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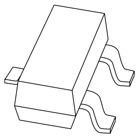


PMBTA45

500 V, 150 mA NPN high-voltage low V_{CEsat} (BISS) transistor

Rev. 02 — 10 March 2010

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.

PNP complement: PBHV9050T.

1.2 Features and benefits

- High voltage
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High collector current gain (h_{FE}) at high I_C
- AEC-Q101 qualified

1.3 Applications

- Electronic ballasts
- LED driver for LED chain module
- LCD backlighting
- Automotive motor management
- Flyback converters
- Hook switch for wired telecom
- Switch Mode Power Supply (SMPS)

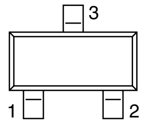
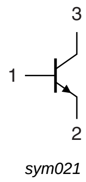
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CESM}	collector-emitter peak voltage	V_{BE} = 0 V	-	-	500	V
V_{CEO}	collector-emitter voltage	open base	-	-	500	V
I_C	collector current		-	-	0.15	A
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 30 mA	50	100	-	

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	base		
2	emitter		
3	collector		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMBTA45	-	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code[1]
PMBTA45	LK*

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

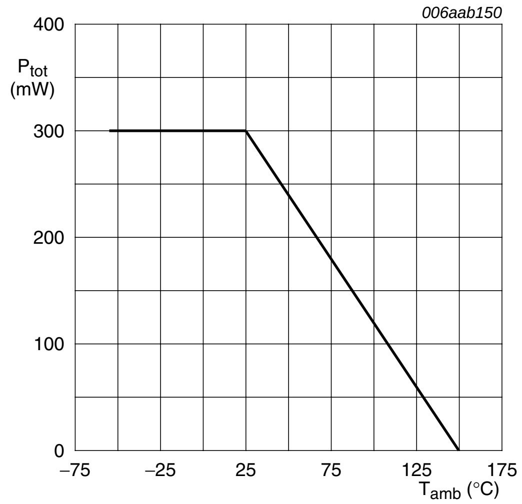
5. Limiting values

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		-	500	V
V_{CESM}	collector-emitter peak voltage	V_{BE} = 0 V		-	500	V
V_{EBO}	emitter-base voltage	open collector		-	6	V
I_C	collector current			-	0.15	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	0.5	A
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms		-	200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	300	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.



FR4 PCB, standard footprint

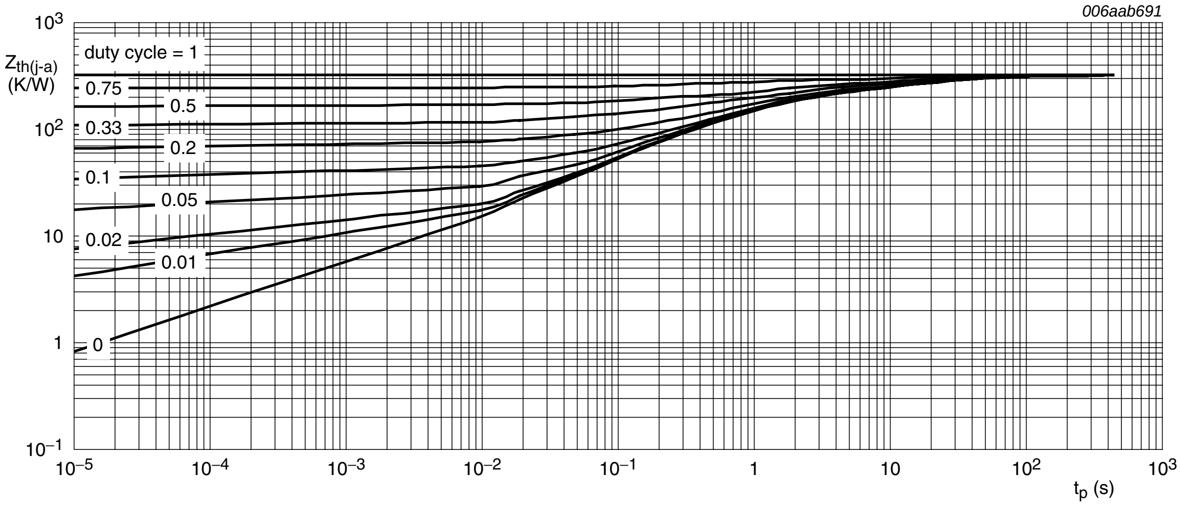
Fig 1. Power derating curve

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]	-	-	417	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	70	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

