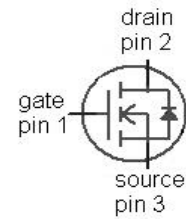
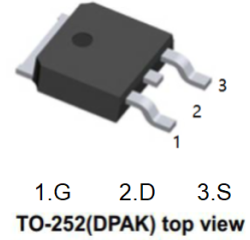


**Features**

- $V_{DS}(V) = 30V$
- $I_D = 50A$  ( $V_{GS} = 10V$ )
- $R_{DS(ON)} < 5m\Omega$  ( $V_{GS} = 10V$ )
- $R_{DS(ON)} < 7.3m\Omega$  ( $V_{GS} = 4.5V$ )



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

| Parameter                                     | Symbol        | Conditions   | Value    | Unit              |
|---|---------------|--|----------|-------------------|
| Continuous drain current                      | $I_D$         | $V_{GS} = 10\text{ V}, T_C = 25\text{ °C}$   | 50       | A                 |
|   |               | $V_{GS} = 10\text{ V}, T_C = 100\text{ °C}$  | 50       |                   |
|   |               | $V_{GS} = 4.5\text{ V}, T_C = 25\text{ °C}$  | 50       |                   |
|   |               | $V_{GS} = 4.5\text{ V}, T_C = 100\text{ °C}$   | 50       |                   |
| Pulsed drain current <sup>2)</sup>            | $I_{D,pulse}$ | $T_C = 25\text{ °C}$   | 350      |                   |
| Avalanche current, single pulse <sup>3)</sup> | $I_{AS}$      | $T_C = 25\text{ °C}$   | 50       |                   |
| Avalanche energy, single pulse                | $E_{AS}$      | $I_D = 35\text{ A}, R_{GS} = 25\text{ }\Omega$   | 60       | mJ                |
| Reverse diode $dv/dt$                         | $dv/dt$       | $I_D = 50\text{ A}, V_{DS} = 24\text{ V}, di/dt = 200\text{ A}/\mu\text{s}, T_{j,max} = 175\text{ °C}$ | 6        | kV/ $\mu\text{s}$ |
| Gate source voltage                           | $V_{GS}$      |  | $\pm 20$ | V                 |

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

| Parameter                                      | Symbol         | Conditions   | Value       |      |      | Unit          |
|--|----------------|--|-------------|------|------|---------------|
| Power dissipation                              | $P_{tot}$      | $T_C=25\text{ °C}$   | 68          |      |      | W             |
| Operating and storage temperature              | $T_j, T_{stg}$ |  | -55 ... 175 |      |      | °C            |
| IEC climatic category; DIN IEC 68-1            |                |  | 55/175/56   |      |      |               |
| Parameter                                      | Symbol         | Conditions   | Values      |      |      | Unit          |
|  |                |  | min.        | typ. | max. |               |
| Thermal resistance, junction - case            | $R_{thJC}$     |  |             |      | 2.2  | K/W           |
| SMD version, device on PCB                     | $R_{thJA}$     | minimal footprint  |             |      | 75   |               |
|  |                | 6 cm <sup>2</sup> cooling area <sup>4)</sup>               |             |      | 50   |               |
| Drain-source breakdown voltage                 | $V_{(BR)DSS}$  | $V_{GS}=0\text{ V}, I_D=1\text{ mA}$                       | 30          |      |      | V             |
| Gate threshold voltage                         | $V_{GS(th)}$   | $V_{DS}=V_{GS}, I_D=250\text{ }\mu\text{A}$                | 1           |      | 2.2  |               |
| Zero gate voltage drain current                | $I_{DSS}$      | $V_{DS}=30\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$  |             | 0.1  | 1    | $\mu\text{A}$ |
|  |                | $V_{DS}=30\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ °C}$ |             | 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 <sup>5)</sup> | $R_{DS(on)}$   | $V_{GS}=4.5\text{ V}, I_D=30\text{ A}$                     |             | 5.8  | 7.3  | m $\Omega$    |
|  |                | $V_{GS}=10\text{ V}, I_D=30\text{ A}$                      |             | 4.2  | 5    |               |
| Gate resistance                                | $R_G$          |  |             | 1.5  |      | $\Omega$      |
| Transconductance                               | $g_{fs}$       | $ V_{DS} >2 I_D R_{DS(on)max}, I_D=30\text{ A}$            | 38          | 77   |      | S             |

