

## OptiMOS™ Power-Transistor

### Feature

- N-Channel
- Enhancement mode
- Excellent Gate Charge x  $R_{DS(on)}$  product (FOM)
- Superior thermal resistance
- 175°C operating temperature
- Avalanche rated
- $dv/dt$  rated; Halogen Free according to IEC61249-2-21

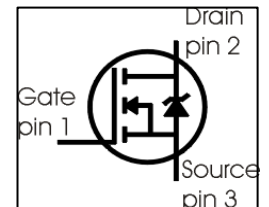
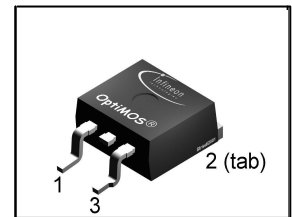


Type	Package	Marking
SPB100N03S2-03	P- TO263 -3	PN0303

### Product Summary

$V_{DS}$	30	V
$R_{DS(on)}$ max. SMD version	3	mΩ
$I_D$	100	A

P-TO263 -3



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

Parameter	Symbol	Value	Unit
Continuous drain current1) $T_C=25^\circ\text{C}$	$I_D$	100 100	A
Pulsed drain current $T_C=25^\circ\text{C}$	$I_D$ puls	400	
Avalanche energy, single pulse $I_D=80\text{A}$ , $V_{DD}=25\text{V}$ , $R_{GS}=25\Omega$	$E_{AS}$	810	mJ
Repetitive avalanche energy, limited by $T_{jmax}^{2)}$	$E_{AR}$	30	
Reverse diode $dv/dt$ $I_S=100\text{A}$ , $V_{DS}=24\text{V}$ , $di/dt=200\text{A}/\mu\text{s}$ , $T_{jmax}=175^\circ\text{C}$	$dv/dt$	6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation $T_C=25^\circ\text{C}$	$P_{tot}$	300	W
Operating and storage temperature IEC climatic category; DIN IEC 68-1	$T_j$ , $T_{stg}$	-55... +175 55/175/56	$^\circ\text{C}$

**Thermal Characteristics**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Characteristics</b>					
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: @ min. footprint @ 6 cm <sup>2</sup> cooling area <sup>3)</sup>	$R_{thJA}$	-	-	62 40	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Static Characteristics</b>					
Drain-source breakdown voltage $V_{GS}=0V, I_D=1mA$	$V_{(BR)DSS}$	30	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D = 250\mu A$	$V_{GS(th)}$	2.1	3	4	
Zero gate voltage drain current $V_{DS}=30V, V_{GS}=0V, T_j=25^\circ C$ $V_{DS}=30V, V_{GS}=0V, T_j=125^\circ C$	$I_{DSS}$	-	0.01 1	1 100	$\mu A$
Gate-source leakage current $V_{GS}=20V, V_{DS}=0V$	$I_{GSS}$	-	1	100	
Drain-source on-state resistance $V_{GS}=10V, I_D=80A$ $V_{GS}=10V, I_D=80A, \text{SMD version}$	$R_{DS(on)}$	-	2.5 2.2	3.3 3	$m\Omega$

<sup>1</sup>Current limited by bondwire ; with an  $R_{thJC} = 0.5K/W$  the chip is able to carry  $I_D = 233A$  at  $25^\circ C$ , for detailed information see app.-note ANPS071E available at [www.infineon.com/optimos](http://www.infineon.com/optimos)

<sup>2</sup>Defined by design. Not subject to production test.