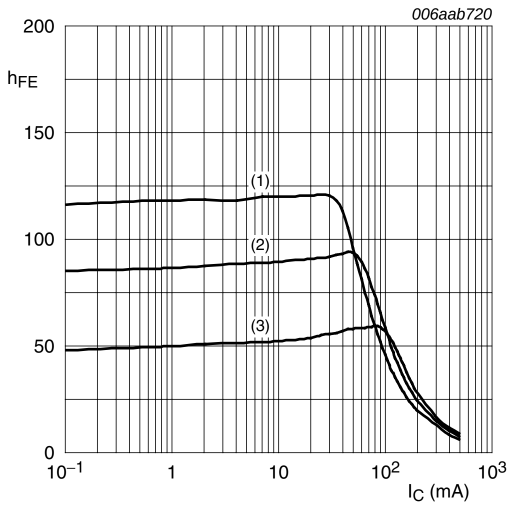
7. Characteristics

Table 7. Characteristics

T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 360 V; I_E = 0 A		-	-	100	nA
		V_{CB} = 360 V; I_E = 0 A; T_j = 150 °C		-	-	10	µA
I_{CES}	collector-emitter cut-off current	V_{CE} = 360 V; V_{BE} = 0 V		-	-	100	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A		-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 10 V					
		I_C = 30 mA		50	100	-	
		I_C = 50 mA	[1]	50	100	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 20 mA; I_B = 2 mA		-	60	75	mV
		I_C = 50 mA; I_B = 6 mA	[1]	-	65	90	mV
V_{BEsat}	base-emitter saturation voltage	I_C = 50 mA; I_B = 5 mA	[1]	-	0.75	0.9	V
f_T	transition frequency	V_{CE} = 10 V; I_E = 10 mA; f = 100 MHz		-	35	-	MHz
C_c	collector capacitance	V_{CB} = 20 V; I_E = i_e = 0 A; f = 1 MHz		-	4	-	pF
C_e	emitter capacitance	V_{EB} = 0.5 V; I_C = i_c = 0 A; f = 1 MHz		-	200	-	pF
t_d	delay time	V_{CC} = 20 V; I_C = 0.05 A; I_{Bon} = 5 mA; I_{Boff} = −10 mA		-	80	-	ns
t_r	rise time			-	2700	-	ns
t_{on}	turn-on time			-	2780	-	ns
t_s	storage time			-	3400	-	ns
t_f	fall time			-	800	-	ns
t_{off}	turn-off time			-	4200	-	ns

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$.



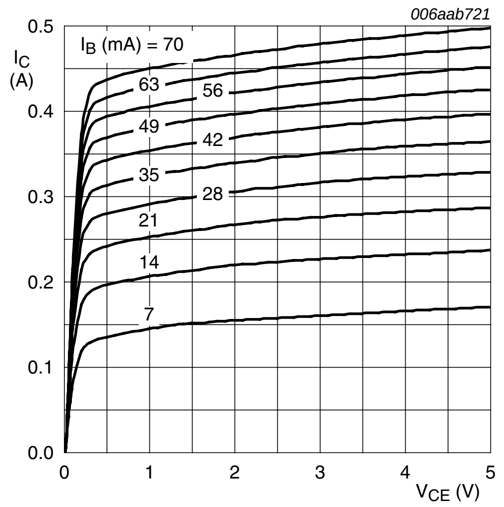
V_{CE} = 10 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

