

OptiMOS™ Power-Transistor

Feature

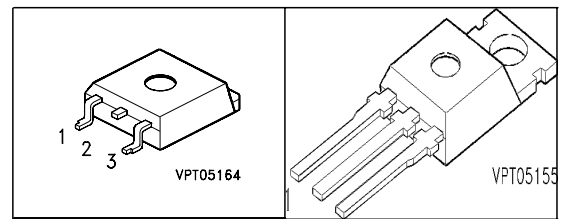
- N-Channel
- Enhancement mode
- Logic Level
- Excellent Gate Charge x $R_{DS(on)}$ product (FOM)
- Superior thermal resistance
- 175°C operating temperature
- Avalanche rated
- dv/dt rated

Product Summary

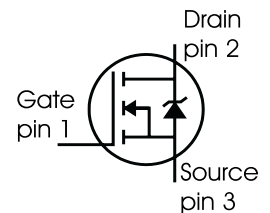
| | | |
|--------------|----|------------|
| V_{DS} | 30 | V |
| $R_{DS(on)}$ | 8 | m Ω |
| I_D | 73 | A |

P-TO263-3-2

P-TO220-3-1



| Type | Package | Ordering Code | Marking |
|----------------|-------------|---------------|---------|
| SPP73N03S2L-10 | P-TO220-3-1 | Q67042-S4037 | 2N03L10 |
| SPB73N03S2L-10 | P-TO263-3-2 | Q67042-S4036 | 2N03L10 |



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

| Parameter | Symbol | Value | Unit |
|---|--------------------------|-------------|-------------------|
| Continuous drain current | I_D | 73 | A |
| $T_C=25\text{ }^\circ\text{C}$ | | 73 | |
| $T_C=100\text{ }^\circ\text{C}$ | | 52 | |
| Pulsed drain current | $I_{D\text{ puls}}$ | 292 | |
| $T_C=25\text{ }^\circ\text{C}$ | | 292 | |
| Avalanche energy, single pulse | E_{AS} | 170 | mJ |
| $I_D=73\text{ A}$, $V_{DD}=25\text{ V}$, $R_{GS}=25\text{ }\Omega$ | | 170 | |
| Reverse diode dv/dt | dv/dt | 6 | kV/ μs |
| $I_S=73\text{ A}$, $V_{DS}=24$, $di/dt=200\text{ A}/\mu\text{s}$, $T_{j\text{ max}}=175\text{ }^\circ\text{C}$ | | 6 | |
| Gate source voltage | V_{GS} | ± 20 | V |
| Power dissipation | P_{tot} | 90 | W |
| $T_C=25\text{ }^\circ\text{C}$ | | 90 | |
| Operating and storage temperature | T_j , T_{stg} | -55... +175 | $^\circ\text{C}$ |
| IEC climatic category; DIN IEC 68-1 | | 55/175/56 | |

Thermal Characteristics

| Parameter | Symbol | Values | | | Unit |
|--|------------|--------|------|------|------|
| | | min. | typ. | max. | |
| Characteristics | | | | | |
| Thermal resistance, junction - case | R_{thJC} | - | - | 1.6 | K/W |
| SMD version, device on PCB: | R_{thJA} | - | - | 62 | |
| @ min. footprint @ 6 cm ² cooling area ¹⁾ | | - | - | 40 | |

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

| Parameter | Symbol | Values | | | Unit |
|--|---------------|--------|------------|----------|-----------|
| | | min. | typ. | max. | |
| Static Characteristics | | | | | |
| Drain-source breakdown voltage $V_{GS}=0V, I_D=1mA$ | $V_{(BR)DSS}$ | 30 | - | - | V |
| Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=60\mu A$ | $V_{GS(th)}$ | 1.2 | 1.6 | 2 | |
| Zero gate voltage drain current $V_{DS}=30V, V_{GS}=0V, T_j=25\text{ °C}$ $V_{DS}=30V, V_{GS}=0V, T_j=175\text{ °C}$ | I_{DSS} | - | 0.01 10 | 1 100 | μA |
| Gate-source leakage current $V_{GS}=20V, V_{DS}=0V$ | I_{GSS} | - | 1 | 100 | |
| Drain-source on-state resistance $V_{GS}=4.5V, I_D=36A$ | $R_{DS(on)}$ | - | 10.3 | 13.1 | $m\Omega$ |
| Drain-source on-state resistance $V_{GS}=10V, I_D=36A$ | $R_{DS(on)}$ | - | 6.3 | 8 | |

