

N-Ch and P-Ch Fast Switching MOSFETs

- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

Description

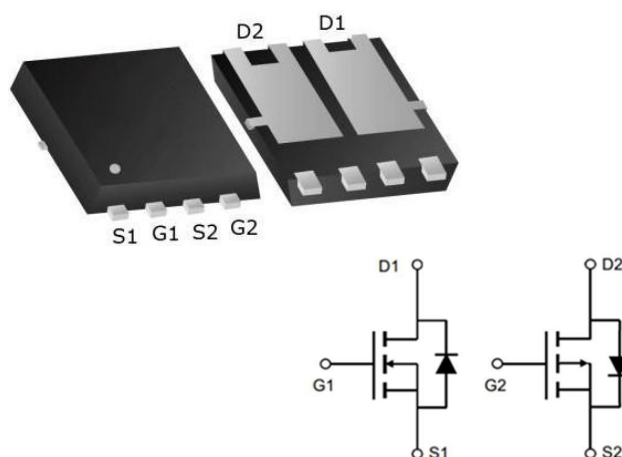
The XR30G30F is th high performance complementary N-ch and P-ch MOSFETs with high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The XR30G30F meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

Product Summary



BVDSS	RDSON	ID
30V	9.5mΩ	30A
-30V	16mΩ	-30A

PDFN5060-8L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
$I_D@T_a=25^{\circ}\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}^1$	30	-30	A
$I_D@T_a=100^{\circ}\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}^1$	15	-16	A
I_{DM}	Pulsed Drain Current ²	46	-40	A
EAS	Single Pulse Avalanche Energy ³	28	66	mJ
$P_D@T_c=25^{\circ}\text{C}$	Total Power Dissipation ⁴	15	21.3	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	$^{\circ}\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	$^{\circ}\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	48	$^{\circ}\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	5	$^{\circ}\text{C/W}$

N-Channel Electrical Characteristics $T = 25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, V _{GS} =0V,	-	-	1.0	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.0	1.5	2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} =10V, I _D =10A	-	9.5	13	mΩ
		V _{GS} =4.5V, I _D =5A	-	16	22.5	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1.0MHz	-	633	-	pF
C _{oss}	Output Capacitance		-	120	-	pF
C _{rss}	Reverse Transfer Capacitance		-	99	-	pF
Q _g	Total Gate Charge	V _{DS} =15V, I _D =10A, V _{GS} =10V	-	15	-	nC
Q _{gs}	Gate-Source Charge		-	4.7	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	3.6	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =30V,I _D =18A, R _{GEN} =3Ω, V _{GS} =10V	-	5	-	ns
t _r	Turn-on Rise Time		-	8	-	ns
t _{d(off)}	Turn-off Delay Time		-	21	-	ns
t _f	Turn-off Fall Time		-	7	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	30	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	72	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S =18A	-	-	1.2	V
t _{rr}	Body Diode Reverse Recovery Time	I _F =18A,dI/dt=100A/μs	-	7	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	5.9	-	nC

Note :

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. The EAS data shows Max. rating . The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=20A$
4. The power dissipation is limited by 150°C junction temperature
5. The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

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P-Channel Electrical Characteristics (T_J=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = -250μA	-30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -30V, V _{GS} =0V	-	-	-1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D = -250μA	-1.0	-1.6	-2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} = -10V, I _D = -10A	-	16	25	mΩ
		V _{GS} = -4.5V, I _D = -5A	-	25	40	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -15V, V _{GS} =0V, f=1.0MHz	-	1240	-	pF
C _{oss}	Output Capacitance		-	151	-	pF
C _{rss}	Reverse Transfer Capacitance		-	138	-	pF
Q _g	Total Gate Charge	V _{DS} = -15V, I _D = -6A, V _{GS} = -10V	-	24	-	nC
Q _{gs}	Gate-Source Charge		-	3.7	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	4.8	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -15V, I _D = -10A, V _{GS} = -10V, R _{GEN} =3Ω	-	11	-	ns
t _r	Turn-on Rise Time		-	5.5	-	ns
t _{d(off)}	Turn-off Delay Time		-	3.5	-	ns
t _f	Turn-off Fall Time		-	4.6	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-30	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-40	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S = -10A	-	-	-1.2	V

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: T_J=25°C, V_{DD}=-15V, V_G=-10V, R_G=25Ω, L=0.1mH, I_{AS}= -27A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

