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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	- -	- -	12.5 7.5	A	T_C = 20°C T_C = 100°C
Pulsed drain current[2]	$I_{D,pulse}$	-	-	34.0	A	T_C=25°C
Application (Flyback) relevant avalanche current, single pulse[3]	I_{AS}	-	-	4.5	A	measured with standard leakage inductance of transformer of 10µH
MOSFET dv/dt ruggedness	dv/dt	-	-	100	V/ns	V_{DS} =0...400V
Gate source voltage	V_{GS}	-16 -30	- -	16 30	V	static; AC (f>1 Hz)
Power dissipation	P_{tot}	-	-	26.5	W	T_C=25°C
Operating and storage temperature	T_j, T_{stg}	-40	-	150	°C	-
Continuous diode forward current	I_S	-	-	5.7	A	T_C=25°C
Diode pulse current[2]	$I_{S,pulse}$	-	-	34.0	A	T_C = 25°C
Reverse diode dv/dt[4]	dv/dt	-	-	1	V/ns	V_{DS} =0...400V, I_{SD}<=I_S, T_j=25°C
Maximum diode commutation speed[4]	di_f/dt	-	-	50	A/µs	V_{DS} =0...400V, I_{SD}<=I_S, T_j=25°C
Insulation withstand voltage	V_{ISO}	-	-	2500	V	V_{rms}, T_C=25°C, t=1min

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction	R_{thJC}	-	-	4.7	°C/W	-
Thermal resistance, junction - ambient	R_{thJA}	-	-	80	°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] DPAK / IPAK equivalent. Limited by $T_{j\,max}$. T_j = 20°C. Maximum duty cycle D=0.5
[2] Pulse width t_p limited by $T_{j,max}$
[3] Proven during verification test. For explanation please read AN - CoolMOS™ 700V P7.
[4] V_{DClink}=400V; $V_{DS,peak}$<$V_{(BR)DSS}$; identical low side and high side switch with identical R_G

3 Electrical characteristics

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	700	-	-	V	V_{GS}=0V, I_D=1mA
Gate threshold voltage	$V_{(GS)th}$	2.50	3	3.50	V	V_{DS}=V_{GS}, I_D=0.15mA
Zero gate voltage drain current	I_{DSS}	- -	- 10	1 -	µA	V_{DS}=700V, V_{GS}=0V, T_j=25°C V_{DS}=700V, V_{GS}=0V, T_j=150°C
Gate-source leakage current incl. Zener diode	I_{GSS}	-	-	1	µA	V_{GS}=20V, V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	- -	0.30 0.67	0.36 -	Ω	V_{GS}=10V, I_D=3.0A, T_j=25°C V_{GS}=10V, I_D=3.0A, T_j=150°C
Gate resistance	R_G	-	30	-	Ω	f=1 MHz, open drain

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	517	-	pF	V_{GS}=0V, V_{DS}=400V, f=250kHz
Output capacitance	C_{oss}	-	11	-	pF	V_{GS}=0V, V_{DS}=400V, f=250kHz
Effective output capacitance, energy related[1]	$C_{o(er)}$	-	27	-	pF	V_{GS}=0V, V_{DS}=0...400V
Effective output capacitance, time related[2]	$C_{o(tr)}$	-	329	-	pF	I_D=constant, V_{GS}=0V, V_{DS}=0...400V
Turn-on delay time	$t_{d(on)}$	-	19	-	ns	V_{DD}=400V, V_{GS}=13V, I_D=2.3A, R_G=5.3Ω
Rise time	t_r	-	8	-	ns	V_{DD}=400V, V_{GS}=13V, I_D=2.3A, R_G=5.3Ω
Turn-off delay time	$t_{d(off)}$	-	100	-	ns	V_{DD}=400V, V_{GS}=13V, I_D=2.3A, R_G=5.3Ω
Fall time	t_f	-	18	-	ns	V_{DD}=400V, V_{GS}=13V, I_D=2.3A, 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}	-	2.3	-	nC	V_{DD}=400V, I_D=2.3A, V_{GS}=0 to 10V
Gate to drain charge	Q_{gd}	-	6.0	-	nC	V_{DD}=400V, I_D=2.3A, V_{GS}=0 to 10V
Gate charge total	Q_g	-	16.4	-	nC	V_{DD}=400V, I_D=2.3A, V_{GS}=0 to 10V
Gate plateau voltage	$V_{plateau}$	-	4.4	-	V	V_{DD}=400V, I_D=2.3A, V_{GS}=0 to 10V