¹⁾Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

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

| Parameter | Symbol | Conditions | Values | | | Unit |
|--------------------------------|--------------|---|--------|------|------|----------|
| | | | min. | typ. | max. | |
| Dynamic Characteristics | | | | | | |
| Transconductance | g_{fs} | $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D = 52\text{A}$ | 32 | 63 | - | S |
| Input capacitance | C_{iss} | $V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$ | - | 1320 | 1650 | pF |
| Output capacitance | C_{oss} | | - | 540 | 675 | |
| Reverse transfer capacitance | C_{rss} | | - | 124 | 155 | |
| Gate resistance | R_G | | - | 1.4 | - | Ω |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = 15\text{V}$, $V_{GS} = 10\text{V}$, $I_D = 18\text{A}$, $R_G = 4.7\Omega$ | - | 7.7 | 11.6 | ns |
| Rise time | t_r | | - | 44 | 66 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 31.5 | 47.3 | |
| Fall time | t_f | | - | 19 | 28.5 | |

Gate Charge Characteristics

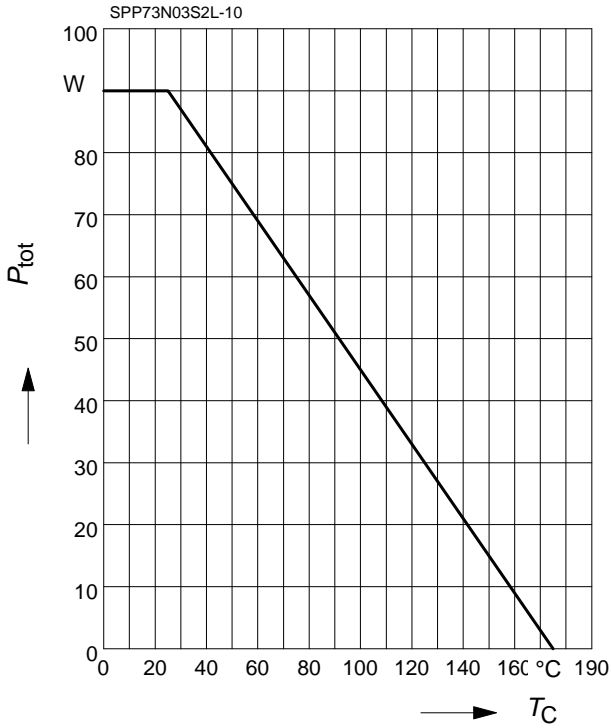
| | | | | | | |
|-----------------------|-----------------|--|---|------|------|----|
| Gate to source charge | Q_{gs} | $V_{DD} = 24\text{V}$, $I_D = 36\text{A}$ | - | 4.5 | 5.6 | nC |
| Gate to drain charge | Q_{gd} | | - | 11.8 | 14.8 | |
| Gate charge total | Q_g | $V_{DD} = 24\text{V}$, $I_D = 36\text{A}$, $V_{GS} = 0$ to 10V | - | 34.7 | 43.4 | |
| Gate plateau voltage | $V_{(plateau)}$ | $V_{DD} = 24\text{V}$, $I_D = 36\text{A}$ | - | 3.6 | - | V |

