SPS01N60C3

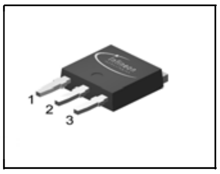
Cool MOS™ Power Transistor

V_{DS} @ T_{jmax}	650	V
$R_{DS(on)}$	6	Ω
I_D	0.8	A

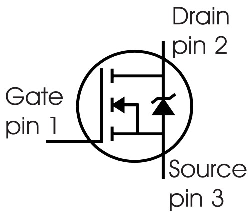
Feature

- New revolutionary high voltage technology
- Ultra low gate charge
- Periodic avalanche rated
- Extreme d*v*/d*t* rated
- Ultra low effective capacitances
- Improved transconductance
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC[0)] for target applications

PG-TO251-3-11



Type	Package	Ordering Code	Marking
SPS01N60C3	PG-TO251-3-11	-	01N60C3



Maximum Ratings

Parameter	Symbol	Value	Unit
Continuous drain current T_C = 25 °C T_C = 100 °C	I_D	 0.8 0.5	A
Pulsed drain current, t_p limited by T_{jmax}	$I_{D\ puls}$	1.6	
Avalanche energy, single pulse I_D = 0.6 A, V_{DD} = 50 V	E_{AS}	20	mJ
Avalanche energy, repetitive t_{AR} limited by T_{jmax}[1)] I_D = 0.8 A, V_{DD} = 50 V	E_{AR}	0.01	
Avalanche current, repetitive t_{AR} limited by T_{jmax}	I_{AR}	0.8	A
Gate source voltage static	V_{GS}	±20	V
Gate source voltage AC (f >1Hz)	V_{GS}	±30	
Power dissipation, T_C = 25°C	P_{tot}	11	W
Operating and storage temperature	T_j , T_{stg}	-55... +150	°C
Reverse diode dv/dt [3)]	dv/dt	15	V/ns

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain Source voltage slope V_{DS} = 480 V, I_D = 0.8 A, T_j = 125 °C	dv/dt	50	V/ns

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Thermal resistance, junction - case	R_{thJC}	-	-	11	K/W
Thermal resistance, junction - ambient, leaded	R_{thJA}	-	-	75	
SMD version, device on PCB: @ min. footprint @ 6 cm^2 cooling area 2)	R_{thJA}	 - -	 - -	 75 50	
Soldering temperature, wavesoldering 1.6 mm (0.063 in.) from case for 10s	T_{sold}	-	-	260	°C

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

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=0.25mA	600	-	-	V
Drain-Source avalanche breakdown voltage	$V_{(BR)DS}$	V_{GS}=0V, I_D=0.8A	-	700	-	
Gate threshold voltage	$V_{GS(th)}$	I_D=250µA, V_{GS}=V_{DS}	2.1	3	3.9	
Zero gate voltage drain current	I_{DSS}	V_{DS}=600V, V_{GS}=0V, T_j=25°C, T_j=150°C	 - -	 0.1 -	 1 50	µA
Gate-source leakage current	I_{GSS}	V_{GS}=30V, V_{DS}=0V	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=0.5A, T_j=25°C T_j=150°C	 - -	 5.6 15.1	 6 -	Ω

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

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Transconductance	g_{fs}	V_{DS}≥2*I_D*$R_{DS(on)max}$, I_D=0.5A	-	0.75	-	S
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	100	-	pF
Output capacitance	C_{oss}		-	40	-	
Reverse transfer capacitance	C_{rss}		-	2.5	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=350V, V_{GS}=0/10V, I_D=0.8A, R_G=100Ω	-	30	-	ns
Rise time	t_r		-	25	-	
Turn-off delay time	$t_{d(off)}$		-	55	82	
Fall time	t_f		-	30	45	

Gate Charge Characteristics

Parameter	Symbol	Conditions	min.	typ.	max.	Unit
Gate to source charge	Q_{gs}	V_{DD}=350V, I_D=0.8A	-	0.9	-	nC
Gate to drain charge	Q_{gd}		-	2.2	-	
Gate charge total	Q_g	V_{DD}=350V, I_D=0.8A, V_{GS}=0 to 10V	-	3.9	5	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=350V, I_D=0.8A	-	5.5	-	V

[0]J-STD20 and JESD22

[1]Repetitve avalanche causes additional power losses that can be calculated as $P_{AV}=E_{AR}*f$.

[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.

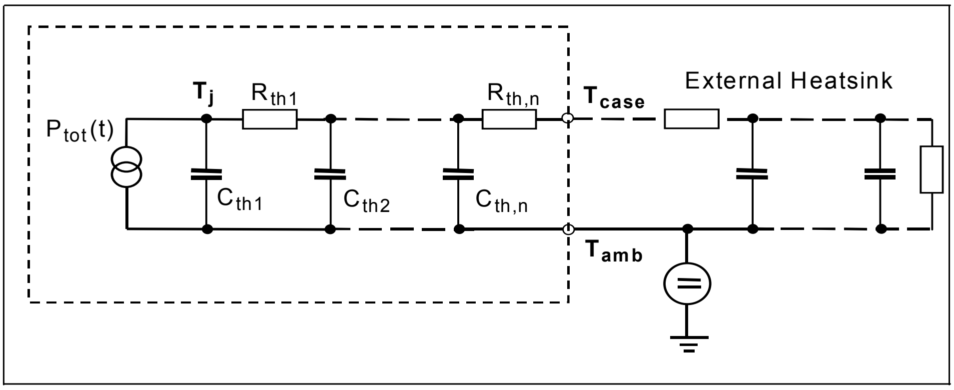
[3]I_{SD}<=I_D, di/dt<=400A/us, V_{DClink}=400V, V_{peak}<$V_{BR, DSS}$, T_j<$T_{j,max}$.
Identical low-side and high-side switch.

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

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Inverse diode continuous forward current	I_S	T_C=25°C	-	-	0.8	A
Inverse diode direct current, pulsed	I_{SM}		-	-	1.6	
Inverse diode forward voltage	V_{SD}	V_{GS}=0V, I_F=I_S	-	1	1.2	V
Reverse recovery time	t_{rr}	V_R=350V, I_F=I_S ,	-	570	970	ns
Reverse recovery charge	Q_{rr}	di_F/dt=100A/µs	-	0.75	-	µC

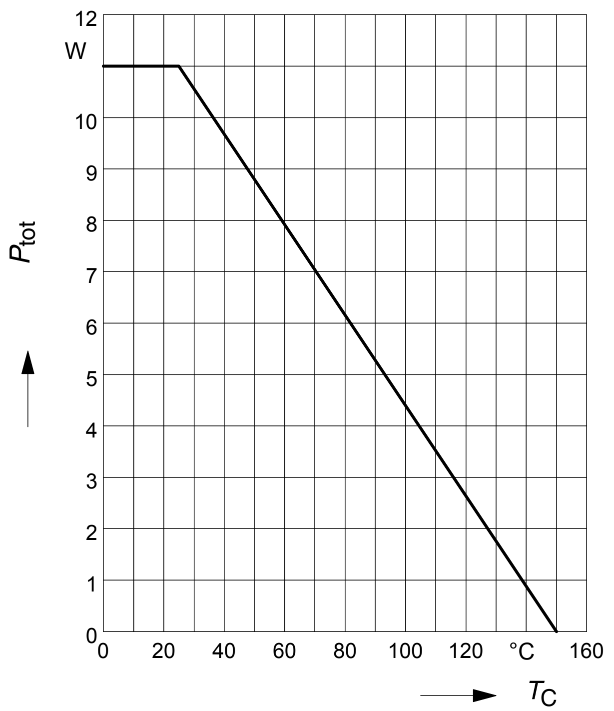
Typical Transient Thermal Characteristics

Symbol	Value	Unit	Symbol	Value	Unit
	typ.			typ.	
Thermal resistance			Thermal capacitance		
R_{th1}	0.225	K/W	C_{th1}	0.00001221	Ws/K
R_{th2}	0.395		C_{th2}	0.00005037	
R_{th3}	0.603		C_{th3}	0.0000809	
R_{th4}	0.995		C_{th4}	0.0002915	
R_{th5}	0.691		C_{th5}	0.001844	
R_{th6}	0.148		C_{th6}	0.412	



