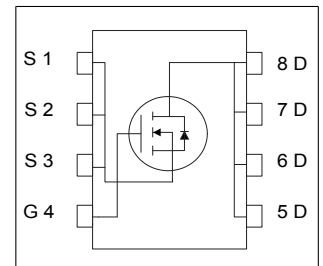
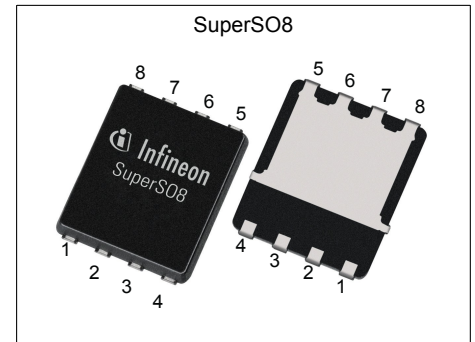


MOSFET

OptiMOS™ 3 Power-MOSFET, 30 V

Features

- Fast switching MOSFET for SMPS
- Optimized technology for DC/DC converters
- Qualified according to JEDEC¹⁾ for target applications
- N-channel; Logic level
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Very low on-resistance $R_{DS(on)}$
- Superior thermal resistance
- Avalanche rated
- Pb-free plating; RoHS compliant
- Halogen-free according to IEC61249-2-21



RoHS

Table 1 Key Performance Parameters

| Parameter | Value | Unit |
|------------------|-------|------|
| V_{DS} | 30 | V |
| $R_{DS(on),max}$ | 3 | mΩ |
| I_D | 122 | A |

| Type / Ordering Code | Package | Marking | Related Links |
|----------------------|------------|----------|---------------|
| BSC030N03LS G | PG-TDSON-8 | 030N03LS | - |

¹⁾ J-STD20 and JESD22

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1 Maximum ratings

at $T_A=25\text{ °C}$, unless otherwise specified

Table 2 Maximum ratings

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|-----------------------------------------------|-------------------|--------|------|-----------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | Min. | Typ. | Max. | | |
| Continuous drain current ¹⁾ | I_D | - | - | 122 77 98 62 23 | A | $V_{GS}=10\text{ V}$, $T_C=25\text{ °C}$ $V_{GS}=10\text{ V}$, $T_C=100\text{ °C}$ $V_{GS}=4.5\text{ V}$, $T_C=25\text{ °C}$ $V_{GS}=4.5\text{ V}$, $T_C=100\text{ °C}$ $V_{GS}=10\text{ V}$, $T_A=25\text{ °C}$, $R_{thJA}=50\text{ K/W}^{2)}$ |
| Pulsed drain current ³⁾ | $I_{D,pulse}$ | - | - | 488 | A | $T_C=25\text{ °C}$ |
| Avalanche current, single pulse ⁴⁾ | I_{AS} | - | - | 50 | A | $T_C=25\text{ °C}$ |
| Avalanche energy, single pulse | E_{AS} | - | - | 75 | mJ | $I_D=50\text{ A}$, $R_{GS}=25\text{ }\Omega$ |
| Reverse diode dv/dt | dv/dt | - | - | 6 | kV/ μ s | $I_D=50\text{ A}$, $V_{DS}=24\text{ V}$, $di/dt=200\text{ A}/\mu$ s, $T_{j,max}=150\text{ °C}$ |
| Gate source voltage | V_{GS} | -20 | - | 20 | V | - |
| Power dissipation | P_{tot} | - | - | 69 2.5 | - | $T_C=25\text{ °C}$ $T_A=25\text{ °C}$, $R_{thJA}=50\text{ K/W}^{2)}$ |
| Operating and storage temperature | T_j , T_{stg} | -55 | - | 150 | °C | IEC climatic category; 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, bottom | R_{thJC} | - | - | 1.8 | K/W | - |
| Thermal resistance, junction - case, top | R_{thJC} | - | - | 18 | K/W | - |
| Device on PCB, 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 μ m thick) copper area for drain connection. PCB is vertical in still air.

³⁾ See Diagram 3 for more detailed information

⁴⁾ See Diagram 13 for more detailed information

3 Electrical characteristics

at $T_j=25\text{ °C}$, unless otherwise specified

Table 4 Static characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|----------------------------------|---------------|--------|------------|----------|---------------|-------------------------------------------------------------------------------------------------------------------------------------|
| | | Min. | Typ. | Max. | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | 30 | - | - | V | $V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$ |
| Gate threshold voltage | $V_{GS(th)}$ | 1 | - | 2.2 | V | $V_{DS}=V_{GS}$, $I_D=250\text{ }\mu\text{A}$ |
| Zero gate voltage drain current | I_{DSS} | - | 0.1 10 | 1 100 | μA | $V_{DS}=30\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$ $V_{DS}=30\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=125\text{ °C}$ |
| Gate-source leakage current | I_{GSS} | - | 10 | 100 | nA | $V_{GS}=20\text{ V}$, $V_{DS}=0\text{ V}$ |
| Drain-source on-state resistance | $R_{DS(on)}$ | - | 3.8 2.5 | 4.7 3 | m Ω | $V_{GS}=4.5\text{ V}$, $I_D=30\text{ A}$ $V_{GS}=10\text{ V}$, $I_D=30\text{ A}$ |
| Gate resistance | R_G | 0.7 | 1.5 | 2.6 | Ω | - |
| Transconductance | g_{fs} | 49 | 98 | - | S | $ V_{DS} >2 I_D R_{DS(on)max}$, $I_D=30\text{ A}$ |

