Table of Contents

1 Maximum ratings

at T_j = 25°C, unless otherwise specified

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain current[1]	I_D	- -	- -	13 8.6	A	T_C=25°C T_C=100°C
Pulsed drain current[2]	$I_{D,pulse}$	-	-	34	A	T_C=25°C
Avalanche energy, single pulse	E_{AS}	-	-	34	mJ	I_D=2.0A; V_{DD}=50V
Avalanche energy, repetitive	E_{AR}	-	-	0.28	mJ	I_D=2.0A; V_{DD}=50V
Avalanche current, repetitive	I_{AR}	-	-	2.0	A	-
MOSFET dv/dt ruggedness	dv/dt	-	-	100	V/ns	V_{DS}=0 to 400V
Gate source voltage	V_{GS}	-20 -30	- -	20 30	V	static; AC (f>1 Hz)
Power dissipation	P_{tot}	-	-	84	W	T_C=25°C
Operating and storage temperature	T_j, T_{stg}	-55	-	150	°C	-
Mounting torque	-	-	-	60	Ncm	M3 and M3.5 screws
Continuous diode forward current	I_S	-	-	10	A	T_C=25°C
Diode pulse current[2]	$I_{S,pulse}$	-	-	34	A	T_C=25°C
Reverse diode dv/dt[3]	dv/dt	-	-	1	V/ns	V_{DS}=0 to 400V, I_{SD}<=2.8A, T_j=25°C
Maximum diode commutation speed[3]	di_f/dt	-	-	50	A/µs	V_{DS}=0 to 400V, I_{SD}<=2.8A, T_j=25°C

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	1.5	°C/W	-
Thermal resistance, junction - ambient	R_{thJA}	-	-	62	°C/W	leaded
Thermal resistance, junction - ambient for SMD version	R_{thJA}	-	-	-	°C/W	n.a.
Soldering temperature, wavesoldering only allowed at leads	T_{sold}	-	-	260	°C	1.6 mm (0.063 in.) from case for 10s

[1] Limited by $T_{j\,max}$. Maximum duty cycle D=0.5
[2] Pulse width t_p limited by $T_{j,max}$
[3] V_{DClink}=400V; $V_{DS,peak}$<$V_{(BR)DSS}$; identical low side and high side switch with identical R_G; t_{cond}<2µs

3 Electrical characteristics

at T_j = 25°C, unless otherwise specified

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	800	-	-	V	V_{GS}=0V, I_D=1mA
Gate threshold voltage	$V_{GS(th)}$	2.5	3	3.5	V	V_{DS}=V_{GS}, I_D=0.28mA
Zero gate voltage drain current	I_{DSS}	- -	- 10	1 -	µA	V_{DS}=800V, V_{GS}=0V, T_j=25°C V_{DS}=800V, V_{GS}=0V, T_j=150°C
Gate-source leakage curent incl. zener diode	I_{GSS}	-	-	1	µA	V_{GS}=20V, V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	- -	0.31 0.80	0.36 -	Ω	V_{GS}=10V, I_D=5.6A, T_j=25°C V_{GS}=10V, I_D=5.6A, T_j=150°C
Gate resistance	R_G	-	1	-	Ω	f=250kHz, open drain

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	930	-	pF	V_{GS}=0V, V_{DS}=500V, f=250kHz
Output capacitance	C_{oss}	-	16	-	pF	V_{GS}=0V, V_{DS}=500V, f=250kHz
Effective output capacitance, energy related[1]	$C_{o(er)}$	-	27	-	pF	V_{GS}=0V, V_{DS}=0 to 500V
Effective output capacitance, time related[2]	$C_{o(tr)}$	-	336	-	pF	I_D=constant, V_{GS}=0V, V_{DS}=0 to 500V
Turn-on delay time	$t_{d(on)}$	-	10	-	ns	V_{DD}=400V, V_{GS}=13V, I_D=5.6A, R_G=5.3Ω
Rise time	t_r	-	6	-	ns	V_{DD}=400V, V_{GS}=13V, I_D=5.6A, R_G=5.3Ω
Turn-off delay time	$t_{d(off)}$	-	40	-	ns	V_{DD}=400V, V_{GS}=13V, I_D=5.6A, R_G=5.3Ω
Fall time	t_f	-	6	-	ns	V_{DD}=400V, V_{GS}=13V, I_D=5.6A, R_G=5.3Ω

Table 6 Gate charge characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	4	-	nC	V_{DD}=640V, I_D=5.6A, V_{GS}=0 to 10V
Gate to drain charge	Q_{gd}	-	13	-	nC	V_{DD}=640V, I_D=5.6A, V_{GS}=0 to 10V
Gate charge total	Q_g	-	30	-	nC	V_{DD}=640V, I_D=5.6A, V_{GS}=0 to 10V
Gate plateau voltage	$V_{plateau}$	-	4.5	-	V	V_{DD}=640V, I_D=5.6A, V_{GS}=0 to 10V

