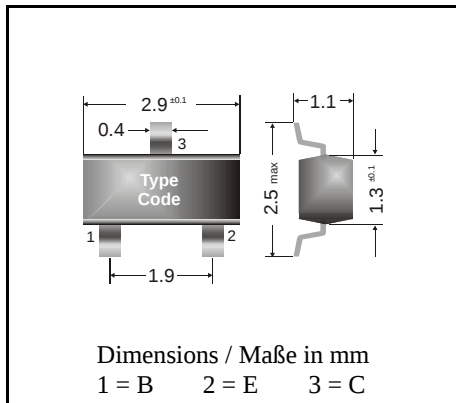


NPN

Surface mount Si-Epitaxial Planar Transistors
Si-Epitaxial Planar Transistoren für die Oberflächenmontage

NPN

Version 2004-05-04



Power dissipation – Verlustleistung 250 mW

Plastic case SOT-23
Kunststoffgehäuse (TO-236)

Weight approx. – Gewicht ca. 0.01 g

Plastic material has UL classification 94V-0
Gehäusematerial UL94V-0 klassifiziertStandard packaging taped and reeled
Standard Lieferform gegurtet auf Rolle**Maximum ratings ($T_A = 25^\circ\text{C}$)****Grenzwerte ($T_A = 25^\circ\text{C}$)**

			MMBT2222	MMBT2222A
Collector-Emitter-voltage	B open	V_{CE0}	30 V	40 V
Collector-Base-voltage	E open	V_{CB0}	60 V	75 V
Emitter-Base-voltage	C open	V_{EB0}	5 V	6 V
Power dissipation – Verlustleistung		P_{tot}	250 mW ¹⁾	
Collector current – Kollektorstrom (dc)		I_C	600 mA	
Junction temp. – Sperrschichttemperatur		T_j	150°C	
Storage temperature – Lagerungstemperatur		T_S	- 65...+ 150°C	

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

				Min.	Typ.	Max.
Collector-Base cutoff current – Kollektorreststrom						
$I_E = 0, V_{CB} = 50 \text{ V}$	MMBT2222	I_{CB0}		–	–	10 nA
$I_E = 0, V_{CB} = 60 \text{ V}$	MMBT2222A	I_{CB0}		–	–	10 nA
$I_E = 0, V_{CB} = 50 \text{ V}, T_j = 150^\circ\text{C}$	MMBT2222	I_{CB0}		–	–	10 μA
$I_E = 0, V_{CB} = 60 \text{ V}, T_j = 150^\circ\text{C}$	MMBT2222A	I_{CB0}		–	–	10 μA
Emitter-Base cutoff current – Emitterreststrom						
$I_C = 0, V_{EB} = 3 \text{ V}$	MMBT2222A	I_{EB0}		–	–	100 nA
Collector saturation voltage – Kollektor-Sättigungsspannung ¹⁾						
$I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$	MMBT2222	V_{CEsat}		–	–	400 mV
	MMBT2222A	V_{CEsat}		–	–	300 mV
$I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$	MMBT2222	V_{CEsat}		–	–	1.6 V
	MMBT2222A	V_{CEsat}		–	–	1 V

¹⁾ Mounted on P.C. board with 3 mm² copper pad at each terminal
 Montage auf Leiterplatte mit 3 mm² Kupferbelag (Löt-pad) an jedem Anschluß

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

			Min.	Typ.	Max.
Base saturation voltage – Basis-Sättigungsspannung ¹⁾					
I _C = 150 mA, I _B = 15 mA	MMBT2222	V _{BEsat}	–	–	1.3 V
	MMBT2222A	V _{BEsat}	600 mV	–	1.2 V
I _C = 500 mA, I _B = 50 mA	MMBT2222	V _{BEsat}	–	–	2.6 V
	MMBT2222A	V _{BEsat}	–	–	2 V
DC current gain – Kollektor-Basis-Stromverhältnis ¹⁾					
V _{CE} = 10 V, I _C = 0.1 mA		h _{FE}	35	–	–
V _{CE} = 10 V, I _C = 1 mA		h _{FE}	50	–	–
V _{CE} = 10 V, I _C = 10 mA		h _{FE}	75	–	–
V _{CE} = 10 V, I _C = 150 mA		h _{FE}	100	–	300
V _{CE} = 1 V, I _C = 150 mA		h _{FE}	50	–	–
V _{CE} = 10 V, I _C = 500 mA		h _{FE}	40	–	–
h-Parameters at V _{CE} = 10V, f = 1 kHz, I _C = 1 mA / 10 mA ²⁾					
Small signal current gain	MMBT2222	h _{fe}	50	–	300
Kleinsignal-Stromverstärkung	MMBT2222A	h _{fe}	75	–	375
Input impedance	MMBT2222	h _{ie}	2 kΩ	–	8 kΩ
Eingangs-Impedanz	MMBT2222A	h _{ie}	0.25 kΩ	–	1.25 kΩ
Output admittance	MMBT2222	h _{oe}	5 μS	–	35 μS
Ausgangs-Leitwert	MMBT2222A	h _{oe}	25 μS	–	200 μS
Gain-Bandwidth Product – Transittfrequenz					
V _{CE} = 10 V, I _C = 10 mA, f = 100 MHz		f _T	250 MHz	–	–
Collector-Base Capacitance – Kollektor-Basis-Kapazität					
V _{CB} = 10 V, I _E = i _e = 0, f = 1 MHz		C _{CB0}	–	4 pF	8 pF
Emitter-Base Capacitance – Emitter-Basis-Kapazität					
V _{EB} = 0.5 V, I _C = i _c = 0, f = 1 MHz		C _{EB0}	–	20 pF	25 pF
Noise figure – Rauschzahl					
V _{CE} = 10 V, I _C = 100 μA, R _S = 1 kΩ, f = 1 kHz	MMBT2222A	F	–	–	4 dB
Switching times – Schaltzeiten					
delay time	V _{CC} = 30 V, - V _{BE} = 0.5 V	t _d	–	–	10 ns
rise time	I _C = 150 mA, I _{B1} = 15 mA	t _r	–	–	25 ns
storage time	V _{CC} = 30 V, I _C = 150 mA	t _s	–	–	225 ns
fall time	I _{B1} = - I _{B2} = 15 mA	t _f	–	–	60 ns
Thermal resistance junction to ambient air Wärmewiderstand Sperrschicht – umgebende Luft			R _{thA}	420 K/W ³⁾	
Recommended complementary PNP transistors Empfohlene komplementäre PNP-Transistoren			MMBT2907, MMBT2907A		
Marking - Stempelung			MMBT2222 = (M)1B	MMBT2222A = 1P	

¹⁾ Tested with pulses $t_p = 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$ – Gemessen mit Impulsen $t_p = 300\text{ }\mu\text{s}$, Schaltverhältnis $\leq 2\%$

²⁾ MMBT2222: $I_C = 1\text{ mA}$, MMBT2222A: $I_C = 10\text{ mA}$

³⁾ Mounted on P.C. board with 3 mm² copper pad at each terminal
Montage auf Leiterplatte mit 3 mm² Kupferbelag (Lötpad) an jedem Anschluß