

-40V P-Channel Enhancement Mode MOSFET

Description

The AP5P04MI-L uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = -40V$ $I_D = -5.0A$

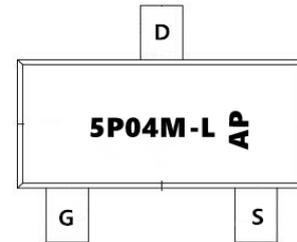
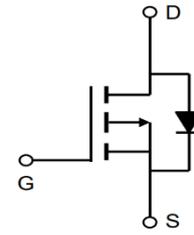
$R_{DS(ON)} < 75m\Omega$ @ $V_{GS} = -10V$ (Type: 60m Ω)

Application

Battery protection

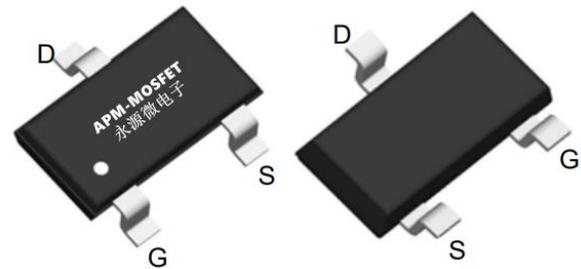
Load switch

Uninterruptible power supply



Top View

Bottom View



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP5P04MI-L	SOT23-3L	5P04M-L AP	3000

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

Symbol	Parameter	Steady State	Units
V _{DS}	Drain-Source Voltage	-40	V
V _{GS}	Gate-Source Voltage	±20	V
I _D @T _A =25°C	Continuous Drain Current, V _{GS} @ -4.5V ¹	-5.0	A
I _D @T _A =70°C	Continuous Drain Current, V _{GS} @ -4.5V ¹	-2.85	A
I _{DM}	Pulsed Drain Current ²	-15	A
P _D @T _A =25°C	Total Power Dissipation ³	1.2	W
P _D @T _A =70°C	Total Power Dissipation ³	0.84	W
T _{STG}	Storage Temperature Range	-55 to 150	°C
T _J	Operating Junction Temperature Range	-55 to 150	°C
R _{θJA}	Thermal Resistance Junction-Ambient ¹	125	°C/W
R _{θJC}	Thermal Resistance Junction-Case ¹	104	°C/W

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

Symbol	Parameter	Conditions	Min.	Typ	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250uA	-40	-46	---	V
RDS(ON)	Static Drain-Source On-Resistance ²	V _{GS} =-10V, I _D =-3A	---	60	75	mΩ
		V _{GS} =-4.5V, I _D =-2A	---	85	100	
VGS(th)	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-1.0	-1.5	-2.5	V
IDSS	Drain-Source Leakage Current	V _{DS} =-40V, V _{GS} =0V, T _J =25°C	---	---	-1	uA
IGSS	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
gfs	Forward Transconductance	V _{DS} =-5V, I _D =-3A	---	5.8	---	S
Q _g	Total Gate Charge (-4.5V)	V _{DS} =-32V, V _{GS} =-4.5V, I _D =-3A	---	11.8	---	nC
Q _{gs}	Gate-Source Charge		---	2.2	---	
Q _{gd}	Gate-Drain Charge		---	3.0	---	
Td(on)	Turn-On Delay Time	V _{DD} =-20V, V _{GS} =-10V, R _G =3.3Ω, I _D =-5A	---	7.0	---	ns
T _r	Rise Time		---	6.5	---	
Td(off)	Turn-Off Delay Time		---	24	---	
T _f	Fall Time		---	7.8	---	
Ciss	Input Capacitance	V _{DS} =-20V, V _{GS} =0V, f=1MHz	---	553	---	pF
Coss	Output Capacitance		---	50	---	
Crss	Reverse Transfer Capacitance		---	42	---	
IS	Continuous Source Current ^{1,4}	V _G =V _D =0V, Force Current	---	---	-5	A
ISM	Pulsed Source Current ^{2,4}		---	---	-15	A
VSD	Diode Forward Voltage ²	V _{GS} =0V, I _S =-1A, T _J =25°C	---	---	-1.2	V

Note :

- 1、 The data tested by surface mounted on a 1 inch 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 I_D and I_{DM} , in real applications , should be limited by total power dissipation.

