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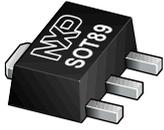
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Kind regards,

Team Nexperia



BSS87

200 V, N-channel vertical D-MOS transistor

9 December 2014

Product data sheet

1. General description

N-channel enhancement mode vertical Double-Diffused Field-Effect Transistor (D-MOSFET) in a SOT89 (SC-62) medium power and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Direct interface to Complementary (C-MOS) transistor and Transistor-Transistor Logic (TTL) devices.
- Very fast switching
- No secondary breakdown

3. Applications

- Relay driver
- High-speed line driver
- Load-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 | $T_j = 25\text{ °C}$ | - | - | 200 | V |
| V_{GS} | gate-source voltage | | -20 | - | 20 | V |
| I_D | drain current | $V_{GS} = 10\text{ V}; T_{amb} = 25\text{ °C}$ | [1] | - | 0.4 | A |
| Static characteristics | | | | | | |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = 10\text{ V}; I_D = 0.4\text{ A}; T_j = 25\text{ °C}$ | - | 1.6 | 3 | Ω |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm².

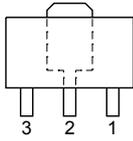
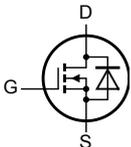


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5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------|---|---|
| 1 | S | source |  <p style="text-align: center;">SOT89</p> |  <p style="text-align: center;"><i>017aaa253</i></p> |
| 2 | D | drain | | |
| 3 | G | gate | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| BSS87 | SOT89 | plastic surface-mounted package; die pad for good heat transfer; 3 leads | SOT89 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| BSS87 | KA |

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 | $T_j = 25\text{ °C}$ | | - | 200 | 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] | - | 0.7 | A |
| | | $V_{GS} = 10\text{ V}; T_{amb} = 25\text{ °C}$ | [1] | - | 0.4 | A |
| | | $V_{GS} = 10\text{ V}; T_{amb} = 100\text{ °C}$ | [1] | - | 0.2 | A |
| I_{DM} | peak drain current | $T_{amb} = 25\text{ °C};$ single pulse; $t_p \leq 10\text{ }\mu\text{s}$ | | - | 1.6 | A |
| P_{tot} | total power dissipation | $T_{amb} = 25\text{ °C}$ | [2] | - | 0.58 | W |
| | | | [1] | - | 1 | W |
| | | $T_{sp} = 25\text{ °C}$ | | - | 12.5 | W |
| T_j | junction temperature | | | -55 | 150 | °C |
| T_{amb} | ambient temperature | | | -55 | 150 | °C |
| T_{stg} | storage temperature | | | -65 | 150 | °C |
| Source-drain diode | | | | | | |
| I_S | source current | $T_{amb} = 25\text{ °C}$ | [1] | - | 0.4 | A |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for drain 1 cm².

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

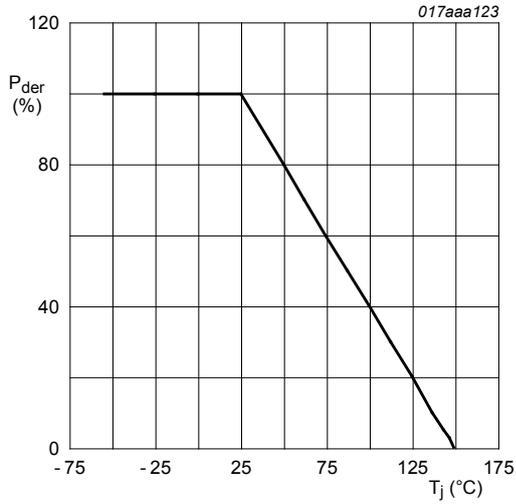


Fig. 1. MOSFET transistor: Normalized total power dissipation as a function of junction temperature