<sup>3</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu m$  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	$g_{fs}$	$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 100A$	71	142	-	S
Input capacitance	$C_{iss}$	$V_{GS} = 0V$ , $V_{DS} = 25V$ , $f = 1MHz$	-	5300	7020	pF
Output capacitance	$C_{oss}$		-	2450	3200	
Reverse transfer capacitance	$C_{rss}$		-	470	700	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 15V$ , $V_{GS} = 10V$ , $I_D = 100A$ , $R_G = 2.2\Omega$	-	24	36	ns
Rise time	$t_r$		-	40	60	
Turn-off delay time	$t_{d(off)}$		-	44	66	
Fall time	$t_f$		-	39	59	

**Gate Charge Characteristics**

Gate to source charge	$Q_{gs}$	$V_{DD} = 24V$ , $I_D = 100A$	-	26	34	nC
Gate to drain charge	$Q_{gd}$		-	45	68	
Gate charge total	$Q_g$	$V_{DD} = 24V$ , $I_D = 100A$ , $V_{GS} = 0$ to $10V$	-	113	150	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = 24V$ , $I_D = 100A$	-	5.6	-	V

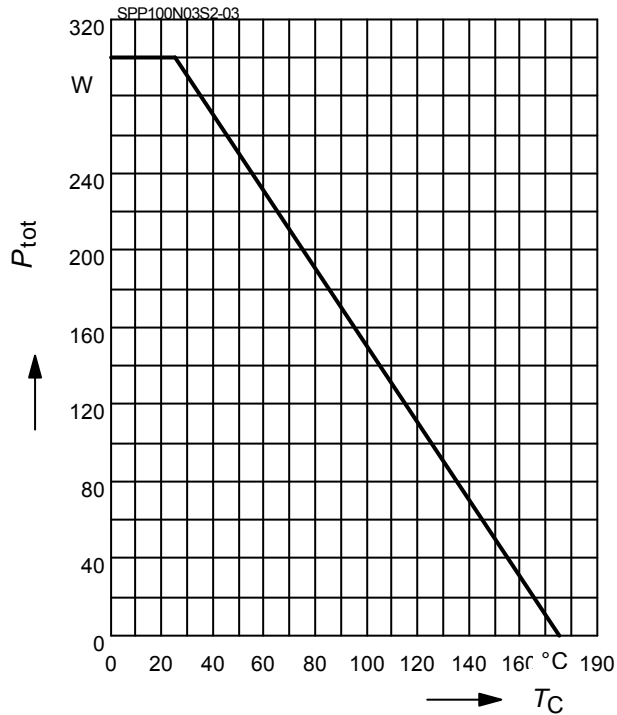
**Reverse Diode**

Inverse diode continuous forward current	$I_S$	$T_C = 25^\circ C$	-	-	100	A
Inv. diode direct current, pulsed	$I_{SM}$		-	-	400	
Inverse diode forward voltage	$V_{SD}$	$V_{GS} = 0V$ , $I_F = 100A$	-	0.9	1.3	V
Reverse recovery time	$t_{rr}$	$V_R = 15V$ , $I_F = I_S$ , $dI_F/dt = 100A/\mu s$	-	79	100	ns
Reverse recovery charge	$Q_{rr}$		-	109	136	nC

