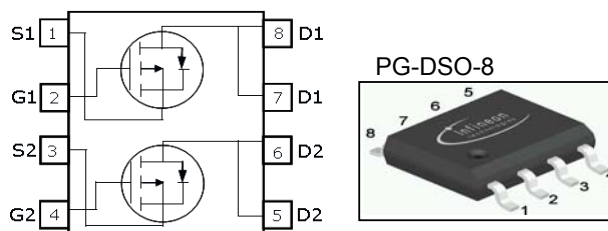


**OptiMOS® P-Power-Transistor**
**Features**

- dual 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  |
| $R_{DS(on),max}$ | $V_{GS}=4.5\text{ V}$ | 45.0 | mΩ |
|                  | $V_{GS}=2.5\text{ V}$ | 70.0 |    |
| $I_D$            |                       | -5.7 | A  |



| Type      | Package  | Marking | Lead free | Halogen free | Packing |
|-----------|----------|---------|-----------|--------------|---------|
| BSO207P H | PG-DSO-8 | 207P    | 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 <sup>1)</sup> | $I_D$          | $V_{GS}=4.5\text{ V}, T_A=25\text{ °C}$ | -5.7        | -5.0         | A    |
|                                        |                | $V_{GS}=4.5\text{ V}, T_A=70\text{ °C}$ | -4.6        | -4.0         |      |
|                                        |                | $V_{GS}=2.5\text{ V}, T_A=25\text{ °C}$ | -4.5        | -4.0         |      |
|                                        |                | $V_{GS}=2.5\text{ V}, T_A=70\text{ °C}$ | -3.6        | -3.2         |      |
| Pulsed drain current <sup>2)</sup>     | $I_{D,pulse}$  | $T_A=25\text{ °C}$                      | -22.8       |              |      |
| Avalanche energy, single pulse         | $E_{AS}$       | $I_D=-5.7\text{ A}, R_{GS}=25\text{ Ω}$ | 44          |              | mJ   |
| Gate source voltage                    | $V_{GS}$       |                                         | ±12         |              | V    |
| Power dissipation <sup>1)</sup>        | $P_{tot}$      | $T_A=25\text{ °C}$                      | 2           | 1.6          | W    |
| Operating and storage temperature      | $T_j, T_{stg}$ |                                         | -55 ... 150 |              | °C   |
| ESD class                              |                | JESD22-A114 HBM                         | 1A < 500V   |              |      |
| 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,<br>junction - soldering point | $R_{thJS}$ |                                                                   | -      | -    | 35   | K/W  |
| Thermal resistance,<br>junction - ambient         | $R_{thJA}$ | minimal footprint,<br>$t_p \leq 10$ s                             | -      | -    | 110  |      |
|                                                   |            | minimal footprint,<br>steady state                                | -      | -    | 150  |      |
|                                                   |            | 6 cm <sup>2</sup> cooling area <sup>1)</sup> ,<br>$t_p \leq 10$ s | -      | -    | 62.5 |      |
|                                                   |            | 6 cm <sup>2</sup> cooling area <sup>1)</sup> ,<br>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           | $V_{GS(th)}$  | $V_{DS}=V_{GS}$ , $I_D=44$ $\mu$ 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          | -    | 0.1  | 1    | $\mu$ A    |
|                                  |               | $V_{DS}=-20$ V, $V_{GS}=0$ V, $T_j=150$ °C         | -    | 10   | 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, $I_D=-4.5$ A                       | -    | 44   | 70   | m $\Omega$ |
|                                  |               | $V_{GS}=4.5$ V, $I_D=-5.7$ A                       | -    | 32   | 45   |            |
| Gate resistance                  | $R_G$         |                                                    | -    | 7.7  | -    | $\Omega$   |
| Transconductance                 | $g_{fs}$      | $ V_{DS}  > 2 I_D  R_{DS(on)max}$ , $I_D = -4.6$ A | 10   | 18   | -    | S          |

<sup>1)</sup> Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm<sup>2</sup> (one layer, 70  $\mu$ m thick) copper area for drain connection. PCB is vertical in still air.