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

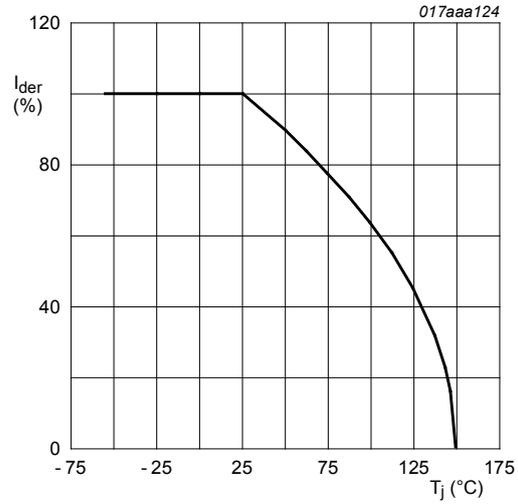
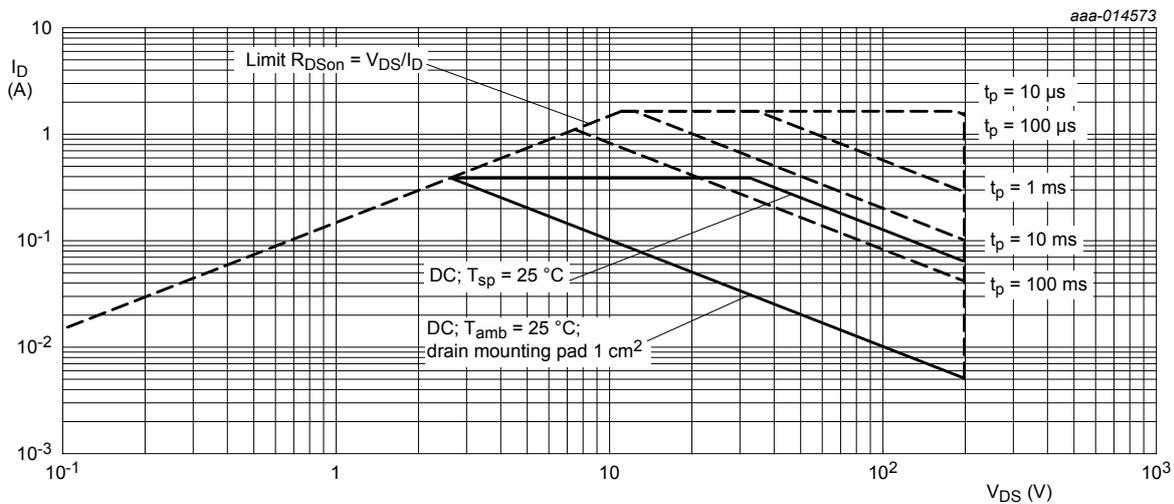


Fig. 2. MOSFET transistor: Normalized continuous drain current as a function of junction temperature

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



I_{DM} = single pulse

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

9. 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] | - | 190 | 216 | K/W |
| | | | [2] | - | 105 | 125 | K/W |
| | | in free air; t ≤ 5 s | [2] | - | 36 | 42 | K/W |
| R _{th(j-sp)} | thermal resistance from junction to solder point | | | - | 6 | 10 | 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 1 cm².

