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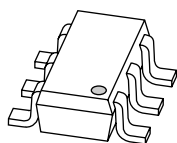
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Kind regards,

Team Nexperia



PIMC31

500 mA, 50 V NPN/PNP double resistor-equipped transistor;
R1 = 1 k Ω , R2 = 10 k Ω

Rev. 01 — 24 March 2009

Product data sheet

1. Product profile

1.1 General description

500 mA, 50 V NPN/PNP double Resistor-Equipped Transistor (RET) in a small SOT457 (SC-74) Surface-Mounted Device (SMD) plastic package.

NPN/NPN complement: PIMN31

1.2 Features

- 500 mA output current capability
- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs
- AEC-Q101 qualified

1.3 Applications

- Digital application in automotive and industrial segments
- Switching loads

1.4 Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---------------------------|------------|-----|-----|-----|------------|
| Per transistor; for the PNP transistor with negative polarity | | | | | | |
| V _{CEO} | collector-emitter voltage | open base | - | - | 50 | V |
| I _O | output current | | - | - | 500 | mA |
| R1 | bias resistor 1 (input) | | 0.7 | 1 | 1.3 | k Ω |
| R2/R1 | bias resistor ratio | | 9 | 10 | 11 | |

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|------------------------|--------------------|----------------|
| 1 | GND (emitter) TR1 | | |
| 2 | input (base) TR1 | | |
| 3 | output (collector) TR2 | | |
| 4 | GND (emitter) TR2 | | |
| 5 | input (base) TR2 | | |
| 6 | output (collector) TR1 | | |

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3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PIMC31 | SC-74 | plastic surface-mounted package (TSOP6); 6 leads | SOT457 |

4. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PIMC31 | ZH |

5. Limiting values

Table 5. Limiting values

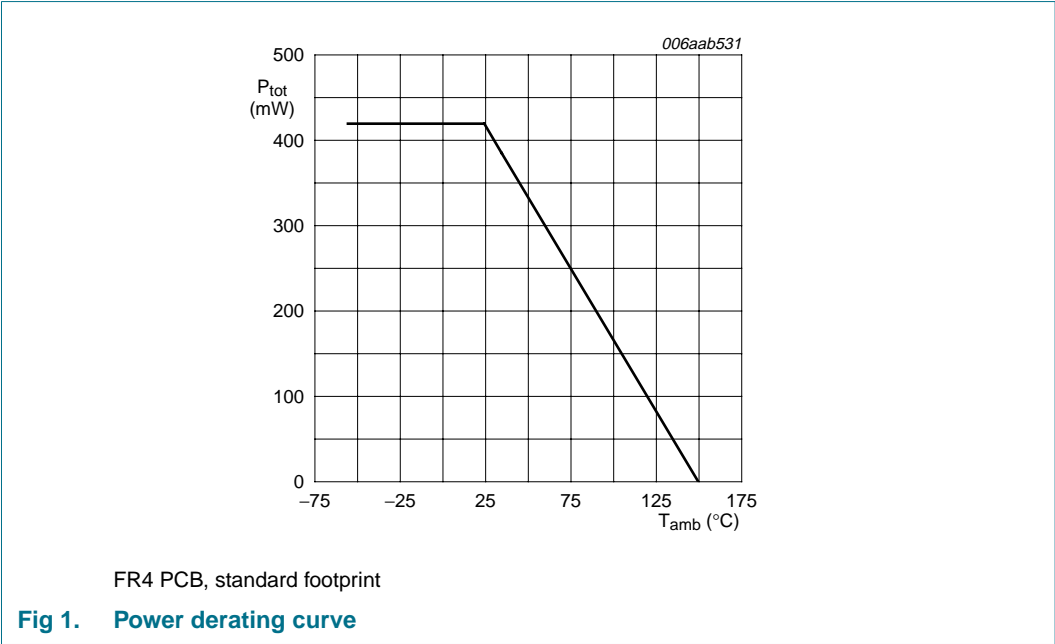
In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---------------------------|----------------|-----|-----|------|
| Per transistor; for the PNP transistor with negative polarity | | | | | |
| V _{CBO} | collector-base voltage | open emitter | - | 50 | V |
| V _{CEO} | collector-emitter voltage | open base | - | 50 | V |
| V _{EBO} | emitter-base voltage | open collector | - | 5 | V |
| V _I | input voltage TR1 | | | | |
| | positive | | - | +10 | V |
| | negative | | - | -5 | V |
| | input voltage TR2 | | | | |
| | positive | | - | +5 | V |
| | negative | | - | -10 | V |

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|-------------------------|--------------------------|-----|------|------|
| I _O | output current | | - | 500 | mA |
| P _{tot} | total power dissipation | T _{amb} ≤ 25 °C | [1] | 290 | mW |
| Per device | | | | | |
| P _{tot} | total power dissipation | T _{amb} ≤ 25 °C | [1] | 420 | 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.

