

P-Ch 30V Fast Switching MOSFETs

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

Product Summary



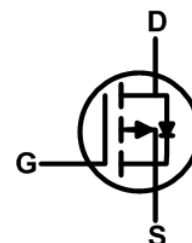
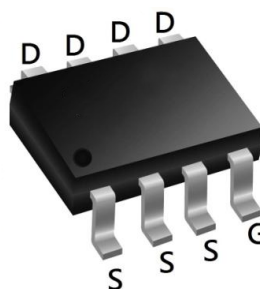
BVDSS	RDSON	ID
-30V	6.6mΩ	-18A

General Description

The XR4409 is the highest performance trench P-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The XR4409 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

SOP8 Pin Configuration



Absolute Maximum Ratings (T_A= 25°C, unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source voltage		V _{DS}	-30	V
Gate-Source voltage		V _{GS}	±20	V
Continuous Drain Current	T _A =25°C	I _D	-18	A
	T _A =100°C		-8.8	
Pulsed Drain Current ¹		I _{DM}	-53	A
Single Pulse Avalanche Energy ²		EAS	80	mJ
Total Power Dissipation	T _A =25°C	P _D	3	W
Operating Junction and Storage Temperature Range		T _J , T _{STG}	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient ³	R _{θJA}	41.6	°C/W

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Electrical Characteristics ($T_J = 25^\circ\text{C}$, unless otherwise noted)

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-30	-	-	V
Gate-body Leakage current		I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T _J =25°C	I _{DSS}	V _{DS} = -30V, V _{GS} = 0V	-	-	-1	μA
	T _J =100°C			-	-	-100	
Gate-Threshold Voltage		V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1.0	-	-2.5	V
Drain-Source On-Resistance ⁴		R _{DS(on)}	V _{GS} = -10V, I _D = -12A	-	6.6	9.8	mΩ
			V _{GS} = -4.5V, I _D = -10A	-	8.8	14	
Forward Transconductance ⁴		g _{fs}	V _{DS} = -10V, I _D = -10A	-	50	-	S
Dynamic Characteristics ⁵							
Input Capacitance		C _{iss}	V _{DS} = -15V, V _{GS} =0V, f =1MHz	-	3100	-	pF
Output Capacitance		C _{oss}		-	430	-	
Reverse Transfer Capacitance		C _{rss}		-	358	-	
Gate Resistance		R _g	f=1MHz	-	9.5	-	Ω
Switching Characteristics ⁵							
Total Gate Charge		Q _g	V _{GS} = -10V, V _{DS} = -15V I _D = -12A	-	35	-	nC
Gate-Source Charge		Q _{gs}		-	9.9	-	
Gate-Drain Charge		Q _{gd}		-	10.5	-	
Turn-On Delay Time		t _{d(on)}	V _{GS} =-10V, V _{DD} = -15V R _G = 3Ω, I _D = -12A	-	10.8	-	ns
Rise Time		t _r		-	13.2	-	
Turn-Off Delay Time		t _{d(off)}		-	73	-	
Fall Time		t _f		-	35	-	
Reverse Recovery Time		t _{rr}	I _F = -12A, dI _F /dt = 100A/μs	-	25	-	ns
Reverse Recovery Charge		Q _{rr}		-	10	-	nC
Drain-source body diode Characteristics							
Diode Forward Voltage ⁴		V _{SD}	I _S = -1A, V _{GS} = 0V	-	-	-1.2	V
Continuous Source Current	T _A =25°C	I _S	-	-	-	-14	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ\text{C}$.
2. The EAS data shows Max. rating. The test condition is $V_{DD} = -25V, V_{GS} = -10V, L = 0.1\text{mH}, I_{AS} = -40A$.
3. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Characteristics

