

# PMBTA44

400 V, 0.3 A NPN high-voltage low  $V_{CEsat}$  (BISS) transistor

Rev. 01 — 22 February 2008

Product data sheet

## 1. Product profile

### 1.1 General description

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

### 1.2 Features

- Low current (max. 300 mA)
- High voltage (max. 400 V)
- AEC-Q101 qualified

### 1.3 Applications

- LED driver for LED chain module
- LCD backlighting
- High Intensity Discharge (HID) front lighting
- Automotive motor management
- Hook switch for wired telecom
- Switch mode power supply

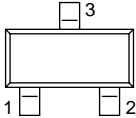
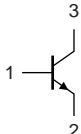
### 1.4 Quick reference data

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	$V_{CE} = 10\text{ V}; I_C = 10\text{ mA}$	50	-	200	

## 2. Pinning information

**Table 2. Pinning**

Pin	Description	Simplified outline	Symbol
1	base		
2	emitter		
3	collector		

*sym021*

## 3. Ordering information

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
PMBTA44	-	plastic surface-mounted package; 3 leads	SOT23

## 4. Marking

**Table 4. Marking codes**

Type number	Marking code <sup>[1]</sup>
PMBTA44	W3*

- [1] \* = -: made in Hong Kong  
 \* = p: made in Hong Kong  
 \* = t: made in Malaysia  
 \* = W: made in China

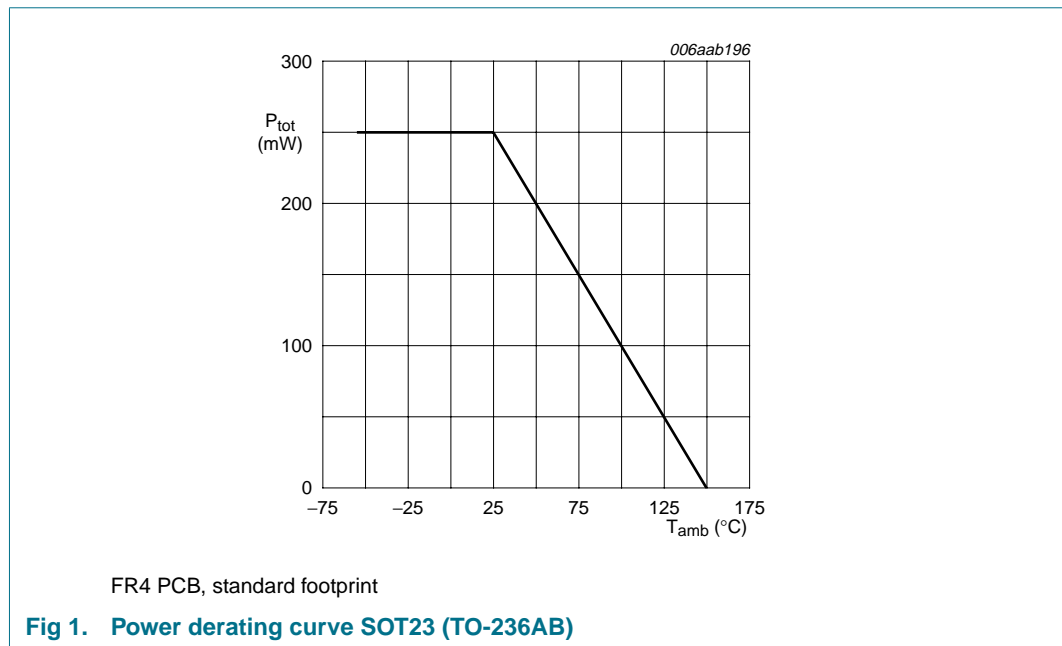
## 5. Limiting values

**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	single pulse; $t_p \leq 1$ ms	-	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 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

