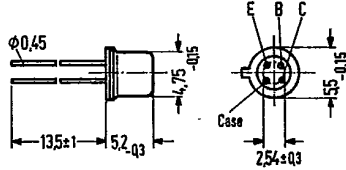


25C D ■ 8235605 0004066 9 ■ SIEG  
 PNP Germanium RF Transistor 25C 04066 D AF 239  
 SIEMENS AKTIENGESELLSCHAFT ————— T-31-07

for UHF input stages up to 900 MHz

AF 239 is a germanium PNP mesa transistor in TO 72 case (18 A 4 DIN 41876). The leads are electrically insulated from the case.

Type	Ordering code
AF 239	Q60106-X239



Approx. weight 0.4 g Dimensions in mm

**Maximum ratings**

Collector-emitter voltage	$-V_{CEO}$	15	V
Collector-emitter voltage	$-V_{CES}$	20	V
Emitter-base voltage	$-V_{EBO}$	0.3	V
Collector current	$-I_C$	10	mA
Emitter current	$I_E$	11	mA
Base current	$-I_B$	1	mA
Junction temperature	$T_j$	90	°C
Storage temperature range	$T_{stg}$	-30 to +75	°C
Total power dissipation ( $T_{amb} = 45^\circ\text{C}$ )	$P_{tot}$	60	mW

**Thermal resistance**

Junction to ambient air	$R_{thJA}$	≤ 750	K/W
Junction to case	$R_{thJC}$	≤ 400	K/W

**Static characteristics ( $T_{amb} = 25^\circ\text{C}$ )**

For the operating point, the following data applies:

$-V_{CE}$ V	$-I_C$ mA	$-I_B$ μA	$h_{FE}$ $I_C/I_B$	$-V_{BE}$ mV
10	2	40	50 (>10)	350
5	5	120	42	400

Collector cutoff current ( $-V_{CES} = 20\text{ V}$ )	$-I_{CES}$	0.5 (<8)	μA
Collector cutoff current ( $-V_{CEO} = 15\text{ V}$ )	$-I_{CEO}$	< 500	μA
Emitter cutoff current ( $-V_{EBO} = 0.3\text{ V}$ )	$-I_{EBO}$	< 100	μA

**Dynamic characteristics** ( $T_{amb} = 25^{\circ}\text{C}$ )

Transition frequency ( $-I_C = 2\text{ mA}; -V_{CE} = 10\text{ V}; f = 100\text{ MHz}$ )	$f_T$	700	MHz
Reverse transfer capacitance ( $-I_C = 2\text{ mA}; -V_{CE} = 10\text{ V}; f = 450\text{ kHz}$ )	$-C_{12e}$	0.23	pF

Operating point:  $-I_C = 2\text{ mA}; -V_{CB} = 10\text{ V}$

Power gain (common base configuration)

( $f = 800\text{ MHz}; R_L = 500\ \Omega$ )	$G_{pb}$	11.5 (>9)	dB
( $f = 800\text{ MHz}; R_L = 2\text{ k}\Omega$ )	$G_{pb}$	14.5 (>11.5)	dB
( $f = 900\text{ MHz}; R_L = 500\ \Omega$ )	$G_{pb}$	10.5 ( $\geq 8.5$ )	dB
( $f = 900\text{ MHz}; R_L = 2\text{ k}\Omega$ )	$G_{pb}$	12.5	dB
Noise figure			
( $f = 800\text{ MHz}; R_g = 60\ \Omega$ )	NF	5 (<6)	dB
( $f = 900\text{ MHz}; R_g = 60\ \Omega$ )	NF	6 (<7)	dB

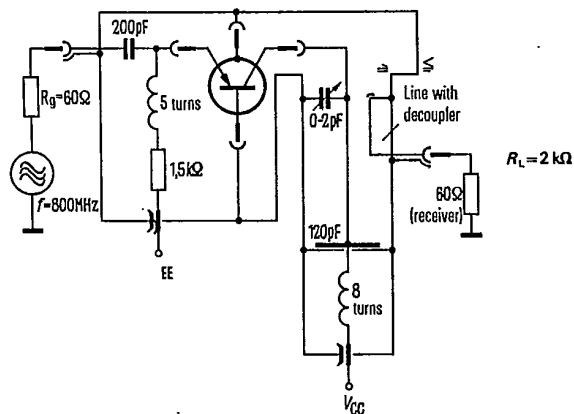
Four-pole characteristics ( $-I_C = 2\text{ mA}; -V_{CE} = 10\text{ V};$  measuring plane 5 mm below case bottom)  $f = 200\text{ MHz}$

