CoolMOS™ Power Transistor

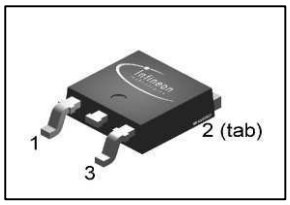
Features

- New revolutionary high voltage technology
- Extreme dv/dt rated
- High peak current capability
- Fully qualified according to JEDEC[1)] for industrial applications
- Pb-free lead plating; RoHS compliant; Halogen free mold compound
- Ultra low gate charge
- Ultra low effective capacitances

Product Summary

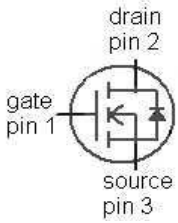
V_{DS}	800	V
$R_{DS(on)max}$ @ T_j = 25°C	2.7	Ω
$Q_{g,typ}$	12	nC

PG-TO252-3



CoolMOS™ 800V designed for:

- Industrial application with high DC bulk voltage
- Switching Application (i.e. active clamp forward)



Type	Package	Marking
SPD02N80C3	PG-TO252-3	02N80C3

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	T_C=25 °C	2	A
		T_C=100 °C	1.2	
Pulsed drain current[2)]	$I_{D,pulse}$	T_C=25 °C	6	
Avalanche energy, single pulse	E_{AS}	I_D=1 A, V_{DD}=50 V	90	mJ
Avalanche energy, repetitive t_{AR}[2),3)]	E_{AR}	I_D=2 A, V_{DD}=50 V	0.05	
Avalanche current, repetitive t_{AR}[2),3)]	I_{AR}		2	A
MOSFET dv/dt ruggedness	dv/dt	V_{DS}=0…640 V	50	V/ns
Gate source voltage	V_{GS}	static	±20	V
		AC (f>1 Hz)	±30	
Power dissipation	P_{tot}	T_C=25 °C	42	W
Operating and storage temperature	T_j, T_{stg}		-55 ... 150	°C

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

Parameter	Symbol	Conditions	Value	Unit
Continuous diode forward current	I_S	T_C=25 °C	2	A
Diode pulse current[2]	$I_{S,pulse}$		6	
Reverse diode dv/dt[4]	dv/dt		4	V/ns

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics						
Thermal resistance, junction - case	R_{thJC}		-	-	3	K/W
Thermal resistance, junction - ambient	R_{thJA}	SMD version, device on PCB, minimal footprint	-	-	62	
		SMD version, device on PCB, 6 cm^2 cooling area[5]	-	35	-	
Soldering temperature, reflow soldering	T_{sold}	reflow MSL1	-	-	260	°C
Electrical characteristics, at T_j=25 °C, unless otherwise specified						
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0 V, I_D=250 µA	800	-	-	V
Avalanche breakdown voltage	$V_{(BR)DS}$	V_{GS}=0 V, I_D=2 A	-	870	-	
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=0.12 mA	2.1	3	3.9	
Zero gate voltage drain current	I_{DSS}	V_{DS}=800 V, V_{GS}=0 V, T_j=25 °C	-	-	5	µA
		V_{DS}=800 V, V_{GS}=0 V, T_j=150 °C	-	25	-	
Gate-source leakage current	I_{GSS}	V_{GS}=20 V, V_{DS}=0 V	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=1.2 A, T_j=25 °C	-	2.4	2.7	Ω
		V_{GS}=10 V, I_D=1.2 A, T_j=150 °C	-	6.5	-	
Gate resistance	R_G	f=1 MHz, open drain	-	1.2	-	Ω

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics						
Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=100 V, f=1 MHz	-	290	-	pF
Output capacitance	C_{oss}		-	13	-	
Effective output capacitance, energy related[6)]	$C_{o(er)}$	V_{GS}=0 V, V_{DS}=0 V to 480 V	-	11	-	
Effective output capacitance, time related[7)]	$C_{o(tr)}$		-	26	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=400 V, V_{GS}=0/10 V, I_D=2 A, R_G=47 ? , T_j=25 °C	-	25	-	ns
Rise time	t_r		-	15	-	
Turn-off delay time	$t_{d(off)}$		-	72	-	
Fall time	t_f		-	18	-	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=640 V, I_D=2 A, V_{GS}=0 to 10 V	-	1.5	-	nC
Gate to drain charge	Q_{gd}		-	6	-	
Gate charge total	Q_g		-	12	16	
Gate plateau voltage	$V_{plateau}$		-	5.5	-	V
Reverse Diode						
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=I_S=2 A, T_j=25 °C	-	1	1.2	V
Reverse recovery time	t_{rr}	V_R=400 V, I_F=I_S=2 A, di_F/dt=100 A/µs	-	520	-	ns
Reverse recovery charge	Q_{rr}		-	2	-	µC
Peak reverse recovery current	I_{rrm}		-	6	-	A

