

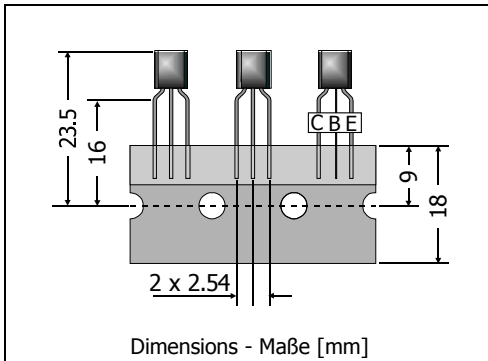
## PN2222 / PN2222A

NPN

Si-Epi-Planar Switching Transistors  
Si-Epi-Planar Schalttransistoren

NPN

Version 2006-09-12

Power dissipation  
Verlustleistung

625 mW

Plastic case  
KunststoffgehäuseTO-92  
(10D3)

Weight approx. – Gewicht ca.

0.18 g

Plastic material has UL classification 94V-0  
Gehäusematerial UL94V-0 klassifiziertStandard packaging taped in ammo pack  
Standard Lieferform gegurtet in Ammo-PackMaximum ratings ( $T_A = 25^\circ\text{C}$ )Grenzwerte ( $T_A = 25^\circ\text{C}$ )

			PN2222 (2N2222)	PN2222A (2N2222A)
Collector-Emitter-volt. – Kollektor-Emitter-Spannung	B open	$V_{CEO}$	30 V	40 V
Collector-Base-voltage – Kollektor-Basis-Spannung	E open	$V_{CBO}$	60 V	75 V
Emitter-Base-voltage – Emitter-Basis-Spannung	C open	$V_{EBO}$	5 V	6 V
Power dissipation – Verlustleistung		$P_{tot}$	625 mW <sup>1)</sup>	
Collector current – Kollektorstrom (dc)		$I_C$	600 mA	
Junction temperature – Sperrschichttemperatur		$T_j$	-55...+150°C	
Storage temperature – Lagerungstemperatur		$T_s$	-55...+150°C	

Characteristics ( $T_j = 25^\circ\text{C}$ )Kennwerte ( $T_j = 25^\circ\text{C}$ )

			Min.	Typ.	Max.
DC current gain – Kollektor-Basis-Stromverhältnis <sup>2)</sup>					
$I_C = 0.1 \text{ mA}$ , $V_{CE} = 10 \text{ V}$		$h_{FE}$	35	–	–
$I_C = 1 \text{ mA}$ , $V_{CE} = 10 \text{ V}$		$h_{FE}$	50	–	–
$I_C = 10 \text{ mA}$ , $V_{CE} = 10 \text{ V}$		$h_{FE}$	75	–	–
$I_C = 150 \text{ mA}$ , $V_{CE} = 10 \text{ V}$		$h_{FE}$	100	–	300
$I_C = 500 \text{ mA}$ , $V_{CE} = 10 \text{ V}$	PN2222	$h_{FE}$	30	–	–
	PN2222A	$h_{FE}$	40	–	–
h-Parameters at/bei $V_{CE} = 10 \text{ V}$ , $f = 1 \text{ kHz}$ , $I_C = 1 \text{ mA} / 10 \text{ mA}$					
Small signal current gain Kleinsignal-Stromverstärkung	PN2222A	$h_{fe}$	50	–	300
	PN2222A	$h_{fe}$	75	–	375
Input impedance – Eingangs-Impedanz	PN2222A	$h_{ie}$	2 k $\Omega$	–	8 k $\Omega$
	PN2222A	$h_{ie}$	0.25 k $\Omega$	–	1.25 k $\Omega$
Output admittance – Ausgangs-Leitwert	PN2222A	$h_{oe}$	5 $\mu\text{S}$	–	35 $\mu\text{S}$
	PN2222A	$h_{oe}$	25 $\mu\text{S}$	–	200 $\mu\text{S}$

1 Mounted on P.C. board with 3 mm<sup>2</sup> copper pad at each terminal  
Montage auf Leiterplatte mit 3 mm<sup>2</sup> Kupferbelag (Löt-pad) an jedem Anschluss

2 Tested with pulses  $t_p = 300 \mu\text{s}$ , duty cycle  $\leq 2\%$  – Gemessen mit Impulsen  $t_p = 300 \mu\text{s}$ , Schaltverhältnis  $\leq 2\%$

