



# PMV280NEA

100 V N-channel Trench MOSFET

22 November 2016

Product data sheet

## 1. General description

N-channel enhancement mode Field-Effect Transistor (FET) in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

## 2. Features and benefits

- Logic level compatible
- Very fast switching
- Trench MOSFET technology
- ElectroStatic Discharge (ESD) protection > 2 kV HBM
- AEC-Q101 qualified

## 3. Applications

- Relay driver
- High-speed line driver
- Low-side loadswitch
- Switching circuits

## 4. Quick reference data

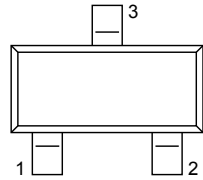
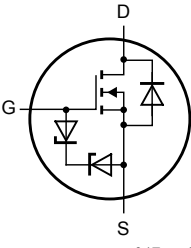
Table 1. Quick reference data

| Symbol                        | Parameter                        | Conditions                                                     |     | Min | Typ | Max | Unit |
|-------------------------------|----------------------------------|----------------------------------------------------------------|-----|-----|-----|-----|------|
| $V_{DS}$                      | drain-source voltage             | $T_j = 25\text{ °C}$                                           |     | -   | -   | 100 | V    |
| $V_{GS}$                      | gate-source voltage              |                                                                |     | -20 | -   | 20  | V    |
| $I_D$                         | drain current                    | $V_{GS} = 10\text{ V}; T_{amb} = 25\text{ °C}$                 | [1] | -   | -   | 1.1 | A    |
| <b>Static characteristics</b> |                                  |                                                                |     |     |     |     |      |
| $R_{DS(on)}$                  | drain-source on-state resistance | $V_{GS} = 10\text{ V}; I_D = 1.1\text{ A}; T_j = 25\text{ °C}$ |     | -   | 285 | 385 | mΩ   |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and mounting pad for drain 6 cm<sup>2</sup>.

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline                                                                                    | Graphic symbol                                                                                   |
|-----|--------|-------------|-------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 1   | G      | gate        | <br>TO-236AB (SOT23) | <br>017aaa255 |
| 2   | S      | source      |                                                                                                       |                                                                                                  |
| 3   | D      | drain       |                                                                                                       |                                                                                                  |

6. Ordering information

Table 3. Ordering information

| Type number | Package  |                                          |         |
|-------------|----------|------------------------------------------|---------|
|             | Name     | Description                              | Version |
| PMV280ENEA  | TO-236AB | plastic surface-mounted package; 3 leads | SOT23   |

7. Marking

Table 4. Marking codes

| Type number | Marking code <sup>[1]</sup> |
|-------------|-----------------------------|
| PMV280ENEA  | EL %                        |

[1] % = placeholder for manufacturing site code

## 8. Limiting values

**Table 5. Limiting values**

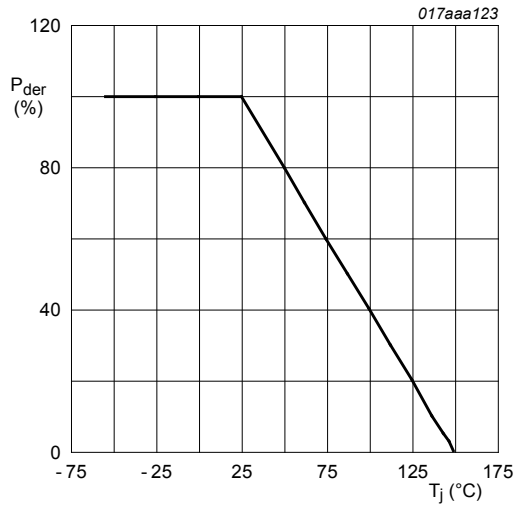
In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol                    | Parameter                                    | Conditions                                                                                               |     | Min | Max  | Unit               |
|---------------------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------|-----|-----|------|--------------------|
| $V_{DS}$                  | drain-source voltage                         | $T_j = 25\text{ }^{\circ}\text{C}$                                                                       |     | -   | 100  | V                  |
| $V_{GS}$                  | gate-source voltage                          |                                                                                                          |     | -20 | 20   | V                  |
| $I_D$                     | drain current                                | $V_{GS} = 10\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$                                             | [1] | -   | 1.1  | A                  |
|                           |                                              | $V_{GS} = 10\text{ V}; T_{amb} = 100\text{ }^{\circ}\text{C}$                                            | [1] | -   | 0.7  | A                  |
| $I_{DM}$                  | peak drain current                           | $T_{amb} = 25\text{ }^{\circ}\text{C}$ ; single pulse; $t_p \leq 10\text{ }\mu\text{s}$                  |     | -   | 5    | A                  |
| $E_{DS(AL)S}$             | non-repetitive drain-source avalanche energy | $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $I_D = 0.16\text{ A}$ ; DUT in avalanche (unclamped) |     | -   | 8.4  | mJ                 |
| $P_{tot}$                 | total power dissipation                      | $T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                   | [2] | -   | 580  | mW                 |
|                           |                                              |                                                                                                          | [1] | -   | 1.14 | W                  |
|                           |                                              | $T_{sp} = 25\text{ }^{\circ}\text{C}$                                                                    |     | -   | 5    | W                  |
| $T_j$                     | junction temperature                         |                                                                                                          |     | -55 | 150  | $^{\circ}\text{C}$ |
| $T_{amb}$                 | ambient temperature                          |                                                                                                          |     | -55 | 150  | $^{\circ}\text{C}$ |
| $T_{stg}$                 | storage temperature                          |                                                                                                          |     | -65 | 150  | $^{\circ}\text{C}$ |
| <b>Source-drain diode</b> |                                              |                                                                                                          |     |     |      |                    |
| $I_S$                     | source current                               | $T_{amb} = 25\text{ }^{\circ}\text{C}$                                                                   | [1] | -   | 1    | A                  |
| <b>ESD maximum rating</b> |                                              |                                                                                                          |     |     |      |                    |
| $V_{ESD}$                 | electrostatic discharge voltage              | HBM                                                                                                      | [3] | -   | 2000 | V                  |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and mounting pad for drain  $6\text{ cm}^2$ .