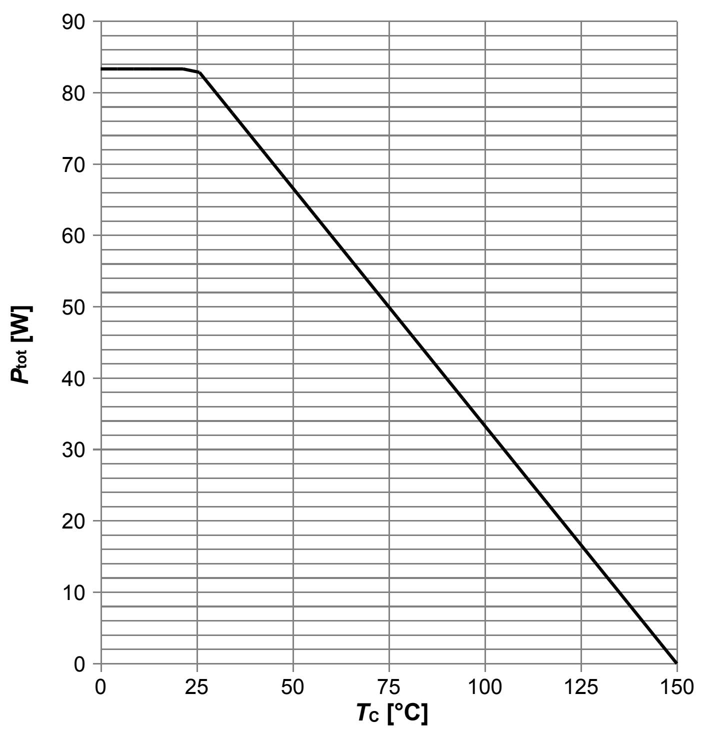
[1] $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 500V
[2] $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 500V

Table 7 Reverse diode characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode forward voltage	V_{SD}	-	0.9	-	V	V_{GS}=0V, I_F=5.6A, T_j=25°C
Reverse recovery time	t_{rr}	-	1100	-	ns	V_R=400V, I_F=2.8A, di_F/dt=50A/µs
Reverse recovery charge	Q_{rr}	-	12	-	µC	V_R=400V, I_F=2.8A, di_F/dt=50A/µs
Peak reverse recovery current	I_{rrm}	-	19	-	A	V_R=400V, I_F=2.8A, di_F/dt=50A/µs

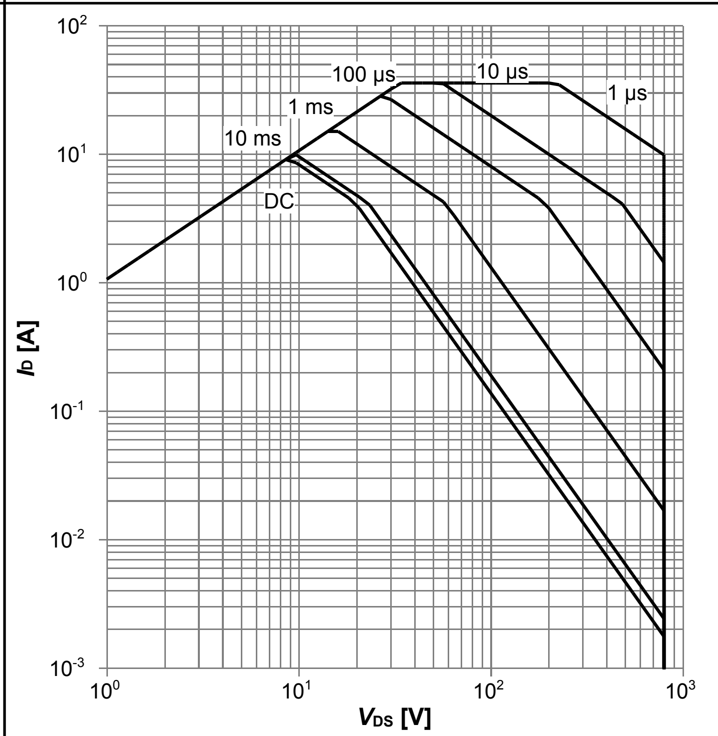
4 Electrical characteristics diagrams

Diagram 1: Power dissipation



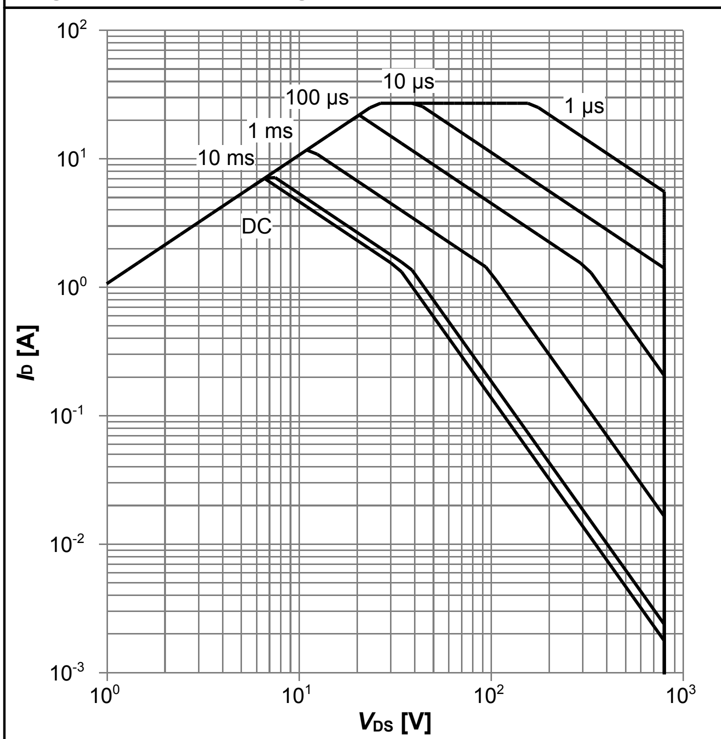
P_{tot}=f(T_C)