$g_{11b} = 45\text{ mS}$	$ Y_{12b}  = 0.09\text{ mS}$	$ Y_{21b}  = 52\text{ mS}$	$g_{22b} = 0.05\text{ mS}$
$-b_{11b} = 29\text{ mS}$	$\varphi_{12b} = -90^{\circ}$	$\varphi_{21b} = 135^{\circ}$	$b_{22b} = 1.6\text{ mS}$

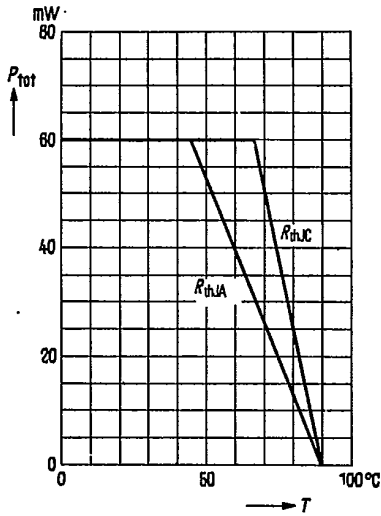
$f = 800\text{ MHz}$

$g_{11b} = 2\text{ mS}$	$ Y_{12b}  = 0.38\text{ mS}$	$ Y_{21b}  = 20\text{ mS}$	$g_{22b} = 0.5\text{ mS}$
$-b_{11b} = 17.5\text{ mS}$	$\varphi_{12b} = -100^{\circ}$	$\varphi_{21b} = 37^{\circ}$	$b_{22b} = 6.3\text{ mS}$

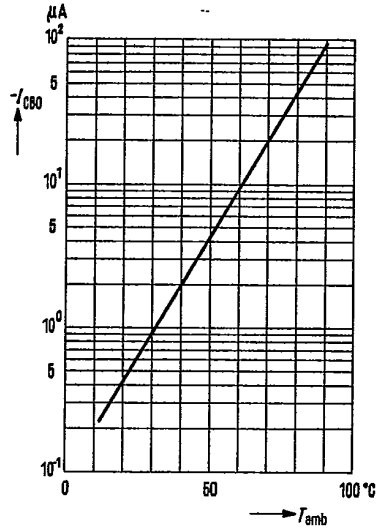
Test circuit for power gain and noise figure at  $f = 800\text{ MHz}$



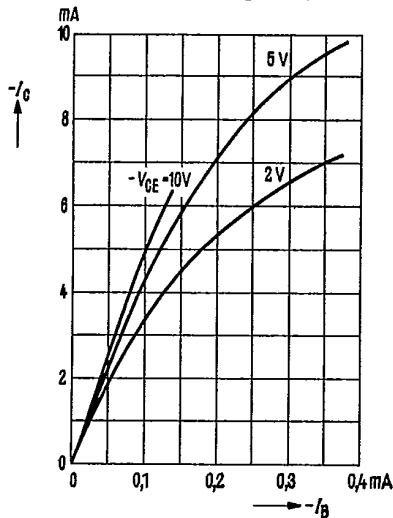
Total perm. power dissipation versus temperature  
 $P_{tot} = f(T)$ ;  $R_{th}$  = parameter



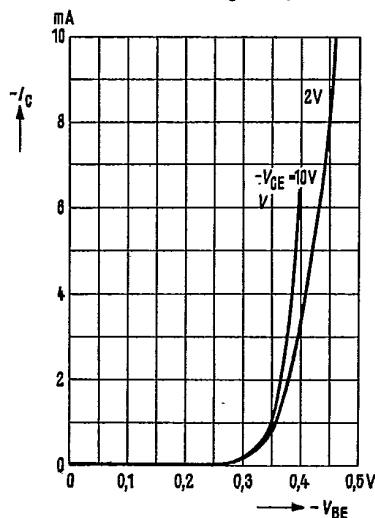
Collector cutoff current versus temperature  $I_{CBO} = f(T_{emb})$   
 $-V_{CBO} = 20 V$



Collector current  $I_C = f(I_B)$   
 $V_{CE} = \text{parameter}$   
 (common emitter configuration)