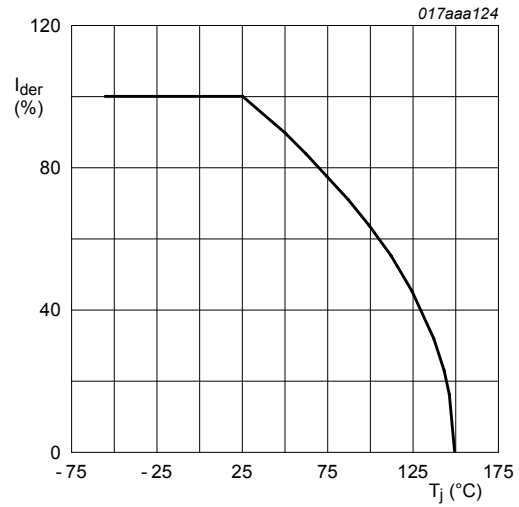
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[3] Measured between all pins.



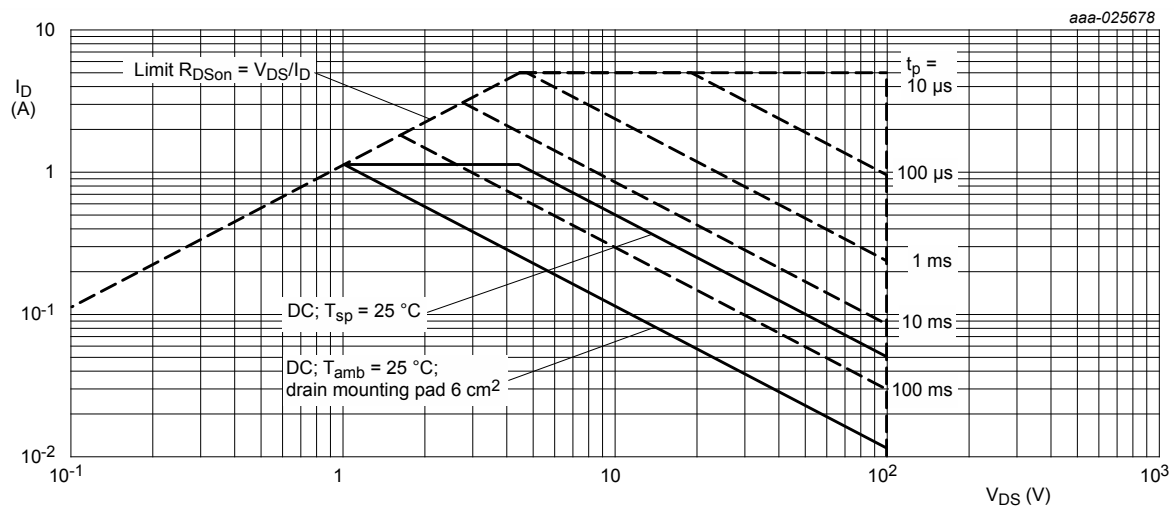
$$P_{der} = \frac{P_{tot}}{P_{tot(25^\circ\text{C})}} \times 100 \%$$

**Fig. 1. Normalized total power dissipation as a function of junction temperature**



$$I_{der} = \frac{I_D}{I_{D(25^\circ\text{C})}} \times 100 \%$$

**Fig. 2. Normalized continuous drain current as a function of junction temperature**



**Fig. 3. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage**

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

| Symbol                | Parameter                                        | Conditions  |     | Min | Typ | Max | Unit |
|-----------------------|--------------------------------------------------|-------------|-----|-----|-----|-----|------|
| R <sub>th(j-a)</sub>  | thermal resistance from junction to ambient      | in free air | [1] | -   | 186 | 215 | K/W  |
|                       |                                                  |             | [2] | -   | 96  | 110 | K/W  |
| R <sub>th(j-sp)</sub> | thermal resistance from junction to solder point |             |     | -   | 20  | 25  | K/W  |

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

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and mounting pad for drain 6 cm<sup>2</sup>.

