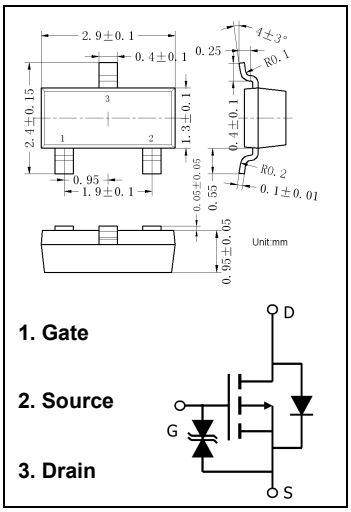
SOT-23 Plastic-Encapsulate Mosfets

AO3415 20V P-Channel Mosfet



Features

- V_{DS} = -20V
- I_D = 3A (V_{GS} = -4V)
- $R_{DS(ON)}$ < 41mΩ (V_{GS} = -4.5V)
- $R_{DS(ON)}$ < 53mΩ (V_{GS} = -2.5V)
- $R_{DS(ON)}$ < 65mΩ (V_{GS} = -1.8V)
- ESD protected

Applications

The AO3415 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications.

Maximum Ratings (T_a=25°C unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{DS}	Drain-Source voltage		-20	V
V_{GS}	Gate-Source voltage		±8	V
I_D	Continuous Drain Current	T_a=25°C	-4	A
		T_a=70°C	-3.5	
I_{DM}	Pulsed Drain Current [C]		-30	
P_D	Power Dissipation [B]	T_a=25°C	1.5	W
		T_a=70°C	1	
T_J, T_{STG}	Junction and Storage Temperature Range		-55 to +150	°C

Thermal Characteristics

Symbol	Parameter		Typ	Max	Unit
$R_{\theta JA}$	Maximum Junction-to-Ambient [A]	t ≤ 10s	65	80	°C/W
	Maximum Junction-to-Ambient [A, D]	Steady-State	85	100	°C/W
$R_{\theta JL}$	Maximum Junction-to-Lead	Steady-State	43	52	°C/W

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Parameters						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = -250μA	-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} = ±8V			±10	μA
$V_{GS(th)}$	Gate-Threshold Voltage	V_{DS} = V_{GS}, I_D = -250μA	-0.3	-0.57	-0.9	V
$I_{D(ON)}$	On-state Drain Current	V_{GS} = -4.5V, V_{DS} = -5V	-30			A
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = -4.5V, I_D = -4A		34	41	mΩ
		T_J=125°C		49	59	
		V_{GS} = -2.5V, I_D = -4A		42	53	
		V_{GS} = -1.8V, I_D = -2A		52	65	
		V_{GS} = -1.5V, I_D = -1A		61		
g_{fs}	Forward Trans conductance	V_{DS} = -5V, I_D = -4A		20		S
V_{SD}	Diode Forward Voltage	I_S = -1A, V_{GS}=0 V		-0.64	-1	V
I_S	Maximum Body-Diode Continuous Current				-2	A
Dynamic Parameters						
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = -10V f = 1.0MHz	600	751	905	pF
C_{oss}	Output Capacitance		80	115	150	
C_{rss}	Reverse Transfer Capacitance		48	80	115	
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	6	13	20	Ω
Dynamic Parameters						
Q_g	Total Gate Charge	V_{GS} = -4.5V V_{DS} = -10V I_D = -4A	7.4	9.3	11	nC
Q_{gs}	Gate Source Charge		0.8	1	1.2	
Q_{gd}	Gate Drain Charge		1.3	2.2	3.1	
$t_{D(on)}$	Turn-On Delay Time	V_{GS} = -4.5V, V_{DS} = -10V, R_L = 2.5Ω, R_{GEN} = 3Ω		13		ns
t_r	Turn-On Rise Time			9		
$t_{D(off)}$	Turn-Off Delay Time			19		
t_f	Turn-Off Fall Time			29		
t_{rr}	Body Diode Reverse Recovery Time	I_F = -4A, dI/dt = 500A/μs	20	26	32	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F = -4A, dI/dt = 500A/μs	40	51	62	nC

A. The value of RθJA is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with TA =25° C. The value in any given application depends on the user's specific board design.

