

PNP Silicon Planar Transistors

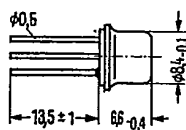
2 N 2904

2 N 2905

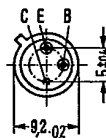
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2 N 2904 and 2 N 2905 are epitaxial PNP silicon planar transistors in TO 39 case (5 C 3 DIN 41 873). The collector is electrically connected to the case. The transistors are particularly suitable for use as high-speed switches.

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



Approx. weight 1.5 g



Dimensions in mm

Maximum ratings

Maximum ratings		2 N 2904	2 N 2905
Collector-base voltage	$-V_{CBO}$	60	V
Collector-emitter voltage	$-V_{CEO}$	40	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 ($T_{amb} \leq 25\text{ °C}$)	P_{tot}	0.6	W
Total power dissipation ($T_{case} \leq 25\text{ °C}$)	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 ($-I_C = 10\text{ }\mu\text{A}$)	$-V_{(BR)CBO}$	> 60	> 60	V
Collector-emitter breakdown voltage ($-I_C = 10\text{ mA}$)	$-V_{(BR)CEO}$	> 40	> 40	V
Emitter-base breakdown voltage ($-I_E = 10\text{ }\mu\text{A}$)	$-V_{(BR)EBO}$	> 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

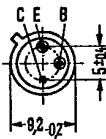
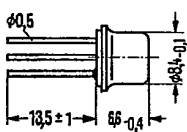
PNP Silicon Planar Transistors

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

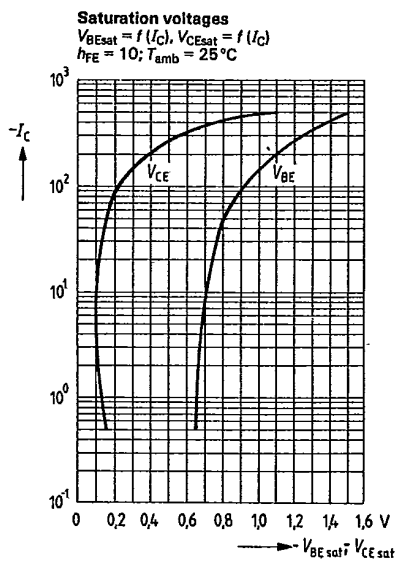
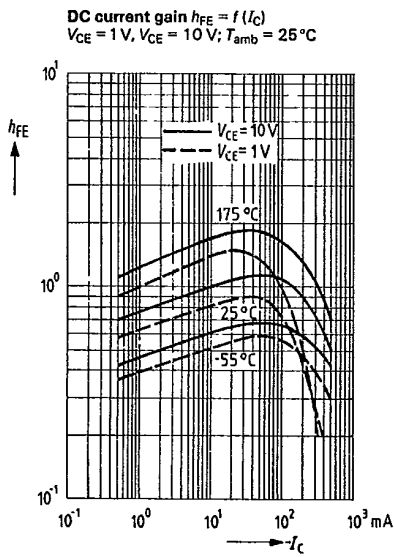
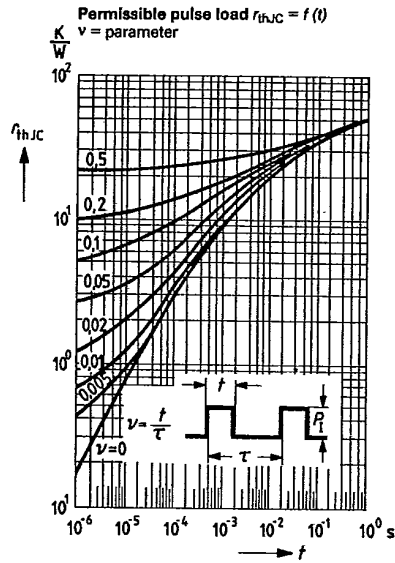
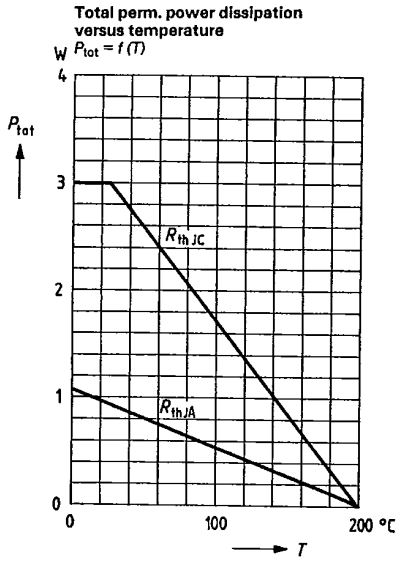
		2 N 2904 A	2 N 2905 A	
Collector-base breakdown voltage ($-I_C = 10\ \mu\text{A}$)	$-V_{(\text{BR})\text{CBO}}$	> 60	> 60	V
Collector-emitter breakdown voltage ($-I_C = 10\ \text{mA}$)	$-V_{(\text{BR})\text{CEO}}$	> 60	> 60	V
Emitter-base breakdown voltage ($-I_E = 10\ \mu\text{A}$)	$-V_{(\text{BR})\text{EBO}}$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