### 1 Power dissipation

$$P_{tot} = f(T_C)$$

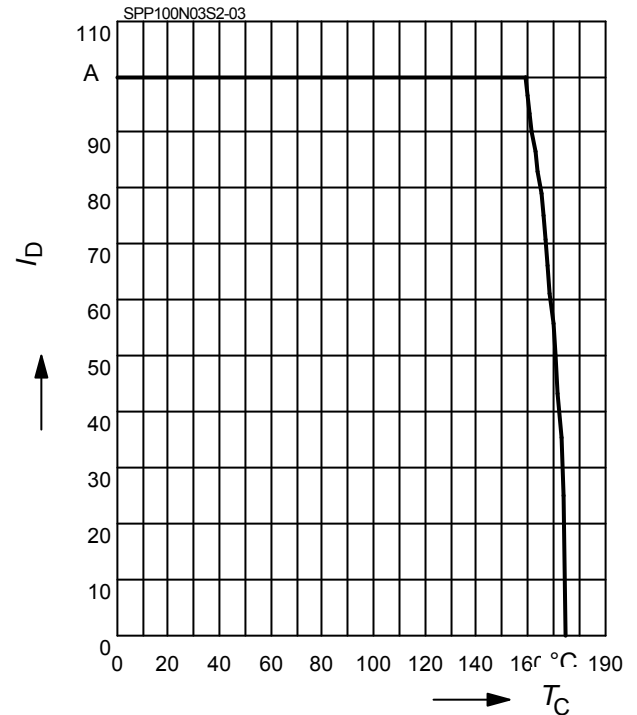
parameter:  $V_{GS} \geq 6 \text{ V}$



### 2 Drain current

$$I_D = f(T_C)$$

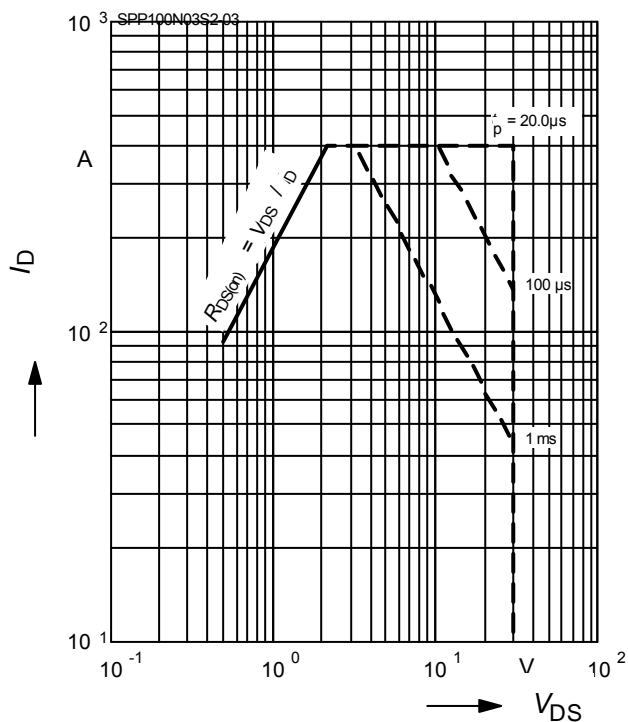
parameter:  $V_{GS} \geq 10 \text{ V}$



### 3 Safe operating area

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

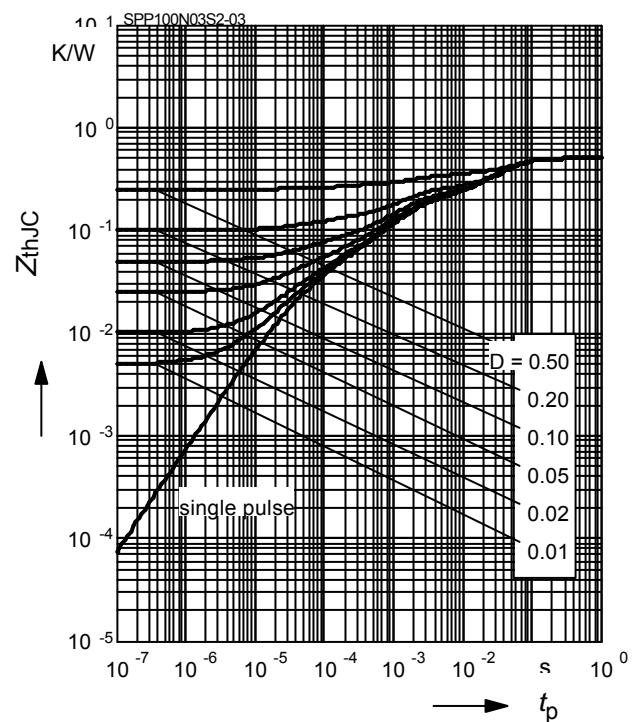
parameter:  $D = 0, T_C = 25 \text{ °C}$



