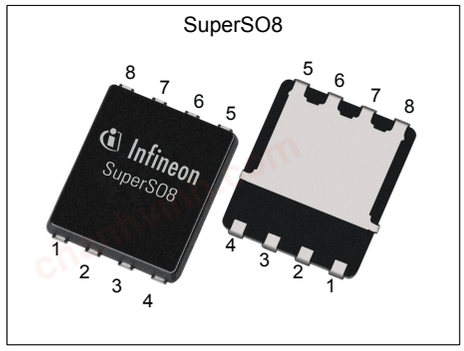
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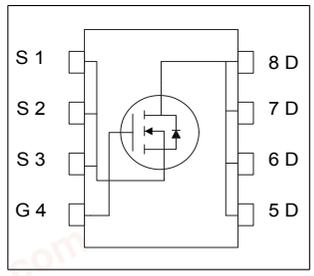
# MOSFET

## OptiMOS™5 Power-MOSFET, 25 V




### Features

- Optimized for high performance buck converters
- Very low on-resistance $R_{DS(on)}$ @ $V_{GS}$=4.5 V
- 100% avalanche tested
- Superior thermal resistance
- N-channel
- Qualified according to JEDEC[1)] for target applications
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21




### Table 1 Key Performance Parameters

| Parameter | Value | Unit |
|---|---|---|
| $V_{DS}$ | 25 | V |
| $R_{DS(on),max}$ | 2.6 | mΩ |
| $I_D$ | 82 | A |
| $Q_{OSS}$ | 7.6 | nC |
| $Q_G$(0V..4.5V) | 5.6 | nC |

| Type / Ordering Code | Package | Marking | Related Links |
|---|---|---|---|
| BSC026NE2LS5 | PG-TDSON-8 | 26NE2LS5 | - |

[1)] J-STD20 and JESD22

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## Table of Contents

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# 1 Maximum ratings

at $T_A$=25 °C, unless otherwise specified

## Table 2 Maximum ratings

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Continuous drain current[1] | $I_D$ | -<br>-<br>-<br>-<br>- | -<br>-<br>-<br>-<br>- | 82<br>52<br>66<br>42<br>24 | A | $V_{GS}$=10 V, $T_C$=25 °C<br>$V_{GS}$=10 V, $T_C$=100 °C<br>$V_{GS}$=4.5 V, $T_C$=25 °C<br>$V_{GS}$=4.5 V, $T_C$=100 °C<br>$V_{GS}$=10 V, $T_A$=25 °C, $R_{thJA}$=50 K/W[2] |
| Pulsed drain current[3] | $I_{D,pulse}$ | - | - | 328 | A | $T_C$=25 °C |
| Avalanche current, single pulse[4] | $I_{AS}$ | - | - | 35 | A | $T_C$=25 °C |
| Avalanche energy, single pulse | $E_{AS}$ | - | - | 14 | mJ | $I_D$=35 A, $R_{GS}$=25 Ω |
| Gate source voltage | $V_{GS}$ | -16 | - | 16 | V | - |
| Power dissipation | $P_{tot}$ | -<br>- | -<br>- | 29<br>2.5 | W | $T_C$=25 °C<br>$T_A$=25 °C, $R_{thJA}$=50 K/W[2] |
| Operating and storage temperature | $T_j$, $T_{stg}$ | -55 | - | 150 | °C | IEC climatic category;<br>DIN IEC 68-1: 55/150/56 |

# 2 Thermal characteristics

## Table 3 Thermal characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Thermal resistance, junction - case | $R_{thJC}$ | - | - | 4.3 | K/W | - |
| Thermal resistance, junction - case, top | $R_{thJC}$ | - | - | 20 | K/W | - |
| Device on PCB,<br>6 cm$^2$ cooling area[2] | $R_{thJA}$ | - | - | 50 | K/W | - |

[1] Rating refers to the product only with datasheet specified absolute maximum values, maintaining case temperature at 25°C. For higher case temperature please refer to Diagram 2. De-rating will be required based on the actual environmental conditions.
[2] Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm2 (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.
[3] See figure 3 for more detailed information
[4] See figure 13 for more detailed information

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# 3 Electrical characteristics

at Tj=25°C, unless otherwise specified

## Table 4 Static characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | 25 | - | - | V | $V_{GS}$=0 V, $I_D$=1 mA |
| Gate threshold voltage | $V_{GS(th)}$ | 1.2 | 1.6 | 2 | V | $V_{DS}$=$V_{GS}$, $I_D$=250 µA |
| Zero gate voltage drain current | $I_{DSS}$ | -<br>- | 0.1<br>10 | 1<br>100 | µA | $V_{DS}$=20 V, $V_{GS}$=0 V, $T_j$=25 °C<br>$V_{DS}$=20 V, $V_{GS}$=0 V, $T_j$=125 °C |
| Gate-source leakage current | $I_{GSS}$ | - | 10 | 100 | nA | $V_{GS}$=16 V, $V_{DS}$=0 V |
| Drain-source on-state resistance | $R_{DS(on)}$ | -<br>- | 3.0<br>2.2 | 4.0<br>2.6 | mΩ | $V_{GS}$=4.5 V, $I_D$=30 A<br>$V_{GS}$=10 V, $I_D$=30 A |
| Gate resistance | $R_G$ | - | 0.7 | 1.2 | Ω | - |
| Transconductance | $g_{fs}$ | 55 | 110 | - | S | \|$V_{DS}$\|>2\|$I_D$\|$R_{DS(on)max}$, $I_D$=30 A |

