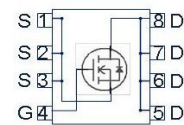
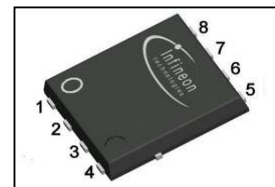


**OptiMOS<sup>®</sup> 2 Power-Transistor**
**Features**

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

**Product Summary**

|                  |     |            |
|------------------|-----|------------|
| $V_{DS}$         | 25  | V          |
| $R_{DS(on),max}$ | 3.7 | m $\Omega$ |
| $I_D$            | 100 | A          |

**PG-TDSON-8**


| Type          | Package    | Marking |
|---------------|------------|---------|
| BSC037N025S G | PG-TDSON-8 | 37N025S |

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

| Parameter                           | Symbol            | Conditions  | Value       | Unit              |
|-------------------------------------|-------------------|---|-------------|-------------------|
| Continuous drain current            | $I_D$             | $T_C=25\text{ }^\circ\text{C}$  | 100         | A                 |
|                                     |                   | $T_C=100\text{ }^\circ\text{C}$   | 68          |                   |
|                                     |                   | $T_A=25\text{ }^\circ\text{C}$ ,<br>$R_{thJA}=45\text{ K/W}^2)$   | 21          |                   |
| Pulsed drain current                | $I_{D,pulse}$     | $T_C=25\text{ }^\circ\text{C}^3)$   | 200         |                   |
| Avalanche energy, single pulse      | $E_{AS}$          | $I_D=50\text{ A}$ , $R_{GS}=25\text{ }\Omega$   | 350         | mJ                |
| Reverse diode $dv/dt$               | $dv/dt$           | $I_D=50\text{ A}$ , $V_{DS}=24\text{ V}$ ,<br>$di/dt=200\text{ A}/\mu\text{s}$ ,<br>$T_{j,max}=150\text{ }^\circ\text{C}$ | 6           | kV/ $\mu\text{s}$ |
| Gate source voltage                 | $V_{GS}$          |   | $\pm 20$    | V                 |
| Power dissipation                   | $P_{tot}$         | $T_C=25\text{ }^\circ\text{C}$  | 69          | W                 |
|                                     |                   | $T_A=25\text{ }^\circ\text{C}$ ,<br>$R_{thJA}=45\text{ K/W}^2)$   | 2.8         |                   |
| 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 - case       | $R_{thJC}$ |  | - | - | 1.8 | K/W |
| Thermal resistance,<br>junction - ambient | $R_{thJA}$ | minimal footprint                            | - | - | 62  |     |
|   |            | 6 cm <sup>2</sup> cooling area <sup>2)</sup> | - | - | 45  |     |

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

|                                  |               |  |     |     |     |               |
|----------------------------------|---------------|--|-----|-----|-----|---------------|
| Drain-source breakdown voltage   | $V_{(BR)DSS}$ | $V_{GS}=0\text{ V}, I_D=1\text{ mA}$                       | 25  | -   | -   | V             |
| Gate threshold voltage           | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=50\text{ }\mu\text{A}$                 | 1.2 | 1.6 | 2   |               |
| Zero gate voltage drain current  | $I_{DSS}$     | $V_{DS}=25\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$  | -   | 0.1 | 1   | $\mu\text{A}$ |
|                                  |               | $V_{DS}=25\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ °C}$ | -   | 10  | 100 |               |
| Gate-source leakage current      | $I_{GSS}$     | $V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$                    | -   | 10  | 100 | nA            |
| Drain-source on-state resistance | $R_{DS(on)}$  | $V_{GS}=4.5\text{ V}, I_D=50\text{ A}$                     | -   | 4.8 | 6   | m $\Omega$    |
|                                  |               | $V_{GS}=10\text{ V}, I_D=50\text{ A}$                      | -   | 3.1 | 3.7 |               |
| Gate resistance                  | $R_G$         |  | -   | 1.2 | -   | $\Omega$      |
| Transconductance                 | $g_{fs}$      | $ V_{DS} >2 I_D R_{DS(on)max}, I_D=50\text{ A}$            | 46  | 92  | -   | 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  $\mu\text{m}$  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>$f=1\text{ MHz}$                    | - | 2750 | 3660 | pF |
| Output capacitance           | $C_{oss}$    |   | - | 1050 | 1400 |    |
| Reverse transfer capacitance | $C_{rss}$    |   | - | 130  | 195  |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=15\text{ V}, V_{GS}=10\text{ V},$<br>$I_D=25\text{ A}, R_G=2.7\ \Omega$ | - | 6.9  | 10   | ns |
| Rise time                    | $t_r$        |   | - | 6    | 9    |    |
| Turn-off delay time          | $t_{d(off)}$ |   | - | 27   | 41   |    |
| Fall time                    | $t_f$        |   | - | 5    | 8    |    |