### 4 Max. transient thermal impedance

$$Z_{thJC} = f(t_p)$$

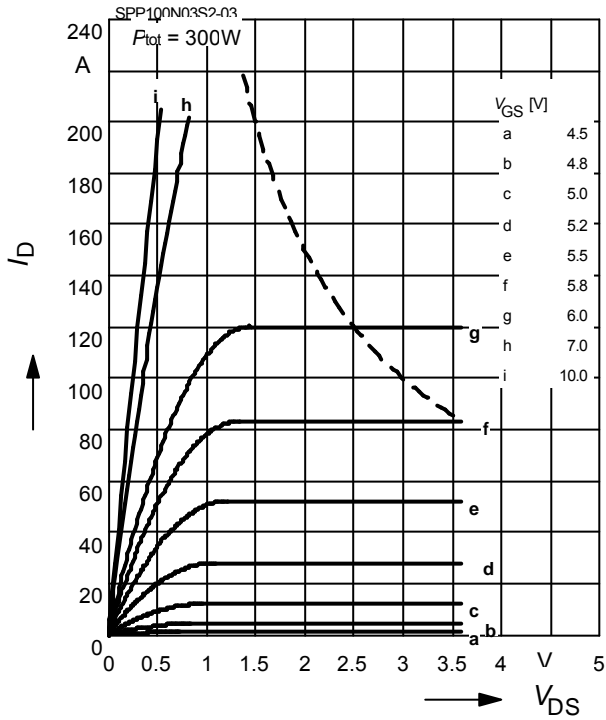
parameter:  $D = t_p/T$



**5 Typ. output characteristic**

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

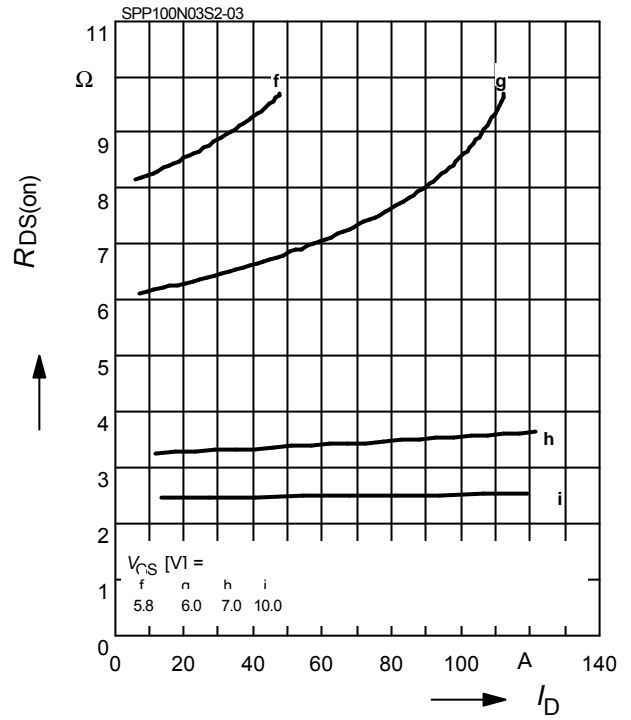
parameter:  $t_p = 80 \mu\text{s}$



**6 Typ. drain-source on resistance**

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

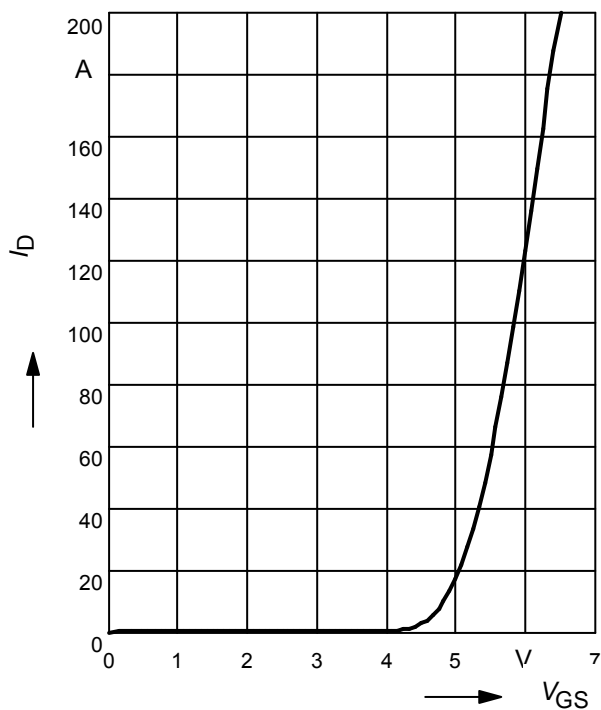
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

