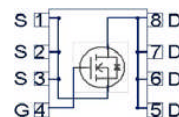
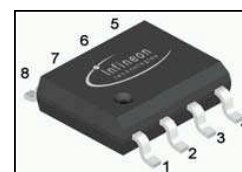


**OptiMOS™ 3 M-Series Power-MOSFET**
**Features**

- Optimized for 5V driver application (Notebook, VGA, POL)
- Low FOM<sub>SW</sub> for High Frequency SMPS
- 100% Avalanche tested
- N-channel
- Very low on-resistance  $R_{DS(on)}$  @  $V_{GS}=4.5\text{ V}$
- Excellent gate charge x  $R_{DS(on)}$  product (FOM)
- Qualified for consumer level application
- Pb-free plating; RoHS compliant
- Halogen-free according to IEC61249-2-21


**Product Summary**

|                  |                       |     |    |
|------------------|-----------------------|-----|----|
| $V_{DS}$         |                       | 30  | V  |
| $R_{DS(on),max}$ | $V_{GS}=10\text{ V}$  | 6.5 | mΩ |
|                  | $V_{GS}=4.5\text{ V}$ | 8   |    |
| $I_D$            |                       | 16  | A  |

**PG-DSO-8**


| Type          | Package  | Marking  |
|---------------|----------|----------|
| BSO065N03MS G | PG-DSO-8 | 065N03MS |

**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>        | $I_D$          | $V_{GS}=10\text{ V}, T_A=25\text{ °C}$     | 16          | 13           | A    |
|                                               |                | $V_{GS}=10\text{ V}, T_A=90\text{ °C}$     | 10.9        | 8.6          |      |
|                                               |                | $V_{GS}=4.5\text{ V}, T_A=25\text{ °C}$    | 14.2        | 11           |      |
|                                               |                | $V_{GS}=4.5\text{ V}, T_A=90\text{ °C}$    | 9.8         | 7.8          |      |
| Pulsed drain current <sup>2)</sup>            | $I_{D,pulse}$  | $T_A=25\text{ °C}$                         | 112         |              |      |
| Avalanche current, single pulse <sup>3)</sup> | $I_{AS}$       | $T_A=25\text{ °C}$                         | 16          |              |      |
| Avalanche energy, single pulse                | $E_{AS}$       | $I_D=16\text{ A}, R_{GS}=25\text{ }\Omega$ | 60          |              |      |
| Gate source voltage                           | $V_{GS}$       |                                            | ±20         |              | V    |
| Power dissipation <sup>1)</sup>               | $P_{tot}$      | $T_A=25\text{ °C}$                         | 2.5         | 1.56         | W    |
| Operating and storage temperature             | $T_j, T_{stg}$ |                                            | -55 ... 150 |              | °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 | - | - | 50  |     |
|                                                   |            | 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, $I_D=1$ mA                         | 30  | -   | -   | V          |
| Gate threshold voltage           | $V_{GS(th)}$  | $V_{DS}=V_{GS}$ , $I_D=250$ $\mu$ A              | 1   | -   | 2   |            |
| Zero gate voltage drain current  | $I_{DSS}$     | $V_{DS}=30$ V, $V_{GS}=0$ V,<br>$T_j=25$ °C      | -   | 0.1 | 10  | $\mu$ A    |
|                                  |               | $V_{DS}=30$ V, $V_{GS}=0$ V,<br>$T_j=125$ °C     | -   | 10  | 100 |            |
| Gate-source leakage current      | $I_{GSS}$     | $V_{GS}=16$ V, $V_{DS}=0$ V                      | -   | 10  | 100 | nA         |
| Drain-source on-state resistance | $R_{DS(on)}$  | $V_{GS}=4.5$ V, $I_D=14.2$ A                     | -   | 6.4 | 8   | m $\Omega$ |
|                                  |               | $V_{GS}=10$ V, $I_D=16$ A                        | -   | 5.4 | 6.5 |            |
| Gate resistance                  | $R_G$         |                                                  | 0.6 | 1.3 | 2.3 | $\Omega$   |
| Transconductance                 | $g_{fs}$      | $ V_{DS}  > 2 I_D R_{DS(on)max}$ ,<br>$I_D=16$ A | 25  | 50  | -   | 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>$f=1\text{ MHz}$                     | - | 2300 | 3100 | pF |
| Output capacitance           | $C_{oss}$    |                                                                                  | - | 710  | 940  |    |
| Reverse transfer capacitance | $C_{rss}$    |                                                                                  | - | 47   | -    |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=15\text{ V}, V_{GS}=4.5\text{ V},$<br>$I_D=16\text{ A}, R_G=1.6\ \Omega$ | - | 12.2 | -    | ns |
| Rise time                    | $t_r$        |                                                                                  | - | 6.2  | -    |    |
| Turn-off delay time          | $t_{d(off)}$ |                                                                                  | - | 15.6 | -    |    |
| Fall time                    | $t_f$        |                                                                                  | - | 6.4  | -    |    |