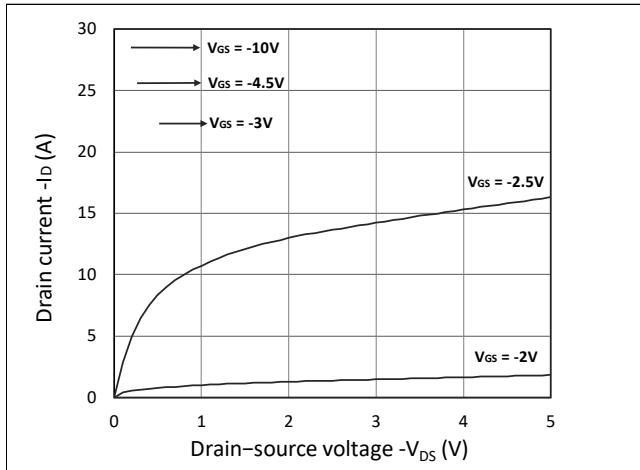


Figure 1. Output Characteristics

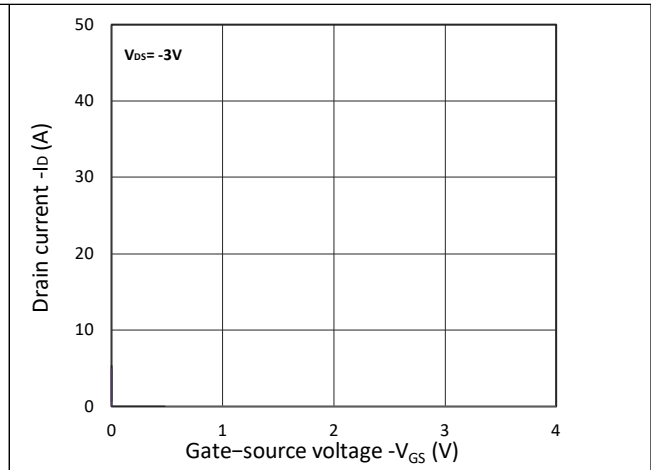


Figure 2. Transfer Characteristics

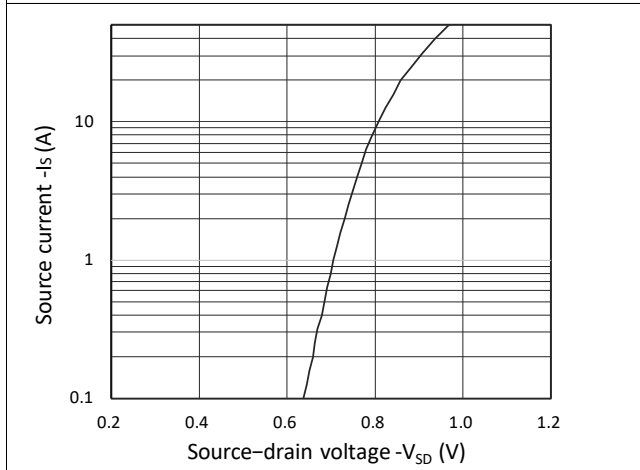


Figure 3. Forward Characteristics of Reverse

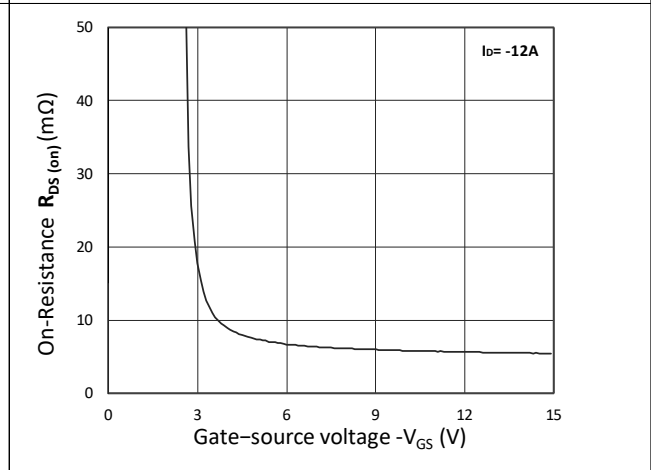


