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Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
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ALPHA & OMEGA SEMICONDUCTOR

# AO3418
30V N-Channel MOSFET

General Description

The AO3418 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.

Product Summary

V_{DS}	30V
I_D (at V_{GS}=10V)	3.8A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 55mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 65mΩ
$R_{DS(ON)}$ (at V_{GS}=2.5V)	< 85mΩ

Green Product

SOT23
Top View   Bottom View
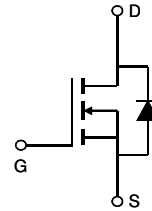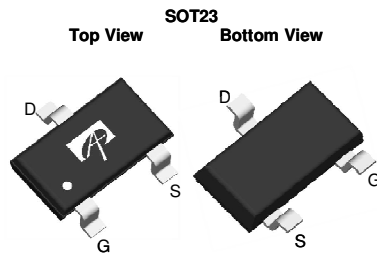
Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current	T_A=25°C	I_D	3.8	A
	T_A=70°C		3.1	
Pulsed Drain Current [C]		I_{DM}	15	
Power Dissipation [B]	T_A=25°C	P_D	1.4	W
	T_A=70°C		0.9	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{θJA}$	70	90	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		100	125	°C/W
Maximum Junction-to-Lead	Steady-State	$R_{θJL}$	63	80	°C/W

Electrical Characteristics (T$_J$=25℃ unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
STATIC PARAMETERS							
BV$_{DSS}$	Drain-Source Breakdown Voltage	I$_D$=250µA, V$_{GS}$=0V		30			V
I$_{DSS}$	Zero Gate Voltage Drain Current	V$_{DS}$=30V, V$_{GS}$=0V				1	µA
			T$_J$=55℃			5	
I$_{GSS}$	Gate-Body leakage current	V$_{DS}$=0V, V$_{GS}$=±12V				±100	nA
V$_{GS(th)}$	Gate Threshold Voltage	V$_{DS}$=V$_{GS}$ I$_D$=250µA		0.5	1	1.5	V
I$_{D(ON)}$	On state drain current	V$_{GS}$=10V, V$_{DS}$=5V		15			A
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V, I$_D$=3.8A			43	55	mΩ
			T$_J$=125℃		70	84	
		V$_{GS}$=4.5V, I$_D$=3.5A			47	65	mΩ
		V$_{GS}$=2.5V, I$_D$=1A			59	85	mΩ
g$_{FS}$	Forward Transconductance	V$_{DS}$=5V, I$_D$=3.8A			14		S
V$_{SD}$	Diode Forward Voltage	I$_S$=1A,V$_{GS}$=0V			0.75	1	V
I$_S$	Maximum Body-Diode Continuous Current					1.5	A
DYNAMIC PARAMETERS							
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=15V, f=1MHz		185	235	285	pF
C$_{oss}$	Output Capacitance			25	35	45	pF
C$_{rss}$	Reverse Transfer Capacitance			10	18	25	pF
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, f=1MHz		2.1	4.3	6.5	Ω
SWITCHING PARAMETERS							
Q$_g$(10V)	Total Gate Charge	V$_{GS}$=10V, V$_{DS}$=15V, I$_D$=3.8A			10	12	nC
Q$_g$(4.5V)	Total Gate Charge				4.7		nC
Q$_{gs}$	Gate Source Charge				0.95		nC
Q$_{gd}$	Gate Drain Charge				1.6		nC
t$_{D(on)}$	Turn-On DelayTime	V$_{GS}$=10V, V$_{DS}$=15V, R$_L$=3.95Ω, R$_{GEN}$=3Ω			3.5		ns
t$_r$	Turn-On Rise Time				1.5		ns
t$_{D(off)}$	Turn-Off DelayTime				17.5		ns
t$_f$	Turn-Off Fall Time				2.5		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=3.8A, dI/dt=100A/µs			8.5	11	ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=3.8A, dI/dt=100A/µs			2.6	3.5	nC

A. The value of R$_{θJA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T$_A$ =25° C. The value in any given application depends on the user's specific board design.