Reverse Diode

| | | | | | | |
|--|----------|---|---|------|------|----|
| Inverse diode continuous forward current | I_S | $T_C = 25^\circ\text{C}$ | - | - | 73 | A |
| Inverse diode direct current, pulsed | I_{SM} | | - | - | 292 | |
| Inverse diode forward voltage | V_{SD} | $V_{GS} = 0\text{V}$, $I_F = 73\text{A}$ | - | 0.96 | 1.28 | V |
| Reverse recovery time | t_{rr} | $V_R = 15\text{V}$, $I_F = I_S$, $di_F/dt = 100\text{A}/\mu\text{s}$ | - | 26.9 | 40.4 | ns |
| Reverse recovery charge | Q_{rr} | | - | 20.6 | 30.9 | nC |

1 Power dissipation

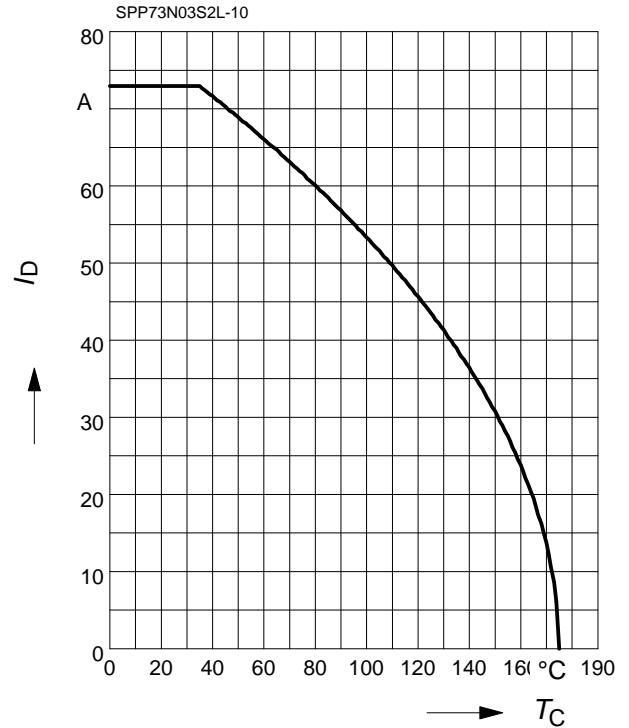
$P_{tot} = f(T_C)$



2 Drain current

$I_D = f(T_C)$

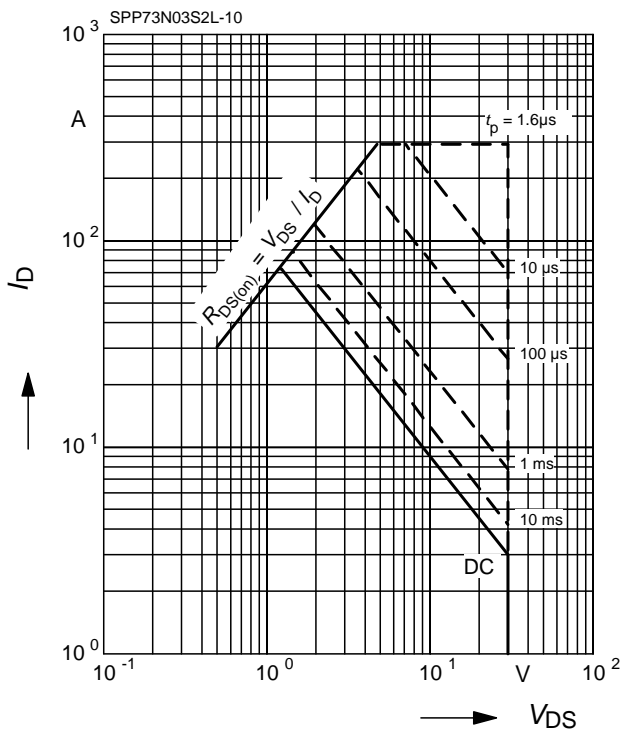
parameter: $V_{GS} \geq 10\text{ V}$



3 Safe operating area

$I_D = f(V_{DS})$

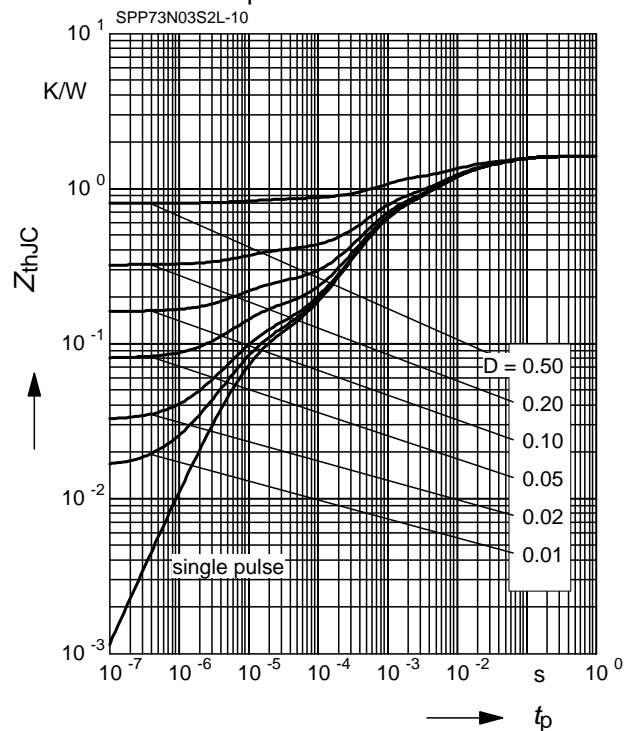
parameter: $D = 0, T_C = 25\text{ °C}$



4 Transient thermal impedance

