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OptiMOS™ 2 Power-Transistor
Features

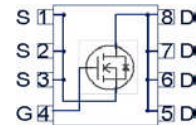
- Fast switching MOSFET for SMPS
- Optimized technology for notebook DC/DC
- Qualified according to JEDEC¹ for target applications
- N-channel
- Logic level
- Excellent gate charge $\times R_{DS(on)}$ product (FOM)
- Very low on-resistance $R_{DS(on)}$
- Avalanche rated
- dv/dt rated
- Pb-free lead plating;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

Product Summary

| | | |
|------------------|-----|------------|
| V_{DS} | 30 | V |
| $R_{DS(on),max}$ | 20 | m Ω |
| I_D | 8.8 | A |

PG-DSO-8


| Type | Package | Marking |
|------------|----------|---------|
| BSO200N03S | PG-DSO-8 | 200N3S |


Maximum ratings, at $T_j=25\text{ }^\circ\text{C}$, unless otherwise specified

| Parameter | Symbol | Conditions | Value | | Unit |
|-------------------------------------|----------------|---|-------------|--------------|-------------------|
| | | | 10 secs | steady state | |
| Continuous drain current | I_D | $T_A=25\text{ }^\circ\text{C}^{(2)}$ | 8.8 | 7.0 | A |
| | | $T_A=70\text{ }^\circ\text{C}^{(2)}$ | 7.1 | 5.6 | |
| Pulsed drain current | $I_{D,pulse}$ | $T_A=25\text{ }^\circ\text{C}^{(3)}$ | 35 | | |
| Avalanche energy, single pulse | E_{AS} | $I_D=8.8\text{ A}, R_{GS}=25\text{ }\Omega$ | 17 | | mJ |
| Reverse diode dv/dt | dv/dt | $I_D=8.8\text{ A}, V_{DS}=20\text{ V}, di/dt=200\text{ A}/\mu\text{s}, T_{j,max}=150\text{ }^\circ\text{C}$ | 6 | | kV/ μs |
| Gate source voltage | V_{GS} | | ± 20 | | V |
| Power dissipation | P_{tot} | $T_A=25\text{ }^\circ\text{C}^{(2)}$ | 2.5 | 1.56 | W |
| Operating and storage temperature | T_j, T_{stg} | | -55 ... 150 | | $^\circ\text{C}$ |
| IEC climatic category; DIN IEC 68-1 | | | 55/150/56 | | |

| Parameter | Symbol | Conditions | Values | | | Unit |
|-----------|--------|------------|--------|------|------|------|
| | | | min. | typ. | max. | |

Thermal characteristics

| | | | | | | |
|--|------------|--|---|---|-----|-----|
| Thermal resistance, junction - soldering point | R_{thJS} | | - | - | 35 | K/W |
| Thermal resistance, junction - ambient | R_{thJA} | minimal footprint, $t_p \leq 10$ s | - | - | 110 | |
| | | minimal footprint, steady state | - | - | 150 | |
| | | 6 cm ² cooling area ²⁾ , $t_p \leq 10$ s | - | - | 50 | |
| | | 6 cm ² cooling area ²⁾ , steady state | - | - | 80 | |

Electrical characteristics, at $T_j=25$ °C, unless otherwise specified
Static characteristics

| | | | | | | |
|----------------------------------|---------------|--|-----|------|-----|------------|
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}=0$ V, $I_D=1$ mA | 30 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}$, $I_D=10$ μ A | 1.2 | 1.6 | 2 | |
| Zero gate voltage drain current | I_{DSS} | $V_{DS}=30$ V, $V_{GS}=0$ V, $T_j=25$ °C | - | 0.1 | 1 | μ A |
| | | $V_{DS}=30$ V, $V_{GS}=0$ V, $T_j=125$ °C | - | 10 | 100 | |
| Gate-source leakage current | I_{GSS} | $V_{GS}=20$ V, $V_{DS}=0$ V | - | 10 | 100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}=4.5$ V, $I_D=7.3$ A | - | 25 | 31 | m Ω |
| | | $V_{GS}=10$ V, $I_D=8.8$ A | - | 16.6 | 20 | |
| Gate resistance | R_G | | - | 0.9 | - | Ω |
| Transconductance | g_{fs} | $ V_{DS} > 2 I_D R_{DS(on)max}$, $I_D=8.8$ A | 9.5 | 19 | - | S |