B. The power dissipation PD 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 initialTJ=25° C.

D. The RθJA is the sum of the thermal impedance from junction to lead RθJL 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 1in2 FR-4 board with 2oz. Copper, assuming a maximum junction temperature of TJ(MAX)=150° C. The SOA curve provides a single pulse rating.

Typical Characteristics

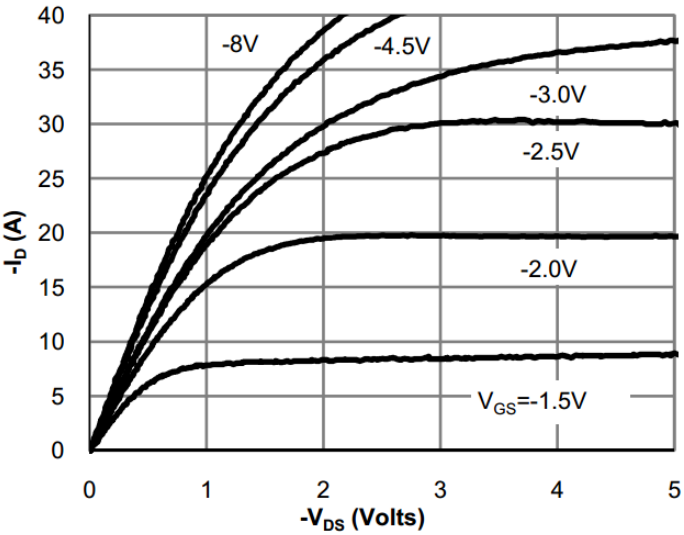


Fig 1: On-Region Characteristics (Note E)

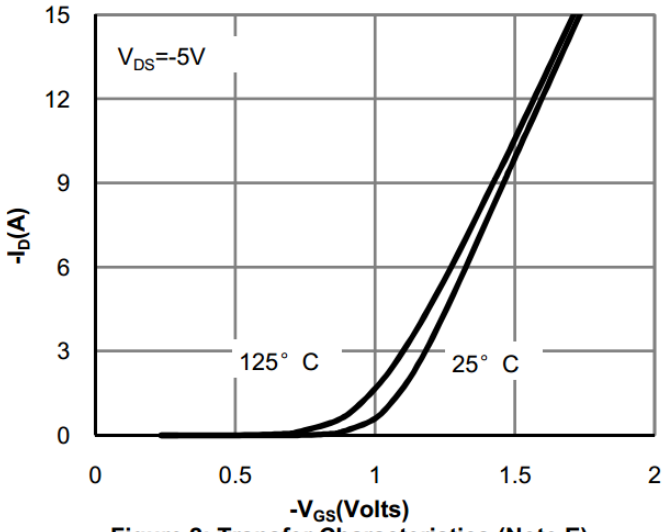


Figure 2: Transfer Characteristics (Note E)

