

PMT200EN

100 V N-channel Trench MOSFET

25 October 2012

Product data sheet

1. Product profile

1.1 General description

N-channel enhancement mode Field-Effect Transistor (FET) in a small SOT223 (SC-73) small Surface-Mounted Device (SMD) plastic package using Trench MOSFET technology.

1.2 Features and benefits

- Logic-level compatible
- Very fast switching
- Trench MOSFET technology

1.3 Applications

- Relay driver
- LED backlight driver
- Low-side loadswitch
- Switching circuits

1.4 Quick reference data

Table 1. Quick reference data

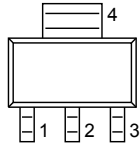
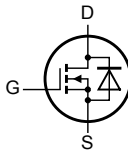
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------------|----------------------------------|---|-----|-----|-----|------------|
| V_{DS} | drain-source voltage | $T_j = 25\text{ °C}$ | - | - | 100 | V |
| V_{GS} | gate-source voltage | | -20 | - | 20 | V |
| I_D | drain current | $V_{GS} = 10\text{ V}; T_{amb} = 25\text{ °C}; t \leq 5\text{ s}$ | [1] | - | 3.3 | A |
| Static characteristics | | | | | | |
| R_{DSon} | drain-source on-state resistance | $V_{GS} = 10\text{ V}; I_D = 1.5\text{ A}; T_j = 25\text{ °C}$ | - | 190 | 235 | m Ω |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm².



2. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|---|--|
| 1 | G | gate |  <p>SC-73 (SOT223)</p> |  <p>017aaa253</p> |
| 2 | D | drain | | |
| 3 | S | source | | |
| 4 | D | drain | | |

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| PMT200EN | SC-73 | plastic surface-mounted package with increased heatsink; 4 leads | SOT223 |

4. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PMT200EN | T200EN |

5. 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 | $V_{GS} = 10\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}; t \leq 5\text{ s}$ | [1] | - | 3.3 | A |
| | | $V_{GS} = 10\text{ V}; T_{amb} = 25\text{ }^\circ\text{C}$ | [1] | - | 1.8 | A |
| | | $V_{GS} = 10\text{ V}; T_{amb} = 100\text{ }^\circ\text{C}$ | [1] | - | 1.1 | A |
| I_{DM} | peak drain current | $T_{amb} = 25\text{ }^\circ\text{C};$ single pulse; $t_p \leq 10\text{ }\mu\text{s}$ | | - | 13 | A |
| P_{tot} | total power dissipation | $T_{amb} = 25\text{ }^\circ\text{C}$ | [2] | - | 800 | mW |
| | | | [1] | - | 1700 | mW |
| | | $T_{sp} = 25\text{ }^\circ\text{C}$ | | - | 8300 | mW |
| T_j | junction temperature | | | -55 | 150 | $^\circ\text{C}$ |

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|---------------------------|---------------------|--------------------------|-----|-----|-----|------|
| T _{amb} | ambient temperature | | | -55 | 150 | °C |
| T _{stg} | storage temperature | | | -65 | 150 | °C |
| Source-drain diode | | | | | | |
| I _S | source current | T _{amb} = 25 °C | [1] | - | 1.6 | A |

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 6 cm².
- [2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