1 Power dissipation

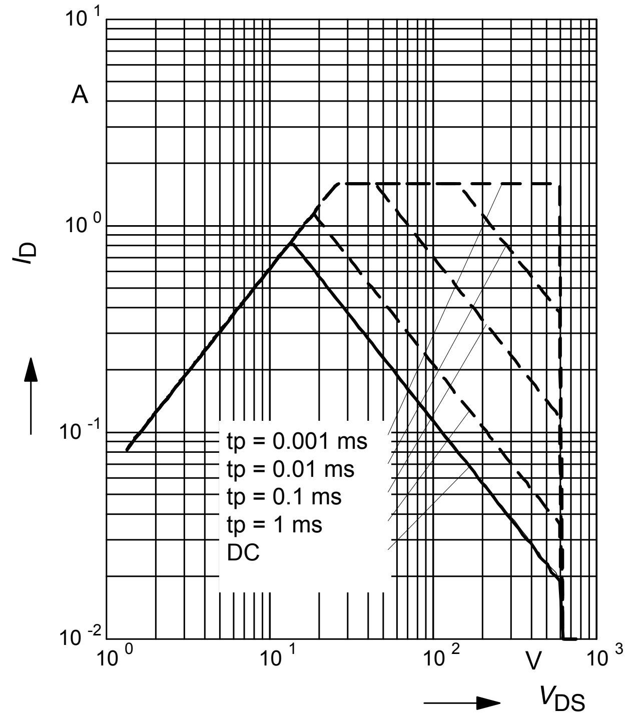
$P_{tot} = f(T_C)$



2 Safe operating area

$I_D = f(V_{DS})$

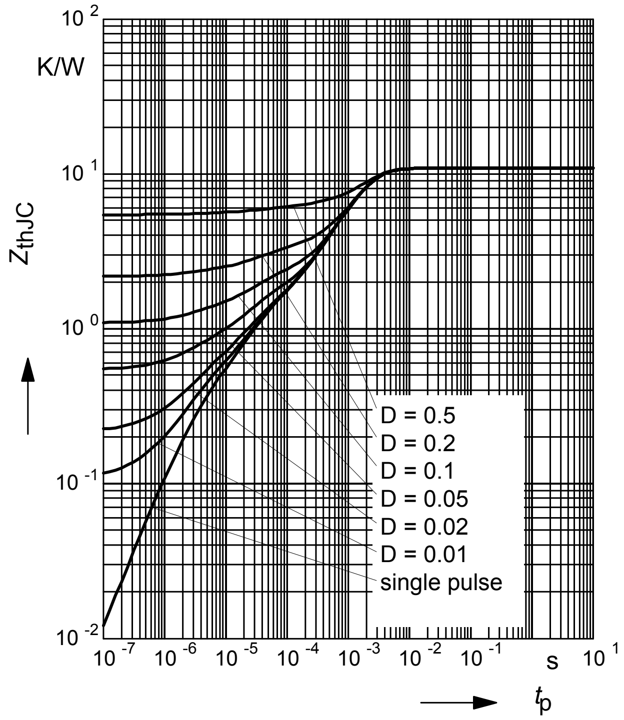
parameter : $D = 0$, T_C=25°C



3 Transient thermal impedance

$Z_{thJC} = f(t_p)$

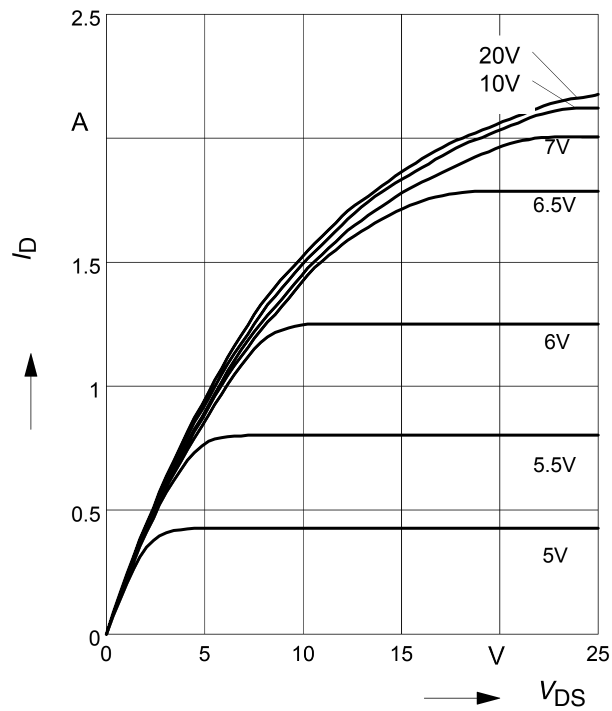
parameter: $D = t_p/T$



4 Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

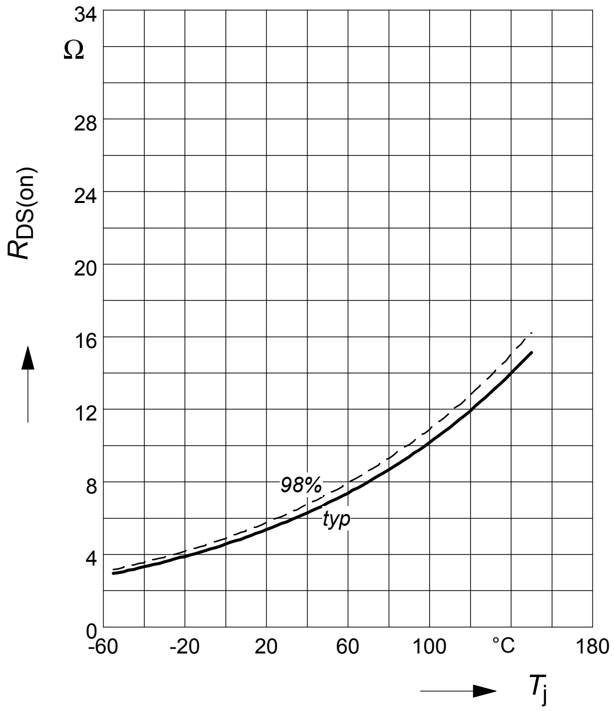
parameter: t_p = 10 µs, V_{GS}



