PNP Transistors for AF Input Stages

ACY 23
ACY 32

SIEMENS AKTIENGESELLSCHAF

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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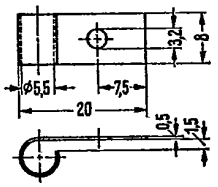
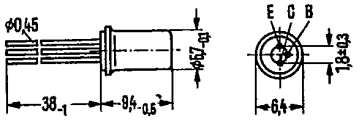
Not for new design

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

Heat sink





Approx. weight 1 g

Dimensions in mm

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

Maximum ratings		ACY 23, ACY 32	
Collector-emitter voltage	$-V_{CEO}$	30	V
Collector-emitter voltage ($V_{BE} \geq 0.2$ V)	$-V_{CEV}$	32	V
Collector-base voltage	$-V_{CBO}$	32	V
Emitter-base voltage	$-V_{EBO}$	16	V
Collector current	$-I_C$	200	mA
Base current	$-I_B$	40	mA
Junction temperature	T_j	90	°C
Storage temperature range	T_{stg}	−55 to +75	°C
Total power dissipation (T_{case} = 45 °C)	P_{tot}	900	mW
Thermal resistance			
Junction to ambient air	R_{thJA}	≤300	K/W
Junction to case	R_{thJC}	≤50	K/W

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

		ACY 23, ACY 32		
	T_{amb}	25	60	°C
Collector cutoff current ($-V_{CBO}$ = 10 V)	$-I_{CBO}$	3 (<10)	60 (<100)	µA
Collector cutoff current ($-V_{CBO}$ = 32 V)	$-I_{CBO}$	5 (<18)	<150	µA
Collector cutoff current ($-V_{CEV}$ = 32 V; V_{BE}≧0.2 V)	$-I_{CEV}$	5 (<18)*	<150	µA
Emitter cutoff current ($-V_{EBO}$ = 16 V)	$-I_{EBO}$	4 (<18)*	<120	µA

Static characteristics (T_{amb} = 25 °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 mA; I_B = 5 mA)	$-V_{CEsat}$	0.11 (<0.18)	V
Collector-emitter saturation voltage ($-I_C$ = 200 mA for the characteristic which, at constant base current, intersects the operating point, where $-I_C$ = 220 mA and $-V_{CE}$ = 0.5 V)	$-V_{CEsat}$	0.25 (<0.4)	V

Dynamic characteristics (T_{amb} = 25 °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 mA; $-V_{CE}$ = 5 V; f = 1 kHz

h_{fe} group		V	VI	
h_{fe}		50 to 100 **ACY 23**	75 to 150* **ACY 32**	–
Operating point: $-I_C$ = 1 mA; $-V_{CE}$ = 5 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 mA; $-V_{CE}$ = 5 V; f = 1 kHz; Δf = 200 Hz; R_g = 500 Ω)	NF	4 (<10)*	3 (<6)*	dB
Operating point: $-I_C$ = 1 mA; $-V_{CE}$ = 5 V; f = 1 kHz	h_{11e}	3 (1.2 to 5)	3 (1.2 to 5)	kΩ
	h_{12e}	7 (<15)	7 (<15)	10^{-4}
h_{fe} =	h_{21e}	100 (50 to 150)	100 (50 to 150)	–
	h_{22e}	40 (<75)	40 (<75)	µS