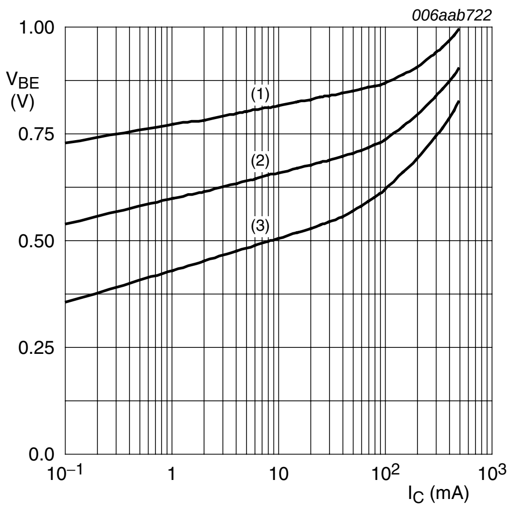
(3) T_{amb} = −55 °C

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



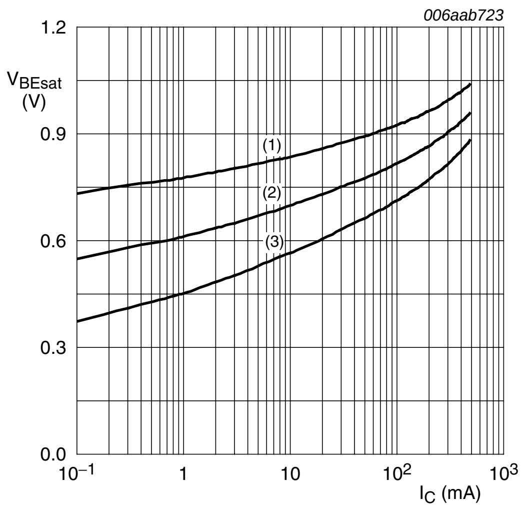
V_{CE} = 10 V

(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



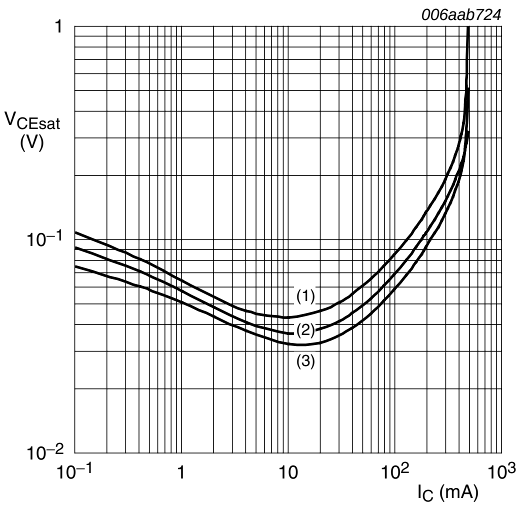
I_C/I_B = 5

(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



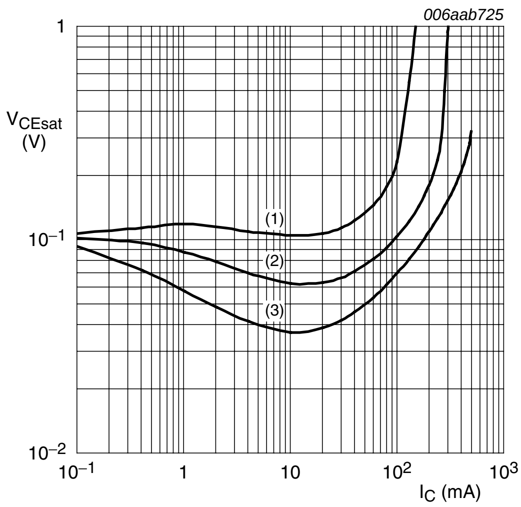
I_C/I_B = 5

(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



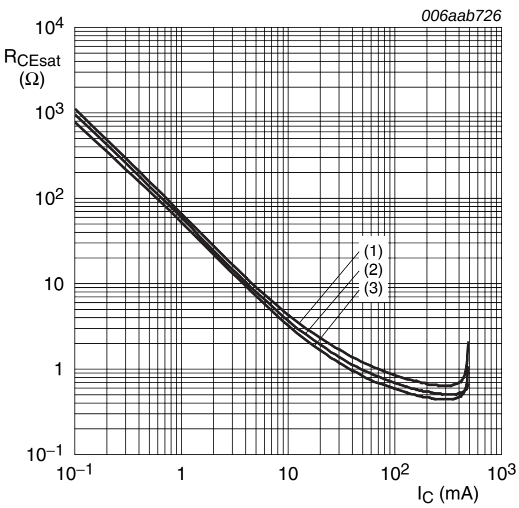
T_{amb} = 25 °C

(1) I_C/I_B = 20

(2) I_C/I_B = 10

(3) I_C/I_B = 5

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



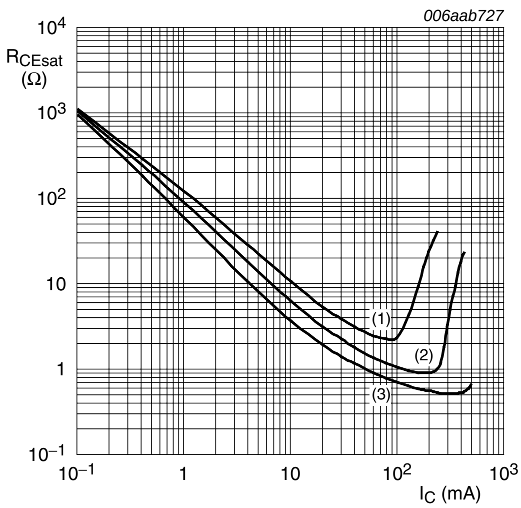
I_C/I_B = 5

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

