
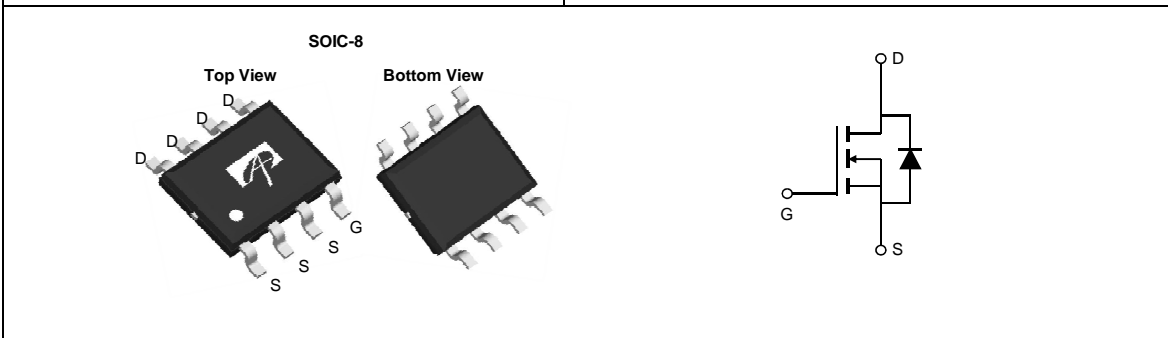




# THE DATASHEET OF AO4354



<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>Latest Trench Power AlphaMOS (αMOS LV) technology</li> <li>Very Low RDS(on) at 4.5V<sub>GS</sub></li> <li>Low Gate Charge</li> <li>High Current Capability</li> <li>RoHS and Halogen-Free Compliant</li> </ul> <p><b>Application</b></p> <ul style="list-style-type: none"> <li>DC/DC Converters in Computing, Servers, and POL</li> <li>Isolated DC/DC Converters in Telecom and Industrial</li> </ul>	<p><b>Product Summary</b></p> <table style="width: 100%; border: none;"> <tr> <td style="padding: 2px 10px 2px 0;"><math>V_{DS}</math></td> <td style="padding: 2px 10px 2px 0;">30V</td> </tr> <tr> <td style="padding: 2px 10px 2px 0;"><math>I_D</math> (at <math>V_{GS}=10V</math>)</td> <td style="padding: 2px 10px 2px 0;">23A</td> </tr> <tr> <td style="padding: 2px 10px 2px 0;"><math>R_{DS(ON)}</math> (at <math>V_{GS}=10V</math>)</td> <td style="padding: 2px 10px 2px 0;">&lt; 3.7mΩ</td> </tr> <tr> <td style="padding: 2px 10px 2px 0;"><math>R_{DS(ON)}</math> (at <math>V_{GS} = 4.5V</math>)</td> <td style="padding: 2px 10px 2px 0;">&lt; 5.3mΩ</td> </tr> </table> <p>100% UIS Tested 100% <math>R_g</math> Tested</p> <div style="text-align: right;">  </div>	$V_{DS}$	30V	$I_D$ (at $V_{GS}=10V$ )	23A	$R_{DS(ON)}$ (at $V_{GS}=10V$ )	< 3.7mΩ	$R_{DS(ON)}$ (at $V_{GS} = 4.5V$ )	< 5.3mΩ
$V_{DS}$	30V								
$I_D$ (at $V_{GS}=10V$ )	23A								
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$R_{DS(ON)}$ (at $V_{GS} = 4.5V$ )	< 5.3mΩ								



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted			
Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current	$I_D$	$T_A=25^\circ\text{C}$	23
		$T_A=100^\circ\text{C}$	14
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	174	A
Avalanche Current <sup>C</sup>	$I_{AS}$	37	A
Avalanche energy $L=0.1\text{mH}$ <sup>C</sup>	$E_{AS}$	68	mJ
$V_{DS}$ Spike	100ns	$V_{SPIKE}$	36
Power Dissipation <sup>B</sup>	$P_D$	$T_A=25^\circ\text{C}$	3.1
		$T_A=100^\circ\text{C}$	1.2
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	°C

Thermal Characteristics					
Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10\text{s}$	$R_{\theta JA}$	31	40	°C/W
	Steady-State		59	75	°C/W
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	16	24	°C/W

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.2	1.8	2.2	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A T <sub>J</sub> =125°C		3 4.1	3.7 5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A		4.1	5.3	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A		105		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.7	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				4	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance			2010		pF
C <sub>oss</sub>	Output Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz		898		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			124		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	0.9	1.8	2.7	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g(10V)</sub>	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =20A		36	49	nC
Q <sub>g(4.5V)</sub>	Total Gate Charge			17	23	nC
Q <sub>gs</sub>	Gate Source Charge			6		nC
Q <sub>gd</sub>	Gate Drain Charge			8		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =0.75Ω, R <sub>GEN</sub> =3Ω		7.5		ns
t <sub>r</sub>	Turn-On Rise Time			4.0		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			37.0		ns
t <sub>f</sub>	Turn-Off Fall Time			7.5		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =20A, dI/dt=500A/μs		14		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =20A, dI/dt=500A/μs		20.3		nC

A. The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° C. The value in any given application depends on the user's specific board design.

