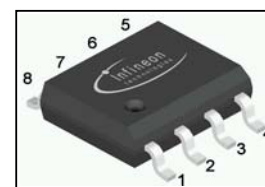


**OptiMOS® 2 Power-Transistor**
**Features**

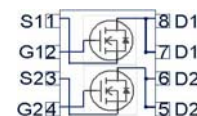
- Fast switching MOSFET for SMPS
- Optimized technology for notebook DC/DC converters
- Qualified according to JEDEC<sup>1)</sup> for target applications
- N-channel
- Logic level
- Excellent gate charge  $\times R_{DS(on)}$  product (FOM)
- Very low on-resistance  $R_{DS(on)}$
- Superior thermal resistance
- Avalanche rated
- Pb-free plating; RoHS compliant

**Product Summary**

|                  |     |            |
|------------------|-----|------------|
| $V_{DS}$         | 30  | V          |
| $R_{DS(on),max}$ | 15  | m $\Omega$ |
| $I_D$            | 9.1 | A          |

**PG-DSO-8**


| Type      | Package  | Marking |
|-----------|----------|---------|
| BSO150N03 | PG-DSO-8 | 150N3   |


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

| Parameter                           | Symbol         | Conditions  | Value       |              | Unit              |
|-------------------------------------|----------------|---|-------------|--------------|-------------------|
|                                     |                |   | 10 secs     | steady state |                   |
| Continuous drain current            | $I_D$          | $T_A=25\text{ }^\circ\text{C}^{2)}$   | 9.1         | 7.6          | A                 |
|                                     |                | $T_A=70\text{ }^\circ\text{C}^{2)}$   | 7.3         | 6.1          |                   |
| Pulsed drain current                | $I_{D,pulse}$  | $T_A=25\text{ }^\circ\text{C}^{3)}$   | 36          |              |                   |
| Avalanche energy, single pulse      | $E_{AS}$       | $I_D=9.1\text{ A}, R_{GS}=25\text{ }\Omega$   | 82          |              | mJ                |
| Reverse diode $dv/dt$               | $dv/dt$        | $I_D=9.1\text{ A}, V_{DS}=20\text{ V}, di/dt=200\text{ A}/\mu\text{s}, T_{j,max}=150\text{ }^\circ\text{C}$ | 6           |              | kV/ $\mu\text{s}$ |
| Gate source voltage                 | $V_{GS}$       |   | $\pm 20$    |              | V                 |
| Power dissipation                   | $P_{tot}$      | $T_A=25\text{ }^\circ\text{C}^{2)}$   | 2.0         | 1.4          | W                 |
| Operating and storage temperature   | $T_j, T_{stg}$ |   | -55 ... 150 |              | $^\circ\text{C}$  |
| 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 | $R_{thJS}$ |  | - | - | 50  | K/W |
| Thermal resistance, junction - ambient         | $R_{thJA}$ | minimal footprint, $t_p \leq 10$ s                             | - | - | 110 |     |
|  |            | minimal footprint, steady state                                | - | - | 150 |     |
|  |            | 6 cm <sup>2</sup> cooling area <sup>2)</sup> , $t_p \leq 10$ s | - | - | 63  |     |
|  |            | 6 cm <sup>2</sup> cooling area <sup>2)</sup> , steady state    | - | - | 90  |     |

**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           | $V_{GS(th)}$  | $V_{DS}=V_{GS}$ , $I_D=25$ $\mu$ A              | 1.2 | 1.6  | 2   |            |
| Zero gate voltage drain current  | $I_{DSS}$     | $V_{DS}=30$ V, $V_{GS}=0$ V, $T_j=25$ °C        | -   | 0.1  | 1   | $\mu$ A    |
|                                  |               | $V_{DS}=30$ V, $V_{GS}=0$ V, $T_j=125$ °C       | -   | 10   | 100 |            |
| Gate-source leakage current      | $I_{GSS}$     | $V_{GS}=20$ V, $V_{DS}=0$ V                     | -   | 10   | 100 | nA         |
| Drain-source on-state resistance | $R_{DS(on)}$  | $V_{GS}=4.5$ V, $I_D=8.4$ A                     | -   | 15.2 | 19  | m $\Omega$ |
|                                  |               | $V_{GS}=10$ V, $I_D=9.1$ A                      | -   | 12.5 | 15  |            |
| Gate resistance                  | $R_G$         |   | -   | 1.5  | -   | $\Omega$   |
| Transconductance                 | $g_{fs}$      | $ V_{DS}  > 2 I_D  R_{DS(on)max}$ , $I_D=9.1$ A | 13  | 26   | -   | S          |

