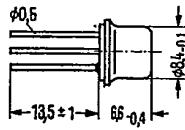


PNP Silicon Planar Transistors

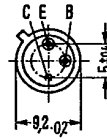
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2 N 2904 and 2 N 2905 are epitaxial PNP silicon planar transistors in TO 39 case (5 C 3 DIN 41 873). The collector is electrically connected to the case. The transistors are particularly suitable for use as high-speed switches.

Type	Ordering code
2 N 2904	Q62702-F65
2 N 2905	Q62702-F66



Approx. weight 1.5 g



Dimensions in mm

Maximum ratings

	2 N 2904	2 N 2905	
Collector-base voltage	-V _{CB0}	60	V
Collector-emitter voltage	-V _{CE0}	40	V
Emitter-base voltage	-V _{EB0}	5	V
Collector current	-I _C	0.6	A
Junction temperature	T _j	200	°C
Storage temperature range	T _{stg}	-65 to +200	°C
Total power dissipation (T _{amb} ≤ 25 °C)	P _{tot}	0.6	W
Total power dissipation (T _{case} ≤ 25 °C)	P _{tot}	3	W

Thermal resistance

Junction to ambient air	R _{thJA}	< 188	K/W
Junction to case	R _{thJC}	< 50	K/W

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Static characteristics ($T_{amb} = 25^{\circ}\text{C}$)		2 N 2904	2 N 2905	
Collector-base breakdown voltage ($-I_C = 10 \mu\text{A}$)	$-V_{(BR)CBO}$	> 60	> 60	V
Collector-emitter breakdown voltage ($-I_C = 10 \text{ mA}$)	$-V_{(BR)CEO}$	> 40	> 40	V
Emitter-base breakdown voltage ($-I_E = 10 \mu\text{A}$)	$-V_{(BR)EBO}$	> 5	> 5	V
Collector-emitter saturation voltage ($-I_C = 150 \text{ mA}$, $I_B = 15 \text{ mA}$)	$-V_{CEsat}$	< 0.4	< 0.4	V
($-I_C = 500 \text{ mA}$, $I_B = 50 \text{ mA}$)	$-V_{CEsat}$	< 1.6	< 1.6	V
Base-emitter saturation voltage ($-I_C = 150 \text{ mA}$, $I_B = 15 \text{ mA}$)	$-V_{BEsat}$	< 1.3	< 1.3	V
($-I_C = 500 \text{ mA}$, $I_B = 50 \text{ mA}$)	$-V_{BEsat}$	< 2.6	< 2.6	V
Collector cutoff current ($-V_{CB} = 50 \text{ V}$)	$-I_{CBO}$	< 20	< 20	nA
($-V_{CB} = 50 \text{ V}$, $T_{amb} = 150^{\circ}\text{C}$)	$-I_{CBO}$	< 20	< 20	μA
DC current gain ($-V_{CE} = 10 \text{ V}$, $-I_C = 0.1 \text{ mA}$)	h_{FE}	> 20	> 35	-
($-V_{CE} = 10 \text{ V}$, $-I_C = 1 \text{ mA}$)	h_{FE}	> 25	> 50	-
($-V_{CE} = 10 \text{ V}$, $-I_C = 10 \text{ mA}$)	h_{FE}	> 35	> 75	-
($-V_{CE} = 10 \text{ V}$, $-I_C = 150 \text{ mA}$)	h_{FE}	40 to 120	100 to 300	-
($-V_{CE} = 10 \text{ V}$, $-I_C = 500 \text{ mA}$)	h_{FE}	> 20	> 30	-
Dynamic characteristics ($T_{amb} = 25^{\circ}\text{C}$)				
Transition frequency ($-V_{CE} = 20 \text{ V}$, $-I_C = 50 \text{ mA}$, $f = 100 \text{ MHz}$)	f_T	> 200	> 200	MHz
Collector-base capacitance ($-V_{CB} = 10 \text{ V}$, $f = 100 \text{ kHz}$)	C_{CBO}	< 8	< 8	pF
Emitter-base capacitance ($-V_{EB} = 2 \text{ V}$, $f = 100 \text{ kHz}$)	C_{CEO}	< 30	< 30	pF
Switching times:				
Delay time	t_d	< 10	< 10	ns
Rise time	t_r	< 40	< 40	ns
Turn-on time	t_{on}	< 45	< 45	ns
Storage time	t_s	< 80	< 80	ns
Fall time	t_f	< 30	< 30	ns
Turn-off time	t_{off}	< 100	< 100	ns

