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SPD30N06S2-15

OptiMOS® Power-Transistor

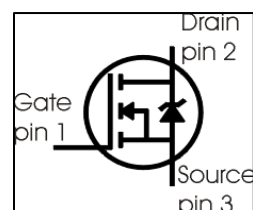
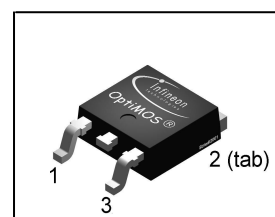
Feature

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

Product Summary

V_{DS}	55	V
$R_{DS(on)}$	14.7	m Ω
I_D	30	A

P- TO252 -3-11



Type	Package	Ordering Code	Marking
SPD30N06S2-15	P- TO252 -3-11	Q67040-S4253	2N0615

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

Parameter	Symbol	Value	Unit
Continuous drain current 1) $T_C=25^\circ\text{C}$	I_D	30 30	A
Pulsed drain current $T_C=25^\circ\text{C}$	$I_{D \text{ puls}}$	120	
Avalanche energy, single pulse $I_D=30 \text{ A}$, $V_{DD}=25\text{V}$, $R_{GS}=25\Omega$	E_{AS}	240	mJ
Repetitive avalanche energy, limited by $T_{jmax}^{2)}$	E_{AR}	13.6	
Reverse diode dv/dt $I_S=30\text{A}$, $V_{DS}=44\text{V}$, $di/dt=200\text{A}/\mu\text{s}$, $T_{jmax}=175^\circ\text{C}$	dv/dt	6	kV/ μs
Gate source voltage	V_{GS}	± 20	V
Power dissipation $T_C=25^\circ\text{C}$	P_{tot}	136	W
Operating and storage temperature	T_j, T_{stg}	-55... +175	$^\circ\text{C}$
IEC climatic category; DIN IEC 68-1		55/175/56	


SPD30N06S2-15
Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

Characteristics

Thermal resistance, junction - case	R_{thJC}	-	0.69	1.1	K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}	-	-	100	
SMD version, device on PCB:	R_{thJA}				
@ min. footprint		-	-	75	
@ 6 cm ² cooling area ³⁾		-	-	50	

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 $V_{GS}=0V, I_D=1mA$	$V_{(BR)DSS}$	55	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D=80\mu A$	$V_{GS(th)}$	2.1	3	4	
Zero gate voltage drain current $V_{DS}=55V, V_{GS}=0V, T_j=25^\circ\text{C}$ $V_{DS}=55V, V_{GS}=0V, T_j=125^\circ\text{C}$	I_{DSS}	-	0.01	1	μA
		-	1	100	
Gate-source leakage current $V_{GS}=20V, V_{DS}=0V$	I_{GSS}	-	1	100	nA
Drain-source on-state resistance $V_{GS}=10V, I_D=30A$	$R_{DS(on)}$	-	11.4	14.7	m Ω

¹Current limited by bondwire ; with an $R_{thJC} = 1.1K/W$ the chip is able to carry $I_D = 67A$ at 25°C , for detailed information see app.-note ANPS071E available at www.infineon.com/optimos

²Defined by design. Not subject to production test.

³Device 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.


SPD30N06S2-15
Electrical Characteristics

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic Characteristics

Transconductance	g_{fs}	$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D = 30A$	19	38	-	S
Input capacitance	C_{iss}	$V_{GS} = 0V$, $V_{DS} = 25V$, $f = 1MHz$	-	1560	2070	pF
Output capacitance	C_{oss}		-	404	540	
Reverse transfer capacitance	C_{rss}		-	105	160	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 30V$, $V_{GS} = 10V$, $I_D = 30A$, $R_G = 7.5\Omega$	-	11	17	ns
Rise time	t_r		-	20	30	
Turn-off delay time	$t_{d(off)}$		-	32	48	
Fall time	t_f		-	19	28	

Gate Charge Characteristics

Gate to source charge	Q_{gs}	$V_{DD} = 44V$, $I_D = 30A$	-	8	11	nC
Gate to drain charge	Q_{gd}		-	16	24	
Gate charge total	Q_g	$V_{DD} = 44V$, $I_D = 30A$, $V_{GS} = 0$ to $10V$	-	39	52	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = 44V$, $I_D = 30A$	-	5.6	-	V

