

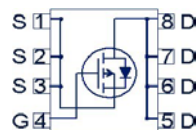
## OptiMOS™-P Power-Transistor

### Features

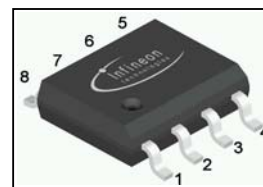
- P-Channel
- Enhancement mode
- Logic level
- 150°C operating temperature
- Qualified according JEDEC for target applications
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21

### 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  $T_j=25\text{ °C}$ , unless otherwise specified

| Parameter                           | Symbol            | Conditions                                 | Value       |              | Unit |
|-------------------------------------|-------------------|--------------------------------------------|-------------|--------------|------|
|                                     |                   |                                            | ≤10 secs    | steady state |      |
| Continuous drain current            | $I_D$             | $T_A=25\text{ °C}^{(1)}$                   | -9.1        | -7.4         | A    |
|                                     |                   | $T_A=70\text{ °C}^{(1)}$                   | -7.3        | -5.9         |      |
| Pulsed drain current                | $I_{D,pulse}$     | $T_A=25\text{ °C}^{(2)}$                   | -36.4       |              |      |
| Avalanche energy, single pulse      | $E_{AS}$          | $I_D=-9.1\text{ A}$ , $R_{GS}=25\text{ Ω}$ | 98          |              | mJ   |
| Gate source voltage                 | $V_{GS}$          |                                            | ±25         |              | V    |
| Power dissipation                   | $P_{tot}$         | $T_A=25\text{ °C}^{(1)}$                   | 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,<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 | - | - | 53  |     |
|                                                   |            | 6 cm <sup>2</sup> cooling area <sup>1)</sup> ,<br>steady state    | - | - | 80  |     |

**Electrical characteristics, at  $T_j = 25^\circ\text{C}$ , unless otherwise specified**
**Static characteristics**

|                                  |               |                                                                |     |      |      |               |
|----------------------------------|---------------|----------------------------------------------------------------|-----|------|------|---------------|
| Drain-source breakdown voltage   | $V_{(BR)DSS}$ | $V_{GS} = 0$ V, $I_D = -250$ $\mu\text{A}$                     | -30 | -    | -    | V             |
| Gate threshold voltage           | $V_{GS(th)}$  | $V_{DS} = V_{GS}$ ,<br>$I_D = -100$ $\mu\text{A}$              | -1  | -1.5 |      |               |
| Zero gate voltage drain current  | $I_{DSS}$     | $V_{DS} = -30$ V, $V_{GS} = 0$ V,<br>$T_j = 25^\circ\text{C}$  | -   | -0.1 | -1   | $\mu\text{A}$ |
|                                  |               | $V_{DS} = -30$ V, $V_{GS} = 0$ V,<br>$T_j = 125^\circ\text{C}$ | -   | -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}$ ,<br>$I_D = -7.3$ A           | 11  | 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  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical in still air.

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

**Dynamic characteristics**

|                              |              |                                                                                      |   |      |      |    |
|------------------------------|--------------|--------------------------------------------------------------------------------------|---|------|------|----|
| Input capacitance            | $C_{iss}$    | $V_{GS}=0\text{ V},$<br>$V_{DS}=-25\text{ V}, f=1\text{ MHz}$                        | - | 1750 | 2330 | pF |
| Output capacitance           | $C_{oss}$    |                                                                                      | - | 470  | 625  |    |
| Reverse transfer capacitance | $C_{rss}$    |                                                                                      | - | 390  | 580  |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=-15\text{ V},$<br>$V_{GS}=-10\text{ V},$<br>$I_D=-1\text{ A}, R_G=6\ \Omega$ | - | 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<sup>3)</sup>**

|                          |               |                                                                               |   |      |      |    |
|--------------------------|---------------|-------------------------------------------------------------------------------|---|------|------|----|
| Gate to source charge    | $Q_{gs}$      | $V_{DD}=-24\text{ V}, I_D=9.1\text{ A},$<br>$V_{GS}=0\text{ to }-10\text{ V}$ | - | -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            | $Q_{oss}$     | $V_{DD}=-15\text{ V}, V_{GS}=0\text{ V}$                                      | - | -14  | -19  |    |

