OptiMOS™ Power-Transistor

Feature

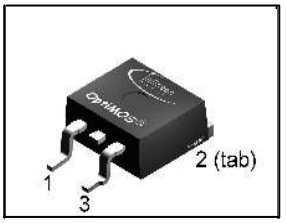
- N-Channel
- Enhancement mode
- Excellent Gate Charge x $R_{DS(on)}$ product (FOM)
- Superior thermal resistance
- 175°C operating temperature
- Avalanche rated
- d*v*/d*t* rated; Halogen Free according to IEC61249-2-21

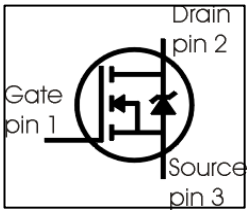
RoHS Halogen-Free

Product Summary

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

P-TO263 -3





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

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

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

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 cm2 cooling area 3)		-	-	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	$V_{(BR)DSS}$	30	-	-	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}=30V, V_{GS}=0V, T_j=25°C		-	0.01	1	
V_{DS}=30V, 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		-	2.5	3.3	
V_{GS}=10V, I_D=80A, SMD version		-	2.2	3	

1Current limited by bondwire ; with an R_{thJC} = 0.5K/W the chip is able to carry I_D= 233A 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.

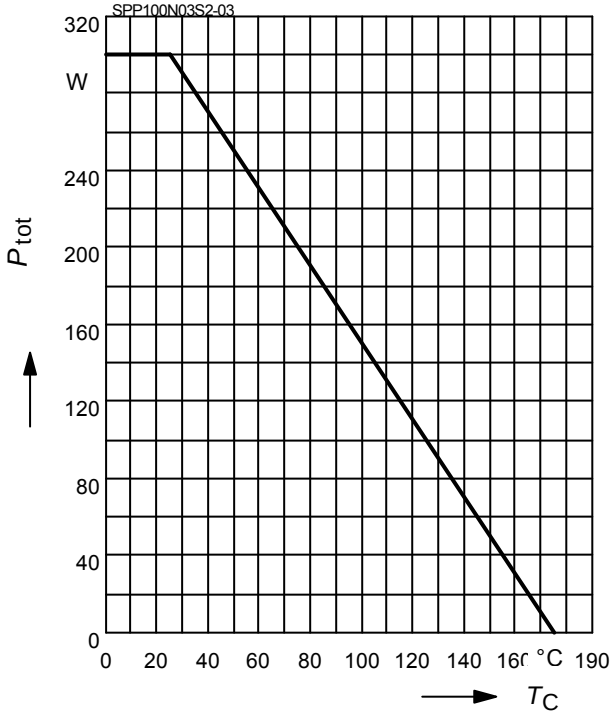
Electrical Characteristics

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	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=2.2Ω	-	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°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/µs	-	79	100	ns
Reverse recovery charge	Q_{rr}		-	109	136	nC

