OptiMOS® Power-Transistor

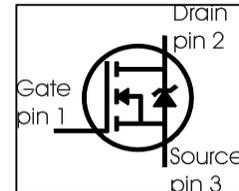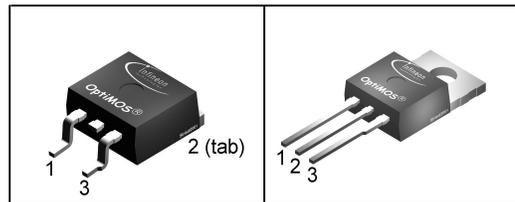**Feature**

- N-Channel
- Enhancement mode
- 175°C operating temperature
- Avalanche rated
- dv/dt rated

Product Summary

V_{DS}	40	V
$R_{DS(on)}$ max. SMD version	3.3	mΩ
I_D	100	A

P- TO263 -3-2   P- TO220 -3-1

2 (tab)
1
3
1
2
3

Drain
pin 2

Gate
pin 1

Source
pin 3

Type	Package	Ordering Code	Marking
SPP100N04S2-04	P- TO220 -3-1	Q67060-S6040	PN0404
SPB100N04S2-04	P- TO263 -3-2	Q67060-S6041	PN0404

Maximum Ratings, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current [1)	I_D		A
T_C=25°C		100	
		100	
Pulsed drain current	$I_{D\ puls}$	400	
T_C=25°C			
Avalanche energy, single pulse	E_{AS}	810	mJ
I_D=80 , V_{DD}=25V, R_{GS}=25Ω			
Reverse diode dv/dt	dv/dt	6	kV/µs
I_S=100A, V_{DS}=32V, di/dt=200A/µs, T_{jmax}=175°C			
Gate source voltage	V_{GS}	±20	V
Power dissipation	P_{tot}	300	W
T_C=25°C			
Operating and storage temperature	T_j , T_{stg}	-55... +175	°C
IEC climatic category; DIN IEC 68-1		55/175/56	

2003-05-08

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - case	R_{thJC}	-	0.3	0.5	K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}	-	-	62	
SMD version, device on PCB:	R_{thJA}				
@ min. footprint		-	-	62	
@ 6 cm^2 cooling area [2)]		-	-	40	

Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Drain-source breakdown voltage V_{GS}=0V, I_D=1mA	$V_{(BR)DSS}$	40	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ I_D =250µA	$V_{GS(th)}$	2.1	3	4	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS}=40V, V_{GS}=0V, T_j=25°C		-	0.01	1	
V_{DS}=40V, V_{GS}=0V, T_j=125°C		-	1	100	
Gate-source leakage current V_{GS}=20V, V_{DS}=0V	I_{GSS}	-	1	100	nA
Drain-source on-state resistance	$R_{DS(on)}$				mΩ
V_{GS}=10V, I_D=80A		-	2.9	3.6	
V_{GS}=10V, I_D=80A, SMD version		-	2.6	3.3	

[1]Current limited by bondwire ; with an R_{thJC} = 0.5K/W the chip is able to carry I_D= 210A at 25°C, for detailed information see app.-note ANPS071E available at *www.infineon.com/optimos*

[2]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

| Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic Characteristics						
Transconductance	g_{fs}	$V_{DS} \geq 2*I_D*R_{DS(on)max}$, I_D=100A	73	146	-	S
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	5430	7220	pF
Output capacitance	C_{oss}		-	1915	2550	
Reverse transfer capacitance	C_{rss}		-	400	600	
Turn-on delay time	$t_{d(on)}$	V_{DD}=20V, V_{GS}=10V, I_D=100A, R_G=2.2Ω	-	22	33	ns
Rise time	t_r		-	54	80	
Turn-off delay time	$t_{d(off)}$		-	63	95	
Fall time	t_f		-	53	80	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=32V, I_D=100A	-	28	37	nC
Gate to drain charge	Q_{gd}		-	53	80	
Gate charge total	Q_g	V_{DD}=32V, I_D=100A, V_{GS}=0 to 10V	-	129	172	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=32V, I_D=100A	-	5.2	-	V
Reverse Diode						
Inverse diode continuous forward current	I_S	T_C=25°C	-	-	100	A
Inv. diode direct current, pulsed	I_{SM}		-	-	400	
Inverse diode forward voltage	V_{SD}	V_{GS}=0V, I_F=80A	-	0.9	1.3	V
Reverse recovery time	t_{rr}	V_R=20V, I_F=I_S, di_F/dt=100A/µs	-	66	80	ns
Reverse recovery charge	Q_{rr}		-	153	190	nC