Reverse Diode

Inverse diode continuous forward current	I_S	$T_C = 25^\circ C$	-	-	30	A
Inv. diode direct current, pulsed	I_{SM}		-	-	120	
Inverse diode forward voltage	V_{SD}	$V_{GS} = 0V$, $I_F = 30A$	-	1	1.3	V
Reverse recovery time	t_{rr}	$V_R = 30V$, $I_F = I_S$, $di_F/dt = 100A/\mu s$	-	45	56	ns
Reverse recovery charge	Q_{rr}		-	78	97	

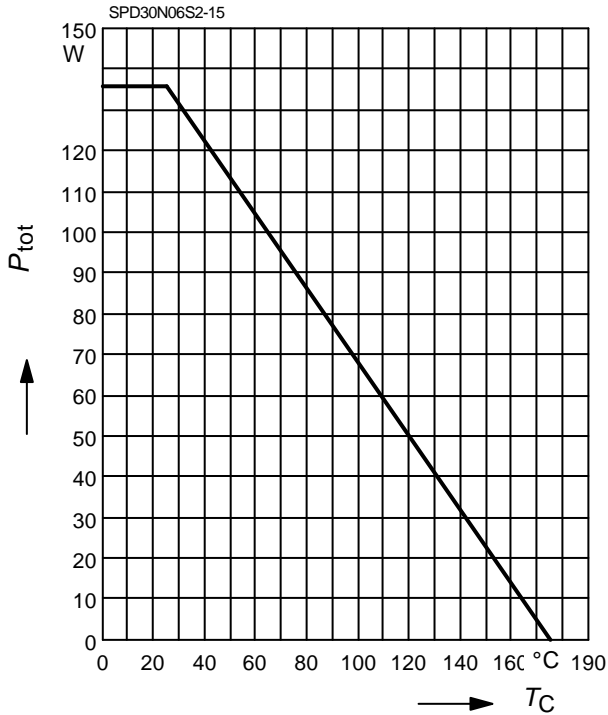