1 Power dissipation

$P_{tot} = f(T_C)$

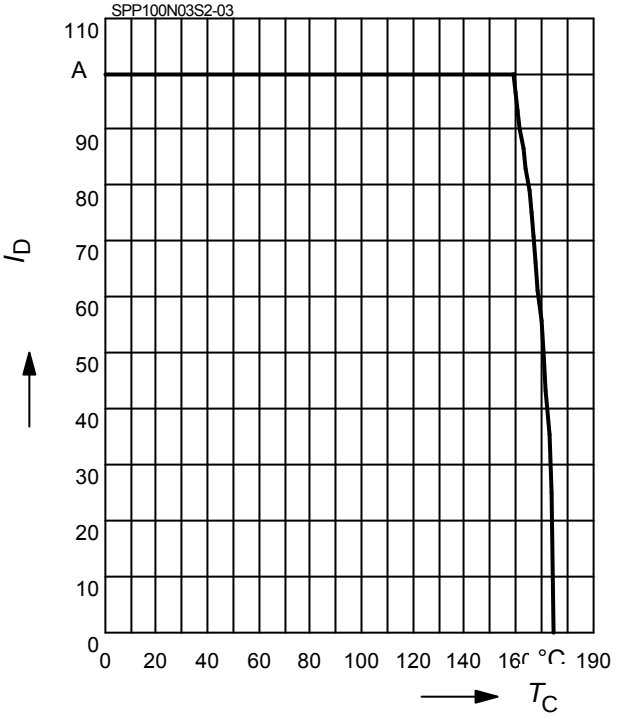
parameter: $V_{GS} \geq 6$ V



2 Drain current

$I_D = f(T_C)$

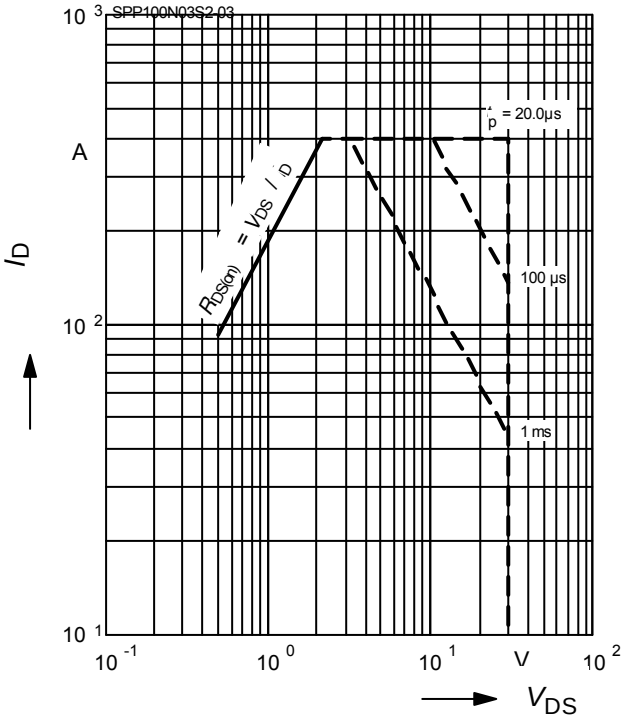
parameter: $V_{GS} \geq 10$ V



3 Safe operating area

$I_D = f(V_{DS})$

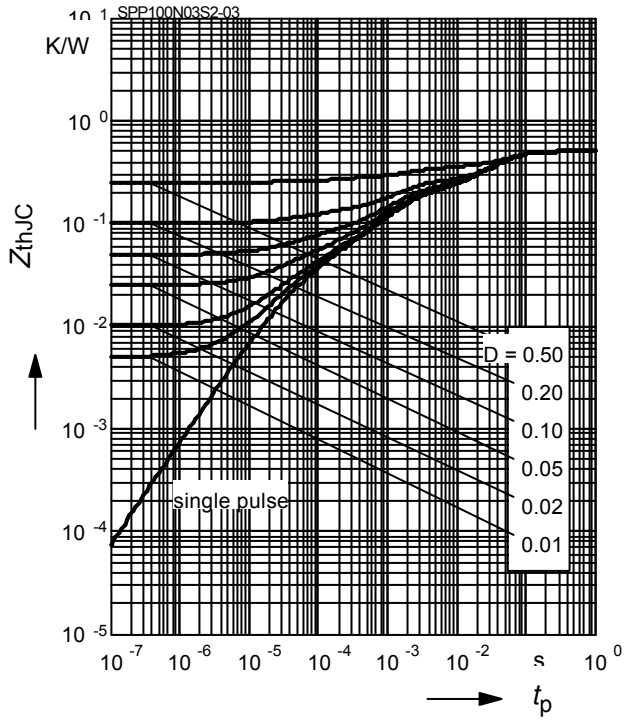
parameter : $D = 0$, $T_C = 25$ °C



4 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

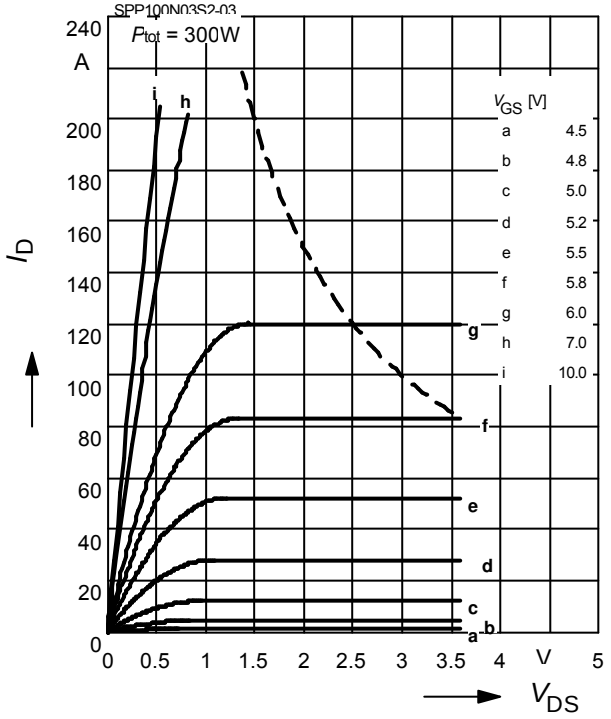
parameter : $D = t_p/T$



5 Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

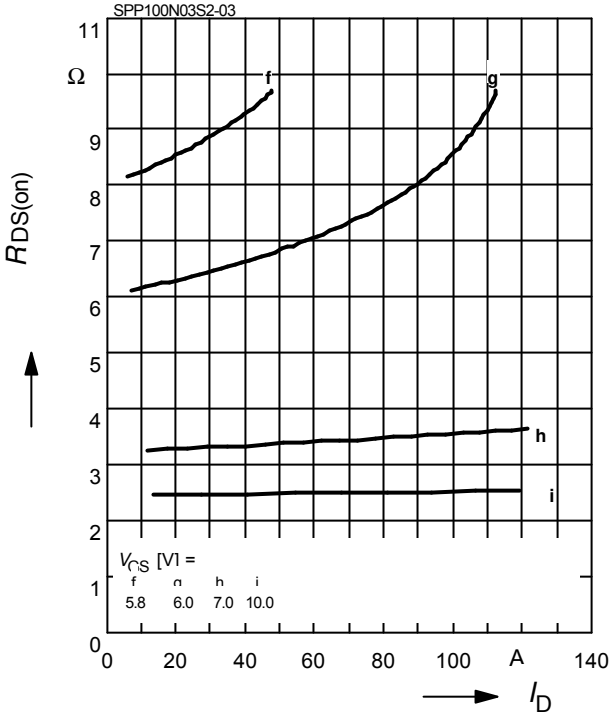
parameter: t_p = 80 µs



6 Typ. drain-source on resistance

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