* AQL = 0.65%

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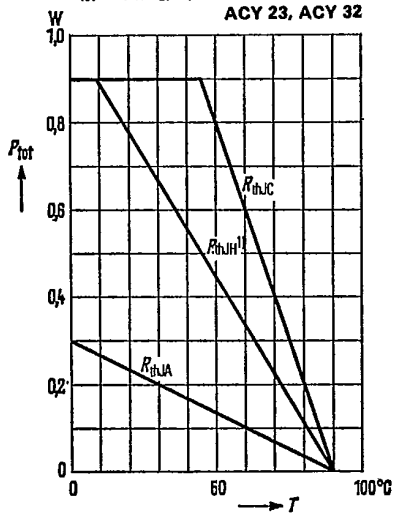
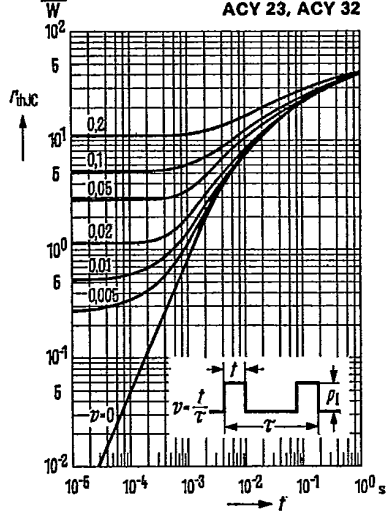
Total perm. power dissipation versus temperature
$P_{tot} = f(T)$; R_{th} = parameter
ACY 23, ACY 32

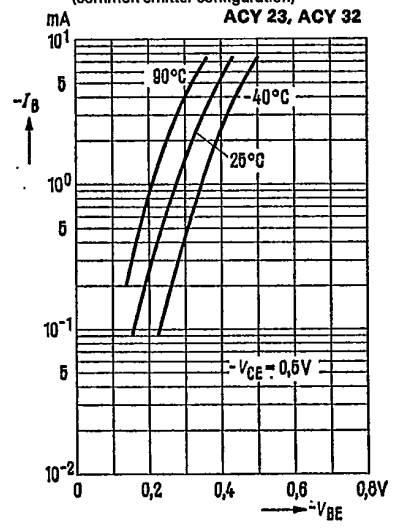


1) Heat sink aluminum 12.5 cm² x 2 mm

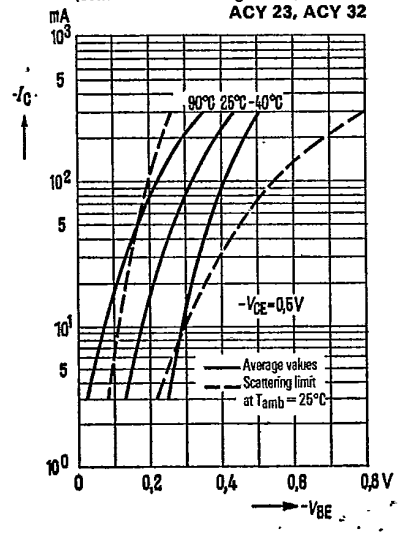
Permissible pulse load
$\frac{K}{W}$ $r_{thJC} = f(t)$; v = parameter
ACY 23, ACY 32



Input characteristics $I_B = f(V_{BE})$
$-V_{BE} = 0.5$ V; T_{amb} = parameter
(common emitter configuration)
ACY 23, ACY 32



Collector current $I_C = f(V_{BE})$
$-V_{CE} = 0.5$ V, T_{amb} = parameter
(common emitter configuration)
ACY 23, ACY 32



ACY 23
ACY 32

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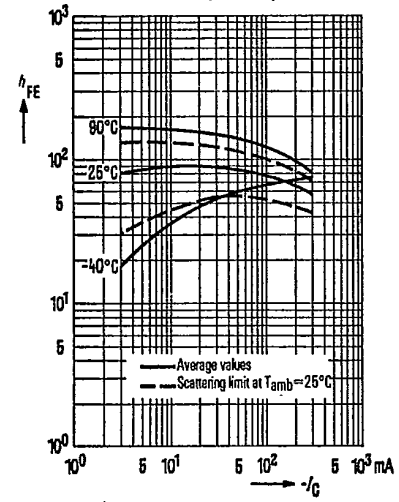
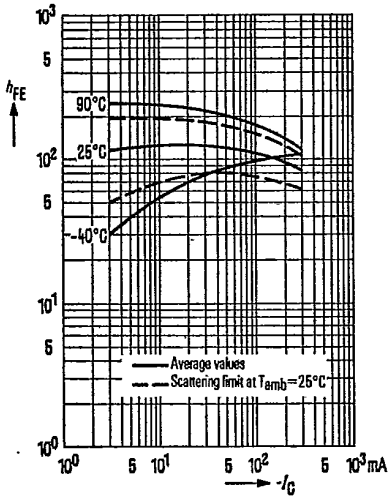
DC current gain $h_{FE} = f(I_C)$
$-V_{CE}$ = 0.5 V; T_{amb} = parameter
(common emitter configuration)

