



# PMBT2907AYS

60V, 600 mA, double PNP switching transistor

26 June 2015

Product data sheet

## 1. General description

Double PNP switching transistor in a very small SOT363 (TSSOP6) Surface-Mounted Device (SMD) plastic package.

Double NPN complement: PMBT2222AYS

## 2. Features and benefits

- Double general-purpose switching transistor
- AEC-Q101 qualified

## 3. Applications

- Switching and linear amplification

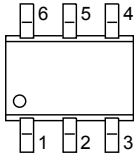
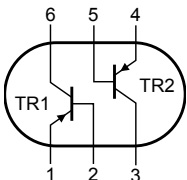
## 4. Quick reference data

Table 1. Quick reference data

| Symbol                | Parameter                 | Conditions                                                                                                                                          | Min | Typ | Max  | Unit |
|-----------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|------|------|
| <b>Per transistor</b> |                           |                                                                                                                                                     |     |     |      |      |
| $h_{FE}$              | DC current gain           | $V_{CE} = -10\text{ V}$ ; $I_C = -150\text{ mA}$ ; $t_p \leq 300\text{ }\mu\text{s}$ ;<br>$\delta \leq 0.02$ ; $T_{amb} = 25\text{ }^\circ\text{C}$ | 100 | -   | 300  |      |
| <b>Per transistor</b> |                           |                                                                                                                                                     |     |     |      |      |
| $V_{CEO}$             | collector-emitter voltage | open base                                                                                                                                           | -   | -   | -60  | V    |
| $I_C$                 | collector current         |                                                                                                                                                     | -   | -   | -600 | mA   |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description   | Simplified outline                                                                                   | Graphic symbol                                                                                |
|-----|--------|---------------|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 1   | E      | emitter TR1   | <br>TSSOP6 (SOT363) | <br>sym018 |
| 2   | B      | base TR1      |                                                                                                      |                                                                                               |
| 3   | C      | collector TR2 |                                                                                                      |                                                                                               |
| 4   | E      | emitter TR2   |                                                                                                      |                                                                                               |
| 5   | B      | base TR2      |                                                                                                      |                                                                                               |
| 6   | C      | collector TR1 |                                                                                                      |                                                                                               |

6. Ordering information

Table 3. Ordering information

| Type number | Package |                                          |         |
|-------------|---------|------------------------------------------|---------|
|             | Name    | Description                              | Version |
| PMBT2907AYS | TSSOP6  | plastic surface-mounted package; 6 leads | SOT363  |

7. Marking

Table 4. Marking codes

| Type number | Marking code               |
|-------------|----------------------------|
| PMBT2907AYS | BH%<br><a href="#">[1]</a> |

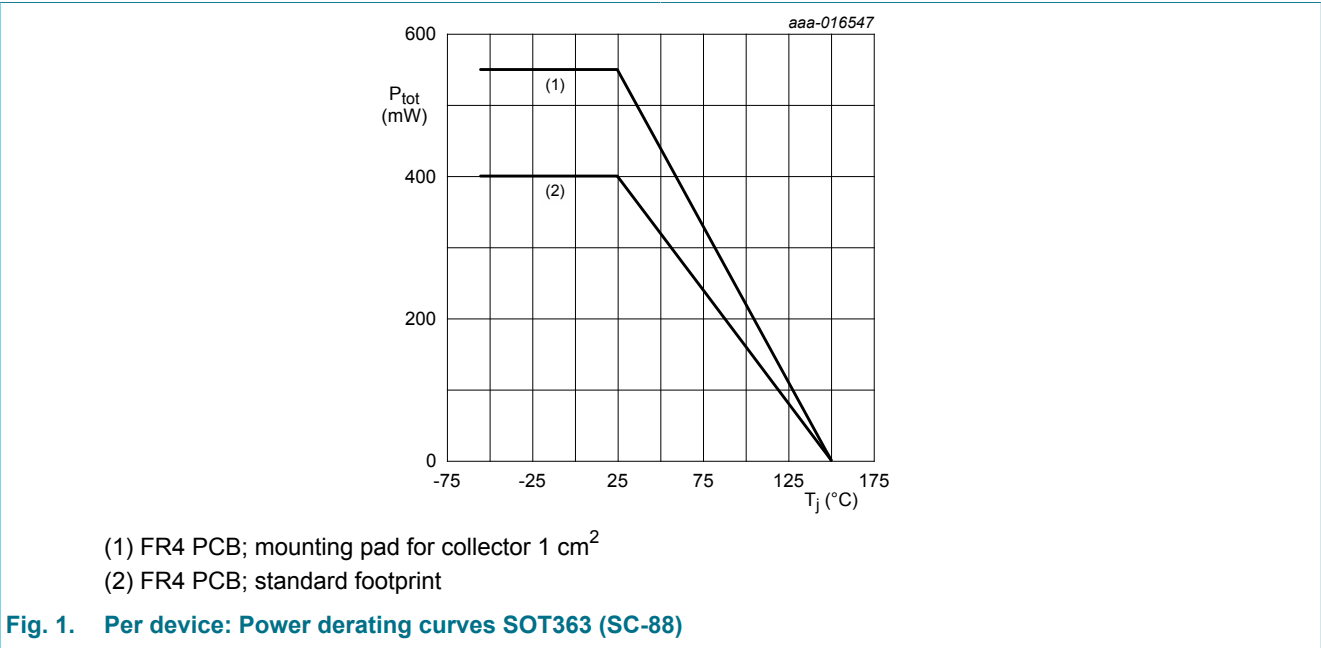
[1] % = placeholder for manufacturing site code

