

SOT-23 Plastic-Encapsulate Mosfets

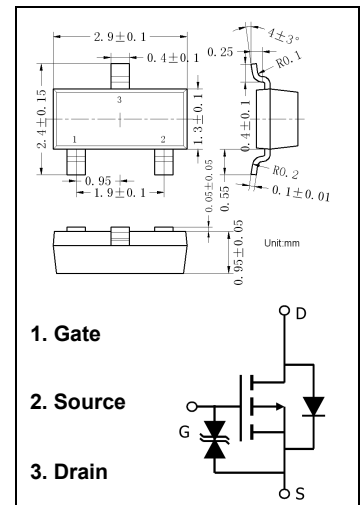
A03415 20V P-Channel Mosfet

Features

- $V_{DS} = -20V$
- $I_D = 3A$ ($V_{GS} = -4V$)
- $R_{DS(ON)} < 41m\Omega$ ($V_{GS} = -4.5V$)
- $R_{DS(ON)} < 53m\Omega$ ($V_{GS} = -2.5V$)
- $R_{DS(ON)} < 65m\Omega$ ($V_{GS} = -1.8V$)
- 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_{θJA}	Maximum Junction-to-Ambient ^A	t ≤ 10s	65	80	°C/W
	Maximum Junction-to-Ambient ^{A, D}	Steady-State	85	100	°C/W
R_{θJL}	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 T _J =55°C			-1 -5	μA
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 T _J =125°C		34 49	41 59	mΩ
		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	600	751	905	pF
C _{oss}	Output Capacitance	V _{DS} = -10V	80	115	150	
C _{rss}	Reverse Transfer Capacitance	f = 1.0MHz	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	7.4	9.3	11	nC
Q _{gs}	Gate Source Charge	V _{DS} = -10V	0.8	1	1.2	
Q _{gd}	Gate Drain Charge	I _D = -4A	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 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 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 initial T_J=25° C.
- D. The R_{θJA} is the sum of the thermal impedance 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 impedance 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.

Typical Characteristics

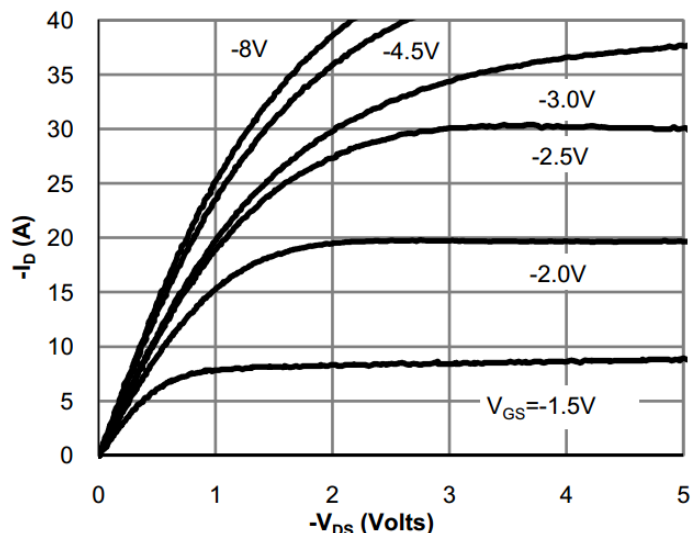


Fig 1: On-Region Characteristics (Note E)