**Reverse Diode**

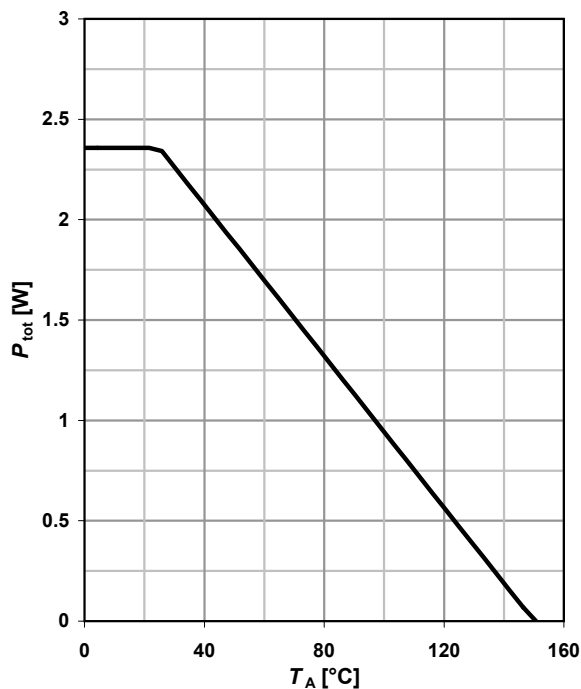
|                                  |               |                                                                             |   |       |       |    |
|----------------------------------|---------------|-----------------------------------------------------------------------------|---|-------|-------|----|
| Diode continuous forward current | $I_S$         | $T_A=25\text{ }^\circ\text{C}$                                              | - | -     | -2.1  | A  |
| Diode pulse current              | $I_{S,pulse}$ |                                                                             | - | -     | -36.5 |    |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=-9.1\text{ A},$<br>$T_j=25\text{ }^\circ\text{C}$   | - | -0.88 | -1.2  | V  |
| Reverse recovery time            | $t_{rr}$      | $V_R=15\text{ V}, I_F=-9.1\text{ A},$<br>$di_F/dt=100\text{ A}/\mu\text{s}$ | - | 19    | 24    | ns |
| Reverse recovery charge          | $Q_{rr}$      |                                                                             | - | 9     | 11    | nC |

