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[Alpha & Omega Semiconductor Inc.](#)
[AO3435](#)

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AO3435

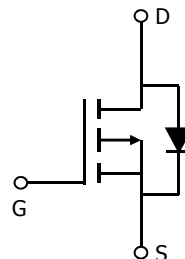
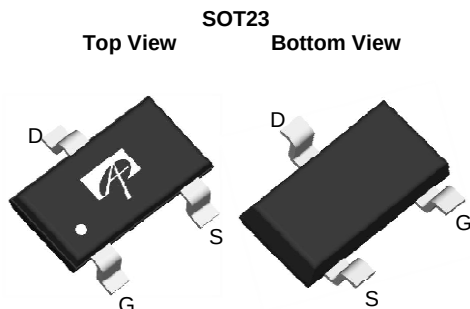
20V P-Channel MOSFET

General Description

The AO3435 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.5V. This device is suitable for use in buck convertor applications.

Product Summary

$V_{DS} = -20V$
 $I_D = -3.5A$ ($V_{GS} = -4.5V$)
 $R_{DS(ON)} < 70m\Omega$ ($V_{GS} = -4.5V$)
 $R_{DS(ON)} < 90m\Omega$ ($V_{GS} = -2.5V$)
 $R_{DS(ON)} < 110m\Omega$ ($V_{GS} = -1.8V$)
 $R_{DS(ON)} < 130m\Omega$ ($V_{GS} = -1.5V$)



Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

Parameter	Symbol	10 Sec	Steady State	Units
Drain-Source Voltage	V_{DS}	-20		V
Gate-Source Voltage	V_{GS}	± 8		V
Continuous Drain Current ^A	$T_A=25^\circ C$	-3.5	-2.9	A
	$T_A=70^\circ C$	-2.7	-2.3	
Pulsed Drain Current ^B	I_{DM}	-25		
Power Dissipation ^A	$T_A=25^\circ C$	1.4	1	W
	$T_A=70^\circ C$	0.9	0.6	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150		$^\circ C$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A $t \leq 10s$	$R_{\theta JA}$	70	90	$^\circ C/W$
Maximum Junction-to-Ambient ^A Steady-State		100	125	$^\circ C/W$
Maximum Junction-to-Lead ^C Steady-State	$R_{\theta JL}$	63	80	$^\circ C/W$



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 T _J =55°C			-1 -5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±8V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-0.5	-0.65	-1	V
I _{D(ON)}	On state drain current	V _{GS} =-4.5V, V _{DS} =-5V	-25			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-4.5V, I _D =-3.5A T _J =125°C		56 80	70 100	mΩ
		V _{GS} =-2.5V, I _D =-3.0A		70	90	mΩ
		V _{GS} =-1.8V, I _D =-2.0A		85	110	mΩ
		V _{GS} =-1.5V, I _D =-0.5A		100	130	mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-3.5A		15		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.7	-1	V
I _S	Maximum Body-Diode Continuous Current				-1.4	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-10V, f=1MHz		510	745	pF
C _{oss}	Output Capacitance			70		pF
C _{rss}	Reverse Transfer Capacitance			52		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		18	23	Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =-4.5V, V _{DS} =-10V, I _D =-3.5A		5.6	11	nC
Q _{gs}	Gate Source Charge			0.6		nC
Q _{gd}	Gate Drain Charge			1.8		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =-4.5V, V _{DS} =-10V, R _L =3Ω, R _{GEN} =6Ω		11		ns
t _r	Turn-On Rise Time			10		ns
t _{D(off)}	Turn-Off DelayTime			60		ns
t _f	Turn-Off Fall Time			30		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-3.5A, dI/dt=100A/μs		17	49	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-3.5A, dI/dt=100A/μs		4		nC

A: The value of R_{θJA} is measured with the device mounted on 1 in² 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. The current rating is based on the t ≤ 10s thermal resistance rating.
B: Repetitive rating, pulse width limited by junction temperature.
C: The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.
D: The static characteristics in Figures 1 to 6 are obtained using 300μs pulse width, duty cycle 0.5% max.
E: 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. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