<sup>1)</sup>J-STD20 and JESD22

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

| 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>$f=1\text{ MHz}$                     | - | 1420 | 1890 | pF |
| Output capacitance           | $C_{oss}$    |  | - | 510  | 680  |    |
| Reverse transfer capacitance | $C_{rss}$    |  | - | 67   | 100  |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=15\text{ V}, V_{GS}=10\text{ V},$<br>$I_D=4.5\text{ A}, R_G=2.7\ \Omega$ | - | 5.3  | 7.9  | ns |
| Rise time                    | $t_r$        |  | - | 4.0  | 6.0  |    |
| Turn-off delay time          | $t_{d(off)}$ |  | - | 21   | 31   |    |
| Fall time                    | $t_f$        |  | - | 3.0  | 4.5  |    |

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

|                              |               |  |   |     |     |    |
|------------------------------|---------------|--|---|-----|-----|----|
| Gate to source charge        | $Q_{gs}$      | $V_{DD}=15\text{ V}, I_D=4.5\text{ A},$<br>$V_{GS}=0\text{ to }5\text{ V}$ | - | 3.9 | 5.2 | nC |
| Gate charge at threshold     | $Q_{g(th)}$   |  | - | 2.3 | 3.0 |    |
| Gate to drain charge         | $Q_{gd}$      |  | - | 2.6 | 4.0 |    |
| Switching charge             | $Q_{sw}$      |  | - | 4.3 | 6.1 |    |
| Gate charge total            | $Q_g$         |  | - | 11  | 15  |    |
| Gate plateau voltage         | $V_{plateau}$ |  | - | 2.8 | -   |    |
| Gate charge total, sync. FET | $Q_{g(sync)}$ | $V_{DS}=0.1\text{ V},$<br>$V_{GS}=0\text{ to }5\text{ V}$                  | - | 9.6 | 13  | nC |
| Output charge                | $Q_{oss}$     | $V_{DD}=15\text{ V}, V_{GS}=0\text{ V}$                                    | - | 12  | 16  |    |

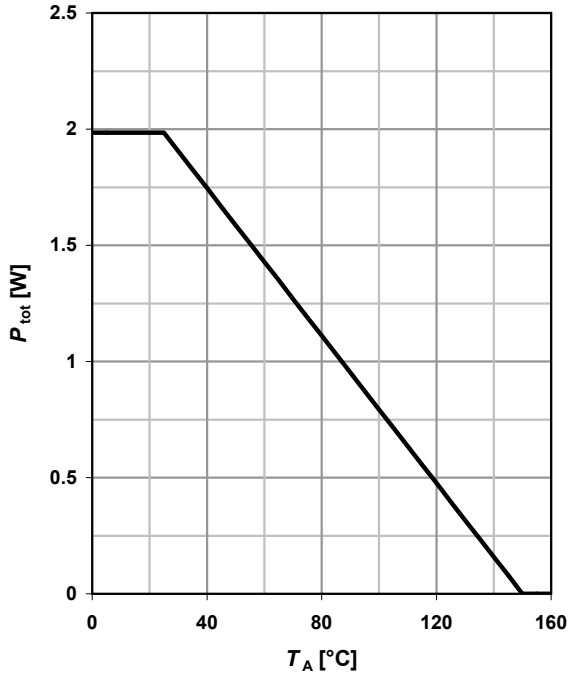
**Reverse Diode**

|                                  |               |  |   |      |    |    |
|----------------------------------|---------------|--|---|------|----|----|
| Diode continuous forward current | $I_S$         | $T_A=25\text{ }^\circ\text{C}$   | - | -    | 2  | A  |
| Diode pulse current              | $I_{S,pulse}$ |  | - | -    | 36 |    |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=2\text{ A},$<br>$T_j=25\text{ }^\circ\text{C}$ | - | 0.75 | 1  | V  |
| Reverse recovery charge          | $Q_{rr}$      | $V_R=12\text{ V}, I_F=I_S,$<br>$di_F/dt=400\text{ A}/\mu\text{s}$      | - | -    | 10 | nC |