## Table 5 Dynamic characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Input capacitance[1)] | $C_{iss}$ | - | 780 | 1100 | pF | $V_{GS}$=0 V, $V_{DS}$=12 V, $f$=1 MHz |
| Output capacitance[1)] | $C_{oss}$ | - | 390 | 530 | pF | $V_{GS}$=0 V, $V_{DS}$=12 V, $f$=1 MHz |
| Reverse transfer capacitance | $C_{rss}$ | - | 38 | - | pF | $V_{GS}$=0 V, $V_{DS}$=12 V, $f$=1 MHz |
| Turn-on delay time | $t_{d(on)}$ | - | 3 | - | ns | $V_{DD}$=12 V, $V_{GS}$=10 V, $I_D$=30 A, $R_{G,ext}$=1.6 Ω |
| Rise time | $t_r$ | - | 3 | - | ns | $V_{DD}$=12 V, $V_{GS}$=10 V, $I_D$=30 A, $R_{G,ext}$=1.6 Ω |
| Turn-off delay time | $t_{d(off)}$ | - | 13 | - | ns | $V_{DD}$=12 V, $V_{GS}$=10 V, $I_D$=30 A, $R_{G,ext}$=1.6 Ω |
| Fall time | $t_f$ | - | 2 | - | ns | $V_{DD}$=12 V, $V_{GS}$=10 V, $I_D$=30 A, $R_{G,ext}$=1.6 Ω |

## Table 6 Gate charge characteristics[2)]

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Gate to source charge | $Q_{gs}$ | - | 2.0 | - | nC | $V_{DD}$=12 V, $I_D$=30 A, $V_{GS}$=0 to 4.5 V |
| Gate charge at threshold | $Q_{g(th)}$ | - | 1.2 | - | nC | $V_{DD}$=12 V, $I_D$=30 A, $V_{GS}$=0 to 4.5 V |
| Gate to drain charge | $Q_{gd}$ | - | 1.4 | - | nC | $V_{DD}$=12 V, $I_D$=30 A, $V_{GS}$=0 to 4.5 V |
| Switching charge | $Q_{sw}$ | - | 2.2 | - | nC | $V_{DD}$=12 V, $I_D$=30 A, $V_{GS}$=0 to 4.5 V |
| Gate charge total[1)] | $Q_g$ | - | 5.6 | 7.8 | nC | $V_{DD}$=12 V, $I_D$=30 A, $V_{GS}$=0 to 4.5 V |
| Gate plateau voltage | $V_{plateau}$ | - | 2.6 | - | V | $V_{DD}$=12 V, $I_D$=30 A, $V_{GS}$=0 to 4.5 V |
| Gate charge total[1)] | $Q_g$ | - | 12 | 16 | nC | $V_{DD}$=12 V, $I_D$=30 A, $V_{GS}$=0 to 10 V |
| Gate charge total, sync. FET | $Q_{g(sync)}$ | - | 4.8 | - | nC | $V_{DS}$=0.1 V, $V_{GS}$=0 to 4.5 V |
| Output charge | $Q_{oss}$ | - | 7.6 | - | nC | $V_{DD}$=12 V, $V_{GS}$=0 V |

[1)] Defined by design. Not subject to production test
[2)] See "Gate charge waveforms" for parameter definition

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## Table 7 Reverse diode

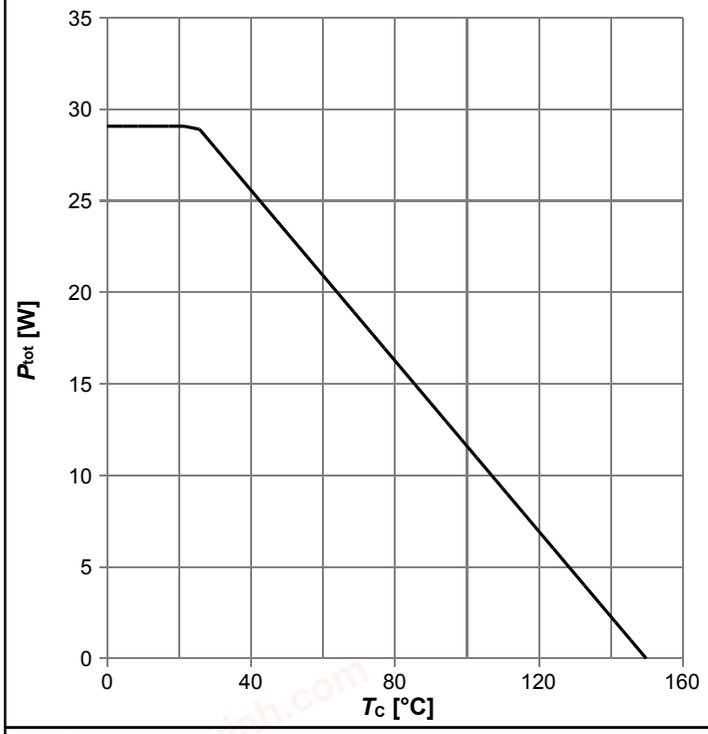
| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Diode continuous forward current | $I_S$ | - | - | 29 | A | $T_C$=25 °C |
| Diode pulse current | $I_{S,pulse}$ | - | - | 328 | A | $T_C$=25 °C |
| Diode forward voltage | $V_{SD}$ | - | 0.84 | 1 | V | $V_{GS}$=0 V, $I_F$=30 A, $T_j$=25 °C |
| Reverse recovery charge | $Q_{rr}$ | - | 7 | - | nC | $V_R$=12 V, $I_F$=$I_S$, d$i_F$/d$t$=400 A/µs |