Table 5 Dynamic characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|----------------------------------|--------------|--------|------|------|------|----------------------------------------------------------------------------------------------|
| | | Min. | Typ. | Max. | | |
| Input capacitance ¹⁾ | C_{iss} | - | 3200 | 4300 | pF | $V_{GS}=0\text{ V}$, $V_{DS}=15\text{ V}$, $f=1\text{ MHz}$ |
| Output capacitance ¹⁾ | C_{oss} | - | 1200 | 1600 | pF | $V_{GS}=0\text{ V}$, $V_{DS}=15\text{ V}$, $f=1\text{ MHz}$ |
| Reverse transfer capacitance | C_{rss} | - | 66 | - | pF | $V_{GS}=0\text{ V}$, $V_{DS}=15\text{ V}$, $f=1\text{ MHz}$ |
| Turn-on delay time | $t_{d(on)}$ | - | 7.3 | - | ns | $V_{DD}=15\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=30\text{ A}$, $R_G=1.6\text{ }\Omega$ |
| Rise time | t_r | - | 5.2 | - | ns | $V_{DD}=15\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=30\text{ A}$, $R_G=1.6\text{ }\Omega$ |
| Turn-off delay time | $t_{d(off)}$ | - | 29 | - | ns | $V_{DD}=15\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=30\text{ A}$, $R_G=1.6\text{ }\Omega$ |
| Fall time | t_f | - | 4.8 | - | ns | $V_{DD}=15\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=30\text{ A}$, $R_G=1.6\text{ }\Omega$ |

Table 6 Gate charge characteristics²⁾

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|------------------------------|---------------|--------|------|------|------|------------------------------------------------------------------------------|
| | | Min. | Typ. | Max. | | |
| Gate to source charge | Q_{gs} | - | 9.5 | 13 | nC | $V_{DD}=15\text{ V}$, $I_D=30\text{ A}$, $V_{GS}=0\text{ to }4.5\text{ V}$ |
| Gate charge at threshold | $Q_{g(th)}$ | - | 5.2 | 6.9 | nC | $V_{DD}=15\text{ V}$, $I_D=30\text{ A}$, $V_{GS}=0\text{ to }4.5\text{ V}$ |
| Gate to drain charge | Q_{gd} | - | 4.6 | 7.6 | nC | $V_{DD}=15\text{ V}$, $I_D=30\text{ A}$, $V_{GS}=0\text{ to }4.5\text{ V}$ |
| Switching charge | Q_{sw} | - | 9.0 | 13 | nC | $V_{DD}=15\text{ V}$, $I_D=30\text{ A}$, $V_{GS}=0\text{ to }4.5\text{ V}$ |
| Gate charge total | Q_g | - | 20 | 27 | nC | $V_{DD}=15\text{ V}$, $I_D=30\text{ A}$, $V_{GS}=0\text{ to }4.5\text{ V}$ |
| Gate plateau voltage | $V_{plateau}$ | - | 3.0 | - | V | $V_{DD}=15\text{ V}$, $I_D=30\text{ A}$, $V_{GS}=0\text{ to }4.5\text{ V}$ |
| Gate charge total | Q_g | - | 42 | 55 | - | $V_{DD}=15\text{ V}$, $I_D=30\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$ |
| Gate charge total, sync. FET | $Q_{g(sync)}$ | - | 17 | 23 | nC | $V_{DS}=0.1\text{ V}$, $V_{GS}=0\text{ to }4.5\text{ V}$ |
| Output charge | Q_{oss} | - | 31 | 41 | - | $V_{DD}=15\text{ V}$, $V_{GS}=0\text{ V}$ |

¹⁾ Defined by design. Not subject to production test

²⁾ See "Gate charge waveforms" for parameter definition. Defined by design, not subject to production test

Table 7 Reverse diode

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---------------------------------------|---------------|--------|------|------|------|--------------------------------------------------------------------|
| | | Min. | Typ. | Max. | | |
| Diode continuous forward current | I_S | - | - | 63 | A | $T_C=25\text{ °C}$ |
| Diode pulse current | $I_{S,pulse}$ | - | - | 488 | A | $T_C=25\text{ °C}$ |
| Diode forward voltage | V_{SD} | - | 0.82 | 1.1 | V | $V_{GS}=0\text{ V}$, $I_F=30\text{ A}$, $T_j=25\text{ °C}$ |
| Reverse recovery charge ¹⁾ | Q_{rr} | - | - | 20 | nC | $V_R=15\text{ V}$, $I_F=I_S$, $di_F/dt=400\text{ A/}\mu\text{s}$ |

