



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

Product Summary

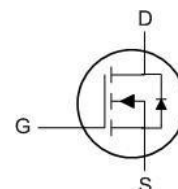
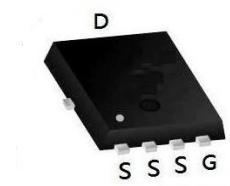
BVDSS	RDSON	ID
30V	6.5mΩ	60A

Description

The XR60N03F is the high cell density trench N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The XR60N03F meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

PDFN5060-8L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		10s	Steady State	
V_{DS}	Drain-Source Voltage	30		V
V_{GS}	Gate-Source Voltage	± 20		V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	60		A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	33		A
I_{DM}	Pulsed Drain Current ²	198		A
EAS	Single Pulse Avalanche Energy ³	36		mJ
I_{AS}	Avalanche Current	53.8		A
$P_D@T_C=25^\circ C$	Total Power Dissipation ⁴	32.5		W
T_{STG}	Storage Temperature Range	-55 to 175		$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 175		$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	3.56	$^\circ C/W$

Electrical Characteristics ($T_J=25^\circ\text{C}$ 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 =25A	-	6.5	7.5	mΩ
		V _{GS} =4.5V, I _D =15A	-	10	14	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1.0MHz	-	1140	-	pF
C _{oss}	Output Capacitance		-	175	-	pF
C _{rss}	Reverse Transfer Capacitance		-	151	-	pF
Q _g	Total Gate Charge	V _{DS} =15V, I _D =25A, V _{GS} =10V	-	13.3	-	nC
Q _{gs}	Gate-Source Charge		-	3.1	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	5	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =15V, I _D =25A, R _{GEN} =3Ω, V _{GS} =10V	-	15	-	ns
t _r	Turn-on Rise Time		-	19	-	ns
t _{d(off)}	Turn-off Delay Time		-	35	-	ns
t _f	Turn-off Fall Time		-	21	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	60	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	200	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S =30A	-	-	1.2	V
t _{rr}	Body Diode Reverse Recovery Time	I _F =30A, dI/dt=100A/μs	-	25	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	26	-	nC

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

2. EAS condition: $T_J=25^\circ\text{C}$, $V_{DD}=15V$, $V_G=10V$, $R_G=25\Omega$, $L=0.5mH$, $I_{AS}=12A$ 3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Typical Performance Characteristics