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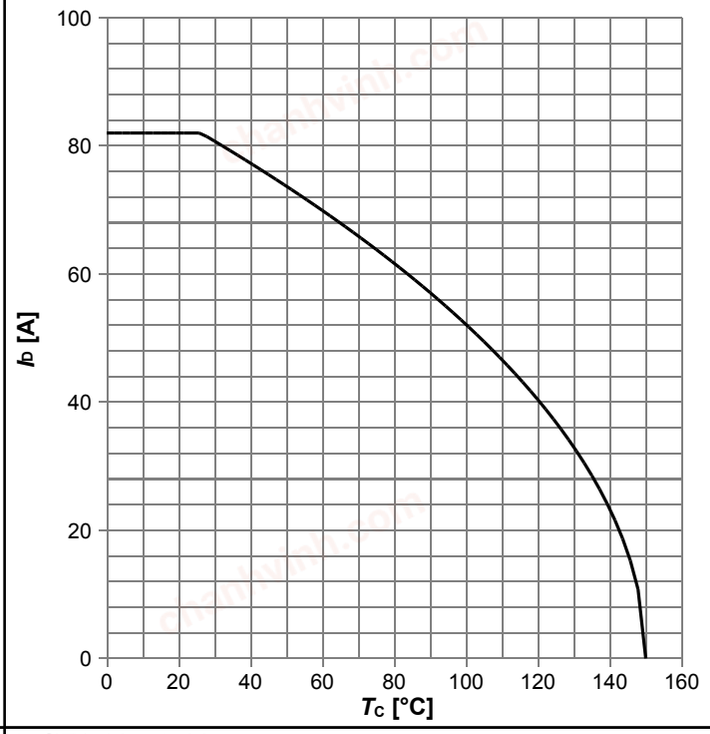
# 4 Electrical characteristics diagrams