8. Limiting values

Table 5. Limiting values  
In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol           | Parameter                 | Conditions                          |     | Min | Max  | Unit |
|------------------|---------------------------|-------------------------------------|-----|-----|------|------|
| Per transistor   |                           |                                     |     |     |      |      |
| V <sub>CBO</sub> | collector-base voltage    | open emitter                        |     | -   | -60  | V    |
| V <sub>CEO</sub> | collector-emitter voltage | open base                           |     | -   | -60  | V    |
| V <sub>EBO</sub> | emitter-base voltage      | open collector                      |     | -   | -5   | V    |
| I <sub>C</sub>   | collector current         | single pulse; t <sub>p</sub> ≤ 1 ms |     | -   | -600 | mA   |
| I <sub>CM</sub>  | peak collector current    |                                     |     | -   | -800 | mA   |
| I <sub>BM</sub>  | peak base current         |                                     |     | -   | -200 | mA   |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C            | [1] | -   | 250  | mW   |
|                  |                           |                                     | [2] | -   | 300  | mW   |
| Per device       |                           |                                     |     |     |      |      |
| P <sub>tot</sub> | total power dissipation   | T <sub>amb</sub> ≤ 25 °C            | [1] | -   | 400  | mW   |
|                  |                           |                                     | [2] | -   | 550  | mW   |
| T <sub>j</sub>   | junction temperature      |                                     |     | -   | 150  | °C   |
| T <sub>amb</sub> | ambient temperature       |                                     |     | -55 | 150  | °C   |
| T <sub>stg</sub> | storage temperature       |                                     |     | -65 | 150  | °C   |

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint
- [2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>