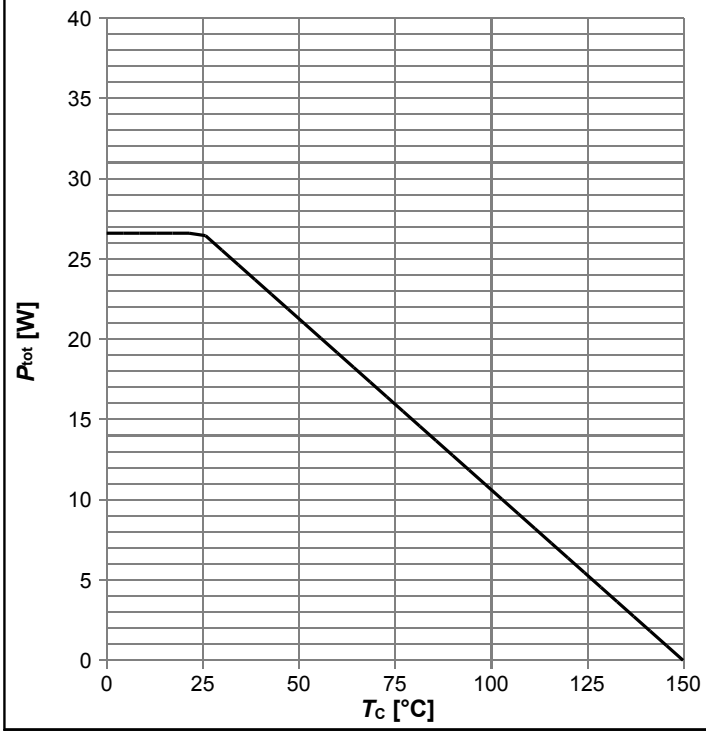
[1] $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 400V
[2] $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 400V

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=3.8A, T_j=25°C
Reverse recovery time	t_{rr}	-	210	-	ns	V_R=400V, I_F=2.3A, di_F/dt=50A/µs
Reverse recovery charge	Q_{rr}	-	1	-	µC	V_R=400V, I_F=2.3A, di_F/dt=50A/µs
Peak reverse recovery current	I_{rrm}	-	10	-	A	V_R=400V, I_F=2.3A, di_F/dt=50A/µs