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

|                              |               |   |   |     |    |    |
|------------------------------|---------------|---|---|-----|----|----|
| Gate to source charge        | $Q_{gs}$      | $V_{DD}=15\text{ V}, I_D=25\text{ A},$<br>$V_{GS}=0\text{ to }5\text{ V}$ | - | 8   | 11 | nC |
| Gate charge at threshold     | $Q_{g(th)}$   |   | - | 4   | 6  |    |
| Gate to drain charge         | $Q_{gd}$      |   | - | 6   | 9  |    |
| Switching charge             | $Q_{sw}$      |   | - | 10  | 14 |    |
| Gate charge total            | $Q_g$         |   | - | 22  | 29 |    |
| Gate plateau voltage         | $V_{plateau}$ |   | - | 3.1 | -  |    |
| Gate charge total, sync. FET | $Q_{g(sync)}$ | $V_{DS}=0.1\text{ V},$<br>$V_{GS}=0\text{ to }5\text{ V}$                 | - | 19  | 26 | nC |
| Output charge                | $Q_{oss}$     | $V_{DD}=15\text{ V}, V_{GS}=0\text{ V}$                                   | - | 23  | 30 |    |

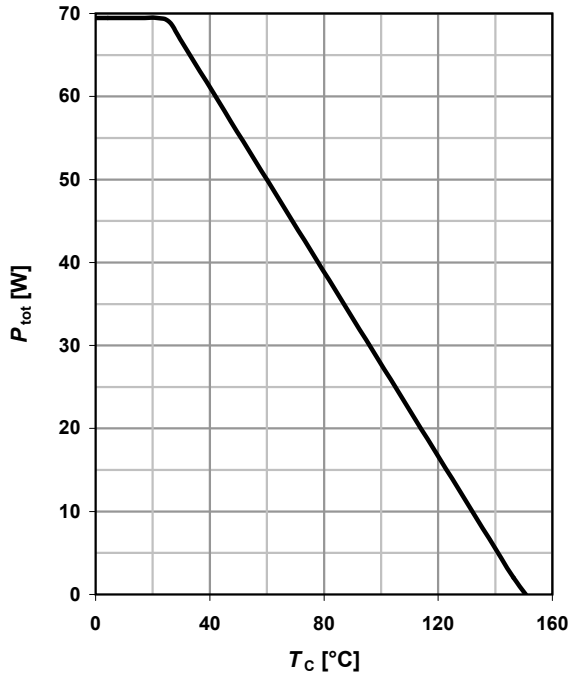
**Reverse Diode**

|                                  |               |   |   |      |     |    |
|----------------------------------|---------------|---|---|------|-----|----|
| Diode continuous forward current | $I_S$         | $T_C=25\text{ }^\circ\text{C}$  | - | -    | 50  | A  |
| Diode pulse current              | $I_{S,pulse}$ |   | - | -    | 200 |    |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=50\text{ A},$<br>$T_J=25\text{ }^\circ\text{C}$ | - | 0.85 | 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