<sup>1)</sup> See figure 3 for more detailed information

<sup>2)</sup> See figure 13 for more detailed information

<sup>3)</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>4)</sup> Measured from drain tab to source pin

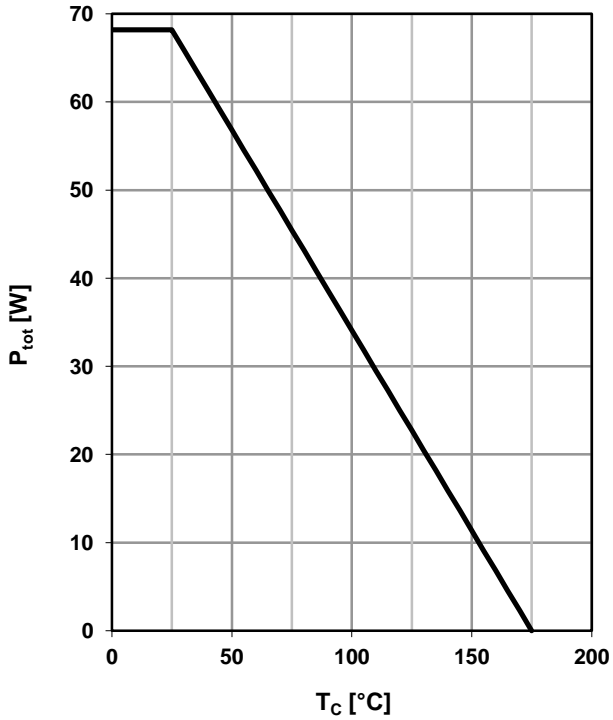
**Dynamic characteristics**

| Parameter                        | Symbol        | Conditions  | Values |      |      | Unit |
|----------------------------------|---------------|---|--------|------|------|------|
|                                  |               |   | min.   | typ. | max. |      |
| Input capacitance                | $C_{iss}$     | $V_{GS}=0\text{ V}, V_{DS}=15\text{ V},$<br>$f=1\text{ MHz}$                          |        | 2400 | 3200 | pF   |
| Output capacitance               | $C_{oss}$     |   |        | 920  | 1200 |      |
| Reverse transfer capacitance     | $C_{rss}$     |   |        | 49   |      |      |
| Turn-on delay time               | $t_{d(on)}$   | $V_{DD}=15\text{ V}, V_{GS}=10\text{ V},$<br>$I_D=30\text{ A}, R_{G,ext}=1.6\ \Omega$ |        | 6.7  |      | ns   |
| Rise time                        | $t_r$         |   |        | 13   |      |      |
| Turn-off delay time              | $t_{d(off)}$  |   |        | 25   |      |      |
| Fall time                        | $t_f$         |   |        | 3.8  |      |      |
| Gate to source charge            | $Q_{gs}$      | $V_{DD}=15\text{ V}, I_D=30\text{ A},$<br>$V_{GS}=0\text{ to }4.5\text{ V}$           |        | 7.4  |      | nC   |
| Gate charge at threshold         | $Q_{g(th)}$   |   |        | 3.8  |      |      |
| Gate to drain charge             | $Q_{gd}$      |   |        | 3.5  |      |      |
| Switching charge                 | $Q_{sw}$      |   |        | 7.1  |      |      |
| Gate charge total                | $Q_g$         |   |        | 15   | 20   |      |
| Gate plateau voltage             | $V_{plateau}$ |   |        | 3.1  |      |      |
| Gate charge total                | $Q_g$         | $V_{DD}=15\text{ V}, I_D=30\text{ A},$<br>$V_{GS}=0\text{ to }10\text{ V}$            |        | 31   |      | nC   |
| Gate charge total, sync. FET     | $Q_{g(sync)}$ | $V_{DS}=0.1\text{ V},$<br>$V_{GS}=0\text{ to }4.5\text{ V}$                           |        | 13   | 17   |      |
| Output charge                    | $Q_{oss}$     | $V_{DD}=15\text{ V}, V_{GS}=0\text{ V}$   |        | 24   |      |      |
| Diode continuous forward current | $I_S$         | $T_C=25\text{ }^\circ\text{C}$  |        |      | 50   | A    |
| Diode pulse current              | $I_{S,pulse}$ |   |        |      | 350  |      |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=30\text{ A},$<br>$T_j=25\text{ }^\circ\text{C}$               |        | 0.86 | 1.1  | V    |
| Reverse recovery charge          | $Q_{rr}$      | $V_R=15\text{ V}, I_F=I_S,$<br>$di_F/dt=400\text{ A}/\mu\text{s}$                     |        |      | 15   | nC   |

<sup>6)</sup> See figure 16 for gate charge parameter definition

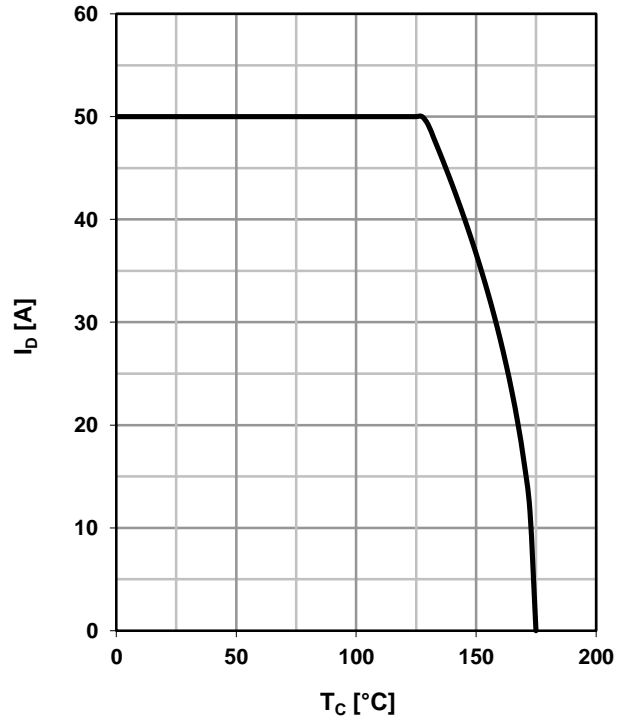
**1 Power dissipation**

$P_{tot}=f(T_C)$



**2 Drain current**

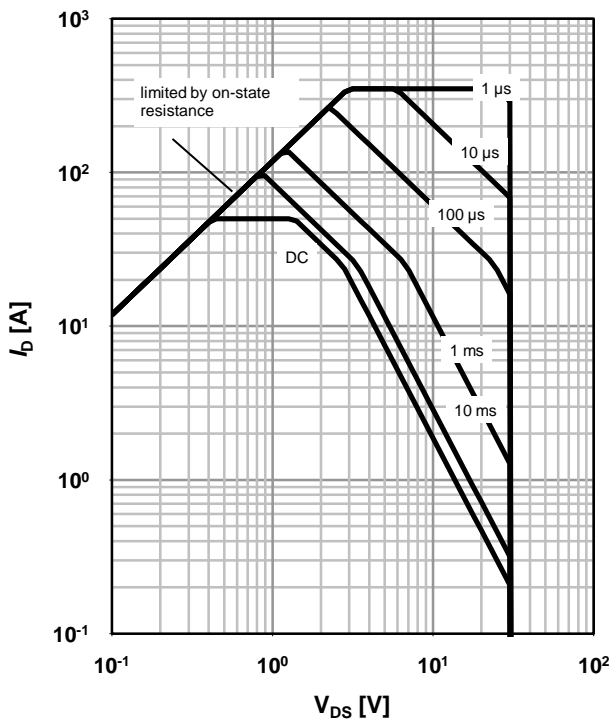
$I_D=f(T_C); V_{GS} \geq 10V$



**3 Safe operating area**

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

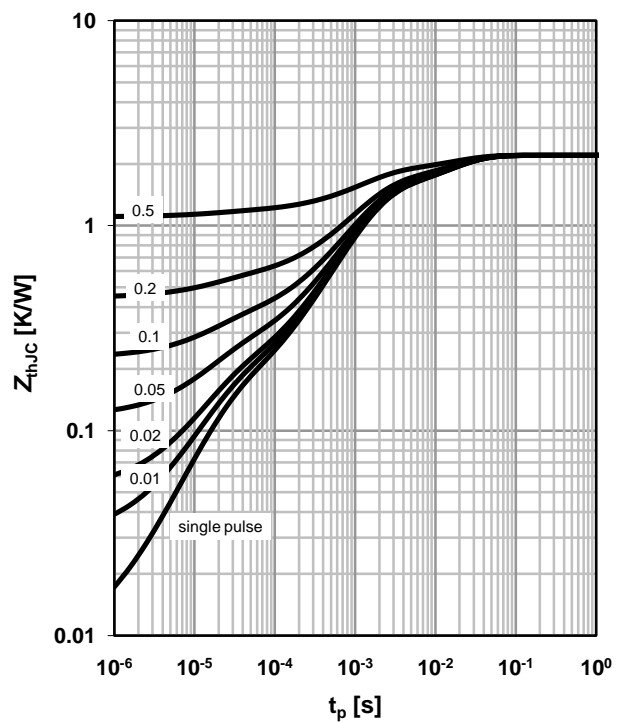
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJC}=f(t_p)$