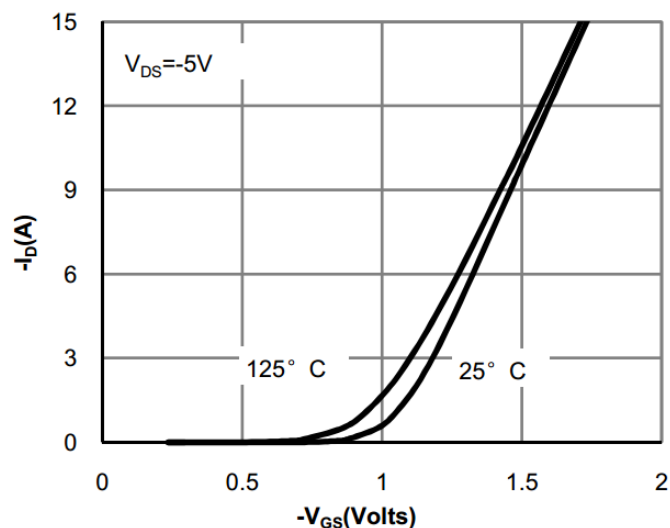


Figure 2: Transfer Characteristics (Note E)

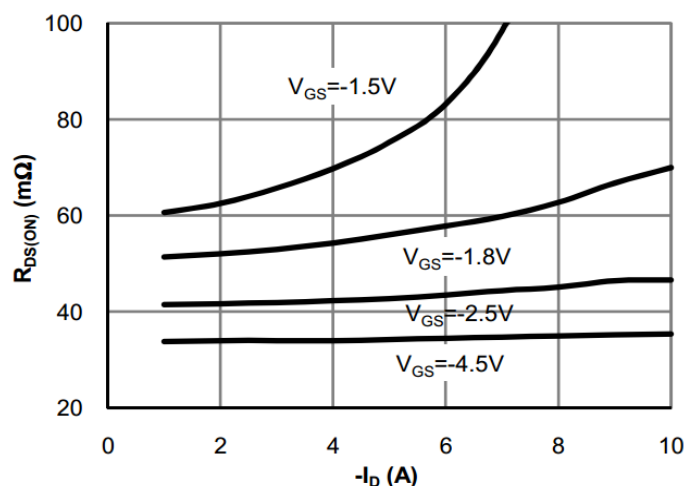


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

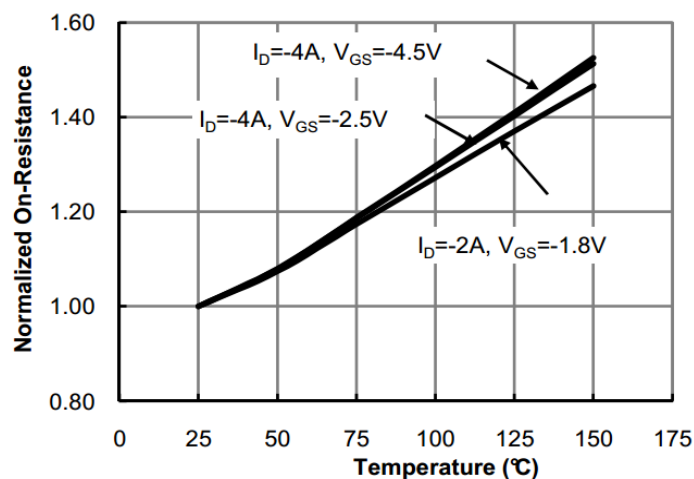


Figure 4: On-Resistance vs. Junction Temperature (Note E)