<sup>2)</sup> See figure 3 for more detailed information

<sup>3)</sup> See figure 13 for more detailed information

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

#### Dynamic characteristics

|                              |              |                                                                                          |   |      |      |    |
|------------------------------|--------------|------------------------------------------------------------------------------------------|---|------|------|----|
| Input capacitance            | $C_{iss}$    | $V_{GS}=0\text{ V}, V_{DS}=15\text{ V},$<br>$f=1\text{ MHz}$                             | - | 1100 | 1650 | pF |
| Output capacitance           | $C_{oss}$    |                                                                                          | - | 380  | 570  |    |
| Reverse transfer capacitance | $C_{rss}$    |                                                                                          | - | 310  | 465  |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=-10\text{ V},$<br>$V_{GS}=4.5\text{ V}, I_D=-5.7\text{ A},$<br>$R_G=1.6\ \Omega$ | - | 9    | 14   | ns |
| Rise time                    | $t_r$        |                                                                                          | - | 22   | 33   |    |
| Turn-off delay time          | $t_{d(off)}$ |                                                                                          | - | 33   | 50   |    |
| Fall time                    | $t_f$        |                                                                                          | - | 35   | 53   |    |

#### Gate Charge Characteristics<sup>4)</sup>

|                          |               |                                                                                |   |      |      |    |
|--------------------------|---------------|--------------------------------------------------------------------------------|---|------|------|----|
| Gate to source charge    | $Q_{gs}$      | $V_{DD}=-10\text{ V}, I_D=-5.7\text{ A},$<br>$V_{GS}=0\text{ to }4.5\text{ V}$ | - | -2   | -3   | nC |
| Gate charge at threshold | $Q_{g(th)}$   |                                                                                | - | -2   | -3   |    |
| Gate to drain charge     | $Q_{gd}$      |                                                                                | - | -5   | -7   |    |
| Switching charge         | $Q_{sw}$      |                                                                                | - | -5   | -7   |    |
| Gate charge total        | $Q_g$         |                                                                                | - | -12  | -16  |    |
| Gate plateau voltage     | $V_{plateau}$ |                                                                                | - | -1.7 | -2.5 | V  |
| Output charge            | $Q_{oss}$     | $V_{DD}=-10\text{ V}, V_{GS}=0\text{ V}$                                       | - | 7    | 9    | nC |

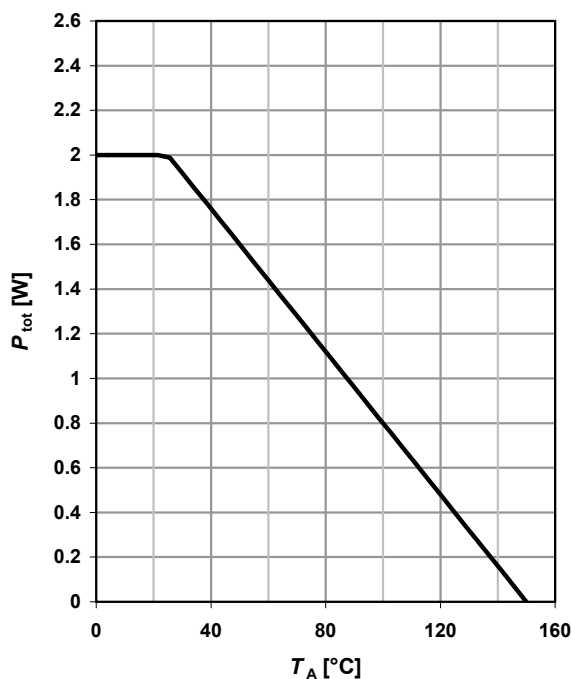
#### Reverse Diode

|                                  |               |                                                                   |   |     |      |    |
|----------------------------------|---------------|-------------------------------------------------------------------|---|-----|------|----|
| Diode continuous forward current | $I_S$         | $T_A=25\text{ °C}$                                                | - | -   | -2.2 | A  |
| Diode pulse current              | $I_{S,pulse}$ |                                                                   | - | -   | -23  |    |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=-5.7\text{ A},$<br>$T_j=25\text{ °C}$     | - | -   | -1.1 | V  |
| Reverse recovery charge          | $Q_{rr}$      | $V_R=10\text{ V}, I_F=I_S,$<br>$di_F/dt=100\text{ A}/\mu\text{s}$ | - | 6.2 | -    | nC |