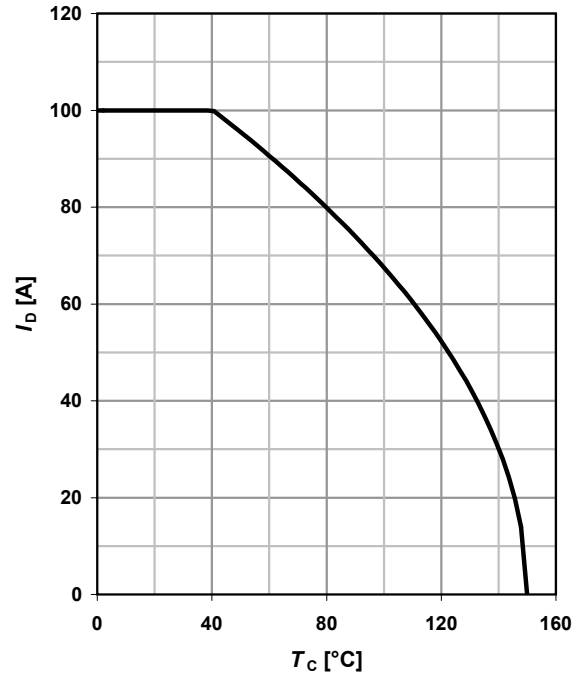
**1 Power dissipation**

$P_{tot}=f(T_C)$



**2 Drain current**

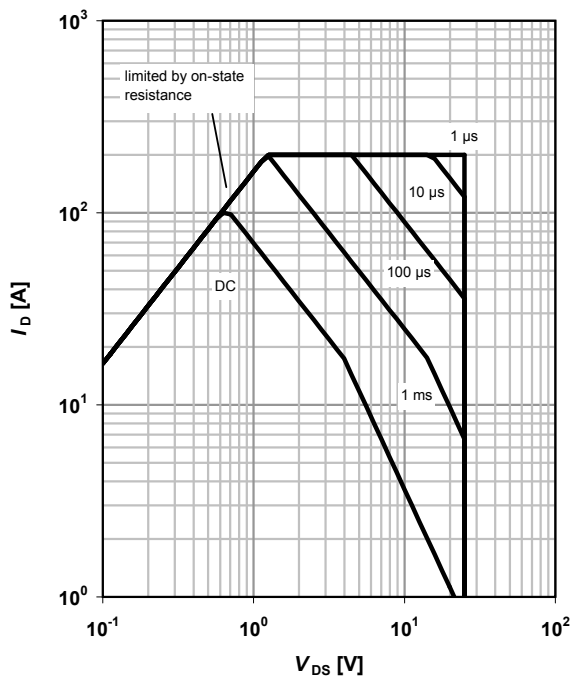
$I_D=f(T_C); V_{GS} \geq 10\text{ V}$



**3 Safe operating area**

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

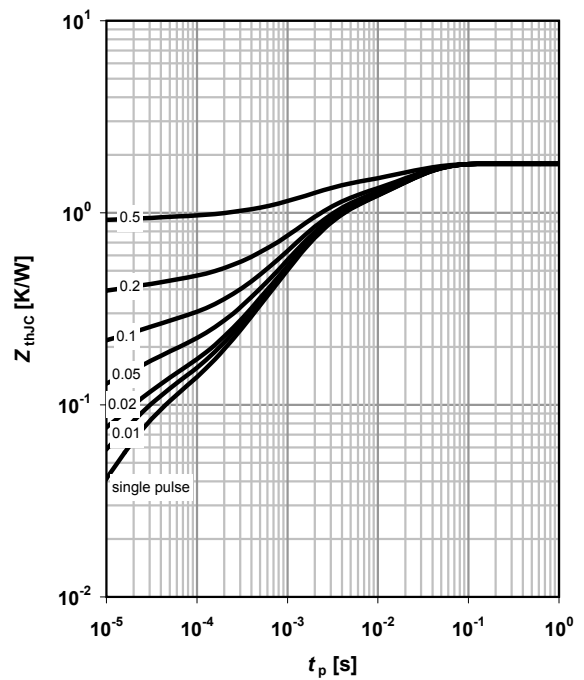
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJC}=f(t_p)$

