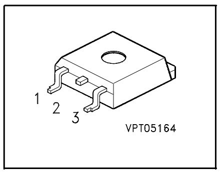
Cool MOS™ Power Transistor

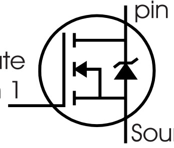
V_{DS} @ T_{jmax}	650	V
$R_{DS(on)}$	0.6	Ω
I_D	7.3	A

Feature

- New revolutionary high voltage technology
- Ultra low gate charge
- Periodic avalanche rated
- Extreme d*v*/d*t* rated
- High peak current capability
- Improved transconductance
- Qualified according to JEDEC[0)] for target applications

P-TO263-3-2





Type	Package	Ordering Code	Marking
SPB07N60C3	P-TO263-3-2	Q67040-S4394	07N60C3

Maximum Ratings

Parameter	Symbol	Value		Unit
		SPB		
Continuous drain current	I_D			A
T_C = 25 °C		7.3		
T_C = 100 °C		4.6		
Pulsed drain current, t_p limited by T_{jmax}	$I_{D\ puls}$	21.9		A
Avalanche energy, single pulse	E_{AS}	230		mJ
I_D=5.5A, V_{DD}=50V				
Avalanche energy, repetitive t_{AR} limited by T_{jmax}[2)]	E_{AR}	0.5		
I_D=7.3A, V_{DD}=50V				
Avalanche current, repetitive t_{AR} limited by T_{jmax}	I_{AR}	7.3		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}	83		W
Operating and storage temperature	T_j , T_{stg}	-55...+150		°C

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain Source voltage slope V_{DS} = 480 V, I_D = 7.3 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}	-	-	1.5	K/W
Thermal resistance, junction - case, FullPAK	R_{thJC_FP}	-	-	3.9	
Thermal resistance, junction - ambient, leaded	R_{thJA}	-	-	62	
Thermal resistance, junction - ambient, FullPAK	R_{thJA_FP}	-	-	80	
SMD version, device on PCB:	R_{thJA}				
@ min. footprint		-	-	62	
@ 6 cm^2 cooling area 3)		-	35	-	
Soldering temperature, reflow soldering, MSL1 1.6 mm (0.063 in.) from case for 10s	T_{sold}	-	-	220	°C

Electrical Characteristics, at T_j=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=7.3A	-	700	-	
Gate threshold voltage	$V_{GS(th)}$	I_D=350µA, V_{GS}=V_{DS}	2.1	3	3.9	
Zero gate voltage drain current	I_{DSS}	V_{DS}=600V, V_{GS}=0V,				µA
		T_j=25°C	-	0.5	1	
		T_j=150°C	-	-	100	
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=4.6A				Ω
		T_j=25°C	-	0.54	0.6	
		T_j=150°C	-	1.46	-	
Gate input resistance	R_G	f=1MHz, open drain	-	0.8	-	

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

Parameter	Symbol	Conditions	Values min.	Values typ.	Values max.	Unit
Characteristics						
Transconductance	g_{fs}	$V_{DS}\geq 2{*}I_D{*}R_{DS(on)max}$, I_D=4.6A	-	6	-	S
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	790	-	pF
Output capacitance	C_{oss}		-	260	-	
Reverse transfer capacitance	C_{rss}		-	16	-	
Effective output capacitance,[4] energy related	$C_{o(er)}$	V_{GS}=0V, V_{DS}=0V to 480V	-	30	-	
Effective output capacitance,[5] time related	$C_{o(tr)}$		-	55	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=380V, V_{GS}=0/13V, I_D=7.3A, R_G=12Ω, T_j=125°C	-	6	-	ns
Rise time	t_r		-	3.5	-	
Turn-off delay time	$t_{d(off)}$		-	60	100	
Fall time	t_f		-	7	15	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=480V, I_D=7.3A	-	3	-	nC
Gate to drain charge	Q_{gd}		-	9.2	-	
Gate charge total	Q_g	V_{DD}=480V, I_D=7.3A, V_{GS}=0 to 10V	-	21	27	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=480V, I_D=7.3A	-	5.5	-	V

[0]J-STD20 and JESD22

[1]Limited only by maximum temperature

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

[3]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.

[4]$C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}.

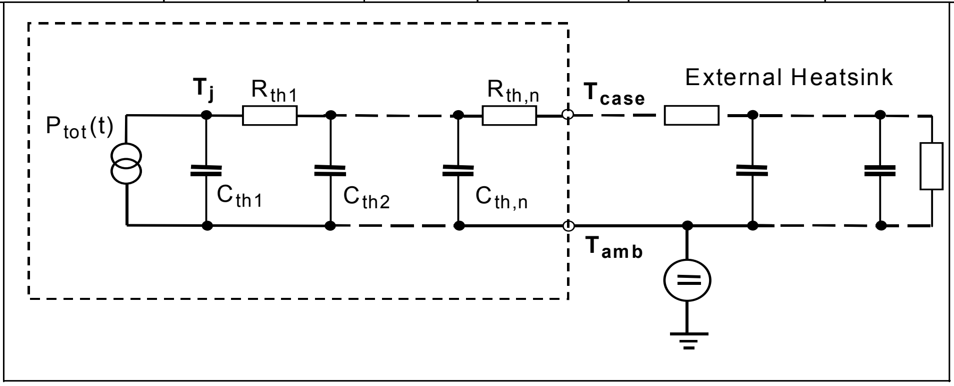
[5]$C_{o(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}.