SPD30N06S2-15

1 Power dissipation

$P_{tot} = f(T_C)$

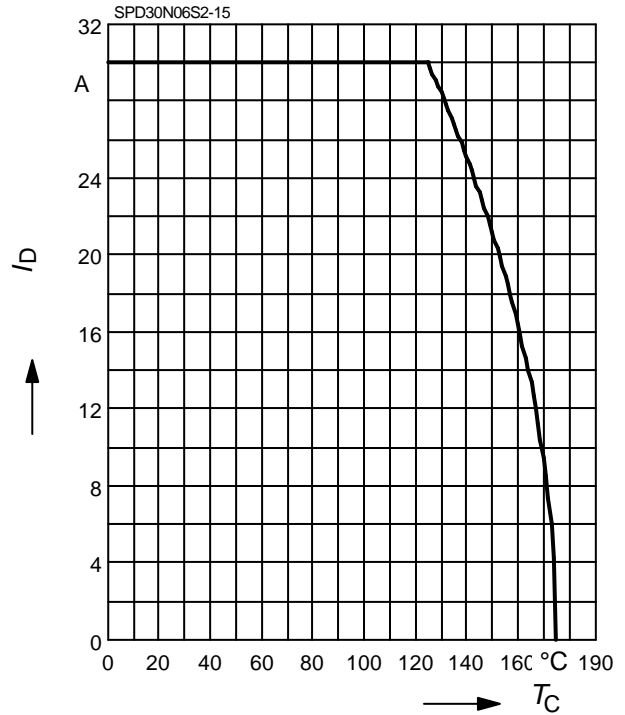
parameter: $V_{GS} \geq 6\text{ V}$



2 Drain current

$I_D = f(T_C)$

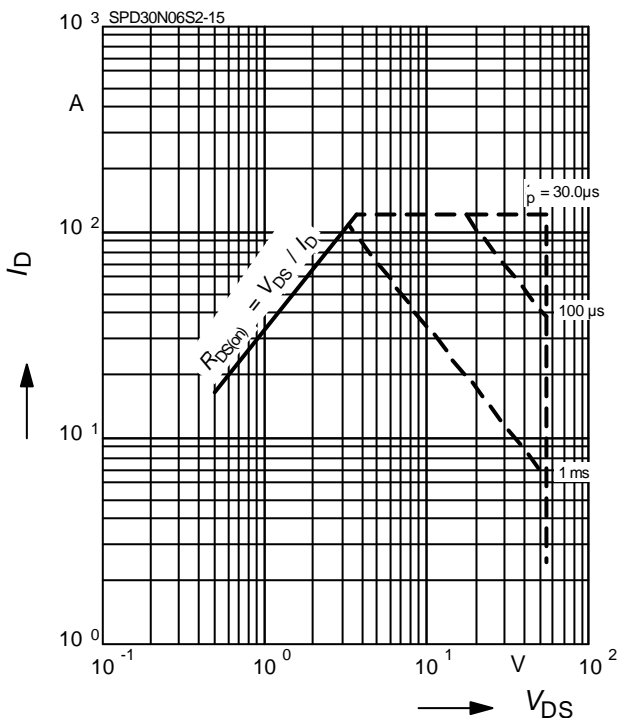
parameter: $V_{GS} \geq 10\text{ V}$



3 Safe operating area

$I_D = f(V_{DS})$

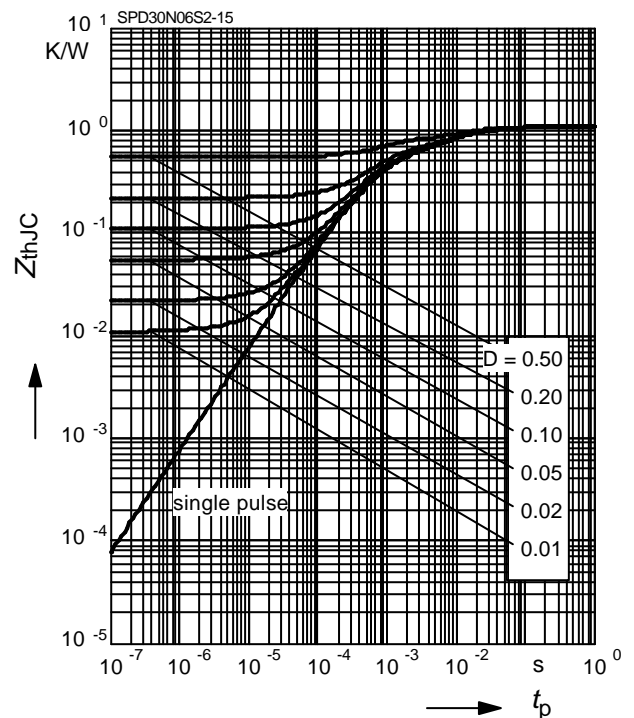
parameter: $D = 0, T_C = 25\text{ °C}$