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

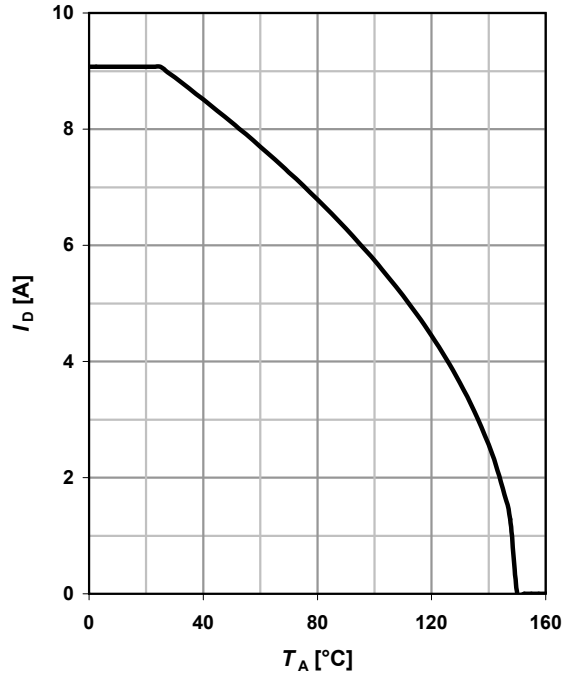
**1 Power dissipation**

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



**2 Drain current**

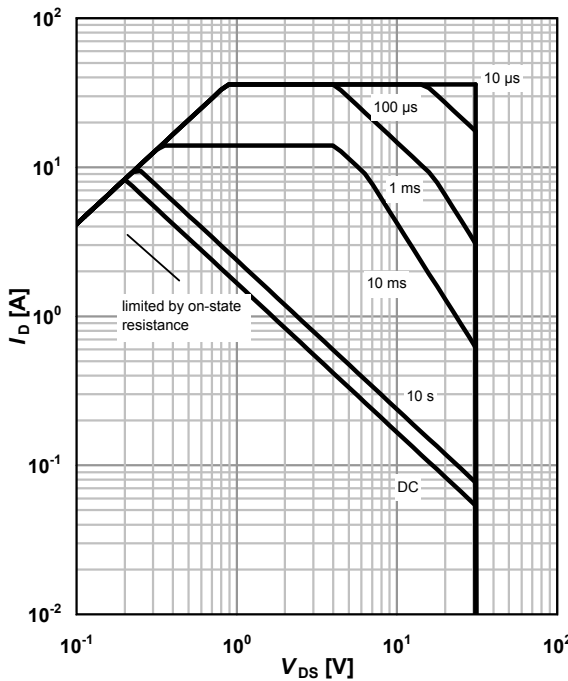
$I_D=f(T_A); V_{GS} \geq 10 \text{ V}; t_p \leq 10 \text{ s}$