Electrical Characteristics

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Inverse diode continuous forward current	I_S	T_C=25°C	-	-	7.3	A
Inverse diode direct current, pulsed	I_{SM}		-	-	21.9	
Inverse diode forward voltage	V_{SD}	V_{GS}=0V, I_F=I_S	-	1	1.2	V
Reverse recovery time	t_{rr}	V_R=480V, I_F=I_S ,	-	400	600	ns
Reverse recovery charge	Q_{rr}	di_F/dt=100A/µs	-	4	-	µC
Peak reverse recovery current	I_{rrm}		-	28	-	A
Peak rate of fall of reverse recovery current	di_{rr}/dt	T_j=25°C	-	800	-	A/µs

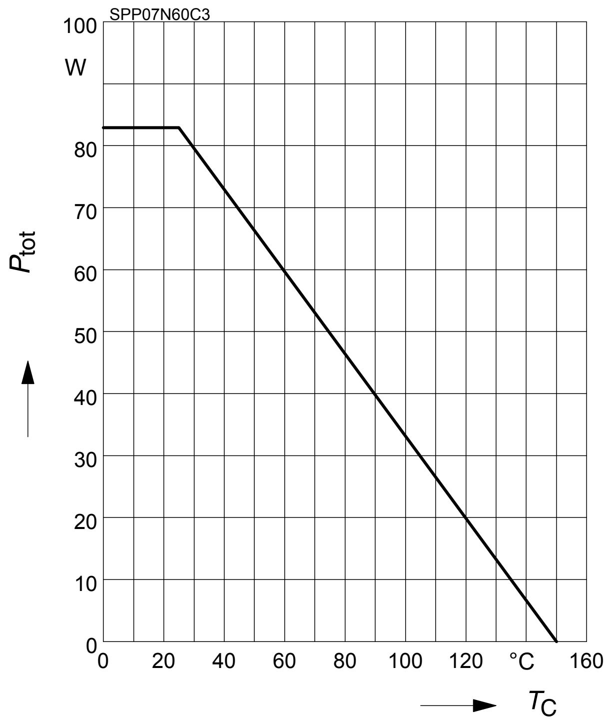
Typical Transient Thermal Characteristics

Symbol	Value		Unit	Symbol	Value		Unit
	SPB				SPB		
R_{th1}	0.024		K/W	C_{th1}	0.00012		Ws/K
R_{th2}	0.046			C_{th2}	0.0004578		
R_{th3}	0.085			C_{th3}	0.000645		
R_{th4}	0.308			C_{th4}	0.001867		
R_{th5}	0.317			C_{th5}	0.004795		
R_{th6}	0.112			C_{th6}	0.045		



