

PNP Germanium Transistors

AC 121
AC 152

SIEMENS AKTIENGESELLSCHAFT

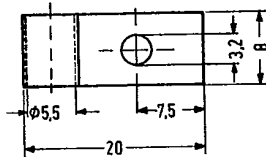
for AF, driver and output stages of medium performance

AC 121 and AC 152 are alloyed germanium PNP transistors in 1 A 3 DIN 41 871 metal case (similar to TO 1).

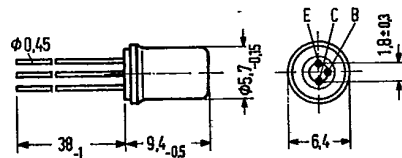
The leads of these transistors are electrically insulated from the case. The collector terminal is marked by a red dot at the rim of the case. For use in push-pull output stages, the transistors AC 121 and AC 152 are available in pairs. A fixing part (heat sink¹⁾) is provided for fixing on the chassis; it has to be ordered separately.

Not for new design

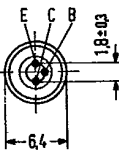
Type	Ordering code	Type	Ordering code
AC 121 IV	Q60103-D121	AC 152 IV	Q60103-X152-D
AC 121 V	Q60103-E121	AC 152 V	Q60103-X152-E
AC 121 VI	Q60103-F121	AC 152 VI	Q60103-X152-F
AC 121 VII	Q60103-G121	AC 152 paired	Q60103-X152-P
AC 121 paired	Q60103-P121-X1	Heat sink	Q62901-B1



Approx. weight 2 g



Approx. weight 1 g



Dimensions in mm

Maximum ratings

Collector-emitter voltage
Collector-emitter voltage
($V_{BE} \geq 0.2$ V)
Collector-base voltage
Emitter-base voltage
Collector current
Base current
Junction temperature
Storage temperature range
Total power dissipation

	AC 121	AC 152	
$-V_{CEO}$	20	24	V
$-V_{CEV}$	20	32	V
$-V_{CBO}$	20	32	V
$-V_{EBO}$	10	10	V
$-I_C$	300	500	mA
$-I_B$	60	100	mA
T_j	90	90	°C
T_{stg}	-55 to +75		°C
P_{tot}	900	900	mW

Thermal resistance

Junction to ambient air
Junction to case

R_{thJA}	≤ 300	≤ 300	K/W
R_{thJC}	≤ 50	≤ 50	K/W

¹⁾ Thermal resistance between transistor case and heat sink below the fixing screw at careful mounting: $R_{th} \leq 10$ K/W

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

The transistors AC 121, AC 152 are grouped according to the DC current gain h_{FE} at $-I_C = 100\text{ mA}$, and marked by the Roman numerals. The following values apply at a collector voltage of $-V_{CE} = 0.5\text{ V}$ and the following collector currents:

h_{FE} group		IV	V	VI	VII	AC 152
		AC 152	AC 152	AC 152	-	
Type		AC 121	AC 121	AC 121	AC 121	AC 121
$-I_C$ mA	$-I_C$ mA	h_{FE} I_C/I_B	h_{FE} I_C/I_B	h_{FE} I_C/I_B	h_{FE} I_C/I_B	$-V_{BE}$ V
[2]	3	48 [47]	80 [78]	115 [114]	200	0.13 (<0.22)
100	100	45 (30 to 60)	75 (50 to 100)	110 (75 to 150)	190 (125 to 250)	0.32 (<0.55)
[500]	300	35 [28]	58 [47]	86 [68]	148	0.44 (<0.8) [0.52 (<1.0)]

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

Collector-emitter saturation voltage
($-I_C = 100\text{ mA}$; $h_{FE} = 20$)
Collector-emitter saturation voltage
($-I_C = 300\text{ mA}$; $h_{FE} = 20$)
Collector-emitter saturation voltage
Emitter cutoff current ($-V_{EBO} = 10\text{ V}$)
Collector cutoff current ($-V_{CBO} = 20\text{ V}$)
Collector cutoff current
($-V_{CEV} = 20\text{ V}$; $V_{BE} \geq 0.2\text{ V}$)