**Diagram 1: Power dissipation**



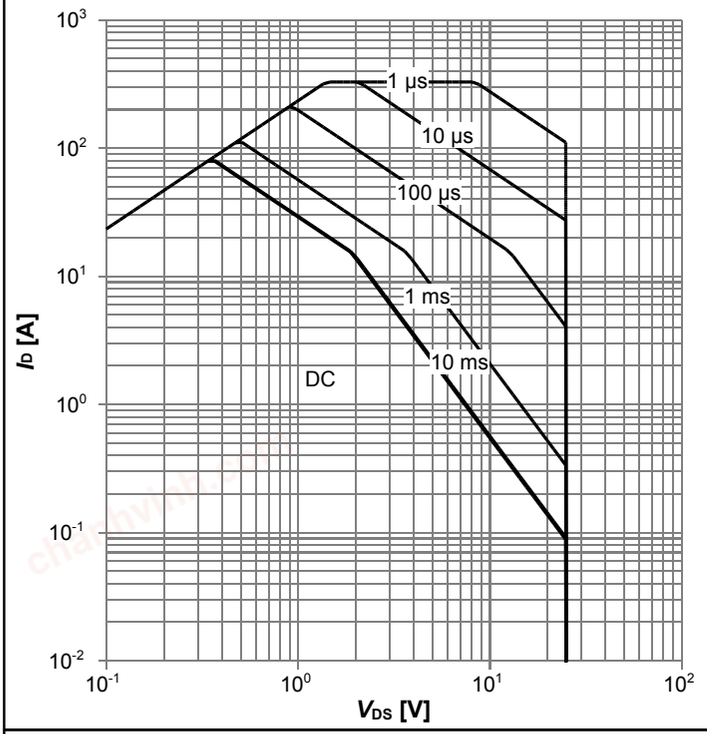

$P_{tot}=f(T_C)$

**Diagram 2: Drain current**



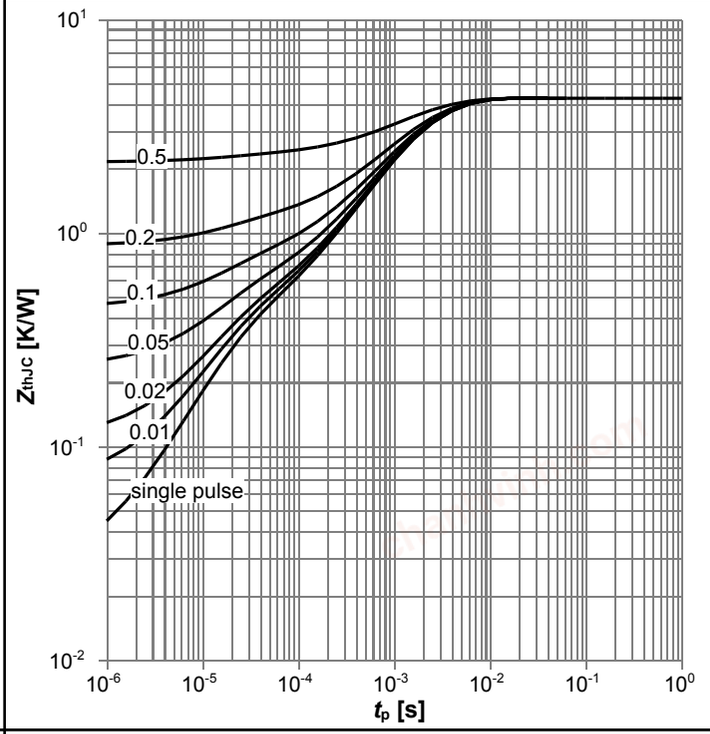

$I_D=f(T_C)$; $V_{GS}\geq 10$ V

**Diagram 3: Safe operating area**




$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$; parameter: $t_p$

**Diagram 4: Max. transient thermal impedance**

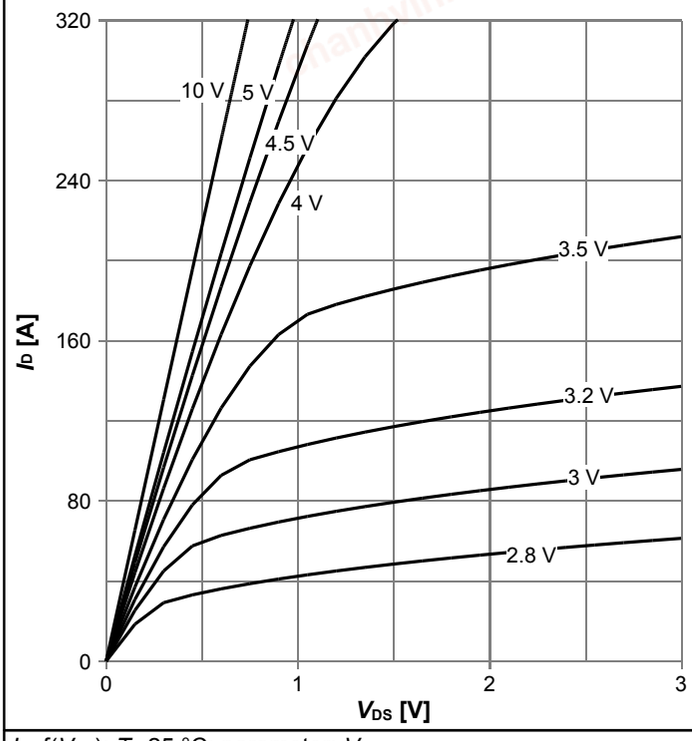



$Z_{thJC}=f(t_p)$; parameter: $D=t_p/T$

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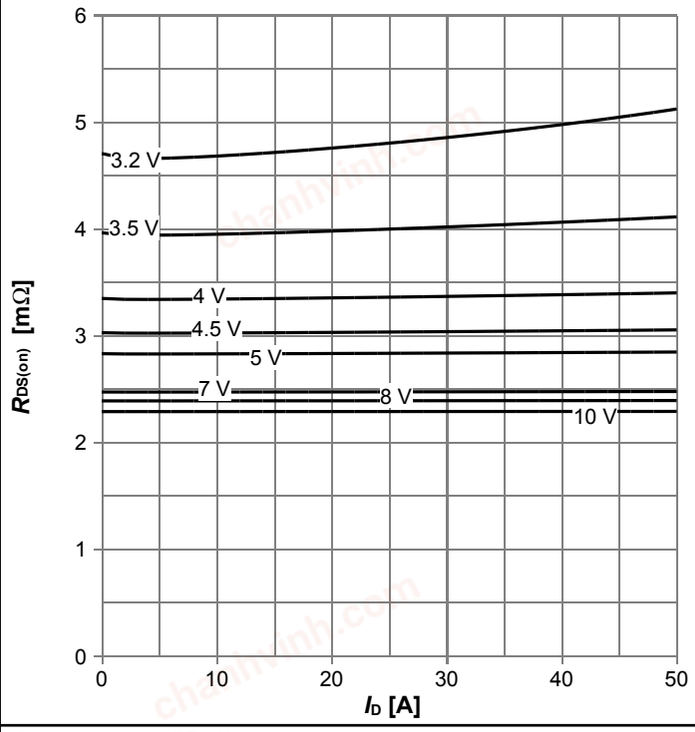