¹⁾ Defined by design. Not subject to production test

4 Electrical characteristics diagrams

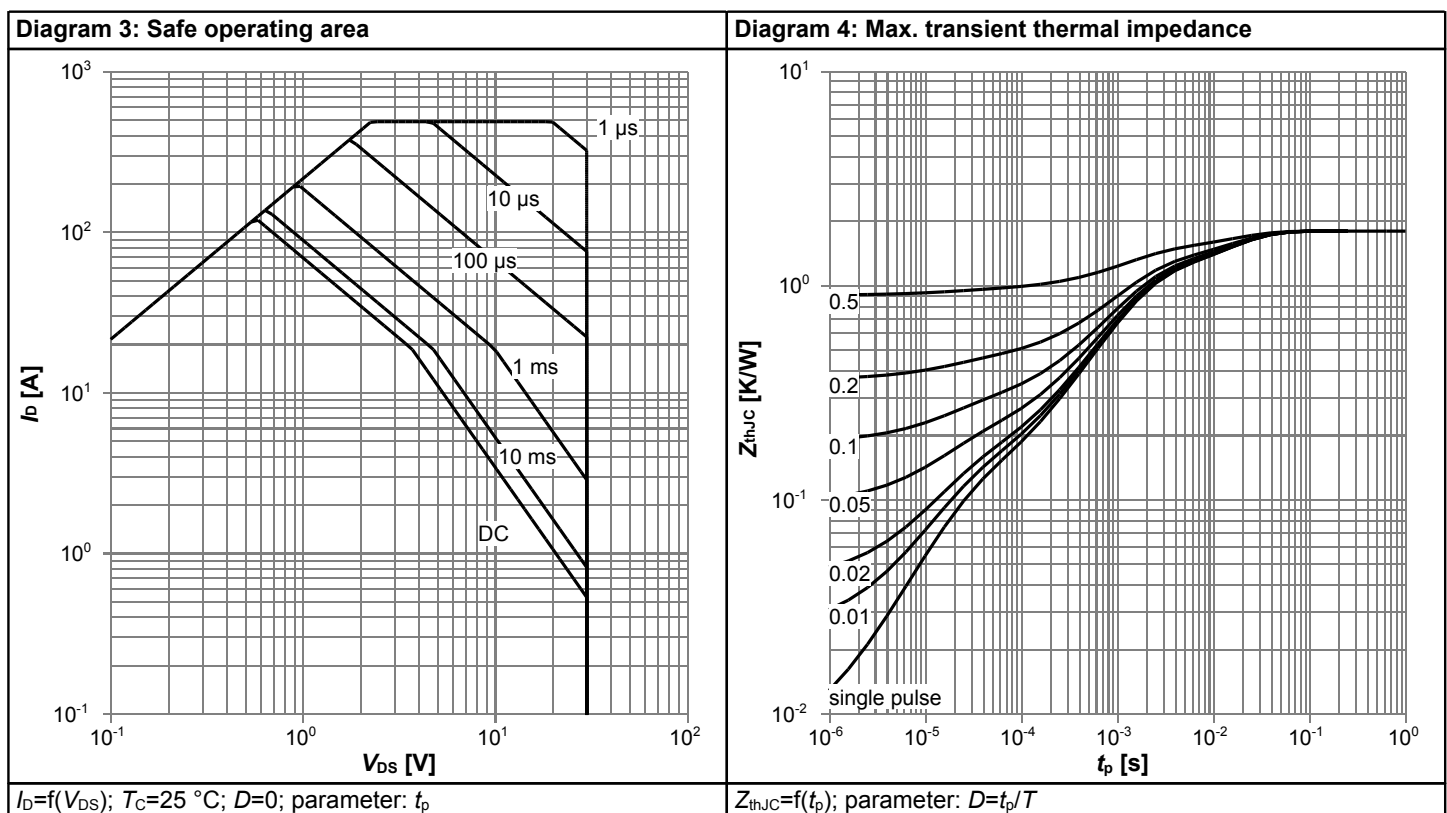
