CoolMOS™ Power Transistor

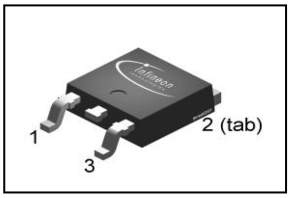
Product Summary

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

Features

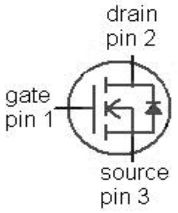
- New revolutionary high voltage technology
- Extreme dv/dt rated
- High peak current capability
- Qualified according to AEC Q101
- Green package (RoHS compliant), Pb-free lead plating, halogen free for mold compound
- Ultra low gate charge
- Ultra low effective capacitances

PG-TO252-3



CoolMOS™ 800V designed for:

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



Type	Package	Marking
IPD80R2k7C3A	PG-TO252-3	80C2k7A

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, Storage temperature	T_j, T_{stg}		-40 ... 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 d*v*/d*t*[4]	d*v*/d*t*		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[1]	$V_{(BR)DSS}$	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	-	5.5	-	
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, $R_{G,ext}$=47 Ω, 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] For applications with applied blocking voltage > 65% of the specified blocking voltage, we recommend to evaluate the impact of the cosmic radiation effect in early design phase. For assessment please contact local Infineon sales office.

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

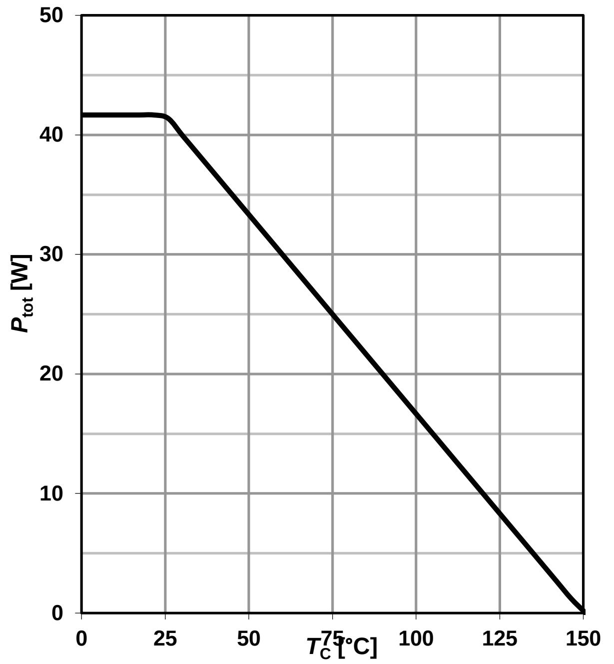
[5] Device on 40mm*40mm*1.5 epoxy PCB FR4 with 6cm² (one layer, 70µm thick) copper area for drain connection. PCB is vertical without blown air

[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

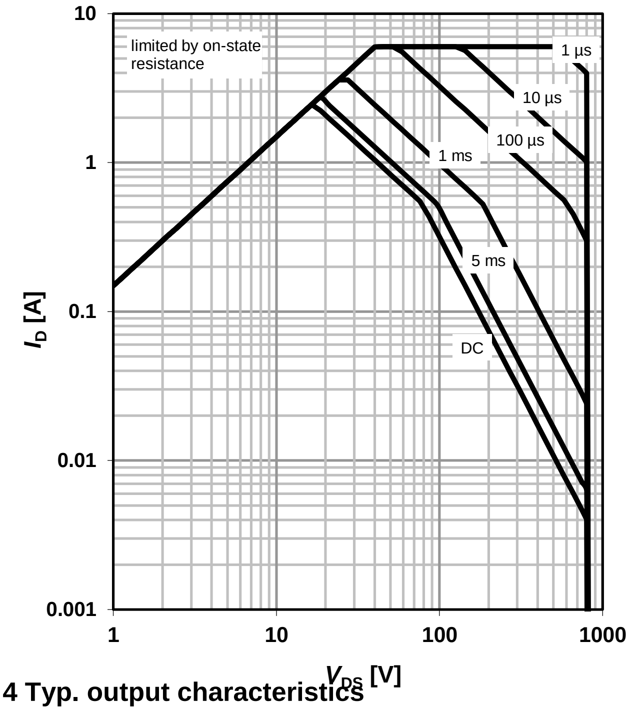
P_{tot}=f(T_C)



