AO3420

20V N-Channel MOSFET

General Description

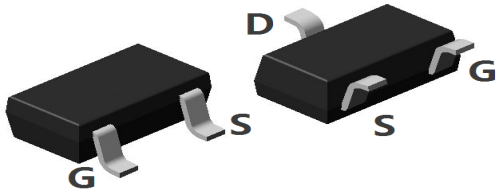
The AO3420 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V while retaining a 12V $V_{GS(MAX)}$ rating. This device is suitable for use as a uni-directional or bi-directional load switch.

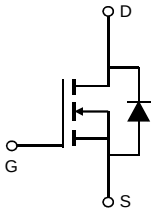
Product Summary

V_{DS}	20V
I_D (at V_{GS}=10V)	6A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 24mΩ
$R_{DS(ON)}$ (at V_{GS} =4.5V)	< 27mΩ
$R_{DS(ON)}$ (at V_{GS}=2.5V)	< 42mΩ
$R_{DS(ON)}$ (at V_{GS}=1.8V)	< 55mΩ

SOT23

Top View Bottom View





Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current	T_A=25℃	I_D	6	A
	T_A=70℃		5	
Pulsed Drain Current [C]		I_{DM}	30	
Power Dissipation [B]	T_A=25℃	P_D	1.4	W
	T_A=70℃		0.9	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	℃

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	70	90	℃/W
Maximum Junction-to-Ambient [A D]	Steady-State		100	125	℃/W
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	63	80	℃/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250µA, V_{GS}=0V	20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V			1	µA
		T_J=55°C			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	0.4	0.75	1.1	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=6A		16	24	mΩ
		T_J=125°C		23	35	
		V_{GS}=4.5V, I_D=5A		18	27	mΩ
		V_{GS}=2.5V, I_D=4A		23	42	mΩ
		V_{GS}=1.8V, I_D=2A		31	55	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=6A		25		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.7	1	V
I_S	Maximum Body-Diode Continuous Current				2	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=10V, f=1MHz	420	525	630	pF
C_{oss}	Output Capacitance		65	95	125	pF
C_{rss}	Reverse Transfer Capacitance		45	75	105	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	0.8	1.7	2.6	Ω
SWITCHING PARAMETERS						
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=10V, I_D=6A		12.5		nC
Q_g(4.5V)	Total Gate Charge			6		nC
Q_{gs}	Gate Source Charge			1		nC
Q_{gd}	Gate Drain Charge			2		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=10V, R_L=1.7Ω, R_{GEN}=3Ω		3		ns
t_r	Turn-On Rise Time			7.5		ns
$t_{D(off)}$	Turn-Off DelayTime			20		ns
t_f	Turn-Off Fall Time			6		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=6A, dI/dt=100A/µs		14		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=6A, dI/dt=100A/µs		6		nC

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

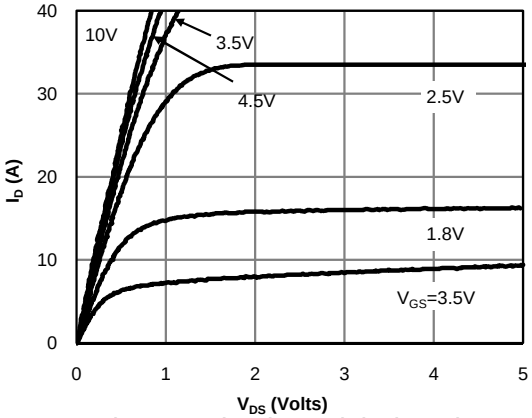


Fig 1: On-Region Characteristics (Note E)

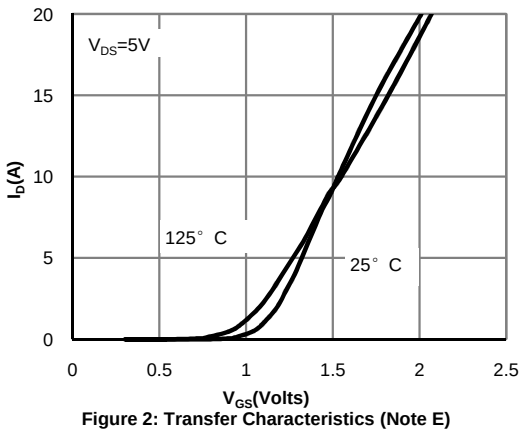


Figure 2: Transfer Characteristics (Note E)