Typical Performance Characteristics-N

Figure1: Output Characteristics

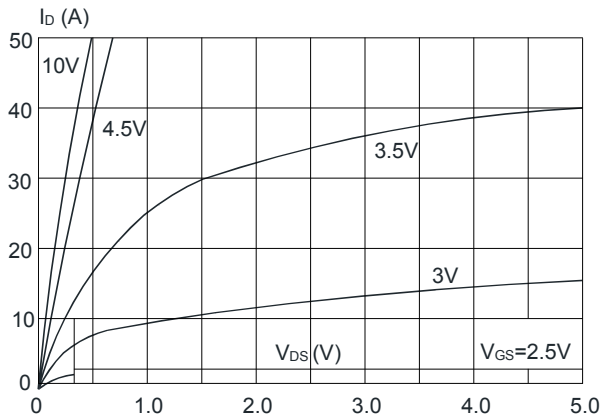


Figure 2: Typical Transfer Characteristics

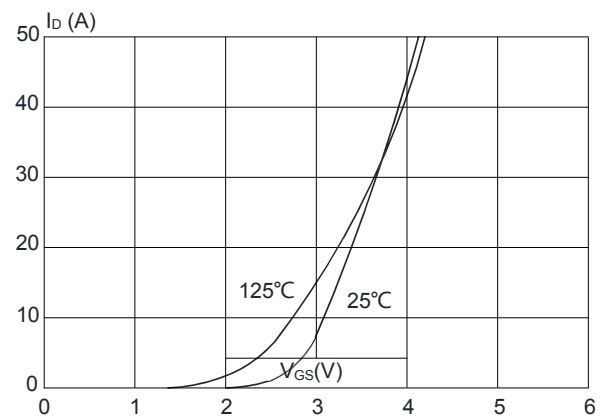


Figure 3: On-resistance vs. Drain Current

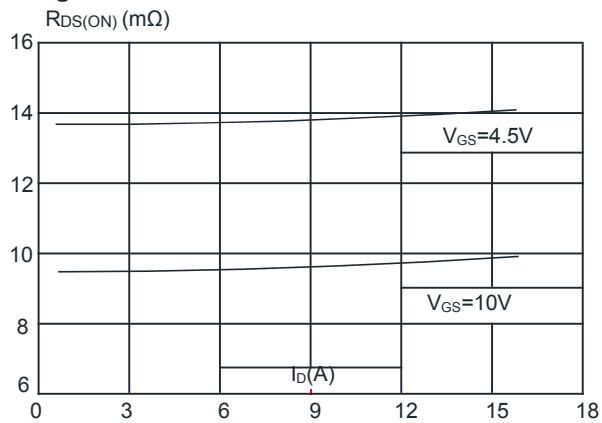


Figure 4: Body Diode Characteristics

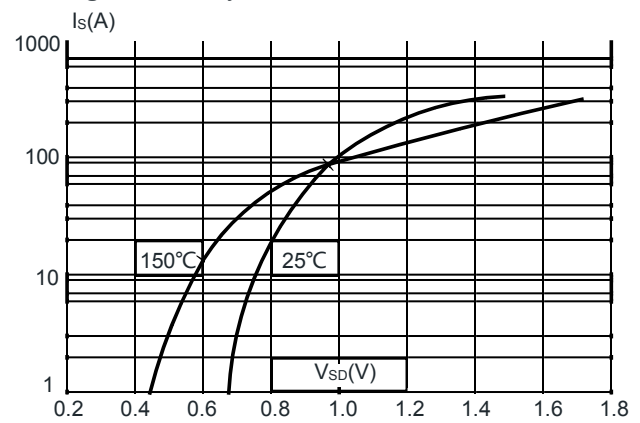


Figure 5: Gate Charge Characteristics

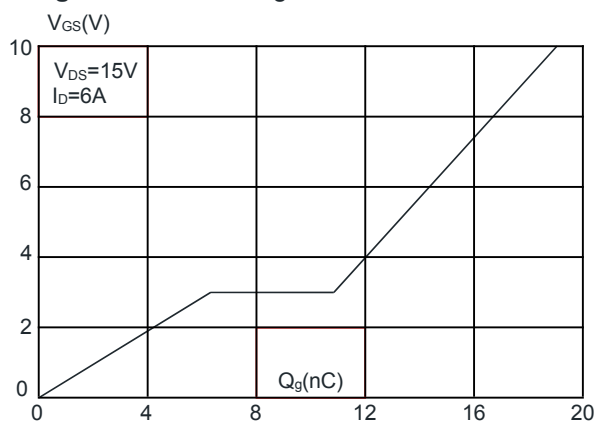
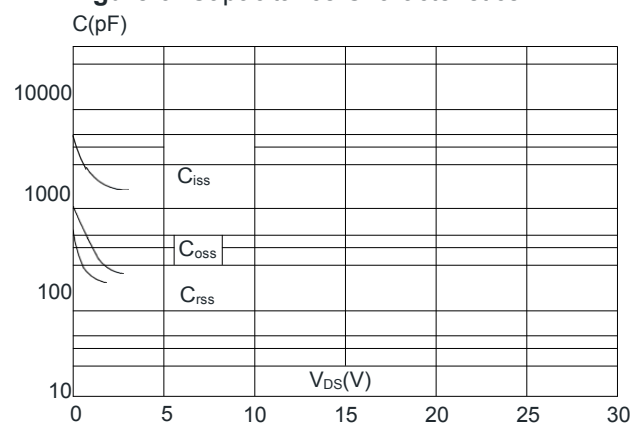