2 Safe operating area [1)]

I_D=f(V_{DS}); T_C=25 °C; D=0, Parameter: tp

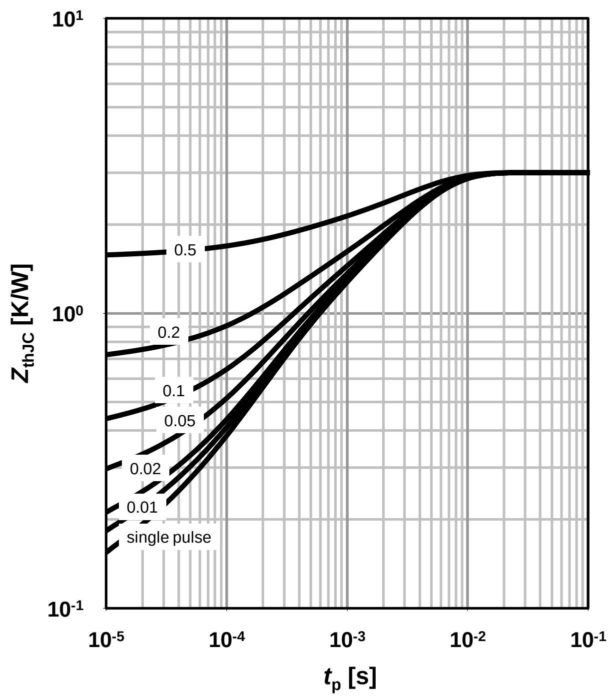
[1)] DC curve indicates operation at thermal equilibrated state, not guaranteed over lifetime.



3 Max. transient thermal impedance

Z_{thJC}=f(t_P)