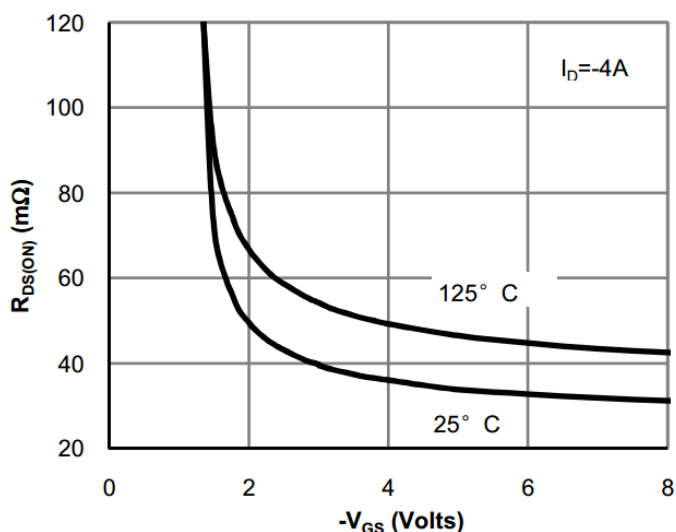


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

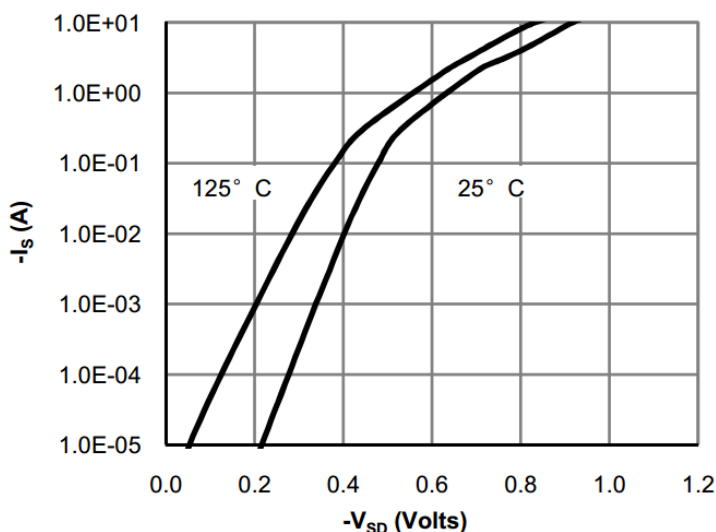
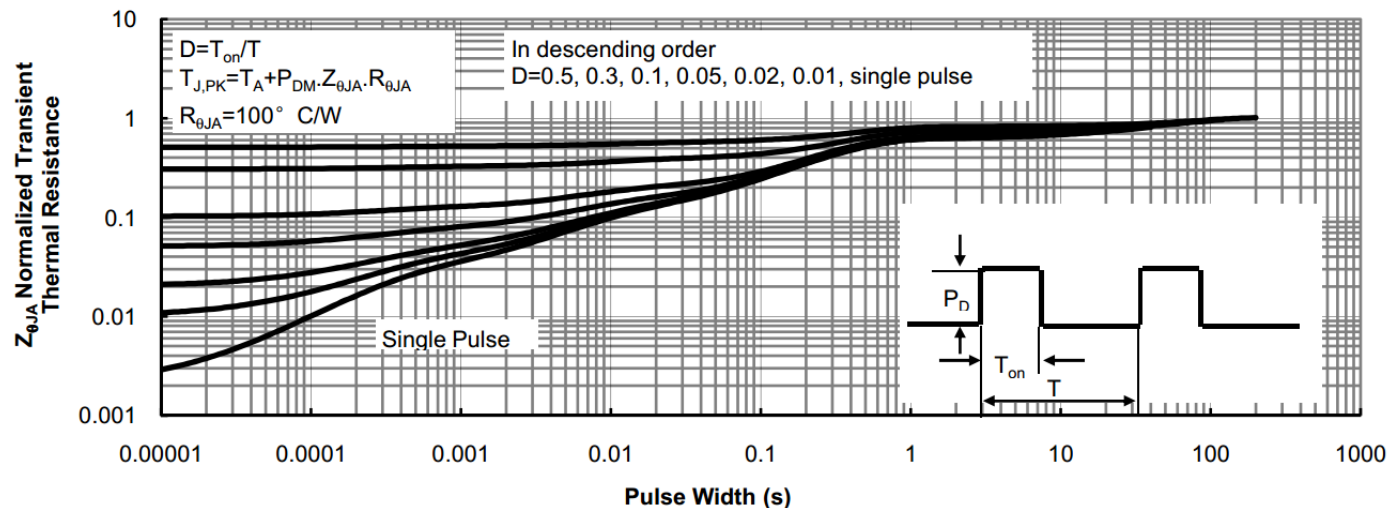
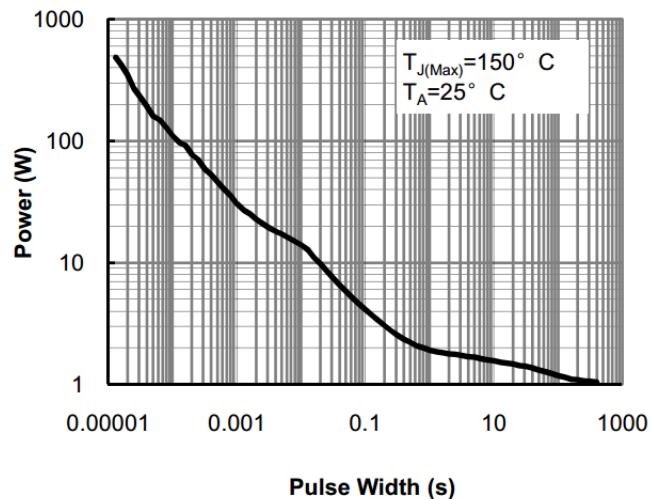
