

20V N-Channel Enhancement Mode MOSFET

Description

The AP3416AI 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

$V_{DS} = 20V$ $I_D = 6.8A$

$R_{DS(ON)} < 22m\Omega$ @ $V_{GS}=4.5V$ (Type:15m Ω)

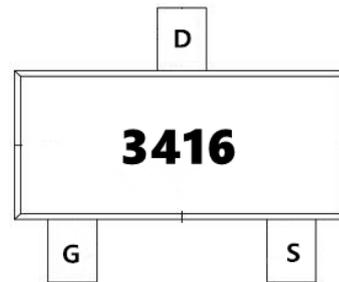
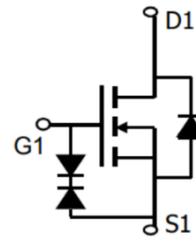
ESD \geq 2500HBM

Application

Lithium battery protection

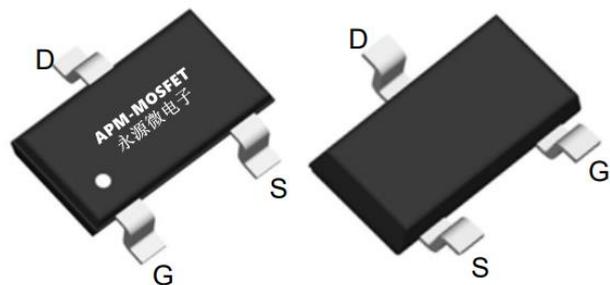
Wireless impact

Mobile phone fast charging



Top View

Bottom View



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP3416AI	SOT23L	3416	3000

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D@T_A=25^\circ\text{C}$	Continuous Drain Current	6.8	A
$I_D@T_A=70^\circ\text{C}$	Continuous Drain Current	6.0	A
IDM	Pulsed Drain Current ²	30	A
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation ³	1.5	W
TSTG	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	125	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-ambient ¹	85	$^\circ\text{C/W}$

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Electrical Characteristics (T_c=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
BVDSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	20	22		V
VGS(th)	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.5	0.65	1.2	V
RDS(ON)	Static Drain-Source On-Resistance	V _{GS} =4.5V, I _D =4A		15	22	mΩ
RDS(ON)	Static Drain-Source On-Resistance	V _{GS} =2.5V, I _D =3A		20	30	
IDSS	Zero Gate Voltage Drain Current	V _{DS} =20V, V _{GS} =0V			1	μA
IGSS	Gate-Body Leakage Current	V _{GS} =±10V, V _{DS} =0V			±100	nA
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1MHZ		780		pF
C _{oss}	Output Capacitance			140		
C _{rss}	Reverse Transfer Capacitance			80		
Q _g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =10V, I _D =6.8A		11		nC
Q _{gs}	Gate-Source Charge			2.3		
Q _{gd}	Gate-Drain Charge			2.9		
t _{D(on)}	Turn-on Delay Time	V _{GS} =4.5V, V _{DS} =10V, I _D =6.8A, R _{GEN} =3Ω		9		ns
t _r	Turn-on Rise Time			30		
t _{D(off)}	Turn-off Delay Time			35		
t _f	Turn-off fall Time			10		
V _{SD}	Diode Forward Voltage	I _S =6.8A, V _{GS} =0V			1.2	V

Note :

- 1、 The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、 The power dissipation is limited by 150°C junction temperature
- 4、 The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation

Typical Characteristics

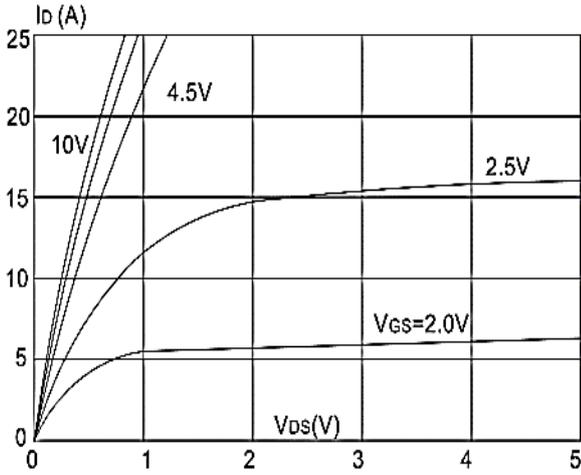


Figure 1: Output Characteristics

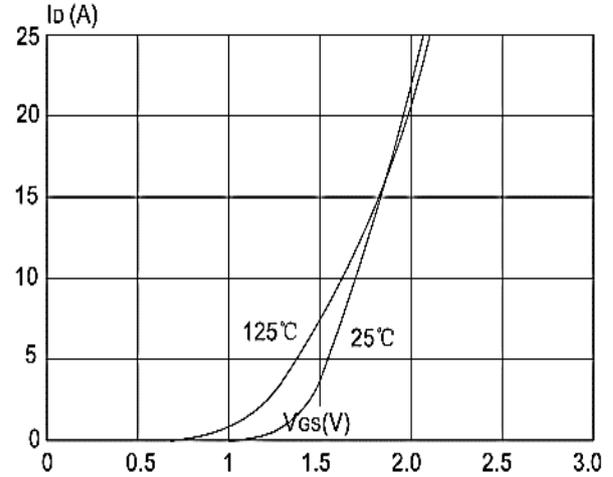


Figure 2: Typical Transfer Characteristics

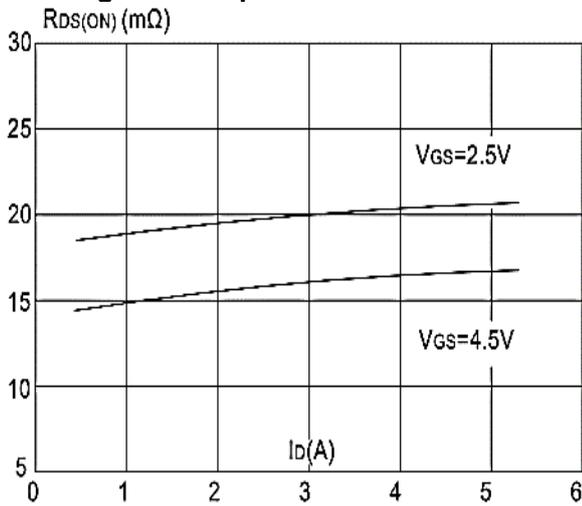


Figure 3: On-resistance vs. Drain Current

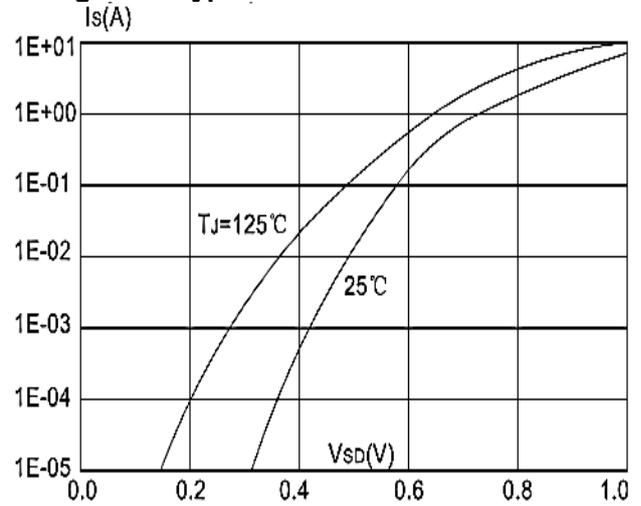