Figure1: Output Characteristics

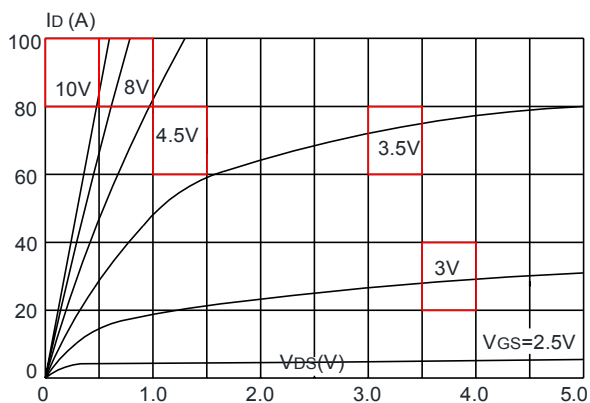


Figure 2: Typical Transfer Characteristics

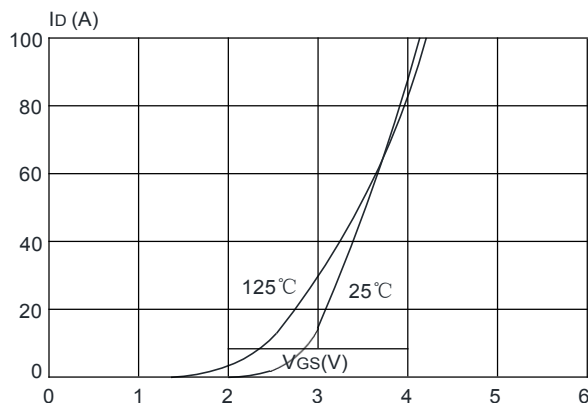


Figure 3: On-resistance vs. Drain Current

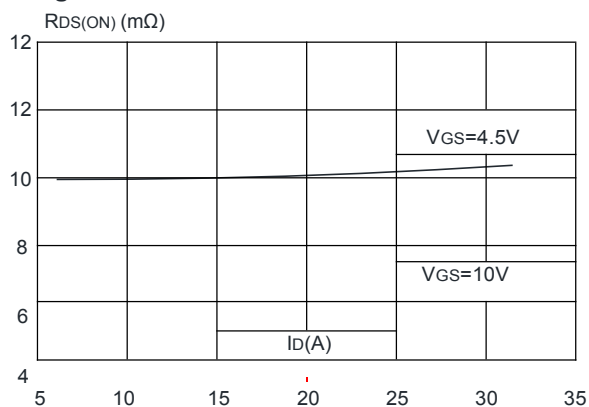


Figure 4: Body Diode Characteristics

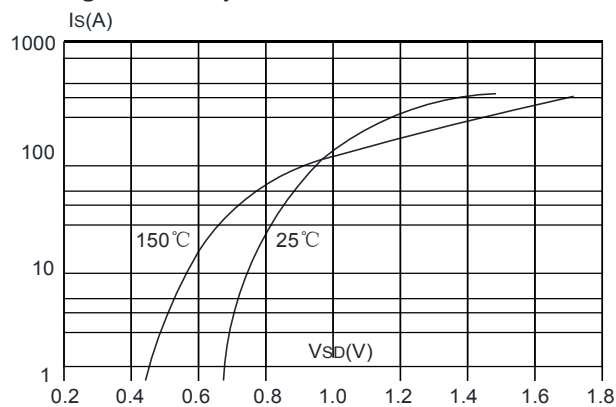


Figure 5: Gate Charge Characteristics

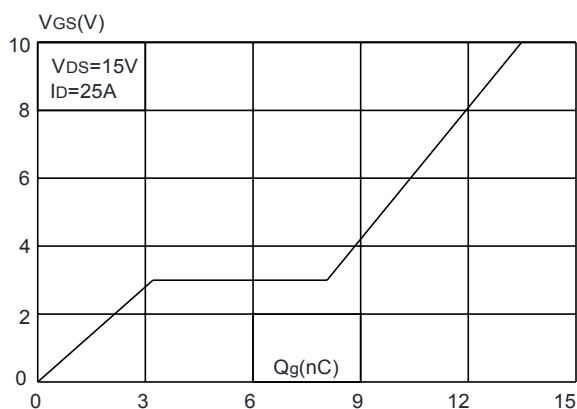
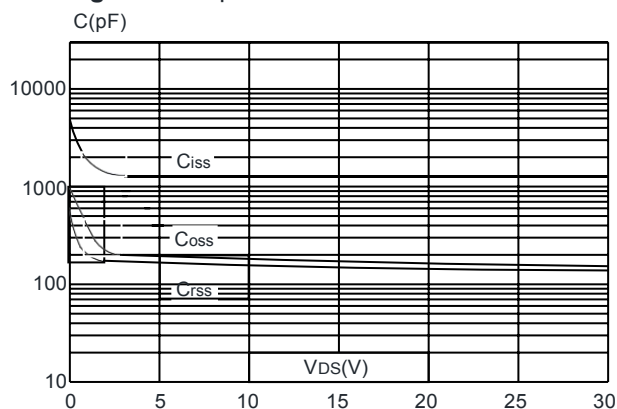


Figure 6: Capacitance Characteristics



N-Ch 30V Fast Switching MOSFETs

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

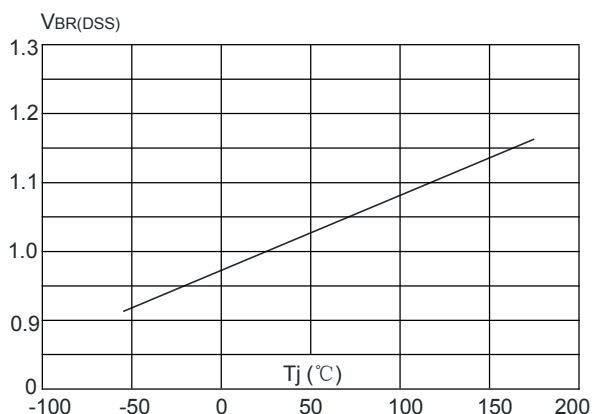


Figure 8: Normalized on Resistance vs. Junction Temperature

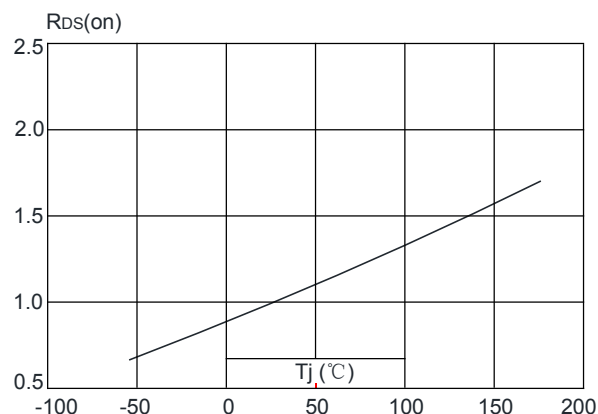
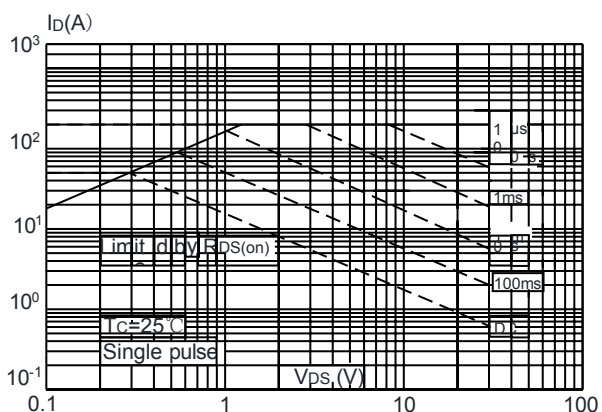