Fig 9. Collector-emitter saturation resistance as a function of collector current; typical values



T_{amb} = 25 °C

(1) I_C/I_B = 20

(2) I_C/I_B = 10

(3) I_C/I_B = 5

Fig 10. Collector-emitter saturation resistance as a function of collector current; typical values

8. Test information

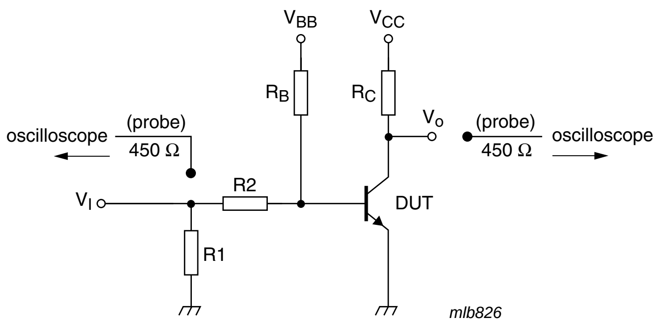


Fig 11. Test circuit for switching times

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

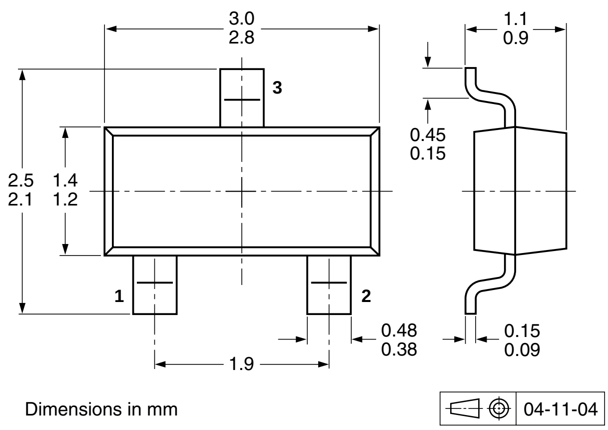


Fig 12. Package outline SOT23 (TO-236AB)

10. Packing information

Table 8. Packing methods

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

Type number	Package	Description	Packing quantity	
			3000	10000
PMBTA45	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