<sup>4)</sup> See figure 16 for gate charge parameter definition

### 1 Power dissipation

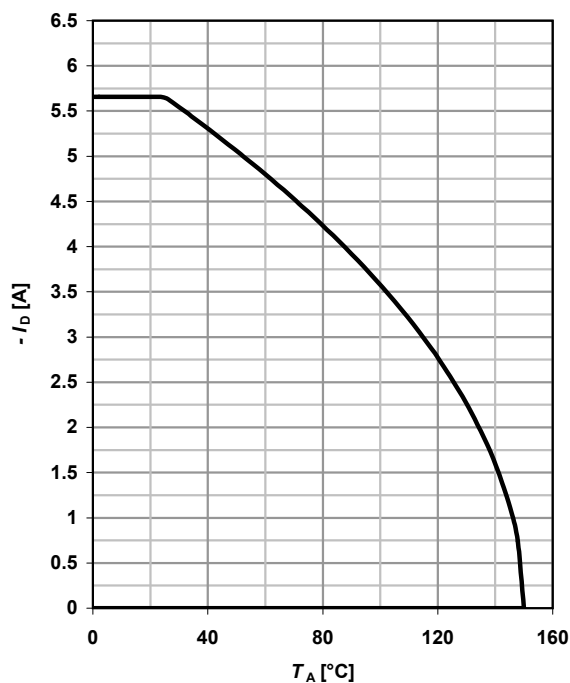
$$P_{\text{tot}} = f(T_A); t_p \leq 10 \text{ s}$$