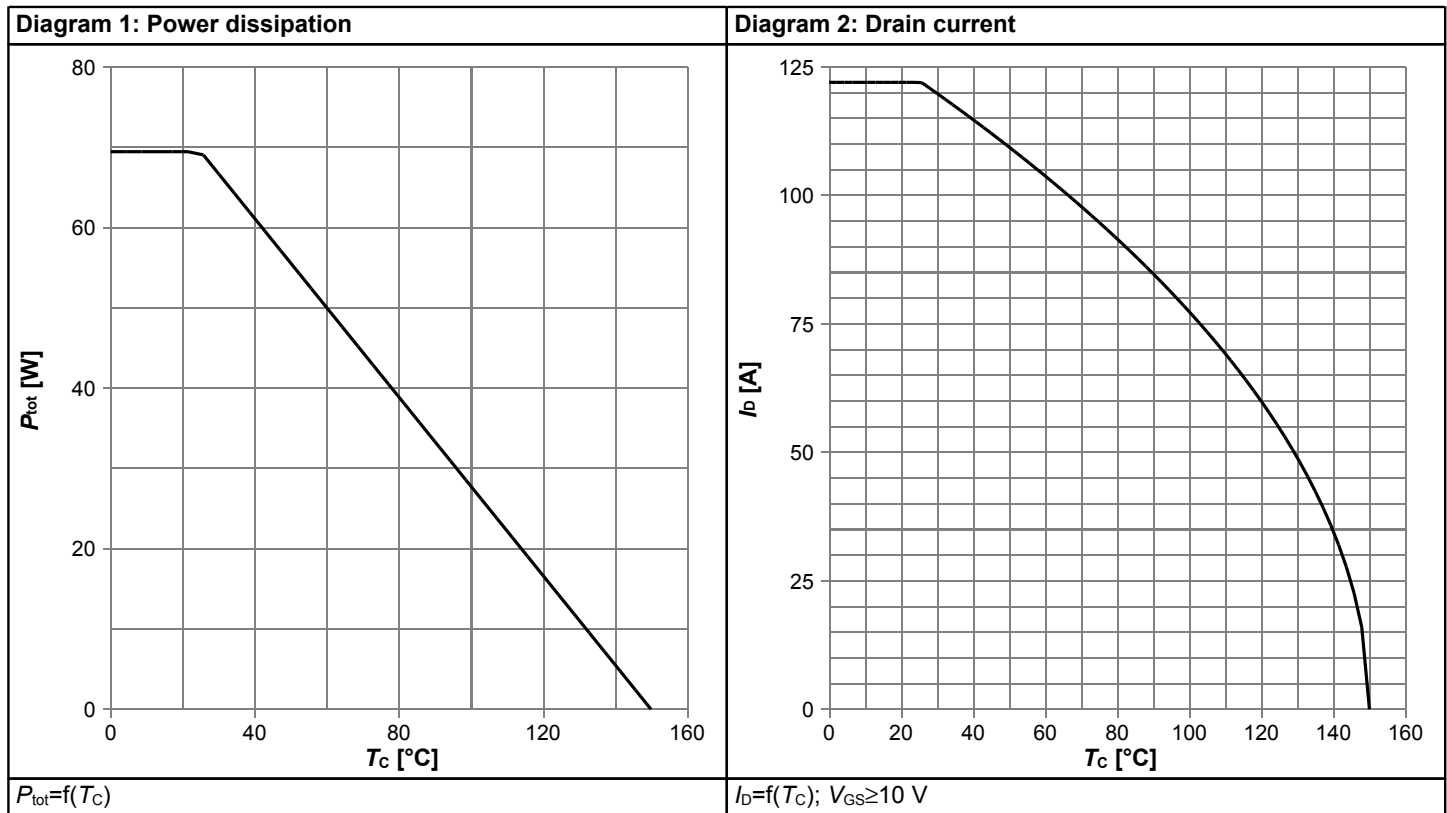
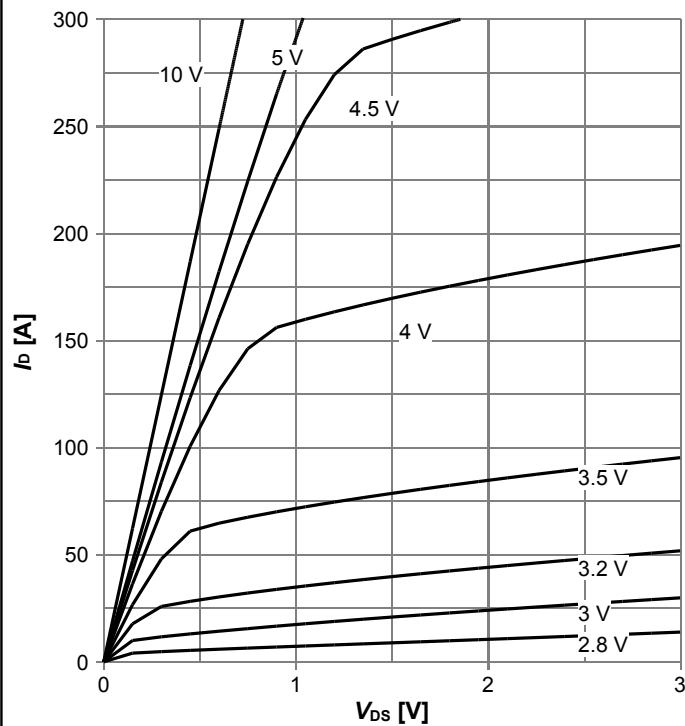
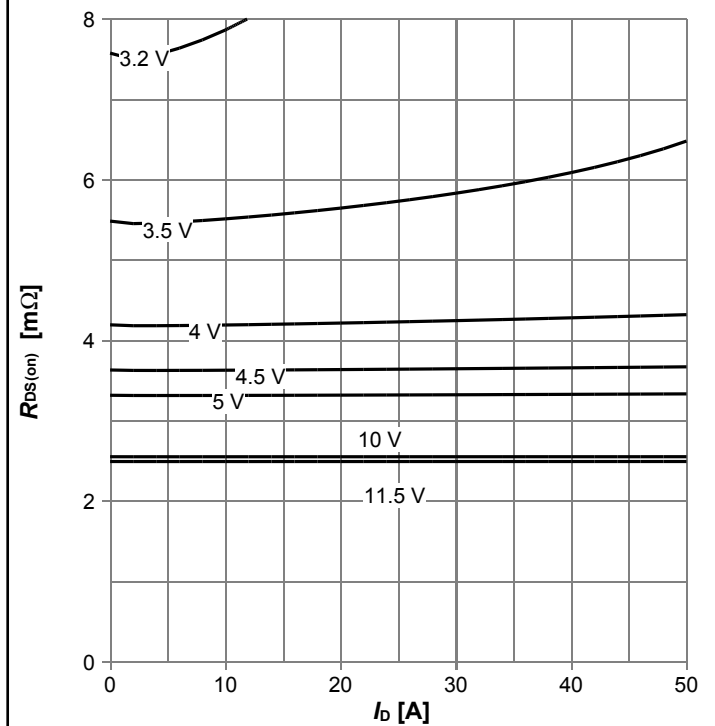