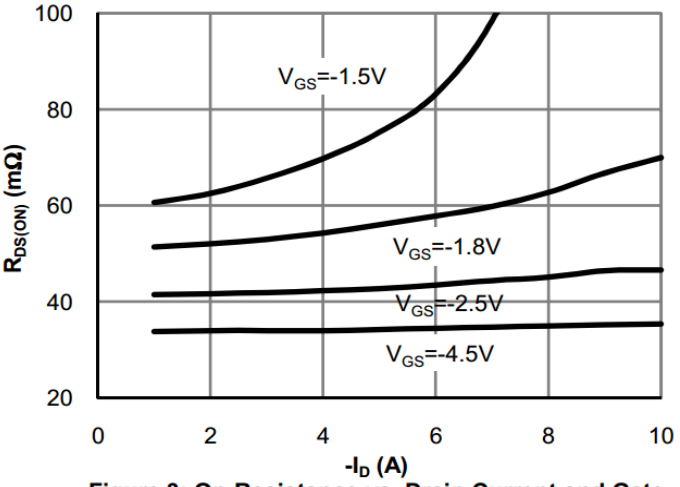


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

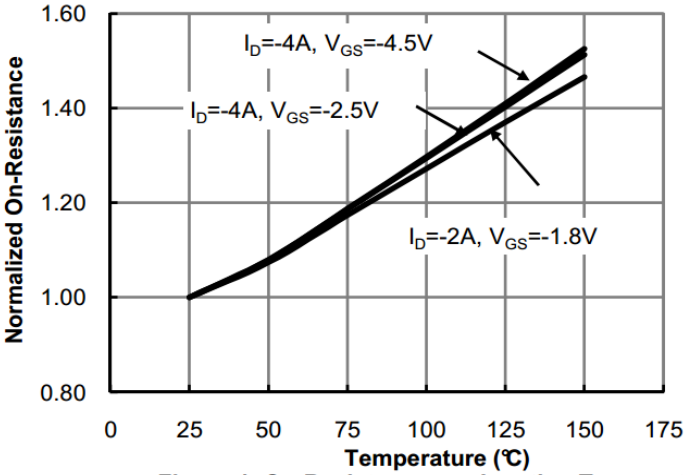


Figure 4: On-Resistance vs. Junction Temperature (Note E)

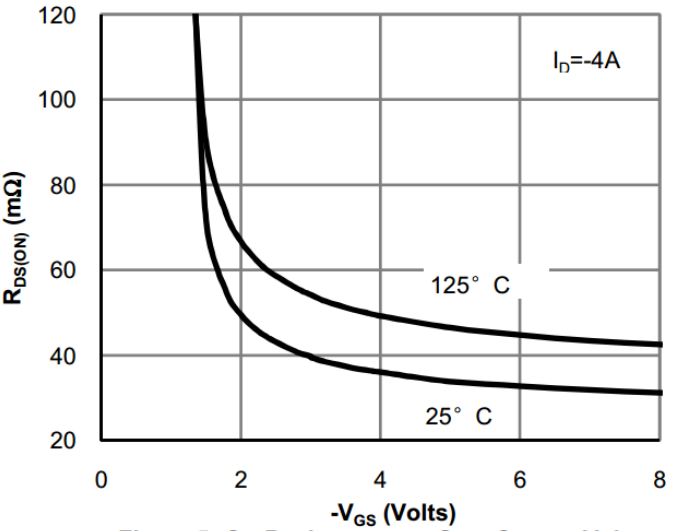


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

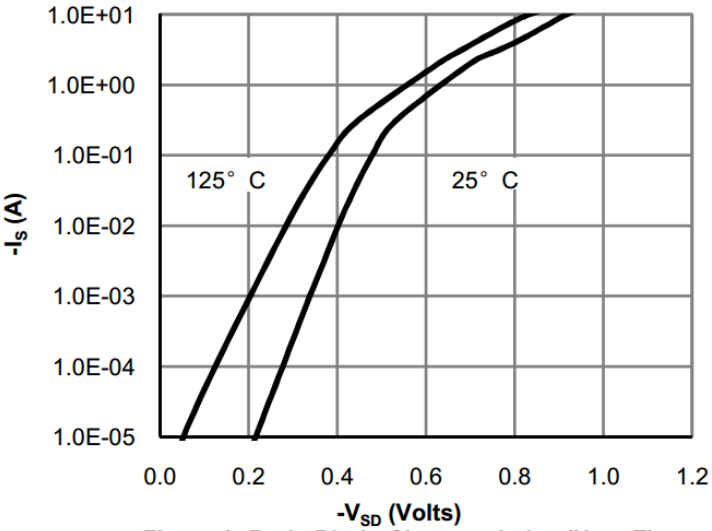


Figure 6: Body-Diode Characteristics (Note E)