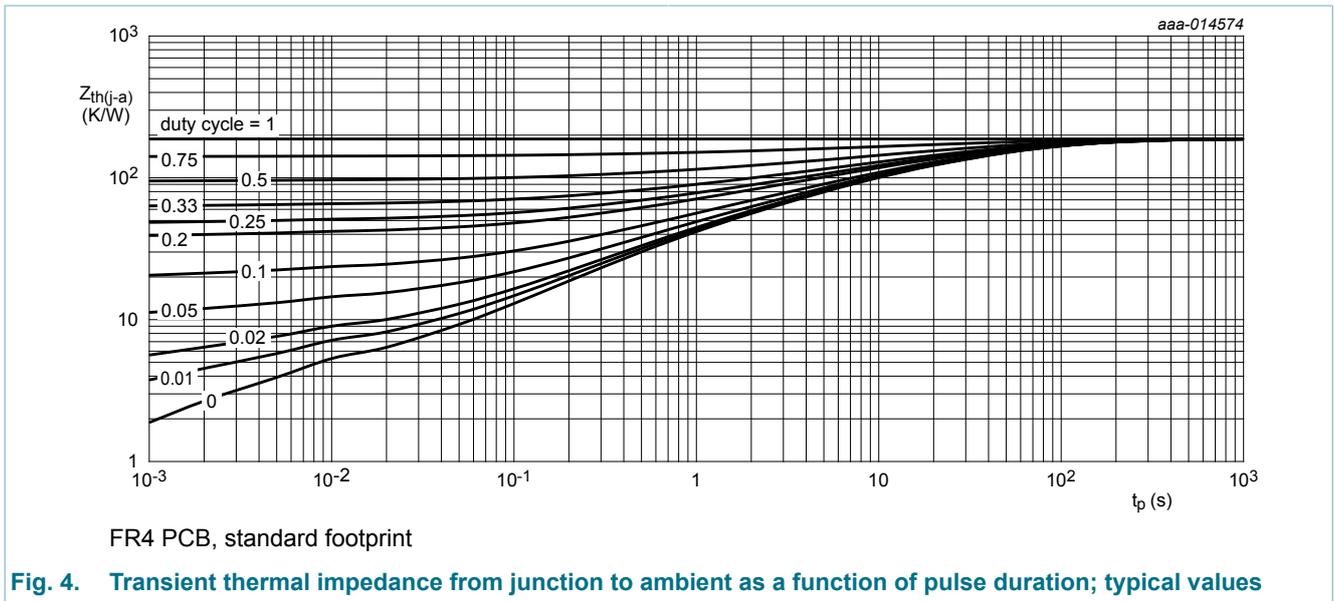
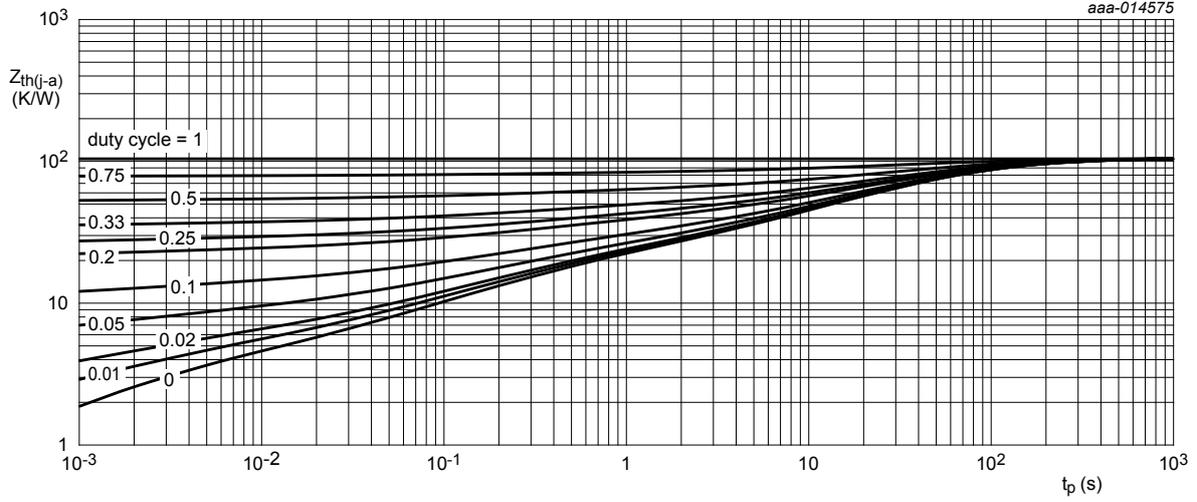


Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, mounting pad for drain 1 cm²

