

PNP Germanium RF Transistor

AF109 R

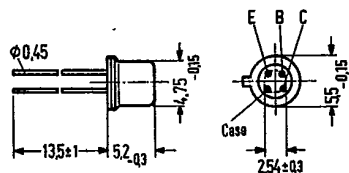
SIEMENS AKTIENGESELLSCHAFT 04053 D

T-31-07

for AGC input stages up to 260 MHz

AF 109 R is a germanium PNP RF mesa transistor in TO 72 case (18 A 4 DIN 41876).
The terminals are electrically insulated from the case.

Type	Ordering code
AF 109 R	Q60106-X109-R1



Approx. weight 0.35 g Dimensions in mm

Maximum ratings

Collector-emitter voltage

Collector-base voltage

Emitter-base voltage

Collector current

Emitter current

Base current

Junction temperature

Storage temperature range

Total power dissipation ($T_{amb} = 45^\circ\text{C}$)

$-V_{CEO}$	15	V
$-V_{CBO}$	20	V
$-V_{EBO}$	0.3	V
$-I_C$	10	mA
I_E	11	mA
$-I_B$	1	mA
T_j	90	$^\circ\text{C}$
T_{stg}	-30 to +75	$^\circ\text{C}$
P_{tot}	60	mW

Thermal resistance

Junction to ambient air

Junction to case

R_{thJA}	≤ 750	K/W
R_{thJC}	≤ 400	K/W

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

$-V_{CE}$ V	$-I_C$ mA	$-I_B$ μA	h_{FE} I_C/I_B	$-V_{BE}$ mV
12	1.5	30	50 (>20)	380 (320 to 430)
6	2	36	55	380 (320 to 430)
6	5	66	75	405 (360 to 450)

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Static characteristics ($T_{amb} = 25^{\circ}\text{C}$)Collector cutoff current ($-V_{CBO} = 20\text{ V}$) $-I_{CBO}$ 0.5 (<8) μA Emitter cutoff current ($-V_{EBO} = 0.3\text{ V}$) $-I_{EBO}$ 0.5 (<100) μA Collector cutoff current ($-V_{CEO} = 15\text{ V}$) $-I_{CEO}$ <500 μA **Dynamic characteristics** ($T_{amb} = 25^{\circ}\text{C}$)

Reverse transfer capacitance

($-I_C = 1\text{ mA}$; $-V_{CE} = 12\text{ V}$; $f = 450\text{ kHz}$) $-C_{12e}$ 0.25 pF

Operating point:

 $-V_{CC} = 12\text{ V}$; $R_{EE} = 1\text{ k}\Omega$; $f = 200\text{ MHz}$ Power gain ($-I_C = 2\text{ mA}$; $R_L = 920\ \Omega$) G_{pb} 16.5 (>13) dBNoise figure ($-I_C = 2\text{ mA}$; $R_g = 60\ \Omega$)

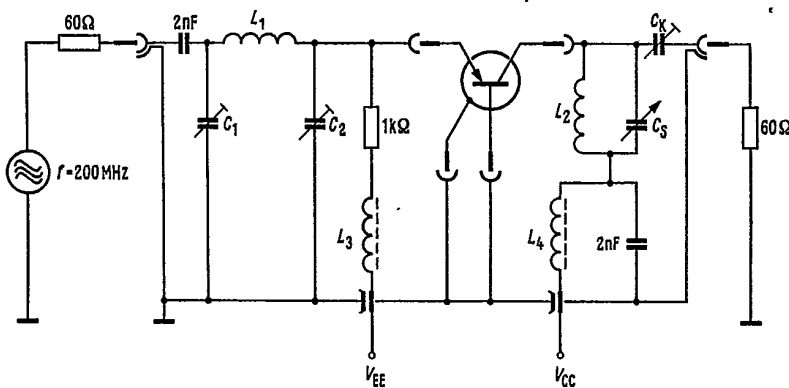
NF 4 (<4.8) dB

Adjustable amplification range ($I_E \leq 9\text{ mA}$) G_{pb} 36 dB

Interference voltage at operating point of minimum cross modulation stability

 $V_{int}\ 1\%$ 22 mW

$V_{int} = 1\%$ is the rms value of half the EMF (terminal voltage under matching condition) of a 100% sine-wave modulated TV carrier with a generator impedance of $240\ \Omega$, which causes 1% amplitude modulation on the signal carrier.

