PMBTA44

400 V, 0.3 A NPN high-voltage low VCEsat transistor

1 January 2023 **Product data sheet**

1. General description

NPN high-voltage low V_{CEsat} transistor in a SOT23 (TO-236AB) small Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Low current (max. 300 mA)
- High voltage (max. 400 V)

3. Applications

- LED driver for LED chain module
- LCD backlighting
- High Intensity Discharge (HID) front lighting
- Hook switch for wired telecom
- Switch Mode Power Supply (SMPS)

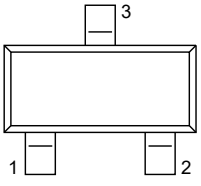
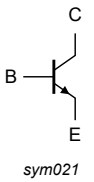
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	400	V
I_C	collector current			-	-	300	mA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 10 mA; T_{amb} = 25 °C		50	-	200	

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 SOT23	 sym021
2	E	emitter		
3	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMBTA44	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	SOT23

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
PMBTA44	W3%

[1] % = placeholder for manufacturing site code

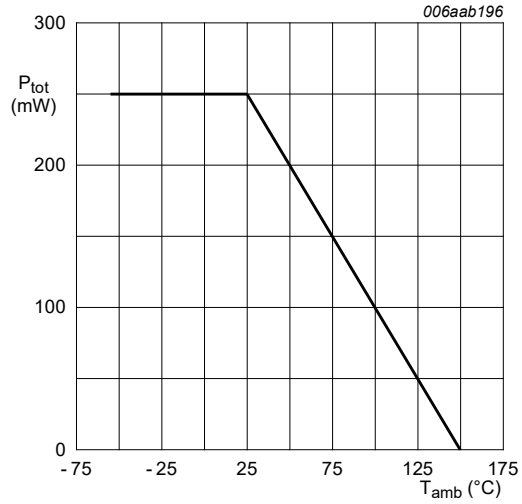
8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	500	V
V_{CEO}	collector-emitter voltage	open base		-	400	V
V_{EBO}	emitter-base voltage	open collector		-	6	V
I_C	collector current			-	300	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	300	mA
I_{BM}	peak base current			-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	250	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.



FR4 PCB, standard footprint

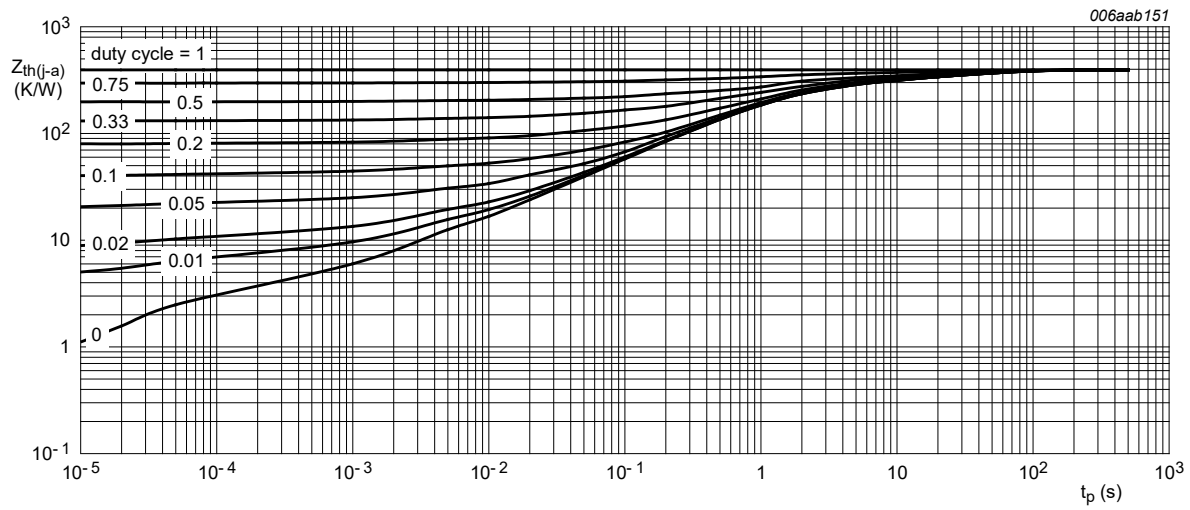
Fig. 1. Power derating curve SOT23 (TO-236AB)

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	500	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.