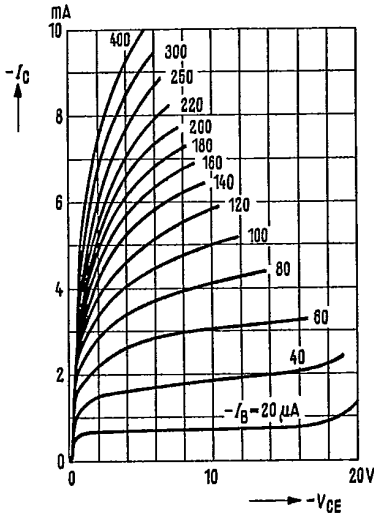


Collector current  $I_C = f(V_{BE})$   
 $V_{CE} = \text{parameter}$   
 (common emitter configuration)

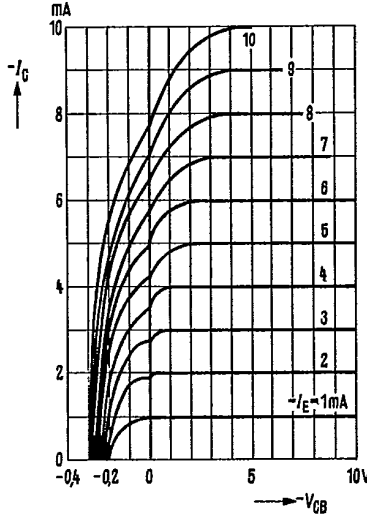


T-31-07

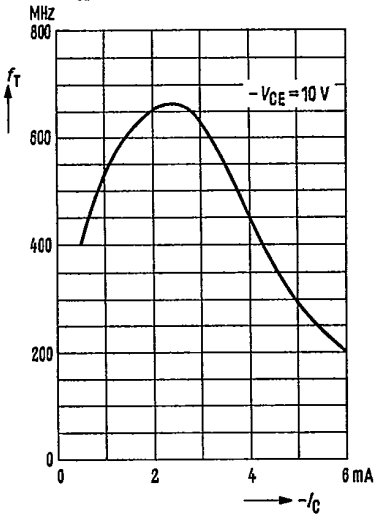
Output characteristics  $I_C = f(V_{CE})$   
 $I_B = \text{parameter}$   
 (common emitter configuration)



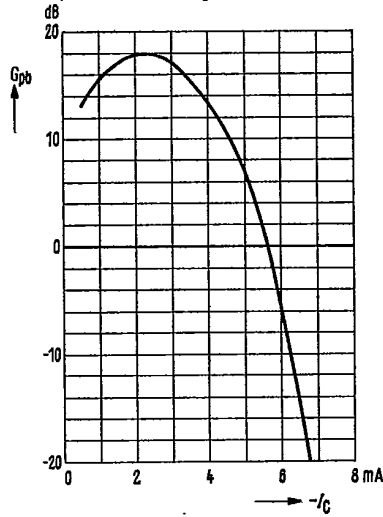
Output characteristics  $I_C = f(V_{CB})$   
 $I_E = \text{parameter}$   
 (common base configuration)



Transition frequency  $f_T = f(I_C)$   
 $-V_{CE} = 10 \text{ V}; f = 100 \text{ MHz}$

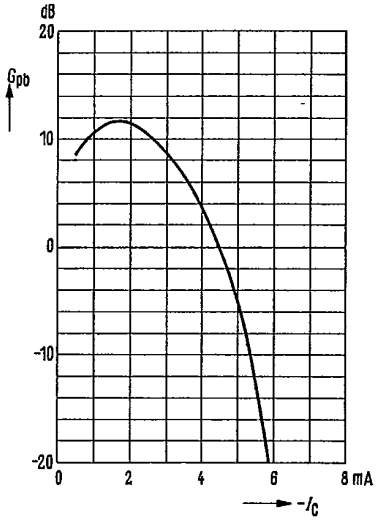


Power gain  $G_{pb} = f(I_C)$   
 $f = 600 \text{ MHz}; -V_{CE} = 10 \text{ V};$   
 $R_V = 1 \text{ k}\Omega; R_L = 2 \text{ k}\Omega$   
 (common base configuration)

