

## General Description

The MY150N03NE5 uses Fast switching MOSFET for SMPS Very low on-resistance  $R_{DS(on)}$  and Optimized technology for DC/DC converters.

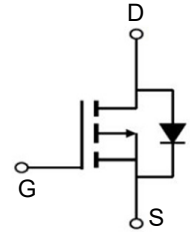
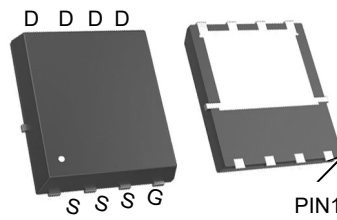


## Features

|                                  |     |            |
|----------------------------------|-----|------------|
| $V_{DSS}$                        | 30  | V          |
| $I_D$                            | 150 | A          |
| $R_{DS(ON)}$ (at $V_{GS}=10V$ )  | 1.3 | m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=4.5V$ ) | 1.8 | m $\Omega$ |

## Application

- logic level
- Superior thermal resistance
- 100 valanche tested
- P-free plating



## Package Marking and Ordering Information

| Product ID  | Pack       | Marking | Qty(PCS) |
|-------------|------------|---------|----------|
| MY150N03NE5 | PDFN5*6-8L | NULL    | 5000     |

## Absolute Maximum Ratings ( $T_J=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter                                      | Symbol        | Conditions                                                                 | Value    | Unit |
|------------------------------------------------|---------------|----------------------------------------------------------------------------|----------|------|
| Continuous drain current                       | $I_D$         | $V_{GS}=10\text{ V}, T_C=25^{\circ}\text{C}$                               | 150      | A    |
|                                                |               | $V_{GS}=10\text{ V}, T_C=100^{\circ}\text{C}$                              | 120      |      |
|                                                |               | $V_{GS}=4.5\text{ V}, T_C=25^{\circ}\text{C}$                              | 100      |      |
|                                                |               | $V_{GS}=4.5\text{ V}, T_C=100^{\circ}\text{C}$                             | 100      |      |
|                                                |               | $V_{GS}=10\text{ V}, T_A=25^{\circ}\text{C}, R_{thJA}=50\text{ K/W}^{(2)}$ | 31       |      |
| Pulsed drain current <sup>(3)</sup>            | $I_{D,pulse}$ | $T_C=25^{\circ}\text{C}$                                                   | 400      | mJ   |
| Avalanche current, single pulse <sup>(4)</sup> | $I_{AS}$      | $T_C=25^{\circ}\text{C}$                                                   | 50       |      |
| Avalanche energy, single pulse                 | $E_{AS}$      | $I_D=50\text{ A}, R_{GS}=25\text{ }\Omega$                                 | 295      |      |
| Gate source voltage                            | $V_{GS}$      |                                                                            | $\pm 20$ | V    |

**Electrical Characteristics ( $T_J=25\text{ }^{\circ}\text{C}$ , unless otherwise noted)**

| Parameter                           | Symbol                | Conditions                                                               | Value       | Unit               |
|-------------------------------------|-----------------------|--------------------------------------------------------------------------|-------------|--------------------|
| Power dissipation                   | $P_{\text{tot}}$      | $T_C=25\text{ }^{\circ}\text{C}$                                         | 139         | W                  |
|                                     |                       | $T_A=25\text{ }^{\circ}\text{C}$ ,<br>$R_{\text{thJA}}=50\text{ K/W}^2)$ | 2.5         |                    |
| Operating and storage temperature   | $T_J, T_{\text{stg}}$ |                                                                          | -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 | $R_{\text{thJC}}$ | bottom                                       | - | - | 0.9 | K/W |
|                                     |                   | top                                          |   |   | 20  |     |
| Device on PCB                       | $R_{\text{thJA}}$ | 6 cm <sup>2</sup> cooling area <sup>2)</sup> | - | - | 50  |     |

