T-37-17

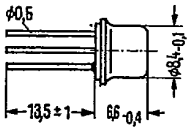
PNP Silicon Planar Transistors

2 N 2904
2 N 2905

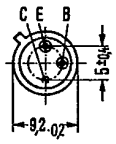
SIEMENS AKTIENGESELLSCHAF

2 N 2904 and 2 N 2905 are epitaxial PNP silicon planar transistors in TO 39 case (5 C 3 DIN 41873). 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	$-V_{CBO}$	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 ($T_{amb} \leqq 25$ °C)	P_{tot}	0.6	W
Total power dissipation ($T_{case} \leqq 25$ °C)	P_{tot}	3	W

Thermal resistance

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

2 N 2904
2 N 2905

Static characteristics (T_{amb} = 25 °C)		**2 N 2904**	**2 N 2905**	
Collector-base breakdown voltage ($-I_C$ = 10 µA)	$-V_{(BR)CBO}$	> 60	> 60	V
Collector-emitter breakdown voltage ($-I_C$ = 10 mA)	$-V_{(BR)CEO}$	> 40	> 40	V
Emitter-base breakdown voltage ($-I_E$ = 10 µA)	$-V_{(BR)EBO}$	> 5	> 5	V
Collector-emitter saturation voltage				
($-I_C$ = 150 mA, I_B = 15 mA)	$-V_{CEsat}$	< 0.4	< 0.4	V
($-I_C$ = 500 mA, I_B = 50 mA)	$-V_{CEsat}$	< 1.6	< 1.6	V
Base-emitter saturation voltage				
($-I_C$ = 150 mA, I_B = 15 mA)	$-V_{BEsat}$	< 1.3	< 1.3	V
($-I_C$ = 500 mA, I_B = 50 mA)	$-V_{BEsat}$	< 2.6	< 2.6	V
Collector cutoff current				
($-V_{CB}$ = 50 V)	$-I_{CBO}$	< 20	< 20	nA
($-V_{CB}$ = 50 V, T_{amb} = 150 °C)	$-I_{CBO}$	< 20	< 20	µA
DC current gain				
($-V_{CE}$ = 10 V, $-I_C$ = 0.1 mA)	h_{FE}	> 20	> 35	–
($-V_{CE}$ = 10 V, $-I_C$ = 1 mA)	h_{FE}	> 25	> 50	–
($-V_{CE}$ = 10 V, $-I_C$ = 10 mA)	h_{FE}	> 35	> 75	–
($-V_{CE}$ = 10 V, $-I_C$ = 150 mA)	h_{FE}	40 to 120	100 to 300	–
($-V_{CE}$ = 10 V, $-I_C$ = 500 mA)	h_{FE}	> 20	> 30	–
Dynamic characteristics (T_{amb} = 25 °C)				
Transition frequency ($-V_{CE}$ = 20 V, $-I_C$ = 50 mA, f = 100 MHz)	f_T	> 200	> 200	MHz
Collector-base capacitance ($-V_{CB}$ = 10 V, f = 100 kHz)	C_{CBO}	< 8	< 8	pF
Emitter-base capacitance ($-V_{EB}$ = 2 V, f = 100 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 AKTIENGESELLSCHAF T-37-17

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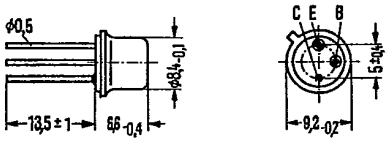
Type	Ordering code
2 N 2904 A	Q62702-F91
2 N 2905 A	Q62702-F92



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 ($T_{amb} \leqq 25$ °C)	P_{tot}	0.6	W
Total power dissipation ($T_{case} \leqq 25$ °C)	P_{tot}	3	W

