



PBHV9050T

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

Rev. 01 — 16 September 2009

Product data sheet

1. Product profile

1.1 General description

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

NPN complement: PMBTA45.

1.2 Features

- 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)

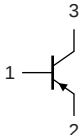
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CESM}	collector-emitter peak voltage	$V_{BE} = 0\text{ V}$	-	-	-500	V
V_{CEO}	collector-emitter voltage	open base	-	-	-500	V
I_C	collector current		-	-	-0.15	A
h_{FE}	DC current gain	$V_{CE} = -10\text{ V};$ $I_C = -50\text{ mA}$	80	160	300	

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	base		 <i>sym013</i>
2	emitter		
3	collector		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBHV9050T	-	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PBHV9050T	LL *

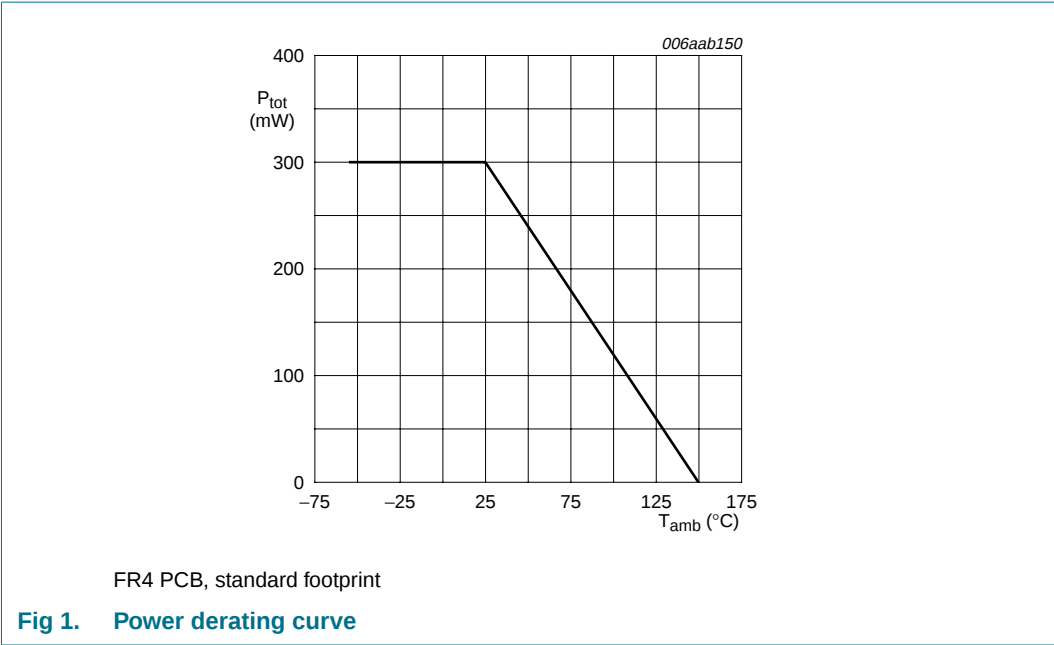
- [1] * = -: made in Hong Kong
* = p: made in Hong Kong
* = t: made in Malaysia
* = W: made in China

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	$V_{BE} = 0\text{ V}$	-	-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; $t_p \leq 1\text{ ms}$	-	-0.5	A
I_{BM}	peak base current	single pulse; $t_p \leq 1\text{ ms}$	-	-200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	[1]	300	mW
T_j	junction temperature		-	150	$^{\circ}\text{C}$
T_{amb}	ambient temperature		-55	+150	$^{\circ}\text{C}$
T_{stg}	storage temperature		-65	+150	$^{\circ}\text{C}$

