

OptiMOS™ 2 Power-Transistor
Features

- Fast switching MOSFET for SMPS
- Optimized technology for notebook DC/DC
- Qualified according to JEDEC¹ for target applications

Thermal resistance, junction - soldering point

Thermal resistance, junction - ambient

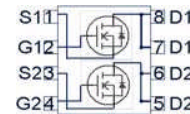
- Excellent gate charge $\times R_{DS(on)}$ product (FOM)
- Very low on-resistance $R_{DS(on)}$
- Avalanche rated
- dv/dt rated
- Pb-free plating; RoHS compliant
- Halogen-free according to IEC61249-2-21

Product Summary

| | | |
|------------------|-----|------------|
| V_{DS} | 30 | V |
| $R_{DS(on),max}$ | 20 | m Ω |
| I_D | 7.9 | A |

P-DSO-8


| Type | Package | Marking |
|-----------|----------|---------|
| BSO200N03 | PG-DSO-8 | 200N3 |


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 | $T_A=25\text{ }^\circ\text{C}^{(2)}$ | 7.9 | 6.6 | A |
| | | $T_A=70\text{ }^\circ\text{C}^{(2)}$ | 6.3 | 5.3 | |
| Pulsed drain current | $I_{D,pulse}$ | $T_A=25\text{ }^\circ\text{C}^{(3)}$ | 32 | | |
| Avalanche energy, single pulse | E_{AS} | $I_D=7.9\text{ A}$, $R_{GS}=25\text{ }\Omega$ | 27 | | mJ |
| Reverse diode dv/dt | dv/dt | $I_D=7.9\text{ A}$, $V_{DS}=20\text{ V}$, $di/dt=200\text{ A}/\mu\text{s}$, $T_{j,max}=150\text{ }^\circ\text{C}$ | 6 | | kV/ μs |
| Gate source voltage | V_{GS} | | ± 20 | | V |
| Power dissipation | P_{tot} | $T_A=25\text{ }^\circ\text{C}^{(2)}$ | 2.0 | 1.4 | 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} | | - | - | 50 | 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 | - | - | 63 | |
| | | 6 cm ² cooling area ²⁾ , steady state | - | - | 90 | |

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 | $V_{GS(th)}$ | $V_{DS}=V_{GS}$, $I_D=13$ 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, $I_D=6.8$ A | - | 21.7 | 27 | m Ω |
| | | $V_{GS}=10$ V, $I_D=7.9$ A | - | 16.7 | 20 | |
| Gate resistance | R_G | | - | 1.5 | - | Ω |
| Transconductance | g_{fs} | $ V_{DS} > 2 I_D R_{DS(on)max}$, $I_D=7.9$ A | 9 | 18 | - | 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

| | | | | | | |
|------------------------------|---------------------|--|---|-----|------|----|
| Thermal resistance, | $j\theta_{C_{iss}}$ | $V_{GS}=0\text{ V}, V_{DS}=15\text{ V},$ $f=1\text{ MHz}$ | - | 756 | 1010 | pF |
| Thermal resistance, | $j\theta_{C_{oss}}$ | | - | 270 | 360 | |
| Reverse transfer capacitance | C_{rss} | | - | 37 | 56 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}=15\text{ V}, V_{GS}=10\text{ V},$ $I_D=3.9\text{ A}, R_G=2.7\ \Omega$ | - | 3.9 | 5.8 | ns |
| Rise time | t_r | | - | 3.2 | 4.8 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 14 | 22 | |
| Fall time | t_f | | - | 2.2 | 3.3 | |

Gate Charge Characteristics⁴⁾

| | | | | | | |
|------------------------------|---------------|--|---|-----|-----|----|
| Gate to source charge | Q_{gs} | $V_{DD}=15\text{ V}, I_D=3.9\text{ A},$ $V_{GS}=0\text{ to }5\text{ V}$ | - | 2.2 | 2.9 | nC |
| Gate charge at threshold | $Q_{g(th)}$ | | - | 1.2 | 1.6 | |
| Gate to drain charge | Q_{gd} | | - | 1.5 | 2.3 | |
| Switching charge | Q_{sw} | | - | 2.5 | 3.5 | |
| Gate charge total | Q_g | | - | 6 | 8 | |
| Gate plateau voltage | $V_{plateau}$ | | - | 2.9 | - | V |
| Gate charge total, sync. FET | $Q_{g(sync)}$ | $V_{DS}=0.1\text{ V},$ $V_{GS}=0\text{ to }5\text{ V}$ | - | 5.1 | 7 | nC |
| Output charge | Q_{oss} | $V_{DD}=15\text{ V}, V_{GS}=0\text{ V}$ | - | 6 | 8 | |