<sup>2)</sup> See figure 3

<sup>3)</sup> See figure 16 for gate charge parameter definition

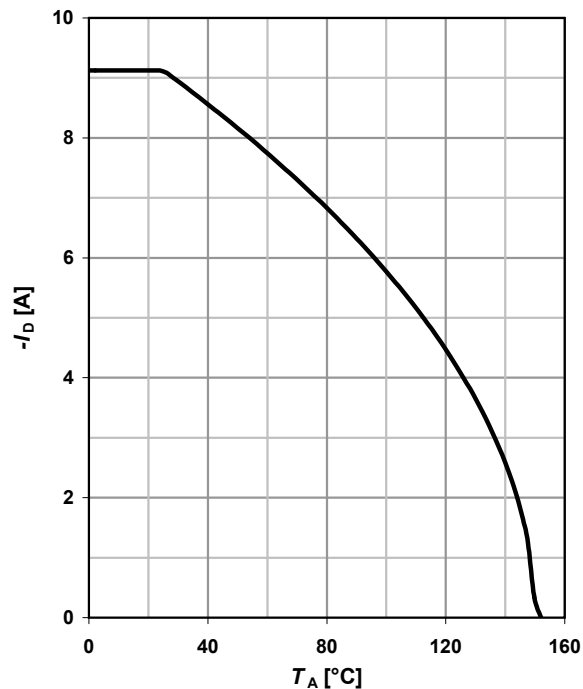
### 1 Power dissipation

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



### 2 Drain current

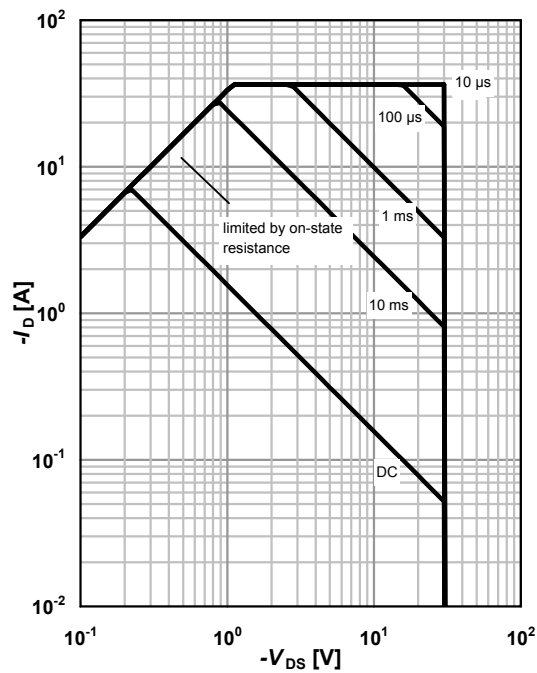
$$I_D = f(T_A); |V_{GS}| \geq 10 \text{ V}; t_p \leq 10 \text{ s}$$