Diagram 2: Safe operating area



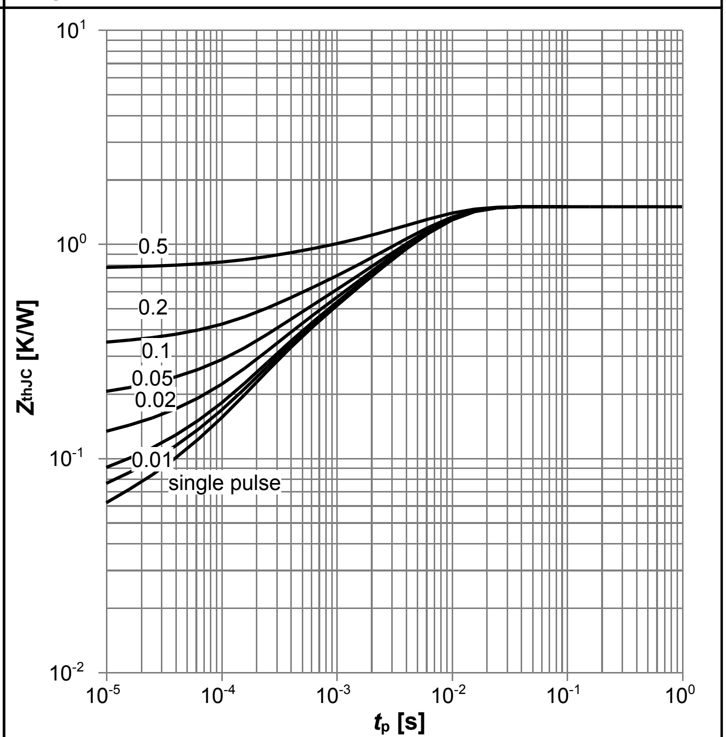
I_D=f(V_{DS}); T_C=25 °C; D=0; parameter: t_p

Diagram 3: Safe operating area



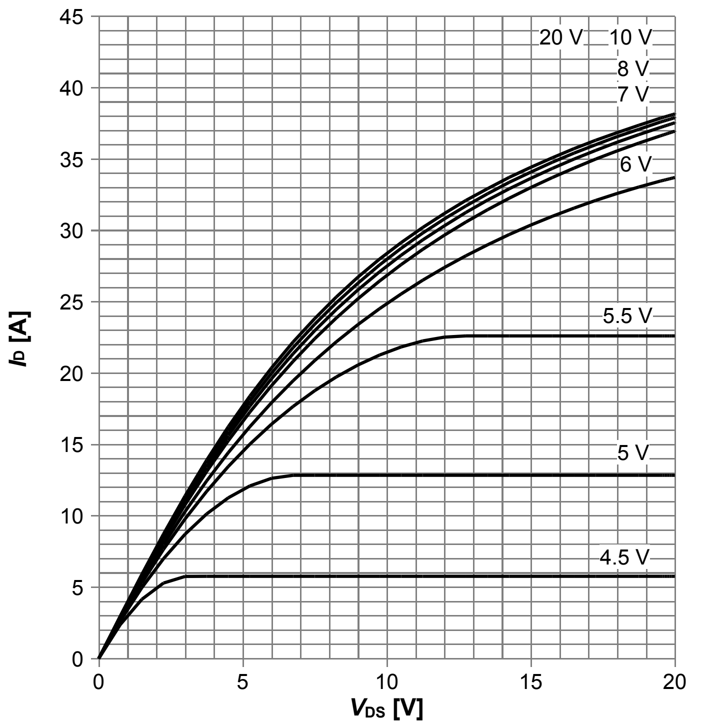
I_D=f(V_{DS}); T_C=80 °C; D=0; parameter: t_p

