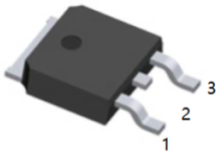
## Features

- Deal for high frequency switching
- Optimized technology for DC / DC converters
- Excellent gate charge x RDS ( on ) product ( FOM )
- Very low on-resistance RDS ( on )

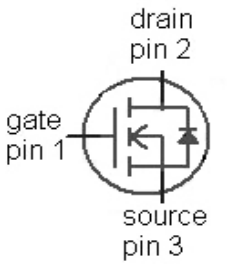



1.G 2.D 3.S

**TO-252(DPAK) top view**

## Product Summary

- $V_{DS}$(V) = 60V
- $I_D$ = 50A ($V_{GS}$= 10V)
- $R_{DS(ON)}$ < 8.8mΩ ($V_{GS}$ = 10V)




**MAXIMUM RATINGS** ($T_J$ = 25°C unless otherwise specified)

| Parameter | Symbol | Conditions | Value | Unit |
|---|---|---|---|---|
| Continuous drain current | $I_D$ | $T_C$=25 °C[2)] | 50 | A |
| | | $T_C$=100 °C | 47 | |
| Pulsed drain current[3)] | $I_{D,pulse}$ | $T_C$=25 °C | 200 | |
| Avalanche energy, single pulse[4)] | $E_{AS}$ | $I_D$=50 A, $R_{GS}$=25 Ω | 43 | mJ |
| Gate source voltage | $V_{GS}$ | | ±20 | V |
| Power dissipation | $P_{tot}$ | $T_C$=25 °C | 71 | W |
| Operating and storage temperature | $T_j$, $T_{stg}$ | | -55 ... 175 | °C |
| IEC climatic category; DIN IEC 68-1 | | | 55/175/56 | |

[1)] J-STD20 and JESD22

[2)] Current is limited by bondwire; with an $R_{thJC}$=2.1 K/W the chip is able to carry 67 A.

[3)] See figure 3 for more detailed information

[4)] See figure 13 for more detailed information

**Electrical characteristics,** at $T_j$=25°C, unless otherwise specified

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| Thermal resistance, junction - case | $R_{thJC}$ | | | | 2.1 | K/W |
| Thermal resistance, junction - ambient | $R_{thJA}$ | minimal footprint | | | 62 | |
| | | 6 cm² cooling area[4)] | | | 40 | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$=0 V, $I_D$=1 mA | 60 | | | |
| V Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=34 µA | 2 | 3 | 4 | |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$=60 V, $V_{GS}$=0 V, $T_j$=25 °C | | 0.1 | 1 | µA |
| | | $V_{DS}$=60 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 | | 1 | 100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}$=10 V, $I_D$=50 A | | 7.1 | 8.8 | mΩ |
| Gate resistance | $R_G$ | | | 0.9 | | Ω |
| Transconductance | $g_{fs}$ | $\|V_{DS}\|>2\|I_D\|R_{DS(on)max}$, $I_D$=50 A | 29 | 57 | | S |

[4)] Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.