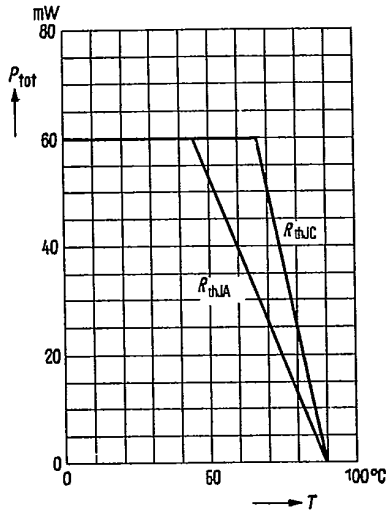
 $g_{11b} = 24\text{ mS}$ $g_{12b} = -0.2\text{ mS}$ $g_{21b} = -12\text{ mS}$ $g_{22b} = 0.2\text{ mS}$ $b_{11b} = -32\text{ mS}$ $b_{12b} = -0.16\text{ mS}$ $b_{21b} = 35\text{ mS}$ $b_{22b} = 1.6\text{ mS}$ **Test circuit for power gain at $f = 200\text{ MHz}$**  $L_1 = 3\text{ turns}$; $d = 1\text{ mm}$; $\text{dia} = 6.5\text{ mm}$ $L_2 = 2\text{ turns}$; $d = 1\text{ mm}$; $\text{dia} = 6.5\text{ mm}$ $L_3 = L_4 = 20\text{ turns}$; 0.5 CuLs

on core B63310-K-1A12,3

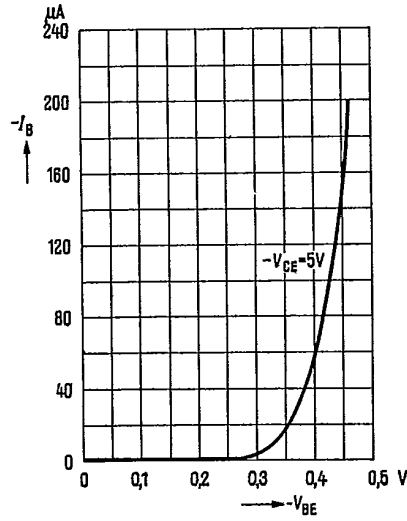
 $C_K = 1.5\text{ to }5\text{ pF}$, so that $R_L = 920\ \Omega$ $C_1 = 6.5\text{ to }18\text{ pF}$ $C_2 = 9.5\text{ to }20\text{ pF}$ $C_3 = 3\text{ to }10\text{ pF}$

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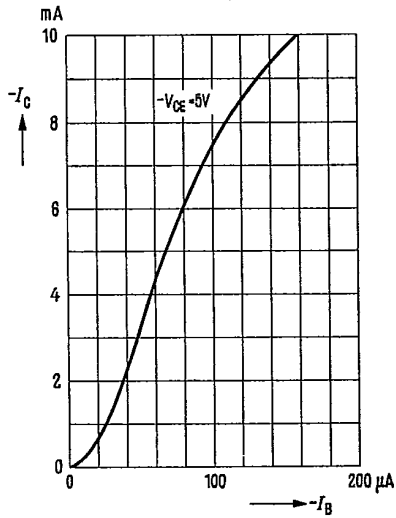
Total perm. power dissipation
versus temperature
 $P_{tot} = f(T)$; R_{th} = parameter



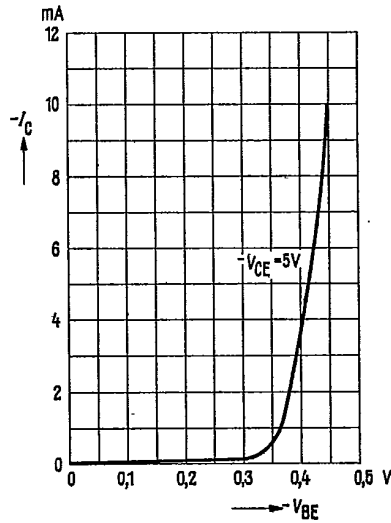
Input characteristic $I_B = f(V_{BE})$
 $-V_{CE} = 5\text{ V}$
(common emitter configuration)



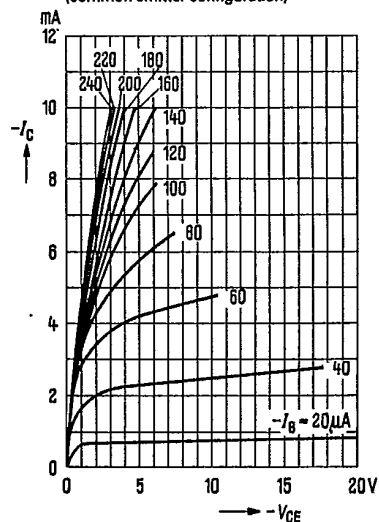
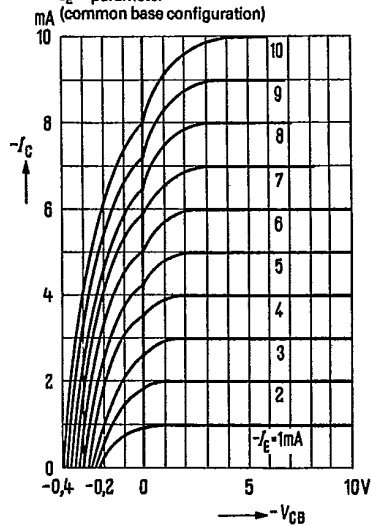
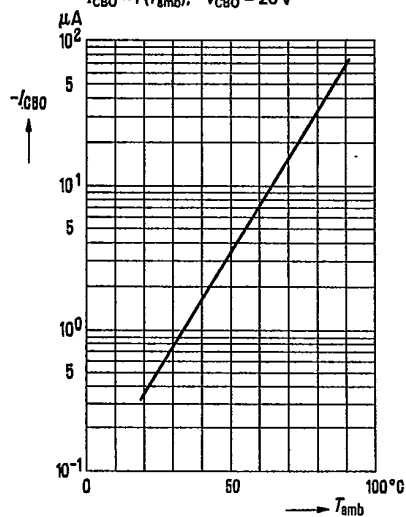
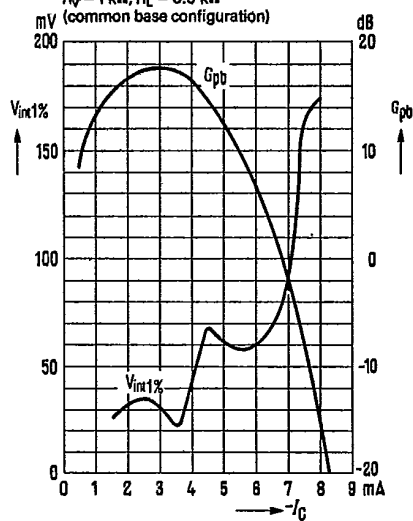
Collector current $I_C = f(I_B)$
 $-V_{CE} = 5\text{ V}$
(common emitter configuration)