**3 Safe operating area**

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

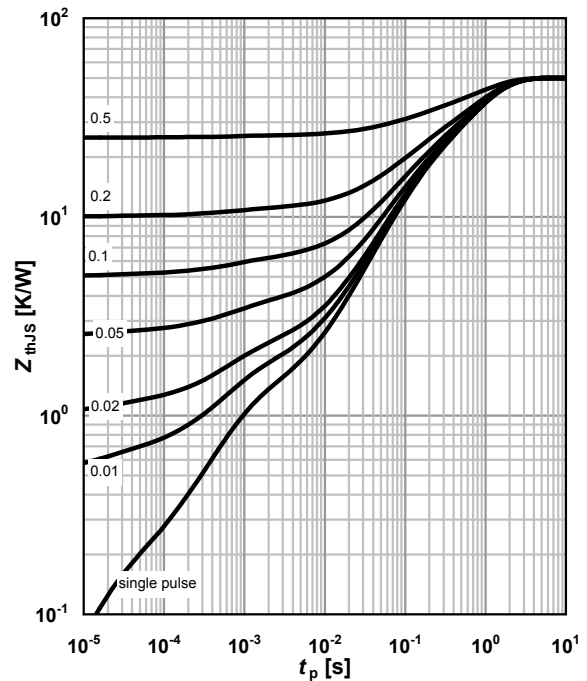
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJS}=f(t_p)$

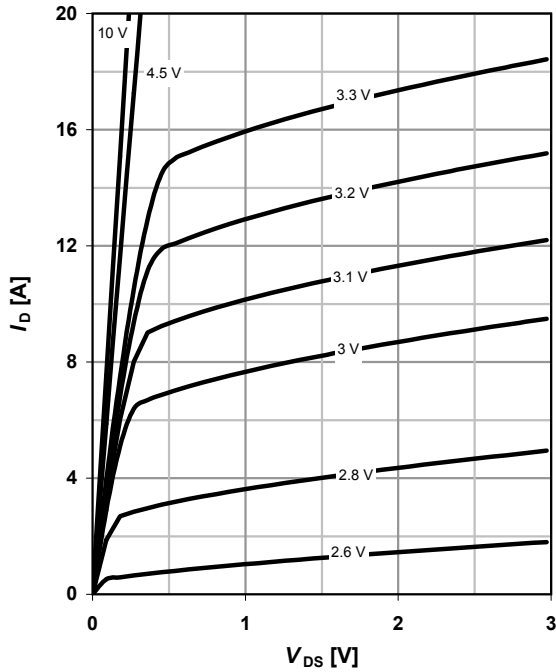
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

$I_D = f(V_{DS}); T_j = 25\text{ °C}$

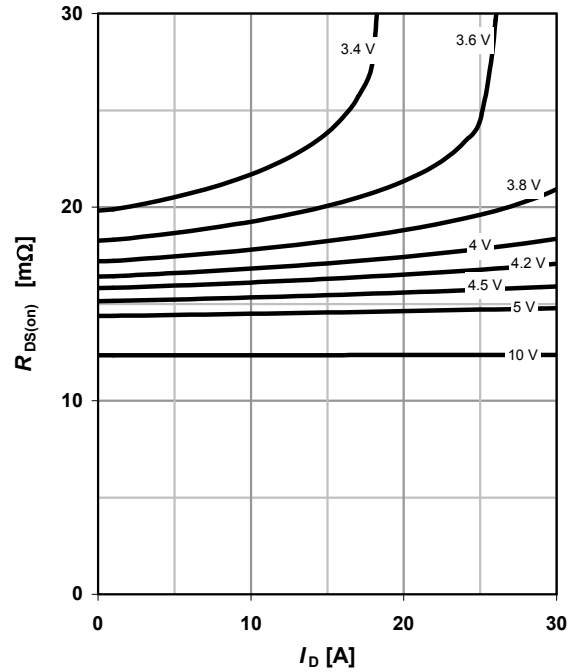
parameter:  $V_{GS}$



**6 Typ. drain-source on resistance**

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

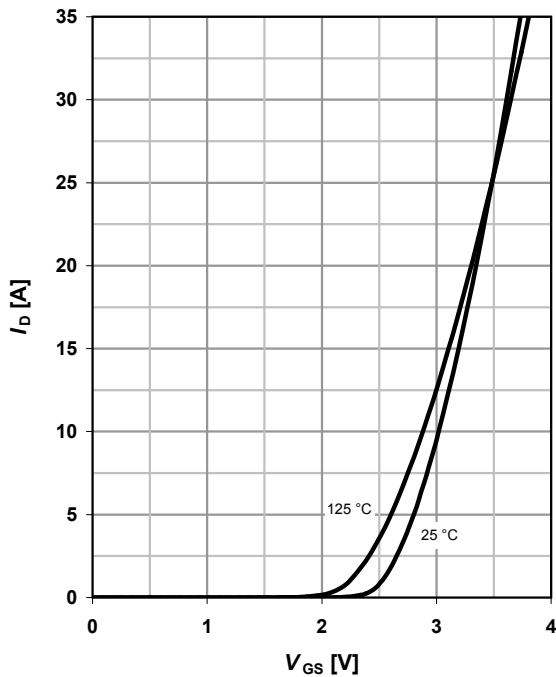
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