### 2 Drain current

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

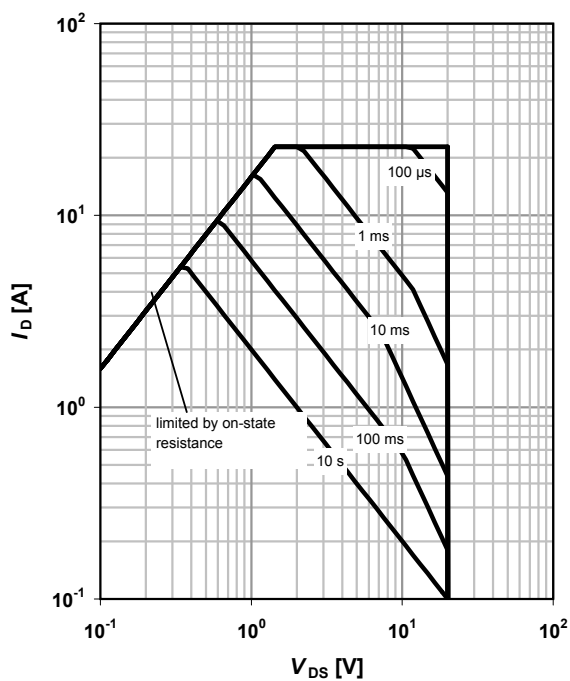
parameter:  $V_{GS} = 4.5 \text{ V}$



### 3 Safe operating area

$$I_D = f(V_{DS}); T_A = 25^\circ\text{C}^2; D = 0$$

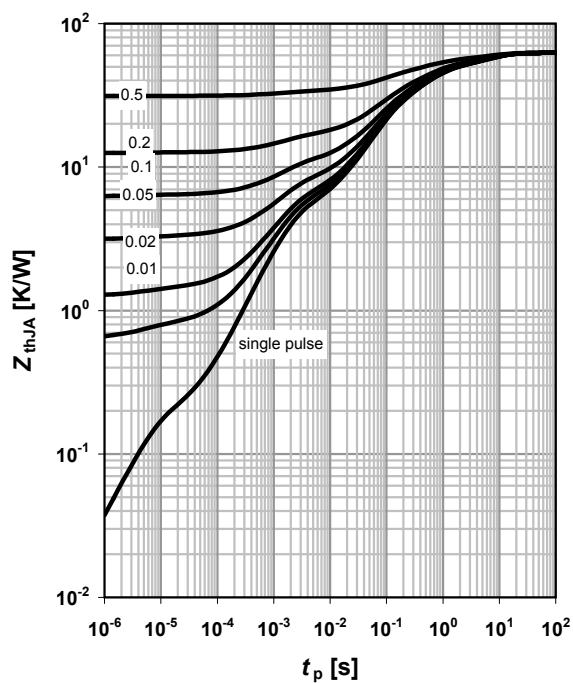
parameter:  $t_p$



### 4 Max. transient thermal impedance

$$Z_{\text{thJA}} = f(t_p^2)$$

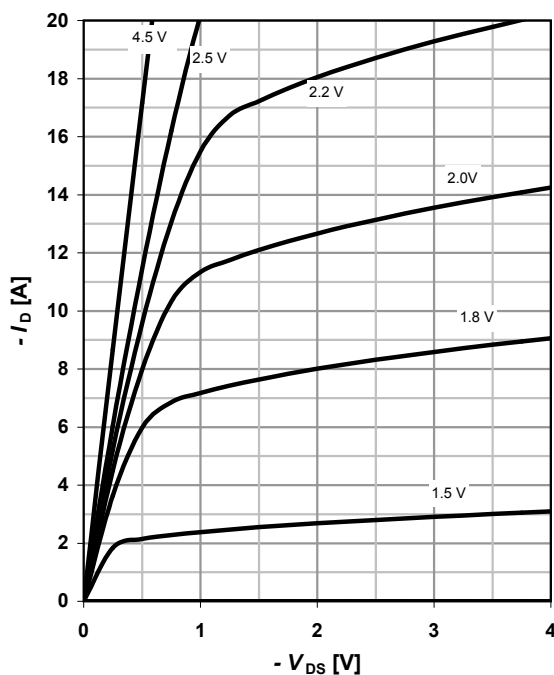
parameter:  $D = t_p / T$



