



Description

The AO3416A 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 Battery protection or in other Switching application.

General Features

$V_{DS} = 20V$ $I_D = 6A$

$R_{DS(ON)} < 21m\Omega$ @ $V_{GS}=4.5V$

$R_{DS(ON)} < 35m\Omega$ @ $V_{GS}=2.5V$

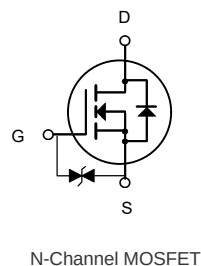
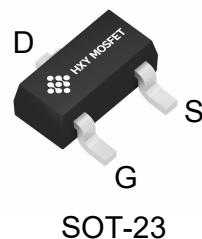
ESD=2000V HBM

Application

Battery protection

Load switch

Uninterruptible power supply



Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AO3416A	SOT-23	3416	3000

Absolute Maximum Ratings ($T_A=25^{\circ}C$ unless otherwise noted)

Symbol	Parameter	Limit	Unit
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D	Drain Current-Continuous	6	A
I_D	Drain Current-Continuous @ $T_A=70^{\circ}C$	3.3	A
I_{DM}	Drain Current-Pulsed (Note 1)	20.4	A
P_D	Maximum Power Dissipation	0.9	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	$^{\circ}C$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 2)	139	$^{\circ}C/W$



Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	20	---	---	V
$\Delta BV_{DSS} / \Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	---	---	---	$V/^{\circ}\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=4.5V$, $I_D=5A$	---	16	21	$m\Omega$
		$V_{GS}=2.5V$, $I_D=3A$	---	25	35	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	0.4	0.7	1.0	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	---	---	$mV/^{\circ}\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=20V$, $V_{GS}=0V$, $T_J=25^{\circ}\text{C}$	---	---	1	μA
		$V_{DS}=20V$, $V_{GS}=0V$, $T_J=100^{\circ}\text{C}$	---	---	100	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 10V$, $V_{DS}=0V$	---	---	± 10	nA
gfs	Forward Transconductance	$V_{DS}=10V$, $I_D=3A$	---	---	---	S
R_g	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	---	---	Ω
Q_g	Total Gate Charge	$V_{DS}=10V$, $V_{GS}=4.5V$, $I_D=5A$	---	8	---	nC
Q_{gs}	Gate-Source Charge		---	2.5	---	
Q_{gd}	Gate-Drain Charge		---	3	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{GS}=4.5V$, $V_{DD}=10V$, $R_G=3\Omega$, $I_D=5A$	---	0.5	---	ns
T_r	Rise Time		---	1	---	
$T_{d(off)}$	Turn-Off Delay Time		---	12	---	
T_f	Fall Time		---	4	---	
C_{iss}	Input Capacitance	$V_{DS}=10V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	545	---	pF
C_{oss}	Output Capacitance		---	103	---	
C_{rss}	Reverse Transfer Capacitance		---	90	---	
I_S	Continuous Source Current ^{1,5}	$V_G=V_D=0V$, Force Current	---	---	6	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=6A$, $T_J=25^{\circ}\text{C}$	---	---	1.2	V