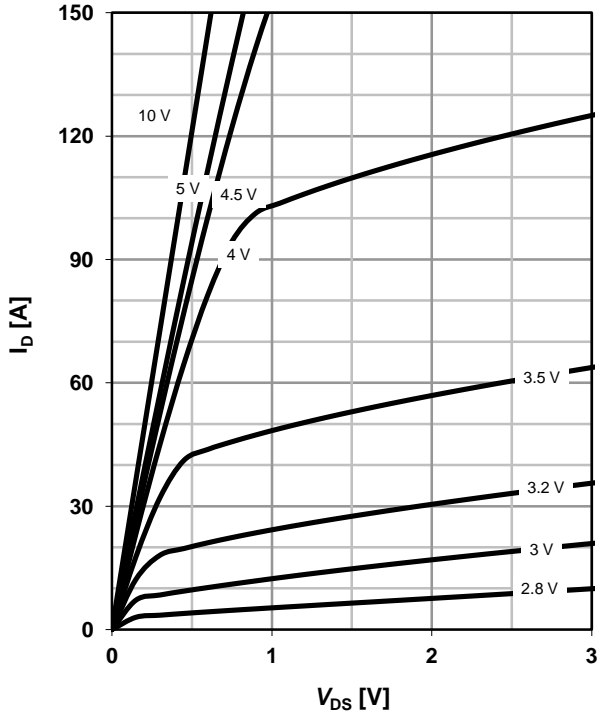
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

$I_D = f(V_{DS}); T_j = 25\text{ °C}$

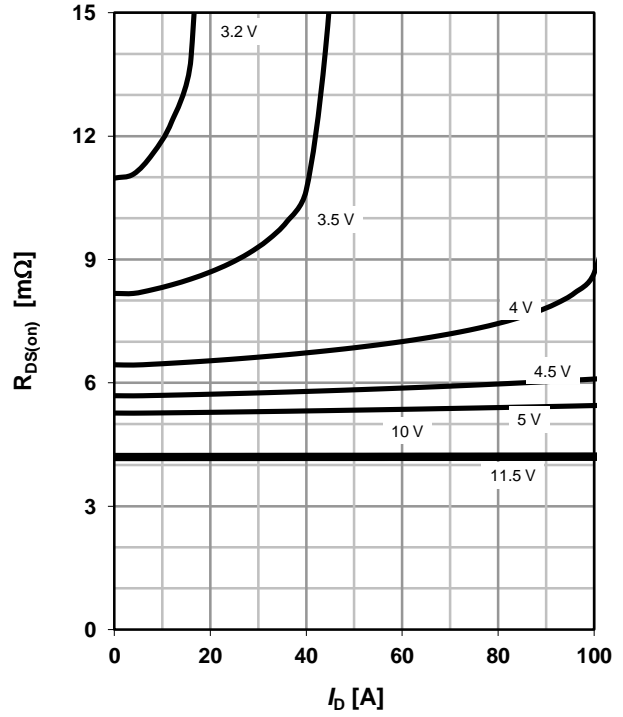
parameter:  $V_{GS}$



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

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

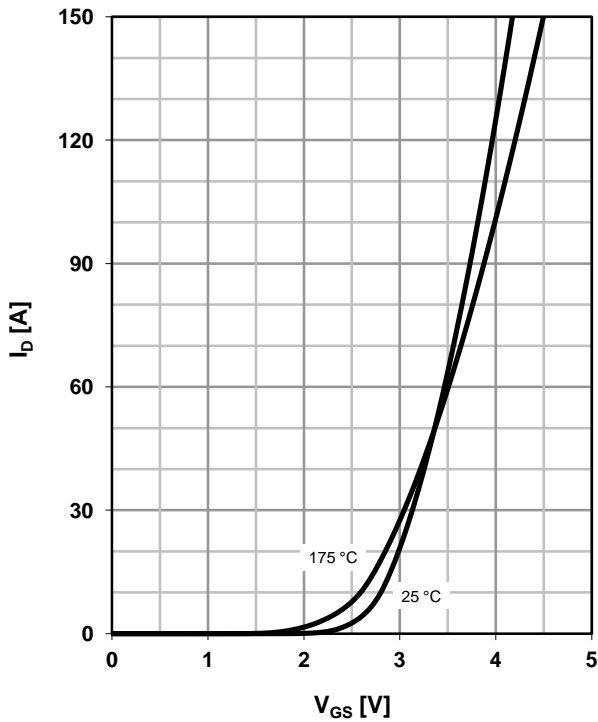
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