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

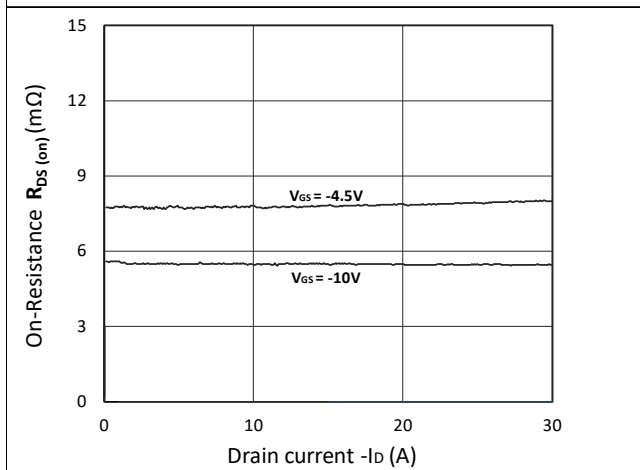


Figure 5. $R_{DS(ON)}$ vs. I_D

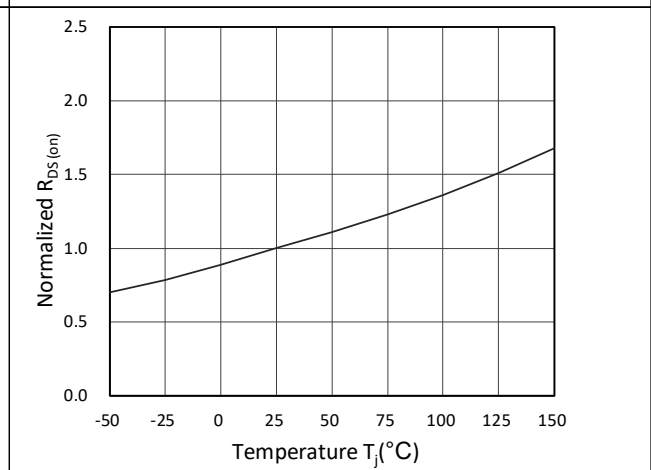


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

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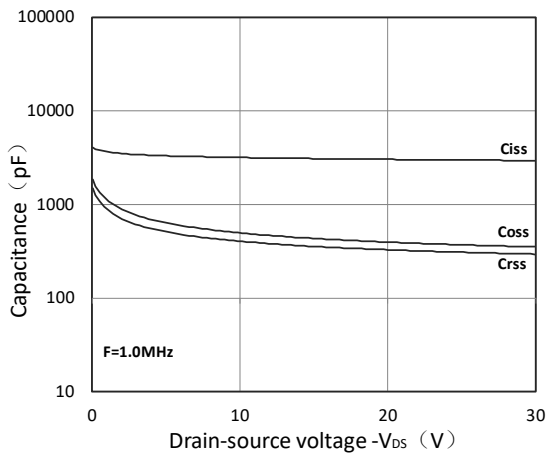


