

PNP Transistors for AF Input Stages

ACY 23
ACY 32

SIEMENS AKTIENGESELLSCHAFT

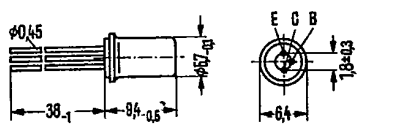
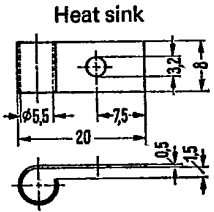
25C 04041 D

ACY 23 and ACY 32 are alloyed germanium PNP transistors in 1 A 3 DIN 41871 case (similar to TO-1). All leads are electrically insulated from the case. The collector terminal is marked by a red dot on the rim of the case. The transistors are particularly intended for use in AF input stages.

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Not for new design

Type	Ordering code
ACY 23 V	Q60103-Y23-E
ACY 23 VI	Q60103-Y23-F
ACY 32 V	Q60103-Y32-E
ACY 32 VI	Q60103-Y32-F
Heat sink	Q62901-B1



Approx. weight 1 g Dimensions in mm

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

Maximum ratings

Collector-emitter voltage
 Collector-emitter voltage ($V_{BE} \geq 0.2 \text{ V}$)
 Collector-base voltage
 Emitter-base voltage
 Collector current
 Base current
 Junction temperature
 Storage temperature range
 Total power dissipation ($T_{case} = 45 \text{ }^\circ\text{C}$)

Thermal resistance

Junction to ambient air
 Junction to case

	ACY 23, ACY 32	
$-V_{CEO}$	30	V
$-V_{CEV}$	32	V
$-V_{CBO}$	32	V
$-V_{EBO}$	16	V
$-I_C$	200	mA
$-I_B$	40	mA
T_j	90	$^\circ\text{C}$
T_{stg}	-55 to +75	$^\circ\text{C}$
P_{tot}	900	mW
R_{thJA}	≤ 300	K/W
R_{thJC}	≤ 50	K/W

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

ACY 23, ACY 32

	T_{amb}	25	60	$^\circ\text{C}$
Collector cutoff current ($-V_{CBO} = 10\text{ V}$)	$-I_{CBO}$	3 (<10)	60 (<100)	μA
Collector cutoff current ($-V_{CBO} = 32\text{ V}$)	$-I_{CBO}$	5 (<18)	<150	μA
Collector cutoff current ($-V_{CEV} = 32\text{ V}; V_{BE} \geq 0.2\text{ V}$)	$-I_{CEV}$	5 (<18)*	<150	μA
Emitter cutoff current ($-V_{EBO} = 16\text{ V}$)	$-I_{EBO}$	4 (<18)*	<120	μA

Static characteristics ($T_{amb} = 25^\circ\text{C}$) ACY 23, ACY 32

$-V_{CE}$	$-I_C$ mA	$-I_B$ μA	h_{FE} I_C/I_B	V_{BE} V
0.5	2	30	67	0.13 (<0.2)
0.5	10	137	73	0.18 (<0.3)
0.5	100	1560	64	0.32 (<0.55)

Collector-emitter saturation voltage ($I_C = 100\text{ mA}; I_B = 5\text{ mA}$)	$-V_{CEsat}$	0.11 (<0.18)	V
Collector-emitter saturation voltage ($-I_C = 200\text{ mA}$ for the characteristic which, at constant base current, intersects the operating point, where $-I_C = 220\text{ mA}$ and $-V_{CE} = 0.5\text{ V}$)	$-V_{CEsat}$	0.25 (<0.4)	V

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

The transistors ACY 23 and ACY 32 are grouped according to the small-signal current gain h_{fe} and marked by Roman numerals.

