

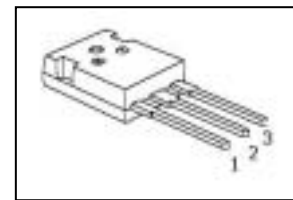
CoolMOS® Power Transistor

Product Summary

V_{DS}	800	V
$R_{DS(on)max}$	0.29	Ω
$Q_{g,typ}$	91	nC

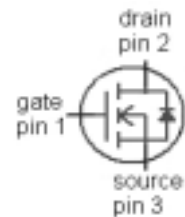
Features

- New revolutionary high voltage technology
- Ultra low gate charge and ultra low effective capacitances
- Extreme dv/dt rated
- High peak current capability
- Automotive AEC Q101 qualified
- RoHS compliant

PG-TO247-3

CoolMOS C3A designed for:

- DC/DC converters for Automotive Applications

Type	Package	Marking
IPW80R290C3A	PG-TO247-3	8R290C3A


Maximum ratings, at $T_j=25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	$T_C=25\text{ °C}$	17	A
		$T_C=100\text{ °C}$	11	
Pulsed drain current ¹⁾	$I_{D,pulse}$	$T_C=25\text{ °C}$	51	
Avalanche energy, single pulse	E_{AS}	$I_D=3.4\text{ A}$, $V_{DD}=50\text{ V}$	670	mJ
Avalanche energy, repetitive t_{AR} ^{1),2)}	E_{AR}	$I_D=17\text{ A}$, $V_{DD}=50\text{ V}$	0.5	
Avalanche current, repetitive t_{AR} ^{1),2)}	I_{AR}		17	A
MOSFET dv/dt ruggedness	dv/dt	$V_{DS}=0\dots640\text{ V}$	50	V/ns
Gate source voltage	V_{GS}	static	± 20	V
Power dissipation	P_{tot}	$T_C=25\text{ °C}$	227	W
Operating temperature	T_j		-40 ... 150	°C
Storage temperature	T_{stg}		-40 ... 150	

Maximum ratings, at $T_j=25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous diode forward current	I_S	$T_C=25\text{ °C}$	17	A
Diode pulse current ¹⁾	$I_{S,pulse}$		51	
Reverse diode dv/dt ³⁾	dv/dt		4	V/ns

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Thermal characteristics

Thermal resistance, junction - case	R_{thJC}		-	-	0.55	K/W
Thermal resistance, junction - ambient	R_{thJA}	leaded	-	-	62	
Soldering temperature, only allowed at leads	T_{sold}	leaded	-	-	260	°C

Electrical characteristics, at $T_j=25\text{ °C}$, unless otherwise specified

Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}$, $I_D=250\text{ }\mu\text{A}$	800	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=1.0\text{ mA}$	2.1	3	3.9	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=800\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$	-	-	25	μA
Gate-source leakage current	I_{GSS}	$V_{GS}=20\text{ V}$, $V_{DS}=0\text{ V}$	-	-	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10\text{ V}$, $I_D=11\text{ A}$, $T_j=25\text{ °C}$	-	0.25	0.29	Ω
		$V_{GS}=10\text{ V}$, $I_D=11\text{ A}$, $T_j=150\text{ °C}$	-	0.67	-	
Gate resistance	R_G	$f=1\text{ MHz}$, open drain	-	0.85	-	Ω

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=100\text{ V},$ $f=1\text{ MHz}$	-	2300	-	pF
Output capacitance	C_{oss}		-	94	-	
Effective output capacitance, energy related ⁴⁾	$C_{o(er)}$	$V_{GS}=0\text{ V}, V_{DS}=0\text{ V}$ to 480 V	-	72	-	
Effective output capacitance, time related ⁵⁾	$C_{o(tr)}$		-	210	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=400\text{ V},$ $V_{GS}=0/10\text{ V}, I_D=17\text{ A},$ $R_G=4.7\ \Omega,$ $T_j = 125^\circ\text{C}$	-	25	-	ns
Rise time	t_r		-	15	-	
Turn-off delay time	$t_{d(off)}$		-	72	-	
Fall time	t_f		-	12	-	