Figure 6: Capacitance Characteristics



N-Ch and P-Ch Fast Switching MOSFETs

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

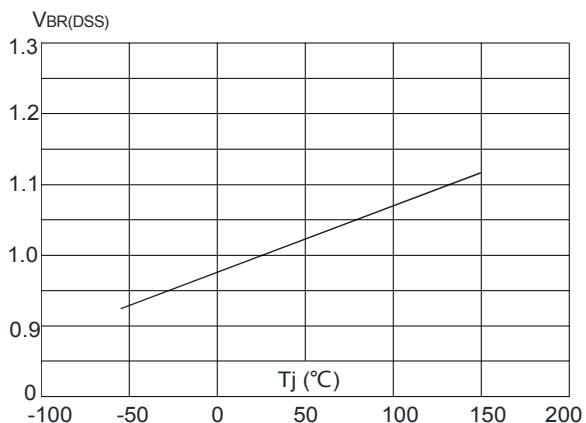


Figure 8: Normalized on Resistance vs. Junction Temperature

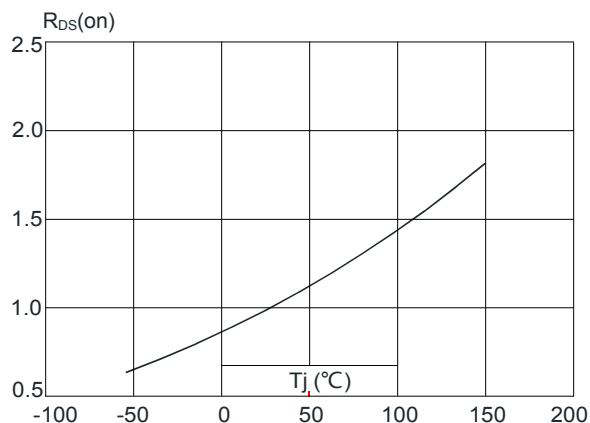


Figure 9: Maximum Safe Operating Area

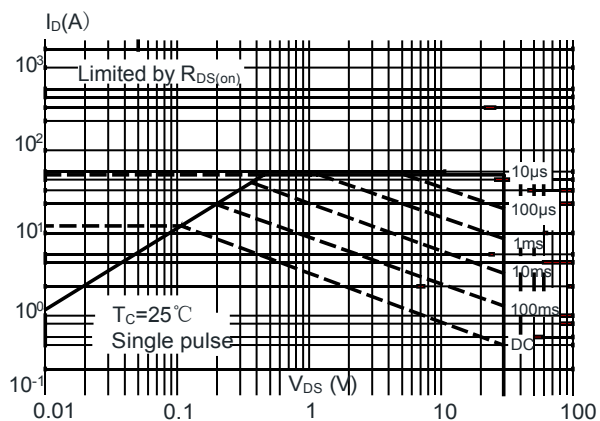


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

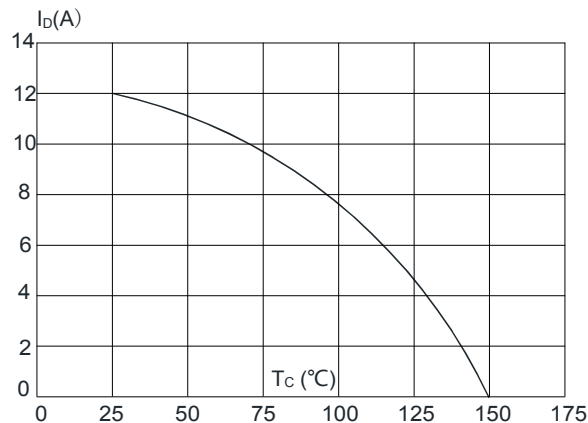
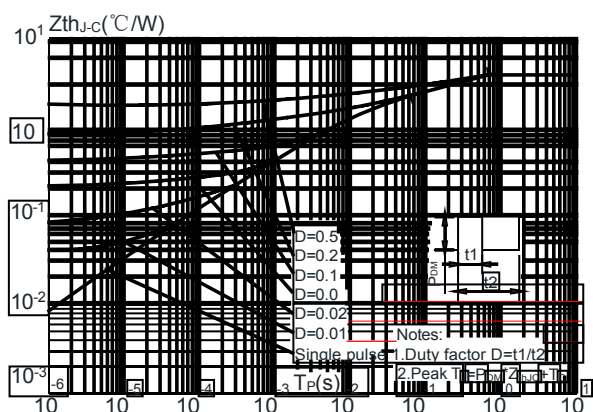