**Electrical characteristics, at  $T_J=25\text{ }^{\circ}\text{C}$ , unless otherwise specified**

**Static characteristics**

|                                  |                             |                                                                                        |     |     |     |               |
|----------------------------------|-----------------------------|----------------------------------------------------------------------------------------|-----|-----|-----|---------------|
| Drain-source breakdown voltage   | $V_{(\text{BR})\text{DSS}}$ | $V_{\text{GS}}=0\text{ V}, I_{\text{D}}=1\text{ mA}$                                   | 30  | -   | -   | V             |
| Gate threshold voltage           | $V_{\text{GS(th)}}$         | $V_{\text{DS}}=V_{\text{GS}}, I_{\text{D}}=85\text{ }\mu\text{A}$                      | 1.2 | -   | 2   |               |
| Zero gate voltage drain current  | $I_{\text{DSS}}$            | $V_{\text{DS}}=40\text{ V}, V_{\text{GS}}=0\text{ V}, T_J=25\text{ }^{\circ}\text{C}$  | -   | 0.1 | 1   | $\mu\text{A}$ |
|                                  |                             | $V_{\text{DS}}=40\text{ V}, V_{\text{GS}}=0\text{ V}, T_J=125\text{ }^{\circ}\text{C}$ | -   | 10  | 100 |               |
| Gate-source leakage current      | $I_{\text{GSS}}$            | $V_{\text{GS}}=20\text{ V}, V_{\text{DS}}=0\text{ V}$                                  | -   | 10  | 100 | nA            |
| Drain-source on-state resistance | $R_{\text{DS(on)}}$         | $V_{\text{GS}}=4.5\text{ V}, I_{\text{D}}=50\text{ A}$                                 | -   | 1.8 | 2.3 | m $\Omega$    |
|                                  |                             | $V_{\text{GS}}=10\text{ V}, I_{\text{D}}=50\text{ A}$                                  | -   | 1.3 | 1.6 |               |
| Gate resistance                  | $R_{\text{G}}$              |                                                                                        | -   | 1.5 | -   | $\Omega$      |
| Transconductance                 | $g_{\text{fs}}$             | $ V_{\text{DS}} >2 I_{\text{D}} R_{\text{DS(on)max}}, I_{\text{D}}=50\text{ A}$        | 95  | 190 | -   | S             |

<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 for more detailed information

<sup>4)</sup> See figure 13 for more detailed information

| Parameter | Symbol | Conditions | Values |      |      | Unit |
|-----------|--------|------------|--------|------|------|------|
|           |        |            | min.   | typ. | max. |      |

#### Dynamic characteristics

|                              |              |                                                                            |   |      |       |    |
|------------------------------|--------------|----------------------------------------------------------------------------|---|------|-------|----|
| Input capacitance            | $C_{iss}$    | $V_{GS}=0\text{ V}, V_{DS}=20\text{ V}, f=1\text{ MHz}$                    | - | 8900 | 12000 | pF |
| Output capacitance           | $C_{oss}$    |                                                                            | - | 1800 | 2400  |    |
| Reverse transfer capacitance | $C_{rss}$    |                                                                            | - | 100  | -     |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD}=20\text{ V}, V_{GS}=10\text{ V}, I_D=30\text{ A}, R_G=1.6\ \Omega$ | - | 14   | -     | ns |
| Rise time                    | $t_r$        |                                                                            | - | 7.6  | -     |    |
| Turn-off delay time          | $t_{d(off)}$ |                                                                            | - | 56   | -     |    |
| Fall time                    | $t_f$        |                                                                            | - | 9.4  | -     |    |

#### Gate Charge Characteristics<sup>5)</sup>

|                              |               |                                                                        |   |     |     |    |
|------------------------------|---------------|------------------------------------------------------------------------|---|-----|-----|----|
| Gate to source charge        | $Q_{gs}$      | $V_{DD}=20\text{ V}, I_D=30\text{ A}, V_{GS}=0\text{ to }10\text{ V}$  | - | 25  | -   | nC |
| Gate charge at threshold     | $Q_{g(th)}$   |                                                                        | - | 14  | -   |    |
| Gate to drain charge         | $Q_{gd}$      |                                                                        | - | 11  | -   |    |
| Switching charge             | $Q_{sw}$      |                                                                        | - | 23  | -   |    |
| Gate charge total            | $Q_g$         |                                                                        | - | 113 | 150 |    |
| Gate plateau voltage         | $V_{plateau}$ |                                                                        | - | 2.9 | -   | V  |
| Gate charge total            | $Q_g$         | $V_{DD}=20\text{ V}, I_D=30\text{ A}, V_{GS}=0\text{ to }4.5\text{ V}$ | - | 54  | -   | nC |
| Gate charge total, sync. FET | $Q_{g(sync)}$ | $V_{DS}=0.1\text{ V}, V_{GS}=0\text{ to }10\text{ V}$                  | - | 106 | -   |    |
| Output charge                | $Q_{oss}$     | $V_{DD}=20\text{ V}, V_{GS}=0\text{ V}$                                | - | 69  | -   |    |