$Z_{thJC} = f(t_p)$

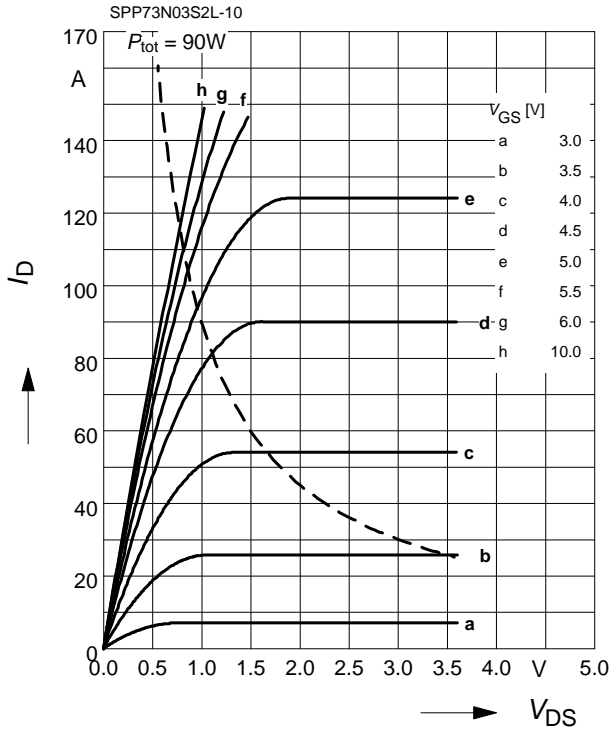
parameter: $D = t_p/T$



5 Typ. output characteristic

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

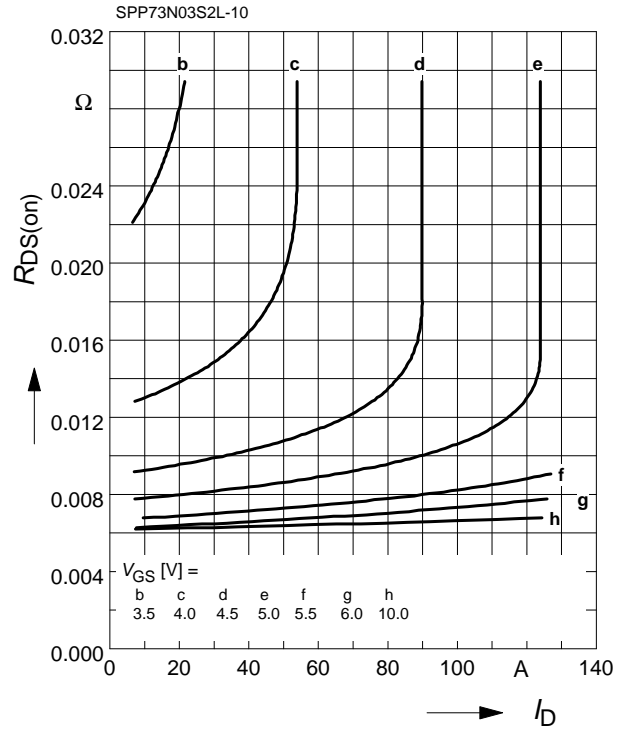
parameter: $t_p = 80 \mu\text{s}$



6 Typ. drain-source on resistance

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

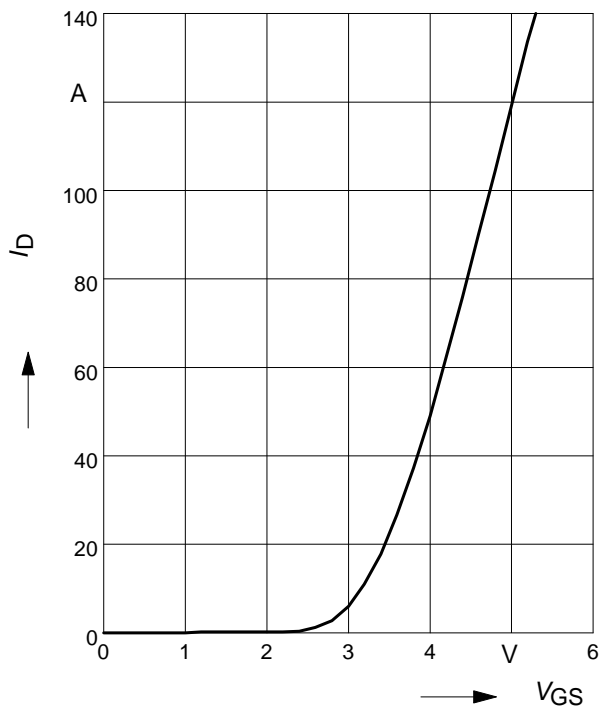
parameter: V_{GS}



7 Typ. transfer characteristics