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Test Circuit-N

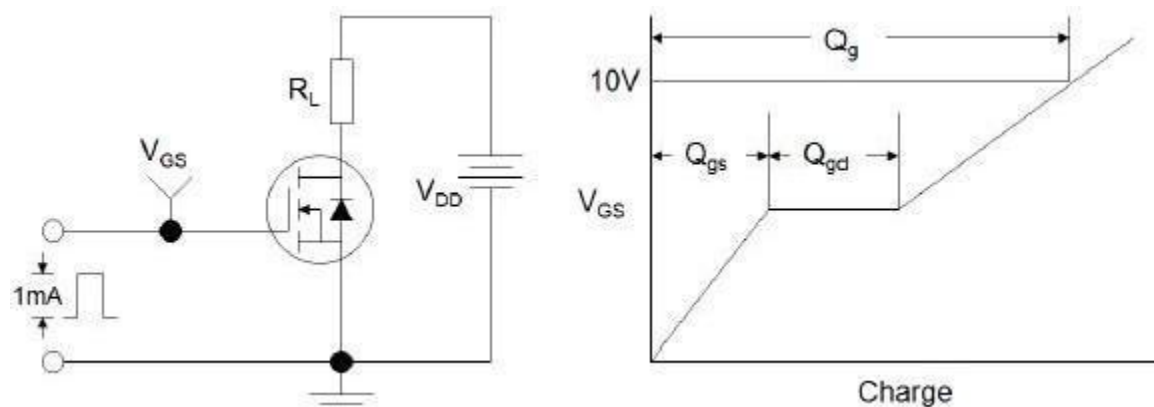


Figure1:Gate Charge Test Circuit & Waveform

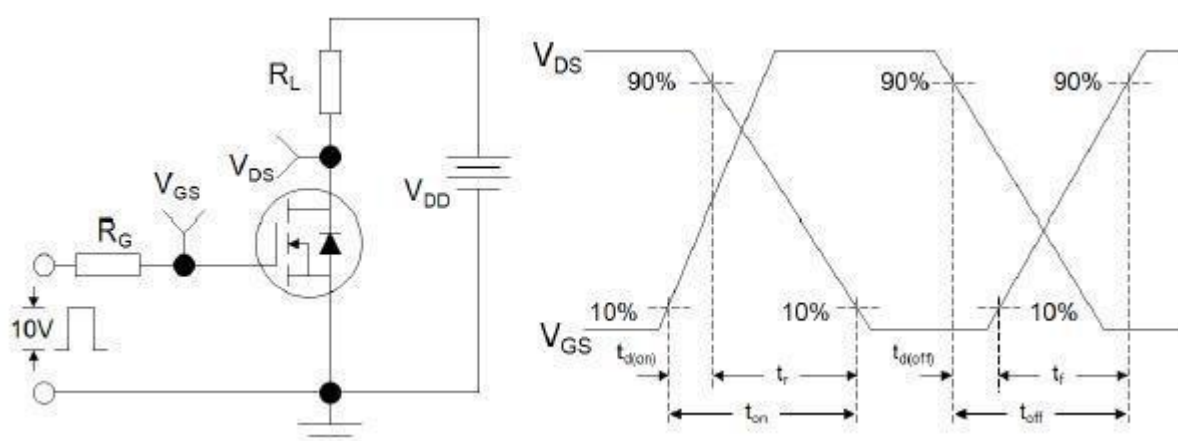


Figure 2: Resistive Switching Test Circuit & Waveforms

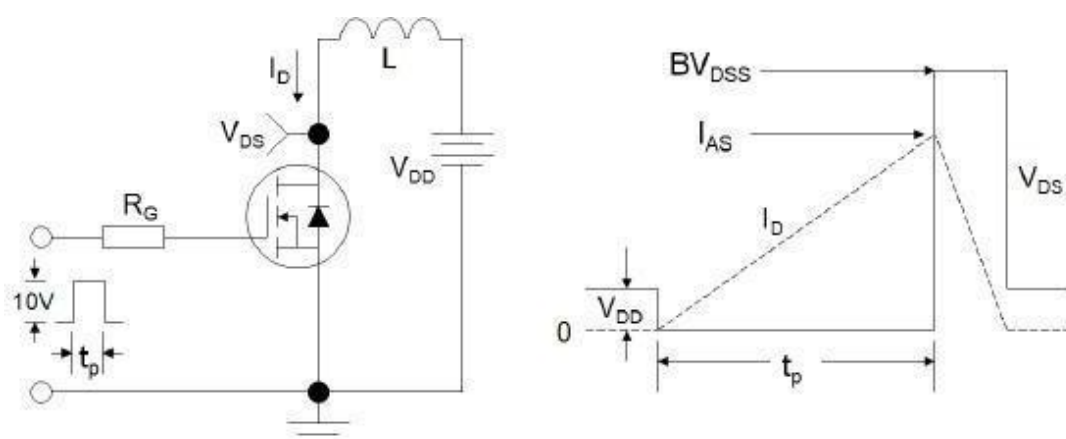


Figure 3:Unclamped Inductive Switching Test Circuit & Waveform

Typical Performance Characteristics-P

Figure 1: Output Characteristics