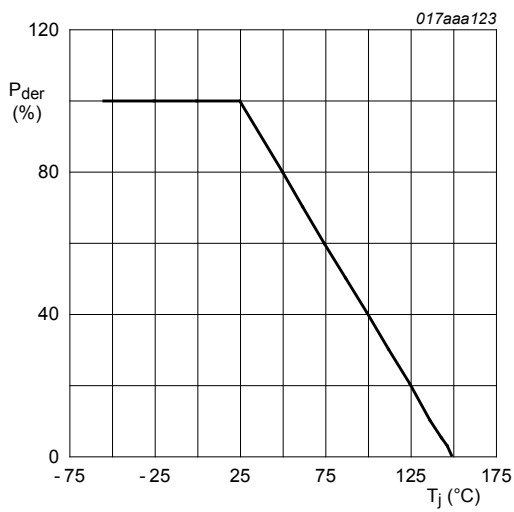


Fig. 1. Normalized total power dissipation as a function of junction temperature

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

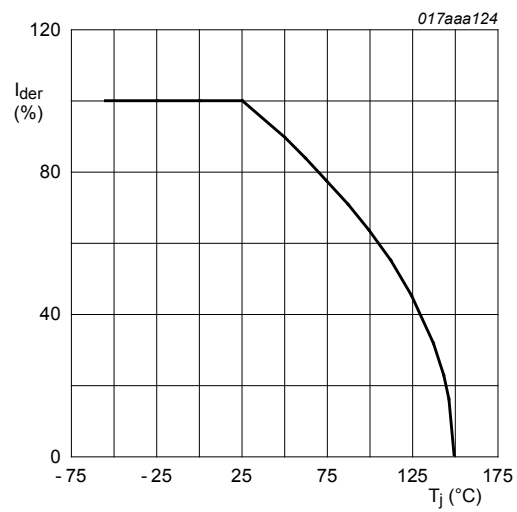
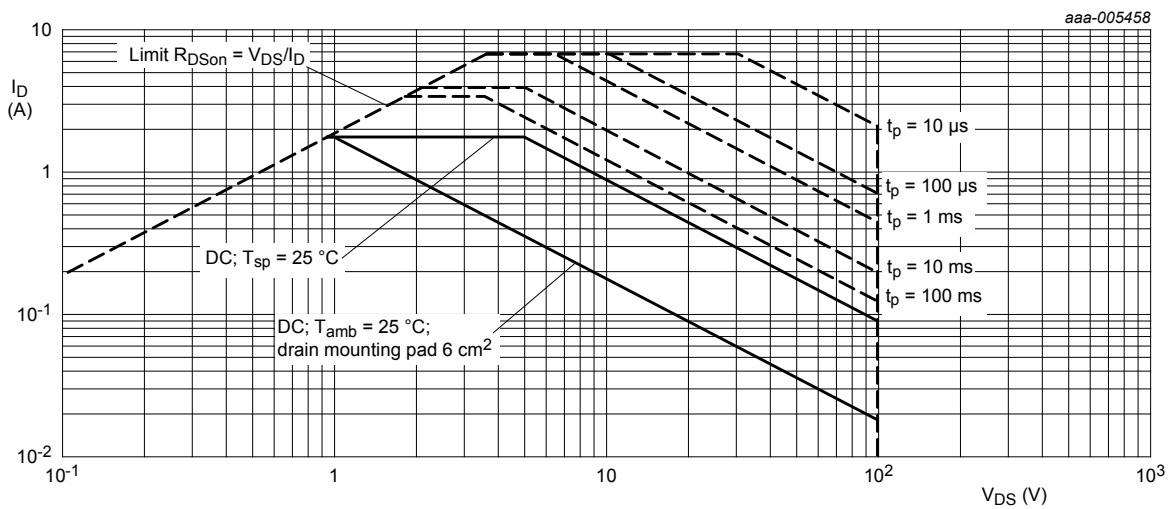


Fig. 2. Normalized continuous drain current as a function of junction temperature