### 5 Typ. output characteristics

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

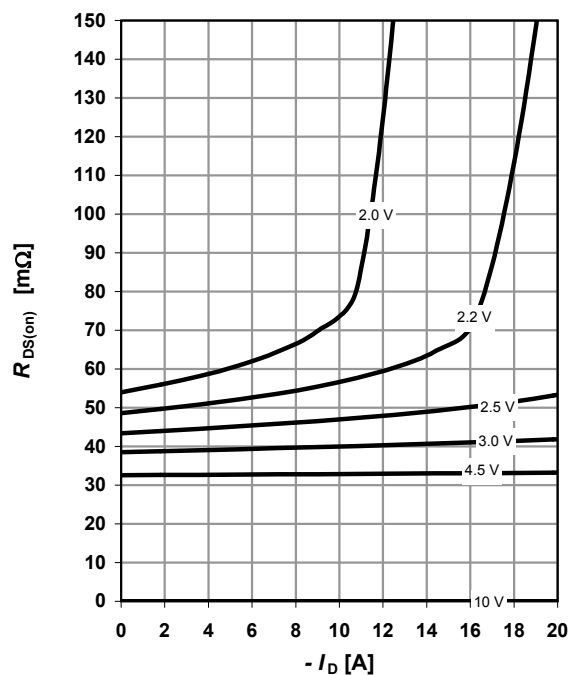
parameter:  $V_{GS}$



### 6 Typ. drain-source on resistance

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

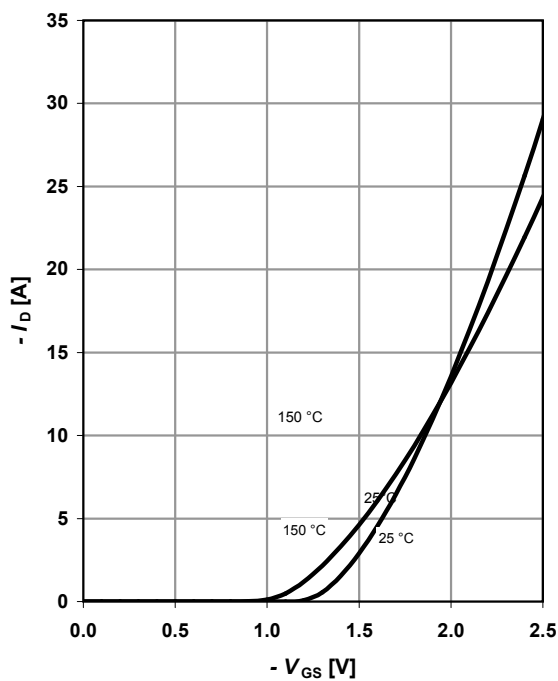
parameter:  $V_{GS}$



### 7 Typ. transfer characteristics

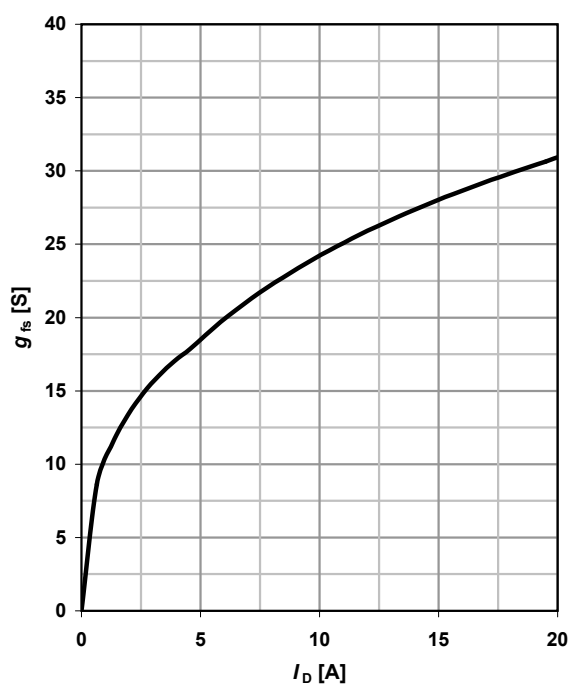
$$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$$