Figure 7. Capacitance Characteristics

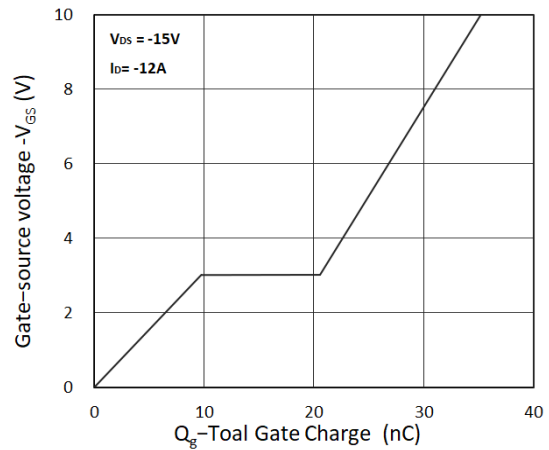


Figure 8. Gate Charge Characteristics

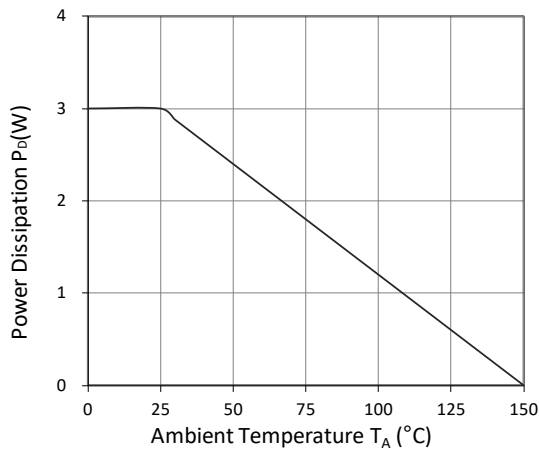


Figure 9. Power Dissipation

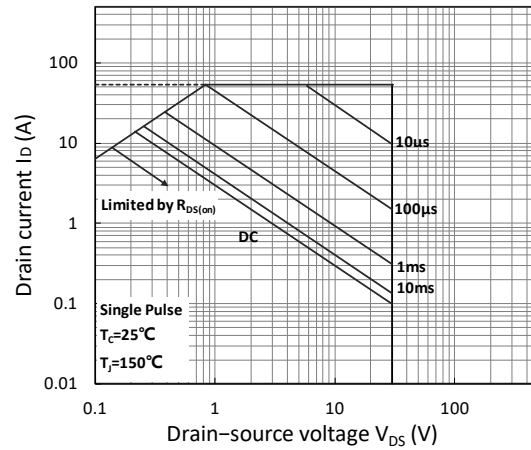


Figure 10. Safe Operating Area

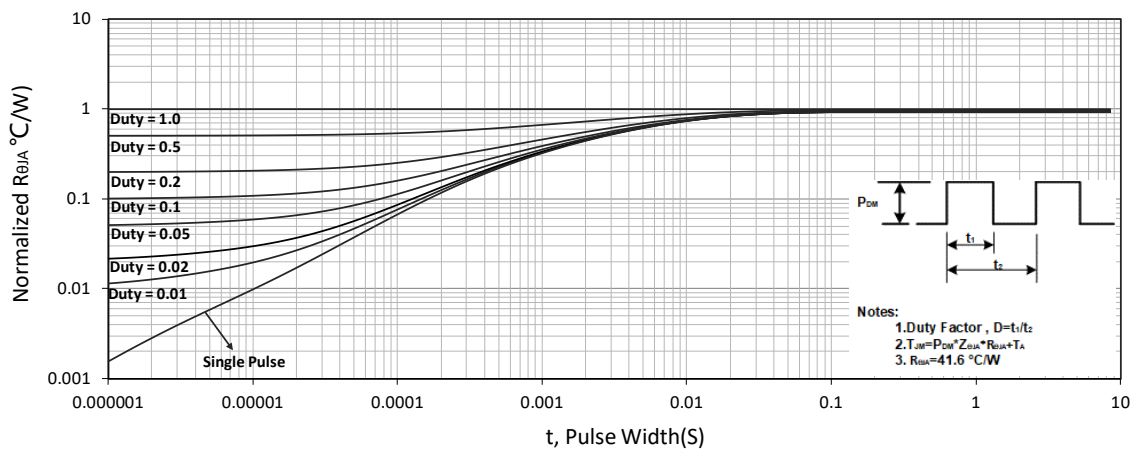


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