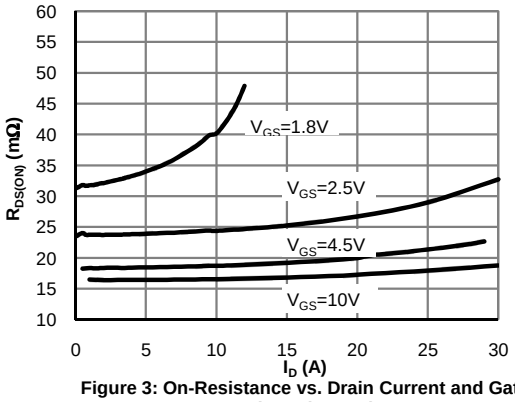


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

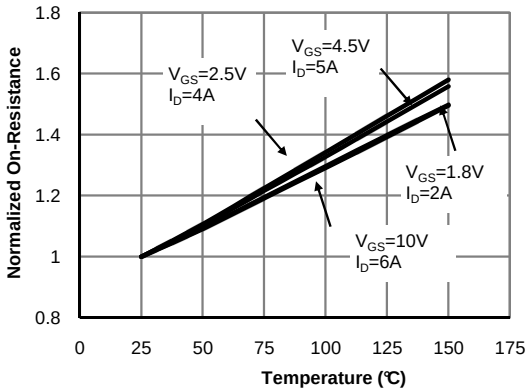


Figure 4: On-Resistance vs. Junction Temperature (Note E)

