

-20V P-Channel Enhancement Mode MOSFET

Description

The AP3139AK 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

$V_{DS} = -20V$ $I_D = -0.8A$

$R_{DS(ON)} < 350m\Omega$ @ $V_{GS} = -4.5V$ (Type: 290m Ω)

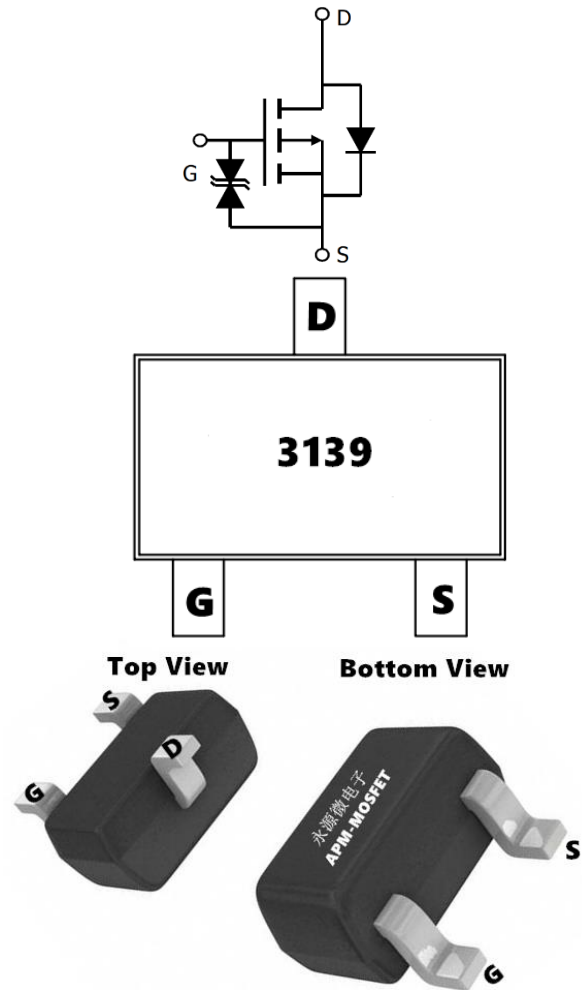
ESD=1.6KV HBM

Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP3139AK	SOT523-3L	3139	3000

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D@T_A=25^\circ C$	Continuous Drain Current, V_{GS} @ -4.5V ¹	-0.8	A
$I_D@T_A=70^\circ C$	Continuous Drain Current, V_{GS} @ -4.5V ¹	-0.3	A
I_{DM}	Pulsed Drain Current ²	-4.0	A
$P_D@T_A=25^\circ C$	Total Power Dissipation ³	150	mW
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	833	$^\circ C/W$

-20V P-Channel Enhancement Mode MOSFET
Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	-	-	V
IDSS	Zero Gate Voltage Drain Current	$V_{DS}=-20V, V_{GS}=0V$	-	-	-1	μA
IGSS	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 12V$	-	-	± 10	μA
VGS(th)	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.4	-0.7	-1.0	V
RDS(on)	Static Drain-Source on-Resistance	$V_{GS}=-4.5V, I_D=-0.5A$	-	290	350	m Ω
		$V_{GS}=-2.5V, I_D=-0.4A$	-	380	500	
Ciss	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V, f=1.0MHz$	-	54	-	pF
Coss	Output Capacitance		-	11	-	pF
Crss	Reverse Transfer Capacitance		-	25	-	pF
td(on)	Turn-on Delay Time	$V_{DD}=-10V, R_L=5\Omega, R_{GEN}=3\Omega, V_{GS}=-4.5V$	-	6.7	-	ns
tr	Turn-on Rise Time		-	4.8	-	ns
td(off)	Turn-off Delay Time		-	17.3	-	ns
tf	Turn-off Fall Time		-	7.4	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	-0.8	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-4.0	A
VSD	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=-0.8A$	-	-	-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 Δ 300us , duty cycle Δ 2%
- 3、The power dissipation is limited by 150 $^{\circ}\text{C}$ junction temperature
- 4、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