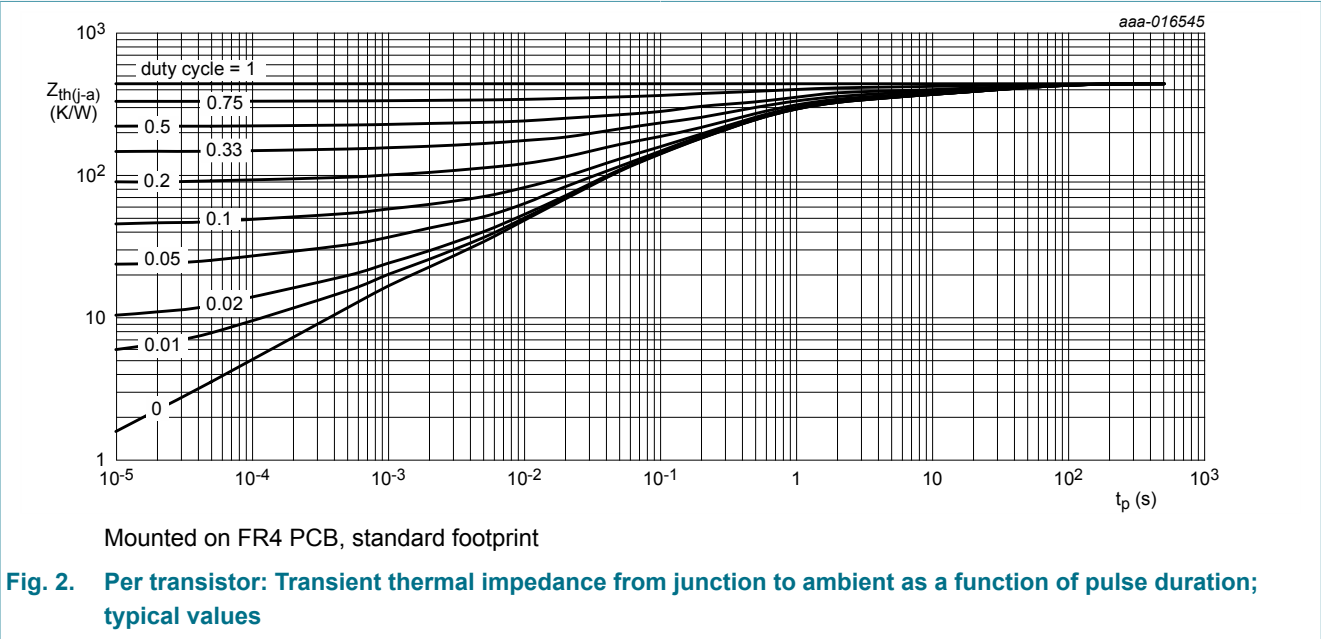


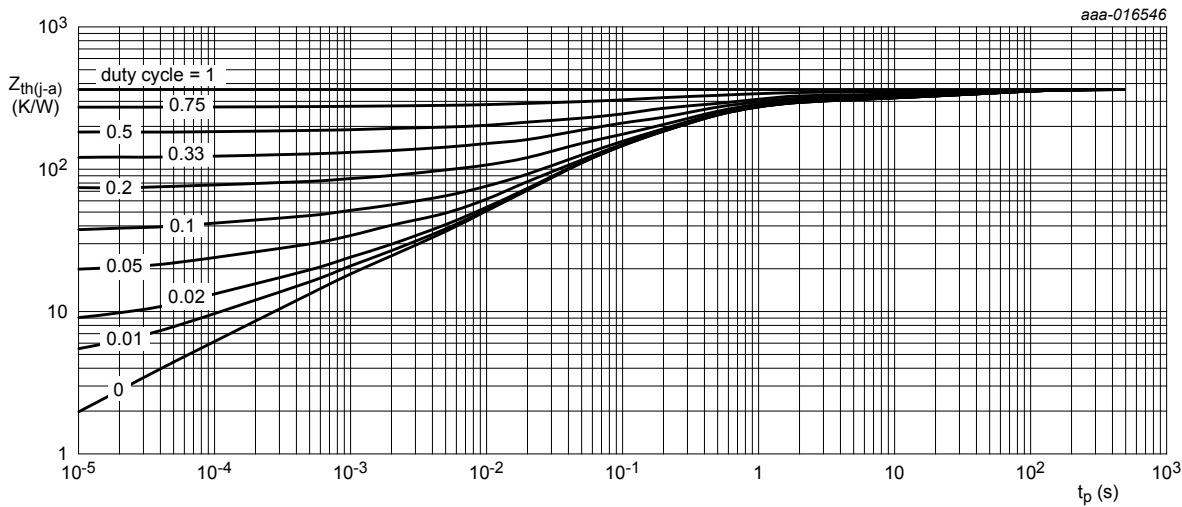
9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol               | Parameter                                   | Conditions  |     | Min | Typ | Max | Unit |
|----------------------|---------------------------------------------|-------------|-----|-----|-----|-----|------|
| Per transistor       |                                             |             |     |     |     |     |      |
| R <sub>th(j-a)</sub> | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 500 | K/W  |
|                      |                                             |             | [2] | -   | -   | 417 | K/W  |
| Per device           |                                             |             |     |     |     |     |      |
| R <sub>th(j-a)</sub> | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 313 | K/W  |
|                      |                                             |             | [2] | -   | -   | 227 | K/W  |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint  
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>