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

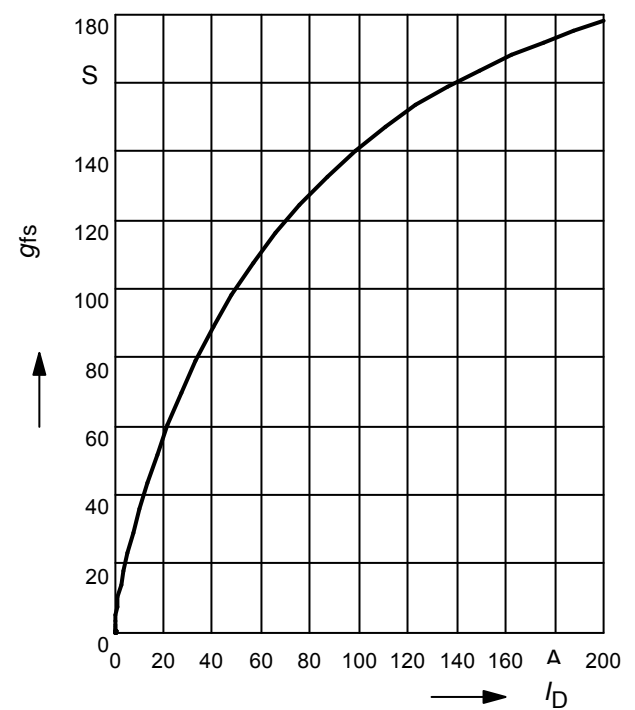
parameter:  $t_p = 80 \mu\text{s}$



**8 Typ. forward transconductance**

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

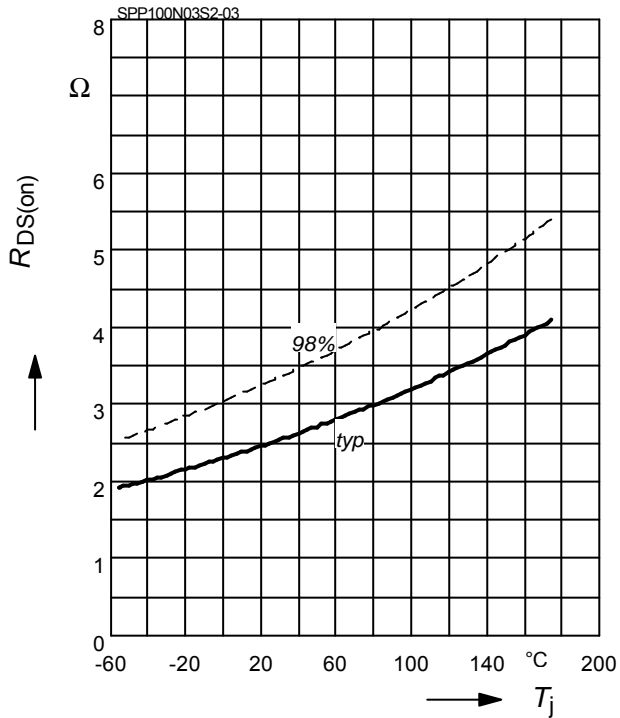
parameter:  $g_{fs}$



**9 Drain-source on-state resistance**

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