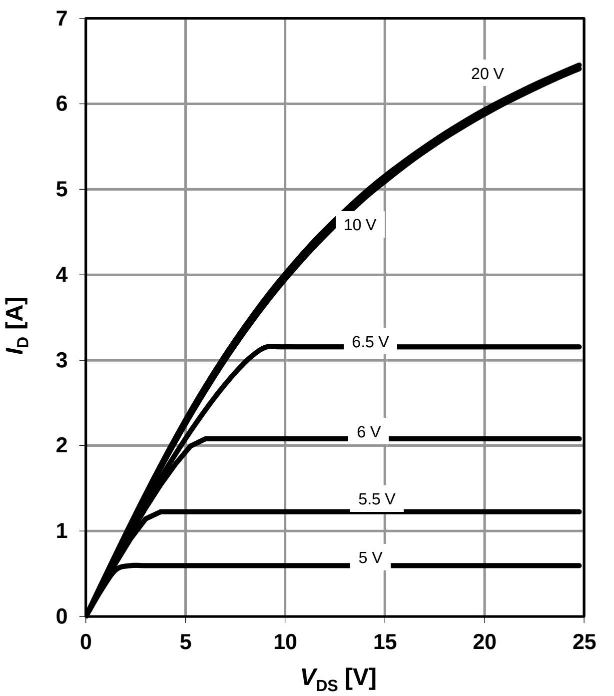
parameter: $D=t_p/T$



4 Typ. output characteristics

I_D=f(V_{DS}); T_j=25 °C; t_p=10 µs

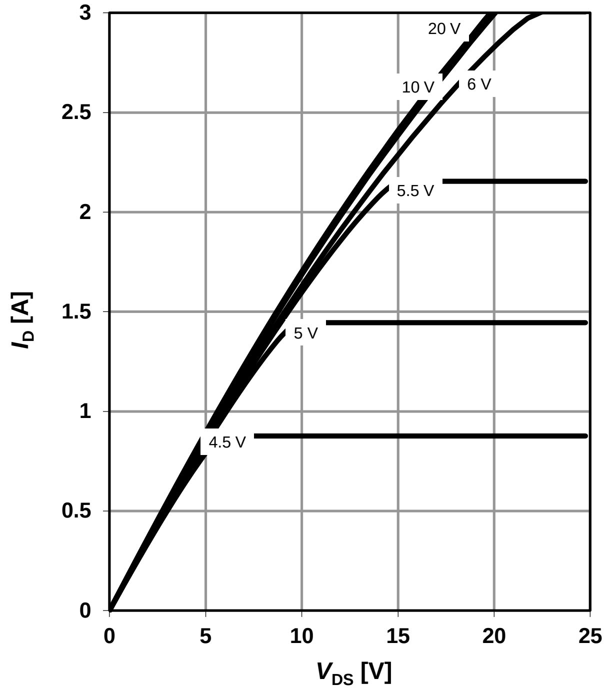
parameter: V_{GS}



5 Typ. output characteristics

$I_D=f(V_{DS})$; $T_j=150$ °C; $t_p=10$ µs

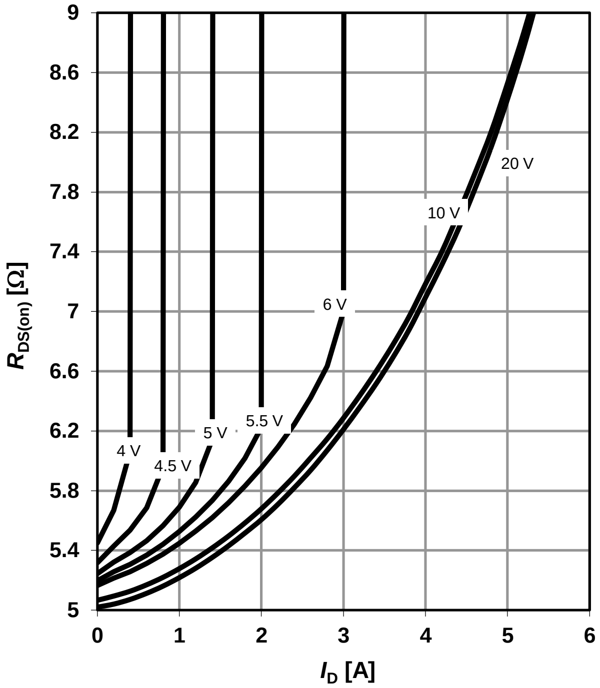
parameter: V_{GS}



6 Typ. drain-source on-state resistance

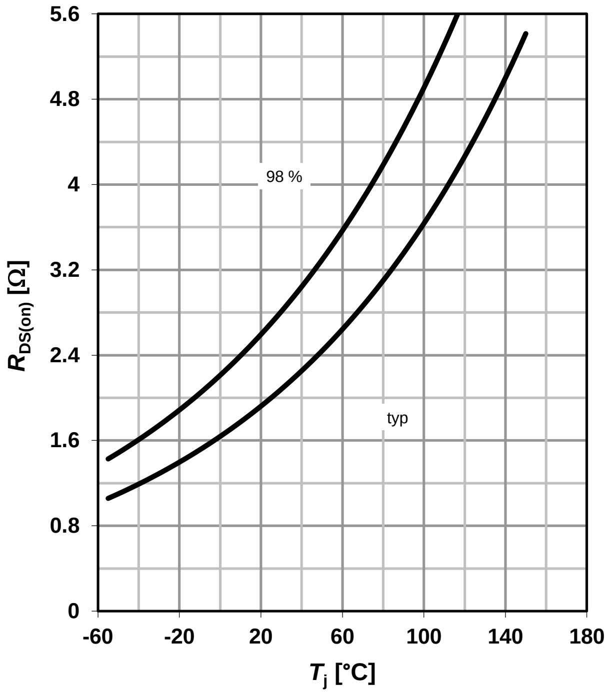
$R_{DS(on)}=f(I_D)$; $T_j=150$ °C

parameter: V_{GS}



7 Drain-source on-state resistance

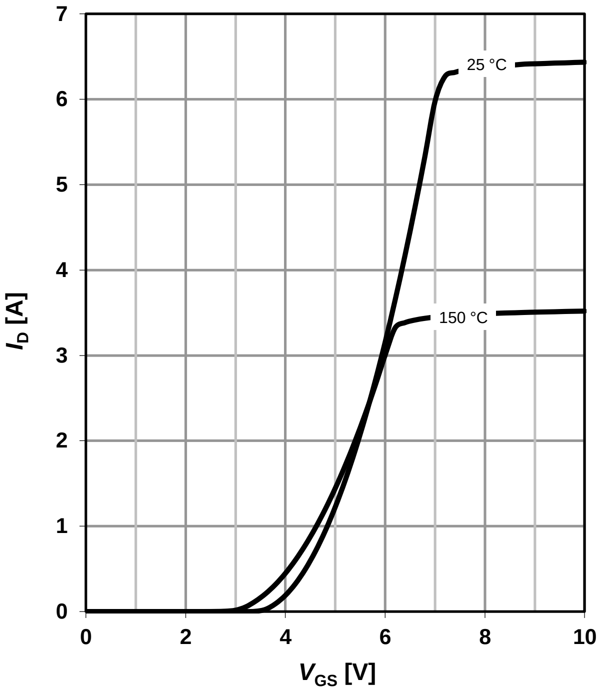
$R_{DS(on)}=f(T_j)$; $I_D=1.2$ A; $V_{GS}=10$ V