	AC 121	
$-V_{CEsat}^{1)}$	0.11 (<0.3)	V
$-V_{CEsat}^{1)}$	0.15 (<0.35)	V
$-V_{CEsat}$	0.28 (<0.45) ²⁾	V
$-I_{EBO}$	4 (<25)	μA
$-I_{CBO}$	5 (<25)	μA
$-I_{CEV}$	5 (<25)	μA

Collector-emitter saturation voltage
($-I_C = 100\text{ mA}$; $h_{FE} = 20$)
Collector-emitter saturation voltage
($-I_C = 300\text{ mA}$; $h_{FE} = 20$)
Collector-emitter saturation voltage
Collector cutoff current ($-V_{CBO} = 32\text{ V}$)
Collector cutoff current ($-V_{CEV} = 32\text{ V}$;
 $V_{BE} = 0.2\text{ V}$)
Emitter cutoff current ($V_{EBO} = 10\text{ V}$)

	AC 152	
$-V_{CEsat}^{1)}$	0.11 (<0.18)	V
$-V_{CEsat}^{1)}$	0.15 (<0.25)	V
$-V_{CEsat}$	0.32 (<0.5) ²⁾	V
$-I_{CBO}$	6 (<25)	μA
$-I_{CEV}$	6 (<25)	μA
$-I_{EBO}$	4 (<25)	μA

1) The transistor is overloaded to such a degree that the DC current gain decreases to $h_{FE} = 20$.

2) ($-I_C = 500\text{ mA}$ for the characteristic which, at a constant base current, intersects the operating point, where $-I_C = 550\text{ mA}$; $-V_{CE} = 0.5\text{ V}$)

Condition for matching pairs: AC 152/AC 152
 ($-I_C = 100 \text{ mA}$; $-V_{CE} = 0.5 \text{ V}$)

ΔV_{BE}	<35	mV
$\frac{h_{FE1}}{h_{FE2}}$	1.25	-

Condition for matching pairs: AC 127/AC 152
 ($\pm I_C = 300 \text{ mA}$; $V_{CB} = 0$)

ΔV_{BE}	<35	mV
$\frac{h_{FE1}}{h_{FE2}}$	<1.25	-

Condition for matching pairs: AC 121/AC 121
 ($-I_C = 300 \text{ mA}$; $-V_{CE} = 0.5 \text{ V}$)

ΔV_{BE}	<35	mV
$\frac{h_{FE1}}{h_{FE2}}$	<1.25	-

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

Cutoff frequency

($-I_C = 20 \text{ mA}$; $-V_{CE} = 5 \text{ V}$)

Transition frequency

Base intrinsic resistance

Collector-base capacitance ($-V_{CBO} = 5 \text{ V}$)

	AC 121	
f_{hfe}	17	kHz
f_T	1.5	MHz
$r_{bb'}$	60	Ω
C_{CBO}	25 (<40)	pF

Cutoff frequency

($-I_C = 5 \text{ mA}$; $-V_{CE} = 5 \text{ V}$)

Transition frequency

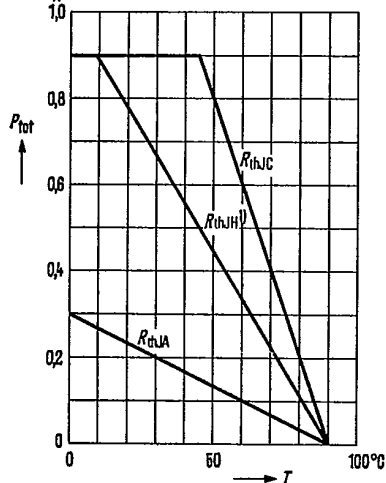
Base intrinsic resistance

Collector-base capacitance ($-V_{CBO} = 5 \text{ V}$)