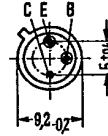
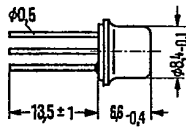
PNP Silicon Planar Transistors

2 N 2904 A
2 N 2905 A

SIEMENS AKTIENGESELLSCHAFT T-37-17

2 N 2904 A and 2 N 2905 A are epitaxial PNP silicon planar transistors in TO 39 case (5 C 3 DIN 41 873). The collector is electrically connected to the case. The transistors are particularly suitable for use as high-speed switches.

Type	Ordering code
2 N 2904 A	Q62702-F91
2 N 2905 A	Q62702-F92



Approx. weight 1.5 g

Dimensions in mm

Maximum ratings

	2 N 2904 A	2 N 2905 A
Collector-base voltage	-V _{CBO} 60	V
Collector-emitter voltage	-V _{CEO} 60	V
Emitter-base voltage	-V _{EBO} 5	V
Collector current	-I _C 0.6	A
Junction temperature	T _J 200	°C
Storage temperature range	T _{stg} -65 to +200	°C
Total power dissipation (T _{amb} ≤ 25 °C)	P _{tot} 0.6	W
Total power dissipation (T _{case} ≤ 25 °C)	P _{tot} 3	W

Thermal resistance

Junction to ambient air	R _{thJA} < 188	K/W
Junction to case	R _{thJC} < 50	K/W

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

		2 N 2904 A	2 N 2905 A	
Collector-base breakdown voltage ($-I_C = 10 \mu\text{A}$)	$-V_{(BR)CBO}$	> 60	> 60	V
Collector-emitter breakdown voltage ($-I_C = 10 \text{ mA}$)	$-V_{(BR)CEO}$	> 60	> 60	V
Emitter-base breakdown voltage ($-I_E = 10 \mu\text{A}$)	$-V_{(BR)EBO}$	> 5	> 5	V
Collector-emitter saturation voltage ($-I_C = 150 \text{ mA}$, $I_B = 15 \text{ mA}$)	$-V_{CEsat}$	< 0.4	< 0.4	V
($-I_C = 500 \text{ mA}$, $I_B = 50 \text{ mA}$)	$-V_{CEsat}$	< 1.6	< 1.6	V
Base-emitter saturation voltage ($-I_C = 150 \text{ mA}$, $I_B = 15 \text{ mA}$)	$-V_{BEsat}$	< 1.3	< 1.3	V
($-I_C = 500 \text{ mA}$, $I_B = 50 \text{ mA}$)	$-V_{BEsat}$	< 2.6	< 2.6	V
Collector cutoff current ($-V_{CB} = 50 \text{ V}$)	$-I_{CBO}$	< 10	< 10	nA
($-V_{CB} = 50 \text{ V}$, $T_{amb} = 150^\circ\text{C}$)	$-I_{CBO}$	< 10	< 10	μA
DC current gain ($-V_{CE} = 10 \text{ V}$, $-I_C = 0.1 \text{ mA}$)	h_{FE}	> 40	> 75	—
($-V_{CE} = 10 \text{ V}$, $-I_C = 1 \text{ mA}$)	h_{FE}	> 40	> 100	—
($-V_{CE} = 10 \text{ V}$, $-I_C = 10 \text{ mA}$)	h_{FE}	> 40	> 100	—
($-V_{CE} = 10 \text{ V}$, $-I_C = 150 \text{ mA}$)	h_{FE}	40 to 120	100 to 300	—
($-V_{CE} = 10 \text{ V}$, $-I_C = 500 \text{ mA}$)	h_{FE}	> 40	> 50	—