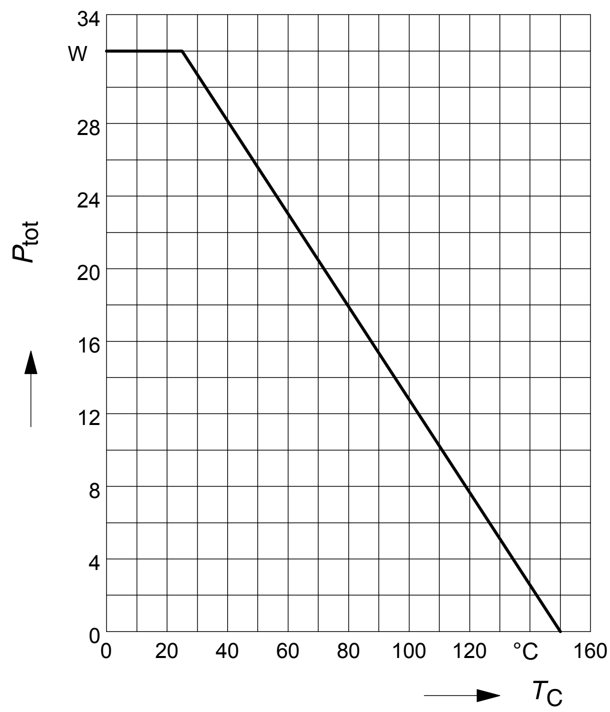
1 Power dissipation

$P_{tot} = f(T_C)$



2 Power dissipation FullPAK

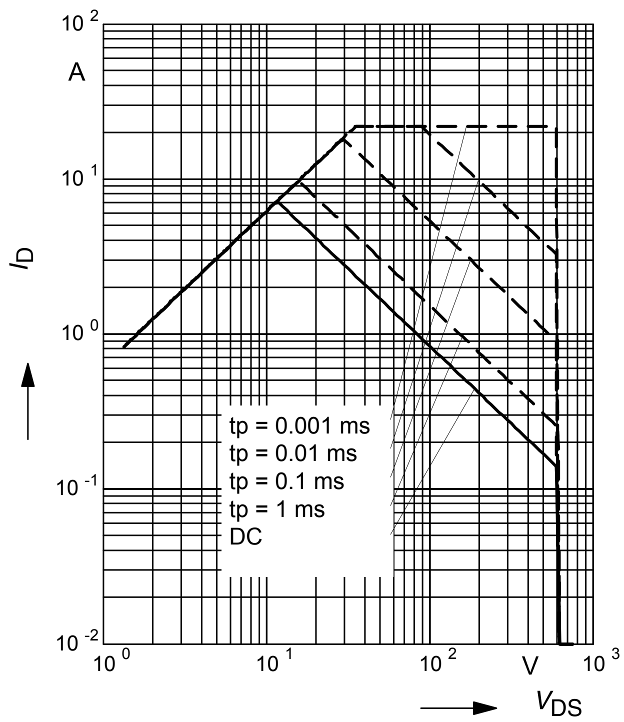
$P_{tot} = f(T_C)$



3 Safe operating area

$I_D = f(V_{DS})$

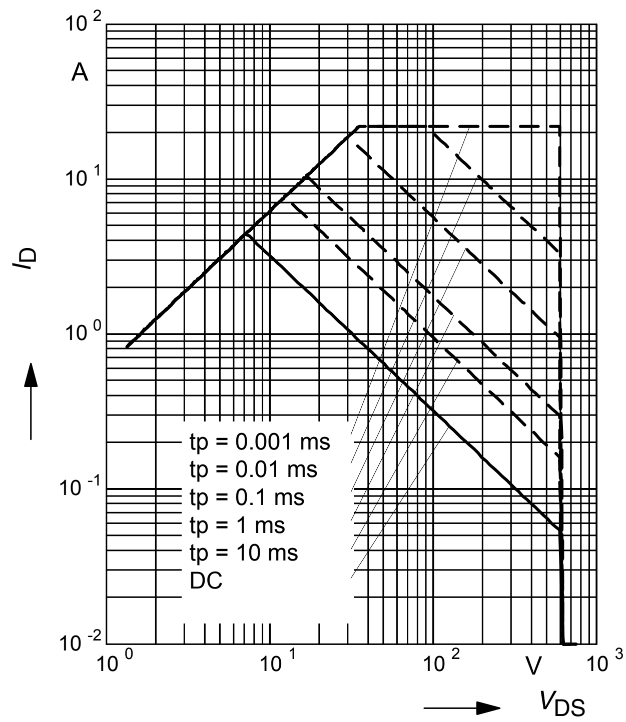
parameter : $D = 0$, T_C=25°C



4 Safe operating area FullPAK

$I_D = f(V_{DS})$

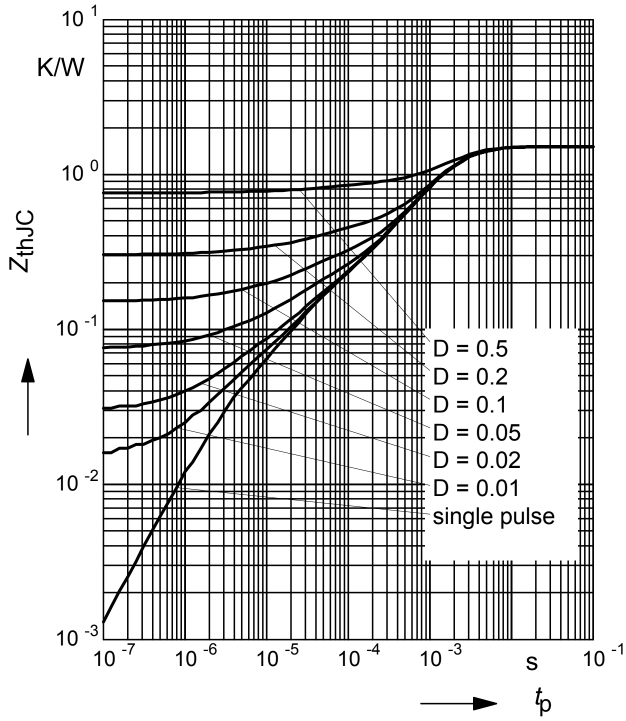
parameter: $D = 0$, T_C = 25°C



5 Transient thermal impedance

$Z_{thJC} = f(t_p)$

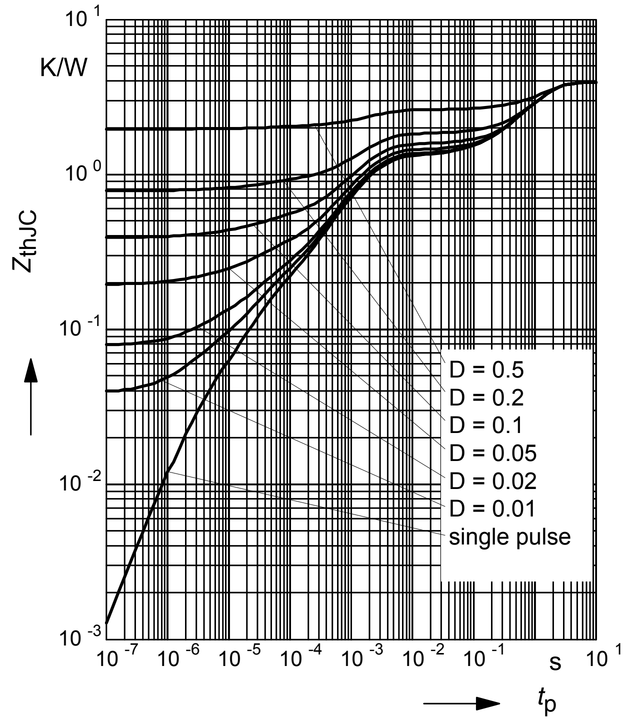
parameter: $D = t_p/T$



6 Transient thermal impedance FullPAK

$Z_{thJC} = f(t_p)$

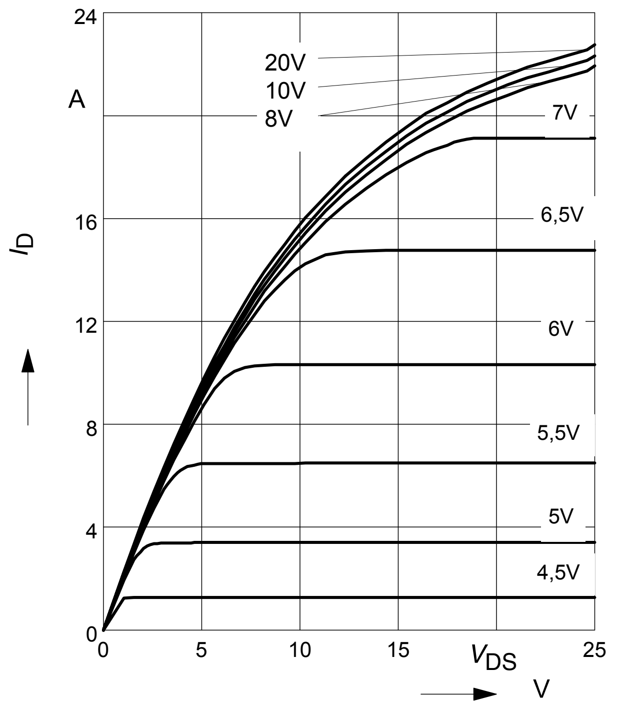
parameter: $D = t_p/t$