Typical Characteristics (Continued)

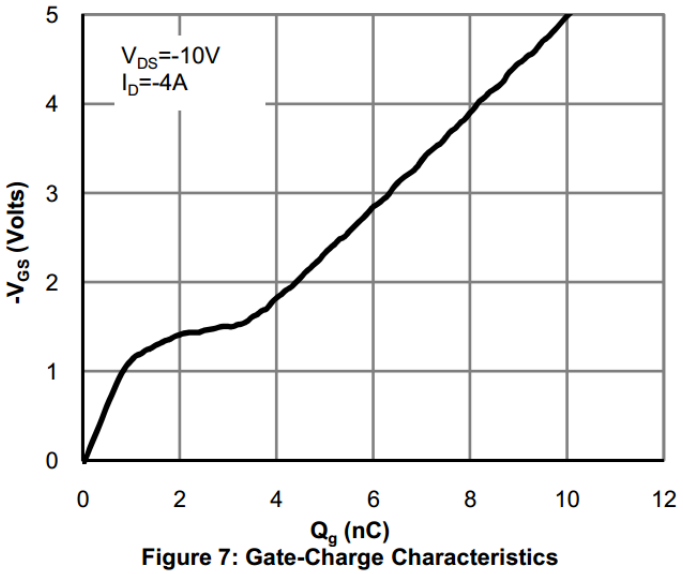


Figure 7: Gate-Charge Characteristics

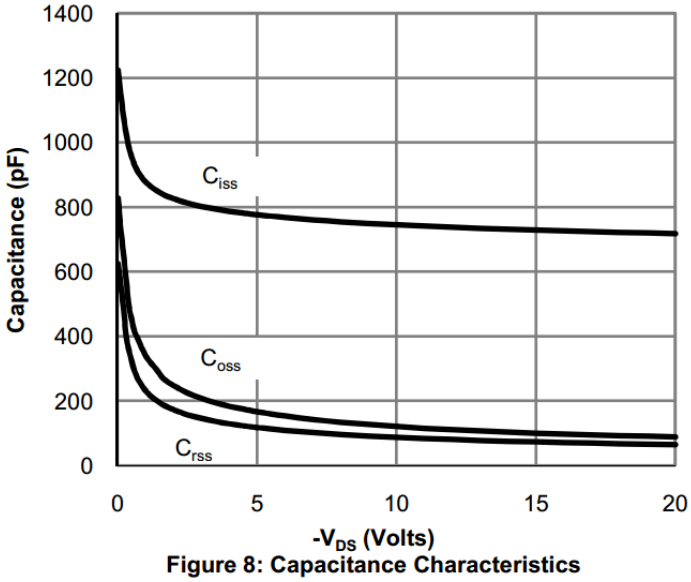


Figure 8: Capacitance Characteristics

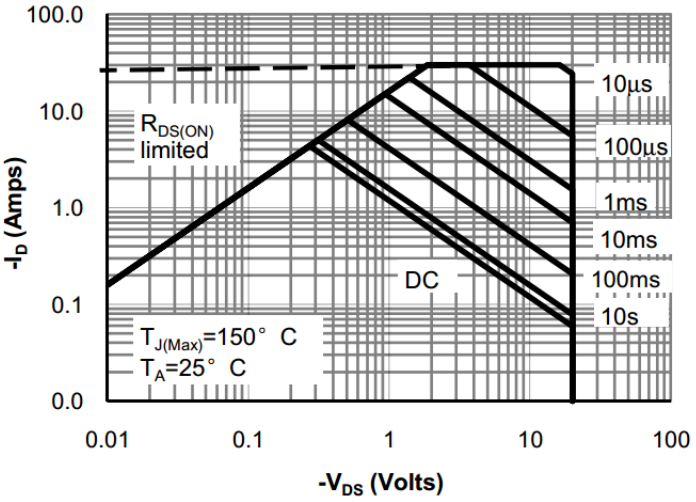