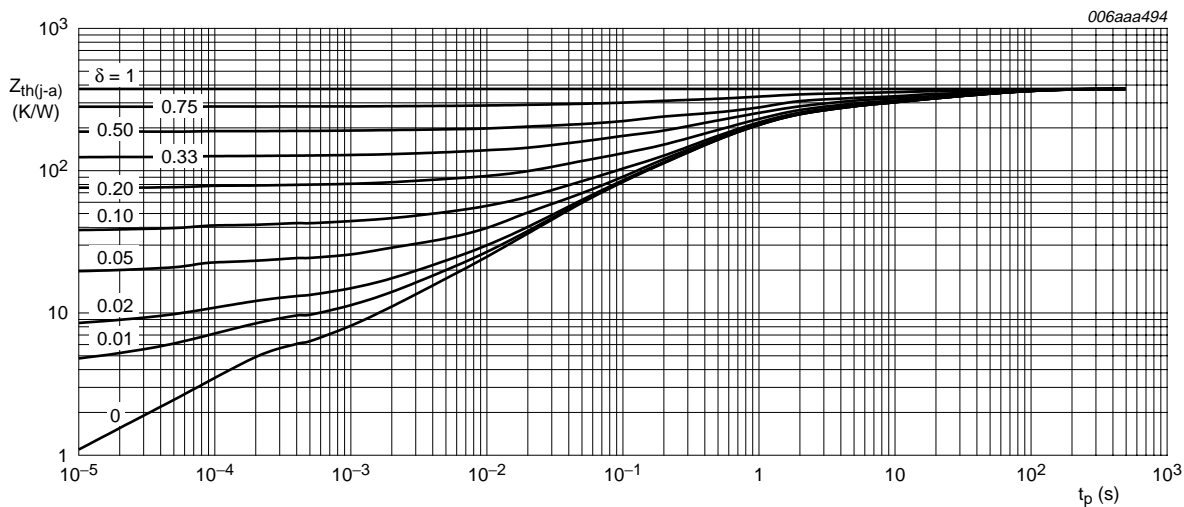


6. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------------|--|-------------|-----|-----|-----|------|
| Per transistor | | | | | | |
| R _{th(j-a)} | thermal resistance from junction to ambient | in free air | [1] | - | 431 | K/W |
| R _{th(j-sp)} | thermal resistance from junction to solder point | | - | - | 105 | K/W |
| Per device | | | | | | |
| R _{th(j-a)} | thermal resistance from junction to ambient | in free air | [1] | - | 298 | K/W |

