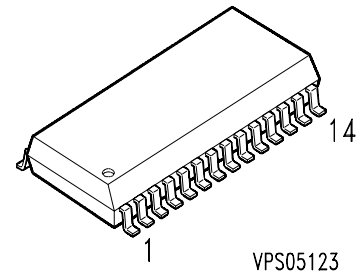
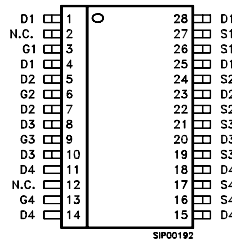


SIPMOS[®] Power Transistor

- Quad-channel
- Enhancement mode
- Logic level
- Avalanche-rated
- dv/dt rated



VPS05123

| Type | V_{DS} | I_D | $R_{DS(on)}$ | Package | Ordering Code |
|-------------|----------|-------|----------------|----------|-----------------------|
| BUZ 103SL-4 | 55 V | 4.8 A | 0.055 Ω | P-DSO-28 | C67078-S. . . . - . . |

Maximum Ratings

| Parameter | Symbol | Values | Unit |
|--|-------------|---------------|-------------------|
| Continuous drain current <i>one channel active</i> $T_A = 25\text{ }^\circ\text{C}$ | I_D | 4.8 | A |
| Pulsed drain current <i>one channel active</i> $T_A = 25\text{ }^\circ\text{C}$ | I_{Dpuls} | 19.2 | |
| Avalanche energy, single pulse $I_D = 4.8\text{ A}$, $V_{DD} = 25\text{ V}$, $R_{GS} = 25\text{ }\Omega$ $L = 12\text{ mH}$, $T_j = 25\text{ }^\circ\text{C}$ | E_{AS} | 140 | mJ |
| Reverse diode dv/dt $I_S = 4.8\text{ A}$, $V_{DS} = 40\text{ V}$, $di_F/dt = 200\text{ A}/\mu\text{s}$ $T_{jmax} = 175\text{ }^\circ\text{C}$ | dv/dt | 6 | kV/ μs |
| Gate source voltage | V_{GS} | ± 14 | V |
| Power dissipation, <i>one channel active</i> $T_A = 25\text{ }^\circ\text{C}$ | P_{tot} | 2.4 | W |
| Operating temperature | T_j | -55 ... + 175 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | -55 ... + 175 | |
| IEC climatic category, DIN IEC 68-1 | | 55 / 175 / 56 | |

Thermal Characteristics

| Parameter | Symbol | Values | | | Unit |
|--|------------|--------|------|------|------|
| | | min. | typ. | max. | |
| Thermal resistance, junction - soldering point ¹⁾ | R_{thJS} | - | tbd | - | K/W |
| Thermal resistance, junction - ambient ²⁾ | R_{thJA} | - | 62.5 | - | |

1) Device on 50mm*50mm*1.5mm epoxy PCB FR4 with 6 cm² (one layer, 70µm thick) copper area for Drain connection. PCB is vertical without blown air.

2) one channel active

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

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

Static Characteristics

| | | | | | |
|--|---------------|-----|--------|-----------------|----|
| Drain- source breakdown voltage $V_{GS} = 0 \text{ V}, I_D = 0.25 \text{ mA}, T_j = 25^\circ\text{C}$ | $V_{(BR)DSS}$ | 55 | - | - | V |
| Gate threshold voltage $V_{GS} = V_{DS}, I_D = 50 \mu\text{A}$ | $V_{GS(th)}$ | 1.2 | 1.6 | 2 | |
| Zero gate voltage drain current $V_{DS} = 55 \text{ V}, V_{GS} = 0 \text{ V}, T_j = -40^\circ\text{C}$ $V_{DS} = 55 \text{ V}, V_{GS} = 0 \text{ V}, T_j = 25^\circ\text{C}$ $V_{DS} = 55 \text{ V}, V_{GS} = 0 \text{ V}, T_j = 150^\circ\text{C}$ | I_{DSS} | - | - | 0.1 1 100 | µA |
| Gate-source leakage current $V_{GS} = 20 \text{ V}, V_{DS} = 0 \text{ V}$ | I_{GSS} | - | 10 | 100 | |
| Drain-Source on-resistance $V_{GS} = 5 \text{ V}, I_D = 4.8 \text{ A}$ | $R_{DS(on)}$ | - | 0.0403 | 0.055 | |