5 Drain-source on-state resistance

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

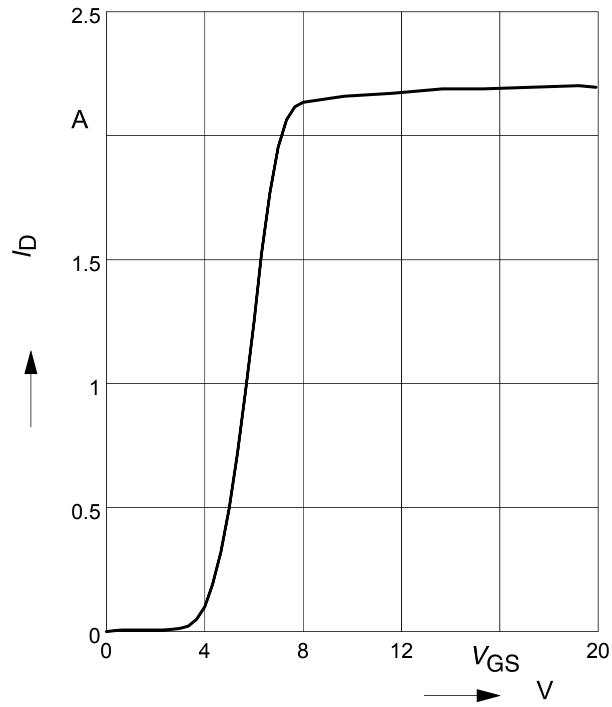
parameter : I_D = 0.5 A, V_{GS} = 10 V



6 Typ. transfer characteristics

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

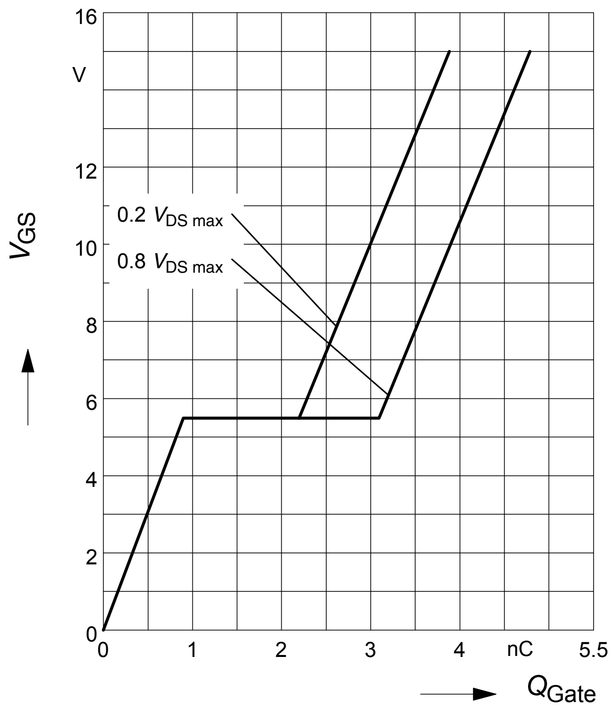
parameter: t_p = 10 µs



7 Typ. gate charge

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

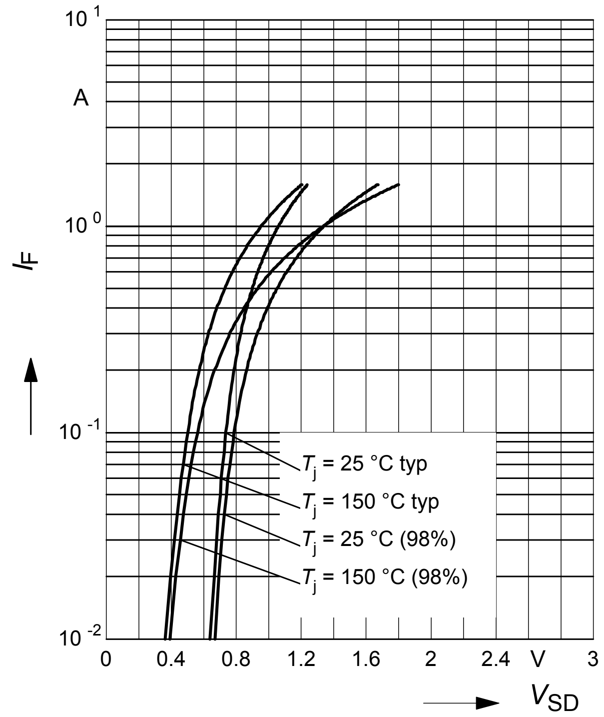
parameter: I_D = 0.8 A pulsed