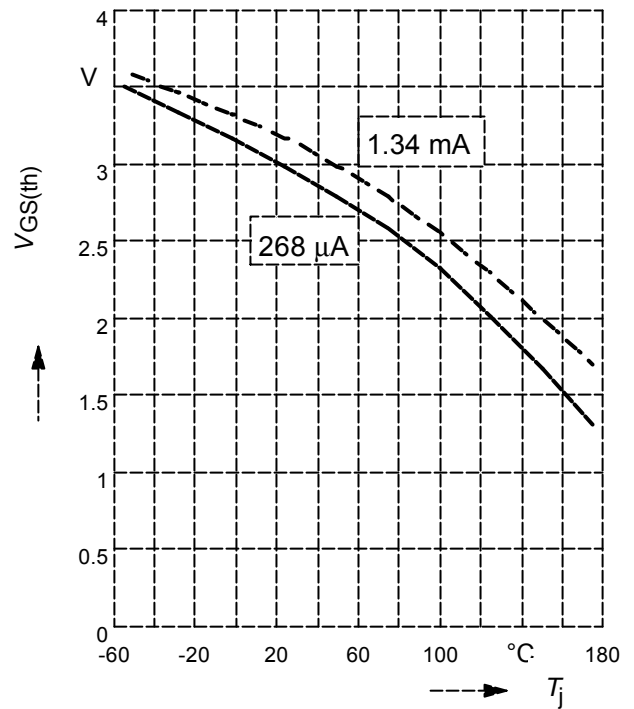
parameter :  $I_D = 80\text{ A}$ ,  $V_{GS} = 10\text{ V}$



**10 Typ. gate threshold voltage**

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

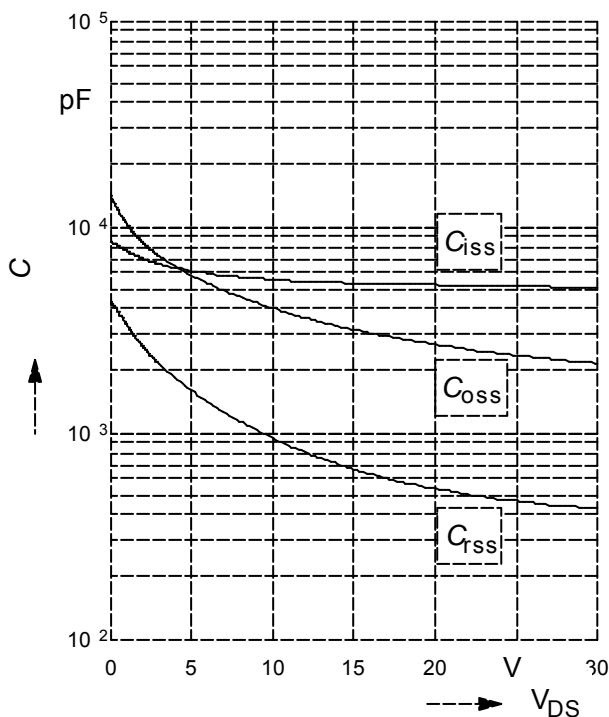
parameter:  $V_{GS} = V_{DS}$



**11 Typ. capacitances**

$C = f(V_{DS})$

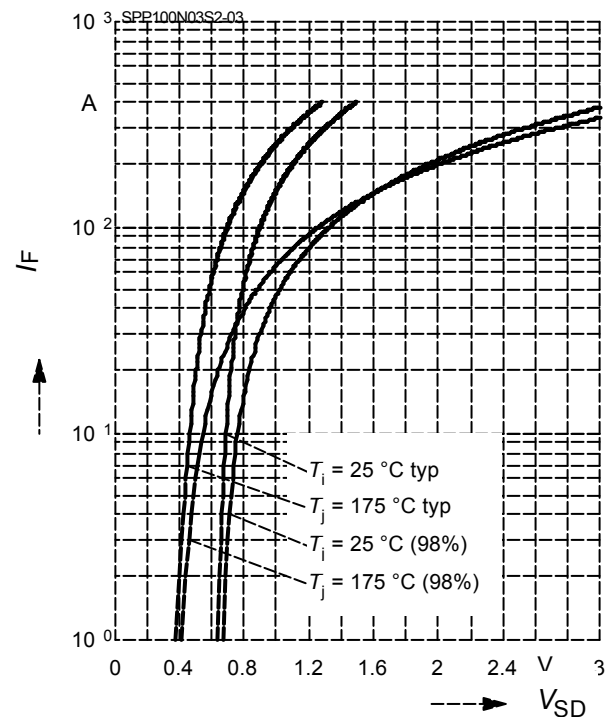
parameter:  $V_{GS}=0\text{V}$ ,  $f=1\text{ MHz}$



