AP3139AK

-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

$R_{DS(ON)}$ < 350mΩ @ V_{GS}=-4.5V **(Type：290mΩ)**

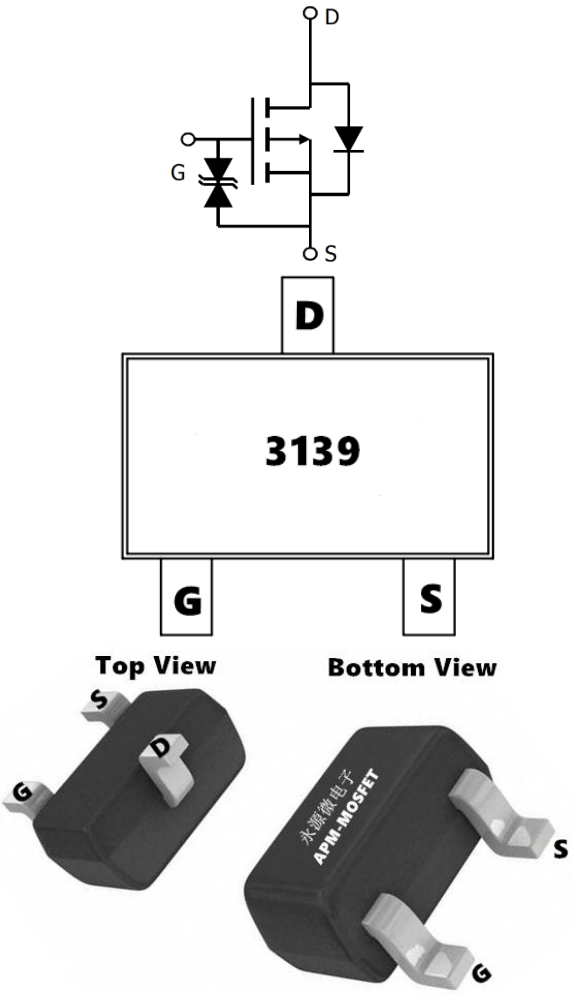
ESD=1.6KV HBM

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℃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℃	Continuous Drain Current, V_{GS} @ -4.5V[1]	-0.8	A
I_D@T_A=70℃	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℃	Total Power Dissipation[3]	150	mW
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
$R_{\theta}JA$	Thermal Resistance Junction-Ambient [1]	833	℃/W

Electrical Characteristics (T_J=25℃, unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D= -250μA	-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} = ±12V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D= -250μA	-0.4	-0.7	-1.0	V
RDS(on)	Static Drain-Source on-Resistance	V_{GS} =-4.5V, I_D =-2A	-	290	350	mΩ
		V_{GS} =-2.5V, I_D =-1A	-	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=5Ω, R_{GEN}=3Ω,V_{GS}=-4.5V,	-	6.7	-	ns
tr	Turn-on Rise Time		-	4.8	-	ns
td(off)	Turn-off Delay Time		-	17.3	-	ns
t_f	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 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℃ 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