Diagram 4: Max. transient thermal impedance



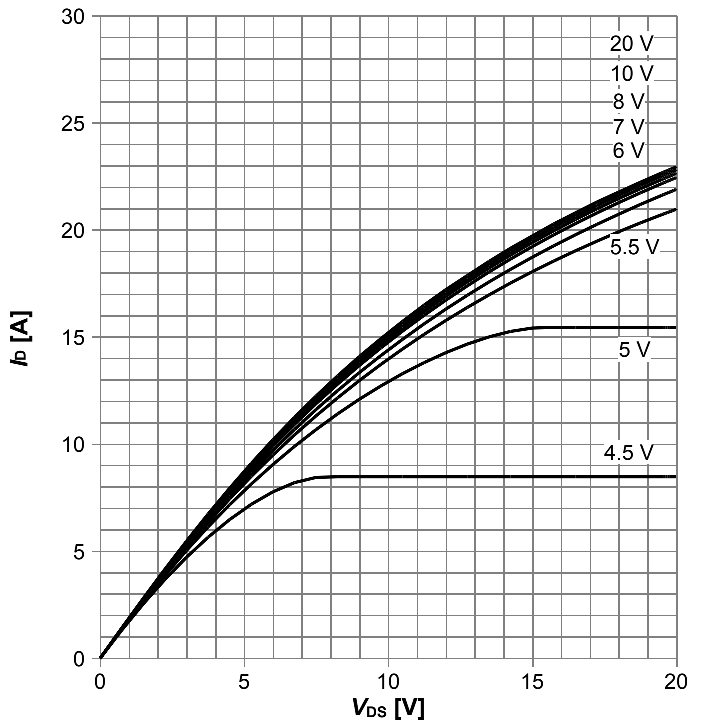
Z_{thJC} =f(t_P); parameter: D=t_p/T

Diagram 5: Typ. output characteristics



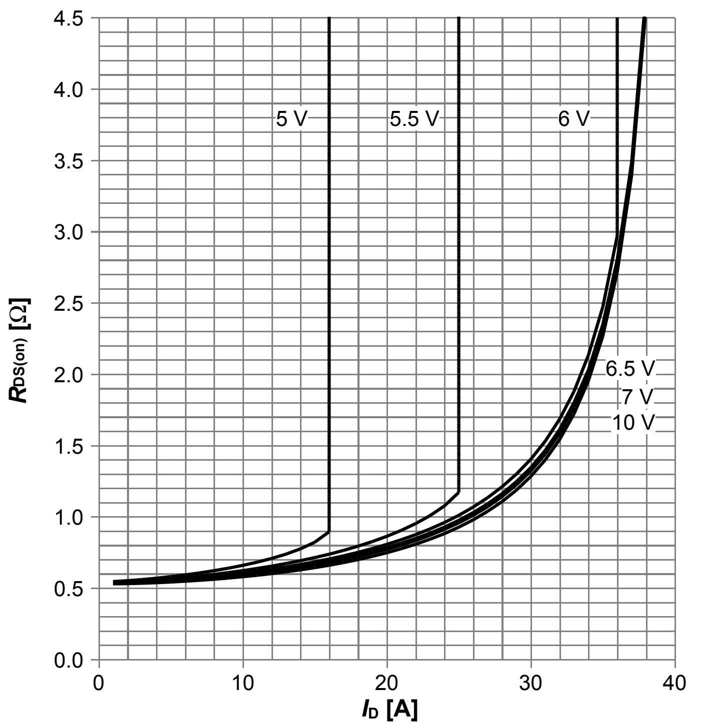
I_D=f(V_{DS}); T_j=25 °C; parameter: V_{GS}

Diagram 6: Typ. output characteristics



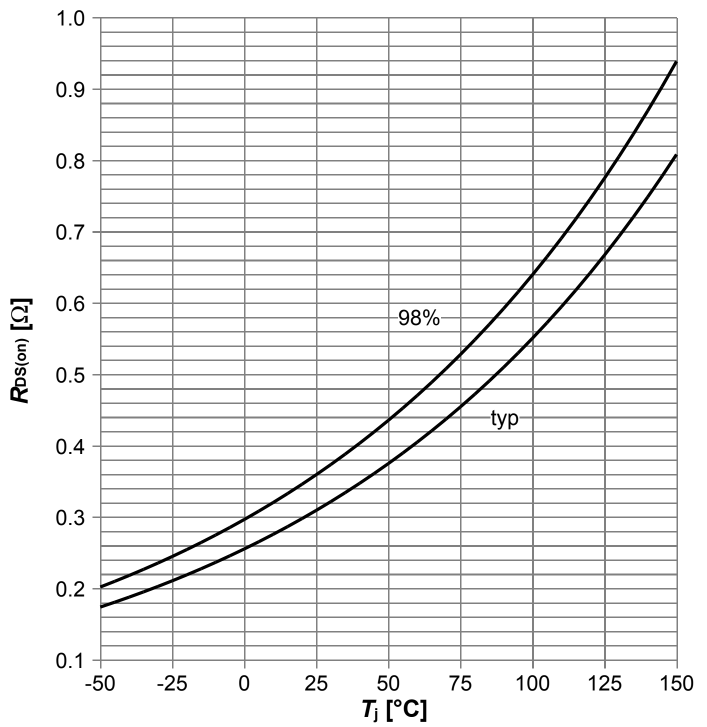
I_D=f(V_{DS}); T_j=125 °C; parameter: V_{GS}