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

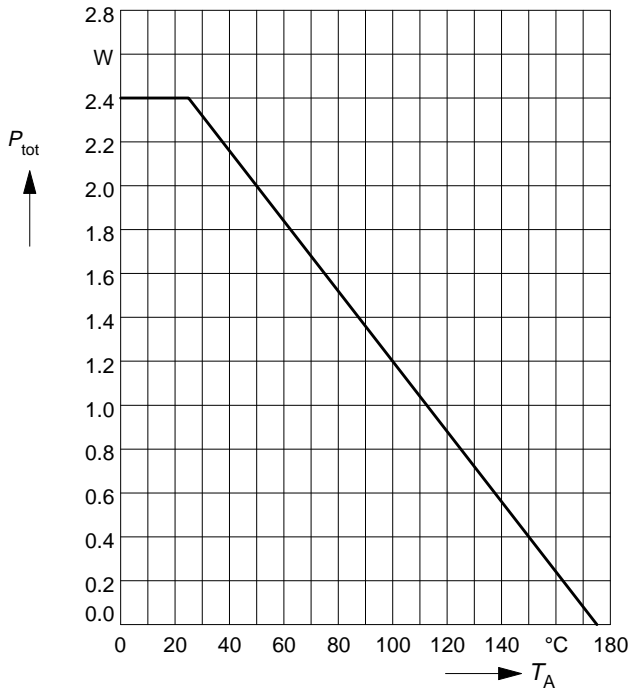
| Parameter | Symbol | Values | | | Unit |
|---|-----------------|--------|------|------|------|
| | | min. | typ. | max. | |
| Dynamic Characteristics | | | | | |
| Transconductance $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D = 0 \text{ A}$ | g_{fs} | tbd | - | - | S |
| Input capacitance $V_{GS} = 0 \text{ V}$, $V_{DS} = 25 \text{ V}$, $f = 1 \text{ MHz}$ | C_{iss} | - | 770 | 960 | pF |
| Output capacitance $V_{GS} = 0 \text{ V}$, $V_{DS} = 25 \text{ V}$, $f = 1 \text{ MHz}$ | C_{oss} | - | 230 | 290 | |
| Reverse transfer capacitance $V_{GS} = 0 \text{ V}$, $V_{DS} = 25 \text{ V}$, $f = 1 \text{ MHz}$ | C_{rss} | - | 130 | 165 | |
| Turn-on delay time $V_{DD} = 30 \text{ V}$, $V_{GS} = 5 \text{ V}$, $I_D = 4.8 \text{ A}$ $R_G = 6.5 \Omega$ | $t_{d(on)}$ | - | 50 | 75 | ns |
| Rise time $V_{DD} = 30 \text{ V}$, $V_{GS} = 5 \text{ V}$, $I_D = 4.8 \text{ A}$ $R_G = 6.5 \Omega$ | t_r | - | 30 | 45 | |
| Turn-off delay time $V_{DD} = 30 \text{ V}$, $V_{GS} = 5 \text{ V}$, $I_D = 4.8 \text{ A}$ $R_G = 6.5 \Omega$ | $t_{d(off)}$ | - | 20 | 30 | |
| Fall time $V_{DD} = 30 \text{ V}$, $V_{GS} = 5 \text{ V}$, $I_D = 4.8 \text{ A}$ $R_G = 6.5 \Omega$ | t_f | - | 40 | 60 | |
| Gate charge at threshold $V_{DD} = 40 \text{ V}$, $I_D \geq 0.1 \text{ A}$, $V_{GS} = 0 \text{ to } 1 \text{ V}$ | $Q_{g(th)}$ | - | 1.33 | 2 | nC |
| Gate charge at 5.0 V $V_{DD} = 40 \text{ V}$, $I_D = 4.8 \text{ A}$, $V_{GS} = 0 \text{ to } 5 \text{ V}$ | $Q_{g(5)}$ | - | 20 | 30 | |
| Gate charge total $V_{DD} = 40 \text{ V}$, $I_D = 4.8 \text{ A}$, $V_{GS} = 0 \text{ to } 10 \text{ V}$ | $Q_{g(total)}$ | - | 32.6 | 50 | |
| Gate plateau voltage $V_{DD} = 40 \text{ V}$, $I_D = 28 \text{ A}$ | $V_{(plateau)}$ | - | 2.94 | - | V |