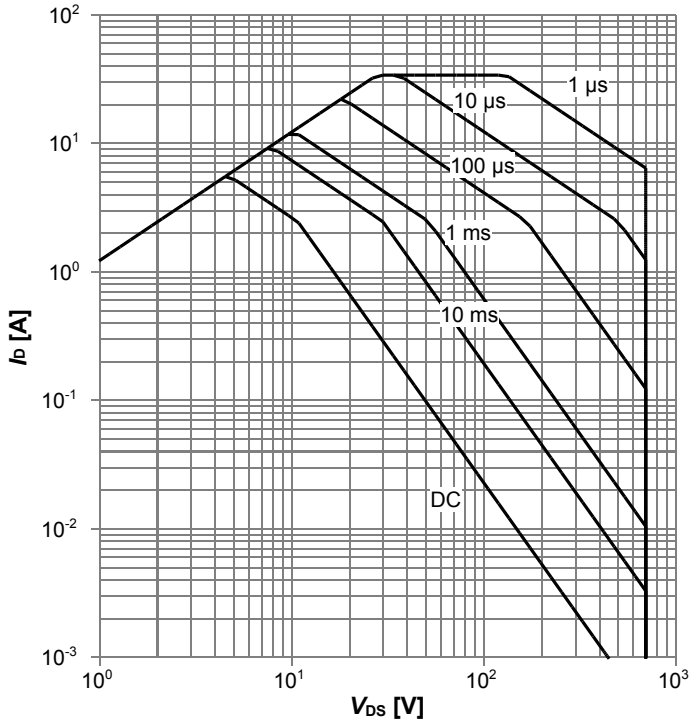
4 Electrical characteristics diagrams

Diagram 1: Power dissipation



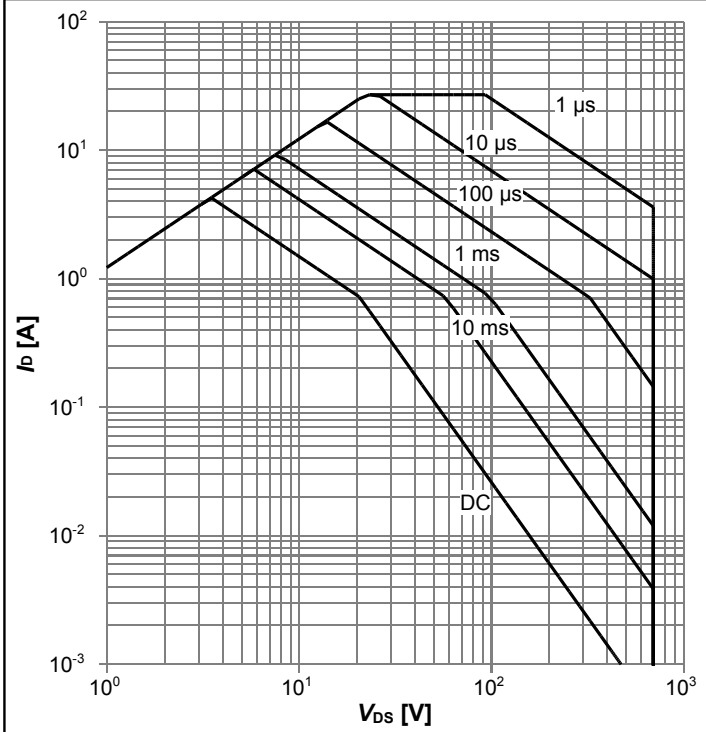
$P_{tot}=f(T_C)$

Diagram 2: Safe operating area



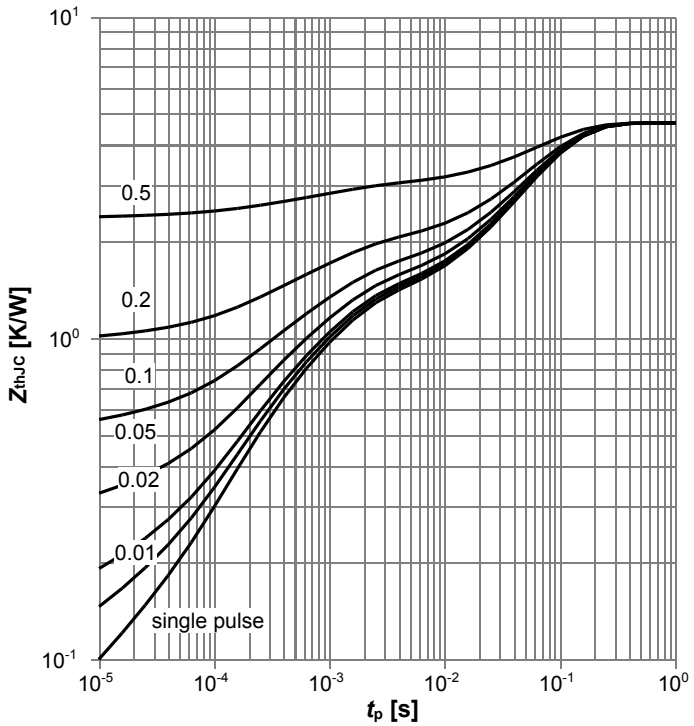
$I_D=f(V_{DS})$; T_C=25 °C; D=0; parameter: t_p

Diagram 3: Safe operating area



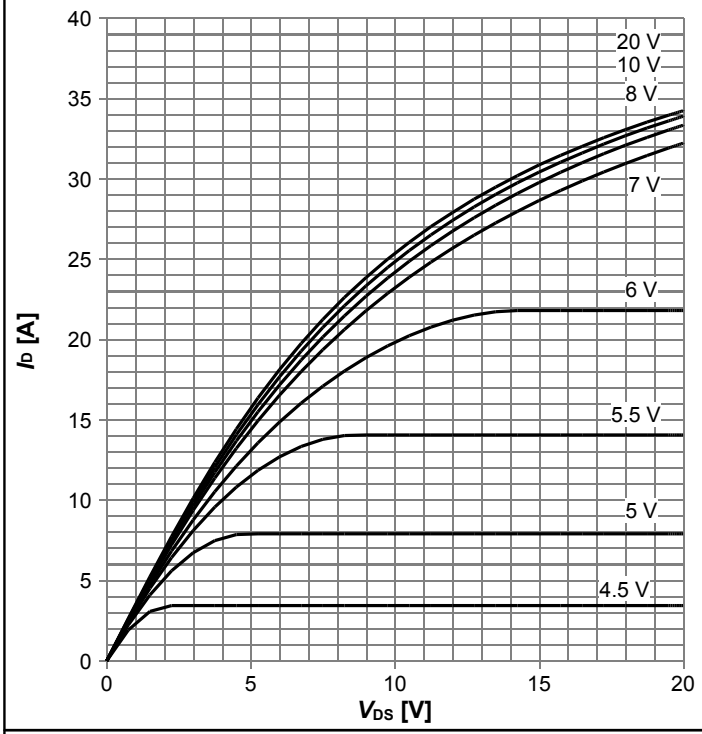
$I_D=f(V_{DS})$; T_C=80 °C; D=0; parameter: t_p