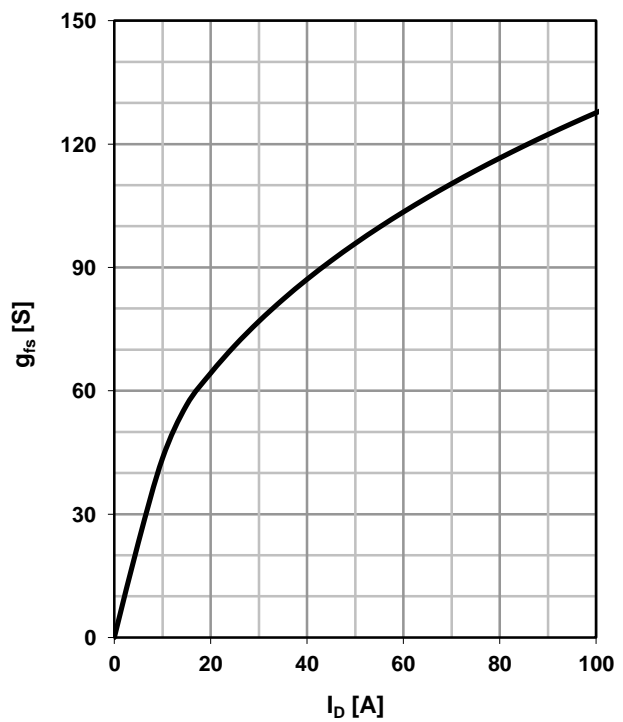
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