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

| Parameter | Symbol | Values | | | Unit |
|---|----------|--------|------|------|------|
| | | min. | typ. | max. | |
| Reverse Diode | | | | | |
| Inverse diode continuous forward current $T_A = 25^\circ\text{C}$ | I_S | - | - | 4.8 | A |
| Inverse diode direct current, pulsed $T_A = 25^\circ\text{C}$ | I_{SM} | - | - | 19.2 | |
| Inverse diode forward voltage $V_{GS} = 0\text{ V}, I_F = 9.6\text{ A}$ | V_{SD} | - | 0.9 | 1.6 | V |
| Reverse recovery time $V_R = 30\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$ | t_{rr} | - | 55 | 85 | ns |
| Reverse recovery charge $V_R = 30\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$ | Q_{rr} | - | 93 | 140 | nC |

Power dissipation

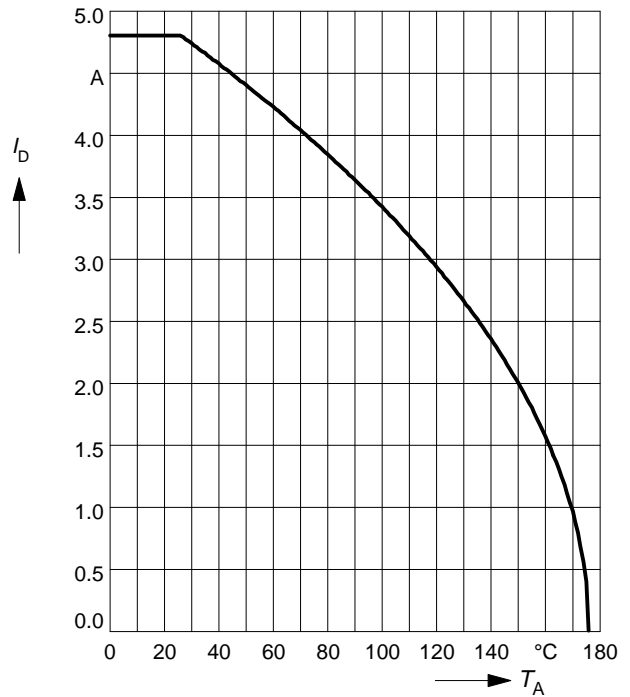
$$P_{\text{tot}} = f(T_A)$$



Drain current

$$I_D = f(T_A)$$

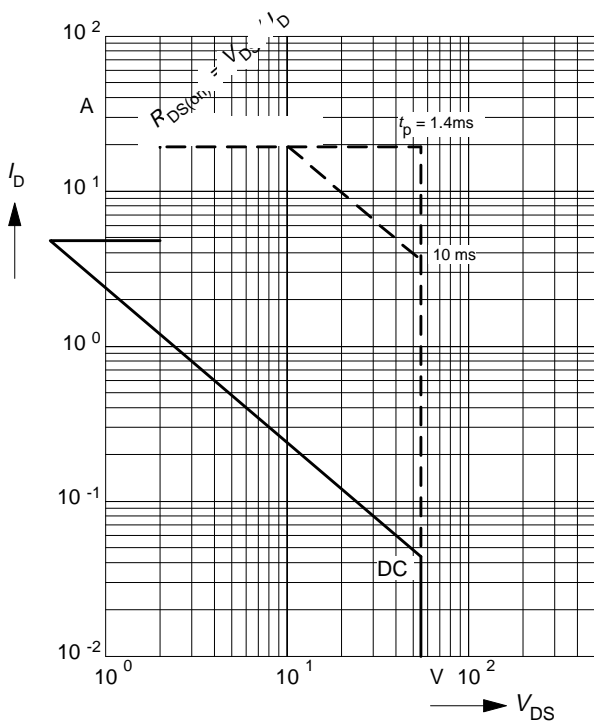
parameter: $V_{\text{GS}} \geq 5 \text{ V}$