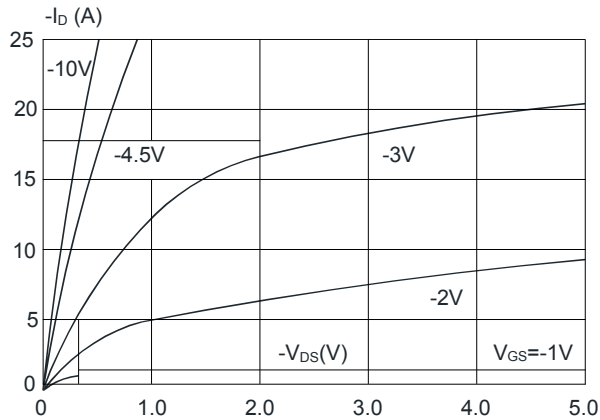


Figure 2: Typical Transfer Characteristics

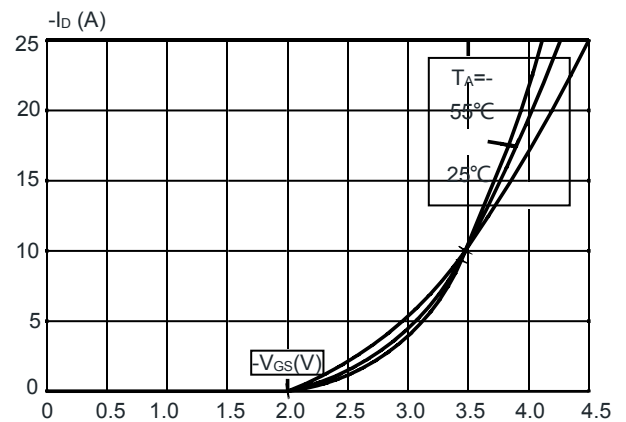


Figure 3: On-resistance vs. Drain Current

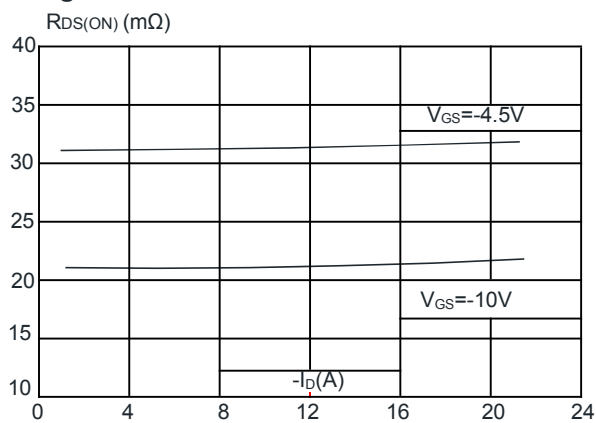


Figure 4: Body Diode Characteristics

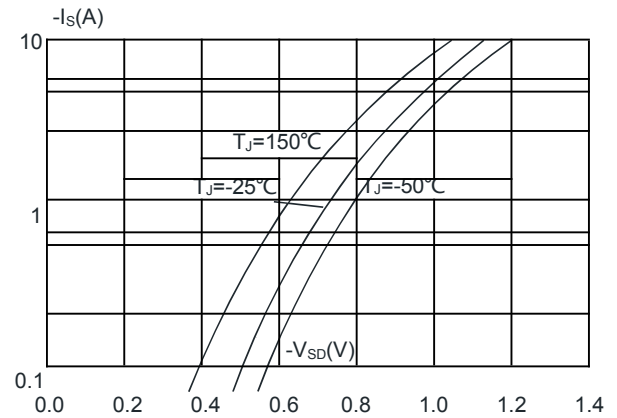


Figure 5: Gate Charge Characteristics

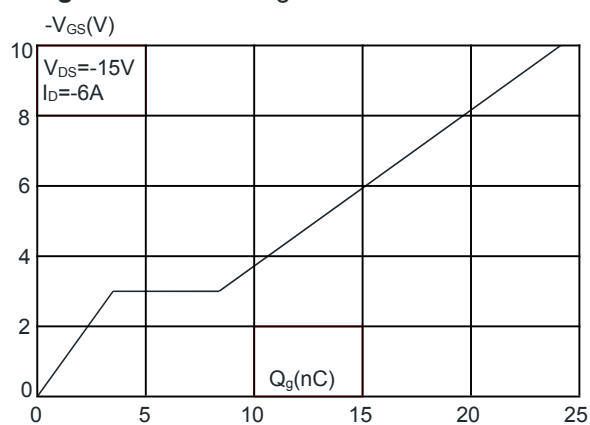
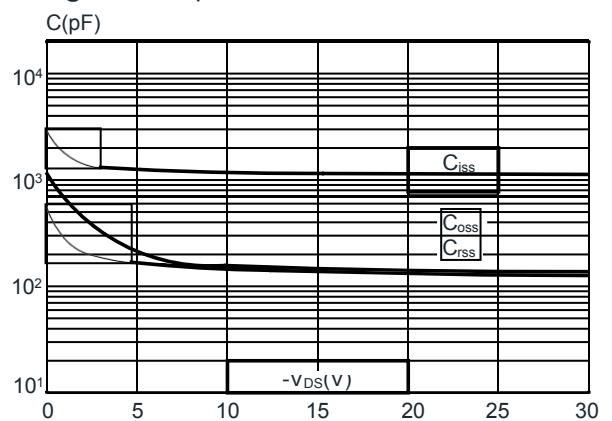