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 | | | | | | |
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $I_D = 250 \mu A; V_{GS} = 0 V; T_j = 25 \text{ }^\circ C$ | 200 | - | - | V |
| V_{GSth} | gate-source threshold voltage | $I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_j = 25 \text{ }^\circ C$ | 0.8 | - | 2.8 | V |
| I_{DSS} | drain leakage current | $V_{DS} = 60 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ C$ | - | - | 200 | nA |
| | | $V_{DS} = 200 \text{ V}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ C$ | - | - | 60 | μA |
| I_{GSS} | gate leakage current | $V_{GS} = 20 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ C$ | - | - | 100 | nA |
| | | $V_{GS} = -20 \text{ V}; V_{DS} = 0 \text{ V}; T_j = 25 \text{ }^\circ C$ | - | - | -100 | nA |
| R_{DSon} | drain-source on-state resistance | $V_{GS} = 10 \text{ V}; I_D = 0.4 \text{ A}; T_j = 25 \text{ }^\circ C$ | - | 1.6 | 3 | Ω |
| | | $V_{GS} = 10 \text{ V}; I_D = 0.4 \text{ A}; T_j = 150 \text{ }^\circ C$ | - | 3.7 | 7 | Ω |
| | | $V_{GS} = 4.5 \text{ V}; I_D = 0.3 \text{ A}; T_j = 25 \text{ }^\circ C$ | - | 1.9 | 4 | Ω |
| g_{fs} | forward transconductance | $V_{DS} = 25 \text{ V}; I_D = 0.4 \text{ A}; T_j = 25 \text{ }^\circ C$ | - | 0.8 | - | S |
| Dynamic characteristics | | | | | | |
| $Q_{G(tot)}$ | total gate charge | $V_{DS} = 50 \text{ V}; I_D = 0.25 \text{ A}; V_{GS} = 10 \text{ V}; T_j = 25 \text{ }^\circ C$ | - | 5.5 | 10 | nC |
| Q_{GS} | gate-source charge | | - | 0.3 | - | nC |
| Q_{GD} | gate-drain charge | | - | 1.4 | - | nC |
| C_{iss} | input capacitance | $V_{DS} = 25 \text{ V}; f = 1 \text{ MHz}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ C$ | - | 100 | 120 | pF |
| C_{oss} | output capacitance | | - | 20 | 30 | pF |
| C_{rss} | reverse transfer capacitance | | - | 10 | 15 | pF |
| $t_{d(on)}$ | turn-on delay time | | $V_{DS} = 50 \text{ V}; I_D = 0.25 \text{ A}; V_{GS} = 10 \text{ V}; R_{G(ext)} = 6 \text{ } \Omega; T_j = 25 \text{ }^\circ C$ | - | 2.7 | 6 |
| t_r | rise time | - | | 3.7 | 6 | ns |
| $t_{d(off)}$ | turn-off delay time | - | | 16.4 | 30 | ns |
| t_f | fall time | - | | 7.5 | 20 | ns |
| Source-drain diode | | | | | | |
| V_{SD} | source-drain voltage | $I_S = 0.4 \text{ A}; V_{GS} = 0 \text{ V}; T_j = 25 \text{ }^\circ C$ | - | 0.8 | 1.2 | V |

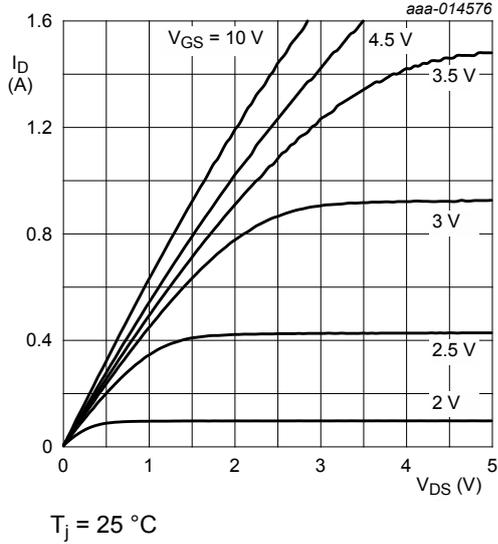


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values

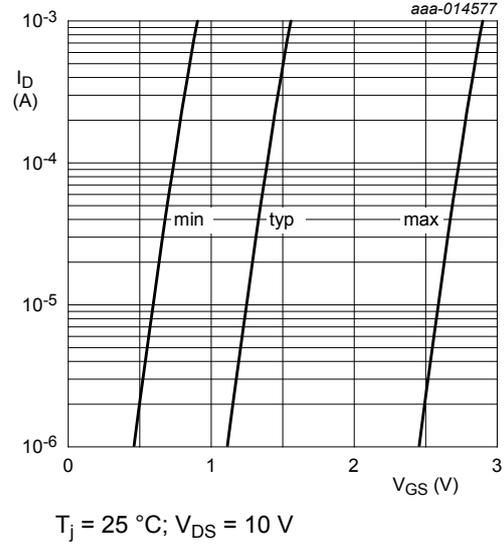


Fig. 7. Sub-threshold drain current as a function of gate-source voltage

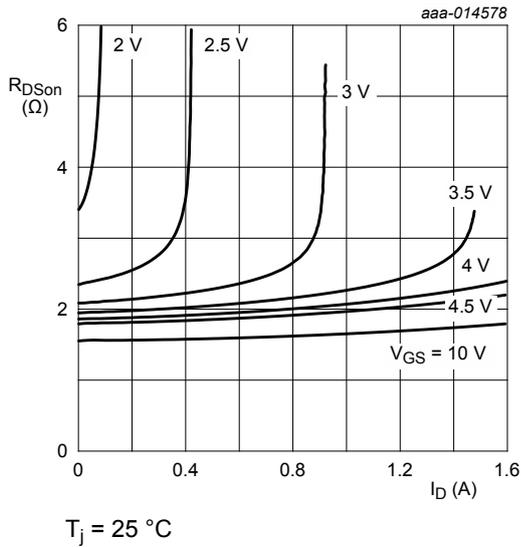


Fig. 8. Drain-source on-state resistance as a function of drain current; typical values