7 Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C

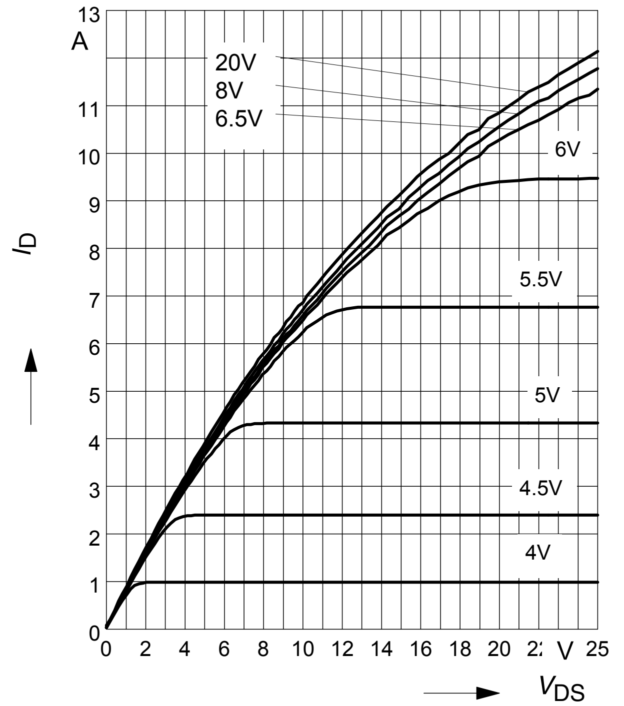
parameter: t_p = 10 µs, V_{GS}



8 Typ. output characteristic

$I_D = f(V_{DS})$; T_j=150°C

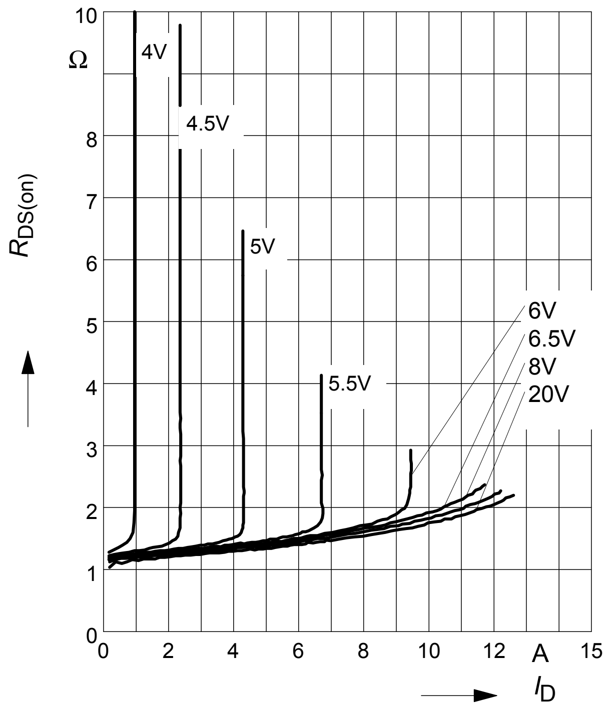
parameter: t_p = 10 µs, V_{GS}



9 Typ. drain-source on resistance

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

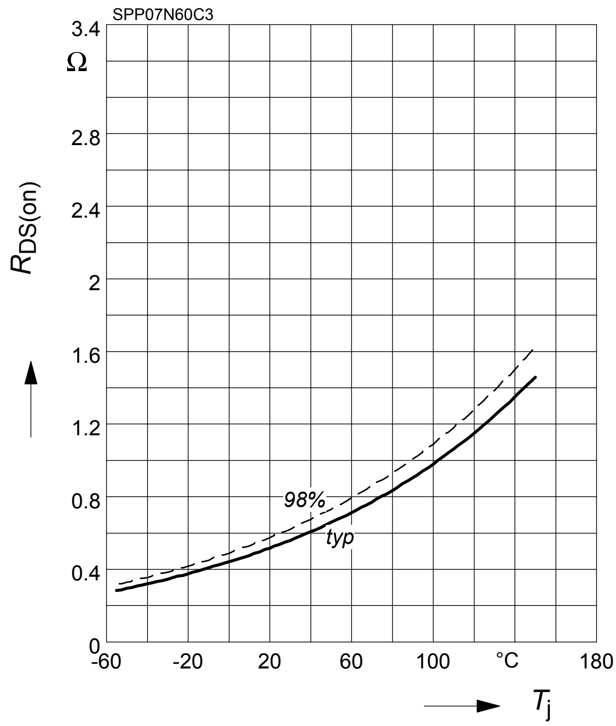
parameter: T_j=150°C, V_{GS}



10 Drain-source on-state resistance

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

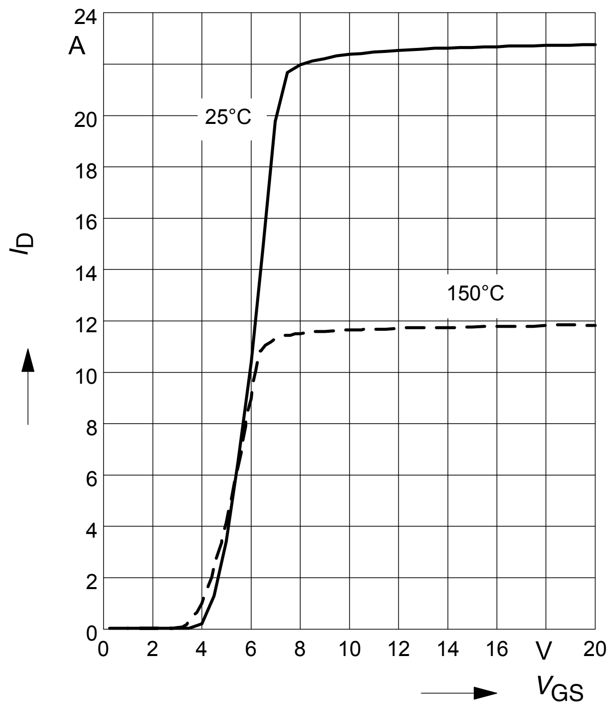
parameter : I_D = 4.6 A, V_{GS} = 10 V



11 Typ. transfer characteristics

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