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

|                              |               |                                                                             |   |      |      |    |
|------------------------------|---------------|-----------------------------------------------------------------------------|---|------|------|----|
| Gate to source charge        | $Q_{gs}$      | $V_{DD}=15\text{ V}, I_D=16\text{ A},$<br>$V_{GS}=0\text{ to }4.5\text{ V}$ | - | 6.4  | -    | nC |
| Gate charge at threshold     | $Q_{g(th)}$   |                                                                             | - | 3.7  | -    |    |
| Gate to drain charge         | $Q_{gd}$      |                                                                             | - | 3.2  | -    |    |
| Switching charge             | $Q_{sw}$      |                                                                             | - | 5.9  | -    |    |
| Gate charge total            | $Q_g$         |                                                                             | - | 14.4 | 19   |    |
| Gate plateau voltage         | $V_{plateau}$ |                                                                             | - | 2.8  | -    |    |
| Gate charge total            | $Q_g$         | $V_{DD}=15\text{ V}, I_D=16\text{ A},$<br>$V_{GS}=0\text{ to }10\text{ V}$  | - | 30   | 40   | nC |
| Gate charge total, sync. FET | $Q_{g(sync)}$ | $V_{DS}=0.1\text{ V},$<br>$V_{GS}=0\text{ to }4.5\text{ V}$                 | - | 12.5 | 16.6 |    |
| Output charge                | $Q_{oss}$     | $V_{DD}=15\text{ V}, V_{GS}=0\text{ V}$                                     | - | 18.4 | 25   |    |

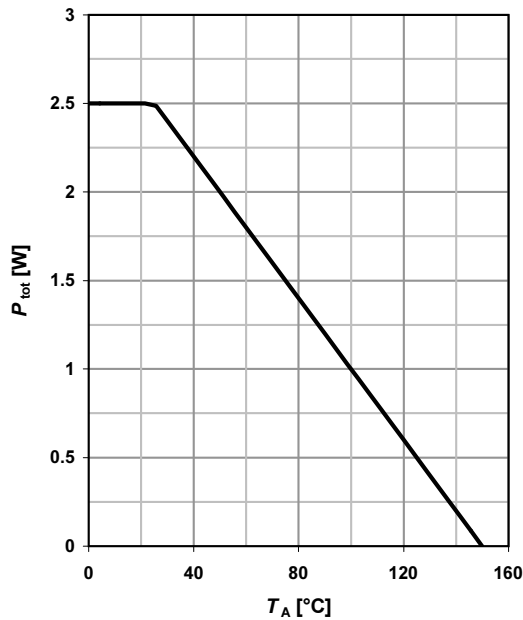
**Reverse Diode**

|                                  |               |                                                                   |   |      |     |    |
|----------------------------------|---------------|-------------------------------------------------------------------|---|------|-----|----|
| Diode continuous forward current | $I_S$         | $T_A=25\text{ °C}$                                                | - | -    | 3   | A  |
| Diode pulse current              | $I_{S,pulse}$ |                                                                   | - | -    | 112 |    |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=16\text{ A},$<br>$T_J=25\text{ °C}$       | - | 0.84 | 1.1 | V  |
| Reverse recovery charge          | $Q_{rr}$      | $V_R=15\text{ V}, I_F=I_S,$<br>$di_F/dt=400\text{ A}/\mu\text{s}$ | - | -    | 12  | nC |