8 Forward characteristics of body diode

$I_F = f(V_{SD})$

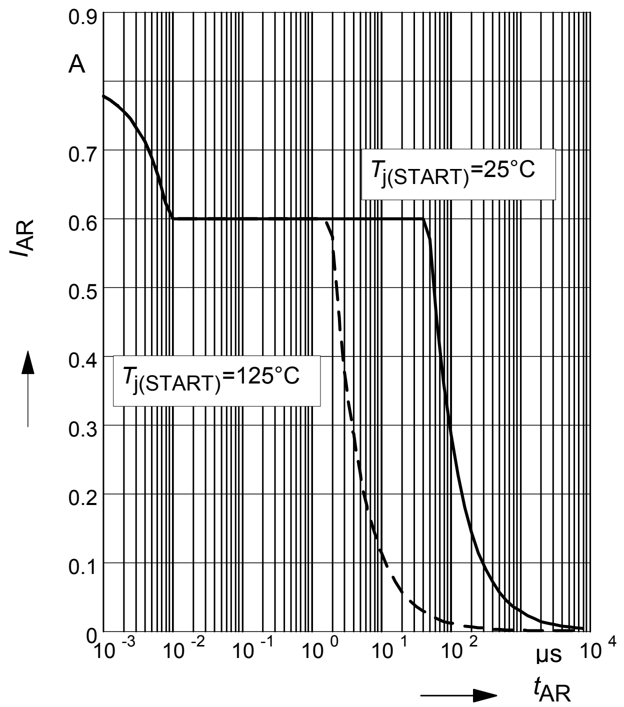
parameter: T_j , t_p = 10 µs



9 Avalanche SOA

$I_{AR} = f(t_{AR})$

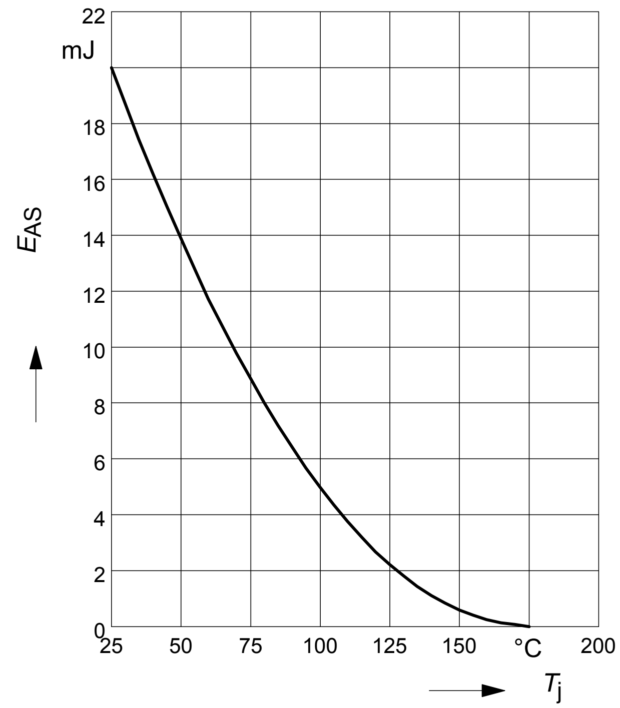
par.: $T_j \leq 150$ °C



10 Avalanche energy

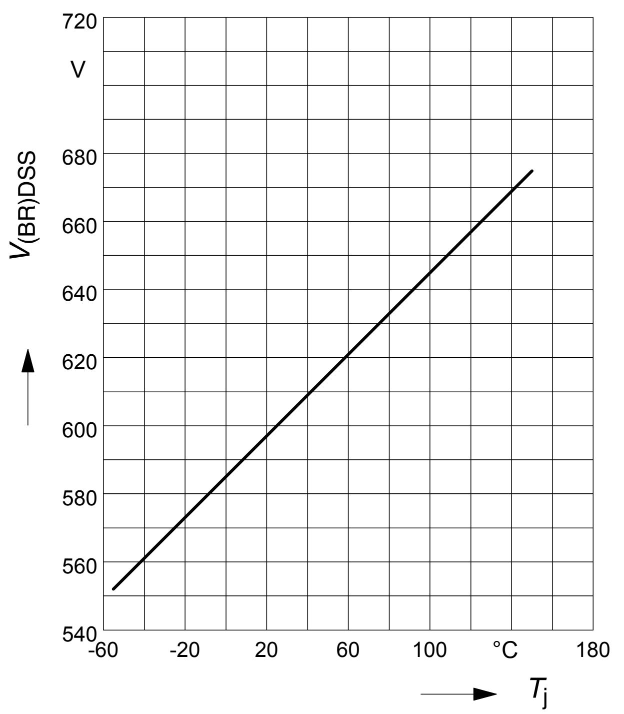
$E_{AS} = f(T_j)$

par.: $I_D = 0.6$ A, $V_{DD} = 50$ V



11 Drain-source breakdown voltage

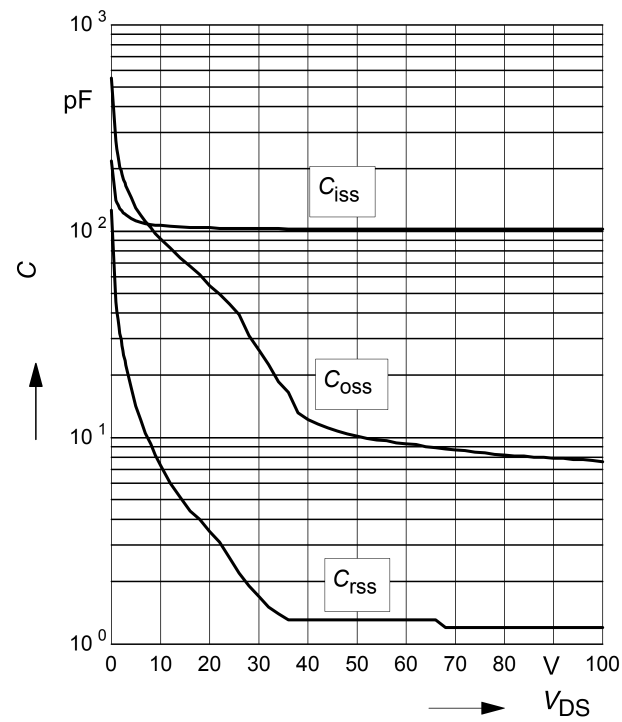