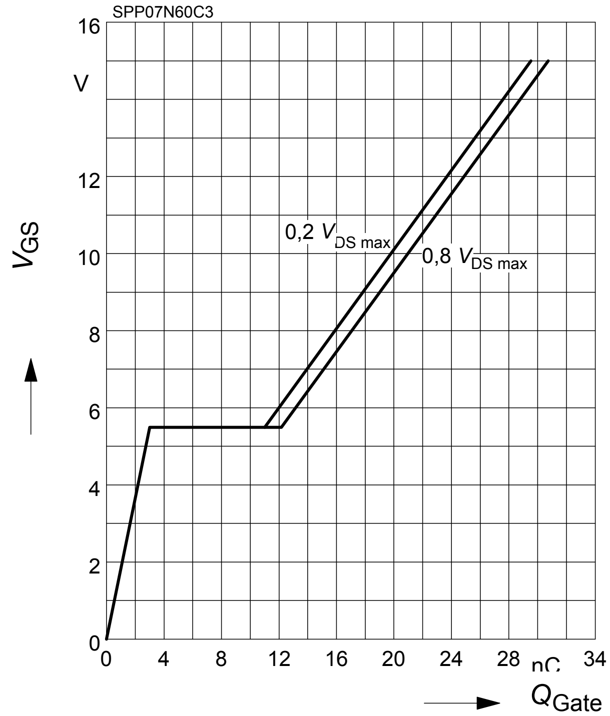
parameter: t_p = 10 µs



12 Typ. gate charge

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

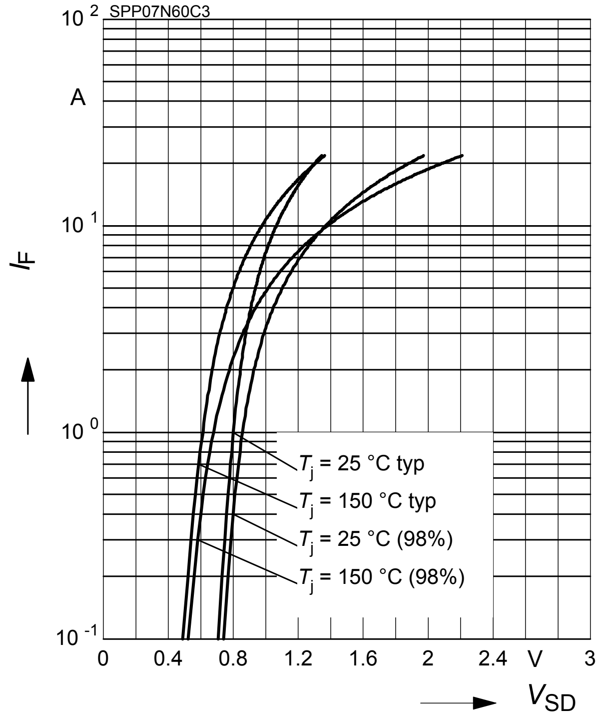
parameter: I_D = 7.3 A pulsed



13 Forward characteristics of body diode

$I_F = f(V_{SD})$

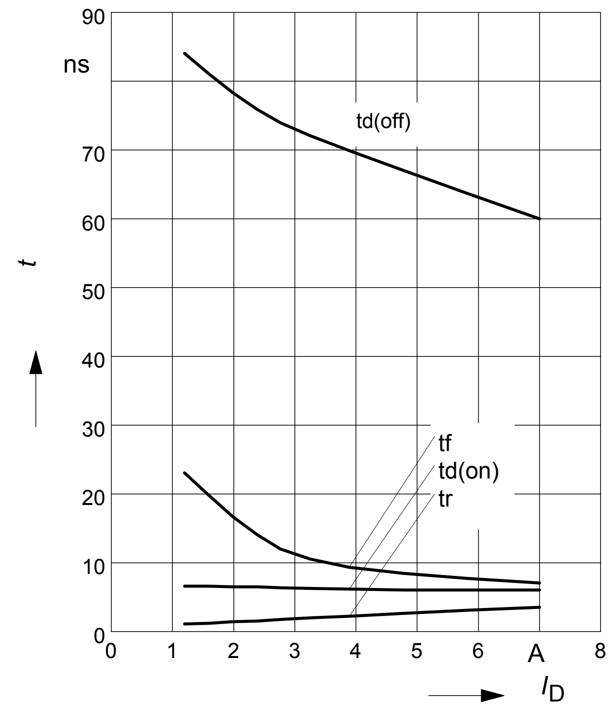
parameter: T_j , t_p = 10 µs



14 Typ. switching time

$t = f(I_D)$, inductive load, T_j=125°C

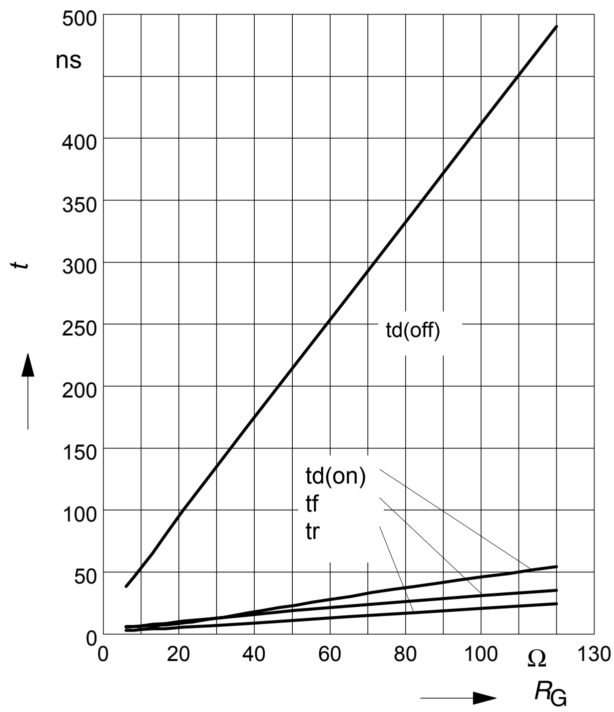
par.: V_{DS}=380V, V_{GS}=0/+13V, R_G=12Ω



15 Typ. switching time

$t = f(R_G)$, inductive load, T_j=125°C

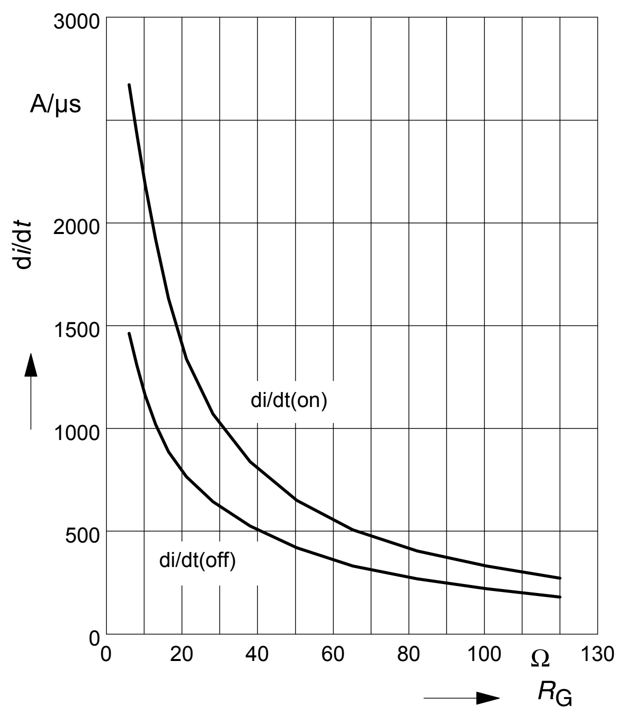
par.: V_{DS}=380V, V_{GS}=0/+13V, I_D=7.3 A