Figure 6: Capacitance Characteristics



N-Ch and P-Ch Fast Switching MOSFETs

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

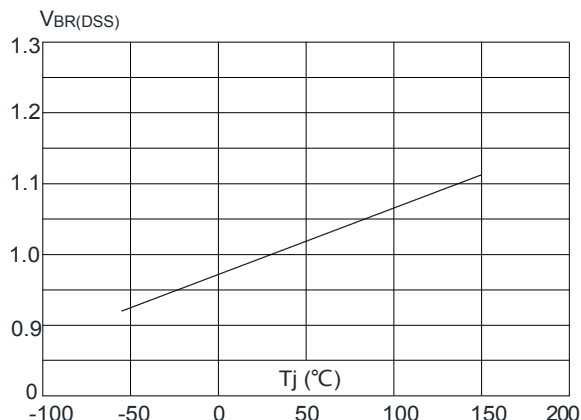


Figure 8: Normalized on Resistance vs. Junction Temperature

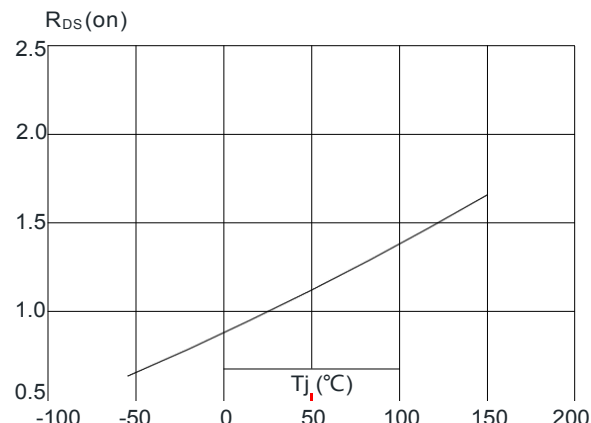


Figure 9: Maximum Safe Operating Area

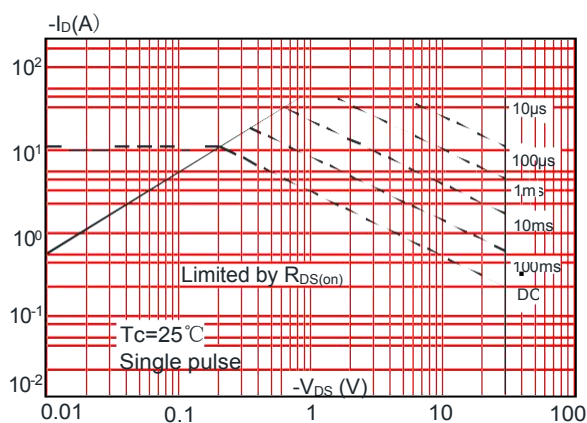