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

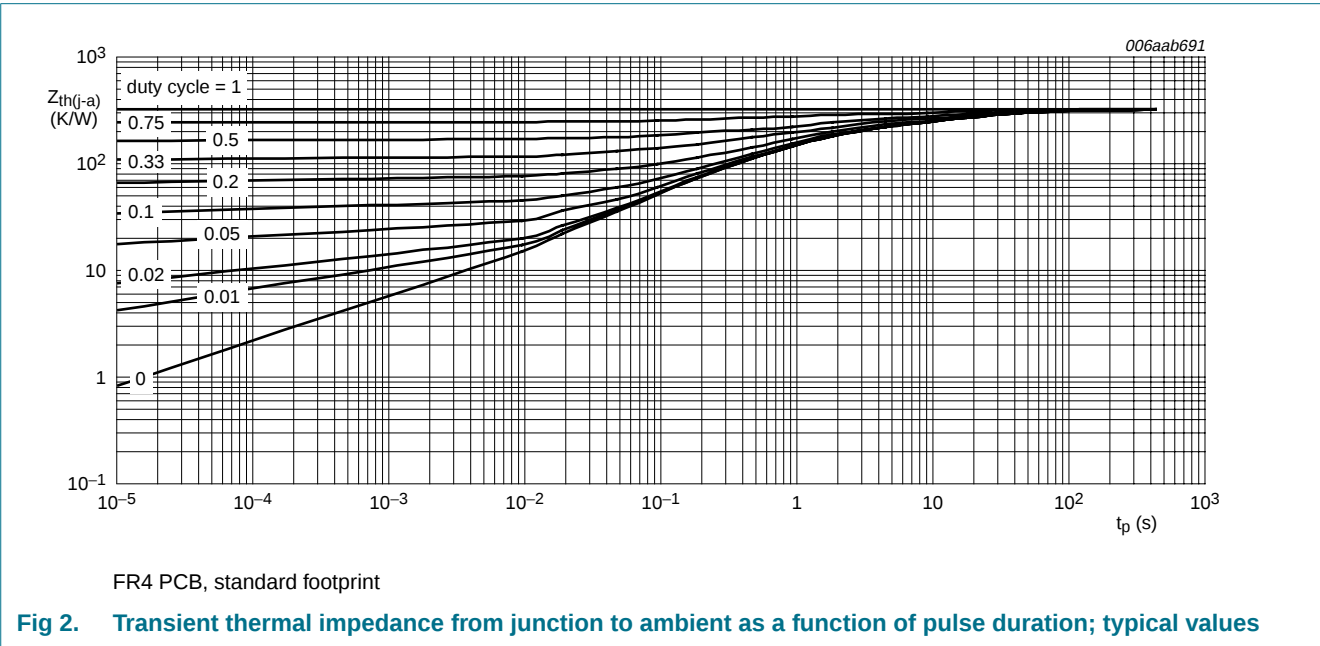


6. Thermal characteristics

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]	-	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.



