

## OptiMOS® Power-Transistor

### Feature

- N-Channel
- Enhancement mode
- Logic Level
- Excellent Gate Charge x  $R_{DS(on)}$  product (FOM)
- Superior thermal resistance
- 175°C operating temperature
- Avalanche rated
- $dv/dt$  rated

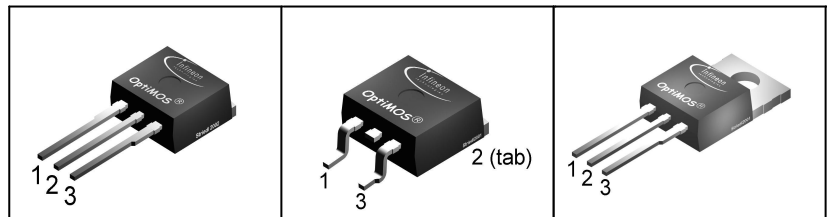
### Product Summary

|              |     |    |
|--------------|-----|----|
| $V_{DS}$     | 30  | V  |
| $R_{DS(on)}$ | 8.4 | mΩ |
| $I_D$        | 73  | A  |

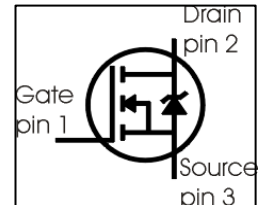
P- TO262 -3-1

P- TO263 -3-2

P- TO220 -3-1



| Type           | Package       | Ordering Code | Marking |
|----------------|---------------|---------------|---------|
| SPP73N03S2L-08 | P- TO220 -3-1 | Q67042-S4037  | 2N03L08 |
| SPB73N03S2L-08 | P- TO263 -3-2 | Q67042-S4036  | 2N03L08 |
| SPI73N03S2L-08 | P- TO262 -3-1 | Q67042-S4081  | 2N03L08 |



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

| Parameter   | Symbol                | Value       | Unit              |
|---|-----------------------|-------------|-------------------|
| Continuous drain current <sup>1)</sup><br>$T_C=25^\circ\text{C}$ , <sup>1)</sup>  | $I_D$                 | 73<br>62    | A                 |
| Pulsed drain current<br>$T_C=25^\circ\text{C}$  | $I_{D\text{ puls}}$   | 320         |                   |
| Avalanche energy, single pulse<br>$I_D=73\text{A}$ , $V_{DD}=25\text{V}$ , $R_{GS}=25\Omega$                                    | $E_{AS}$              | 170         | mJ                |
| Repetitive avalanche energy, limited by $T_{j\text{max}}^{2)}$  | $E_{AR}$              | 10          |                   |
| Reverse diode $dv/dt$<br>$I_S=73\text{A}$ , $V_{DS}=24$ , $di/dt=200\text{A}/\mu\text{s}$ , $T_{j\text{max}}=175^\circ\text{C}$ | $dv/dt$               | 6           | kV/ $\mu\text{s}$ |
| Gate source voltage   | $V_{GS}$              | $\pm 20$    | V                 |
| Power dissipation<br>$T_C=25^\circ\text{C}$   | $P_{\text{tot}}$      | 107         | W                 |
| Operating and storage temperature   | $T_i, T_{\text{sta}}$ | -55... +175 | $^\circ\text{C}$  |
| IEC climatic category; DIN IEC 68-1   |                       | 55/175/56   |                   |

### Thermal Characteristics

| Parameter                                      | Symbol     | Values |      |      | Unit |
|--|------------|--------|------|------|------|
|  |            | min.   | typ. | max. |      |
| <b>Characteristics</b>                         |            |        |      |      |      |
| Thermal resistance, junction - case            | $R_{thJC}$ | -      | 0.9  | 1.4  | K/W  |
| SMD version, device on PCB:                    | $R_{thJA}$ |        |      |      |      |
| @ min. footprint                               |            | -      | -    | 62   |      |
| @ 6 cm <sup>2</sup> cooling area <sup>3)</sup> |            | -      | -    | 40   |      |