Gate Charge Characteristics

Gate to source charge	Q_{gs}	$V_{DD}=640\text{ V}, I_D=17\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	12	-	nC
Gate to drain charge	Q_{gd}		-	45	-	
Gate charge total	Q_g		-	88	117	
Gate plateau voltage	$V_{plateau}$		-	5.5	-	V

Reverse Diode

Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=I_S,$ $T_j=25^\circ\text{C}$	-	1	1.2	V
Reverse recovery time	t_{rr}	$V_R=400\text{ V}, I_F=I_S,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	550	-	ns
Reverse recovery charge	Q_{rr}		-	15	-	μC
Peak reverse recovery current	I_{rrm}		-	51	-	A

¹⁾ Pulse width t_p limited by $T_{j,max}$

²⁾ Repetitive avalanche causes additional power losses that can be calculated as $P_{AV}=E_{AR} \cdot f$.

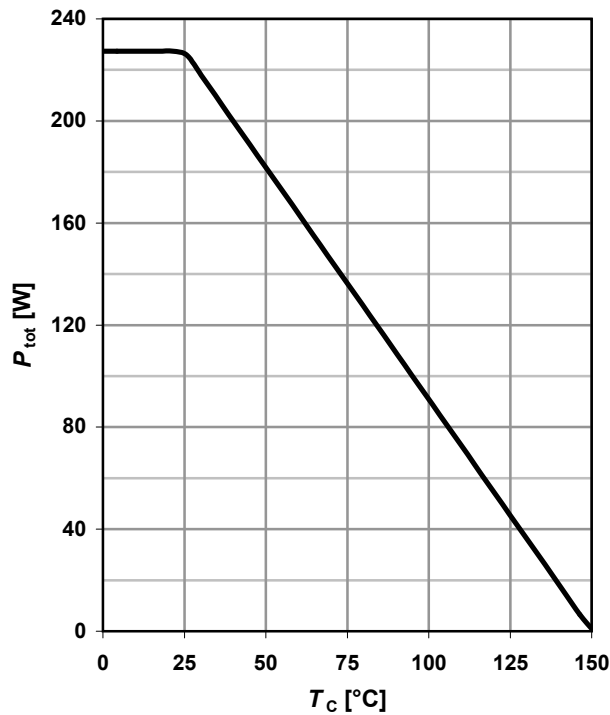
³⁾ $I_{SD} \leq I_D, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DClink} = 400\text{ V}, V_{peak} < V_{(BR)DSS}, T_j < T_{j,max}$, identical low side and high side switch

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} .