¹⁾J-STD20 and JESD22

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 figure 3

| Parameter | Symbol | Conditions | Values | | | Unit |
|-----------|--------|------------|--------|------|------|------|
| | | | min. | typ. | max. | |

Dynamic characteristics

| | | | | | | |
|------------------------------|--------------|--|---|-----|-----|----|
| Input capacitance | C_{iss} | $V_{GS}=0\text{ V}, V_{DS}=15\text{ V},$ $f=1\text{ MHz}$ | - | 630 | 840 | pF |
| Output capacitance | C_{oss} | | - | 220 | 290 | |
| Reverse transfer capacitance | C_{rss} | | - | 31 | 46 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}=15\text{ V}, V_{GS}=10\text{ V},$ $I_D=4.4\text{ A}, R_G=2.7\ \Omega$ | - | 2.9 | 4.3 | ns |
| Rise time | t_r | | - | 2.6 | 3.9 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 12 | 17 | |
| Fall time | t_f | | - | 1.8 | 2.7 | |

Gate Charge Characteristics⁴⁾

| | | | | | | |
|------------------------------|---------------|--|---|-----|-----|----|
| Gate to source charge | Q_{gs} | $V_{DD}=15\text{ V}, I_D=4.4\text{ A},$ $V_{GS}=0\text{ to }5\text{ V}$ | - | 1.8 | 2.4 | nC |
| Gate charge at threshold | $Q_{g(th)}$ | | - | 1.0 | 1.3 | |
| Gate to drain charge | Q_{gd} | | - | 1.2 | 1.9 | |
| Switching charge | Q_{sw} | | - | 2.1 | 3.0 | |
| Gate charge total | Q_g | | - | 4.9 | 6.5 | |
| Gate plateau voltage | $V_{plateau}$ | | - | 2.9 | - | V |
| Gate charge total, sync. FET | $Q_{g(sync)}$ | $V_{DS}=0.1\text{ V},$ $V_{GS}=0\text{ to }5\text{ V}$ | - | 4.2 | 5.6 | nC |
| Output charge | Q_{oss} | $V_{DD}=15\text{ V}, V_{GS}=0\text{ V}$ | - | 5 | 7 | |

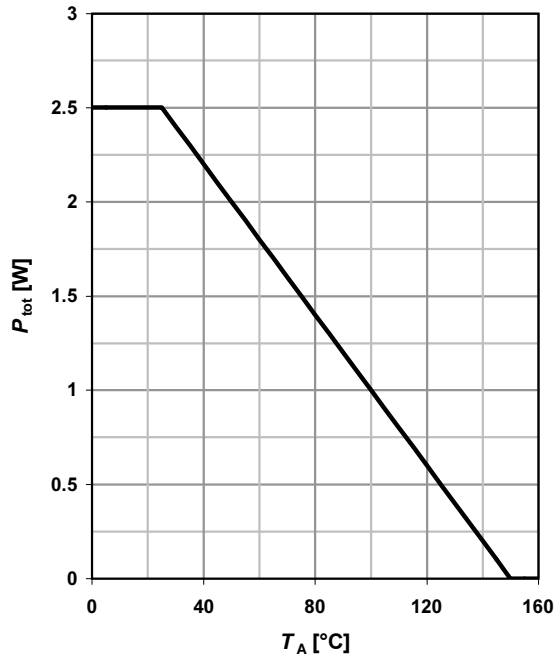
Reverse Diode

| | | | | | | |
|----------------------------------|---------------|--|---|------|-----|----|
| Diode continuous forward current | I_S | $T_A=25\text{ }^\circ\text{C}$ | - | - | 2.5 | A |
| Diode pulse current | $I_{S,pulse}$ | | - | - | 35 | |
| Diode forward voltage | V_{SD} | $V_{GS}=0\text{ V}, I_F=2.5\text{ A},$ $T_j=25\text{ }^\circ\text{C}$ | - | 0.77 | 1 | V |
| Reverse recovery charge | Q_{rr} | $V_R=12\text{ V}, I_F=I_S,$ $di_F/dt=400\text{ A}/\mu\text{s}$ | - | - | 6 | nC |

