

TO-236
(SOT-23)

Top View

Features

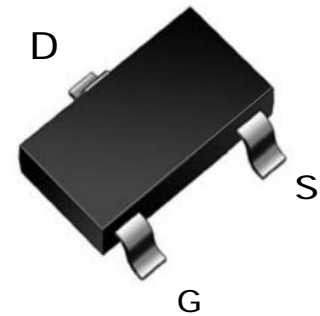
$V_{DS} = 30V$

$I_D = 4 A$

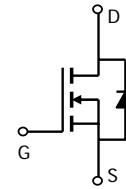
$R_{DS(ON)} < 55m\Omega (V_{GS} = 10V)$

$R_{DS(ON)} < 70m\Omega (V_{GS} = 4.5V)$

$R_{DS(ON)} < 110m\Omega (V_{GS} = 2.5V)$


General Description

The AO3402 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications. AO3402L (Green Product) is offered in a lead-free package.


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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current ^A	I_D	$T_A=25^\circ C$	4
		$T_A=70^\circ C$	3.4
Pulsed Drain Current ^B	I_{DM}	15	A
Power Dissipation ^A	P_D	$T_A=25^\circ C$	1.4
		$T_A=70^\circ C$	1
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	$R_{\theta JA}$	70	90	$^\circ C/W$
Maximum Junction-to-Ambient ^A		Steady-State	100	125
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	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	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V T _J =55°C			1 5	μA
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	0.6	1	1.4	V
I _{D(ON)}	On state drain current	V _{GS} =4.5V, V _{DS} =5V	10			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =4A T _J =125°C		45 66	55 80	mΩ
		V _{GS} =4.5V, I _D =3A		55	70	mΩ
		V _{GS} =2.5V, I _D =2A		83	110	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =4A		8		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.8	1	V
I _S	Maximum Body-Diode Continuous Current				2.5	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		390		pF
C _{oss}	Output Capacitance			54.5		pF
C _{rss}	Reverse Transfer Capacitance			41		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		3		Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =15V, I _D =4A		4.34		nC
Q _{gs}	Gate Source Charge			0.6		nC
Q _{gd}	Gate Drain Charge			1.38		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =3.75Ω, R _{GEN} =6Ω		3.3		ns
t _r	Turn-On Rise Time			1		ns
t _{D(off)}	Turn-Off DelayTime			21.7		ns
t _f	Turn-Off Fall Time			2.1		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =4A, di/dt=100A/μs		12		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =4A, di/dt=100A/μs		6.3		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 a 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, 12, 14 are obtained using 80μs pulses, 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.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

