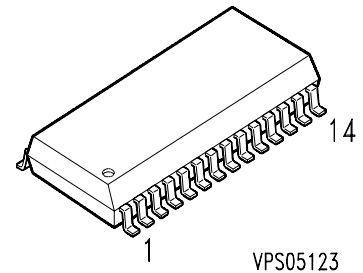
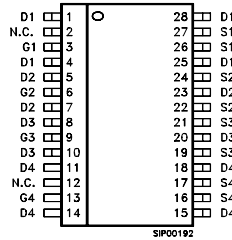


#### SIPMOS<sup>®</sup> Power Transistor

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



VPS05123

Type	$V_{DS}$	$I_D$	$R_{DS(on)}$	Package	Ordering Code
BUZ 104SL-4	55 V	3.2 A	0.125 $\Omega$	P-DSO-28	C67078-S. . . . - . .

#### Maximum Ratings

Parameter	Symbol	Values	Unit
Continuous drain current <i>one channel active</i> $T_A = 25\text{ }^\circ\text{C}$	$I_D$	3.2	A
Pulsed drain current <i>one channel active</i> $T_A = 25\text{ }^\circ\text{C}$	$I_{Dpuls}$	12.8	A
Avalanche energy, single pulse $I_D = 3.2\text{ A}$ , $V_{DD} = 25\text{ V}$ , $R_{GS} = 25\text{ }^\circ\Omega$ $L = 10.15\text{ mH}$ , $T_j = 25\text{ }^\circ\text{C}$	$E_{AS}$	52	mJ
Reverse diode $dv/dt$ $I_S = 3.2\text{ A}$ , $V_{DS} = 40\text{ V}$ , $di_F/dt = 200\text{ A}/\mu\text{s}$ $T_{jmax} = 175\text{ }^\circ\text{C}$	$dv/dt$	6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$	$\pm 14$	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 <sup>1)</sup>	$R_{thJS}$	-	-	tbd	K/W
Thermal resistance, junction - ambient <sup>2)</sup>	$R_{thJA}$	-	-	62.5	

1) Device on 50mm\*50mm\*1.5mm epoxy PCB FR4 with 6 cm<sup>2</sup> (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 $V_{GS} = 0 \text{ V}, I_D = 0.25 \text{ mA}, T_j = 25 \text{ }^\circ\text{C}$	$V_{(BR)DSS}$	55	-	-	V
Gate threshold voltage $V_{GS}=V_{DS}, I_D = 20 \text{ }\mu\text{A}$	$V_{GS(th)}$	1.2	1.6	2	
Zero gate voltage drain current $V_{DS} = 55 \text{ V}, V_{GS} = 0 \text{ V}, T_j = -40 \text{ }^\circ\text{C}$ $V_{DS} = 55 \text{ V}, V_{GS} = 0 \text{ V}, T_j = 25 \text{ }^\circ\text{C}$ $V_{DS} = 55 \text{ V}, V_{GS} = 0 \text{ V}, T_j = 150 \text{ }^\circ\text{C}$	$I_{DSS}$	-	-	0.1 1 100	$\mu\text{A}$
Gate-source leakage current $V_{GS} = 20 \text{ V}, V_{DS} = 0 \text{ V}$	$I_{GSS}$	-	10	100	
Drain-Source on-resistance $V_{GS} = 5 \text{ V}, I_D = 3.2 \text{ A}$	$R_{DS(on)}$	-	0.095	0.125	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

