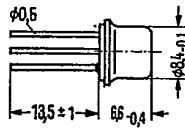


PNP Silicon Planar Transistors

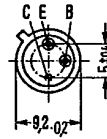
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2 N 2904 and 2 N 2905 are epitaxial PNP silicon planar transistors in TO 39 case (5 C 3 DIN 41 873). The collector is electrically connected to the case. The transistors are particularly suitable for use as high-speed switches.

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 <sub>CB0</sub> 60	V
Collector-emitter voltage	-V <sub>CE0</sub> 40	V
Emitter-base voltage	-V <sub>EB0</sub> 5	V
Collector current	-I <sub>C</sub> 0.6	A
Junction temperature	T <sub>j</sub> 200	°C
Storage temperature range	T <sub>stg</sub> -65 to +200	°C
Total power dissipation (T <sub>amb</sub> ≤ 25 °C)	P <sub>tot</sub> 0.6	W
Total power dissipation (T <sub>case</sub> ≤ 25 °C)	P <sub>tot</sub> 3	W

Thermal resistance

Junction to ambient air	R <sub>thJA</sub> < 188	K/W
Junction to case	R <sub>thJC</sub> < 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	$\mu\text{A}$
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	-
<b>Dynamic characteristics (<math>T_{amb} = 25^\circ\text{C}</math>)</b>				
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

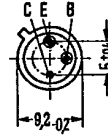
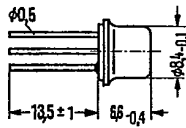
PNP Silicon Planar Transistors

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 <sub>CBO</sub> 60	V
Collector-emitter voltage	-V <sub>CEO</sub> 60	V
Emitter-base voltage	-V <sub>EBO</sub> 5	V
Collector current	-I <sub>C</sub> 0.6	A
Junction temperature	T <sub>J</sub> 200	°C
Storage temperature range	T <sub>stg</sub> -65 to +200	°C
Total power dissipation (T <sub>amb</sub> ≤ 25 °C)	P <sub>tot</sub> 0.6	W
Total power dissipation (T <sub>case</sub> ≤ 25 °C)	P <sub>tot</sub> 3	W

Thermal resistance

Junction to ambient air	R <sub>thJA</sub> < 188	K/W
Junction to case	R <sub>thJC</sub> < 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	$\mu\text{A}$
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	—

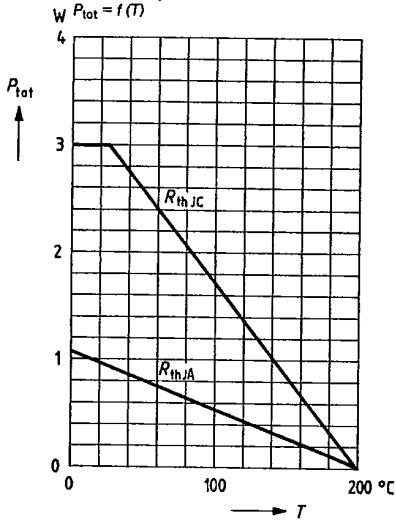
**Dynamic characteristics** ( $T_{amb} = 25^\circ\text{C}$ )

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

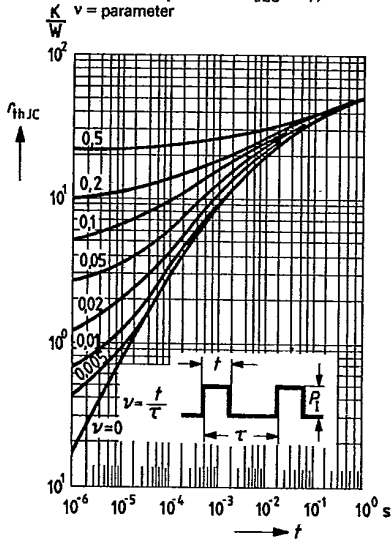
2 N 2904  
 2 N 2905  
 2 N 2904 A  
 2 N 2905 A

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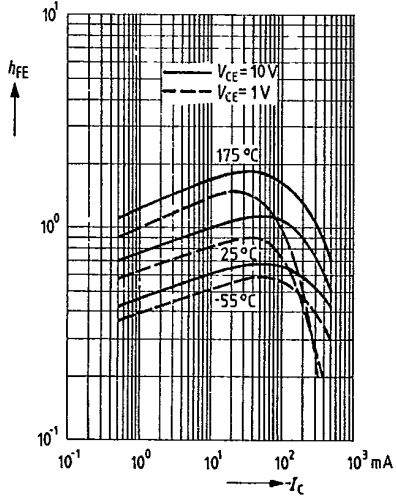
Total perm. power dissipation versus temperature