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

### 1 Power dissipation

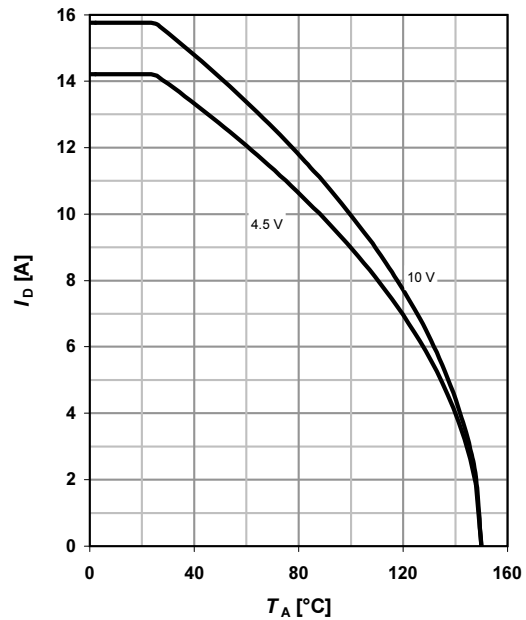
$$P_{\text{tot}} = f(T_A); t_p \leq 10 \text{ s}$$



### 2 Drain current

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

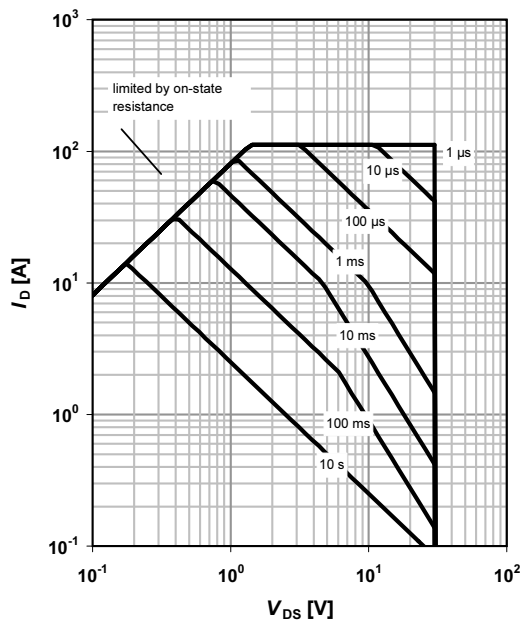
parameter:  $V_{GS}$



### 3 Safe operating area

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

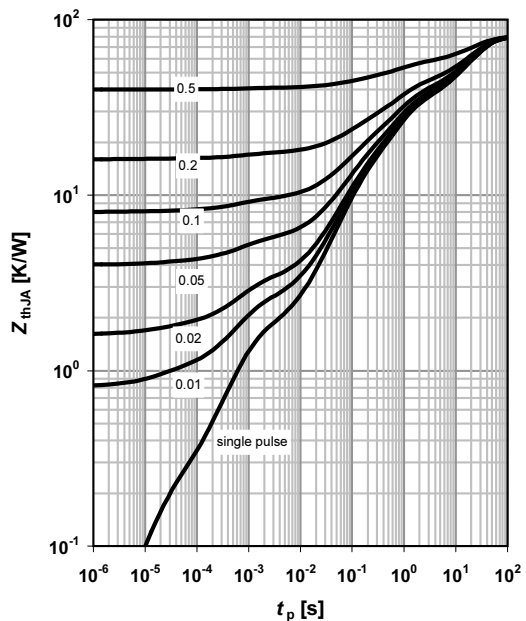
parameter:  $t_p$



### 4 Max. transient thermal impedance

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