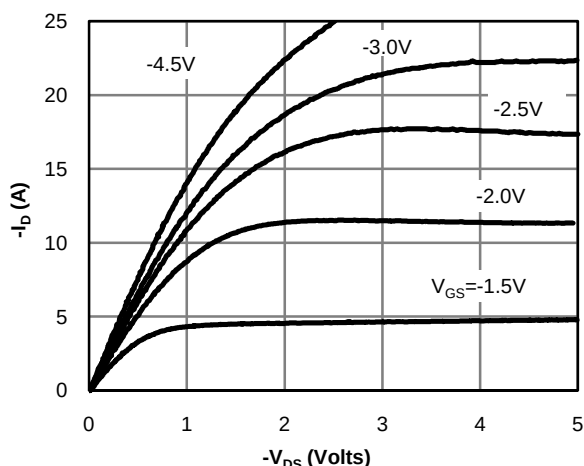


Figure 1: On-Region Characteristics

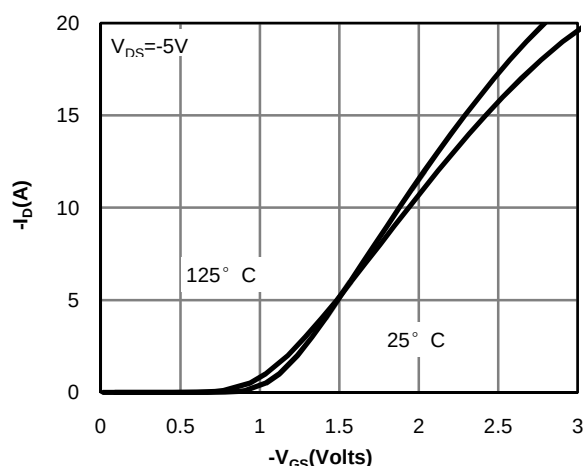


Figure 2: Transfer Characteristics

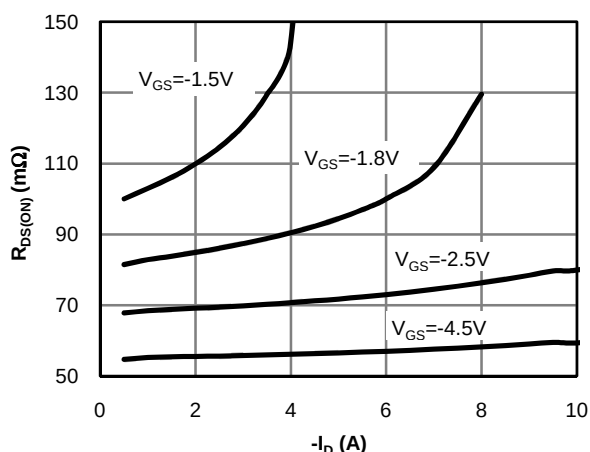


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

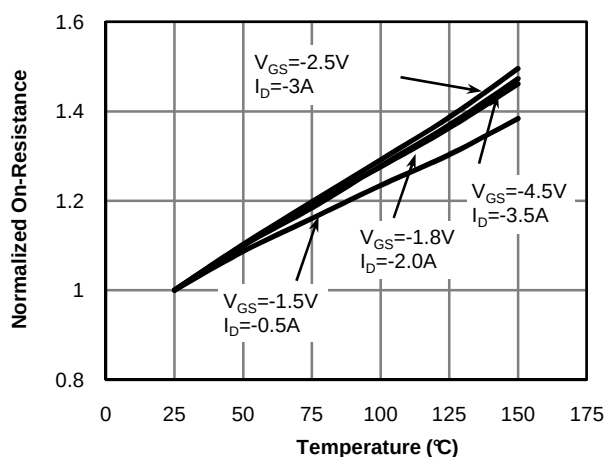


Figure 4: On-Resistance vs. Junction Temperature

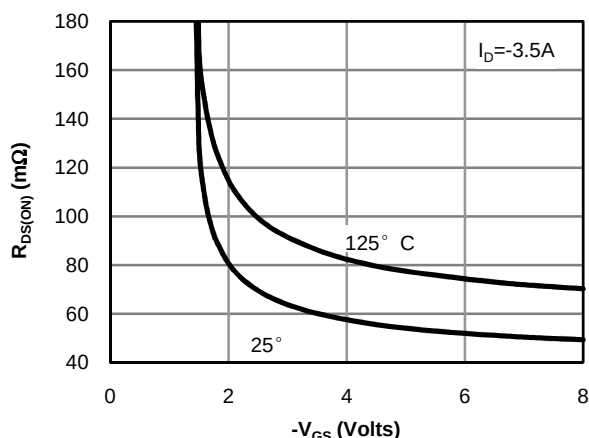


Figure 5: On-Resistance vs. Gate-Source Voltage