16 Typ. drain current slope

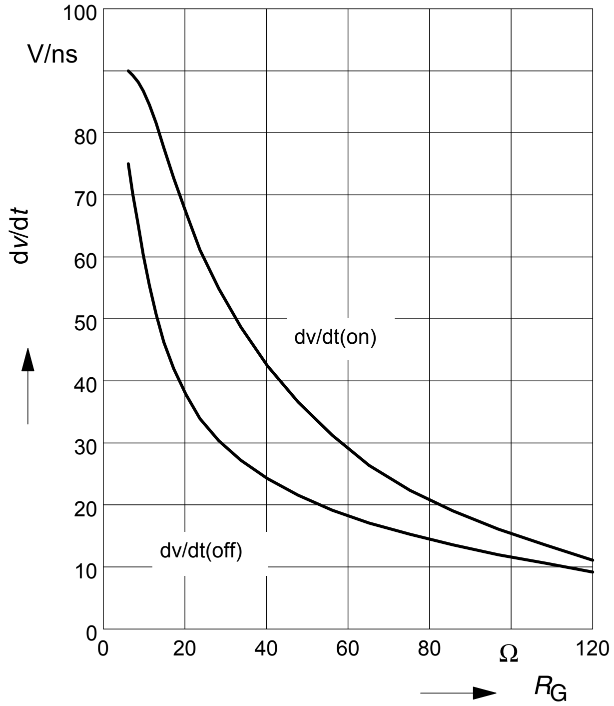
di/dt = f(R_G), inductive load, T_j = 125°C

par.: V_{DS}=380V, V_{GS}=0/+13V, I_D=7.3A



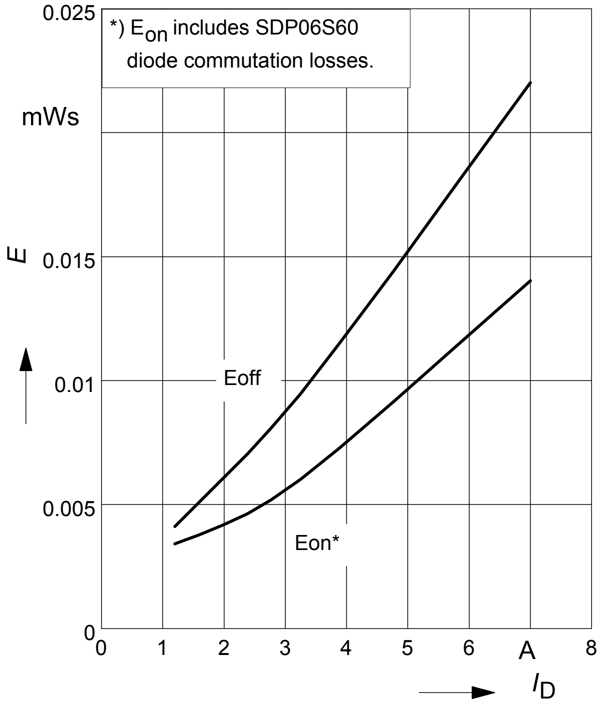
17 Typ. drain source voltage slope

dv/dt = f(R_G), inductive load, T_j = 125°C
par.: V_{DS}=380V, V_{GS}=0/+13V, I_D=7.3A



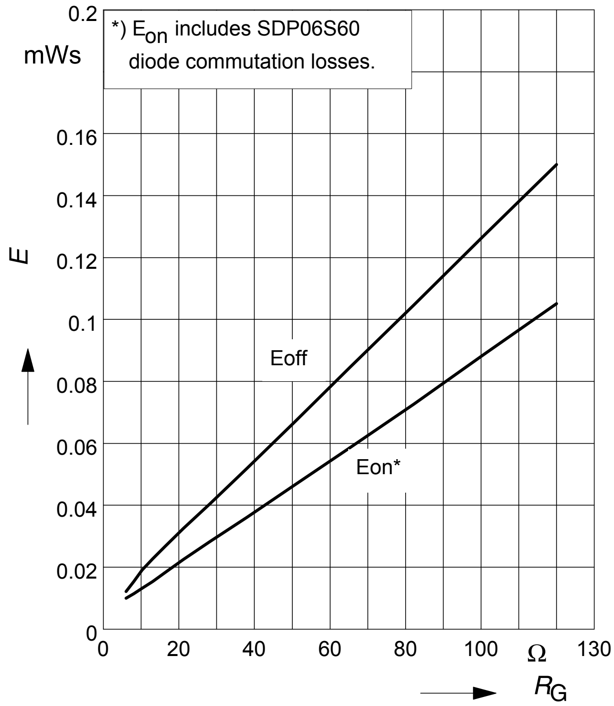
18 Typ. switching losses

$E = f(I_D)$, inductive load, T_j=125°C
par.: V_{DS}=380V, V_{GS}=0/+13V, R_G=12Ω



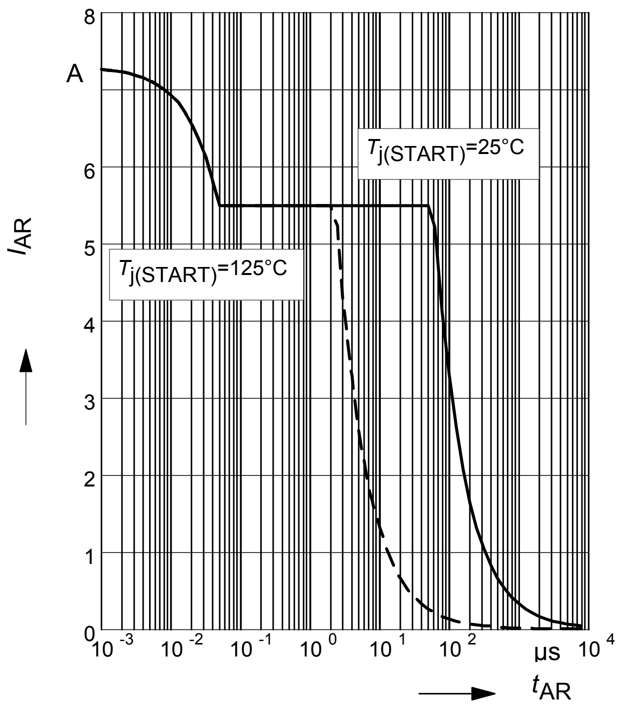
19 Typ. switching losses

$E = f(R_G)$, inductive load, T_j=125°C
par.: V_{DS}=380V, V_{GS}=0/+13V, I_D=7.3A