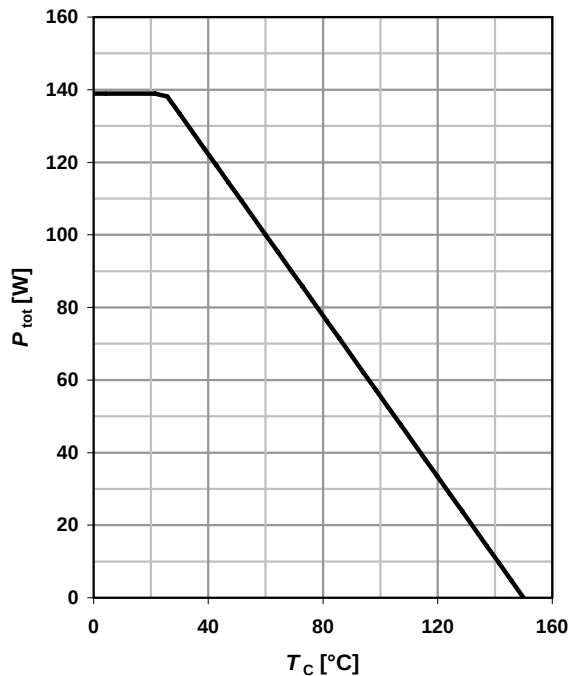
#### Reverse Diode

|                                  |               |                                                                    |   |     |     |    |
|----------------------------------|---------------|--------------------------------------------------------------------|---|-----|-----|----|
| Diode continuous forward current | $I_S$         | $T_C=25\text{ }^\circ\text{C}$                                     | - | -   | 100 | A  |
| Diode pulse current              | $I_{S,pulse}$ |                                                                    | - | -   | 400 |    |
| Diode forward voltage            | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=50\text{ A}, T_j=25\text{ }^\circ\text{C}$ | - | 0.8 | 1.2 | V  |
| Reverse recovery charge          | $Q_{rr}$      | $V_R=20\text{ V}, I_F=I_S, di_F/dt=400\text{ A}/\mu\text{s}$       | - | 125 | -   | nC |