[1)] J-STD20 and JESD22

[2)] Pulse width t_p limited by $T_{j,max}$

[3)] Repetitive avalanche causes additional power losses that can be calculated as P_{AV}=E_{AR}*f.

[4)] I_{SD}=I_D, di/dt=400A/µs, V_{DClink} = 400V, V_{peak}<$V_{(BR)DSS}$, T_j<T_{jmax}, identical low side and high side switch

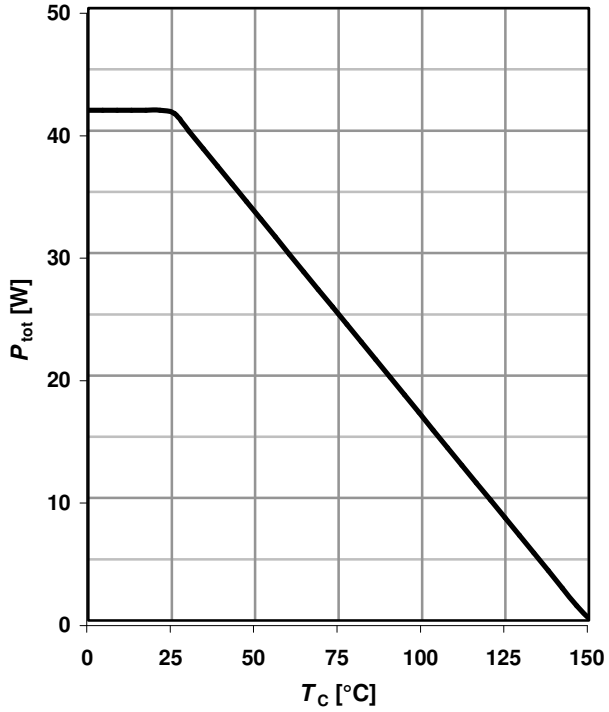
[5)] Device on 40mm*40mm*1.5 epoxy PCB FR4 with 6cm² (one layer, 70µm thick) copper area for drain connection. PCB is vertical without blown air