Diagram 4: Max. transient thermal impedance



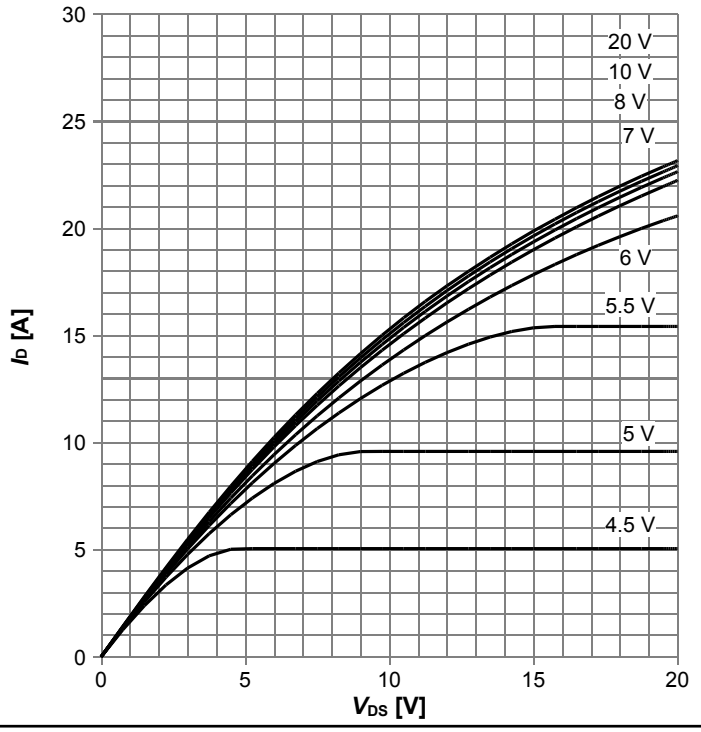
$Z_{thJC}=f(t_P)$; parameter: $D=t_p/T$

Diagram 5: Typ. output characteristics



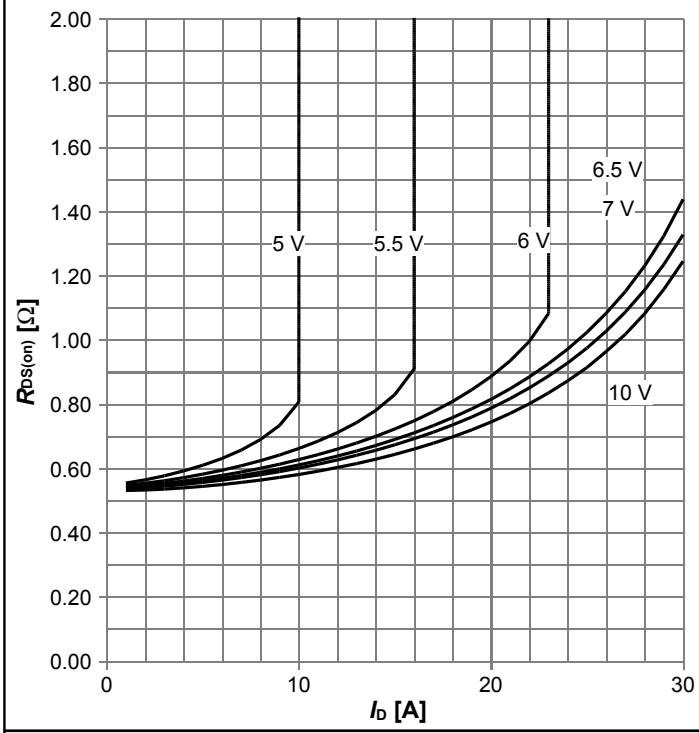
$I_D=f(V_{DS})$; $T_j=25$ °C; parameter: V_{GS}

Diagram 6: Typ. output characteristics



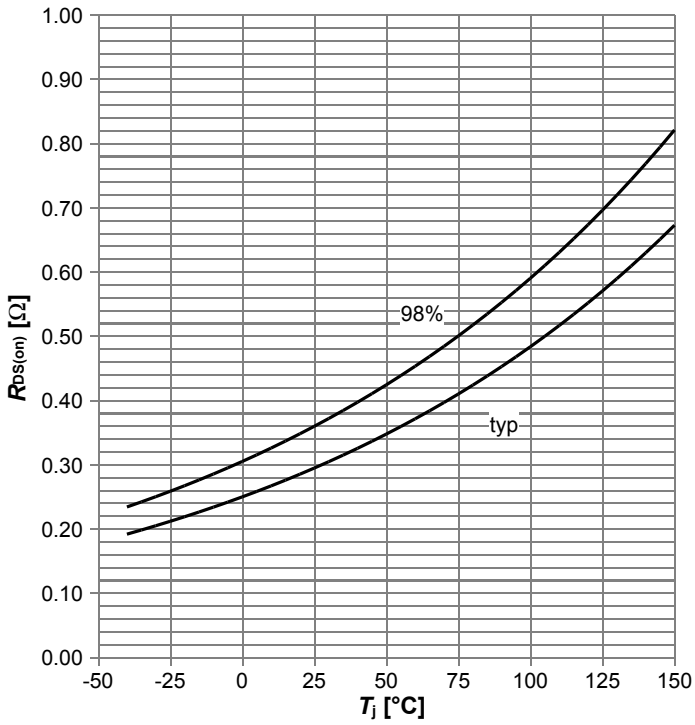
$I_D=f(V_{DS})$; $T_j=125$ °C; parameter: V_{GS}