### Dynamic Characteristics

Transconductance $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 3.2 \text{ A}$	$g_{fs}$	3	-	-	S
Input capacitance $V_{GS} = 0 \text{ V}$ , $V_{DS} = 25 \text{ V}$ , $f = 1 \text{ MHz}$	$C_{iss}$	-	320	400	pF
Output capacitance $V_{GS} = 0 \text{ V}$ , $V_{DS} = 25 \text{ V}$ , $f = 1 \text{ MHz}$	$C_{oss}$	-	100	125	
Reverse transfer capacitance $V_{GS} = 0 \text{ V}$ , $V_{DS} = 25 \text{ V}$ , $f = 1 \text{ MHz}$	$C_{rss}$	-	55	70	
Turn-on delay time $V_{DD} = 30 \text{ V}$ , $V_{GS} = 5 \text{ V}$ , $I_D = 3.2 \text{ A}$ $R_G = 16.8 \Omega$	$t_{d(on)}$	-	20	30	ns
Rise time $V_{DD} = 30 \text{ V}$ , $V_{GS} = 5 \text{ V}$ , $I_D = 3.2 \text{ A}$ $R_G = 16.8 \Omega$	$t_r$	-	30	45	
Turn-off delay time $V_{DD} = 30 \text{ V}$ , $V_{GS} = 5 \text{ V}$ , $I_D = 3.2 \text{ A}$ $R_G = 16.8 \Omega$	$t_{d(off)}$	-	35	53	
Fall time $V_{DD} = 30 \text{ V}$ , $V_{GS} = 5 \text{ V}$ , $I_D = 3.2 \text{ A}$ $R_G = 16.8 \Omega$	$t_f$	-	20	30	
Gate charge at threshold $V_{DD} = 40 \text{ V}$ , $I_D \geq 0.1 \text{ A}$ , $V_{GS} = 0 \text{ to } 1 \text{ V}$	$Q_{g(th)}$	-	0.55	0.85	nC
Gate charge at 5.0 V $V_{DD} = 40 \text{ V}$ , $I_D = 3.2 \text{ A}$ , $V_{GS} = 0 \text{ to } 5 \text{ V}$	$Q_{g(5)}$	-	5.3	8	
Gate charge total $V_{DD} = 40 \text{ V}$ , $I_D = 3.2 \text{ A}$ , $V_{GS} = 0 \text{ to } 10 \text{ V}$	$Q_{g(total)}$	-	14	21	
Gate plateau voltage $V_{DD} = 40 \text{ V}$ , $I_D = 3.2 \text{ A}$	$V_{(plateau)}$	-	3.27	-	V

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

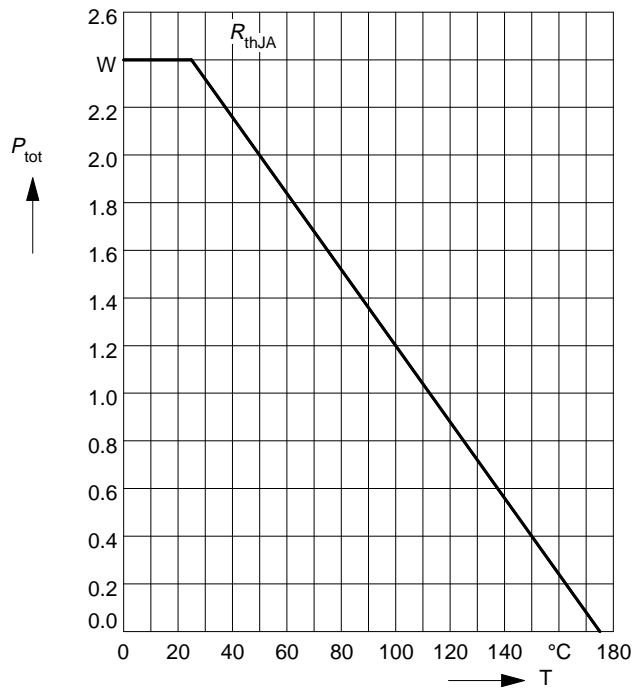
Parameter	Symbol	Values			Unit
		min.	typ.	max.	