1 Power dissipation

$P_{tot} = f(T_C)$

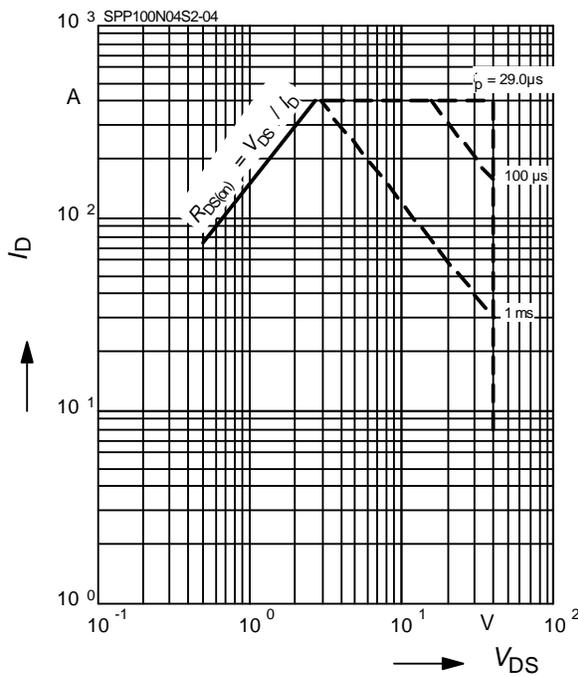parameter: $V_{GS} \geq 6$ V
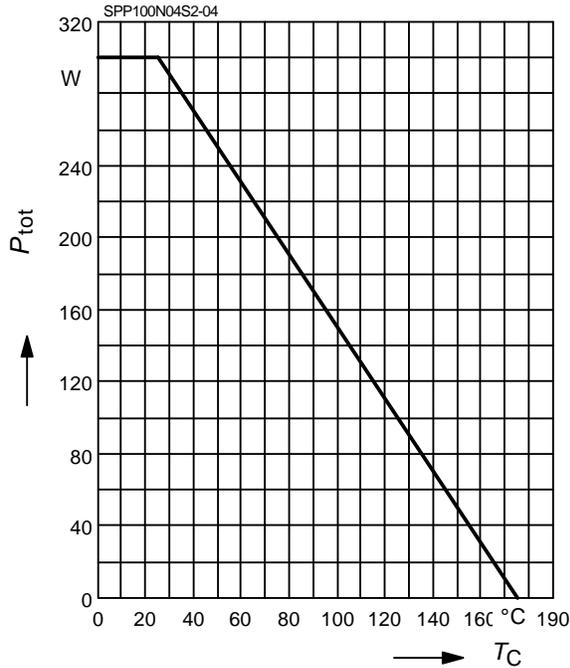
2 Drain current

$I_D = f(T_C)$

parameter: $V_{GS} \geq 10$ V
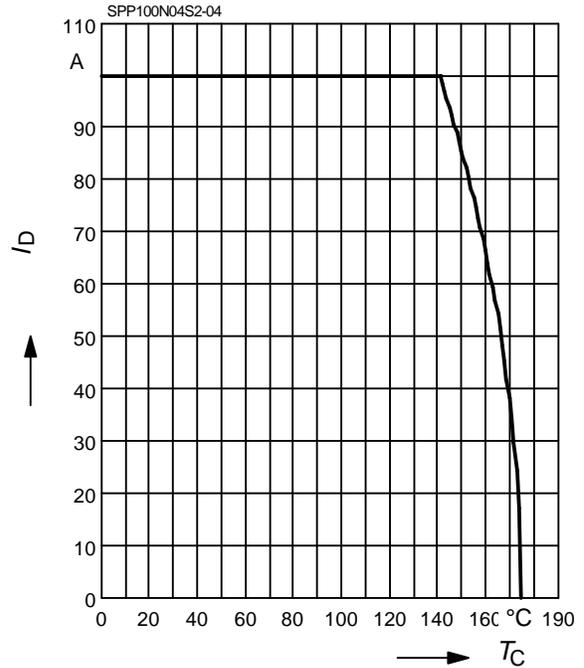
3 Safe operating area