Thermal resistance

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

Static characteristics (T_{amb} = 25 °C)		2 N 2904 A	2 N 2905 A	
Collector-base breakdown voltage				
($-I_C$ = 10 µA)	$-V_{(BR)CBO}$	> 60	> 60	V
Collecor-emitter breakdown voltage				
($-I_C$ = 10 mA)	$-V_{(BR)CEO}$	> 60	> 60	V
Emitter-base breakdown voltage				
($-I_E$ = 10 µA)	$-V_{(BR)EBO}$	> 5	> 5	V
Collector-emitter saturation voltage				
($-I_C$ = 150 mA, I_B = 15 mA)	$-V_{CEsat}$	< 0.4	< 0.4	V
($-I_C$ = 500 mA, I_B = 50 mA)	$-V_{CEsat}$	< 1.6	< 1.6	V
Base-emitter saturation voltage				
($-I_C$ = 150 mA, I_B = 15 mA)	$-V_{BEsat}$	< 1.3	< 1.3	V
($-I_C$ = 500 mA, I_B = 50 mA)	$-V_{BEsat}$	< 2.6	< 2.6	V
Collector cutoff current				
($-V_{CB}$ = 50 V)	$-I_{CBO}$	< 10	< 10	nA
($-V_{CB}$ = 50 V, T_{amb} = 150 °C)	$-I_{CBO}$	< 10	< 10	µA
DC current gain				
($-V_{CE}$ = 10 V, $-I_C$ = 0.1 mA)	h_{FE}	> 40	> 75	–
($-V_{CE}$ = 10 V, $-I_C$ = 1 mA)	h_{FE}	> 40	> 100	–
($-V_{CE}$ = 10 V, $-I_C$ = 10 mA)	h_{FE}	> 40	> 100	–
($-V_{CE}$ = 10 V, $-I_C$ = 150 mA)	h_{FE}	40 to 120	100 to 300	–
($-V_{CE}$ = 10 V, $-I_C$ = 500 mA)	h_{FE}	> 40	> 50	–
Dynamic characteristics (T_{amb} = 25 °C)				
Transition frequency				
($-V_{CE}$ = 20 V, $-I_C$ = 50 mA, f = 100 MHz)	f_T	> 200	> 200	MHz
Collector-base capacitance				
($-V_{CB}$ = 10 V, f = 100 kHz)	C_{CBO}	< 8	< 8	pF
Emitter-base capacitance				
($-V_{EB}$ = 2 V, f = 100 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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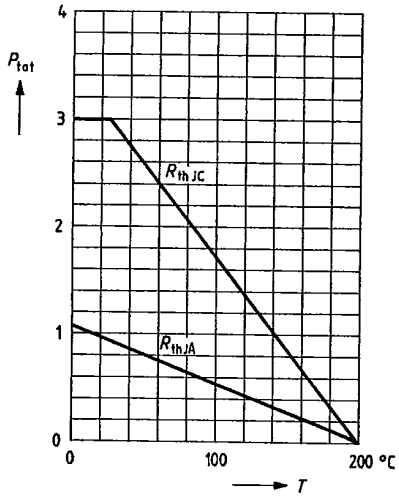
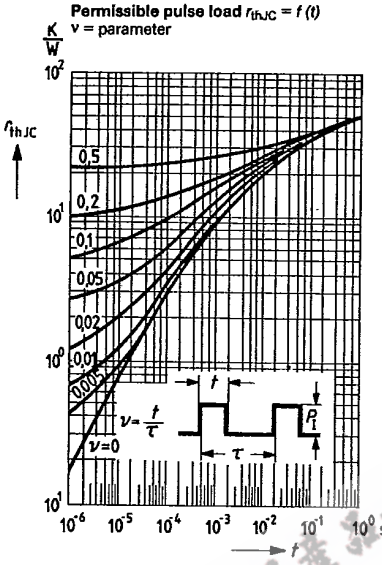
2 N 2904
2 N 2905
2 N 2904 A
2 N 2905 A

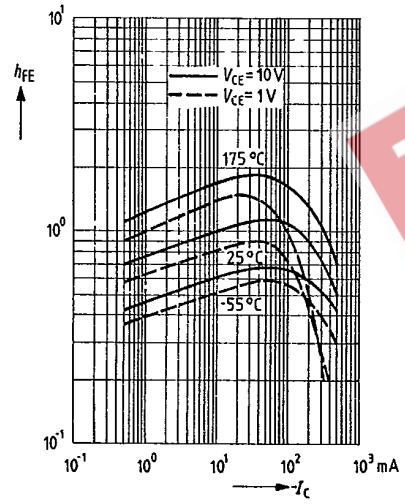
Total perm. power dissipation versus temperature
$P_{tot} = f(T)$