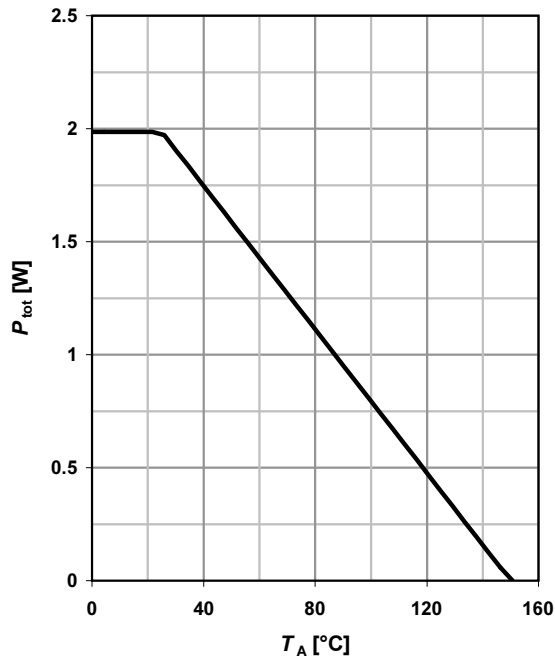
Reverse Diode

| | | | | | | |
|----------------------------------|---------------|--|---|------|----|----|
| Diode continuous forward current | I_S | $T_A=25\text{ }^\circ\text{C}$ | - | - | 2 | A |
| Diode pulse current | $I_{S,pulse}$ | | - | - | 32 | |
| Diode forward voltage | V_{SD} | $V_{GS}=0\text{ V}, I_F=2\text{ A},$ $T_j=25\text{ }^\circ\text{C}$ | - | 0.77 | 1 | V |
| Reverse recovery charge | Q_{rr} | $V_R=12\text{ V}, I_F=I_S,$ $di_F/dt=400\text{ A}/\mu\text{s}$ | - | - | 8 | nC |