**Diagram 5: Typ. output characteristics**



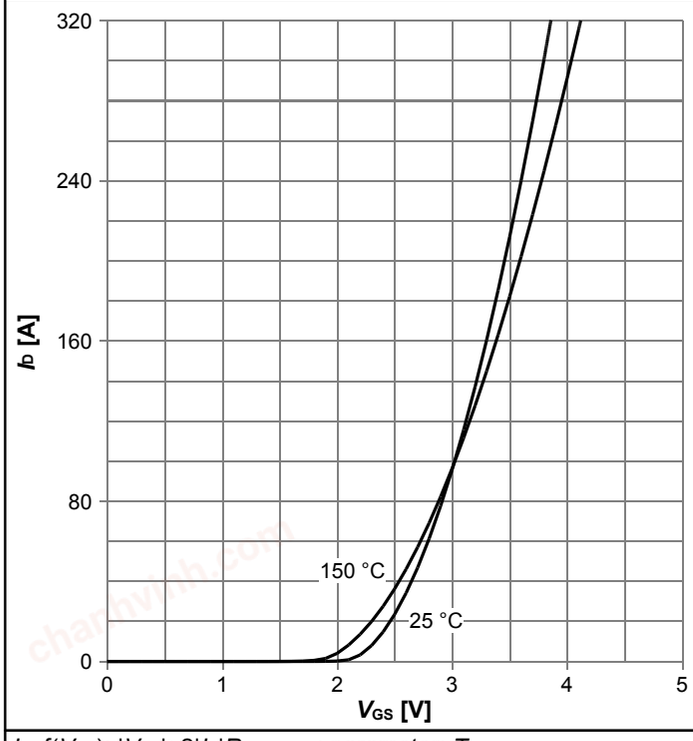

$I_D=f(V_{DS})$; $T_j=25$ °C; parameter: $V_{GS}$

**Diagram 6: Typ. drain-source on resistance**



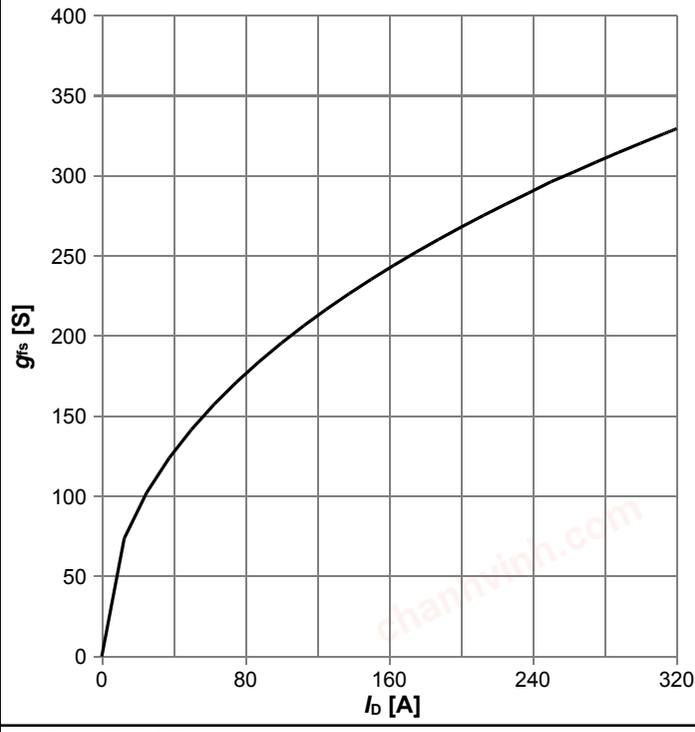

$R_{DS(on)}=f(I_D)$; $T_j=25$ °C; parameter: $V_{GS}$

**Diagram 7: Typ. transfer characteristics**




$I_D=f(V_{GS})$; $|V_{DS}|>2|I_D|R_{DS(on)max}$; parameter: $T_j$

**Diagram 8: Typ. forward transconductance**

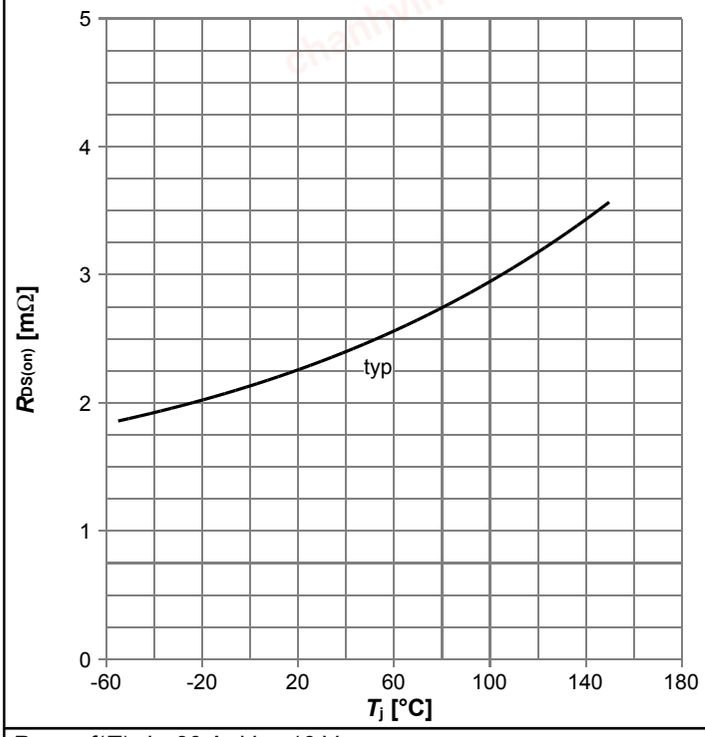



$g_{fs}=f(I_D)$; $T_j=25$ °C

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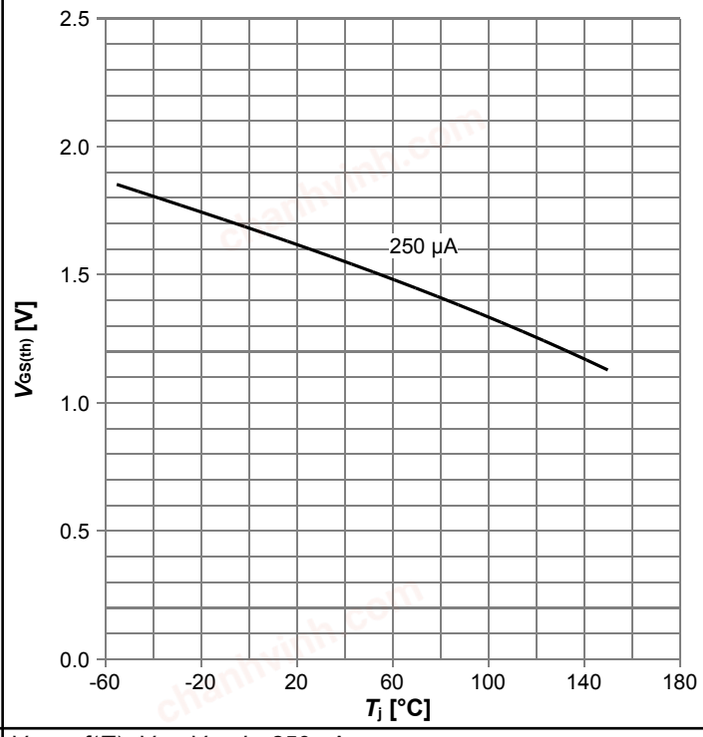