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



I_{DM} = single pulse

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

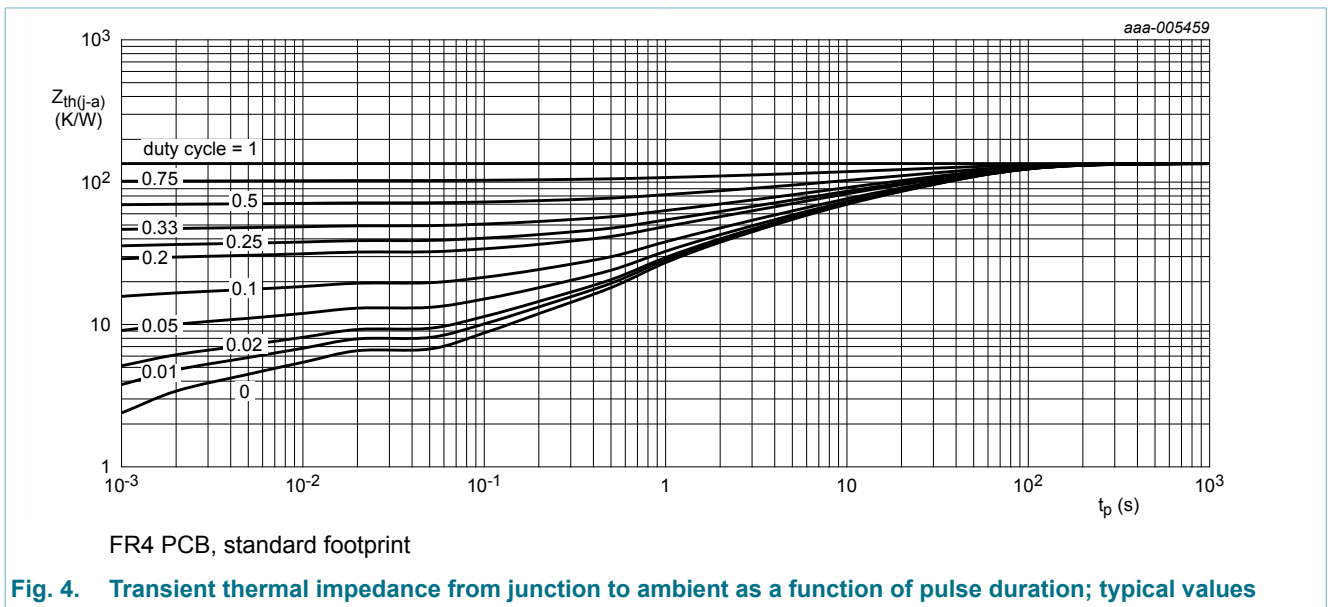
6. Thermal characteristics

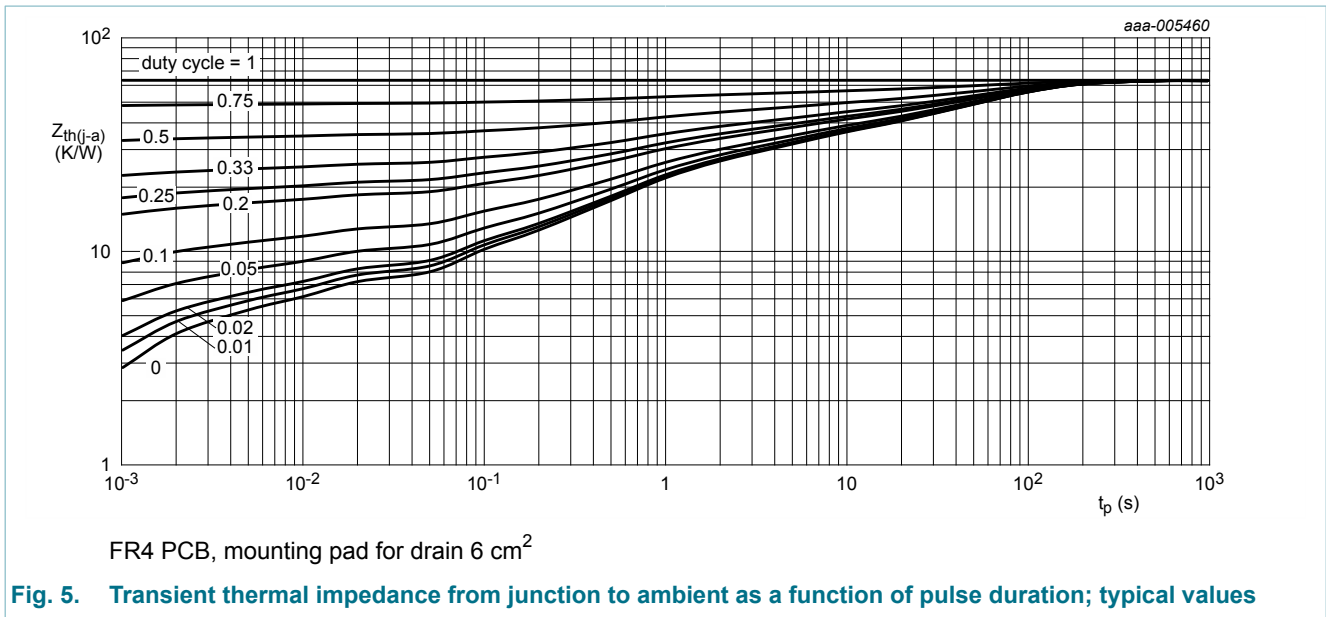
Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|----------------|--|---------------------------|-----|-----|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | - | 135 | 155 | K/W |
| | | | [2] | - | 60 | 70 | K/W |
| | | in free air; $t \leq 5$ s | [2] | - | 31 | 36 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | | - | 12 | 15 | 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, mounting pad for drain 6 cm².





7. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|----------------------------------|---|-----|-----|------|------------|
| Static characteristics | | | | | | |
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $I_D = 250 \mu A; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$ | 100 | - | - | V |
| V_{GSth} | gate-source threshold voltage | $I_D = 250 \mu A; V_{DS} = V_{GS}; T_j = 25 \text{ }^\circ C$ | 1.3 | 1.7 | 2.5 | V |
| I_{DSS} | drain leakage current | $V_{DS} = 100 V; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$ | - | - | 1 | μA |
| I_{GSS} | gate leakage current | $V_{GS} = 20 V; V_{DS} = 0 V; T_j = 25 \text{ }^\circ C$ | - | - | 100 | nA |
| | | $V_{GS} = -20 V; V_{DS} = 0 V; T_j = 25 \text{ }^\circ C$ | - | - | -100 | nA |
| R_{DSon} | drain-source on-state resistance | $V_{GS} = 10 V; I_D = 1.5 A; T_j = 25 \text{ }^\circ C$ | - | 190 | 235 | m Ω |
| | | $V_{GS} = 10 V; I_D = 1.5 A; T_j = 150 \text{ }^\circ C$ | - | 420 | 520 | m Ω |
| | | $V_{GS} = 4.5 V; I_D = 1 A; T_j = 25 \text{ }^\circ C$ | - | 200 | 270 | m Ω |
| g_{fs} | forward transconductance | $V_{DS} = 10 V; I_D = 1.5 A; T_j = 25 \text{ }^\circ C$ | - | 5 | - | S |
| Dynamic characteristics | | | | | | |
| $Q_{G(tot)}$ | total gate charge | $V_{DS} = 80 V; I_D = 1.5 A; V_{GS} = 10 V; T_j = 25 \text{ }^\circ C$ | - | 7.4 | 10 | nC |
| Q_{GS} | gate-source charge | $T_j = 25 \text{ }^\circ C$ | - | 0.7 | - | nC |
| Q_{GD} | gate-drain charge | | - | 1.9 | - | nC |
| C_{iss} | input capacitance | $V_{DS} = 80 V; f = 1 \text{ MHz}; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$ | - | 315 | 475 | pF |
| C_{oss} | output capacitance | | - | 35 | - | pF |

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------------------|------------------------------|--|-----|-----|-----|------|
| C_{rSS} | reverse transfer capacitance | | - | 25 | - | pF |
| $t_{d(on)}$ | turn-on delay time | $V_{DS} = 50\text{ V}; I_D = 1.5\text{ A}; V_{GS} = 10\text{ V}; R_{G(ext)} = 6\ \Omega; T_j = 25\text{ }^\circ\text{C}$ | - | 4 | - | ns |
| t_r | rise time | | - | 5 | - | ns |
| $t_{d(off)}$ | turn-off delay time | | - | 11 | - | ns |
| t_f | fall time | | - | 3 | - | ns |
| Source-drain diode | | | | | | |
| V_{SD} | source-drain voltage | $I_S = 1.6\text{ A}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^\circ\text{C}$ | - | 0.8 | 1.2 | V |