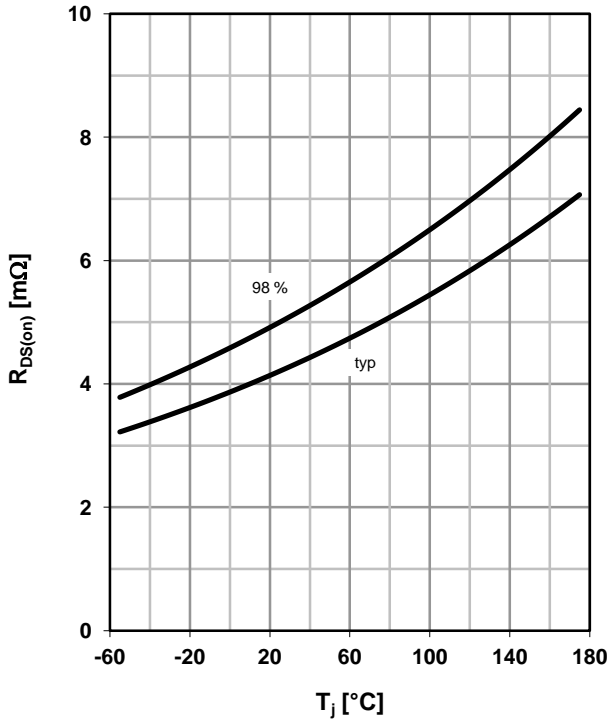
**8 Typ. forward transconductance**

$g_{fs} = f(I_D); T_j = 25\text{ °C}$



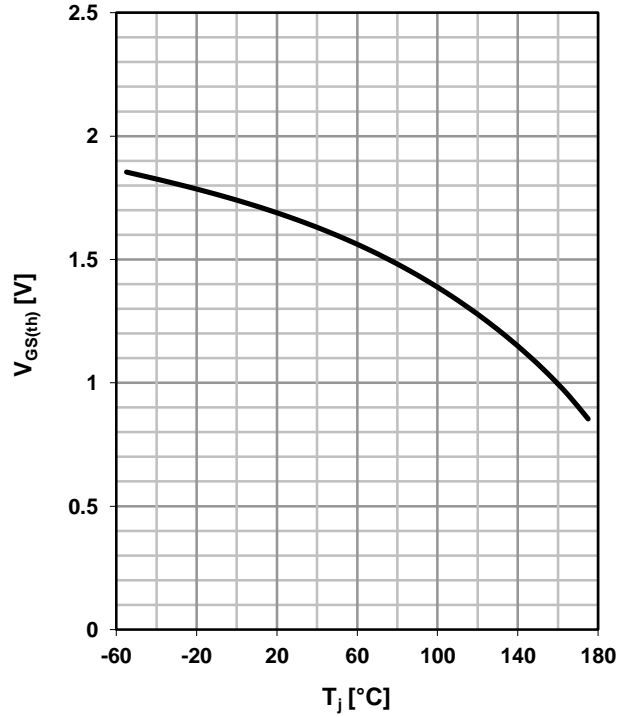
**9 Drain-source on-state resistance**

$R_{DS(on)}=f(T_j); I_D=30\text{ A}; V_{GS}=10\text{ V}$



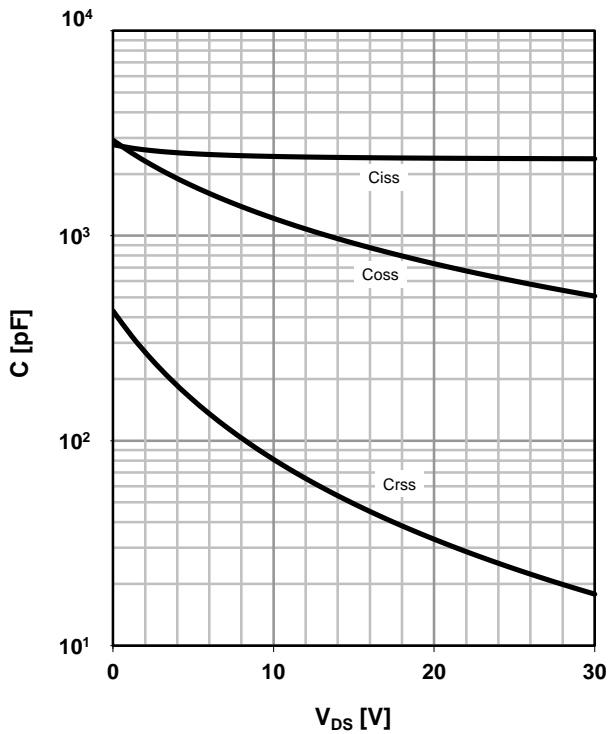
**10 Typ. gate threshold voltage**

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



**11 Typ. capacitances**

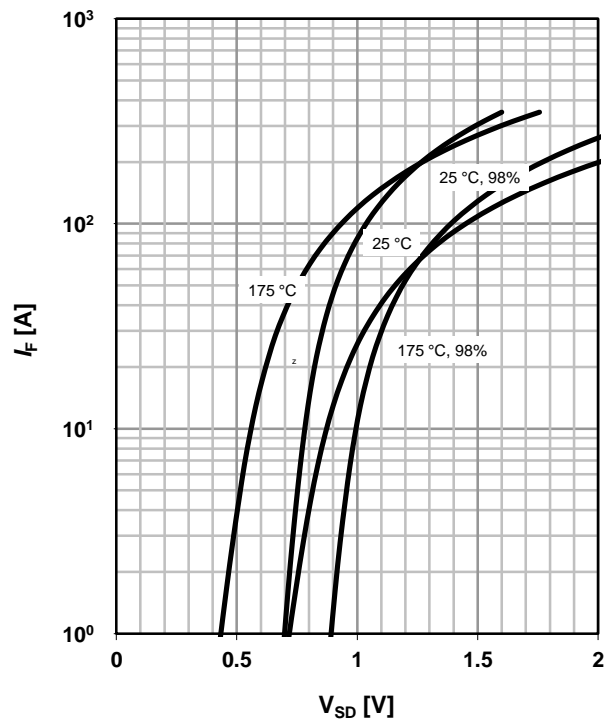
$C=f(V_{DS}); V_{GS}=0\text{ V}; f=1\text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F=f(V_{SD})$