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$



Typical Characteristics

Figure1: Output Characteristics

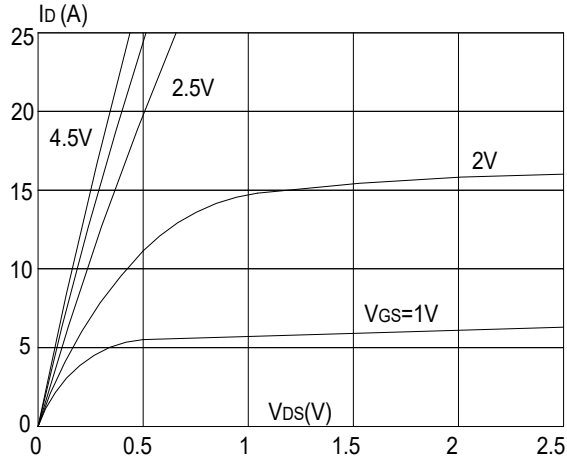


Figure 2: Typical Transfer Characteristics

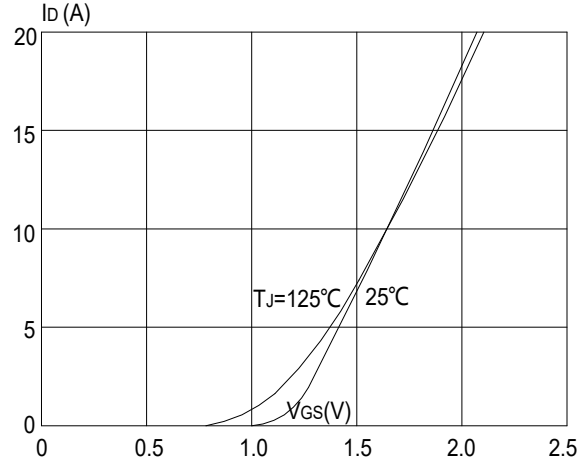


Figure 3: On-resistance vs. Drain Current

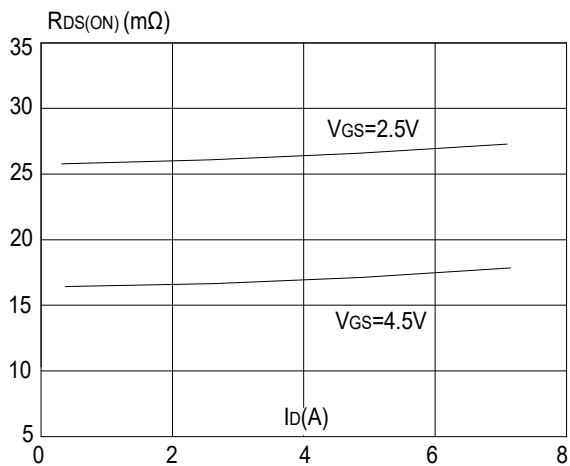


Figure 4: Body Diode Characteristics

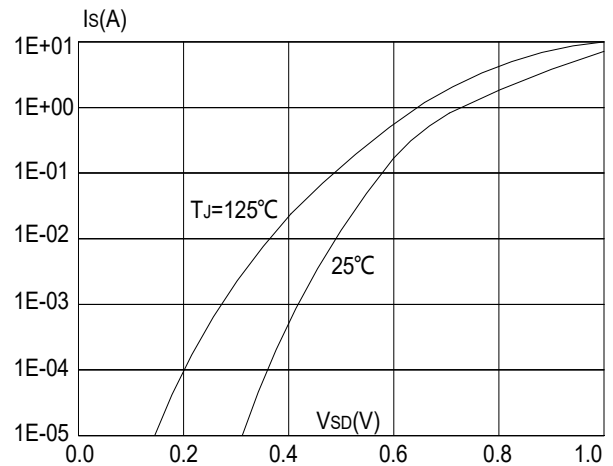


Figure 5: Gate Charge Characteristics

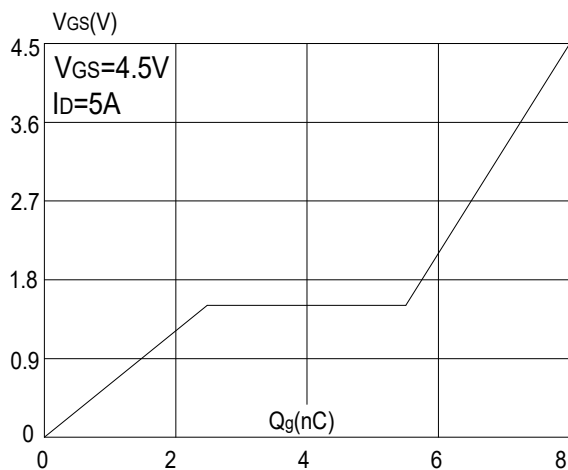