Operating point: $-I_C = 1\text{ mA}; -V_{CE} = 5\text{ V}; f = 1\text{ kHz}$

h_{fe} group	V	VI	
h_{fe}	50 to 100 ACY 23	75 to 150* ACY 32	-
Operating point: $-I_C = 1\text{ mA}; -V_{CE} = 5\text{ V}$			
Transition frequency	f_T	1.5 (>0.5)	1.5 (>0.5) MHz
Base intrinsic resistance	$r_{bb'}$	75 (<200)	75 (<200) Ω
Collector-junction capacitance	$C_{b'c}$	27	27 pF
Noise figure ($-I_C = 0.5\text{ mA}; -V_{CE} = 5\text{ V}; f = 1\text{ kHz}; \Delta f = 200\text{ Hz}; R_g = 500\ \Omega$)	NF	4 (<10)*	3 (<6)* dB
Operating point: $-I_C = 1\text{ mA}; -V_{CE} = 5\text{ V}; f = 1\text{ kHz}$			
	h_{11e}	3 (1.2 to 5)	3 (1.2 to 5) k Ω
	h_{12e}	7 (<15)	7 (<15) 10^{-4}
	$h_{fe} = h_{21e}$	100 (50 to 150)	-
	h_{22e}	40 (<75)	40 (<75) μS

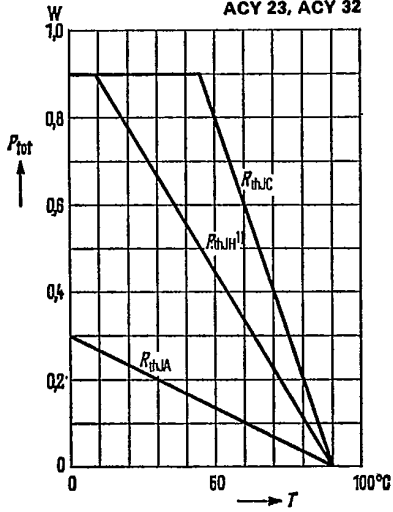
* AQL = 0.65%

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Total perm. power dissipation versus temperature