⁴⁾ See figure 16 for gate charge parameter definition

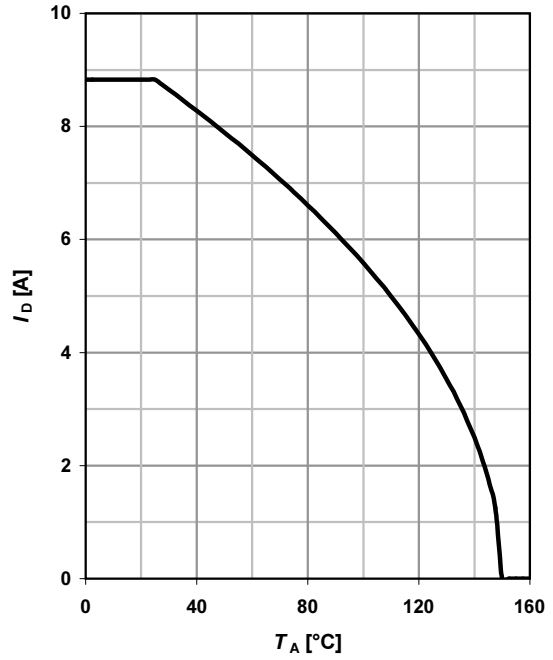
1 Power dissipation

$P_{tot}=f(T_A); t_p \leq 10 \text{ s}$



2 Drain current

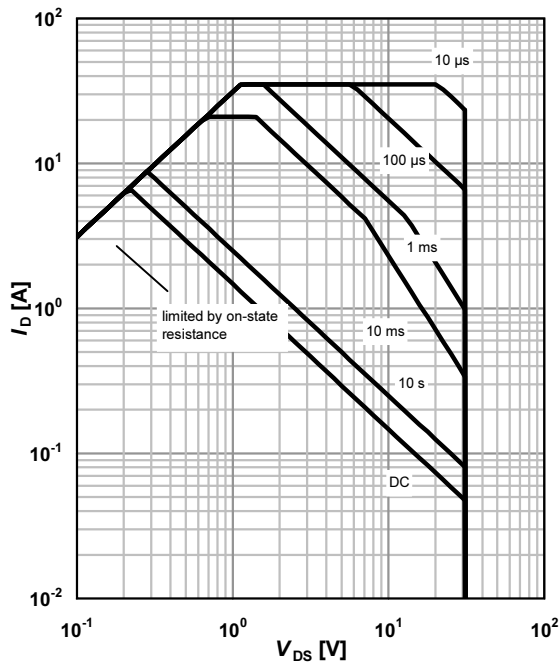
$I_D=f(T_A); V_{GS} \geq 10 \text{ V}; t_p \leq 10 \text{ s}$



3 Safe operating area

$I_D=f(V_{DS}); T_A=25 \text{ °C}^1; D=0$

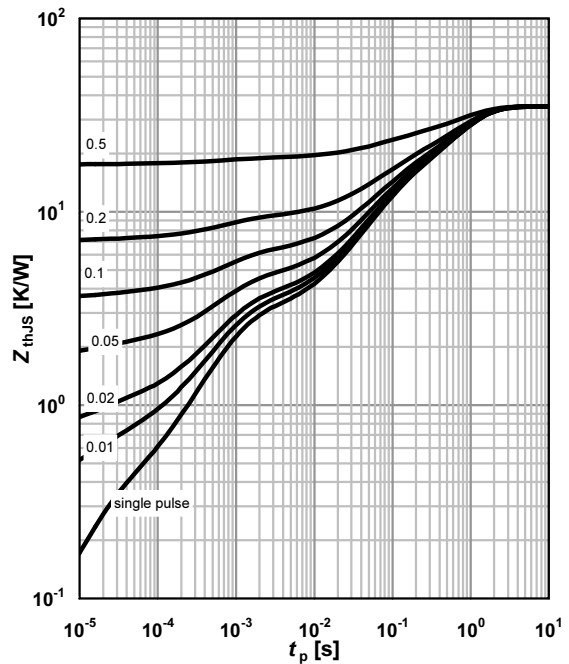
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJS}=f(t_p)$