**Reverse Diode**

Inverse diode continuous forward current $T_A = 25^\circ\text{C}$	$I_S$	-	-	3.2	A
Inverse diode direct current, pulsed $T_A = 25^\circ\text{C}$	$I_{SM}$	-	-	12.8	
Inverse diode forward voltage $V_{GS} = 0\text{ V}, I_F = 6.4\text{ A}$	$V_{SD}$	-	0.95	1.6	V
Reverse recovery time $V_R = 30\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$	$t_{rr}$	-	50	75	ns
Reverse recovery charge $V_R = 30\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$	$Q_{rr}$	-	90	135	nC

### Power dissipation

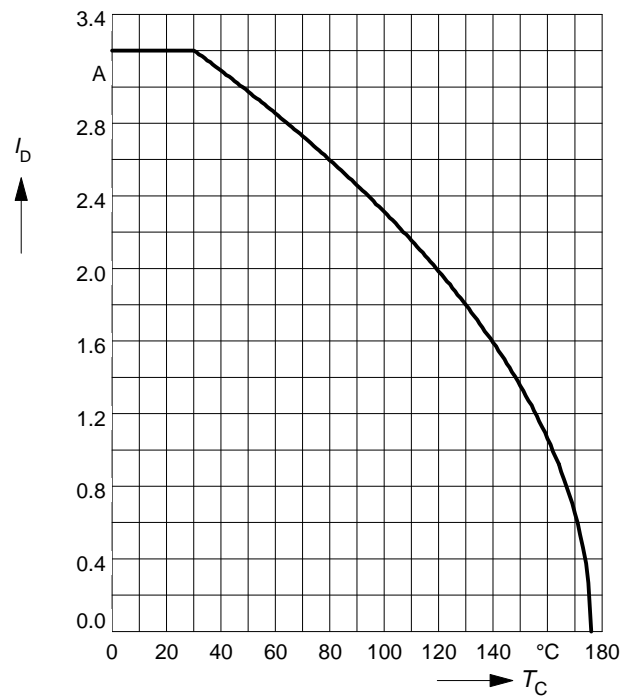
$$P_{\text{tot}} = f(T)$$



### Drain current

$$I_D = f(T_C)$$