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

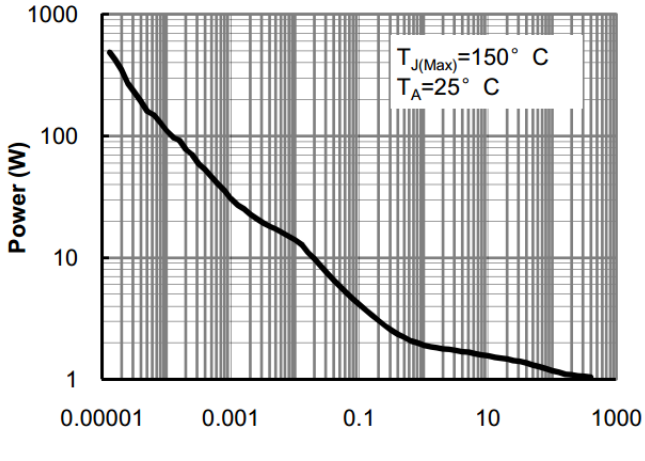


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

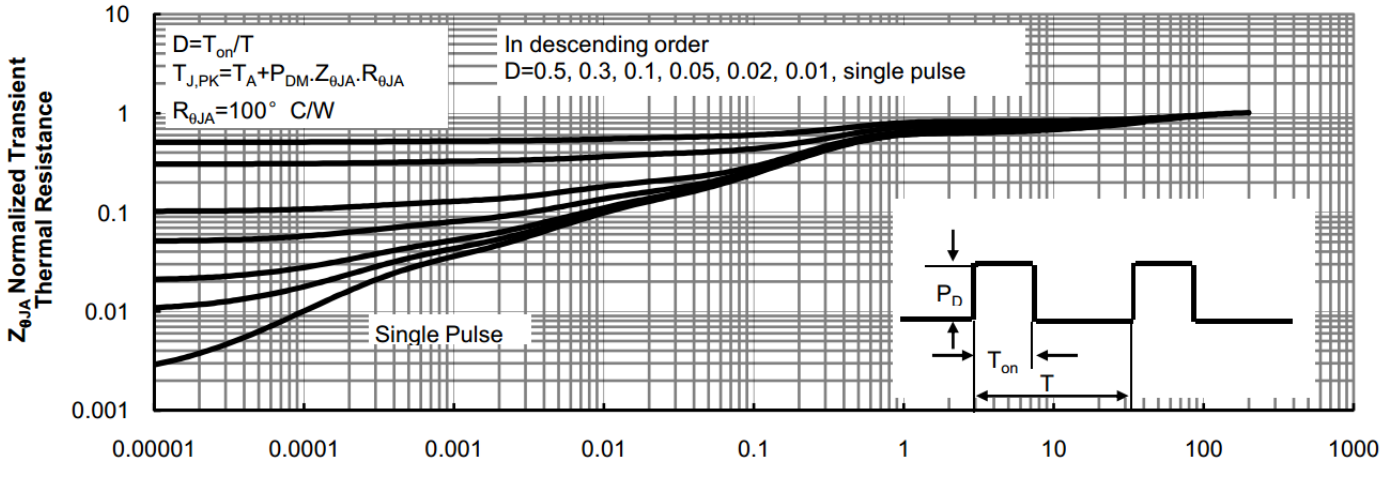
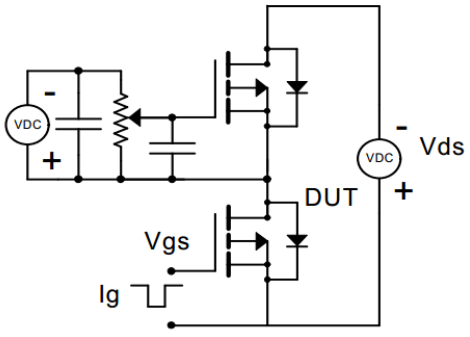
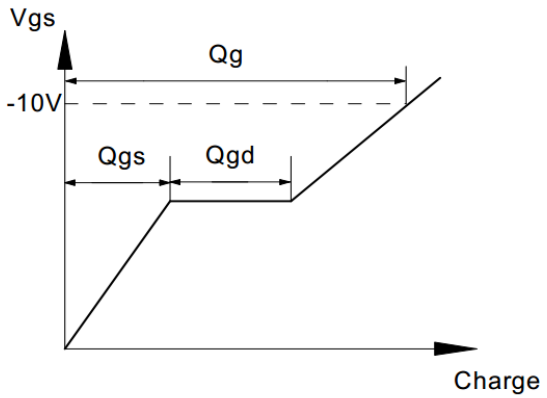