Figure 4: Body Diode Characteristics

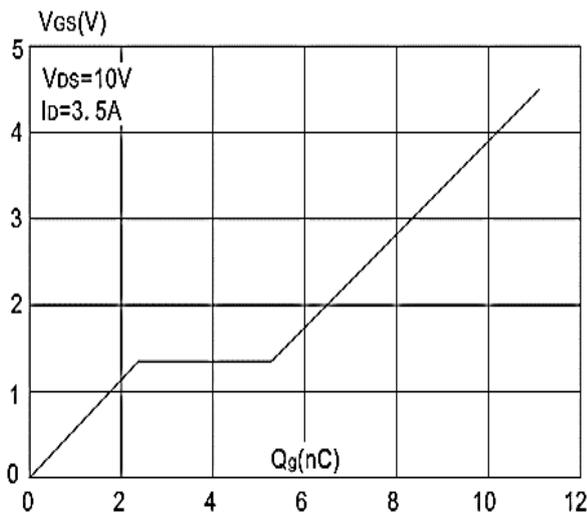


Figure 5: Gate Charge Characteristics

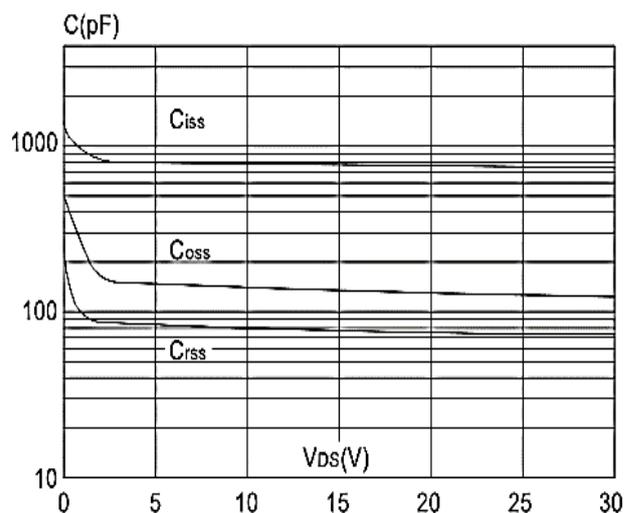


Figure 6: Capacitance Characteristics

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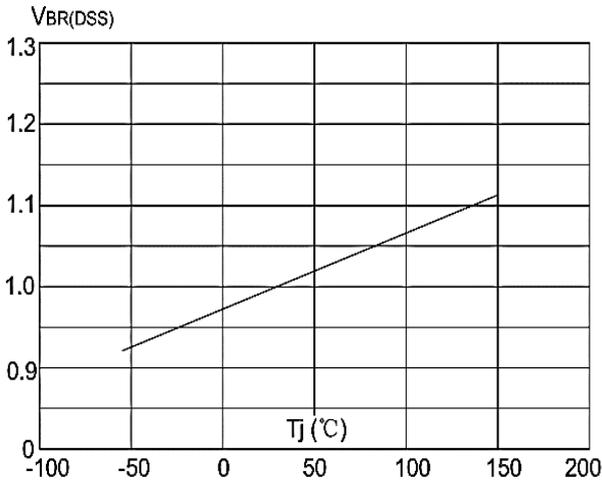