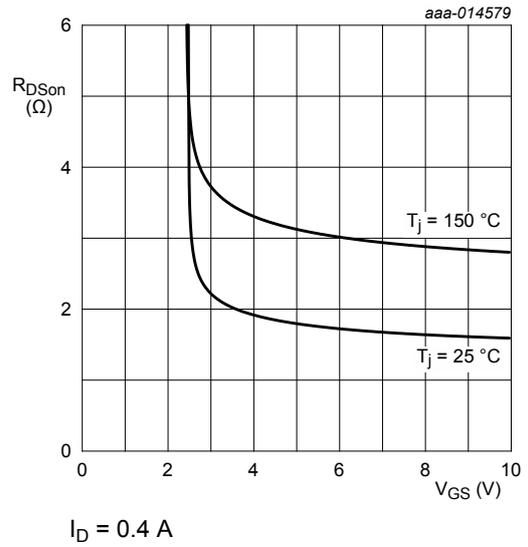
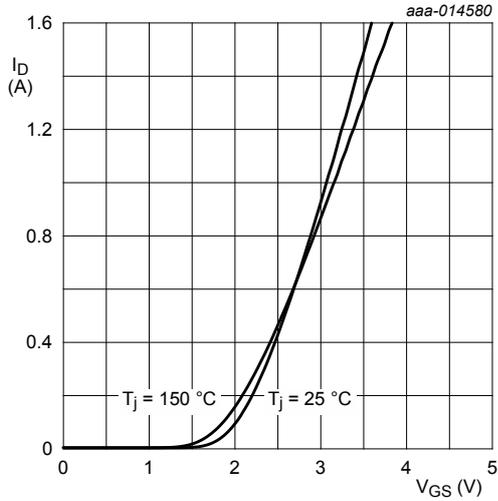


Fig. 9. Drain-source on-state resistance as a function of gate-source voltage; typical values



$$V_{DS} > I_D \times R_{DSon}$$

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

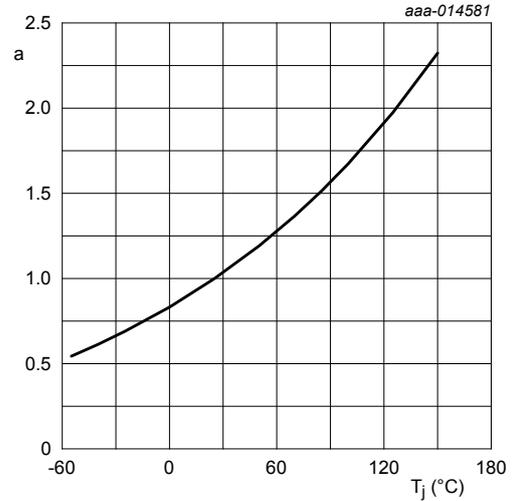
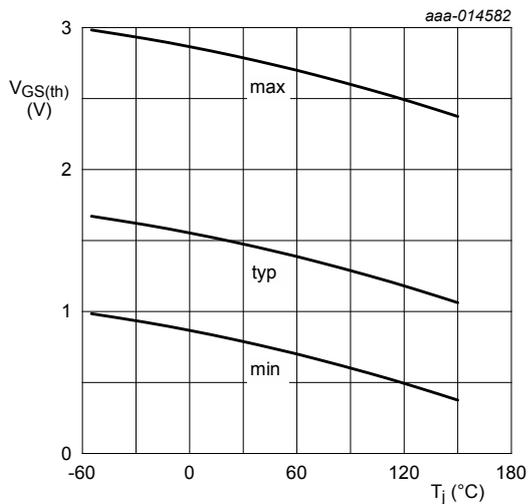


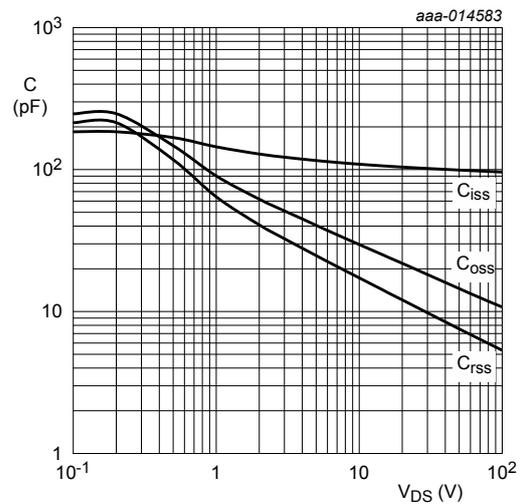
Fig. 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values