$I_D = f(V_{DS})$

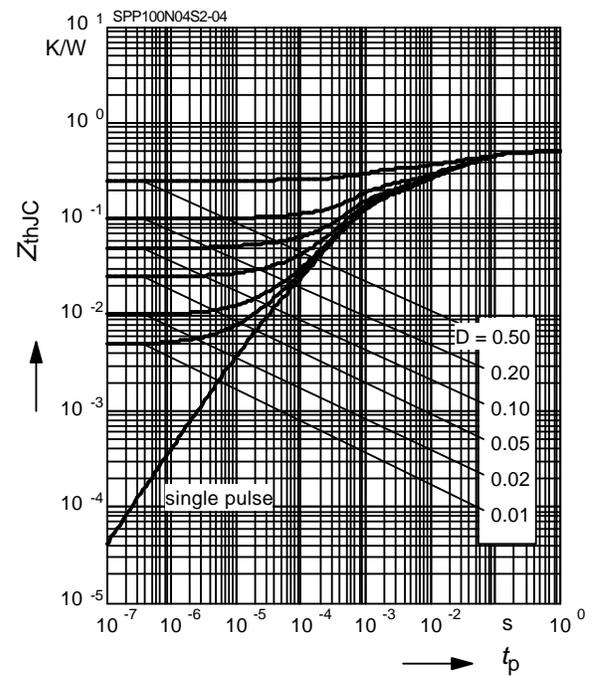parameter : $D = 0$, $T_C = 25$ °C

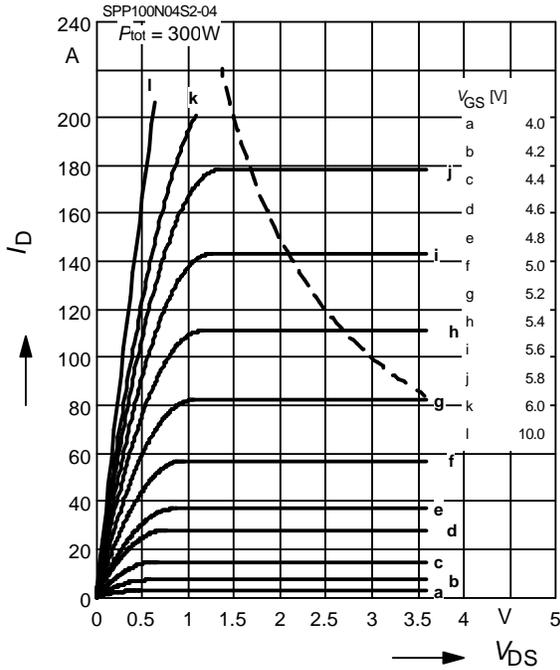
4 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

parameter : $D = t_p/T$

Page 4   2003-05-08

5 Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

parameter: t_p = 80 µs

SPP100N04S2-04
P_{tot} = 300W

V_{GS} [V]
a	4.0
b	4.2
c	4.4
d	4.6
e	4.8
f	5.0
g	5.2
h	5.4
i	5.6
j	5.8
k	6.0
l	10.0