Diagram 5: Typ. output characteristics



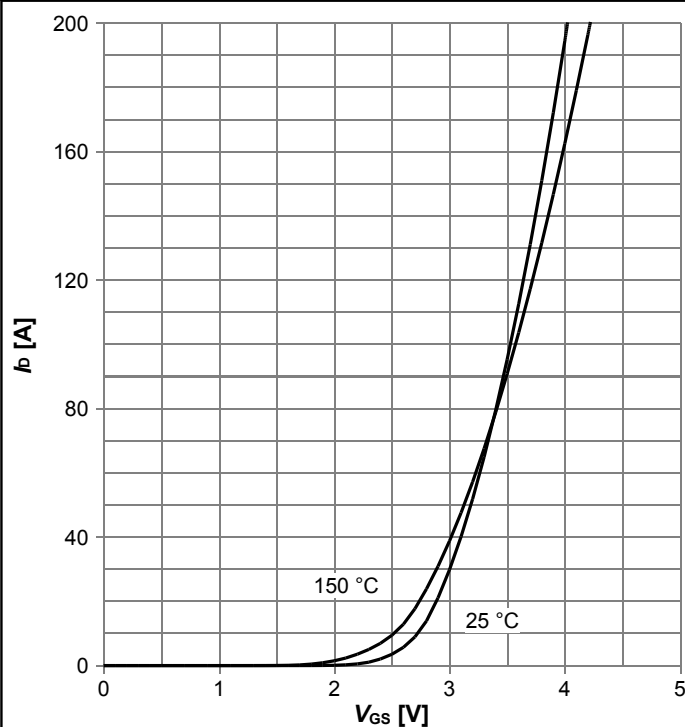
$I_D = f(V_{DS})$; $T_j = 25^\circ\text{C}$; parameter: V_{GS}

Diagram 6: Typ. drain-source on resistance



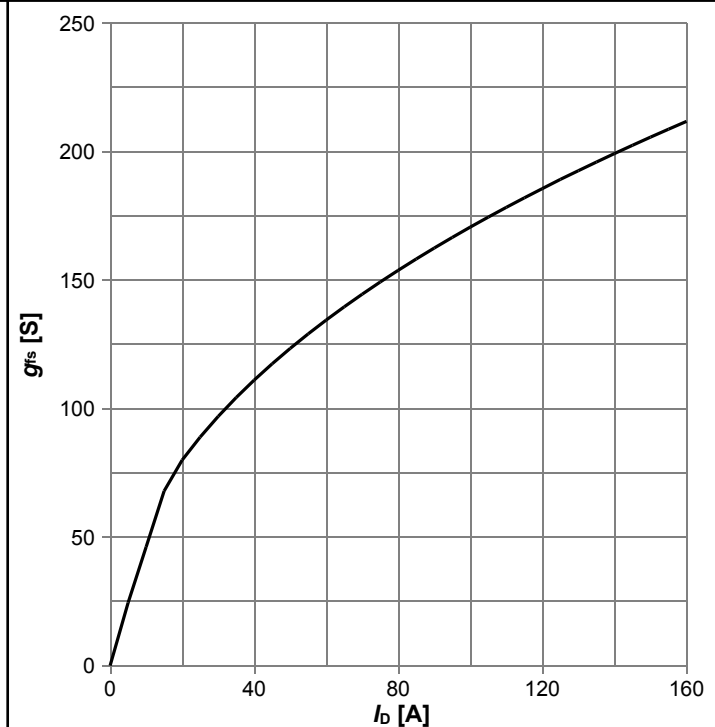
$R_{DS(on)} = f(I_D)$; $T_j = 25^\circ\text{C}$; parameter: V_{GS}

Diagram 7: Typ. transfer characteristics



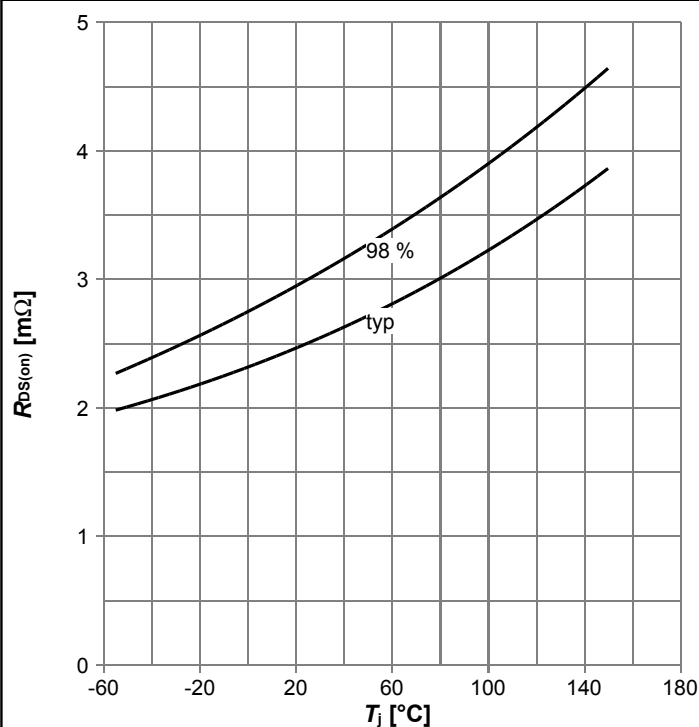
$I_D = f(V_{GS})$; $|V_{DS}| > 2|I_D|R_{DS(on)max}$; parameter: T_j