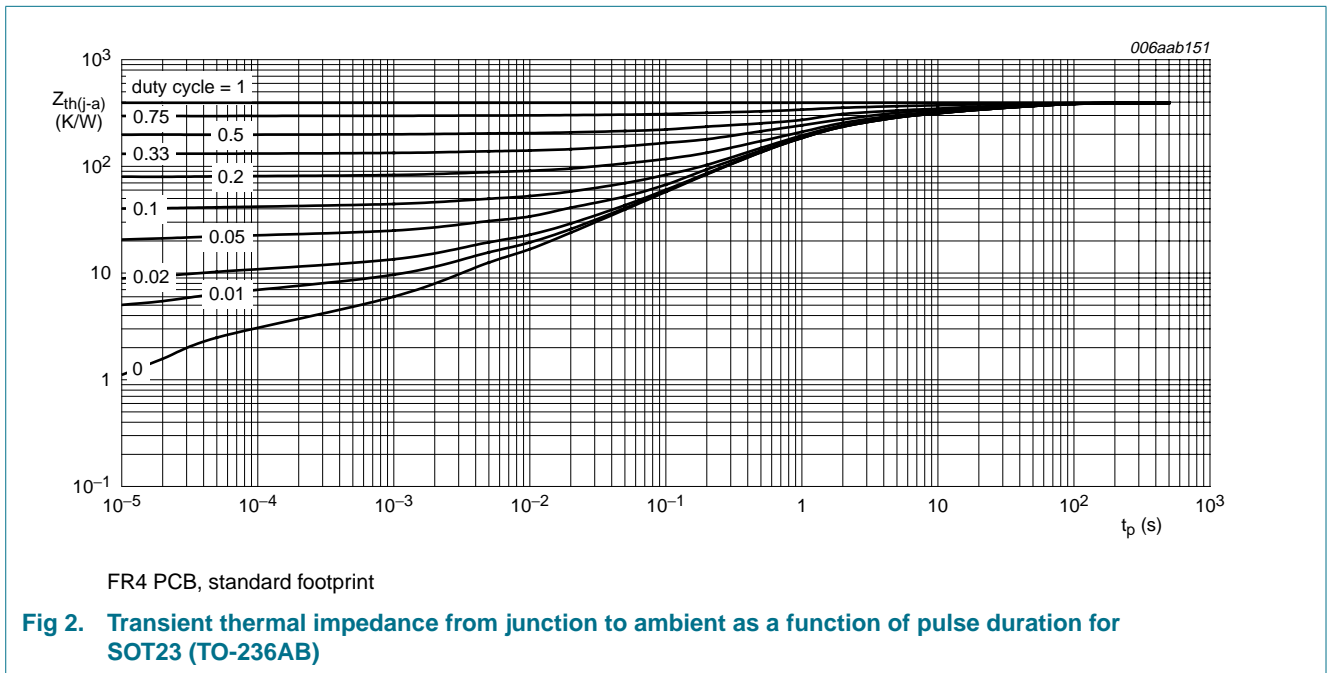


## 6. Thermal characteristics

**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.



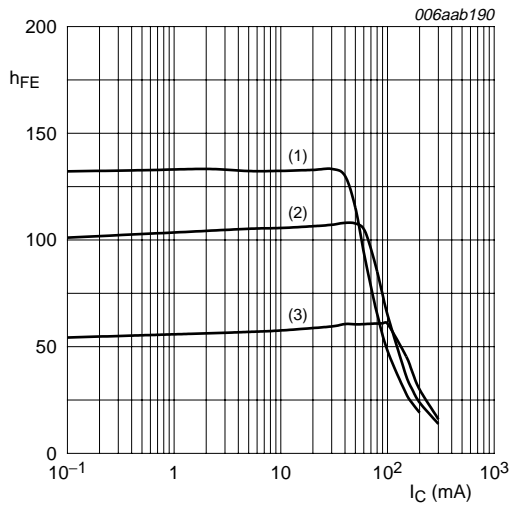
## 7. Characteristics

**Table 7. Characteristics**

$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

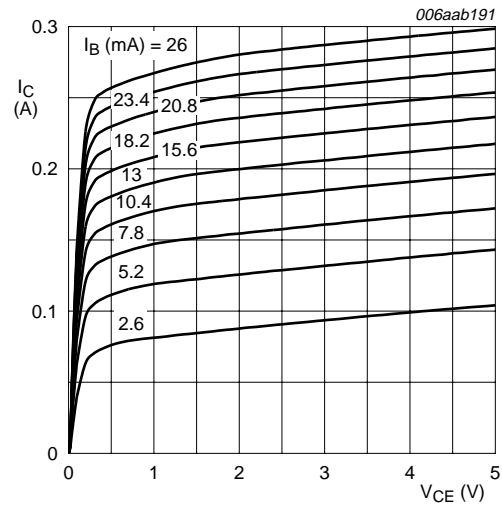
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 320\text{ V}; I_E = 0\text{ A}$	-	-	100	nA
		$V_{CB} = 320\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	10	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 4\text{ V}; I_C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