ACY 23 V, ACY 32 V



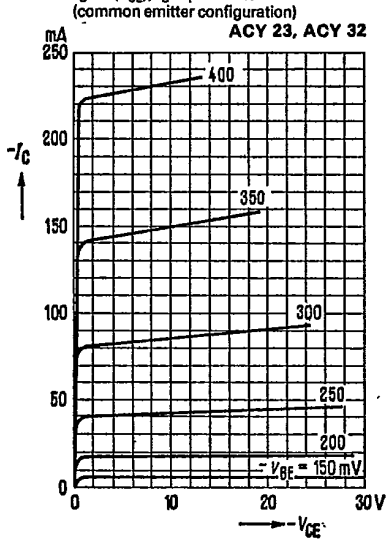
DC current gain $h_{FE} = f(I_C)$
$-V_{CE}$ = 0.5 V; T_{amb} = parameter
(common emitter configuration)

ACY 23 VI, ACY 32 VI



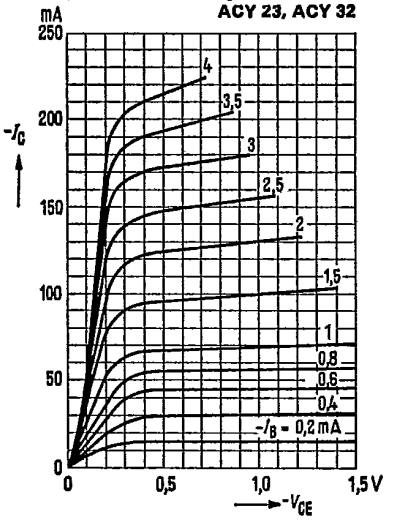
Output characteristics
$I_C = f(V_{CE})$; I_B = parameter
(common emitter configuration)

ACY 23, ACY 32



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

ACY 23, ACY 32



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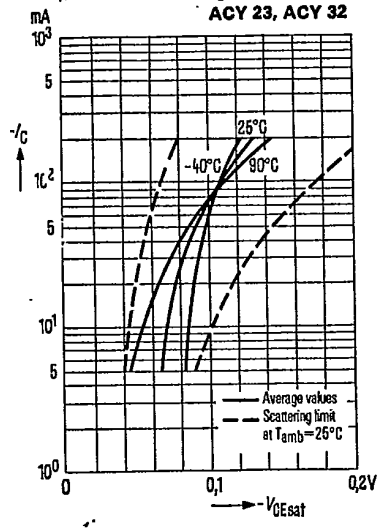
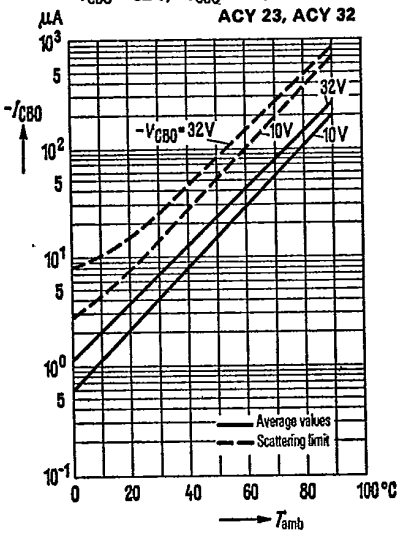
Collector-emitter saturation voltage
$V_{CEsat} = f(I_C)$; $h_{FE} = 20$; T_{amb} = parameter
(common emitter configuration)