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

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

1 Power dissipation

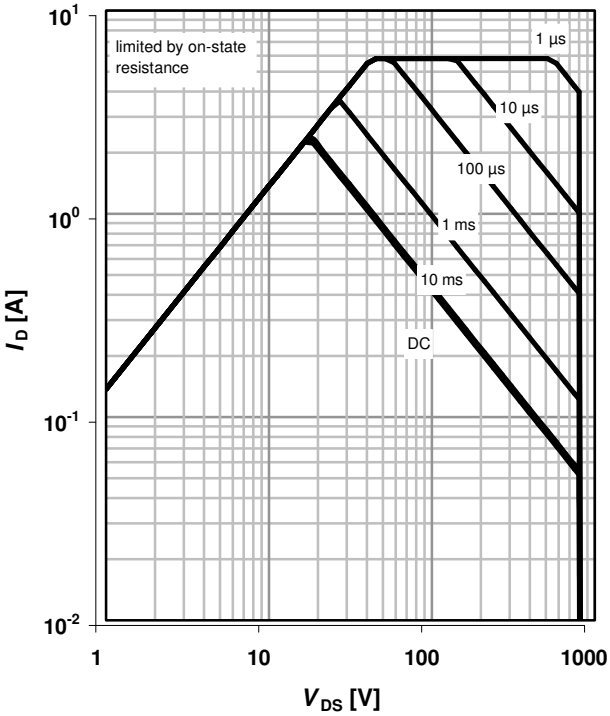
$P_{tot}=f(T_C)$



2 Safe operating area

$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$

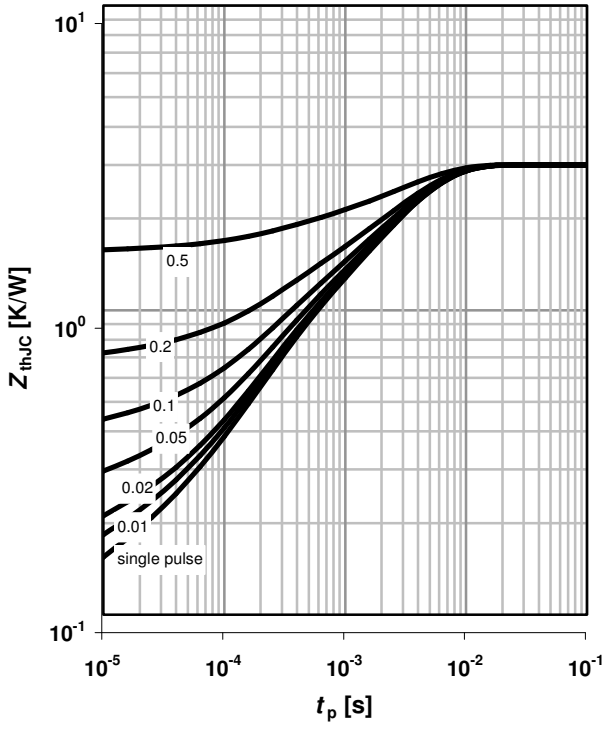
parameter: t_p



3 Max. transient thermal impedance

$Z_{thJC}=f(t_P)$

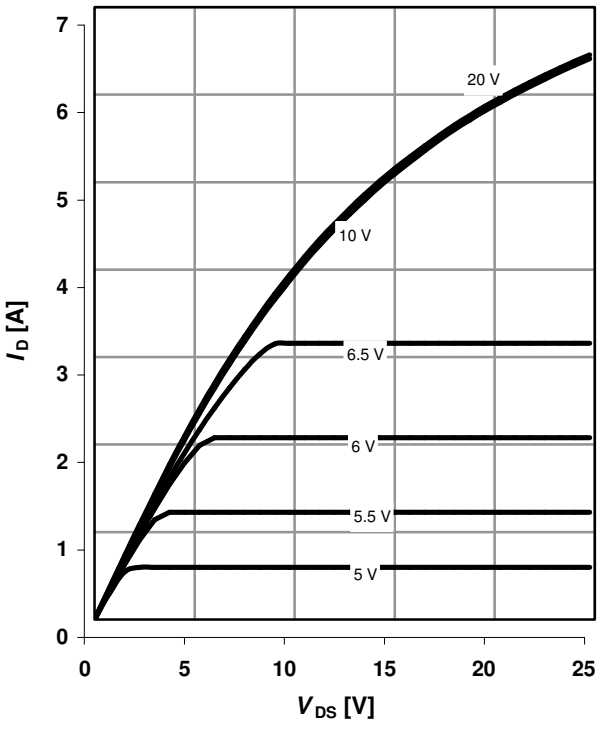
parameter: $D=t_p/T$



4 Typ. output characteristics

