

AON7409 30V P-Channel MOSFET

General Description

- The AON7409 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{\rm DS(ON)}$. This device is ideal for load switch and battery protection applications.
- RoHS and Halogen-Free Compliant.

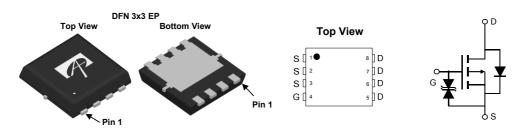
Product Summary

 $\begin{array}{lll} V_{DS} & -30V \\ I_{D} \; (at \; V_{GS} \text{=-}10V) & -32A \\ R_{DS(ON)} \; (at \; V_{GS} \text{=-}10V) & < 8.5 \text{m}\Omega \\ R_{DS(ON)} \; (at \; V_{GS} \text{=-}4.5V) & < 17 \text{m}\Omega \end{array}$

Typical ESD protection

 $\begin{array}{cc} 100\% \; UIS \; Tested \\ 100\% \; \; R_g \; Tested \end{array}$





Parameter	Symbol	Maximum	Units	
Drain-Source Voltage	V _{DS}	-30	V	
Gate-Source Voltage	V _{GS}	±25	V	
Continuous Drain T _C =25°C		-32		
Current ^G T _C =100°C	I _D	-25	A	
Pulsed Drain Current ^c	I _{DM}	-128		
Continuous Drain T _A =25°C		-16	۸	
Current T _A =70°C	IDSM	-12.5	A	
Avalanche Current ^C	I _{AS}	40	A	
Avalanche energy L=0.1mH ^C	E _{AS}	80	mJ	
T _C =25°C	P _D	96	W	
Power Dissipation B T _C =100°C	r _D	38.5	VV	
T _A =25°C	D	3.1	10/	
Power Dissipation ^A T _A =70°C	P _{DSM}	2	W	
Junction and Storage Temperature Range	T _J , T _{STG}	-55 to 150	°C	

Thermal Characteristics									
Parameter		Symbol	Тур	Max	Units				
Maximum Junction-to-Ambient A	t ≤ 10s	$R_{\theta JA}$	30	40	°C/W				
Maximum Junction-to-Ambient AD	Steady-State		60	75	°C/W				
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	1	1.3	°C/W				



Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Тур	Max	Units				
STATIC PARAMETERS										
BV _{DSS}	Drain-Source Breakdown Voltage	$I_D = -250 \mu A, V_{GS} = 0 V$	-30			V				
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-30V, V _{GS} =0V			-1 -5	μΑ				
I _{GSS}	Gate-Body leakage current	V_{DS} =0V, V_{GS} =±25V			±10	uA				
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_{D}=-250\mu A$	-1.6	-2.1	-2.7	V				
I _{D(ON)}	On state drain current	V _{GS} =-10V, V _{DS} =-5V	-128			Α				
		V _{GS} =-10V, I _D =-16A		6.8	8.5	0				
R _{DS(ON)}	Static Drain-Source On-Resistance	T _J =125°C		9.6	11.5	mΩ				
		V _{GS} =-4.5V, I _D =-10A		12.8	17	mΩ				
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-16A		-43		S				
V_{SD}	Diode Forward Voltage	I _S =-1A,V _{GS} =0V		-0.7	-1	V				
I _S	Maximum Body-Diode Continuous Curr	ent ^G			-32	Α				
DYNAMIC	PARAMETERS									
C _{iss}	Input Capacitance			2142		pF				
Coss	Output Capacitance	V_{GS} =0V, V_{DS} =-15V, f=1MHz		474		pF				
C _{rss}	Reverse Transfer Capacitance			363		pF				
R_g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		2.3	4.6	Ω				
SWITCHI	NG PARAMETERS									
Q _g (10V)	Total Gate Charge			41	58	nC				
Q _g (4.5V)	Total Gate Charge	V _{GS} =-10V, V _{DS} =-15V, I _D =-16A		18.5	27	nC				
Q_{gs}	Gate Source Charge			15		nC				
Q_{gd}	Gate Drain Charge			6		nC				
$t_{D(on)}$	Turn-On DelayTime			13		ns				
t _r	Turn-On Rise Time	V_{GS} =-10V, V_{DS} =-15V, R_L =0.9 Ω ,		12		ns				
$t_{D(off)}$	Turn-Off DelayTime	R_{GEN} =3 Ω		34		ns				
t _f	Turn-Off Fall Time			18.5		ns				
t _{rr}	Body Diode Reverse Recovery Time	I _F =-16A, dI/dt=500A/μs		17.5		ns				
Q_{rr}	Body Diode Reverse Recovery Charge	I _F =-16A, dI/dt=500A/μs		44.5		nC				

A. The value of $R_{\theta JA}$ is measured with the device mounted on $1in^2$ FR-4 board with 2oz. Copper, in a still air environment with T_A =25° C. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ t $\leq 10s$ value and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design.

- D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.
- E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

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B. The power dissipation P_D is based on $T_{J_{(MAX)}}$ =150 $^{\circ}$ C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$ =150° C. Ratings are based on low frequency and duty cycles to keep initial T_J =25° C.

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$ =150° C. The SOA curve provides a single pulse rating.