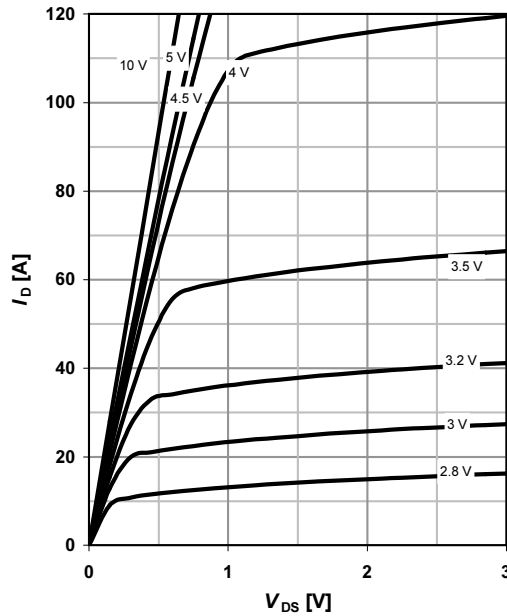
parameter:  $D = t_p/T$



### 5 Typ. output characteristics

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

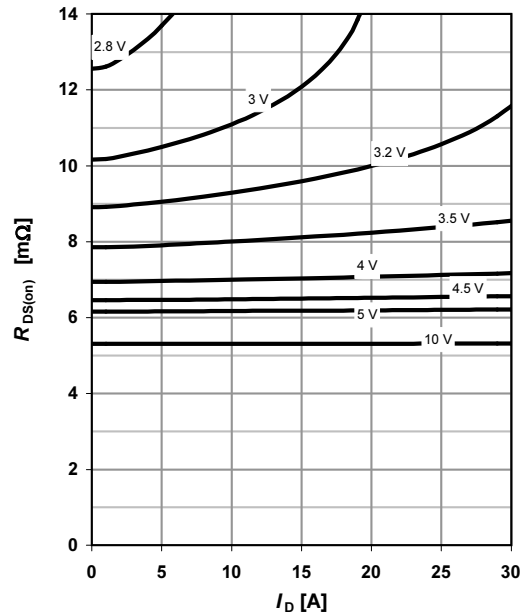
parameter:  $V_{GS}$



### 6 Typ. drain-source on resistance

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

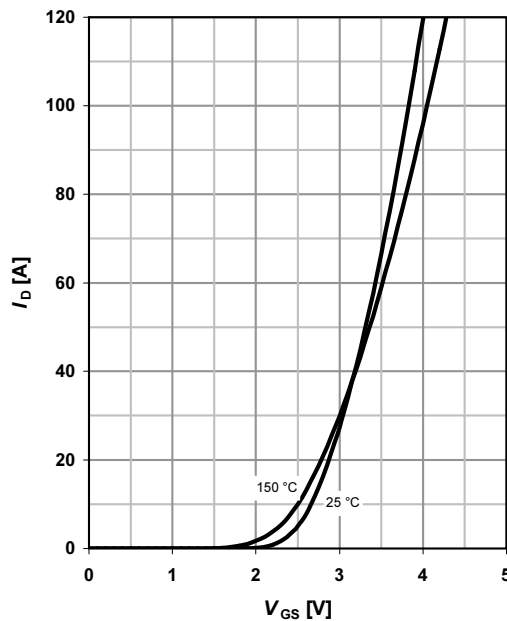
parameter:  $V_{GS}$



### 7 Typ. transfer characteristics

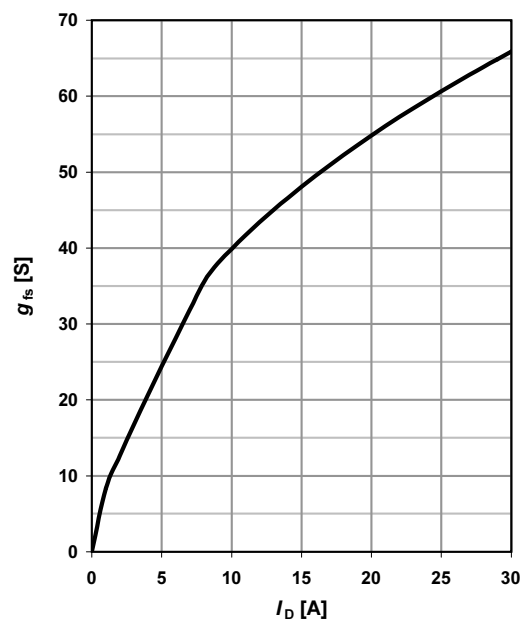
$$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)\max}$$