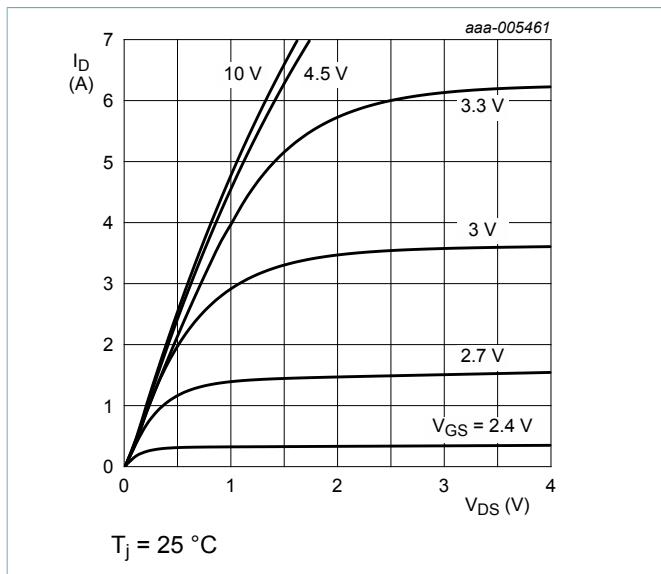


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

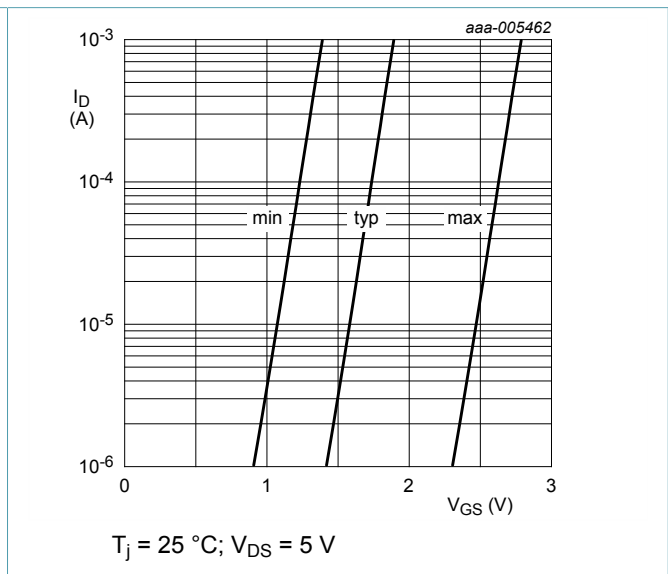


Fig. 7. Subthreshold drain current as a function of gate-source voltage

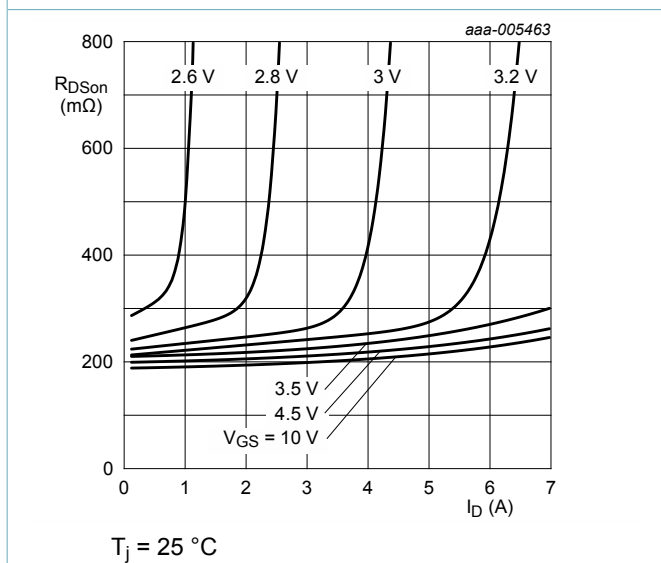


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

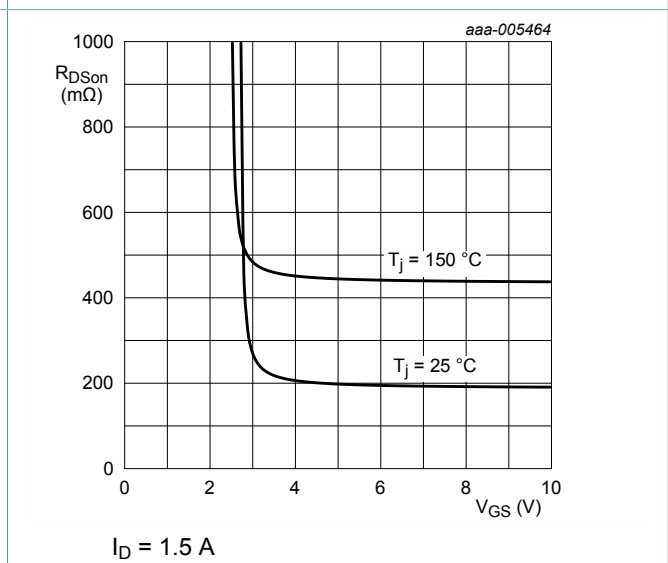
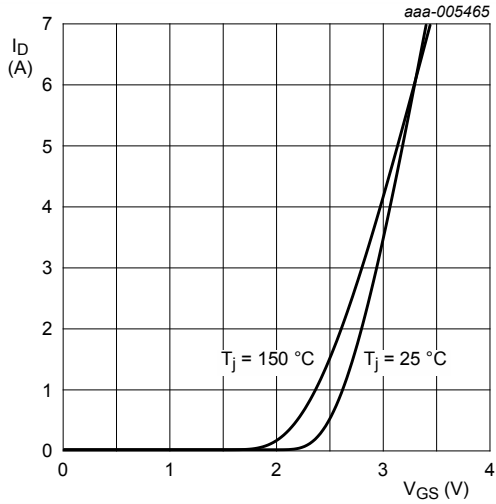


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values



$$V_{DS} > I_D \times R_{DS(on)}$$

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

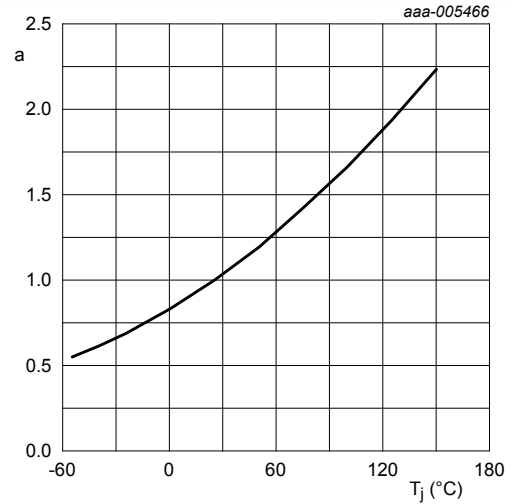
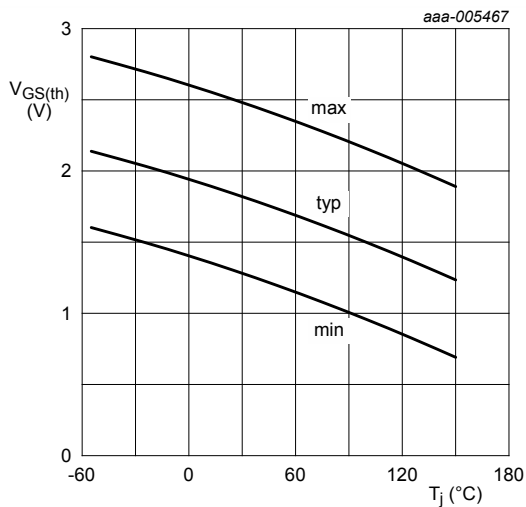