**Diagram 9: Drain-source on-state resistance**



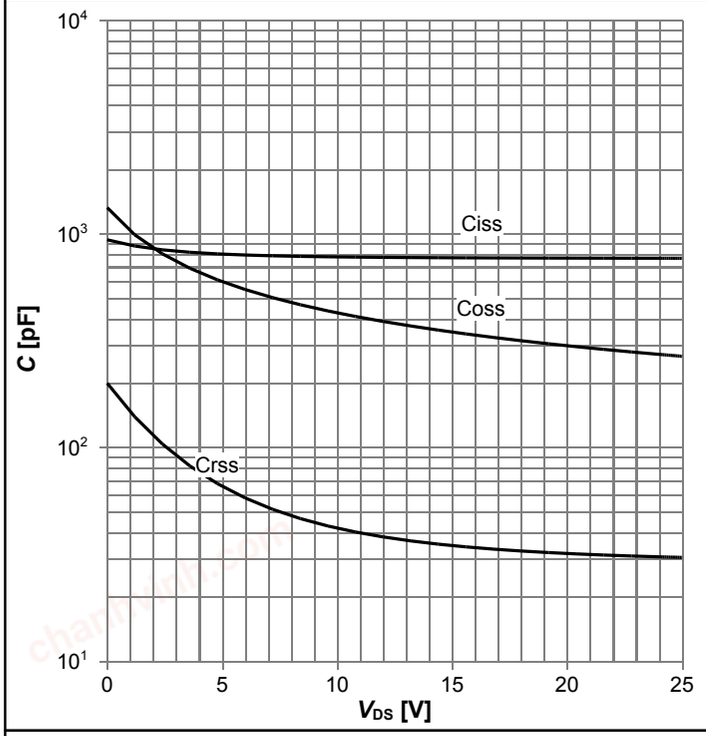

$R_{DS(on)}$=f($T_j$); $I_D$=30 A; $V_{GS}$=10 V

**Diagram 10: Typ. gate threshold voltage**



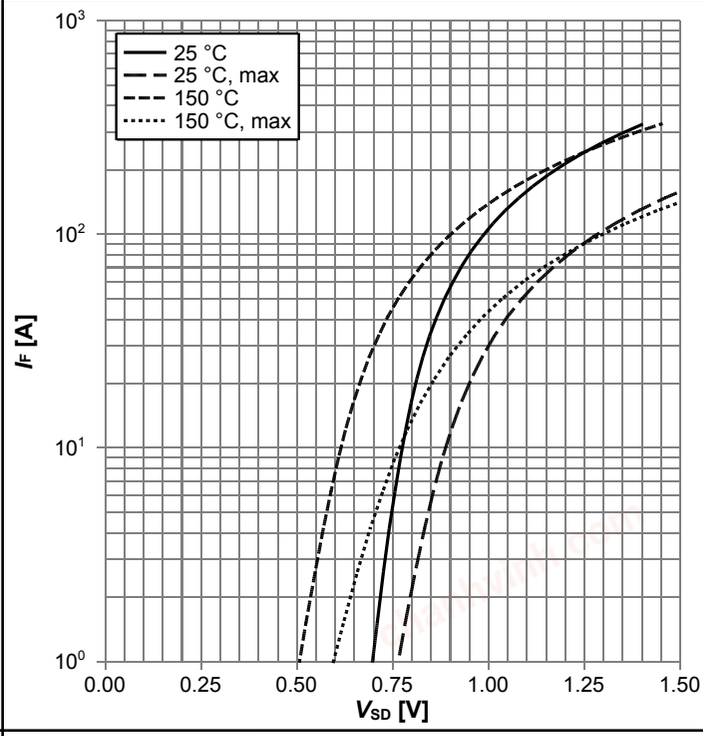

$V_{GS(th)}$=f($T_j$); $V_{GS}$=$V_{DS}$; $I_D$=250 µA

**Diagram 11: Typ. capacitances**




$C$=f($V_{DS}$); $V_{GS}$=0 V; $f$=1 MHz

**Diagram 12: Forward characteristics of reverse diode**

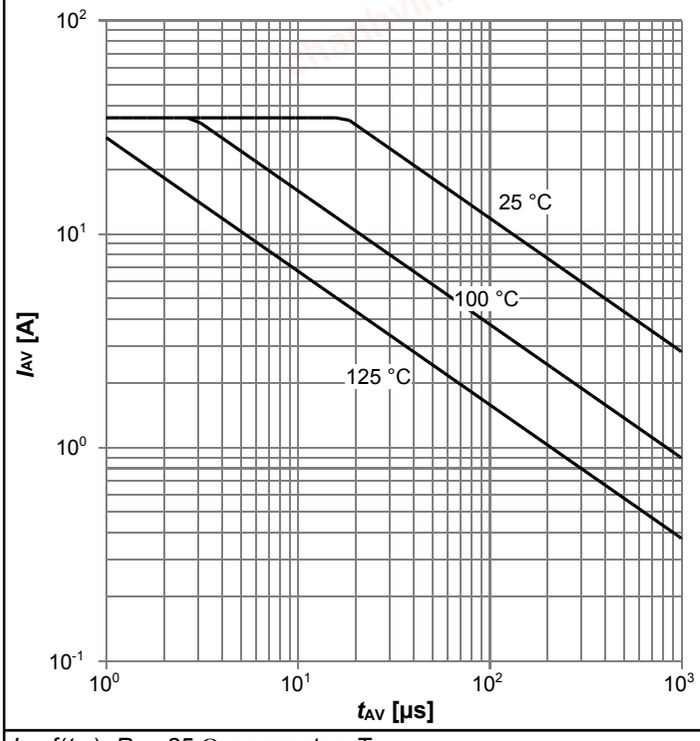



$I_F$=f($V_{SD}$); parameter: $T_j$

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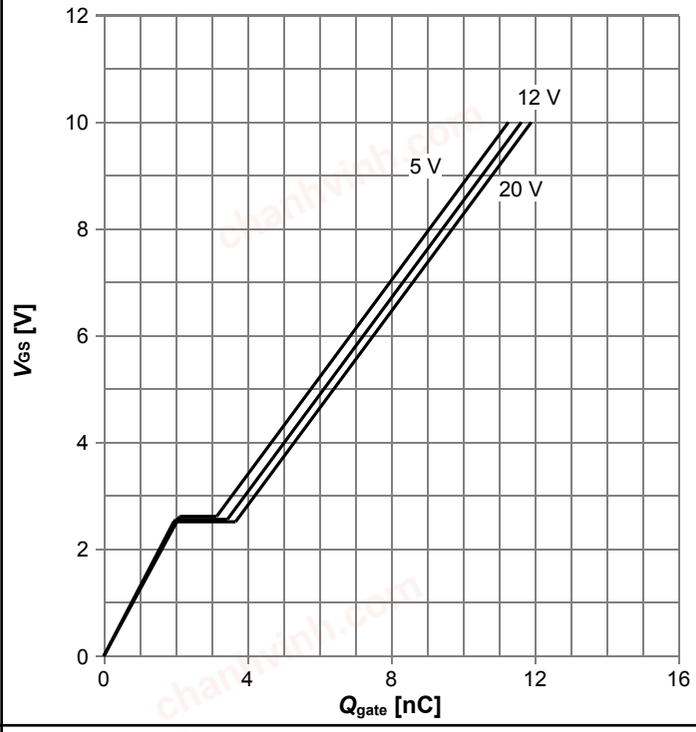