parameter:  $T_j$



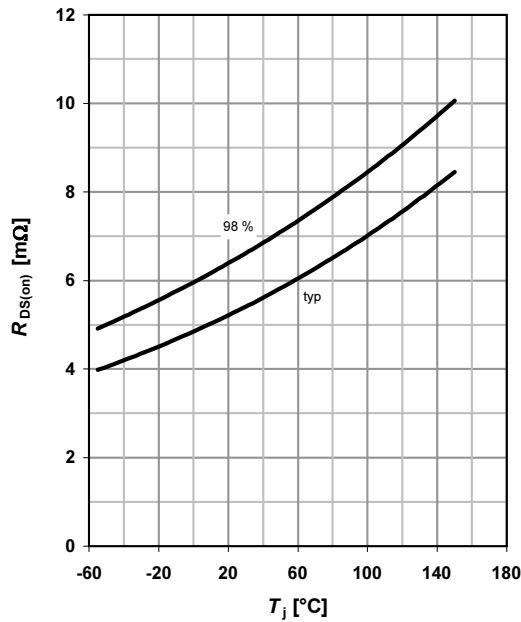
### 8 Typ. forward transconductance

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



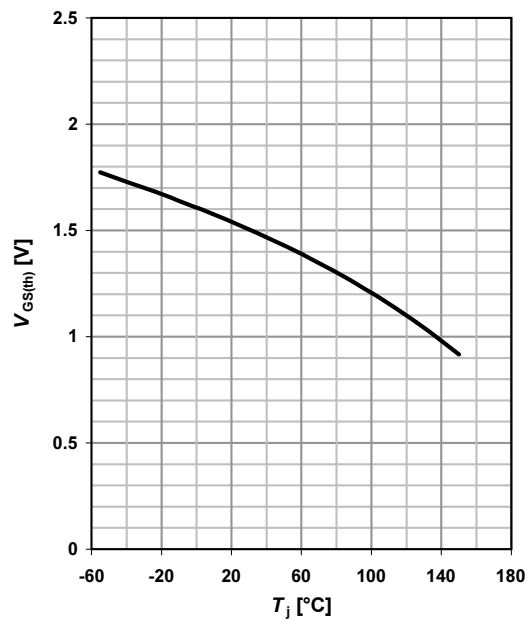
### 9 Drain-source on-state resistance

$$R_{DS(on)} = f(T_j); I_D = 16 \text{ A}; V_{GS} = 10 \text{ V}$$



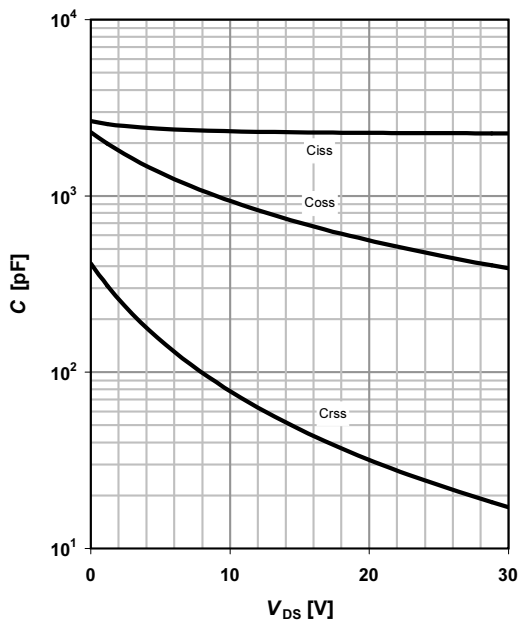
### 10 Typ. gate threshold voltage

$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = 250 \mu\text{A}$$



### 11 Typ. capacitances

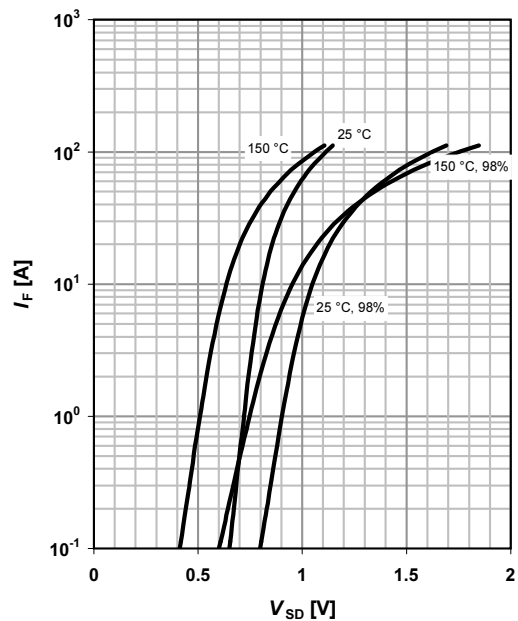
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