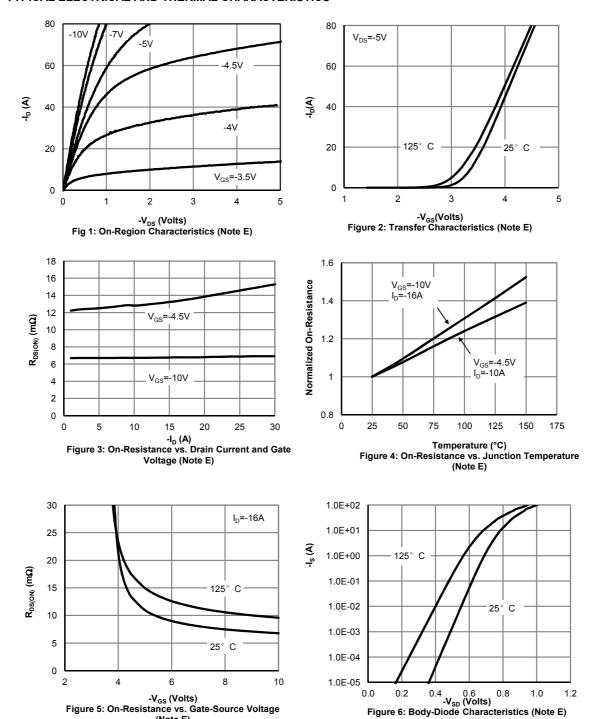
G. The maximum current rating is package limited.

H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.



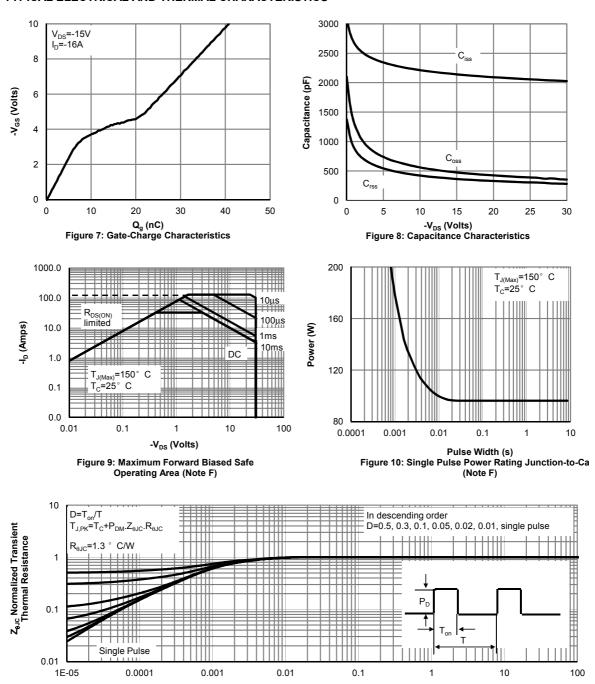
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

(Note E)





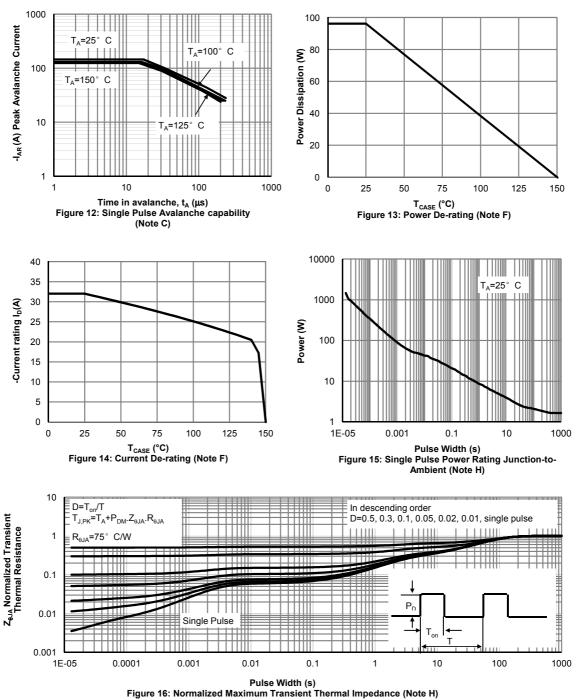
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Pulse Width (s)
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

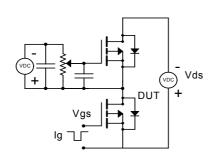


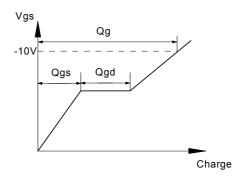
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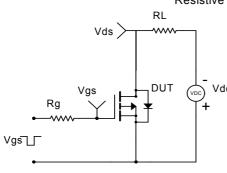


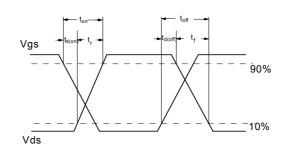
Gate Charge Test Circuit & Waveform



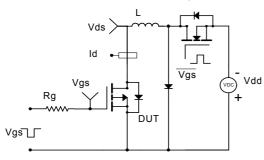


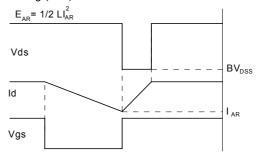
Resistive Switching Test Circuit & Waveforms





Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms