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

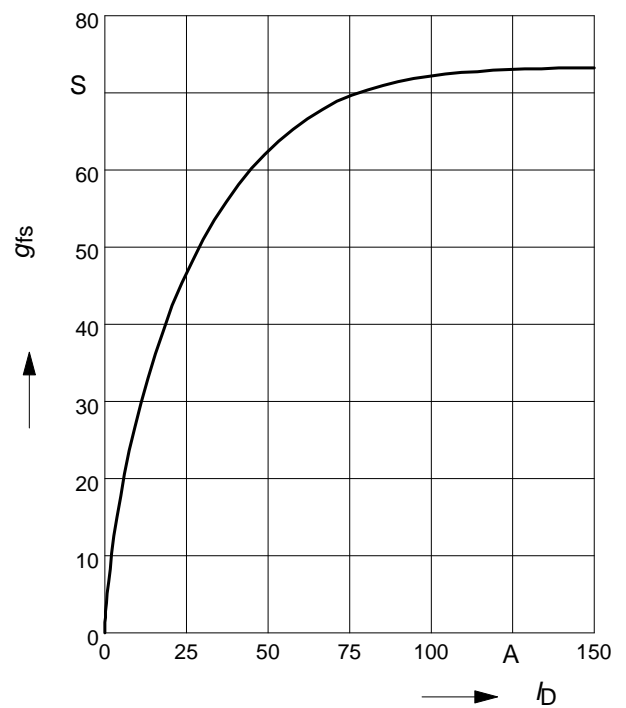
parameter: $t_p = 80 \mu\text{s}$



8 Typ. forward transconductance

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

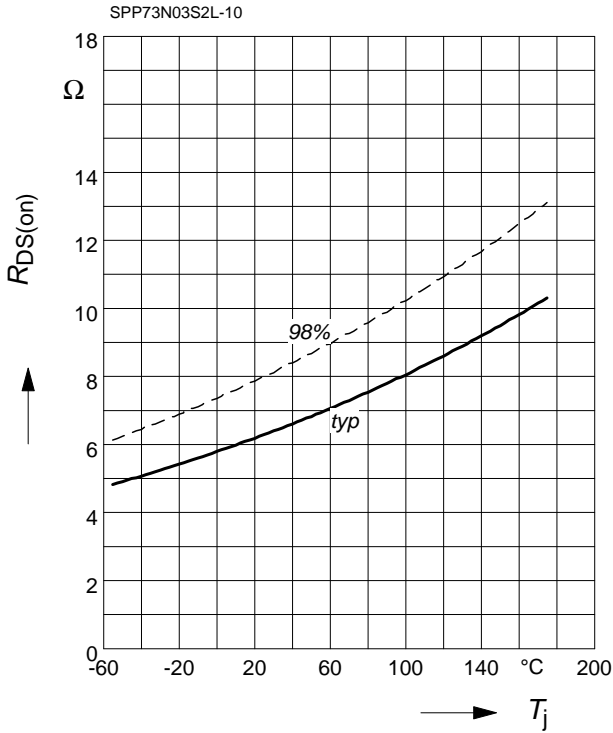
parameter: g_{fs}



9 Drain-source on-state resistance

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

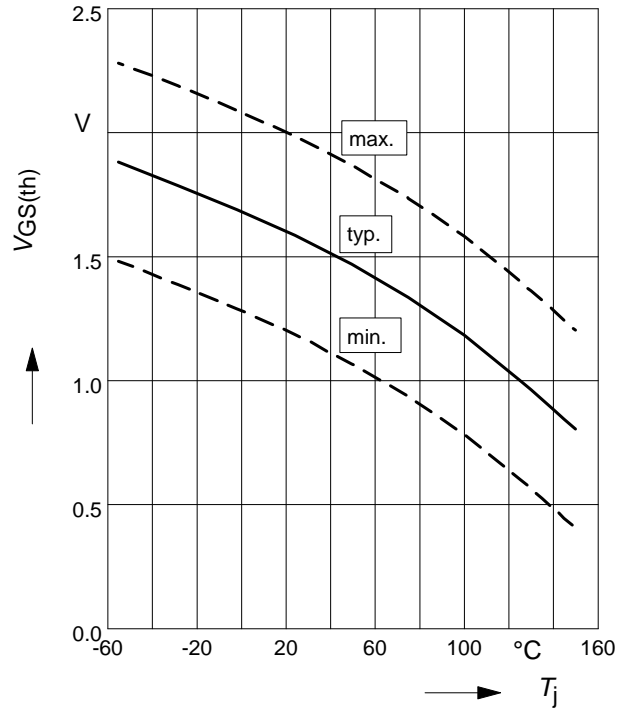
parameter : $I_D = 36\text{ A}$, $V_{GS} = 10\text{ V}$