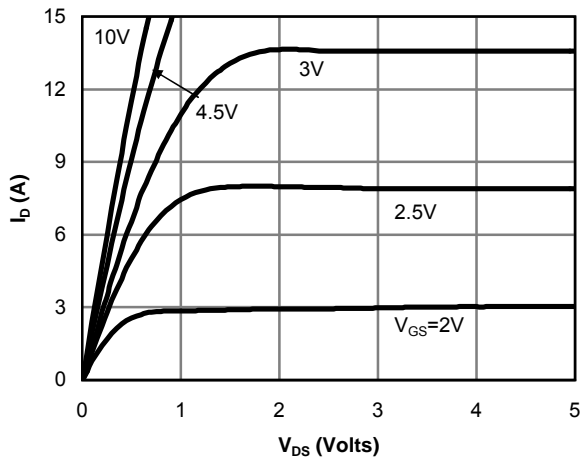


Fig 1: On-Region Characteristics

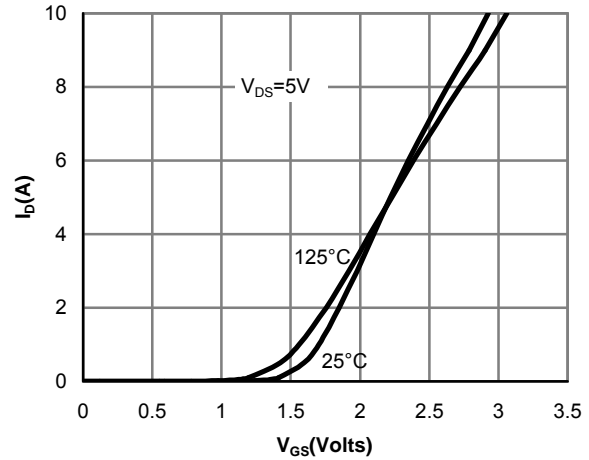


Figure 2: Transfer Characteristics

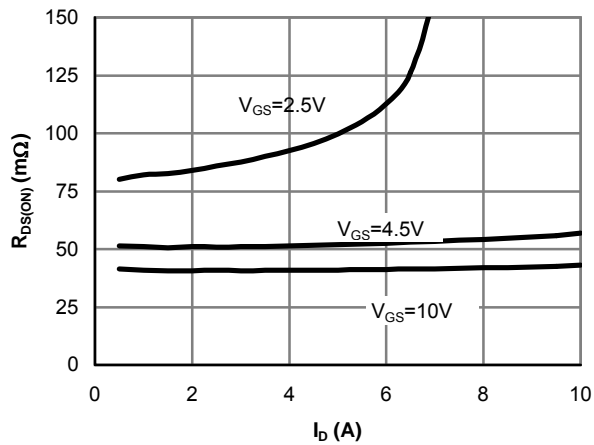


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

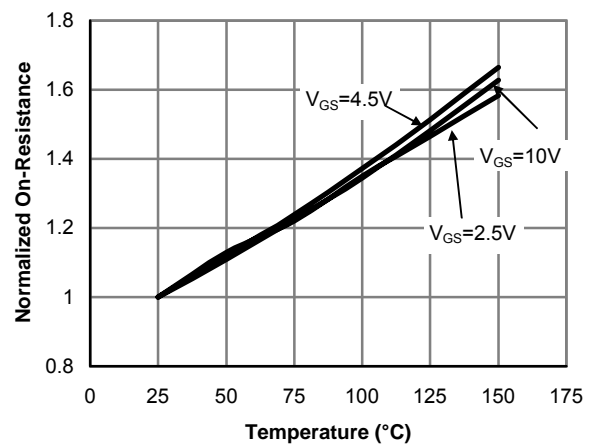


Figure 4: On-Resistance vs. Junction Temperature

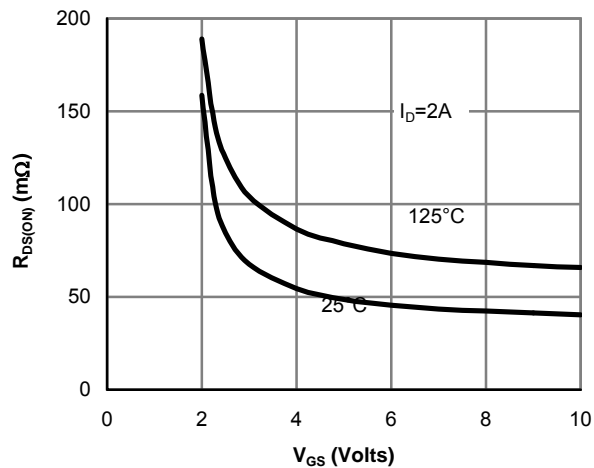