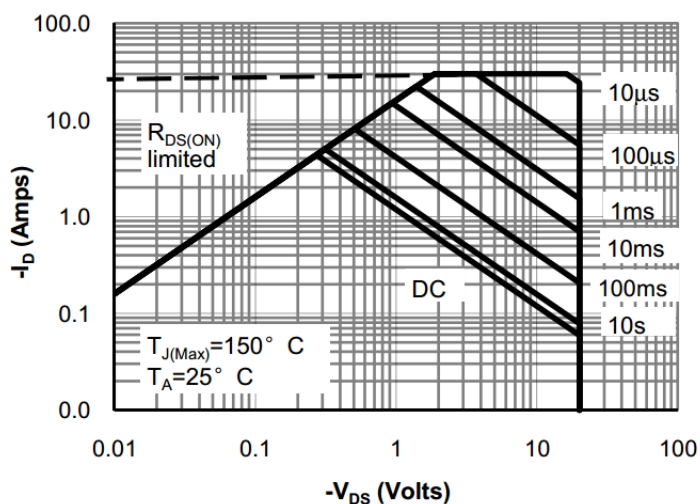
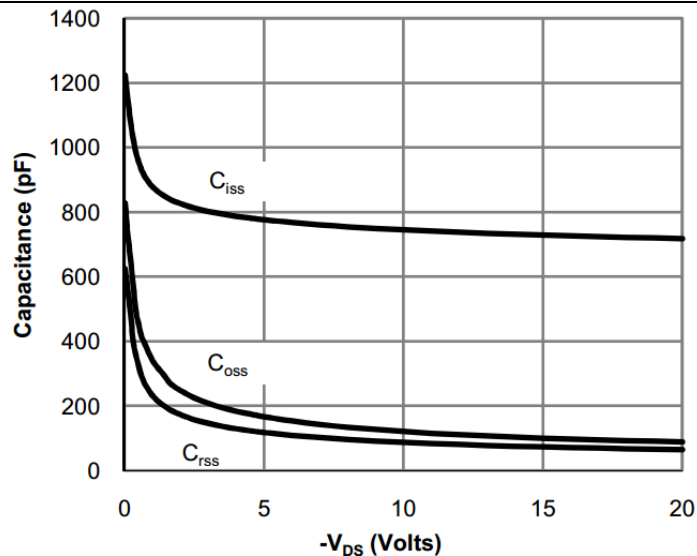
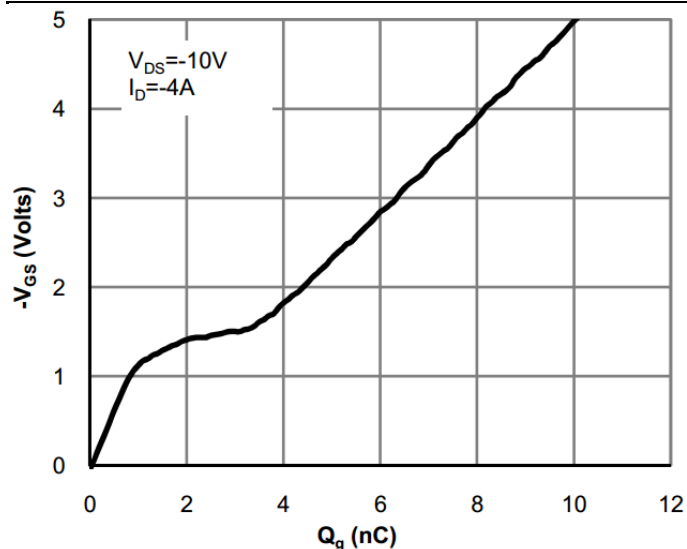
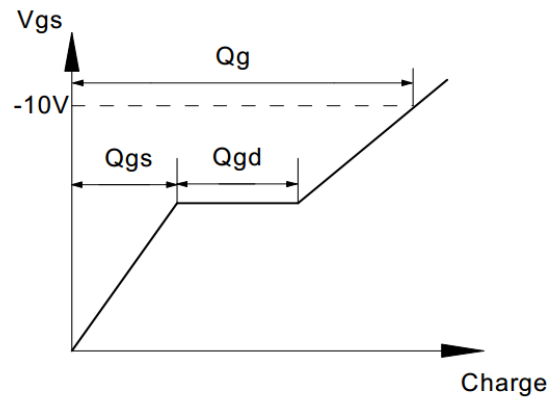
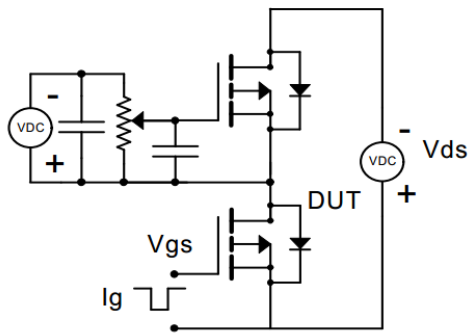