### Electrical Characteristics, at $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified

| Parameter  | Symbol        | Values |      |      | Unit       |
|--|---------------|--------|------|------|------------|
|  |               | min.   | typ. | max. |            |
| <b>Static Characteristics</b>  |               |        |      |      |            |
| Drain-source breakdown voltage<br>$V_{GS}=0V, I_D=1mA$   | $V_{(BR)DSS}$ | 30     | -    | -    | V          |
| Gate threshold voltage, $V_{GS} = V_{DS}$<br>$I_D=55\mu A$   | $V_{GS(th)}$  | 1.2    | 1.6  | 2    |            |
| Zero gate voltage drain current<br>$V_{DS}=30V, V_{GS}=0V, T_j=25^\circ C$<br>$V_{DS}=30V, V_{GS}=0V, T_j=175^\circ C$ | $I_{DSS}$     | -      | 0.01 | 1    | $\mu A$    |
|  |               | -      | 10   | 100  |            |
| Gate-source leakage current<br>$V_{GS}=20V, V_{DS}=0V$   | $I_{GSS}$     | -      | 1    | 100  | nA         |
| Drain-source on-state resistance<br>$V_{GS}=4.5V, I_D=36A$<br>$V_{GS}=4.5V, I_D=36A, \text{SMD version}$               | $R_{DS(on)}$  | -      | 9.9  | 13.4 | m $\Omega$ |
|  |               | -      | 9.5  | 13.1 |            |
| Drain-source on-state resistance <sup>4)</sup><br>$V_{GS}=10V, I_D=36A$<br>$V_{GS}=10V, I_D=36A, \text{SMD version}$   | $R_{DS(on)}$  | -      | 6.8  | 8.4  |            |
|  |               | -      | 6.5  | 8.1  |            |

<sup>1</sup>Current limited by bondwire ; with an  $R_{thJC} = 1.4K/W$  the chip is able to carry  $I_D= 87A$  at  $25^\circ C$ , for detailed information see app.-note ANPS071E available at [www.infineon.com/optimos](http://www.infineon.com/optimos)

<sup>2</sup>Defined by design. Not subject to production test.

<sup>3</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu m$  thick) copper area for drain connection. PCB is vertical without blown air.

<sup>4</sup>Diagrams are related to straight lead versions

### Electrical Characteristics

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

### Dynamic Characteristics

|                              |              |   |    |      |      |    |
|------------------------------|--------------|---|----|------|------|----|
| Transconductance             | $g_{fs}$     | $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ ,<br>$I_D = 62A$          | 32 | 63   | -    | S  |
| Input capacitance            | $C_{iss}$    | $V_{GS} = 0V$ , $V_{DS} = 25V$ ,<br>$f = 1MHz$                          | -  | 1290 | 1710 | pF |
| Output capacitance           | $C_{oss}$    |   | -  | 500  | 670  |    |
| Reverse transfer capacitance | $C_{rss}$    |   | -  | 130  | 190  |    |
| Turn-on delay time           | $t_{d(on)}$  | $V_{DD} = 15V$ , $V_{GS} = 10V$ ,<br>$I_D = 18A$ ,<br>$R_G = 4.7\Omega$ | -  | 7.7  | 11.6 | ns |
| Rise time                    | $t_r$        |   | -  | 20   | 30   |    |
| Turn-off delay time          | $t_{d(off)}$ |   | -  | 31.5 | 47.3 |    |
| Fall time                    | $t_f$        |   | -  | 19   | 28.5 |    |

### Gate Charge Characteristics

|                       |                 |   |   |      |      |    |
|-----------------------|-----------------|---|---|------|------|----|
| Gate to source charge | $Q_{gs}$        | $V_{DD} = 24V$ , $I_D = 36A$                            | - | 4    | 5    | nC |
| Gate to drain charge  | $Q_{gd}$        |   | - | 12   | 18   |    |
| Gate charge total     | $Q_g$           | $V_{DD} = 24V$ , $I_D = 36A$ ,<br>$V_{GS} = 0$ to $10V$ | - | 34.7 | 46.2 |    |
| Gate plateau voltage  | $V_{(plateau)}$ | $V_{DD} = 24V$ , $I_D = 36A$                            | - | 3.6  | -    | V  |