10 Gate threshold voltage

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

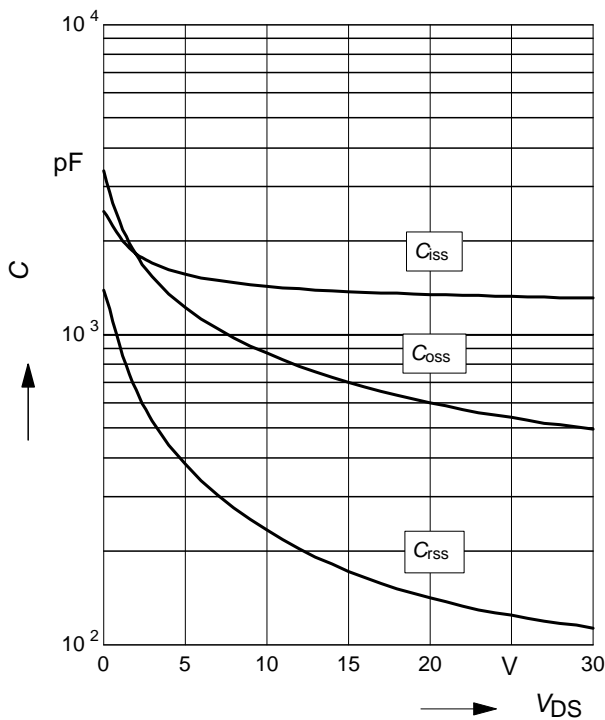
parameter: $V_{GS} = V_{DS}$, $I_D = 60\ \mu\text{A}$



11 Typ. capacitances

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

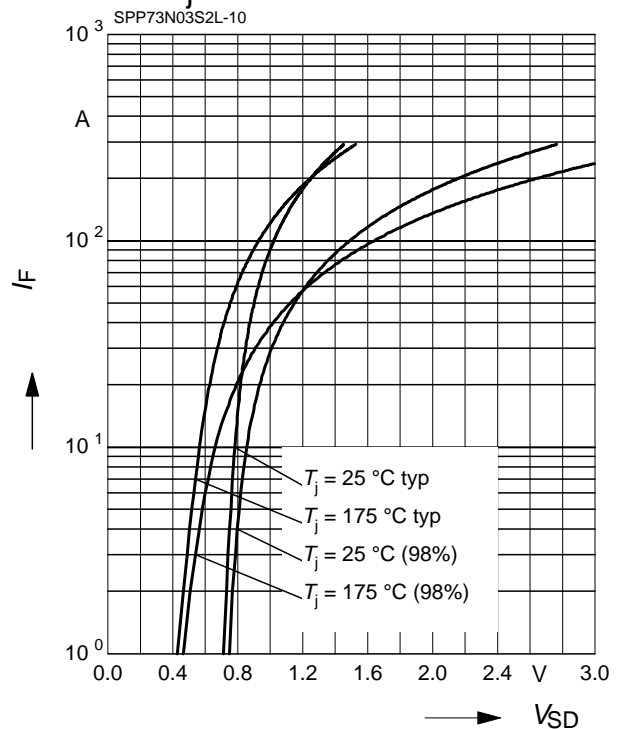
parameter: $V_{GS}=0\text{V}$, $f=1\text{ MHz}$



12 Forward character. of reverse diode

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

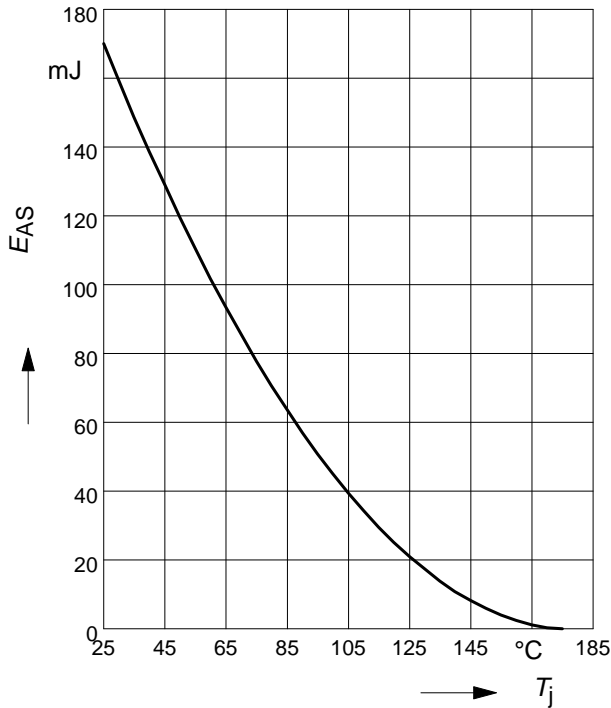
parameter: T_j , $t_p = 80\ \mu\text{s}$