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



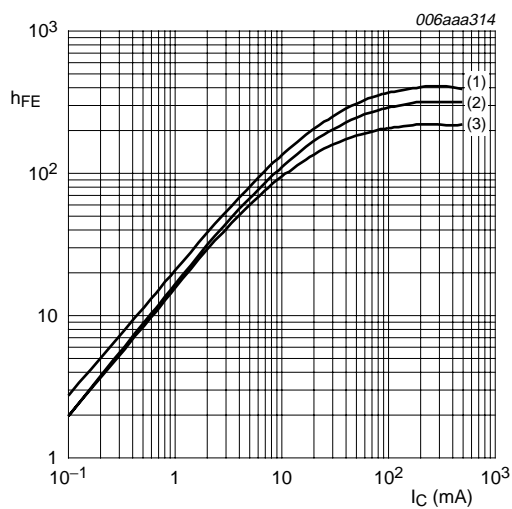
FR4 PCB, standard footprint

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

7. Characteristics

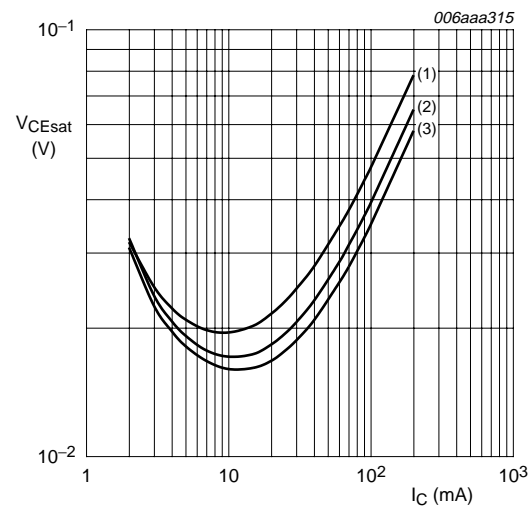
Table 7. Characteristics
T_{amb} = 25 °C unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|--------------------------------------|---|-----|-----|------|------|
| Per transistor; for the PNP transistor with negative polarity | | | | | | |
| I _{CBO} | collector-base cut-off current | V _{CB} = 50 V; I _E = 0 A | - | - | 100 | nA |
| I _{CEO} | collector-emitter cut-off current | V _{CE} = 50 V; I _B = 0 A | - | - | 0.5 | μA |
| I _{EBO} | emitter-base cut-off current | V _{EB} = 5 V; I _C = 0 A | - | - | 0.72 | mA |
| h _{FE} | DC current gain | V _{CE} = 5 V; I _C = 50 mA | 70 | - | - | |
| V _{CEsat} | collector-emitter saturation voltage | I _C = 50 mA; I _B = 2.5 mA | - | - | 0.3 | V |
| V _{I(off)} | off-state input voltage | V _{CE} = 5 V; I _C = 100 μA | 0.3 | 0.6 | 1 | V |
| V _{I(on)} | on-state input voltage | V _{CE} = 0.3 V; I _C = 20 mA | 0.4 | 0.8 | 1.4 | V |
| R1 | bias resistor 1 (input) | | 0.7 | 1 | 1.3 | kΩ |
| R2/R1 | bias resistor ratio | | 9 | 10 | 11 | |
| C _c | collector capacitance | V _{CB} = 10 V; I _E = i _e = 0 A; f = 1 MHz | | | | |
| | TR1 (NPN) | | - | 7 | - | pF |
| | TR2 (PNP) | | - | 11 | - | pF |



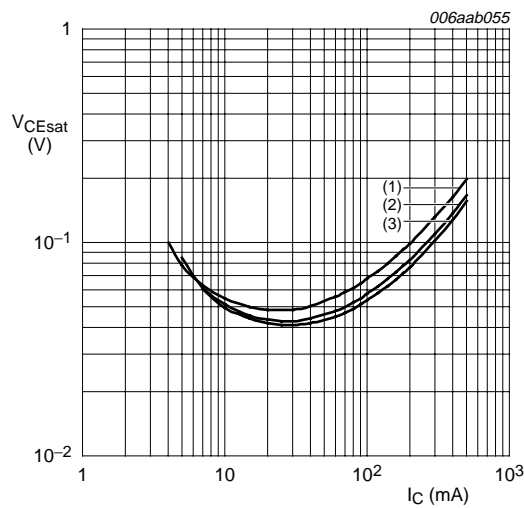
- $V_{CE} = 5\text{ V}$
- (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 3. TR1 (NPN): DC current gain as a function of collector current; typical values



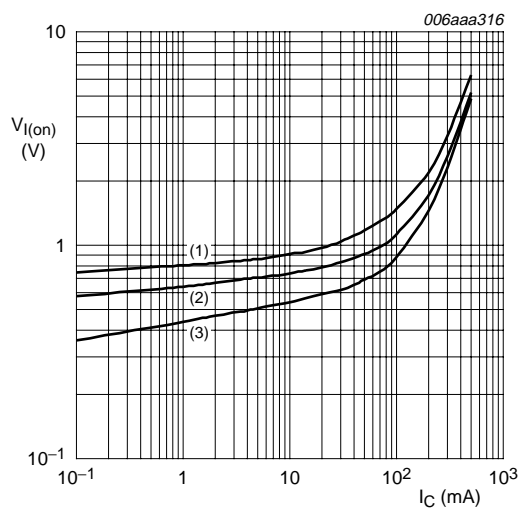
- $I_C/I_B = 20$
- (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 4. TR1 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values



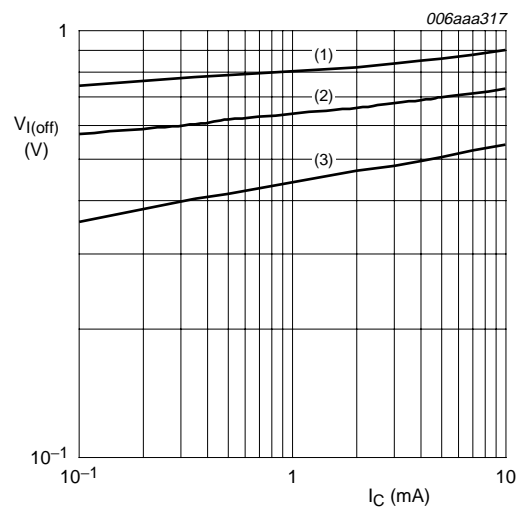
- $I_C/I_B = 50$
- (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 - (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 - (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 5. TR1 (NPN): Collector-emitter saturation voltage as a function of collector current; typical values



