PNP Germanium Transistors

AC 121
AC 152

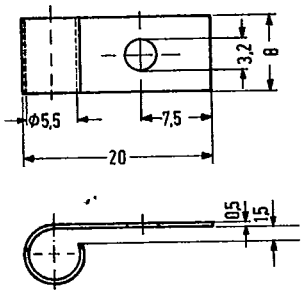
SIEMENS AKTIENGESELLSCHAF

for AF, driver and output stages of medium performance

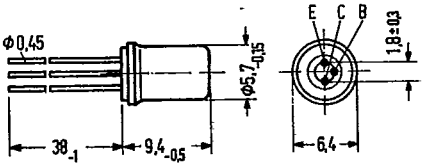
AC 121 and AC 152 are alloyed germanium PNP transistors in 1 A 3 DIN 41 871 metal case (similar to TO 1).
The leads of these transistors are electrically insulated from the case. The collector terminal is marked by a red dot at the rim of the case. For use in push-pull output stages, the transistors AC 121 and AC 152 are available in pairs. A fixing part (heat sink[1]) 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	$-V_{CEO}$	20	24	V
Collector-emitter voltage ($V_{BE} \geq 0.2$ V)	$-V_{CEV}$	20	32	V
Collector-base voltage	$-V_{CBO}$	20	32	V
Emitter-base voltage	$-V_{EBO}$	10	10	V
Collector current	$-I_C$	300	500	mA
Base current	$-I_B$	60	100	mA
Junction temperature	T_j	90	90	°C
Storage temperature range	T_{stg}	−55 to +75		°C
Total power dissipation	P_{tot}	900	900	mW
Thermal resistance				
Junction to ambient air	R_{thJA}	≤300	≤300	K/W
Junction to case	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

Static characteristics (T_{amb} = 25 °C)

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

h_{FE} group		IV	V	VI	VII	AC 152
		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 °C)

	AC 121	
Collector-emitter saturation voltage ($-I_C$ = 100 mA; h_{FE} = 20)	$-V_{CEsat}$ [1] 0.11 (<0.3)	V
Collector-emitter saturation voltage ($-I_C$ = 300 mA; h_{FE} = 20)	$-V_{CEsat}$ [1] 0.15 (<0.35)	V
Collector-emitter saturation voltage	$-V_{CEsat}$ 0.28 (<0.45) [2]	V
Emitter cutoff current ($-V_{EBO}$ = 10 V)	$-I_{EBO}$ 4 (<25)	µA
Collector cutoff current ($-V_{CBO}$ = 20 V)	$-I_{CBO}$ 5 (<25)	µA
Collector cutoff current ($-V_{CEV}$ = 20 V; V_{BE} ≥0.2 V)	$-I_{CEV}$ 5 (<25)	µA

	AC 152	
Collector-emitter saturation voltage ($-I_C$ = 100 mA; h_{FE} = 20)	$-V_{CEsat}$ [1] 0.11 (<0.18)	V
Collector-emitter saturation voltage ($-I_C$ = 300 mA; h_{FE} = 20)	$-V_{CEsat}$ [1] 0.15 (<0.25)	V
Collector-emitter saturation voltage	$-V_{CEsat}$ 0.32 (<0.5) [2]	V
Collector cutoff current ($-V_{CBO}$ = 32 V)	$-I_{CBO}$ 6 (<25)	µA
Collector cutoff current ($-V_{CEV}$ = 32 V); (V_{BE} = 0.2 V)	$-I_{CEV}$ 6 (<25)	µA
Emitter cutoff current (V_{EBO} = 10 V)	$-I_{EBO}$ 4 (<25)	µA

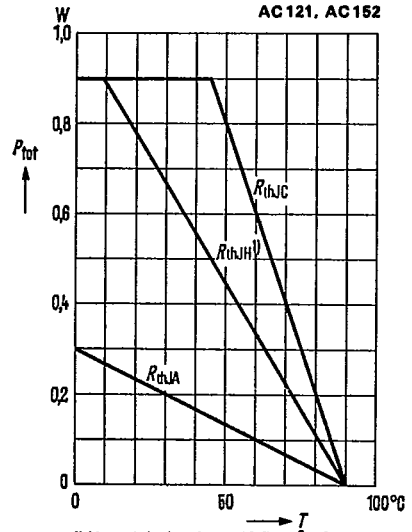
1) The transistor is overloaded to such a degree that the DC current gain decreases to h_{FE} = 20.
2) ($-I_C$ = 500 mA for the characteristic which, at a constant base current, intersects the operating point, where $-I_C$ = 550 mA; $-V_{CE}$ = 0.5 V)

