

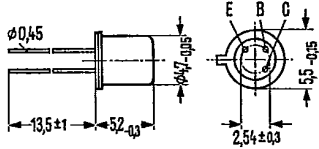
NPN Silicon Planar Transistors

2 N 2221 A
2 N 2222 A

SIEMENS AKTIENGESELLSCHAFT D T-35-19

2 N 2221 A, and 2 N 2222 A are epitaxial NPN silicon planar transistors in TO 18 case (18 A 3 DIN 41876). The collector is electrically connected to the case. The transistors are particularly suitable for use as high-speed switches.

Type	Ordering code
2 N 2221 A	Q62702-F414
2 N 2222 A	Q62702-S122



Approx. weight 0.3 g Dimensions in mm

Maximum ratings

Maximum ratings		2 N 2221 A	
		2 N 2222 A	
Collector-emitter voltage	V_{CEO}	40	V
Collector-base voltage	V_{CBO}	75	V
Emitter-base voltage	V_{EBO}	6	V
Collector current	I_C	0.8	A
Junction temperature	T_j	175	°C
Storage temperature range	T_{stg}	-65 to +200	°C
Total power dissipation ($T_{amb} = 25\text{ °C}$)	P_{tot}	0.5	W
Total power dissipation ($T_{case} = 25\text{ °C}$)	P_{tot}	1.8	W

Thermal resistance

Junction to ambient air	R_{thJA}	≤ 300	K/W
Junction to case	R_{thJC}	≤ 83	K/W

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

		2 N 2221 A	2 N 2222 A	
Collector-base breakdown voltage ($I_C = 10\ \mu\text{A}$)	$V_{(BR)CBO}$	> 75	> 75	V
Collector-emitter breakdown voltage ($I_C = 10\ \text{mA}$)	$V_{(BR)CEO}$	> 40	> 40	V
Emitter-base breakdown voltage ($I_E = 10\ \mu\text{A}$)	$V_{(BR)EBO}$	> 6	> 6	V
Collector-emitter saturation voltage ($I_B = 15\ \text{mA}$; $I_C = 150\ \text{mA}$)	V_{CEsat}	< 0.3	< 0.3	V
($I_B = 50\ \text{mA}$; $I_C = 500\ \text{mA}$)	V_{CEsat}	< 1	< 1	V
Base-emitter saturation voltage ($I_C = 150\ \text{mA}$; $I_B = 15\ \text{mA}$)	V_{BEsat}	< 1.2	< 1.2	V
($I_C = 500\ \text{mA}$; $I_B = 50\ \text{mA}$)	V_{BEsat}	< 2	< 2	V
Emitter cutoff current ($V_{EB} = 3\ \text{V}$)	I_{EBO}	< 10	< 10	nA
Collector-cutoff current ($V_{CB} = 60\ \text{V}$)	I_{CBO}	< 10	< 10	nA
($V_{CB} = 60\ \text{V}$; $T_{amb} = 150^\circ\text{C}$)	I_{CBO}	< 10	< 10	μA
DC current gain ($V_{CE} = 10\ \text{V}$; $I_C = 0.1\ \text{mA}$)	h_{FE}	> 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}	> 25	> 40	—
($V_{CE} = 1\ \text{V}$; $I_C = 150\ \text{mA}$)	h_{FE}	> 20	> 50	—

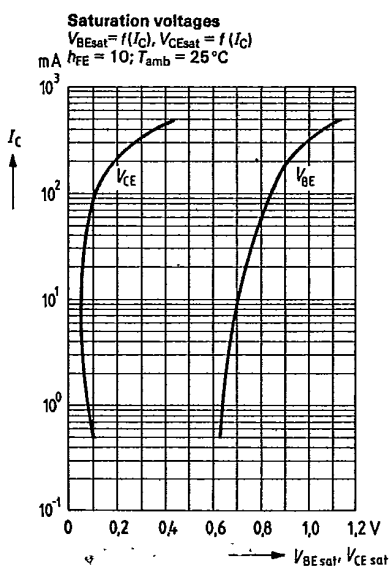
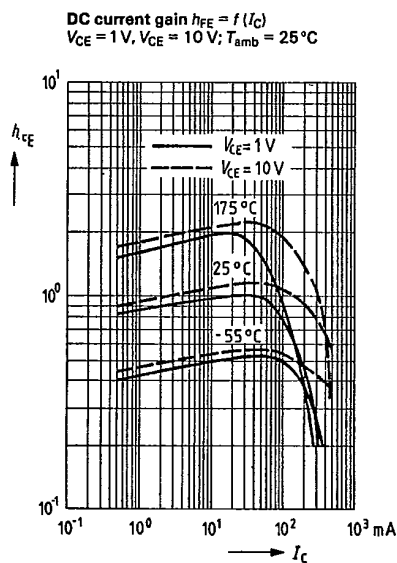
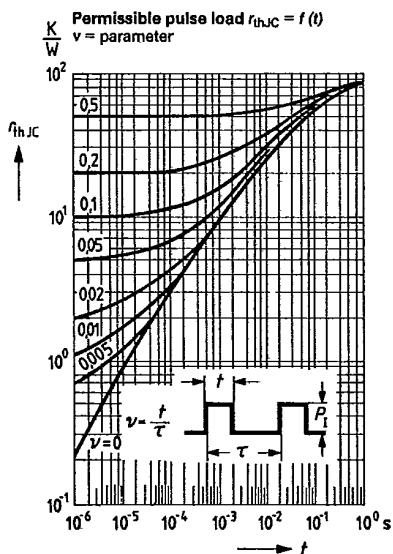
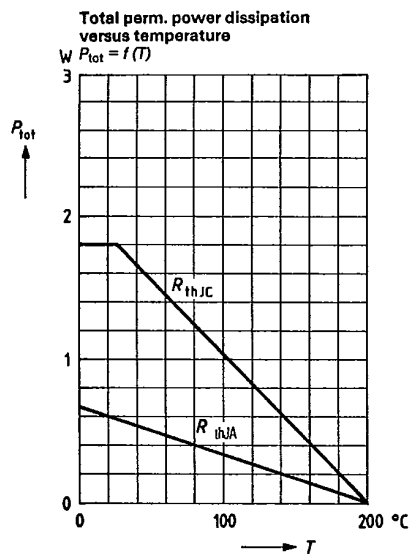
Dynamic characteristics ($T_{amb} = 25^\circ\text{C}$)