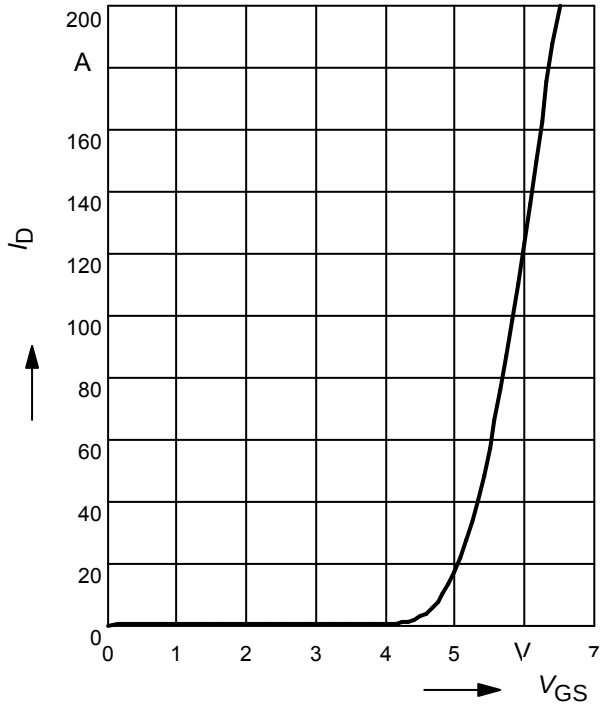
parameter: V_{GS}



7 Typ. transfer characteristics

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

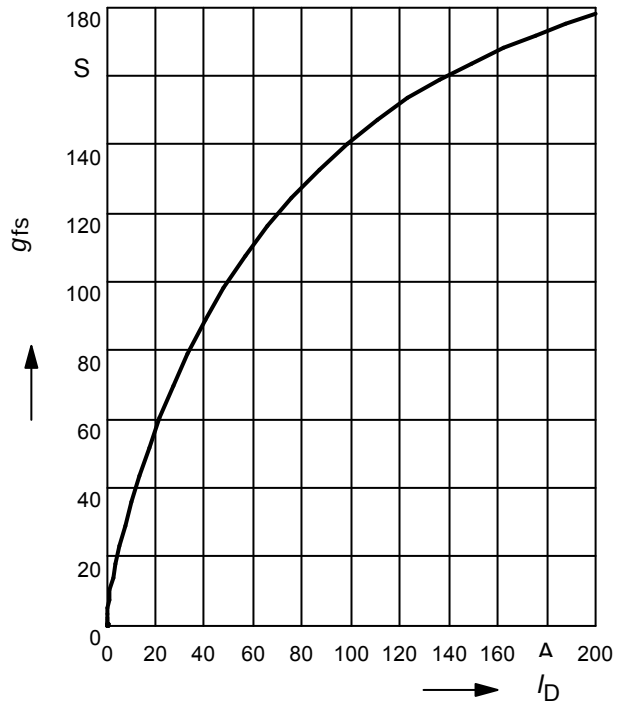
parameter: t_p = 80 µs



8 Typ. forward transconductance

$g_{fs} = f(I_D)$; T_j=25°C

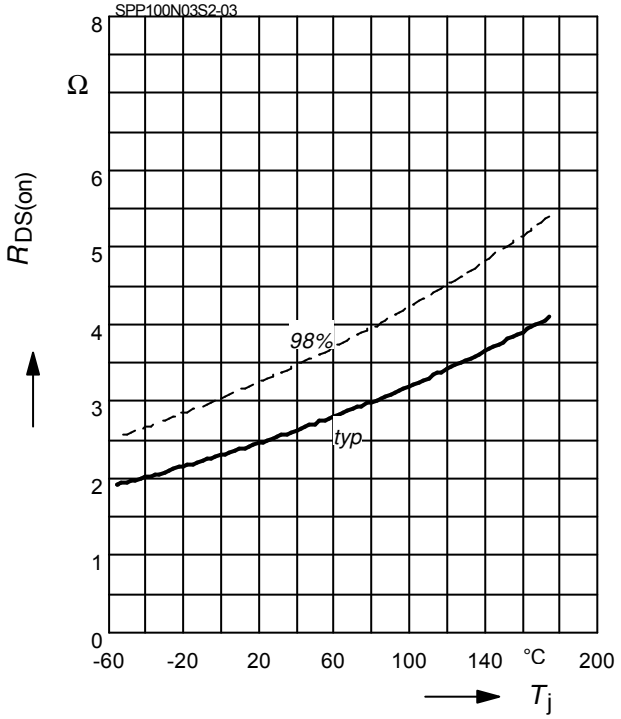
parameter: g_{fs}



9 Drain-source on-state resistance