### 12 Forward characteristics of reverse diode

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

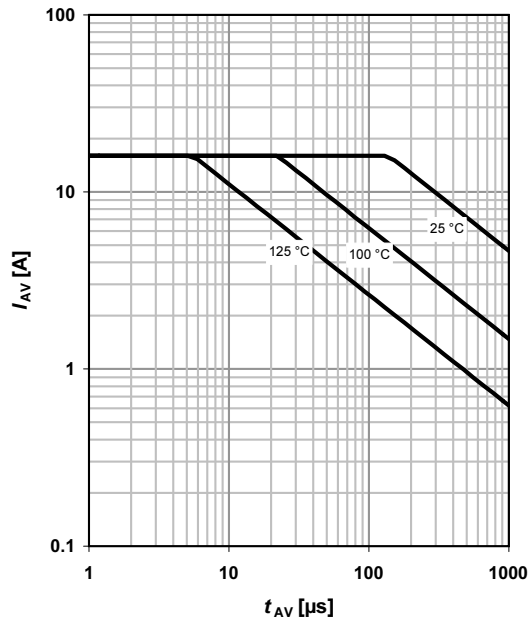
parameter:  $T_j$



### 13 Avalanche characteristics

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

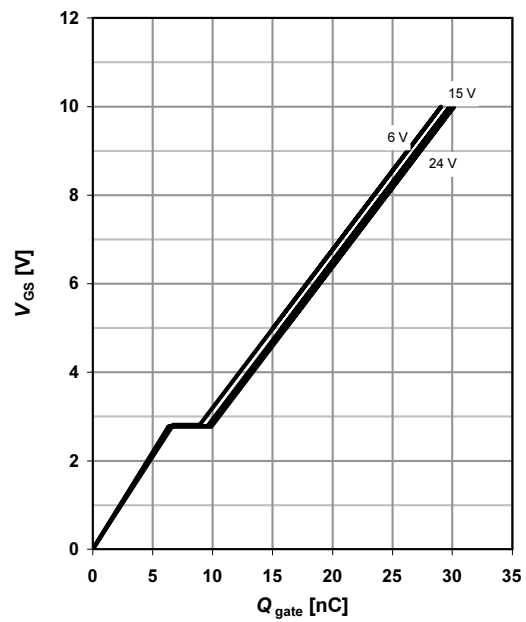
parameter:  $T_{j(\text{start})}$



### 14 Typ. gate charge

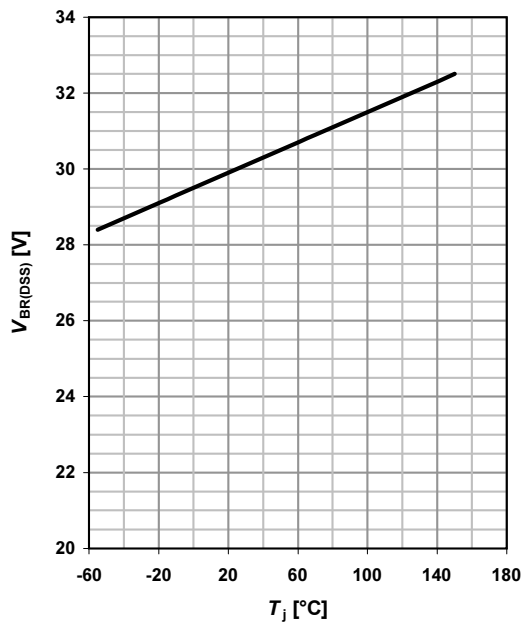
$$V_{GS}=f(Q_{\text{gate}}); I_D=16\ \text{A pulsed}$$