### 3 Safe operating area

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

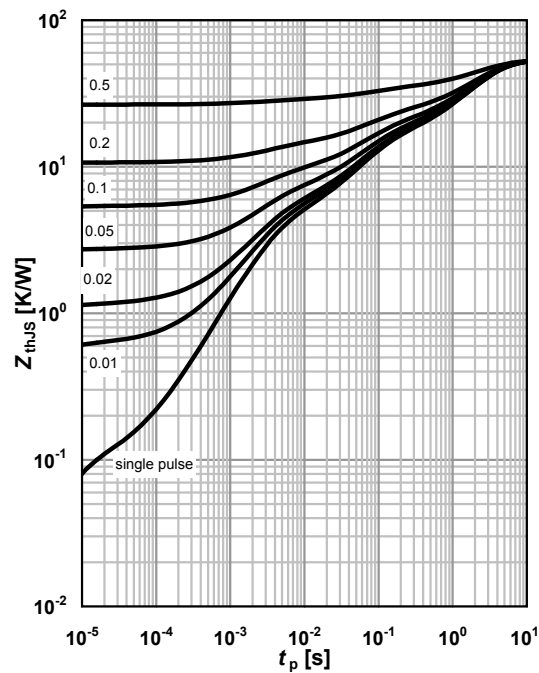
parameter:  $t_p$



### 4 Max. transient thermal impedance

$$Z_{\text{thJS}} = f(t_p)$$

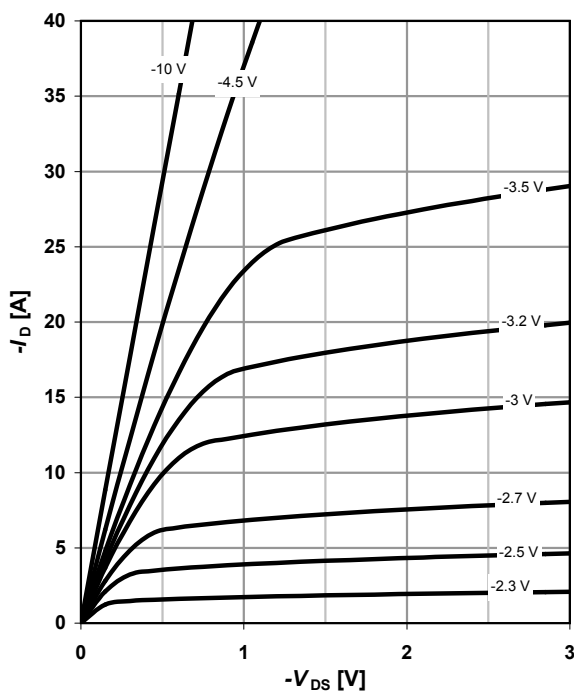
parameter:  $D = t_p / T$



### 5 Typ. output characteristics

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