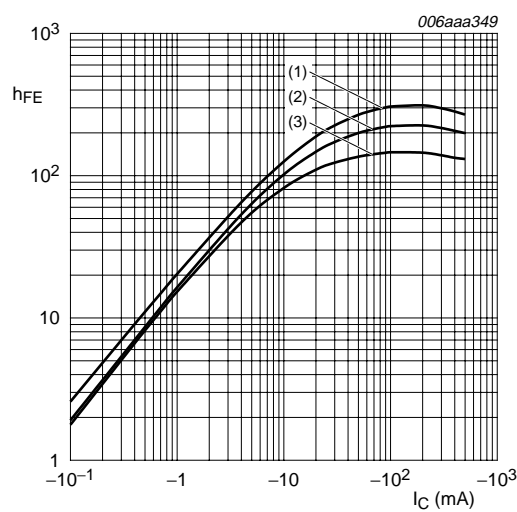
$V_{CE} = 0.3\text{ V}$
(1) $T_{amb} = -40^\circ\text{C}$
(2) $T_{amb} = 25^\circ\text{C}$
(3) $T_{amb} = 100^\circ\text{C}$

Fig 6. TR1 (NPN): On-state input voltage as a function of collector current; typical values



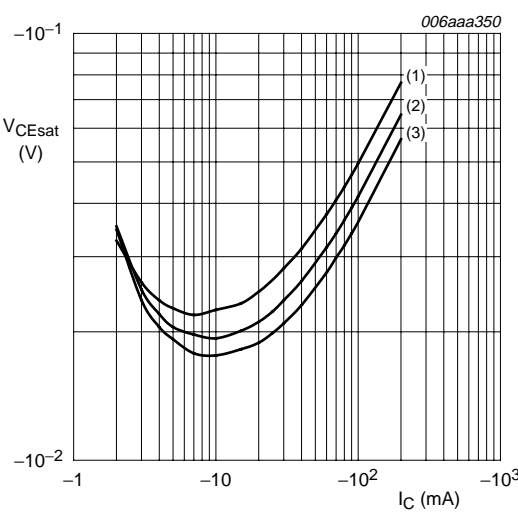
$V_{CE} = 5\text{ V}$
(1) $T_{amb} = -40^\circ\text{C}$
(2) $T_{amb} = 25^\circ\text{C}$
(3) $T_{amb} = 100^\circ\text{C}$

Fig 7. TR1 (NPN): Off-state input voltage as a function of collector current; typical values



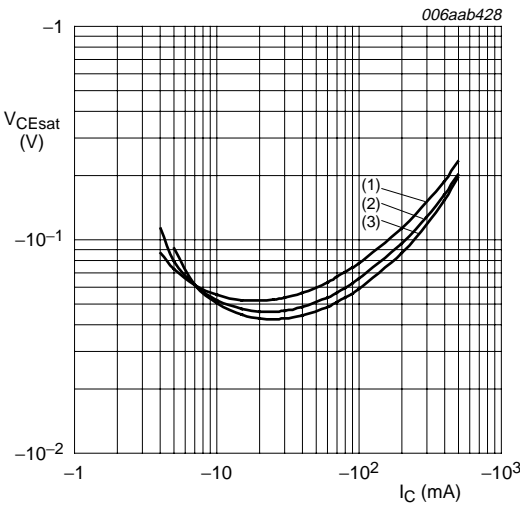
$V_{CE} = -5\text{ V}$
(1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
(3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 8. TR2 (PNP): DC current gain as a function of collector current; typical values



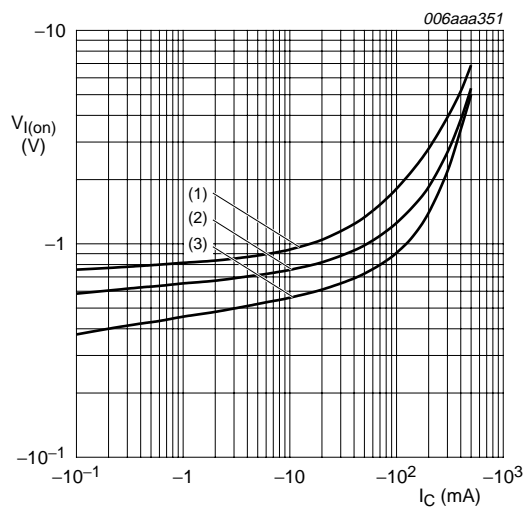
$I_C/I_B = 20$
(1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
(3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 9. TR2 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values