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

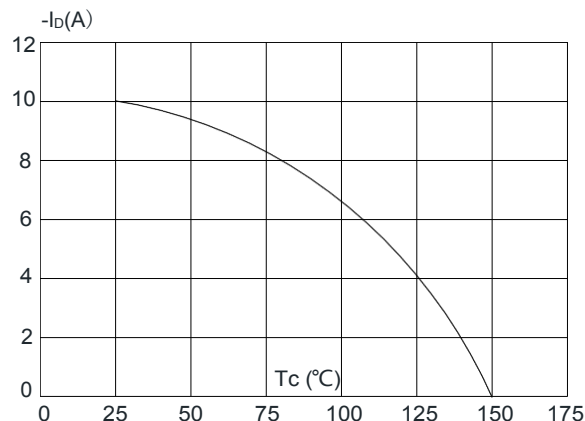
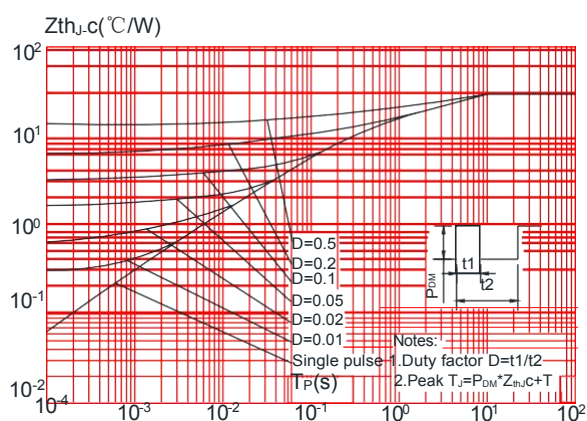
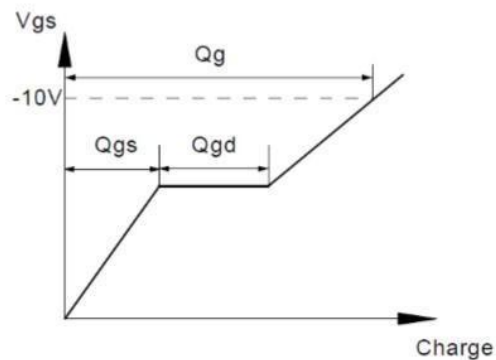
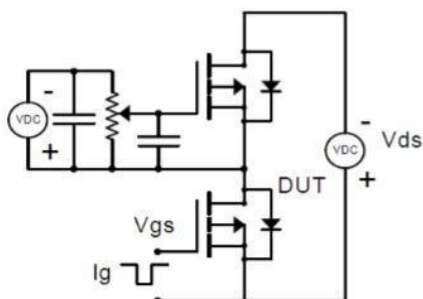


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

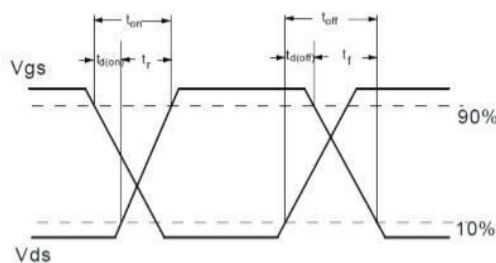
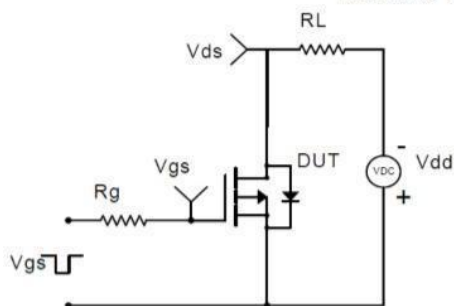