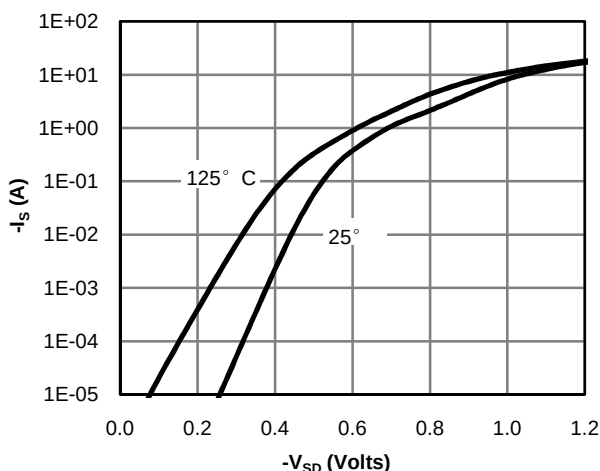


Figure 6: Body-Diode Characteristics



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

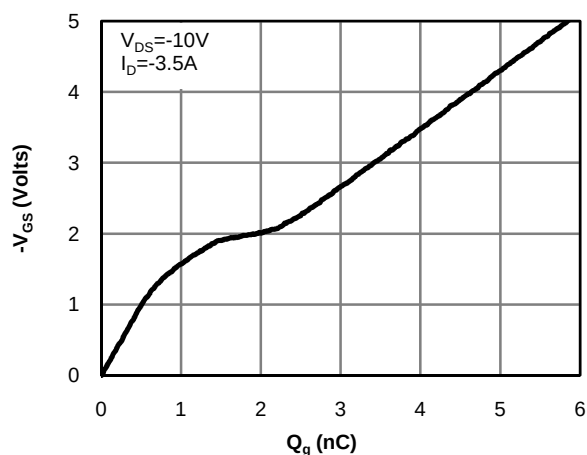


Figure 7: Gate-Charge Characteristics

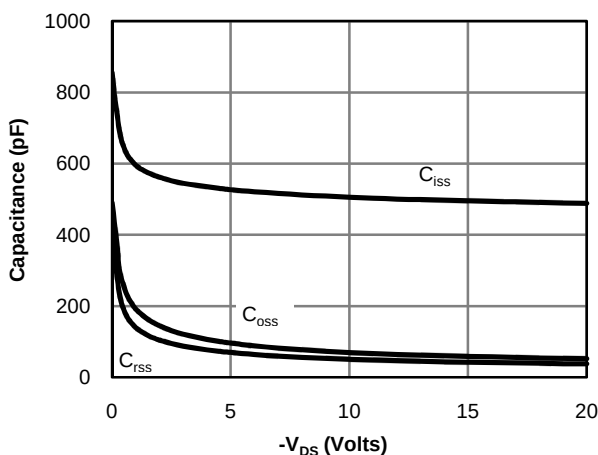


Figure 8: Capacitance Characteristics

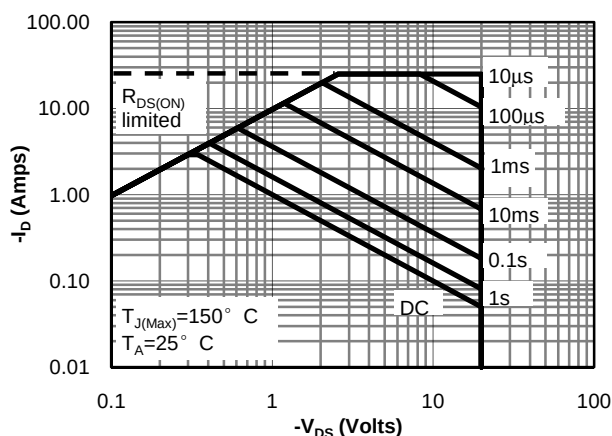


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

