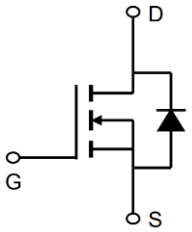
AP4N06AI

60V N-Channel Enhancement Mode MOSFET

Description

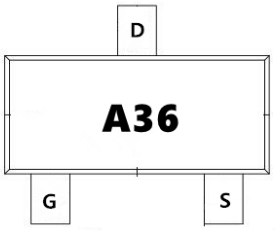
The AP4N06AI uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



General Features

V_{DS}=60V I_D =4A

$R_{DS(ON)}$ < 85mΩ @ V_{GS}=10V **(Type：62mΩ)**

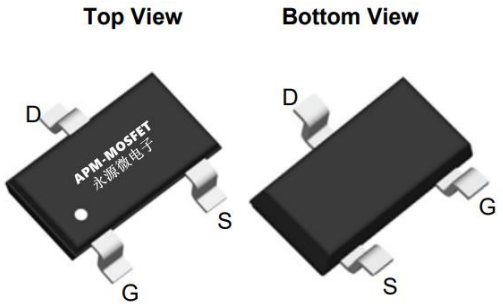


Application

Battery protection

Load switch

Uninterruptible power supply



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP4N06AI	SOT23L	A36	3000

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	4	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	2.1	A
I_{DM}	Pulsed Drain Current[2]	20	A
EAS	Single Pulse Avalanche Energy[3]	11	mJ
I_{AS}	Avalanche Current	15	A
P_D@T_C=25℃	Total Power Dissipation[4]	42	W
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]	62	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	3	℃/W

60V N-Channel Enhancement Mode MOSFET

Electrical Characteristics (T_A=25℃unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
BVDSS	Drain-Source Breakdown Voltage	VGS=0V, ID=250μA	60	66		V
IDSS	Zero Gate Voltage Drain Current	VDS=60V,VGS=0V			1	μA
IGSS	Gate-Body Leakage Current	VGS=±20V, VDS=0V			±100	nA
		VGS=±10V, VDS=0V			±50	
VGS(th)	Gate Threshold Voltage	VDS= VGS, ID=250μA	0.9	1.3	2.0	V
RDS(ON)	Static Drain-Source On-Resistance	VGS=10V, ID=3A		62	85	mΩ
		VGS=4.5V, ID=2A		85	120	
Ciss	Input Capacitance	VDS=10V,VGS=0V,f=1MHZ		409		pF
Coss	Output Capacitance			50		pF
Crss	Reverse Transfer Capacitance			41		pF
Qg	Total Gate Charge	VGS=10V,VDS=30V,ID=3A		10.27		nC
Qgs	Gate-Source Charge			1.65		nC
Qgd	Gate-Drain Charge			2.11		nC
Qrr	Reverse Recovery Chrage	IF=3A, di/dt=100A/us		6.99		nC
trr	Reverse Recovery Time			32.6		ns
tD(on)	Turn-on Delay Time	VGS=10V, VDS=30V, RL=20Ω RGEN=3Ω		3.6		ns
tr	Turn-on Rise Time			17.6		ns
tD(off)	Turn-off Delay Time			13		ns
tf	Turn-off fall Time			23		ns
VSD	Diode Forward Voltage	IS=4A,VGS=0V			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