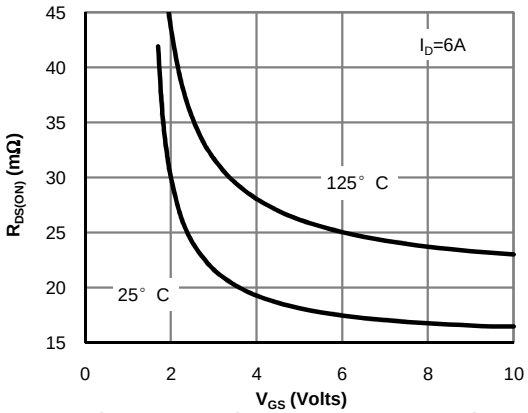


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

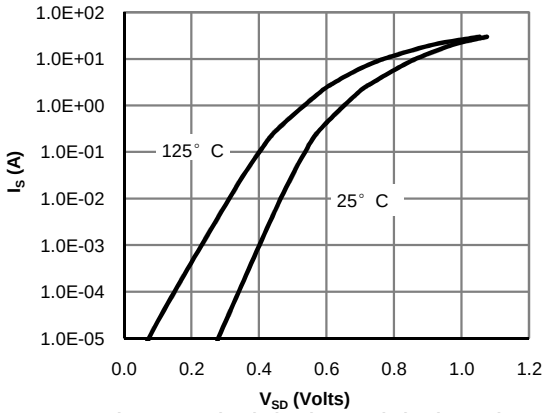


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

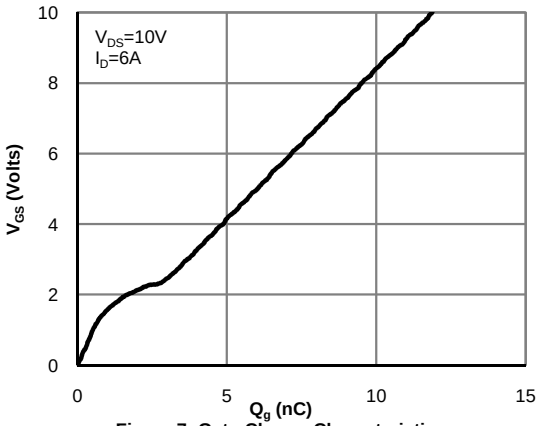


Figure 7: Gate-Charge Characteristics

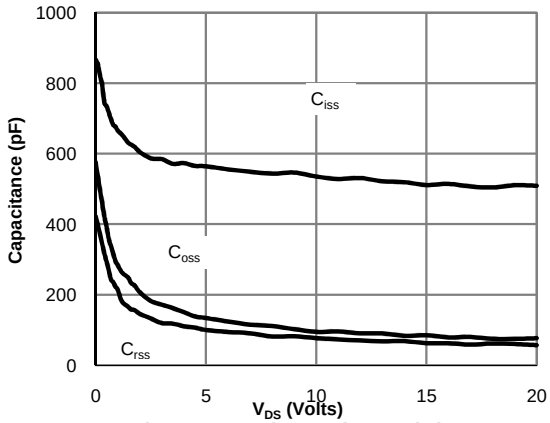


Figure 8: Capacitance Characteristics

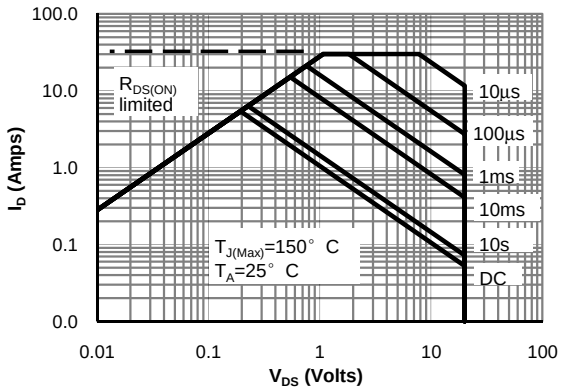


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

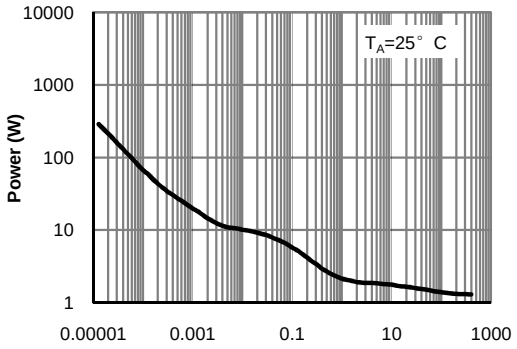


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

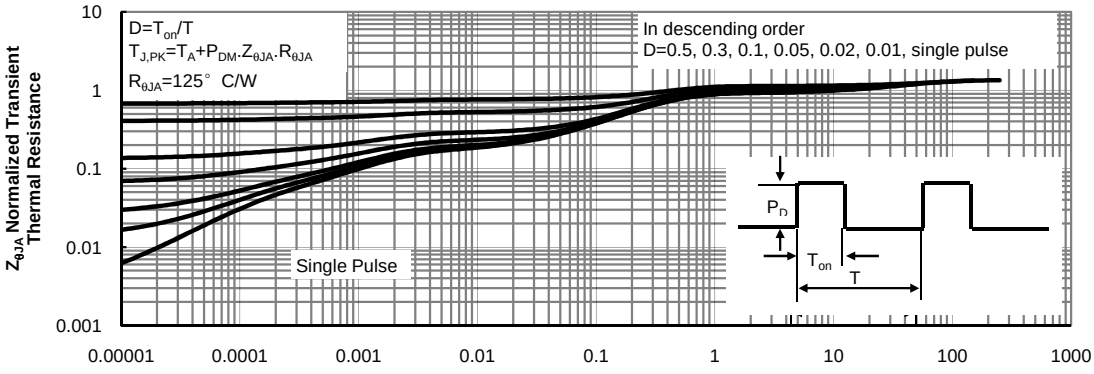
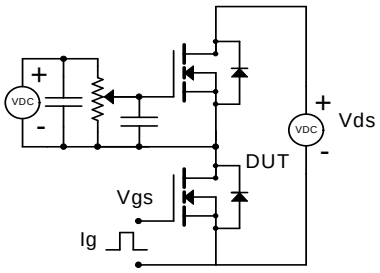
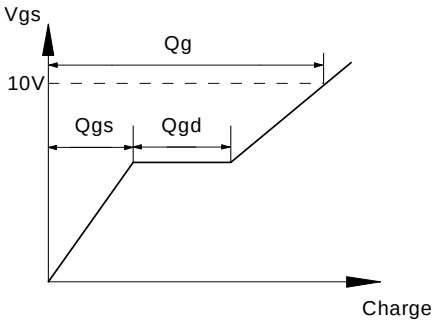


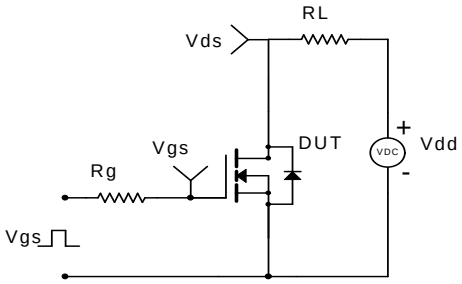
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

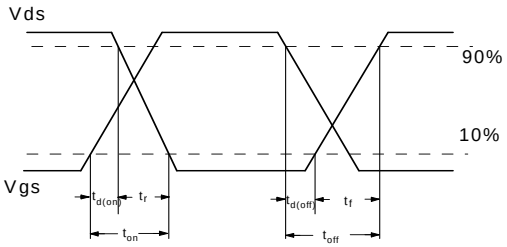
Gate Charge Test Circuit & Waveform





Resistive Switching Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms