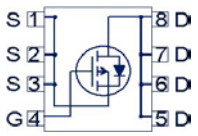
# OptiMOS™-P Power-Transistor

## Features

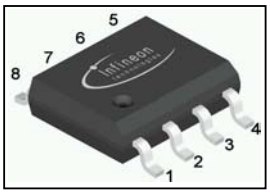
- P-Channel
- Enhancement mode
- Logic level
- 150°C operating temperature
- Qualified according JEDEC for target applications
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21

## Product Summary

| | | |
|---|---|---|
| $V_{DS}$ | -30 | V |
| $R_{DS(on),max}$ | 20 | mΩ |
| $I_D$ | -9.1 | A |




PG-DSO-8




| Type | Package | Marking | Lead free | Halogen free | packing |
|---|---|---|---|---|---|
| BSO200P03S H | PG-DSO-8 | 200P3S | Yes | Yes | dry |

**Maximum ratings,** at $T_j$=25 °C, unless otherwise specified

| Parameter | Symbol | Conditions | Value | | Unit |
|---|---|---|---|---|---|
| | | | ≤10 secs | steady state | |
| Continuous drain current | $I_D$ | $T_A$=25 °C[1)] | -9.1 | -7.4 | A |
| | | $T_A$=70 °C[1)] | -7.3 | -5.9 | |
| Pulsed drain current | $I_{D,pulse}$ | $T_A$=25 °C[2)] | -36.4 | | |
| Avalanche energy, single pulse | $E_{AS}$ | $I_D$=-9.1 A, $R_{GS}$=25 Ω | 98 | | mJ |
| Gate source voltage | $V_{GS}$ | | ±25 | | V |
| Power dissipation | $P_{tot}$ | $T_A$=25 °C[1)] | 2.36 | 1.56 | W |
| Operating and storage temperature | $T_j$, $T_{stg}$ | | -55 ... 150 | | °C |
| ESD rating | | | | | |
| 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, $t_p$≤10 s | - | - | 110 | |
| | | minimal footprint, steady state | - | - | 150 | |
| | | 6 cm$^2$ cooling area[1)], $t_p$≤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, $I_D$=-250µA | -30 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-100 µA | -1 | -1.5 | | |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$=-30 V, $V_{GS}$=0 V, $T_j$=25 °C | - | -0.1 | -1 | µA |
| | | $V_{DS}$=-30 V, $V_{GS}$=0 V, $T_j$=125 °C | - | -10 | -100 | |
| Gate-source leakage current | $I_{GSS}$ | $V_{GS}$=-25 V, $V_{DS}$=0 V | - | - | -100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}$=-10 V, $I_D$=-9.1 A | - | 16.7 | 20.0 | |
| Transconductance | $g_{fs}$ | \|$V_{DS}$\|>2\|$I_D$\|$R_{DS(on)max}$, $I_D$=-7.3 A | 11 | 18 | - | S |

[1)] Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm$^2$ (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.