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

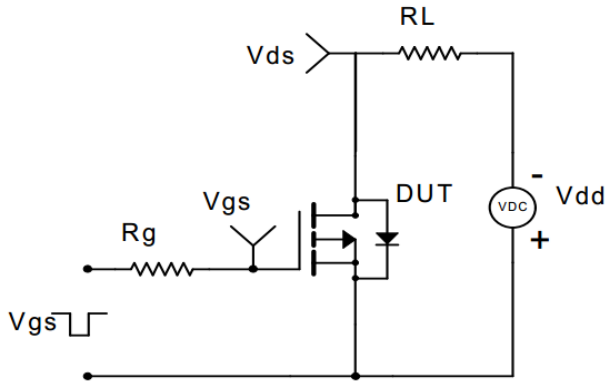
Test Circuit & Waveform

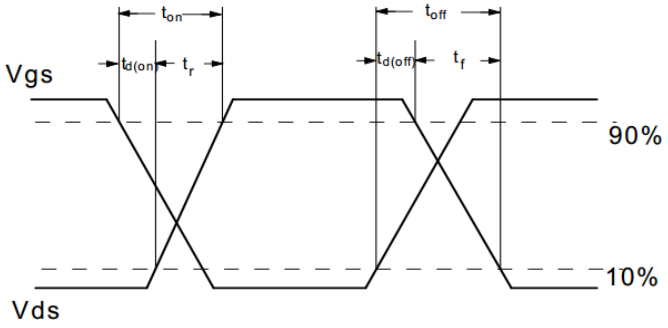
Gate Charge Test Circuit & Waveform



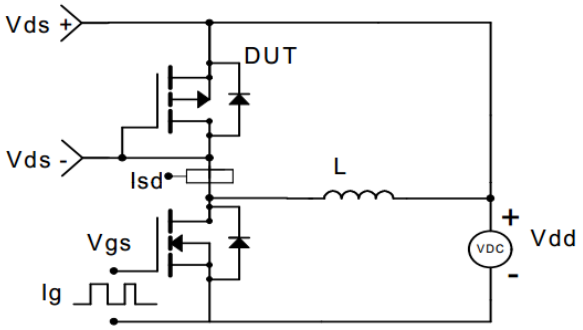


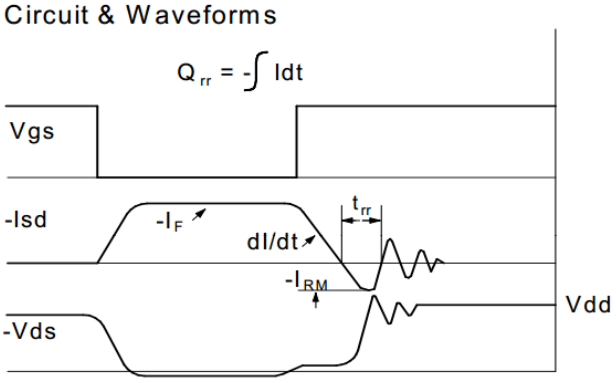
Resistive Switching Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms





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