4 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

parameter: $D = t_p/T$

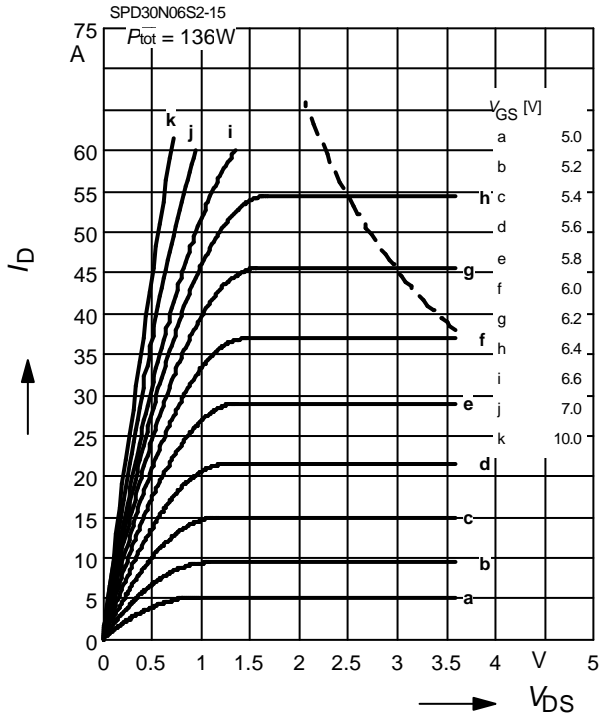




SPD30N06S2-15

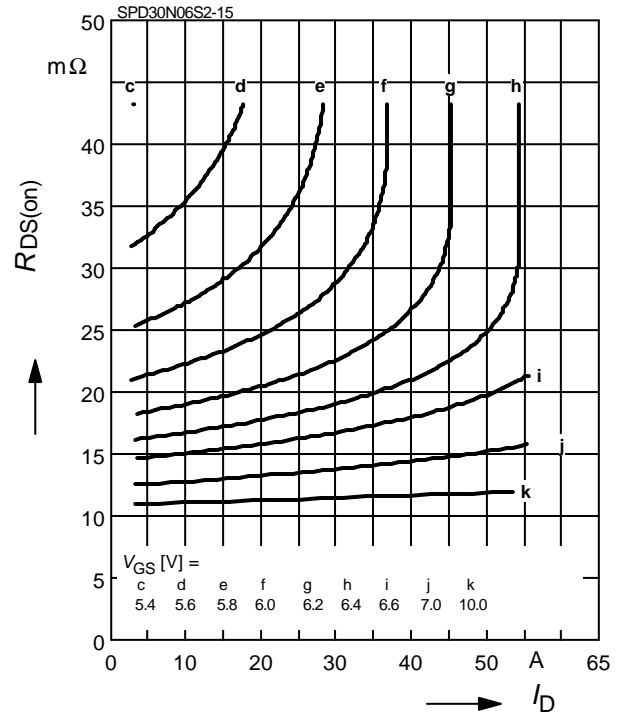
5 Typ. output characteristic

$I_D = f(V_{DS}); T_j = 25^\circ\text{C}$
 parameter: $t_p = 80 \mu\text{s}$



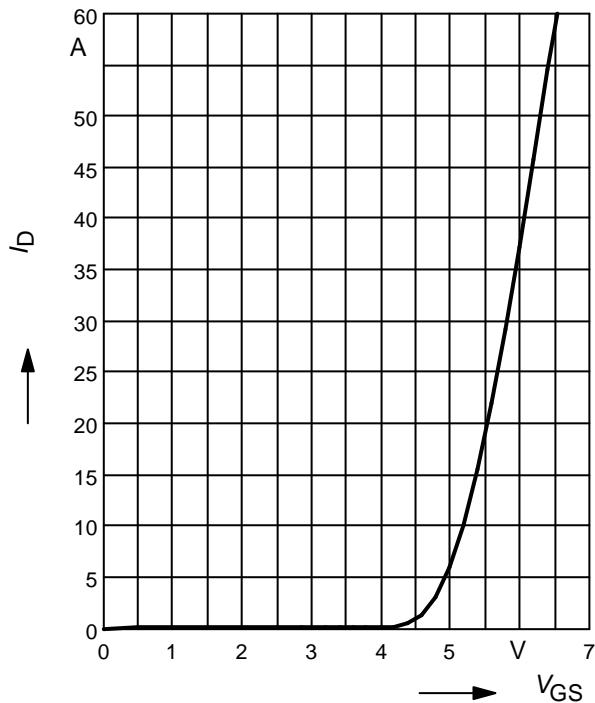
6 Typ. drain-source on resistance

$R_{DS(on)} = f(I_D)$
 parameter: V_{GS}