**12 Forward character. of reverse diode**

$I_F = f(V_{SD})$

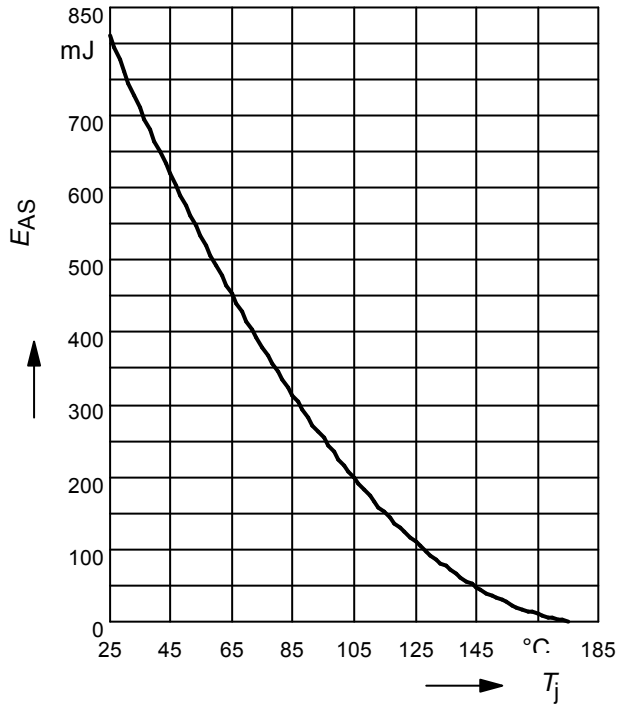
parameter:  $T_j$ ,  $t_p = 80\text{ }\mu\text{s}$



**13 Typ. avalanche energy**

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

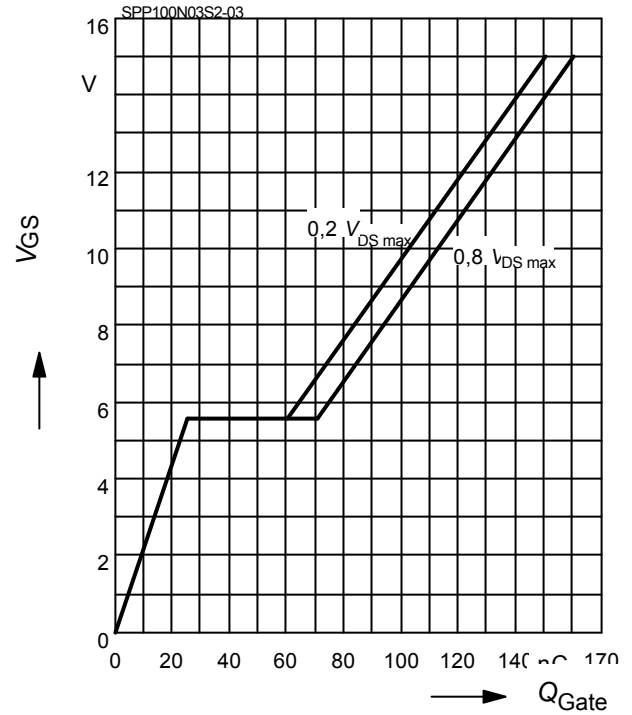
par.:  $I_D = 80 \text{ A}$ ,  $V_{DD} = 25 \text{ V}$ ,  $R_{GS} = 25 \Omega$