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

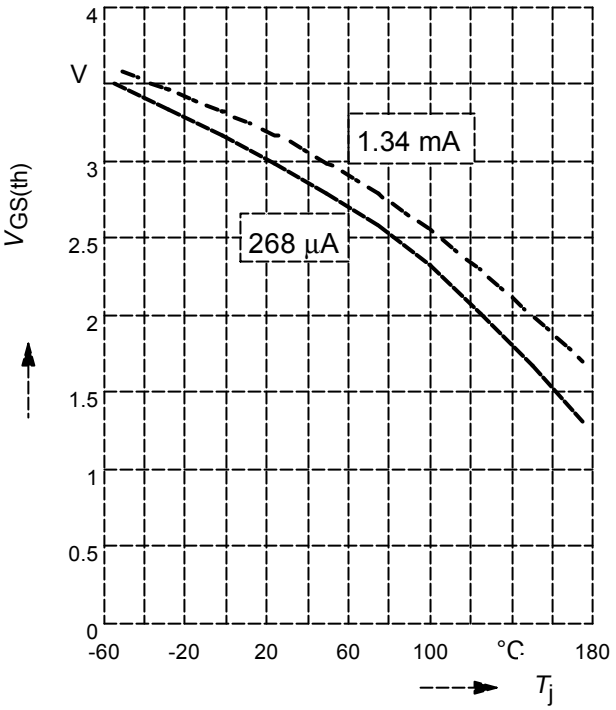
parameter : I_D = 80 A, V_{GS} = 10 V



10 Typ. gate threshold voltage

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

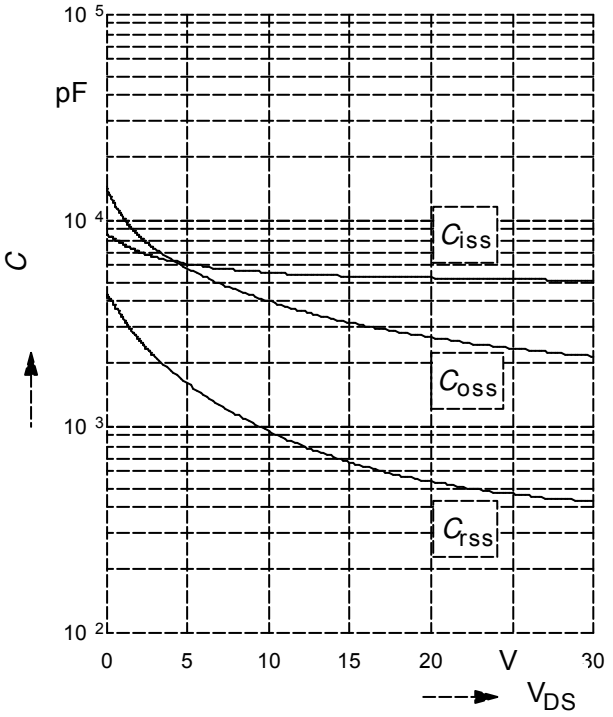
parameter: $V_{GS} = V_{DS}$



11 Typ. capacitances

$C = f(V_{DS})$