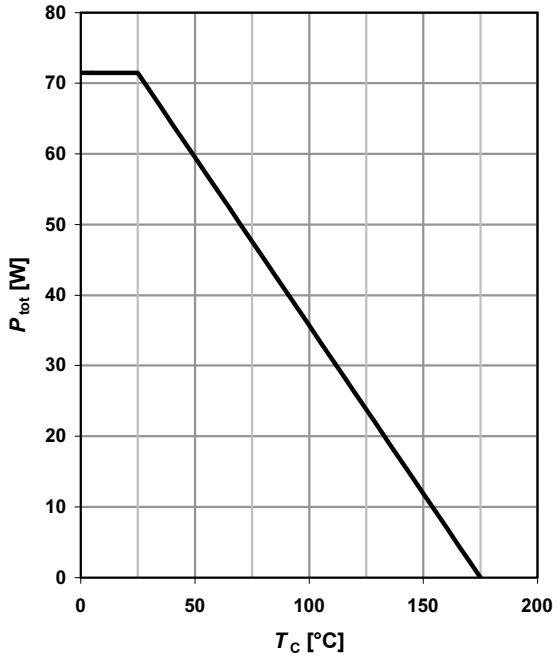
**Dynamic characteristics**

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| Input capacitance | $C_{iss}$ | $V_{GS}$=0 V, $V_{DS}$=30 V, $f$=1 MHz | | 2900 | 3900 | pF |
| Output capacitance | $C_{oss}$ | | | 640 | 850 | |
| Reverse transfer capacitance | $C_{rss}$ | | | 23 | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=30 V, $V_{GS}$=10 V, $I_D$=45 A, $R_G$=3.5 Ω | | 15 | | ns |
| Rise time | $t_r$ | | | 40 | | |
| Turn-off delay time | $t_{d(off)}$ | | | 20 | | |
| Fall time | $t_f$ | | | 5 | | |
| Gate to source charge | $Q_{gs}$ | $V_{DD}$=30 V, $I_D$=50 A, $V_{GS}$=0 to 10 V | | 16 | | nC |
| Gate to drain charge | $Q_{gd}$ | | | 3 | | |
| Switching charge | $Q_{sw}$ | | | 11 | | |
| Gate charge total | $Q_g$ | | | 36 | 48 | |
| Gate plateau voltage | $V_{plateau}$ | | | 5.6 | | V |
| Output charge | $Q_{oss}$ | $V_{DD}$=30 V, $V_{GS}$=0 V | | 29 | 38 | nC |
| Diode continous forward current | $I_S$ | $T_C$=25 °C | | | 50 | A |
| Diode pulse current | $I_{S,pulse}$ | | | | 200 | |
| Diode forward voltage | $V_{SD}$ | $V_{GS}$=0 V, $I_F$=50 A, $T_j$=25 °C | | 1.0 | 1.2 | V |
| Reverse recovery time | $t_{rr}$ | $V_R$=30 V, $I_F$=45A, $di_F/dt$=100 A/µs | | 45 | | ns |
| Reverse recovery charge | $Q_{rr}$ | | | 40 | | nC |

[5] See figure 16 for gate charge parameter definition

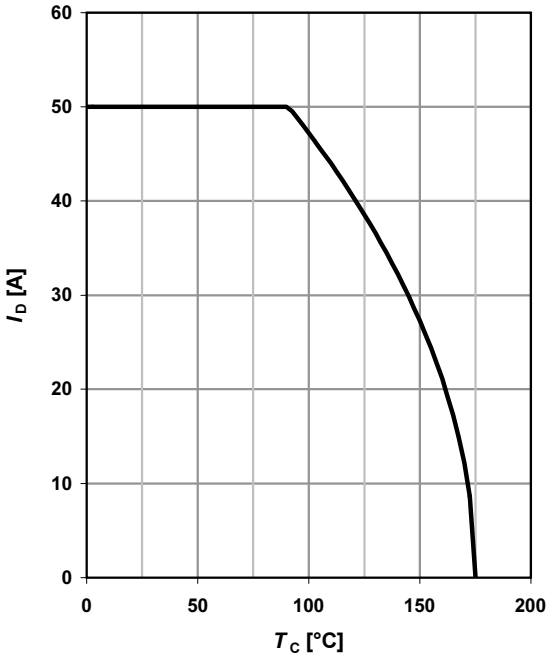
**1 Power dissipation**

$P_{tot}$=f($T_C$)