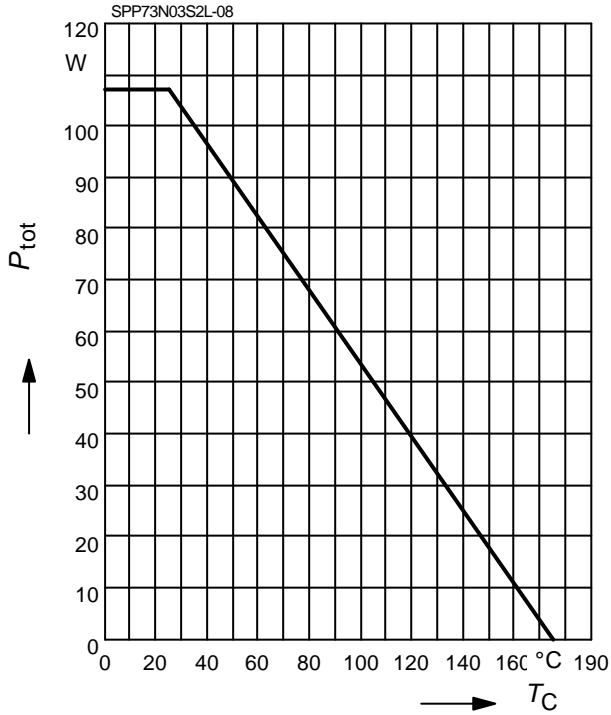
### Reverse Diode

|  |          |   |   |      |      |    |
|--|----------|---|---|------|------|----|
| Inverse diode continuous forward current | $I_S$    | $T_C = 25^\circ C$                                    | - | -    | 73   | A  |
| Inv. diode direct current, pulsed        | $I_{SM}$ |   | - | -    | 320  |    |
| Inverse diode forward voltage            | $V_{SD}$ | $V_{GS} = 0V$ , $I_F = 73A$                           | - | 0.96 | 1.28 | V  |
| Reverse recovery time                    | $t_{rr}$ | $V_R = 15V$ , $I_F = I_S$ ,<br>$di_F/dt = 100A/\mu s$ | - | 27   | 40   | ns |
| Reverse recovery charge                  | $Q_{rr}$ |   | - | 21   | 31   |    |