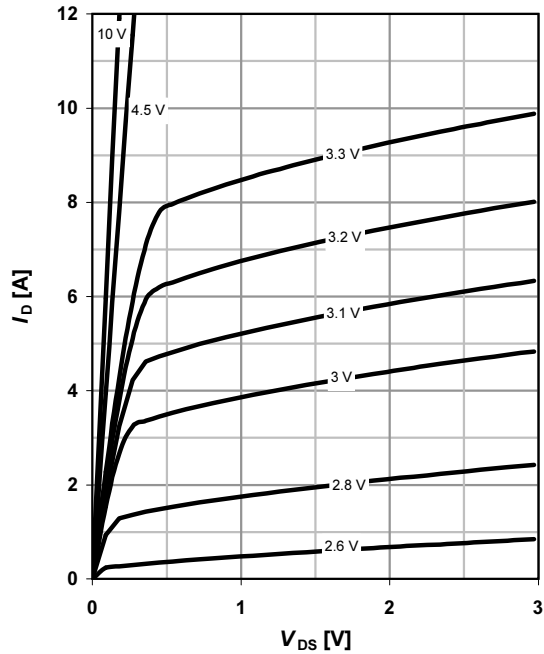
parameter: $D=t_p/T$



5 Typ. output characteristics

$I_D = f(V_{DS}); T_j = 25\text{ °C}$

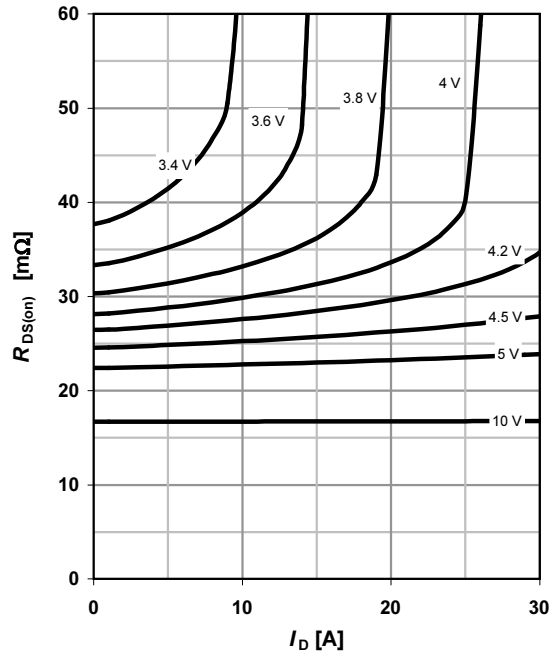
parameter: V_{GS}



6 Typ. drain-source on resistance

$R_{DS(on)} = f(I_D); T_j = 25\text{ °C}$

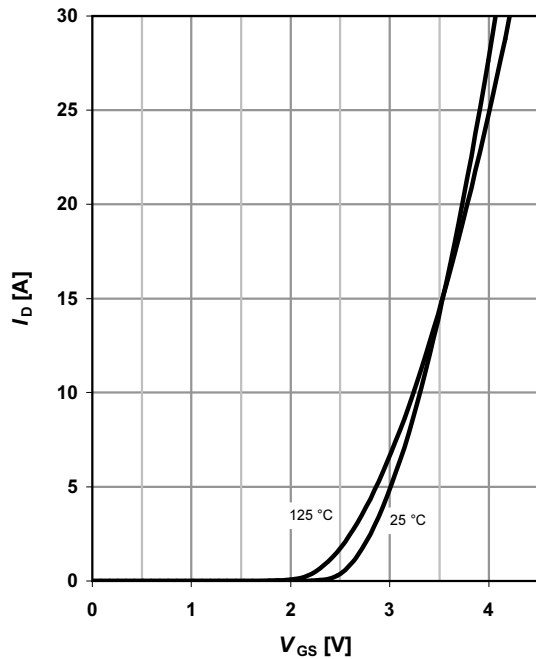
parameter: V_{GS}



7 Typ. transfer characteristics