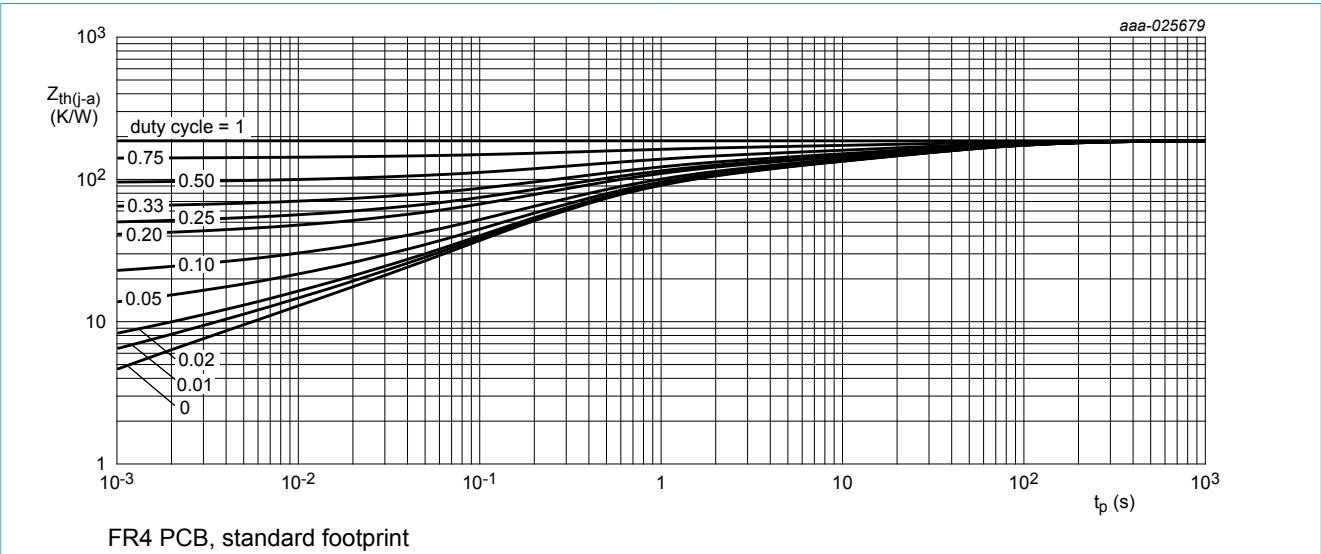


Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

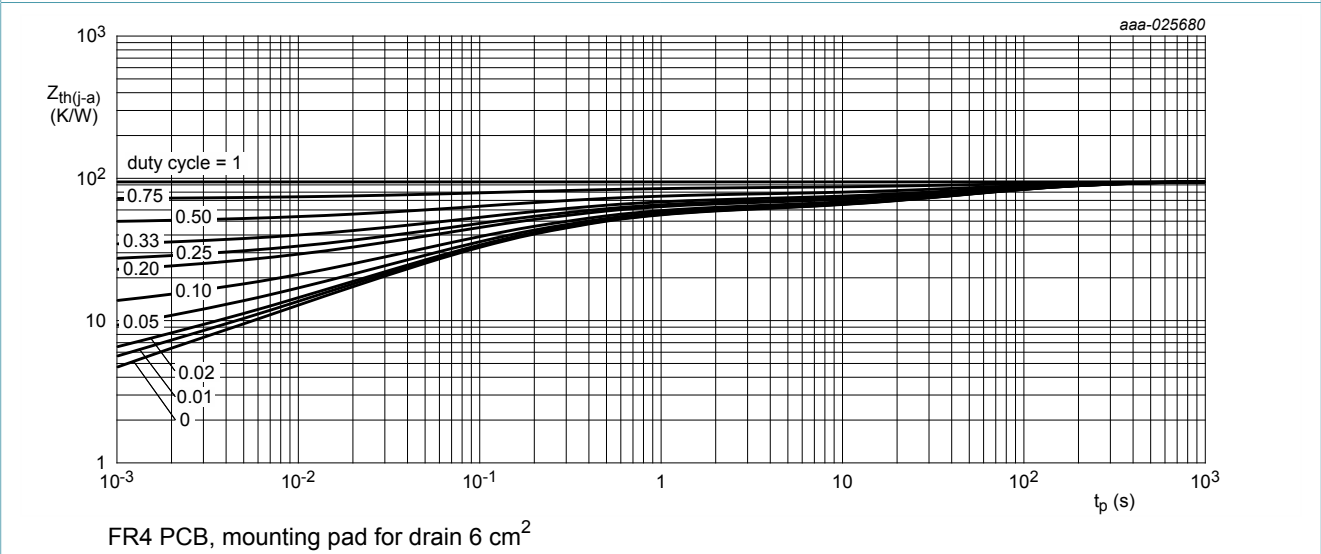


Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

| Symbol                  | Parameter                        | Conditions                                                                                                                |  | Min | Typ | Max | Unit |
|-------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------|--|-----|-----|-----|------|
| Static characteristics  |                                  |                                                                                                                           |  |     |     |     |      |
| V <sub>(BR)DSS</sub>    | drain-source breakdown voltage   | I <sub>D</sub> = 250 μA; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                    |  | 100 | -   | -   | V    |
| V <sub>GSth</sub>       | gate-source threshold voltage    | I <sub>D</sub> = 250 μA; V <sub>DS</sub> =V <sub>GS</sub> ; T <sub>j</sub> = 25 °C                                        |  | 1.3 | 1.7 | 2.7 | V    |
| I <sub>DSS</sub>        | drain leakage current            | V <sub>DS</sub> = 100 V; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                    |  | -   | -   | 1   | μA   |
| I <sub>GSS</sub>        | gate leakage current             | V <sub>GS</sub> = 20 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                     |  | -   | -   | 15  | μA   |
|                         |                                  | V <sub>GS</sub> = -20 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                    |  | -   | -   | -15 | μA   |
|                         |                                  | V <sub>GS</sub> = 10 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                     |  | -   | -   | 1   | μA   |
|                         |                                  | V <sub>GS</sub> = -10 V; V <sub>DS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                    |  | -   | -   | -1  | μA   |
| R <sub>DSon</sub>       | drain-source on-state resistance | V <sub>GS</sub> = 10 V; I <sub>D</sub> = 1.1 A; T <sub>j</sub> = 25 °C                                                    |  | -   | 285 | 385 | mΩ   |
|                         |                                  | V <sub>GS</sub> = 10 V; I <sub>D</sub> = 1.1 A; T <sub>j</sub> = 150 °C                                                   |  | -   | 660 | 892 | mΩ   |
|                         |                                  | V <sub>GS</sub> = 4.5 V; I <sub>D</sub> = 1 A; T <sub>j</sub> = 25 °C                                                     |  | -   | 301 | 432 | mΩ   |
| g <sub>fs</sub>         | forward transconductance         | V <sub>DS</sub> = 10 V; I <sub>D</sub> = 1.1 A; T <sub>j</sub> = 25 °C                                                    |  | -   | 5.2 | -   | S    |