**Characteristics (T<sub>j</sub> = 25°C)****Kennwerte (T<sub>j</sub> = 25°C)**

			<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>
Collector-Emitter saturation voltage – Kollektor-Sättigungsspannung <sup>2)</sup>					
I <sub>C</sub> = 150 mA, I <sub>B</sub> = 15 mA	PN2222	V <sub>CEsat</sub>	–	–	0.4 V
	PN2222A	V <sub>CEsat</sub>	–	–	0.3 V
I <sub>C</sub> = 500 mA, I <sub>B</sub> = 50 mA	PN2222	V <sub>CEsat</sub>	–	–	1.6 V
	PN2222A	V <sub>CEsat</sub>	–	–	1.0 V
Base-Emitter saturation voltage – Basis-Sättigungsspannung <sup>2)</sup>					
I <sub>C</sub> = 150 mA, I <sub>B</sub> = 15 mA	PN2222	V <sub>BEsat</sub>	–	–	1.3 V
	PN2222A	V <sub>BEsat</sub>	0.65 V	–	1.2 V
I <sub>C</sub> = 500 mA, I <sub>B</sub> = 50 mA	PN2222	V <sub>BEsat</sub>	–	–	2.6 V
	PN2222A	V <sub>BEsat</sub>	–	–	2.0 V
Collector-Base cutoff current – Kollektor-Basis-Reststrom					
V <sub>CB</sub> = 50 V, (E open)	PN2222	I <sub>CBO</sub>	–	–	10 nA
	PN2222A	I <sub>CBO</sub>	–	–	10 nA
V <sub>CB</sub> = 60 V, (E open)	PN2222	I <sub>CBO</sub>	–	–	10 μA
	PN2222A	I <sub>CBO</sub>	–	–	10 μA
Emitter-Base cutoff current – Emitter-Basis-Reststrom					
V <sub>EB</sub> = 3 V, (C open)	PN2222A	I <sub>EB0</sub>	–	–	100 nA
Gain-Bandwidth Product – Transitfrequenz					
V <sub>CE</sub> = 20 V, I <sub>C</sub> = 20 mA, f = 100 MHz		f <sub>T</sub>	250 MHz	–	–
Collector-Base Capacitance – Kollektor-Basis-Kapazität					
V <sub>CB</sub> = 10 V, I <sub>E</sub> = i <sub>e</sub> = 0, f = 1 MHz		C <sub>CBO</sub>	–	–	8 pF
Emitter-Base Capacitance – Emitter-Basis-Kapazität					
V <sub>EB</sub> = 0.5 V, I <sub>C</sub> = i <sub>c</sub> = 0, f = 1 MHz		C <sub>EBO</sub>	–	–	30 pF
Noise figure – Rauschzahl					
V <sub>CE</sub> = 10 V, I <sub>C</sub> = 100 μA, R <sub>G</sub> = 1 kΩ, f = 1 kHz	PN2222A	F	–	–	4 dB
Switching times – Schaltzeiten (between 10% and 90% levels)					
delay time	V <sub>CC</sub> = 3 V, V <sub>BE</sub> = 0.5 V I <sub>C</sub> = 150 mA, I <sub>B1</sub> = 15 mA	t <sub>d</sub>	–	–	10 ns
rise time		t <sub>r</sub>	–	–	25 ns
storage time	V <sub>CC</sub> = 3 V, I <sub>C</sub> = 150 mA, I <sub>B1</sub> = I <sub>B2</sub> = 15 mA	t <sub>s</sub>	–	–	225 ns
fall time		t <sub>f</sub>	–	–	60 ns
Thermal resistance junction to ambient air Wärmewiderstand Sperrschicht – umgebende Luft		R <sub>thA</sub>	< 200 K/W <sup>1)</sup>		
Recommended complementary PNP transistors Empfohlene komplementäre PNP-Transistoren			PN2709 / PN2709A		

<sup>2)</sup> Tested with pulses t<sub>p</sub> = 300 μs, duty cycle ≤ 2% – Gemessen mit Impulsen t<sub>p</sub> = 300 μs, Schaltverhältnis ≤ 2%

<sup>1)</sup> Mounted on P.C. board with 3 mm<sup>2</sup> copper pad at each terminal  
Montage auf Leiterplatte mit 3 mm<sup>2</sup> Kupferbelag (Lötpad) an jedem Anschluss