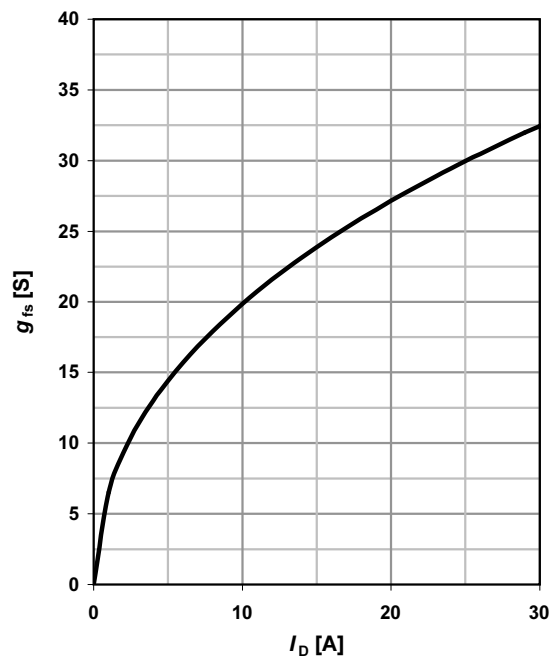
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter: T_j



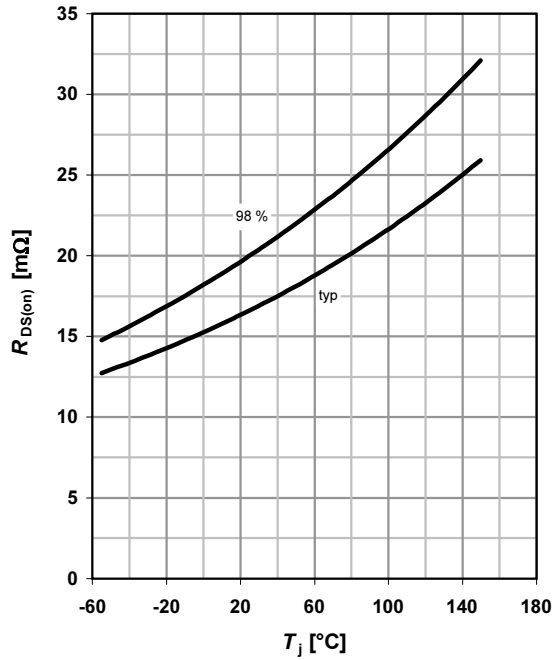
8 Typ. forward transconductance

$g_{fs} = f(I_D); T_j = 25\text{ °C}$



9 Drain-source on-state resistance

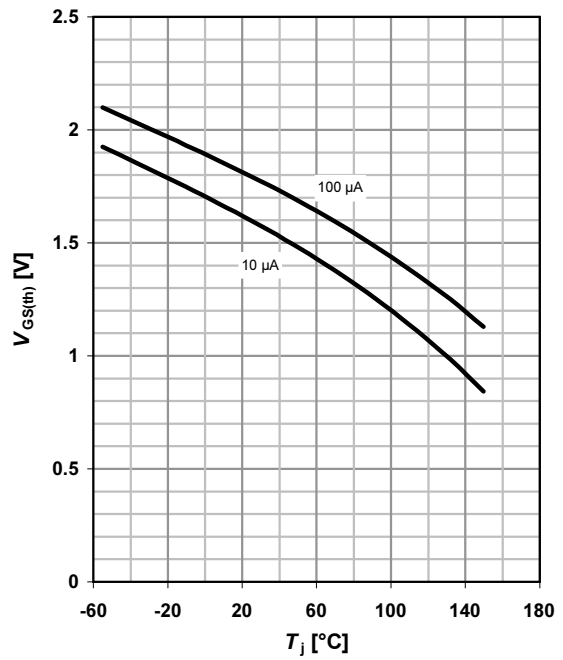
$R_{DS(on)} = f(T_j); I_D = 8.8 \text{ A}; V_{GS} = 10 \text{ V}$