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Typical Characteristics

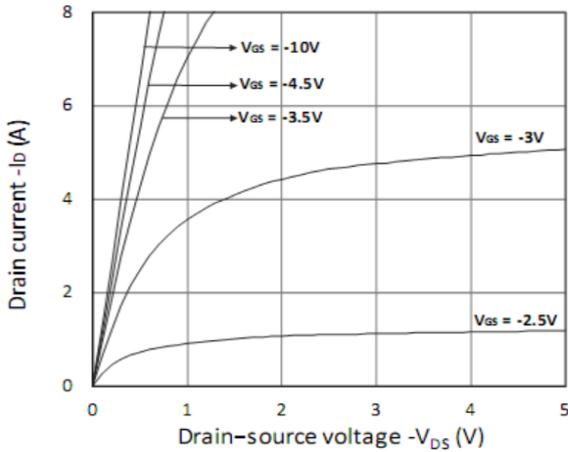


Figure 1. Output Characteristics

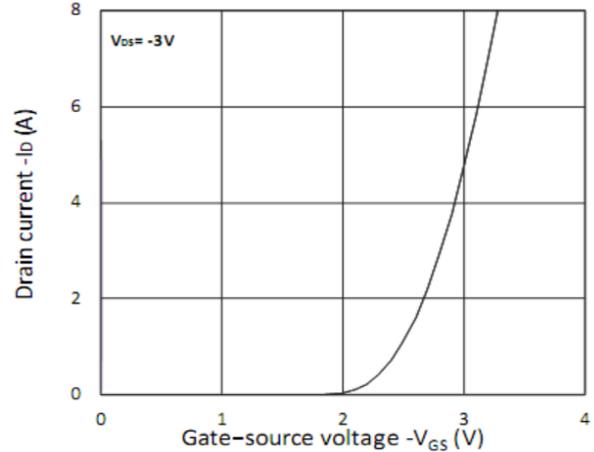


Figure 2. Transfer Characteristics

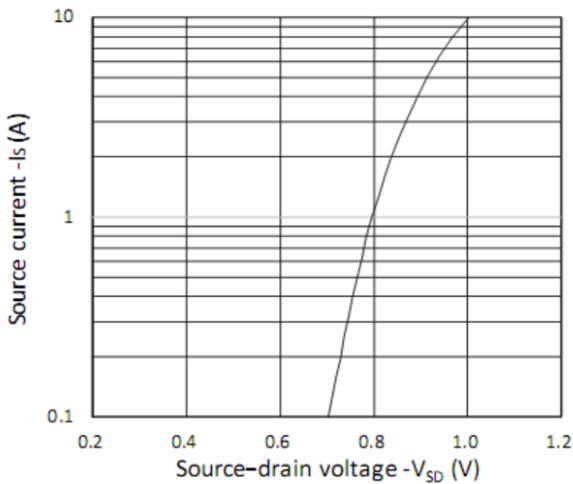


Figure 3. Forward Characteristics of Reverse

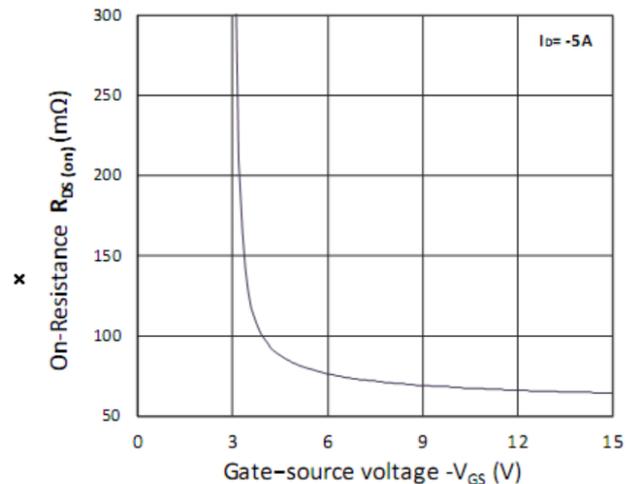


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

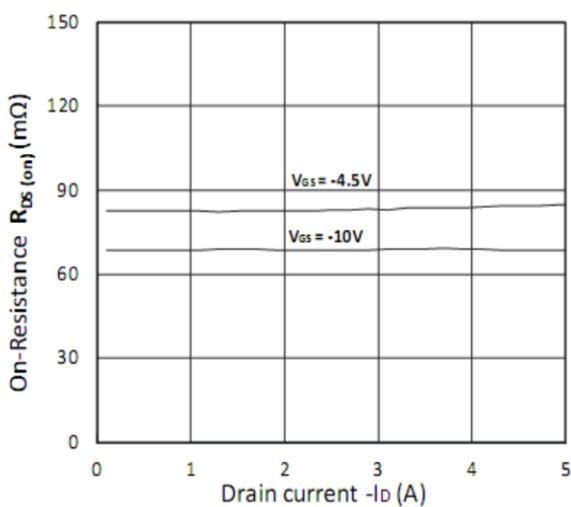


Figure 5. $R_{DS(ON)}$ vs. I_D

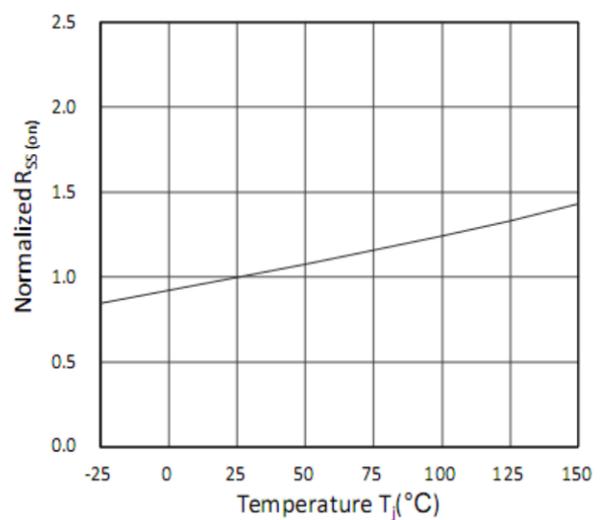


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