[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$ .



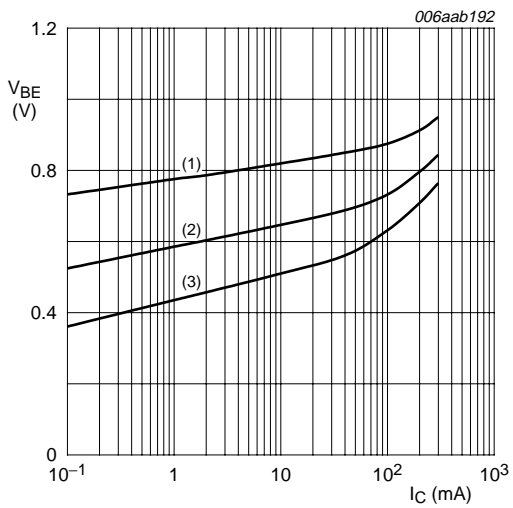
$V_{CE} = 10\text{ V}$   
 (1)  $T_{amb} = 100^\circ C$   
 (2)  $T_{amb} = 25^\circ C$   
 (3)  $T_{amb} = -55^\circ C$

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



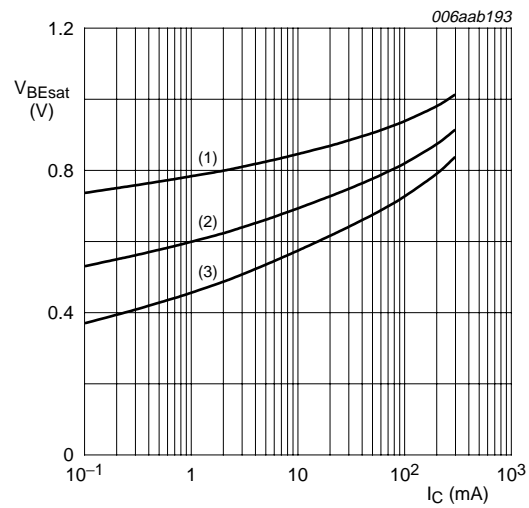
$T_{amb} = 25^\circ C$

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



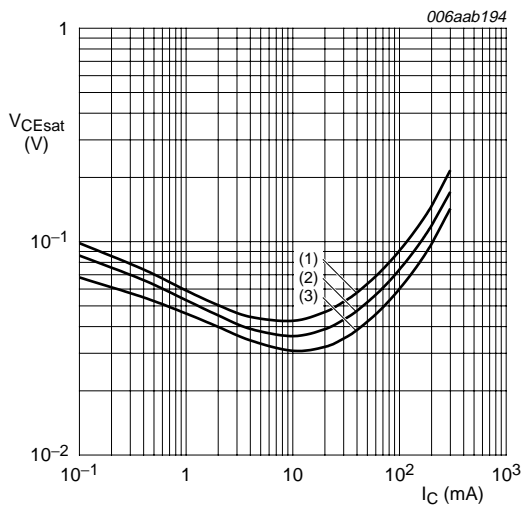
$V_{CE} = 10\text{ V}$   
 (1)  $T_{amb} = -55^\circ C$   
 (2)  $T_{amb} = 25^\circ C$   
 (3)  $T_{amb} = 100^\circ C$