$V_{(BR)DSS} = f(T_j)$



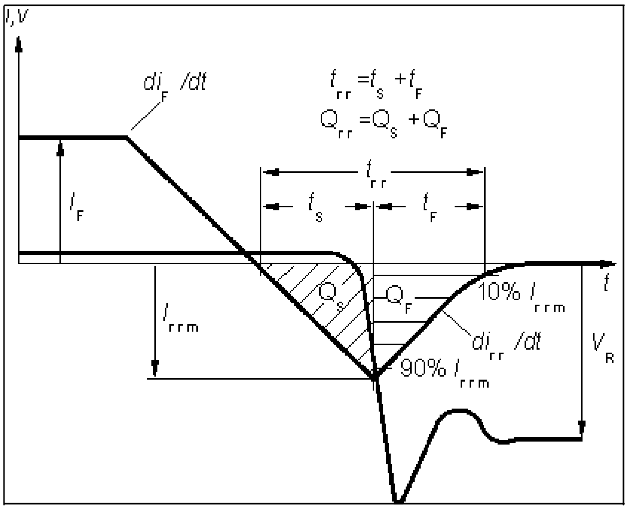
12 Typ. capacitances

$C = f(V_{DS})$

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



Definition of diodes switching characteristics



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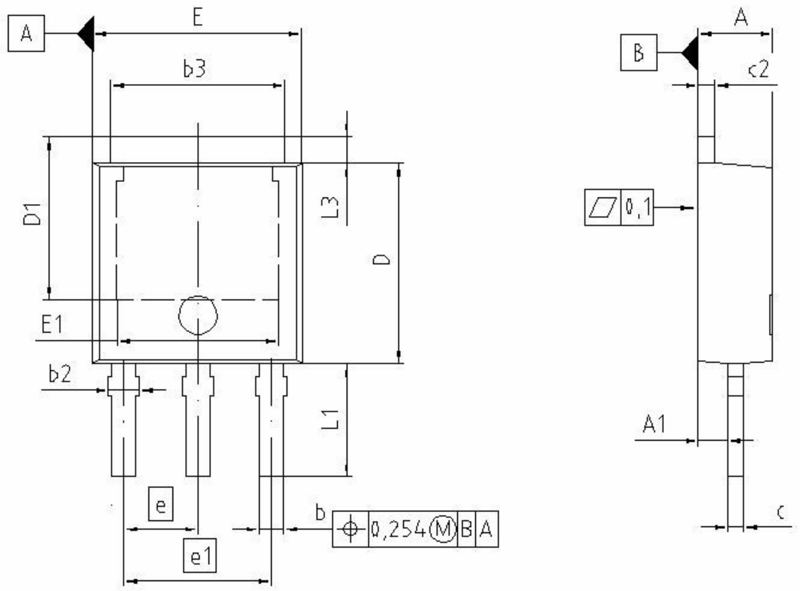
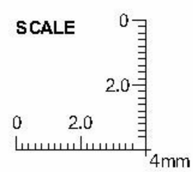


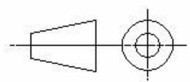
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.184	2.388	0.086	0.094
A1	0.000	0.150	0.000	0.006
b	0.635	0.889	0.025	0.035
b2	0.650	1.150	0.025	0.045
b3	5.004	5.500	0.197	0.217
c	0.460	0.580	0.018	0.023
c2	0.460	0.980	0.018	0.039
D	5.969	6.223	0.235	0.245
D1	5.020	5.320	0.198	0.209
E	6.400	6.731	0.252	0.265
E1	4.900	5.100	0.193	0.201
e	2.286		0.090	
e1	4.572		0.180	
N	3		3	
L1	3.400	3.600	0.134	0.142
L3	0.900	1.118	0.035	0.044

REFERENCE
../..

SCALE



EUROPEAN PROJECTION



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