Figure 6: Body-Diode Characteristics (Note E)

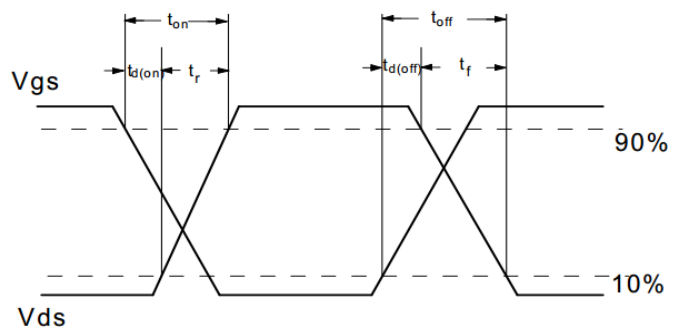
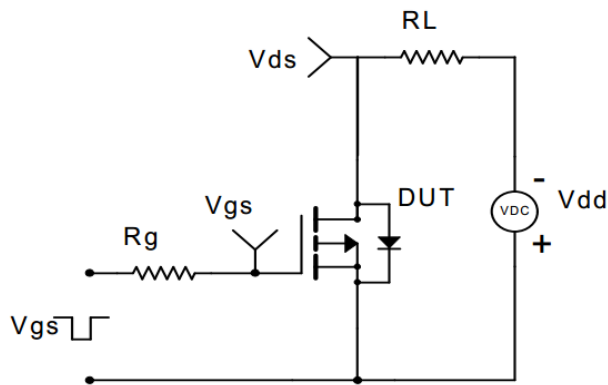
Typical Characteristics (Continued)



Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