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



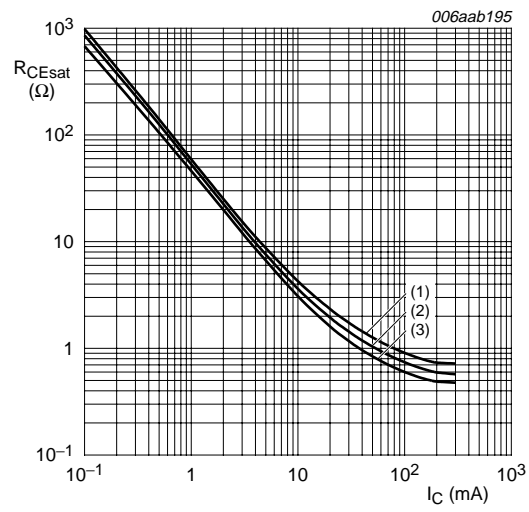
$I_C/I_B = 5$   
 (1)  $T_{amb} = -55^\circ C$   
 (2)  $T_{amb} = 25^\circ C$   
 (3)  $T_{amb} = 100^\circ C$

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



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

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



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

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

## 8. Test information

### 8.1 Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

## 9. Package outline

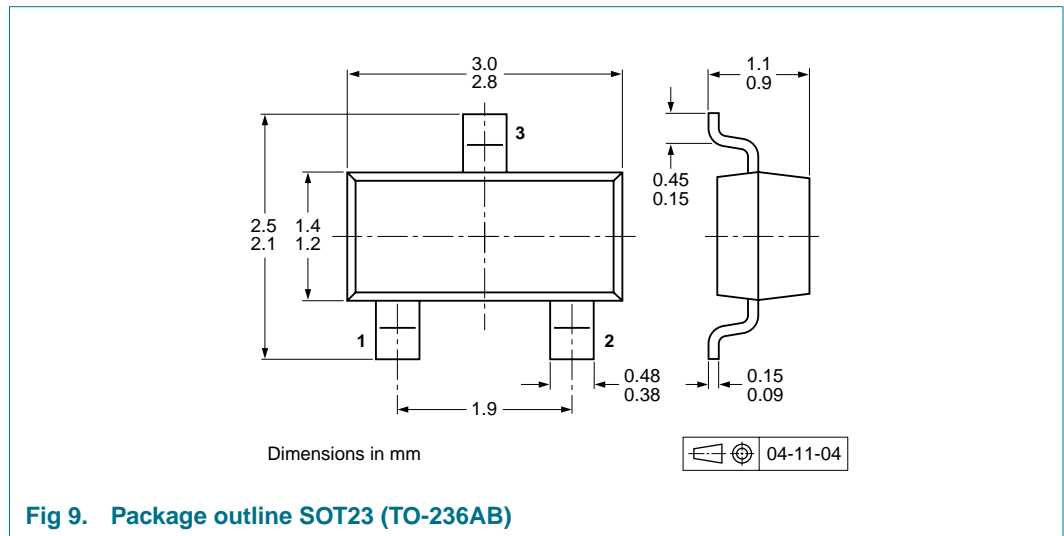


Fig 9. Package outline SOT23 (TO-236AB)