Diagram 7: Typ. drain-source on-state resistance



$R_{DS(on)}$=f(I_D); T_j=125 °C; parameter: V_{GS}

Diagram 8: Drain-source on-state resistance



$R_{DS(on)}$=f(T_j); I_D=5.6 A; V_{GS}=10 V

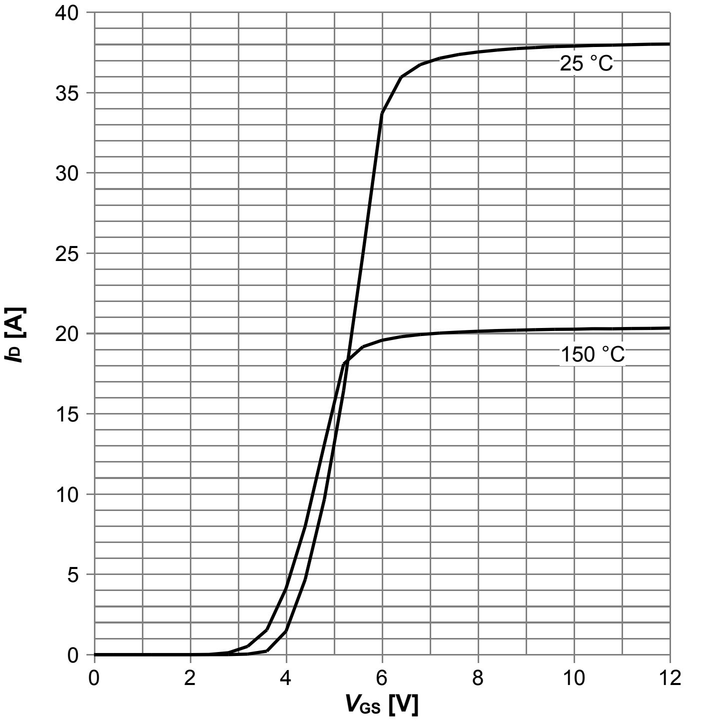
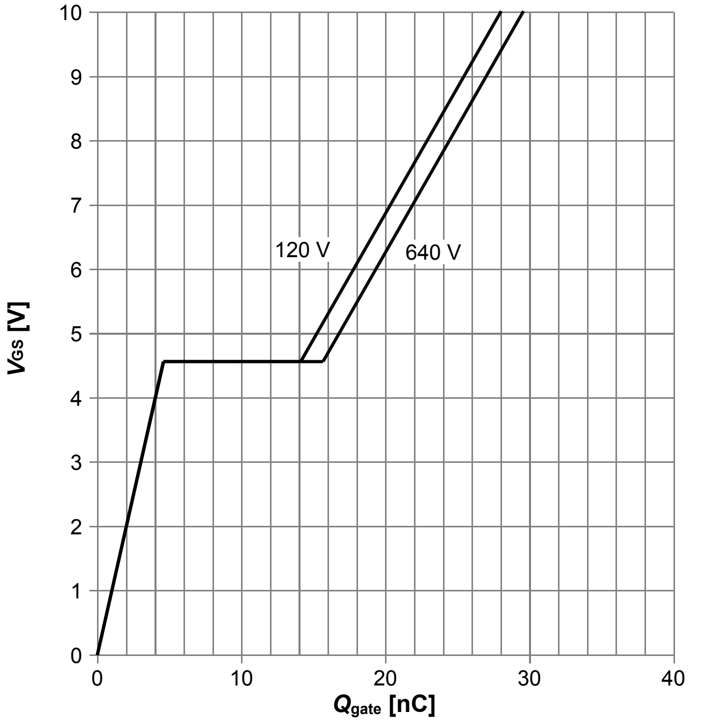
Diagram 9: Typ. transfer characteristics	Diagram 10: Typ. gate charge
	
$I_D=f(V_{GS})$; V_{DS}=20V; parameter: T_j	$V_{GS}=f(Q_{gate})$; I_D=5.6 A pulsed; parameter: V_{DD}