6 Typ. drain-source on resistance

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

parameter: V_{GS}

SPP100N04S2-04

V_{GS} [V] =
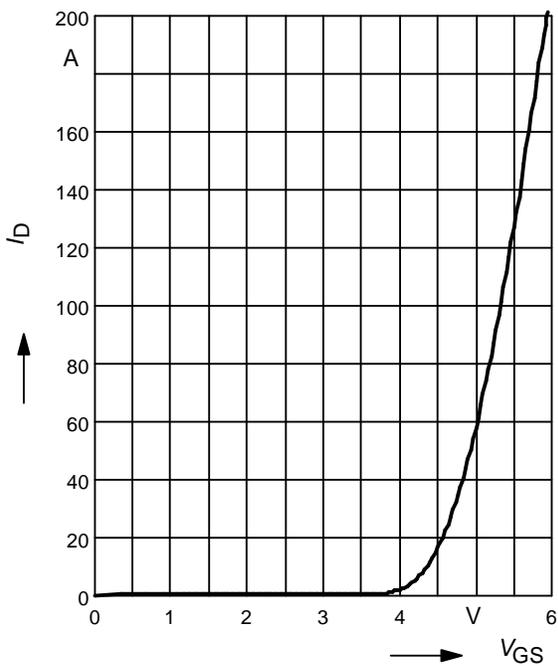| f	g	h	i	j	k	l
5.0	5.2	5.4	5.6	5.8	6.0	10.0
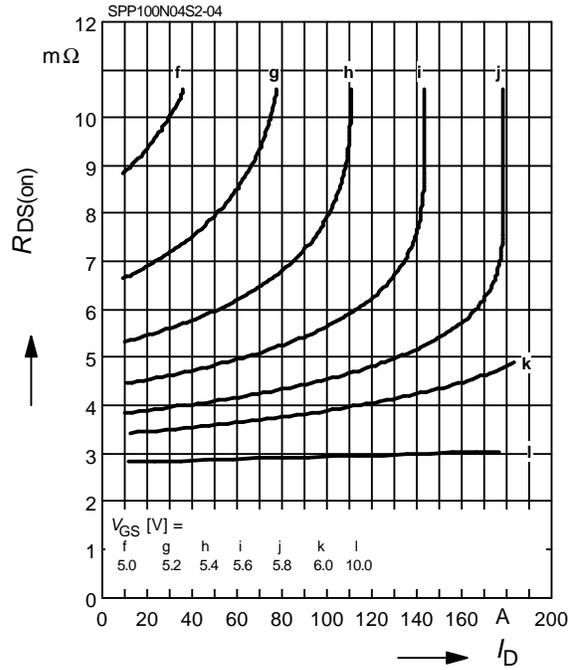
7 Typ. transfer characteristics

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

parameter: t_p = 80 µs

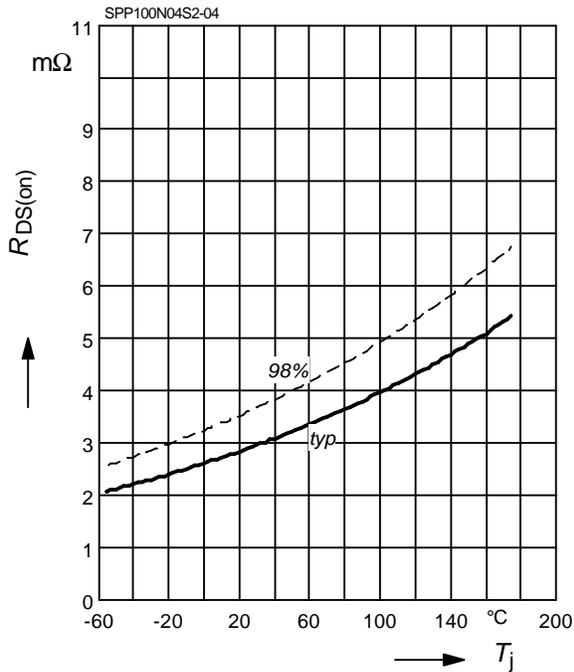## 8 Typ. forward transconductance

$g_{fs} = f(I_D)$; T_j=25°C

parameter: g_{fs}

Page 5   2003-05-08
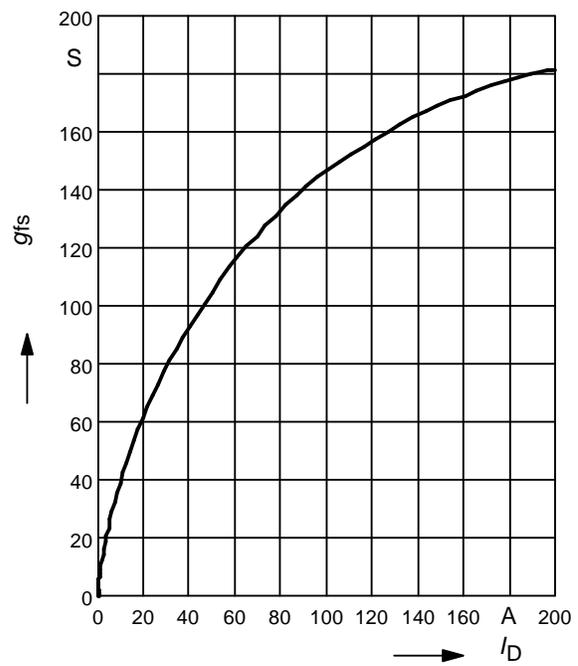
9 Drain-source on-state resistance