	AC 152	
f_{hfe}	15	kHz
f_T	1.5	MHz
$r_{bb'}$	75 (<200)	Ω
C_{CBO}	25 (<40)	pF

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

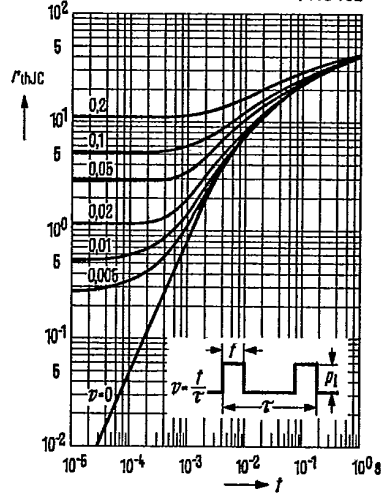
AC 121, AC 152



1) Heat sink aluminum 12.5 cm² x 2 mm

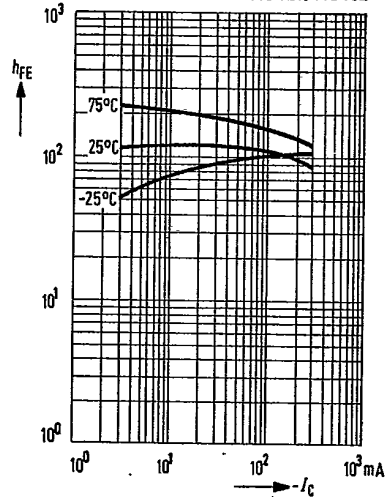
Permissible pulse load
 $r_{\text{thJC}} = f(t); v = \text{parameter}$

AC 121, AC 152



DC current gain $h_{\text{FE}} = f(I_{\text{C}})$
 $-V_{\text{CE}} = 0.5 \text{ V}; T_{\text{amb}} = \text{parameter}$
(common emitter configuration)

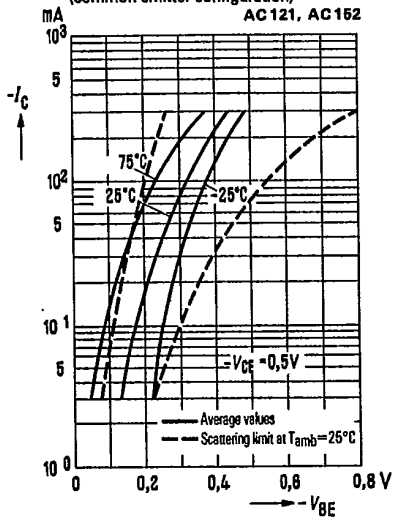
AC 121, AC 152



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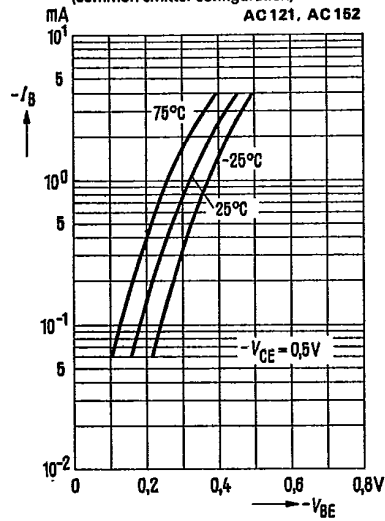
Collector current $I_C = f(V_{BE})$
 $-V_{CE} = 0.5 \text{ V}; T_{amb} = \text{parameter}$
 (common emitter configuration)