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



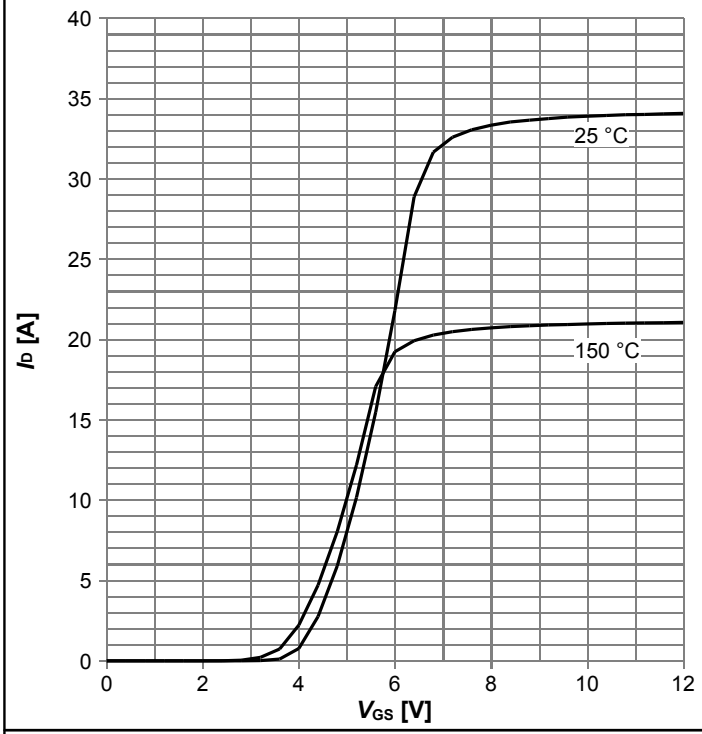
$R_{DS(on)}=f(I_D)$; $T_j=125$ °C; parameter: V_{GS}

Diagram 8: Drain-source on-state resistance



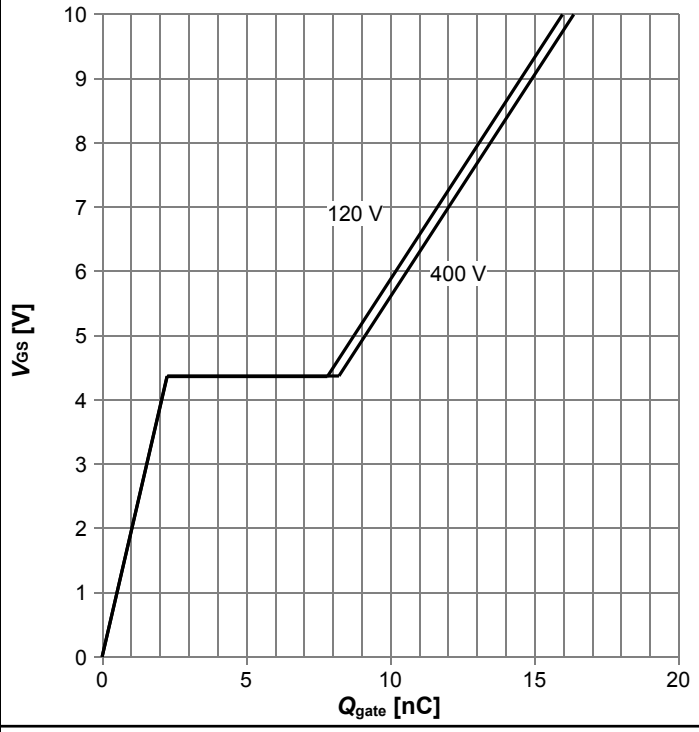
$R_{DS(on)}=f(T_j)$; $I_D=3.0$ A; $V_{GS}=10$ V

Diagram 9: Typ. transfer characteristics



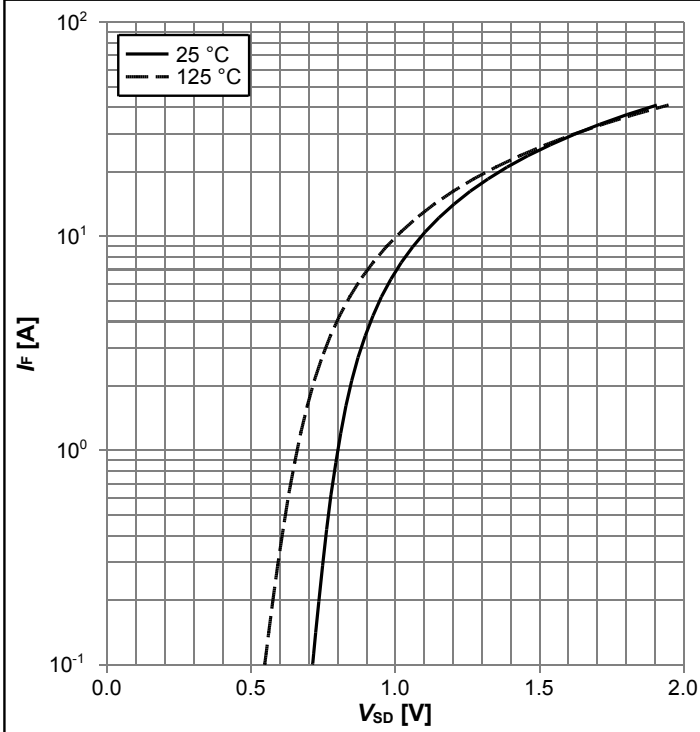
$I_D=f(V_{GS})$; V_{DS}=20V; parameter: T_j