parameter:  $T_j$



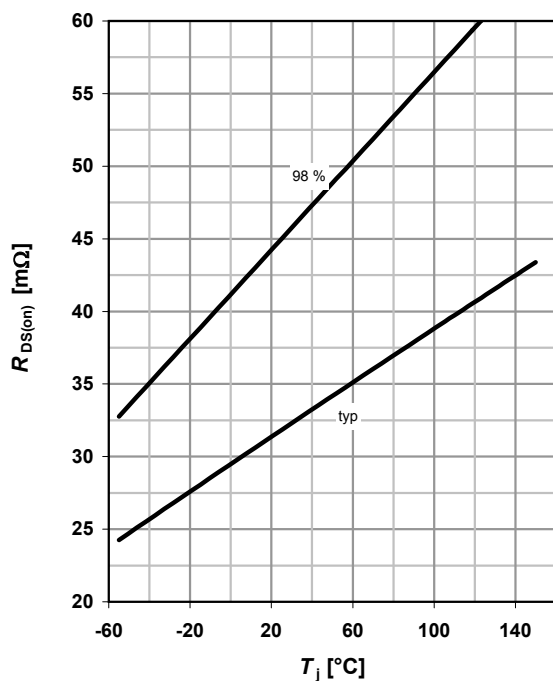
### 8 Typ. forward transconductance

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



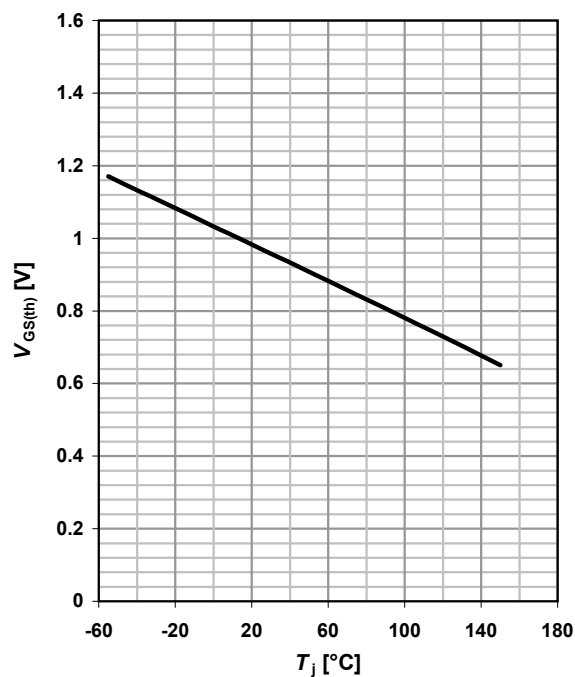
## 9 Drain-source on-state resistance

$$R_{DS(on)} = f(T_j); I_D = -5.7 \text{ A}; V_{GS} = -4.5 \text{ V}$$



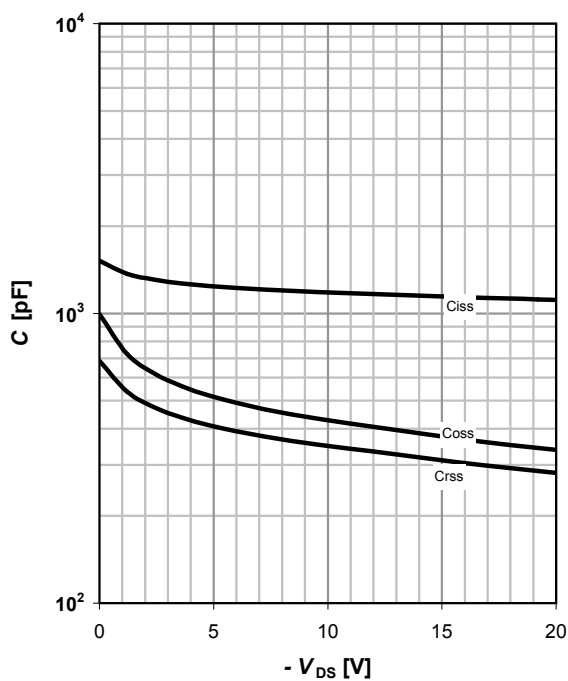
## 10 Typ. gate threshold voltage

$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = -44 \mu\text{A}$$



## 11 Typ. capacitances

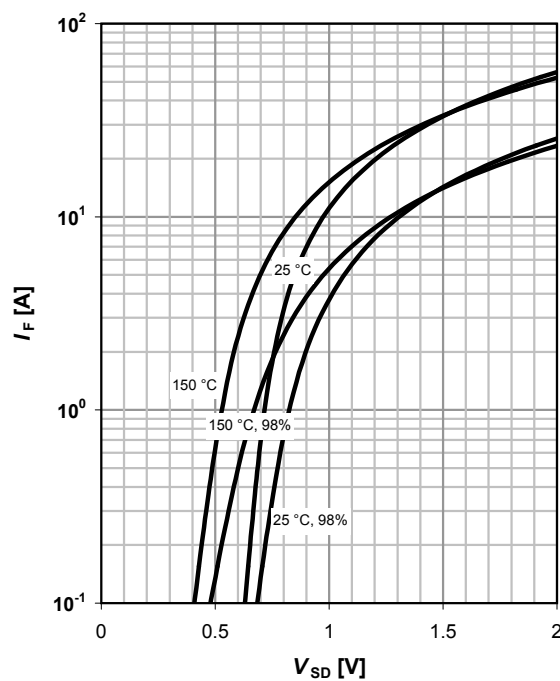
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