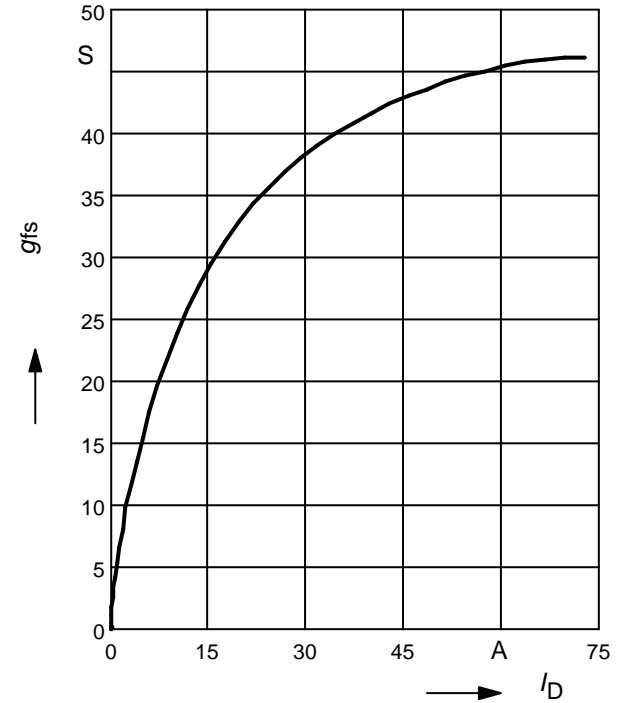
7 Typ. transfer characteristics

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



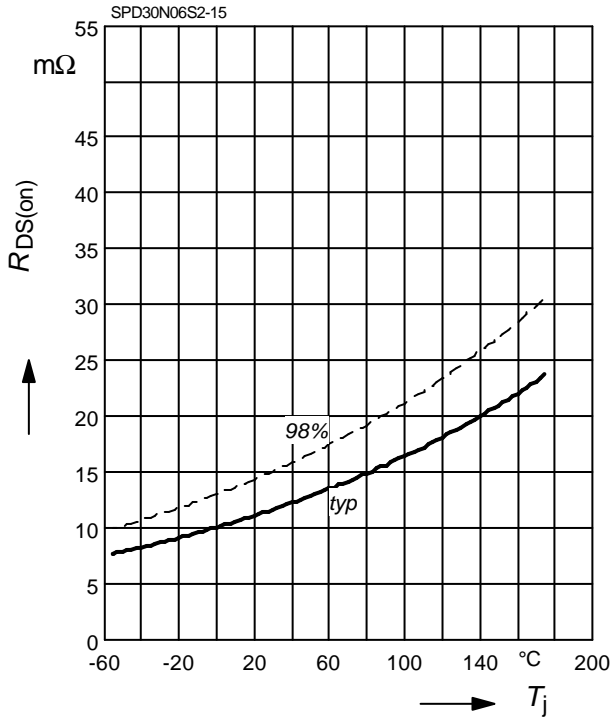


SPD30N06S2-15

9 Drain-source on-state resistance

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

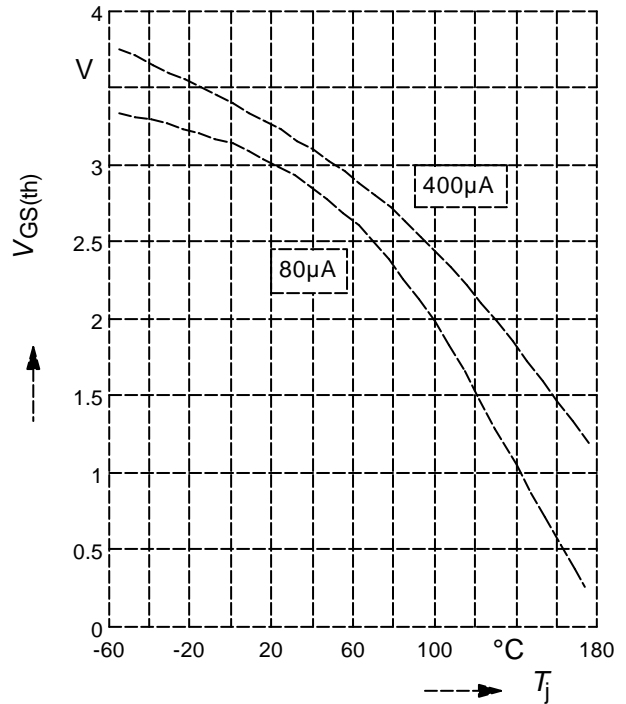
parameter : $I_D = 30\text{ A}$, $V_{GS} = 10\text{ V}$