### 1 Power dissipation

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

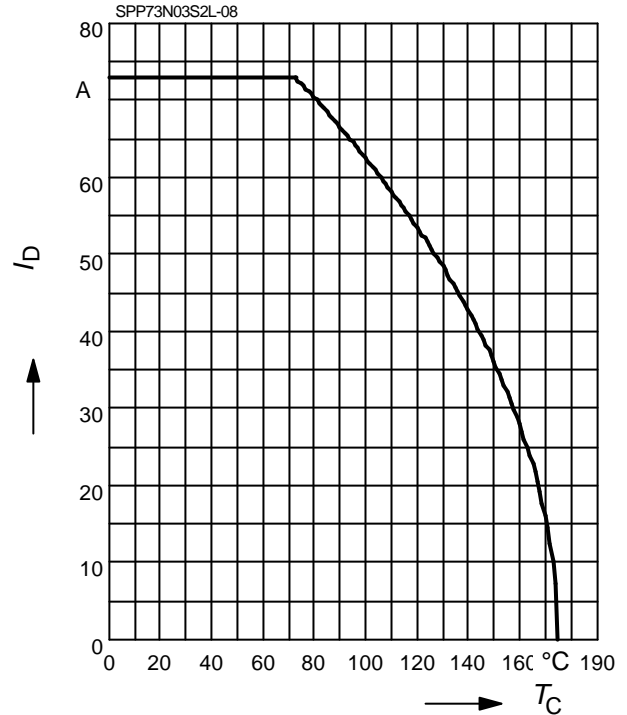
parameter:  $V_{GS} \geq 4 \text{ V}$



### 2 Drain current

$$I_D = f(T_C)$$

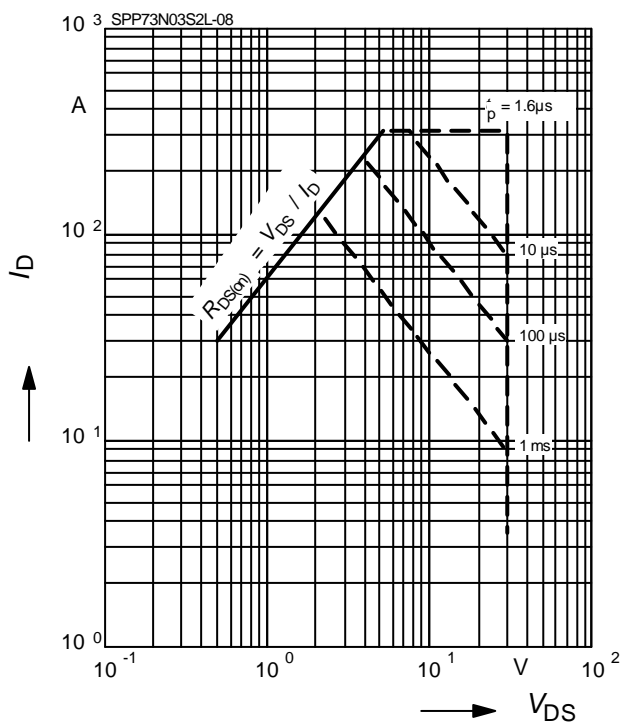
parameter:  $V_{GS} \geq 10 \text{ V}$



### 3 Safe operating area

$$I_D = f(V_{DS})$$

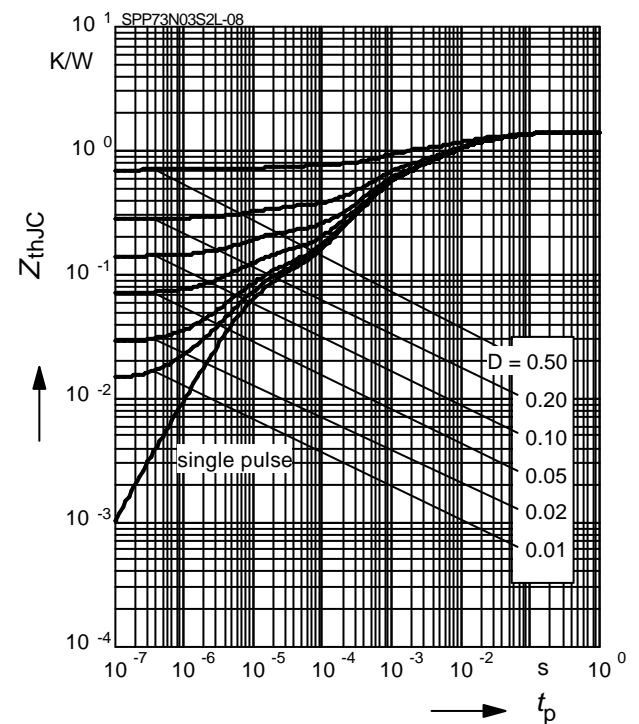
parameter:  $D = 0$ ,  $T_C = 25 \text{ °C}$