**14 Typ. gate charge**

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

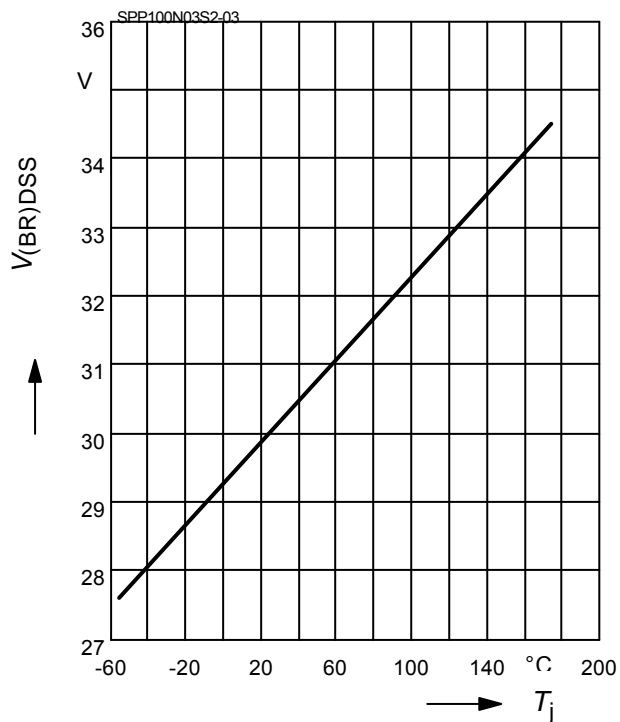
parameter:  $I_D = 100 \text{ A}$  pulsed



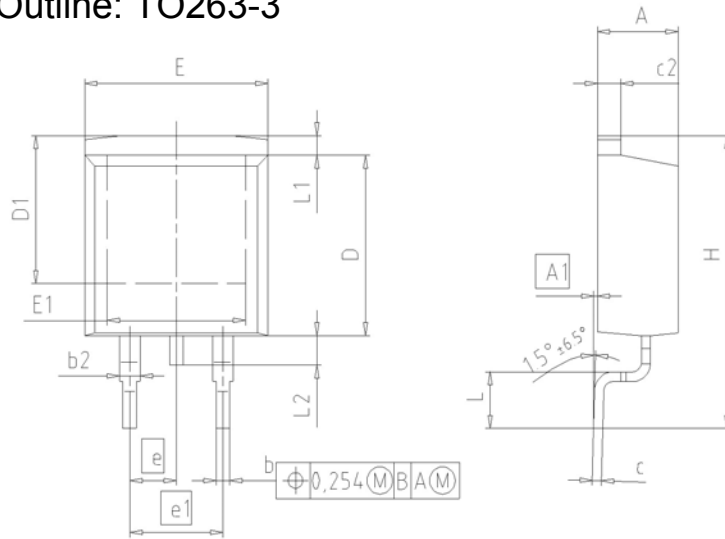
**15 Drain-source breakdown voltage**

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

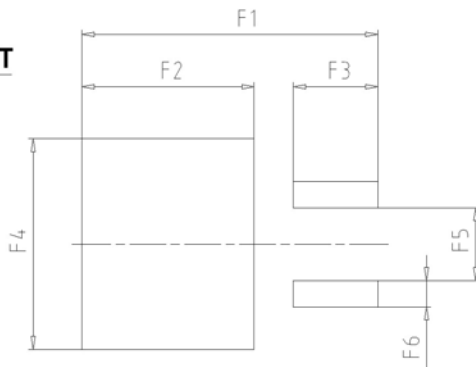
parameter:  $I_D = 10 \text{ mA}$



Package Outline: TO263-3



**FOOTPRINT**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.57	0.169	0.180
A1	0.00	0.25	0.000	0.010
b	0.65	0.85	0.026	0.033
b2	0.95	1.15	0.037	0.045
c	0.33	0.65	0.013	0.026
c2	1.17	1.40	0.046	0.055
D	8.51	9.45	0.335	0.372
D1	7.10	7.90	0.280	0.311
E	9.80	10.31	0.386	0.406
E1	6.50	8.60	0.256	0.339
e	2.54		0.100	
e1	5.08		0.200	
N	2		2	
H	14.61	15.88	0.575	0.625
L	2.29	3.00	0.090	0.118
L1	0.70	1.60	0.028	0.063
L2	1.00	1.78	0.039	0.070
F1	16.05	16.25	0.632	0.640
F2	9.30	9.50	0.366	0.374
F3	4.50	4.70	0.177	0.185
F4	10.70	10.90	0.421	0.429
F5	3.65	3.85	0.144	0.152
F6	1.25	1.45	0.049	0.057

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**SCALE**

7.5mm

**EUROPEAN PROJECTION**

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