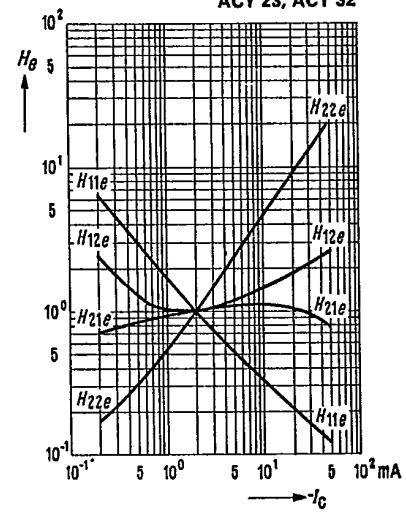
Collector cutoff current versus temperature $I_{CBO} = f(T_{amb})$
$-V_{CBO}$ = 32 V; $-V_{CBO}$ = 10 V



h-parameter versus collector current

$$H_e = \frac{h_e(I_C)}{h_e(I_C = -2\text{ mA})} = f(I_C)$$

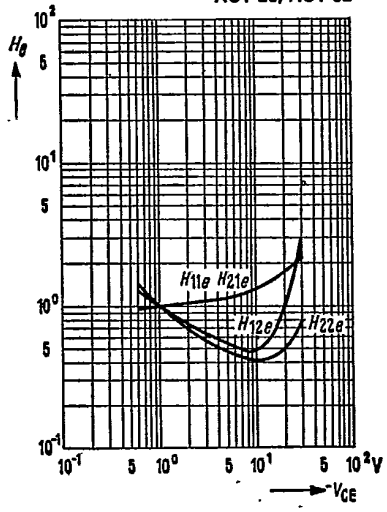
$-V_{CE}$ = 1 V; f = 1 kHz



h-parameter versus collector-emitter voltage

$$H_e = \frac{h_e(V_{CE})}{h_e(V_{CE} = -1\text{ V})} = f(V_{CE})$$

$-I_C$ = 2 mA; f = 1 kHz



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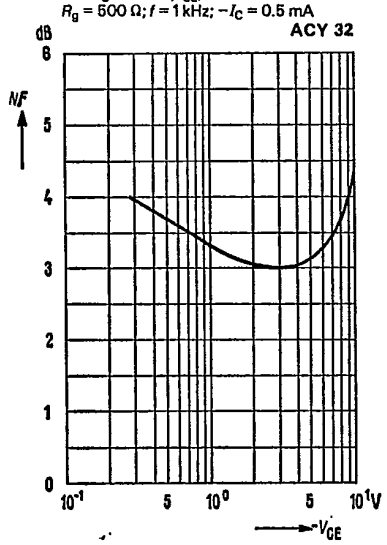
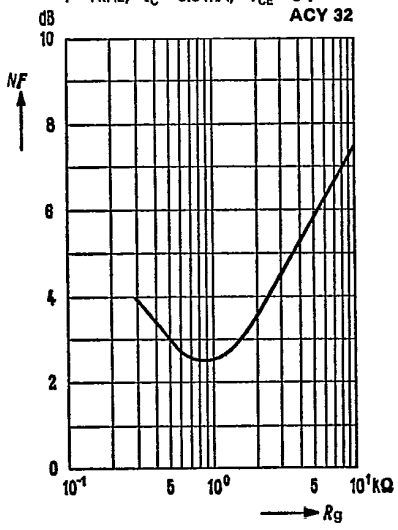
Noise figure versus collector-emitter voltage $NF = f(V_{CE})$
$R_g = 500\ \Omega$; $f = 1$ kHz; $-I_C = 0.5$ mA



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



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