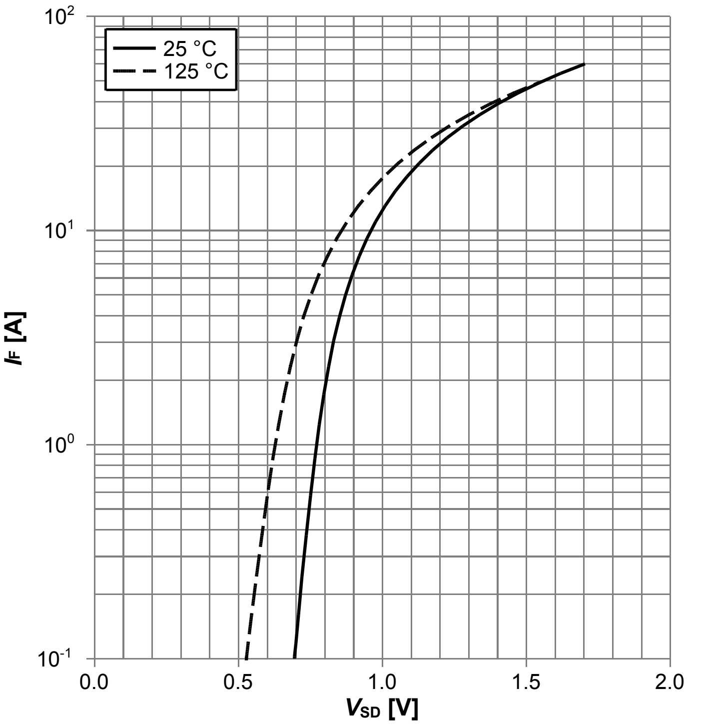
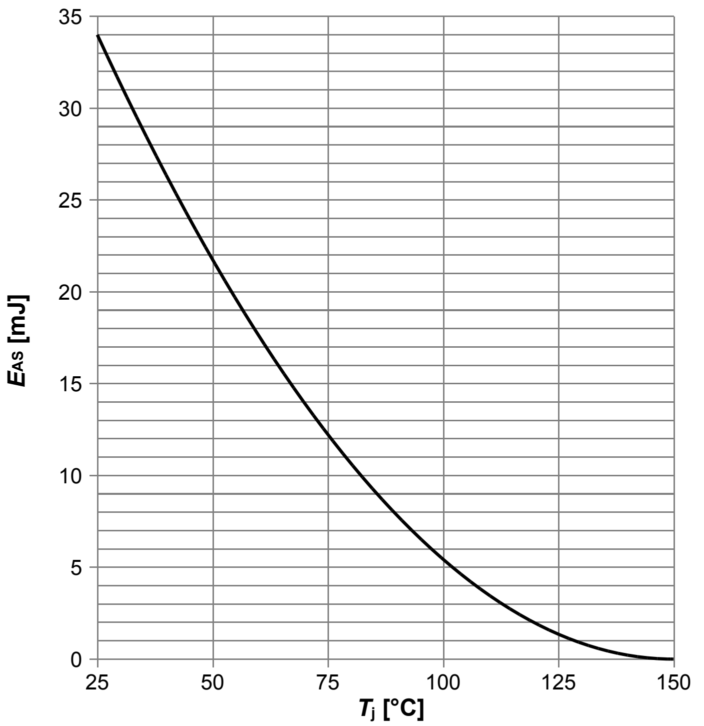
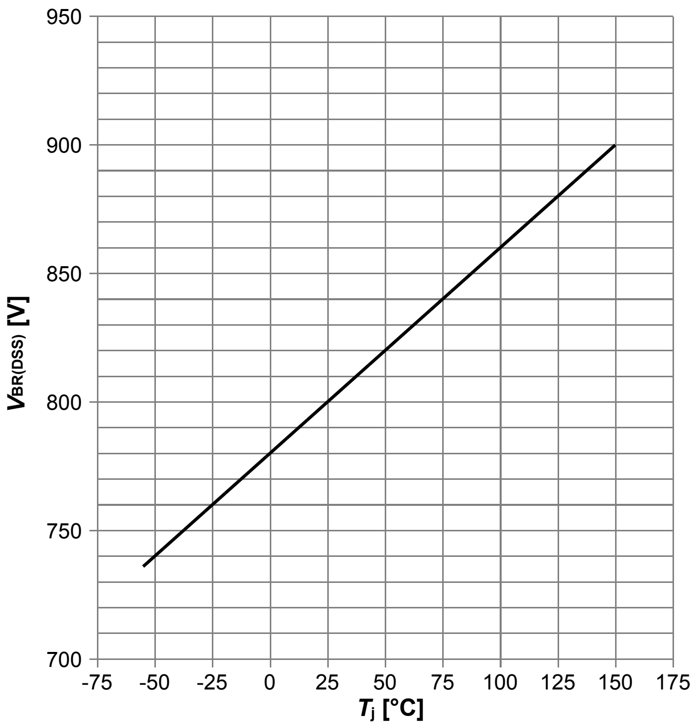
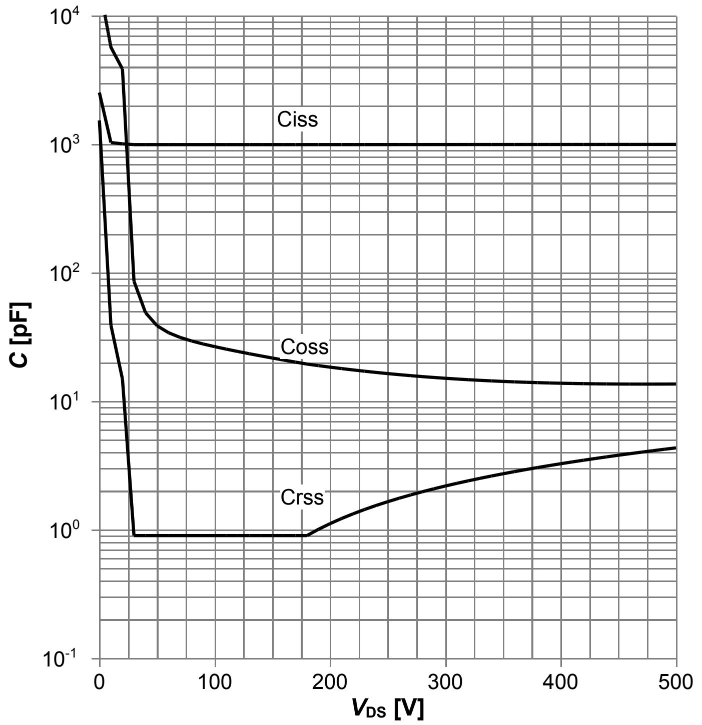
Diagram 11: Forward characteristics of reverse diode	Diagram 12: Avalanche energy
	