Safe operating area

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

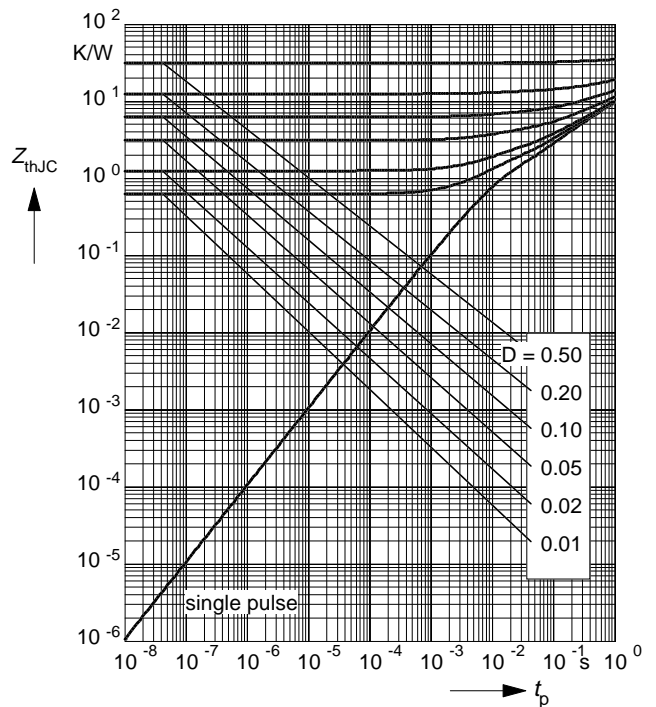
parameter: $D = 0, T_C = 25^\circ\text{C}$