**Fig. 3. Per Transistor: 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          |
|-----------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|--|-----|-----|------|---------------|
| <b>Per transistor</b> |                                      |                                                                                                                                        |  |     |     |      |               |
| $I_{CBO}$             | collector-base cut-off current       | $V_{CB} = -50\text{ V}; I_E = 0\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                        |  | -   | -   | -10  | nA            |
|                       |                                      | $V_{CB} = -50\text{ V}; I_E = 0\text{ A}; T_j = 125\text{ }^{\circ}\text{C}$                                                           |  | -   | -   | -10  | $\mu\text{A}$ |
| $I_{EBO}$             | emitter-base cut-off current         | $V_{EB} = -5\text{ V}; I_C = 0\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                         |  | -   | -   | -50  | nA            |
| $h_{FE}$              | DC current gain                      | $V_{CE} = -10\text{ V}; I_C = -0.1\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                    |  | 75  | -   | -    |               |
|                       |                                      | $V_{CE} = -10\text{ V}; I_C = -1\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                      |  | 100 | -   | -    |               |
|                       |                                      | $V_{CE} = -10\text{ V}; I_C = -10\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                                     |  | 100 | -   | -    |               |
|                       |                                      | $V_{CE} = -10\text{ V}; I_C = -150\text{ mA}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^{\circ}\text{C}$ |  | 100 | -   | 300  |               |
|                       |                                      | $V_{CE} = -10\text{ V}; I_C = -500\text{ mA}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^{\circ}\text{C}$ |  | 50  | -   | -    |               |
| $V_{CEsat}$           | collector-emitter saturation voltage | $I_C = -150\text{ mA}; I_B = -15\text{ mA}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^{\circ}\text{C}$   |  | -   | -   | -400 | mV            |
|                       |                                      | $I_C = -500\text{ mA}; I_B = -50\text{ mA}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^{\circ}\text{C}$   |  | -   | -   | -1.6 | V             |
| $V_{BEsat}$           | base-emitter saturation voltage      | $I_C = -150\text{ mA}; I_B = -15\text{ mA}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^{\circ}\text{C}$   |  | -   | -   | -1.3 | V             |
|                       |                                      | $I_C = -500\text{ mA}; I_B = -50\text{ mA}; t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02; T_{amb} = 25\text{ }^{\circ}\text{C}$   |  | -   | -   | -2.6 | V             |
| $t_d$                 | delay time                           | $I_C = -150\text{ mA}; I_{Bon} = -15\text{ mA}; I_{Boff} = 15\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$                         |  | -   | -   | 12   | ns            |
| $t_r$                 | rise time                            |                                                                                                                                        |  | -   | -   | 30   | ns            |
| $t_{on}$              | turn-on time                         |                                                                                                                                        |  | -   | -   | 40   | ns            |
| $t_s$                 | storage time                         |                                                                                                                                        |  | -   | -   | 300  | ns            |
| $t_f$                 | fall time                            |                                                                                                                                        |  | -   | -   | 65   | ns            |
| $t_{off}$             | turn-off time                        |                                                                                                                                        |  | -   | -   | 365  | ns            |
| $C_C$                 | collector capacitance                | $V_{CB} = -10\text{ V}; I_E = 0\text{ A}; i_e = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$                    |  | -   | -   | 8    | pF            |
| $C_E$                 | emitter capacitance                  | $V_{EB} = -2\text{ V}; I_C = 0\text{ A}; i_c = 0\text{ A}; f = 1\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$                     |  | -   | -   | 30   | pF            |
| $f_T$                 | transition frequency                 | $V_{CE} = -20\text{ V}; I_C = -50\text{ mA}; f = 100\text{ MHz}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                 |  | 200 | -   | -    | MHz           |