10 Typ. gate threshold voltage

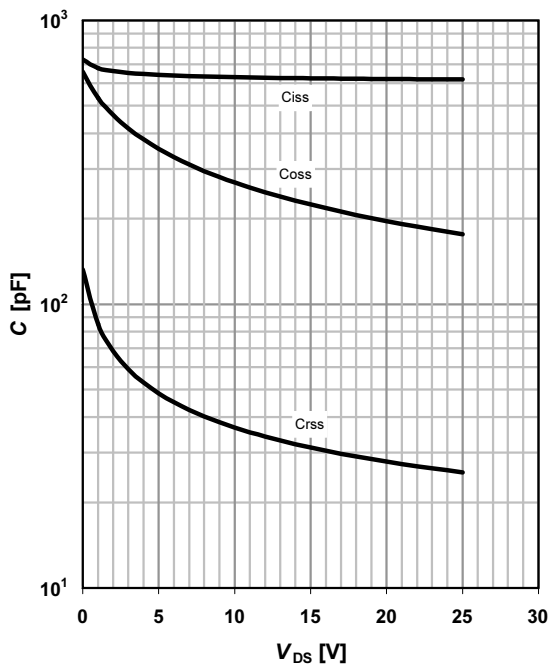
$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$

parameter: I_D



11 Typ. capacitances

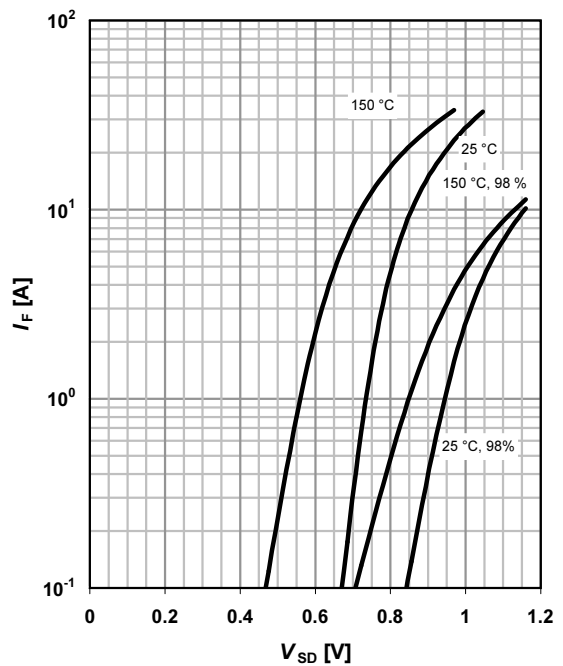
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