Figure 5: On-Resistance vs. Gate-Source Voltage

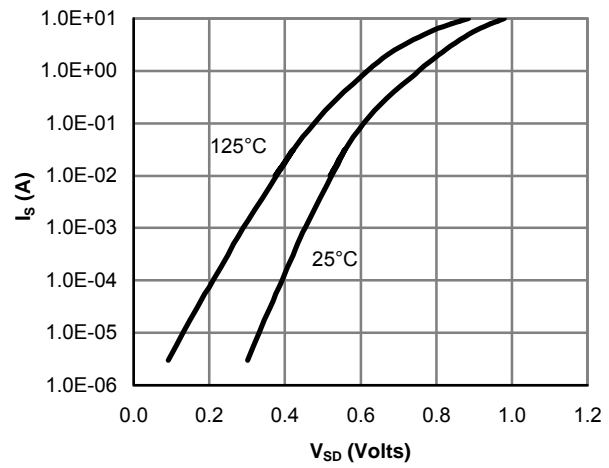
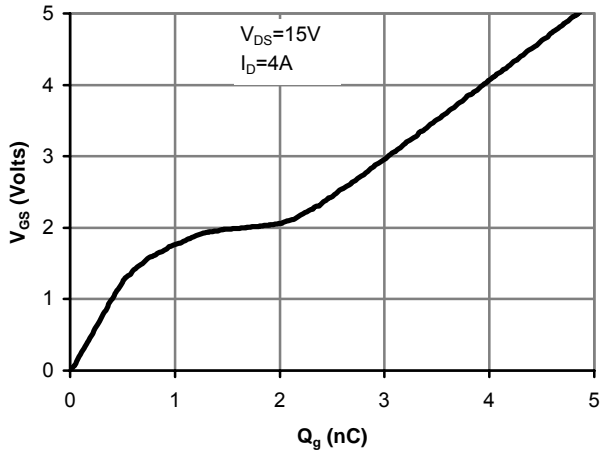
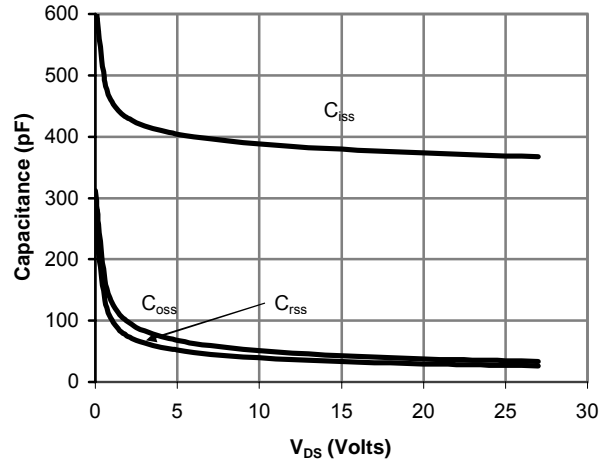
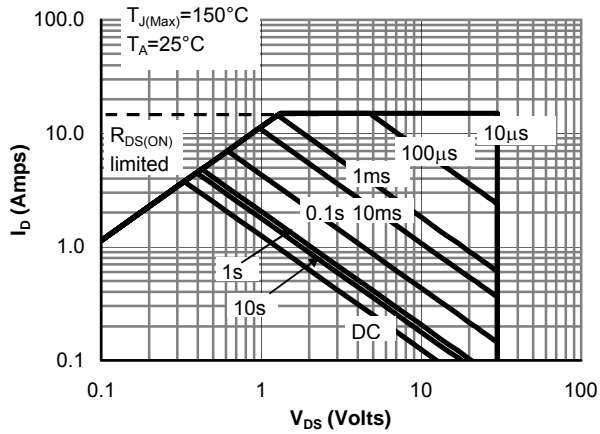
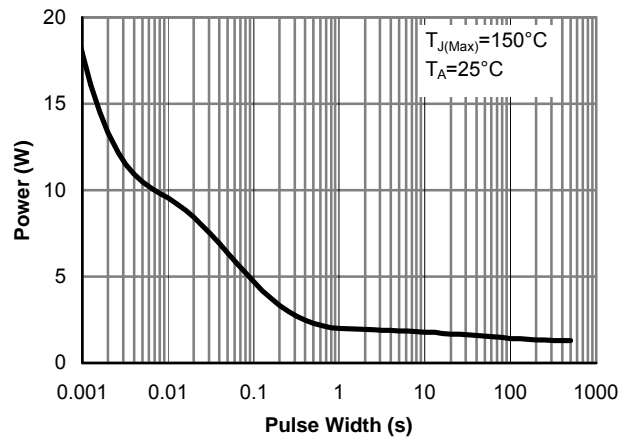
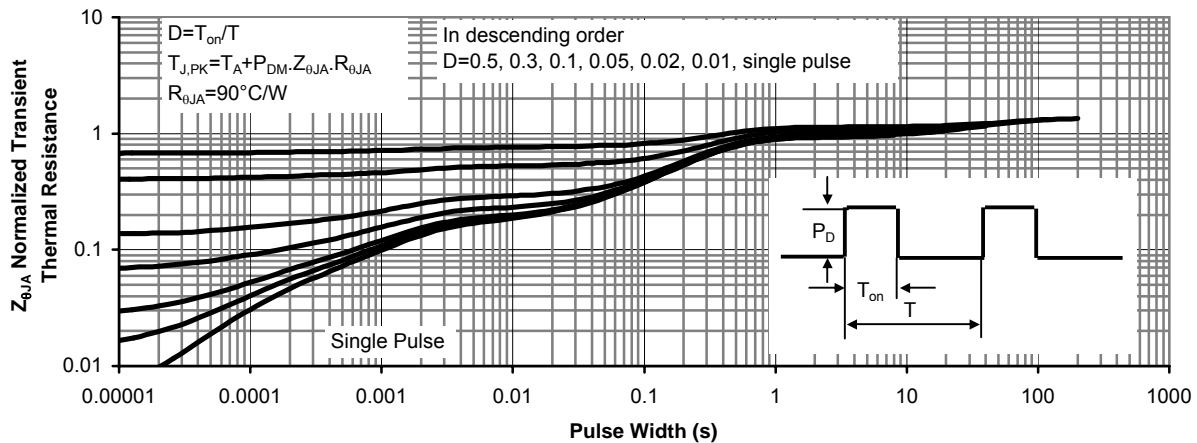


Figure 6: Body-Diode Characteristics

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