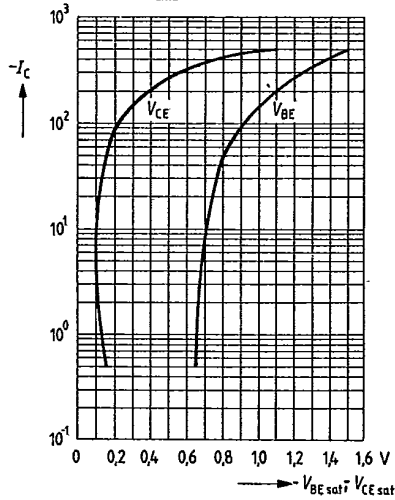
Permissible pulse load  $r_{thJC} = f(t)$



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

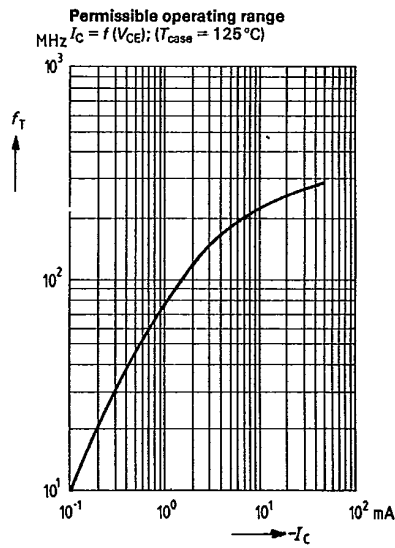
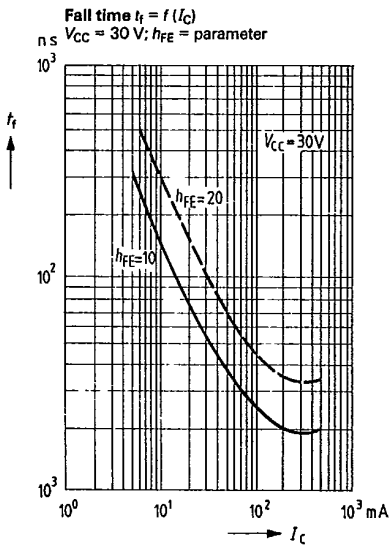
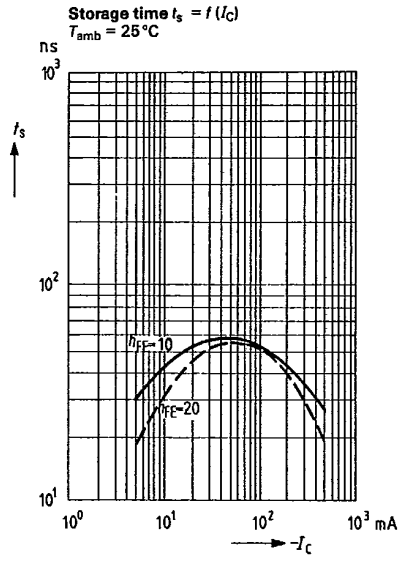
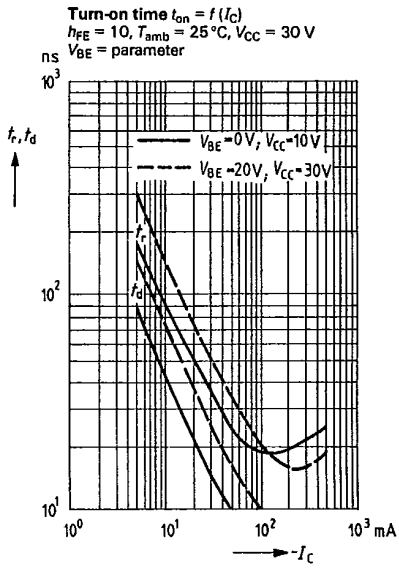


Saturation voltages  
 $V_{BEsat} = f(I_C), V_{CEsat} = f(I_C)$   
 $h_{FE} = 10; T_{amb} = 25^\circ C$



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

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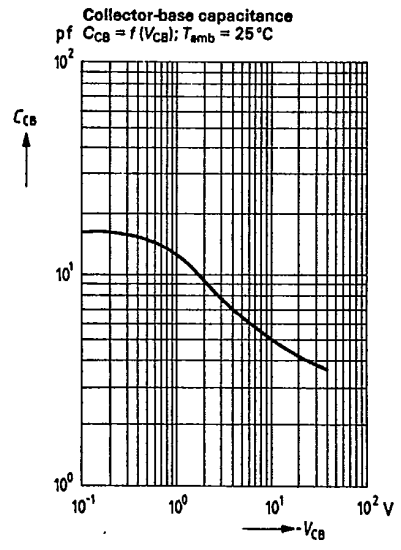


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