Collector base capacitance ($V_{CB} = 10\ \text{V}$; $f = 100\ \text{kHz}$)	C_{CBO}	< 8	< 8	pF
Transition frequency ($V_{CE} = 20\ \text{V}$; $I_C = 20\ \text{mA}$; $f = 100\ \text{MHz}$)	f_T	> 250	> 300	MHz

Switching times:

($V_{CC} = 20\ \text{V}$; $I_C = 150\ \text{mA}$;
 I_{B1} approx. I_{B2} approx. $15\ \text{mA}$)

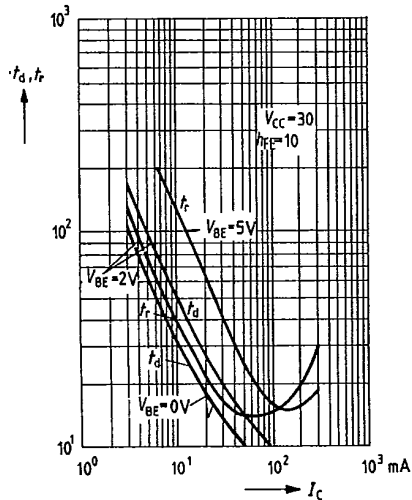
Delay time	t_d	< 10	< 10	ns
Rise time	t_r	< 25	< 25	ns
Storage time	t_s	< 225	< 225	ns
Fall time	t_f	< 60	< 60	ns



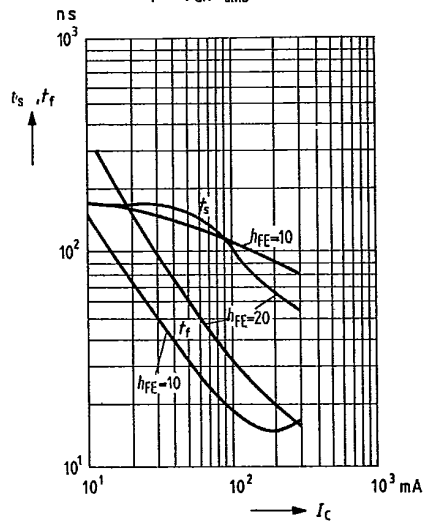
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2 N 2220
 2 N 2221
 2 N 2222
 2 N 2221 A
 2 N 2222 A

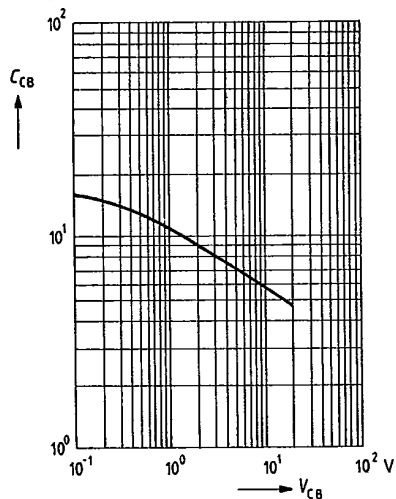
Turn-on time $t_{on} = f(I_C)$
 $h_{FE} = 10$; $T_{amb} = 25^\circ\text{C}$; $V_{CC} = 30\text{ V}$
 n_s $V_{BE} = \text{parameter}$



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



Collector-base capacitance
 $C_{CB} = f(V_{CB})$; $T_{amb} = 25^\circ\text{C}$



Transition frequency $f_T = f(I_C)$
 $V_{CE} = 20\text{ V}$; $T_{amb} = 25^\circ\text{C}$