Test Circuit-P

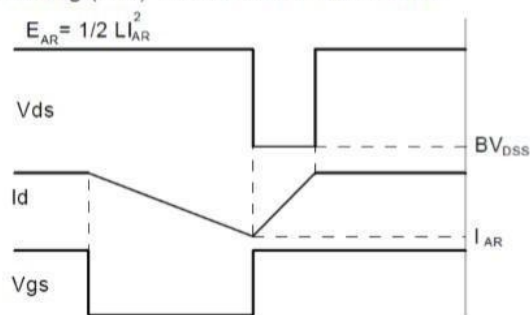
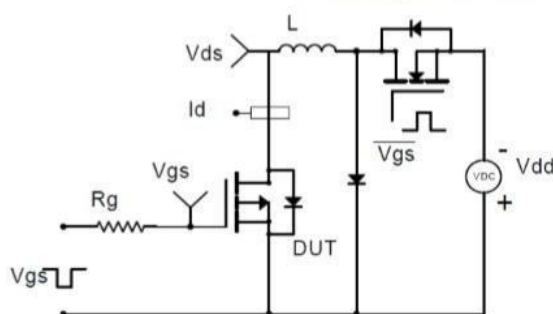
Gate Charge Test Circuit & Waveform



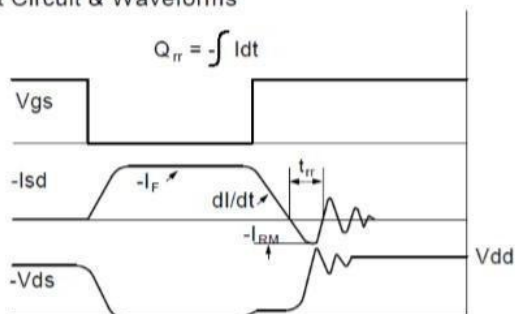
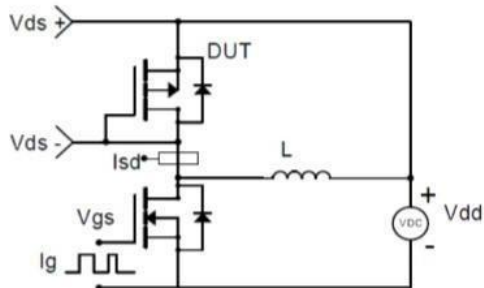
Resistive Switching Test Circuit & Waveforms



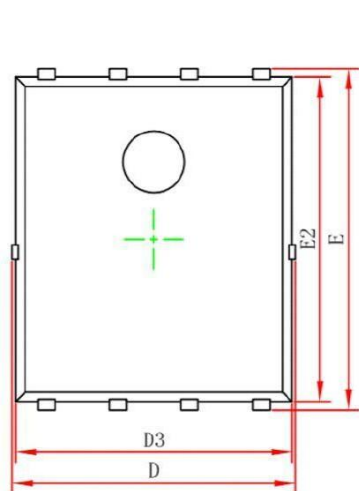
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



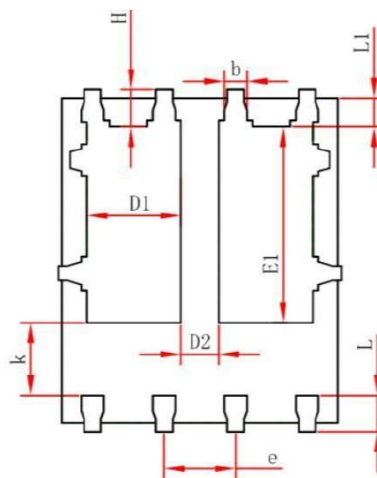
Diode Recovery Test Circuit & Waveforms



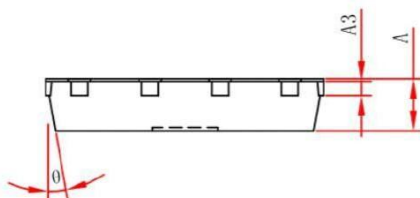
Package Mechanical Data- PDFN5060-8L



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.154REF.		0.006REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°