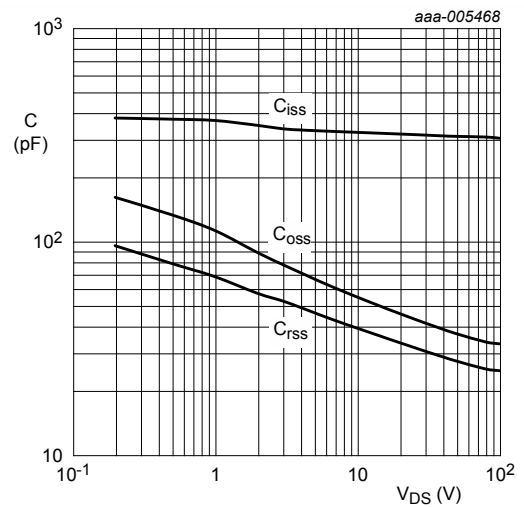
Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

$$a = \frac{R_{DS(on)}}{R_{DS(on)(25^\circ C)}}$$



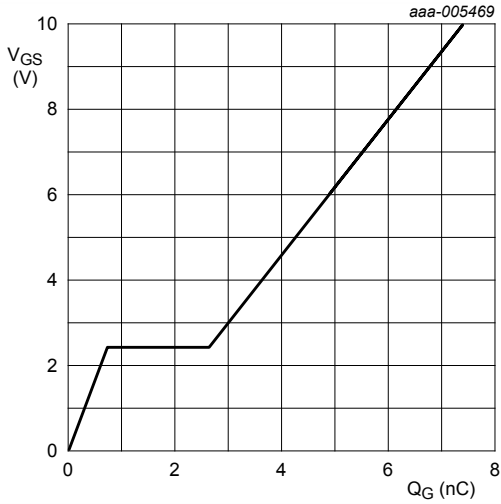
$$I_D = 0.25 \text{ mA}; V_{DS} = V_{GS}$$

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



$$f = 1 \text{ MHz}; V_{GS} = 0 \text{ V}$$

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



$I_D = 1.5 \text{ A}; V_{DS} = 80 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}$

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

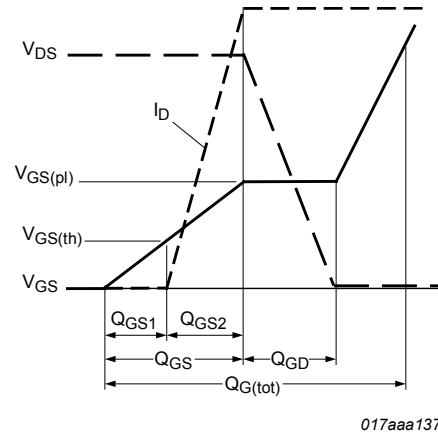
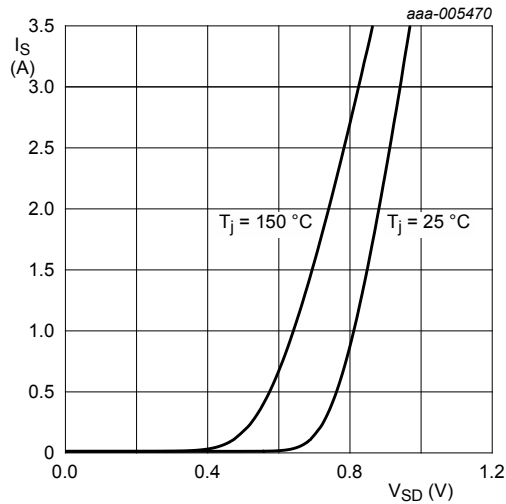