| R <sub>G</sub>          | gate resistance                  | f = 1 MHz                                                                                                                 |  | -   | 1.8 | -   | Ω    |
| Dynamic characteristics |                                  |                                                                                                                           |  |     |     |     |      |
| Q <sub>G(tot)</sub>     | total gate charge                | V <sub>DS</sub> = 50 V; I <sub>D</sub> = 1.2 A; V <sub>GS</sub> = 10 V; T <sub>j</sub> = 25 °C                            |  | -   | 4.5 | 6.8 | nC   |
| Q <sub>GS</sub>         | gate-source charge               |                                                                                                                           |  | -   | 0.5 | -   | nC   |
| Q <sub>GD</sub>         | gate-drain charge                |                                                                                                                           |  | -   | 1.1 | -   | nC   |
| C <sub>iss</sub>        | input capacitance                | V <sub>DS</sub> = 50 V; f = 1 MHz; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C                                          |  | -   | 190 | -   | pF   |
| C <sub>oss</sub>        | output capacitance               |                                                                                                                           |  | -   | 13  | -   | pF   |
| C <sub>rss</sub>        | reverse transfer capacitance     |                                                                                                                           |  | -   | 9   | -   | pF   |
| t <sub>d(on)</sub>      | turn-on delay time               | V <sub>DS</sub> = 50 V; I <sub>D</sub> = 1.2 A; V <sub>GS</sub> = 10 V; R <sub>G(ext)</sub> = 6 Ω; T <sub>j</sub> = 25 °C |  | -   | 3   | -   | ns   |
| t <sub>r</sub>          | rise time                        |                                                                                                                           |  | -   | 4   | -   | ns   |
| t <sub>d(off)</sub>     | turn-off delay time              |                                                                                                                           |  | -   | 10  | -   | ns   |
| t <sub>f</sub>          | fall time                        |                                                                                                                           |  | -   | 3   | -   | ns   |
| Source-drain diode      |                                  |                                                                                                                           |  |     |     |     |      |
| V <sub>SD</sub>         | source-drain voltage             | I <sub>S</sub> = 1 A; V <sub>GS</sub> = 0 V; T <sub>j</sub> = 25 °C                                                       |  | -   | 0.8 | 1.2 | V    |

