

**PNP Germanium Transistors**

**AC 121  
AC 152**

**SIEMENS AKTIENGESELLSCHAFT**

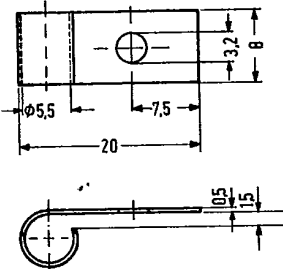
for AF, driver and output stages of medium performance

AC 121 and AC 152 are alloyed germanium PNP transistors in 1 A 3 DIN 41871 metal case (similar to TO 1).

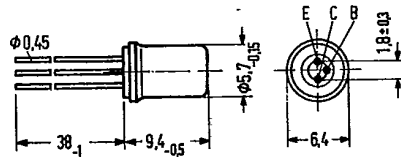
The leads of these transistors are electrically insulated from the case. The collector terminal is marked by a red dot at the rim of the case. For use in push-pull output stages, the transistors AC 121 and AC 152 are available in pairs. A fixing part (heat sink<sup>1)</sup>) is provided for fixing on 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**

	AC 121	AC 152		
Collector-emitter voltage	-V <sub>CEO</sub>	20	24	V
Collector-emitter voltage (V <sub>BE</sub> ≥ 0.2 V)	-V <sub>CEV</sub>	20	32	V
Collector-base voltage	-V <sub>CBO</sub>	20	32	V
Emitter-base voltage	-V <sub>EBO</sub>	10	10	V
Collector current	-I <sub>C</sub>	300	500	mA
Base current	-I <sub>B</sub>	60	100	mA
Junction temperature	T <sub>J</sub>	90	90	°C
Storage temperature range	T <sub>stg</sub>	-55 to +75		°C
Total power dissipation	P <sub>tot</sub>	900	900	mW

**Thermal resistance**

	R <sub>thJA</sub>	≤300	≤300	K/W
Junction to ambient air	R <sub>thJA</sub>	≤300	≤300	K/W
Junction to case	R <sub>thJC</sub>	≤50	≤50	K/W

<sup>1)</sup> Thermal resistance between transistor case and heat sink below the fixing screw at careful mounting: R<sub>th</sub> ≤ 10 K/W

**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) <sup>2)</sup>	V
$-I_{EBO}$	4 (<25)	$\mu\text{A}$
$-I_{CBO}$	5 (<25)	$\mu\text{A}$
$-I_{CEV}$	5 (<25)	$\mu\text{A}$

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) <sup>2)</sup>	V
$-I_{CBO}$	6 (<25)	$\mu\text{A}$
$-I_{CEV}$	6 (<25)	$\mu\text{A}$
$-I_{EBO}$	4 (<25)	$\mu\text{A}$

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  $-I_C = 550\text{ mA}$ ;  $-V_{CE} = 0.5\text{ V}$ )

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AC 121  
 AC 152

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

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

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

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

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

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

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

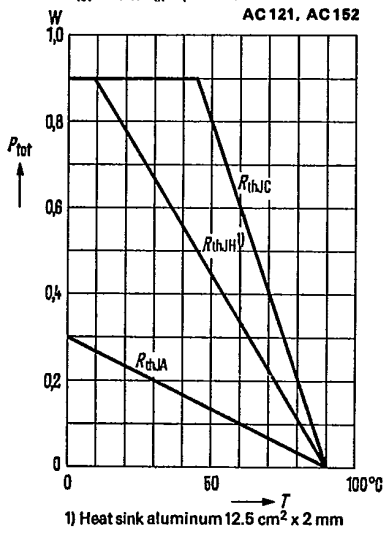
Cutoff frequency  
 ( $-I_C = 20 \text{ mA}$ ;  $-V_{CE} = 5 \text{ V}$ )  
 Transition frequency  
 Base intrinsic resistance  
 Collector-base capacitance ( $-V_{CBO} = 5 \text{ V}$ )

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

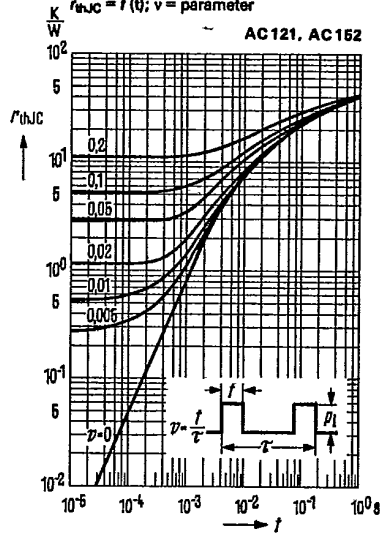
Cutoff frequency  
 ( $-I_C = 5 \text{ mA}$ ;  $-V_{CE} = 5 \text{ V}$ )  
 Transition frequency  
 Base intrinsic resistance  
 Collector-base capacitance ( $-V_{CBO} = 5 \text{ V}$ )

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

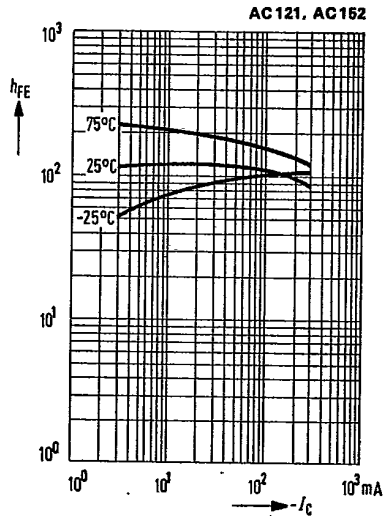
Total perm. power dissipation versus temperature  
 $P_{tot} = f(T); R_{th} = \text{parameter}$