Figure 6: Capacitance Characteristics

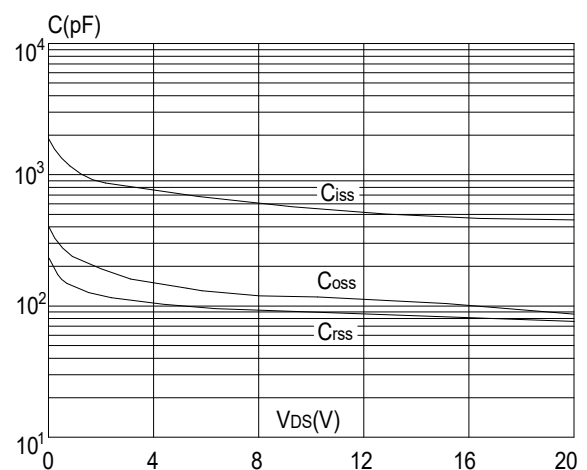




Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

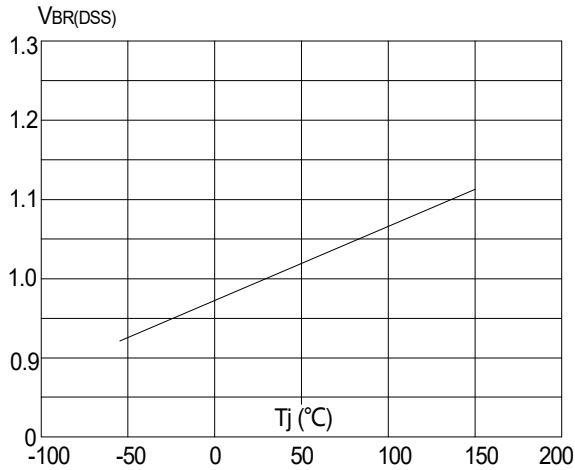


Figure 8: Normalized on Resistance vs. Junction Temperature

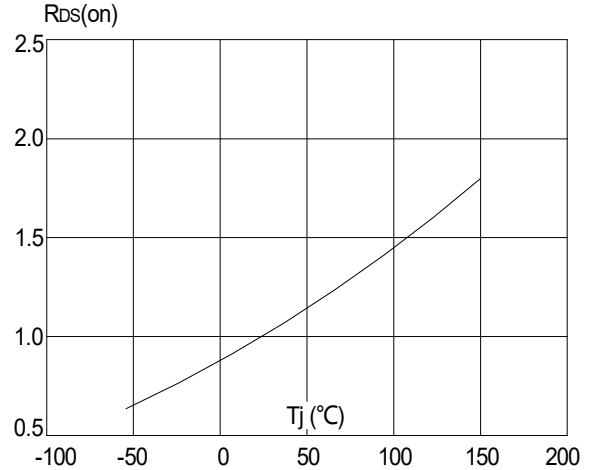


Figure 9: Maximum Safe Operating Area

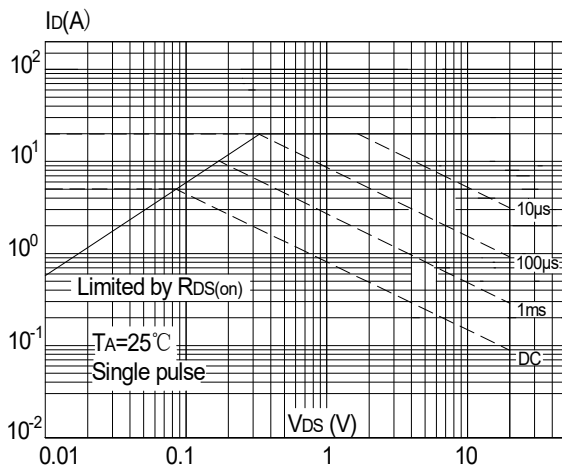


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

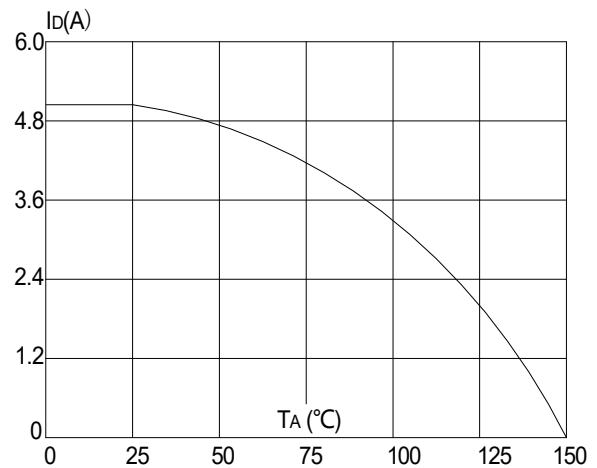