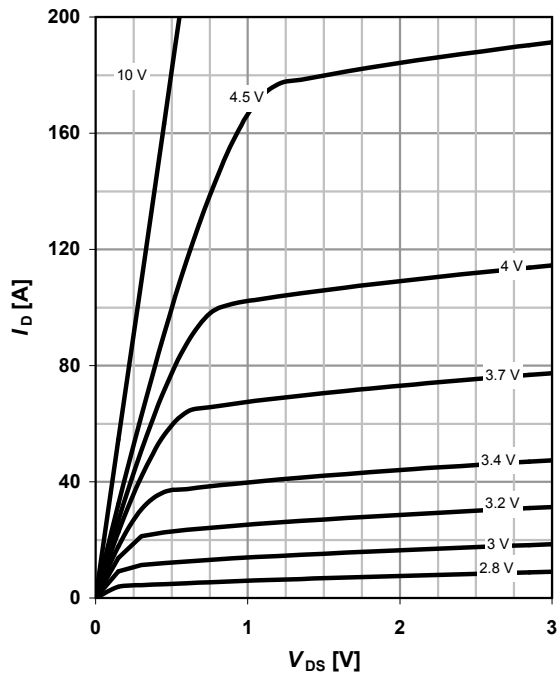
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

$I_D = f(V_{DS}); T_j = 25\text{ °C}$

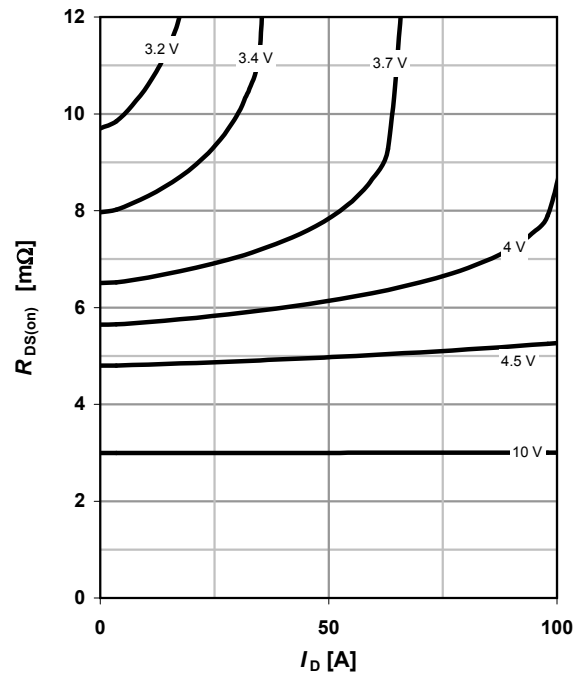
parameter:  $V_{GS}$



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

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

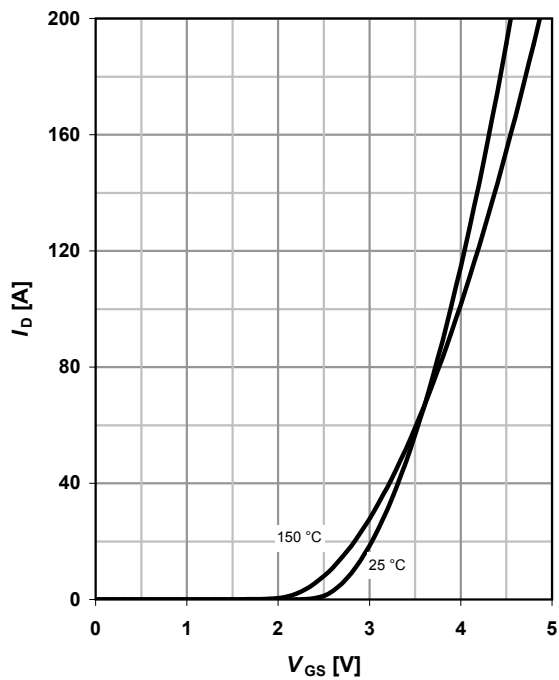
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