## 12 Forward characteristics of reverse diode

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

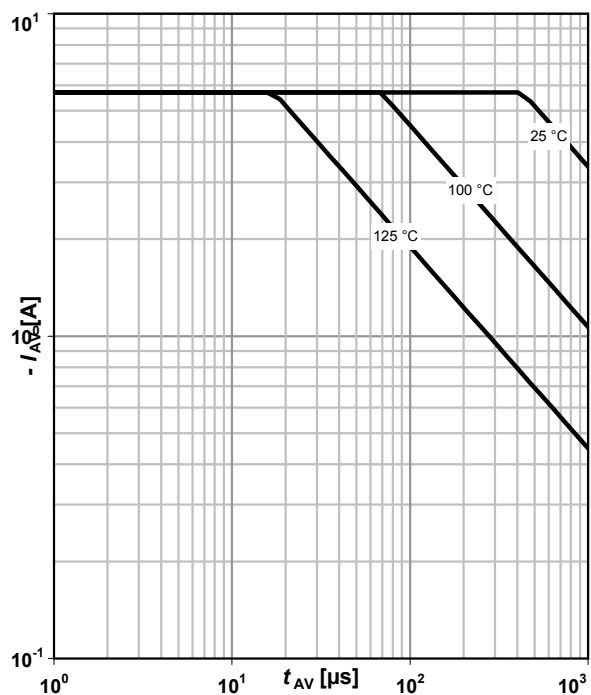
parameter:  $T_j$



### 13 Avalanche characteristics

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

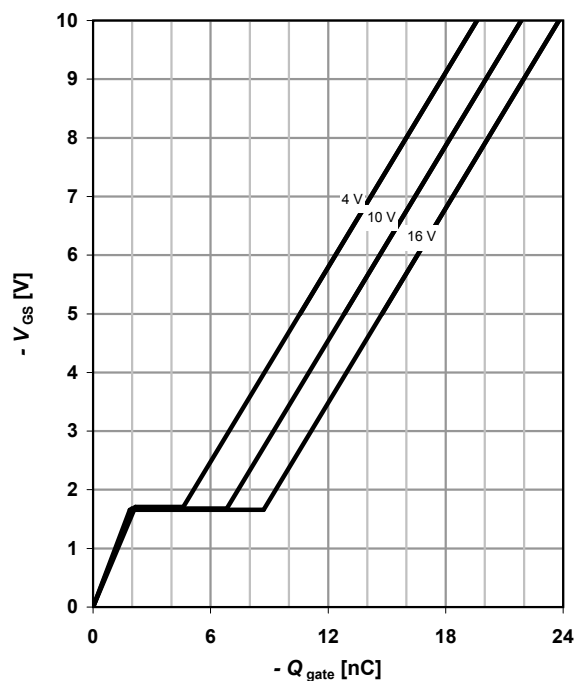
parameter:  $T_{j(\text{start})}$



### 14 Typ. gate charge

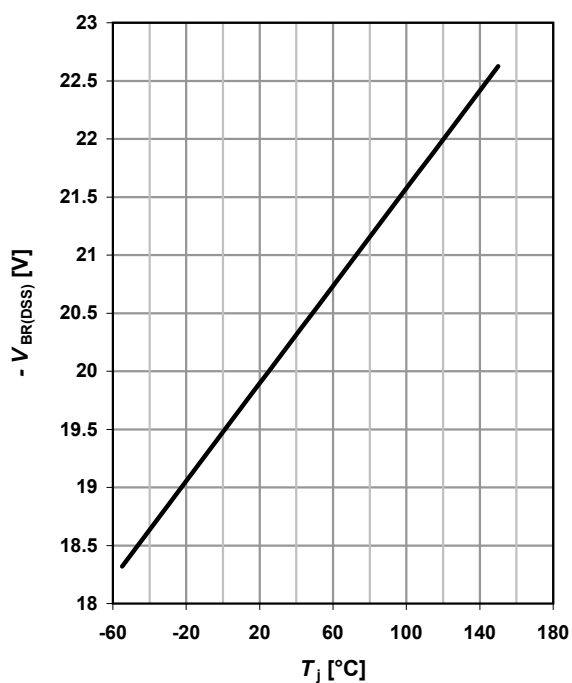
$$V_{GS}=f(Q_{\text{gate}}); I_D=-5.7\ \text{A pulsed}$$