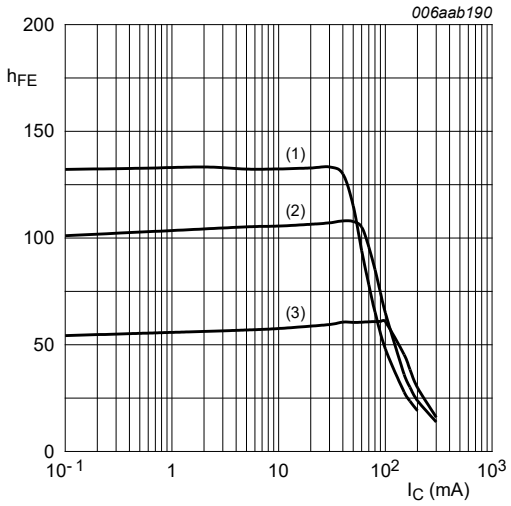
FR4 PCB, standard footprint

Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

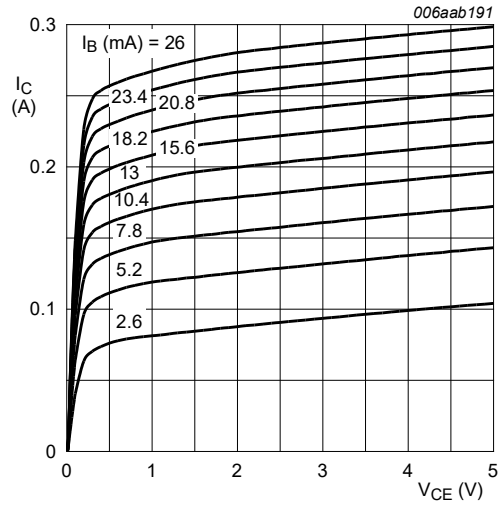
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 320 V; I_E = 0 A; T_{amb} = 25 °C		-	-	100	nA
		V_{CB} = 320 V; I_E = 0 A; T_j = 150 °C		-	-	10	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = 4 V; I_C = 0 A; T_{amb} = 25 °C		-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 10 mA; T_{amb} = 25 °C		50	-	200	
		V_{CE} = 10 V; I_C = 50 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		45	-	-	
		V_{CE} = 10 V; I_C = 100 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		40	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 1 mA; I_B = 0.1 mA; T_{amb} = 25 °C		-	-	400	mV
		I_C = 10 mA; I_B = 1 mA; T_{amb} = 25 °C		-	-	500	mV
		I_C = 50 mA; I_B = 5 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	-	750	mV
V_{BEsat}	base-emitter saturation voltage	I_C = 10 mA; I_B = 1 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		-	-	850	mV
f_T	transition frequency	V_{CE} = 10 V; I_C = 10 mA; f = 100 MHz; T_{amb} = 25 °C		20	-	-	MHz
C_c	collector capacitance	V_{CB} = 20 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	-	7	pF
C_e	emitter capacitance	V_{EB} = 0.5 V; I_C = 0 A; i_c = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	-	180	pF



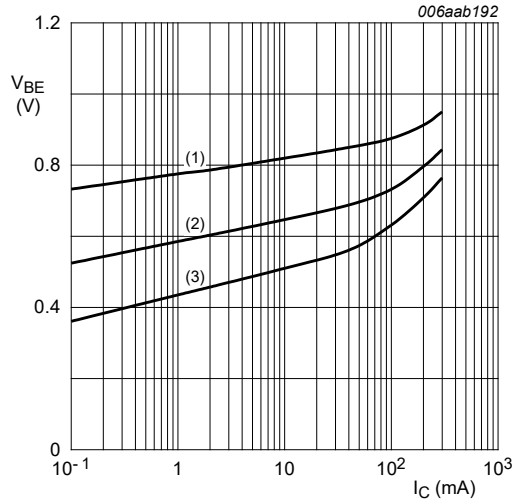
V_{CE} = 10 V
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 3. DC current gain as a function of collector current; typical values