10 Typ. gate threshold voltage

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

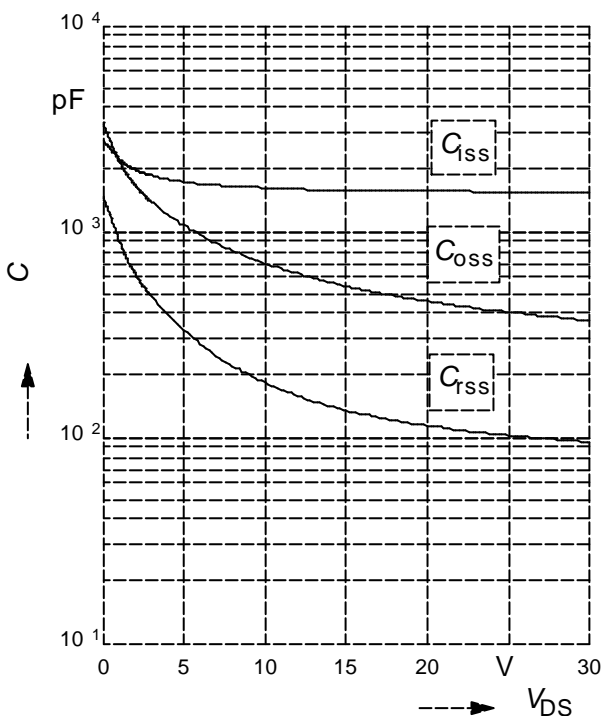
parameter: $V_{GS} = V_{DS}$



11 Typ. capacitances

$C = f(V_{DS})$

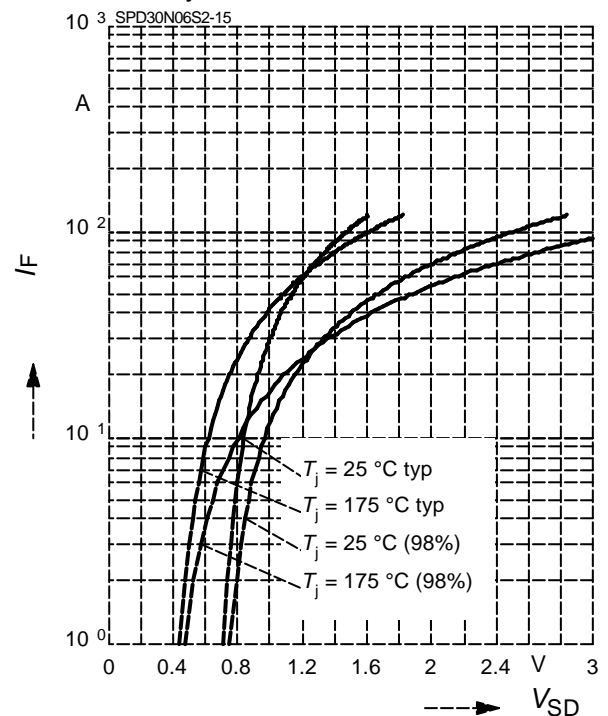
parameter: $V_{GS}=0\text{V}$, $f=1\text{ MHz}$