Figure 9: Maximum Safe Operating Area



Maximum Effective
Transient Thermal Impedance, Junction-to-Case

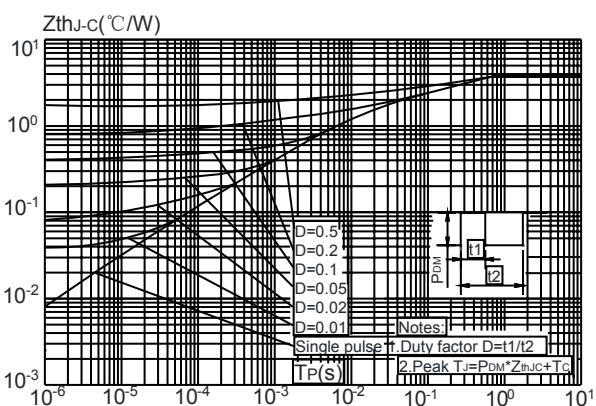
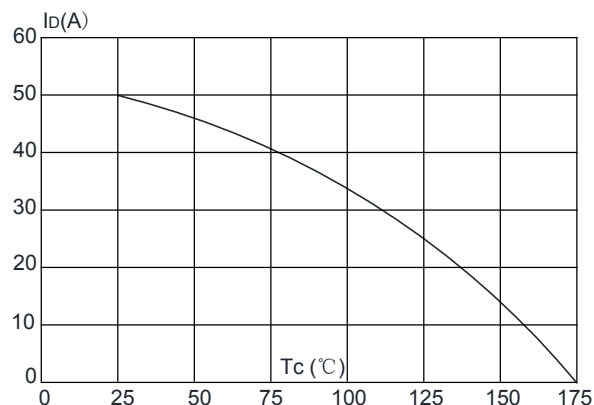