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



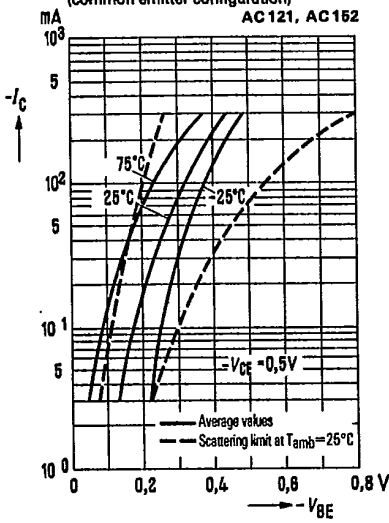
DC current gain  $h_{FE} = f(I_C)$   
-  $V_{CE} = 0.5 \text{ V}; T_{amb} = \text{parameter}$   
(common emitter configuration)



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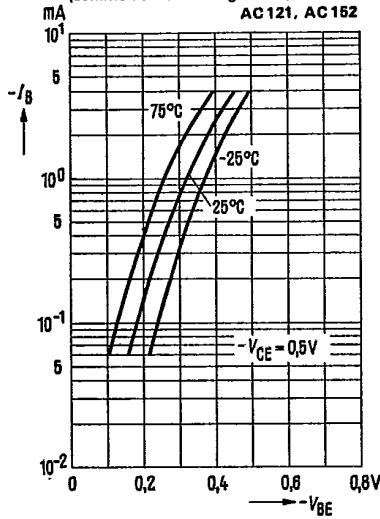
Collector current  $I_C = f(V_{BE})$   
 $-V_{CE} = 0.5\text{ V}; T_{amb} = \text{parameter}$   
 (common emitter configuration)

AC 121, AC 152



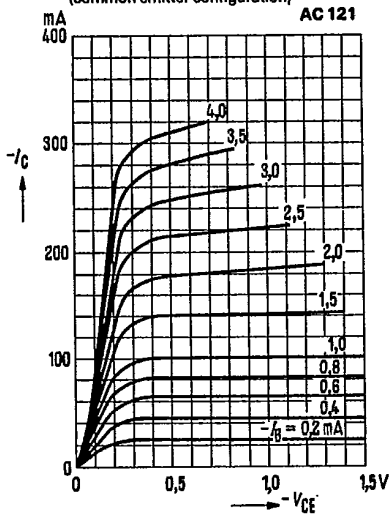
Input characteristics  $I_B = f(V_{BE})$   
 $-V_{CE} = 0.5\text{ V}; T_{amb} = \text{parameter}$   
 (common emitter configuration)

AC 121, AC 152



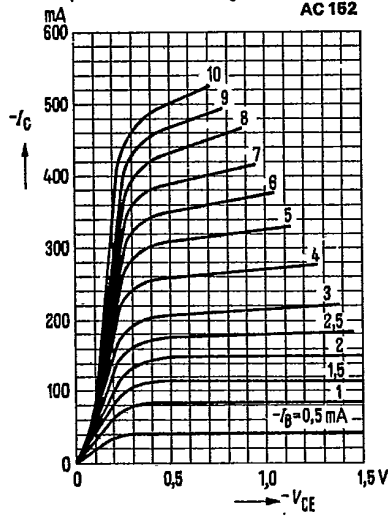
Output characteristics  
 $I_C = f(V_{CE}); I_B = \text{parameter}$   
 (common emitter configuration)

AC 121



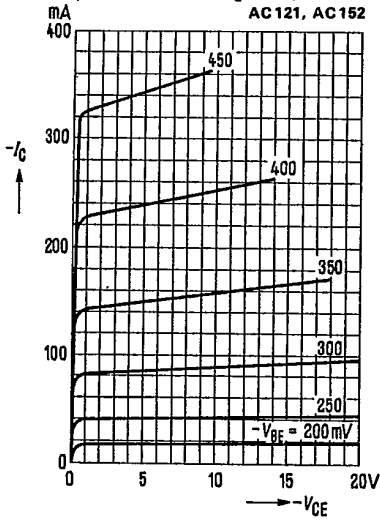
Output characteristics  
 $I_C = f(V_{CE}); I_B = \text{parameter}$   
 (common emitter configuration)

AC 152

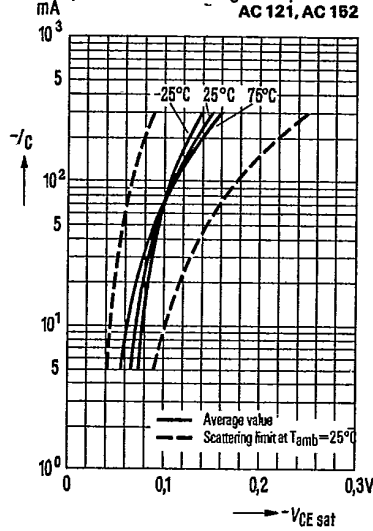


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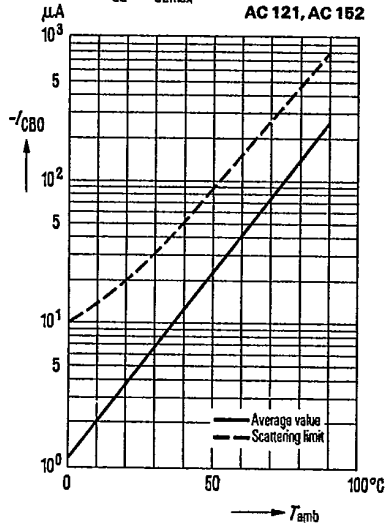
**Output characteristics**  
 $I_C = f(V_{CE}); V_{BE} = \text{parameter}$   
(common emitter configuration)



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



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



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