$I_D=f(V_{DS})$; $T_j=25$ °C; $t_p=10$ µs

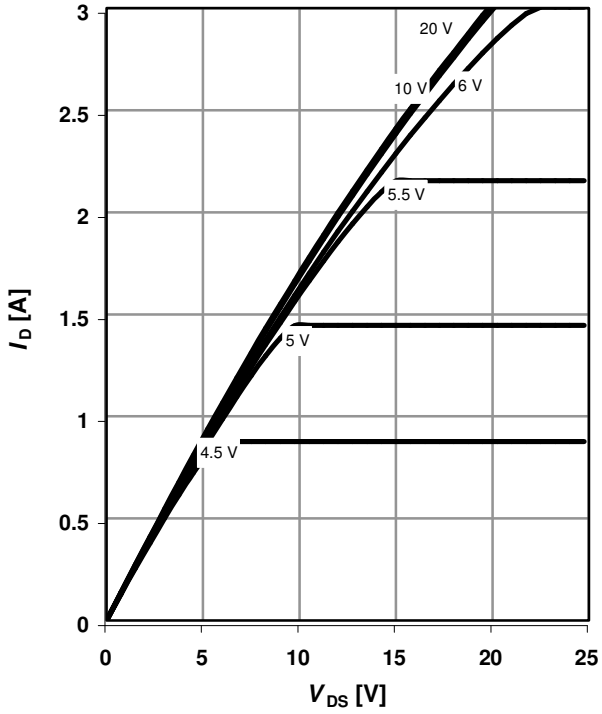
parameter: V_{GS}



5 Typ. output characteristics

I_D=f(V_{DS}); T_j=150 °C; t_p=10 µs

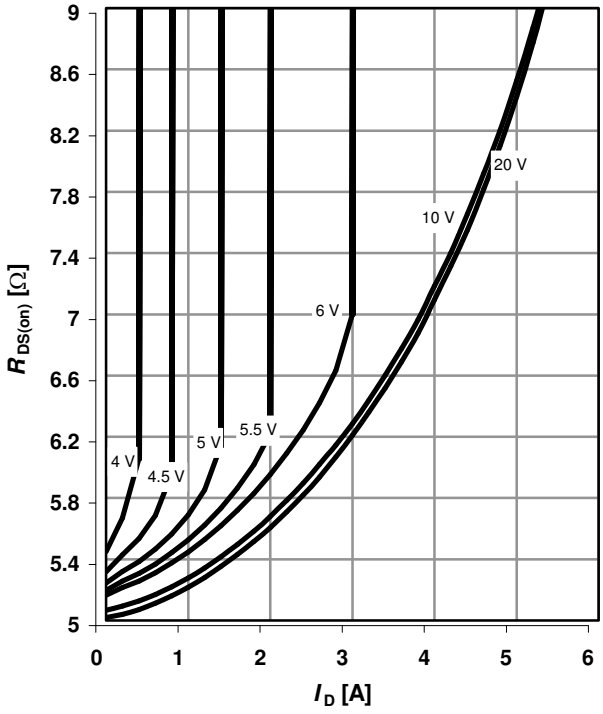
parameter: V_{GS}



6 Typ. drain-source on-state resistance

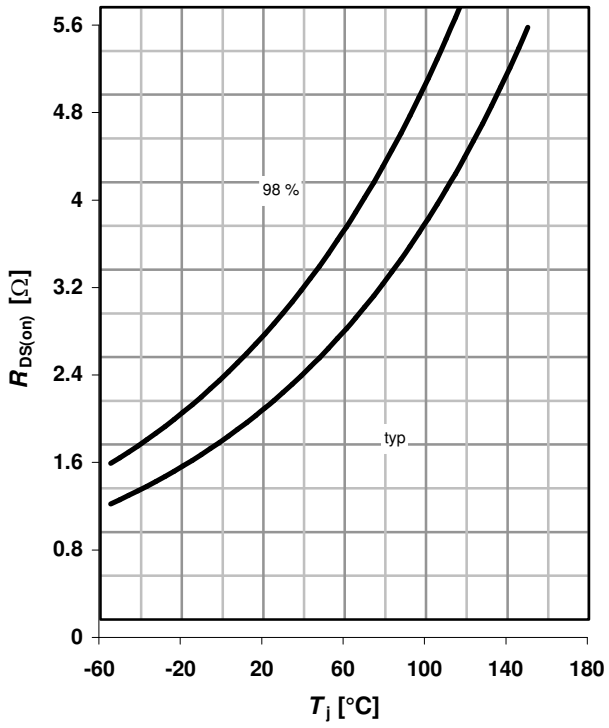
$R_{DS(on)}$=f(I_D); T_j=150 °C

parameter: V_{GS}



7 Drain-source on-state resistance

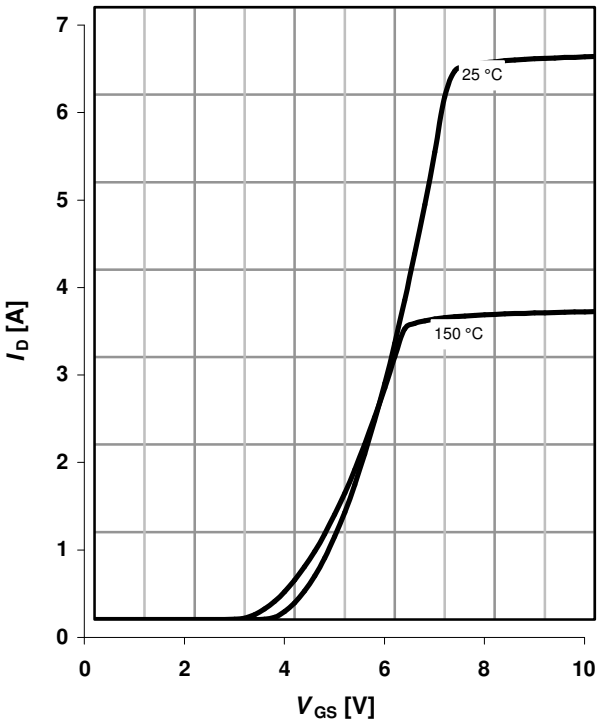
$R_{DS(on)}$=f(T_j); I_D=1.2 A; V_{GS}=10 V