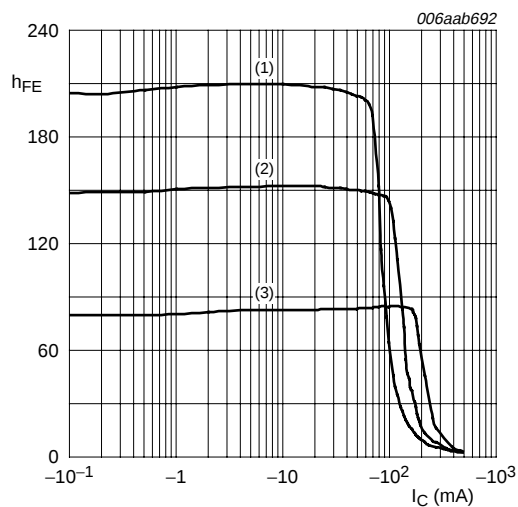
7. Characteristics

Table 7. Characteristics

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

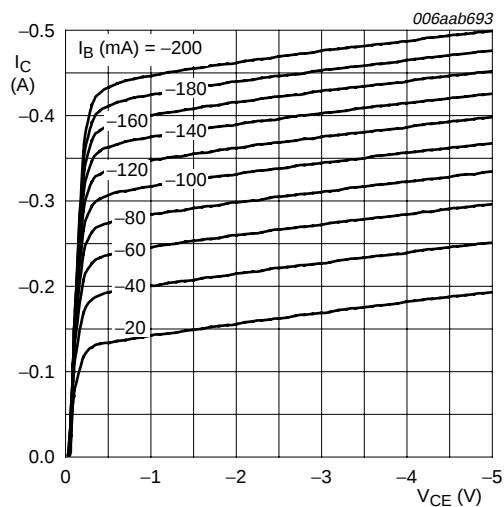
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = -360\text{ V};$ $I_E = 0\text{ A}$	-	-	-100	nA
		$V_{CB} = -360\text{ V};$ $I_E = 0\text{ A}; T_J = 150\text{ }^{\circ}\text{C}$	-	-	-10	μA
I_{CES}	collector-emitter cut-off current	$V_{CE} = -360\text{ V};$ $V_{BE} = 0\text{ V}$	-	-	-100	nA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$	-	-	-100	nA
h_{FE}	DC current gain	$V_{CE} = -10\text{ V}$				
		$I_C = -10\text{ mA}$	100	160	300	
		$I_C = -50\text{ mA}$	[1] 80	160	300	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -20\text{ mA};$ $I_B = -2\text{ mA}$	-	-115	-200	mV
		$I_C = -50\text{ mA};$ $I_B = -10\text{ mA}$	-	-95	-200	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = -50\text{ mA};$ $I_B = -10\text{ mA}$	[1] -	-0.75	-0.9	V
f_T	transition frequency	$V_{CE} = -10\text{ V};$ $I_E = -10\text{ mA};$ $f = 100\text{ MHz}$	-	50	-	MHz
C_c	collector capacitance	$V_{CB} = -20\text{ V};$ $I_E = i_e = 0\text{ A};$ $f = 1\text{ MHz}$	-	6	-	pF
C_e	emitter capacitance	$V_{EB} = -0.5\text{ V};$ $I_C = i_c = 0\text{ A};$ $f = 1\text{ MHz}$	-	170	-	pF
t_d	delay time	$V_{CC} = -20\text{ V};$	-	75	-	ns
t_r	rise time	$I_C = -0.05\text{ A};$	-	1600	-	ns
t_{on}	turn-on time	$I_{Bon} = -5\text{ mA};$	-	1675	-	ns
t_s	storage time	$I_{Boff} = 10\text{ mA}$	-	1200	-	ns
t_f	fall time		-	550	-	ns
t_{off}	turn-off time		-	1750	-	ns

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



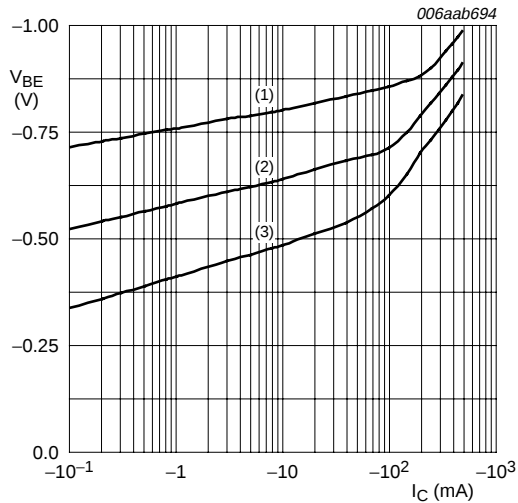
$V_{CE} = -10\text{ V}$
(1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
(3) $T_{amb} = -55\text{ }^{\circ}\text{C}$