**Diagram 13: Avalanche characteristics**



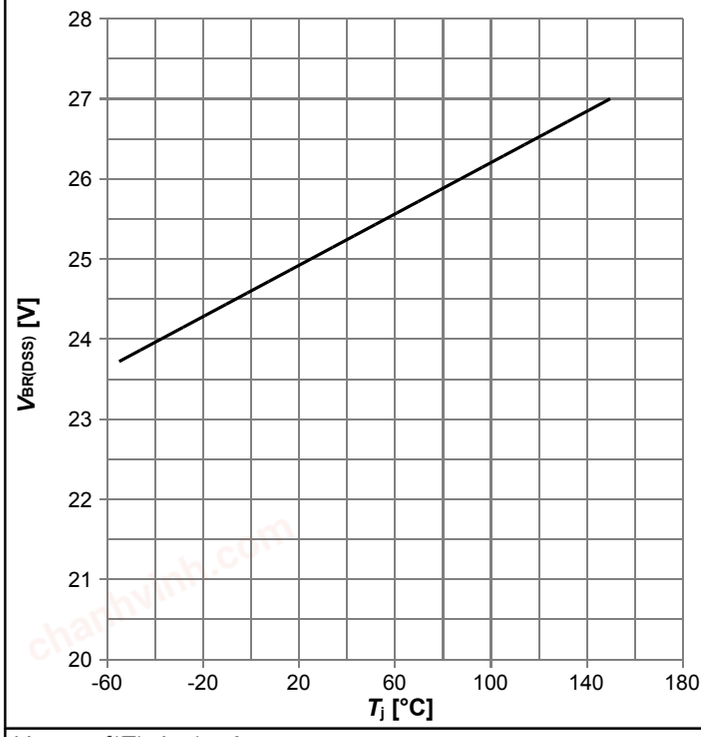

$I_{AS}$=f($t_{AV}$); $R_{GS}$=25 Ω; parameter: $T_{j(start)}$

**Diagram 14: Typ. gate charge**



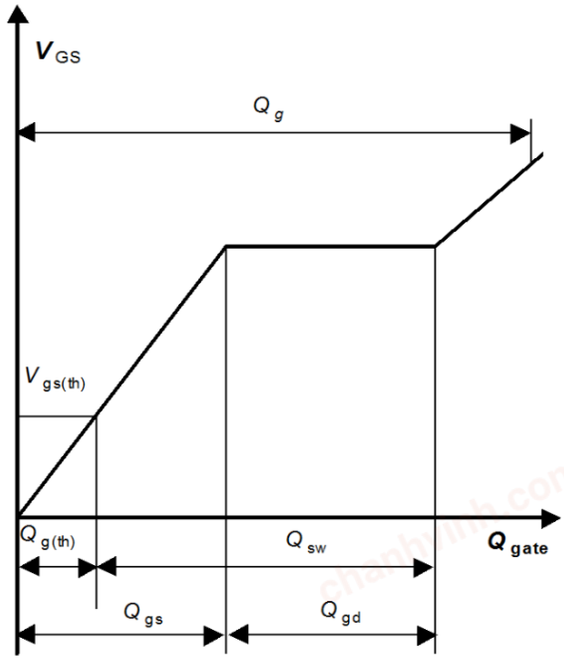

$V_{GS}$=f($Q_{gate}$); $I_D$=30 A pulsed; parameter: $V_{DD}$

**Diagram 15: Drain-source breakdown voltage**




$V_{BR(DSS)}$=f($T_j$); $I_D$=1 mA

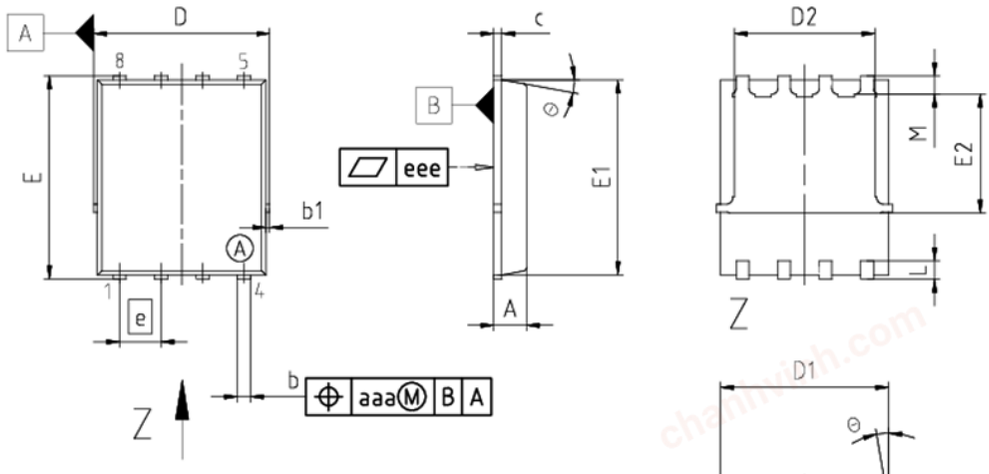
**Diagram Gate charge waveforms**



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## 5 Package Outlines




| DIM | MILLIMETERS | |
|---|---|---|
| | MIN | MAX |
| A | 0.90 | 1.10 |
| b | 0.31 | 0.54 |
| b1 | 0.02 | 0.22 |
| c | 0.15 | 0.35 |
| D | 5.15 | 5.49 |
| D1 | 4.95 | 5.35 |
| D2 | 3.70 | 4.40 |
| E | 5.95 | 6.35 |
| E1 | 5.70 | 6.10 |
| E2 | 3.40 | 3.80 |