Transient thermal impedance

$$Z_{\text{th JA}} = f(t_p)$$

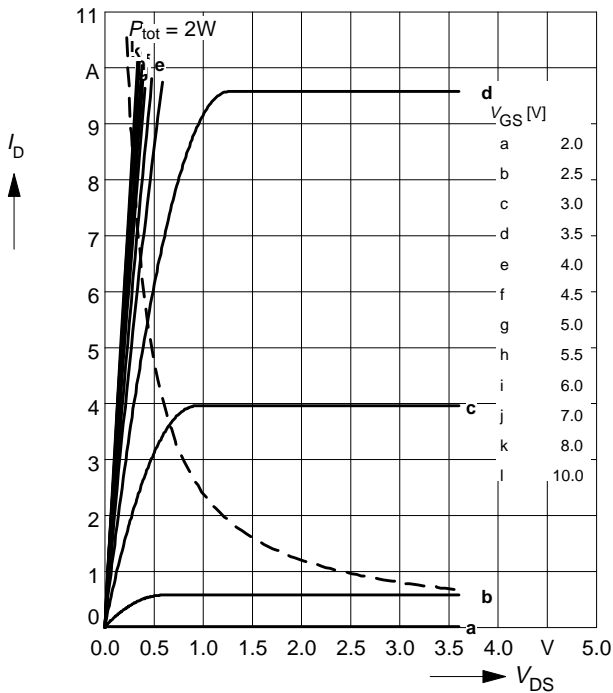
parameter: $D = t_p / T$



Typ. output characteristics

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

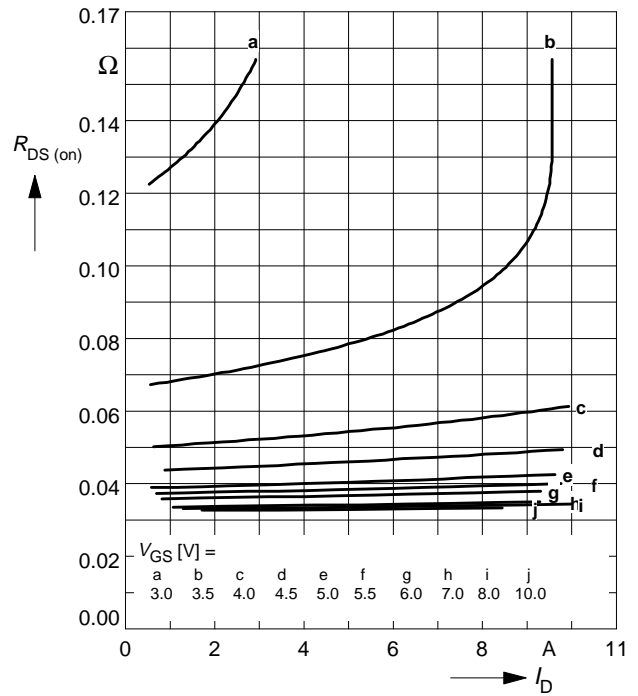
parameter: $t_p = 80 \mu s$



Typ. drain-source on-resistance

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

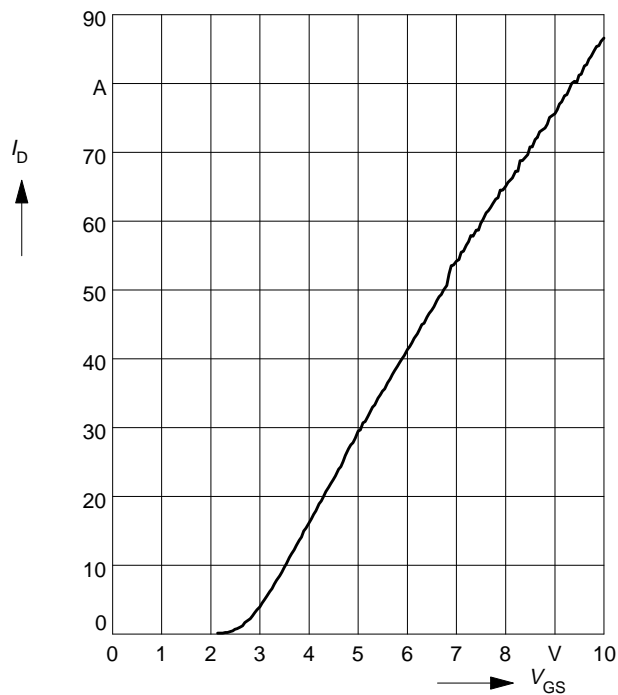
parameter: $t_p = 80 \mu s, T_j = 25 \text{ }^\circ\text{C}$



Typ. transfer characteristics $I_D = f(V_{GS})$

parameter: $t_p = 80 \mu s$

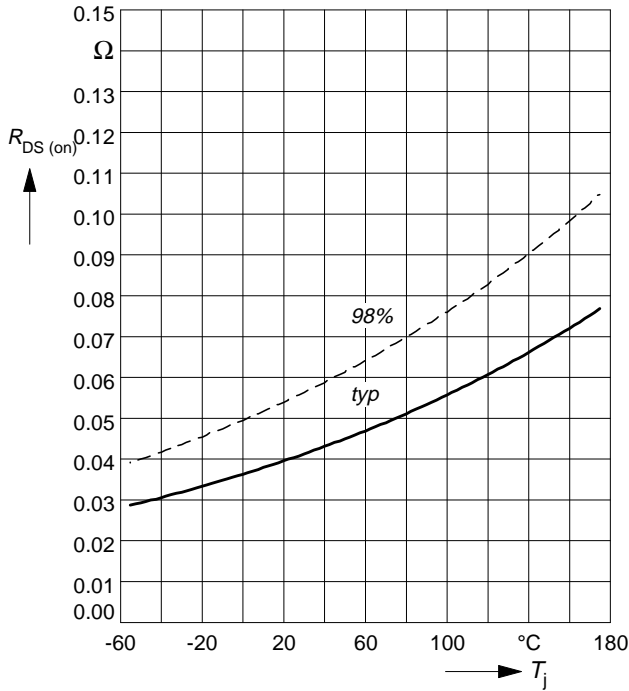
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



Drain-source on-resistance

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

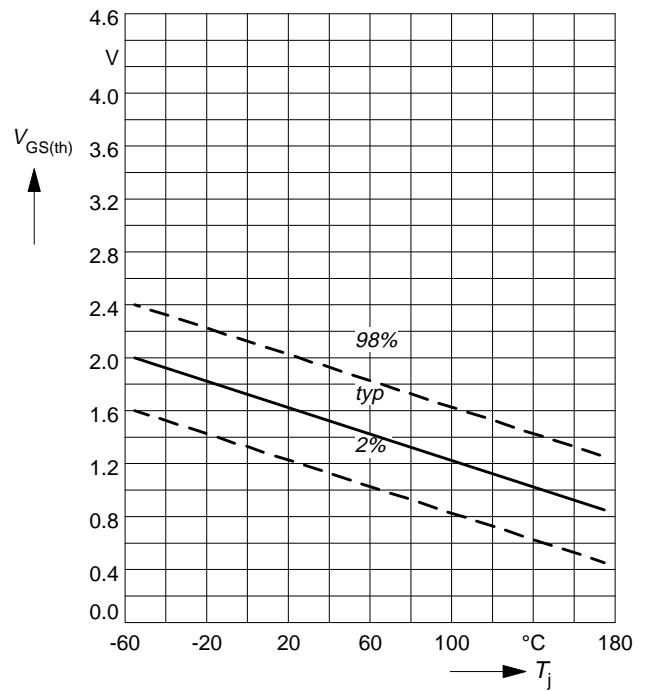
parameter: $I_D = 4.8 \text{ A}$, $V_{GS} = 5 \text{ V}$



Gate threshold voltage

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

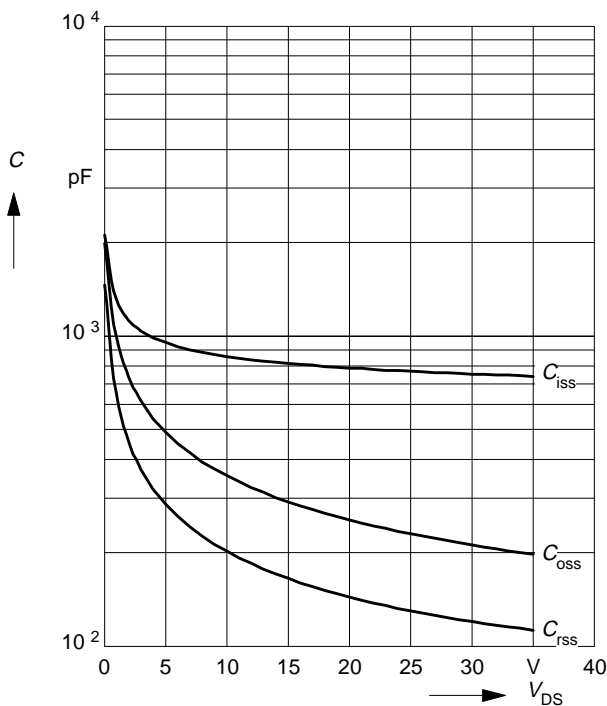
parameter: $V_{GS} = V_{DS}$, $I_D = 50 \mu\text{A}$



Typ. capacitances

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

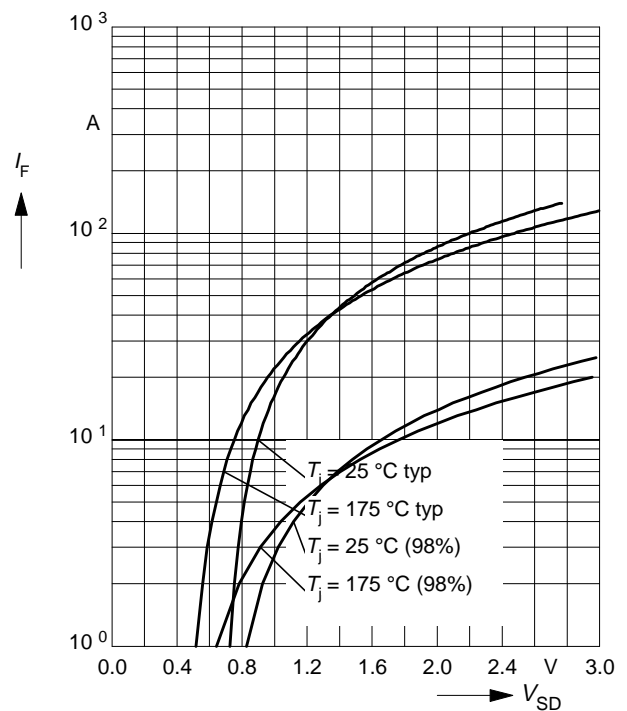
parameter: $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$