8 Typ. transfer characteristics

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

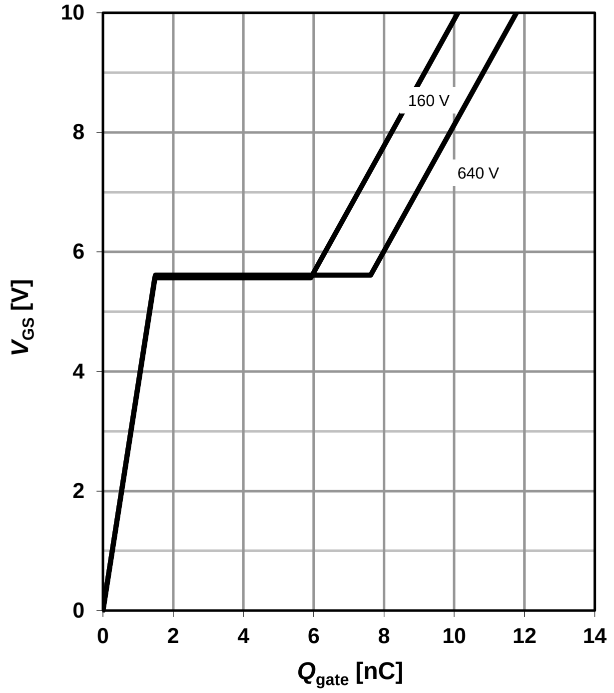
parameter: T_j



9 Typ. gate charge

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

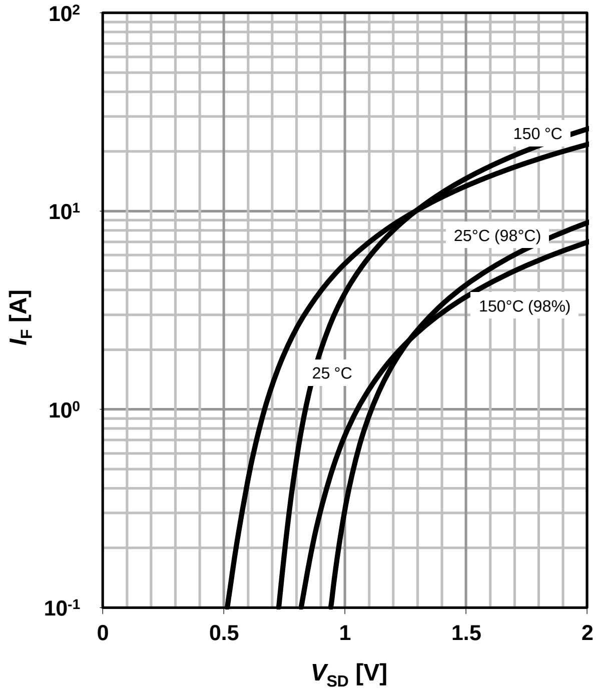
parameter: V_{DD}



10 Forward characteristics of reverse diode

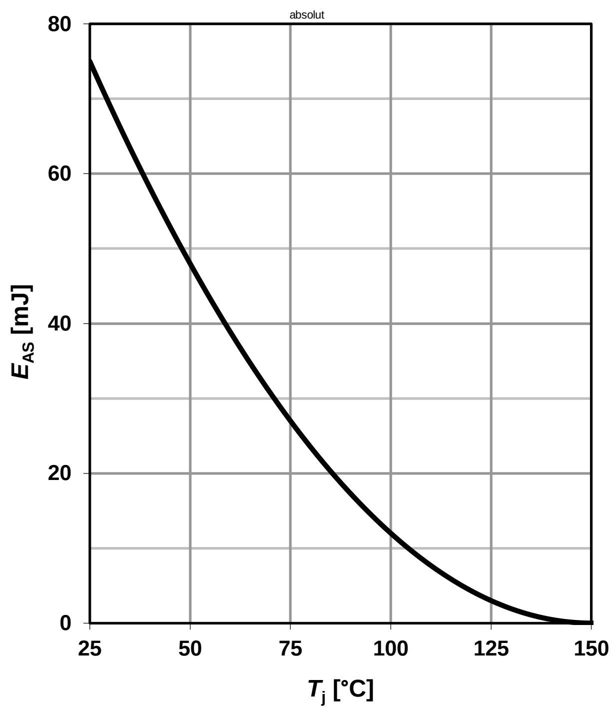
I_F=f(V_{SD}); t_p=10 µs

parameter: T_j



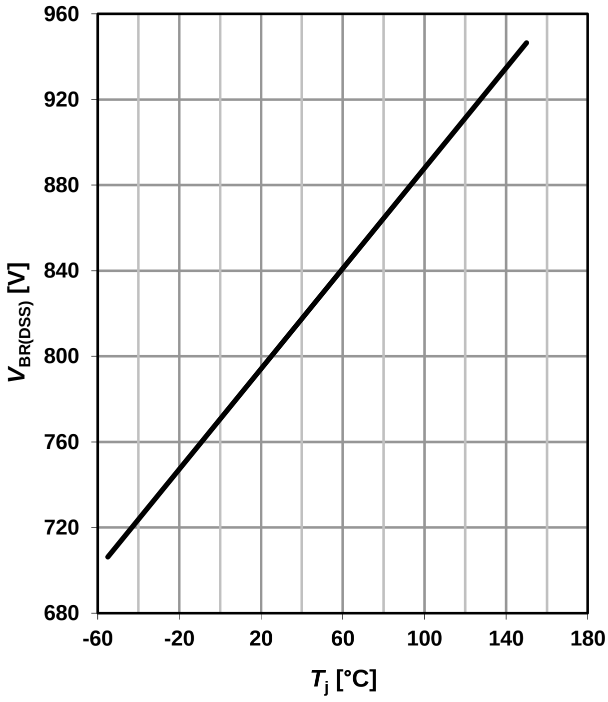
11 Avalanche energy

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



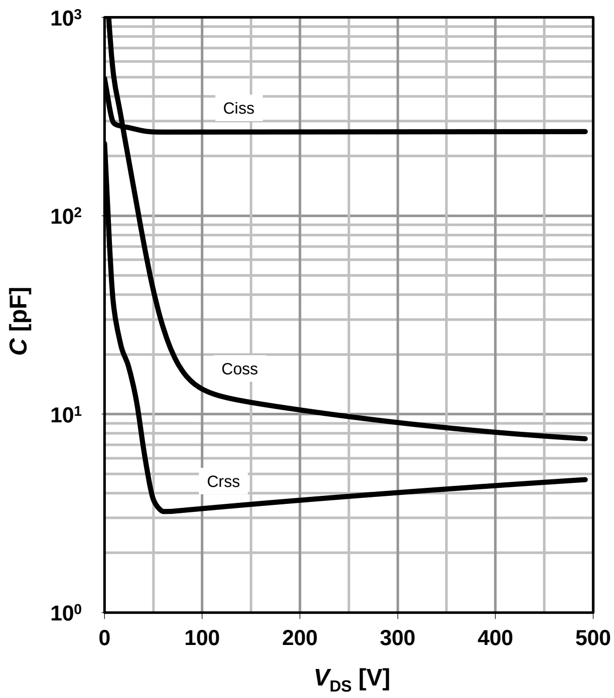
12 Drain-source breakdown voltage

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