B. The power dissipation P$_D$ is based on T$_{J(MAX)}$=150° C, using ≤ 10s junction-to-ambient thermal resistance.

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 initialT$_J$=25° C.

D. The R$_{θJA}$ is the sum of the thermal impedence from junction to lead R$_{θJL}$ and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300µs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedence which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T$_{J(MAX)}$=150° C. The SOA curve provides a single pulse rating.

ALPHA & OMEGA
SEMICONDUCTOR

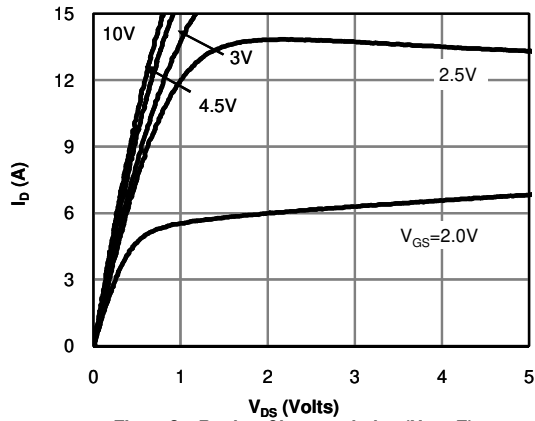**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**
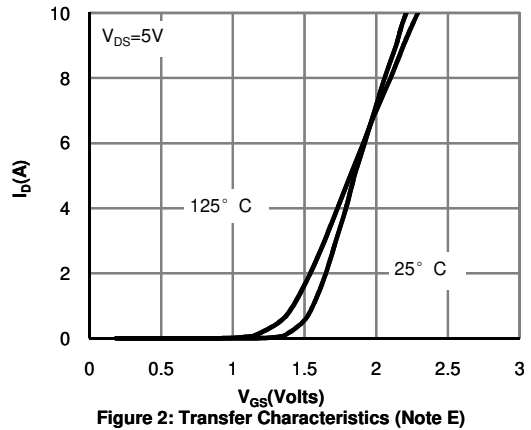
Fig 1: On-Region Characteristics (Note E)

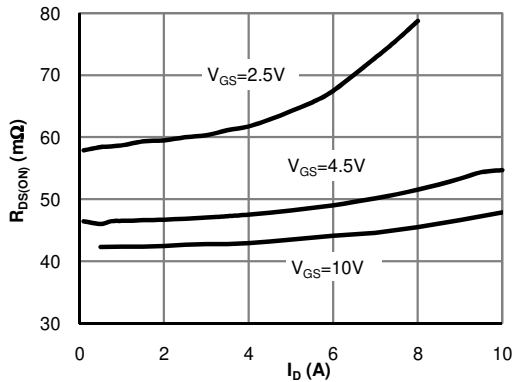Figure 2: Transfer Characteristics (Note E)

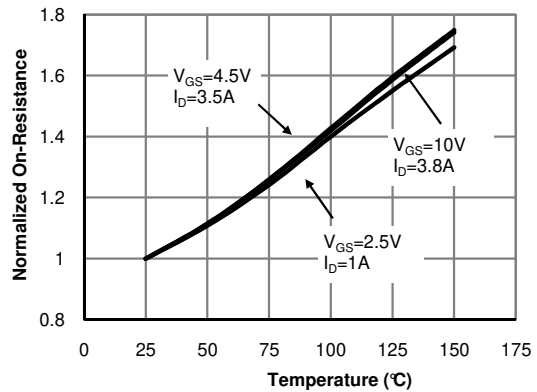Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