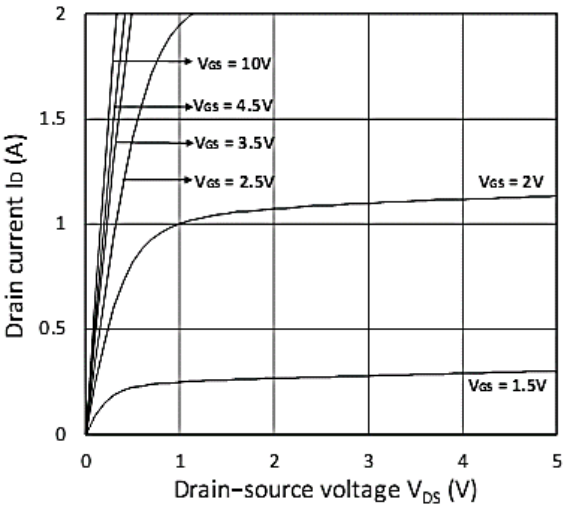


Figure 1. Output Characteristics

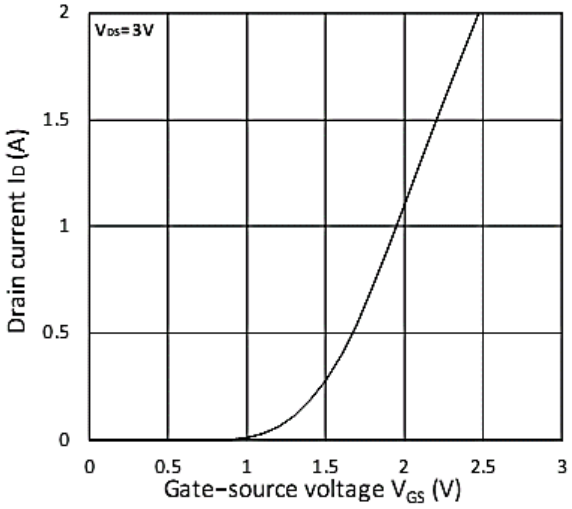


Figure 2. Transfer Characteristics

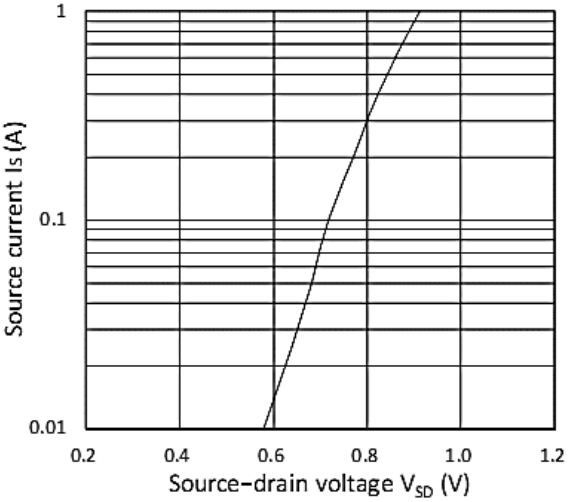


Figure 3. Forward Characteristics of Reverse

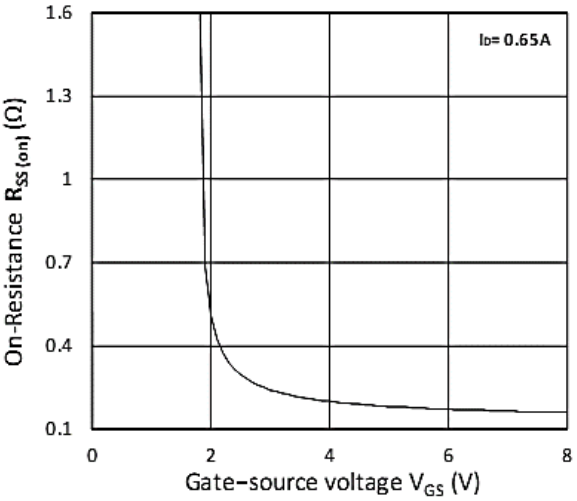


Figure 4. RDS(ON) vs. VGS

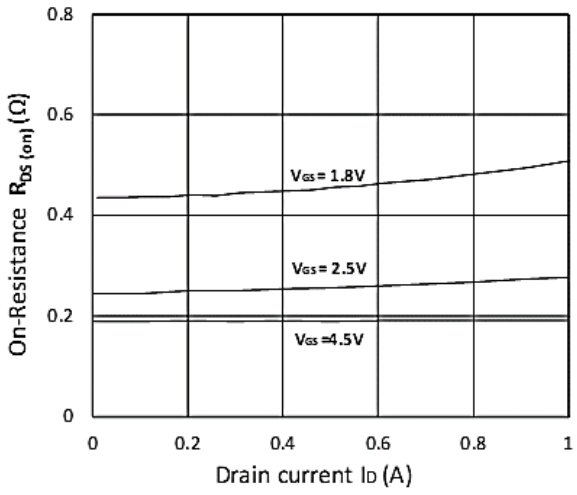


Figure 5. RDS(ON) vs. ID

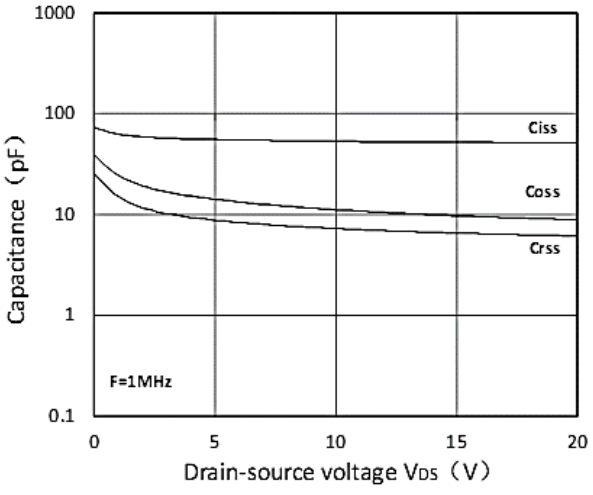
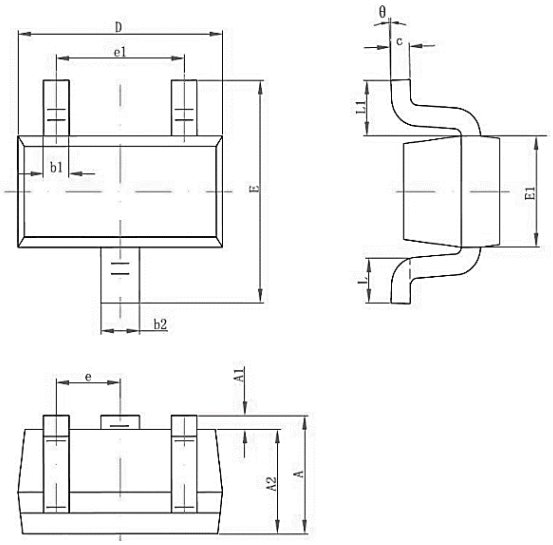


Figure 6. Normalized RDS(on) vs. Temperature

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