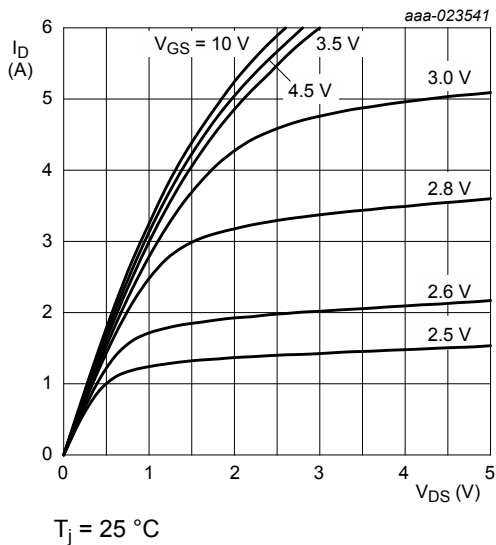


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

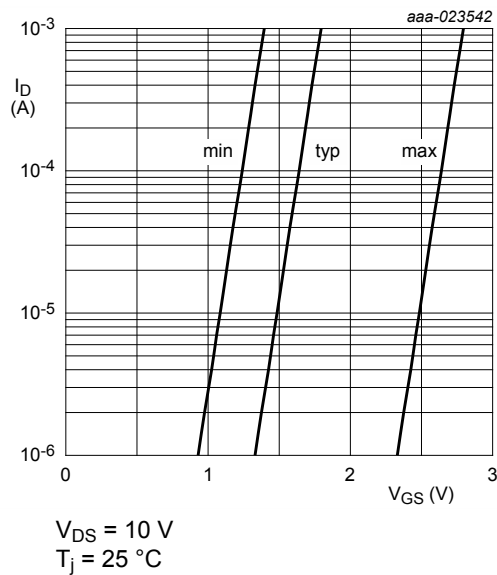


Fig. 7. Subthreshold drain current as a function of gate-source voltage

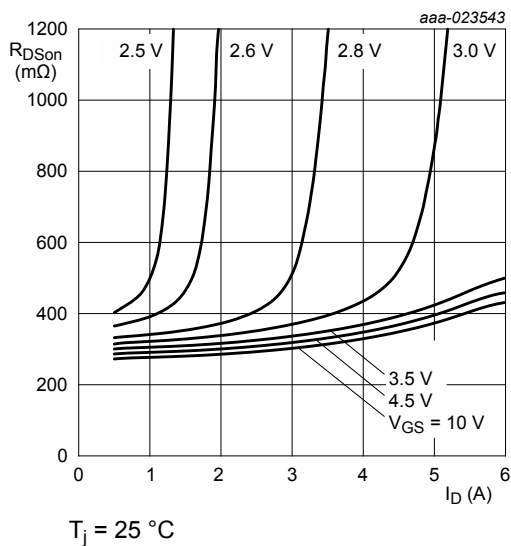


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

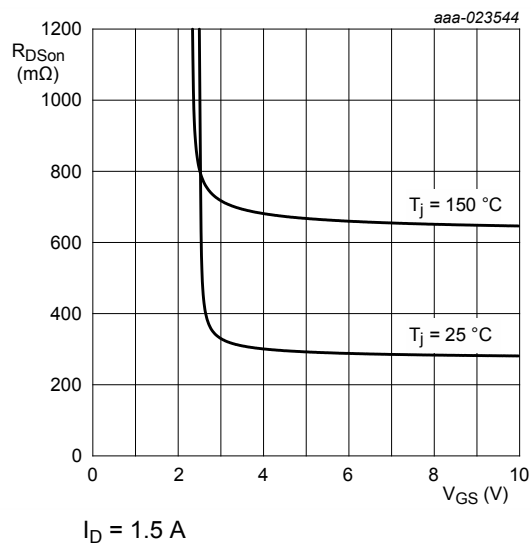


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values

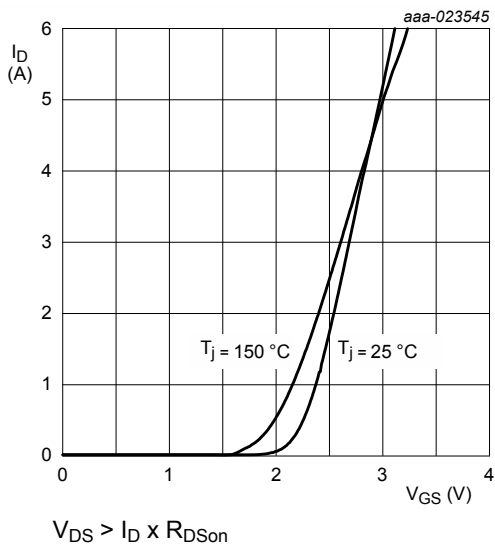


Fig. 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values

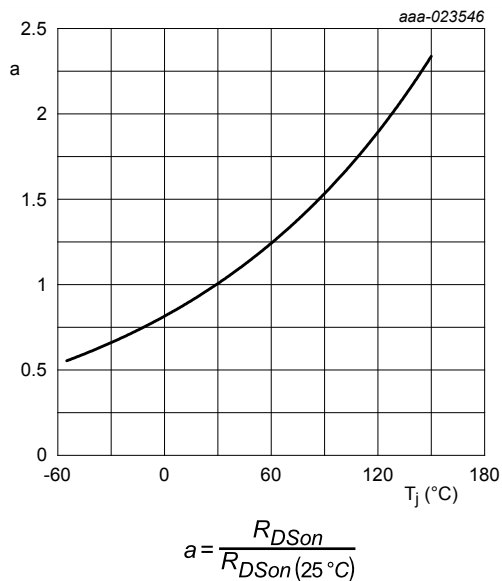


Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

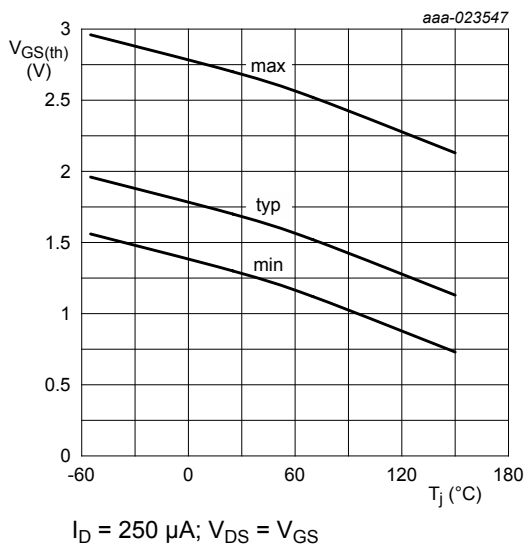


Fig. 12. Gate-source threshold voltage as a function of junction temperature

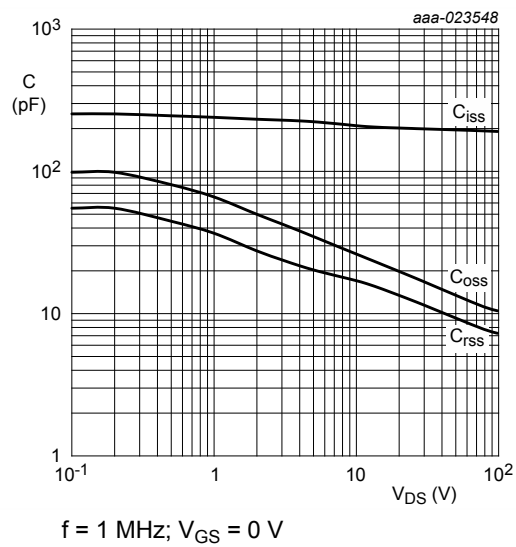
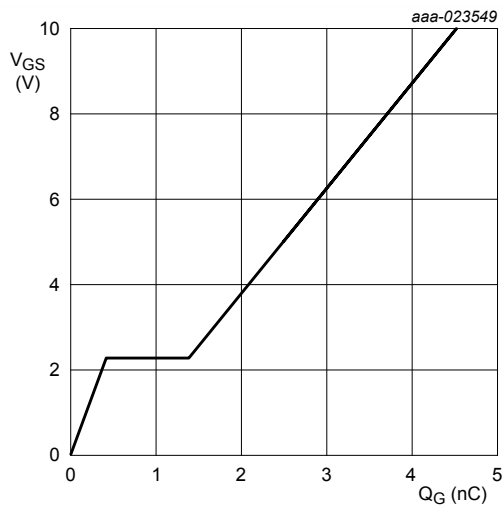


Fig. 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values



$V_{DS} = 50\text{ V}; I_D = 1.5\text{ A}$

Fig. 14. Gate-source voltage as a function of gate charge; typical values

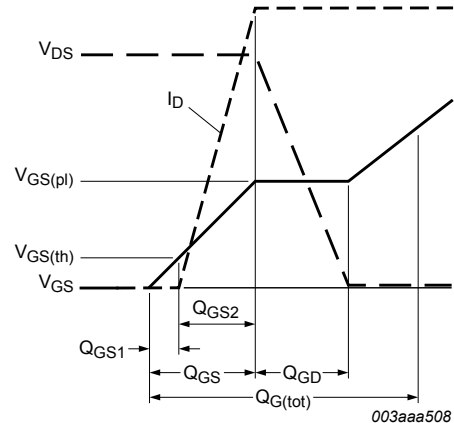
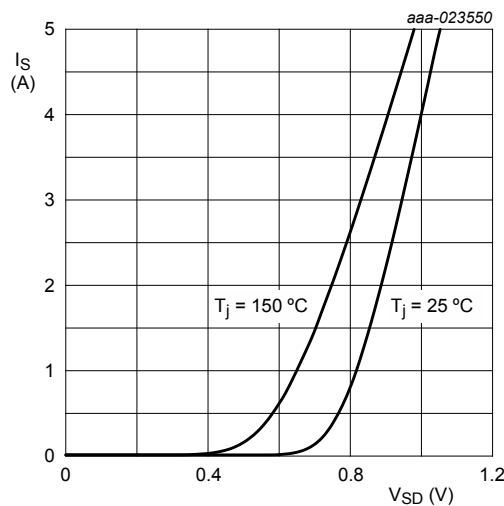