<sup>5)</sup> See figure 16 for gate charge parameter definition

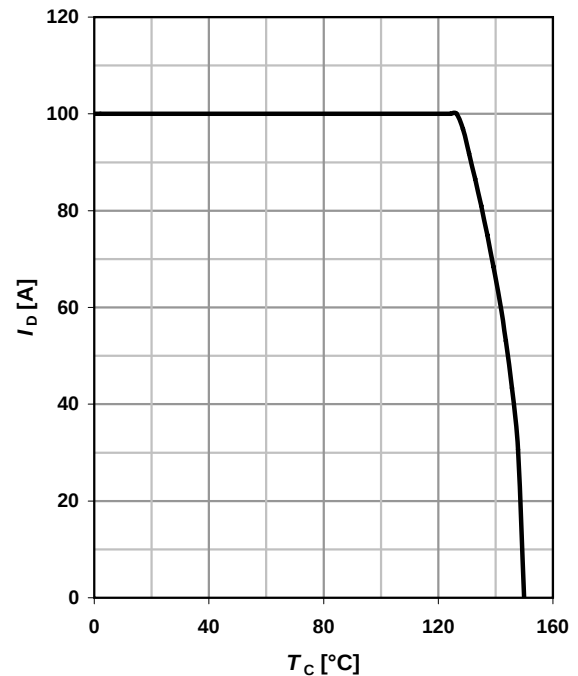
### 1 Power dissipation

$$P_{\text{tot}} = f(T_c)$$



### 2 Drain current

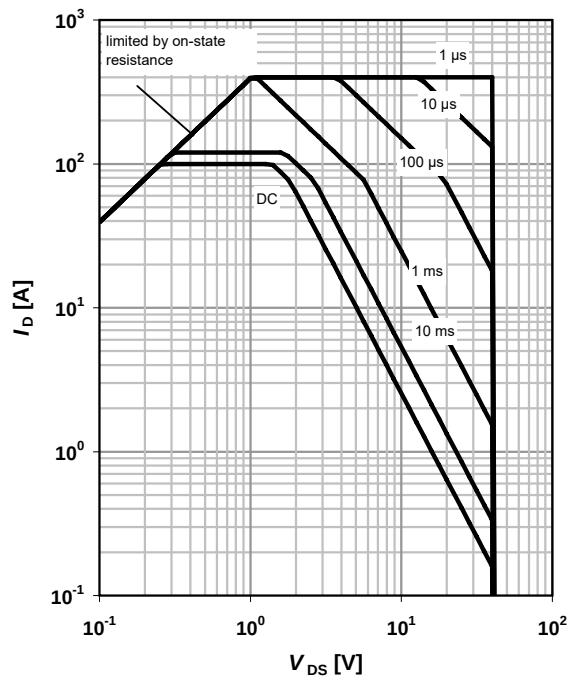
$$I_D = f(T_c); V_{GS} \geq 10 \text{ V}$$



