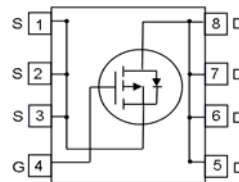


OptiMOS® P-Power-Transistor
Features

- single P-Channel in SO8
- Qualified according JEDEC for target applications
- 150°C operating temperature
- Super Logic Level (2.5V rated)
- Pb-free plating; RoHS compliant, Halogen-free according to IEC61249-2-21

Product Summary

| | | | |
|------------------|-----------------------|------|----|
| V_{DS} | | -20 | V |
| $R_{DS(on),max}$ | $V_{GS}=4.5\text{ V}$ | 21 | mΩ |
| | $V_{GS}=2.5\text{ V}$ | 34 | |
| I_D | | -8.9 | A |



| Type | Package | Marking | Lead free | Halogen free | Packing |
|------------|----------|---------|-----------|--------------|---------|
| BSO203SP H | PG-DSO-8 | 203SP | Yes | Yes | dry |

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

| Parameter | Symbol | Conditions | Value | | Unit |
|----------------------------------------|----------------|----------------------------------------------------|------------------|--------------|------|
| | | | 10 secs | steady state | |
| Continuous drain current ¹⁾ | I_D | $V_{GS} = -4.5\text{ V}$, $T_A = 25\text{ °C}$ | -8.9 | -7.0 | A |
| | | $V_{GS} = -4.5\text{ V}$, $T_A = 70\text{ °C}$ | -7.1 | -5.8 | |
| | | $V_{GS} = -2.5\text{ V}$, $T_A = 25\text{ °C}$ | -7.0 | -5.7 | |
| | | $V_{GS} = -2.5\text{ V}$, $T_A = 70\text{ °C}$ | -5.6 | -4.5 | |
| Pulsed drain current ²⁾ | $I_{D,pulse}$ | $T_A = 25\text{ °C}$ | -35.6 | | |
| Avalanche energy, single pulse | E_{AS} | $I_D = -8.9\text{ A}$, $R_{GS} = 25\text{ Ω}$ | 97 | | mJ |
| Gate source voltage | V_{GS} | | ±12 | | V |
| Power dissipation ¹⁾ | P_{tot} | $T_A = 25\text{ °C}$ | 2.5 | 1.6 | W |
| Operating and storage temperature | T_j, T_{stg} | | -55 ... 150 | | °C |
| ESD class | | JESD22-A114 HBM | 1B (500V - 1 kV) | | |
| Soldering temperature | | | 260 | | °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 ¹⁾ , $t_p \leq 10$ s | - | - | 53 | |
| | | 6 cm ² cooling area ¹⁾ , 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, $I_D = -0.25$ mA | -20 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}$, $I_D = -100$ μ A | -0.6 | -0.9 | -1.2 | |
| Zero gate voltage drain current | I_{DSS} | $V_{DS} = -20$ V, $V_{GS} = 0$ V, $T_j = 25$ °C | - | - | -1 | μ A |
| | | $V_{DS} = -20$ V, $V_{GS} = 0$ V, $T_j = 150$ °C | - | - | -100 | |
| Gate-source leakage current | I_{GSS} | $V_{GS} = -12$ V, $V_{DS} = 0$ V | - | - | -100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS} = 2.5$ V, $I_D = -7$ A | - | 22 | 34 | m Ω |
| | | $V_{GS} = 4.5$ V, $I_D = -8.9$ A | - | 15 | 21 | |
| Gate resistance | R_G | | - | 3.3 | - | Ω |
| Transconductance | g_{fs} | $ V_{DS} > 2 I_D R_{DS(on)max}$, $I_D = -7.1$ A | 18 | 33 | - | S |

¹⁾ 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.

²⁾ See figure 3 for more detailed information

³⁾ See figure 13 for more detailed information

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

Dynamic characteristics

| | | | | | | |
|------------------------------|--------------|-------------------------------------------------------------------------------------------|---|------|------|----|
| Input capacitance | C_{iss} | $V_{GS}=0\text{ V}, V_{DS}=15\text{ V},$ $f=1\text{ MHz}$ | - | 2500 | 3750 | pF |
| Output capacitance | C_{oss} | | - | 820 | 1230 | |
| Reverse transfer capacitance | C_{rss} | | - | 680 | 1020 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}=-10\text{ V}, V_{GS}=-$ $4.5\text{ V}, I_D=-8.9\text{ A}, R_G=$ $6\ \Omega$ | - | 16 | 24 | ns |
| Rise time | t_r | | - | 55 | 83 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 45 | 68 | |
| Fall time | t_f | | - | 74 | 111 | |

Gate Charge Characteristics⁴⁾

| | | | | | | |
|--------------------------|---------------|--------------------------------------------------------------------------------|---|------|-----|----|
| Gate to source charge | Q_{gs} | $V_{DD}=-10\text{ V}, I_D=-8.9\text{ A},$ $V_{GS}=0\text{ to }4.5\text{ V}$ | - | -4 | -6 | nC |
| Gate charge at threshold | $Q_{g(th)}$ | | - | -4 | -6 | |
| Gate to drain charge | Q_{gd} | | - | -11 | -17 | |
| Switching charge | Q_{sw} | | - | -12 | -18 | |
| Gate charge total | Q_g | | - | -26 | -39 | |
| Gate plateau voltage | $V_{plateau}$ | | - | -1.6 | - | V |
| Output charge | Q_{oss} | $V_{DD}=-10\text{ V}, V_{GS}=0\text{ V}$ | - | 16 | 21 | nC |

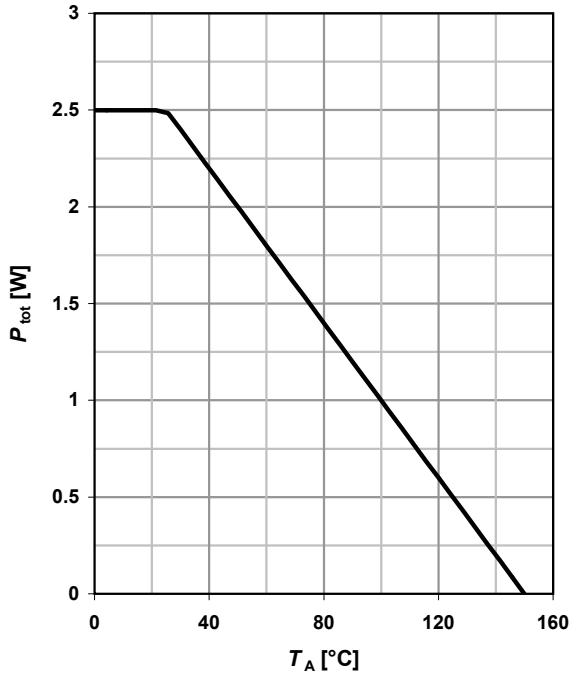
Reverse Diode

| | | | | | | |
|----------------------------------|---------------|---------------------------------------------------------------------------|---|----|-------|----|
| Diode continuous forward current | I_S | $T_A=25\text{ }^\circ\text{C}$ | - | - | -3 | A |
| Diode pulse current | $I_{S,pulse}$ | | - | - | -35.6 | |
| Diode forward voltage | V_{SD} | $V_{GS}=0\text{ V}, I_F=-8.9\text{ A},$ $T_j=25\text{ }^\circ\text{C}$ | - | - | 1.1 | V |
| Reverse recovery time | t_{rr} | $V_R=10\text{ V}, I_F=I_S,$ $di_F/dt=100\text{ A}/\mu\text{s}$ | - | 26 | 39 | ns |
| Reverse recovery charge | Q_{rr} | $V_R=10\text{ V}, I_F=I_D,$ $di_F/dt=100\text{ A}/\mu\text{s}$ | - | 14 | 21 | nC |

⁴⁾ See figure 16 for gate charge parameter definition

1 Power dissipation

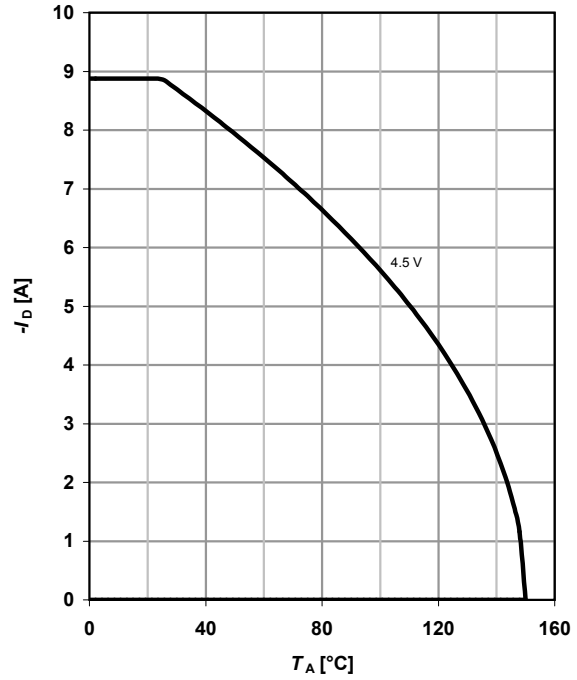
$P_{tot}=f(T_A); t_p \leq 10 \text{ s}$



2 Drain current

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

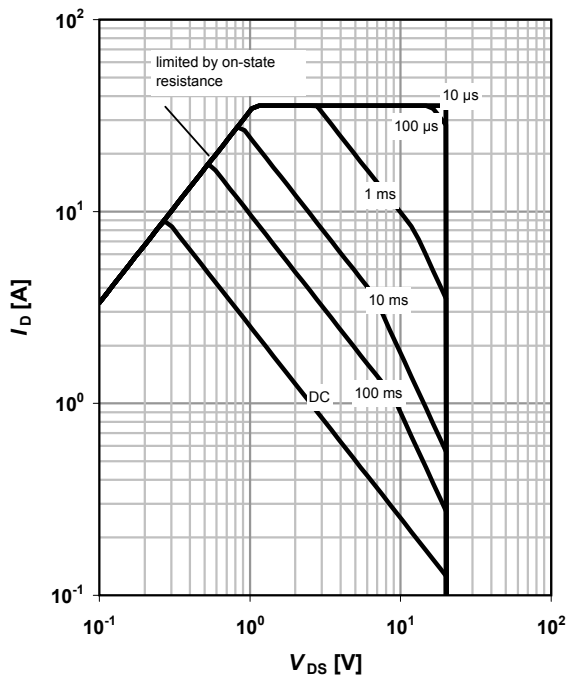
parameter: V_{GS}



3 Safe operating area

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

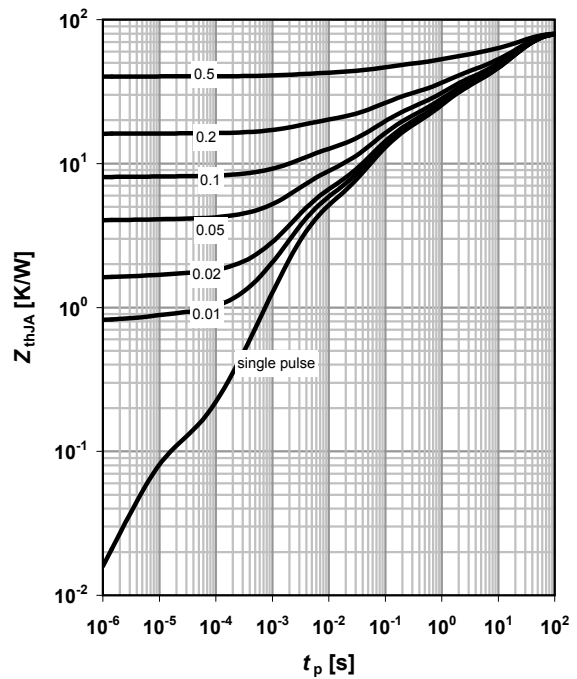
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJA}=f(t_p)^1$

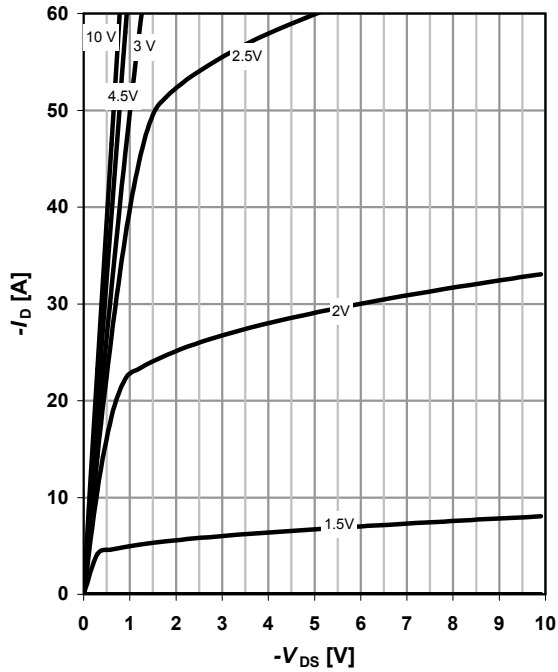
parameter: $D=t_p/T$



5 Typ. output characteristics

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

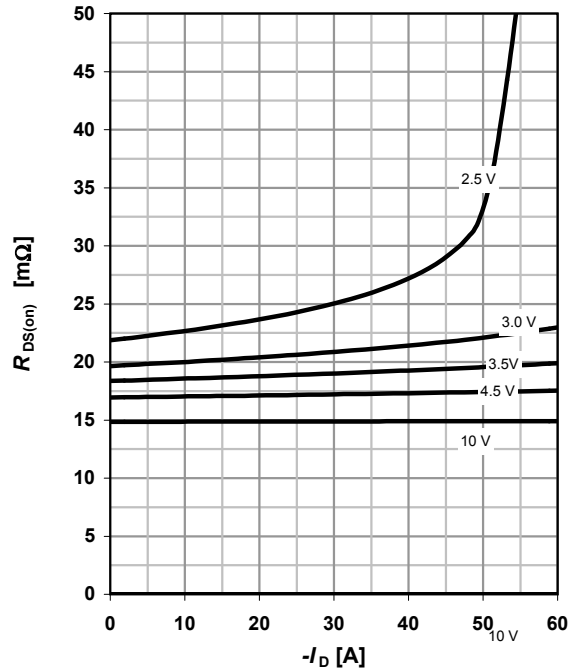
parameter: V_{GS}



6 Typ. drain-source on resistance

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

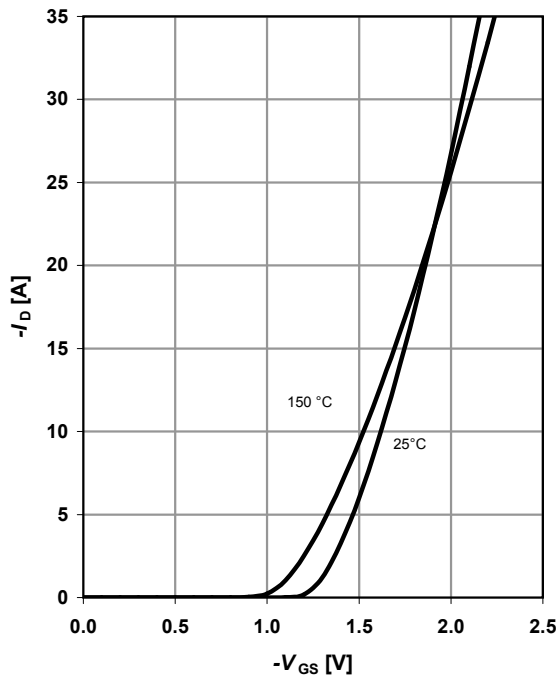
parameter: V_{GS}



7 Typ. transfer characteristics

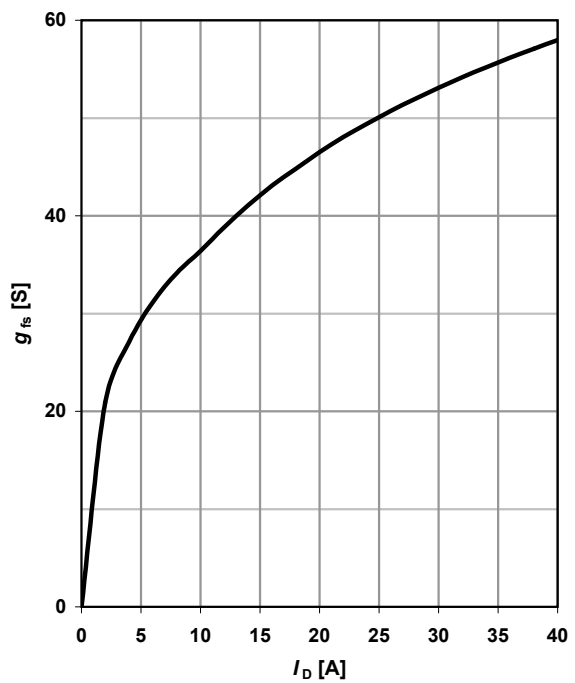
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter: T_j