parameter:  $V_{DD}$

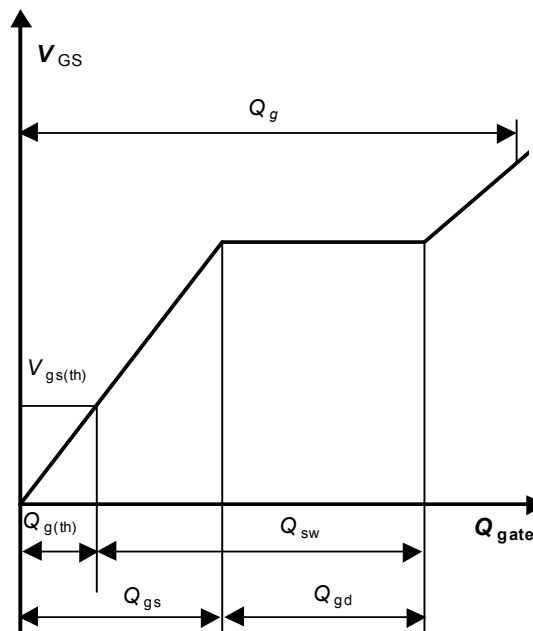


### 15 Drain-source breakdown voltage

$$V_{BR(DSS)}=f(T_j); I_D=0.25\ \text{mA}$$

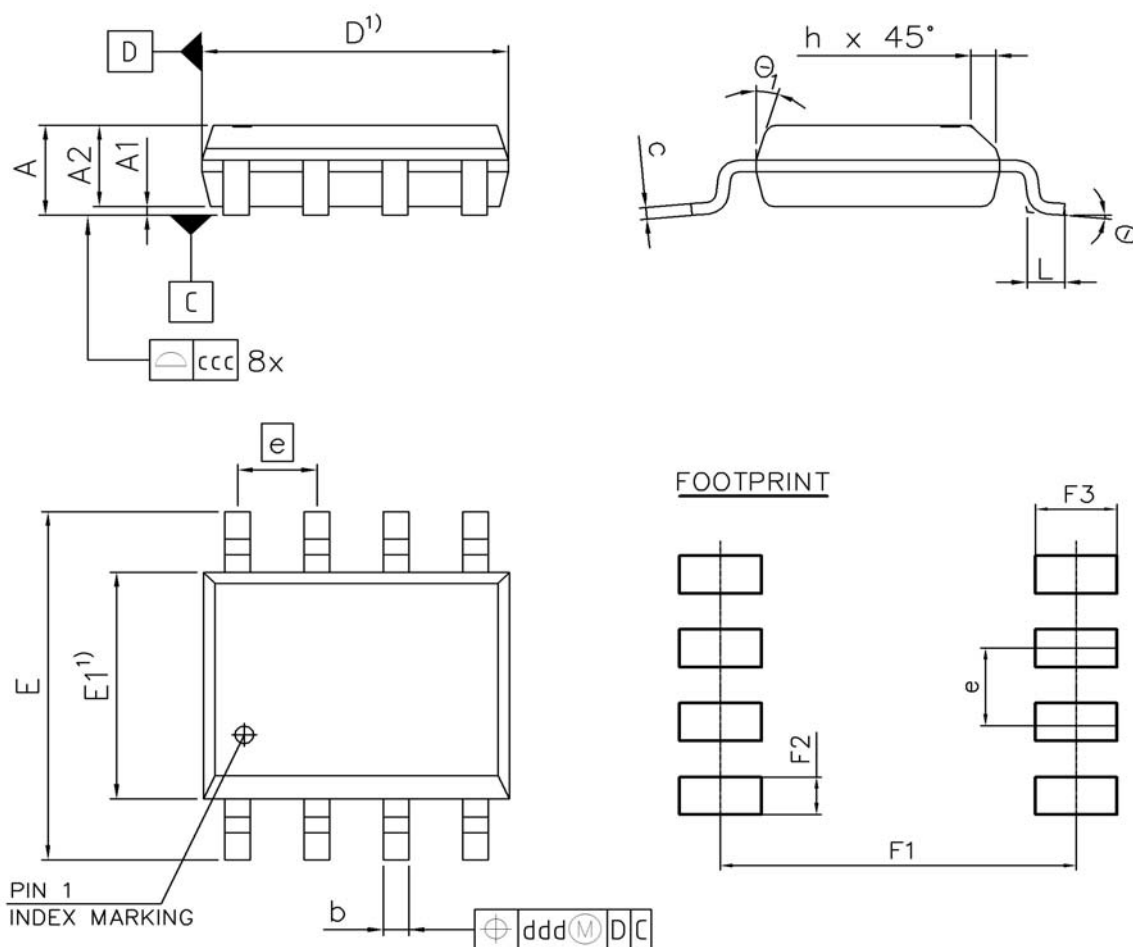


### 16 Gate charge waveforms



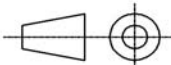
# Package Outline

## 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°    |
| 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 |

|                                                                                                              |
|--------------------------------------------------------------------------------------------------------------|
| DOCUMENT NO.<br>Z8B00003333                                                                                  |
| SCALE<br>0 1.0 2mm                                                                                           |
| EUROPEAN PROJECTION<br> |
| ISSUE DATE<br>09.01.2008                                                                                     |
| REVISION<br>02                                                                                               |



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