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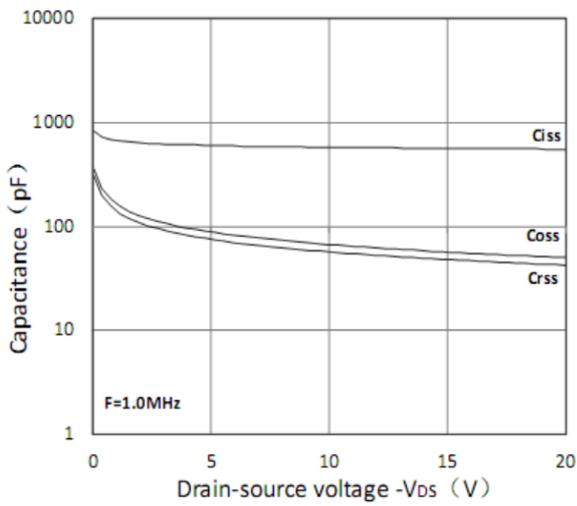


Figure 7. Capacitance Characteristics

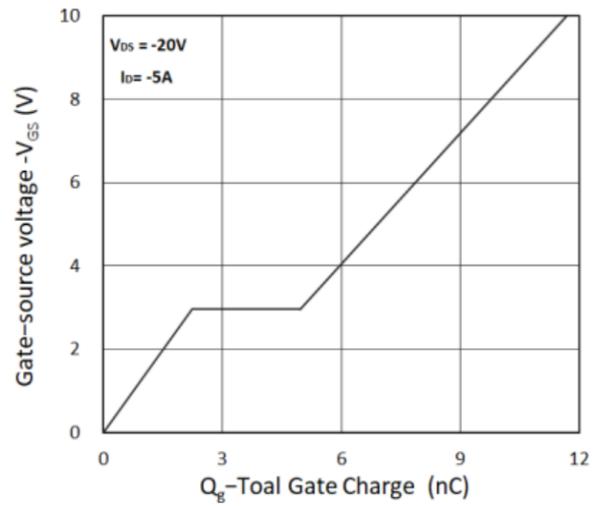
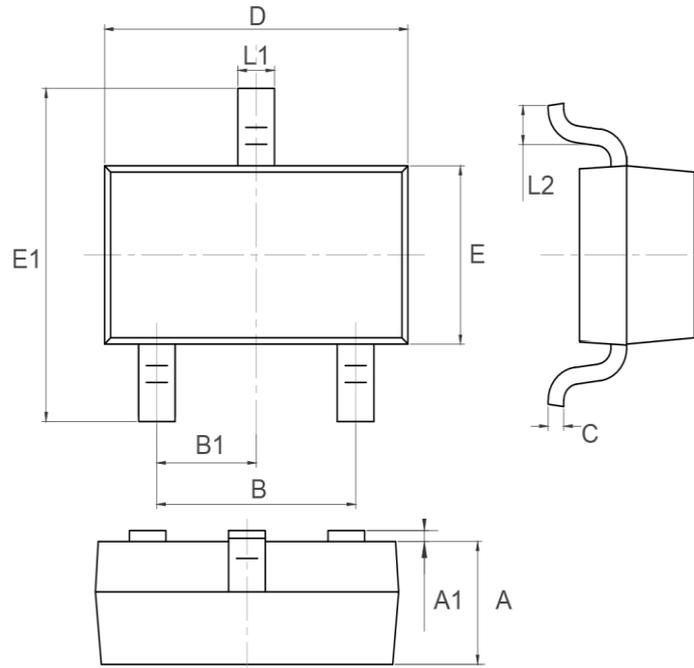


Figure 8. Gate Charge Characteristics

Package Mechanical Data-SOT23-3L-Single



Symbol	Dim in mm		
	Min	Typ	Max
A	1	1.1	1.2
A1	0	0.05	0.1
B	1.8	1.9	2
B1	0.95TYP		
C	0.1	0.15	0.2
D	2.82	2.92	3.02
E	1.5	1.6	1.7
E1	2.65	2.8	2.95
L1	0.3	0.4	0.5
L2	0.3	0.45	0.6

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Edition	Date	Change
REV1.0	2023/10/10	Initial release

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