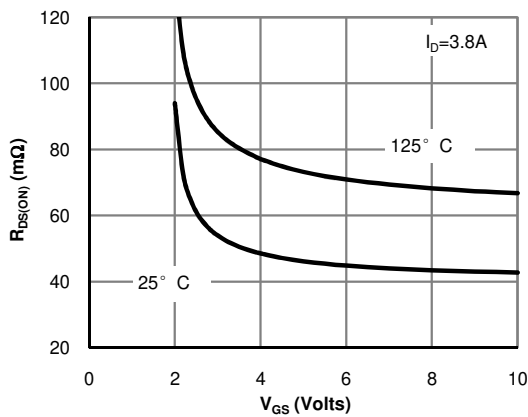Figure 4: On-Resistance vs. Junction Temperature (Note E)

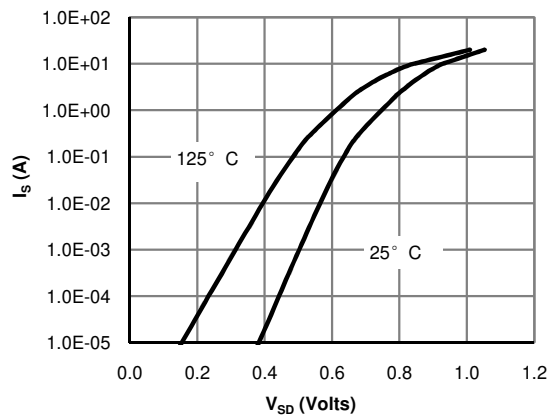Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

Figure 6: Body-Diode Characteristics (Note E)
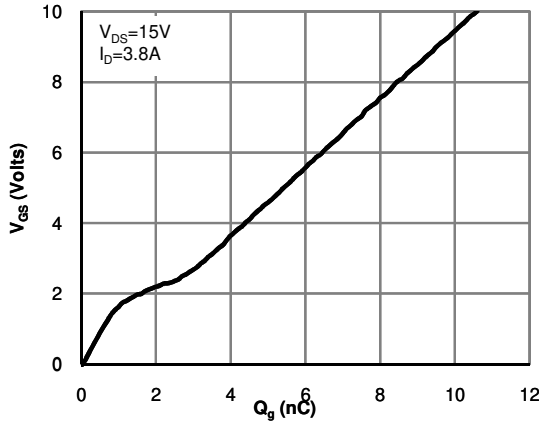
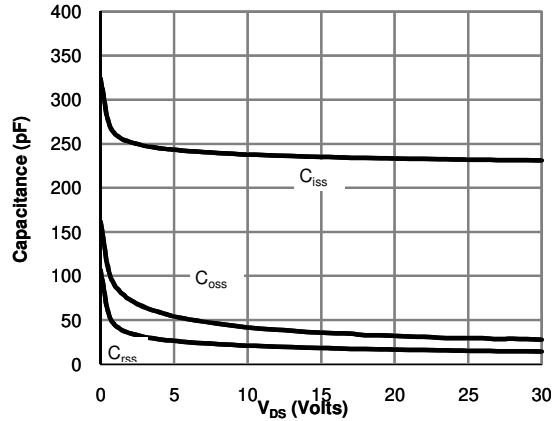## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7: Gate-Charge Characteristics