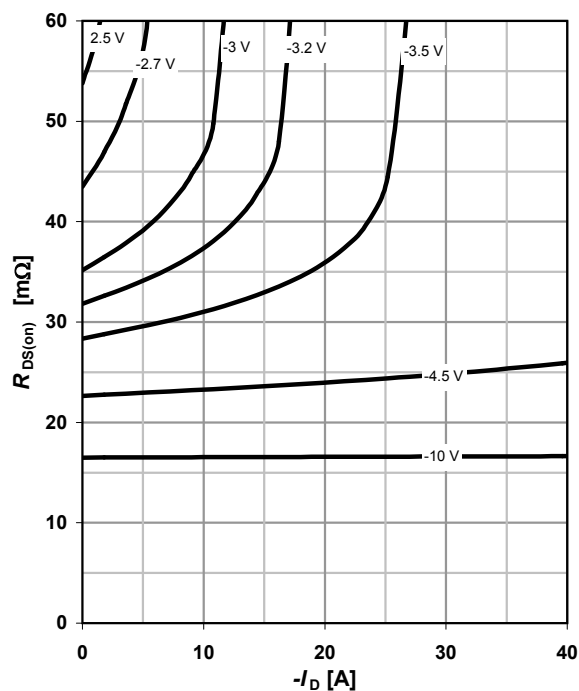
parameter:  $V_{GS}$



### 6 Typ. drain-source on resistance

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

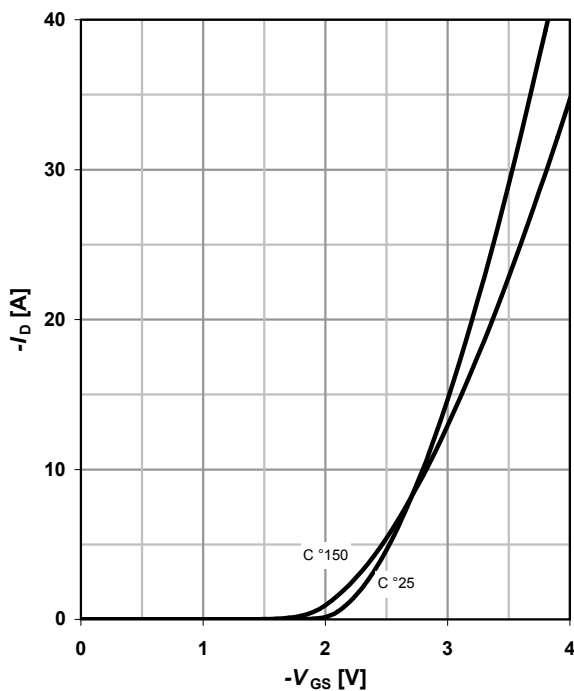
parameter:  $V_{GS}$



### 7 Typ. transfer characteristics

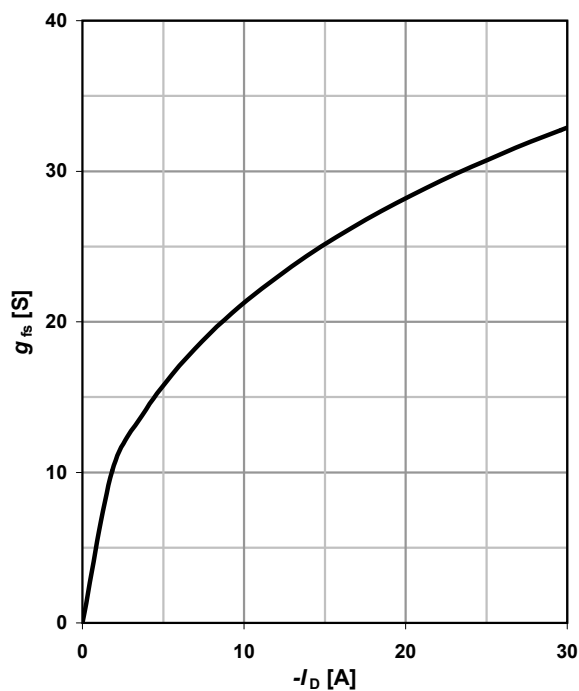
$$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$$