Diagram 8: Typ. forward transconductance



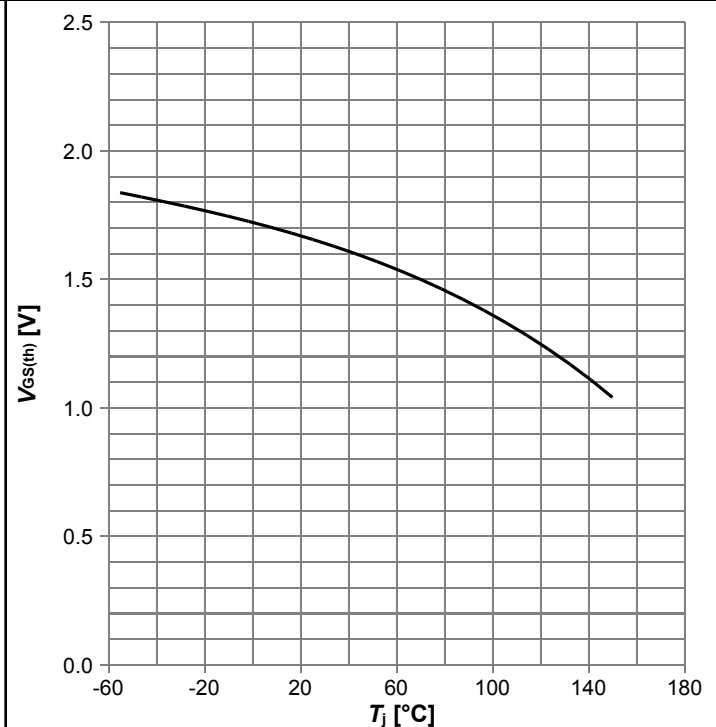
$g_{fs} = f(I_D)$; $T_j = 25^\circ\text{C}$

Diagram 9: Drain-source on-state resistance



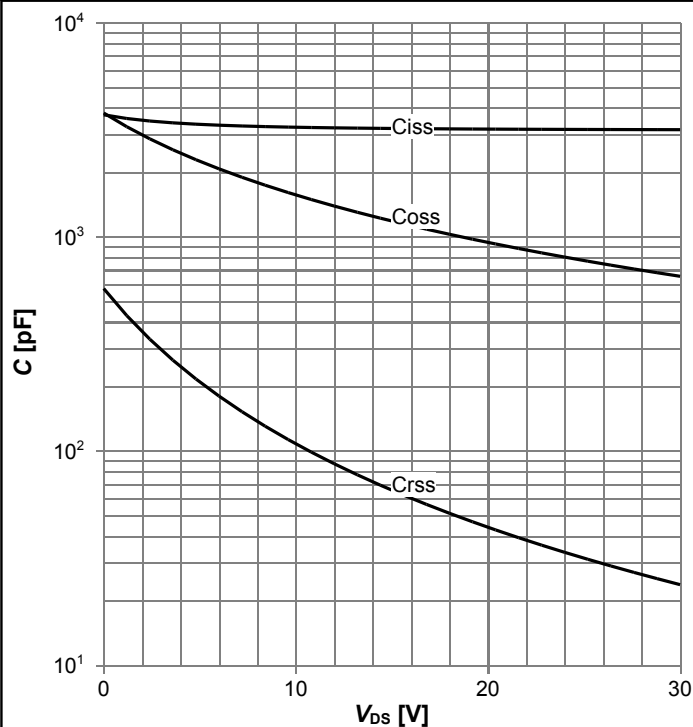
$R_{DS(on)} = f(T_j)$; $I_D = 30 \text{ A}$; $V_{GS} = 10 \text{ V}$

Diagram 10: Typ. gate threshold voltage



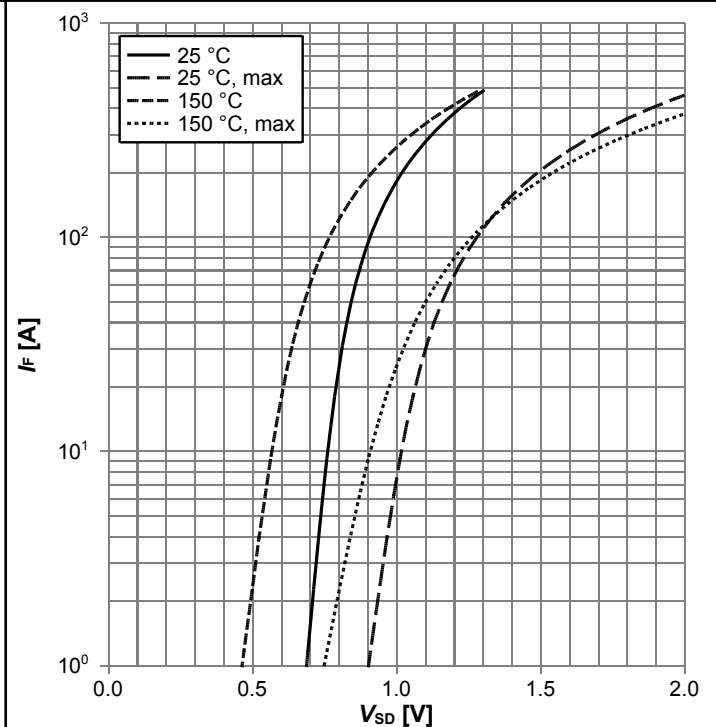
$V_{GS(th)} = f(T_j)$; $V_{GS} = V_{DS}$; $I_D = 250 \text{ μA}$