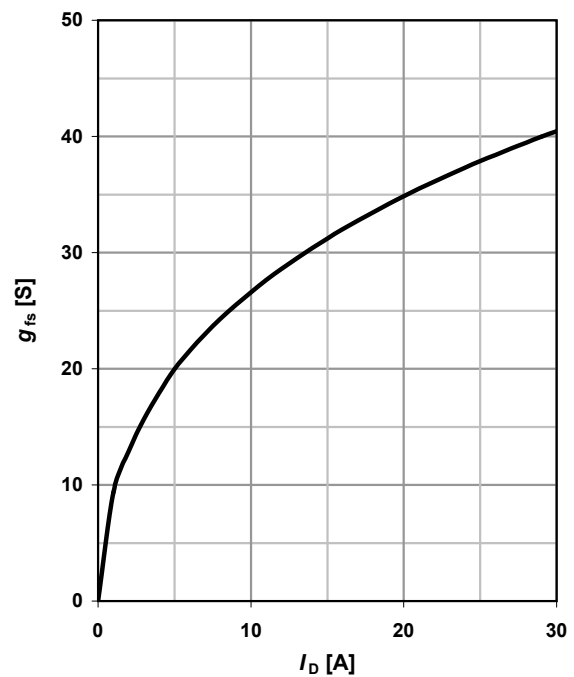
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