### 4 Max. transient thermal impedance

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

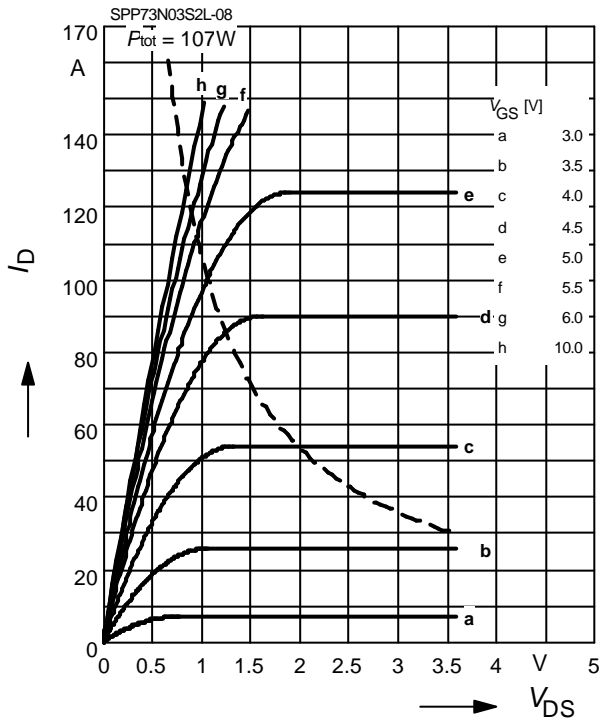
parameter:  $D = t_p/T$



### 5 Typ. output characteristic

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

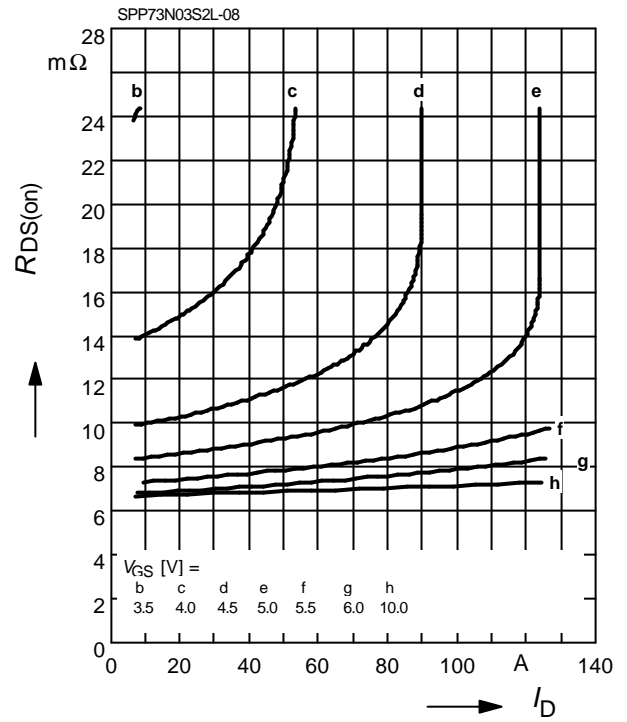
parameter:  $t_p = 80 \mu\text{s}$



### 6 Typ. drain-source on resistance

$$R_{DS(\text{on})} = f(I_D)$$

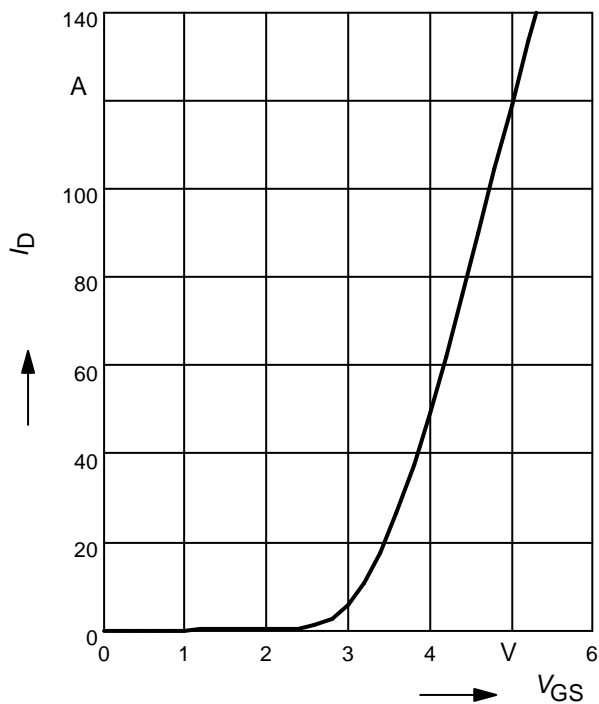
parameter:  $V_{GS}$