$R_{DS(on)} = f(T_j)$
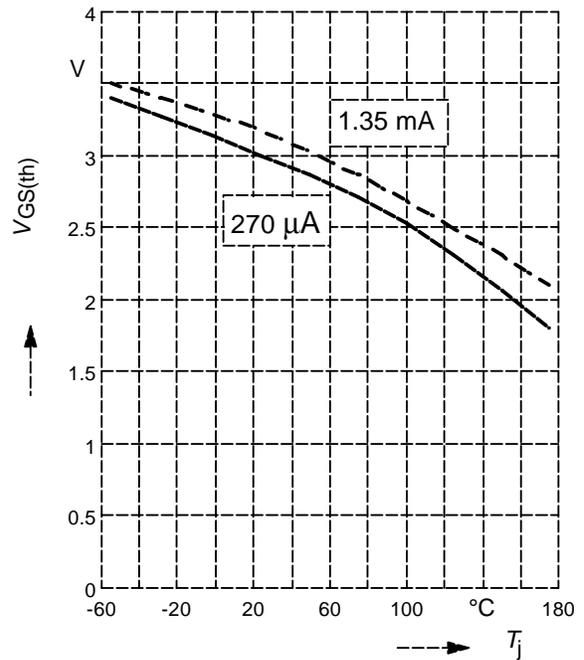
parameter : $I_D = 80$ A, $V_{GS} = 10$ V

10 Typ. gate threshold voltage

$V_{GS(th)} = f(T_j)$
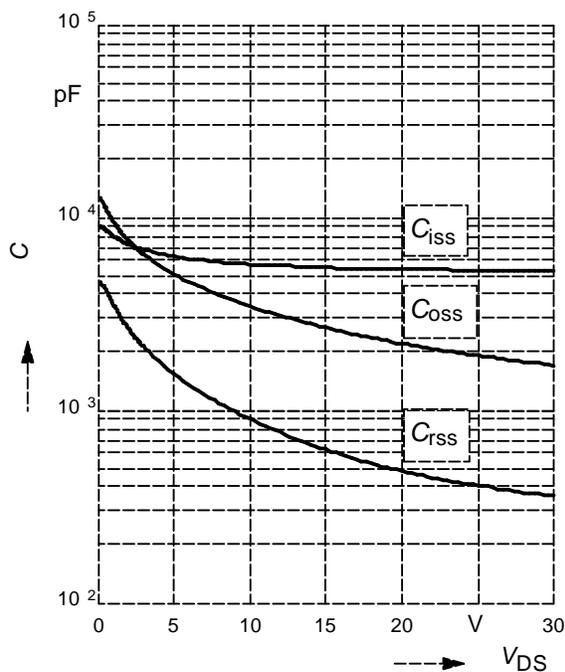
parameter: $V_{GS} = V_{DS}$

11 Typ. capacitances

$C = f(V_{DS})$
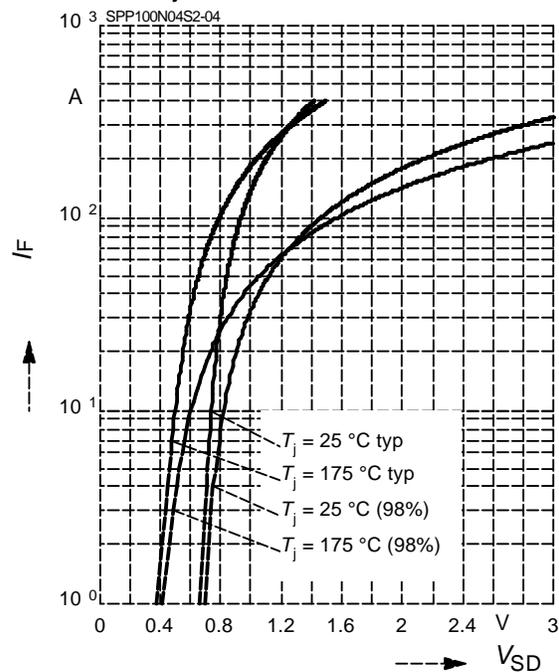
parameter: $V_{GS}=0$V, $f=1$ MHz