parameter:  $V_{DD}$

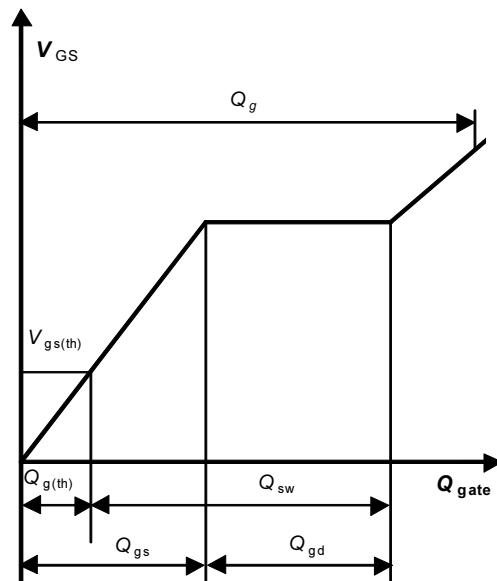


### 15 Drain-source breakdown voltage

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

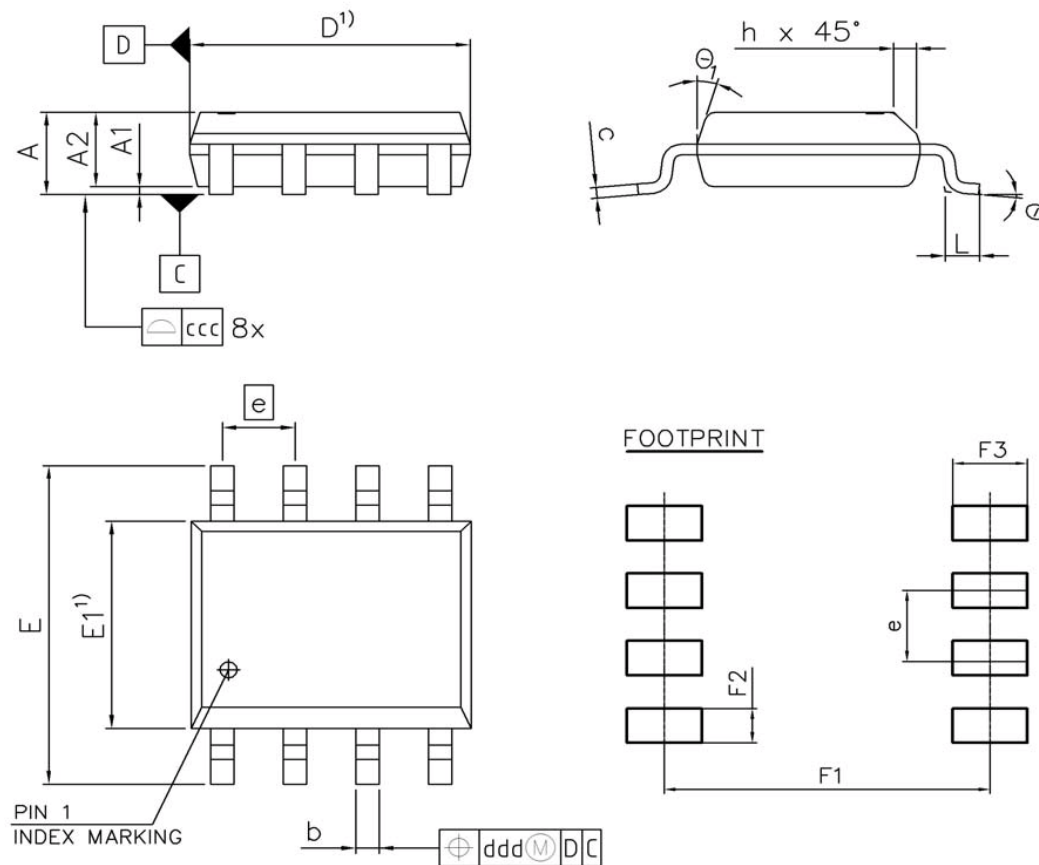


### 16 Gate charge waveforms



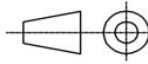
# Package Outline

## 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        | 1.65 | 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 <sub>1</sub> | -           | 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                                                                                  |
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| EUROPEAN PROJECTION<br> |
| ISSUE DATE<br>09.01.2008                                                                                     |
| REVISION<br>02                                                                                               |



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