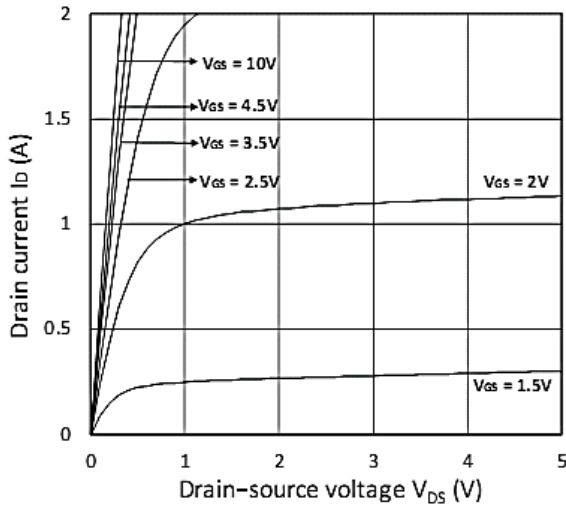


Figure 1. Output Characteristics

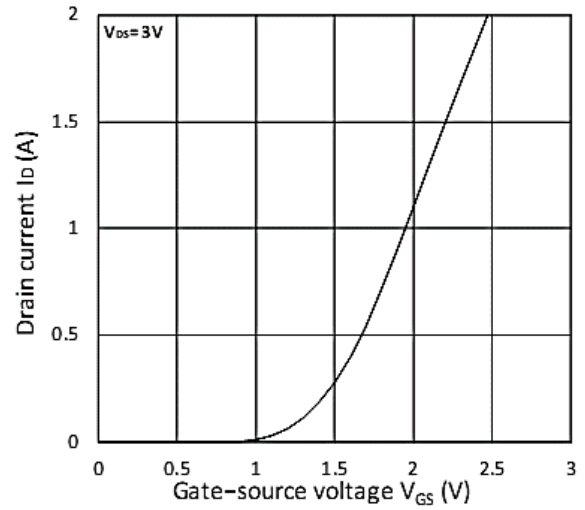


Figure 2. Transfer Characteristics

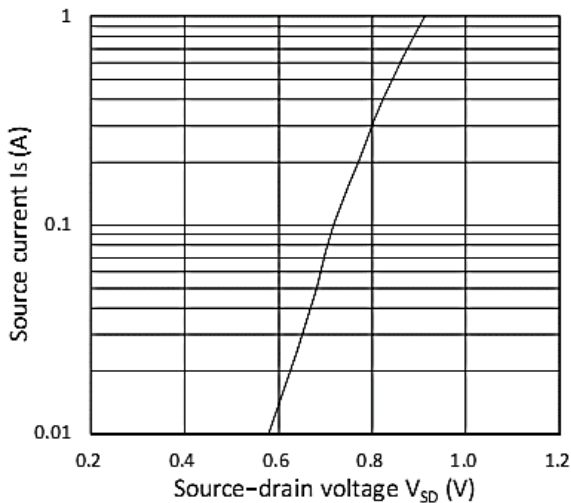


Figure 3. Forward Characteristics of Reverse

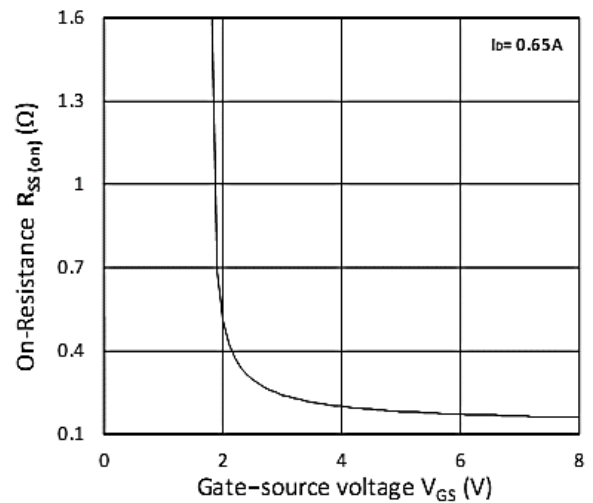


Figure 4. R_DS(on) vs. V_GS

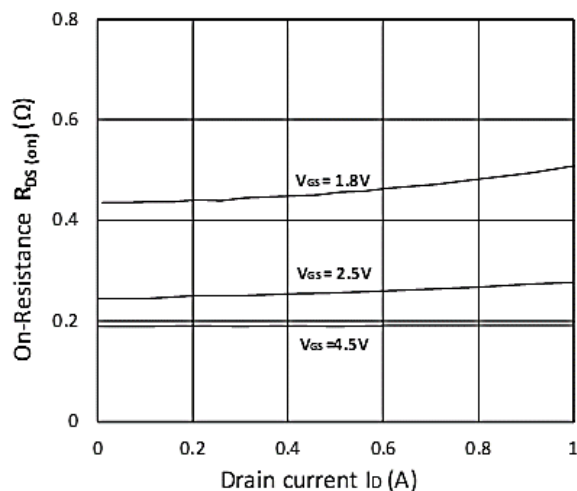


Figure 5. R_DS(on) vs. I_D

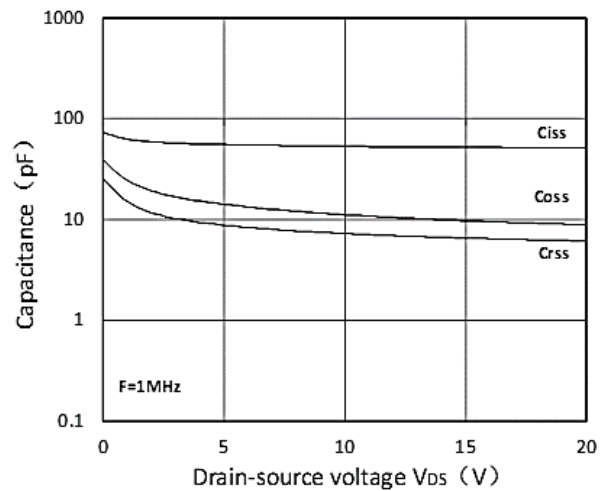
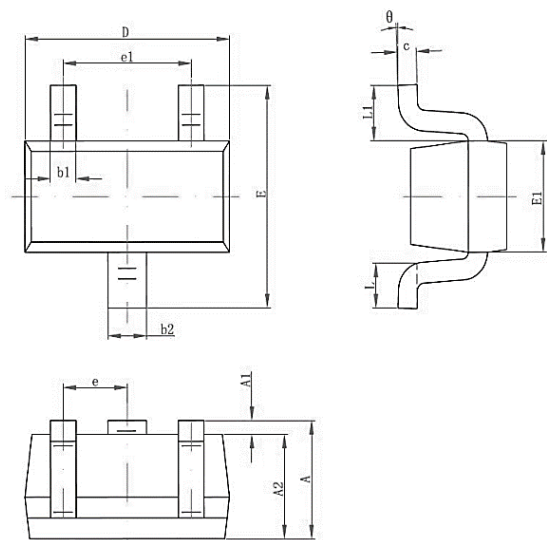


Figure 6. Normalized R_DS(on) vs. Temperature

Package Mechanical Data-SOT523-3-Single



Symbol	Dimensions In Millimeters	
	Min.	Max.
A	0.70	0.90
A1	0.00	0.10
A2	0.70	0.80
b1	0.15	0.29
b2	0.25	0.39
C	0.10	0.20
D	1.50	1.70
E	1.45	1.75
E1	0.70	0.90
e	0.500 (Typ)	
e1	0.90	1.10
L	0.26	0.46
θ	0°	8°

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Edition	Date	Change
REV1.0	2024/1/1	Initial release

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