8 Typ. transfer characteristics

I_D=f(V_{GS}); |V_{DS}|>2|I_D|$R_{DS(on)max}$; t_p=10 µs

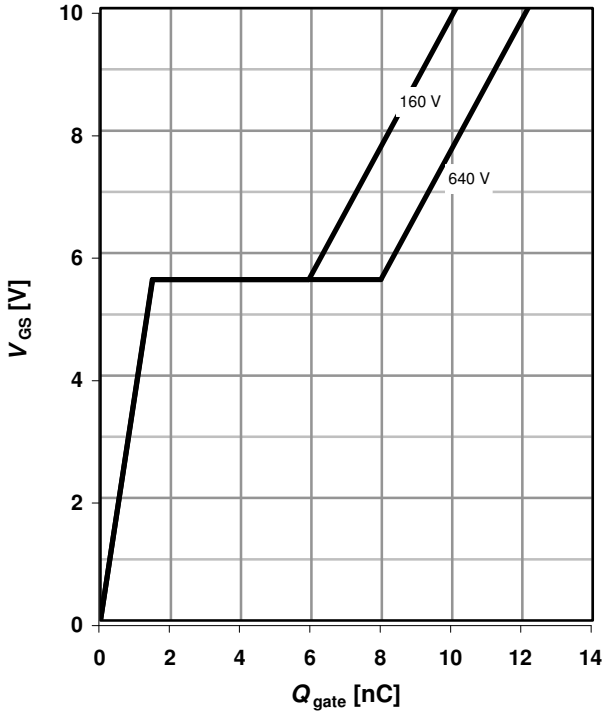
parameter: T_j



9 Typ. gate charge

V_{GS}=f(Q_{gate}); I_D=2 A pulsed

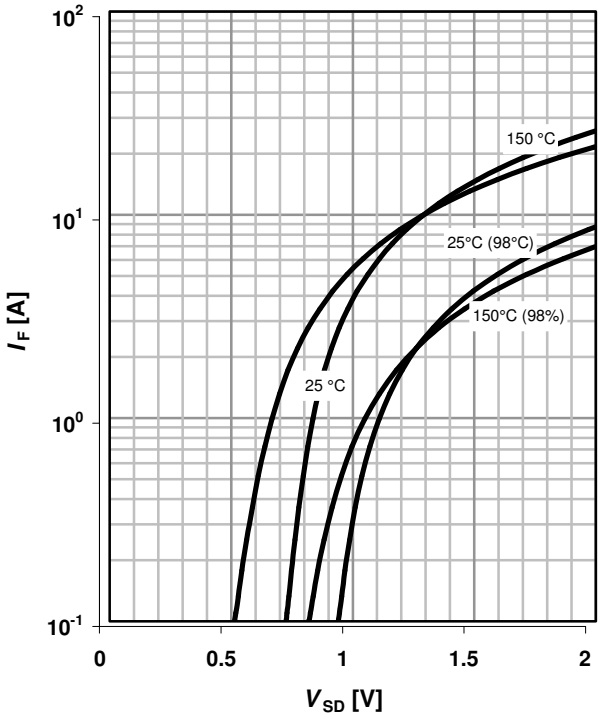
parameter: V_{DD}



10 Forward characteristics of reverse diode

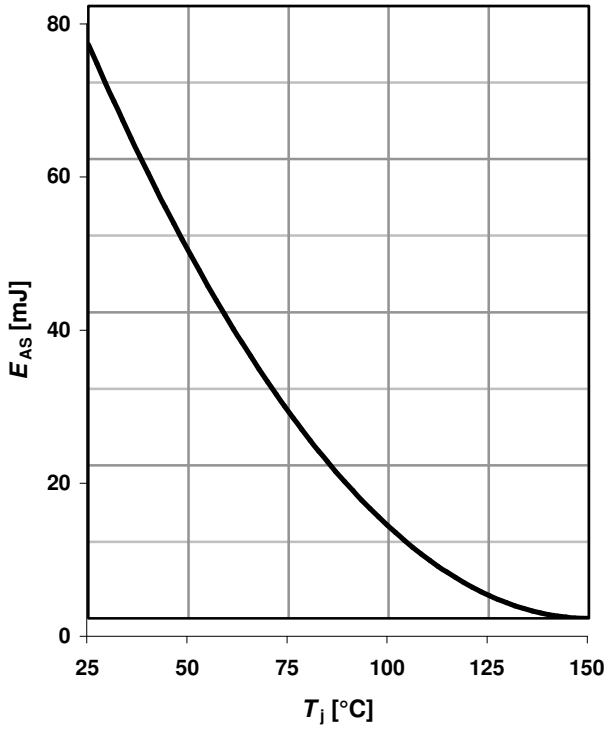
I_F=f(V_{SD}); t_p=10 µs

parameter: T_j



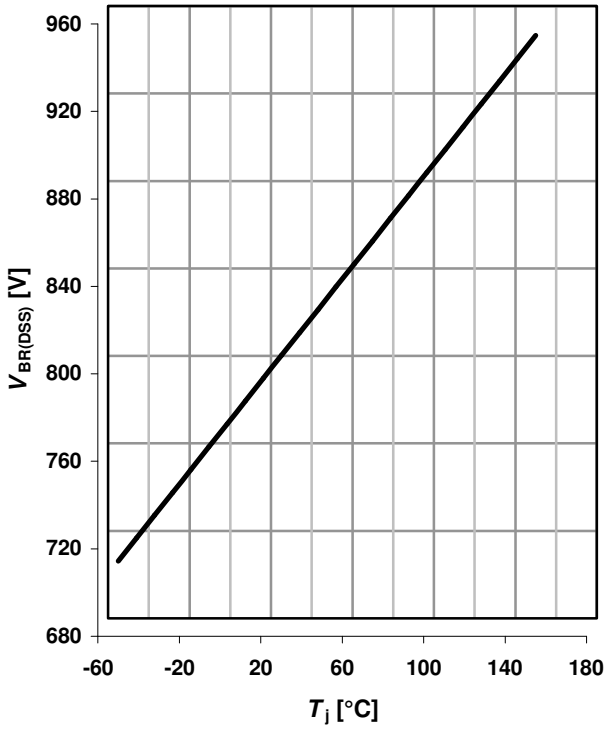
11 Avalanche energy

E_{AS}=f(T_j); I_D=1 A; V_{DD}=50 V



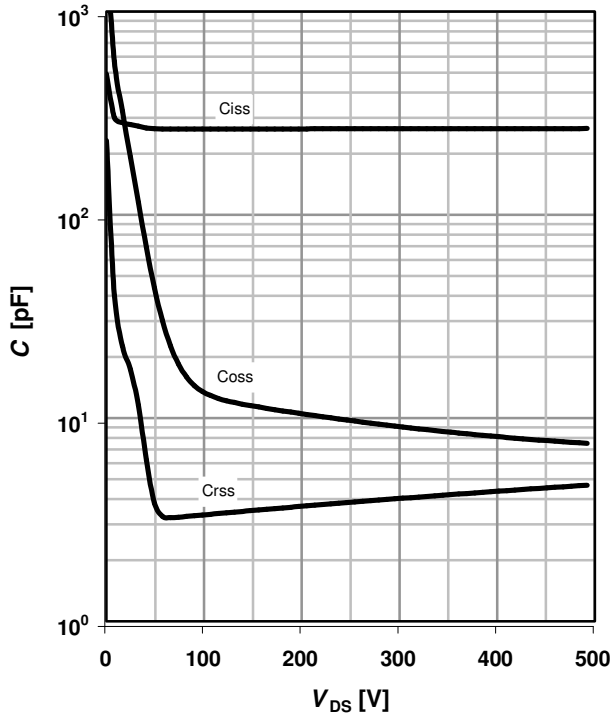
12 Drain-source breakdown voltage

$V_{BR(DSS)}$=f(T_j); I_D=0.25 mA



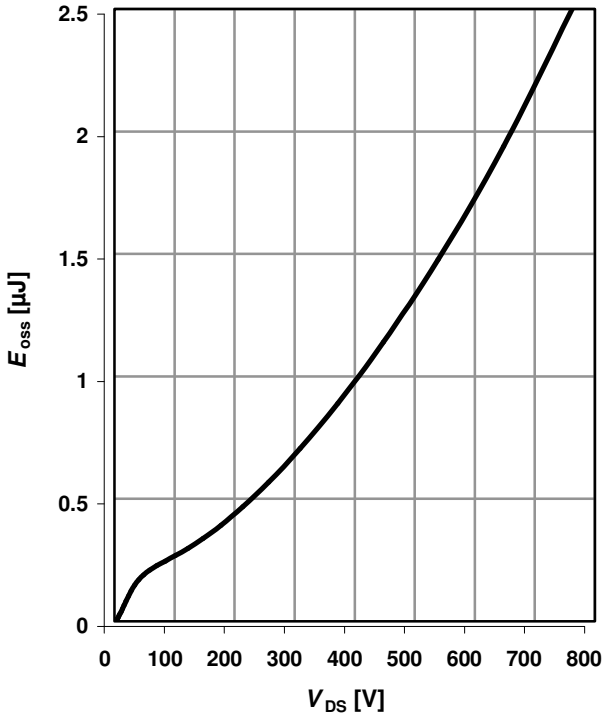
13 Typ. capacitances

C=f(V_{DS}); V_{GS}=0 V; f=1 MHz

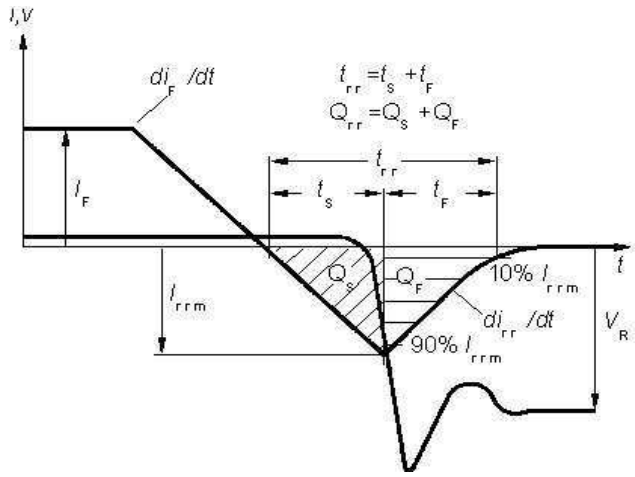


14 Typ. Coss stored energy