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

Transition frequency ($-V_{\text{CE}} = 20\ \text{V}$, $-I_C = 50\ \text{mA}$, $f = 100\ \text{MHz}$)	f_{T}	> 200	> 200	MHz
Collector-base capacitance ($-V_{\text{CB}} = 10\ \text{V}$, $f = 100\ \text{kHz}$)	C_{CBO}	< 8	< 8	pF
Emitter-base capacitance ($-V_{\text{EB}} = 2\ \text{V}$, $f = 100\ \text{kHz}$)	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

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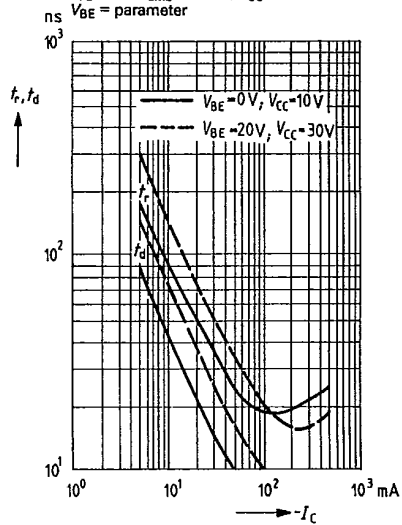
2 N 2904
2 N 2905
2 N 2904 A
2 N 2905 A



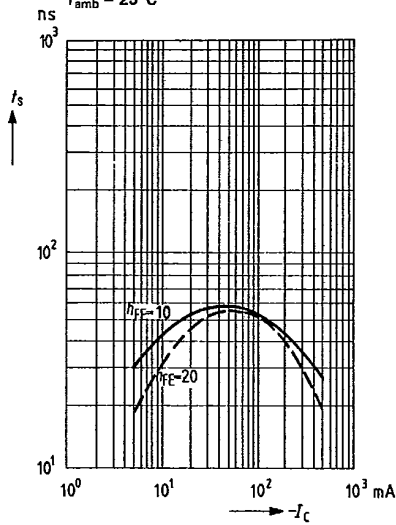
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2 N 2904
2 N 2905
2 N 2904 A
2 N 2905 A

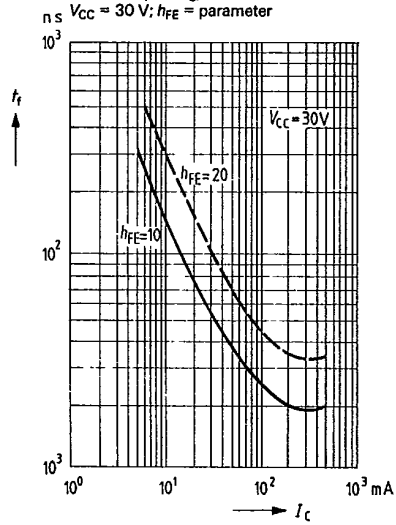
Turn-on time $t_{on} = f(I_C)$
 $h_{FE} = 10$, $T_{amb} = 25^\circ\text{C}$, $V_{CC} = 30\text{ V}$
 $V_{BE} = \text{parameter}$



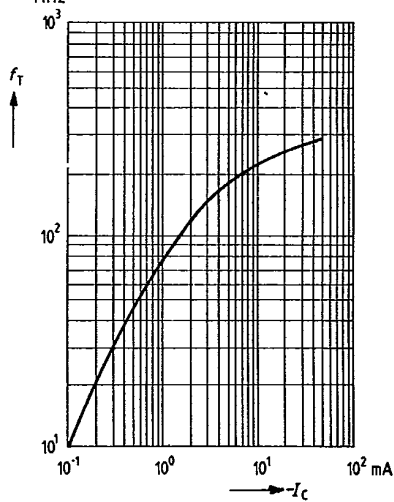
Storage time $t_s = f(I_C)$
 $T_{amb} = 25^\circ\text{C}$



Fall time $t_f = f(I_C)$
 $V_{CC} = 30\text{ V}$; $h_{FE} = \text{parameter}$



Permissible operating range
 $f_T = f(V_{CE})$; ($T_{case} = 125^\circ\text{C}$)

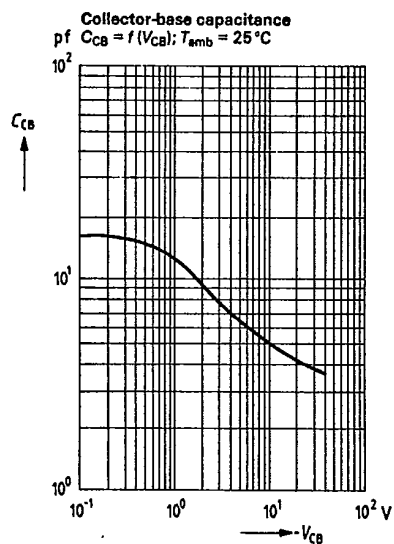


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2 N 2904
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