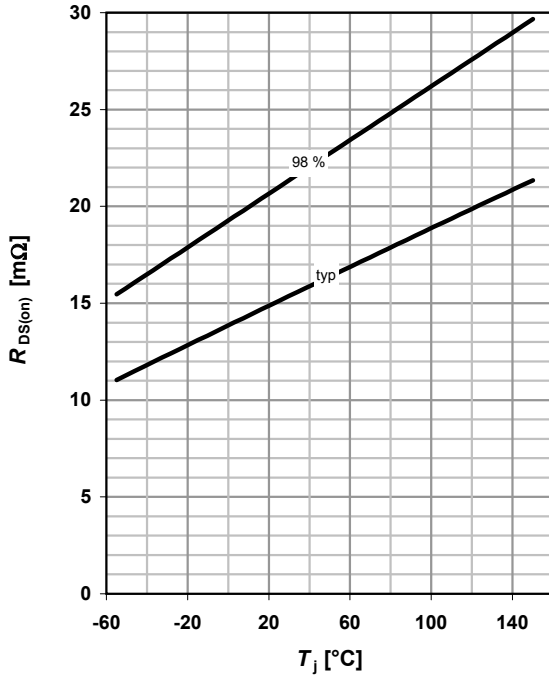
8 Typ. forward transconductance

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



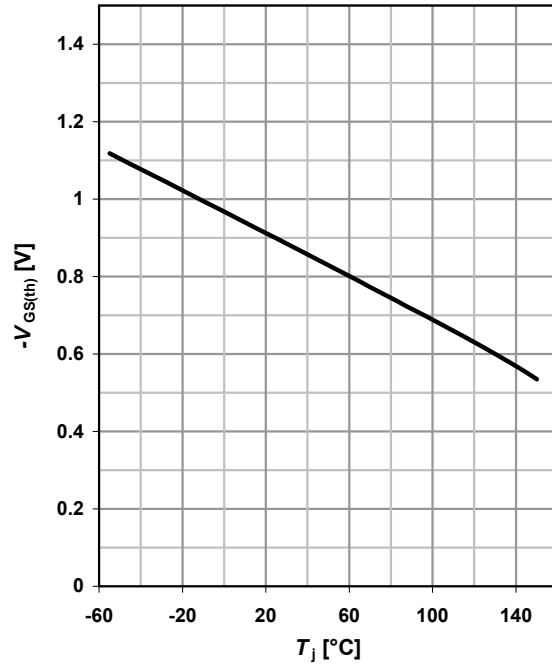
9 Drain-source on-state resistance

$R_{DS(on)} = f(T_j); I_D = -8.9 \text{ A}; V_{GS} = -4.5 \text{ V}$



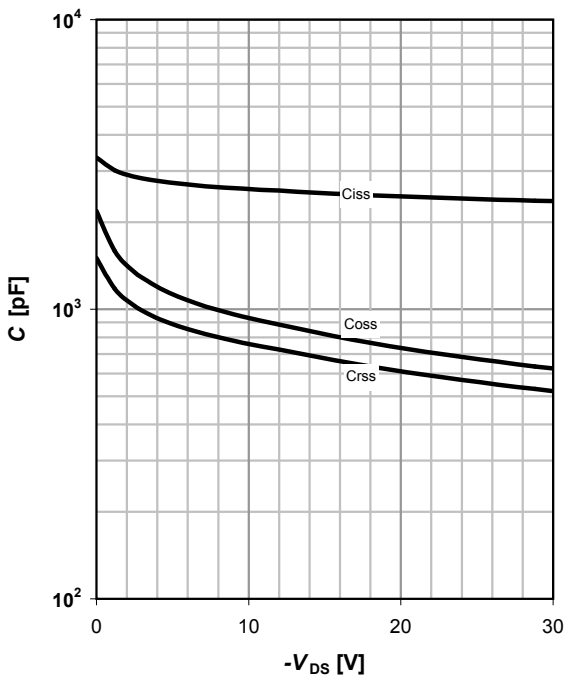
10 Typ. gate threshold voltage

$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = -100 \mu\text{A}$



11 Typ. capacitances

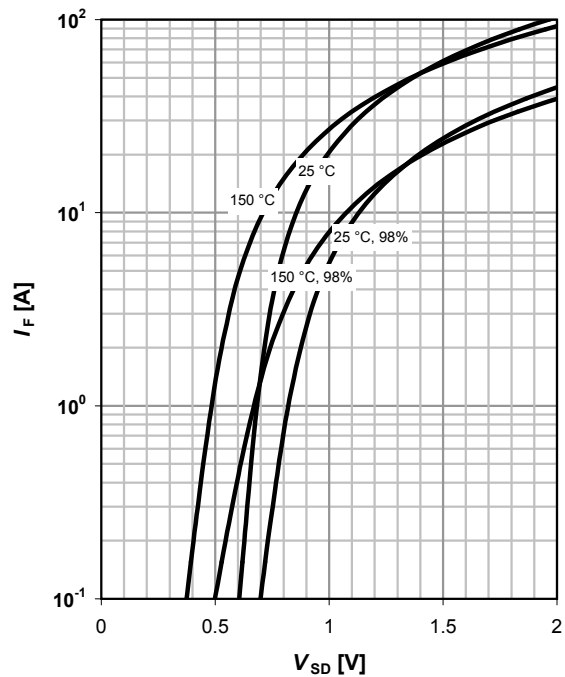
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