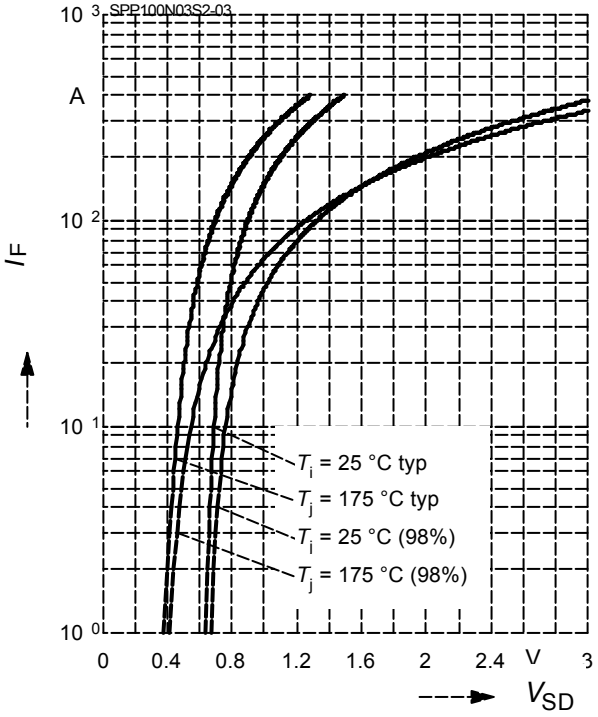
parameter: V_{GS}=0V, f=1 MHz



12 Forward character. of reverse diode

$I_F = f(V_{SD})$

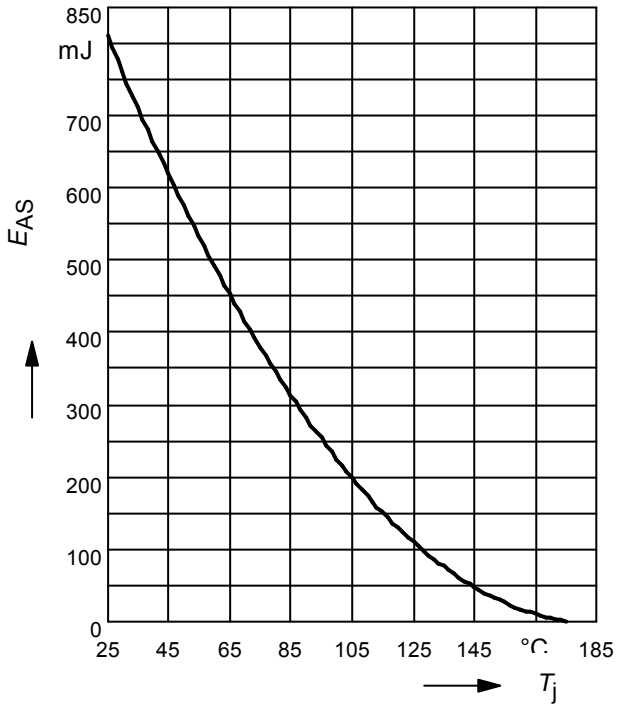
parameter: T_j , tp = 80 µs



13 Typ. avalanche energy

$E_{AS} = f(T_j)$

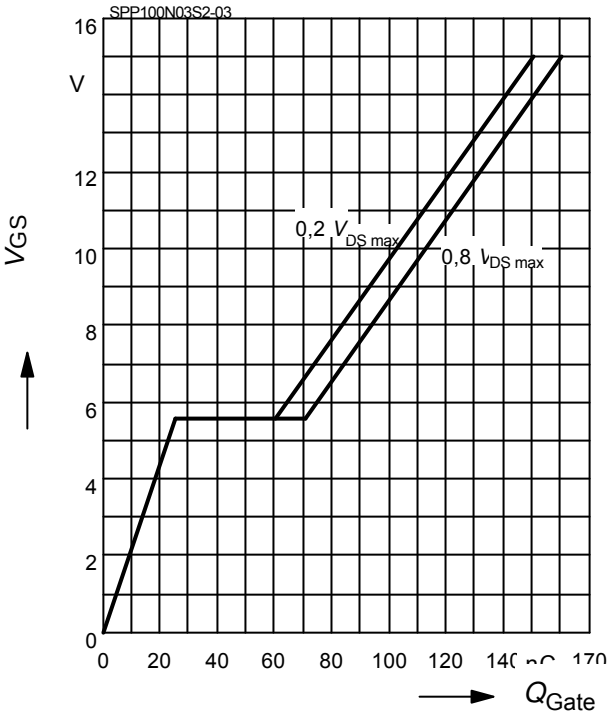
par.: $I_D = 80$ A, $V_{DD} = 25$ V, $R_{GS} = 25\ \Omega$