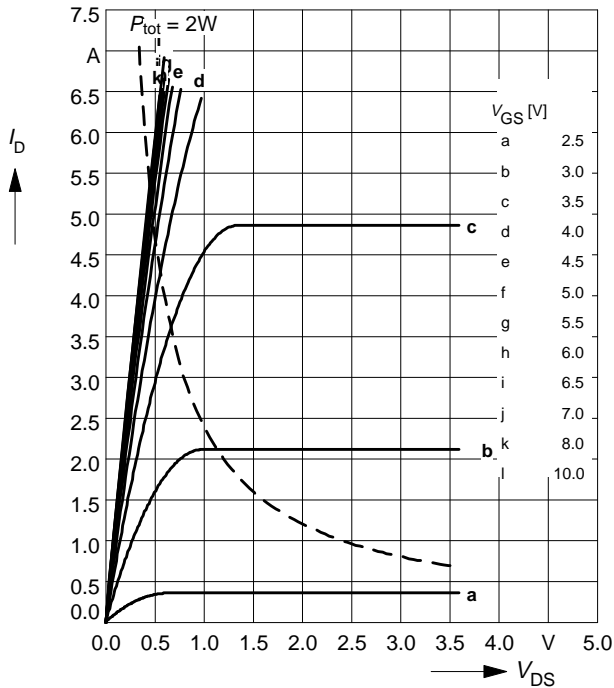
parameter:  $V_{GS} \geq 5 \text{ V}$



### Typ. output characteristics

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

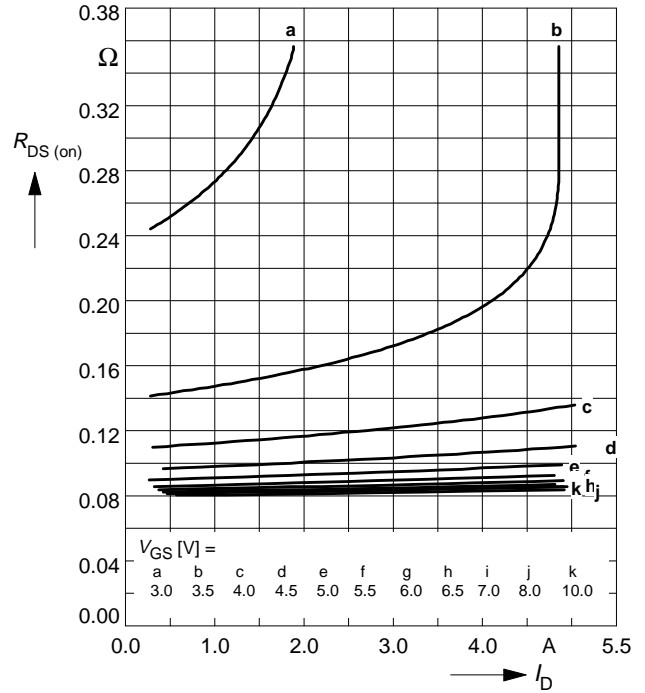
parameter:  $t_p = 80 \mu s$



### Typ. drain-source on-resistance

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

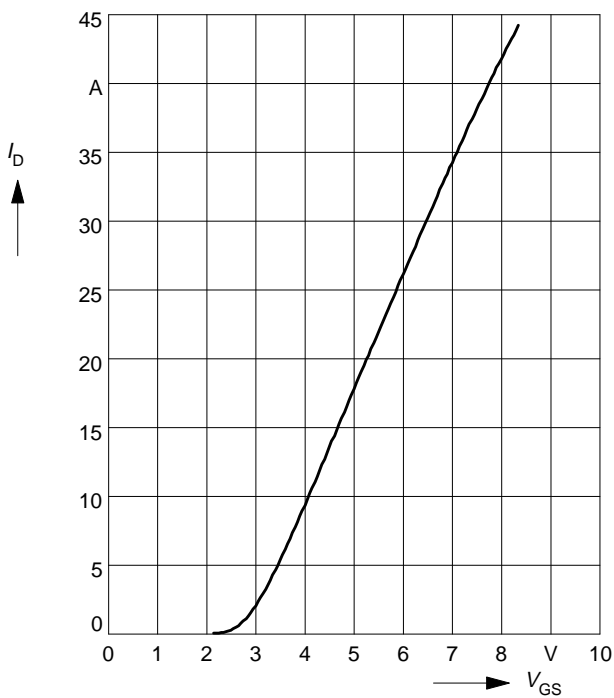
parameter:  $t_p = 80 \mu s, T_j = 25 \text{ }^\circ\text{C}$



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

parameter:  $t_p = 80 \mu s$

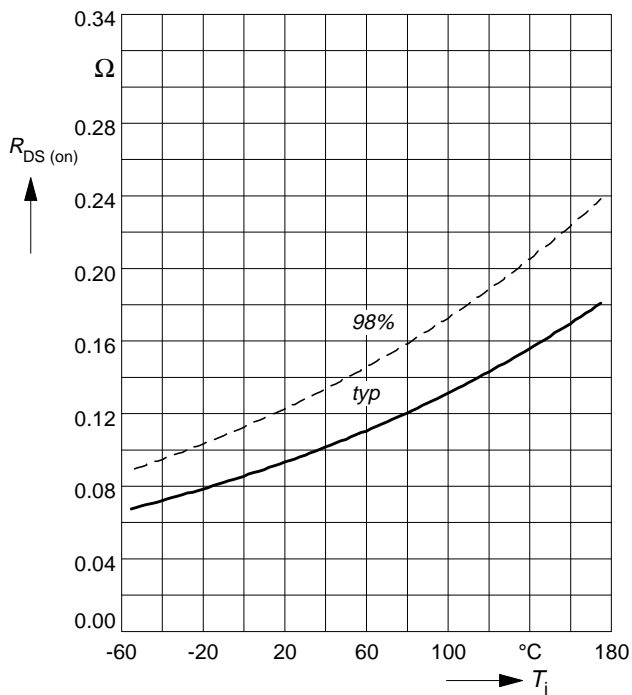
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