$I_F=f(V_{SD})$; parameter: T_j	$E_{AS}=f(T_j)$; I_D=2.0 A; V_{DD}=50 V

Diagram 13: Drain-source breakdown voltage



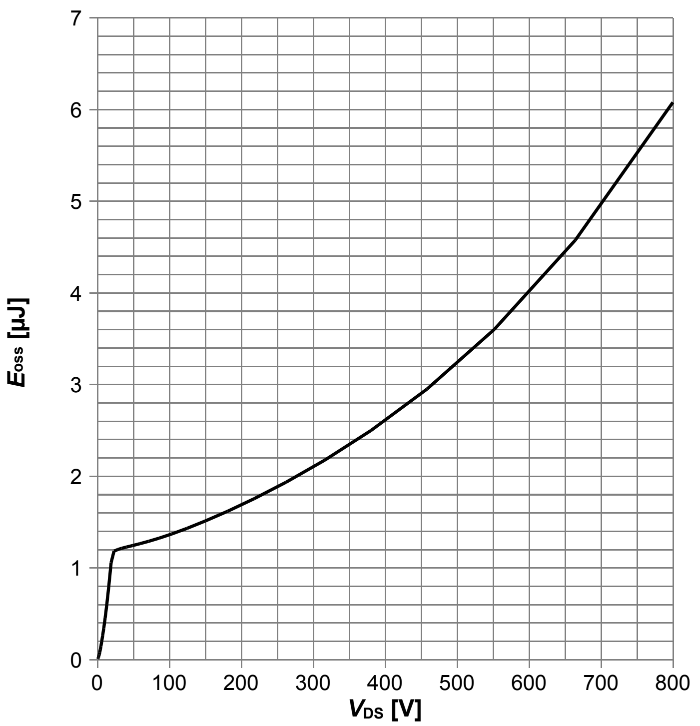
$V_{BR(DSS)}$=f(T_j); I_D=1 mA

Diagram 14: Typ. capacitances



C=f(V_{DS}); V_{GS}=0 V; f=250 kHz

Diagram 15: Typ. Coss stored energy



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

5 Test Circuits

Table 8 Diode characteristics

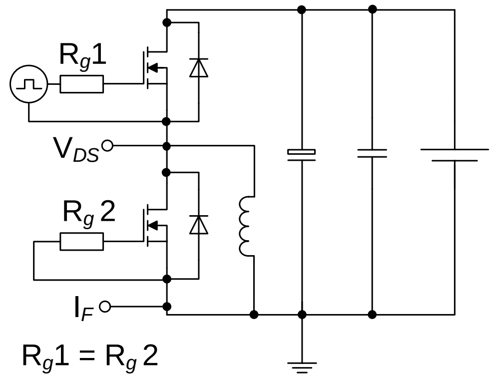
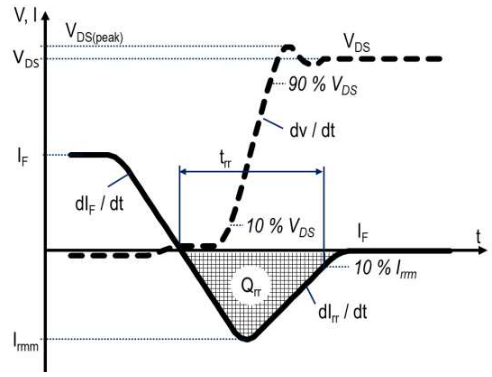
<table>
<tr><th>Test circuit for diode characteristics</th><th>Diode recovery waveform</th></tr>
<tr><td>
</td><td>
</td></tr>
</table>