Collector current $I_C = f(V_{BE})$
 $-V_{CE} = 5\text{ V}$
(common emitter configuration)

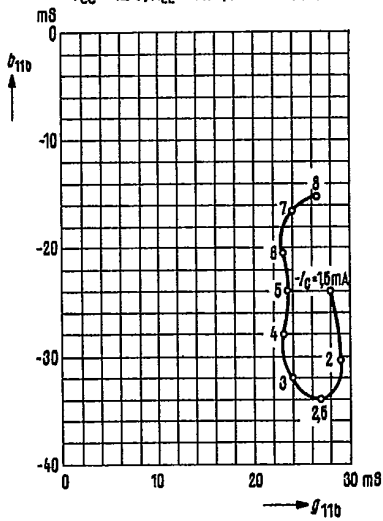


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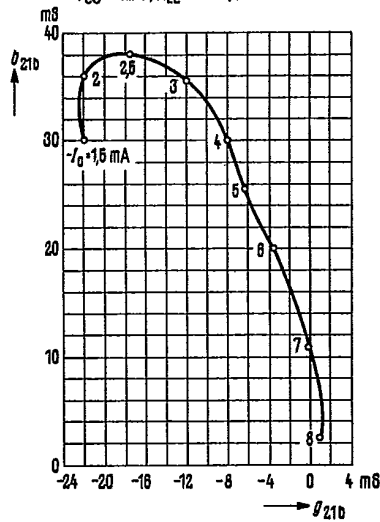
Output characteristics $I_C = f(V_{CE})$;
(common emitter configuration)Output characteristics $I_C = f(V_{CB})$;
 I_E = parameter
(common base configuration)Collector cutoff current
versus temperature
 $I_{CBO} = f(T_{amb})$; $-V_{CB0} = 20$ VInterference voltage $V_{int} 1\% = f(I_C)$
Power gain $G_{pb} = f(I_C)$
 $f = 200$ MHz; $-V_{BE0} = 12$ V
 $R_s = 1$ kΩ; $R_L = 0.9$ kΩ
(common base configuration)

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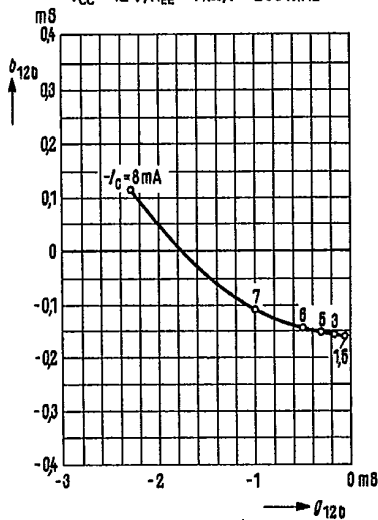
Small signal short circuit input
admittance y_{11b}
(common base configuration)
 $-V_{CC} = 12\text{ V}; R_{EE} = 1\text{ k}\Omega; f = 200\text{ MHz}$



Small signal short circuit forward
transfer admittance y_{21b}
(common base configuration)
 $-V_{CC} = 12\text{ V}; R_{EE} = 1\text{ k}\Omega; f = 200\text{ MHz}$



Small signal short circuit reverse
transfer admittance y_{12b}
(common base configuration)
 $-V_{CC} = 12\text{ V}; R_{EE} = 1\text{ k}\Omega; f = 200\text{ MHz}$



Small signal short circuit output
admittance y_{22b}
(common base configuration)
 $-V_{CC} = 12\text{ V}; R_{EE} = 1\text{ k}\Omega; f = 200\text{ MHz}$