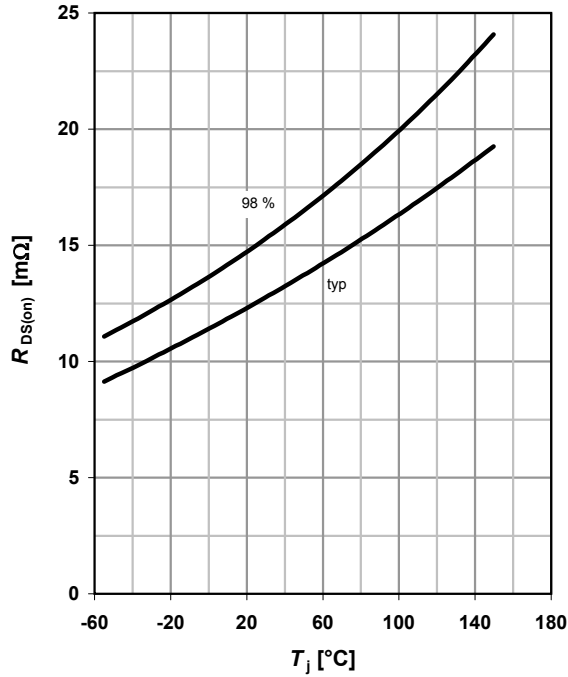
**8 Typ. forward transconductance**

$g_{fs} = f(I_D); T_j = 25\text{ °C}$



**9 Drain-source on-state resistance**

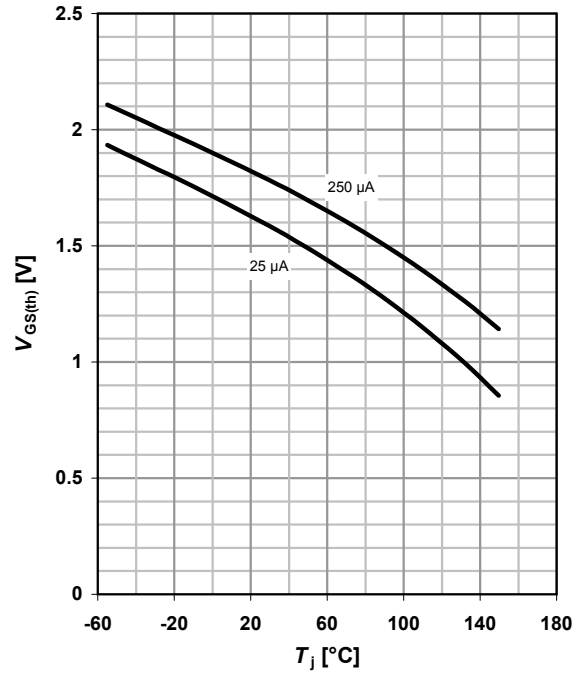
$R_{DS(on)} = f(T_j); I_D = 9.1 \text{ A}; V_{GS} = 10 \text{ V}$



**10 Typ. gate threshold voltage**

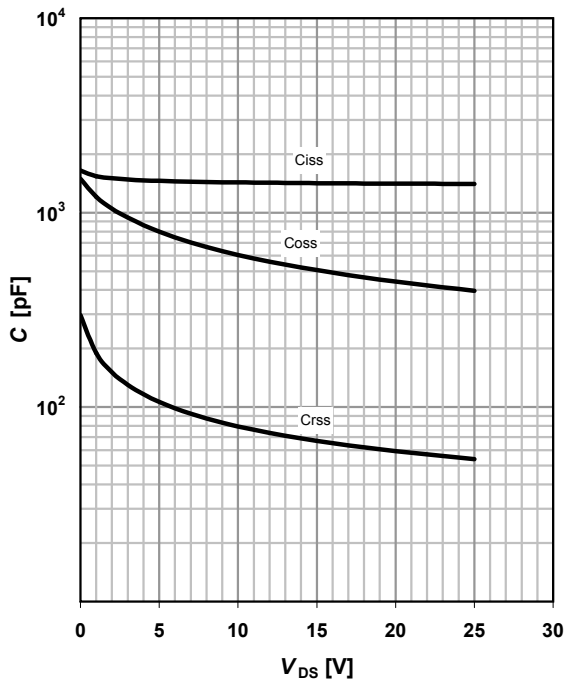
$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$

parameter:  $I_D$



**11 Typ. capacitances**

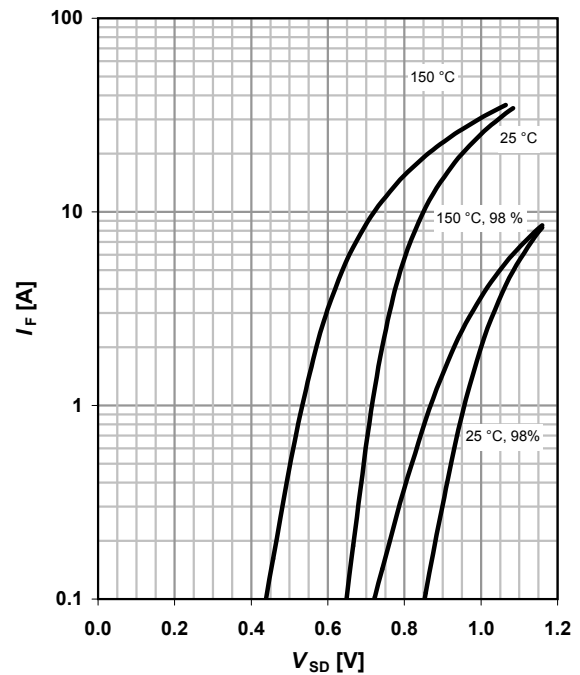
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F = f(V_{SD})$