12 Forward characteristics of reverse diode

$I_F = f(V_{SD})$

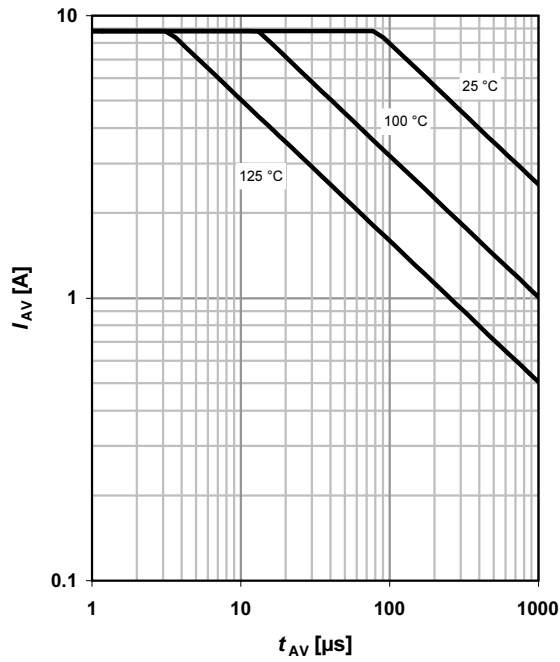
parameter: T_j



13 Avalanche characteristics

$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$

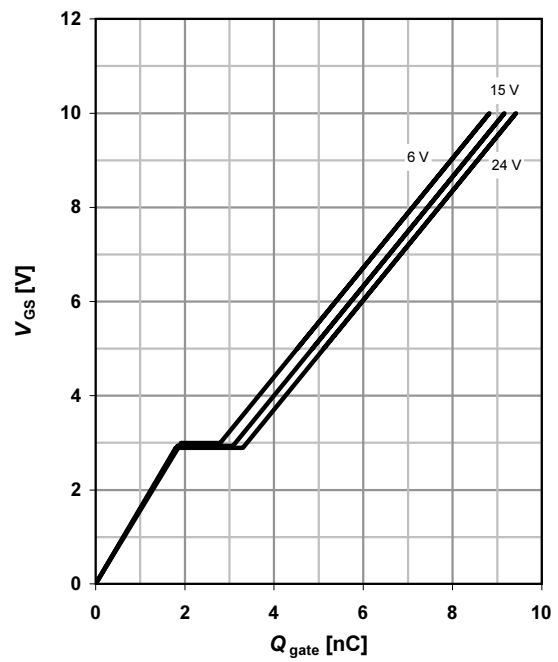
parameter: $T_{j(start)}$



14 Typ. gate charge

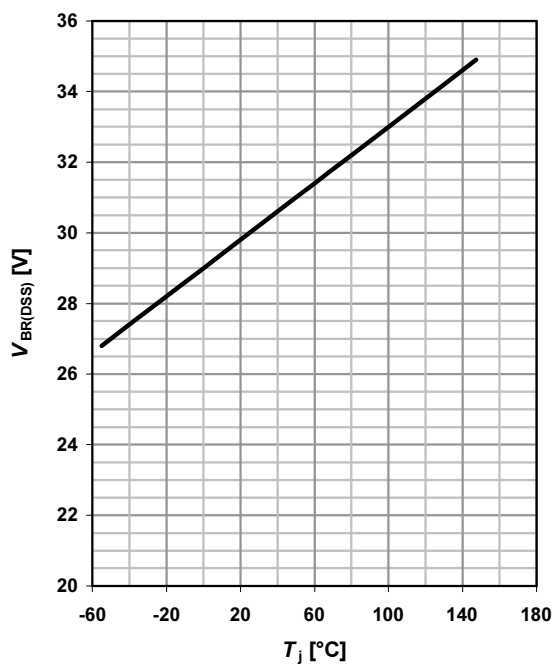
$V_{GS}=f(Q_{gate}); I_D=4.4 \text{ A pulsed}$