⁴⁾ See figure 16 for gate charge parameter definition

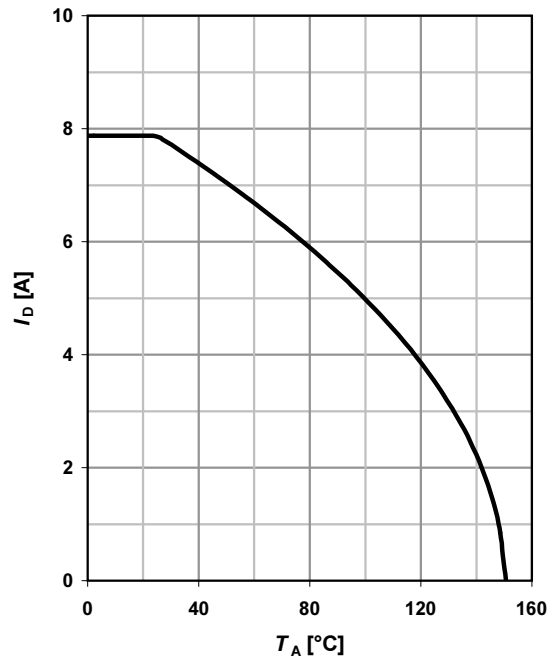
1 Power dissipation

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



2 Drain current

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



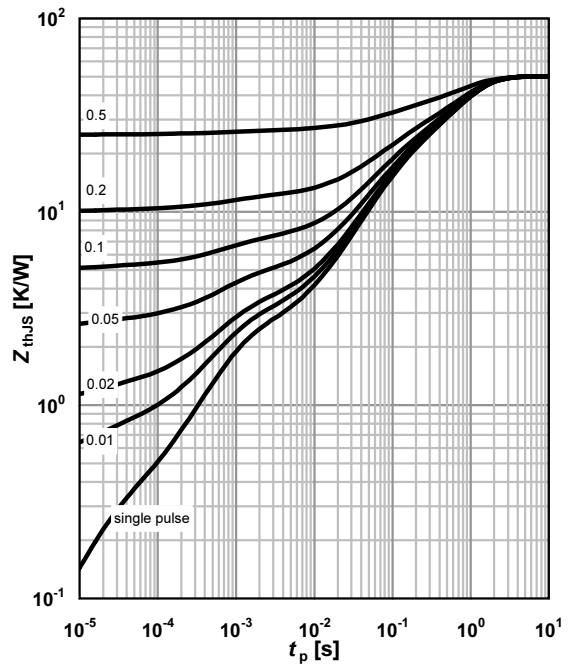
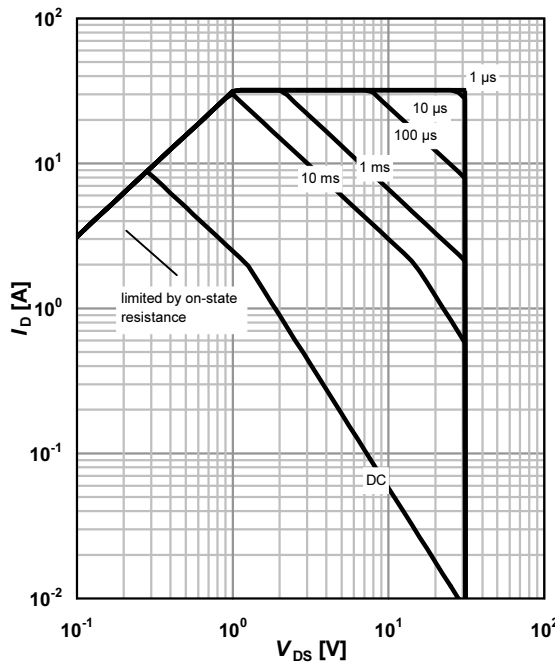
3 Safe operating area