1 Power dissipation

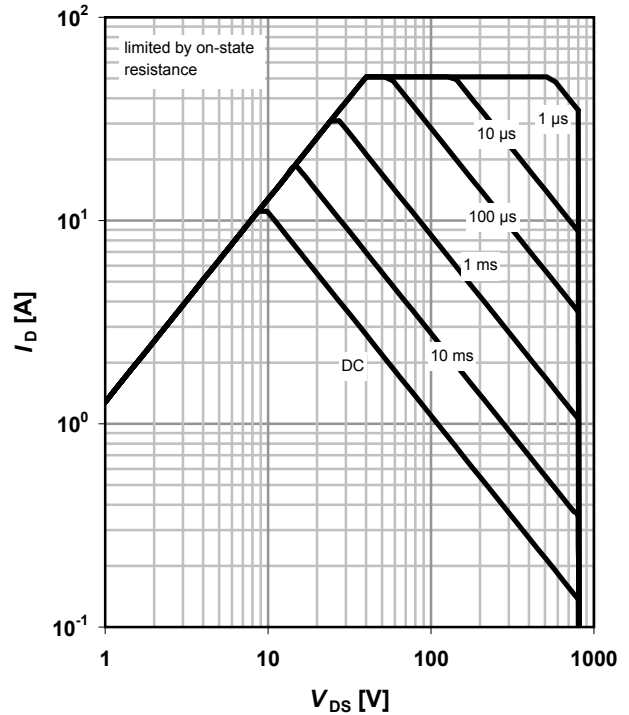
$P_{tot}=f(T_C)$



2 Safe operating area

$I_D=f(V_{DS}); T_C=25\text{ °C}; D=0$

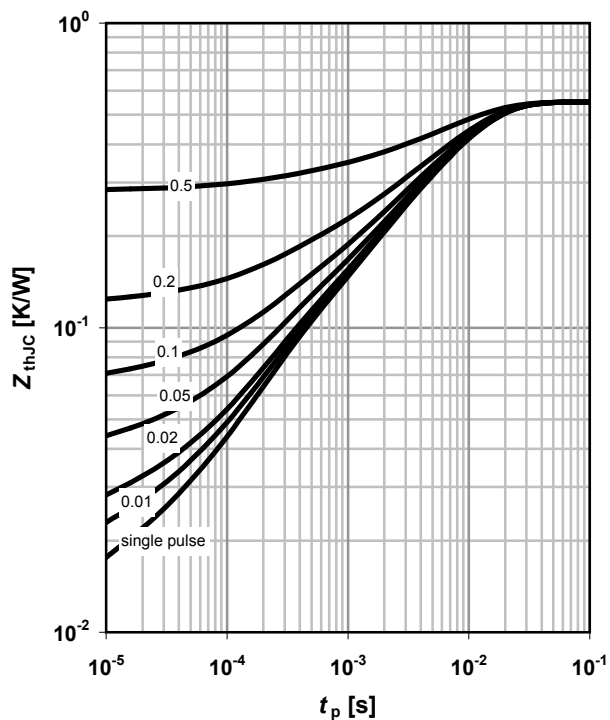
parameter: t_p



3 Max. transient thermal impedance

$Z_{thJC}=f(t_p)$

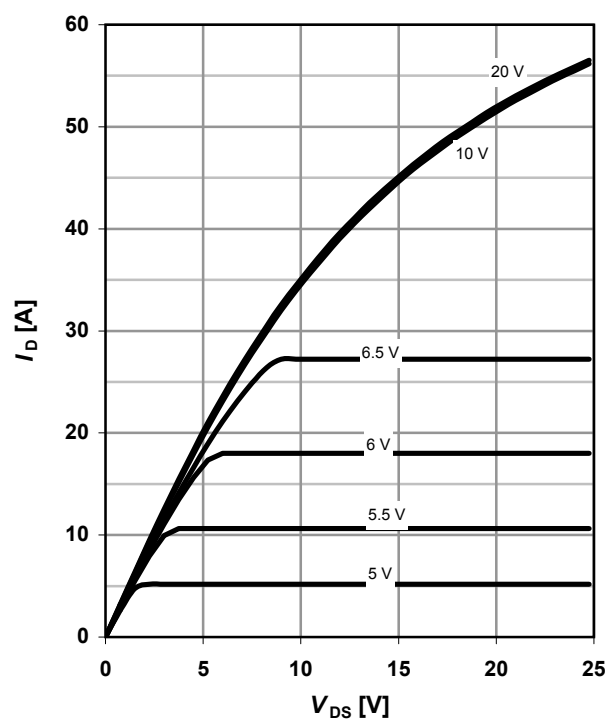
parameter: $D=t_p/T$



4 Typ. output characteristics