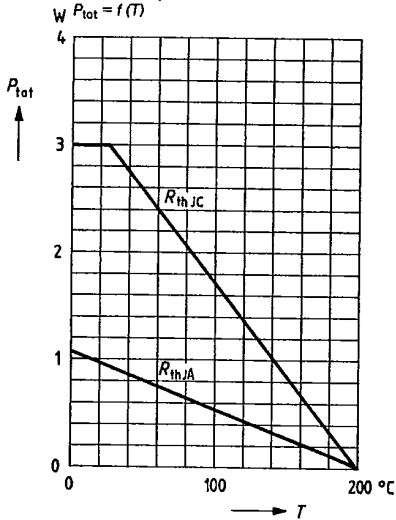
Dynamic characteristics ($T_{amb} = 25^\circ\text{C}$)

Transition frequency ($-V_{CE} = 20 \text{ V}$, $-I_C = 50 \text{ mA}$, $f = 100 \text{ MHz}$)	f_T	> 200	> 200	MHz
Collector-base capacitance ($-V_{CB} = 10 \text{ V}$, $f = 100 \text{ kHz}$)	C_{CBO}	< 8	< 8	pF
Emitter-base capacitance ($-V_{EB} = 2 \text{ V}$, $f = 100 \text{ kHz}$)	C_{CEO}	< 30	< 30	pF
Switching times:				
Delay time	t_d	< 10	< 10	ns
Rise time	t_r	< 40	< 40	ns
Turn-on time	t_{on}	< 45	< 45	ns
Storage time	t_s	< 80	< 80	ns
Fall time	t_f	< 30	< 30	ns
Turn-off time	t_{off}	< 100	< 100	ns

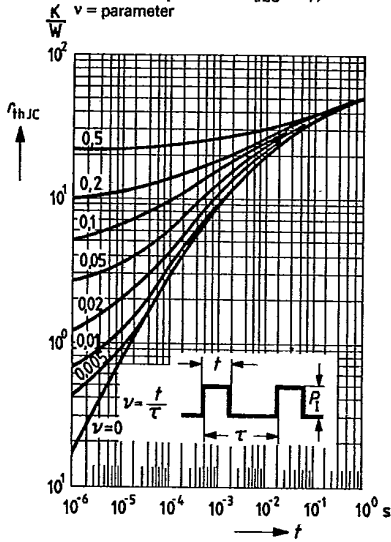
2 N 2904
 2 N 2905
 2 N 2904 A
 2 N 2905 A

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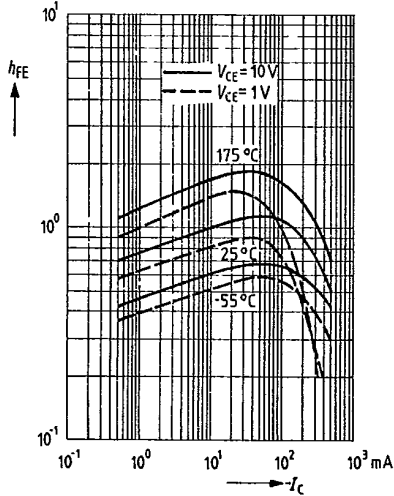
Total perm. power dissipation versus temperature
 $P_{tot} = f(T)$



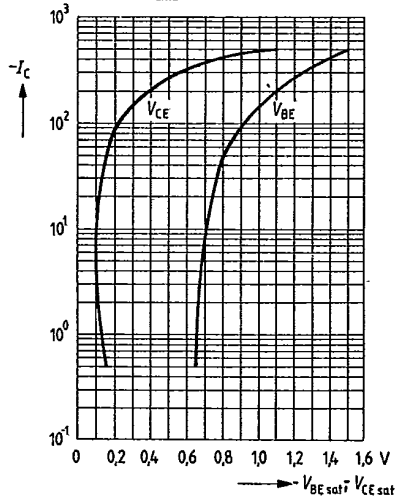
Permissible pulse load $r_{thJC} = f(t)$
 $v = \text{parameter}$



DC current gain $h_{FE} = f(I_C)$
 $V_{CE} = 1V, V_{CE} = 10V; T_{amb} = 25^\circ C$