**2 Drain current**

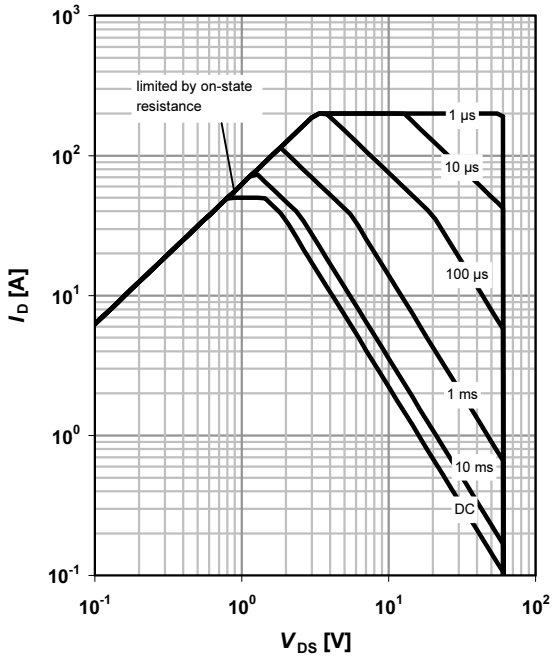
$I_D$=f($T_C$); $V_{GS}$≥10 V




**3 Safe operating area**

$I_D$=f($V_{DS}$); $T_C$=25 °C; $D$=0

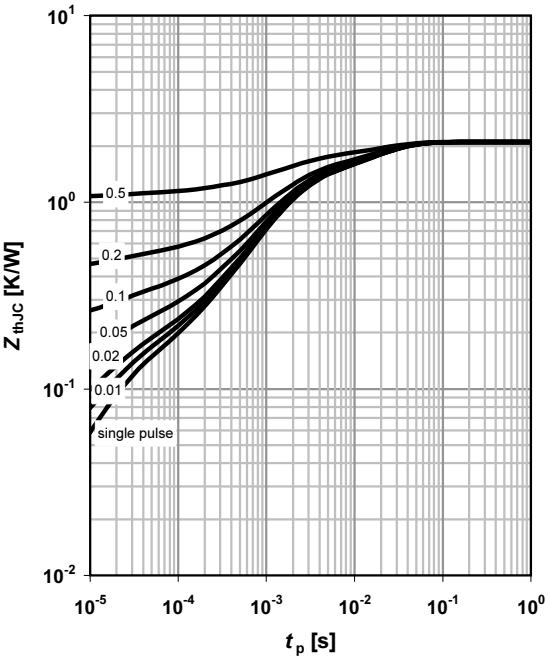
parameter: $t_p$




**4 Max. transient thermal impedance**

$Z_{thJC}$=f($t_p$)