## 10. Packing information

**Table 8. Packing methods**

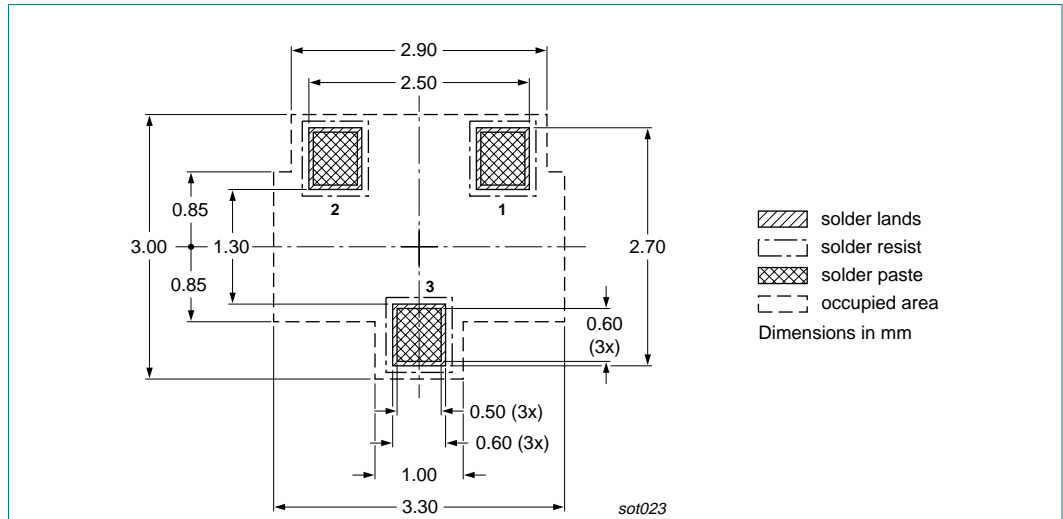
The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

Type number	Package	Description	Packing quantity	
			3000	10000
PMBTA44	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235

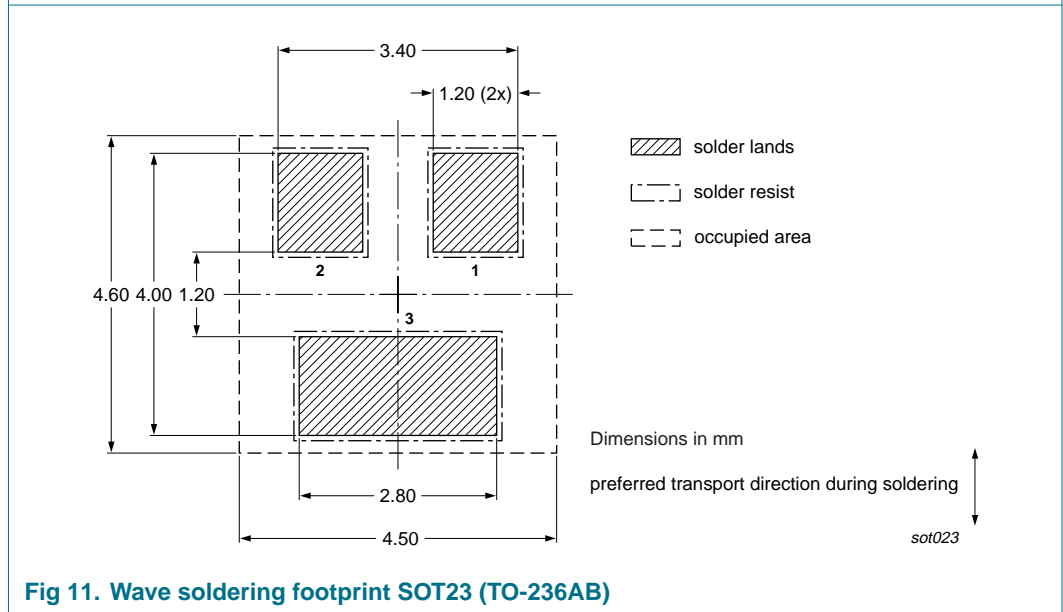
[1] For further information and the availability of packing methods, see [Section 14](#).



## 11. Soldering



**Fig 10. Reflow soldering footprint SOT23 (TO-236AB)**



**Fig 11. Wave soldering footprint SOT23 (TO-236AB)**

## 12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMBTA44_1	20080222	Product data sheet	-	-

## 13. Legal information

### 13.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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.

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[2] The term 'short data sheet' is explained in section "Definitions".

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**Телефон:** +7 812 627 14 35

**Электронная почта:** [sales@st-electron.ru](mailto:sales@st-electron.ru)

**Адрес:** 198099, Санкт-Петербург,  
Промышленная ул, дом № 19, литера Н,  
помещение 100-Н Офис 331