$P_{tot} = f(T); R_{th} = \text{parameter}$

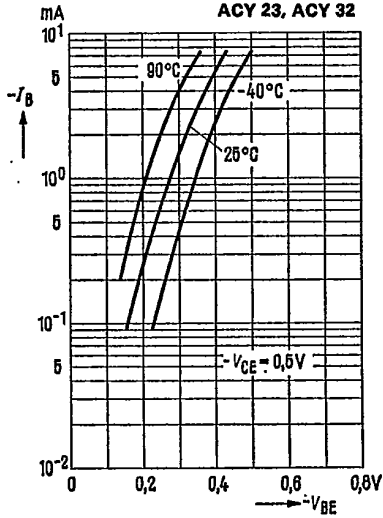
ACY 23, ACY 32



1) Heat sink aluminum 12.5 cm² x 2 mm

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

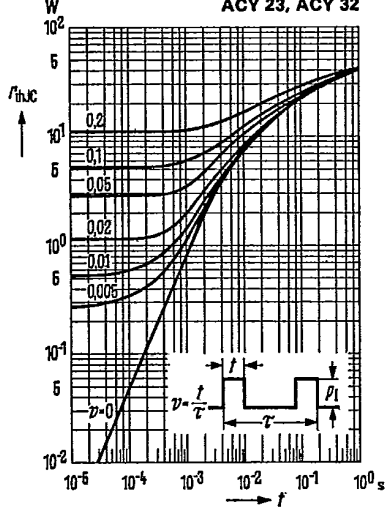
ACY 23, ACY 32



Permissible pulse load

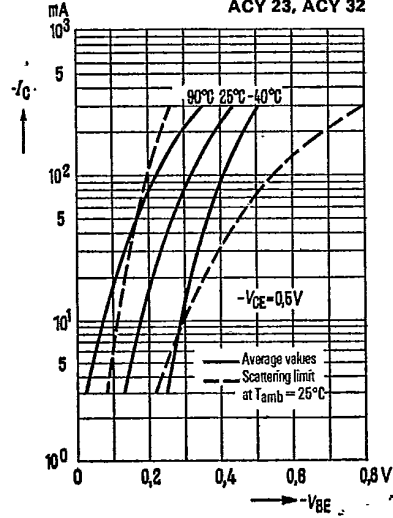
$r_{thJC} = f(t); v = \text{parameter}$

ACY 23, ACY 32



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

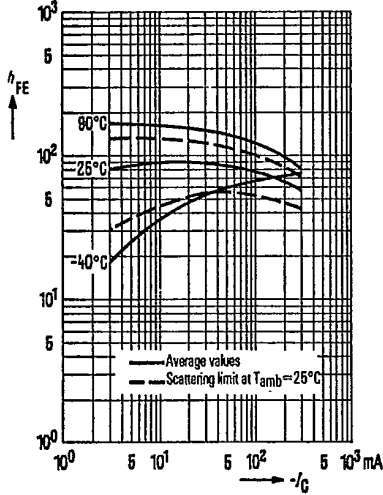
ACY 23, ACY 32



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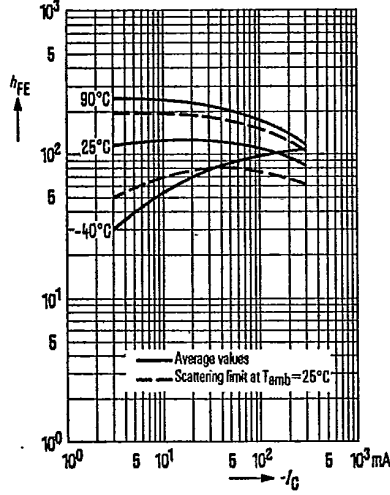
DC current gain $h_{FE} = f(I_C)$
 $-V_{CE} = 0.5 \text{ V}; T_{amb} = \text{parameter}$
 (common emitter configuration)

ACY 23 V, ACY 32 V



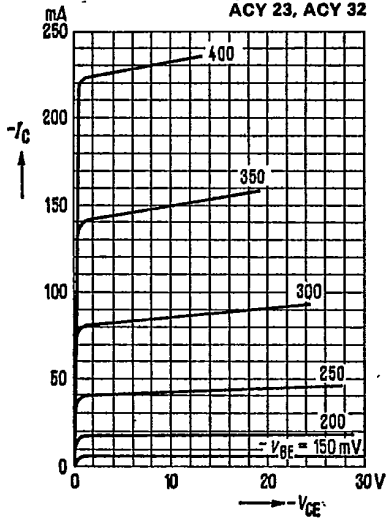
DC current gain $h_{FE} = f(I_C)$
 $-V_{CE} = 0.5 \text{ V}; T_{amb} = \text{parameter}$
 (common emitter configuration)

ACY 23 VI, ACY 32 VI



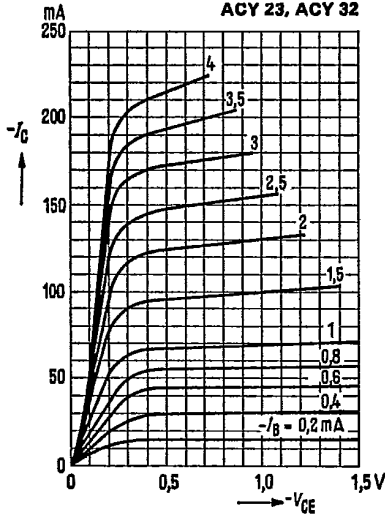
Output characteristics
 $I_C = f(V_{CE}); I_B = \text{parameter}$
 (common emitter configuration)

ACY 23, ACY 32



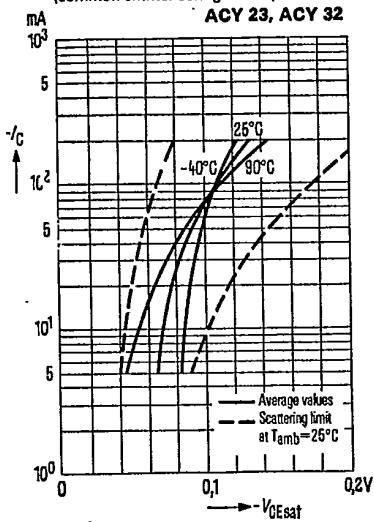
Output characteristics
 $I_C = f(V_{CE}); I_B = \text{parameter}$
 (common emitter configuration)

ACY 23, ACY 32



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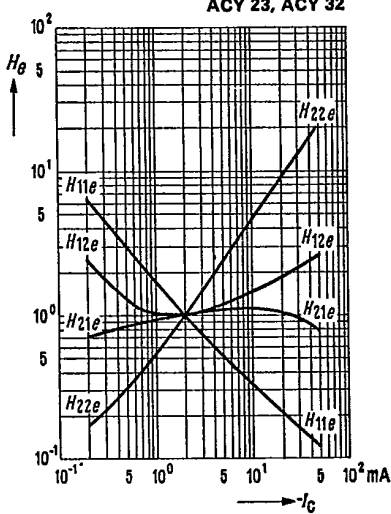
Collector-emitter saturation voltage
 $V_{CEsat} = f(I_C); h_{FE} = 20; T_{amb} = \text{parameter}$
(common emitter configuration)