### 3 Safe operating area

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

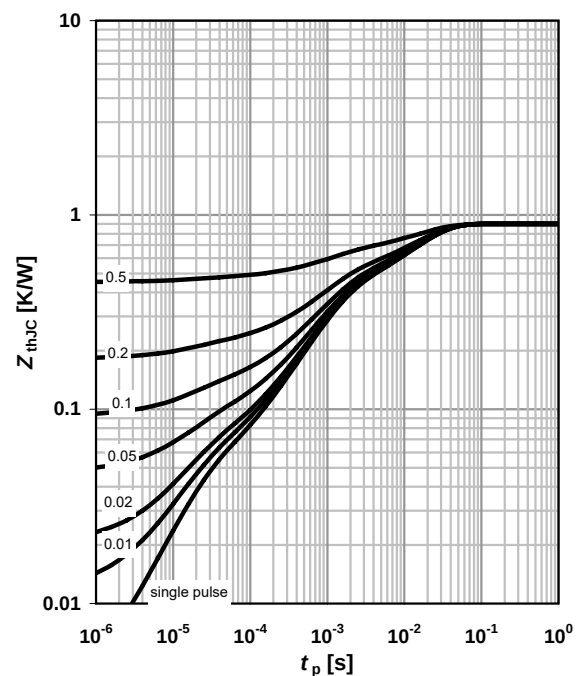
parameter:  $t_p$



### 4 Max. transient thermal impedance

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

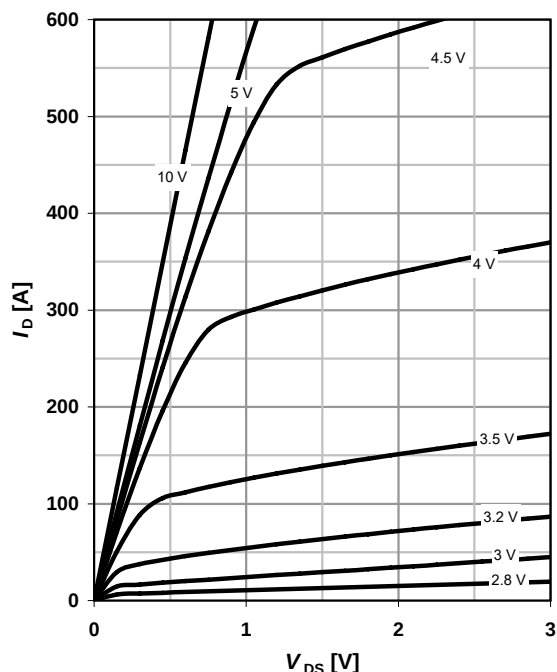
parameter:  $D = t_p/T$



**5 Typ. output characteristics**

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

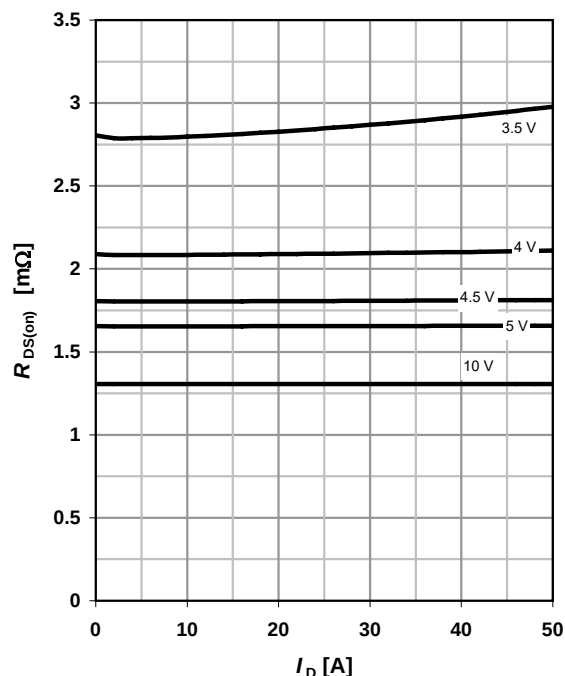
parameter:  $V_{GS}$



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

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

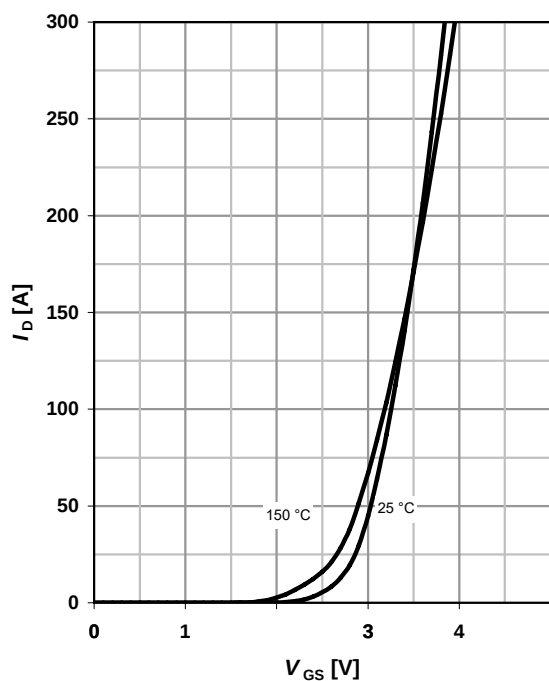
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

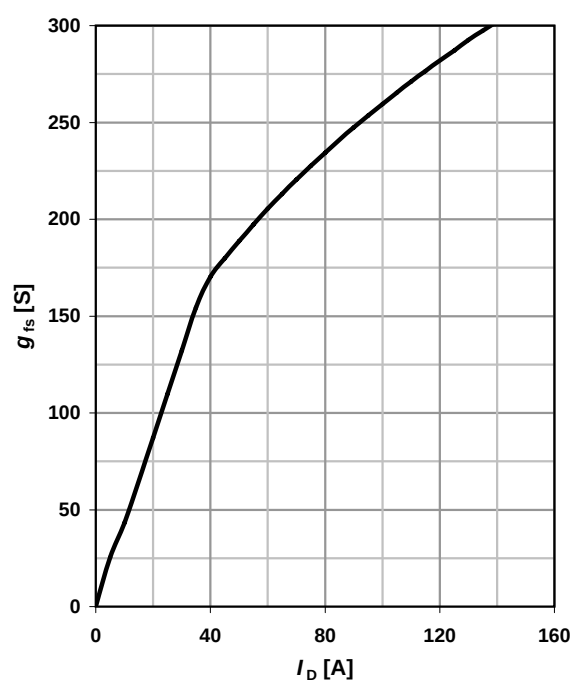
$$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$$