Thermal resistance, junction - solderir

$Z_{thJS}=f(t_p)$

Thermal resistance, junction - ambier parameter: $D=t_p/T$

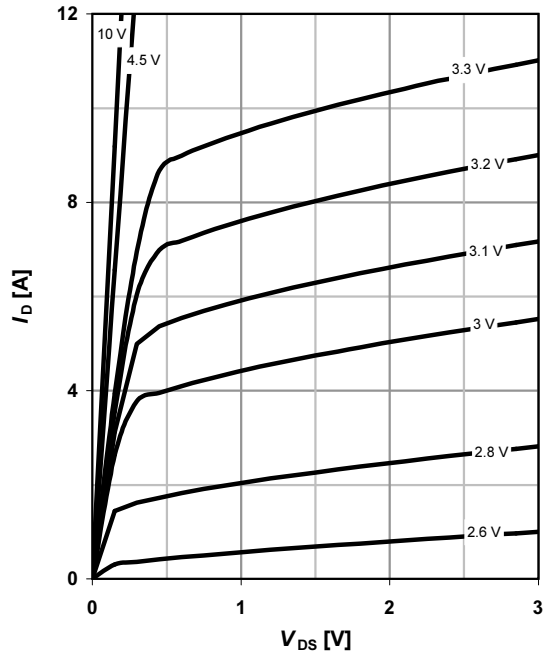
4 Max. transient thermal impedance



5 Typ. output characteristics

$I_D = f(V_{DS}); T_J = 25\text{ °C}$

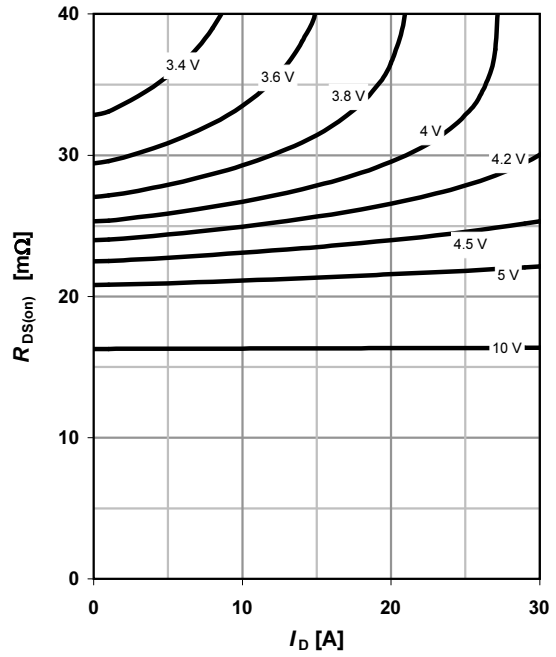
parameter: V_{GS}



6 Typ. drain-source on resistance

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

parameter: V_{GS}