$I_D=f(V_{DS}); T_j=25\text{ °C}$

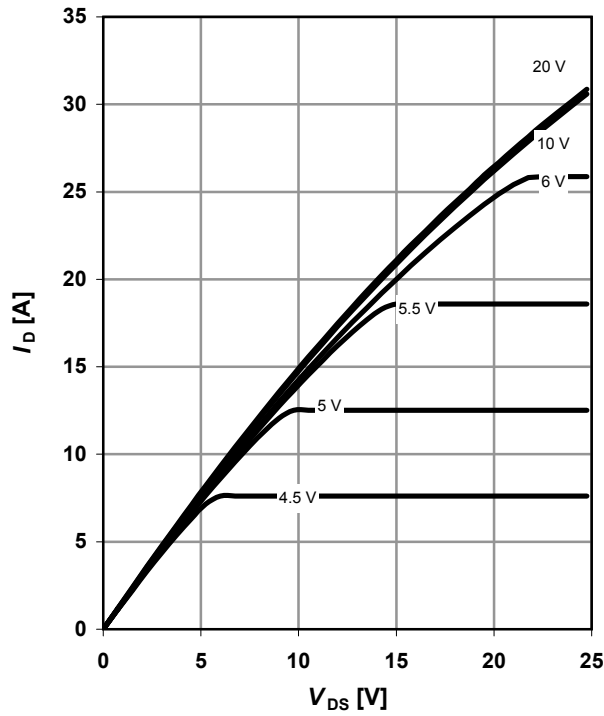
parameter: V_{GS}



5 Typ. output characteristics

$I_D = f(V_{DS}); T_j = 150\text{ °C}$

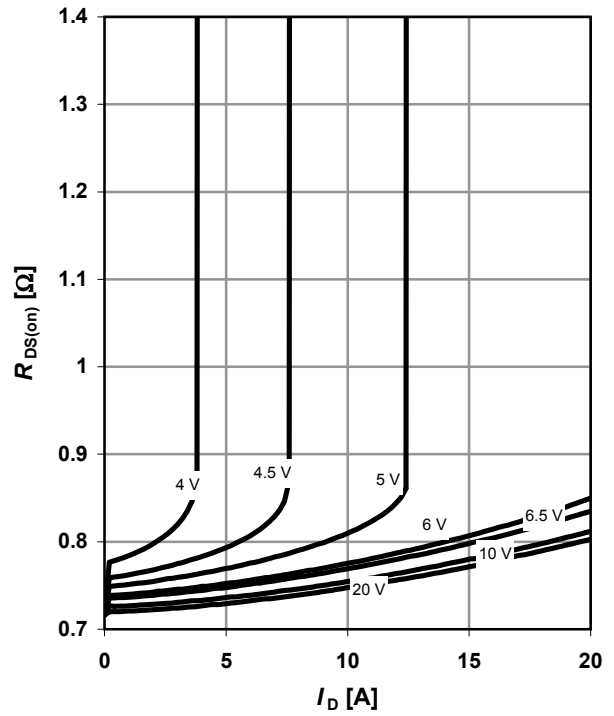
parameter: V_{GS}



6 Typ. drain-source on-state resistance

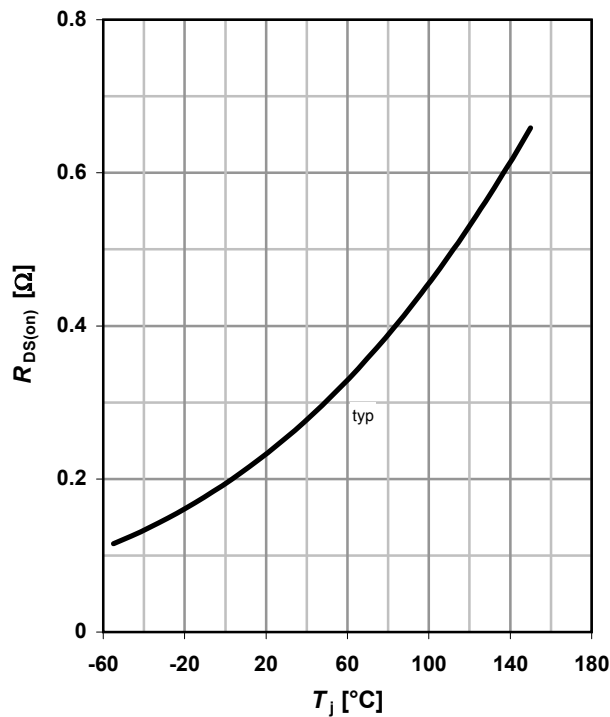
$R_{DS(on)} = f(I_D); T_j = 150\text{ °C}$