13 Avalanche energy

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

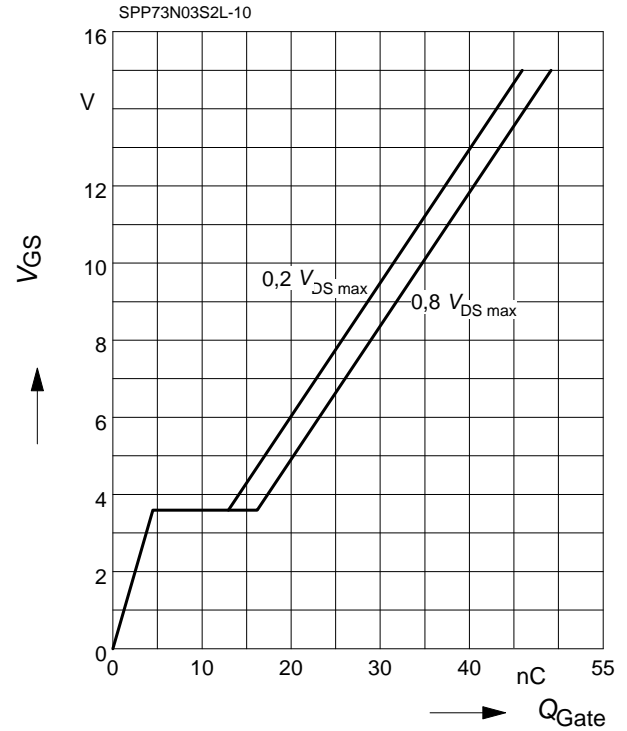
par.: $I_D = 73 \text{ A}$, $V_{DD} = 25 \text{ V}$, $R_{GS} = 25 \Omega$



14 Typ. gate charge

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

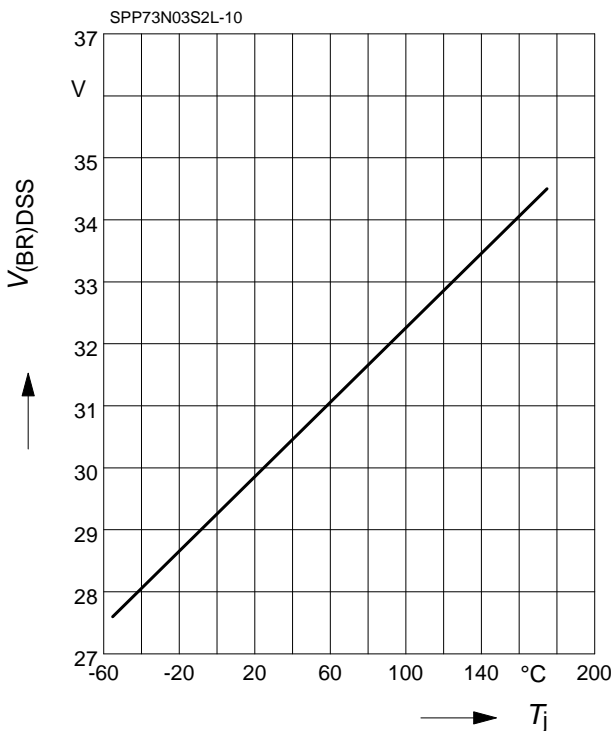
parameter: $I_D = 36 \text{ A}$ pulsed



15 Drain-source breakdown voltage

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

parameter: $I_D = 10 \text{ mA}$



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