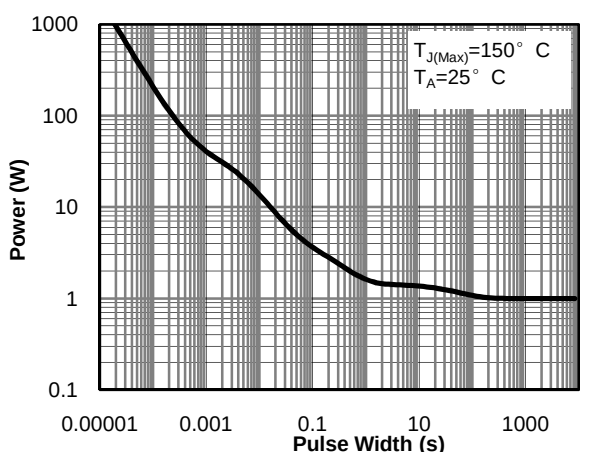


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

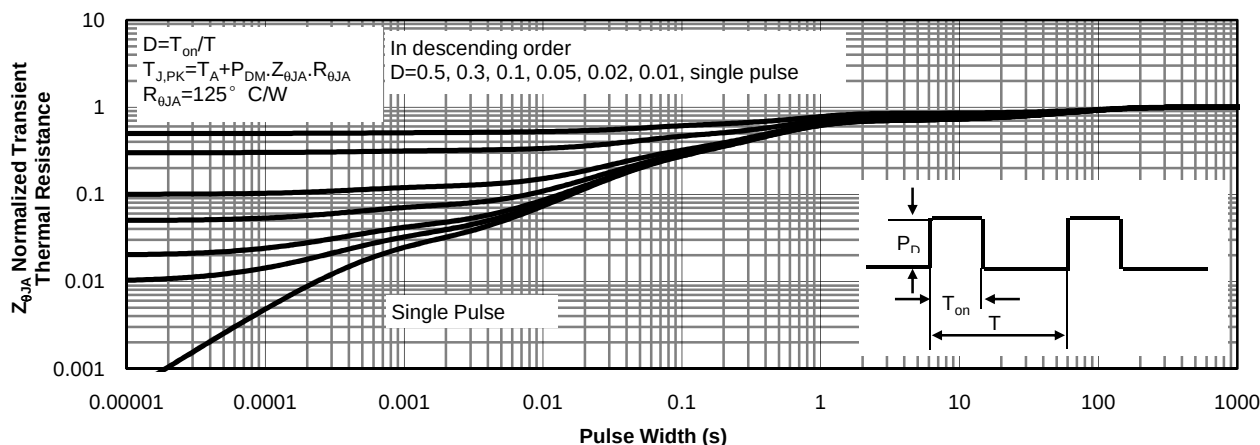
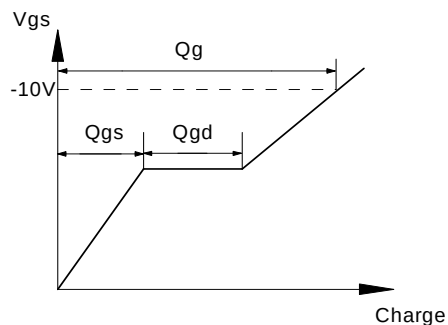
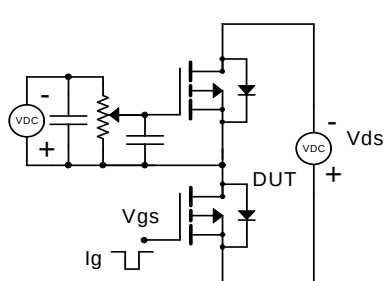


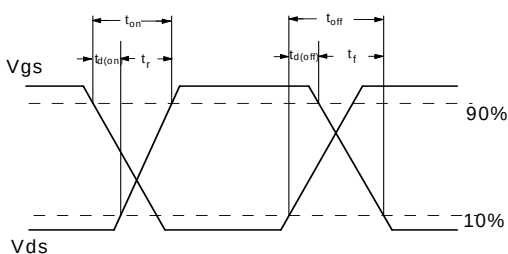
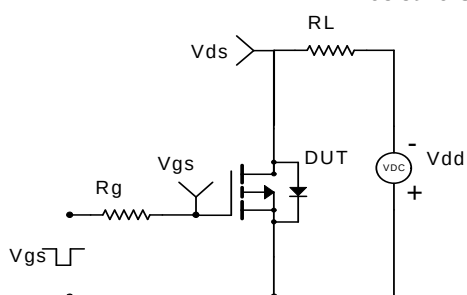
Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)



Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