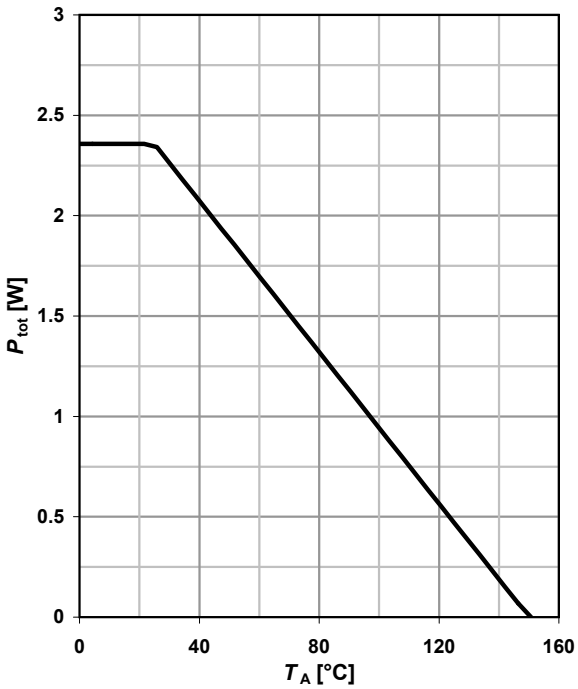
| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| **Dynamic characteristics** | | | | | | |
| Input capacitance | $C_{iss}$ | $V_{GS}$=0 V, $V_{DS}$=-25 V, $f$=1 MHz | - | 1750 | 2330 | pF |
| Output capacitance | $C_{oss}$ | | - | 470 | 625 | |
| Reverse transfer capacitance | $C_{rss}$ | | - | 390 | 580 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=-15 V, $V_{GS}$=-10 V, $I_D$=-1 A, $R_G$=6 Ω | - | 10 | 53 | ns |
| Rise time | $t_r$ | | - | 11 | 17 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 42 | 63 | |
| Fall time | $t_f$ | | - | 33 | 50 | |
| Gate Charge Characteristics[3] | | | | | | |
| Gate to source charge | $Q_{gs}$ | $V_{DD}$=-24 V, $I_D$=9.1 A, $V_{GS}$=0 to -10 V | - | -4.8 | -6.4 | nC |
| Gate charge at threshold | $Q_{g(th)}$ | | - | -2.6 | -3.5 | |
| Gate to drain charge | $Q_{gd}$ | | - | -14 | | |
| Switching charge | $Q_{sw}$ | | - | -16 | -24 | |
| Gate charge total | $Q_g$ | | - | -40 | -54 | |
| Gate plateau voltage | $V_{plateau}$ | | - | -2.7 | - | V |
| Output charge | $Q_{oss}$ | $V_{DD}$=-15 V, $V_{GS}$=0 V | - | -14 | -19 | |
| **Reverse Diode** | | | | | | |
| Diode continous forward current | $I_S$ | $T_A$=25 °C | - | - | -2.1 | A |
| Diode pulse current | $I_{S,pulse}$ | | - | - | -36.5 | |
| Diode forward voltage | $V_{SD}$ | $V_{GS}$=0 V, $I_F$=-9.1 A, $T_j$=25 °C | - | -0.88 | -1.2 | V |
| Reverse recovery time | $t_{rr}$ | $V_R$=15 V, $I_F$=-9.1 A, $di_F/dt$=100 A/µs | - | 19 | 24 | ns |
| Reverse recovery charge | $Q_{rr}$ | | - | 9 | 11 | nC |

[2] See figure 3

[3] See figure 16 for gate charge parameter definition

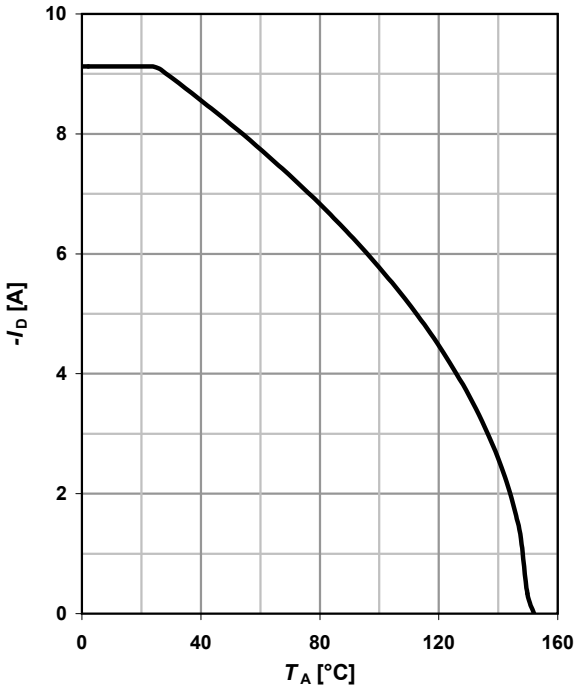
## 1 Power dissipation

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




## 2 Drain current

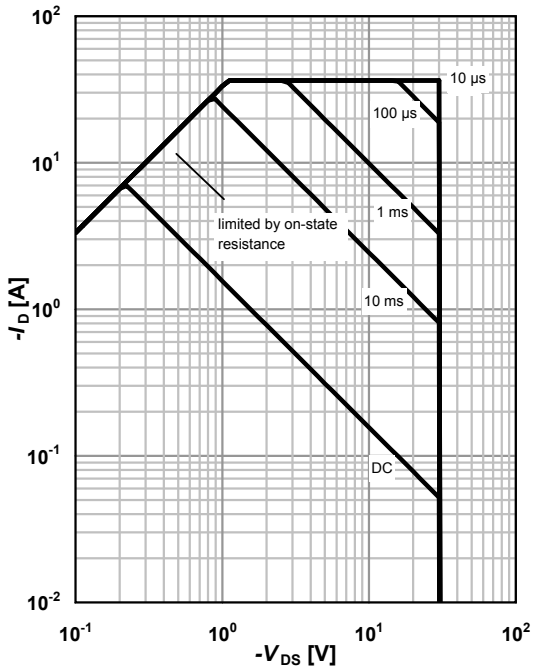
$I_D=f(T_A)$; $|V_{GS}| \geq 10$ V; $t_p \leq 10$ s




## 3 Safe operating area

$I_D=f(V_{DS})$; $T_A=25$ °C[1)]; $D=0$

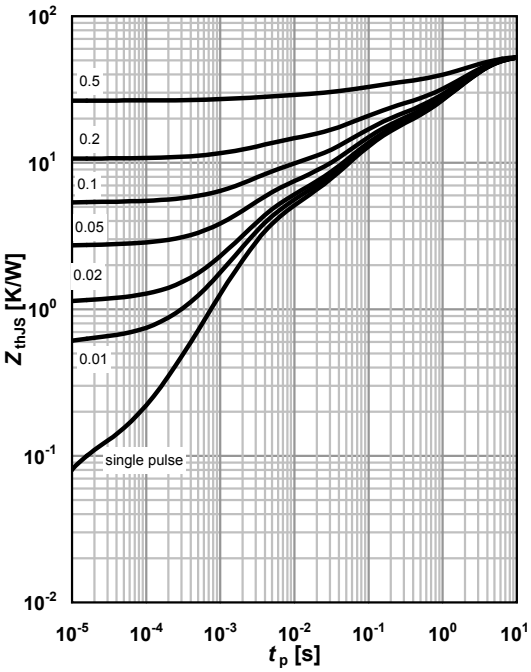
parameter: $t_p$




## 4 Max. transient thermal impedance

$Z_{thJS}=f(t_p)$

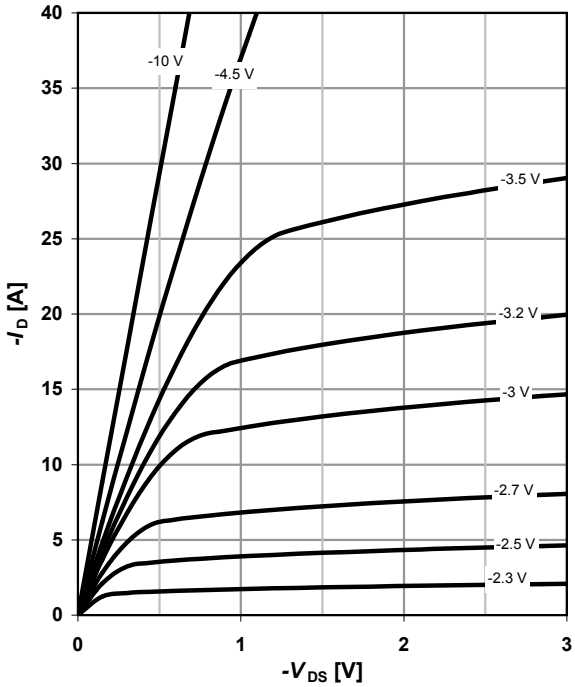
parameter: $D=t_p/T$



## 5 Typ. output characteristics

$I_D$=f($V_{DS}$); $T_j$=25 °C

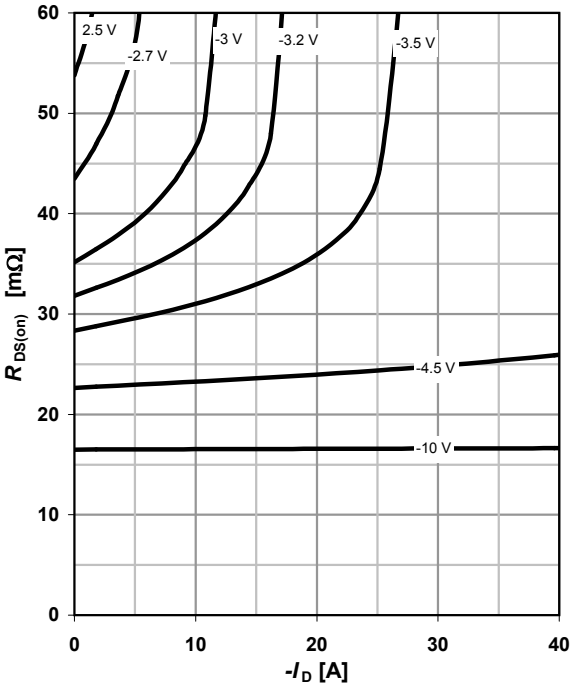
parameter: $V_{GS}$




## 6 Typ. drain-source on resistance

$R_{DS(on)}$=f($I_D$); $T_j$=25 °C

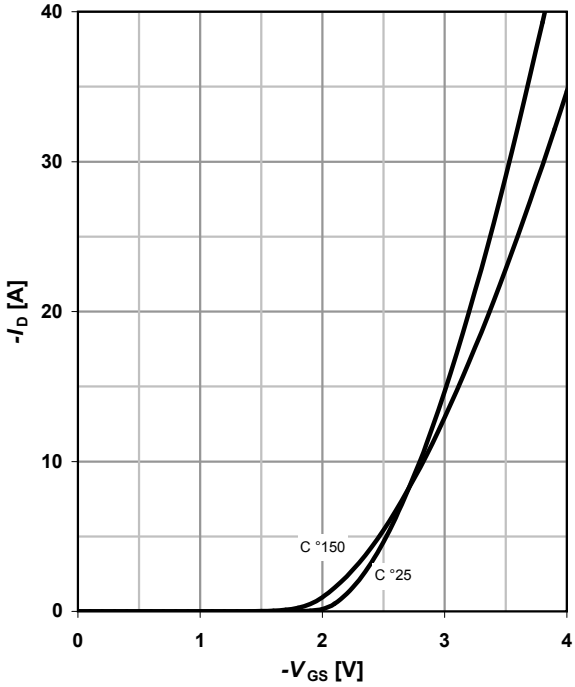
parameter: $V_{GS}$




## 7 Typ. transfer characteristics

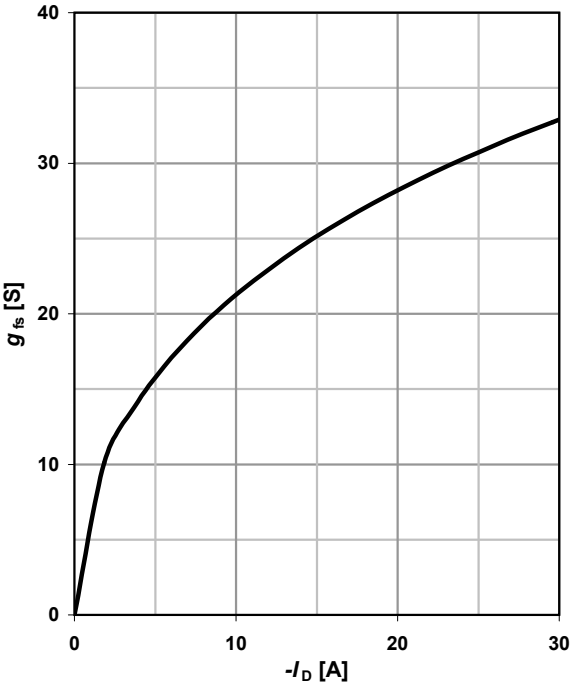
$I_D$=f($V_{GS}$); $|V_{DS}|>2|I_D|R_{DS(on)max}$

parameter: $T_j$



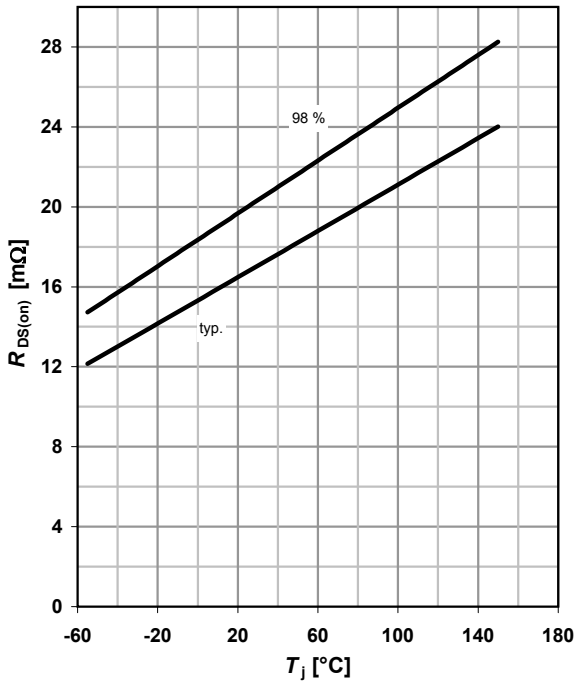

## 8 Typ. forward transconductance

$g_{fs}$=f($I_D$); $T_j$=25 °C



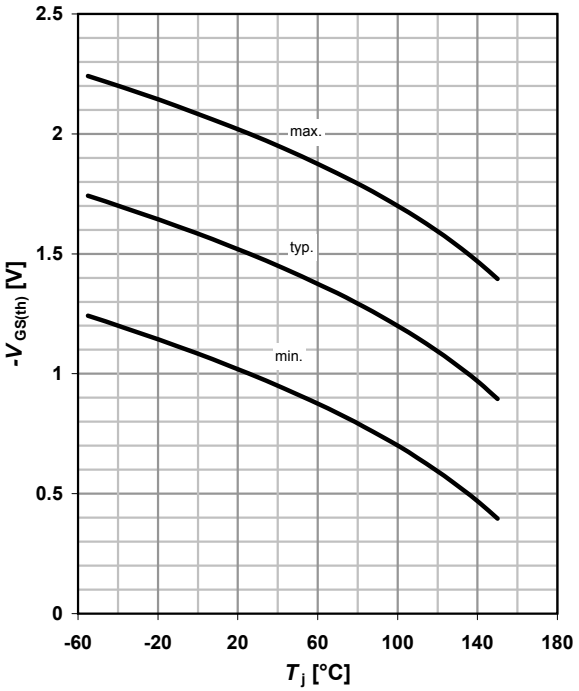
### 9 Drain-source on-state resistance

$R_{DS(on)}$=f($T_j$); $I_D$=-9.1 A; $V_{GS}$=-10 V



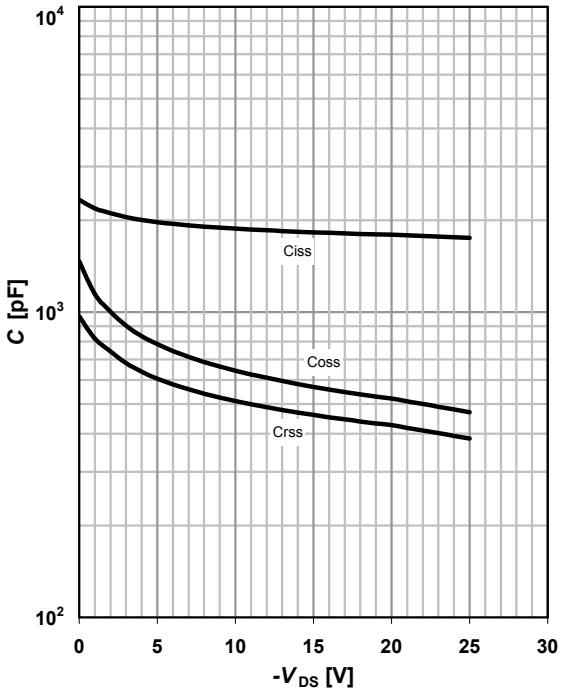

### 10 Typ. gate threshold voltage

$V_{GS(th)}$=f($T_j$); $V_{GS}$=$V_{DS}$; $I_D$=-100 µA




### 11 Typ. capacitances

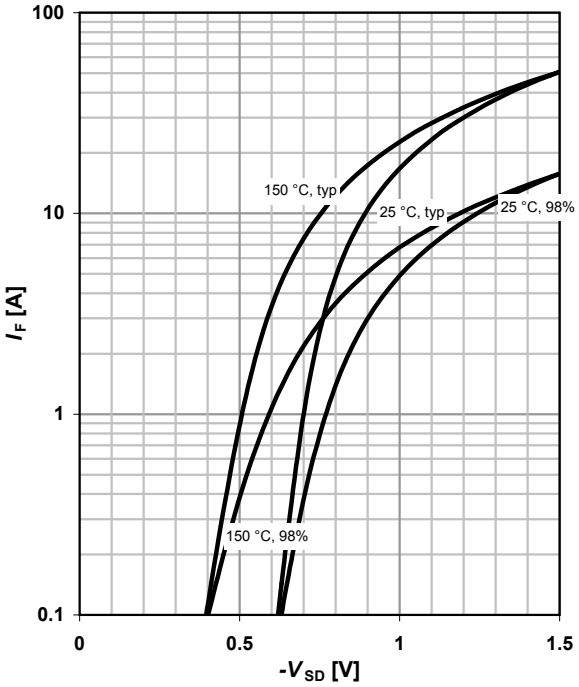
$C$=f($V_{DS}$); $V_{GS}$=0 V; $f$=1 MHz




### 12 Forward characteristics of reverse diode

$I_F$=f($V_{SD}$)

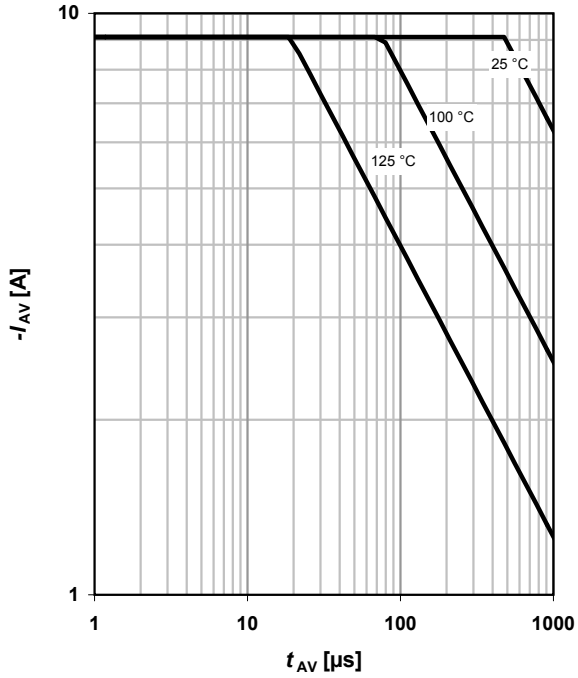
parameter: $T_j$



## 13 Avalanche characteristics

$I_{AS}$=f($t_{AV}$); $R_{GS}$=25 Ω

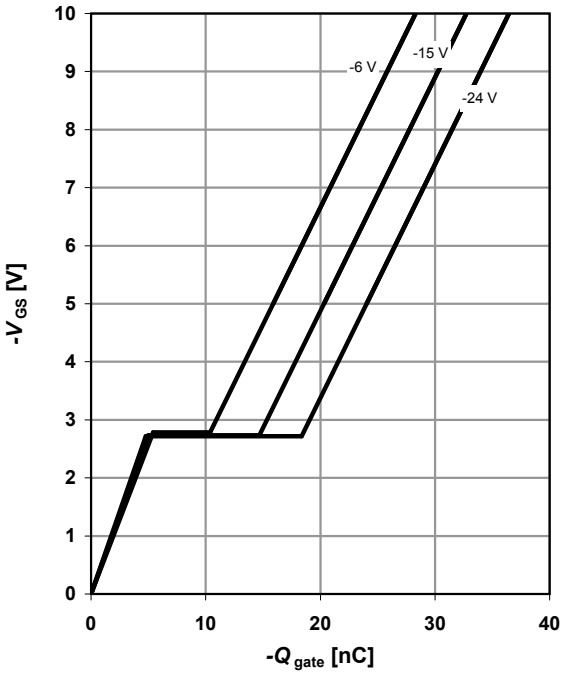
parameter: $T_{j(start)}$




## 14 Typ. gate charge

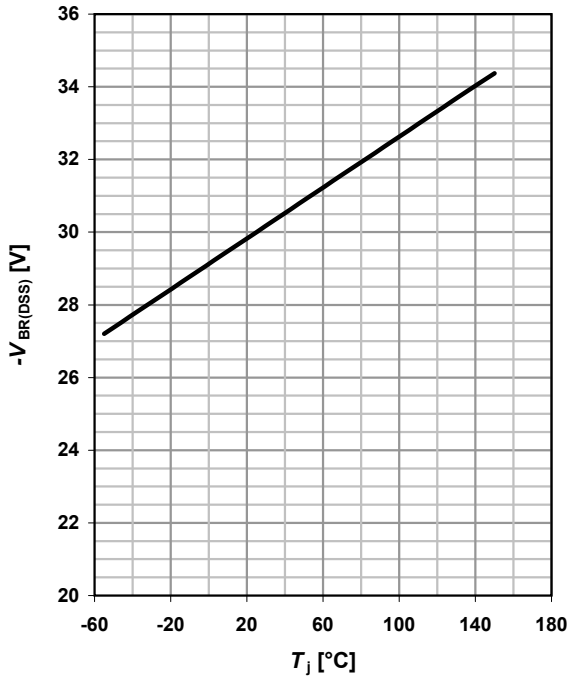
$V_{GS}$=f($Q_{gate}$); $I_D$=-9.1 A pulsed

parameter: $V_{DD}$

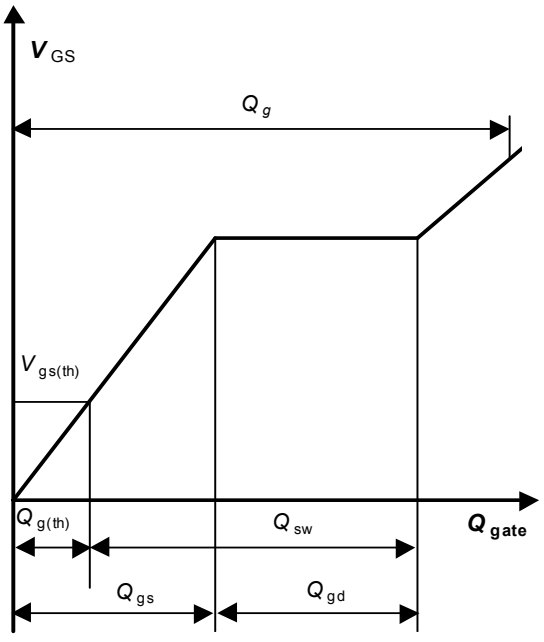



## 15 Drain-source breakdown voltage

$V_{BR(DSS)}$=f($T_j$); $I_D$=-250 µA

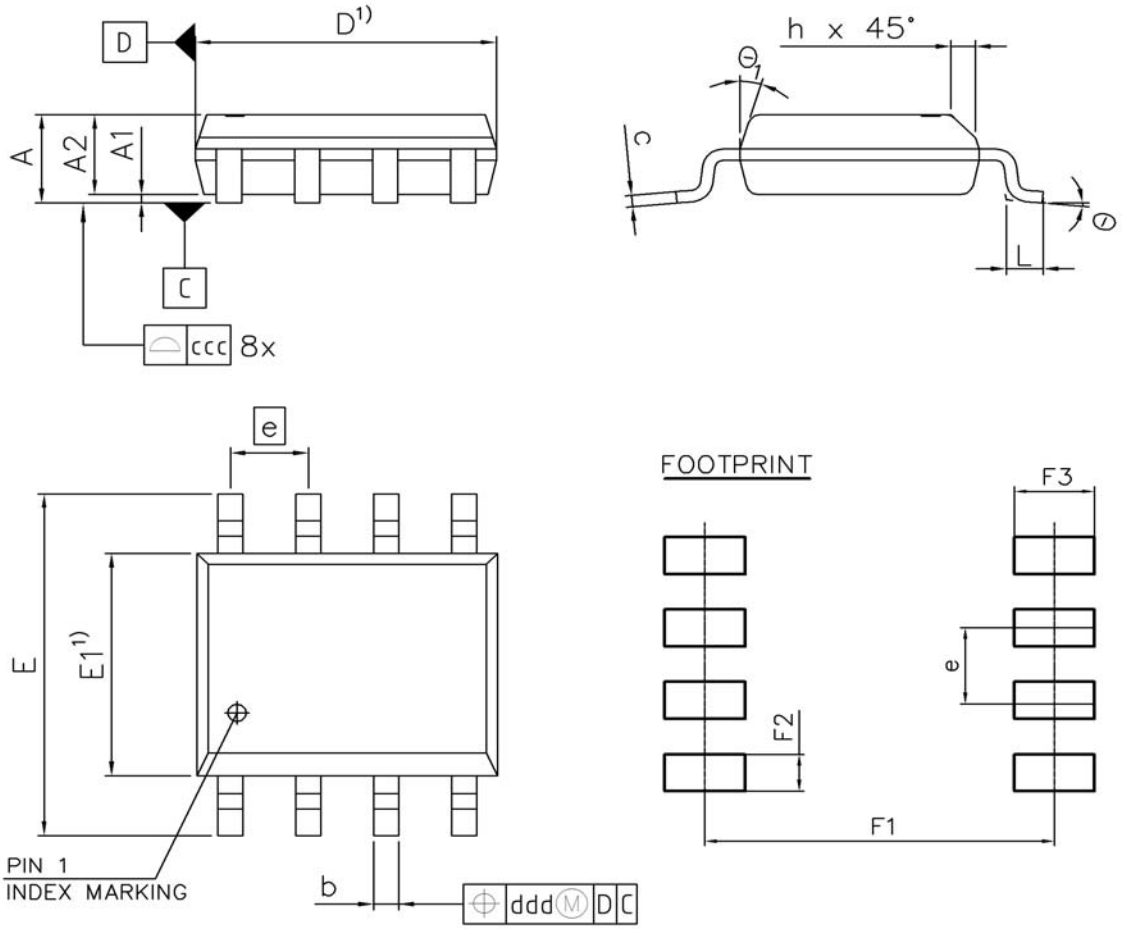



## 16 Gate charge waveforms



**Package Outline**

**P-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° |
| Θ1 | - | 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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