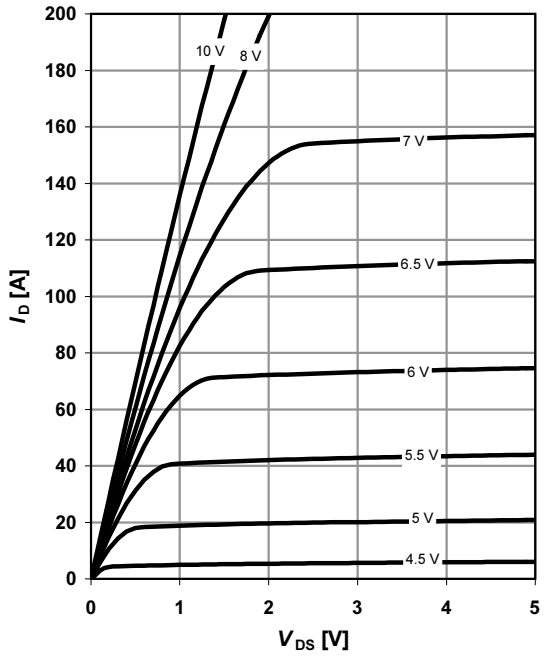
parameter: $D$=$t_p$/$T$



**5 Typ. output characteristics**

$I_D$=f($V_{DS}$); $T_j$=25 °C

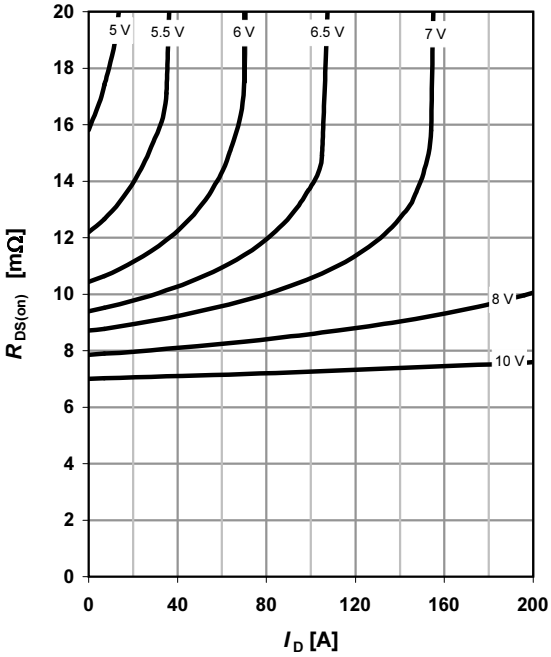
parameter: $V_{GS}$




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

$R_{DS(on)}$=f($I_D$); $T_j$=25 °C

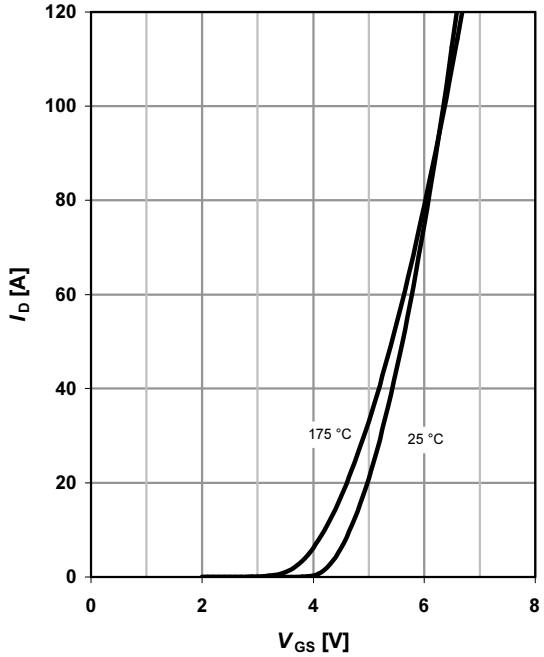
parameter: $V_{GS}$




**7 Typ. transfer characteristics**

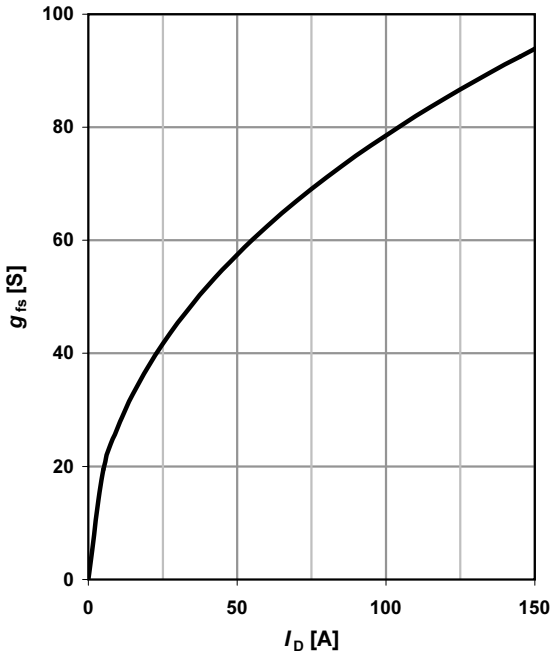
$I_D$=f($V_{GS}$); $|V_{DS}|>2|I_D|R_{DS(on)max}$