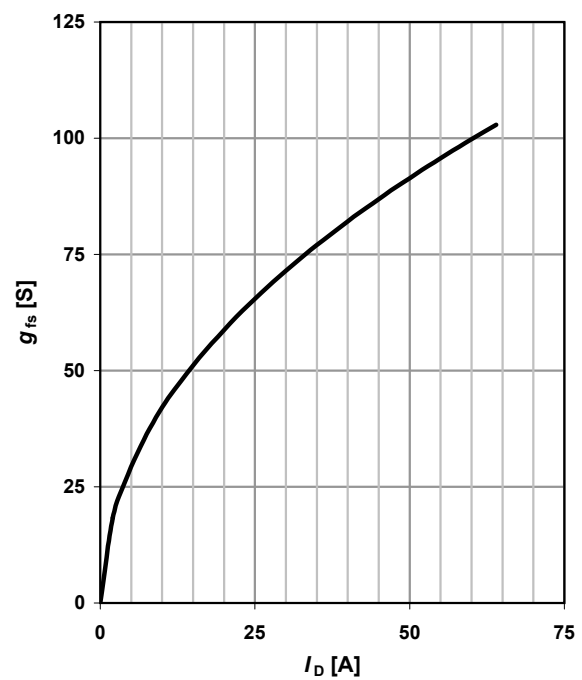
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



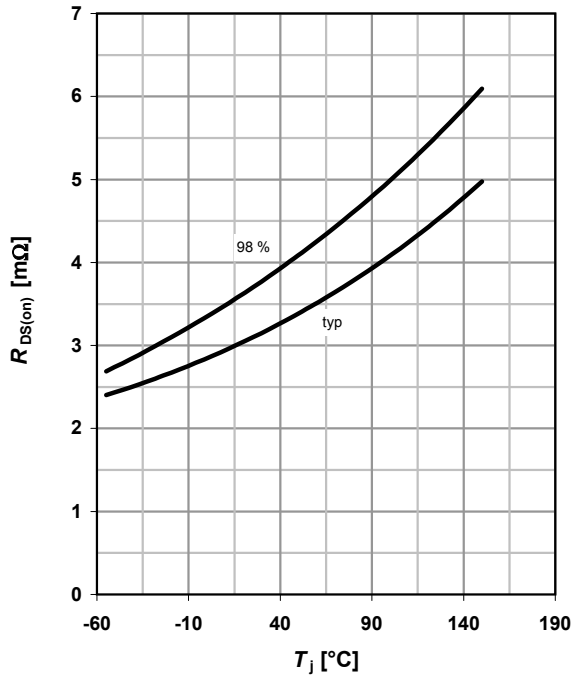
**8 Typ. forward transconductance**

$g_{fs} = f(I_D); T_j = 25\text{ °C}$



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

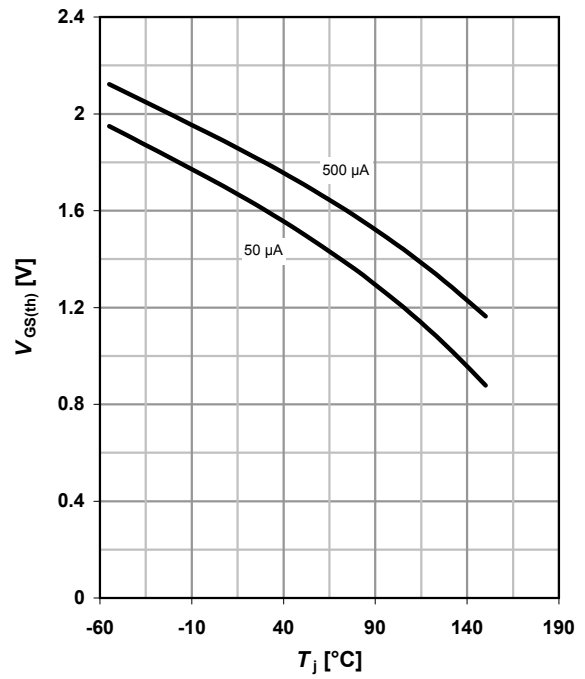
$R_{DS(on)} = f(T_j); I_D = 50 \text{ A}; V_{GS} = 10 \text{ V}$