parameter: V_{GS}



7 Drain-source on-state resistance

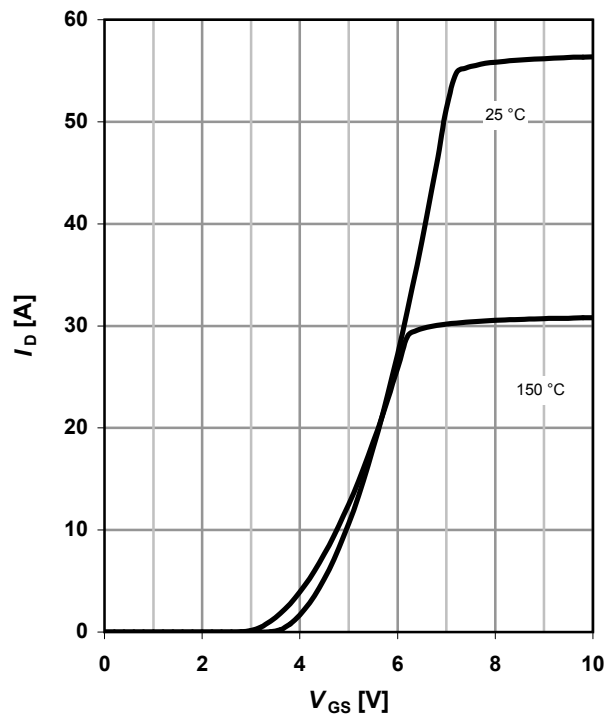
$R_{DS(on)} = f(T_j); I_D = 11\text{ A}; V_{GS} = 10\text{ V}$