Diagram 10: Typ. gate charge



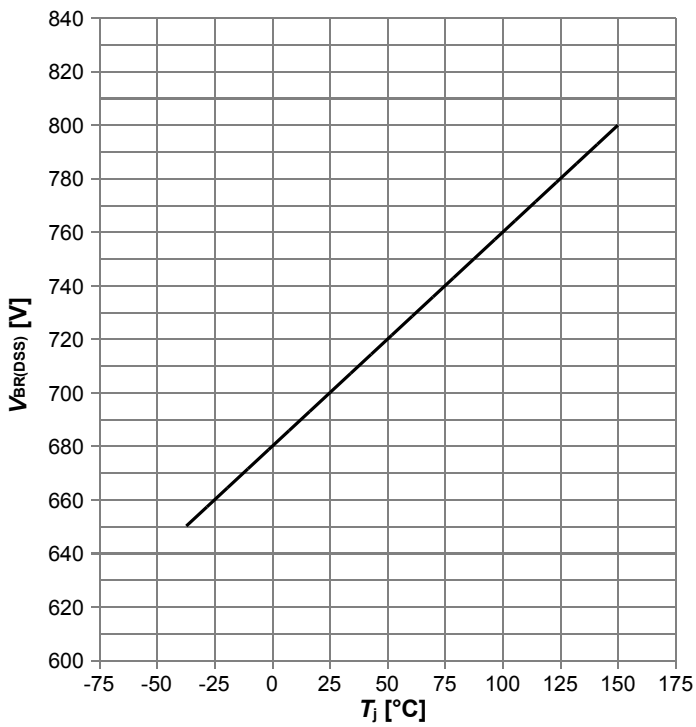
$V_{GS}=f(Q_{gate})$; I_D=2.3 A pulsed; parameter: V_{DD}

Diagram 11: Forward characteristics of reverse diode

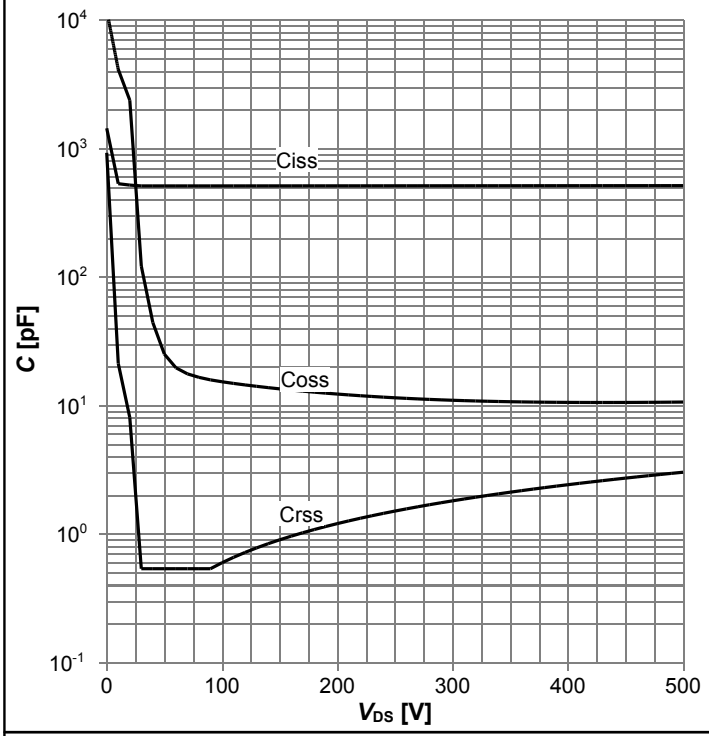
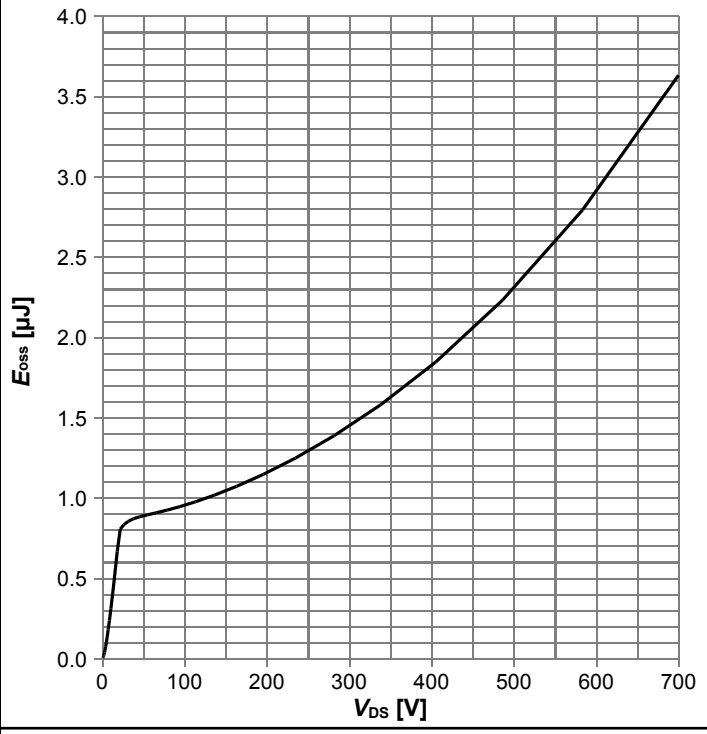