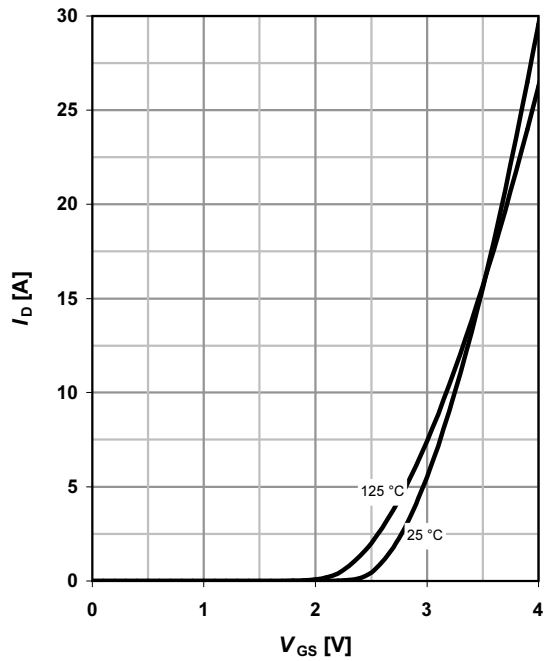
7 Typ. transfer characteristics

Thermal resistance, junction - solder

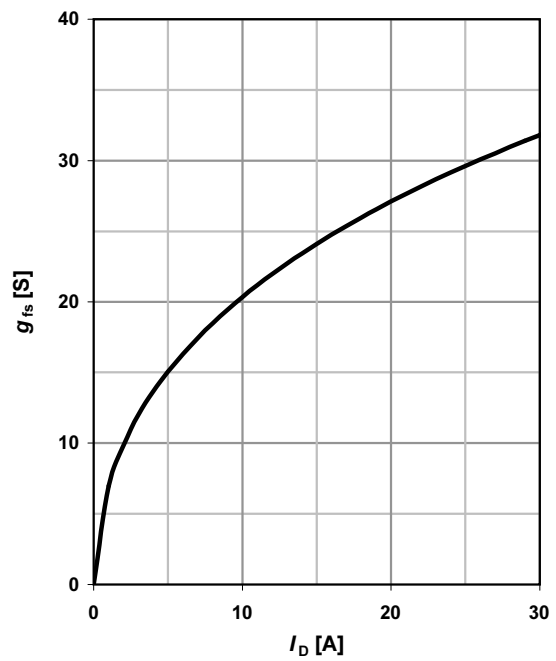
$g_{fs} = f(I_D); T_J = 25\text{ °C}$

Thermal resistance, junction - ambient

junction - ambient

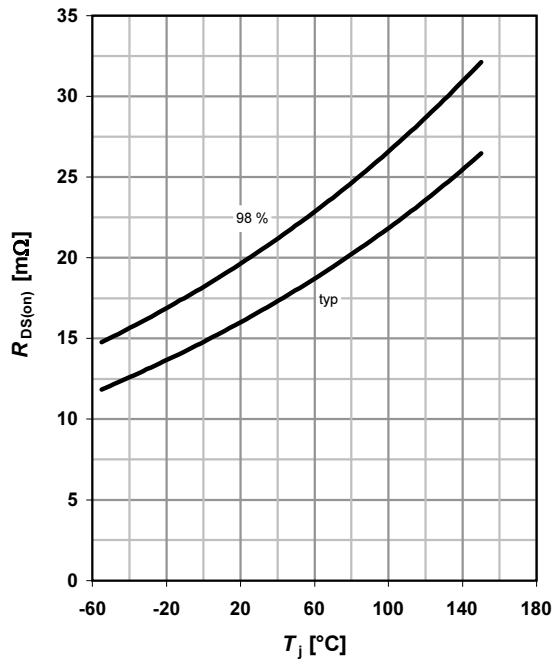


8 Typ. forward transconductance



9 Drain-source on-state resistance

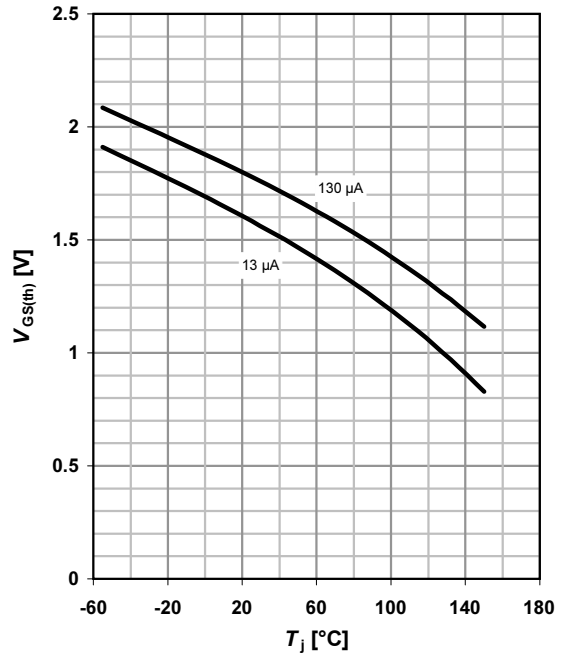
$R_{DS(on)} = f(T_j); I_D = 7.9 \text{ A}; V_{GS} = 10 \text{ V}$