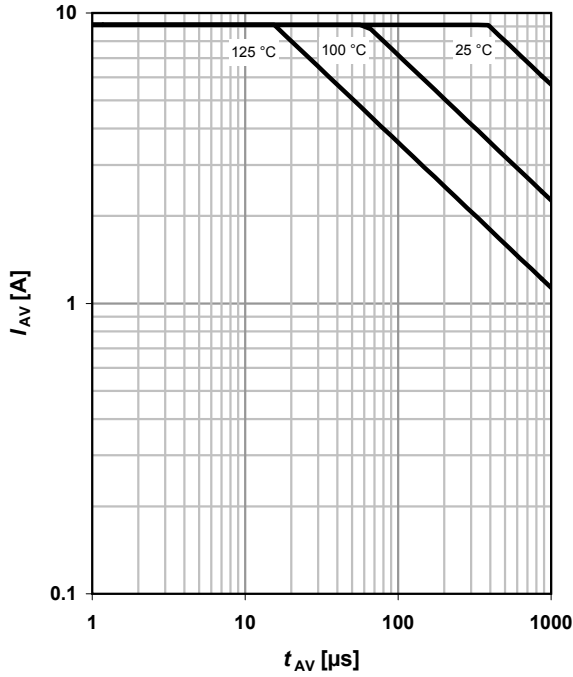
parameter:  $T_j$



**13 Avalanche characteristics**

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

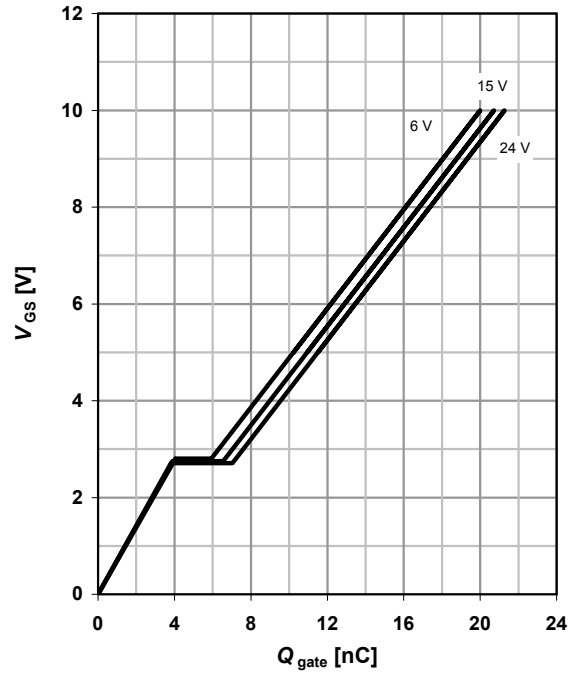
parameter:  $T_{j(start)}$



**14 Typ. gate charge**

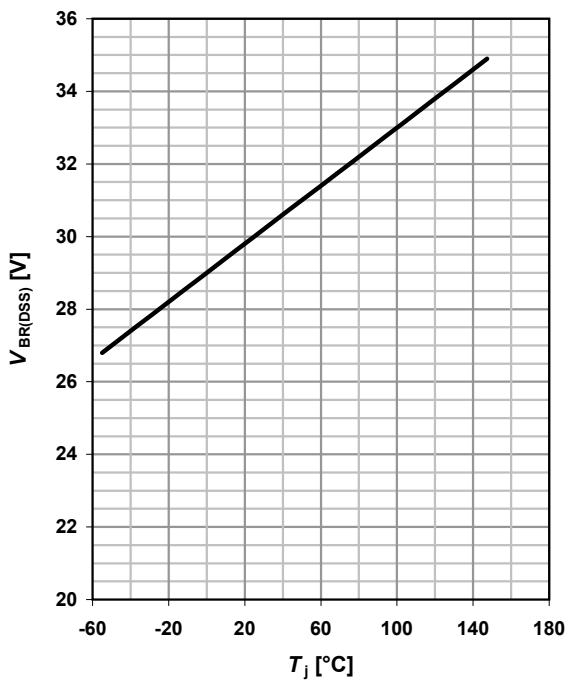
$V_{GS}=f(Q_{gate}); I_D=4.5 \text{ A pulsed}$