Condition for matching pairs: AC 152/AC 152	ΔV_{BE}	<35	mV
($-I_C$ = 100 mA; $-V_{CE}$ = 0.5 V)	$\frac{h_{FE1}}{h_{FE2}}$	1.25	–
Condition for matching pairs: AC 127/AC 152	ΔV_{BE}	<35	mV
($\pm I_C$ = 300 mA; V_{CB} = 0)	$\frac{h_{FE1}}{h_{FE2}}$	<1.25	–
Condition for matching pairs: AC 121/AC 121	ΔV_{BE}	<35	mV
($-I_C$ = 300 mA; $-V_{CE}$ = 0.5 V)	$\frac{h_{FE1}}{h_{FE2}}$	<1.25	–

Dynamic characteristics (T_{amb} = 25°C)		**AC 121**	
Cutoff frequency ($-I_C$ = 20 mA; $-V_{CE}$ = 5 V)	f_{hfe}	17	kHz
Transition frequency	f_T	1.5	MHz
Base intrinsic resistance	$r_{bb'}$	60	Ω
Collector-base capacitance ($-V_{CBO}$ = 5 V)	C_{CBO}	25 (<40)	pF

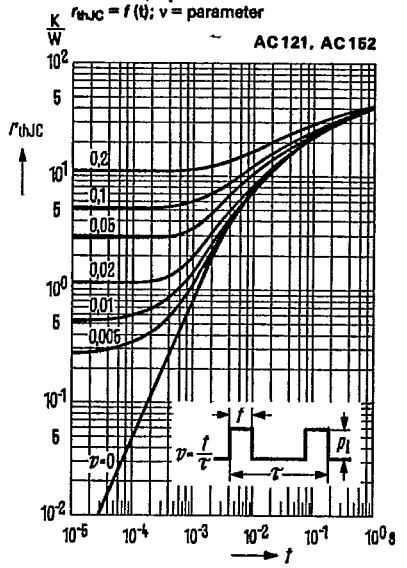
		AC 152	
Cutoff frequency ($-I_C$ = 5 mA; $-V_{CE}$ = 5 V)	f_{hfe}	15	kHz
Transition frequency	f_T	1.5	MHz
Base intrinsic resistance	$r_{bb'}$	75 (<200)	Ω
Collector-base capacitance ($-V_{CBO}$ = 5 V)	C_{CBO}	25 (<40)	pF

Total perm. power dissipation versus temperature
$P_{tot} = f(T)$; R_{th} = parameter
AC 121, AC 152

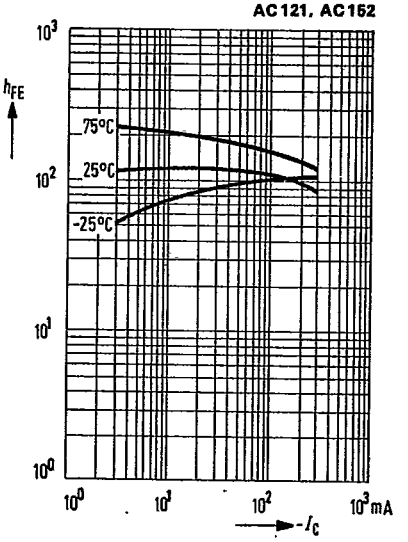


1) Heat sink aluminum 12.5 cm^2 x 2 mm

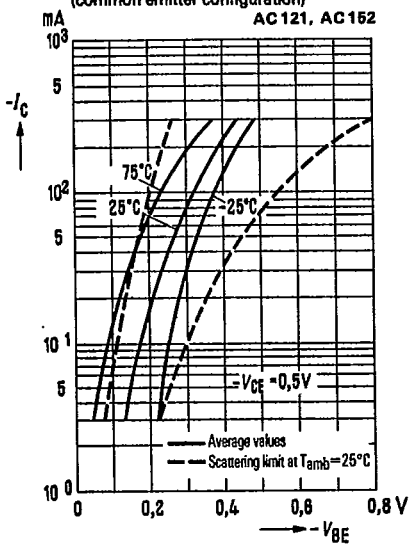
Permissible pulse load
$r_{thJC} = f(t)$; v = parameter
AC 121, AC 152



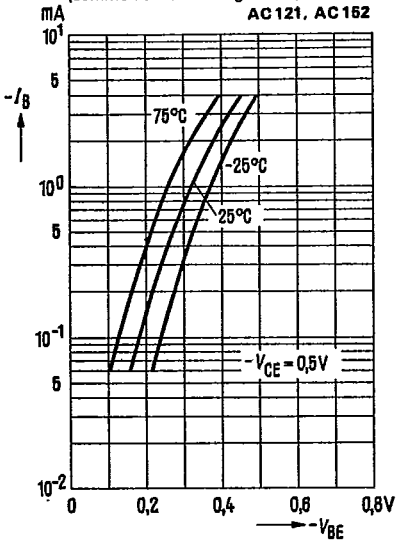
DC current gain $h_{FE} = f(I_C)$
$-V_{CE} = 0.5$ V; T_{amb} = parameter
(common emitter configuration)
AC 121, AC 152