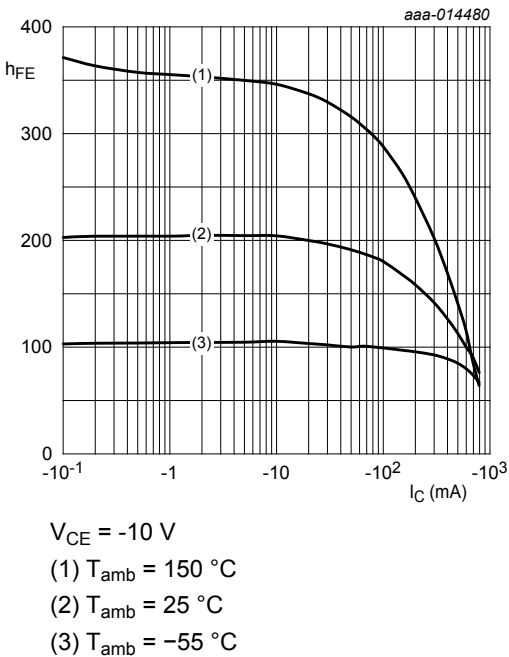


Fig. 4. DC current gain as a function of collector current; typical values

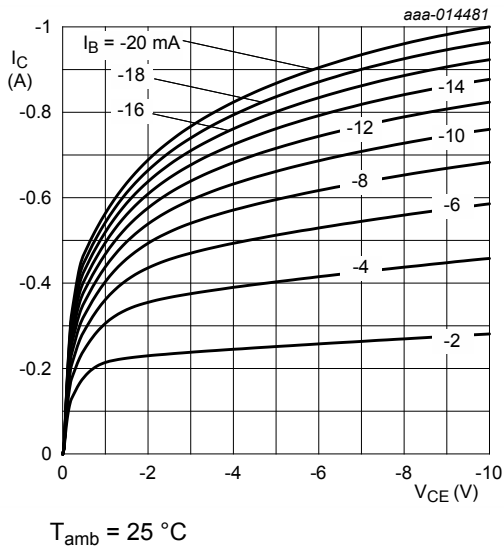


Fig. 5. Collector current as a function of collector-emitter voltage; typical values