B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150° C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150° C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25° C.

D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> 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 impedance which is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150° C. The SOA curve provides a single pulse rating.

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**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

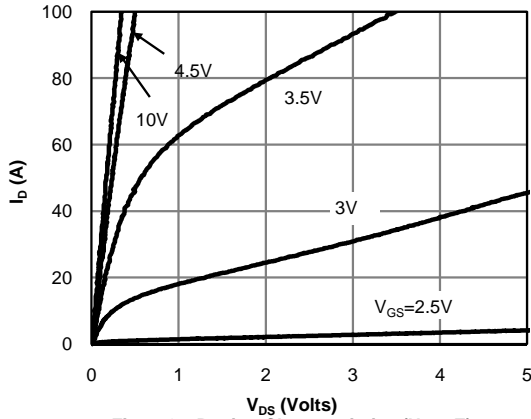


Fig 1: On-Region Characteristics (Note E)

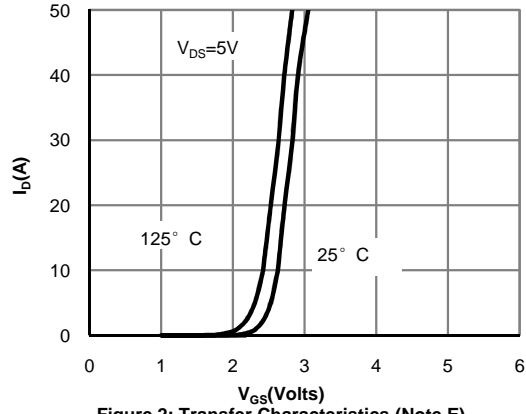


Figure 2: Transfer Characteristics (Note E)

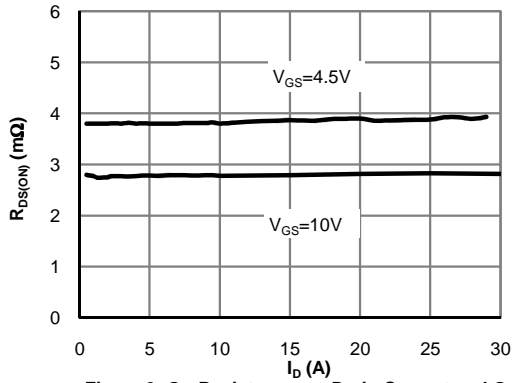


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

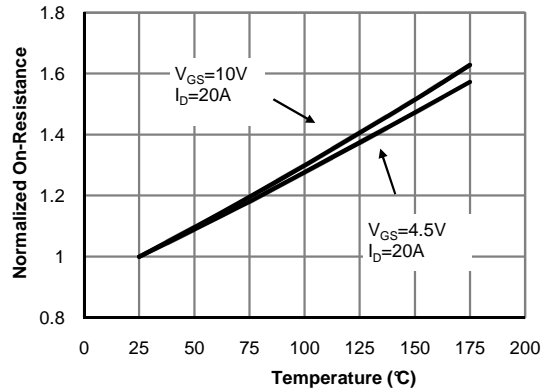


Figure 4: On-Resistance vs. Junction Temperature (Note E)