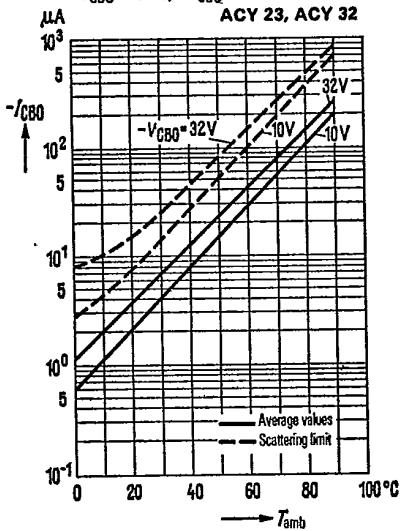
h-parameter versus collector current

$$H_o = \frac{h_o(I_C)}{h_o(I_C = -2 \text{ mA})} = f(I_C)$$

$-V_{CE} = 1 \text{ V}; f = 1 \text{ kHz}$



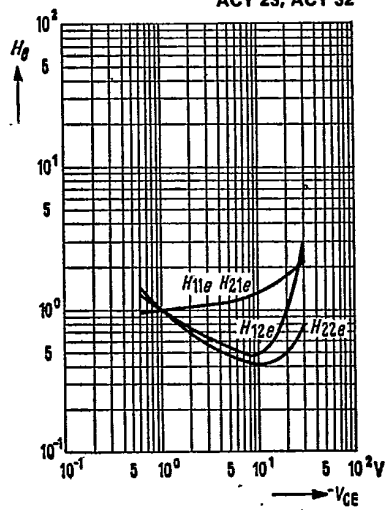
Collector cutoff current versus temperature
 $I_{CBO} = f(T_{amb})$
 $-V_{CB0} = 32 \text{ V}; -V_{CB0} = 10 \text{ V}$



h-parameter versus collector-emitter voltage

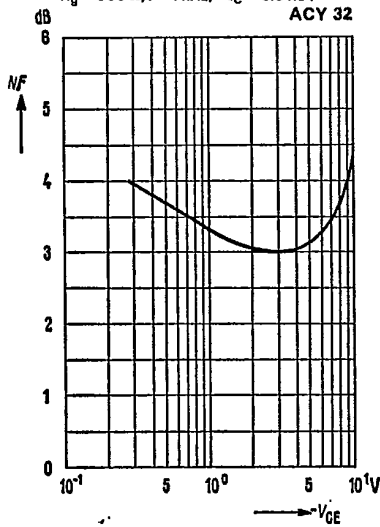
$$H_o = \frac{h_o(V_{CE})}{h_o(V_{CE} = -1 \text{ V})} = f(V_{CE})$$

$-I_C = 2 \text{ mA}; f = 1 \text{ kHz}$

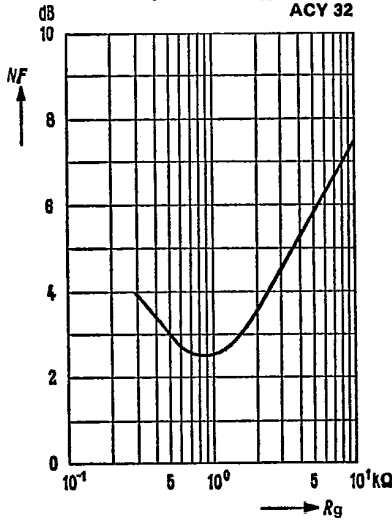


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Noise figure versus collector-emitter voltage $NF = f(V_{CE})$
 $R_g = 500 \Omega; f = 1 \text{ kHz}; -I_C = 0.5 \text{ mA}$



Noise figure versus internal resistance of generator $NF = f(R_g)$
 $f = 1 \text{ kHz}; -I_C = 0.5 \text{ mA}; -V_{CE} = 5 \text{ V}$



Noise figure versus collector current $NF = f(I_C)$
 $R_g = 500 \Omega; -V_{CE} = 5 \text{ V}; f = 1 \text{ kHz}$