8 Typ. transfer characteristics

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

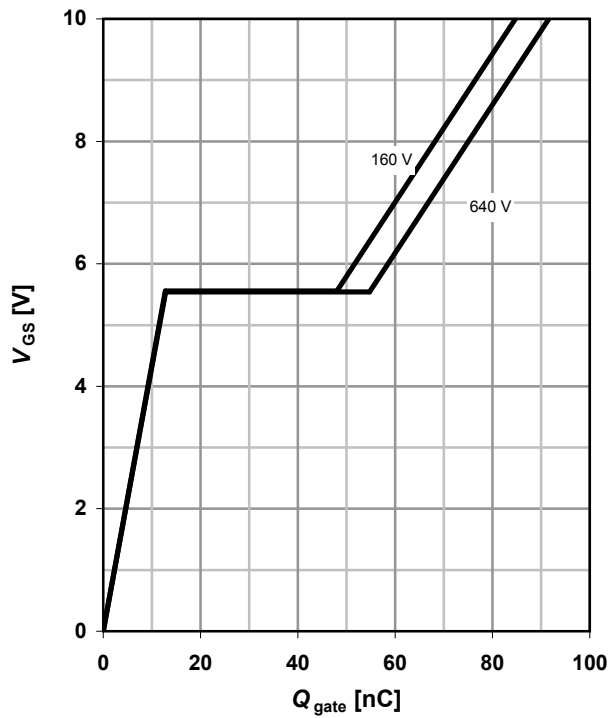
parameter: T_j



9 Typ. gate charge

$V_{GS}=f(Q_{gate}); I_D=17\text{ A pulsed}$

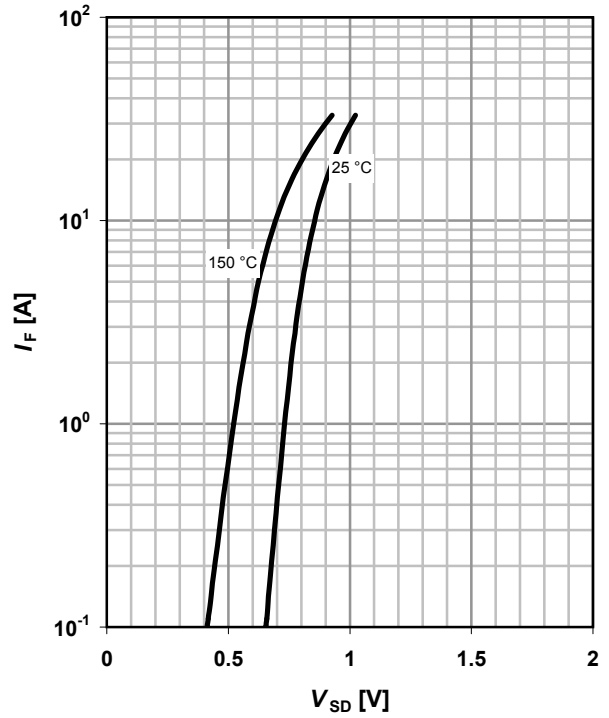
parameter: V_{DD}



10 Forward characteristics of reverse diode

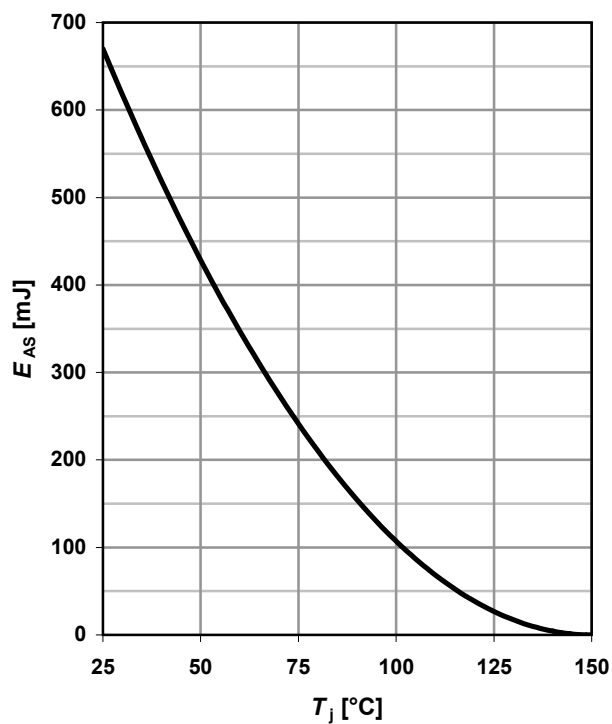
$I_F=f(V_{SD})$

parameter: T_j



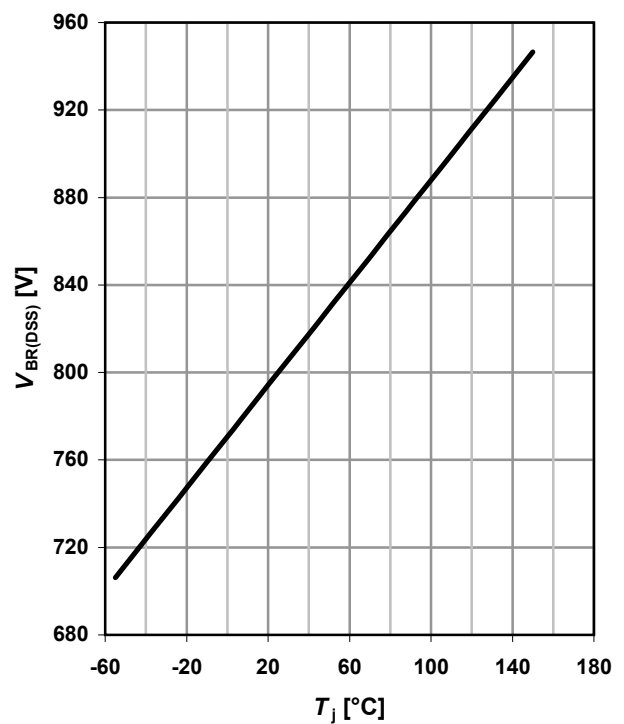
11 Avalanche energy

$E_{AS}=f(T_j); I_D=3.4\text{ A}; V_{DD}=50\text{ V}$



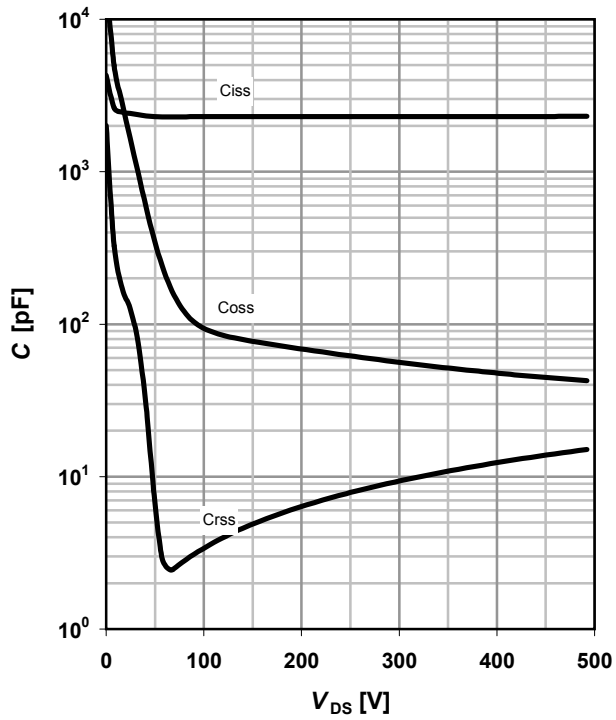
12 Drain-source breakdown voltage

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



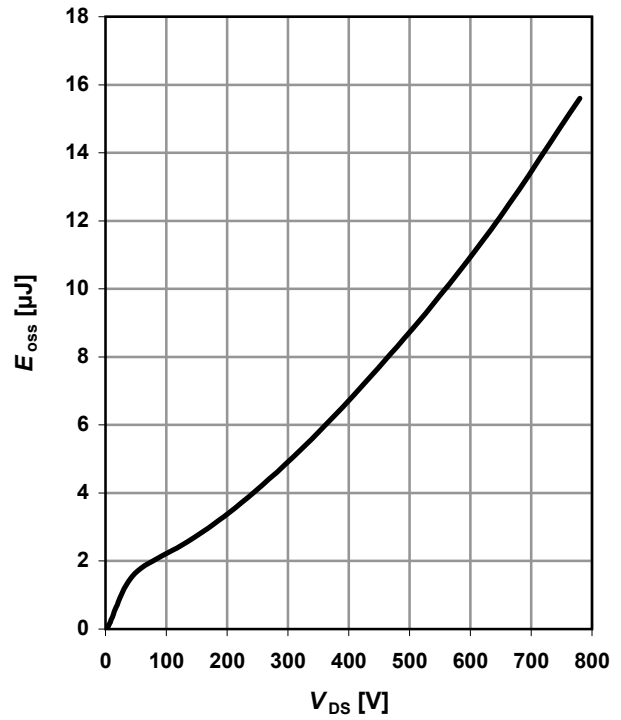
13 Typ. capacitances