Figure 10: Maximum Continuous Drain Current vs. Case Temperature



Test Circuit

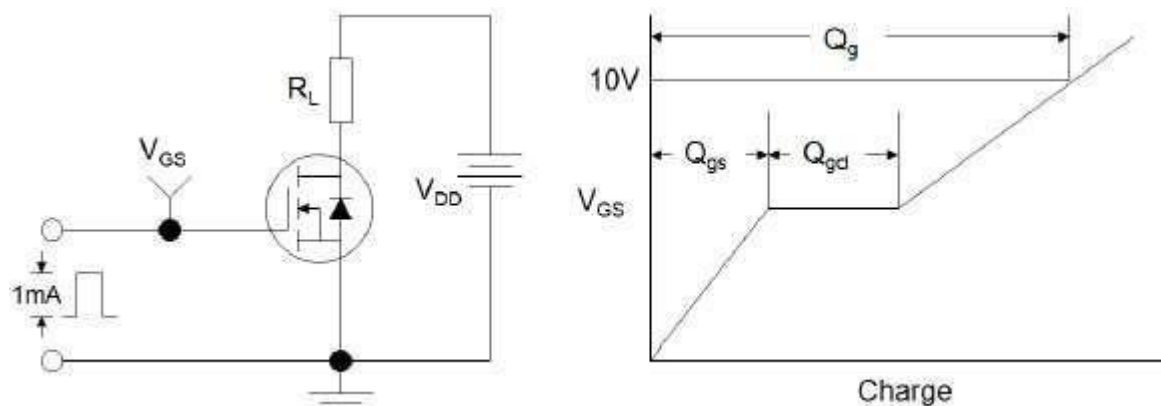


Figure1:Gate Charge Test Circuit & Waveform

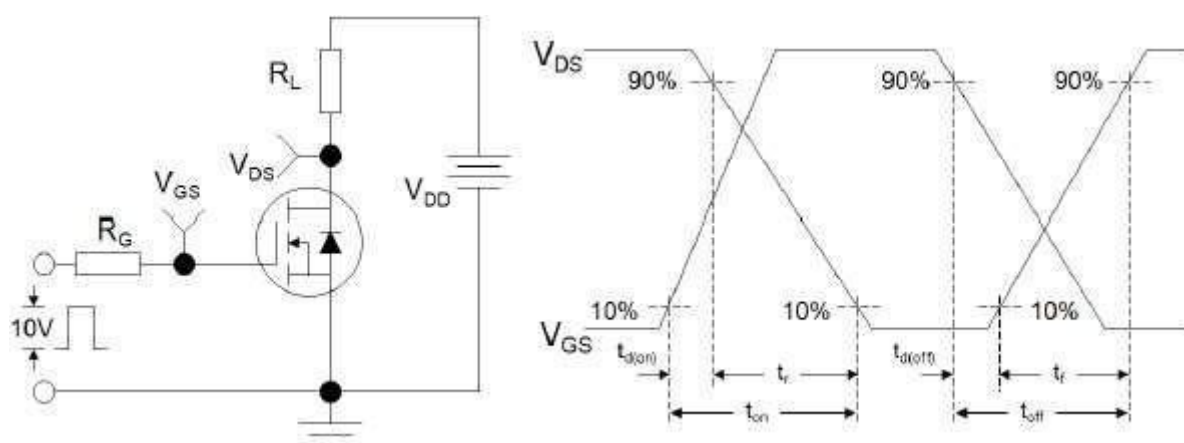


Figure 2: Resistive Switching Test Circuit & Waveforms

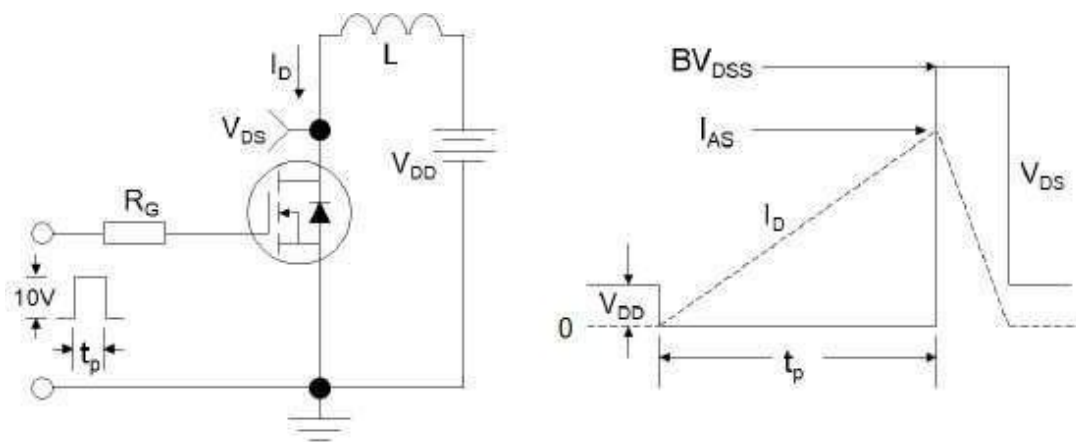
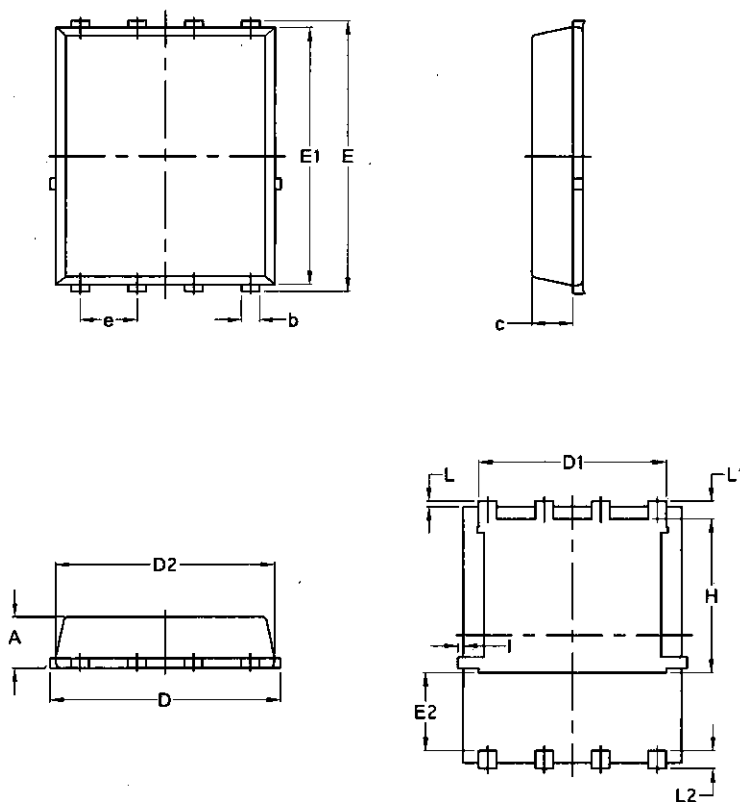


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Package Mechanical Data-DFN5060-8L-JQ Single



Symbol	Common			
	mm		Inch	
	Mim	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	/	0.18	/	0.0070