parameter: $T_j$



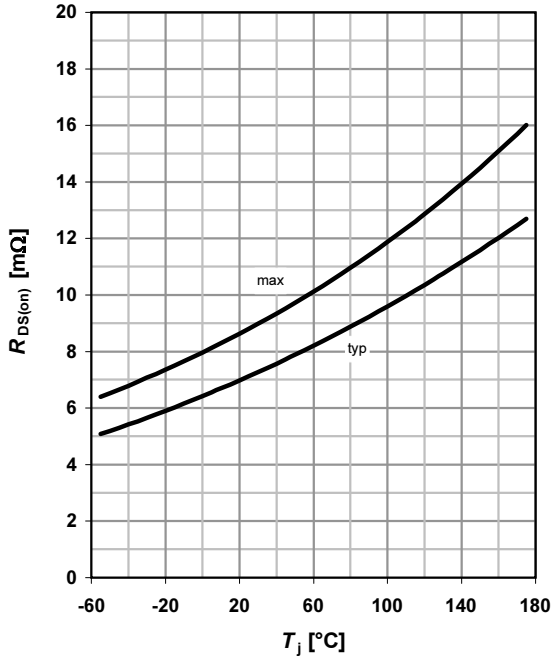

**8 Typ. forward transconductance**

$g_{fs}$=f($I_D$); $T_j$=25 °C



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

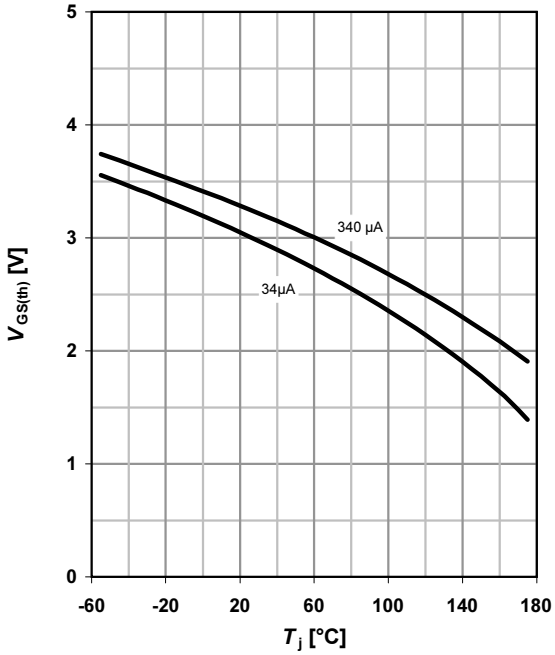
$R_{DS(on)}$=f($T_j$); $I_D$=50 A; $V_{GS}$=10 V




**10 Typ. gate threshold voltage**

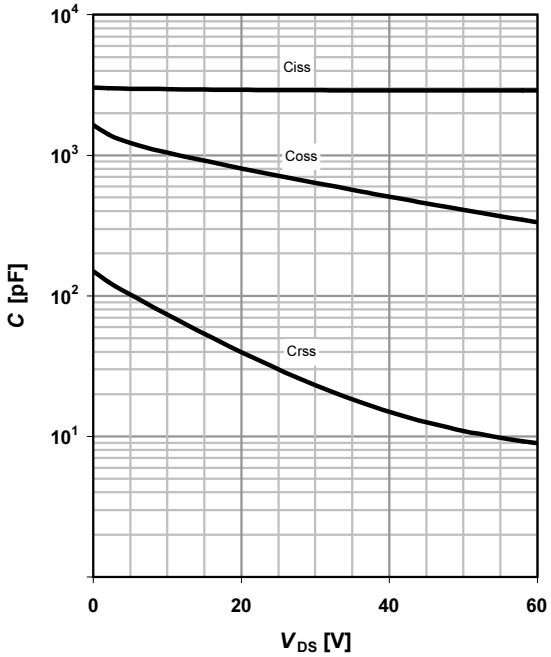
$V_{GS(th)}$=f($T_j$); $V_{GS}$=$V_{DS}$