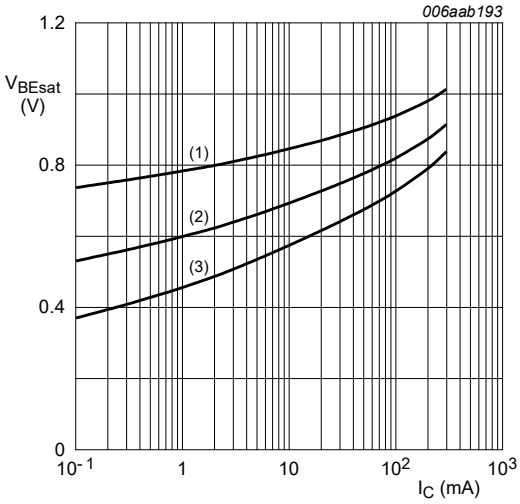
T_{amb} = 25 °C

Fig. 4. Collector current as a function of collector-emitter voltage; typical values



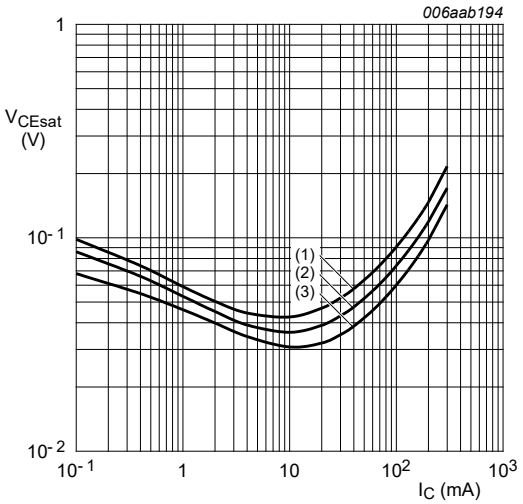
V_{CE} = 10 V
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

Fig. 5. Base-emitter voltage as a function of collector current; typical values



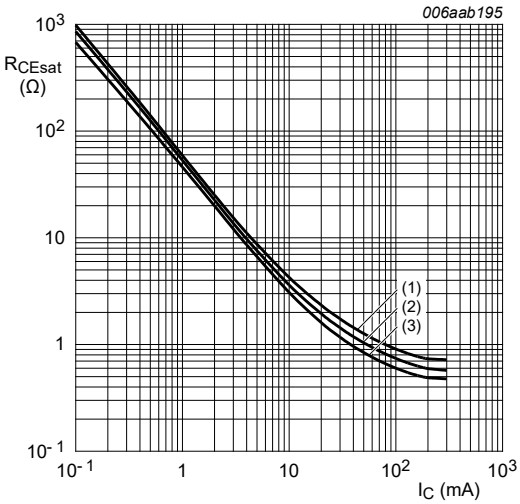
I_C/I_B = 5
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

Fig. 6. Base-emitter saturation voltage as a function of collector current; typical values



I_C/I_B = 5
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 7. Collector-emitter saturation voltage as a function of collector current; typical values



I_C/I_B = 5
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 8. Collector-emitter saturation resistance as a function of collector current; typical values