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



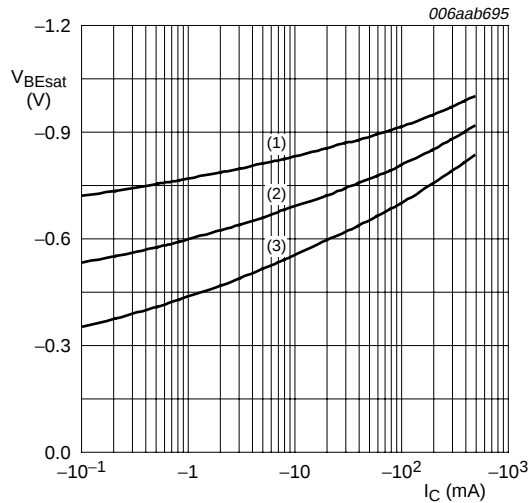
$T_{amb} = 25\text{ }^{\circ}\text{C}$

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



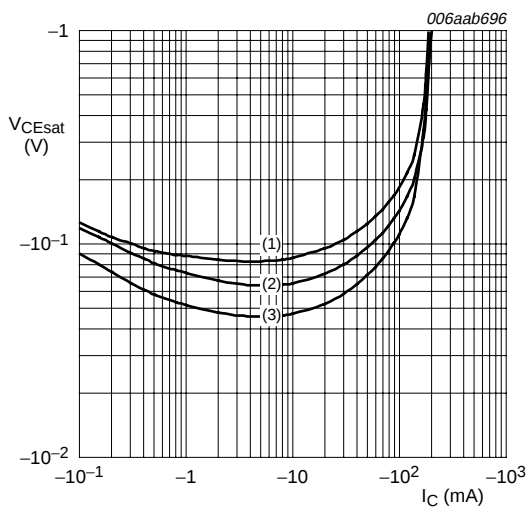
$V_{CE} = -10\text{ V}$
(1) $T_{amb} = -55\text{ }^{\circ}\text{C}$
(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
(3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

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



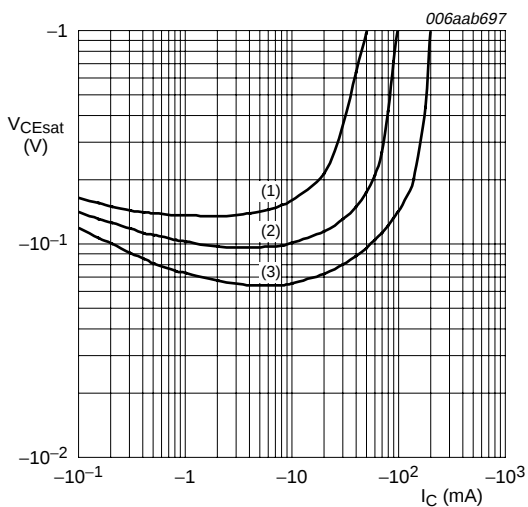
$I_C/I_B = 5$
(1) $T_{amb} = -55\text{ }^{\circ}\text{C}$
(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
(3) $T_{amb} = 100\text{ }^{\circ}\text{C}$

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



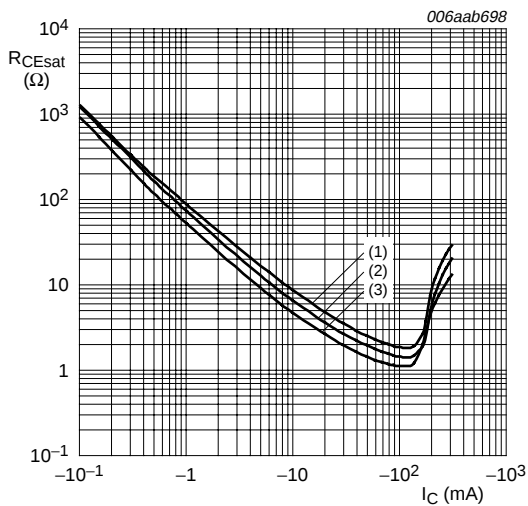
- $I_C/I_B = 5$
- (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = -55\text{ }^{\circ}\text{C}$

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



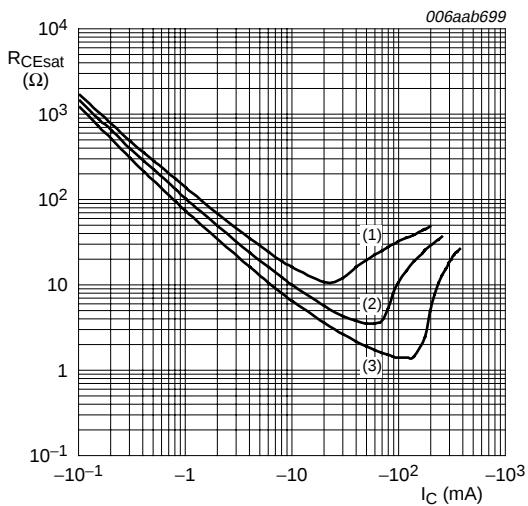
- $T_{amb} = 25\text{ }^{\circ}\text{C}$
- (1) $I_C/I_B = 20$
 - (2) $I_C/I_B = 10$
 - (3) $I_C/I_B = 5$