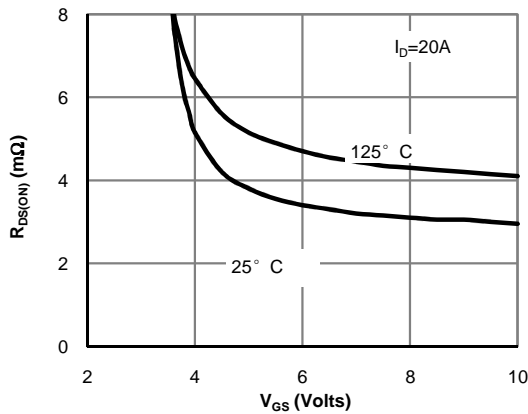


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

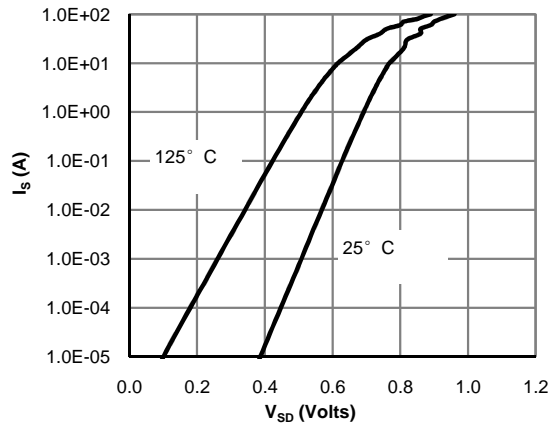


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

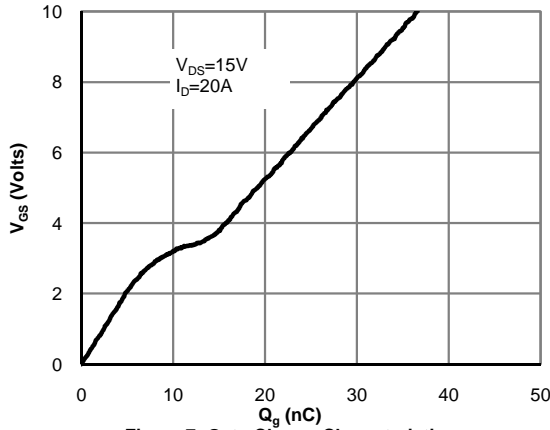


Figure 7: Gate-Charge Characteristics

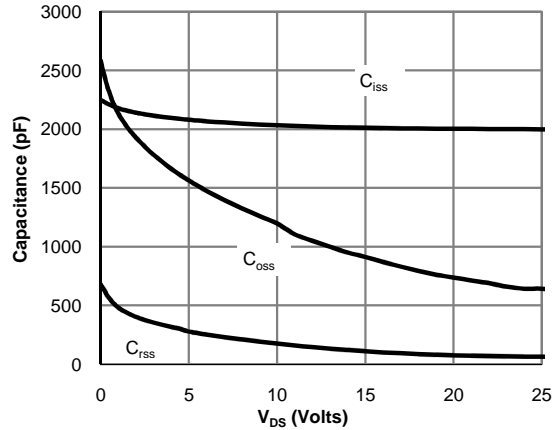


Figure 8: Capacitance Characteristics

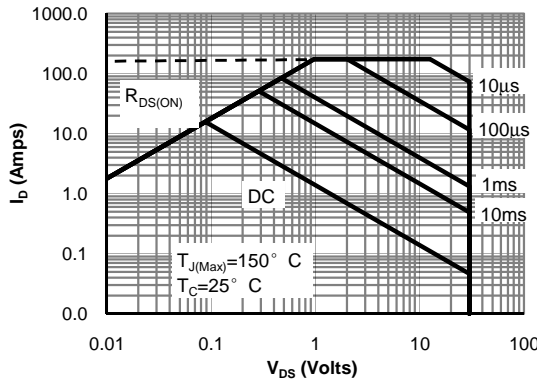


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

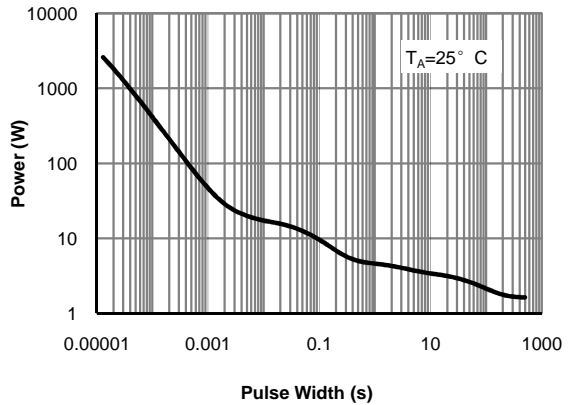


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note F)