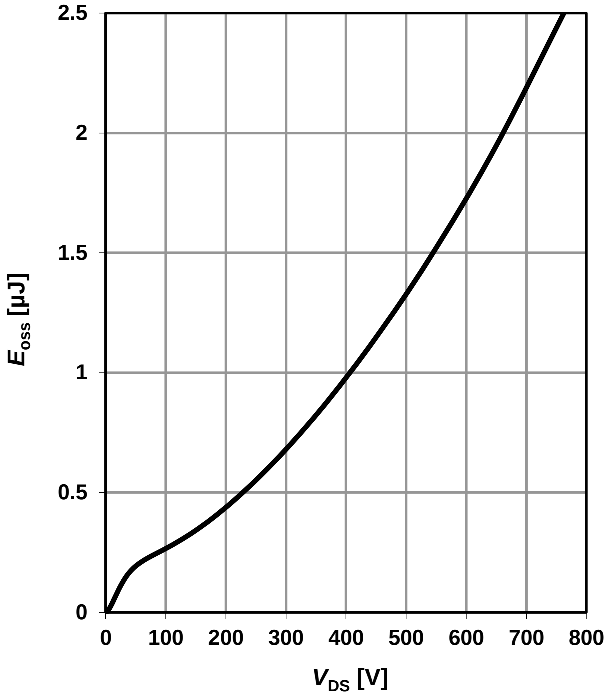
13 Typ. capacitances

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

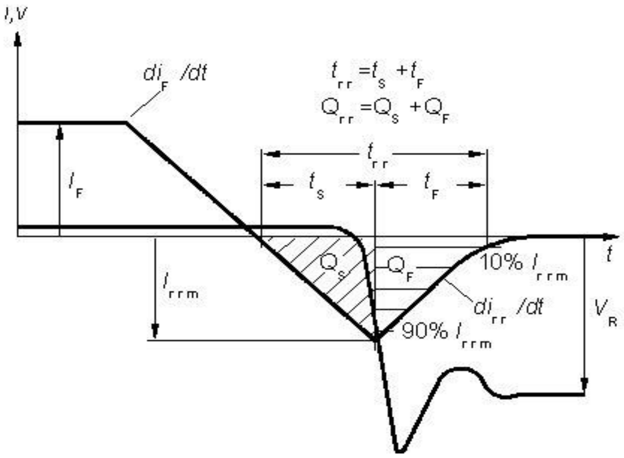


14 Typ. Coss stored energy

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

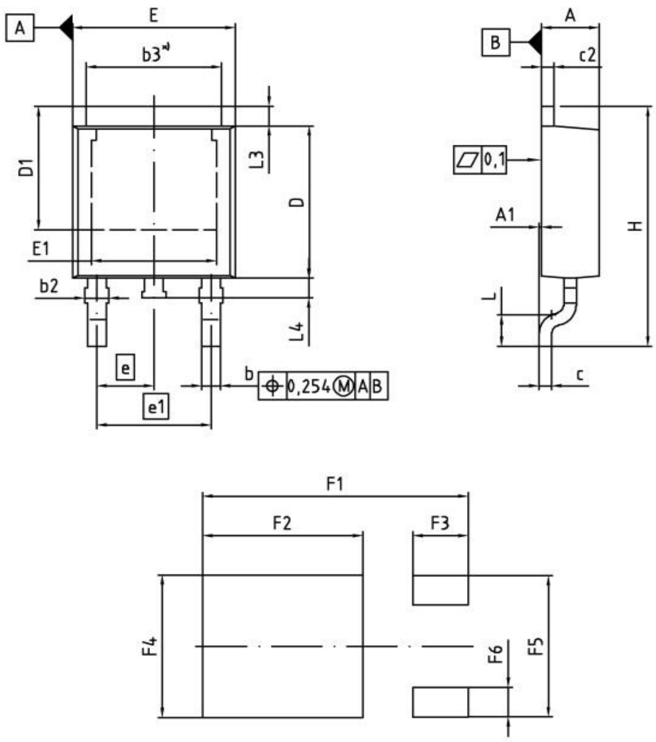


Definition of diode switching characteristics



PG-TO252-3: Outline

TO252-3 (DPAK)



*) mold flash not included

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.16	2.41	0.085	0.095
A1	0.00	0.15	0.000	0.006
b	0.64	0.89	0.025	0.035
b2	0.65	1.15	0.026	0.045
b3	5.00	5.50	0.197	0.217
c	0.46	0.60	0.018	0.024
c2	0.46	0.98	0.018	0.039
D	5.97	6.22	0.235	0.245
D1	5.02	5.84	0.198	0.230
E	6.40	6.73	0.252	0.265
E1	4.70	5.21	0.185	0.205
e	2.29 (BSC)		0.090 (BSC)	
e1	4.57		0.180	
N	3		3	
H	9.40	10.48	0.370	0.413
L	1.18	1.70	0.046	0.067
L3	0.90	1.25	0.035	0.049
L4	0.51	1.00	0.020	0.039
F1	10.60		0.417	
F2	6.40		0.252	
F3	2.20		0.087	
F4	5.80		0.228	
F5	5.76		0.227	
F6	1.20		0.047	

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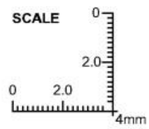
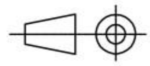
SCALE



EUROPEAN PROJECTION



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REVISION
04

dimensions in mm/inches

Revision 2013-11-21, Rev. 1.1, Final Data Sheet

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