11. Package outline

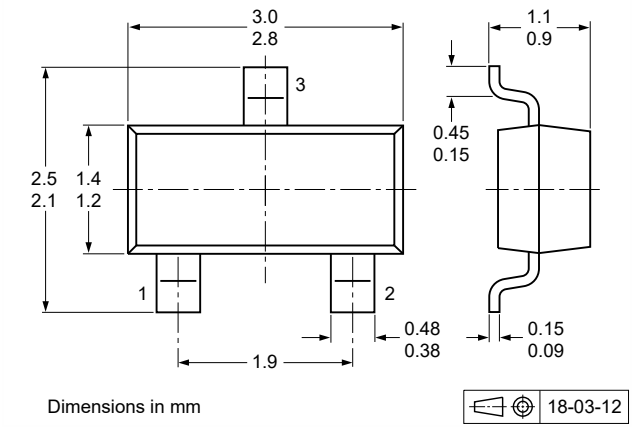


Fig. 9. Package outline SOT23

12. Soldering

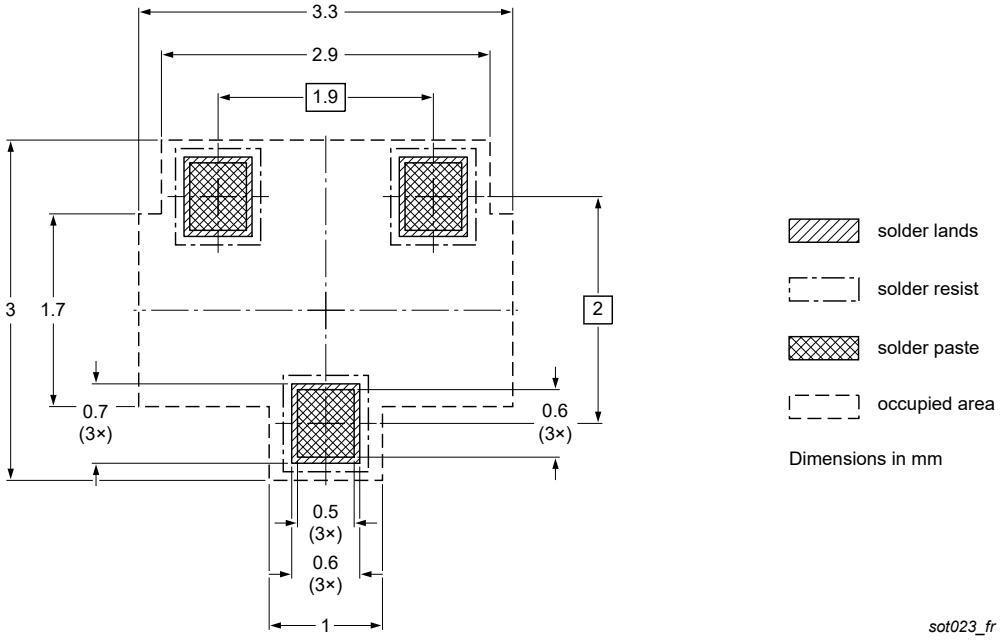


Fig. 10. Reflow soldering footprint for SOT23

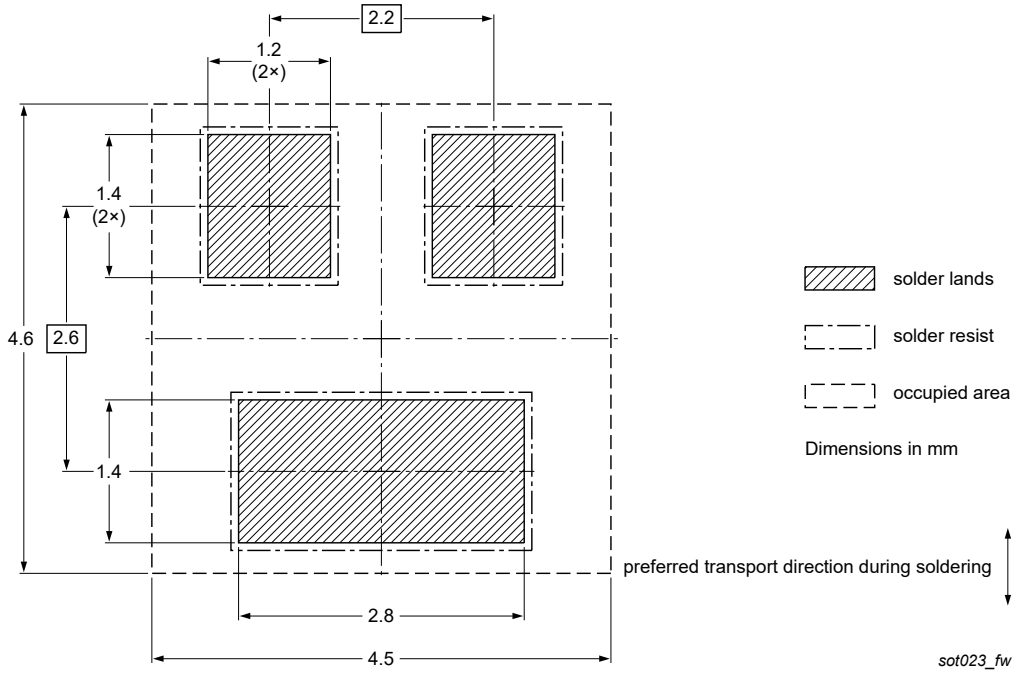


Fig. 11. Wave soldering footprint for SOT23

13. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMBTA44 v.2	20230101	Product data sheet	-	PMBTA44 v.1
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate. • Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).			
PMBTA44 v.1	20080222	Product data sheet	-	-

14. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
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