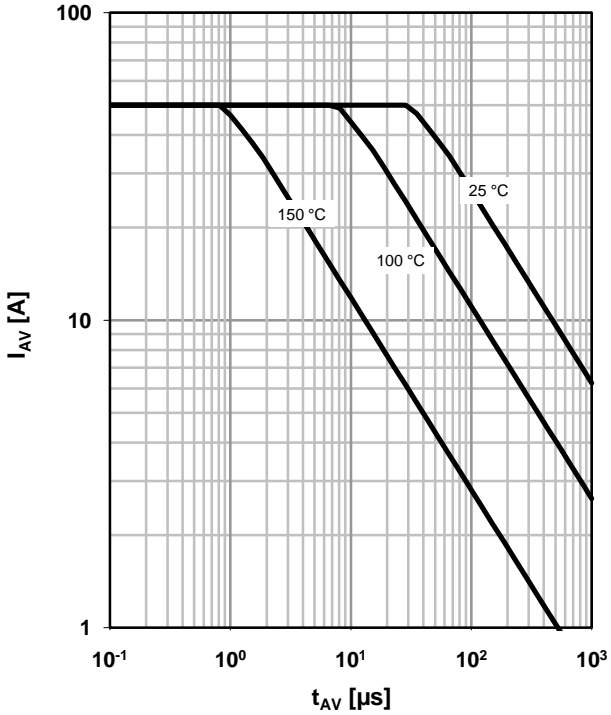
parameter:  $T_j$



**13 Avalanche characteristics**

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

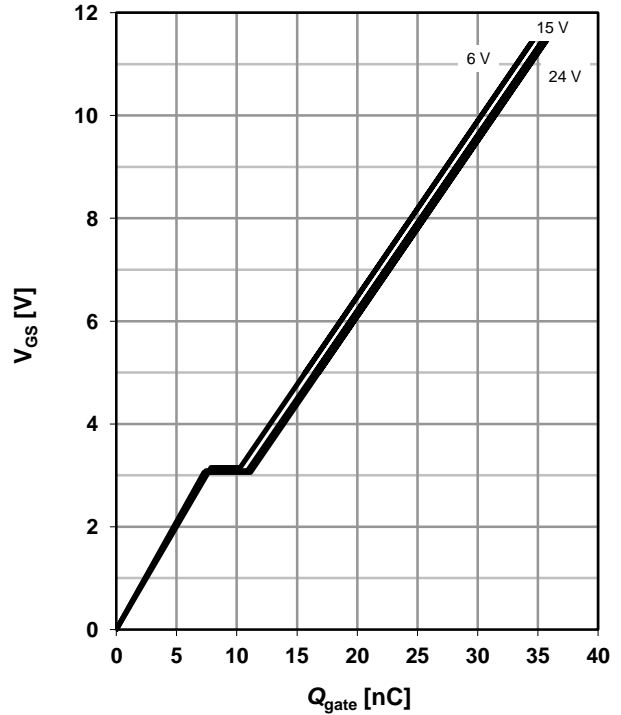
parameter:  $T_{j(\text{start})}$



**14 Typ. gate charge**

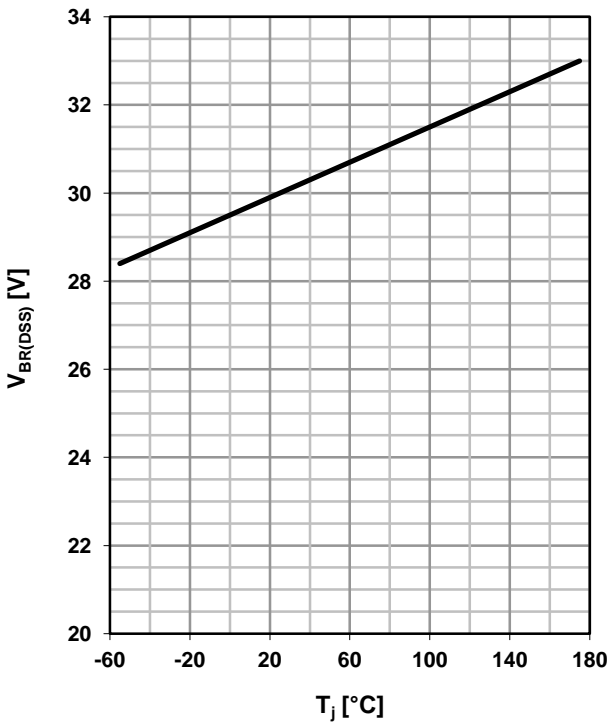
$V_{GS}=f(Q_{\text{gate}}); I_D=30\ \text{A pulsed}$