20 Avalanche SOA

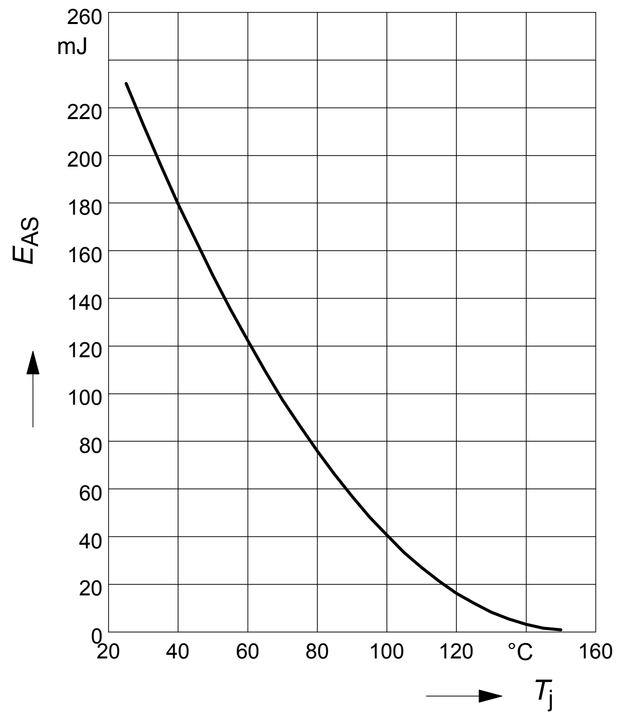
$I_{AR} = f(t_{AR})$
par.: $T_j \leq$ 150 °C