Diagram 11: Typ. capacitances



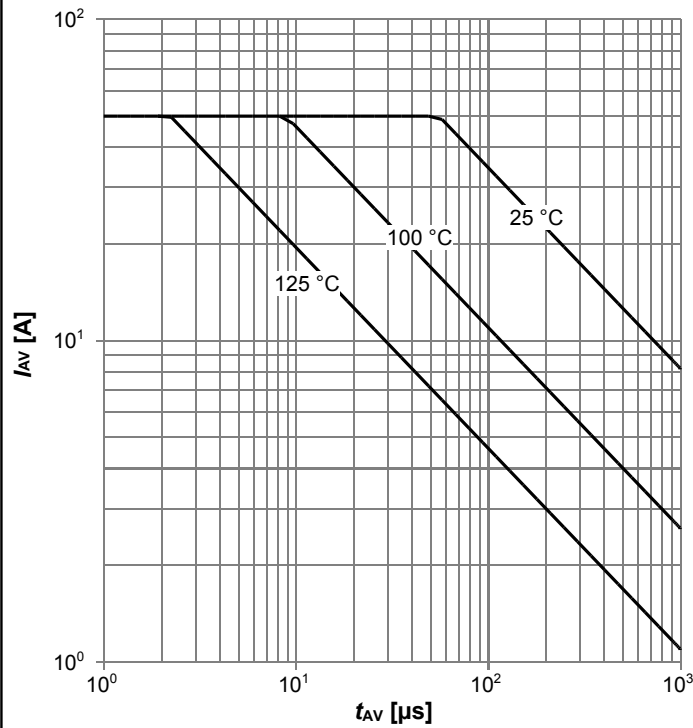
$C = f(V_{DS})$; $V_{GS} = 0 \text{ V}$; $f = 1 \text{ MHz}$

Diagram 12: Forward characteristics of reverse diode



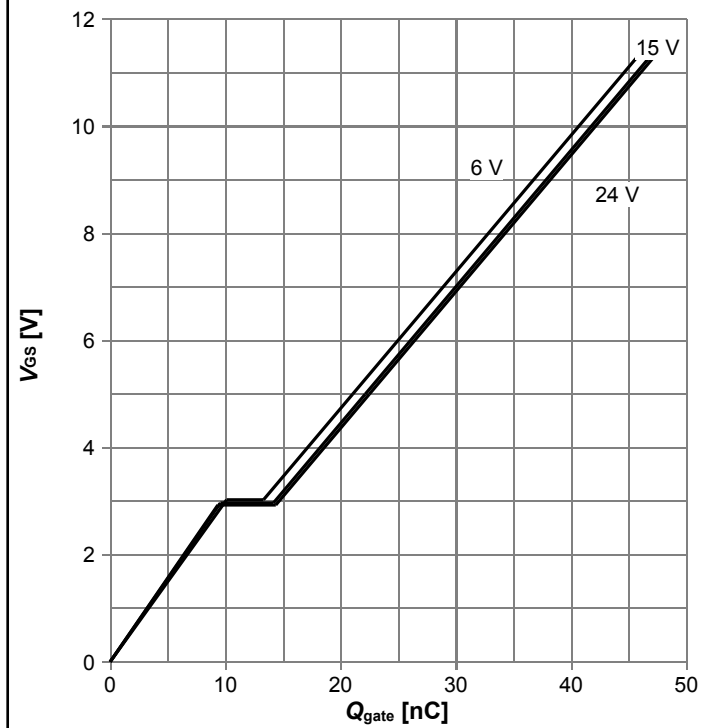
$I_F = f(V_{SD})$; parameter: T_j

Diagram 13: Avalanche characteristics



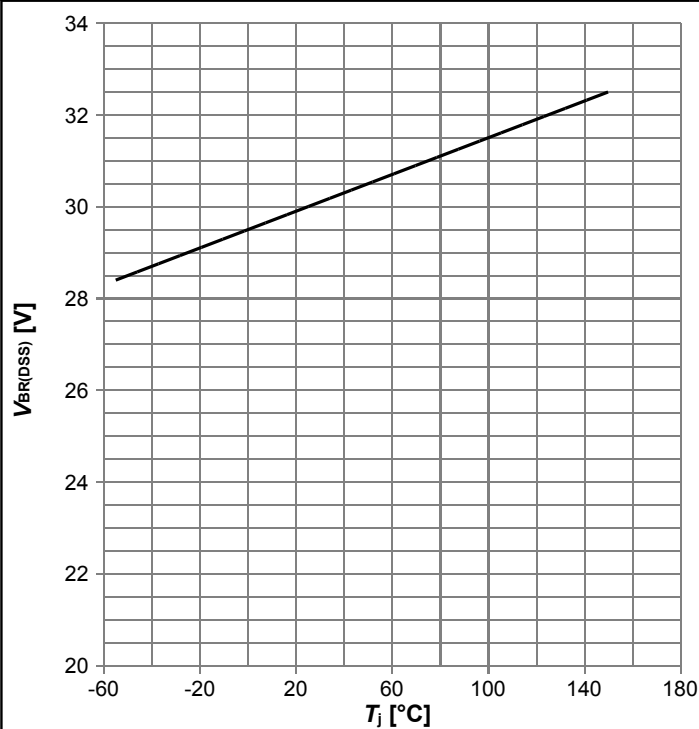
$I_{AS}=f(t_{AV})$; $R_{GS}=25\ \Omega$; parameter: $T_{j(start)}$