### Drain-source on-resistance

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

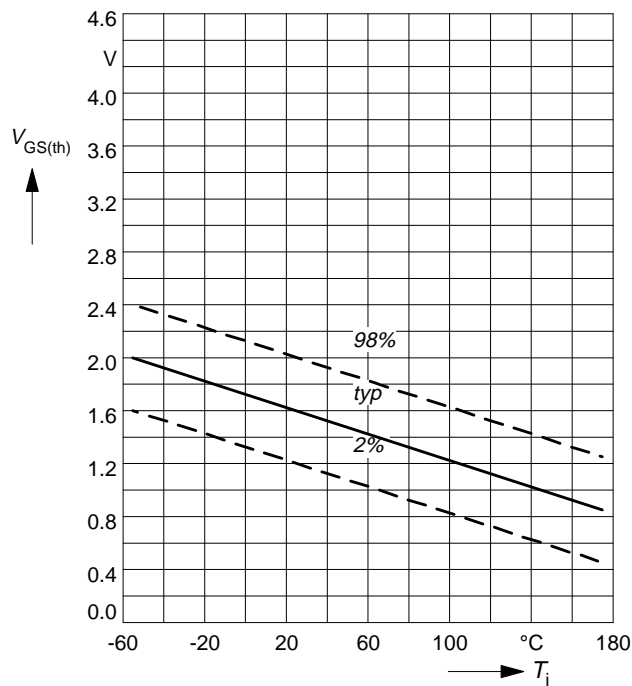
parameter:  $I_D = 3.2 \text{ A}$ ,  $V_{GS} = 5 \text{ V}$



### Gate threshold voltage

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

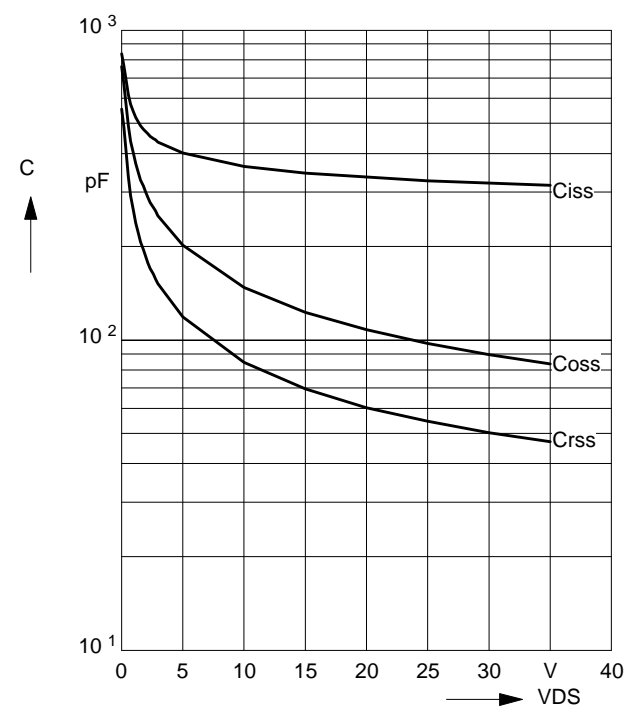
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 20 \mu\text{A}$