$I_F=f(V_{SD})$; parameter: T_j

Diagram 13: Drain-source breakdown voltage



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

Diagram 14: Typ. capacitances	Diagram 15: Typ. Coss stored energy
	
C=f(V_{DS}); V_{GS}=0 V; f=250 kHz	E_{oss}=f(V_{DS})

5 Test Circuits

Table 8 Diode characteristics

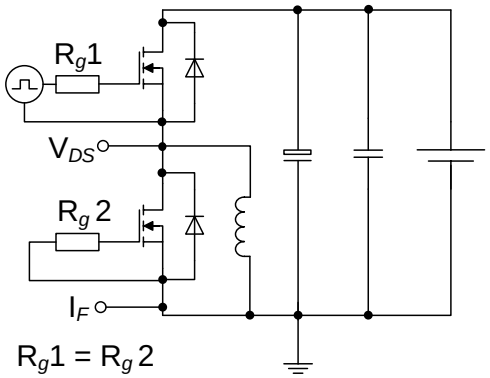
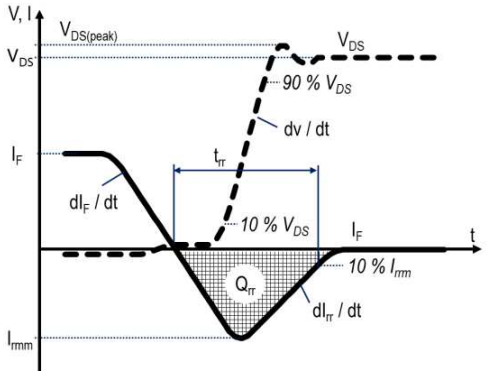
Test circuit for diode characteristics	Diode recovery waveform
	