parameter: $I_D$




**11 Typ. capacitances**

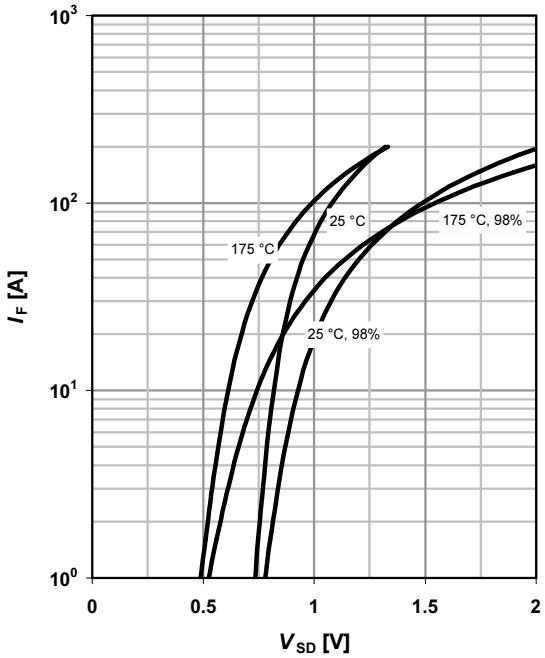
$C$=f($V_{DS}$); $V_{GS}$=0 V; $f$=1 MHz