parameter:  $T_j$



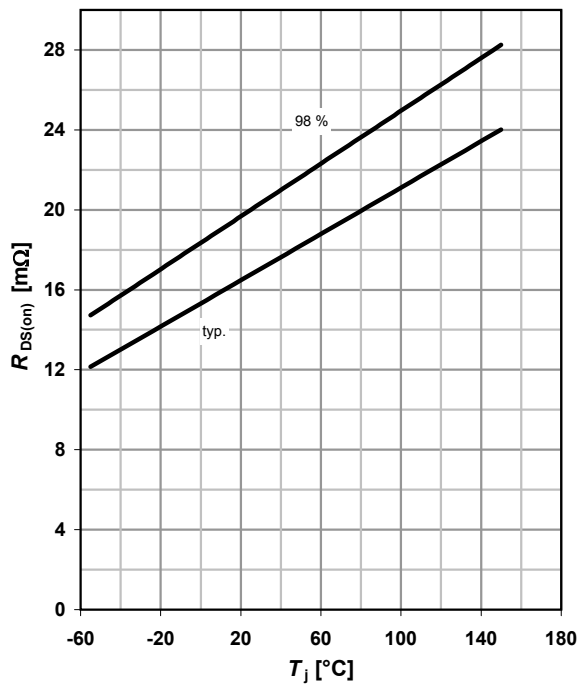
### 8 Typ. forward transconductance

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



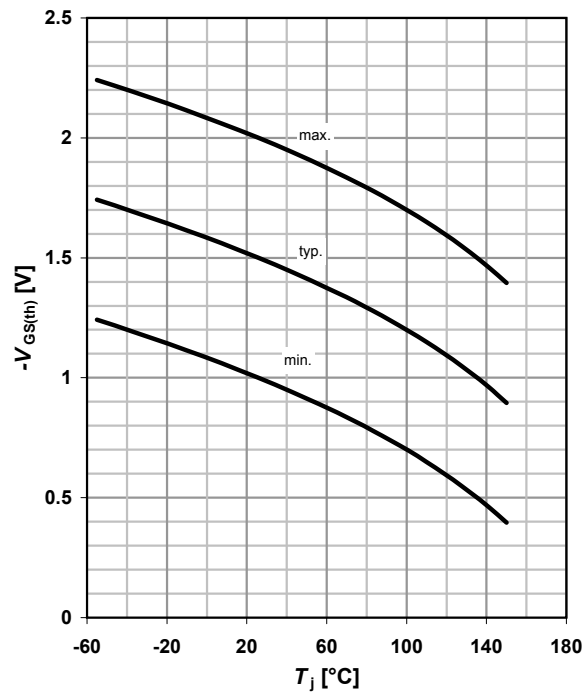
### 9 Drain-source on-state resistance

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



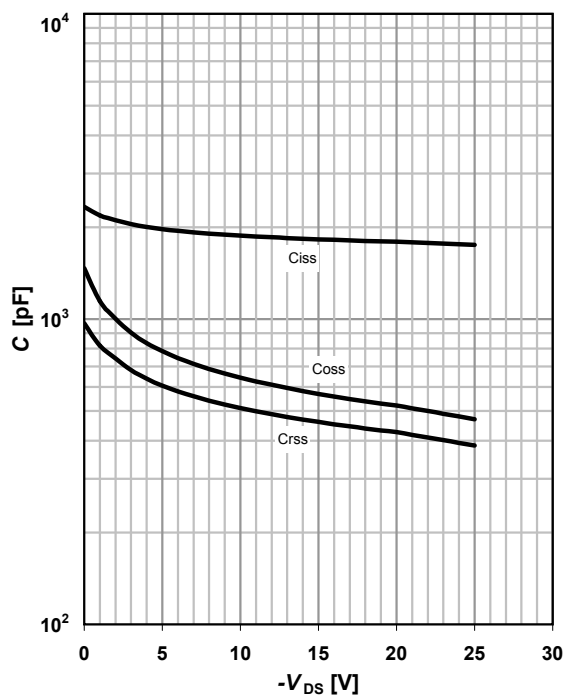
### 10 Typ. gate threshold voltage

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



### 11 Typ. capacitances

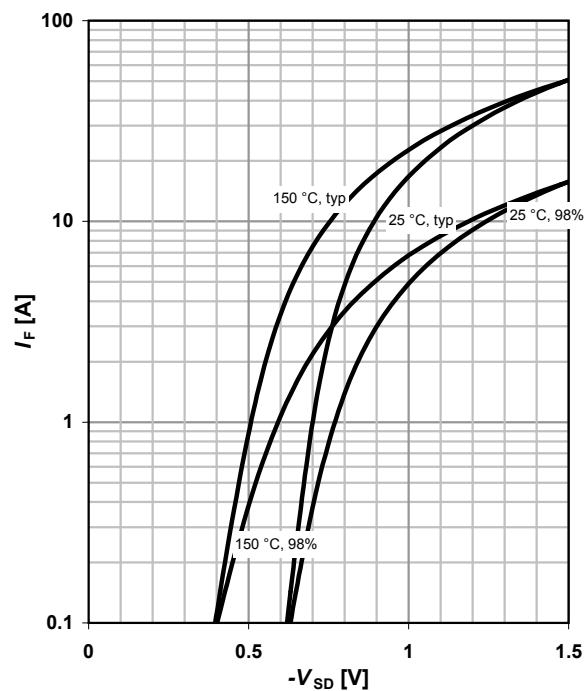
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