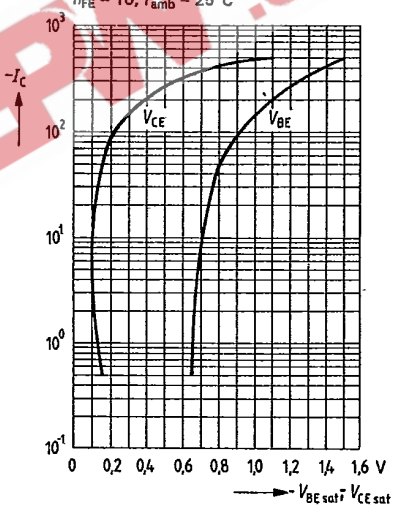
Permissible pulse load $r_{thJC} = f(t)$
ν = parameter



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



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



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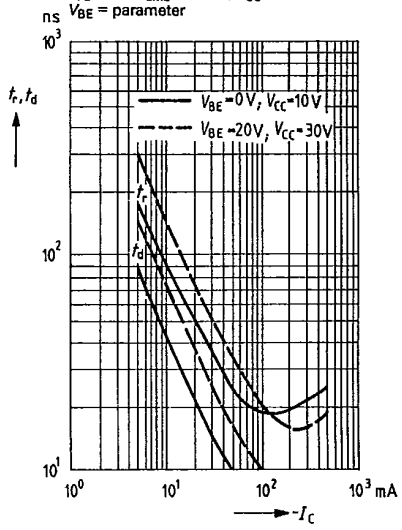
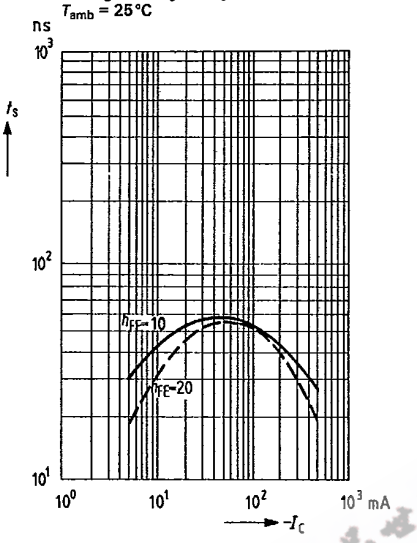
2 N 2904
2 N 2905
2 N 2904 A
2 N 2905 A

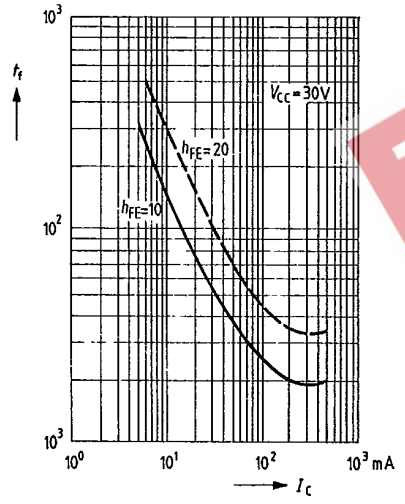
Turn-on time $t_{on} = f(I_C)$
h_{FE} = 10, T_{amb} = 25 °C, V_{CC} = 30 V
V_{BE} = parameter



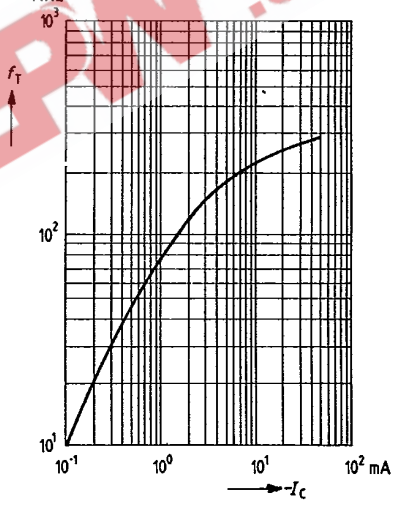
Storage time $t_s = f(I_C)$
T_{amb} = 25 °C



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



Permissible operating range
MHz $I_C = f(V_{CE})$; (T_{case} = 125 °C)



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2 N 2904
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