12 Forward character. of reverse diode

$I_F = f(V_{SD})$

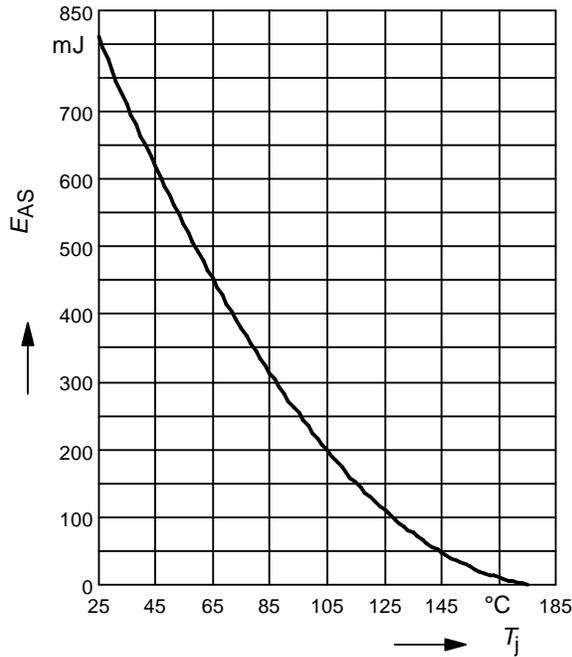parameter: T_j , $t_p = 80$ µs

Page 6

2003-05-08

13 Typ. avalanche energy
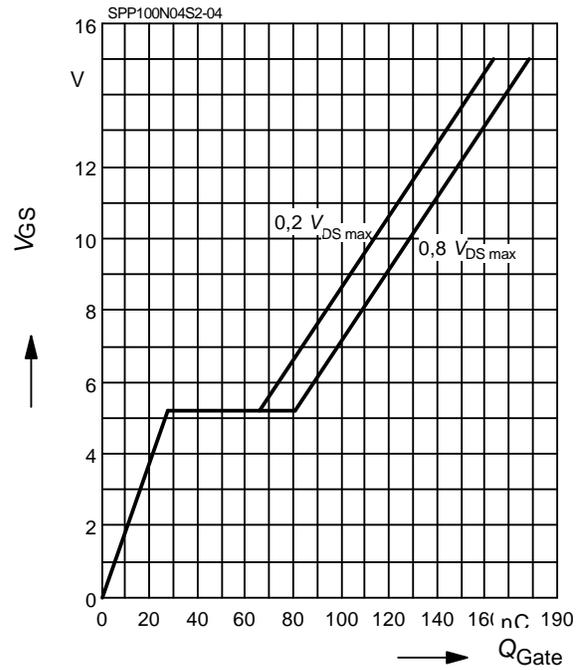
$E_{AS} = f(T_j)$

par.: $I_D = 80$, $V_{DD} = 25$ V, $R_{GS} = 25$ Ω
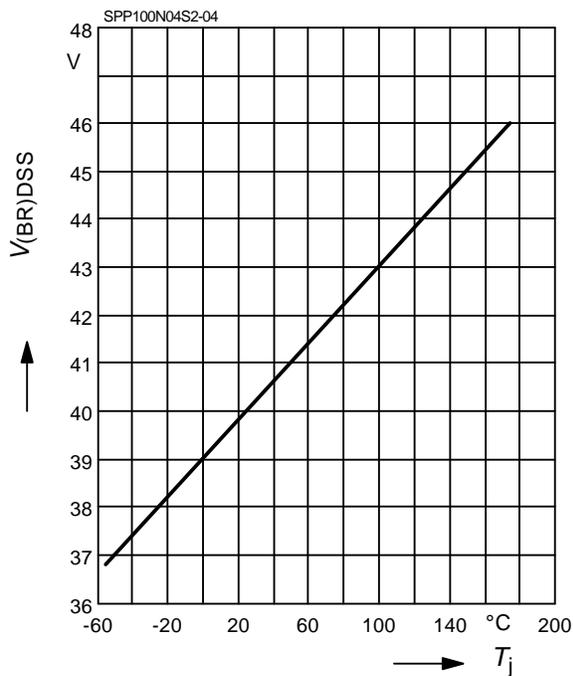

14 Typ. gate charge

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

parameter: $I_D = 100$ A pulsed

15 Drain-source breakdown voltage

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

parameter: $I_D = 10$ mA

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Further information
Please notice that the part number is **B**SPP100N04S2-04 and **B**SPB100N04S2-04, for simplicity the device is referred to by the term SPP100N04S2-04 and SPB100N04S2-04 throughout this documentation.