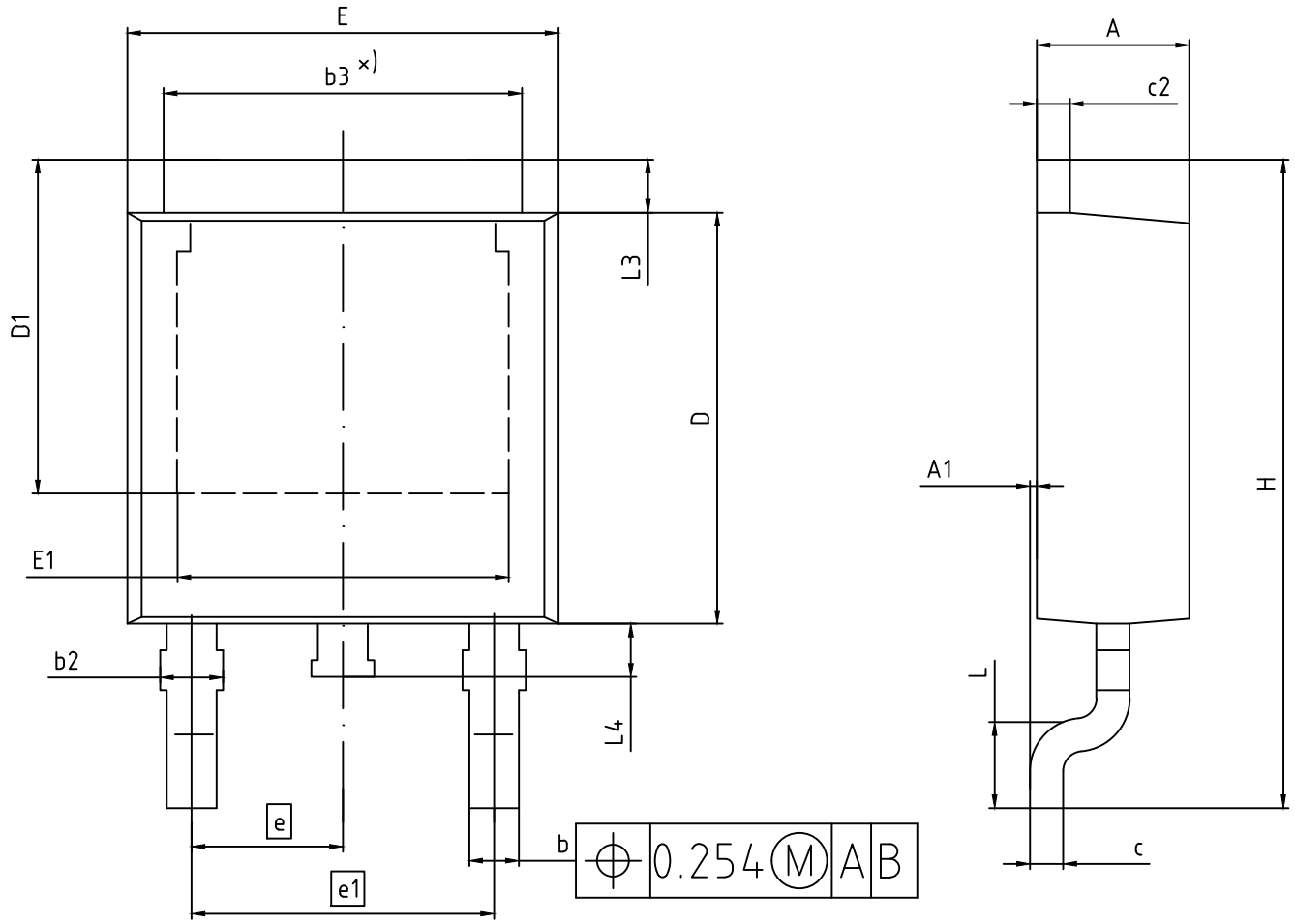
E_{oss}= f(V_{DS})

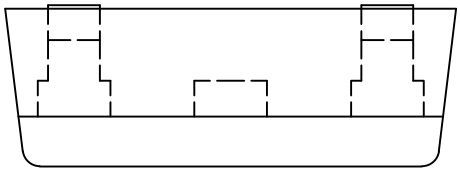


Definition of diode switching characteristics



PG-TO252-3-1: Outline , PG-TO-252-3-11 (D-PAK), PG-TO-252-3-21 (D-PAK)





ALL DIMENSIONS REFER TO JEDEC STANDARD TO-252 AND DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

DIMENSION	MILLIMETERS	
	MIN.	MAX.
A	2.16	2.41
A1	0.00	0.15
b	0.64	0.89
b2	0.65	1.15
b3	4,95	5.50
c	0.46	0.61
c2	0.40	0.98
D	5.97	6.22
D1	5.02	5.84
E	6.35	6.73
E1	4.32	5.50
e	2.29	
e1	4.57	
N	3	
H	9.40	10.48
L	1.18	1.78
L3	0.89	1.27
L4	0.51	1.02

DOCUMENT NO.	Z8B00003328
REVISION	07
SCALE:	10:1
	0 1 2mm
EUROPEAN PROJECTION	
ISSUE DATE	01.04.2020

Revision History

SPD02N80C3

Revision: 2020-05-26, Rev. 2.94

Previous Revision		
Revision	Date	Subjects (major changes since last revision)
2.93	2016-04-19	Non-halogen free version discontinued (creation:2016-04-13)
2.94	2020-05-26	Update package outline

We Listen to Your Comments
Any information within this document that you feel is wrong, unclear or missing at all? Your feedback will help us to continuously improve the quality of this document. Please send your proposal (including a reference to this document) to:
erratum@infineon.com

Published by
Infineon Technologies AG
81726 München, Germany

Legal Disclaimer
The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics (“Beschaffenheitsgarantie”) .

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.
In addition, any information given in this document is subject to customer’s compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer’s products and any use of the product of Infineon Technologies in customer’s applications.
The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer’s technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

Information
For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office (www.infineon.com).

Warnings
Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.
The Infineon Technologies component described in this Data Sheet may be used in life-support devices or systems and/or automotive, aviation and aerospace applications or systems only 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, automotive, aviation and aerospace 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.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Infineon:

SPD02N80C3 SPD02N80C3ATMA1