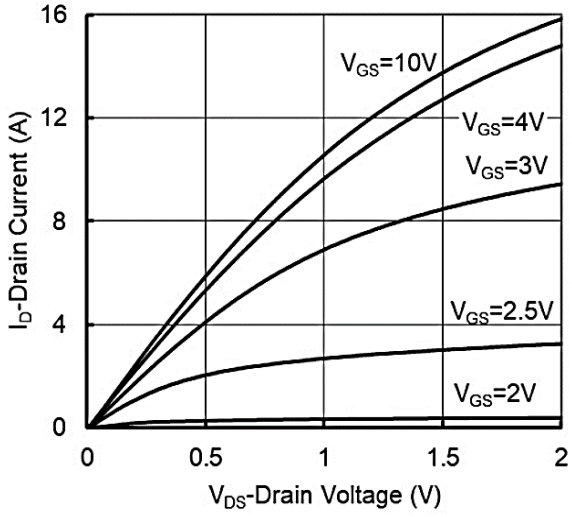


Figure1. Output Characteristics

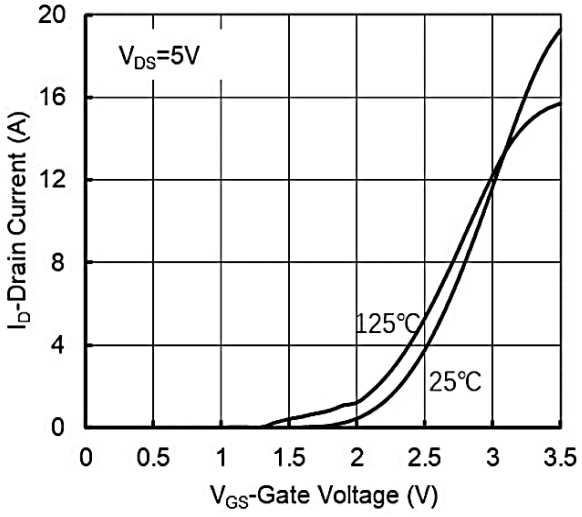


Figure2. Transfer Characteristics

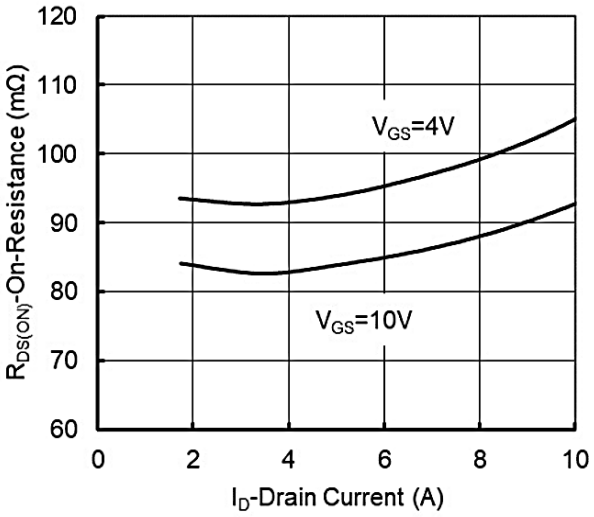


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

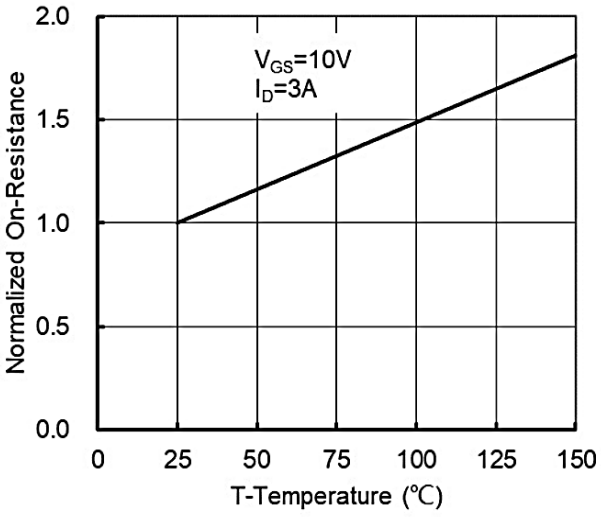


Figure 4: On-Resistance vs. Junction Temperature

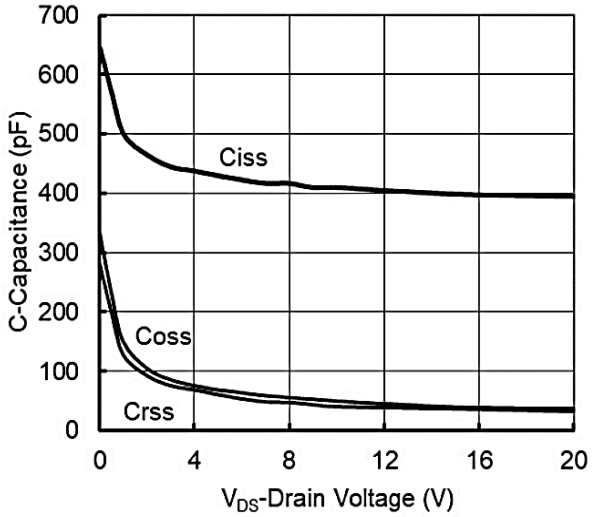


Figure5. Capacitance Characteristics

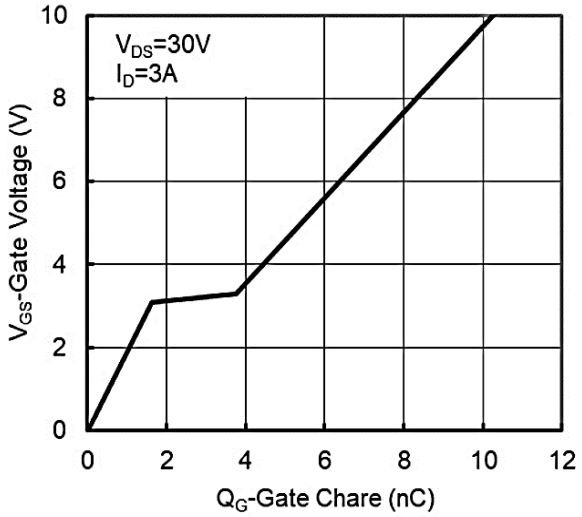


Figure6. Gate Charge

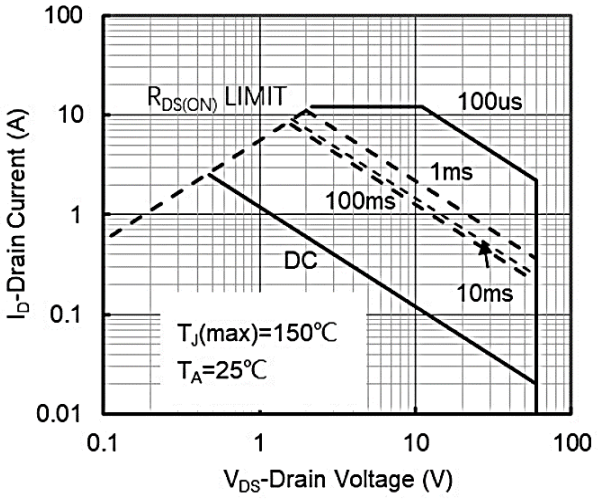


Figure7. Safe Operation Area

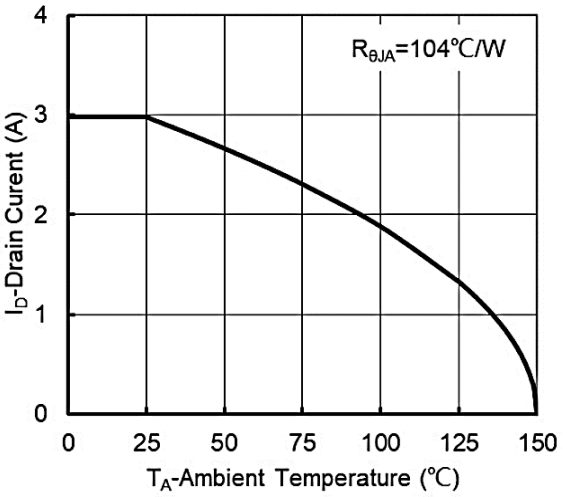


Figure8. Maximum Continuous Drain Current vs Ambient Temperature

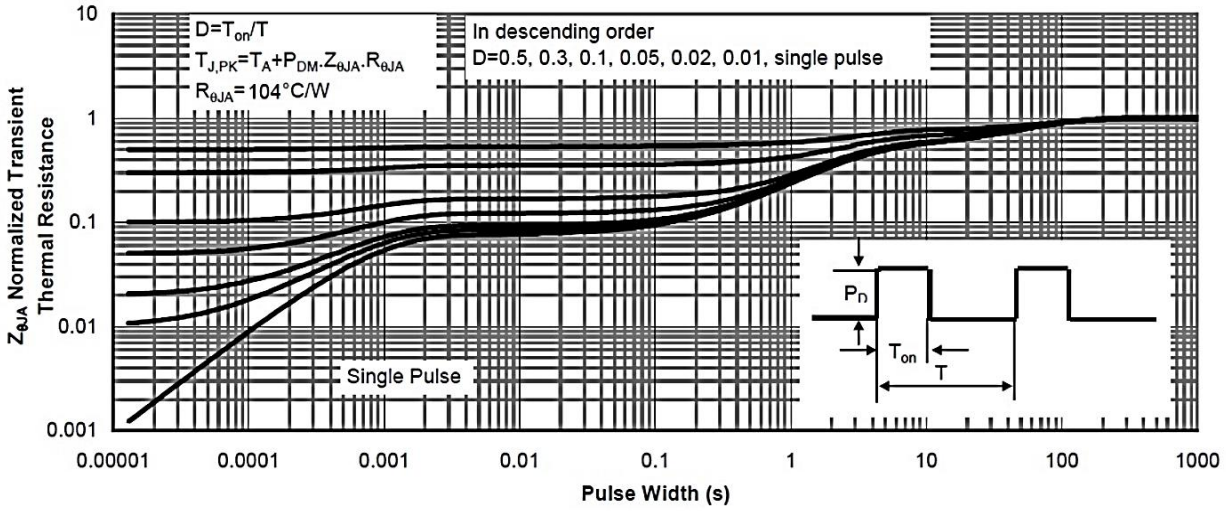


Figure9. Normalized Maximum Transient Thermal Impedance

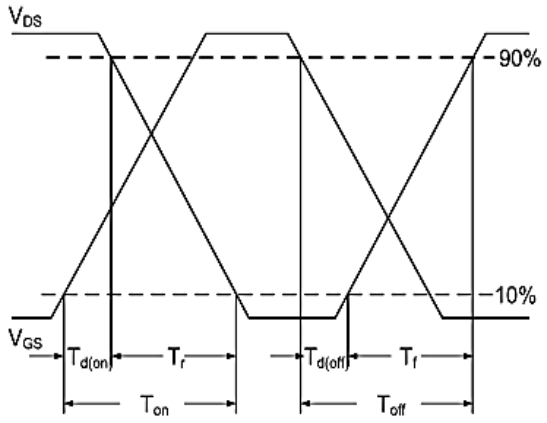


Fig.10 Switching Time Waveform

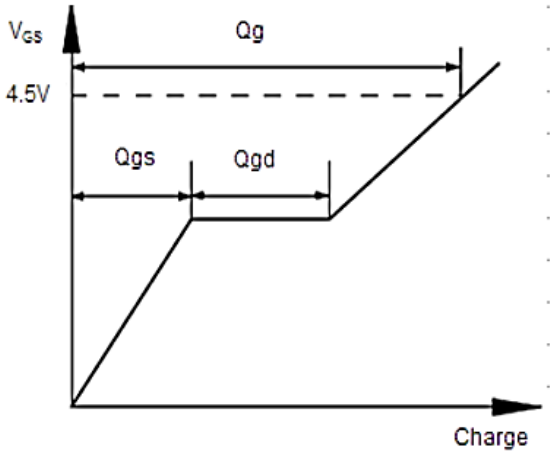
