

NPN Silicon Planar Transistors

2 N 2220

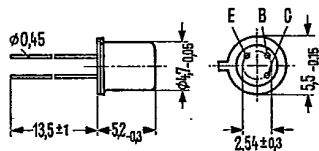
2 N 2221

2 N 2222

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2 N 2220, 2 N 2221, and 2 N 2222 are epitaxial NPN silicon planar transistors in TO 18 case (18 A 3 DIN 41 876). The collector is electrically connected to the case. The transistors are particularly suitable for use as high-speed switches.

Type	Ordering code
2 N 2220	Q68000-A4573
2 N 2221	Q62702-F134
2 N 2222	Q62702-F135



Approx. weight 0.33 g Dimensions in mm

Maximum ratings

Collector-emitter voltage
 Collector-base voltage
 Emitter-base voltage
 Collector current
 Junction temperature
 Storage temperature range
 Total power dissipation ($T_{amb} = 25^\circ\text{C}$)
 Total power dissipation ($T_{case} = 25^\circ\text{C}$)

	2 N 2220	2 N 2221	2 N 2222
V_{CEO}	30		V
V_{CBO}	60		V
V_{EBO}	5		V
I_C	0.8		A
T_j	175		$^\circ\text{C}$
T_{stg}	-65 to +200		$^\circ\text{C}$
P_{tot}	0.5		W
P_{tot}	1.8		W

Thermal resistance

Junction to ambient air
 Junction to case

R_{thJA}	≤ 300	K/W
R_{thJC}	≤ 83	K/W

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Static characteristics ($T_{amb} = 25^{\circ}\text{C}$)		2 N 2220	2 N 2221	2 N 2222	
Collector-base breakdown voltage ($I_C = 10\text{ }\mu\text{A}$)	$V_{(BR)CBO}$	> 60	> 60	> 60	V
Collector-emitter breakdown voltage ($I_C = 10\text{ mA}$)	$V_{(BR)CEO}$	> 30	> 30	> 30	V
Emitter-base breakdown voltage ($I_E = 10\text{ }\mu\text{A}$)	$V_{(BR)EBO}$	> 5	> 5	> 5	V
Collector-emitter saturation voltage ($I_B = 15\text{ mA}$; $I_C = 150\text{ mA}$)	V_{CEsat}	< 0.4	< 0.4	< 0.4	V
($I_B = 50\text{ mA}$; $I_C = 500\text{ mA}$)	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	< 1.3	V
($I_C = 500\text{ mA}$; $I_B = 50\text{ mA}$)	V_{BEsat}	—	< 2.6	< 2.6	V
Emitter cutoff current ($V_{EB} = 3\text{ V}$)	I_{EBO}	< 10	< 10	< 10	nA
Collector cutoff current ($V_{CB} = 50\text{ V}$)	I_{CBO}	< 10	< 10	< 10	nA
($V_{CB} = 50\text{ V}$; $T_{amb} = 150^{\circ}\text{C}$)	I_{CBO}	< 10	< 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}	> 12	> 25	> 50	—
($V_{CE} = 10\text{ V}$; $I_C = 10\text{ mA}$)	h_{FE}	> 17	> 35	> 75	—
($V_{CE} = 10\text{ V}$; $I_C = 150\text{ mA}$)	h_{FE}	20 to 60	40 to 120	100 to 300	—
($V_{CE} = 10\text{ V}$; $I_C = 500\text{ mA}$)	h_{FE}	—	> 20	> 30	—
($V_{CE} = 1\text{ V}$; $I_C = 150\text{ mA}$)	h_{FE}	> 10	> 20	> 50	—

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

Collector base capacitance ($V_{CB} = 10\text{ V}$; $f = 1\text{ MHz}$)	C_{CBO}	< 8	< 8	< 8	pF
Transition frequency ($V_{CE} = 20\text{ V}$; $I_C = 20\text{ mA}$; $f = 100\text{ MHz}$)	f_T	> 250	> 250	> 250	MHz

Switching times:

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

Delay time	t_d	5	5	5	ns
Rise time	t_r	15	15	15	ns
Storage time	t_s	190	190	190	ns
Fall time	t_f	23	23	23	ns