10 Typ. gate threshold voltage

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

parameter: I_D



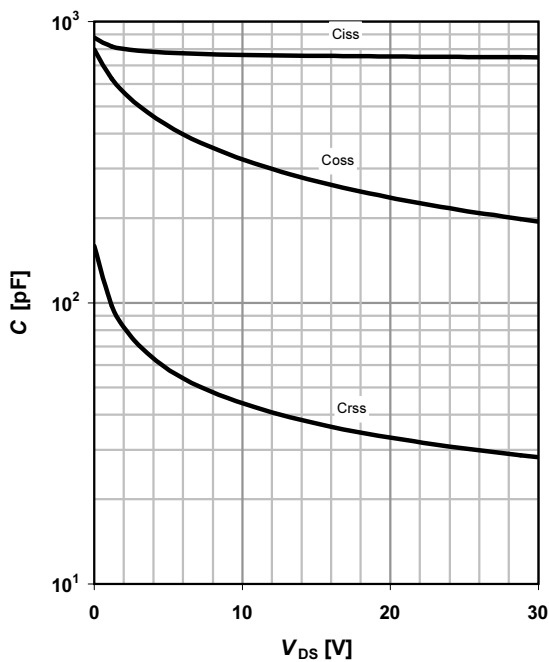
11 Typ. capacitances

Thermal resistance, junction - solder

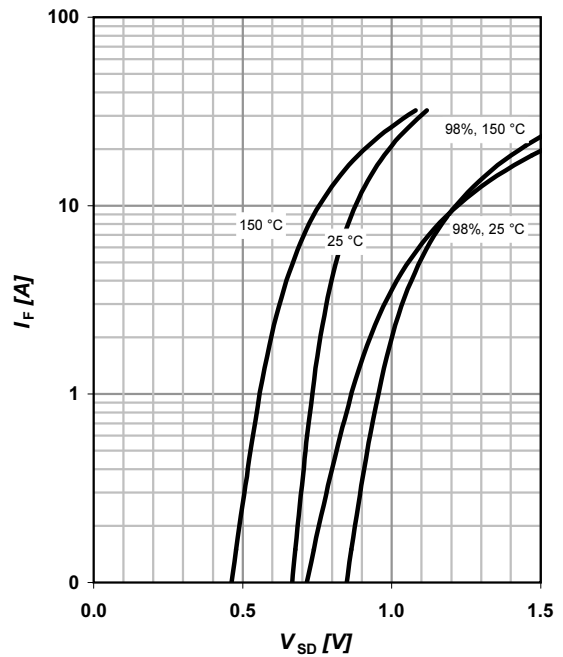
junction - solder $I_F = f(V_{SD})$

Thermal resistance, junction - ambier

junction - ambier parameter: T_j



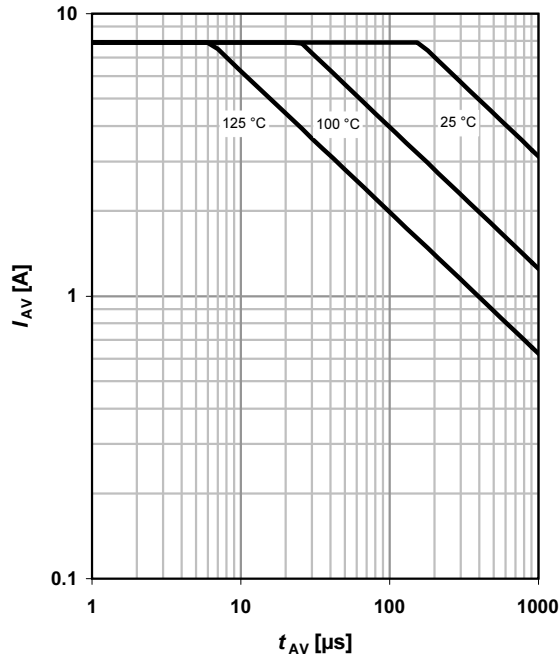
12 Forward characteristics of reverse diode



