

-30V P-Channel Enhancement Mode MOSFET

Description

The AP3401AI 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

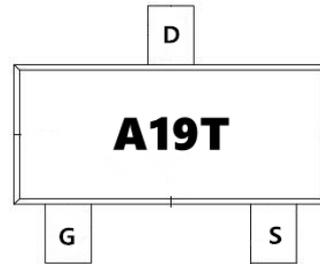
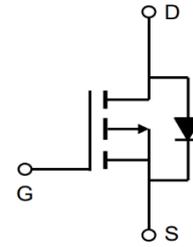
$V_{DS} = -30V$ $I_D = -4.8A$

$R_{DS(ON)} < 50m\Omega$ @ $V_{GS}=10V$ (Type: 40m Ω)

$R_{DS(ON)} < 55m\Omega$ @ $V_{GS}=4.5V$ (Type: 45m Ω)

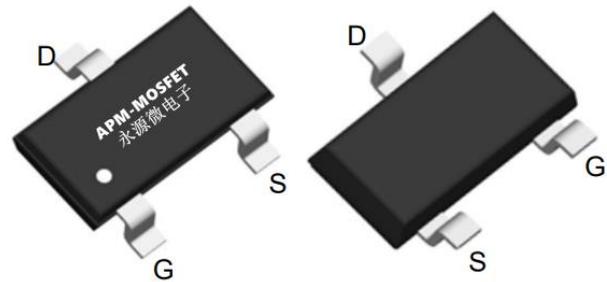
Application

- Battery protection
- Load switch
- Uninterruptible power supply



Top View

Bottom View



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP3401AI	SOT23L	A19T	3000

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

Symbol	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	-30	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D @ T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-4.8	A
$I_D @ T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-3.3	A
IDM	Pulsed Drain Current ^{note1}	-20.4	A
P_D	Power Dissipation $T_A = 25^\circ C$	2.15	W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	125	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	104	$^\circ C/W$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$

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Electrical Characteristics (T_J=25 °C, unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = -250μA	-30	-34	-	V
IDSS	Zero Gate Voltage Drain Current	V _{DS} = -30V, V _{GS} = 0V,	-	-	-1	μA
IGSS	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±12V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	-0.5	-1.0	-1.5	V
RDS(on)	Static Drain-Source on-Resistance note2	V _{GS} =-10V, I _D =-5A	-	40	50	mΩ
RDS(on)	Static Drain-Source on-Resistance note2	V _{GS} =-4.5V, I _D =-4A	-	45	55	mΩ
RDS(on)	Static Drain-Source on-Resistance note2	V _{GS} =-2.5V, I _D =-1A	-	55	80	mΩ
C _{iss}	Input Capacitance	V _{DS} = -15V, V _{GS} = 0V, f = 1.0MHz	-	745	-	pF
C _{oss}	Output Capacitance		-	70	-	pF
C _{rss}	Reverse Transfer Capacitance		-	57	-	pF
Q _g	Total Gate Charge	V _{DS} = -15V, I _D = -5.1A, V _{GS} = -10V	-	8	-	nC
Q _{gs}	Gate-Source Charge		-	1.8	-	nC
Q _{gd}	Gate-Drain("Miller") Charge		-	2.7	-	nC
td(on)	Turn-on Delay Time	V _{DD} = -15V, I _D = -1A, V _{GS} =-10V, R _{GEN} =2.5Ω	-	7	-	ns
t _r	Turn-on Rise Time		-	3	-	ns
td(off)	Turn-off Delay Time		-	30	-	ns
t _f	Turn-off Fall Time		-	12	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	-4.8	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-16.4	A
VSD	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S = -5.1A	-	-0.8	-1.2	V

Note :

- 1、 The data tested by surface mounted on a 1 inch 2 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