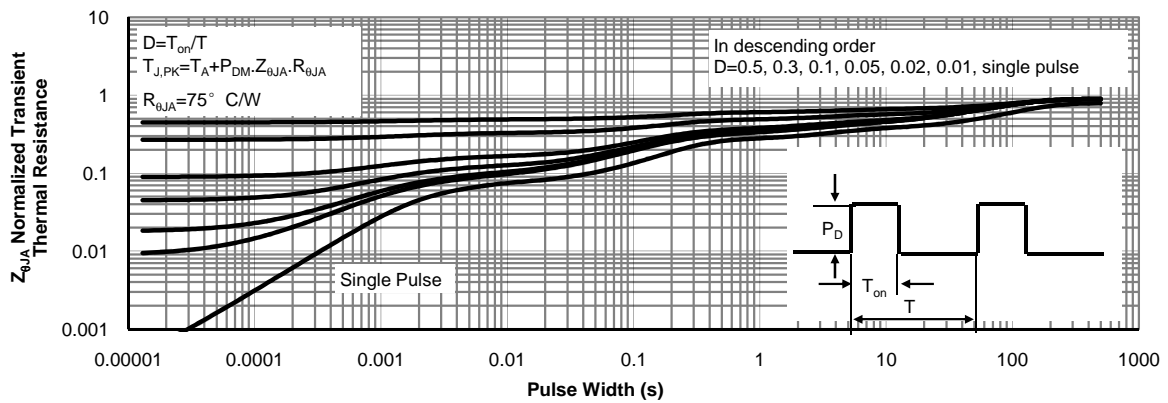
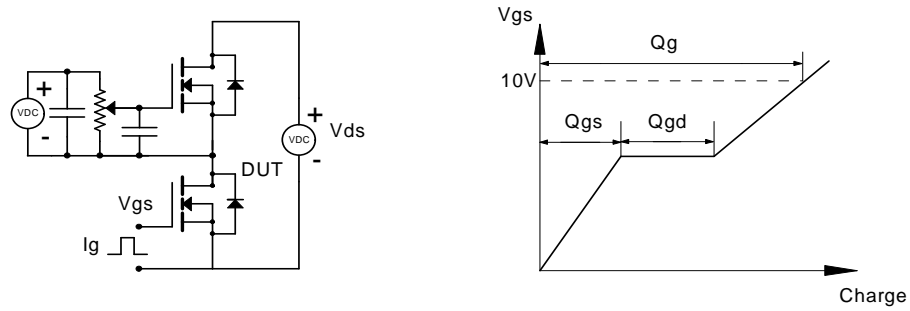
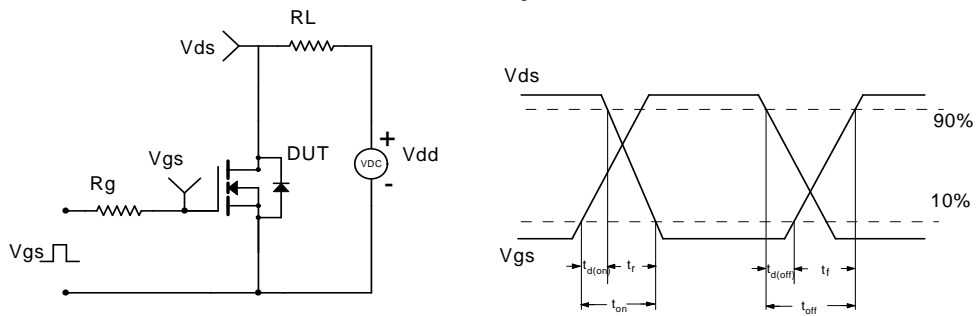


Figure 15: Normalized Maximum Transient Thermal Impedance (Note F)

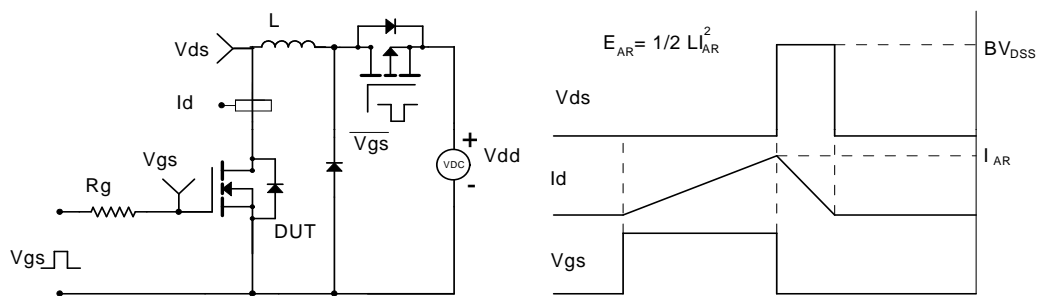
**Gate Charge Test Circuit & Waveform**



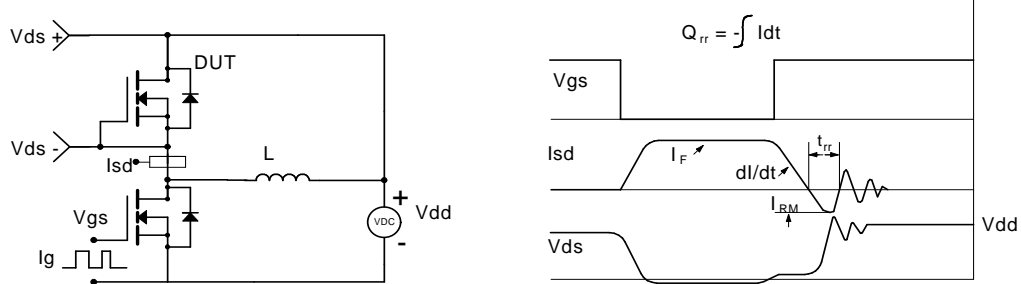
**Resistive Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching (UIS) Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**



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