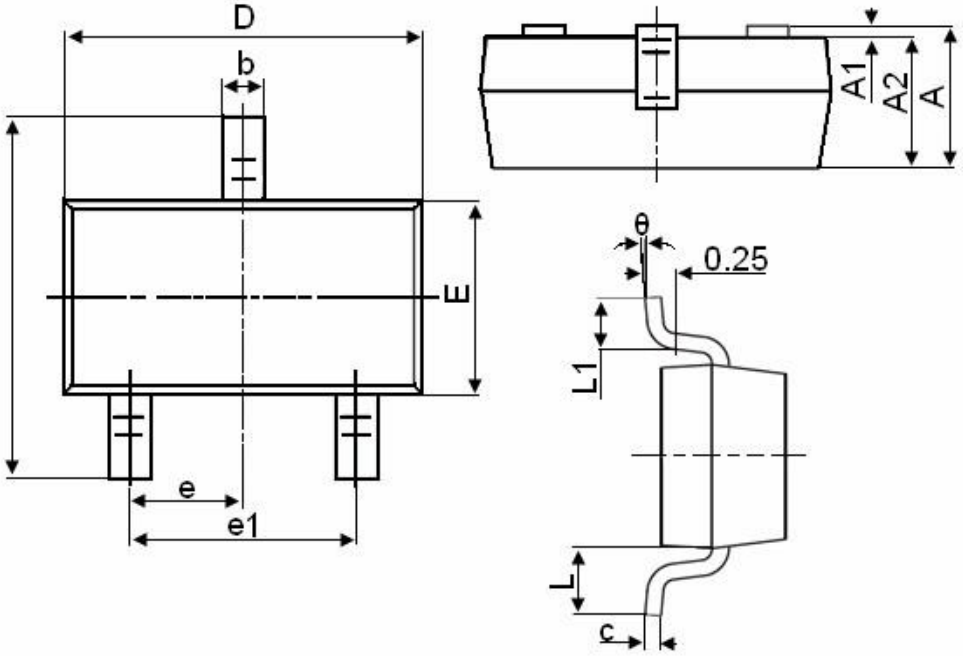


Fig.11 Gate Charge Waveform

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°

Attention

1,Any and all APM Microelectronics products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your APM Microelectronics representative nearest you before using any APM Microelectronics products described or contained herein in such applications.

2,APM Microelectronics assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all APM Microelectronics products described or contained herein.

3, Specifications of any and all APM Microelectronics products described or contained here instipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

4, APM Microelectronics Semiconductor CO., LTD. strives to supply high quality high reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives that could give rise to smoke or fire, or that could cause damage to other property. Whendesigning equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design,and structural design.

5,In the event that any or all APM Microelectronics products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.

6, No part of this publication may be reproduced or transmitted in any form or by any means,electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of APM Microelectronics Semiconductor CO., LTD.

7, Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. APM Microelectronics believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

8, Any and all information described or contained herein are subject to change without notice due to product/technology improvement,etc. When designing equipment, refer to the "Delivery Specification" for the APM Microelectronics product that you Intend to use.

60V N-Channel Enhancement Mode MOSFET

Edition	Date	Change
Rve1.0	2021/10/8	Initial release