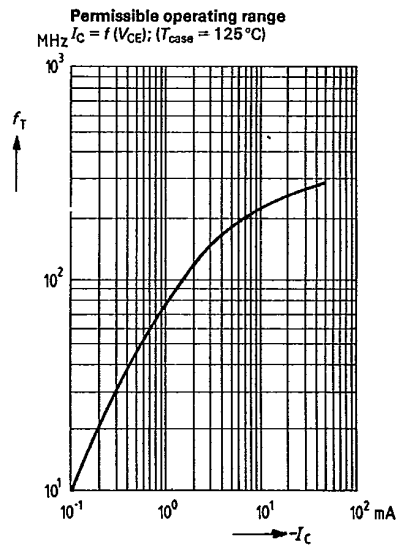
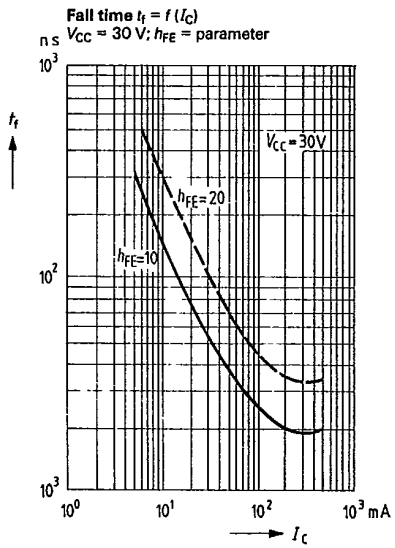
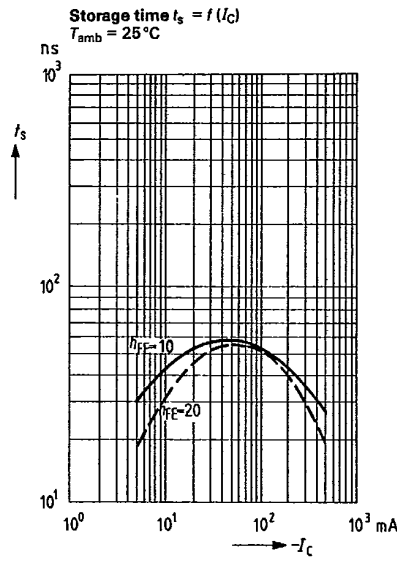
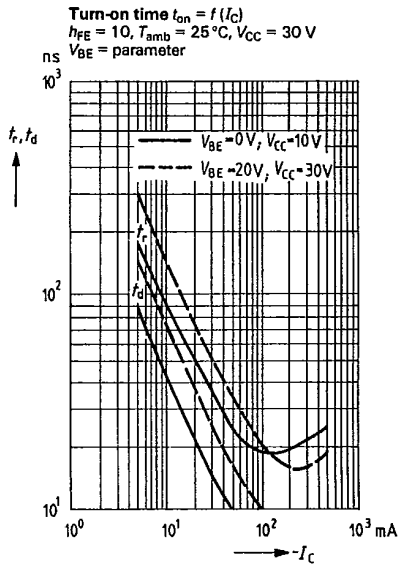


Saturation voltages
 $V_{BEsat} = f(I_C), V_{CEsat} = f(I_C)$
 $h_{FE} = 10; T_{amb} = 25^\circ C$



2 N 2904
 2 N 2905
 2 N 2904 A
 2 N 2905 A

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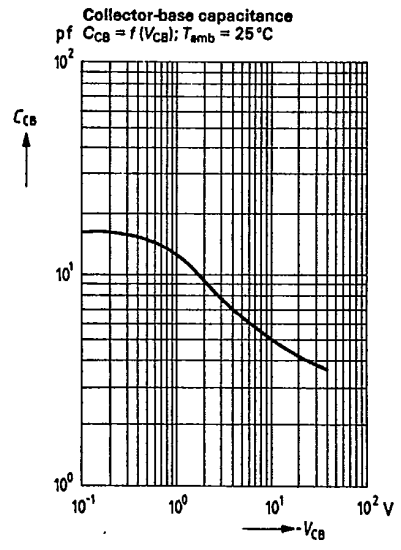


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