parameter:  $V_{DD}$

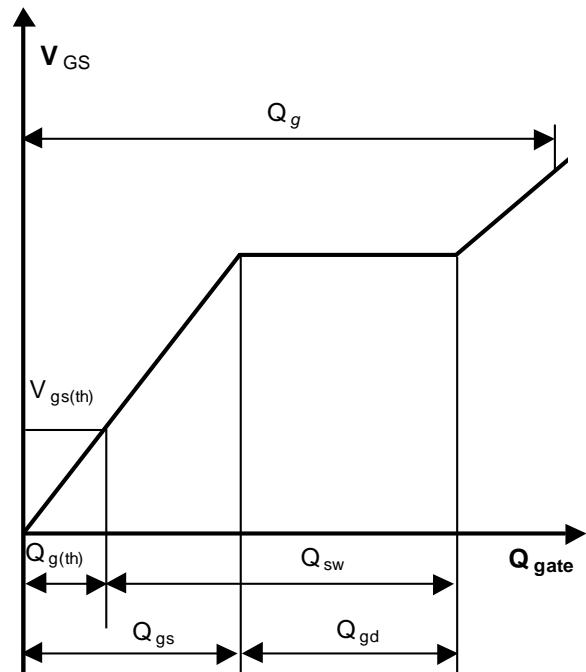


**15 Drain-source breakdown voltage**

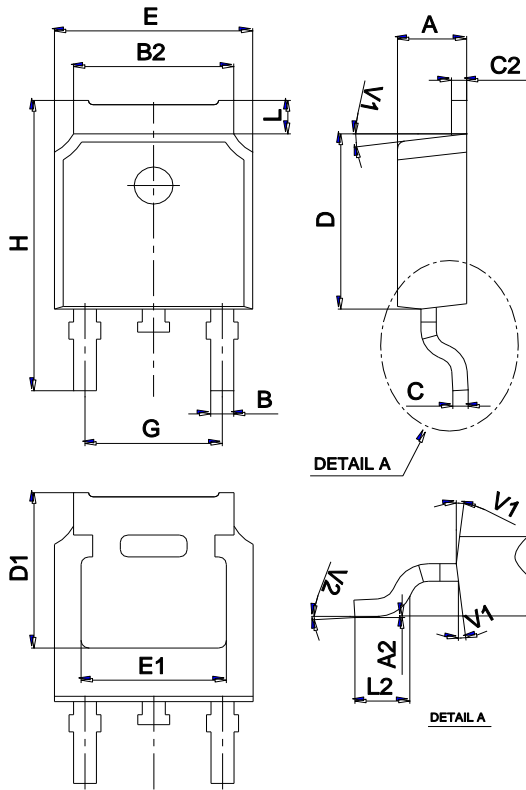
$V_{BR(DSS)}=f(T_j); I_D=1\ \text{mA}$



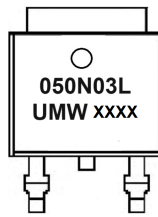
**16 Gate charge waveforms**



Package Mechanical Data TO-252



| Ref. | Dimensions  |      |       |          |      |       |
|------|-------------|------|-------|----------|------|-------|
|      | Millimeters |      |       | Inches   |      |       |
|      | Min.        | Typ. | Max.  | Min.     | Typ. | Max.  |
| A    | 2.10        |      | 2.50  | 0.083    |      | 0.098 |
| A2   | 0           |      | 0.10  | 0        |      | 0.004 |
| B    | 0.66        |      | 0.86  | 0.026    |      | 0.034 |
| B2   | 5.18        |      | 5.48  | 0.202    |      | 0.216 |
| C    | 0.40        |      | 0.60  | 0.016    |      | 0.024 |
| C2   | 0.44        |      | 0.58  | 0.017    |      | 0.023 |
| D    | 5.90        |      | 6.30  | 0.232    |      | 0.248 |
| D1   | 5.30REF     |      |       | 0.209REF |      |       |
| E    | 6.40        |      | 6.80  | 0.252    |      | 0.268 |
| E1   | 4.63        |      |       | 0.182    |      |       |
| G    | 4.47        |      | 4.67  | 0.176    |      | 0.184 |
| H    | 9.50        |      | 10.70 | 0.374    |      | 0.421 |
| L    | 1.09        |      | 1.21  | 0.043    |      | 0.048 |
| L2   | 1.35        |      | 1.65  | 0.053    |      | 0.065 |
| V1   |             | 7°   |       |          | 7°   |       |
| V2   | 0°          |      | 6°    | 0°       |      | 6°    |



Ordering information

| Order code           | Package | Baseqty | Deliverymode  |
|----------------------|---------|---------|---------------|
| UMW IPD050N03LGATMA1 | TO-252  | 2500    | Tape and reel |



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