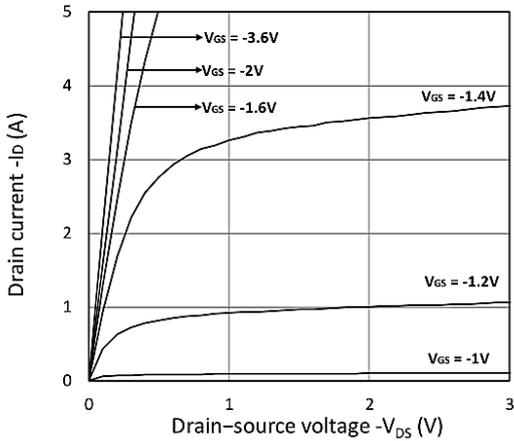


Figure 1. Output Characteristics

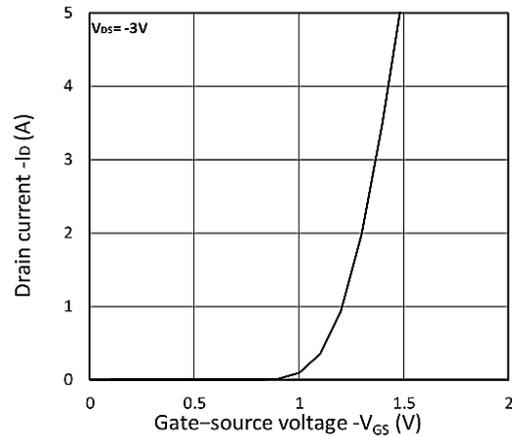


Figure 2. Transfer Characteristics

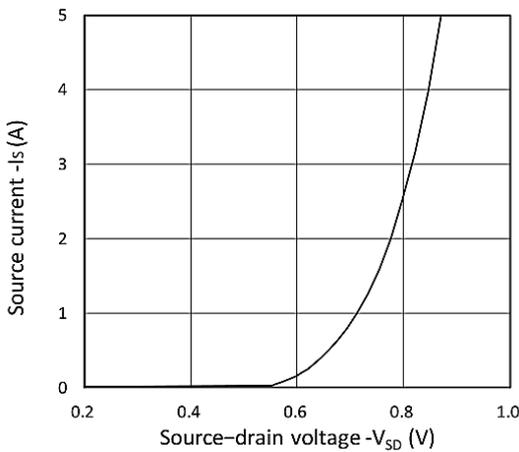


Figure 3. Forward Characteristics of Reverse

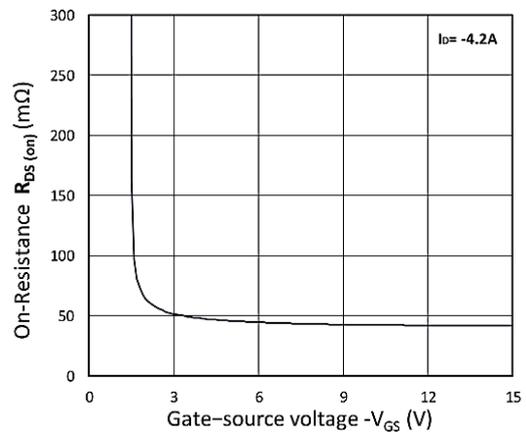


Figure 4. R_{DS(ON)} vs. V_{GS}

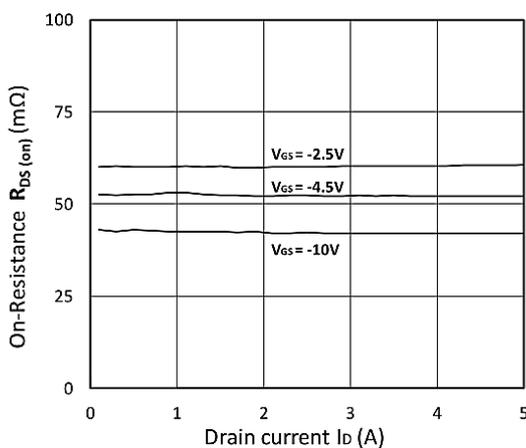


Figure 5. R_{DS(ON)} vs. I_D

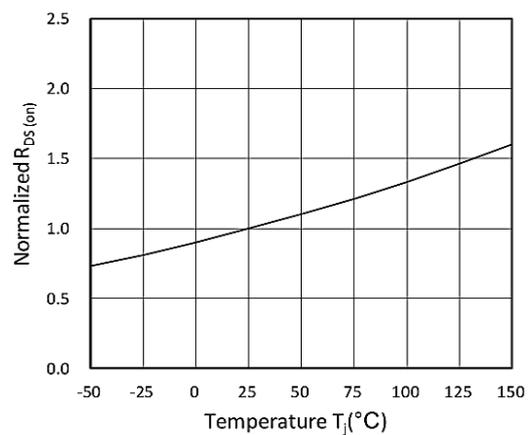


Figure 6. Normalized R_{DS(on)} vs. Temperature

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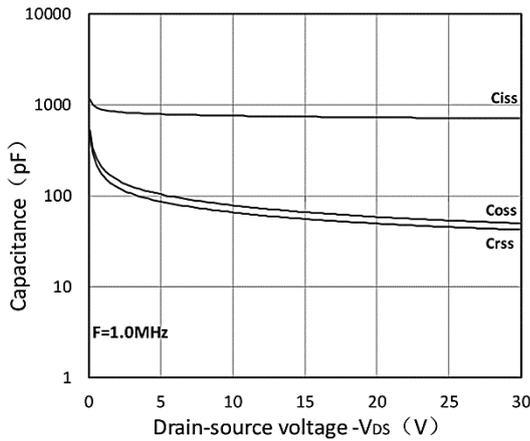