Figure 8: Capacitance Characteristics
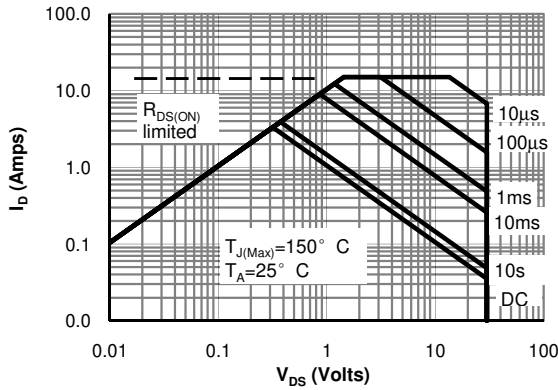
Figure 9: Maximum Forward Biased Safe Operating Area (Note F)
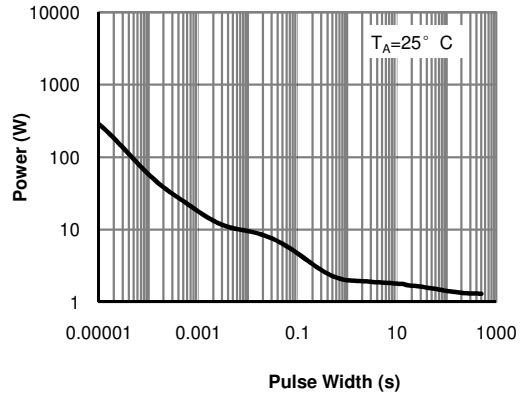
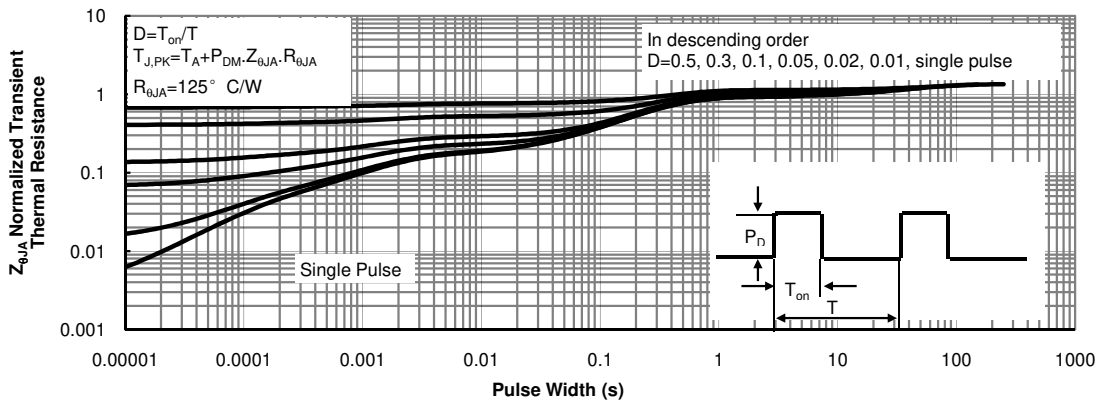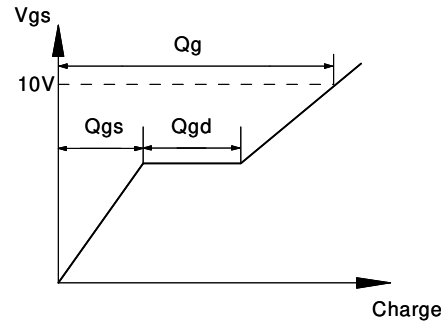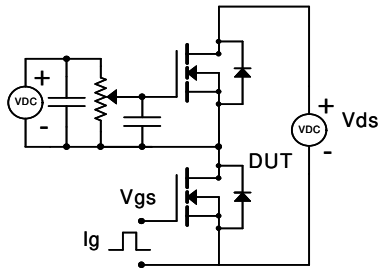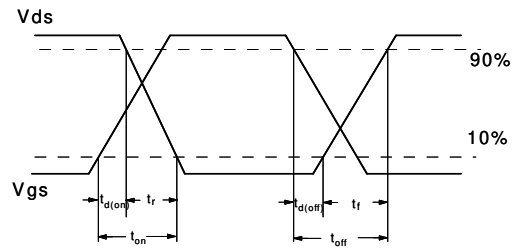**Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)**
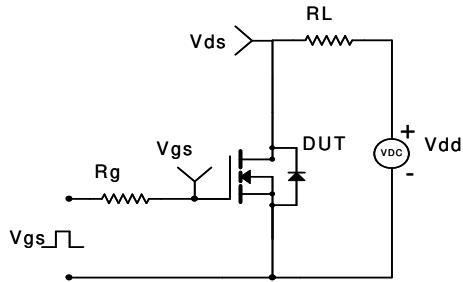

Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = -\int I dt$$