12 Forward characteristics of reverse diode

$I_F = f(V_{SD})$

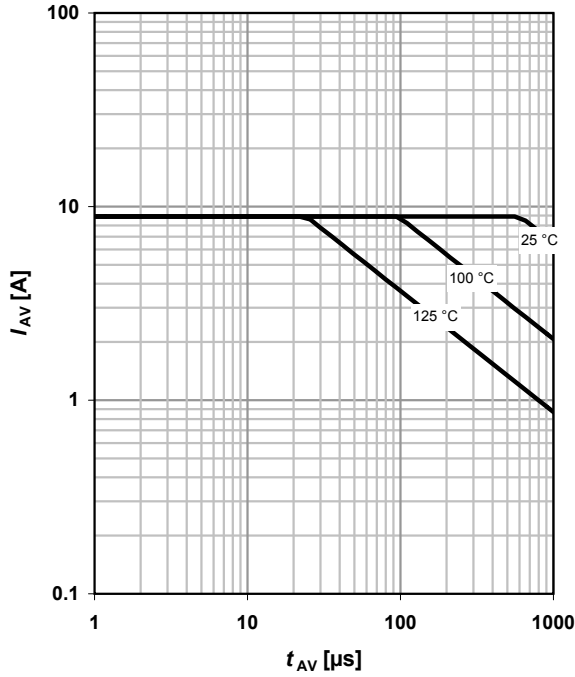
parameter: T_j



13 Avalanche characteristics

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

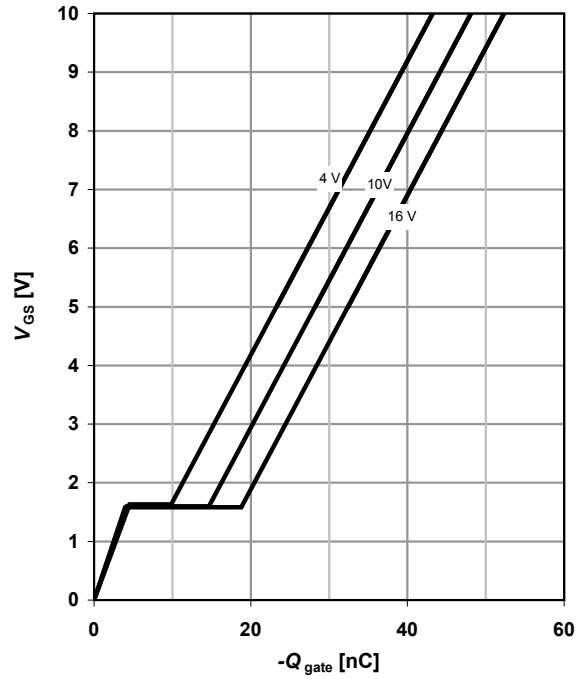
parameter: $T_{j(start)}$



14 Typ. gate charge

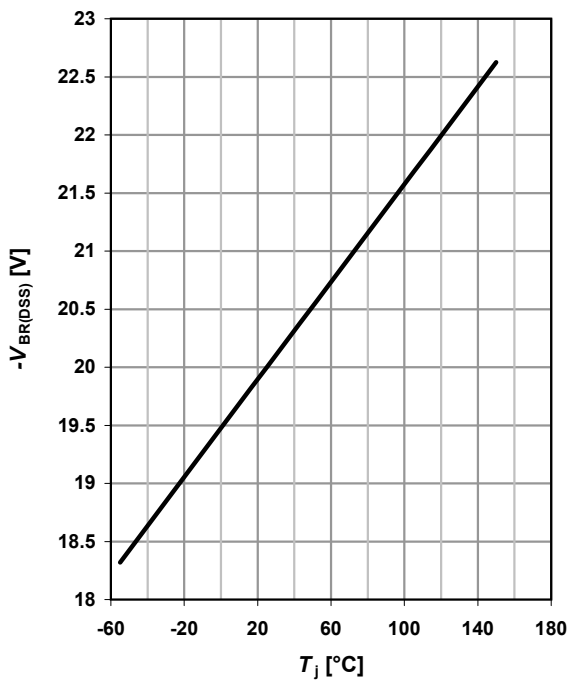
$V_{GS}=f(Q_{gate}); I_D=-8.9 \text{ A pulsed}$

parameter: V_{DD}

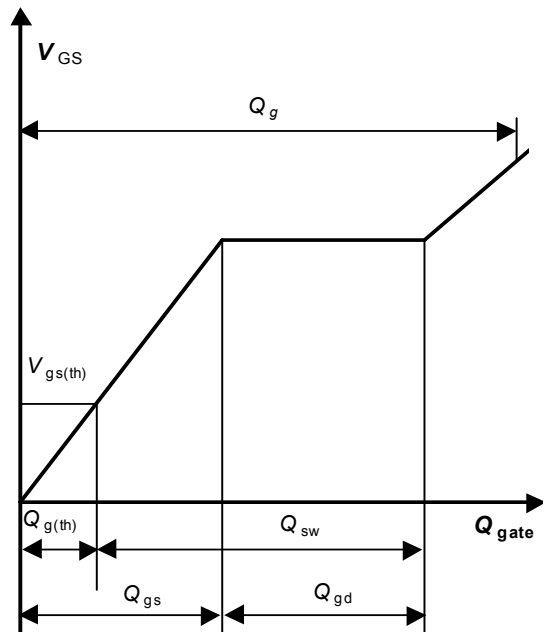


15 Drain-source breakdown voltage

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



16 Gate charge waveforms



Package Outline

PG-DSO-8: Outline



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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