parameter:  $V_{DD}$

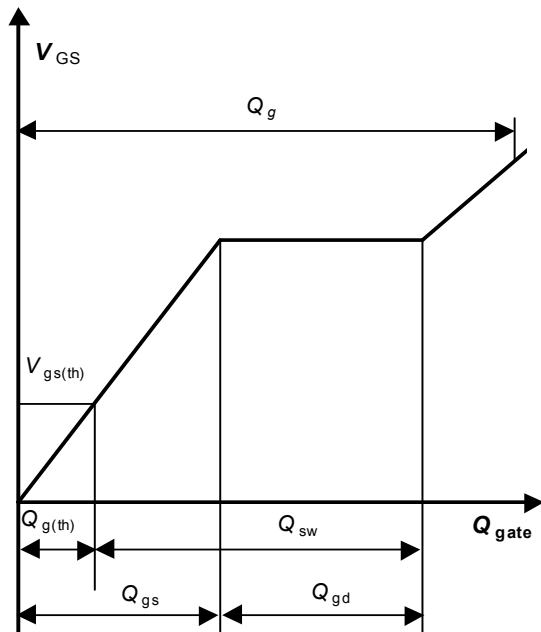


**15 Drain-source breakdown voltage**

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

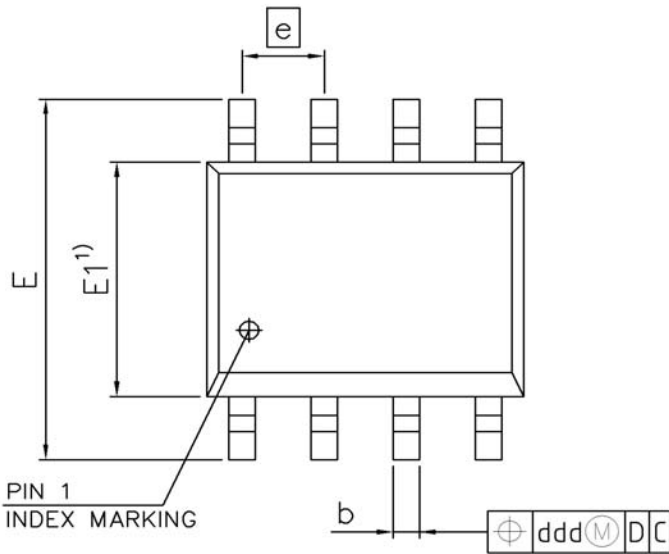
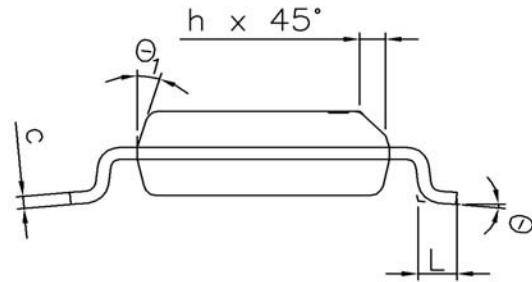
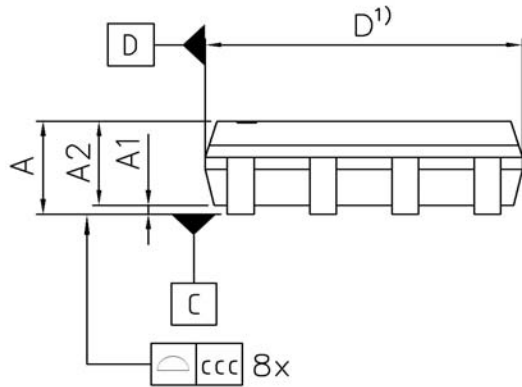


**16 Gate charge waveforms**

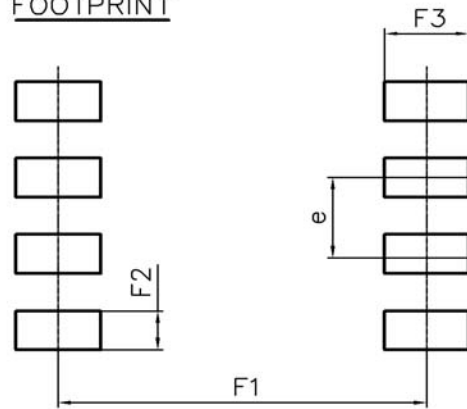


Package Outline

PG-DSO-8



FOOTPRINT



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 <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 |

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