Fig. 15. MOSFET transistor: Gate charge waveform definitions



$V_{GS} = 0\text{ V}$

Fig. 16. Source current as a function of source-drain voltage; typical values

11. Test information

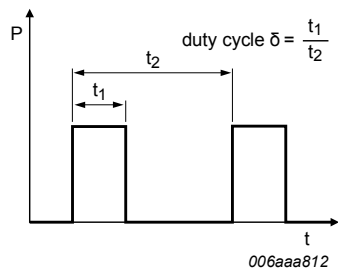


Fig. 17. Duty cycle definition

**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

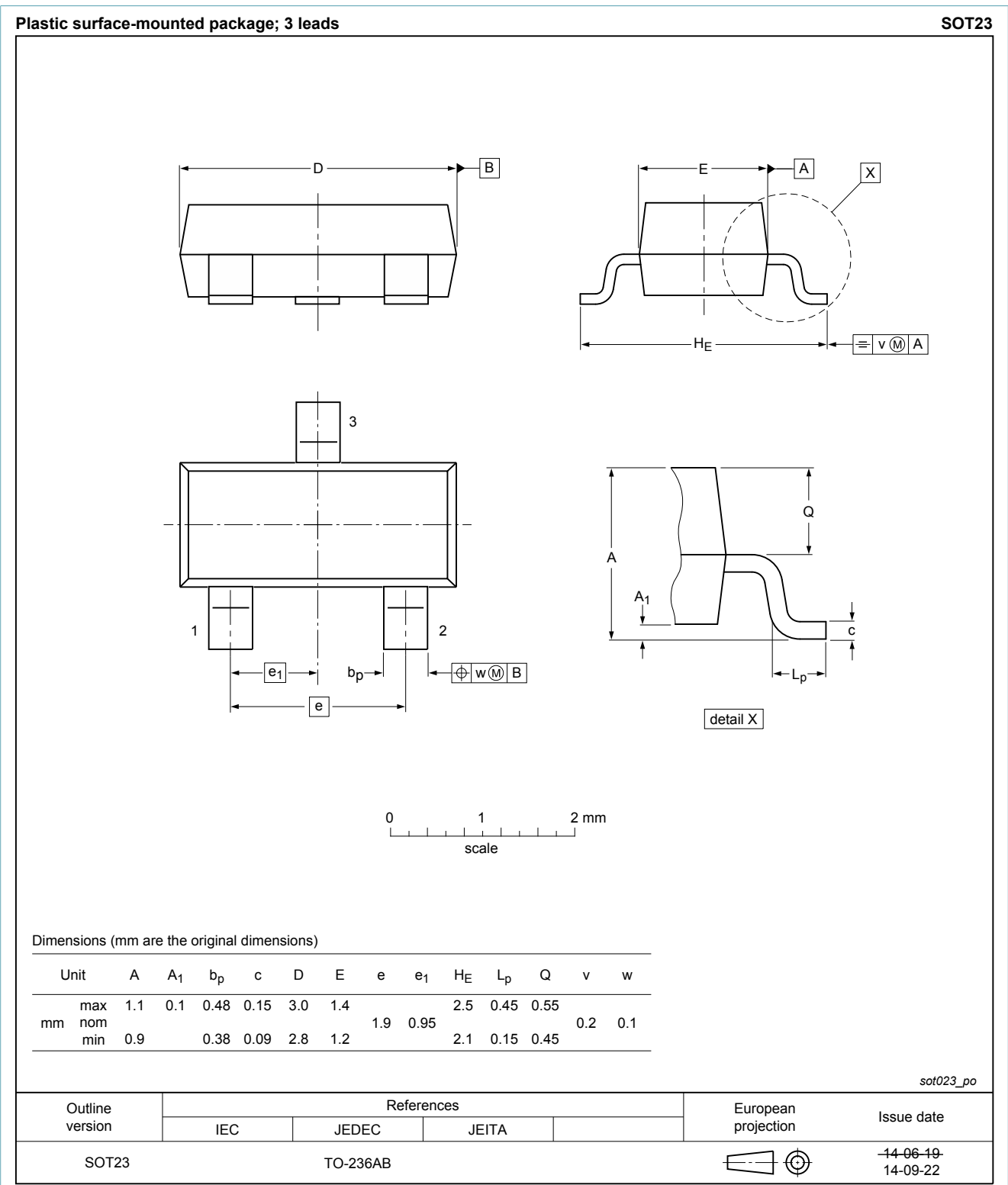


Fig. 18. Package outline TO-236AB (SOT23)