AC 121, AC 152



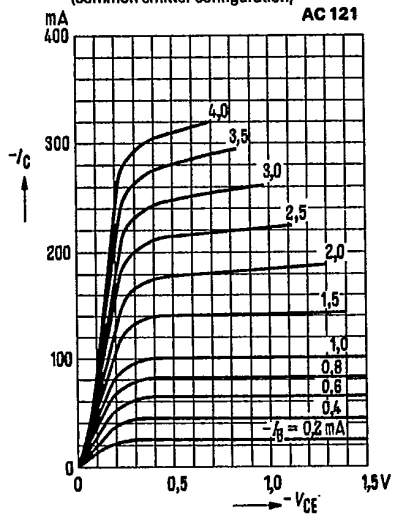
Input characteristics $I_B = f(V_{BE})$
 $-V_{CE} = 0.5 \text{ V}; T_{amb} = \text{parameter}$
 (common emitter configuration)

AC 121, AC 152



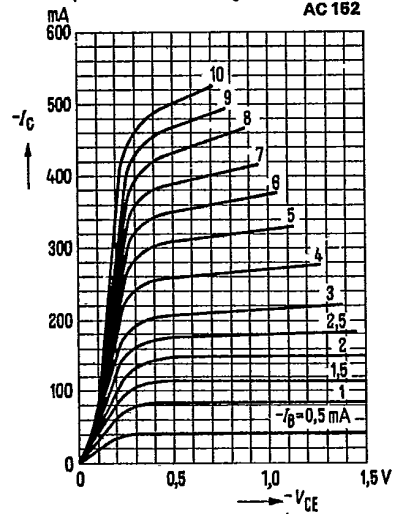
Output characteristics
 $I_C = f(V_{CE}); I_B = \text{parameter}$
 (common emitter configuration)

AC 121



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

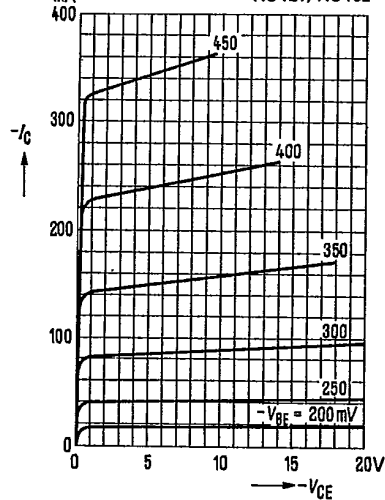
AC 152



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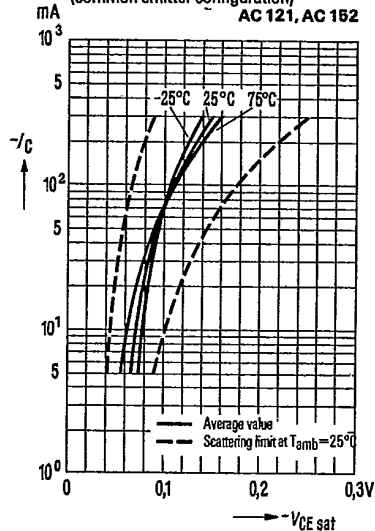
Output characteristics
 $I_C = f(V_{CE})$; V_{BE} = parameter
(common emitter configuration)

AC 121, AC 152



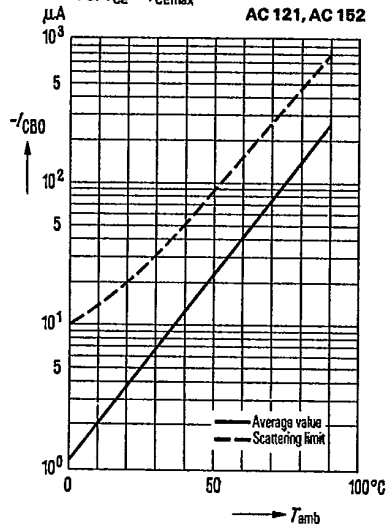
Collector emitter saturation voltage
 $V_{CEsat} = f(I_C)$; $h_{FE} = 20$
(common emitter configuration)

AC 121, AC 152



Collector cutoff current versus temperature
 $I_{CBO} = f(T_{amb})$
For $V_{CE} = V_{CEmax}$

AC 121, AC 152



Collector-emitter voltage
 $V_{CER} = f(R_{BE})$

AC 152