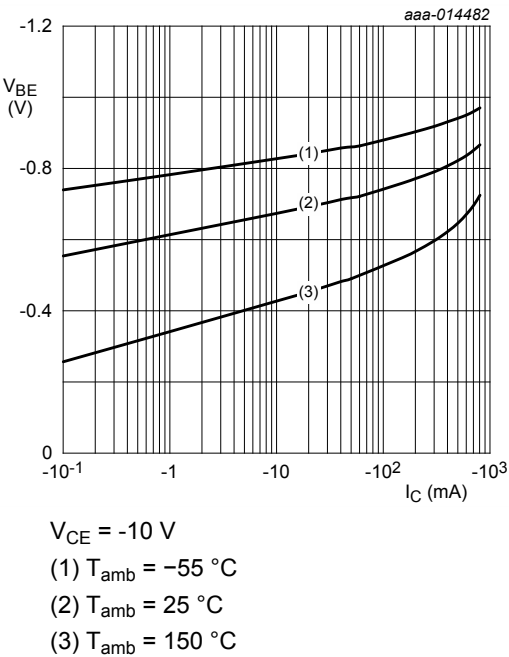


Fig. 6. Base-emitter voltage as a function of collector current; typical values

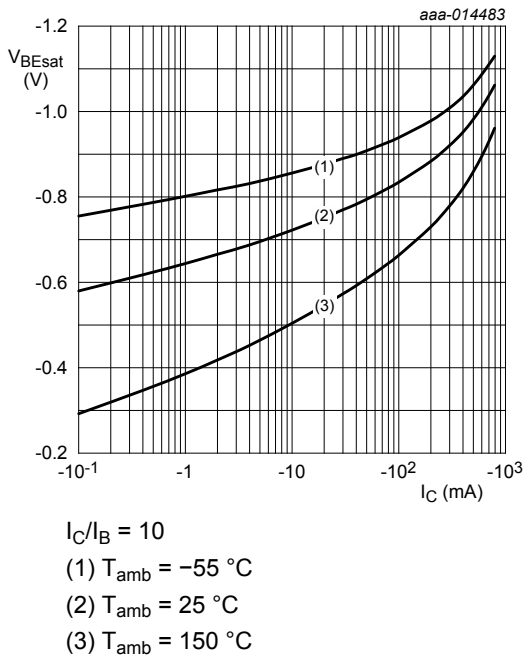
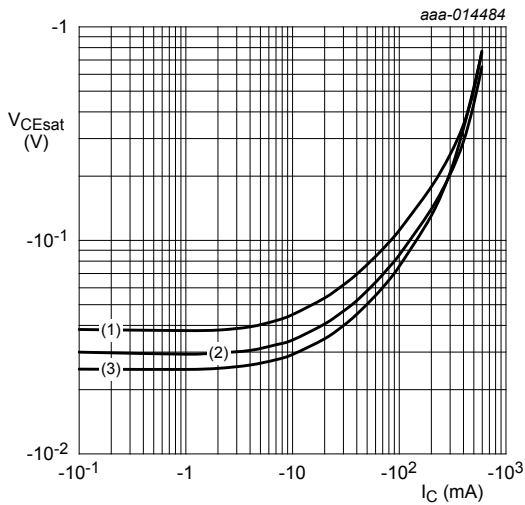
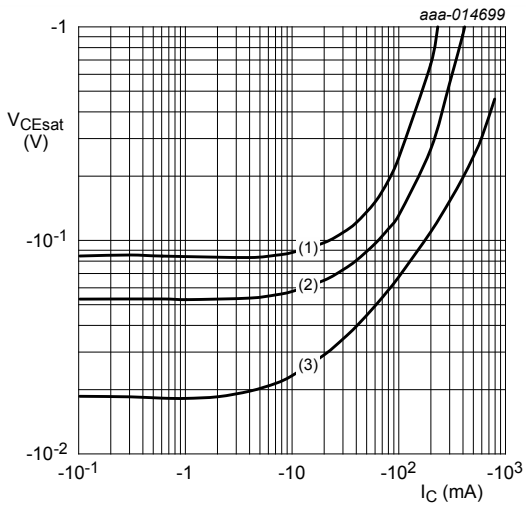


Fig. 7. Base-emitter saturation voltage as a function of collector current; typical values



$I_C/I_B = 20$   
(1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$   
(2)  $T_{amb} = 25\text{ }^{\circ}\text{C}$   
(3)  $T_{amb} = -55\text{ }^{\circ}\text{C}$

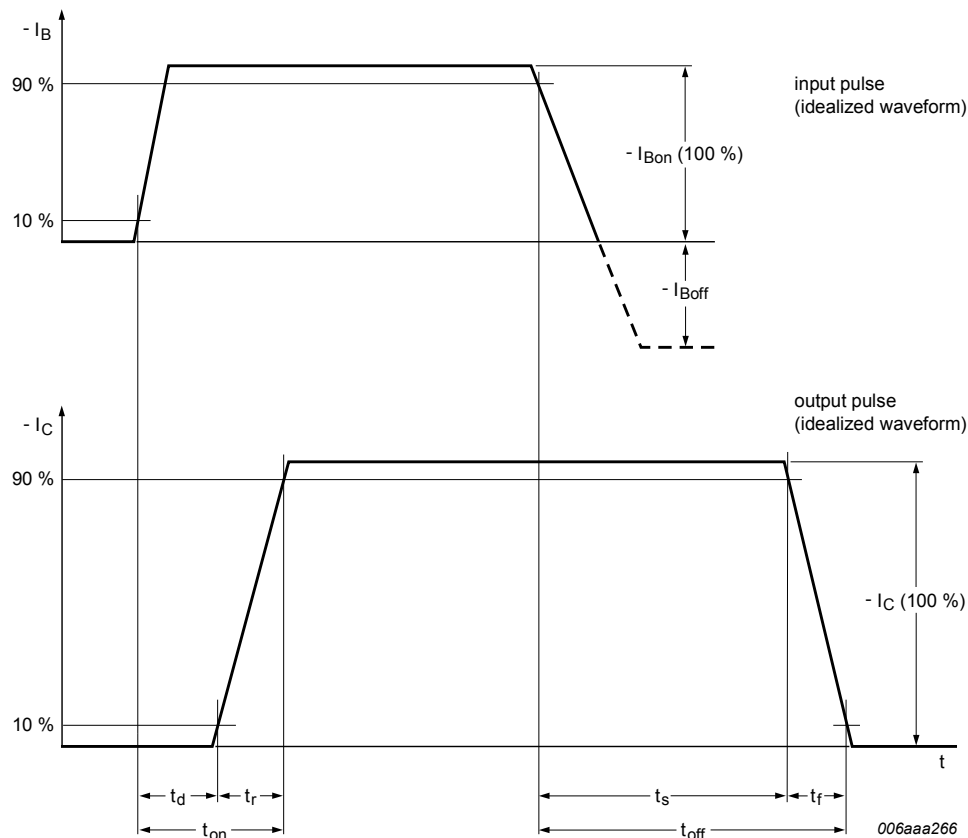
Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values