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



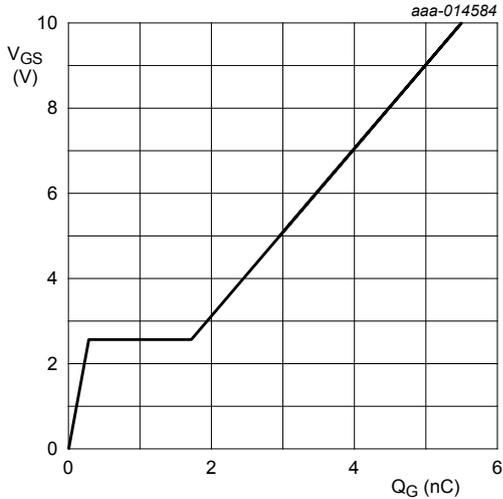
$$I_D = 1 \text{ mA}; V_{DS} = V_{GS}$$

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



$I_D = 0.25 \text{ A}$; $V_{DS} = 50 \text{ V}$; $T_{amb} = 25 \text{ }^\circ\text{C}$

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

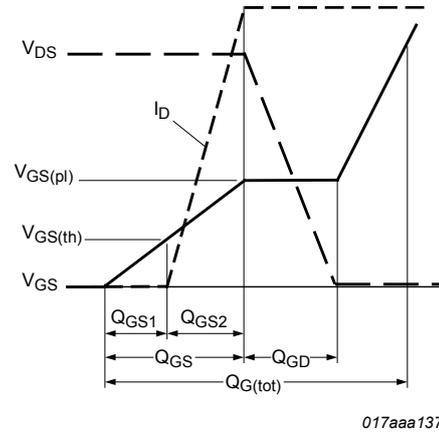
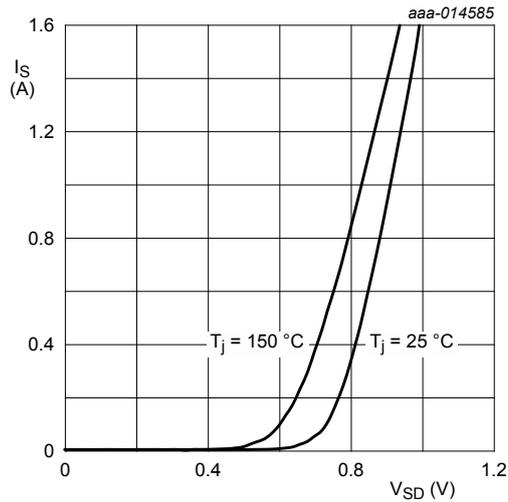