Diagram 14: Typ. gate charge



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

Diagram 15: Drain-source breakdown voltage

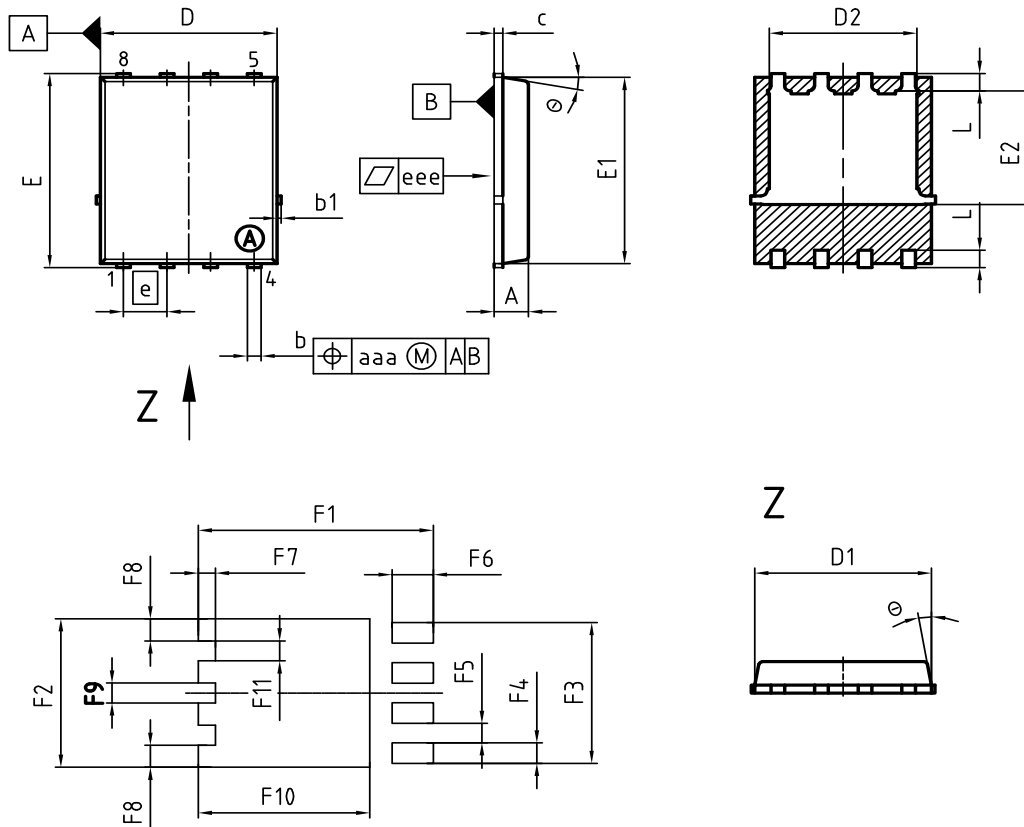


$V_{BR(DSS)}=f(T_j)$; $I_D=1\text{ mA}$

Diagram Gate charge waveforms



5 Package Outlines



| DIM | MILLIMETERS | | INCHES | |
|-------|-------------|-------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.90 | 1.10 | 0.035 | 0.043 |
| b | 0.34 | 0.54 | 0.013 | 0.021 |
| b1 | 0.02 | 0.22 | 0.001 | 0.008 |
| c | 0.15 | 0.35 | 0.006 | 0.014 |
| D=D1 | 4.95 | 5.35 | 0.195 | 0.211 |
| D2 | 4.20 | 4.40 | 0.165 | 0.173 |
| E | 5.95 | 6.35 | 0.234 | 0.250 |
| E1 | 5.70 | 6.10 | 0.224 | 0.240 |
| E2 | 3.40 | 3.80 | 0.134 | 0.150 |
| e | 1.27 | | 0.050 | |
| N | 8 | | 8 | |
| L | 0.45 | 0.65 | 0.018 | 0.026 |
| theta | 8.5° | 11.5° | 8.5° | 11.5° |
| aaa | 0.25 | | 0.010 | |
| eee | 0.05 | | 0.002 | |
| F1 | 6.75 | 6.95 | 0.266 | 0.274 |
| F2 | 4.60 | 4.80 | 0.181 | 0.189 |
| F3 | 4.36 | 4.56 | 0.172 | 0.180 |
| F4 | 0.55 | 0.75 | 0.022 | 0.030 |
| F5 | 0.52 | 0.72 | 0.020 | 0.028 |
| F6 | 1.10 | 1.30 | 0.043 | 0.051 |
| F7 | 0.40 | 0.60 | 0.016 | 0.024 |
| F8 | 0.60 | 0.80 | 0.024 | 0.031 |
| F9 | 0.53 | 0.73 | 0.021 | 0.029 |
| F10 | 4.90 | 5.10 | 0.193 | 0.201 |
| F11 | 0.53 | 0.73 | 0.021 | 0.029 |

| |
|-----------------------------|
| DOCUMENT NO. Z8B00003332 |
| SCALE 0 2.5 5mm |
| EUROPEAN PROJECTION |
| ISSUE DATE 08-03-2007 |
| REVISION 03 |

Figure 1 Outline PG-TDSON-8, dimensions in mm/inches

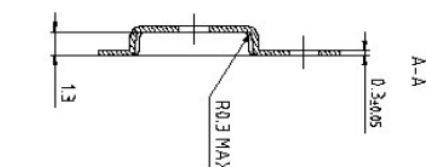


Figure 2 Outline Tape (PG-TDSON-8), dimensions in mm

Revision History

BSC030N03LS G

Revision: 2020-08-26, Rev. 2.0

Previous Revision

| Revision | Date | Subjects (major changes since last revision) |
|----------|------------|----------------------------------------------|
| 2.0 | 2020-08-26 | Update current rating and footnotes |

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Published by

Infineon Technologies AG

81726 München, Germany

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