Forward characteristics of reverse diode

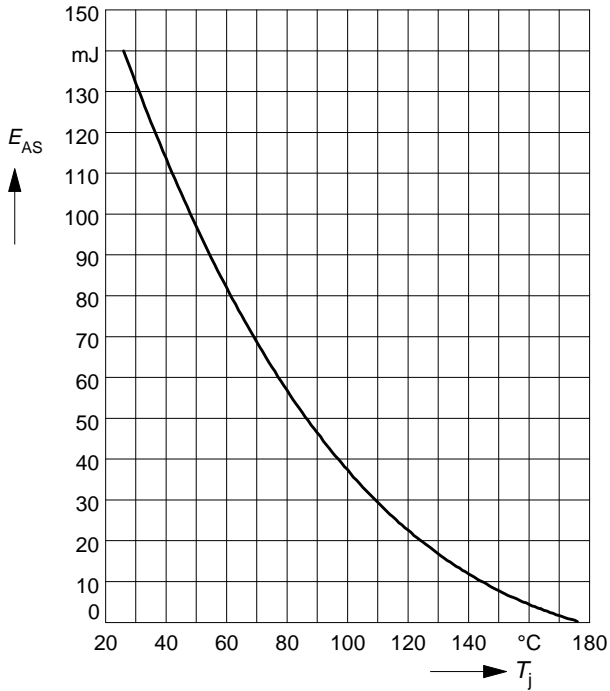
$$I_F = f(V_{SD})$$

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



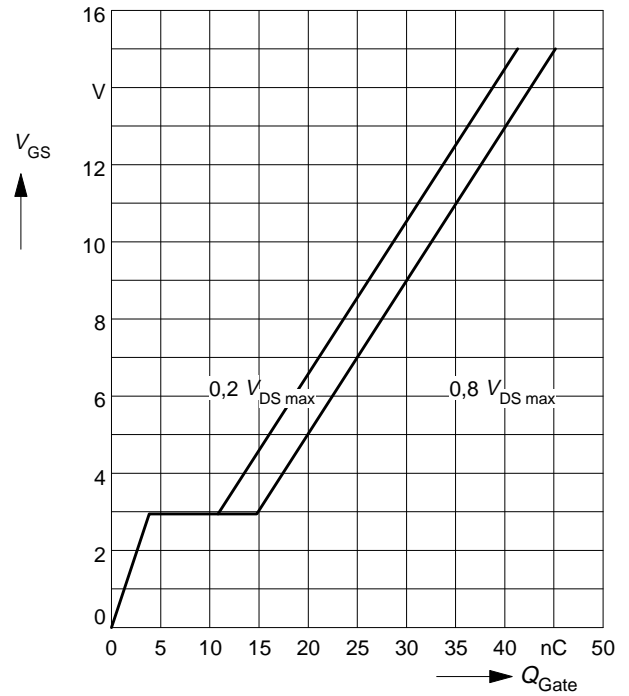
Avalanche energy $E_{AS} = f(T_j)$

parameter: $I_D = 4.8 \text{ A}$, $V_{DD} = 25 \text{ V}$
 $R_{GS} = 25 \Omega$, $L = 12 \text{ mH}$



Typ. gate charge $V_{GS} = f(Q_{Gate})$

parameter: $I_{D \text{ puls}} = 5 \text{ A}$



Drain-source breakdown voltage $V_{(BR)DSS} = f(T_j)$

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