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

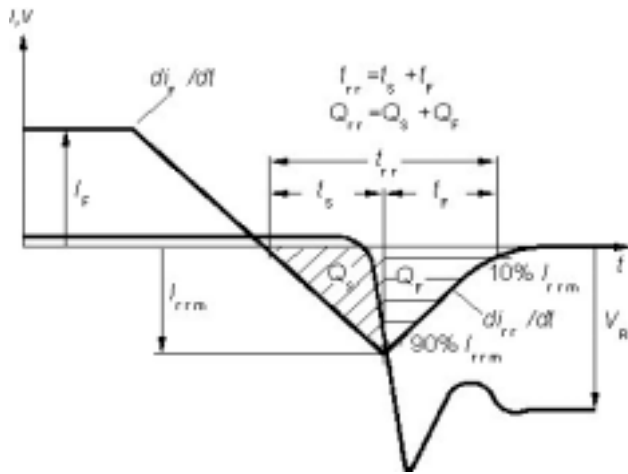


14 Typ. Coss stored energy

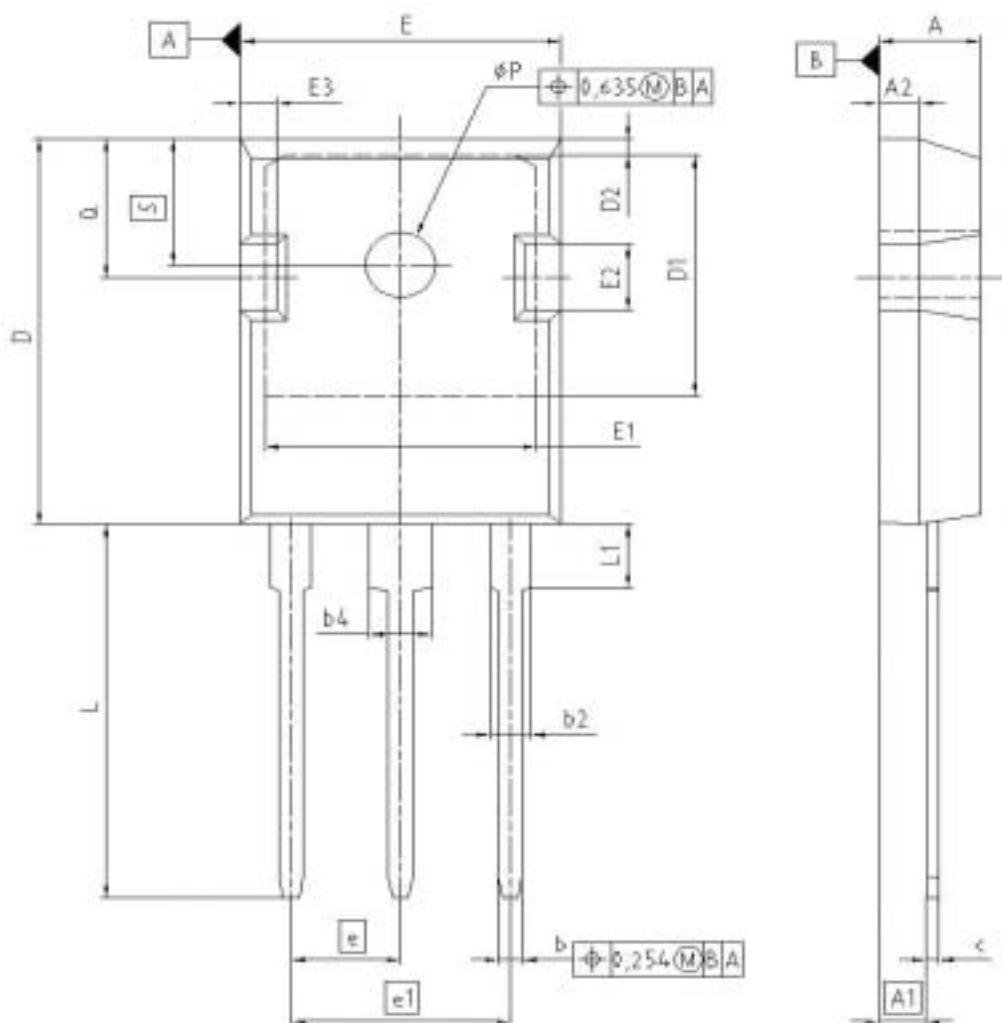
$E_{oss}=f(V_{DS})$



Definition of diode switching characteristics



PG-TO247-3: Outlines



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.803	5.157	0.193	0.203
A1	2.273	2.527	0.092	0.096
A2	1.853	2.107	0.075	0.081
b	1.073	1.327	0.047	0.052
b2	1.903	2.355	0.075	0.094
b4	2.870	3.494	0.113	0.136
c	0.545	0.752	0.024	0.030
D	20.823	21.077	0.820	0.830
D1	17.323	17.831	0.682	0.702
D2	1.053	1.317	0.042	0.052
E	15.773	16.027	0.621	0.631
E1	13.893	14.147	0.547	0.557
E2	3.683	3.937	0.145	0.155
E3	1.883	1.937	0.068	0.075
e	5.450		0.215	
e1	10.800		0.430	
N	3		3	
L	20.053	20.307	0.789	0.799
L1	4.188	4.472	0.164	0.175
ϕP	3.559	3.851	0.140	0.144
Q	5.493	5.747	0.216	0.226
S	6.043	6.297	0.238	0.248

REFERENCE
JEDEC TO247-AD

SCALE

7.5mm

EUROPEAN PROJECTION

ISSUE DATE
25-05-2005

FILE
TO247_1

Published by
Infineon Technologies AG
81726 Munich, Germany
© 2009 Infineon Technologies AG
All Rights Reserved.

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 or hints given herein, any typical values stated herein and/or any information regarding the application of the device, 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.

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 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.