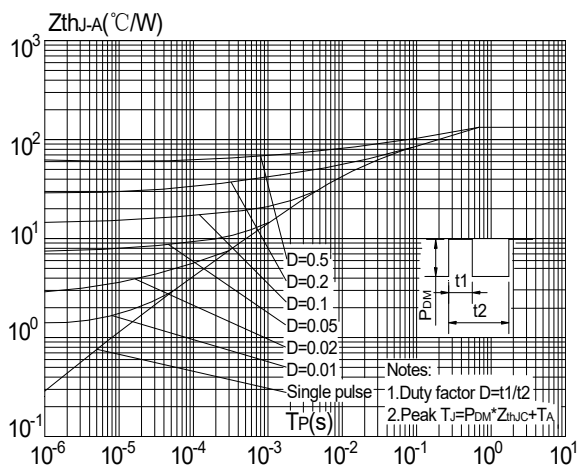
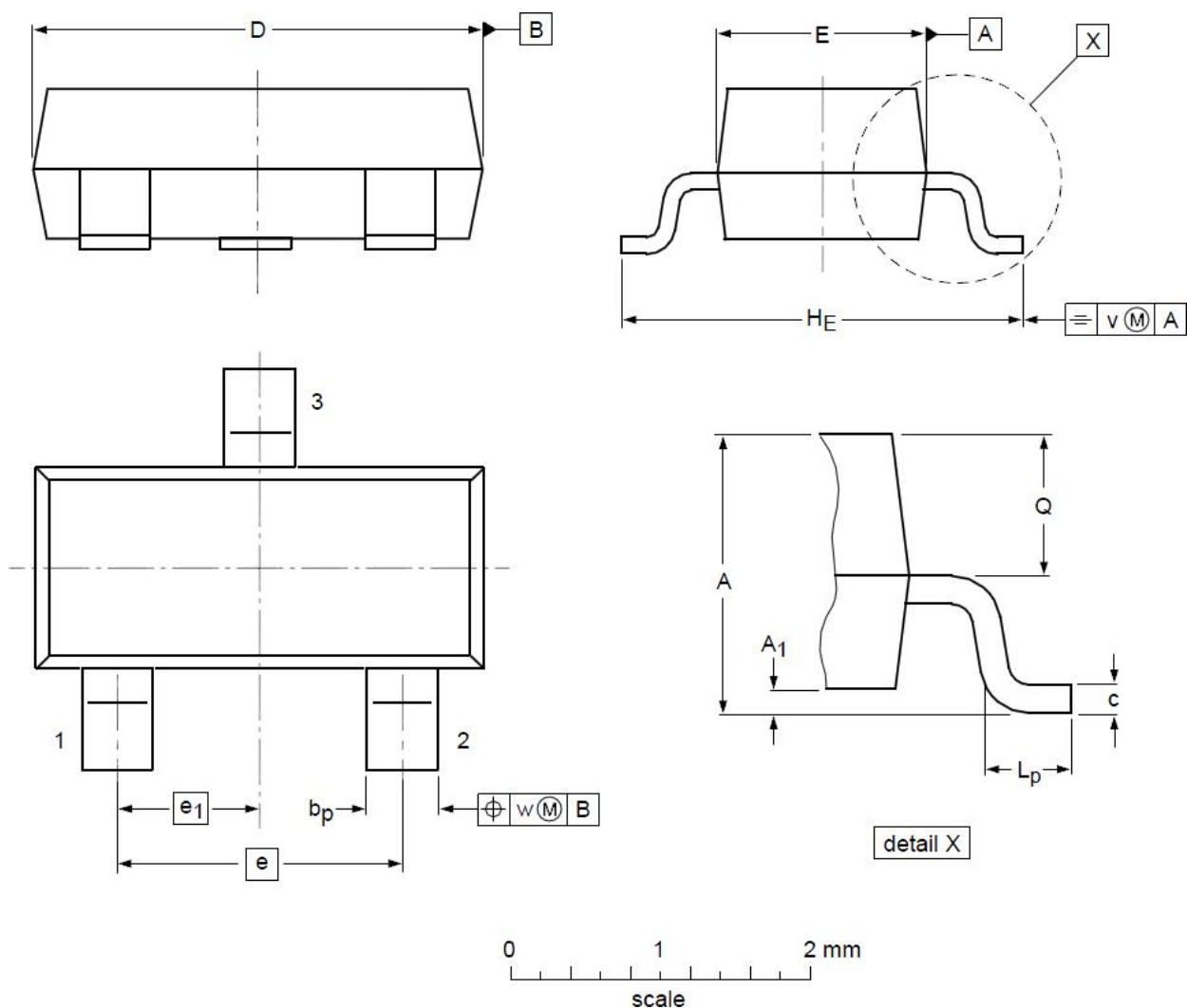


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient





SOT-23 Package Outline Dimensions



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.01	1.15	A ₁	0.01	0.05	0.10
b _p	0.30	0.42	0.50	c	0.08	0.13	0.15
D	2.80	2.92	3.00	E	1.20	1.33	1.40
e	--	1.90	--	e ₁	--	0.95	--
H _E	2.25	2.40	2.55	L _p	0.30	0.42	0.50
Q	0.45	0.49	0.55	v	--	0.20	--
w	--	0.10	--				



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