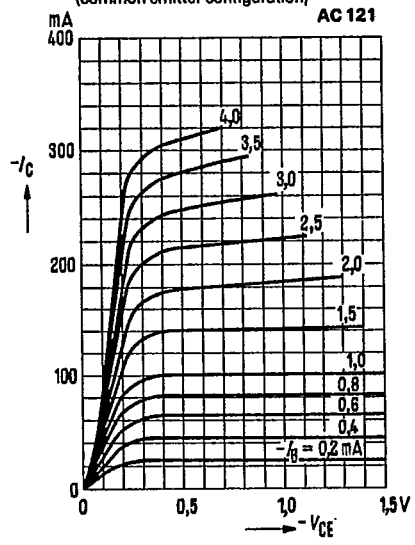
Collector current $I_C = f(V_{BE})$
$-V_{CE} = 0.5$ V; T_{amb} = parameter
(common emitter configuration)



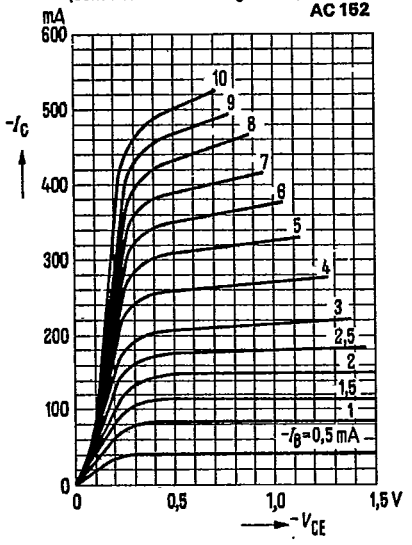
Input characteristics $I_B = f(V_{BE})$
$-V_{CE} = 0.5$ V; T_{amb} = parameter
(common emitter configuration)



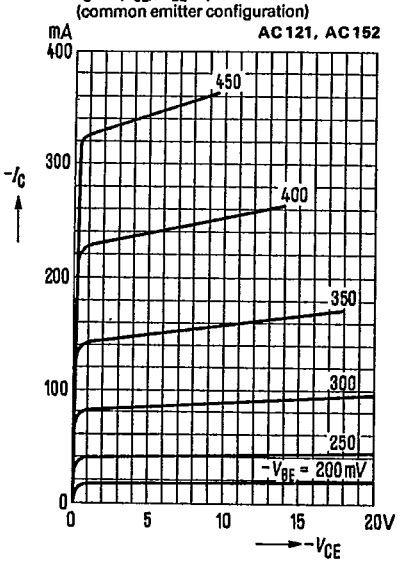
Output characteristics
$I_C = f(V_{CE})$; I_B = parameter
(common emitter configuration)



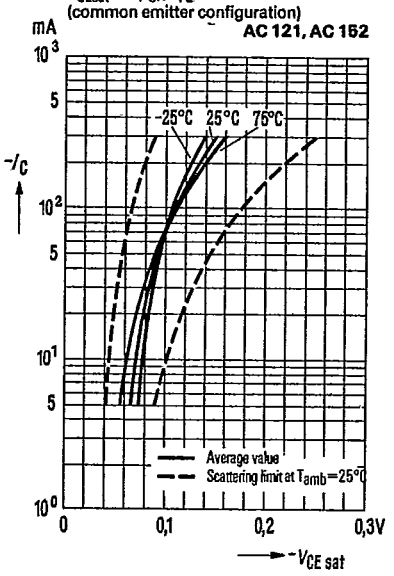
Output characteristics
$I_C = f(V_{CE})$; I_B = parameter
(common emitter configuration)



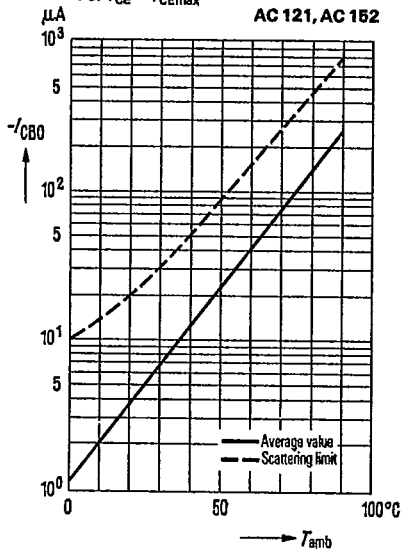
Output characteristics
$I_C = f(V_{CE})$; V_{BE} = parameter
(common emitter configuration)



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
$V_{CER} = f(R_{BE})$