**10 Typ. gate threshold voltage**

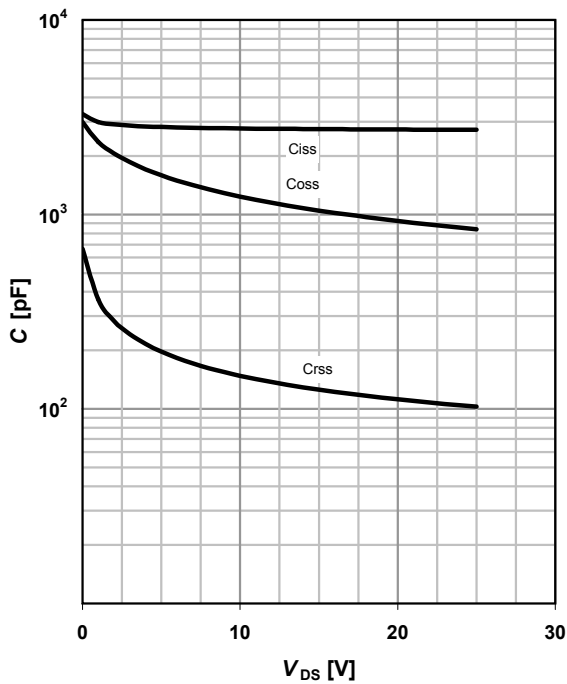
$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$

parameter:  $I_D$



**11 Typ. capacitances**

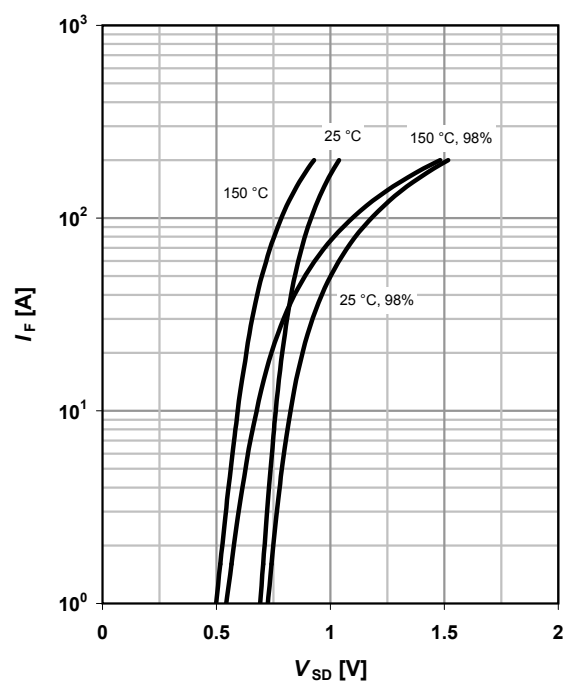
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F = f(V_{SD})$