parameter:  $T_j$



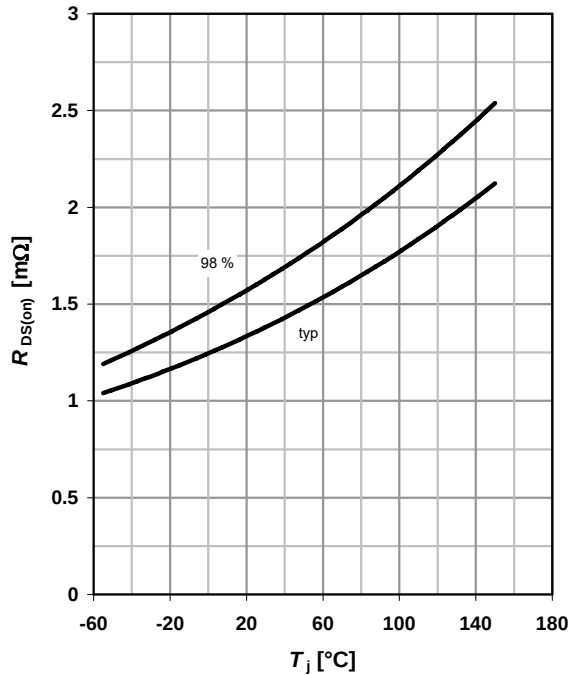
**8 Typ. forward transconductance**

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



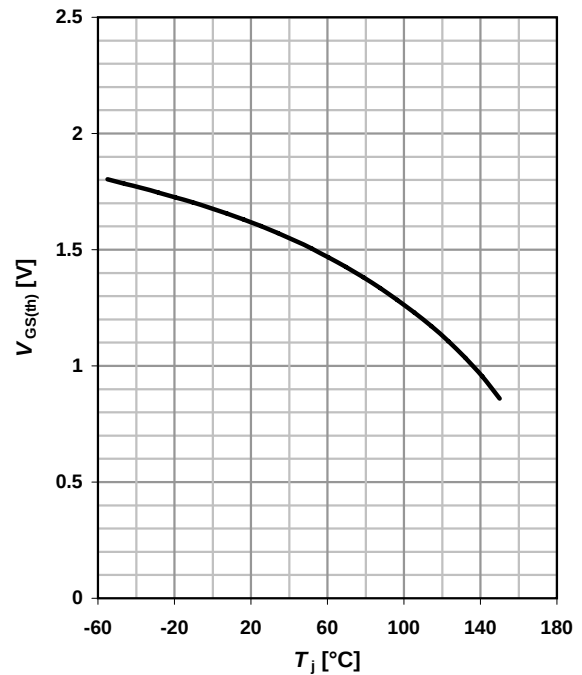
**9 Drain-source on-state resistance**

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



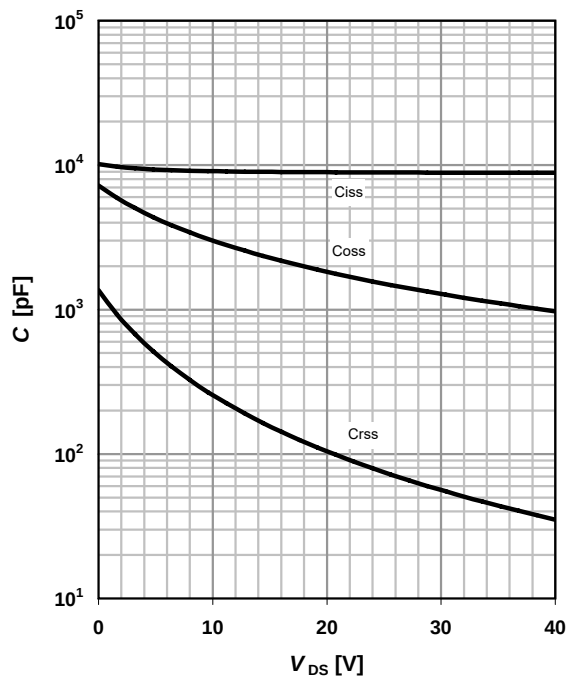
**10 Typ. gate threshold voltage**

$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = 85 \mu\text{A}$$



**11 Typ. capacitances**

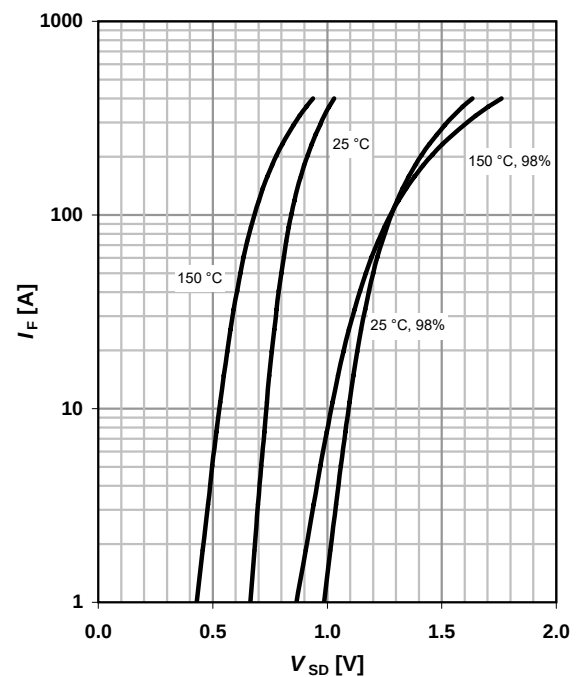
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