Figure 7. Capacitance Characteristics

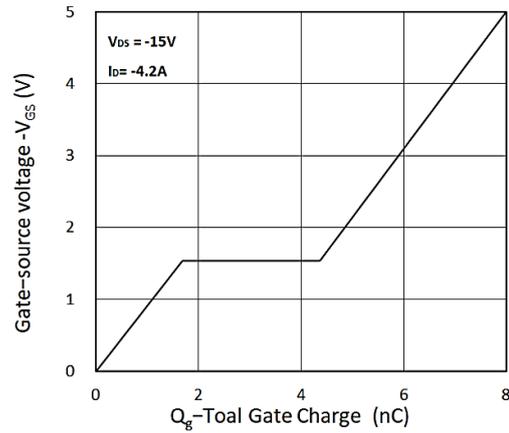


Figure 8. Gate Charge Characteristics

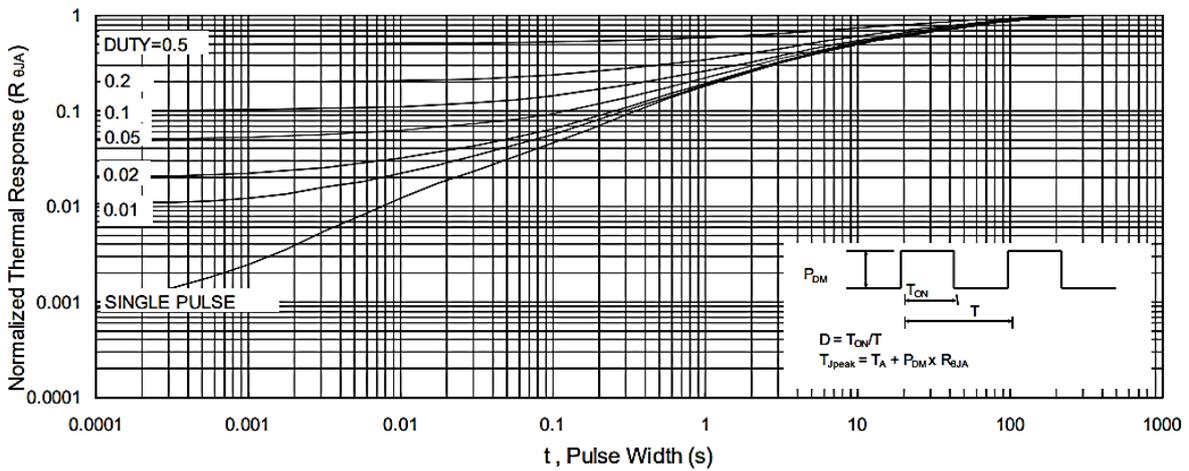


Figure 9 Normalized Maximum Transient Thermal Impedance

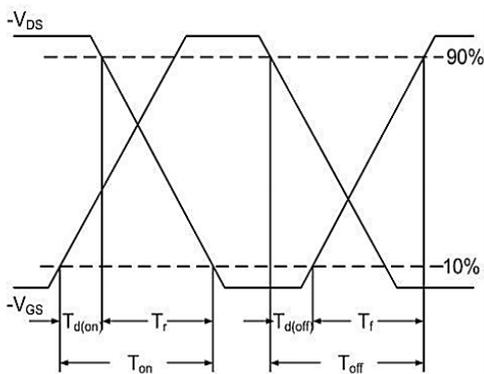


Figure.10 Switching Time Waveform

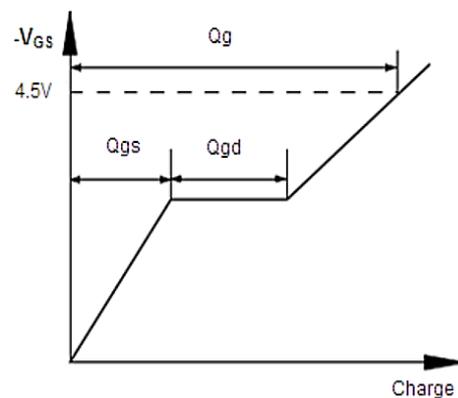
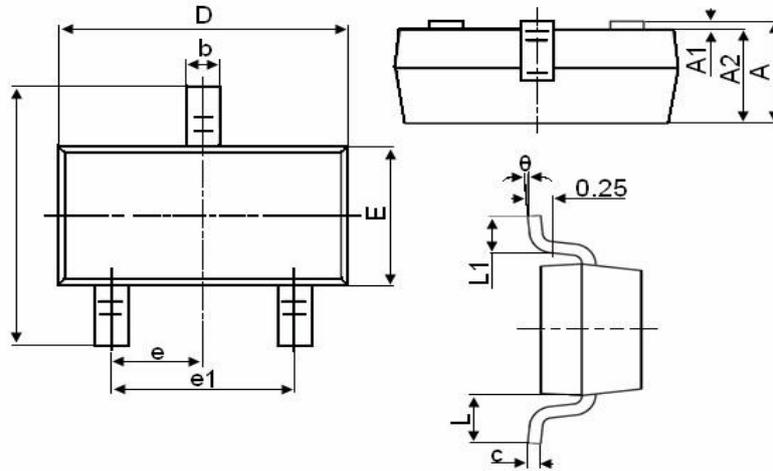


Figure.11 Gate Charge Waveform

Package Mechanical Data-SOT23-XC-Single



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

-30V P-Channel Enhancement Mode MOSFET**Attention**

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Edition	Date	Change
Rve1.0	2018/11/31	Initial release
Rve1.1	2021/12/10	Reduce internal RDS

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