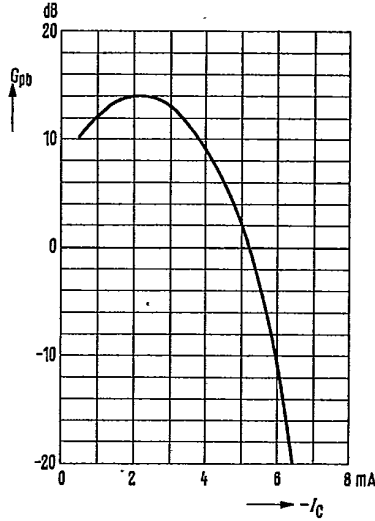


T-31-07

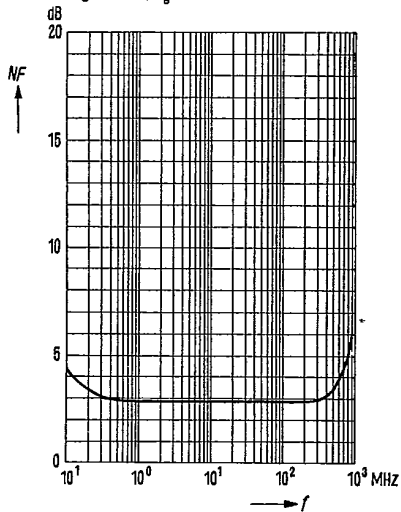
Power gain  $G_{pb} = f(I_C)$   
 $f = 800 \text{ MHz}$ ;  $-V_{\text{batt}} = 10 \text{ V}$ ;  $R_V = 1 \text{ k}\Omega$ ;  
 $R_L = 500 \Omega$   
 (common base configuration)



Power gain  $G_{pb} = f(I_C)$   
 $f = 800 \text{ MHz}$ ;  $-V_{\text{batt}} = 10 \text{ V}$ ;  
 $R_V = 1 \text{ k}\Omega$ ;  $R_L = 2 \text{ k}\Omega$   
 (common base configuration)

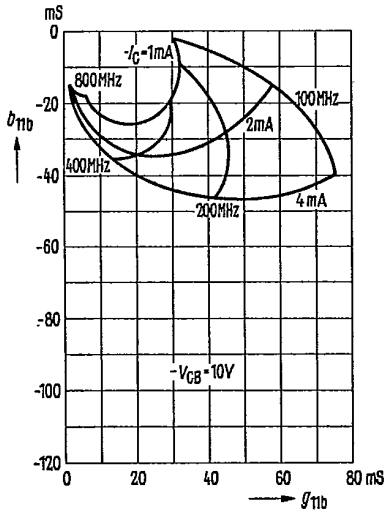


Noise figure versus frequency  $NF = f(f)$   
 $-V_{CB} = 10 \text{ V}$ ;  
 $-I_C = 2 \text{ mA}$ ;  $R_G = 60 \Omega$

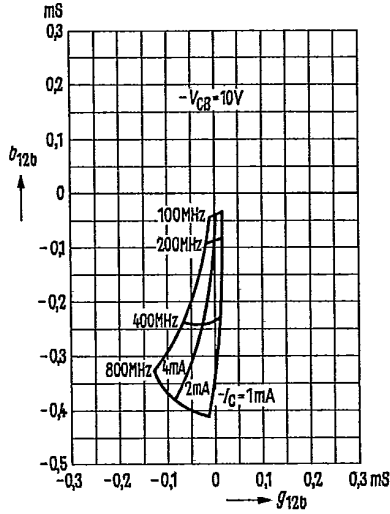


T-31-07

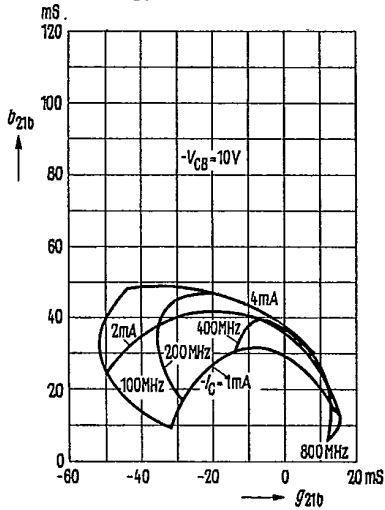
Small signal short circuit input admittance  $y_{11b}$ ;  $-V_{CB} = 10\text{ V}$   
 (common base configuration)  
 measuring plane 5 mm below case bottom



Small signal circuit reverse transfer admittance  $y_{12b}$ ;  $-V_{CB} = 10\text{ V}$   
 (common base configuration)  
 measuring plane 5 mm below case bottom



Small signal short circuit forward transfer admittance  $y_{21b}$ ;  $-V_{CB} = 10\text{ V}$   
 (common base configuration)  
 measuring plane 5 mm below case bottom



Small signal short circuit output admittance  $y_{22b}$ ;  $-V_{CB} = 10\text{ V}$   
 (common base configuration)  
 measuring plane 5 mm below case bottom