**12 Forward characteristics of reverse diode**

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

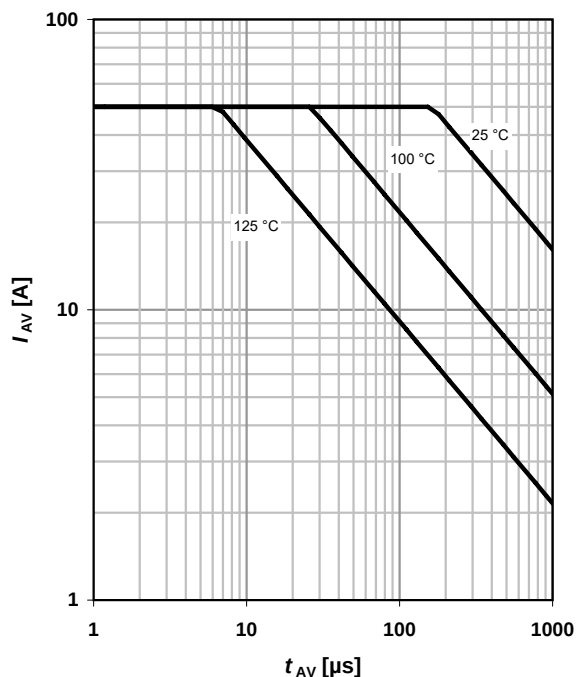
parameter:  $T_j$



### 13 Avalanche characteristics

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

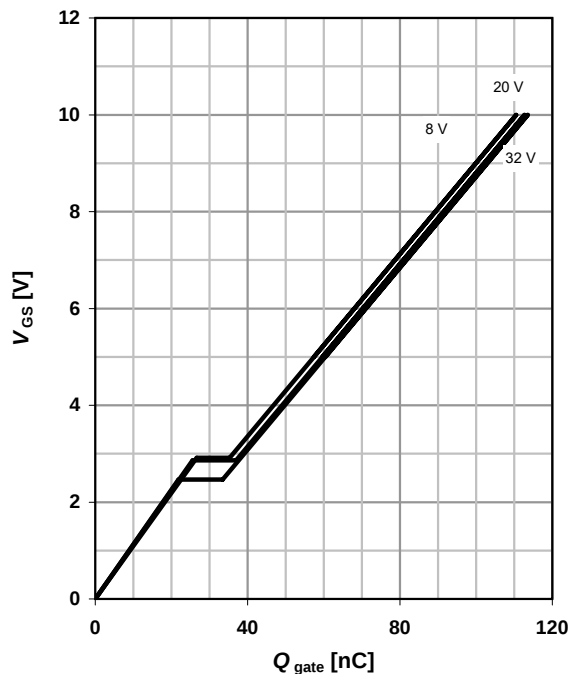
parameter:  $T_{j(\text{start})}$



### 14 Typ. gate charge

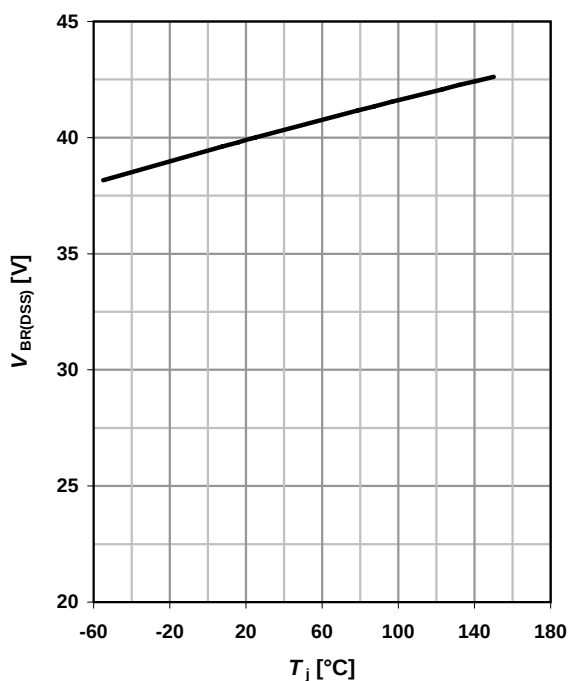
$$V_{GS}=f(Q_{\text{gate}}); I_D=30\ \text{A pulsed}$$