**12 Forward characteristics of reverse diode**

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

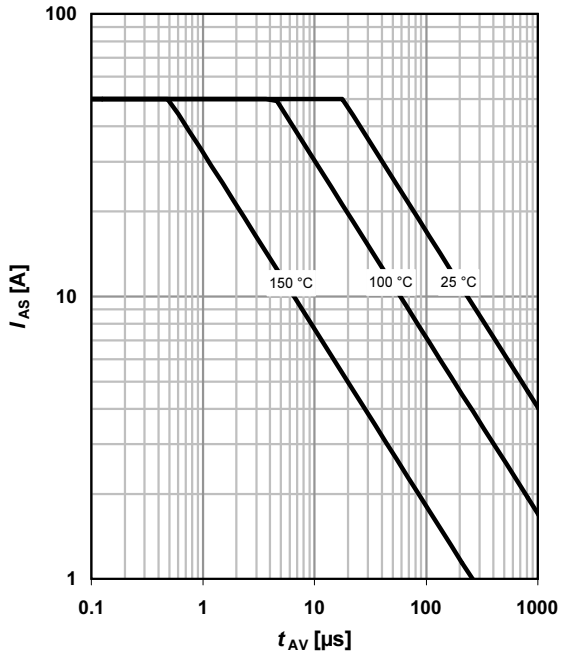
parameter: $T_j$



### 13 Avalanche characteristics

$I_{AS}$=f($t_{AV}$); $R_{GS}$=25 Ω

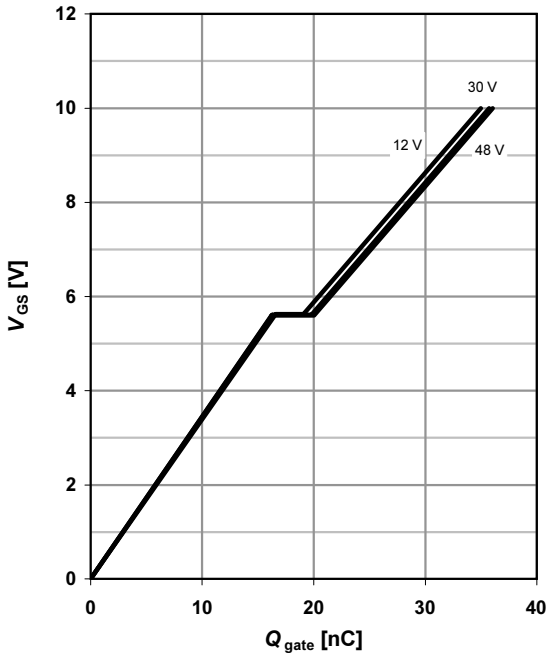
parameter: $T_{j(start)}$




### 14 Typ. gate charge

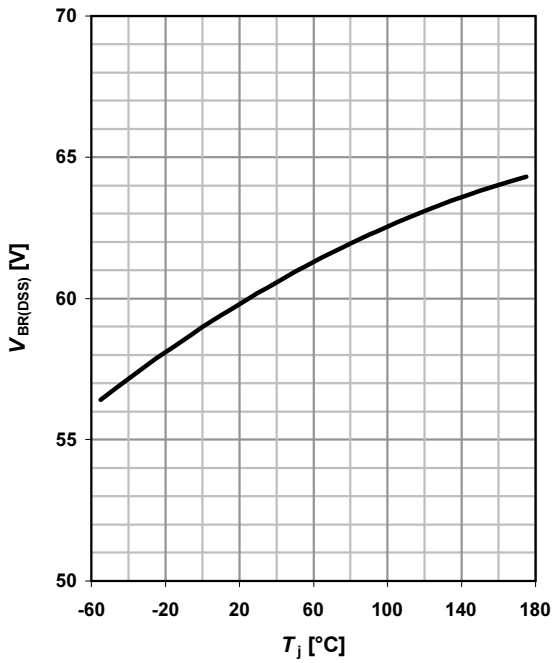
$V_{GS}$=f($Q_{gate}$); $I_D$=50 A pulsed

parameter: $V_{DD}$

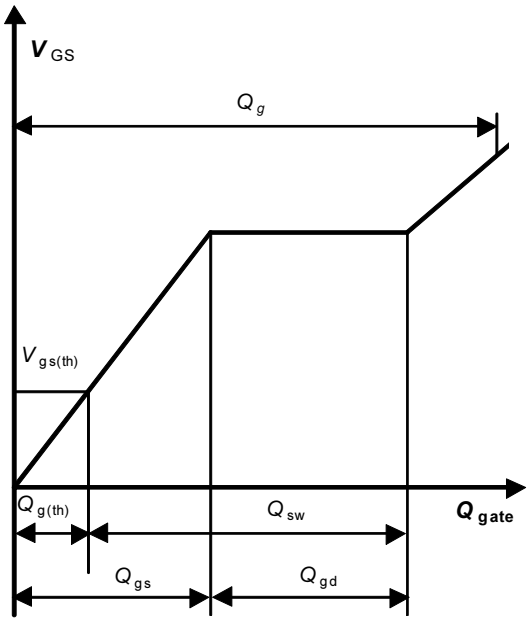



### 15 Drain-source breakdown voltage

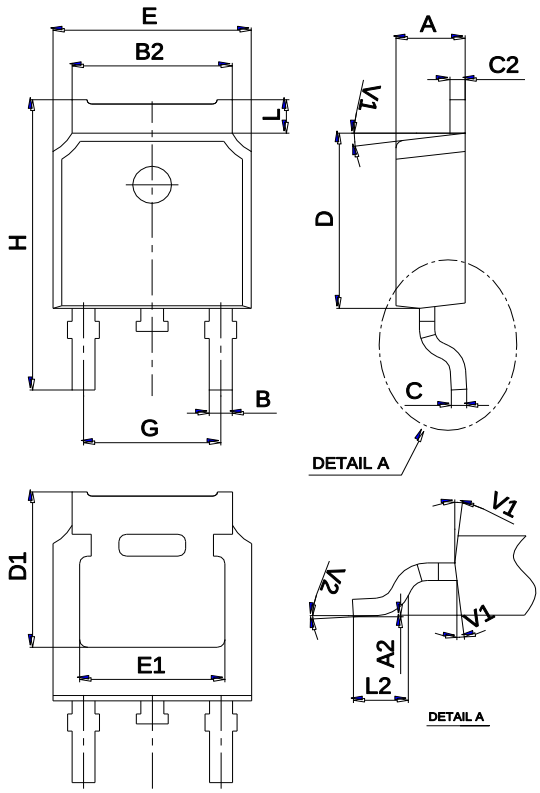
$V_{BR(DSS)}$=f($T_j$); $I_D$=1 mA




### 16 Gate charge waveforms



## Package 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 IPD088N06N3G | TO-252 | 2500 | Tape and reel |

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