21 Avalanche energy

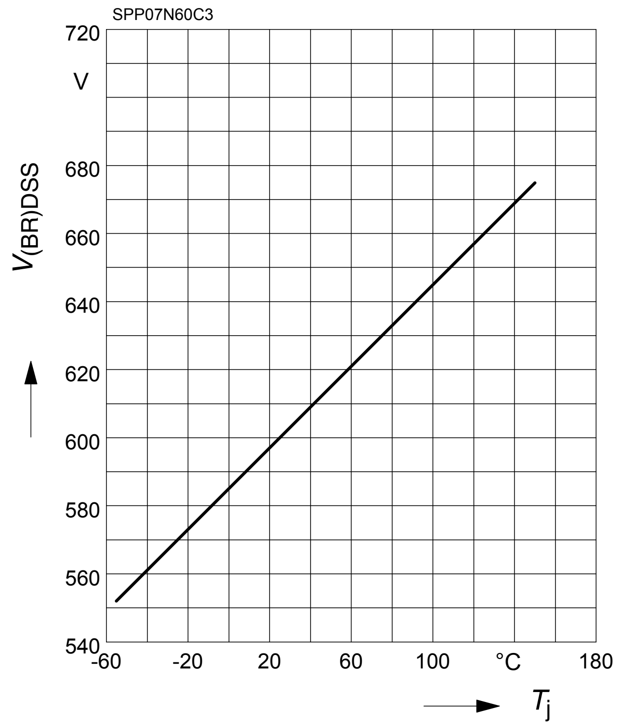
$E_{AS} = f(T_j)$

par.: I_D = 5.5 A, V_{DD} = 50 V



22 Drain-source breakdown voltage

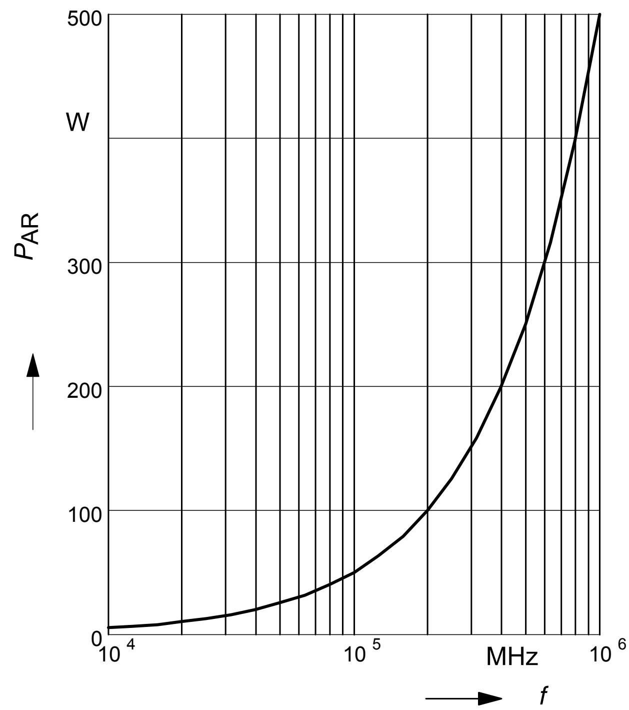
$V_{(BR)DSS} = f(T_j)$



23 Avalanche power losses

$P_{AR} = f(f)$

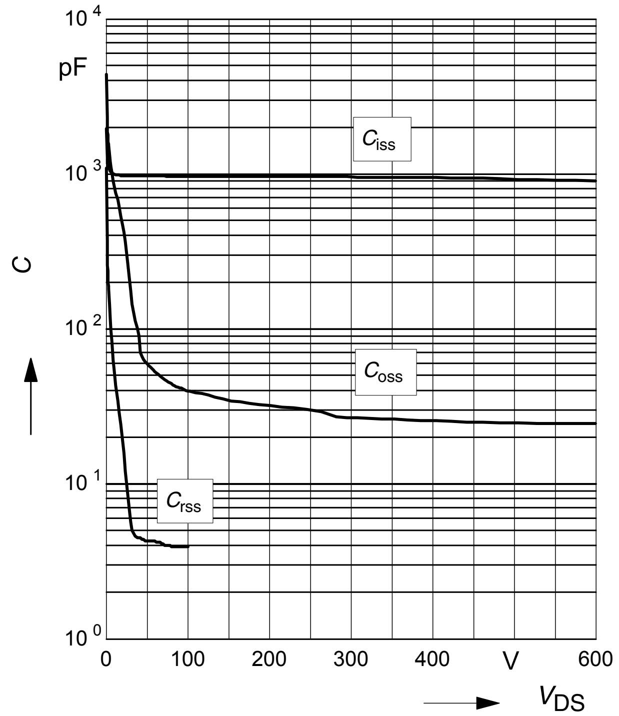
parameter: E_{AR}=0.5mJ



24 Typ. capacitances

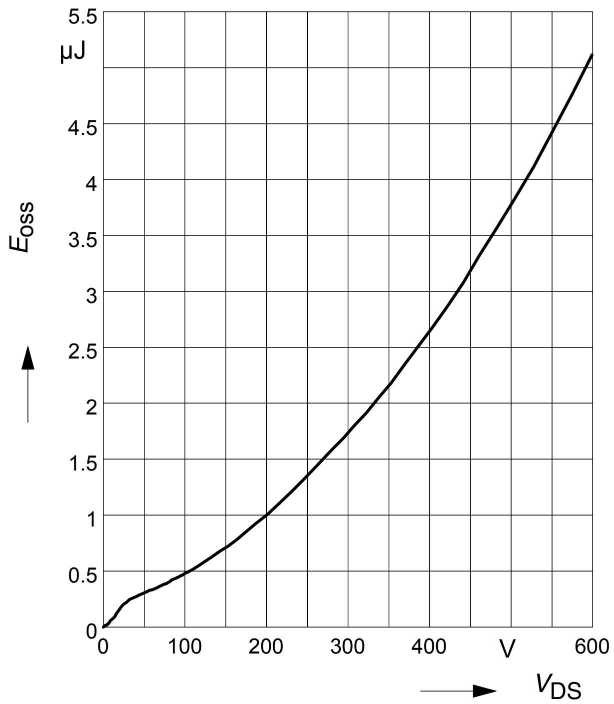
$C = f(V_{DS})$

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

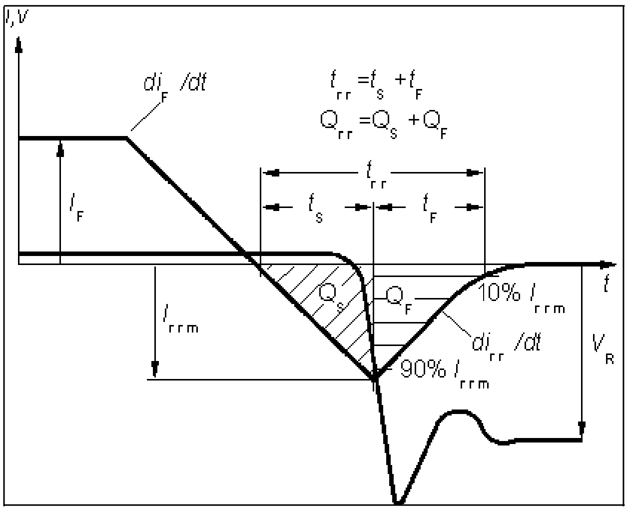


25 Typ. C_{oss} stored energy

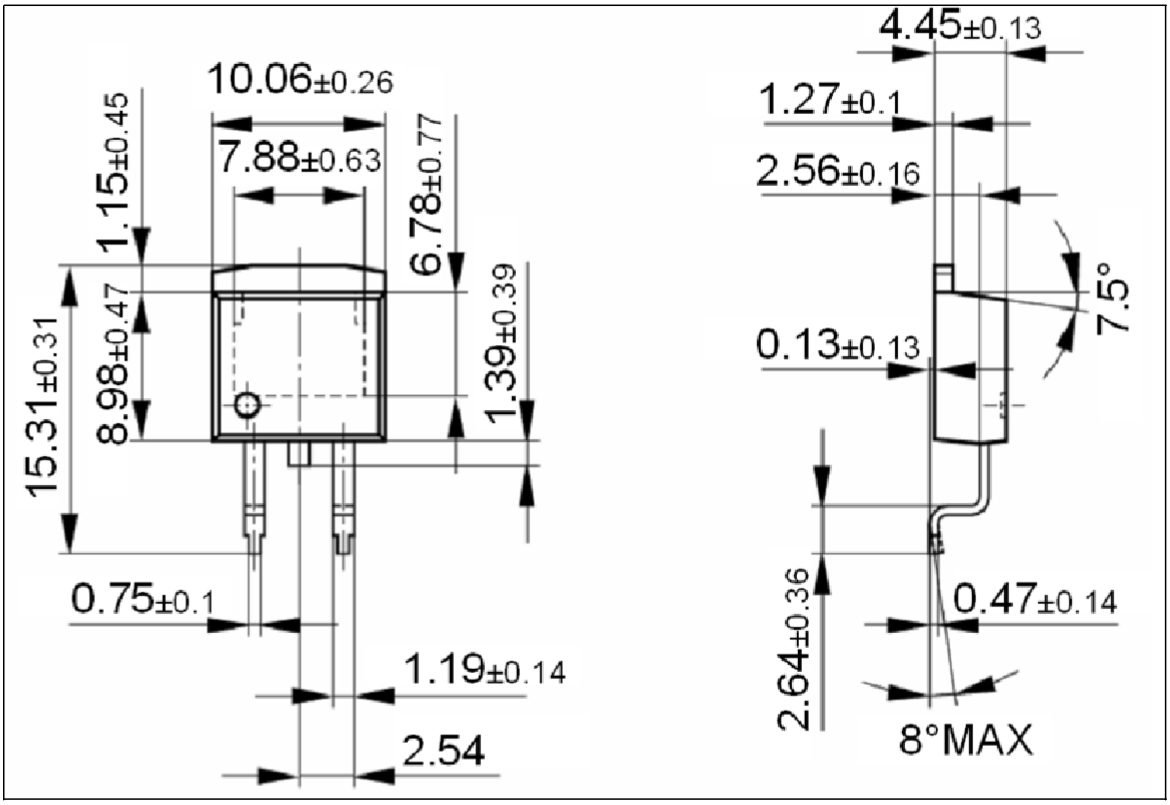
$E_{oss}=f(V_{DS})$



Definition of diodes switching characteristics



P-TO-263-3-2 (D2-PAK)



Published by
Infineon Technologies AG,
Bereichs Kommunikation
St.-Martin-Strasse 53,
D-81541 München

Attention please!
The information herein is given to describe certain components and shall not be considered as warranted characteristics.

Terms of delivery and rights to technical change reserved.

We hereby disclaim any and all warranties, including but not limited to warranties of non-infringement, regarding circuits, descriptions and charts stated herein.

Infineon Technologies is an approved CECC manufacturer.

Information
For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office in Germany or our Infineon Technologies Reprensatives worldwide (see address list).

Warnings
Due to technical requirements components may contain dangerous substances.
For information on the types in question please contact your nearest Infineon Technologies Office.

Infineon Technologies Components may only be used in life-support devices or systems with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.