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

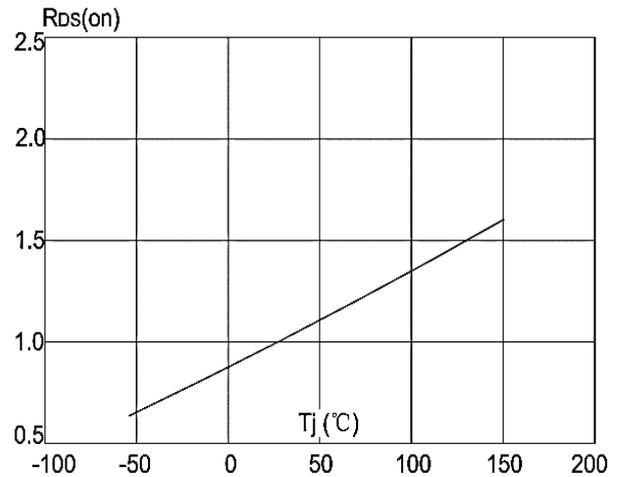


Figure 8: Normalized on Resistance vs. Junction Temperature

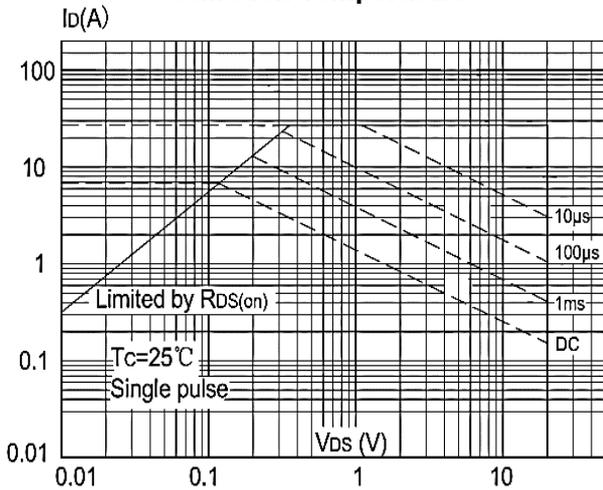


Figure 9: Maximum Safe Operating Area

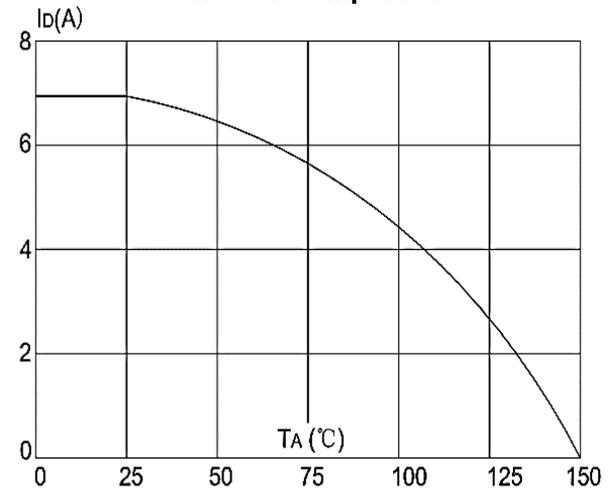


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

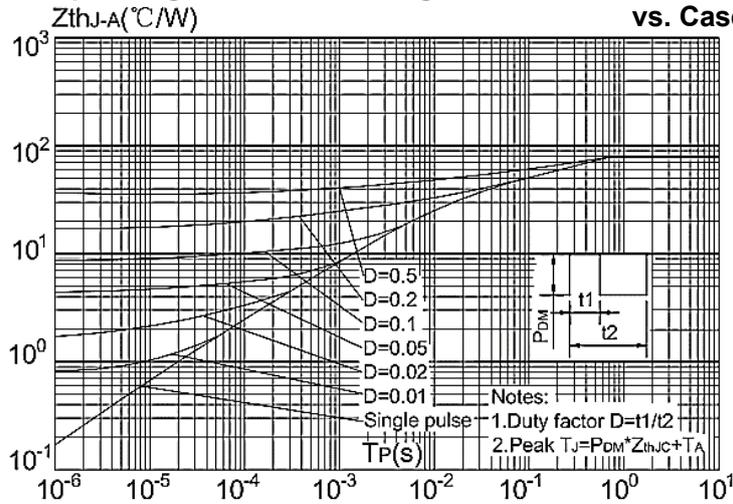
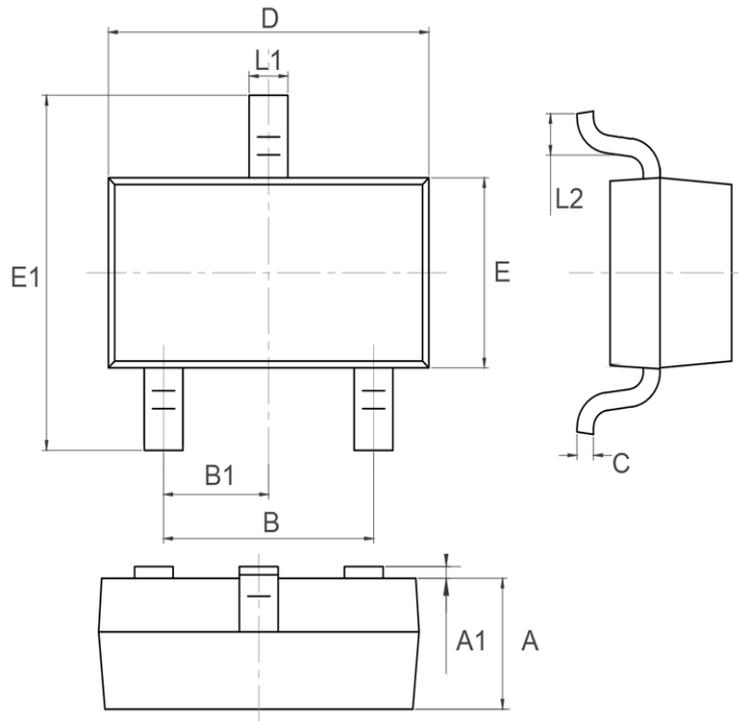


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

Package Mechanical Data-SOT23L-Single



Symbol	Dim in mm		
	Min	Typ	Max
A	0.9	1	1.1
A1	0	0.05	0.1
B	1.8	1.9	2
B1	0.95TYP		
C	0.08	0.115	0.15
D	2.8	2.9	3
E	1.2	1.3	1.4
E1	2.25	2.4	2.55
L1	0.3	0.4	0.5
L2	0.2	0.35	0.5

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Edition	Date	Change
REV1.0	2020/9/11	Initial release
REV1.1	2024/5/17	Change layout

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