parameter: V_{DD}

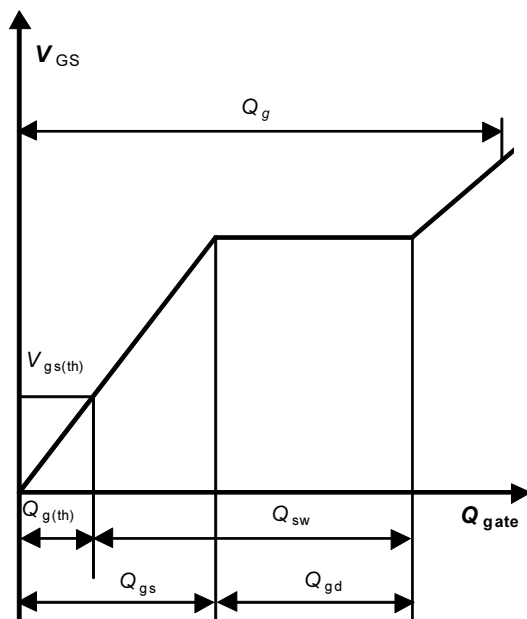


15 Drain-source breakdown voltage

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

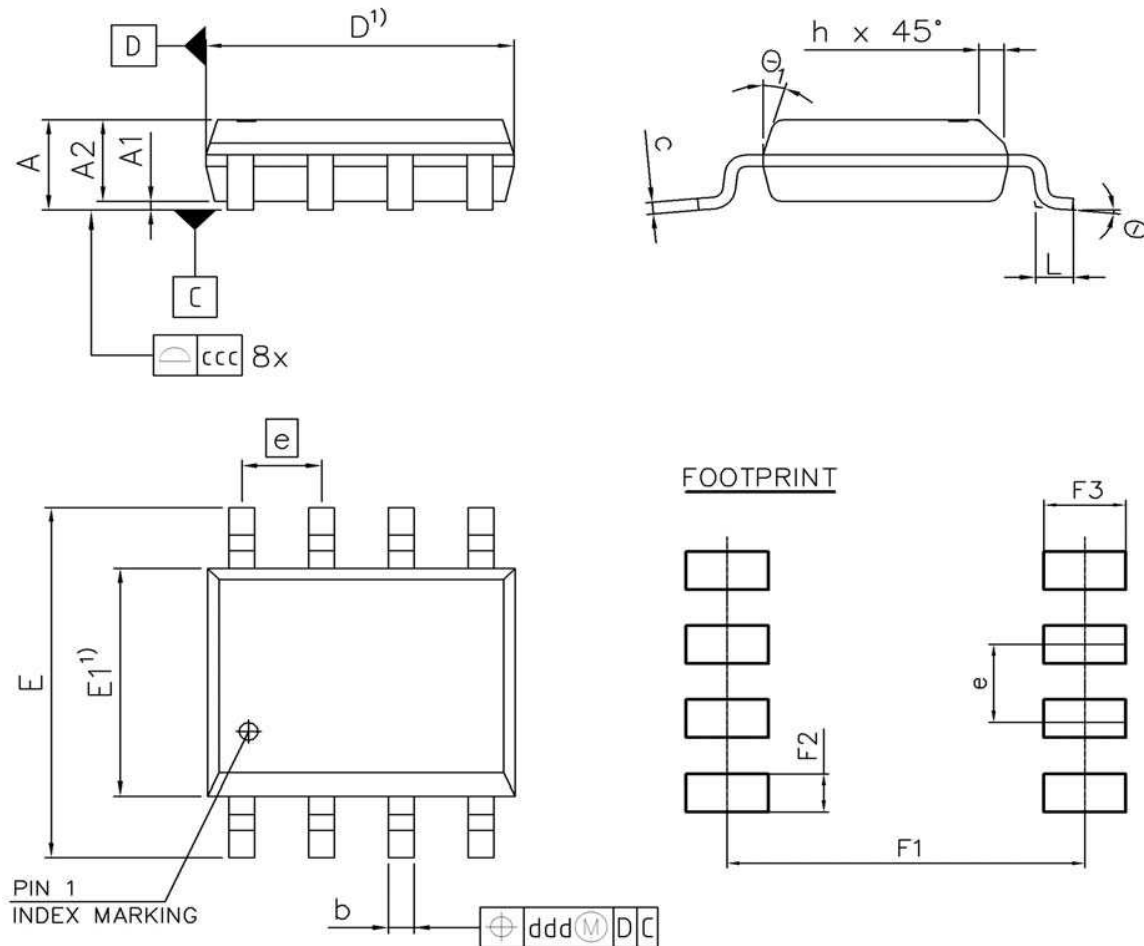


16 Gate charge waveforms



Package Outline

PG-DSO-8



1) DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

| DIM | MILLIMETERS | | INCHES | |
|----------------|-------------|------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | - | 1.75 | - | 0.069 |
| A1 | 0.10 | - | 0.004 | - |
| A2 | 1.25 | 1.65 | 0.049 | 0.065 |
| b | 0.35 | 0.51 | 0.014 | 0.020 |
| c | 0.17 | 0.25 | 0.007 | 0.010 |
| D | 4.80 | 5.00 | 0.189 | 0.197 |
| E | 5.80 | 6.20 | 0.228 | 0.244 |
| E1 | 3.80 | 4.00 | 0.150 | 0.157 |
| e | 1.27 | | 0.050 | |
| N | 8 | | 8 | |
| L | 0.39 | 0.89 | 0.015 | 0.035 |
| h | 0.23 | 0.50 | 0.009 | 0.020 |
| θ | 0° | 8° | 0° | 8° |
| θ ₁ | - | 19° | - | 19° |
| ccc | 0.10 | | 0.004 | |
| ddd | 0.25 | | 0.010 | |
| F1 | 5.59 | 5.79 | 0.220 | 0.228 |
| F2 | 0.55 | 0.75 | 0.022 | 0.030 |
| F3 | 1.21 | 1.41 | 0.048 | 0.056 |

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