### 12 Forward characteristics of reverse diode

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

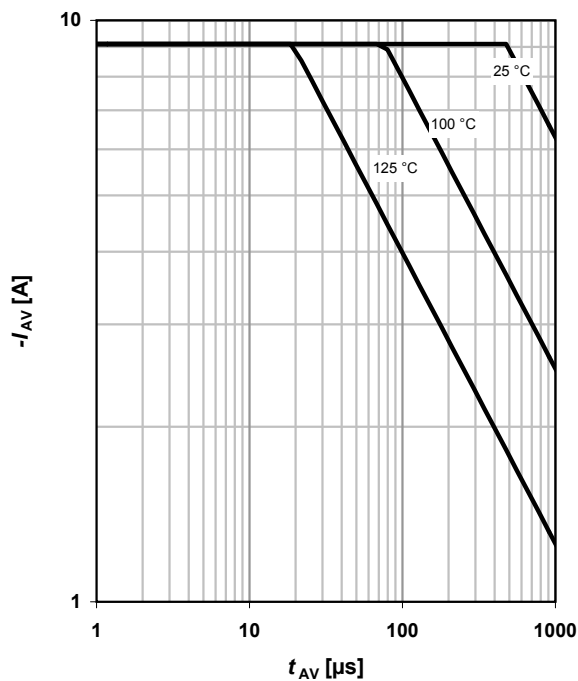
parameter:  $T_j$



### 13 Avalanche characteristics

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

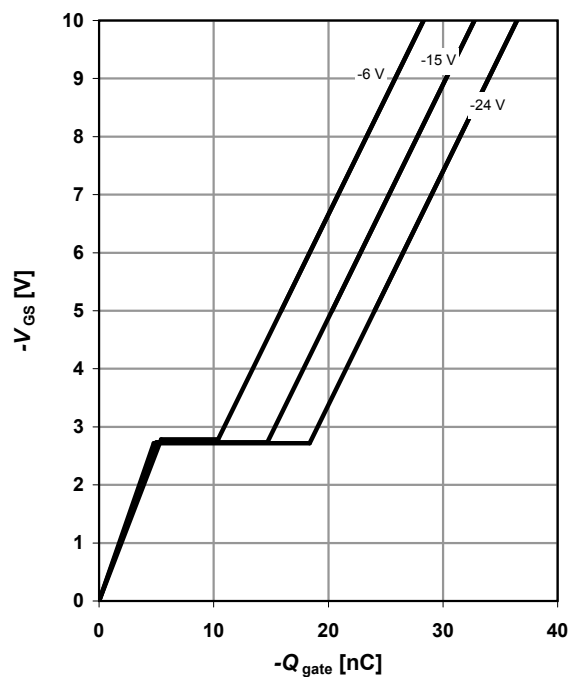
parameter:  $T_{j(\text{start})}$



### 14 Typ. gate charge

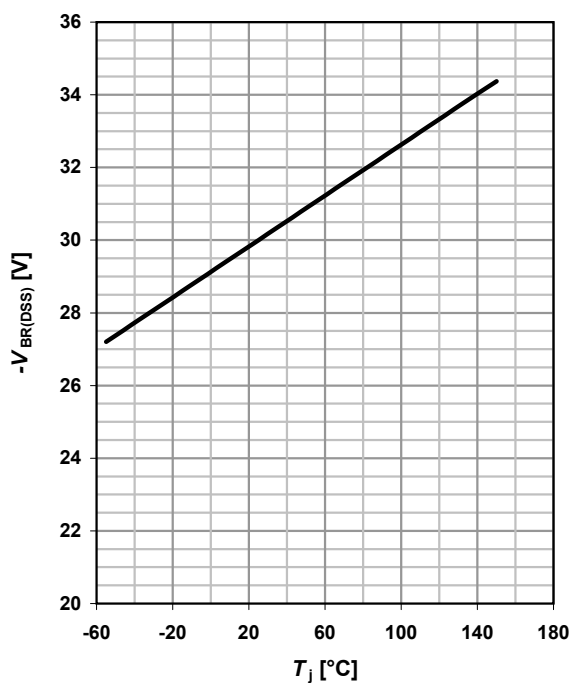
$$V_{GS}=f(Q_{\text{gate}}); I_D=-9.1\ \text{A pulsed}$$