parameter:  $V_{DD}$

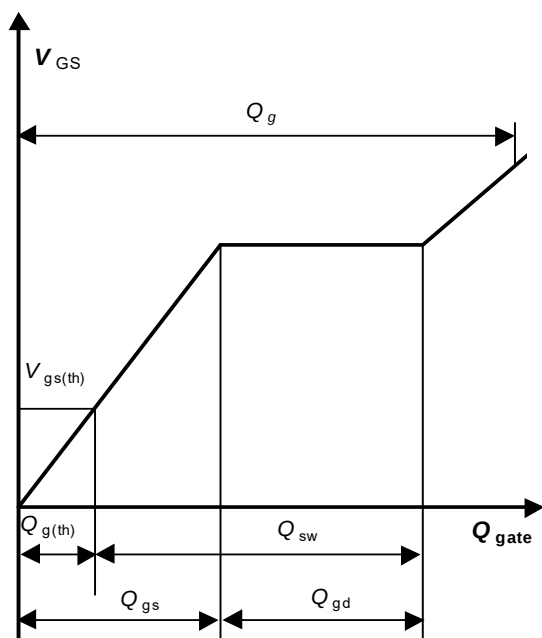


### 15 Drain-source breakdown voltage

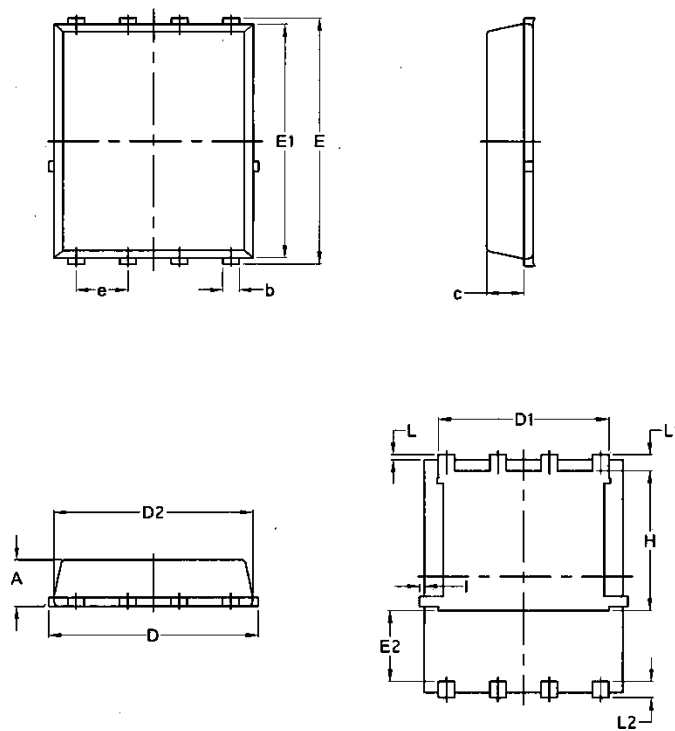
$$V_{BR(DSS)}=f(T_j); I_D=1\ \text{mA}$$



### 16 Gate charge waveforms



**Package Mechanical Data-DFN5\*6-8L-JQ Single**



| Symbol | Common   |        |          |        |
|--------|----------|--------|----------|--------|
|        | mm       |        | Inch     |        |
|        | Mim      | Max    | Min      | Max    |
| A      | 1.03     | 1.17   | 0.0406   | 0.0461 |
| b      | 0.34     | 0.48   | 0.0134   | 0.0189 |
| c      | 0.824    | 0.0970 | 0.0324   | 0.082  |
| D      | 4.80     | 5.40   | 0.1890   | 0.2126 |
| D1     | 4.11     | 4.31   | 0.1618   | 0.1697 |
| D2     | 4.80     | 5.00   | 0.1890   | 0.1969 |
| E      | 5.95     | 6.15   | 0.2343   | 0.2421 |
| E1     | 5.65     | 5.85   | 0.2224   | 0.2303 |
| E2     | 1.60     | /      | 0.0630   | /      |
| e      | 1.27 BSC |        | 0.05 BSC |        |
| L      | 0.05     | 0.25   | 0.0020   | 0.0098 |
| L1     | 0.38     | 0.50   | 0.0150   | 0.0197 |
| L2     | 0.38     | 0.50   | 0.0150   | 0.0197 |
| H      | 3.30     | 3.50   | 0.1299   | 0.1378 |
| I      | /        | 0.18   | /        | 0.0070 |