13 Avalanche characteristics

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

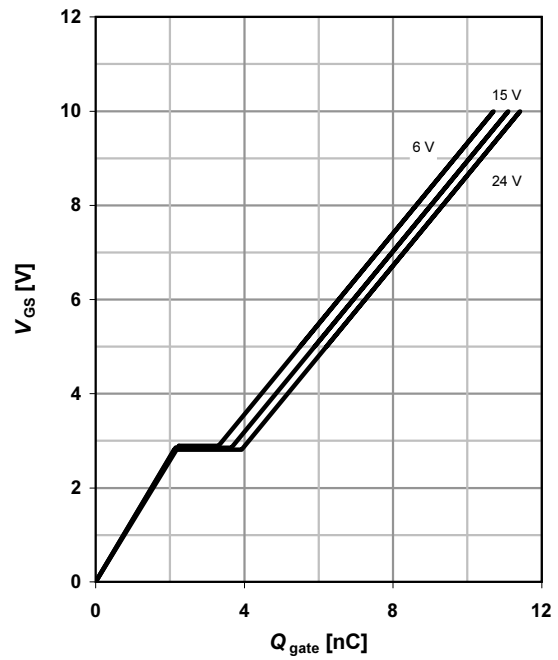
parameter: $T_{j(start)}$



14 Typ. gate charge

$V_{GS}=f(Q_{gate}); I_D=3.9 \text{ A pulsed}$

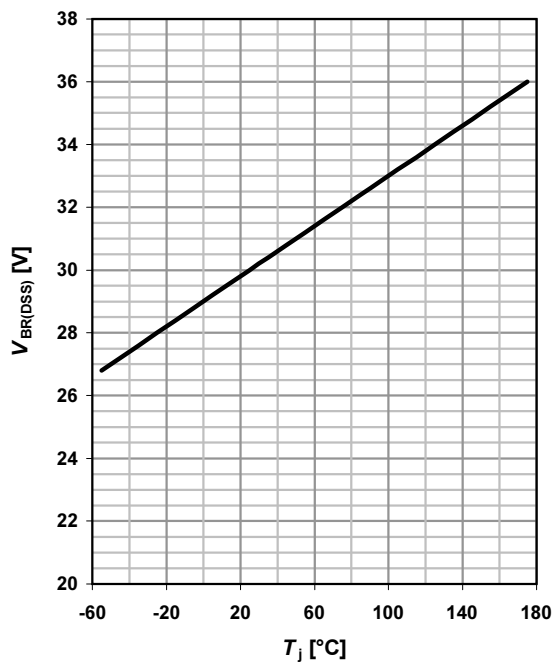
parameter: V_{DD}



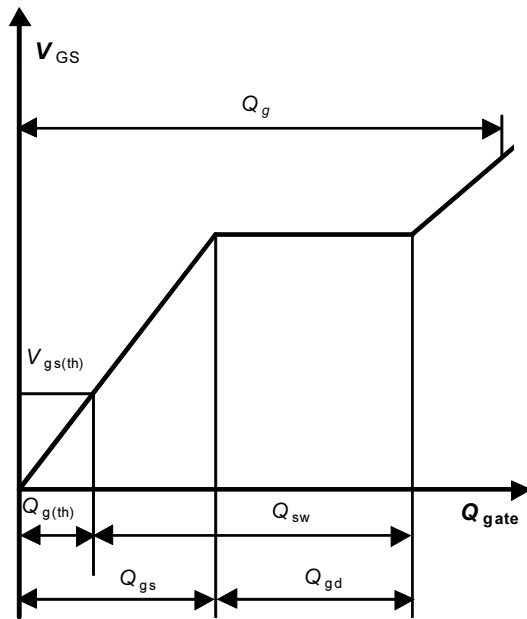
15 Drain-source breakdown voltage

Thermal resistance, junction - soldering point

Thermal resistance, junction - ambient

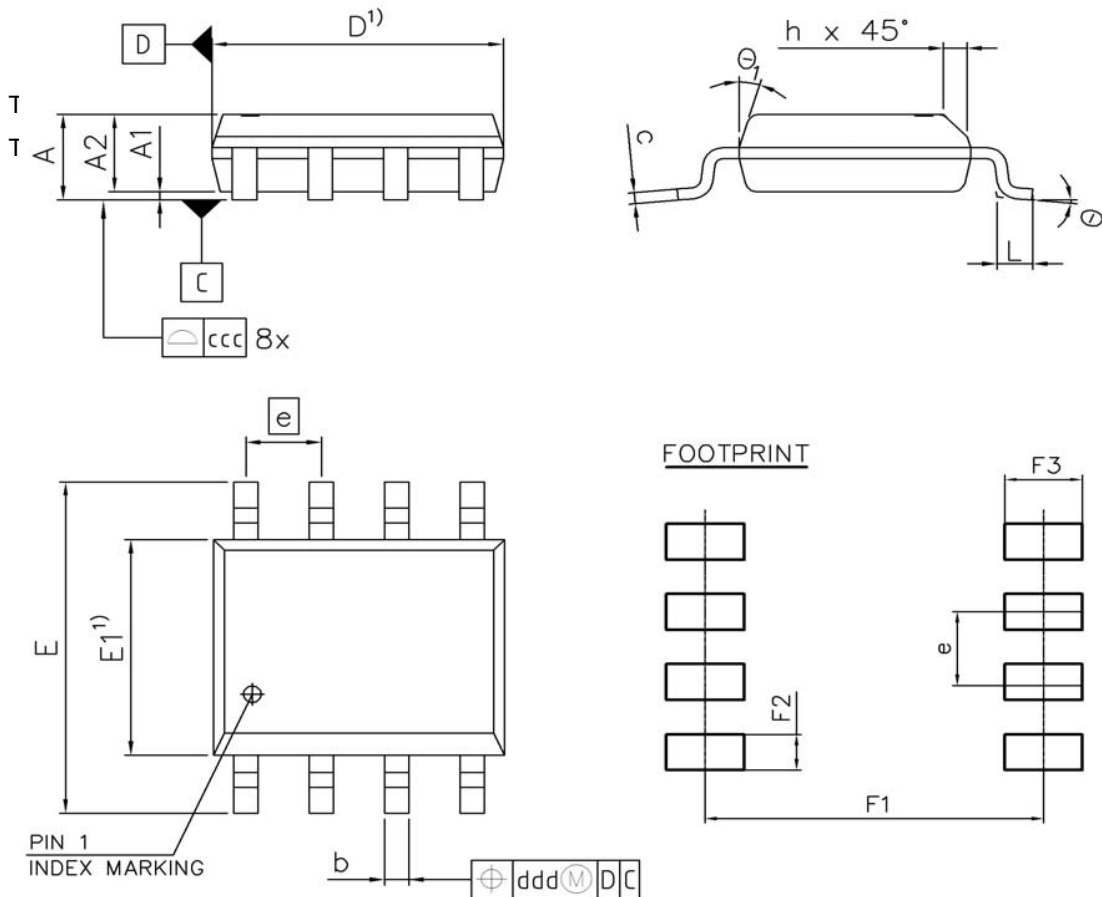


16 Gate charge waveforms



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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