### 7 Typ. transfer characteristics

$$I_D = f(V_{GS}); V_{DS} \geq 2 \times I_D \times R_{DS(\text{on})\text{max}}$$

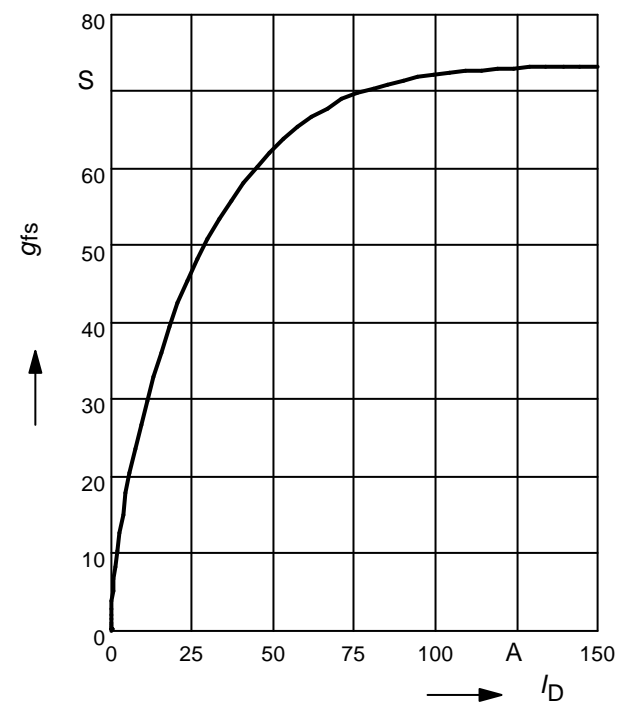
parameter:  $t_p = 80 \mu\text{s}$



### 8 Typ. forward transconductance

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

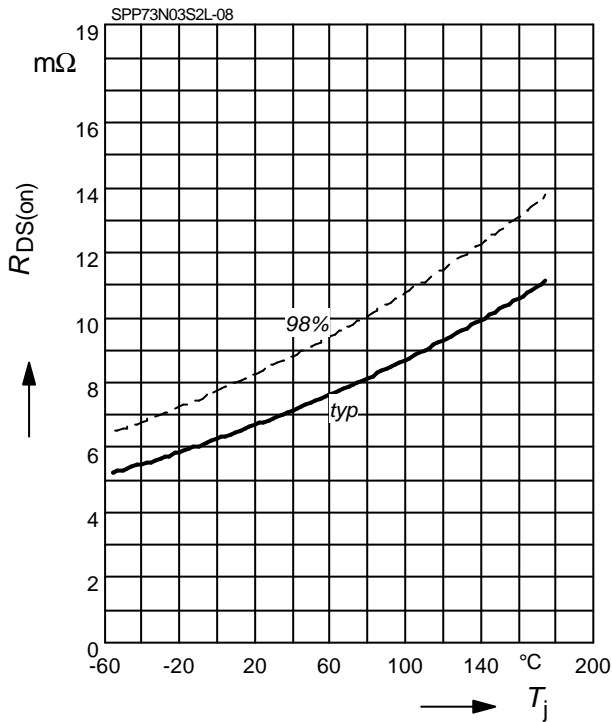
parameter:  $g_{fs}$



### 9 Drain-source on-state resistance

$$R_{DS(on)} = f(T_j)$$

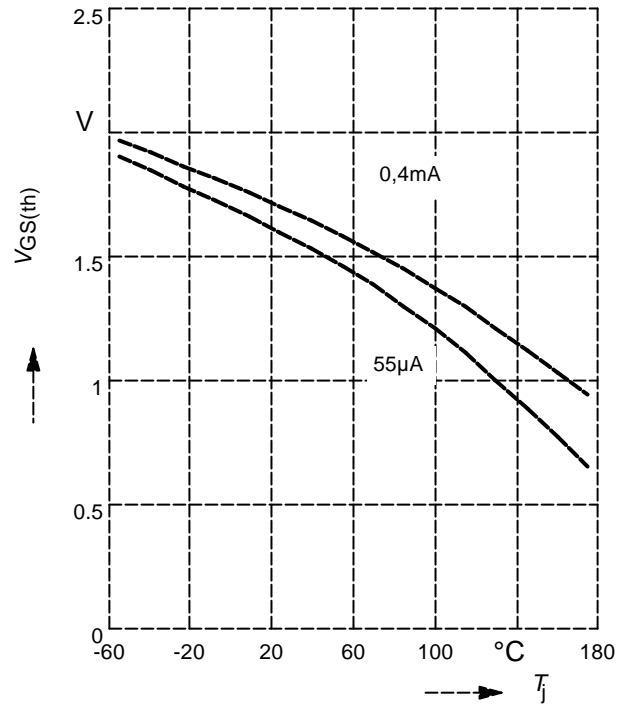
parameter:  $I_D = 36\text{ A}$ ,  $V_{GS} = 10\text{ V}$