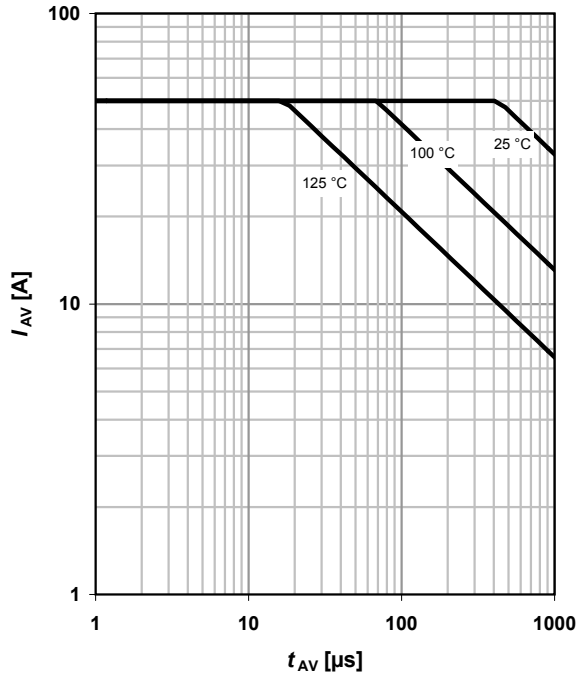
parameter:  $T_j$



**13 Avalanche characteristics**

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

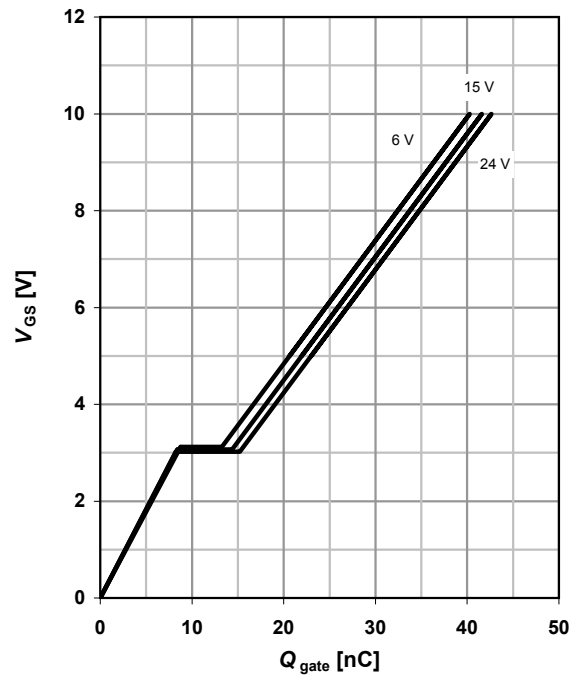
parameter:  $T_{j(start)}$



**14 Typ. gate charge**

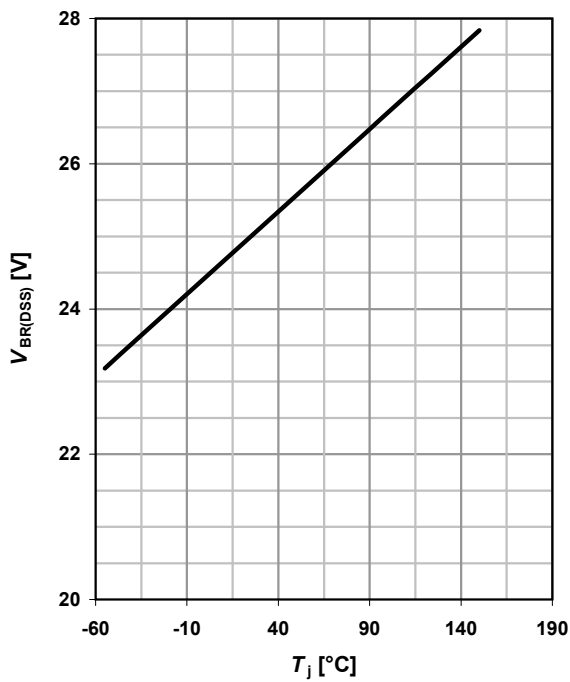
$V_{GS}=f(Q_{gate}); I_D=25\ A\ pulsed$

parameter:  $V_{DD}$

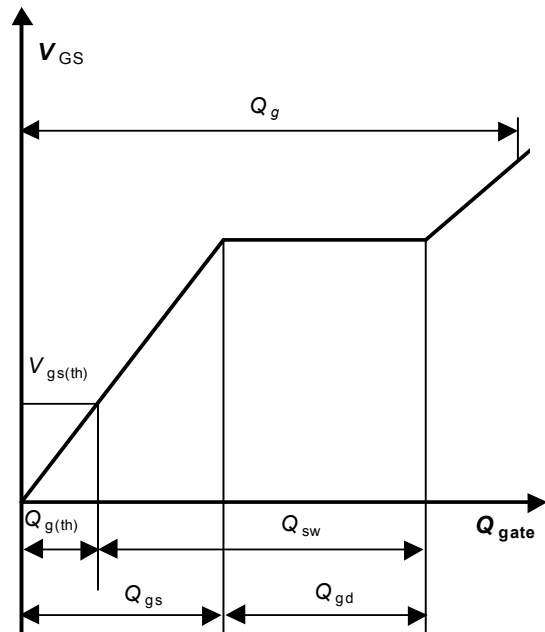


**15 Drain-source breakdown voltage**

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

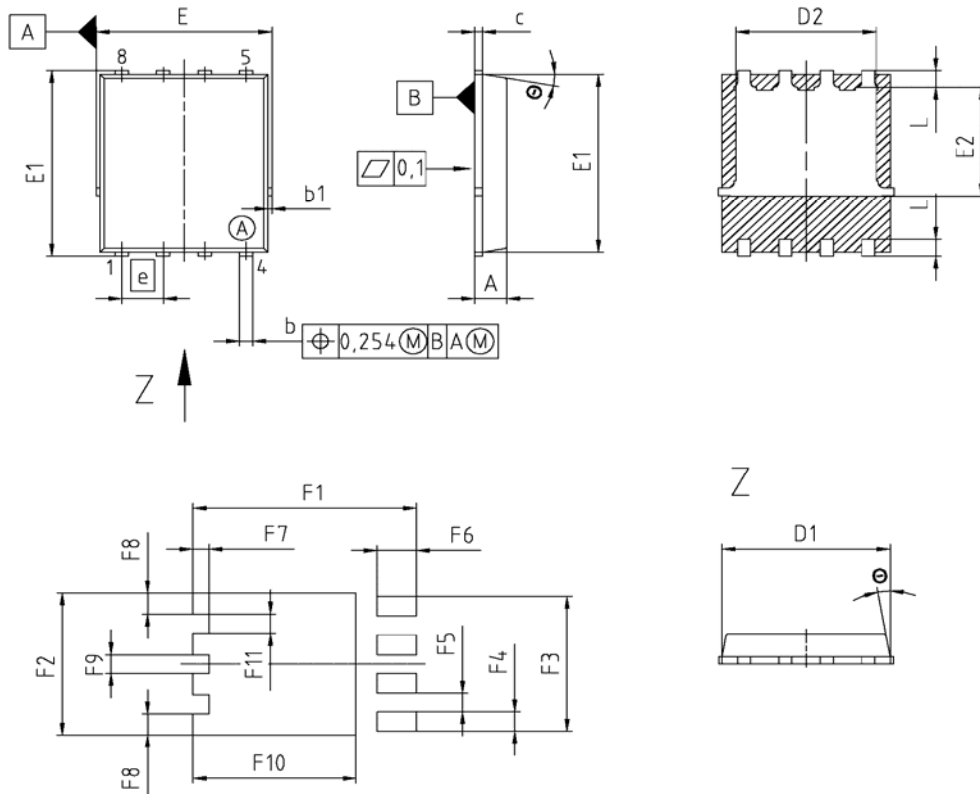


**16 Gate charge waveforms**



Package Outline

P-TDSON-8



| DIM      | MILLIMETERS |       | INCHES |       |
|----------|-------------|-------|--------|-------|
|          | MIN         | MAX   | MIN    | MAX   |
| A        | 0.900       | 1.100 | 0.035  | 0.043 |
| b        | 0.340       | 0.540 | 0.013  | 0.021 |
| b1       | 0.000       | 0.120 | 0.000  | 0.005 |
| c        | 0.150       | 0.350 | 0.006  | 0.014 |
| D        | 4.950       | 5.350 | 0.195  | 0.211 |
| D2       | 4.200       | 4.400 | 0.165  | 0.173 |
| E        | 5.950       | 6.350 | 0.234  | 0.250 |
| E1       | 5.700       | 6.100 | 0.224  | 0.240 |