Table 9 Switching times

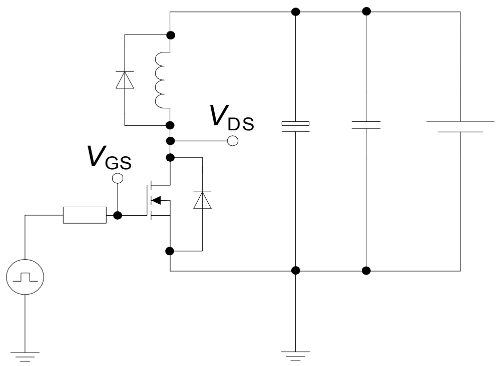
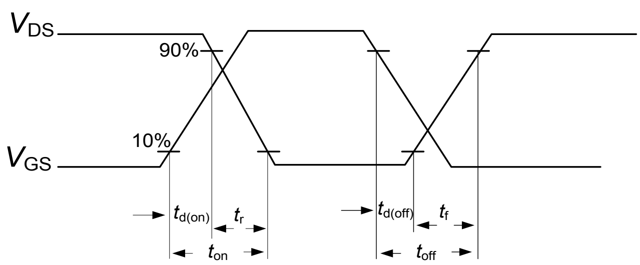
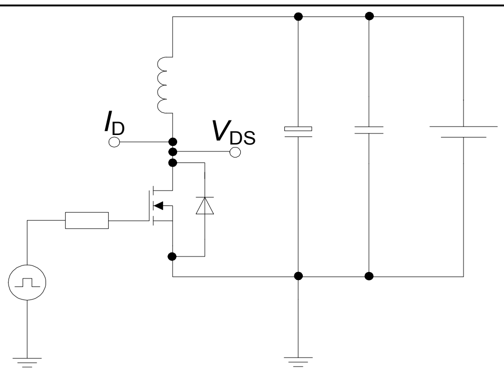
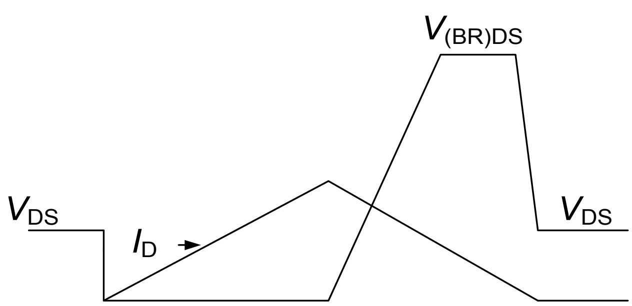
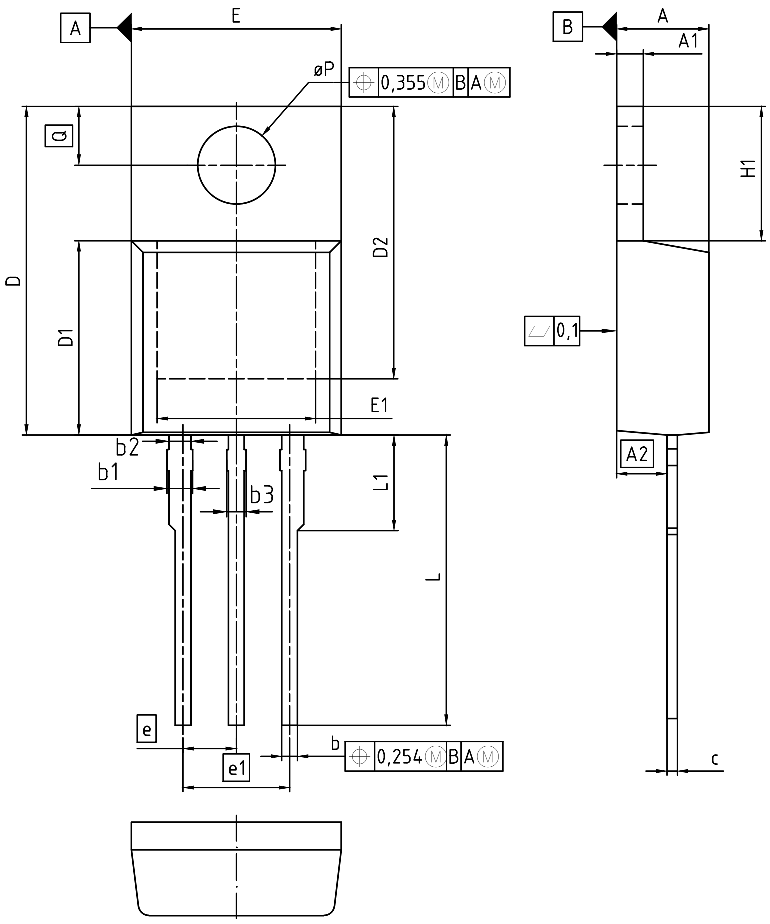
<table>
<tr><th>Switching times test circuit for inductive load</th><th>Switching times waveform</th></tr>
<tr><td>
</td><td>
</td></tr>
</table>

Table 10 Unclamped inductive load

<table>
<tr><th>Unclamped inductive load test circuit</th><th>Unclamped inductive waveform</th></tr>
<tr><td>
</td><td>
</td></tr>
</table>

6 Package Outlines



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.57	0.169	0.180
A1	1.17	1.40	0.046	0.055
A2	2.15	2.72	0.085	0.107
b	0.65	0.86	0.026	0.034
b1	0.95	1.40	0.037	0.055
b2	0.95	1.15	0.037	0.045
b3	0.65	1.15	0.026	0.045
c	0.33	0.60	0.013	0.024
D	14.81	15.95	0.583	0.628
D1	8.51	9.45	0.335	0.372
D2	12.19	13.10	0.480	0.516
E	9.70	10.36	0.382	0.408
E1	6.50	8.60	0.256	0.339
e	2.54		0.100	
e1	5.08		0.200	
N	3		3	
H1	5.90	6.90	0.232	0.272
L	13.00	14.00	0.512	0.551
L1	-	4.80	-	0.189
øP	3.60	3.89	0.142	0.153
Q	2.60	3.00	0.102	0.118

DOCUMENT NO. Z8B00003318
SCALE
EUROPEAN PROJECTION
ISSUE DATE 30-07-2009
REVISION 06

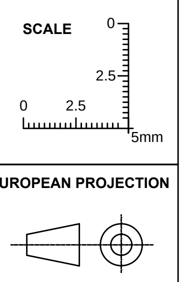


Figure 1 Outline PG-TO 220-3, dimensions in mm/inches

7 Appendix A

Table 11 Related Links

- **IFX CoolMOS Webpage:** www.infineon.com
- **IFX Design tools:** www.infineon.com

Revision History

IPP80R360P7

Revision: 2018-02-09, Rev. 2.1

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.0	2017-03-21	Release of final version
2.1	2018-02-09	Corrected front page text

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.