SILICON EPITAXIAL TRANSISTORS

N-P-N transistors in a microminiature (SMD) plastic package intended for surface mounted applications. They are primarily intended for use in telephony and professional communication equipment.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	60 V
Collector-emitter voltage (open base)	V_{CEO}	max.	40 V
Emitter-base voltage (open collector)	V_{EBO}	max.	6 V
Collector current (DC)	I_C	max.	200 mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	250 mW
DC current gain I_C = 10 mA; V_{CE} = 1 V	h_{FE}	> <	100 300
Transition frequency at f = 35 MHz I_C = 10 mA; V_{CE} = 20 V	f_T	>	300 MHz

MECHANICAL DATA

Fig.1 SOT-23.

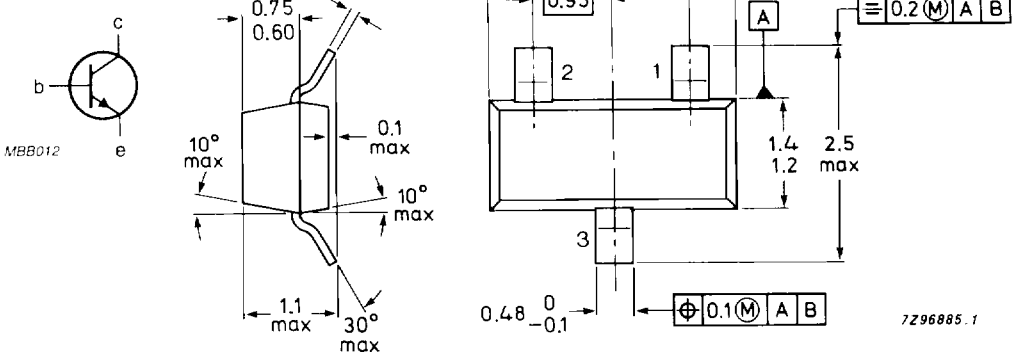
Dimensions in mm

Marking code

PMBT3904: p1A

Pinning:

1 = base
2 = emitter
3 = collector



TOP VIEW

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	60	V
Collector-emitter voltage (open base)	V_{CEO}	max.	40	V
Emitter-base voltage (open collector)	V_{EBO}	max.	6	V
Collector current (d.c.)	I_C	max.	200	mA
Total power dissipation* up to T_{amb} = 25 °C	P_{tot}	max.	250	mW
Storage temperature	T_{stg}		−65 to +150	°C
Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

$T_j = P\,(R_{th\ j\text{-}t} + R_{th\ t\text{-}s} + R_{th\ s\text{-}a}) + T_{amb}$

Thermal resistance from junction to ambient*	$R_{th\ j\text{-}a}$	=	500	K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Collector-emitter breakdown voltage▲ I_C = 1 mA; I_B = 0	$V_{(BR)CEO}$	min.	40	V
Collector-base breakdown voltage I_C = 10 μA; I_E = 0	$V_{(BR)CBO}$	min.	60	V
Emitter-base breakdown voltage I_E = 10 μA; I_C = 0	$V_{(BR)EBO}$	min.	6	V
Collector cut-off current V_{CE} = 30 V; V_{EB} = 3 V	I_{CEX}	max.	50	nA
Output capacitance at f = 1 MHz I_E = 0; V_{CB} = 5 V	C_c	max.	4	pF
Input capacitance at f = 1 MHz I_C = 0; V_{BE} = 0,5 V	C_e	max.	8	pF
Base current with reverse biased emitter junction V_{EB} = 3 V; V_{CE} = 30 V	I_{BEX}	max.	50	nA

* Mounted on an FR4 printed-circuit board 8 mm x 10 mm x 0.7 mm.

▲ Pulse test conditions: t_p = 300 μs; duty cycle ≤ 2%.

Saturation voltages			
I_C = 10 mA; I_B = 1 mA	V_{CEsat}	max.	0.2 V
I_C = 50 mA; I_B = 5 mA	V_{CEsat}	max.	0.3 V
I_C = 10 mA; I_B = 1 mA	V_{BEsat}	min.	0.65 V
	V_{BEsat}	max.	0.85 V
I_C = 50 mA; I_B = 5 mA	V_{BEsat}	max.	0.95 V
D.C. current gain *			
I_C = 0,1 mA; V_{CE} = 1 V	h_{FE}	>	40
I_C = 1 mA; V_{CE} = 1 V	h_{FE}	>	70
I_C = 10 mA; V_{CE} = 1 V	h_{FE}	>	100
	h_{FE}	<	300
I_C = 50 mA; V_{CE} = 1 V	h_{FE}	>	60
I_C = 100 mA; V_{CE} = 1 V	h_{FE}	>	30
Transition frequency at f = 100 MHz			
I_C = 10 mA; V_{CE} = 20 V	f_T	min.	300 MHz
Noise figure at R_S = 1 kΩ			
I_C = 100 μA; V_{CE} = 5 V			
f = 10 Hz to 15,7 kHz	F	max.	5 dB
Switching times			
Turn-on time when V_{CC} = 3 V; V_{BE} = 0,5 V			
I_C = 10 mA; I_{Bon} = 1 mA			
Delay time	t_d	<	35 ns
Rise time	t_r	<	35 ns
Turn-off time when V_{CC} = 3 V; I_C = 10 mA			
I_{Bon} = I_{Boff} = 1 mA			
Storage time	t_s	<	200 ns
Fall time	t_f	<	50 ns

* Pulse test conditions: t_p = 300 μs; duty cycle ≤ 2%.