

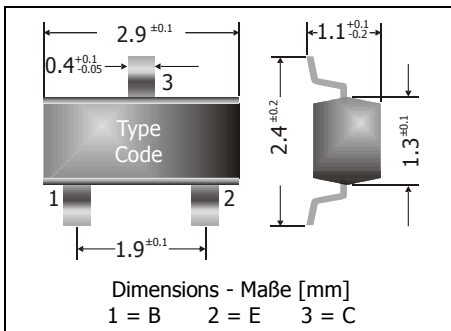
## MMBT2222A

NPN

**Surface Mount Si-Epi-Planar Switching Transistors**  
**Si-Epi-Planar Schalttransistoren für die Oberflächenmontage**

NPN

Version 2015-05-12



Power dissipation – Verlustleistung

250 mW

Plastic case  
KunststoffgehäuseSOT-23  
(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 getupet auf Rolle

### Maximum ratings (T<sub>A</sub> = 25°C)

### Grenzwerte (T<sub>A</sub> = 25°C)

			MMBT2222A
Collector-Emitter-volt. – Kollektor-Emitter-Spannung	B open	V <sub>CEO</sub>	40 V
Collector-Base-voltage – Kollektor-Basis-Spannung	E open	V <sub>CB0</sub>	75 V
Emitter-Base-voltage – Emitter-Basis-Spannung	C open	V <sub>EB0</sub>	6 V
Power dissipation – Verlustleistung		P <sub>tot</sub>	250 mW <sup>1)</sup>
Collector current – Kollektorstrom (dc)		I <sub>C</sub>	600 mA
Junction temperature – Sperrschichttemperatur		T <sub>j</sub>	-55...+150°C
Storage temperature – Lagerungstemperatur		T <sub>S</sub>	-55...+150°C

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

### Kennwerte (T<sub>j</sub> = 25°C)

			Min.	Typ.	Max.
DC current gain – Kollektor-Basis-Stromverhältnis <sup>2)</sup>					
I <sub>C</sub> = 0.1 mA, V <sub>CE</sub> = 10 V		h <sub>FE</sub>	35	–	–
I <sub>C</sub> = 1 mA, V <sub>CE</sub> = 10 V		h <sub>FE</sub>	50	–	–
I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 10 V		h <sub>FE</sub>	75	–	–
I <sub>C</sub> = 150 mA, V <sub>CE</sub> = 10 V		h <sub>FE</sub>	100	–	300
I <sub>C</sub> = 500 mA, V <sub>CE</sub> = 10 V <sup>2)</sup>	MMBT2222A	h <sub>FE</sub>	40	–	–
h-Parameters at/bei V <sub>CE</sub> = 10 V, f = 1 kHz, I <sub>C</sub> = 1 mA / 10 mA					
Small signal current gain Kleinsignal-Stromverstärkung	MMBT2222A	h <sub>fe</sub>	75	–	375
Input impedance – Eingangs-Impedanz	MMBT2222A	h <sub>ie</sub>	0.25 kΩ	–	1.25 kΩ
Output admittance – Ausgangs-Leitwert	MMBT2222A	h <sub>oe</sub>	25 μS	–	200 μS

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<sub>p</sub> = 300 μs, duty cycle ≤ 2% – Gemessen mit Impulsen t<sub>p</sub> = 300 μs, Schaltverhältnis ≤ 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	MMBT2222A	V <sub>CEsat</sub>	–	–	0.3 V
I <sub>C</sub> = 500 mA, I <sub>B</sub> = 50 mA	MMBT2222A	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	MMBT2222A	V <sub>BEsat</sub>	0.65 V	–	1.2 V
I <sub>C</sub> = 500 mA, I <sub>B</sub> = 50 mA	MMBT2222A	V <sub>BEsat</sub>	–	–	2.0 V
Collector-Base cutoff current – Kollektor-Basis-Reststrom					
V <sub>CB</sub> = 60 V, (E open)	MMBT2222A	I <sub>CBO</sub>	–	–	10 nA
V <sub>CB</sub> = 60 V, T <sub>j</sub> = 125°C, (E open)	MMBT2222A	I <sub>CBO</sub>	–	–	10 µA
Emitter-Base cutoff current – Emitter-Basis-Reststrom					
V <sub>EB</sub> = 3 V, (C open)	MMBT2222A	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>	–	–	25 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	MMBT2222A	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	t <sub>d</sub>	–	–	10 ns
rise time	I <sub>C</sub> = 150 mA, I <sub>B1</sub> = 15 mA	t <sub>r</sub>	–	–	25 ns
storage time	V <sub>CC</sub> = 3 V, I <sub>C</sub> = 150 mA,	t <sub>s</sub>	–	–	225 ns
fall time	I <sub>B1</sub> = I <sub>B2</sub> = 15 mA	t <sub>f</sub>	–	–	60 ns
Thermal resistance junction to ambient air Wärmewiderstand Sperrschicht – umgebende Luft			R <sub>thA</sub>	< 420 K/W <sup>1)</sup>	
Recommended complementary PNP transistors Empfohlene komplementäre PNP-Transistoren			MMBT2709A		
Marking - Stempelung			MMBT2222A = 1P		

<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 (Löt-pad) an jedem Anschluss