Fig. 15. MOSFET transistor: Gate charge waveform definitions



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

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

11. Test information

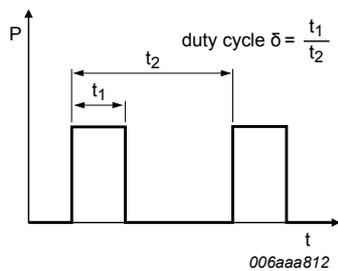


Fig. 17. Duty cycle definition

12. Package outline

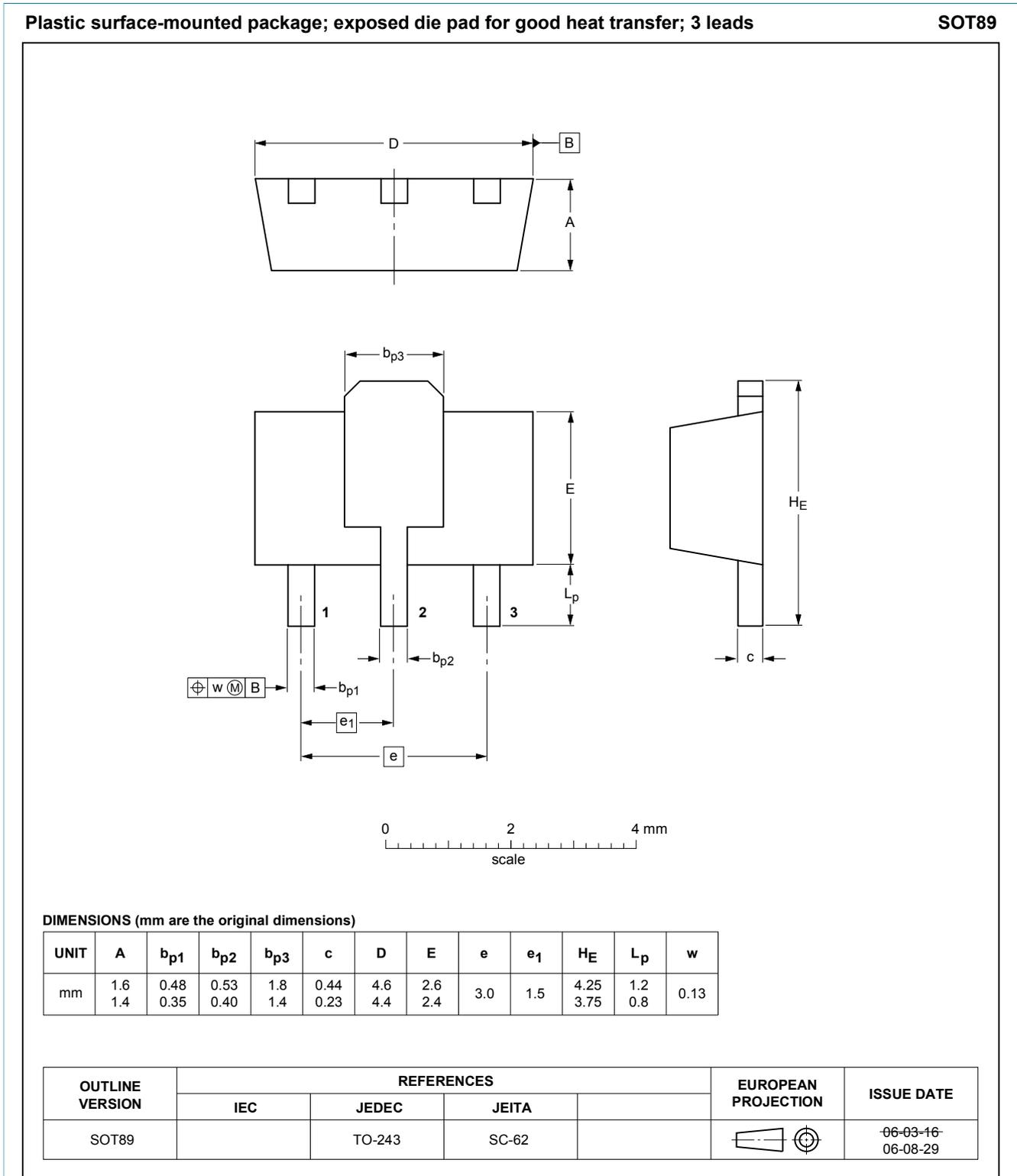


Fig. 18. Package outline SOT89

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|---|-----------------------|---------------|------------|
| BSS87 v.5 | 20141209 | Product data sheet | - | BSS87 v.4 |
| Modifications: | <ul style="list-style-type: none">Figure 3 corrected. | | | |
| BSS87 v.4 | 20140815 | Product data sheet | - | BSS87 v.3 |
| BSS87 v.3 | 20010518 | Product specification | - | BSS87 v.2 |
| BSS87 v.2 | 19970623 | Product specification | - | BSS87 v.1 |

15. Legal information

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|--------------------------------|--------------------|---|
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16. Contents

| | | |
|-----------|--------------------------------------|-----------|
| 1 | General description | 1 |
| 2 | Features and benefits | 1 |
| 3 | Applications | 1 |
| 4 | Quick reference data | 1 |
| 5 | Pinning information | 2 |
| 6 | Ordering information | 2 |
| 7 | Marking | 2 |
| 8 | Limiting values | 3 |
| 9 | Thermal characteristics | 5 |
| 10 | Characteristics | 7 |
| 11 | Test information | 10 |
| 12 | Package outline | 11 |
| 13 | Soldering | 12 |
| 14 | Revision history | 13 |
| 15 | Legal information | 14 |
| 15.1 | Data sheet status | 14 |
| 15.2 | Definitions | 14 |
| 15.3 | Disclaimers | 14 |
| 15.4 | Trademarks | 15 |

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- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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