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



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

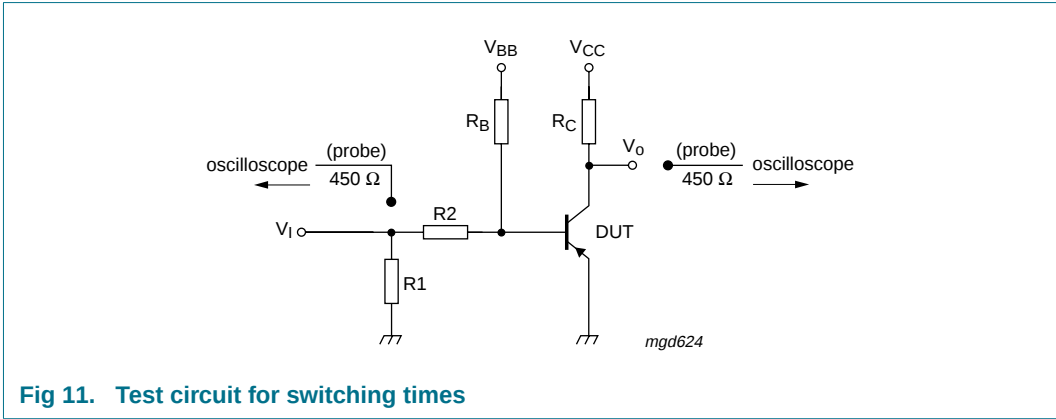
Fig 9. Collector-emitter saturation resistance as a function of collector current; typical values



- $T_{amb} = 25\text{ }^{\circ}\text{C}$
- (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

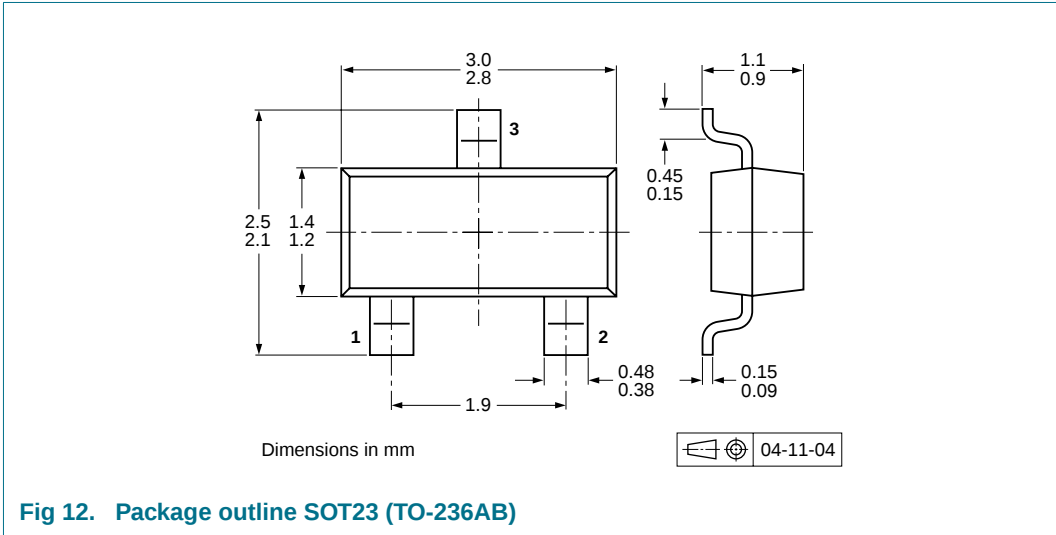
8. Test information



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



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
PBHV9050T	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235

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

12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBHV9050T_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.
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[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

1 Product profile 1

1.1 General description..... 1

1.2 Features 1

1.3 Applications 1

1.4 Quick reference data..... 1

2 Pinning information..... 2

3 Ordering information..... 2

4 Marking 2

5 Limiting values..... 3

6 Thermal characteristics..... 4

7 Characteristics..... 5

8 Test information..... 8

8.1 Quality information 8

9 Package outline 8

10 Packing information..... 8

11 Soldering 9

12 Revision history..... 10

13 Legal information..... 11

13.1 Data sheet status 11

13.2 Definitions..... 11

13.3 Disclaimers..... 11

13.4 Trademarks..... 11

14 Contact information..... 11

15 Contents 12



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