12 Forward character. of reverse diode

$I_F = f(V_{SD})$

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



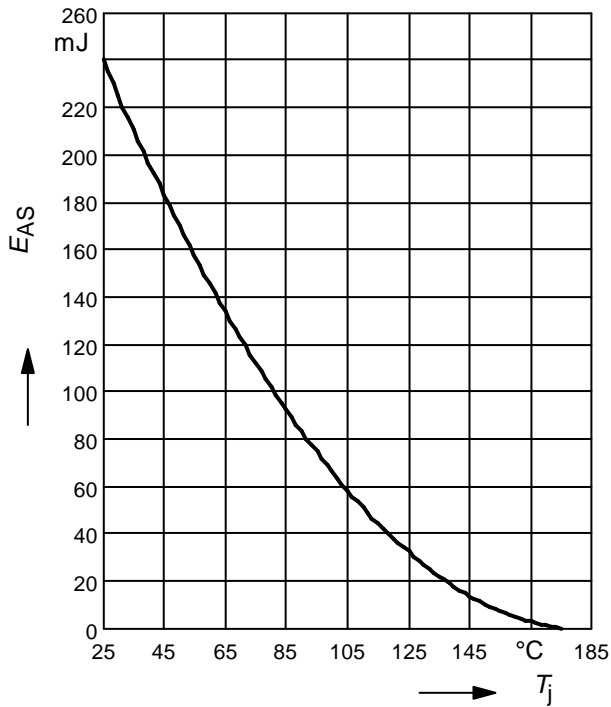


SPD30N06S2-15

13 Typ. avalanche energy

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

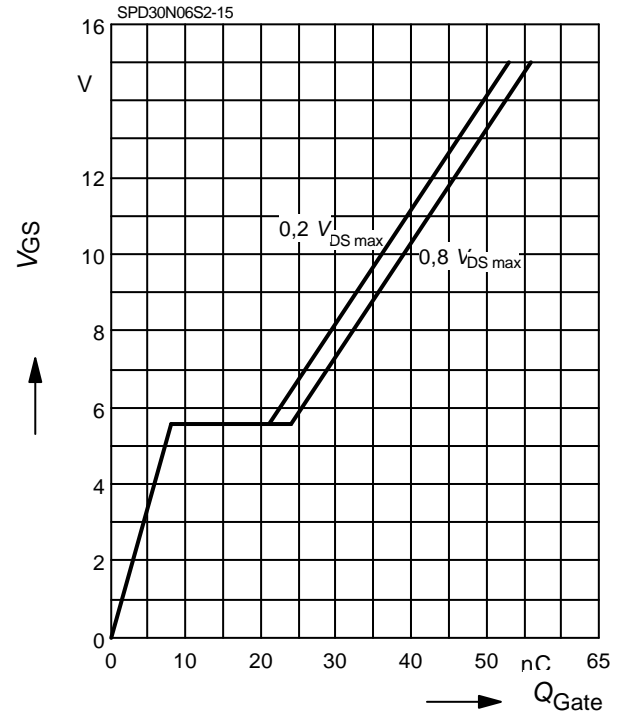
par.: $I_D = 30\text{ A}$, $V_{DD} = 25\text{ V}$, $R_{GS} = 25\ \Omega$



14 Typ. gate charge

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

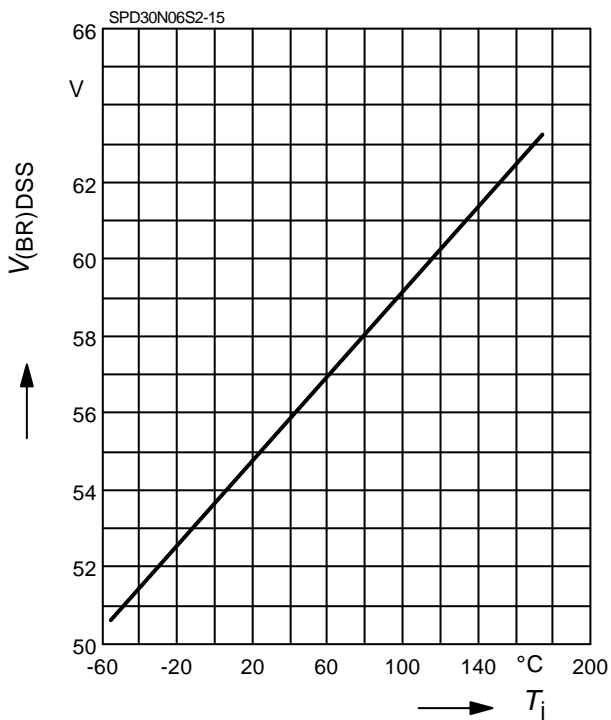
parameter: $I_D = 30\text{ A}$ pulsed



15 Drain-source breakdown voltage

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

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





SPD30N06S2-15

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Further information

Please notice that the part number is BSPD30N06S2-15, for simplicity the device is referred to by the term SPD30N06S2-15 throughout this documentation.