parameter:  $V_{DD}$

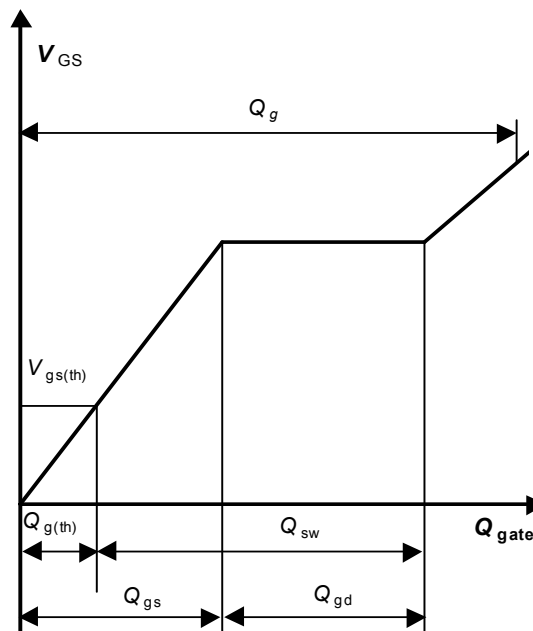


### 15 Drain-source breakdown voltage

$$V_{BR(DSS)}=f(T_j); I_D=-250\ \mu\text{A}$$

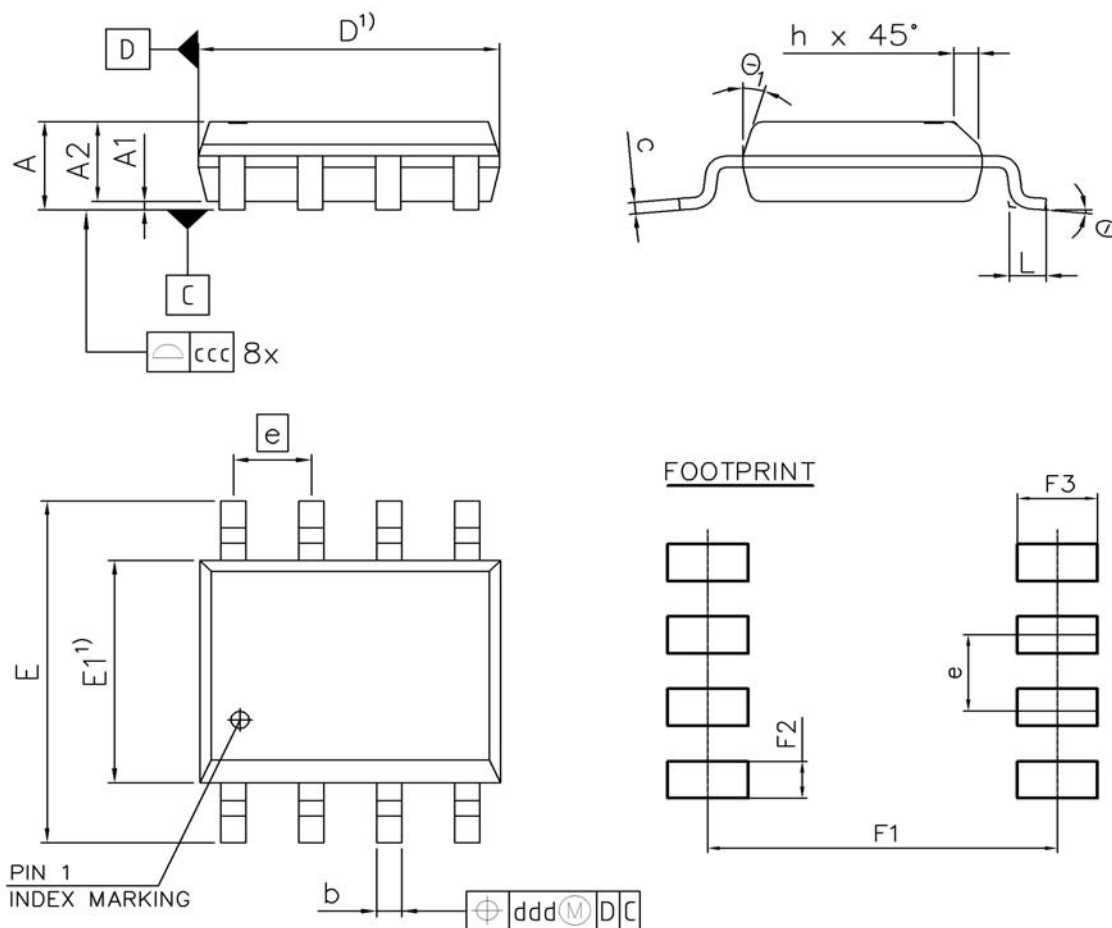


### 16 Gate charge waveforms



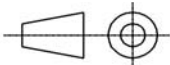
# Package Outline

## 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 |
| $\theta$   | 0°          | 8°   | 0°     | 8°    |
| $\theta_1$ | -           | 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 |

|                                                                                                              |
|--------------------------------------------------------------------------------------------------------------|
| DOCUMENT NO.<br>Z8B00003333                                                                                  |
| SCALE<br>0 1.0 2mm                                                                                           |
| EUROPEAN PROJECTION<br> |
| ISSUE DATE<br>09.01.2008                                                                                     |
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[SSM6P54TU,LF](#) [SSM6P69NU,LF](#) [DMP22D4UFO-7B](#)