| e | 1.27 | |
| N | 8 | |
| L | 0.45 | 0.71 |
| M | 0.45 | 0.75 |
| Θ | 8.5° | 12° |
| aaa | 0.25 | |
| eee | 0.08 | |

DOCUMENT NO.
Z8B00003332

SCALE 0 2 0 2 4mm

EUROPEAN PROJECTION

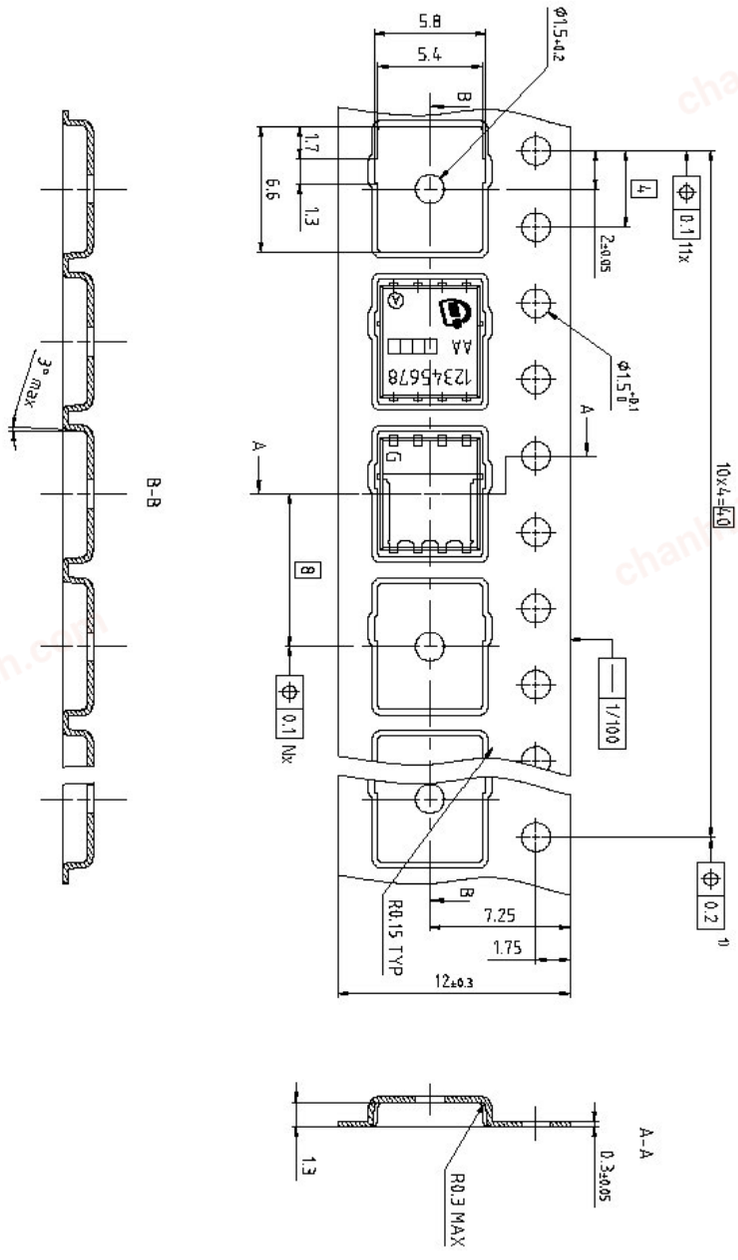
ISSUE DATE
10-04-2013

REVISION
04

**Figure 1 Outline PG-TDSON-8, dimensions in mm**

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*Dimension in mm*

**Figure 2 Outline Tape (TDSON-8)**

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## Revision History

BSC026NE2LS5

**Revision: 2020-10-23, Rev. 2.1**

Previous Revision

| Revision | Date | Subjects (major changes since last revision) |
|---|---|---|
| 2.0 | 2015-03-10 | Release of final version |
| 2.1 | 2020-10-23 | Update Max Current Rating |

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