14 Typ. gate charge

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

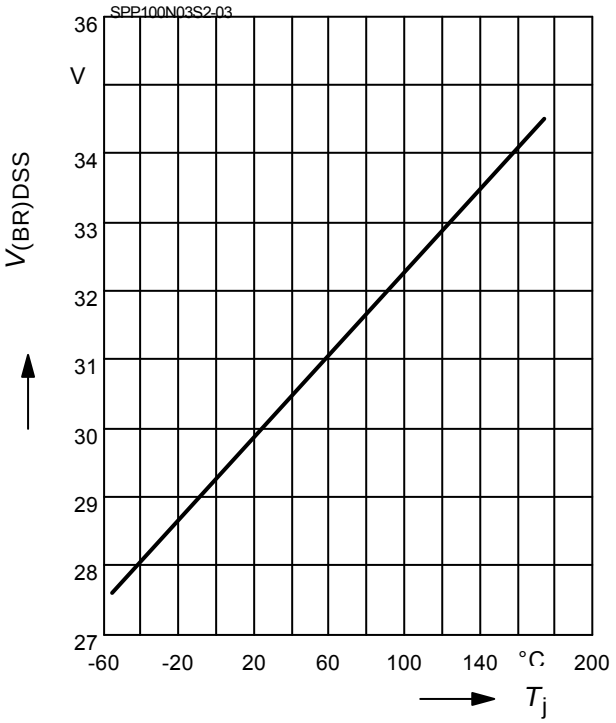
parameter: $I_D = 100$ A pulsed



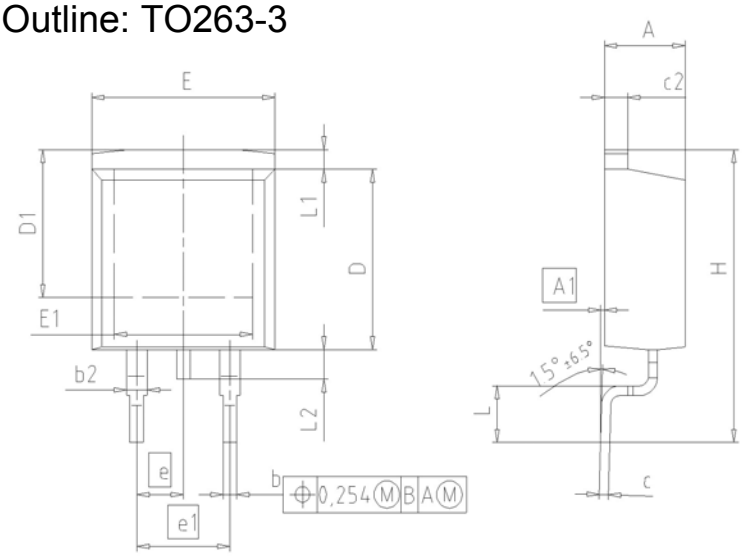
15 Drain-source breakdown voltage

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

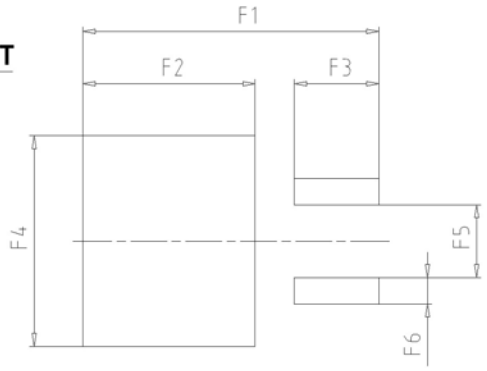
parameter: I_D=10 mA



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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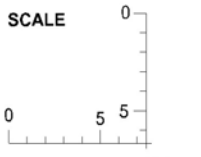
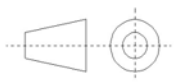
SCALE



EUROPEAN PROJECTION



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