Table 9 Switching times

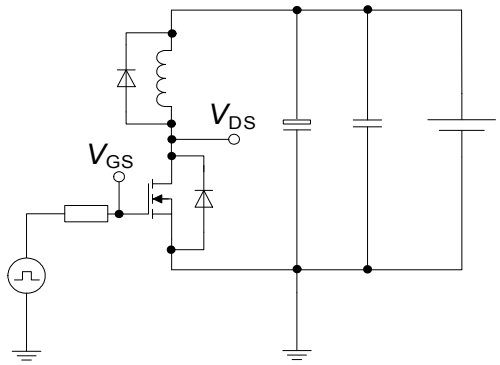
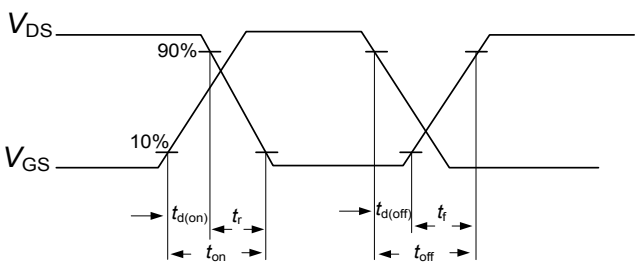
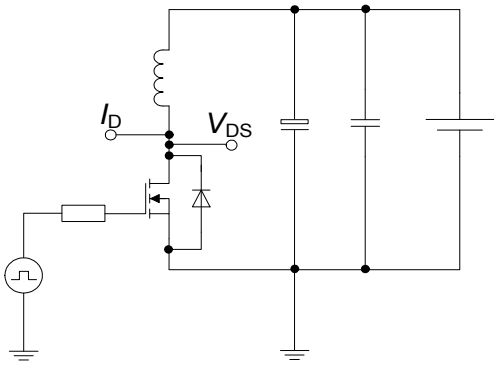
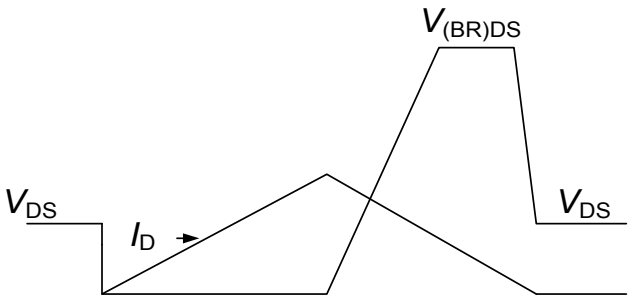
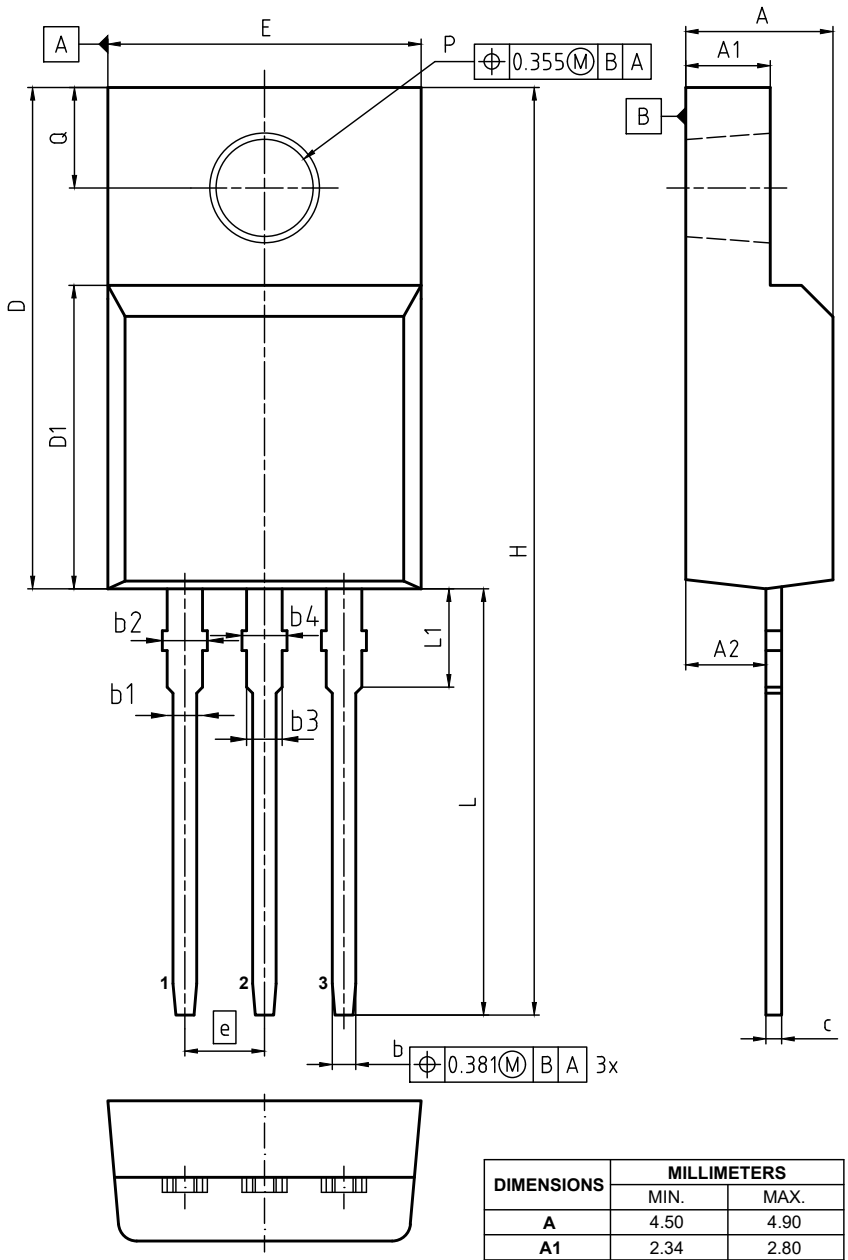
Switching times test circuit for inductive load	Switching times waveform
	

Table 10 Unclamped inductive load

Unclamped inductive load test circuit	Unclamped inductive waveform
	

6 Package Outlines



NOTES:
STANDARD QUALITY GRADE
DIMENSIONS DO NOT INCLUDE MOLD FLASH, PRO-TRUSIONS OR GATE BURRS

DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	4.50	4.90
A1	2.34	2.80
A2	2.42	2.86
b	0.65	0.90
b1	0.95	1.38
b2	1.20	1.50
b3	0.65	1.38
b4	1.20	1.50
c	0.40	0.63
D	15.67	16.15
D1	8.97	9.83
E	10.00	10.65
e	2.54	
H	28.70	29.75
L	12.78	13.75
L1	2.83	3.45
øP	3.00	3.38
Q	3.15	3.50

DOCUMENT NO.	Z8B00181328
REVISION	03
ISSUE DATE	23.07.2018
SCALE 5:1	0 1 2 3 4 5mm
EUROPEAN PROJECTION	

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

7 Appendix A

Table 11 Related Links

- **IFX CoolMOS™ P7 Webpage:** www.infineon.com
- **IFX Design tools:** www.infineon.com

Revision History

IPA70R360P7S

Revision: 2020-01-27, Rev. 2.2

Previous Revision		
Revision	Date	Subjects (major changes since last revision)
2.0	2016-10-11	Release of final version
2.1	2018-02-12	Corrected front page text
2.2	2020-01-27	Updated package drawing, symbol ID and product validation

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