### 10 Typ. gate threshold voltage

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

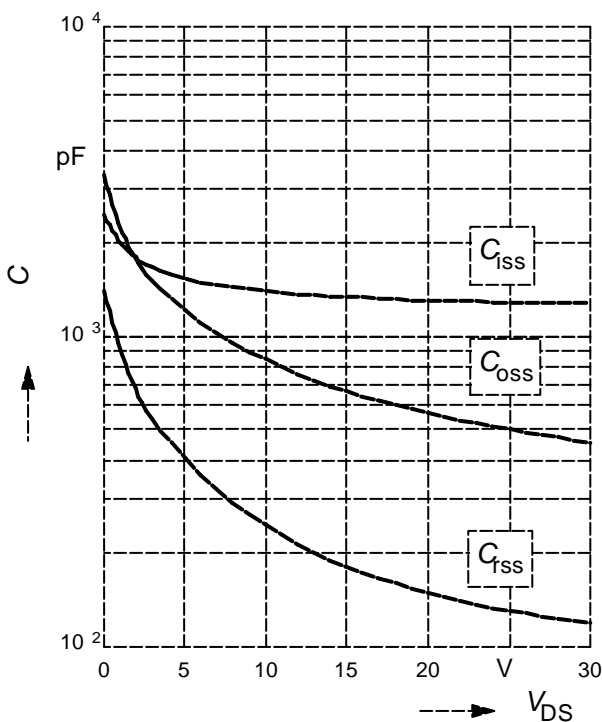
parameter:  $V_{GS} = V_{DS}$



### 11 Typ. capacitances

$$C = f(V_{DS})$$

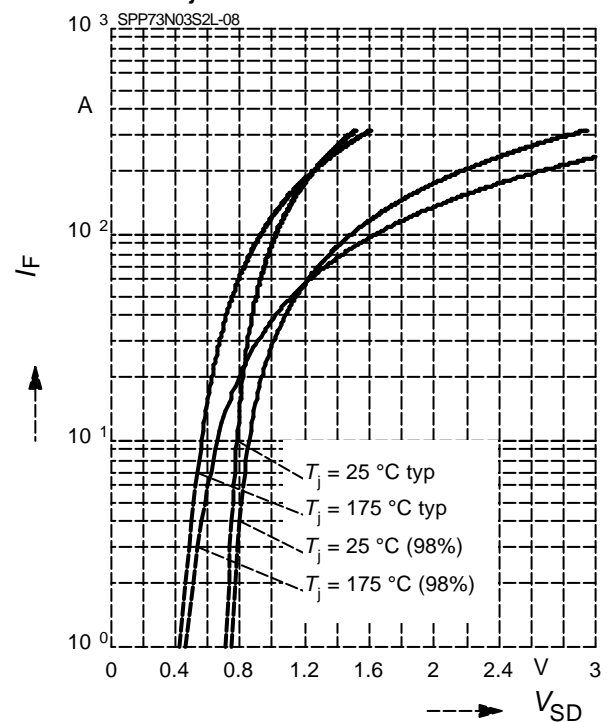
parameter:  $V_{GS} = 0\text{ V}$ ,  $f = 1\text{ MHz}$



### 12 Forward character. of reverse diode

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

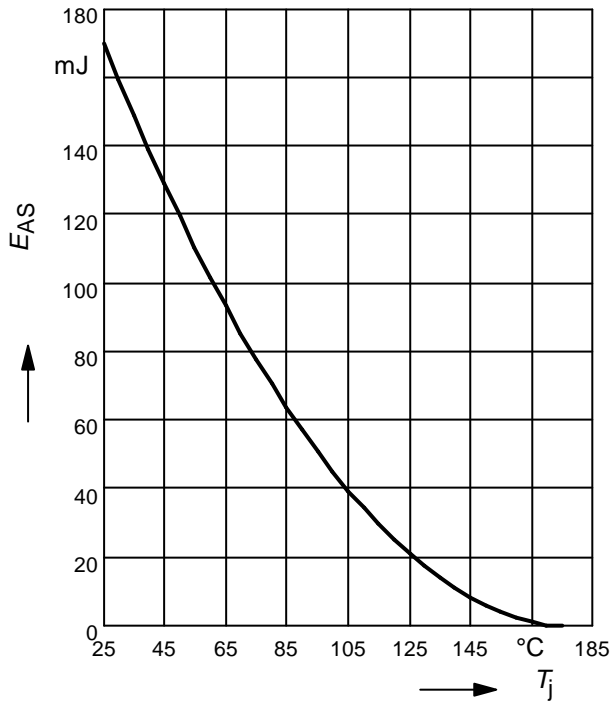
parameter:  $T_j$ ,  $t_p = 80\ \mu\text{s}$