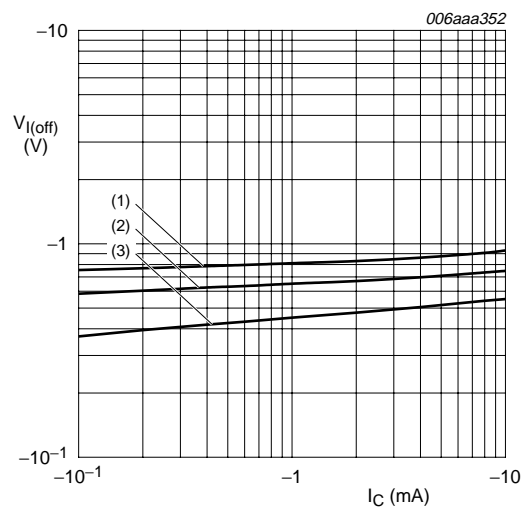
$I_C/I_B = 50$
(1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
(2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
(3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 10. TR2 (PNP): Collector-emitter saturation voltage as a function of collector current; typical values



- $V_{CE} = -0.3\text{ V}$
- (1) $T_{amb} = -40^\circ\text{C}$
 - (2) $T_{amb} = 25^\circ\text{C}$
 - (3) $T_{amb} = 100^\circ\text{C}$

Fig 11. TR2 (PNP): On-state input voltage as a function of collector current; typical values



- $V_{CE} = -5\text{ V}$
- (1) $T_{amb} = -40^\circ\text{C}$
 - (2) $T_{amb} = 25^\circ\text{C}$
 - (3) $T_{amb} = 100^\circ\text{C}$

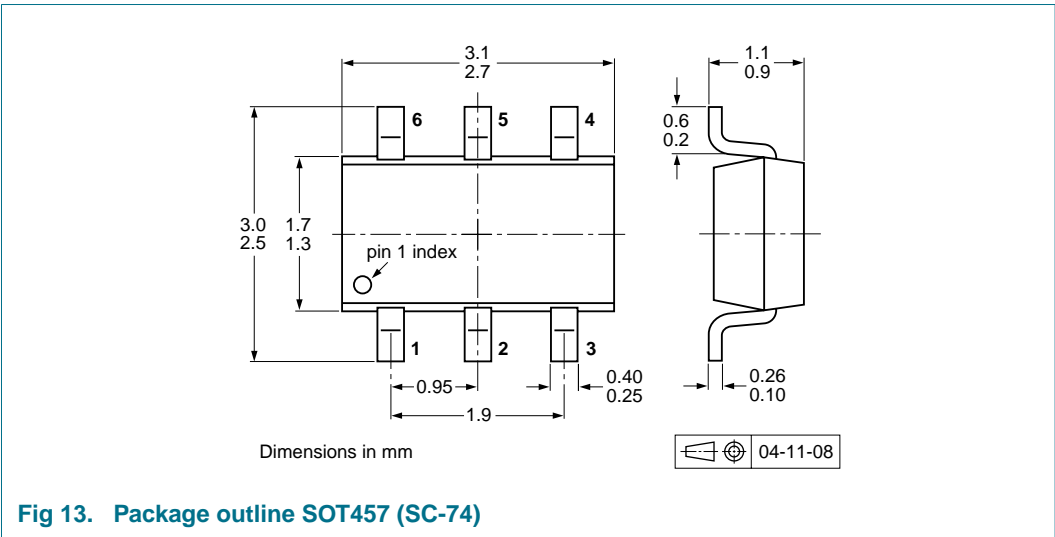
Fig 12. TR2 (PNP): Off-state input voltage as a function of collector current; typical values

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 |
| PIMC31 | SOT457 | 4 mm pitch, 8 mm tape and reel; T1 | ^[2] -115 | -135 |
| | | 4 mm pitch, 8 mm tape and reel; T2 | ^[3] -125 | -165 |

- [1] For further information and the availability of packing methods, see [Section 14](#).
[2] T1: normal taping
[3] T2: reverse taping

12. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-------------|--------------|--------------------|---------------|------------|
| PIMC31_1 | 20090324 | 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

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. 2

6 Thermal characteristics. 3

7 Characteristics 4

8 Test information 9

8.1 Quality information 9

9 Package outline 9

10 Packing information. 9

11 Soldering 10

12 Revision history. 11

13 Legal information. 12

13.1 Data sheet status 12

13.2 Definitions 12

13.3 Disclaimers 12

13.4 Trademarks 12

14 Contact information. 12

15 Contents 13



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