13. Soldering

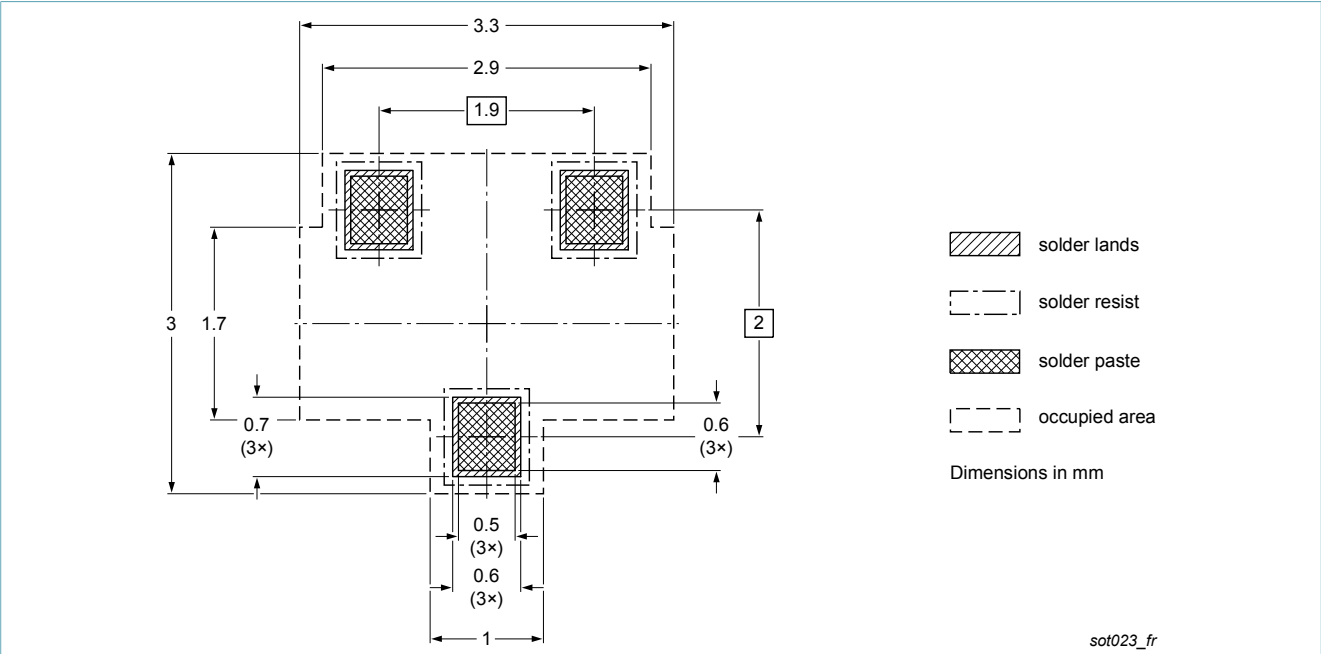


Fig. 19. Reflow soldering footprint for TO-236AB (SOT23)

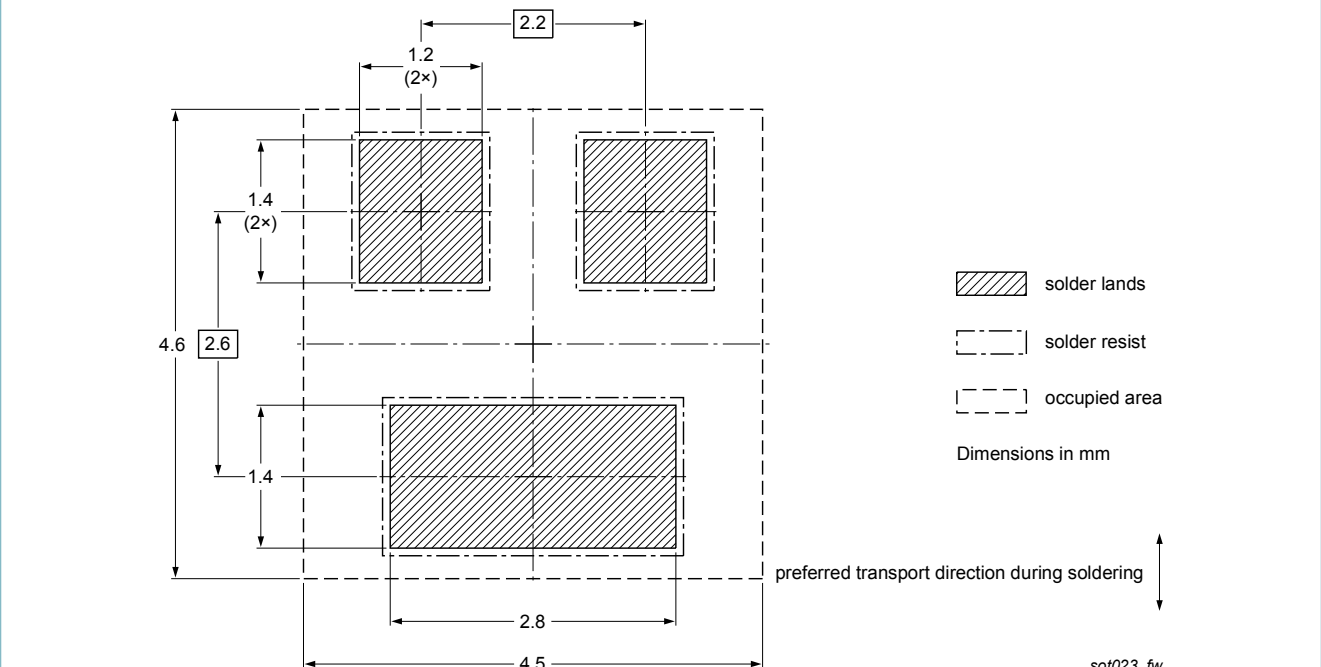


Fig. 20. Wave soldering footprint for TO-236AB (SOT23)

14. Revision history

Table 8. Revision history

| Data sheet ID  | Release date | Data sheet status  | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| PMV280ENEA v.1 | 20161122     | Product data sheet | -             | -          |

## 15. Legal information

### 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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