| E2       | 3.658       | 4.058 | 0.144  | 0.160 |
| e        | 1.270       |       | 0.050  |       |
| N        | 8           |       | 8      |       |
| L        | 0.450       | 0.650 | 0.018  | 0.026 |
| $\theta$ | 9°          | 11°   | 9°     | 11°   |
| aaa      | 0.250       |       | 0.010  |       |
| eee      | 0.050       |       | 0.002  |       |
| F1       | 6.750       | 6.950 | 0.266  | 0.274 |
| F2       | 4.600       | 4.800 | 0.181  | 0.189 |
| F3       | 4.360       | 4.560 | 0.172  | 0.180 |
| F4       | 0.550       | 0.750 | 0.022  | 0.030 |
| F5       | 0.520       | 0.720 | 0.020  | 0.028 |
| F6       | 1.100       | 1.300 | 0.043  | 0.051 |
| F7       | 0.400       | 0.600 | 0.016  | 0.024 |
| F8       | 0.600       | 0.800 | 0.024  | 0.031 |
| F9       | 0.530       | 0.730 | 0.021  | 0.029 |
| F10      | 4.900       | 5.100 | 0.193  | 0.201 |
| F11      | 0.535       | 0.735 | 0.021  | 0.029 |

**REFERENCE**  
JEDEC / MO-240

**SCALE**

**EUROPEAN PROJECTION**

**ISSUE DATE**  
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**FILE**  
TDSON\_1





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