### Typ. capacitances

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

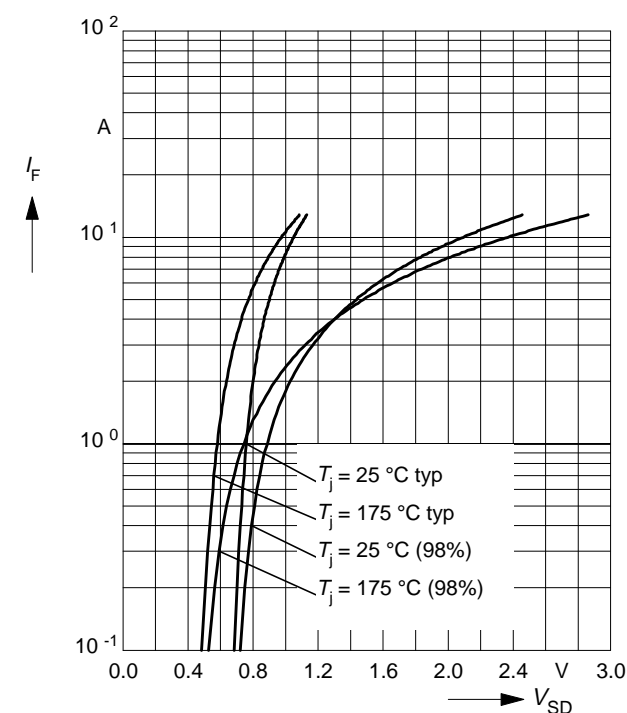
parameter:  $V_{GS} = 0\text{V}$ ,  $f = 1\text{MHz}$



### Forward characteristics of reverse diode

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

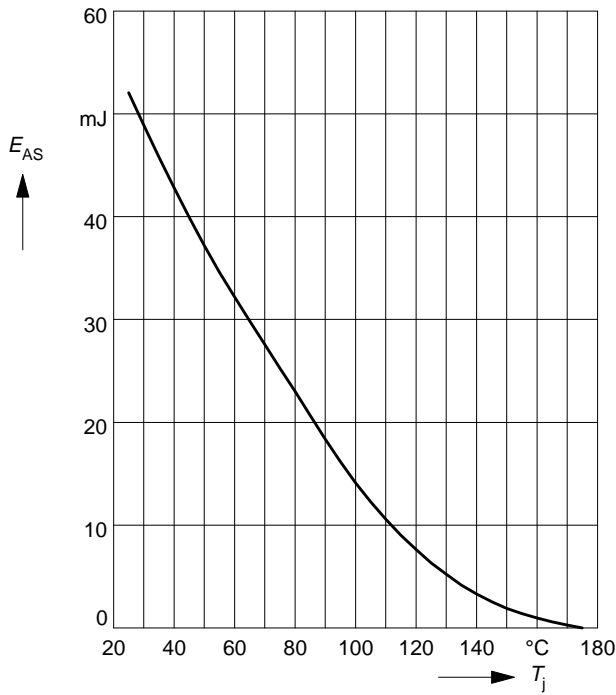
parameter:  $T_j$ ,  $t_p = 80 \mu\text{s}$



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

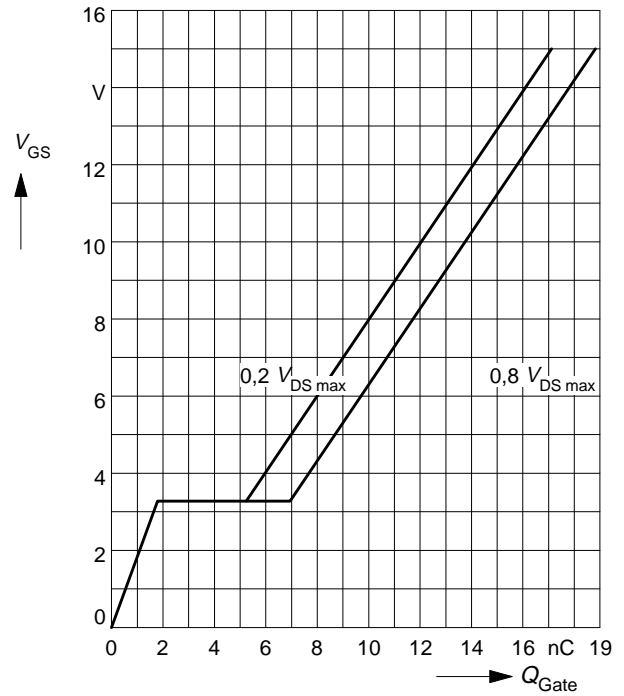
parameter:  $I_D = 3.2A, V_{DD} = 25V$

$R_{GS} = 25\Omega, L = 10.15mH$



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

parameter:  $I_{D puls} = 3A$



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