Fig. 15. Gate charge waveform definitions



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

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

8. Test information

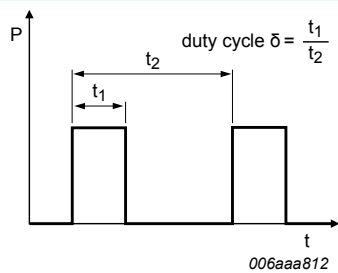


Fig. 17. Duty cycle definition

9. Package outline

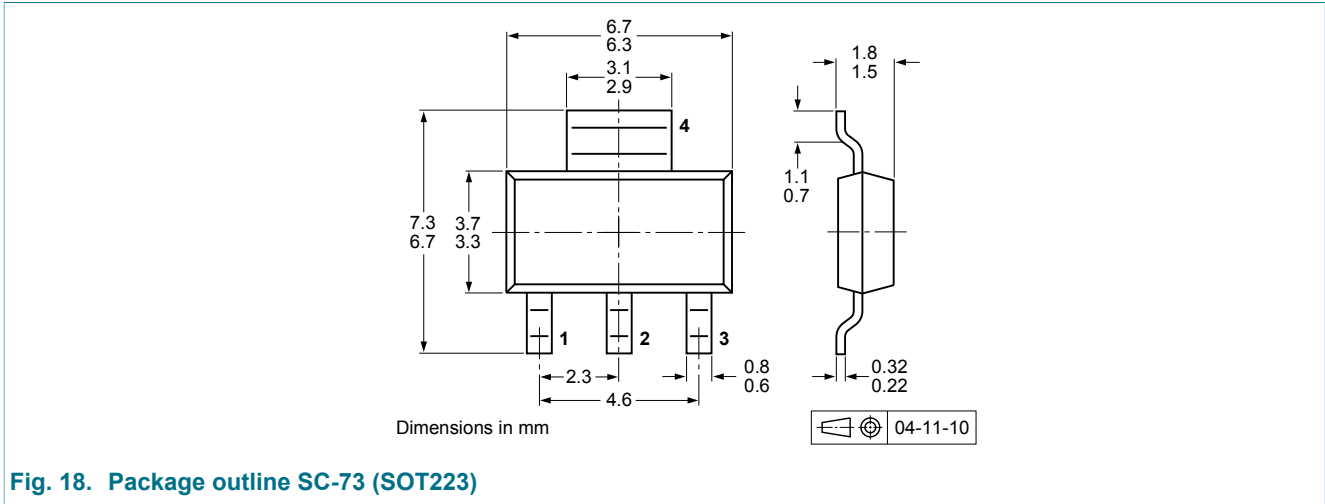


Fig. 18. Package outline SC-73 (SOT223)