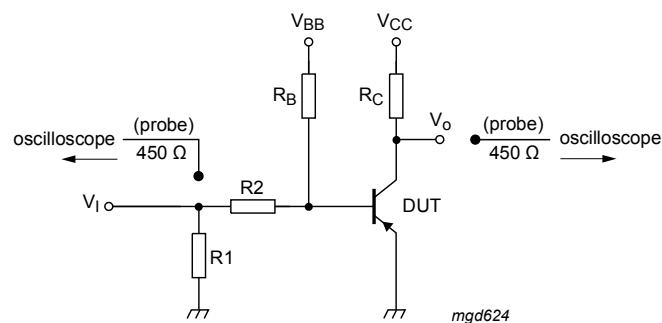
$T_{amb} = 25\text{ }^{\circ}\text{C}$   
(1)  $I_C/I_B = 100$   
(2)  $I_C/I_B = 50$   
(3)  $I_C/I_B = 10$

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

## 11. Test information



**Fig. 10. BISS transistor switching time definition**

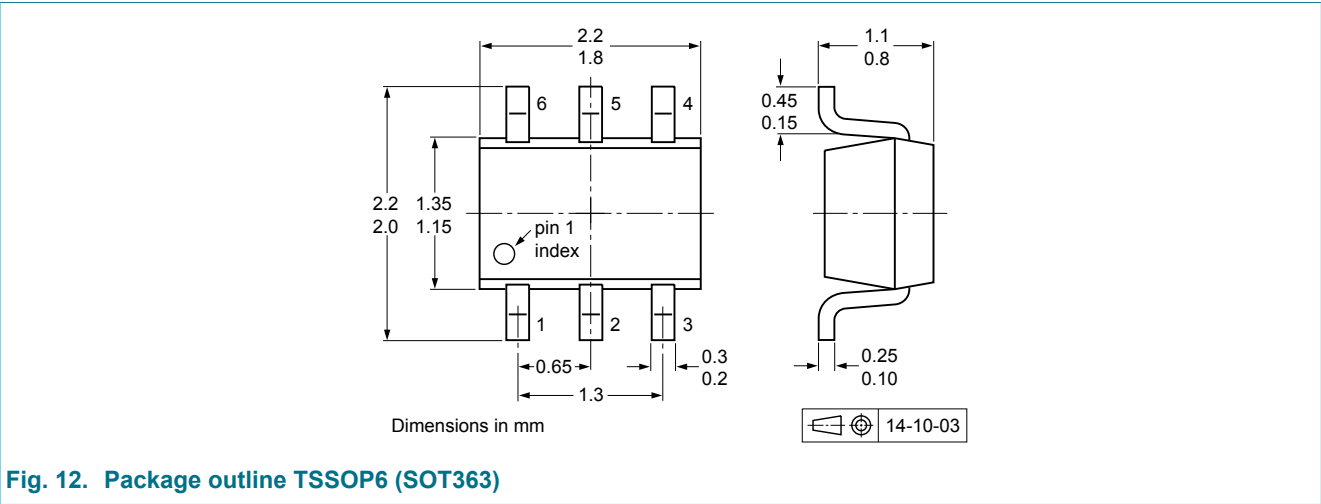


**Fig. 11. Test circuit for switching times**

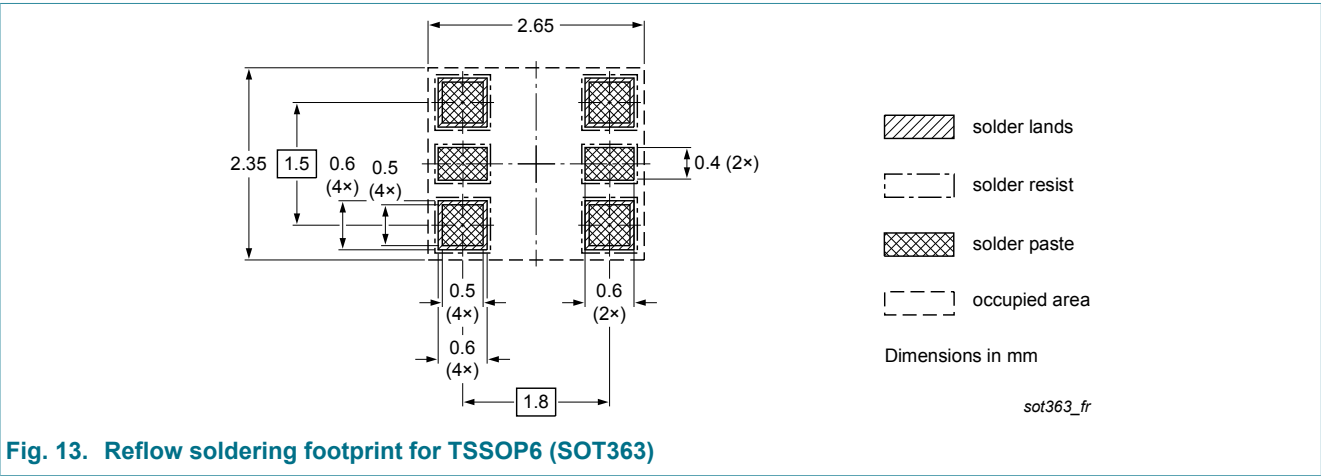
### 11.1 Quality information

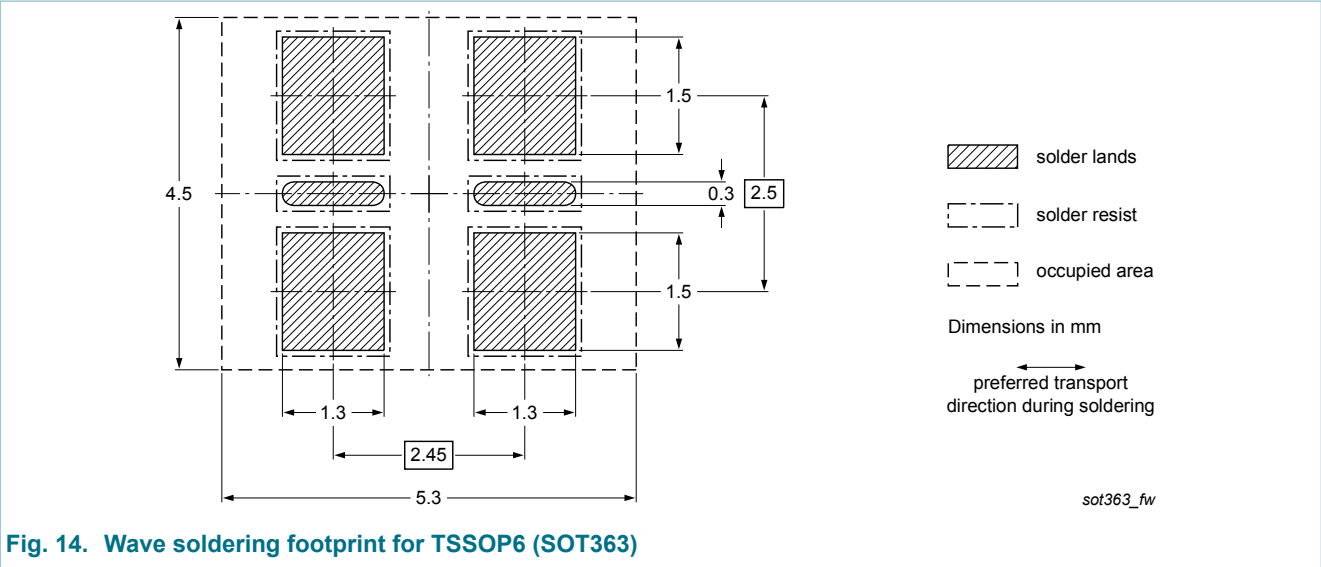
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

12. Package outline



13. Soldering





14. Revision history

Table 8. Revision history

| Data sheet ID   | Release date | Data sheet status  | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| PMBT2907AYS v.1 | 20150626     | Product data sheet | -             | -          |

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|--------------------------------|--------------------|---------------------------------------------------------------------------------------|
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Date of release: 26 June 2015

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105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

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