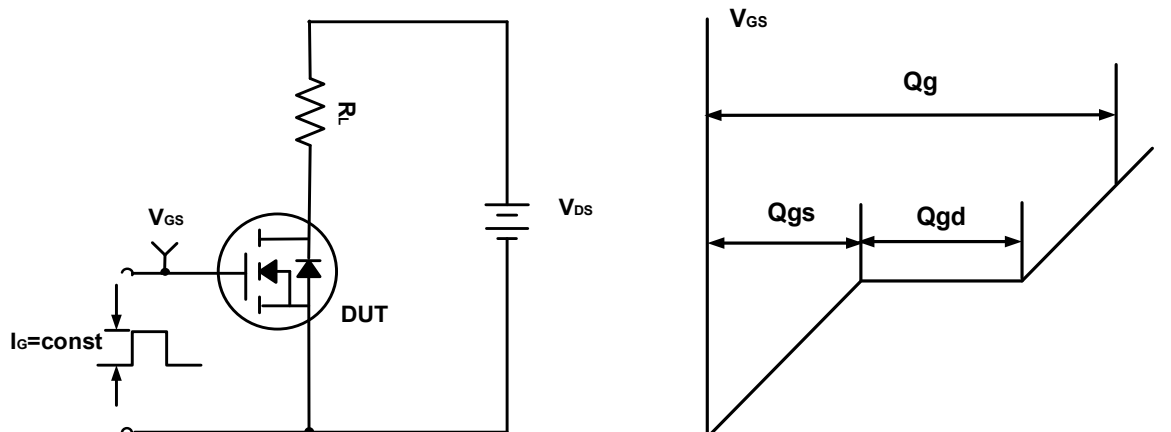


Figure A. Gate Charge Test Circuit & Waveforms

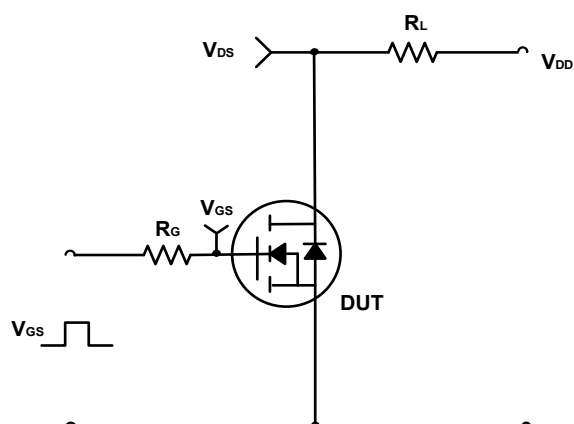


Figure B. Switching Test Circuit & Waveforms

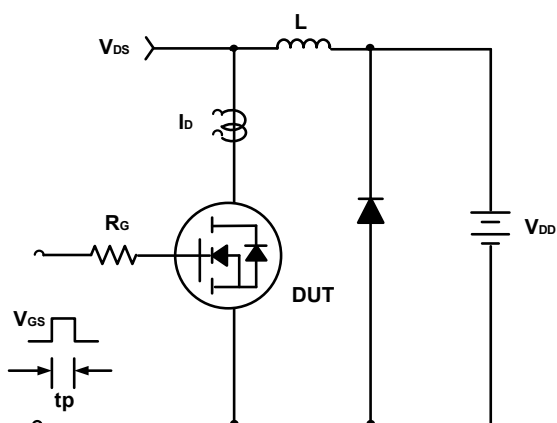
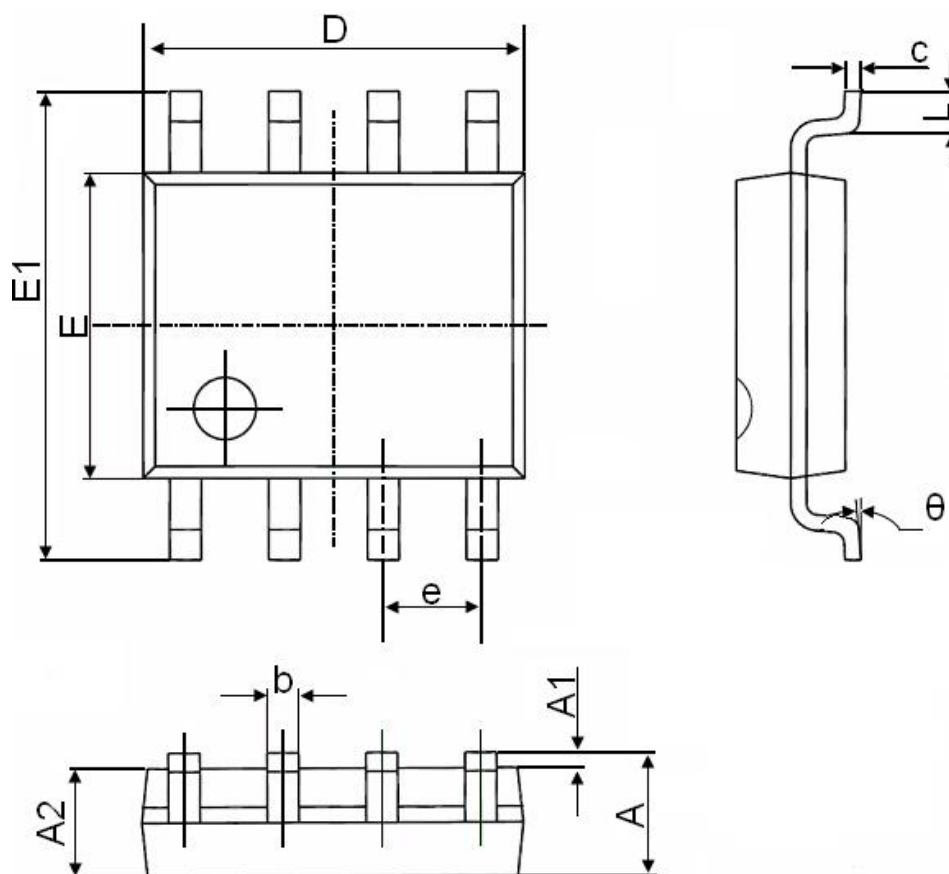


Figure C. Unclamped Inductive Switching Circuit & Waveforms

SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°