10. Soldering

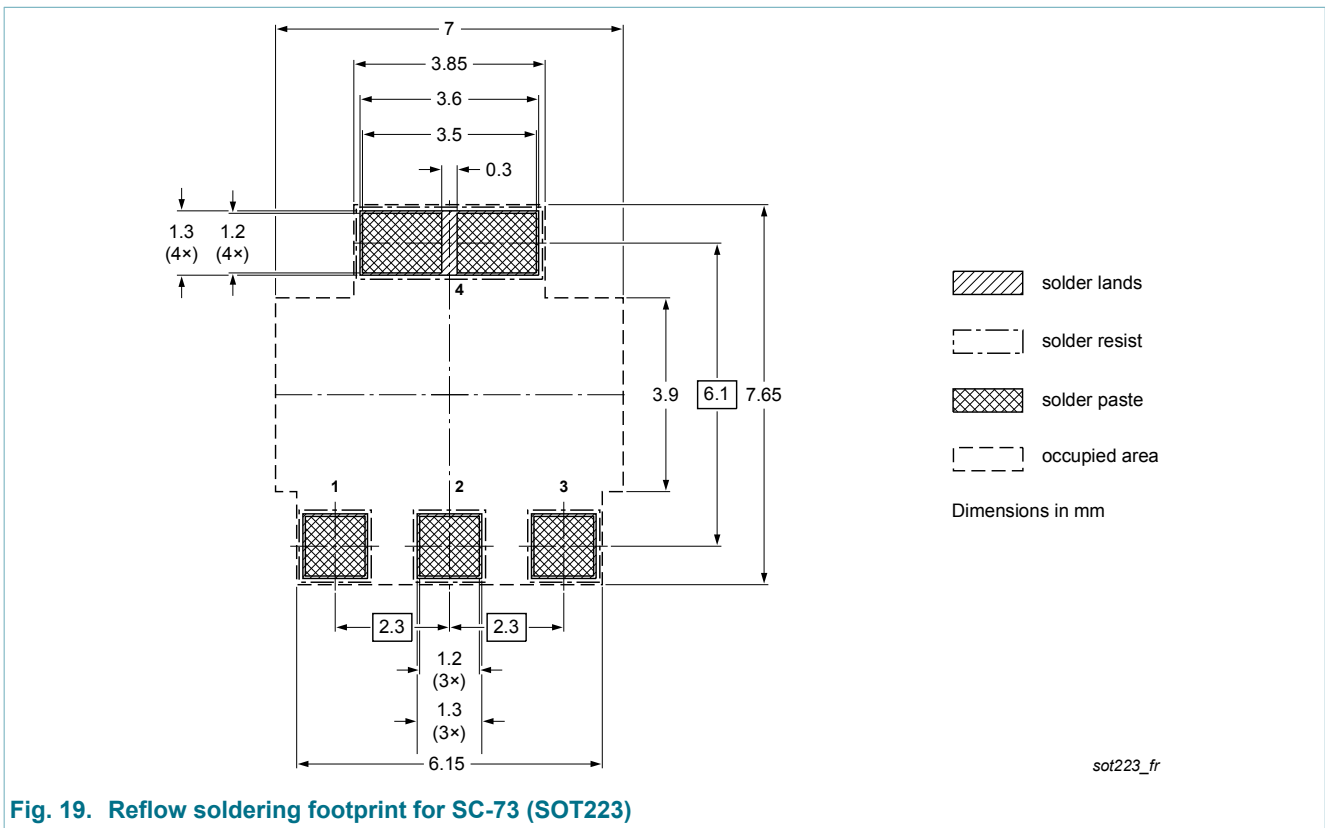
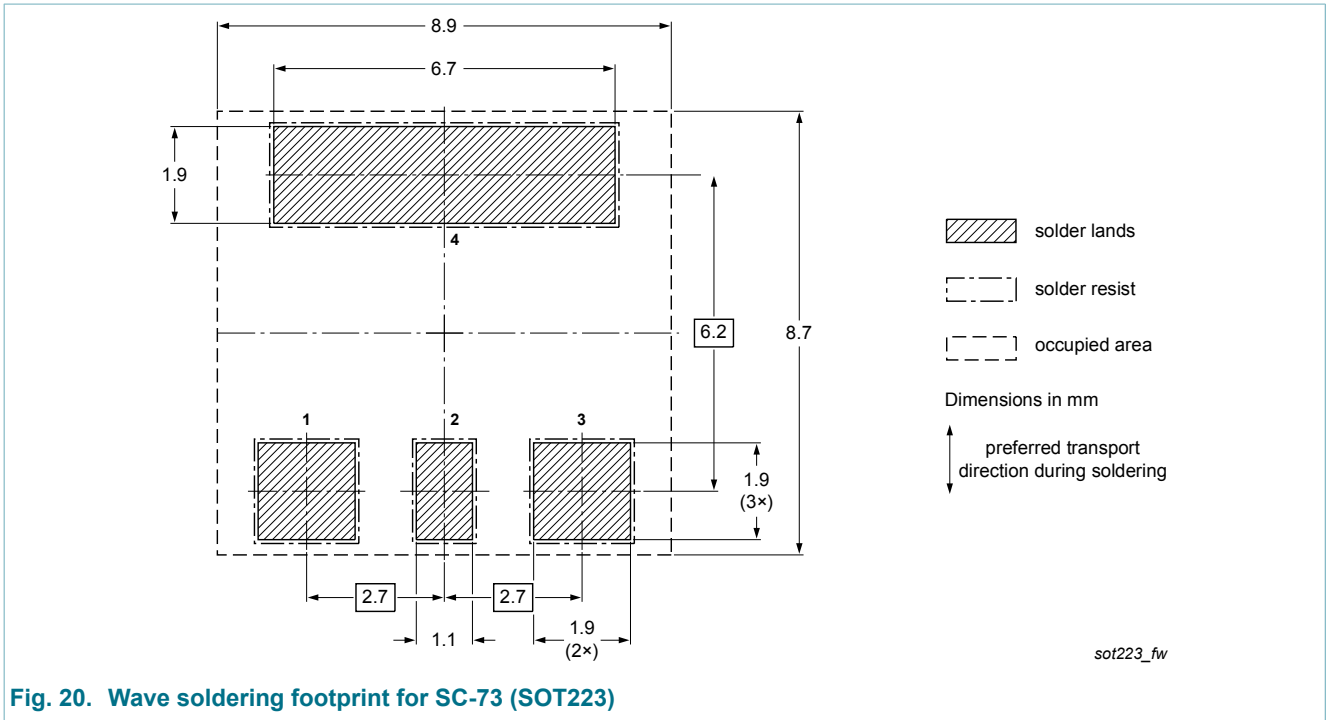


Fig. 19. Reflow soldering footprint for SC-73 (SOT223)



11. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| PMT200EN v.1 | 20121025 | Product data sheet | - | - |

12. Legal information

12.1 Data sheet status

| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
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