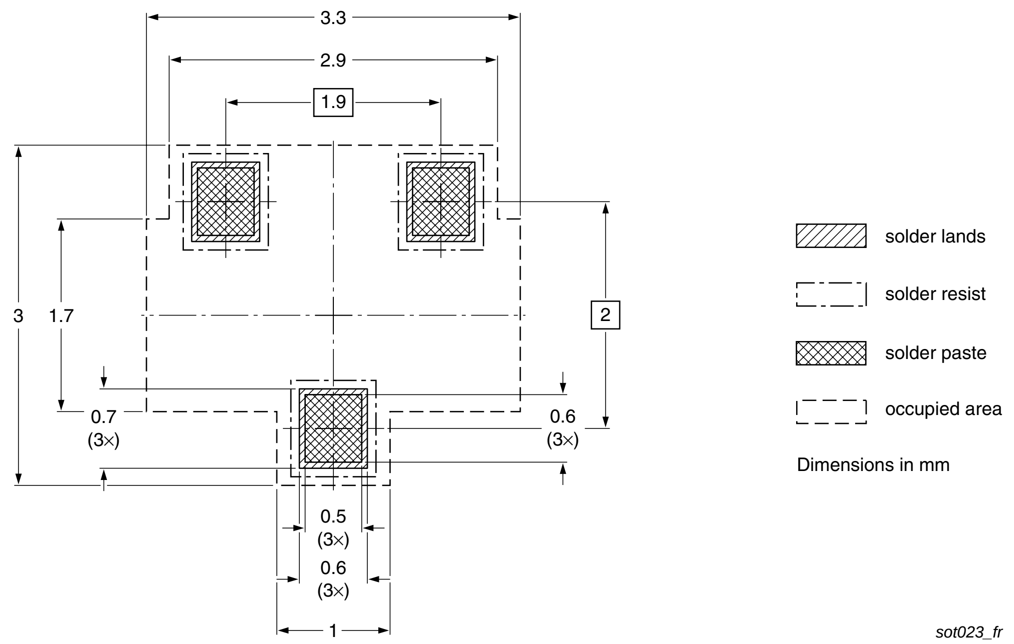


Fig 13. Reflow soldering footprint SOT23 (TO-236AB)

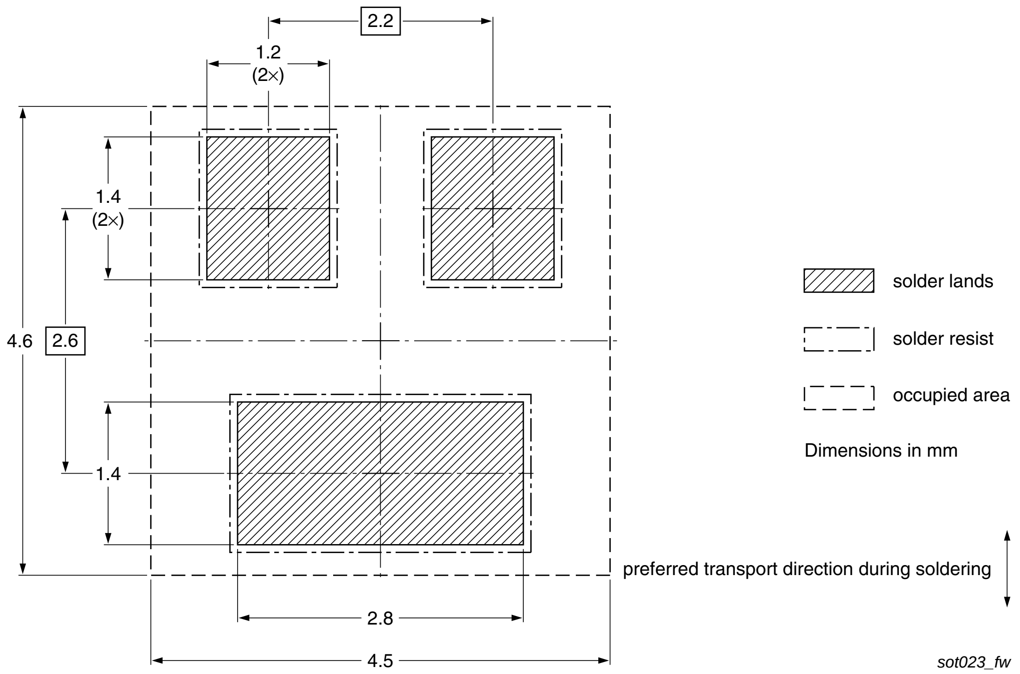


Fig 14. Wave soldering footprint SOT23 (TO-236AB)

12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMBTA45_2	20100310	Product data sheet	-	PMBTA45_1
Modifications:	• Figure 7: updated			
PMBTA45_1	20090916	Product data sheet	-	-

13. Legal information

13.1 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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15. Contents

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Document identifier: PMBTA45_2