### 13 Typ. avalanche energy

$$E_{AS} = f(T_j)$$

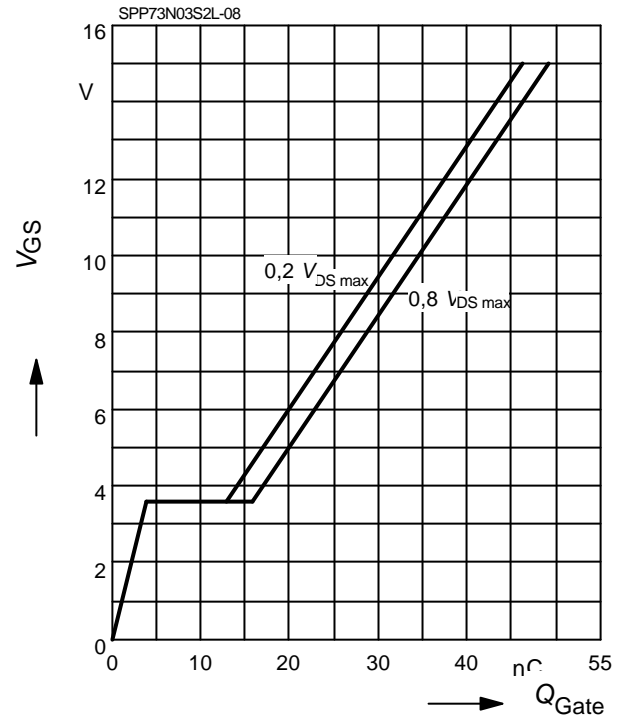
par.:  $I_D = 73A$ ,  $V_{DD} = 25V$ ,  $R_{GS} = 25\Omega$



### 14 Typ. gate charge

$$V_{GS} = f(Q_{Gate})$$

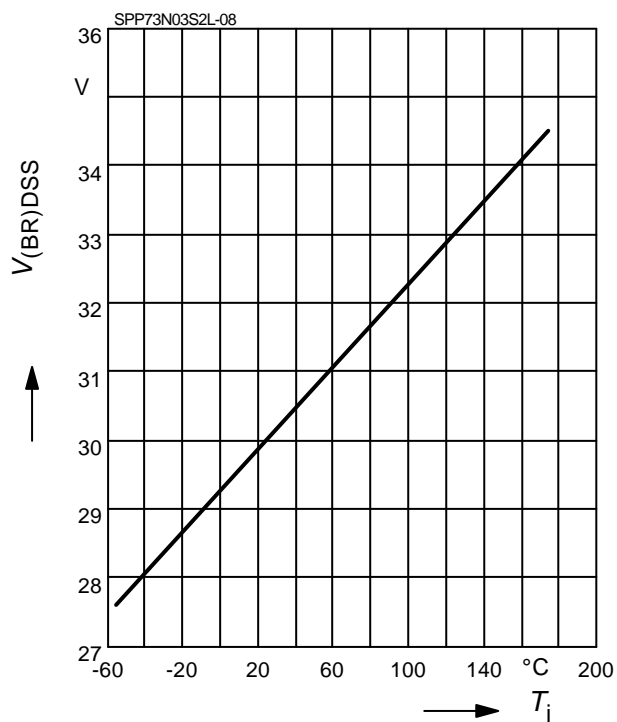
parameter:  $I_D = 36A$  pulsed



### 15 Drain-source breakdown voltage

$$V_{(BR)DSS} = f(T_j)$$

parameter:  $I_D = 10mA$



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**Further information**

Please notice that the part number is BSPP73N03S2L-08, BSPB73N03S2L-08 and BSPI73N03S2L-08, for simplicity the device is referred to by the term SPP73N03S2L-08, SPB73N03S2L-08 and SPI73N03S2L-08 throughout this documentation